

Department ransportation tional Highway

iffic Safety ministration

DOT HS 807 032 Test Report

June 1986

# **Dynamic Testing for Side Crush**

MRB-to-Car Side Impact Test of a 90° Moving Rigid Barrier to a 1983 Ford Escort Test No. 1 16.1 MPH Test No. 2 32.2 MPH

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## SECTION 1.0

## PURPOSE AND INTRODUCTION

## PURPOSE

The main purpose of this test was to obtain side crush measurements for improvement of computer simulation models in one of a fleet of vehicles. The vehicle was tested using conditions not currently contained in a Federal Motor Vehicle Safety Standard.

### INTRODUCTION

A stationary 1983 Ford Escort 2-Door Hatchback was impacted on the left and right side by a Moving Rigid Barrier (MRB) on May 16, 1986.

Test #1: The MRB was to be towed into the stationary Ford Escort at 16.1 mph, and the intended contact point of the MRB longitudinal centerline was to be -9.8 inches (rearward) from the center of gravity of the Ford Escort. The angle of the MRB was  $90^{\circ}$  counter clockwise with respect to the longitudinal axis of the struck vehicle. The actual test speed was 16.1 mph and the actual contact point was -9.5 inches (rearward) from the center of gravity of the Ford Escort.

Test #2: The MRB was to be towed into the stationary Ford Escort at 32.3 mph, and the intended contact point of the MRB longitudinal centerline was to be -9.8 inches (rearward) from the center of gravity of the Ford Escort. The angle of the MRB was  $90^{\circ}$  clockwise with respect to the longitudinal axis of the struck vehicle. The actual speed was 32.2 mph and the actual contact point was -9.9 inches (rearward) from the center of gravity of the Ford Escort.

Section 2 contains General Test and Vehicle Parameter Data. Section 3 contains data required by R & D. Appendix A & B contains pre-test and post-test vehicle photographs. Appendix C & D contains Data Plots.

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## SECTION 2.0

# GENERAL TEST AND VEHICLE PARAMETER DATA

The following data sheets describe the General Test and Vehicle Parameter Data.

## TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: Ford Motor Co.	
MAKE/MODEL: Ford Escort	VIN: 1X687AT279044
BODY STYLE: 2-Door Hatchback	MODEL YEAR: 1983
NHTSA NO.: R & D	COLOR: red
ENGINE DATA: TYPE: Inline CYLINDERS:	4 DISPLACEMENT: 1600cc
TRANSMISSION DATA: 4 speed manual	
DATE VEHICLE RECEIVED: 5/12/86	ODOMETER READING: 58,977
DEALER'S NAME AND ADDRESS: NA	

ACCESSORIES:

STEERING	Yes	AUTOMATIC TRANSMISSION	No
BRAKES	Yes	AUTOMATIC SPEED CONTROL	No
SEATS	No	TILTING STEERING WHEEL	No
WINDOWS	No	TELESCOPING STEERING WHEEL	No
) GLASS	Yes	AIR CONDITIONING	No
	Yes	ANTI-SKID BRAKE	No
	No	REAR WINDOW DEFROSTER	No
	STEERING BRAKES SEATS WINDOWS OGLASS	STEERING Yes BRAKES Yes SEATS No WINDOWS No O GLASS Yes Yes No	STEERINGYesAUTOMATIC TRANSMISSIONBRAKESYesAUTOMATIC SPEED CONTROLSEATSNoTILTING STEERING WHEELWINDOWSNoTELESCOPING STEERING WHEELO GLASSYesAIR CONDITIONINGYesANTI-SKID BRAKENoREAR WINDOW DEFROSTER

## REMARKS:

IS THE VEHICLE STOCK THROUGHOUT? Yes
 DOES VEHICLE SHOW EVIDENCE OF PRIOR ACCIDENT HISTORY? No
 DOES VEHICLE SHOW ANY SIGNIFICANT CORROSION? No
 CONDITION OF THE FRONT/REAR BUMPER AND FRAME: Good

## DATA FROM CERTIFICATION LABEL ON LEFT DOOR FACE OR "B" POST:

VEHICLE MANUFACTURED BY: Ford Motor Co.

