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NHTSA #
C36540

REPORT NO. 105-83-TRC-03-002 – TRC20000113 – LIBERTY BUS INC.
NHTSA C30901 - 2003 LIBERTY BUS FREEDOM

FMVSS 105-83
HYDRAULIC BRAKE SYSTEM COMPLIANCE TEST
2003 LIBERTY BUS FREEDOM, 16-PASSENGER SCHOOL BUS
NHTSA C30901

TRANSPORTATION RESEARCH CENTER INC.
East Liberty, Ohio 43319

JUNE 2003
FINAL REPORT

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

PREPARED FOR:

U.S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Enforcement
Office of Vehicle Safety Compliance
400 Seventh Street, S.W.
Room 6115 (NVS-221)
Washington, D.C. 20590

Prepared for the Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-01-C-21025.

Prepared By _____

Approved By _____

Date: 5/29/03

Report Accepted By:

_____

Contract Technical Manager, Office of Vehicle Safety Compliance

6/5/03

_____

Date

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No. 105-TRC-03-002	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle Final report of FMVSS 105 Compliance Testing of 2003 LIBERTY BUS FREEDOM, 16-PASSENGER SCHOOL BUS, NHTSA No. C30901		5. Report Date June 2003 6. Performing Organization Code TRC 20020113/3051
7. Author(s) Ginny Watters, Project Manager Randy Landes, Engineering Technician		8. Performing Organization Report No. TRC-DOT-105-021
9. Performing Organization Name and Address Transportation Research Center Inc. 10820 State Route 347 East Liberty, OH 43319		10. Work Unit No. 11. Contract or Grant No. DTNH22-01-C-21025
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Vehicle Safety Compliance (NEF-30) 400 Seventh Street, SW, Room 6115 Washington, D.C. 20590		13. Type of Report and Period Covered Final test report April 04, 2003 to May 06, 2003 14. Sponsoring Agency Code NVS-221
15. Supplementary Notes		
16. Abstract Compliance tests were conducted on the subject 2003 LIBERTY BUS GUIDE, 16-PASSENGER SCHOOL BUS in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-105-83-02 for the determination of FMVSS 105 compliance. Test failures identified were as follows: None		
17. Key Words Compliance Testing Safety Engineering FMVSS 105		18. Distribution Statement Copies of this report are available from: NHTSA Technical Reference Division Room 5108 (NAD-52) 400 Seventh Street, SW Washington, D.C. 20590 Telephone No. (202) 366-4946 Attn: Robert Hornickle
19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages 104 / 22. Price

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1.0 INTRODUCTION

Tests were conducted on a 2003 LIBERTY BUS FREEDOM; 16-PASSENGER SCHOOL BUS manufactured by LIBERTY BUS INC. to determine compliance with FMVSS 105-83 "Hydraulic Brake Systems."

All tests were conducted in accordance with the U.S. DOT, NHTSA Laboratory Procedure TP 105-83-02 and/or the corresponding Transportation Research Center Inc. (TRC Inc.) test procedure, which 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.

TRC Inc. personnel using the following TRC facilities conducted all tests:

7.5-Mile Test Track
Instrument Check
Burnish & Reburnish
Fade & Recovery

Skid Pad
Effectiveness
Water Recovery
Spike Stops
Failed Stops
Inoperative Power Assists

Brake Slope
Parking Brake

Brake Soak
Water Recovery

The test vehicle met all the requirements of FMVSS 105-83.

2.0 FMVSS 105-83 VEHICLE INFORMATION SHEET Date: 03/18/03

Vehicle: Make: Liberty Bus NHTSA No. C30901

Model: Freedom, SVC-0366-124 GVWR: 9,600 lbs.

Model Year: 2003 Manufacture Date: Mo.: 02 Yr.: 2003

Body Style: 16-Passenger School Bus Wheelbase: 155 in.

VIN: 1GBHG39U831110237

Buses Only — Chassis Mfr.: Chevrolet Motor Div. GAWR: Front: 4,300 lbs.
Manufacture Date: 10/02 Rear: 6,084 lbs.
Serial No.: N/A No. of Seats: 8 + Driver

Engine Type: Gasoline, Seq.FI, OHV, 16 Valve, V-8 Cyl., Piston, Vortec 6000

Displacement: 6.0 Liters HP: N/A

Engine Idle Speed: 687 RPM

Transmission Type: Automatic, 4-speed, RWD

No. of Axles: Two

GAWR: Front: 4,300 lbs. Rear: 6,083 lbs.

Tires: Size: LT245/75R16 E Manufacturer: Bridgestone

Type: V-Steel Rib 265, M+S, steel belted radial, tubeless

Recommended Pressure at GVWR: front 50 psi rear 80 psi

Brakes: Front: ( ) Drum (X) Disc
Rear: ( ) Drum (X) Disc

Actuation: Describe Hydraulic Circuit Split: Axle by axle

Power Unit: Hydraulic, Vacuum, etc. Hydraulic

Brake Power Assist Unit: Yes X No

Brake Power Unit w/Accumulator: Yes No X

Power Assist or Power Unit w/Backup Yes No X

Variable Proportioning System: Yes No X

Antiskid Device: Mfg. TRW Yes X No

Parking Mechanism: (see definition)

Description: Automatic transmission w/park detent

Master Cylinder: 1.451 in.

Pedal Ratio: 6.5:1

2.0 FMVSS 105-83 VEHICLE INFORMATION SHEET. continued

Front Brakes:

Wheel Brake Components: Type: Drum ( ) Disc (X)

MATERIAL	CONSTRUCTION	MATERIAL	CONSTRUCTION
( ) Cast Iron	( ) Cast	(X) Cast Iron	(X) Integral Cast
( ) Steel	( ) Composite	( ) Steel	( ) 2-piece
( ) Bi-Metal	( ) Centrifuse	( ) Bi-Metal	(X) Vented
	( ) Pressed		( ) Unvented
( ) _____	( ) _____	( ) _____	(X) Bonded Linings

Diameter:	Inside:	N/A		Outside	12.796 in.
Thickness:	Not Applicable N/A			Include Vent	1.499 in.
Lining Code:	Primary:*	N/A		Inboard:	AK NS265H FF
Or Color:	Secondary:*	N/A		Outboard:	AK NS265H FF
Shoe Cage:	Left:	N/A	Reset To: N/A	Not Applicable	N/A
Diameter:	Right:	N/A	Reset To: N/A	Not Applicable	N/A

Dimensions:				
Width:	Primary:	N/A	Inboard	1.819 in.
	Secondary:	N/A	Outboard	1.822 in.
Length:	Primary:	N/A	Inboard	8.180 in.
	Secondary:	N/A	Outboard	8.179 in.
Thickness:	Primary:	N/A	Inboard	0.481 in.
	Secondary:	N/A	Outboard	0.480 in.
Hydraulic	Wheel		Disc	
Piston Diam:	Cylinder	N/A	Caliper	2.237 in. (x2)

*May be Primary/Secondary or other: Not Applicable

Rear Brakes:

Wheel Brake Components: Type: Drum ( ) Disc (X)

MATERIAL	CONSTRUCTION	MATERIAL	CONSTRUCTION
( ) Cast Iron	( ) Cast	(X) Cast Iron	(X) Integral Cast
( ) Steel	( ) Composite	( ) Steel	( ) 2-piece
( ) Bi-Metal	( ) Centrifuse	( ) Bi-Metal	(X) Vented
	( ) Pressed		( ) Unvented
( ) _____	( ) Bonded Linings	( ) _____	(X) Bonded Linings

2.0 FMVSS 105-83 VEHICLE INFORMATION SHEET, continued

Rear Brakes:

Wheel Brake Components:	Type: Drum ( )		Disc (X)	
Diameter:	Inside: N/A		Outside	12.499 in.
Thickness:	N/A		Include Vent	1.143 in.
Lining Code	Leading*: N/A		Inboard	AK NS265H FF
Or Color:	Trailing*: N/A		Outboard	AK NS265H FF
Shoe Cage	Left N/A	Reset To N/A	Not Applicable	
Diameter:	Right N/A	Reset To N/A	Not Applicable	

Dimensions of Linings:

Width:	Primary	N/A	Inboard	1.703 in.
	Secondary	N/A	Outboard	1.698 in
Length:	Primary	N/A	Inboard	5.482 in.
	Secondary	N/A	Outboard	5.480 in.
Thickness:	Primary	N/A	Inboard	0.547 in.
	Secondary	N/A	Outboard	0.540 in.
Hydraulic Piston Diam:	Wheel Cylinder	N/A	Disc Caliper	1.991 in. (x2)

*May be Primary/Secondary or other: Not Applicable

Other Component Information:

Friction-Type Parking Brake:	( ) Hand-Operated ( ) Foot-Operated
Non-Service Brake Type: Parking Brake:	( ) Hand-Operated (X) Foot-Operated
Will adjusters be locked out for this test series?	( ) Yes ( ) No (X) Not Appl.

Describe method used to lock out adjusters: Not Applicable

Note: If at any time 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.

3.0 Data Sheet No. 1.1 Summary of Tests (Sheet 1 of 9)

Veh.: 2003 LIBERTY BUS FREEDOM NHTSA No.: C30901 GVWR: 9,600 lbs.

Test	Required Performance	Actual Performance*	P	F
Max. Speed in 2 miles	None	97.7 mph avg.	Not Appl.	
First Effectiveness:	30 mph: Pedal Force, 15-150 lbs. Stopping distance, 69 ft. for one stop	5 of six stops pass Best Stop: 47.8 ft., 137 lbs. PF (max)	X	
	60 mph: Pedal Force. 15-150 lb. Stopping distance, 267 ft. for one stop	6 of six stops pass Best Stop: 167.1 ft., 118 lbs. PF (max)	X	
Second Effectiveness:	30 mph: Pedal Force, 15-150 lbs. Stopping distance, 57 ft. for one stop	6 of six stops pass Best Stop: 48.2 ft., 111 lbs. PF (max)	X	
	60 mph: Pedal Force, 15-150 lbs. Stopping distance, 216 ft. for one stop	6 of six stops pass Best Stop: 166.2 ft., 141 lbs. PF (max)	X	
	80 mph: Pedal Force, 15-150 lbs. Stopping distance, N/A ft. for one stop	N/A of four stops pass Best Stop: N/A ft., N/A lbs. PF (max)	Not Appl.	

*Stopping Distance - Visual Data
Pedal Force - Visual Data

3.0 Data Sheet No. 1.1 Summary of Tests (Sheet 2 of 9)

Veh.: 2003 LIBERTY BUS FREEDOM NHTSA No.: C30901 GVWR: 9,600 lbs.

Test	Required Performance	Actual Performance*		P	F
Parking Brake REGULAR	Shall hold vehicle stationary for 5 minutes in both uphill and downhill direction on a 30% grade, both at LLVW and GVWR, with no more than 90 lbs. hand lever or 125 lbs. foot pedal force.	Held stationary for 5 minutes? Yes			
			Force (lbs.)		
		GVWR-Uphill	101	X	
		GVWR-Downhill	97	X	
		LLVW-Uphill	88	X	
		LLVW-Downhill	91	X	
		(X) Foot Pedal			
		( ) Hand Lever			
Parking Brake	(1) Shall meet REGULAR PROCEDURE requirements with transmission in "Park." (2) Shall meet REGULAR PROCEDURE requirements on 20% slope with transmission in "Neutral." (3) Parking mechanism shall not disengage or suffer damage in front and rear 2 1/2 mph moving barrier impacts.	GVWR-30%-Uphill	Not Appl.		
		GVWR-30%-Downhill	" " "		
		GVWR-20%-Uphill	" " "		
		GVWR-20%-Downhill	" " "		
		LLVW-20%-Uphill	" " "		
		LLVW-20%-Downhill	" " "		
		LLVW-30%-Uphill	" " "		
		LLVW-30%-Downhill	" " "		
		MEETS MOVING BARRIER SPEC	Not Appl.		

3.0 Data Sheet No. 1.1 Summary of Tests (Sheet 3 of 9)

Veh.: 2003 LIBERTY BUS FREEDOM NHTSA No.: C30901 GVWR: 9,600 lbs.

Test	Required Performance	Actual Performance*	P	F
Third Effectiveness LLVW	60 mph: Pedal Force, 15-150 lbs. Stopping distance, 242 ft. for one of six stops	6 of six stops pass Best Stop: 154.9 ft., 135 lbs. PF (max)	X	
Partial Failure LLVW	60 mph: Pedal Force, 15-150 lbs. Stopping distance, 517 ft. for one of four stops with any sub-system failed.	System #1 Inoperative: 4 of four stops pass Best Stop: 221.5 ft., 130 lbs. PF (max) System #2 Inoperative: 2 of four stops pass Best Stop: 514.7 ft., 138 lbs. PF (max)	X X	
Partial Failure GVWR	60 mph: Pedal Force, 15-150 lbs. Stopping distance, 517 ft. for one of four stops with any sub-system failed.	System #2 Inoperative: 4 of four stops pass Best Stop: 389.7 ft., 144 lbs. PF (max) System #1 Inoperative: 4 of four stops pass Best Stop: 281.7 ft., 105 lbs. PF (max)	X X	
Partial Failure Antilock and/ or Variable Proportioning Brake Systems GVWR	60 mph: Pedal Force, 15-150 lbs. Stopping distance, 517 ft. for one of four stops with any sub-system failed.	ABS Inoperative: 4 of four stops pass Best Stop: 207.7 ft., 54 lbs. PF (max) Variable Prop. Inoperative: ____ of four stops pass Best Stop: ____ ft., ____ lbs. PF (max)	X Not Appl.	

*Stopping Distance - Visual Data
Pedal Force - Visual Data

3.0 Data Sheet No. 1.1 Summary of Tests (Sheet 4 of 9)

Veh.: 2003 LIBERTY BUS FREEDOM NHTSA No.: C30901 GVWR: 9,600 lbs.

Test	Required Performance	Actual Performance*	P	F
Inoperative Power Unit	60 mph: Pedal Force, 15-150 lbs. Stopping distance, 517 ft. for one of four stops with power disconnected and reserve depleted.	4 of four stops pass Best Stop: 384.2 ft., 141 lbs. PF (max)	X	
Inoperative Power Unit Optional (Brake Power Assist Units)	Six stops from 60 mph: at specified decels. Seventh stop at no less than seven fpsps (554 ft.).	7th Stop: _____ fpsps decel _____ lbs. PF	Not Appl.	
Inoperative Power Unit - Optional Procedure (Accumulator Systems)	Ten stops from 60 mph, at specified decelerations Eleventh stop at not less than seven fpsps (554 ft.).	11th Stop: _____ fpsps decel _____ lbs. PF	Not Appl.	
Inoperative Power Unit - Optional Procedure (Backup Systems)	15 stops from 60 mph, at average deceleration of 12 fpsps (stopping distance 293 ft.) stops with any sub-system Failed.	_____ of fifteen stops within 293 ft. Worst Stop: _____ fpsps decel _____ lbs. PF	Not Appl.	

*Stopping Distance - Visual Data
Pedal Force Visual Data

3.0 Data Sheet No. 1.1 Summary of Tests (Sheet 5 of 9)

Veh.: 2003 LIBERTY BUS FREEDOM NHTSA No.: C30901 GVWR: 9,600 lbs.

Test	Required Performance	Actual Performance*	P	F
First Fade and Recovery (Baseline)	30-0 mph: Three stops at 10 fpsps Pedal Force: 10-60 lbs.	Average Control Force (max) 22 lbs. PF	X	
First Fade and Recovery (Fade)	60-0 mph: Pedal Force: 15-150 lbs. (min) Stops 1-5: 15 fpsps (min) Stops 6-10: 5-15 fpsps decel	Stops 1-5: 8.9** fpsps decel (min) 50 lbs. PF (max) Stops 6-10: 12.5 fpsps decel (min) 60 lbs. PF (max)	X X	
First Fade and Recovery (Recovery)	30-0 mph: Makes 5 stops at not less than 10 fpsps (1) a maximum for the first four recovery stops of 150 pounds, and for the fifth stop, of 20 pounds more than the average control force for the baseline check; and (2) a minimum of (a) the average control force for the baseline check minus 10 lbs., or (b) the baseline check times 0.6, whichever is lower (but in no case less than 5 lbs.). Allowable range: 12 to 42 pounds	Stops 1-4: 23 lbs. PF (max) 8.2 10.3 fpsps decel (min) Stop 5: 19 lbs. PF (max) 9.9 fpsps decel (min)	X X	

*Stopping Distance - Visual Data
Pedal Force - Visual Data

**Data acquisition system continued to record after stop creating low average values.

3.0 Data Sheet No. 1.1 Summary of Tests (Sheet 6 of 9)

Veh.: 2003 LIBERTY BUS FREEDOM NHTSA No.: C30901 GVWR: 9,600 lbs.

Test	Required Performance	Actual Performance*	P	F
Second Fade and Recovery (Baseline)	30-0 mph: Three stops at 10 fpsps Pedal Force: 10-60 lbs.	Average Control Force (max) 25 lbs. PF	X	___
Second Fade and Recovery (Fade)	60-0 mph: Pedal Force: 15-150 lbs. Stops 1-~~5~~ 10: 15 fpsps decel (min) Stops ~~6~~ 11-15: 5-15 fpsps decel (min)	Stops 1-~~5~~ 10: 7.4 ~~12.0~~ fpsps decel (min) 36 ~~31~~ lbs. PF (max) Stops 6-15: 11.2 ~~12.5~~ fpsps decel (min) 45 lbs. PF (max)	X X	___ ___
Second Fade and Recovery (Recovery)	30-0 mph: Makes 5 stops at not less than 10 fpsps (1) a maximum for the first four recovery stops of 150 pounds, and for the fifth stop, of 20 pounds more than the average control force for the baseline check; and (2) a minimum of (a) the average control force for the baseline check minus 10 lbs., or (b) the baseline check times 0.6, whichever is lower (but in no case less than 5 lbs.). Allowable range: 15 to 45 pounds	Stops 1-4: 25 lbs. PF (max) 8.0 ~~8.4~~ fpsps decel (min) Stop 5: 19.5 ~~20~~ lbs. PF (max) 8.3 fpsps decel (min)	X X	___ ___

*Stopping Distance - Visual Data
Pedal Force - Visual Data

3.0 Data Sheet No. 1.1 Summary of Tests (Sheet 7 of 9)

Veh.: 2003 LIBERTY BUS FREEDOM NHTSA No.: C30901 GVWR: 9,600 lbs.

Test	Required Performance	Actual Performance*	P	F
Fourth Effectiveness	30 mph: Pedal Force, 15-150 lbs. 65 ft. for one of six stops	6 of six stops pass Best Stop: 47.8 ft., 132 lbs. PF (max)	X	
	60 mph: Pedal Force, 15-150 lbs. Stopping distance, 267 ft. for one of six stops	6 of six stops pass Best Stop: 167.2 ft., 118 lbs. PF (max)	X	
	80 mph: Pedal Force: 15-150 lbs. Stopping distance: 510 ft. for one of four stops	4 of four stops pass Best Stop: 277.5 ft., 133 lbs. PF (max)	X	
	100 mph: Pedal Force, 15-150 lbs. Stopping distance, N/A ft. for one of four stops	_____ of four stops pass Best Stop: _____ ft., _____ lbs. PF (max)	Not Appl.	

*Stopping Distance - Visual Data
Pedal Force - Visual Data

3.0 Data Sheet No. 1.1 Summary of Tests (Sheet 7 continued of 9)

Veh.: 2003 LIBERTY BUS FREEDOM NHTSA No.: C30901 GVWR: 9,600 lbs.

			P	F
Water Recovery (Baseline)	30 mph: Three stops at 10 fpsps Pedal Force: 10-90 lbs.	Avg. Sustained Control Force (max) 28 lbs. PF	X	
Water Recovery (Recovery)	30 mph: Make 5 stops at not less than 10 fpsps (1) maximum for the first four recovery stops at 150 pounds, and for the fifth stop, of 60 pounds more than the average control force for the baseline check (but no more than 110 lbs.); and (2) a minimum of (a) the average control force for the baseline check minus 10 lbs. or (b) the baseline check times 0.6, whichever is lower (but in no case less than 5 lbs.).	Stops 1-4: 24.75 lbs. PF (max) 9.8.1 fpsps decel (min)	X	
		Stop 5: 28 lbs. PF (max) 8.5 fpsps decel (min)	X	
	Allowable range:	17 to 73 pounds	X	

*Stopping Distance - Visual Data
Pedal Force - Visual Data
**Recorded Data

3.0 Data Sheet No. 1.1 Summary of Tests (Sheet 8 of 9)

Veh.: 2003 LIBERTY BUS FREEDOM NHTSA No.: C30901 GVWR: 9,600 lbs.

Test	Required Performance	Actual Performance*	P	F
Spike Stops	30 mph: Vehicle shall be capable of making 10 spike stops.	10 stops completed Max. pedal force ** 281 lbs. (peak) 165 lbs. avg.	Not Appl.	
Post-Spike Effectiveness	60 mph: Pedal Force: 15-150 lbs. Stopping distance: 267 ft. for one of six stops	6 of six stops pass Best Stop: 169.1 ft., 104 lb. PF (max.)	X	
Moving Barrier (For vehicles tested by the Optional Brake Procedure)	Parking mechanism shall not disengage or fracture when vehicle is subjected to front and rear 2-1/2 mph moving barrier impacts.	Front Impact: Vehicle Movement? Yes ___ No ___ Rear Impact: Vehicle Movement? Yes ___ No ___	Not Tested N/A	

*Stopping Distance - Visual Data
Pedal Force - Visual Data
**Manual Apply

3.0 Data Sheet No. 1.1 Summary of Tests (Sheet 9 of 9)

Veh.: 2003 LIBERTY BUS FREEDOM NHTSA No.: C30901 GVWR: 9,600 lbs.

