REPORT NUMBER 104-GTL-07-001

SAFETY COMPLIANCE TESTING FOR FMVSS NO. 104 WINDSHIELD WIPING AND WASHING SYSTEMS

SUZUKI MOTOR CORPORATION
2007 SUZUKI AERIO, PASSENGER CAR
NHTSA NO. C70503

GENERAL TESTING LABORATORIES, INC.
1623 LEEDSTOWN ROAD
COLONIAL BEACH, VIRGINIA 22443

JANUARY 9, 2008

FINAL REPORT

PREPARED FOR

U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
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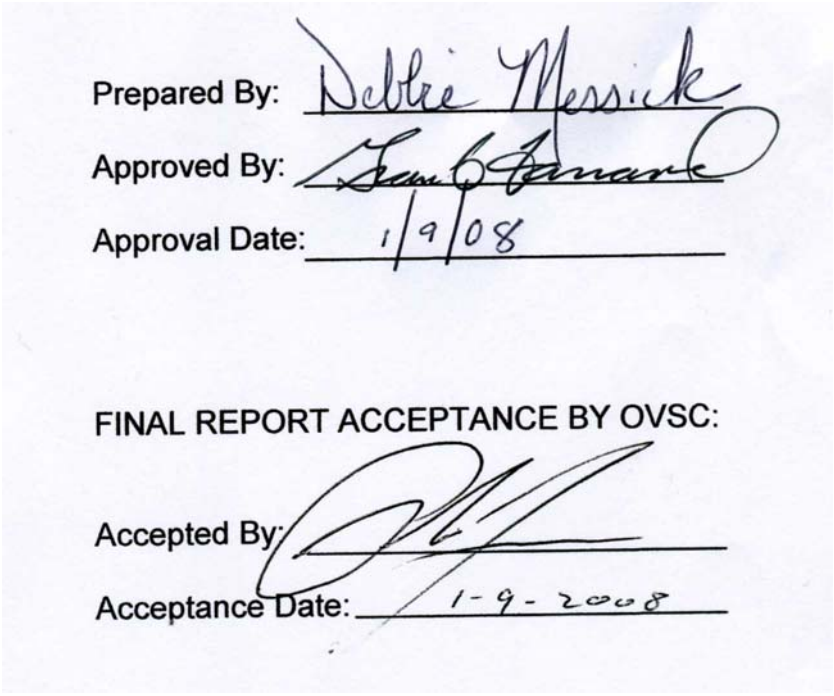

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SECTION 1

PURPOSE OF COMPLIANCE TEST

1.0 PURPOSE OF COMPLIANCE TEST

A 2007 Suzuki Aerio Passenger Car was subjected to Federal Motor Vehicle Safety Standard (FMVSS) No. 104 testing to determine if the vehicle was in compliance with the requirements of the standard. All tests were conducted in accordance with NHTSA, Office of Vehicle Safety Compliance (OVSC) Laboratory Procedure, TP-104-08 dated 26 June 1996 and General Testing Laboratories, Inc. (GTL) Test Procedure, TP-104-08A dated 4 April 1997.

1.1 The test vehicle was a 2007 Suzuki Aerio Passenger Car. Nomenclature applicable to the test vehicle are:

A. Vehicle Identification Number: JS2RA62S675353819

B. NHTSA No.: C70503

C. Manufacturer: SUZUKI MOTOR CORPORATION

D. Manufacture Date: 12/06

1.2 TEST DATE

The test vehicle was subjected to FMVSS No. 104 testing on October 8, 2007.

SECTION 2

COMPLIANCE TEST PROCEDURE AND SUMMARY OF RESULTS

2.0 GENERAL

The 2007 Suzuki Aerio passenger car, NHTSA No. C70503 was subjected to FMVSS No. 104 tests on October 8, 2007. The selected portions of FMVSS No. 104 tests used were as amplified in the following subparagraphs. The test vehicle was positioned in the test system with three water spray nozzles suspended in line with the center of the longitudinal axis of the windshield and horizontal left/right center of the windshield to provide an even distribution of spray to the entire windshield. The height of the nozzles was approximately 22 inches above the glazing surface.

2.1 WIPER FREQUENCY TEST

The wiper frequency test was performed with the engine operating and with a minimum of 50 cubic inches per minute of water from the spray nozzles. The wiper frequency was measured at the low and high wiper speed settings with the engine operating at idle RPM and 2,000 RPM.

