

## TROUBLESHOOTING

<div>Problem or Symptom</div> <div>Check or Solution</div>														
	Belt jumping off or slapping	Lack of drive in one wheel or both	Loses power under load, belt slips, or erratic drive	Jerky or aggressive engagement	Cannot get full forward or reverse speed	Input shaft /pulley will not turn	Returns to neutral during operation or under load	Noisy operation	Leaking lubricant	Brakes will not stop tractor	Park brake will not hold	Transaxle overheats	Freewheel valve pushes hard	Creeps in neutral
Belt sheaves and idlers loose, out of adjustment, worn, or damaged—tighten, replace, or adjust properly	●	●	●	●	●	●		●						
Belt worn, frayed, glazed, or stretched—replace belt	●	●	●	●				●						
Tensioning spring weak or broken—replace as necessary	●	●	●					●						
Accumulation of grass and other debris in cooling fins or around moving parts of transmission		●	●			●		●		●	●	●	●	●
Brake pedal linkage out of adjustment—adjust properly		●	●	●		●	●			●	●	●	●	
Brake components out of adjustment— adjust properly or replace transaxle		●		●		●	●			●	●	●	●	
Foot pedal linkage bent, worn, out of adjustment, or broken—replace or adjust properly		●	●	●	●	●	●					●		●
Neutral return linkage worn, bent, or broken—replace as necessary		●				●							●	●
Internal transaxle components worn, stripped, or broken—replace as necessary		●	●	●		●	●	●				●		●
Transaxle case mountings loose, worn, or broken—replace mountings or transaxle	●	●		●				●					●	●

<div>Problem or Symptom</div> <div>Check or Solution</div>	Belt jumping off or slapping	Lack of drive in one wheel or both	Loses power under load, belt slips, or erratic drive	Jerky or aggressive engagement	Cannot get full forward or reverse speed	Input shaft /pulley will not turn	Returns to neutral during operation or under load	Noisy operation	Leaking lubricant	Brakes will not stop tractor	Park brake will not hold	Transaxle overheats	Freewheel valve pushes hard	Creeps in neutral
Fan and/or pulley loose or damaged—tighten or replace	●					●		●				●		
Hydrostatic oil filter plugged		●	●		●			●				●		
Incorrect type or volume of lubricant used—replace with correct type and volume		●	●	●			●	●	●			●		●
Wheels and axle keys, key ways, or snap rings worn—replace as necessary		●	●		●			●						
Transaxle case halves cap screws loose or stripped								●	●					
Freewheeling mechanism or linkage damaged		●	●		●			●				●	●	
Engine performance problems—see Engine Section		●	●											



## DIAGNOSTICS

### Test Conditions:

- Tractor on level surface
- Front wheels blocked
- Engine OFF
- Rear wheels raised off surface with axle housings on jack stands

Test/Check Point	Normal	If Not Normal
1. Fan	Fan in good condition and tight	Replace snap ring and/or splined collar Replace
2. Drive belt	Belt in good condition, not glazed, split, unraveled, or stretched	Replace drive belt
3. Idler tensioning spring	Tensioning spring installed and not damaged	Install spring Repair or replace
4. Sheaves and idlers, belt traction drive system	Drive sheaves and idlers in good condition and adjusted properly  Belt not slipping, squealing, or vibrating excessively	Adjust idler assembly Repair or replace  Check belt condition, check adjustment and condition of idlers and guides. Adjust, repair or replace components as needed
5. Hydro housing exterior	No cracks, leaks, or loose hardware	Tighten hardware Replace transaxle Replace any damaged components
6. Axles	Axles straight	Replace transaxle as needed
7. Wheels and tires	Air pressure equal in driving tires	Adjust air pressure
	Driving tires have same circumference	Match tires for same circumference
	Wheels not bent or out of round	Repair or replace wheels as necessary
8. Axles, wheels, and tires	Axles, wheels, and tires in good shape and functioning properly	Check axles and wheel for straitness, check condition of keys and keyways, washers, and snap rings. Check tires for tread wear and proper inflation. Repair or replace components as needed
9. Engine performance	Engine running smoothly throughout throttle range	Adjust, tune, or repair engine
10. Stroking Control Arm: (lack of forward or reverse speed)	Linkage should stroke control until it reaches the stop inside the transaxle (Forward) and should stroke about 2/3 stroke in reverse	Adjust or repair as needed

## TESTS AND ADJUSTMENTS

### TRACTION DRIVE SYSTEM TEST

#### Reason:

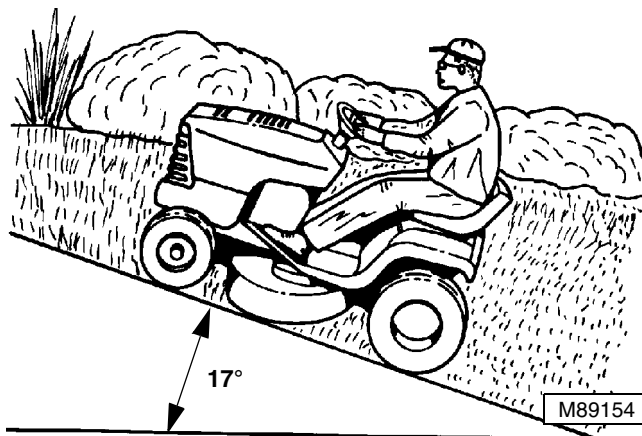
To ensure forward drive, neutral return, brake linkages and belt drive system maintain traction up a 17° slope. To ensure that transport (freewheeling) valve assembly and linkage allow tractor to be pushed when engaged and to drive tractor when disengaged. Also to ensure tractor returns to neutral, engages the brake, stops tractor within specification, and holds tractor stationary in PARK position on a 17° slope or less.

#### Test Drive:

### CAUTION

**DO NOT** engage FORWARD foot pedal too aggressively during the 17° slope test drive. Tractor may tip over backwards. It is recommended that the mower deck be installed before performing the 17° slope test.

1. Attach mower deck to tractor.
2. Carefully test drive tractor to see if traction drive system pulls tractor steadily up a 17° slope.
3. If tractor fails traction test, the drive belt may be excessively worn, stretched, glazed or unraveling. Replace or adjust tension if above conditions exist.

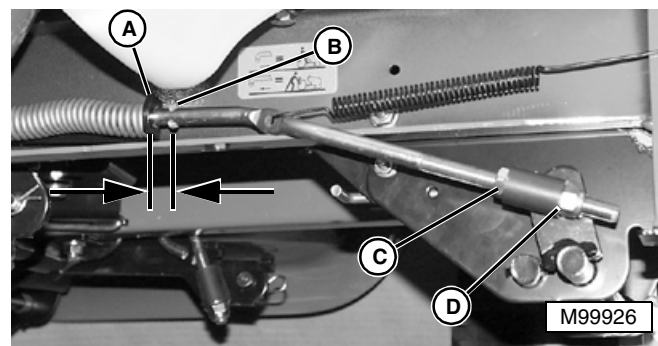


4. Drive or push tractor onto a 17° slope, depress the brake pedal and lock it in the PARK position.
5. FORWARD and REVERSE pedals must return to NEUTRAL position, PARK brake must hold tractor in a stationary position on slope and tractor must not creep downward once park brake is locked into position.

6. Drive tractor on dry pavement in a safe, open and level area at fast idle in the forward direction. Apply a “panic stop” force (no more than 50 pounds of force)—tractor **must stop** within **1.5 M (5 ft)** and both wheels should “**lock-up**”, leaving skid marks on pavement.
7. If any test fails, the brake linkage must be adjusted or components replaced.

### BRAKE LINKAGE ADJUSTMENT

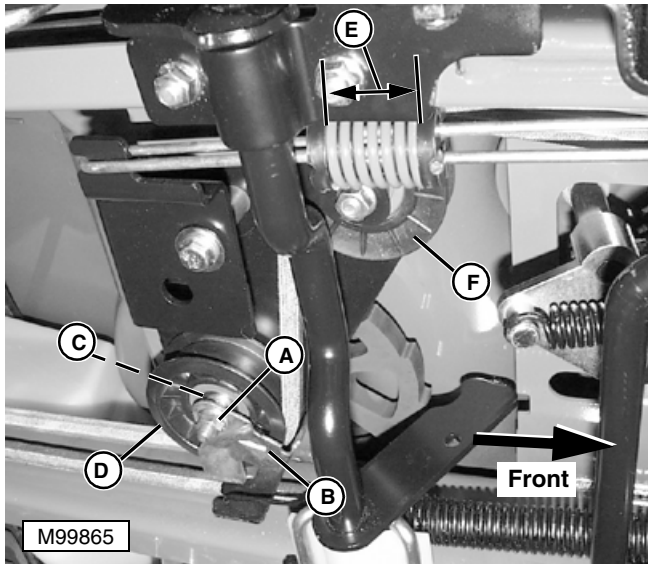
1. Park tractor on level surface.
2. Turn key switch to **STOP** position.
3. Engage park brake. Brake should engage.
4. If the brake does not engage, adjust as follows:



5. With park brake engaged, measure the gap between the compression spring bracket (A) and the tabs (B) on the brake rod. The gap should measure **6 – 7 mm (0.24 – 0.28 in.)** when the park brake is engaged.
6. If gap is not within specification, adjust to obtain the proper gap:
  - Loosen the jam nut (C).
  - Turn the lock nut (D) *clockwise* to *increase* the gap.
  - Turn the lock nut *counterclockwise* to *decrease* the gap.
  - Tighten the jam nut and recheck the gap measurement.
7. Release parking brake and check for a dragging brake, adjust as necessary.

