

135-TRC-04-004

**SAFETY COMPLIANCE TESTING FOR FMVSS 135
Passenger Car Brake Systems**

Ford Motor Company
2004 Ford Freestar S, 5-Door MPV
NHTSA No. C40203

TRANSPORTATION RESEARCH CENTER INC.

10820 State Route 347
East Liberty, Ohio 43319



Final Report Completed: March 18, 2004

FINAL REPORT

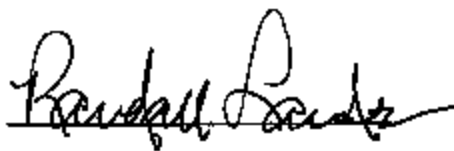
Prepared Under Contract No.: DTNH22-01-C-21025

**U.S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Safety Assurance
Office of Vehicle Safety Compliance
400 Seventh Street, SW
Room 6115 (NVS-221)
Washington, DC 20590**

Prepared for the Department of Transportation, National Highway Traffic Safety Administration,
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Prepared By



Approved By



Approval Date:

3/17/04

Final Report Acceptance By OVSC:



Contract Technical Manager, Office of
Vehicle Safety Compliance

3/22/04

Acceptance Date

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7. AUTHOR(S): Project Manager: WALTER DUDEK Project Engineer: RANDALL A. LANDES				8. PERFORMING ORGANIZATION REPORT NO.: TRC-DOT-135-049	
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16. ABSTRACT: Compliance tests were conducted on the subject 2004 Ford Freestar S, 5-Door MPV, in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-135-00 for the determination of FMVSS 135 compliance. Test failures identified were as follows: None (Label - See Appendix C).					
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1.0 INTRODUCTION

Tests were conducted on a 2004 Ford Freestar S, 5-dr. MPV, manufactured by Ford Motor Company, to determine compliance with FMVSS 135 "Passenger Car Brake Systems." All tests were conducted in accordance with the U.S. D.O.T., NHTSA Laboratory Procedure TP 135-00 and/or the corresponding TRC Inc. test procedure that was submitted to NHTSA for their approval. The test procedure was clearly described in the submitted document and has not been repeated in this report.

All stops were performed manually.

All tests were conducted by TRC Inc. personnel using the following TRC facilities:

7.5-Mile Test Track

Vehicle Maximum Speed

Burnish

Heating Snubs and Hot Performance Stops

Brake Cooling and Recovery Stops

Skid Pad

Cold Effectiveness Stops

High Speed Effectiveness Stops

Stops with Engine Off

Failed Antilocks

Failed Variable Proportioning Valve (if applicable)

Failed Hydraulic Circuits

Brake Power Assist Unit Failures

Brake Slope

Parking Brake

Average PPC during the test period was 1.01 (Skid Pad) and 0.97 (Test Track) utilizing the ASTM E1337 w/E1336 tire method.

The test vehicle was ABS equipped. Therefore, the Wheel Lock Sequence and Adhesion Utilization Tests were not performed.

This vehicle met the requirements of FMVSS 135.

DATA SHEET 1 - VEHICLE INFORMATION

VEHICLE SPECS

Year: 2004	NHTSA No: C40203
Mfr: FORD MOTOR CO.	GVWR (Kg): 2567.0
Make: FORD	GAWR Front(Kg): 1322.0
Model: FREESTAR S	GAWR Rear(Kg): 1252.0
Body Style: MPV 4-DOOR	Wheelbase (mm): 3086.1
Mfr. Date: 09/03	Odometer: Start: 74 MI. End: 534 MI.
VIN: 2FMZA50624BA08509	

BUSES ONLY

Chassis Mfg.: N/A
Serial No.: N/A
No. of Seats: N/A
Manufacture Date: N/A

Engine Type: GASOLINE, 6CYL, OHV, EFI, PISTON.	Tire Size: P225/60R16
Displacement: 3.9 LITER	Tire Type: 97S, SYMMETRY, GREENX, M&S, STEEL
Engine Hspwr: N/A	Tire Mfr.: MICHELIN
Idle Speed(rpm): 68.2774	GVWR Front Press. (kpa): 241.32
Transmission Type: AUTO. 4-SPD, FWD	GVWR Rear Press. (kpa): 241.32
No. of Axles: 2	

BRAKE APPLY SYSTEM

Brake Series: Front: DISC Rear: DISC	Power Assist Unit: YES
Brake Actuation	Pwr Unit w/Accumulator: NO
(Hydr. Circuit Split): DIAGONAL	Pwr Asst./Pwr Unit w/Backup: NO
Power Unit: VACUUM	Variable Prop. System: NO
Anti-Skid unit Mfr: TRW	Anti-Skid Device: YES
Parking Mechanism: YES	
Type of Parking Unit: AUTOMATIC TRANSMISSION WITH PARK DETENT.	
Mstr Cylinder Dia(mm): 26.90	Pedal Ratio: 5.3 : 1

FRONT SYSTEM BRAKE COMPONENT MATERIALS AND CONSTRUCTION:

BRAKE TYPE: DISC	Material: CAST
Drum Construction: N/A	LF Drum Shoe Cage Dia.(mm): 0.00
Disc Construction: INTGRL CAST, VENTED	RF Drum Shoe Cage Dia.(mm): 0.00
Front Brake Dia.(mm): 292.89	LF Drum Dia. RESET(mm): 0.00
Fr Disc Thickness(mm): 30.02	RF Drum Dia. RESET(mm): 0.00
Lining Construction: Bonded	
FRONT BRAKE COMPONENT DIMENSIONS AND CODES:	
Inboard (Leading)	Outboard (Trailing)
Width(mm): 51.46	Width(mm): 51.26
Length(mm): 132.72	Length(mm): 132.94
Thickness(mm): 11.58	Thickness(mm): 11.86
Lining Code/Color: FM 2136 FF	Lining Code/Color: FM 2136 FF
Hyd. Piston Dia.(mm): 51.00 (X2)	

DATA SHEET 1 - (CONTINUED)

REAR SYSTEM

BRAKE COMPONENT MATERIALS AND CONSTRUCTION:

BRAKE TYPE: DISC

Material: CAST IRON

Drum Construction: N/A

LR Drum Shoe Cage Dia.(mm): 0.00

Disc Construction: INTGR CAST,VNT

RR Drum Shoe Cage Dia.(mm): 0.00

Lining Construction: BONDED

LR Drum Dia. RESET(mm): 0.00

Rear Brake Dia.(mm): 316.03

RR Drum Dia. RESET(mm): 0.00

Rr Disc Thickness(mm): 20.09

REAR BRAKE COMPONENT DIMENSIONS AND CODES:

Inboard (Leading)

Outboard (Trailing)

Width(mm): 27.94

Width (mm): 46.18

Length(mm): 93.55

Length (mm): 93.50

Thickness(mm): 10.90

Thickness (mm): 10.82

Lining Code/Color: TX 205TB FF

Lining Code/Color: TX 205TB FF

Hyd Piston Dia (mm): 45.42

OTHER COMPONENT INFORMATION:

Friction-type Park Brake: HAND-OPERATED

Non-Service Brake Type Parking Brake: N/A

NOTE: If at any time after the test series has begun, any brake system part requires replacement or the brake system requires adjustments other than permitted in burnish and reburnish procedures, discontinue testing and notify the COTR immediately.

Technician:

Karen Eastaday
KAREN EASTADAY

Date:

03-18-04

Quality Assurance:

Ken Webster
KEN WEBSTER

		Specification and Limit				TEST RESULTS (In compliance if one stop meets requirement)					
TEST	Loading Condition	Speed (km/h)	Min. Pedal Force (N)	Max. Pedal Force (N)	Stopping Distance Requirement (m)	Shortest Stop Min. Pedal Force (N) ^{***}	Shortest Stop Max. Pedal Force Newtons (Average - N)	Shortest Stop Stopping Distance (m) (Corrected)	PASS/Fail		
Equipment Requirements					Specified Equipment	Vehicle contains specified equipment			Pass		
Vehicle Maximum Speed	LLWV	NA				173.2 km/h avg.			NA		
Bumpshock	GVWR	80				200, 80 - 0 km/h stops @ 3.0 mpsps			NA		
Wheel Lockup Sequence w/o ABS	GVWR				Lockup of front wheels prior to rear	ABS Equipped			NA		
Wheel Lockup Sequence w/o ABS	LLWV					ABS Equipped			NA		
Adhesion Utilization w/o ABS	LLWV				Rear axle adhesion utilization curve below specified value			ABS Equipped			NA
Adhesion Utilization w/o ABS	GVWR							ABS Equipped			NA
Cold Effectiveness	GVWR	100	85	600	70	5	480.4	48.5	Pass		
High Speed Effectiveness	GVWR	138.6	85	600	spd. depend. - 142.6	5	489.6	80.8	Pass		
Stops with Engine Off	GVWR	100	85	600	70	5	479.9	48.3	Pass		
Cold Effectiveness	LLWV	100	85	600	70	5	486.2	48.1	Pass		
High Speed Effectiveness	LLWV	138.6	85	600	spd. depend. - 142.5	5	481.5	84.9	Pass		
Failed Antilock	LLWV	100	85	500	85	6	225.7	66.8	Pass		
Failed Proportioning Valve	LLWV	100	85	600	110	5	NA	NA	NA		
Failed Hydraulic Circuit #1	LLWV	100	85	500	168	5	480.2	80.1	Pass		
Failed Hydraulic Circuit #2	LLWV	100	85	500	168	5	487.4	86.0	Pass		
Failed Hydraulic Circuit #1	GVWR	100	85	500	168	5	481.8	87.7	Pass		
Failed Hydraulic Circuit #2	GVWR	100	85	500	168	5	493.5	88.7	Pass		
Failed Antilock	GVWR	100	85	600	85	5	222.4	68.8	Pass		
Failed Proportioning Valve	GVWR	100	85	600	110	5	NA	NA	NA		
Power Brake Unit Failure	GVWR	100	85	600	168	5	490.7	145.8	Pass		
Parking Brake - Uphill	GVWR	-	-	400	Hold for 6 min.?	NA	382.3	Yes-Holds	Pass		
Parking Brake - Downhill	GVWR	-	-	400	Hold for 5 min.?	NA	376.0	Yes-Holds	Pass		
Heating Snubs	GVWR	120-80	NA	NA	15 Snubs- 3.0 mpsps	6	53 Vts. Avg.	NA	NA		
Hot Performance Stop #1	GVWR	100	85	361	73.2	5	388.4 (282.0)	48.9	Pass		
Hot Performance Stop #2	GVWR	100	85	500	88	5	636.1	80.7	Pass*		
Brake Cooling	GVWR	50	NA	NA	4 Stops - 3.0 mpsps	5	67 Vts. Avg.	NA	NA		
Recovery Performance Stop #1	GVWR	100	85	361	One of the two stops between 85.8 and 38.1 meters	5	376.8 (284.3)	49.7	Pass		
Recovery Performance Stop #2	GVWR	100	85	351		5	423.9 (307.2)	47.2			
Final Inspection-Brake Integrity	Check components for detachment, fracture or lubricants.					No detachments or fractures-normal appear. & color.			Pass		
Final Inspection-Reservoir/Warning Indicators	Master cylinder or brake power reservoir shall meet the volume and label requirements of S5.4.2 and S5.4.3.					Brake system has sufficient capacity and indicators are in compliance.			Pass*		

*** Note: The Shortest Stop Minimum Pedal Force represents the minimum force value required to engage the data acquisition's recording mode. *See Appendix C.

DATA SHEET 3 - VEHICLE WEIGHT

VEHICLE: 2004 FORD FREESTAR S

NHTSA No. C40203 Date: 02/19/04

Tire Pressure(cold): Front (kpa) 241. Rear (kpa) 241

Odometer: Start 74 MI. End 534 MI.

Scale(s) Used: TRC Toledo Scales

NOTE: GVWR, LLVW and axle weights to be measured within +0% and -1%.

GVWR/GAWR INFORMATION
(From Veh. Certification Label)

UNLOADED VEHICLE WEIGHT(UVW)

GVWR(Kg): 2567
GAWR Front(Kg): 1322
GAWR Rear(Kg): 1252

L Front(Kg): 575 L Rear(Kg): 394
R Front(Kg): 572 R Rear(Kg): 389
T Front(Kg): 1147 T Rear(Kg): 783
Total UVW(Kg): 1930

TARGET LIGHT LOADED WEIGHT(LLVW):

ACTUAL LIGHT LOADED WEIGHT(LLVW):

NOTE 1: LLVW = UVW+181.4Kg

NOTE 2: Weight distributed in front passenger seat area.

NOTE 3: Neither axle load at LLVW less than at UVW; ballast as required.

L Front(Kg): 624 L Rear(Kg): 434
R Front(Kg): 625 R Rear(Kg): 430
T Front(Kg): 1248 T Rear(Kg): 864
Total LLVW(Kg): 2112

L Front(Kg): 628 L Rear(Kg): 435
R Front(Kg): 621 R Rear(Kg): 428
T Front(Kg): 1248 T Rear(Kg): 862
Total Actual Test LLVW(Kg): 2111

Load: Driver/Observer 73(Kg) + Instru. 41(Kg) + Ballast 67(Kg) = 181(Kg)

FULLY LOADED TEST WEIGHT (ACTUAL GVWR)

NOTE 1: Vehicle loaded so axle loads proportional to GAWR shown previously.

NOTE 2: But no axle weight to be less than at LLVW.

NOTE 3: If weight on any axle at LLVW exceeds the axle's proportional share of the GVWR, the load required to reach GVWR is placed so that the weight on that axle remains the same as at LLVW.

L Front(Kg): 658 L Rear(Kg): 625
R Front(Kg): 660 R Rear(Kg): 625
T Front(Kg): 1318 T Rear(Kg): 1249
Total Fully Loaded GVWR(Kg): 2567

Load: Driver/Observer 73(Kg) + Instru. 41(Kg) + Ballast 523(Kg) = 637(kg)

Technician:

KAREN EASTERDAY

Date:

03-18-04

Quality Assurance:

REN WEBSTER

DATA SHEET 4 - EQUIPMENT REQUIREMENTS (S5)

SERVICE BRAKE SYSTEM (S5.1)

Vehicle equipped with a service brake system acting on all wheels? YES

Wear Adjustment (S5.1.1):

Service Brakes are compensated for wear by means of a system of automatic adjustment? YES

Describe: DISC-AUTOMATIC CLEARANCE TAKE-UP..

Wear Status (S5.1.2):

Wear status of service brakes is indicated by:

(A) Acoustic or optical device? YES

Describe: METAL TAB EMITS HIGH FREQUENCY SQUEAL WHEN WORN.

(B) Visual check outside or under vehicle? YES

Describe: FRONT&REAR:LOOK THROUGH CALIPER.

PARKING BRAKE SYSTEM (S5.2)

Vehicle equipped with a parking brake system of a friction type with solely mechanical means to retain engagement: YES

CONTROLS (S5.3)

(A) Service brakes activated by means of a foot control? YES

(B) Parking brake control is independent of the service brake control? YES

(C) Parking brake control is hand or foot operated? YES

(D) ABS, if equipped, cannot be manually disabled? YES

DATA INDICATES COMPLIANCE:

COMMENTS: NONE.

Tester/Technician:


KAREN EASTERDAY

Date:

03-18-04

Quality Assurance:


KEN WEBSTER

DATA SHEET 5 - VEHICLE MAX SPEED

VEHICLE: 2004 FORD FREESTAR S NHTSA No. C40203 Date: 02/19/04

Ambient Temperature: 49.00°F Wind Velocity: 15.00(MPH)
Road PFC: .97 Wind Direction: 169°
Odometer: Start 93(mi) End 108(mi)

TEST WEIGHT: Total (Kg): 2111 Front (Kg): 1248 Rear (Kg): 862

ESTABLISH VEHICLE MAXIMUM SPEED

VEHICLE LOAD: LLVW

GEAR: Drive

PEDAL FORCE: N/A

TEST SPEED: Maximum attainable from
a standing start in 3.2 km.

IBT: N/A

DECEL RATE: N/A

WHEEL LOCKUP: N/A

INTERVAL: N/A

1. Ballast Vehicle to LLVW
2. Accelerate at a maximum rate from a standing start for a distance of 3.2 km on a level surface.
3. Repeat in opposite direction.
4. Record speed attained in each direction and use the average of the two runs.

	DIRECTION	MAX SPEED (km/h)		Time 0 - 100 KPH (seconds)
		Visual	Recorded	
Run No. 1	South	172.7 km/h	172.7	11.93
Run No. 2	North	173.6 km/h	173.6	12.00

AVERAGE = 173.2 km/h

COMMENTS: INV DATA, Section 0001, 02/19/04, 19:34:23

Tester/Technician:

Karen Easterday
KAREN EASTERDAY

Date: 03-18-04

Quality Assurance:

Ken Webster
KEN WEBSTER

Vehicle: 2004 FORD MOTOR CO. NHTSA NUMBER: C40283
 Make: FORD
 Model: FRENSTAR S
 Body Style: MPV 4-DOOR
 Front Cold Tire Pressure: 241 (Kpa)
 Rear Cold Tire Pressure: 241 (Kpa)

Transportation Research Center, Inc.
 10820 State Route 347
 East Liberty, Ohio 43319
 (937) 666-2011 www.trcpg.com

Date Tested: 02/25/04

DATA SHEET 6 - BURNISH AT GVWR

Testing Conditions: INV DATA, Section 0503, 02/25/04, 05:22:19

Weather Conditions: 33°F Wind: 6 mph 6°

Start Odo.: 115 End Odo.: 378

Schedule:

Initial Brake Temperature Less than 100°C
 Initial Speed 80 km/h to zero
 100 stops with transmission in gear

Performance Requirements:

Interval between runs: Time necessary to reduce TWT to 100 C° or
 2 km distance, whichever occurs first.
 Constant decel rate: 1.0 m/s²
 Pedal force adjusted to maintain constant decel.
 No Lock-Up allowed longer than 0.1 sec above 15 km/h
 Vehicle must stay in lane of 3.0m

STOP #	INIT SPD (Kph)	LEFT FRONT INT (°C)	RIGHT FRONT INT (°C)	LEFT REAR INT (°C)	RIGHT REAR INT (°C)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	AVG. DECEL (m/sec²)
1	80.36	43	43	32	32	83.89	58.79	2.74
10	80.34	52	52	43	44	71.30	48.68	2.72
20	79.91	59	59	53	53	71.43	44.68	2.82
30	78.67	61	58	66	64	60.09	39.85	2.73
40	80.17	93	98	44	47	59.84	45.85	2.84
50	80.03	92	97	55	56	57.34	39.46	2.85
60	79.34	97	106	67	72	64.88	30.10	2.78
70	80.12	94	101	69	71	68.68	47.31	2.83
80	80.28	98	108	68	68	64.41	48.03	2.77
90	79.16	92	104	69	68	71.38	34.86	2.76
100	79.84	101	104	68	67	68.91	48.86	2.78
110	80.33	94	108	70	78	74.98	51.12	2.64
120	80.56	89	106	69	73	67.92	54.63	2.75
130	80.27	94	103	69	71	73.80	51.86	2.84
140	79.22	98	106	68	62	69.48	50.93	2.77
150	80.23	93	104	69	73	79.77	52.85	2.77
160	79.45	96	106	71	71	69.98	49.84	2.75
170	80.23	92	99	39	57	63.13	42.74	2.59
180	78.23	86	101	56	58	48.49	49.74	2.75
190	80.05	91	98	54	56	62.34	59.67	2.74
200	78.52	88	96	56	59	75.83	37.17	2.74

COMMENTS: THIS VEHICLE WAS EQUIPPED. DATA SHEETS 7-10 NOT INCLUDED.