2.2 WIPED AREA TEST

The test was conducted with the windshield wiper system operating at the high speed setting, engine at idle RPM and the spray nozzles spraying water at a minimum of 50 cubic inches per minute. The wiper blade wipe pattern was outlined on the glazing surface and then transferred to a windshield pattern. The wiped area was determined for areas A, B and C from the windshield pattern.

2.3 CAPABILITY TEST

The windshield glazing surface was coated with a mixture of water and fine grade test dust. Within 15 seconds following application of the water-dust mixture, the windshield wiper and washing system was activated in the high speed mode for ten complete cycles. The vehicle's engine was operating at idle RPM. The cleared areas of the windshield were marked on the inside windshield surface. After ten complete cycles the system was deactivated and the wiped area transferred to a windshield pattern.

The glazing surface was cleaned and dried. The water dust mixture was re-applied and the test repeated.

The windshield patterns were used subsequently to determine the cleared area percentages.

2.4 SUMMARY OF RESULTS

Based on the test performed, the test vehicle's windshield wiping and washing system appears to meet the requirements of FMVSS 104.

SECTION 3

COMPLIANCE TEST DATA

3.0 TEST RESULTS

The following data sheets document the results of testing on the 2007 Suzuki Aerio.

SUMMARY OF DATA
FMVSS 104, WINDSHIELD WIPING AND WASHING SYSTEMS

VEH. MOD YR/MAKE/MODEL/BODY: 2007 SUZUKI AERIO PASSENGER CAR
VEH. NHTSA NO: C70503; VIN: JS2RA62S675353819
VEH. BUILD DATE: 12/06 TEST DATE: OCTOBER 8, 2007
TEST LABORATORY: GENERAL TESTING LABORATORIES
OBSERVERS: GRANT FARRAND, JIMMY LATANE

WIPER TYPE: 2 SPEED ELECTRIC WITH DELAY

WASHER TYPE: HIGH PRESSURE ELECTRIC

WINDSHIELD AREAS: A = 959 in^2 B = 691 in^2 C = 225 in^2

MANUFACTURER'S WINDSHIELD PATTERN USED: Yes X No

ACCESSIBILITY:

(1) Washer Control Accessible: Yes X No
(2) Wiper Control Accessible: Yes X No
(3) Washer Reservoir Filler Accessible: Yes X No

DESCRIBE UNUSUAL FEATURES OF WIPING AND WASHING SYSTEMS:

PERFORMANCE:

TEST	PASS	FAIL
WIPER FREQUENCY	X	
WIPED AREA	X	
WASHER CAPABILITY	X	

RECORDED BY: G. FARRAND DATE: 10/11/07

APPROVED BY: D. MESSICK

FREQUENCY TEST DATA
FMVSS 104 – WINDSHIELD WIPER SYSTEM

VEH. MOD YR/MAKE/MODEL/BODY: 2007 SUZUKI AERIO PASSENGER CAR
VEH. NHTSA NO: C70503; VIN: JS2RA62S675353819
VEH. BUILD DATE: 12/06 TEST DATE: OCTOBER 8, 2007
TEST LABORATORY: GENERAL TESTING LABORATORIES
OBSERVERS: GRANT FARRAND, JIMMY LATANE

Water Hardness: 7.0 grains/gallon (12 max.); Date Certified: 09/07

Water Spray Flow Rate: 71.0. in^3/min. (specified range = 50 to 100 in^3/min.)

Ambient Air Temp.: 79 ºF (50-100ºF); Water Temp.: 79 ºF (100ºF max.)

Manufacturer's Recommended Engine Idle Speed: 750 rpm

RUN 1, MAXIMUM WIPER FREQUENCY TEST:

TIME	ENGINE SPEED	TOTAL CYCLES	AVG. CYCLES/MIN. (45 MINIMUM)
1ST 3 minutes	750 (idle ± 50 rpm)	200	66.7
2nd 3 minutes	2000 (2000 rpm ± 50 rpm)	207	69.0

Frequency at least 45 cycles/minute regardless of engine speed: Yes X No ___

RUN 2, LOWER WIPER FREQUENCY TEST:

TIME	ENGINE SPEED	TOTAL CYCLES	AVG. CYCLES/MIN. (20 MINIMUM)
1ST 3 minutes	750 (idle ± 50 rpm)	142	47.3
2nd 3 minutes	2000 (2000 rpm ± 50 rpm)	147	49.0

