Cub Cadet®

Power Equipment

Service Manual

SERIES 2000 TRACTORS, MOWER DECKS AND ATTACHMENTS

Model Numbers
2130, 2135, 2140, 2145, 2160, 2165, 2185,
38" Mower Deck, 42" Mower Deck, 190-300,
190-301, 190-314, 190-315, 190-302, 190-303 and 190-304

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RECORD OF REVISIONS

Change No.	Date	Description Of Revision

WORK SAFELY — FOLLOW THESE RULES



This symbol is used to call your attention to instructions concerning your personal safety. Be sure to observe and follow these instructions.

1. To prevent accidental starting, always pull the high tension wire(s) off the spark plug(s) before servicing and/or adjusting the machine.
2. To prevent injury, do not allow children or bystanders in the vicinity of the machine while it is being adjusted and/or serviced.
3. Do not wear jewelry (rings, wrist watches, necklaces, etc.) or loose fitting clothing when working on machinery; they could catch on moving parts, causing serious injury. Wear sturdy, rough-soled work shoes. Never adjust and/or service a machine in bare feet, sandals or sneakers.
4. Always wear safety glasses when using a hammer, chisel or other tools that may cause chips to fly.
5. Be sure to reinstall all safety devices, guards or shields after adjusting and/or servicing the machine.
6. When operating a power washer to clean a machine before servicing, be careful at all times to avoid injury. Maintain proper footing and balance at all times. Never direct the spray at people or animals, as high pressure spray can cause serious injury.
7. If a portable heater is used to heat the service area, the following precautions must be observed:
   a. Do not use portable heaters in the presence of volatile materials such as gasoline, paint or paint thinner. A fire or explosion may result.
   b. When in operation, locate the heater away from the immediate work area to avoid accidental contact, which could result in severe burns or ignite your clothing.
   c. Portable heaters consume oxygen and emit hazardous combustion fumes. A heater should be used only in a well ventilated area. Keep a window or door partially open to provide ventilation.
   d. Keep the heater at least four feet from all combustible materials.
   e. Never use gasoline as fuel.
8. Gasoline is highly flammable — observe the following precautions when handling gasoline:
   a. Use an approved gasoline container.
   b. Never remove the fuel tank cap or fill the fuel tank when the engine is running, is hot, or is indoors. DO NOT SMOKE when working around flammable fuel.
   c. Avoid fires — be sure container or funnel does not touch the battery. Do not overfill the fuel tank. Wipe up all spilled gasoline.
   d. Replace fuel tank cap securely.
9. Never use trouble lights or electric powered tools that have cut or damaged cords or plugs. Be sure all electric tools are properly grounded.
10. Never run an engine in a confined area, such as a garage or storage building, any longer than is necessary for immediate moving of the machine out of or into the area. EXHAUST GASES ARE TOXIC. OPENING DOORS AND WINDOWS MAY NOT PROVIDE ADEQUATE VENTILATION.
11. After servicing, be sure all tools, spare parts, and/or servicing equipment are removed from the machine.
12. Electrical storage batteries give off highly flammable hydrogen gas when charging, and continue to do so for some time after receiving a steady charge. Do not, under any circumstances, allow an electrical spark or an open flame near the battery. Always disconnect the battery cables (negative cable first) before working on the electrical system.
13. Hydraulic fluid escaping under pressure can have enough force to penetrate the skin. Hydraulic fluid may also infect a minor cut or opening in the skin. If injured by escaping fluid, see a doctor at once. Serious infection or reaction can result if medical treatment is not given immediately.

    Do not attempt to repair or tighten hoses that are under pressure or with the tractor engine running. Cycle all hydraulic control valves to relieve all pressure before disconnecting lines or performing other work on the hydraulic system. Make

sure all connections are tight and hoses and lines are in good condition before applying pressure to the system. To locate a leak under pressure, use a small piece of cardboard or wood. Never use your hands.

14. When using a welder or acetylene torch, always wear welding goggles and gloves. Keep a charged fire extinguisher within reach. Do not weld or heat areas near the fuel tank, fuel lines, hydraulilc lines, or battery.

15. Always use safety stands in conjunction with hydraulic jacks or hoists. Do not rely on the jack or hoist to carry the load; it could fail, causing serious injury and/or damage. Be sure jack stands are properly positioned to prevent tipping or rollover.

16. When removing supporting components or disassembling machines, be sure to use safety stands and adequate supports to prevent tipping or rollover and to prevent components from falling.

17. Use a safety catch on all hoist hooks. Do not take a chance, the load could slip off the hook.

18. Use pullers to remove bearings, bushings, gears, sleeves, etc. when applicable. Use hammers, punches and chisels only when absolutely necessary. Then, be sure to wear safety glasses.

19. Petroleum based solvents used for cleaning parts are flammable. Use care to avoid fire or explosion when using these solvents.

20. Be careful when using compressed air to dry parts. Use approved air fixtures, do not exdeed 30 psi, wear safety glasses or goggles, and use proper shielding to protect everyone in the work area.

IMPORTANT: The above is only a partial list of safe work rules. In addition, always refer to the Operator's Manual for the specific machine for additional safe work rules regarding the machine operation.

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SECTION 1
GENERAL INFORMATION AND MANUAL USAGE

1-1. SAFETY PRECAUTIONS.

1-1.1 Refer to the Safety Summary on page i, and observe all WARNINGS and CAUTIONS when servicing the tractors covered in this manual.

WARNING This symbol indicates safety instructions which, if not followed, could cause personal injury and/or damage to the tractor component being serviced.

CAUTION This symbol indicates instructions which, if not followed, could cause failure of the tractor component or could result in an environmental hazzard.

NOTE This symbol indicates general information which should be given special attention.

1-2 GENERAL.

1-2.1 This service manual cover Series 2000 tractors, mower decks and selected attachments. See Table 1-1. Service instructions for engines are detailed in separate service manuals. Refer to Appendix A, Related Service Manuals.

Table 1-1. Equipment in this Manual.

DESCRIPTION	MODEL NUMBER
Series 2000 Tractor	2130
Series 2000 Tractor	2135
Series 2000 Tractor	2140
Series 2000 Tractor	2145
Series 2000 Tractor	2160
Series 2000 Tractor	2165
Series 2000 Tractor	2185
38" Mower Deck	Standard on models 2130 and 2135
42" Mower Deck	Standard on models 2140 and 2145
46" Mower Deck	190-300
48" Mower Deck	190-301
38" Mulching Attachment	190-314
42" Mulching Attachment	190-315
42" Spring Trip Blade	190-302
40" Snowthrower	190-303
28" Tiller	190-304

1-3 REFERENCE DATA.

1-3.1 **Specifications.** Specifications for each tractor model are contained in Tables 1-2 through 1-8.

1-3.2 **Serial Number Location.** The chassis serial number plate is located on the left hand side of the frame under the running board. Refer to Figure 1-1.

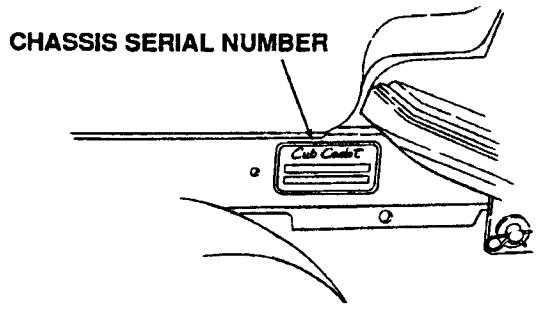


Figure 1-1. Chassis Serial Number Plate.

1-3.3 **Position Reference.** All references to LEFT, RIGHT, FRONT and REAR indicate that position on the tractor when seated in the operators position, unless specifically instructed to reference from a different position on the tractor.

1-4 FACILITIES.

1-4.1 The minimum requirement for facilities sufficient to service the tractors, decks and accessories covered in this manual is a normally equipped shop for the service of commercial power equipment.

1-5 SPECIAL SERVICE INFORMATION.

1-5.1 **Dealer Preparation.** Section 2 contains a check list of recommended procedures to be performed during pre-delivery set up of the tractors covered in this manual.

1-5.2 **Preventive Maintenance**. Maintenance schedules and lubrication guides for each Model are contained in Section 3.

1-5.3 **Troubleshooting**. Section 4 contains troubleshooting and testing information for the various systems and components of the tractors covered in this manual.

1-5.4 **Corrective Maintenance.** Instructions necessary to identify and correct problems are contained in Section 5.

1-5.6 **Adjustments.** Information on adjusting various system components is contained in Section 6.

1-5.7 **Attachments.** Information on selected attachments is contained in Section 7.

1-5.8 **Appendices.** The appendices contain the following support information:

a. Appendix A — List of related Engine Service Manuals.

b. Appendix B — List of bulk service items needed to maintain and service the equipment covered in this manual.

c. Appendix C — Testing procedures for selected electrical components.

d. Appendix D — Complete electrical schematics for each tractor.

e. Appendix E — A graphic listing of electrical connectors/insulators available from Cub Cadet.

f. Appendix F — Information concerning mower deck belt problems and possible causes.

g. Appendix G — Information regarding the operation of the mower deck.

h. Appendix H — General torque data charts and conversion tables.

Table 1-2. Model 2130 Specifications

	2130
CAPACITIES	
Fuel Tank	3 gallons
Crankcase (approximately)	4 pints
Transmission Case (approximately)	6 qts.
SIX SPEED DRIVE	
Speed: Forward	0 to 5 mph
Reverse	0 to 3 mph
ENGINE	
Make and Model	Kohler Command
Horsepower	12.5 HP
Cylinders	1
Bore	3.43 in.
Stroke	2.64 in.
Displacement (cubic inches)	24.29
Engine Speed (governed)	
Low Speed	1400 RPM
High Speed (no load)	3600 RPM ± 75
Ignition	Battery
Spark Plug Gap (Cub Cadet No. 759-3336)	.040 in.
ELECTRICAL SYSTEM	
System Voltage	12 volt neg. ground
Battery	725-1635
Alternator	15 amp regulated
Fuse (auto type)	20 amp
Head Lamp Bulb	759-3693
BRAKES	Internal expanding
TIRE SIZES	
Front	15 x 6-6
Rear	20 x 9-8
DIMENSIONS	
Tread:	
Front with 15 x 6-6 tires	30.00 in.
Rear with 20 x 9-6 tires	27.50 in.
Wheelbase	47.00 in.
Length, over all	72.00 in.
Width, over all (w/ mower deck - chute up)	45.00 in.
Height, over all (to top of steering wheel)	42.00 in.
Ground Clearance	6.00 in.
Turning Radius	26.50 in.

Specifications are subject to change without notice.

Table 1-3. Model 2135 Specifications

	2135
CAPACITIES	
Fuel Tank	3 gallons
Crankcase (approximately)	4 pints
Transmission Case (approximately)	6 qts.
HYDROSTATIC DRIVE	
Speed: Forward	0 to 5.5 mph
Reverse	0 to 3 mph
ENGINE	
Make and Model	Kohler Command
Horsepower	12.5 HP
Cylinders	1
Bore	3.43 in.
Stroke	2.64 in.
Displacement (cubic inches)	24.29
Engine Speed (governed)	
Low Speed	1400 RPM
High Speed (no load)	3600 RPM ± 75
Ignition	Battery
Spark Plug Gap (Cub Cadet No. 759-3336)	.040 in.
ELECTRICAL SYSTEM	
System Voltage	12 volt neg. ground
Battery	725-1635
Alternator	15 amp regulated
Fuse (auto type)	20 amp
Head Lamp Bulb	759-3693
BRAKES	Internal expanding
TIRE SIZES	
Front	15 x 6-6
Rear	20 x 9-8
DIMENSIONS	
Tread:	
Front with 15 x 6-6 tires	30.00 in.
Rear with 20 x 9-6 tires	27.50 in.
Wheelbase	47.00 in.
Length, over all	72.00 in.
Width, over all (w/ mower deck - chute up)	45.00 in.
Height, over all (to top of steering wheel)	42.00 in.
Ground Clearance	6.00 in.
Turning Radius	26.50 in.

Specifications are subject to change without notice.

Table 1-4. Model 2140 Specifications

	2140
CAPACITIES	
Fuel Tank	3 gallons
Crankcase (approximately)	4 pints
Transmission Case (approximately)	6 qts.
SIX SPEED DRIVE	
Speed: Forward	0 to 5 mph
Reverse	0 to 3 mph
ENGINE	
Make and Model	Onan Elite
Horsepower	14 HP
Cylinders	1
Bore	3.31 in.
Stroke	2.76 in.
Displacement (cubic inches)	23.7
Engine Speed (governed)	
Low Speed	1400 RPM
High Speed (no load)	3600 RPM $\pm$ 75
Ignition	Battery
Spark Plug Gap (Cub Cadet No. 759-3340)	.035 in.
ELECTRICAL SYSTEM	
System Voltage	12 volt neg. ground
Battery	725-1635
Alternator	15 amp regulated
Fuse (auto type)	20 amp
Head Lamp Bulb	759-3693
BRAKES	Internal expanding
TIRE SIZES	
Front	15 x 6-6
Rear	20 x 9-8
DIMENSIONS	
Tread:	
Front with 15 x 6-6 tires	30.00 in.
Rear with 20 x 9-6 tires	27.50 in.
Wheelbase	47.00 in.
Length, over all	72.00 in.
Width, over all (w/ mower deck - chute up)	51.00 in.
Height, over all (to top of steering wheel)	42.00 in.
Ground Clearance	6.00 in.
Turning Radius	26.50 in.

Specifications are subject to change without notice.

Table 1-5. Model 2145 Specifications

	2145
CAPACITIES	
Fuel Tank	3 gallons
Crankcase (approximately)	4 pints
Transmission Case (approximately)	6 qts.
HYDROSTATIC DRIVE	
Speed: Forward	0 to 5.5 mph
Reverse	0 to 3 mph
ENGINE	
Make and Model	Onan Elite
Horsepower	14 HP
Cylinders	1
Bore	3.31 in.
Stroke	2.76 in.
Displacement (cubic inches)	23.7
Engine Speed (governed)	
Low Speed	1400 RPM
High Speed (no load)	3600 RPM $\pm$ 75
Ignition	Battery
Spark Plug Gap (Cub Cadet No. 759-3340)	.035 in.
ELECTRICAL SYSTEM	
System Voltage	12 volt neg. ground
Battery	725-1635
Alternator	15 amp regulated
Fuse (auto type)	20 amp
Head Lamp Bulb	759-3693
BRAKES	Internal expanding
TIRE SIZES	
Front	15 x 6-6
Rear	20 x 9-8
DIMENSIONS	
Tread:	
Front with 15 x 6-6 tires	30.00 in.
Rear with 20 x 9-6 tires	27.50 in.
Wheelbase	47.00 in.
Length, over all	72.00 in.
Width, over all (w/ mower deck - chute up)	51.00 in.
Height, over all (to top of steering wheel)	42.00 in.
Ground Clearance	6.00 in.
Turning Radius	26.50 in.

Specifications are subject to change without notice.

Table 1-6. Model 2160 Specifications

	2160
CAPACITIES	
Fuel Tank	3 gallons
Crankcase (approximately)	3 pints 8 oz.
Transmission Case (approximately)	6 qts.
SIX SPEED DRIVE	
Speed: Forward	0 to 5.5 mph
Reverse	0 to 3 mph
ENGINE	
Make and Model	B & S Vanguard
Horsepower	16 HP
Cylinders	2
Bore	2.68 in.
Stroke	2.60 in.
Displacement (cubic inches)	29.3
Engine Speed (governed)	
Low Speed	1200 RPM
High Speed	
(no load)	3600 RPM
(full load)	3350 RPM
Valve Clearance (engine cold)	
Intake	.004-.006 in.
Exhaust	.004-.006 in.
Ignition	Battery
Spark Plug Gap (Cub Cadet No. 759-3336)	.030 in.
ELECTRICAL SYSTEM	
System Voltage	12 volt neg. ground
Battery	725-1635
Alternator	15 amp regulated
Fuse (auto type)	20 amp
Head Lamp Bulb	759-3693
BRAKES	Internal expanding
TIRE SIZES	
Front	16 x 6.5-8
Rear	23 x 9.5-12
DIMENSIONS	
Tread:	
Front with 16 x 6.5-8 tires	31.5 in.
Rear with 23 x 9.5-12 tires	30.25 in.
Wheelbase	47.00 in.
Length, over all	72.00 in.
Width, over all	39.00 in.
Height, over all (to top of steering wheel)	43.00 in.
Ground Clearance	6.00 in.
Turning Radius	28.00 in.

Specifications are subject to change without notice.

Table 1-7. Model 2165 Specifications

	2165
CAPACITIES	
Fuel Tank	3 gallons
Crankcase (approximately)	3 pints 8 oz.
Transmission Case (approximately)	6 qts.
HYDROSTATIC DRIVE	
Speed: Forward	0 to 6 mph
Reverse	0 to 3 mph
ENGINE	
Make and Model	B & S Vanguard
Horsepower	16 HP
Cylinders	2
Bore	2.68 in.
Stroke	2.60 in.
Displacement (cubic inches)	29.3
Engine Speed (governed)	
Low Speed	1200 RPM
High Speed	
(no load)	3600 RPM
(full load)	3350 RPM
Valve Clearance (engine cold)	
Intake	.004-.006 in.
Exhaust	.004-.006 in.
Ignition	Battery
Spark Plug Gap (Cub Cadet No. 759-3336)	.030 in.
ELECTRICAL SYSTEM	
System Voltage	12 volt neg. ground
Battery	725-1635
Alternator	15 amp regulated
Fuse (auto type)	20 amp
Head Lamp Bulb	759-3693
BRAKES	Internal expanding
TIRE SIZES	
Front	16 x 6.5-8
Rear	23 x 9.5-12
DIMENSIONS	
Tread:	
Front with 16 x 6.5-8 tires	31.5 in.
Rear with 23 x 9.5-12 tires	30.25 in.
Wheelbase	47.00 in.
Length, over all	72.00 in.
Width, over all	39.00 in.
Height, over all (to top of steering wheel)	43.00 in.
Ground Clearance	6.00 in.
Turning Radius	28.00 in.

Specifications are subject to change without notice.

Table 1-8. Model 2185 Specifications

	2185
CAPACITIES	
Fuel Tank	3 gallons
Crankcase (approximately)	4 pints
Transmission Case (approximately)	6 qts.
HYDROSTATIC DRIVE	
Speed: Forward	0 to 6 mph
Reverse	0 to 3 mph
ENGINE	
Make and Model	Kohler Command
Horsepower	18 HP
Cylinders	2
Bore	3.03 in.
Stroke	2.64 in.
Displacement (cubic inches)	38.1
Engine Speed (governed)	
Low Speed	1200 RPM
High Speed	
(no load)	3600 RPM
(full load)	3350 RPM
Ignition	Battery
Spark Plug Gap (Cub Cadet No. 759-3336)	.040 in.
ELECTRICAL SYSTEM	
System Voltage	12 volt neg. ground
Battery	725-1635
Alternator	15 amp regulated
Fuse (auto type)	20 amp
Head Lamp Bulb	759-3693
BRAKES	Internal expanding
TIRE SIZES	
Front	16 x 6.5-8
Rear	23 x 9.5-12
DIMENSIONS	
Tread:	
Front with 16 x 6.5-8 tires	31.5 in.
Rear with 23 x 9.5-12 tires	30.25 in.
Wheelbase	47.00 in.
Length, over all	72.00 in.
Width, over all	39.00 in.
Height, over all (to top of steering wheel)	43.00 in.
Ground Clearance	6.00 in.
Turning Radius	28.00 in.

Specifications are subject to change without notice.

SECTION 2
DEALER PREPARATION

2-1 GENERAL.

2-1.1 The Series 2000 tractors covered in this manual are shipped from the factory fully assembled. Engine oil has been added and the unit has been lubricated at the factory. However, it is a good practice to check the entire unit during the preparation process. Refer to Table 2-1 for a PRE-DELIVERY CHECK LIST which can be used as a guide to ensure a comprehensive inspection is performed when each unit is prepared for delivery. Lubrications guides can be found in Section 3 of this manual.

2-1.2 Tractors are shipped with a dry battery. Electrolyte must be added and the battery activated. Refer to paragraph 2-2 for proper battery activation procedures.

2-2 BATTERY ACTIVATION.

CAUTION

Proper activation of the battery will affect its life and performance. Failure to follow these steps can cause premature failure of the battery.

2-2.1 Activate battery with electrolyte as follows:

WARNING

Battery cables must be disconnected in the proper order to avoid arcing. When disconnecting cables from the battery, ALWAYS remove the negative cable first, and then remove the positive cable.

WARNING

Electrolyte is diluted sulfuric acid. Use extreme care to avoid spilling and to avoid contact with skin and eyes. Acid can destroy clothing and burn your skin. Should acid come in contact with your skin, flush the area immediately with clean cold water. If acid spills on clothing, first dilute with clean water, then neutralize with a solution of baking soda and water.

1. Remove the battery from the tractor and place on a work bench or table.
2. Fill each cell to the top of the plates with electrolyte.
3. Allow the battery to sit 30 minutes. This will allow the chemical action to take place between the electrolyte and battery plates.

NOTE

When the battery is charged, the heat will cause expansion of the electrolyte.

4. Re-check the electrolyte level and, if necessary, add electrolyte to completely cover the plates.
5. Connect the charger to the battery per instructions with the charger.

CAUTION

Charging the battery at more than the recommended 4 AMPS will shorten the service life of the battery, and may cause the plates to warp and short out the battery.

6. Charge the battery at 4 AMPS maximum until the specific gravity of each cell is 1.250 or higher.
7. Check the level of electrolyte in all cells and add, if necessary, to bring level up to split ring.
8. Wash off any spilled electrolyte.

WARNING

Battery cables must be installed in the proper order to avoid arcing. When connecting cables to the battery, ALWAYS connect the positive cable first, then connect the negative cable.

9. Install the battery in the tractor and connect the POSITIVE battery cable to the positive terminal of the battery.
10. Connect the NEGATIVE battery cable to the negative terminal of the battery.

Table 2-1. Pre-Delivery Check List

CUSTOMER NAME _____ MODEL NUMBER _____

CUSTOMER ADDRESS _____ SERIAL NUMBER _____

CITY _____ STATE _____ ZIP _____ TECHNICIAN _____

ENGNE INFORMATION
Engine Make _____
Model No. _____
Serial No. _____
Spec No. _____

TRANSMISSION INFORMATION
Transmission make _____
Model No. _____
Serial No. _____

CUSTOMER SIGNATURE _____ **DATE** _____

Operator's manual complete?
- ❑ Owners manual
- ❑ Attachment guide
- ❑ Merchandising Catalog

Battery and connections
- ❑ Remove battery and fill to proper level
- ❑ Allow battery to stand for 30 minutes
- ❑ Charge at 4 AMPS max. to 1.265 specific gravity

Tire pressure
- ❑ Front
- ❑ Rear

* Refer to owners manual for proper PSI

Check all lights and indicators
- ❑ Headlights
- ❑ Low oil light
- ❑ Hour meter

Lubrication
- ❑ Transmission oil level
- ❑ Engine oil level

* Check tractor owners manual for type and grade

Air cleaner and connections
- ❑ Remove air cleaner cover to verify air cleaner is installed
- ❑ Insure retaining bolt seal is installed
- ❑ Insure proper installation of breather hose
- ❑ Proper operation of throttle and choke cables

Steering
- ❑ Check for 1/8 to 1/4 inch toe in.
- ❑ Insure equal travel right and left

Hydrostatic / Gear drive and brakes
- ❑ Check brakes
- ❑ Check for neutral when brake pedal is depressed
- ❑ Check for neutral when forward and reverse pedals are released
- ❑ Neutral interlock adjustment (6 Speed only)

Grease pivot points
- ❑ Front axle pivot bar
- ❑ Each steering knuckle
- ❑ Each front wheel
- ❑ Steering housing
- ❑ All grease points on mower deck

* Refer to specific mower owners manual

Install attachments mower / snow blower etc.
- ❑ Check PTO air gap if applicable
- ❑ Follow burnishing procedures outlined in owners manual
- ❑ Adjust lift assist spring and inspect linkage
- ❑ Deck level adjustment

Safety operations
- ❑ Check no cut in reverse
- ❑ Check engine shutdown with PTO engaged and seat empty
- ❑ Check engine shutdown with empty seat and parking brake not engaged

Check engine speeds / Controls
- ❑ Low idle - 1200 RPM
- ❑ High idle - 3600 RPM

Final inspection
- ❑ Overall appearance
- ❑ Clean and polish

SECTION 3
PREVENTIVE MAINTENANCE

3-1. GENERAL

3-1.1 This section provides basic preventive maintenance and specific lubrication information for the Series 2000 tractors and decks covered in this manual. Refer to the appropriate Tables 3-1 through 3-14 and Figures 3-1 through 3-9.

LUBRICATION GUIDE

WARNING

The service life and reliability of any machine depends upon the care it is given. Proper lubrication is a very important part of that care. The lubrication schedules provided in this section reflect the minimal requirements to maintain the equipment. More frequent inspections and maintenance is preferable.

Using the lubrication illustrations (Figures 3-1 through 3-9) as a guide, make certain that all lubrication fittings are installed and functioning.

Be sure all fittings are free from dirt and paint so the lubricant is certain to enter the bearing.

Using a pressure lubricating gun, always force the lubricant through the full length of each bearing until it emerges at the end, carrying with it the worn lubricant and any dirt that may have entered the bearing.

Miscellaneous working parts not provided with lubrication fittings should be oiled regularly with a good grade of lubricating oil.

Always lubricate the tractor thoroughly before taking it to a remote location for a prolonged period of time.

Lubricant is cheap. Use plenty of it. Worn parts can be expensive to replace.

Keep your supply of lubricating oil and grease stored in clean containers, and covered to protect from dust and dirt.

Keep the lubricating gun nozzle clean and wipe dirt from the grease fittings before lubricating.

The symbols in the illlustrations indicate the method of application and the hourly intervals to apply the lubricant.



Use a pressure lubricating gun and apply 251H EP grease (or equivalent No. 2 multi-purpose lithium grease) sufficient to flush out the old grease and dirt. Lubricate at the hourly intervals indicated on the symbols.



Dipstick, use to check engine and transmission oil before each use.

Table 3-1. Model 2130 Maintenance

Operation to be performed	Before each use	10 hours or once a month	30 hours or three times a season	50 hours or twice a season	100 hours or yearly	Before storage
Clean grille, engine air inlet screen, dash intake screen and side panel screens		More often under dirty conditions X				
Check engine oil level	X					
Fill fuel tank	X					
Change engine oil & oil filter	After first 5 hours				More often under dirty conditions X	
Check transmisson oil level	X					
Clean & re-oil foam air precleaner		X				
Check battery electrolyte level		X				
Grease front axle pivot bolt		X				
Grease steering knuckles		X				
Retorque rear wheel lug nuts		After first 10 hours X				
Clean cooling fins & external surfaces			X			
Service air cleaner paper cartridge					More often under dirty conditions	
Check spark plug					X	X
Grease steering gear housing			X			
Grease front wheel bearings			X			X
Drain fuel						X
Pivot bar adjustment bolts				X		
Deck spindles				X		
Spindle belt idler arm				X		
Lubricate all foot and lift control pivot points		X				

NOTE

Maintenance information for optional equipment may be found in the manual which is included with that specific piece of equipment.

Table 3-2. Model 2130 Lubrication

Point of Lubrication	Check at Hours	Change at Hours	Capacity	Anticipated Air Temperature	
				Above + 32°F	Below + 32°F
Engine crankcase	Check before each use	100	Approx. 4 pints	*Cub Cadet* Engine Oil SAE 10W30 or 10W40	*Cub Cadet* Engine Oil SAE 5W20 or 5W30
Six speed transaxle and clutch assembly	Check before each use	Add as needed	Approx. 6 qts.	*Cub Cadet* Drive System Oil **NOTE:** *Cub Cadet* Drive System Oil is specially formulated for this application. If any other oil is used *Cub Cadet* will not be responsible for substandard performance. Failures due to use of improper fluid are not covered by warranty. For maximum protection, use *Cub Cadet* Drive System Oil.	
Steering knuckles and front axle pivot bolt	10			Use 251H EP grease or equivalent No. 2 multe-purpose lithium grease and apply two strokes (minimum) or sufficient grease to flush out old grease and dirt.	
Front wheel bearings	30			Two strokes (minimum) of the lubricator using 251H EP grease or equivalent No. 2 multi-purpose lithium grease.	
Steering gear housing	30			Two strokes (minimum) of the lubricator using 251H EP grease or equivalent No. 2 multi-purpose lithium grease.	
Deck spindles	50			Two strokes (minimum) of the lubricator using 251H EP grease or equivalent No. 2 multi-purpose lithium grease.	
Spindle belt idler arm	50			Two strokes (minimum) of the lubricator using 251H EP grease or equivalent No. 2 multi-purpose lithium grease.	
Foot and lift control pivot points	10			Use a liberal amount of high grade lubricating oil.	

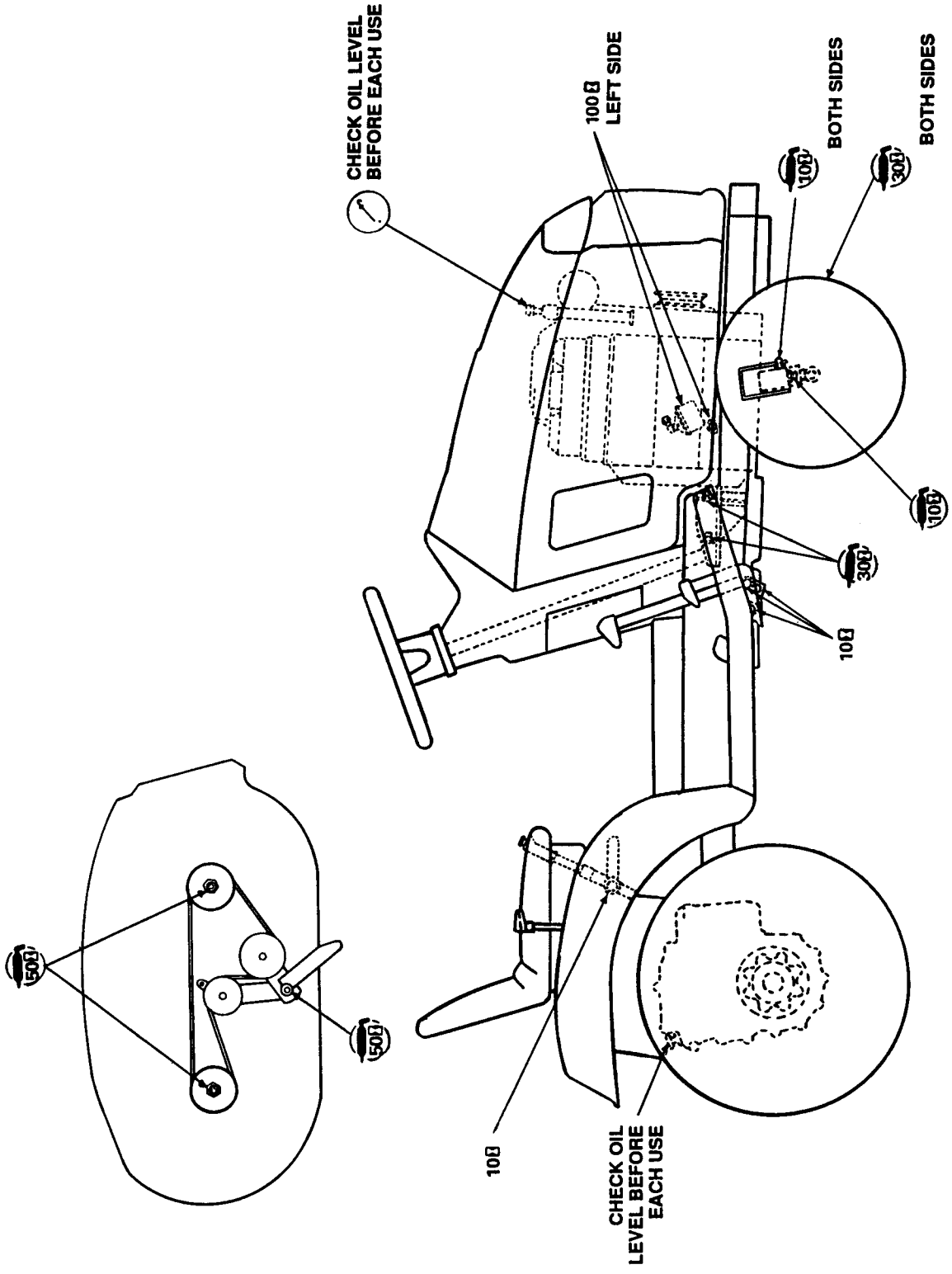


Figure 3-1. Model 2130 Lubrication Points.

Table 3-3. Model 2135 Maintenance

Operation to be performed	Before each use	10 hours or once a month	30 hours or three times a season	50 hours or twice a season	100 hours or yearly	Before storage
Clean grille, engine air inlet screen, dash intake screen and side panel screens		More often under dirty conditions X				
Check engine oil level	X					
Fill fuel tank	X					
Change engine oil & oil filter	After first 5 hours				More often under dirty conditions X	
Check transmisson oil level	X					
Replace transmisson oil filter		After first 10 hours X		After first 50 hours X	Every 100 hours thereafter X	
Clean & re-oil foam air precleaner		X				
Check battery electrolyte level		X				
Grease front axle pivot bolt		X				
Grease steering knuckles		X				
Retorque rear wheel lug nuts		After first 10 hours X				
Clean cooling fins & external surfaces			X			
Service air cleaner paper cartridge					More often under dirty conditions	
Check spark plug					X	X
Grease steering gear housing			X			
Grease front wheel bearings			X			X
Drain fuel						X
Pivot bar adjustment bolts				X		
Deck spindles				X		
Spindle belt idler arm				X		
Lubricate all foot and lift control pivot points		X				

NOTE

Maintenance information for optional equipment may be found in the manual which is included with that specific piece of equipment.

Table 3-4. Model 2135 Lubrication

Point of Lubrication	Check at Hours	Change at Hours	Capacity	Anticipated Air Temperature	
				Above + 32°F	Below + 32°F
Engine crankcase	Check before each use	100	Approx. 4 pints	*Cub Cadet* Engine Oil SAE 10W30 or 10W40	*Cub Cadet* Engine Oil SAE 5W20 or 5W30
Hydro transmission and transaxle with filter	Check before each use	Add as needed	Approx. 6 qts.	*Cub Cadet* Drive System Oil **NOTE:** *Cub Cadet* Drive System Oil is specially formulated for this application. If any other oil is used *Cub Cadet* will not be responsible for substandard performance. Failures due to use of improper fluid are not covered by warranty. For maximum protection, use *Cub Cadet* Drive System Oil.	
Steering knuckles and front axle pivot bolt	10			Use 251H EP grease or equivalent No. 2 multe-purpose lithium grease and apply two strokes (minimum) or sufficient grease to flush out old grease and dirt.	
Front wheel bearings	30			Two strokes (minimum) of the lubricator using 251H EP grease or equivalent No. 2 multi-purpose lithium grease.	
Steering gear housing	30			Two strokes (minimum) of the lubricator using 251H EP grease or equivalent No. 2 multi-purpose lithium grease.	
Deck spindles	50			Two strokes (minimum) of the lubricator using 251H EP grease or equivalent No. 2 multi-purpose lithium grease.	
Spindle belt idler arm	50			Two strokes (minimum) of the lubricator using 251H EP grease or equivalent No. 2 multi-purpose lithium grease.	
Foot and lift control pivot points	10			Use a liberal amount of high grade lubricating oil.	

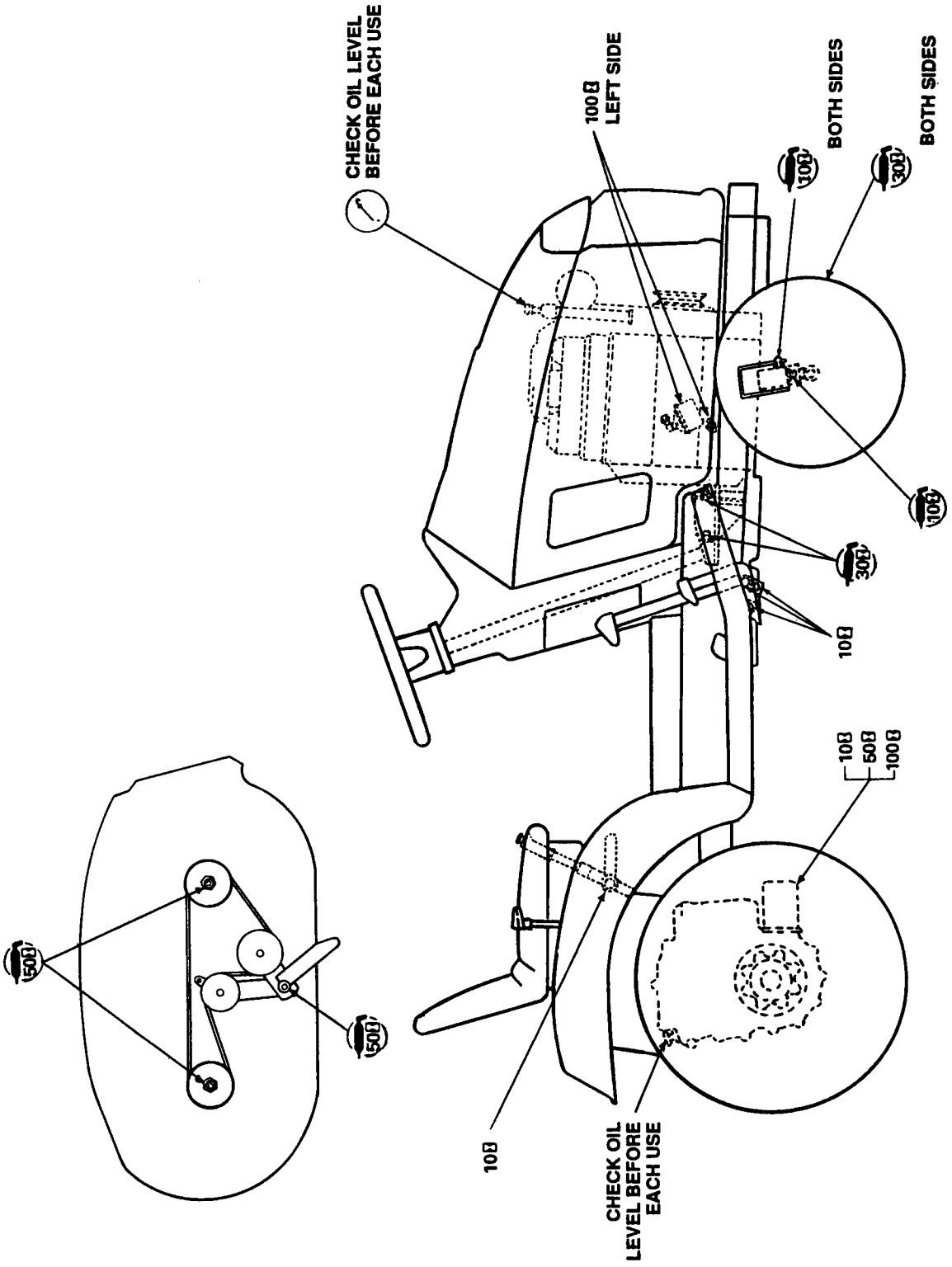


Figure 3-2. Model 2135 Lubrication Points.

Table 3-5. Model 2140 Maintenance

Operation to be performed	Before each use	10 hours or once a month	30 hours or three times a season	50 hours or twice a season	100 hours or yearly	Before storage
Clean grille, engine air inlet screen, dash intake screen and side panel screens		More often under dirty conditions X				
Check engine oil level	X					
Fill fuel tank	X					
Change engine oil & oil filter	After first 25 hours				More often under dirty conditions X	
Check valve clearance	After first 25 hours					
Check transmisson oil level	X					
Clean & re-oil foam (air filter) wrapper		X				
Check battery electrolyte level		X				
Grease front axle pivot bolt		X				
Grease steering knuckles		X				
Retorque rear wheel lug nuts		After first 10 hours X				
Clean cooling fins & external surfaces			X			
Service air cleaner paper cartridge					More often under dirty conditions	
Check spark plug					X	X
Grease steering gear housing			X			
Grease front wheel bearings			X			X
Drain fuel						X
Pivot bar adjustment bolts				X		
Deck spindles				X		
Spindle belt idler arm				X		
Lubricate all foot and lift control pivot points		X				

NOTE

Maintenance information for optional equipment may be found in the manual which is included with that specific piece of equipment.

Table 3-6. Model 2140 Lubrication

Point of Lubrication	Check at Hours	Change at Hours	Capacity	Anticipated Air Temperature		
				Above +30°F	0° to +30°F	Below 0°F
Engine crankcase	Check before each use	100	Approx. 2 pints	*Cub Cadet* Engine Oil SAE 30	*Cub Cadet* Engine Oil SAE 5W30 or 10W30	*Cub Cadet* Engine Oil SAE 5W20 or 5W30
Six speed transaxle and clutch assembly	Check before each use	Add as needed	Approx. 6 qts.	*Cub Cadet* Drive System Oil **NOTE:** *Cub Cadet* Drive System Oil is specially formulated for this application. If any other oil is used *Cub Cadet* will not be responsible for substandard performance. Failures due to use of improper fluid are not covered by warranty. For maximum protection, use *Cub Cadet* Drive System Oil.		
Steering knuckles and front axle pivot bolt	10			Use 251H EP grease or equivalent No. 2 multe-purpose lithium grease and apply two strokes (minimum) or sufficient grease to flush out old grease and dirt.		
Front wheel bearings	30			Two strokes (minimum) of the lubricator using 251H EP grease or equivalent No. 2 multi-purpose lithium grease.		
Steering gear housing	30			Two strokes (minimum) of the lubricator using 251H EP grease or equivalent No. 2 multi-purpose lithium grease.		
Deck spindles	50			Two strokes (minimum) of the lubricator using 251H EP grease or equivalent No. 2 multi-purpose lithium grease.		
Spindle belt idler arm	50			Two strokes (minimum) of the lubricator using 251H EP grease or equivalent No. 2 multi-purpose lithium grease.		
Foot and lift control pivot points	10			Use a liberal amount of high grade lubricating oil.		

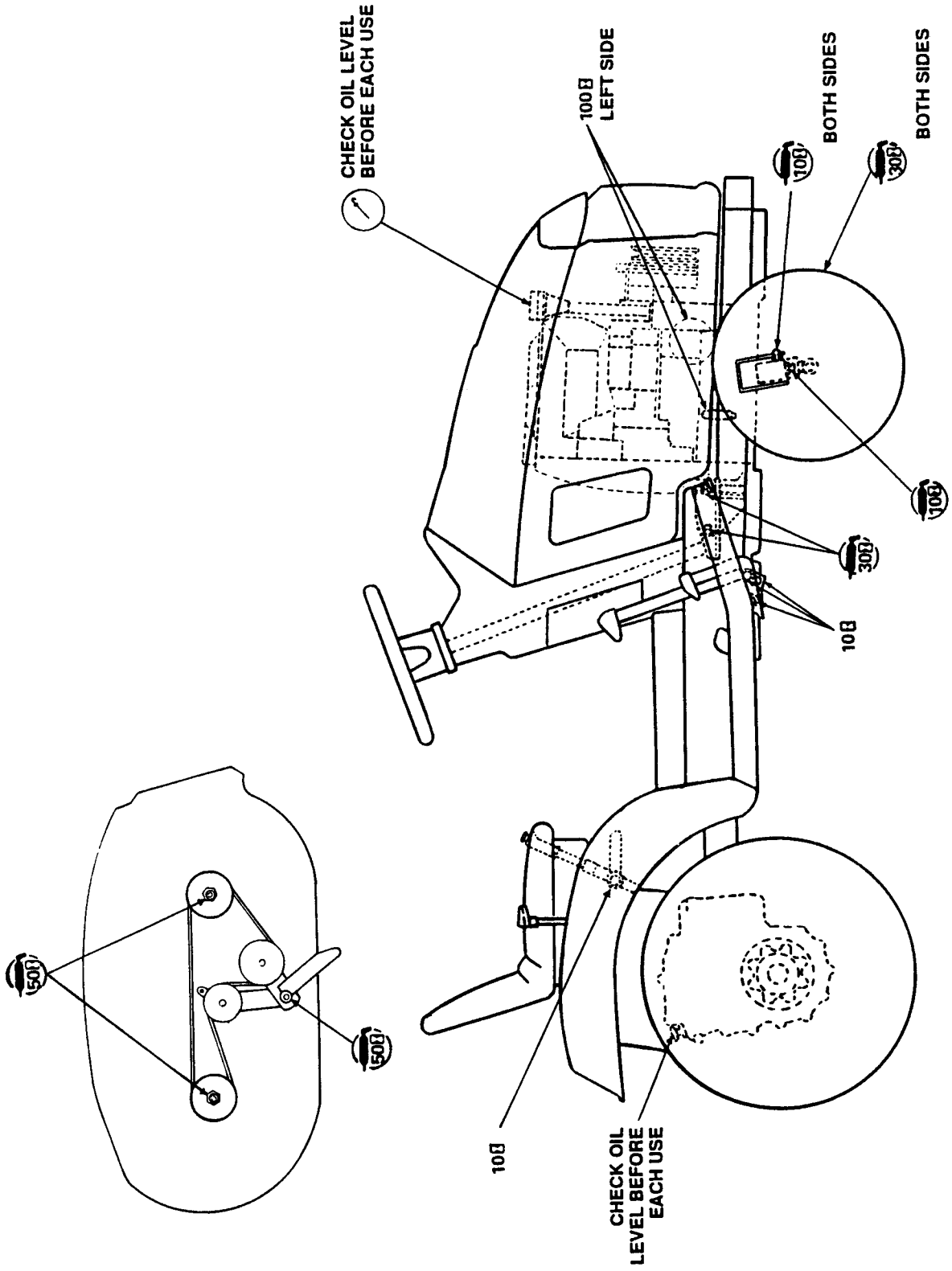


Figure 3-3. Model 2140 Lubrication Points.

Table 3-7. Model 2145 Maintenance

Operation to be performed	Before each use	10 hours or once a month	30 hours or three times a season	50 hours or twice a season	100 hours or yearly	Before storage
Clean grille, engine air inlet screen, dash intake screen and side panel screens		More often under dirty conditions X				
Check engine oil level	X					
Fill fuel tank	X					
Change engine oil & oil filter	After first 25 hours				More often under dirty conditions X	
Check valve clearance	After first 25 hours					
Check transmisson oil level	X					
Replace transmisson oil filter		After first 10 hours X		After first 50 hours X	Every 100 hours thereafter X	
Clean & re-oil foam (air filter) wrapper		X				
Check battery electrolyte level		X				
Grease front axle pivot bolt		X				
Grease steering knuckles		X				
Retorque rear wheel lug nuts		After first 10 hours X				
Clean cooling fins & external surfaces			X			
Service air cleaner paper cartridge					More often under dirty conditions	
Check spark plug					X	X
Grease steering gear housing			X			
Grease front wheel bearings			X			X
Drain fuel						X
Pivot bar adjustment bolts				X		
Deck spindles				X		
Spindle belt idler arm				X		
Lubricate all foot and lift control pivot points		X				

NOTE

Maintenance information for optional equipment may be found in the manual which is included with that specific piece of equipment.

Table 3-8. Model 2145 Lubrication

Point of Lubrication	Check at Hours	Change at Hours	Capacity	Anticipated Air Temperature		
				Above +30°F	0° to +30°F	Below 0°F
Engine crankcase	Check before each use	100	Approx. 2 pints	*Cub Cadet* Engine Oil SAE 30	*Cub Cadet* Engine Oil SAE 5W30 or 10W30	*Cub Cadet* Engine Oil SAE 5W20 or 5W30
Hydro transmission and transaxle with filter	Check before each use	Add as needed	Approx. 6 qts.	*Cub Cadet* Drive System Oil **NOTE:** *Cub Cadet* Drive System Oil is specially formulated for this application. If any other oil is used *Cub Cadet* will not be responsible for substandard performance. Failures due to use of improper fluid are not covered by warranty. For maximum protection, use *Cub Cadet* Drive System Oil.		
Steering knuckles and front axle pivot bolt	10			Use 251H EP grease or equivalent No. 2 multe-purpose lithium grease and apply two strokes (minimum) or sufficient grease to flush out old grease and dirt.		
Front wheel bearings	30			Two strokes (minimum) of the lubricator using 251H EP grease or equivalent No. 2 multi-purpose lithium grease.		
Steering gear housing	30			Two strokes (minimum) of the lubricator using 251H EP grease or equivalent No. 2 multi-purpose lithium grease.		
Deck spindles	50			Two strokes (minimum) of the lubricator using 251H EP grease or equivalent No. 2 multi-purpose lithium grease.		
Spindle belt idler arm	50			Two strokes (minimum) of the lubricator using 251H EP grease or equivalent No. 2 multi-purpose lithium grease.		
Foot and lift control pivot points	10			Use a liberal amount of high grade lubricating oil.		

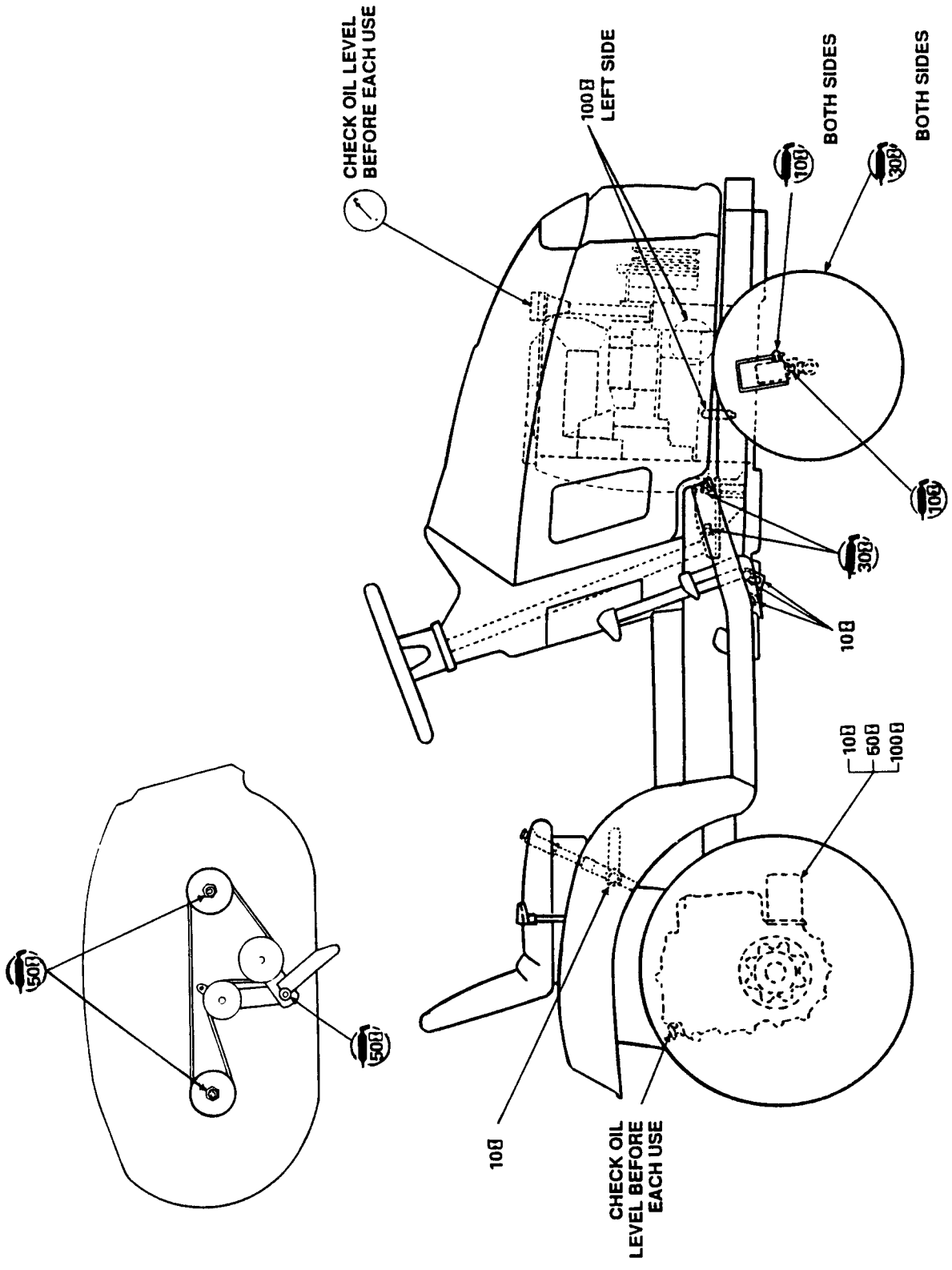


Figure 3-4. Model 2145 Lubrication Points.

Table 3-9. Model 2160 Maintenance

Operation to be performed	Before each use	10 hours or once a month	30 hours or three times a season	50 hours or twice a season	100 hours or yearly	Before storage
Clean grille, engine air inlet screen, dash intake screen and side panel screens		More often under dirty conditions X				
Check engine oil level	X					
Fill fuel tank	X					
Change engine oil & oil filter	After first 5 hours			More often under dirty conditions X		
Check transmisson oil level	X					
Clean & re-oil foam air precleaner		X				
Check battery electrolyte level		X				
Grease front axle pivot bolt		X				
Grease steering knuckles		X				
Retorque rear wheel lug nuts		After first 10 hours X				
Clean cooling fins & external surfaces			X			
Service air cleaner paper cartridge					More often under dirty conditions	
Check spark plugs					X	X
Grease steering gear housing			X			
Grease front wheel bearings			X			X
Drain fuel						X
Pivot bar adjustment bolts				X		
Lubricate all foot and lift control pivot points		X				

NOTE

Maintenance information for optional equipment may be found in the manual which is included with that specific piece of equipment.

Table 3-10. Model 2160 Lubrication

Point of Lubrication	Check at Hours	Change at Hours	Capacity	Anticipated Air Temperature		
				Above +40°F	0° to + 40°F	Below 0°F
Engine crankcase	Check before each use	50	Approx. 3 pints 8 ounces	*Cub Cadet* Engine Oil SAE 30	*Cub Cadet* Engine Oil SAE 5W30 or 10W30	*Cub Cadet* Engine Oil SAE 5W20 or 5W30
Six speed transaxle and clutch assembly	Check before each use	Add as needed	Approx. 6 qts.	*Cub Cadet* Drive System Oil **NOTE:** *Cub Cadet* Drive System Oil is specially formulated for this application. If any other oil is used *Cub Cadet* will not be responsible for substandard performance. Failures due to use of improper fluid are not covered by warranty. For maximum protection, use *Cub Cadet* Drive System Oil.		
Steering knuckles and front axle pivot bolt	10			Use 251H EP grease or equivalent No. 2 multe-purpose lithium grease and apply two strokes (minimum) or sufficient grease to flush out old grease and dirt.		
Front wheel bearings	30			Two strokes (minimum) of the lubricator using 251H EP grease or equivalent No. 2 multi-purpose lithium grease.		
Steering gear housing	30			Two strokes (minimum) of the lubricator using 251H EP grease or equivalent No. 2 multi-purpose lithium grease.		
Foot and lift control pivot points	10			Use a liberal amount of high grade lubricating oil.		