Test	Required Performance	Actual Performance*	P	F
Final Inspect:				
Lining	Firmly attached to backing.	Yes X No ___	X	___
	Areas 90% of original.	Yes X No ___	X	___
	Working surface free of lubricant or fluid.	Yes X No ___	X	___
Mechanical	Components must be intact and functional.	Yes X No ___	X	___
Hydraulic	Components must be leak-free.	Yes X No ___	X	___
	Independent reservoirs must have adequate volume.	Yes X No ___	X	___
	Total reservoir volume must be adequate.	Yes X No ___	X	___
Indicator Lamp	Lit when key is ON or in "check" position.	Lit for check of function: Yes X No ___	X	___
	Lit when following occur either (A), (C), or (D): or else (B), (C), or (D): (A) Gross pressure loss, (B) Unsafe fluid level, (C) Electrical failure, (D) Parking brake on.	Lit for (A): Yes ___ No X Lit for (B): Yes X No ___ Lit for (C): Yes X No ___ Lit for (D): Yes X No ___	Not Appl. X X X	 ___ ___ ___
	Color meets requirement	Yes X No ___	X	___
	Lettering meets requirement	Yes X No ___	X	___
(For vehicles without split service brake system)	Indicator lamp flashes and is accompanied by audible signal:	Yes ___ No ___ N/A ___	Not Appl.	

4.0 Data Sheet No. 1.2 Vehicle Weight

Veh.: 2003 LIBERTY BUS FREEDOM NHTSA No.: C30901 Date: 05/05/03
TIRE PRESSURE (cold): FRONT 50 psi REAR 80 psi
ODO. START 129 FINISH 772

SCALE(S) USED: TRC Mettler Toledo Digitol Truckmate Platform

VEHICLE WEIGHT (9.0 - S6.1)

Schedule				Requirements		
Obtain GVWR, LLVW, and axle weights within +0, -1%				None		
GVWR 9,600 lbs. (front vehicle certification label)	GAWR: Front	4,300 lbs.	Target Weight	Front	3,976 lbs.	
	Rear	6,083 lbs.		Rear	5,624 lbs.	
				GVWR =	9,600 lbs.	

UNLOADED VEHICLE WEIGHT (UVW) - Actual Weight of Test Vehicle with Maximum Capacity of Engine Fuel, Oil, and Coolant.

Left Front	1,780 lbs.	Right Front	1,720 lbs.	Total Front	3,500 lbs.		
Left Rear	1,590 lbs.	Right Rear	1,620 lbs.	Total Rear	3,210 lbs.	Veh.	6,710 lbs.

LIGHT LOADED VEHICLE WEIGHT (LLVW)

Note 1: LLVW = UVW + 400 lbs.
Note 2: Weight distributed in front passenger seat area.
Note 3: Neither axle load at LLVW less than at UVW; ballasted as required

Left Front	1,960 lbs.	Right Front	1,850 lbs.	Total Front	3,810 lbs.		
Left Rear	1,670 lbs.	Right Rear	1,660 lbs.	Total Rear	3,330 lbs.	Veh.	7,140 lbs.

ACTUAL TEST LLVW

Left Front	1,950 lbs.	Right Front	1,850 lbs.	Total Front	3,800 lbs.		
Left Rear	1,660 lbs.	Right Rear	1,660 lbs.	Total Rear	3,320 lbs.	Veh.	7,120 lbs.

Load: Driver 160 lbs. + Instrument 100 lbs. + Ballast 140 lbs. = 400 lbs.

4.0 Data Sheet No. 1.2 Vehicle Weight, continued

FULLY LOADED VEHICLE WEIGHT (GVWR)

Note 1: Vehicle loaded so axle loads proportional to GAWR shown above (target).
Note 2: But no axle weight to be less than at LLVW.

Load: Driver	160	lbs. + Instrument	100	lbs. + Ballast	2,630	lbs.	=	2,890	lbs.
Left Front	2,010	lbs.	Right Front	1,960	lbs.	Total Front	3,970	lbs.	
Left Rear	2,800	lbs.	Right Rear	2,830	lbs.	Total Rear	5,630	lbs.	Veh. 9,600 lbs.

COMMENTS: None.

DATA INDICATES COMPLIANCE YES ( ) NO ( ) NO REQUIREMENTS (X)
DRIVER Karen Easterday OBSERVER None
RECORDED DATA PROCESSED BY R. Landes DATE 04/03/03
APPROVING LABORATORY OFFICIAL K. Webster DATE 04/04/03

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			

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

EXAMPLE

"BFMID" = Both front wheel lockup occurred at approximately middle of stop

Section 5.0 – Test Data
Data Sheets 4 through 23A

Vehicle: 2003 LIBERTY BUS INC NHTSA NUMBER: C30901
Make: LIBERTY
Model: FREEDOM
Body Style: SCHOOL BUS
Front Cold Tire Pressure: 50 (psi)
Rear Cold Tire Pressure: 80 (psi)

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

Date Tested: 04/14/03

DATA SHEET 4 - SPEED VERSUS DISTANCE DETERMINATION

Testing Conditions: INV DATA, Section 0001, 04/14/03, 07:44:17

Weather Conditions: 57°F Wind: 16 mph 148° Start Odo.: 160 End Odo.: 179

Schedule:
GVWR, accelerate from 0 mph to maximum speed attainable in 2 miles or to 70± mph, record times to speeds.

Performance Requirements:
Maximum Speed
First Run South
Second Run North

RUN #	MAX SPD (mph)	0-40 MPH TIME (second)	0-60 MPH TIME (second)	0-80 MPH TIME (second)	AVE W2E RUNS #1 & 2 (mph)
1	97.7	8.1	14.8	26.0	97.7
2	97.6	8.1	14.5	24.5	

INSTRUMENTATION CHECK (S7.2)

Testing Conditions:
INV DATA, Section 0010, 04/14/03, 09:14:08

Schedule.
GVWR, 10 Stops, 30-0 mph, 10 fpsps
in gear, 150-200 Deg F IBT

Performance Requirements: None

STOP #	INITIAL SPD (mph)	Ave IBT Front (°F)	AVG IBT REAR (°F)	Stop Distance (feet)	AVE SUSTAINED PEDAL FORCE (lb)	AVERAGE SUSTAINED DECELERATION (ft/sec²)	MAX PEDAL FORCE (lb)
1	30.1	133.5	154.5	122.4	15.6	8.0	21.5
2	30.2	150.5	172.5	104.6	17.2	9.5	20.8
3	29.8	153.0	167.5	106.2	18.4	8.9	24.3
4	29.4	173.5	183.0	99.1	17.7	9.1	20.7
5	30.0	174.0	185.0	105.5	17.4	8.1	22.4
6	29.7	165.0	182.0	105.9	18.5	9.7	23.9
7	29.9	172.5	190.0	100.9	17.2	9.7	23.8
8	28.8	170.5	183.5	106.8	16.4	9.2	19.7
9	30.0	167.0	181.0	93.7	18.2	10.1	29.6
10	29.6	170.0	187.5	107.1	16.7	8.9	20.5

DATA INDICATES COMPLIANCE: YES ( ) NO ( ) NO REQUIREMENTS (X)

Driver: KAREN WESTENDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/12/03
Approving Laboratory Official: KEN WEBSTER Date: 05/20/03

Vehicle: 2003 LIBERTY BUS INC NHTSA NUMBER: C30901
Make: LIBERTY
Model: FREEDOM
Body Style: SCHOOL BUS
Front Cold Tire Pressure: 50 (psi)
Rear Cold Tire Pressure: 80 (psi)

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Date Tested: 04/14/03

DATA SHEET 5 - FIRST EFFECTIVENESS AT GVWR (S7.3)

Testing Conditions: INV DATA, Section 0015, 04/14/03, 09:59:30

Weather Conditions: 69°F Wind: 14 mph 164° Start Odo.: 184 End Odo.: 192

Schedule:
GVWR, 150 - 200°F Initial brake temperatures,
Initial Speeds 30 & 60 mph to 4sto
6 stops each speed with transmission in neutral

Performance Requirements:
One Stop with:
Stopping Distance less than 69 ft@30mph
and less than 267 ft@60mph
Pedal force <150 lbs.
Lock-Up of one wheel or less
Vehicle Must Stay in lane of 12 ft.

STOP #	INIT SPD (mph)	AVR. FRONT IBT (°F)	AVE REAR TEMP (°F)	ACTUAL STOP DISTANCE (feet)	CORRECTED DISTANCE (SAE J99) (feet)	MAX. PEDAL FORCE (lb)	AVG. PEDAL FORCE (lb)	MAX. DECEL (ft/sec²)	AVG. DECEL (ft/sec²)
1	30.2	146.0	170.0	52.5	51.7	65.9	38.0	28.8	12.3
2	30.2	156.5	178.0	52.7	52.1	83.1	46.1	31.6	12.3
3	29.6	163.5	174.5	50.5	51.2	128.7	70.8	33.6	13.6
4	30.2	175.5	177.0	52.9	52.3	121.7	86.9	32.2	15.4
5	29.4	181.0	179.5	47.8	49.7	136.6	82.7	34.4	13.7
6	29.9	172.5	172.0	51.7	52.1	151.4	75.7	35.5	12.4
1	60.4	165.0	161.0	174.8	172.8	85.0	58.4	33.1	16.2
2	60.1	187.5	176.5	185.6	185.2	128.1	83.9	35.1	15.9
3	59.9	176.0	182.5	177.0	177.4	131.6	88.9	36.5	16.8
4	58.8	192.0	186.0	167.1	173.9	117.7	75.6	34.5	17.0
5	59.9	167.0	168.5	174.6	175.3	135.9	79.0	35.7	16.2
6	59.8	189.0	175.0	173.3	174.4	111.8	70.8	36.2	15.8

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
1	-	NOX	SOUTH	YES
2	-	NOX	SOUTH	YES
3	-	NOX	SOUTH	YES
4	-	NOX	SOUTH	YES
5	-	NOX	SOUTH	YES
6	-	NOX	SOUTH	YES

COMMENTS: NONE

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN KASTERMAN Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/12/03
Approving Laboratory Official. KEN WEBSTER Date: 05/20/03

Vehicle: 2003 LIBERTY BUS INC NHTSA NUMBER: C30901
Make: LIBERTY
Model: FREEDOM
Body Style: SCHOOL BUS
Front Cold Tire Pressure: 50 (psi)
Rear Cold Tire Pressure: 80 (psi)

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Date Tested: 04/14/03

DATA SHEET 6 - BURNISH AT GVWR (S7.4)

Testing Conditions: INV DATA, Section 0002, 04/14/03, 11:10:18

Weather Conditions: 65°F Wind: 7 mph 162° Start Odo.: 194 End Odo.: 408

Schedule:
GVWR, 200 stops in Gear, 40 - 0 mph, 12 fpsps decel, 230 - 270°F IBT or 1 mile interval, whichever is shorter

Performance Requirements:
Lock-up <= 1 wheel, stay in 12 ft. lane. NOTE: Pedal Force may exceed 150 lb.

STOP #	INIT SPD (mph)	LEFT FRONT IBT (°F)	RIGHT FRONT IBT (°F)	LEFT REAR IBT (°F)	RIGHT REAR IBT (°F)	MAX. PEDAL FORCE (lb)	AVG. PEDAL FORCE (lb)	AVG. DECEL (ft/sec²)
1	40.0	233	209	264	254	19.0	14.5	9.8
25	40.0	255	237	388	360	16.0	13.2	9.6
50	39.9	247	228	385	320	14.4	11.9	9.2
75	39.8	250	226	393	317	17.1	12.3	9.4
100	40.1	255	235	383	334	19.4	13.9	9.6
125	39.8	255	230	388	313	18.5	13.2	11.0
150	40.0	256	232	399	336	17.1	14.4	11.3
175	40.4	240	216	418	348	17.7	14.7	10.1
200	39.9	233	211	401	364	19.5	14.5	11.7

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.

MANUFACTURER'S PROCEDURE: NO ADJUSTMENT REQUIRED.

DATA INDICATES COMPLIANCE: YES ( ) NO ( ) NO REQUIREMENTS (X)

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/12/03
Approving Laboratory Official: KEN WEBSTER Date: 05/20/03

Vehicle: 2002 LIBERTY BUS INC NHTSA NUMBER: C30901
Make: LIBERTY
Model: FREEDOM
Body Style: SCHOOL BUS
Front Cold Tire Pressure: 50 (psi)
Rear Cold Tire Pressure: 80 (psi)

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Date Tested: 04/15/03

DATA SHEET 7 - SECOND EFFECTIVENESS AT GVWR (S7.5)

Testing Conditions: INV DATA, Section 0030, 04/15/03, 08:48:25

Weather Conditions: 38°F Wind: 8 mph 257° Start Odo.: 422 End Odo.: 430

Schedule:
GVWR, 150 - 200°F Initial brake temperatures,
6 Stops in Neutral, 30, 60,
4 Stops 80 - 0 mph

Performance Requirements:
One Stop with:
Stopping Distance less than 57 ft@30mph,
216 ft@60mph,and 0 @80mph
Pedal force <150 lbs.
Lock-Up of one wheel or less
Vehicle Must stay in lane of 12 ft.

STOP #	INIT SPD (mph)	LEFT FRONT IBT (°F)	RIGHT FRONT IBT (°F)	LEFT REAR IBT (°F)	RIGHT REAR IBT (°F)	ACTUAL DISTANCE (feet)	CORRECTED DISTANCE (SAE J299) (feet)	MAX. PEDAL FORCE (lb)	AVG. PEDAL FORCE (lb)	MAX. DECEL (ft/sec²)	AVG. DECEL (ft/sec²)
1	29.9	148	138	181	170	51.2	51.6	83.0	48.7	36.6	11.7
2	30.1	171	159	192	184	50.5	50.3	106.3	63.4	39.9	12.2
3	30.0	174	160	174	165	51.7	51.6	91.4	60.2	33.0	11.9
4	30.6	181	177	187	177	52.1	50.7	119.3	70.2	36.3	11.2
5	30.0	192	187	181	171	48.7	48.5	119.1	67.2	34.8	10.8
6	30.3	199	179	178	168	48.2	47.3	111.2	60.2	36.2	12.0
1	60.3	188	170	168	160	170.6	168.7	129.8	78.6	35.2	17.1
2	59.5	191	171	160	146	166.7	165.4	133.0	78.2	35.6	16.5
3	59.8	187	167	156	140	166.2	167.3	141.3	82.2	37.4	16.7
4	59.9	186	167	151	138	167.7	168.4	137.0	80.9	35.4	16.1
5	59.8	178	159	146	128	167.7	169.0	129.7	76.5	39.3	17.0
6	59.3	181	157	144	130	169.0	172.2	135.4	81.4	40.4	16.7

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
1	-	NOX	SOUTH	YES
2	-	NOX	SOUTH	YES
3	-	NOX	SOUTH	YES
4	-	NOX	SOUTH	YES
5	-	NOX	SOUTH	YES
6	-	NOX	SOUTH	YES

COMMENTS. NONE

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/12/03
Approving Laboratory Official: KEN WEBSTER Date: 05/20/03

Vehicle: 2003 LIBERTY BUS IMC NETSA NUMBER: C30901
Make: LIBERTY
Model: FREEDOM
Body Style: SCHOOL BUS
Front Cold Tire Pressure: 80 (psi)
Rear Cold Tire Pressure: 80 (psi)

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Date Tested: 04/15/03

DATA SHEET 8 - FIRST REBURNISH AT GVWR (S7.6)

Testing Conditions: INV DATA, Section 0020, 04/15/03, 10:50:23

Weather Conditions: 75°F Wind:17 mph 233° Start Odo.: 431 End Odo.: 470

Schedule:
GVWR, 35 stops in gear, 40 - 0 mph,
12 fpsps decel, 230 - 270°F IBT or
1 mile interval, whichever is shorter

Performance Requirements:
Lock-up <= 1 wheel, stay in 12
ft. lane. NOTE: Pedal Force
may exceed 150 lb.

STOP #	INIT SPD (mph)	LEFT FRONT IBT (°F)	RIGHT FRONT IBT (°F)	LEFT REAR IBT (°F)	RIGHT REAR IBT (°F)	MAX. PEDAL FORCE (lb)	AVG. PEDAL FORCE (lb)	AVG. DECEL (ft/sec²)
1	39.9	226	210	253	248	20.4	17.6	9.0
10	39.6	264	238	352	343	16.3	13.4	9.5
20	39.7	265	239	376	316	18.4	13.9	10.1
30	39.7	259	235	384	323	27.2	13.7	9.5
35	39.9	262	257	363	301	16.2	12.2	8.9

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.

MANUFACTURER'S PROCEDURE: NO ADJUSTMENTS REQUIRED.

COMMENTS: NONE.

DATA INDICATES COMPLIANCE: YES ( ) NO ( ) NO REQUIREMENTS (X)

Driver: KAREN EASTERDAY Observer: WONG
Recorded Data Processed by: CHUCK JENKINS Date: 05/12/03
Approving Laboratory Official: KEN WEBSTER Date: 05/20/03

Vehicle: 2003 LIBERTY BUS INC NHTSA NUMBER: C30903
Make: LIBERTY
Model: FREEDOM
Body Style: SCHOOL BUS
Front Cold Tire Pressure: 50 (psi)
Rear Cold Tire Pressure: 80 (psi)

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Date Tested: 04/16/03

DATA SHEET 9 - PARKING BRAKE AT GVWR & LLVW (S7.7.1)

Testing Conditions: LSV DATA, Section 0090, 04/16/03, 10:47:50
Testing Conditions: INV DATA, Section 0085, 04/16/03, 08:32:53
Parking Mechanism: AUTOMATIC TR Service type: N/A
Non-Service type: FOOT OPERATED
Weather Conditions: 70°F Wind: 13 mph 215° Start Odo.: 489 End Odo.: 492

Test Weight: Total:9680lbs. GVWR Total:7:401bs. LLVW

Schedule:
GVWR & LLVW, IBT <=150°F, neutral, Variable 20%-30% grade,vehicle held on grade with service brake pedal force <=150 lb., then parking brake applied and service brake released.
2 reapplications of force to service brake and parking brake allowed.

Performance Requirement:
Hold vehicle stationary for 5 minutes, GVWR & LLVW, uphill and downhill, park brake pedal force <=125 lb. foot lever, <=80 lb. hand lever.

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.

GVWR APPLY #	MAX SERVICE FORCE (lb)	MIN P-FORCE TO HOLD (lb)	LEFT REAR IBT (°F)	RIGHT REAR IBT (°F)	AVG REAR IBT (°F)	DRIVER VEHICLE STOP COMMENTS (No. Reapplications,Direction of Stop (Up/Down) - Brake holds/fails)			
1	0.2	211.2	66	66	66.0	PRE-TEST CAL.			
2	145.1	100.9	101	102	101.5	-	0REAPPLY	UPHILL	HOLDS	30%
3	208.0	97.4	129	135	132.0	-	0REAPPLY	DOWNHILL	HOLDS	30%
5	0.6	211.6	98	94	96.0	POST TEST CAL				

LLVW APPLY #	MAX SERVICE FORCE (lb)	MIN P-FORCE TO HOLD (lb)	LEFT REAR IBT (°F)	RIGHT REAR IBT (°F)	AVG REAR IBT (°F)	DRIVER VEHICLE STOP COMMENTS (No. of Reapplications Direction of Stop (Up/Down)		Brake Holds/fails)	
1	148.7	87.8	126	125	126.0	-	0REAPPLY	UPHILL	HOLDS	30%
2	150.3	90.8	121	118	119.5	-	0REAPPLY	DOWNHILL	HOLDS	30%

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

MFR.'S BURNISH PROCEDURE FOR NON-SERVICE ELEMENTS: N/A

COMMENTS: OPTIONAL PROCEDURE (DATA SHEET 10) NOT PERFORMED.

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/12/03
Approving Laboratory Official: KEN WEBSTER Date: 05/20/03

Vehicle: 2003 LIBERTY BUS INC NHTSA NUMBER: C30901
Make: LIBERTY
Model: FREEDOM
Body Style: SCHOOL BUS
Front Cold Tire Pressure: 50 (psi)
Rear Cold Tire Pressure: 80 (psi)

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Date Tested: 04/16/03

DATA SHEET 11 - Third Effectiveness (S7.8)

Testing Conditions: IKV DATA, Section 0035, 04/16/03, 11:08:52

Weather Conditions: 74°F Wind: 7 mph 233° Start Odo.: 493 End Odo.: 498

Schedule:
LIVW, 6 stops in neutral, 60-0 mph,
.50 - 200°F INT.

Performance Requirements:
One Stop with:
Stopping Distance less than 242 ft@60mph
Pedal force <150 lbs.
Lock-Up of one wheel or less
Vehicle Must stay in lane of 12 ft.

STOP #	INIT SPD (mph)	LEFT FRONT IBT (°F)	RIGHT FRONT IBT (°F)	LEFT REAR IBT (°F)	RIGHT REAR IBT (°F)	ACTUAL STOPPING DISTANCE (feet)	CORRECTED DISTANCE (SAE J299) (feet)	MAX. PEDAL FORCE (lb)	Avg. PEDAL FORCE (lb)	AVG. DECEL (ft/sec²)	MAX. DECEL (ft/sec²)
1	59.8	157	153	167	164	160.2	161.5	131.3	78.0	18.4	34.8
2	60.8	192	187	154	149	161.2	156.7	137.3	90.0	18.3	36.8
3	59.6	186	182	135	127	162.4	164.5	142.3	94.3	17.8	36.9
4	59.9	184	174	136	125	156.9	157.5	120.3	87.0	18.5	42.0
5	59.6	187	175	134	123	155.1	157.4	133.5	85.5	19.7	35.9
6	60.1	182	166	127	116	154.9	154.5	134.9	87.2	19.7	37.8

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

COMMENTS: NONE

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: KNNB
Recorded Data Processed by: CHUCK JENKINS Date: 05/12/03
Approving Laboratory Official: KEN WEBSTER Date: 05/20/03

Vehicle: 2003 LIBERTY BUS INC BMTSA NUMBER: C30901
Make: LIBERTY
Model: FREEDOM
Body Style: SCHOOL BUS
Front Cold Tire Pressure: 50 (psi)
Rear Cold Tire Pressure: 80 (psi)

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Date Tested: 04/16/03

DATA SHEET 12 - Partial Failure LLVW (S7.9)

Testing Conditions: INV DATA, Section 0050, 04/16/03, 13:42:45
Testing Conditions: INV DATA, Section 0055, 04/16/03, 15:29:30

Weather Conditions: 77°F Wind: 16 mph 203° Start Odo.: 501 End Odo.: 515

Schedule:
LLVW, 4 stops in gear with each subsystem inoperative, 50-0 mph, 150-200' INT.
Non-split system vehicle: 10 stops.

