1965-74 G.M. 1 & 2-SPEED ELECTRIC – SQUARE MOTOR

Chevrolet
All Models (1965-70)
All Models Exc. "G" (1971-72)
"P" Models (1973-74)
GMC
All Models Exc. "P" (1965-70)
All Models Exc. "G" (1971-72)
"P" Models (1973-74)

DESCRIPTION

Single speed motor is a shunt wound type and two speed motor is a compound wound (series and shunt) type. Gear train consists of a helical gear at end of armature shaft which drives an intermediate gear and pinion assembly. Pinion drives output gear and shaft; and crank arm, attached to output gear shaft, drives wiper transmissions through connecting link arms. Circuit protection for wipers is through a fuse on fuse block. Windshield washer pump is a positive displacement type using a bellows or a piston arrangement. Pump is mounted on shaft of wiper output gear.

TESTING & TROUBLE SHOOTING

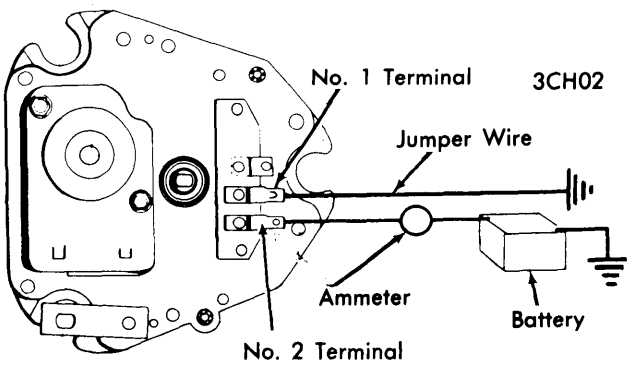
1-SPEED WIPER (ON CAR)

Wiper Inoperative – Check fuse, proper wiring harness terminal connections, ground strap at wiper and dash switch mounting. Disconnect wiring harness from wiper and check for 12 volts at harness terminals. No voltage indicates faulty wiring. *CAUTION – Do not connect a hot line to No. 1 wiper terminal.* Connect 12 volts to No. 2 terminal and a jumper wire from No. 1 terminal to ground. If wiper operates, dash switch or wiring is faulty. If wiper does not operate, disconnect transmission from crank arm. If wiper now operates, linkage or transmission is faulty. If wiper still does not operate, remove wiper and test unit. *See 1-Speed Wiper (Off Car).*

Wiper Will Not Shut Off – Disconnect wiring at dash switch, if wiper shuts off dash switch is faulty. If wiper does not shut off, connect 12 volts to No. 2 terminal. *CAUTION – Do not connect jumper wire to No. 1 terminal.* If wiper now shuts off correctly, lead between No. 1 terminal and dash switch is grounded. If wiper does not shut off, remove from vehicle and check unit. *See 1-Speed Wiper (Off Car).*

Wiper Operates Intermittently – Check for loose ground strap, dash switch mounting or loose connection.

Blades Fail To Return To Park Position – Check for dirty or broken park switch (remove wiper from car to check). Check wiper ground strap connection to body.



1-SPEED WIPER TEST CONNECTIONS

1-SPEED WIPER (OFF CAR)

Wiper Inoperative – Connect a battery and ammeter to No. 2 terminal and jumper wire from No. 1 terminal to ground. If current draw is 0 amperes, check solder connection at terminal board or disassemble motor and check all splice connections. If current draw is 1-1.5 amperes, disassemble motor and check for open armature, sticking brushes, improperly positioned brush springs or faulty brush pigtail connections at splice joints. If current draw is 10-12 amperes, check for open shunt field circuit or broken gear.

Wiper Runs Slow & Vibrates – If current draw is 7-9 amperes check for gear train binding or shorted armature.

Wiper Shuts Off Before Crank Arm Reaches Park Position – If crank arm stops rotating when jumper wire is disconnected from No. 1 terminal, check for dirty, broken or bent park switch contacts. *NOTE – When crank arm reaches park position, crank arm index grooves will line up approximately with ridges on gear box cover.*

Wiper Will Not Shut Off – If crank arm does not stop in park position when jumper wire removed from No. 1 terminal, check that park switch contacts are opening and that there is no ground in internal motor lead to No. 1 terminal.