BRAKE ADJUSTMENT

Schedule:

Adjust service brakes: record procedure and amount adjusted.

Left Front: DISC DISC BRAKE NO ADJUSTMENT REQUIRED
 Right Front: DISC DISC BRAKE NO ADJUSTMENT REQUIRED
 Left Rear: DISC DISC BRAKE NO ADJUSTMENT REQUIRED
 Right Rear: DISC DISC BRAKE NO ADJUSTMENT REQUIRED
 DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: KAREN MASTERDAY
 Recorded Data Processed by: MICHAEL VICKER
 Approving Laboratory Official: IAN WEBSTER

Observer: NONE
 Date: 02/12/04
 Date: 02/25/04

Vehicle: 2004 FORD MOTOR CO.
 Make: FORD
 Model: FORDSTAR S
 Body Style: MPV 4-DOOR
 Front Cold Tire Pressure: 241 (Kpa)
 Rear Cold Tire Pressure: 241 (Kpa)

NETSA NUMBER: C40202

Transportation Research Center, Inc.
 18220 State Route 387
 East Liberty, Ohio 43023
 (937) 666-2011 www.trcpg.com

Date Tested: 02/25/04

DATA SHEET 11 - COLD EFFECTIVENESS AT GVWR

Testing Conditions: IST DATA, Section 0413, 02/25/04, 09:28:10

Weather Conditions: 10°F Wind: 3 mph 11°

Start Odo.: 188

End Odo.: 392

Schedule:

Initial Brake Temperature 65 - 100 C
 Initial Speed 100 km/h to zero
 6 stops with transmission in neutral

Performance Requirements:

One Stop with:
 Stopping Distance less than 75m
 Pedal force between 65N and 850N
 No Lock-Up allowed longer than 0.1 sec above 15 km/h
 Vehicle must stay in lane of 3.5m

STOP	INIT	LEFT	RIGHT	LEFT	RIGHT	ACTUAL	CORRECTED	MAX.	AVG.	MAX.	AVG.
#	SPD	FRONT	FRONT	REAR	REAR	DISTANCE	DISTANCE	PEDAL	PEDAL	DECEL	DECEL
	(km/h)	(°C)	(°C)	(°C)	(°C)	(meters)	(meters)	(N)	(N)	(m/sec²)	(m/sec²)
1	100.57	68	72	47	49	82.1	81.5	403.68	353.86	10.45	7.17
2	100.57	70	83	52	52	82.4	81.8	419.49	381.83	11.18	6.66
3	89.86	88	81	49	54	53.8	51.7	418.83	270.70	10.81	6.80
4	89.86	81	68	50	53	48.1	49.5	488.01	283.82	11.08	7.45
5	89.82	81	92	51	50	49.4	49.3	480.43	282.58	10.94	7.54
6	89.82	81	86	51	49	50.7	50.8	463.85	357.12	10.97	7.03

STOP	DRIVER VEHICLE STOP COMMENTS		
#	(Wheel Lock up - Direction of Stop - Stay in Lane)		
1	-	NOX	SOUTH YES
2	-	NOX	SOUTH YES
3	-	NOX	SOUTH YES
4	-	NOX	SOUTH YES
5	-	NOX	SOUTH YES
6	-	NOX	SOUTH YES

Corrected Distances are used to determine shortest stopping distance.

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: KAREN BASTENRAY
 Recorded Data Processed by: MICHAEL PICKER
 Approving Laboratory Official: KEN WHEATZER

Observer: NONE
 Date: 03/12/04
 Date: 03/15/04

Vehicle: 2004 FORD MOTOR CO. METSA NUMBER: E40101

Make: FORD

Model: FORDSTAR 8

Body Style: MYV 4-DOOR

Front Cold Tire Pressure: 341 (Kpa)

Rear Cold Tire Pressure: 341 (Kpa)

Transportation Research Center, Inc.

10820 State Route 343

East Liberty, Ohio 43319

(614) 665-2811 www.trcpg.com

Date Tested: 02/25/04

DATA SHEET 12 - HIGH SPEED EFFECTIVENESS AT GVWR

Testing Conditions: INV DATA, Section 0019, 02/25/04, 11:09:27

Weather Conditions: 32°F Wind: 7 mph 1° Start Odo: 353 End Odo: 401

Schedule:

Initial Brake Temperature: 48-100°C

Initial Speed: 80+ km/h, not greater than 100km/h

6 stops with transmission in gear

Performance Requirements:

One Stop with:

Stopping Distance less than: 142.5 meters

Pedal Force between 60N and 800N

No Lock-Up allowed longer than 0.1 sec above 18 km/h

Vehicle must stay in lane or 3.0m

STOP #	INIT SPD (km/h)	LEFT FRONT	RIGHT FRONT	LEFT REAR	RIGHT REAR	ACTUAL DISTANCE (km)	CORRECTED DISTANCE (km)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	MAX. DECEL (m/sec²)	AVG. DECEL (m/sec²)
		INT (°C)	INT (°C)	INT (°C)	INT (°C)						
1	137.39	74	84	38	41	94.8	94.8	449.14	339.20	10.83	7.83
2	137.18	77	88	38	39	81.5	81.5	448.86	348.84	11.97	7.85
3	138.92	82	88	36	39	90.3	89.9	526.64	357.12	12.25	7.37
4	137.40	85	92	37	40	90.2	91.7	487.24	375.60	12.35	7.45
5	136.14	73	82	30	36	89.1	89.6	489.78	394.16	12.80	6.85
6	138.18	71	74	27	32	91.6	92.1	480.06	360.68	11.54	7.82

STOP #	DRIVER VEHICLE STOP COMMENTS		
	(Wheel Lock up - Direction of Stop - Stay in Lane)		
1	-	NOX	SOUTH YES
2	-	NOX	SOUTH YES
3	-	NOX	SOUTH YES
4	-	NOX	SOUTH YES
5	-	NOX	SOUTH YES
6	-	NOX	SOUTH YES

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: KAREN HASTEDAY

Observer: NONE

Recorded Data Processed by: MICHAEL FICKER

Date: 03/12/04

Approving Laboratory Official: INV HESTER

Date: 03/18/04

Vehicle: 2004 FORD MOTOR CO. NHTSA NUMBER: C40203

Make: FORD

Model: F150 F150

Body Style: F150 4-DOOR

Front Cold Tire Pressure: 241 (Kpa)

Rear Cold Tire Pressure: 241 (Kpa)

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East Liberty, Ohio 43319
(927)666-2011 www.trcpg.com

Date tested: 02/25/04

DATA SHEET 13 - STOPS WITH ENGINE OFF AT GYRE

Testing Conditions: INT DATA, Section 0025, 02/25/04, 13:55:06

Weather Conditions: 16°F Wind: 5 mph 27°

Start Odo.: 405 End Odo.: 411

Procedure:

Initial Brake Temperature: 55-100°C

Initial Speed 100 km/h to zero

4 stops with transmission in neutral

Performance Requirements:

One Stop with:

Stopping Distance less than 70m

Pedal force between 65N and 800N

No Lock-Up allowed longer than 0.1 sec above 15 km/h

Vehicle must stay in lane of 3.5m

STOP #	INIT SPD (Kph)	LEFT FRONT INT (°C)	RIGHT FRONT INT (°C)	LEFT REAR INT (°C)	RIGHT REAR INT (°C)	ACTUAL DISTANCE (meters)	CORRECTED DISTANCE (NHTSA 999) (meters)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	MAX. DECEL (m/sec²)	AVG. DECEL (m/sec²)
1	99.55	83	76	46	48	52.2	52.6	372.52	244.51	10.02	7.13
2	99.78	84	87	46	43	51.0	51.3	422.77	304.93	10.26	7.13
3	98.78	74	81	37	37	51.3	51.4	432.57	326.54	10.32	6.92
4	99.53	84	96	44	44	49.3	49.7	429.23	349.88	10.02	7.63
5	100.61	81	89	34	37	49.7	49.3	479.90	353.48	12.84	7.26
6	99.94	72	61	30	35	50.3	50.6	454.65	356.13	10.81	7.27

DRIVER VEHICLE STOP COMMENTS

STOP # (Wheel Lock-Up - Direction of Stop - Stay in Lane)

STOP #	WHEEL LOCK-UP	DIRECTION OF STOP	STAY IN LANE
1	-	SOUTH	YES
2	-	SOUTH	YES
3	-	SOUTH	YES
4	-	SOUTH	YES
5	-	SOUTH	YES
6	-	SOUTH	YES

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: KAREN BASTEDAY

Observer: NONE

Recorded Data Processed by: MICHAEL FICKER

Date: 02/13/04

Approving Laboratory Official: IAN WEBSTER

Date: 02/18/04

Vehicle: 2004 FORD MOTOR CO.
 Make: FORD
 Model: FORD
 Body Style: MPV 4-DOOR
 Front Cold Tire Pressure: 241 (kpa)
 Rear Cold Tire Pressure: 241 (kpa)

WVTA NUMBER: 040283

Transportation Research Center, Inc.
 18810 State Route 147
 East Liberty, Ohio 43319
 (614) 656-2011 www.trc.org

Date Tested: 02/26/04

DATA SHEET 14 - COLD EFFECTIVENESS AT LIVE

Testing Conditions: INV DATA, Section 0410, 02/26/04, 10:35:00

Weather Conditions: 34°F Wind: 4 mph 52°

Start Odo.: 422

End Odo.: 427

Schedule:

Initial Brake Temperature: 65-100°C
 Initial Speed 100 km/h to zero
 6 stops with transmission in neutral

Performance Requirements:

One Stop with:
 Stopping Distance less than 70m
 Pedal force between 55N and 500N
 No Lock-up allowed longer than 0.1 sec above 10 km/h
 vehicle must stay in lane of 3.5m

STOP	INIT	LEFT	RIGHT	LEFT	RIGHT	ACTUAL	CORRECTED	MAX.	AVG.	MAX.	AVG.
#	SPEED	FRONT	FRONT	REAR	REAR	DISTANCE	DISTANCE	PEDAL	PEDAL	DECEL	DECEL
	(km/h)	(°C)	(°C)	(°C)	(°C)	(meters)	(meters)	(N)	(N)	(m/sec²)	(m/sec²)
1	99.54	71	76	49	41	47.7	48.1	487.69	337.56	12.23	7.25
2	99.75	81	86	41	42	47.0	47.2	489.36	361.98	12.44	7.73
3	98.81	83	82	31	32	46.7	46.8	444.34	381.33	12.67	7.22
4	99.63	70	82	35	27	46.3	46.7	502.44	379.27	12.72	7.97
5	100.48	82	94	38	32	46.8	46.1	495.16	351.29	12.17	7.39
6	99.96	76	87	26	36	46.9	46.9	512.16	348.97	12.44	7.20

STOP	DRIVER VEHICLE STOP COMMENTS			
#	(Wheel lock-up - Direction of Stop - Stay in Lane)			
1	-	NOX	SOUTH	YES
2	-	NOX	SOUTH	YES
3	-	NOX	SOUTH	YES
4	-	NOX	SOUTH	YES
5	-	NOX	SOUTH	YES
6	-	NOX	SOUTH	YES

DATA INDICATING COMPLIANCE: YES (X) NO ()

Driver: KAREN BASTENAY
 Recorded Data Processed by: MICHAEL VICKER
 Approving Laboratory Official: KEN WHESTER

Observer: NONE
 Date: 03/12/04
 Date: 03/15/04

Vehicle: 2004 FORD MOTOR CO.
 Make: FORD
 Model: F150
 Body Style: SUV 4-DOOR
 Front Cold Tire Pressure: 343 (kpa)
 Rear Cold Tire Pressure: 341 (kpa)

NETSA NUMBER: C68203

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Date Tested: 02/16/04

DATA SHEET 15 - HIGH SPEED EFFECTIVENESS AT LLVN

Testing Conditions: INV DATA, Section 8035, 02/16/04, 11:15:51

Weather Conditions: 38°F Wind: 3 mph 41°

Start Odo.: 429

End Odo.: 436

Schedule:

Initial Brake Temperature: 65-100°C
 Initial Speed: 80% max km/h
 6 stops with transmission in gear

Performance Requirements:

One Stop with:
 Stopping Distance less than 147.8m
 Pedal force between 55N and 800N
 No Lock-Up allowed longer than 0.1 sec above 15 km/h
 Vehicle must stay in lane of 3.8m

STOP #	INIT SPD (kph)	LEFT FRONT TBY (°C)	RIGHT FRONT TBY (°C)	LEFT REAR TBY (°C)	RIGHT REAR TBY (°C)	ACTUAL DISTANCE (meter)	CORRECTED DISTANCE (SAE 299) (meter)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	MAX. DECEL (m/sec²)	AVG. DECEL (m/sec²)
1	137.96	73	84	22	24	86.2	86.0	471.59	368.84	13.78	7.84
2	135.68	80	93	34	26	86.2	86.4	481.38	373.69	12.71	7.89
3	139.26	74	91	22	24	85.9	86.3	484.44	394.42	12.89	8.22
4	137.47	79	80	21	23	88.2	86.5	497.61	391.97	13.24	8.30
5	137.51	78	82	27	26	83.7	84.8	491.53	390.43	13.89	7.78
6	137.72	88	97	29	27	84.4	88.4	490.23	404.27	12.93	8.31

STOP #	DRIVER VEHICLE STOP COMMENTS				
#	(Wheel Lock-Up - Direction of Stop - Stay in Lane)				
1	-	NOX	SOUTH	YES	
2	-	NOX	SOUTH	YES	
3	-	NOX	SOUTH	YES	
4	-	NOX	SOUTH	YES	
5	-	NOX	SOUTH	YES	
6	-	NOX	SOUTH	YES	

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: KAREN KASTNER
 Recorded Data Processed by: MICHAEL PICKER
 Approving Laboratory Official: IAN WEBSTER

Observer: NONE
 Date: 03/12/04
 Date: 03/15/04

Vehicle: 2004 FORD MOTOR CO. NHTSA NUMBER: C40303
 Make: FORD
 Model: FORDSTAR II
 Body Style: SUV 4-DOOR
 Front Cold Tire Pressure: 241 (Kpa)
 Rear Cold Tire Pressure: 241 (Kpa)

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 18820 State Route 347
 East Liberty, Ohio 43319
 (937)666-2811 www.trcpg.com

Date Tested: 02/24/04

DATA SHEET 16 - ANTILOCK FUNCTIONAL FAILURE AT LHM

Testing Conditions: INV DATA, Section 0040, 02/24/04, 13:28:41

Weather Conditions: 41°F Wind: 4 mph 44° Start Odo.: 448 End Odo.: 448

Schedule:

Initial Brake Temperature: 65-100°C
 Initial Speed 100 km/h to zero
 6 stops with transmission in neutral

Performance Requirements:

One Stop with:
 Stopping Distance less than 82m
 Pedal force between 55N and 500N
 No Lock-Up allowed longer than 0.1 sec above 15 km/h
 Vehicle Must stay in lane of 1.5m

STOP	INIT	LEFT	RIGHT	LEFT	RIGHT	ACTUAL	CORRECTED	MAX.	AVG.	MAX.	AVG.
#	SPD	FRONT	FRONT	REAR	REAR	DISTANCE	DISTANCE	PEDAL	PEDAL	DECEL	DECEL
#	(km/h)	(°C)	(°C)	(°C)	(°C)	(meters)	(meters)	(N)	(N)	(m/sec²)	(m/sec²)
1	99.55	73	73	37	41	54.2	54.8	194.46	141.79	8.10	6.02
2	100.39	84	83	40	46	56.2	55.8	228.85	119.98	9.35	6.01
3	100.87	79	84	34	37	59.5	58.8	184.75	126.30	8.36	6.16
4	100.09	85	88	37	36	56.0	56.0	283.43	136.74	9.62	6.48
5	98.91	81	85	34	32	56.3	57.6	184.01	126.32	8.62	6.46
6	100.30	72	76	28	28	57.5	57.1	202.03	126.30	8.87	6.24

STOP	DRIVER VEHICLE STOP COMMENTS
#	(Wheel Lock-Up - Direction of Stop - Stay in Lane)
1	NOX SOUTH YES
2	NOX SOUTH YES
3	NOX SOUTH YES
4	NOX SOUTH YES
5	NOX SOUTH YES
6	NOX SOUTH YES

How was the ABS failure induced: REMOVED 40 AMP FUSE FROM NOX UNDER HOOD ON LEFT SIDE.

Is brake system indicator lamp activated: YES (X) NO ()

Vehicle equipped: ABS/Trac-ctrl Intake: w/ABS Cam's Fail Mechanism. Data Sheet 17 not included.