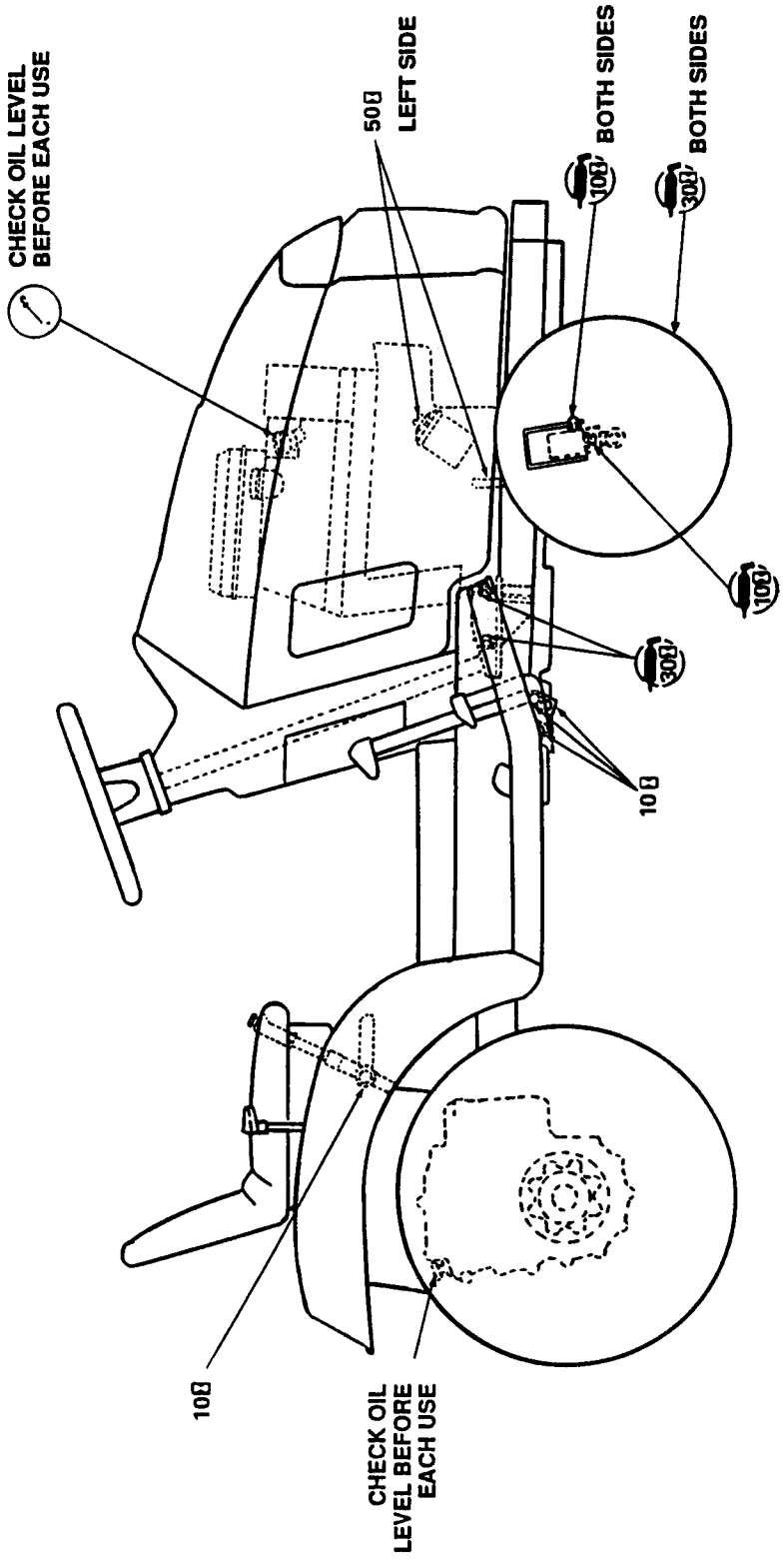


Figure 3-5. Model 2160 Lubrication Points.

Table 3-11. Model 2165 Maintenance

Operation to be performed	Before each use	10 hours or once a month	30 hours or three times a season	50 hours or twice a season	100 hours or yearly	Before storage
Clean grille, engine air inlet screen, dash intake screen and side panel screens		More often under dirty conditions X				
Check engine oil level	X					
Fill fuel tank	X					
Change engine oil & oil filter	After first 5 hours			More often under dirty conditions X		
Check transmisson oil level	X					
Replace transmisson oil filter		After first 10 hours X		After first 50 hours X	Every 100 hours thereafter X	
Clean & re-oil foam air precleaner		X				
Check battery electrolyte level		X				
Grease front axle pivot bolt		X				
Grease steering knuckles		X				
Retorque rear wheel lug nuts		After first 10 hours X				
Clean cooling fins & external surfaces			X			
Service air cleaner paper cartridge					More often under dirty conditions	
Check spark plugs					X	X
Grease steering gear housing			X			
Grease front wheel bearings			X			X
Drain fuel						X
Pivot bar adjustment bolts				X		
Lubricate all foot and lift control pivot points		X				

NOTE

Maintenance information for optional equipment may be found in the manual which is included with that specific piece of equipment.

Table 3-12. Model 2165 Lubrication

Point of Lubrication	Check at Hours	Change at Hours	Capacity	Anticipated Air Temperature		
				Above +40°F	0° to + 40°F	Below 0°F
Engine crankcase	Check before each use	50	Approx. 3 pints 8 ounces	*Cub Cadet* Engine Oil SAE 30	*Cub Cadet* Engine Oil SAE 5W30 or 10W30	*Cub Cadet* Engine Oil SAE 5W20 or 5W30
Hydro transmission and transaxle with filter	Check before each use	Add as needed	Approx. 6 qts.	*Cub Cadet* Drive System Oil **NOTE:** *Cub Cadet* Drive System Oil is specially formulated for this application. If any other oil is used *Cub Cadet* will not be responsible for substandard performance. Failures due to use of improper fluid are not covered by warranty. For maximum protection, use *Cub Cadet* Drive System Oil.		
Steering knuckles and front axle pivot bolt	10			Use 251H EP grease or equivalent No. 2 multe-purpose lithium grease and apply two strokes (minimum) or sufficient grease to flush out old grease and dirt.		
Front wheel bearings	30			Two strokes (minimum) of the lubricator using 251H EP grease or equivalent No. 2 multi-purpose lithium grease.		
Steering gear housing	30			Two strokes (minimum) of the lubricator using 251H EP grease or equivalent No. 2 multi-purpose lithium grease.		
Foot and lift control pivot points	10			Use a liberal amount of high grade lubricating oil.		

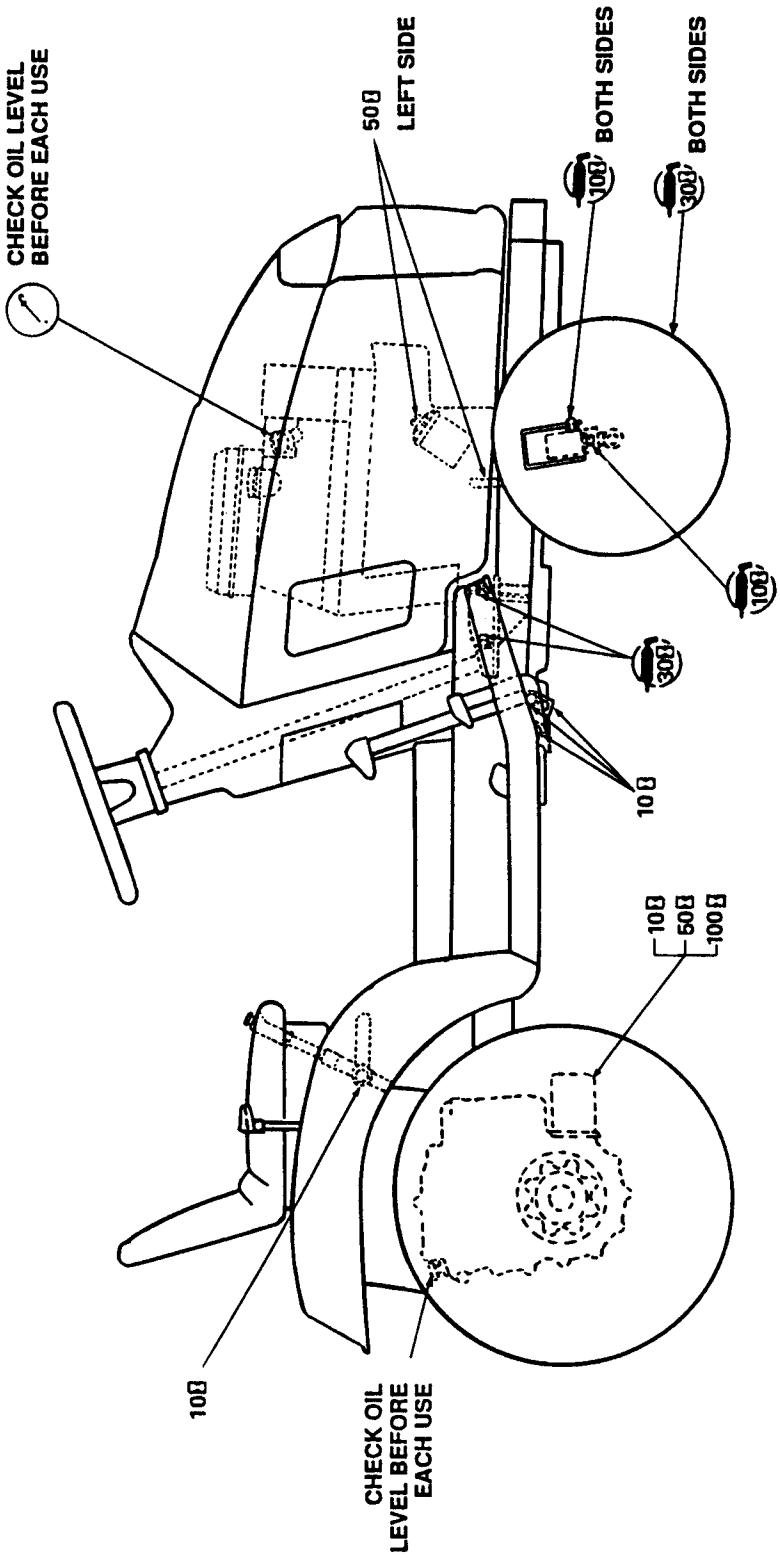


Figure 3-6. Model 2165 Lubrication Points.

Table 3-13. Model 2185 Maintenance

Operation to be performed	Before each use	10 hours or once a month	30 hours or three times a season	50 hours or twice a season	100 hours or yearly	Before storage
Clean grille, engine air inlet screen, dash intake screen and side panel screens		More often under dirty conditions X				
Check engine oil level	X					
Fill fuel tank	X					
Change engine oil & oil filter	After first 5 hours				More often under dirty conditions X	
Check transmisson oil level	X					
Replace transmisson oil filter		After first 10 hours X		After first 50 hours X	Every 100 hours thereafter X	
Clean & re-oil foam air precleaner		X				
Check battery electrolyte level		X				
Grease front axle pivot bolt		X				
Grease steering knuckles		X				
Retorque rear wheel lug nuts		After first 10 hours X				
Clean cooling fins & external surfaces			X			
Service air cleaner paper cartridge					More often under dirty conditions	
Check spark plugs					X	X
Grease steering gear housing			X			
Grease front wheel bearings			X			X
Drain fuel						X
Pivot bar adjustment bolts				X		
Lubricate all foot and lift control pivot points		X				

NOTE

Maintenance information for optional equipment may be found in the manual which is included with that specific piece of equipment.

Table 3-14. Model 2185 Lubrication

Point of Lubrication	Check at Hours	Change at Hours	Capacity	Anticipated Air Temperature	
				Above + 32°F	Below + 32°F
Engine crankcase	Check before each use	100	Approx. 4 pints	*Cub Cadet* Engine Oil SAE 10W30 or 10W40	*Cub Cadet* Engine Oil SAE 5W20 or 5W30
Hydro transmission and transaxle with filter	Check before each use	Add as needed	Approx. 6 qts.	*Cub Cadet* Drive System Oil **NOTE:** *Cub Cadet* Drive System Oil is specially formulated for this application. If any other oil is used *Cub Cadet* will not be responsible for substandard performance. Failures due to use of improper fluid are not covered by warranty. For maximum protection, use *Cub Cadet* Drive System Oil.	
Steering knuckles and front axle pivot bolt	10			Use 251H EP grease or equivalent No. 2 multe-purpose lithium grease and apply two strokes (minimum) or sufficient grease to flush out old grease and dirt.	
Front wheel bearings	30			Two strokes (minimum) of the lubricator using 251H EP grease or equivalent No. 2 multi-purpose lithium grease.	
Steering gear housing	30			Two strokes (minimum) of the lubricator using 251H EP grease or equivalent No. 2 multi-purpose lithium grease.	
Foot and lift control pivot points	10			Use a liberal amount of high grade lubricating oil.	

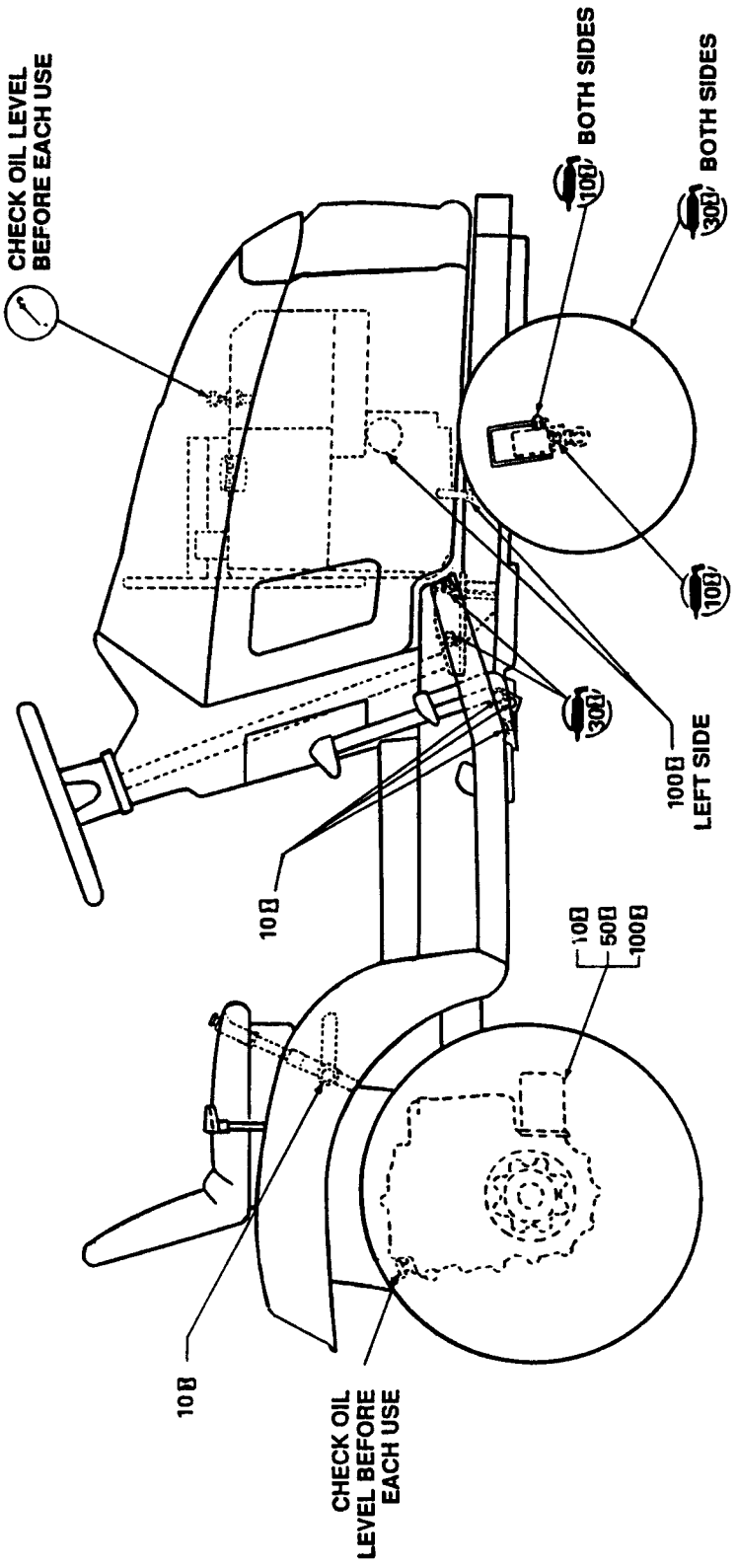
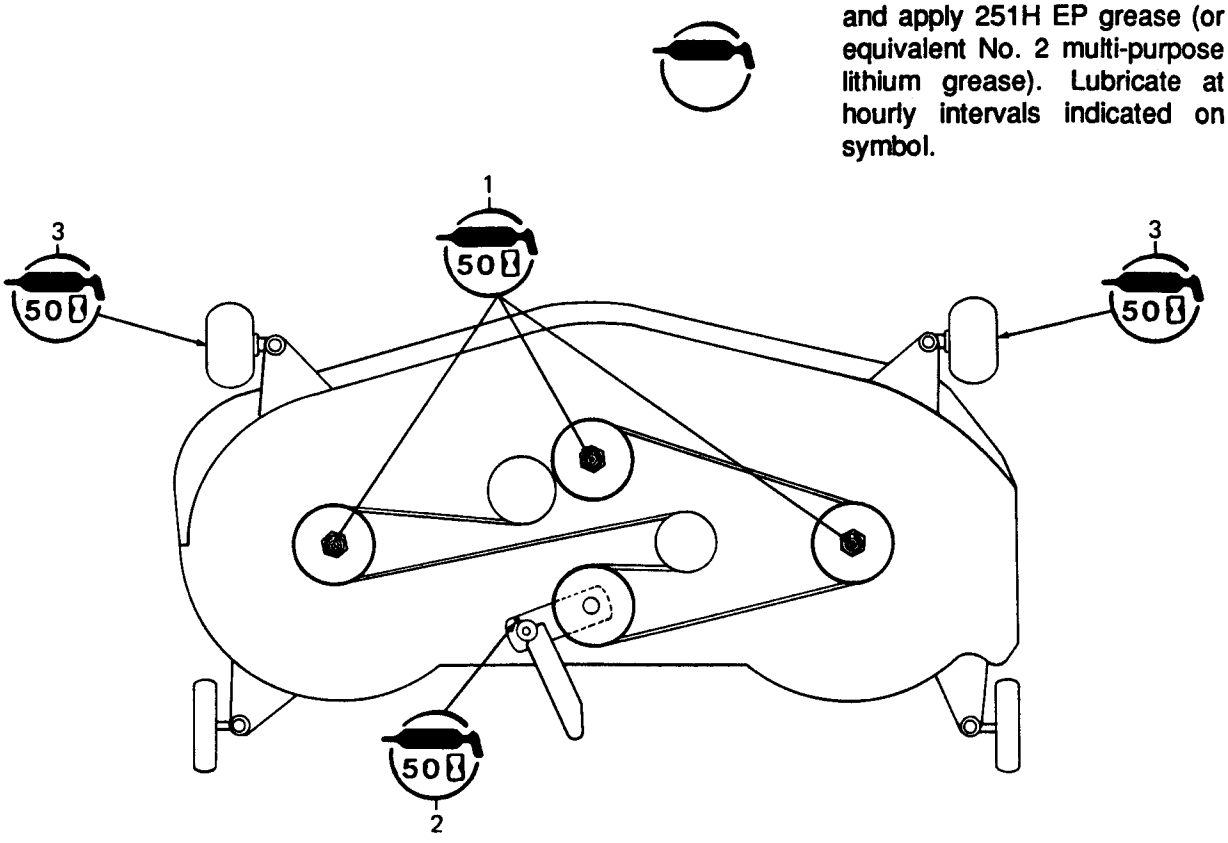
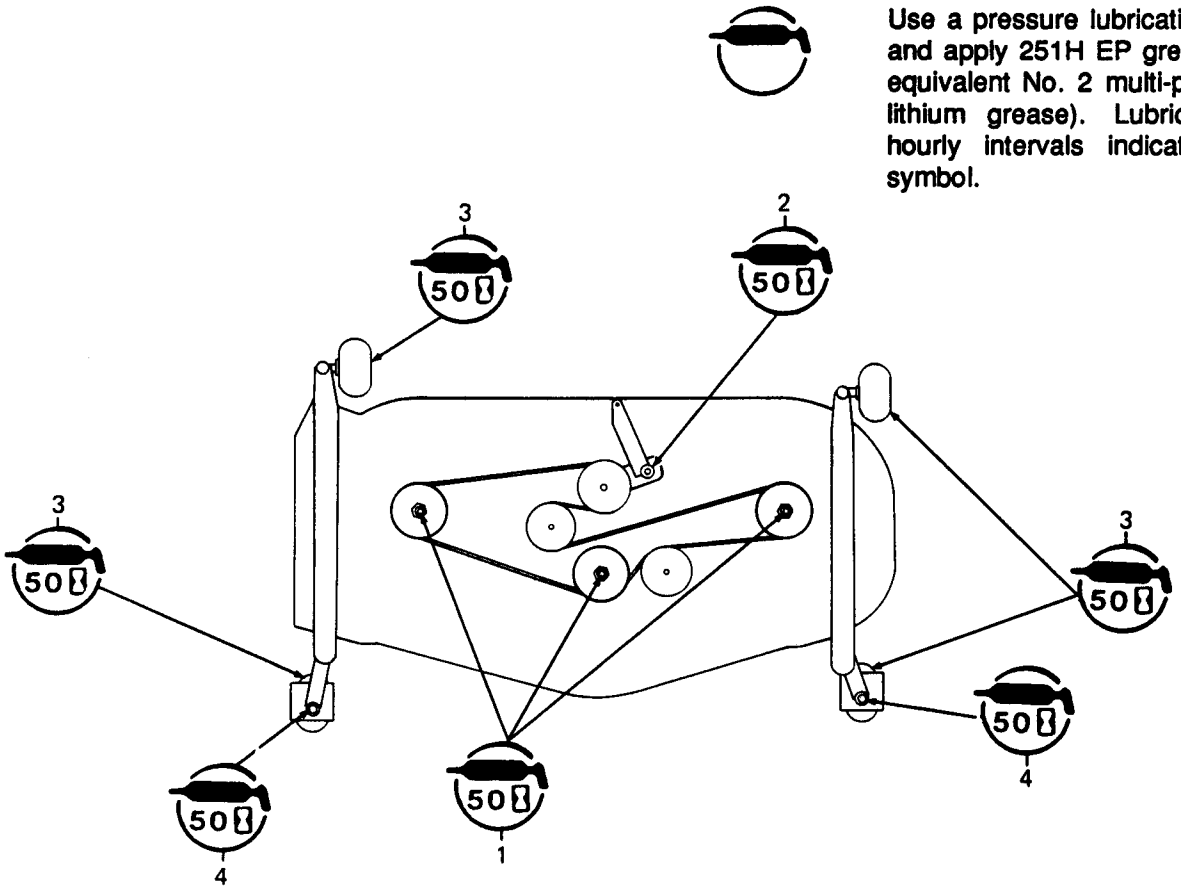


Figure 3-7. Model 2185 Lubrication Points.



1. Deck Spindles
2. Idler Arm
3. Ball Wheels

Figure 3-8. Model 190-300 46" Mower Deck.



1. Deck Spindles
2. Idler Arm
3. Ball Wheels
4. Front Caster Assemblies

Figure 3-9. Model 190-301 48" Mower Deck.

SECTION 4
TROUBLESHOOTING AND TESTING

4.1 GENERAL.

4-1.1 This section provides information regarding troubleshooting and testing of various systems and components of the Series 2000 tractors covered by this manual.

NOTE

See Appendix A for a listing of available Engine Service Manuals. Refer to the appropriate engine manual for information regarding troubleshooting and testing of the engine.

4-2 TROUBLESHOOTING.

4-2.1 Referring to Table 4-1, check left column for basic description most closely matching the problem being experienced.

NOTE

Battery failure is not always due to charging system defects. Improper battery activation, use of lights and PTO while the engine is running at a low speed, corroded battery cables or connectors, low water level, or prolonged storage may be probable causes.

Table 4-1. Troubleshooting

BASIC TYPES OF TROUBLE	PROBABLE CAUSES	POSSIBLE SOLUTIONS	REFER TO
BATTERY TROUBLESHOOTING			
Battery will not hold a charge	Low electrolyte level	**CAUTION** Never use electrolyte to fill an operating battery. Plate separators will be destroyed. Use pure water and fill to level indicator or 1/4 to 1/2 inch above top of the plates.	Appendix C Para. C-5.8
	Electrolyte (specific gravity)	Test each cell and evaluate the condition. • All readings even at 1.250 or above — Battery O.K. • All readings even but less than 1.250 — Recharge and retest • High-low variation between cells less than 50 gravity points — Recharge and retest. • High- low variation between cells exceeds 50 gravity points — Replace battery.	Appendix C Para. C-5.10

Table 4-1. Troubleshooting

BASIC TYPES OF TROUBLE	PROBABLE CAUSES	POSSIBLE SOLUTIONS	REFER TO
Battery will not hold a charge (cont.)	Battery capacity	Test capacity and evaluate condition. • Minimum voltage of 10.5 volts measured across battery ternminals. • Recharge battery for 10 minutes at a 25 amp charge rate, measure for an increase in voltage across terminals. If voltage increases — Recharge battery at recommended 4 amp charge rate. If no increase — Replace battery.	
No charge to battery	Charge system not operating	• With ignition switch in ON position, check for battery voltage at charge terminal of regulator. If no voltage, check wire harness for broken wires or connections. • If battery voltage is present at regulator, start the engine and check charging voltage from output terminal of regulator (12.5 to 14 VDC). If voltage is low, check engine stater output (24 VAC minimum).	Appendix D Appropriate Engine Service Manual
Battery boiling over	Battery overfilled or charging system overcharging	• Adjust electrolyte level • Check voltage regulator output	
ENGINE START TROUBLESHOOTING			
Engine cranks but does not start.	Spark plugs	• Remove plug(s) - check gap and condition of electrodes. Re-gap to engine specifications. If condition questionable - replace plug(s).	Appropriate Engine Service Manual
	Defective ignition module	• Use spark tester and check for spark at plug. **WARNING** Removal of the yellow wire will eliminate all normal and safety shutdown systems. The yellow wire must be reconnected to stop the engine. Use extreme caution when reconnecting the wire while the engine is running.	Appendix D

Table 4-1. Troubleshooting

BASIC TYPES OF TROUBLE	PROBABLE CAUSES	POSSIBLE SOLUTIONS	REFER TO
Engine cranks but does not start (cont.)	Defective ignition module (cont.)	• If no spark, remove yellow wire from connector block where tractor harness and engine harness connect. Crank engine. • If still no spark, refer to engine service manual for ignition module testing and replacement.	
	Grounded yellow wires or defective safety switches.	If engine has spark, ignition module is O.K. Test tractor harness and switches for proper operation.	Appendix D
Engine quits abruptly while operating	Defective ignition module, grounded yellow wire, or defective safety switch	• Remove yellow wire from connector block where tractor harness and engine harness connect. Crank engine. If engine has spark, ignition module is O.K. Test tractor harness and switches for proper operation. See Electrical Circuit Troubleshooting. • If no spark, refer to engine service manual for ignition module testing and replacement.	Appendix D
Engine has spark but will not start	Engine not getting fuel	**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. • Check fuel tank for fuel • Check fuel flow to filter. If no flow, check tank and fuel lines for obstructions or kinks • Check fuel flow through filter. If no flow, replace clogged filter. • Check operation of fuel pump as follows: a. Disconnect carburetor fuel line at fuel pump.	

Table 4-1. Troubleshooting

BASIC TYPES OF TROUBLE	PROBABLE CAUSES	POSSIBLE SOLUTIONS	REFER TO
Engine has spark but will not start (cont.)	Engine not getting fuel (cont.)	b. Attach a test length of fuel line to the fuel pump and position over an appropriate container. c. Start engine and check for a steady stream of fuel from the test line. • If steady flow is present, refer to engine service manual. • If fuel flow is weak, check engine vacuum. Refer to engine service manual if below specifications. • If vacuum is to spacifications, replace the fuel pump.	
	Carburetor fuel solenoid not operating (Models 2160, 2165 and 2185).	**WARNING** Use extreme caution when conducting electrical system test. Short circuits and electrical sparks can cause fires, resulting in damage to the equipment and/or personal injury. • With ignition in start position, test for battery voltage at the carburetor fuel solenoid. • Models 2160 and 2165 - If no voltage, check continuity of diode assembly at starter. • Model 2185 - If no voltage, check diode assembly in engine wire harness. • If voltage is present - remove and check solenoid	Appendix D Appropriate Engine Service Manual
Engine cranks slowly	Poor engine ground	Check engine ground cable from negative terminal of battery to engine crankcase.	
Engine does not crank	PTO switch in ON position or brake pedal NOT fully depressed	Turn PTO switch OFF and fully depress brake pedal.	
	Low battery voltage		Battery Troubleshooting

Table 4-1. Troubleshooting

BASIC TYPES OF TROUBLE	PROBABLE CAUSES	POSSIBLE SOLUTIONS	REFER TO
Engine does not crank (cont.)	Starter not being activated due to one or more of the following: • Loose connections or broken wire in tractor wire harness. • Loose or broken wires in Engine wire harness • Inoperative switches. • Defective solenoid. • Defective starting motor.	Check battery cable connection at solenoid for battery voltage. If no voltage, check connections. With ignition switch in start position, check for battery voltage through the activation wire (small red wire) at the solenoid. • If no voltage, inspect the wire harness for loose or broken connections. Check operation of interlock (pedal switch), PTO, and ignition switches. • If voltage is present, check solenoid to starter cable lead for battery voltage. If no voltage, replace solenoid. If voltage is present, refer to engine service manual for starter inspection procedures.	Appendix D Appropriate Engine Service Manual
	Drive line or PTO clutch lockup	• Disconnect drive shaft and test engine. If engine cranks, inspect drive shaft and transaxle. • Remove PTO and test engine . If engine cranks inspect PTO.	
ELECTRICAL CIRCUIT TROUBLESHOOTING			
Blowing fuses	Grounded wire harness	**WARNING** Use extreme caution when conducting electrical system test. Short circuits and electrical sparks can cause fires, resulting in damage to the equipment and/or personal injury. • Check routing of harness for contact with moving parts. • Check for damaged wire insulation • Check for damaged terminals and/or insulators.	Appendix D

Table 4-1. Troubleshooting

BASIC TYPES OF TROUBLE	PROBABLE CAUSES	POSSIBLE SOLUTIONS	REFER TO
Blowing fuses (cont.)	Grounded or shorted electrical components	• Check for shorted headlight socket • Check ignition switch for internal short — test all terminals for continuity to ground terminal (G) in all switch positions. The G terminal should have continuity only to terminals L and M in OFF position only. • Check reverse relay for internal short. • Check for shorted (grounded) PTO field coil.	Appendix D
Blowing fuses when cranking engine	Failed carburetor solenoid diode	Current should flow through diode in one direction only— from power souce toward solenoid • Models 2160 and 2165— diode connected at starter • Model 2185— diodes found in engine wire harness	
Starter motor continues to spin when ignition switch is returned to the run position after starting the engine.	Defective ignition switch, improper wire harness connection, or defective solenoid.	Check primary coil lead (small red wire) at solenoid for battery voltage. • If present, check wire harness and ignition switch for improper internal connections • If no voltage present, solenoid points are stuck and solenoid should be replaced.	Appendix D
Engine shuts down when operator leaves seat with brake pedal locked down	Defective interlock switch or switch not activated.	• Check continuity of interlock switch • Check for broken, bent or loose switch actuator	Appendix C Para. 5-19
Engine continues to run when operator leaves seat with brake pedal in up position	Defective interlock or seat switch	Check continuity of seat and interlock switches	Appendix C
	Disconnected wire	Check for loose wires (yellow or green) at seat and interlock switches.	Appendix D
Engine continues to run when operator leaves seat with PTO in the ON position	Defective PTO switch or seat switch	Check continuity of seat and PTO switches (terminals 3 and 4)	Appendix C
	Disconnected wire	Check for loose wires (yellow or green) at seat and PTO switches	Appendix D

Table 4-1. Troubleshooting

BASIC TYPES OF TROUBLE	PROBABLE CAUSES	POSSIBLE SOLUTIONS	REFER TO
Amp light stays on	Low battery voltage	Measure battery voltage - Battery voltage must be above 10.5 V. DC	Battery Trouble-shooting
	Loose wires or poor ground to the voltage sensor	Check wire harness connections, then, using a jumper lead, ground sensor directly to negative terminal of battery. If amp light turns off, re-ground the sensor. Loose wires or poor grounding will result in incorrect operation and can cause failure of the sensor	Appendix D
	Defective voltage sensor	**NOTE:** VOLTAGE SENSOR READS BATTERY VOLTAGE ONLY — SENSOR DOES NOT READ CHARGING SYSTEM OUTPUT.	
Hour meter not operating	Disconnected or broken wire leads.	• With ignition switch in RUN position check for battery voltage at red wire • If voltage is present, check for proper ground through green wire If above conditions are present — Hour meter is defective	Appendix D
ELECTRICAL PTO TROUBLESHOOTING			
Electric PTO will not engage	Low battery voltage		Battery Trouble-shooting
	No voltage to PTO **NOTE:** With ignition switch in the RUN position, battery voltage should be present at the red wire of PTO connection.	Test for battery voltage in red wire at PTO connector — If no voltage, check for: • Blown fuses— check positive and ground fuses • Check for loose or broken connections in red wire to PTO If voltage is present, proceed to next test.	Appendix D
	Open circuit in PTO field coil	Disconnect PTO connector. Using an ohmmeter, measure resistance of field coil: • Models 2130, 2135, 2140 and 2145 — 6.5 to 7.5 ohms • Models 2160, 2165 and 2185 — 2.4 to 3.4 ohms	

Table 4-1. Troubleshooting

BASIC TYPES OF TROUBLE	PROBABLE CAUSES	POSSIBLE SOLUTIONS	REFER TO
Electric PTO will not engage (cont.)	Open circuit in PTO field coil (cont.)	**OR** With ignition switch in RUN position and PTO connected to wire harness, test for battery voltage in blue wire at PTO connector If measurements are NOT within specifications and/or NO voltage is present, the field coil is defective If within specifications and/or voltage is present, proceed to next test.	
	No continuity through blue wire	Test for battery voltage in blue wire connection at PTO switch • If no voltage, check wire. • If voltage is present, proceed to next test.	Appendix D
	Defective PTO switch	Disconnect wire harness and test continuity of PTO switch per Appendix C (C-3.2). If switch OK, proceed to next test	Appendix C
	Defective reverse relay	Unplug the relay from wire harness and test for proper operation per Apendix C (C-3.3). If relay OK, proceed to next test	Appendix C
	PTO safety circuit not operating correctly	Test safety circuit as follows: • Using an ohmmeter, test continuity of brown wire between the coil terminal of the relay and the PTO switch terminal (7). If NO continuity, check wire and connections. If OK, proceed to next test. • Using an ohmmeter, test continuity of brown wire between the coil terminal of the relay and the contact point terminal of the relay. If NO continuity, check wire and connections. If OK, proceed to next test. • With ignition switch in the RUN position, test for battery voltage in the white wire at the reverse relay — If voltage is present, PTO circuit is OK.— If no voltage, proceed to next test.	Appendix C and D

Table 4-1. Troubleshooting

BASIC TYPES OF TROUBLE	PROBABLE CAUSES	POSSIBLE SOLUTIONS	REFER TO
Electric PTO will not engage (cont.)	PTO safety circuit not operating correctly (cont.)	Test safety circuit as follows: (cont.) • With ignition switch in the RUN position, test for battery voltage in the red wire at the reverse switch— If voltage is present, the reverse switch is not operating correctly — If no voltage, check red wire and connections between reverse switch and ignition switch.	
PTO will not engage or disengages while operating	Air gap of PTO out of adjustment	Models 2130, 2135, 2140 and 2145 — The PTO air gap is factory preset. No air gap specifications or adjustments apply. Inspect the clutch assembly per paragraph 5-6.4 Models 2160, 2165 and 2185— Adjust air gap to 0.012-0.017 in. and retest. If problem persists, inspect the clutch assembly per paragraph 5-7.4.	Paragraph 5-6 Paragraph 5-7
	Low battery voltage		Battery Trouble-shooting
	Defective PTO bearings	Inspect PTO clutch per paragraph 5-6.4 or 5-7.4.	
PTO clutch is engaged whenever engine is running, with PTO switch in OFF position	PTO bearing seized	**WARNING** Never operate or allow tractor to be operated when the PTO cannot be disengaged. Serious personal injury could result. Inspect PTO clutch per paragraph 5-6.4 or 5-7.4 — If bearings OK, proceed to next test.	
	Blue wire in PTO circuit grounding	TURN ENGINE OFF BEFORE PERFORMING THE FOLLOWING PROCEDURE. Remove blue wire from wire harness connectors at PTO and PTO switch, then test for continuity to gound. Continuity should NOT be present — If no continuity, proceed to next test.	

Table 4-1. Troubleshooting

BASIC TYPES OF TROUBLE	PROBABLE CAUSES	POSSIBLE SOLUTIONS	REFER TO
PTO clutch is engaged whenever engine is running, with PTO switch in OFF position (cont.)	PTO field coil grounding through PTO housing	TURN IGNITION SWITCH TO THE OFF POSITION BEFORE PERFORMING THE FOLLOWING PROCEDURE • Remove blue wire from wire harness connector at PTO clutch • While turning the ignition switch to the ON position, listen for the audible click of clutch engaging. — If PTO engages, field coil is defective	
DRIVE LINE TROUBLESHOOTING			
Drive shaft vibration	Bent drive shaft	Check drive shaft run out and replace if defective.	
	Damaged, worn or missing roller barrels	Check for excessive drive shaft end play: • Disconnect drive shaft from rear adapter and push coupler/drive shaft toward engine. • Push adapter/input shaft toward clutch or hydro transmission assembly. • Measure gap between coupler and adapter. If gap measures 1/8 in. or larger, add a spacer plate to drive line. Remove drive shaft and replace damaged or missing roller barrels.	Paragraphs 5-22 and 5-23.
	Excessive drive line misalignment	Check transaxle and engine installation — Re-align if improperly installed.	
6 SPEED TRANSMISSION TROUBLESHOOTING (MODELS 2130, 2140 AND 2160)			
Tractor will not move in forward or reverse	Parking brake engaged	Disengage parking brake	
	Transmission will not shift from neutral	No detent resistance felt when moving speed control lever. • Carriage bolt of gear shift backet is loose, allowing speed control lever to slip inside gear shift bracket. Tighten carriage bolt. • Shift rod disconnected from gear shift bracket or transaxle shifter arm. Connect shift rod.	Paragraph 5-20

Table 4-1. Troubleshooting

BASIC TYPES OF TROUBLE	PROBABLE CAUSES	POSSIBLE SOLUTIONS	REFER TO
Tractor will not move in forward or reverse (cont.)	Clutch assembly not being actuated.	• Clutch adjustment rod disconnected from clutch cam on clutch shaft, or from control arm on clutch assembly. Connect adjustment rod. • Set screw securing control arm to clutch assembly is loose. Re-position control arm and tighten set screw.	Paragraph 5-20
	No input to clutch assembly.	Clutch adapter loose on clutch input shaft. Tighten bell washer and hex lock nut.	Paragraph 5-20
	Excessive clutch plate wear due to improper operation.	Rebuild or replace clutch assembly. **NOTE:** Forward or reverse pedal must be FULLY DEPRESSED when operating the tractor.	Paragraph 5-24
	Transmission locked up or unable to engage shift gears due to loose neutral spacer (Early style).	Rebuild transaxle — replacing shift shaft and neutral spacer with new style components.	Paragraph 5-29
Tractor will not reach normal operating speed in one or both directions, or operates in one direction only.	Low engine RPM	• Move throttle control lever to full throttle position. • Check and, if necessary, adjust top no load engine speed to specifications (Usually 3500-3600 RPM)	Appropriate Engine Service Manual
	Improper brake adjustment or operation causing drag on transmission	• Check for too tightly adjusted brake rod — Readjust brake rod. • Damaged, weak or missing brake return spring — Replace spring. • Corroded or damaged brake actuator seizing in brake plate — Repair or replace necessary components. • Broken or damaged brake shoes or drum causing binding — Replace necessary components.	Section 6 — Adjustments Paragraph 5-27
	Clutch assembly not being fully actuated.	• Clutch adjustment rod not correctly installed. Pivot sleeve on adjustment rod should be installed in upper hole of control arm. Ferrule on front end of rod should be installed in forward slotted hole of clutch cam. • Clutch adjustment rod incorrectly adjusted — Readjust clutch rod.	Paragraph 5-20 Section 6 — Adjustments

Table 4-1. Troubleshooting

BASIC TYPES OF TROUBLE	PROBABLE CAUSES	POSSIBLE SOLUTIONS	REFER TO
Tractor will not reach normal operating speed in one or both directions, or operates in one direction only. (cont.)	Clutch assembly not being fully actuated. (cont.)	• Set screw securing control arm to clutch assembly is loose, allowing slippage of control arm. Re-position control arm and tighten set screw. • Clutch interlock rod incorrectly adjusted, limiting movement of control arm in one direction — Correctly adjust interlock rod. • Hex flange lock nut on rear end of adjustment rod not completely tightened, causing loss of forward speed — Tighten nut fully against shoulder of rod.	Paragraph 5-24 Section 6 — Adjustments Paragraph 5-20
	Full input not being transmitted to clutch input shaft.	Clutch adapter loose on clutch input shaft. Tighten bell washer and hex lock nut.	Paragraph 5-22
	Improper shimming of the forward and/or reverse clutch packs.	Remove the clutch assembly, check for the .002-.007 in. clearance specification for each clutch pack and re-shim as necessary.	Paragraph 5-24
	Excessive clutch plate wear due to improper operation.	Rebuild or replace clutch assembly. **NOTE:** Forward or reverse pedal must be FULLY DEPRESSED when operating the tractor.	Paragraph 5-24
	Unable to engage all shift gears due to loose neutral spacer (Early style).	Rebuild transaxle — replacing shift shaft and neutral spacer with new style components.	Paragraph 5-29
Tractor creeps forward or rearward when forward or reverse pedals are released.	Centering spacer not properly positioned on neutral bracket.	Referring to Section 6 — Adjustments, adjust centering spacer so that clutch control arm is in neutral position.	Section 6 — Adjustments
	Clutch adjustment rod not properly adjusted.	Readjust clutch rod. The clutch rod should be readjusted whenever the centering spacer is repositioned.	Section 6 — Adjustments
	Set screw securing control arm to clutch assembly is loose.	Re-position control arm on clutch assembly and tighten set screw.	Paragraph 5-24
	Loss of tension or distortion in the neutral arm spring — preventing control arm from being consistently neutralized.	Replace damaged spring. Correct spring is black in color.	Paragraph 5-24

Table 4-1. Troubleshooting

BASIC TYPES OF TROUBLE	PROBABLE CAUSES	POSSIBLE SOLUTIONS	REFER TO
Tractor creeps forward or rearward when forward or reverse pedals are released. (cont.)	Improper adjustment or binding of the interlock rod — preventing control arm from being consistently neutralized.	Check interlock rod for interference and/or misadjustment.	
	Surface interference in neutral return bracket of clutch shaft causing sluggish return to neutral.	Remove material from the bottom surface of opening in neutral return bracket per Service Bulletin CC-292.	Service Bulletin CC-292
	Forward and/or reverse clutch packs shimmed too tight.	Remove the clutch assembly, check for the .002-.007 in. clearance specification for each clutch pack and reshim as necessary.	Paragraph 5-24
	Clutch plate damage due to improper operation.	Rebuild or replace clutch assembly. **NOTE:** Forward or reverse pedal must be FULLY DEPRESSED when operating the tractor.	Paragraph 5-24
Tractor momentarily moves in opposite direction when depressing either forward or reverse pedal.	Clutch pack shimmed too tightly.	Remove the clutch assembly, check for the .002-.007 in. clearance specification for each clutch pack and reshim as necessary.	Paragraph 5-24
Squealing or squawking noise coming from clutch assembly.	Clutch plates not fully seated.	Operate tractor in both directions while fully engaging and disengaging the clutch assembly repeatedly.	Service Bulletin CC-301
Tractor drives in either forward or reverse whenever engine is running.	Clutch pack seized (usually due to improper operation).	Repair or replace clutch assembly. **NOTE:** Forward or reverse pedal must be FULLY DEPRESSED when operating the tractor.	Paragraph 5-24
Tractor jumps/slips in drive when under load.	Clutch assembly slippage (usually caused by repeated partial actuation of clutch assembly).	• Check control arm and clutch linkage for proper installation. • Worn clutch plates — Rebuild or replace clutch assembly. **NOTE:** Forward or reverse pedal must be FULLY DEPRESSED when operating the tractor.	
	Worn shift keys and/or shift gears.	Replace worn keys and gears.	Paragraph 5-29
Cannot shift transaxle	Forward or reverse pedal depressed	Release pedal.	
	Shift interlock misadjusted.	Check that interlock arm on clutch assembly is pointing straight down and interlock lever of transaxle is in center detent position.	Section 6 — Adjustments

Table 4-1. Troubleshooting

BASIC TYPES OF TROUBLE	PROBABLE CAUSES	POSSIBLE SOLUTIONS	REFER TO
Cannot shift transaxle (cont.)	Transmission locked up due to loose neutral spacer (Early style).	Rebuild transaxle — replacing shift shaft and neutral spacer with new style components (Service Bulletin CC-288)	Paragraph 5-29
Transaxle can be shifted when forward or reverse pedal is depressed	Interlock linkage not attached.	Check and reattach interlock linkage.	Paragraph 5-24
	Interlock rod misadjusted	Check that interlock arm on clutch assembly is pointing straight down and interlock lever of transaxle is in center detent position.	Section 6 — Adjustments
Speed control lever not aligning with numbers of shifter cover.	Loose gear shift bracket.	Carriage bolt of gear shift backet is loose, allowing speed control lever to slip inside gear shift bracket. Tighten carriage bolt.	Paragraph 5-20
	Misformed or bent gear shift rod or speed control lever	Repair or replace defective rods.	
	Miswelded transmission shift arm	If severely misaligned or unable to engage all gears, replace shift arm.	Paragraph 5-29
Oil leaking from breather tube	Incorrect oil level and/or dipstick.	Reduce oil level and replace dipstick per Service Bulletin CC-286	Service Bulletin CC-286
Oil leaking between clutch assembly and transaxle.	Damaged O-ring.	**WARNING** Observe all applicable local and federal laws regulating the proper disposal of the drained oil. Drain oil from transaxle and remove clutch assembly to replace O-ring.	Paragraph 5-24
Oil leaking from clutch assembly.	Damaged O-ring or seal	Remove clutch assembly. Inspect applicable sealing surfaces of housing and replace O-ring or seal.	Paragraph 5-24
Oil leaking from transaxle assembly.	Damaged shift shaft seal.	Remove brake assembly to replace seal.	Paragraphs 5-26 and 5-27
	Improper sealing of housings.	Split and reseal applicable housings with Ultra Grey sealant (759-3746).	Paragraphs 5-26 and 5-29
Axle coming out of axle housing	Improperly installed axle retaining ring.	• Remove axle/axle housing and inspect ring groove of axle.	Paragraph 5-28

Table 4-1. Troubleshooting

BASIC TYPES OF TROUBLE	PROBABLE CAUSES	POSSIBLE SOLUTIONS	REFER TO
Axle coming out of axle housing (cont.)	Improperly installed axle retaining ring. (cont.)	• Install new retaining ring, making certain ring is seated in groove.	Paragraph 5-28
HYDRO TRANSAXLE TROUBLESHOOTING (Models 2135, 2145, 2165 and 2185)			
Tractor will not move in forward or reverse	Parking brake engaged	Disengage parking brake.	
	Hydro disengagement rod locked in disengage position.	Release disengagement rod from notch of drawbar plate.	
	Hydro transmission not being actuated.	• Hydro adjustment rod disconnected from clutch cam on clutch shaft, or from control arm on hydro transmission. Connect adjustment rod. • Set screw securing control arm to hydro transmission is loose. Re-position control arm and tighten set screw.	Paragraph 5-21
	No input to hydro transmission.	Pump adapter loose on hydro input shaft. Tighten bell washer and hex lock nut.	Paragraph 5-23
	NOTE Applies only to tractors equipped with the Model BDU-10L-219 hydro transmission. Bypass valve stuck or jammed in the engaged position.	Actuate valve button to ensure smooth operation, then check that button extends approximately 0.22 in. from bottom of plug.	Paragraph 5-25
	Hydro transmission not primed with oil.	• Check oil level in transaxle. • Inspect pickup tube and tighten tube fittings to prevent suction of air. • Remove and inspect oil filter and filter nipple. Replace plugged oil filter. Ensure nipple is not blocking oil passage of transaxle. • Remove charge pump and inspect for damage or excessive wear.	Paragraph 5-25
	Extensive internal wear or damage to hydro transmisssion.	Rebuild or replace hydro transmission.	Paragraph 5-25

Table 4-1. Troubleshooting

BASIC TYPES OF TROUBLE	PROBABLE CAUSES	POSSIBLE SOLUTIONS	REFER TO
Tractor will not move in forward or reverse. (cont.)	Drive collar disengaged inside transaxle.	**NOTE:** Make certain hydro dump arm is securelly fastened to shift yoke of transaxle. • Pull arm rearward to ensure good spring tension against drive collar. If no tension is felt, disassemble transaxle and inspect compression spring. • If tension is felt, release the dump arm while rocking the tractor forward or backward. Feel for drive collar to engage gear inside transaxle (tractor should stop abruptly). If drive collar does not engage, disassemble transaxle.	Paragraph 5-21 Paragraph 5-30
Tractor will not reach normal operating speed in one or both directions, or operates in one direction only.	Low engine RPM	• Move throttle control lever to full throttle position. • Check and, if necessary, adjust top no load engine speed to specifications (Usually 3500-3600 RPM)	Appropriate Engine Service Manual
	Improper brake adjustment or operation causing drag on transmission	• Check for too tightly adjusted brake rod — Readjust brake rod. • Damaged, weak or missing brake return spring — Replace spring. • Corroded or damaged brake actuator seizing in brake plate — Repair or replace necessary components. • Broken or damaged brake shoes or drum causing binding — Replace necessary components.	Section 6 — Adjustments Paragraph 5-27
	Trunnion arm of hydro transmission not being fully actuated.	• Hydro adjustment rod not correctly installed. Pivot sleeve on adjustment rod should be installed in lower hole of control arm. Ferrule on front end of rod should be installed in rear slotted hole of clutch cam. • Hydro adjustment rod incorrectly adjusted — Readjust clutch rod. • Hex flange lock nut on rear end of adjustment rod not completely tightened, causing loss of forward speed — Tighten nut fully against shoulder of rod.	Paragraph 5-21 Section 6 — Adjustments Paragraph 5-21

Table 4-1. Troubleshooting

BASIC TYPES OF TROUBLE	PROBABLE CAUSES	POSSIBLE SOLUTIONS	REFER TO
Tractor will not reach normal operating speed in one or both directions, or operates in one direction only. (cont.)	Trunnion arm of hydro transmission not being fully actuated. (cont.)	• Set screw securing control arm to hydro transmission is loose, allowing slippage of control arm. Re-position control arm and tighten set screw. • Damper cylinder restricting range of motion of pedal/clutch shaft. Test cylinder for full extension and retraction of piston. Replace if defective.	Paragraph 5-25 Paragraph 5-21
	Full input not being transmitted to hydro input shaft.	Pump adapter loose on hydro input shaft. Tighten bell washer and hex lock nut.	Paragraph 5-23
	NOTE Applies only to tractors equipped with the Model BDU-10L-219 hydro transmission. Bypass valve stuck in partially engaged position.	Actuate valve button to ensure smooth operation, then check that button extends approximately 0.22 in. from bottom of plug.	Paragraph 5-25
	Hydro transmission is not being properly primed with oil, or oil is contaminated with water.	• Check oil level in transaxle. • Inspect pickup tube and tighten tube fittings to prevent suction of air. • Remove and inspect oil filter and filter nipple. Replace plugged oil filter. Ensure nipple is not blocking oil passage of transaxle. • Remove charge pump and inspect for damage or excessive wear. 1. Check appearance of residual oil for foaming, indicating the suction of air. 2. Check for milky appearance, indicating water in oil. Drain and replace oil.	Paragraph 5-25
	Hydro transmission is getting hot.	• Check cooling fan for broken or missing blades. Replace fan. • Check transmission housing for dirty or plugged cooling fins. Clean housing.	

Table 4-1. Troubleshooting

BASIC TYPES OF TROUBLE	PROBABLE CAUSES	POSSIBLE SOLUTIONS	REFER TO
Tractor will not reach normal operating speed in one or both directions, or operates in one direction only. (cont.)	Check valves not properly seating.	Inspect valve poppets and seats for foreign matter, burrs or wear. Repair as necessary.	Paragraph 5-25
	Cradle bearings displaced.	Replace and reposition cradle bearings.	Paragraph 5-25
	Extensive internal wear or damage to hydro transmisssion.	Rebuild or replace hydro transmission.	Paragraph 5-25
Tractor creeps forward or rearward when forward or reverse pedals are released.	Centering spacer not properly positioned on neutral bracket.	Referring to Section 6 — Adjustments, adjust centering spacer so that hydro control arm is in neutral position.	Section 6 — Adjustments
	Hydro adjustment rod not properly adjusted.	Readjust hydro rod. The hydro rod should be readjusted whenever the centering spacer is repositioned.	Section 6 — Adjustments
	Set screw securing control arm to hydro transmission is loose.	Re-position control arm on hydro transmission and tighten set screw.	Paragraph 5-25
	Loss of tension or distortion in the neutral arm spring — preventing control arm from being consistently neutralized.	Replace damaged spring. Correct spring is yellow dichromate plated.	Paragraph 5-25
	Surface interference in neutral return bracket of clutch shaft causing sluggish return to neutral.	Remove material from the bottom surface of opening in neutral return bracket per Service Bulletin CC-292.	Service Bulletin CC-292
	Defective damper cylinder restricting normal rotation of pedal/clutch shaft.	Fully extend and retract cylinder to test for return to static (neutral) length. Replace if defective.	Paragraph 5-21
	Swashplate leveler and/or leveler pin distorted.	Repair or replace hydro transmission.	Paragraph 5-25
Tractor sluggish or noisy under load	Low engine RPM	Run tractor at full throttle.	
	Hydro transmission is not being properly primed with oil, or oil is contaminated with water.	• Check oil level in transaxle. • Inspect pickup tube and tighten tube fittings to prevent suction of air. • Remove and inspect oil filter and filter nipple. Replace plugged oil filter. Ensure nipple is not blocking oil passage of transaxle.	Paragraph 5-25

Table 4-1. Troubleshooting

BASIC TYPES OF TROUBLE	PROBABLE CAUSES	POSSIBLE SOLUTIONS	REFER TO
Tractor sluggish or noisy under load. (cont.)	Hydro transmission is not being properly primed with oil, or oil is contaminated with water. (cont.)	• Remove charge pump and inspect for damage or excessive wear. 1. Check appearance of residual oil for foaming, indicating the suction of air. 2. Check for milky appearance, indicating water in oil. Drain and replace oil.	Paragraph 5-25
	Check valves not properly seating.	Inspect valve poppets and seats for foreign matter, burrs or wear. Repair as necessary.	Paragraph 5-25
Hydro unit overheating	Low oil level	Fill to proper level.	
	Broken or missing cooling fan blades.	Replace cooling fan.	Paragraph 5-25
	Cooling fins of hydro housing dirty or plugged.	Clean housing.	
	Brake not fully releasing.	Inspect brake assembly for proper operation and correctly adjust brake linkage.	Section 6 — Adjustments
	Excessive loading of tractor.	Reduce load.	
Oil leaking between hydro transmission and transaxle.	Damaged O-ring.	**WARNING** Observe all applicable local and federal laws regulating the proper disposal of the drained oil. Drain oil from transaxle and remove hydro pump to replace O-ring.	Paragraph 5-25
Oil leaking from hydro transmission	Damaged seal, O-ring or gasket.	Inspect applicable sealing surfaces and replace damaged component.	Paragraph 5-25
	Excessive internal hydro case pressure.	**NOTE** Applies only to tractors equipped with the Model BDU-10L-219 hydro transmission. Check return tube and connector for damage or obstructions. Clear obstruction or replace components.	Paragraph 5-25

Table 4-1. Troubleshooting

BASIC TYPES OF TROUBLE	PROBABLE CAUSES	POSSIBLE SOLUTIONS	REFER TO
Oil leaking from hydro transmission (cont.)	Excessive internal hydro case pressure. (cont.)	**NOTE** Applies only to tractors equipped with the Model BDU-10L-221 hydro transmission. Check oil drain hole (near output shaft) of center section for blockage, and make certain output shaft seal is removed.	Paragraph 5-25
Oil leaking from transaxle assembly.	Damaged shift shaft seal.	Remove brake assembly to replace seal.	Paragraph 5-27
	Improper sealing of housings.	Split and reseal applicable housings with Ultra Grey sealant (759-3746).	Paragraph 5-30
Tractor will not move when hydro disengagement rod is engaged	Parking brake engaged or brake assembly not fullly releasing.	• Disengage parking brake. • Inspect brake assembly for proper operation and correctly adjust brake linkage.	Section 6 — Adjustments
	Hydro dump arm loose on shift yoke.	• Tighten hex cap screw and bell washer securing arm. • Inspect square shoulder of shift yoke and hole of arm for wear.	Paragraph 5-21
	Broken shift yoke.	Pull dump arm rearward to feel for spring tension. If no tension felt, disassemble transaxle to inspect and/or replace shift yoke	Paragraph 5-30
Axle coming out of axle housing	Improperly installed axle retaining ring.	• Remove axle/axle housing and inspect ring groove of axle. • Install new retaining ring, making certain ring is seated in groove.	Paragraph 5-28
BRAKE SYSTEM TROUBLESHOOTING			
Intermittent noise from brake assembly.	Brake drum contacting brake actuation arm.	Replace old style brake drum with new style per Service Bulletin CC-275. Drum should be approximately 0.800 in. wide.	Paragraph 5-28
Poor braking action	Brake rod incorrectly adjusted.	Readjust brake rod.	Section 6 — Adjustments
	Worn or broken brake shoes or brake drum	Replace defective components.	Paragraph 5-27
	Oil on brake components	Replace shift shaft seal.	

