GENERAL MOTORS – MODIFIED PULSE SYSTEM

Buick (Exc. Skylark & Skyhawk)
Cadillac (All Models)
Chevrolet (Exc. Nova, Vega, Monza, & Chevette)
Oldsmobile (Exc. Omega & Starfire)
Pontiac (Exc. Ventura, Phoenix, Astre & Sunbird)

NOTE – *Refer to GM Pulse Control System in this section for Nova, Omega, Skylark, Ventura and Phoenix models.*

DESCRIPTION

Modified pulse wiper system combines the standard two or three speed operation with a variable delay action wipe cycle. Delay time, cycles wipers between a minimum of zero seconds (or low speed) and a maximum of 12 seconds depending on switch delay mode position. Modified pulse motor is similar to round motor except for the red wire which provides a battery positive circuit from ignition switch to the pulse relay when the gearbox is energized.

OPERATION

GEARBOX RELAY

This relay acts as a switch, turning the battery voltage to pulse relay on and off. With ignition "ON", battery circuit is completed to one side of relay coil and to one relay switch contacts. Turning wiper switch on to any position, completes gearbox relay coil circuit to ground, causing relay contacts to close and completing the battery circuit to pulse relay.

PULSE RELAY

This relay provides battery voltage to motor windings. When pulse relay switch contacts are closed by either the dash switch or timing circuit, a ground is provided for the pulse relay coil, completing battery voltage circuit to motor windings.

TIMING CIRCUIT

This circuit consists of two diodes, a capacitor, a transistor, a holding switch located on washer pump, and a variable resistor in the dash switch. When voltage is applied through the resistor, the capacitor is charged. At a predetermined point of charge, capacitor causes transistor to switch, completing a ground circuit for the pulse relay coil. Pulse relay coil contacts close, completing the battery circuit to wiper motor. Holding switch contacts are held open by a fin on the washer pump drive cam. When wiper starts to run, fin is moved away from the holding switch allowing contacts to close. Two things happen at this point: The capacitor is partially discharged in preparation for next delay cycle, and transistor is turned off.