2-SPEED WIPER (ON CAR)

Wiper Inoperative – Check wiring harness, wiper ground strap and dash switch for proper connections and mounting. Check fuse. With ignition switch on, check for 12 volts at harness terminal which connects to No. 2 terminal. To bypass switch, disconnect wiring at motor and connect jumper wire from No. 1 and 3 terminals to ground and a 12 volt source to No. 2 terminal. If wiper does not operate, disconnect transmissions from crank arm. If wiper still does not operate, remove from car and test unit. *See 2-Speed Wiper (Off Car).*

Wiper Will Not Shut Off – Determine whether wiper has both speeds, low speed only or high speed only, then operate wiper by by-passing switch as previously outlined. *See Wiper Inoperative.* If wiper operates correctly and has both speeds, lead to switch from No. 1 terminal is grounded or switch is faulty. If wiper has low speed only, lead to switch from No. 3 terminal is grounded or switch is faulty. If wiper has high speed only, lead to switch from No. 3 terminal is open or switch is faulty. If wiper still does not operate, remove from car and test unit. *See 2-Speed Wiper (Off Car).*

Operates Low Speed Only & Shuts Off With Dash Switch In High Position – Reverse harness leads connecting to No. 1 and 3 terminals.

Does Not Return To Park With Wiper Off – Check ground strap connection and park switch contacts may be dirty, bent or broken.

Speed Normal In Low, But Too Fast In High – Terminal board resistor may be open. Remove from car to test terminal board.

Wiper Operates Intermittently – Loose ground strap or dash switch mounting.

2-SPEED WIPER (OFF CAR)

NOTE – Use ammeter with reading of 30 amperes (minimum) in feed wire circuit.

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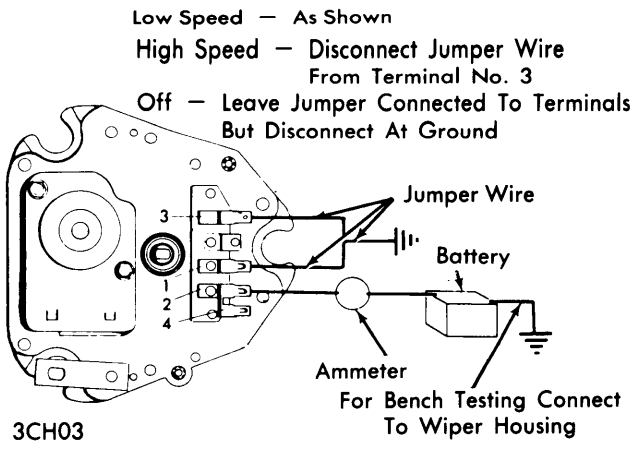
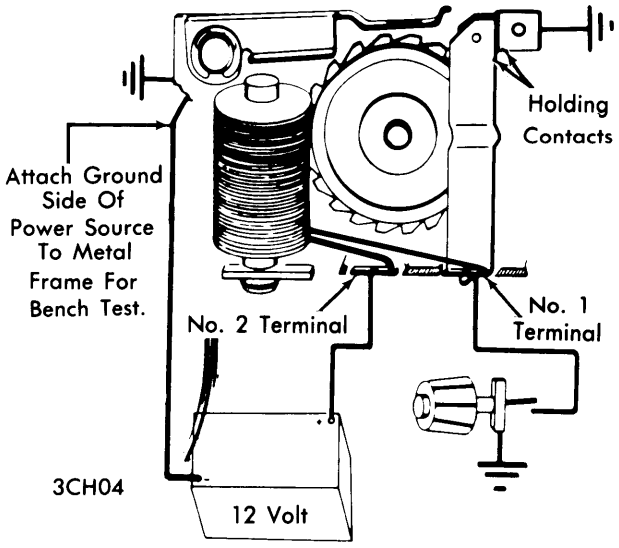


2-SPEED WIPER TEST CONNECTIONS



WASHER PUMP TEST CONNECTIONS

Wiper Inoperative – Connect an ammeter and battery to No. 2 terminal and a jumper wire from No. 1 and 3 terminals to ground. Wiper should operate at low speed. If ammeter reading is 0, check for loose splice joints or loose solder connection at No. 2 terminal. If reading is 1-1.5 amperes, check for sticking brushes, open armature or loose splice joint. If reading is 11 amperes, check for broken gear or other stalling condition.

Wiper Will Not Shut Off – If wiper has both speeds, park switch contacts may not be opening or internal motor lead to No. 1 terminal is grounded. If wiper has low speed only, shunt field coil may be grounded or internal wiper lead to No. 3 terminal is grounded. If wiper has high speed only, shunt field is open or internal lead to No. 3 terminal is open.

Wipers Operate Intermittently – Check for sticking brushes, loose splice joints or other loose connections.

