SECTION 8E

WINDSHIELD WIPER/WASHER SYSTEM (PULSE)

NOTICE: Refer to Battery Disconnect Caution in Section 0A.

NOTICE: When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number fastener is not available, a fastener of equal size and strength (or stronger) may be used. The correct torque value must be used when installing fasteners that require it. If the above conditions are not followed, parts or system damage could result.

CONTENTS

GENERAL DESCRIPTION

Figure 1

The windshield wiper/washer system consists of a permanent magnet depressed park wiper motor assembly, wiper linkage assemblies, wiper arm and blade assemblies, a washer pump mounted on a washer fluid reservoir and a wiper/washer switch assembly (Figure 1).

Pulse and timing functions, along with the demand wash function, are controlled by a printed circuit board in the wiper motor cover assembly. The wiper motor also is equipped with RFI (radio frequency interference) suppression.

Depressed park positioning is accomplished by an external drive mechanism on the wiper motor assembly.

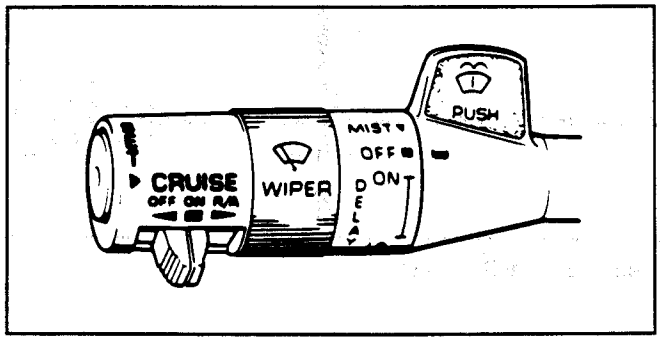

Figure 1 – Wiper/Washer Switch Assembly

CIRCUIT OPERATION

Figure 2

Wiper Operation

In addition to the features of a conventional (non-pulse) wiper system (mist, low and high speeds), the pulse type windshield wiper/washer system includes an operating mode in which the wipers make single sweeps with an adjustable time interval between sweeps. The time interval is controlled by a solid state timer in the wiper motor cover assembly. The duration of the delay interval is determined by the delay resistor in the wiper/washer switch assembly.

When the wiper switch is turned OFF, the wiper motor returns the wipers to end of sweep (inner wipe) position, the wiper motor reverses and activates its external depressed park mechanism to lower the wipers to park position.

Pulse Operation

With the wiper switch in DELAY (pulse), battery voltage is applied to the wiper motor connector at terminal "B" through CKT 143. Voltage also is applied to terminal "D" through CKT 113 and terminal "E" through CKT 112.

The length of delay time between sweeps is controlled by the variable pulse delay resistor. The delay is adjustable from 1 to 22 seconds, nominally.