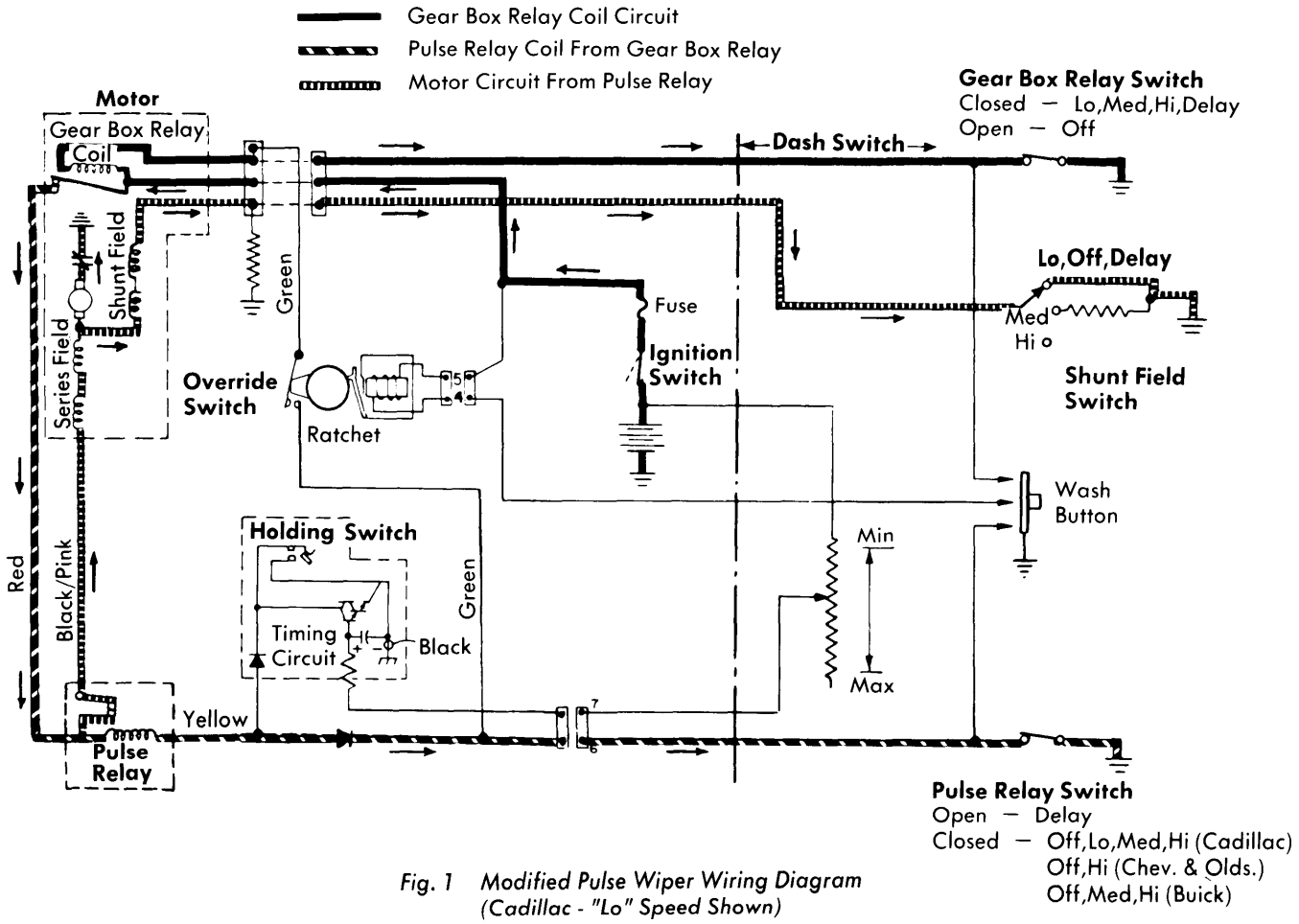

Fig. 1 Modified Pulse Wiper Wiring Diagram (Cadillac - "Lo" Speed Shown)

GENERAL MOTORS – MODIFIED PULSE SYSTEM (Cont.)

Also, a holding circuit to ground for pulse relay coil is provided until wiping stroke is completed. The cycle is repeated when fin on pump drive cam, re-opens the holding switch contacts at end of the wipe stroke, and again the capacitor starts charging.

WIPER DELAY CYCLE

When wiper is operating in the delay mode, blades stop at end of normal wipe pattern, that is, blades do not move into the park position. Delay time between strokes is controlled by the variable resistor in dash switch. An increase of resistance causes the wipers to delay longer.

WIPER SYSTEM TESTING

WIPER MOTOR INOPERATIVE IN ALL SWITCH POSITIONS

1) With ignition "ON", check for voltage at wiper motor No. 2 terminal with a test light. If lamp lights, see step **2**. If lamp does not light, check fuse at fuse block. If fuse is not blown, repair open circuit between fuse block and No. 2 terminal. If fuse is blown, disconnect wires at terminal No's. 1, 2, 3 and replace fuse. If fuse blows again with ignition "ON", repair grounded wire between fuse block and No. 2 terminal. If fuse does not blow again, reconnect wiring and with ignition "ON" and dash switch in "LO" or "MIN" delay, check fuse. If fuse is blown, repair or replace motor as required.

2) Place ignition in "ON" position and dash switch in "LO" or "MIN" delay. Connect test lamp between motor Black/Pink wire and ground. If lamp lights, problem is in motor. Repair or replace motor as required. If lamp does not light, turn ignition "ON", place dash switch in "LO" or "MIN" delay and connect jumper between No. 1 terminal and ground. If wiper does not run, see step **3**. If wiper runs, check for open circuit between No. 1 terminal and dash switch, dash switch for proper ground, or dash switch for defect.

3) Remove washer pump cover and reconnect wiring. Turn ignition "ON" and dash switch to "LO" or "MIN" delay. Connect test lamp between pulse relay Red wire terminal and ground. If lamp does not light, replace gear box relay and recheck wiper unit. If lamp comes on, turn ignition "ON" and dash switch to "LO" or "MIN". Connect jumper between pulse relay Yellow wire terminal and ground. If wiper fails to operate, replace pulse relay. If wiper runs, replace timing device.