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: LAREN EASTHARDY Observer: MOORE
 Recorded Data Processed by: MICHAEL PICKER Date: 03/12/04
 Approving Laboratory Official: TNN WENSTER Date: 03/25/04

Vehicle: 2004 FORD MOTOR CO. METAL NUMBER: C40203

Make: FORD

Model: F150 F150

Body Style: NPY 4-DOOR

Front Cold Tire Pressure: 241 (kpa)

Rear Cold Tire Pressure: 241 (kpa)

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Date Tested: 02/26/04

DATA SHEET 18 - HYDRAULIC CIRCUIT FAILURE #1 AT LLYN

Testing Conditions: LMY DATA, Section 0050, 02/26/04, 11:04:04

Weather Conditions: 42°F Wind: 11 mph 31° Start Odo.: 448 End Odo.: 451

Method of simulating failure: disconnected brake line @ M/C Front Port

System Portion Failed: LF & RH

Schedule:

Initial Brake Temperature: 65-100°C

Initial Speed 100 km/h to zero

4 stops with transmission in neutral

Performance Requirements:

One Stop with:

Stopping Distance less than 15m

Pedal force between 250 and 500N

No Lock-Up allowed longer than 0.1 sec above 10 km/h

Vehicle must stay in lane of 3.5m

STOP	INIT SPD (km/h)	LEFT FRONT INT (°C)	RIGHT FRONT INT (°C)	LEFT REAR INT (°C)	RIGHT REAR INT (°C)	ACTUAL DISTANCE (meters)	CORRECTED DISTANCE (SEE 205) (meters)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	MAX. DECEL (m/sec²)	AVG. DECEL (m/sec²)
1	99.71	27	33	46	19	89.5	90.1	480.16	390.36	6.74	4.13
2	101.07	21	77	34	16	91.6	91.9	510.00	495.79	7.14	4.07
3	98.92	17	31	41	15	90.8	91.8	519.68	391.85	7.28	4.09
4	98.38	16	31	39	14	87.5	90.4	488.83	386.27	7.14	4.11

STOP DRIVER VEHICLE STOP COMMENTS
(Wheel Lock-Up - Direction of Stop - Stay in Lane)

STOP	1	2	3	4
WHEEL LOCK-UP	-	-	-	-
DIRECTION OF STOP	SOUTH	SOUTH	SOUTH	SOUTH
STAY IN LANE	YES	YES	YES	YES

Force Needed to Activate Brake Failure Lamp (N): N/A

Fluid Removed (ml) to Activate Brake Failure Lamp: 275

Is brake system indicator lamp activated: YES (X) NO ()

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: KAREN HASTEDAY

Observer: NONE

Recorded Data Processed by: MICHAEL PICKER

Date: 03/12/04

Approving Laboratory Official: IAN WEBSTER

Date: 03/18/04

Vehicle: 2004 FORD MOTOR CO. NHTSA NUMBER: E40283

Make: FORD

Model: F150 F250

Body Style: NPY 4-DOOR

Front Cold Tire Pressure: 241 (Kpa)

Rear Cold Tire Pressure: 241 (Kpa)

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(937)466-2011 www.tropg.com

Date Tested: 02/27/04

DATA SHEET 19 - HYDRAULIC CIRCUIT FAILURE #2 AT LLVM

Testing Conditions: INV DATA, Section 0058, 02/27/04, 09:24:18

Weather Conditions: 12°F Wind: 5 mph 15' Start Odo.: 455 End Odo.: 464

Method of simulating failure: Disconnected Brake Line @ M/C Rear Port

System Portion Failed: RV & LR

Schedule:

Initial Brake Temperature 81-100°C

Initial Speed 100 km/h to zero

4 stops with transmission in neutral

Performance Requirements:

One Stop with:

Stopping Distance less than 16m

Pedal force between 40N and 600N

No Lock-Up allowed longer than 0.1 sec above 15 km/h

Vehicle must stay in lane of 3.5m

STOP	INIT SPD [kph]	LEFT FRONT TBT [°C]	RIGHT FRONT TBT [°C]	LEFT REAR TBT [°C]	RIGHT REAR TBT [°C]	ACTUAL DISTANCE (meter)	CORRECTED DISTANCE (SEE 289) (meter)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	MAX. DECEL (m/sec²)	AVG. DECEL (m/sec²)
1	99.94	83	12	11	54	87.1	87.3	474.77	198.90	7.18	4.42
2	100.40	86	12	8	42	86.8	86.8	482.12	287.51	8.89	6.09
3	100.87	81	12	7	28	86.1	86.0	487.38	271.60	6.80	3.98
4	99.17	82	11	7	14	86.4	86.3	492.10	253.98	6.84	3.63

STOP # DRIVER VEHICLE STOP COMMENTS
 (Throttle Lock-Up - Direction of Stop - Stay in Lane)

STOP #	DRIVER	VEHICLE	STOP COMMENTS
1	-	NOX	SOUTH YES
2	-	NOX	SOUTH YES
3	-	NOX	SOUTH YES
4	-	NOX	SOUTH YES

Pedals Needed to Activate Brake Failure Lamp (N): 5/A

Fluid Removed (ml) to Activate Brake Failure Lamp: 270

Is brake system indicator lamp activated: YES (X) NO ()

Comments: Stop#2 - DAS continued to log - low averages.

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: KAREN EASTENDAY

Observer: NONE

Recorded Data Processed by: MICHAEL VICINA

Date: 03/12/04

Approving Laboratory Official: KEN WEBSTER

Date: 03/15/04

Vehicle: 2004 FORD MOTOR CO. METAL NUMBER: C46203

Make: FORD

Model: FORDSTAR S

Body Style: MPV 4-DOOR

Front Cold Tire Pressure: 241 (Kpa)

Rear Cold Tire Pressure: 241 (Kpa)

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West Liberty, Ohio 43383

1937655-3811 www.trcpg.com

Date Tested: 03/27/04

DATA SHEET 20 - HYDRAULIC CIRCUIT FAILURE #1 AT GVWR

Testing Conditions: INV DATA, Section 0250, 02/27/04, 13:14:43

Weather Conditions: 43°F Wind: 5 mph 52° Start Odo.: 473 End Odo.: 477

Method of simulating failure: Disconnected Brake Line @ M/C Front Port

System Portion Failed: L8 & R2

Procedure:

Initial Brake Temperature 55-100°C

Initial Speed 100 km/h to zero

5 stops with transmission in neutral

Performance Requirements:

One Stop with:

Stopping Distance less than 1.8m

Pedal force between 45N and 500N

No Lock-Up allowed longer than 0.1 sec above 10 km/h

Vehicle must stay in lane of 3.5m

STOP	INIT	LEFT	RIGHT	LEFT	RIGHT	ACTUAL	CORRECTED	MAX.	AVG.	MAX.	AVG.
#	SPD	FRONT	FRONT	REAR	REAR	DISTANCE	(SEE 255)	PEDAL	PEDAL	DECEL	DECEL
	(km/h)	(°C)	(°C)	(°C)	(°C)	(meters)	(meters)	(N)	(N)	(m/sec²)	(m/sec²)
1	100.62	25	93	86	20	88.8	87.7	481.79	381.18	5.93	4.31
2	100.03	21	97	62	18	91.8	91.6	473.80	392.71	6.89	4.06
3	100.36	21	87	38	16	91.1	90.6	501.94	414.42	6.21	4.02
4	100.02	21	87	54	16	89.8	88.7	504.57	381.69	6.08	4.05

STOP	DRIVER VEHICLE STOP COMMENTS		
#	(Wheel Lock-Up - Direction of Stop - Stay in Lane)		
1	NOX	SOUTH	YES
2	NOX	SOUTH	YES
3	NOX	SOUTH	YES
4	NOX	SOUTH	YES

Is brake system indicator lamp activated: YES (X) NO ()

Comments: See Appendix C.

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: LARRY MASTERDAY

Observer: NONE

Recorded Data Processed by: MICHAEL PICKER

Date: 03/12/04

Approving Laboratory Official: KEW WEBSTER

Date: 03/18/04

Vehicle: 2004 FORD MOTOR CO. NHTSA NUMBER: C48203
 Make: FORD
 Model: FREETAR 3
 Body Style: MPV 4-DOOR
 Front Cold Tire Pressure: 241 (Kpa)
 Rear Cold Tire Pressure: 241 (Kpa)

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Date Tested: 02/27/04

DATA SHEET 21 - HYDRAULIC CIRCUIT FAILURE #2 AT GVWR

Testing Conditions: INV DATA, Section 206a, 02/27/04, 10:48:14

Weather Conditions: 38°F Wind: 5 mph 11° Start Odo.: 447 End Odo.: 478

Method of Simulating Failure: Disconnected Brake Line w/ E/C Rear Port

System Portion Failed: RF & LR

Procedure:

Initial Brake Temperature 55-100°C
 Initial Speed 100 km/h to zero
 4 stops with transmission in neutral

Performance Requirements:

One Stop with:
 Stopping Distance less than 165m
 Pedal Force between 65N and 300N
 No Lock-Up allowed longer than 0.1 sec above 15 km/h
 Vehicle must stay in lane of 3.5m

STOP	INIT	LEFT	RIGHT	LEFT	RIGHT	ACTUAL	CONNECTED	MAX.	AVG.	MAX.	AVG.
S	SPD	FRONT	FRONT	REAR	REAR	DISTANCE	DISTANCE	PEDAL	PEDAL	DECEL	DECEL
	(kph)	(°C)	(°C)	(°C)	(°C)	(meters)	(meters)	(N)	(N)	(m/sec²)	(m/sec²)
1	99.33	87	13	12	46	93.0	94.3	477.76	406.12	5.93	4.10
2	100.44	93	14	11	63	90.4	95.7	492.49	410.39	6.54	4.20
3	98.74	93	14	10	67	92.3	94.7	495.84	403.52	6.35	4.09
4	100.26	92	16	10	60	95.5	98.0	500.40	418.03	6.36	3.89

STOP DRIVER VEHICLE STOP COMMENTS
 (Wheel Lock-Up - Direction of Stop - Stay in Lane)

STOP	1	2	3	4
1	-	NOX	SOUTH	YES
2	-	NOX	SOUTH	YES
3	-	NOX	SOUTH	YES
4	-	NOX	SOUTH	YES

Is brake system indicator lamp activated: YES (X) NO ()

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: TAREN BASTERDAY Observer: MONE
 Recorded Data Processed by: MICHAEL PICKER Date: 03/12/04
 Approving Laboratory Official: KEN WHESTER Date: 03/15/04

Vehicle: 2004 FORD MOTOR CO. NHTSA NUMBER: C48283

Make: FORD

Model: FORDSTAR 9

Body Style: MPV 4-DOOR

Front Cold Tire Pressure: 341 (Kpa)

Rear Cold Tire Pressure: 341 (Kpa)

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West Liberty, Ohio 43319

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Date Tested: 02/27/04

DATA SHEET 22 - ANTILOCK FUNCTIONAL FAILURE AT GVWR

Testing Conditions: INV DATA, Section 0070, 02/27/04, 14:23:02

Weather Conditions: 48°F Wind: 3 mph 4"

Start Odo.: 460

End Odo.: 487

Schedule:

Initial Brake Temperature 55-100°C

Initial Speed 180 km/h to zero

6 stops with transmission in neutral

Performance Requirements:

One Stop with:

Stopping Distance less than 15m

Pedal force between 653 and 500N

No lock-up allowed longer than 0.1 sec above 15 km/h

Vehicle must stay in lane of 3.5m

STOP	INIT SPD (mph)	LEFT FRONT INT (°C)	RIGHT FRONT INT (°C)	LEFT REAR INT (°C)	RIGHT REAR INT (°C)	ACTUAL DISTANCE (meters)	CORRECTED DISTANCE (SEE 289) (meters)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	MAX. DNCEL (m/sec²)	AVG. DNCEL (m/sec²)
1	108.50	71	58	58	42	65.4	66.7	225.27	157.81	6.84	5.58
2	101.38	78	59	58	42	61.1	60.8	214.28	146.84	6.81	5.21
3	98.26	75	57	49	41	61.0	61.9	218.08	185.70	7.34	5.02
4	98.87	82	57	46	41	66.8	68.3	228.31	189.80	8.26	5.96
5	99.83	87	57	46	42	59.5	59.6	198.80	162.68	6.44	6.35
6	99.41	87	57	46	42	58.0	58.6	222.39	168.73	8.19	6.52

STOP	DRIVER VEHICLE STOP COMMENTS
1	(Wheel Lock-Up - Direction of Stop - Stay in Lane)
1	NOX SOUTH YES
2	NOX SOUTH YES
3	NOX SOUTH YES
4	NOX SOUTH YES
5	NOX SOUTH YES
6	NOX SOUTH YES

How was the ABS failure induced: REMOVED 40 AMP FUSE FROM NOX UNDER HOOD ON LEFT SIDE.

Is brake system indicator lamp activated: YES (X) NO ()

Vehicle equipped: ABS/ESP - was integral w/ABS and failed separately. Data Sheet 21 not included.

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: KAREN BASTRDAY

Observer: NOME

Recorded Data Processed by: MICHAEL PICKER

Date: 03/12/04

Approving Laboratory Official: EMM WHESTER

Date: 03/15/04

Vehicle: 2004 FORD MOTOR CO. EXTRA NUMBER: C40203

Make: FORD

Model: FORDSTAR S

Body Style: SUV 4-DOOR

Front Cold Tire Pressure: 341 (Kpa)

Rear Cold Tire Pressure: 341 (Kpa)

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Date Tested: 03/02/04

DATA SHEET 24 - BRAKE POWER UNIT OR PWR ASSIST UNIT IN/OP AT GVWR

Testing Conditions: INV DATA, Section 0050, 03/02/04, 13:31:32

Weather Conditions: 51°F Wind: 15 mph 272° Start Odo.: 498 End Odo.: 508

Failure Simulation: Disconnect primary source of power.

Method of rendering inoperative: Removed Engine Vacuum Hose at Booster

Schedule:

Initial Brake Temperature 85-109°C

Initial Speed 100 km/h to zero

6 stops with transmission in Neutral

Performance Requirements:

One Stop with:

Stopping Distance less than 160m

Pedal force between 45N and 500N

No Lock-Up allowed longer than 0.1 sec above 15 km/h

Vehicle must stay in lane of 2.1m

STOP	INIT	LEFT	RIGHT	LEFT	RIGHT	ACTUAL	CORRECTED	MAX.	AVG.	MAX.	AVG.
#	SPD	FRONT	FRONT	REAR	REAR	DISTANCE	DISTANCE	PEDAL	PEDAL	DECEL	DECEL
#	(km/h)	(°C)	(°C)	(°C)	(°C)	(meters)	(meters)	(N)	(N)	(m/sec²)	(m/sec²)
1	100.87	87	82	54	52	148.5	148.7	414.41	485.92	3.27	2.55
2	98.61	97	88	56	58	152.1	153.2	489.24	466.86	3.29	2.93
3	100.11	96	88	51	54	148.2	147.8	482.45	464.08	3.48	2.59
4	100.03	96	90	47	50	145.7	145.6	499.73	483.83	3.49	2.64
5	100.09	83	78	39	43	149.3	149.0	500.20	488.88	3.48	2.68
6	95.84	88	89	44	51	143.3	143.7	500.57	468.46	3.48	2.67

DRIVER VEHICLE STOP COMMENTS

(Wheel Lock-Up - Direction of Stop - Stay in Lane)

STOP	WHEEL LOCK-UP	DIRECTION OF STOP	STAY IN LANE
#			
1	-	NOX	SOUTH
2	-	NOX	SOUTH
3	-	NOX	SOUTH
4	-	NOX	SOUTH
5	-	NOX	SOUTH
6	-	NOX	SOUTH

Is the brake system indicator lamp activated: YES () NO (X)

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: KAREN BASTARDAY

Observer: NONE

Recorded Data Processed by: MICHAEL DICKER

Date: 03/12/04

Approving Laboratory Official: KEN WHESTER

Date: 03/15/04

Vehicle: 2004 FORD MOTOR CO. METAL NUMBER: C46203

Make: FORD

Model: FERRARI 2

Body Style: MPV 4-DOOR

Front Cold Tire Pressure: 241 (Kpa)

Rear Cold Tire Pressure: 241 (Kpa)

Transportation Research Center, Inc.

10620 State Route 347

East Liberty, Ohio 43319

(614) 666-2011 www.trcny.com

Date Tested: 03/02/04

DATA SHEET 25 - PARKING BRAKE AT GVWR

Testing Conditions: INV DATA, Section 2088, 03/02/04, 14:54:44

Parking brake: AUTOMATIC TA Non-service type: N/A

Service type: HAND-OPERATED

Weather Conditions: 51°F Wind: 20 mph 704°

Start Odo.: 508

End Odo.: 508

Test Weight: Total: 3557kg

Front: 1318kg

Rear: 1249kg

Schedule:

Initial Brake Temperature <100°C or (Ambient temp.

if non-service brake type materials)

Loaded to GVWR with transmission in neutral

Drive onto 20% slope in forward and reverse directions.

Performance Requirements:

Up to Three Applies in each direction:

Parking brake must hold the vehicle stationary in both directions for 5 minutes each.

Pedal force: Hand control: <400 N

Foot control: <500 N

NOTE: For vehicles with parking brake systems not utilizing the service brake friction elements, the friction elements of such systems are to be burnished prior to parking brake tests according to the manufacturer's published recommendation as furnished to the purchaser. If no recommendations are furnished, test the system in an unburnished condition. If recommendations are furnished, record method used.

APPLY	MAX SERVICE	MAX P-BRAKE	LEFT	RIGHT	AVG	DRIVER VEHICLE STOP COMMENTS (Direction of Stop (Up/Down) - Brake holds/Inches)			
	FORCE	FORCE	FEAR	FEAR	FEAR				
#	(N)	(N)	(°C)	(°C)	(°C)				
1	122.7	162.3	37	39	38.1	0 RAPIDLY	UPHILL	HOLDS	20%
2	87.4	375.0	34	34	34.2	0 RAPIDLY	DOWNHILL	HOLDS	20%

Is brake system indicator lamp activated: YES (X) NO ()

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: KAREN HARTERDAY

Observer: NONE

Recorded Data Processed by: MICHAEL FICKER

Date: 03/12/04

Approving Laboratory Official: KEN WEBSTER

Date: 03/15/04

Vehicle: 1994 FORD MOTOR CO. NHTSA NUMBER: C48289

Make: FORD

Model: PRESTIGE 5

Body Style: MPV 4-DOOR

Front Cold Tire Pressure: 241 (Kpa)

Rear Cold Tire Pressure: 241 (Kpa)

Transportation Research Center, Inc.