Performance Requirements:
One stop, 60 mph, 517 ft., pedal force ≤150 lbs., lockup allowed, stay in 12 ft. lane.
Warning light on at 50 lbs. pedal force manual, 25 lbs. power, or 225 psi.

System #1 Inoperative

STOP #	INIT SPD (mph)	LEFT FRONT TBT (°F)	RIGHT FRONT TBT (°F)	LEFT REAR TBT (°F)	RIGHT REAR TBT (°F)	ACTUAL STOP DISTANCE (feet)	CORRECTED DISTANCE (SAE J99) (feet)	AVG. PEDAL FORCE (lb)	MAX. DECEL (ft/sec²)	MAX PEDAL FORCE (lb)	AVG DECEL (ft/sec²)
1	59.6	193	165	99	97	223.4	226.7	89.6	25.8	120.8	16.7
2	59.7	192	162	92	89	221.5	223.6	101.2	27.5	130.1	16.3
3	59.7	162	140	88	87	225.4	227.8	102.7	31.5	140.6	16.2
4	60.1	174	156	91	89	228.8	227.9	90.3	27.1	147.7	14.5

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

System #2 Inoperative

STOP #	INIT SPD (mph)	LEFT FRONT TBT (°F)	RIGHT FRONT TBT (°F)	LEFT REAR TBT (°F)	RIGHT REAR TBT (°F)	ACTUAL STOP DISTANCE (feet)	CORRECTED DISTANCE (SAE J99) (feet)	AVG. PEDAL FORCE (lb)	MAX. DECEL (ft/sec²)	MAX PEDAL FORCE (lb)	AVG DECEL (ft/sec²)
1	59.7	124	118	186	183	514.7	519.1	115.3	19.3	138.2	7.2
2	60.1	107	102	187	183	519.4	518.5	110.6	16.0	129.3	7.0
3	59.8	98	105	182	170	547.3	545.6	113.1	16.1	128.6	7.1
4	59.9	94	90	169	176	516.5	518.9	128.8	16.8	138.6	7.2

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

COMMENTS:
System #1: Warning light on at N/A lb., M/C RWHD PRT DISCONNECTED LR&RF INOP
System #2: Warning light on at N/A lb., M/C RWHD PRT DISCONNECTED, LF&RF INOP
FLUID LEVEL SENSOR? YES (X) NO (X) LAMP ON? YES (X) NO ( )
DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 06/11/03
Approving Laboratory Official: KEN WEBSTER Date: 05/20/03

Vehicle: 2003 LIBERTY BUS INC NHTSA NUMBER: C30901
Make: LIBERTY
Model: FREEDOM
Body Style: SC3001 BUS
Front Cold Tire Pressure: 50 (psi)
Rear Cold Tire Pressure: 80 (psi)

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Date Tested: 04/17/03

DATA SHEET 13 - Partial Failure GVWR (S7.9.3)

Testing Conditions: INV DATA, Section 0060, 04/17/03, 08:55:31
Testing Conditions: INV DATA, Session 0065, 04/17/03, 10:50:48

Weather Conditions: 50°F Wind: 4 mph 3° Start Odo.: 528 End Odo.: 540

Schedule:
GVWR, 4 stops in gear with each subsystem inoperative, 60-0 mph, 150-200° IBT.

Performance Requirements:
One stop, 60 mph, 537 ft., pedal force <150 lbs., lockup allowed, stay in 12 ft. lane.

System #2 Inoperative

STOP #	INIT SPD (mph)	LEFT FRONT IBT (°F)	RIGHT FRONT IBT (°F)	LEFT REAR IBT (°F)	RIGHT REAR IBT (°F)	ACTUAL STOP DISTANCE (feet)	CORRECTED DISTANCE (SAE J299) (feet)	AVG. PEDAL FORCE (lb)	MAX. DECEL (ft/sec²)	MAX PEDAL FORCE (lb)	AVG DECEL (ft/sec²)
1	59.8	56	55	166	161	401.1	404.2	122.4	15.9	141.0	9.1
2	59.3	53	54	179	130	390.9	393.8	117.9	17.3	132.7	9.4
3	60.0	54	57	184	178	407.0	407.7	111.8	16.0	131.3	9.1
4	59.9	55	56	177	164	389.7	393.6	129.3	16.5	144.0	9.7

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

System #1 Inoperative

STOP #	INIT SPD (mph)	LEFT FRONT IBT (°F)	RIGHT FRONT IBT (°F)	LEFT REAR IBT (°F)	RIGHT REAR IBT (°F)	ACTUAL STOP DISTANCE (feet)	CORRECTED DISTANCE (SAE J299) (feet)	AVG. PEDAL FORCE (lb)	MAX. DECEL (ft/sec²)	MAX PEDAL FORCE (lb)	AVG DECEL (ft/sec²)
1	60.3	171	165	109	104	345.9	346.1	88.2	17.1	121.0	10.1
2	59.7	187	179	87	82	281.7	284.5	90.2	19.7	105.3	13.0
3	60.2	184	179	75	71	282.4	280.3	97.8	21.2	137.6	12.1
4	60.3	192	180	68	66	285.3	282.5	73.0	20.1	139.5	9.1

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

COMMENTS: NONE

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/12/03
Approving Laboratory Official: KEN WEBSTER Date: 05/20/03

Vehicle: 2003 LIBERTY BUS INC NHTSA NUMBER: C30Spx
Make: LIBERTY
Model: FREEDOM
Body Style: SCHOOL BUS
Front Cold Tire Pressure: 50 (psi)
Rear Cold Tire Pressure: 80 (psi)

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Date Tested: 04/17/03

DATA SHEET 14-ANTILOCK OR VARIABLE PROPORTIONING BRAKE SYSTEM (S7.9.4)

Testing Conditions: INV DATA, Section 0043, 04/17/03, 13:18:38

Schedule:
GVWR. 4 stops in gear,60-0 MPH,
antilock or variable prop failed, 150-200°F IBT

Performance Requirements:
One stop, 60 mph, 517 ft., pedal force <150 lbs.,
lockup allowed, stay in 12 ft. lane.

ABS FAILURE

STOP #	INIT SPD (mph)	LEFT FRONT IBT (°F)	RIGHT FRONT IBT (°F)	LEFT REAR IBT (°F)	RIGHT REAR IBT (°F)	ACTUAL DISTANCE (feet)	CORRECTED DISTANCE (SAE J299) (feet)	AVG. PEDAL FORCE (lb)	MAX PEDAL FORCE (lb)	AVG DECEL (ft/sec²)	MAX. DECEL (ft/sec²)
1	60.0	156	148	156	157	207.7	207.5	35.0	53.7	14.5	26.0
2	60.3	189	177	186	184	221.6	219.6	31.6	59.3	16.0	29.5
3	60.2	191	180	165	181	218.8	217.4	33.9	52.9	15.5	26.4
4	60.1	185	169	172	175	228.3	227.2	31.8	48.2	15.3	24.4

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

COMMENTS: TO SIMULATE ABS FAILURE, REMOVED 60 AMP FUSE FROM UNDERHOOD FUSE BOX

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: RONS
Recorded Data Processed by: CHUCK JENKINS Date: 05/12/03
Approving Laboratory Official: KEN WEBSTER Date: 05/20/03

Vehicle: 2003 LIBERTY BUS INC NHTSA NUMBER: C30901

Make: LIBERTY
Model: FREEDOM
Body Style: SCHOOL BUS
Front Cold Tire Pressure: 50 (psi)
Rear Cold Tire Pressure: 80 (psi)

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Date Tested: 04/17/03

DATASHEET 15-REGULAR PROCEDURE FOR FAILED BOOSTER OR PWR ASSIST(S7.10)

Testing Conditions: INV DATA, Section 0080, 04/17/03, 15:04:25

Weather Conditions: 63°F Wind: 8 mph 259° Start Odo.: 549 End Odo.: 553

Schedule:
GVWR, 4 stops in gear,60-0 MPH,
antilock or variable prop failed, 150-200°F IBT

Performance Requirements:
One stop, 60 mph, 512 ft.,pedal force <150 lbs.,
lockup allowed, stay in 12 ft. lane.

System #1 Inoperative

STOP #	INIT SPD (mph)	LEFT FRONT IBT (°F)	RIGHT FRONT IBT (°F)	LEFT REAR IBT (°F)	RIGHT REAR IBT (°F)	ACTUAL DISTANCE (feet)	CORRECTED DISTANCE (SAE J299) (feet)	MAX PEDAL FORCE (lb)	AVG. PEDAL FORCE (lb)	MAX. DECEL (ft/sec²)	AVG DECEL (ft/sec²)
1	59.8	141	124	159	159	423.8	427.1	141.4	131.0	12.0	9.6
2	60.2	171	160	150	155	406.0	403.0	142.8	124.7	13.4	9.9
3	60.4	173	162	157	164	384.2	379.5	141.0	118.0	13.8	9.6
4	59.9	181	153	175	166	385.7	387.0	139.9	125.5	13.7	10.1

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

COMMENTS: Disconnect primary source of power.
REPLACED ACCESSORIES SERPENTINE BELT WITH SHORTER ONE AND
BYPASSED THE POWER STEERING PUMP.
"BRAKE" WARNING INDICATOR IS A LIGHT AS WELL AS AN AUDIBLE ALARM.
DATA SHEET 16, OPTIONAL PROCEDURE, NOT PERFORMED.

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: MONZ
Recorded Data Processed by: CHUCK JENKINS Date: 05/12/03
Approving Laboratory Official: KEN WEBSTER Date: 05/20/03

Vehicle: 2003 LIBERTY BUS FAC NHTSA NUMBER: C30901
Make: LIBERTY
Model: FREEDOM
Body Style: SCHOOL BUS
Front Cold Tire Pressure: 50 (psi)
Rear Cold Tire Pressure: 90 (psi)

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Date Tested: 04/18/03

DATA SHEET 17 - FIRST FADE AND RECOVERY (BASELINE) (S7.11)

Testing Conditions: INV DATA, Section 3100, 04/18/03, 14:34:31

Schedule:
GVWR, 3 stops in gear,30 0 MPH,
150-200°F IBT, 10 fpsps decel

Performance Requirements:
Pedal Force 10-60 lb., lockup
=< 1 wheel, stay in 12 ft. lane.

STOP #	INIT SPD (mph)	LEFT FRONT IBT (°F)	RIGHT FRONT IBT (°F)	LEFT REAR IBT (°F)	RIGHT REAR IBT (°F)	MAX PEDAL FORCE (lb)	AVG. PEDAL FORCE (lb)	MAX. DECEL (ft/sec²)	AVE DECEL (ft/sec²)	AVG MAX PEDAL FORCE (lb)
1	30.8	147	141	178	175	20.9	15.4	11.3	6.7	22.4
2	30.2	149	142	163	159	22.0	15.7	13.1	8.3	
3	29.6	180	172	198	191	24.2	15.5	13.4	7.6	

COMMENTS: NONE.

DATA INDICATES COMPLIANCE: YES [X] NO [ ]

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/12/03
Approving Laboratory Official: KEN WEBSTER Date: 05/20/03

Vehicle: 2003 LIBERTY BUS INC NHTSA NUMBER: C30901
Make: LIBERTY
Model: FREEDOM
Body Style: SCHOOL BUS
Front Cold Tire Pressure: 50 (psi)
Rear Cold Tire Pressure: 80 (psi)

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Date Tested: 04/18/03

DATA SHEET 17A - FIRST FADE AND RECOVERY (FADE) (S7.11)

Testing Conditions: INV DATA, Section 0101, 04/18/03, 14:54.27

Schedule:
GVWR, 20 stops in 60sec,60-0 MPH,
130-150°F IBT, 15 fpsps decel,
0.4 mile interval.

Performance Requirements:
5 stops at 15 fpsps, 5 stops at
5-15 fpsps, pedal force < 150 lbs.;
Terminate reading at 5 mph.

STOP #	INIT Spd (mph)	LEFT FRONT IBT (°F)	RIGHT FRONT IBT (°F)	LEFT REAR IBT (°F)	RIGHT REAR IBT (°F)	MAX PEDAL FORCE (lb)	AVG. PEDAL FORCE (lb)	MAX. DECEL (ft/sec²)	AVG SUSTAINED DECEL (ft/sec²)	APPLICATION TIME (second)	TOTAL ELAPSED TIME (minute)
1	59.6	127	122	143	135	29.5	21.2	17.4	10.9	2.56	6.22
2	60.7	215	201	255	233	30.5	22.7	20.2	11.7	2.20	
3	59.7	311	291	382	353	27.8	22.2	20.6	11.7	2.31	
4	59.2	405	377	489	460	39.5	28.1	18.0	11.3	2.31	
5	59.3	498	468	577	546	49.9	26.2	20.2	8.8	2.21	
6	60.4	575	549	650	610	59.7	36.2	24.4	12.5	2.15	
7	59.3	648	615	711	679	51.2	34.6	24.1	12.7	2.44	
8	61.5	706	684	778	735	53.8	32.9	20.7	11.9	2.33	
9	60.4	766	745	831	788	51.1	35.3	22.1	11.6	2.34	
10	60.3	816	794	876	829	33.6	25.3	24.3	10.5	2.33	

COMMENTS: STOP #5, DAS CONTINUED TO RECORD.
STOP #9, ODOR OBSERVED.
STOP #10, SMOKE AND ODOR OBSERVED.

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/12/03
Approving Laboratory Official: KEN WEBSTER Date: 05/20/03

Vehicle: 2003 LIBERTY BUS INC NHTSA NUMBER: C100001
Make: LIBERTY
Model: FREEDOM
Body Style: SCHOOL BUS
Front Cold Tire Pressure: 50 (psi)
Rear Cold Tire Pressure: 80 (psi)

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Date Tested: 04/18/03

DATA SHEET 17B - FIRST FADE AND RECOVERY (RECOVERY)(S7.11)

Testing Conditions: (NV DATA, Section 0102, 04/18/03, 15:02:51

Weather Conditions: 60°F Wind: 16 mph 144° Start Odo.: 563 End Odo.: 577

Schedule:
GVWR, 5 stops in gear,30-0 MPH,
20 fpsps decel x 0 mile interval.

Performance Requirements:
5 stops at 30 fpsps, stops 1-4 pedal force
< 150 lbs., stop 5 pedal force +20
lb. to lesser of -10 or .5 times the
average baseline pedal force Pedal force
range: MAX. 42.0 lb, MIN 17.0 lb.

STOP #	UNIT SPD (mph)	LEFT FRONT INT (°F)	RIGHT FRONT INT (°F)	LEFT REAR INT (°F)	RIGHT REAR INT (°F)	MAX PEDAL FORCE (lb)	AVG. PEDAL FORCE (lb)	AVE DECEL (ft/sec²)
1	29.9	746	719	797	785	23.0	13.8	10.1
2	30.5	630	606	687	695	20.3	13.1	8.2
3	30.1	563	522	618	618	19.8	12.6	9.3
4	30.1	499	434	558	524	17.4	12.5	8.2
5	30.5	382	366	515	455	18.6	12.6	9.8

COMMENTS: NONE

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/12/03
Approving Laboratory Official: KEN WEBSTER Date: 05/20/03

Vehicle: 2003 LIBERTY BUS INC NHTSA NUMBER: C30901
Make: LIBERTY
Model: FREEDOM
Body Style: SCHOOL BUS
Front Cold Tire Pressure: 50 (psi)
Rear Cold Tire Pressure: 80 (psi)

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Date Tested: 04/21/03

DATA SHEET 18 - SECOND REBURNISH AT GVWR (S7.12)

Testing Conditions. IMV DATA, Section 0025, 04/21/03, 08:34:40

Weather Conditions- 53°F Wind:11 mph 215° Start Odo.: 595 End Odo.: 631

Schedule:
GVWR, 35 stops in gear, 40 - 0 mph,
12 fpsps decel. 230 - 270°F IBT or
1 mile interval, whichever is shorter

Performance Requirements:
Lock-up <= 1 wheel, stay in 12
ft. lane. NOTE: Pedal Force
may exceed 150 lb.

STOP #	INIT SPD (mph)	LEFT FRONT IBT (°F)	RIGHT FRONT IBT (°F)	LEFT REAR IBT (°F)	RIGHT REAR IBT (°F)	MAX. PEDAL FORCE (lb)	AVG. PEDAL FORCE (lb)	AVG. DECEL (ft/sec²)
1	40.3	176	154	234	216	23.1	18.2	9.9
10	39.5	239	222	358	347	21.9	14.8	10.1
20	39.8	249	230	403	359	25.5	14.6	10.3
30	39.5	241	225	409	360	20.5	15.5	10.5
35	40.2	244	230	366	346	21.5	15.9	10.7

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.

MANUFACTURER'S PROCEDURE: ADJUSTMENT NOT REQUIRED.

COMMENTS: NONE

DATA INDICATES COMPLIANCE: YES ( ) NO ( ) NO REQUIREMENTS (X)

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CEUCK JENKINS Date: 05/12/03
Approving Laboratory Official: KEN WEBSTER Date: 05/20/03

Vehicle: 2003 LIBERTY BUS INC NHTSA NUMBER: C30501
Make: LIBERTY
Model: FREEDOM
Body Style: SCHOOL BUS
Front Cold Tire Pressure: 50 (psi)
Rear Cold Tire Pressure: 80 (psi)

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Date Tested: 04/21/03

DATA SHEET 19 - SECOND FADE AND RECOVERY (BASELINE)(S7.13)

Testing Conditions: IBV DATA, Section 0105, 04/21/03, 10:25:13

Schedule:
GVWR, 3 stops in gear,30 D MPH,150-200#
IBT,10 fpsps decel.

Performance Requirements:
Pedal force 10-60 lb.,lockup
wo 1 wheel, stay in 12 ft. lane.

STOP #	INIT SPD (mph)	LEFT FRONT IBT (°F)	RIGHT FRONT IBT (°F)	LEFT REAR IBT (°F)	RIGHT REAR IBT (°F)	MAX PEDAL FORCE (lb)	AVG. PEDAL FORCE (lb)	AVE DECEL (ft/sec²)	MAX DECEL (ft/sec²)	AVG OF MAX PEDAL FORCE (lb)
1	30.1	144	140	154	159	24.5	15.7	8.3	14.8	25.5
2	30.2	161	160	179	181	27.8	17.4	8.4	18.5	
3	29.4	176	167	185	182	23.7	16.6	8.0	11.8	

COMMENTS: NONE

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed By: CHUCK JENKINS Date: 05/12/03
Approving Laboratory Official: KEN WEBSTER Date: 05/20/03

Vehicle: 2003 LIBERTY BUS INC NHTSA NUMBER: C30901
Make: LIBERTY
Model: FREEDOM
Body Style: SCHOOL BUS
Front Cold Tire Pressure: 50 (psi)
Rear Cold Tire Pressure: 80 (psi)

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Date Tested: 04/21/03

DATA SHEET 19A - SECOND FADE AND RECOVERY (FADE)(S7.13)

Testing Conditions: INV DATA. Section 0106, 04/21/03, 10:40:07

Schedule:
GVWR, 15 stops in gear,60.0 MPH,
150-200°F IBT, 15 fpsps decel,
0.4 mile interval.

Performance Requirements:
10 stops at 15 fpsps, 5 stops at
5-15 fpsps, pedal force <= 150lb;
terminate reading at 5 mph.

STOP #	INIT SPD (mph)	LEFT FRONT IBT (°F)	RIGHT FRONT IBT (°F)	LEFT REAR IBT (°F)	RIGHT REAR IBT (°F)	MAX PEDAL FORCE (lb)	AVG. PEDAL FORCE (lb)	MAX DECEL (ft/sec²)	AVG SUSTAINED DECEL (ft/sec²)	APPLICATION TIME (second)	TOTAL ELAPSED TEST TIME (minutes)
1	61.1	122	118	126	135	30.6	22.0	25.2	12.0	0.01	9.11
2	59.0	215	205	225	240	29.1	14.6	19.3	7.4	0.36	
3	60.9	309	292	337	354	22.9	16.1	20.2	11.7	0.29	
4	60.1	401	378	451	465	25.6	17.5	22.0	11.5	0.18	
5	59.7	490	462	549	552	25.6	17.2	20.5	10.9	0.24	
6	59.5	572	538	631	620	24.6	20.6	19.6	11.9	0.21	
7	59.7	646	611	698	676	26.1	19.2	20.1	11.3	0.22	
8	59.0	710	676	764	729	30.4	21.3	25.1	11.6	0.35	
9	59.3	774	734	816	771	35.8	23.6	27.5	11.6	0.37	
10	59.2	822	784	860	803	35.3	25.3	21.4	11.6	0.27	
11	60.3	864	827	897	831	43.2	27.1	19.8	12.3	0.26	
12	60.2	902	867	936	872	37.7	25.4	23.5	11.2	0.20	
13	59.8	929	896	976	909	43.5	28.9	20.3	11.3	0.33	
14	60.2	951	921	1001	936	39.3	27.6	21.7	11.4	0.23	
15	60.6	969	939	1027	957	44.6	29.4	21.7	12.5	0.19	

Comments: STOP #2, BAS CONTINUED TO RECORD.