DATE OF MANUFACTURE: 09/82

GVWR: 3030 LBS.,

GAWR: FRONT 1705 LBS., REAR 1424 LBS.

## VEHICLE TIRE DATA

RECOMMENDED COLD TIRE PRESSURE: FRONT 26 psi; REAR 26 psi TIRES ON VEHICLE (MFGR. & LINE, SIZE): Sport & Radial (LRR) 165SR13M/S BIAS PLY, BELTED, OR RADIAL: Radial

PLY RATING: 3

IS SPARE TIRE "SPACE SAVER"? Yes

IS SPARE TIRE STANDARD EQUIPMENT? Yes .

## WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER (WITH MAXIMUM FLUIDS):

RIGHT FRONT DNA	LBS.	RIGHT REAR	DNA	LBS.
LEFT FRONT DNA	LBS.	LEFT REAR	DNA	LBS.
TOTAL FRONT WEIGHT	DNA	LBS. (% OF	TOTAL VEHICLE	WEIGHT)
TOTAL REAR WEIGHT	DNA	LBS. (% OF	TOTAL VEHICLE	WEIGHT)
TOTAL DELIVERED WEIGHT	DNA	LBS.		

# WEIGHT OF TEST VEHICLE AFTER PREPARATION:

RIGHT FRONT 5	93 LI	BS.	RIGH	T REAR	3'	72	LB	S.
LEFT FRONT 6	41 LI	BS.	LEFT	REAR	3'	79	LBS	5.
TOTAL FRONT WE	IGHT 12	234	LBS.	(62.2	% OF	TOTAL	VEH IC LE	WEIGHT)
TOTAL REAR WEI	GHT	75 1	LBS.	(37.8	% OF	TOTAL	VEHICLE	WEIGHT)
TOTAL TEST WEI	GHT 1	985	LBS.					
WEIGHT OF BALL	AST SECURED	IN VEHICLE	TRUNK	AREA:	0		LBS	5.

TEST FLUID DATA	
TEST FLUID TYPE:	PURPLE STODDARD SOLVENT 2; SPEC. GRAVITY: 0.764
KINEMATIC VISCOSITY:	0.99 CENTISTOKES
"USEABLE" CAPACITY*: NA	GALLONS ACTUAL
TEST VOLUME: 0.0	GALLONS
FUEL SYSTEM CAPACITY (DATA F	ROM OWNERS MANUAL): NA GALLONS
DETAILS OF FUEL SYSTEM:DN	A
ELECTRIC FUEL PUMP: DNA	FUEL INJECTION: DNA
DOES ELECTRIC FUEL PUMP OPER OPERATING? DNA	ATE WITH IGNITION SWITCH "ON" AND THE ENGINE NOT
DATA FROM "RECOMMENDED TIRE	PRESSURE" LABEL ON DOOR, POST, GLOVEBOX, ETC.
VEHICLE LOAD (UP TO CAPACITY	): 26 psi; REAR 26 psi
RECOMMENDED TIRE SIZE: P165	/80R 13 LOAD RANGE X B, C,
VEHICLE CAPACITY:	TYPES OF SEATS: Front - Bucket
NUMBER OF OCCUPANTS (DESIGNA	TED SEATING CAPACITY): 2 FRONT
CARGO LOAD DNA	LBS. <u>4</u> TOTAL
TOTALDNA	LBS.

\*WITH ENTIRE FUEL SYSTEM FILLED WITH FUEL TANK THROUGH CARBURETOR BOWL.





The final vane clears emitter/receiver two inches before impact. The vanes have one foot spacing.

## TEST ANOMALIES

Test #1 vehicle was impacted perpendicular at the left side low speed.

1. The following data channel did not return to baseline following the crash pulse.

RDKZV Vehicle Rear Deck Rate Gyro

Test #2 vehicle was impacted perpendicular on the right side high speed.

1. The following data channel did not return to baseline following the crash pulse.

BCGZG Moving Barrier Center of Gravity Acceleration Z Axis.

γ TRCO is investigating the zero-shift phenomenon of accelerometer and rate gyro data during the crash pulse in conjunction with Metraplex Corporation and Endevco Representatives. There is no definite resolutions of the date of this report.