Highest and lower frequency differ by at least 15 cycles/minute, and lower frequency is at least 20 cycles/minute regardless of engine speed: Yes X No ___

REMARKS:

RECORDED BY: G. FARRAND DATE: 10/08/07

APPROVED BY: D. MESSICK

WIPED AREA TEST DATA
FMVSS 104 – WINDSHIELD WIPER SYSTEM

VEH. MOD YR/MAKE/MODEL/BODY: 2007 SUZUKI AERIO PASSENGER CAR
VEH. NHTSA NO: C70503; VIN: JS2RA62S675353819
VEH. BUILD DATE:12/06; TEST DATE: OCTOBER 8, 2007
TEST LABORATORY:GENERAL TESTING LABORATORIES
OBSERVERS: GRANT FARRAND, JIMMY LATANE

Air Temperature in test area = 79 ºF (specified range of 50 to 100ºF)

Air Velocity at windshield = 1 mph (specified range of 0 to 1 mph)

Engine speed = 750 rpm (manufacturer's recommended idle ± 50 rpm)

Temperature of water spray = 79 ºF (100º F maximum)

Water spray flow rate = 71 in^3/min. (specified range of 50 to 100 in^3/min.)

Windshield wiper frequency = 67 cycles/min. (45 cpm minimum)

TEST RESULTS:

PERCENT WIPED				
WINDSHIELD AREA	ACTUAL	REQUIRED	PASS	FAIL
A	93.6%	80%	X	
B	96.1%	94%	X	
C	100%	99%	X	

REMARKS:

RECORDED BY: G. FARRAND DATE: 10/08/07

APPROVED BY: D. MESSICK

CAPABILITY TEST DATA
FMVSS 104 – WINDSHIELD WASHER SYSTEM

VEH. MOD YR/MAKE/MODEL/BODY: 2007 SUZUKI AERIO PASSENGER CAR
VEH. NHTSA NO: C70503; VIN: JS2RA62S675353819
VEH. BUILD DATE:12/06; TEST DATE: OCTOBER 8, 2007
TEST LABORATORY:GENERAL TESTING LABORATORIES
OBSERVERS: GRANT FARRAND, JIMMY LATANE

Air Temperature in test area = 80 ºF (specified range of 70 to 80ºF)

Washer reservoir fluid temperature = 75 ºF (specified range of 70 to 80ºF)

Air Velocity at windshield = 1 mph (specified range of 0 to 1 mph)

Engine speed = 750 rpm (manufacturer's recommended idle ± 50 rpm)

Number of windshield washer nozzles on the vehicle = 4

Windshield washer system activation coordinated with components of the wiper system:
Yes X No

TEST RESULTS:

CLEARED AREA PERCENTAGES						
WINDSHIELD AREA	TEST 1	TEST 2	AVG	REQ'D*	PASS	FAIL
A	94.0	94.7	94.4	75%	X	
B	96.0	96.0	96.0	75%	X	
C	100	100	100	75%	X	

*NOTE FOR REFERENCE ONLY: SAE 942b, revised Jul72, recommends capability to clear 80% of the total wash area and 90% of the wash area included in AREA C.

REMARKS:

RECORDED BY: G. FARRAND DATE: 10/08/07

APPROVED BY: D MESSICK

SECTION 4
INSTRUMENTATION AND EQUIPMENT LIST

TABLE 1 - INSTRUMENTATION & EQUIPMENT LIST

EQUIPMENT	DESCRIPTION	MODEL/ SERIAL NO.	CAL. DATE	NEXT CAL. DATE
TIMER	ACCU-SPLIT	ACT1	10/07	10/08
TEMPERATURE READOUT	OMEGA	DP41	03/07	03/08
TEMPERATURE RECORDER	OMEGA	CT485	06/07	06/08
SPRAY SYSTEM	GTL	N/A	BEFORE USE	BEFORE USE
ANEMOMETER	OMEGA	HH-600	06/07	06/08
CYCLE COUNTER	GTL	GTL	BEFORE USE	BEFORE USE
SOFT WATER	N/A	N/A	10/07	10/08
TACHOMETER	MONARCH	ACT-3	08/07	08/08
TEST DUST	AC	GM FINE	CALIBRATED DUST	CALIBRATED BY VENDOR*

*AC Inspection #503, Batch #1943, Measured with particle size roller analyzer.

