

Wiper/Washer Systems

GENERAL MOTORS ROUND WIPER MOTOR

Buick (Exc. Skyhawk & Skylark)
Cadillac (Exc. Cimarron)
Chevrolet (Exc. Cavalier, Chevette & Citation)
Oldsmobile (Exc. Firenza & Omega)
Pontiac (Exc. J2000, Phoenix & T1000)

DESCRIPTION

Wiper system consists of a round motor with a depressed park wiper arm feature (concealed wiper arms). Wiper motor field coils are shunt wound for speed control and contain an internal circuit breaker and ground. Motor drive housing contains a reduction gear, pawl to open relay contacts and a terminal board with a resistor.

OPERATION

"LO" and "HI" Speeds – Relay coil circuit is completed to ground through wiper switch, providing power to run motor in "LO" speed. In "HI" shunt field is grounded through a resistor. Cadillac models use an additional resistor in parallel to provide a "MED" speed.

"OFF" (Park) – With wiper switch moved to "OFF", relay switch circuit is opened, allowing latch arm to move into path of gear drive pawl. When pawl engages latch arm, relay contacts are opened and gear drive is unlocked from output shaft and wiper arm. Cam action on output shaft moves arms to park position and opens relay, stopping motor.

TESTING

WIPER CIRCUITS

Preliminary Checks – 1) Check terminal connections and ground on wiper motor and switch. Check fuse. With ignition on, 12 volts should be to center terminal on motor.

2) Disconnect motor connections and operate motor with jumpers by-passing wiper switch. For testing, terminal "1" is adjacent to gear box, terminal "2" is in center and terminal "3" is adjacent to motor housing. Connect power jumper to terminal "2", ground motor and operate with jumpers connected as follows: "LO" speed, connect terminals "1" and "3" to ground. "HI" speed, disconnect terminal "3", terminal "1" remains grounded. "OFF" (Park), reconnect terminal "3" and disconnect terminal "1".

3) If motor operates correctly after by-passing switch and harness, test other system components with motor on car. If motor does not operate, continue to step four.

4) Disconnect wiper linkage from motor crank arm and try jumper wire test again as in step two. If motor operates, check linkage for binds. If motor fails, remove motor and test motor circuits.

Testing System (Motor On Car) – 1) If wiper is inoperative or intermittent, check for an open lead wire from motor terminal "1" to wiper switch. Check for a defective switch or poor switch ground.

2) If wiper will not shut off (blades make full stroke), check for a grounded lead wire from wiper terminal "1" to wiper switch. Check for corroded wiper terminals or defective wiper switch.

3) If wiper will not shut off (blades move up and down about 15° from park), check for an open lead wire from wiper ter-

terminal "3" to wiper switch. Check for a defective switch or poor ground.

4) If wiper operates in high speed only, check for open lead wire from wiper terminal "3" to switch, or defective switch.

5) If wiper operates in low speed only, check for a grounded lead from wiper terminal "3" to switch or defective wiper switch.

NOTE – Cadillac only, if wiper operates in high speed with switch in "MED" position, check for open medium speed resistor.

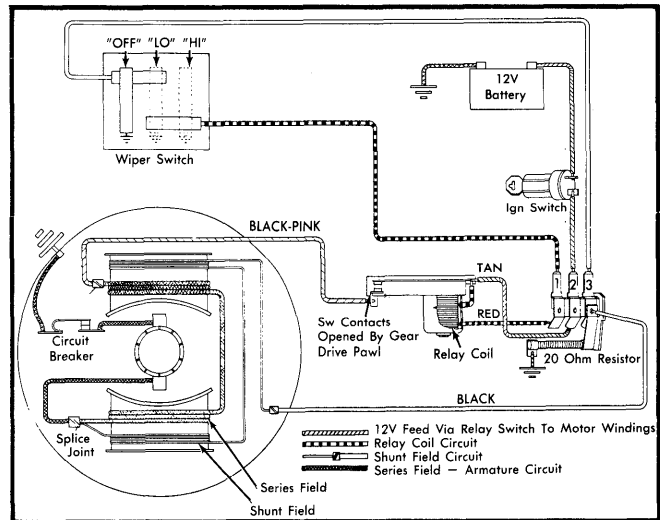


Fig. 1 General Motors Round Motor Wiper System Wiring Diagram

Testing Motor (Off Car) – 1) If wiper is inoperative, check for open relay coil, circuit breaker open, series field open, brushes sticking, defective solder joints or binding condition at relay latch arm.

2) Motor will not shut off (rotates through 360°), check for relay coil grounding, relay latch spring disconnected or broken. Latch arm binding.