10628 State Route 347

East Liberty, Ohio 43319

(637) 646-2011 www.trc.org

Date Tested: 03/02/04

DATA SHEET 26 - HEATING SNUGS AT GYMR

Testing Conditions: INV DATA, Section 2090, 03/02/04, 15:25:34

Subcycle:

Conduct 15 snugs from 120 Km/h or 800 Vmax, whichever is slower, to 1/2 of initial speed.
 Attain required decel in 1 second and maintain that decel.
 Interval between snugs is 15 seconds and NOT to initial speed.

Performance Requirements:

Initial TBT for first snug is 55-65°C
 Maintain 1.0 m/s/s deceleration
 Vehicle must stay in lane of 3.5m

SNUG #	AVG. DECEL [m/sec ²]	Time Between Snugs (seconds)	AVG. PEDAL FORCE (N)	LEFT FRONT TBT (°C)	RIGHT FRONT TBT (°C)	LEFT REAR TBT (°C)	RIGHT REAR TBT (°C)	INIT SPD (km/h)
1	2.12	--NA--	49.93	64	52	48	46	119.34
2	2.87	47	38.46	107	184	72	68	118.86
3	2.58	45	47.68	147	147	112	94	119.96
4	2.02	45	47.47	183	189	173	141	120.11
5	2.75	46	59.02	217	218	249	207	118.87
6	2.73	44	66.14	244	260	297	263	119.54
7	2.60	44	59.89	246	283	339	308	119.41
8	2.67	44	83.42	281	289	274	267	119.84
9	2.08	45	56.17	288	308	397	390	121.05
10	2.82	45	51.19	293	311	398	408	119.78
11	2.76	45	52.81	294	310	379	403	120.50
12	1.98	46	69.76	299	313	387	381	120.76
13	2.88	46	57.94	298	321	338	376	119.27
14	2.09	44	87.19	303	339	323	348	119.83
15	1.69	45	82.55	307	336	309	345	120.74

STOP DRIVER VEHICLE SNUG COMMENTS
 [Wheel Lock-Up - Direction of Stop - Stay in Lane]

STOP #	WHEEL LOCK-UP	DIRECTION OF STOP	STAY IN LANE
1	-	NOX	NOX
2	-	NOX	NOX
3	-	NOX	NOX
4	-	NOX	NOX
5	-	NOX	NOX
6	-	NOX	NOX
7	-	NOX	NOX
8	-	NOX	NOX
9	-	NOX	NOX
10	-	NOX	NOX
11	-	NOX	NOX
12	-	NOX	NOX
13	-	NOX	NOX
14	-	NOX	NOX
15	-	NOX	NOX

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: JARRE HASTEDAY

Observer: MONE

Recorded Data Processed by: MICHAEL BICKER

Date: 03/12/04

Approving Laboratory Official: IAN WEBSTER

Date: 03/18/04

Vehicle: 2004 FORD MOTOR CO. NHTSA NUMBER: C40203

Make: FORD

Model: FREETAR 2

Body Style: MPV 4-DOOR

Front Cold Tire Pressure: 341 (Kpa)

Rear Cold Tire Pressure: 341 (Kpa)

Transportation Research Center, Inc.

10020 State Route 347

East Liberty, Ohio 43119

(614) 455-2011 www.trcrg.com

Date Tested: 03/02/04

DATA SHEET 27 - HOT PERFORMANCE AT GWR

Testing Conditions: HWY DATA, Section 0055, 03/02/04, 15:35:28

Schedule:

Make 2 stops from 100 kph

Pedal Force: 1st stop is done with an average force not greater than the average recorded in the shortest GWR Cold Effectiveness stop.

2nd stop is done with a force not greater than 500 N.

No Lock-Up allowed longer than 0.1 sec above 15 km/h.

Distance Requirements are based on the following:

shortest stop in Data Sheet 11 is: 4

Initial speed of stop: 89.69 (kph)

Actual distance of stop: 49.1 (meter)

Average pedal force: 351.0 (N)

Performance Requirements:

Stop Number 1 must be equal or less than: 75.2 (meter)

In addition the stopping distance for at least one of the of the two hot stops must be equal or less than: 89 (meter)

STOP	INIT SPD (kph)	LEFT FRONT TYT (°C)	RIGHT FRONT IRT (°C)	LEFT REAR TYT (°C)	RIGHT REAR IRT (°C)	ACTUAL DISTANCE (meter)	CORRECTED DISTANCE (SEE 25)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	MAX. WHEEL SPEED (m/sec)	AVG. WHEEL SPEED (m/sec)
1	89.64	116	348	203	333	49.8	49.8	368.18	261.87	11.89	6.56
2	89.63	116	362	206	328	49.7	50.7	539.09	181.77	11.64	7.61

SEE APPENDIX C

STOP	DRIVER VEHICLE STOP COMMENTS (Wheel Lock-Up - Direction of Stop - Stay in Lane)
1	NOI WEST YES
2	NOI WEST YES

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: KAREN EASTENDAY

Observer: NONE

Recorded Data Processed by: MICHAEL WICKER

Date: 03/12/04

Approving Laboratory Official: KEN WEBSTER

Date: 03/12/04

Vehicle: 2004 FORD MOTOR CO. RETSA NUMBER: E40293

Make: FORD

Model: F250STAR S

Body Style: MPV 4-DOOR

Front Cold Tire Pressure: 241 (Kpa)

Rear Cold Tire Pressure: 241 (Kpa)

Transportation Research Center, Inc.

10820 State Route 347

near Liberty, Ohio 43219

(614) 666-2011 www.trcpi.com

Date Tested: 03/02/04

DATA SHEET 28 - BRAKE COOLING STOPS AT GYMR

Testing Conditions: INV DATA, Section 0109, 03/02/04, 15:39:40

Procedure:

Initial Brake Temperature:

Achieved on completing Hot Performance

Initial Speed 50 km/h to zero

4 stops with transmission in gear

Performance Requirements:

Constant Decel rate: 3.0 m/s/s

Pedal force adjusted as necessary

No lock-up allowed longer than 0.1 sec above 15 km/h

Vehicle must stay in lane of 3.5m

STOP	INIT	AVG.	AVG.	LEFT	RIGHT	LEFT	RIGHT
#	SPD	DECEL	PEDAL	FRONT	FRONT	REAR	REAR
	(km/h)	(m/sec ²)	(N)	(°C)	(°C)	(°C)	(°C)
1	50.75	2.41	73.79	205	120	263	275
2	50.24	2.83	60.82	243	269	229	249
3	50.26	2.63	65.00	204	119	189	212
4	50.03	2.67	67.44	174	161	137	191

STOP	DRIVER VEHICLE STOP COMMENTS		
#	(Wheel Lock up - Direction of Stop - Stay in Lane)		
1	-	NOX	WEST
2	-	NOX	NORTH
3	-	NOX	NORTH
4	-	NOX	NORTH

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: JAMES BASTARDAY

Observer: BOWE

Recorded Data Processed by: MICHAEL PICKER

Date: 03/12/04

Approving Laboratory Official: KEN WEBSTER

Date: 03/18/04

Vehicle: 2004 FORD MOTOR CO. EXTRA NUMBER: C46203

Make: FORD

Model: F150 F150

Body Style: MPV 4-DOOR

Front Cold Tire Pressure: 341 (Kpa)

Rear Cold Tire Pressure: 341 (Kpa)

Transportation Research Center, Inc.

10820 State Route 347

East Liberty, Ohio 43319

(937) 665-2811 www.trcpg.com

Date Tested: 02/02/04

DATA SHEET 29 - RECOVERY PERFORMANCE AT GVWR

Testing Conditions: INV DATA, Section 0105, 02/02/04, 15:46:33

Weather Conditions: 51°F Wind: 16 mph 271°

Start Odo.: 809

End Odo.: 827

Schedule:

Make 2 stops from 100 kph

Pedal Force: Both stops are performed with an average force not greater than the average recorded in the shortest GVWR Cold Effectiveness stop.

Performance Requirements:

One of the two stops must be within the following limits:

Upper limit of corrected stopping distance: 58.9 (meter)

Lower limit of corrected stopping distance: 36.1 (meter)

No Lock-Up allowed longer than 0.1 sec above 15 km/h.

Distance Requirements are based on the following:

shortest stop in Data Sheet 11 is: Stop 4

Initial speed of stop: 99.88 (kph)

Actual distance of stop: 49.1 (meter)

Average pedal force: 351.0 (N)

STOP	INIT SPD (kph)	LEFT FRONT TST (°C)	RIGHT FRONT TST (°C)	LEFT REAR TST (°C)	RIGHT REAR TST (°C)	ACTUAL DISTANCE (meter)	CORRECTED DISTANCE (SEE 299) (meter)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	MAX. DECEL (m/sec²)	AVG. DECEL (m/sec²)
1	100.05	181	168	144	179	50.8	49.7	376.64	334.26	11.50	6.79
2	100.03	178	181	153	183	47.2	47.2	423.93	387.18	12.20	7.18

STOP	DRIVER VEHICLE STOP COMMENTS
1	[Wheel Lock-Up - Direction of Stop - Stay in Lane]
2	

DATA INDICATES COMPLIANCE: YES (X) NO ()

Driver: KAREN HARTERDAY

Observer: NONE

Recorded Data Processed by: MICHAEL PICKER

Date: 02/12/04

Approving Laboratory Official: KEN WEBSTER

Date: 02/15/04

DATA SHEET 30 (Part 1 of 5)
6.0 Test Completion Inspection (7.17)

VEHICLE: 2004 Ford Freestar S NHTSA NO.: C40203 DATE: 03/05/04

System Integrity (S5.6)

Each vehicle shall meet the complete performance requirements of this standard without:

(a) Detachment or fracture of any component of the braking system such as brake springs and brake shoes or disc pad facings, other than minor cracks, that do not impair attachment of the friction facings. All mechanical components of the braking system shall be intact and functional. Friction facing tearout (complete detachment of lining) shall not exceed 10 percent of the lining on any single frictional element.

(b) Any visible brake fluid or lubricant on the friction surface of the brake or leakage at the master cylinder or brake power unit reservoir cover, seal, and filler openings.

Friction Material Condition: Primary/Inner		Friction Material Condition: Secondary/Outer	
LF	Normal Appearance & Color	LF	Normal Appearance & Color
RF	Normal Appearance & Color	RF	Normal Appearance & Color
LR	Normal Appearance & Color	LF	Normal Appearance & Color
RR	Normal Appearance & Color	RR	Normal Appearance & Color
Drum (or Rotor) Condition:		Brake Fluid/Lubricant Inside Brakes:	
LF	Normal Appearance & Color	LF	None
RF	Normal Appearance & Color	RF	None
LR	Normal Appearance & Color	LR	None
RR	Normal Appearance & Color	RR	None
Hydraulic Component Condition:		Mechanical Component Condition:	
LF	Good	Brk/Pedal	Good
RF	Good	Power Brk	Good
LR	Good	Stop/Lamp	Good
RR	Good	Linkage	Good
M/Cyl	Good	Other	NA

COMPLIANCE: Yes X No

Comments: Special Note: Though the description states normal appearance and color, all of the linings possessed a moderate number of surface fractures, approx. 0.4 mm in depth, across their surfaces. There was no "chunk out" or pieces of lining missing.

Technician: K. Easterday

DATA SHEET 30 (Part 2 of 5)
TEST COMPLETION INSPECTION (\$7.17)

VEHICLE: 2004 Ford Freestar S; NHTSA NO.: C40203; GVWR: 2567 kg
MASTER CYLINDER RESERVOIR:

DATE	03/04/04	Requirements	Pass	Fail
Reservoir Compartments (\$5.4.1)				
(1) Does master cylinder have a reservoir compartment for each brake subsystem?	Yes	Master cylinder shall have a reservoir compartment for each subsystem.	X	
	No			
(2) Does loss of fluid in one compartment result in complete loss from another compartment?	Yes	Loss of fluid from one compartment shall not cause complete loss from another compartment.	X	
	No			
Reservoir Capacity (\$5.4.2)				
Shall conform to requirements (1) or (2), state units: (1) For reservoirs having completely separate compartments for each subsystem (two separate, independent reservoirs):				
Subsystem 1 Subsystem reservoir capacity		Each compartment (reservoir) shall have a minimum capacity equivalent to the fluid displacement resulting when all wheel cylinders or caliper pistons serviced by that independent compartment/reservoir moves from a new lining, fully retracted position to a fully worn, properly adjusted, fully applied position. (Use Data Sheet 31 and Appendix 1A)	NA	NA
Subsystem 1 Fluid displaced from new to worn lining				
Subsystem 2 Subsystem reservoir capacity			NA	NA
Subsystem 2 Fluid displaced from new to worn lining				
2) For reservoirs utilizing a portion of the reservoir for a common supply to two or more subsystems:				
Total minimum capacity for the entire master cylinder reservoir (includes individual compartment reservoirs)	426 ml	Shall have total minimum capacity for entire reservoir for displacement resulting from all subsystem wheel cylinders or caliper pistons moving from new lining to full worn condition as above.	X	
Fluid displaced from new to worn linings (ALL linings) *Value calculated from Data Sheet 31	248.0 ml*			

Comments: None

DATA SHEET 30 (Part 3 of 5)

TEST COMPLETION INSPECTION (\$7.18)

VEHICLE: 2004 Ford Freestar S; NHTSA NO.: C40203; GVWR: 2567 kg

MASTER CYLINDER RESERVOIR:

DATE	03/04/04		Requirements	Pass	Fail
Master Cylinder Piston Displacement(\$5.4.2) [If Common Reservoir Supply - continued from previous page]					
Fluid displaced by three strokes of master cylinder piston for Primary (Subsystem No. 1)	28 ml	Individual partial compartments of reservoir shall each have a minimum of fluid equal to at least the volume displaced by the master cylinder piston servicing the subsystem during a <u>full stroke</u> of the piston. NOTE: Procedure uses three strokes to ensure an accurate measurement.			
Fluid displaced by three strokes of master cylinder piston for Secondary (Subsystem No. 2)	28 ml				
Fluid displaced per stroke, Primary	9.3 ml				
Fluid displaced per stroke, Secondary	9.3 ml				
Fluid available in partial compartment Subsystem No. 1	60 ml				
Fluid available in partial compartment Subsystem No. 2	58 ml				
Brake Power Unit Reservoir (\$5.4.2)					
Volume displaced in charging system piston or accumulator to normal operating pressure plus wheel cylinder or caliper piston displacement.		Shall have a capacity at least equal to fluid displacement required to charge the system pistons on accumulators to normal operating pressure plus displacement when wheel cylinders or caliper pistons move from new lining to full worn condition as above.	NA		
Reservoir Labeling (\$5.4.3)					
Exact copy of reservoir label: On master cylinder reservoir cap: WARNING, CLEAN FILLER CAP BEFORE REMOVING. USE ONLY DOT 3 OR 4 BRAKE FLUID FROM A SEALED CONTAINER.		Label shall read: "Warning, clean filler cap before removing; use only * fluid from a sealed container". * Fluid type specified in 49 CFR 571.118	X		
Measure letter height	3.2 mm	Letters shall be at least 3.2 mm/ 0.125" high	X		
Describe label attachment method and location. <u>Label affixed to the forward facing/vertical surface of the master cylinder reservoir.</u>		Lettering shall be permanently affixed, engraved or embossed and located so as to be visible by direct view either on or within 100 mm/3.94 inches of the brake fluid reservoir filler plug or cap.	X		
Does the lettering contrast with the background?	Yes	If label is not engraved or embossed, letters shall be of a color that contrasts with the background	X		
	No				

Comments: None

Technician: K. Easterday

DATA SHEET 30 (Part 4 of 5)

TEST COMPLETION INSPECTION (\$7.18)

VEHICLE: 2004 Ford Freestar S: NHTSA NO.: C40203; DATE: 03/04/04

BRAKE SYSTEM WARNING INDICATOR (\$5.5)

CONDITION	ANSWER	REQUIREMENTS	PASS	FAIL
Brake Systems Indicator Lamp Function Check (\$5.5.2) (Bulb and systems check)				
Describe location of brake indicator lamp: <u>Lower right quadrant of the instrument cluster.</u>	NA	Shall be in front, and in clear view, of driver.	X	
Does lamp light with Ignition (start) switch at ON/RUN?	Yes	Automatic activation when Ignition switch is "on" when engine not running, or Ignition between "on" and "start" if is manufacturer check position- OR -single manual action by driver	X	
Does lamp light with Ignition between ON and Start?	Yes			
Brake check description in owner's manual?	Yes	Manufacturer shall explain the brake check function test procedure in the owner's manual.	X	
Brake System Warning Indicator ACTIVATION (\$5.5.1) DURATION (\$5.5.3) FUNCTION (\$5.5.4)				
CONDITION	Light ON?	REQUIREMENT	PASS	FAIL
A. In event of hydraulic leak (1) On or before appearance of pressure differential of 218 psi (split system)	NA	When Ignition (Start) switch is ON, lamp must light whenever (A), (B), (C), or (D) occurs. In addition, if service brake system is not a split system, audible warning must be activated when any condition in (A) exists. Visual warning indicator for non-split systems must be flashing.	X	
(2) If any reservoir falls below either "safe" level or 25% of capacity, whichever is greater.	Yes			
(3) On or before supply pressure to brake power unit falls to 60%	NA			
B. Electrical functional failure in an antilock or variable brake proportioning system.	Yes		X	
C. Application of the parking brake.	Yes			
D. Brake lining wear-out if optical warning	NA			
Must have Audible alarm if <u>not split system</u> and a condition in (a) above exists?	NA			
If condition (A) (2) above does not exist, then fluid reservoir must be transparent for fluid check without the need for reservoir to be opened? (\$5.4.4)	NA			
Indicator lamps remain activated as long as condition exists - Ignition "on", and engine on or off? (\$5.5.3 DURATION)	Yes			
Visual warning - continuous or flashing? Audible warning - continuous or flashing?	Yes-Cont. NA			

Comments: None.

