400 Seventh Street, S.W.
Washington, D.C. 20590

U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

Dear Crash Data Researchers/Users:

Thank you for choosing crash data from the National Highway Traffic Safety Administration (NHTSA) for your research or other use. The information contained in this motor vehicle crash report is collected, maintained and distributed in accordance with Public Law 89-564. In accordance with this Public Law, NHTSA is required not to release any case information until completion of quality control procedures. These procedures include a review of the case material to extract all names, licenses and registration numbers, non-coded interview material, non-research related researcher comments in the margins, non-factual data, and the production number portion of the vehicle identification number (VIN).

If you requested NHTSA to query its database files in order to identify a specific crash, then that query was made using non-personal descriptors you provided for use in our search. This motor vehicle crash may have been identified from a data search and matches the general, non-personal descriptors you provided, but we cannot confirm that this is the specific crash report you requested.

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*** *** ***

TRANSPORTATION SCIENCES CENTER
ACCIDENT RESEARCH GROUP

Calspan SRL Corporation
Buffalo, New York 14225

CALSPAN REMOTE AIR BAG DEPLOYMENT INVESTIGATION

CALSPAN CASE NO. 95-14

VEHICLE #1 - 1994 MAZDA 626
VEHICLE #2 - 1988 MAZDA 626

LOCATION - STATE OF

CRASH DATE - APRIL 1995

Contract No. DTNH22-94-D-07058

Prepared for:

U.S. Department of Transportation
National Highway Traffic Safety Administration
Washington, D.C. 20590

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The crash investigation process is an inexact science which requires that physical evidence such as skid marks, vehicular damage measurements, and occupant contact points are coupled with the investigator's expert knowledge and experience of vehicle dynamics and occupant kinematics in order to determine the pre-crash, crash, and post-crash movements of involved vehicles and occupants.

Because each crash is a unique sequence of events, generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicle(s) or their safety systems.

TECHNICAL REPORT STANDARD TITLE PAGE

1. *Report No.* 95-14	2. *Government Accession No.*	3. *Recipient's Catalog No.*
4. *Title and Subtitle* Calspan Remote Head-on Crash Investigation Vehicle #1 - 1994 Mazda 626 Vehicle #2 - 1988 Mazda 626 Location - State of		5. *Report Date:* 1996 6. *Performing Organization Code*
7. *Author(s)* Accident Research Group		8. *Performing Organization Report No.*
9. *Performing Organization Name and Address* Transportation Sciences Center Accident Research Group Calspan Corporation P.O. Box 400 Buffalo, New York 14225		10. *Work Unit No.* 11. *Contract or Grant No.* DTNH22-94-D-07058
12. *Sponsoring Agency Name and Address* U.S. Department of Transportation National Highway Traffic Safety Administration Washington, D.C. 20590		13. *Type of Report and Period Covered* Technical Report Crash Date: 1995 14. *Sponsoring Agency Code*
15. *Supplementary Notes* Remote investigation of a head-on crash that resulted in the partial deployment of the dual air bag system in Vehicle #1.		
16. *Abstract* A crash involving two vehicles occurred on an undivided ramp linking a bridge to an island in the State of The crash occurred in the month of 1995. The driver was exiting the bridge via the ramp which he presumed to be a one way travel direction. As he was traversing the ramp, he positioned his vehicle, a 1994 Mazda 626 (Vehicle #1), in the center of the ramp. His travel speed was reported at 24 km/h (15 mph) prior to the crash which appeared to be consistent with the description of the vehicle damage. Vehicle #2, a 1988 Mazda 626, was traveling in the opposite direction on the ramp at an unknown rate of speed. Upon sighting the approach of Vehicle #2, the driver of Vehicle #1 reportedly applied full braking and steered to the right. The crash involved contact between the left front bumper corner of both vehicles. Vehicle #1 continued a short distance to the right and came to the final rest position (FRP) against a cinder block wall. Driver #1 indicated Vehicle #2's forward trajectory was halted by the crash and the uphill grade of the ramp. Both vehicles were driven from the scene. Vehicle #1 was equipped with a dual air bag system which partially deployed during the crash sequence. The passenger side air bag deployed while the driver side air bag remained packaged within the air bag module. Driver #1 was reportedly wearing his three point manual lap and shoulder belt at the time of the crash. There were no other occupants in his vehicle. Neither driver was injured.		
17. *Key Words* Head-on off-set impact Undivided on/off ramp to bridge 24 km/h (15 mph) travel speed Partial deployment of a dual air bag system		18. *Distribution Statement* General Public
19. *Security Classif. (of this report)* Unclassified	20. *Security Classif. (of this page)* Unclassified	21. *No. of Pages* / 22. *Price*