## DRIVE BELT TENSION ADJUSTMENT

1. Engage park brake.



2. Remove belt guide nut (A) and belt guide (B).
3. Loosen idler nut (C) and slide idler (D) forward to increase distance between plastic caps of compression spring (E).
4. Tighten idler nut.
5. Release park brake and measure distance between plastic caps of compression spring (E).
6. Repeat steps 2 thru 5 until distance between plastic caps of compression spring (E) is **32-34 mm (1.26-1.34 in.)**.
7. Tighten idler nut (C) to specification.
8. Install belt guide (B).

### Specifications:

**Compression Spring . . 32 – 34 mm (1.26 – 1.34 in.)**

**Idler Nut . . . . . 26 N•m (228 lb-in.)**

*NOTE: If dimension between caps of compression spring (E) will not reach 32 mm (1.26 in.) by adjusting idler (D), it may be necessary to move the V-idler (F) rearward.*

## NEUTRAL CREEP ADJUSTMENT

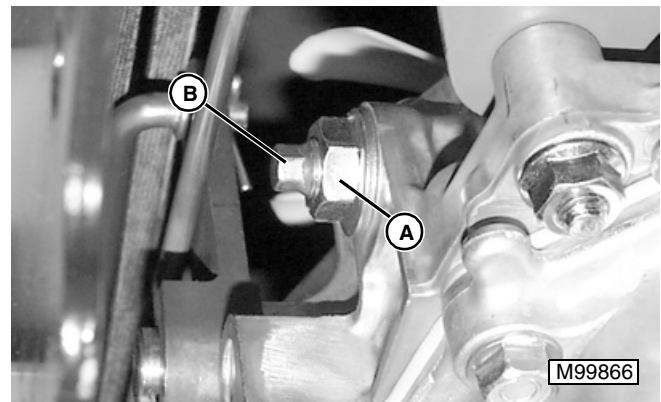
### Reason:

If the tractor creeps forward or backward with the forward/reverse pedals in the neutral position, parking brake released, and the engine running, the neutral eccentric must be adjusted.

### Procedure:

1. Park tractor on level surface.
2. Turn key switch to **STOP** position.
3. Move forward/reverse pedals to **NEUTRAL** position. Release parking brake.
4. Lift rear of tractor until wheels are off the ground. Support on suitable stands.
5. Place blocks in front of and behind front wheels.

*NOTE: The eccentric shaft is located on the left side of the transaxle above and behind of the left hand axle.*



## CAUTION

**Keep hands away from transaxle cooling fan and wheels during procedure to avoid injury.**

*NOTE: Engine will not start with seat switch disconnected. Use a jumper wire to bypass switch.*

6. Start and run engine at FAST idle.
7. Loosen locknut (A) on eccentric (B) and rotate eccentric to eliminate neutral creep.
8. Hold eccentric in position with a wrench and tighten lock nut.
9. Check forward/reverse pedal height adjustment.

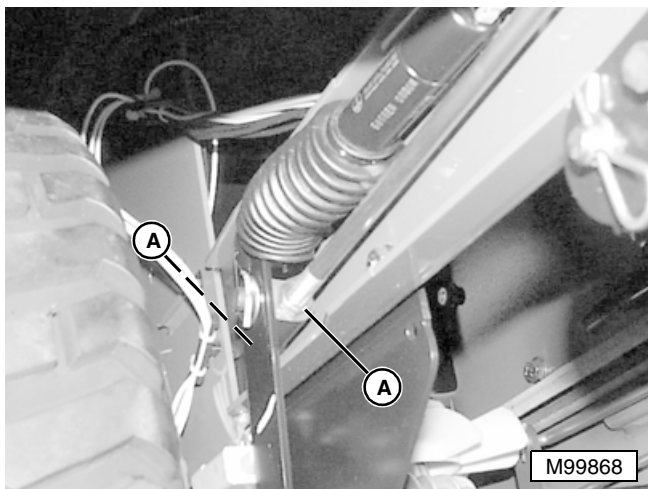
## FORWARD AND REVERSE PEDAL ADJUSTMENT

### Reason:

To ensure full travel speeds can be reached in forward and reverse directions. This also ensures that the transaxle swash plate and control arm will not act as a mechanical stop for the pedal linkage.

### Procedure:

1. Push each travel pedal forward by hand while watching for pedal contact with the foot rest.
2. If one pedal makes contact and the other pedal does not, an adjustment is needed.



3. Loosen both nuts (A) and move the rod in the appropriate direction and tighten nuts. Repeat this procedure until both pedals make contact with the foot rest.

## TRANSPORT (FREEWHEEL) TEST

### Reason:

To ensure that tractor can be moved manually without damage to transaxle when freewheel rod is pulled.

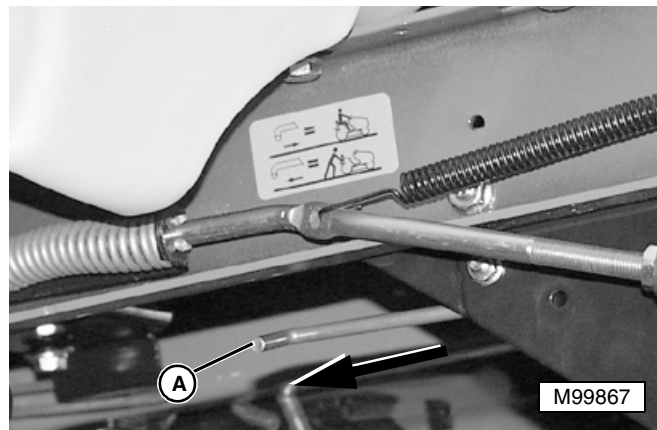
### Procedure:



## CAUTION

**DO NOT** operate freewheel valve with engine running or damage to hydrostatic transmission can occur.

1. Release park brake.



**NOTE:** Left rear wheel removed for clarity of photo.

2. With engine off and forward/reverse pedals disengaged, pull freewheel rod (A) to the freewheel position (forward).
3. Push tractor forward at least 3 M (10 ft). Tractor should push easily the entire distance.
4. Push tractor backwards the same distance. Tractor should push easily the entire distance.
5. If tractor pushes hard in forward or reverse direction, internal transaxle components could be damaged or worn. Inspect freewheeling linkage or replace transaxle.

**IMPORTANT:** After using Transport (Freewheel), be sure to push engagement rod completely back into tractor. If not completely engaged the transaxle will not operate properly, will be excessively noisy and could be damaged.

## REPAIR

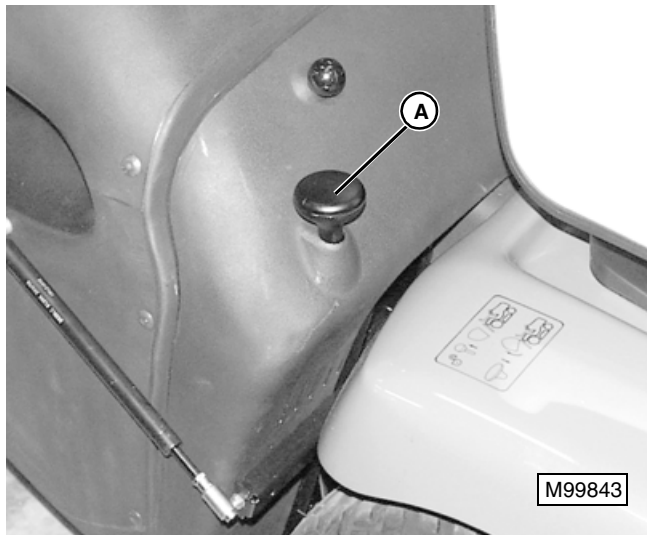
## TRANSAXLE REMOVAL AND INSTALLATION

## Removal:

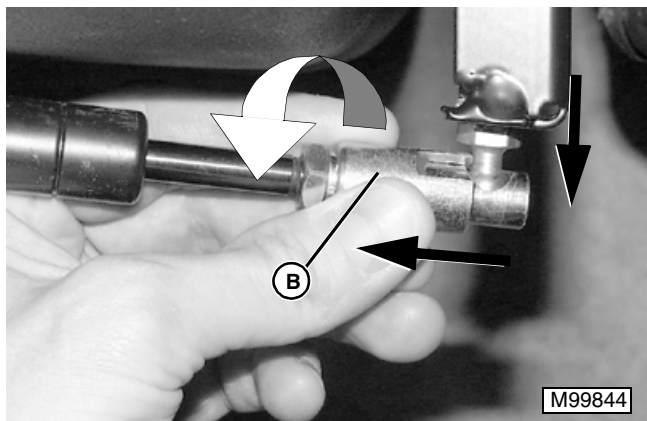
1. Remove mower deck.
2. Engage park brake to release tension on traction drive belt.

**IMPORTANT:** During transaxle removal, rear of tractor must be supported *by the frame*.

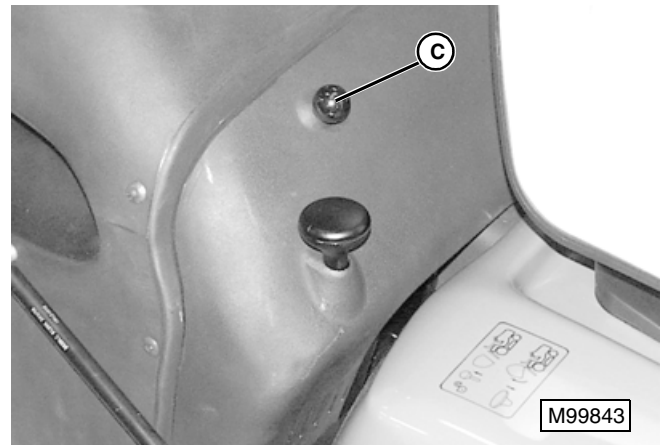
3. Raise rear of tractor, and support using suitable stands.
4. Remove rear wheels. (See "REAR WHEEL REMOVAL/INSTALLATION" on page 5 in "MISCELLANEOUS" section.)