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# SECTION 3.0 DATA REQUIRED BY R & D TEST #1

The following pages are included in this section:

Test #1 vehicle was impacted perpendicular on the left side low speed.

- 1. Vehicle crush data
- 2. Vehicle accelerometer location and data summary
- 3. High speed camera information
- 4. Transducer information

TEST #1 VEHICLE WAS IMPACTED PER	PENDICULAR ON LEFT SIDE LOW SPEED								
Test Condition									
Test Number: 860516	Date of Test = May 16, 1986								
Wind Velocity 9 - 18/218S	Time of Test = 13:33								
Ambient Temperature at Impact Area: 76	°F								
Subject Vehicle Data	Actual Intended								
Vehicle Test Weight (lbs.)	1985 1985								
MRB Test Weight (lbs.)	3229 3229								
MRB Velocity (mph)*	16.1 16.1								
Impact Point (in.)**	-9.5 -9.8								
Vehicle Attitude (All dimensions in in	ches):								
Delivered Attitude: RF 27 1/8 ;LF 3	27 5/16 ;RR 25 9/16 ;LR 25 5/8								
Pre-Test Attitude: RF 25 3/8 ;LF	25 3/8 ;RR 24 7/16 ;LR 24 1/2								
Post-Test Attitude: RF 26 1/8 ;LF 2	25 3/16 ;RR 25 1/16 ;LR 24 5/16								
Vehicle dimension (All in inches):									
***Center of Gravity = 35 11/16	, wheel base = $94 \ 1/4$								
Width Car = 66 3/4	, length car = 164 5/16								
Width Roof = 45 3/8	, track width = $547/8$								
Front overhang = 33 3/8	, rear overhang = 36 3/4								

\* As measured over final one foot of travel.

\*\* As measured + is forward of the center of gravity of the test vehicles. As measured - is rearward of the center of gravity of the test vehicles.

\*\*\* Rearward of front wheel centerline.

PSU/Case Number

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## National Accident Sampling System - Continuous Sampling Subsystem: Vehicle Data

Complete When Applicable								
End Damage	Side Damage							
Undeformed end width	Bowing: B1 X1							
Corner shift: A1	B2 X2							
A2 End shift at frame (CDC) (check one) $<4$ inches X $\geq 4$ inches	Bowing constant $\frac{X1 + X2}{2} =$							

#### FIELD MEASUREMENTS

Note: Measure C1 to C6 from Driver to Passenger side in Front or Rear impacts-Rear to Front in Side impacts.

NC I

Specific		Direct Damage									
Impact Number	Plane* of C-Measurements	Width** (CDC)	Max*** Crush	Field L**	C	C <sub>2</sub>	C3	C4	C <sub>5</sub>	C <sub>6</sub>	±D
	Bumper crush				0	5.3	5.2	5.6	5.2	0	
	Door free space				0	0	0	0	0	0	
	Net bumper crush			75	0	5.3	5.2	5.6	5.2	0	-13.1
	Sill crush					4.2	4.1	4.5	4.7		
	Sill free space				***	1.5	1.5	1.5	1.5	-	
	Net sill crush					2.7	2.6	3.0	3.2		

\*Identify the plane at which the C-measurements are taken (e.g., at bumper, above bumper, at sill, above sill, at beltline, etc.) or label adjustments (e.g., free space).

Free space value is defined as the distance between the baseline and the original body contour taken at the individual C locations. This may include the following: bumper lead, bumper taper, side protrusion, side taper, etc. Record the value for each C-measurement and maximum crush.

\*\*Measure and document on the vehicle diagram the beginning or end of the direct damage width and field L (c.g., side damage with respect to undamaged axle.)

\*\*\*Measure and document on the vehicle diagram the location of the maximum crush.