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CALSPAN REMOTE AIR BAG DEPLOYMENT INVESTIGATION

CALSPAN CASE NO. 95-14

VEHICLE #1 - 1994 MAZDA 626
VEHICLE #2 - 1988 MAZDA 626

LOCATION - STATE OF

CRASH DATE - 1995

This investigation was initiated in response to a notification received by the National Highway Traffic Safety Administration (NHTSA) that a dual air bag equipped vehicle was involved in a head-on crash that resulted in the partial deployment of the dual air bag system.

SUMMARY

This case involved two vehicles which occurred on an undivided ramp to an island in the State of New York. The crash occurred in the month of 1995. Driver #1, a 39 year old male who was 167.6 cm (66.0") tall and weighed 74.8 kg (165 lbs.), was exiting a bridge via the ramp which he presumed to be a one way travel direction. As he traversed the ramp, he positioned his vehicle, a 1994 Mazda 626 (Vehicle #1), in the center of the ramp. He reported his travel speed at 24 km/h (15 mph) prior to the crash which appeared to be consistent with the description of the vehicle damage.

The horizontal alignment of the ramp was described by the driver as a tight right radius with a negative slope in his direction of travel. The roadway reportedly lacked painted center lines. He indicated the ambient conditions were clear and sunny. There was no posted speed limit on the ramp.

Vehicle #2, a 1988 Mazda 626, was traveling in the opposite direction on the ramp at an unknown rate of speed. Driver #1 said he had limited sight distance of on-coming vehicles because of the ramp curvature. He described the sight distance as approximately 1.2 m - 1.5 m (4.0' - 5.0'). Just prior to the crash Driver #1 reportedly applied full brakes and steered to the right in an attempt to avoid the crash.

The crash involved contact between the left front bumper corner of both vehicles. Vehicle #1 continued a short distance ("a few feet") to the right and came to the final rest position (FRP) against a cinder block wall. The driver indicated Vehicle #2's forward trajectory was halted by the crash and it came to the FRP at the point of impact (POI). The CDC for Vehicle #1 was estimated from photographs as 11-FLEE-3 (refer to photographs # 1-2 on page A-1).

During the crash, the dual air bag system partially initiated the Supplemental Restraint System (SRS) deployment sequence. The driver side air bag failed to open while the passenger side fully

deployed. Reportedly, representatives from Mazda inspected the vehicle and removed the driver air bag module for analysis at their facility. The outcome of their analysis was not reported to the driver.

Following the crash both vehicles were driven down the ramp to a safe area pending the arrival of the police. When it was apparent that the police department was not going to respond, both drivers drove their vehicles to the nearest precinct where an incident report was filed.

Upon leaving the precinct, Driver #1 noticed radiator fluid seeping from his radiator. The vehicle was subsequently transported via flatbed truck to the collision shop.

CRASH DEMOGRAPHIC DATA	
Location:	Undivided on/off ramp to a bridge
State:	State of
Area/Type:	Residential
Investigating Police Agency:	Local precinct
Accident type:	Two vehicle off-set head-on crash
Air Bag Vehicle Driver Injury Severity: Vehicle #2 Driver Injury Severity:	Not injured Not injured
AMBIENCE	
Viewing Conditions:	Daylight
Weather:	Clear and Sunny
Road Surface:	Dry
HIGHWAY	
Type:	State route
Number of Lanes:	2
Width:	Unknown
Surface:	Asphalt (worn surface)
Median:	None
Edge:	Inside edge - cinder block wall

Vertical Alignment:	Negative slope in Vehicle #1's travel direction
Horizontal Alignment:	Right curved ramp in Vehicle #1's travel direction
TRAFFIC CONTROLS	
Signals:	None
Signs:	None
Markings:	Center line worn off
Speed Limit:	None posted on ramp
VEHICLE #1 DESCRIPTION	
Description:	1994 Mazda 626
V.I.N.:	1YVGE22D2R5 (Serial # omitted)
Color:	Green
Miles:	11,088 km (6,890 miles)
Brakes:	Power assisted, ABS
Active Restraints:	3-point lap and shoulder belts
Passive Restraints:	Driver and passenger side Supplemental Restraint System (SRS)
Defects:	Driver side SRS failed to deploy
Tow Status:	Driven to a local precinct and subsequently transported (via flatbed truck) to a collision shop
VEHICLE #2 DESCRIPTION	
Description:	1988 Mazda 626
Color:	White
Tow Status:	Driven from scene