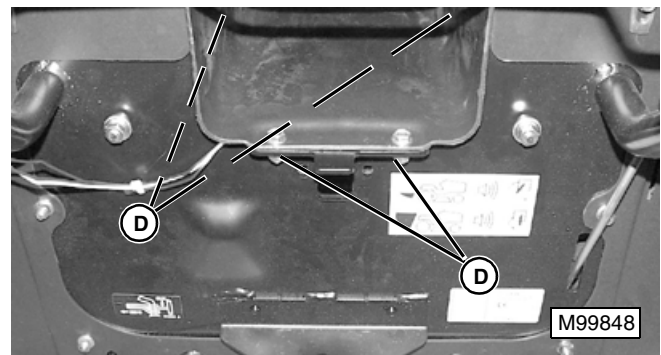
5. Push down on knob (A) to open grass collector hopper.



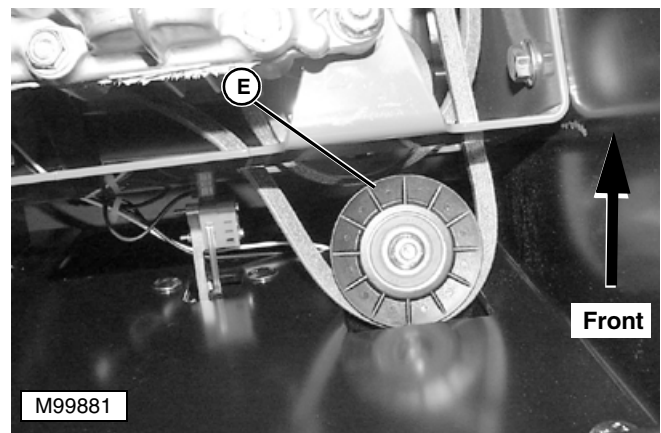
6. Remove end of gas lift assist cylinder from hopper by pulling back on locking collar (B), and turning. Pull end of cylinder off of ball stud.
7. Support grass collector hopper, and repeat for other side.



8. Pull up on release handle (C) to unlock hopper support brackets.
9. Lift grass collector hopper off of rear of tractor.

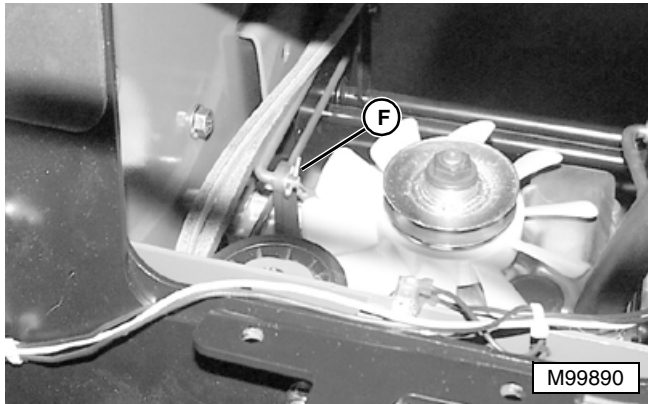


10. Remove four cap screws and lock nuts (D). Move chute toward the front and remove from the underside of the tractor.

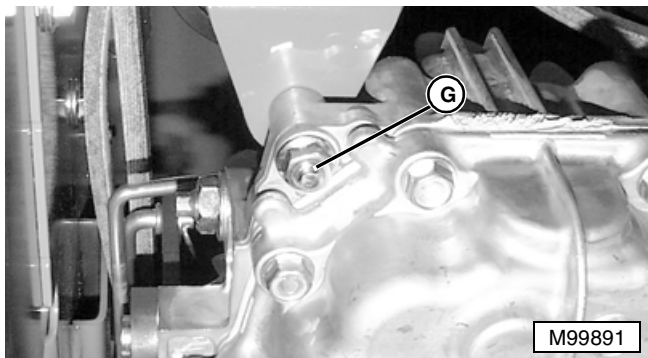


(Looking Up From Bottom)

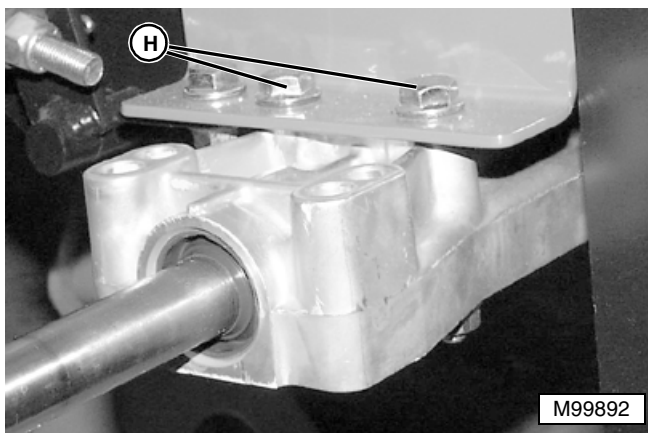
11. At rear of tractor, between grass collector back plate assembly, and hitch plate, locate fixed idler sheave (E). Remove nut and carriage bolt retaining idler sheave to hitch extension plate.
12. Remove idler sheave.
13. Slip belt off of transaxle drive sheave.



14. Remove cotter pin and washer (F), and disconnect control rod from transaxle control lever.

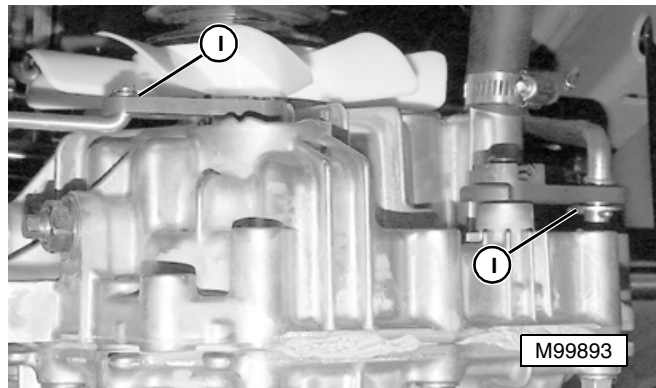


15. Locate cap screw and nut (G) at retaining rear of transaxle to frame. Remove cap screw and nut.
16. Support transaxle using a floor or transmission jack.



17. Remove four cap screws (H) and nuts attaching transaxle to frame.

18. Lower transaxle slightly to gain access to control rods.



19. Remove cotter pins and washers (I) attaching control rod, and freewheeling rod to transaxle control levers. Disconnect rods from transaxle.
20. Lower transaxle and remove from tractor.

#### Installation:

**NOTE:** Freewheeling and forward/reverse control rods must be in holes of transaxle levers before transaxle is installed into tractor frame.



Install in reverse order of removal.

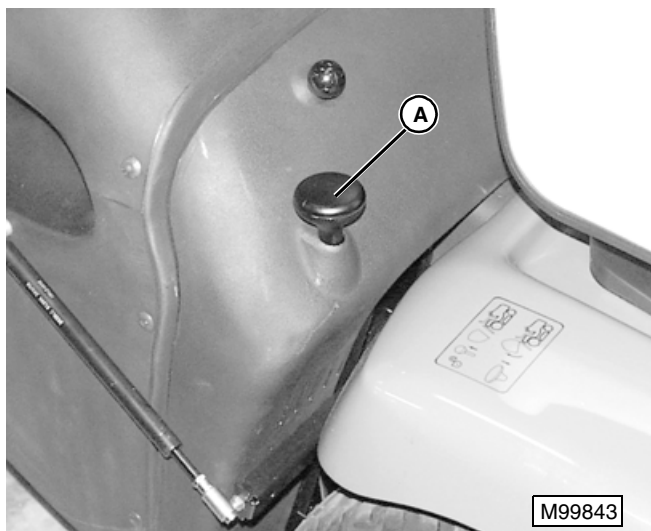
- Tighten cap screws to **40 N•m (30 lb-ft)**.



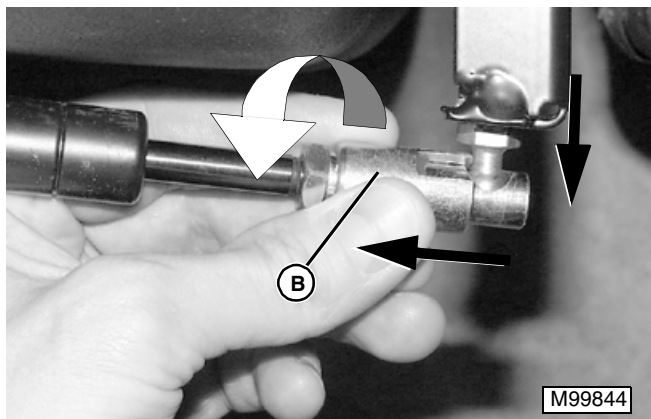
## TRACTION DRIVE BELT REMOVAL AND INSTALLATION

### Procedure:

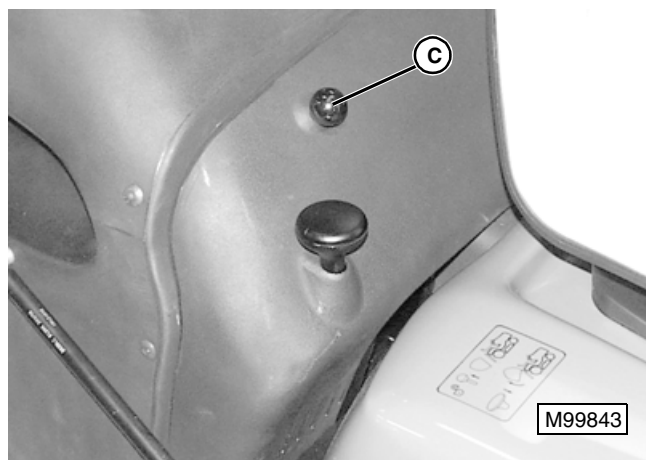
1. Park tractor on a level surface. Turn engine OFF. Remove ignition key.
2. Engage park brake to relieve tension on traction drive belt.
3. Remove mower deck.