WASHER (ON CAR)

Washer Inoperative – **1)** Check the following: Sufficient solution in jar; hoses undamaged and connections tight; screen in jar cover hose not plugged; electrical connections tight; nozzle not plugged. If washer still inoperative, start wiper motor only, then push washer button and listen for click of washer relay.

2) If relay click is heard, listen for soft clicking of pump ratchet wheel rotating. If soft click is not heard, pump is faulty. If soft click is heard and pump does not operate, check the following: Proper gear engagement. Check that cam gear teeth are not damaged. Valve assembly.

3) If no relay click heard, check for voltage at washer No. 2 terminal. No voltage indicates faulty wiring. If voltage is correct, connect a jumper wire from washer No. 1 terminal to ground and turn on wiper. If washer relay clicks now and pump operates correctly, dash switch is faulty or there is an open circuit between pump and switch. If no click heard, relay coil is open.

WASHER (OFF CAR)

Washer Inoperative – **1)** Remove pump cover and connect a battery to washer No. 2 terminal and to ground. Connect a jumper wire from No. 1 terminal to ground. Turn ratchet pawl so holding contacts are closed. Pawl should be pulled toward relay pole and engage ratchet teeth. If not, relay coil is open.

2) If relay and ratchet pawl operate correctly, manually rotate three-lobe cam clockwise (looking at cam). Relay holding contacts should close and pump plunger arm should release from lock out position. Disconnect jumper wire from No. 1 terminal. Relay coil should remain energized and hold ratchet pawl against ratchet wheel. If not, holding contacts are dirty or open.

3) If pump operated properly in step **2)** , manually rotate three-lobe cam until ratchet wheel has turned 360° or 21 teeth. At this point, holding contacts should be opened by hump on wheel and pump plunger arm should be in lock out position.

WASHER VALVE ASSEMBLY

Attach a hose to intake (large) pipe. You should be able to blow through pipe, but not draw through it. Attach a hose to each exhaust (small) pipe. You should be able to draw through each pipe but not blow through them. If any valve allows air to pass in both directions, valve assembly is faulty.

REMOVAL & INSTALLATION

WIPER MOTOR

Removal – Disconnect battery ground cable and remove wiper arms with blades from transmission shaft. Remove cowl grille. *NOTE – On 1971-72 models do not remove cowl grille or wiper arms with blades.* Disconnect wiper drive rods from crank arm and arm from motor shaft. *NOTE – On 1971-72 models, use suitable tool to reach through grille and remove cotter pins, connecting drive rods to crank arm.* Disconnect wiper motor and washer wiring connections and washer hoses from washer pump. Remove motor attaching screws and remove motor and washer pump.

Installation – Reverse removal procedure while noting the following: Wiper motor must be in park position when installed. Holes in grille tabs at rear edge of grille must engage cowl lugs.

1965-74 G.M. 1 & 2-SPEED ELECTRIC – SQUARE MOTOR (Cont.)

Windshield Wiper Specifications

Application	1-Speed	2-Speed
Current Draw (Amps.)		
No Load (Max.)	3.0	3.6
Dry Windshield (Max.)	3.5	4.5
Stall (Max.)	11.0	12.0
Crank Arm Speed (RPM-No Load)		
Low Speed (Min.)		34
High Speed (Min.)		65

OVERHAUL

GEAR BOX

Disassembly – Remove washer pump, if equipped. Remove pump drive gear by wedging off shaft using two screwdrivers. Clamp crank arm in vise and remove retaining nut. *CAUTION – Arm must be secured in vise to avoid stripping wiper gears.* Remove crank arm, seal cap, retaining ring and endplay washers. Drill out gear box cover rivets and remove cover. Remove output gear and shaft assembly, then slide intermediate gear and pinion assembly off shaft. Remove terminal board and park switch by unsoldering motor leads from terminals and drilling out rivets holding terminal board and park switch ground strap to plate.

Reassembly – *NOTE – Service kit is available which contains necessary screws, nuts and washers to replace rivets removed at disassembly.* Reverse disassembly procedure while noting the following: Lubricate gear teeth with suitable cam lubricant. Cover must be positioned over locating dowel pins. Ground strap must be reconnected. Place wiper in park position, install crank arm on output shaft so identification marks line up with marks in cover. Clamp crank in vise before tightening retaining nut.