DATA INDICATES COMPLIANCE: YES [X] NO [ ]

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/12/03
Approving Laboratory Official: KEN WEBSTER Date: 05/20/03

Vehicle: 2003 LIBERTY BUS INC NHTSA NUMBER: C30901
Make: LIBERTY
Model: FREEDOM
Body Style: SCHOOL BUS
Front Cold Tire Pressure: 90 (psi)
Rear Cold Tire Pressure: 80 (psi)

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Date Tested: 04/21/03

DATA SHEET 19B - SECOND FADE AND RECOVERY (RECOVERY) (S7.13)

Testing Conditions: ENV DATA, Section 0107, 04/21/03, 10:51:21

Weather Conditions: 55°F Wind: 17 mph 210° Start Odo.: 635 End Odo.: 649

Schedule:
GVWR, 5 stops in gear, 30-0 MPH,
10 fpsps decel. Pedal Force 10-60 lb.,
1 mile interval.

Performance Requirements:
5 stops at 10 fpsps, stops 1-4 pedal force
<= 150lb: stop 5 pedal force +20
lb. to lesser of -10 or .6 X the
average baseline pedal force. Pedal force
range: Max. 45.0 lb. Min 15.0 lb.

STOP #	INIT SPD (mph)	LEFT FRONT TBT (°F)	RIGHT FRONT TBT (°F)	LEFT REAR TBT (°F)	RIGHT REAR TBT (°F)	MAX PEDAL FORCE (lb)	AVG. PEDAL FORCE (lb)	AVE DECEL (ft/sec²)
1	30.4	852	817	060	849	24.9	15.0	8.4
2	29.9	704	675	692	721	22.0	12.6	8.0
3	30.7	587	563	599	624	19.8	13.1	8.8
4	29.6	502	480	535	526	18.9	12.0	8.8
5	29.7	419	394	471	431	19.5	12.1	8.3

Comment: NONE

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NOBE
Recorded Data Processed by: CHUCK JENKINS Date: 05/12/03
Approving Laboratory Official: KEN WEBSTER Date: 05/20/03

Vehicle: 2003 LIBERTY BUS INC NHTSA NUMBER: C30901
Make: LIBERTY
Model: FREEDOM
Body Style: SCHOOL BUS
Front Cold Tire Pressure: 50 (psi)
Rear Cold Tire Pressure: 80 (psi)

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Date Tested: 04/21/03

DATA SHEET 20 - THIRD REBURNISH AT GVWR (S7.14)

Testing Conditions: INV DATA, Section 0110, 04/21/03, 11:20:21

Weather Conditions: 55°F Wind:22 mph 220° Start Odo.: 649 End Odo.: 691

Schedule:
GVWR, 35 stops in gear, 40 - 0 mph,
12 stops decel, 230 - 270°F IBT or
1 mile interval, whichever is shorter

Performance Requirements:
Lock-up of 1 wheel, stay in 12 ft. lane (W07S: Pedal Force may exceed 150 lb.

STOP #	INIT SPD (mph)	LEFT FRONT IBT (°F)	RIGHT FRONT IBT (°F)	LEFT REAR IBT (°F)	RIGHT REAR IBT (°F)	AVG. PEDAL FORCE (lb)	AVG. DECEL (ft/sec²)
1	40.7	237	199	235	195	17.6	11.2
10	40.2	247	222	332	288	14.9	10.4
20	39.5	230	220	315	309	17.5	10.6
30	40.5	255	245	351	334	16.8	12.1
35	39.7	224	218	304	292	15.5	11.1

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.

MANUFACTURER'S PROCEDURE: NO ADJUSTMENT REQUIRED.

COMMENTS: NONE

DATA INDICATES COMPLIANCE: YES ( ) NO ( ) NO REQUIREMENTS (X)

Driver: KAREN KASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/12/03
Approving Laboratory Official: KEN WEBSTER Date: 05/20/03

Vehicle: 2003 LIBERTY 905 INC NHTSA NUMBER: C30901
Make: LIBERTY
Model: FREEDOM
Body Style: SCHOOL BUS
Front Cold Tire Pressure: 50 (psi)
Rear Cold Tire Pressure: 80 (psi)

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Date Tested: 04/21/03

DATA SHEET 21 - FOURTH EFFECTIVENESS AT GVWR (S7.15)

Testing Conditions: INV DATA, Section 3115, 04/21/03, 13:11:55

Weather Conditions: 55°F Wind: 26 mph 222° Start Odo.: 683 End Odo.: 708

Schedule:
GVWR, 150 - 200°F Initial brake temperatures,
Initial Speeds 30 & 60 mph to zero
6 stops each speed with transmission in neutral

Performance Requirements:
One Stop with:
Stopping Distance less than 60ft@30mph
and less than 267 ft@60mph
Pedal force <150 lbs.
Lock-Up of one wheel or less
Stay in Lane of 12 ft.

STOP #	UNIT SPD (mph)	LEFT FRONT IBT (°F)	RIGHT FRONT IBT (°F)	LEFT REAR IBT (°F)	RIGHT REAR IBT (°F)	ACTUAL STOP DISTANCE (feet)	CORRECTED DISTANCE (SAE J299) (feet)	MAX. PEDAL FORCE (lb)	AVG. PEDAL FORCE (lb)	MAX. DECEL (ft/sec²)	AVG. DECEL (ft/sec²)
1	30.0	152	143	171	160	48.0	48.1	77.8	41.1	35.8	12.2
2	30.2	174	161	180	167	58.6	57.8	110.3	52.3	38.2	10.5
3	30.3	180	165	171	161	50.8	49.9	105.6	66.5	58.3	14.2
4	29.4	183	172	176	160	50.5	52.6	121.4	61.1	46.7	12.7
5	30.0	181	162	162	149	47.8	47.7	132.2	66.2	57.0	13.4
6	30.0	192	172	169	152	49.7	49.8	117.6	69.0	35.7	13.0
1	59.8	183	162	157	145	169.6	170.9	108.1	68.8	39.6	18.2
2	59.5	175	155	160	145	168.8	171.7	104.5	72.2	39.4	19.7
3	59.3	190	168	155	136	173.0	177.4	142.3	81.1	37.9	17.7
4	59.8	178	150	132	112	173.3	174.5	145.3	86.0	36.5	17.2
5	59.9	182	160	138	118	167.2	167.5	118.3	76.8	39.5	20.0
6	59.8	188	169	144	126	168.4	169.5	116.4	74.1	36.8	18.9

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
1	-	NOX	SOUTH	YES
2	-	NOX	SOUTH	YES
3	-	NOX	SOUTH	YES
4	-	NOX	SOUTH	YES
5	-	NOX	SOUTH	YES
6	-	NOX	SOUTH	YES

COMMENTS: NONE

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KARRW EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/12/03
Approving Laboratory Official: KEN WEBSTER Date: 05/20/03

Vehicle: 2003 LIBERTY BUS INC NHTSA NUMBER: C3D901
Make: LIBERTY
Model: FREEDOM
Body Style: SCHOOL BUS
Front Cold Tire Pressure: 50 (psi)
Rear Cold Tire Pressure: 80 (psi)

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

Date Tested: 04/21/03

DATA SHEET 21 - FOURTH EFFECTIVENESS AT GVWR, CONTINUED (S7.15)

Testing Conditions: INV DATA, Section 0117, 04/21/03, 15:06:52

Schedule:
GVWR, 4 stops in neutral, 80 & 95 or
100 mph, 150-200°F IBT.

Performance Requirements:
One Stop with:
1 Stop, 80 mph 510 ft, 95/100 mph, N/A ft.
pedal force <=140lb.,
lockup <=1 wheel, stay in 12 ft. lane.

STOP #	INIT SPD (mph)	LEFT FRONT IBT (°F)	RIGHT FRONT IBT (°F)	LEFT REAR IBT (°F)	RIGHT REAR IBT (°F)	ACTUAL DISTANCE (feet)	CORRECTED DISTANCE (SAE J299) (feet)	MAX. PEDAL FORCE (lb)	AVG. PEDAL FORCE (lb)	MAX. DECEL (ft/sec²)	AVG. DECEL (ft/sec²)
1	80.8	158	146	131	105	283.2	277.5	133.2	87.6	37.9	20.5
2	79.5	175	159	135	117	281.5	286.9	118.5	At 0	37.4	20.2
3	79.4	185	152	148	126	265.6	289.7	123.5	79.5	44.2	21.2
4	79.5	184	153	152	126	254.9	298.4	99.7	66.4	40.8	19.3

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

COMMENTS: 95/100 MPH STOPS NOT APPLICABLE.

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/12/03
Approving Laboratory Official: KEN WEBSTER Date: 05/20/03

Vehicle: 2003 LIBERTY BUS IFC NHTSA NUMBER: C30901
Make: LIBERTY
Model: FREEDOM
Body Style: SCHOOL BUS
Front Cold Tire Pressure: 50 (psi)
Rear Cold Tire Pressure: 80 (psi)

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

Date Tested: 04/24/03

DATA SHEET 22 - WATER RECOVERY (BASELINE)(S7.16)

Testing Conditions: Inv DATA, Section 0126, 04/20/03, 16:07:12

Schedule:
GVWR, 3 stops in gear, 30-0 mph,
150-200°F IBT, 10 fpsps decel.

Performance Requirements:
Pedal force 10-60 lb., lock-up
-el wheel, stay in 12 ft. lane.

STOP #	INIT SPD (mph)	LEFT FRONT IBT (°F)	RIGHT FRONT IBT (°F)	LEFT REAR IBT (°F)	RIGHT REAR IBT (°F)	MAX. PEDAL FORCE (lb)	AVG. PEDAL FORCE (lb)	MAX. DECEL (ft/sec²)	AVG. DECEL (ft/sec²)	AVG MAX PF (lb)
1	29.8	136	125	170	165	31.5	19.8	16.2	9.4	28.3
2	29.9	156	145	185	186	26.9	21.3	13.5	9.3	
3	30.2	169	158	193	195	26.3	18.9	13.0	8.8	

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

COMMENTS: NONE

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/12/03
Approving Laboratory Official: KEN WEBSTER Date: 05/20/03

Vehicle: 2003 LIBERTY BUS INC NHTSA NUMBER. C30901
Make: LIBERTY
Model: FREEDOM
Body Style: SCHOOL BUS
Front Cold Tire Pressure: 50 (psi)
Rear Cold Tire Pressure: 80 (psi)

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

Date Tested: 04/24/03

DATA SHEET 22A - WATER RECOVERY (RECOVERY)(S7.16)

Testing Conditions: INV DATA. Section 0130, 04/24/03, 16:17:29

Weather Conditions: 58°F wind: 11 mph 90° Start Odo.: 723 End Odo.: 725

Schedule:
Drive for 2 min., or 6mph in any combination of foward and reverse directions in 6 inches of water

GVWR, 5 stops in gear, 30.0 mph, 10 fpsps decel. Stops initiated as soon as 30 mph is reached.

Performance Requirements:
5 stops at 10 fpsps. stops 1-4 pedal force <= 150lb; stop 5 pedal force +45 lb. max. Min. force (5th stop only) baseline -10 lb. or times .8. whichever is lower but >3 lb.
Pedal force range: max73 lb min.17 lb.

STOP #	INIT SPD (mph)	MAX PEDAL FORCE (lb)	AVG PEDAL FORCE (lb)	AVG DECEL (ft/sec²)	Max Decel (ft/sec²)
1	30.6	21.6	17.1	8.7	13.3
2	30.2	21.8	15.1	9.3	14.7
3	30.2	18.7	15.2	9.1	12.4
4	30.6	24.9	18.8	9.6	14.1
5	30.0	28.2	22.3	8.5	12.6

COMMENTS: NHTSA/OVSC TECHNICAL ENGINEER OBSERVED THIS TEST.

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/12/03
Approving Laboratory Official: KEN WEBSTER Date: 05/20/03

Vehicle: 2003 LIBERTY BUS INC NHTSA NUMBER: CJ0901
Make: LIBERTY
Model: FREEDOM
Body Style: SCHOOL BUS
Front Cold Tire Pressure: 50 (psi)
Rear Cold Tire Pressure: 80 (psi)

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

Date Tested: 04/25/03

DATA SHEET 23 - SPIKE STOPS (S7.17)

Testing Conditions: INT DATA, Section B120, 04/25/03, 09:06:17

Weather Conditions: 52°F Wind: 8 mph 62° Start Odo.: 735 End Odo.: 758

Schedule:
GVWR, 10 stops in neutral, 30-0 mph
200 lb. pedal force in .08 sec.,
150-200°F IBT, no cav. stops or brake adj.

Performance Requirements:
Complete stops without failure,
lock-up allowed.

STOP #	INIT SPD (mph)	LEFT FRONT IBT (°F)	RIGHT FRONT IBT (°F)	LEFT REAR IBT (°F)	RIGHT REAR IBT (°F)	MAX PEDAL FORCE (lb)	AVG.SUST. PEDAL FORCE (lb)	TIME TO 190 LBS (second)	TIME TO 200 lbs (second)	TIME TO MAX PF (second)
1	30.6	172	164	184	179	261.8	173.6	0.33	0.41	1.19
2	30.4	180	177	167	170	217.6	140.5	0.46	0.50	0.67
3	30.0	183	181	165	165	255.7	176.3	0.05	0.23	0.57
4	30.3	184	182	166	164	262.7	169.4	0.18	0.19	0.33
5	30.3	186	179	165	162	215.6	127.6	0.07	0.22	0.45
6	30.4	192	183	165	166	281.3	164.7	0.05	0.06	0.24
7	29.8	187	187	161	158	273.1	154.2	0.05	0.06	0.24
8	30.1	191	189	160	158	208.8	114.5	0.03	0.05	0.06
9	30.3	188	186	158	159	242.5	149.0	0.19	0.21	0.64
10	30.2	187	184	156	154	264.1	152.3	0.06	0.06	0.26

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
7	-	NOX	SOUTH	YES
8	-	NOX	SOUTH	YES
9	-	NOX	SOUTH	YES
10	-	NOX	SOUTH	YES

COMMENTS: DAVE DOLIN PERFORMED SPIKE STOPS MANUALLY.

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/12/03
Approving Laboratory Official: KEN WEBSTER Date: 05/20/03

Vehicle: 2003 LIBERTY BUS INC TEST# NUMBER: C30901
Make: LIBERTY
Model: FREEDOM
Body Style: SCHOOL BUS
Front Cold Tire Pressure: 80 (psi)
Rear Cold Tire Pressure: 80 (psi)

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

Date Tested: 04/25/03

DATA SHEET 23A - POST SPIKE EFFECTIVENESS (S7.17)

Testing Conditions: INV DATA, Section D135, 04/25/03, 10:10:10

Weather Conditions: 52°F Wind: 8 mph 62° Start Odo.: 735 End Odo.: 758

Schedule:
Gvwr, 6 stops in neutral, 60-0 mph
150-200°F ABT.

Performance Requirements:
1 stop, 60 mph 267 ft., pedal force
=<150 lb., lockup =<1 wheel, stay in 12 ft. lane.

STOP #	INIT SPD (mph)	Ave. Front IBT (°F)	Ave. Rear Temp. (°F)	Stopping Distance (feet)	CORRECTED DISTANCE (SAE 299) (feet)	Max PEDAL FORCE (lb)	Avg. PEDAL FORCE (lb)	AVE Decel (ft/sec²)	MAX. DECEL (ft/sec²)
1	60.1	161.5	173.5	169.1	168.5	104.2	61.5	16.6	36.6
2	60.9	187.0	179.5	174.1	174.6	136.7	76.1	17.4	38.7
3	59.2	177.5	192.0	171.8	176.7	108.5	55.5	15.1	41.5
4	59.4	181.5	191.5	172.3	175.8	129.2	76.6	17.7	39.4
5	59.7	162.5	190.5	169.6	171.2	130.9	81.3	17.5	37.2
6	59.8	180.0	185.5	171.8	172.9	134.3	72.0	17.0	41.8

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

COMMENTS: NONE

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREW BASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/12/03
Approving Laboratory Official: KEN WEBSTER Date: 05/20/03

Veh.: 2003 LIBERTY BUS FREEDOM NHTSA No.: C30901 Date: 05/02/03

TEST COMPLETION INSPECTION (S7.18)

Requirements: No fracture of any components such as brake springs, brake shoe or disc pads facing. All mechanical components shall be intact and functional. Friction facing tearout shall not exceed 10% of the lining on any single frictional element. No visible brake fluid or lubricant on the friction surface of the brake. No leakage at any system reservoir cover, seal, or filler opening.

Friction Material Condition:

Primary/Inner/Primary

LF Normal appearance and color
RF Normal appearance and color
LR Normal appearance and color
RR Normal appearance and color

Secondary/Outer Secondary

LF Normal appearance and color
RF Normal appearance and color
LR Normal appearance and color
RR Normal appearance and color

Drum (or Rotor) Condition:

LF Normal appearance and color
RF Normal appearance and color
LR Normal appearance and color
RR Normal appearance and color

Brake Fluid/Lubricant Inside Brakes:

LF None
RF None
LR None
RR None

Hydraulic Component Condition:

LF Normal appearance; no leakage
RF Normal appearance; no leakage
LR Normal appearance; no leakage
RR Normal appearance; no leakage
Master Cylinder: Normal appearance; no leakage

Mechanical Component Condition:

Brake Pedal: Good
Power Brake: Good
Stoplights: Good
Linkages: Good

Comments: None

DATA INDICATES COMPLIANCE Yes (X) No ( ) No Requirements ( )
DRIVER Karen Easterday OBSERVER None
RECORDED DATA PROCESSED BY R. Landes DATE 05/06/03
APPROVING LABORATORY OFFICIAL K. Webster DATE 05/06/03

Veh.: 2003 LIBERTY BUS FREEDOM NHTSA No.: C30901 Date: 05/01/03

MASTER CYLINDER RESERVOIR

Reservoir Compartments			P	F
(1) Does master cylinder have a reservoir compartment for each subsystem?	Yes X No ____	Master cylinder shall have a reservoir compartment for each subsystem.	X	____
(2) Does loss of fluid in one compartment result in complete loss for another compartment?	Yes ____ No X	Loss of fluid from one compartment shall not cause complete loss from another compartment.	X	____

Reservoir Capacity

Shall conform to requirements (1) or (2), state units. (1) For reservoirs having completely separate compartments for each subsystem.

Subsystem 1			
Subsystem reservoir capacity	Not Appl.	Shall have a minimum capacity equivalent to the fluid displacement resulting when all wheel cylinders or caliper pistons serviced by that portion of the reservoir move from a new lining, fully retracted position to a fully worn, properly adjusted, fully applied position.	Not Appl.
Fluid Displaced	Not Appl.		
Subsystem 2			
Subsystem reservoir capacity		Same as above	Not Appl.
Fluid displaced	Not Appl.		

Veh.: 2003 LIBERTY BUS FREEDOM NHTSA No.: C30901 Date: 05/01/03

(2) For reservoirs utilizing a portion of the reservoir for a common supply to two or more subsystems.

			P	F
Total minimum capacity for the entire master cylinder reservoir.	913 ml	Shall have total minimum capacity for entire reservoir for displacement resulting from all subsystem wheel cylinders or caliper positions moving from new lining to full worn condition as above. Shall have minimum reservoir volume in partial compartment equal to at least the volume displaced by the master cylinder piston servicing the subsystem.	X	____
Fluid displaced	438.2 ml*		X	____
Subsystem 1 Minimum volume in partial compartment	147 ml			
Fluid displaced	19.0 ml			
Subsystem 2 Minimum volume in partial compartment	106 ml	Same as above.	X	____
Fluid displaced	10.7 ml			

*See bottom of Page 53.

Veh.: 2003 LIBERTY BUS FREEDOM NHTSA No.: C30901 Date: 05/01/03

MASTER CYLINDER PISTON DISPLACEMENT

Reservoir Compartments			P	F
Fluid displaced by three strokes of master cylinder piston.		Individual partial compartments of reservoir shall each		
Primary (Subsystem No. 1)	57 ml	have a minimum of		
Secondary (Subsystem No. 2)	32 ml	fluid equal to at least the volume displaced		
Fluid displaced per stroke.		by the master cylinder		
Primary	19.0 ml	piston servicing the	X	___
Secondary	10.7 ml	subsystem during a full stroke of the piston.		
Fluid available in partial compartment				
Subsystem No. 1	147 ml		X	___
Subsystem No. 2	106 ml		X	___

Brake Power Unit Reservoir			
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 the 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.	Not Appl.

Veh.: 2003 LIBERTY BUS FREEDOM NHTSA No.: C30901 Date: 05/01/03

Reservoir Labeling			P	F
Exact copy of reservoir label: On reservoir cap -*WARNING. CLEAN FILLER CAP BEFORE REMOVING. USE ONLY DOT 3 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 571.116.	X	
Measure letter height	1/8 in.	Letters shall be at least 1/8 inch high.	X	
Describe label attachment method and location. Embossed on the top of the master cylinder reservoir.		Label shall be permanently affixed, engraved, or embossed and located so as to be visible by direct view either on or within four inches of the brake fluid reservoir filler plug or cap.	X	
Does the lettering contrast with the background?	Yes ____ No X	If label is not engraved or embossed, letters shall be of a color that contrasts with the background.	Not Appl.	

Veh.: 2003 LIBERTY BUS FREEDOM NHTSA No.: C30901 Date: 05/01/03

BRAKE SYSTEMS INDICATOR LAMP

Functional Requirement:

Split service brake systems - with ignition on, lamp must light either for conditions (a) and (d) or (b) and (d). If vehicle is so equipped, must also light for (c). DO NOT TEST BULB CHECK.