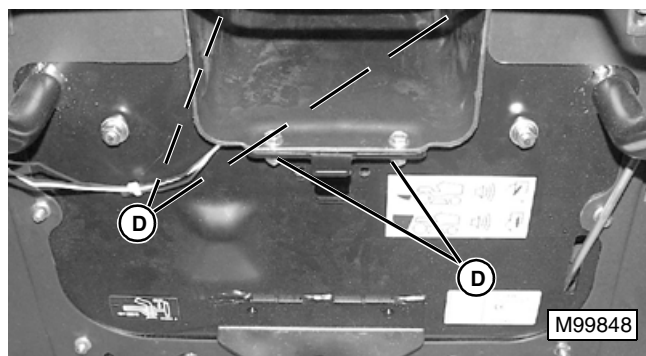
4. Push down on knob (A) to open grass collector hopper.



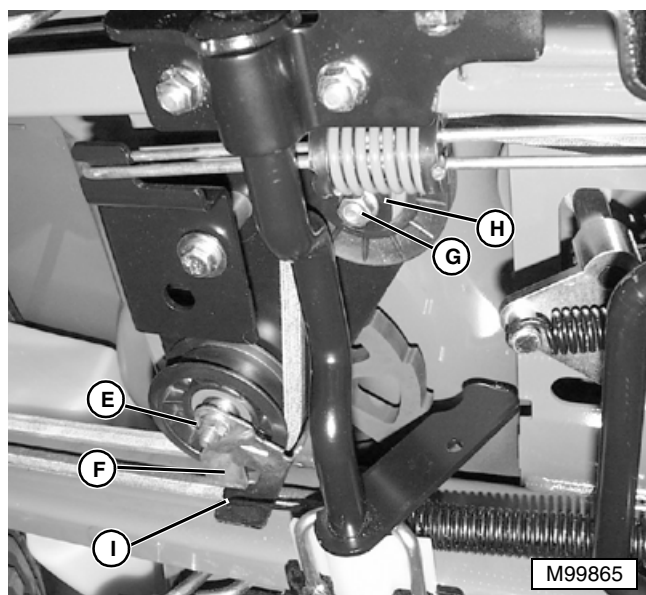
5. Remove end of gas lift assist cylinder from hopper by pulling back on locking collar (B), and turning. Pull end of cylinder off of ball stud.
6. Support grass collector hopper, and repeat for other side.



7. Pull up on release handle (C) to unlock hopper support brackets.
8. Lift grass collector hopper off of rear of tractor.



9. Remove four cap screws and lock nuts (D). Move chute toward the front and remove from the underside of the tractor.
10. Raise tractor and support on suitable stands to gain easy access to underside of frame.



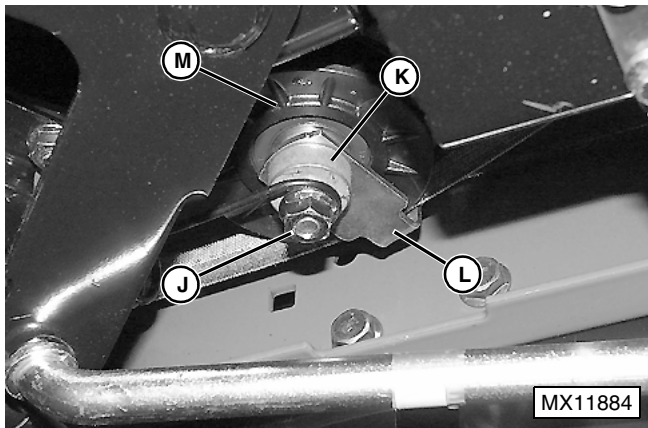
11. Remove nut (E) and belt guide (F).
12. Remove nut (G) and belt guide (H).
13. Slip traction drive belt off of flat idler and V-idler sheaves.
14. Disengage park brake.



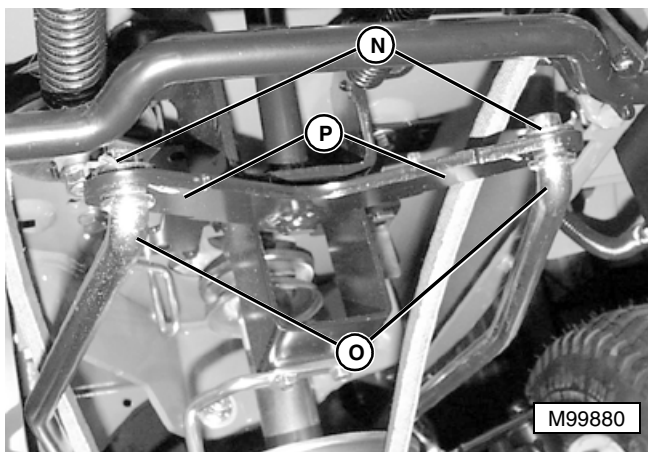
## CAUTION

**TENSIONED SPRING.** Idler assembly tensioning spring is under high tension. Wear gloves and eye protection when removing spring.

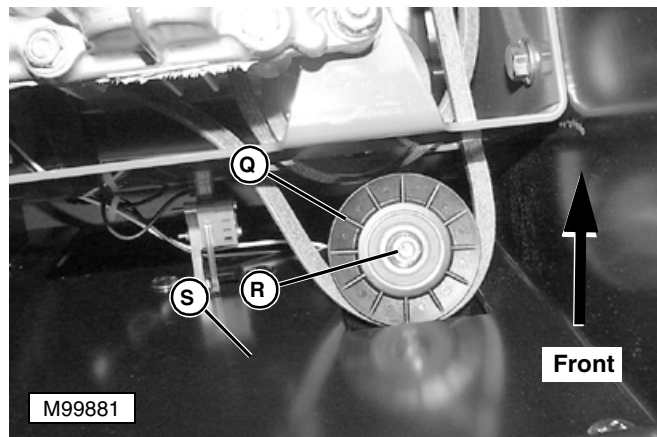
15. Using a suitable spring puller, disconnect idler tensioning spring (I) from idler assembly. Remove spring.



16. Remove nut (J), spacer (K), and belt guide (L). Disconnect belt from idler sheave (M).



17. Remove two cotter pins and washers (N). Disconnect tie rods (O) from steering arms (P).

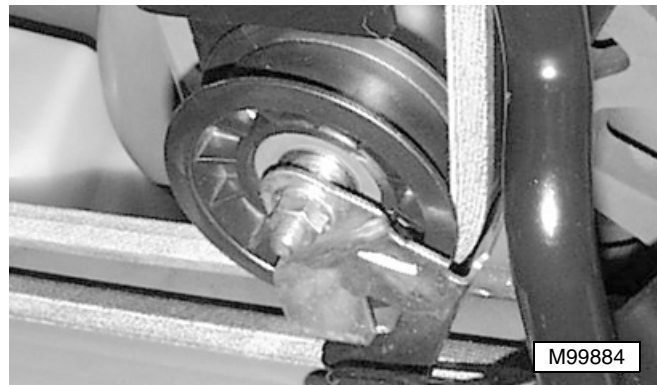


(Looking Up From Bottom)

18. At rear of tractor, between grass collector back plate assembly, and hitch plate, locate fixed idler sheave (Q). Remove nut and carriage bolt (R) retaining idler (N) to hitch extension plate (S).
19. Remove traction drive belt from the tractor.

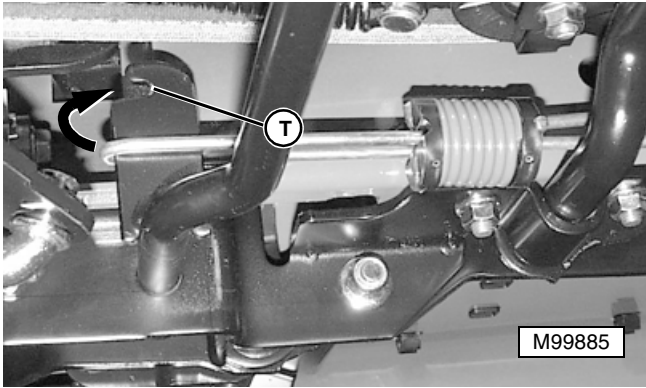
### Installation:

Installation is the reverse of removal.



- Check guides on idler sheaves. Guides should be positioned so that belt is approximately 3 mm (0.125 in.) away on all sides.

**IMPORTANT:** V-idler in rear should be pushed forward before tightening, while the flat idler in rear should be pushed rearward. This needs to be done to prevent the belt from jumping off the flat idler.



- With park brake released, check drive belt tension. If tension is not correct, check compression spring to make sure that it has not slipped out of slot (T) on brake shaft lever as shown.

