Theory of Operation

Clutch Engagement

Function:

To transfer power from the engine flywheel to the main drive shaft.

Theory of Operation:

The drive clutch assembly (A) is splined to the main drive shaft (B). When the clutch pedal is depressed the clutch shaft yoke (C) rotates forward and pushes the clutch release yoke and bearing (D) forward. The clutch release bearing presses the center of the pressure plate diaphragm (E) forward. The pressure plate diaphragm pivots and the outside edges of the diaphragm moves rearward releasing pressure on the pressure plate (F).

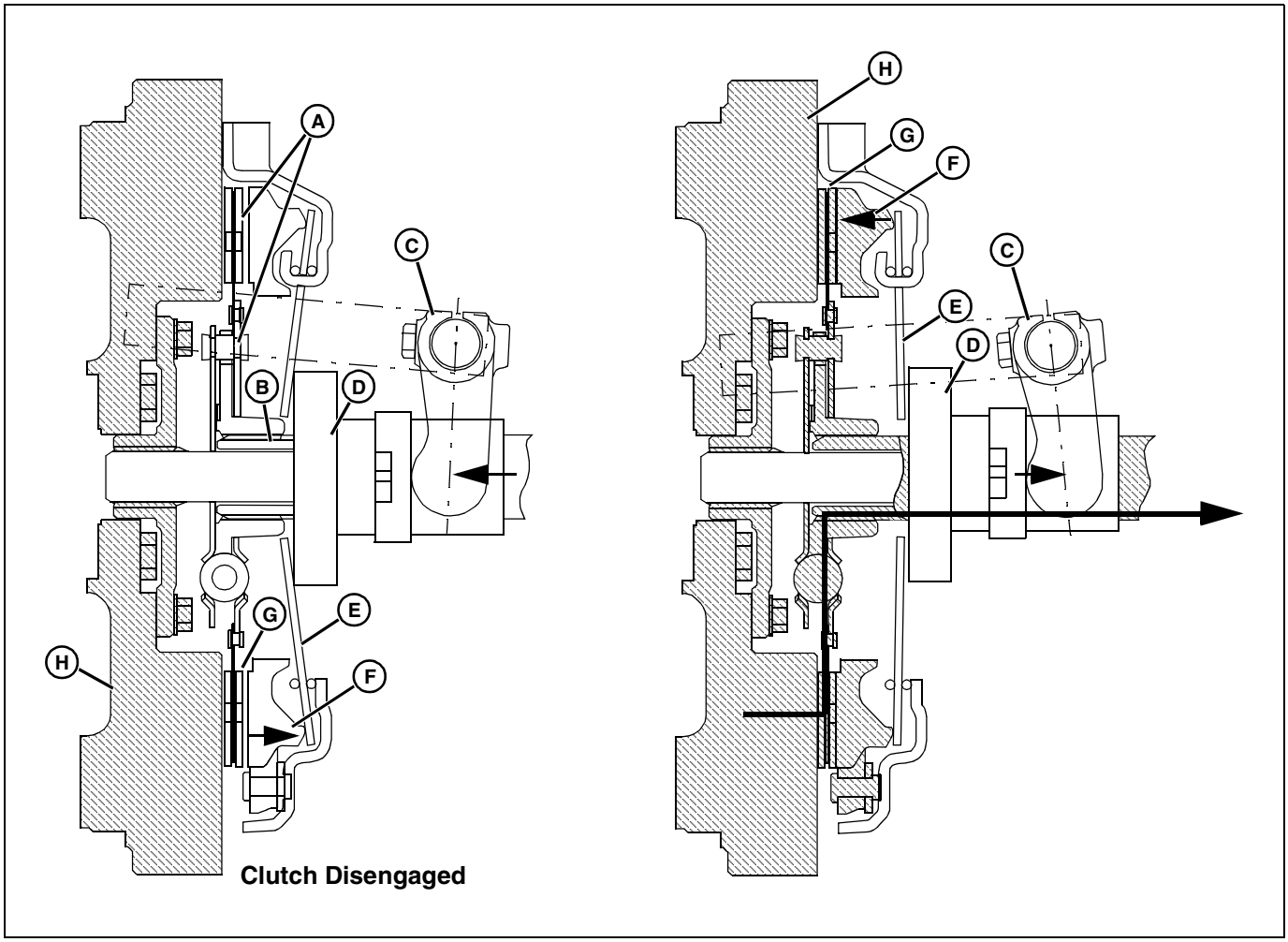
Releasing the pressure on the pressure plate keeps the clutch disk (G) from being pressed against the flywheel (H).

When the clutch pedal is released, the clutch shaft yoke (C) is rotated rearward. Diaphragm compression forces the clutch release bearing (D) to the rear.

When the clutch release bearing is forced rearward, the inside edges of the pressure plate diaphragm (E) are allowed to move rearward. The outside edges of the pressure plate diaphragm press the pressure plate (F) forward. The pressure plate forces the clutch disk (G) against the flywheel engaging the clutch disk.

When the clutch disk is engaged against the flywheel, power is transferred from the flywheel, through the clutch disk to the main drive shaft. Power is transferred from the main drive shaft to the rear axles through the gear collar shift transmission. See “Gear Synchromesh Shift” on page 428.

The PTO drive shaft runs through the center of the main drive shaft and is splined directly to the engine flywheel. See “PTO Theory of Operation” on page 623 in the Final Drive Power Train section.



MIF

Gear Synchromesh Shift

Function:

To transfer power from the engine clutch to the rear axles.

Theory of Operation:

When the clutch is engaged, there is rotation of the drive shaft (A) which has four gears splined to it.

There are four corresponding gears on the driven shaft (B). Three are directly meshed to the gears on the drive shaft. The three gears on the driven shaft are mounted on roller bearings (C) and turn independently from the driven shaft. Two shift collars (D) are splined to the driven shaft (B) and are shifted forward or backward to engage the drive shaft gears to the driven shaft gears.

Power flow is shown below with the collar shifted into first gear.

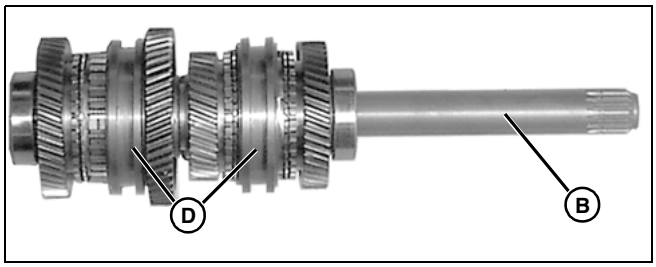
The driven shaft is splined directly to the reduction shaft, and transfers power to the reduction shaft of the range gears. See “Range Transmission” on page 587 in the Final Drive Power Train section.

The diagram below shows the front shifter in the rearmost (1st gear) position. Power flow is shown with the solid arrow. Power flow for 2nd and 3rd gear are shown with dashed arrows.