Non-split systems - same as for split systems plus for (a), must light and sound alarm when supply pressure falls to 50% normal.

Condition:		Performance	P	F
(a) In event of hydraulic leak, must meet 1 of 4 criteria below:				
(1) Pressure differential ≤ 225 psi		Not Appl. psi	Not Appl.	
(2) Non power-assisted brakes, pedal force ≤ 50 lbs.		Not Appl. lb.	"	"
(3) Power-assisted brakes, pedal force ≤ 25 lbs.		Not Appl. lb.	"	"
(4) Supply pressure to brake power unit	Normal psi	Not Appl. psi		
≤ 50% normal pressure	Lamp on @	Not Appl. psi	"	"
Lamp on psi/Normal psi x 100		Not Appl. %	"	"
(b) If any reservoir falls below	Resvr. full	913 ml	(X) @ safe lev.	
safe level or 25% capacity, whichever is greater.	Lamp on	603 ml	( ) above level	
(Lamp on cc/Full cc) x 100		@ 66 %	X	___
(c) If total electrical failure of anti-skid or variable proportioning system.	( ) not so eq		X	___
	(X) not so eq		Not Appl.	
	( ) varbl. propn. not electrical			
(d) If parking brake applied			X	___

Veh.: 2003 LIBERTY BUS FREEDOM NHTSA No.: C30901 Date: 05/01/03

Labeling Requirement:

(For purposes of this inspection only): Lamps shall be noticeable to the driver in daylight when lighted, shall remain lighted (ignition on) as long as condition exists, and shall be labeled as indicated below.

Condition:		Performance	P	F
(a & b)	Hydraulic failure indicator labeled Brake _____	(X) BRAKE,	Info. only	
(1)	Noticeable to the driver	(X) Y, ( ) N	X	___
(2)	Remain lighted (with leak, turn ign. off & on)	(X) Y, ( ) N	X	___
(3)	Lens or lettering shall be red - color of lens,	Black ___		
	coloring of lettering	Red ___	X	___
(4)	Lettering at least 1/8" high (1/4" non-split) (for a & b only)	1/8 in.	X	___
(c) Antilock or electrical proportioning failure		( ) BRAKE,	Info. only	
	( ) ANTILOCK, "ABS" within symbol			
	(1), (2), (3) may be yellow (X) Y, ( ) N, & (4) OK ( ) not so eq		X	___
(d) Parking brake applied, indicator labeled		(X) BRAKE,	X	___
	( ) PARK BRAKE, ( ) PARK, ( ) _____		Info. only	
	(1), (2), (3), (4) OK (X) Y, ( ) N, & (4) OK		X	___

7.0 Data Sheet No. 1.25 Calculation of Minimum Reservoir Volume Requirements

Veh.: 2003 LIBERTY BUS FREEDOM NHTSA No.: C30901 Date: 05/02/03

LOCATION	TYPE	DESCRIPTION		MIN. THICKNESS		THICKNESS TO FULLY WORN (1)
Left Front	Drum ( )	Primary	( )	Pre-Test	0.481 in.	0.050 in.
	Disc (X)	Primary	( )	Post-Test	0.463 in.	
		Inboard	(X)	Δ	0.018 in.	
		Secondary	( )	Pre-Test	0.480 in.	0.050 in.
		Secondary	( )	Post-Test	0.466 in.	
		Outboard	(X)	Δ	0.014 in.	

Lining Clearance:

Diametral[2] Not Appl. Inboard 0.01 in. Outboard 0.01 in.

Wheel Cylinder Dia[2] Not Appl.
Shoe Cage Dia[4] Not Appl.
Caliper Piston Dia[3] 2.237 in. (x2 pistons)
Center Point of Brake Assembly to Center Point of W.C. Not Appl.

Right Rear	Drum ( )	Primary	( )	Pre-Test	0.547 in.	0.050 in.
	Disc (X)	Leading	( )	Post-Test	0.529 in.	
		Inboard	(X)	Δ	0.018 in.	
		Secondary	( )	Pre-Test	0.540 in.	0.050 in.
		Trailing	( )	Post-Test	0.524 in.	
		Outboard	(X)	Δ	0.016 in.	

Lining Clearance:

Diametral[2] Not Appl. Inboard 0.01 in. Outboard 0.01 in.

Wheel Cylinder Dia[3] Not Appl.
Shoe Cage Dia[4] Not Appl.
Caliper Piston Dia[3] 1.991 in. (x2 pistons)
Center Point of Brake Assembly to Center Point of W.C. Not Appl.

Subsystem 1 consists of: LF ( ) LR (X) RF ( ) RR (X) Operative
Subsystem 2 consists of: LF (X) LR ( ) RF (X) RR ( ) Operative

(1) Manufacturer's Recommendations (X)
Rear - 0.05 in. (X)

Front – 0.05 in. (X)

(2) Drum Brakes, Measured At Horizontal Centerline
Manufacturer's Data: Not Appl.

(4) Reset Position

(3) Manufacturer's Data:
Front – 57 mm [2.244 in.] (x2 Pistons)
Rear – 50.8 mm [2.000 in.] (x2 Pistons)

Metal Lining Foundation Thickness
Front - 0.293 in. (nominal)
Rear - 0.261 in. (nominal)

Note: Manufacturer's new lining thickness specifications: Fronts – 0.48 in.
Rears – 0.55 in.

Procedure and Calculations 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. Both measured and manufacturer's provided data utilized to obtain the greatest amount of fluid volume.

Disc Brake: $V_r = (\Delta t_i + t_{ic} + \Delta t_o + t_{oc}) \times \frac{\pi d^2}{4}$

Where:
V_r = Volume required per wheel
Δt = Change in thickness (average)
i = Inboard
o = Outboard
d = Caliper cylinder diameter
C = Average radial drum-to-lining clearance

Front
Disc Brake: $V_r = (\Delta t_i + t_{ic} + \Delta t_o + t_{oc}) \times \frac{\pi d^2}{4}$

$\Delta t_i = 0.43$ in.

$\Delta t_o = 0.43$ in.

$t_{ic} + t_{oc} = 0.02$ in.

$d = 2.244$ in.

$V_r = (0.43 + 0.01 + 0.43 + 0.01) \frac{\pi (2.244)^2}{4}$

$= 0.88 (3.955)$

$= 3.480$ in.^{3} = 57.04 ml x2 Pistons per Caliper = 114.08 ml

Rear
Disc Brake: $V_r = (\Delta t_i + t_{ic} + \Delta t_o + t_{oc}) \times \frac{\pi d^2}{4}$

$\Delta t_i = 0.50$ in.

$\Delta t_o = 0.50$ in.

$t_{ic} + t_{oc} = 0.02$ in.

$d = 2.000$ in.

$V_r = (0.50 + 0.01 + 0.50 + 0.01) \frac{\pi (2.000)^2}{4}$

$= 1.02 (3.142)$

$= 3.204$ in.^{3} = 52.52 ml x2 Pistons per Caliper = 105.04

Total Volume required 2(114.08) + 2(105.04) = 438.2 ml*

APPENDIX A

Instrumentation
Pre- & Post-Test Calibrations
Daily Calibrations

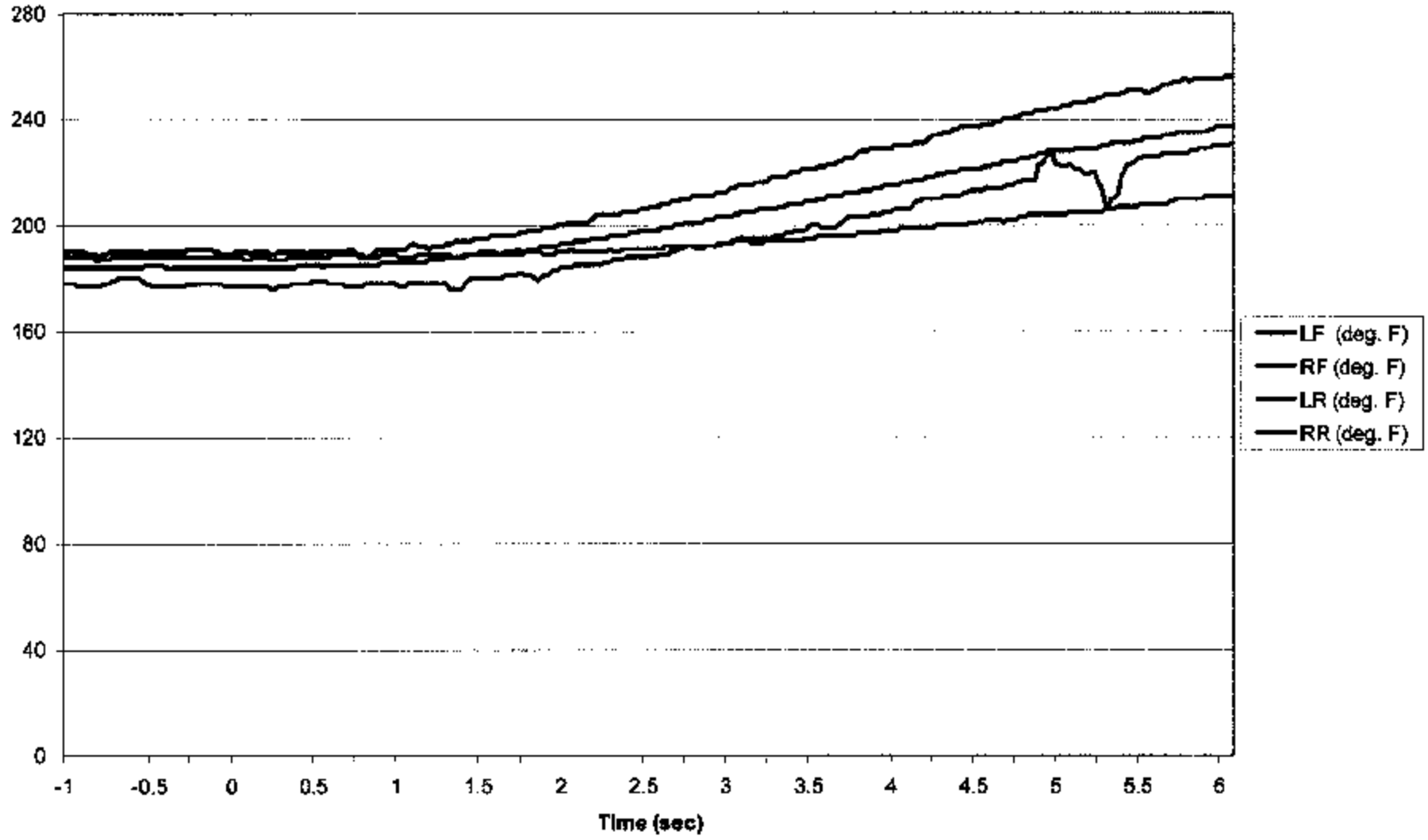
INSTRUMENTATION - FMVSS 105-83 CALIBRATION (12 MONTH MAX. INTERVAL)

VEHICLE:2003 LIBERTY BUS FREEDOM; NHTSA NO.:C30901; DATE:02/03/03

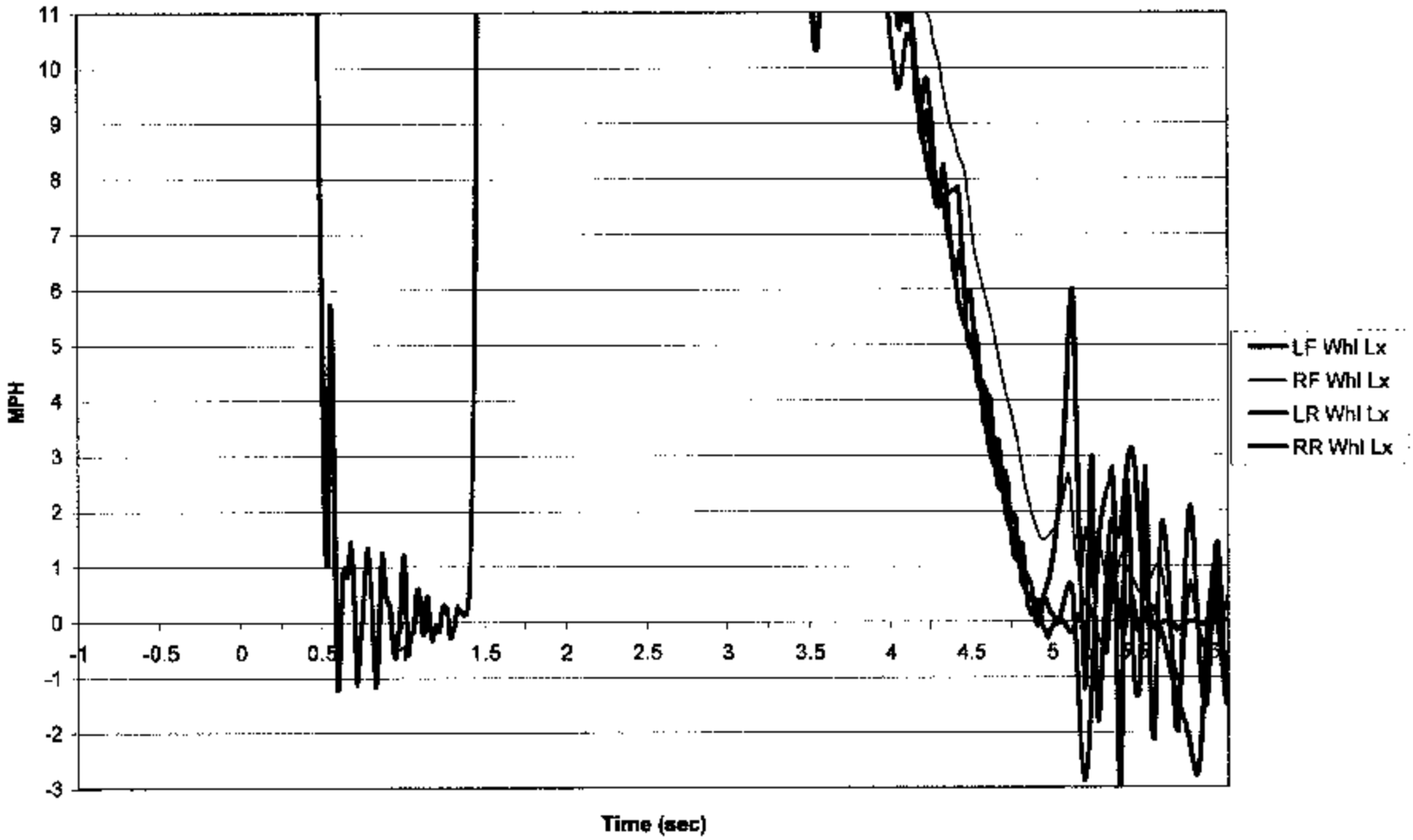
INSTRUMENT	SERIAL NUMBER	CALIBRATION DATE	NEXT CALIBRATION
Data Acquisition System - Link Engr. 2082	975016	09/13/02	09/15/03
Computer – Dell Latitude LM/Link Engrg.	TRC-43207	Not Applicable	Not Applicable
Software - Link Engrg. Rev Data	TRC Propr.	NA	NA
LF Torque Wheel	Not Utilized		
RF Torque Wheel	Not Utilized		
LR Torque Wheel	Not Utilized		
RR Torque Wheel	Not Utilized		
Stopwatch – Accusplit	SW-ST03	11/05/02	11/05/03
Tire Pressure Air Gage - Ashcroft	AG-05	11/05/02	11/05/03
Frequency Counter – Hewlett Packard	M-1128A00670	09/19/02	09/19/03
Pedal Force Transducer – Sensor Devel.	169755	Each Test	Each Test
Asst. Pipe-Handle Steel Weights – Ohaus	LBS-0001	02/06/02	02/06/03
Park Brake Force Transducer – Interface	LC-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 DRS-06 Radar	140.0119	Each Test	Each Test
Wind Velocity – Davis Scientific	021023N09	10/29/02	10/02/03
Ambient Temperature Gauge – Davis Sci.	021024N11	10/24/02	10/24/03
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 – Mettler Toledo Scales	JX6A 3000 JAG EXTREME	02/11/03	05/11/03
Note: Pipe Handle Weights Checked 05/12/03 – No change – OK.			

QUALITY ASSURANCE

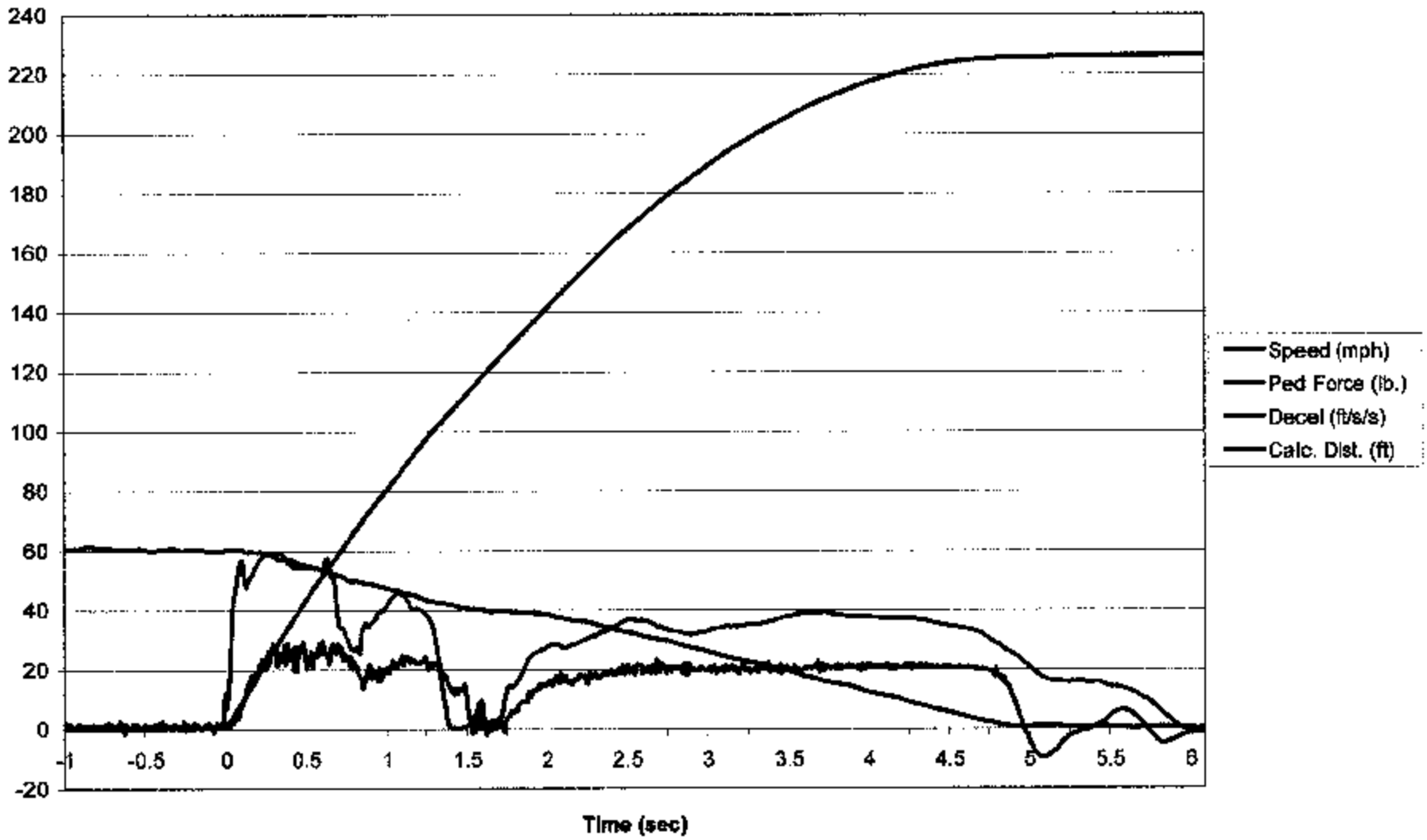
2003 Liberty Bus Freedom, ABS Inoperative @ 60 MPH, Stop #2, NHTSA No C30901



2003 Liberty Bus Freedom, ABS Inoperative @ 60 MPH, Stop #2, NHTSA No. C30901



2003 Liberty Bus Freedom, ABS Inoperative @ 60 MPH, Stop #2, NHTSA No. C30901



PRE-TEST CALIBRATION

INSTRUMENTATION CALIBRATION

FMVSS 105-83

X Pre-Test Calibration
___ Post-Test Calibration
Test Vehicle No. C30901

Technician Karen Easterday
Date 04/11/03
Approved By Randy Landes

INSTRUMENT	CALIBRATION PROCEDURE	DESIRED VALUE	INDICATED VALUE	RECORDED VALUE	ALLOWED DEVIATION
Velocity Meter	7.90 KHz Input	70 mph	70.0 mph	70.0 mph	.1 mph
5th Wheel Distance Meter	Drive Measured Distance @ <10 mph	1000 ft.	999.9 ft.	999.9 ft	10 ft.
		500 ft.	499.3 ft.	499.3 ft.	5 ft.
		250 ft.	249.9 ft.	249.9 ft.	2.5 ft.
		100 ft.	99.3 ft.	99.3 ft.	1 ft.
5th Wheel Velocity Meter	Drive Measured Mile @ Constant Speed	30 mph 120 sec.	120.12 sec.	30.0 mph	1 sec./ 1 mph
		60 mph/ 60 sec.	60.15 sec.	60.0 mph	1 sec./ 1 mph
Pedal Force Transducer	Cal. Value	86.7 lbs.	86.7 lbs.	86.7 lbs.	1.5 lbs.
	Dead Weight	0 lbs.	0.0 lbs.	0.0 lbs.	1.5 lbs.
		25 lbs.	25.0 lbs.	25.0 lbs.	1.5 lbs.
		50 lbs.	49.7 lbs.	49.7 lbs.	1.5 lbs.
		75 lbs.	74.7 lbs.	74.7 lbs.	1.5 lbs.
		100 lbs.	99.7 lbs.	99.7 lbs.	1.5 lbs.
		125 lbs.	124.7 lbs.	124.7 lbs.	1.5 lbs.
		150 lbs.	149.7 lbs.	149.7 lbs.	1.5 lbs.
		175 lbs.	174.8 lbs.	174.8 lbs.	1.5 lbs.
		200 lbs.	200.0 lbs.	200.0 lbs.	1.5 lbs.
Accelerometer	Tilt To Known Angles to Simulate Decel	0 fpsps	0.0 fpsps	0.0 fpsps	.5 fpsps
		10 fpsps	10.0 fpsps	10.0 fpsps	.5 fpsps
		20 fpsps	20.0 fpsps	20.0 fpsps	.5 fpsps
		25 fpsps	25.0 fpsps	25.0 fpsps	.5 fpsps
		32.2 fpsps	32.2 fpsps	32.2 fpsps	.5 fpsps

INSTRUMENTATION CALIBRATION, continued

FMVSS 105-83

X	Pre-Test Calibration	Technician	Karen Easterday
	Post-Test Calibration	Date	04/11/03
	Test Vehicle No. C30901	Approved By	Randy Landes

Lock-Up Detector	0 Wheel Speed Simulation @ over 10 mph	Light "ON"		
		LFX	X	Yes
		RFX	X	Yes
		LRX	X	Yes
		RRX	X	Yes

DAILY CALIBRATION

DAILY CALIBRATIONS (1 of 3)

Vehicle: 2003 Liberty Bus Freedom NHTSA No.: C30901

Deceleration Calibration Data for Unit 3051
Desired full scale value is: 32.2 ft/s/s
Allowed deviation is: + or - 0.5 ft/s/s

		"Date" "stp"	"Time" "stp"	Zero "Decel"	Cal "Decel"	
Accelerometer	Level to zero, then tilt to full scale	4/11/2003	14:06:47	0.00	32.30	PRE-TEST CAL.
		4/14/2003	7:16:00	0.10	32.20	
		4/14/2003	15:49:43	0.00	32.10	
		4/15/2003	8:32:18	0.10	32.20	
		4/15/2003	14:01:01	0.10	32.20	
		4/16/2003	8:49:13	0.00	32.20	
		4/16/2003	16:12:31	0.10	32.20	
		4/17/2003	8:03:47	0.00	32.20	
		4/17/2003	15:45:19	0.00	32.10	
		4/18/2003	14:03:39	0.00	32.20	
		4/18/2003	15:34:32	-0.10	32.20	
		4/21/2003	8:17:58	0.00	32.20	
		4/21/2003	15:51:00	0.00	32.20	
		4/24/2003	15:54:35	0.00	32.20	
		4/24/2003	16:24:33	0.00	32.20	
		4/25/2003	8:29:47	0.00	32.10	
		4/25/2003	12:03:21	0.00	32.20	POST- TEST CAL.