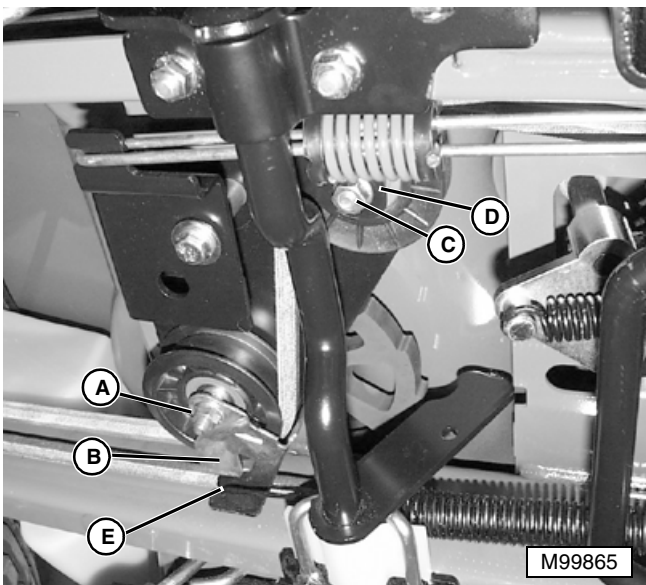
## TRACTION DRIVE BELT TENSIONER ASSEMBLY

### Removal:

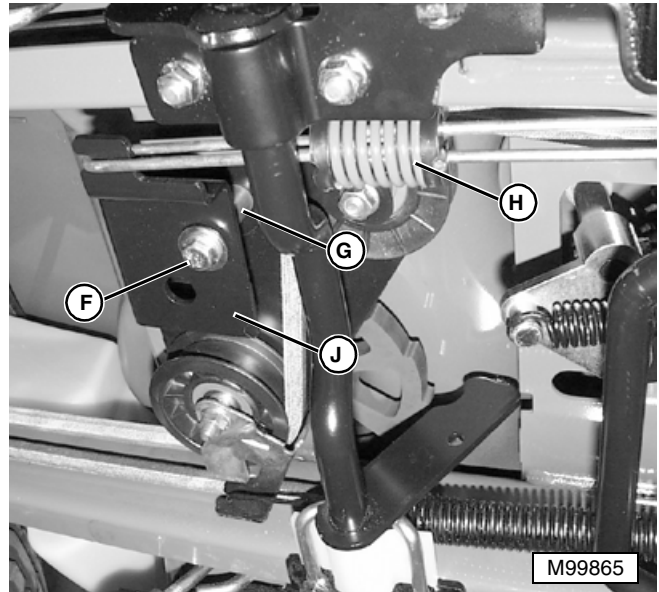
1. Remove mower deck.
2. Engage park brake to relieve tension on traction drive belt.

## ⚠ CAUTION

**TENSIONED SPRING.** The drive belt tension spring is under high tension when installed. Wear approved eye protection and gloves when removing to minimize the risk of personal injury.



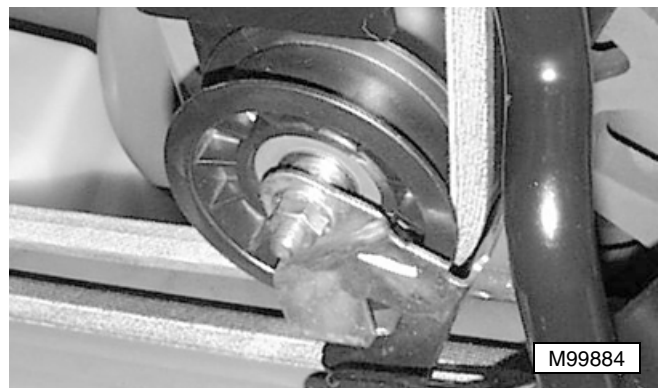
3. Remove nut (A) and belt guide (B).
4. Remove nut (C) and belt guide (D).
5. Slip traction drive belt off of flat idler and V-idler sheaves.
6. Disengage park brake.
7. Using a suitable spring puller, disconnect idler tensioning spring (E) from idler assembly. Remove spring.



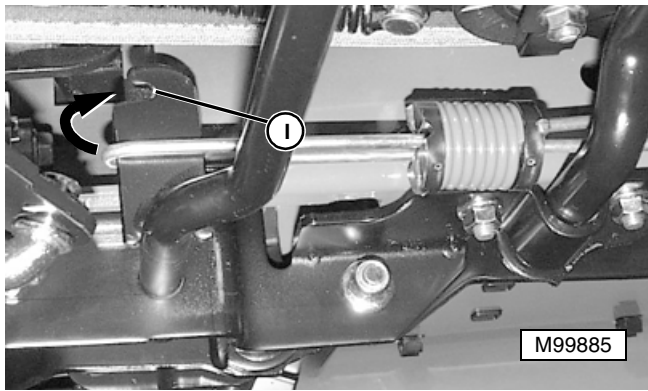
8. Remove cap screw and washer (F) retaining tensioner assembly to frame.
9. Remove spacer (G), compression spring (H), and tensioner assembly (J).
10. Inspect flat and V-idlers and bearings for smooth operation, wear, or damage. Replace as needed.

### Installation:

Installation is the reverse of removal.



- Check guides on idler sheaves. Guides should be positioned so that belt is approximately **3 mm (0.125 in.)** away on all sides.

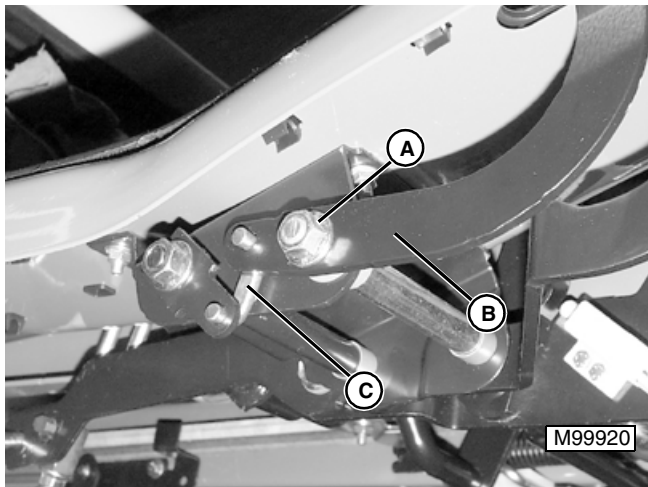


- With park brake released, check drive belt tension. If tension is not correct, check compression spring to make sure that it has not slipped out of slot (I) on brake shaft lever as shown.

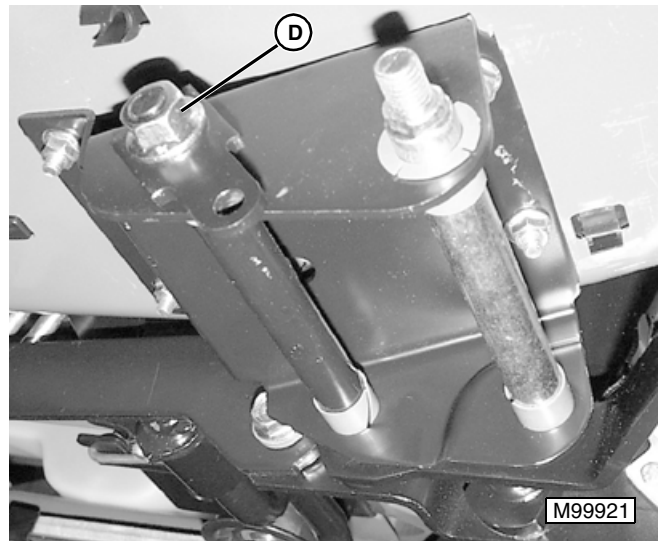
## CONTROL PEDALS AND LINKAGE

### Pedal Bushing Replacement:

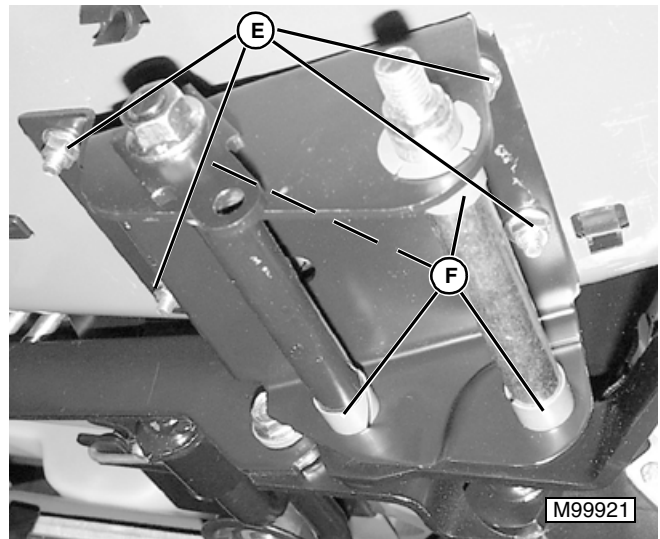
1. Remove mower deck.



2. Remove nut (A) attaching reverse pedal (B) to control shaft. Remove pedal and U-shaped link (C).



3. Loosen nut (D) on forward control shaft.



4. Remove four nuts (E) retaining pedal assembly to fender deck.
5. Lower pedal assembly to allow removal of forward and reverse control shafts. Replace bushings (F) or other parts as needed.

### Installation:

Installation is the reverse of removal.

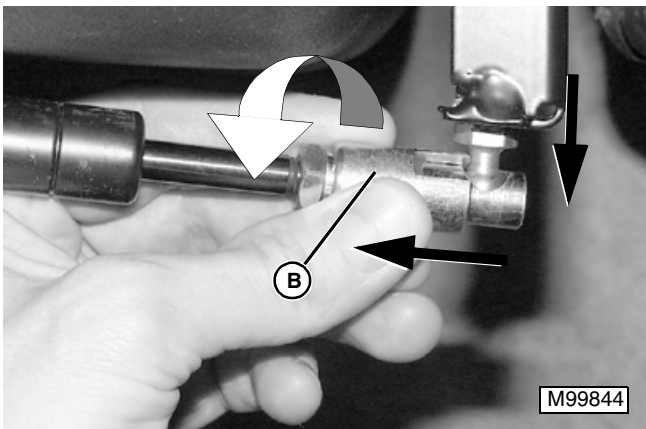
- Perform pedal adjustment. (See "FORWARD AND REVERSE PEDAL ADJUSTMENT" on page 17.)