Note: Use as many lines/columns as necessary to describe each damage profile. 3-3



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VEHICLE EXTERIOR STATIC CRUSH PROFILE



PROFILE LEVEL EQUALS SILL EDGE HEIGHT WHICH IS 12.3" ABOVE GROUND LEVEL THE CENTER OF THE CRUSH IS -13.1" FROM THE CENTER OF GRAVITY SCALE FACTOR EQUALS 0.034

3-5

REAR

## VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

					POSITIVE DIRECTION		NEGA DIRE	TIVE CTION
					MAX	TIME	MAX	TIME
NO.	LOCATION	Χ*	Υ <b></b> *	Z.**	(g)	(msec)	(g)	(msec)
1	CENTER OF							
	GRAVITY	-35.7	0.0	13.4				
	(LONGITUDINAL)				2.88	51.25	3.48	15.88
	(LATERAL)	$\Delta V = -12.0$	mph @	100.00 msec	2.18	141.00	14.31	41.38
	(VERTICAL)				12.49	66.25	10.32	37.00
	(RESULTANT)					15.27 @	49.13	
2	REAR DECK							*****
	OVER AXLE	-93.1	0.0	19.3				
	(LONGITUDINAL)				4.13	24.50	7.93	31.38
	(LATERAL)	$\Delta V = -14.2$	mph Q	100.00 msec	1.01	103.88	15.79	49.13
	(VERTICAL)							
	(RESULTANT)							

\* Reference: X - Front Axle (+ Forward), Y - Vehicle Centerline (+ To Right), Z - Ground Level (+ Up)

All measurements of accelerometer locations in inches.







## YAW RATE GYRO LOCATION AND DATA SUMMARY

				POSITIVE MAX	DIRECTION TIME	NEGATIVE MAX	DIRECTION TIME
LOCATION	Χ*	Y*	Z₩	(deg/sec)	(msec)	(deg/sec)	(msec)
YAW RATE GYRO	-100.2	11.5	24.6		Υ		Y

\*Reference: X - Front Axle (+ Forward), Y - Vehicle Centerline (+ To Left), Z - Ground Level (+ Up)

All measurements of rate gyro in inches.

Yaw rotation is positive when measured counterclockwise as viewed from above.

YSee TEST ANOMALIES

## MOVING BARRIER ACCELEROMETER LOCATIONS AND DATA SUMMARY



						POSI DIRE	TIVE CTION	NEGA DIRE	TIVE CTION	
						MA X	TIME	MAX	TIME	
NO.	LOCATION	Χ*	Y #	Z *		(g)	(msec)	(g)	(msec)	
1	CENTER OF									
	GRAVITY	61.5	0.0	12.0						
	LONGITUDINAL	$\Delta V = -7.7$	mph @	100.00 m	isec	0.21	198.25	6.92	41.63	
	(LATERAL)					1.71	63.75	2.56	52.63	
	(VERTICAL)					3.10	47.38	1.69	41.63	
	(RESULTANT)						7.24 @	41.50		
2	REAR FRAME									
	MEMBER	22.0	20.3	13.6						
	(LONGITUDINAL)	$\Delta V = -7.9$	mph @	100.00 m	sec	0.30	108.13	7.39	40.63	
	(LATERAL)					0.82	169.50	1.41	11.00	

.

\*Reference: X - Rear most point of frame (+ Forward), Y - Barrier centerline (+ To left), Z - Ground level (+ Up)

All measurements of accelerometer locations in inches.

CAMERA INFORMATION

						1	 	
PURPOSE OF CAMERA DATA	Real time panning	Vehicle Dynamics	Close-up of impact point	Close-up of impact point				
SPEED (fps)	24	1008	1000	1003				
LENS (mm)	25	Ø	25	13				
ТҮРЕ	Kodak	Photosonic 1B	Photosonic 1B	Photosonic 1B				
LOCATION	Right panning	Overhead wide	Overhead tight	Onboard MRB				
CAMERA NO.	1	2	щ	4				

NON-GOVERNMENT FURMISHED TRANSDUCER INFORMATION

DESIRED FULL SCALE (ENGR, UNITS)	100 G	100 6	100 G	100 G	100 G
SENSITIVITY	.2225	.2115	. 2381	.2211	.2488
DATE OF LAST CALIBRATION	3/25/86	3/25/86	3/25/86	3/25/86	3/25/86
MFGR.	Bell Howell	Bell Howell	Bell Howell	Bell Howell	Bell Howell
SERIAL NUMBER	18849	18859	18235	19022	18851
MODEL NUMBER	4-202-0001	4-202-0001	4-202-0001	4-202-0001	4-202-0001
TYPE OF TRANSDUCER	Accel	Accel	Accel	Accel	Accel
PAUGMETER BEING MEASURED	BCGXG	BCGYG	BCGZG	BRCYG	BRCXG

All struck vehicle accelerometers were Government Furnished Equipment and were Endevco 2264 and 7264 Accelerometers.