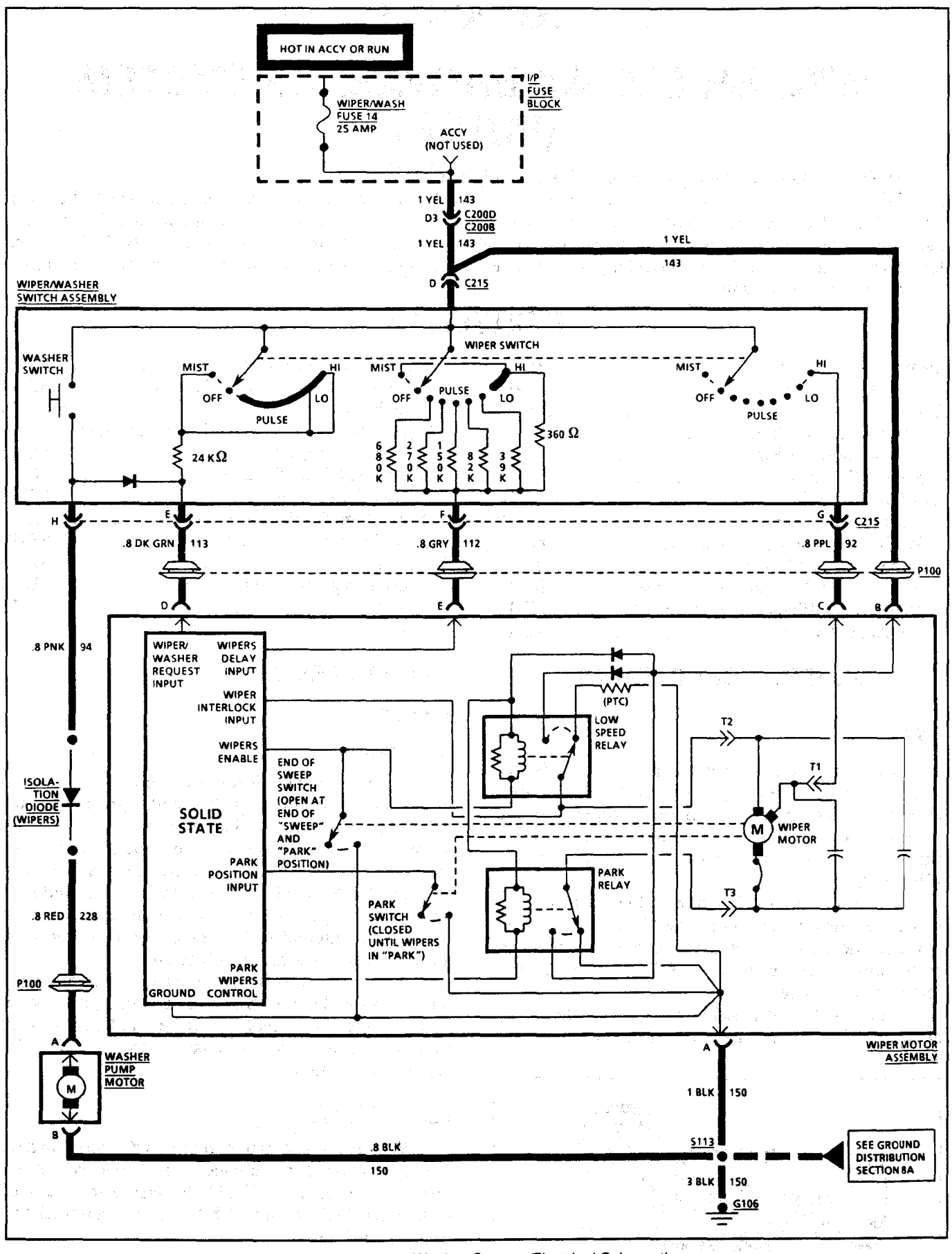

Figure 2 – Wiper/Washer System Electrical Schematic

Low Speed Operation

In the LO position of the wiper switch, battery voltage is applied to the wiper motor connector at terminal "B" through CKT 143 and terminal "E" through CKT 112, with voltage applied to terminal "D" through CKT 113.

The circuit board supplies power to the wiper motor, which runs continuously through the low speed relay.

High Speed Operation

In the HI position of the wiper switch, battery voltage is applied at terminals "B", "C" and "E" of the wiper motor assembly through CKTs 143, 92 and 112. Voltage also is applied to terminal "D" through CKT 113.

Park Position Operation

When turned OFF from any position, the wipers complete the last sweep and park. When the wiper switch is in OFF, the wiper motor assembly has battery voltage applied to terminal "B" only, from CKT 143. When the end of sweep switch opens, the control circuit reverses the wiper motor which activates the external depressed park mechanism. The wiper motor continues to run until the park switch opens.

Washer Operation

When the washer switch is turned to ON, battery voltage is applied to terminal "D" of the wiper motor assembly through CKT 113. The washer switch also applies voltage to terminal "A" which turns ON the washer pump through CKTs 94 and 228. The wiper motor has voltage applied through the low speed relay and operates at low speed for 2 to 4 wipes.

When the washer switch is held ON, the wiper motor circuit board will keep the washer pump ON only as long as the washer switch is held ON.

If the wipers had been in DELAY, LO or HI, they would return to that operation after the wash cycle. If in OFF, they then return to park position after 2 to 4 wipes.

