V2206

REPORT NO.: MGA-95-21411

SAFETY COMPLIANCE TESTING FOR FMVSS 214 "SIDE IMPACT PROTECTION - PASSENGER CARS"

VOLVO
1995 VOLVO 850 4 DOOR STATION WAGON
NHTSA NO: CS5900

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105

MGA Ref. No.: G93A-02

Test Date: December 20, 1994

Report Date: January 20, 1995

FINAL REPORT

Prepared For:

U.S. DEPARTMENT OF TRANSPORTATION
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15. Supplementary Notes

16. Abstract

Compliance tests were conducted on the subject 1995 Volvo 850 4 Door Sedan in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure for the determination of FMVSS 214 compliance. The test was conducted at the MGA Research Proving Grounds and crash Test Center in Burlington, Wisconsin on December 20, 1994.

The impact velocity of the Moving Barrier (MDB) was 33.3 mph (53.6 kph) and the ambient temperature of the struck side (driver's) of the target vehicle at the time of impact was 73°F. The maximum static crush of the impacted vehicle was 284 mm at the occupant H-Point level of the struck vehicle.

The test or target vehicle's performance is given below:

	Driver's SID	Left Rear SID
Thoracic Trauma Index (TTI)	49 g's	51 g's
Pelvis Acceleration	58 g's	49 g's
Upper Rib Acceleration	38.7 g's	51.6 g's
Lower Rib	37.2 g's	58.9 g's
Lower Spine	58.8 g's	43.3 g's

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Approved by:

John Fleck

John Fleck, Project Engineer

Date: 1-19-95

FINAL REPORT ACCEPTED BY:

Contract Technical Manager

Date: 2/13/95

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SECTION 1

PURPOSE AND TEST PROCEDURE

This side impact test is part of the FY 94 FMVSS 214 "Dynamic" compliance test program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-93-C-Ø2Ø47. The purpose of this test was to evaluate side impact protection in a 1995 Volvo 85Ø 4 Door Station Wagon.

This test was conducted using the Office of Vehicle Safety Compliance's FMVSS 214 test procedure (TP-214D-Ø3, dated May 17, 1993).

MGA does not endorse or certify products. The manufacturer's name appears solely for identification purposes only.

SECTION 2

SUMMARY OF SIDE IMPACT TEST

A stationary 1995 Volvo 850 4 Door Station Wagon was impacted on the left or driver's side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the monorail at a velocity of 33.3 mph (53.6 kph) on December 20, 1995. The orientation angle of the striking vehicle was 90° counterclockwise with respect to the longitudinal axis of the struck vehicle. Pre- and post-test photographs of the test vehicle, the moving deformable barrier (MDB), and the side impact dummies (SIDs) are shown in Appendix A.

Two restrained Side Impact Dummies (SIDs) were placed in the driver (Pos. #1) and left rear (Pos. #4) designated seating positions. The SID in the driver (Pos. #1) and left rear (Pos. #4) were placed according to instructions specified in the Laboratory Test Procedure. The side impact event was documented by nine high speed cameras. Camera locations and other pertinent camera information can be found in this report. Appendix B contains the vehicle and dummy response data traces.

The SIDs were instrumented with the following accelerometers.

1. Left Upper Rib (LUR) uniaxial accelerometer (Y-direction)
2. Left Lower Rib (LLR) uniaxial accelerometer (Y-direction)
3. Lower Thoracic Spine (T_{12}) uniaxial accelerometer (Y-direction)
4. Pelvic (PEV) section uniaxial accelerometer (Y-direction)

The summary of the side impact dummy (SID) configuration and performance verification test data are shown in Appendix C. Dummy and vehicle calibration data can be found in Appendix D of this report.

The driver's Thoracic Trauma Index (TTI) was 49 g's. Maximum pelvic Y acceleration was 58 g's.

The left rear passenger's TTI was 51* g's. Maximum pelvic Y acceleration was 49 g's.

* Redundant lower spine data channel used to calculate TTI. See test notes.

TEST NOTES

The passenger lower spine Y acceleration and velocity plots look abnormal. Post-test evaluation of the umbilical cable found a poor connection. Therefore, the passenger TTI levels in this report use the redundant lower spine Y data.

SECTION 3
SUMMARY OF TEST DATA

TABLE 1

GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 1995/Volvo/850/4 Door Station Wagon

Vehicle NHTSA No.: CS5900 VIN: YV1LW551652097541

Vehicle Body Color: Green Month & Year of Manufacture: 10-94

Engine Data: 5 cylinders; 149 CID; ___ Liter; ____cc

Placement ___ Longitudinal; or X Lateral

Transmission: 3 speed; __ Manual; X Automatic; __ Overdrive

Final Drive: __ Rear Wheel Drive; X Frt. Wheel Drive; __ Four Wheel Drive

Odometer Reading 100 miles

Options: X A/C; X Pwr. Steering.; X Pwr. Brakes; X Pwr. Windows

__Power Seats; X Tilt Wheel; __Power Door Locks; __Self Leveling System;

X Telescoping Steering Wheel

DATA FROM TIRE PLACARD:

Tire Pressure (at capacity): 36 Psi FRONT (248 kpa)

41 Psi REAR (283 kpa)

Recommended Tire Size: 19560R15

Tires on Test Vehicle: 19560R15 Manufacturer: Goodyear

Vehicle Capacity Data:

Number of Occupants: 2 Front; 3 Rear; __ 3rd Seat 5 Total

Type of Front Seats: X Bucket; __ Bench; __ Split Bench

Type of Front Seat Back: __ Fixed; X Adjustable with X Knob

Vehicle Maximum Capacity Loading = 995 lbs (A) (451.3 kg)

No. of Occupants x 150 lbs. = 750 lbs (B) (340.2 kg)

Cargo Capacity (A-B) = 245 lbs (111.1 kg)

WEIGHT OF TEST VEHICLE WITH MAXIMUM FLUIDS:

Right Front = 958 lbs (434.5 kg) Right Rear = 663 lbs (300.7 kg)

Left Front = 985 lbs (446.8 kg) Left Rear = 677 lbs (307.1 kg)

TOTAL FRONT = 1943 lbs (881.3 kg) TOTAL REAR = 1340 lbs (607.8 kg)

% of Total Vehicle Weight = 59.0 %; % of Total Weight = 41.0 %

TOTAL WEIGHT = 3283 lbs (1489.1 kg)

TABLE 2

TEST VEHICLE DATA

Year/Make/Model/Body Style: 1995/Volvo/850/4 Door Station Wagon

Vehicle NHTSA No.: CS5900 TEST DATE: December 20, 1994

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Test Vehicle Delivered Weight with Maximum Fluids = 3283 lbs (1489.1 kg)

Cargo Carrying Capacity of Test Vehicle = 245 lbs (111.1 kg)

Weight of 2 Side Impact Dummies (2 x 178 lbs.) = 356 lbs (161.5 kg)

TEST VEHICLE TARGET WEIGHT: = 3884 lbs (1761.7 kg)

ACTUAL WEIGHT OF TEST VEHICLE WITH 2 DUMMIES AND CARGO:

Right Front = 993 lbs (450.4 kg) Right Rear = 871 lbs (395.1 kg)

Left Front = 1093 lbs (495.8 kg) Left Rear = 913 lbs (414.1 kg)

TOTAL FRONT = 2086 lbs (946.2 kg) TOTAL REAR = 1784 lbs (809.2 kg)

% of Total Weight = 54.0% % of Total Weight = 46.0%

TOTAL TEST WEIGHT = 3870 lbs (1755.4 kg)

TEST VEHICLE ATTITUDE (all dimensions in inches):

CURB WEIGHT ATTITUDE: in (mm)

Right Front 26.3 (660) Left Front 25.7 (654) Right Rear 26.5 (673) Left Rear 26.3 (667)

FULLY LOADED WEIGHT ATTITUDE: in (mm)

Right Front 26.2 (666) Left Front 25.5 (648) Right Rear 25.0 (636) Left Rear 24.3 (616)

TEST ATTITUDE: in (mm)

Right Front 25.9 (659) Left Front 25.6 (650) Right Rear 25.2 (640) Left Rear 24.3 (616)

Test Vehicle Wheelbase: 104.7 inches (2660 mm)

C.G. = 48.2 inches (1226 mm) rearward of front wheel centerline

TOTAL VEHICLE LENGTH:

Right Side = 180.0 in (4572 mm)

Centerline = 183.4 in (4660 mm)

Left Side = 180.0 in (4572 mm)

FIGURE 1

PRE-TEST CONDITIONS

Year/Make/Model/Body Style: 1995/Volvo/850/4 Door Station Wagon

Vehicle NHTSA No.: CS5900 TEST DATE: December 20, 1994

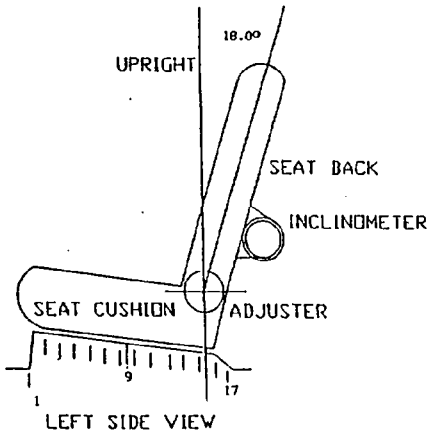
FRONT SEAT CUSHION PLACEMENT:

Total Length of Adjustment Travel: 8.9 in (225 mm)

Total Number of Adjustment Positions or Detents: 17

Test Position: Mid Position

(9th detent from front, 1st position being #1)



FRONT SEAT BACK ADJUSTMENT POSITION:

Seat Back Angle = 18.0° degrees

SECOND POSITION SEAT:

Total Length of Fore/Aft Adjustment Travel: Non-Adjustable

Seat Back Adjustment Position: N/A

ADJUSTABLE STEERING COLUMN POSITION: Mid Position

Telescoping adjusted to mid position (20 mm)

WINDOW POSITIONS: Left Front closed Left Rear closed

Right Front open Right Rear open

Note: Windows will be in closed position on struck side of test vehicle and in open position on opposite side.

AMOUNT OF STODDARD SOLVENT IN FUEL TANK:

Fuel system usable capacity = 19.3 gallons (73 liters)

Test Volume: 17.9 gallons (67.8 liters) 93% of capacity

LOCATIONS OF IMPACT POINT ON TEST VEHICLE SIDE TO BE IMPACTED:

Wheelbase: = 104.7 in (2660 mm)

Impact Point is 15.4 in (390 mm) rearward of front axle centerline

TABLE 3

CRASH TEST SUMMARY FOR TEST VEHICLE

Year/Make/Model/Body Style: 1995/Volvo/850/4 Door Station Wagon

Vehicle NHTSA No.: CS5900 TEST DATE: December 20, 1994

Overall Length = 183.5 in (4660 mm); Overall Width = 68.5 in (1741 mm)

TEST WEIGHT:

Right Front	= 993 lbs (450.4 kg)	Right Rear	= 871 lbs (395.1 kg)
Left Front	= 1093 lbs (495.8 kg)	Left Rear	= 913 lbs (414.1 kg)
TOTAL FRONT	= 2086 lbs (946.2 kg)	TOTAL REAR	= 1784 lbs (809.2 kg)
% of Total Weight	= 54.0 %	% of Total Weight	= 46.0 %

TOTAL VEHICLE WEIGHT 3870 lbs (1755.4 kg)

Wheelbase = 104.7 in (2660 mm)

Longitudinal C.G. front Center of Front Axle = 48.2 in (1226 mm)

Impact Angle with Respect to Impactor = 90° degrees

MAXIMUM EXTERIOR STATIC CRUSH:

1. LEVEL 1 (278 mm above ground) = 110 mm
2. LEVEL 2 (495 mm above ground) = 284 mm
3. LEVEL 3 (578 mm above ground) = 280 mm
4. LEVEL 4 (834 mm above ground) = 231 mm
5. LEVEL 5 (1324 mm above ground) = 55 mm

Maximum Post-Test Intrusion = 284 mm

OCCUPANTS:	Left Front Passenger	Left Rear Passenger
Type of Dummy	SID	SID
Restraints Used	3 pt. lap & shoulder belt with steering wheel and SIP airbags	3 pt. lap & shoulder belt

INSTRUMENTATION:

Number of Vehicle Data Channels:		= 17
Number of Cameras:	Onboard Vehicle	= 3
	Offboard Vehicle	= 4
	Deformable Barrier	= 2
	TOTAL	= 9

TABLE 4

CRASH TEST SUMMARY FOR SIDE IMPACTOR

Year/Make/Model/Body Style: 1995/Volvo/850/4 Door Station Wagon

Vehicle NHTSA No.: CS5900 TEST DATE: December 20, 1994

POSITION OF IMPACT (MDB) ON MONORAIL:

Crabbed 27° to left

MDB DETAILS:

Overall Width of Framework Carriage	= 49.3 in (1252.2 mm)
Overall Length of MDB (incl. honeycomb impact face)	= 162 in (4114.8 mm)
Wheelbase of Framework Carriage	= 102 in (259.1 mm)
Tread of Framework Carriage (Front & Rear)	= 74 in (1879.6 mm)
C.G. Location Rearward of Front Axle	= 43.4 in (1102.4 mm)
C.G. Location From Center Line	= -0.3 in (-7.62 mm)
C.G. Location Above Ground Level	= 19.2 in (487.7 mm)

MDB WEIGHT:

Left Front = 1095 lbs (496.7 kg)	Left Rear = 413 lbs (187.3 kg)
Right Front = 624 lbs (283.0 kg)	Right Rear = 858 lbs (389.2 kg)
TOTAL FRONT = 1719 lbs (779.7 kg)	TOTAL REAR = 1271 lbs (576.5 kg)

TOTAL MDB WEIGHT = 2990 lbs (1356.2 kg)

Impact Angle (MDB C/L to Target Vehicle C/L) = 90° degrees

Impact Speed = Primary: 33.31 mph (53.6 kph) Secondary: 33.20 mph (53.6 kph)

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE:

1.	Row A Top of Stack (33 in)	= 114 mm
2.	Row B Mid Stack (27 in)	= 72 mm
3.	Row C Top of Bumper (21 in)	= 84 mm
4.	Row D Center of Bumper (17 in)	= 129 mm

INSTRUMENTATION:

Number of MDB Data Channels = 7

TABLE 5

POST-TEST OBSERVATIONS

Year/Make/Model/Body Style: 1995/Volvo/850/4 Door Station Wagon

Vehicle NHTSA No.: CS5900 TEST DATE: December 20, 1994

VISIBLE DUMMY CONTACT POINTS:

	LEFT FRONT SID	LEFT REAR SID
Head	to side window	to "C" Post
Arm	to airbag & door trim	to door trim panel
Pelvis	to airbag & door trim	to armrest
Left Knee	to door trim panel	to door trim panel
Right Knee	to left knee	to left knee

DOOR OPENING:

	LEFT SIDE	RIGHT SIDE
Front	remained closed	remained closed
Rear	remained closed	remained closed

MDB DISTANCE FROM TARGET IMPACT POINT:

Horizontal: 1.0 in forward (25 mm) Vertical: .25 in high (6 mm)

ARM REST LOCATIONS:

Front: 195 mm below window opening

Rear: 220 mm below window opening

SEAT CRUSH:

Driver Seat Back: 147 mm Driver Seat Cushion: 131 mm

Left Rear Seat Back: 216 mm Left Rear Seat Cushion: 237 mm

GLAZING DAMAGE:

PILLAR PERFORMANCE:

No separation noted

SILL SEPARATION:

No separation noted

OTHER NOTABLE IMPACT EFFECTS:

Side impact airbag deployed on driver seat

SECTION 4
OCCUPANT AND VEHICLE INFORMATION

TABLE 6

SIDE IMPACT DUMMY (SID) TEST DATA SUMMARY

Year/Make/Model/Body Style: 1995/Volvo/850/4 Door Station Wagon

Vehicle NHTSA No.: CS5900 TEST DATE: December 20, 1994

	Front Dummy ID # 272					Rear Dummy ID # 269			
	Pos. Direct.		Neg. Direct			Pos. Direct.		Neg. Direct	
	Max (g)	Time (msec)	Max (g)	Time (msec)		Max (g)	Time (msec)	Max (g)	Time (msec)
RIB ACCELERATIONS:									
Upper Rib Lateral.....Y	38.7	41	12.5	72		51.6	41	6.4	108
Upper Rib Lateral....Y(R)	38.7	41	13.6	72		50.5	41	6.4	107
Lower Rib Lateral.....Y	37.2	41	15.0	73		58.9	42	12.3	68
Lower Rib Lateral.....Y(R)	37.9	41	15.5	73		56.6	42	12.7	68
SPINE ACCELERATIONS:									
Lower Lateral.....Y	58.8	40	15.4	61		51.5	46	24.0	80
Lower Lateral.....Y(R)	58.4	40	15.3	61		43.3	44	18.9	62
PELVIC ACCELERATIONS:									
Lateral.....Y	57.5	34	6.7	79		49.5	36	12.8	70
Lateral.....Y(R)	58.9	34	6.1	98		50.3	36	12.6	70

REFERENCE:

Positive Direction - Longitudinal (X) = forward

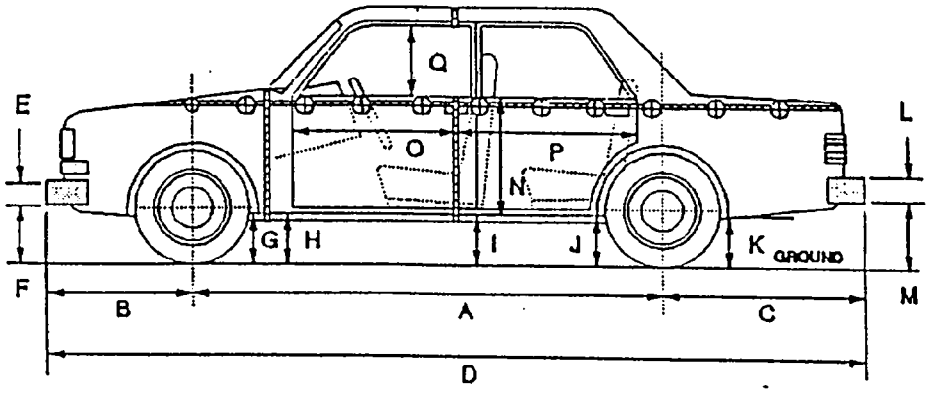
Lateral (Y) = to right

Vertical (Z) = up

Note: Y(R) denotes redundant Y direction accelerometer.

FIGURE 2

PRE- AND POST-TEST MEASUREMENTS



LEFT SIDE VIEW

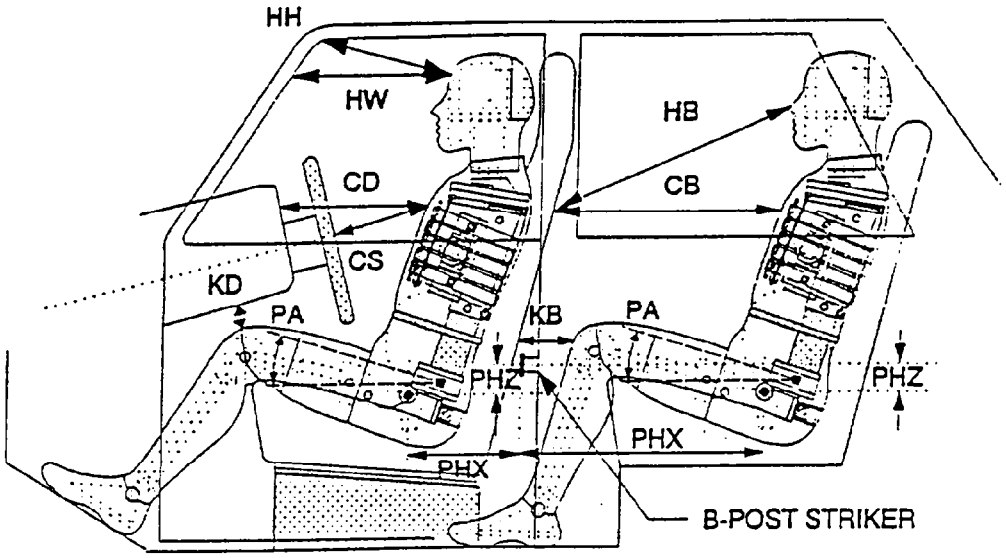
D = Length at Centerline
R = Right Side Length
S = Left Side Length
T = Width at B Post
E & L = Bumper Thickness
J1 = To Pinch Weld
J2 = To Sill

Units: mm

LOCATION	PRE-TEST	POST-TEST	Δ CHANGE
A	2660	2670	10
B	975	977	2
C	1025	1070	45
D	4660	4717	57
E	175	175	0
F	362	358	4
G	205	208	3
H	193	193	0
I	201	185	16
J1/J2	200/207	214/192	14/15
K	265	267	2
L	220	220	0
M	313	314	1
N	595	408	187
O	675	665	10
P	1225	1160	65
Q	434	420	14
R	4572	4610	38
S	4572	4610	38
T	1741	1560	181

FIGURE 3

SIDE IMPACT DUMMY (SID) LONGITUDINAL CLEARANCE DIMENSIONS



LEFT SIDE VIEW

NOTE: 2-DOOR VEHICLE SHOWN. REAR DUMMY PHX & PHZ MEASUREMENTS FOR A 4-DOOR VEHICLE WOULD USE THE C-POST STRIKER AS A REFERENCE POINT

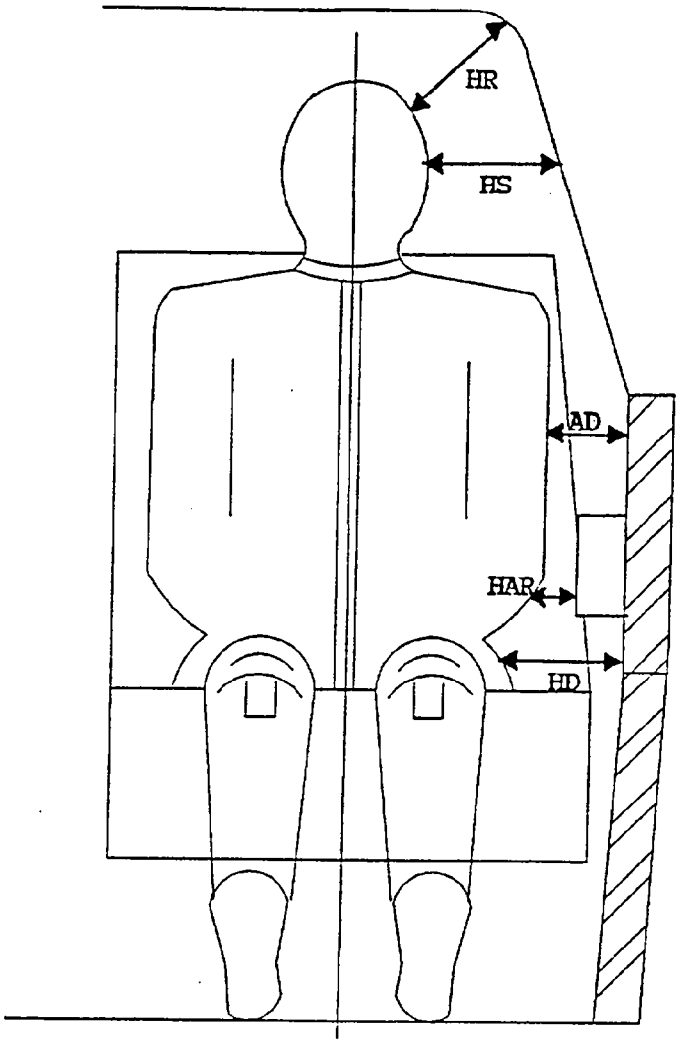
NOTE: All dimensions are in mm

	DRIVER ID #272	LEFT REAR PASSENGER ID #269	
HH	352	---	
HW	458	---	
HB	---	738	
CD	508	CB	602
CS	280	---	
KDL	112	KBL	165
KDR	112	KBR	188
PA°	24.4°	24.5°	
PHX	234	190	
PHZ	224	220	

NOTE: 2-door vehicle shown. Rear dummy PHX & PHZ measurements for 4-door vehicle would use the C-post striker as reference point.

FIGURE 4

SIDE IMPACT DUMMY (SID) LATERAL CLEARANCE DIMENSIONS



NOTE: All dimensions are in mm

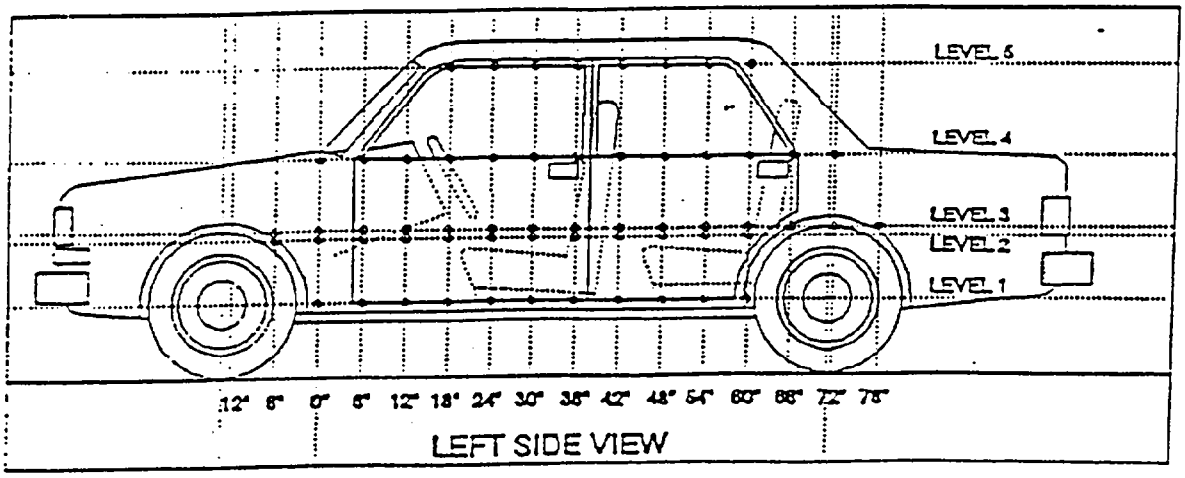
	DRIVER ID #272	LEFT REAR PASSENGER ID #269
HR	135	125
HS	225	187
AD	112	63
HD	140	104

FIGURE 5

VEHICLE SIDE MEASUREMENTS

Year/Make/Model/Body Style: 1995/Volvo/850/4 Door Station Wagon

Vehicle NHTSA No.: CS5900 TEST DATE: December 20, 1994



As tested height measurements are with respect to ground along the vertical 33" line shown above:

	33" Side Profile
Level 5 @ Window Top	= 1324 mm
Level 4 @ Window Sill	= 834 mm
Level 3 @ Mid Door	= 578 mm
Level 2 @ Occupant H-Point	= 495 mm
Level 1 @ Axle Centerline Height (or Sill Top Height)	= 278 mm

TABLE 7

TEST VEHICLE EXTERIOR PROFILES FROM REFERENCE PLANE AND STATIC CRUSH

LEVEL 1 AT AXLE CENTER LINE

Year/Make/Model/Body Style: 1995/Volvo/850/4 Door Station Wagon

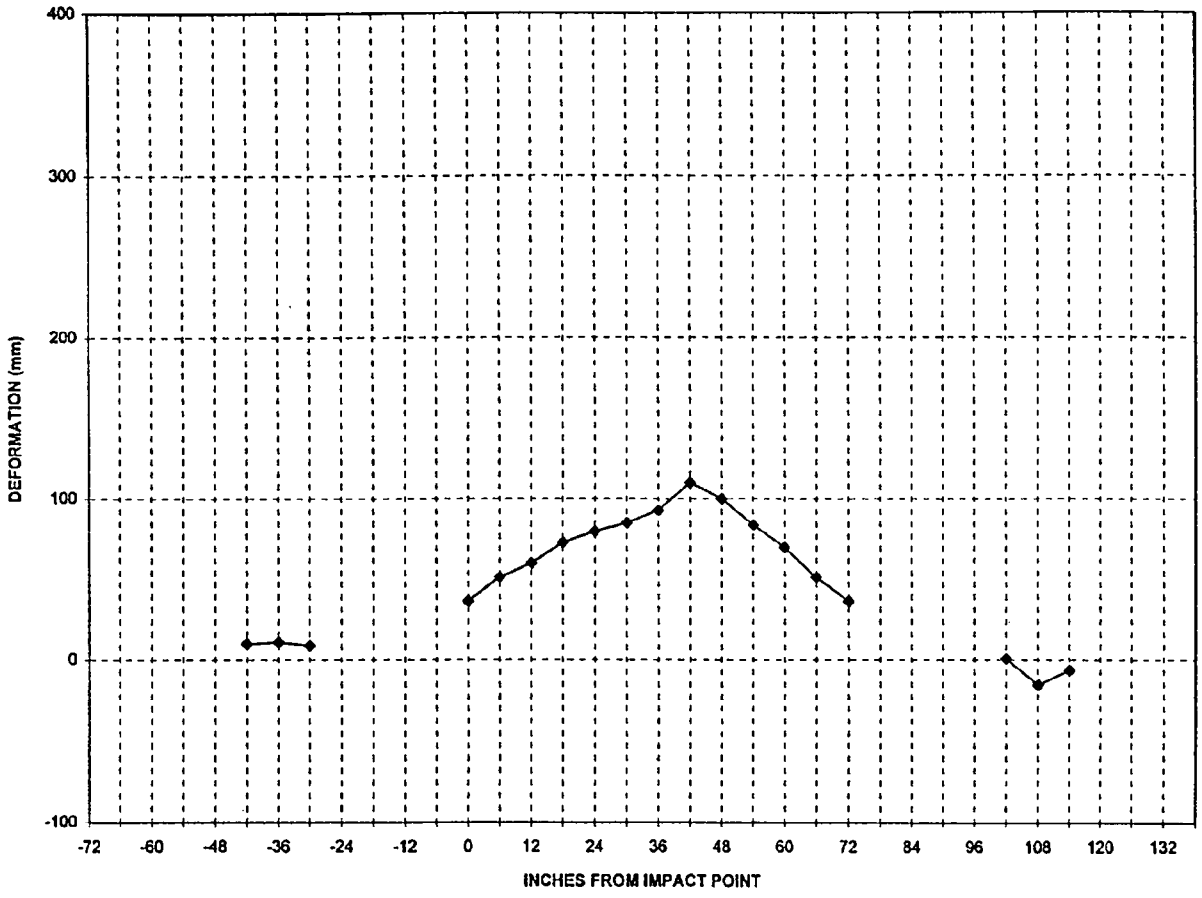
Vehicle NHTSA No.: CS5900 TEST DATE: December 20, 1994

Longitudinal Distance (in)	PRE-TEST (mm)	POST-TEST (mm)	STATIC CRUSH (mm)	
-72	---	---	---	
-66	---	---	---	
-60	---	---	---	
-54	---	---	---	
-48	---	---	---	
-42	826	836	10	
-36	795	806	11	
-30	775	784	9	
-24	---	---	---	
-18	---	---	---	
-12	---	---	---	
-6	---	---	---	
0	785	821	36	(impact point)
6	782	833	51	
12	782	842	60	
18	779	852	73	
24	785	865	80	
30	788	873	85	
36	788	881	93	
42	780	890	110	
48	781	881	100	
54	781	865	84	
60	782	852	70	
66	785	836	51	
72	787	823	36	
78	---	---	---	
84	---	---	---	
90	---	---	---	
96	---	---	---	
102	---	---	---	
108	797	798	1	
114	815	800	-15	
120	837	831	-6	
126	---	---	---	
132	---	---	---	
138	---	---	---	

Reference plane is parallel to test vehicle longitudinal centerline
Given dimensions = reference plane to car body

FIGURE 6

VEHICLE EXTERIOR STATIC CRUSH



LEVEL 1 AT AXLE CENTER LINE

TABLE 7

TEST VEHICLE EXTERIOR PROFILES FROM REFERENCE PLANE AND STATIC CRUSH

LEVEL 2 AT OCCUPANT H-POINT

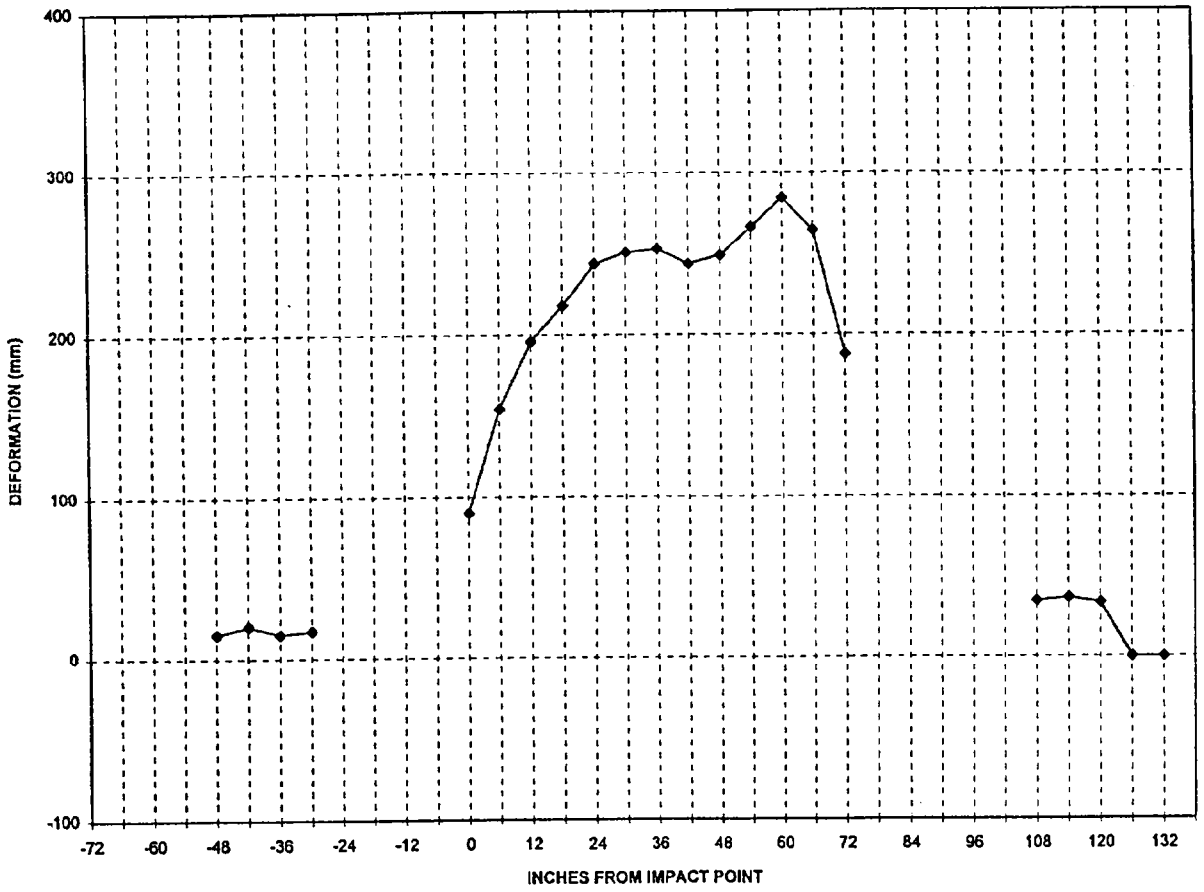
Year/Make/Model/Body Style: 1995/Volvo/850/4 Door Station Wagon
Vehicle NHTSA No.: CS5900 TEST DATE: December 20, 1994

Longitudinal Distance (in)	PRE-TEST (mm)	POST-TEST (mm)	STATIC CRUSH (mm)	
-72	---	---	---	
-66	---	---	---	
-60	---	---	---	
-54	---	---	---	
-48	806	821	15	
-42	780	800	20	
-36	766	781	15	
-30	752	769	17	
-24	---	---	---	
-18	---	---	---	
-12	---	---	---	
-6	---	---	---	
0	740	830	90	(impact point)
6	736	891	155	
12	733	929	196	
18	731	949	218	
24	728	972	244	
30	724	975	251	
36	722	975	253	
42	723	967	244	
48	723	972	249	
54	724	990	266	
60	726	1010	284	
66	726	990	264	
72	732	920	188	
78	---	---	---	
84	---	---	---	
90	---	---	---	
96	---	---	---	
102	751	785	34	
108	764	800	36	
114	776	809	33	
120	787	787	0	
126	804	804	0	
132	---	---	---	
138	---	---	---	
144	---	---	---	

Reference plane is parallel to test vehicle longitudinal centerline
Given dimensions = reference plane to car body

FIGURE 6 (Cont'd)

VEHICLE EXTERIOR STATIC CRUSH



LEVEL 2 AT OCCUPANT H-POINT

TABLE 7

TEST VEHICLE EXTERIOR PROFILES FROM REFERENCE PLANE AND STATIC CRUSH

LEVEL 3 AT MID-DOOR

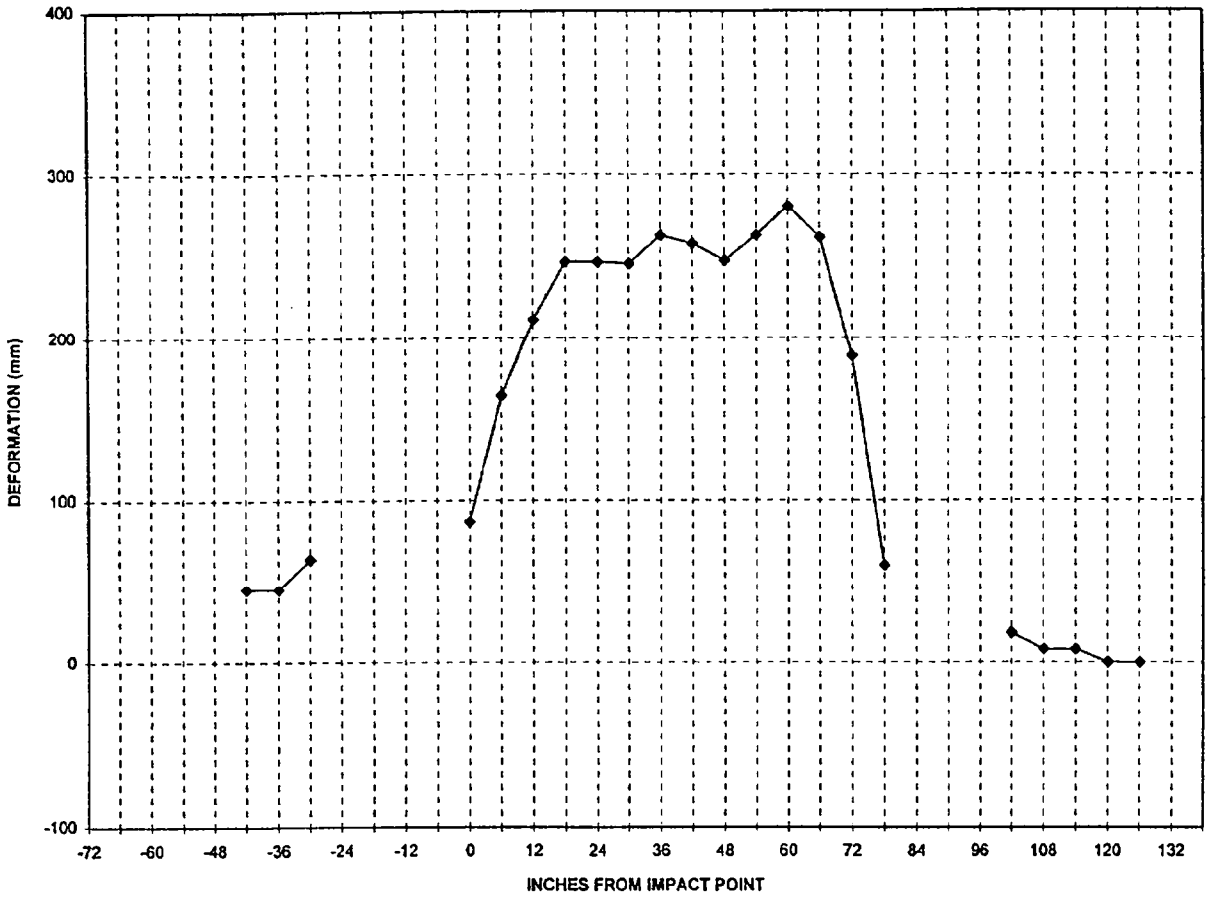
Year/Make/Model/Body Style: 1995/Volvo/850/4 Door Station Wagon
Vehicle NHTSA No.: CS5900 TEST DATE: December 20, 1994

Longitudinal Distance (in)	PRE-TEST (mm)	POST-TEST (mm)	STATIC CRUSH (mm)	
-72	---	---	---	
-66	---	---	---	
-60	---	---	---	
-54	---	---	---	
-48	---	---	---	
-42	815	860	45	
-36	796	841	45	
-30	775	839	64	
-24	---	---	---	
-18	---	---	---	
-12	---	---	---	
-6	---	---	---	
0	746	833	87	(impact point)
6	745	910	165	
12	740	951	211	
18	735	981	246	
24	731	977	246	
30	730	975	245	
36	728	990	262	
42	728	985	257	
48	728	975	247	
54	728	990	262	
60	730	1010	280	
66	734	995	261	
72	738	921	189	
78	740	800	60	
84	---	---	---	
90	---	---	---	
96	---	---	---	
102	782	800	18	
108	797	805	8	
114	810	810	0	
120	827	827	0	
126	---	---	---	
132	---	---	---	
138	---	---	---	

Reference plane is parallel to test vehicle longitudinal centerline
Given dimensions = reference plane to car body

FIGURE 6

VEHICLE EXTERIOR STATIC CRUSH



LEVEL 3 AT MID-DOOR

TABLE 7

TEST VEHICLE EXTERIOR PROFILES FROM REFERENCE PLANE AND STATIC CRUSH

LEVEL 4 AT WINDOW SILL

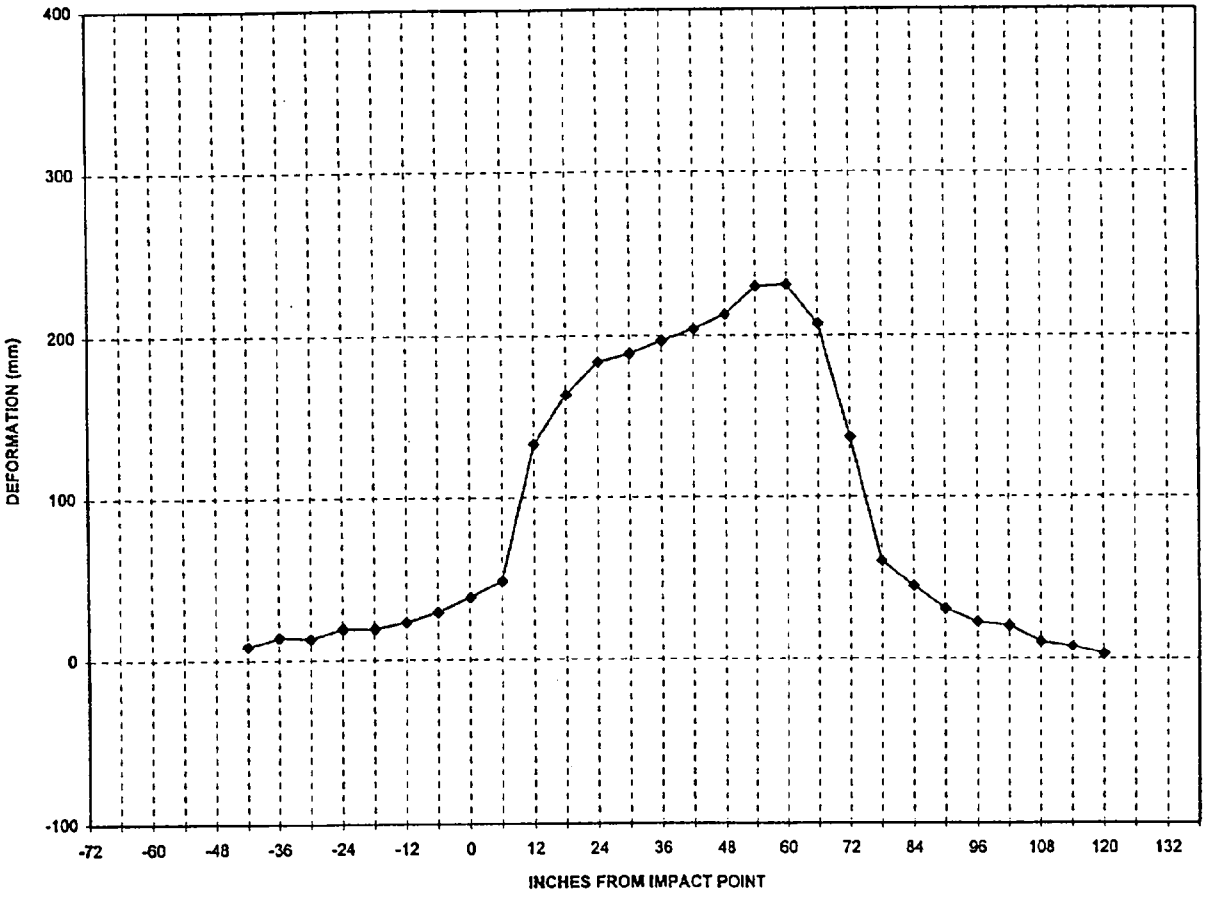
Year/Make/Model/Body Style: 1995/Volvo/850/4 Door Station Wagon
Vehicle NHTSA No.: CS5900 TEST DATE: December 20, 1994

Longitudinal Distance (in)	PRE-TEST (mm)	POST-TEST (mm)	STATIC CRUSH (mm)	
-72	---	---	---	
-66	---	---	---	
-60	---	---	---	
-54	---	---	---	
-48	---	---	---	
-42	851	860	9	
-36	827	842	15	
-30	816	830	14	
-24	800	820	20	
-18	791	811	20	
-12	781	805	24	
-6	775	805	30	
0	771	810	39	(impact point)
6	766	815	49	
12	767	900	133	
18	757	921	164	
24	757	941	184	
30	756	945	189	
36	755	952	197	
42	756	960	204	
48	757	970	213	
54	760	990	230	
60	760	991	231	
66	763	970	207	
72	767	904	137	
78	770	830	60	
84	780	825	45	
90	790	821	31	
96	799	822	23	
102	809	830	21	
108	824	835	11	
114	837	845	8	
120	850	853	3	
126	---	---	---	
132	---	---	---	
138	---	---	---	
144	---	---	---	

Reference plane is parallel to test vehicle longitudinal centerline
Given dimensions = reference plane to car body

FIGURE 6

VEHICLE EXTERIOR STATIC CRUSH



LEVEL 4 AT WINDOW SILL

TABLE 7

TEST VEHICLE EXTERIOR PROFILES FROM REFERENCE PLANE AND STATIC CRUSH

LEVEL 5 AT WINDOW TOP

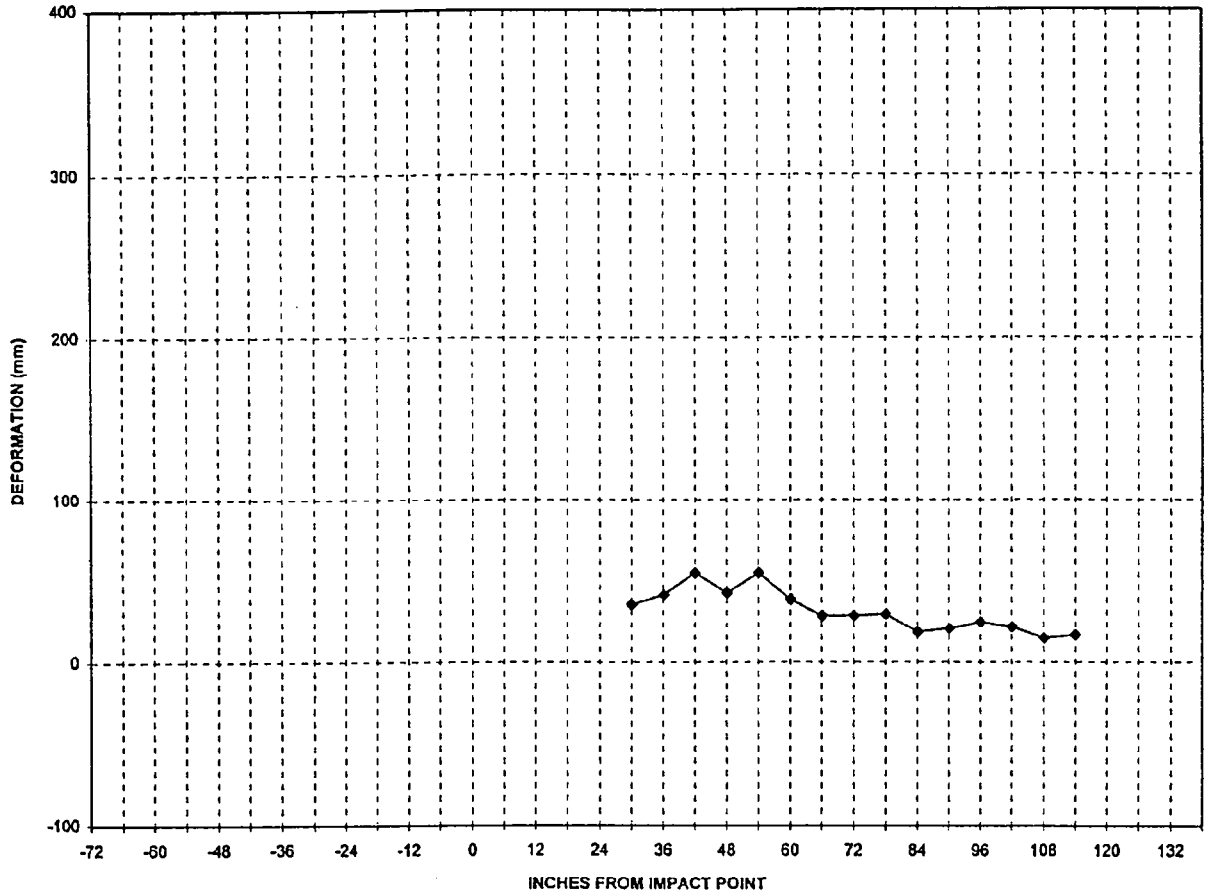
Year/Make/Model/Body Style: 1995/Volvo/850/4 Door Station Wagon
Vehicle NHTSA No.: CS5900 TEST DATE: December 20, 1994

Longitudinal Distance (in)	PRE-TEST (mm)	POST-TEST (mm)	STATIC CRUSH (mm)	
-72	---	---	---	
-66	---	---	---	
-60	---	---	---	
-54	---	---	---	
-48	---	---	---	
-42	---	---	---	
-36	---	---	---	
-30	---	---	---	
-24	---	---	---	
-18	---	---	---	
-12	---	---	---	
-6	---	---	---	
0	---	---	---	(impact point)
6	---	---	---	
12	---	---	---	
18	---	---	---	
24	---	---	---	
30	979	1015	36	
36	973	1015	42	
42	975	1030	55	
48	977	1020	43	
54	978	1033	55	
60	982	1021	39	
66	986	1015	29	
72	993	1022	29	
78	1000	1030	30	
84	1003	1022	19	
90	1008	1029	21	
96	1014	1039	25	
102	1023	1045	22	
108	1031	1046	15	
114	1038	1055	17	
120	---	---	---	
126	---	---	---	
132	---	---	---	
138	---	---	---	

Reference plane is parallel to test vehicle longitudinal centerline
Given dimensions = reference plane to car body

FIGURE 6

VEHICLE EXTERIOR STATIC CRUSH



LEVEL 5 AT WINDOW TOP

FIGURE 7

TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 1995/Volvo/850/4 Door Station Wagon

Vehicle NHTSA No.: CS5900 TEST DATE: December 20, 1994

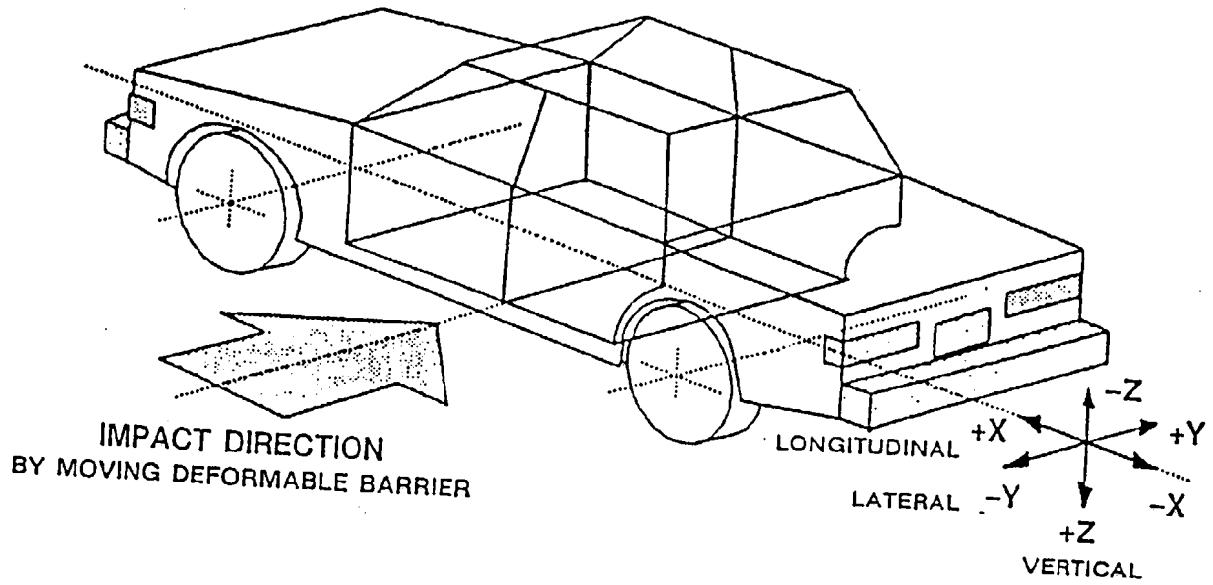


FIGURE 8

MDB FACE DIMENSIONS

Measurements in inches

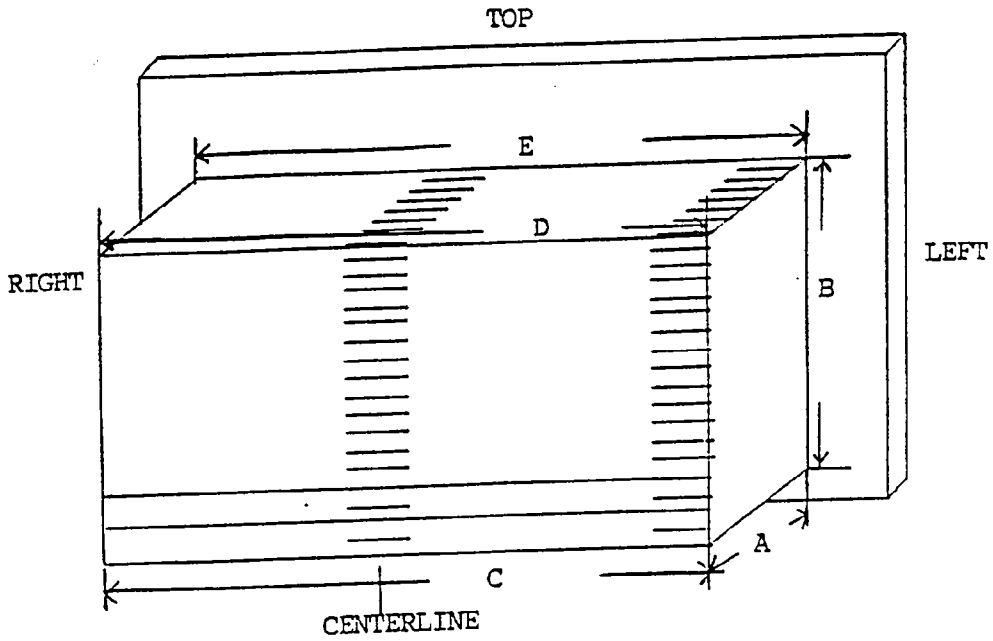
A = 15.1

B = 22.0

C = 65.9

D = 65.9

E = 66.0



Measurements in inches

	Right	Left
A =	11.0	10.9
B =	13.0	13.0
C =	21.0	21.0
D =	33.0	33.0

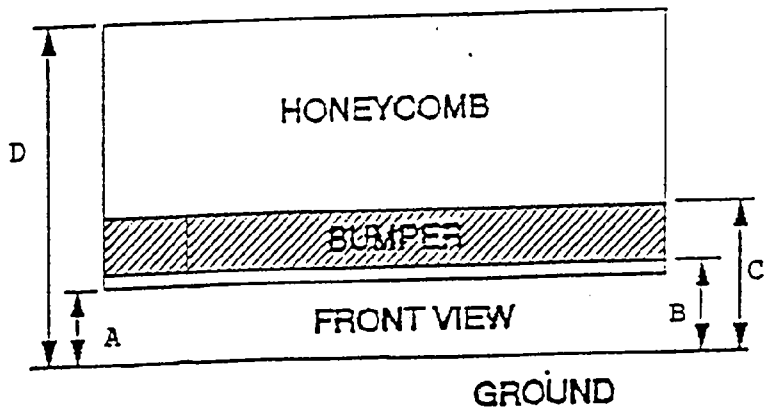


TABLE 8

EXTERIOR STATIC CRUSH FOR SIDE IMPACTOR

Year/Make/Model/Body Style: 1995/Volvo/850/4 Door Station Wagon

Vehicle NHTSA No.: CS5900 TEST DATE: December 20, 1994

Location	Top of Stack (33 inches)	Mid-Stack (27 inches)	Top of Bumper (21 inches)	Center of Bumper (17 inches)	
Horizontal Distance From Center	Crush inches (mm)	Crush inches (mm)	Crush inches (mm)	Crush inches (mm)	
32"	1.2 (31)	0 (0)	3.3 (84)	5.1 (129)	Right
28"	0 (0)	-.4 (-10)	2.8 (72)	4.9 (125)	
24"	.3 (-7)	-.4 (-9)	2.2 (57)	3.8 (97)	
20"	-.2 (-5)	-.3 (-7)	2.0 (52)	3.0 (76)	
16"	-.1 (-3)	-.3 (-7)	2.0 (51)	2.9 (73)	
12"	0 (0)	-.2 (-5)	2.0 (52)	2.7 (68)	
8"	0 (0)	-.1 (-3)	2.2 (55)	2.7 (68)	
4"	.1 (2)	-.1 (-3)	2.2 (56)	2.9 (74)	
0"	.1 (3)	-.1 (-3)	2.3 (58)	3.0 (75)	
4"	.2 (5)	0 (-1)	2.4 (61)	3.0 (77)	Left
8"	.4 (9)	0 (0)	2.4 (62)	3.1 (79)	
12"	.6 (15)	0 (1)	2.6 (67)	3.2 (81)	
16"	1.0 (25)	.1 (3)	2.8 (70)	3.3 (85)	
20"	1.3 (34)	.2 (6)	2.8 (72)	3.5 (88)	
24"	1.7 (44)	0.9 (23)	3.0 (76)	3.6 (92)	
28"	3.9 (98)	2.7 (68)	3.2 (81)	4.1 (105)	
32"	4.5 (114)	2.8 (72)	3.2 (80)	4.0 (101)	

TABLE 9

TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Year/Make/Model/Body Style: 1995/Volvo/850/4 Door Station Wagon

Vehicle NHTSA No.: CS5900 TEST DATE: December 20, 1994

Accel. No.	Description	Coordinates (mm)*			Long. (X) Maximums (g's)		Lat. (Y) Maximums (g's)		Vert. (Z) Maximums (g's)		Resultant (g's)
		X	Y	Z	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Max.
1	Rt. Side Sill @ Front Seat	2812	660	250	1.8	3.8	25.5	3.4	3.3	4.9	26.0
2	Rt. Side Sill @ Rear Seat	1949	592	270	2.0	4.9	18.7	2.5	5.7	6.2	19.4
3	Rr. Floorpan Above Axle	1170	12	560	2.0	11.7	21.0	1.2	11.5	16.3	22.0
4	Left Side Sill @ Rr. Seat	1715	-725	210	---	---	46.7	7.7	---	---	---
5	Left Side Sill @ Frt. Seat	2743	-725	203	---	---	50.8	10.9	---	---	---
6	Left Lower A-Post	3145	-715	400	---	---	111.4	22.2	---	---	---
7	Left Mid A-Post	3150	-730	797	---	---	41.1	12.3	---	---	---
9	Left B-Post Lower	2115	-710	450	---	---	163.3	25.6	---	---	---
10	Left B-Post Mid	2142	-712	820	---	---	114.8	25.1	---	---	---
11	Right Rear Occupant Compartment	1887	330	281	---	---	23.2	6.2	---	---	---
12	Driver Left Seat Track	2635	700	311	---	---	154.7	44.7	---	---	---

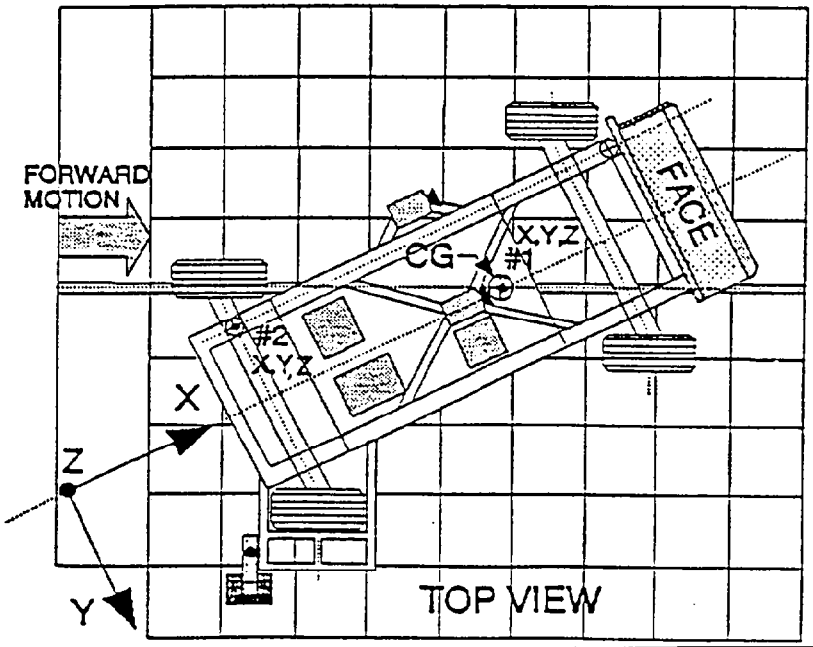
*Reference: X - Rear Bumper (+ Forward)
Y - Vehicle Centerline (+ To right)
Z - Ground Level (+ Up)

FIGURE 9

MOVING DEFORMABLE BARRIER (MDB) ACCELEROMETER LOCATIONS

Year/Make/Model/Body Style: 1995/Volvo/850/4 Door Station Wagon

Vehicle NHTSA No.: CS5900 TEST DATE: December 20, 1994



Accel. No.	Location	Coordinates (mm)			Pos. Direct.		Neg. Direct.	
		X	Y	Z	Max (g)	Time (msec)	Max (g)	Time (msec)
1	MDB Center of Gravity Longitudinal ... X Lateral ..... Y Vertical ..... Z Resultant ..... R	-1092	0	483	1.7 0.6 17.6 29.8	111 140 16 16	20.2 8.1 14.4 ---	33 36 21 ---
2	Rear Frame Member Longitudinal ... X Lateral ..... Y	-2591	-625	622	1.7 6.3	-19 36	24.9 1.7	35 182

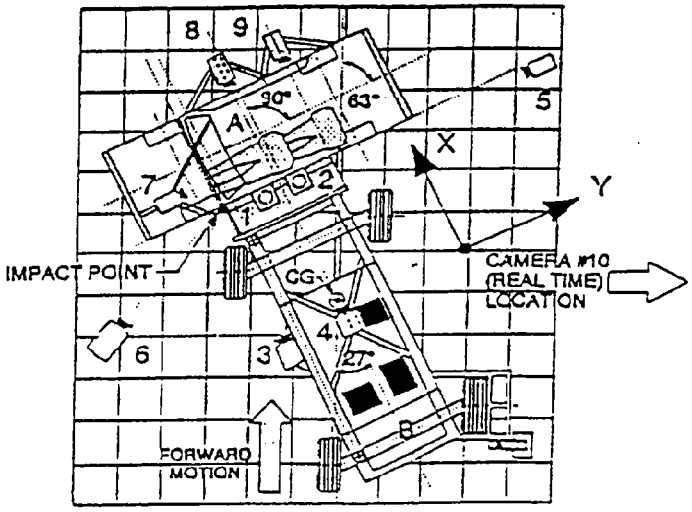
Reference: X = Front Axle (+Forward)
Y = Vehicle Centerline (+ To Right)
Z = Ground Level (+ Up)

FIGURE 10

HIGH SPEED CAMERA LOCATIONS AND DATA

Year/Make/Model/Body Style: 1995/Volvo/850/4 Door Station Wagon

Vehicle NHTSA No.: CS5900 TEST DATE: December 20, 1994



Camera No.	View	Coordinates (mm)			Angle	Lens (mm)	Film Speed (fps)
		X*	Y*	Z*			
	Real Time					13	24
1	Top Impact	-350	850	5420	50°	13	990
2	Top Wide	700	0	5130	50°	8	909
3	Cart Pointer					35	855
4	Cart					13	1015
5	Right Impact	4040	7610	1080	90°	25	1075
6	Left Overall	2540	2515	1555	90°	13	935
7	Onboard Driver				50°	8	943
8	Onboard Hood					13	1010
9	Onboard Passenger					8	939

* Reference: (from point of impact)
+X = Forward
+Y = To Right
+Z = Upward

TABLE 10

FUEL SYSTEM INTEGRITY POST IMPACT TEST DATA

FMVSS NO. 301

Year/Make/Model/Body Style: 1995/Volvo/850/4 Door Station Wagon

Vehicle NHTSA No.: CS5900 TEST DATE: December 20, 1994

Test vehicle fuel tank filled to 92% to 94% of manufacturer's "useable" capacity and with electric fuel pump operating (if it will operate without engine operation). Part 572 test dummies located at each front designated seating position.

TEST VEHICLE IMPACT TYPE: X Side Impact MDB 33.3 mph (53.6 kph)

FUEL SPILLAGE MEASUREMENT:

	ACTUAL	MAX ALLOWED
1. From impact until vehicle motion ceases	0	1 oz.
2. For 5 minute period after vehicle motion ceases	0	5 oz.
3. For next 25 minutes	0	1 oz./1 MIN

SOLVENT SPILLAGE DETAILS:

None

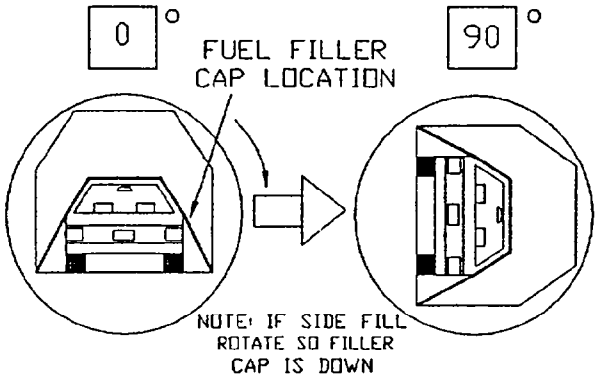
TABLE 11

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

Year/Make/Model/Body Style: 1995/Volvo/850/4 Door Station Wagon

Vehicle NHTSA No.: CS5900 TEST DATE: December 20, 1994

TEST PHASE: 0° - 90°



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 45 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 45 seconds

Next whole minute interval 8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 min FROM onset of rotation	6th min.	7th min.	8th min. if reqd.

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0

Note: Record Spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATIONS(S): None

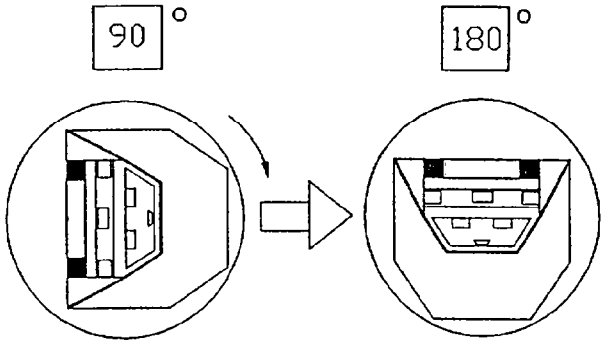
TABLE 11

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

Year/Make/Model/Body Style: 1995/Volvo/850/4 Door Station Wagon

Vehicle NHTSA No.: CS5900 TEST DATE: December 20, 1994

TEST PHASE: 90° - 180°



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 55 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 55 seconds

Next whole minute interval 8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 min FROM onset of rotation	6th min.	7th min.	8th min. if reqd.

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0

Note: Record Spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATIONS(S): None

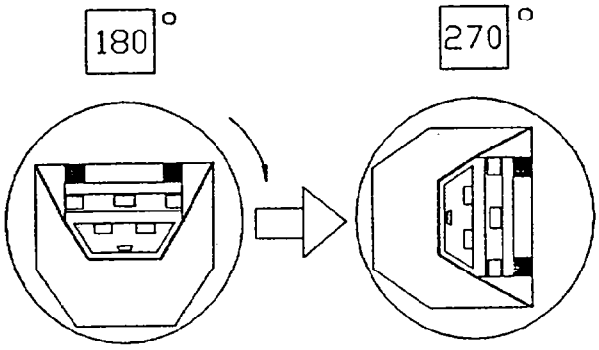
TABLE 11

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

Year/Make/Model/Body Style: 1995/Volvo/850/4 Door Station Wagon

Vehicle NHTSA No.: CS5900 TEST DATE: December 20, 1994

TEST PHASE: 180° - 270°



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 25 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 25 seconds

Next whole minute interval 8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 min FROM onset of rotation	6th min.	7th min.	8th min. if reqd.

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0

Note: Record Spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATIONS(S): None

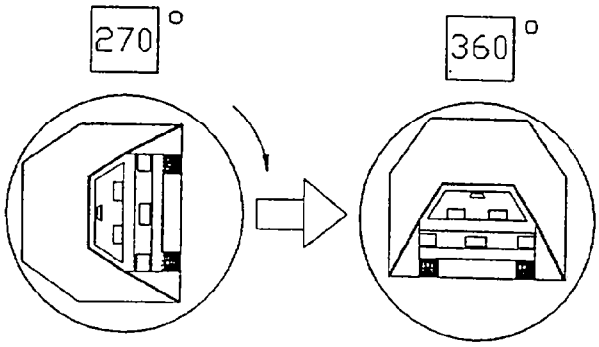
TABLE 11

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

Year/Make/Model/Body Style: 1995/Volvo/850/4 Door Station Wagon

Vehicle NHTSA No.: CS5900 TEST DATE: December 20, 1994

TEST PHASE: 270° - 360°



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 20 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 20 seconds

Next whole minute interval 8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 min FROM onset of rotation	6th min.	7th min.	8th min. if reqd.