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# SECTION 4.0 DATA REQUIRED BY R & D TEST #2

The following pages are included in this section:

Test #2 vehicle was impacted perpendicular on the right side high speed.

- 1. Vehicle crush data
- 2. Vehicle accelerometer location and data summary
- 3. High speed camera information
- 4. Transducer information

TEST #2 VEHICLE	WAS IMPACTED	PERPENDIC	CULAR	ON RI	GHT	SIDE	HIGH	SPE	L.D
Test Condition									
Test Number: 860516			Date	of Te	st	= May	16,	1986	<i>.</i>
Wind Velocity 9 - 18/	243 S.W.		Time	of Te	st	= 14:	36		
Ambient Temperature a	t Impact Area:	82 <sup>0</sup> F							
Subject Vehicle Data			Actua	1			Inten	ded	
Vehicle Test Weight (	lbs.)		1985				1985		
MRB Test Weight (1bs.	)		3229				3229		
MRB Velocity (mph)*			32.2				32.3		
Impact Point (in.)**			-9.9				-9.8		
Vehicle Attitude (Al	l dimensions i	in inches	):						
Delivered Attitude:	RF	;LF		;RR			;LR		
Pre-Test Attitude:	RF 26 1/8	;LF 25 3,	/16	;RR	25	1/16	;LR	24	5/16
Post-Test Attitude:	RF 23 1/16	;LF 24 1,	/16	;RR	22	3/4	;LR	23	5/16
Vehicle dimension (Al	l in inches):								
***Center of Gravity :	= 35 11/16		, whee	l bas	е	=	94 1/	4	
Width Car	= 66 3/4		, leng	th ca	r	=	164 5.	/16	
Width Roof	= 45 3/8		, trac	k wid	th	=	54 7/3	3	
Front overhang	= 33 3/8		, rear	over	han	g =	36 3/	4	
* As measured over :	final one foot	of trave	el.	•					

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\*\* As measured + is forward of the center of gravity of the test vehicles. As measured - is rearward of the center of gravity of the test vehicles.

\*\*\* Rearward of front wheel centerline.

4-2

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## National Accident Sampling System - Continuous Sampling Subsystem: Vehicle Data

## FIELD MEASUREMENTS

Complete W	hen Applicable
End Damage	Side Damage
Undeformed end width	Bowing: B1 X15
Corner shift: A1	B2 X27
A2	Bowing constant
End shift at frame (CDC) (check one) <4 inches ≥4 inches	$\frac{X1 + X2}{2} = \frac{6}{2}$

Note: Measure C1 to C6 from Driver to Passenger side in Front or Rear impacts-Rear to Front in Side impacts.

Specific		Direct	Damage	_	-						
Impact Number	Plane* of C-Measurements	Width** (CDC)	Max*** Crush	Field L**	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	C4	C <sub>5</sub>	C <sub>6</sub>	±D
	Bumper crush				0	14.1	14.1	15	15.8	0	
	Door free space				0	1	1	1	1	0	
	Net bumper crush				0	13.1	13.1	14	14.8	0	
	Bowing				6	6	6	6	6	6	
	Net crush			88.5	6	19.1	19.1	20	20.8	6	-14.6
	Sill crush				-	11	12	13.5	14	_	
	Sill free space				-	2.5	2.5	2.5	2.5	_	
	Net sill crush				-	8.5	9.5	11	11.5	_	

\*Identify the plane at which the C-measurements are taken (e.g., at bumper, above bumper, at sill, above sill, at beltline, etc.) or label adjustments (e.g., free space).

Free space value is defined as the distance between the baseline and the original body contour taken at the individual C locations. This may include the following: bumper lead, bumper taper, side protrusion, side taper, etc. Record the value for each C-measurement and maximum crush.

