Section 3 Powertrain

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General Specifications

Description	Part Number	Specification	Capacity
80W90 Premium Rear Axle Lubricant (Gearbox Lubricant)	XY-80W90-QL	WSP-M2C197-A	0.65l (22.4 oz)

Torque Specifications

Description	Nm	Lb-ft	Lb-in.
Accelerator / Potentiometer Bolts	23-31	18-22	-
Gearbox Bolts	40-55	20-40	-
Gearbox Drain/Fill Plugs	27-34	20-25	-
Halfshaft Nut	175-260	129-191	-
Motor Bolts - Gearbox Side	9-12	-	80-106
Motor Bolts - Motor Side	21 -29	15-21	-
Motor Controller Bolts	9-12	-	80-106
Motor Cable Large End Connectors	24-31	17-23	-
Motor Cable Small End Connectors	8-10	-	71-88
Motor Controller Connections #1	27.5	20	-
Motor Controller Connections #2	27.5	20	-
Motor Controller Connections #3	6.2	-	55

Description and Operation

The Powertrain System consists of the following.

1. Accelerator/Potentiometer - The accelerator/potentiometer provides the motor controller with driver desired speed requests.
2. Motor Controller - The motor controller provides driver input to the motor from the accelerator/potentiometer and the drive mode selector switch.
3. Motor - The motor provides drive force for the gearbox and propels the vehicle gearbox and drivetrain.
4. Halfshafts - The halfshafts connect the gearbox to the wheels and provide rotational force to the driving surface of the vehicle.
5. Gearbox - The gearbox converts power from the motor and drives the halfshafts and wheels.

Diagnosis and Testing

Halfshafts

Universal Joint (U-Joint) Inspection

Place the vehicle on a frame hoist and rotate the halfshaft by hand. Check for rough operation or seized U-joints. Install a new halfshaft if it shows signs of seizure, excessive wear, or incorrect seating.

Motor

The motor diagnosis and testing is in Electrical System section.

Motor Controller

The motor controller diagnosis and testing is in Electrical System section.

Potentiometer

The potentiometer diagnosis and testing is in Electrical System section.

Gearbox

Visual Inspection

Note:

The gearbox lubricant level is can not be inspected. Fluid must be drained and filled. Refer to Gearbox Draining and Filling in this section.

Clean up the leaking area enough to identify the exact source. A gearbox leak can be caused by:

- Gearbox lubricant level is too high.
- Worn or damaged axle shaft hub seals.
- Gearbox housing or cover is cracked.
- Gearbox cover is not sealed.
- Vent is plugged, loose or missing.
- The gearbox is not a serviceable unit. Replace the gearbox if necessary.

Removal and Installation

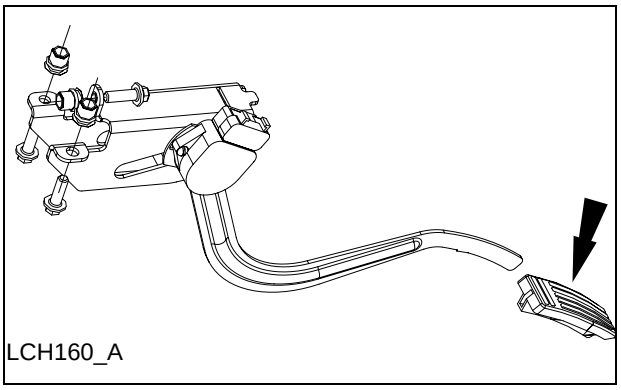
Accelerator Pedal Pad

Removal

Note:

The accelerator pedal pad must be replaced whenever it is removed from the accelerator potentiometer arm.

1. Remove the accelerator pedal pad by tapping it down off of the pedal arm.



2. Discard the accelerator pedal pad.

Installation

Note:

The vehicle may not reach 25 mph if the pedal is not fully installed.

Tap the new accelerator pedal pad onto the accelerator pedal arm until the tabs are locked.