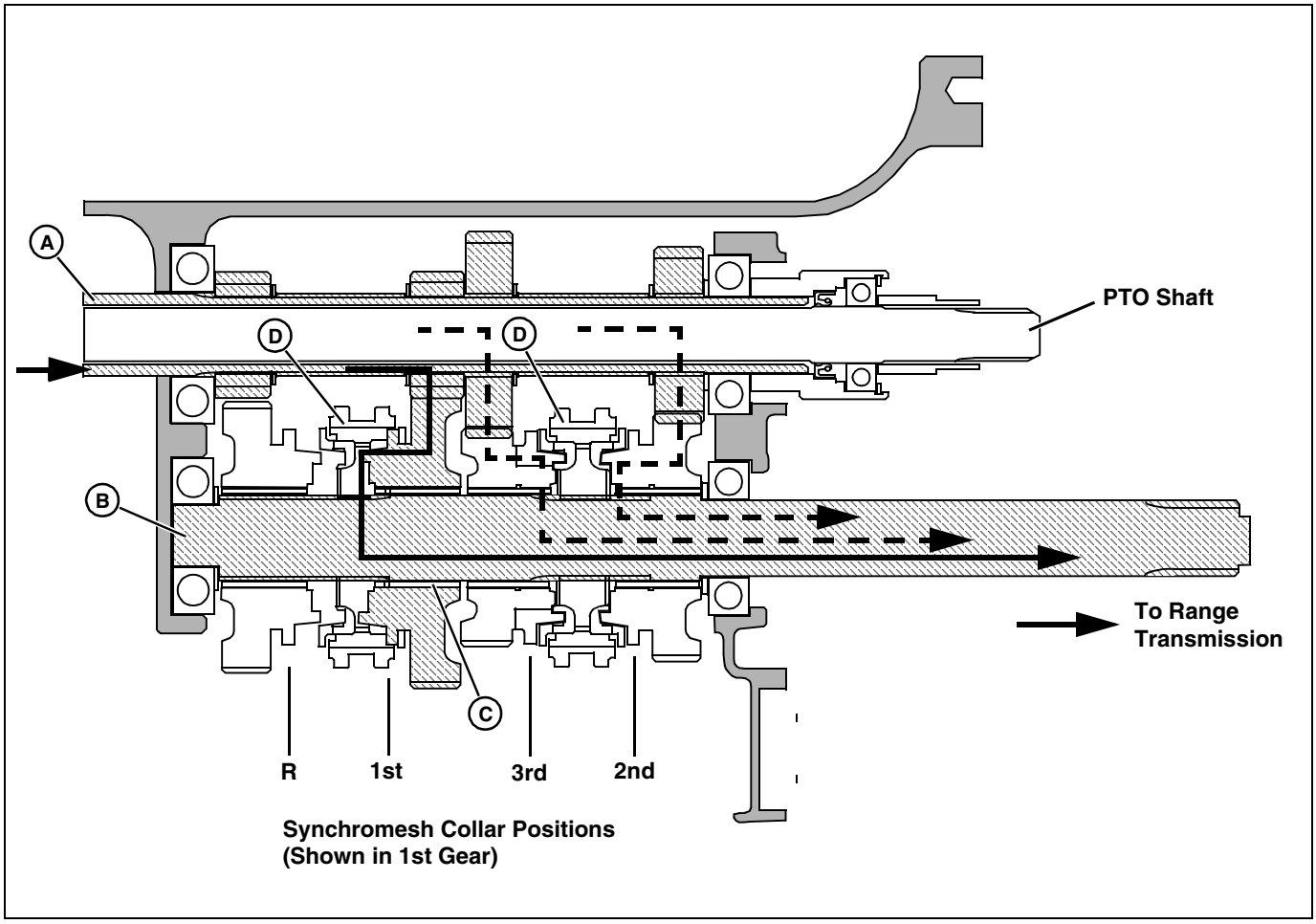
There are four positions for the shifters (from rear to front):

- Rearmost - 2nd
- Next forward - 3rd
- Next forward - 1st
- Most forward - Reverse

The reverse gear is driven through a reverse idler shaft and gear. See “Reverse Synchromesh Shift” on page 429.



M89639A



MIF

Reverse Synchromesh Shift

Function:

To transfer power from the engine clutch to the rear axles.

Theory of Operation:

When the clutch is engaged, there is rotation of the drive shaft (A) which has four gears splined to it, the front one being the reverse gear.

The reverse gear is constantly meshed with a reverse idler gear (B) on the reverse idler shaft (C). The reverse idler shaft is offset to the left of the drive shaft and driven shaft.

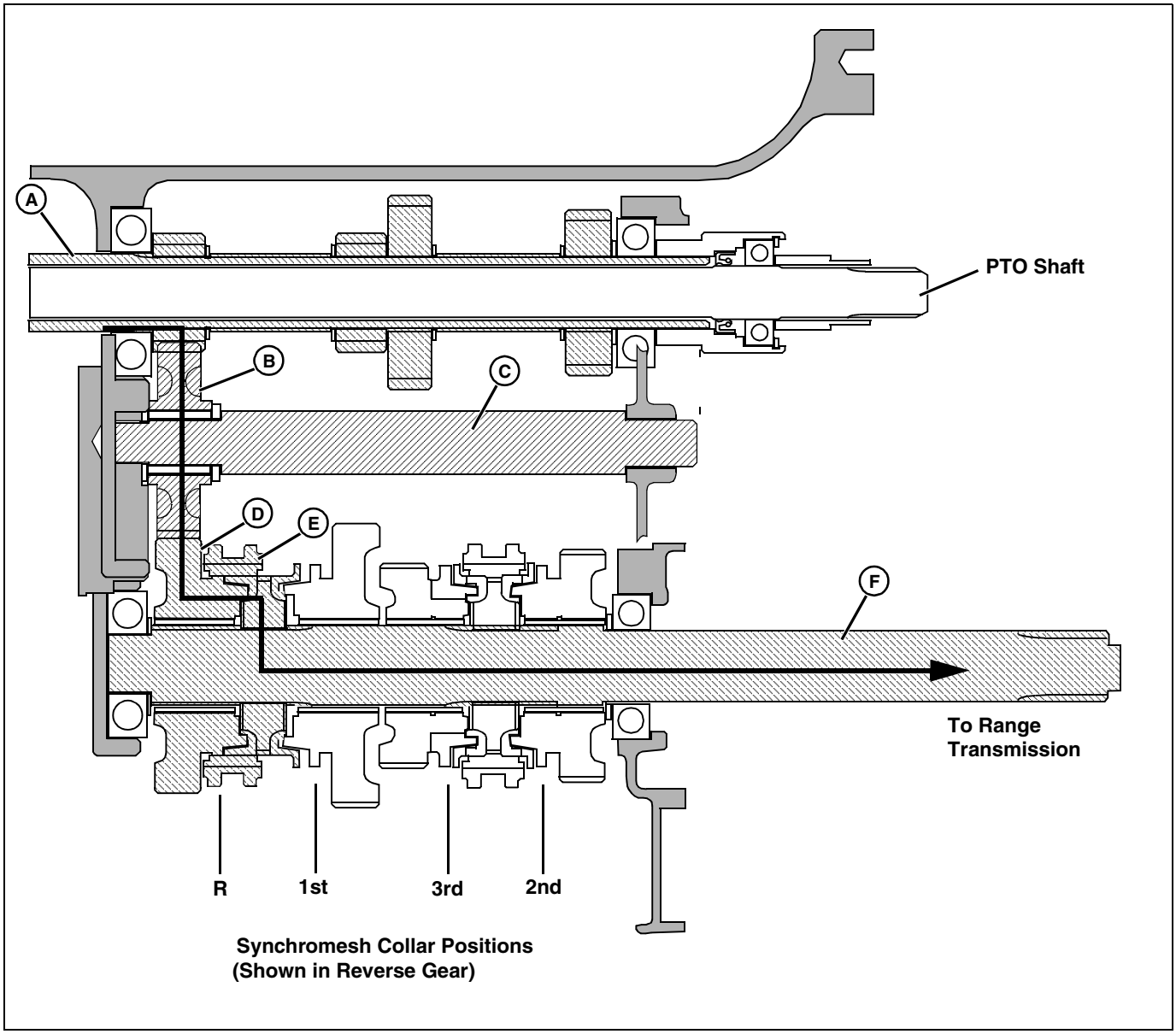
The reverse idler gear is constantly meshed with the reverse gear (D) on the driven shaft. The reverse idler gear and reverse gear on the driven shaft rotate freely on roller bearings.