Technician: K. Easterday

DATA SHEET 30 (Part 5 of 5)
TEST COMPLETION INSPECTION (\$7.18)

VEHICLE: 2004 Ford Freestar S; NHTSA NO.: C40203; DATE: 03/04/04

BRAKE SYSTEM WARNING INDICATOR LABELING (\$5.5.5)

CONDITION AND REQUIREMENT	ANSWER NOTE: Standard requires that the answer to questions be YES	PASS	FAIL
Are visual indicators legible to driver in daylight and nighttime conditions when activated?	Yes	X	
Are visual indicator words 3.2 mm (.125") high minimum? Record Height: "Brake" - <u>3.2 mm</u> ; "ABS" - <u>2.8 mm</u> .	No		X
Visual indicator words and background contrasting colors, one of which is red. Record colors <u>Letters - Red, Lens - Black</u>	Yes	X	
If split system, is there one brake indicator? If yes, does it say the word "Brake"? <u>"BRAKE", w/one symbol.</u>	Yes	X	
If not split system; is there a separate indicator for loss of fluid or fluid pressure? Does this indicator say "Stop-Brake Failure"? Are the letters block and not less than 6.4 mm (.25") in height? Record letter height <u>NA</u>	NA		
If separate indicator for: 1. Low brake fluid per S5.5.1(a)(1), does indicator say "Brake Fluid"? NOTE: not required for mineral oil system Record wording _____ 2. Gross pressure loss per S5.5.1(a)(2), does indicator say "Brake Pressure"? Record wording _____ 3. Electrical functional failure in antilock or variable proportioning system per S5.5.1(b), letters and background contrasting colors one of which is yellow? Record colors <u>Lens - Black, Letters - Yellow (or Amber).</u> Does indicator say "Antilock" or "ABS" or "Brake Proportioning"? Record wording <u>"ABS" within symbol.</u> 4. Parking brake per S5.5.1(c), does indicator say "Park" or "Parking Brake"? Record wording _____ 5. Brake lining wear-out per S5.5.1(d), does indicator say "Brake Wear"? Record wording _____ 6. For any other function? If yes, Record _____	NA NA Yes Yes NA NA NA	X	

Comments: "ABS" letter height is less than 3.2 mm. See Appendix C.
 Technician: K. Easterday

DATA SHEET 31 (Part 1 of 2)

CALCULATION OF MINIMUM RESERVOIR VOLUME REQUIREMENTS

VEHICLE: 2004 Ford Freestar S; NHTSA NO.: C40203; DATE: 03/04/04

BRAKE		LINING		
LOCATION	TYPE	DESCRIPTION	MINIMUM THICKNESS	THICKNESS TO FULLY WORN (1) mm*
Left Front	Drum	Leading	Pre-test 11.58 mm	1.5
		Primary	Post Test 11.15 mm	
		Inboard X	Δ 0.43 mm	
	Disc X	Trailing	Pre-test 11.68 mm	1.5
		Secondary	Post Test 11.48 mm	
		Outboard X	Δ 0.20 mm	
LINING CLEARANCE:	Diametrical (2): N/A	Inboard - 0.885 mm	Outboard - 0.885 mm	
WHEEL CYLINDER DIAMETER (3): N/A		CALIPER PISTON DIAMETER (3): 51.00 mm (x2 pistons)		
SHOE CAGE DIAMETER (4) <u>N/A</u> ; CENTER POINT OF BRAKE ASSY TO CENTER POINT OF W.C. <u>N/A</u>				
Right Rear	Drum	Leading	Pre-test 10.90 mm	1.5
		Primary	Post Test 10.26 mm	
		Inboard X	Δ 0.64 mm	
	Disc X	Trailing	Pre-test 10.82 mm	1.5
		Secondary	Post Test 10.28 mm	
		Outboard X	Δ 0.63 mm	
LINING CLEARANCE:	Diametrical (2) - N/A	Inboard - 0.15 mm	Outboard - 0.15 mm	
WHEEL CYLINDER DIAMETER (3): N/A		CALIPER PISTON DIAMETER (3): 45.42 mm		
SHOE CAGE DIAMETER (4): N/A		CENTER POINT OF BRAKE ASSY TO CENTER PT. OF W.C.: N/A		
CIRCUIT #1 CONSISTS OF:	LF - X	LR	RF	RR - X
CIRCUIT #2 CONSISTS OF:	LF	LR - X	RF - X	RR - X
(1) MFRS. RECOMMENDATIONS - 1.5 mm, front and rear.				
(2) REAR - TOP OF RIVET HEADS - N/A.				
FRONT - 1/32 INCH - N/A. MFRS. DATA - N/A.				
(2) DRUM BRAKES, MEASURED AT HORIZONTAL CENTERLINE: N/A				
(3) MFRS. DATA: Frl: 51 mm (x2 pistons); Rear: 45 mm.				
(4) REBET POSITION: N/A				

Comments: Manufacturer's new lining thickness: Frl. - 12 mm; Rears - 10.95 mm.

Technician: K. Easterday

DATA SHEET 31 – SECTION CONTINUED (Part 2 of 2)

Vehicle: 2004 Ford Freestar S

NHTSA No.: C40203

Date: 03/15/04

Procedure and Example for Determining Master Cylinder Volume Requirement

The procedure followed for determining the minimum volume requirements is outlined in the example shown below. The required data is taken from the previous page.

DISC BRAKES

Volume Required, $V_r = (\Delta t_i + t_c + \Delta t_o + t_{oc}) \times [\pi (D^2)/4]$, where –

- V_r = Volume required per wheel
- Δt = Change in thickness (average)
- i = Inboard
- o = Outboard
- D = Caliper cylinder diameter
- c = Average clearance

Using the above equations, the volume requirements for Subsystem No. 1 (RF, LR) and Subsystem No. 2 (LF, RR) were calculated utilizing measured and manufacturer's provided data to create the greatest displacement, as shown below:

Disc Brake:
(Front)

$$V_r = (\Delta t_i + t_c + \Delta t_o + t_{oc}) \times \frac{\pi d^2}{4}$$
$$\Delta t_i = 10.50 \text{ mm}$$
$$\Delta t_o = 10.50 \text{ mm}$$
$$t_c + t_{oc} = 1.73 \text{ mm}$$
$$d = 51.00 \text{ mm}$$
$$V_r = (10.50 + 0.865 + 10.50 + 0.865) \frac{\pi (51.00)^2}{4}$$
$$= 22.73 (2042.82)$$
$$= 46433.3 \text{ mm}^3 = 46.4 \text{ ml (x2 pistons)} = 92.8 \text{ ml}$$

Disc Brake:
(Rear)

$$V_r = (\Delta t_i + t_c + \Delta t_o + t_{oc}) \times \frac{\pi d^2}{4}$$
$$\Delta t_i = 9.45 \text{ mm}$$
$$\Delta t_o = 9.45 \text{ mm}$$
$$t_c + t_{oc} = 0.3 \text{ mm}$$
$$d = 45.42 \text{ mm}$$
$$V_r = (9.45 + 0.15 + 9.45 + 0.15) \frac{\pi (45.42)^2}{4}$$
$$= 19.20 (1620.3)$$
$$= 31109.0 \text{ mm}^3 = 31.1 \text{ ml}$$

For System 1 (LF, RR)

$$V_{r1} = 92866.6 \text{ mm}^3 + 31109.0 \text{ mm}^3$$

$$V_{r1} = 123975.6 \text{ mm}^3 = (124.0 \text{ ml})$$

For System 2 (RF, LR)

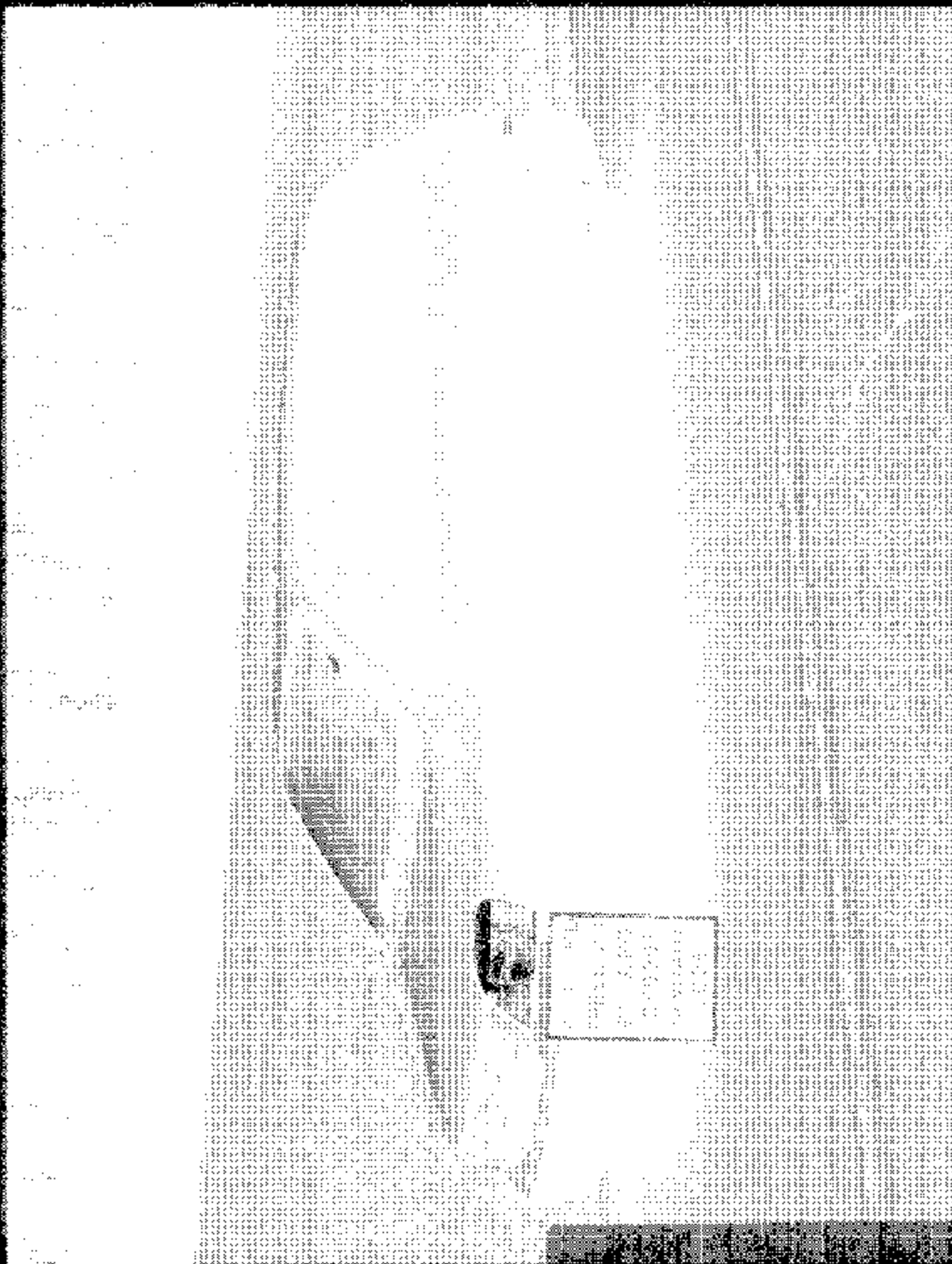
$$V_{r2} = V_{r1}$$

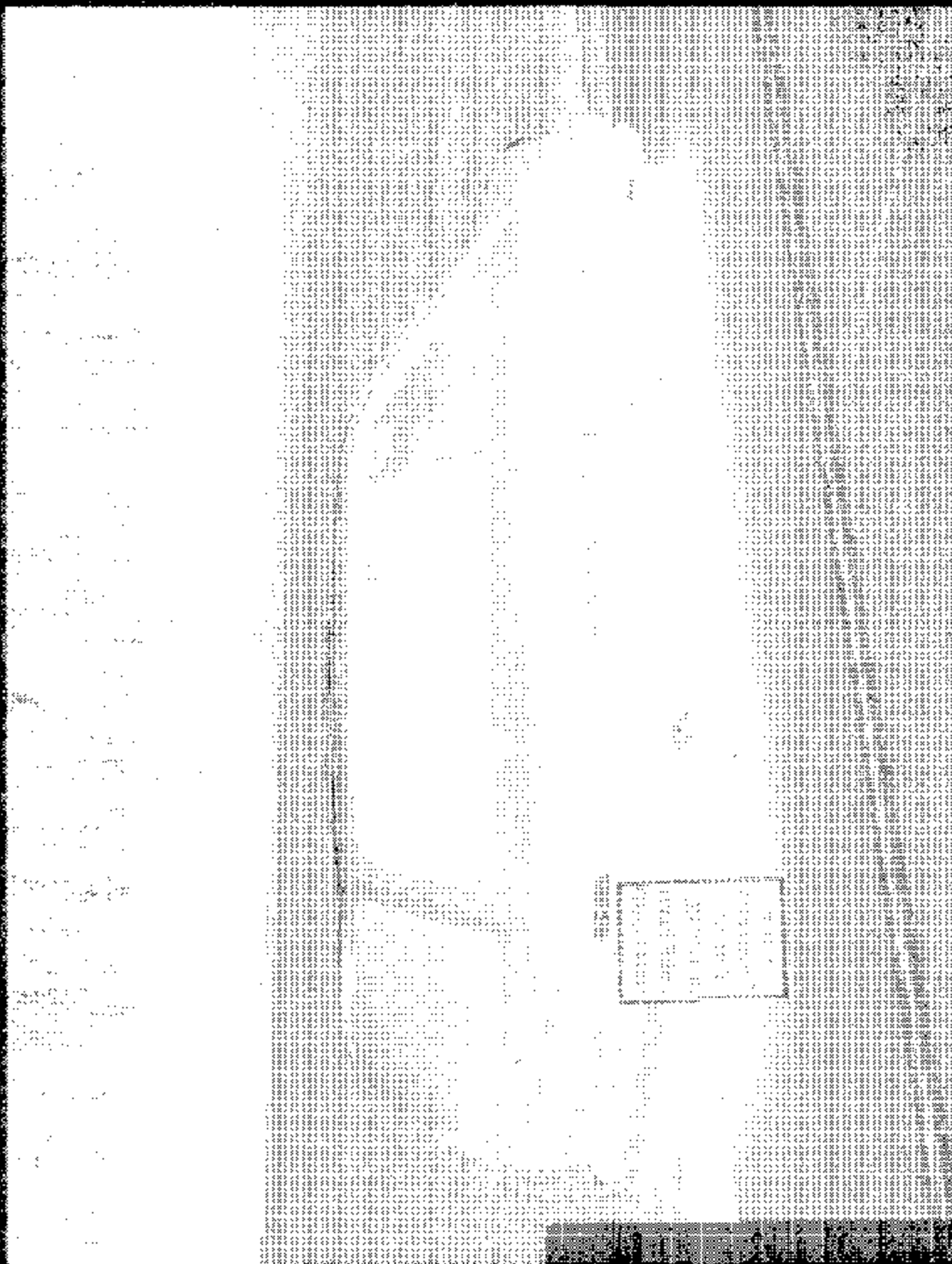
$$V_{r2} = 123975.6 \text{ mm}^3 = (124.0 \text{ ml})$$

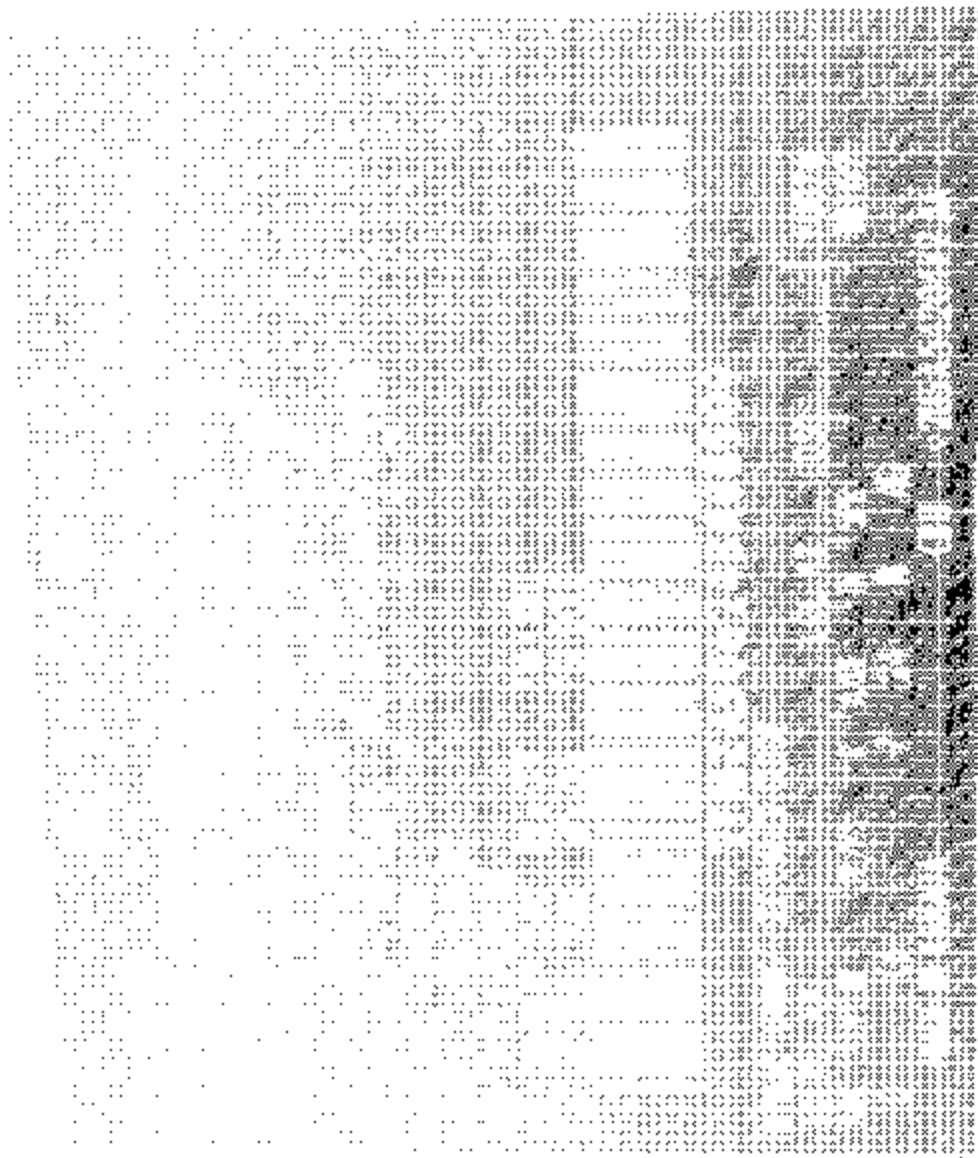
$$\text{TOTAL VOLUME REQUIRED} = V_t = V_{r1} + V_{r2} = 247951.1 \text{ mm}^3 = 248.0 \text{ ml}^*$$