Table 4-1. Troubleshooting

BASIC TYPES OF TROUBLE	PROBABLE CAUSES	POSSIBLE SOLUTIONS	REFER TO
Brakes dragging	Brake rod adjusted too tightly.	Readjust brake rod.	Section 6 — Adjustments
	Corroded or damaged brake actuator seizing in brake plate.	Repair or replace necessary components.	Paragraph 5-27
	Broken or damaged brake shoes or drum causing binding.	Replace necessary components.	
STEERING TROUBLESHOOTING			
NOTE Applies to early production Models 2160, 2165 and 2185. Tires hit side panels when turning on an inclined surface.	Wheel toe-in not correctly adjusted.	Check and readjust for 1/8 in. toe-in.	Section 6 — Adjustments
	Over inflated tires.	Check and reduce air pressure to 10 - 12 psi.	
	Excessive axle side play	Adjust limiter cap screws to eliminate play.	Paragraph 5-10
	Stack-up of component tolerances altering steering geometry.	Adjust steering tolerances per Service Bulletin CC-277.	Service Bulletin CC-277
Steering is loose (excessive lost motion)	Worn ball joints	Replace ball joints.	Paragraph 5-10
	Excessive axle side play	Adjust limiter cap screws to eliminate play.	
	Worn front pivot axle and/or steering knuckle assemblies caused by lack of lubrication.	Replace excessively worn parts.	
	Worn steering housing bearings caused by lack of lubrication.	Replace worn bearings.	Paragraph 5-10
	Incorrect installation of steering shaft washers causing separation of pinion gear from segment gear and/or excessive steering shaft end play.	• Ensure that single thrust washer (approx. 0.030 in.) is placed between pinion gear and steering housing assembly. • Add washers as necessary to obtain the correct steering shaft end play.	Paragraph 5-15
Steering tight (excessive effort needed to turn)	Wheel toe-in not correctly adjusted.	Check and readjust for 1/8 in. toe-in.	Section 6 — Adjustments
	Incorrect tire inflation.	Check for proper air pressure of 10 - 12 psi.	
	Front axle pivot bolt needs lubrication.	Lubricate pivot bolt by applying grease to lube fitting.	Paragraph 5-10

Table 4-1. Troubleshooting

BASIC TYPES OF TROUBLE	PROBABLE CAUSES	POSSIBLE SOLUTIONS	REFER TO
Steering tight (cont.)	Front axle does not pivot freely.	Adjust limiter cap screws to eliminate binding.	Paragraph 5-10
	Insufficient lubrication of steering knuckles.	Apply grease to front axle lube fittings.	
	Insufficient lubrication of steering housing bearings.	Apply grease to lube fittings of steering housing. Do not over lubricate.	Paragraph 5-15
	Upper flange bearing on steering shaft misaligned	Reposition flange bearing to eliminate binding on steering shaft.	
	Improper installation of tie rods in lower steering arm.	• Models 2130, 2135, 2140 and 2145 with 14 tooth segment gear — ball joints should be installed in outer holes of steering arm. • Models 2130, 2135, 2140 and 2145 with 18 tooth segment gear — ball joints should be installed in inner holes of steering arm. • Models 2160, 2165 and 2185 should be equipped with 18 tooth gear only, with ball joints installed in inner holes of steering arm.	Paragraph 5-15
Tractor does not turn equally in both directions	Lower steering arm and/or tie rods not properly adjusted.	Ensure lower steering arm is centered and readjust tie rods.	Section 6 — Adjustments
DASH PANEL and BULKHEAD TROUBLESHOOTING			
Drive shaft rubbing dash panel	Dash panel not properly aligned.	• Loosen screws and large washers securing panel to sides of pedestal and reposition dash panel squarely on pedestal. • Readjust hood/grille brackets as necessary.	Paragraph 5-14 Section 6 — Adjustments
Dash panel and hood overlapping.	Dash panel not properly aligned and hood incorrectly adjusted.		
PTO switch pulling out of dash panel	Retaining tabs of switch broken, or hole in dash oversized.	• Inspect switch and replace if broken. • Contact Cub Cadet Service Dept. for a thin metal backing plate to secure switch in dash.	
Engine appears to be running hot	Recirculation of engine compartment air.	• Make certain that seal trim strips on sides of bulkhead are in place and sealing against side panels. • Ensure seal trim on hood baffle is sealing against top of bulkhead. • Check position and condition of intake boot or foam ring.	Paragraph 5-14

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

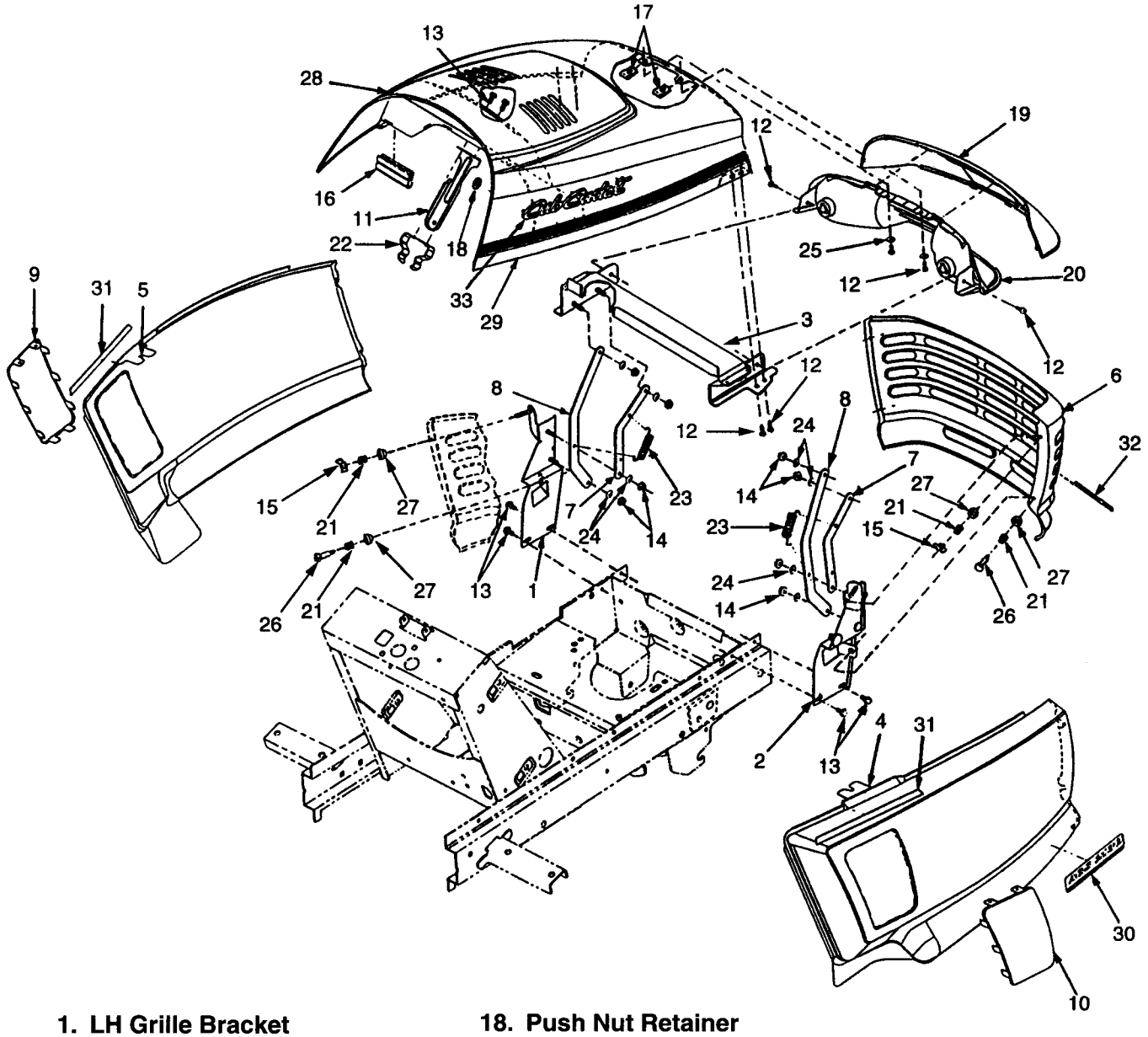
Do not touch the glass portion of the head lamp bulb (28, Fig. 5-4). Touching the glass surface, or allowing contact with dirt or oil, will reduce the life of the head lamp bulbs.

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

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).

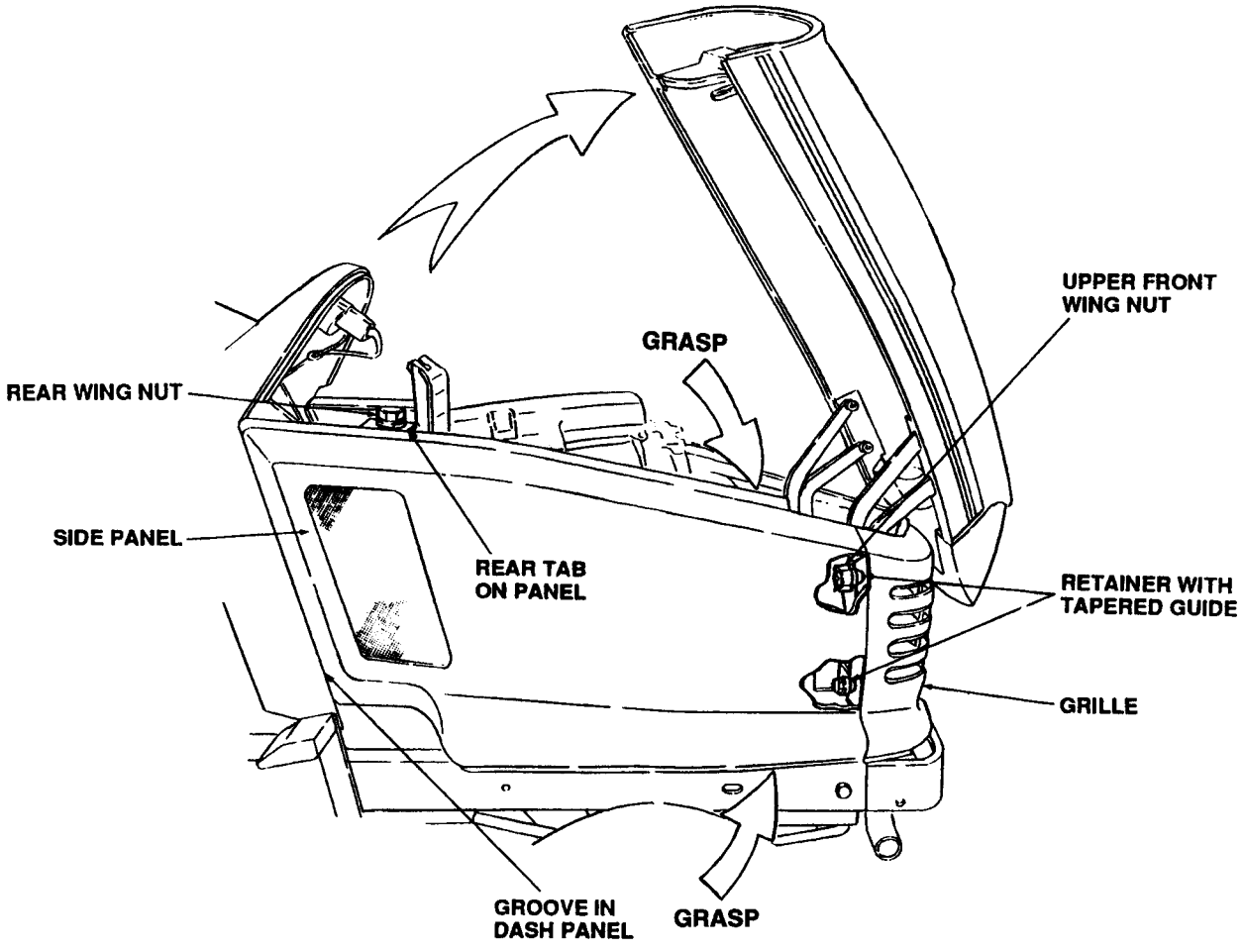


Figure 5-2. Side Panel Removal.

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).

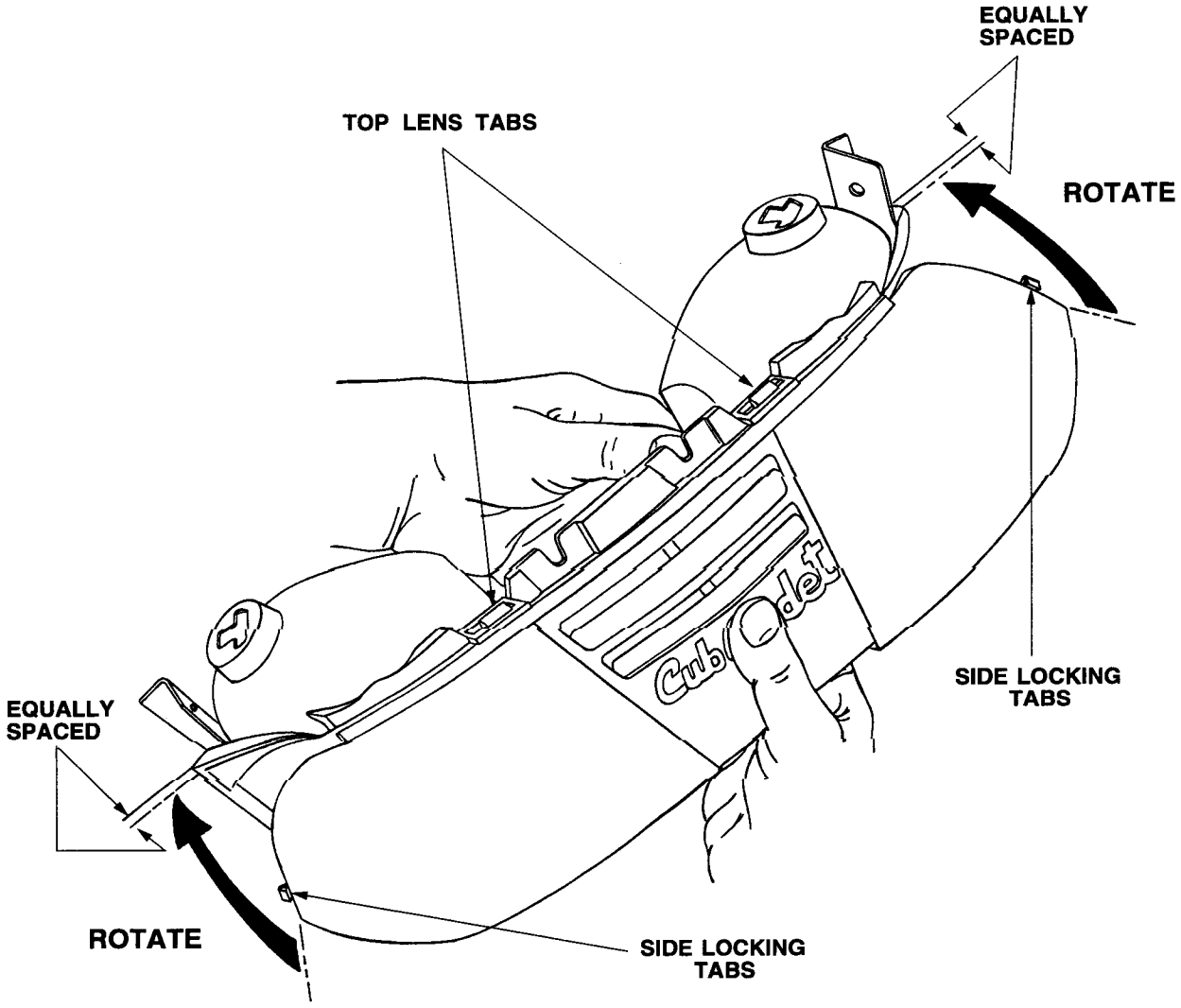


Figure 5-3. Headlight Reflector and Lens Assembly.

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).

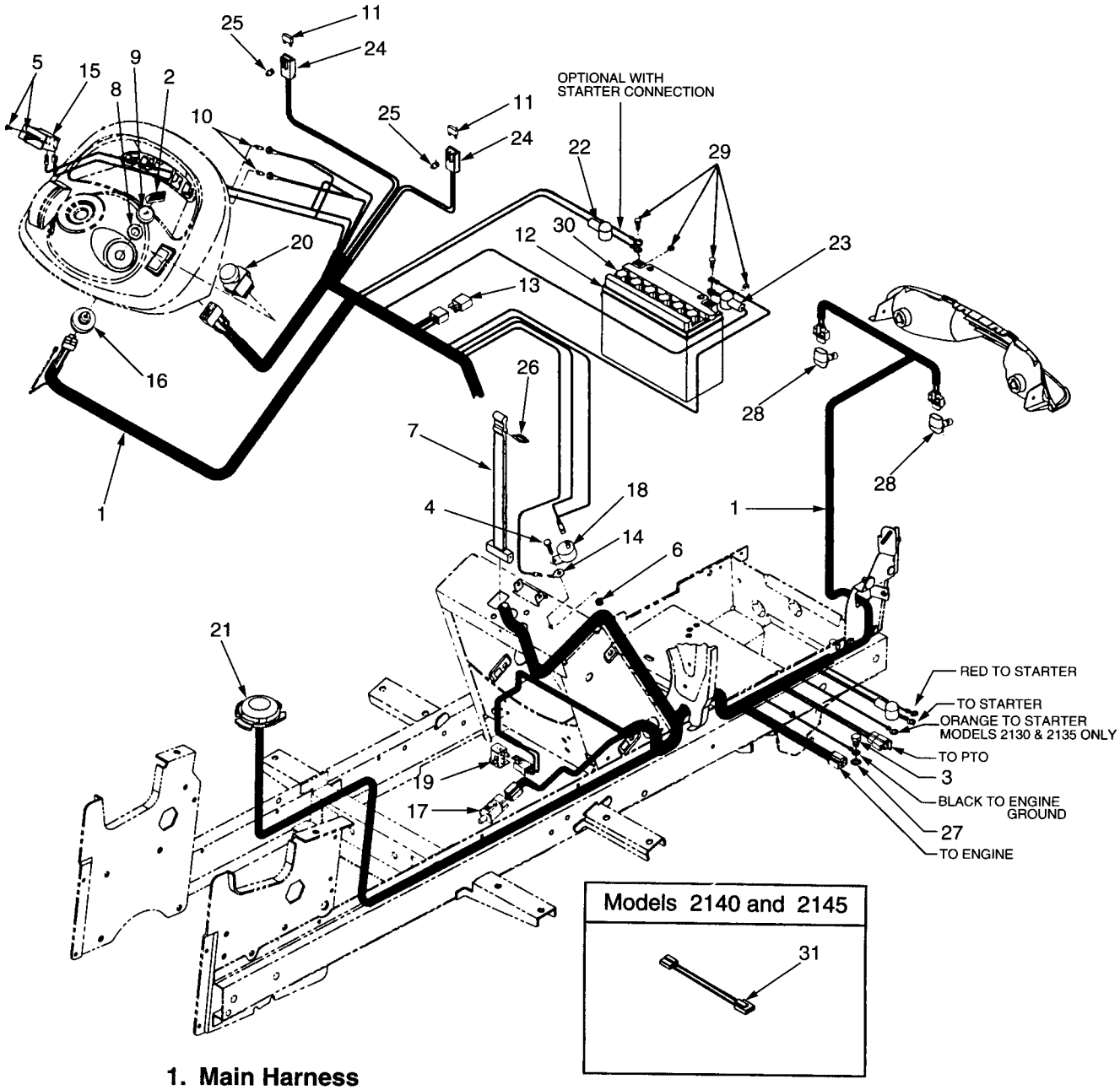
7. Unplug the wire harness connector from the PTO switch (20); then remove the switch by pinching the locking tabs and pushing the switch up through the dash panel.

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

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 headlamp 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 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 previouly 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 groung 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).

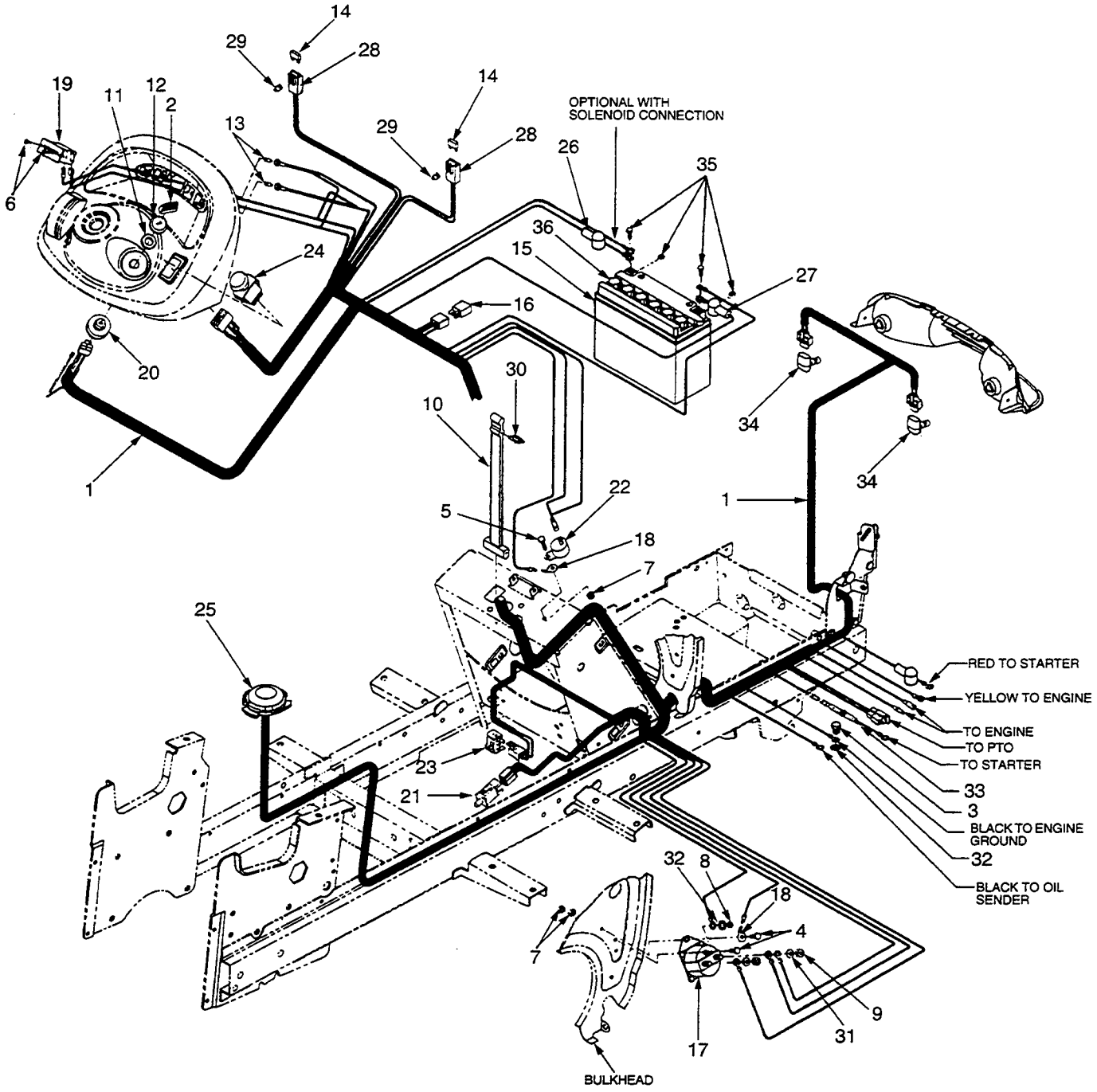
4. Slide the fuse holders (28) off of the fuse holder mounting clips (29) and remove the fuses (14) from the holders.

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

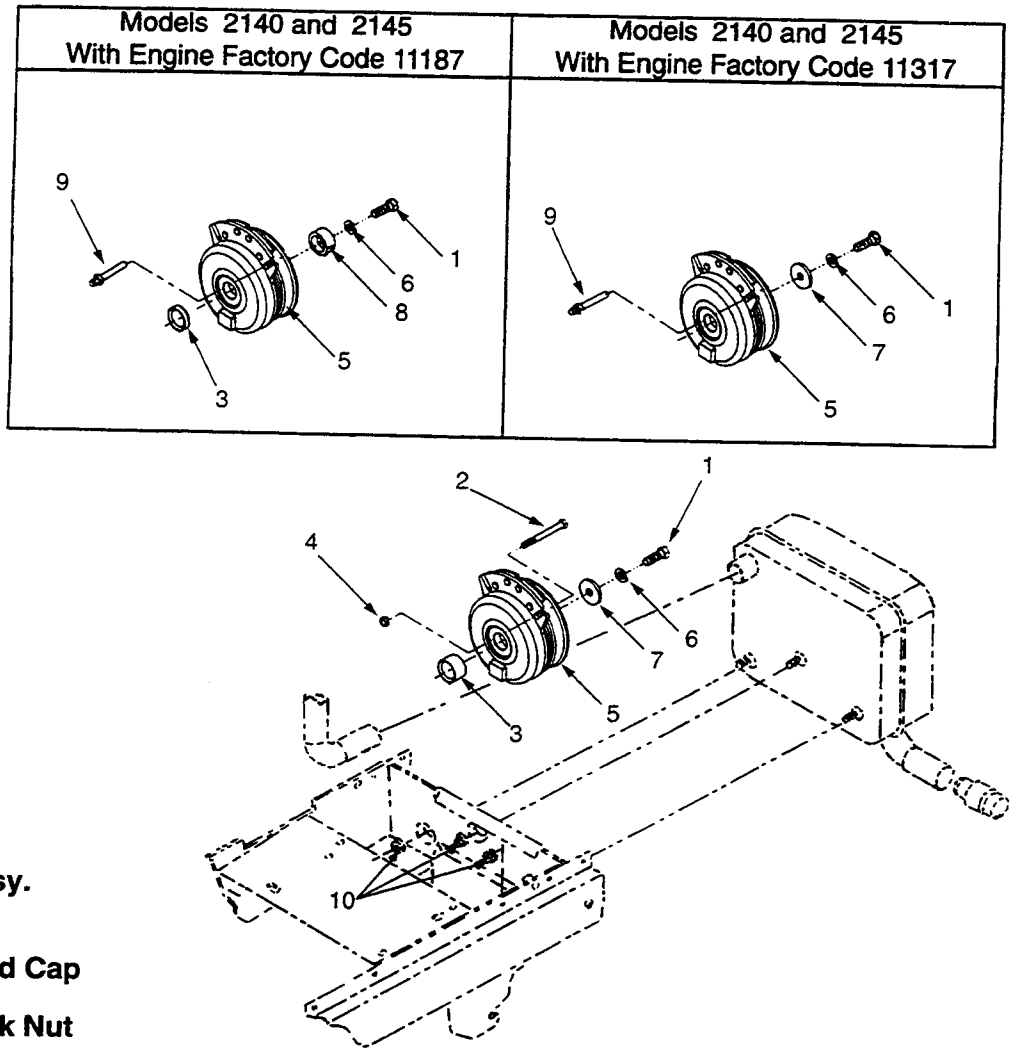
Do not attempt to remove the muffler or PTO clutch when the engine is hot.

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.

NOTE

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

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 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 of 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 tighly 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.

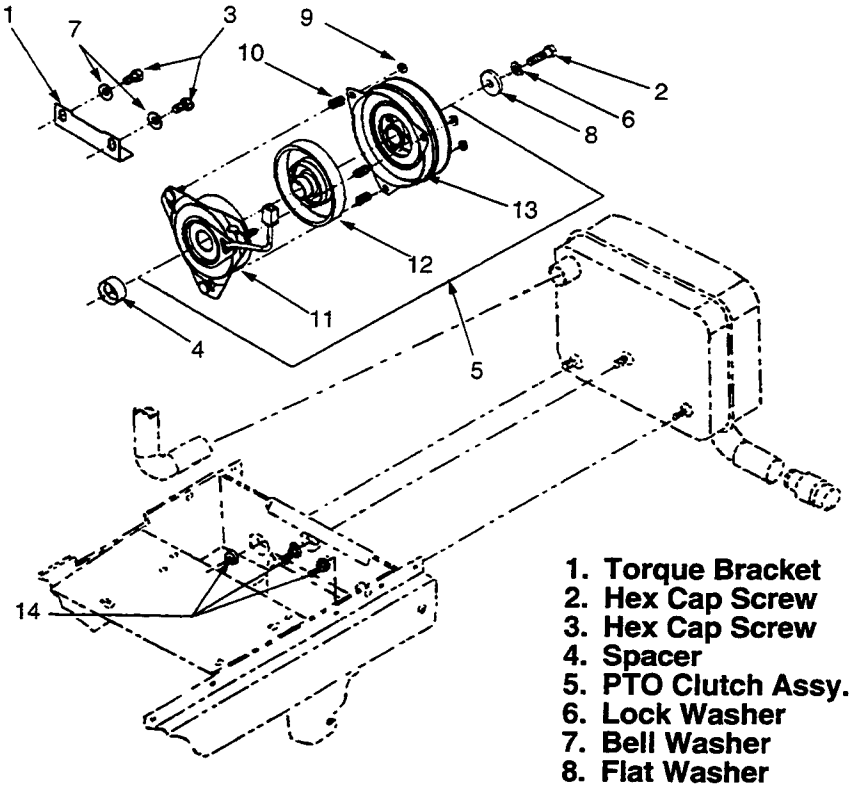
5-7.2 **Removal.**

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.



1. **Torque Bracket**
2. **Hex Cap Screw**
3. **Hex Cap Screw**
4. **Spacer**
5. **PTO Clutch Assy.**
6. **Lock Washer**
7. **Bell Washer**
8. **Flat Washer**
9. **Hex Lock Nut**
10. **Compression Spring**
11. **Field Coil Assy.**
12. **Rotor**
13. **Armature Assy.**
14. **Hex Flange Lock Nut**

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 of 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 guage, 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).

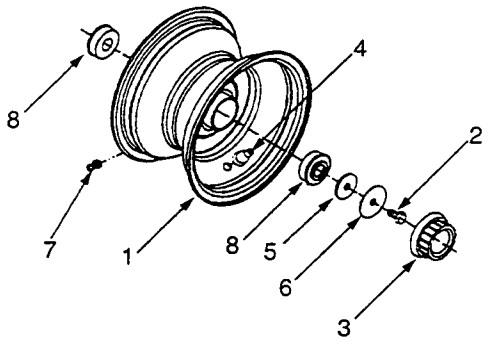
3. If damaged or defective, remove the tubeless air valve (4) and grease fitting (7) from the rim assy.

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).

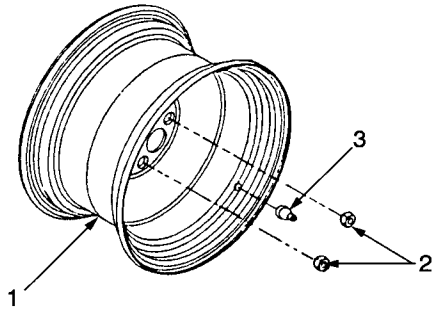
5-9.1 **General.** Use tire changing equipment to remove and/or mount the tires. Usage of improper equipment can result in damage to the tire bead or rim flange.

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.

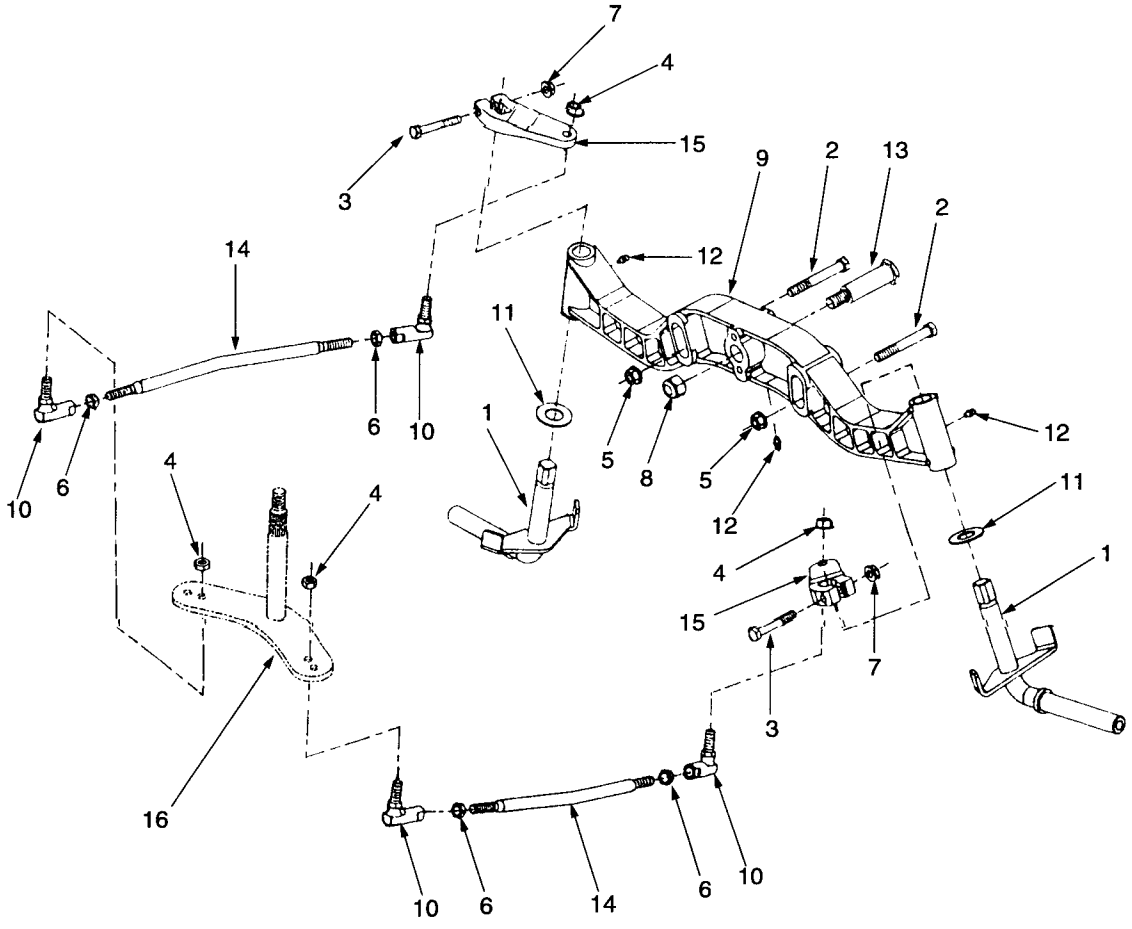
1. Remove the side panels per paragraph 5-3.2.
2. Lock the parking brake and chock the rear

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 sufaces.
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.

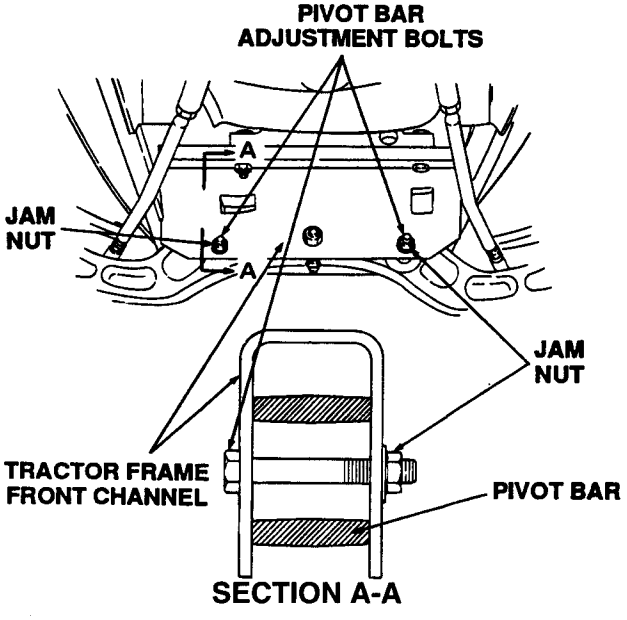


Figure 5-11. Pivot Axle Limiter Bolt Adjustment.

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

NOTE

Earlier Model 2130, 2135, 2140 and 2145 tactors 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).

NOTE

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.

NOTE

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.

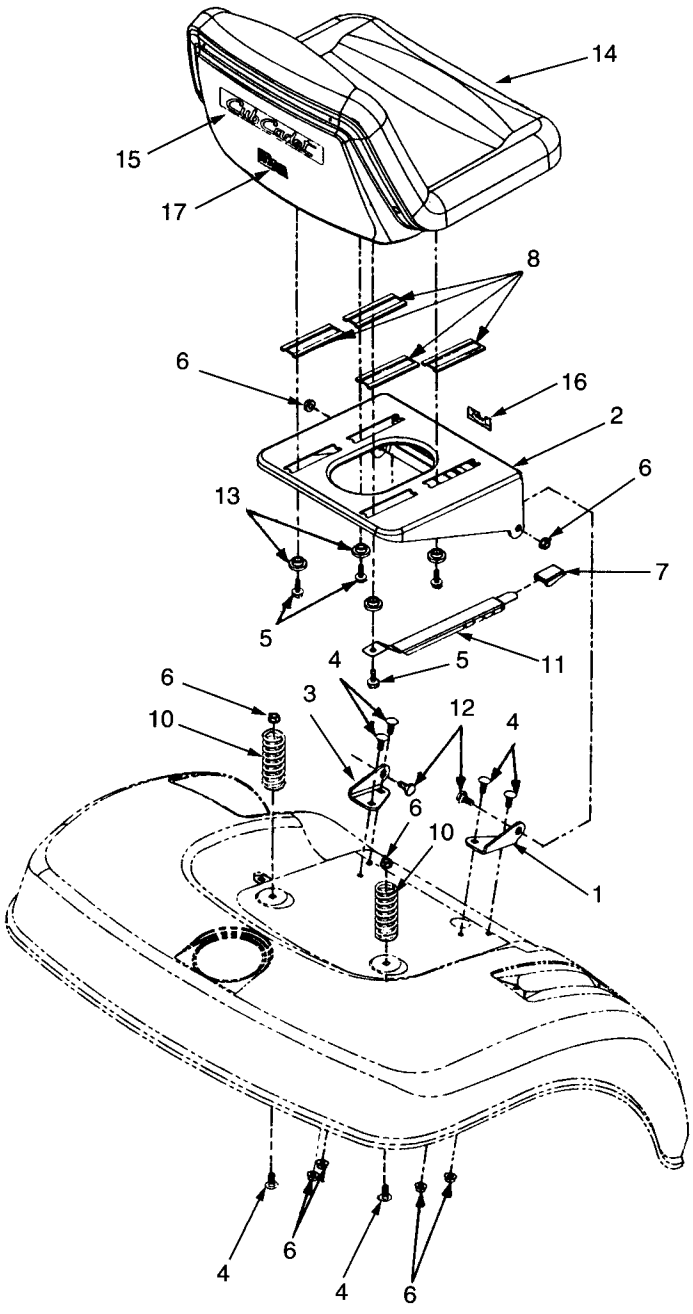
5-11.4 **Inspection.** Clean all parts prior to inspection.

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.

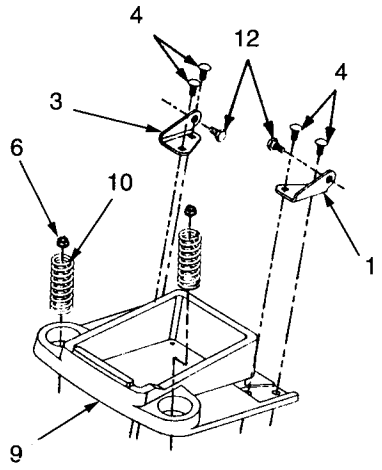
5-11.5 **Repair.**

CAUTION

Do not attempt to remove the plastic retaining



Models 2160, 2165, and 2185



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 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).

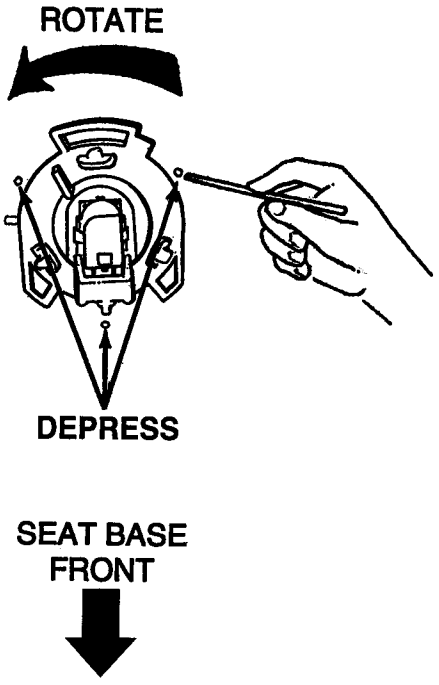


Figure 5-13. Seat Switch Removal (All Models).

5-11.7 **Installation.**

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

NOTE

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.

NOTE

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

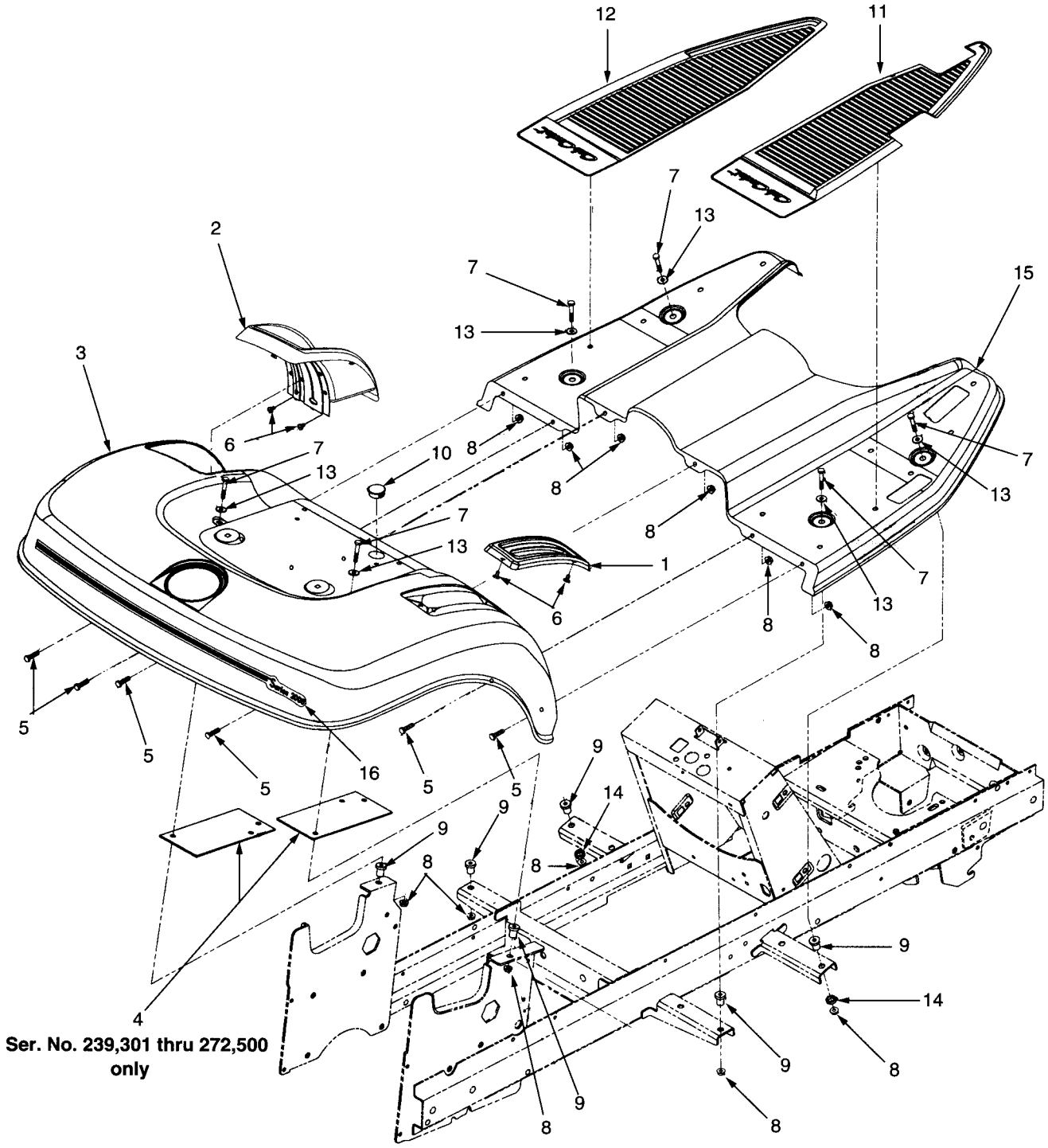
If assistance is available, it is recommended that two people lift the fender and running board assembly both off and onto tractor.

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

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 (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.

NOTE

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

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.

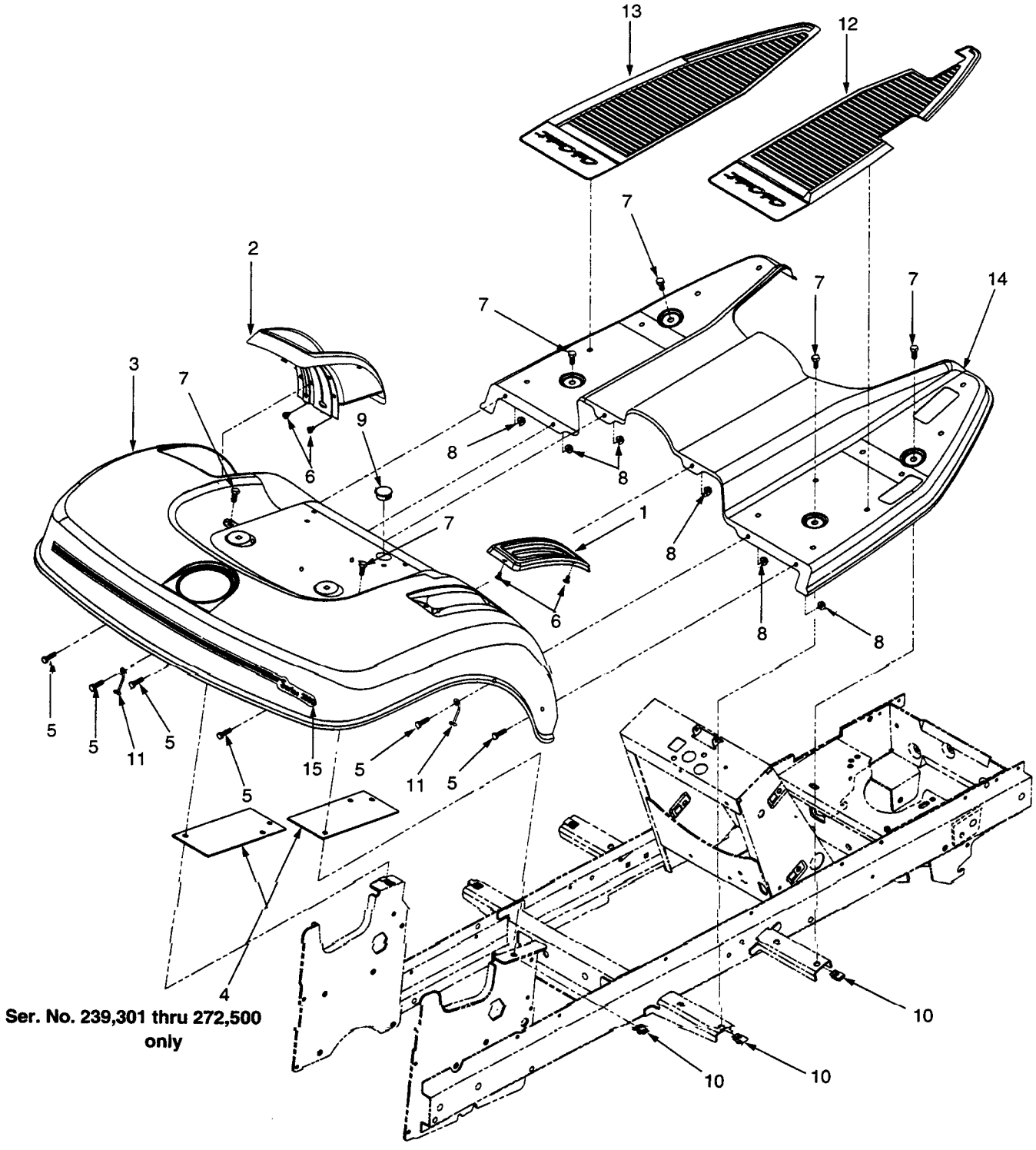
1. Release the parking brake.
2. Remove the forward drive pedal per paragraph 5-19.2
3. Remove the brake pedal per paragraph 5-19.2.
4. Remove the reverse pedal pad per paragraph 5-19.2.
5. Loosen the jam nut and remove the shifter knob per paragraph 5-20.2 or 5-21.2.
6. Disconnect the wire harness from 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.

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.



Ser. No. 239,301 thru 272,500 only

1. Shifter Cover
2. Implement Lift Cover
3. Fender
4. Fender Reinforcement Plate
5. Hex Cap Screw
6. Hex Tapp Screw
7. Hex Washer Hd. Tapp Screw
8. Hex Flange Lock Nut
9. Snap Bushing
10. U-Nut
11. Retainer Hook
12. RH Foot Pad
13. LH Foot Pad
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 pargraph 5-31.2.

5. Disconnect the choke control (16) from the engine per pargraph 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.

NOTE

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 bullkhead.

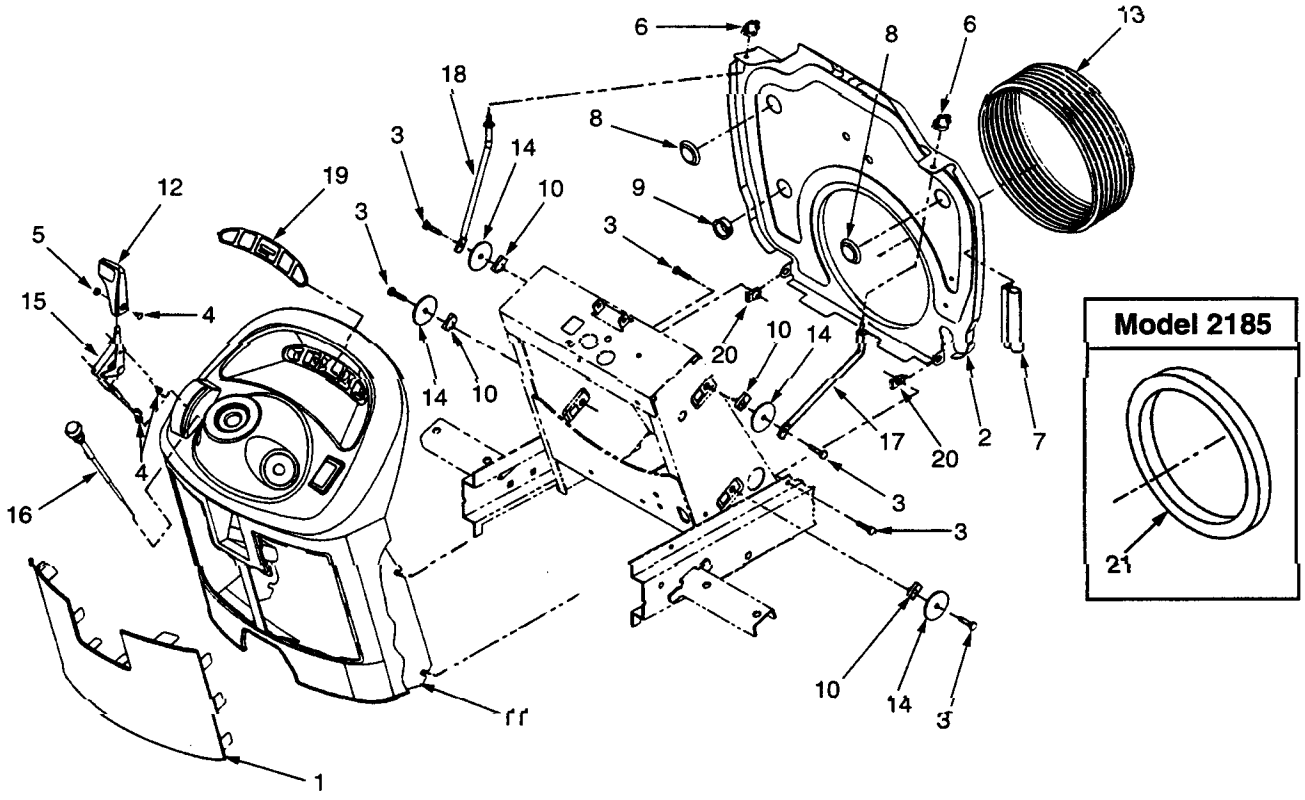
4. Remove the U-type speed nuts (20) from the bulkhead.

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 bullkhead 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.