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0

Note: Record Spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATIONS(S): None

APPENDIX A - PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

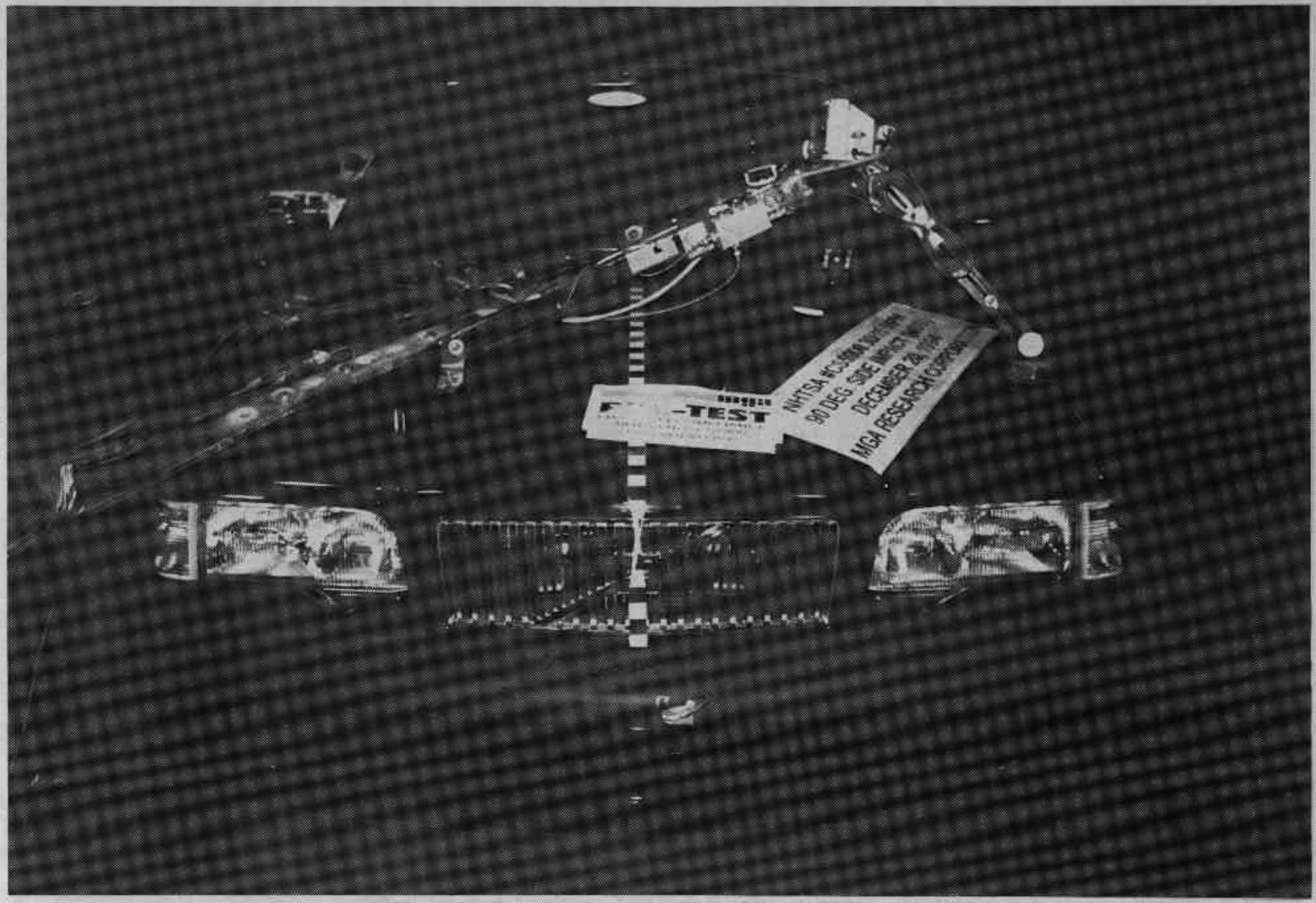


Photo No. A-1 - Pre-Test Front View of Test Vehicle

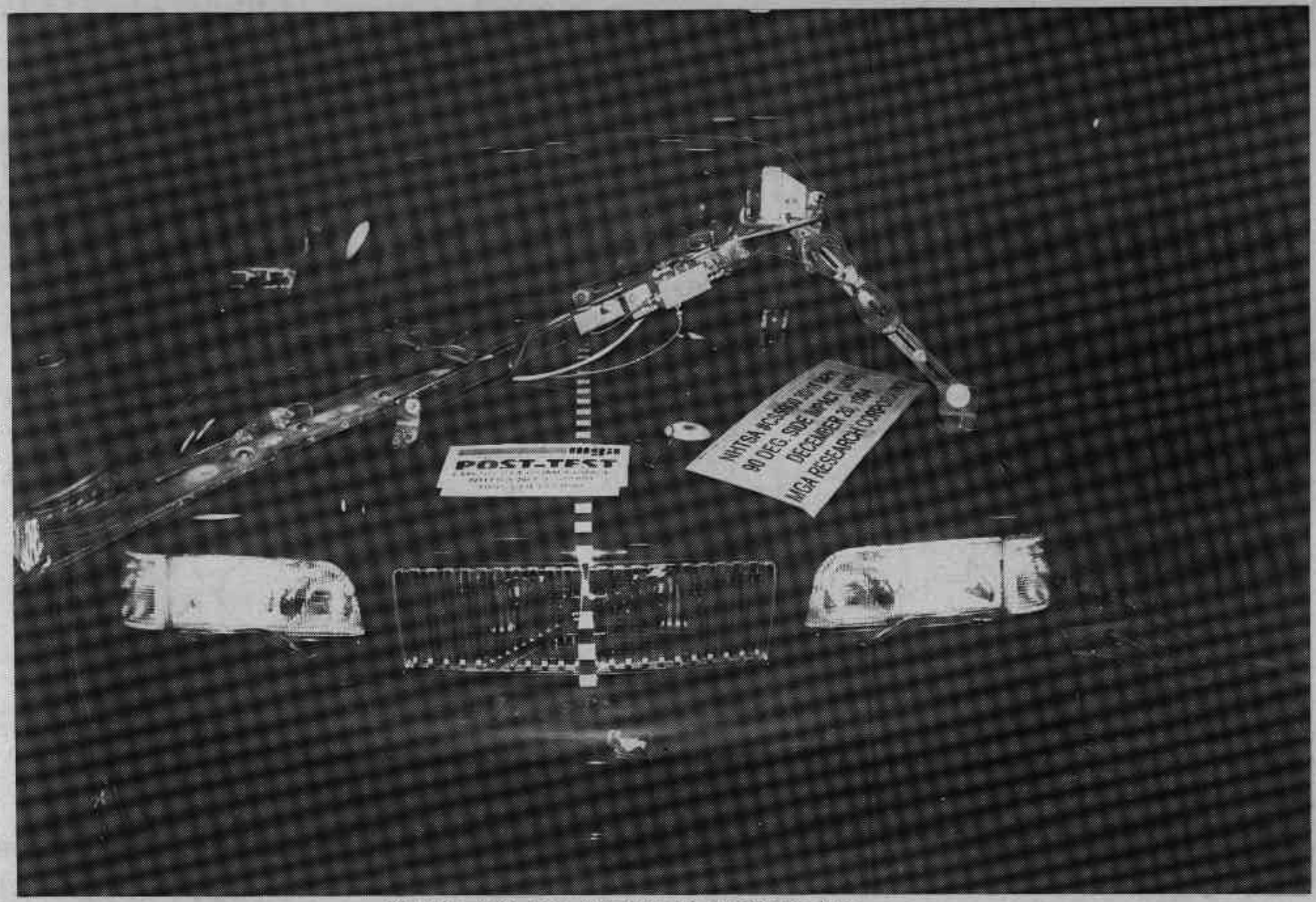


Photo No. A-2 - Post-Test Front View of Test Vehicle

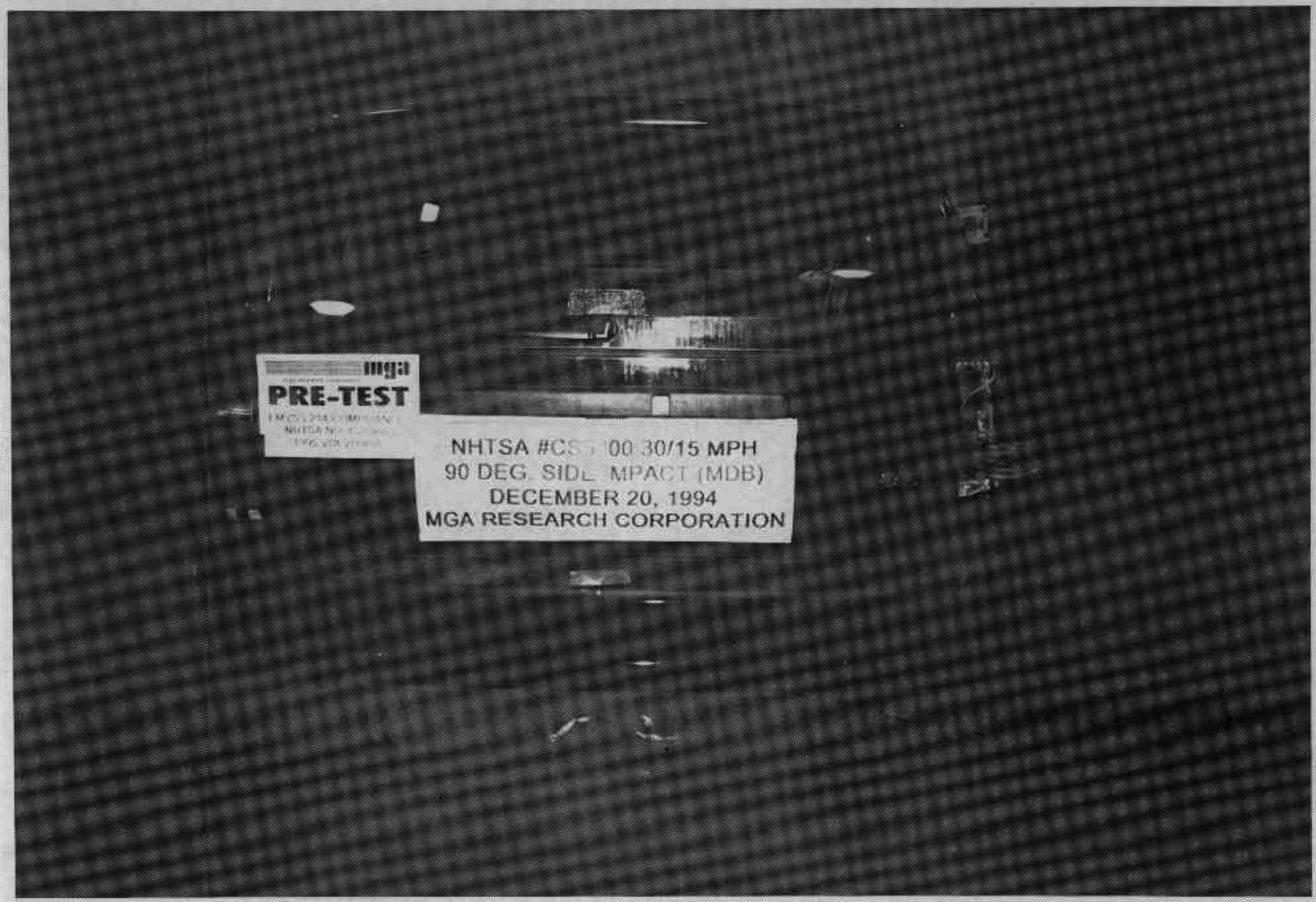


Photo No. A-3 - Pre-Test Rear View of Test Vehicle

Photo No. A-4 - Post-Test Rear View of Test Vehicle

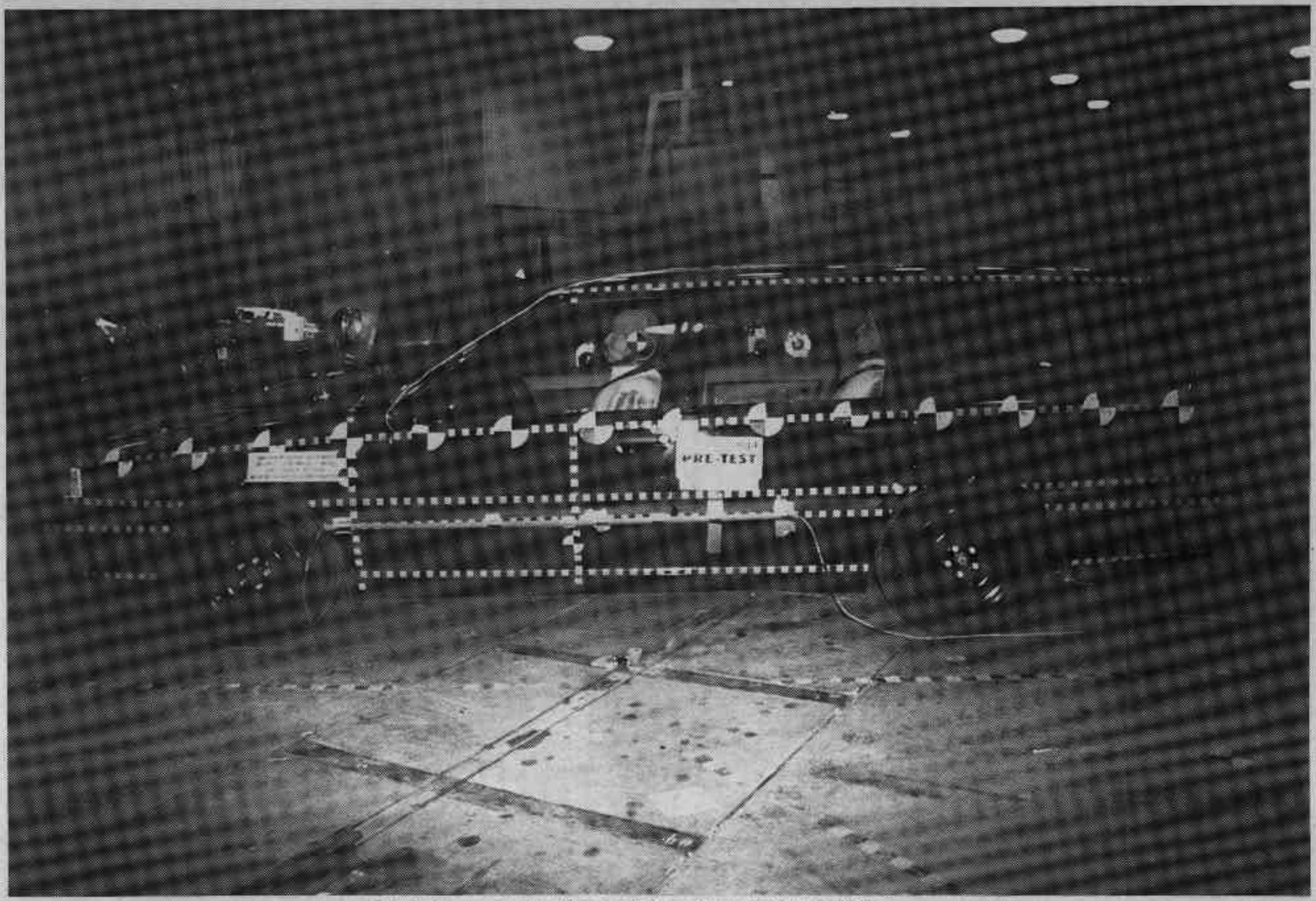


Photo No. A-5 - Pre-Test Left Side View of Test Vehicle

Photo No. A-6 - Post-Test Left Side View of Test Vehicle

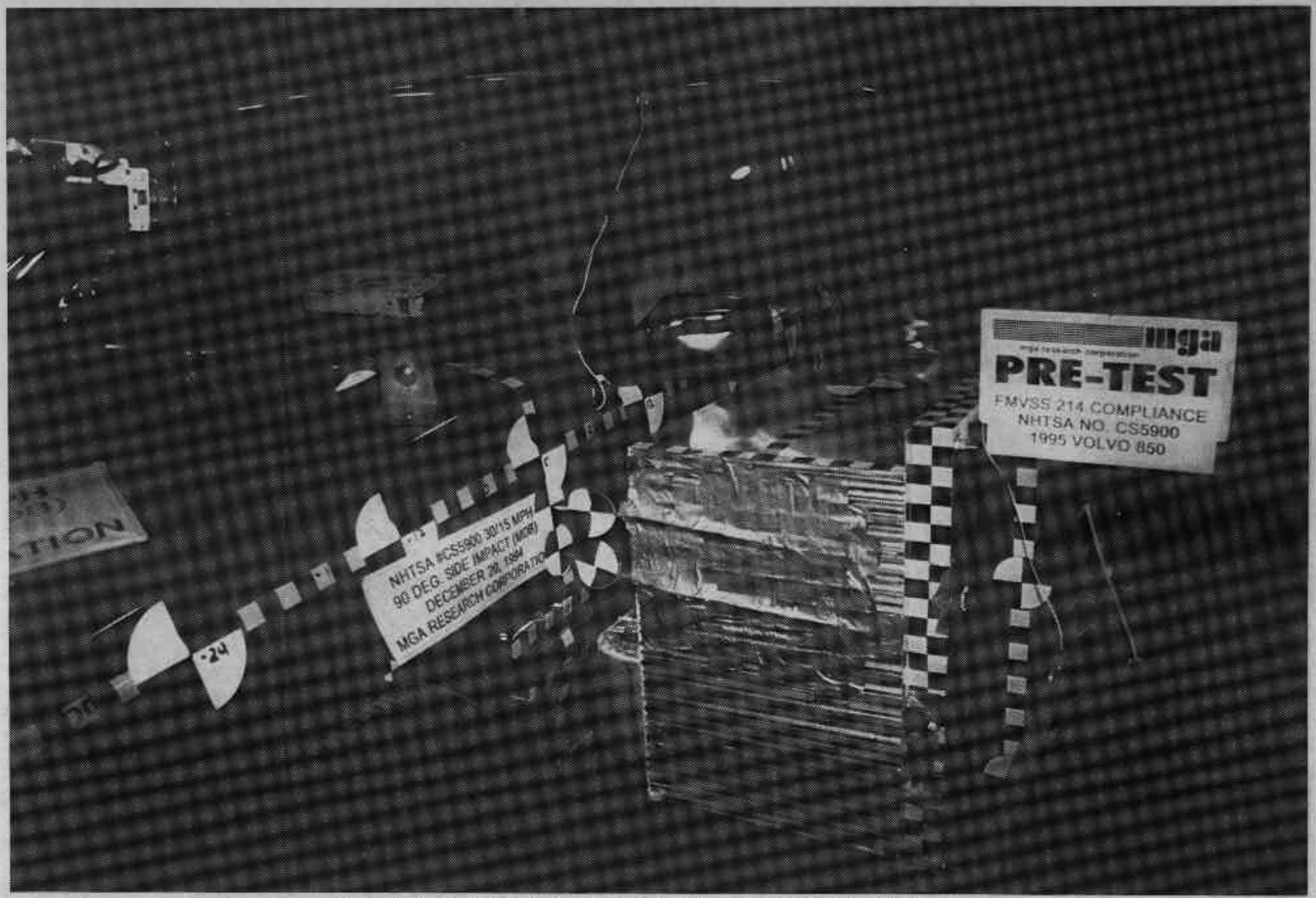


Photo No. A-7 - Pre-Test MDB Positioned Against Vehicle (left side)

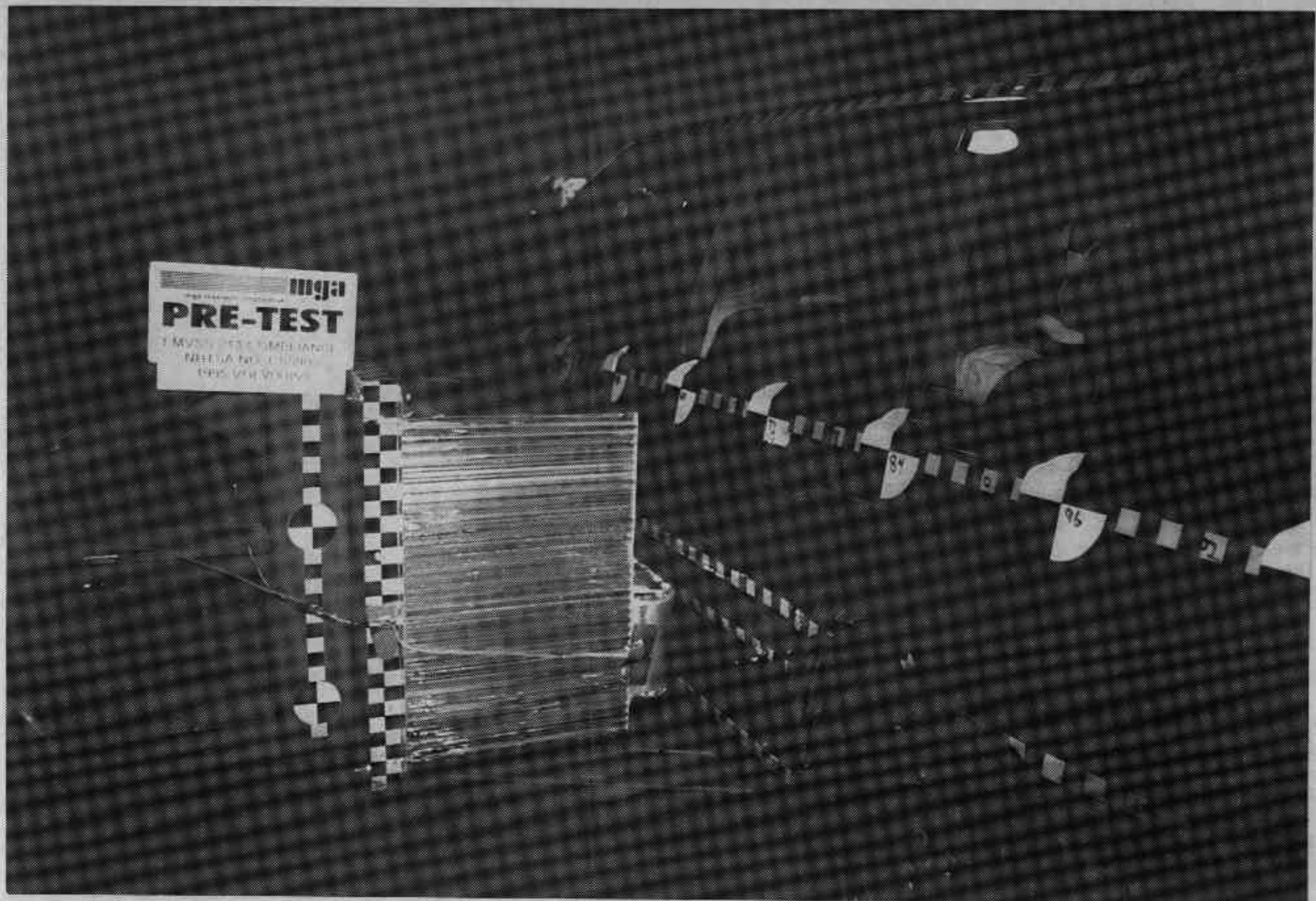


Photo No. A-8 - Pre-Test MDB Positioned Against Vehicle (right side)

Photo No. A-9 - Post-Test MDB Position Against Vehicle Overhead View

Photo No. A-10 - Post-Test MDB Position Against Vehicle (left side)

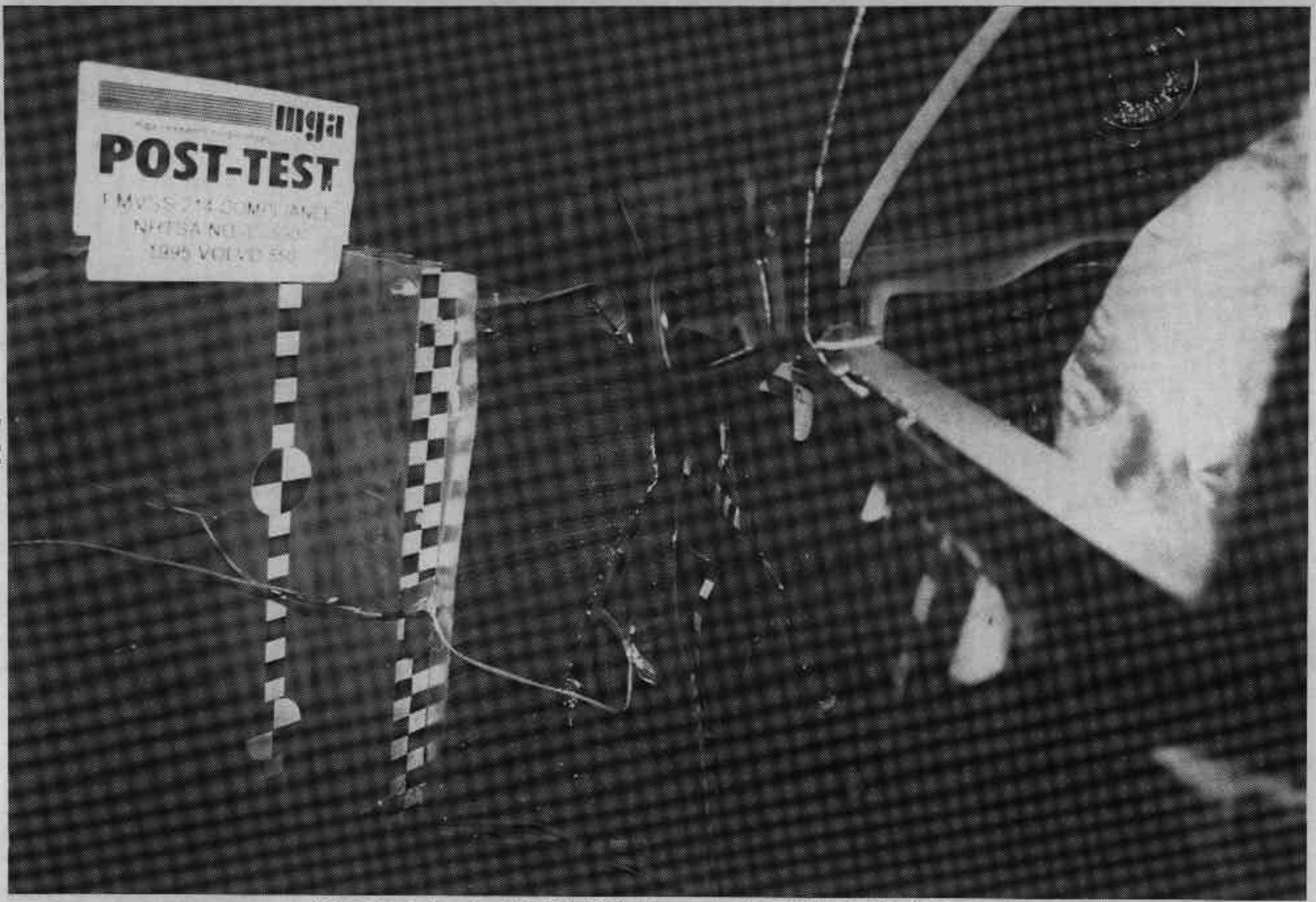


Photo No. A-11 - Post-Test MDB Positioned Against Vehicle (right side)

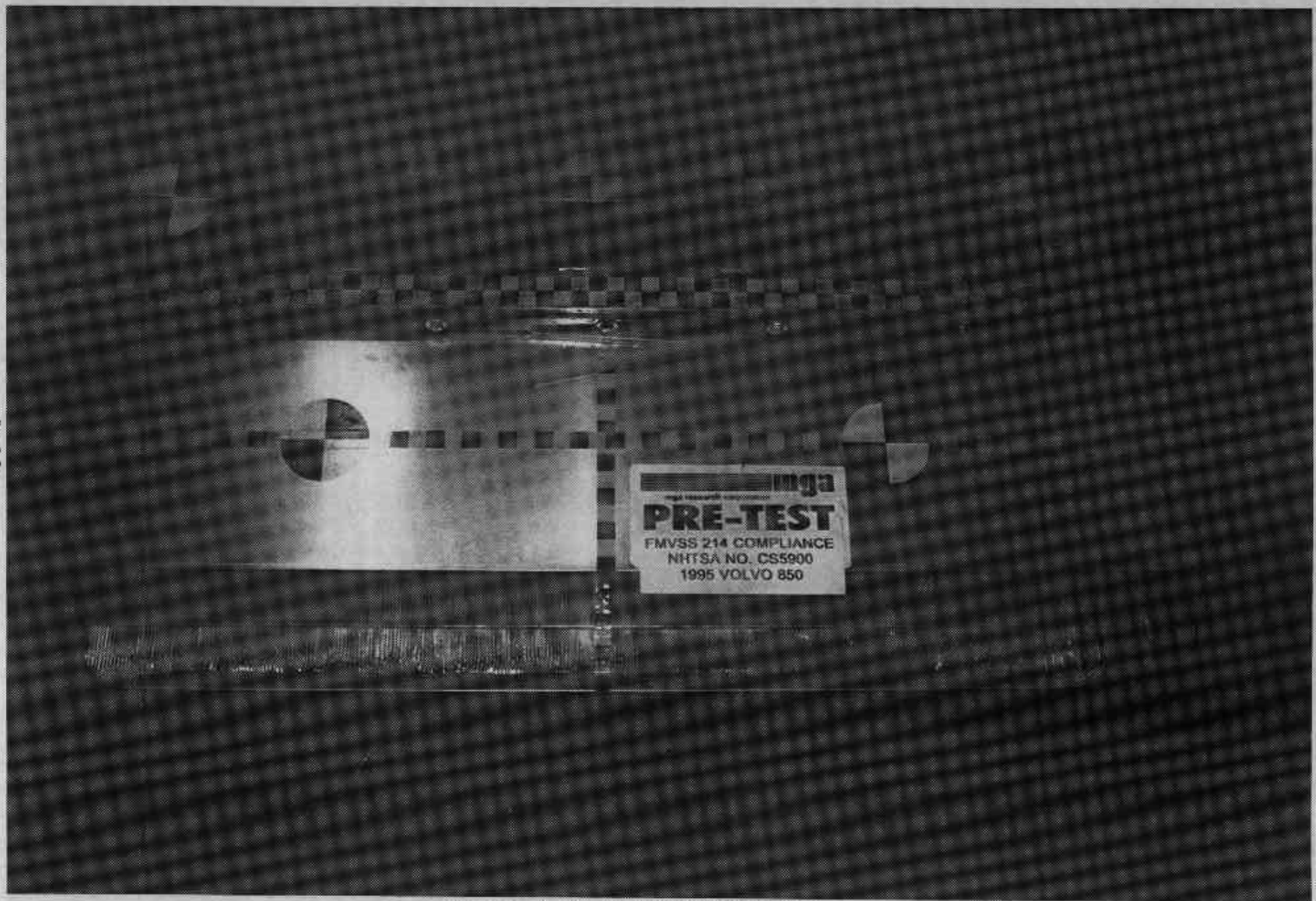


Photo No. A-12 - Pre-Test MDB Top View

Photo No. A-13 - Post-Test MDB Top View

Photo No. A-14 - Pre-Test MDB Front View

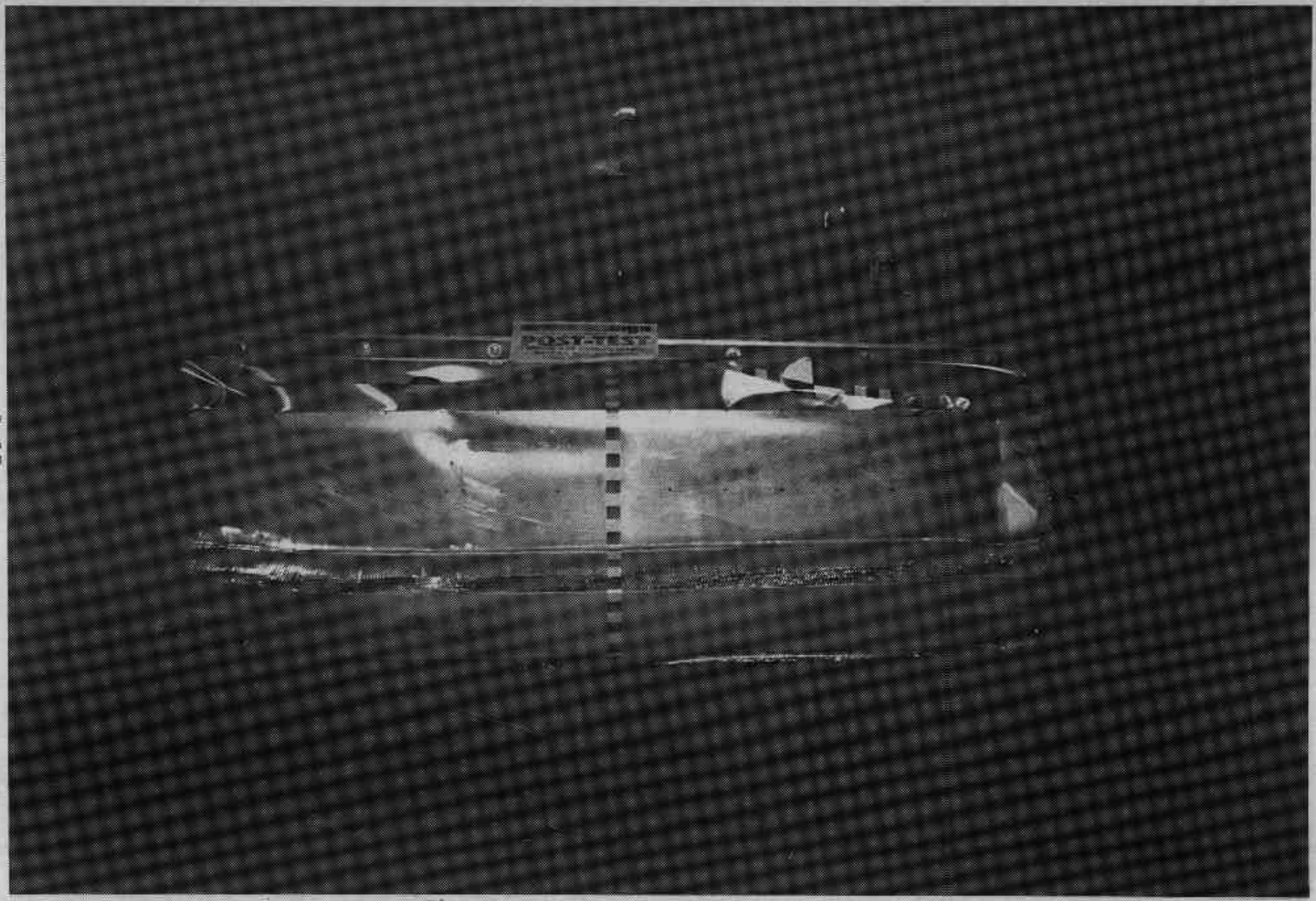


Photo No. A-15 - Post-Test MDB Front View

Photo No. A-16 - Pre-Test MDB Left Side View

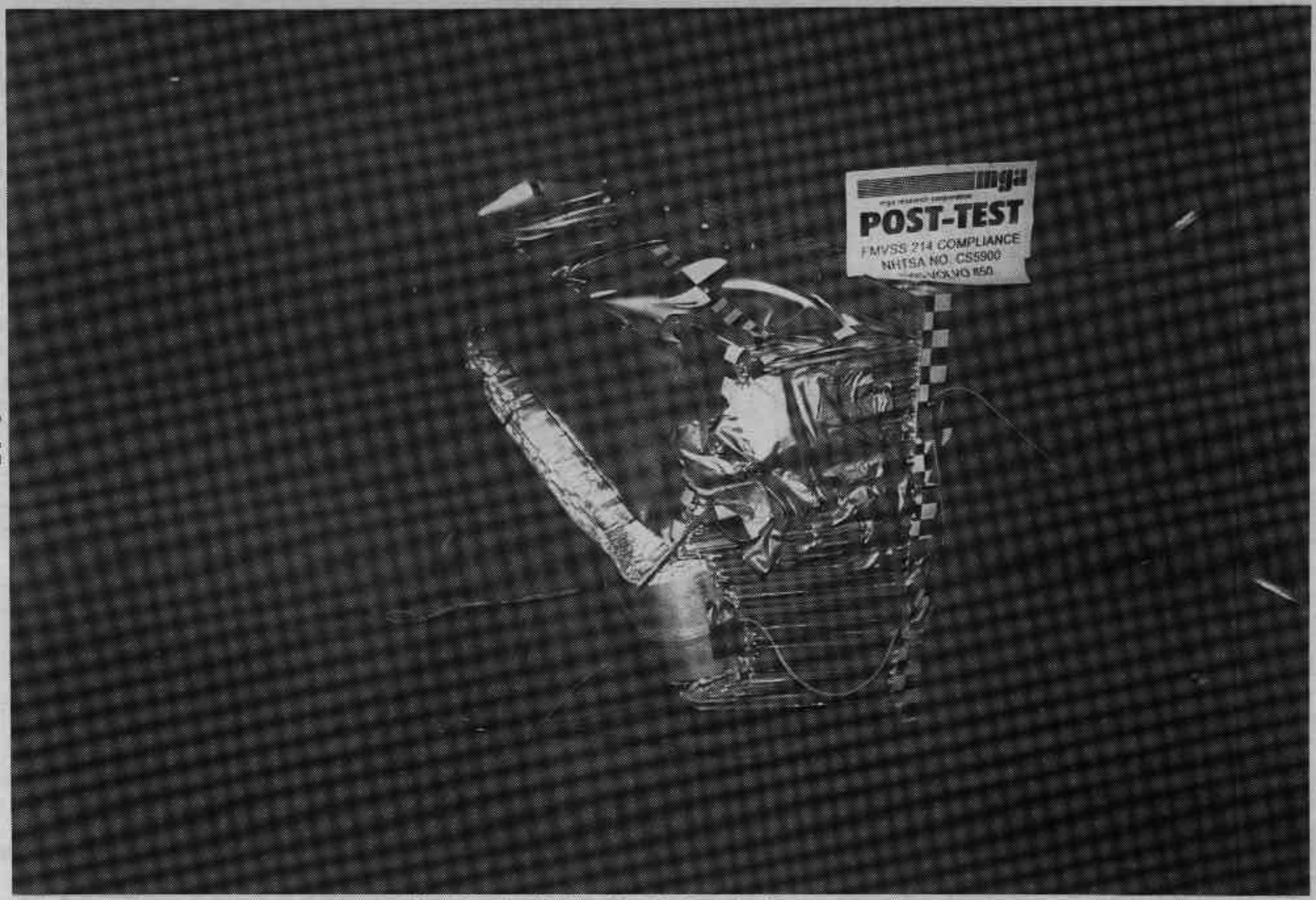


Photo No. A-17 - Post-Test MDB Left Side View

Photo No. A-18 - Pre-Test MDB Right Side View

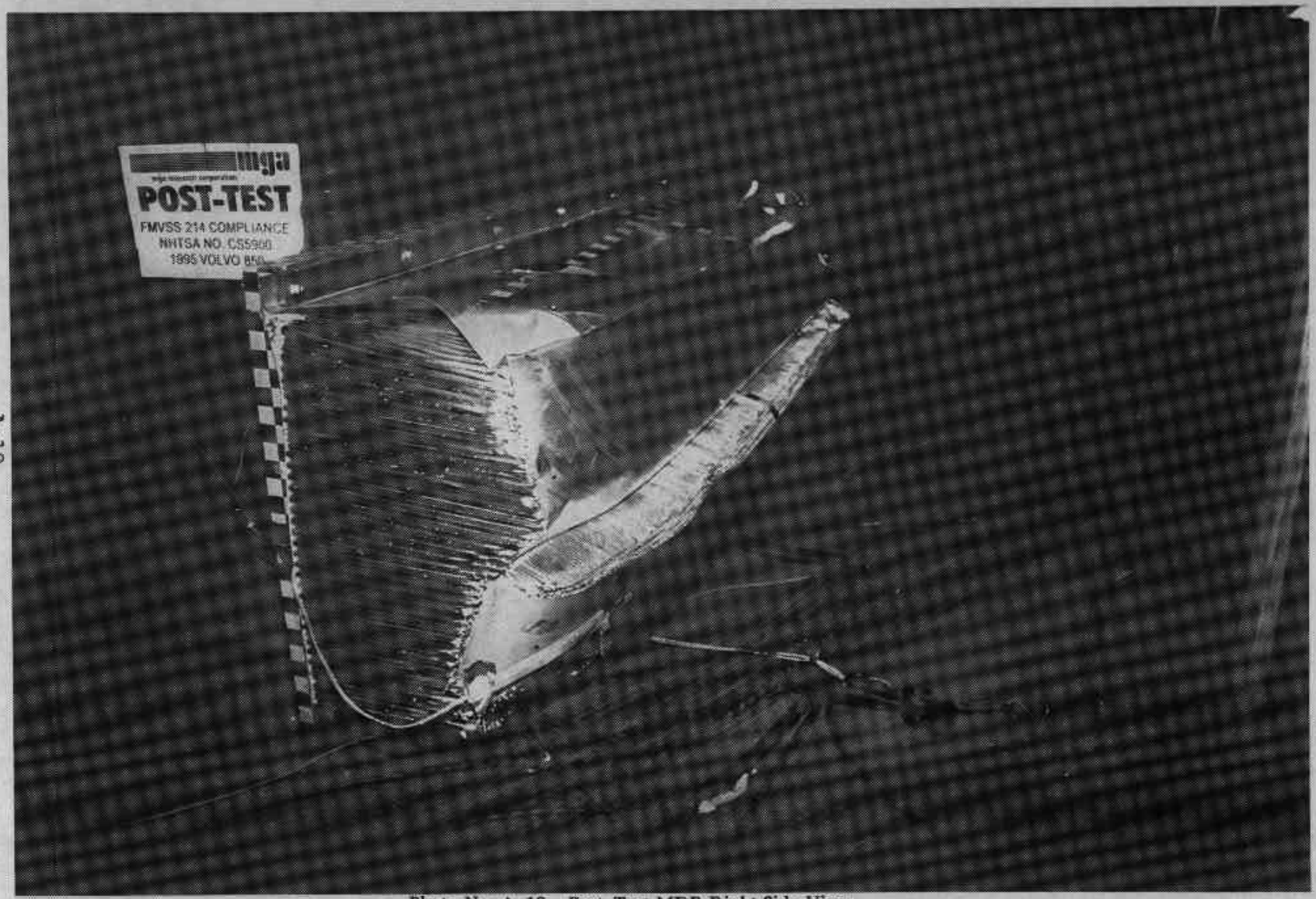


Photo No. A-19 - Post-Test MDB Right Side View

Photo No. A-20 - Pre-Test Driver Dummy Right Side View

Photo No. A-21 - Post-Test Driver Dummy Right Side View

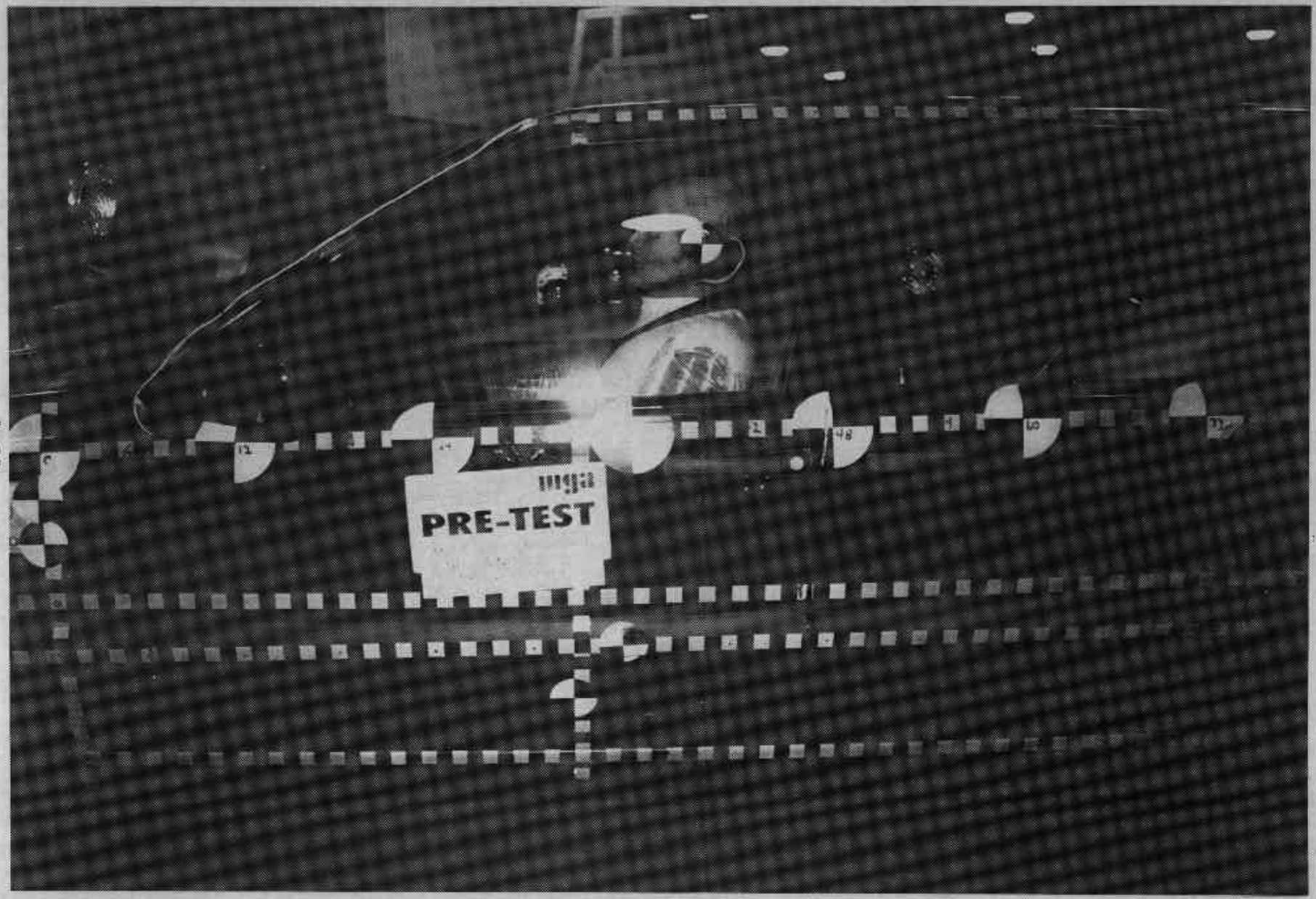


Photo No. A-22 - Pre-Test Driver Dummy Left Side View

A-23

Photo No. A-23 - Post-Test Driver Dummy Left Side View

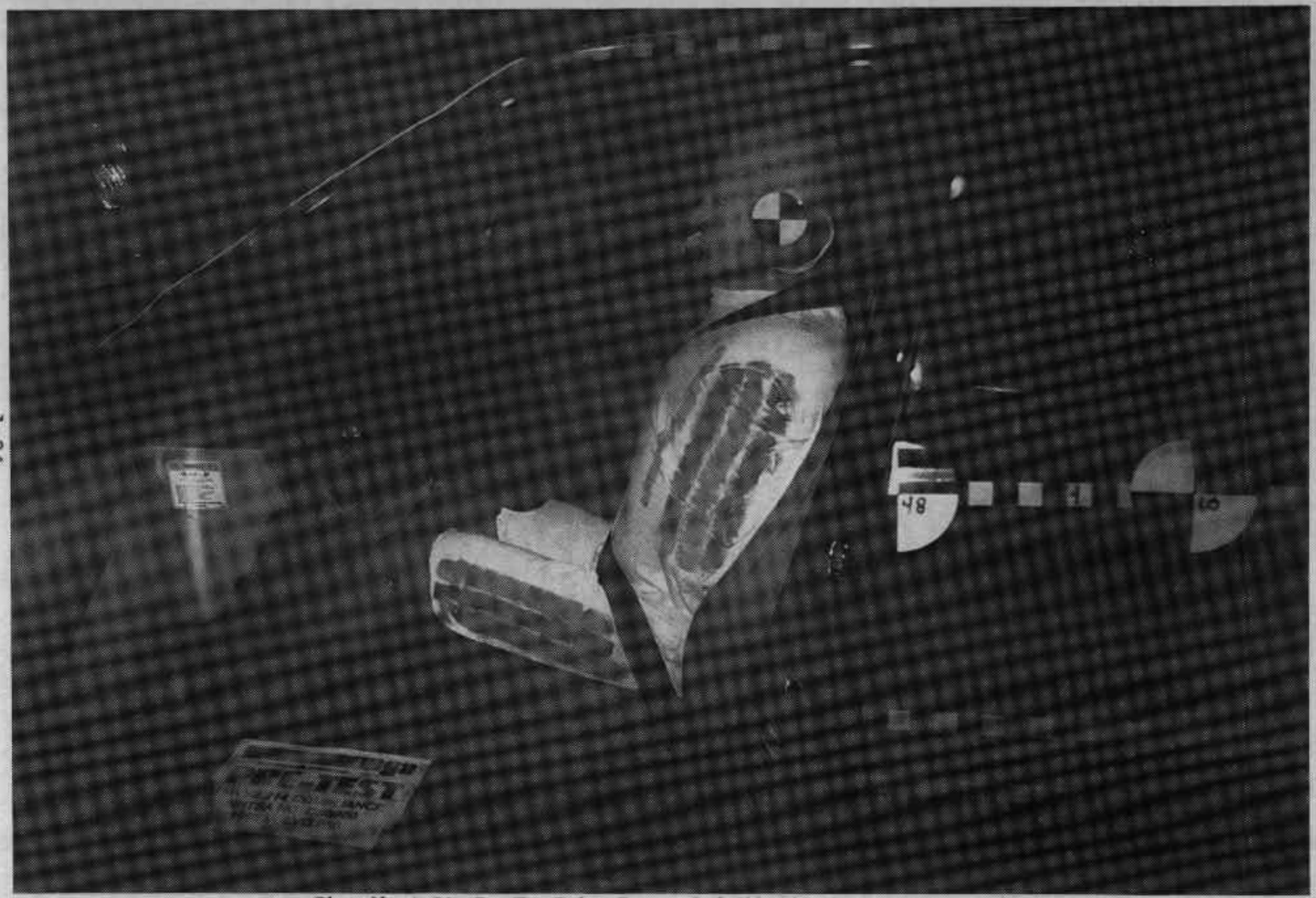


Photo No. A-24 - Pre-Test Driver Dummy Left Side View (Door Open)

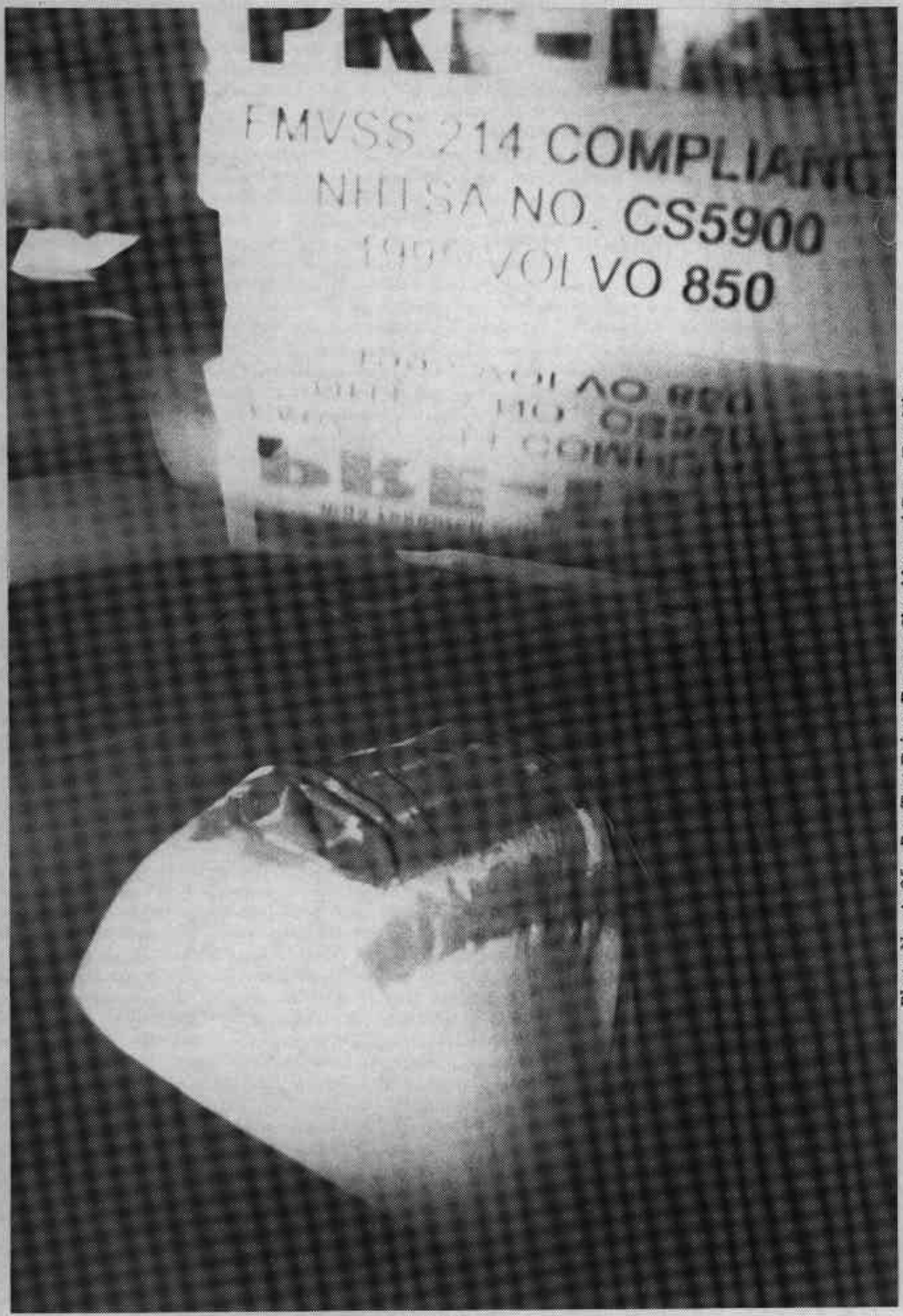


Photo No. A-25 - Pre-Test Driver Dummy Shoulder and Door Top View

Photo No. A-26 - Post-Test Driver Dummy Shoulder and Door Top View

Photo No. A-27 - Post-Test Driver Dummy Contact

Photo No. A-28 - Pre-Test Passenger Dummy Right Side View

Photo No. A-29 - Post-Test Passenger Dummy Right Side View

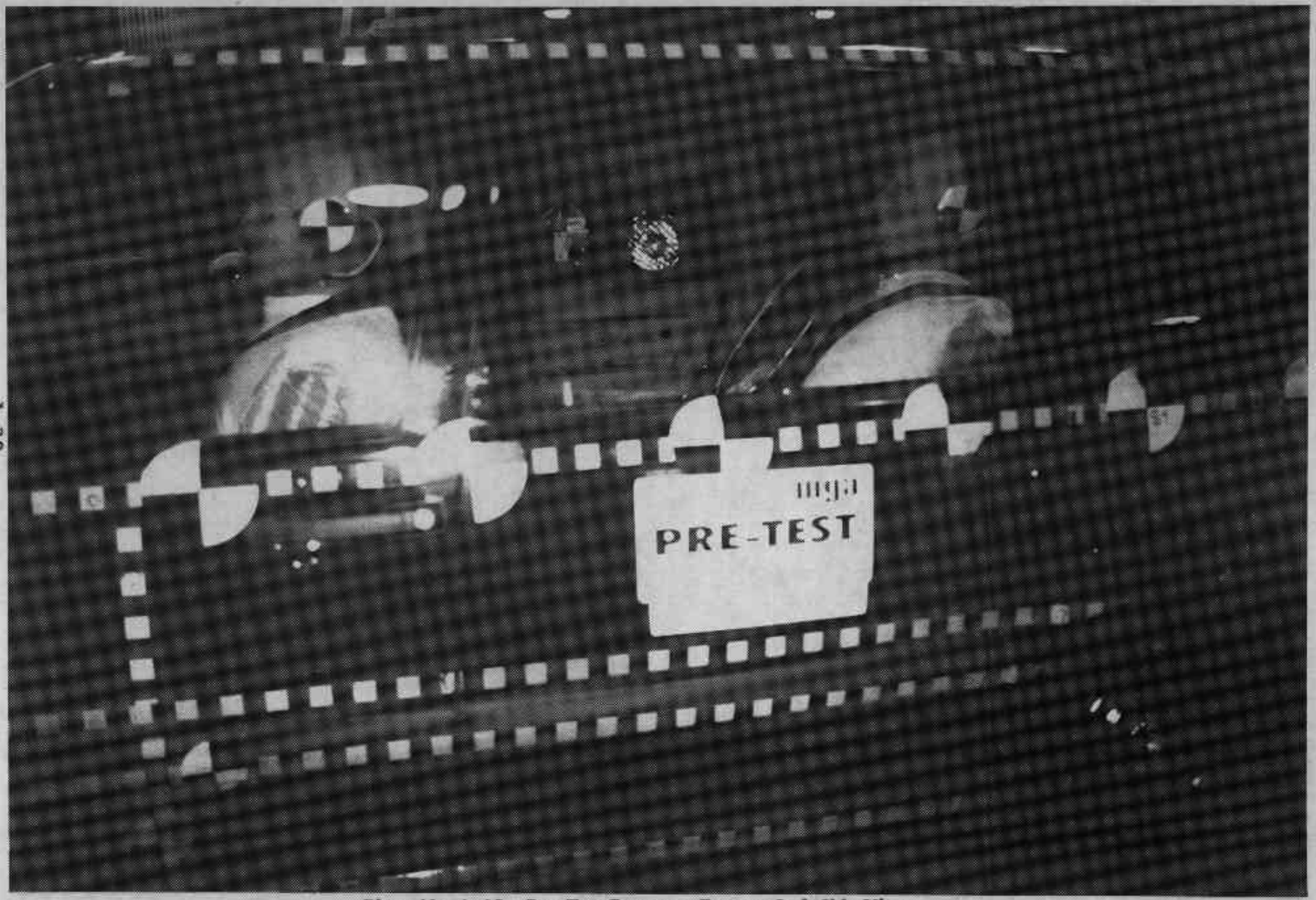


Photo No. A-30 - Pre-Test Passenger Dummy Left Side View

A-31

Photo No. A-31 - Post-Test Passenger Dummy Left Side View

Photo No. A-32 - Pre-Test Passenger Dummy Left Side View (Door Open)

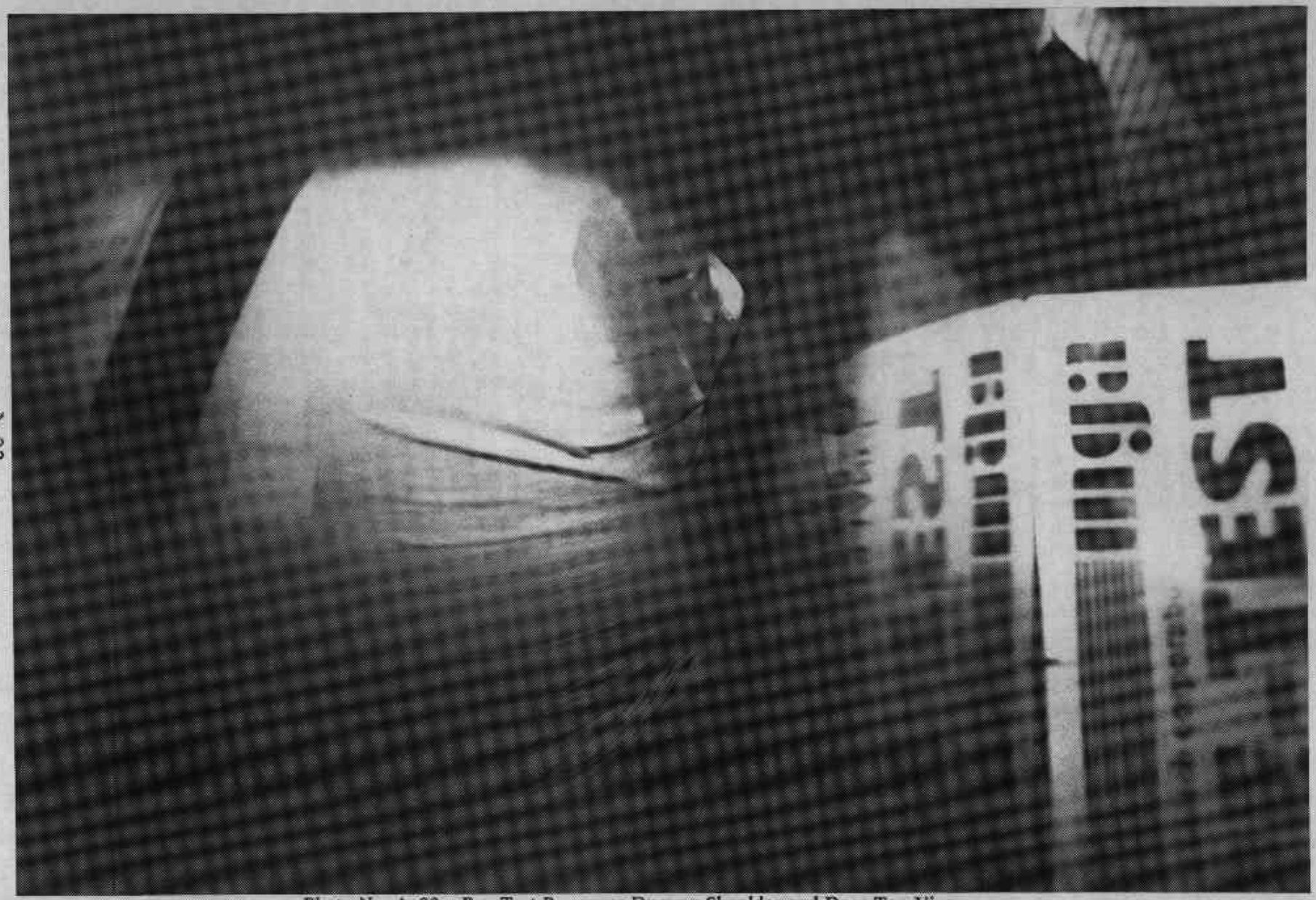


Photo No. A-33 - Pre-Test Passenger Dummy Shoulder and Door Top View

Photo No. A-34 - Post-Test Passenger Dummy Shoulder and Door Top View

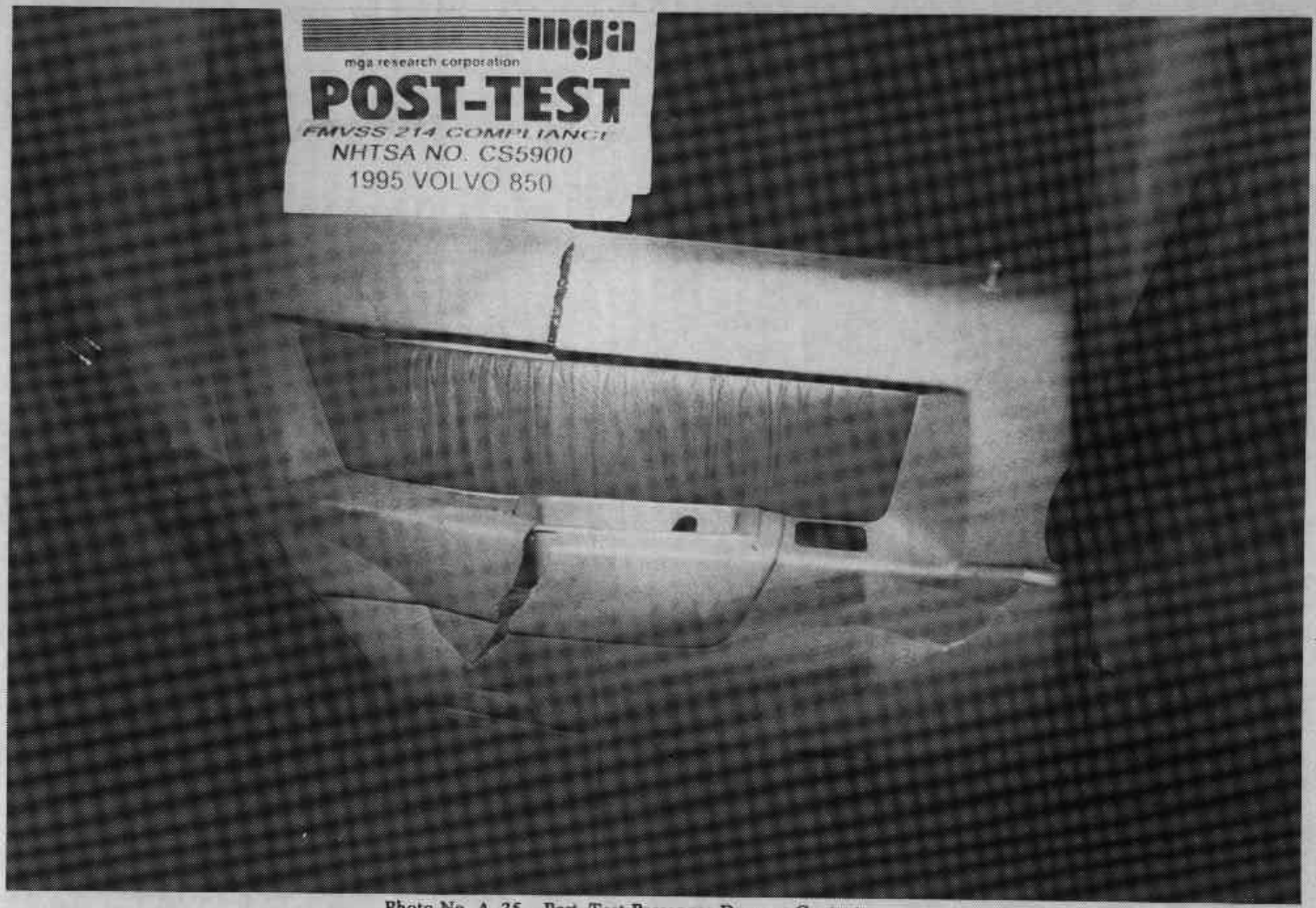


Photo No. A-35 - Post-Test Passenger Dummy Contact

A-36

Photo No. A-36 - Left Front Impact Point on Vehicle

Photo No. A-37 - Left Rear Impact Point on Vehicle

Photo No. A-38 - Vehicle Certification Label

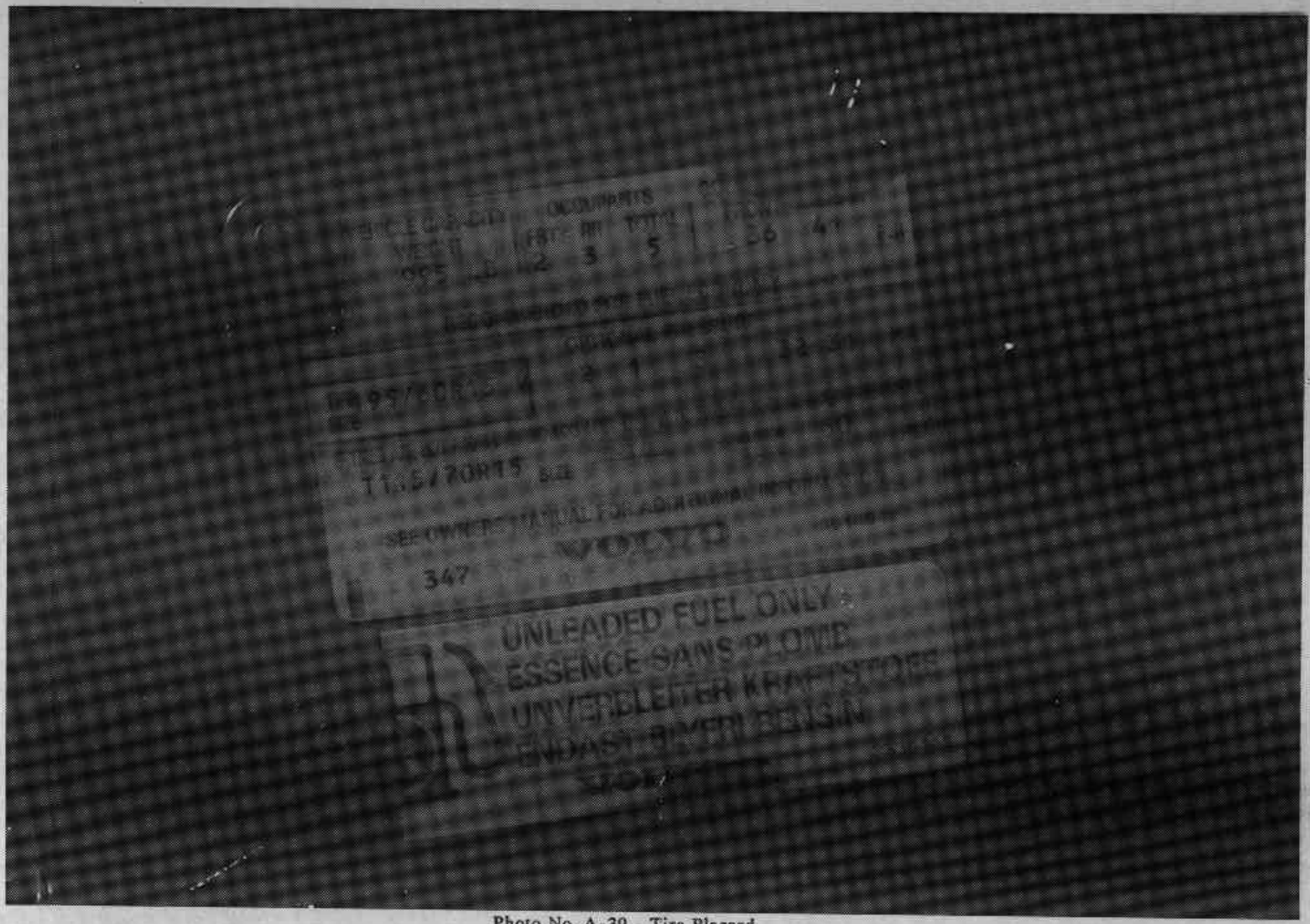


Photo No. A-39 - Tire Placard

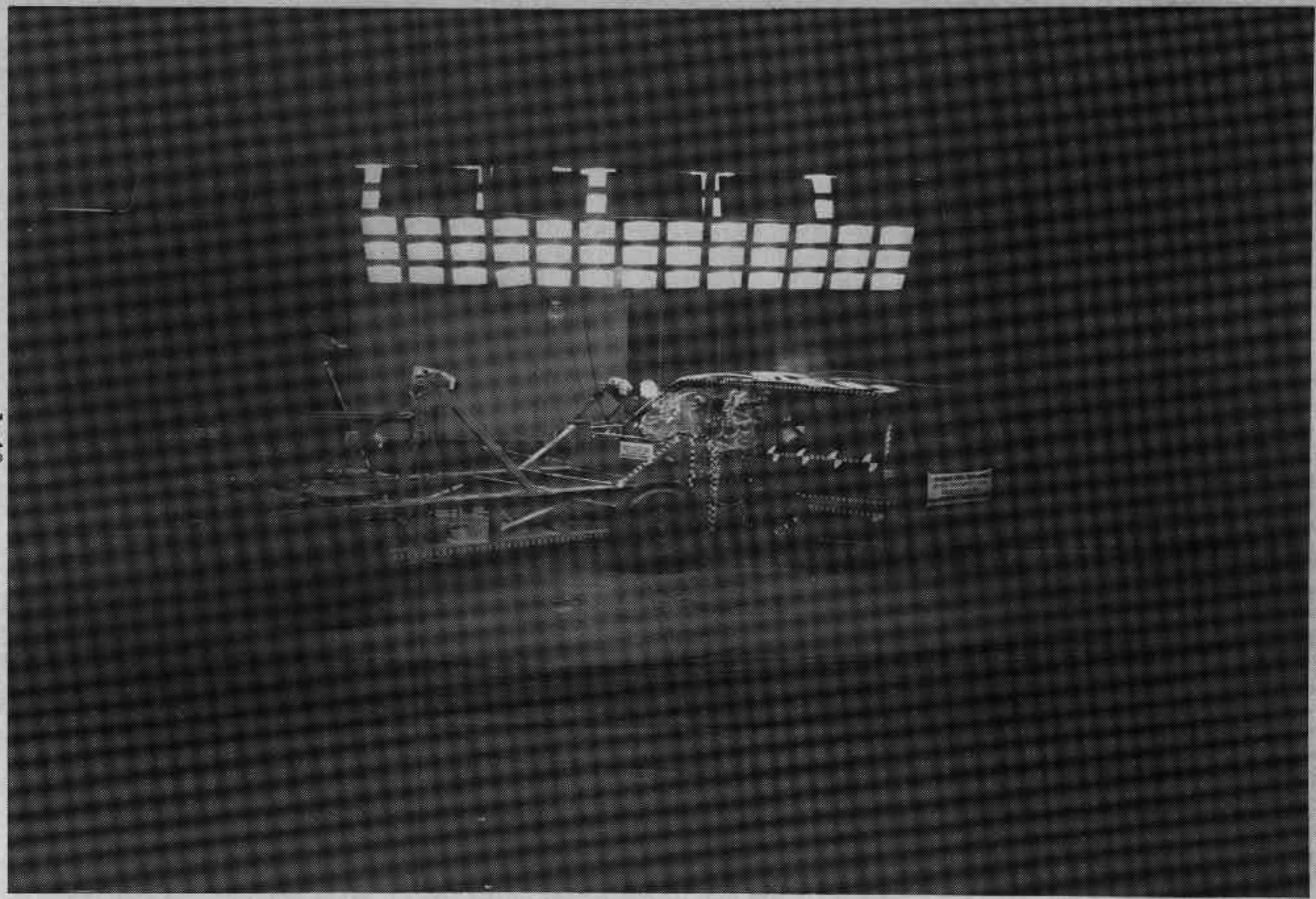


Photo No. A-40 - Impact

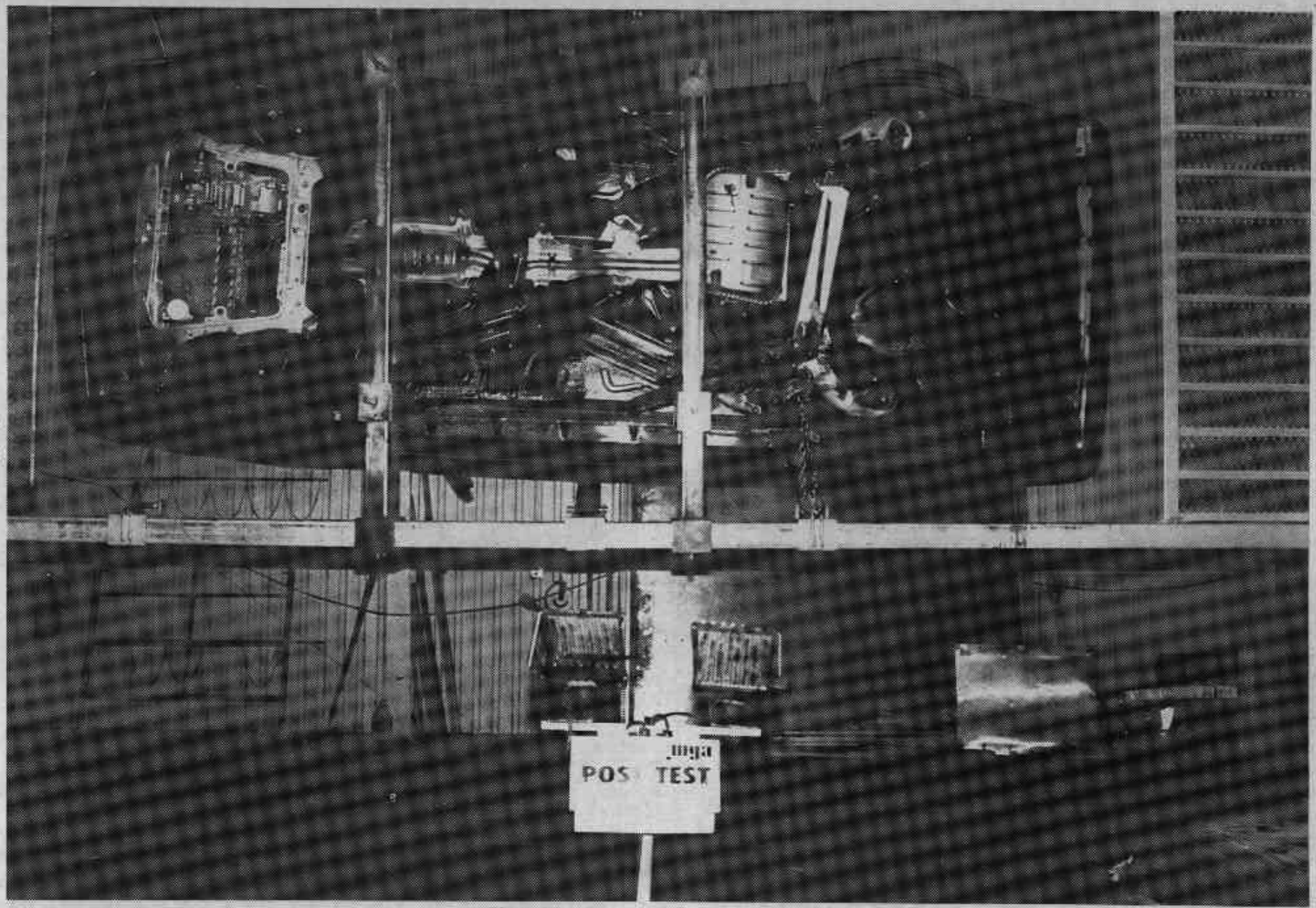


Photo No. A-41 - Rollover 90°

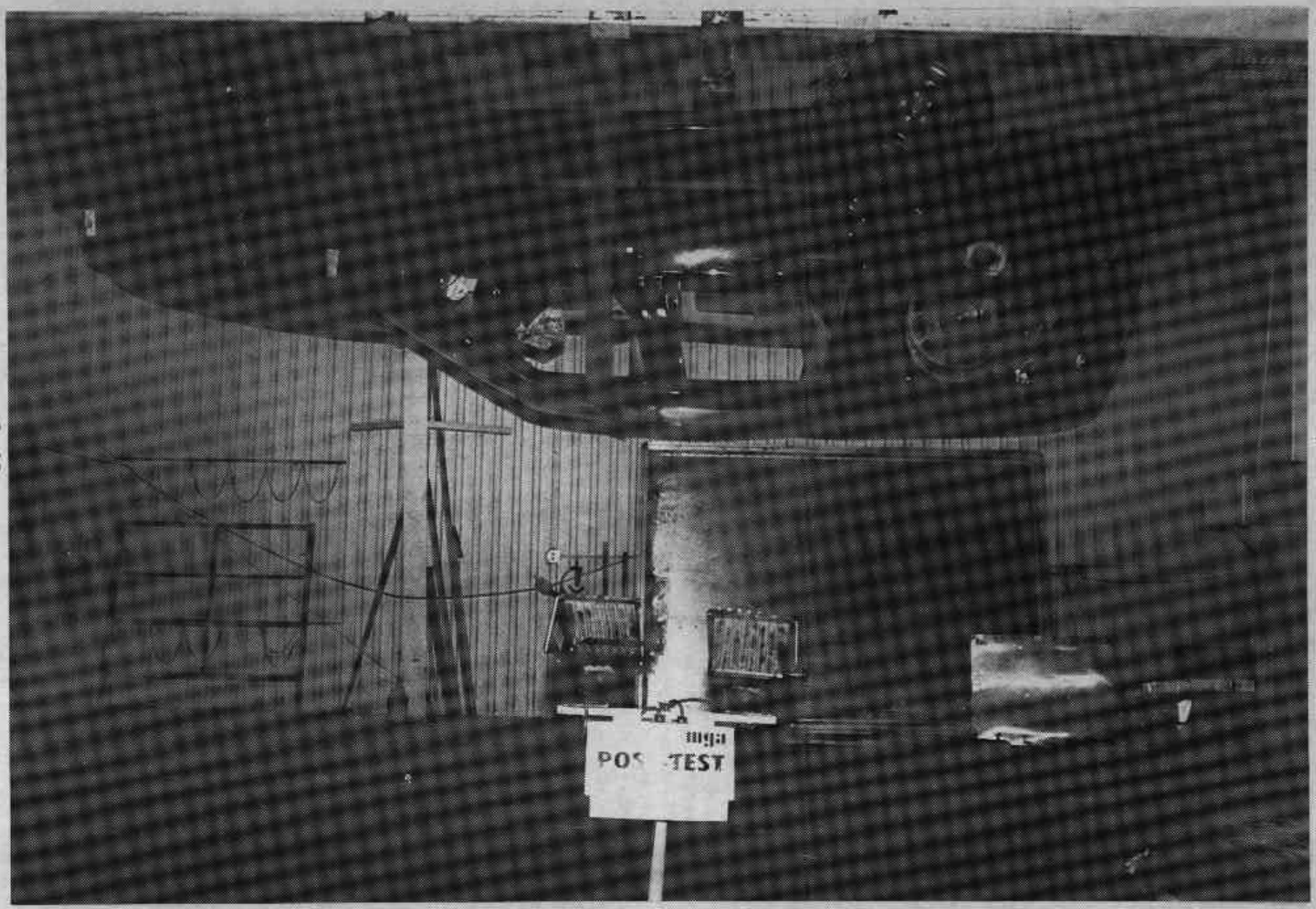
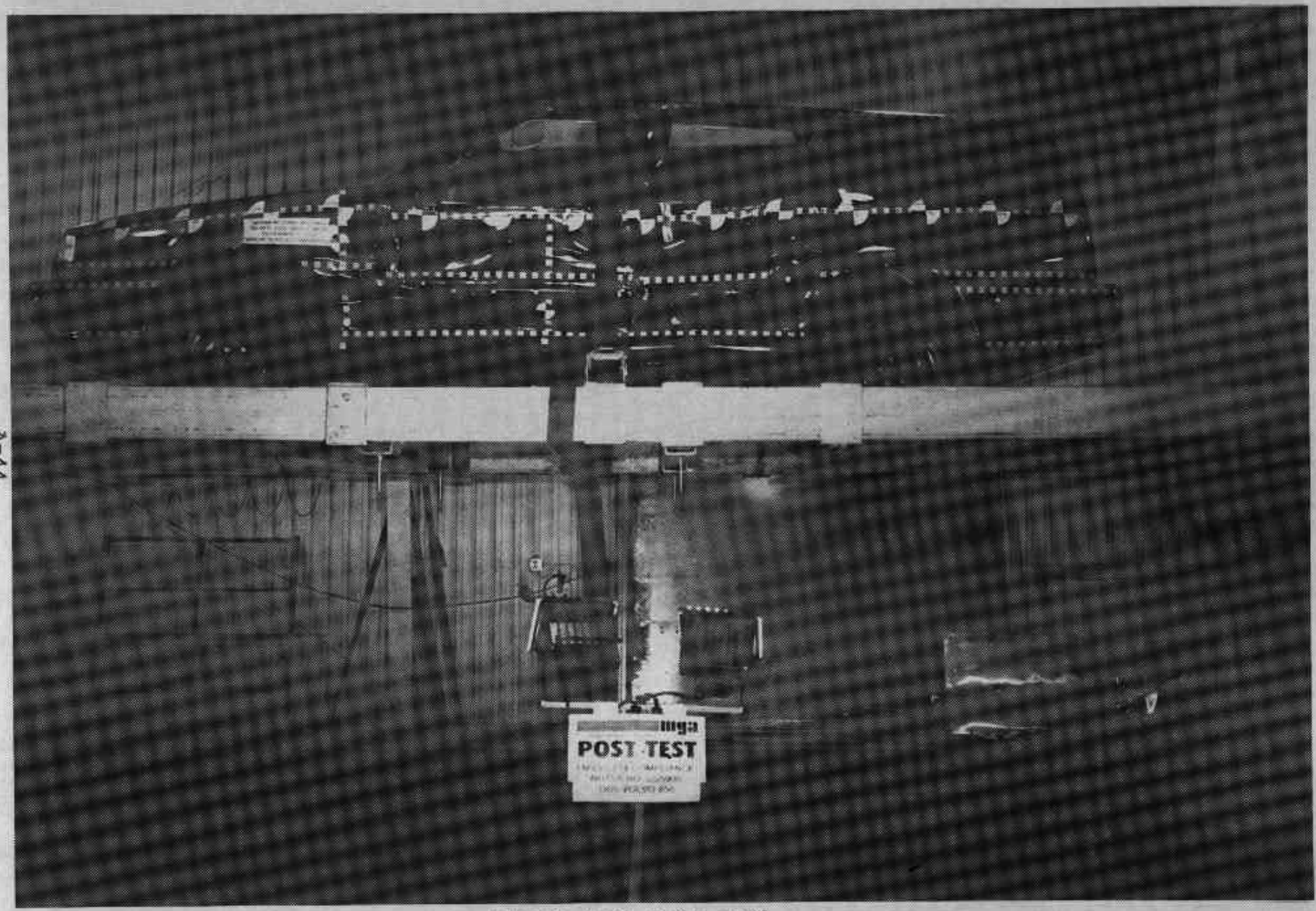


Photo No. A-42 - Rollover 180°

Photo No. A-43 - Rollover 270°



A-44

Photo No. A-44 - Rollover 360°

APPENDIX B - DATA PLOTS

Table of Data Plots

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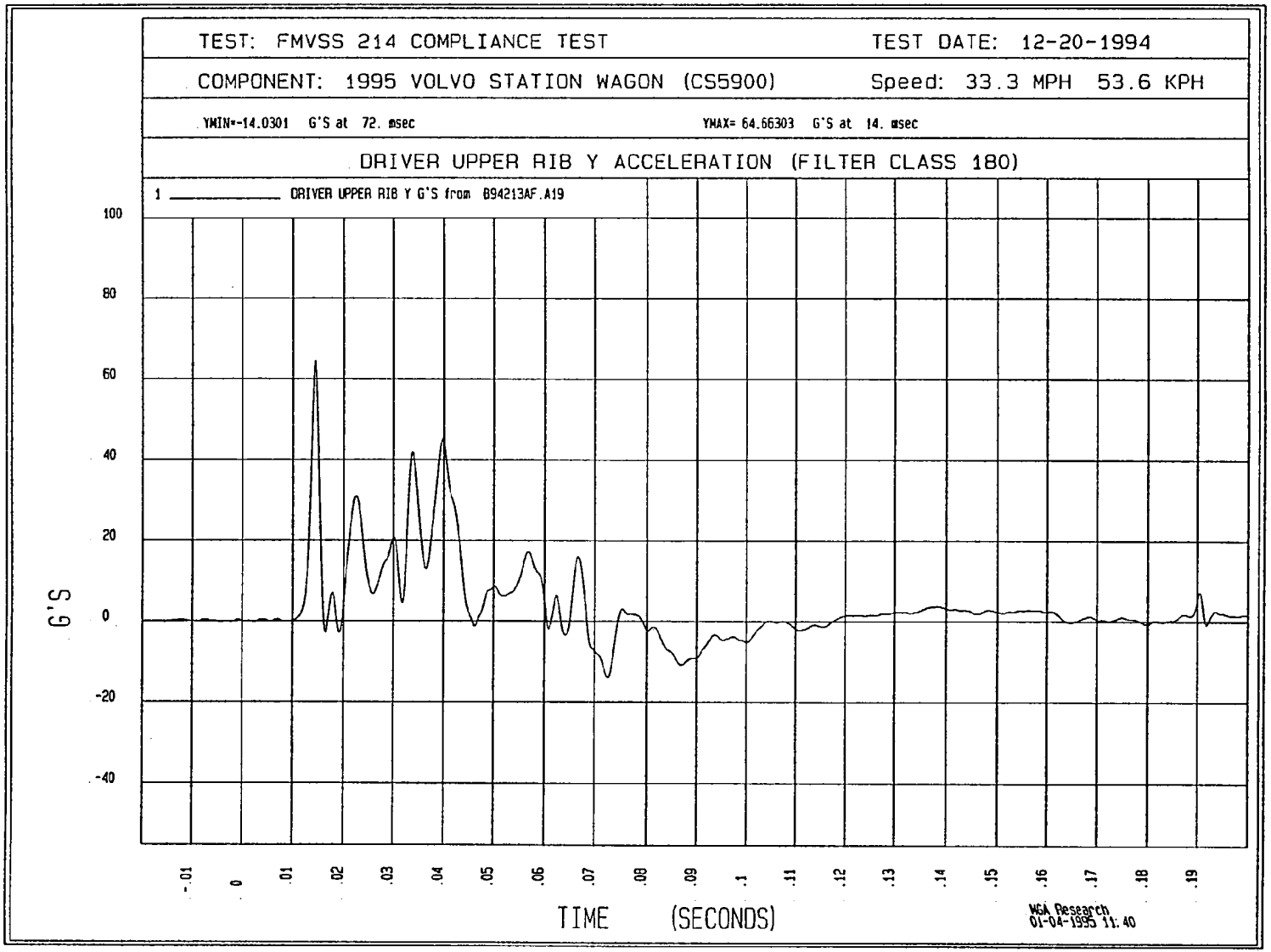
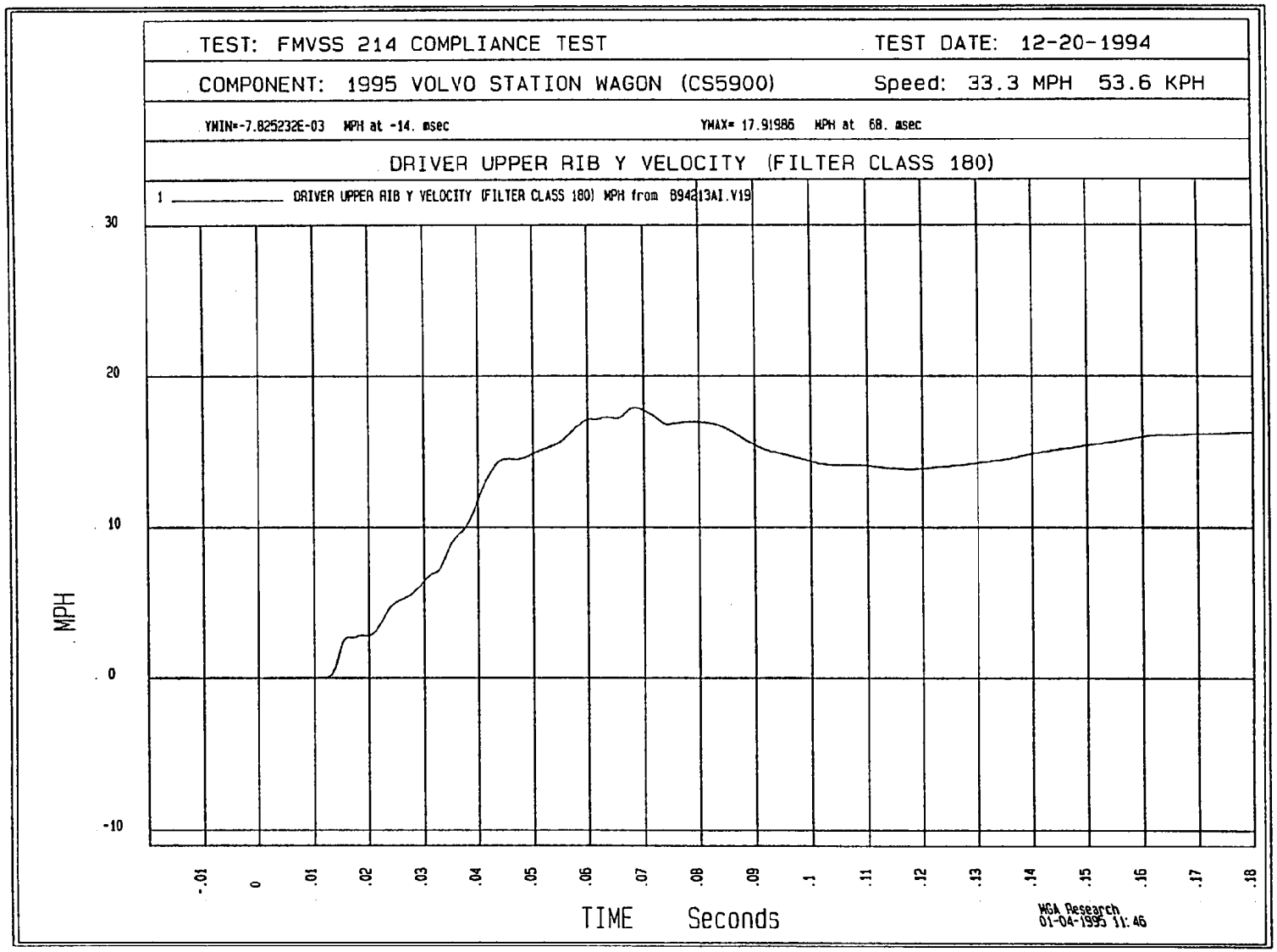