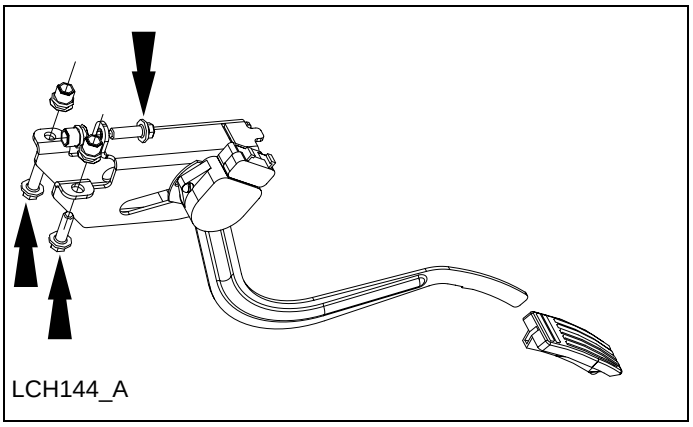
Accelerator/Potentiometer

Removal

WARNING!

MAKE SURE THE VEHICLE IS NOT BEING CHARGED.

1. Turn the vehicle power off. Refer to the Power Shutdown Procedure in the Electrical section.
2. Remove the accelerator pedal pad.
3. Remove the front fascia. Refer to Front Fascia in the Body section.
4. Disconnect the potentiometer connector at the potentiometer.
5. Remove the three accelerator/potentiometer bolts and the accelerator/potentiometer from the vehicle.



6. If necessary, drill out the rivets and remove the potentiometer

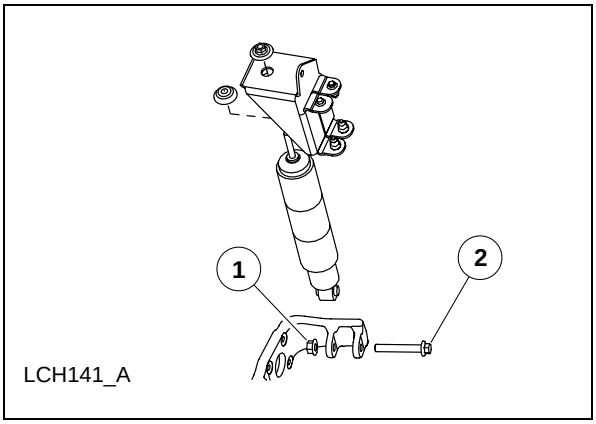
Installation

1. If replaced, position the potentiometer and install new rivets.
2. Position the accelerator potentiometer in the vehicle.
3. Install the three accelerator/potentiometer bolts. Tighten the accelerator/potentiometer bolts to 23-31N.m (18-22lb-ft.).
4. Connect the potentiometer connector.
5. Install a new accelerator pedal pad.
6. Turn the vehicle power on. Refer to Power Shutdown Procedure in the Electrical section.

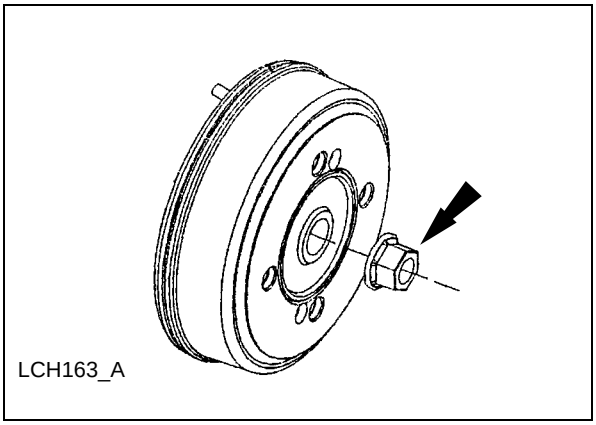
Halfshafts

Removal

1. Raise and support the vehicle. Refer to Lifting in the General Information section.
2. Remove the wheel and tire assembly.
3. Remove the coil over shock assembly lower mounting nut (1) and bolt (2).



4. Remove the halfshaft nut and spacer.



5. Pry the halfshaft from the gearbox and then remove it from the hub.

Installation

1. Reverse the removal procedure.
2. Replace the tension clip on the inboard end of the halfshaft.
3. Install the halfshaft spacer and nut.
4. Tighten the halfshaft nut to 175-260N.m (129-191lb-ft.).