**Pedal Assembly Removal:**

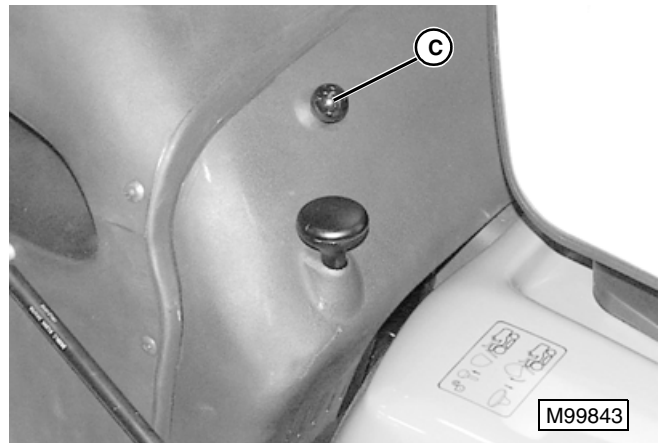
1. Remove mower deck.



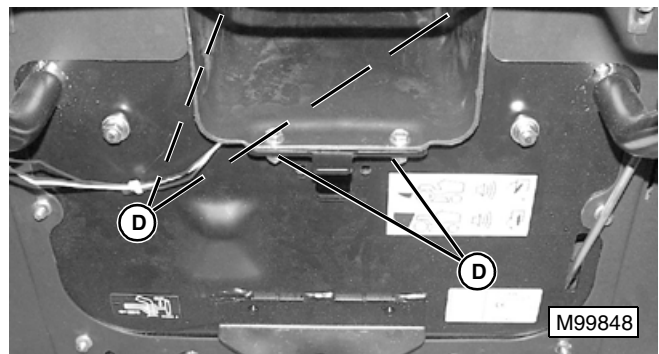
2. Push down on knob (A) to open grass collector hopper.



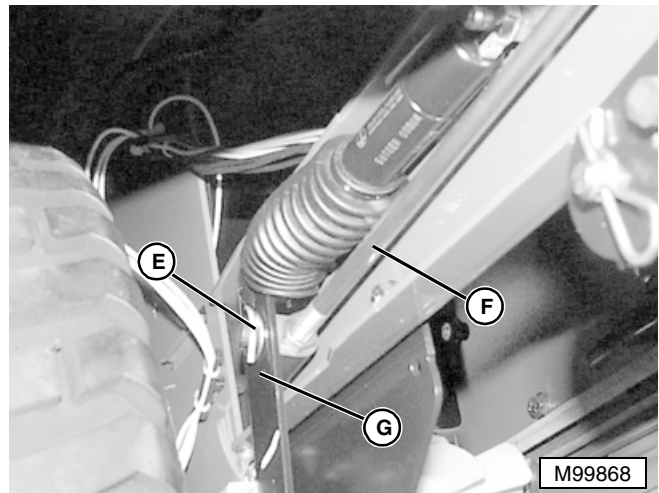
3. Remove end of gas lift assist cylinder from hopper by pulling back on locking collar (B), and turning. Pull end of cylinder off of ball stud.
4. Support grass collector hopper, and repeat for other side.



5. Pull up on release handle (C) to unlock hopper support brackets.
6. Lift grass collector hopper off of rear of tractor.

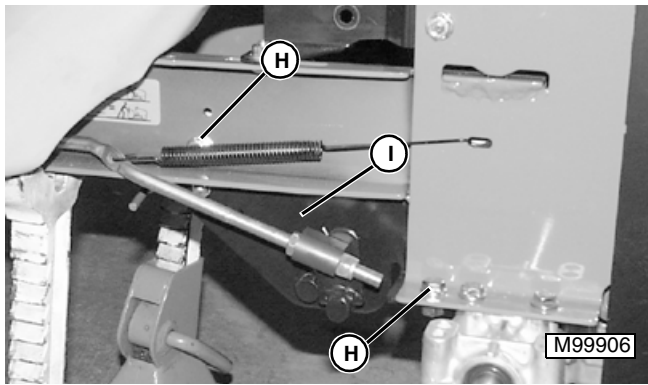


7. At rear of tractor, remove four cap screws and lock nuts (D) that are holding the chute. Move grass chute toward the front and remove from the underside of the tractor.



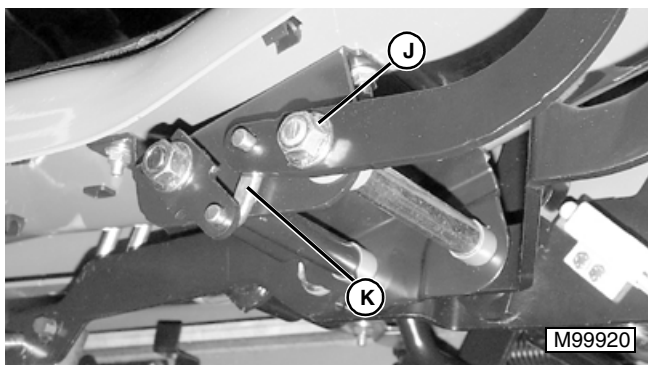
8. Remove cotter pin and washer (E) attaching forward/reverse control rod (F) to cross shaft lever (G).



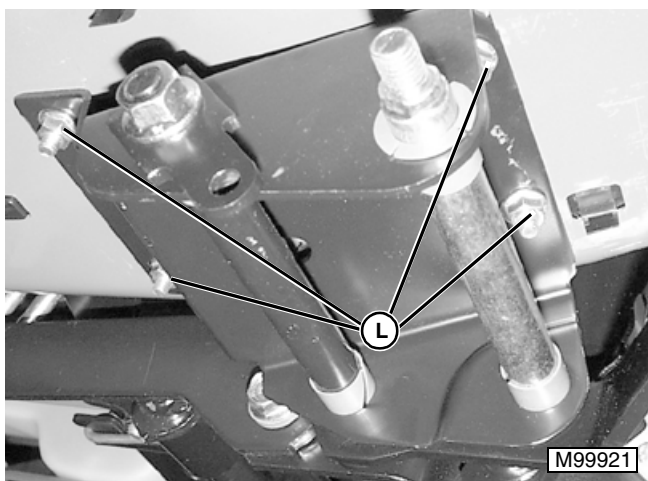


**NOTE:** Left rear wheel removed for clarity of photo.

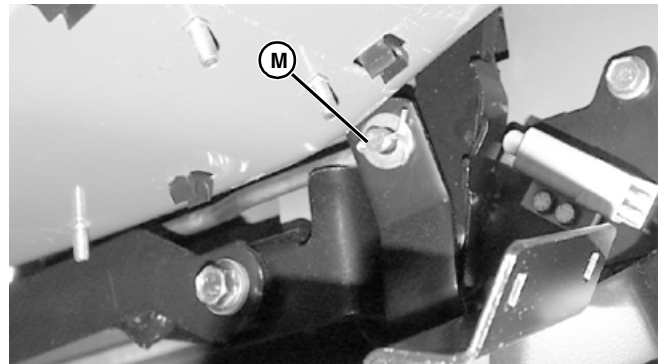
9. In front of left rear tire, locate cap screws and nuts (H) mounting cross shaft assembly (I) to frame. Remove cap screws and nuts. Repeat for right side.
10. Move cross shaft assembly slightly left and disconnect forward/reverse control rod from cross shaft lever.



11. Remove nut (J) attaching reverse pedal to control shaft. Remove pedal and U-shaped link (K).
12. Remove the forward pedal pad.
13. Remove right foot mat.



14. Remove four nuts (L) retaining pedal assembly to fender deck.



15. Lower pedal assembly to gain access to forward/reverse control rod end. Remove cotter pin and washer (M) connecting rod to pedal assembly. Disconnect rod from pedal assembly.
16. Remove pedal assembly.
17. Remove control rod.

#### Installation:

Installation is the reverse of removal.

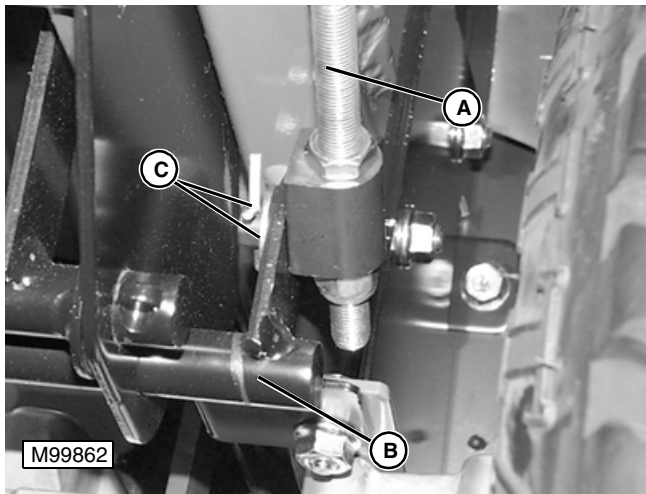
- After installation is complete, perform forward/reverse pedal adjustment. (See "FORWARD AND REVERSE PEDAL ADJUSTMENT" on page 17.)