Figure B-1 - Driver Upper Rib Y Acceleration vs. Time



B-2

Figure B-2 - Driver Upper Rib Y Velocity vs. Time

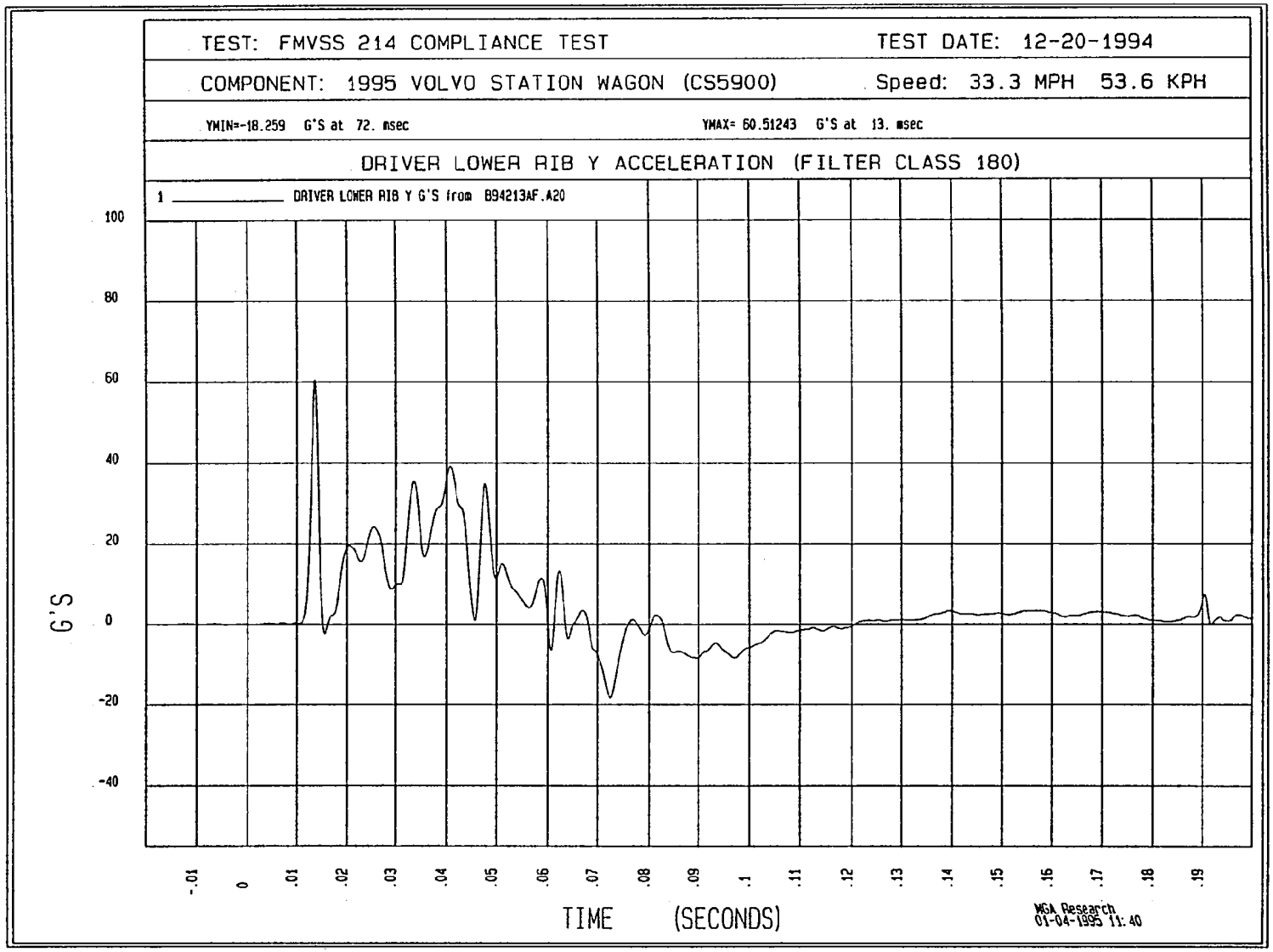


Figure B-3 - Driver Lower Rib Y Acceleration vs. Time

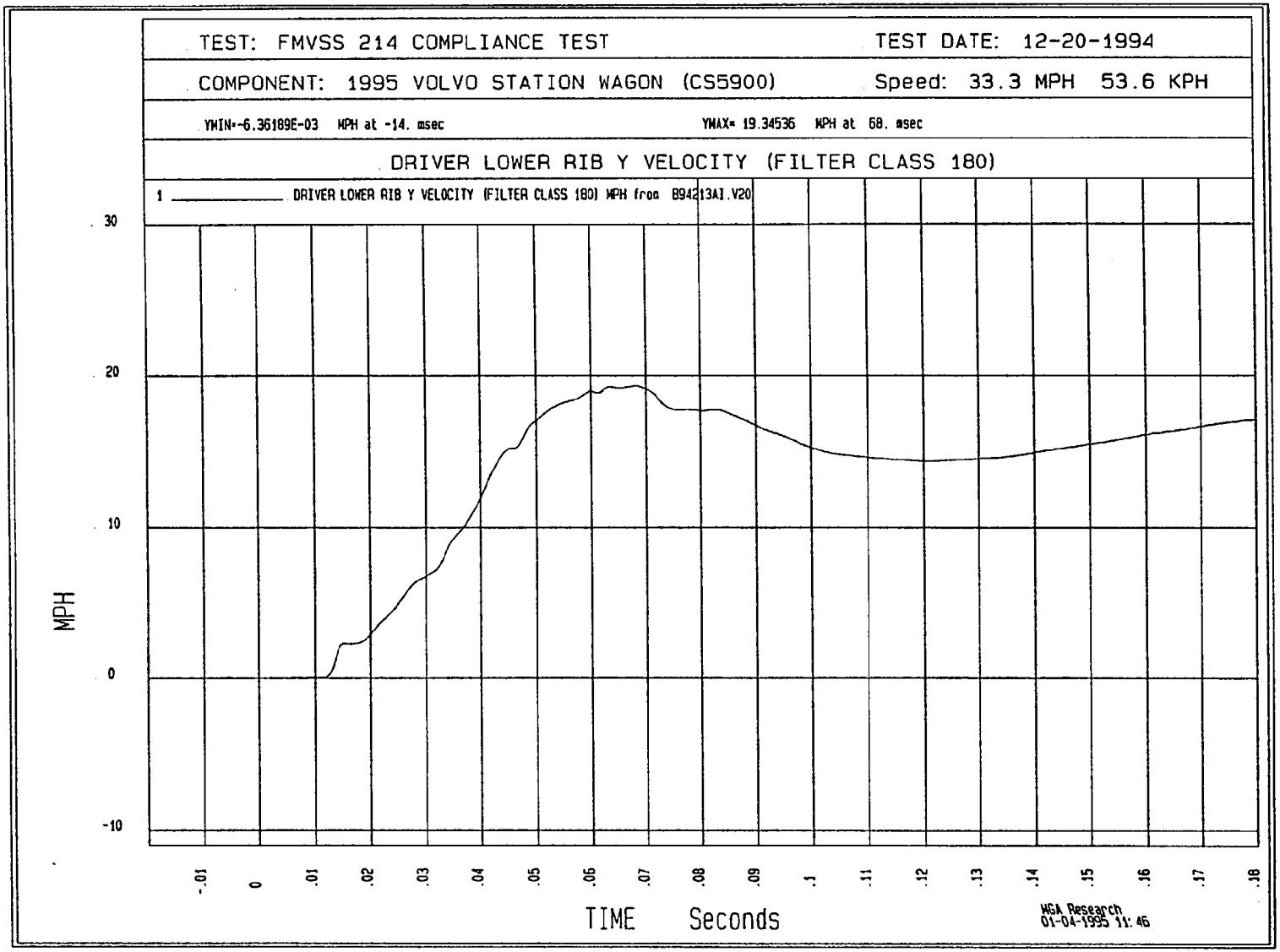


Figure B-4 - Driver Lower Rib Y Velocity vs. Time

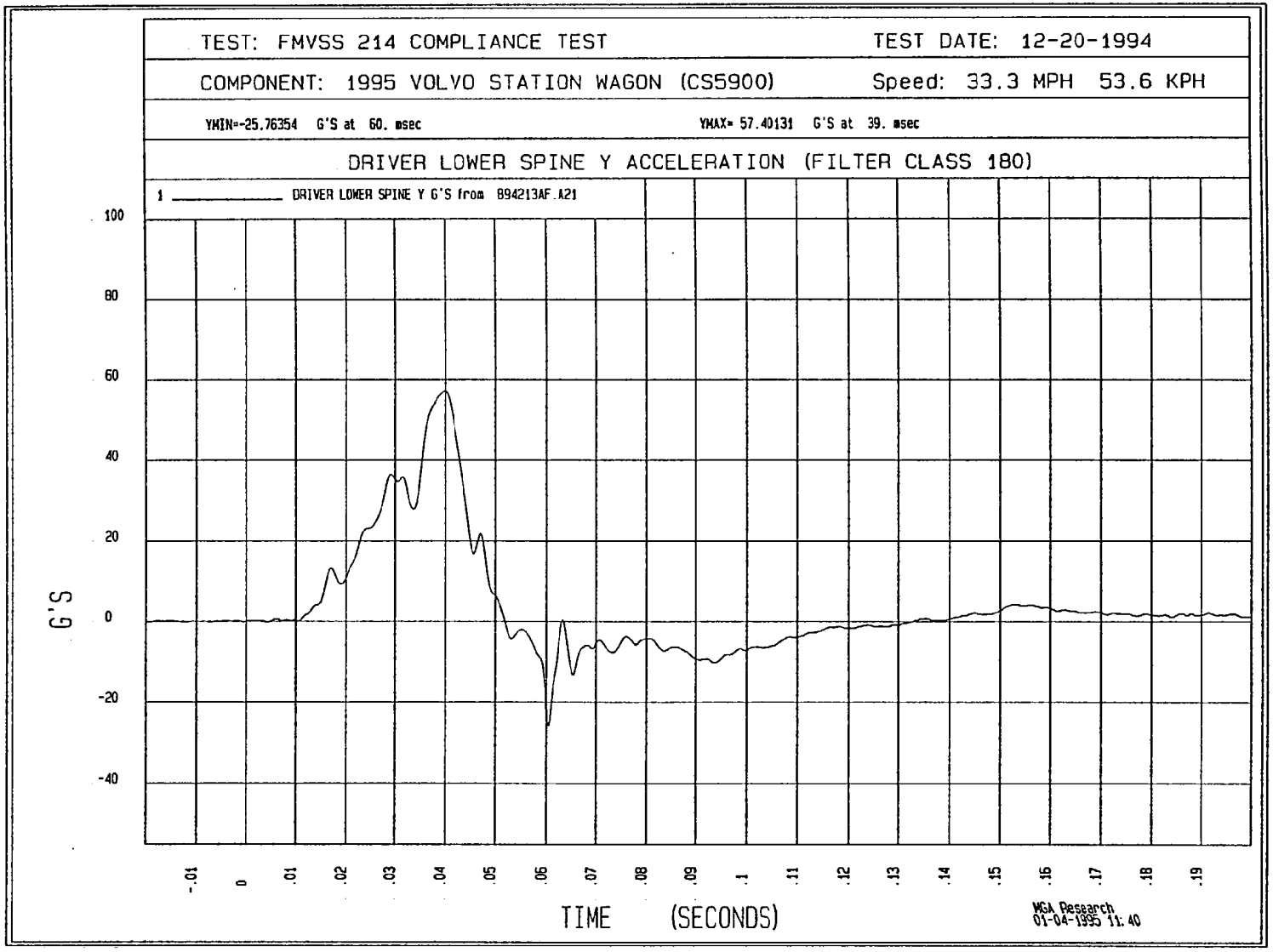


Figure B-5 - Driver Lower Spine Y Acceleration vs. Time

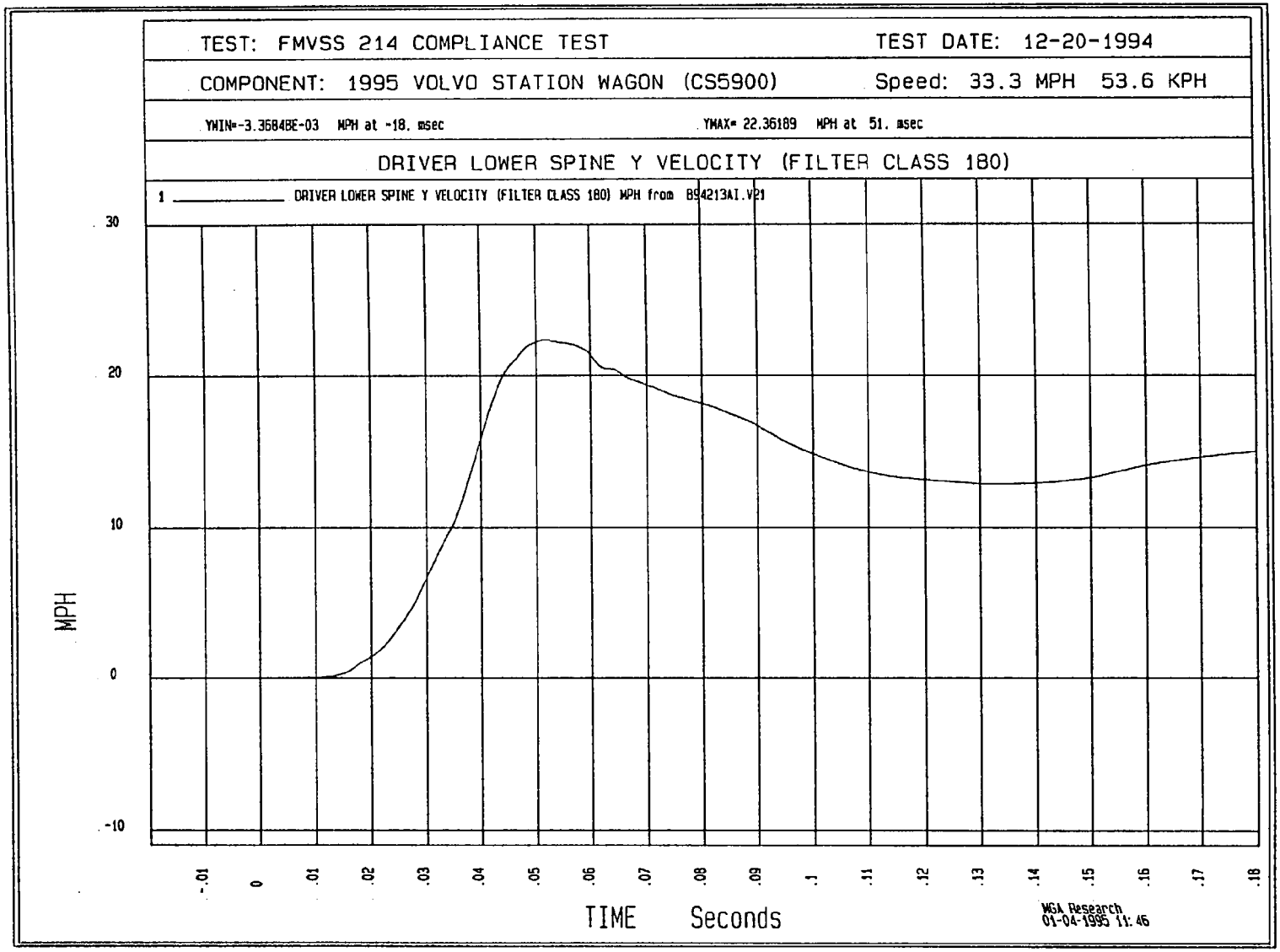


Figure B-6 - Driver Lower Spine Y Velocity vs. Time

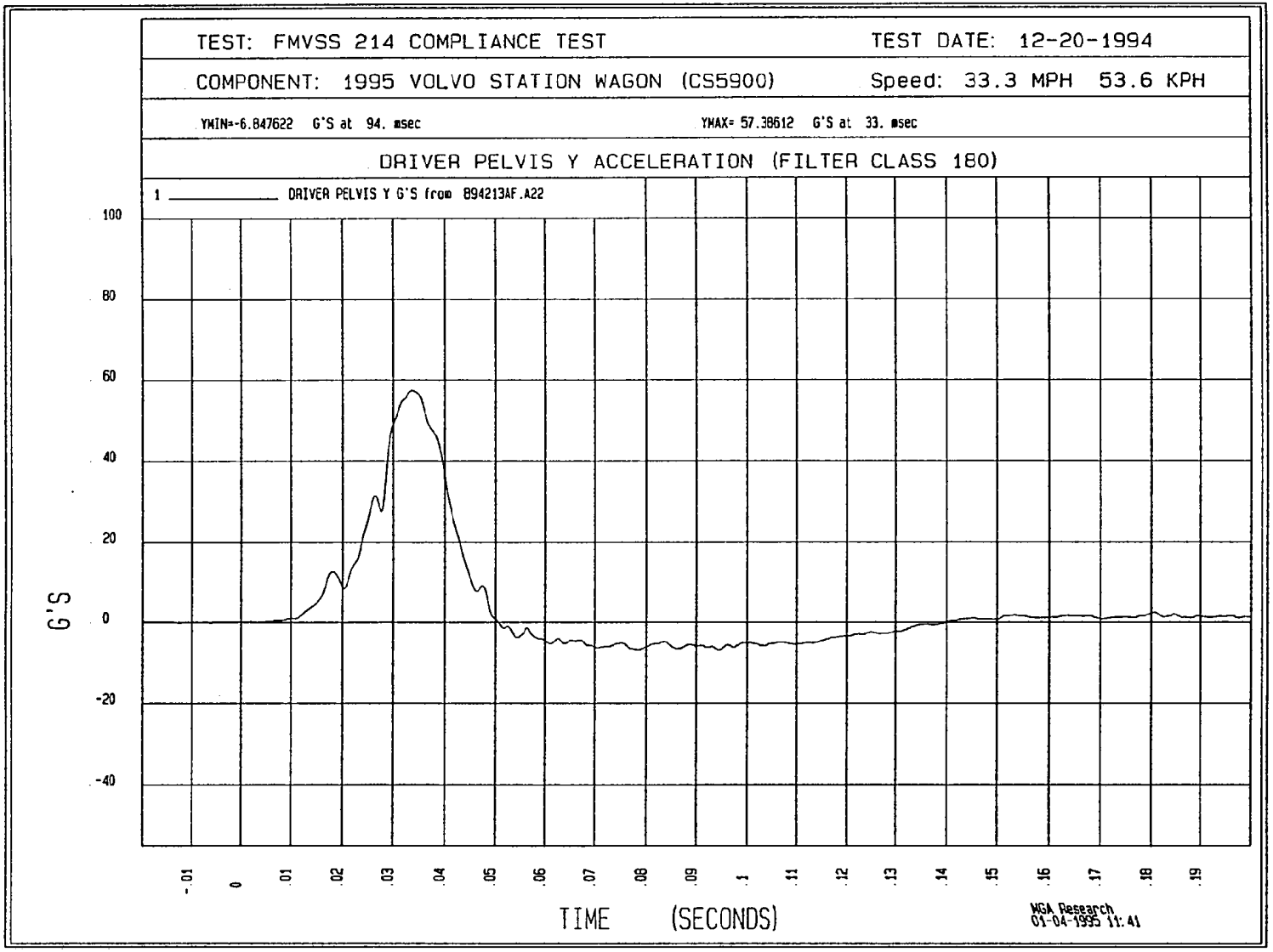


Figure B-7 - Driver Pelvis Y Acceleration vs. Time

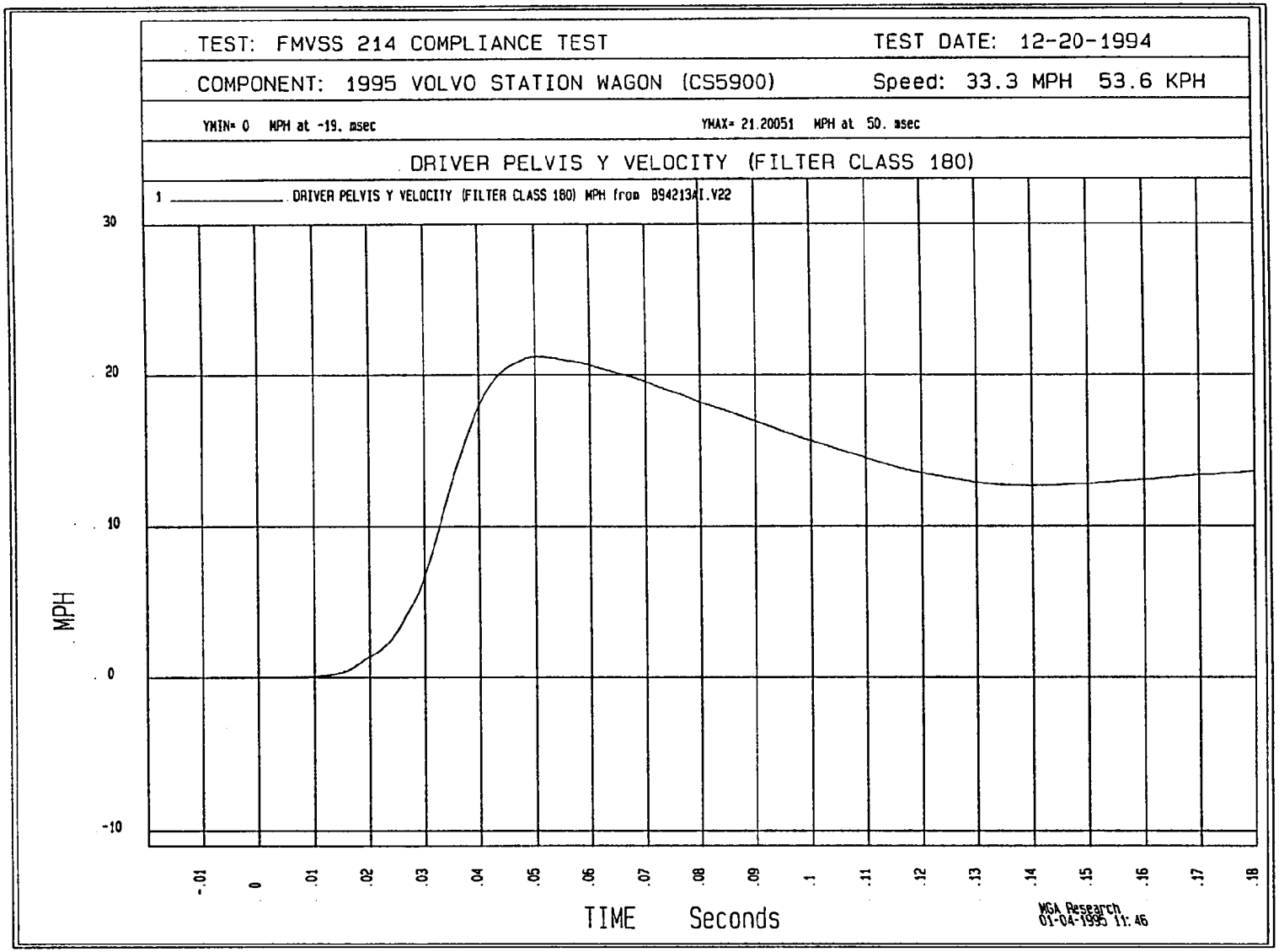


Figure B-8 - Driver Pelvis Y Velocity vs. Time

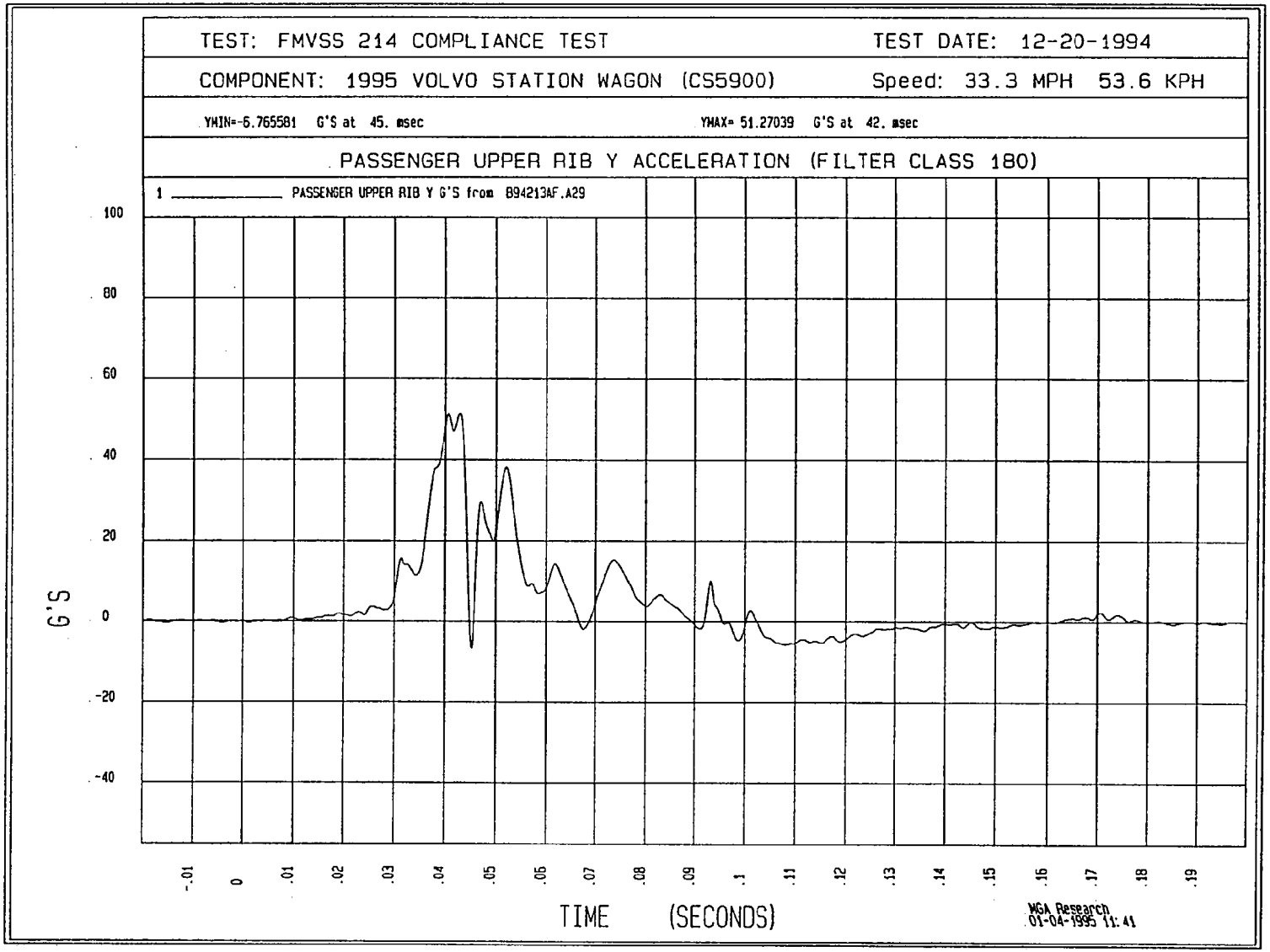


Figure B-9 - Passenger Upper Rib Y Acceleration vs. Time

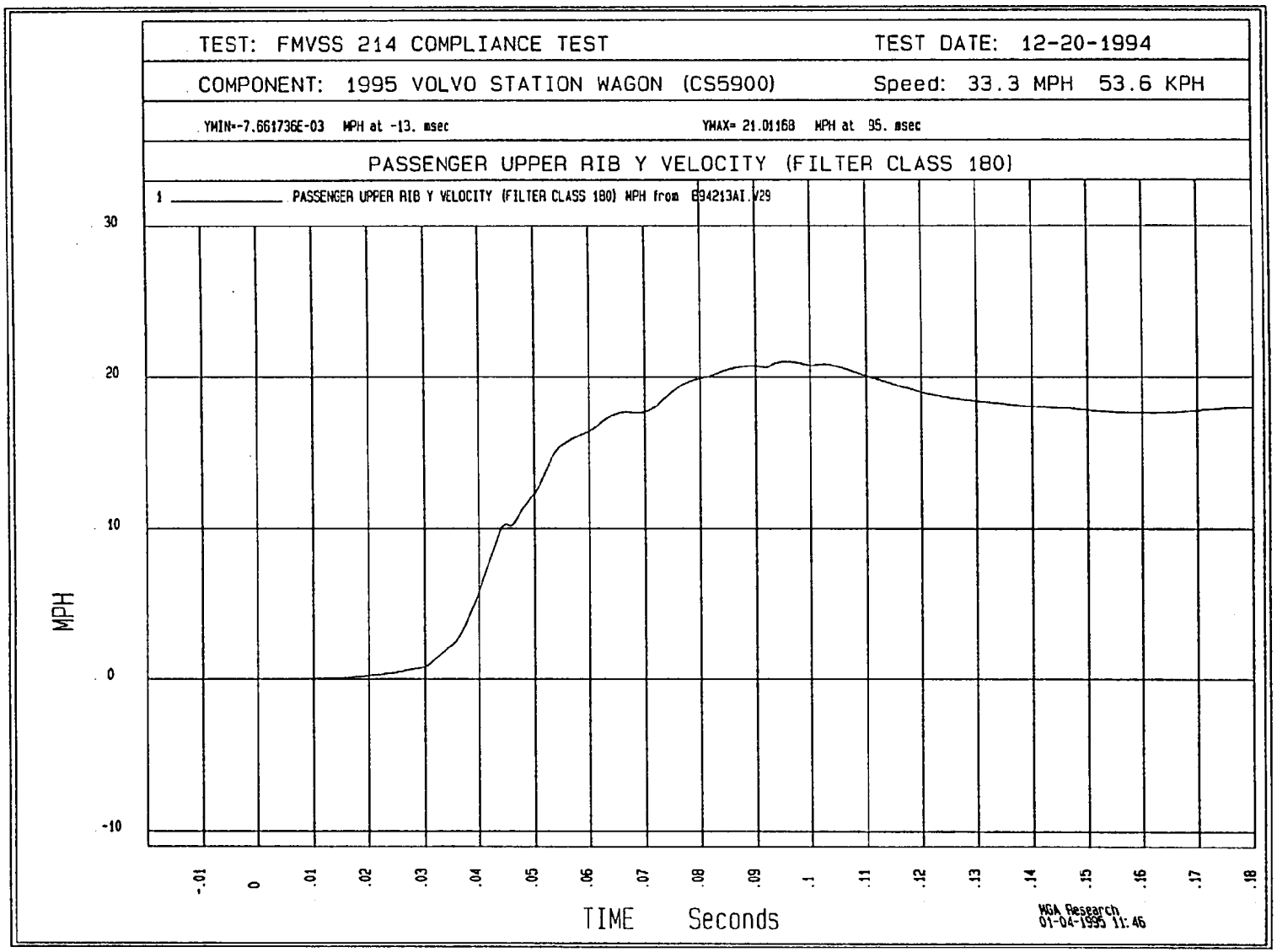


Figure B-10 - Passenger Upper Rib Y Velocity vs. Time

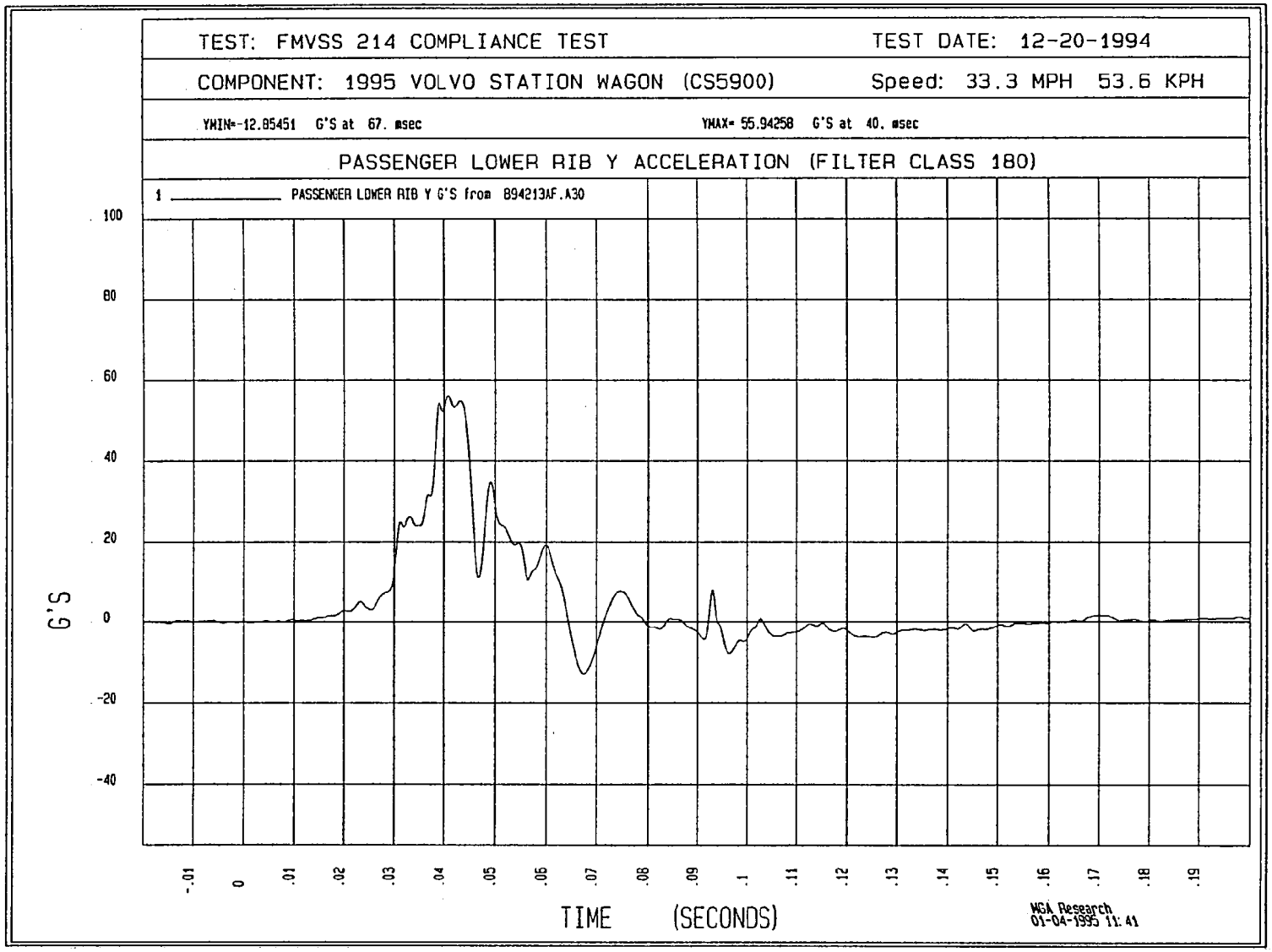


Figure B-11 - Passenger Lower Rib Y Acceleration vs. Time

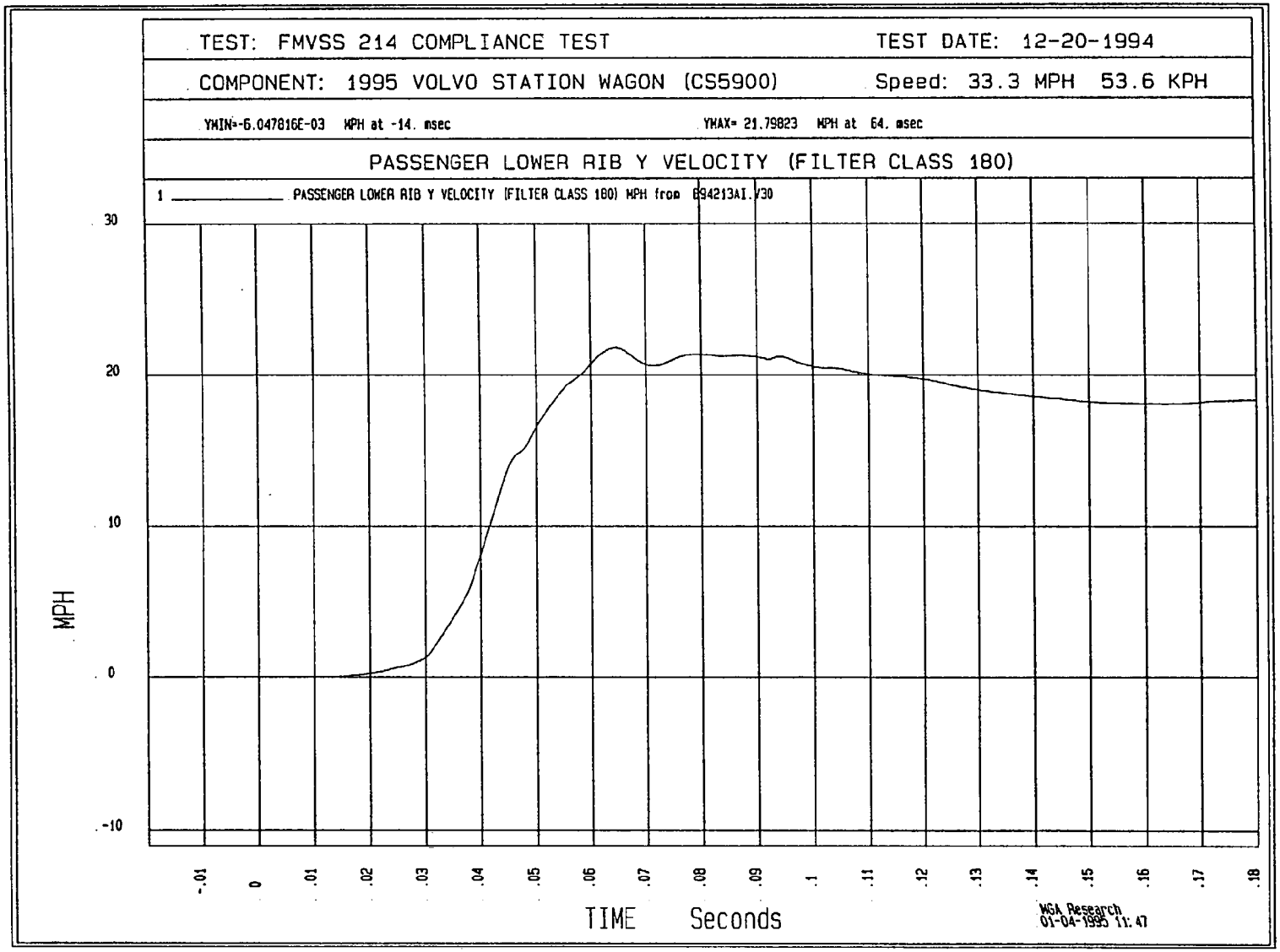


Figure B-12 - Passenger Lower Rib Y Velocity vs. Time

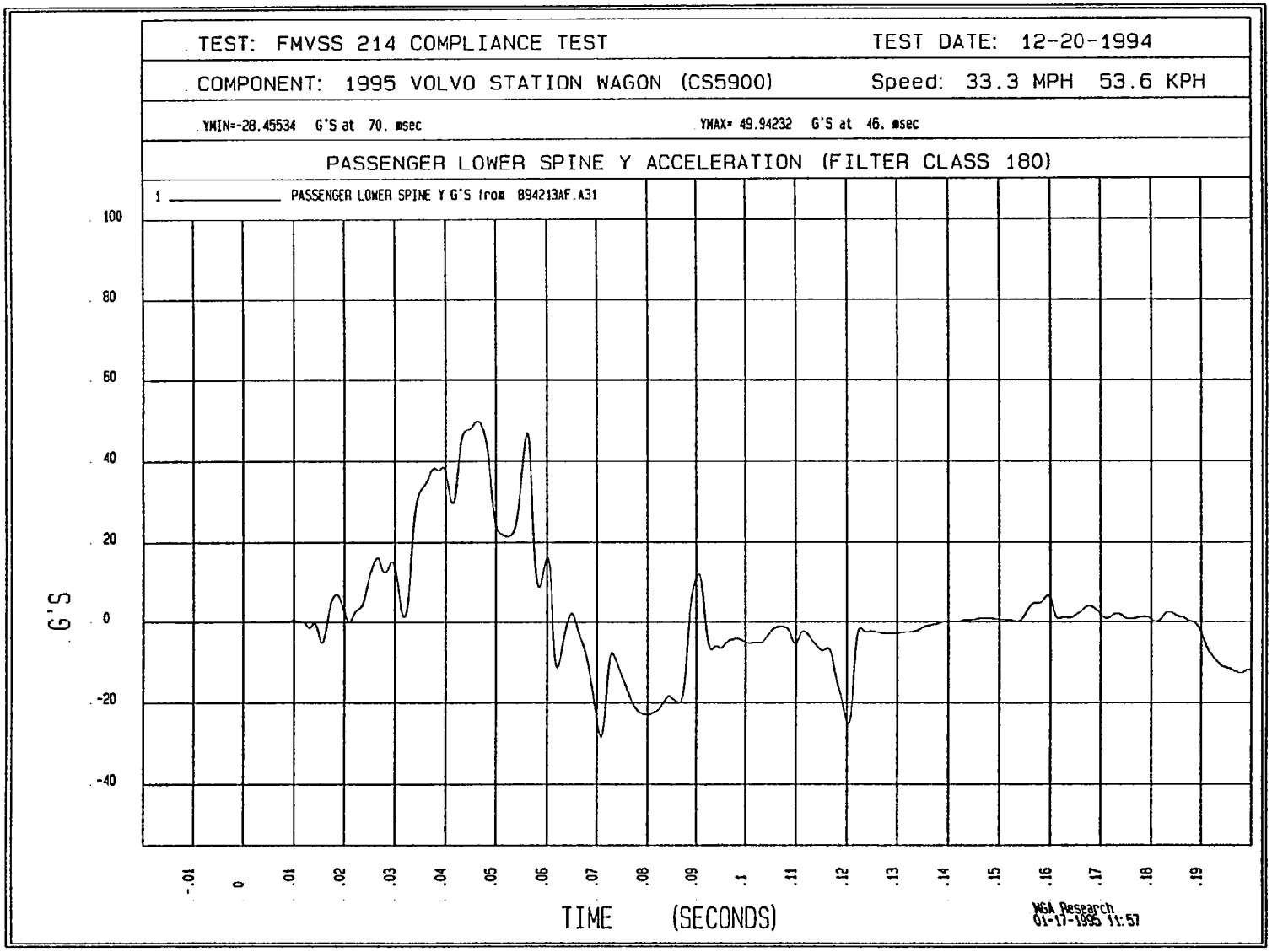


Figure B-13 - Passenger Lower Spine Y Acceleration vs. Time

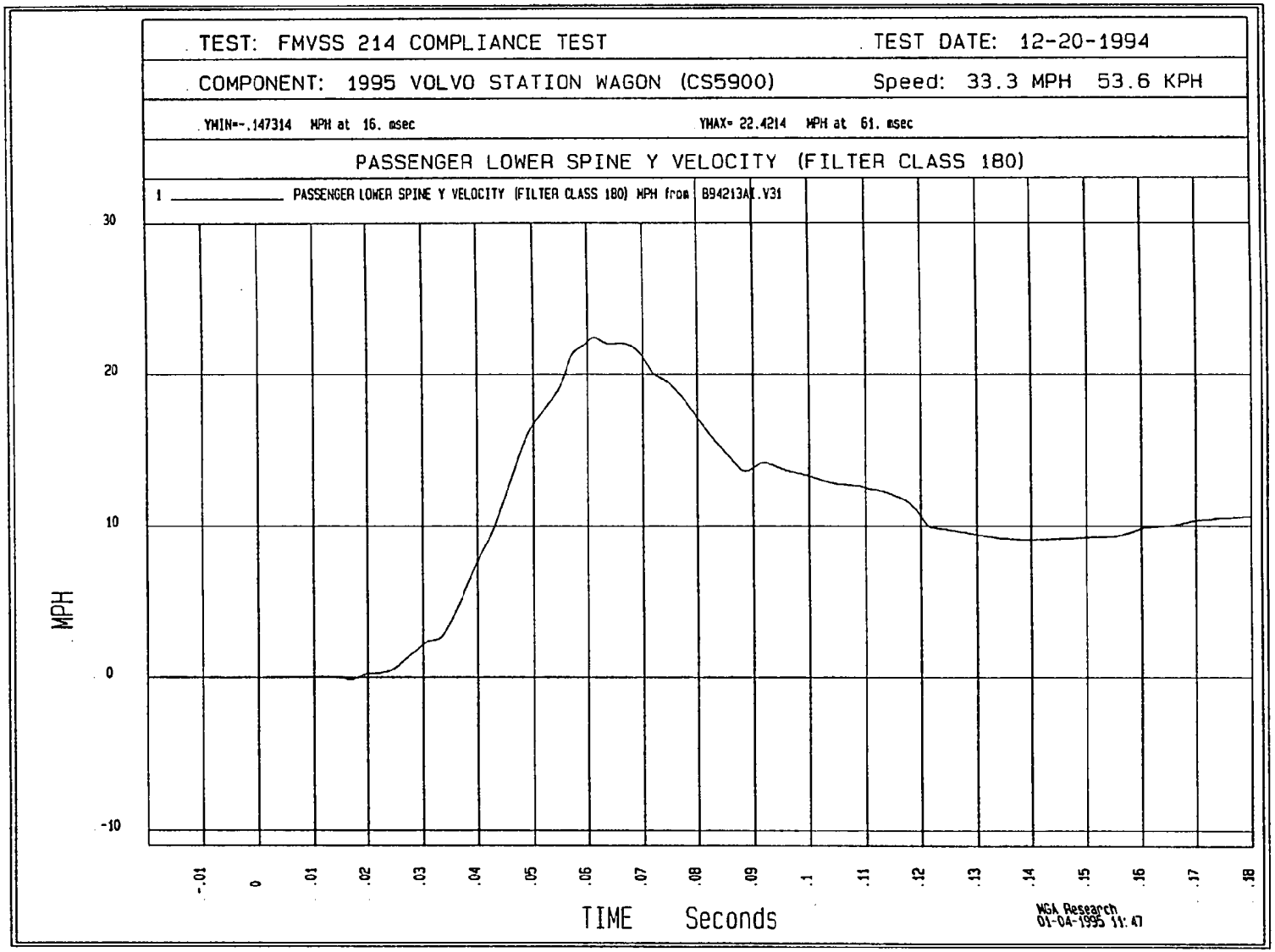


Figure B-14 - Passenger Lower Spine Y Velocity vs. Time

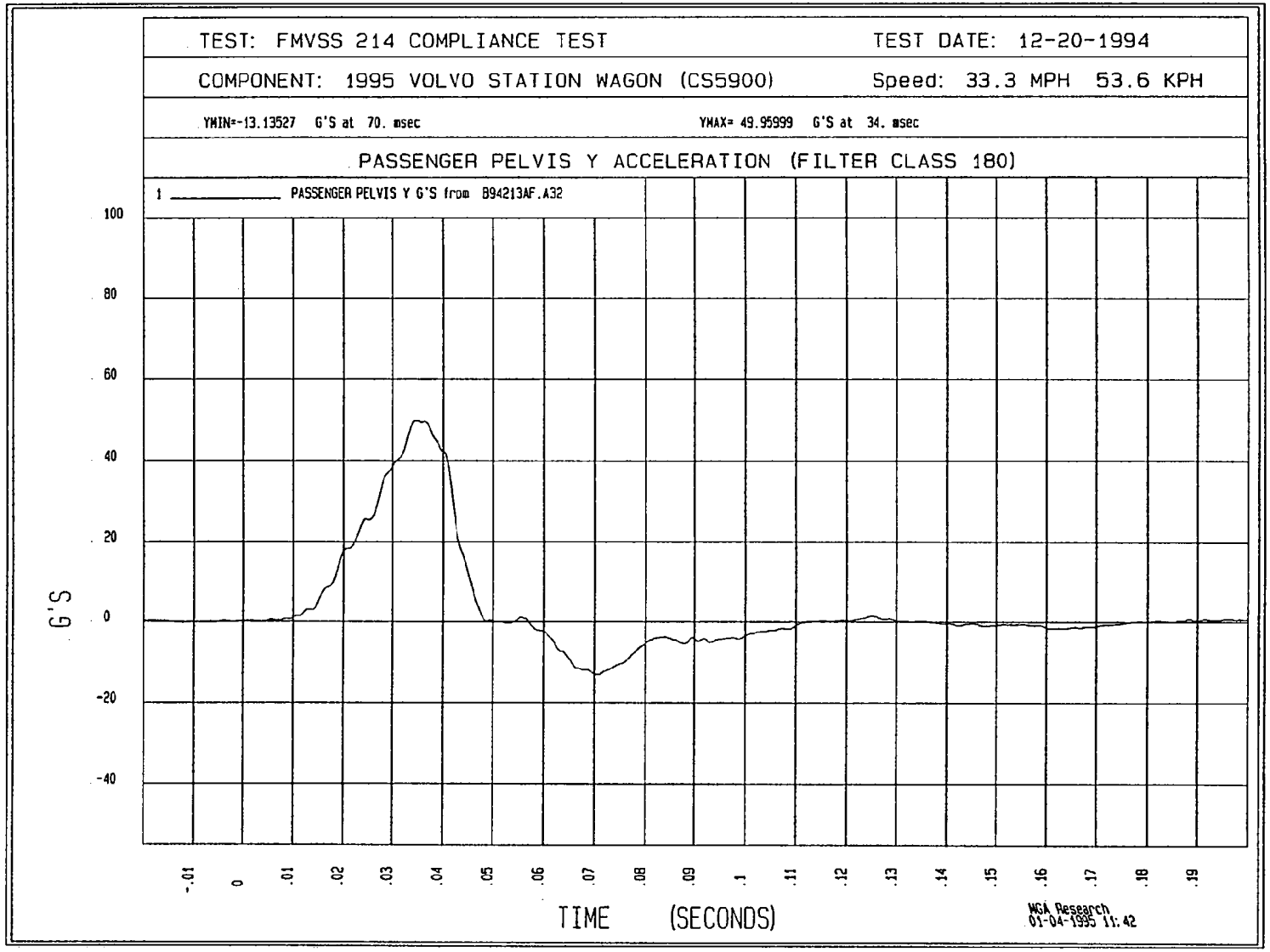


Figure B-15 - Passenger Pelvis Y Acceleration vs. Time

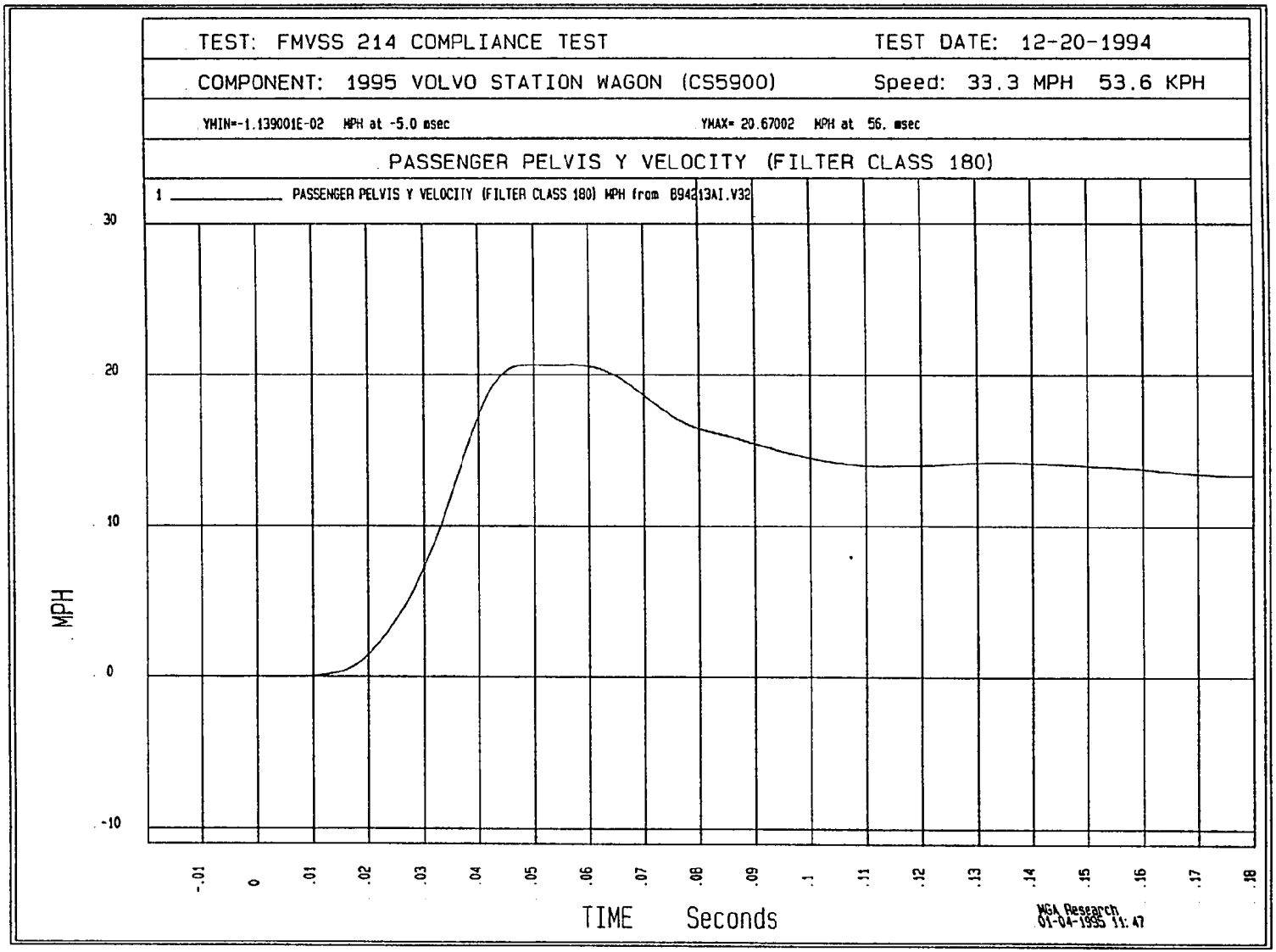


Figure B-16 - Passenger Pelvis Y Velocity vs. Time

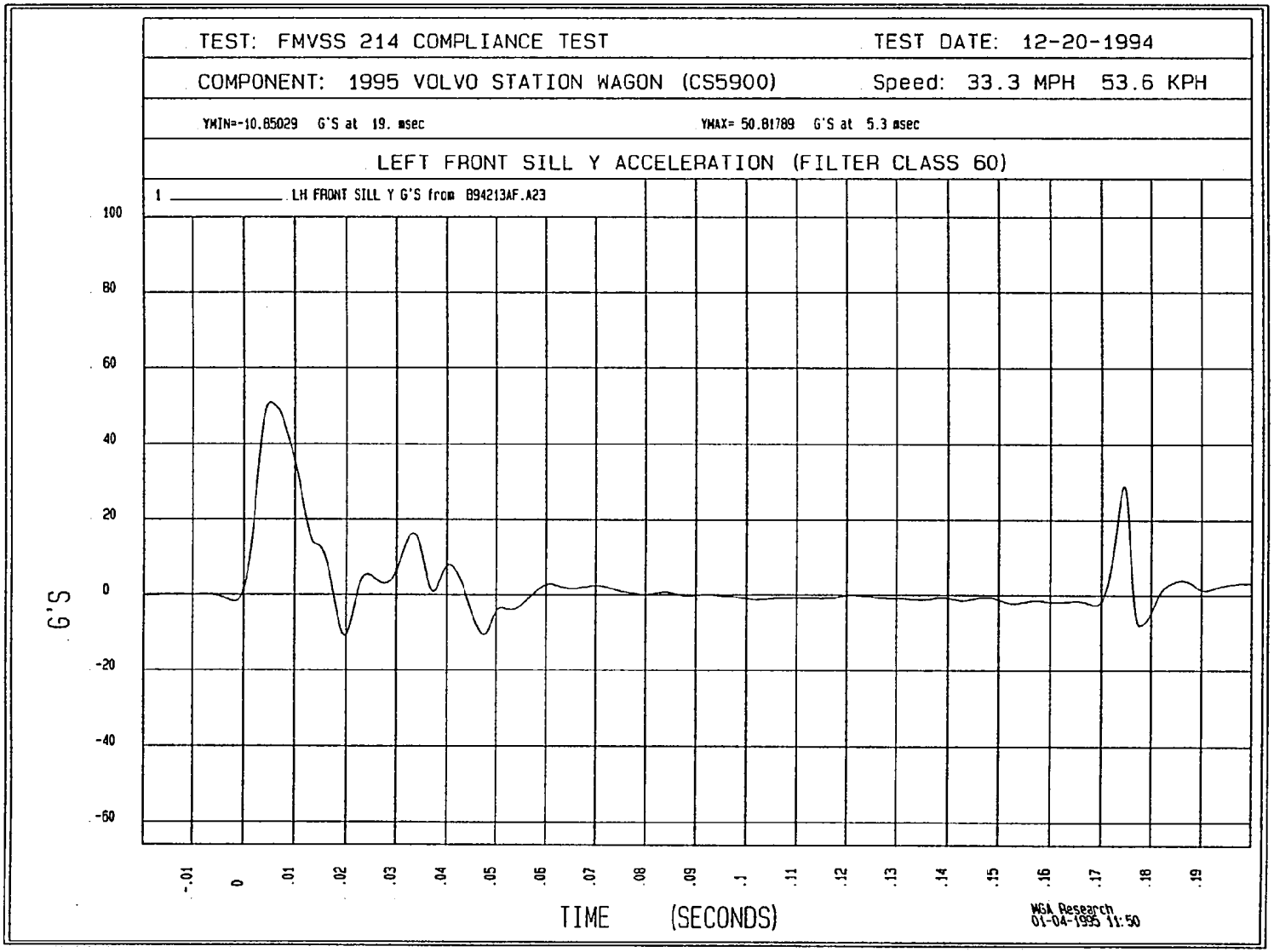


Figure B-17 - Left Front Sill Y Acceleration vs. Time

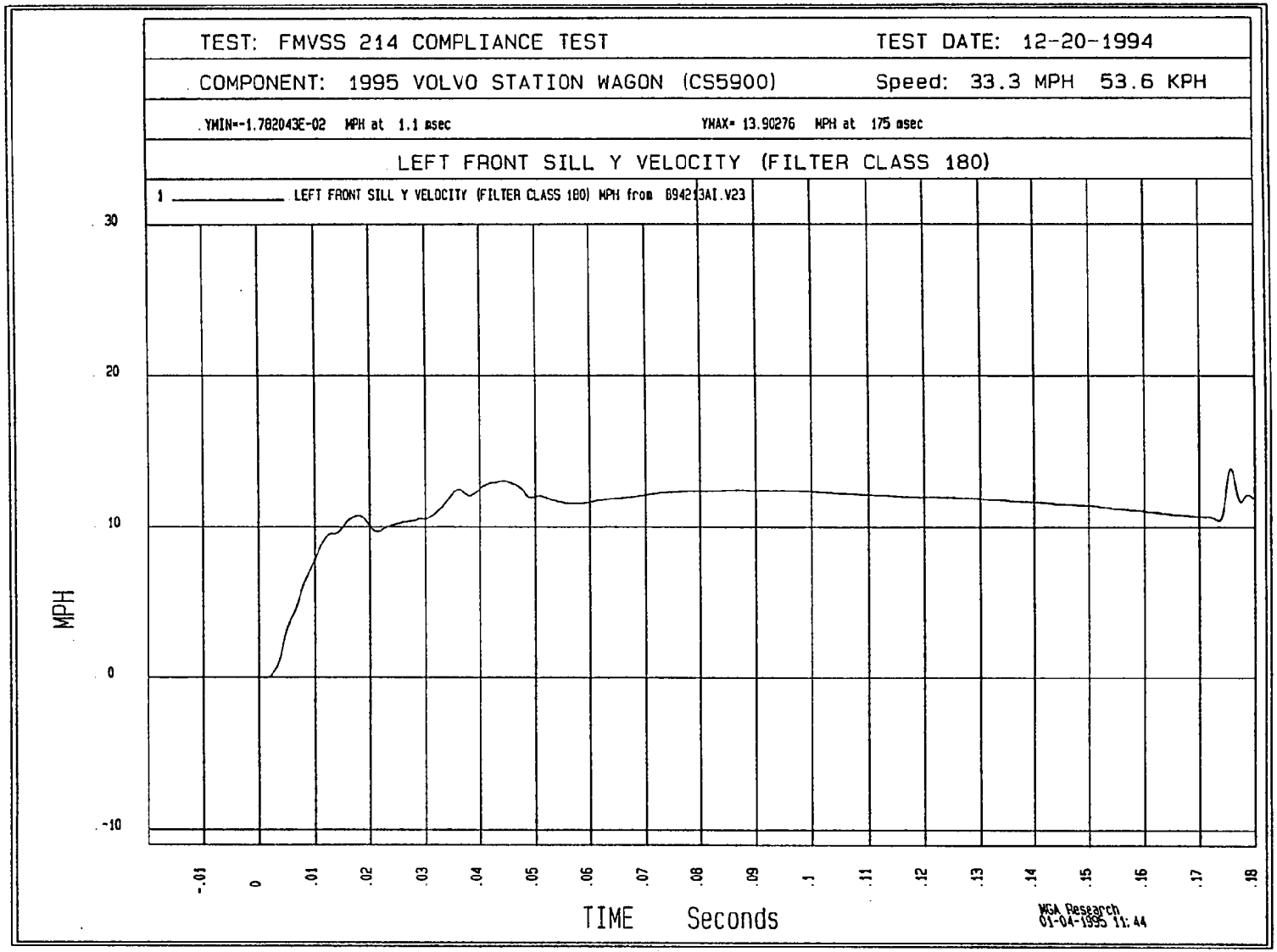


Figure B-18 - Left Front Sill Y Velocity vs. Time

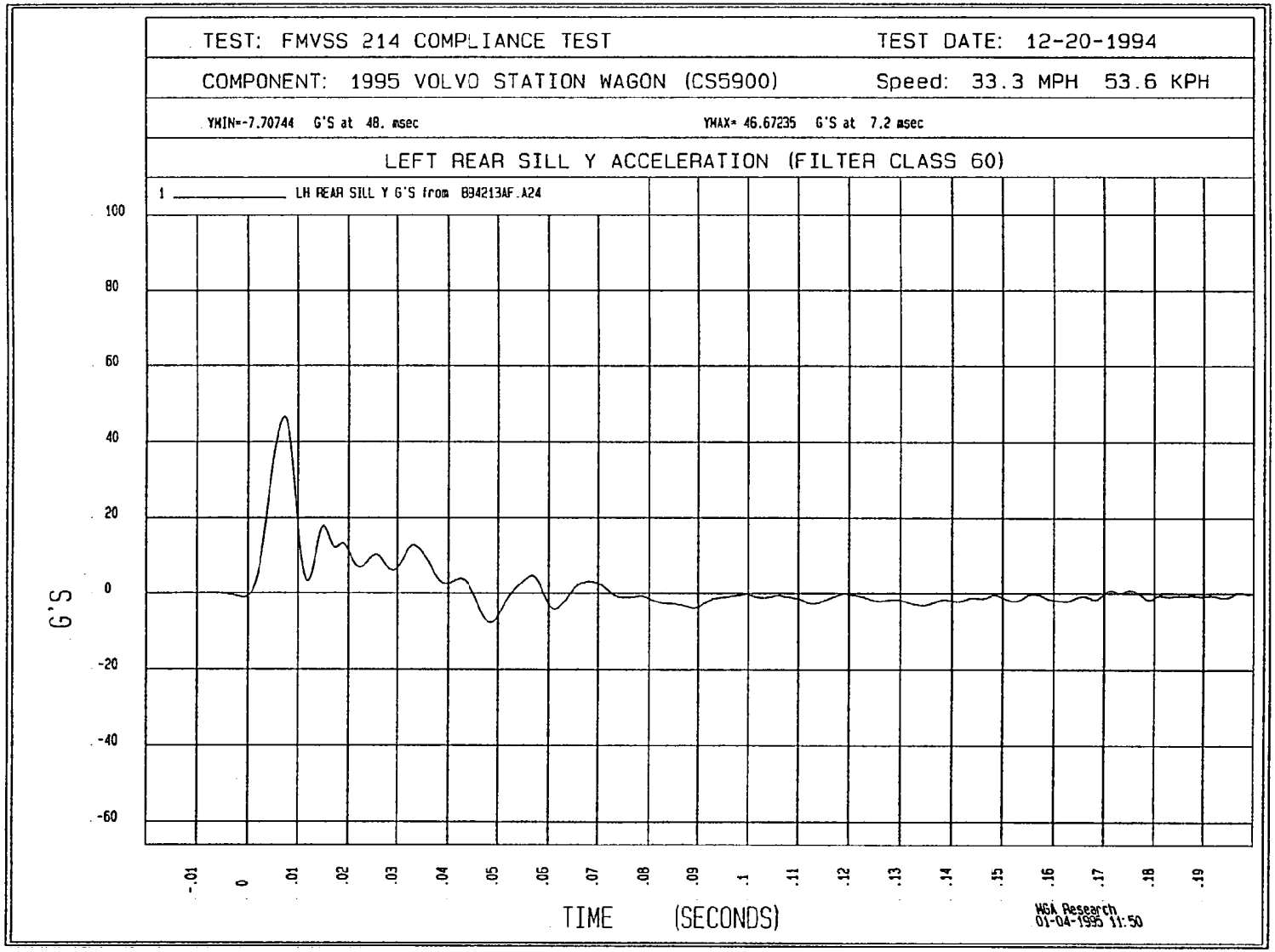


Figure B-19 - Left Rear Sill Y Acceleration vs. Time

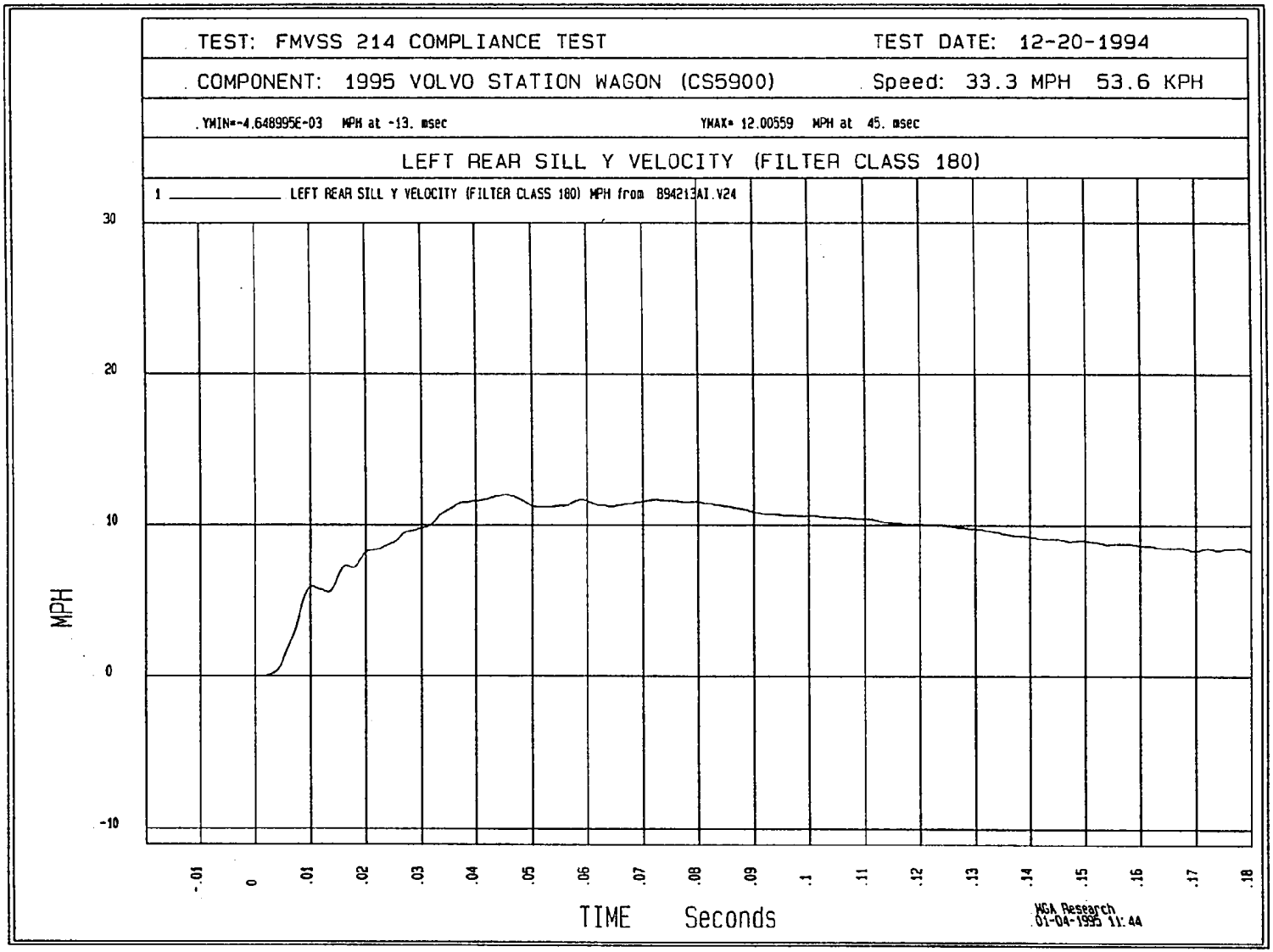


Figure B-2Ø - Left Rear Sill Y Velocity vs. Time

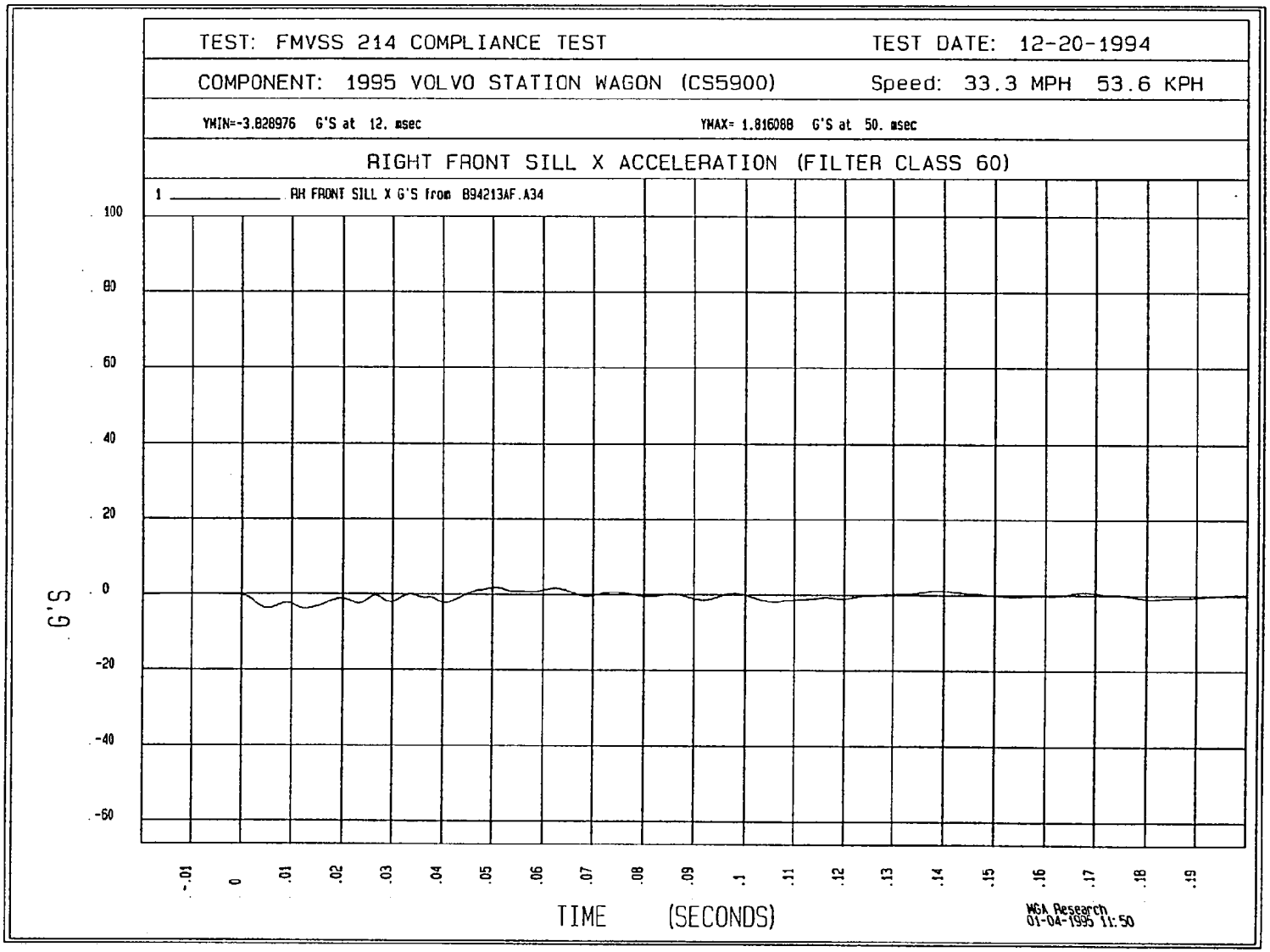


Figure B-21 - Right Front Sill X Acceleration vs. Time

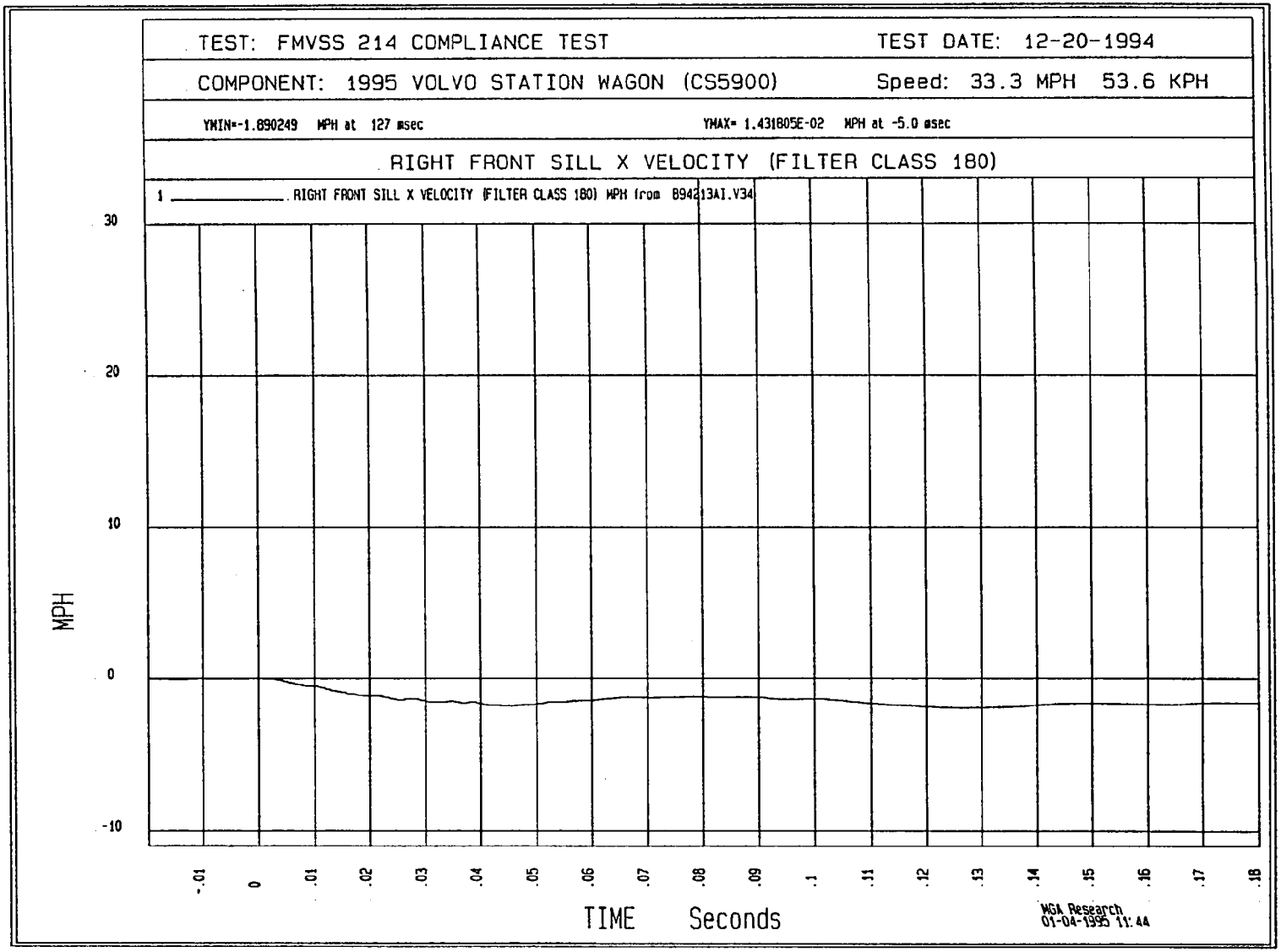


Figure B-22 - Right Front Sill X Velocity vs. Time

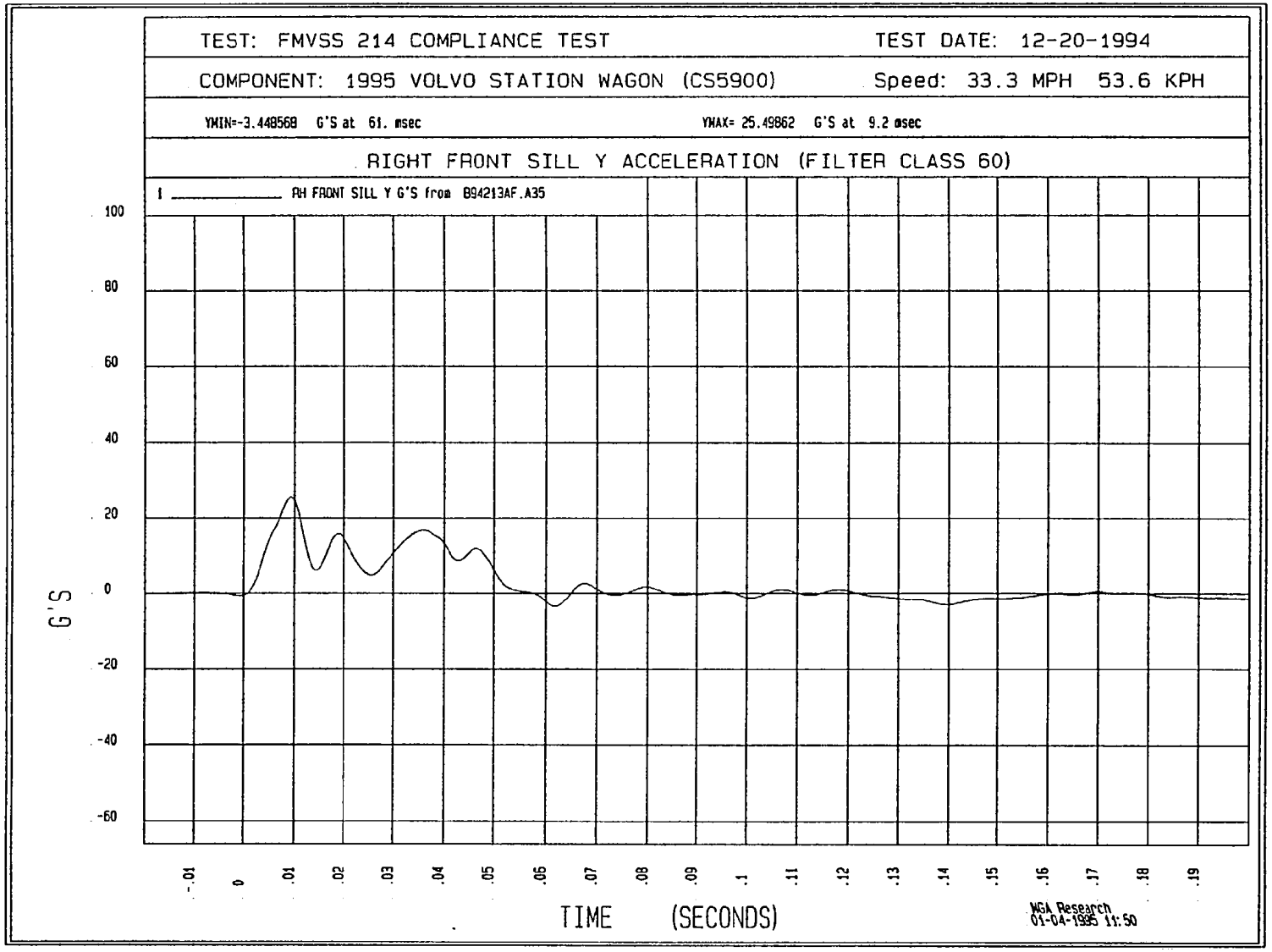


Figure B-23 - Right Front Sill Y Acceleration vs. Time

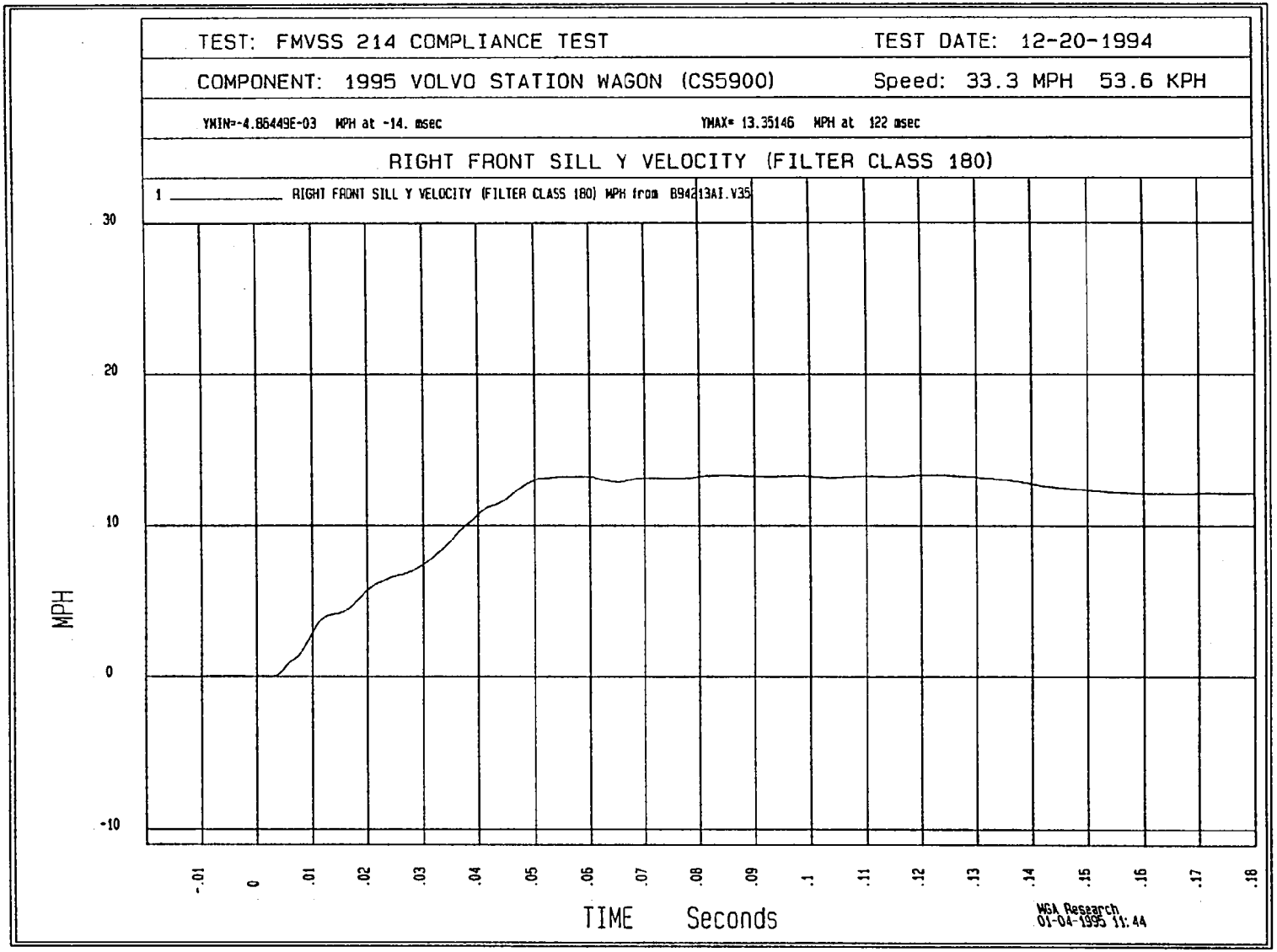


Figure B-24 - Right Front Sill Y Velocity vs. Time

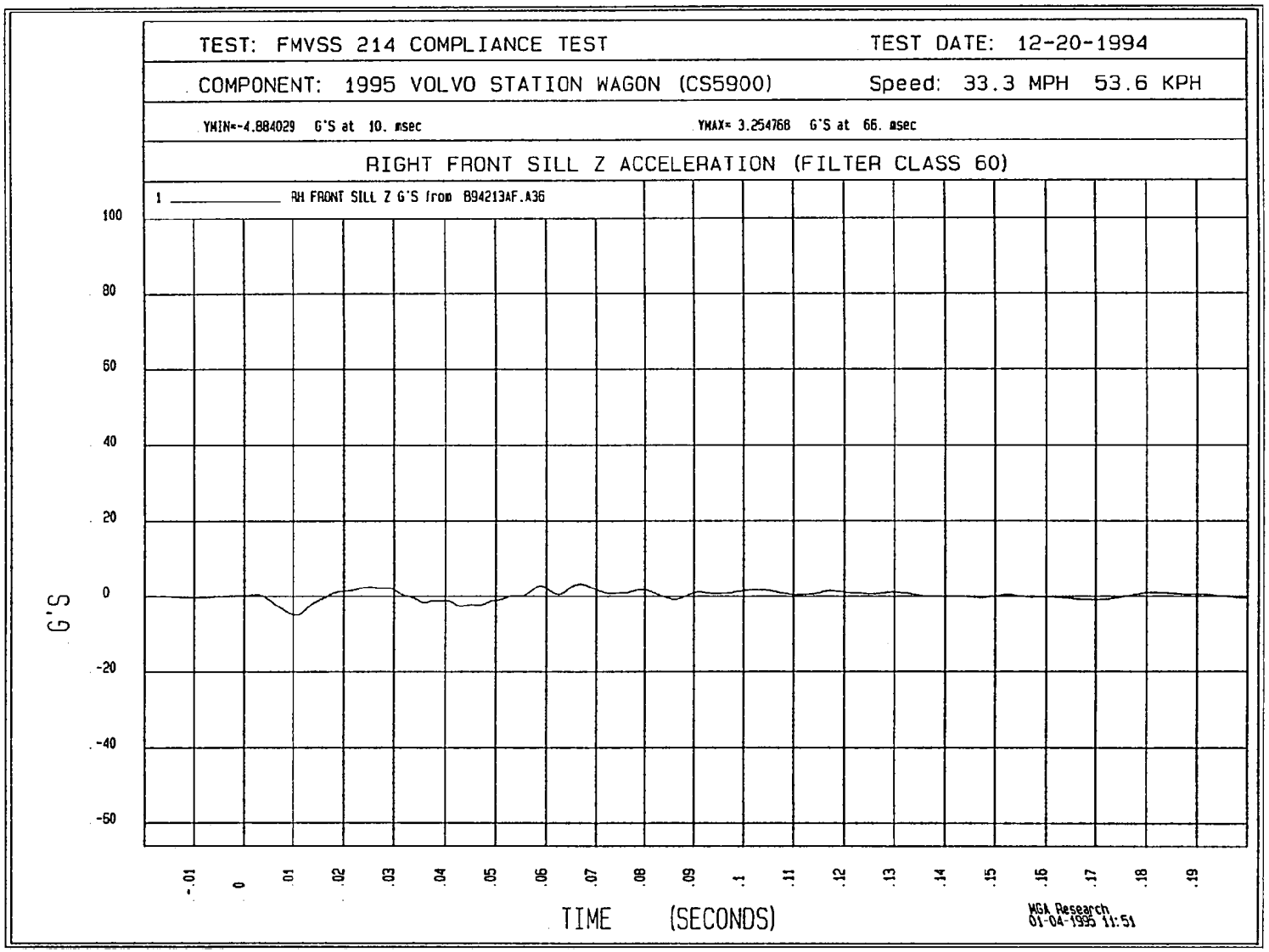


Figure B-25 - Right Front Sill Z Acceleration vs. Time

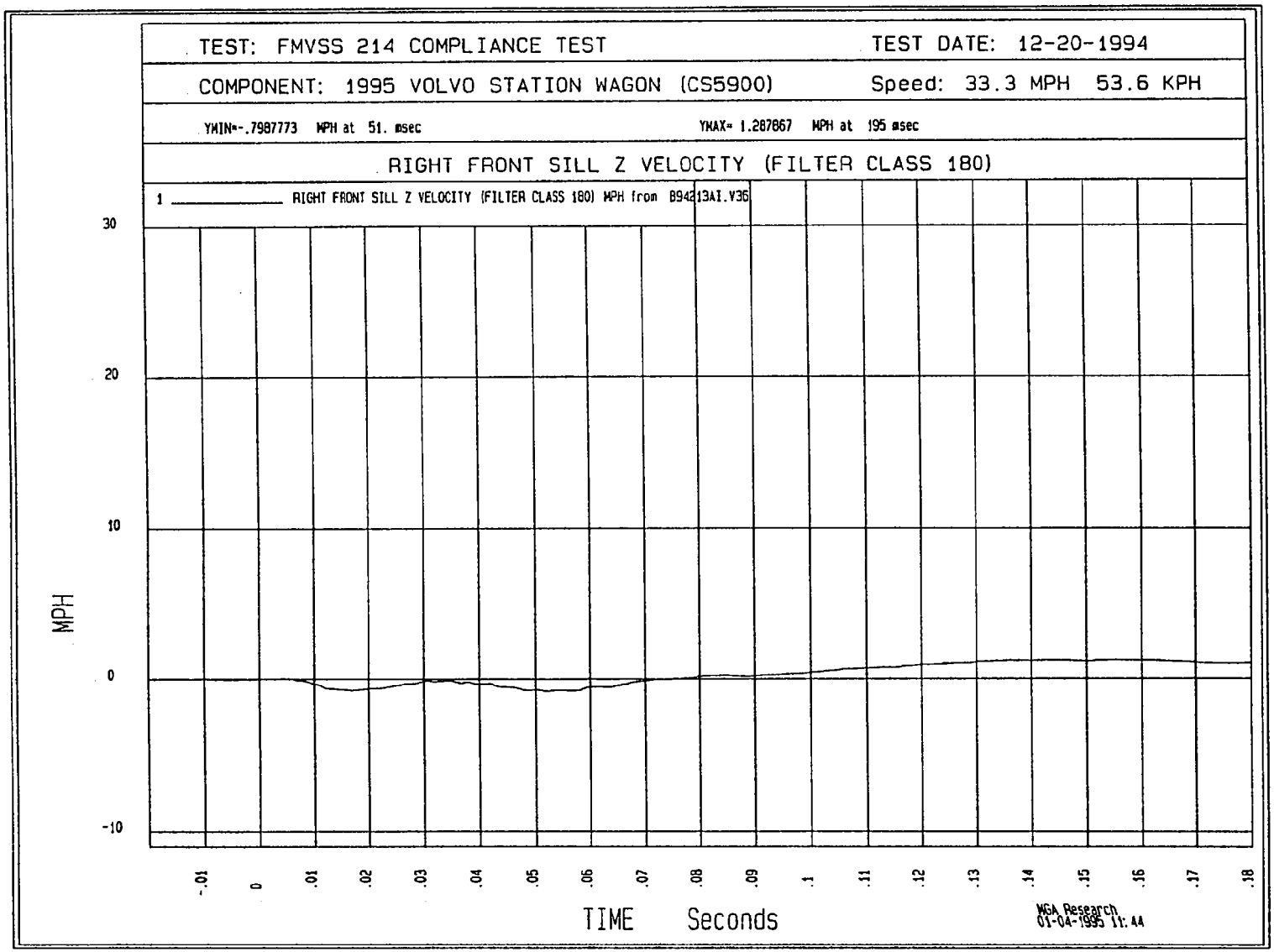
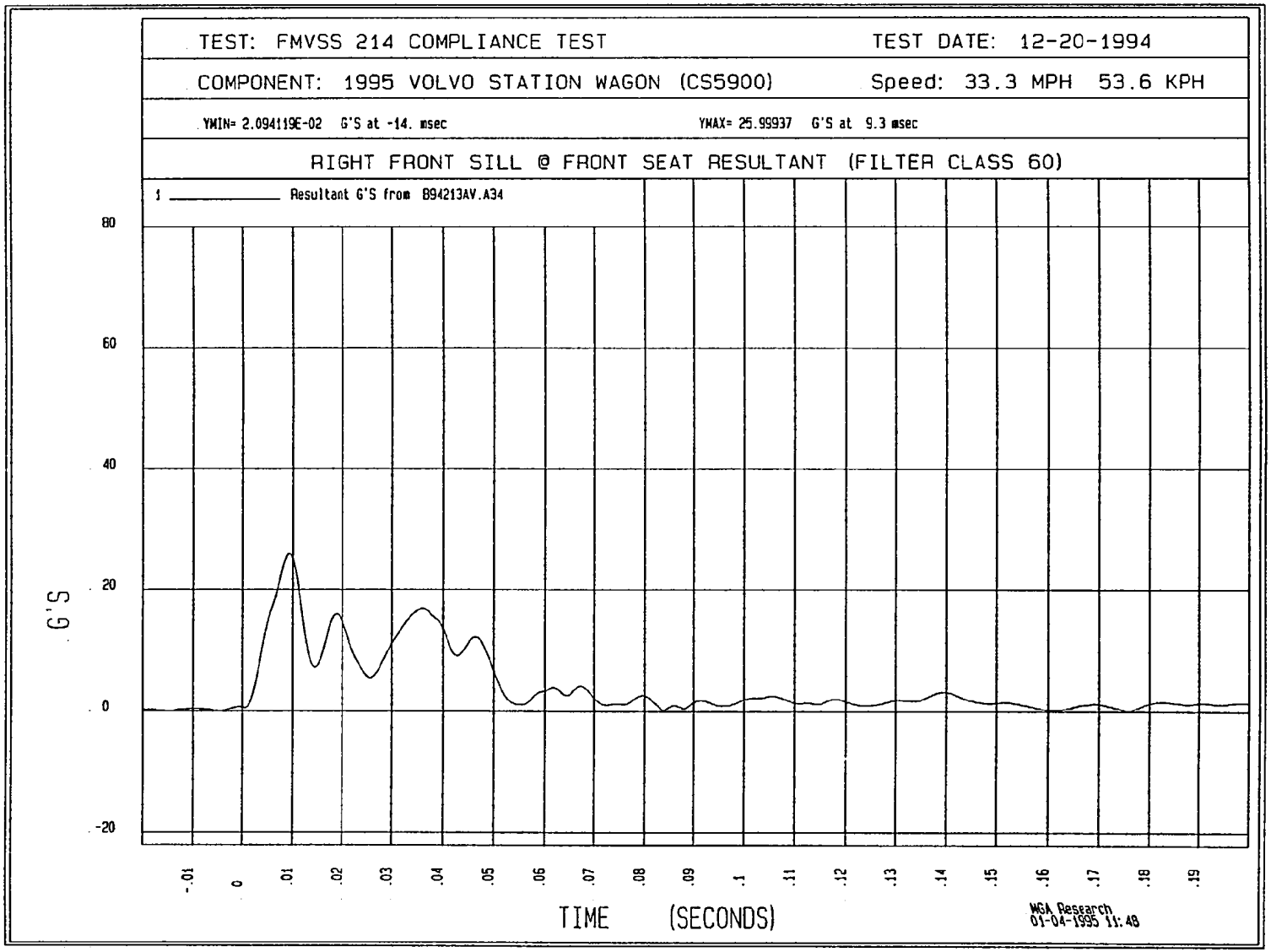


Figure B-26 - Right Front Sill Z Velocity vs. Time



B-27

Figure B-27 - Right Front Sill at Front Seat Resultant vs. Time

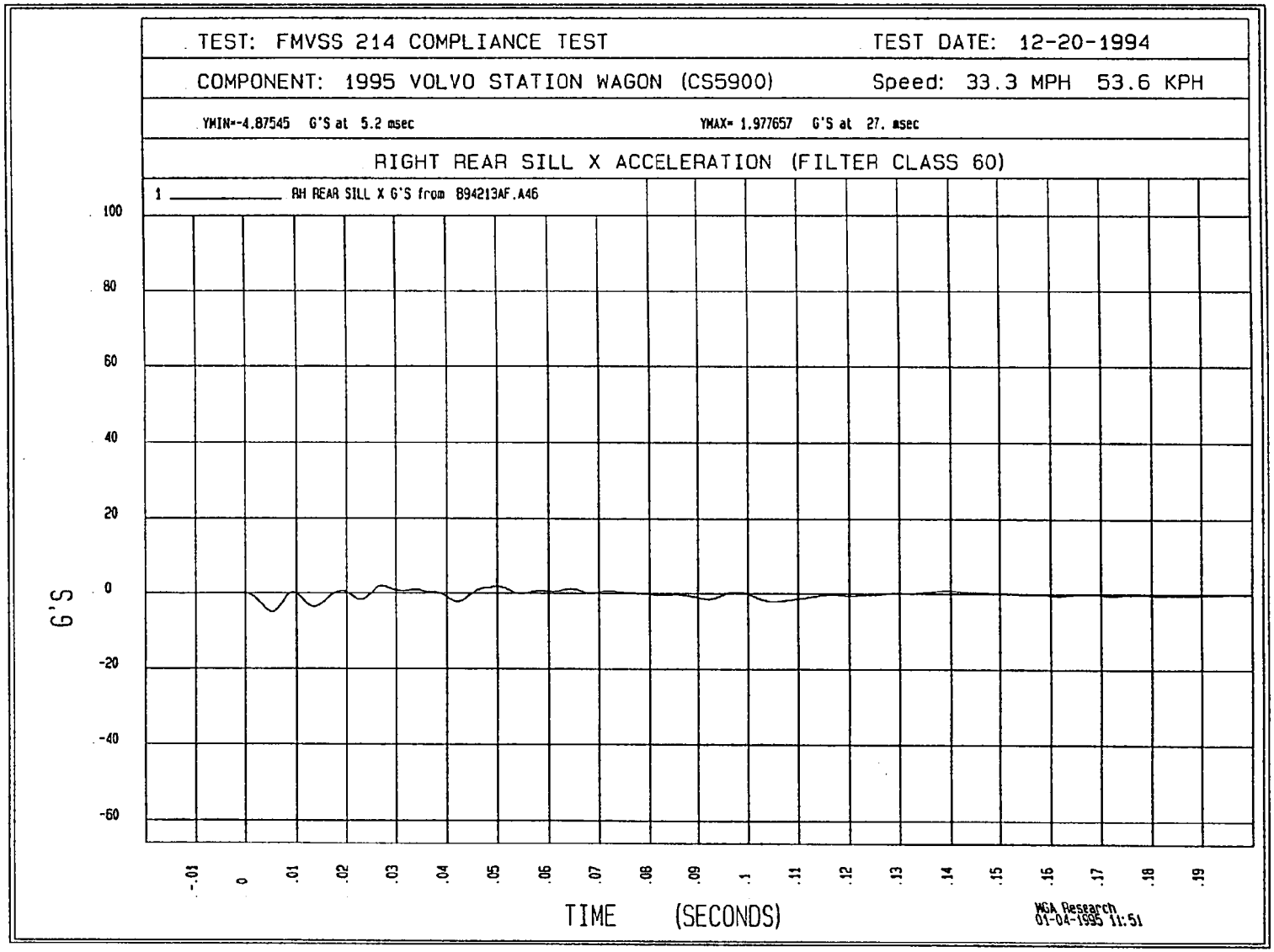
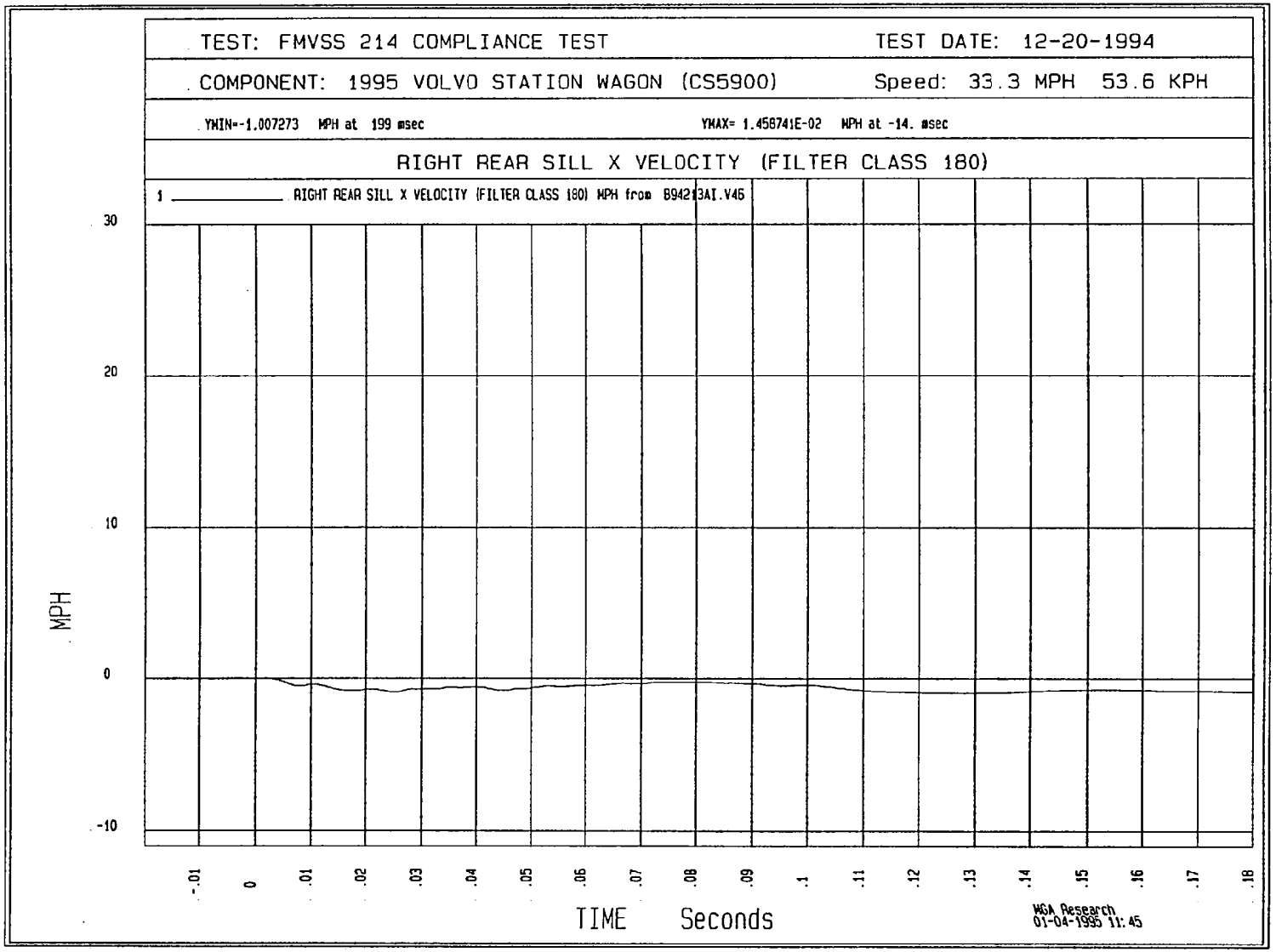


Figure B-28 - Right Rear Sill X Acceleration vs. Time



B-29

Figure B-29 - Right Rear Sill X Velocity vs. Time

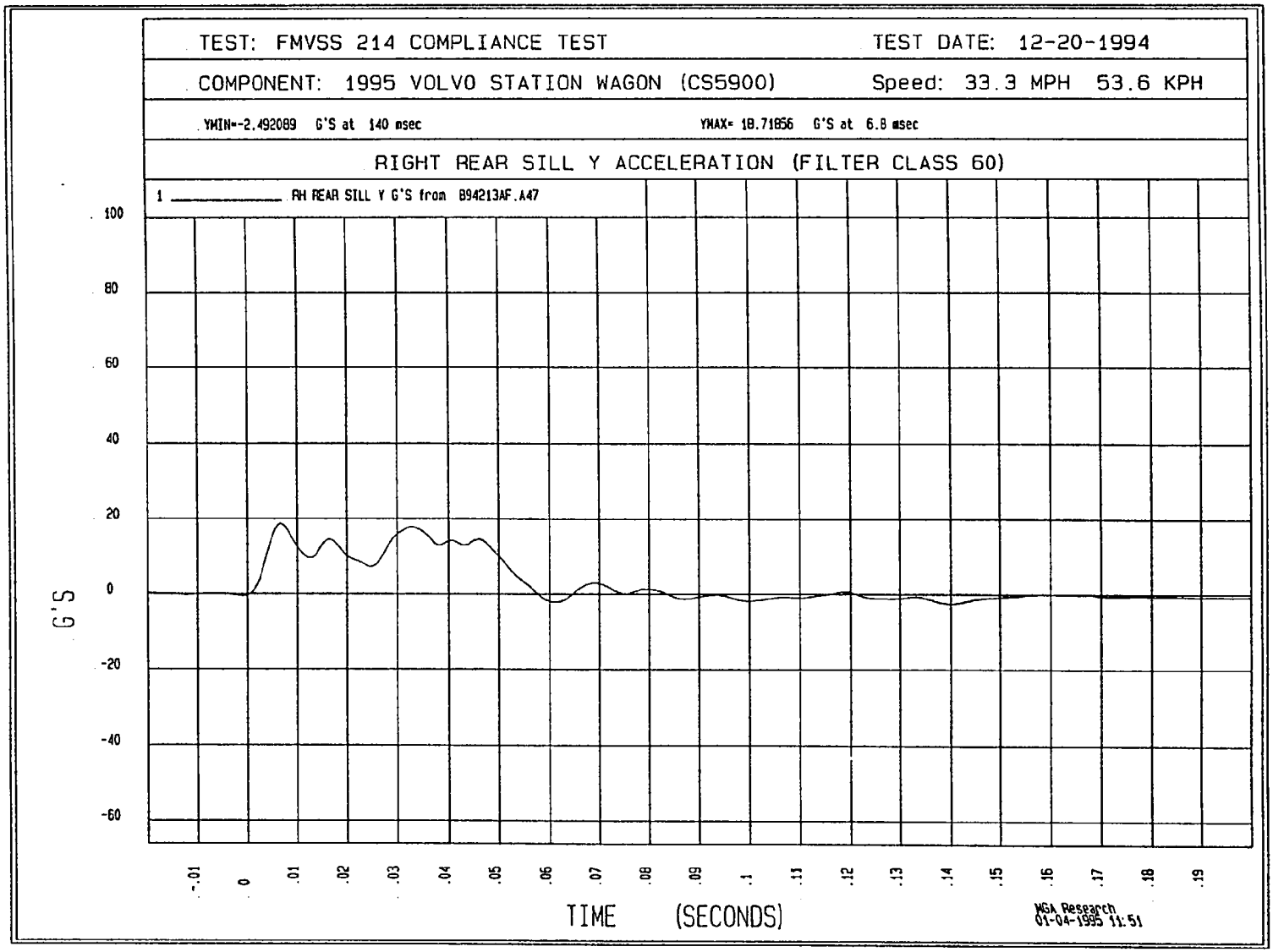


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Figure B-3Ø - Right Rear Sill Y Acceleration vs. Time

