Service Guide

Wiper System
W-Series

Contents
Overview.....................................................................................................................................2
Troubleshooting Procedure .....................................................................................................3
Wiper Blades............................................................................................................................5
Washer Nozzle Spray Adjustment............................................................................................5
Wiper Arms ................................................................................................................................6
Wiper Assembly ........................................................................................................................7
Motor...........................................................................................................................................9
Pivot Assembly..........................................................................................................................11
Link Assembly ..........................................................................................................................12
Ford Wiper Wiring Diagram ....................................................................................................14
Ford E-Series Wiper Control Module .......................................................................................15
Overview

Wiper system overview
# Troubleshooting Procedure

The following troubleshooting and repair procedure should be followed when encountering problems with wiper systems.

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>CORRECTIVE ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Wiper motor inoperative at high or low speed.</td>
<td>Fuse OK?</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Power available at high and low speed terminal of motor connector?</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
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<tr>
<td></td>
<td></td>
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<tr>
<td>2. Wiper motor runs, but wiper arms do not move.</td>
<td>Motor crank broken or loose?</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
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<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Linkage moves freely when removed from motor shaft?</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
</tbody>
</table>
4. **Wiper motor inoperative at high speed.**
   - **Power available at high speed terminal of motor connector?**
     - **Yes** → Remove and replace wiper motor.
     - **No** → **Power available at high speed terminal of wiper switch connector?**
       - **Yes** → Repair open circuit between wiper switch and wiper motor connectors.
       - **No** → Remove and replace wiper switch.

5. **Wipers operational but stop immediately when switched off**
   - **Power available at park terminal of wiper motor connector?**
     - **Yes** → Remove and replace wiper motor.
     - **No** → **Repair open circuit between wiper switch and wiper motor connectors.**

6. **Wipers operational but always park incorrectly in the same position.**
   - **Wiper motor crank in the correct park position?**
     - **Yes** → Remove wiper motor crank, check motor shaft for damaged splines, and replace damaged parts. Run motor and park. Reinstall wiper arms in correct park position.
     - **No** → Remove wiper motor crank, check motor shaft for damaged splines, replace damaged parts, and reinstall crank in the correct park position.

7. **Wiper Oversweep or Undersweep.**
   - **Correct Park Position of Wiper Arms and/or Motor Crank?**
     - **Yes** → Check for Loose/Worn Linkage, Excessive Play in Pivot Shaft and Replace Damaged Parts as Necessary.
     - **No** → **Park Position of Wiper Arms OK?**
       - **Yes** → Replace Linkage.
Wiper Blades

**Removal**

1. Pull the wiper arm away from the windshield and lock the arm into the Service position.
2. Rotate the blade about 90° and push the blade toward the windshield about 1". The rubber insert will bow outward from the arm pushing against it.
3. Unhook the blade assembly from the arm.

**Installation**

1. Hook in a replacement blade and push it away from the vehicle until the blade locks in place.
2. Rotate the blade to its normal position and lower the arm.

![Diagram of wiper blade assembly](image)

**Washer Nozzle Spray Adjustment**

1. Use a screwdriver to adjust middle nozzle 90 degrees (perpendicular) to the windshield.
2. Adjust inboard nozzle to point approximately 60 degrees outward of middle nozzle and the outboard nozzle to point approximately 82.5 degrees outward of middle nozzle.

![Wiper spray nozzle adjustment screws](image)
Wiper Arms

Removal

NOTE: Keep all fasteners unless noted otherwise.

1. Disconnect the washer hose from the T-fitting pump assembly under the hood. Remove the grommet and the hose through the cowl.
2. Remove the arm-retaining cap nut and washer with a 13 mm wrench and remove the wiper arm.

Installation

1. Turn the ignition On, and run the wiper system. Return the wiper control to the Off position to allow the wiper motor to park itself.
2. Push the arm heads over the tapered knurl shaft. The blades should be approximately 4" from the top edge of the windshield glass frit band and the bottom edge of the wiper.
3. Replace arm-retaining cap nuts and wavy washers and with a 13 mm wrench.
4. Inspect by turning the ignition On, and run the wiper system. Return the wiper control to the Off position to allow the wiper motor to park itself.
5. Torque to 10–14 ft•lbs.
6. Push the washer hose through the holes in the cowl and connect to the T-fitting washer pump.
Wiper Assembly

Removal

**CAUTION:** The wiper motor is equipped with an internal thermal overload protection switch that stops the wiper motor in case of overload. Thus, if the motor is not unplugged, the motor may activate itself without warning. Always unplug the motor when working on or disconnecting wiper linkages.