WIPER MOTOR

Disassembly – Disassemble gear box, remove through bolts, tap motor frame lightly and remove motor from mounting plate. Release brush spring tension and slide armature and endplate from motor frame. Pull endplate from armature. *NOTE – A thrust plug is located between armature shaft and endplate.* Remove endplay adjusting washers and note arrangement for proper reassembly.

Reassembly – Reverse disassembly procedure while noting the following: Lubricate armature shaft bushings with light machine oil. Install washers with concave side of washers toward each other. Endplay is automatically controlled by proper installation of washers.

WASHER PUMP (BELLOWS TYPE)

Relay – Remove washer pump cover and unsolder coil leads from terminals. Remove coil retainer clip and remove coil assembly from mounting bracket. To install, reverse removal procedure.

Ratchet Pawl – Remove washer pump cover and disengage spring from ratchet pawl. Remove "E" ring and slide pawl from shaft. To install, reverse removal procedure, and make sure spring is properly assembled before replacing pump cover.

Valve Assembly – Remove valve assembly-to-bellows housing attaching screws and remove valve. Carefully pry bellows lip out of valve body groove. To install, reverse removal procedure and make sure bellows lip is in valve body groove.

Bellows – Remove valve body, then manually operate pump to release pump from lock out position. Hold bellows plunger arm from moving, push in on bottom of bellows with thumb and twist bellows 90°. Bellows and bellows spring will be released. To install, reverse removal procedure.

WASHER PUMP (PISTON TYPE)

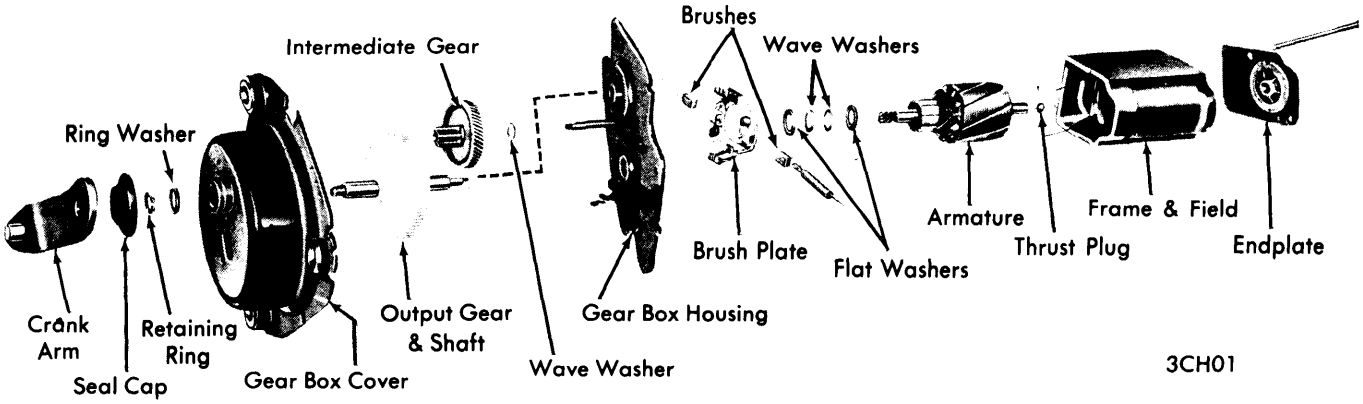
Solenoid Assembly (Ratchet Dog) – Squeeze cover to remove. Remove ratchet dog retaining screw. Hold solenoid plunger in position and lift solenoid assembly and ratchet dog from pump frame. Separate ratchet dog from solenoid mounting plate as required. To install, reverse disassembly procedure.

Ratchet Pawl – Disconnect ratchet pawl spring, remove pawl retaining ring and slide ratchet pawl off cam follower shaft. To install, reverse removal procedure.

Ratchet Wheel – Remove ratchet dog from pump frame, move ratchet wheel spring out of shaft groove and slide ratchet wheel off its shaft. To install, reverse removal procedure.

Pump And Actuator Plate Assembly – Remove solenoid assembly, ratchet dog, ratchet pawl and ratchet wheel. To separate pump and pump actuator plate from frame, pull pump housing in direction of arrow until grooves in housing clear the frame. Remove actuator plate from ratchet wheel and cam follower shafts. To install, reverse removal procedure.

Valve Assembly – Remove screws attaching valve assembly to pump housing. During reassembly, gasket must be properly positioned between housing and valve plate in the housing and valve plate grooves. Triple "O" ring must be properly installed between valve body and pipe assembly.



WINDSHIELD WIPER MOTOR & DRIVE ASSEMBLY (TYPICAL)