1. **Dash Intake Screen**
2. **Bulkhead**
3. **Hex Cap Screw**
4. **Truss Hd. Screw**
5. **Hex Nut**
6. **Wing Nut**
7. **Push-on Seal Trim**
8. **Button Plug**
9. **Snap Bushing**
10. **U-Clip Nut**
11. **Dash Panel**
12. **Throttle Knob**
13. **Intake Boot**
14. **Flat Washer**
15. **Throttle Control**
16. **Choke Control**
17. **RH Mounting Rod**
18. **LH Mounting Rod**
19. **Dash Label**
20. **U-Type Speed Nut**
21. **Foam Sealing Ring**

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.

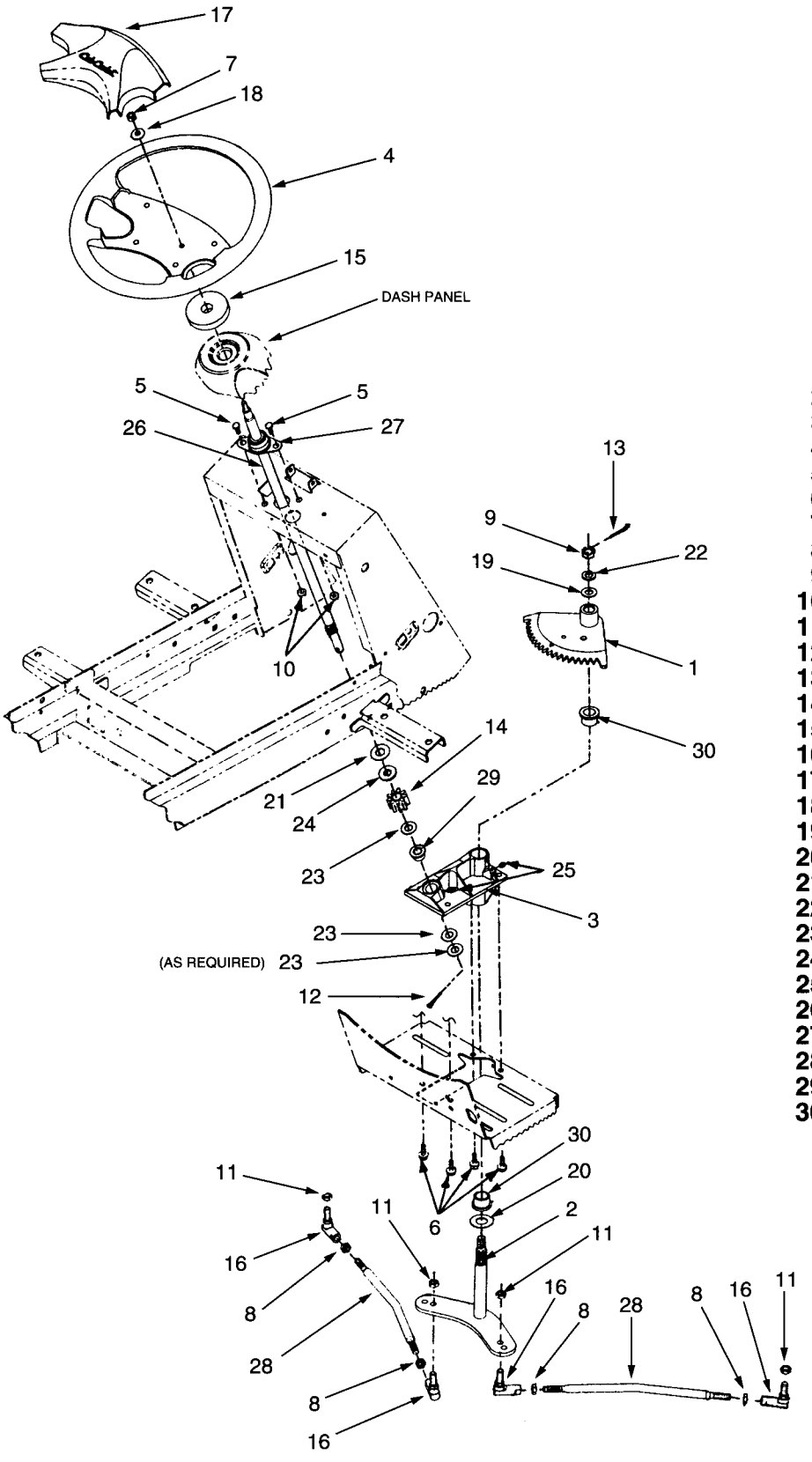
   d. Carefully withdraw the steering shaft from the top of the dash panel.

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



1. Steering Segment Gear
2. Lower Steering Arm
3. Steering Housing
4. Steering Wheel
5. Hex Cap Screw
6. Hex Wash. Hd. Tapp Screw
7. Hex Center Lock Nut
8. Hex Jam Nut
9. Hex Slotted Nut
10. Hex Flange Lock Nut
11. Hex Lock Nut
12. Cotter Pin
13. Cotter Pin
14. Steering Pinion Gear
15. Steering Gasket
16. Ball Joint
17. Steering Wheel Insert
18. Bell Washer
19. Flat Washer
20. Flat Washer
21. Flat Washer
22. Lock Washer
23. Flat Washer
24. Rubber Flat Washer
25. Lube Fitting
26. Steering Shaft
27. Bearing Flange Assy.
28. Tie Rod
29. Flange Bearing
30. Bronze Flange Bearing

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 loooseness 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.

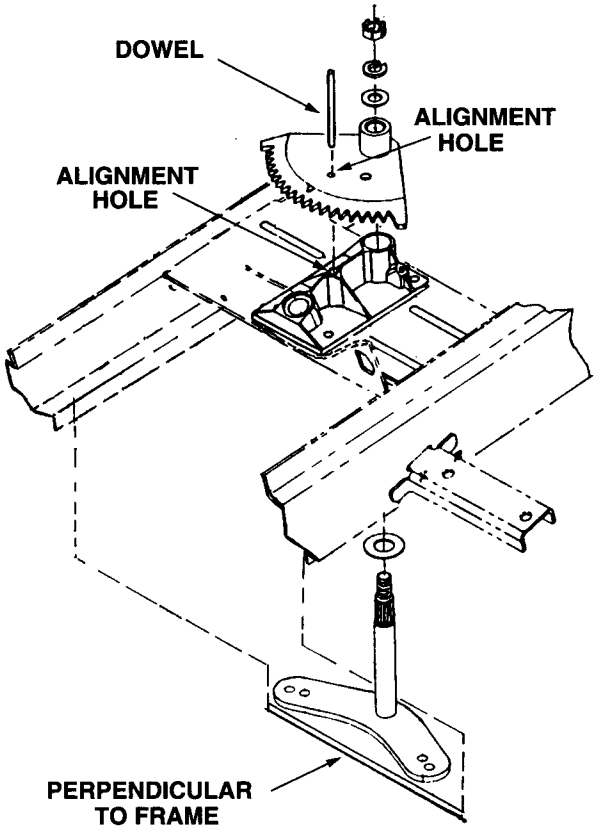


Figure 5-18. Aligning Steering Gear With Lower Steering Arm.

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).

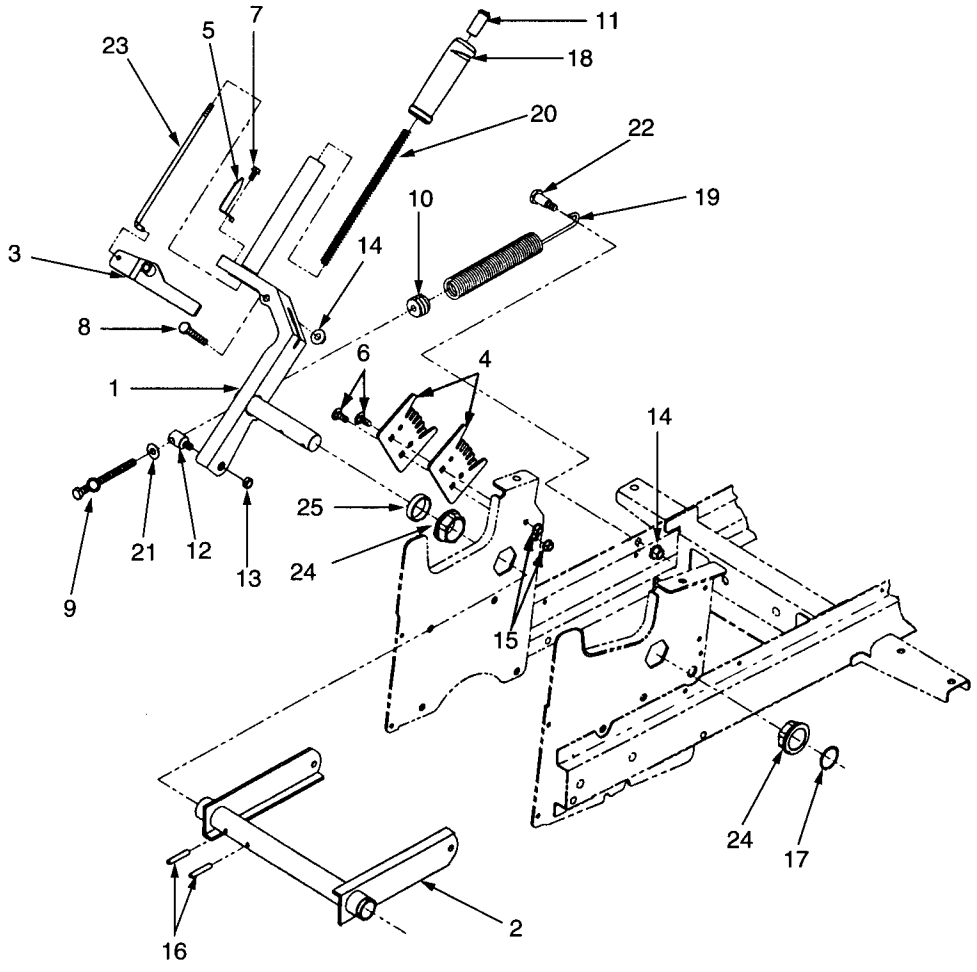
5-16.1 **General.** Remove the mower deck or any attachment connected to the lift system before beginning this procedure.

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

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 overtighten 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 installatiion 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.

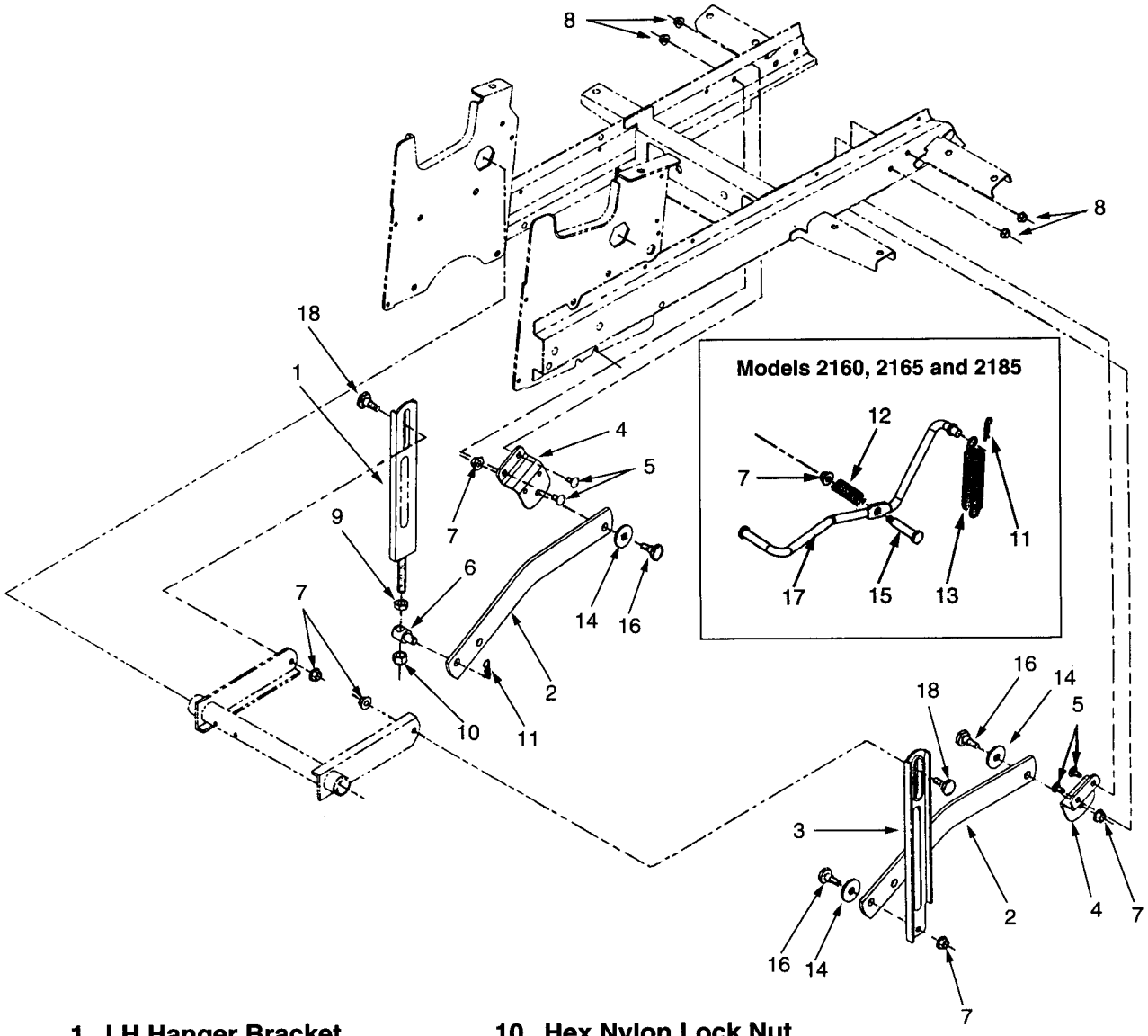
4. If applicable, check the LH and/or RH lift assist rod (17) for distortion or damage, and check the extension spring(s) (13) for damage or loss of tension, as indicated by irregular spacing between the coils.

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.**

NOTE

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.

NOTE

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 indicaton 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).

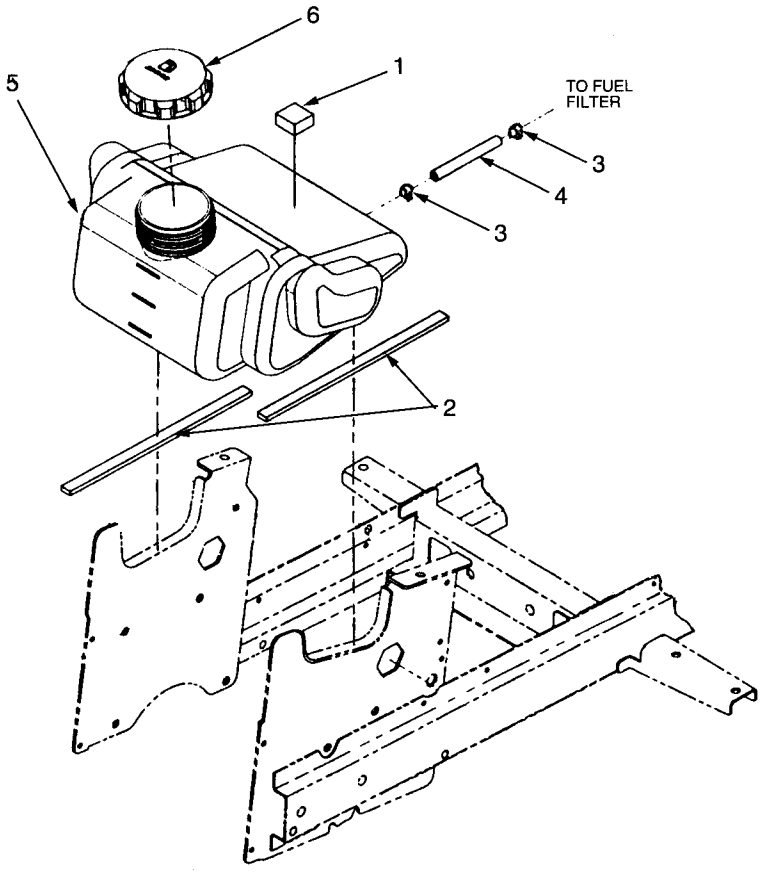
5-18.4 **Inspection.** Clean all parts prior to inspection.

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.



1. **Foam Block**
2. **Foam Tape**
3. **Hose Clamp**
4. **Fuel Line**
5. **Fuel Tank**
6. **Fuel Tank Cap**

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

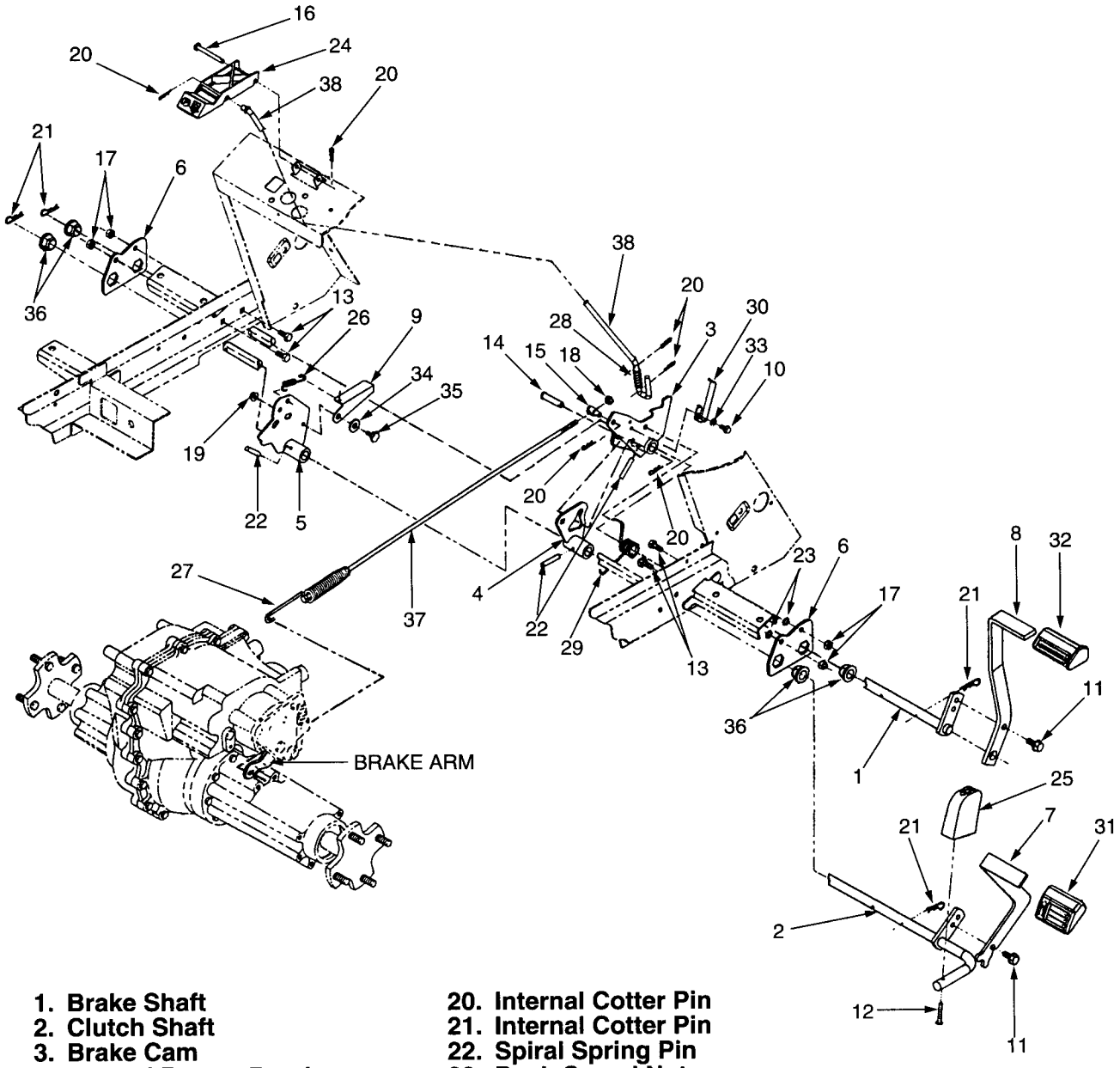
The following step c. applies only to Models 2130, 2140, and 2160.

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

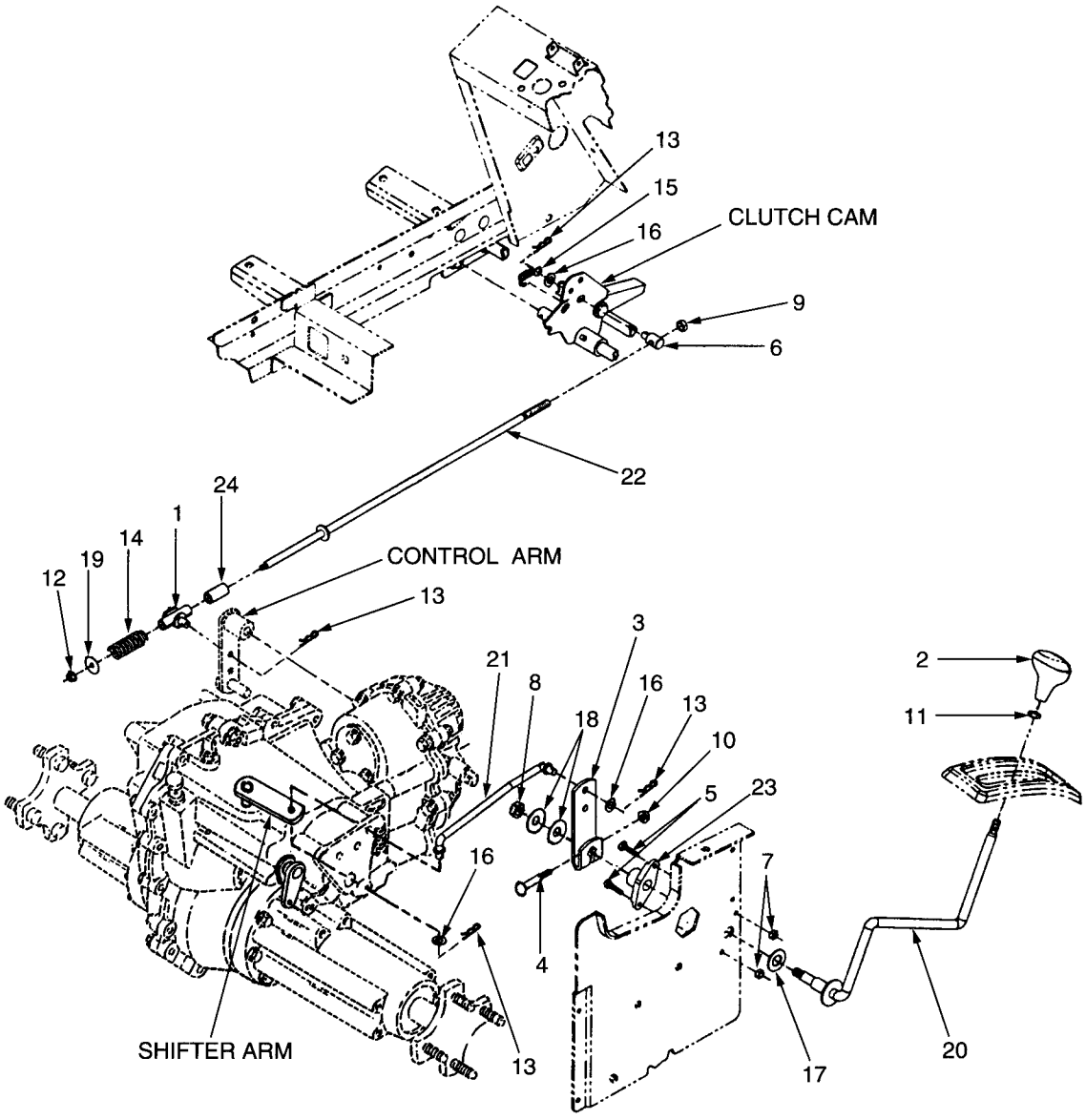
NOTE

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
2. Shifter Knob
3. Gear Shift Bracket
4. Carriage Bolt
5. Hex Cap Screw
6. Adjustment Ferrule
7. Hex Sems Nut
8. Hex Lock Nut
9. Hex Jam Nut
10. Hex Flange Top Lock Nut
11. Hex Jam Nut
12. Hex Flange Lock Nut
13. Internal Cotter Pin
14. Compression Spring
15. Extension Spring
16. Flat Washer
17. Flat Washer
18. Bell Washer
19. Flat Washer
20. Speed Control Lever
21. Gear Shift Rod
22. Clutch Adjustment Rod
23. Control Lever Bushing
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.

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).

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 contol 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

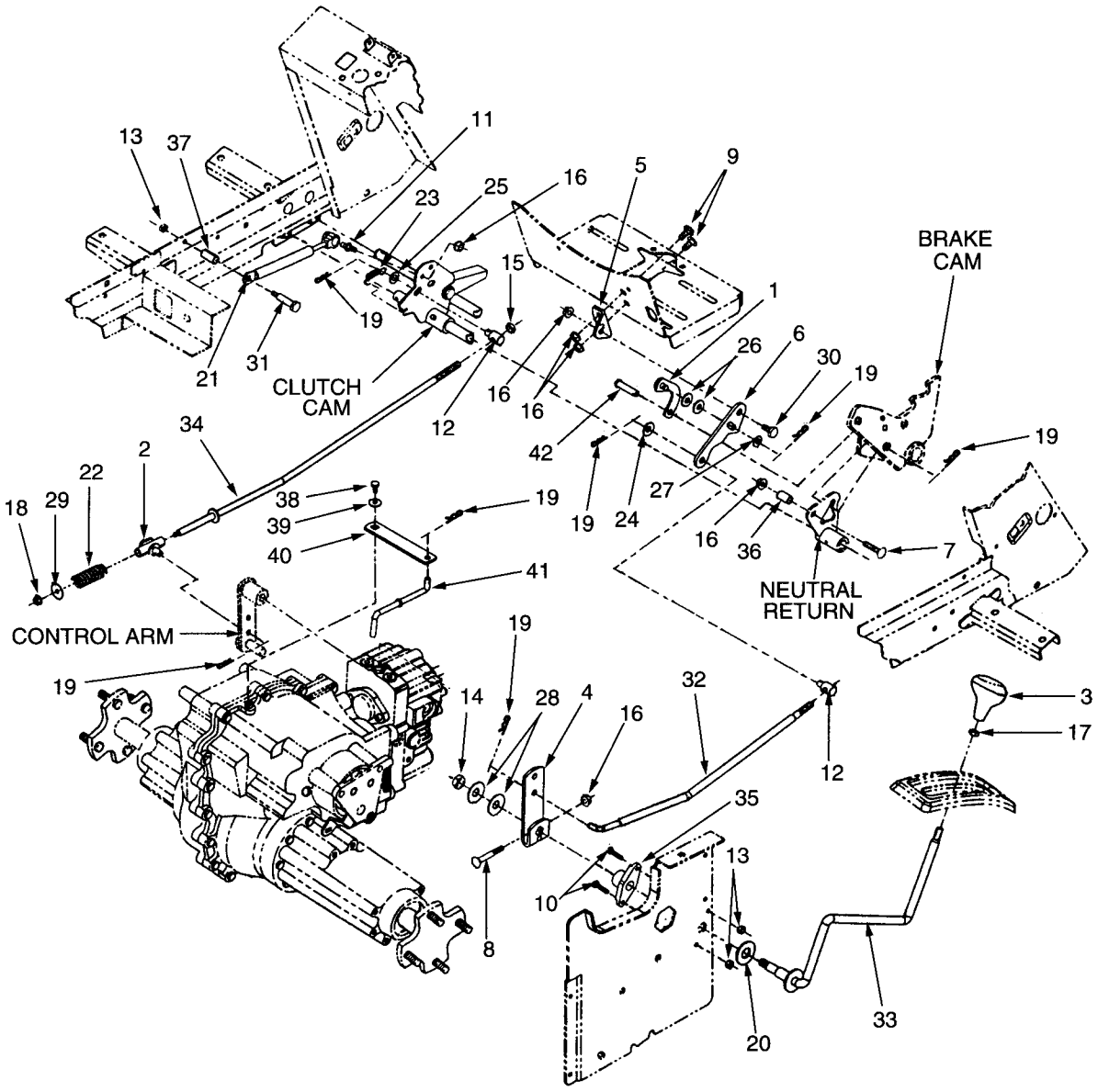
Place the tractor on a flat surface and chock the wheels when releasing the parking brake.

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).



1. Cruise Return Bracket
2. Pivot Sleeve
3. Shifter Knob
4. Gear Shift Bracket
5. Cruise Pivot Bracket
6. Hydro Cruise Cam
7. Carriage Bolt
8. Carriage Bolt
9. Carriage Bolt
10. Hex Cap Screw
11. Ball Screw
12. Adjustment Ferrule
13. Hex Sems Nut
14. Hex Jam Lock Nut
15. Hex Jam Nut
16. Hex Flange Top Lock Nut
17. Hex Jam Nut
18. Hex Flange Lock Nut
19. Internal Cotter Pin
20. Friction Washer
21. Damper Cylinder
22. Compression Spring
23. Extension Spring
24. Bell Washer
25. Flat Washer
26. Flat Washer
27. Flat Washer
28. Bell Washer
29. Flat Washer
30. Shoulder Bolt
31. Shoulder Bolt
32. Hydro Stop Rod
33. Cruise Control Lever
34. Hydro Adjustment Rod
35. Control Lever Bushing
36. Spacer
37. Split Tubing Spacer
38. Hex Cap Screw
39. Bell Washer
40. Hydro Dump Arm
41. Hydro Disengagement Rod
42. Clevis Pin

Figure 5-24. Hydro Transmission Controls (Models 2135, 2145, 2165, and 2185).

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 traingular 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 barrrel 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.

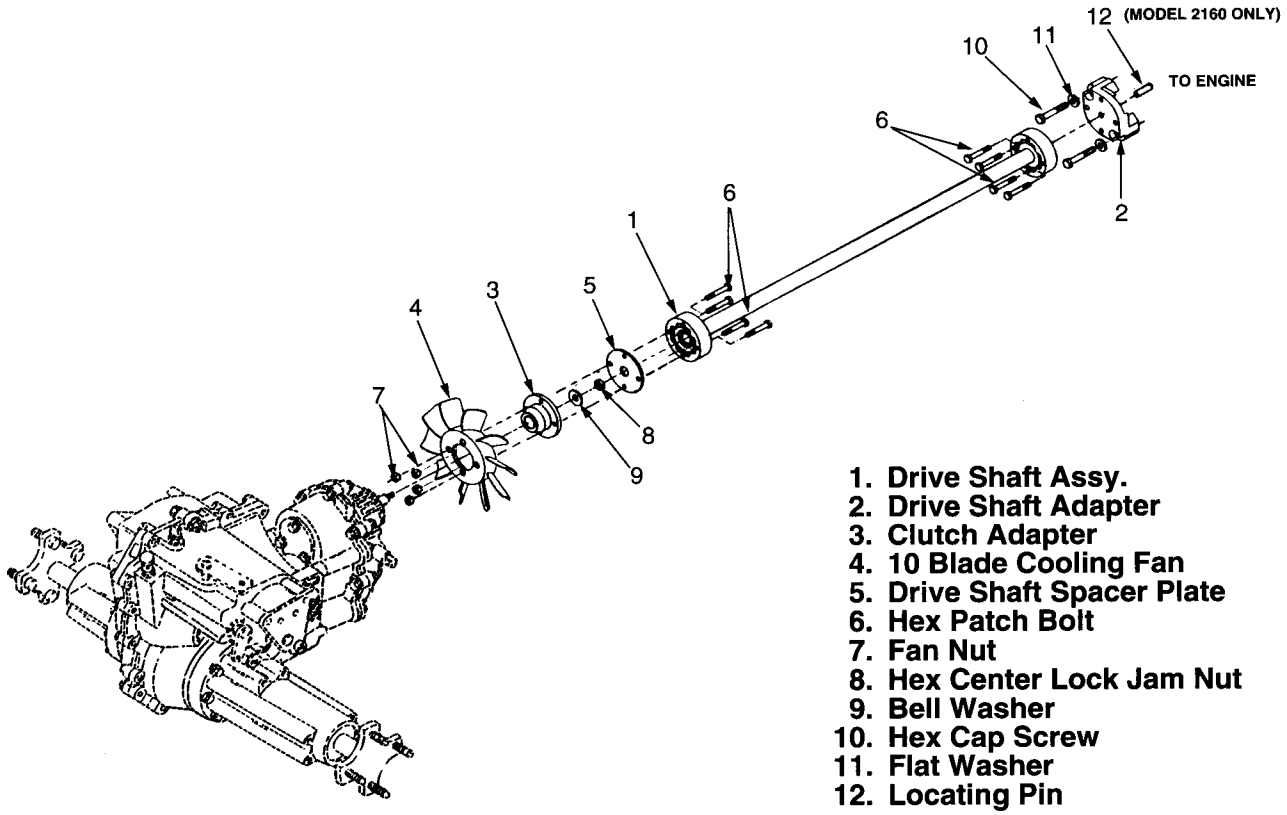


Figure 5-25. Drive Line (Models 2130, 2140 and 2160).

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 slighly 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.

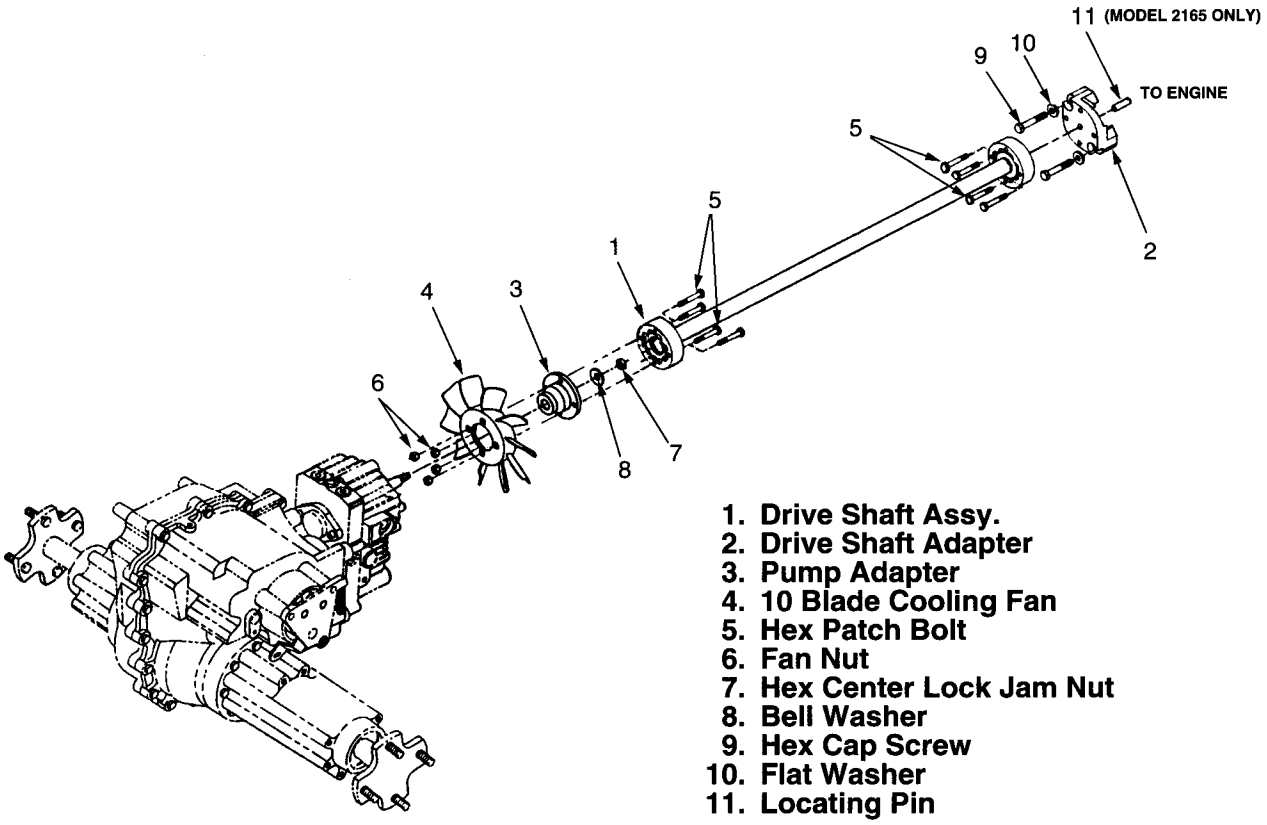
3. Remove the fender and running board per paragraph 5-12.2 or 5-13.2.
4. Remove the steering wheel per paragraph 5-15.2.
5. Loosen the four hex cap screws and large flat washers (3 and 14, Fig. 5-16) securing the dash panel to the pedestal.
6. Remove the drive shaft assy. (1, Fig. 5-26) as follows:

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 sceen 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 barrrel 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 slighly 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.

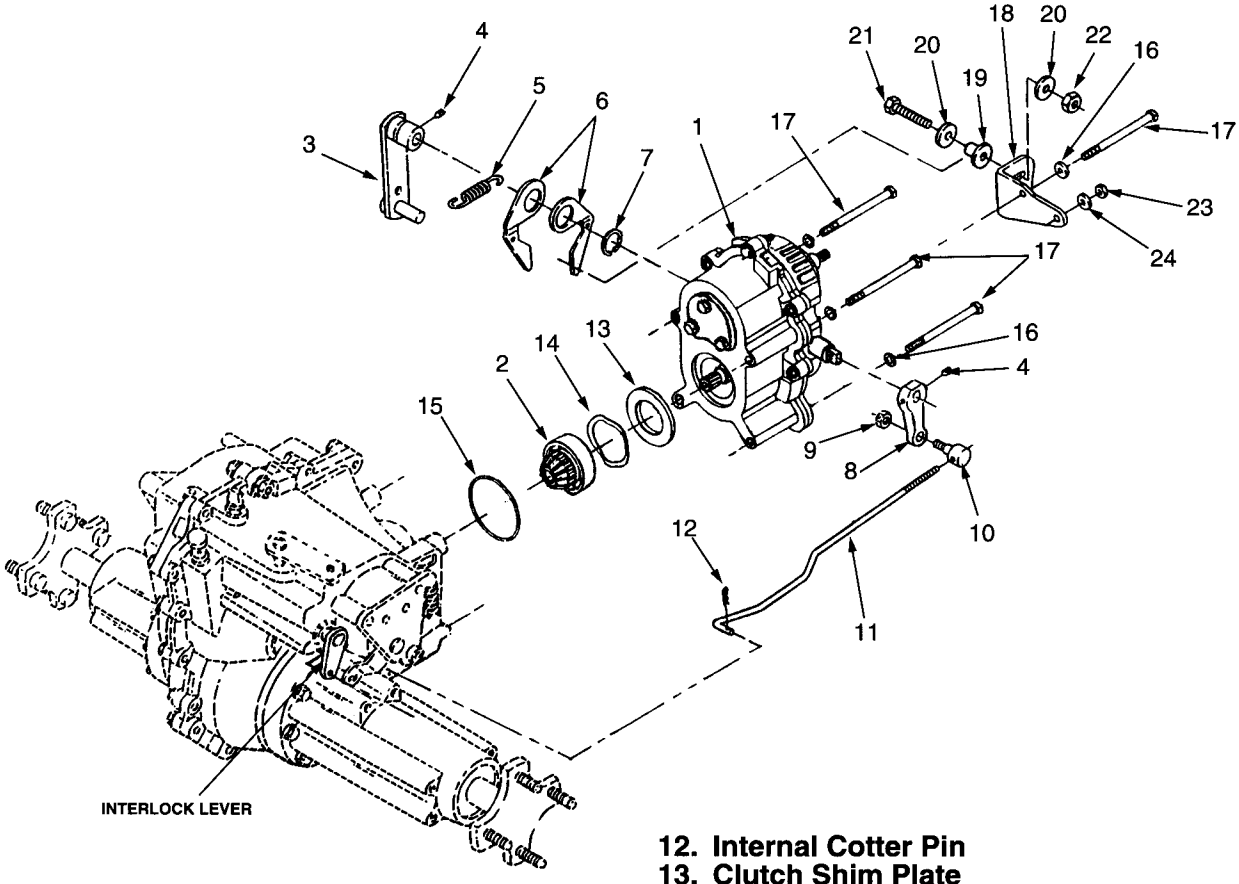
5-24.2 **Removal.**

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

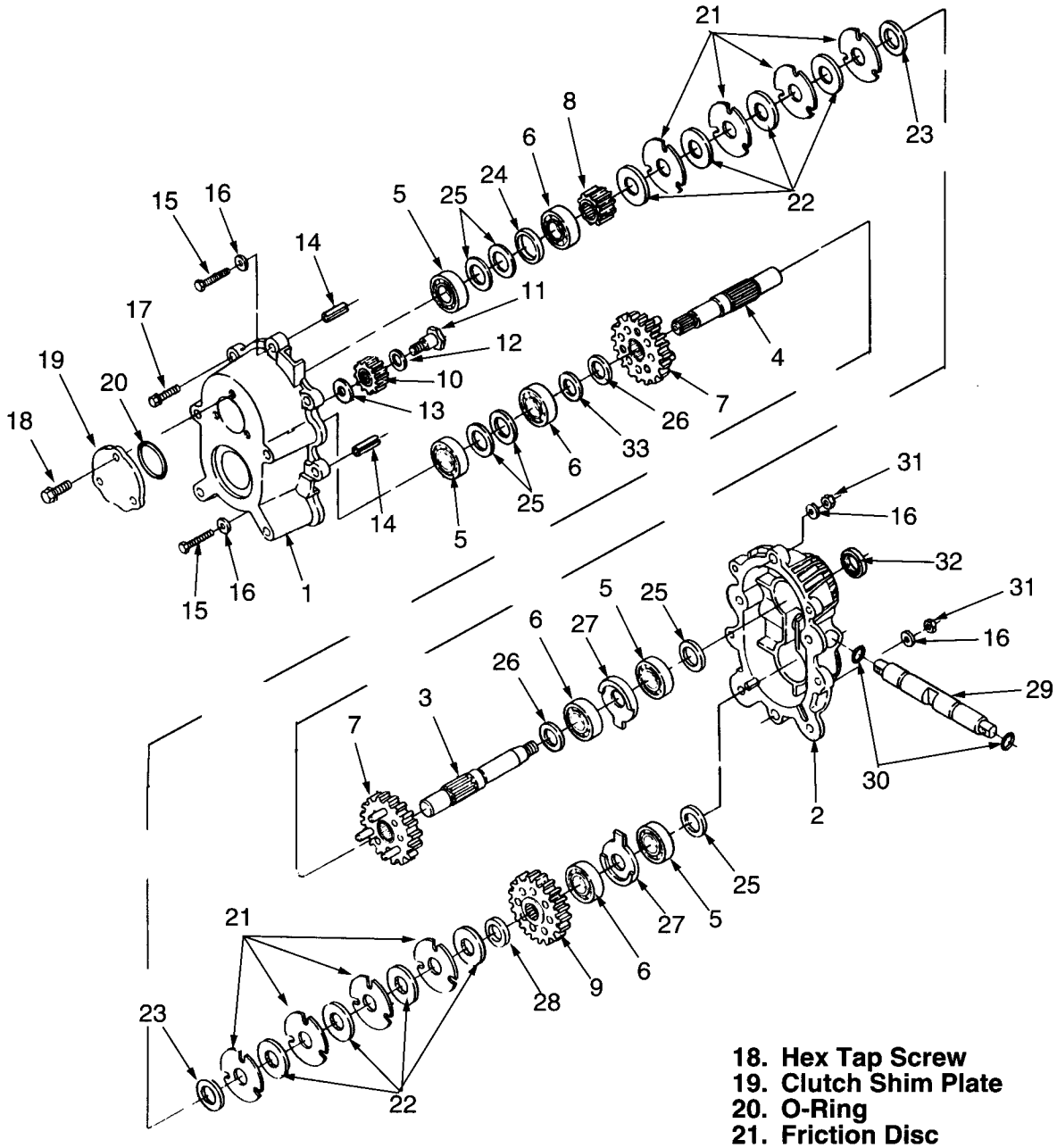
A holding fixture, made from a piece of 2" x 6" wood with a drilled hole large enough to insert the input shaft, will facilitate disassembly of the clutch assembly.

   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 guage, 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 installl 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.

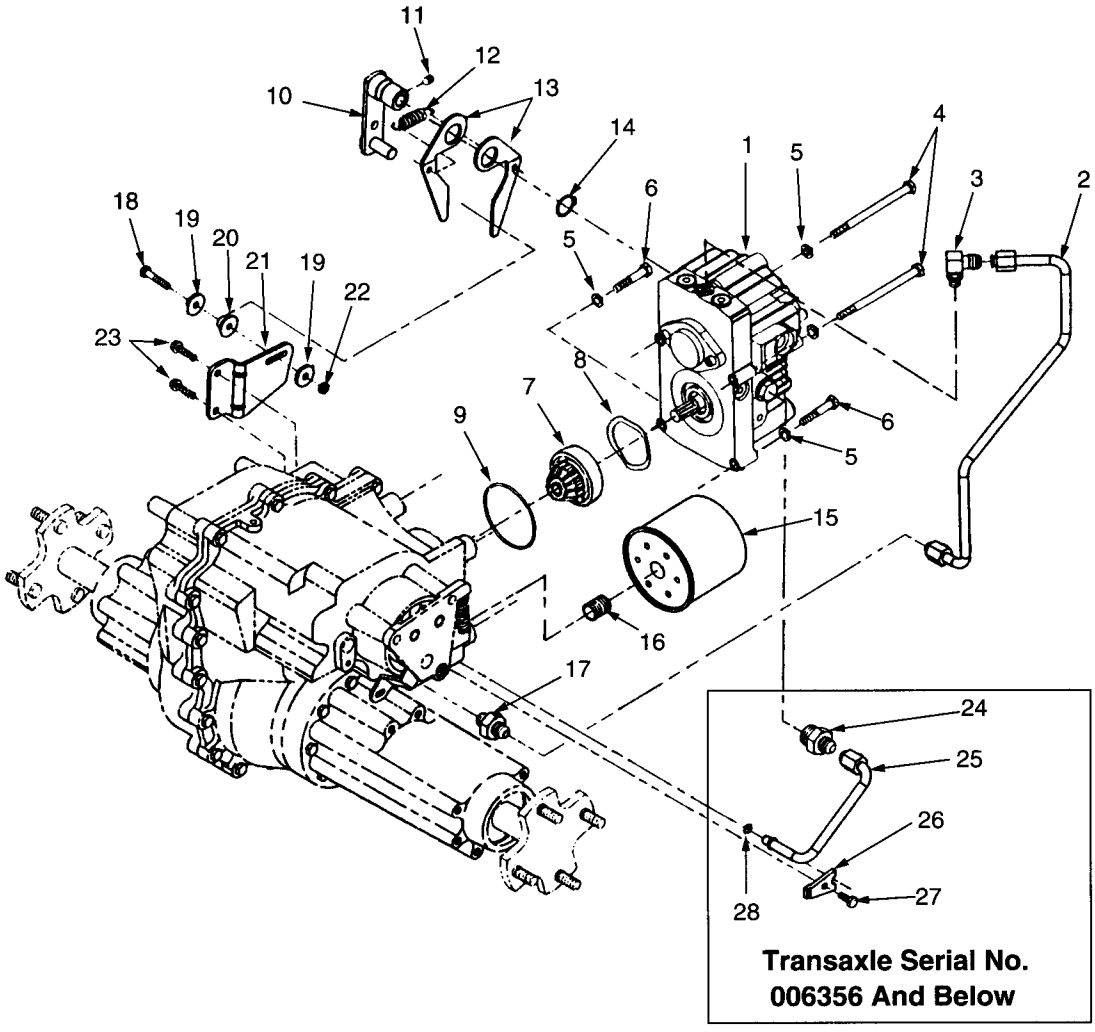
5-25.2 **Removal.**

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

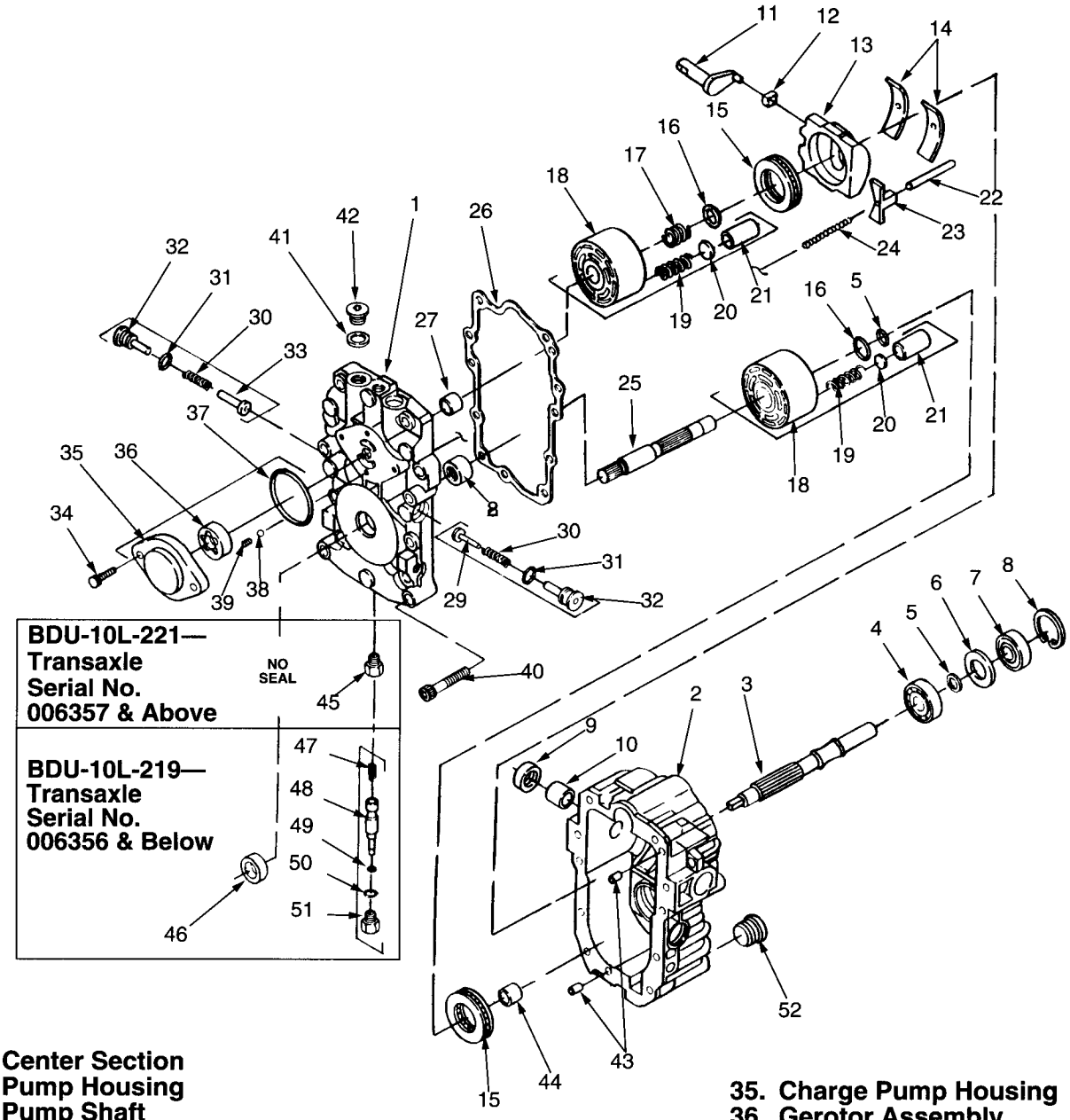
   b. Remove the snap ring (14) and slide the neutral arms (13) off the control arm.

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

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 swashplate 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.

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.
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).

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 transmisson 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 transmisson.

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).

5-26.1 **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.

5-26-2 **Removal.**

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.

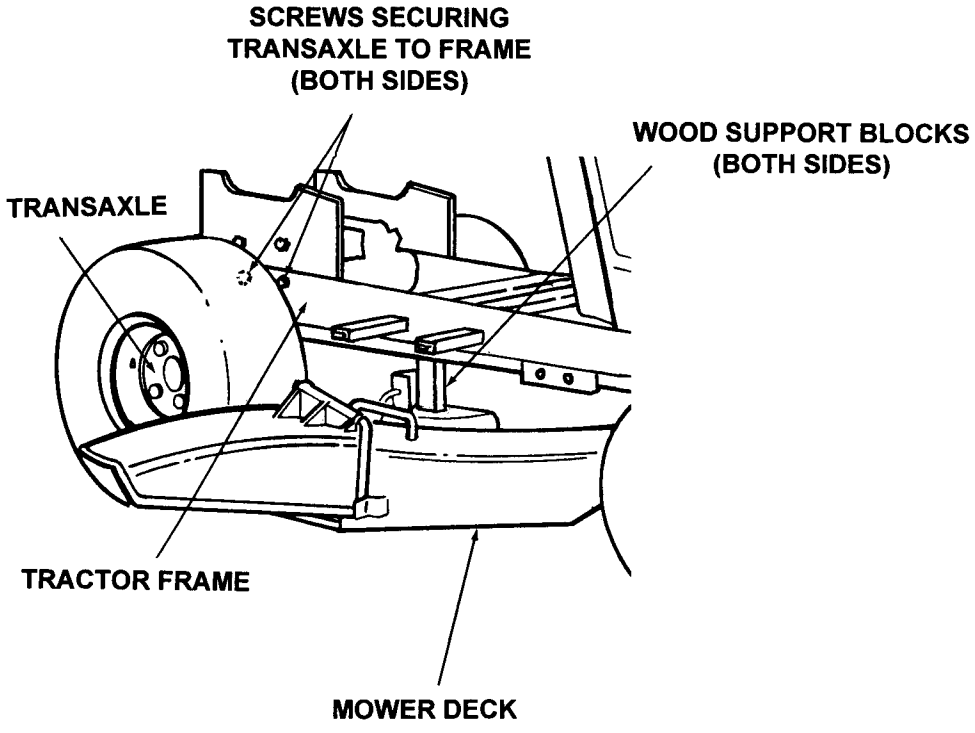


Figure 5-31. Blocking the Deck.

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.