When the shift lever is placed in REVERSE, linkage and a shift fork move the shift collar (E) forward where it engages the reverse gear and transfers power to the driven shaft (F).

Power flow is shown below with the collar shifted into reverse gear.

The driven shaft is splined directly to the reduction shaft, and transfers power to the reduction shaft of the range transmission.

NOTE: The drive shaft/PTO shaft and the driven shaft are shown farther apart than they are to allow visual representation of the offset reverse idler shaft and gear.



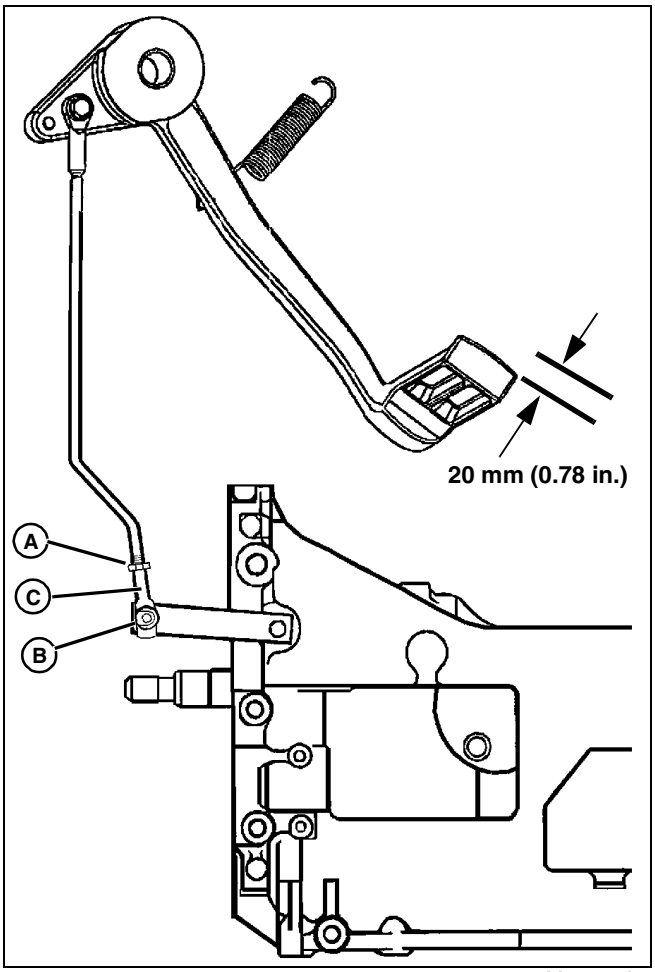
Synchromesh Collar Positions (Shown in Reverse Gear)

MIF

Tests and Adjustments

Clutch Adjustment

Procedure:



M91923A

1. Make sure clutch return spring is correctly installed.

2. Depress the clutch pedal and make sure the pedal stem does not contact the head of the brake pivot cap screw.

3. Loosen jam nut (A) on yoke (C), and remove pin and clip (B) from assembly.

4. Adjust yoke until clutch pedal has **20 mm (0.780 in.)** free travel measured at center of clutch pedal face.

5. When free travel is correct install clip and pin. Hold yoke and tighten jam nut.

Repair

Machine Splitting (Front)

Prepare the Machine:

1. Park machine on a level surface. Engage park brake, shut off engine.

2. Disconnect battery negative terminal.

3. Remove side panels.

4. Remove hood. See “Hood Removal and Installation” on page 772 in Miscellaneous Section.

5. Remove steering wheel.

6. Remove control panel. See “Control Panel Removal and Installation” on page 770 in Miscellaneous Section.

7. Remove left side and right side cowl panels. See “Cowl Panel Removal and Installation” on page 771 in Miscellaneous Section.

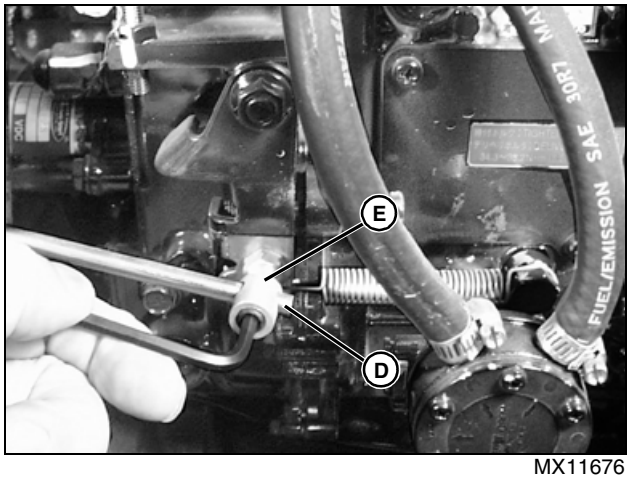
8. Remove fuse panel cover. See “Fuse Panel Cover Removal and Installation” on page 770 in Miscellaneous Section.

9. Remove floor mat and operator’s platform. See “Operator’s Platform Removal and Installation” on page 769 in Miscellaneous Section.

10.Remove key switch panel. See “Key Switch Panel Removal and Installation” on page 771 in Miscellaneous Section.

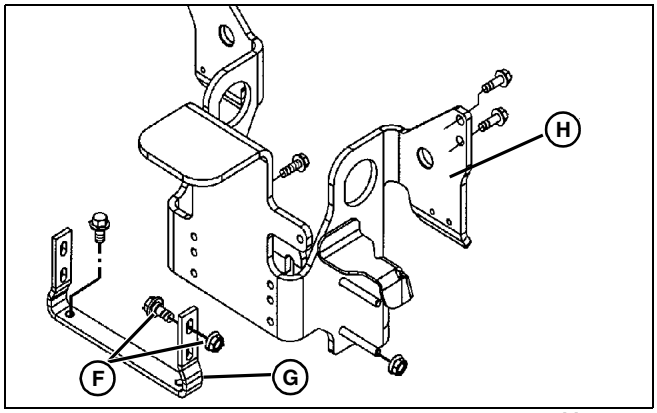
11.Remove fuel tank. See “Fuel Tank Removal and Installation” on page 772 in Miscellaneous Section.

12.Locate and disconnect all electrical connectors attaching wiring harness to switches and lights on rear half of machine. Unfasten wiring harness from cable clips and move harness away from rear half of machine.