- \*\*Measure and document on the vehicle diagram the beginning or end of the direct damage width and field L (e.g., side damage with respect to undamaged axle.)
- \*\*\*Measure and document on the vehicle diagram the location of the maximum crush.

Note: Use as many lines/columns as necessary to describe each damage profile.



4-4

VEHICLE EXTERIOR STATIC CRUSH PROFILE



PROFILE LEVEL EQUALS SILL EDGE HEIGHT WHICH IS 12.3 " ABOVE GROUND LEVEL THE CENTER OF THE CRUSH IS --14.6" FROM THE CENTER OF GRAVITY SCALE FACTOR EQUALS 0.034

FRONT

4-5

REAR

# VEHICLE ACCELEROMETER LOCATIONS



# VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

					POSI DIRE	TIVE CTION	NEG DIR	ATIVE ECTION	
					MAX	TIME	MAX	TIME	
NO.	LOCATION	Х #	Y #	Z¥	(g)	(msec)	(g)	(msec)	
1	CENTER OF								
•	GRAVITY	-35.7	0.0	13.4					
	(LONGITUDINAL)				16.85	74.63	9.66	25.75	
	(LATERAL)	$\triangle V = 18.0$	mph @	129.0 msec	34.29	41.00	5.55	81.38	
	(VERTICAL)				26.64	50.38	31.77	42.63	
	(RESULTANT)					45.72 @	42.00		
2	REAR DECK								
	OVER AXLE	-93.1	0.0	19.3					
	(LONGITUDINAL)				8.98	40.25	7.12	83.75	
	(LATERAL)	$\Delta V = 21.4$	mph @	129.00 msec	22.31	35.25	3.89	127.38	
	(VERTICAL)								
	(RESULTANT								

\* Reference: X - Front Axle (+ Forward), Y - Vehicle Centerline (+ To Right), Z - Ground Level (+ Up)

All measurements of accelerometer locations in inches.

## YAW RATE GYRO LOCATION AND DATA SUMMARY

				POSITIVE MAX	DIRECTION TIME	NEGATIVE MAX	DIRECTION TIME
LOCATION	XW	Y #	Z*	(deg/sec)	(msec)	(deg/sec)	(msec)
YAW RATE GYRO	-100.2	11.5	24.6	133.42	55.88	80.43	108.75

\*Reference: X - Front Axle (+ Forward), Y - Vehicle Centerline (+ To Left), Z - Ground Level (+ Up)

All measurements of rate gyro in inches.

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Yaw rotation is positive when measured counterclockwise as viewed from above.

## MOVING BARRIER ACCELEROMETER LOCATIONS AND DATA SUMMARY



					POSI DIRE	TIVE CTION	NEGA DIRE	TIVE CTION	
					MAX	TIME	MAX	TIME	
NO.	LOCATION	Х*	Υ*	Z *	(g)	(msec)	(g)	(msec)	
1	CENTER OF								
	GRAVITY	62.5	0.0	12.0					
	LONGITUDINAL	$\Delta V = -14.0$	mph @	129.00 msec	0.37	210.00	10.79	25.00	
	(LATERAL)				3.33	73.00	2.67	46.63	
	(VERTICAL)					γ		γ	
	(RESULTANT)					0	γ		
2	REAR FRAME								
	MEMBER	22.0 2	20.3	13.6					
	(LONGITUDINAL)	$\Delta V = -13.9$	9 mph	@ 129.00 msec	0.52	180.13	9.81	24.13	
	(LATERAL)				3.25	38.88	1.91	44.88	

\*Reference: X - Rear most point of frame (+ Forward), Y - Barrier centerline (+ To left), Z - Ground level (+ Up)

All measurements of accelerometer locations in inches.