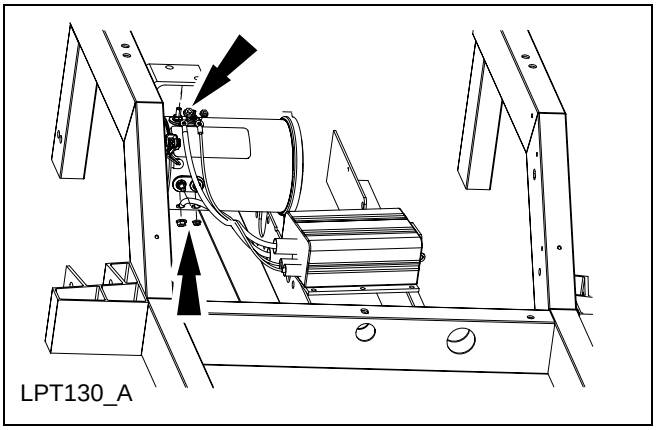
Motor

Removal

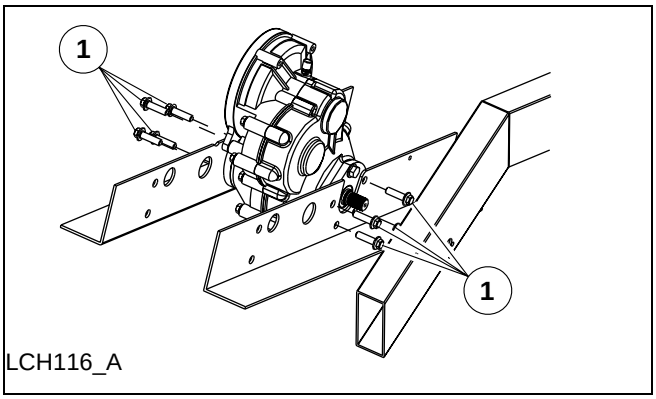
WARNING!

MAKE SURE THE VEHICLE IS NOT BEING CHARGED.

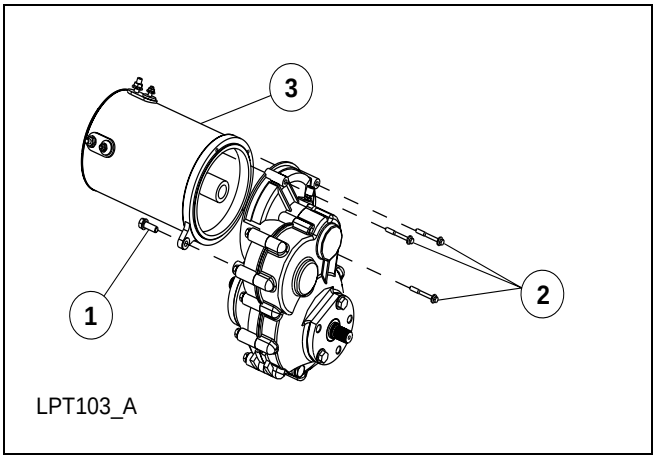
1. Turn the vehicle power off. Refer to the Power Shutdown Procedure in the Electrical section.
2. Raise and support the vehicle. Refer to Lifting in the General Information section.
3. Remove the right rear wheel and tire assembly.
4. Remove the right side halfshaft. Refer to Halfshafts in this section.
5. Make note of the locations of the electrical connections and disconnect the motor electrical connections.