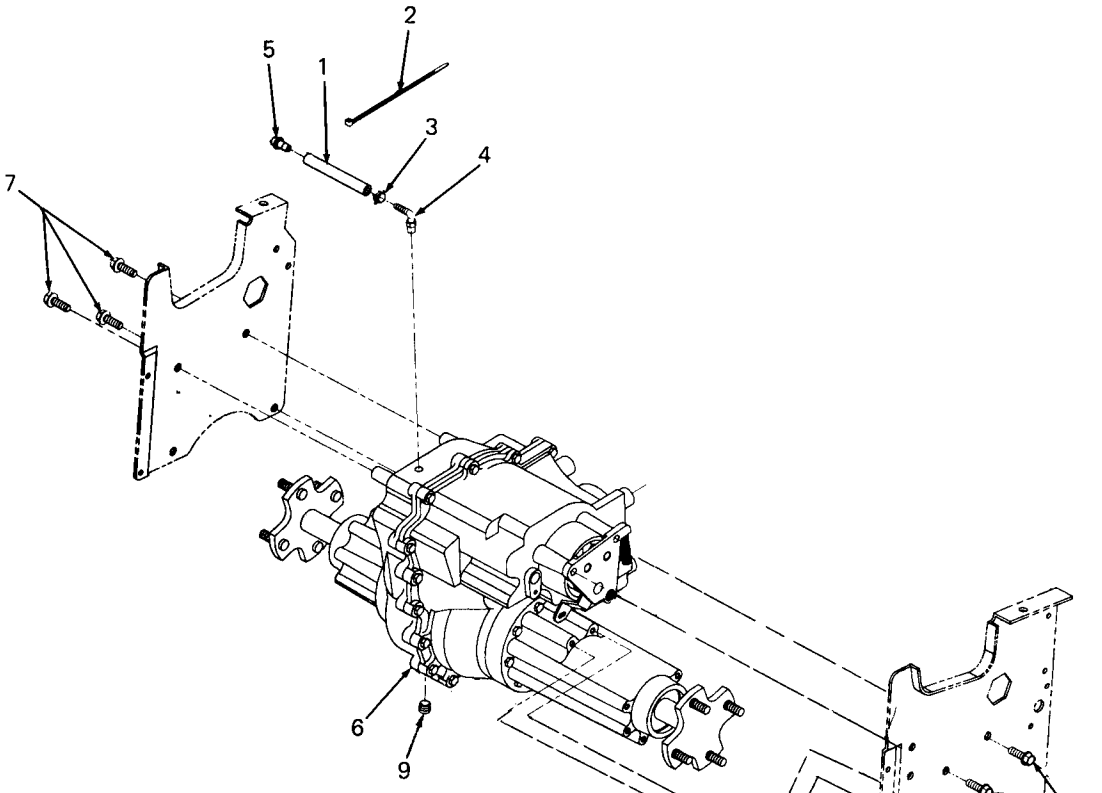
3. Inspect the vent (11) for dirt, paint, corrosion, or other damage.
4. Inspect the breather tube (1) for brittleness, deterioration, or other damage.

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.



1. **Breather Tube**
2. **Self-Clinch Cable Tie**
3. **Hose Clamp**
4. **Elbow Fitting**
5. **Vent**
6. **Transaxle**
7. **Hex Wash. Tapp Screw**
8. **Hex Wash. SF-Tapp Screw**
9. **Plug**

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.**

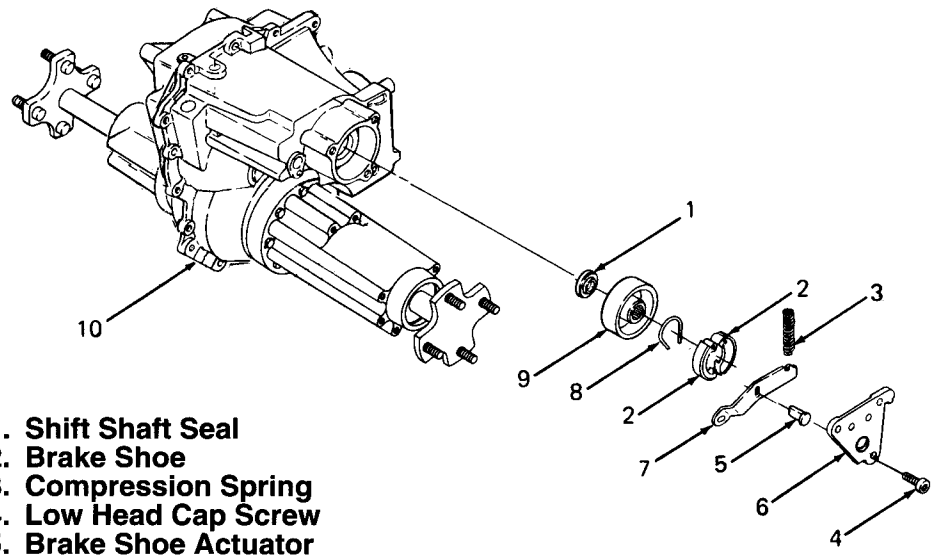
1. Remove the transaxle from the tractor per paragraph 5-26.2.
2. Remove the low head cap screw (4, Fig. 5-33) securing the brake assembly components (2, 3, 5, 6, 7, and 8) to the transaxle (10), then remove the brake assembly.
3. Remove the brake drum (9) from the transaxle (10).
4. If leaking oil,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



1. **Shift Shaft Seal**
2. **Brake Shoe**
3. **Compression Spring**
4. **Low Head Cap Screw**
5. **Brake Shoe Actuator**
6. **Brake Plate**
7. **Brake Arm**
8. **Brake Spring**
9. **Brake Drum**
10. **Transaxle**

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.**

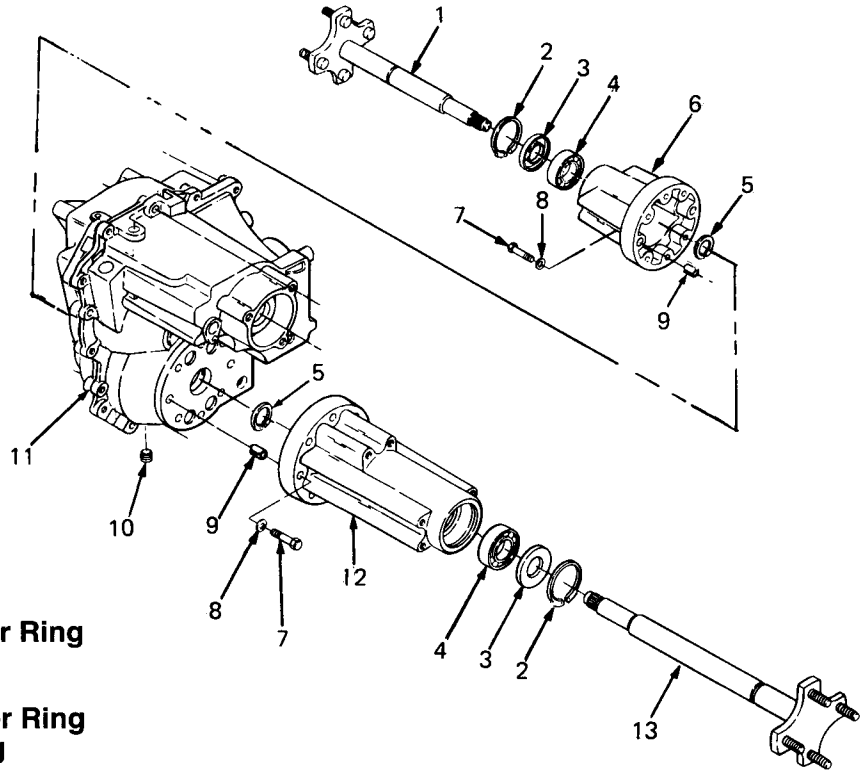
1. Place the large, flanged end of the axle housing (6 or 12) on a clean workbench. Use care to avoid damage to the machined sealing surface of the housing.

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).



1. **LH Axle**
2. **Inverted Retainer Ring**
3. **Oil Seal**
4. **Bearing**
5. **External Retainer Ring**
6. **LH Axle Housing**
7. **Hex Screw**
8. **Bell Washer**
9. **Dowel Bushing**
10. **Oil DrainPlug**
11. **Transaxle Housing**
12. **RH Axle Housing**
13. **RH Axle**

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.

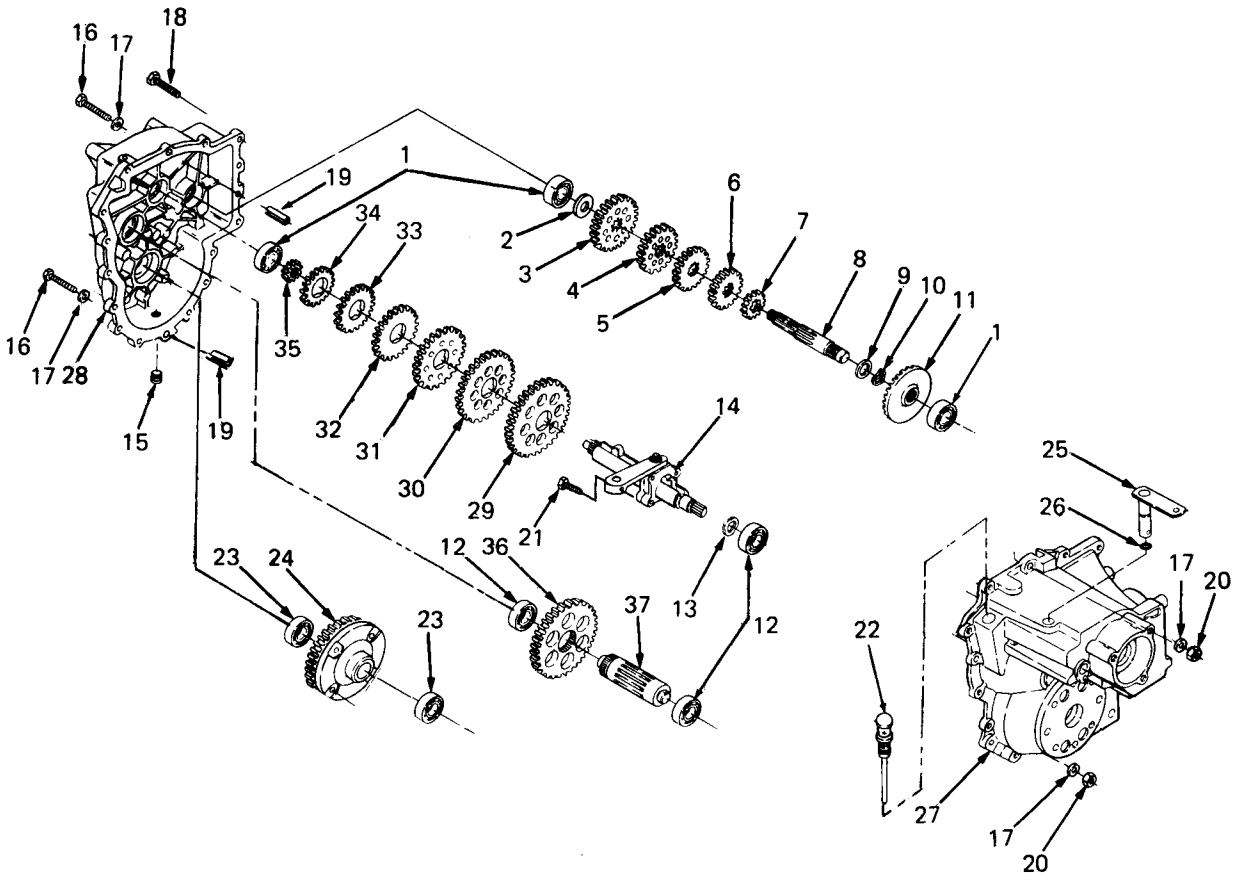
5-29.2 **Removal.**

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

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 rearmost 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).

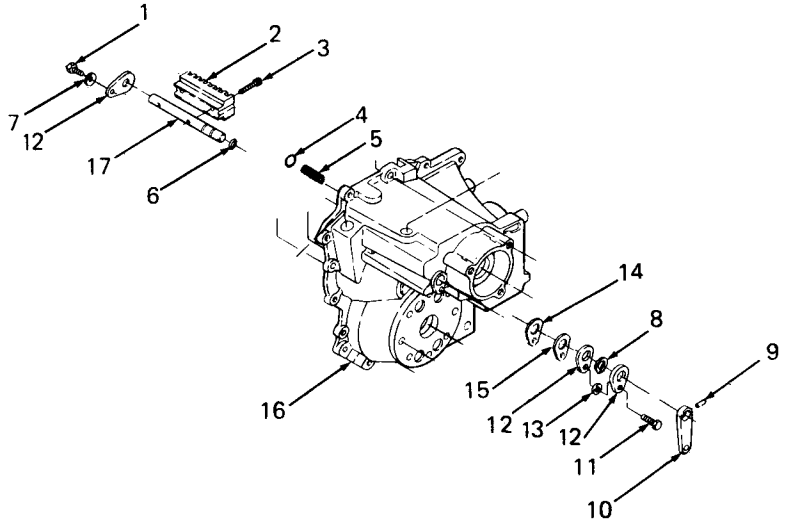
d. Slide the second interlock shaft support (12) and the interlock shaft shim(s) (14 and 15, if used) from the interlock shaft (17).

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).

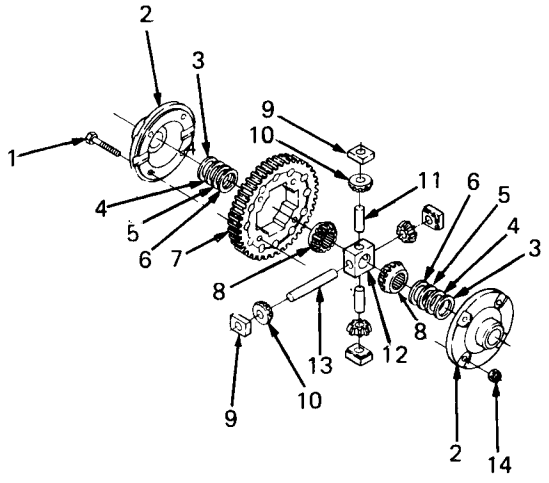
NOTE

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.

NOTE

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.

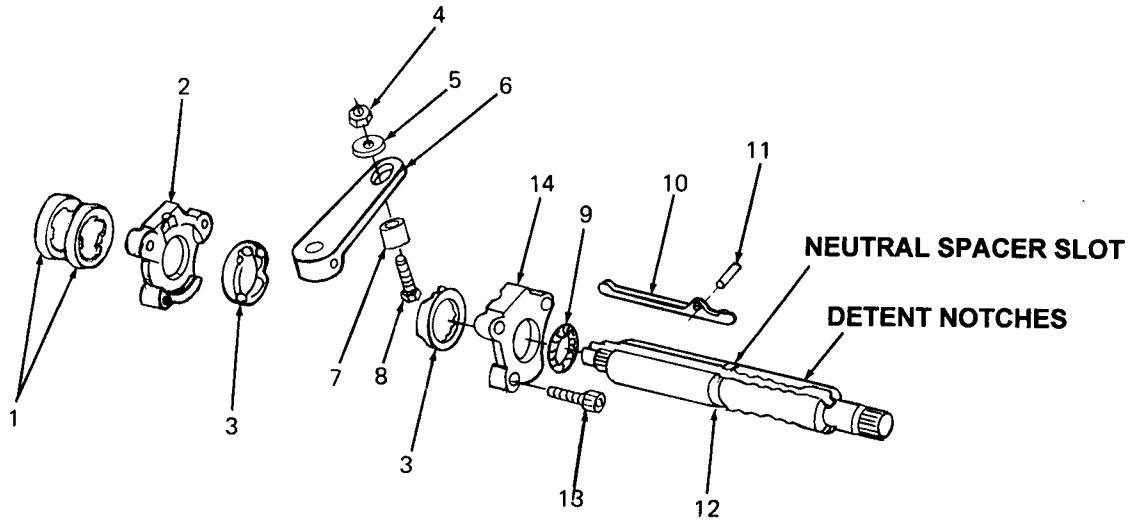
NOTE

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.

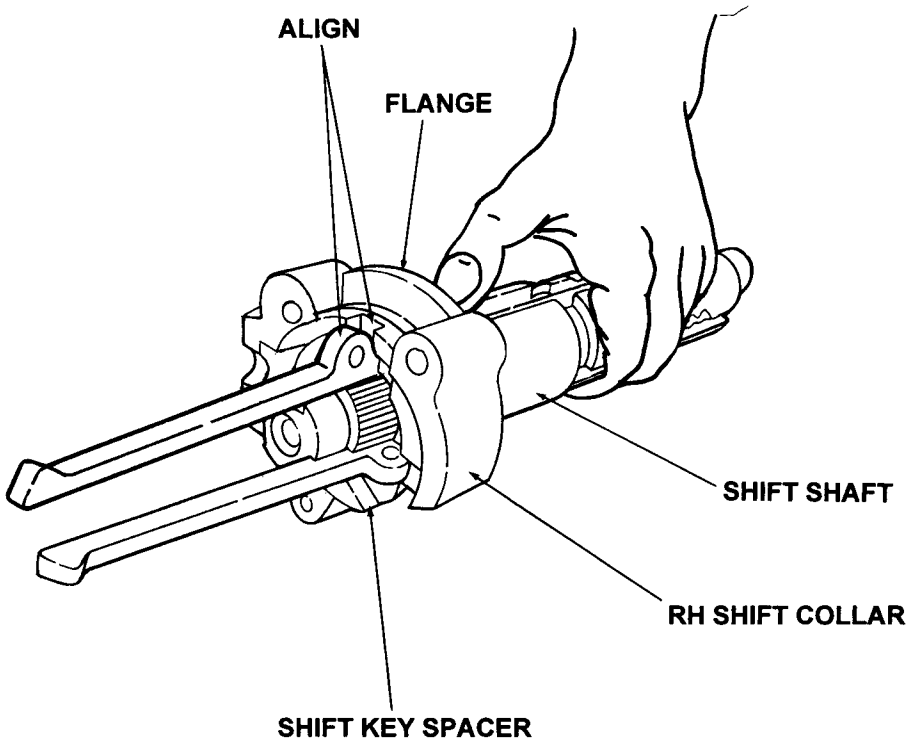


Figure 5-39. Installing Shift Keys (Models 2130, 2140 and 2160).

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. Llubricate 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 component 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

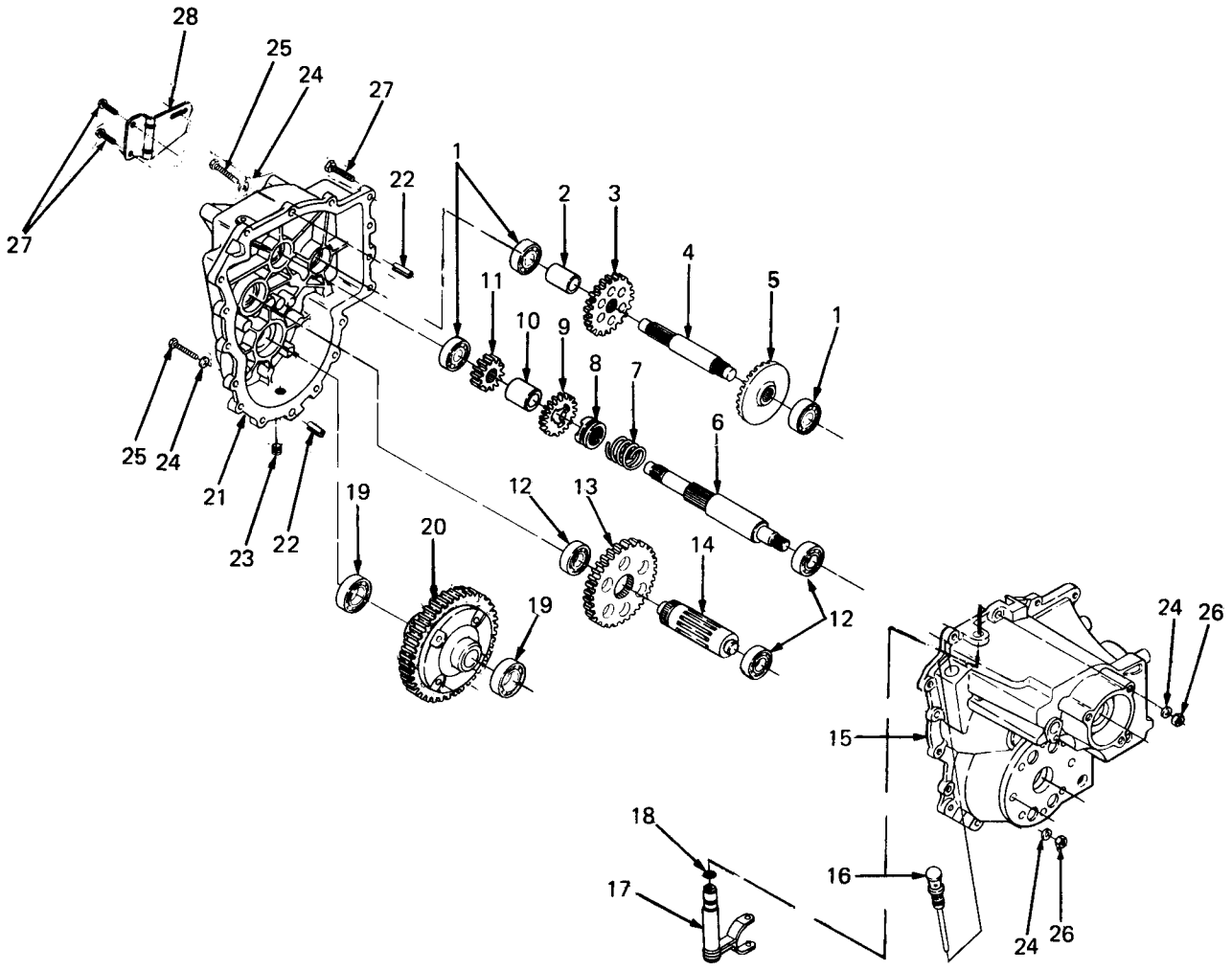
When separating the two transaxle housing halves, use care to avoid damage to the machined mating surfaces.

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

NOTE

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

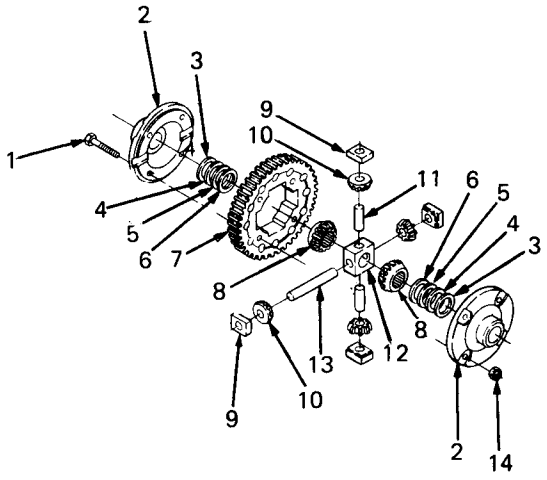
2. Remove the upper differential cover (2), upper flat washer (3, 4, 5 or 6), upper 14-tooth differential side gear (8).

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.**

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.

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).

NOTE

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 bulkhead) to prevent fuel from leaking.

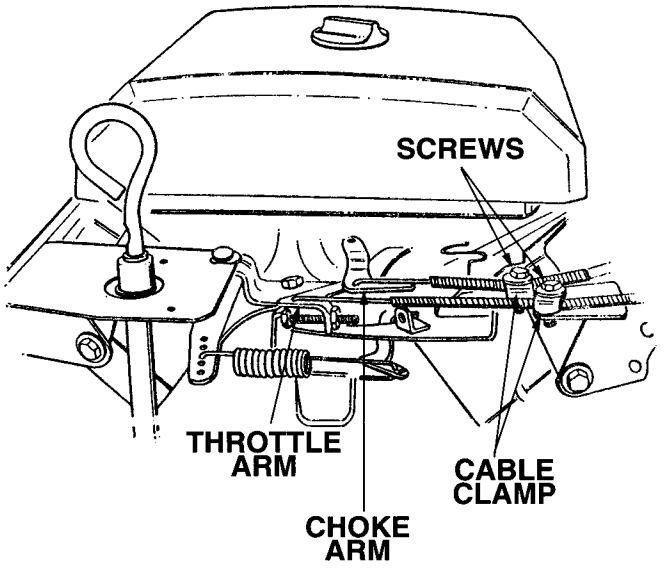


Figure 5-42. Engine Control Cables (Model 2185 shown).

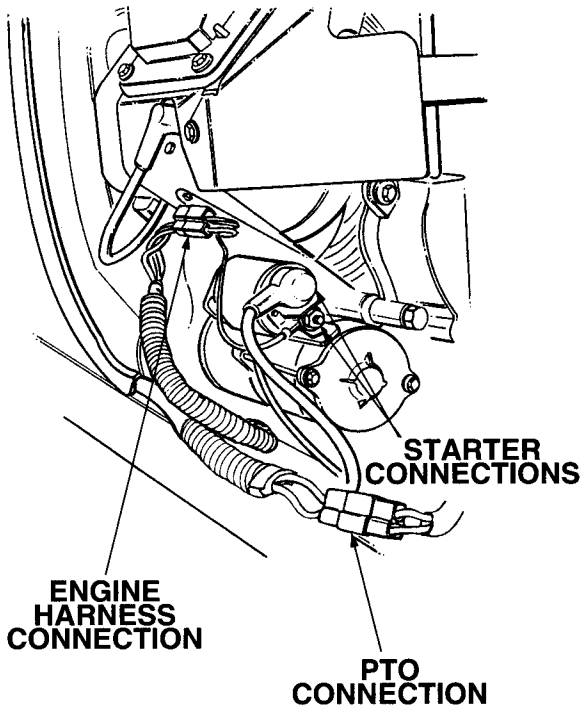


Figure 5-43. Wire Harness Connections (Model 2185 Shown).

7. Disconnect the drive shaft from the engine per paragraph 5-22.2 or 5-23.2.

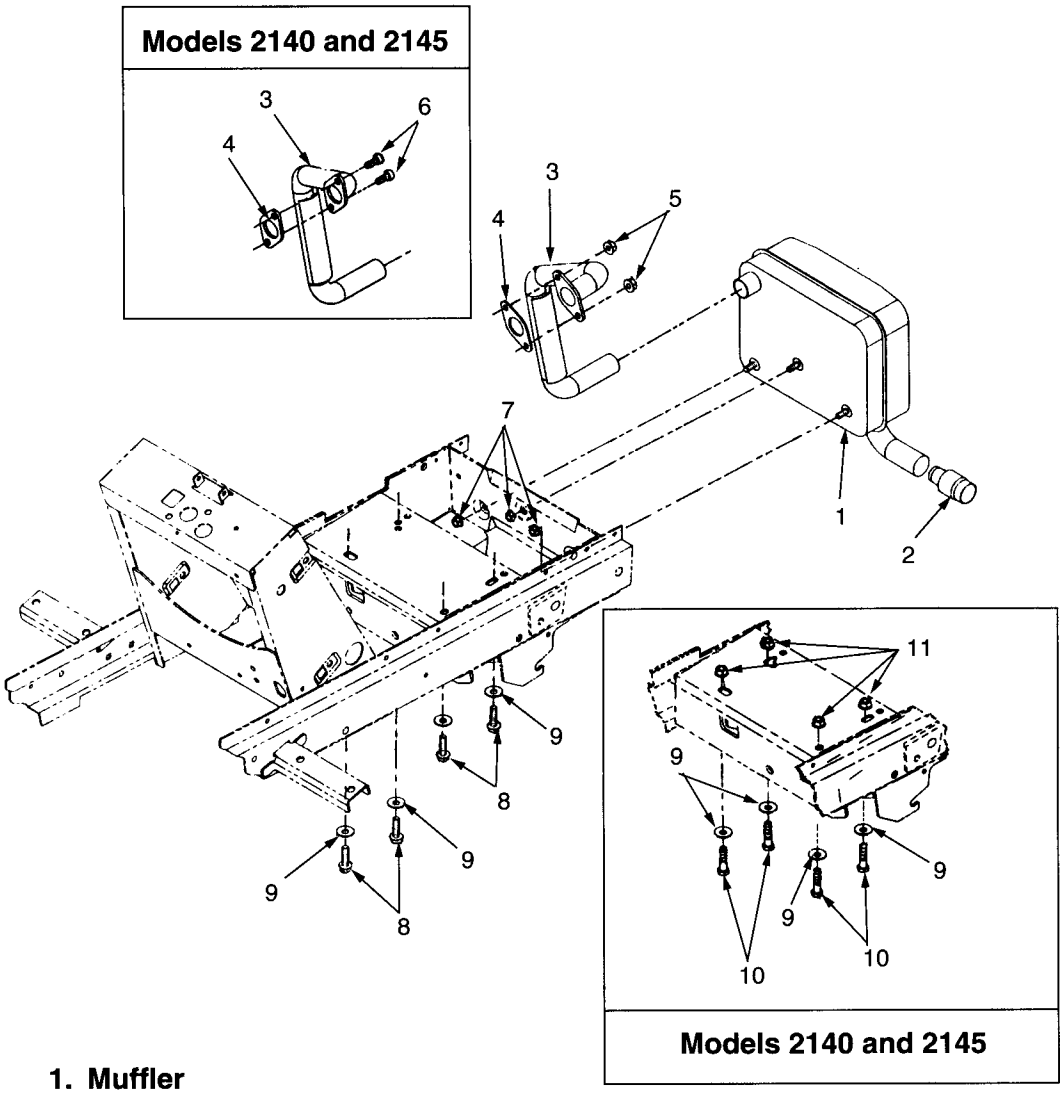
8. Remove the muffler (1, Fig. 5-44 and 5-45) by removing the three hex flange top lock nuts (7). Where used, separate the spark arrestor (2) from the muffler.

NOTE

The following step 9. applies only to Model 2185.

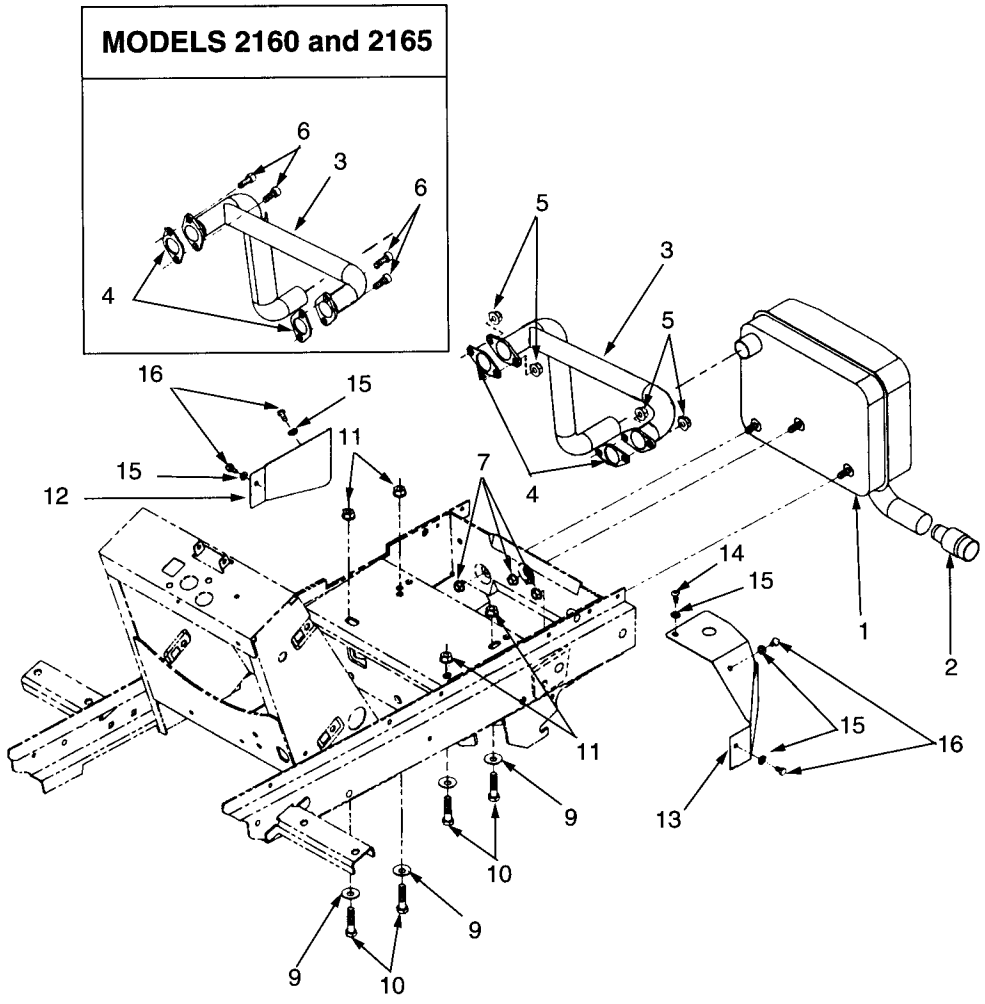
9. Remove the LH and RH heat baffles (12 and 13, Fig. 5-45) from the engine and throttle control bracket by removing the truss mach. tapp screw (14), hex cap screws (16) and flat washers (15). Note the location of the fuel line clamp when removing the LH baffle.

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).



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. Hex Wash. Hd Tapp Screw
9. Bell Washer
10. Hex Cap Screw
11. Hex Nut

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 ckoke 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 atttach rod (2) from the quick attach brackets on the bottom of the frame by removing 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 backet. 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.

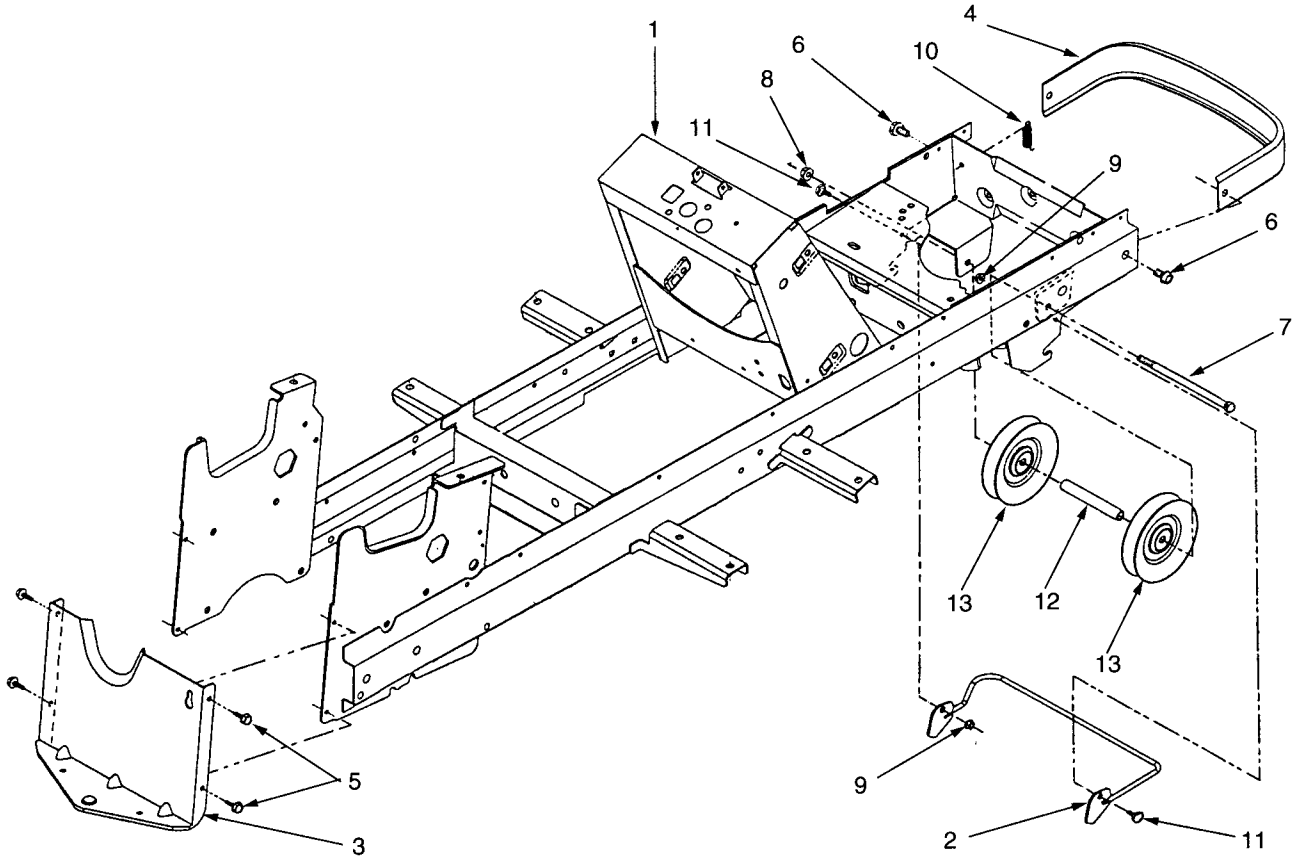
2. Install the quick attach rod (2)onto the quick attach brackets of the frame, using the shoulder bolts (11) and hex flange lock nuts (9).

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.

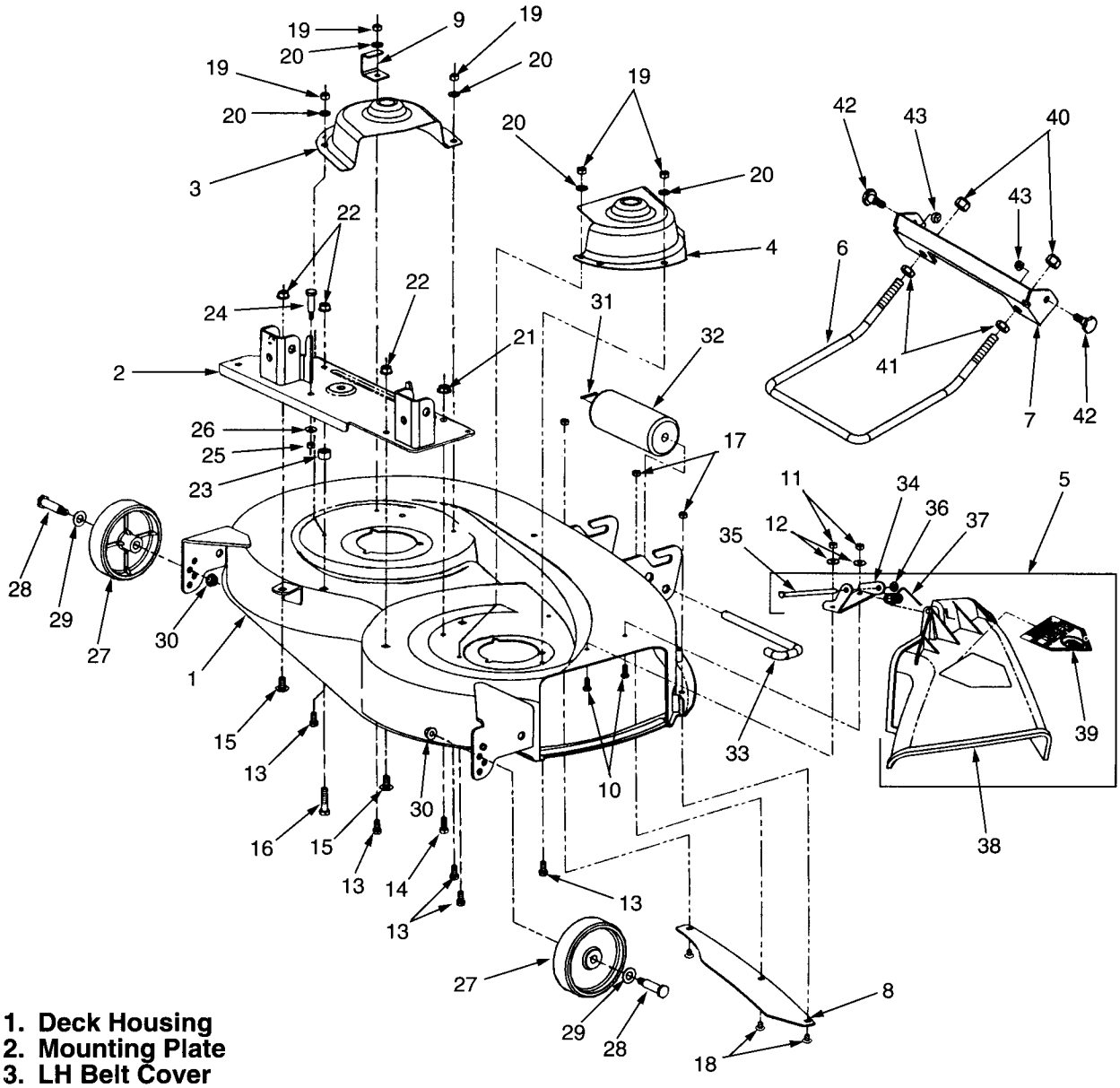
8. Remove the deflector assembly (5, Fig. 5-47) by removing the two hex cap screws (10), hex nuts (11) and bell washers (12).
9. Remove the cotter pin (31, Fig. 5-47) and withdraw the roller pin (33) to remove the deck roller (32).
10. Remove the extension skirt (8, Fig. 5-47) from the underside of the 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.

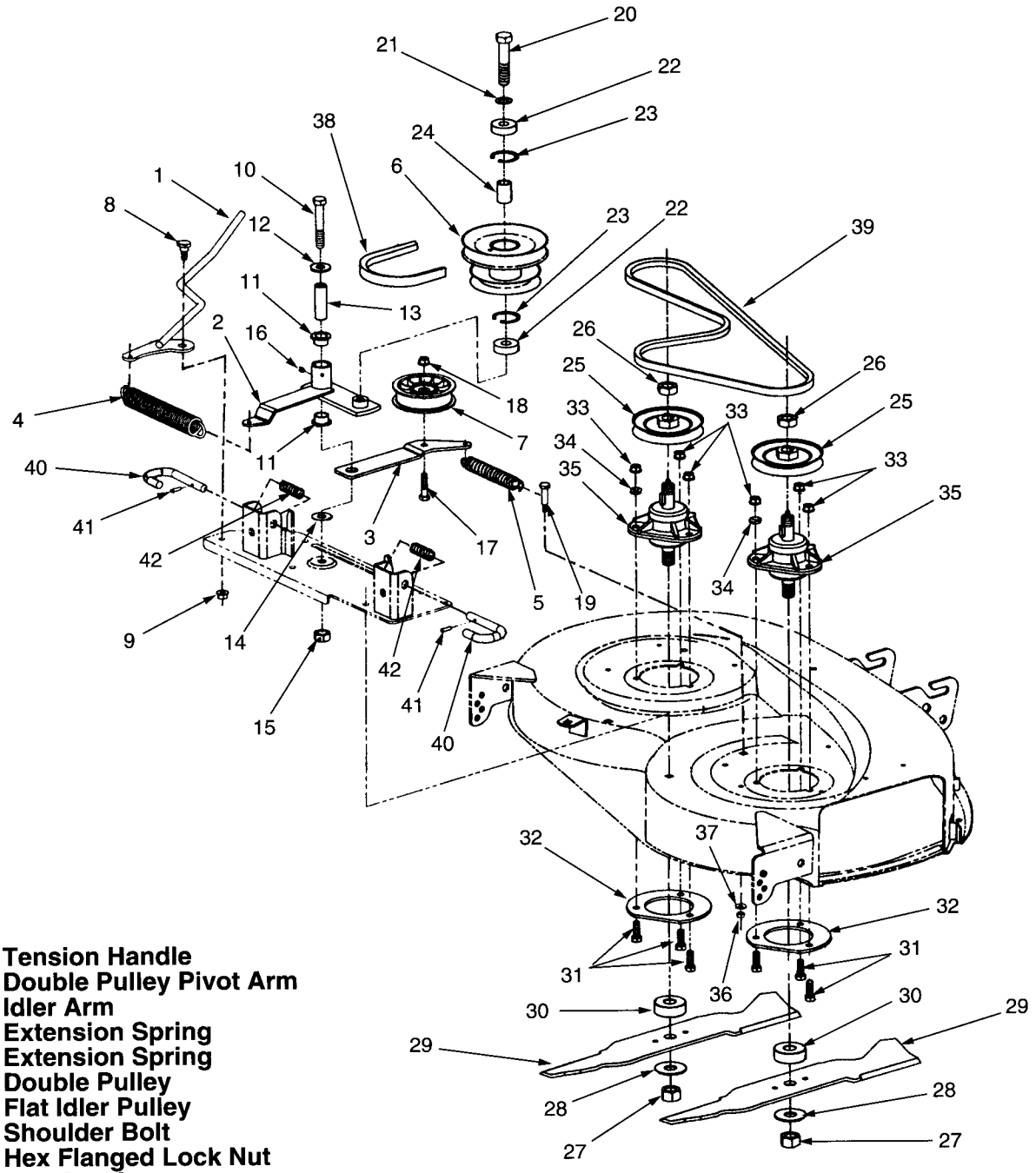
WARNING

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
2. Mounting Plate
3. LH Belt Cover
4. RH Belt Cover
5. Deflector Assembly
6. Front Lift Rod
7. Front Lift Bracket
8. Extension Skirt
9. Handle Stop Bracket
10. Hex Cap Screw
11. Hex Nut
12. Bell Washer
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
20. Flat Washer
21. Hex Flange Top Lock Nut
22. Hex Flanged Lock Nut
23. Spacer
24. Shoulder Bolt
25. Hex Nut
26. Bell Washer
27. Deck Wheel
28. Shoulder Bolt
29. Flat Washer
30. Hex Flanged Lock Nut
31. Cotter Pin
32. Deck Roller
33. Roller Pin
34. Hinge Mtng. Bracket
35. Hinge Pin
36. Speed Nut Cap
37. Torsion Spring
38. Deflector Chute
39. Danger Label
40. Hex Nylon Top Lock Nut
41. Hex Jam Nut
42. Shoulder Bolt
43. Hex Flanged Lock Nut

Figure 5-47. Deck and Attachments (Tractor Models 2130 and 2135).



1. Tension Handle
2. Double Pulley Pivot Arm
3. Idler Arm
4. Extension Spring
5. Extension Spring
6. Double Pulley
7. Flat Idler Pulley
8. Shoulder Bolt
9. Hex Flanged Lock Nut
10. Hex Cap Screw
11. Flange Bearing
12. Flat Washer
13. Idler Brkt. Spacer
14. Flat Washer
15. Hex Center Lock Nut
16. Lube Fitting
17. Hex Cap Screw
18. Hex Flanged Lock Nut
19. Shoulder Bolt
20. Hex Cap Screw
21. Flat Washer
22. Ball Bearing
23. Internal Snap Ring
24. Pulley Spacer
25. V-pulley
26. Hex Jam Nut
27. Hex Nut
28. Flat Washer
29. Cutting Blade
30. Spacer
31. Hex Cap Screw
32. Spindle Mntg. Plate
33. Hex Flanged Lock Nut
34. Flat Washer
35. Spindle Assembly
36. Hex Nut
37. Bell Washer
38. PTO V-belt
39. Spindle V-belt
40. Mower Support Pin
41. Spirol Pin
42. Compression Spring

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 spirol 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).

NOTE

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).

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 reassembled with the hinge mntg. bracket (34) fastened to the deck housing (see paragraph 5-33.6 step1), skip the following step 8.

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.

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).

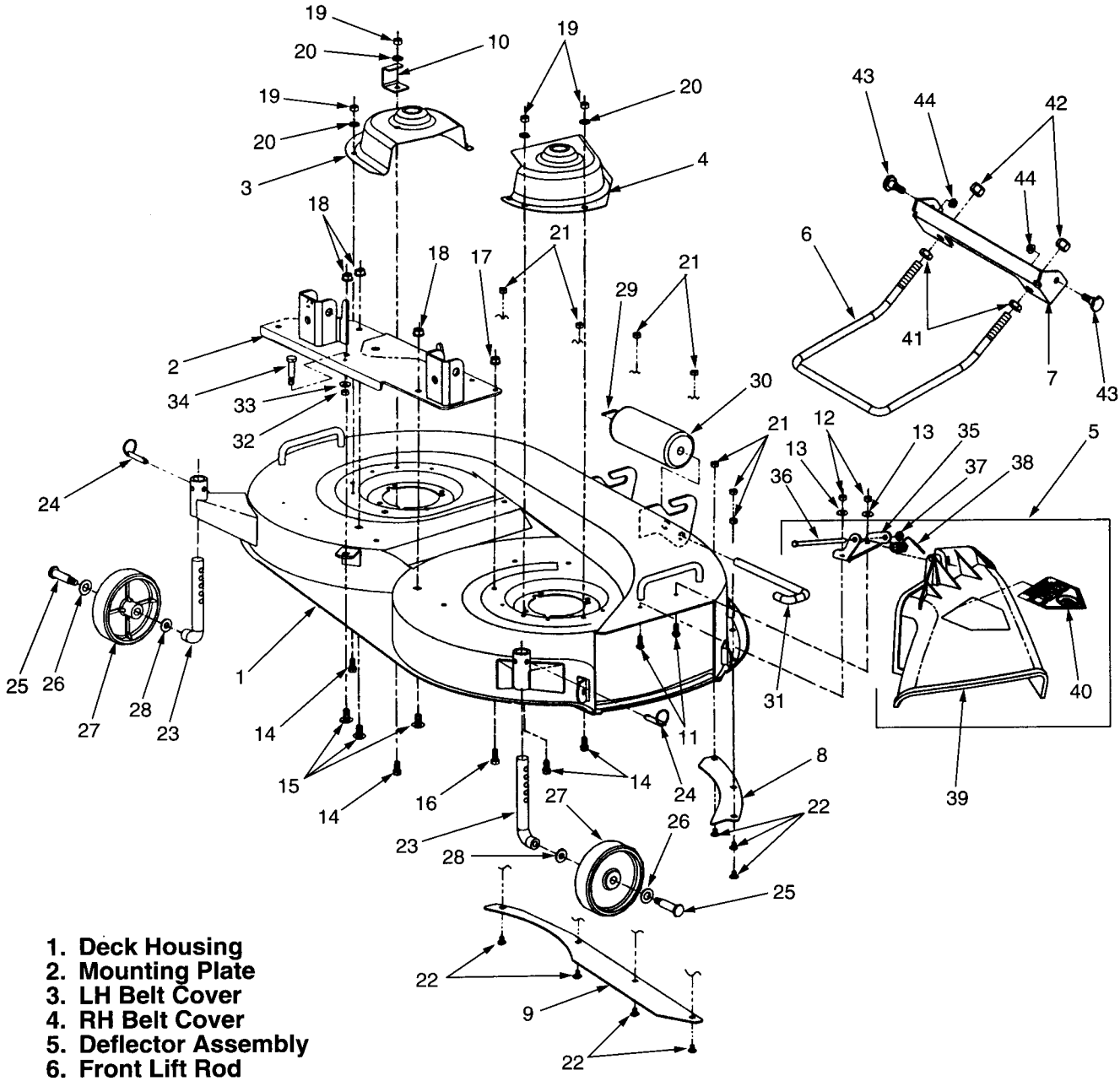
WARNING

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.

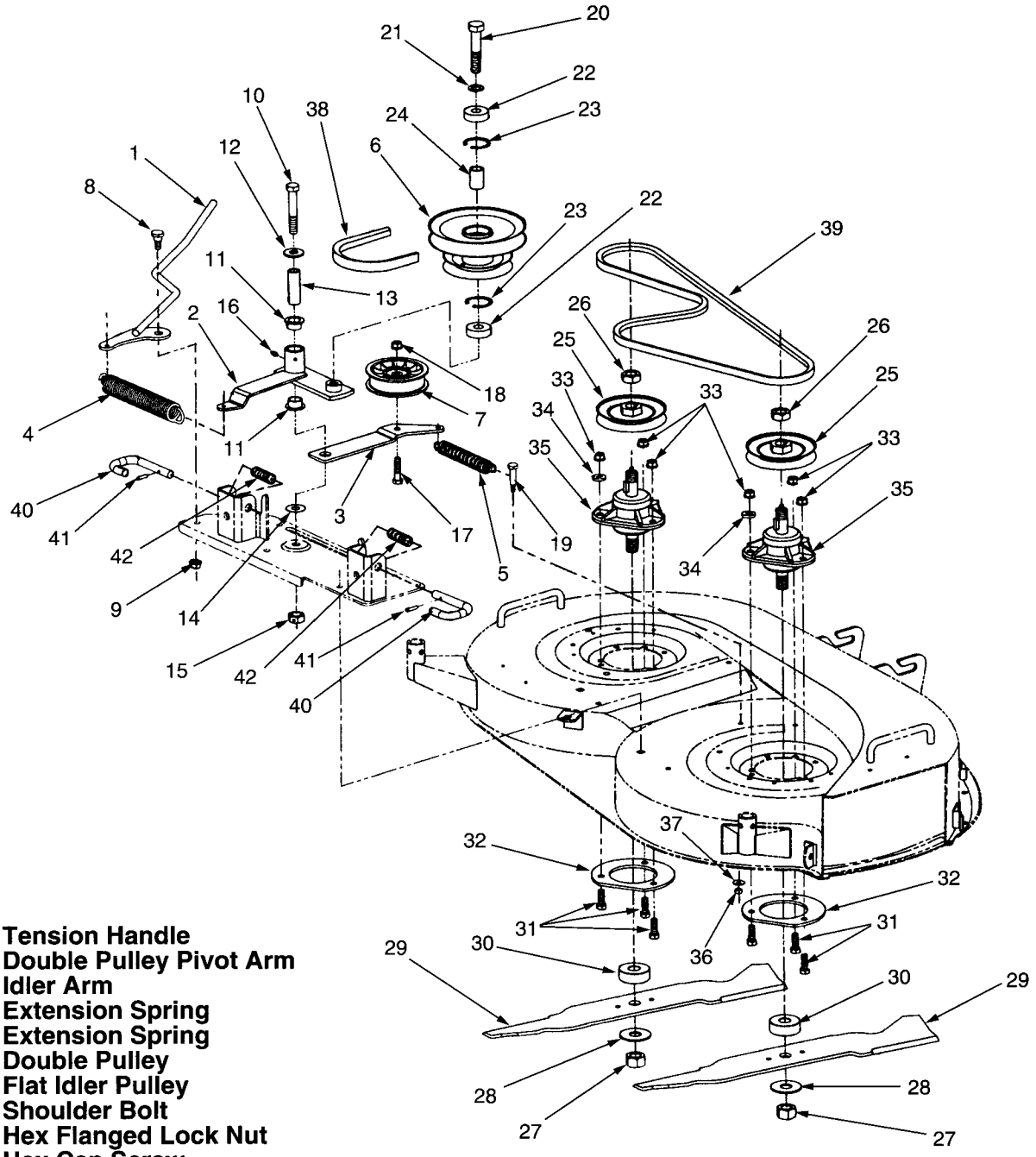
2. Remove the hex jam nuts (26) and pull the V-pulleys (25) from the spindle shafts and woodruff keys.
3. Remove the spindle assemblies (35) and spindle mntg. plates (32) from the deck housing by removing the hex cap screws (31), hex flanged lock nuts (33) and flat washers (34).
4. If necessary, remove 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).



1. Tension Handle
2. Double Pulley Pivot Arm
3. Idler Arm
4. Extension Spring
5. Extension Spring
6. Double Pulley
7. Flat Idler Pulley
8. Shoulder Bolt
9. Hex Flanged Lock Nut
10. Hex Cap Screw
11. Flange Bearing
12. Flat Washer
13. Idler Brkt. Spacer
14. Flat Washer
15. Hex Center Lock Nut
16. Lube Fitting
17. Hex Cap Screw
18. Hex Flanged Lock Nut
19. Shoulder Bolt
20. Hex Cap Screw
21. Flat Washer
22. Ball Bearing
23. Internal Snap Ring
24. Pulley Spacer
25. V-pulley
26. Hex Jam Nut
27. Hex Nut
28. Flat Washer
29. Cutting Blade
30. Spacer
31. Hex Cap Screw
32. Spindle Mntg. Plate
33. Hex Flanged Lock Nut
34. Flat Washer
35. Spindle Assembly
36. Hex Nut
37. Bell Washer
38. PTO V-belt
39. Spindle V-belt
40. Mower Support Pin
41. Spirol Pin
42. Compression Spring

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).

NOTE

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).

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 reassembled 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).

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.