1. Disconnect the wiper motor harness to the jumper harness.

*NOTE:* Removal of the washer bottle assembly is only necessary on the Ford E-Series chassis.

*NOTE:* Do not disconnect washer bottle or hose or harness connector for access to the wiper assembly.

*NOTE:* Keep all fasteners unless noted otherwise.

2. On the Ford E-Series chassis, remove (4) Torx screws from washer bottle bracket and set assembly aside.

3. Remove the wiper arms and pivot

4. Remove (2) 5/16" nuts on the cowl.

5. Remove (2) 5/16" flange bolts from the lower cowl channel. Remove the M20 locknuts and flat washers from pivots.
6. Remove wiper assembly from under cowl.

Installation

1. Install pivots in cowl using M20 locknuts and flat washers on either side.
   1. Torque to 13–17 ft•lbs.
2. Use (2) 5/16” nuts to fasten the wiper motor bracket against the inside of the cowl channel.
3. Use (2) flange bolts with U-nuts to secure to the lower cowl channel.
   4. Torque to 7–11 ft•lbs.

   **NOTE:** Wiper assembly may be wire-tied to prevent motor crank rotation during vehicle installation. Remove after vehicle installation of system.

5. Connect the wiper motor harness to the jumper harness.
6. Turn the ignition On, and run the wiper system. Return the wiper control to the Off position to allow the wiper motor to park itself.
7. Install wiper arms.
Motor

CAUTION: The wiper motor is equipped with an internal thermal overload protection switch that stops the wiper motor in case of overload. Thus, if the motor is not unplugged, the motor may activate itself without warning. Always unplug the motor when working on or disconnecting wiper linkages.

Removal

1. Disconnect the wiper motor harness from the jumper harness.

   NOTE: The Ford E-Series chassis requires moving the washer bottle bracket to service the wiper motor.

2. Place the wiper arms up into the service Up position away from the windshield.

3. Rotate the motor crank to the Down position to gain access to the crank retaining nut on the motor shaft.

4. Use a 1” open end wrench to hold the crank arm in place.

5. Remove the M8 nut on the motor shaft and set aside for reuse.

6. Position the 1” wrench between the motor and the crank arm. Pry the motor crank off the shaft and move the linkage down until clear of the bracket.

7. Remove (4) fasteners securing the motor bracket to cowl and remove motor assembly.

8. Remove the (3) M6 screws and washers from motor and set aside bracket and fasteners.

Overview of motor removal

Crank in Down position (bracket omitted for clarity)
Installation

CAUTION: Do not let the motor crank rotate while tightening. If the crank rotates, remove fasteners and run the wiper system to return the motor to Park position.

1. Attach the motor to the bracket using the (3) M6 hex screws and washers.
2. Torque to 6-7 ft•lbs.
3. Use (2) 5/16" nuts to fasten the wiper motor bracket inside of the cowl channel.
4. Use (2) flange bolts with U-nuts to secure to the lower cowl channel.
5. Torque all bracket fasteners to 7-11 ft•lbs.
6. Connect the wiper motor to the jumper harness.
7. Turn the ignition On, and run the wiper system. Return the wiper control to the Off position to allow the wiper motor to park itself.
8. Disconnect the wiper motor jumper harness.
9. Lift the wiper arms to the Service position.
10. Place crank arm on the motor shaft in the Down position with both pivot levers pointing down.

11. Rotate the motor crank arm counterclockwise to the Park position.
12. Hold the motor crank arm in place with a 1” wrench and tighten the crank arm nut with a 13 mm wrench.
13. Rotate the crank arm counterclockwise to the Down position to access the crank nut.
14. Use the 1” wrench to hold the crank arm and torque crank retaining nut to 11-13 ft•lbs.
15. Return wiper arms to the windshield.
16. Connect the wiper motor harness to the jumper harness.
17. Turn the ignition On, and run the wiper system. Return the wiper control to the Off position to allow the wiper motor to Park itself.
Pivot Assembly

Removal

**NOTE: Keep all fasteners for reinstallation.**

1. Disconnect the electrical harness at the wiper motor.
2. Remove the wiper arm.
3. Disconnect the linkage from the pivot by removing the E-clip and washer.
4. Remove M20 locknut and washer from the pivot.
5. Remove the pivot assembly.