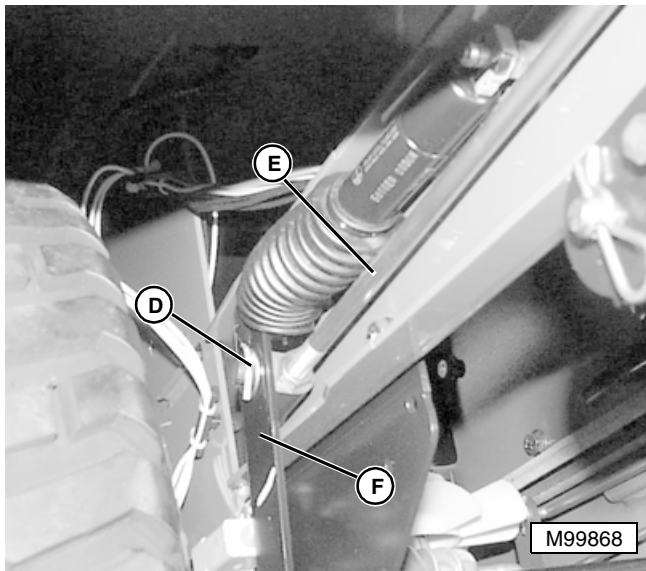
## CROSS SHAFT ASSEMBLY

## Removal:

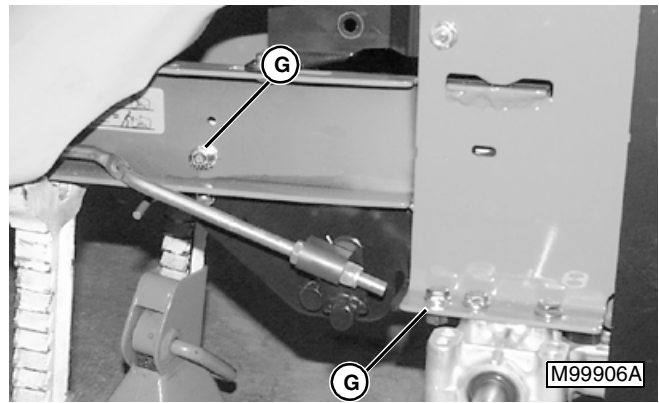
**NOTE:** Cross shaft assembly provides mechanical linkage for both brake, and forward/reverse control assemblies.



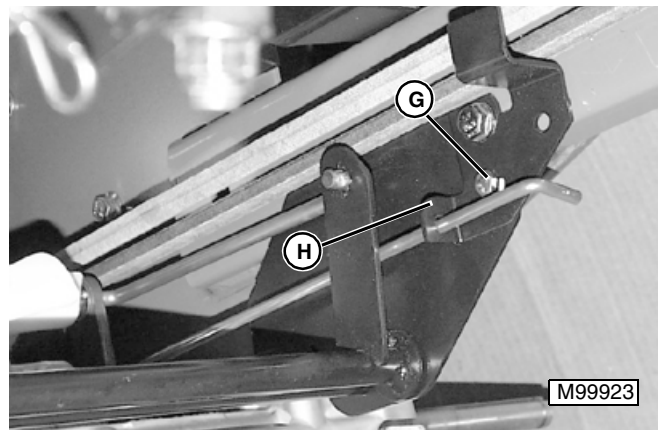
1. Near left rear tire, locate brake rod (A) and brake cross shaft (B). Remove cotter pin and washer (C), and disconnect brake rod end from brake cross shaft.



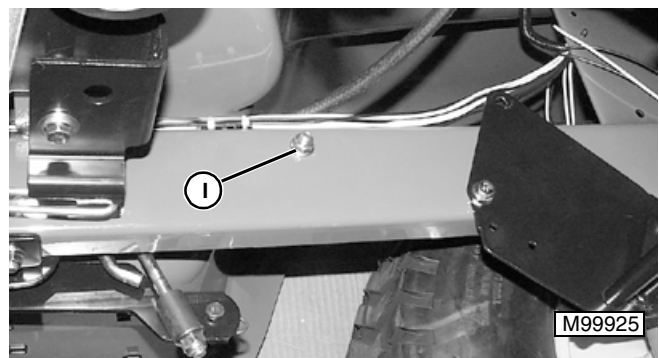
2. Remove cotter pin and washer (D) attaching forward/reverse control rod (E) to cross shaft lever (F).



**NOTE:** Left rear wheel removed for clarity of photo.



3. Remove cap screw and nut (G) retaining freewheeling rod bracket (H) to cross shaft assembly. Remove bracket.
4. In front of left rear tire, locate cap screws and nuts mounting cross shaft assembly to frame. Remove cap screws and nuts. Repeat for right side.
5. Move cross shaft assembly slightly left and disconnect forward/reverse control rod from cross shaft lever.



6. Remove nut (I) on stud attaching front of shock absorber to frame.

7. Turn shafts as needed to disconnect keyed ends of brake and forward/reverse control rods from cross shaft levers.
8. Remove cross shaft assembly from the tractor.

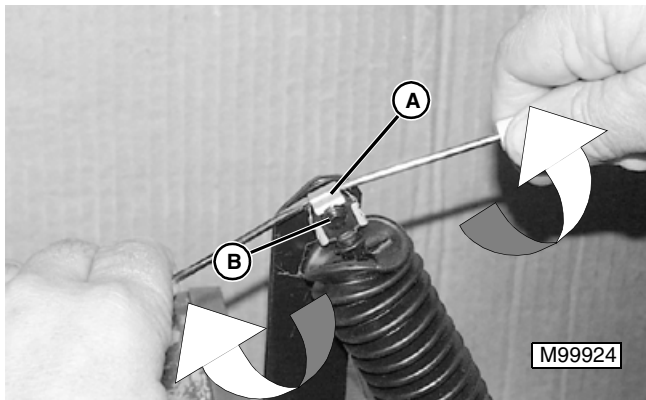
**Installation:**

Installation is the reverse of removal.

## SHOCK ABSORBER REMOVAL AND INSTALLATION

**Removal:**

1. Remove cross shaft assembly. (See "CROSS SHAFT ASSEMBLY" on page 26.)



2. Using two small screwdrivers, gently pry up on end of clip (A) to release clip from groove in pin (B). Remove shock absorber from pin.

**NOTE:** Inspect clips that retain shock absorber. If clips are damaged or deformed, replace.

**Installation:**

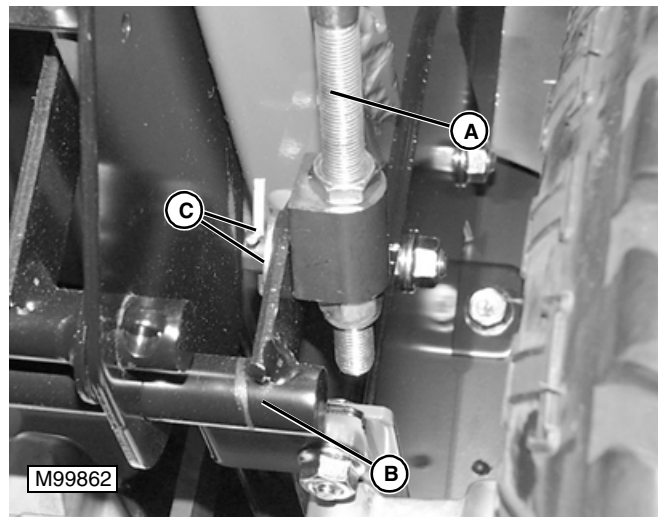
Installation is the reverse of removal.

- If removed, install clips to each end of shock absorber. Install shock absorber onto pins. Using a suitable slip joint or other adjustable pliers, *gently* squeeze clip until flange of clip seats in groove of pin with an audible click. Pull on shock absorber to ensure that clip will firmly retain shock absorber to pin.

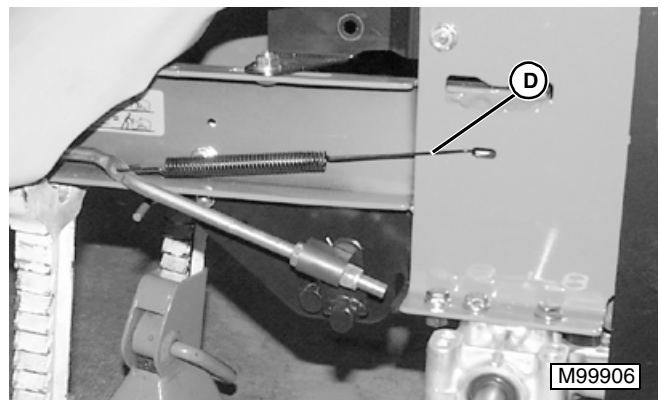
## BRAKE PEDAL AND LINKAGE

**Removal:**

1. Remove mower deck.
2. Remove left rear wheel. (See "REAR WHEEL REMOVAL/INSTALLATION" on page 5 in "MISCELLANEOUS" Section.)
3. Remove mower deck lift lever and linkage. ("MOWER DECK LIFT LINKAGE REMOVAL/INSTALLATION—LTR155/166" on page 30, or "MOWER DECK LIFT LINKAGE REMOVAL/INSTALLATION—LTR180" on page 33 in "ATTACHMENT" Section.)

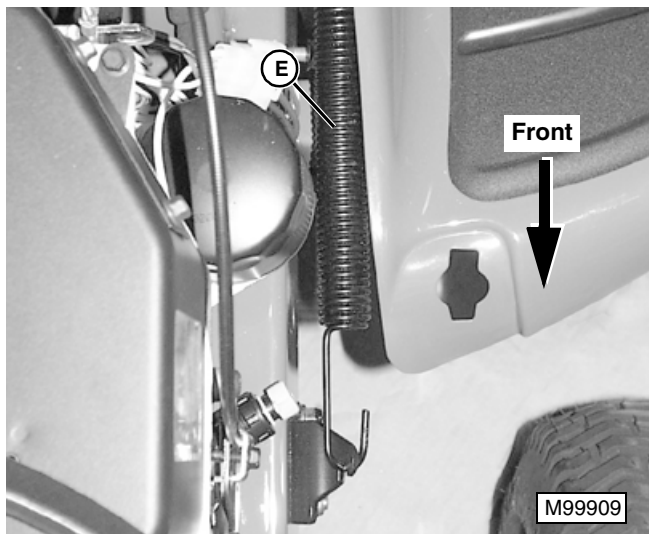


4. Near left rear tire, locate brake rod (A) and brake cross shaft (B). Remove cotter pin and washer (C), and disconnect brake rod end from brake cross shaft.