Pre-Test Linearity Check 04/11/03

Actual (ft/s/s)	Rec. (ft/s/s)
0.0	0.0
10.0	10.0
20.0	20.0
25.0	25.0
32.2	32.2

Post-Test Linearity Check 04/25/03

Actual (ft/s/s)	Rec. (ft/s/s)
0.0	0.0
10.0	10.0
20.0	20.0
25.0	25.0
32.2	32.2

Distance Calibration for 3051

Desired value is. 1000 ft
Allowed deviation is: 10 ft

		"Date" "stp"	"Time" "stp"	Distance for 1000 feet	
Light beam distance sensor	Drive from 0 to 10 to 0 mi/h on a measured kilofeet	4/11/2003	14:42:39	999.9	PRE-TEST CAL. 1000
		4/11/2003	14:44:58	499.3	PRE-TEST CAL. 500
		4/11/2003	14:46:53	249.9	PRE-TEST CAL. 250
		4/11/2003	14:48:16	99.3	PRE-TEST CAL. 100
		4/14/2003	7:29:48	999.9	
		4/15/2003	8:38:52	998.2	
		4/15/2003	14:10:13	998.8	
		4/16/2003	8:55:31	999.8	
		4/16/2003	16:16:47	998.4	
		4/17/2003	8:45:23	999.5	
		4/17/2003	15:47:38	998.5	
		4/18/2003	14:08:55	999.9	
		4/18/2003	15:37:53	998.1	
		4/21/2003	8:23:22	999.3	
		4/21/2003	15:56:31	999.3	
		4/24/2003	15:58:30	1001.2	
		4/24/2003	16:26:40	1000.6	
		4/25/2003	8:40:37	1000.5	
		4/25/2003	11:01:23	1000.5	POST-TEST CAL. 1000
		4/25/2003	11:03:12	499.6	POST-TEST CAL. 500
		4/25/2003	11:04:22	250.1	POST-TEST CAL. 250
		4/25/2003	11:05:59	99.5	POST-TEST CAL. 100

DAILY CALIBRATIONS CONTINUED (2 of 3)

VEHICLE: 2003 Liberty Bus Freedom NHTSA No.: C30901

Wheel Tachometer Calibrations for Unit 3051

Wheel tachometer calibrations: all wheel speeds should be 10 mi/h

		"Date"	"Time"	Zero	@15mi/h	Zero	@15mi/h	Zero	@15mi/h	Zero	@15mi/h	
		stp	stp	LF	LF	RF	RF	LR	LR	RR	RR	
Wheel lock detector	While at a standstill, check zeros. Drive vehicle at approx. 10 mi/h and engage zero speed switch for each wheel	4/14/2003	9:09:53	0.0	11.0	0.0	10.7	-1.1	12.3	-0.6	11.2	PRE-TEST CAL.
		4/15/2003	8:37:51	0.0	10.9	0.0	10.3	0.0	12.7	0.0	11.6	
		4/15/2003	14:06:16	0.0	11.5	0.0	10.2	0.0	13.7	0.0	11.2	
		4/16/2003	8:51:16	0.0	12.1	0.0	10.4	0.0	13.6	0.0	11.5	
		4/16/2003	16:15:37	0.0	10.7	0.0	10.1	0.0	11.9	0.0	11.0	
		4/17/2003	8:07:31	0.0	11.3	0.0	10.3	0.0	12.2	0.0	11.2	
		4/17/2003	15:49:15	0.0	12.1	0.0	10.5	0.0	12.3	-2.1	9.3	
		4/18/2003	14:07:41	0.0	12.4	0.0	10.7	0.0	12.4	-1.8	10.4	
		4/18/2003	15:37:00	0.0	12.4	0.0	10.8	0.0	25.0	0.0	11.7	
		4/21/2003	8:21:05	0.0	12.0	0.0	10.6	0.0	13.9	0.0	12.4	
		4/21/2003	15:55:37	0.0	12.1	0.0	11.0	0.0	27.7	0.0	12.2	
		4/24/2003	15:57:22	0.0	12.7	0.0	11.1	0.0	19.4	0.0	11.9	
		4/24/2003	16:37:15	0.0	11.2	0.0	10.5	0.0	12.5	-4.8	6.9	
		4/25/2003	8:36:07	0.0	11.9	0.0	10.7	0.0	21.0	0.0	12.4	
		4/25/2003	11:07:47	0.0	11.3	0.0	10.5	0.0	12.4	0.0	11.4	

When driven over 10 mi/hr and the wheel tach generators are shunted to zero volts, do all four wheel lock indicators alight?: X Yes, ____ No.

Pedal Force Meter Calibration for Unit 3051

Target shunt calibration is 86.7 lb

Desired recorded value is: 86.7 lb

Allowed deviation is: 1.5 lb

		'Date'	'Time'	Zero	Cal Val	
		stp	stp	Force	Force lb	
Service brk. pedal effort	Driver engages a fixed shunt cal switch.	4/11/2003	13:27:26	-0.2	201.5	PRE-TEST CAL.
		4/14/2003	7:23:22	-0.1	86.8	
		4/14/2003	15:48:59	-0.2	86.8	
		4/15/2003	8:31:26	-0.1	86.8	
		4/15/2003	14:04:47	-0.1	86.8	
		4/16/2003	8:48:25	-0.2	86.9	
		4/16/2003	16:14:09	-0.1	86.8	
		4/17/2003	8:03:05	-0.1	86.9	
		4/17/2003	15:44:21	-0.1	86.8	
		4/18/2003	14:04:29	-0.1	86.9	
		4/18/2003	15:35:53	-0.1	86.9	
		4/21/2003	8:20:03	-0.1	86.8	
		4/21/2003	15:52:18	-0.1	86.9	
		4/24/2003	15:56:22	-0.1	86.9	
		4/24/2003	16:23:45	-0.1	86.8	
		4/25/2003	8:31:59	0.0	86.9	
		4/25/2003	14:11:12	0.1	200.3	POST-TEST CAL.

Pre-Test Linearity Check - 04/11/03

Actual Force (lb)	Recorded Force (lb)
0	0
50	49.7
100	99.7
150	149.7

Post-Test Linearity Check - 04/25/03

Actual Force (lb)	Recrdd Fre(lb)
0	0.2
50	50
100	99.9
150	150.1

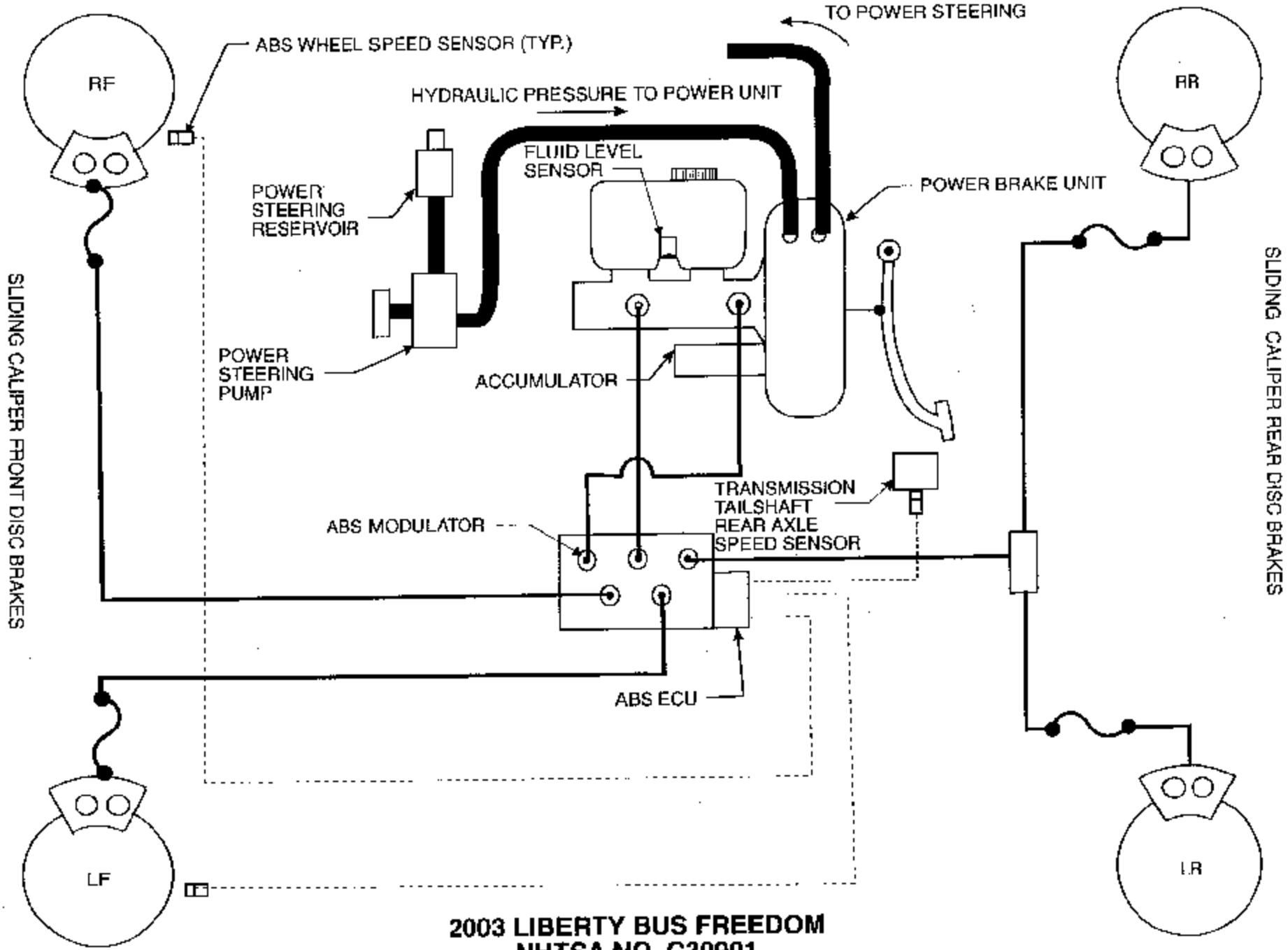
DAILY CALIBRATIONS CONTINUED (3 of 3)

VEHICLE: 2003 Liberty Bus Freedom NHTSA No. C30901

Dynamic Speed Calibration for Unit 3051

Desired speed value is: 60 mi/h
Allowed deviation is: 1.0 mi/h
Desired time value is: 60 seconds
Allowed deviation is: + or - 1.0 seconds

		"Date" stp	"Time" stp	"Speed" km/h	Time" sec	
Light beam speed sensor	Drive vehicle at a steady 60 mi/h through a mile	4/11/2003	14:52:47	30.2	120.12	PRE-TEST CAL. 30
		4/11/2003	14:56:14	59.9	60.15	PRE-TEST CAL. 60
		4/14/2003	7:33:08	60.3	60.31	
		4/15/2003	8:41:43	60.2	60.18	
		4/15/2003	14:13:32	60.3	59.96	
		4/16/2003	8:58:41	60.8	59.65	
		4/16/2003	16:19:37	60.5	59.68	
		4/17/2003	8:48:45	60.2	59.93	
		4/17/2003	15:51:12	60.0	N/A	
		4/18/2003	14:12:04	60.3	60.03	
		4/18/2003	15:40:19	60.3	N/A	
		4/21/2003	8:26:26	60.3	59.93	
		4/21/2003	15:59:37	60.5	59.94	
		4/24/2003	16:01:13	59.9	60.03	
		4/24/2003	16:32:13	60.1	60.21	
		4/25/2003	8:43:47	60.1	60.15	
		4/25/2003	11:10:47	60.1	60.15	POST-TEST CAL. 60
		4/25/2003	11:14:29	30.1	120.28	POST-TEST CAL. 30



2003 LIBERTY BUS FREEDOM
NHTSA NO. C30901

POST-TEST CALIBRATION

POST-TEST CALIBRATION

FMVSS 105-83

____	Pre-Test Calibration	Technician	Karen Easterday
_X_	Post-Test Calibration	Date	04/25/03
	Test Vehicle No. C30901	Approved By	R. Landes

INSTRUMENT	CALIBRATION PROCEDURE	DESIRED VALUE	INDICATED VALUE	RECORDED VALUE	ALLOWED DEVIATION
Velocity Meter	7.90 KHz Input	70 mph	70.0 mph	70.0 mph	.1 mph
5th Wheel Distance Meter	Drive Measured Distance @ <10 mph	1000 ft.	1001.0 ft.	1001.0 ft	10 ft.
		500 ft.	499.6 ft.	499.6 ft.	5 ft.
		250 ft.	250.1 ft.	250.1 ft.	2.5 ft.
		100 ft.	99.5 ft.	99.5 ft.	1 ft.
5th Wheel Velocity Meter	Drive Measured Mile @ Constant Speed	30 mph	120.28 sec.	30.0 mph	1 sec./ 1 mph
		120 sec.			
		60 mph/	60.15 sec.	60.0 mph	1 sec./
		60 sec.			1 mph
Pedal Force Transducer	Cal. Value	86.7 lbs.	86.7 lbs.	86.7 lbs.	1.5 lbs.
	Dead Weight	0 lbs.	0.2 lbs.	0.2 lbs.	1.5 lbs.
		25 lbs.	25.1 lbs.	25.1 lbs.	1.5 lbs.
		50 lbs.	50.0 lbs.	50.0 lbs.	1.5 lbs.
		75 lbs.	74.9 lbs.	74.9 lbs.	1.5 lbs.
		100 lbs.	99.9 lbs.	99.9 lbs.	1.5 lbs.
		125 lbs.	124.7 lbs.	124.7 lbs.	1.5 lbs.
		150 lbs.	150.1 lbs.	150.1 lbs.	1.5 lbs.
		175 lbs.	175.1 lbs.	175.1 lbs.	1.5 lbs.
		200 lbs.	200.1 lbs.	200.1 lbs.	1.5 lbs.
Accelerometer	Tilt To Known Angles to Simulate Decel	0 fpsps	0.0 fpsps	0.0 fpsps	.5 fpsps
		10 fpsps	10.0 fpsps	10.0 fpsps	.5 fpsps
		20 fpsps	20.0 fpsps	20.0 fpsps	.5 fpsps
		25 fpsps	25.0 fpsps	25.0 fpsps	.5 fpsps
		32.2 fpsps	32.2 fpsps	32.2 fpsps	.5 fpsps

INSTRUMENTATION CALIBRATION, CONTINUED

FMVSS 105-83

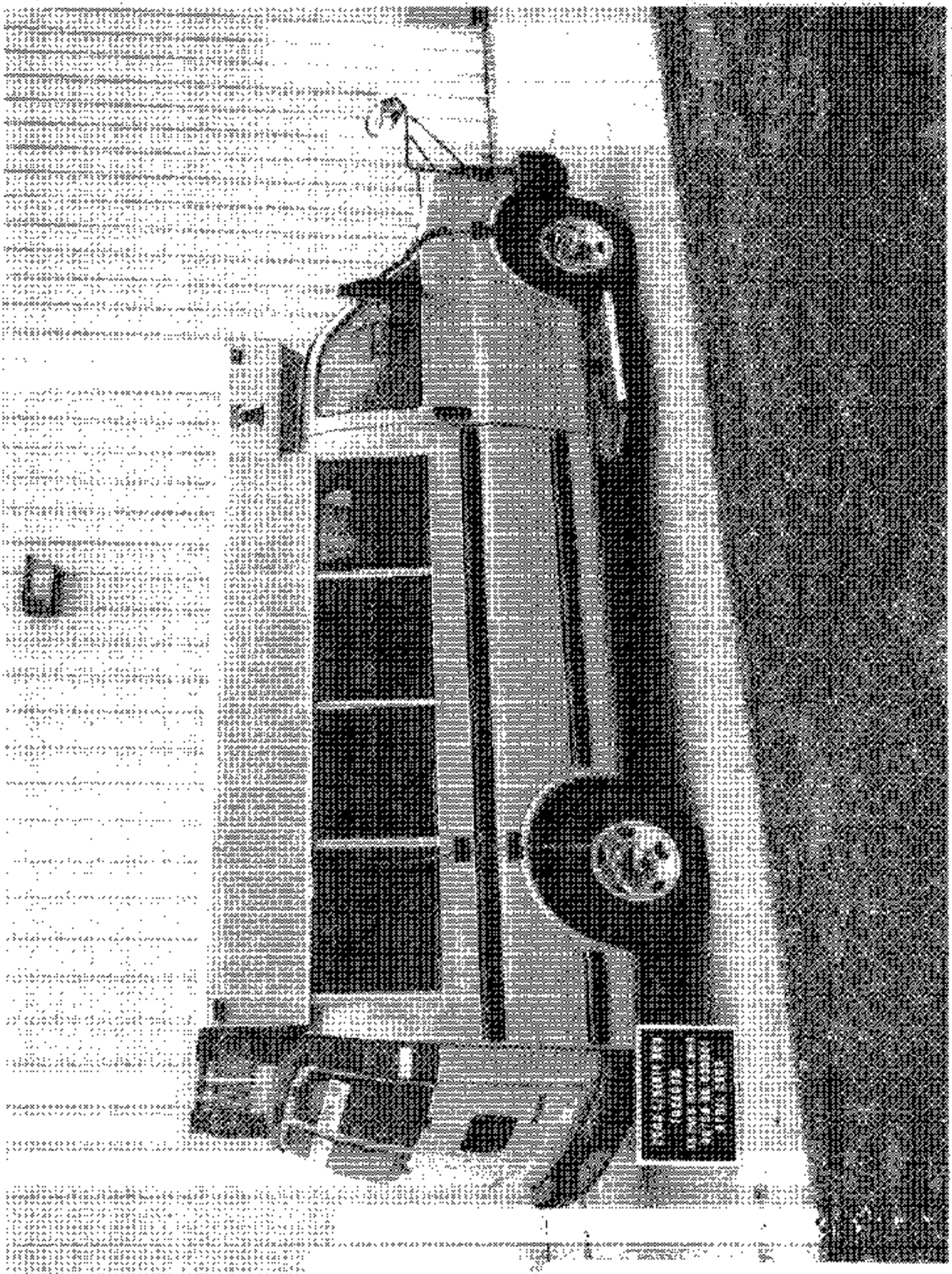
____	Pre-Test Calibration	Technician	Karen Easterday
X	Post Test Calibration	Date	04/25/03
	Test Vehicle No. C30901	Approved By	R. Landes

Lock-Up Detector	0 Wheel Speed Simulation @ over 10 mph	Light "ON"		
		LFX	X	Yes
		RFX	X	Yes
		LRX	X	Yes
		RRX	X	Yes