AIR BAG SYSTEM

Vehicle #1 was equipped with a dual air bag system which partially deployed during the crash sequence. The driver said the passenger side air bag deployed while the driver side air bag remained packaged within the air bag module. Driver #1 claimed that Driver #2 was the first person to have observed the partial deployment phenomenon after he walked over to Vehicle #1 following the crash.

The collision repair person indicated that while Vehicle #1 was in his shop for repair two representatives from Mazda inspected the air bag system. The driver side air bag module was removed and reportedly sent to a test facility in It was the understanding of the vehicle owner that an evaluation of the air bag module would be performed and that a copy of the evaluation report would be made available to the owner. The owner claims he has not received a copy of the report.

Following the completion of collision repairs, Vehicle #1 was transported via flat bed truck to a Mazda dealership where two new replacement air bag modules were installed. Driver #1 was told by the dealer that the air bag electronic system was checked for anomalies. He said the wiring and sensors reportedly checked out positively (i.e., no defects) and that no additional parts (e.g., crash sensors, etc.) aside from the air bag modules were replaced. However, the repair estimate listed the replacement of two air bag sensors (refer to Appendix B for an itemized component repair list). Additionally, the estimate only listed the replacement of the passenger side air bag and not the driver side.

The driver reported no recollection of the air bag system check light functioning during the engine ignition cycle prior to the crash. After the air bags were re-installed, however, the driver has noticed the illumination of the check light cycling on for a couple of seconds and then shutting off after engine ignition.

VEHICLE DATA

Vehicle #1 was a 1994 Mazda 626 four door sedan which was leased by the owner/driver. The vehicle identification number (VIN) was: 1YVGE22D2R5 (serial # omitted). The driver indicated the vehicle was leased approximately ten months prior to the crash. He was the first owner of the vehicle which had approximately 11,088 km (6,890 miles) on the odometer at the time of the crash. There was no reported history of any mechanical problems or previous collisions with the vehicle.

Vehicle #1 was driven from the scene to the police precinct where it was subsequently towed to a collision shop. Damage to the vehicle included: the front bumper, hood, grille, windshield, left front fender, and radiator. The windshield damage resulted from contact by the passenger air bag module flap during the air bag deployment cycle. The cost of vehicle repair was estimated at $9,257 (refer to Appendix B).

Vehicle #2 was a 1988 Mazda which was driven from the scene by the driver. There were no damage estimates available.

DRIVER DATA

Driver #1 was a 39 year old male who was 167.6 cm (66.0") tall and weighed 74.8 kg (165 lbs.). He reported wearing the three point manual lap and shoulder belt prior to the crash. His hand

position on the steering wheel was described as being at the 11 o'clock and 2 o'clock positions. The tilt steering column was adjusted in the full down position.

The driver said that he was shaken up by the crash, but did not sustain any other injuries. The day after the crash he was seen by a chiropractor for back pain which he claimed was unrelated to the crash.

The driver and right front passenger in Vehicle #2 were reportedly not injured in the crash. The driver exited Vehicle #2 at its final rest position (FRP) and walked over to Vehicle #1. Upon a brief discussion, both drivers returned to their vehicles and traveled down the ramp to a safe area prior to calling police.

CRASH DATA

Pre-crash

The driver of Vehicle #1 was on a personal errand and was exiting the bridge via a two way undivided ramp to an island. The driver said that he was under the impression that the ramp was one way as there were no signs or roadway center lines to inform him of the two way travel directions. The driver said he was traveling in the center of the ramp at a speed of 24 km/h (15 mph) due to the sharp curvature of the roadway.

Crash

As Vehicle #1 was proceeding down the ramp, the driver noticed the approach of Vehicle #2 from the opposite direction. The driver applied full brakes and attempted to steer to the right. He said his vehicle was equipped with anti-locking brake system (ABS) and was not sure whether there was enough time for the ABS to function properly. He believed the steering input was effective in moving his vehicle away from a total frontal impact.