3) Motor will not shut off (crank arm moves back and forth with a loud knock), check relay switch contacts shorting together, drive pawl spring disconnected. Motor has open shunt field and operates only in high speed.

4) If motor has only high speed, check for an open shunt field or a poor connection at terminal "3".

5) Motor has low speed only, check for shunt field internal ground, shunt field lead to terminal board, Black wire grounded or shorted armature.

6) If motor has excessive speed in "HI", and "LO" speed is normal, check for an open high speed resistor or poor resistor ground.

7) If motor stops at random and does not return to full park, check relay switch contacts. If motor operates intermittently, check for a defective circuit breaker, shorted armature or fields drawing excessive current causing circuit breaker to trip.

8) If motor operates normal on bench, but occasionally fails on car, check for proper armature end play, gear assembly end play or poor wire connections.

GENERAL MOTORS ROUND WIPER MOTOR (Cont.)

Motor Armature Adjustment — Loosen adjusting screw lock nut and turn screw until end barely touches armature. Back off 1/4 turn and tighten lock nut.

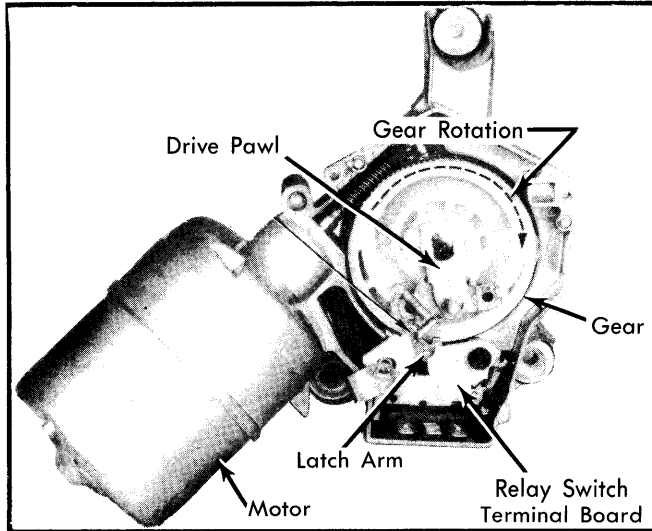


Fig. 2 Wiper Motor Gearbox and Switches

WINDSHIELD WASHER SYSTEM

Washer Inoperative — Check washer solution quantity and hoses. Inspect solution screen, hoses and nozzles for plugging. Check electrical connections to washer pump and wiper switch. Tests wiper switch and power feed to washer pump. Check pump solenoid or ratchet relay coil. Check ratchet wheel for missing tooth or pawl spring missing. Inspect pump valve assembly.

Washer Pumps Continuously When Wiper Operates — Inspect for a grounded wire from pump solenoid or ratchet relay to switch. Wiper switch may be defective. Check ratchet wheel teeth and dog. Lock-out tang on piston actuator plate may be broken or bent.

REMOVAL & INSTALLATION

WIPER MOTOR

Removal — 1) Raise hood and remove cowl screen. Loosen transmission drive link-to-crank arm attaching nuts. Remove transmission drive link(s) from motor crank arm.

2) Disconnect wiring and washer hoses, remove motor attaching screws and remove motor guiding crank arm and motor through opening.

Installation — To install, reverse removal procedure. Motor must be in "PARK" position when reassembling crank arm-to-transmission drive link(s).

WIPER MOTOR GEARBOX

Removal (Relay Switch and Terminal Board) — 1) Remove washer pump. If wiper gear drive pawl is in full park position, manually trip latch arm toward coil.

2) Apply feed current to center terminal of relay switch terminal board and ground motor case. Motor will turn gear moving pawl out of park position in relay switch slot.

3) If motor does not operate, remove some insulation from the Black and Pink wire between motor and relay switch; apply feed current at this point. Tape wire after completing operation.

4) Remove relay switch and terminal board attaching screws and lift assembly out of gearbox.

Installation — To install assembly, reverse removal procedure.

Removal (Drive Gear) — 1) Remove washer pump. Clamp crank arm in a vise before removing retaining nut. Remove crank arm, rubber seal cap, retaining ring, shims, shield and spacer washer.

CAUTION — Failure to clamp crank arm in a vise may result in stripping gear.

2) Slide gear assembly out of housing. Slide drive plate and shaft out of gear. Remove drive pawl, lock pawl and coil spring as required.

Installation — 1) To reassemble drive gear assembly, position drive pawl on drive plate, then install lock pawl. Slide gear and tube over drive shaft allowing lock pawl pins to fit gear guide channels.

2) Install coil spring between lock and drive pawls. Assemble inner spacer washer over gear shaft and install gear assembly in housing. Assemble outer spacer washer, shield, shim washers, as required to obtain .002"-.006" end play.