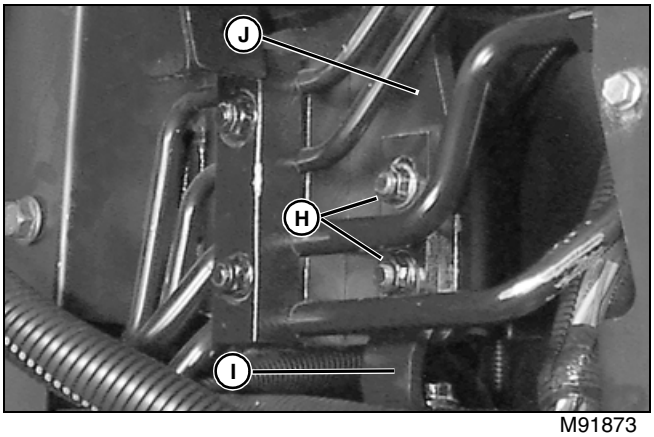


MX11676

13.If not already done, disconnect throttle linkage (D) from throttle lever (E) on fuel injection pump.

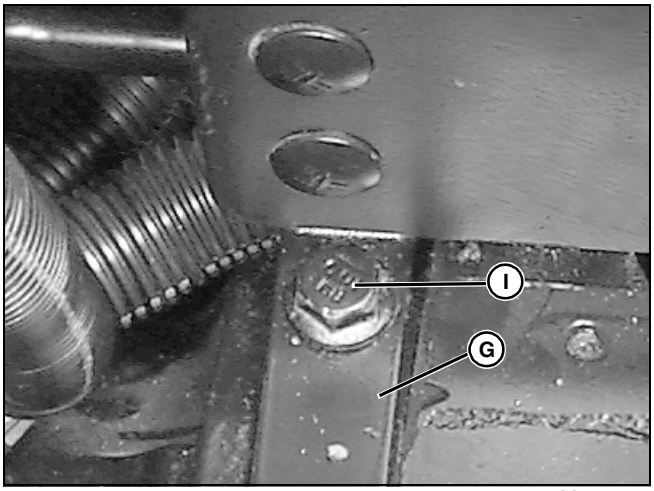


M91871



M91873

14.Loosen four nuts and carriage bolts (F) attaching U-shaped bracket (G) to pedal support frame (H).

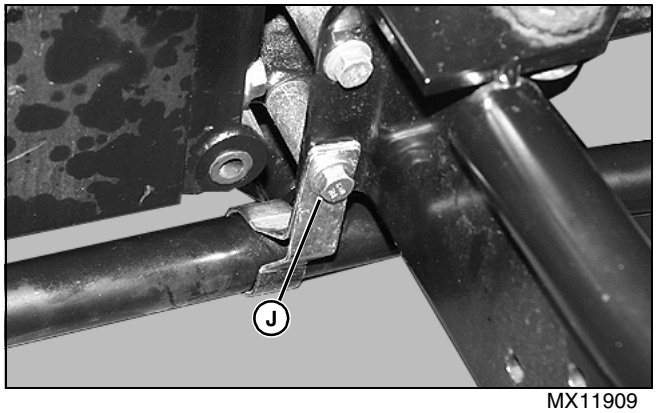


M91876

15.Remove two cap screws (I) attaching U-shaped bracket (G) to transmission tunnel.

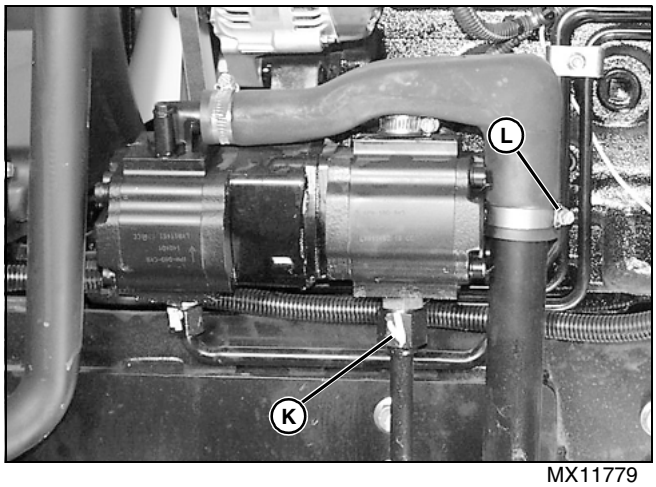
NOTE: Capacity of the hydraulic reservoir is 37 liters (9.8 gal) (39.1 qt).

16.Drain hydraulic oil from transaxle.



MX11909

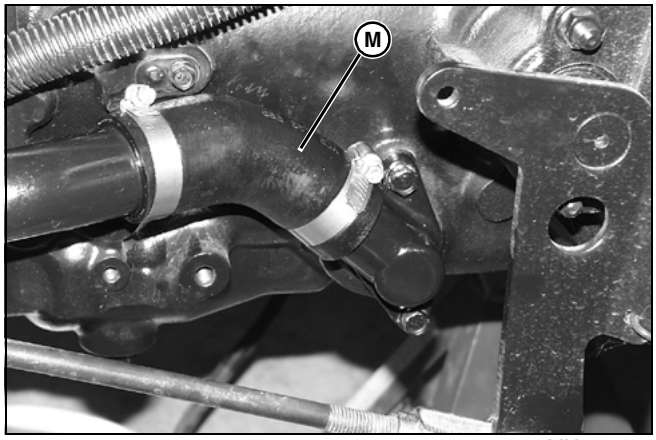
17.Remove cap screw and clamp (J) attaching suction tube to tunnel section.



MX11779

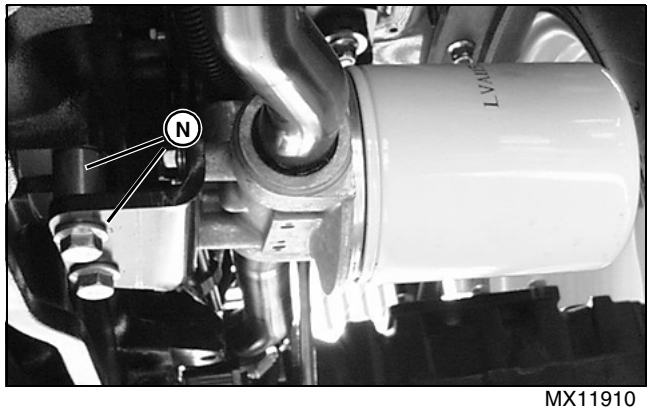
18.Disconnect PTO pressure tube (K) from rear hydraulic pump.

19.Loosen clamp (L) on suction tube manifold.



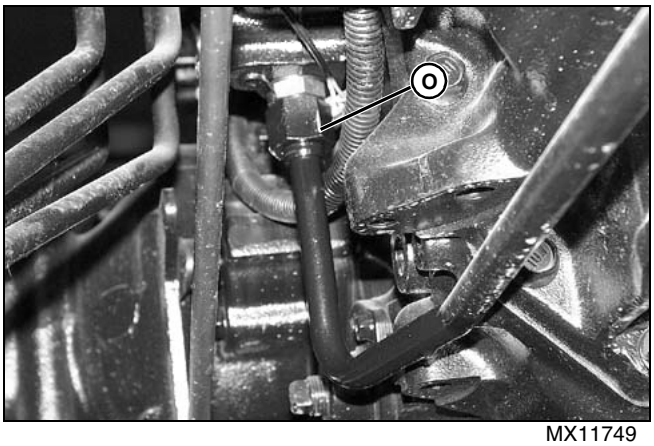
MX11913

20.Disconnect suction tube (M) from elbow from transaxle.