6. Remove the eight gearbox bolts (1) and slightly lift the gearbox to access the motor bolt on the motor side.



7. Remove the motor bolt (1) on the motor side. Lower the gearbox.



8. Remove the three motor bolts (2) on the gearbox side.

9. Remove the motor (3) from the passenger side.

Installation

1. Reverse the removal procedure.

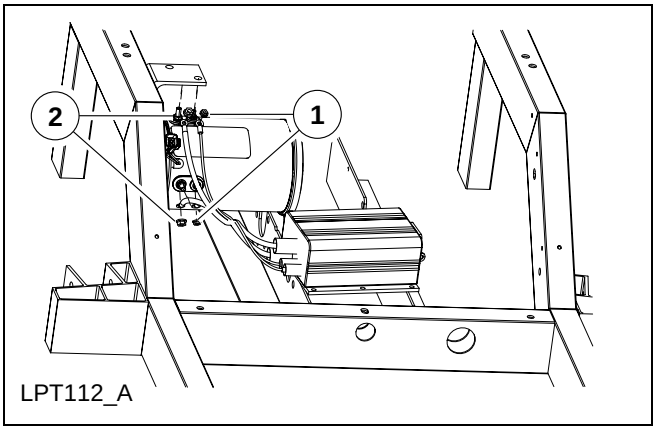
2. Tighten the three motor bolts on the gearbox side to 9-12 N.m (7-9 lb-ft.). Tighten the motor bolt on the motor side to 21-29 N.m (15-21lb-ft.).

3. Tighten the eight gearbox bolts to 40-55N.m (20-40lb-ft.).

Note:

Make sure electrical connections are installed correctly or the vehicle will not operate properly. Refer to the alpha numeric references on the components and the wiring to properly mate the cables to the connectors.

4. Connect the motor cable ends.



5. Tighten motor cable large end connectors (1) to 24-31 N.m. (18-23 lb-ft.).
6. Tighten motor cable small end connectors (2) to 8-10 N.m. (71-88 lb-in).
7. Turn the vehicle power on. Refer to the Power Shutdown Procedure in the Electrical section.
8. Verify proper vehicle operation.

Motor Controller

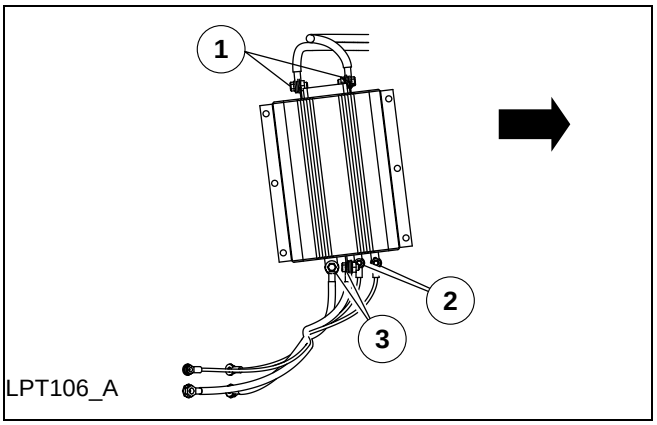
Removal

1. Turn the vehicle power off. Refer to the Power Shutdown Procedure in the Electrical section.
2. Raise and support the vehicle. Refer to Lifting in the General Information section.

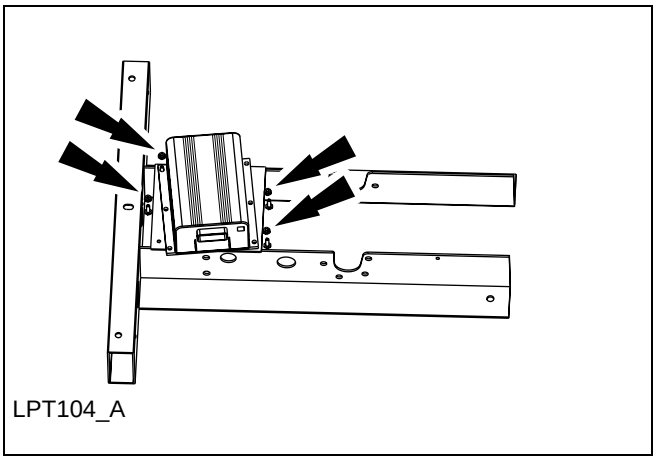
WARNING!

MAKE SURE THE VEHICLE IS NOT BEING CHARGED.

3. Cut away the shrink-wrap from the cable connections.
4. Remove the fasteners at (1), (2) and (3) motor controller connections.