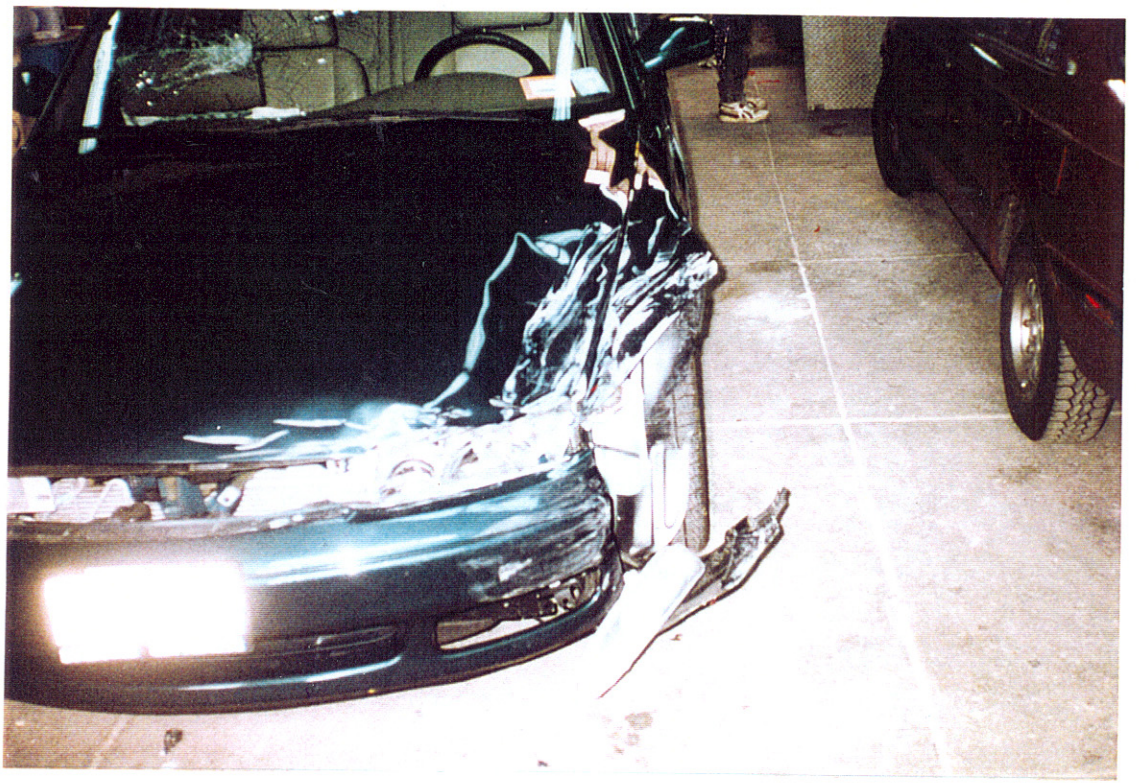
The vehicles struck each other along their respective left front bumper corners which resulted in moderate damage to Vehicle #1. Vehicle #1 continued a short distance ("a few feet") to the right and came to the final rest position (FRP) against a cinder block wall. Vehicle #2 reportedly came to the FRP at the point of impact (POI) due in part to the uphill grade of the ramp.