WIPER INOPERATIVE IN DELAY MODE BUT OPERATES CORRECTLY IN "LO", "MED", OR "HI"

With ignition "ON" and dash switch in mid-delay position, remove connector from No. 6 and 7 terminals and connect a voltmeter between No. 7 connector terminal and ground. A 12 volt reading indicates timing device needs replacing. With a zero reading, check battery circuit to dash switch, check dash switch, or check for an open circuit between dash switch and wiper.

WIPER WILL NOT DELAY BETWEEN WIPES DASH SWITCH IN DELAY MODE

1) With ignition "ON" and dash switch in mid-delay position, remove connector from No. 6 and 7 terminals, then reinstall connector so it misses No. 6 terminal. If wiper still will not delay, see step **2**. If wiper operates correctly, check for grounded wire between No. 6 terminal and dash switch. If no ground is apparent, replace dash switch.

2) Remove washer pump cover and reinstall wiring. With ignition "ON" and dash switch in mid-delay position, disconnect Yellow wire from pulse relay. If wiper will not delay, replace pulse relay. If wiper fails to operate, replace timing device.

WIPER WILL NOT GO "OFF" AND BLADES OPERATE NORMALLY

NOTE – *If washer also pumps continuously, see "Wiper Will Not Go "OFF" And Washer Pumps Continuously".*

1) Remove connector from No. 1, 2 and 3 terminals and remove wire from No. 1 connector cavity. Reinstall connector less No. 1 lead. With dash switch "OFF", turn ignition "ON". If wiper continues to run, see step **2**. If wipers shut off, check for grounded wire between No. 1 terminal and dash switch. If no ground is present, replace dash switch.

2) Remove washer pump cover and reconnect wiring (including No. 1). With dash switch "OFF" and ignition "ON", disconnect lead terminal No. 1A. If wiper shuts off, see step **3**. If wiper continues to run, replace gear box relay.

3) Determine if projection on ratchet gear is opening override switch contacts. If gear position is correct and contacts open, check green lead for grounding. If gear position is correct and contacts do not open, check mounting screw for 14 INCH lbs. torque and adjust lower contact for .025" gap.

WIPER WILL NOT GO "OFF" AND WASHER PUMPS CONTINUALLY

1) Remove washer pump cover and reconnect wiring. With dash switch "OFF" and ignition "ON", check position of washer relay armature leg while unit is operating. If leg is engaging slotted area on ratchet gear, see step **2**. If leg is engaging ratchet gear ramp, check that ratchet gear dog spring engages gear teeth. Also check mounting screw and tighten or replace if necessary.

2) Push wash button and check if relay armature leg drops down on ratchet gear ramp. If leg drops back into slot, check for loose coil on pole piece or missing relay armature spring. If leg drops down on ramp and pump completes wash cycle and then shuts off, check for loose coil on pole piece, missing relay armature spring or burr on end of armature leg. File off burr if present.

WIPER WILL NOT GO "OFF" AND BLADES MOVE IN AND OUT OF PARK POSITION

1) With ignition "ON", check wiper motor operation in "LO" and "HI". **NOTE** – *Wiper will not delay if it has high speed only.* If wiper has "HI" speed only, see step **2**. If wiper operates in both speeds, replace gear box relay.

2) Turn ignition "ON" and dash switch to "LO" or minimum delay and connect jumper between No. 3 terminal and ground. If wiper still has "HI" speed only, remove motor and check for open circuit in shunt field. If motor has "LO" speed only, check for open circuit between No. 3 terminal and dash switch, if circuit is not open, replace dash switch.

WIPER HAS "HI" SPEED ONLY

Perform step **2** under "Wiper Will Not Go "OFF" And Blades Move In And Out Of Park Position".

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WIPER HAS "LO" SPEED ONLY

NOTE – *For this test, wipers must operate correctly in delay mode and also shut "OFF" correctly.*

Remove connector from No. 1, 2, and 3 terminals and remove No. 3 lead from connector. Turn ignition "ON" and dash switch to "HI". If wiper has "HI" speed, check for ground between No. 3 terminal and dash switch. If no ground exists, replace dash switch. If wiper still has only "LO" speed, remove motor and check for ground in shunt field.