Y See TEST ANOMALIES

CAMERA NO.	LOCATION	ТҮРЕ	LENS (mm)	SPEED (fps)	PURPOSE OF CAMERA DATA
1	Right panning	Kodak	25	24	Real time panning
2	Overhead wide	Photosonic 1B	Ø	1000	Vehicle dynamics
С	Overhead tight	Photosonic 1B	25	1000	Close-up of impact point
4	Onboard MRB	Photosonic 1B	13	1003	Close-up of impact point

CAMERA INFORMATION
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DESIRED FULL SCALE	(CIIND	9 001	100 6	100 G	100 G	100 G
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DATE OF LAS'F CALIBRATION	3/25/86	2012616	00/17/1	3/25/86	3/25/86	3/25/86
MFGR.	Bell Howell	Bell Howell	Bell	Howell	llowell	Bell Howell
SERIAL NUMBER	18849	18859	30001	CC701	19022	18851
MODEL	4-202-0001	4-202-0001		T000-202-6	4-202-0001	4-202-0001
TRANSDUCER	Accel	Accel		Tanny	Accel	Accel
BEING MEASURED	BCGXG	BOGYG	B0070	2222	BRCYG	BRCXG

All struck vehicle accelerometers were Government Furnished Equipment and were Endevco 2264 and 7264 Accelerometers.

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## APPENDIX A

#### PHOTOGRA PHS

TEST #1 VEHICLE WAS IMPACTED PERPENDICULAR ON THE LEFT SIDE LOW SPEED.

# Figure

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Figure A-1. PRE-TEST FRONT VIEW



Figure A-2. POST-TEST FRONT VIEW A-2



Figure A-3. PRE-TEST PASSENGER SIDE VIEW



Figure A-4. POST-TEST PASSENGER SIDE VIEW A-3



Figure A-5. PRE-TEST REAR VIEW



Figure A-6. POST-TEST REAR VIEW



# Figure A-7. PRE-TEST DRIVER SIDE VIEW



Figure A-8. POST-TEST DRIVER SIDE VIEW A-5



Figure A-9. PRE-TEST DRIVER FRONT THREE-QUARTER VIEN



Figure A-10. POST-TEST DRIVER FRONT THREE-QUARTER VIEW A-6



Figure A-11. PRE-TEST DRIVER REAR THREE-QUARTER VIEW



Figure A-12. POST-TEST DRIVER REAR THREE-QUARTER VIEW A-7



Figure A-13. PRE-TEST OVERHEAD VIEW



Figure A-14. POST-TEST OVERHEAD VIEW A-8



Figure A-15. POST-TEST FRONT DRIVER DOOR VIEW

#### APPENDIX B

### PHOTOGRAPHS

TEST #2 VEHICLE WAS IMPACTED PERPENDICULAR ON THE RIGHT SIDE HIGH SPEED.

# Figure

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## Figure B-1. PRE-TEST FRONT VIEW



Figure B-2. POST-TEST FRONT VIEW B-2



Figure B-3. PRE-TEST PASSENGER SIDE VIEW



Figure B-4. POST-TEST PASSENGER SIDE VIEW



Figure B-5. PRE-TEST REAR VIEW



Figure B-6. POST-TEST REAR VIEW B-4



Figure B-7. PRE-TEST DRIVER SIDE VIEW



# Figure B-8. POST-TEST DRIVER SIDE VIEW B-5



Figure B-9. PRE-TEST PASSENGER FRONT THREE-QUARTER VIEW



Figure B-10. POST-TEST PASSENGER FRONT THREE-QUARTER VIEW



Figure B-11. PRE-TEST PASSENGER REAR THREE-QUARTER VIEW



Figure B-12. POST-TEST PASSENGER REAR THREE-QUARTER VIEW B-7



Figure B-13. PRE-TEST OVERHEAD VIEW





Figure B-15. POST-TEST OVERALL VIEW



Figure B-16. POST-TEST PASSENGER SIDE VIEW B-9

#### APPENDIX C

#### DATA PLOT PRESENTATION

TEST #1 VEHICLE WAS IMPACTED PERPENDICULAR ON THE LEFT SIDE LOW SPEED.

Data plots generated from the crash test data are presented on the following pages. All data are recorded on magnetic tape for inclusion in the NHTSA crash test data base system. All data were filtered according to SAE J211.

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## APPENDIX D

## DATA PLOT PRESENTATION

TEST #2 VEHICLE WAS IMPACTED PERPENDICULAR ON THE RIGHT SIDE HIGH SPEED

Data plots generated from the crash test data are presented on the following pages. All data are recorded on magnetic tape for inclusion in the NHTSA crash test data base system. All data were filtered according to SAE J211.









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