Mist Operation

When the wiper switch is moved to MIST and released, the wipers make one sweep at low speed and return to park position. If the wiper switch is held in MIST, the wipers will continue to operate until the switch is released. The circuit operation is the same as that of low speed.

DIAGNOSIS

COMPONENT LOCATIONS

- Refer to Figure 4 for a list of component locations.

TROUBLESHOOTING HINTS

Figure 2

- Make the following checks before beginning System Diagnosis.

1. Check fuse 14. If open, check for short to ground through CKT 143 and replace fuse.
2. Check that all system connectors are mated firmly.
3. If washer does not operate, check that:
   — Washer reservoir is filled.
   — Hoses are correctly attached.
   — Hoses are not cut, kinked or pinched.
   — Nozzles are not clogged.
   — Connector seal at washer pump is not damaged or missing.
4. Check for binding or broken wiper arm linkage.

- Refer to System Diagnosis.

SYSTEM DIAGNOSIS

- Perform the System Check (Figure 5), then refer to the Symptom Table (Figure 6) for the appropriate diagnostic procedures.

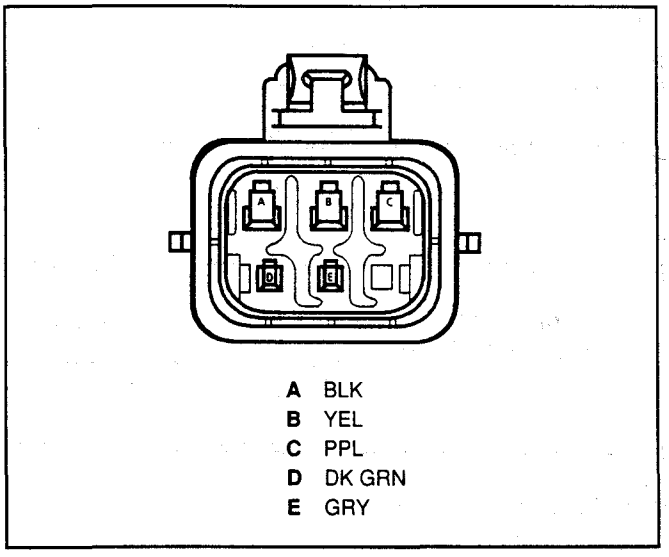

Figure 3 – Wiper Motor Wiring Harness Connector

COMPONENT	LOCATION	SECTION 8A-201-PG	FIG.
I/P Fuse Block	LH side of I/P carrier, on the side	8	15
Isolation Diode (Wipers)	Approx. 20 cm (8 in.) from C215	35	64
Washer Pump	Front of vehicle, below engine hood latch	25	46
Wiper Motor Assembly	Rear of LH shock tower, mounted to dash panel below LH wiper mount	10	18
Wiper/Washer Switch Assembly	In left side of steering column, actuated by multi-function lever	3	5
C200B (18 cavities)	Part of forward lamp harness, between LH kick panel and steering column	25	49
C200D (48 cavities)	Part of I/P harness, between LH kick panel and steering column	25	49
C215 (11 cavities)	Near base of steering column	35	64
G106	Near top LH side of radiator, in top of T-bar	19	35
P100	Left side in dash panel, engine to passenger compartment	19	36
S113	Forward lamp harness, approx. 13 cm (5 in.) from electrical center breakout		

Figure 4 – Component Locations

SYSTEM CHECK

ACTION	NORMAL OPERATION
[1] • Turn ignition switch to RUN. • Press washer switch to ON.	Wipers operate at LO speed. Washer sprays windshield as long as washer switch is held in ON position. After releasing switch, washer stops and wipers return to park position after 2 to 4 sweeps.
[2] • Turn wiper switch to DELAY (pulse mode).	Wipers make one complete sweep, then pause for 1 to 22 seconds before making next sweep. The pause time is adjusted by turning the wiper switch through the delay range.
[3] • Wiper switch in DELAY. • Press washer switch ON.	Washer sprays windshield as long as washer switch is held ON. Wipers run at low speed while spraying and continue for 2 to 4 sweeps after washer switch is released. Wipers then return to pulse operation.
[4] • Turn wiper switch to LO.	Wipers run continuously at low speed.
[5] • Turn wiper switch to HI.	Wipers run continuously at faster speed.
[6] • Turn wiper switch to OFF.	Wipers return to park position at low speed.
[7] • Turn wiper switch to MIST, then release.	Wipers make one complete sweep, then return to park position.