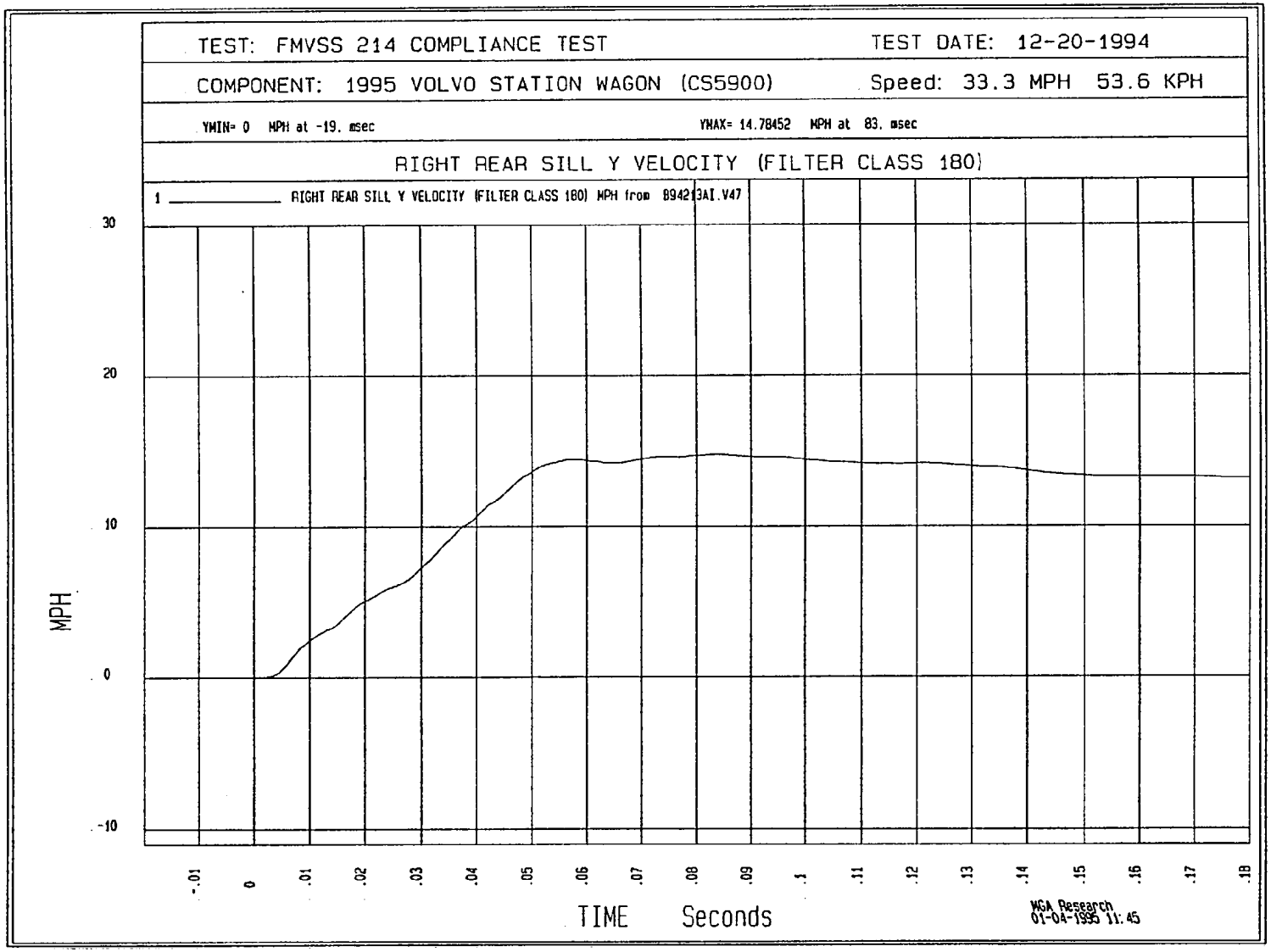

Figure B-31 - Right Rear Sill Y Velocity vs. Time

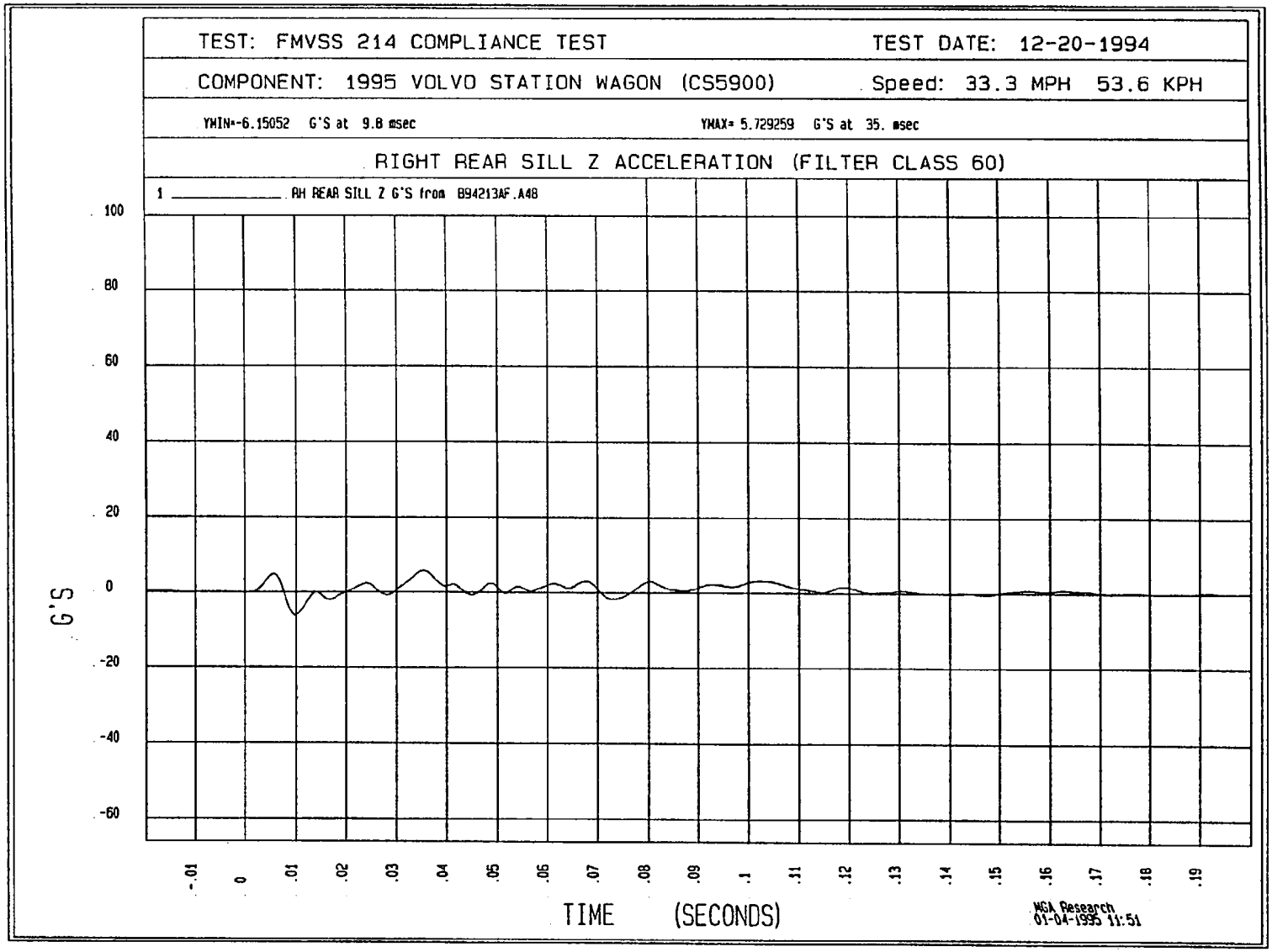

Figure B-32 - Right Rear Sill Z Acceleration vs. Time

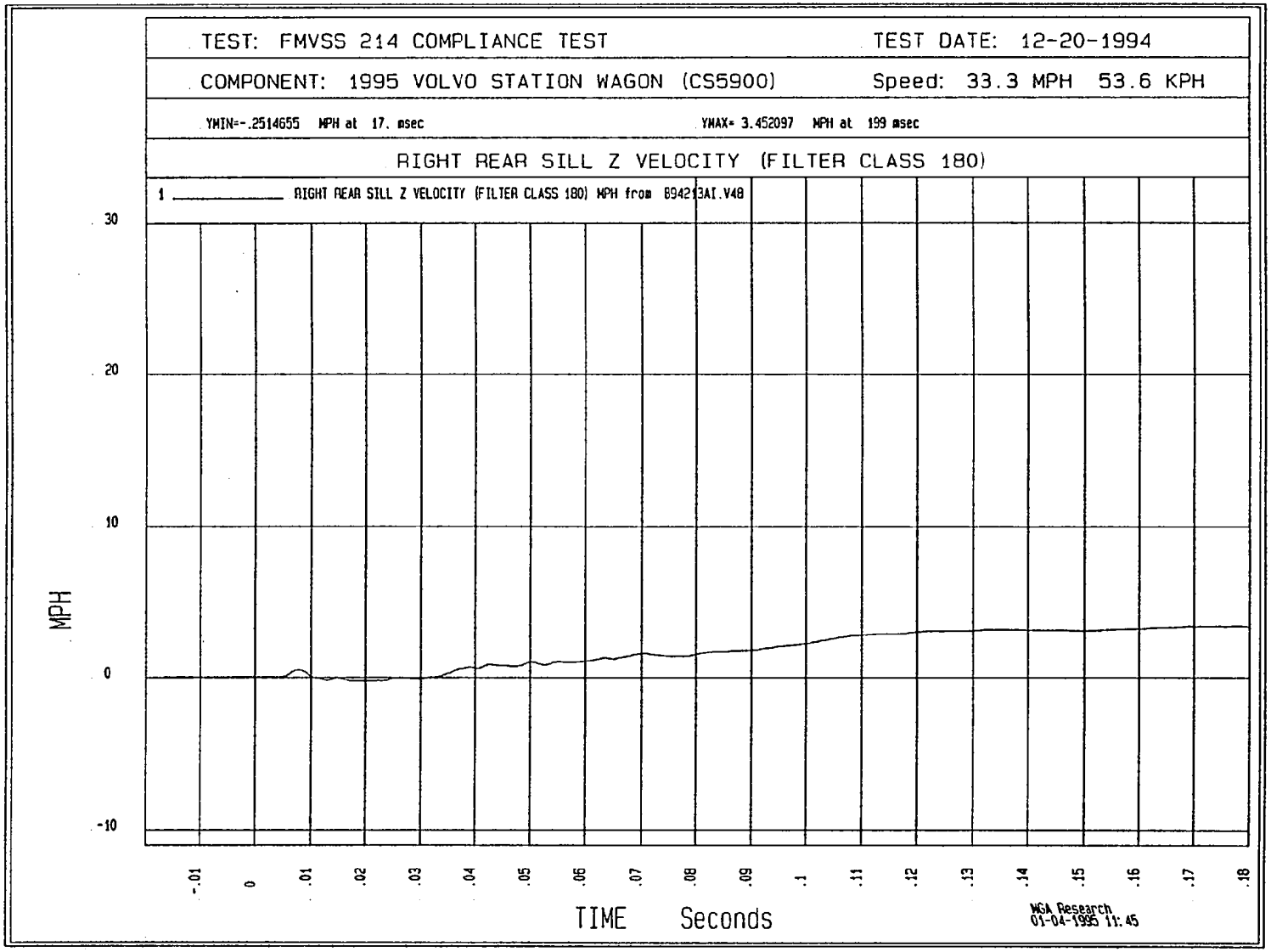

Figure B-33 - Right Rear Sill Z Velocity vs. Time

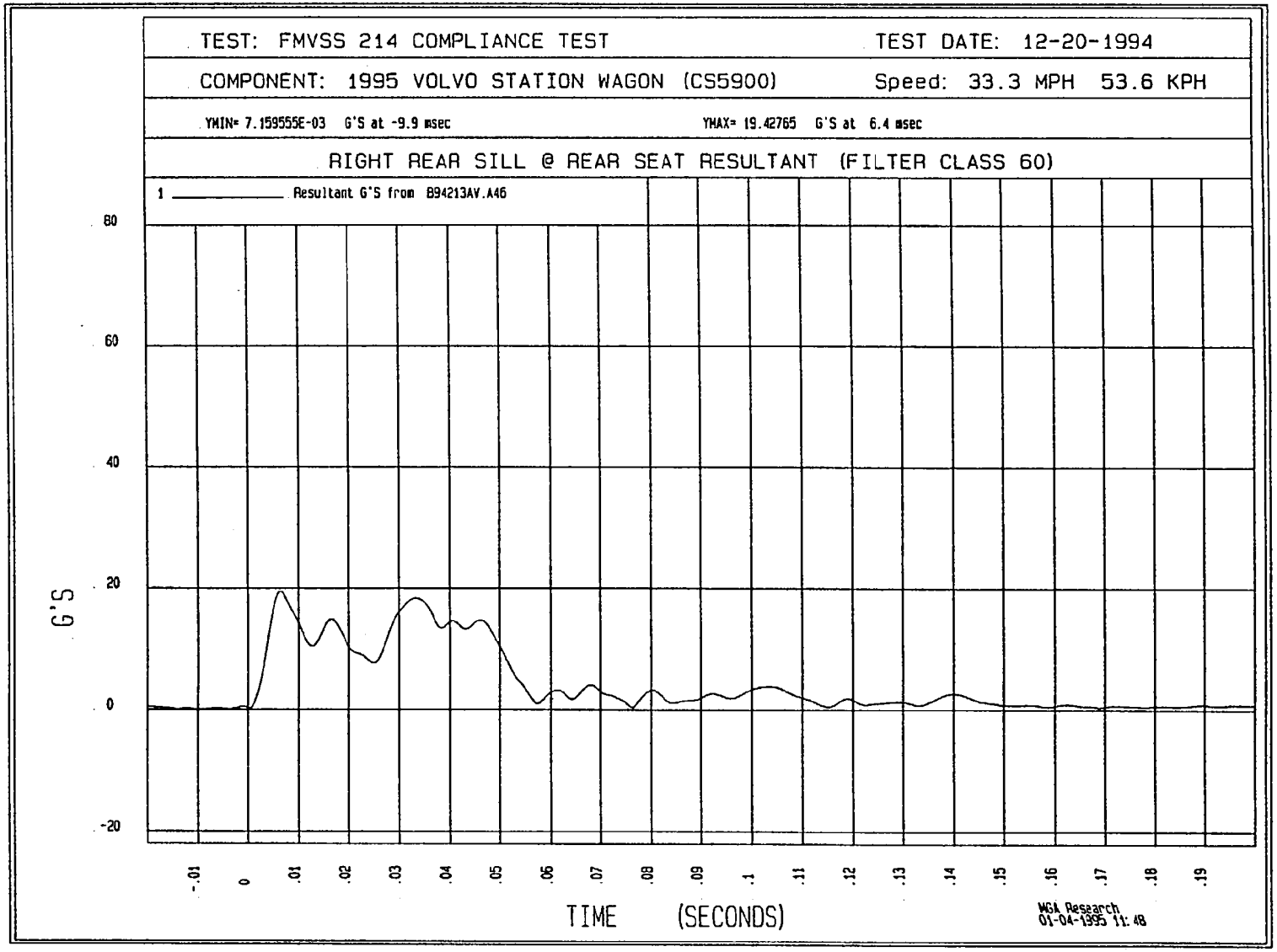

Figure B-34 - Right Rear Sill at Rear Seat Resultant vs. Time

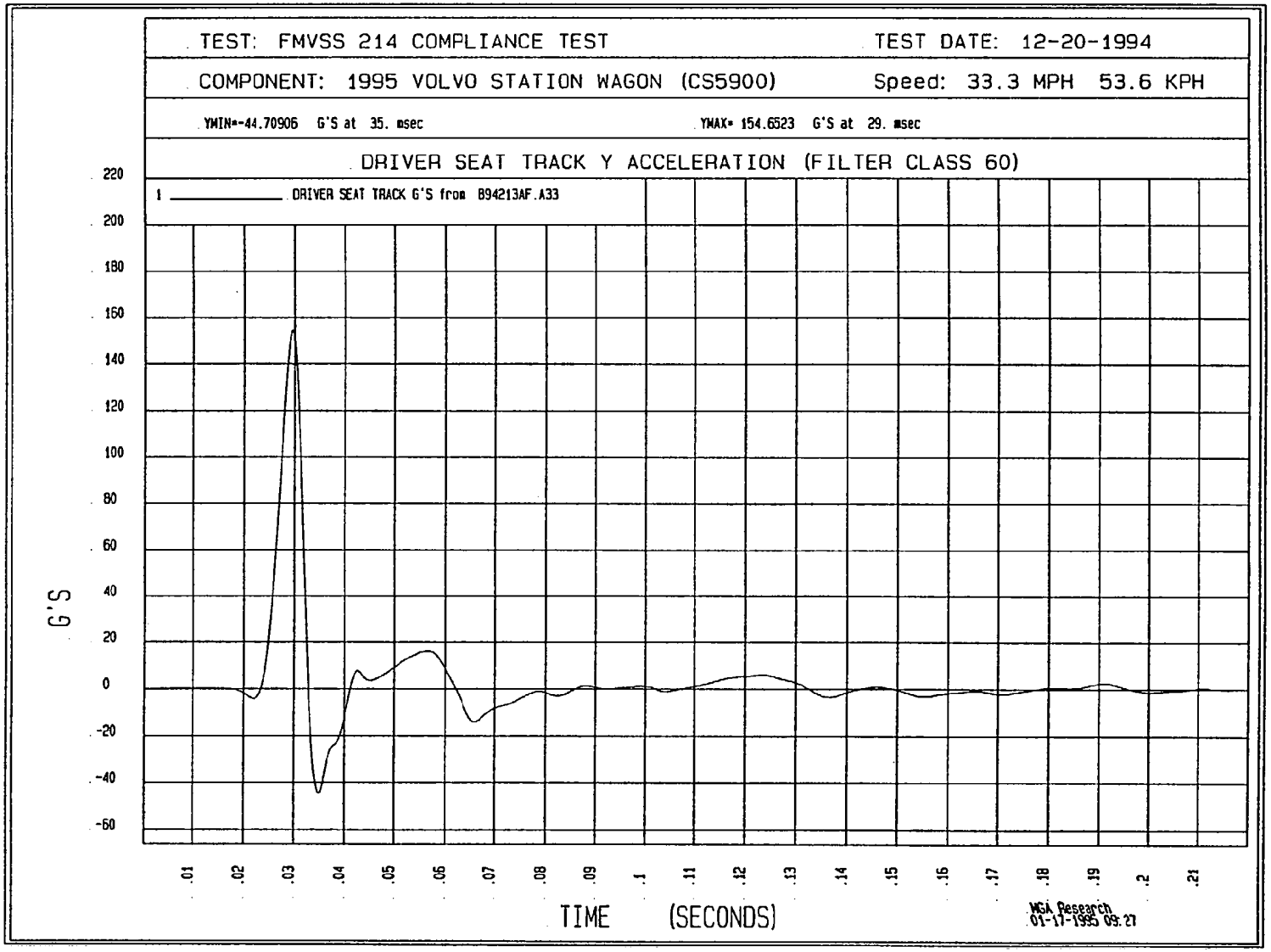

Figure B-35 - Driver Seat Track Y Acceleration vs. Time

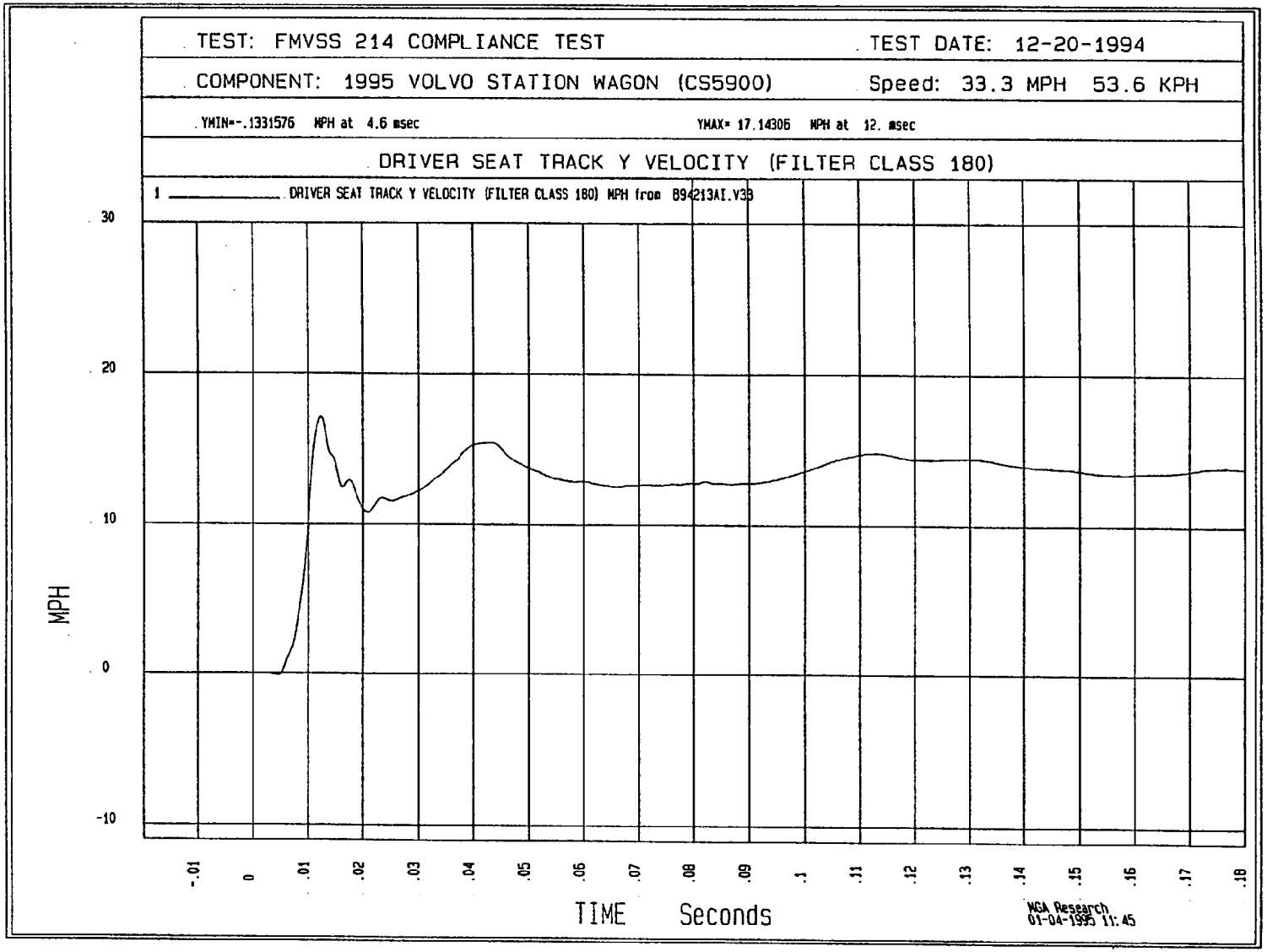

Figure B-36 - Driver Seat Track Y Velocity vs. Time

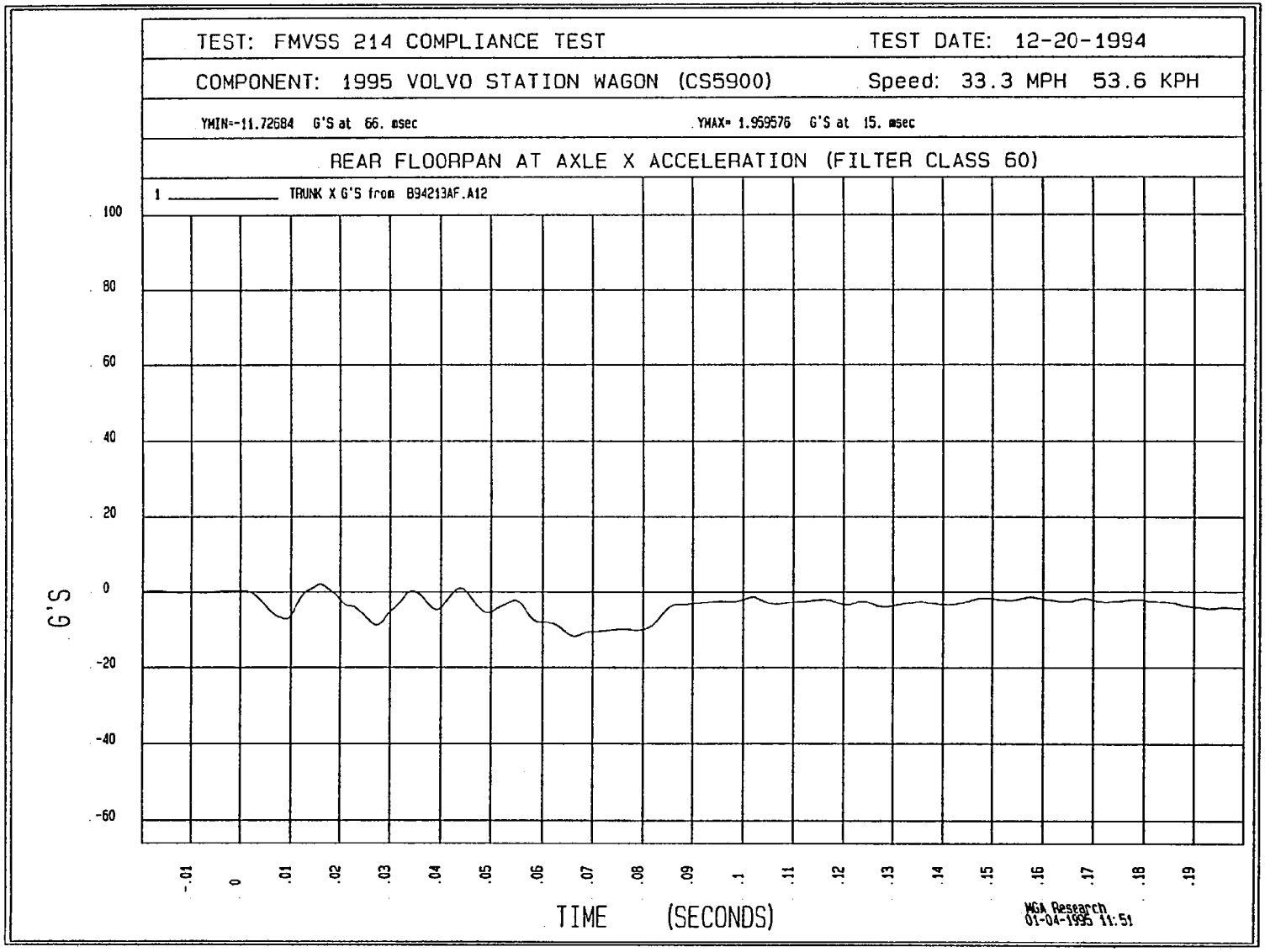

Figure B-37 - Rear Floorpan at Axle X Acceleration vs. Time

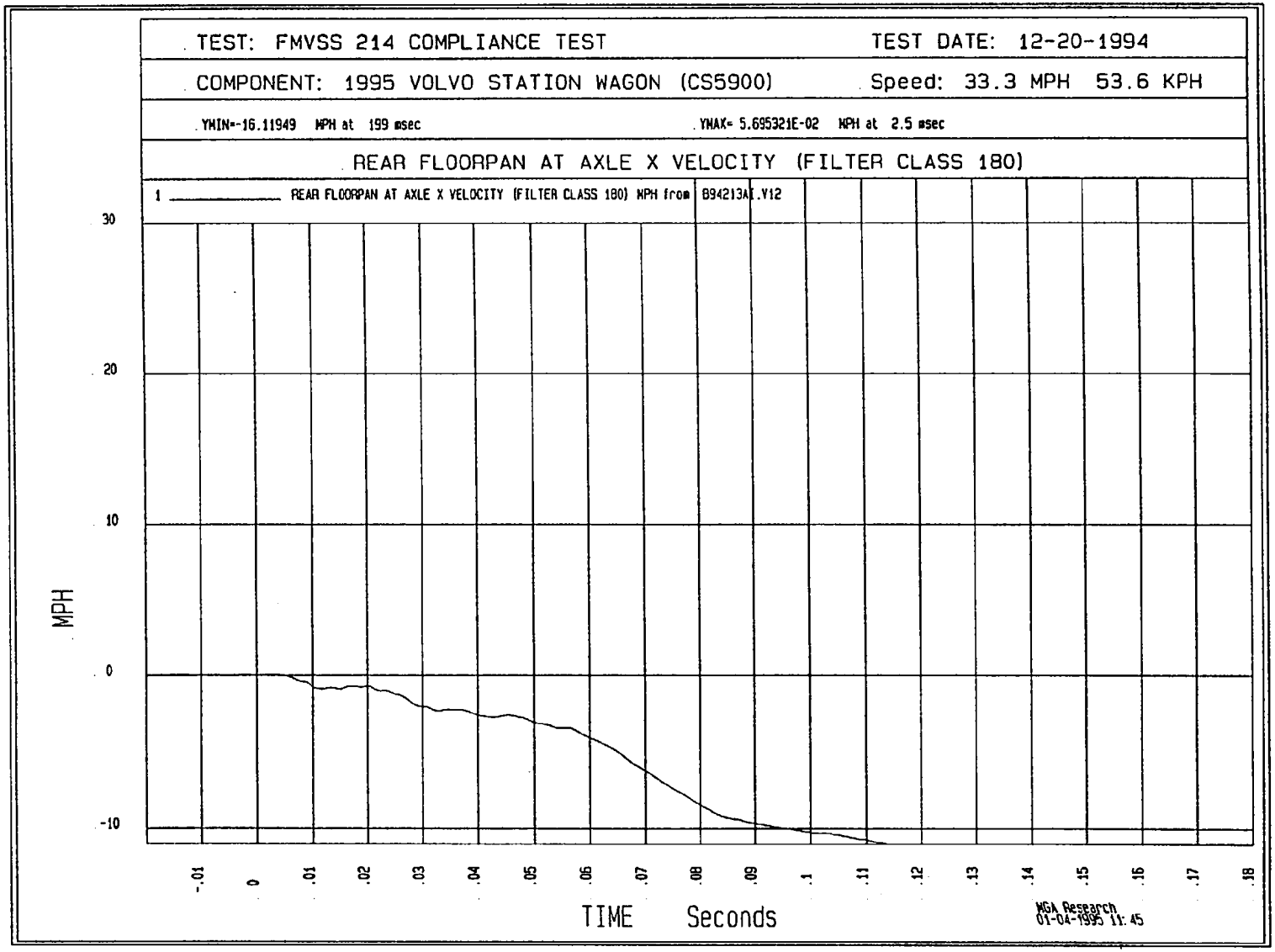

Figure B-38 - Rear Floorpan at Axle X Velocity vs. Time

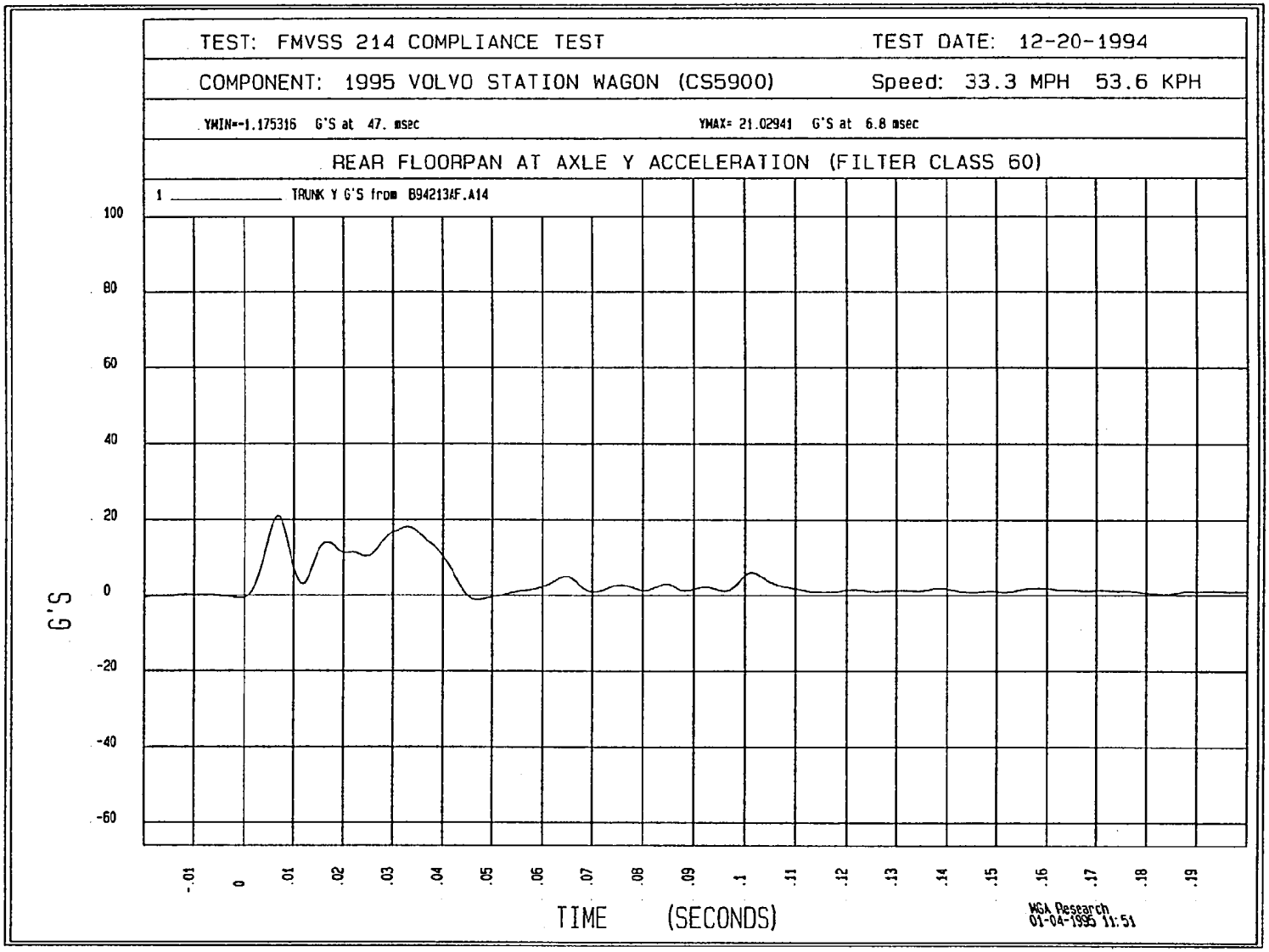

Figure B-39 - Rear Floorpan at Axle Y Acceleration vs. Time

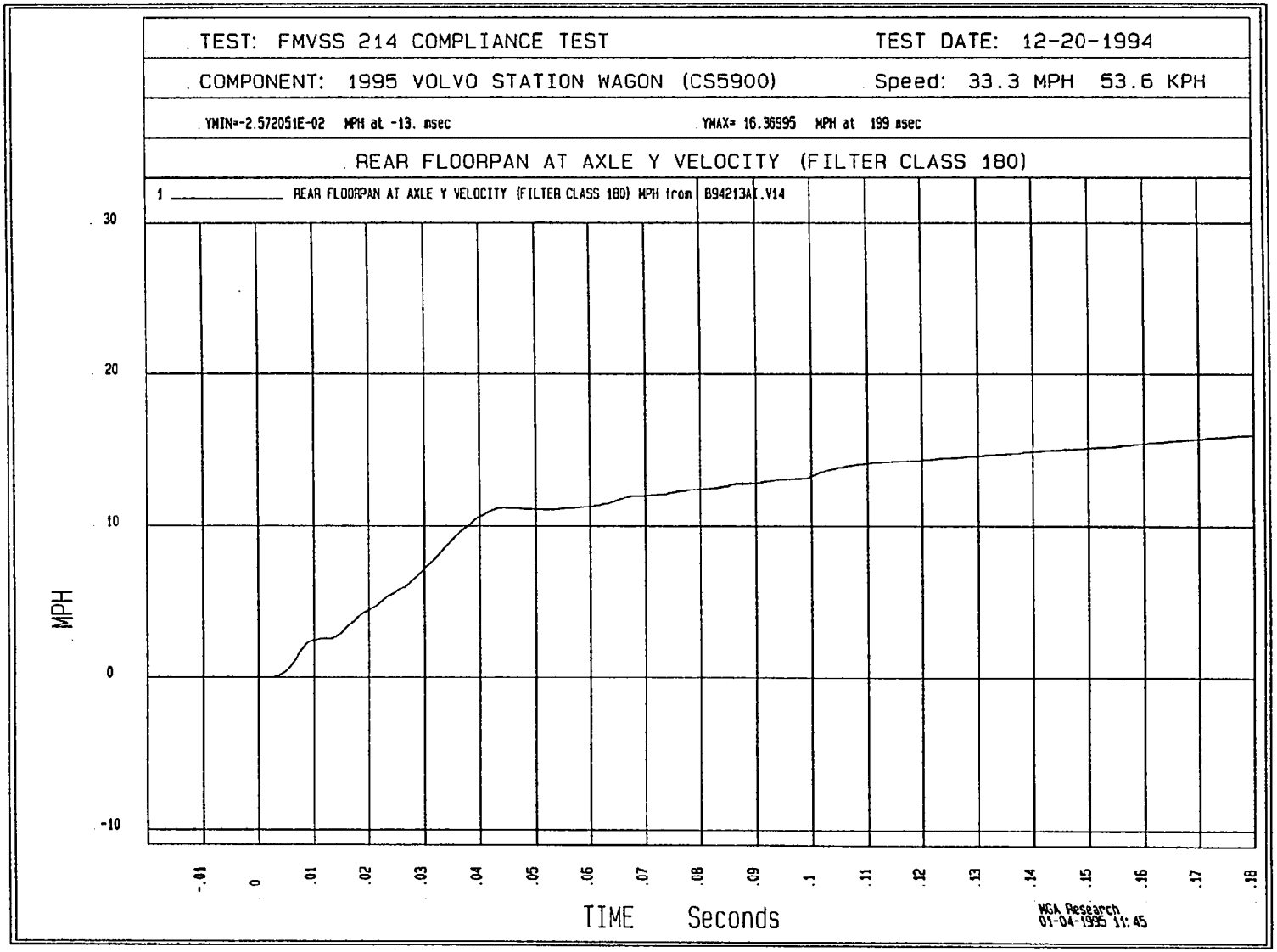

Figure B-4Ø - Rear Floorpan at Axle Y Velocity vs. Time

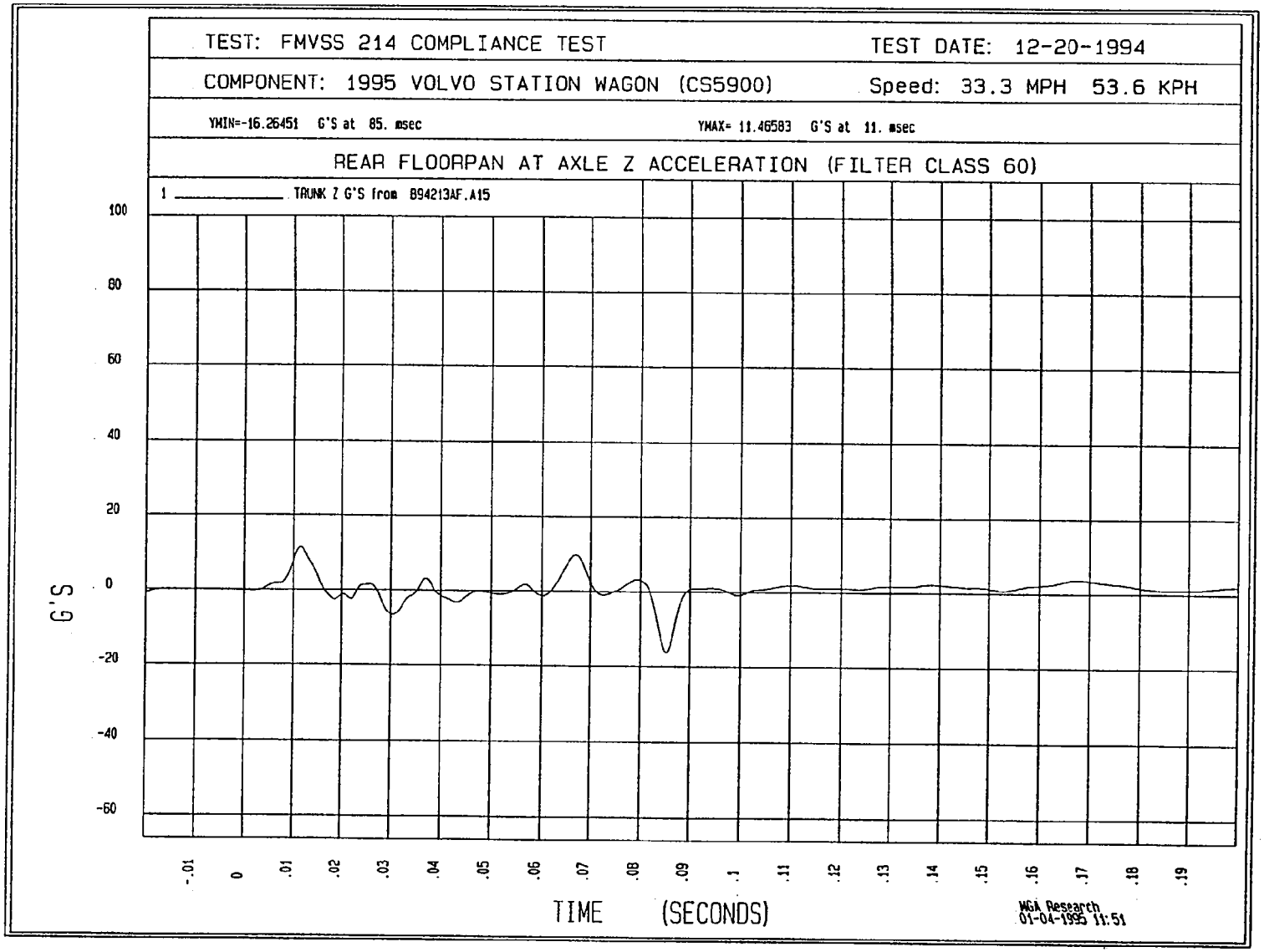

Figure B-41 - Rear Floorpan at Axle Z Acceleration vs. Time

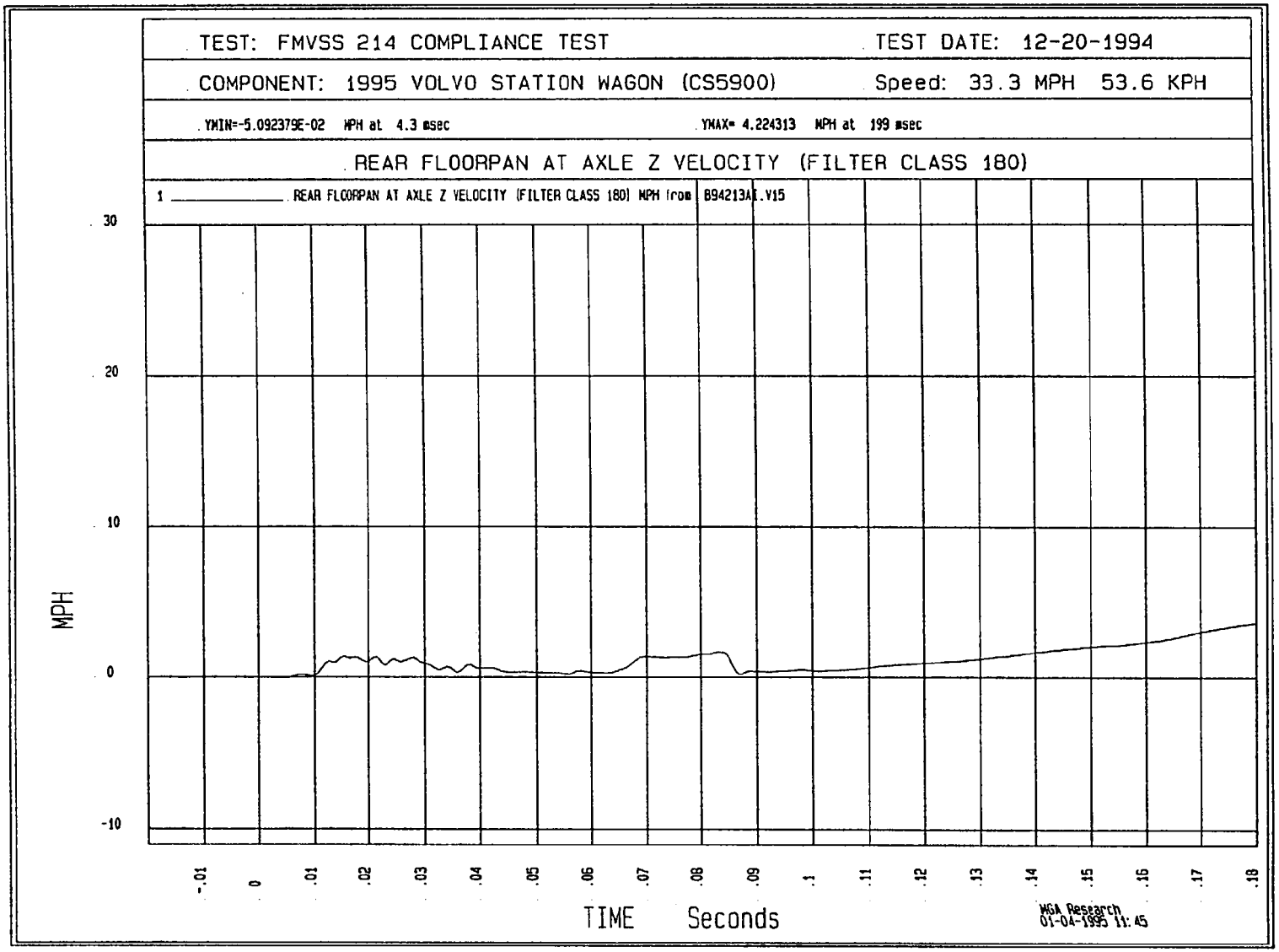

Figure B-42 - Rear Floorpan at Axle Z Velocity vs. Time

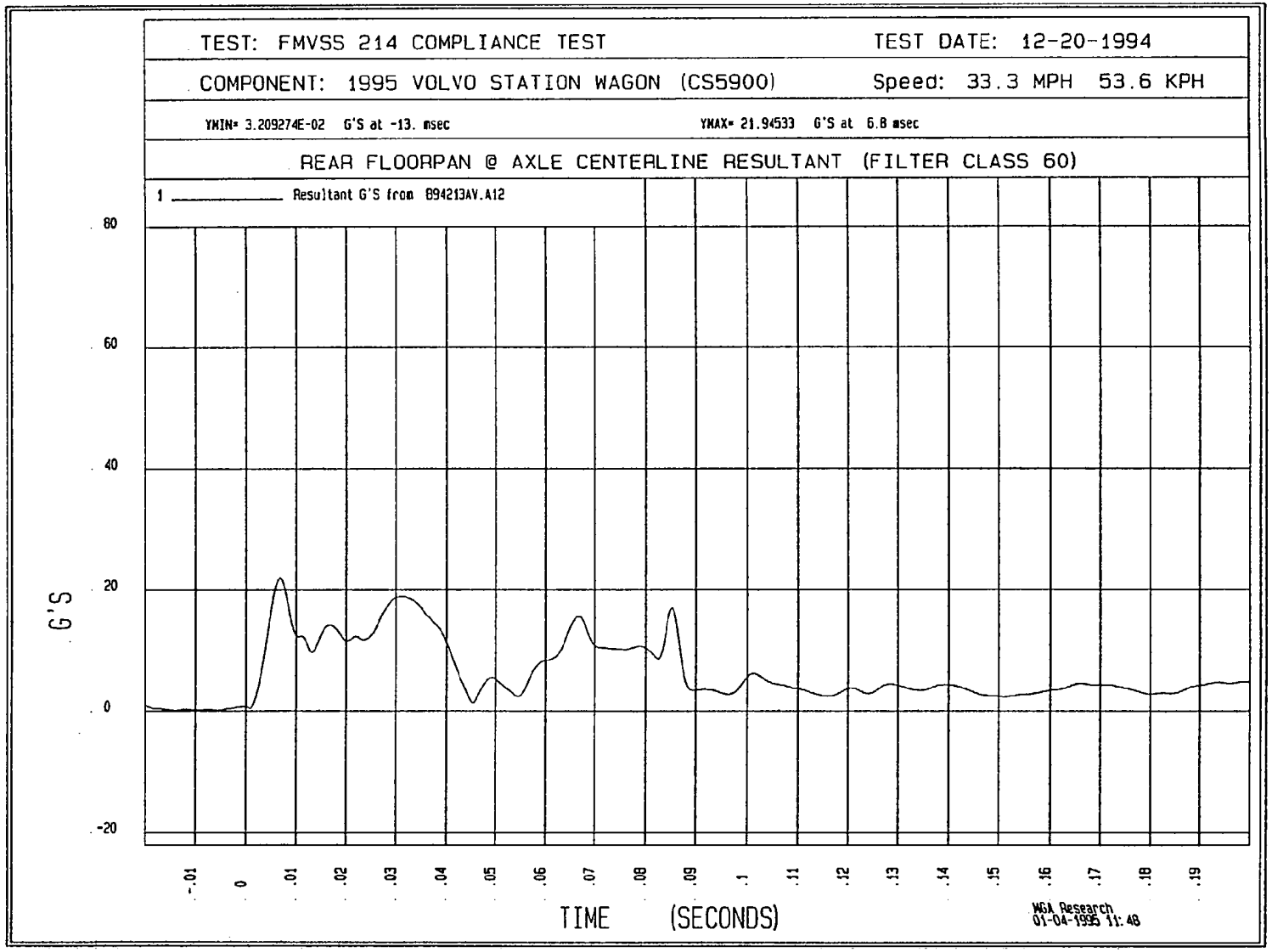

Figure B-43 - Rear Floorpan at Axle Centerline Resultant vs. Time

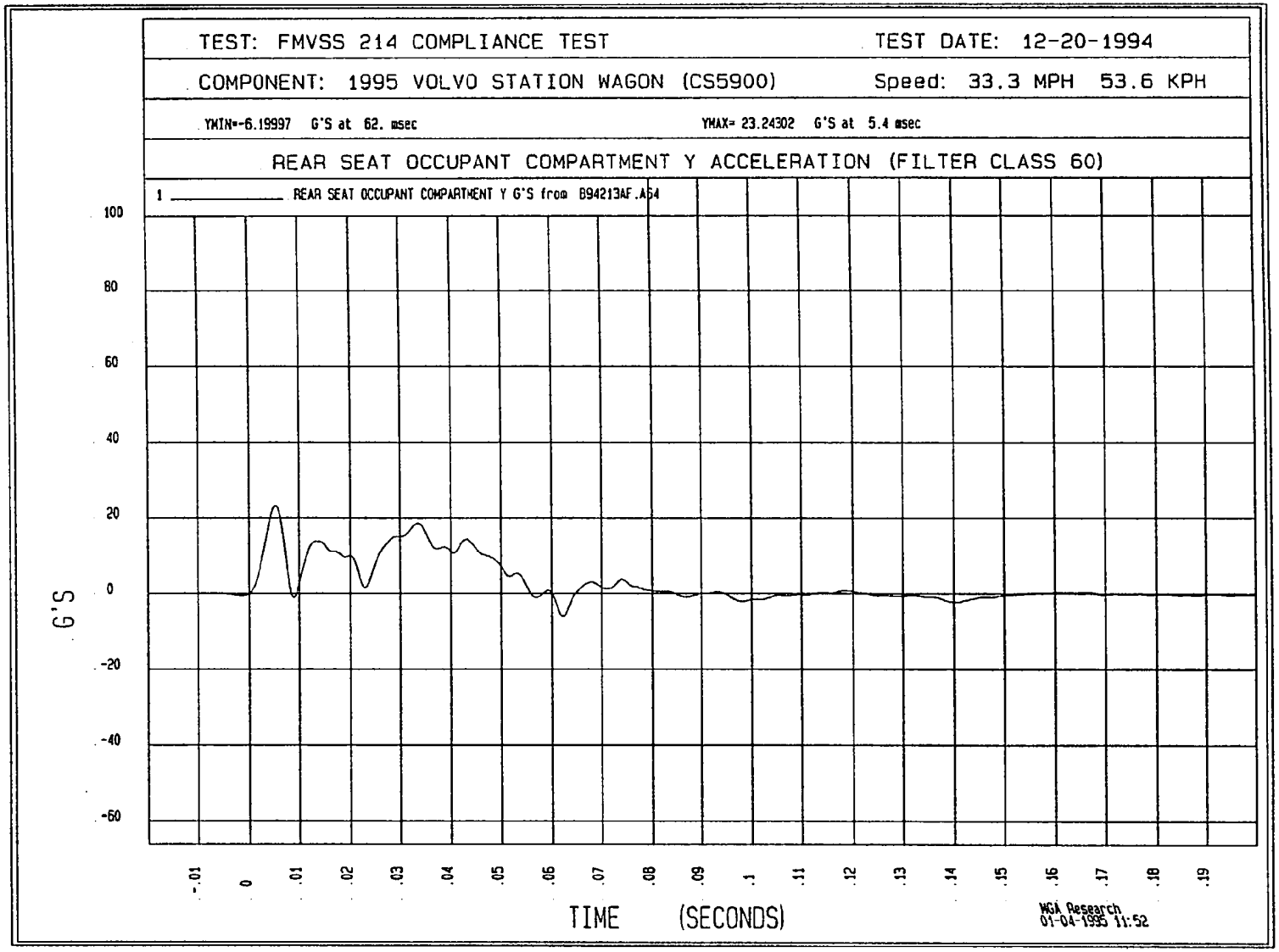

Figure B-44 - Rear Seat Occupant Compartment Y Acceleration vs. Time

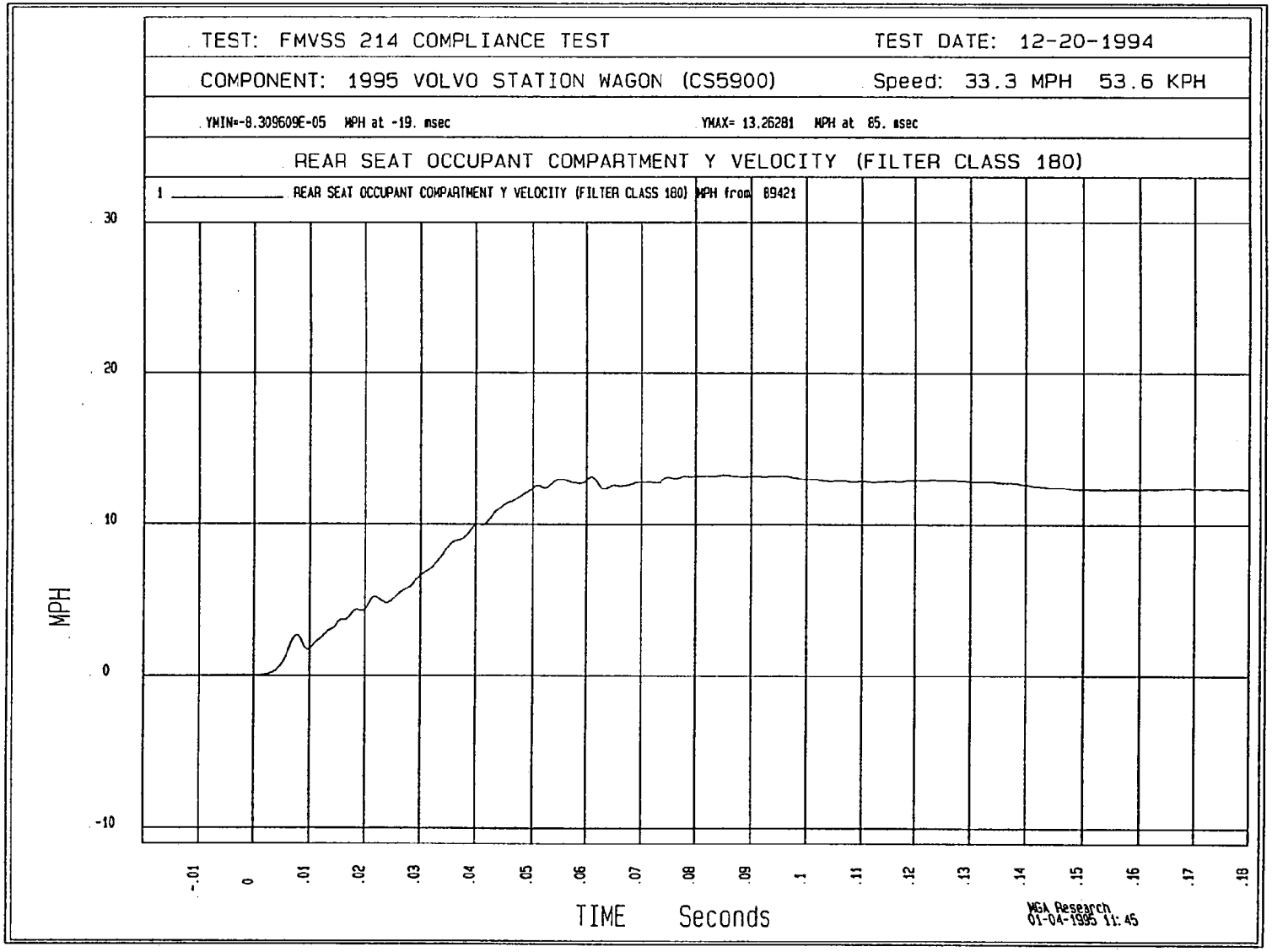

Figure B-45 - Rear Seat Occupant Compartment Y Velocity vs. Time

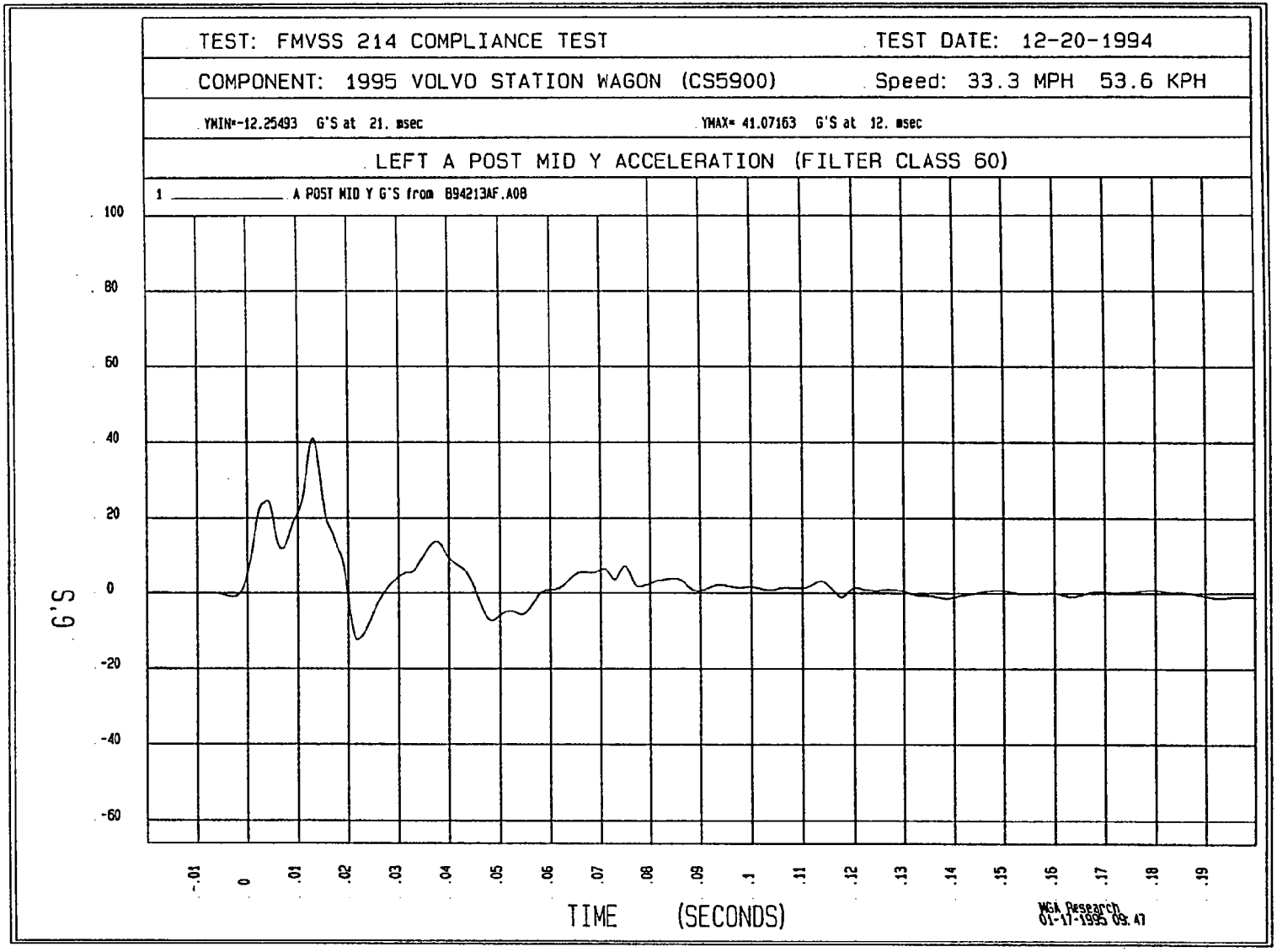

Figure B-46 - Left A Post Mid Y Acceleration vs. Time

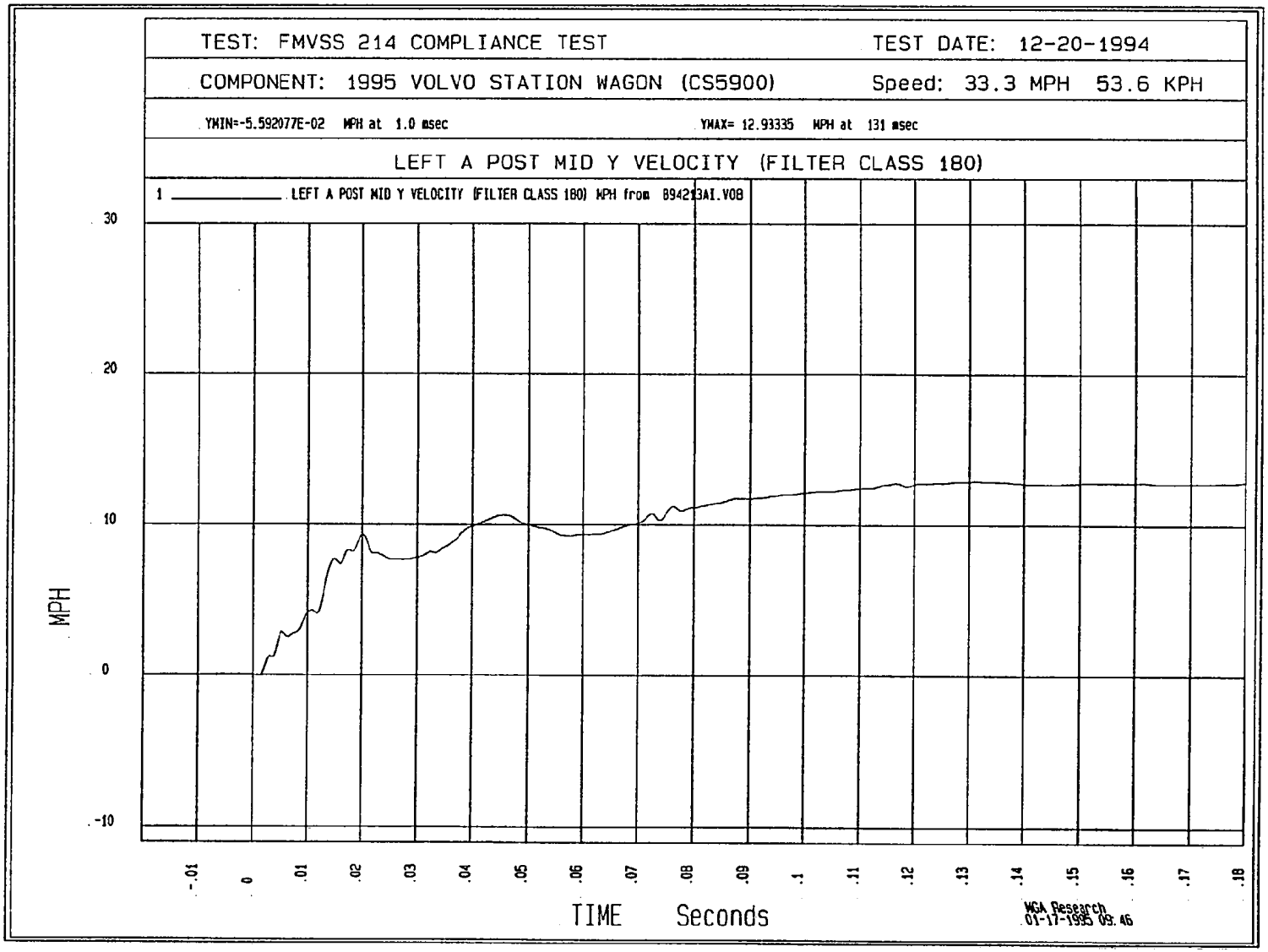

Figure B-47 - Left A Post Mid Y Velocity vs. Time

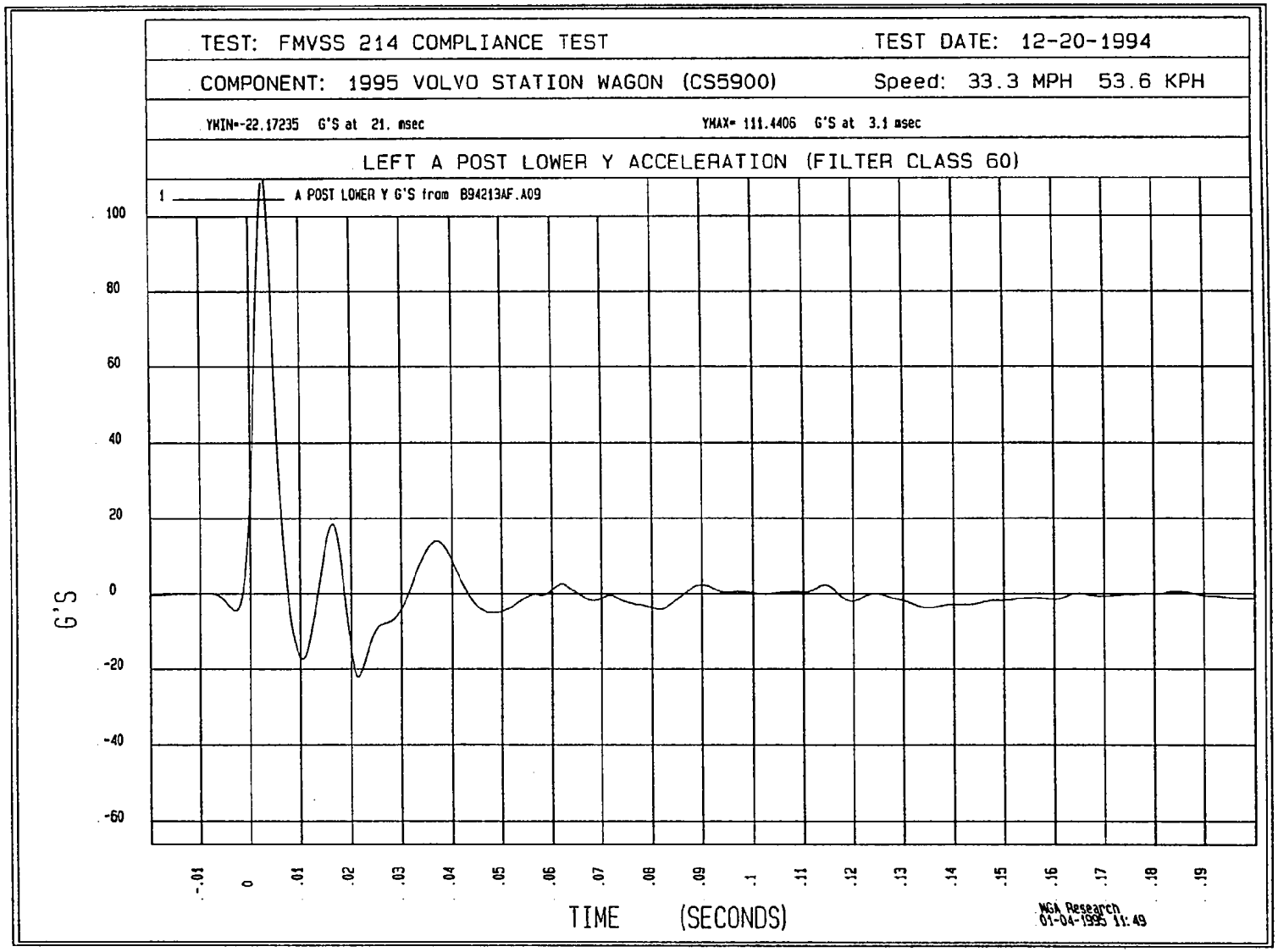

Figure B-48 - Left A Post Lower Y Acceleration vs. Time

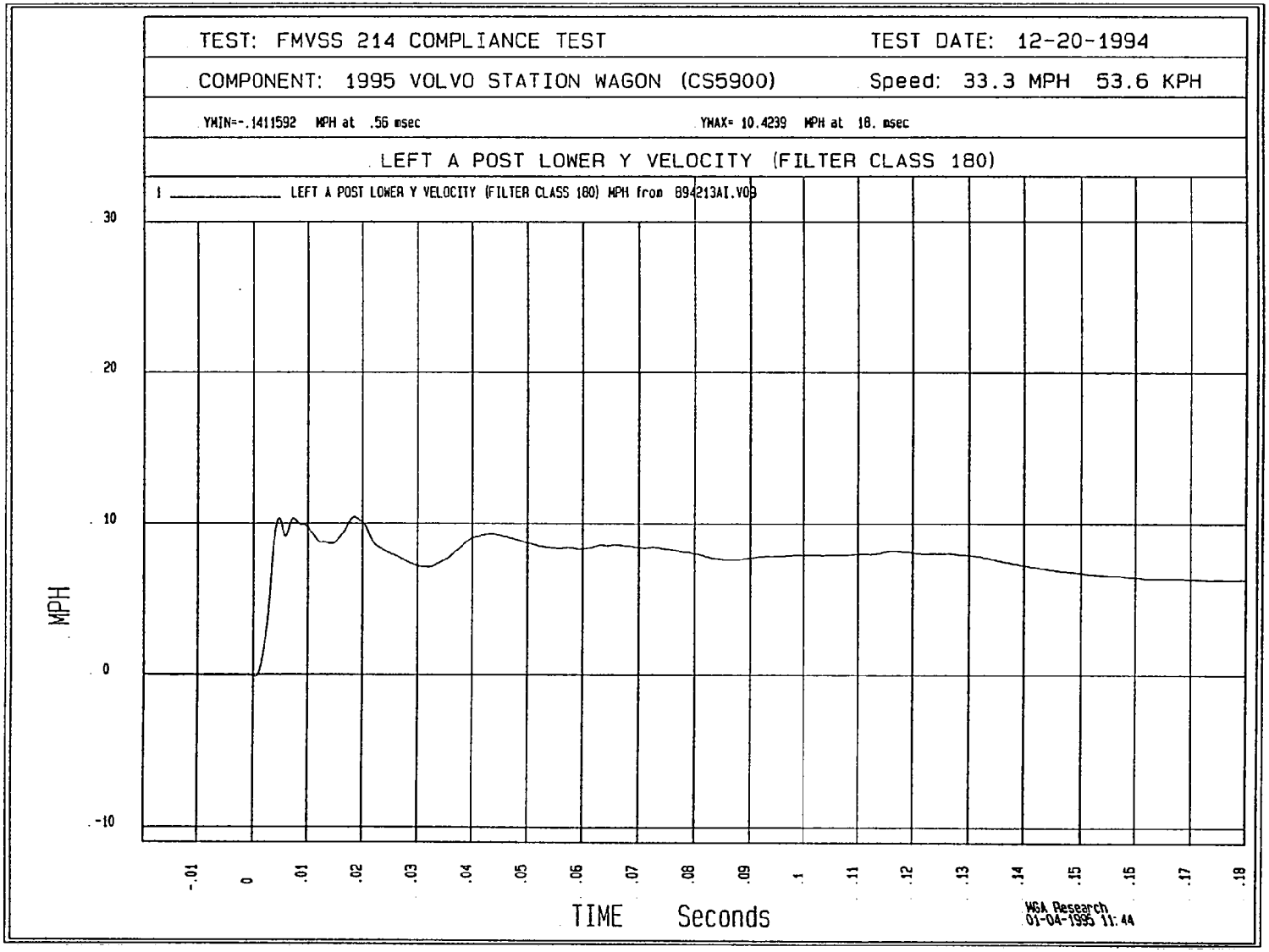

Figure B-49 - Left A Post Lower Y Velocity vs. Time

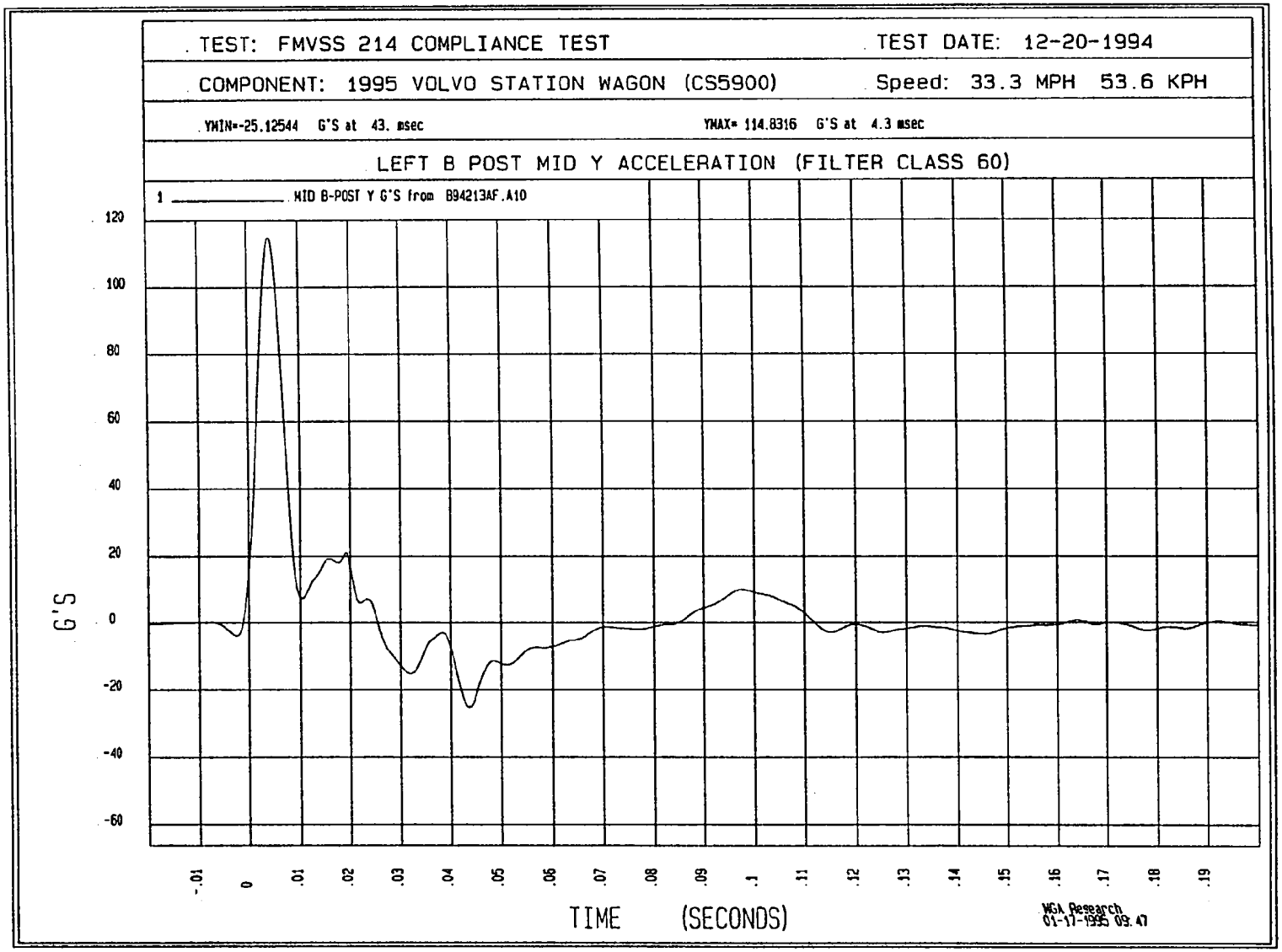

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Figure B-5Ø - Left B Post Mid Y Acceleration vs. Time