5. Remove the four motor controller nuts and bolts.



6. Remove the motor controller from the vehicle.

Installation

1. Position the motor controller in the vehicle.

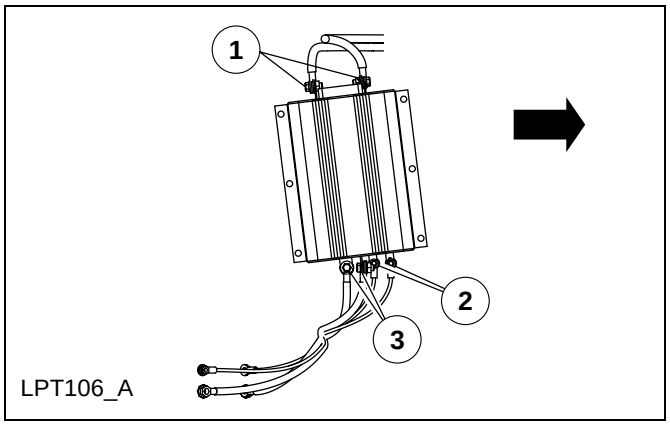
2. Install the motor controller bolts. Tighten the motor controller bolts to 9-12 N.m (84-108lb-in.).

3. Install new shrink-wrap material. Use 1” for the large connectors and 3/4 “ for the small connectors.

Note:

Make sure electrical connections are installed correctly or the vehicle will not operate properly. Refer to the alpha numeric references on the components and the wiring to properly mate the cables to the connectors.

4. Connect the wires as shown. Tighten the motor controller connections at (1) to 27.5N.m (20lb-ft.). Tighten the connection at (2) to 27.5N.m (20 lb-ft.). Tighten the motor controller connections at (3) to 6.2N.m (60lb-in.).



5. Heat the shrink-wrap until connections are tightly sealed.

6. Turn the vehicle power on. Refer to Power Shutdown Procedure in the Electrical section.

7. Verify proper vehicle operation.

Speed Sensor

Removal

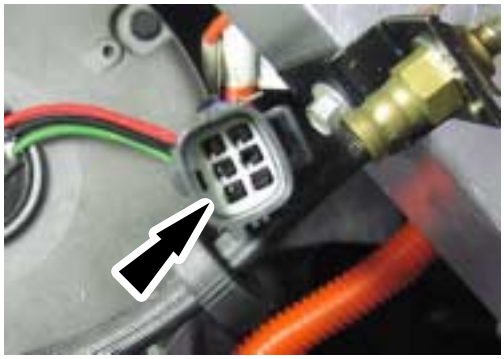
WARNING!

MAKE SURE THE VEHICLE IS NOT BEING CHARGED.

1. Turn the vehicle power off. Refer to the Power Shutdown Procedure in the Electrical section.
2. Raise and support the vehicle. Refer to Lifting in the General Information section.
3. Remove the right rear tire and wheel assembly.
4. Disconnect the speed sensor connector.

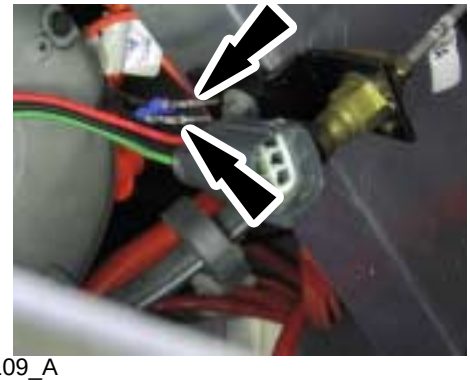
LPT107_A

5. Remove the connector wire retainer.



LPT108_A

6. Remove the two black wires from the connector.

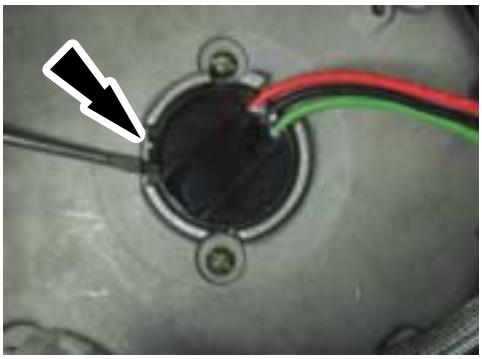


LPT109_A

CAUTION:

Do not allow any outside items fall into the motor with the speed sensor removed or damage could occur to the motor.