SECTION 6.0

Photographs







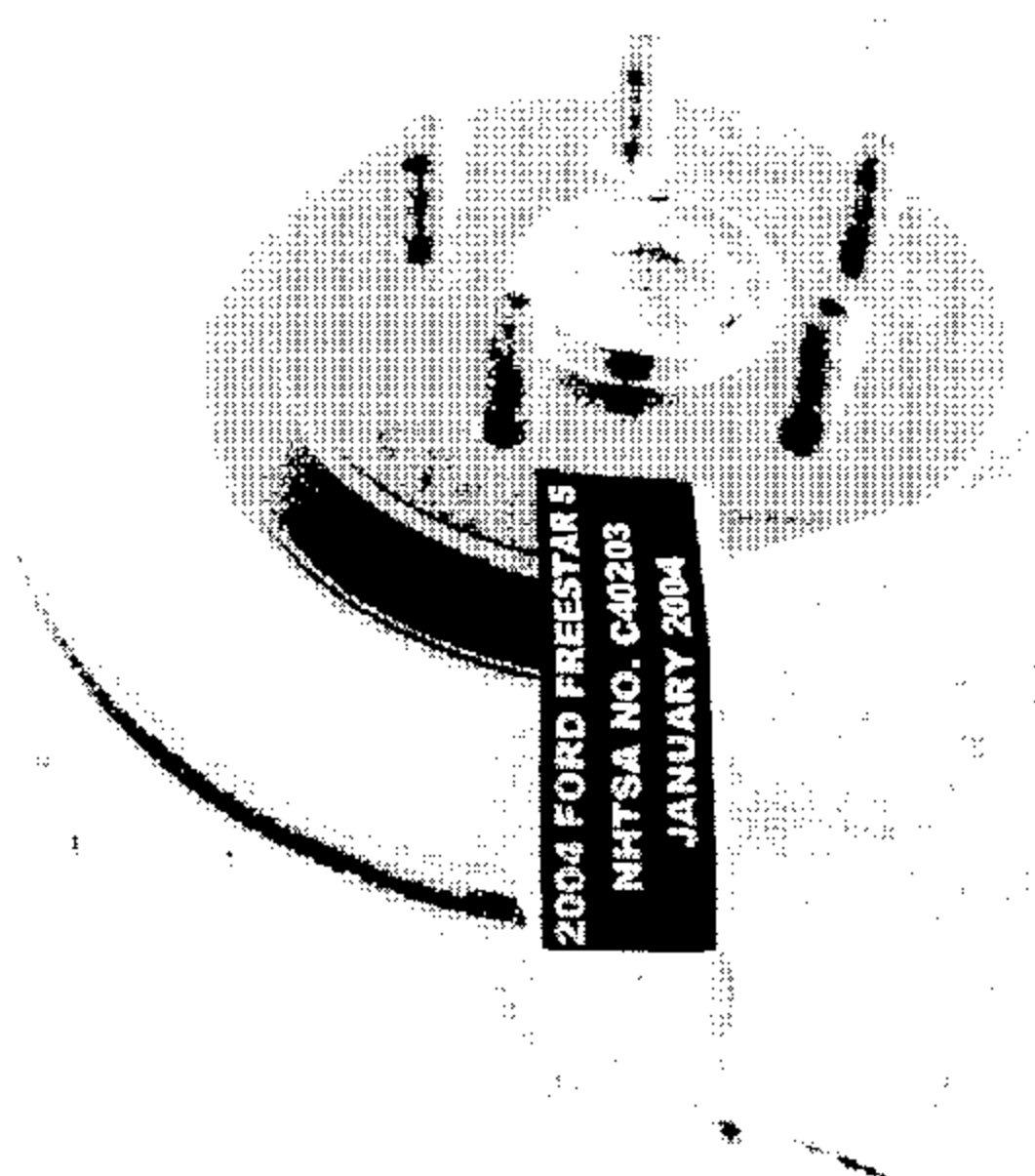
2004 FORD FREESTAR S

NHTSA NO. C40203

JANUARY 2004

2004 FORD FREESTAR S
NHTSA NO. C40203
JANUARY 2004

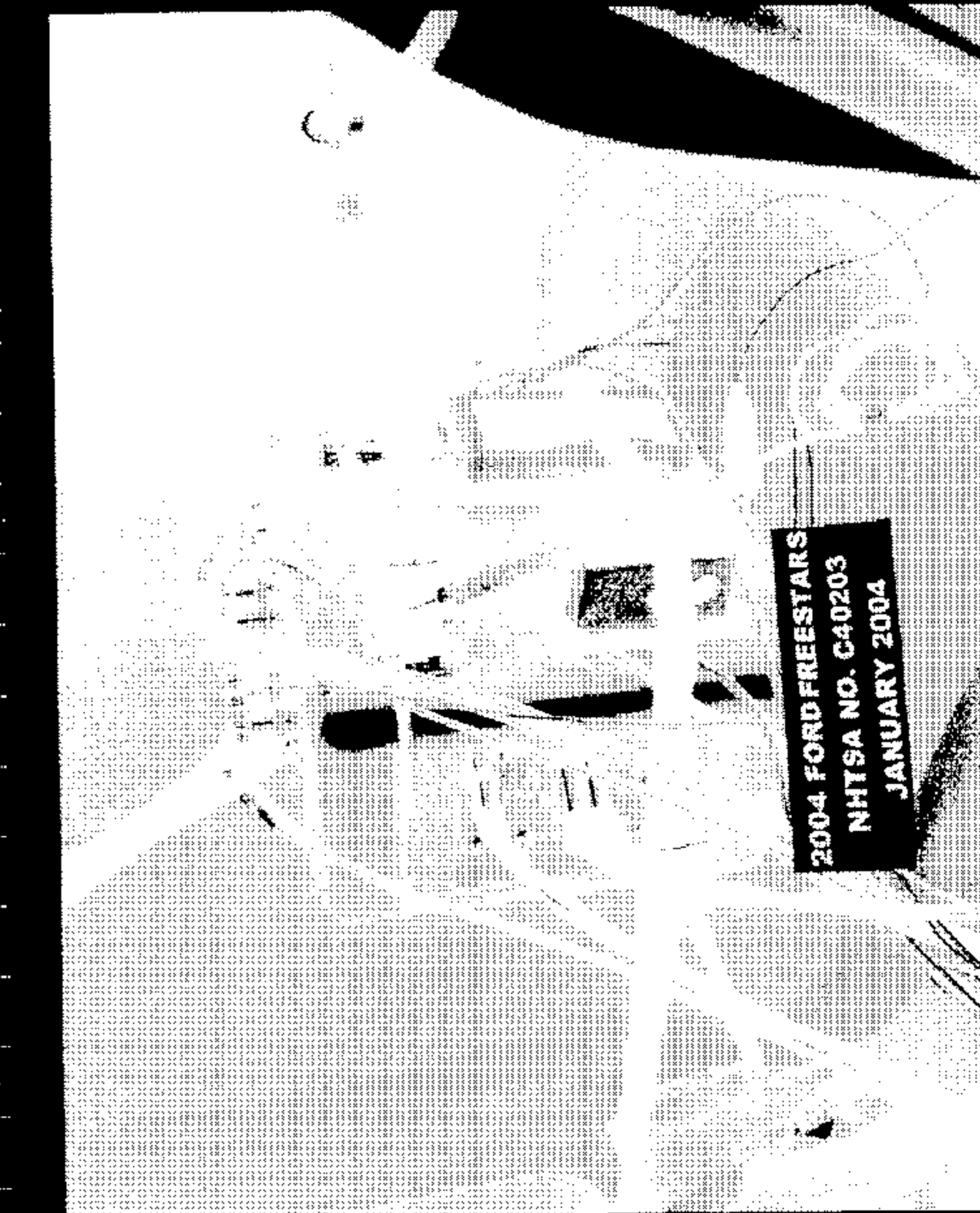
LEFT
FRONT



2004 FORD FREESTAR S
NHTSA NO. C40203
JANUARY 2004

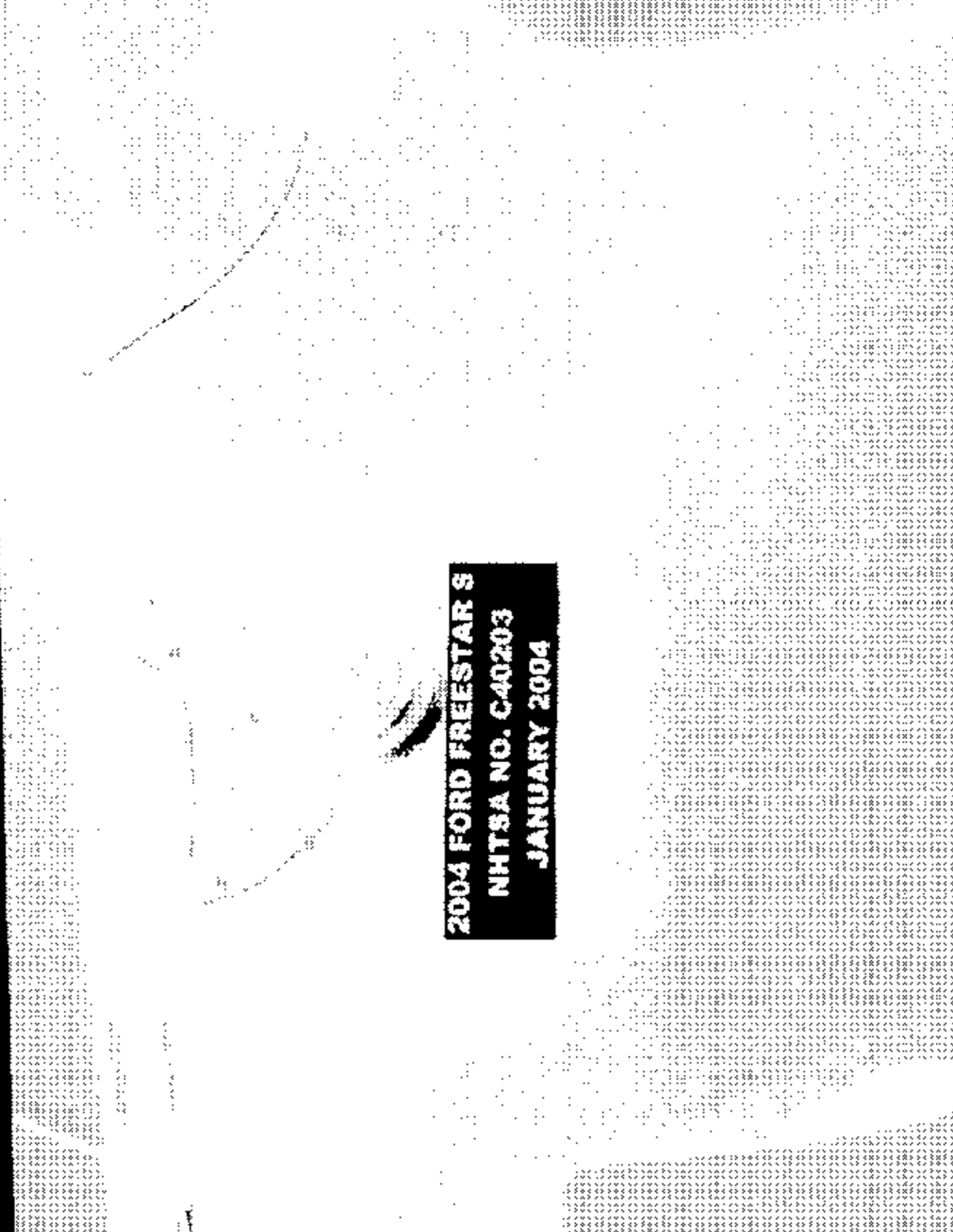
**RIGHT
REAR**



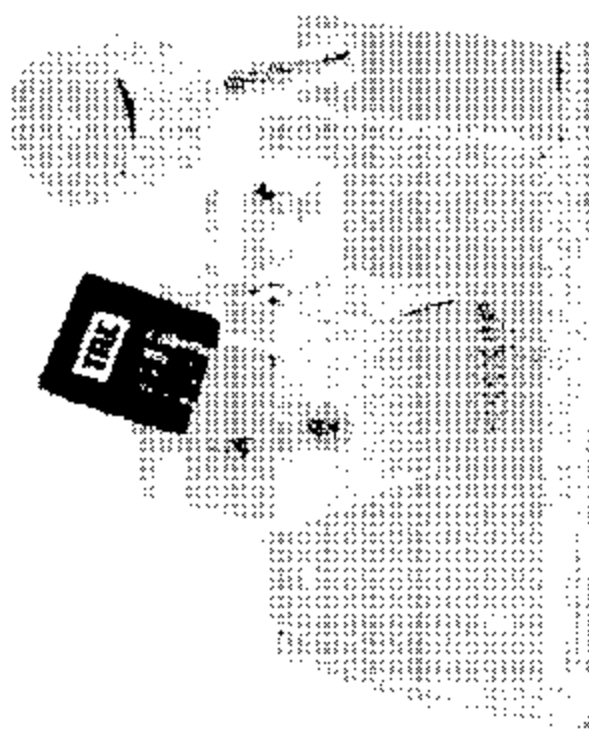


2004 FORD FREESTARS
NHTSA NO. C40203
JANUARY 2004

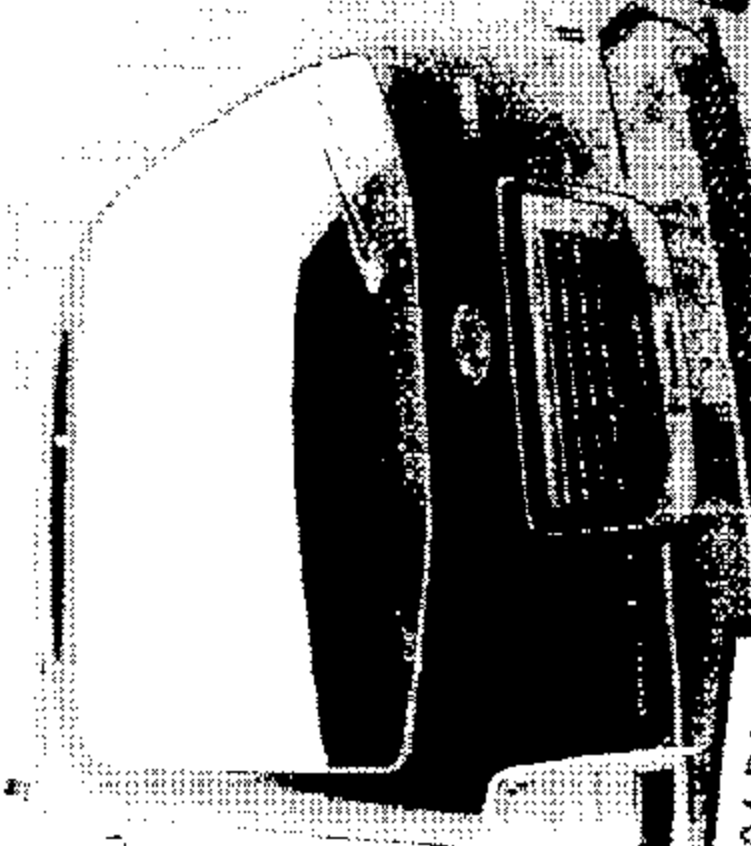
2004 FORD FREESTAR S
NHTSA NO. C40203
JANUARY 2004



2004 FORD FREESTAR S
NHTSA NO. C40203
JANUARY 2004



FORD FORD FORD STAR S
NHTSA NO. C40203
JANUARY 2004



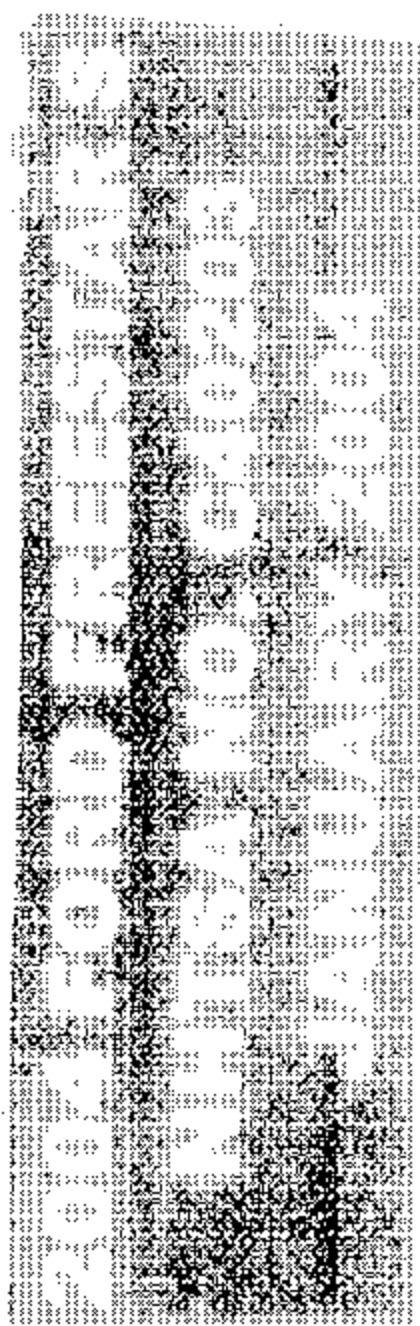
2004 FORD
FREESTAR
NHTSA NO.
C40203
JANUARY
2004