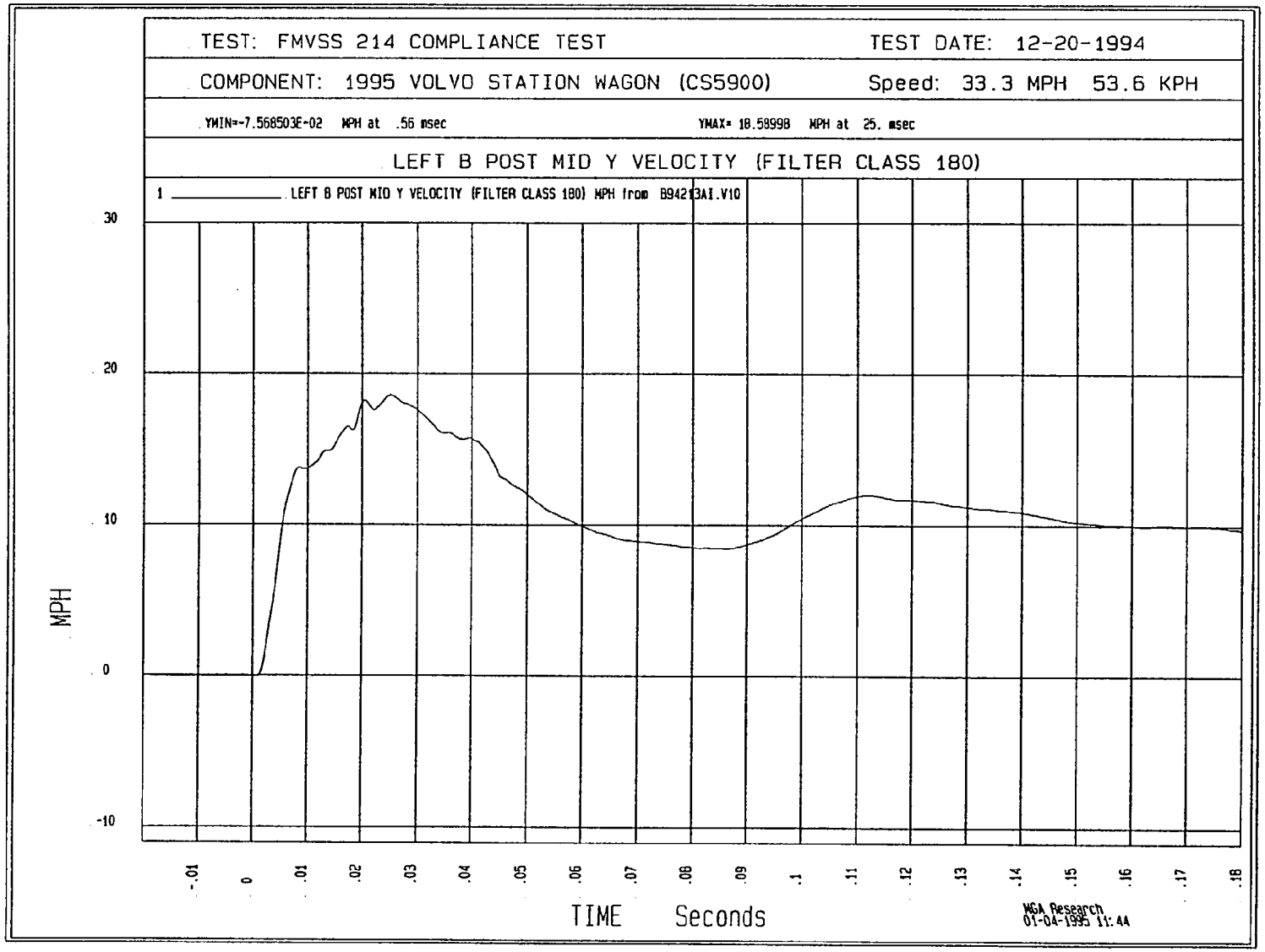

Figure B-51 - Left B Post Mid Y Velocity vs. Time

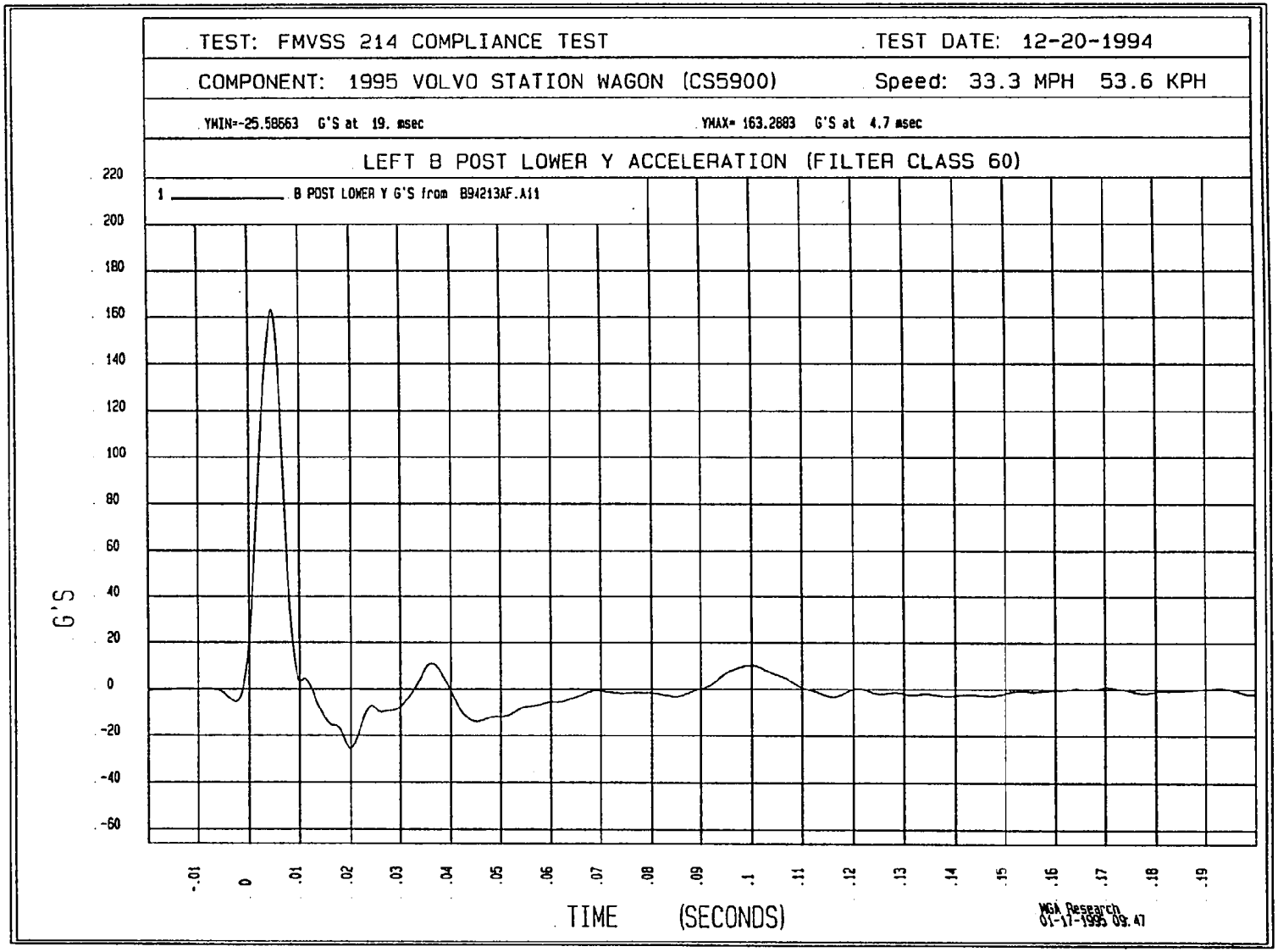

Figure B-52 - Left B Post Lower Y Acceleration vs. Time

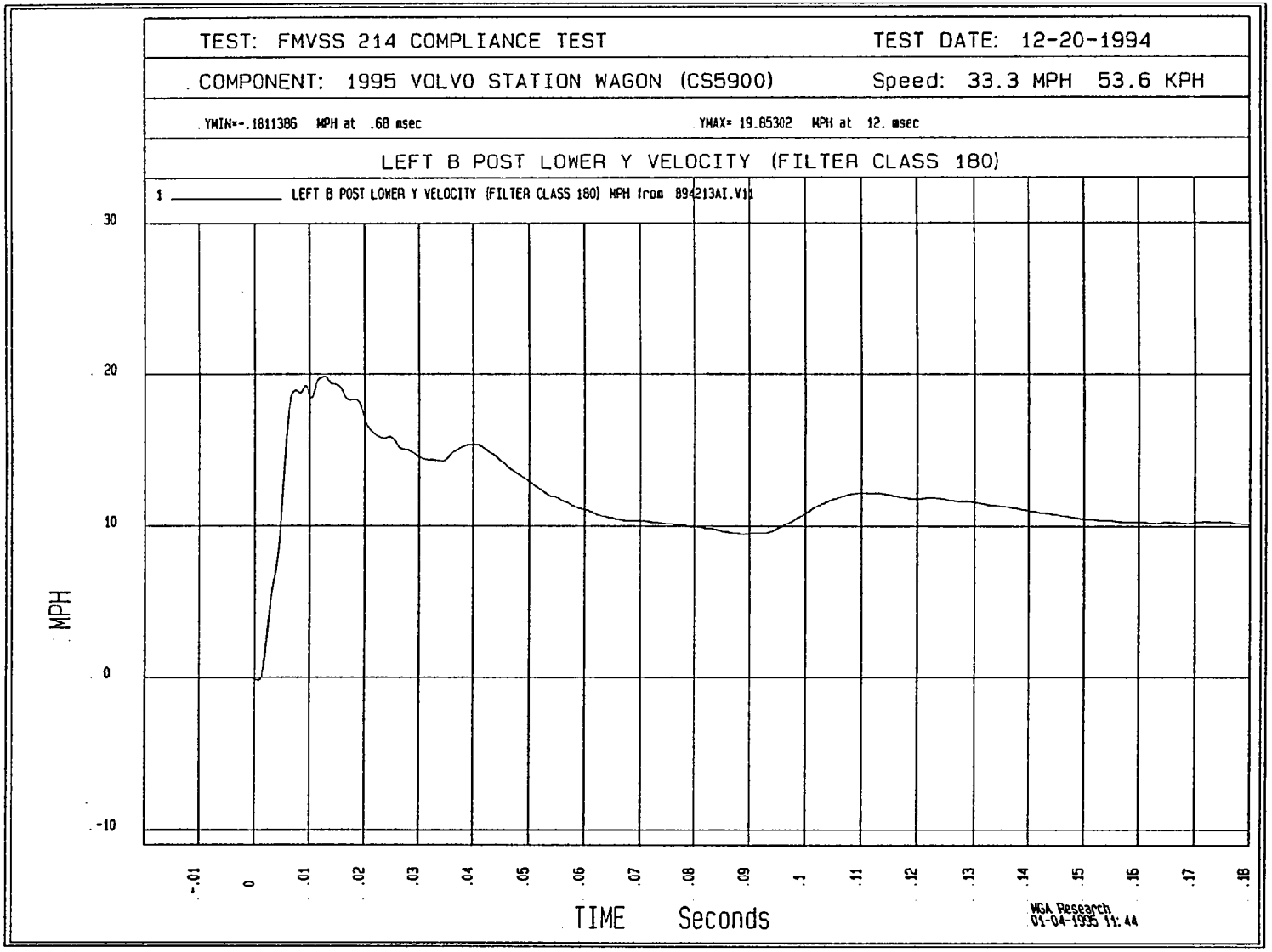

Figure B-53 - Left B Post Lower Y Velocity vs. Time

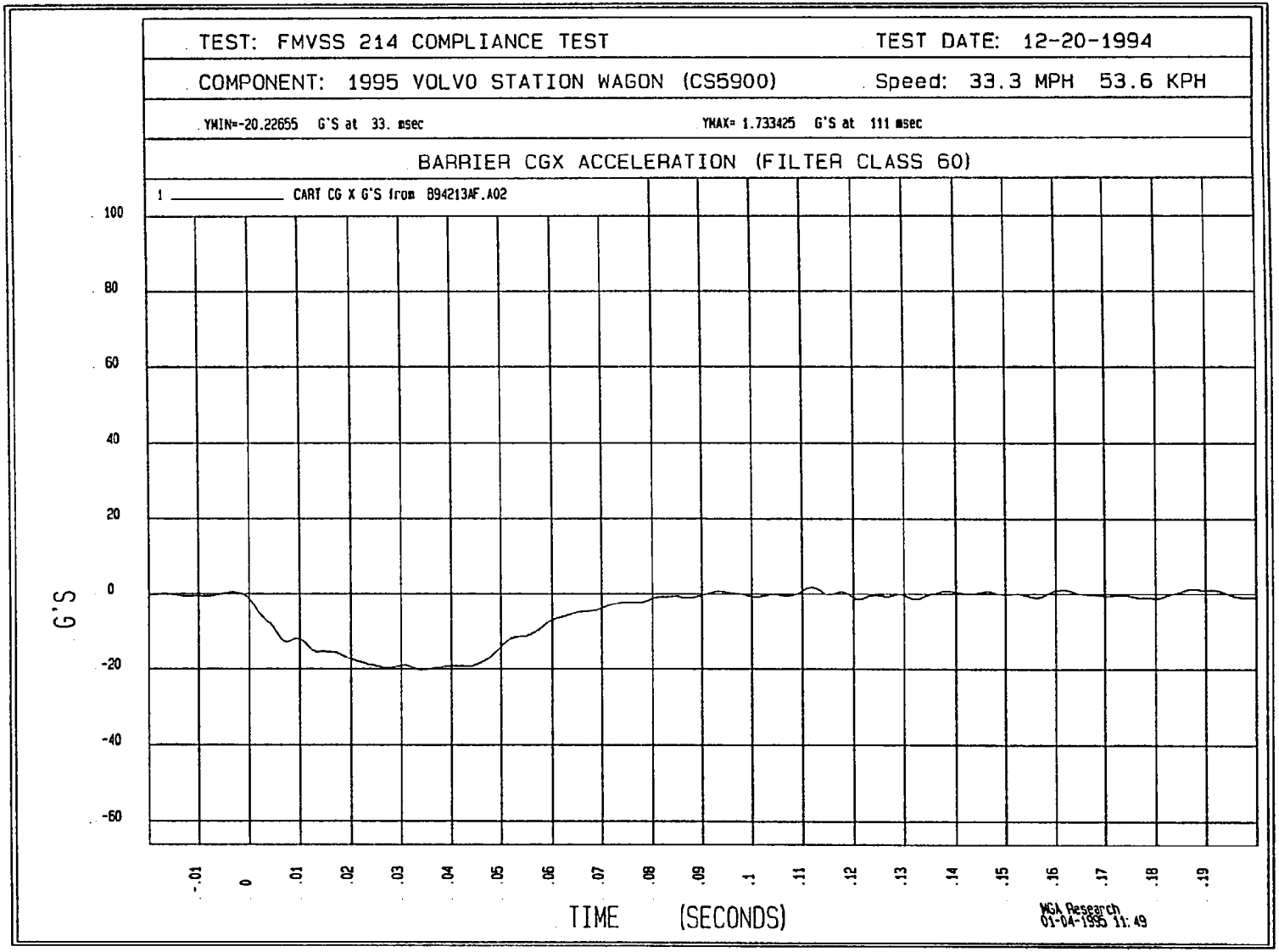

Figure B-54 - Moving Barrier Center of Gravity X Acceleration vs. Time

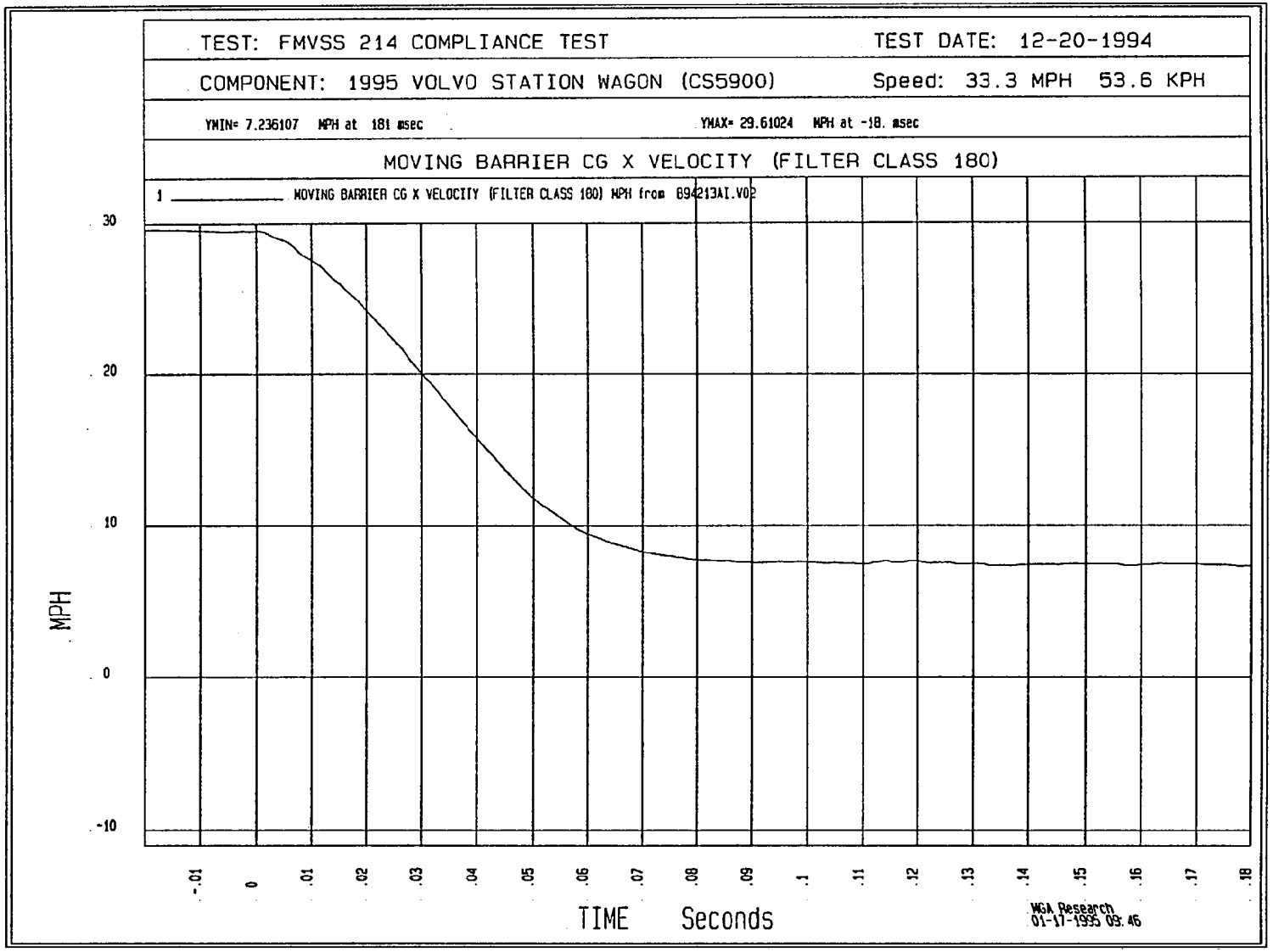

Figure B-55 - Moving Barrier Center of Gravity X Velocity vs. Time

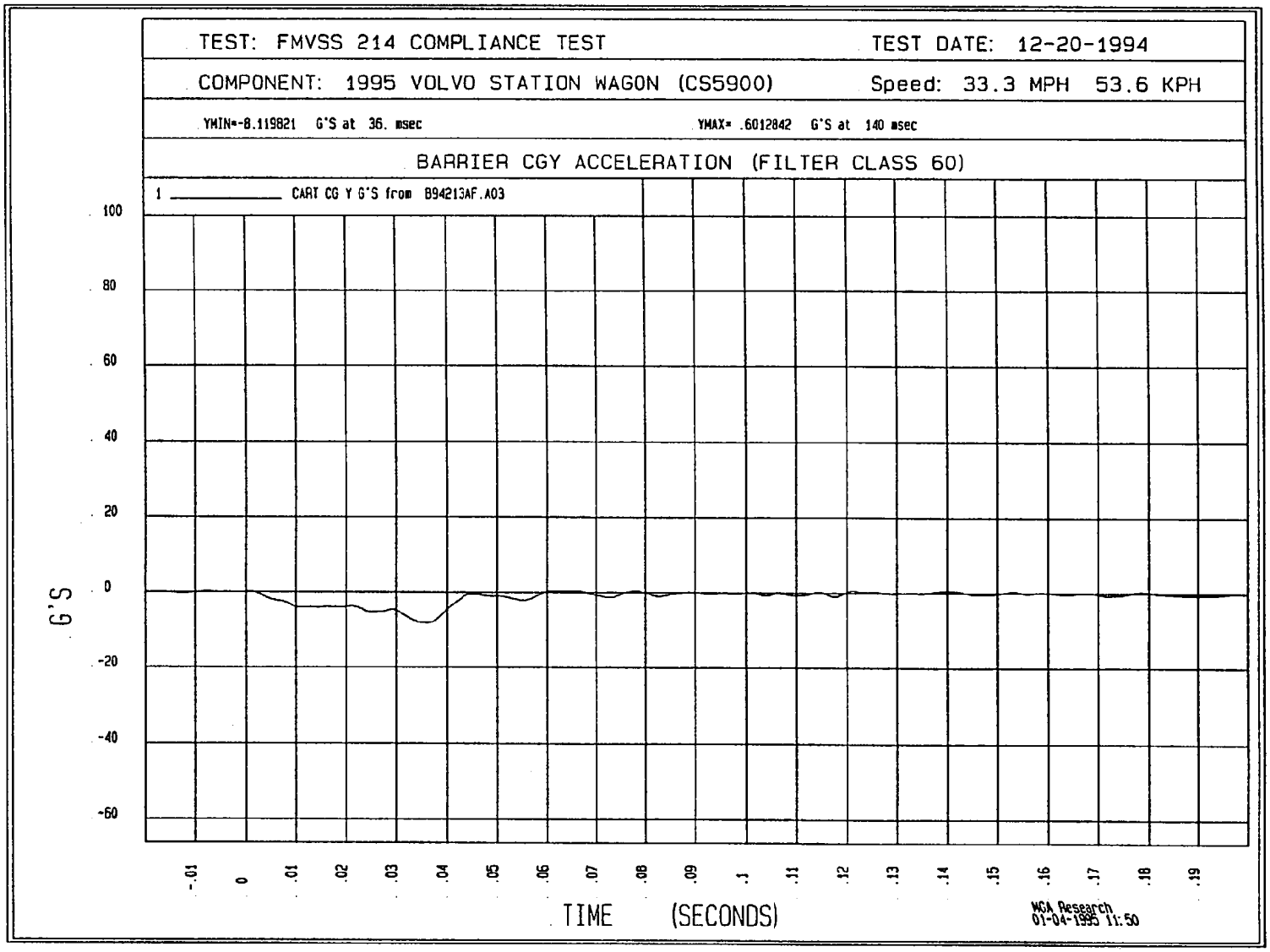

Figure B-56 - Moving Barrier Center of Gravity Y Acceleration vs. Time

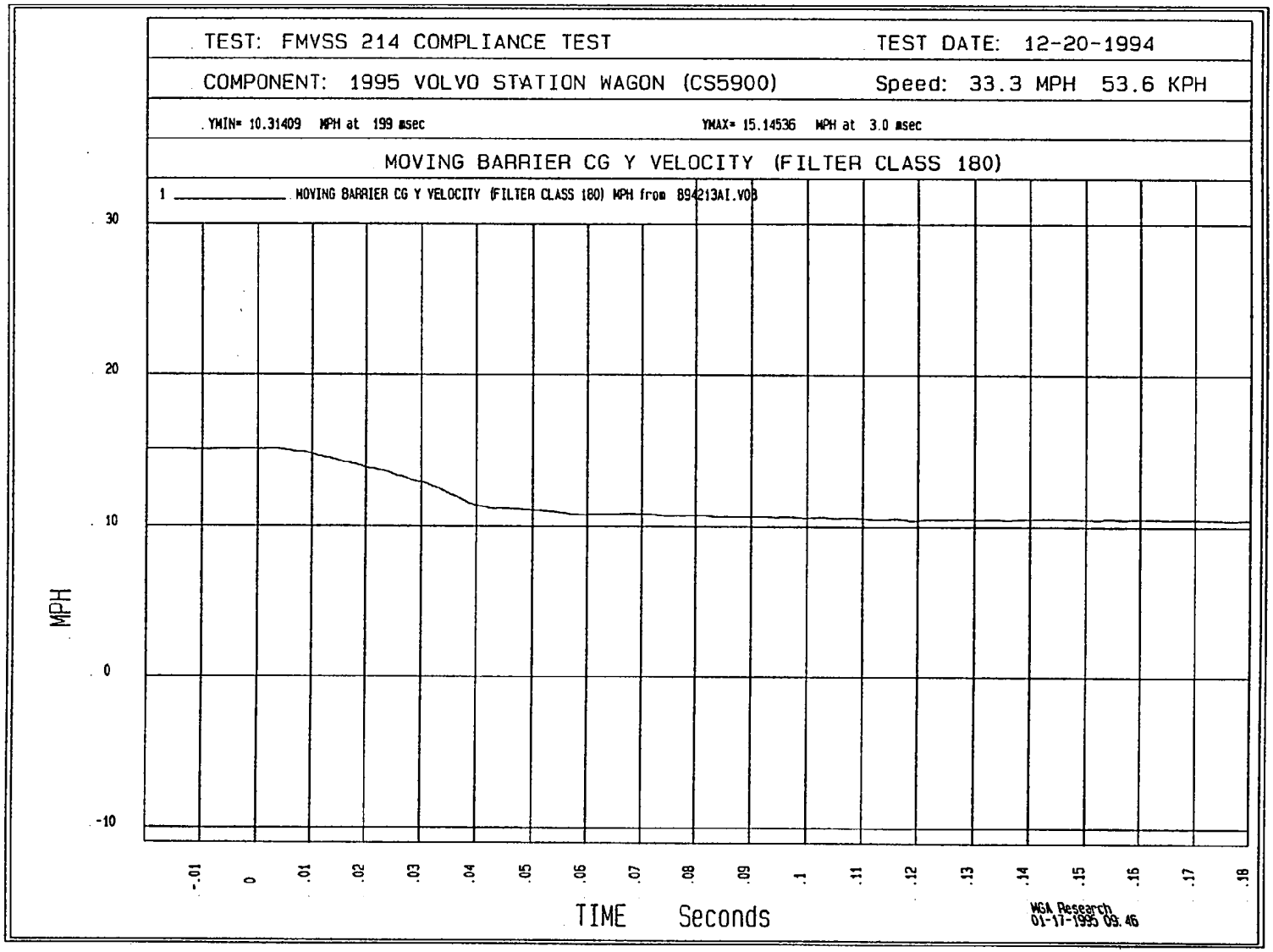

Figure B-57 - Moving Barrier Center of Gravity Y Velocity vs. Time

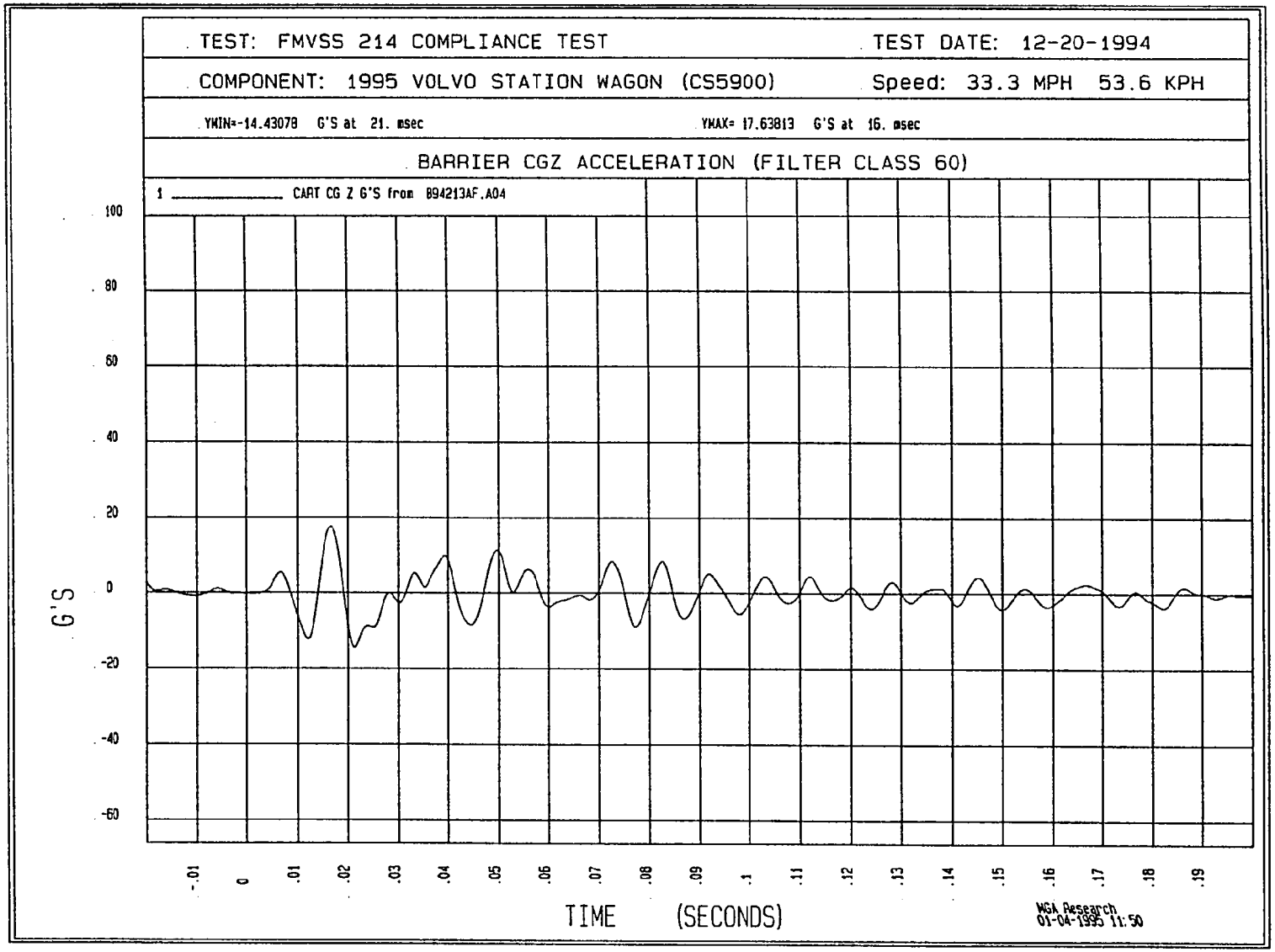

Figure B-58 - Moving Barrier Center of Gravity Z Acceleration vs. Time

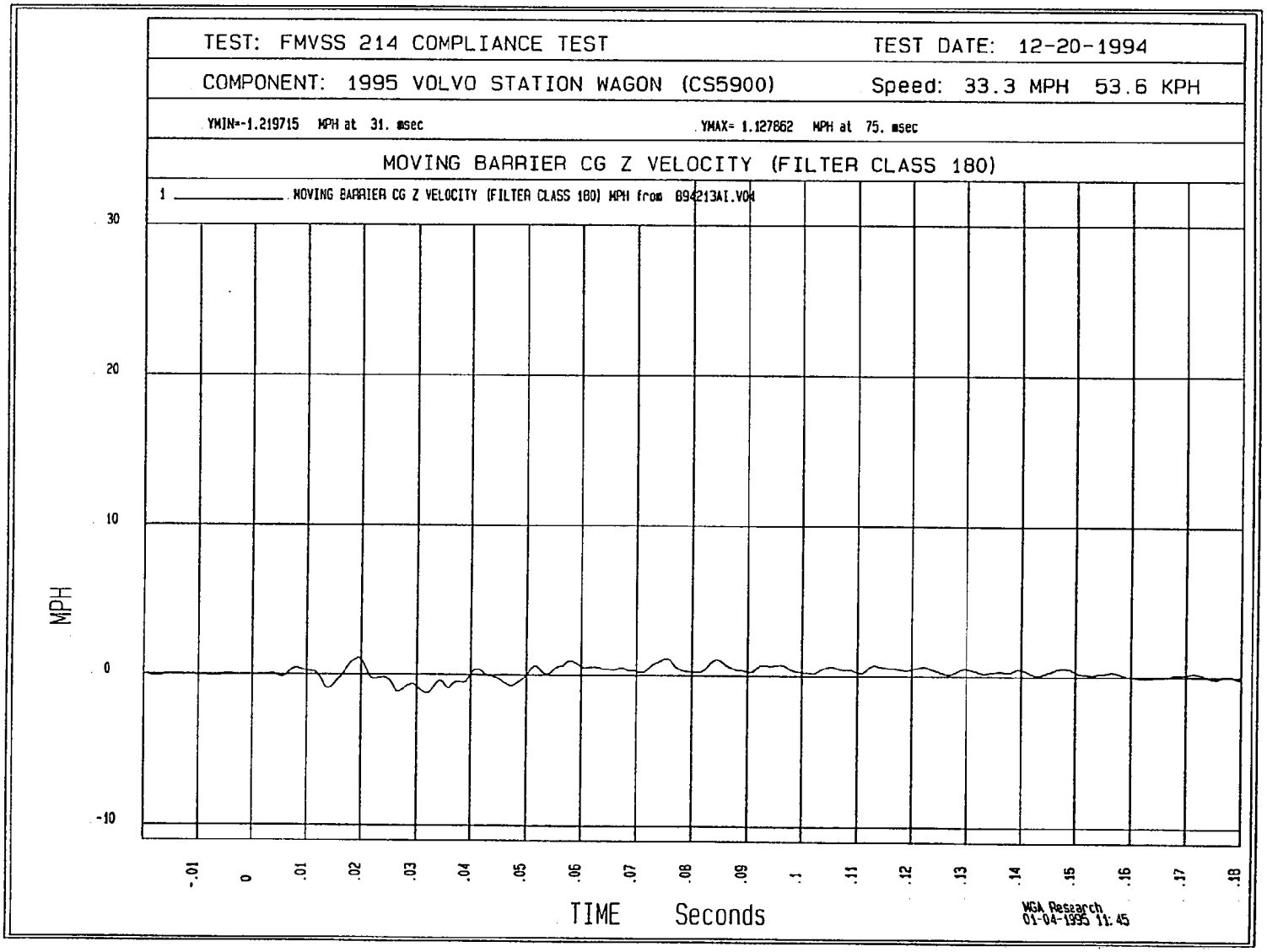

Figure B-59 - Moving Barrier Center of Gravity Z Velocity vs. Time

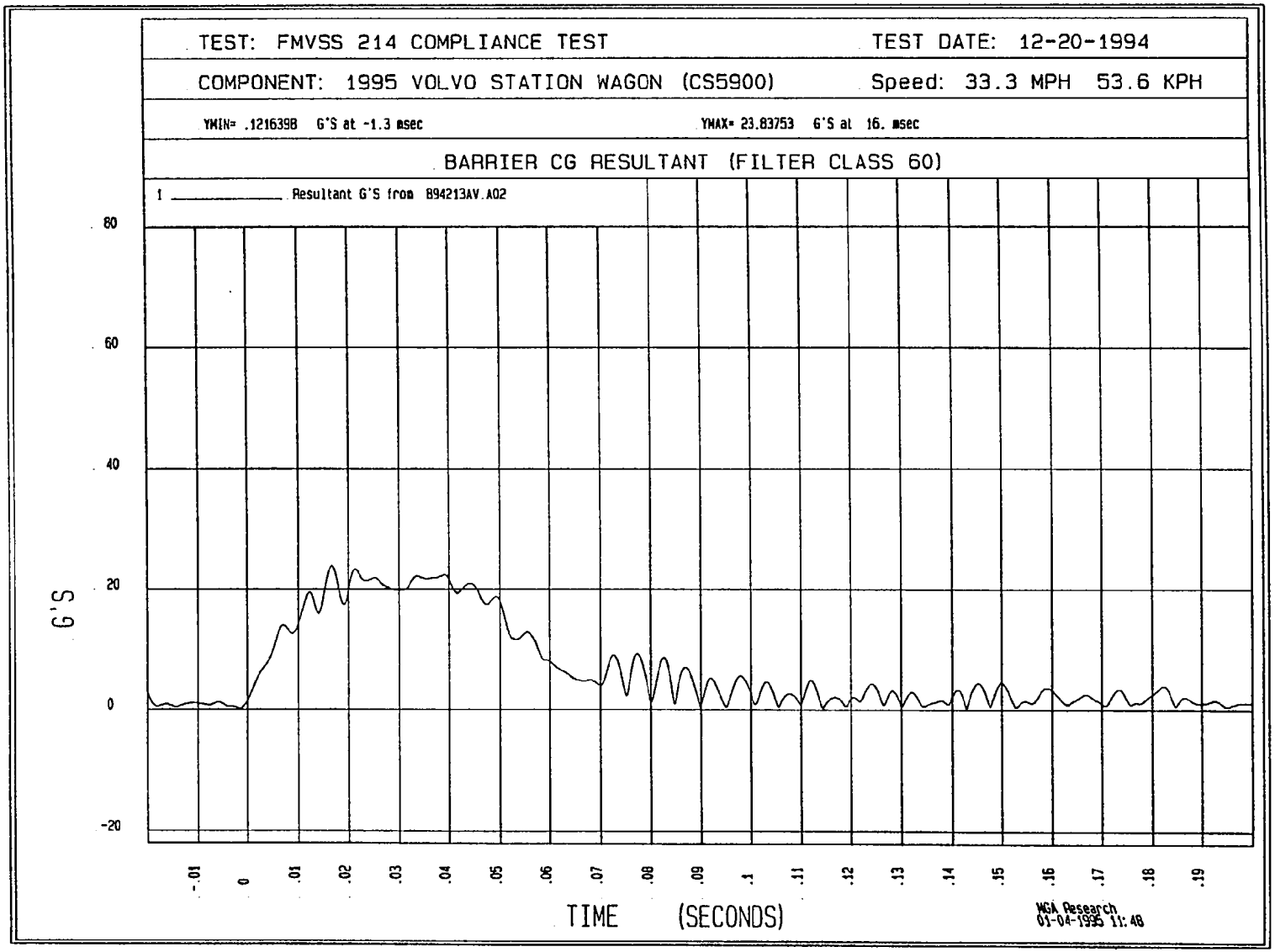

Figure B-6Ø - Moving Barrier Center of Gravity Resultant vs. Time

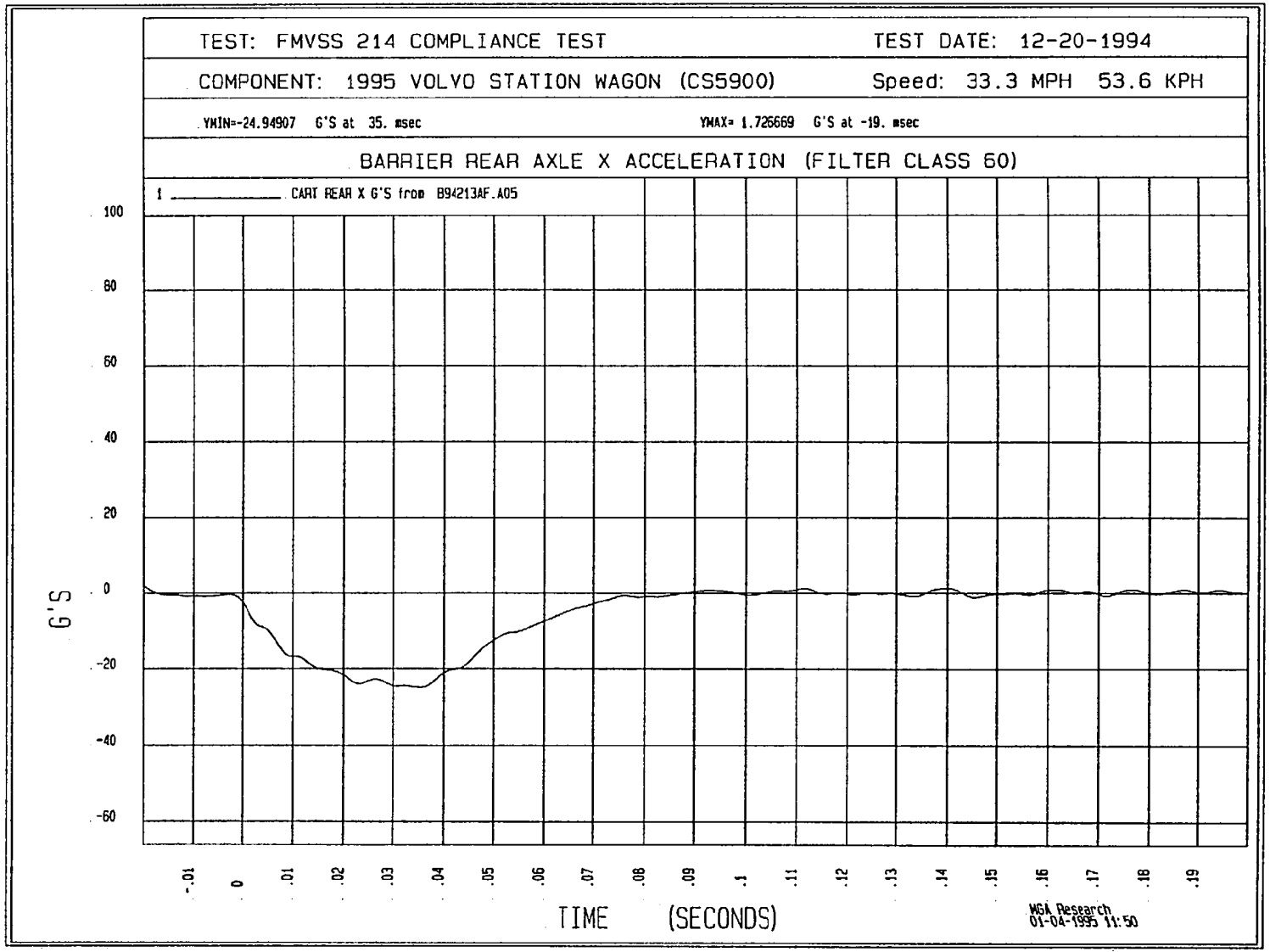

Figure B-61 - Moving Barrier Rear Axle X Acceleration vs. Time

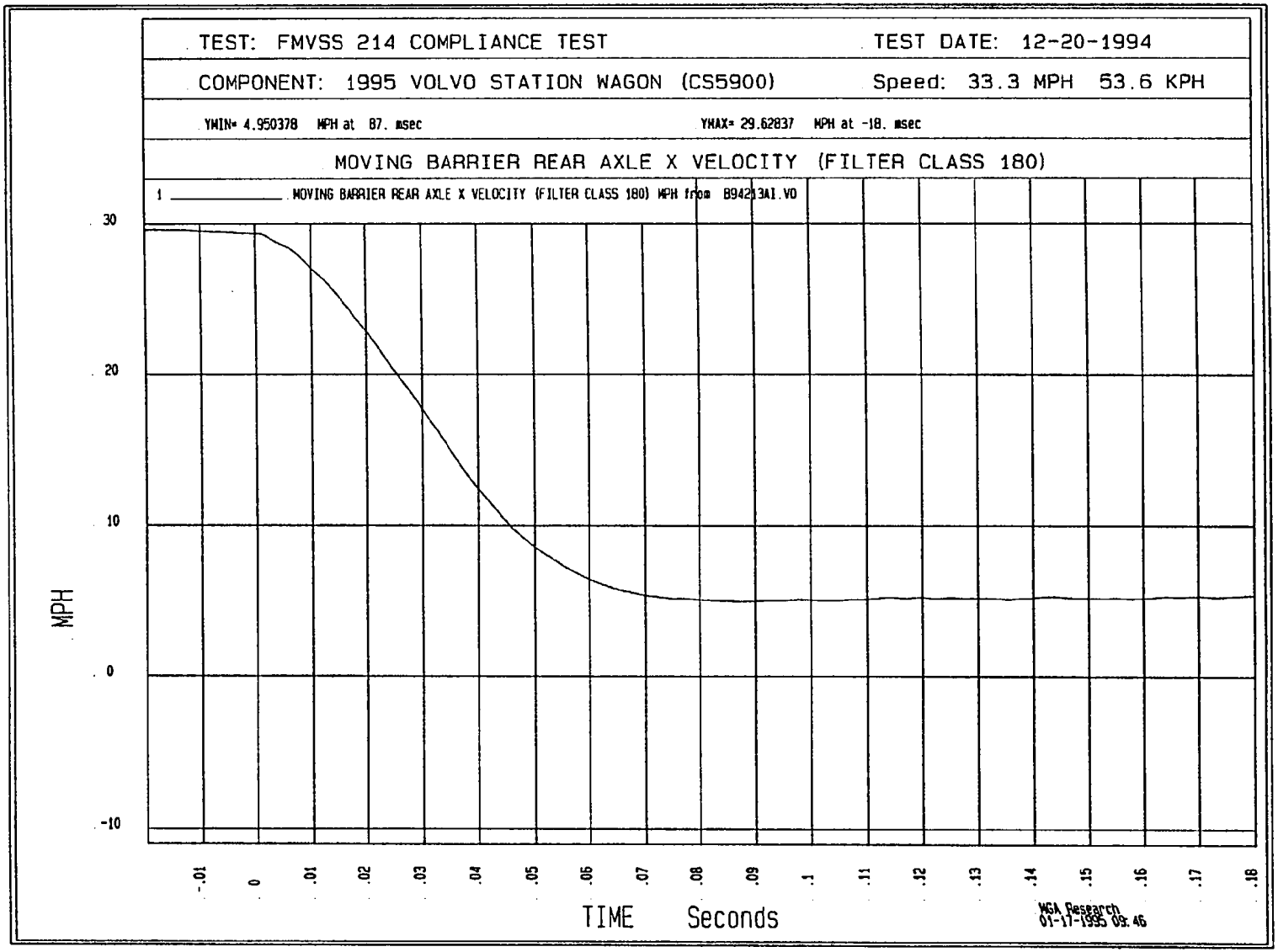

Figure B-62 - Moving Barrier Rear Axle X Velocity vs. Time

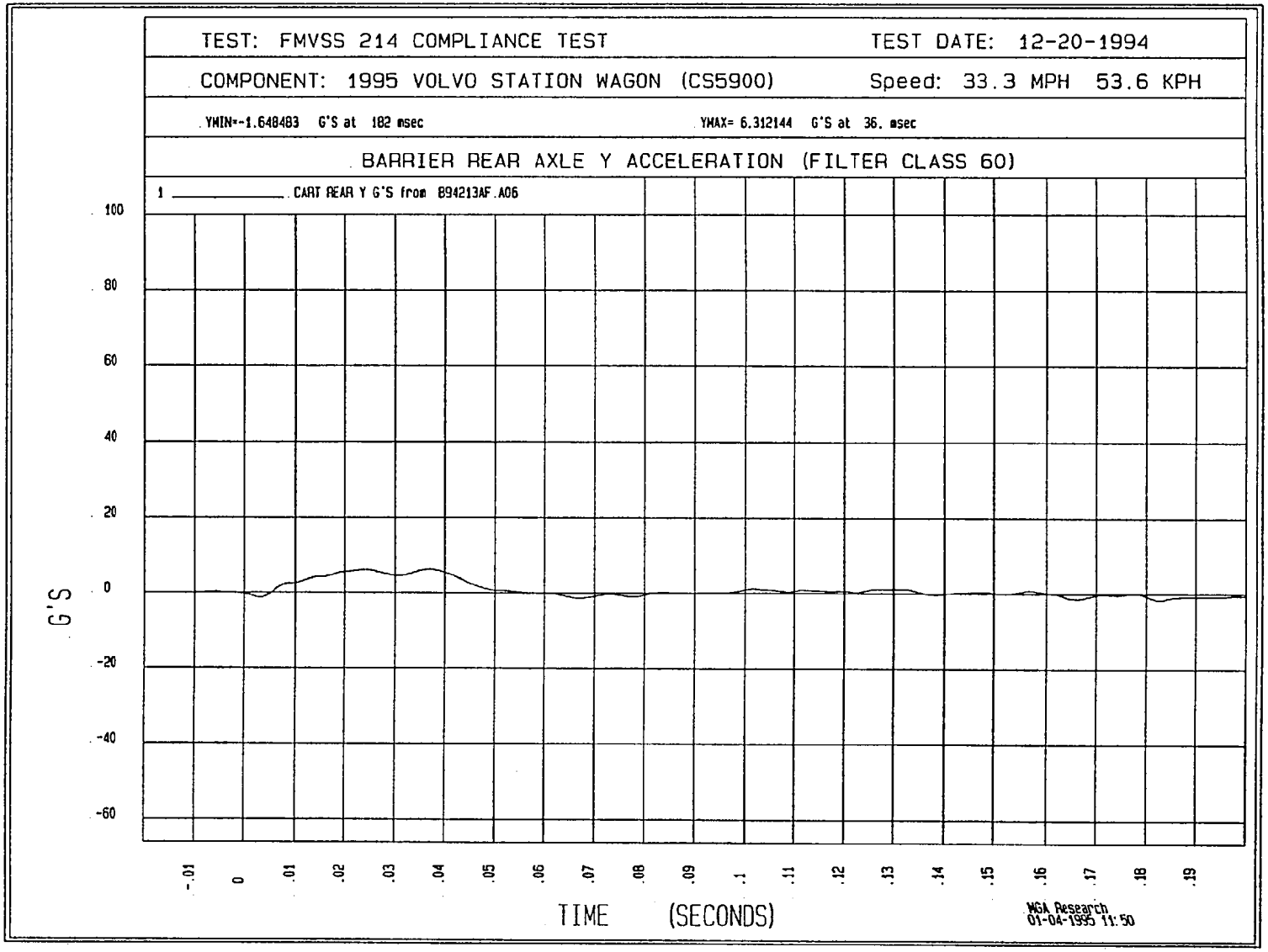

Figure B-63 - Moving Barrier Rear Axle Y Acceleration vs. Time

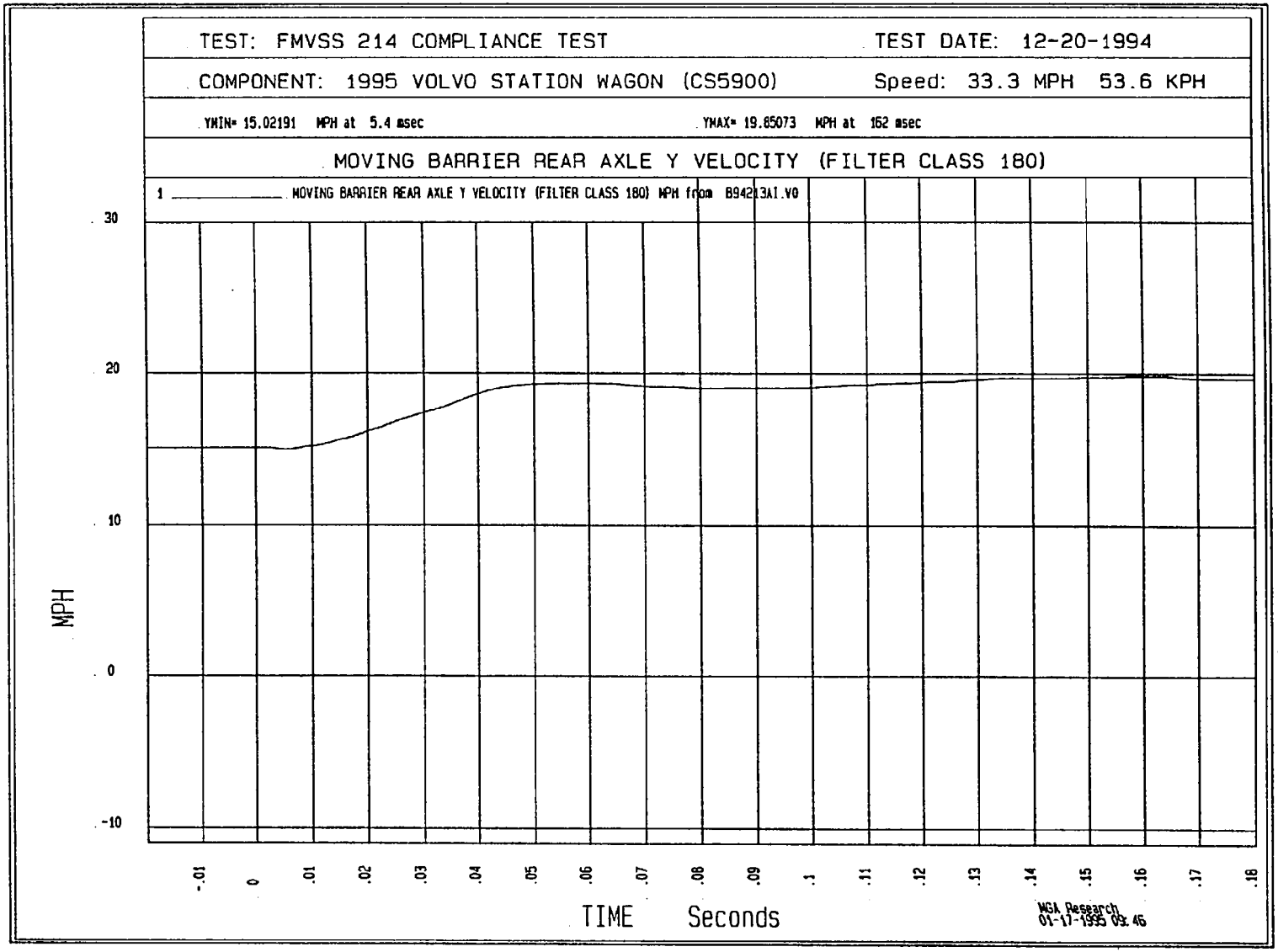

Figure B-64 - Moving Barrier Rear Axle Y Velocity vs. Time

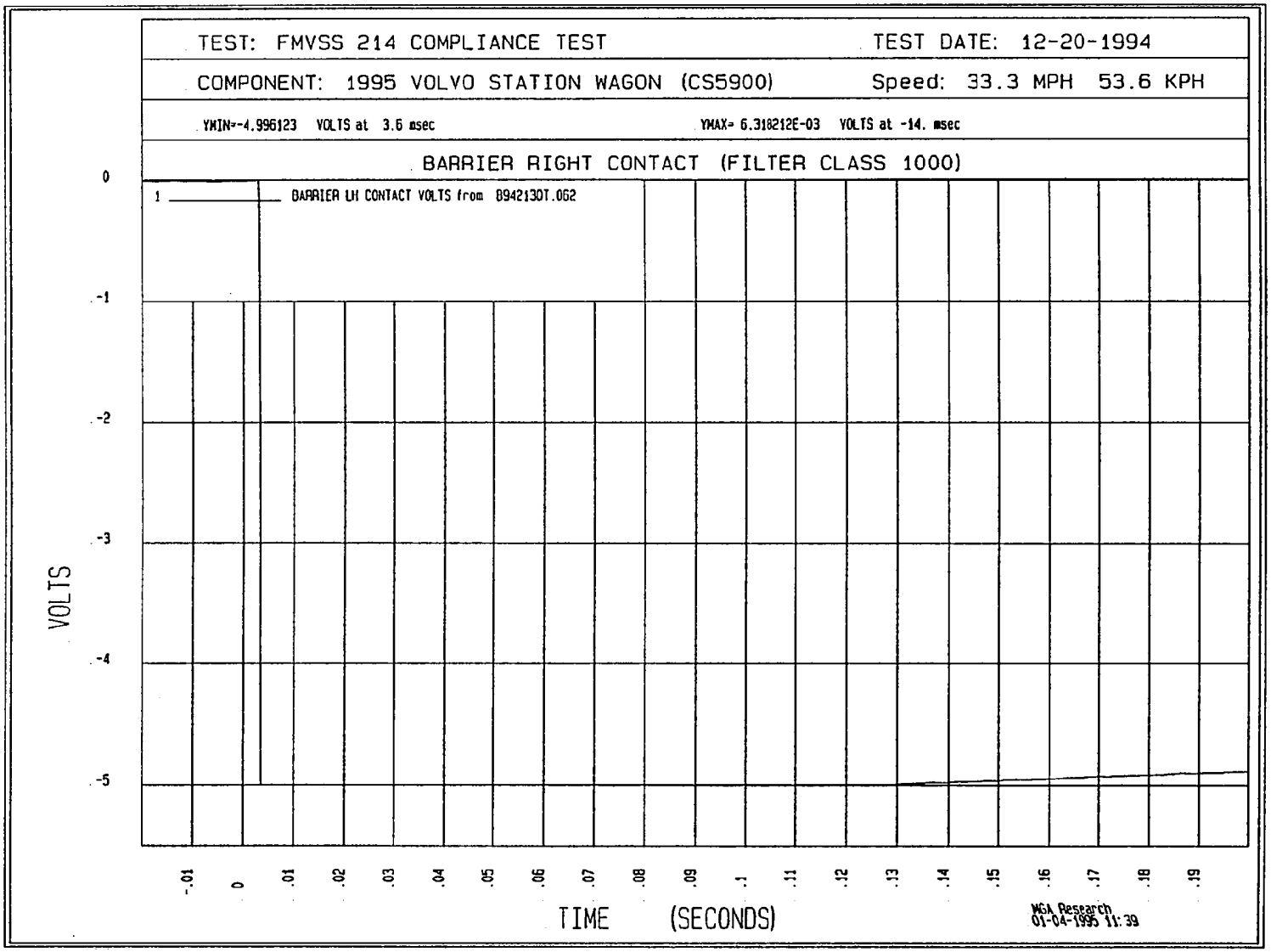

Figure B-65 - Right Hand Barrier Contact

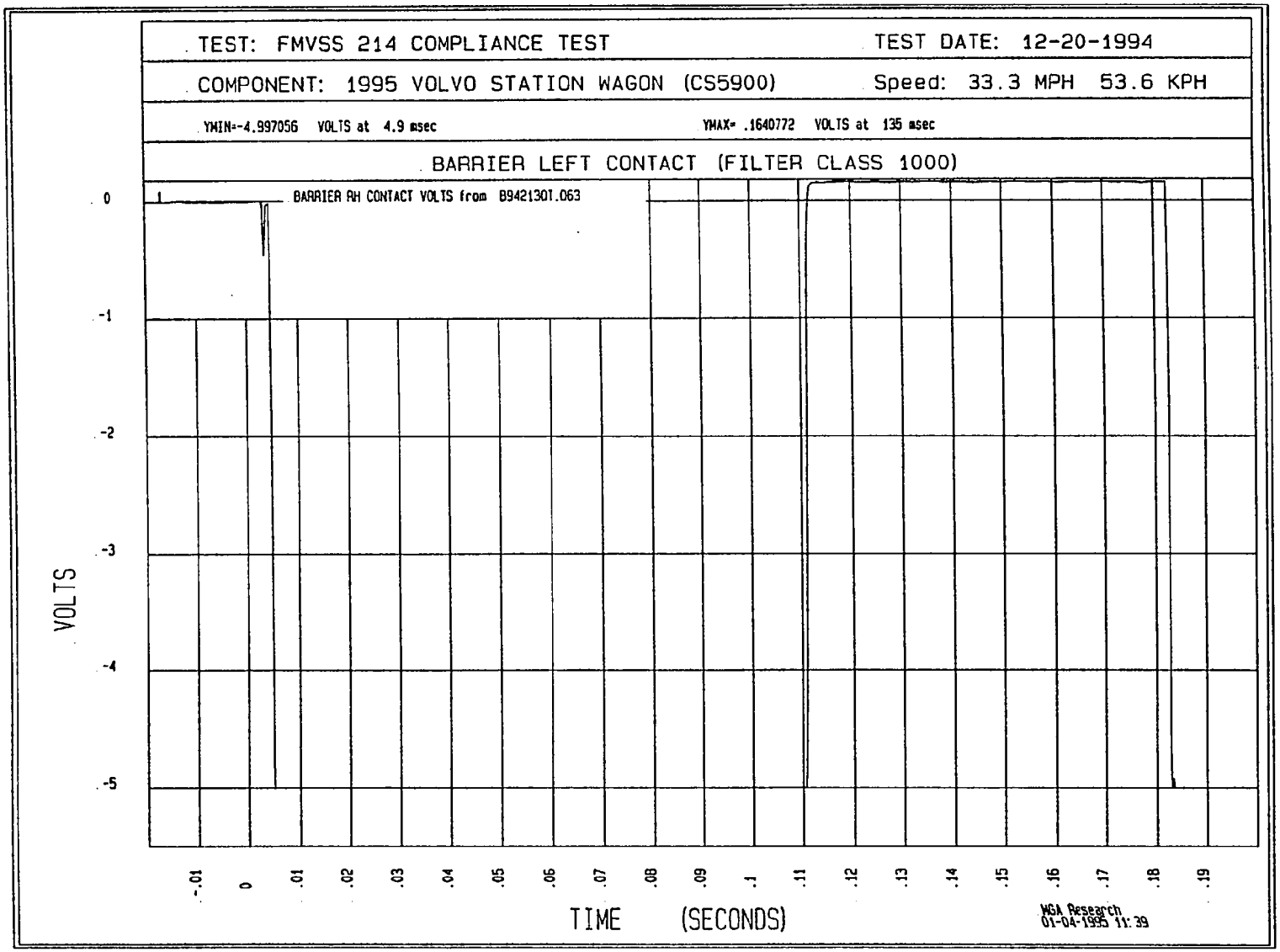

Figure B-66 - Left Hand Barrier Contact

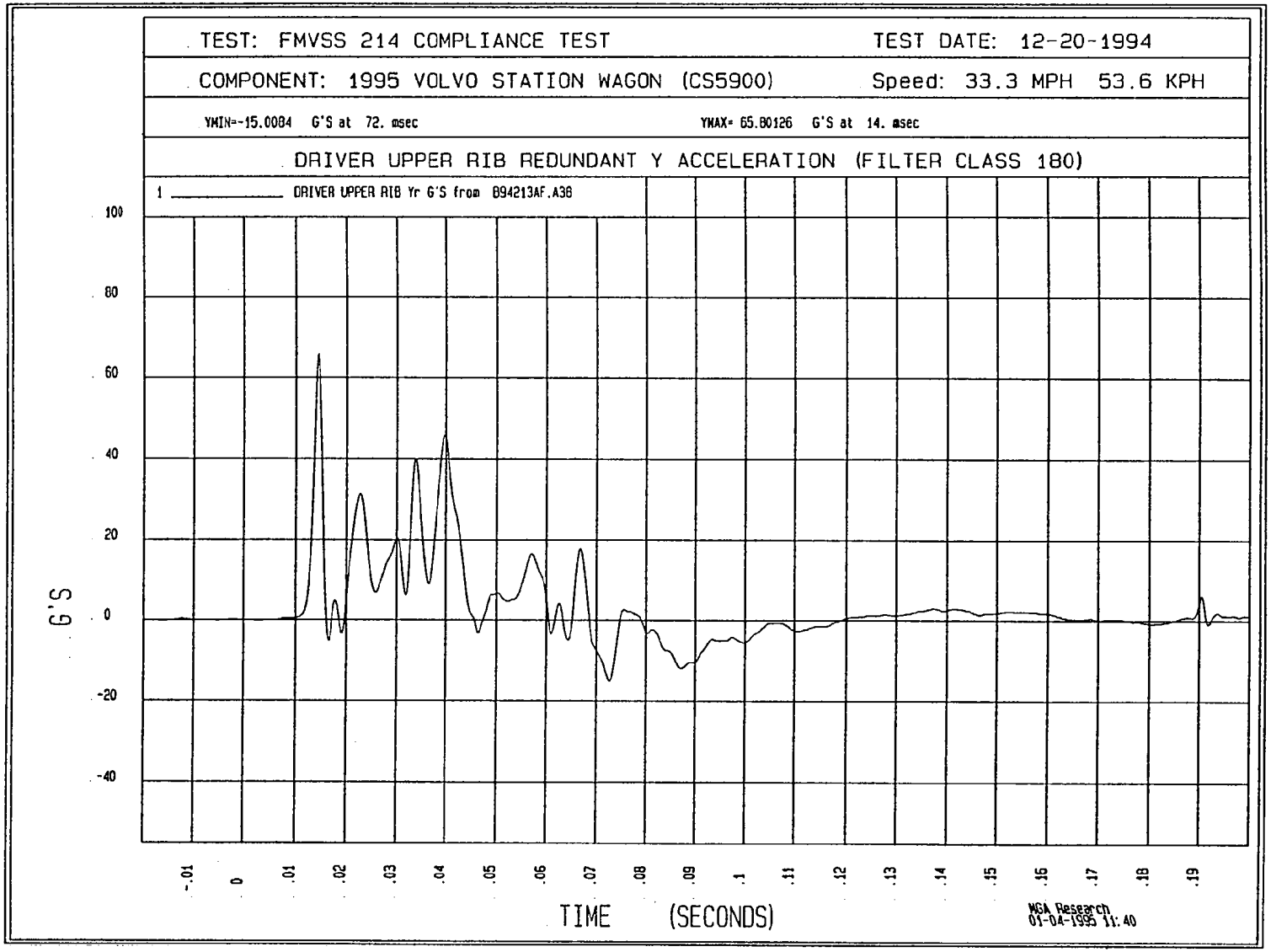

Figure B-67 - Driver Upper Rib Y Redundant Acceleration vs. Time

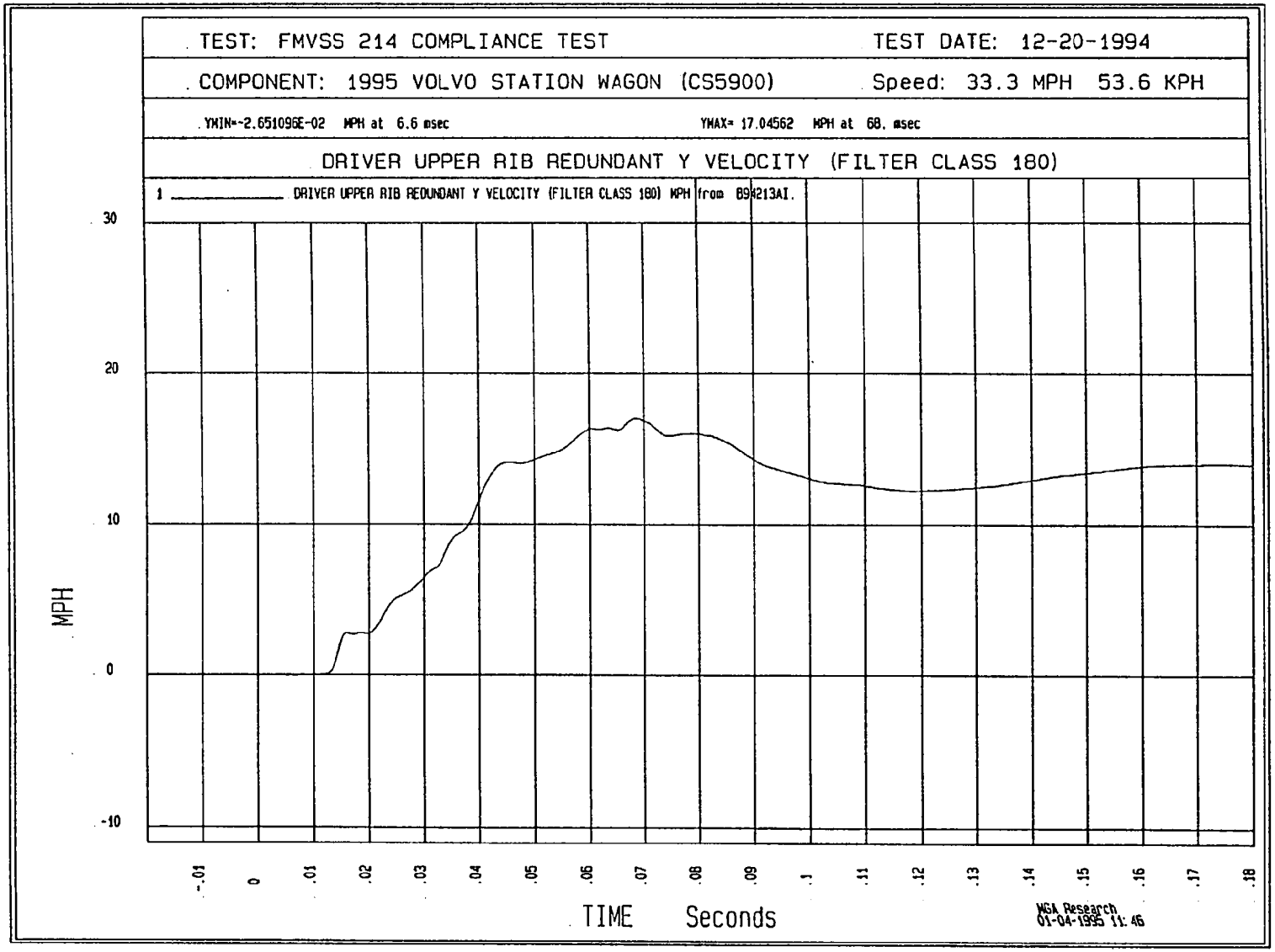

Figure B-68 - Driver Upper Rib Y Redundant Velocity vs. Time

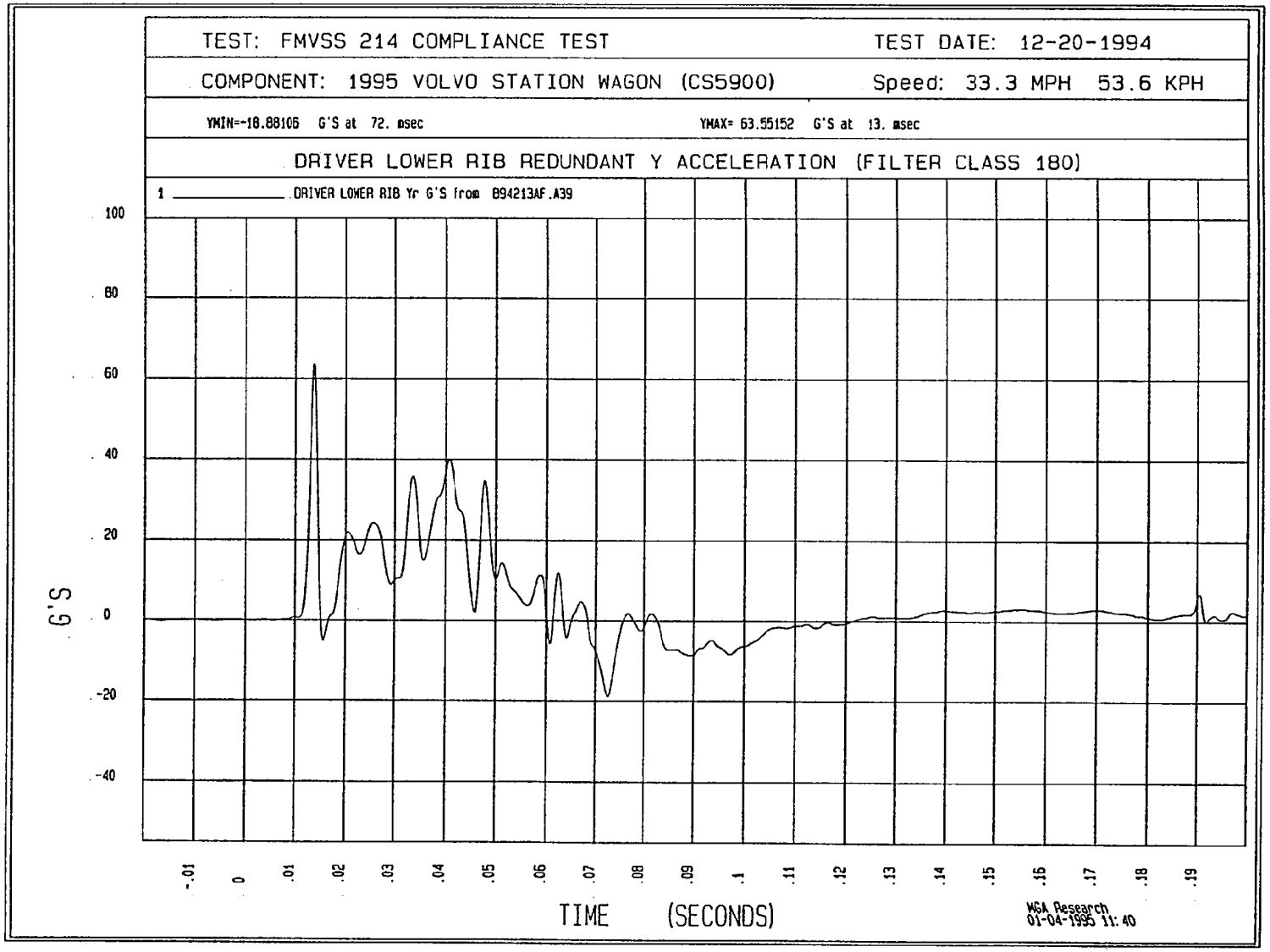

Figure B-69 - Driver Lower Rib Y Redundant Acceleration vs. Time

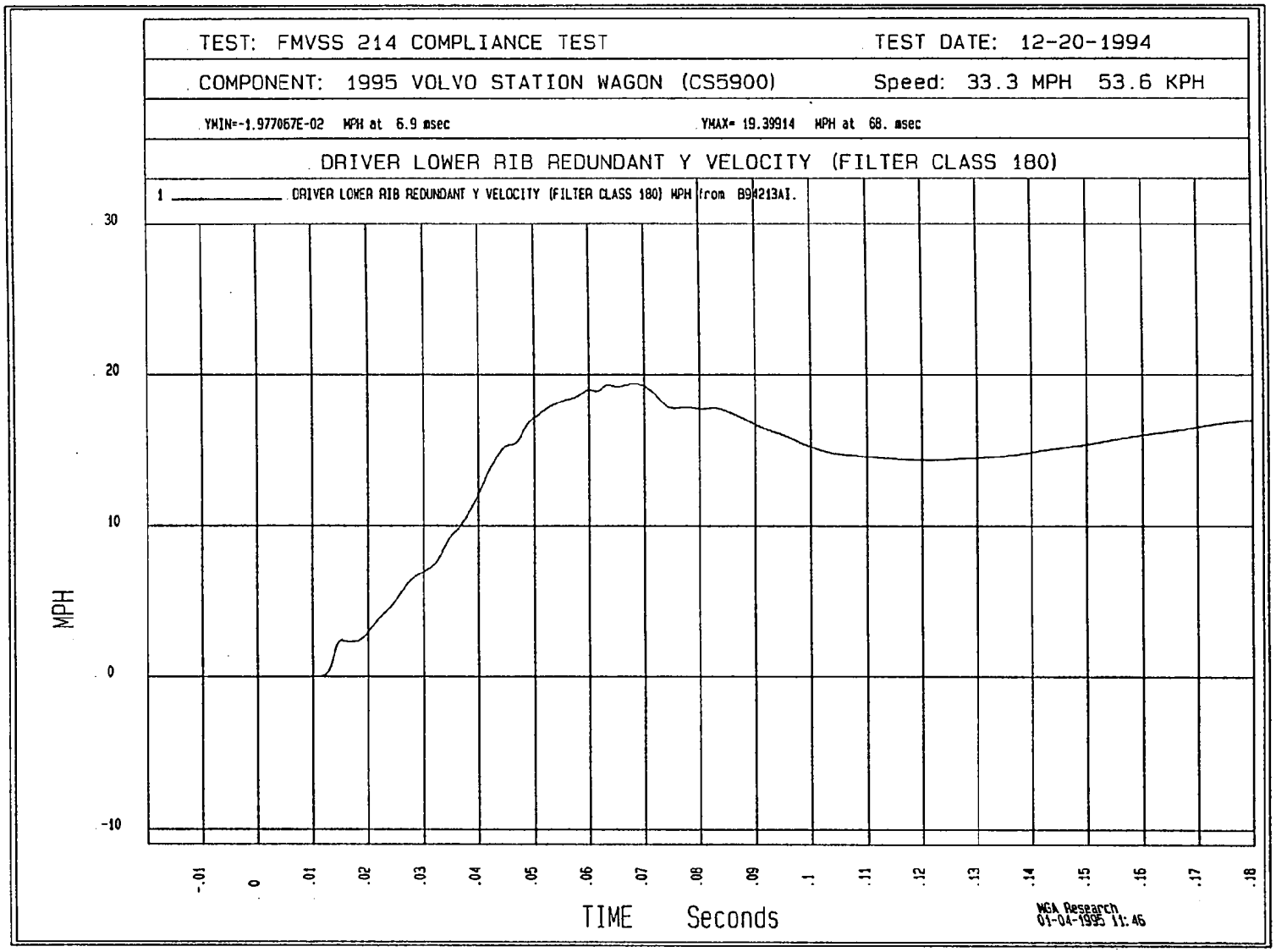

Figure B-70 - Driver Lower Rib Y Redundant Velocity vs. Time