Figure 5 – Wiper/Washer System Check

SYMPTOM	PROCEDURE	PAGE
Wipers do not operate in any mode.	Chart 1	8E–5
Wipers run when switch is "OFF."	Chart 2	8E–6
No low speed mode.	Replace wiper/washer switch assembly.	—
No high speed mode.	Chart 3	8E–7
Wipers operate only when switch is in HI position, but run at low speed.	Check for open or poor connection in CKT 143 between wiper/washer switch CONN C215 TERM "D" and wiper motor CONN TERM "B". If OK, replace wiper motor assembly.	—
Low speed, pulse delay and mist modes inoperative (high speed mode OK).	Chart 4	8E–7
Pulse delay operates incorrectly or not at all.	Chart 5	8E–8
Wipers stop randomly and do not park when switch is moved to "OFF."	Chart 6	8E–8
Wipers do not operate when washer switch is activated.	Chart 7	8E–9
Washer does not operate.	Chart 8	8E–9

Figure 6 – Symptom Table

CHART 1
WIPERS DO NOT OPERATE IN ANY MODE

- IGNITION SWITCH TO "RUN."
- BACKPROBE WITH A TEST LIGHT FROM WIPER/WASHER SWITCH CONN C215 TERM "D" TO GROUND.

IS TEST LIGHT "ON"?

YES

- WIPER SWITCH TO "HI".
- CONNECT TEST LIGHT FROM CONN C215 TERM "G" TO GROUND.

IS TEST LIGHT "ON"?

YES

- DISCONNECT WIPER MOTOR CONNECTOR.
- CONNECT TEST LIGHT FROM WIPER MOTOR CONN TERM "C" TO GROUND.

IS TEST LIGHT "ON"?

(CONTINUED ON NEXT PAGE)

NO

REPAIR OPEN OR POOR CONNECTION IN CKT 143 TO WIPER/WASHER SWITCH ASSEMBLY. IF FUSE 14 IS OPEN, CHECK FOR SHORT TO GROUND IN RELATED CKTS. RELATED CKTS WILL DEPEND ON WHETHER FUSE BLOWS BEFORE OR AFTER SYSTEM OPERATION.

NO

CHECK FOR POOR CONNECTION AT CONN C215 TERM "D" OR OPEN IN PIGTAIL (CKT 143) TO WIPER/WASHER SWITCH ASSEMBLY.
IF OK, REPLACE WIPER/WASHER SWITCH ASSEMBLY.

(CONTINUED FROM PREVIOUS PAGE)

YES

- CONNECT TEST LIGHT FROM WIPER MOTOR CONN TERM "C" TO TERM "A".
  IS TEST LIGHT "ON"?

NO

REPAIR OPEN OR POOR CONNECTION IN CKT 92 BETWEEN CONN C215 AND WIPER MOTOR ASSEMBLY.
THEN, CONTINUE DIAGNOSIS IN OPPOSITE BOX OF CHART.

YES

CHECK FOR POOR CONNECTION TO WIPER MOTOR ASSEMBLY.
IF OK, RELACE WIPER MOTOR ASSEMBLY.

NO

REPAIR OPEN OR POOR CONNECTION IN GROUND CKT 150.

CHART 2
WIPERS RUN WHEN SWITCH IS "OFF"

- IGNITION SWITCH TO "RUN."
- WIPER SWITCH "OFF."
- DISCONNECT WIPER/WASHER SWITCH CONN C215.

WIPER MOTOR KEEPS RUNNING

- USING A DVM, MEASURE VOLTAGE FROM CONN C215 (VEHICLE SIDE) TERM "E" TO GROUND.