2004 FORD FREESTARS
NHTSA NO. C40203
JANUARY 2004

2004 FORD FREESTARS
NHTSA NO. C40203
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2004 FORD FREESTARS
NHTSA NO. C40203
JANUARY 2004

2004 FORD
FREESTAR S
NHTSA NO. C40203
JANUARY 2004



2004 FORD FREESTAR S
NHTSA NO. C40203
JANUARY 2004

IN FILE
A BRAKE
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OSE
BR

7.0 INSTRUMENT CALIBRATION (12 MONTH MAXIMUM INTERVAL)
VEHICLE: 2004 Ford Freestar S; NHTSA NO.: C40203; DATE: 02/20/04

INSTRUMENT	SERIAL NUMBER	CALIBRATION DATE	NEXT CALIBRATION
Data Acquisition System - Link DAS 2030	975016	10/23/03	10/23/04
Computer - Dell Latitude/Link Engr.	TRC-43207	Not Applicable	Not Applicable
Software - Link Engr. Rev Data	TRC Propr.	NA	NA
LF Torque Wheel	Not Utilized		
RF Torque Wheel	Not Utilized		
LR Torque Wheel	Not Utilized		
RR Torque Wheel	Not Utilized		
Stopwatch - Accusplit	SW ST03	04/08/03	04/08/04
Tire Pressure Gauge - Ashcroft	AG-05	11/25/03	11/25/04
Voltage Multimeter - Dana 4300	M-108639	11/25/03	11/25/04
Pedal Force Transducer - Sensor Devel.	LC-169755	Each Test	Each Test
Asst. Pipe-Handle Steel Weights - Ohaus	LB-0002	05/12/03	05/12/04
Park Brake Force Transducer - Interface	41721	Each Test	Each Test
LF Hydraulic Pressure Transducer	Not Utilized		
RF Hydraulic Pressure Transducer	Not Utilized		
LR Hydraulic Pressure Transducer	Not Utilized		
RR Hydraulic Pressure Transducer	Not Utilized		
Accelerometer - Setra (+ or - 15 g) 141A	A-1055763	Each Test	Each Test
Fifth Wheel - ADAT DSR-06 Radar	140.0119	Each Test	Each Test
Wind Velocity/Direct. - Davis Model 6410	WXB308193A	09/15/03	09/15/04
Ambient Temp. Gage - Davis Model 6320	WXB308193A	09/15/03	09/15/04
LF Brake Thermocouple - Temprel/Link	T52-0B-24K	Ea. Test w/Link	Ea. Test w/Link
RF Brake Thermocouple - Temprel/Link	T52-0B-24K	Ea. Test w/Link	Ea. Test w/Link
LR Brake Thermocouple - Temprel/Link	T52-0B-24K	Ea. Test w/Link	Ea. Test w/Link
RR Brake Thermocouple - Temprel/Link	T52-0B-24K	Ea. Test w/Link	Ea. Test w/Link
Lock-up Detection System	TRC Propr.	Each Test	Each Test
Vehicle Weight - Toledo/Mettler	7561RD4011 SN 5825831- 5JC	01/29/04	04/29/04

QUALITY ASSURANCE

DAILY CALIBRATIONS (1 of 3)

Vehicle: 2004 Ford Freestar S

NHTSA No.: G40203

Deceleration Calibration Data for Unit 4353

Desired full scale value is: 9.81 m/s/s

Allowed deviation is: + or - 0.15 m/s/s

Accelerometer Level to zero, then tilt to full scale

"Date"	"Time"	Zero	Cal
"stp"	"stp"	"Decel"	"Decel"
2/19/2004	18:23:33	-0.06	9.79
2/23/2004	9:12:12	0.01	9.80
2/23/2004	15:50:23	0.03	9.79
2/24/2004	8:23:50	0.06	9.81
2/25/2004	9:22:22	0.03	9.82
2/25/2004	15:52:22	-0.02	9.79
2/26/2004	10:31:56	-0.03	9.82
2/26/2004	16:44:49	0.07	9.79
2/27/2004	9:11:09	0.06	9.79
2/27/2004	15:14:21	-0.12	9.83
3/2/2004	13:00:06	0.02	9.81
3/2/2004	15:54:11	0.03	9.74
3/4/2004	8:48:56	0.00	9.89

PRE-TEST CAL

POST-TEST CAL

Pre-Test Linearity Check 02/20/04

Actual (m/s/s)	Rec. (m/s/s)
0.0	0.0
3.0	3.0
6.1	6.1
9.8	9.8

Post-Test Linearity Check 03/04/04

Actual (m/s/s)	Rec. (m/s/s)
0.0	0.0
3.0	3.0
6.1	6.1
9.8	9.8

Distance Calibration Data for Unit 4353

Desired full scale value is: 1000 m

Allowed deviation is: 3 m

Light beam Drive from 0 to 100 to 0 km/h
distance sensor on a measured kilometer

"Date"	"Time"	Distance for
"stp"	"stp"	1000 meters
2/19/2004	18:06:36	1000.6
2/23/2004	9:12:59	1000.0
2/23/2004	15:48:41	999.4
2/24/2004	8:32:36	999.3
2/25/2004	9:19:06	999.9
2/25/2004	15:59:27	999.4
2/26/2004	10:29:22	999.6
2/26/2004	16:49:26	999.9
2/27/2004	9:19:35	999.7
2/27/2004	15:21:11	999.6
3/2/2004	13:09:26	999.3
3/2/2004	15:57:56	999.3

PRE-TEST CAL

DAILY CALIBRATIONS CONTINUED (2 of 3)

VEHICLE: 2004 Ford Freestar S

NHTSA No.: C40203

Wheel Tachometer Calibrations for Unit 4353

Wheel tachometer calibration: all wheel speeds should be 15 km/h

Date	Time	Zero	@15km/h	Zero	@15km/h	Zero	@15km/h	Zero	@15km/h	
		LF	LF	RF	RF	LR	LR	RR	RR	
02/19/2004	19:12:04	0.0	18.9	0.0	18.4	0.0	18.1	-0.9	17.9	PRE-TEST CAL
02/25/2004	9:17:39	0.0	18.3	0.0	18.3	0.0	17.5	-1.7	18.1	
02/25/2004	15:56:37	0.0	18.6	-0.1	16.7	0.0	16.3	0.0	16.6	
02/26/2004	10:28:13	0.0	21.7	0.0	18.6	-0.1	15.9	0.0	17.1	
02/26/2004	18:48:05	0.0	23.8	0.0	18.8	0.0	18.0	0.0	18.1	
02/27/2004	9:14:53	-0.1	25.8	0.0	18.1	0.0	16.4	-0.3	17.5	
02/27/2004	16:17:08	0.0	17.0	0.0	16.7	0.0	16.5	0.0	17.0	
3/2/2004	19:08:22	0.0	17.0	0.0	16.5	0.0	17.8	0.0	18.9	
3/2/2004	18:56:50	-0.1	17.8	0.0	16.7	0.0	17.6	0.0	20.8	

When driven over 15 km/hr and the wheel tach generators are shunted to zero volts, do all four wheel lock indicators align?: ☒ Yes, ☐ No.

Pedal Force Meter Calibration for Unit 4353

Target shunt calibration is 392 N

Desired recorded value is: 392 N

Desired recorded calibration value is: 500 N

Allowed deviation is: 6.6 N

Date	Time	Zero	Cal Val	
		Force	Force lb	
2/19/2004	17:50:51	-0.8	499.0	PRE-TEST CAL
2/23/2004	9:01:58	-0.3	392.8	
2/23/2004	15:44:14	-0.8	392.8	
2/24/2004	8:26:21	-0.2	392.8	
2/25/2004	9:12:39	-0.2	392.8	
2/25/2004	15:51:22	-0.2	392.8	
2/26/2004	10:21:07	-0.7	392.8	
2/28/2004	15:43:58	-0.3	392.7	
2/27/2004	9:10:10	-0.4	392.7	
2/27/2004	15:15:38	-0.2	392.7	
3/2/2004	19:01:30	-0.6	392.5	POST-TEST CAL
3/2/2004	15:53:41	-0.9	392.9	
3/4/2004	8:02:00	-1.1	506.2	

Pre-Test Linearity Check - 02/20/04

Actual Force (N)	Recorded Force (N)
0	0
222	223
445	445
498	498

Post-Test Linearity Check - 03/04/04

Actual Force (N)	Recorded Force (N)
0	0
222	224
445	443
498	501

DAILY CALIBRATIONS CONTINUED (3 of 3)

VEHICLE: 2004 Ford Freestar S

NHTSA No. C40203

Dynamic Speed Calibration for Unit 4353

Desired speed value is: 100 km/h

Allowed deviation is: 1.6 km/h

Desired time value is: 36 seconds

Allowed deviation is: + or - 0.6 seconds

**Light beam
speed sensor**

**Drive vehicle
at a steady
100 km/h
through a
kilometer.**

"Date"	"Time"	"Speed"	"Time"
stp	stp	km/h	sec
2/19/2004	19:13:27	100.1	36.09
2/23/2004	9:09:39	100.5	36.00
2/23/2004	15:47:06	100.3	36.15
2/24/2004	8:30:30	100.3	35.81
2/25/2004	9:16:06	100.4	36.00
2/25/2004	15:54:00	100.3	36.25
2/26/2004	10:26:36	100.2	36.20
2/26/2004	15:48:01	100.4	36.06
2/27/2004	9:17:24	100.5	36.18
2/27/2004	15:19:15	100.0	36.06
3/2/2004	13:06:50	100.5	36.03
3/2/2004	15:55:26	100.4	36.21

PRE-TEST CAL

APPENDIX A

Copy of Manufacturer's Sticker



2004 FREESTAR S
7-PASSENGER
2.4L OHV EFI ENG
4 SPD AUTO D/D

FREESTAR

**EXTENSION
MIDJAM STEEL
INTERIOR
FLINT CLOTH**

STANDARD EQUIPMENT INCLUDED AT NO EXTRA CHARGE

EXTENSION

- [illegible]

FUNCTIONAL

- POWER STEERING
- FRONT INDEPENDENT WHEELS
- 80 MPH CRUISE CONTROL
- OPTIONAL BEAM W/COIL SPRINGS
- POWER WINDOWS (2)
- 100 MILE PER HOUR FUEL TANK
- 100 MILE PER HOUR SPEEDOMETER
- 100 MILE PER HOUR OIL SYSTEM
- 4 WHEEL DISC BRAKE SYSTEM
- 4 WHEEL CHILDS SAFETY SEAT
- 4 WHEEL LOCKING SYSTEM
- 4 WHEEL FRONT END SYSTEM
- 4 WHEEL FRONT REAR BUMPER
- 4 WHEEL FRONT BUMPER TO BUMPER
- 4 WHEEL FRONT ASSISTANCE

PRICE INFORMATION

Product 1113

\$23,775.00

***INCLUDED ON THIS VEHICLE**

ADDITIONAL EQUIPMENT

413.00
39.00

DATE	DESCRIPTION	AMOUNT	BALANCE
12/31/2023	STATE OF TEXAS	24,220.00	24,220.00

CITY MAPS



Fuel Economy Information



1970-71
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 2309-10
 2310-11

Monday
 8:30 - 10:00 am
 10:30 - 12:00 pm
 12:30 - 2:00 pm
 2:30 - 4:00 pm
Tuesday

2004 FREESTAR WAGON FWD,
3.9L ENGINE
DIFFERENTIAL FUEL SYSTEM,
6 CYLINDERS, FUEL INJECTION,
CATALYST, 4-SPEED AUTOMATIC

Estimated Annual Fuel Cost: \$1705

HIGHWAY MPG

23

For Complete Shipping
all labels classified as
NON HAZARDOUS

TROPHY CASE

Ford's All-New Snar
. The 2004 Freestar

**A RANGE OF FUEL ECONOMY VALUES
FOR OTHER VEHICLES CLASSIFIED
AS SPECIAL PURPOSE IS NOT
AVAILABLE AT THIS TIME.**

Ford Extended Service Plan is an early service contract backed by Ford Motor Company and backed by over \$1,000 Ford and Lincoln Motor Company. Ask your dealer for more information. Dealers are not authorized to sell this plan. www.ford.com.

SOLD TO

Grubbs Ford Inc.

CH 43216

2PM/7A/50674RA08.509

THE OIL SHOCK

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OAKVILLE

MEMORANDUM FOR THE RECORD

100

DESIGNER: J. L. K. 1965

TOTAL MSP?

\$24,905.00

APPENDIX B
Discussion on Data

DISCUSSION ON DATA

Symbols for Brake Components

4	-	4 Wheel	G	-	Groan	DL	-	Deceleration (State FPSPS)
X	-	Skid	SQ	-	Squeal	PF	-	Pedal on Floor
L	-	Left	SQK	-	Squeak	SCP	-	Shoe Scrape
R	-	Right	PO	-	Pinchout	RB	-	Rubber Banding
R	-	Rear	P	-	Pull	O	-	Odor
F	-	Front	R	-	Shudder	NOX	-	No Skid
B	-	Both	M	-	Momentary			

INT or INIT	-	Initial Part of Stop
MID	-	Middle of Stop
END	-	End of Stop

All stops were made manually.

APPENDIX C

Contractor's Comments Procedure Modifications and Test Facility

Comments for vehicle C40203.

For all recorded decelerations:

The recorded *average* deceleration values for the tests are slightly lower than that which is required or targeted for certain test sections. However, in all cases and in reality, the driver maintained the correct required/target deceleration values for the majority of time for each of those stops. The recorded deceleration is acquired from the moment the service brake pedal is moved until the vehicle reaches zero speed. Therefore, the time needed to achieve the target deceleration (rise time) and the time the vehicle goes from the target deceleration to zero (fall time) is included in the average deceleration calculation. The rise and fall times were added to the entire length of the stops. Hence the recorded average deceleration values were generally and slightly less than the required/target deceleration values.

For Data Sheets 20 & 21 – Hydraulic Circuit Failure #1 and #2 at GVWR:

Due to the difficult accessibility and resultant complexity of accessing the master cylinder output ports, these two test sequences were performed in reverse order; #21 first, #20 second.

For Data Sheet 27 – Hot Performance at GVWR, stop number two, the driver monetarily exceeded the maximum allowable pedal force of 500 N by 39 N. The target average pedal force, however, was not exceeded and the stopping distance was less than the maximum allowable by a good margin. It is believed that, had the driver not exceeded the maximum allowable pedal effort, the vehicle would have complied with this portion of the Standard.

Regarding the Technical Documentation Page and Data Sheet 30 – Test Completion Inspection, the height of the letters for the “ABS” warning indicator were less than the required 3.2 mm. The Standard’s Engineer was notified via telephone. However, per the Standard’s Engineer, no notice of failure document was ^{required as} sent. Ford has acknowledged that this letter height issue was apparent with a previous compliance test and is known to exist across several of their model lines. NHTSA understands that Ford is correcting the issue.

7.5-MILE TEST TRACK

The 7.5-mile test track encloses a 1,600-acre area, one mile wide and 3.5 miles long.

The track has a downward grade, north to south, of 0.228 percent and a cross slope in the straightaways of 3/16 inch per foot. The 1.88 mile long straightaways flow into transition areas 2,300 feet in length and then into 5,275-foot long curves with a constant radius of 2,400 feet. The 36-foot wide straightaways and the 42-foot wide curves provide three test lanes. Paved berms, 12 feet in width, border the straightaways and the inside of the curves.

As a vehicle moves toward the outside of the track in the curves, it encounters a progressively steeper bank. The inside lane (or "slow" lane) has a bank of 10 degrees allowing a neutral speed of 80 mph with no side forces. In the center lane, the slope increases to 19 degrees resulting in a neutral speed of 110 mph. The outside lane's 28-degree bank allows a 140 mph neutral speed. Rimming the outer lane is a seven-foot safety lane culminating in a 36-degree slope at the guardrail.

The facility is paved with Portland cement concrete. It carries a maximum single axle load of 36,000 pounds and a maximum tandem axle load weight of 48,000 pounds. Special provisions can be made for heavier weight loads.

With 22.5 lane miles, our track will accommodate many vehicles simultaneously. Research which utilizes the track includes component performance and durability studies, brake tests, aerodynamic studies, fuel economy studies, drive line efficiency tests, and the determination of vehicular acceleration and cruise characteristics. In addition, it supports maximum speed determination, road load power, noise and emission measurements and tire durability test programs.

The 7.5-mile test track can be used in conjunction with other facilities at TRC. It provides an excellent area for pre-test conditioning of equipment such as brake burnishing, tire break-in, and vehicle warm-up.