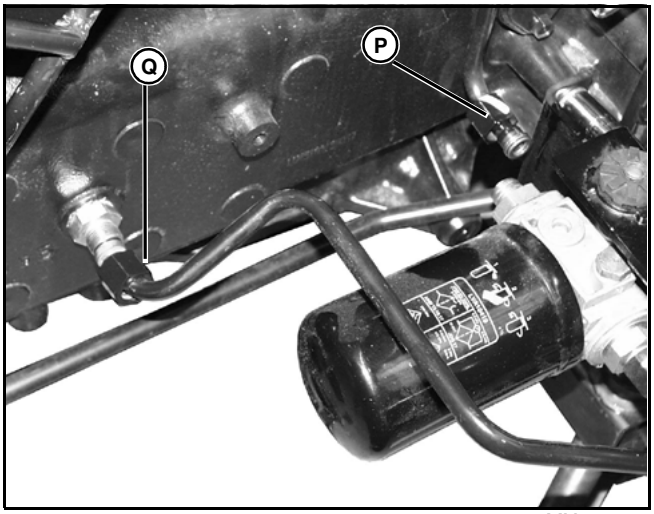
MX11910

21.Remove two bolts and spacers (N). Remove suction tubes and filter as an assembly.



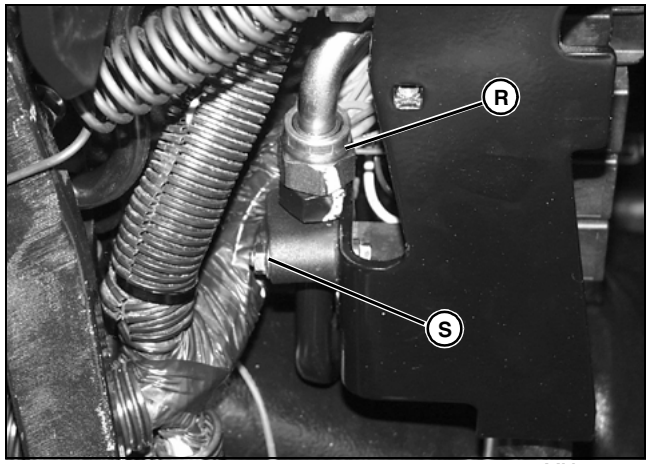
MX11749

22.Disconnect PTO pressure tube (O) from bottom of PTO valve. Remove tube.



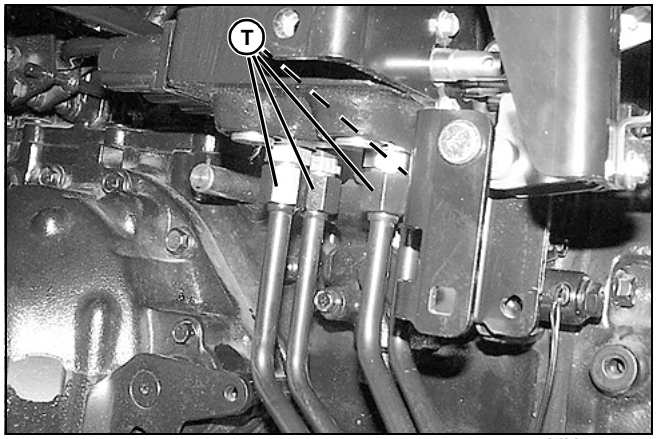
MX11805

23.Disconnect tubes (P) and (Q) from hydraulic oil filter.



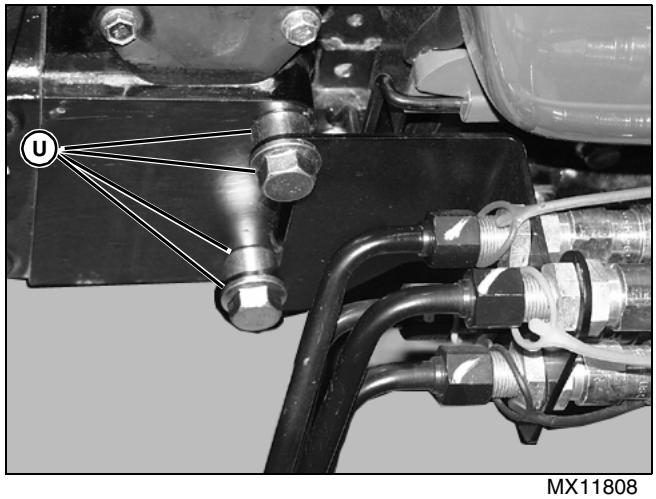
MX11914

24.Disconnect other end of tube from steering return hose (R). Remove tube clamp cap screw and nut (S) and remove tube.



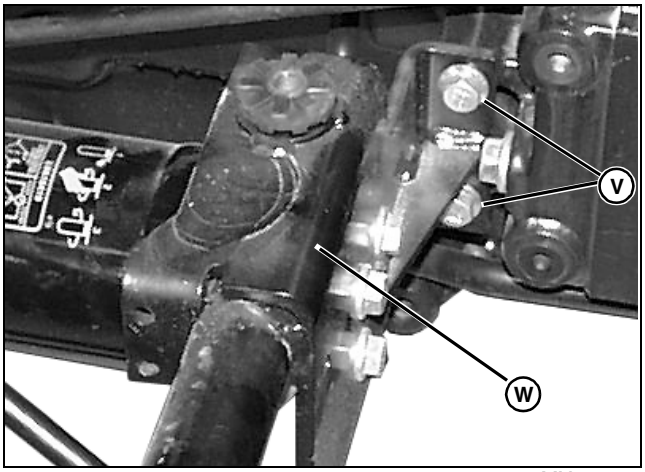
MX11740

25.If equipped, disconnect four work port tubes (T) from SCV.



MX11808

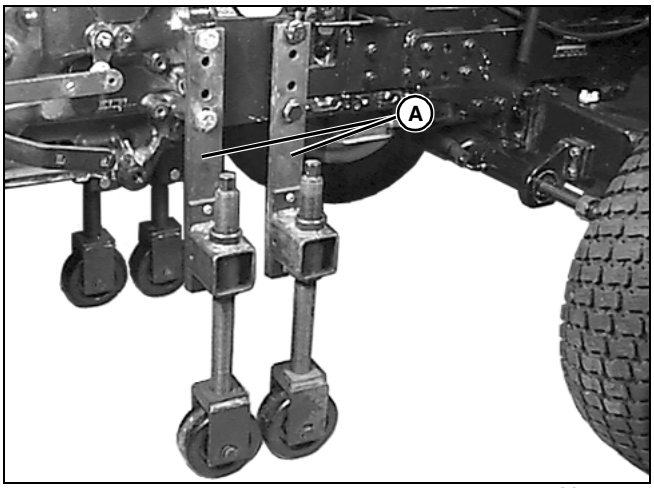
26.Remove cap screws and spacers (U) that attach tube support bracket to frame. Remove tube support bracket and tubes as an assembly.