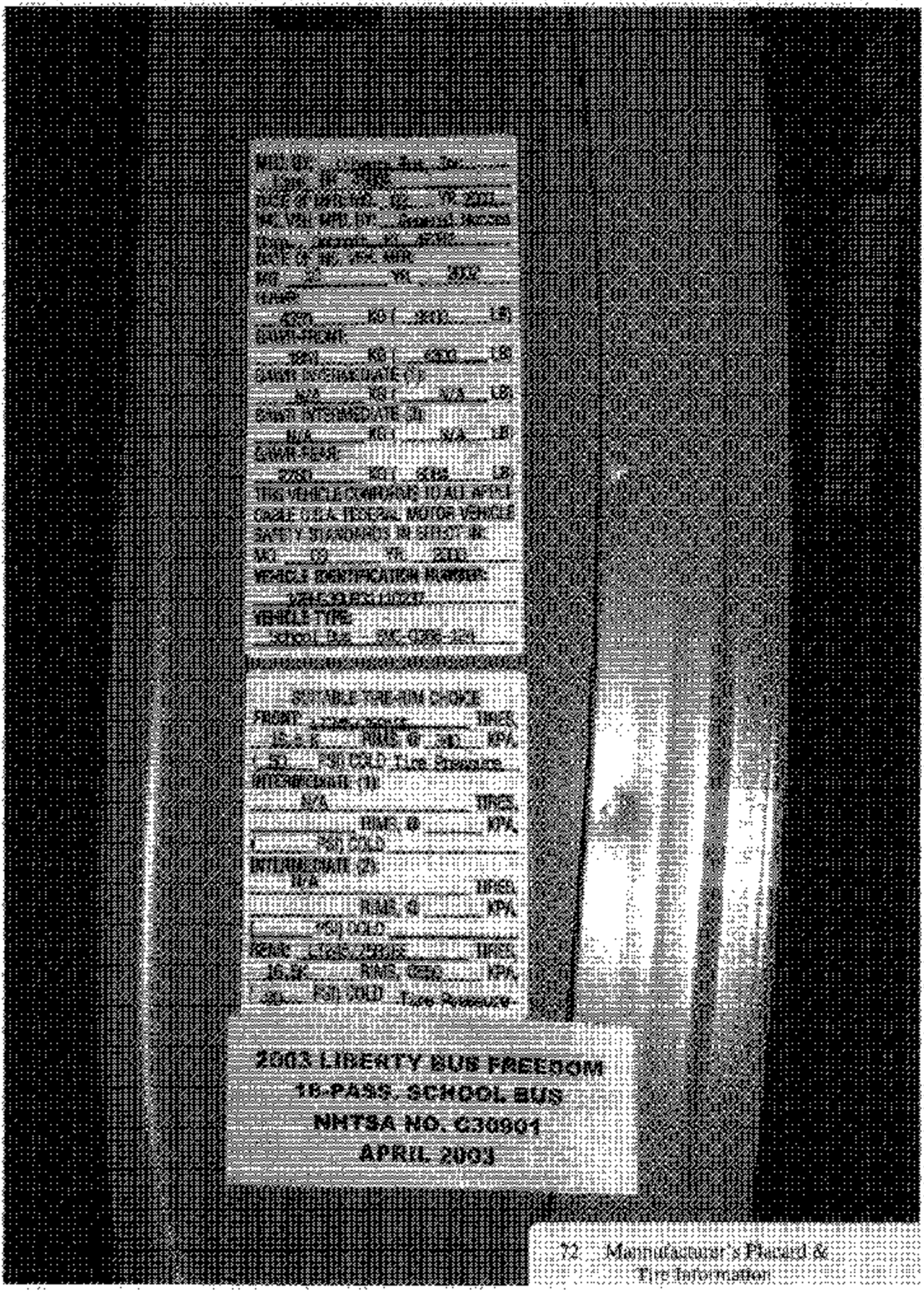
APPENDIX B

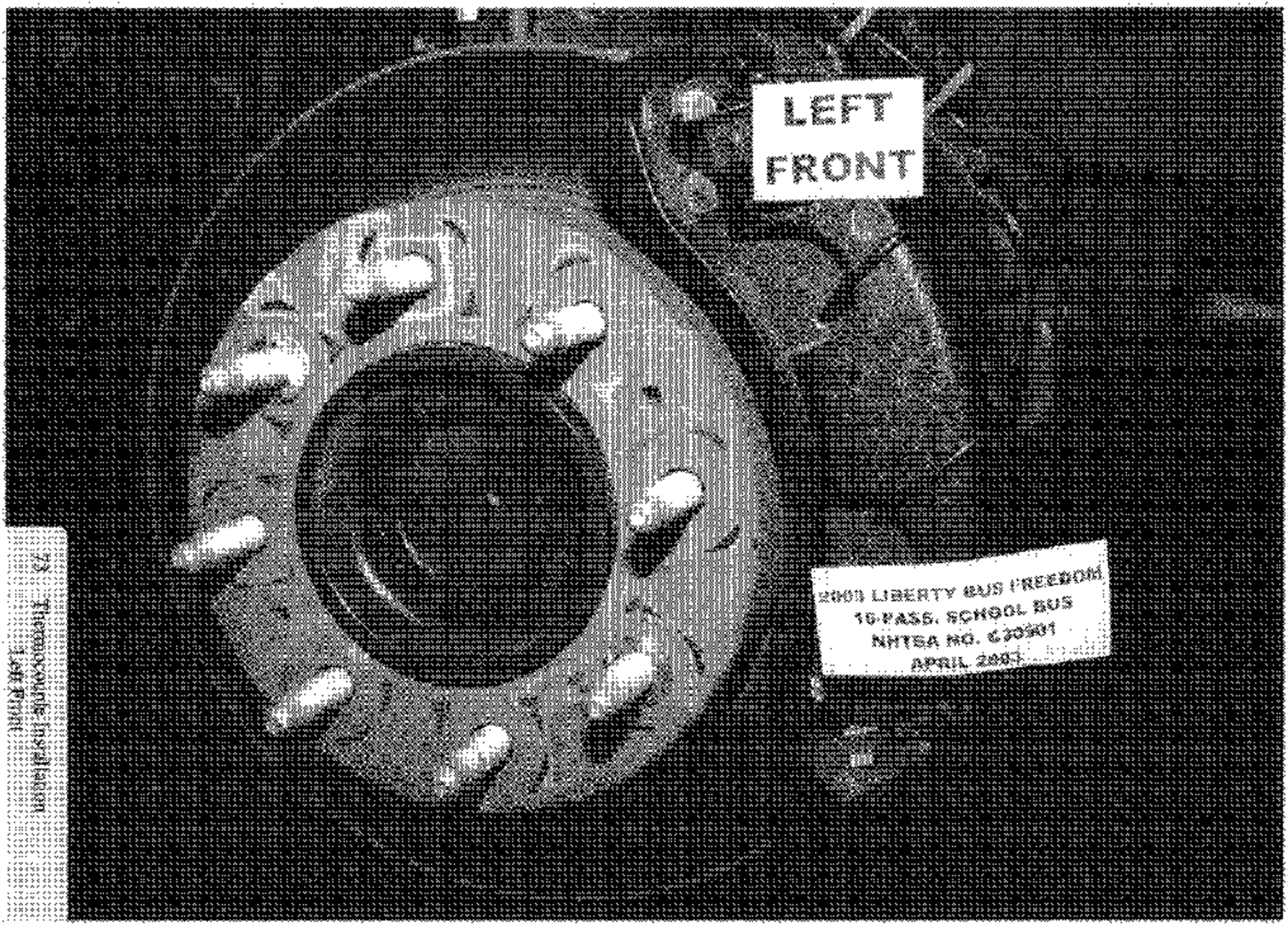
Photographs

70 3/4 Left Frontal

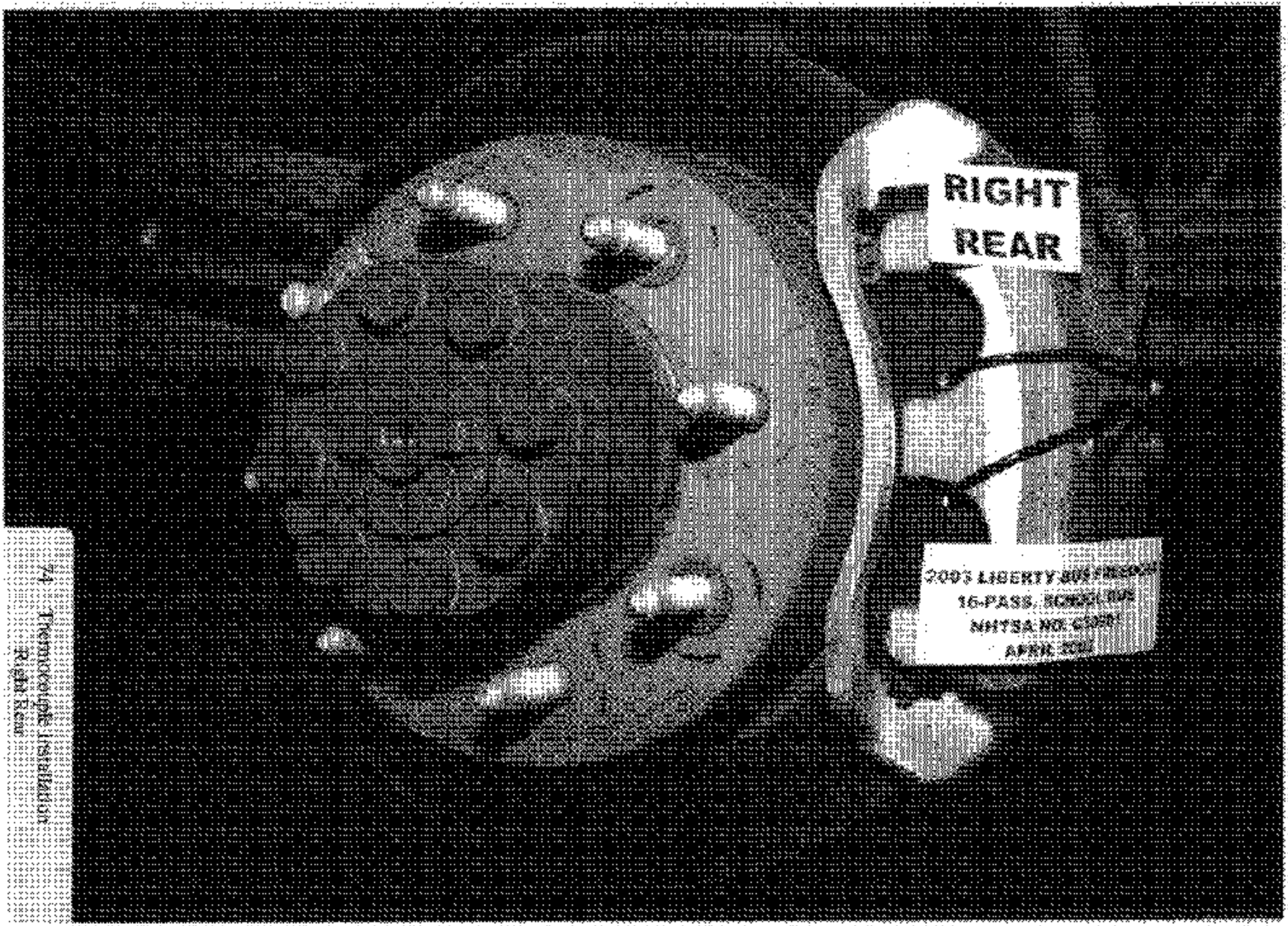


71 3/4 Right Rear


MFD BY: Thomas Built, Inc.
DATE OF MFR: 02 YR 2002
MFD VEH MFD BY: Freightliner
DATE OF MFR: APR
GVWR:
GAWR-FRONT:
GAWR INTERMEDIATE (1):
GAWR INTERMEDIATE (2):
GAWR-REAR:
THIS VEHICLE CONFORMS TO ALL APPLICABLE U.S.A. FEDERAL MOTOR VEHICLE SAFETY STANDARDS IN EFFECT ON:
VEHICLE IDENTIFICATION NUMBER:
VEHICLE TYPE:
SCHOOL BUS
SUITABLE TIRE-RIM CHOICE
FRONT:
RIMS @
PSI COLD
INTERMEDIATE (1):
N/A
PSI COLD
INTERMEDIATE (2):
N/A
PSI COLD
REAR:
PSI COLD
2003 LIBERTY BUS FREEDOM
15-PASS. SCHOOL BUS
NHTSA NO. C30901
APRIL 2003



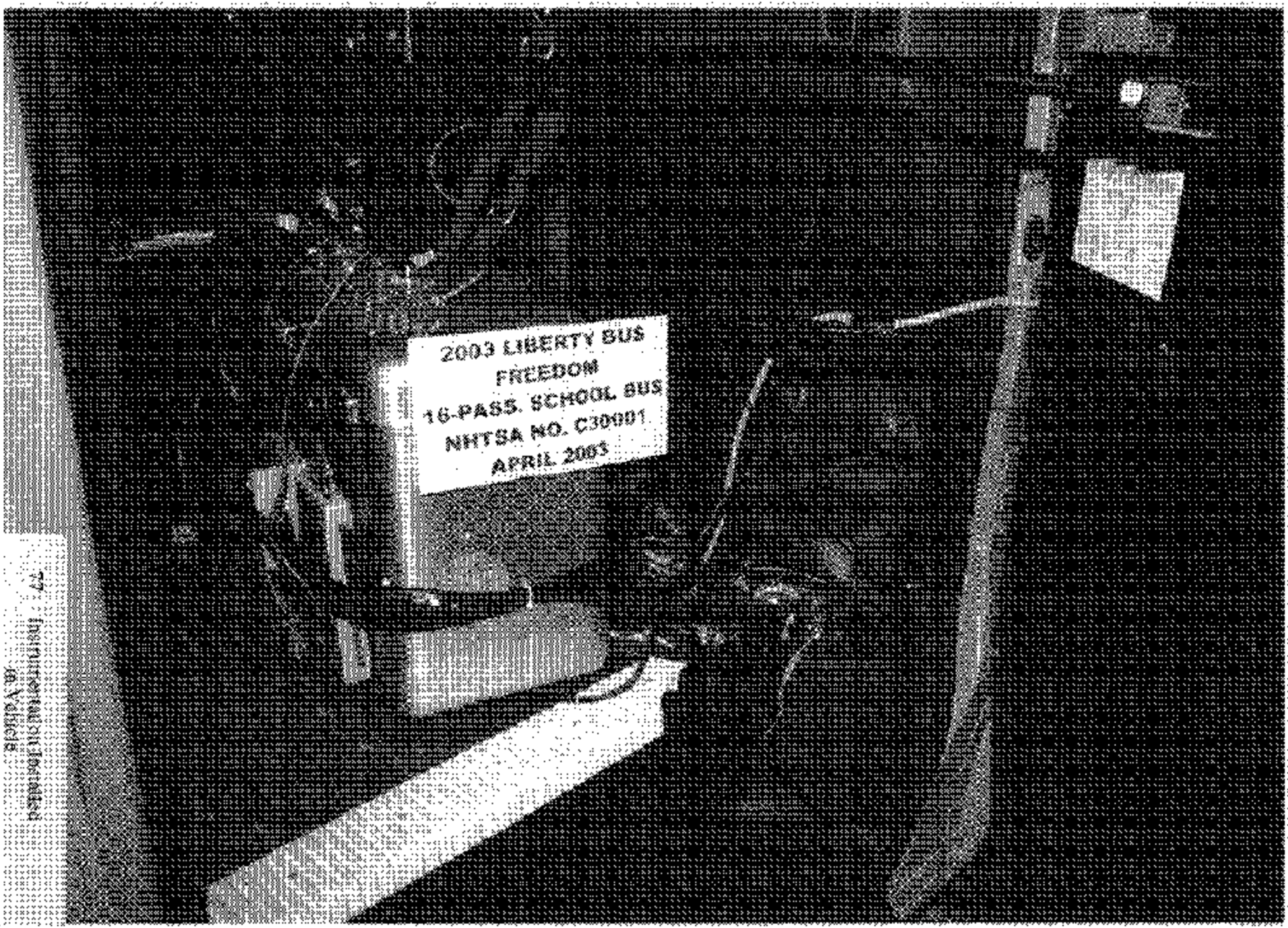
73 Thermocouple Installation
Left Front

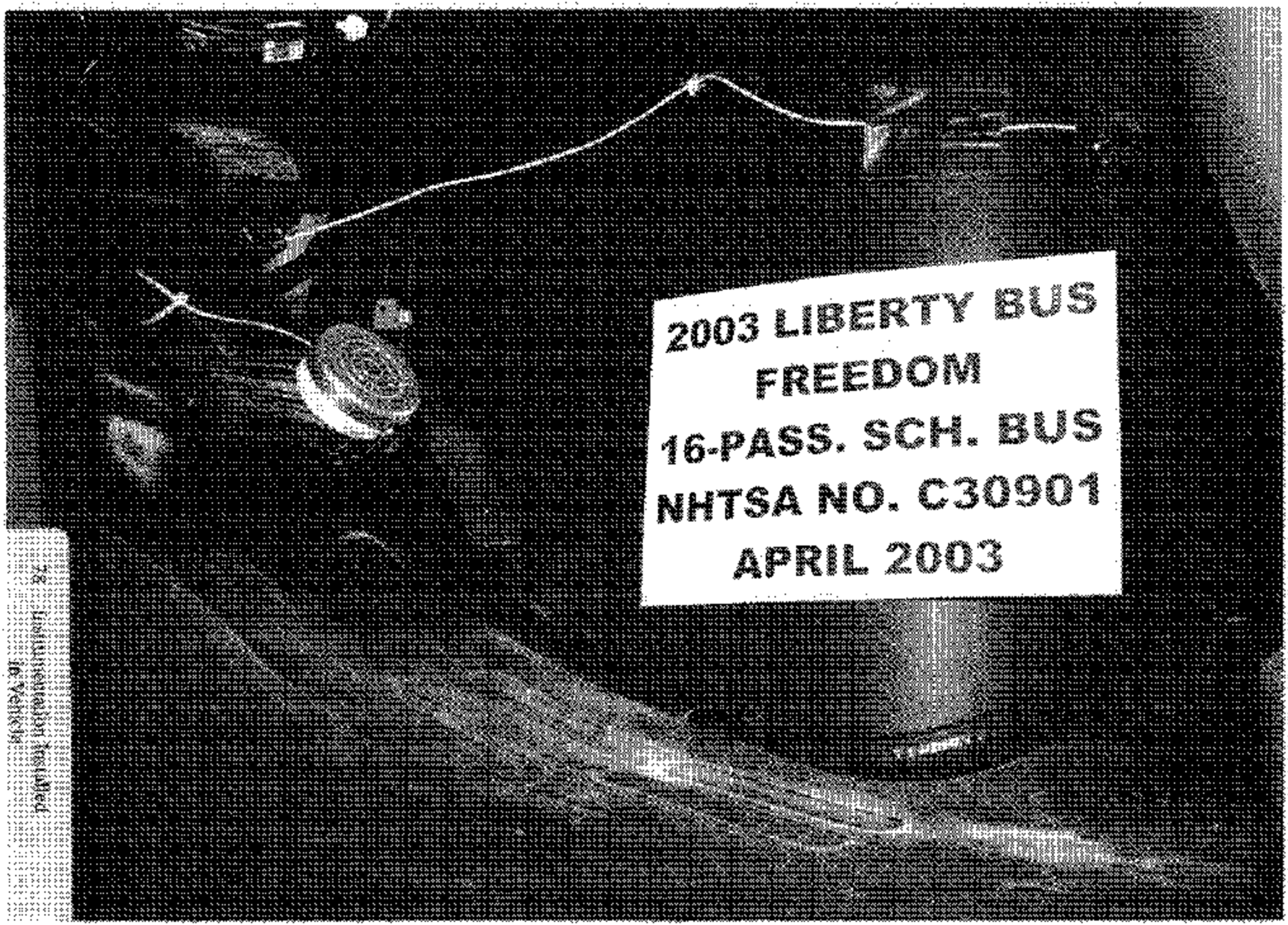


74 Thermocouple Installation
Right Rear

75 Instrumentation Installed in Vehicle

76. Instrumentation installed in vehicle


2003 LIBERTY BUS
FREEDOM
16-PASS. SCHOOL BUS
NHTSA NO. C30001
APRIL 2003

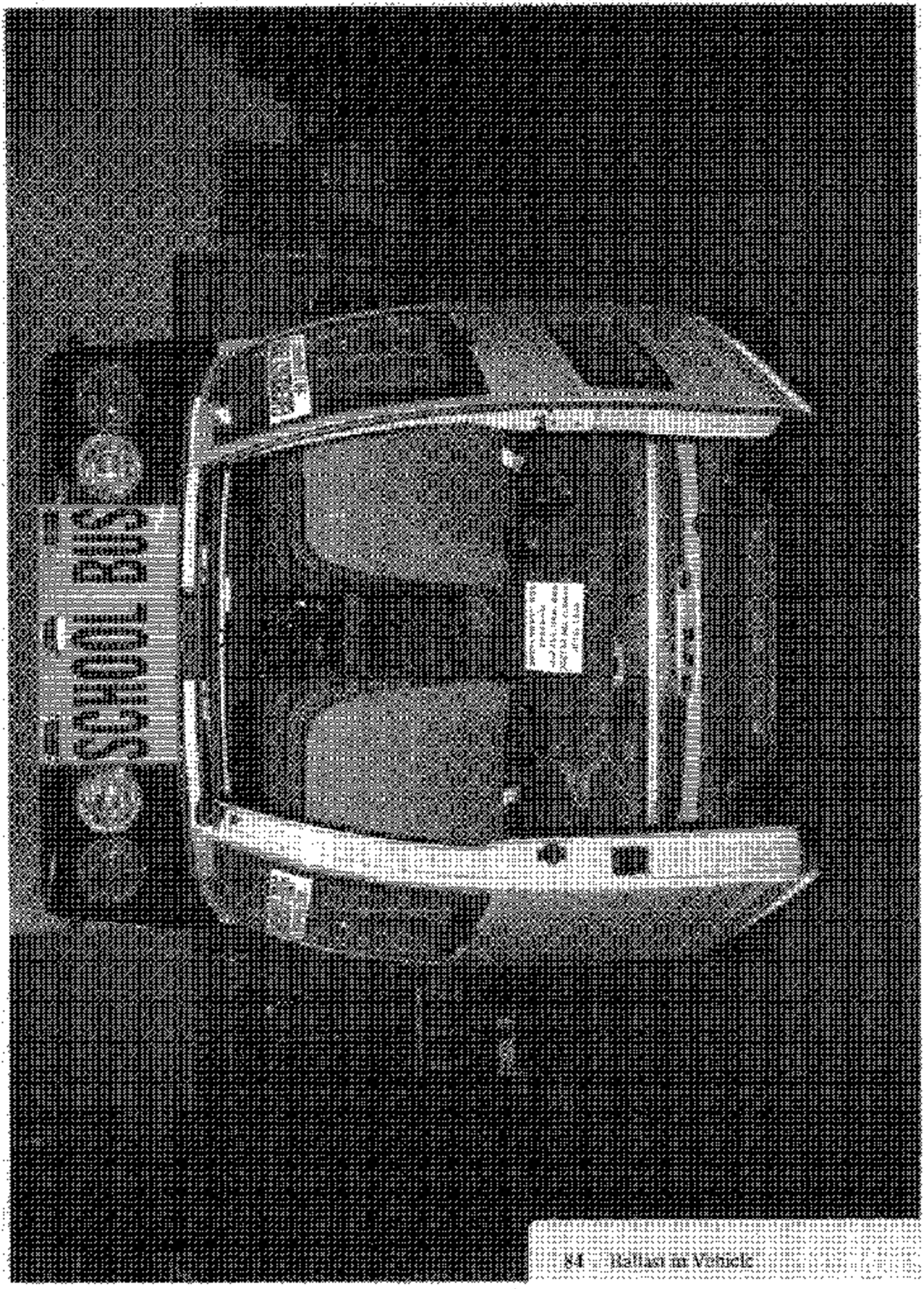

2003 LIBERTY BUS
FREEDOM
16-PASS. SCH. BUS
NHTSA NO. C30901
APRIL 2003

79 Instrumentation Installed in Vehicle

81 Vehicle Being Weighed

2003 LIBERTY BUS
FREEDOM
16-PASS. SCHOOL BUS
NHTSA NO. C30001
APRIL 2003

83 Ballast in Vehicle



85 Brake Fluid Reservoir Label

86 ABS Lamp Activated

67

APPENDIX C

Copy of Manufacturer's Sticker

Note for C30901:

There was no manufacturer's sticker available for the final stage manufacturer.