Installation

1. Insert the pivot in the cowl and connect the pivot lever to the link assembly with E-clip and washer.
2. Secure pivot using M20 locknut and flat washer.
3. Torque to 13-17 ft•lbs.
4. Connect the electrical harness to the wiper motor.
5. Turn the ignition On, and run the wiper system. Return the wiper control to the Off position to allow the wiper motor to park itself.
6. Install wiper arm on pivot.
Link Assembly

Removal

1. Disconnect the electrical harness at the wiper motor.
2. Remove the E-clips and washers from pivot levers and motor crank.
3. Remove the wiper motor drive shaft nut with a 13 mm wrench.
4. Remove the motor crank arm from the wiper motor drive shaft.
5. Remove link assembly.

Installation

1. Secure link assembly to the pivot levers using (2) E-clips and washers.
2. Connect the wiper motor harness to jumper harness.
3. Turn the ignition On, and run the wiper system. Return the wiper control to the Off position to allow the wiper motor to park itself.
4. Disconnect the wiper motor harness.
5. Lift the wiper arms to the Service up position.
6. Place crank arm on the motor shaft and move both pivot levers to the Down position.
7. Rotate the motor crank arm counterclockwise to the Park position.
8. Hold the motor crank arm in place with a 1” wrench and tighten the crank arm nut.
9. Rotate the crank arm counterclockwise to the Down position to access the nut.
10. Use the 1” wrench to hold the crank arm and torque crank retaining nut to 11-13 ft•lbs.

11. Return wiper arms to the windshield.
12. Connect the wiper motor harness to the jumper harness.
13. Turn the ignition On, and run the wiper system. Return the wiper control to the Off position to allow the wiper motor to Park itself.
14. Adjust wiper arm position if necessary.
Ford Wiper Wiring Diagram

WIPER MODULE CONNECTOR

<table>
<thead>
<tr>
<th>850 YL/BK 18</th>
<th>890A VT 18</th>
</tr>
</thead>
<tbody>
<tr>
<td>830 YL/BK 18</td>
<td>830A RD 14</td>
</tr>
<tr>
<td>120 OR 14</td>
<td>820 DG 16</td>
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WIPER SWITCH

<table>
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FORD BODYBUILDER CONNECTOR

<table>
<thead>
<tr>
<th>870 YL/WT 18</th>
<th>513 BK 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>220 LG 14</td>
<td>510 BK/WT 14</td>
</tr>
<tr>
<td>110 PK/BK 14</td>
<td>511 BK 16</td>
</tr>
<tr>
<td>890 VT 18</td>
<td>512 BK 16</td>
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BATTERY

<table>
<thead>
<tr>
<th>E48 30A</th>
<th>E45 5A</th>
</tr>
</thead>
<tbody>
<tr>
<td>E38 20A</td>
<td>IGN SW</td>
</tr>
</tbody>
</table>

WIPER MOTOR CONNECTORS

<table>
<thead>
<tr>
<th>510 BK/WT</th>
</tr>
</thead>
</table>

WIPER MOTOR

<table>
<thead>
<tr>
<th>CASE GND</th>
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</thead>
</table>

FORD BODYBUILDER

<table>
<thead>
<tr>
<th>510 BK/WT</th>
</tr>
</thead>
</table>

UTILIMASTER

| 512 BK 5 |

WASHER MOTOR (VT)

| WASHER NON-SWITCH GN (WT) |

WIPER POWER (BK/RD)

| WIPER PARK (BK/YL) |

WIPER HIGH (BK)

| WIPER LOW (DB) |

WIPER MOTOR GND (BK/WT)

WASHER PUMP 2.3 G

WIPER MODULE
Ford E-Series Wiper Control Module

**WARNING:** Always remove the (BLACK) Negative cable first and connect it last.

**Removal**
1. Disconnect the vehicle Negative (BLACK) battery cable(s).
2. Secure the battery cable(s) away from the terminal to prevent accidental contact.
3. Disconnect the harness connector from the module.
4. Remove (4) screws securing the module to the cowl.

**Installation**
1. Secure replacement module to the cowl.
2. Secure wiper control harness to the module.
3. Connect the battery.