MX11919

27.Remove two cap screws (V) and right side operator's platform support (W).

Split the Machine:



M91866

1. Using cap screws supplied with the splitting stands, secure JTO 7335 splitting stands (A) to the tunnel sections.

2. Adjust splitting stands so that wheels contact the floor, and are parallel to the machine wheels.

3. Remove nine cap screws and lock washers attaching tunnel section to engine section of machine. Note length and locations of cap screws when removing.

4. Release park brake and place gear shift in NEUTRAL.

IMPORTANT: Avoid damage! Check for, and disconnect any additional accessory wires or hydraulic tubes connecting rear half to front half before splitting machine.

5. If necessary, use a pry bar to separate the two machine sections. Lift the steering support slightly to clear the front flange of the tunnel. Split the machine by rolling the two sections apart.

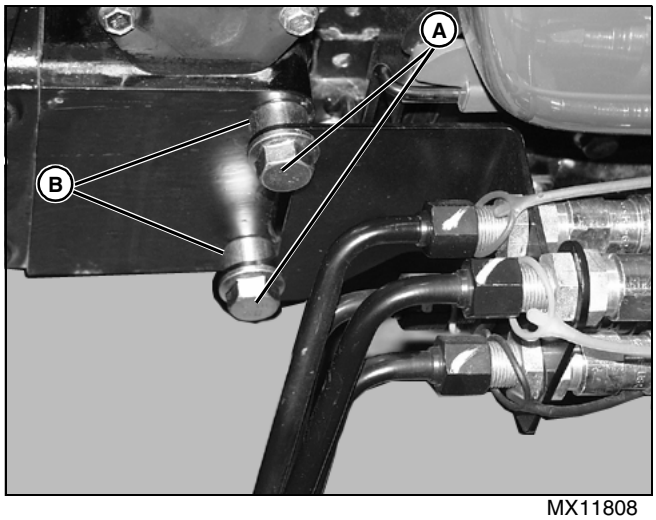
Assemble Machine Sections:

NOTE: Splines on all drive shafts and couplers must be aligned before machine sections are bolted together.

1. Align splines on drive shafts and engine flywheel.

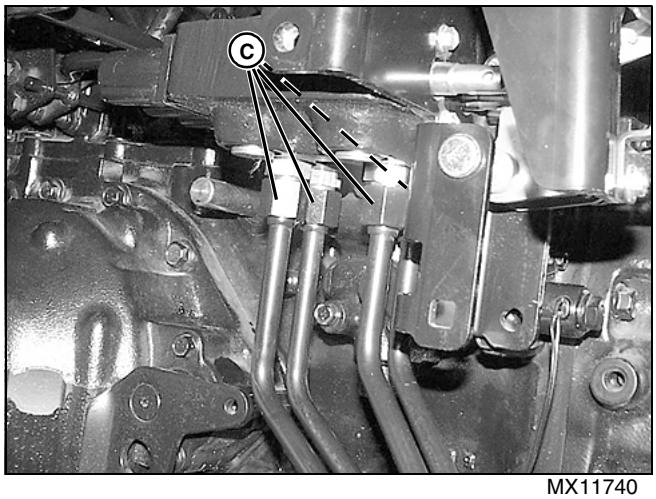
2. Move machine sections together and retain with 9 cap screws. Tighten cap screws to **126 - 154 N•m (95 - 115 lb-ft)**.

3. Remove splitting stands.



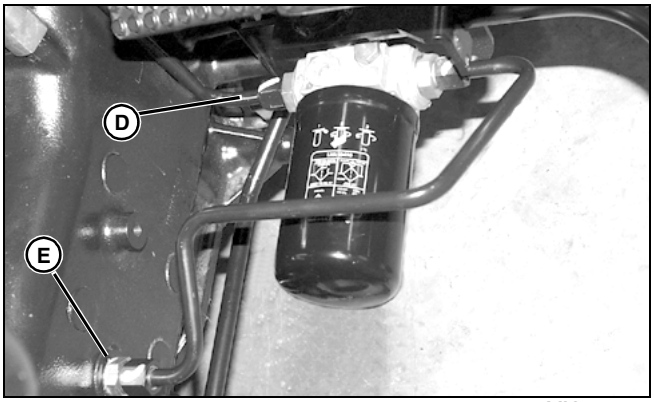
MX11808

4. If equipped, install SCV tube support bracket and tubes as an assembly. Install 2 cap screws (A) and 2 spacers (B) to attach tube support bracket to frame.



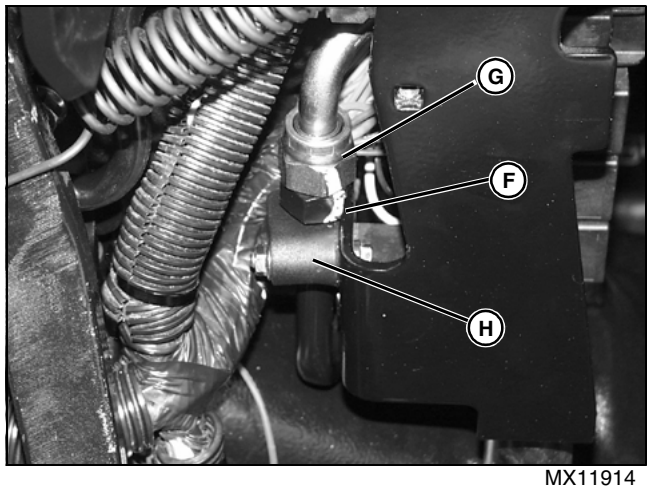
MX11740

5. Connect four work port tubes (C) to SCV. Tighten to **40 - 57 N•m (30 - 43 lb ft)**.



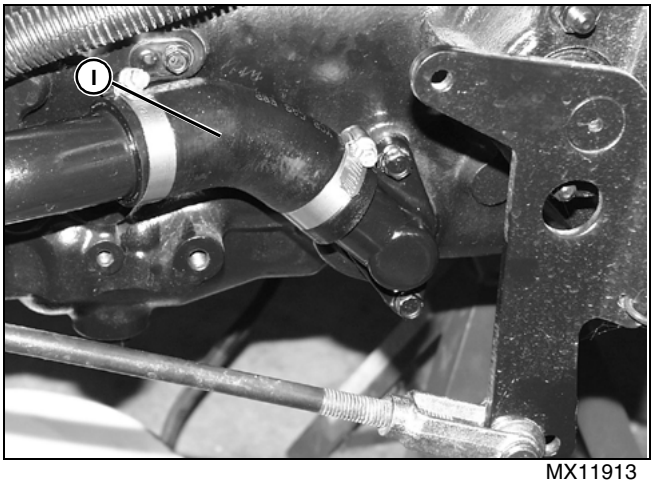
MX11923

6. Connect hydraulic oil tube (D) to left side port of hydraulic oil filter. Connect tube from right side of filter to fitting (E)on tunnel Tighten to **40 - 57 N•m (30 - 43 lb ft)**.