7. Use a flathead screwdriver to pry around the edge of the speed sensor.



LPT110_A

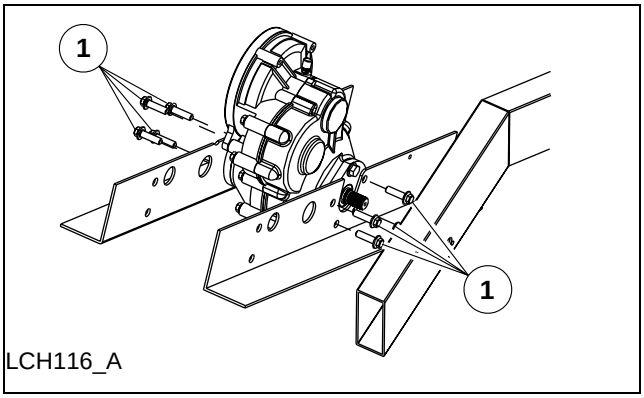
Installation

1. Reverse the removal procedure.
2. Turn the vehicle power on. Refer to the Power Shutdown Procedure in the Electrical section.
3. Check the speedometer operation.

Gearbox

Removal

1. Remove the halfshafts. Refer to Halfshafts in this section.
2. Remove the motor. Refer to Motor in this section.
3. Remove the eight gearbox bolts and washers (1).



4. Remove the gearbox from the vehicle.

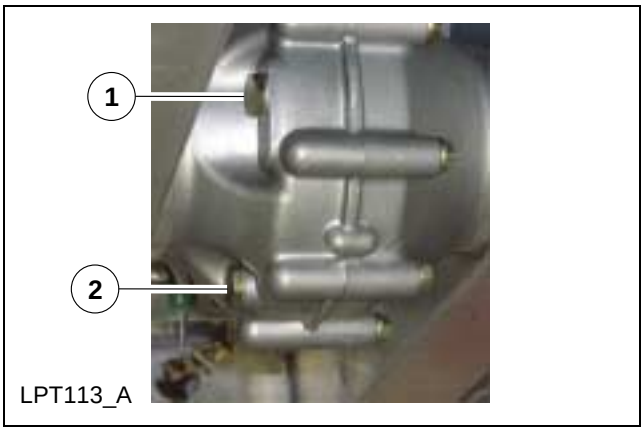
Installation

1. Reverse the removal procedure.
2. Tighten the eight gearbox bolts to 40-55N.m (20-40lb-ft.).

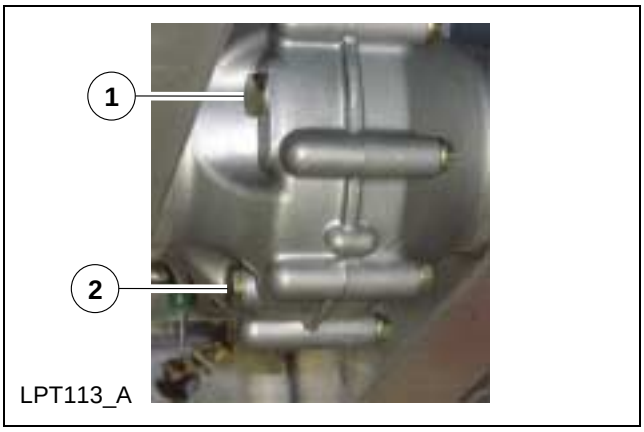
Gearbox Drain and Fill

1. Raise and support the vehicle. Refer to Lifting in General Information section.
2. Position a drain pan under the gearbox.

3. Remove the drain plug and washer (2) from the gearbox.



4. Allow the oil to drain for several minutes before installing the drain plug.
5. Clean and inspect the gearbox opening and the drain plug and washer for damage.
6. Install and tighten the drain plug (2) to 27-34N.m. (20-25lb.ft.)
7. Remove the fill plug and washer (1).



8. Fill the gearbox with 0.65 liters or (22.4 oz) of 80W90 Premium Rear Axle Fluid part number XY-80W90-QL meeting Ford specification WSP-M2C197-A.
9. Tighten the fill plug to 27-34N.m (20-25lb-ft).