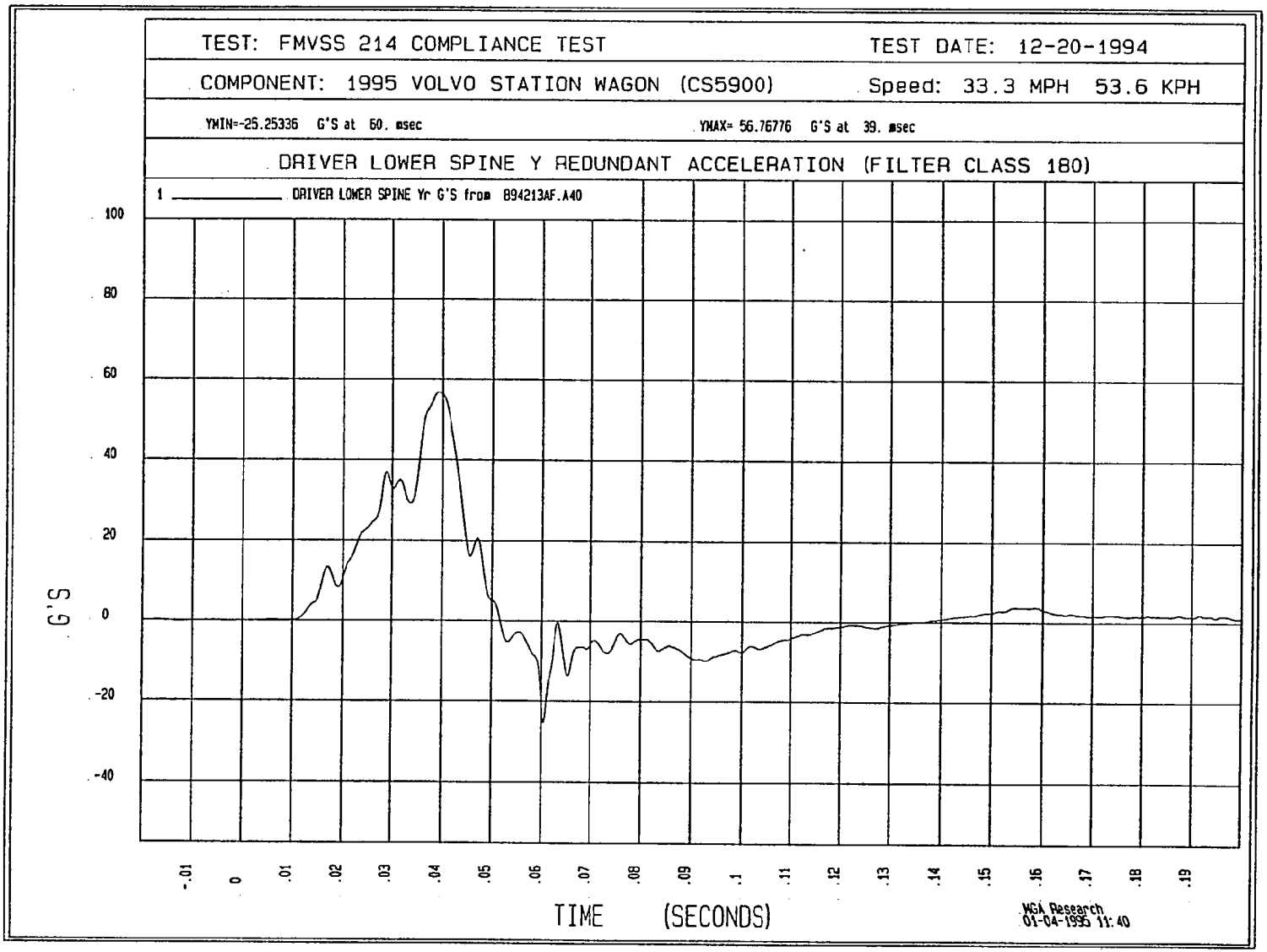

Figure B-71 - Driver Lower Spine Y Redundant Acceleration vs. Time

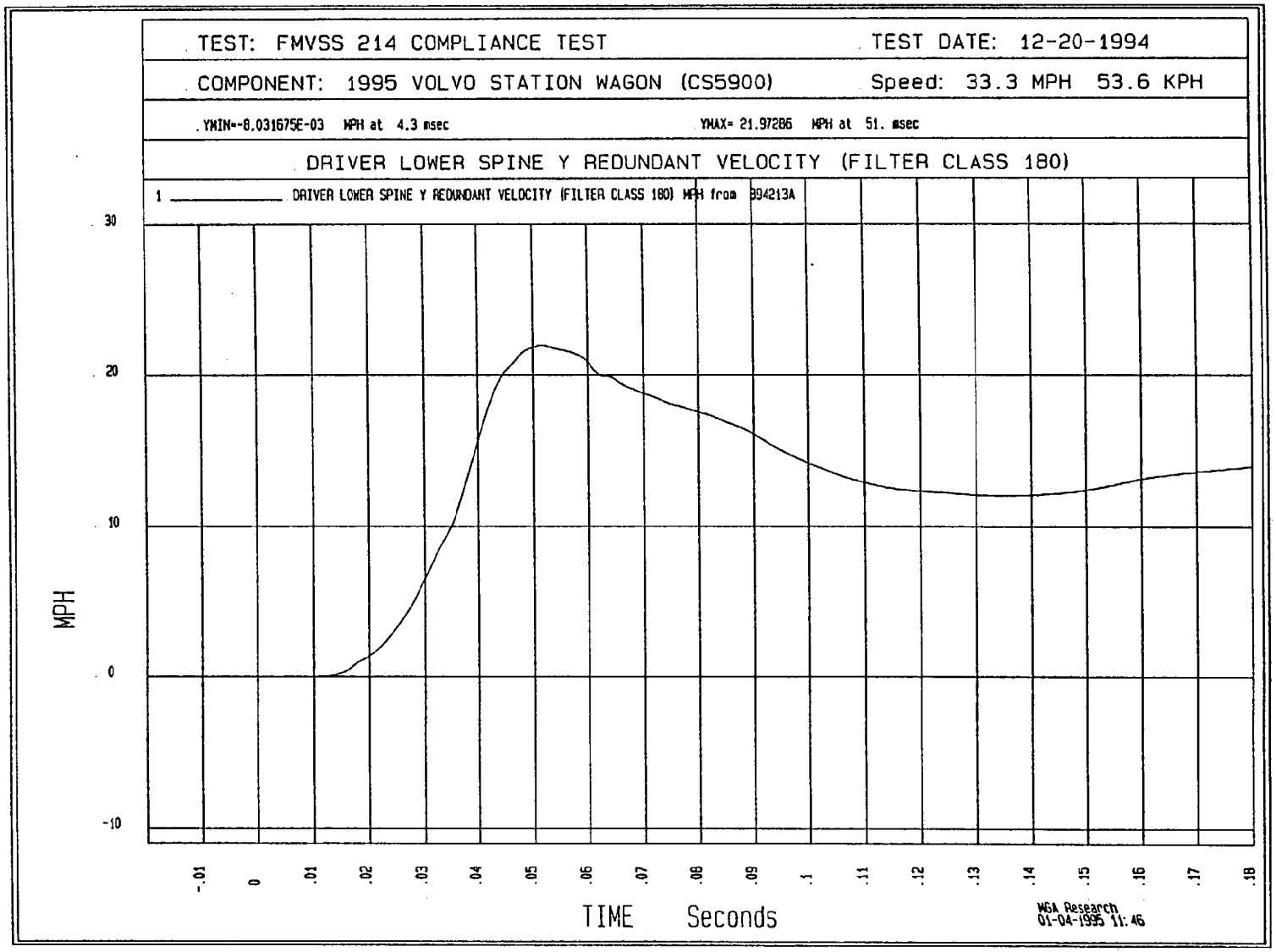

Figure B-72 - Driver Lower Spine Y Redundant Velocity vs. Time

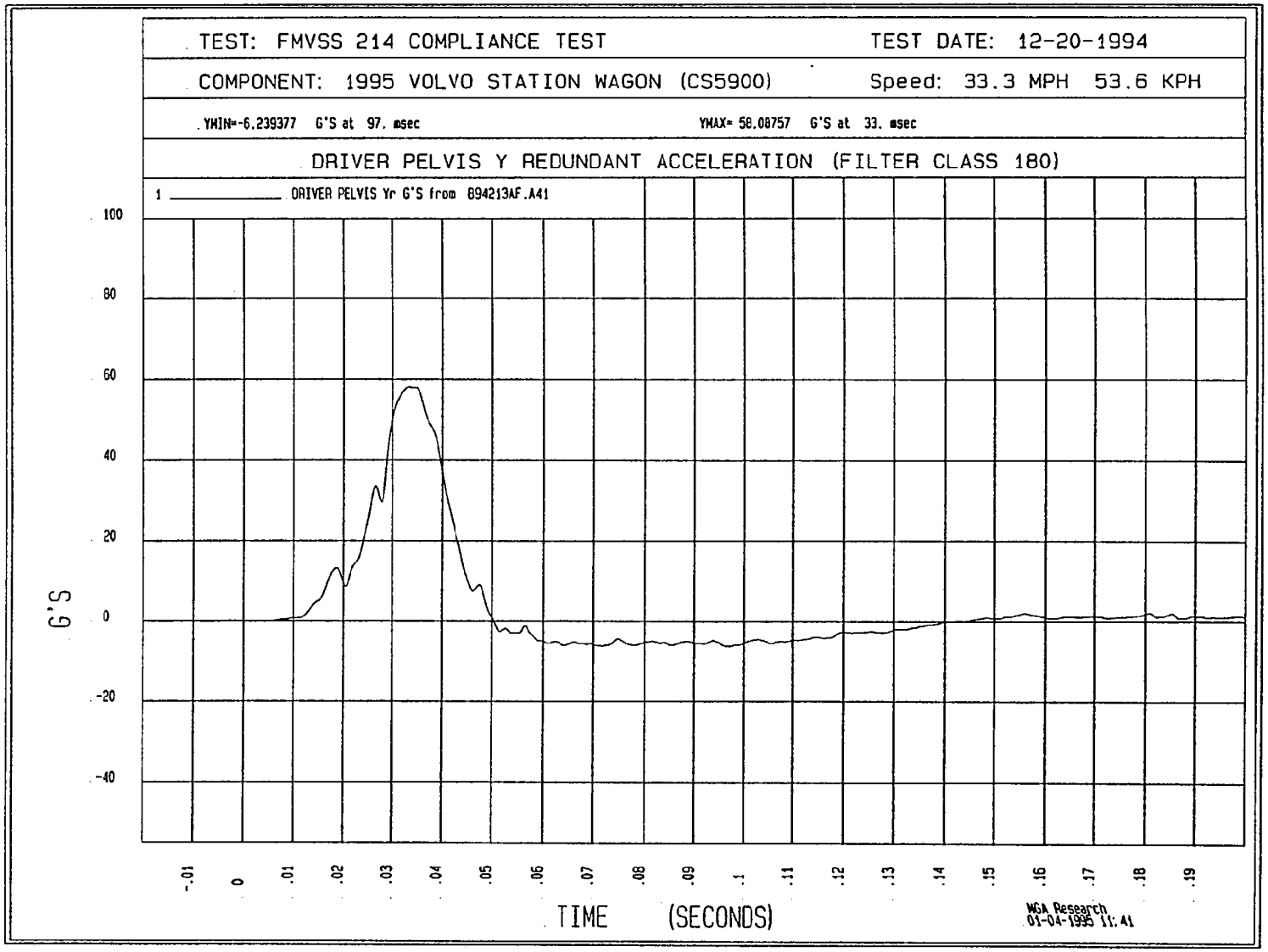

Figure B-73 - Driver Pelvis Y Redundant Acceleration vs. Time

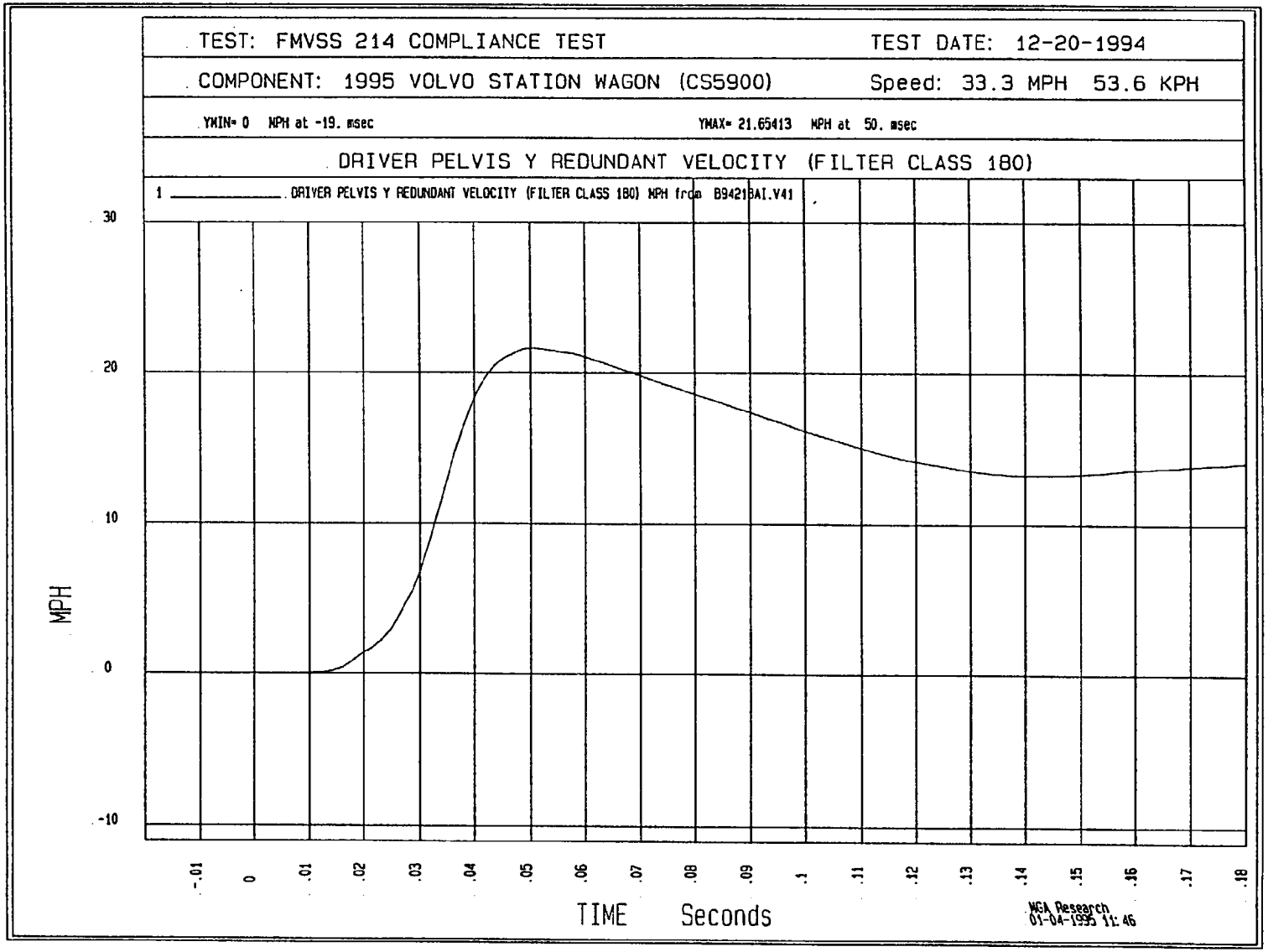

Figure B-74 - Driver Pelvis Y Redundant Velocity vs. Time

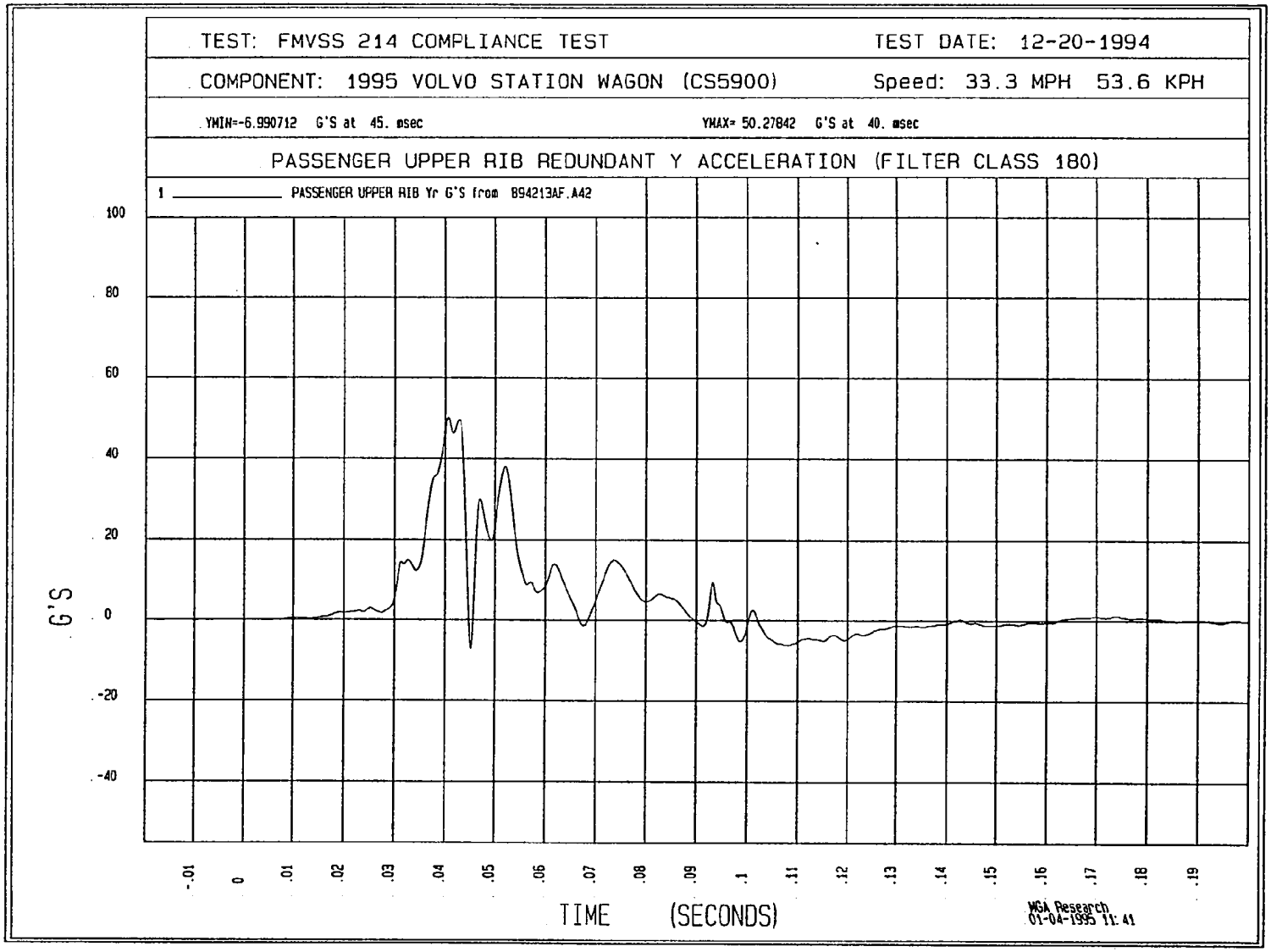

Figure B-75 - Passenger Upper Rib Y Redundant Acceleration vs. Time

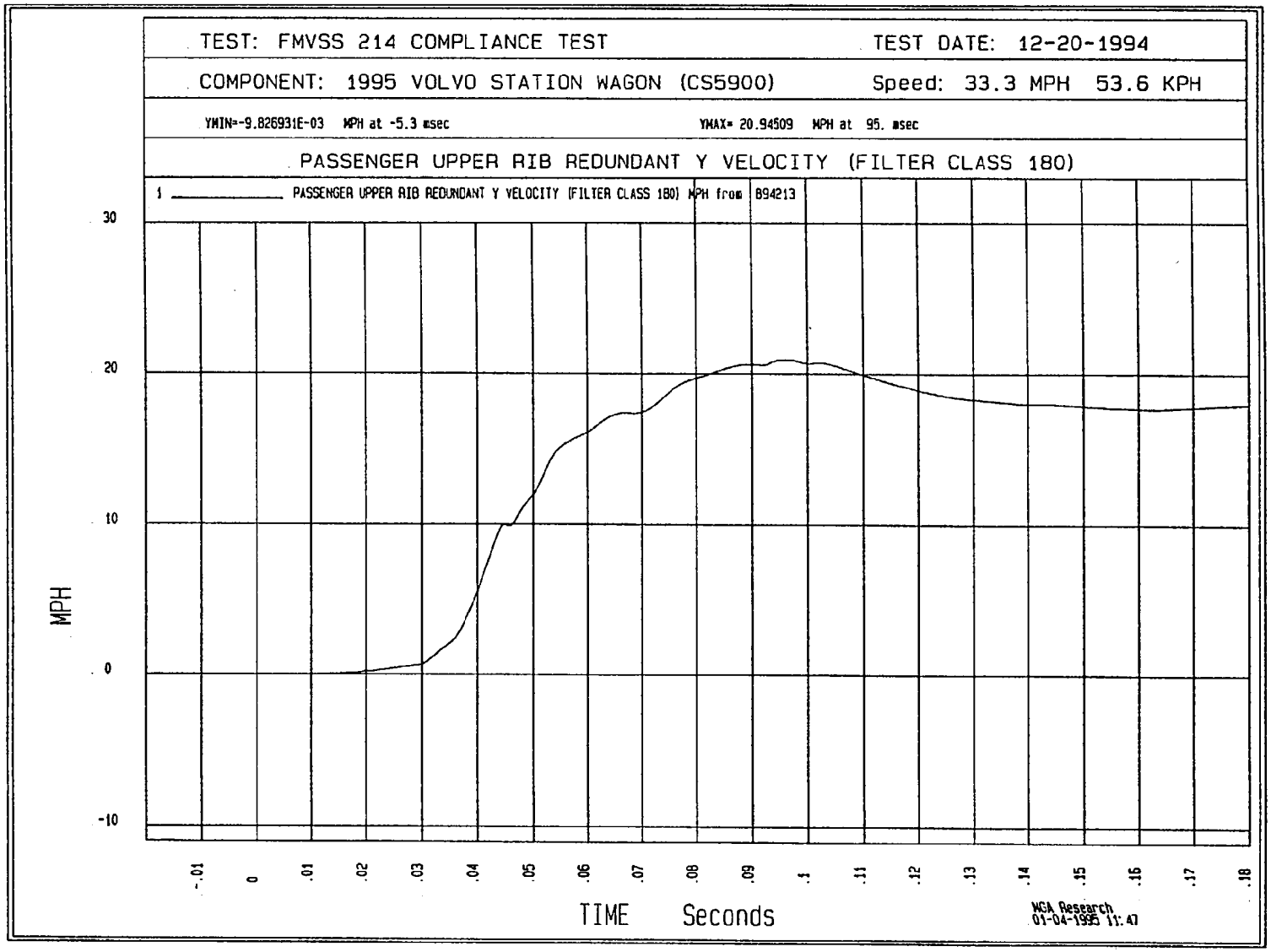

Figure B-76 - Passenger Upper Rib Y Redundant Velocity vs. Time

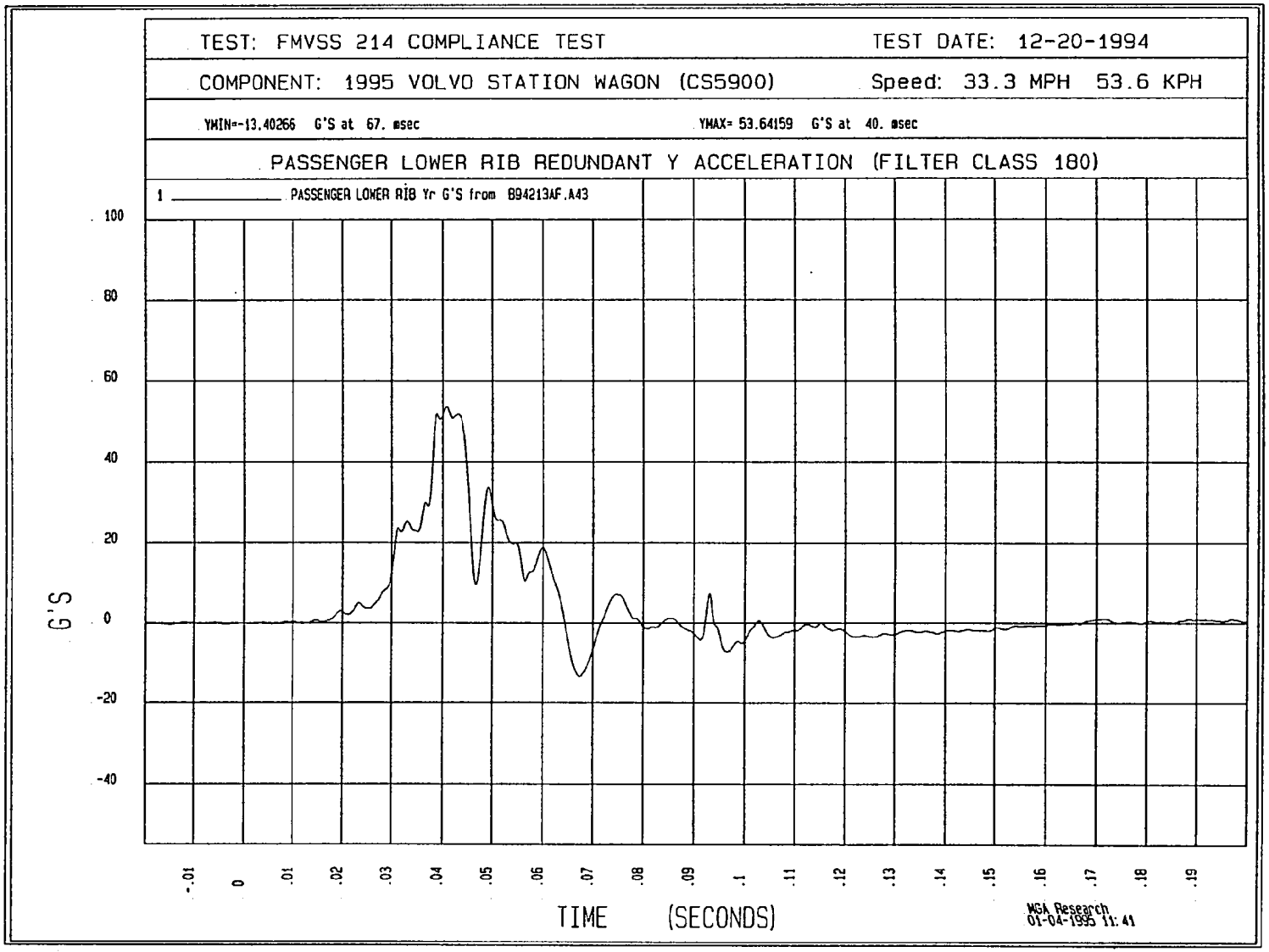

Figure B-77 - Passenger Lower Rib Y Redundant Acceleration vs. Time

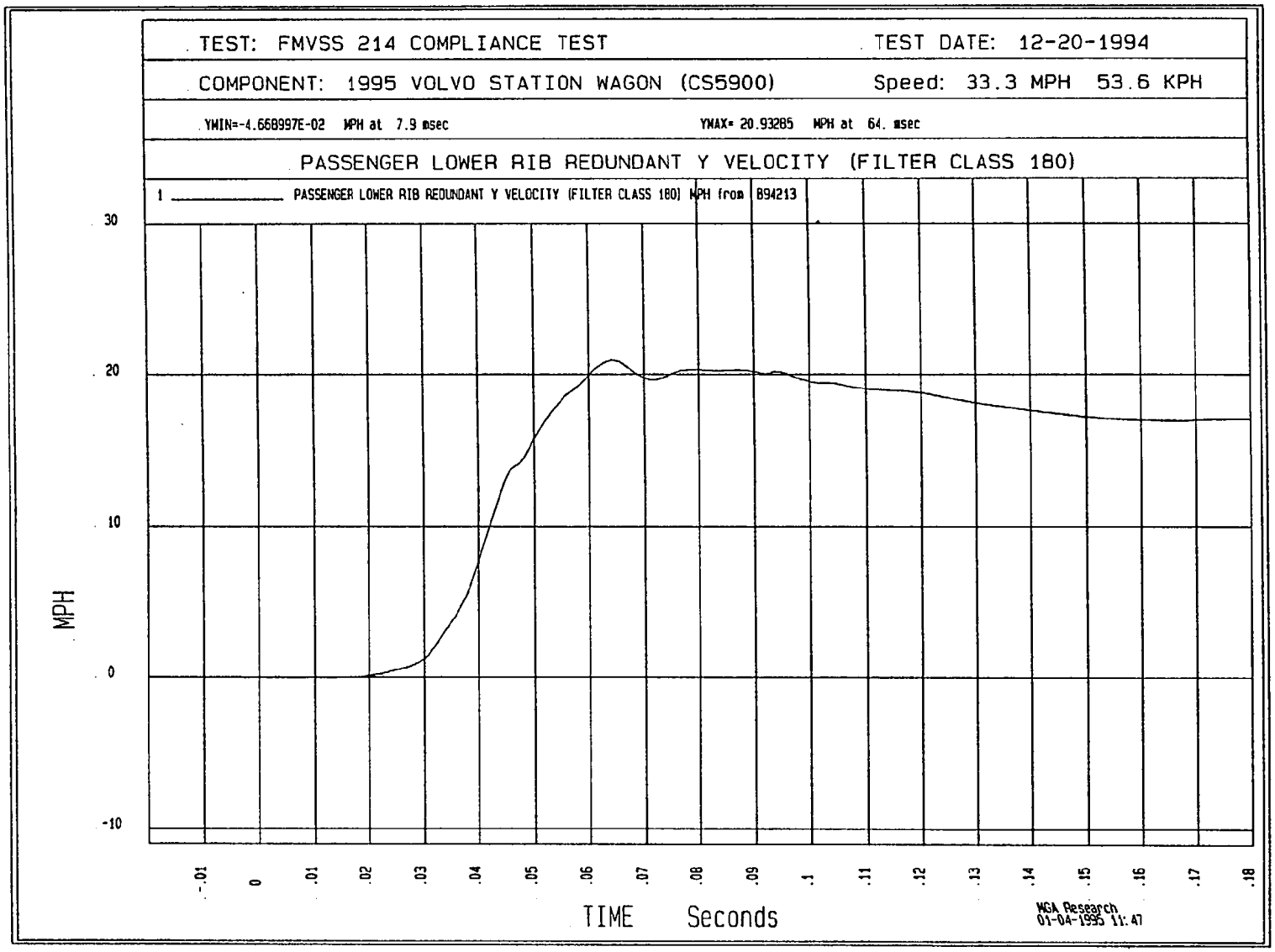

Figure B-78 - Passenger Lower Rib Y Redundant Velocity vs. Time

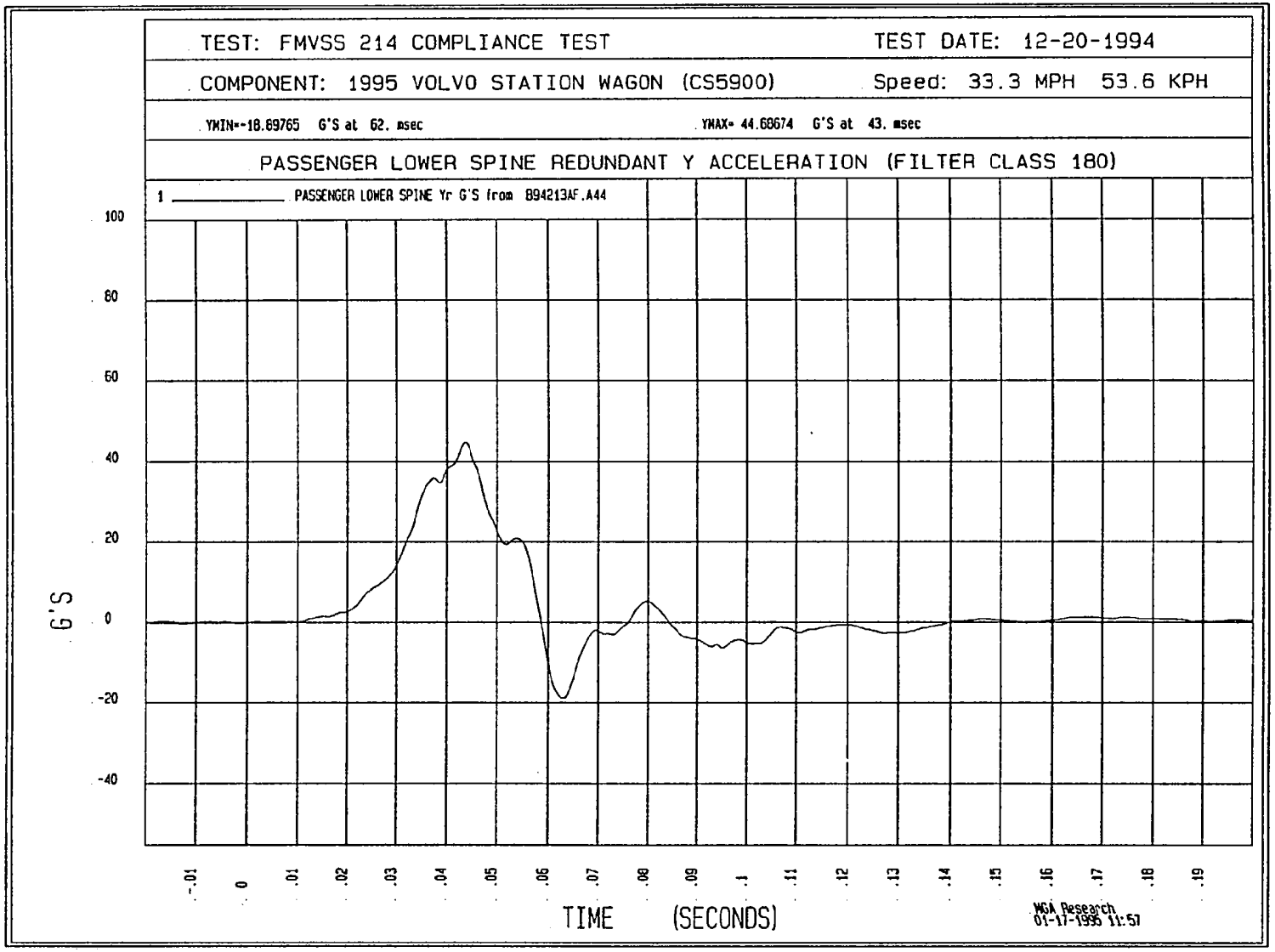

Figure B-79 - Passenger Lower Spine Y Redundant Acceleration vs. Time

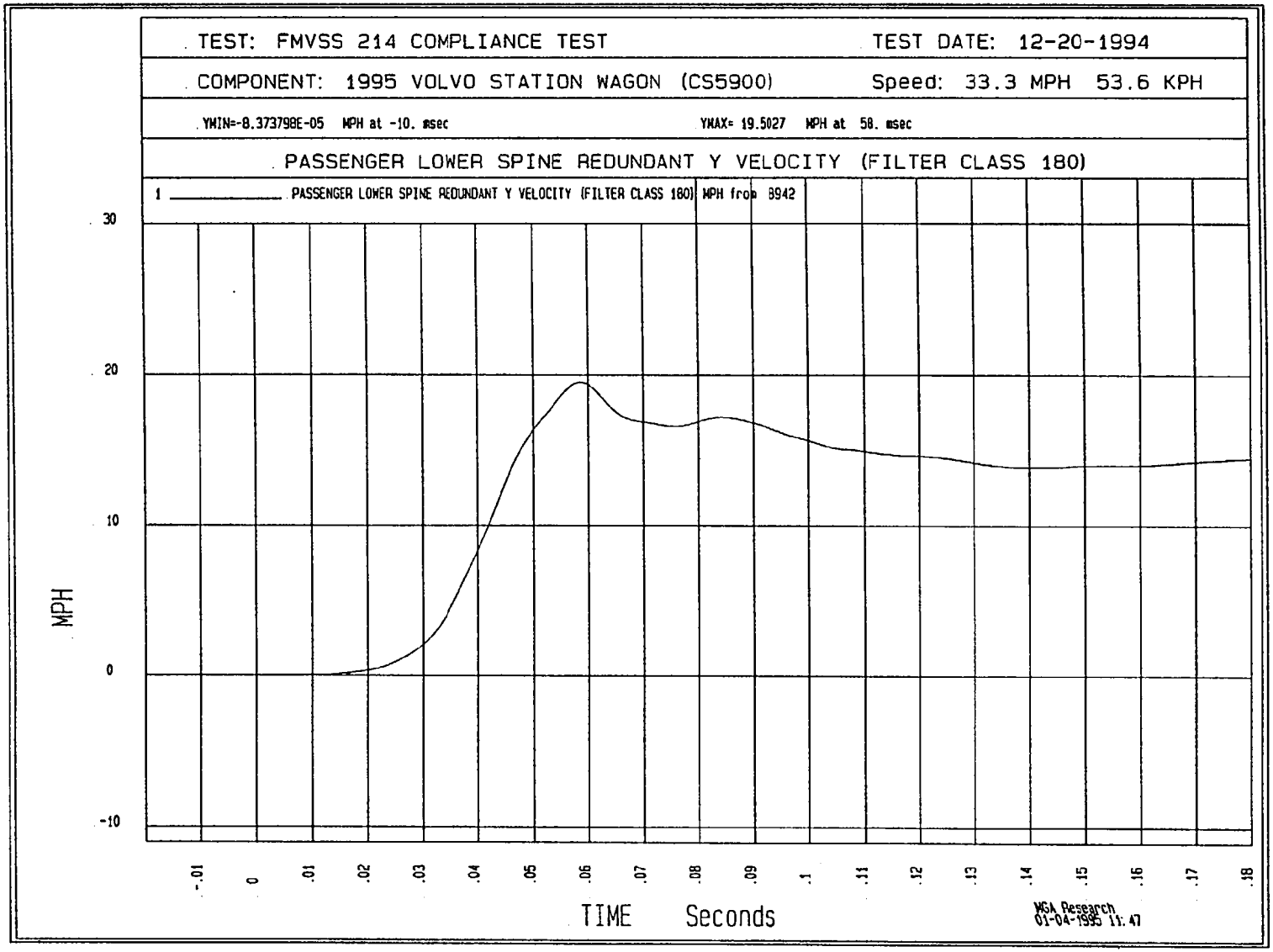

Figure B-8Ø - Passenger Lower Spine Y Redundant Velocity vs. Time

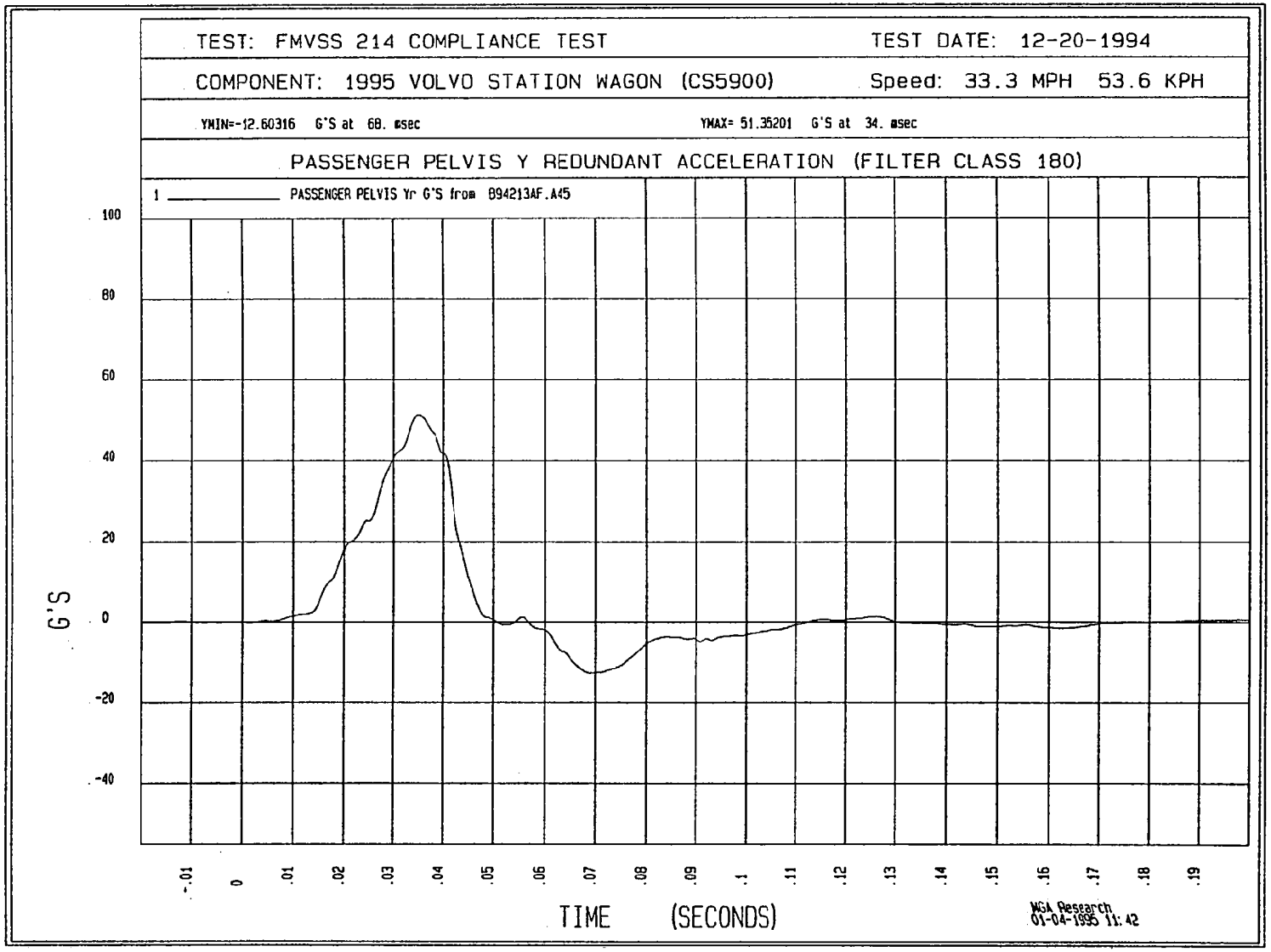

Figure B-81 - Passenger Pelvis Y Redundant Acceleration vs. Time

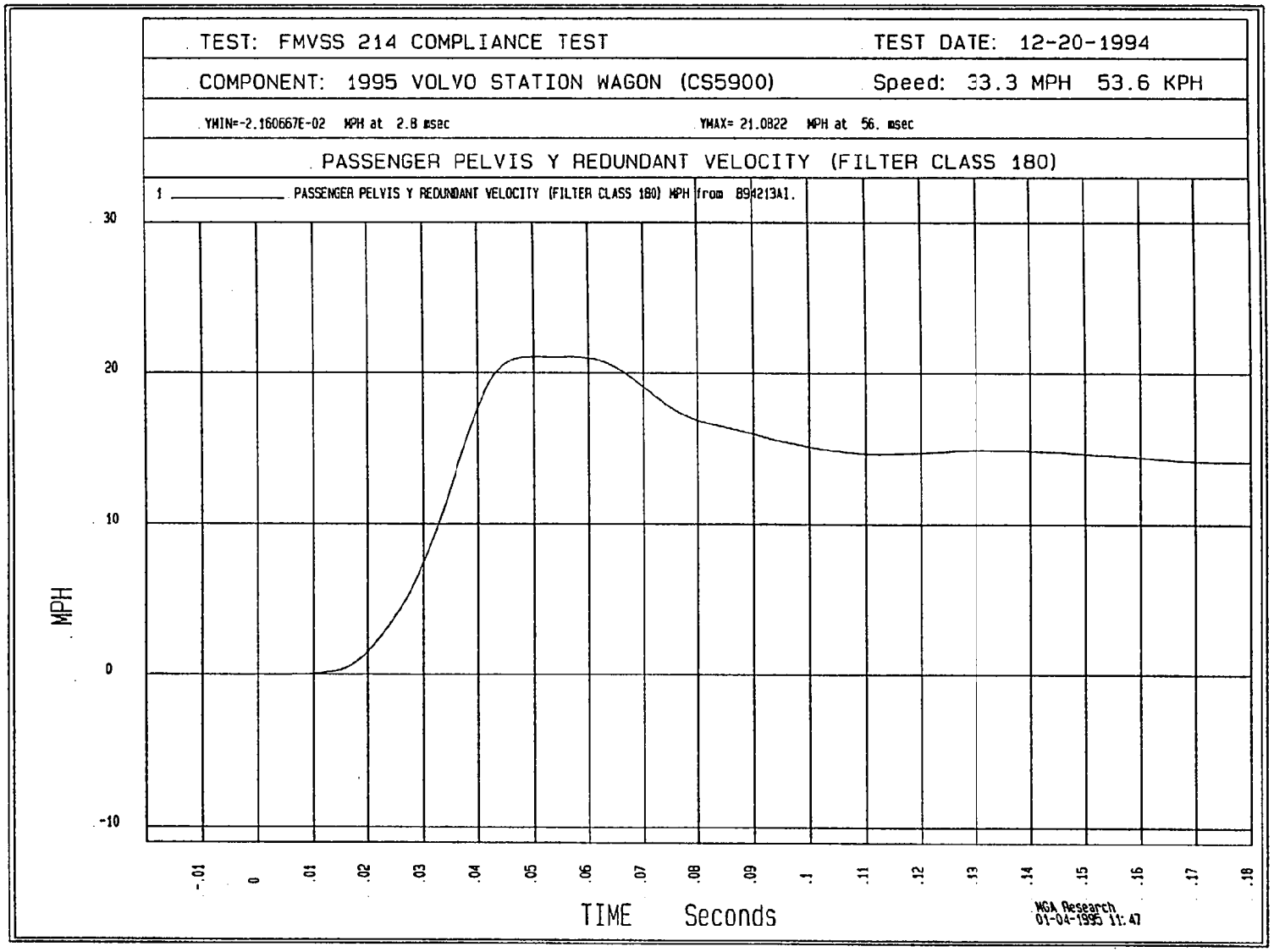

Figure B-82 - Passenger Pelvis Y Redundant Velocity vs. Time

FINITE IMPULSE RESPONSE (FIR) FILTERED DATA

Table of Data Plots

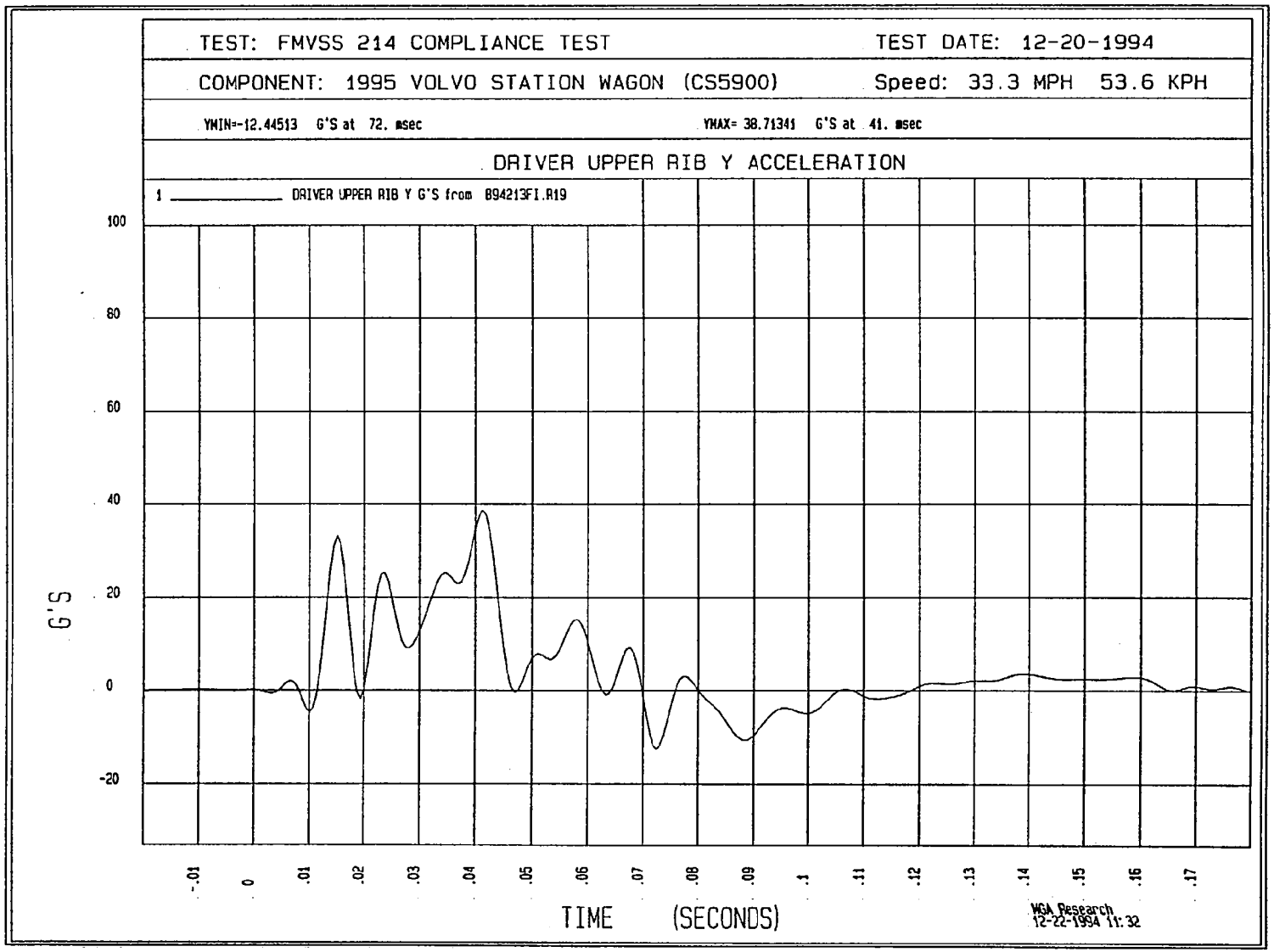

Figure B-83 - Driver Upper Rib Y Acceleration vs. Time

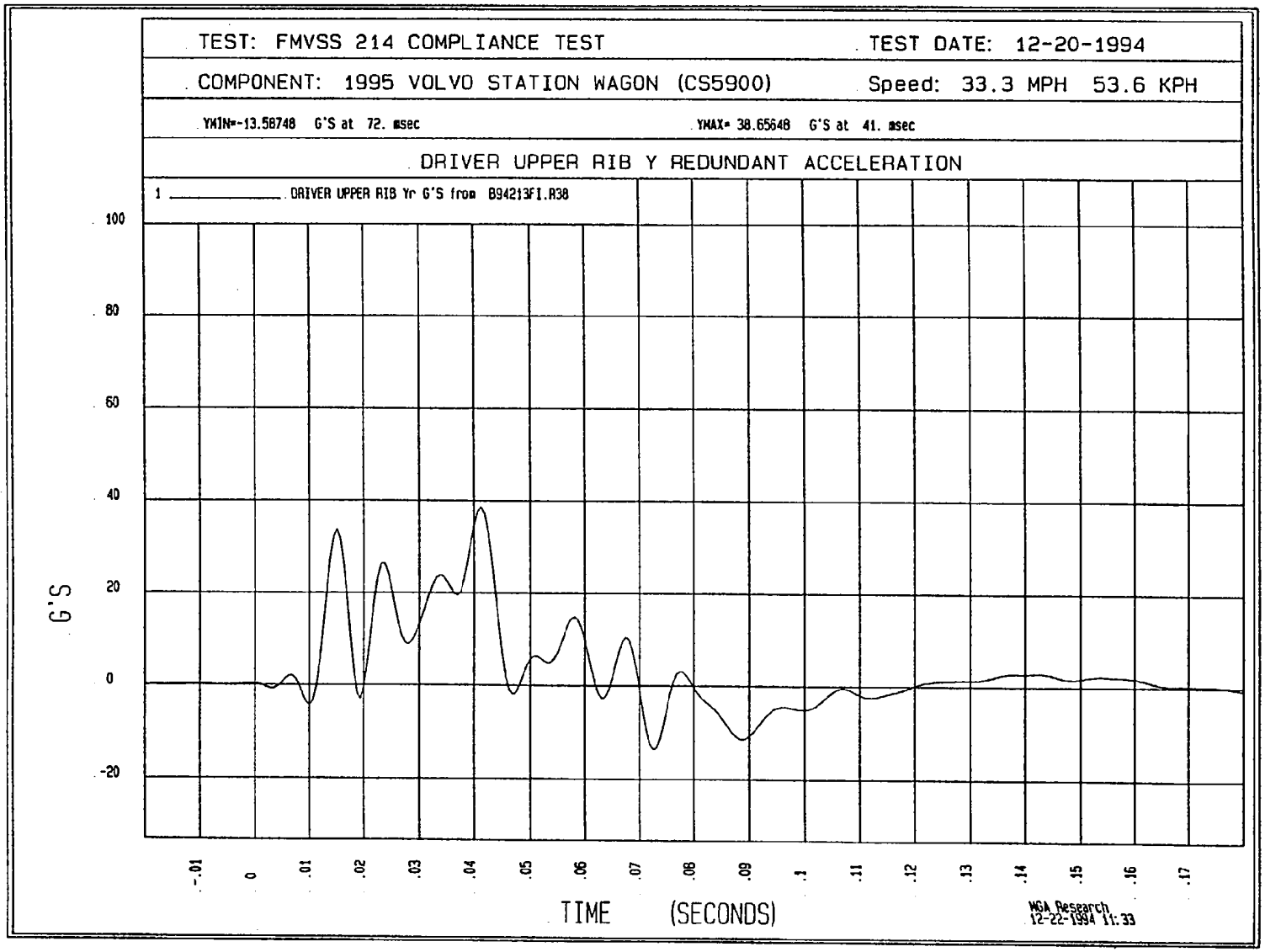

Figure B-84 - Driver Upper Rib Y Redundant Acceleration vs. Time

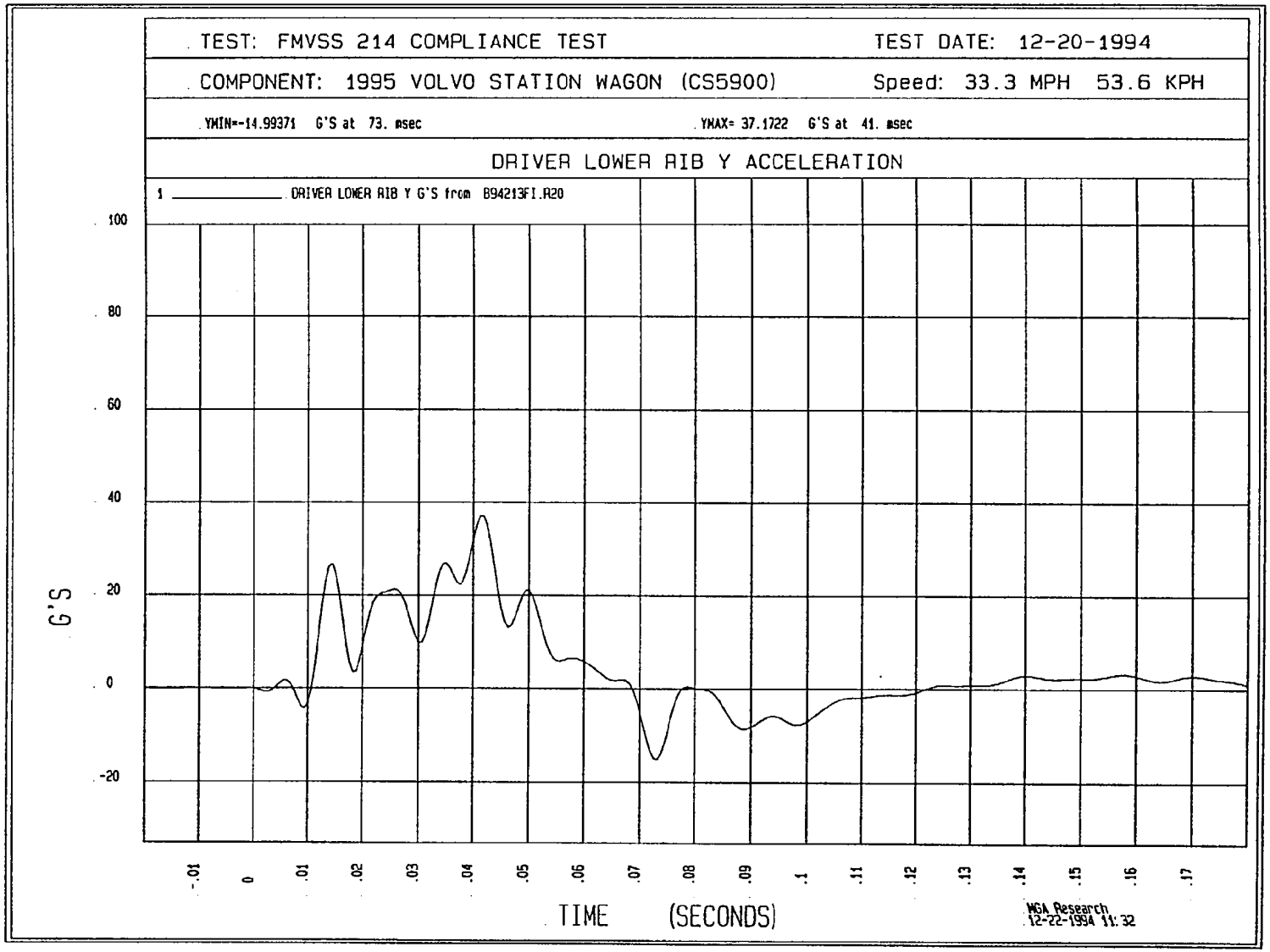

Figure B-85 - Driver Lower Rib Y Acceleration vs. Time

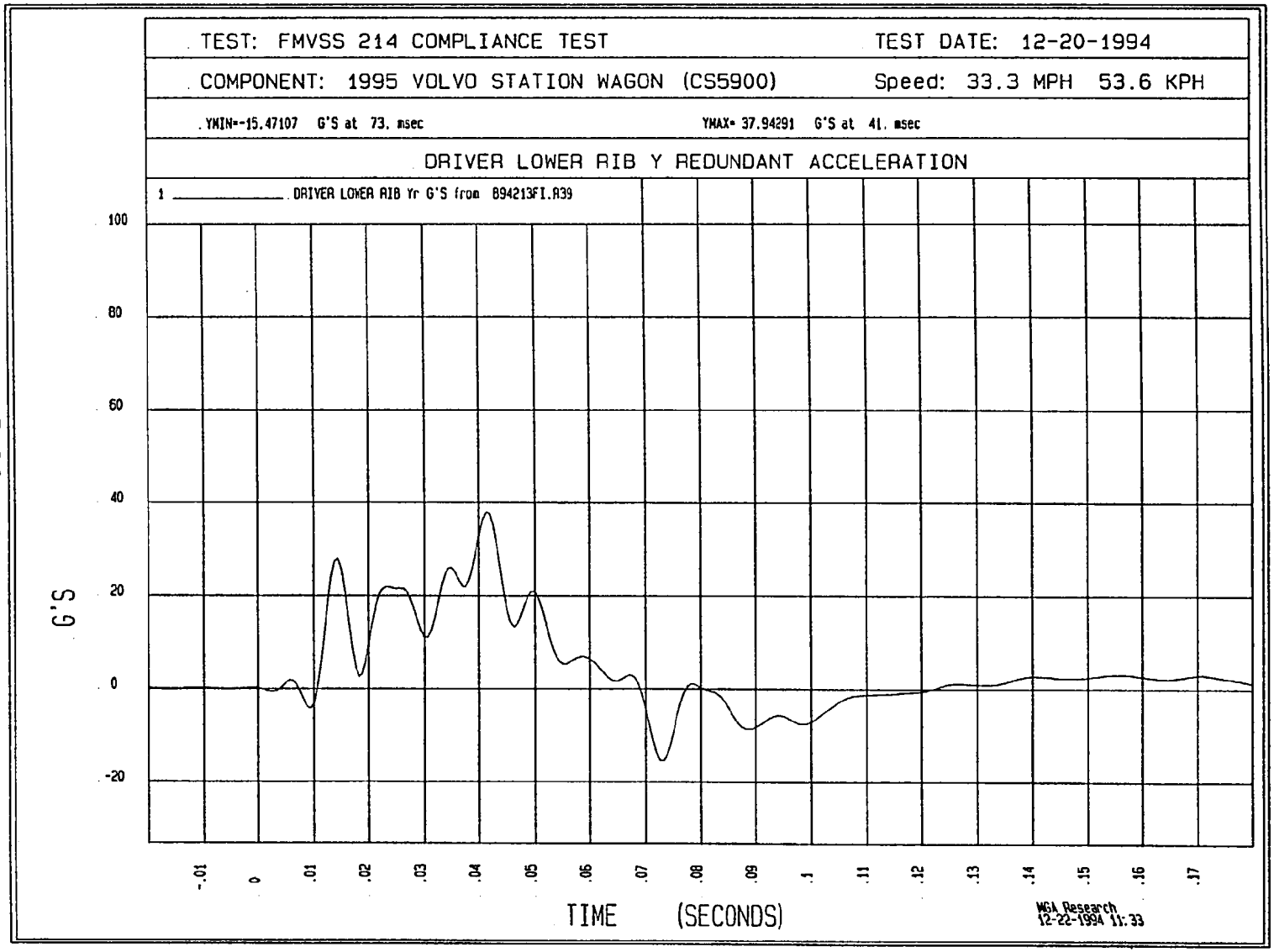

Figure B-86 - Driver Lower Rib Y Redundant Acceleration vs. Time

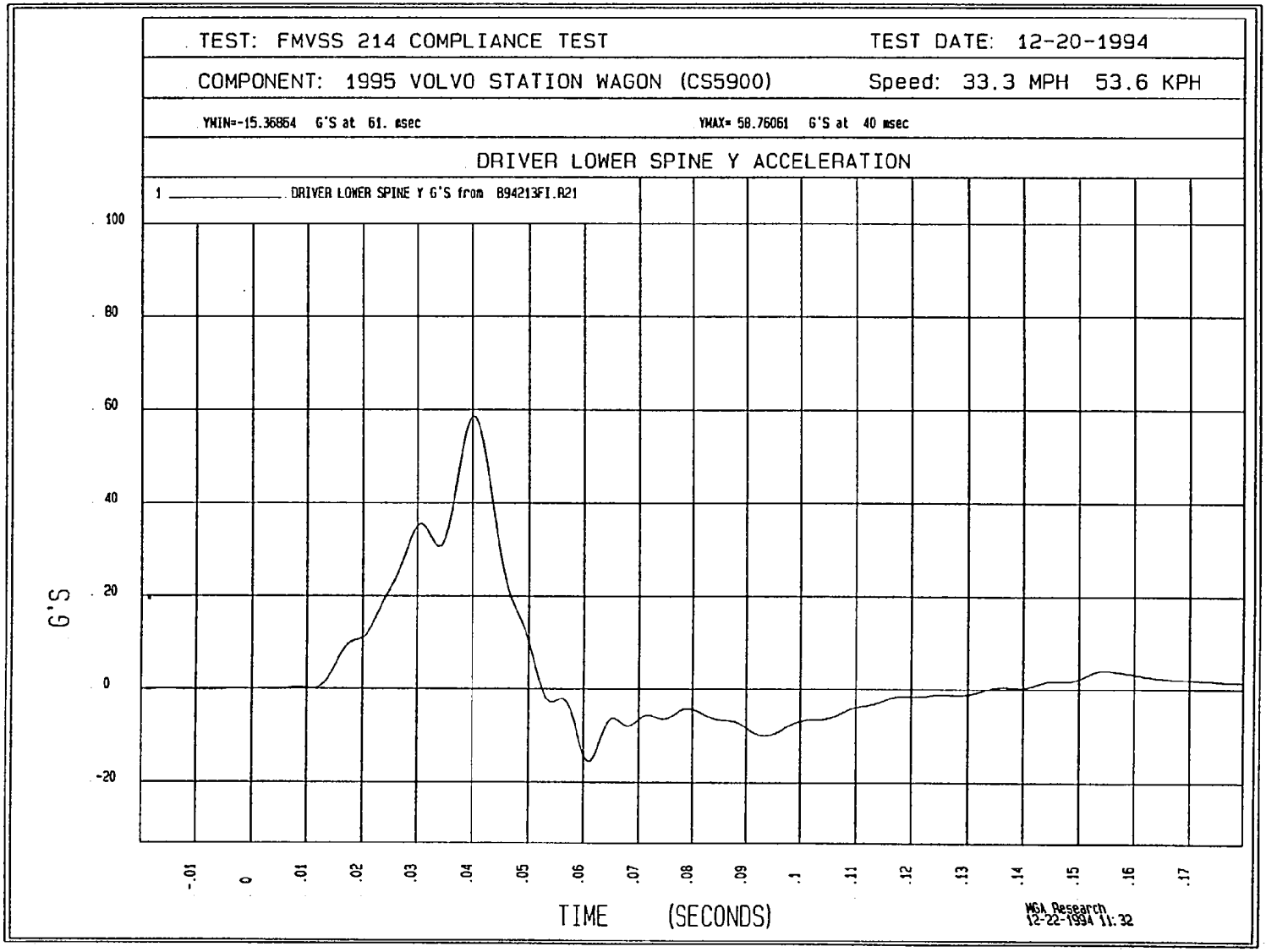

Figure B-87 - Driver Lower Spine Y Acceleration vs. Time

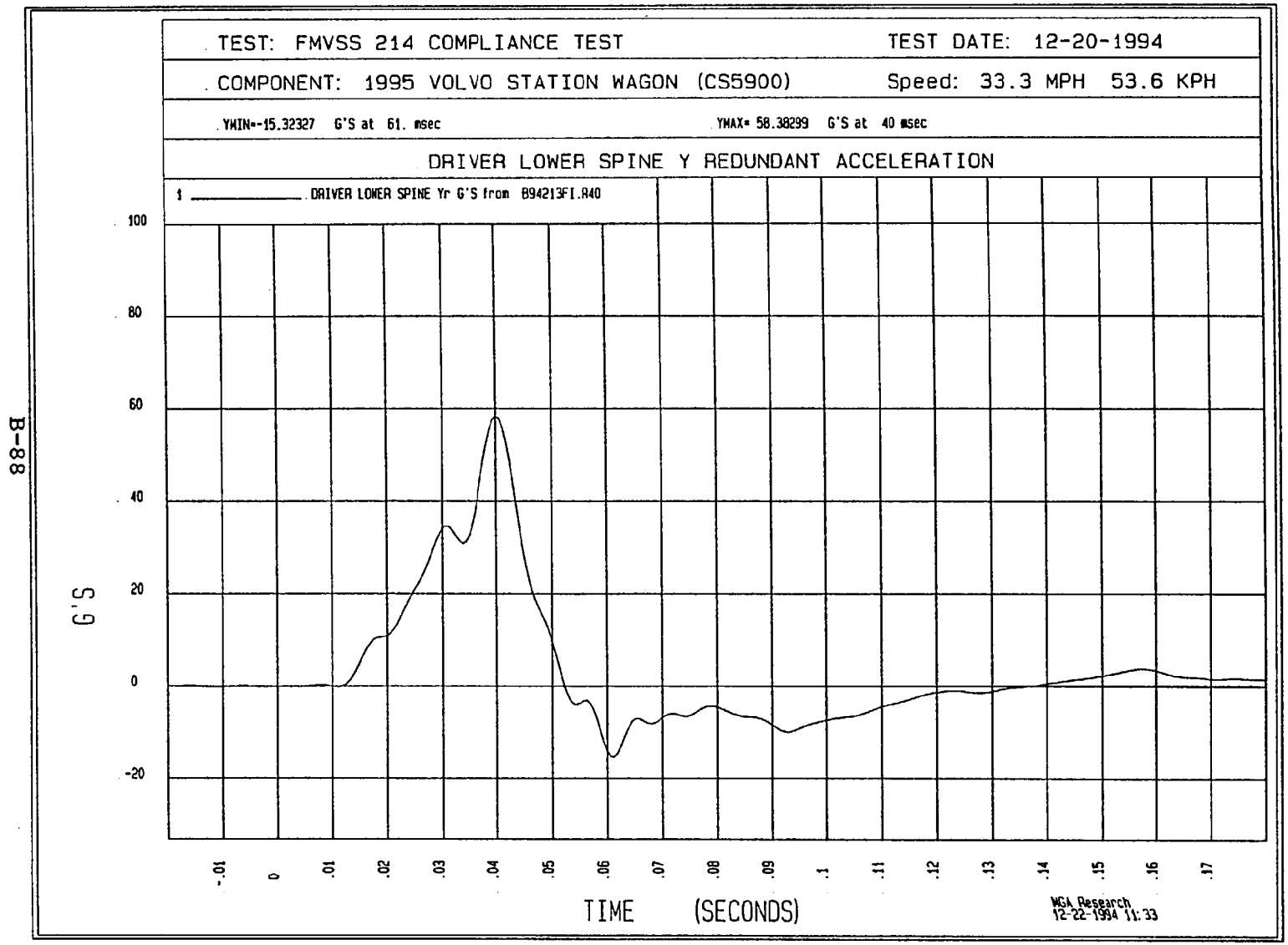

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Figure B-88 - Driver Lower Spine Y Redundant Acceleration vs. Time