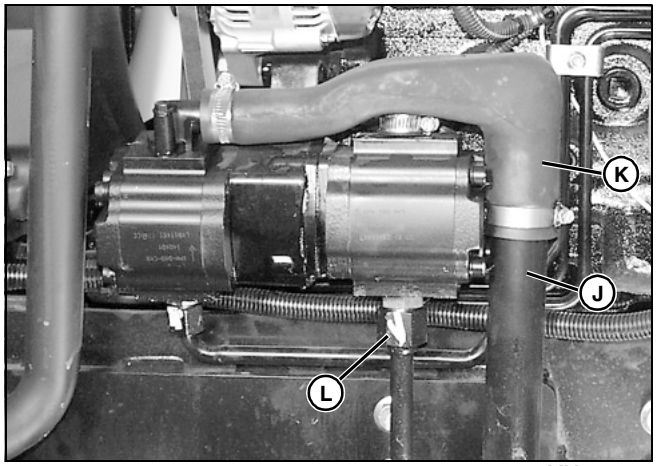
MX11914

7. Connect tube (F) to steering return hose (I). Tighten to **40 - 57 N•m (30 - 43 lb ft)**. Install line clamp (H) and secure with cap screw.



MX11913

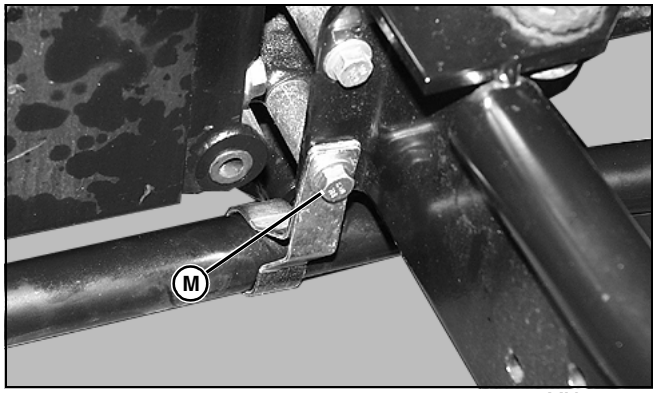
8. Reconnect suction tube (I).



MX11779

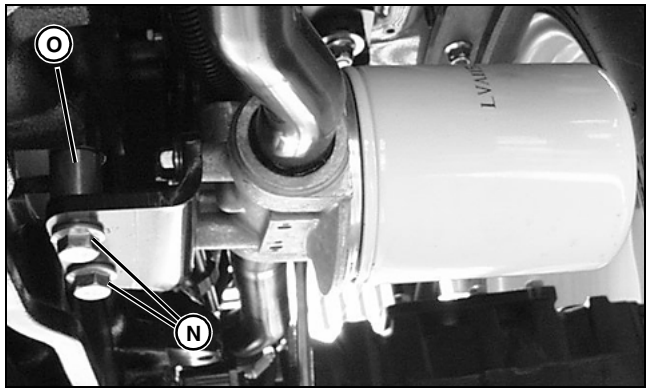
9. Connect suction tube (J) to suction manifold (K) and retain with hose clamp.

10.Connect PTO pressure tube (L) to rear hydraulic pump. Tighten fitting to **40 - 57 N•m (30 - 43 lb ft)**.



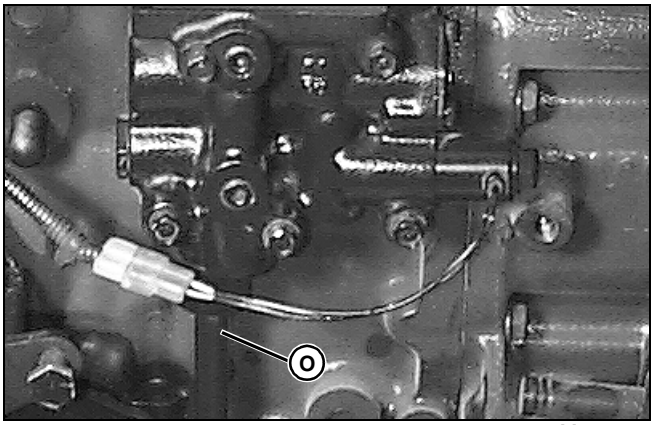
MX11909

11.Secure suction tube clamp (M) to tunnel section.



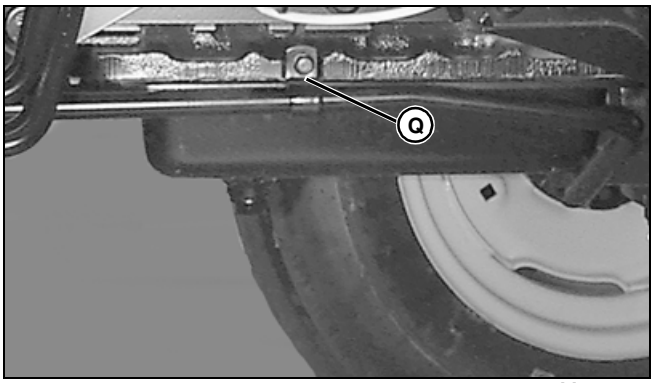
MX11910

12.Install cap screws (N) and spacers (O) securing filter bracket to machine.



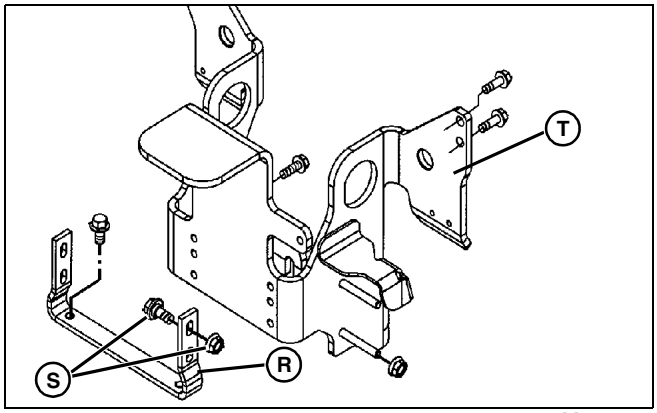
M91389

13.Connect PTO pressure tube (O) to bottom of PTO valve. Tighten nut to **40 - 57 N•m (30 - 43 lb ft)**.

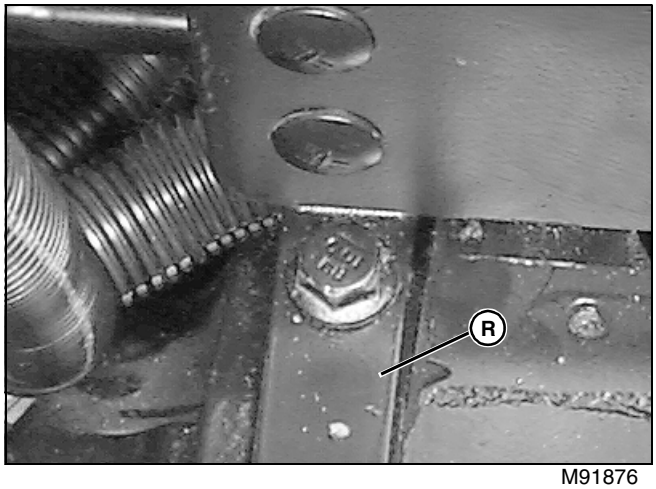


M91882

14.On right side of machine, Secure tube clamp (Q) attaching PTO pressure tube to frame.