SECTION 5

PHOTOGRAPHS

2007 SUZUKI AERIO
NHTSA NO. C70503
FMVSS NO. 104

FIGURE 5.1
LEFT SIDE VIEW OF VEHICLE

2007 SUZUKI AERIO
NHTSA NO. C70503
FMVSS NO. 104

FIGURE 5.2
RIGHT SIDE VIEW OF VEHICLE

2007 SUZUKI AERIO
NHTSA NO. C70503
FMVSS NO. 104

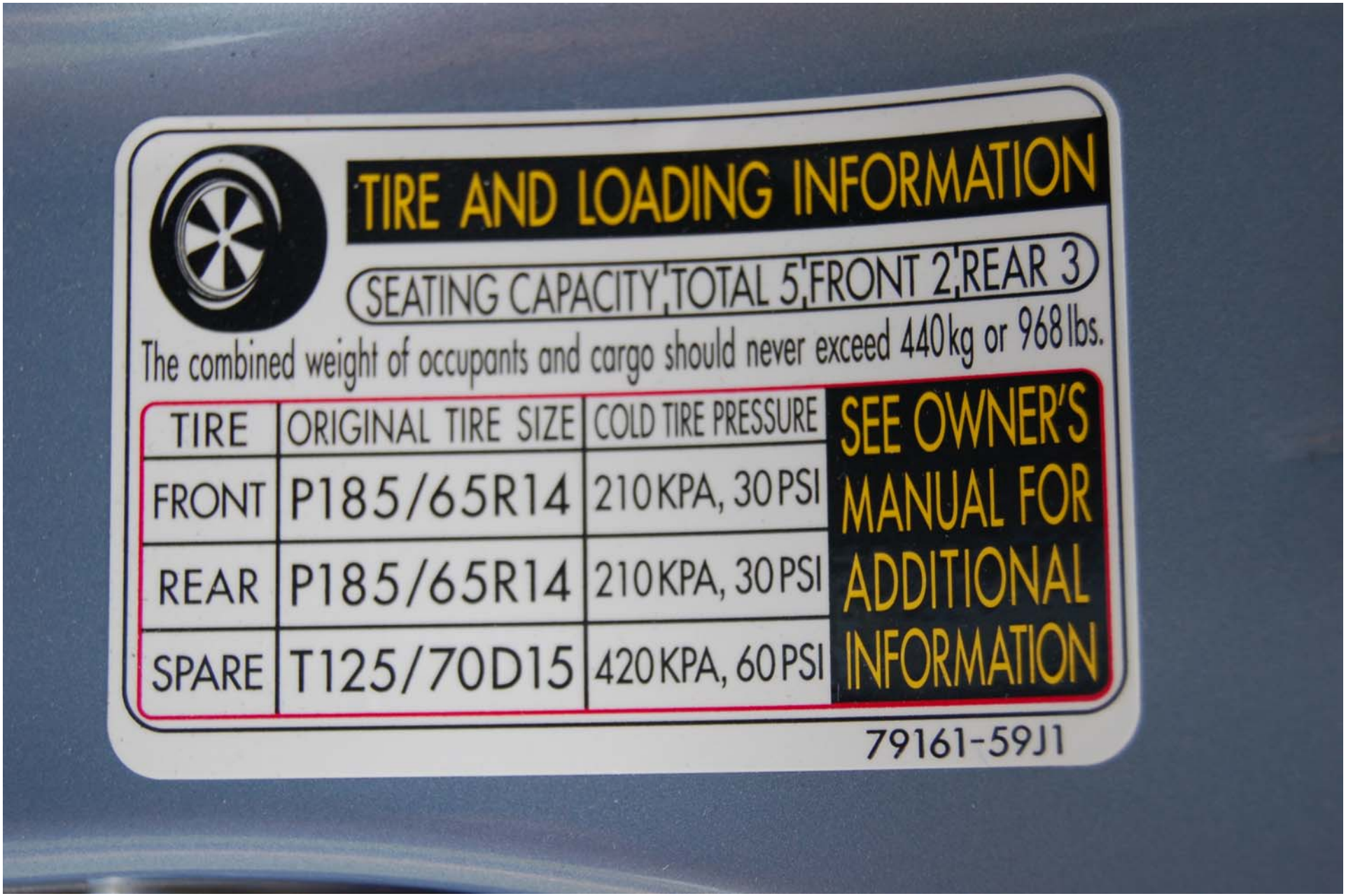
FIGURE 5.3
¾ FRONTAL VIEW FROM LEFT SIDE OF VEHICLE

2007 SUZUKI AERIO
NHTSA NO. C70503
FMVSS NO. 104