Post crash

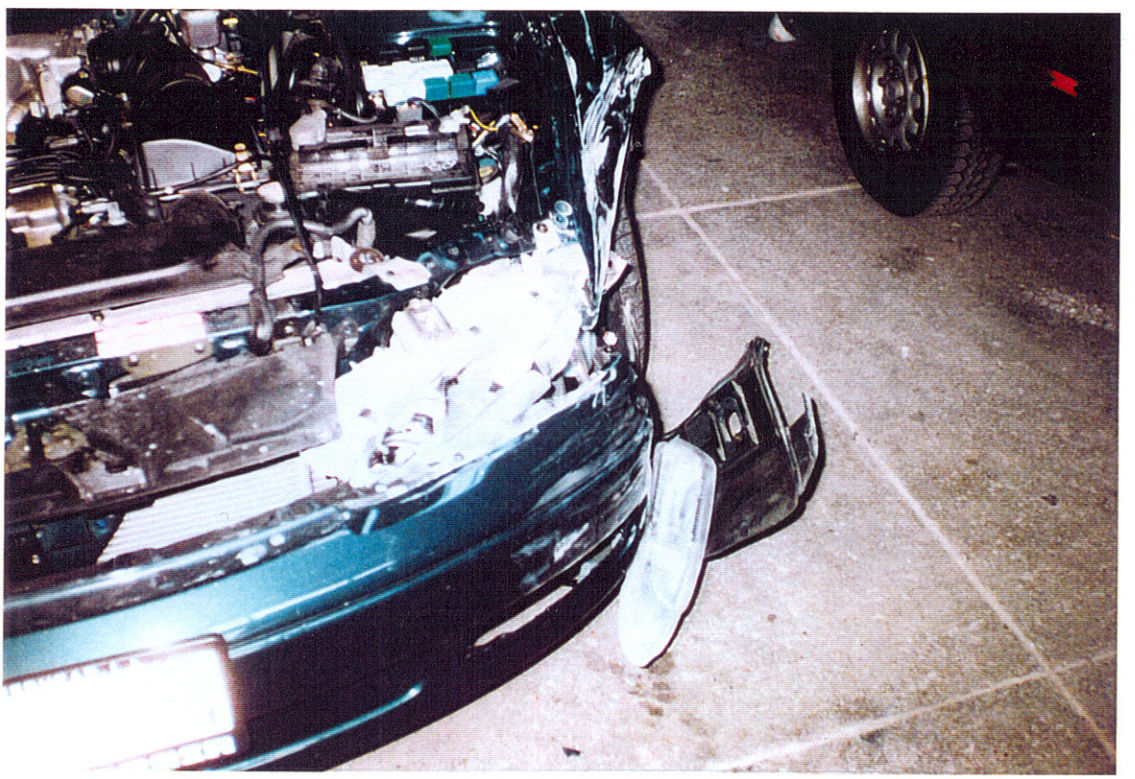
Both drivers exited their vehicles under their own power. After a cursory assessment of the damage, they returned to their vehicles and moved to a safe area. The site distance for traffic on the ramp was described as limited due to the tight radius geometry of the travel lanes. The drivers vacated the area in fear that they posed a risk for other motorists. The police were called, but failed to respond. Both vehicles were then driven back onto the ramp and over the bridge to a police precinct where an incident report was completed by a desk officer.

ATTACHMENT A

Prints



1. Damage to the front and left side plane of the 1994 Mazda 626 (Vehicle #1).



2. View of Vehicle #1 damage with the hood raised.

3. Lateral view of the undeployed driver's side air bag and the deployed passenger side air bag.

Appendix B

Repair Cost Estimate

Vehicle #1

THE APPRAISAL

PHONE: FAX:

CD LOG NO DATE 95

CLAIM# POLICY#
COMPANY CLAIM REP
INSURED CLAIMANT
LOSS DATE 95 TYPE OF LOSS COLL/FLD
SUPPLEMENT

INSP DATE 95 LOCATION
APPRAISER COMPANY
ADDRESS CITY STATE
PHONE ZIP

SHOP ATTN OF
ADDRESS PHONE
CITY STATE LICENSE #
ZIP

NAME
ADDRESS
CITY STATE
ZIP PHONE

LIC# VIN 1YVGE22D2R5
ENG/COLOR GREEN MILEAGE 6891
CONDITION EXCL ACCT'NG CTL#

E=NEW PART EC=ECONOMY PART EU=SALVAGE PART EP=SEE PX REPORT P=CHECK
I=REPAIR/ALIGN/SUBLET L=REFINISH N=ADDITIONAL LABOR OPERATION
TE=PART/PARTIAL REPLACE ET=LABOR/PARTIAL REPLACE IT=LABOR/PARTIAL REPAIR
AA=APPEARANCE ALLOWANCE RP=RELATED PRIOR DAMAGE UP=UNRELATED PRIOR DAMAGE