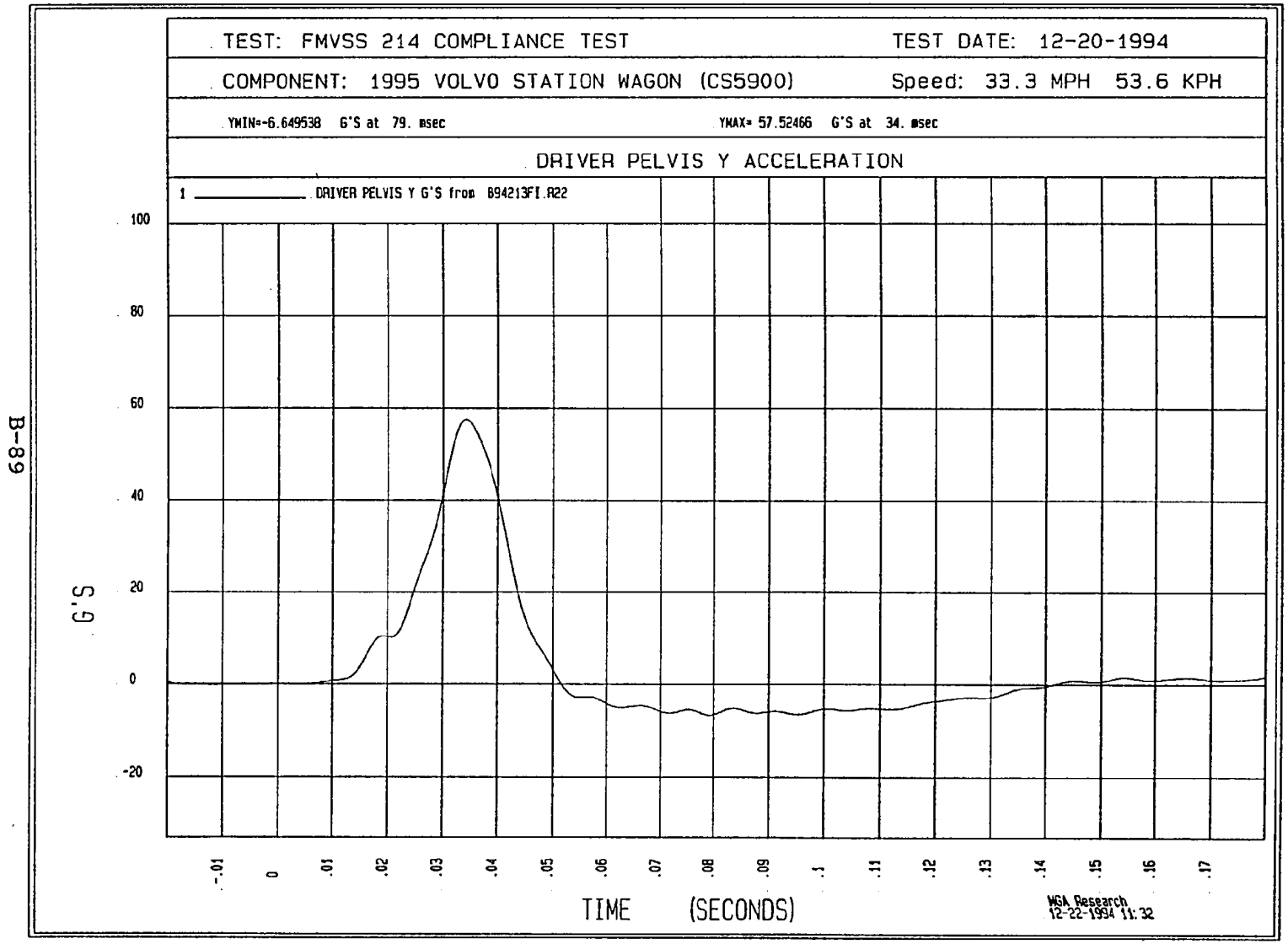

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Figure B-89 - Driver Pelvis Y Acceleration vs. Time

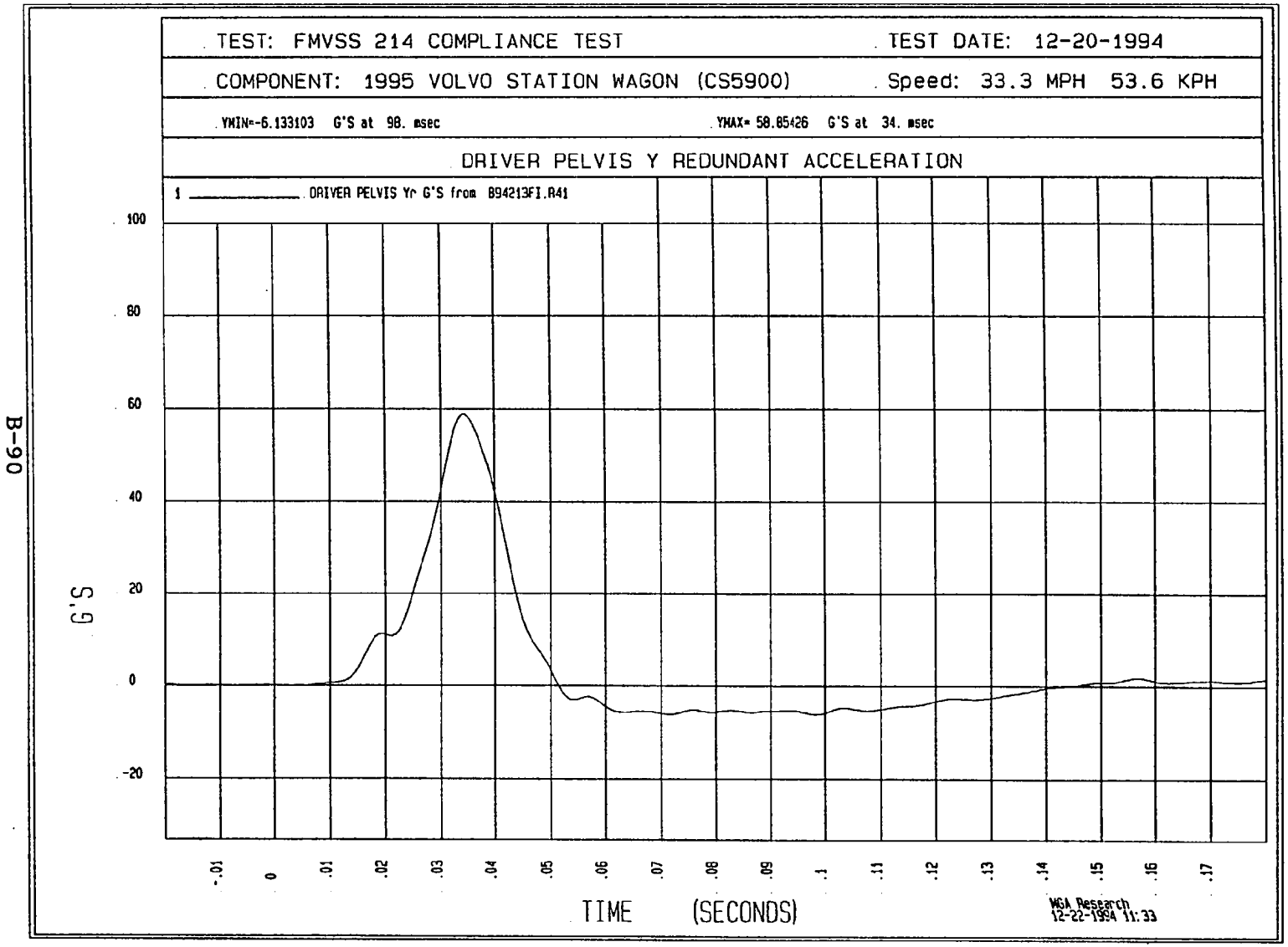

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Figure B-90 - Driver Pelvis Y Redundant Acceleration vs. Time

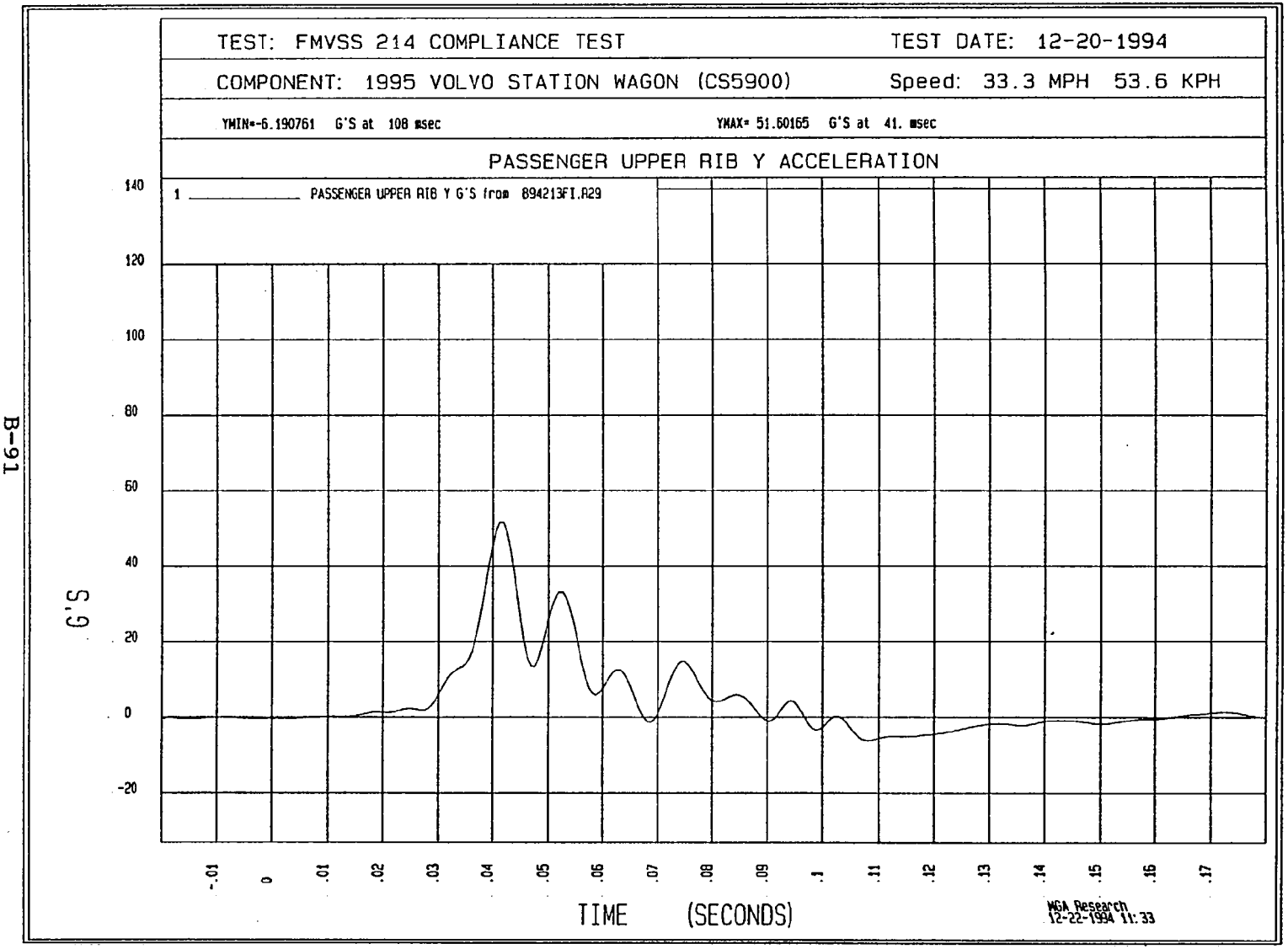

Figure B-91 - Passenger Upper Rib Y Acceleration vs. Time

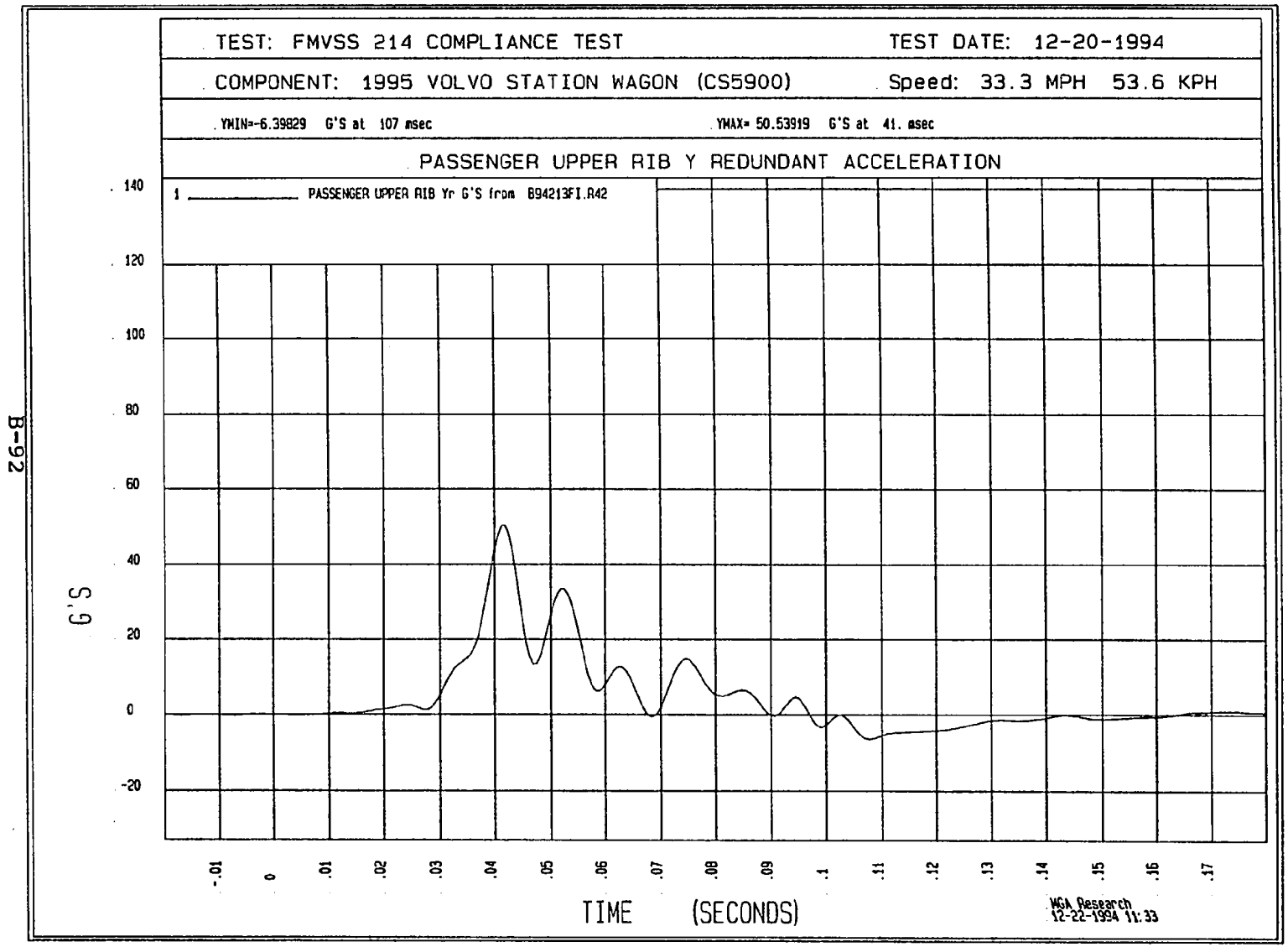

Figure B-92 - Passenger Upper Rib Y Redundant Acceleration vs. Time

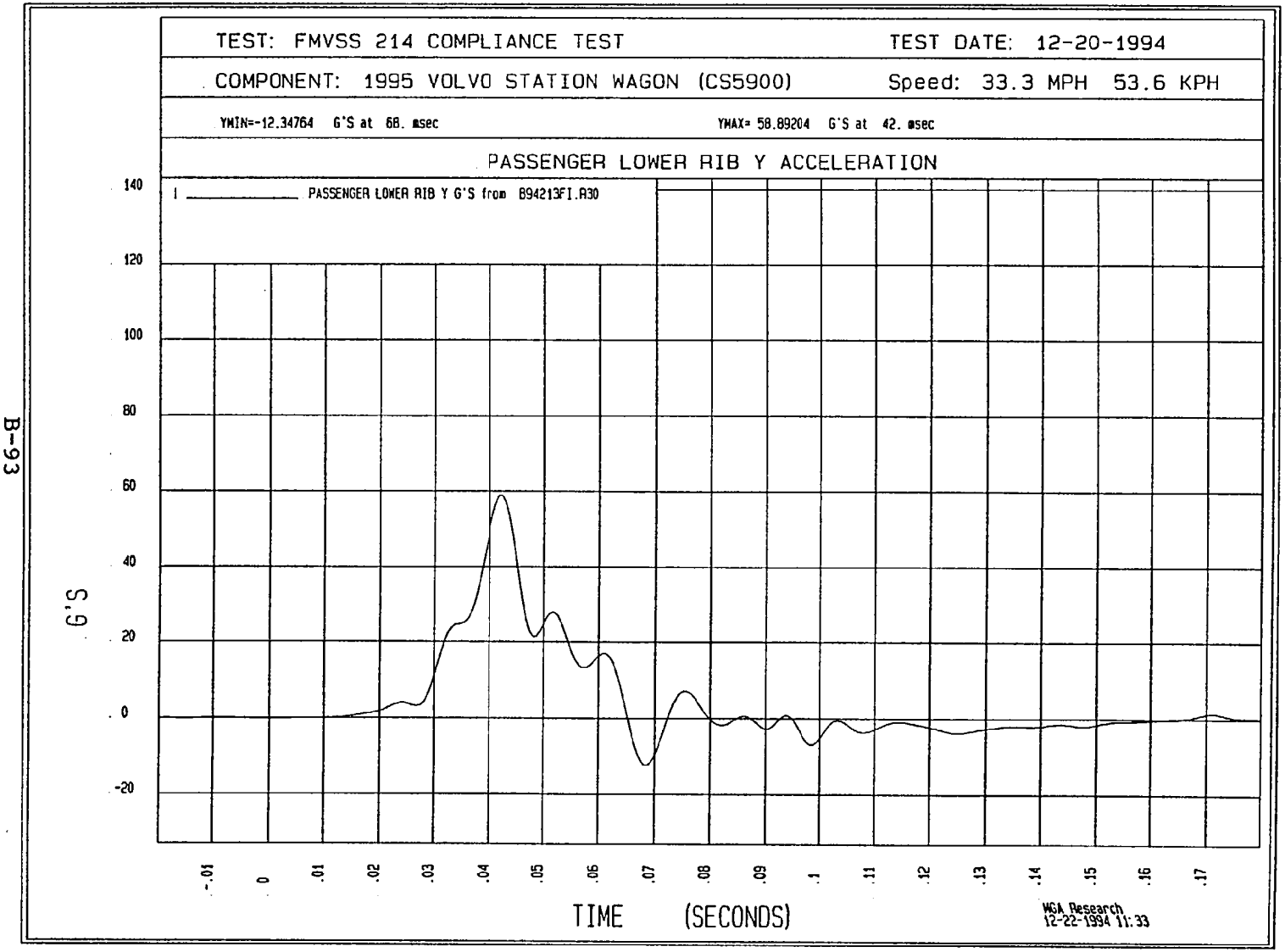

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Figure B-93 - Passenger Lower Rib Y Acceleration vs. Time

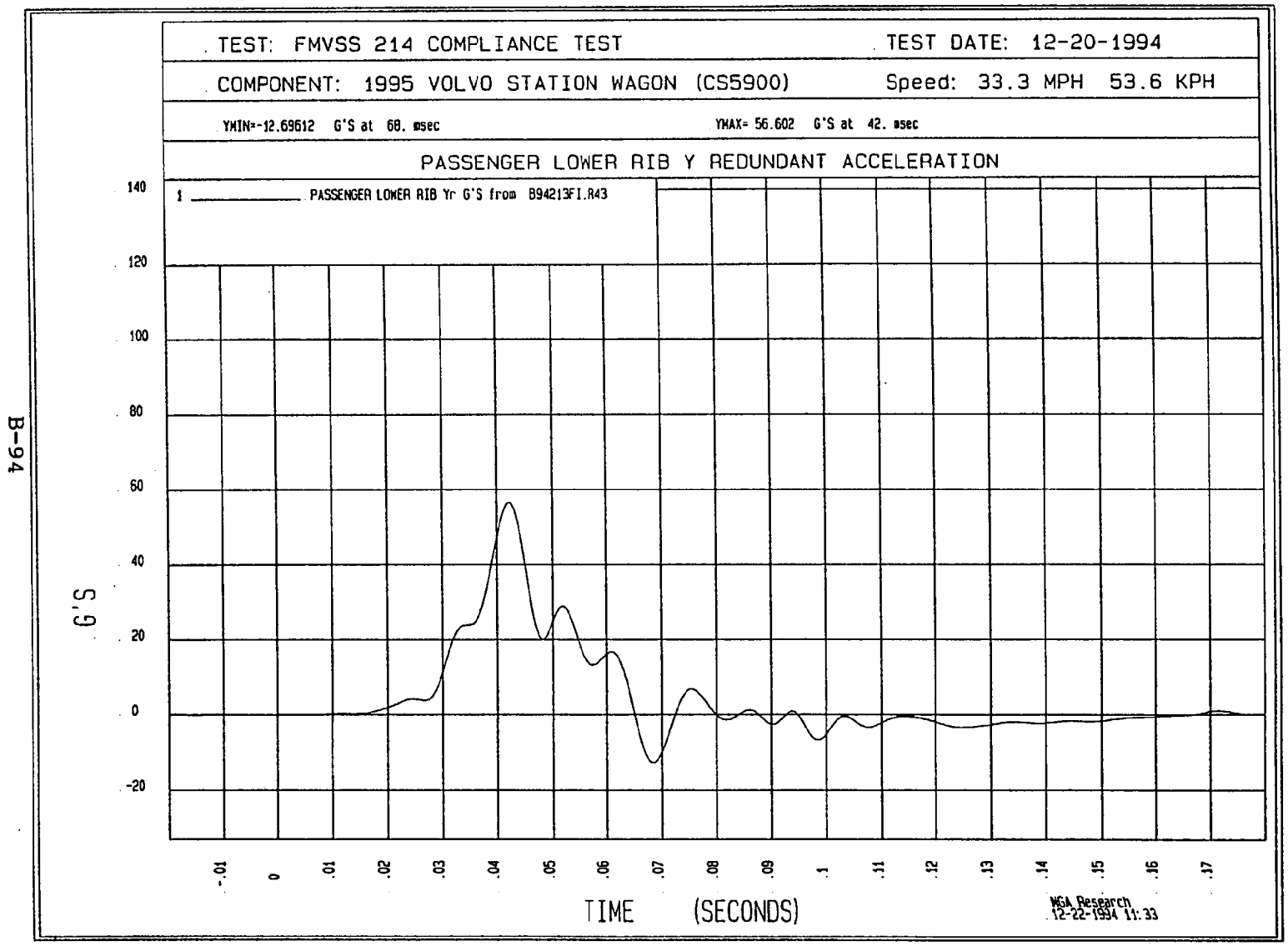

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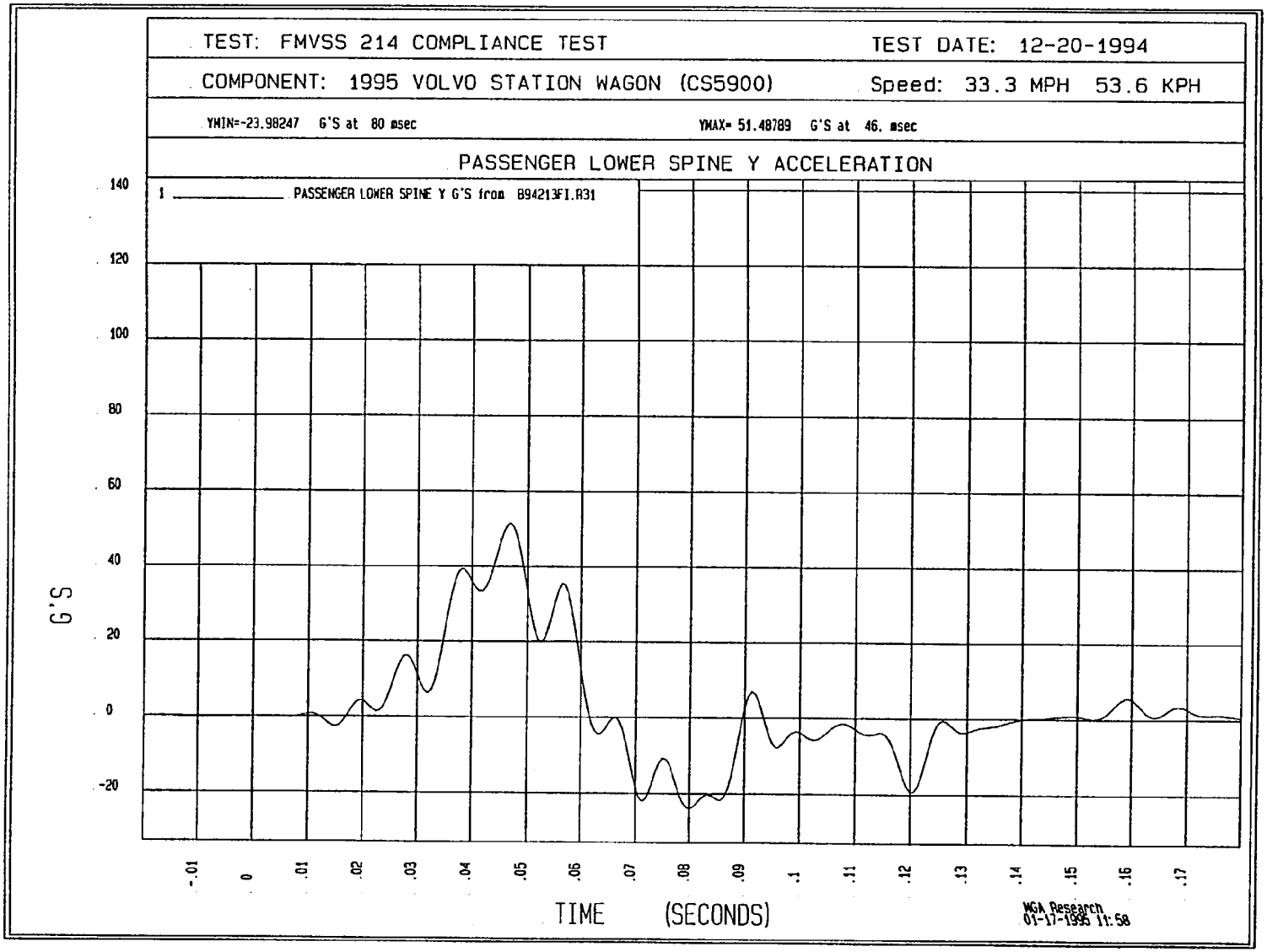
Figure B-94 - Passenger Lower Rib Y Redundant Acceleration vs. Time



B-95

Figure B-95 - Passenger Lower Spine Y Acceleration vs. Time

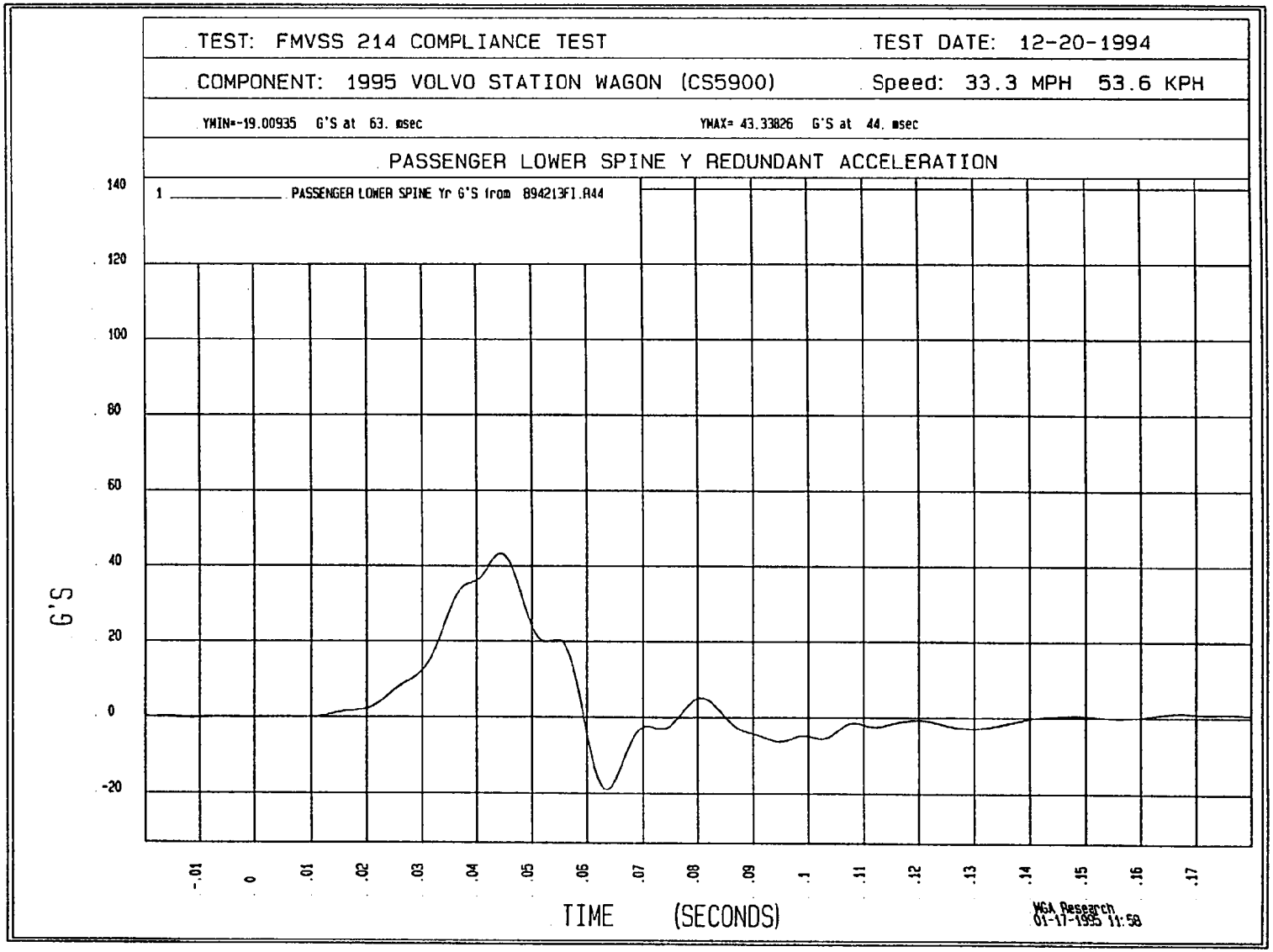
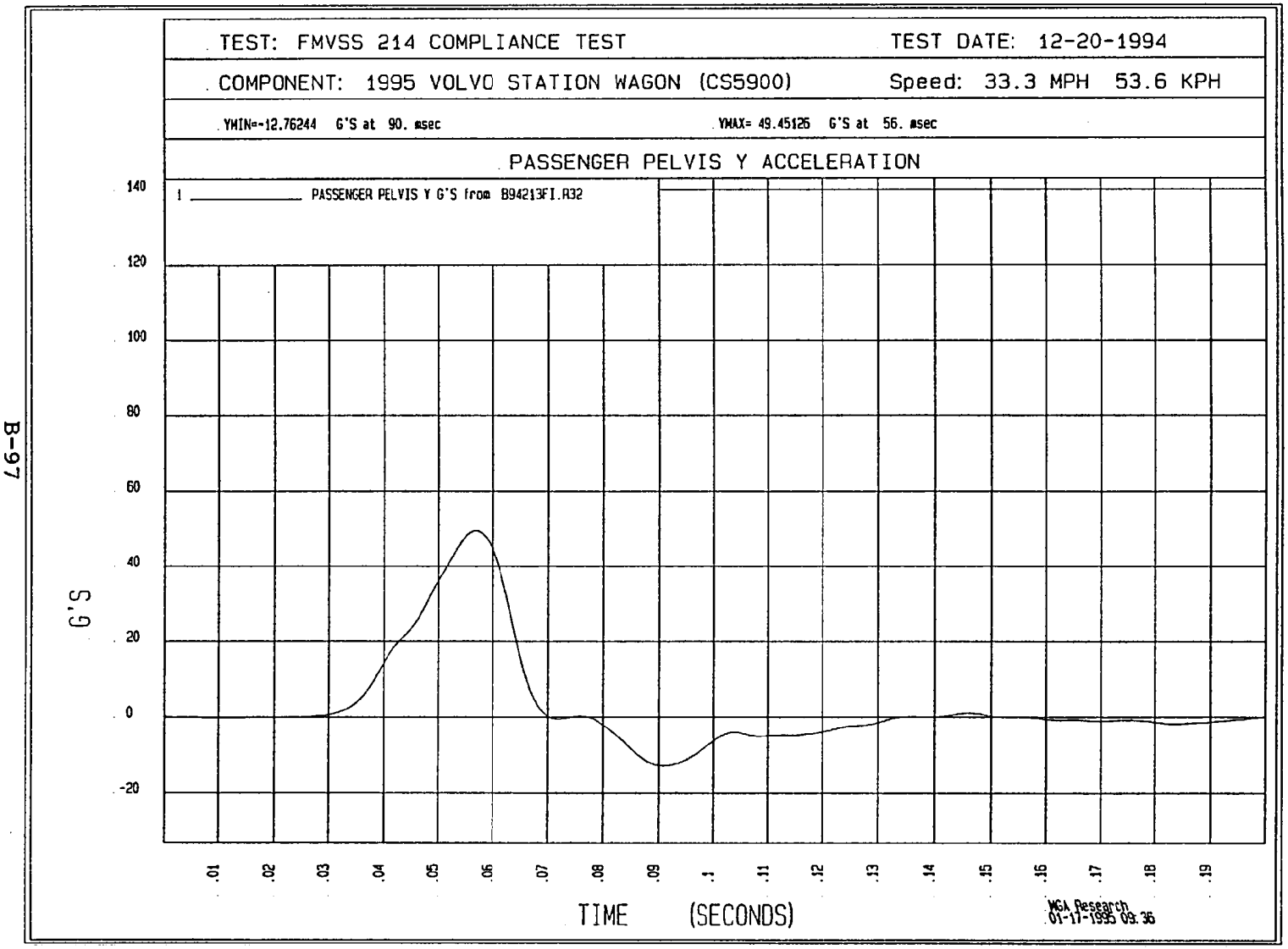
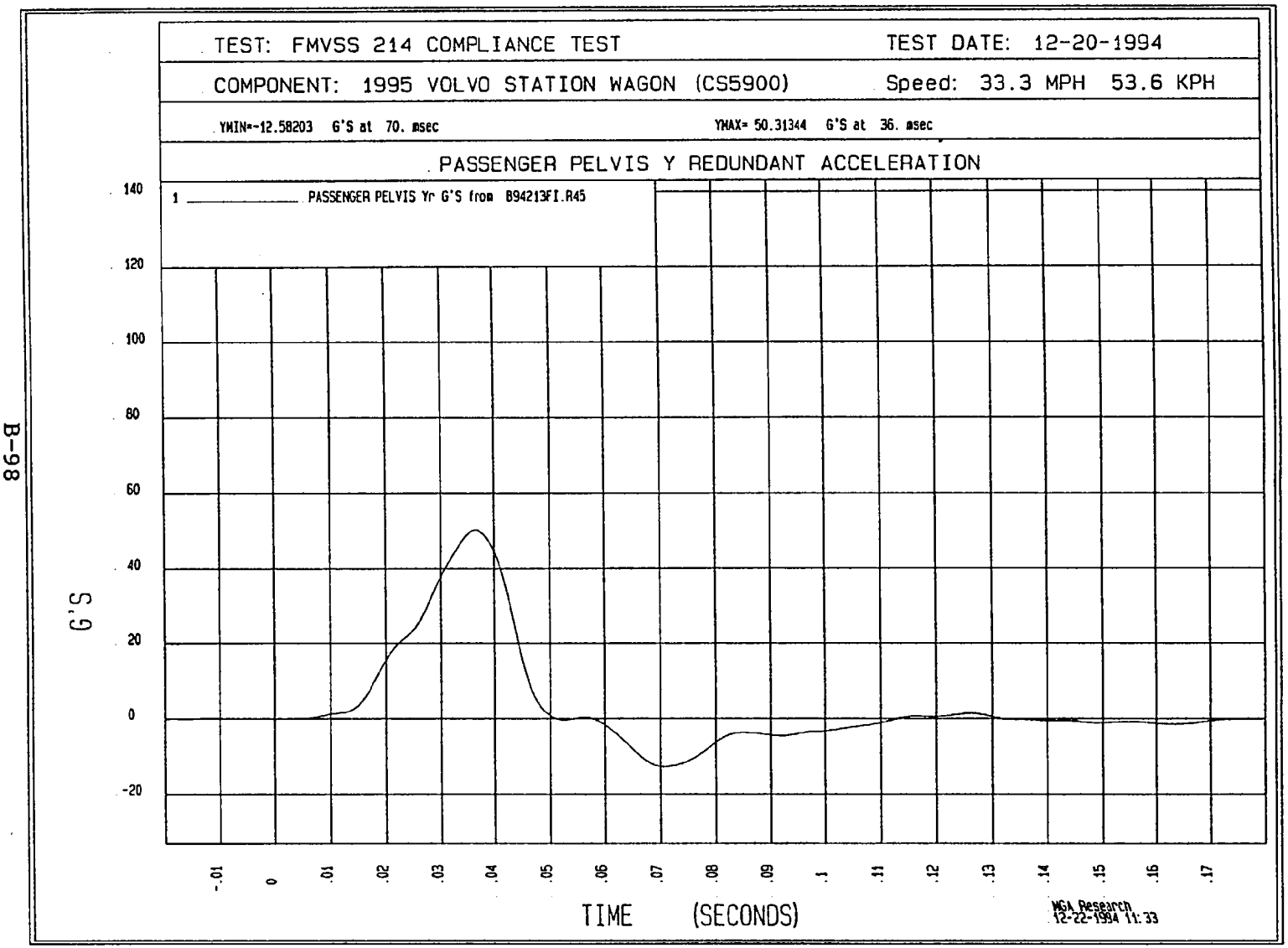


Figure B-96 - Passenger Lower Spine Y Redundant Acceleration vs. Time



B-97

Figure B-97 - Passenger Pelvis Y Acceleration vs. Time



B-98

Figure B-98 - Passenger Pelvis Y Redundant Acceleration vs. Time

APPENDIX C

SID CONFIGURATION AND PERFORMANCE VERIFICATION

REPORT NO. MGA-95-DC011

DUMMY PERFORMANCE CALIBRATIONS

FMVSS 214 - SIDE IMPACT TEST

VOLVO
1995 VOLVO 850 4 DOOR STATION WAGON
NHTSA NO. CS5900

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105

Test Date: December 20, 1994

Report Date: January 12, 1995

FINAL REPORT

Prepared For:

U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
MAIL CODE: NEF-30
400 SEVENTH STREET, S.W., ROOM 6115
Washington, D.C. 20590

TABLE OF CONTENTS

PRE-TEST CERTIFICATION DATA

Driver Dummy Serial Number: 272

Calibration Test Results Summary

Dummy Serial Number: 272

Pre-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 272 DATE OF VERIFICATION: December 16, 1994

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 35.8"	35.3
RH - Rib Height	19.75" - 20.50"	20.25
HP - Hip Pivot Height	3.9" ref.	3.9
RD - Rib From Back Line	9.0" to 9.5"	9.3
KV - Knee Pivot From Back Line	20.1" - 20.7"	20.5
SW - Knee Pivot to Floor	19.3" - 19.9"	19.5
HW - Hip Width	14.0" - 15.4"	15.0

MEASUREMENTS BY: _____

APPROVED BY: _____

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

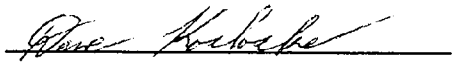
DATE: December 13, 1994

DUMMY NUMBER: 272 TEST NUMBER: D94432

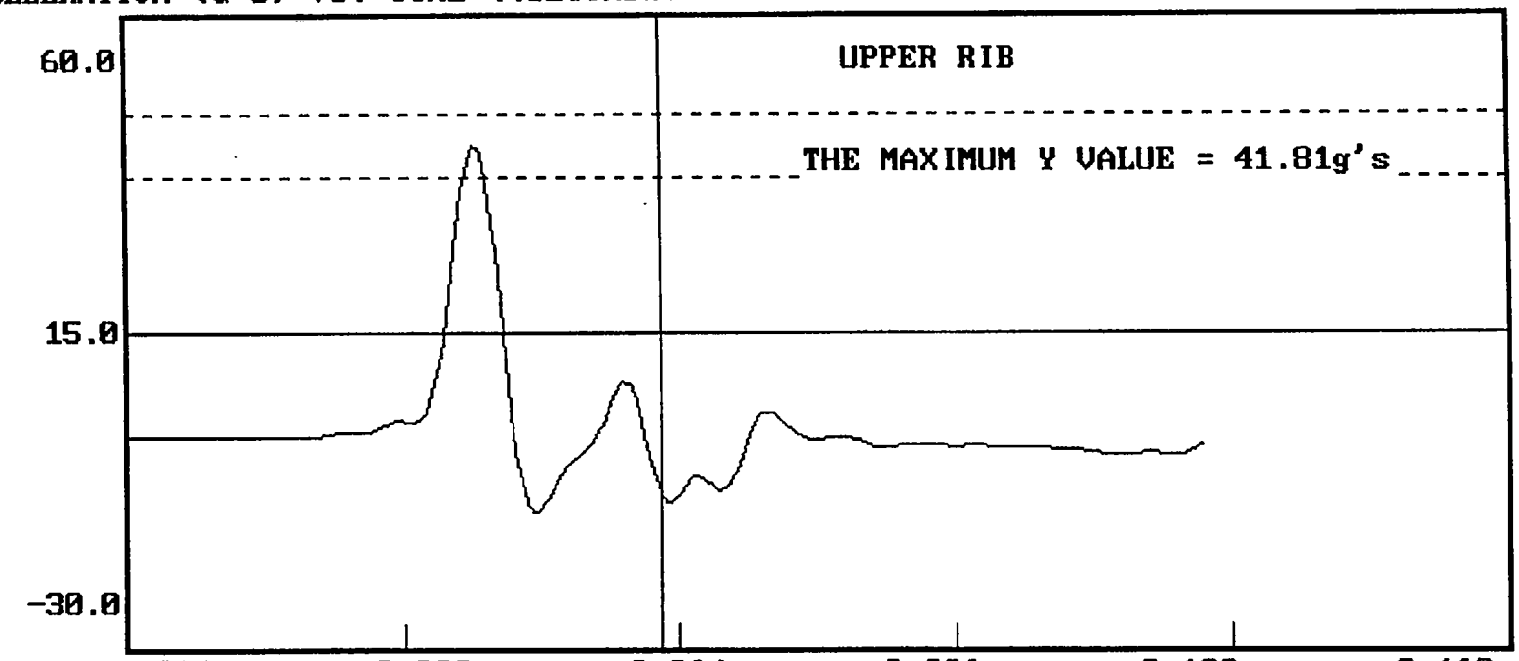
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	20%
PROBE SPEED	13.8 - 14.2 fps	13.8
UPPER RIB	37 - 46 g's	42
LOWER RIB	37 - 46 g's	40
LOWER SPINE	15 - 22 g's	20

TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY 

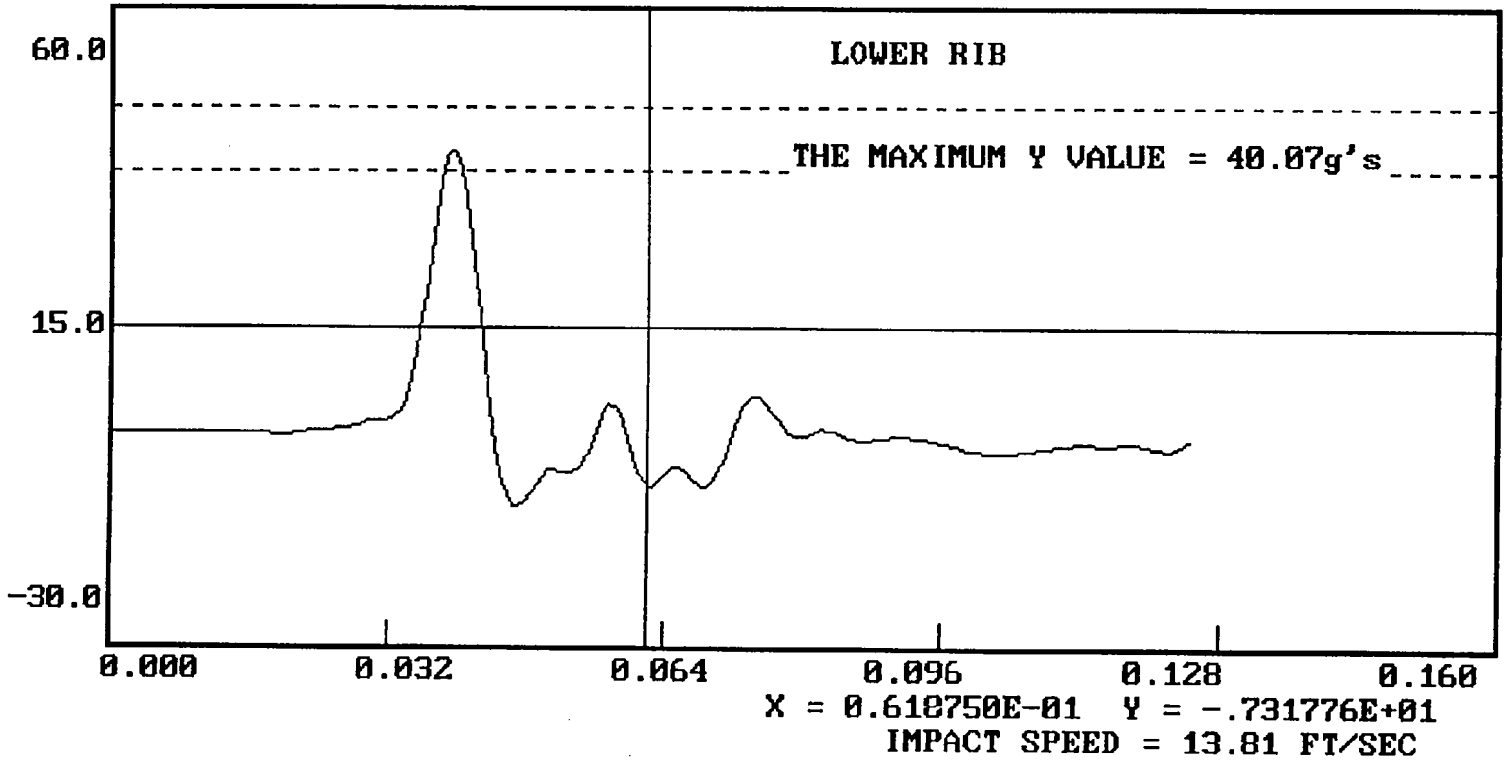
DUMMY CALIBRATION - THORAX IMPACT 12-13-1994 16:42
DUMMY # 272
ACCELERATION (G'S) VS. TIME ((SECONDS))



X = 0.618750E-01 Y = -.823162E+01
IMPACT SPEED = 13.81 FT/SEC

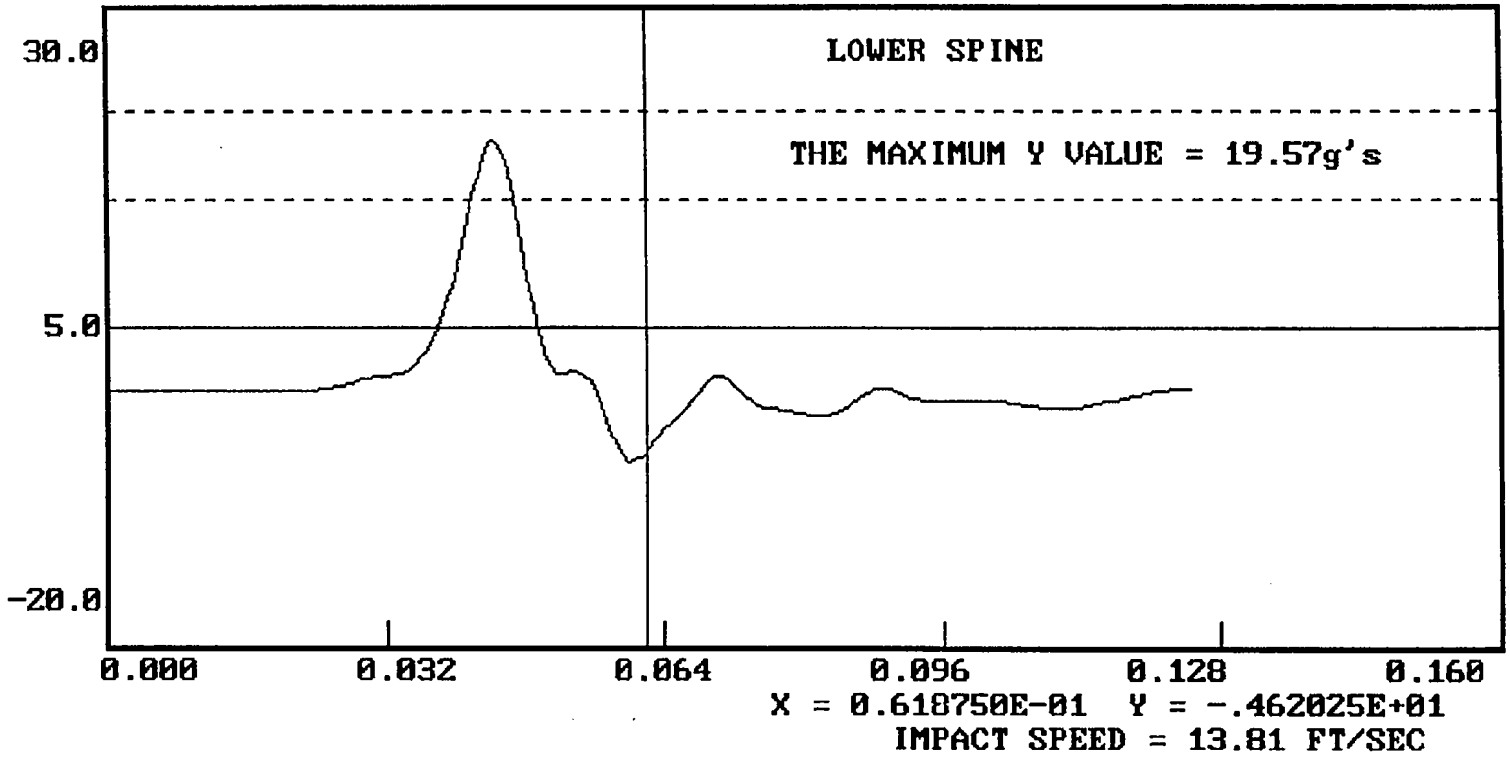
DUMMY CALIBRATION - THORAX IMPACT
DUMMY # 272
ACCELERATION (G'S) VS. TIME ((SECONDS))

12-13-1994 16:42



X = 0.610750E-01 Y = -.731776E+01
IMPACT SPEED = 13.81 FT/SEC

DUMMY CALIBRATION - THORAX IMPACT 12-13-1994 16:42
DUMMY # 272
ACCELERATION (G'S) VS. TIME ((SECONDS))



X = 0.618750E-01 Y = -.462025E+01
IMPACT SPEED = 13.81 FT/SEC

MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: December 14, 1994

DUMMY NUMBER: 272 TEST NUMBER: D94433

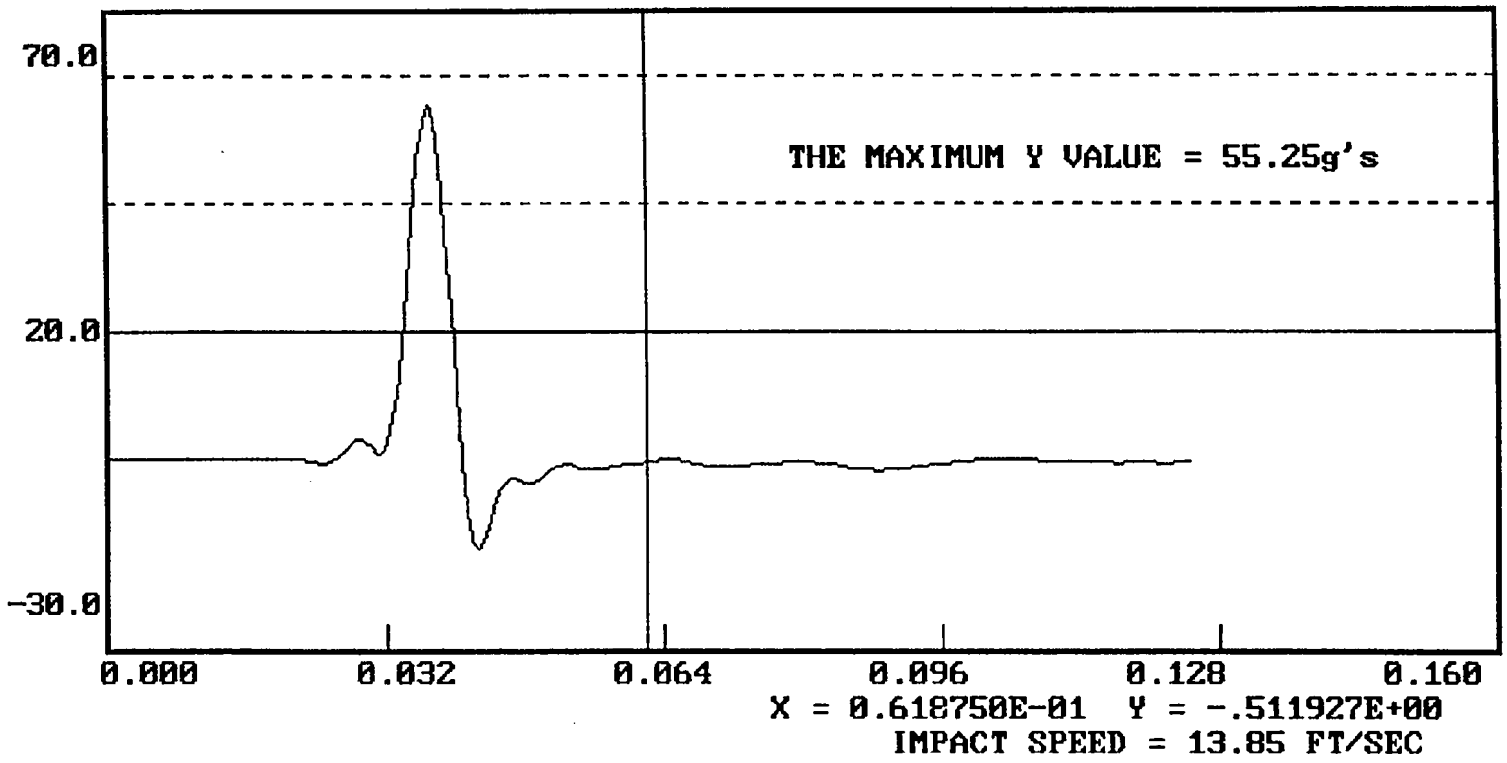
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	18%
PROBE SPEED	13.8 - 14.2 f/s	13.9
PELVIS ACCELERATION	40 - 60 g's	55

TEST MEETS SPECIFICATIONS

TECHNICIAN

APPROVED BY

DUMMY CALIBRATION - PELVIS IMPACT 12-14-1994 15:01
DUMMY # 272
ACCELERATION (G'S) VS. TIME ((SECONDS))



X = 0.618750E-01 Y = -.511927E+00
IMPACT SPEED = 13.85 FT/SEC

MGA RESEARCH CORPORATION

ABDOMINAL COMPRESSION TEST
(PRELOAD = 10 LBS)

SIDE IMPACT DUMMY (SID)

DATE: December 15, 1994

DUMMY NUMBER: 272 TEST NUMBER: D94434

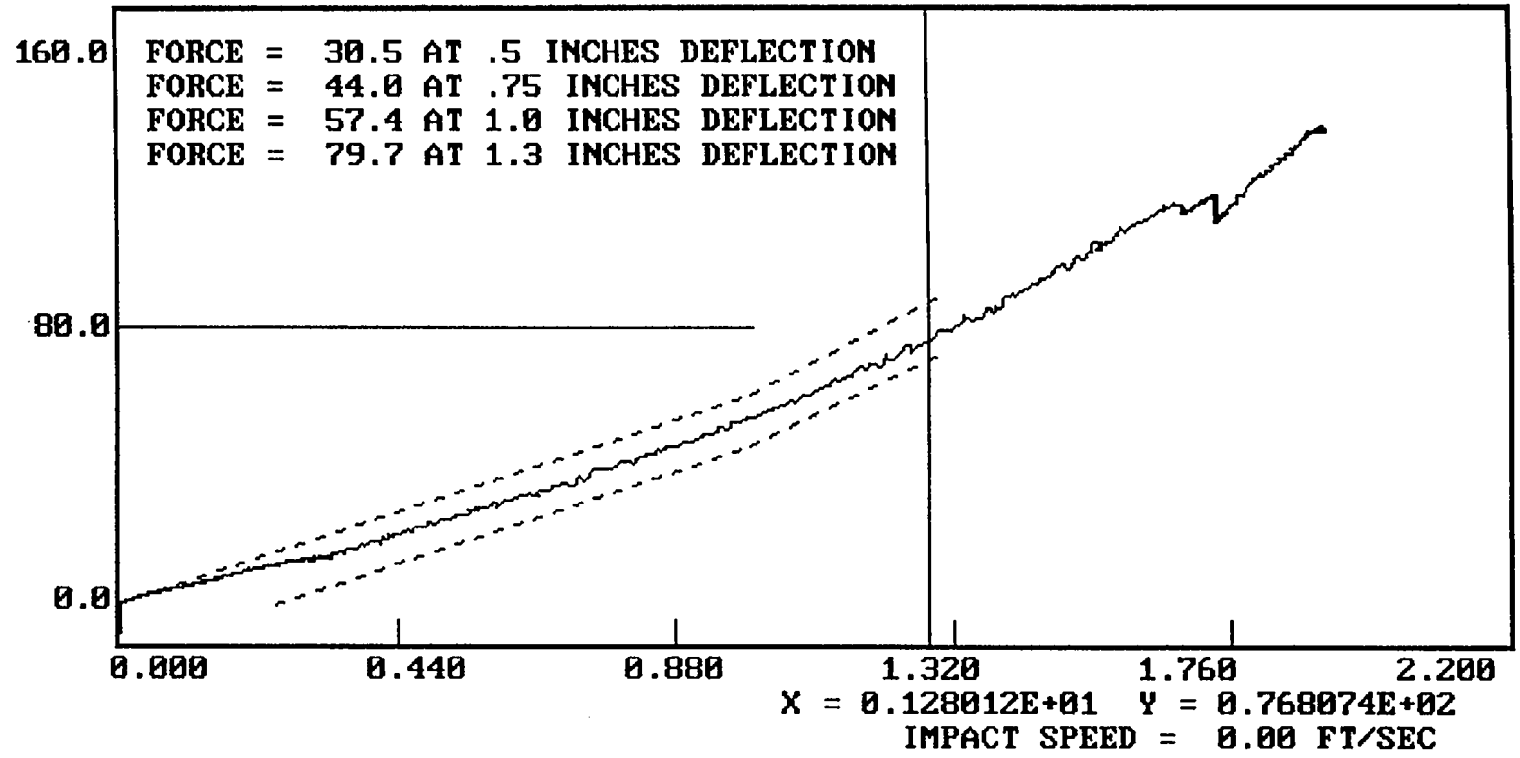
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	25%
FORCE @ 0.5 in	23.3 - 36.5 lbs	30.5
FORCE @ 0.75 in	36.7 - 49.8 lbs	44.0
FORCE @ 1.0 in	50 - 63 lbs	57
FORCE @ 1.3 in	73 - 88 lbs	80

TEST MEETS SPECIFICATIONS

TECHNICIAN _____

APPROVED BY _____

DUMMY CALIBRATION - ABDOMEN COMPRESSION 12-15-1994 15:04
DUMMY # 272
ABDOMEN FORCE () VS. ABDOMEN DISPLACEMENT (INCHES)



X = 0.128012E+01 Y = 0.768074E+02
IMPACT SPEED = 0.00 FT/SEC

MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: December 15, 1994

DUMMY NUMBER: 272 TEST NUMBER: D94435

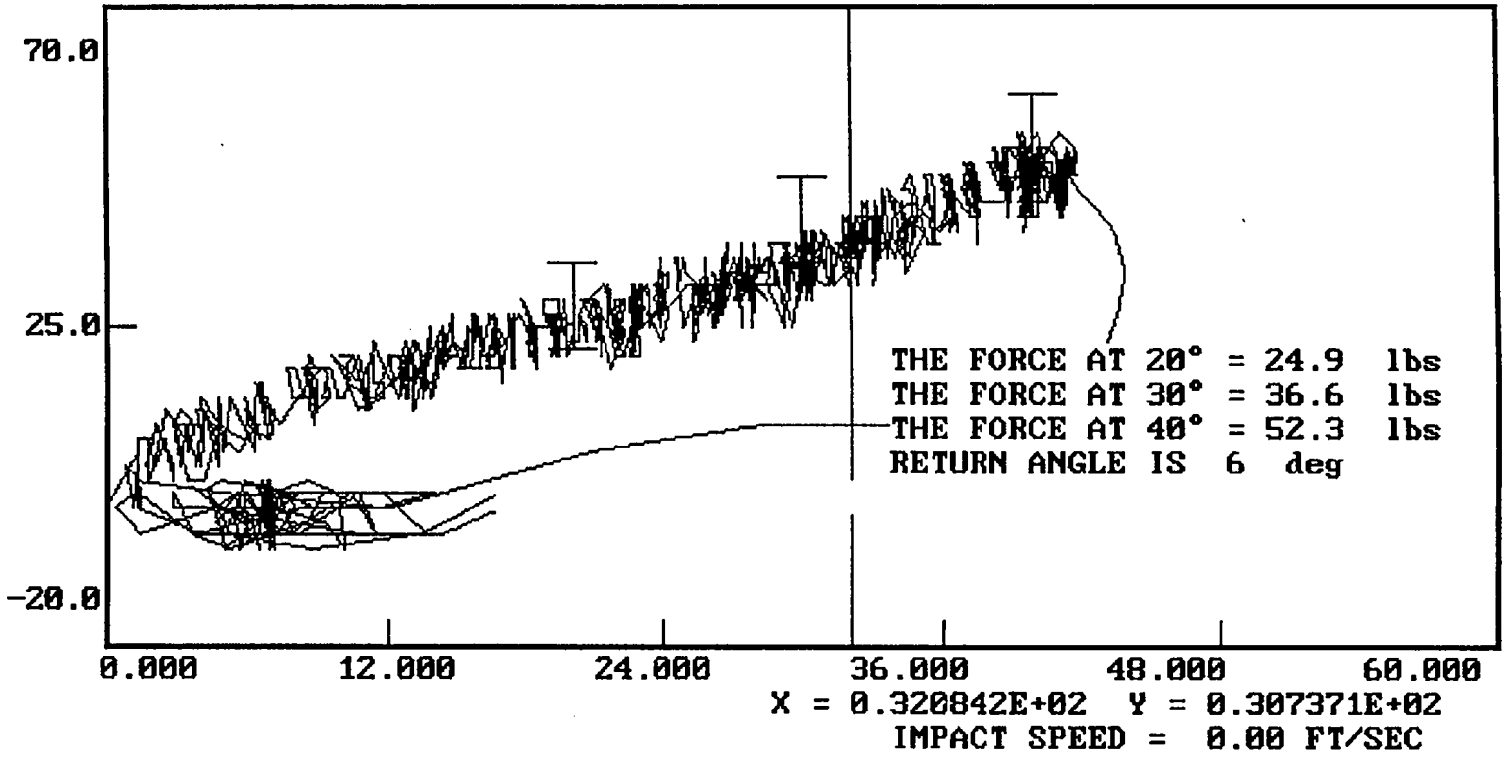
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	20%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	25
FORCE @ 30°	34 - 46 lbs	37
FORCE @ 40°	46 - 58 lbs	52
RETURN ANGLE	12° maximum	6°

TEST MEETS SPECIFICATIONS

TECHNICIAN

APPROVED BY

DUMMY CALIBRATION - LUMBAR FLEXION 12-15-1994 14:05
DUMMY # 272
FORCE () VS. TORSO ROTATION (DEGREES)



PRE-TEST CERTIFICATION DATA

Passenger Dummy Serial Number: 269

Calibration Test Results Summary

Passenger Serial Number: 269

Pre-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 269 DATE OF VERIFICATION: December 16, 1994

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 35.8"	35.3
RH - Rib Height	19.75" - 20.50"	20.20
HP - Hip Pivot Height	3.9" ref.	3.9
RD - Rib From Back Line	9.0" to 9.5"	9.3
KV - Knee Pivot From Back Line	20.1" - 20.7"	20.5
SW - Knee Pivot to Floor	19.3" - 19.9"	19.5
HW - Hip Width	14.0" - 15.4"	15.0

MEASUREMENTS BY: _____

APPROVED BY: _____

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: December 13, 1994

DUMMY NUMBER: 269 TEST NUMBER: D94402

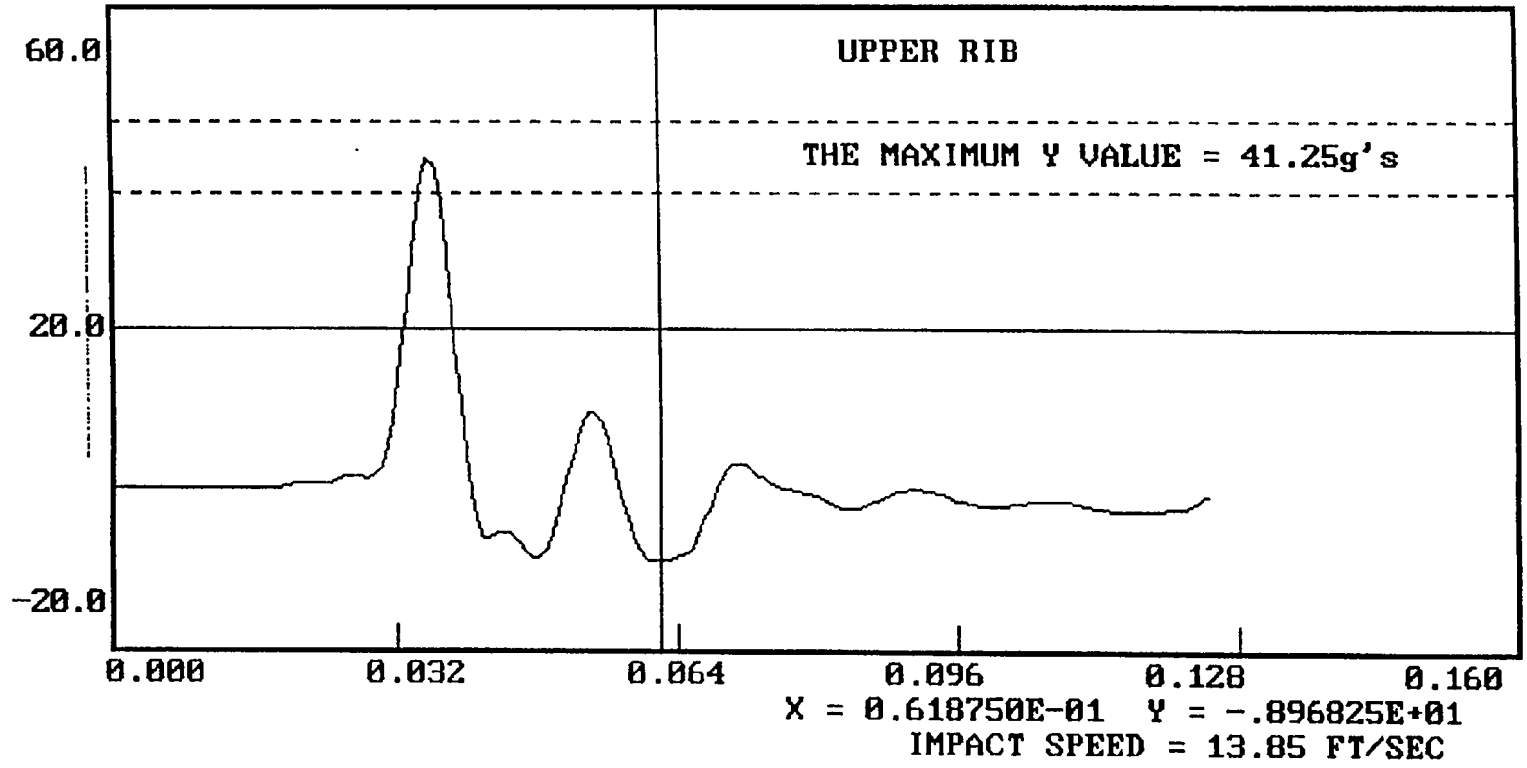
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	20%
PROBE SPEED	13.8 - 14.2 fps	13.9
UPPER RIB	37 - 46 g's	41
LOWER RIB	37 - 46 g's	38
LOWER SPINE	15 - 22 g's	19