FIGURE 5.4
¾ REAR VIEW FROM RIGHT SIDE OF VEHICLE

2007 SUZUKI AERIO
NHTSA NO. C70503
FMVSS NO. 104

FIGURE 5.5
VEHICLE CERTIFICATION LABEL



2007 SUZUKI AERIO
NHTSA NO. C70503
FMVSS NO. 104

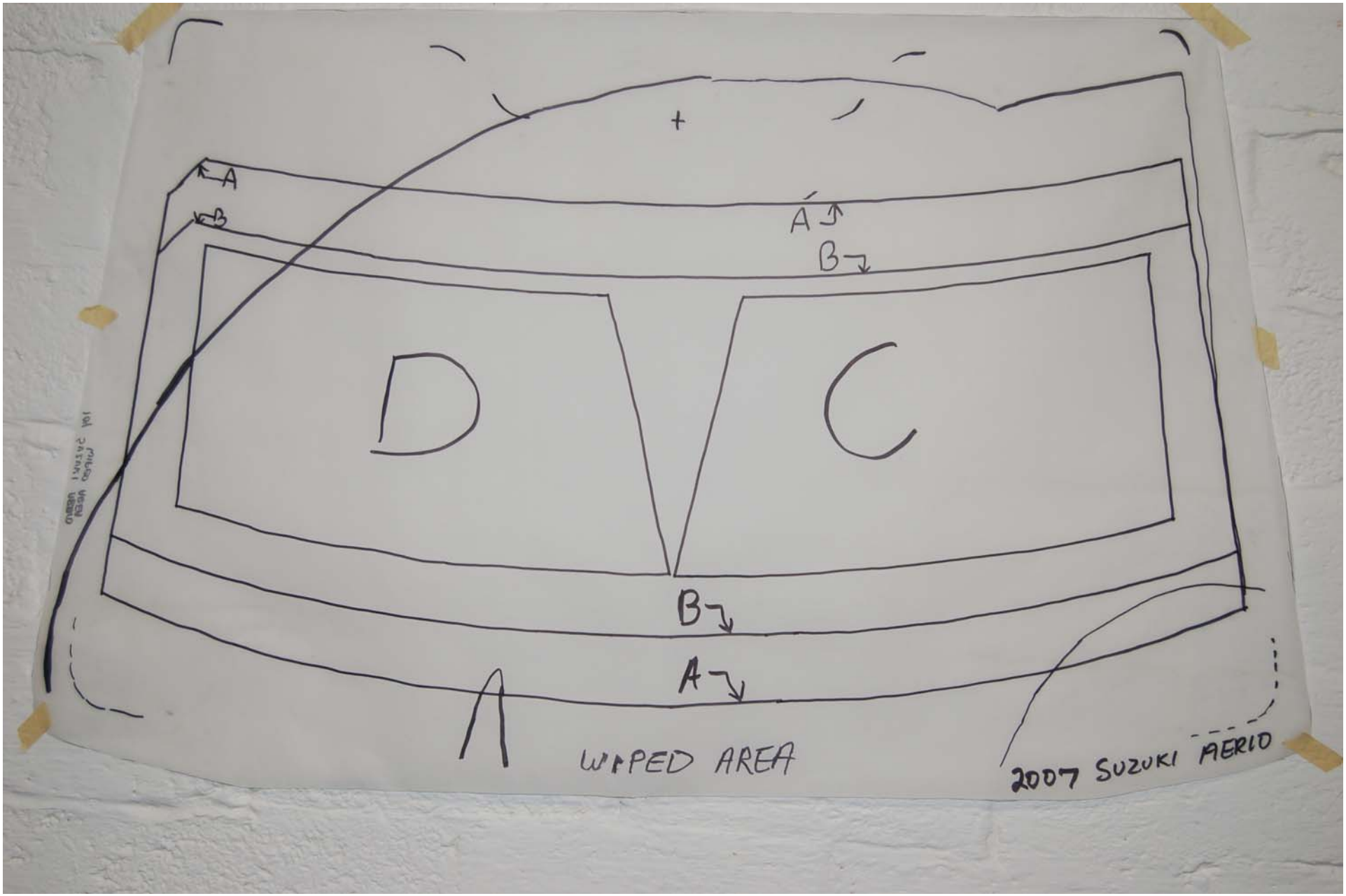
FIGURE 5.6
VEHICLE TIRE INFORMATION LABEL

2007 SUZUKI AERIO
NHTSA NO. C70503
FMVSS NO. 104

FIGURE 5.7
INSTRUMENTATION AND EQUIPMENT SET-UP

2007 SUZUKI AERIO