APPENDIX D

Discussion on Data

DISCUSSION ON DATA

Any discrepancies in brake temperature from visual to recorded data are probably due to the fact that the visual temperatures were taken prior to accelerating to speed, and the recorder was not turned on until just before starting the stop.

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 performed manually.

APPENDIX E

Contractor's Comments
Procedure Modifications
and
Test Facility

Comments for vehicle C30901.

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 always less than the required/target deceleration values.

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 straight-aways of 3/16 inch per foot. The 1.88 mile long straight-aways 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 straight-aways and the 42-foot wide curves provide three test lanes. Paved berms, 16 feet in width, border the straight-aways 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

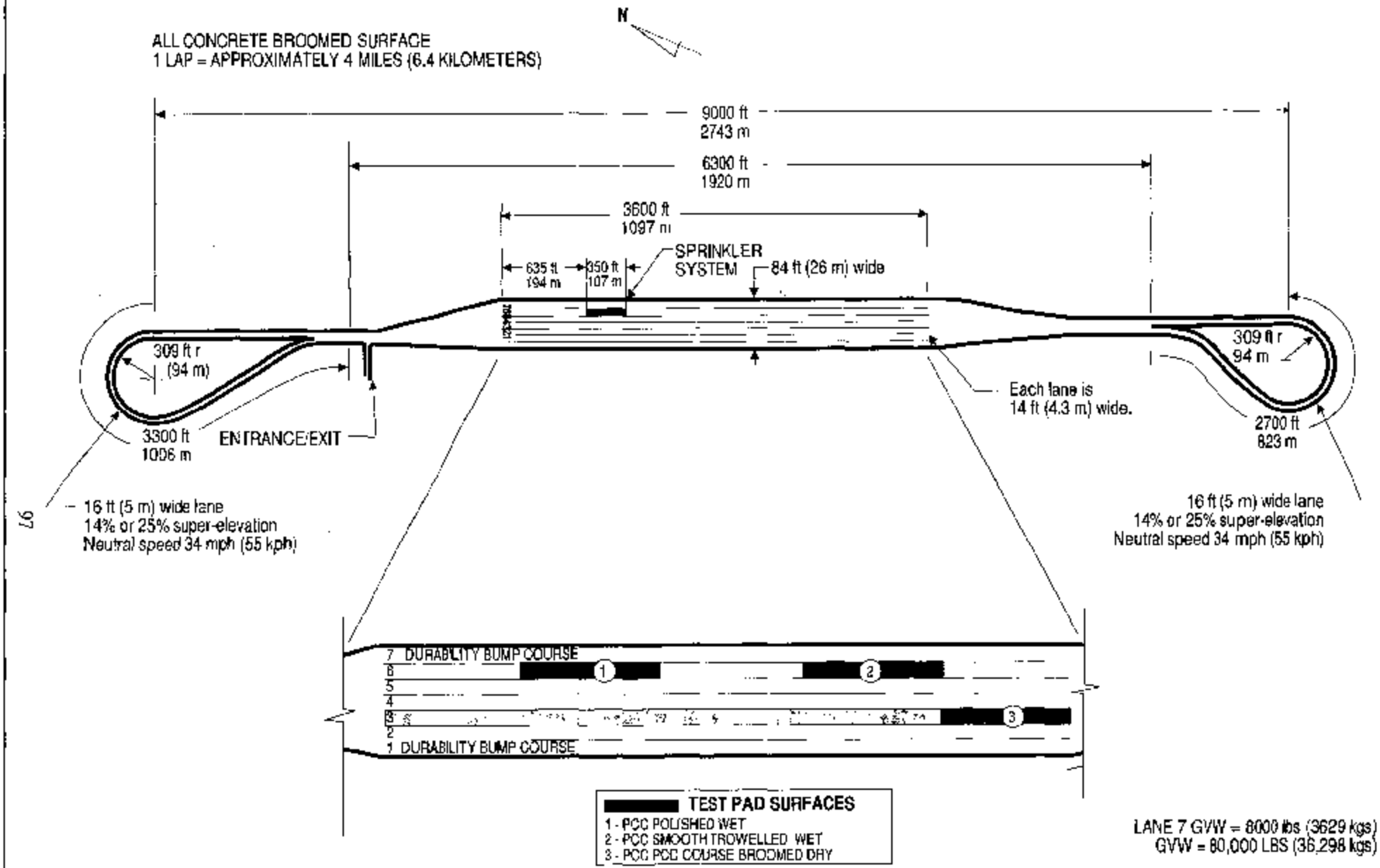
The Skid Pad is a test facility which is utilized primarily for the evaluation of tire and brake systems.

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.

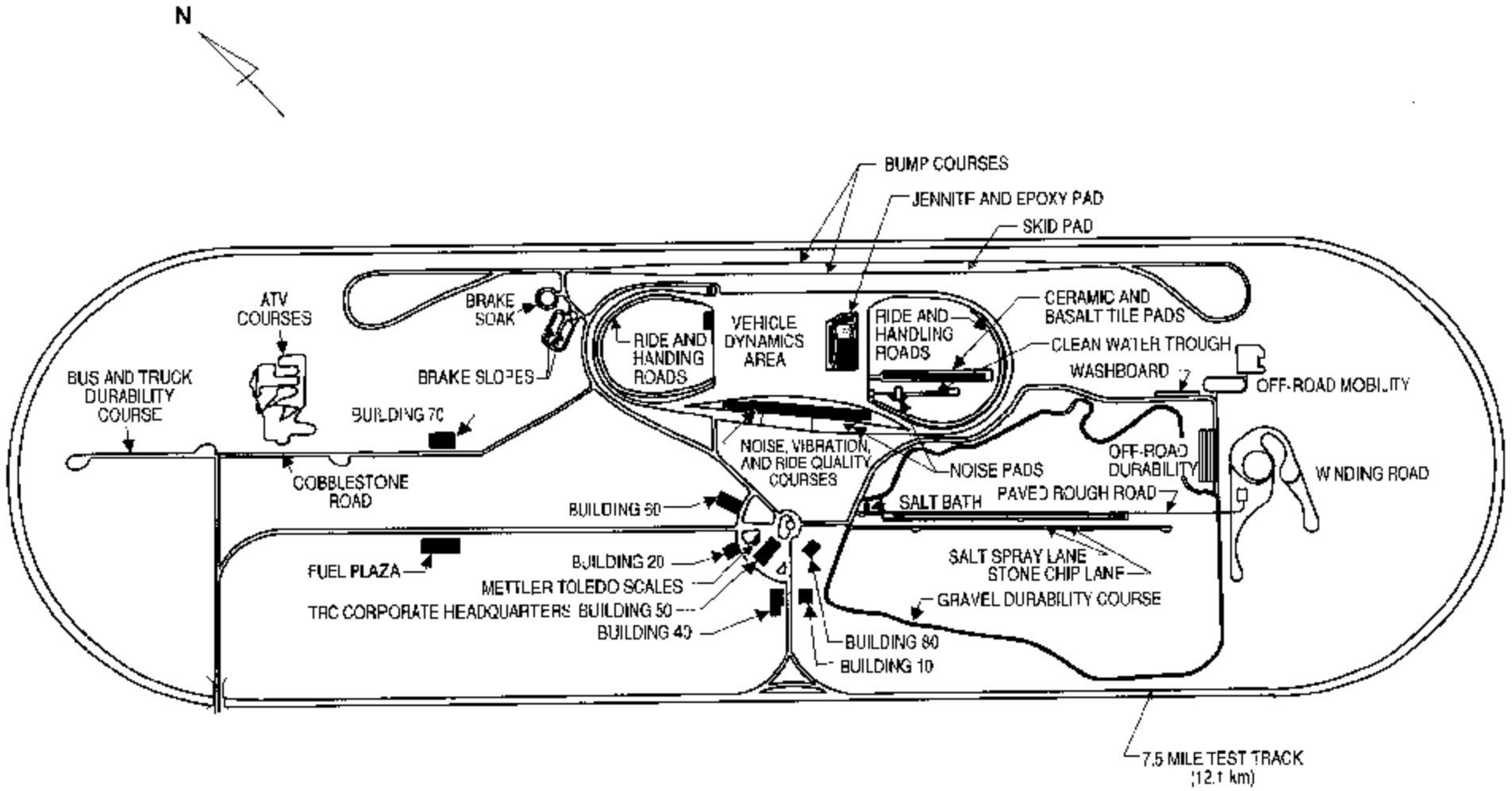


NOTE: BUMP COURSES PARALLEL THE PERIMETERS OF LANES 1 AND 7.

Not to scale
All dimensions are approximate

SKID PAD

TRC (R)
TRANSPORTATION RESEARCH CENTER INC.
EAST LIBERTY, OHIO 43319-0367

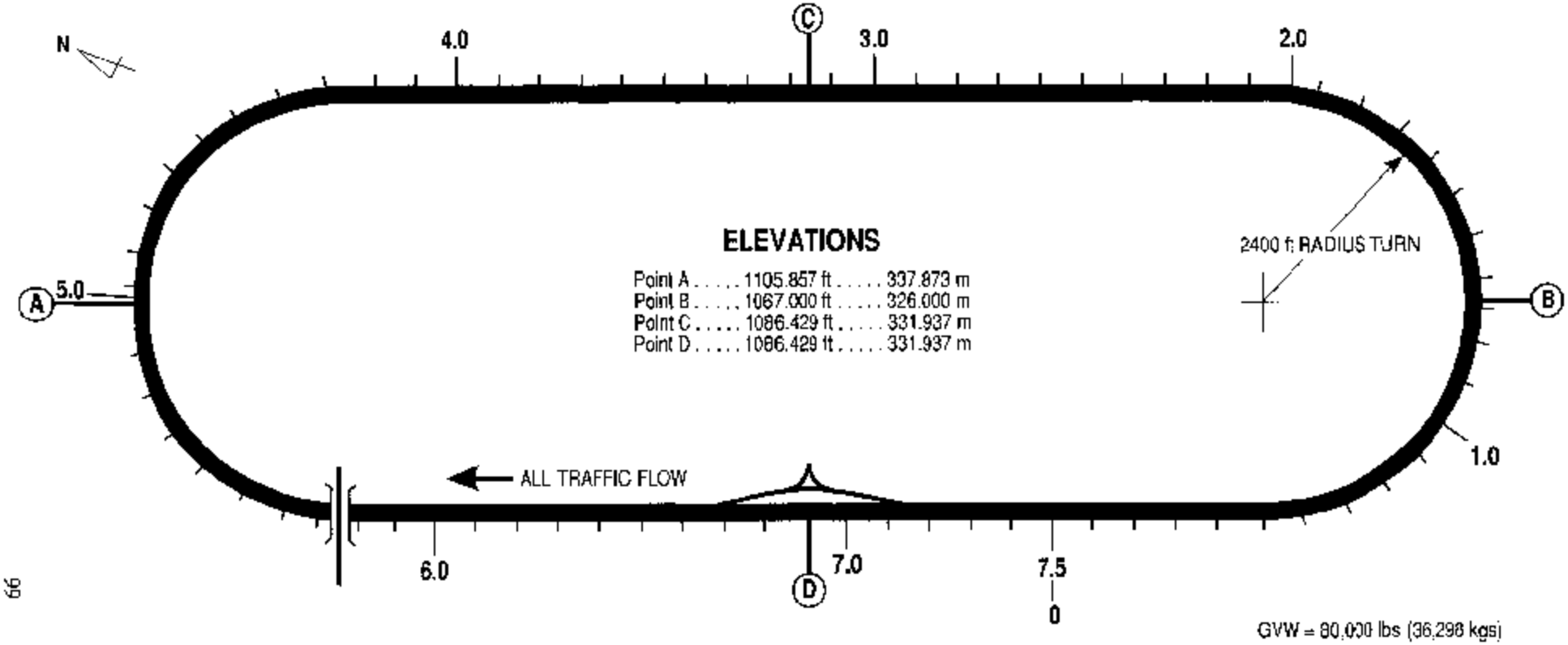


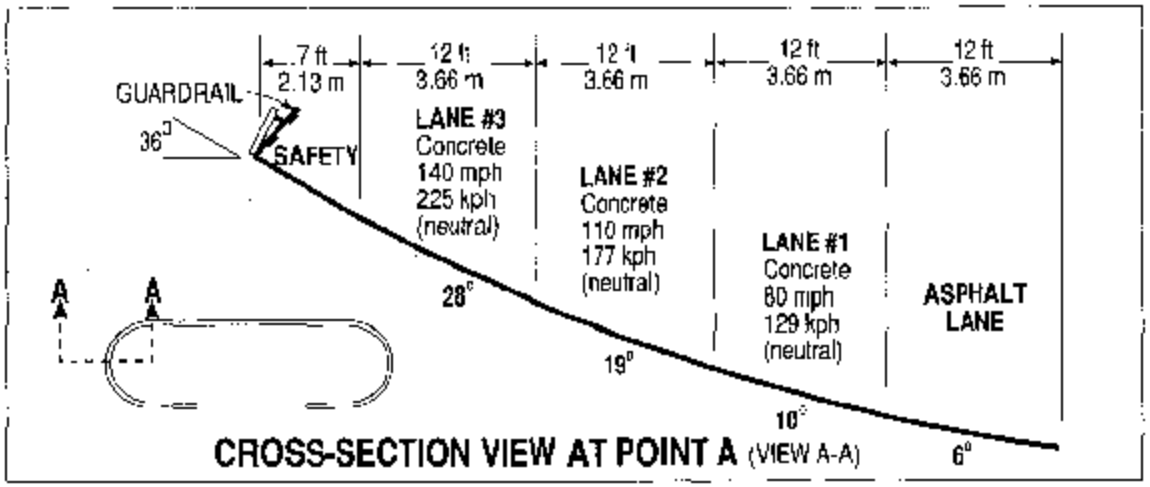
NOT TO SCALE

TEST FACILITY DETAIL

TRANSPORTATION RESEARCH CENTER INC.
EAST LIBERTY, OHIO 43319-0357

F-15 8601





CROSS-SECTION VIEW AT POINT A (VIEW A-A)

DISTANCES

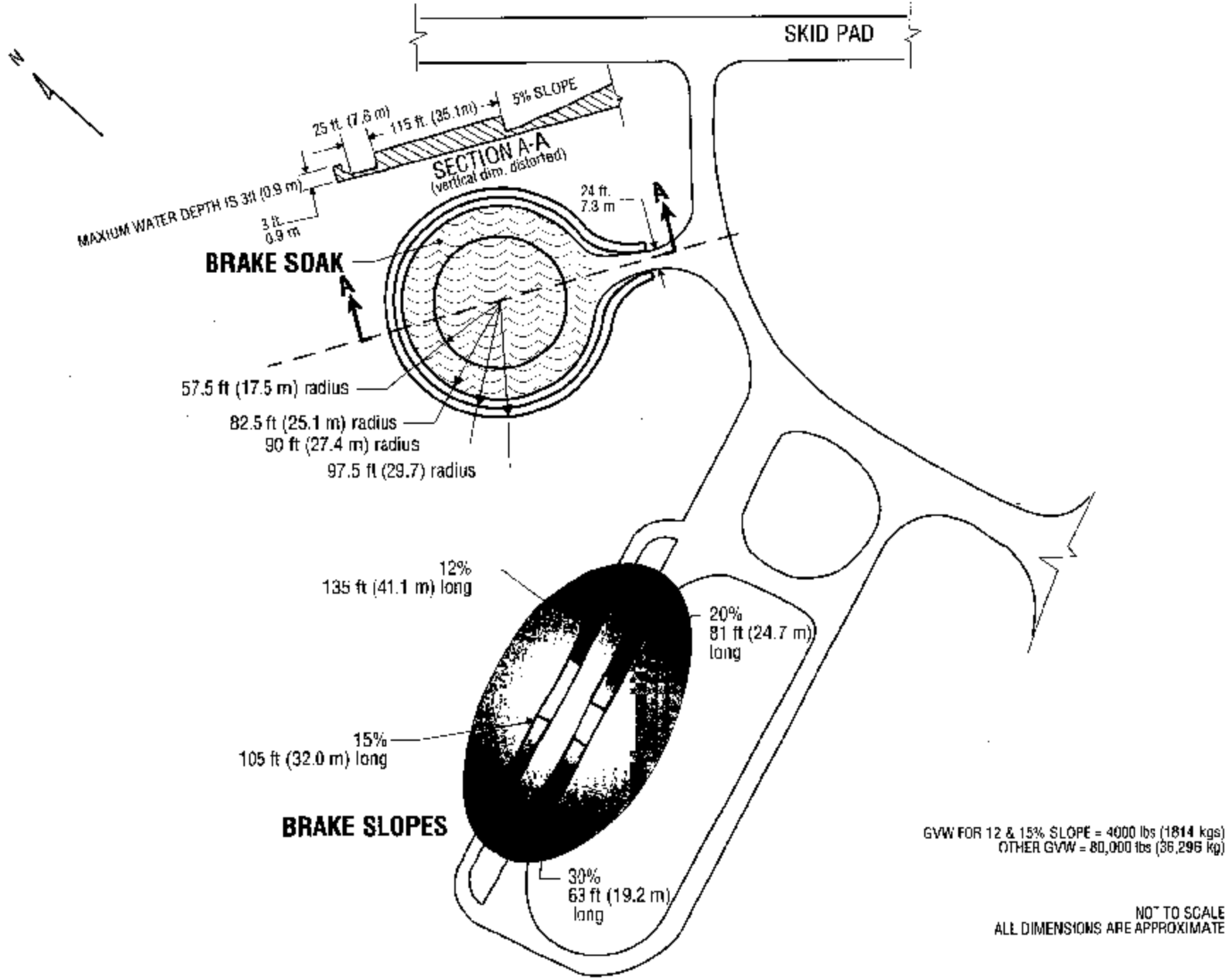
Lane 3 . . . . . 7.539 mi . . . . . 12.133 km
Lane 2 . . . . . 7.521 mi . . . . . 12.104 km
Lane 1 . . . . . 7.507 mi . . . . . 12.081 km

Point A to Point B . . . . . 3.333 mi . . . . . 5.364 km
Point C to Point D . . . . . .947 mi . . . . . 1.521 km

NOT TO SCALE

7.5-MILE TEST TRACK

TRC®
TRANSPORTATION RESEARCH CENTER INC.
EAST LIBERTY, OHIO 43319-0367



100

BRAKE SOAK and BRAKE SLOPES

TRC
TRANSPORTATION RESEARCH CENTER INC.
EAST LIBERTY, OHIO 43319-1867
1-0 0500

APPENDIX F

Notice of Possible Non-Compliance

This vehicle (C30901) met all the requirements.

APPENDIX G

Conversion Sheet

Insert Conversion Sheet

METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
	AREA			
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
	MASS (weight)			
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
	VOLUME			
tsp	teaspoons	5	milliliters	ml
tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
	TEMPERATURE (exact)			
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures. Price $2.25 SD Catalog No. C13.10:286.

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
	AREA			
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
	MASS (weight)			
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
	VOLUME			
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.1	cubic yards	yd^3
	TEMPERATURE (exact)			
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F