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

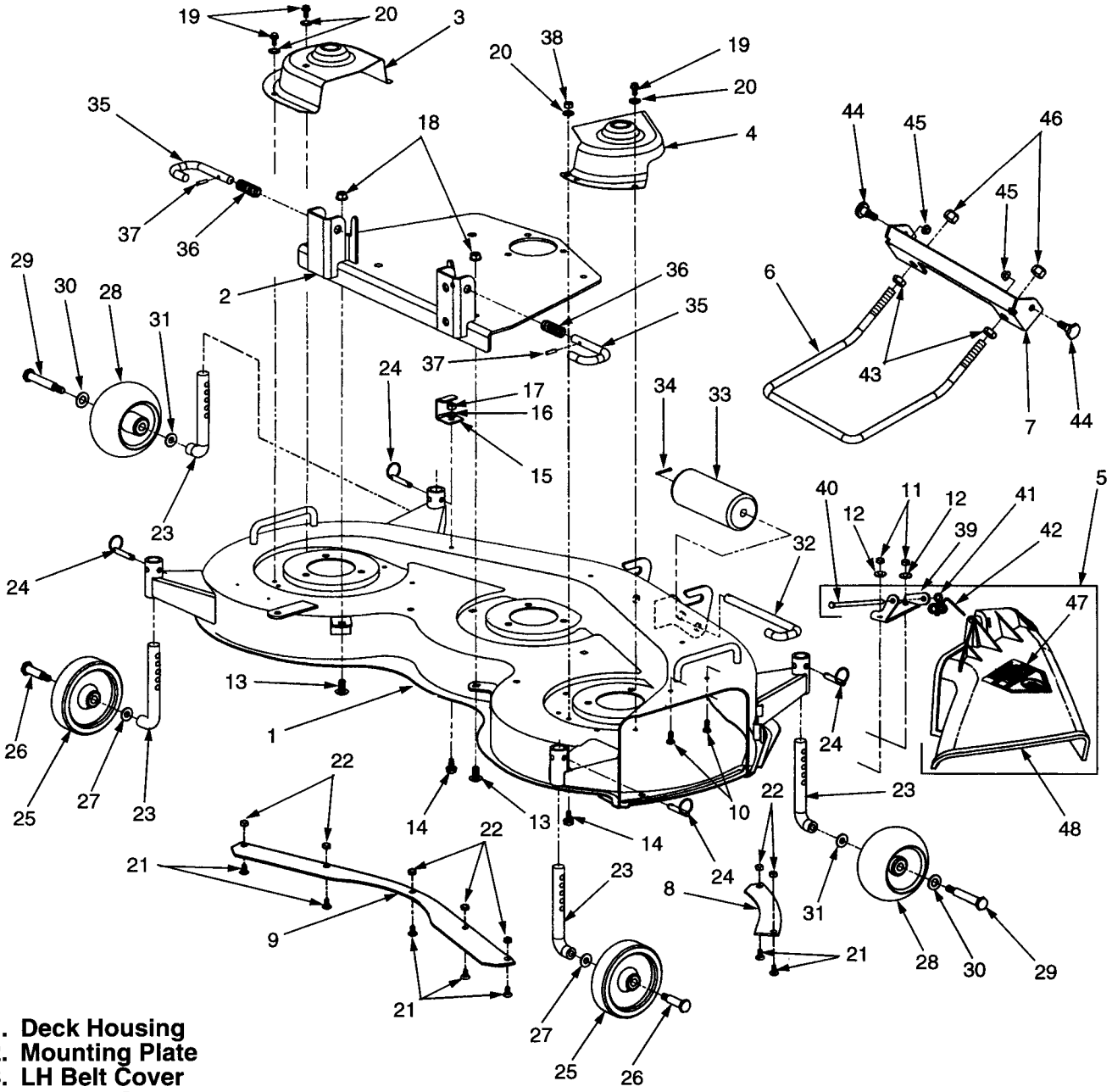
Remove the mower deck from the tractor (see Owner's Manual for correct procedure) and thoroughly clean the entire deck before beginning any repair procedures. Remove the front lift rod/lift bracket (6 and 7, Fig. 5-51) assembly from the tractor frame.

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

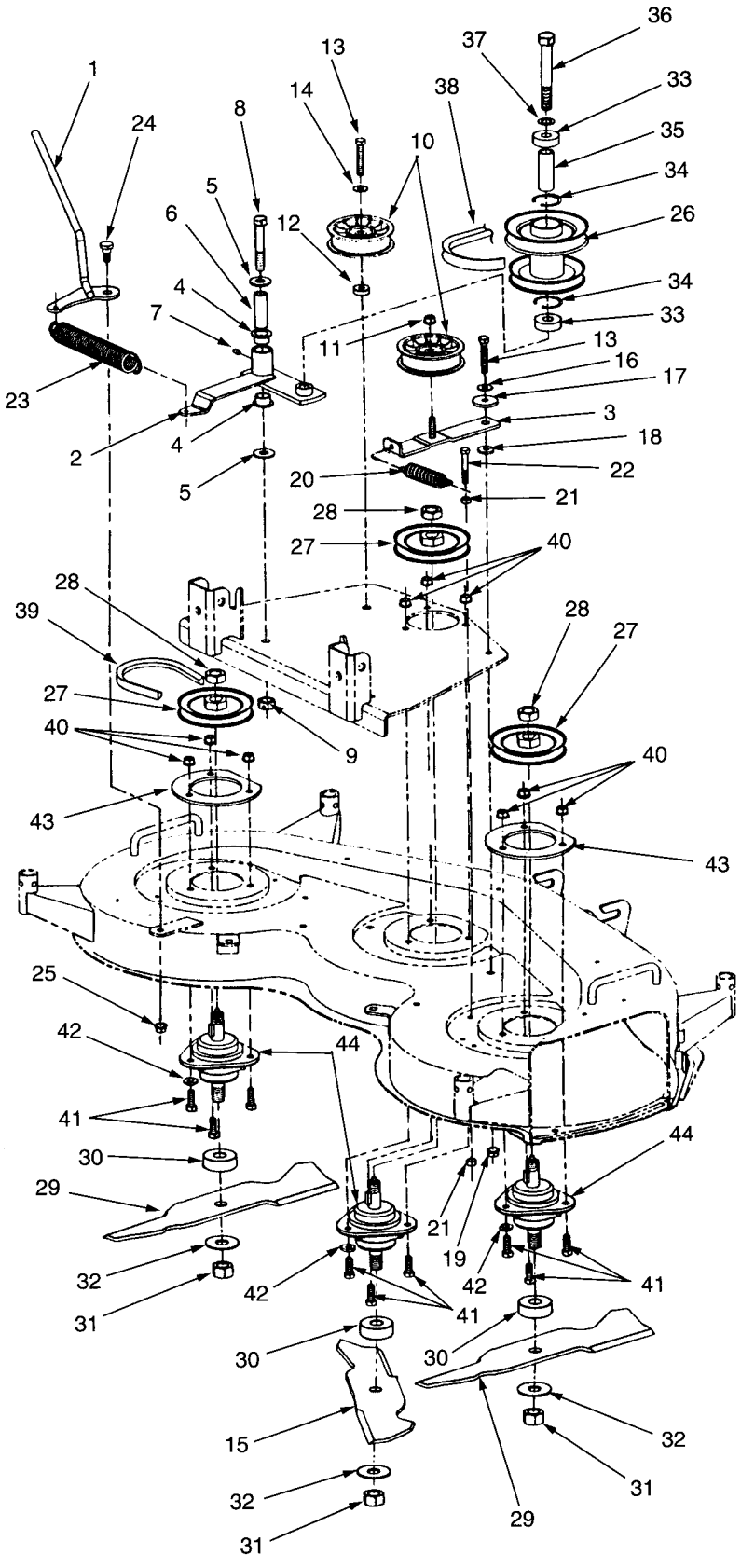


Figure 5-52. Deck Drive Components (Model 190 - 300 Mower Deck).

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.

NOTE

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 spirol 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 reassembled 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
2. LH Caster Spindle
3. RH Caster Spindle
4. Mounting Plate
5. LH Belt Cover
6. RH Belt Cover
7. LH Caster Channel
8. RH Caster Channel
9. Front Caster
10. Caster Wheel Bracket
11. Caster Wheel Assembly
12. Front Roller Bracket
13. Finger Guard
14. Rear Inner Baffle
15. Front Deck Baffle
16. Mounting Strap
17. Handle Stop Bracket
18. Chute Deflector Stop
19. Front Lift Bracket
20. Front Lift Rod
21. Rear Deck Axle
22. Ball Wheel w/Lube Fitting
23. Front Roller
24. Deflector Chute
25. Roller Pin
26. Hinge Pin
27. Torsion Spring
28. Mower Support Pin
29. Compression Spring
30. Spiral Pin
31. Thumb Screw
32. Bell Washer
33. Button Plug
34. Hex Cap Screw
35. Hex Flange Top Lock Nut
36. U-Nut
37. Carriage Bolt
38. Hex Flanged Lock Nut
39. Clevis Pin w/Detent Ball
40. Hex Flanged Lock Nut
41. Carriage Bolt
42. Hex Cap Screw
43. Lock Washer
44. Carriage Bolt
45. Hex Flanged Lock Nut
46. Hex Cap Screw
47. Hex Flanged Lock Nut
48. Spacer
49. Hex Cap Screw
50. Carriage Bolt
51. Hex Flanged Lock Nut
52. Cotter Pin
53. Hex Flanged Lock Nut
54. Carriage Bolt
55. Hex Nylon Top Lock Nut
56. Hex Jam Nut
57. Shoulder Bolt
58. Hex Flanged Lock Nut
59. Shoulder Bolt
60. Flat Washer
61. Bell Washer
62. Step Shoulder Bolt
63. Hex Flanged Lock Nut
64. Hex Top Lock Nut
65. Wave Washer
66. Flat Washer (Hdn)
67. Flange Bearing
68. Flat Washer (Hdn)
69. Lube Fitting
70. Danger Label

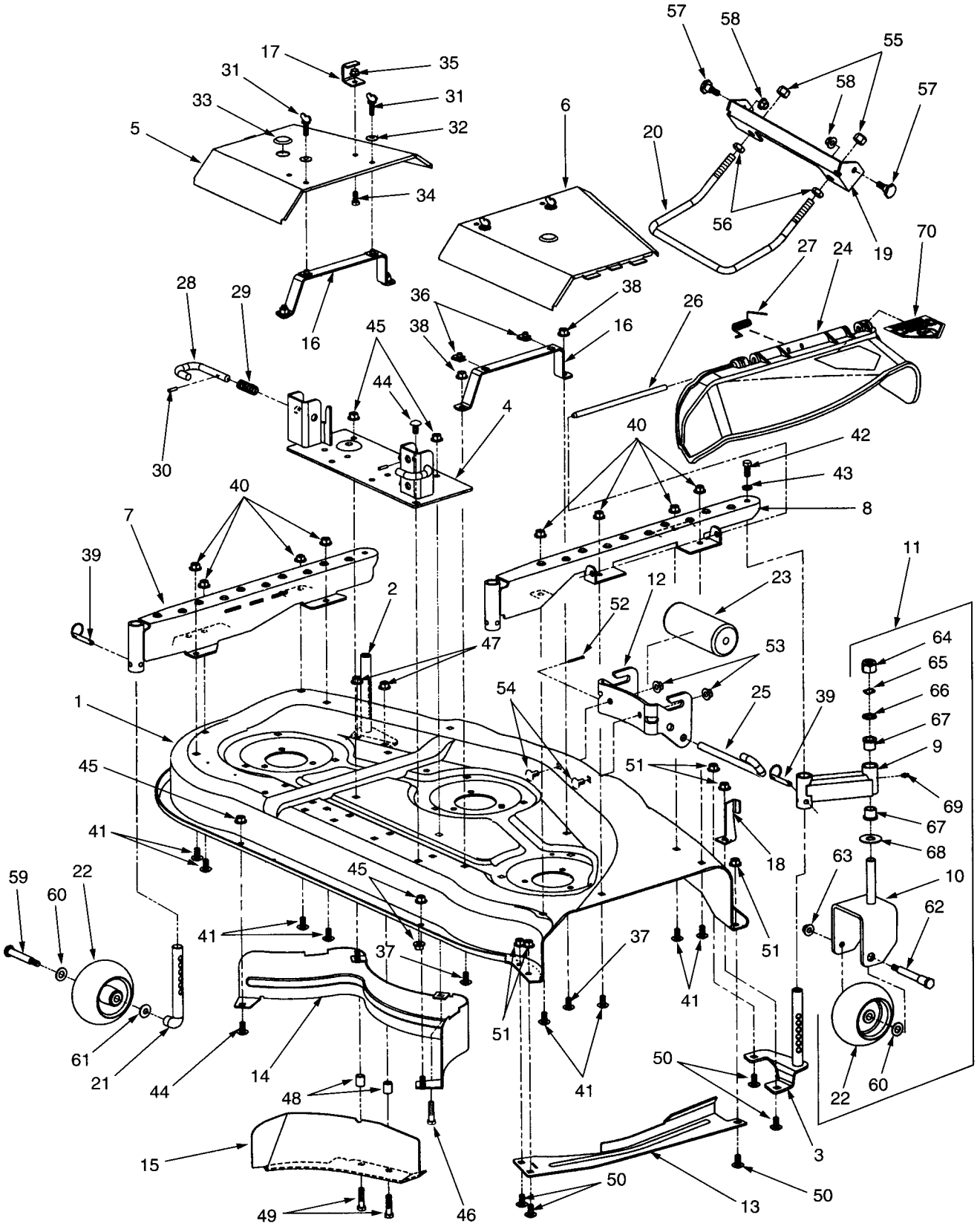


Figure 5-53. Deck and Attachments (Model 190 - 301 Mower Deck).

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 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

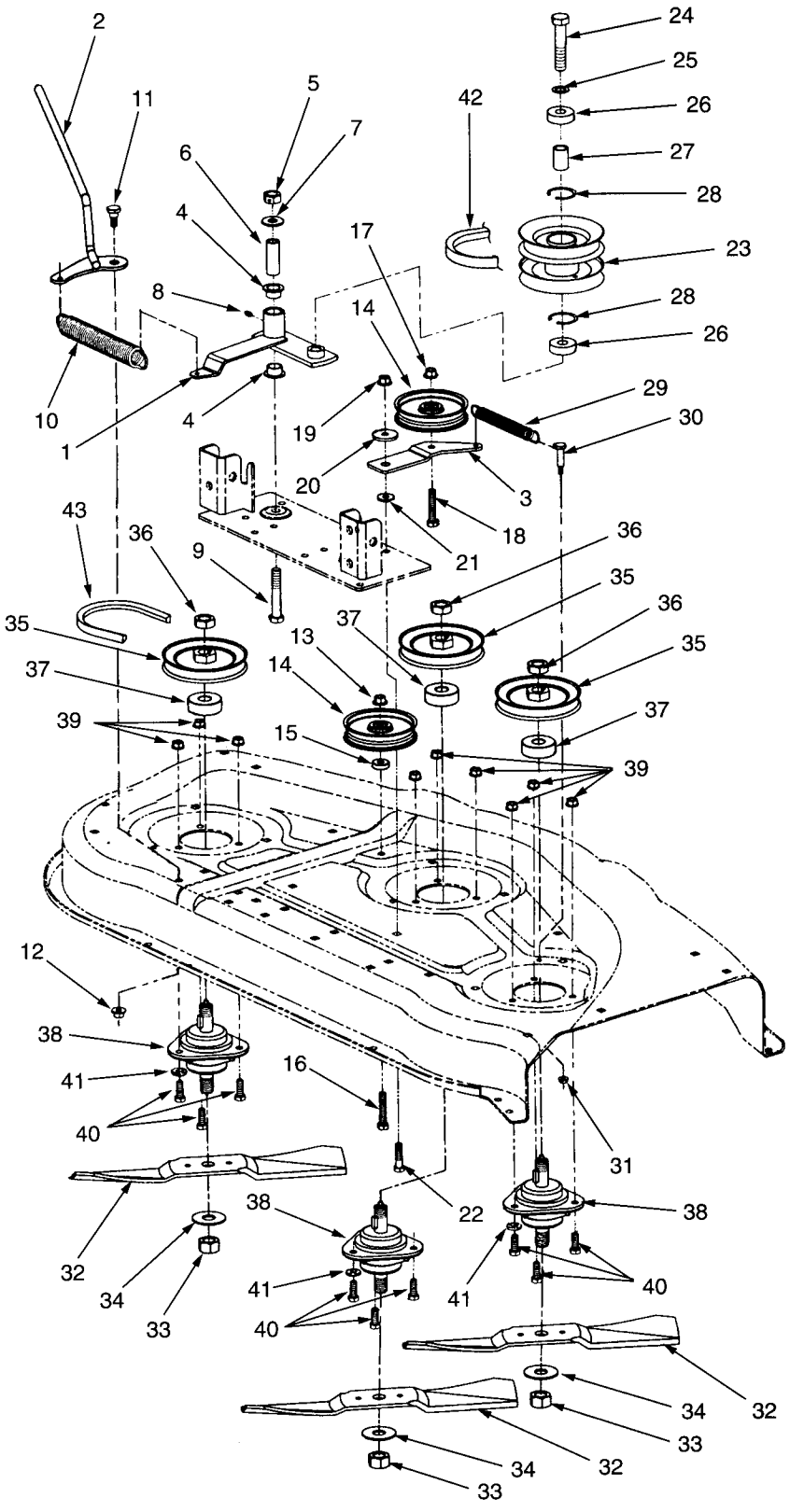


Figure 5-54. Deck Drive Components (Model 190 - 301 Mower Deck).

5-36.3 **Disassembly.**

NOTE

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. Positon 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).

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.

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.

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).

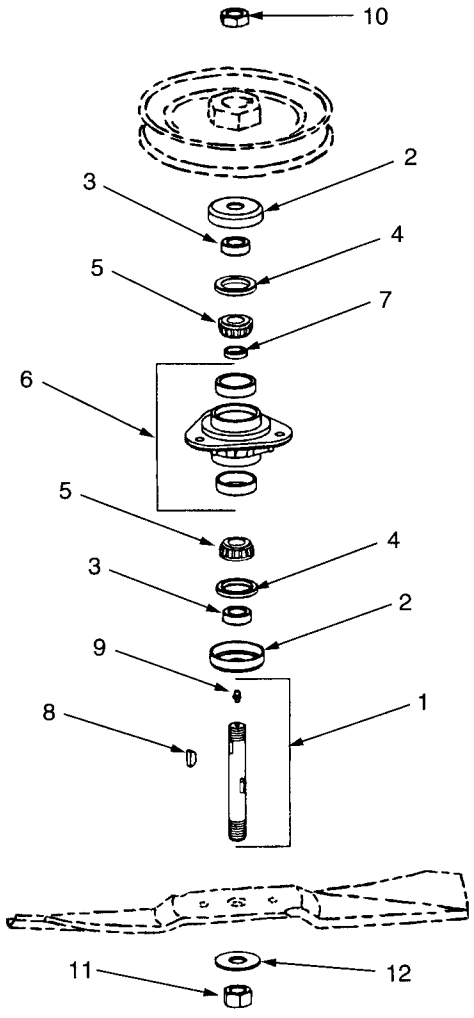
5-37.1 **General.** All the mower decks covered in this manual are equipped with identical spindle assemblies. A complete spindle assembly is available as Part No. 759-3665.

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.

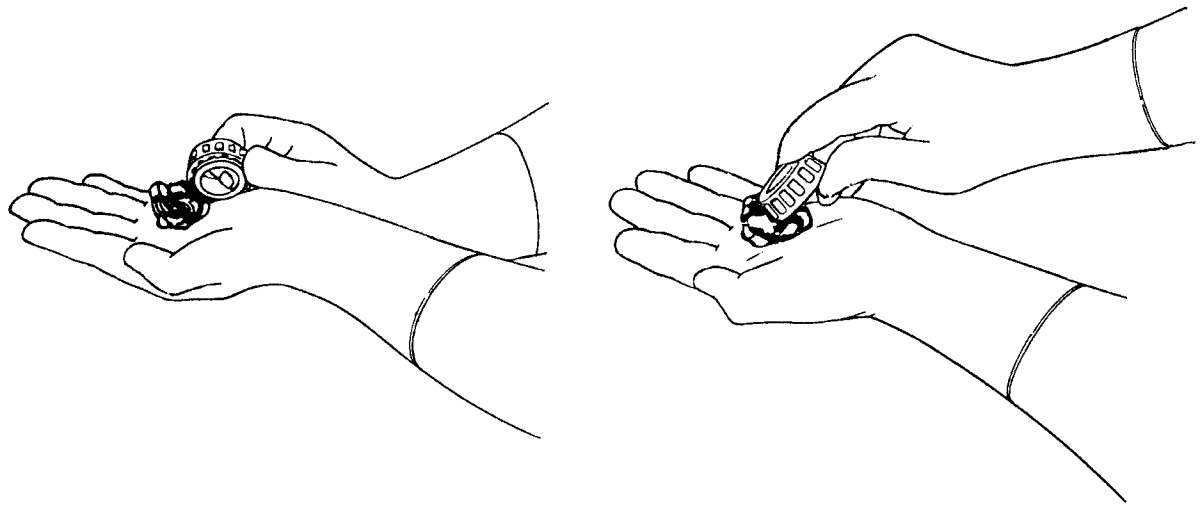


Figure 5-56. Hand Packing Bearing Cones With Grease.

5-37.6 **Reassembly.**

NOTE

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.

SECTION 6
ADJUSTMENTS

6-1. GENERAL.

6-1.1 This section contains specific information on the proper adjustment of various components of the Series 2000 tractors covered by this manual.

6.2 HOOD AND GRILLE (All Models).

6-2.1 Referring to Figure 5-1, check and adjust the hood and grille as follows:

1. Open the hood and check for distortion of the hood guide (11) engagement area of the engine bulkhead (2, Fig 5-16). Repair if necessary.
2. Make certain the dash panel is installed squarely on the frame pedestal.
3. Close the hood and press downward on the front of the hood to completely close the hood.
4. Check for an even spacing of approximately 0.100 in. between the rear edge of the hood and the flange of the dash panel.
5. Loosen the hex wash. hd. tapp screws (13) securing the LH and RH grille brackets (1 and 2) to the frame.
6. Adjust the grille brackets as necessary to obtain the proper spacing.
7. Holding the hood in position, tighten the hex wash. hd. tapp screws.

6-3 PTO CLUTCH BURNISHING PROCEDURE (All Models).

NOTE

Any time a new PTO clutch is put into service, this procedure should be performed prior to operating the new clutch under load.

WARNING

The PTO clutch may be hot. Use care when handling the clutch assembly if the engine has been run recently. Allow the clutch assembly to cool.

6-3.1 With the engine warm (run approximately 5 minutes) and the mower deck installed, proceed as follows:

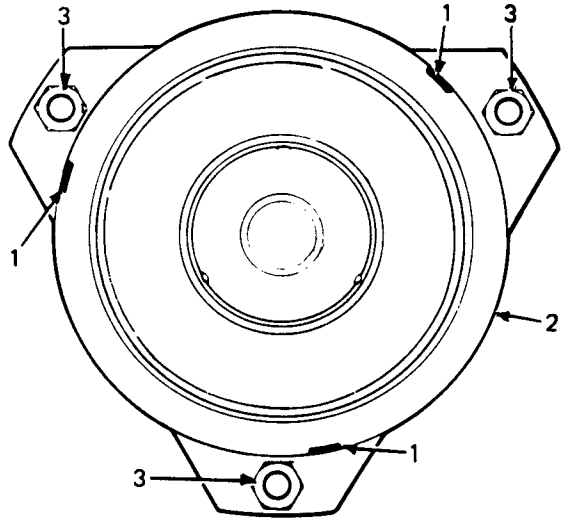
1. With the engine running at approximately 50% throttle, engage and disengage the clutch at ten second intervals (ten seconds ON/ ten seconds OFF) five times. The engine choke may have to be pulled out slightly to accomplish this.
2. Increase the engine speed to 75% throttle and again engage and disengage the PTO clutch at ten second intervals five times.
3. Make certain the PTO is disengaged and stop the engine.
4. On Models 2160, 2165 and 2185, recheck the PTO air gap and adjust if necessary per paragraph 6-4.

6-4 ADJUSTING THE PTO CLUTCH (MODELS 2160, 2165 and 2185).

WARNING

Disengage the PTO, stop the engine and engage the parking brake. The PTO clutch may be hot. Allow the engine and clutch to cool before adjusting the clutch.

6-4.1 Refer to Figure 6-1 and proceed as follows:



1. Access Slots
2. Armature Brake Plate
3. Self Locking Nuts

Figure 6-1. Adjusting PTO Air Gap (Models 2160, 2165 and 2185).

1. Locate the three access slots (1) which are equally spaced around the circumference of the armature brake plate (2).

2. Using a feeler guage, measure the gap between the armature drive plate and the rotor at all three access slots. The air gap measurements should be equal and between .012 to .017 inch.

3. Loosen or tighten the self locking nuts (3) as necessary to achieve an equal air gap measurement, within specifications, at all three locations. Remeasure each location after adjusting any of the self locking nuts.

6-5 FRONT PIVOT AXLE ADJUSTMENT (All Models).

WARNING

Place the tractor on a firm and level surface and chock the rear wheels before raising the front of the tractor off the ground. Use jack stands to support the front of the tractor when raised.

6-5.1 Check for binding or excessive play between the front pivot axle and frame channel, and adjust as follows:

NOTE

A thin coating of lubricant (such as 251H EP grease) should be periodically applied to the front and rear machined faces of the limiter slot areas of the pivot axle.

1. Raise the front of the tractor and set on jack stands, so the front wheels are suspended above the ground.

2. Pivot the ends of the axle up and down to check for binding. If the axle is binding, loosen the lock nuts (see Fig. 5-11) until binding is eliminated.

3. Grasping the ends of the pivot axle, attempt to move the each end of the axle forward and rearward to check for side play between the axle and frame channel. If play is present, gradually tighten the lock nuts until play is minimized.

4. Repeat steps 2 and 3 until minimum play without binding is achieved.

6-6 FRONT WHEEL ALIGNMENT (All Models).

6-6.1 The turning radius should be approximately equal in each direction, and the front wheels should toe-in appoximately 1/8 inch. Check and adjust as follows:

WARNING

Place the tractor on a firm and level surface and chock the rear wheels before beginning alignment procedures.

1. Turn the steering wheel fully to the left and note the distance between the front pivot axle (9, Fig. 5-10) and the rear stop on the left steering knuckle (1, Fig. 5-10).

2. Turn the steering wheel fully to the right and compare the distance between the axle and right steering knuckle stop with that of the left knuckle obtained in the previous step 1. The clearances should be approximately equal.

3. If the steering knuckle clearances differ significantly, check the lower steering arm (2, Fig. 5-17) position as follows:

   a. Center the steering segment gear (1, Fig. 5-17) and insert a 1/4 inch dowel pin into the alignment holes of the gear and the steering housing (see Figure 5-18).

   b. From underneath the tractor, check that the lower steering arm is approximately perpendicular to the tractor frame (see Fig. 5-18). If it is not properly positioned, disassemble and reposition the steering arm per paragraph 5-15.

4. If the lower steering arm is correctly installed, readjust the tie rods (14, Fig. 5-10) and set the 1/8 inch toe-in as follows:

NOTE

To facilitate adjustment of the tie rods and setting of the toe-in, leave the dowel pin inserted in the steering gear to prevent movement of the lower steering arm when adjusting the tie rods.

NOTE

The front of the tractor may be raised slightly to reduce the weight and ease movement of the front wheels.

a. Remove the hex lock nuts (4, Fig. 5-10) securing the front ball joints (10) to the steering arms (15), and disconnect the tie rod assemblies from the arms.

b. Manually place each front wheel in the straight ahead position (as close as visually possible).

c. Place a mark at the same spot on both front wheels; for example, the mold seam in the center of the tire tread or the inner bead flange of the wheel rim.

d. Rotate the wheels to position the marks at the front horizontal diameter of the wheels, then measure the distance between the marks.

e. Rotate the marks to the rear horizontal diameter and measure the distance between the marks. The distance between the marks at the front should be 1/8 inch less than the distance measured at the rear.

f. If the difference between the measurements is more or less than 1/8 inch, move each wheel equally, in the direction necessary, to achieve the required toe-in dimension.

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.

g. Loosen the hex jam nuts (6, Fig. 5-10) from the front ball joints (and rear ball joints, if necessary per above NOTE).

h. Turn the ball joint in or out on each tie rod, as necessary to align with the hole in each steering arm (15, Fig. 5-10).

i. Reinstall the ball joints in the steering arms, but do not tighten the jam nuts against the ball joints now.

j. Remove the dowel pin from the segment gear, and repeat steps 1 and 2 above to ensure the steering knuckle clearances are approximately equal.

k. If the steering knuckle clearances are not approximately equal, determine the difference between the two measurements by subtracting the smaller from the larger.

l. Disconnect the tie rod assembly from the steering knuckle having the *least* clearance. Turning the ball joint (and tie rod if necessary) in full turn increments, shorten the assembly by an amount equal to half (or closest to half) the difference. Reinstall the tie rod assembly in the steering arm.

m. Disconnect the other tie rod assembly and lengthen by the number of full turns required in the previous step l. Reinstall the tie rod assembly in the steering arm.

n. Tighten the hex jam nuts against the ball joints.

5. The turning radius and toe-in shoiuld now be correctly adjusted. Recheck and, if necessary, readjust per the previous instructions.

6-7 ADJUSTING LIFT ASSIST SPRING TENSION (All Models).

6-7.1 **General.** The primary lift assist spring is located along the left/rear frame channel. The spring can be adjusted by accessing the hex cap screw (9, Fig. 5-19) from the rear of the tractor, inside the left rear wheel. Final adjustment should be made *with* the deck installed.

6-7.2 The degree and direction of effort required to operate the tractor's implement lift handle can be varied as follows:

1. Turning the hex cap screw clockwise will decrease the physical effort required for lifting the attachment, but increase the effort needed to lower the equipment. Turning the screw counterclockwise will effect the opposite results.

2. Turn the hex cap screw as necessary to attain a comfortable lifting effort, while not overly increasing the effort required to lower the implement lift handle to its lowest setting.

6-8 BRAKE ADJUSTMENT — ALL MODELS

WARNING

The tractor must be placed on a firm and level surface when testing and/or adjusting the braking system. The tractor may roll, causing serious damage or injury.

6-8.1 Due to normal wear, the tractor brake system should be periodically tested for proper operation and adjusted as follows:

1. Place the tractor on a firm and level surface and stop the engine.

NOTE

The following step 2 applies to Models 2130, 2140 and 2160.

2. Move the speed control lever (20, Fig. 5-23) to the fully rearward (neutral) position.

NOTE

The following step 3 applies to Models 2135, 2145, 2165 and 2185.

3. Pull the hydro disengagement rod (41, Fig. 5-24) rearward and lock in the slot of the drawbar plate (3, Fig. 5-46) to disengage the hydro transmission.

4. Depress the brake pedal and engage the park brake lever (24, Fig. 5-22). While observing the rear wheels, push the tractor forward or rearward. If the tractor can be pushed AND the wheels rotate, the brake tension must be increased.

5. Depress the brake pedal to disengage the park brake lever, then release the brake. While observing the rear wheels, push the tractor forward or rearward. If the wheels do not rotate, the brake tension must be decreased.

6. Release the brake pedal and adjust the brake tension as follows:

   a. Working from underneath the tractor, remove the internal cotter pin (20, Fig. 5-22) from the adjustment ferrule (15) and disconnect the brake rod assembly from the brake cam (see Figure 6-2).

   b. Lightly pull the brake rod forward to ensure the rod is fully seated in the spring and that the spring hook is at the front of the hole in the brake arm (see Fig 5-22). DO NOT actuate the brake arm when pulling the rod.

   c. Turning one full turn at a time, turn the adjustment ferrule inward or outward on the brake rod to align the ferrule with the hole in the brake cam.

   d. Turn the ferrule outward one full turn and install the ferrule in the brake cam.

   e. Depress and release the brake pedal, then check to ensure the spring is not tensioned. There should be a small amount of slack in the brake rod and spring.

   f. Manually depress the brake pedal and observe that the spring begins to extend during the initial movement (approximately 1 inch) of the pedal.

   g. Repeat steps 4 and 5 above to again test the brakes.

      If able to rotate the wheels with the park brake engaged — check for oil on brake shoes, excessively worn brake shoes, or possible internal transaxle damage.

      If unable to push the tractor with the brake disengaged — check for possible brake assembly and/or internal transaxle damage.

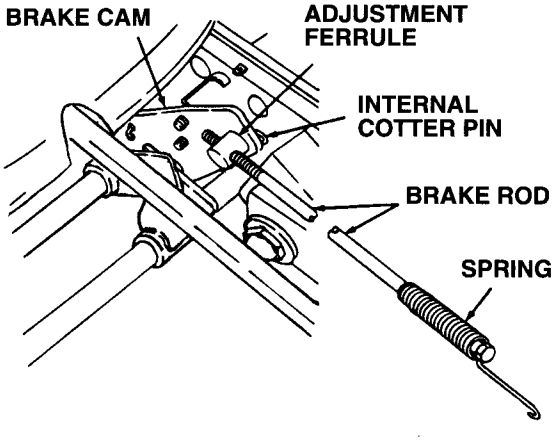


Figure 6-2. Brake Connections.

6-9 CLUTCH ADJUSTMENT ROD — AGS SIX SPEED TRACTORS (Models 2130, 2140 and 2160).

6-9.1 General.

1. The correct installation and adjustment of the clutch adjustment rod (22, Fig. 5-23) is essential to proper operation of the transmission. The adjustment ferrule (6) **must** be installed in the FRONT slotted hole of the clutch cam, and the pivot sleeve (1) **must** be installed in the UPPER hole of the control arm.
2. Although Figure 6-3 depicts the hydro transmission, this figure can also be used for reference when making an adjustment to the clutch rod and/or centering spacer on six speed tractors.
3. The clutch rod must be readjusted whenever a neutral adjustment is made to the centering spacer (5, Fig.6-3).

6-9.2 Verify the correct installation of the clutch rod (per step 1 above) and adjust as follows:

1. Depress the brake pedal and engage the park brake.

NOTE

Although all adjustment is made in the ferrule at the front end of the clutch rod, it is normally easier to disconnect the rod from the control arm at the rear end and turn the rod into, or out of, the ferrule to adjust.

2. Working from underneath the left frame channel of the tractor, remove the internal cotter pin (13, Fig. 5-23) securing the pivot sleeve (1) to the control arm. Disconnect the clutch adjustment rod from the control arm.
3. Ensure the adjustment ferrule (6, Fig. 5-23) is at the back of the proper slotted hole of the clutch cam. The extension spring (15) should hold the ferrule against the back of the hole.
4. Without moving the clutch cam or control arm, check the pivot sleeve pin for direct alignment with the upper hole of the control arm. If not aligned, proceed as follows:
   a. Loosen the hex jam nut (9, Fig. 5-23) from the front of the adjustment ferrule (6).
   b. Turn the rod into, or out of, the adjustment ferrule as necessary to align the pivot sleeve with the hole in the control arm.
5. Install the pivot sleeve (1, Fig. 5-23) in the proper hole of the control arm and secure with the internal cotter pin (13).
6. Tighten the hex jam nut against the adjustment ferrule.

6-10 HYDRO ADJUSTMENT ROD — HDS HYDROSTATIC TRACTORS (Models 2135, 2145, 2165 and 2185).

6-10.1 General.

1. The correct installation and adjustment of the hydro adjustment rod (34, Fig. 5-24) is essential to proper operation of the transmission. The adjustment ferrule (12) **must** be installed in the REAR slotted hole of the clutch cam, and the pivot sleeve (2) **must** be installed in the LOWER hole of the control arm.
2. The hydro adjustment rod must be readjusted whenever a neutral adjustment is made to the centering spacer (5, Fig.6-3).

6-10.2 Verify the correct installation of the clutch rod (per step 1 above) and adjust as follows:

1. Depress the brake pedal and engage the park brake.

NOTE

Although all adjustment is made in the ferrule at the front end of the adjustment rod, it is normally easier to disconnect the rod from the control arm at the rear end and turn the rod into, or out of, the ferrule to adjust.

2. Working from underneath the left frame channel of the tractor, remove the internal cotter pin (19, Fig. 5-24) securing the pivot sleeve (2) to the control arm. Disconnect the hydro adjustment rod from the control arm.
3. Ensure the adjustment ferrule (12, Fig. 5-24) is at the back of the proper slotted hole of the clutch cam. The extension spring (23) should hold the ferrule against the back of the hole.

4. Without moving the clutch cam or control arm, check the pivot sleeve pin for direct alignment with the lower hole of the control arm. If not aligned, proceed as follows:

   a. Loosen the hex jam nut (15, Fig. 5-24) from the front of the adjustment ferrule (12)

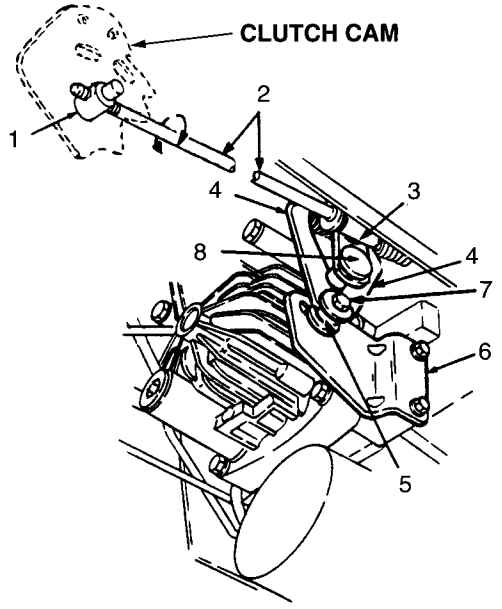
NOTE

Because of the form (bend) in the hydro adjustment rod, the rod and/or adjustment ferrule should be adjusted in approximately full turn increments. The form of the rod should be positioned toward the bottom.

   b. Turn the rod into, or out of, the adjustment ferrule as necessary to align the pivot sleeve with the hole in the control arm.

5. Install the pivot sleeve (2, Fig. 5-24) in the proper hole of the control arm and secure with the internal cotter pin (19).

6. Tighten the hex jam nut against the adjustment ferrule.



1. Adjustment Ferrule
2. Adjustment Rod
3. Pivot Sleeve
4. Neutral Arms
5. Centering Spacer
6. Neutral Bracket
7. Hex Cap Screw
8. Control Arm

Figure 6-3. Adjustment Rod Connections.

6-11 SHIFT INTERLOCK ROD ADJUSTMENT — AGS SIX SPEED TRACTORS (Models 2130, 2140 and 2160).

6-11.1 **General.** Whenever a neutral adjustment is made to the centering spacer (19, Fig. 5-27) on the clutch assembly (1), the interlock rod (11) should be checked and, if necessary, readjusted.

6-11.2 Refer to Figure 5-27 and adjust the interlock rod as follows:

1. Depress the brake pedal and engage the park brake.

2. Working from underneath the rear of the tractor, remove the hex center lock jam nut (9) securing the ferrule (10) to the interlock arm (8), and disconnect the interlock rod.

3. Manually move the interlock lever of the transaxle to ensure the lever is in its center detent position (normally pointing downward).

4. Turn the ferrule on the rod as necessary to align with the hole in the interlock arm. Insert the ferrule into the arm, and secure with the hex center lock jam nut. Do not over tighten the nut; the ferrule must be able to pivot in the arm.

6-12 HYDRO STOP ROD ADJUSTMENT — HDS HYDROSTATIC TRACTORS (Models 2135, 2145, 2165 and 2185).

WARNING

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

6-12.1 Refer to Figure 5-24 and adjust the hydro stop rod as follows:

1. Depress the brake pedal to neutralize the transmission linkage, then slowly release the brake pedal.

2. Working from underneath the right side of the tractor, disconnect the hydro stop rod (32) from the hydro cruise cam (6) by removing the internal cotter pin (19) and bell washer (24).

3. Move the cruise control lever (33) to its full rearward position.

4. Manually position and hold the hydro cruise cam (6) approximately 3/16 of an inch away from the spacer (36) on the neutral return bracket.

5. While continuing to hold the cruise cam, turn the ferrule (12) on the rod as necessary to align with the hole of the cruise cam. Make certain the cruise control lever does not move from the rearward position when adjusting the ferrule.

6. Insert the adjustment ferrule(12) into the right side of the cruise cam (8) and secure with the bell washer (24) and internal cotter pin (19).

6-13 NEUTRAL ADJUSTMENT — AGS SIX SPEED TRACTORS (Models 2130, 2140 and 2160).

6-13.1 **General.** Correct neutral adjustment of the clutch assembly (1, Figure 5-27) is essential to the proper operation of the clutch. While on a level surface, if the tractor attempts to drive (creep) forward or rearward when neither the forward nor reverse pedal is depressed, neutral adjustment should be checked and readjusted.

6-13.2 To check and adjust the clutch assembly neutral setting, proceed as follows:

1. Drive the tractor for approximately 5-10 minutes to warm up the clutch assembly, then stop the engine and engage the parking brake.

WARNING

Place the tractor on a firm and level surface and chock the front wheels before raising the rear wheels from the ground. Use jack stands to support the rear of the tractor when raised.

2. Raise the rear of the tractor, so that the rear tires are at least one inch above the surface, and set it on jack stands. Make certain the jack stands are positioned to balance the tractor and prevent tipping.

WARNING

The operator presence safety circuit will stop the engine if the seat is empty when the brake pedal is released. If an assistant is seated when adjusting the neutral setting, use extreme caution to prevent the tractor from tipping or rolling. Serious injury could result. Similar precautions should be taken with any other method of over-riding the safety circuit, such as placing a weight in the seat. Never allow the tractor to be operated with the safety circuit disabled.

3. Carefully start the tractor engine and release the parking brake.

4. Move the speed control lever (20, Fig. 5-23) to one of the mid (third or fourth gear) speed settings, and observe both rear wheels for rotation in either direction.

5. If wheel rotation is observed, adjust the neutral setting as follows:

   a. Disconnect the clutch adjustment rod (22, Fig. 5-23) from the control arm by removing the internal cotter pin (13) from the pivot sleeve (1).

   b. If wheel rotation stops when the rod is disconnected, check and readjust the rod per paragraph 6-9. Also check the pedal linkage for binding.

   c. If wheel rotation continues, loosen the hex top lock nut (22, Fig.5-27) and hex cap screw (21) securing the centering spacer (19) to the neutral bracket (18).

   d. If the rotation is in the *forward* direction, slide the spacer slightly rearward until the rotation stops. If rotating in the *reverse* direction, slide the spacer forward until rotation stops.

   e. Carefully tighten the hex cap screw (21) and top lock nut (22), making certain the spacer does not move.

   f. Stop the engine and engage the parking brake.

   g. Check and, if necessary, readjust the clutch adjustment rod per paragraph 6-9.

   h. Check and, if necessary, readjust the interlock rod per paragraph 6-11.

6. The inability to attain a neutral setting by adjusting the centering spacer could indicate internal problems with the clutch assembly. Refer to paragraph 5-24 for clutch inspection procedures.

6-14 NEUTRAL ADJUSTMENT — HDS HYDROSTATIC TRACTORS (Models 2135, 2145, 2165 and 2185).

6-14.1 **General.** Incorrect neutral adjustment of the hydrostatic transmission will affect the output performance; most notably in *reverse*. If the tractor attempts to drive (creep) forward or rearward when neither the forward nor reverse pedal is depressed, neutral adjustment should be checked and readjusted.

6-14.2 To check and adjust the hydro transmission neutral setting, proceed as follows:

1. Drive the tractor for approximately 5-10 minutes to warm up the hydro transmission, then stop the engine and engage the parking brake.

WARNING

Place the tractor on a firm and level surface and chock the front wheels before raising the rear wheels from the ground. Use jack stands to support the rear of the tractor when raised.

2. Raise the rear of the tractor, so that the rear tires are at least one inch above the surface, and set it on jack stands. Make certain the jack stands are positioned to balance the tractor and prevent tipping.

WARNING

The operator presence safety circuit will stop the engine if the seat is empty when the brake pedal is released. If an assistant is seated when adjusting the neutral setting, use extreme caution to prevent the tractor from tipping or rolling. Serious injury could result. Similar precautions should be taken with any other method of over-riding the safety circuit, such as placing a weight in the seat. Never allow the tractor to be operated with the safety circuit disabled.

3. Carefully start the tractor engine and release the parking brake. Observe both rear wheels for rotation in either direction.

4. If wheel rotation is observed, adjust the neutral setting as follows:

   a. Disconnect the hydro adjustment rod (34, Fig. 5-24) from the control arm by removing the internal cotter pin (19) from the pivot sleeve (2).

   b. If wheel rotation stops when the rod is disconnected, check and readjust the rod per paragraph 6-10. Also check the pedal linkage and damper cylinder (21, Fig. 5-24) for binding.

   c. If wheel rotation continues, loosen the hex top lock nut (22, Fig.5-29) and hex cap screw (18) securing the centering spacer (20) to the neutral bracket (21).

NOTE

Because of design characteristics of the hydro transmission and the control linkage, it is recommended that the neutral setting be adjusted toward the *reverse* side of the "neutral window".

   d. If the rotation is in the *forward* direction, slide the centering spacer rearward until the wheels just begin to rotate in the *reverse* direction. Then slowly slide the spacer slightly forward until wheel rotation stops.

   e. If the rotation is in the *reverse* direction, slowly slide the centering spacer slightly forward until rotation stops.

   f. Carefully tighten the hex cap screw (18) and top lock nut (22), making certain the spacer does not move.

   g. Stop the engine and engage the parking brake.

   h. Check and, if necessary, readjust the hydro adjustment rod per paragraph 6-10.

5. If unable to obtain a neutral setting by adjusting the centering spacer, refer to paragraph 5-25 for information concerning inspection and repair of the hydrostatic transmission.

6-15 THROTTLE CABLE ADJUSTMENT (All Models).

6-15.1 **General.** If the engine does not achieve its high (no load) speed (see specifications in Section 1) when the throttle control is moved to the full throttle position, check the cable adjustment before performing any other engine or carburetor inspections.

6-15.2 Refer to Figure 6-4 and proceed as follows:

1. Raise the hood and locate the throttle cable connection at the engine.
2. While observing the direction of movement of the engine throttle arm, move the tractor's throttle control lever to the full throttle position.
3. Loosen the screw securing the cable clamp.
4. Push and hold the engine throttle arm fully in the direction of movement noted in step 2 above.
5. While continuing to hold the throttle arm, pull the throttle cable conduit back through the clamp (away from the arm) to remove any slack in the cable and tighten the screw securing the clamp.
6. Start the engine. Use a tachometer to check the high and low speed engine rpm to specifications (see Section1). Refer to the appropriate Engine Service Manual if adjustment is necessary.

6-16 CHOKE CABLE ADJUSTMENT (All Models).

6-16.1 **General.** If the engine is difficult to start or runs roughly when warmed up, check the choke cable setting before performing any other engine or carburetor inspections.

6-16.2 Refer to Figure 6-4 and proceed as follows:

1. Raise the hood and locate the choke cable connection at the engine.
2. While observing the direction of movement of the engine choke arm, pull the tractor's choke handle out.
3. Loosen the screw securing the cable clamp.
4. Push and hold the engine choke arm fully in the direction of movement noted in step 2 above. If desired, the air cleaner cover and element may be removed to observe that the carburetor choke plate is closed completely.
5. While continuing to hold the choke arm, pull the choke cable conduit back through the clamp (away from the arm) to remove any slack in the cable and tighten the screw securing the clamp.

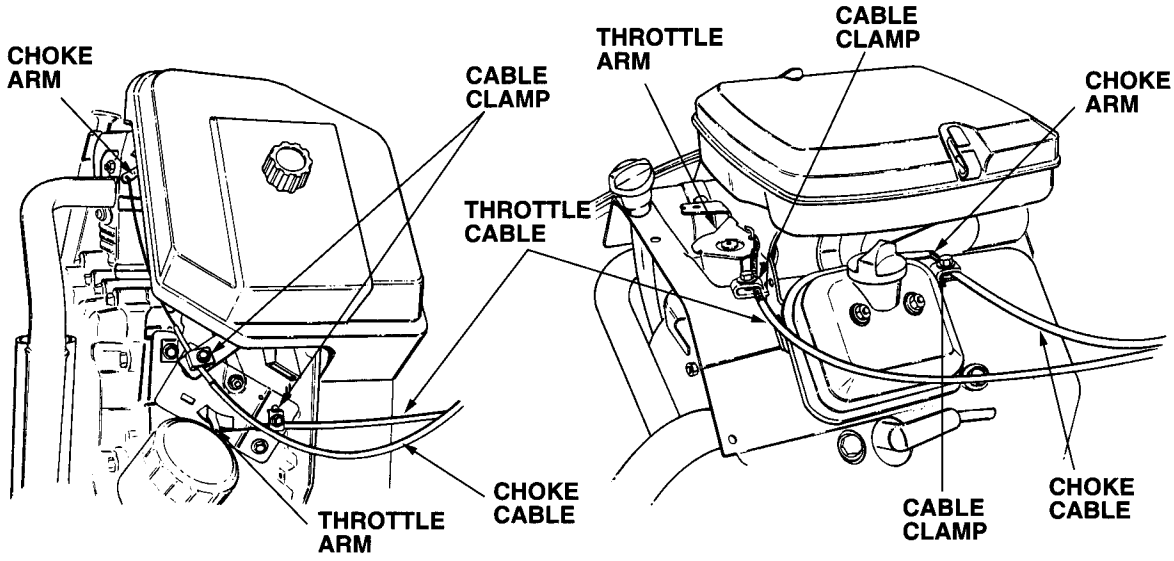


Figure 6-4. Throttle and Choke Cable Connections (Models 2130, 2135, 2160 And 2165 Shown).

SECTION 7
ATTACHMENTS

7-1 GENERAL.

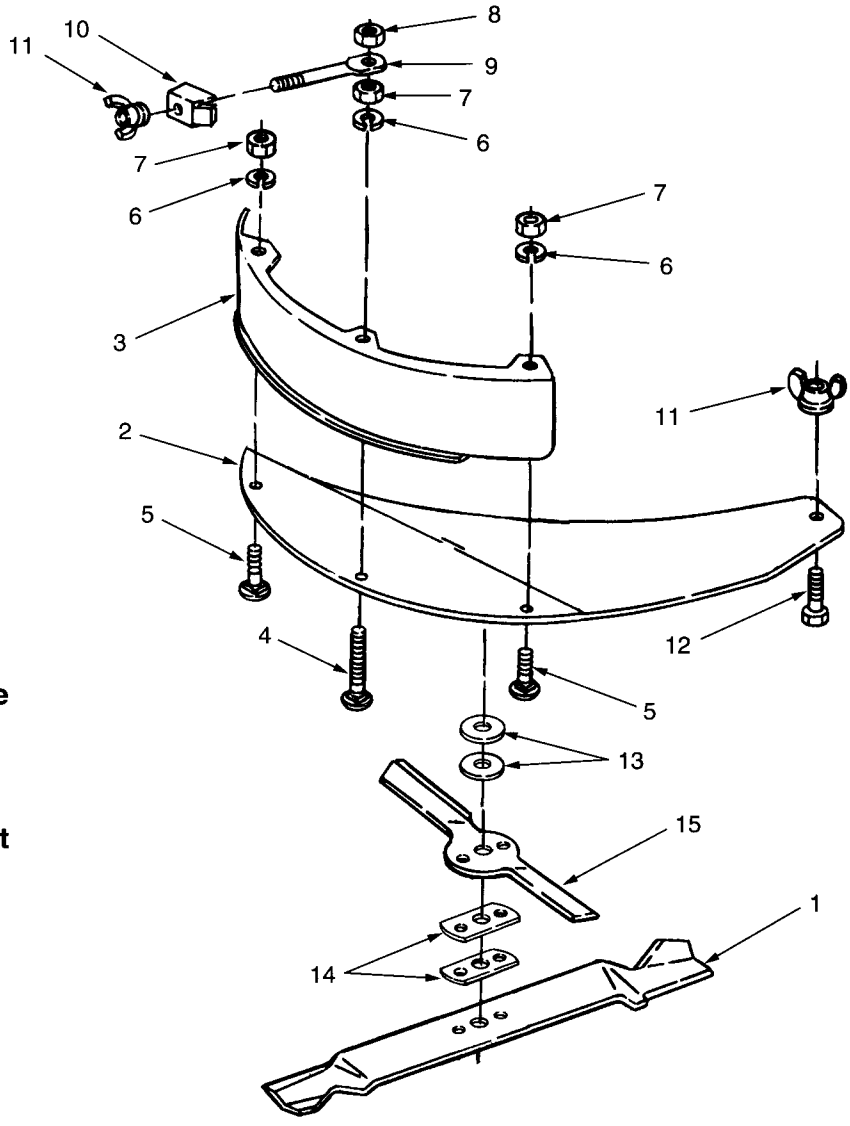
7-1.1 This section describes the installation of the following attachments which are available for the Cub Cadet Series 2000 Tractors.

1. 38 and 42 inch Mulching Attachments — Models 190-314 and 190-315.
2. 42" Snow Blade — Model 190-302.
3. 40" Snow Thrower — Model 190-303.
4. 28" Rotary Tiller — Model 190-304.

7-2 38 and 42 INCH MULCHING ATTACHMENTS (Models 190-314 and 190-315).

7-2.1 **General.** The 190-314 Mulching Kit is designed for usage on the 38" mower deck of Tractor Models 2130 and 2135. The 190-315 is designed for the 42" deck of the Tractor Models 2140 and 2145.

7-2.1.1 Before beginning installation of the mulching attachment, refer to Figure 7-1 to confirm that all parts are included.



1. **Cutting Blade**
2. **Top Mulching Baffle**
3. **Side Mulching Baffle**
4. **Carriage Bolt**
5. **Carriage Bolt**
6. **Lock Washer**
7. **Hex Nut**
8. **Hex Center Lock Nut**
9. **Retaining Bolt**
10. **Locking Bracket**
11. **Nylon Wing Nut**
12. **Hex Cap Screw**
13. **Flat Washer**
14. **Adapter Plate**
15. **Mulching Blade**

Figure 7-1. Mulching Kit Components.

7-2.2 **Deck Removal From Tractor.**

WARNING

Stop the tractor engine, disengage the PTO, place all controls in neutral and engage the brake lock before performing deck removal.

WARNING

When handling the mower deck, be careful not to cut yourself on the sharp blades.

CAUTION

Place the tractor on a firm and level surface before beginning deck removal.

WARNING

Do not remove the deck immediately after running the unit. Both the grille and PTO clutch are hot. Let the unit cool before touching.

NOTE

Refer to the Deck Owner's Manual to remove the deck.

7-2.3 **Remove Cutting Blades From Deck.**

WARNING

When handling the blades, be careful not to cut yourself.

1. A block of wood may be placed between the housing and cutting edge of the blade to assist in removal of the hex nut securing the blade. Refer to Figure 7-2.
2. Remove the hex nuts, flat washers, cutting blades and spacers from the deck. See Figure 3. Put the blades and spacers aside. Save the hex nuts and flat washers to mount the mulching blade assembly.

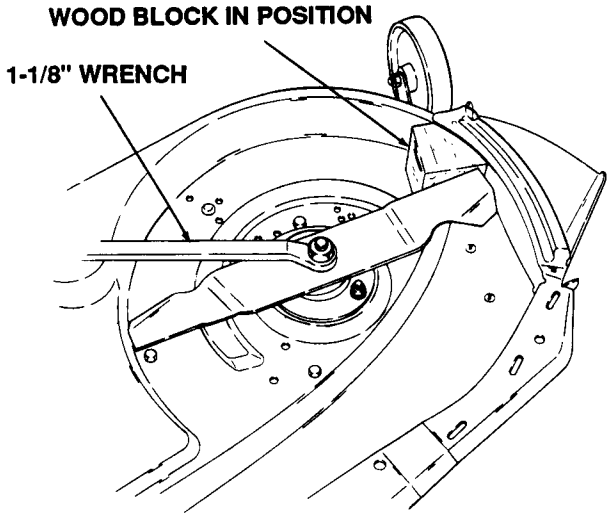


Figure 7-2. Loosen Hex Nut Securing Cutting Blade.