NHTSA NO. C70503
FMVSS NO. 104

FIGURE 5.8
WIPED AREA TEST IN PROGRESS



2007 SUZUKI AERIO
NHTSA NO. C70503
FMVSS NO. 104

FIGURE 5.9
WIPED AREA TEST PATTERN

2007 SUZUKI AERIO
NHTSA NO. C70503
FMVSS NO. 104

FIGURE 5.10
CAPABILITY TEST #1 PRE-COATED WINDSHIELD

2007 SUZUKI AERIO
NHTSA NO. C70503
FMVSS NO. 104

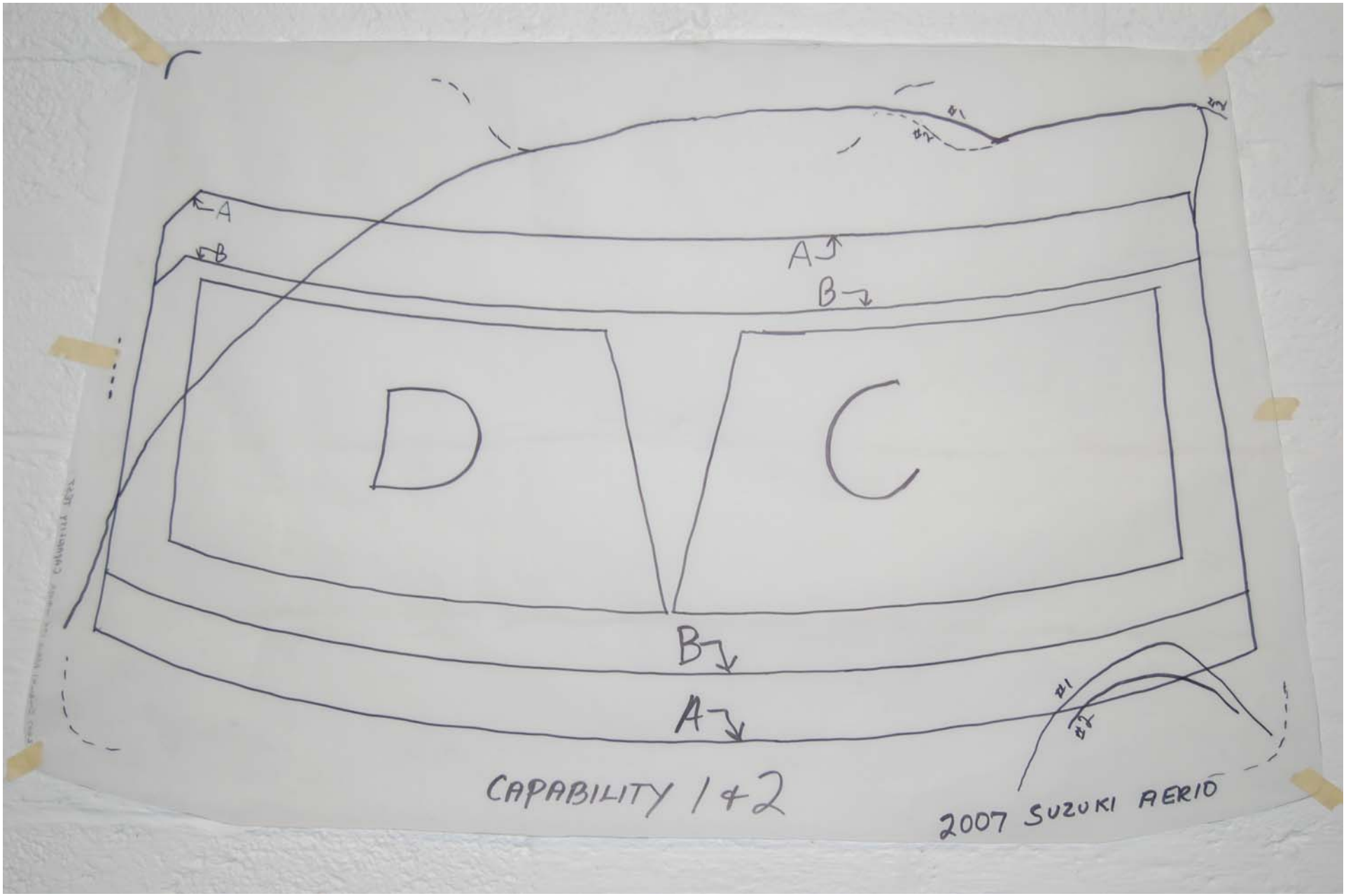
FIGURE 5.11
CAPABILITY TEST #1 IN PROGRESS