TRC SKID PAD

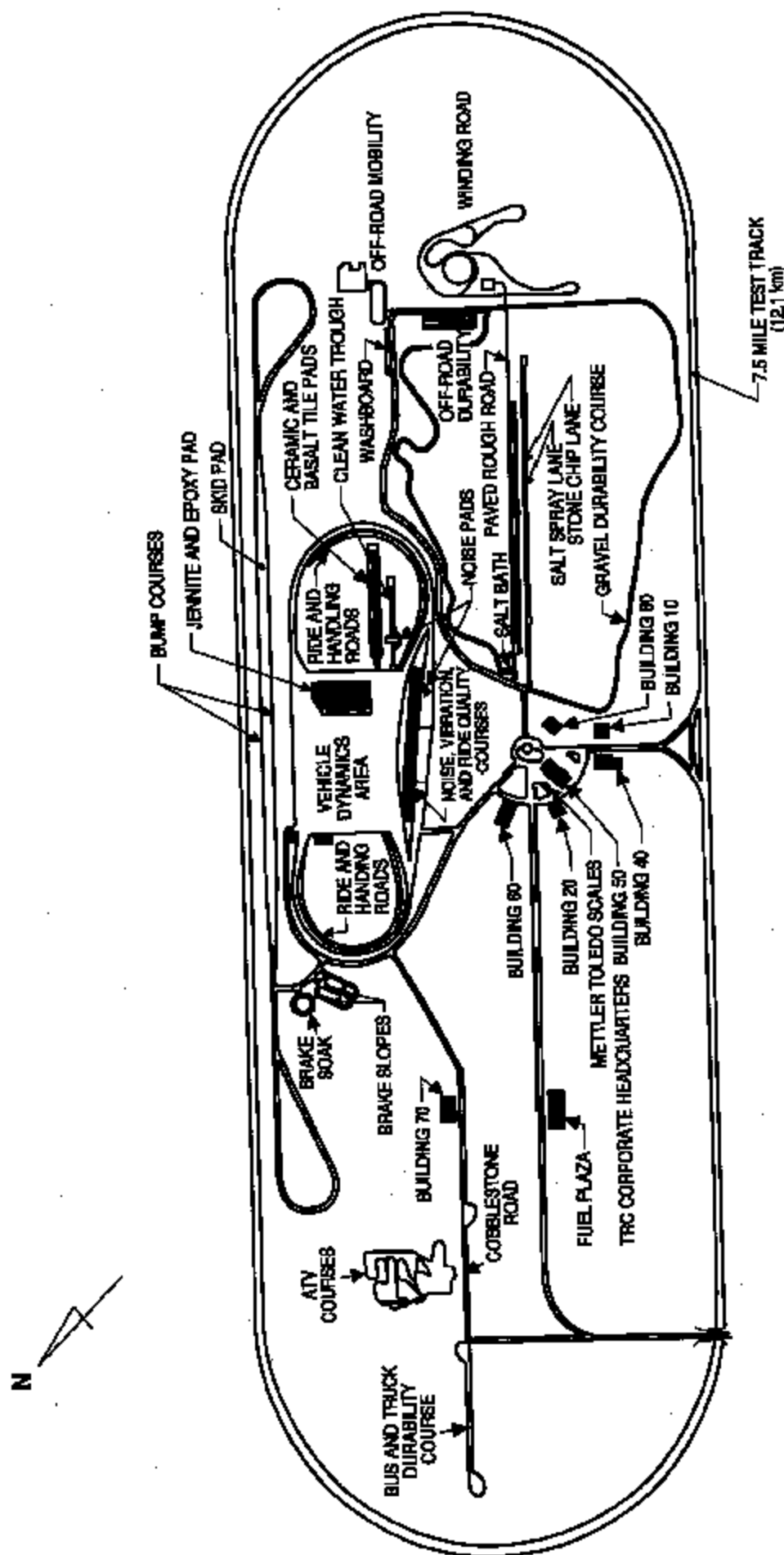
The Skid Pad is a test facility which is utilized primarily for the evaluation of tire and brake systems.

The overall dimensions of the pad are 9,000 feet by 84 feet with loops on the north and south ends. Both turnaround loops have a 309-foot radius and are 16 feet wide with a 25 percent super elevation. They will accommodate speeds of 45 mph with zero side force and 60 mph with .5 g's lateral acceleration. The acceleration/deceleration lanes at each end are 3,280 feet in length.

A test area of 210,000 square feet is situated in the center of the skid pad containing several test pads with varying surface textures. Skid numbers in this area range from 30 (wet) to 80 (dry).

The skid pad is paved with Portland cement. The load capacity of the skid pad is 36,000 pounds maximum single axle weight and 48,000 pounds maximum tandem axle weight.

Varying surface textures in the main test area are ideal for testing tire and/or brake system performance on different surfaces as characterized by "skid numbers." The skid pad is also used for acceleration studies, aerodynamics, rolling resistance, noise testing, and vehicle top speed determination.



NOT TO SCALE

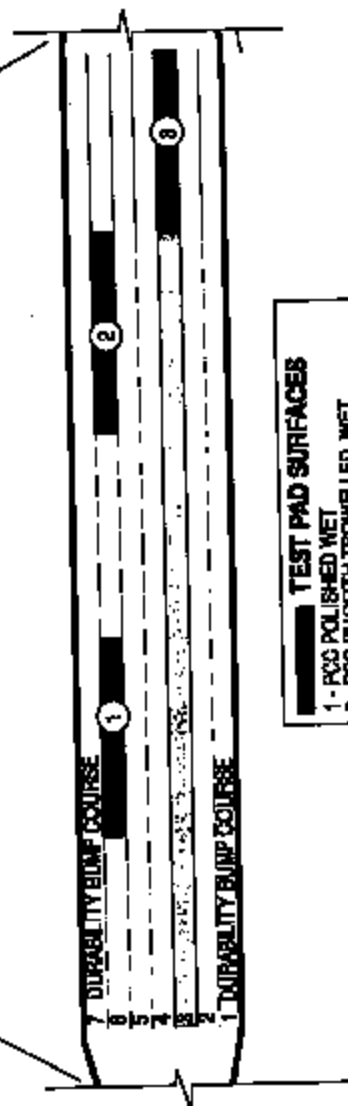
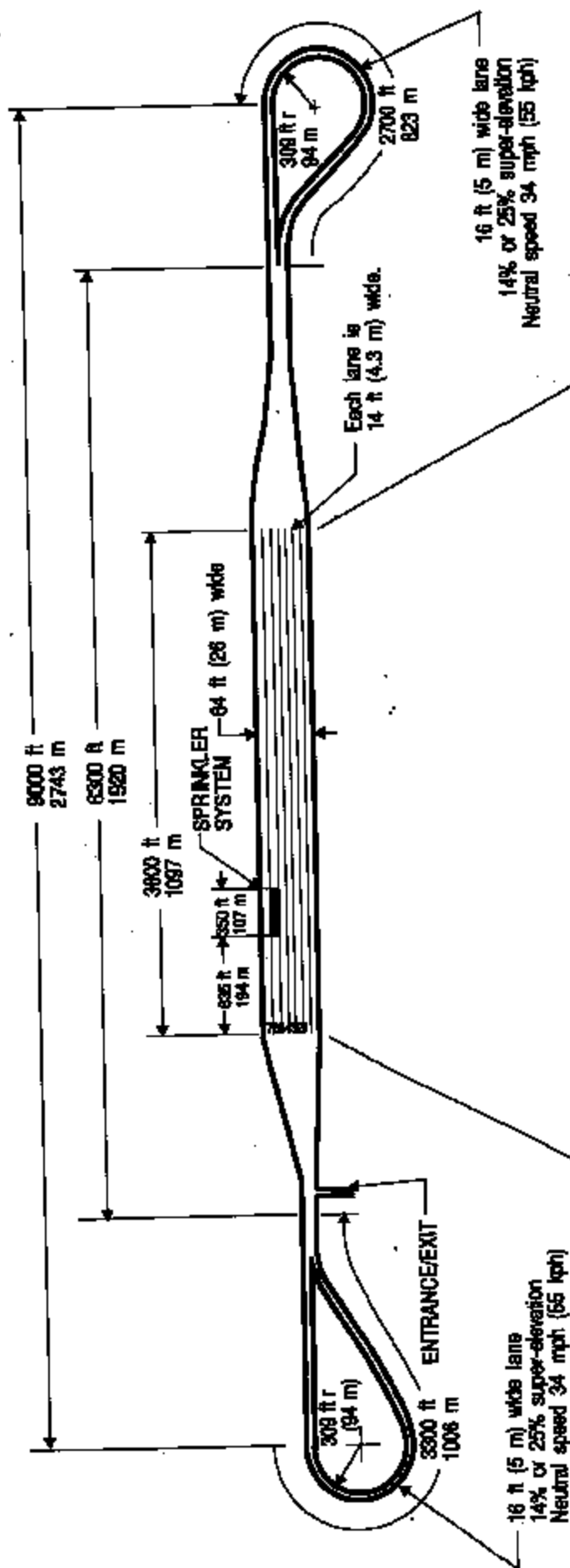
TEST FACILITY DETAIL



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EAST LIBERTY, OHIO 43019-0007

5-15 0001

ALL CONCRETE BROOMED SURFACE
1 LAP - APPROXIMATELY 4 MILES (6.4 KILOMETERS)



TEST PAD SURFACES
1 - PCC POLISHED WET
2 - PCC SMOOTH TROWELLED WET
3 - PCC PCC COURSE BROOMED DRY

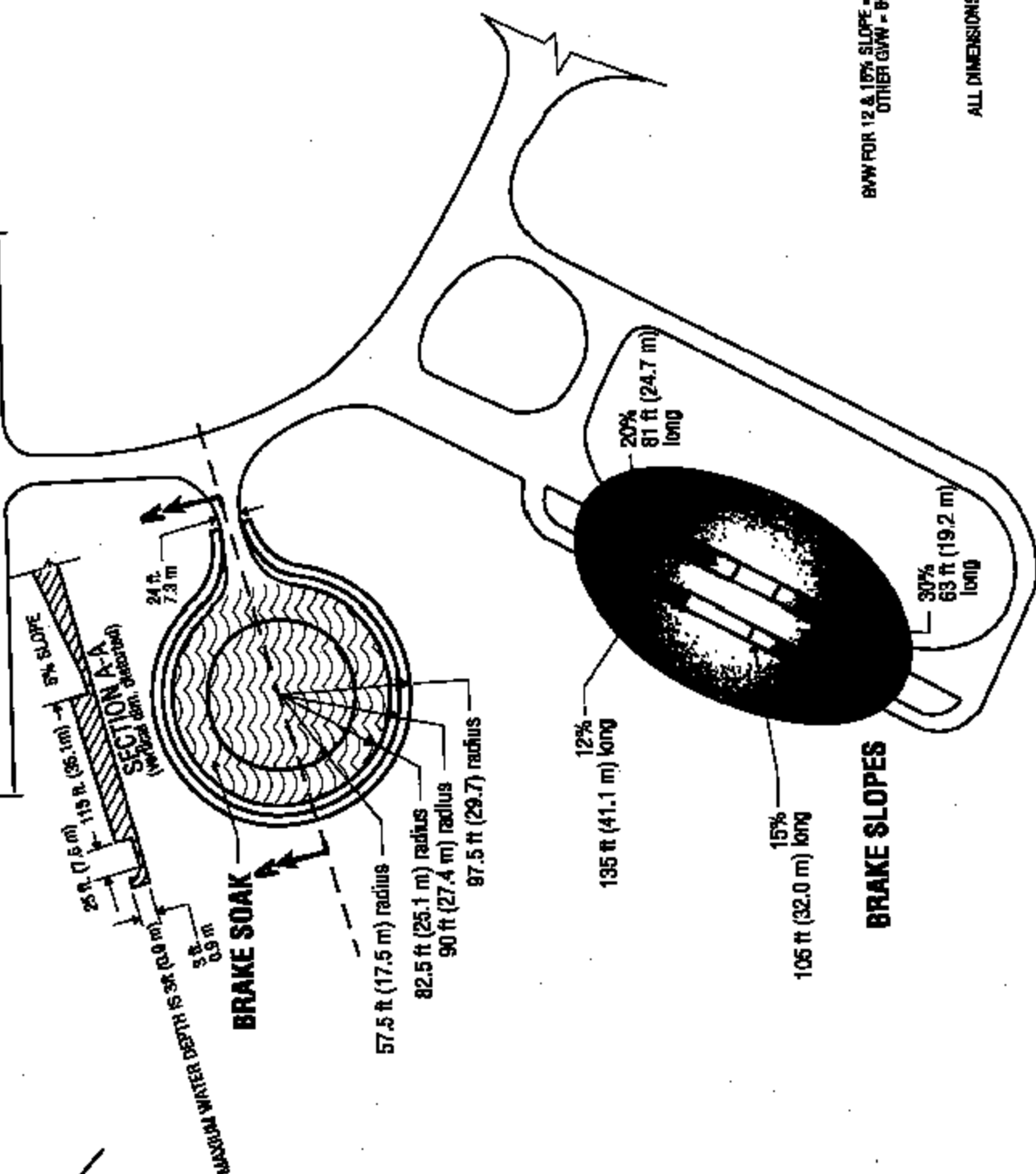
LANE 7 GVW = 8000 lbs (3629 kg)
GVW = 80,000 LBS (36,298 kg)

NOTE: BUMP COURSES PARALLEL THE PERIMETERS OF LANES 1 AND 7.

Not to scale
All dimensions are approximate

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7-15 0059

SKID PAD



GVW FOR 12 & 18% SLOPE = 4000 lbs (1814 kg)
OTHER GVW = 80,000 lbs (36,286 kg)

NOT TO SCALE
ALL DIMENSIONS ARE APPROXIMATE

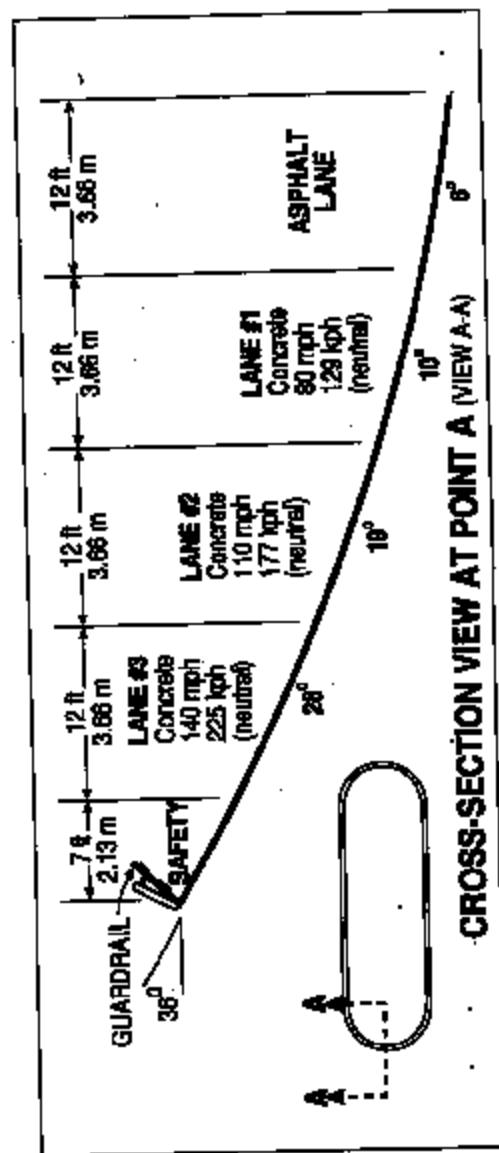
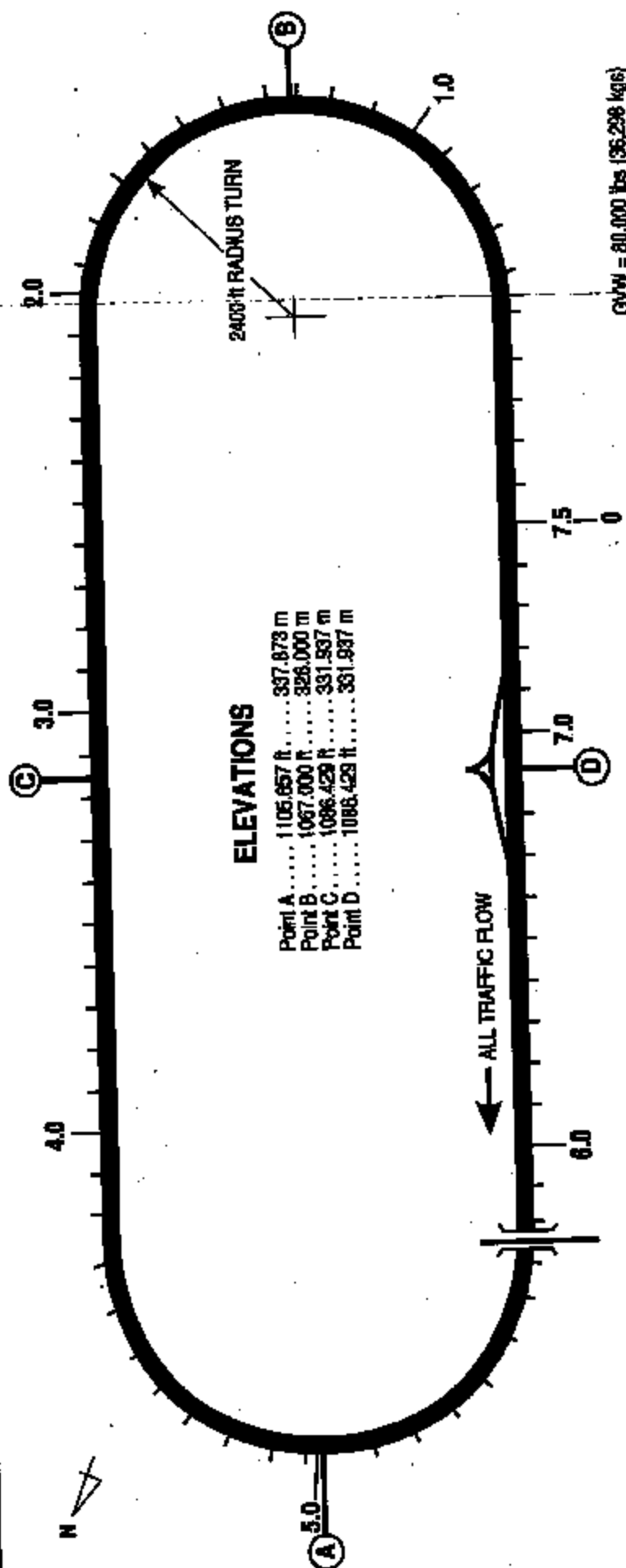
TRC

TRANSPORTATION RESEARCH CENTER INC.

EAST LIBERTY, OHIO 43019-0017

F-3 0500

BRAKE SOAK and BRAKE SLOPES



DISTANCES	
Lane 3	7.539 mi. 12.133 km
Lane 2	7.521 mi. 12.104 km
Lane 1	7.507 mi. 12.081 km
Point A to Point B	3.333 mi. 5.364 km
Point C to Point D	.947 mi. 1.524 km

NOT TO SCALE

APPENDIX D
Notice of Possible Non-Compliance

This vehicle (C40203) met the requirements of the FMVSS 135 standard. (Label - see Appendix C)