5. Using a suitable spring puller, disconnect brake return spring (D) from frame. Remove brake return spring.
6. Remove battery.
7. If not already done, move lift lever to forward (LOWER) position.



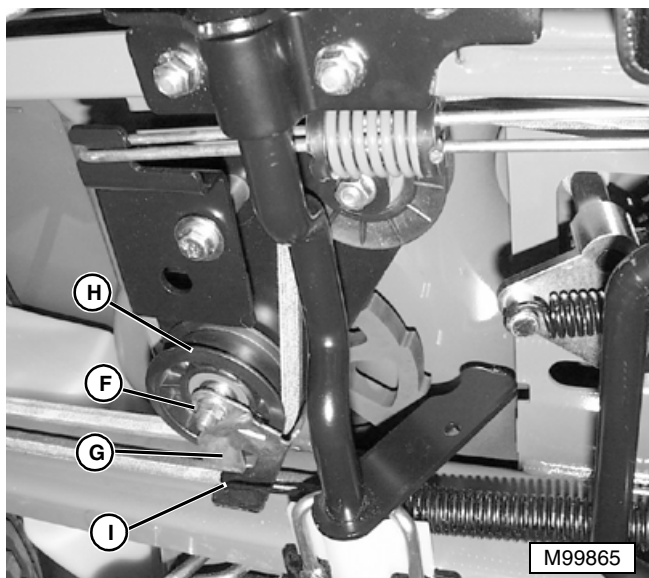


NOTE: Left closeout panel removed for clarity.

## ⚠ CAUTION

**TENSIONED SPRING.** The mower deck lift assist spring is under high tension when installed. Wear approved eye protection and gloves when removing to minimize the risk of personal injury.

8. Using a suitable spring puller, disconnect the front of the lift assist spring (E) from bracket on tractor frame. Remove spring from tractor.
9. Engage park brake to relieve tension on traction drive belt.
10. Raise tractor and support on suitable stands to gain easy access to underside of frame.

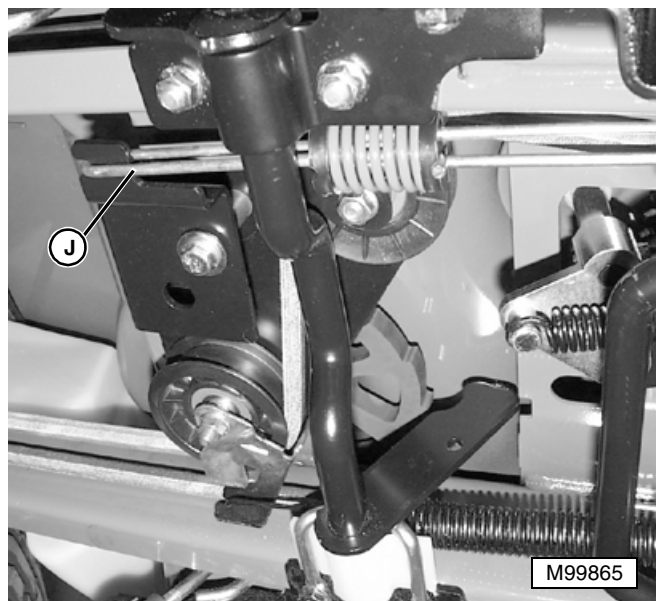


11. Remove nut (F) and belt guide (G).
12. Slip traction drive belt off of flat idler sheave (H).
13. Disengage park brake.

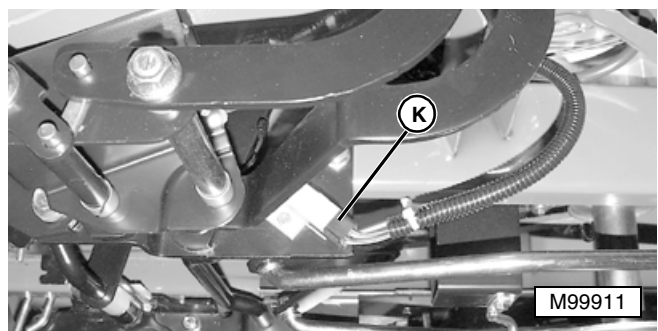
## ⚠ CAUTION

**TENSIONED SPRING.** Idler assembly tensioning spring is under high tension when installed. Wear approved eye protection and gloves when removing to minimize the risk of personal injury.

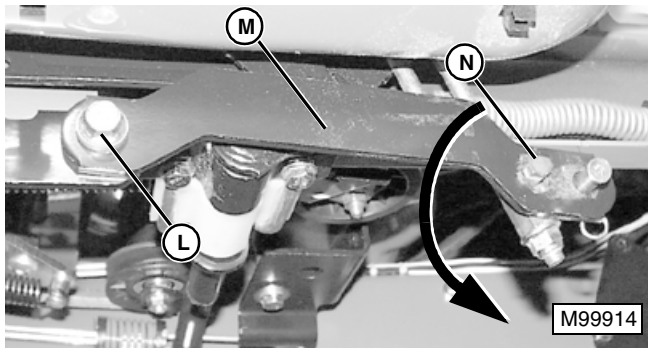
14. Using a suitable spring puller, disconnect idler tensioning spring (I) from idler assembly. Remove spring.



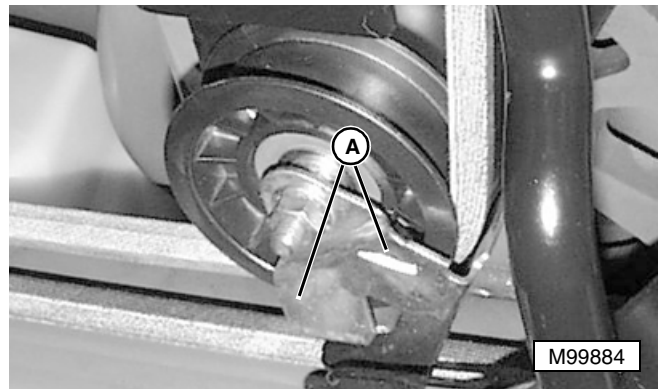
15. Disconnect compression spring assembly (J) from idler assembly and brake pedal arm. Remove spring assembly from tractor.
16. Remove brake pedal pad from brake pedal.



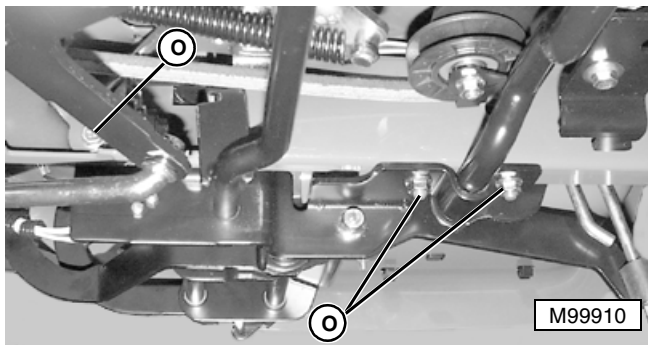
17. Under right foot rest, locate and disconnect brake switch electrical connector (K).



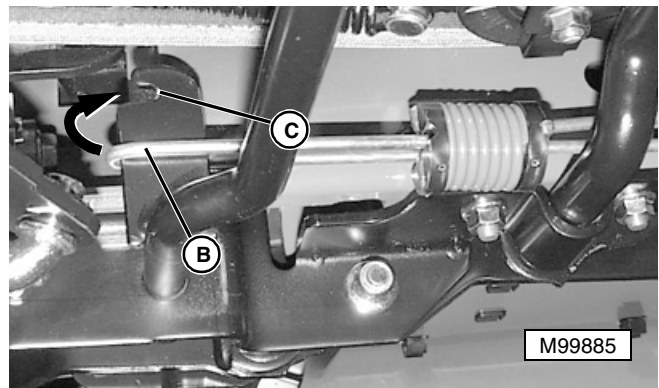
18. Remove cap screw, bushing, and lock nut (L) retaining front of draft arm to lift shaft assembly.
19. Rotate draft arm (M) and remove from lift link (N).
20. Repeat for other side.



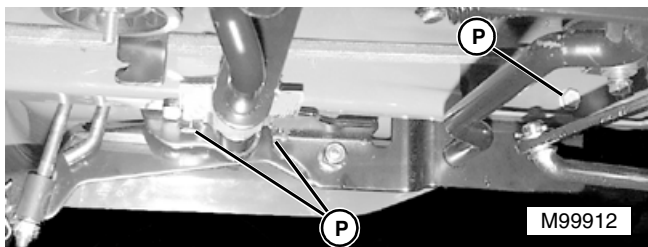
- Check guides (A) on idler sheaves. Guides should be positioned so that belt is approximately 3 mm (0.125 in.) away on all sides.



21. Remove three cap screws and nuts (O) retaining right side of brake pedal shaft/lift shaft support to frame.



- With park brake released, check drive belt tension. If tension is not correct, check compression spring end (B) to make sure that it has not slipped out of slot (C) on brake shaft lever as shown.



22. Remove two cap screws and nuts (P) retaining left side of brake pedal shaft/lift shaft support to frame.
23. Remove cap screw and nut.
24. Remove brake pedal shaft and lift shaft assembly from the tractor.
25. Inspect components for wear or damage. Replace parts as needed.

#### Installation:

Installation is the reverse of removal.