********** SUPPLEMENT **********

1994 MAZDA 626 4 DOOR SEDAN D3143A/B OPTNS B/24

OPTIONS: TWO-STAGE - EXTERIOR SURFACES TWO-STAGE - INTERIOR SURFACES

OP	GDE	MC	DESCRIPTION		MFG. PART NO.	PRICE	AJ%	HOURS	R
E	005		BUMPER,FRONT		GA2K50070H	274.65		1.0	1
E	006		COVER,FRONT BUMPER		GAY55003XB00	446.35			1
L	006	09	COVER,FRONT BUMPER		REFINISH			3.6	4
E	052	07	REINF,FRONT BUMPER	LT	GA2A54323A	14.75		.5	1
L	052		REINF,FRONT BUMPER	LT	REFINISH			.1	4
E	012		RET,FRT BUMPER COVER	LT	GA2E50160	15.50			1
E	020		RET,FRT BUMPER COVER	LT	GA2K501C0	11.10			1
E	025		RET,FRT BUMPER COVER	LT	GA2K500J5A	51.35			1
E	097		SPOILER,LOWER FRONT		GA2K509J1	65.35			1
L	097		SPOILER,LOWER FRONT		REFINISH			.4	4
E	096		DAM,AIR		KA7950AH1B	18.60			1

OP	GDE	MC	DESCRIPTION		MFG. PART NO.	PRICE	AJ%	HOURS	R
E	018		CLOSURE,FRONT BUMPER	LT	GA2K50C1YA00	88.95			1
L	018		CLOSURE,FRONT BUMPER	LT	REFINISH			.2	4
E	038		RETAINER,FRONT BUMPER	LT	BF8250233	2.75			1
E	040		RETAINER,FRONT BUMPER		BF8250233	2.75			1
E	023	07	BRKT,FRONT BUMPER MTG	LT	GA2A54335	23.60		.5	1
L	023		BRKT,FRONT BUMPER MTG	LT	REFINISH			.4	4
E	028		GRILLE ASSEMBLY		GA2K50710B00	80.00			1
L	028		GRILLE ASSEMBLY		REFINISH			.6	4
E	041		HEADLAMP ASSY,HALOGEN	LT	8DGV51040	386.75			1
N	973		HEADLAMPS AIM		ADDNL LABOR			.5	1
E	048		LAMP,SIDE MARKER	LT	GA2A515F0A	33.85			1
E	046		LAMP ASSEMBLY,FOG	LT	GA2K51690E	252.25			1
E	083		PANEL,HOOD		GAYK52310	335.10		1.0	1
L	083		PANEL,HOOD		REFINISH			4.8	4
E	080		LABEL,HOOD		GA2A69036B	4.00		.2	1
E	073	07	PANEL ASSEMBLY,RAD SUPT		GA2K53100S	289.35		13.6	1
L	073		PANEL ASSEMBLY,RAD SUPT		REFINISH			1.4	4
I	755		RADIATOR		SUBLET	35.00*			1
E	033		BAFFLE,RADIATOR PANEL	LT	GA2K56382E	30.55			1
E	764		TANK,COOLANT RECOVERY		FS1115350D	42.20		.2	1
EC	731		CONDENSER,A/C		ECONOMY PART	*		1.3	2
E	129	07	PNL,INR FENDER FRONT	LT	GAYA5422Y	79.60		4.0	1
L	129		PNL,INR FENDER FRONT	LT	REFINISH			.7	4
I	140	07	SIDE MEMBER,FRONT	LT	REPAIR/ALIGN		S1	2.0*	1
E	103		FENDER,FRONT	LT	GAYK52210	248.55		.3	1
L	103		FENDER,FRONT	LT	REFINISH			2.8	4
E	123		SKIRT,INNER FENDER	LT	GA2K56141A	62.45			1
E	✗111		SENSOR,AIR BAG	LT	GA2A57K2YF	185.60			2
E	117		BRKT,AIR BAG SENSOR	LT	GA2A57KX8	2.75			2
E	121		BRKT,AIR BAG SENSOR	LT	GA2A57KX2A	2.75			2
E	152		BRKT,FRONT FENDER	LT	GA2K56211B	8.45			1
N	974		SUSPENSION ALIGN,FRT		ADDNL LABOR			1.2	2
E	G143		WINDSHIELD,TINTED		GA2K63900C	293.40	-15	3.0	1
E	✗837		SENSOR,AIR BAG		GA2A57K40C	142.45		.3	2
E	832	01	OUTLET,AIR VENT DUCT	RT	GA2A64730E29	22.20*	S1	.2	1
E	900	01	PANEL,INSTRUMENT		GB6H60350F29	759.10	S1	7.3	1
I	884		HARNESS,I/P WIRING		REPAIR/ALIGN		S1	3.0*	2
E	✗926	01	MODULE,PASS AIR BAG		GB6H57K70K29	1,075.85			2
I	209		PNL,FRONT DOOR OUTER	LT	REPAIR/ALIGN			1.0*	1
L	209		PNL,FRONT DOOR OUTER	LT	REFINISH			2.0	4
I	210		PNL,FRONT DOOR OUTER	RT	REPAIR/ALIGN			2.5*	1
L	210		PNL,FRONT DOOR OUTER	RT	REFINISH			2.2	4
I	290		PNL,REAR DOOR OUTER	RT	REPAIR/ALIGN			3.0*	1
L	290		PNL,REAR DOOR OUTER	RT	REFINISH			1.8	4
EC	M08		STONEGUARD		ECONOMY PART	15.00*	S1	.5*	4
EC			FLEX ADDITIVE		ECONOMY PART	16.00*			
L			COLOR TINT		REFINISH			1.0*	4*
L			COLOR BLEND		REFINISH			.5*	4*
EC			UNDERCOAT		ECONOMY PART	15.00*			1*
N			RUSTPROOF		ADDNL LABOR	15.00*			1*
N			SEAMSEALER		ADDNL LABOR	15.00*		.5*	1*
I			SET-UP AND MEASURE		REPAIR/ALIGN			2.5*	3*
I			UNIBODY-FRAME ALIGN.	L/F	REPAIR/ALIGN		S1	5.0*	3*
I			UNIBODY-FRAME ALIGN.	R/F	REPAIR/ALIGN		S1	3.0*	3*
I			R&I BOLTED PARTS,RAD.SUPT		REPAIR/ALIGN			1.5*	1*
I			R&I BOLTED PARTS,APRON		REPAIR/ALIGN			1.5*	1*
EC			EVACUATE & RECHARGE AC		ECONOMY PART	29.00*		1.7*	1*