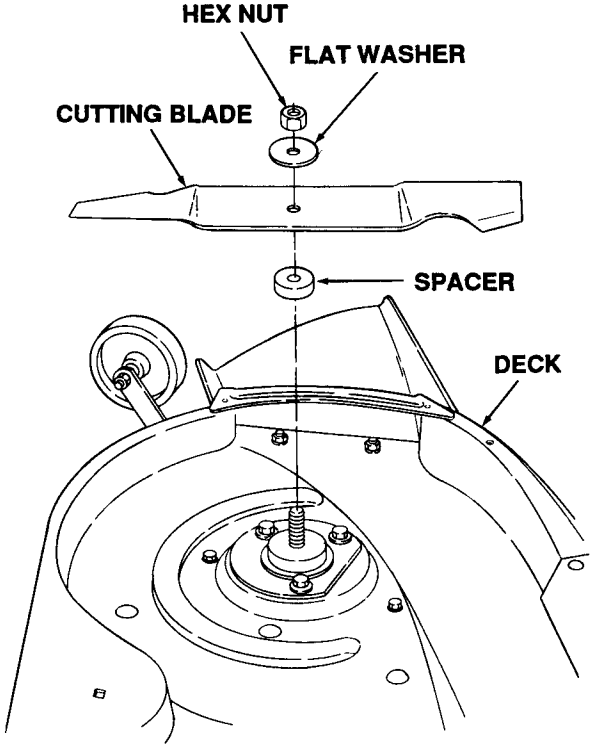
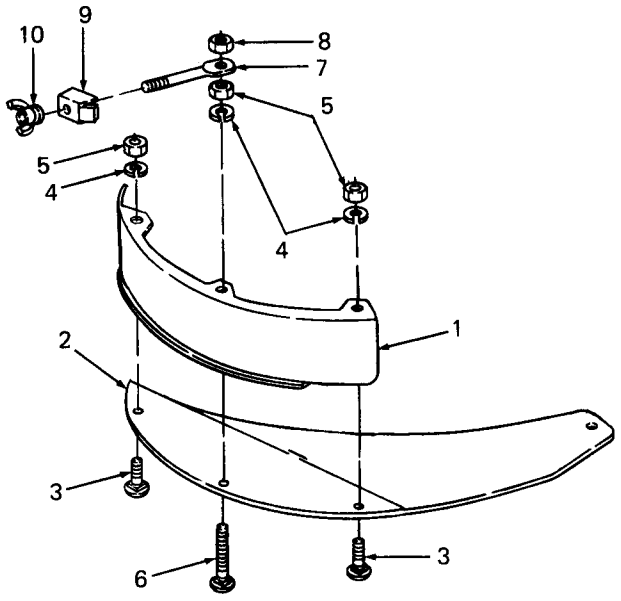


Figure 7-3. Removal Of Cutting Blade.

7-2.4 **Assemble Mulching Baffle.**

1. Assemble the top baffle (2, Fig. 7-4) to the side baffle (1) with the carriage bolts (3 and 6), lock washers (4) and hex nuts (5).

2. Assemble the retaining bolt (7, Fig. 7-4) to the carriage bolt (6) with the hex center lock nut (8). Tighten the center lock nut to eliminate side play, while still allowing the retaining bolt to pivot.



1. **Side Baffle**
2. **Top Baffle**
3. **Carriage Bolt**
4. **Lock Washer**
5. **Hex Nut**
6. **Carriage Bolt**
7. **Retaining Bolt**
8. **Hex Center Lock Nut**
9. **Locking Bracket**
10. **Nylon Wing Nut**

Figure 7-4. Mulching Baffle Assembly.

7-2.5 **Mounting Mulching Baffle Assembly On Deck.**

NOTE

The cutting blades should be removed from the deck when installing the baffle assembly.

NOTE

When performing the initial installation of the mulching baffle assembly, metal 1/4-20 hex nuts may be used in place of the nylon wing nuts during the baffle seating procedure. This will prevent possible stripping of the wing nuts.

CAUTION

When installing the baffle assembly, the short flange at the bottom of the side baffle (1, Fig. 7-4) must be wedged in above the finger guard welded across the bottom of the deck discharge opening. Failure to do so could allow the baffle to fall and be struck by the spinning blades.

1. With the retaining bolt (7, Fig. 7-4) and locking bracket (9) projecting through the discharge opening, position the baffle assembly in the underside of the deck, and press the side baffle into the discharge opening as far as possible.

2. Hook the locking bracket (9) onto the edge of the deck (see Fig. 7-5) and tighten the wing nut (or hex nut, if used) until snug.

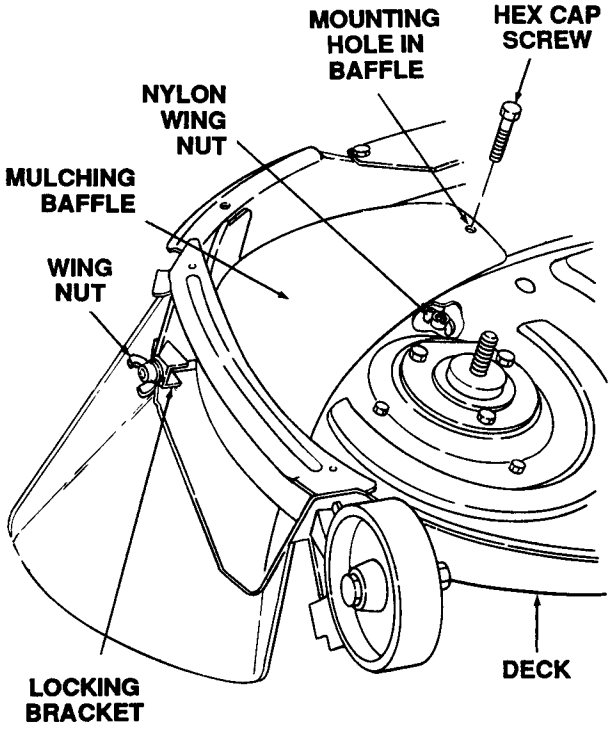


Figure 7-5. Positioning Mulching Baffle.

3. Using a rubber mallet to tap the side baffle through the discharge opening (see Fig. 7-6), alternately tap the rear area of the baffle and retighten the wing nut (or hex nut, if used). Repeat until the baffle is completely seated, and the inner mounting hole of the baffle aligns with the hole in the deck.

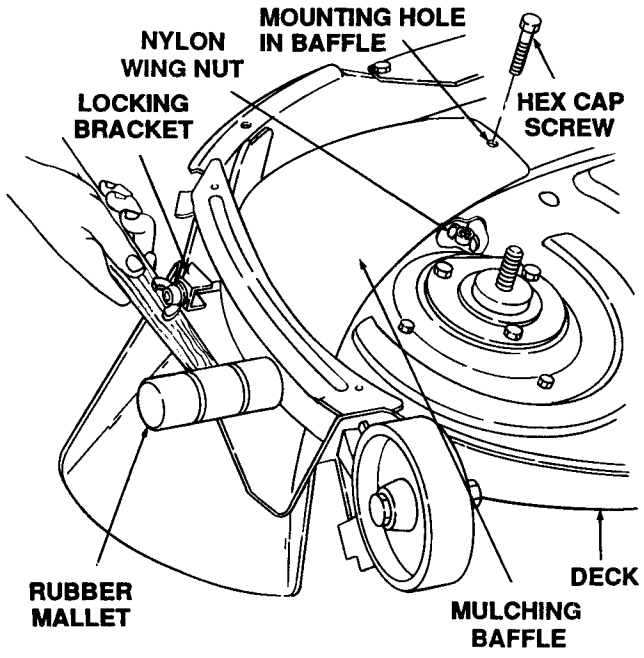


Figure 7-6. Seating the Baffle Assembly.

4. Insert the hex cap screw (see Fig. 7-6) from the underside of the deck and secure with the second wing nut.

7-2.6 **Installing Mulching Blades On Deck.**

WARNING

Use care when handling the blades. The sharpened edges could cause cuts to the skin.

NOTE

With the blades removed, the spindle shafts can slip partially out of the spindle housings when the deck is inverted to re-install the blades. If necessary, hold the shafts from the top of the deck when installing the blades and hardware.

1. Assemble the blades and hardware on the spindle shafts as follows (see Fig. 7-7):

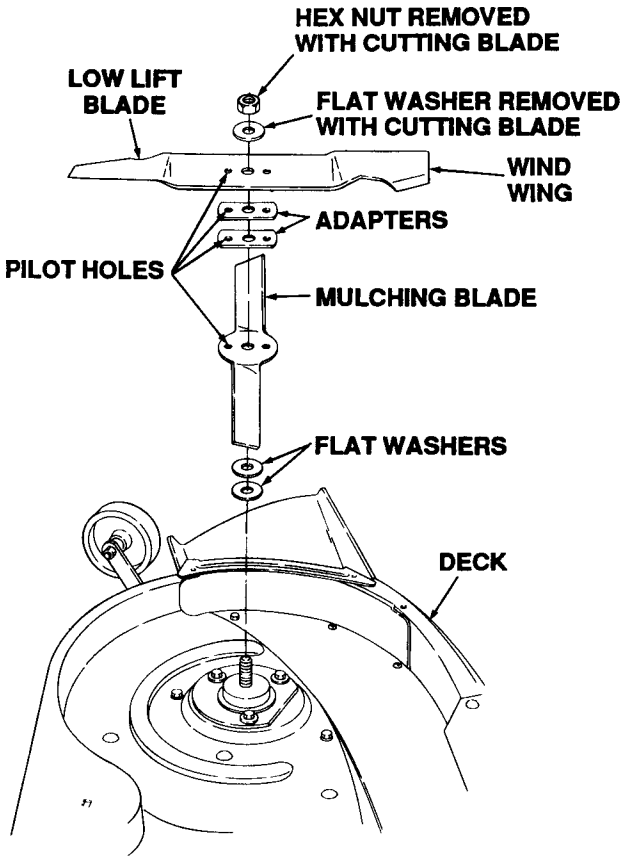


Figure 7-7. Installing Blades and Hardware.

a. Slide the two flat washers (13, Fig. 7-1) onto each spindle shaft.

b. Install the mulching blades (15, Fig. 7-1), making certain the sharpened edge is forward in relation to the blade rotation (sharpened edges pitch upward toward underside of deck).

c. Install the two plate adapters (14, Fig. 7-1).

d. Making sure the lift wings point toward the deck housing, install the cutting blades (1) and loosely secure with the flat washers and hex nuts removed earlier.

WARNING

NEVER USE THE PILOT HOLES OF THE MULCHING BLADES, ADAPTERS, AND CUTTING BLADES TO BOLT THEM TOGETHER. THEY ARE ONLY TO BE USED TO ALIGN THE BLADES AT 90° TO EACH OTHER, AND TO HOLD IN THAT POSITION AS THE HEX NUTS ARE TIGHTENED.

2. Align the pilot holes of the blades and adapters (the blades should be at 90° to each other) and insert a phillips screwdriver, drift punch, or similar type instrument through the pilot holes (see Fig. 7-8).

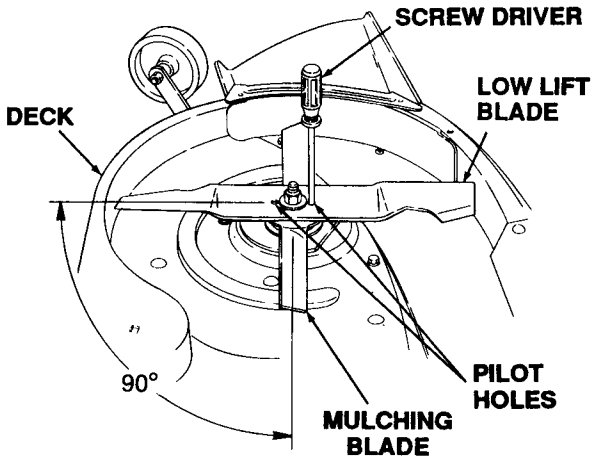


Figure 7-8. Using Pilot Holes To Align Blades.

NOTE

To prevent the spindle shaft from turning when tightening the hex nut, use a 1-1/4 inch wrench to hold the hex shaped hub of the V-pulley.

3. Tighten the hex nuts to 90 to 110 ft-lbs.
4. Install the mower deck on the tractor per the instructions in the Owner's Manual.
5. If the blades strike a foreign object, remove the deck and inspect all blades for damage. If necessary, reposition the blades as described above.

7-3 42 INCH SPRING TRIP BLADE (Model 190-302).

7-3.1 **General.** The 42 inch Spring Trip Blade, Model 190-302, is designed for use on all of the Cub Cadet Series 2000 Tractors. The blade may be used for moving snow, terracing, or for light to medium grading.

WARNING

Whenever the blade assembly is installed on the front of the tractor, the Model 190-307 rear weight kit, with a minimum of two suitcase weights, must be installed on the rear of the tractor. The weight kit counterbalances the weight of the blade and provides stability to the tractor.

7-3.1.1 Before beginning installation of the spring trip blade, refer to Figure 7-9 to confirm that all parts are present, and to familiarize yourself with the components.

7-3.2 **Tractor Preparation.**

WARNING

Stop the tractor engine, disengage the PTO, place all controls in neutral and engage the brake lock before performing any preparation procedures.

WARNING

The exhaust system and surrounding areas are HOT. To avoid personal injury, allow the tractor to cool before beginning any blade installation procedures.

CAUTION

Place the tractor on a firm and level surface before beginning installation procedures.

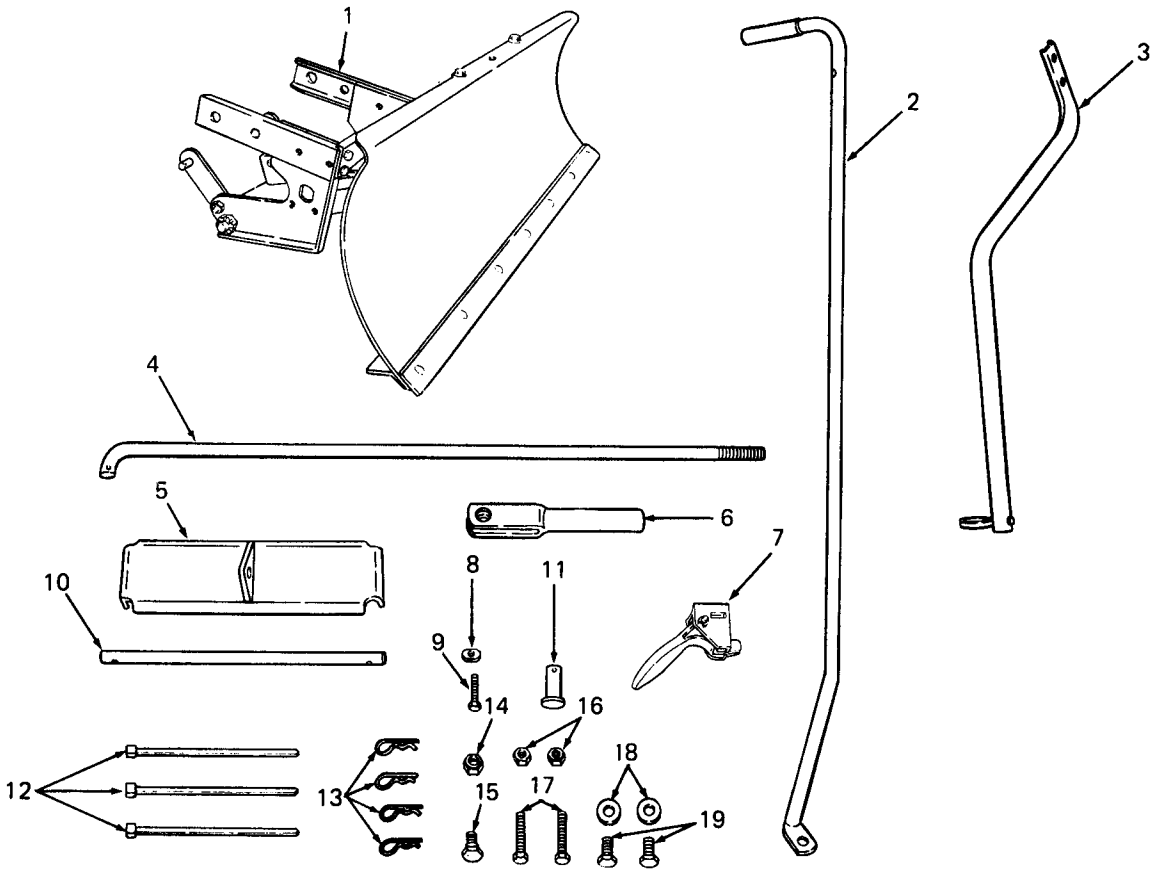
NOTE

Remove the mower deck and front lift rod assembly, or any other attachment from the tractor.

1. Place the tractor lift handle in the No. 2 height position
2. Remove the front bumper from the frame (see Fig. 7-10) by removing the hex wash. tapp screw from each side. Store the screws and bumper for later reassembly.
3. Install an internal cotter pin (13, Fig. 7-9) in the hole at one end of the rod (10).

CAUTION

When installing the lift bracket (5, Fig. 7-9), the tractor lift links must be positioned **within** the slots at each side of the lift bracket, with the center lift rod tab of the bracket positioned as shown in Figure 7-11.



1. **Dozer Blade Assembly (with pivot cable attached)**
2. **Blade Pivot Handle**
3. **Handle Support Tube**
4. **Lift Rod**
5. **Lift Bracket**
6. **Adjustment Clevis**
7. **Trigger Assembly**
8. **Flat Weld Nut**
9. **Truss Screw**
10. **Rod**
11. **Clevis Pin**
12. **Tie Strap**
13. **Internal Cotter Pin**
14. **Flanged Lock Nut**
15. **Shoulder Screw**
16. **Hex Flange Top Lock Nut**
17. **Hex Screw**
18. **Bell Washer**
19. **Hex Screw**

Figure 7-9. 42 Inch Spring Trip Blade Components (Model 190-302).

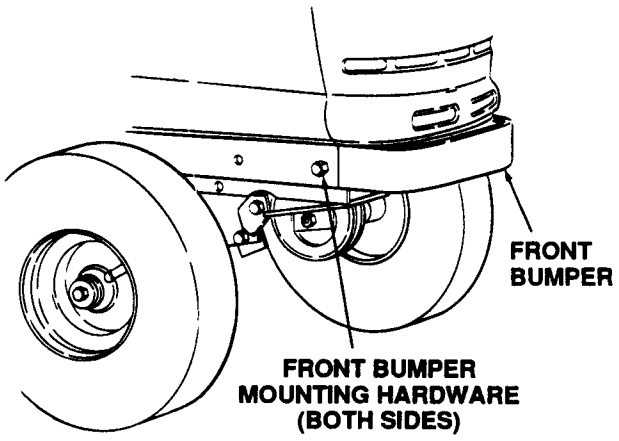


Figure 7-10. Removing Front Bumper.

4. Install the lift bracket (5) onto the tractor lift links, align the holes, and insert the rod (10) through the lift bracket and lift links. Install an internal cotter pin (13) in the other end of the rod (see Fig. 7-11).

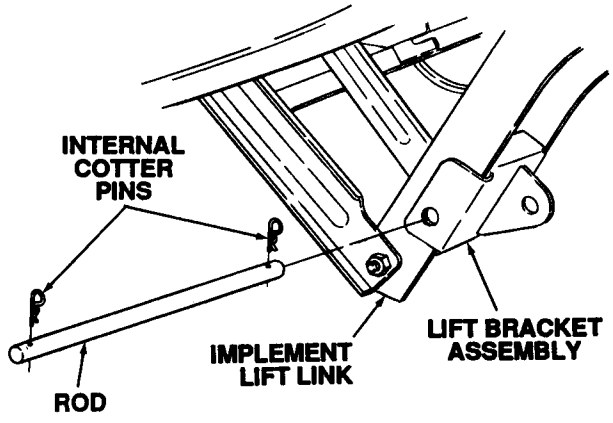


Figure 7-11. installing the Lift Bracket.

7-3.3 **Blade Assembly Preparation.**

NOTE

Although the blade assembly has been partially assembled at the factory, the pivot latch components and the contact surfaces between the pivot plate and A-frame should be checked for proper lubrication. If necessary, apply a liberal amount of a good grade grease to the contact surfaces and apply spray lube to the latch components.

1. Assemble the handle support tube (3, Fig. 7-9) to the LH blade hitch assembly using the hex screws (17) and hex nuts (16) See Fig. 7-12.

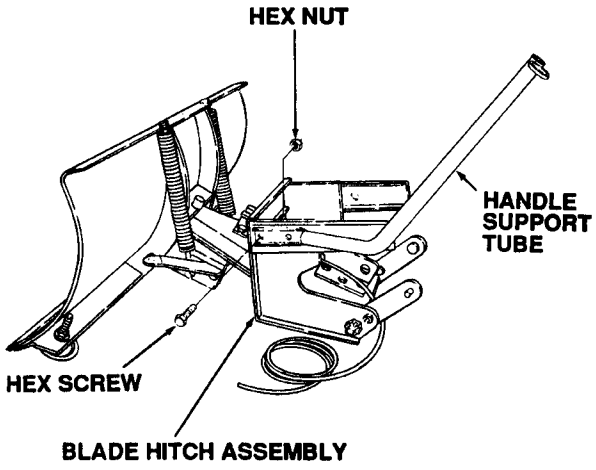


Figure 7-12. Attaching Handle Suppport Tube.

2. Slide the blade pivot handle (2, Fig. 7-9) through the eyelet of the handle support tube (3). Attach to the blade angle arm of the pivot plate with the shoulder screw (15) and flanged lock nut (14). See Fig. 7-13.

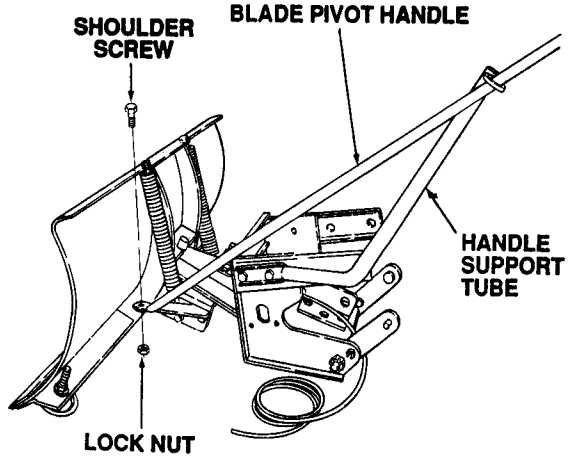


Figure 7-13. Installing Blade Pivot Handle.

CAUTION

When feeding the pivot release cable up through the eyelet of the handle support tube (3), route the cable as shown in Figure 7-14. Make certain the cable has a smooth even bend and is not kinked.

3. Feed the pivot release cable up through the eyelet to the top of the pivot handle (2).

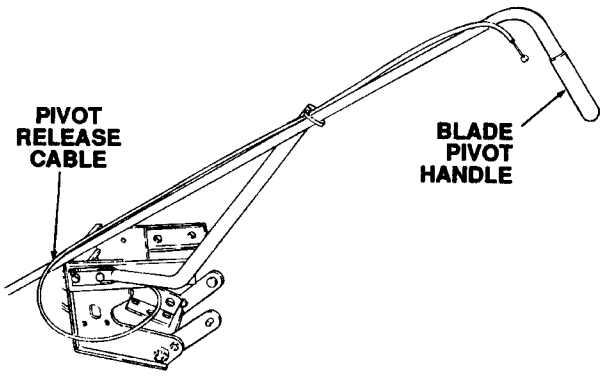


Figure 7-14. Routing Pivot Release Cable.

4. Install the trigger assembly (7, Fig. 7-9) onto the pivot release cable. Refer to Figure 7-15 and proceed as follows:

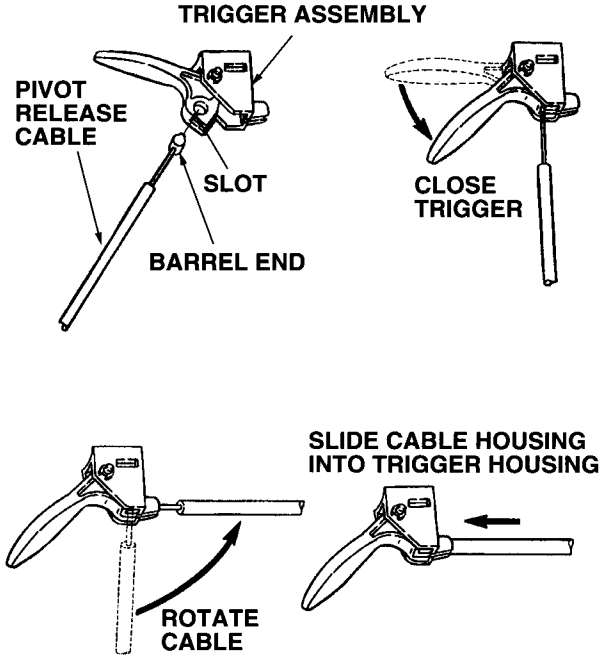


Figure 7-15. Attaching Trigger to Cable.

a. Place the trigger assembly onto the end of the release cable by sliding the barrel end of the cable into the slot of the trigger.

b. Close the trigger as shown.

c. Rotate the cable into the slot of the trigger assembly housing.

d. Slide the cable housing into the receptacle of the trigger housing.

5. Slide the flat weld nut (8, Fig.7-9) into the trigger housing. See Figure 7-16.

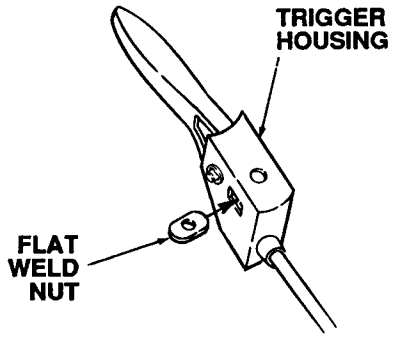


Figure 7-16. Inserting Flat Weld Nut.

6. While holding the flat weld nut (8) in position, place the trigger assembly (7) under the blade pivot handle (2) and fasten with the truss screw (9). See Figure 7-17.

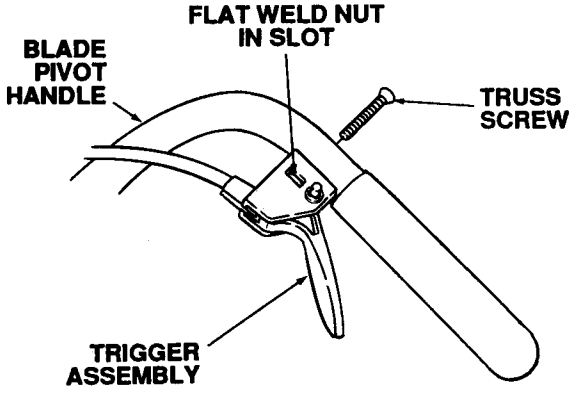


Figure 7-17. Installing Trigger Assembly.

7. Secure the blade release cable to the pivot handle with the three tie straps (12, Fig. 7-9) as shown in Figure 7-18. Cut excess from tie strap ends.

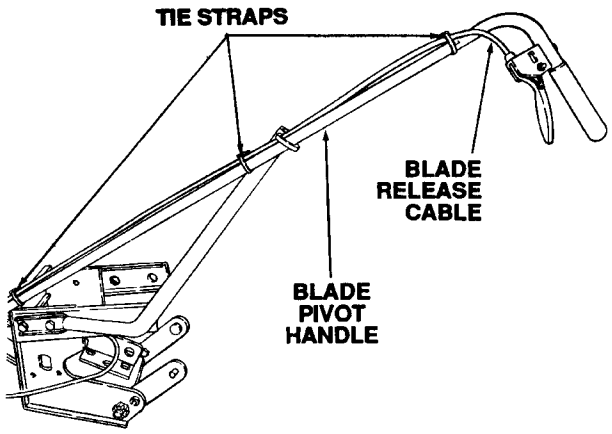


Figure 7-18. Installing Tie Straps.

8. Screw the adjustment clevis (6, Fig. 7-9) onto the threaded end of the lift rod (4).

NOTE

When attaching the lift rod assembly to the blade's A-frame assembly, the rod must be inserted from left to right as shown in Figure 7-19.

9. Install the lift rod (4) in the front lift bracket of the A-frame assembly and secure with an internal cotter pin (13). See Figure 7-19.

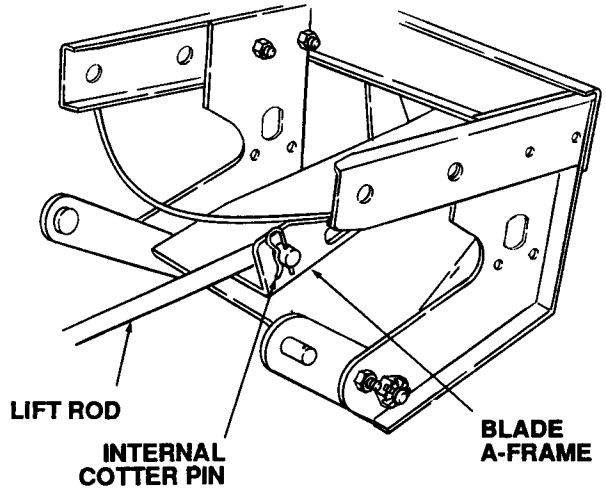


Figure 7-19. Attaching Lift Rod To A-frame.

10. Loosen BUT DO NOT REMOVE the four screws that fasten the front support plate to the LH and RH hitch plates. See Figure 7-20.

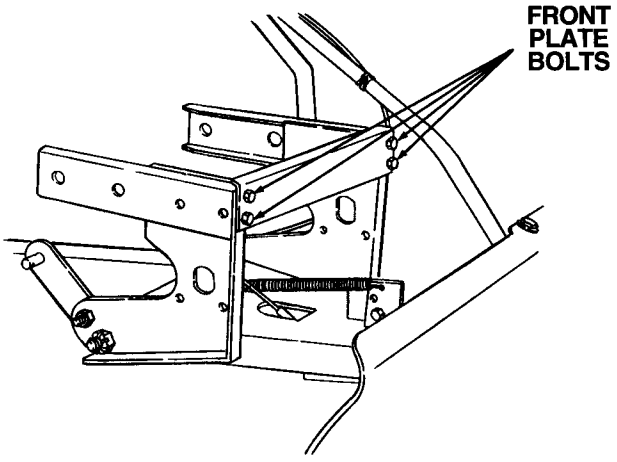


Figure 7-20. Loosen Front Support Plate.

7-3.4 **Blade Installation.**

1. Position the blade assembly directly in front of the tractor with the LH and RH hitch plate channel brackets aligned with the channels of the tractor frame.

NOTE

To ease insertion into the tractor frame channels, apply a light coating of grease to the channel brackets of the blade hitch assembly.

2. Pushing evenly on both sides as indicated in Figure 7-21, slide the blade hitch assembly into the tractor frame channels.

NOTE

The blade hitch assembly is fully inserted when the pins of the hitch assembly mounting arms are locked in the quick attach latch on each side of the tractor frame. See Figure 7-21.

3. Using one hex screw (19) and bell washer (18) per side, secure the blade hitch assembly to the tractor frame channels as shown in Figure 7-21.

4. Tighten the four screws in the front support plate which were loosened during the blade preparation procedures.

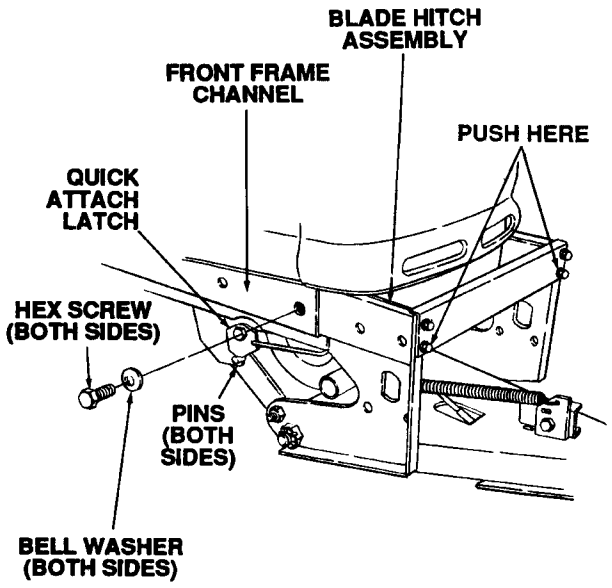


Figure 7-21. Installing Hitch Assembly.

NOTE

Make certain the tractor's implement lift handle is in the No. 2 height position.

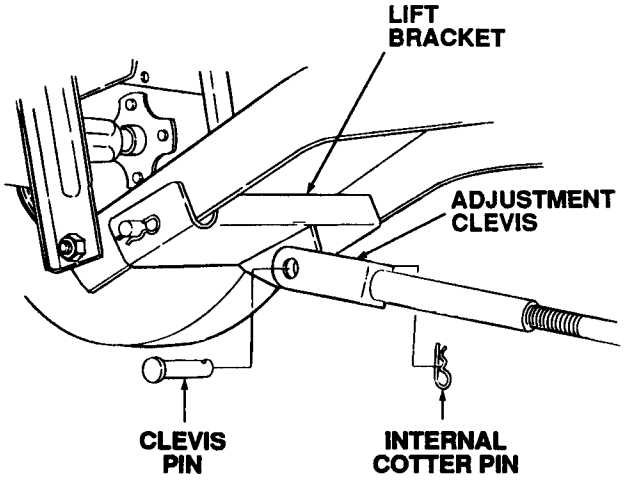


Figure 7-22. Attaching Adjustment Rod to Lift Bracket.

5. Turn the adjustment clevis on the lift rod to align with the hole in the lift bracket tab, then insert the clevis pin (11) and secure with an internal cotter pin (13). See Figure 7-22.

7-3.5 Blade Adjustments.

1. Adjust the skid shoes (refer to Fig. 7-23) to the appropriate position for the job being performed as follows:
   - Loosen the hex nuts on each shoe.
   - Turn the skid shoes to the desired position.
   - Tighten the hex nuts.
2. If the wear bar (see Fig. 7-23) becomes worn, reverse or replace the bar as follows:
   - Remove the seven carriage bolts, lock washers, and hex nuts fastening the wear bar to the blade.
   - Reverse or replace the wear bar and attach with the carriage bolts, lock washers and hex nuts.
3. Maintain the proper trip spring tension (see Fig. 7-23) as follows:
   - There should be a 1/4 inch gap between the top of the spring and the upper lip of the blade.
   - Tighten or loosen the hex cap screws on top of the blade to obtain the proper gap.

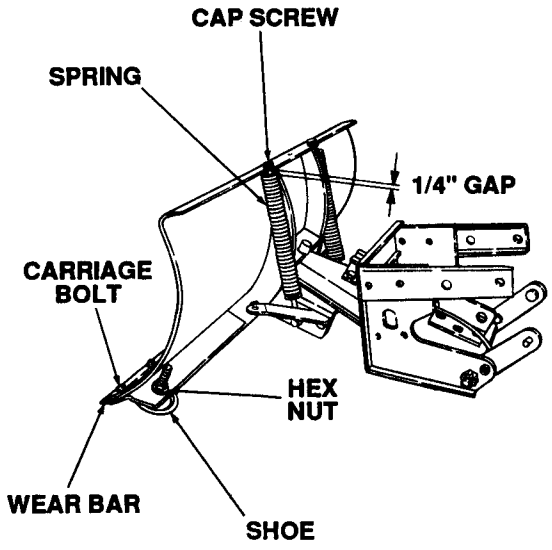


Figure 7-23. Adjusting the Blade.

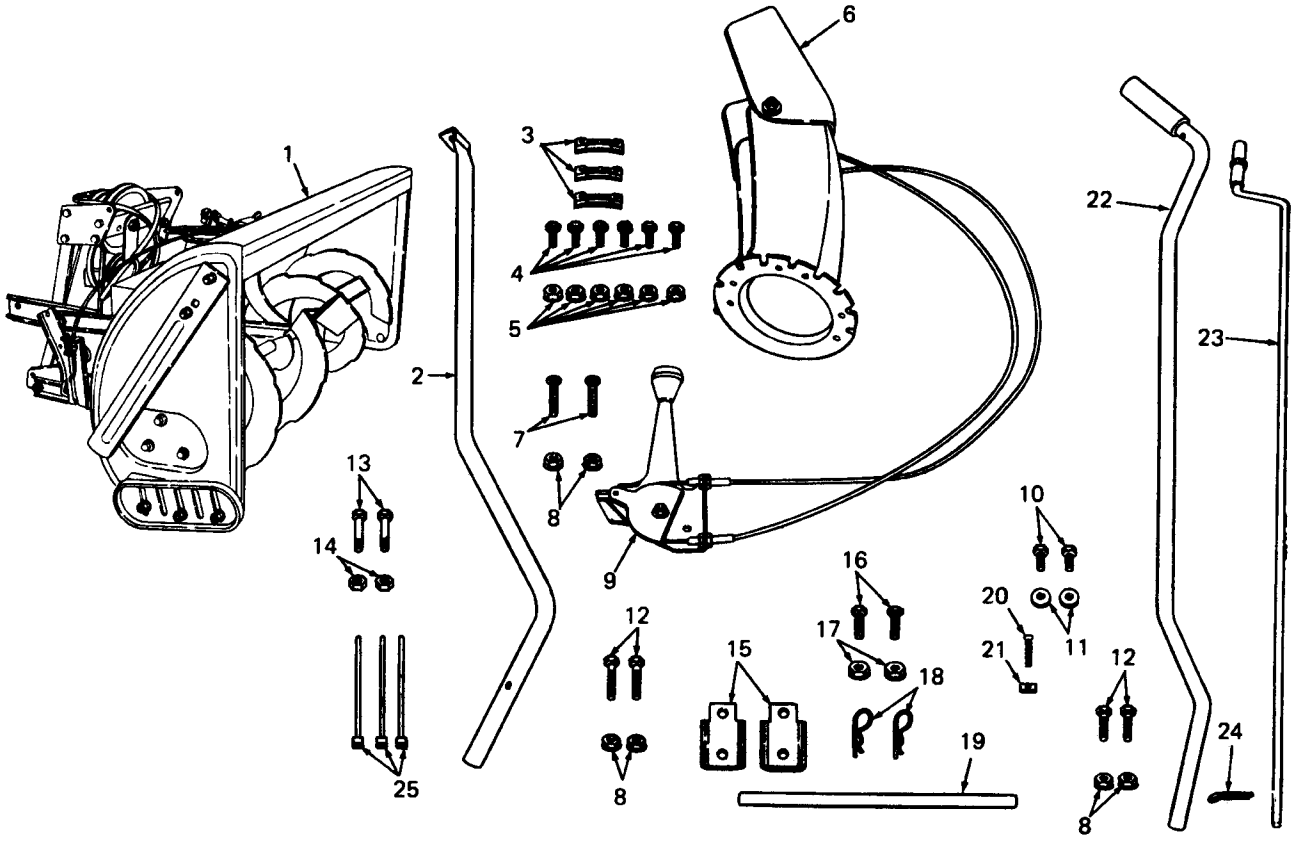
7-4 40 INCH SNOW THROWER ATTACHMENT (Model 190-303).

7-4.1 **General.** The 40-inch Snow Thrower, Model 190-303, is designed for use on all of the Cub Cadet Series 2000 Tractors. It is intended to be used for snow removal purposes only.

7-4.1.1 Before beginning installation of the snow thrower, refer to Figure 7-24 to confirm that all parts are present, and to familiarize yourself with the components.

WARNING

Whenever the snow thrower assembly is installed on the front of the tractor, the Model 190-307 rear weight kit, with a minimum of two suitcase weights, must be installed on the rear of the tractor. The weight kit counterbalances the weight of the snow thrower and provides stability to the tractor.



1. Snow Thrower Assembly
2. Chute Crank Support Tube
3. Chute Flange Keeper
4. Hex Cap Screw, 1/4-20 X 3/4 Lg
5. Hex Flanged Lock Nut, 1/4-20
6. Discharge Chute
7. Carriage Bolt, 5/16-18 X 1.5 Lg
8. Hex Flange Top Lock Nut, 5/16-18 GR5
9. Chute Tilt Handle Assembly
10. Hex Cap Screw, 7/16-14 X 1.0 Lg
11. Bell Washer
12. Hex Cap Screw, 5/16-18 X 1.5 Lg
13. Shear Bolt (extra)
14. Hex Center Lock Nut, 5/16-18 (Extra)
15. Frame Mounting Bracket
16. Hex Cap Screw, 3/8-16 X 3/4 GR5
17. Hex Flanged Lock Nut, 3/8-16
18. Internal Cotter Pin
19. Rod
20. Truss Screw, 10-24 X 1.36 Lg
21. Flat Weld Nut
22. Snow Thrower Lift Handle
23. Chute Crank Rod
24. Cotter Pin
25. Tie Strap

Figure 7-24. 40-Inch Snow Thrower Components (Model 190-303).

7-4.2 **Tractor Preparation.**

WARNING

Stop the tractor engine, disengage the PTO, place all controls in neutral and engage the brake lock before performing any preparation procedures.

WARNING

The exhaust system and surrounding areas are HOT. To avoid personal injury, allow the tractor to cool before beginning any snow thrower installation procedures.

CAUTION

Place the tractor on a firm and level surface before beginning installation procedures.

NOTE

Remove the mower deck and front lift rod assembly, or any other attachment from the tractor.

1. Remove the front bumper from the frame (see Fig. 7-25) by removing the hex wash. tapp screw from each side. Store the screws and bumper for later reassembly.

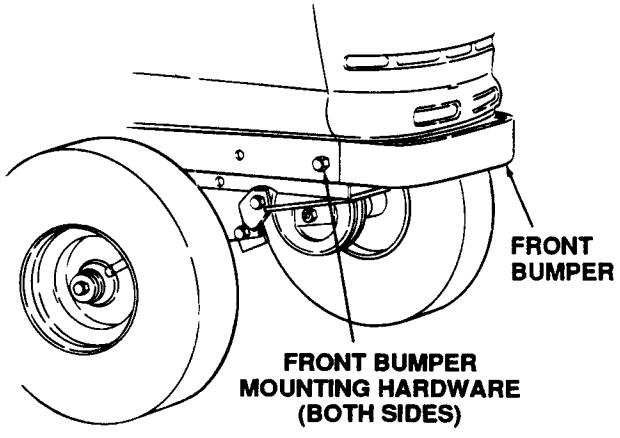


Figure 7-25. Removing Front Bumper.

2. Install the frame mounting bracket (15, Fig. 7-24) onto each side of the tractor frame. Position the brackets (see Fig. 7-26) with the flanges facing outward from the tractor frame. Secure with the hex cap screws (16) and hex flanged lock nuts (17). Insert the cap screws from inside the tractor frame.

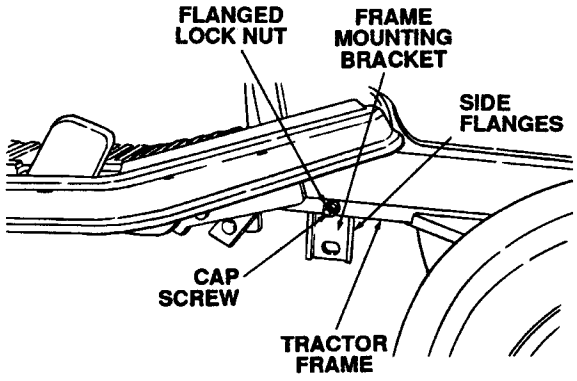


Figure 7-26. Installing Frame Mtg. Brackets

7-4.3 **Snow Thrower Assembly Preparation.**

WARNING

Before beginning preparation of the snow thrower assembly, select a firm and level surface which is large enough to accommodate the snow thrower attachment and tractor. Engage the tractor brake lock.

1. Grease the top and bottom surfaces of the flange on the chute opening of the blower housing. Use a multi-purpose automotive grease or equivalent.
2. Place the discharge chute (6, Fig. 7-24) over the chute opening of the blower housing, with the opening in the discharge chute (6) facing forward.
3. With their flat surface facing down, place the chute flange keepers (3, Fig. 7-24) beneath the flange of the discharge chute (6) and the flange on the chute opening of the housing (see Fig. 7-27). Insert the hex cap screws (4) up through the flange keepers and discharge chute flange as shown in Figure 7-27, and secure with the hex flanged lock nuts (5). Tighten all lock nuts until snug, then back off (loosen) 1/4 turn.

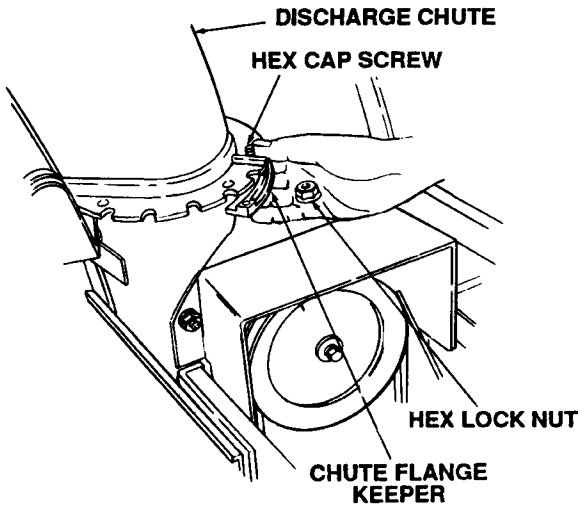


Figure 7-27. Installing Discharge Chute.

4. Install the chute crank support tube (2, Fig. 7-24) onto the frame of the snow thrower assembly (1) using the hex cap screws (12) and hex flange lock nuts (8). Refer to Figure 7-28.

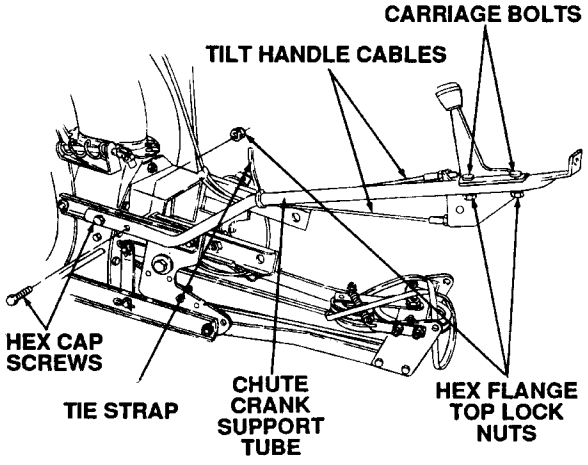


Figure 7-28. Installing Chute Crank Support Tube and Tilt Handle.

5. Install the chute tilt handle assembly (9) on the support tube (2) with the carriage bolts (7) and hex flange top lock nuts (8). See Figure 7-28.

6. Secure the cables of the chute tilt handle assembly (9) to the support tube (2) using one tie strap (25) as shown in Figure 7-28. Cut off excess on end of tie strap.

7. Insert the chute crank rod (23) through the hole in the rearward end of the support tube (2). Refer to Figure 7-29.

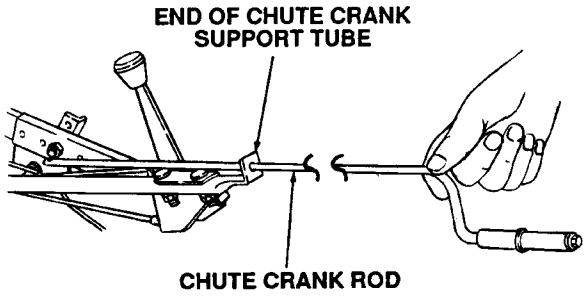


Figure 7-29. Install Chute Crank Rod.

8. Insert the forward end of the chute crank rod (23) into the universal joint, align the holes and secure with the cotter pin (24). See Figure 7-30.

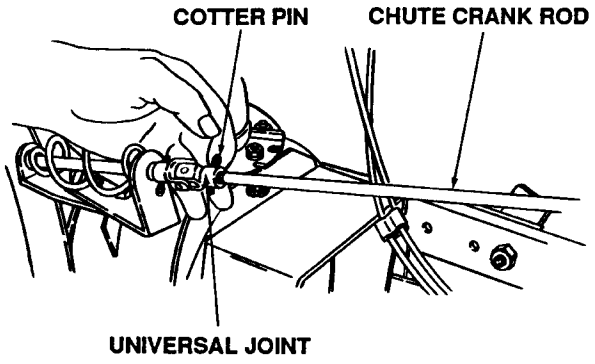


Figure 7-30. Attaching Chute Crank Rod.

NOTE

Note the latch release cable and trigger assembly are preassembled and attached to the snow thrower assembly at the factory. Uncoil the cable and make certain it is out of the way before attaching the snow thrower lift handle.

9. Attach the snow thrower lift handle (22) to the lift latch bracket, located on the right side of the snow thrower undercarriage, using the two hex cap screws (12) and hex flange top lock nuts (8). See Figure 7-32.

10. Slide the flat weld nut (21, Fig. 7-24) into the trigger housing. See Figure 7-31.

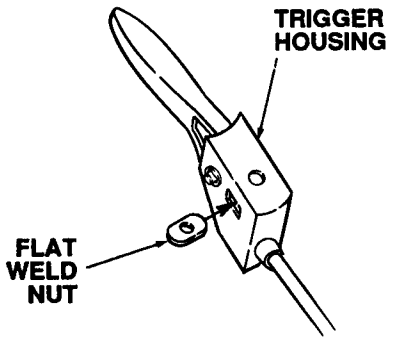


Figure 7-31. Inserting Flat Weld Nut.

11. While holding the flat weld nut (21) in position, place the trigger assembly against the lift handle (22) and fasten with the truss screw (20). See Figure 7-33.

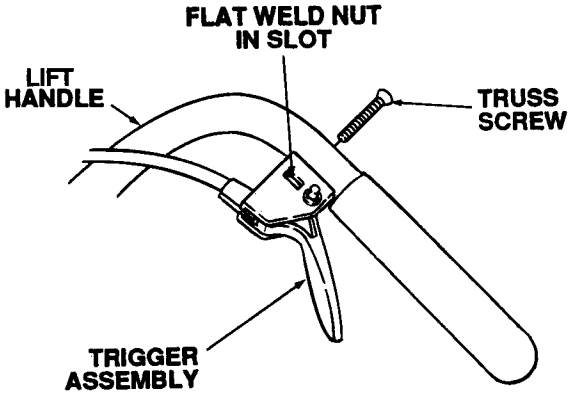


Figure 7-33. Installing Trigger Assembly.

12. Secure the latch release cable to the lift handle using two tie straps (25) as shown in Figure 7-32.
13. Cut the excess from the tie strap ends.

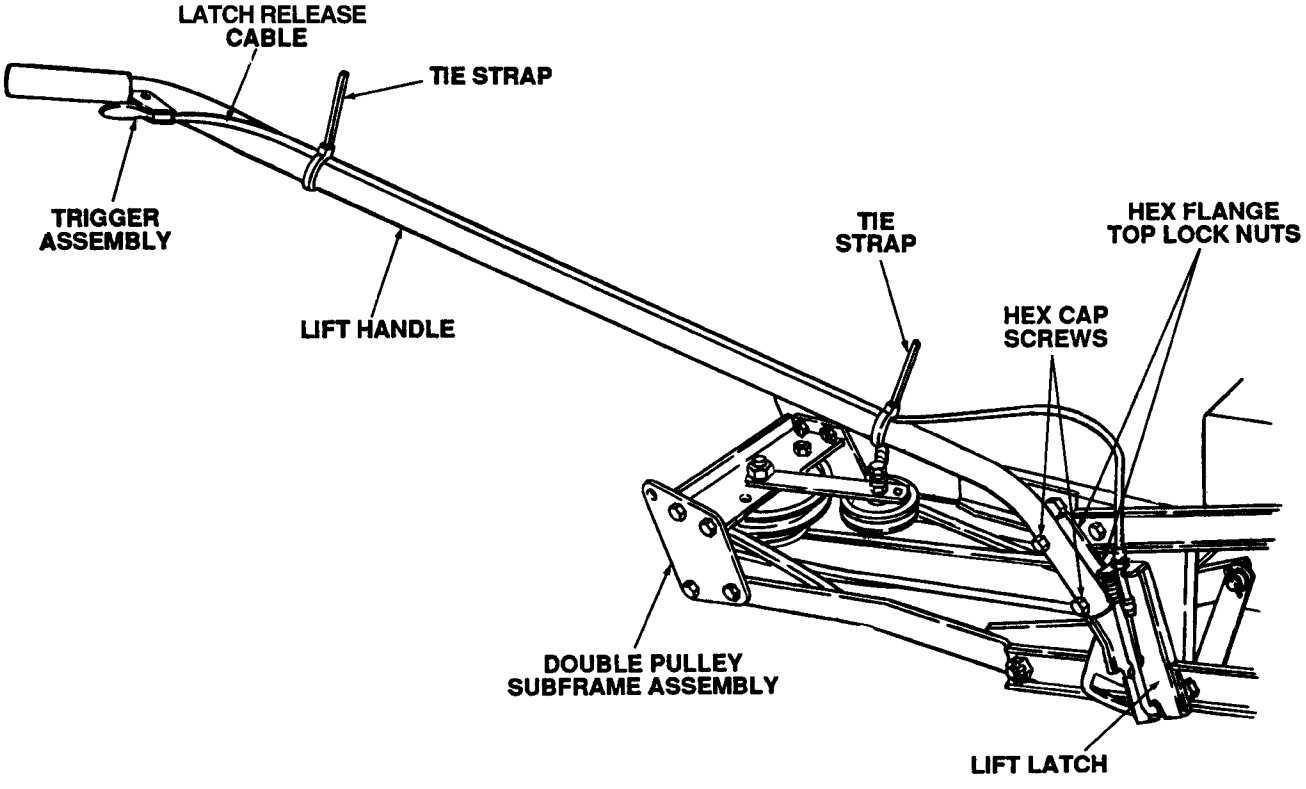


Figure 7-32. Installing Snow Thrower Lift Handle and Latch Release Cable.

7-4.4 **Snow Thrower Installation.**

WARNING

Before installing the snow thrower assembly onto the tractor, ensure the PTO switch and ignition switch are in the OFF position, the parking brake is locked, and that the exhaust system and surrounding areas have adequately cooled

NOTE

To ease insertion into the tractor frame channels, apply a light coating of grease to the channel brackets of the snow thrower hitch assembly.

NOTE

For easier installation, you can lock the pivot points of the snow thrower hitch assembly by rotating the lift handle (22) downward into its locked position.

1. Position the snow thrower assembly (1) directly in front of the tractor with the double pulley subframe assembly extending rearward between the front wheels of the tractor. See Figure 7-34.

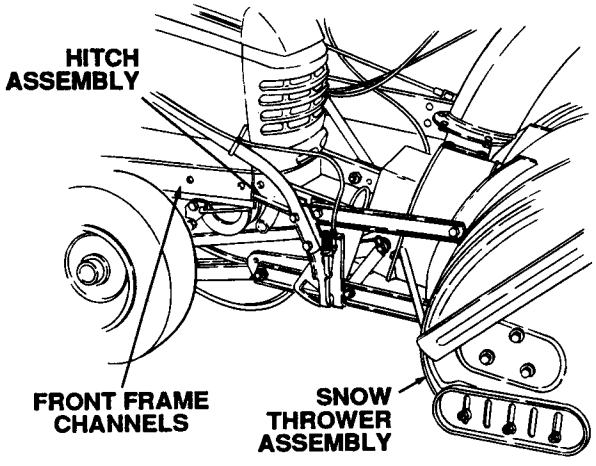


Figure 7-34. Position Snow Thrower.

2. Slide the snow thrower assembly rearward until the channel brackets of the hitch assembly engage the frame channel of the tractor. See Figure 7-34.