INTERMITTANT WIPER OPERATION OR BLADES STOP AT RANDOM

1) Remove wiper fuse from fuse block and connect ammeter (0-30 amperes) across fuse block terminals. With ignition "ON" and dash switch in "LO" or minimum delay, operate washer system. Read lowest current draw, two minutes after wash cycle has been completed. If draw exceeds 6.5 amperes, see step **2** . If draw is between 5.0-6.5 amperes, circuit breaker and brush plate in wiper should be replaced.

2) Replace blade elements and repeat step **1** . If draw still exceeds 6.5 amperes, see step **3** . If draw is below 6.5 amperes, condition is corrected.

3) Disconnect linkage from wiper crank arm and repeat steps **1** and **2** . If lowest current draw is below 6.5 amperes, check and repair binding linkage. If draw still exceeds 6.5, remove wiper from vehicle and check armature end play, gear and/or armature binding, or for a shorted armature.

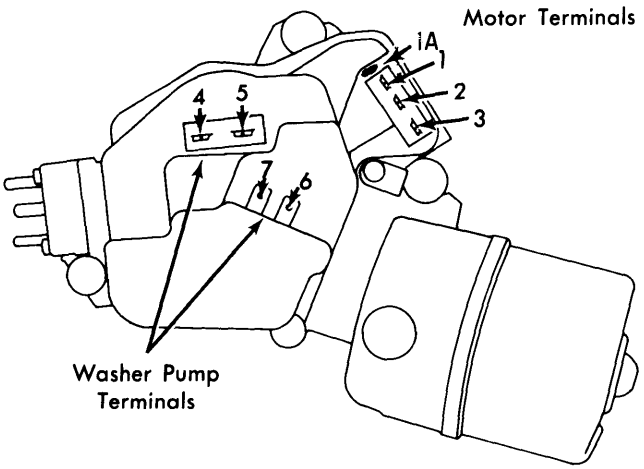

Fig. 2 Modified Pulse Wiper Motor Terminals

WASHER SYSTEM TESTING

WASHER SYSTEM INOPERATIVE

First check washer solution, hoses, pump, nozzles and bottle for proper attachment and condition, or screen (inside bottle) and nozzles for plugging.

1) If system components are satisfactory, turn ignition "ON" and dash switch to "LO" or minimum delay. Momentarily jumper No. 4 terminal to ground. If pump fails to operate, see step**2** . If pump operates, check for open circuit in No. 4 (dash switch) wire. If circuit is not open, replace dash switch.

2) With ignition "ON", check for voltage at No. 4 and 5 terminals using a test light. With voltage at both terminals, see step **3** . With no voltage at either terminal, check for open circuit between No 5 terminal (battery) lead and No. 2 terminal. With voltage at just one terminal, ratchet relay has open circuit and should be replaced.

3) Remove washer pump cover and reconnect wiring. Turn ignition "ON" and dash switch to "LO" or minimum delay. Check ratchet pawl for back and forth movement. If pawl moves back and forth, see step **4** . If pawl does not move, check and repair or replace the cam follower or ratchet pawl spring.

4) With ignition "ON" and wiper running at low speed, push wash button to start wash cycle. If ratchet gear rotates, see step **5** . If ratchet gear fails to rotate, replace ratchet gear and/or pawl as required.

5) Check piston movement through piston housing. If piston moves back and forth, replace valve assembly. If piston does not move, replace piston and pump housing assembly.

LOUD "KLUNKING" NOISE FROM WASHER PUMP

Remove washer pump from wiper and inspect nylon drive cam. Replace cam if broken or if not broken, pump was improperly installed.

WASH CYCLE CONTINUES WITH WIPER SHUT OFF

Remove washer pump cover and check that GREEN wire is connected to No. 1A terminal. Install wire on terminal if disconnected. If Green wire is connected, bridge override switch contacts during wash cycle. If unit does not complete wash cycle, check Green wire for open circuit. If unit does complete wash cycle, check and tighten mounting screw to 14 INCH lbs.. If screw is tight, replace override seitch.

REMOVAL & INSTALLATION

Wiper motor removal and gearbox service procedures are the same as the standard Round Motor System. *See GENERAL MOTORS ROUND MOTOR – REMOVAL & INSTALLATION in this section.*