3) Install snap ring and rubber seal cap. Operate motor to park position and install crank arm. Clamp crank arm in a vise before tightening retaining nut. Install washer pump to wiper motor.

WIPER SWITCH

NOTE — The following procedure covers all models. Skip any steps that do not apply to vehicle being serviced.

Removal — Disconnect battery. On Cadillac, remove left air vent grille. Remove lower panel below steering column, and all switch knobs. Remove trim panel screws and pull panel free from retaining clips. Remove wiper switch screws, disconnect wiring, and remove switch.

Installation — To install, reverse removal procedure.

MOTOR SPECIFICATIONS	
Application	Specification
Operating Voltage	12 Volts
Current Draw (No Load)	
"LO" Speed	4 Amps.
"HI" Speed	3.5 Amps.
Current Draw (Stall)	
Cold Motor	12 Amps.
Crank Arm Speed (Minimum)	
"LO" Speed	31 RPM
"HI" Speed	55 RPM

GENERAL MOTORS SQUARE WIPER MOTOR (Cont.)

- 3) If motor will not shut off and has "LO" speed only, check for a grounded shunt field coil or grounded BLACK wire.
- 4) If motor will not shut off and has "HI" speed only, check for an open circuit in shunt field coil or open circuit in BLACK wire.
- 5) If wiper shuts off, but not in "PARK", check for a defective park switch or dirty contacts.
- 6) If speed is excessive in "HI", check for a defective resistor.

WASHER SYSTEM TEST

Washer Pump Inoperative — Check for voltage at washer pump terminal with ignition "ON". If not present, check for open black/yellow wire, or for blown fuse. If voltage is present, connect jumper from dark blue wire to ground. If motor operates, check wiring to switch. If no open in wiring, replace switch. If motor does not operate, replace motor and pump.

Washer Pressure Weak — Check hoses for cracks and leaks. Clean nozzles and filter screen. If pressure is still low, reverse leads in connector at motor. If pressure does not increase, reconnect wires as originally located and replace motor and pump assembly.

REMOVAL & INSTALLATION

WIPER MOTOR

- Removal** — 1) Reach behind instrument panel (above steering column) and loosen transmission drive link-to-crank arm nuts. Disconnect drive link from crank arm.
- 2) Raise hood, disconnect wiring, and remove 3 motor bolts. Guide crank arm through hole while removing motor.

Installation — To install, replace sealing gasket if damaged and reverse removal procedure.

WIPER ARMS

Removal — Remove wiper arm assemblies using tools (J-22128 or J-8966 or equivalent) to minimize possible windshield or paint damage.

Installation — To install, reverse removal procedure.

WIPER TRANSMISSION

Removal — 1) Remove instrument panel cover and cluster housing. Push left air duct to side. Remove speedometer cable shield and panel brace. Loosen drive link-to-crank arm nuts and disengage drive link.

- 2) Remove wiper arms and blades. Remove transmission-to-dashboard bolts. Move linkage to left, then rotate and move out through access hole in upper right center of dash.

CAUTION — Do not scratch windshield with transmission assembly during removal.

Installation — To install, reverse removal procedure, tightening transmission bolts to 48-72 INCH lbs.

WIPER SWITCH

Removal — 1) Disconnect battery ground cable. Remove horn cap, wheel nut, horn actuator ring and steering wheel. Pry lock plate cover off. Compress lock plate spring, then pry snap ring from slot. Remove lock plate.

2) Slide turn signal switch cam, spring, and thrust washer off shaft. Pull multi-function lever straight out, and unscrew hazard flasher knob. Remove 2 screws, pivot arm and spacer. Remove 3 turn signal switch mounting screws and pull switch up. Do not remove completely.

3) Locate ignition switch on top of steering column jacket near dash. Remove upper screw but do not move switch. Disengage actuator rod, then remove wiper switch and pivot assembly.

Installation — 1) Install wiper and directional switches. Fit pinched end of actuator rod into dimmer switch, and feed other end into wiper/washer switch. Depress dimmer and fit 3/32" drill bit into alignment hole. Push switch up to remove play, tighten screw, and remove rod. Check dimmer switch operation.

2) Reverse the remainder of the removal procedure, using a new snap ring on lock plate.

MOTOR SPECIFICATIONS	
Application	Specification
Operating Voltage.....	12V
Current Draw (No Load)	
"LO" Speed.....	4 Amps.
"HI" Speed.....	3.5 Amps.
Current Draw (Stall)	
Cold Motor.....	12 Amps.
Crank Arm Speed (Minimum)	
"LO" Speed.....	31 RPM
"HI" Speed.....	55 RPM