WIPER MOTOR PARKS

CHECK FOR SHORTED WIRES IN PIGTAIL TO WIPER/WASHER SWITCH ASSEMBLY.
IF OK, REPLACE WIPER/WASHER SWITCH ASSEMBLY.

MORE THAN 1 VOLT

- RECONNECT WIPER/WASHER SWITCH CONN C215.
- DISCONNECT WIPER MOTOR CONNECTOR.
- USING THE DVM, MEASURE VOLTAGE FROM WIPER MOTOR CONN TERM "D" TO GROUND.

LESS THAN 1 VOLT (APPROX. 0 VOLT)

- RECONNECT WIPER/WASHER SWITCH CONN C215.
- DISCONNECT WIPER MOTOR CONNECTOR.
- USING THE DVM, MEASURE VOLTAGE FROM WIPER MOTOR CONN TERM "C" TO GROUND.

MORE THAN 1 VOLT

REPAIR B+ CONNECTION TO CKT 113.

LESS THAN 1 VOLT

REPLACE WIPER MOTOR COVER ASSEMBLY.

0 VOLT

REPLACE WIPER MOTOR COVER ASSEMBLY.

B+

REPAIR SHORT TO B+ IN CKT 92.

CHART 3
NO HIGH SPEED MODE

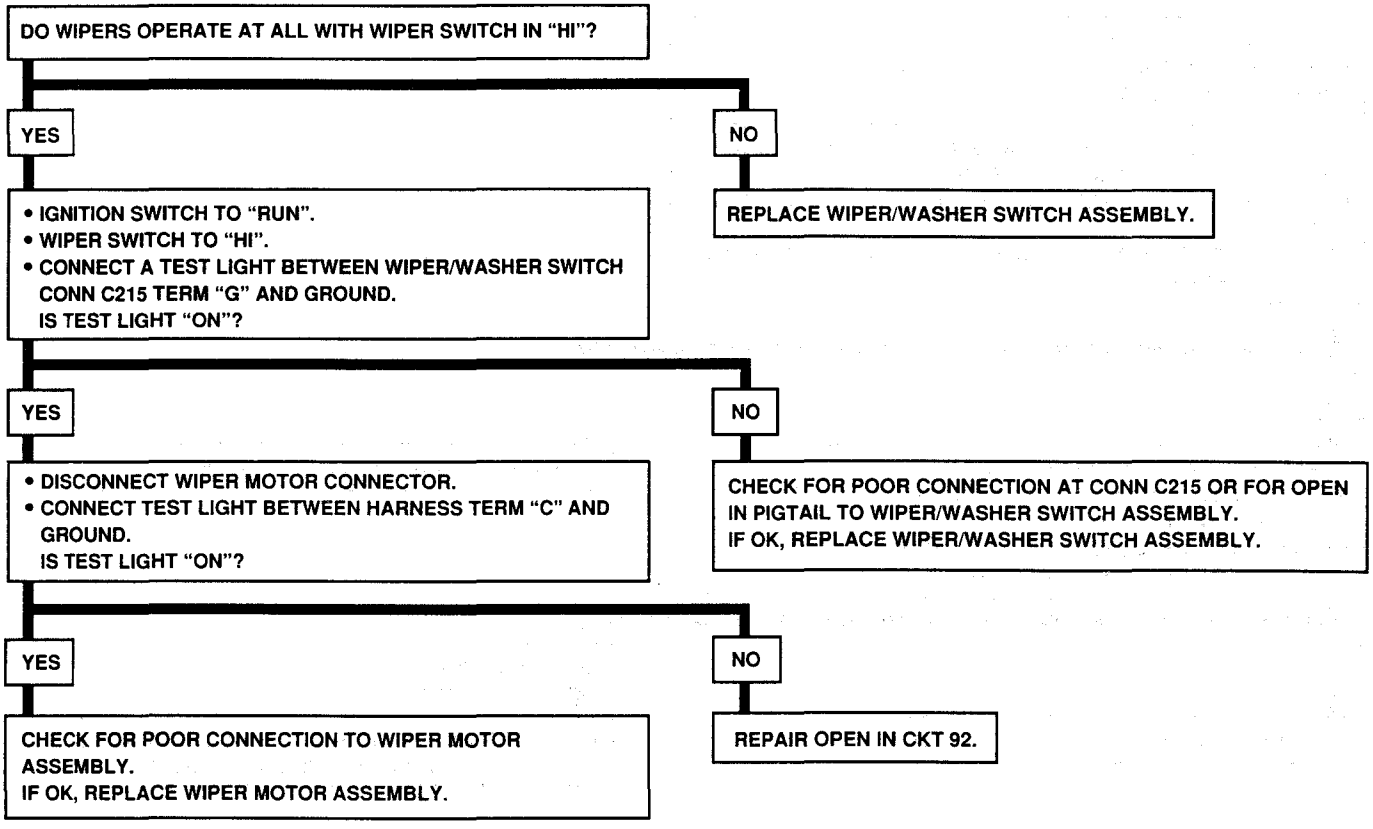

CHART 4
LOW SPEED, PULSE DELAY AND MIST MODES INOPERATIVE (HIGH SPEED MODE OK)

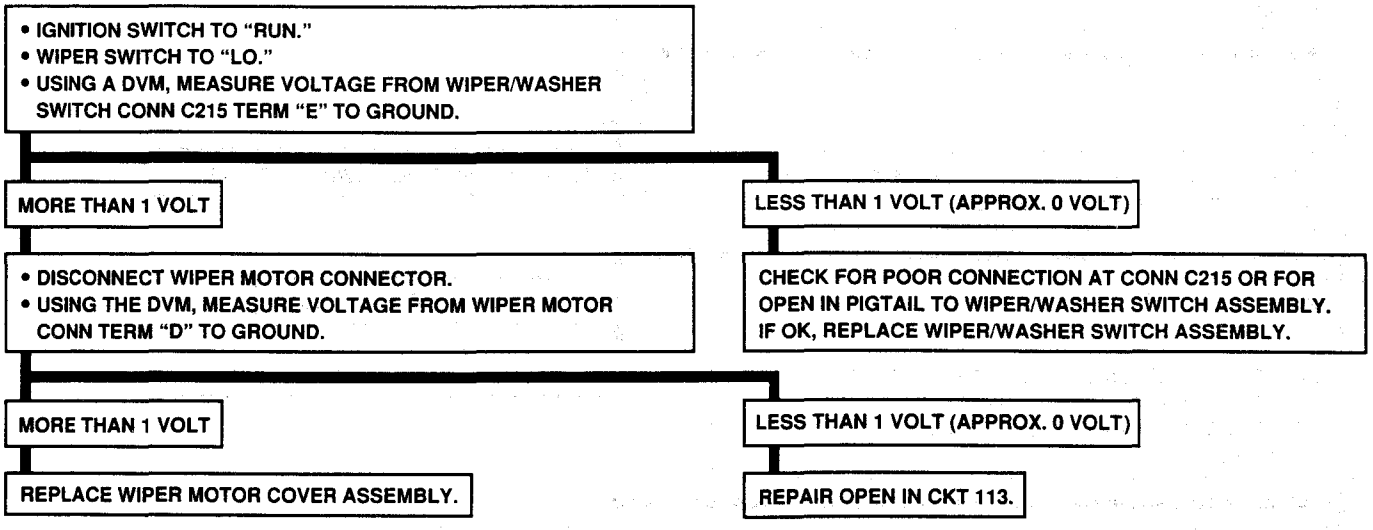

CHART 5
PULSE DELAY OPERATES INCORRECTLY OR NOT AT ALL

- IGNITION SWITCH "OFF".
- DISCONNECT WIPER/WASHER SWITCH CONN C215.
- WIPER SWITCH TO "DELAY".
- WITH A DIGITAL MULTIMETER SET TO OHMS SCALE, MEASURE RESISTANCE THROUGH WIPER/WASHER SWITCH ASSEMBLY FROM CONN C215 TERM "D" TO TERM "F".
- MOVE WIPER SWITCH THROUGH ENTIRE DELAY RANGE, ONE NOTCH AT A TIME.