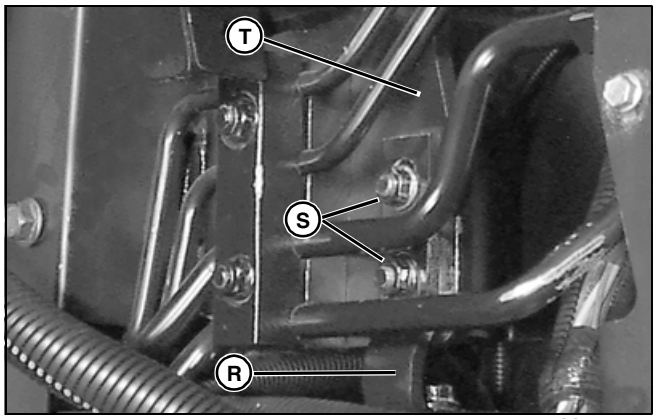


M91871



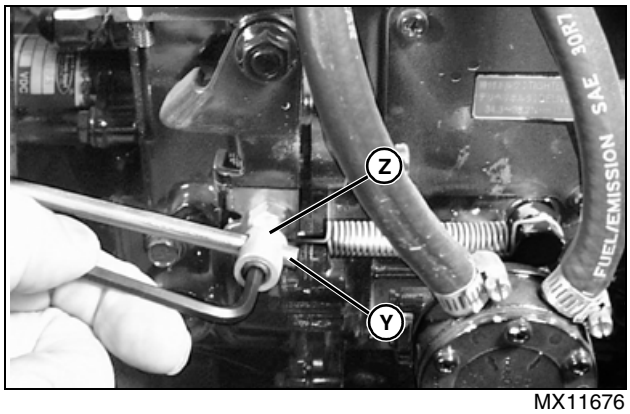
M91876

15.Install U-shaped bracket (R) to transmission tunnel, retain with two cap screws. Tighten cap screws.



M91873

16.Install four carriage bolts (S) and nuts attaching U-shaped bracket (R) to pedal support frame (T) and tighten.



MX11676

17.Connect throttle linkage (Y) to throttle lever (Z) on fuel injection pump.

18.Route electrical harness on rear half of machine. Connect all electrical connectors attaching wiring harness to switches and lights on rear half of machine. Fasten wiring harness to cable clips. Replace any plastic tie bands removed during disassembly.

19.Install fuel tank. See “Fuel Tank Removal and Installation” on page 772 in Miscellaneous Section.

20.Install operator’s platform. See “Operator’s Platform Removal and Installation” on page 769 in Miscellaneous Section.

21.Install floor mat.

22.Install key switch panel. See “Key Switch Panel Removal and Installation” on page 771 in Miscellaneous Section.

23.Install fuse panel cover. See “Fuse Panel Cover Removal and Installation” on page 770 in Miscellaneous Section.

24.Install left side and right side cowl panels. See “Cowl Panel Removal and Installation” on page 771 in Miscellaneous Section.

25.Install control panel. See “Control Panel Removal and Installation” on page 770 in Miscellaneous Section.

26.Install steering wheel. See “Steering Wheel Removal and Installation” on page 736 in Miscellaneous Section.

27.Install hood. See “Hood Removal and Installation” on page 772 in Miscellaneous Section.

28.Install side panels.

29.Connect battery negative terminal.

Machine Splitting (Rear)

Prepare the Machine:

1. Park machine on a level surface. Engage park brake, shut off engine.

2. Disconnect battery negative terminal.

3. Remove fuse panel cover. See “Fuse Panel Cover Removal and Installation” on page 770 in Miscellaneous Section.

4. Remove floor mat.

5. Remove seat and seat support. See “Seat And Seat Support Removal and Installation” on page 766 in Miscellaneous Section.

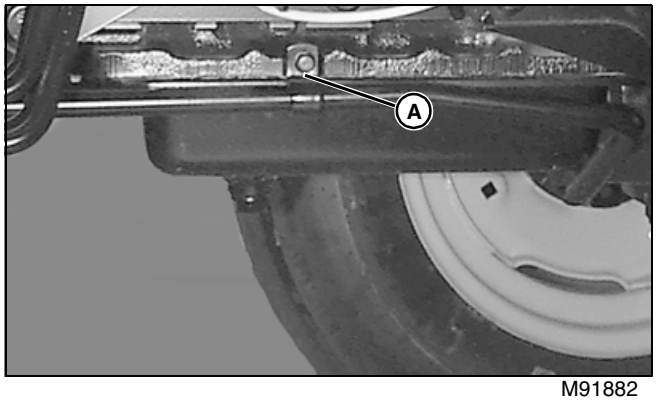
6. Remove seat platform.

7. Remove closeout panel.

8. Remove operator’s platform. See “Operator’s Platform Removal and Installation” on page 769 in Miscellaneous Section.

9. Remove fenders. See “Rear Fenders Removal and Installation” on page 767 in Miscellaneous Section.

10.Locate and disconnect all electrical connectors attaching wiring harness to switches and lights on rear half of machine. Unfasten wiring harness from cable clips and move harness away from rear half of machine.

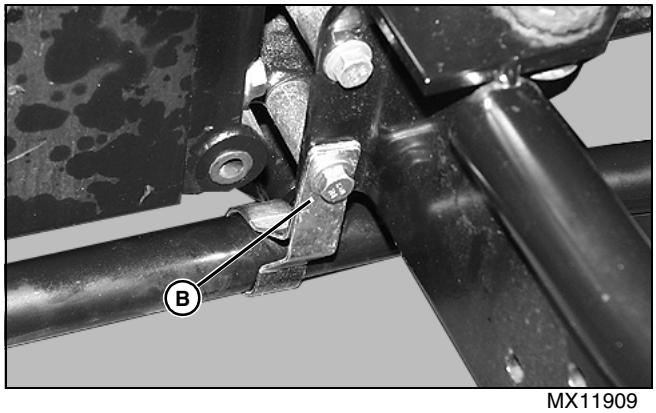


M91882

11.On right side of machine, remove cap screw and tube clamp (A) attaching PTO pressure tube to frame.

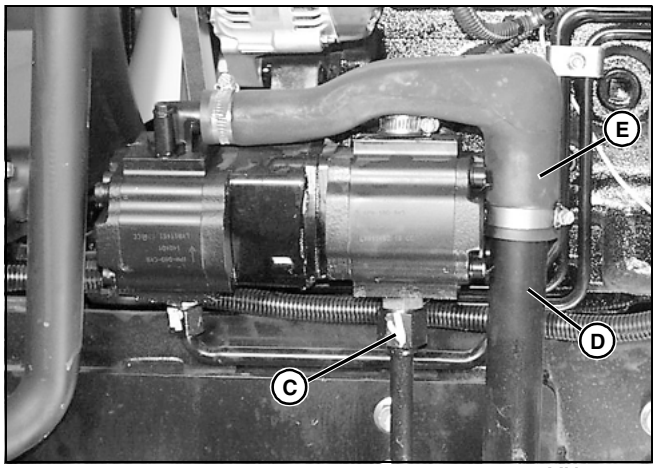
NOTE: Capacity of the hydraulic reservoir is 37 liters (9.8 gal) (39.1 qt).

12.Drain hydraulic oil from reservoir.



MX11909

13.Remove cap screw and clamp (B) attaching suction tube to tunnel section.



MX11779

14.Disconnect PTO pressure tube from rear hydraulic pump.