OP	GDE	MC	DESCRIPTION	MFG. PART NO.	PRICE	AJ%	HOURS	R
EC			COOLANT	ECONOMY PART	15.00*			
N			COVER CAR-EXTERIOR	ADDNL LABOR	5.00*		.3*1*	
N			GLASS CLEANUP	ADDNL LABOR			1.0*1*	
N			HAZARDOUS WASTE REMOVAL	ADDNL LABOR	3.00*		1*	

72 ITEMS

MC MESSAGE

01 CALL DEALER FOR EXACT PART # REQUIRED
07 STRUCTURAL PART AS IDENTIFIED BY I-CAR
09 INCLUDES 0.6 HOURS MAJOR PANEL TWO-STAGE ALLOWANCE

FINAL CALCULATIONS & ENTRIES

GROSS PARTS				5,352.90
OTHER PARTS				128.00
GLASS DISCOUNT				44.01-
PAINT MATERIAL				276.00
PARTS TOTAL				5,712.89
TAX ON PARTS & MATERIAL		@ 8.250%		471.31

LABOR	RATE	REPLACE HRS	REPAIR HRS	
1-SHEET METAL	32.00	33.5	13.8	1,513.60
2-MECH/ELEC	34.00	1.6	4.2	197.20
3-FRAME	34.00		10.5	357.00
4-REFINISH	32.00	23.0		736.00
5-PAINT MATERIAL	12.00			

LABOR TOTAL			2,803.80
TAX ON LABOR	@ 8.250%		231.31
SUBLET REPAIRS			35.00
TAX ON SUBLET	@ 8.250%		2.89
TOWING & STORAGE			
GROSS TOTAL			9,257.20
LESS: DEDUCTIBLE			UNKNOWN
NET TOTAL			9,257.20
LESS: ORIGINAL NET TOTAL			7,961.34
NET SUPPLEMENT TOTAL			1,295.86

PXN:NN/00/00/00/00

ADP AUDAPOINT U S1 LOG 0001981 DATE 95 DEVICE # R2.4B CD 04/95

3.7 HOURS WERE ADDED TO THIS ESTIMATE BASED ON ADP'S TWO-STAGE REFINISH FORMULA: 20% OF REFINISH HOURS, AFTER OVERLAP, PLUS 0.6 HOURS FOR THE FIRST MAJOR PANEL, WHERE NOTED.

ESTIMATE CALCULATED USING THE 2.5 HOUR MAXIMUM ALLOWANCE FOR TWO-STAGE REFINISH OF NON-FLEX, EXTERIOR SURFACES.