DOES RESISTANCE VARY FROM APPROXIMATELY 39 kΩ TO 680 kΩ? (SEE FIGURE 2.)

YES

- RECONNECT WIPER/WASHER SWITCH CONN C215.
- DISCONNECT WIPER MOTOR CONNECTOR.
- IGNITION SWITCH TO "RUN".
- USING A DVM, MEASURE VOLTAGE FROM WIPER MOTOR CONN TERM "E" TO GROUND.

B+

REPLACE WIPER MOTOR COVER ASSEMBLY.

APPROX. 0 VOLT

CHECK CKT 112 FOR OPEN OR POOR CONNECTION. IF OK, REPLACE WIPER MOTOR COVER ASSEMBLY.

NO

REPLACE WIPER/WASHER SWITCH ASSEMBLY.

CHART 6
WIPERS STOP RANDOMLY AND DO NOT PARK WHEN SWITCH IS MOVED TO "OFF"

- IGNITION SWITCH TO "RUN".
- WIPER SWITCH "OFF."
- DISCONNECT WIPER/WASHER SWITCH CONN C215.

DO WIPERS PARK?

NO

- USING A DVM, MEASURE VOLTAGE FROM CONN C215 (VEHICLE SIDE) TERM "E" TO GROUND.

MORE THAN 1 VOLT

- RECONNECT WIPER/WASHER SWITCH CONN C215.
- DISCONNECT WIPER MOTOR CONNECTOR.
- USING THE DVM, MEASURE VOLTAGE FROM CONN TERM "D TO GROUND.

MORE THAN 1 VOLT

REPAIR SHORT TO B+ IN CKT 113.

LESS THAN 1 VOLT

REPLACE WIPER MOTOR COVER ASSEMBLY.

YES

REPLACE WIPER/WASHER SWITCH ASSEMBLY.

LESS THAN 1 VOLT (APPROX. 0 VOLT)

REPLACE WIPER MOTOR COVER ASSEMBLY.

CHART 7
WIPERS DO NOT OPERATE WHEN WASHER SWITCH IS ACTIVATED

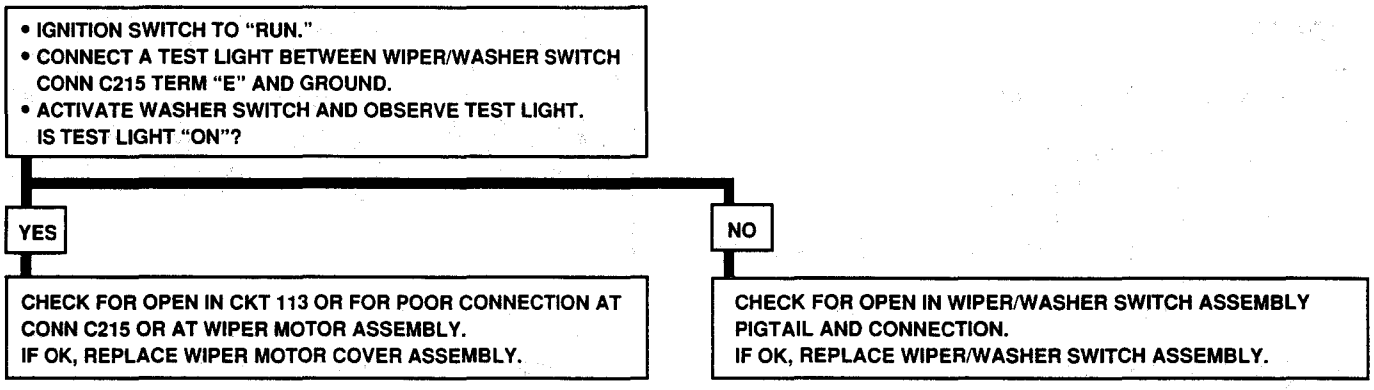

CHART 8
WASHER DOES NOT OPERATE