NOTE

To horizontally align the hitch assembly channel brackets with the tractor frame channels, tip the snow thrower auger housing slightly forward while moving the snow thrower rearward.

3. Lift the snow thrower assembly upward and move it rearward to slide the hitch channel brackets fully into the frame channels of the tractor. Secure the assembly to both sides of the tractor frame using the hex cap screws (10) and bell washers (11). See Figure 7-35.

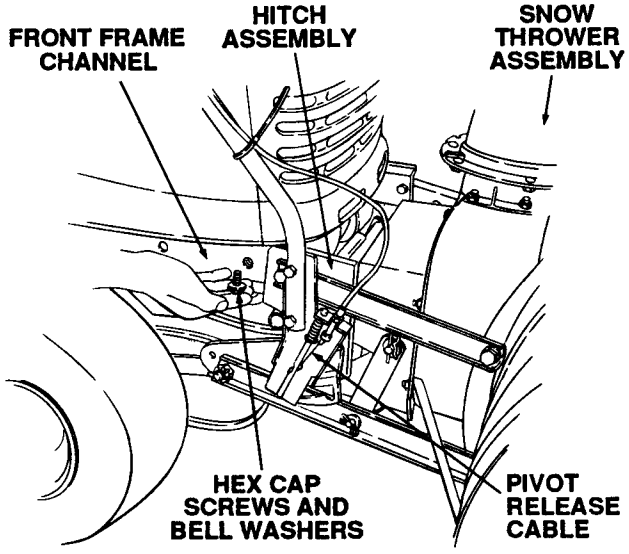


Figure 7-35. Attaching Snow Thrower to Tractor Frame.

4. Install an internal cotter pin (18) into one end of the rod (19) and lift the double pulley subframe assembly up between the frame mounting brackets (15). See Figure 7-36.

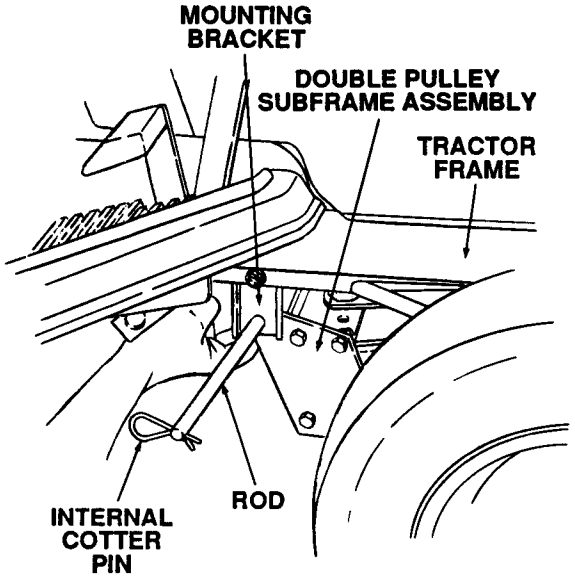


Figure 7-36. Attaching Double Pulley Subframe Assembly.

5. Slide the rod (19) through the nearest mounting bracket (15), both sides of the double pulley subframe, and the other mounting bracket (15). Install the second internal cotter pin (18) into the other end of the rod. See Figure 7-36.

6. Open the hood of the tractor and remove at least one of the side panels.

7. Route the PTO belt under the idler pulleys of the tractor and up over the PTO clutch on the front of the engine. See Figure 7-37.

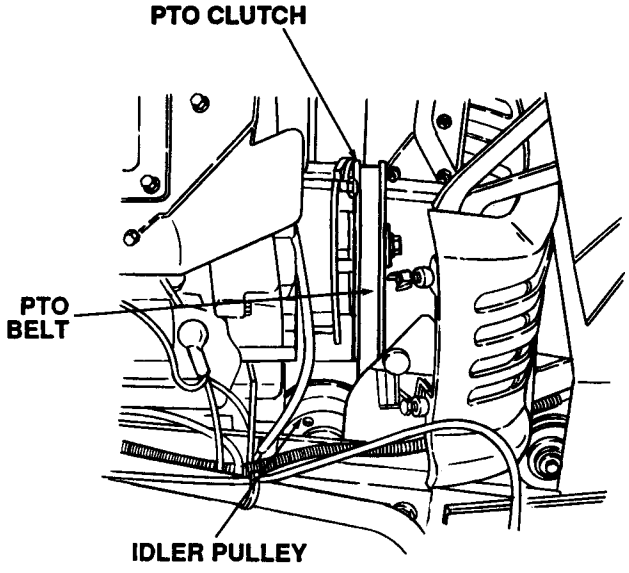


Figure 7-37. Installing PTO Belt.

8. From behind the front/right tire, pull the flat idler pulley toward you and position the PTO belt inside the flat idler pulley. Refer to Figure 7-38.

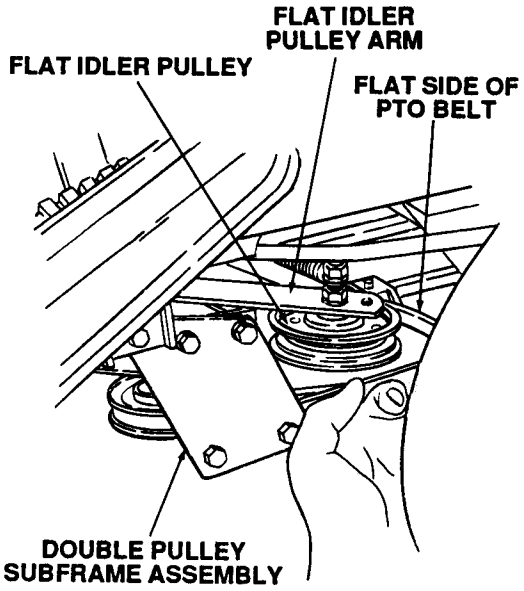


Figure 7-38. Position Flat Idler Pulley.

7-4.5 Snow Thrower Maintenance.

1. The lift latch is operated by the trigger assembly on the lift handle, through the latch release cable. If the latch cable is not functioning properly, refer to Figure 7-39 and adjust as follows:

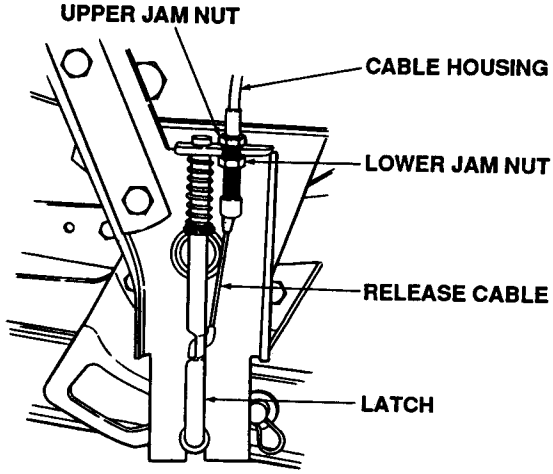


Figure 7-39. Adjusting Latch Release Cable.

a. If the lift latch does not latch securely, loosen the upper jam nut and tighten the lower jam nut until the latch seats fully into the slot of the latch bracket.

b. If the lift latch still does not latch securely in the slot of the latch bracket, refer to Cub Cadet Service Bulletin CC-293 for instructions on modifying the latch bracket slot to obtain a more positive engagement.

c. If the latch does not release, check for slack in the release cable. Loosen the lower jam nut and tighten the upper jam nut until all slack is removed from the cable wire.

2. The shave plate and skid shoes on the bottom of the snow thrower (See Fig. 7-40) are subject to wear. If worn service as follows:

   a. Remove the hex nuts securing the skid shoes to the sides of the auger housing and reverse (right to left, etc.) the shoes.

   b. Replace the shave plate as follows:
      - Loosen the skid shoe fasteners and remove the **rear** hex nut, bell washer, flat washer, and carriage bolt from both skid shoes.
      - Remove the hex nuts, bell washers and carriage bolts securing the shave plate to the housing and replace the shave plate.

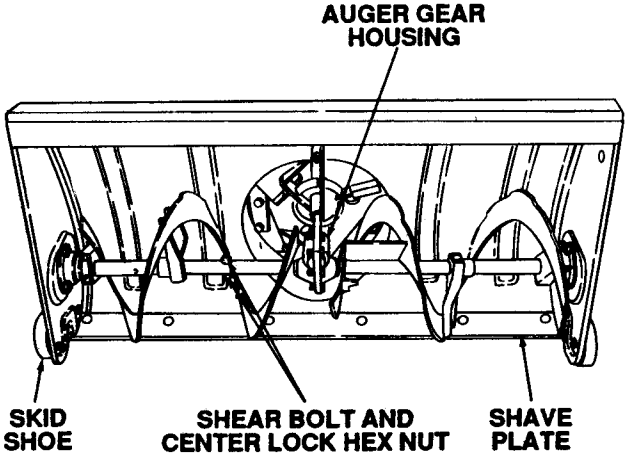


Figure 7-40. Shave Plate and Skid Shoes.

3. To protect the gear box from damage if the augers become jammed, the augers are secured to the auger shaft with shear bolts (13, Fig. 7-24) and hex center lock nuts (14). If the augers will not turn, check the shear bolts (see Fig. 7-40) and replace if necessary.

4. Replace the PTO drive belt as follows:
   a. Remove the snow thrower assembly from the tractor.
   b. Remove the belt guide from the double pulley subframe by removing the hex nuts and lock washers. See Figure 7-41.

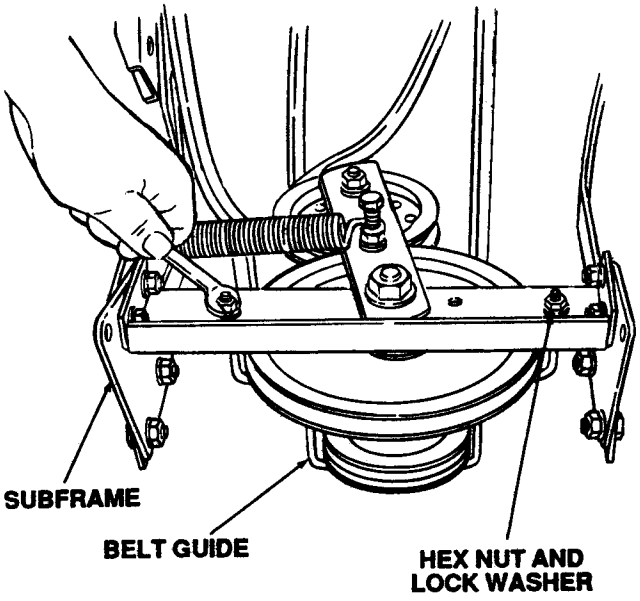


Figure 7-41. Removing Belt Guide.

   c. Pivot the subframe up. See Figure 7-42.
   d. Lift the auger drive belt off the smaller pulley. Refer to Figure 7-42.

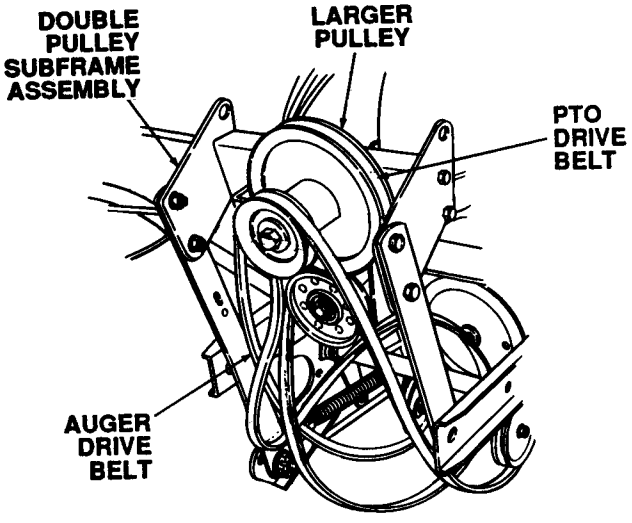


Figure 7-42. Remove PTO Drive Belt.

e. Lift the PTO drive belt off the larger pulley.

f. Place the new PTO drive belt on the larger pulley.

g. Place the auger drive belt on the small pulley.

h. Install the belt guide using the hex nuts and lock washers. Refer to Figure 7-41.

i. Reinstall the snow thrower assembly on the tractor.

5. Replace the auger drive belt as follows:

a. Remove the auger drive belt from the double pulley subframe assembly by following the steps 4a through 4d above.

b. Stand the snow thrower up on its auger housing. See Figure 7-43.

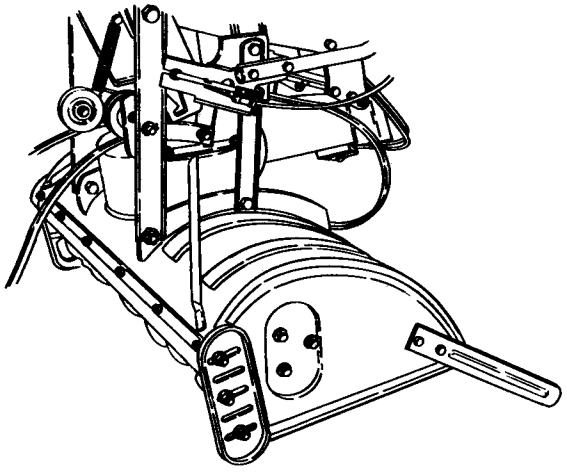


Figure 7-43. Stand Snow Thrower On Auger Housing.

c. Remove the shoulder bolts which are used as idler pulley belt guides. See Figure 7-43.

d. Remove the auger drive belt from both snow thrower idler pulleys and the auger drive pulley. Refer to Figure 7-43.

e. Install the new auger drive belt on the auger drive pulley and both idler pulleys.

f. Install the shoulder bolt belt guides.

g. Place the auger drive belt on the smaller pulley of the double pulley assembly, then install the belt guide using the hex nuts and lock washers. Refer to Figure 7-41.

h. Reinstall the snow thrower assembly on the tractor.

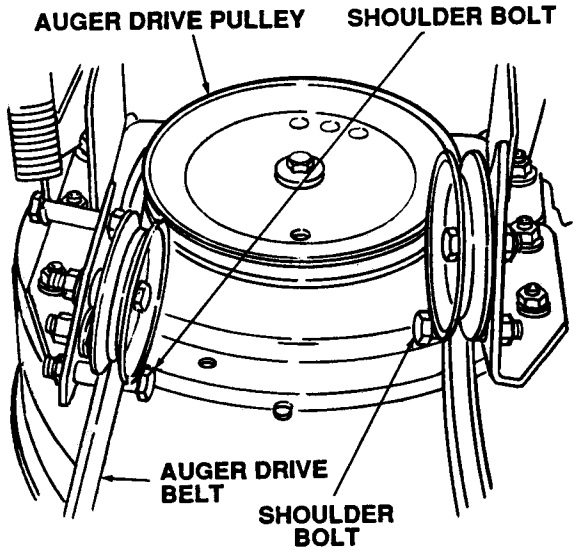


Figure 7-44. Removing Auger Belt From Snow Thrower.

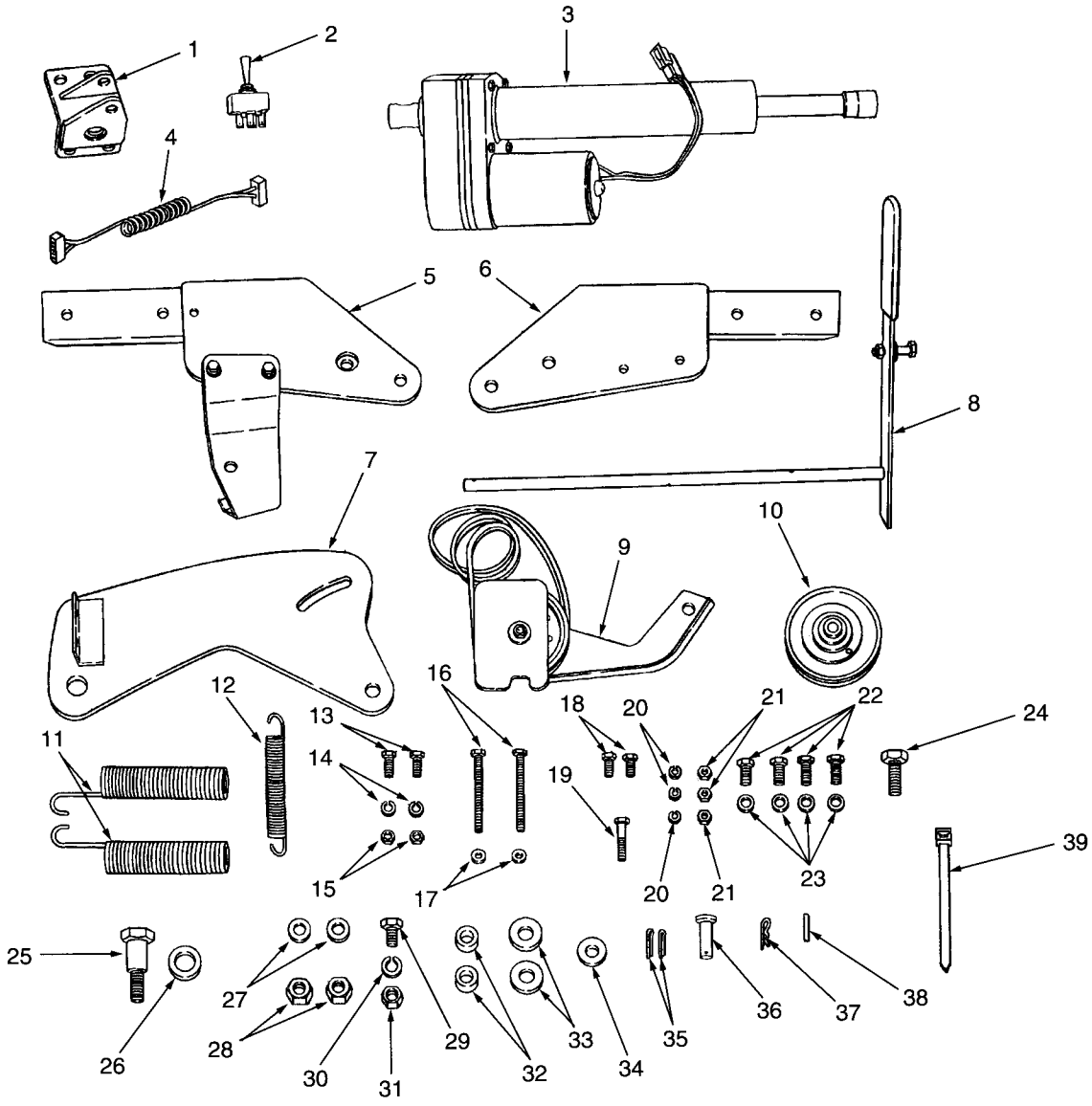
7-5 28 INCH REAR MOUNTED TILLER (Model 190-304).

7-5.1 **General.** The 26-inch Rear Mounted Tiller, Model 190-304, is designed for use on Cub Cadet Series 2000 Tractor Models 2160, 2165 and 2185.

7-5.1.1 Before beginning assembly and installation of the rear mounted tiller, refer to Figure 7-45 to confirm that all parts are present, and to familiarize yourself with the component parts.

WARNING

Whenever the rear mounted tiller assembly is installed on the back of the tractor, the Model 190-307 front/rear weight kit, with a **minimum** of two suitcase weights, must be installed on the front of the tractor. The weight kit counterbalances the weight of the tiller assembly and provides stability to the tractor.



1. Lift Cylinder Mtg. Bracket
2. Electric Lift Switch
3. Lift Cylinder
4. Wire Harness
5. Left Channel Bracket Assy.
6. Right Channel Bracket Assy.
7. Lift Arm
8. Idler Shaft
9. Idler Bracket
10. Idler Pulley
11. Helper Spring
12. Extension Spring
13. Hex Cap Screw, 5/16-18 X 3/4
14. Lock Washer, 5/16
15. Hex Nut, 5/16-18
16. Hex Cap Screw, 5/16-18 X 3-1/2
17. Flat Washer, 5/16
18. Hex Cap Screw, 3/8-16 X 3/4
19. Hex Cap Screw, 3/8-16 X 1-1/2
20. Lock Washer, 3/8
21. Hex Nut, 3/8-16
22. Hex Cap Screw, 7/16-14 X 1
23. Bell Washer, .45 X 1.0 X .62
24. Hex Cap Screw, 1/2-13 X 1-1/2
25. Shoulder Bolt, 3/4 X 1.10
26. Flat Washer, .76 ID X 1.44 OD X .06
27. Flat Washer, .510 ID X 1.0 OD X .12
28. Hex Lock Nut, 1/2-13
29. Shoulder Bolt, .62 X .30
30. Lock Washer, 1/2
31. Hex Jam Nut, 1/2-20
32. Spacer, .50 ID X .88 OD X .27
33. Flat Washer, 1/2 X 1-1/2 X .08
34. Flat Washer, .510 ID X 1.0 OD X .60
35. Cotter Pin, 1/8 X 1.0
36. Clevis Pin, .50 X 2.0
37. Hairpin Cotter
38. Spring Roll Pin, 3/16 X 1-1/2
39. Tie Strap
40. Tiller Assembly (Not Shown)

Figure 7-45. 28-Inch Rear Mounted Tiller Components (Model 190-304).

7-5.2 **Tractor Preparation.**

WARNING

Before performing any tractor preparations, place the PTO switch in the "OFF" position, engage the brake pedal lock, turn the ignition key to the "OFF" position and remove the key from the switch.

WARNING

The tractor must be placed on a hard, level surface during preparation.

NOTE

Two 5/16 inch mounting holes must be drilled in the tractor drawbar in order to securely fasten the lift cylinder mounting bracket to the tractor.

1. Install the lift cylinder mounting bracket (1, Fig. 7-45) on the tractor as follows:

   a. Assemble the lift cylinder mounting bracket (1) on the right rear of the tractor frame as shown in Figure 7-46. Snugly secure the bracket with the two hex cap screws (18), lock washers (20) and hex nuts (21).

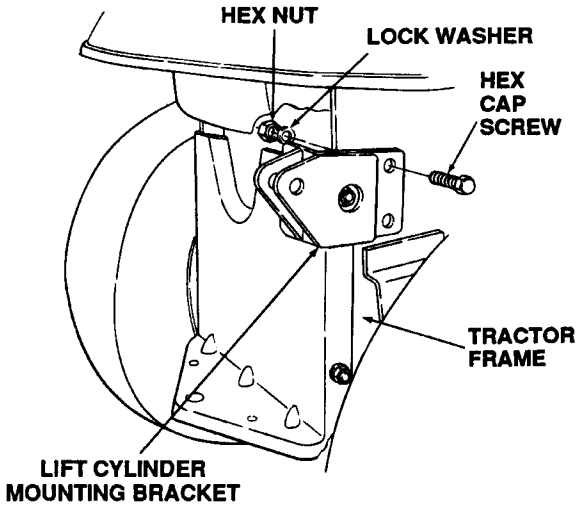


Figure 7-46. Installing Lift Cylinder Mounting Bracket.

   b. Using the two holes in the rear of the cylinder mtg. bracket (1) as a template, mark the hole locations on the tractor drawbar. See Figure 7-47.

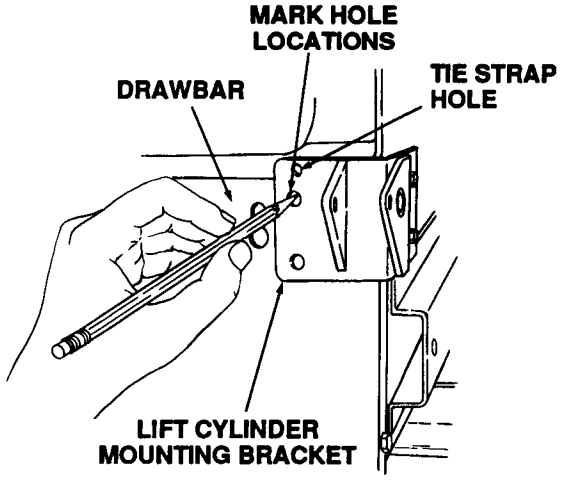


Figure 7-47. Marking Location For Holes.

   c. Once the hole locatiions are marked, remove the mounting bracket from the tractor frame. Drill two 5/16 inch diameter holes at the locations marked on the drawbar.

NOTE

Proper centering of the holes is important. Use a center punch to make an indentation at the center of each marked hole prior to drilling the holes.

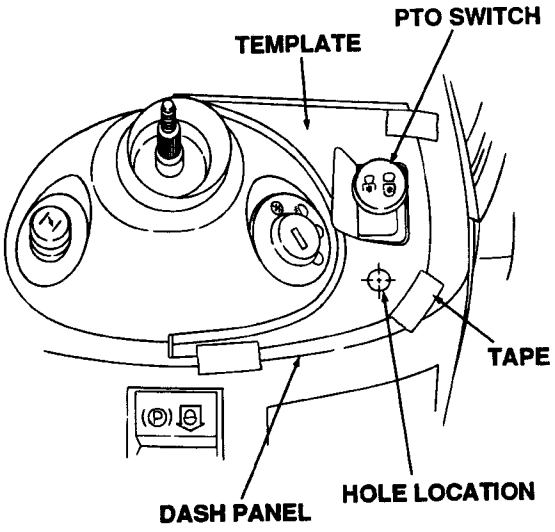
   d. Install the lift cylinder mtg. bracket (1) onto the right rear of the tractor frame as shown in Figure 7-46. Secure the bracket to the right side of the frame with the two hex cap screws (18), lock washers (20) and hex nuts (21). Secure the bracket to the drawbar with the two hex cap screws (13), lock washers (14) and hex nuts (15).

NOTE

A 1/2 inch mounting hole must be drilled in the tractor dash panel to accommodate the electric lift switch. Use the template provided in the Tiller Owner's Manual to properly position the hole.

2. Install the electric lift switch (2, Fig. 7-45) in the tractor dash panel as follows:

   a. Position the template provided in the Owner's Manual on the tractor dash panel an shown in Figure 7-48, then mark the hole location below the PTO switch as shown.



NOTE: STEERING WHEEL IS REMOVED ONLY FOR CLARITY.

Figure 7-48. Marking Hole Location For Electric Lift Switch.

   b. Open the tractor hood and inspect the area immediately below the marked hole location. This area must be free of wiring that may be damaged when drilling the hole. Temporarily secure wires away from this area, if necessary.

NOTE

To properly center the hole, use a small diameter drill bit to make a pilot hole at the center of the marked hole location prior to drilling the 1/2 inch hole.

   c. Drill a 1/2 inch hole in the dash panel at the marked location.

   d. Remove the hex nut from the switch and insert the switch up through the hole from the underside of the dash panel.

   e. Position the switch so that the flat surface on the threads of the switch is toward the right side of the tractor as shown in Figure 7-49. Secure the switch to the dash panel with the hex nut.

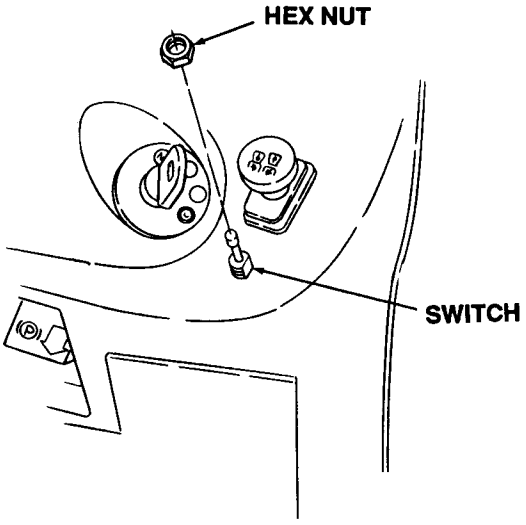


Figure 7-49. Installing Lift Switch.

   f. Plug the matching terminal connector of the wire harness (4, Fig. 7-45) onto the spade terminals of the lift switch.

   g. Route the wire harness (4, red and yellow wires) downward through the tractor pedestal and rearward along the right frame channel, between the frame and running board. Note the harness should be routed adjacent to the existing tractor wire harness.

   h. Secure the rearward end of the wire harness (4) to the cylinder mounting bracket (1) with the tie strap (39).

   i. Connect the short blue wire (with in-line fuse) of the harness (4) to the positive terminal of the battery.

   j. Connect the short black wire of the harness to the negative terminal of the battery.

7-5.3 **Tiller Assembly Preparation.**

WARNING

Place the rear mounted tiiler assembly on a firm and level surface during preparation.

NOTE

The installation components must be assembled on the tiller assembly prior to installation of the tiller onto the rear of the tractor.

1. Assemble the left channel bracket assembly (5, Fig. 7-45) to the left side of the tiller pivot bracket as shown in Figure 7-50. Secure the brackets together with the shoulder bolt (29), lock washer (30) and hex jam nut (31).

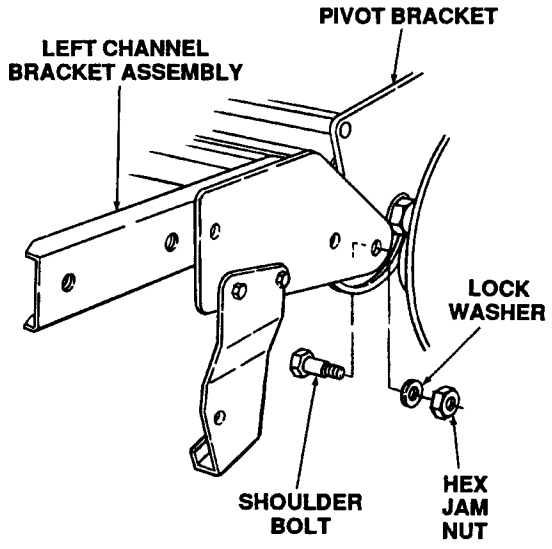


Figure 7-50. Install Left Channel Bracket Assembly.

2. In this order: slide a spacer (32, Fig. 7-45), the lift arm (7), a flat washer (33), the second spacer (32) and flat washer (33) onto the rod of the tiller pivot bracket. Refer to Figure 7-51. Install a cotter pin (35) in the hole at the end of the rod.

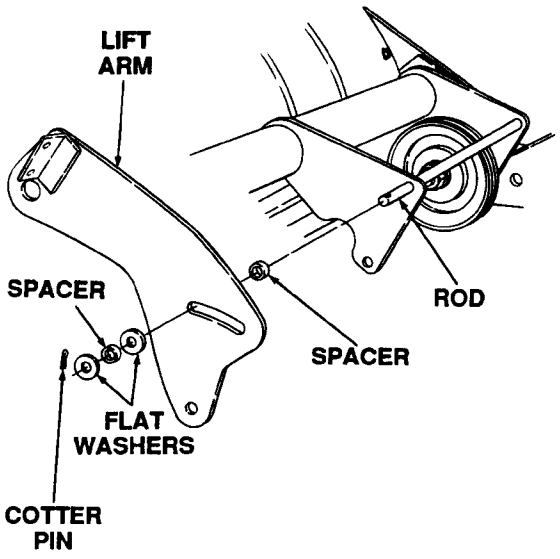


Figure 7-51. Install Lift Arm and Spacers.

3. Position the right channel bracket (6, Fig. 7-45) between the lift arm and right side of the tiller pivot bracket as shown in Figure 7-52. Align the holes and insert the hex cap screw (24) through the brackets and lift arm. Secure with the flat washer (27) and hex lock nut (28).

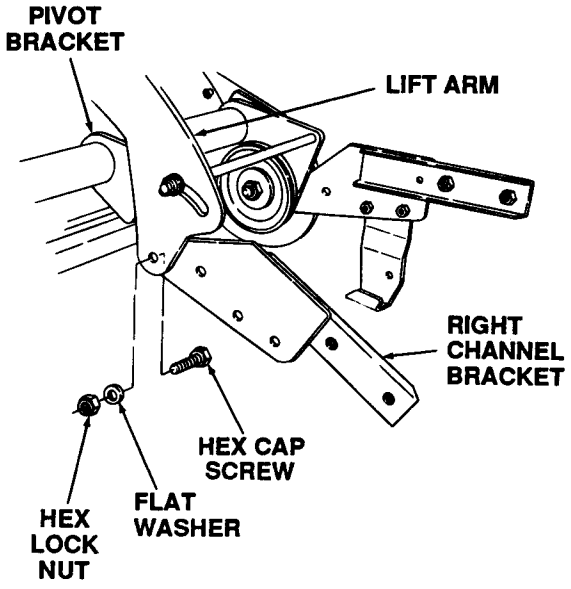


Figure 7-52. Install Right Channel Bracket.

4. Referring to Figure 7-53, attach and hold the hook of each helper spring (11, Fig. 7-45) onto the tiller pivot bracket rod, one hook between each end of the spacer (see Fig. 7-51) and its adjacent flat washer. Insert the two hex cap screws (16) through the holes in the L-bracket of the lift arm, and thread into the helper springs. Tighten each bolt one or two turns only, ensuring that there is no tension on the springs.

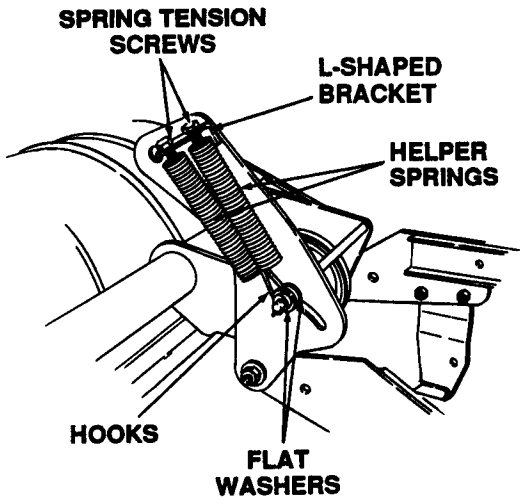


Figure 7-53. Attaching Helper Springs.

5. Refer to Figure 7-54 and insert the idler shaft (8, Fig. 7-45) through the rearward hole of the left channel bracket assembly. Push the shaft approximately half the distance toward the right channel bracket. With the idler pulley facing toward the left, slide the idler bracket assembly (9) onto the idler shaft as shown in Figure 7-54.

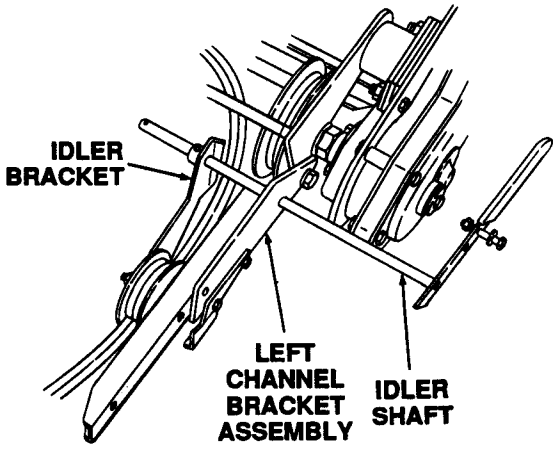


Figure 7-54. Installing Idler Shaft and Bracket.

6. Push the idler shaft through the rearward hole of the right channel bracket. Slide the flat washer (34) onto the end of the idler shaft and secure with a cotter pin (35). Refer to Figure 7-55.

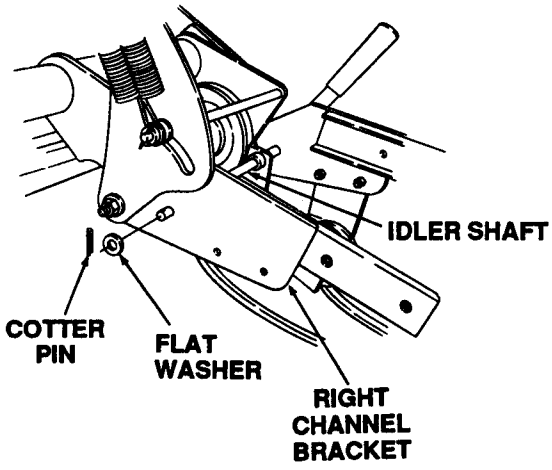


Figure 7-55. Securing Idler Shaft.

7. Align the hole of the idler bracket (9) hub with the hole in the idler shaft (8). Using a block of wood to support the idler shaft, drive the spring roll pin (38) through the holes as shown in Figure 7-56.

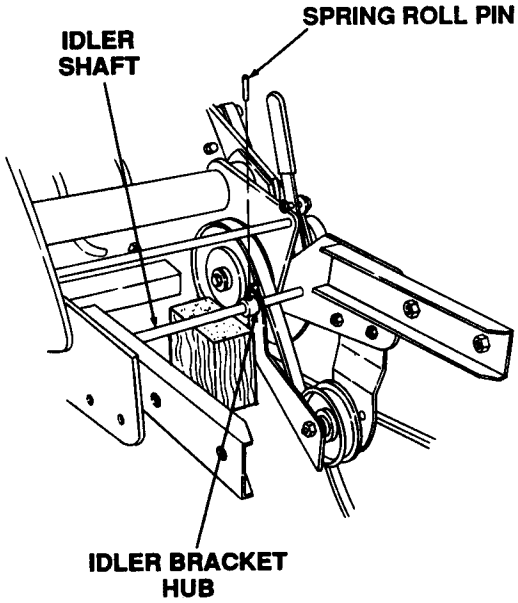


Figure 7-56. Installing Roll Pin.

NOTE

The PTO belt should be captured in the idler bracket (9) assembly with the back of the belt (flat side) against the flat idler pulley.

8. Route the PTO belt around the tiller drive pulley as shown in Figure 7-57. Make certain the V-side of the belt fully engages the pulley groove.

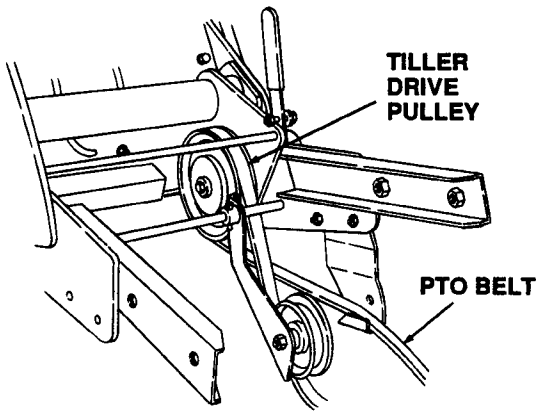


Figure 7-57. Routing the PTO Belt.

9. Place the V-side of the PTO belt in the groove of the idler V-pulley (10), then with the extended hub of the pulley toward the bracket, position the idler pulley (with the belt) on the left channel bracket assembly as shown in Figure 7-58.

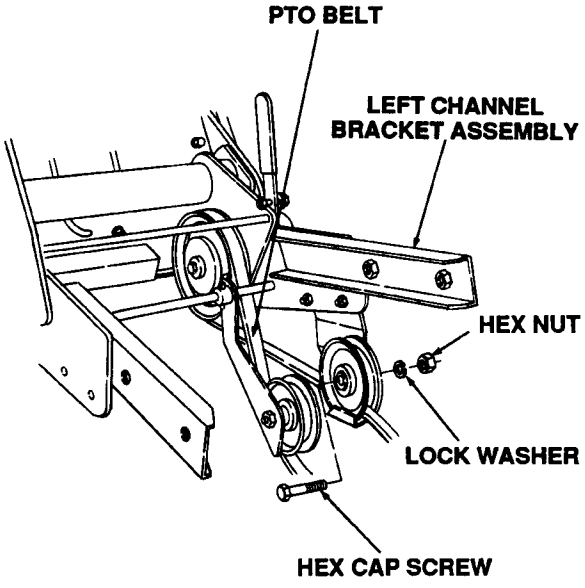


Figure 7-58. Installing V-Idler Pulley.

10. Ensure that the PTO belt is properly routed over the pulleys as shown in Figure 7-59; then secure the idler pulley (with belt) to the left channel bracket with the hex cap screw (19), lock washer (20) and hex nut (21). See Figure 7-58.

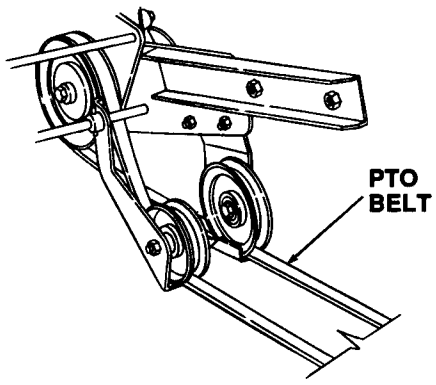


Figure 7-59. Proper PTO Belt Routing.

7-5.4 **Tiller Installation.**

WARNING

Before preparing for tiller installation onto the tractor, ensure the PTO switch is in the "OFF" position, the brake pedal lock is engaged, and the ignition switch is in the "OFF" position and the key is removed.

WARNING

Select a firm and level surface which is large enough to accommodate the tiller attachment and tractor.

WARNING

If the tractor has been recently run, the exhaust system and surrounding areas will be HOT. To avoid personal injury, allow the tractor to cool before installing the PTO belt.

NOTE

Apply a light coating of grease to the tiller channel brackets to ease insertion into the tractor frame channels.

1. Position the tiller assembly directly behind the tractor with the left and right channel brackets toward the rear of the tractor. Slide the PTO belt under the tractor.

2. Align both channel brackets with the rear frame channels of the tractor and carefully slide the tiller forward until the channel brackets are fully inserted into the frame channels. See Figure 7-60.

3. Align the mounting holes of the channel brackets and frame, then secure with the four hex cap screws (22) and bell washers (23). Refer to Figure 7-60.

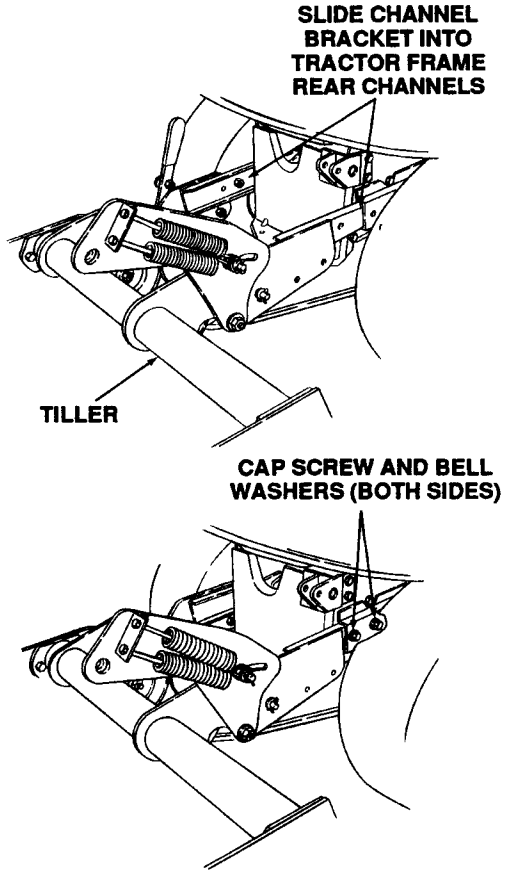


Figure 7-60. Attaching Tiller To Tractor.

4. Install the electric lift cylinder (3, Fig. 7-45) between the lift cylinder mounting bracket (1) on the right rear of the tractor and the tiller lift arm (7) as follows:

   a. Position the motor end of the lift cylinder (3) between the mounting ears of the cylinder mounting bracket as shown in Figure 7-61.

   b. Align the holes, insert the clevis pin (36), and secure with the hairpin cotter (37) as shown in Figure 7-61.

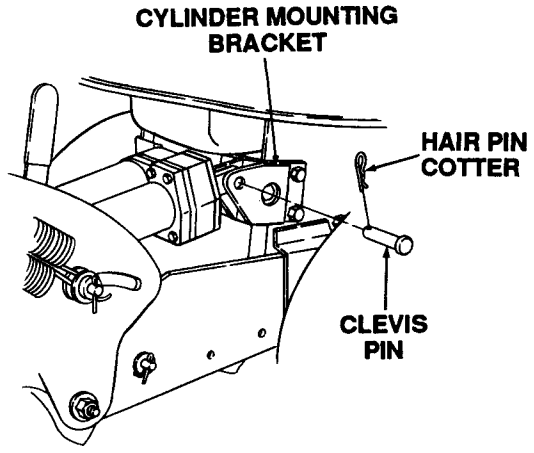


Figure 7-61. Attaching Lift Cylinder To Tractor.

   c. Position the piston end of the lift cylinder to align with the mounting hole of the tiller lift arm. See Figure 7-62. If necessary, rotate the cylinder piston counterclockwise to manually extend the piston.

   d. Slide the flat washer (26) onto the shoulder bolt (25) and insert the shoulder bolt through the lift arm and cylinder piston. Secure with the flat washer (27) and hex lock nut (28) as shown in Figure 7-62.

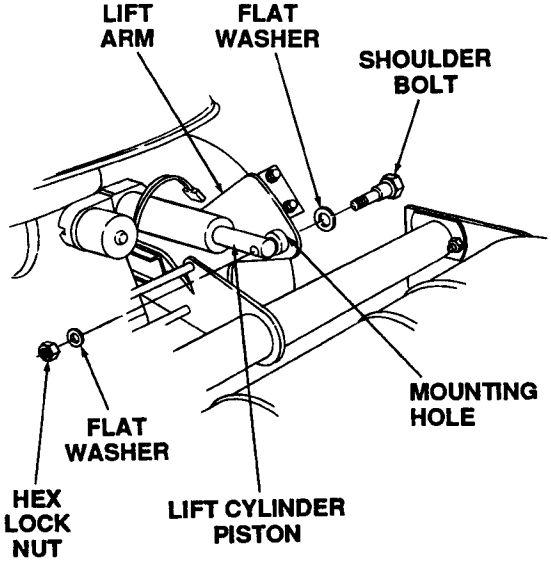


Figure 7-62. Attaching Lift Cylinder To Tiller.

5. Plug the rear connector of the tiller wire harness (4) firmly into the lift cylinder (3) electric motor connector.

6. Hook one end of the extension spring (12) onto the extended bolt of the left channel bracket. Push the idler shaft handle forward and extend the sping to hook the other end of the spring onto the extended bolt of the idler shaft handle. See Figure 7-63.

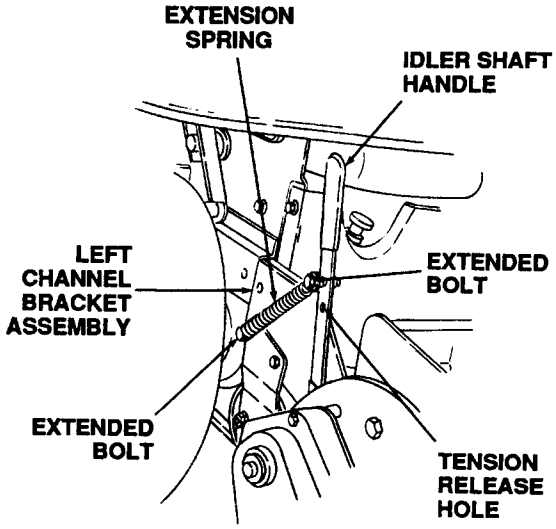


Figure 7-63. Installing Extension Spring.

7. Install the PTO belt onto the PTO clutch at the front of the engine as follows:

WARNING

The exhaust system and surrounding area may be **HOT**. To avoid personal injury, allow the engine and exhaust system to cool before proceeding with the following PTO belt installation instructions.

   a. Pull the PTO belt toward the front of the tractor.

   b. Pull the idler shaft handle rearward until its tension release hole (located below the extension spring, see Fig. 7-63), is positioned behind the rear edge of the left channel bracket.

   c. Insert a pin (or 5/16 inch bolt) through the tension release hole and slowly release the idler shaft handle so that the pin (or bolt) jams against the rear edge of the channel bracket. The pin (or bolt) should hold the handle in place with the tension released from the PTO belt.

CAUTION

Proper belt installation is important to the operation of the tiller. When the belt is correctly installed it will have a 180° twist on the right side between the tiller idler bracket and the right front idler pulley of the tactor. Refer to Figure 7-66.

   d. Install the forward end of the PTO belt on the PTO clutch by passing the belt upward inside the tractor frame. Make sure the V-side of the belt fully engages the groove of the pulley. See Figure 7-64.

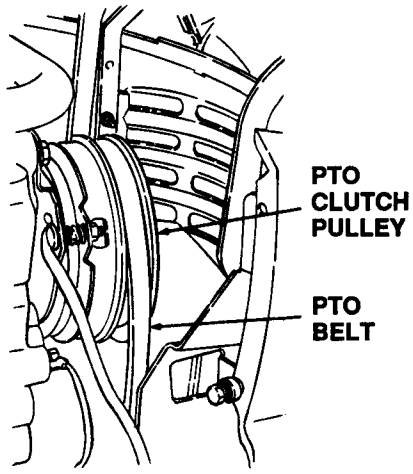


Figure 7-64. Install PTO Belt On PTO Clutch.

   e. Twist the PTO belt 1/4 turn to place the V-sides of the belt in the grooves of the two front idler pulleys of the tractor. See Figure 7-65.

   f. Referring to Figure 7-53, tighten the two spring tension hex cap screws (16) until the upper end of the helper springs (11) are against the L-bracket of the lift arm (7).

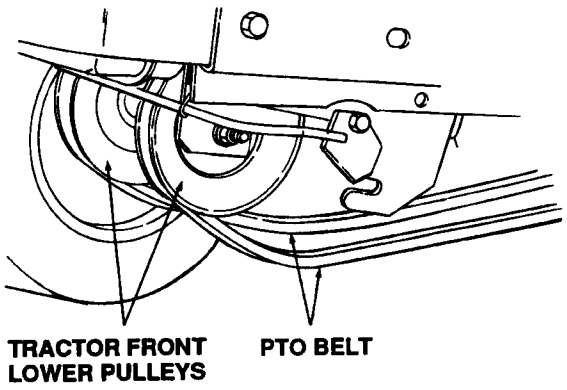


Figure 7-65. Place PTO Belt In Front Idler Pulleys

g. Pull the idler shaft handle rearward and remove the pin (or bolt), then slowly release the handle. The extension spring (12) should apply tension to the handle and PTO belt.

h. Referring to Figure 7-66, make certain the PTO belt is correctly installed in each pulley and that there is a 180° twist in the belt between the idler bracket pulley and the right front idler pulley of the tractor.

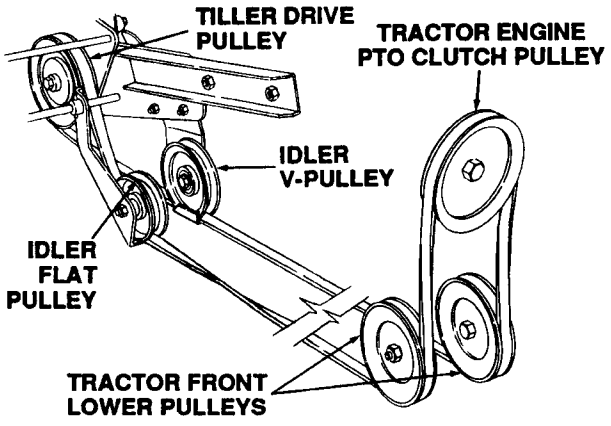


Figure 7-66. Correct PTO Belt Routing.

7-5.5 **Tiller Maintenance.**

1. To prevent damage or premature wear to the PTO belt, regularly check for the following:
   - Check the tiller idler pulleys and drive pulley for accumulation of dirt. Keep pulleys clean.
   - Check the pulleys for stones or other foreign matter which may have been tilled up from beneath the soil.
   - Check the pulleys for damage caused by striking foreign objects.
2. Replace the PTO belt as follows:

WARNING

Place the PTO switch in the "OFF" position, engage the brake pedal lock, turn the ignition key to the "OFF" position and remove the key from the switch.

WARNING

If the tractor has been recently run, the exhaust system and surrounding areas will be **HOT**. To avoid personal injury, allow the tractor to cool before removing the PTO belt.

a. Pull the idler shaft handle rearward until its tension release hole (located below the extension spring, see Fig. 7-63), is positioned behind the rear edge of the left channel bracket.

b. Insert a pin (or 5/16 inch bolt) through the tension release hole and slowly release the idler shaft handle so that the pin (or bolt) jams against the rear edge of the channel bracket. The pin (or bolt) should hold the handle in place with the tension released from the PTO belt.

c. Remove the belt from the PTO clutch on the front of the engine and pull the belt downward through the inside of the tractor frame.

d. Pull the idler shaft handle rearward, remove the pin (or bolt) from the handle and slowly release the handle.

e. Remove the V-idler pulley and belt from the left channel bracket.

f. Remove the fasteners securing the belt guard plate and flat idler pulley to the idler bracket (9) and remove the belt.

g. Place the back side (flat side) of the new belt against the flat idler pulley and reinstall the belt, flat idler pulley and belt guard plate onto the idler bracket (9).

h. Route the belt around the tiller drive pulley as shown in Figure 7-57. Make certain the V-side of the belt fully engages the pulley groove.

i. Place the V-side of the PTO belt in the groove of the idler V-pulley (10), then with the extended hub of the pulley toward the bracket, position the idler pulley (with the belt) on the left channel bracket assembly as shown in Figure 7-58.

j. Ensure that the PTO belt is properly routed over the pulleys as shown in Figure 7-59; then secure the idler pulley (with belt) to the left channel bracket with the hex cap screw (19), lock washer (20) and hex nut (21). See Figure 7-58.

k. Following the instructions in step 7 of paragraph 7-5.4, reinstall the belt onto the PTO clutch.

3. The chain case is lubricated and sealed at the factory and should not require checking or changing. If the chain case is disassembled, replace the grease with 20 ounces of plastilube type "O" grease (part number 737-0133, 14 ounce container).

4. At least once a season, remove the bearing cup on the right hand side of the tiller housing. See Figure 7-67. Clean and refill the cup with 2 ounces of plastilube type "O" grease (part number 737-0133).

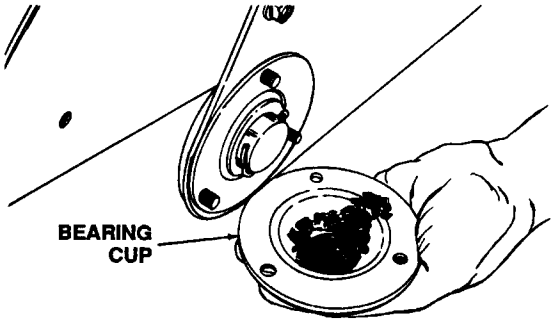


Figure 7-67. Lubricating Right Bearing Cup.

5. The tines are subject to wear and periodically require replacement. When replacing the tines, it is recommended that the individual tines be replaced one at a time in order to retain the correct orientation pattern. When replacing tines, note the following.

- Left hand tines (part number 742-0243) are stamped with an "L" and right hand tines (part number 742-0244) are stamped with an "R".
- Left hand tines mount on the left sides of the two outer tine carriers and on the right sides of the three inner tine carriers. The blade edges extend to the right and face rearward as the tine shaft rotates rearward from the top.
- Right hand tines mount on the right sides of the two outer tine carriers and on the left sides of the three inner tine carriers. The blade edges extend to the left and face rearward as the tine shaft rotates rearward from the top.
- The sharpened edges of all tine blades must face in the direction of rotation, which is rearward from the top. Refer to Figure 7-68.

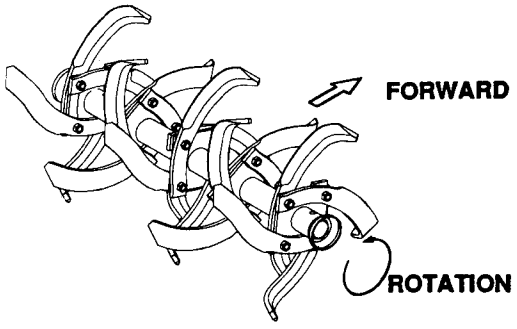


Figure 7-68. Tiller Tines.