TEST MEETS SPECIFICATIONS

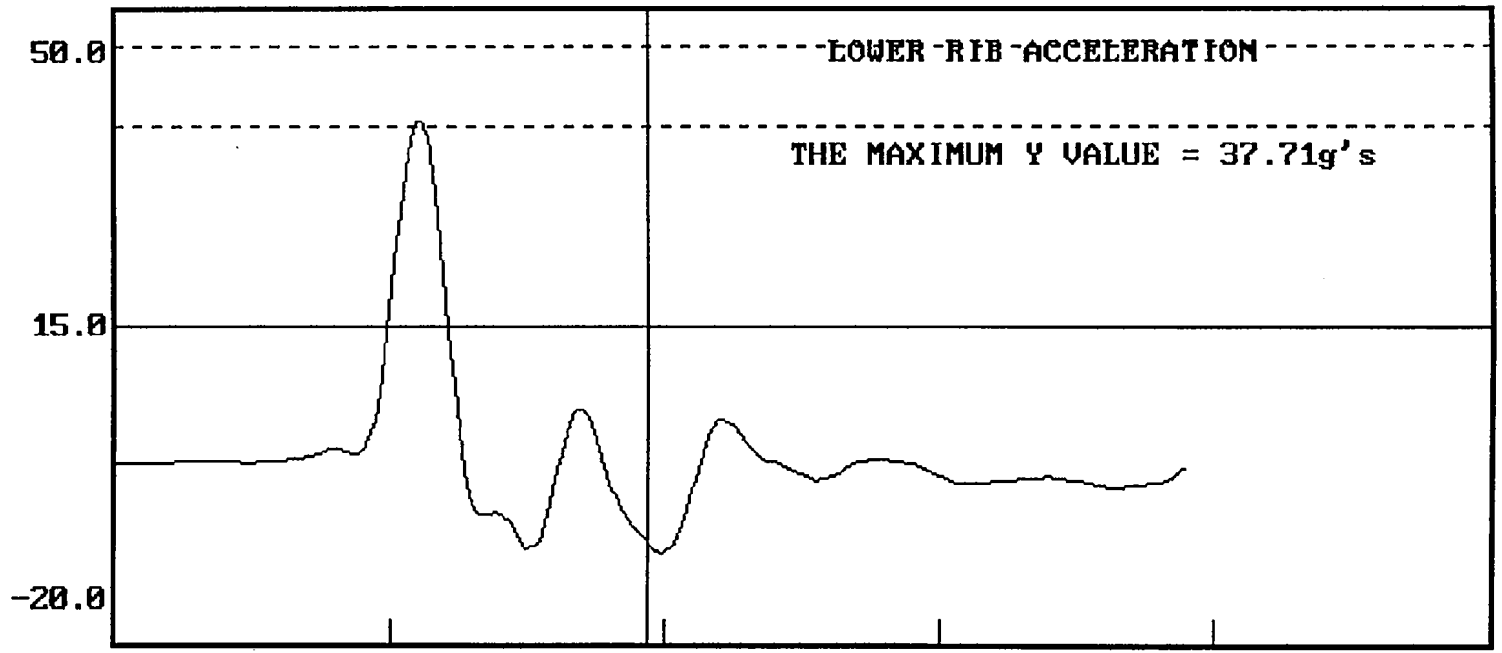
TECHNICIAN _____

APPROVED BY _____

DUMMY CALIBRATION - THORAX IMPACT 12-13-1994 15:51
DUMMY # 269
ACCELERATION (G'S) VS. TIME ((SECONDS))

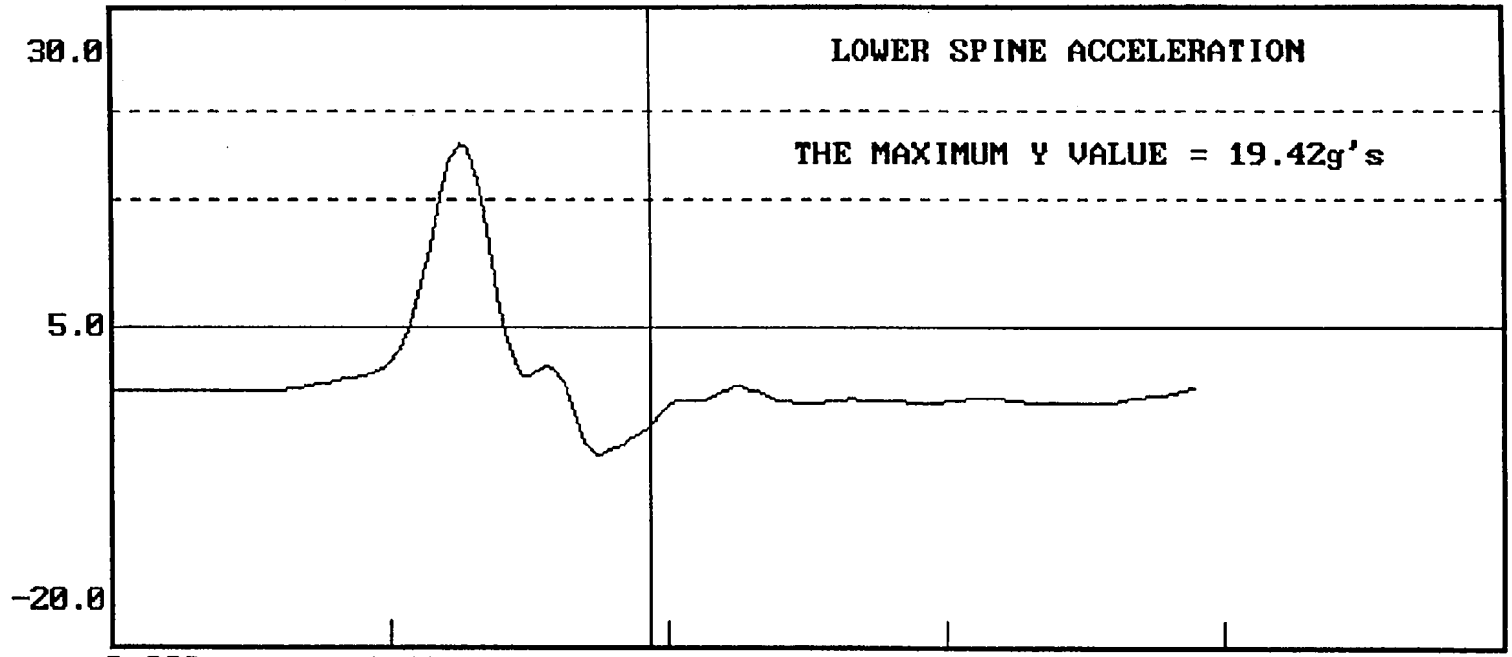


DUMMY CALIBRATION - THORAX IMPACT 12-13-1994 15:51
DUMMY # 269
ACCELERATION (G'S) VS. TIME ((SECONDS))



X = 0.618750E-01 Y = -.886295E+01
IMPACT SPEED = 13.85 FT/SEC

DUMMY CALIBRATION - THORAX IMPACT 12-13-1994 15:51
DUMMY # 269
ACCELERATION (G'S) VS. TIME ((SECONDS))



X = 0.618750E-01 Y = -.260371E+01
IMPACT SPEED = 13.85 FT/SEC

MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

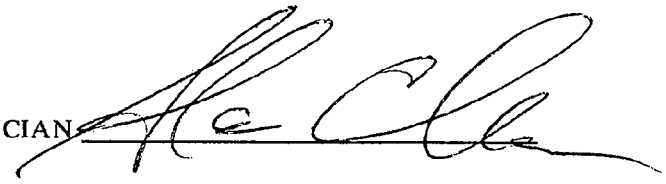
SIDE IMPACT DUMMY (SID)

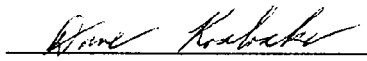
DATE: December 14, 1994

DUMMY NUMBER: 269 TEST NUMBER: D94403

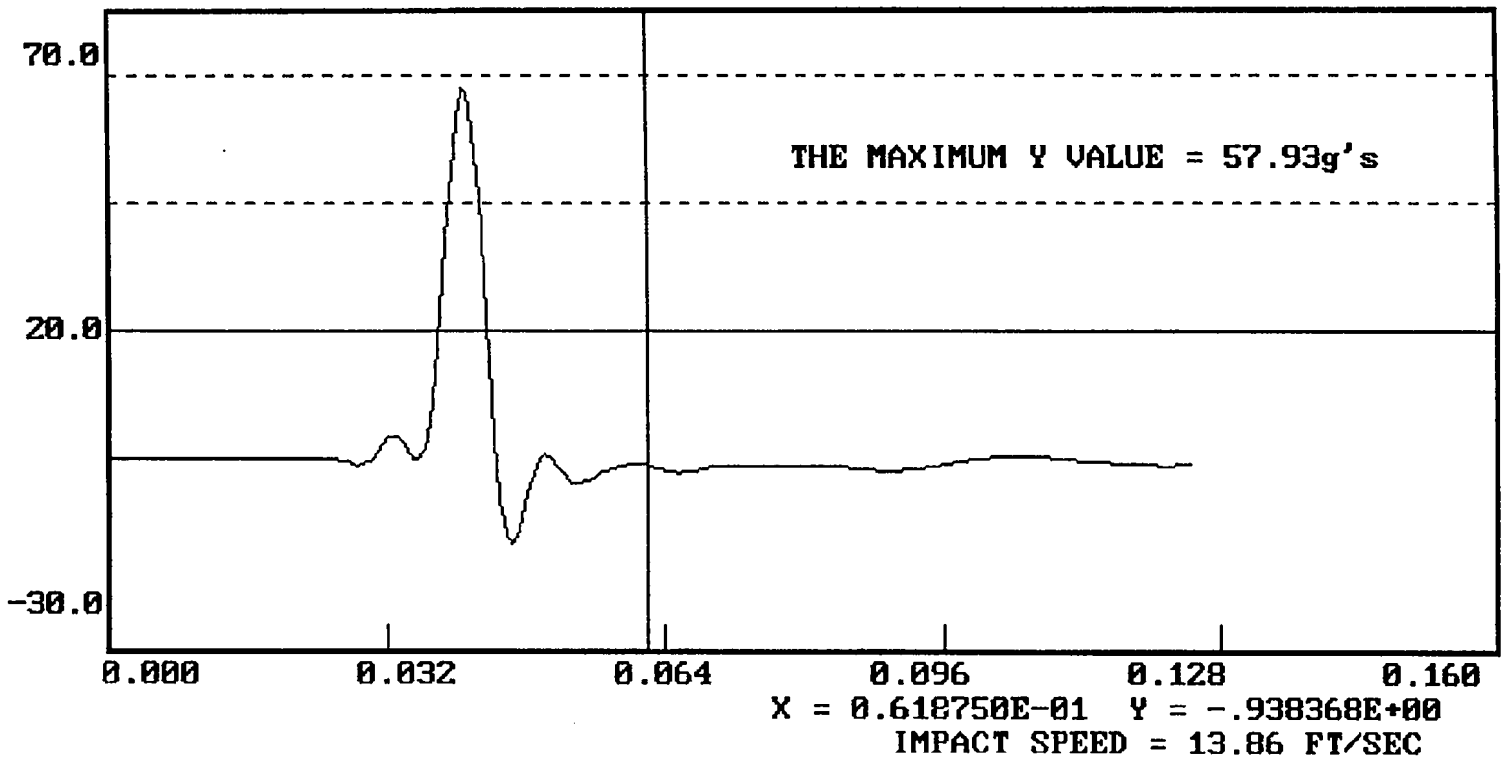
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	18%
PROBE SPEED	13.8 - 14.2 f/s	13.9
PELVIS ACCELERATION	40 - 60 g's	58

TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY 

DUMMY CALIBRATION - PELVIS IMPACT 12-14-1994 14:51
DUMMY # 269
ACCELERATION (G'S) VS. TIME ((SECONDS))



X = 0.618750E-01 Y = -.938368E+00
IMPACT SPEED = 13.86 FT/SEC

MGA RESEARCH CORPORATION

ABDOMINAL COMPRESSION TEST
(PRELOAD = 10 LBS)

SIDE IMPACT DUMMY (SID)

DATE: December 15, 1994

DUMMY NUMBER: 269 TEST NUMBER: D94404

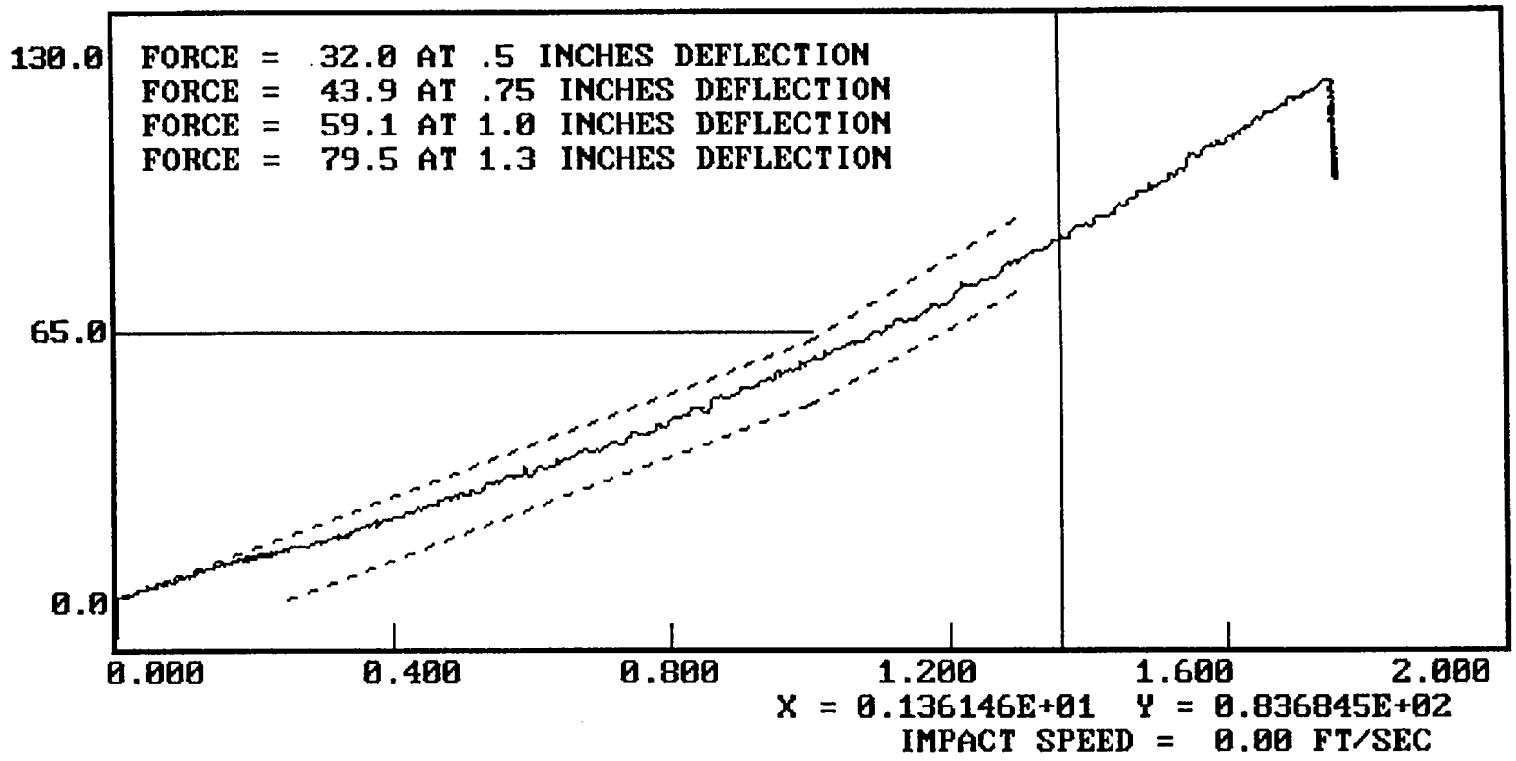
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	25%
FORCE @ 0.5 in	23.3 - 36.5 lbs	32.0
FORCE @ 0.75 in	36.7 - 49.8 lbs	43.9
FORCE @ 1.0 in	50 - 63 lbs	59
FORCE @ 1.3 in	73 - 88 lbs	80

TEST MEETS SPECIFICATIONS

TECHNICIAN

APPROVED BY

DUMMY CALIBRATION - ABDOMEN COMPRESSION 12-15-1994 15:11
DUMMY # 269
ABDOMEN FORCE () VS. ABDOMEN DISPLACEMENT (INCHES)



X = 0.136146E+01 Y = 0.836845E+02
IMPACT SPEED = 0.00 FT/SEC

MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

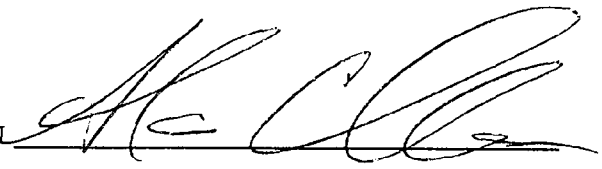
SIDE IMPACT DUMMY (SID)

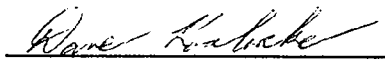
DATE: December 15, 1994

DUMMY NUMBER: 269 TEST NUMBER: D94405

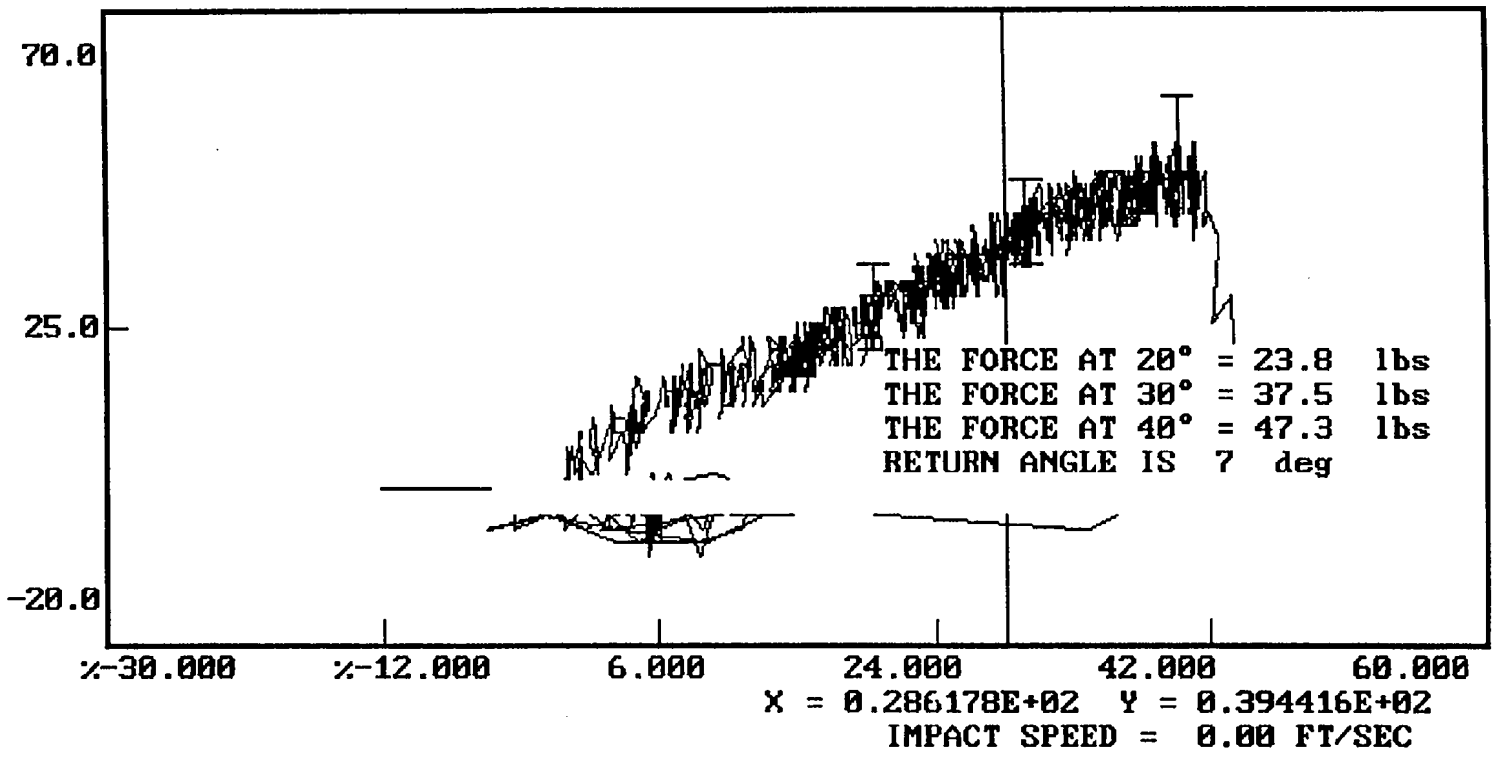
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	20%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	24
FORCE @ 30°	34 - 46 lbs	38
FORCE @ 40°	46 - 58 lbs	47
RETURN ANGLE	12° maximum	7°

TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY 

DUMMY CALIBRATION - LUMBAR FLEXION 12-15-1994 13:49
DUMMY # 269
FORCE () VS. TORSO ROTATION (DEGREES)



POST-TEST CERTIFICATION DATA

Driver Dummy Serial Number: 272

Calibration Test Results Summary

Dummy Serial Number: 272

Post-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 272 DATE OF VERIFICATION: December 22, 1994

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 35.8"	35.3
RH - Rib Height	19.75" - 20.50"	20.25
HP - Hip Pivot Height	3.9" ref.	3.9
RD - Rib From Back Line	9.0" to 9.5"	9.2
KV - Knee Pivot From Back Line	20.1" - 20.7"	20.5
SW - Knee Pivot to Floor	19.3" - 19.9"	19.5
HW - Hip Width	14.0" - 15.4"	15.0

MEASUREMENTS BY: _____

APPROVED BY: _____

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: December 22, 1994

DUMMY NUMBER: 272 TEST NUMBER: D94542

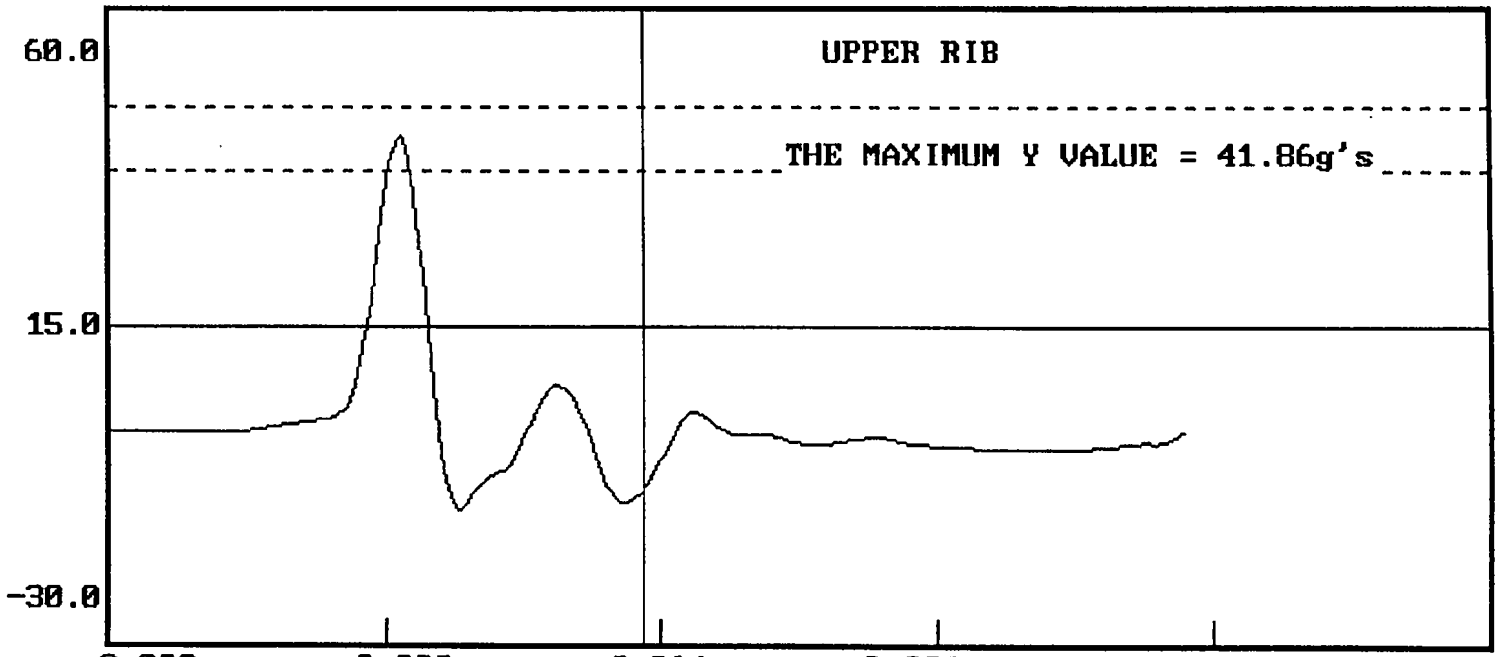
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	25%
PROBE SPEED	13.8 - 14.2 fps	13.8
UPPER RIB	37 - 46 g's	42
LOWER RIB	37 - 46 g's	40
LOWER SPINE	15 - 22 g's	20

TEST MEETS SPECIFICATIONS

TECHNICIAN _____

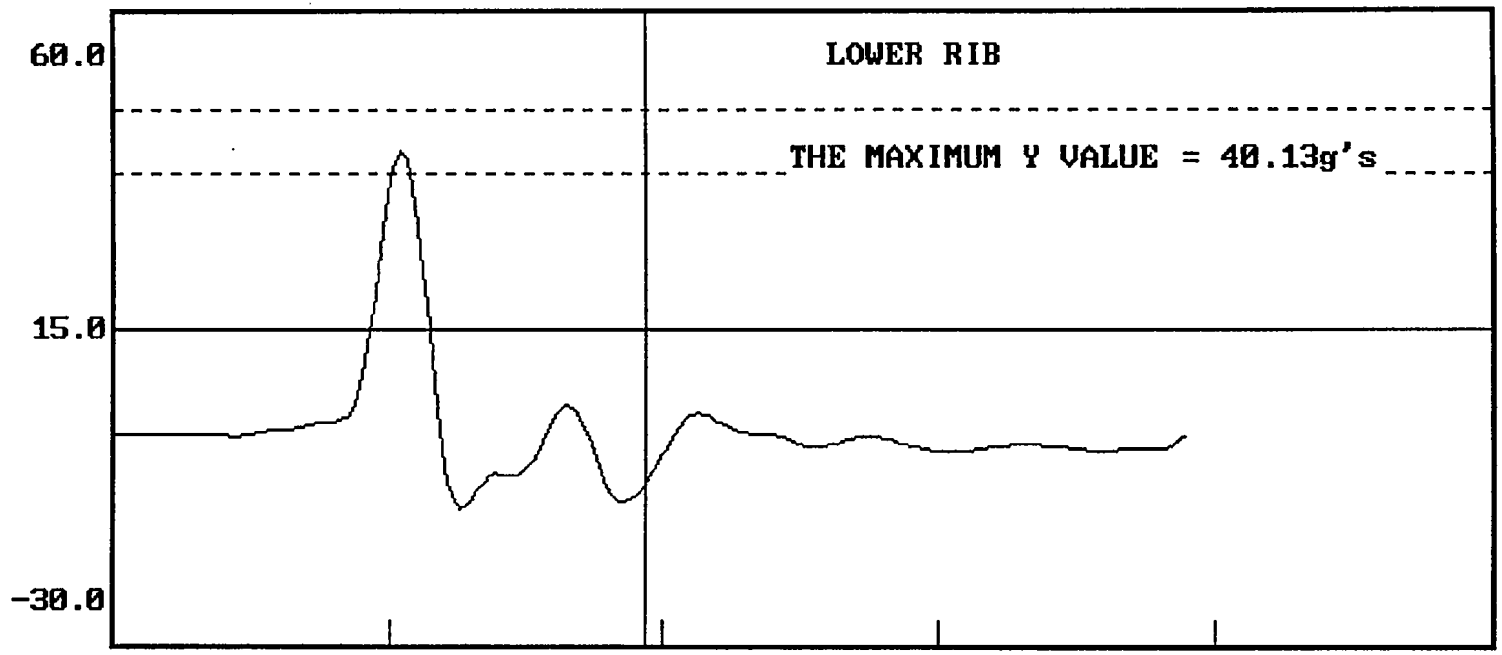
APPROVED BY _____

DUMMY CALIBRATION - THORAX IMPACT 12-22-1994 11:41
DUMMY # 272
ACCELERATION (G'S) VS. TIME ((SECONDS))



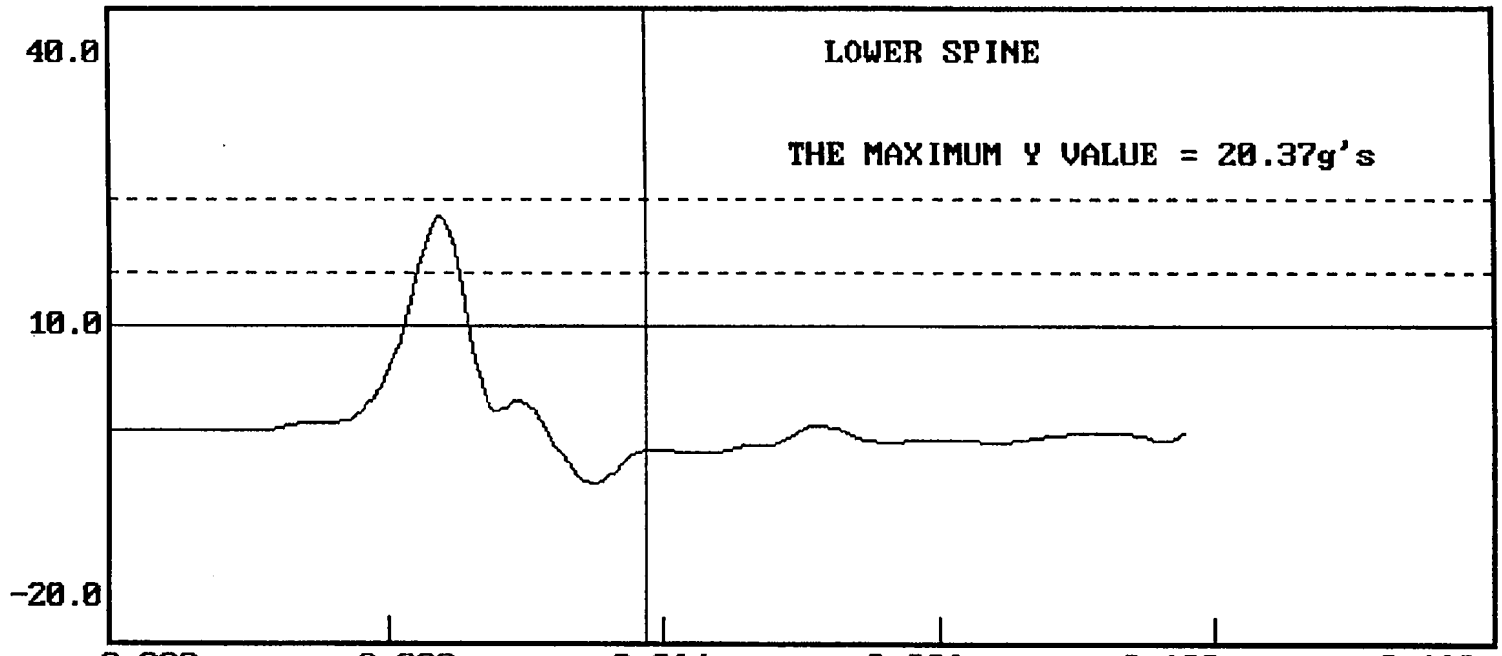
X = 0.618750E-01 Y = -.782894E+01
IMPACT SPEED = 13.82 FT/SEC

DUMMY CALIBRATION - THORAX IMPACT 12-22-1994 11:41
DUMMY # 272
ACCELERATION (G'S) VS. TIME ((SECONDS))



X = 0.618750E-01 Y = -.675891E+01
IMPACT SPEED = 13.82 FT/SEC

DUMMY CALIBRATION - THORAX IMPACT 12-22-1994 11:41
DUMMY # 272
ACCELERATION (G'S) VS. TIME ((SECONDS))



X = 0.618750E-01 Y = -.182124E+01
IMPACT SPEED = 13.82 FT/SEC

MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: December 22, 1994

DUMMY NUMBER: 272 TEST NUMBER: D94543

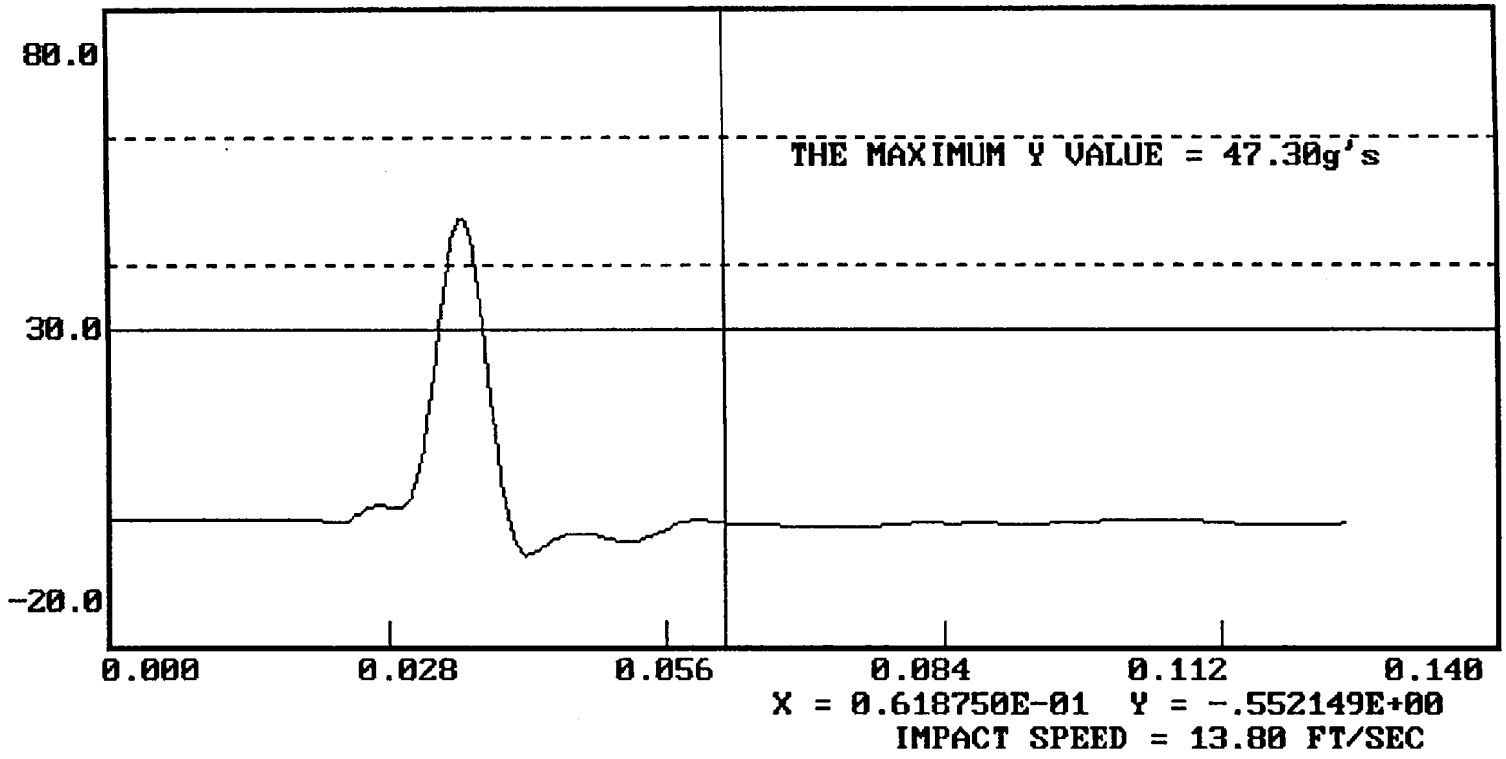
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	25%
PROBE SPEED	13.8 - 14.2 f/s	13.8
PELVIS ACCELERATION	40 - 60 g's	47

TEST MEETS SPECIFICATIONS

TECHNICIAN

APPROVED BY

DUMMY CALIBRATION - PELVIS IMPACT 12-22-1994 12:55
DUMMY # 272
ACCELERATION (G'S) VS. TIME ((SECONDS))



MGA RESEARCH CORPORATION

ABDOMINAL COMPRESSION TEST
(PRELOAD = 1Ø LBS)

SIDE IMPACT DUMMY (SID)

DATE: December 22, 1994

DUMMY NUMBER: 272 TEST NUMBER: D94544

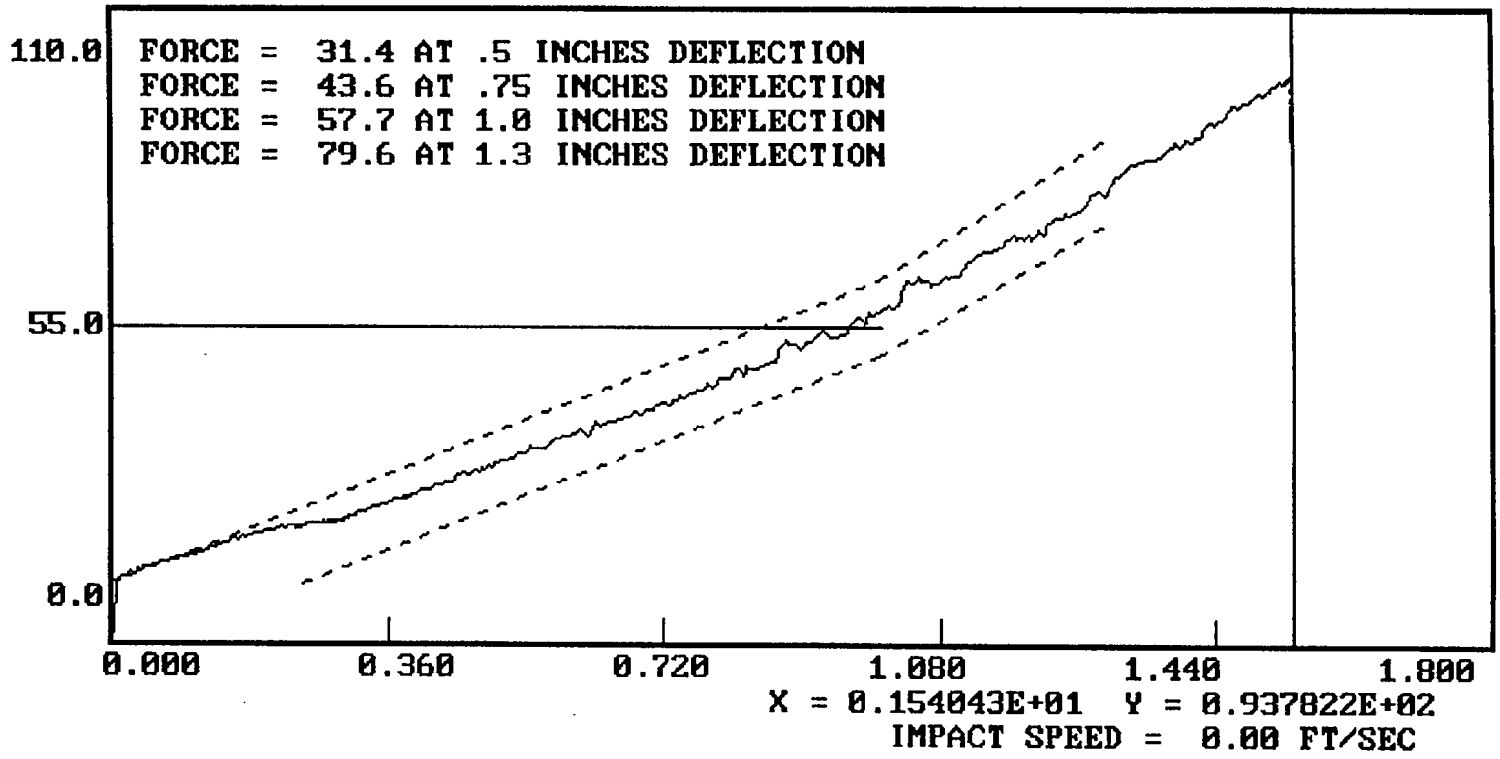
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	7Ø°
RELATIVE HUMIDITY	1Ø - 7Ø%	25%
FORCE @ Ø.5 in	23.3 - 36.5 lbs	31.4
FORCE @ Ø.75 in	36.7 - 49.8 lbs	43.6
FORCE @ 1.Ø in	5Ø - 63 lbs	58
FORCE @ 1.3 in	73 - 88 lbs	8Ø

TEST MEETS SPECIFICATIONS

TECHNICIAN _____

APPROVED BY _____

DUMMY CALIBRATION - ABDOMEN COMPRESSION 12-22-1994 16:35
DUMMY # 272
ABDOMEN FORCE () VS. ABDOMEN DISPLACEMENT (INCHES)



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

SIDE IMPACT DUMMY (SID)

DATE: December 22, 1994

DUMMY NUMBER: 272 TEST NUMBER: D94545

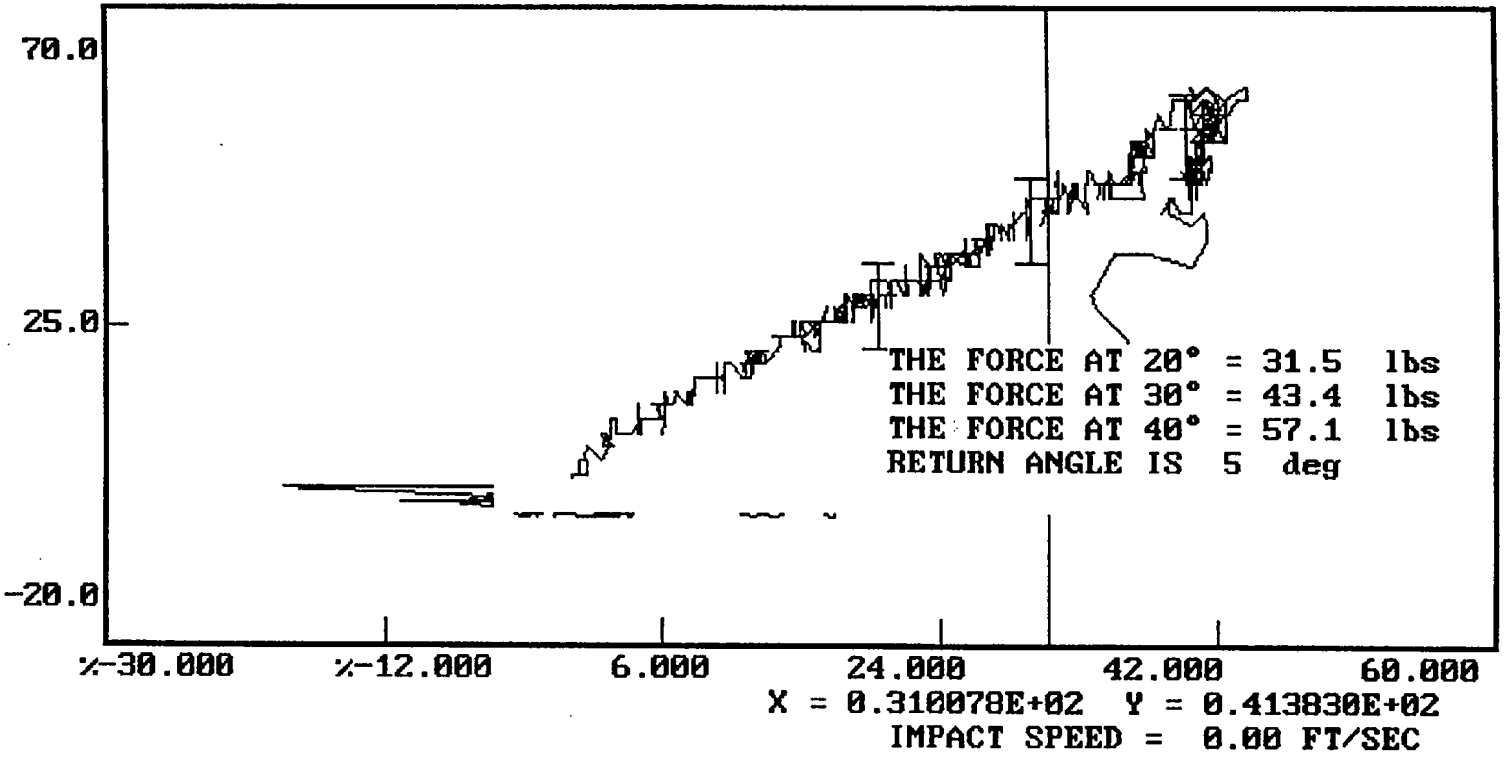
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	25%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	32
FORCE @ 30°	34 - 46 lbs	43
FORCE @ 40°	46 - 58 lbs	57
RETURN ANGLE	12° maximum	5°

TEST MEETS SPECIFICATIONS

TECHNICIAN

APPROVED BY

DUMMY CALIBRATION - LUMBAR FLEXION 12-22-1994 17:25
DUMMY # 272
FORCE () VS. TORSO ROTATION (DEGREES)



POST-TEST CERTIFICATION DATA

Passenger Dummy Serial Number: 269

Calibration Test Results Summary

Dummy Serial Number: 269

Post-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 269

DATE OF VERIFICATION: December 22, 1994

DESCRIPTION	SPECIFICATION	TEST RESULTS
SH - Seated Height	35.0" - 35.8"	35.3
RH - Rib Height	19.75" - 20.50"	20.25
HP - Hip Pivot Height	3.9" ref.	3.9
RD - Rib From Back Line	9.0" to 9.5"	9.3
KV - Knee Pivot From Back Line	20.1" - 20.7"	20.5
SW - Knee Pivot to Floor	19.3" - 19.9"	19.5
HW - Hip Width	14.0" - 15.4"	15.0

MEASUREMENTS BY: _____

APPROVED BY: _____

MGA RESEARCH CORPORATION

THORAX IMPACT TEST

SIDE IMPACT DUMMY (SID)

DATE: December 22, 1994

DUMMY NUMBER: 269 TEST NUMBER: D94512

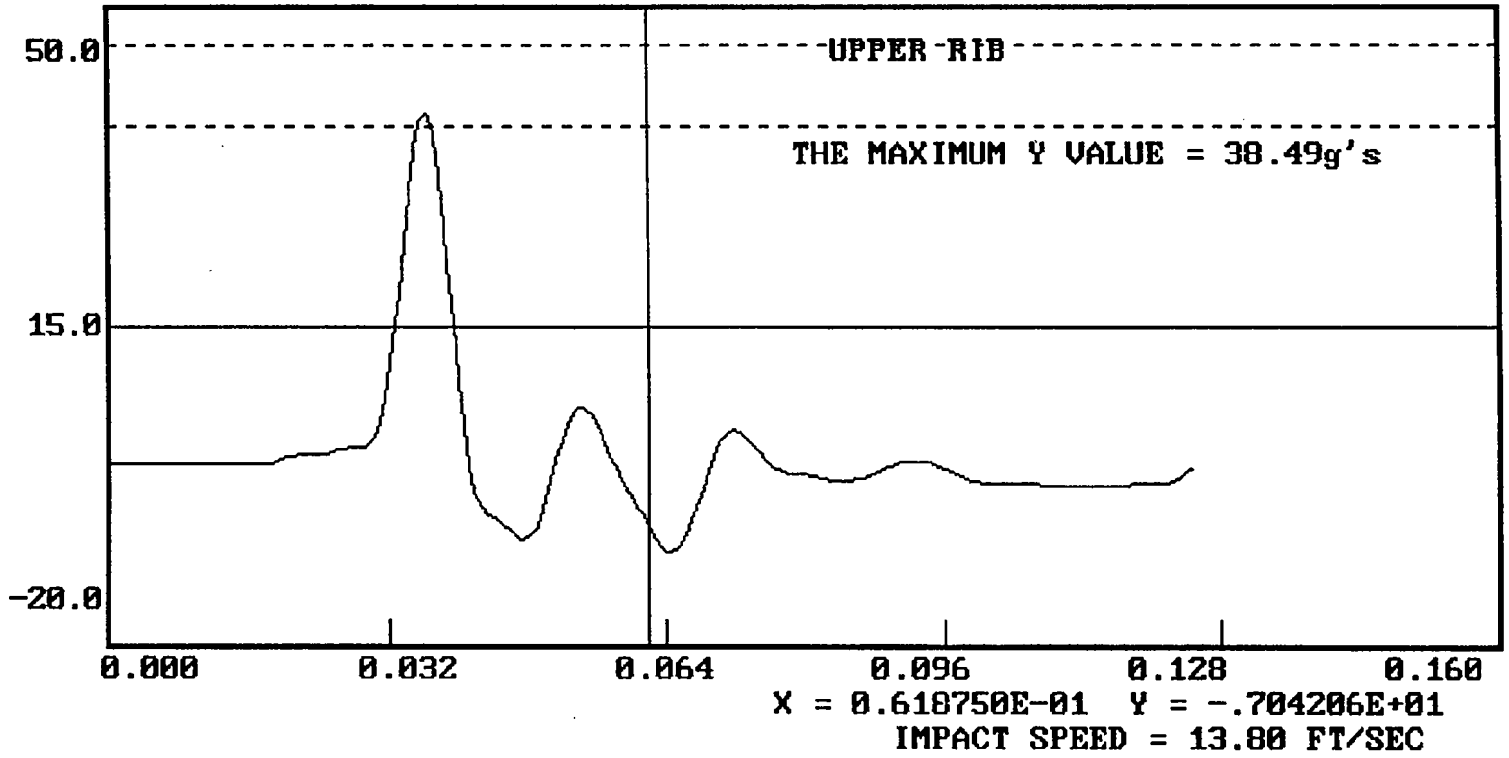
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	25%
PROBE SPEED	13.8 - 14.2 fps	13.8
UPPER RIB	37 - 46 g's	38
LOWER RIB	37 - 46 g's	37
LOWER SPINE	15 - 22 g's	20

TEST MEETS SPECIFICATIONS

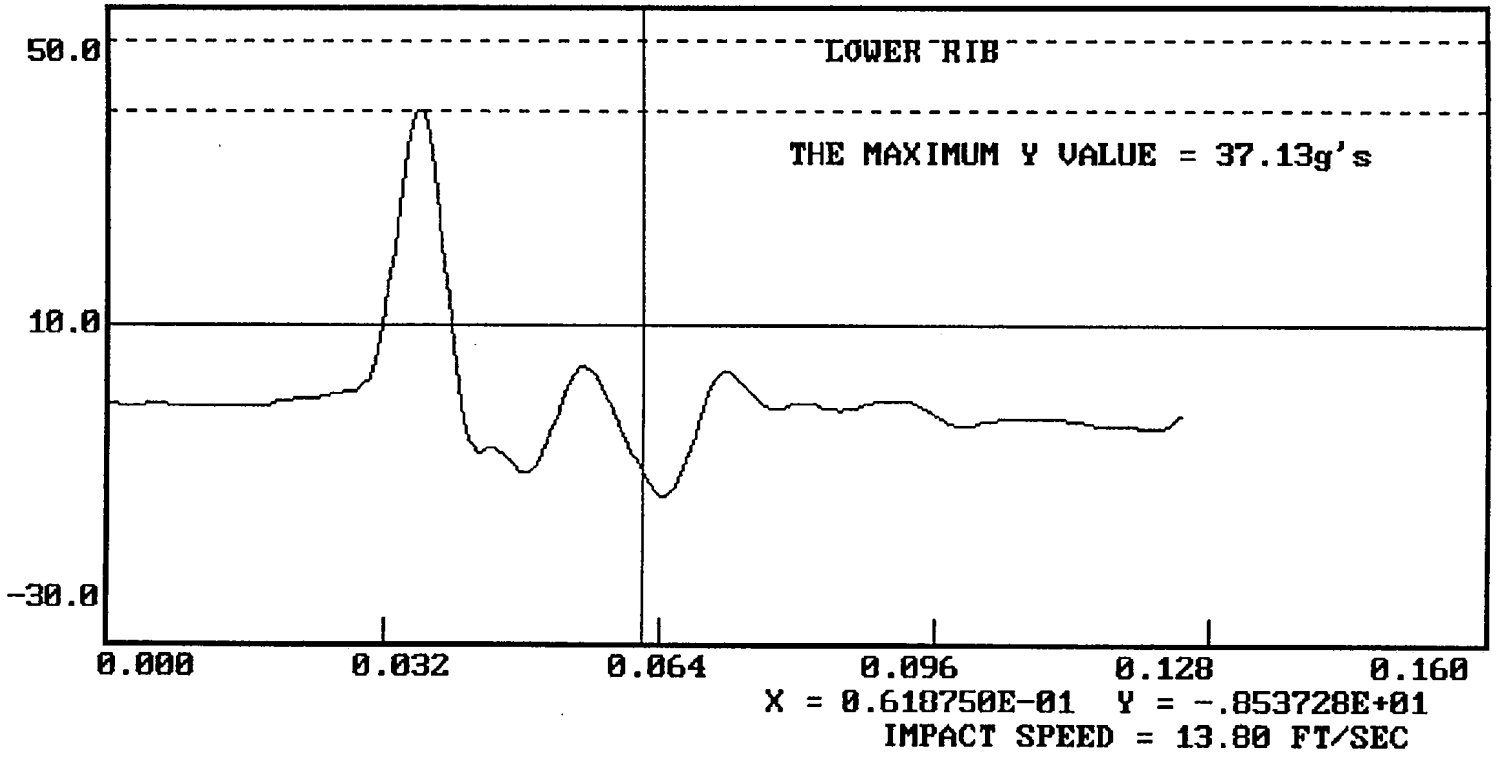
TECHNICIAN _____

APPROVED BY _____

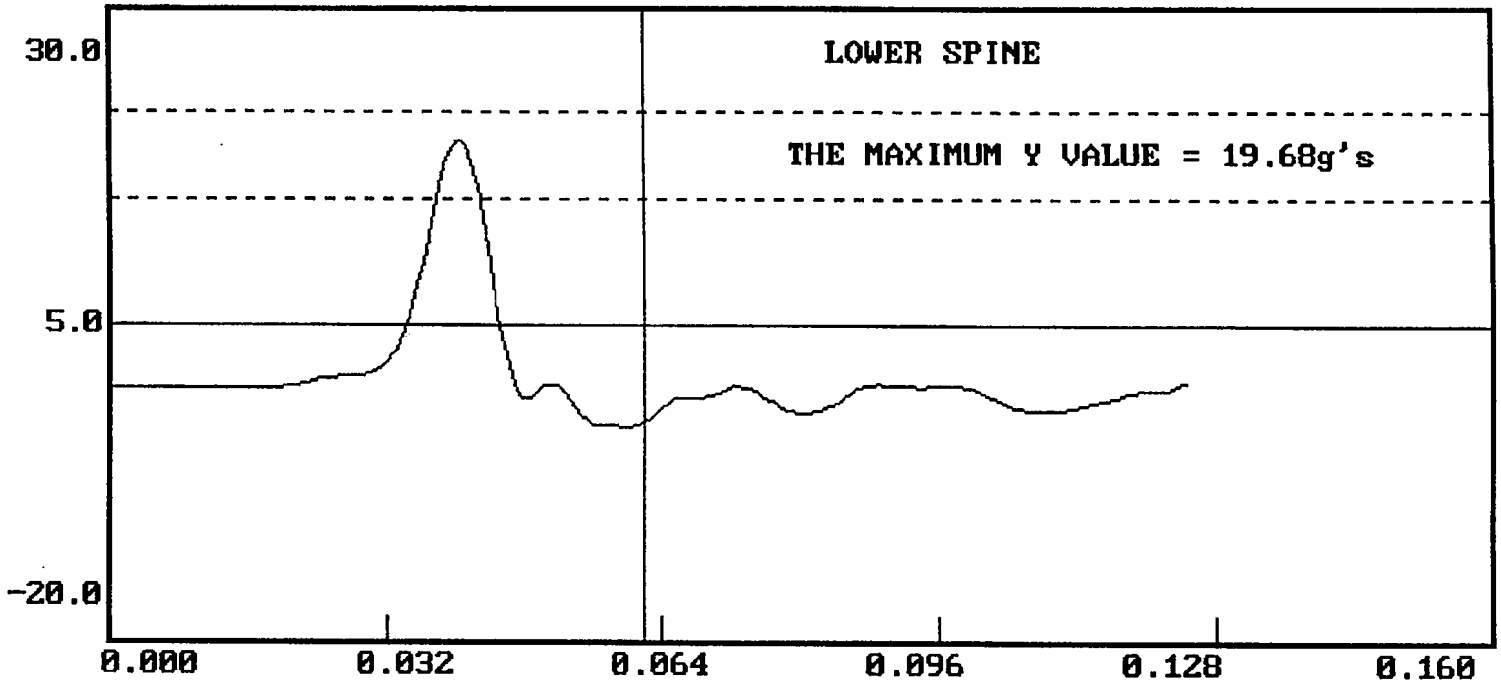
DUMMY CALIBRATION - THORAX IMPACT 12-22-1994 11:12
DUMMY # 269
ACCELERATION (G'S) VS. TIME ((SECONDS))



DUMMY CALIBRATION - THORAX IMPACT 12-22-1994 11:12
DUMMY # 269
ACCELERATION (G'S) VS. TIME ((SECONDS))



DUMMY CALIBRATION - THORAX IMPACT 12-22-1994 11:12
DUMMY # 269
ACCELERATION (G'S) VS. TIME ((SECONDS))



X = 0.618750E-01 Y = -.272171E+01
IMPACT SPEED = 13.80 FT/SEC

MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

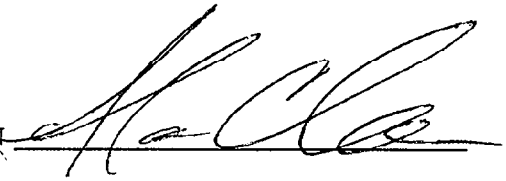
SIDE IMPACT DUMMY (SID)

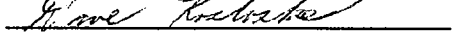
DATE: December 22, 1994

DUMMY NUMBER: 269 TEST NUMBER: D94513

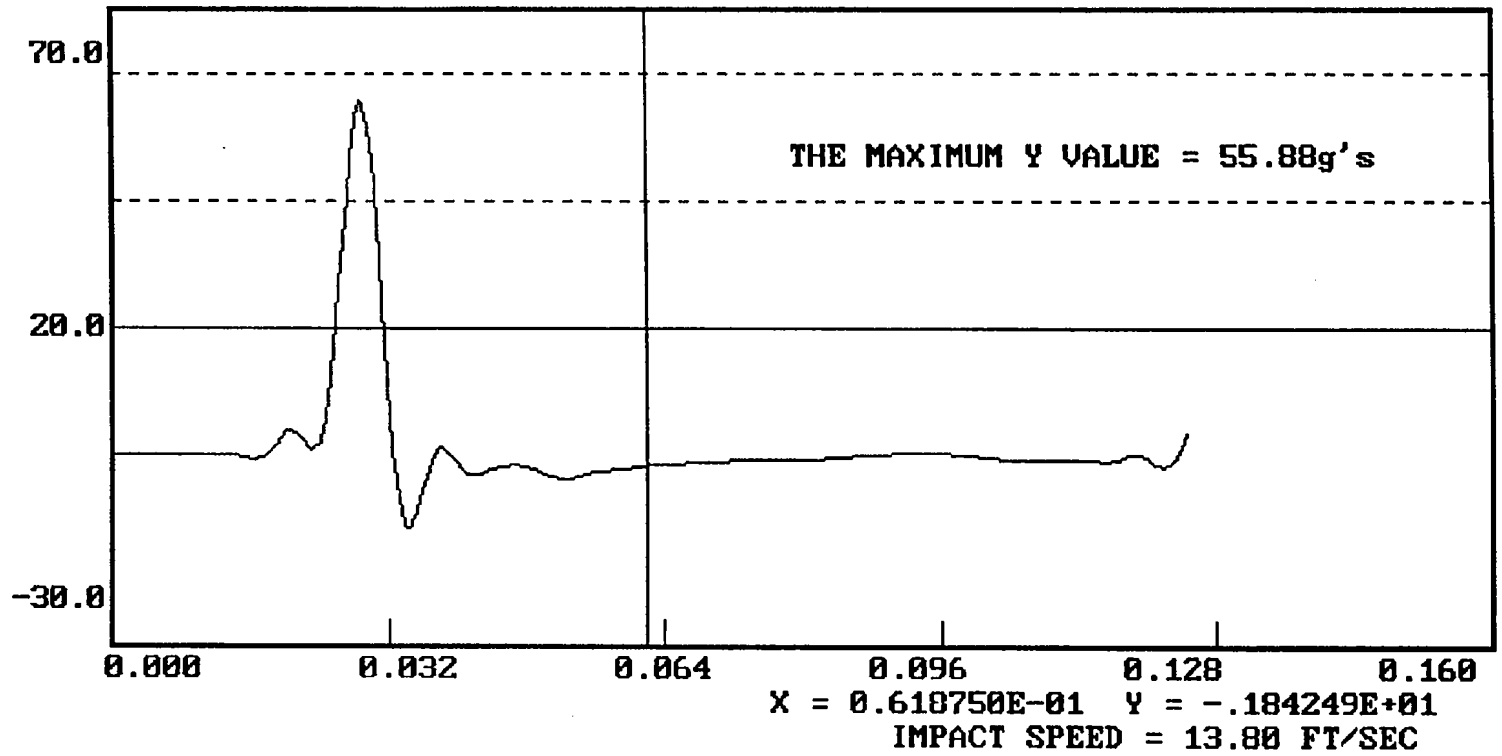
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	25%
PROBE SPEED	13.8 - 14.2 f/s	13.8
PELVIS ACCELERATION	40 - 60 g's	56

TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY 

DUMMY CALIBRATION - PELVIS IMPACT 12-22-1994 13:28
DUMMY # 269
ACCELERATION (G'S) VS. TIME ((SECONDS))



X = 0.618750E-01 Y = -.184249E+01
IMPACT SPEED = 13.80 FT/SEC

MGA RESEARCH CORPORATION

ABDOMINAL COMPRESSION TEST
(PRELOAD = 10 LBS)

SIDE IMPACT DUMMY (SID)

DATE: December 22, 1994

DUMMY NUMBER: 269 TEST NUMBER: D94514

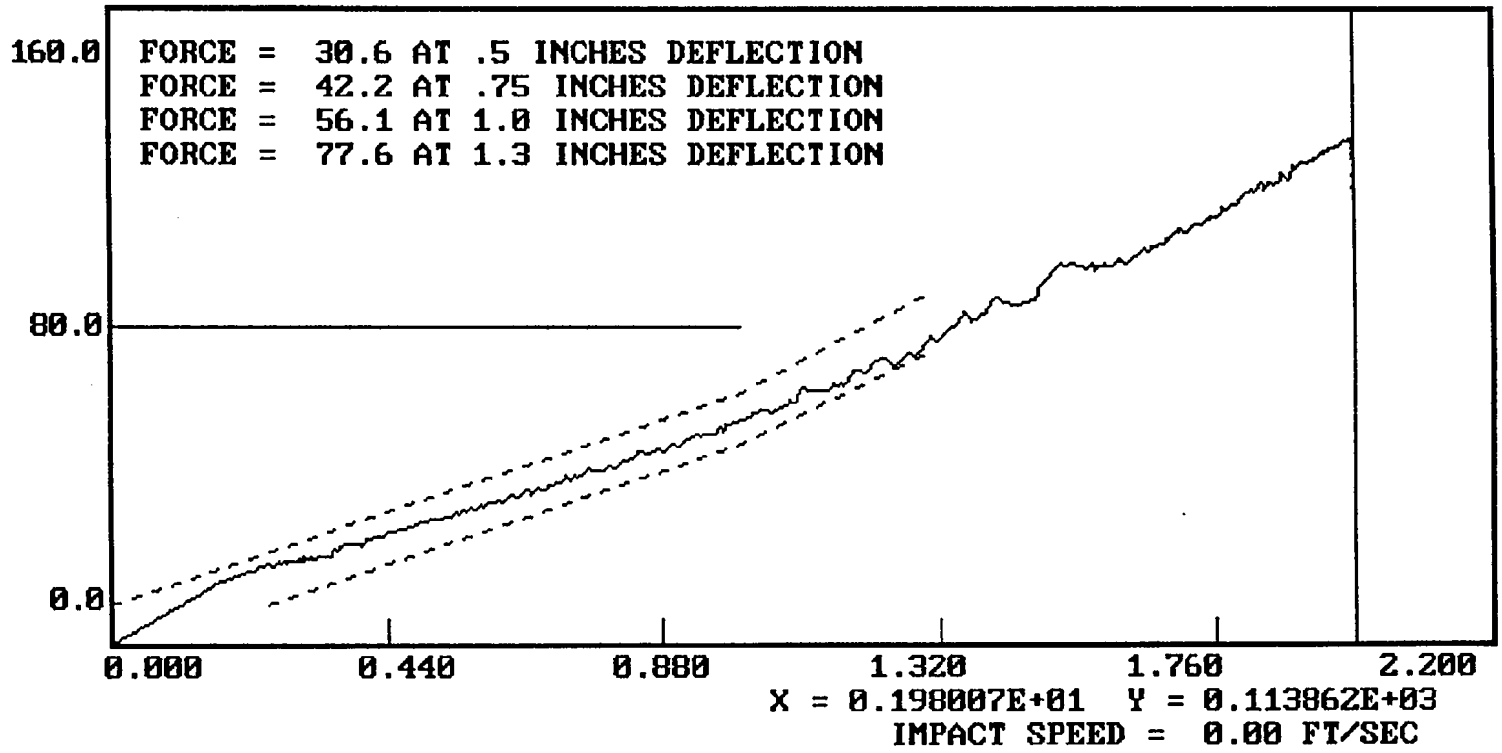
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	25%
FORCE @ 0.5 in	23.3 - 36.5 lbs	30.6
FORCE @ 0.75 in	36.7 - 49.8 lbs	42.2
FORCE @ 1.0 in	50 - 63 lbs	56
FORCE @ 1.3 in	73 - 88 lbs	78

TEST MEETS SPECIFICATIONS

TECHNICIAN _____

APPROVED BY _____

DUMMY CALIBRATION - ABDOMEN COMPRESSION 12-22-1994 16:14
DUMMY # 269
ABDOMEN FORCE () VS. ABDOMEN DISPLACEMENT (INCHES)



MGA RESEARCH CORPORATION

LUMBAR FLEXION TEST

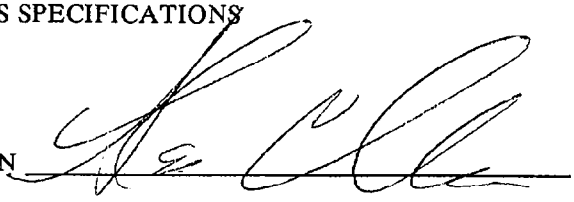
SIDE IMPACT DUMMY (SID)

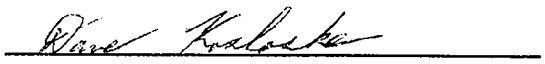
DATE: December 22, 1994

DUMMY NUMBER: 269 TEST NUMBER: D94515

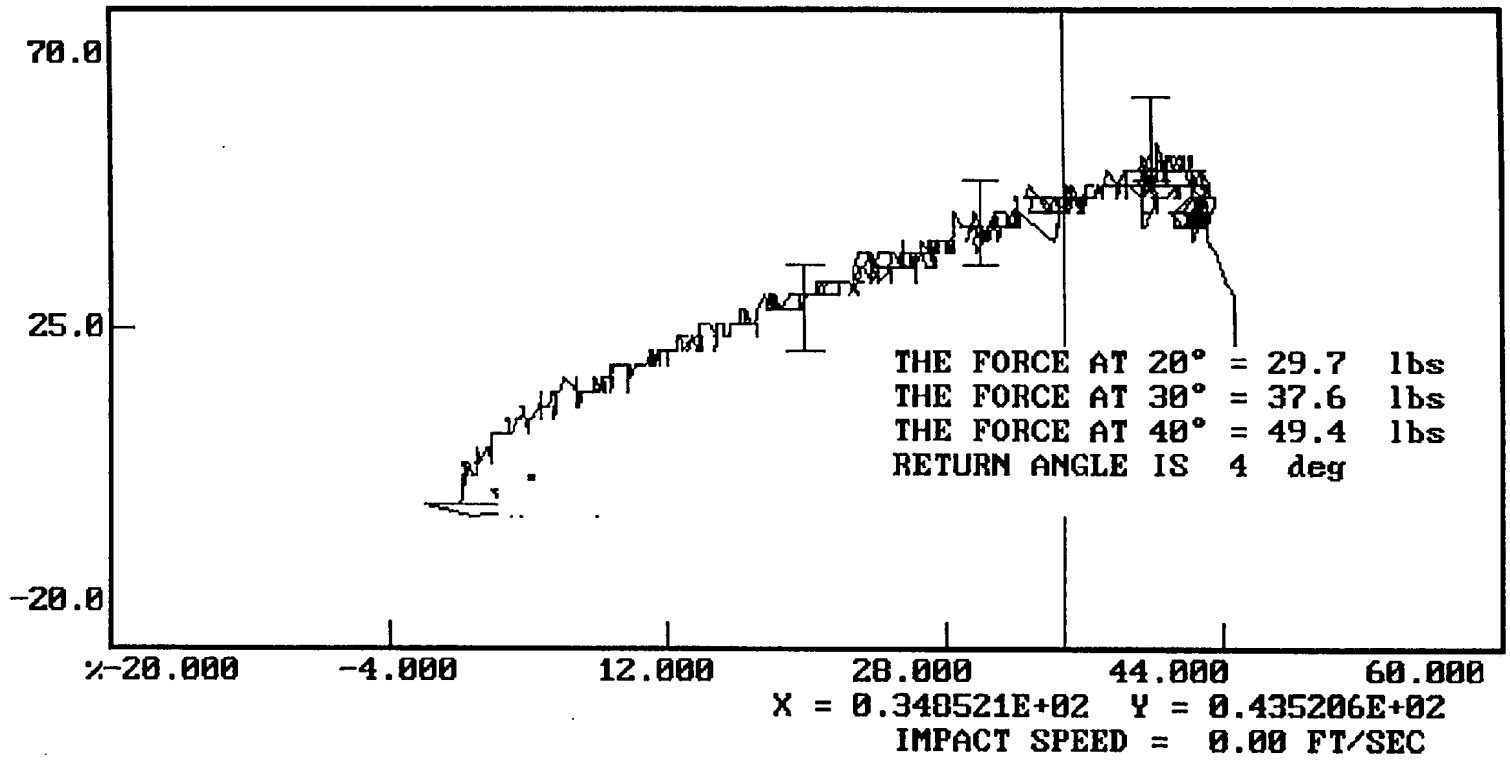
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78° F	70°
RELATIVE HUMIDITY	10 - 70%	25%
FORCE @ 0°	0 - 6 lbs	0
FORCE @ 20°	22 - 34 lbs	30
FORCE @ 30°	34 - 46 lbs	38
FORCE @ 40°	46 - 58 lbs	49
RETURN ANGLE	12° maximum	4°

TEST MEETS SPECIFICATIONS

TECHNICIAN 

APPROVED BY 

DUMMY CALIBRATION - LUMBAR FLEXION 12-22-1994 17:10
DUMMY # 269
FORCE () VS. TORSO ROTATION (DEGREES)



POST-TEST DRIVER DUMMY INSPECTION CHECKLIST

Type: Side Impact Dummy

Serial Number: 272

Inspected By: Rod McClelland

Date: December 22, 1994

Part	Items Checked	Comments
Skin	visual inspection	OK
Head	visual, ballast, accelerometer mount	OK
Neck	visual, cable torque	OK
Spine box	visual, ballast, weldment, accelerometer mount	OK
Rib cage	visual, measure, stiffeners	OK
Sternum	visual	OK
Lumbar spine	visual	OK
Abdomen	visual	OK
Pelvis	visual, palpate, accelerometer mount	OK
Upper legs	visual	OK
Knees	visual, stops, inserts	OK
Lower legs	visual, range of motion	OK
Ankles	visual, range of motion	OK
Feet	visual, range of motion	OK
Joints	1 to 2 g range	OK
Other		

NOTES: (include component/problem/action/reason):

POST-TEST PASSENGER DUMMY INSPECTION CHECKLIST

Type: Side Impact Dummy

Serial Number: 269

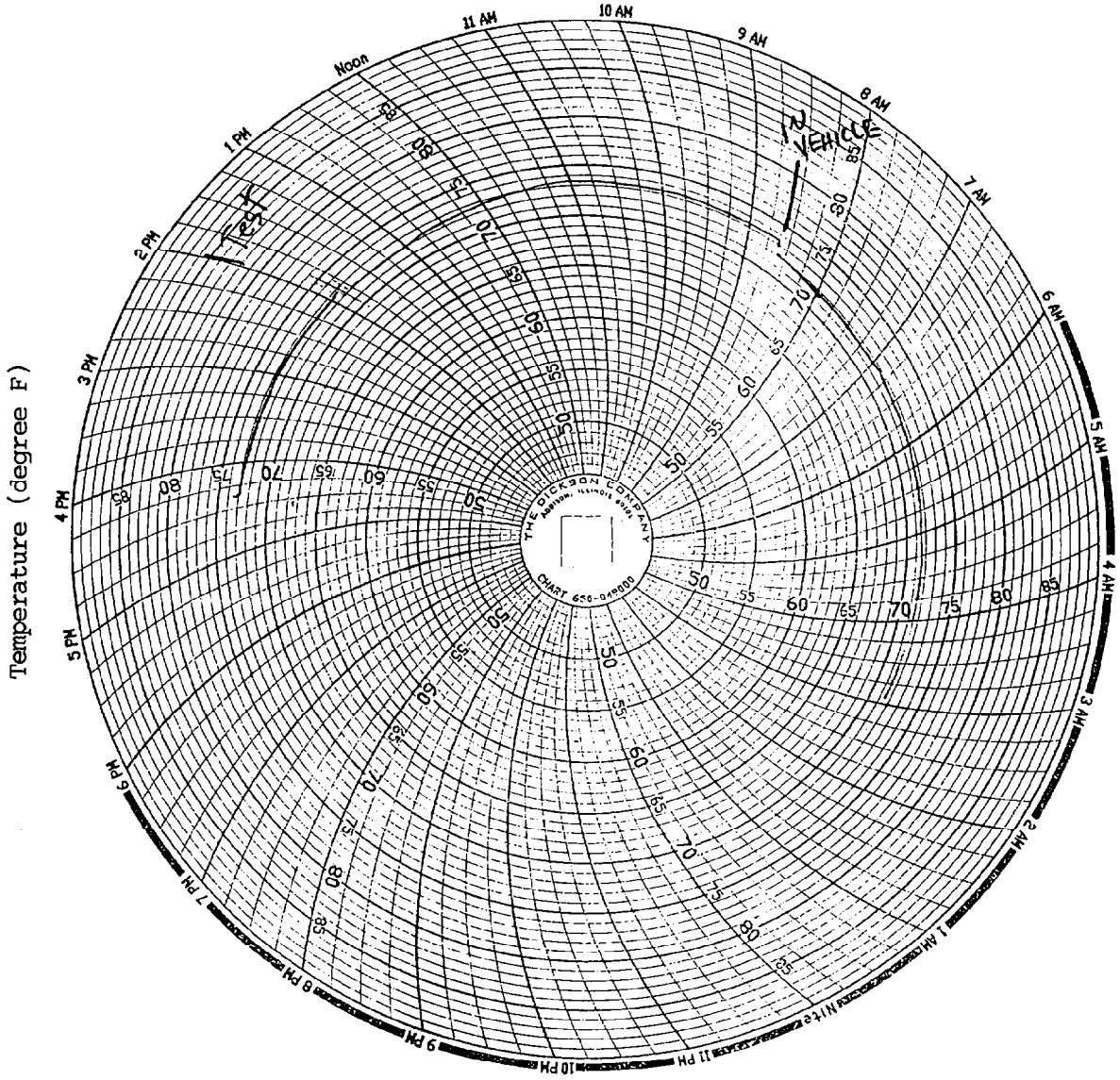
Inspected By: Rod McClelland

Date: December 22, 1994

Part	Items Checked	Comments
Skin	visual inspection	OK
Head	visual, ballast, accelerometer mount	OK
Neck	visual, cable torque	OK
Spine box	visual, ballast, weldment, accelerometer mount	OK
Rib cage	visual, measure, stiffeners	OK
Sternum	visual	OK
Lumbar spine	visual	OK
Abdomen	visual	OK
Pelvis	visual, palpate, accelerometer mount	OK
Upper legs	visual	OK
Knees	visual, stops, inserts	OK
Lower legs	visual, range of motion	OK
Ankles	visual, range of motion	OK
Feet	visual, range of motion	OK
Joints	1 to 2 g range	OK
Other		

NOTES: (include component/problem/action/reason):

VEHICLE AND DUMMY TEMPERATURE



APPENDIX D

DUMMY AND VEHICLE CALIBRATION DATA

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DRIVER DUMMY NO. 272

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Rib	AHW95	Endevco	July Ø7, 1994
Lower Rib	AHY99	Endevco	September Ø2, 1994
Lower Spine	AJ7C2	Endevco	September Ø2, 1994
Pelvis	AGPØ7	Endevco	September 16, 1994
Upper Rib Redundant	AHR15	Endevco	November Ø7, 1994
Lower Rib Redundant	AT614	Endevco	September Ø2, 1994
Lower Spine Redundant	AJ42Ø	Endevco	September Ø2, 1994
Pelvis Redundant	AHWN3	Endevco	September Ø2, 1994

INSTRUMENTS FOR PASSENGER DUMMY NO. 269

	LEFT REAR PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Rib	AC913	Endevco	September 12, 1994
Lower Rib	AJ436	Endevco	July 12, 1994
Lower Spine	AHØØ1	Endevco	September Ø1, 1994
Pelvis	AHWK8	Endevco	September Ø1, 1994
Upper Rib Redundant	AHØMØ	Endevco	September 16, 1994
Lower Rib Redundant	AG781	Endevco	September 16, 1994
Lower Spine Redundant	AHIG2	Endevco	September 16, 1994
Pelvis Redundant	AJ6Ø6	Endevco	November Ø7, 1994

VEHICLE INSTRUMENT CALIBRATION

	VEHICLE ACCELEROMETERS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
MDB CG X	MGA060	Entran	August 04, 1994
MDB CG Y	MGA058	Entran	November 18, 1994
MDB CG Z	MGA065	Entran	November 18, 1994
MDB Rear Axle X	MGA076	Entran	November 18, 1994
MDB Rear Axle Y	AH0P9	Endevco	October 12, 1994
Mid Left A-Post	MGA126	Entran	November 18, 1994
Lower Left B-Post	MGA106	Endevco	November 18, 1994
Upper Left B-Post	X08	Endevco	November 10, 1994
Trunk Centerline X	AJ9J6	Endevco	October 12, 1994
Trunk Centerline Y	AJ9E1	Entran	October 14, 1994
Trunk Centerline Z	AHY48	Endevco	October 14, 1994
Driver Seat Track	X18	Endevco	December 14, 1994
Right Front Sill X	X11	Endevco	November 04, 1994
Right Front Sill Y	A17	Endevco	November 07, 1994
Right Front Sill Z	X05	Endevco	November 10, 1994
Right Rear Sill X	AKAE8	Endevco	October 14, 1994
Right Rear Sill Y	AJ5L6	Endevco	October 17, 1994
Right Rear Sill Z	AJ9D5	Endevco	October 17, 1994
Left Front Sill Y	MGA021	Entran	December 14, 1994
Left Rear Sill Y	X01	Endevco	November 10, 1994
Right Rear Seat Occupant Compartment Y	X06	Endevco	November 10, 1994

Note: All Endevco accelerometers are Model No. 7264-2000
All Entran accelerometers are Model No. AGM-72E