2007 SUZUKI AERIO
NHTSA NO. C70503
FMVSS NO. 104

FIGURE 5.12
CAPABILITY TEST #2 PRE-COATED WINDSHIELD

2007 SUZUKI AERIO
NHTSA NO. C70503
FMVSS NO. 104

FIGURE 5.13
CAPABILITY TEST #2 IN PROGRESS



2007 SUZUKI AERIO
NHTSA NO. C70503
FMVSS NO. 104

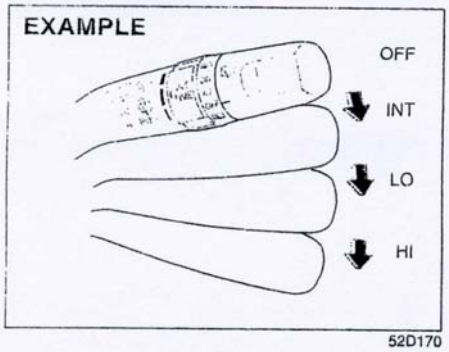
FIGURE 5.14
CAPABILITY TEST #1 AND #2 PATTERN

SECTION 6

OWNER'S MANUAL INFORMATION

Windshield Wiper and Washer Lever

Windshield Wipers



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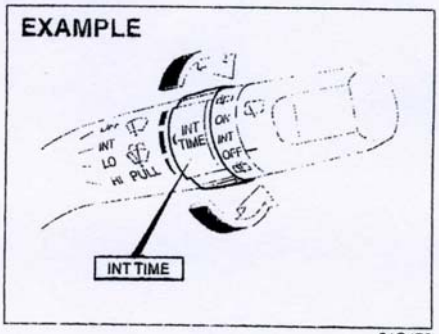
To turn the windshield wipers on, move the lever down to one of the three operating positions. In the "INT" position (if equipped), the wipers operate intermittently. The "INT" position is very convenient for driving in mist or light rain. In the "LO" position, the wipers operate at a steady low speed. In the "HI" position, the wipers operate at a steady high speed. To turn off the wipers, move the lever back to the "OFF" position.



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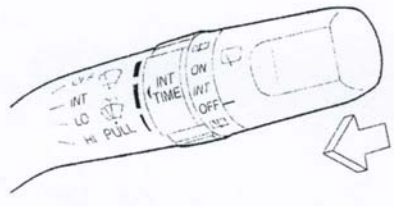
If the lever is equipped with the "INT TIME" control, turn the control forward or rearward to adjust the intermittent wiper operation to the desired interval.

Windshield Washer

EXAMPLE



52D172

To spray windshield washer fluid, pull the lever toward you. The windshield wipers will automatically turn on at low speed if they are not already on and if the "INT" position is equipped.

⚠ WARNING

- To prevent windshield icing in cold weather, turn on the defroster to heat the windshield before and during windshield washer use.
- Do not use radiator antifreeze in the windshield washer reservoir. It can severely impair visibility when sprayed on the windshield, and can also damage your vehicle's paint.

CAUTION

To help prevent damage to windshield wiper and washer system components, you should take the following precautions:

- Do not continue to hold in the lever when there is no windshield washer fluid being sprayed or the washer motor can be damaged.
- Do not attempt to remove dirt from a dry windshield with the wipers or you can damage the windshield and the wiper blades. Always wet the windshield with washer fluid before operating the wipers.
- Clear ice or packed snow from the wiper blades before using the wipers.
- Check the washer fluid level regularly. Check it often when the weather is bad.
- Only fill the washer fluid reservoir 3/4 full during cold weather to allow room for expansion if the temperature falls low enough to freeze the solution.