91-02-N01-014 V1918

REPORT NO.: MGA-93-21402
NHTSA NO: MP0208

DUPLICATE

OFFICE OF MARKET INCENTIVES
SIDE IMPACT PROTECTION STUDY

PASSENGER CARS

DUPLICATE

1993 Ford Probe 2-Door Coupe

This a Dup, ignore Docket numbering
C D

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105

MGA Ref. No.: G93A-02

Test Date: April 29, 1993

FINAL REPORT

Prepared For:

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF MARKET INCENTIVES
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15. Supplementary Notes

16. Abstract

A 54/27 kph (34/17 mph) 90° Impact (Moving Deformable Barrier) Test was conducted on the subject 1993 Ford Probe 2-Door in accordance with the specifications of the Office of Market Incentives Test Procedure. The test was conducted at the MGA Proving Grounds and Crash Test Facility in Burlington, WI. on April 29, 1993.

The impact velocity of the Moving Deformable Barrier (MDB) was 61.6 kph (38.3 mph), and the ambient temperature of the struck side (driver's) of the target vehicle at the time of impact was 68°F. The target vehicle post-test maximum crush was 452 mm.

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

	Driver's SID	Left Rear SID
Left Upper Rib Acceleration	106.6 g's	149.1 g's
Left Lower Rib Acceleration	91.1 g's	153.0 g's
Lower Spine Acceleration	141.6 g's	104.7 g's
Thoracic Trauma Index (TTI)	124.1 g's	128.9 g's
Pelvis Acceleration	176.1 g's	83.2 g's

17. Key Words	18. Distribution Statement
OMI Side Impact Protection Study Side Impact Dummy (SID)	copies of this report are available from: National Highway Traffic Safety Adm. Technical Reference Division Docket Section, Room 5108 400 Seventh St., SW., Washington D.C. 20590

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09/28/93

Date of Report Acceptance

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Section 1

PURPOSE AND TEST PROCEDURE

This side impact test is part of the Composite FY93 Side Impact Protection Study 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 1993 Ford Probe.

The side impact test was conducted in accordance with the Office of Market Incentive (OMI) Laboratory Indicant Test Procedure.

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 1993 Ford Probe 2-Door Coupe 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 61.6 kph (38.3 mph) on April 29, 1993. 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 according to instructions specified in the OMI Side Impact Protection Laboratory Test Procedure which is dated March 1992. The side impact event was documented by ten high speed cameras. Camera locations and other pertinent camera information can be found in this report.

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. Upper thoracic spine (T_{34}) uniaxial accelerometer (Y direction)
5. Pelvic (PEV) section uniaxial accelerometer (Y-direction)

A summary of the side impact dummy (SID) configuration and performance verification test data can be found in Appendix C.

A total of 46 channels of data were recorded. Appendix

The driver's Thoracic Trauma Index (TTI) was 124.1 g's. Maximum pelvic Y acceleration was 176.1 g's.

The left rear passenger's TTI was 128.9 g's. Maximum pelvic Y acceleration was 83.2 g's.

SECTION 3
SUMMARY OF TEST DATA

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 1993/Ford/Probe/2 Door

Vehicle NHTSA No.: MP0208 VIN: 1ZVCT20A1P5118934

Vehicle Body Color: Green Month & Year of Manufacture: 7-92

Engine Data: 4 cylinders; ____ CID; 2.0 Liter; ____cc

Placement X Longitudinal; or ____ Lateral

Transmission: 5 speed; X Manual; ____ Automatic; ____ Overdrive

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

Odometer Reading 88 miles

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

DATA FROM TIRE PLACARD:

Tire Pressure (at capacity): 32 psi FRONT

26 psi REAR

Recommended Tire Size: P195 65R-14

Tires on Test Vehicle: P195 65R-14 Manufacturer: Firestone

Vehicle Capacity Data:

Number of Occupants: 2 Front; 2 Rear; ____ 3rd Seat 4 Total

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

Type of Front Seat Back: ____ Fixed; X Adjustable with X Lever

Vehicle Maximum Capacity Loading = 313 kg. (A)

No. of Occupants x 150 lbs. = 272 kg. (B)

Cargo Capacity (A-B) = 41 kg.

WEIGHT OF TEST VEHICLE WITH MAXIMUM FLUIDS:

Right Front =	376.0 kg.	Right Rear =	210.5 kg.
Left Front =	362.9 kg.	Left Rear =	221.3 kg.
TOTAL FRONT =	738.9 kg.	TOTAL REAR =	431.8 kg.

% of Total Vehicle Weight = 63 ; % of Total Weight = 37

TOTAL WEIGHT = 1170.7 kg.

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Table 2

TEST VEHICLE DATA

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Test Vehicle Delivered Weight with Maximum Fluids = 1170.7 kg.

Maximum Cargo Carrying Capacity of Test Vehicle = 41 kg.

Weight of 2 Side Impact Dummies (2 x 168 lbs.) = 152 kg.

TEST VEHICLE TARGET WEIGHT: = 1363.7 kg.

ACTUAL WEIGHT OF TEST VEHICLE WITH 2 DUMMIES AND CARGO:

Right Front =	408 kg.	Right Rear =	245 kg.
Left Front =	408 kg.	Left Rear =	298 kg.
TOTAL FRONT =	816 kg.	TOTAL REAR =	543 kg.
% of Total Weight =	60.0 kg.	% of Total Weight =	40.0 kg.

TEST VEHICLE ATTITUDE (all dimensions in mm):

AS DELIVERED:

Right Front 676 Left Front 680 Right Rear 695 Left Rear 690

READY FOR TEST:

Right Front 677 Left Front 659 Right Rear 670 Left Rear 662

Test Vehicle Wheelbase: 2604 mm

C.G. = 1040 mm rearward of front wheel centerline

TOTAL VEHICLE LENGTH:

Right Side = 4390 mm

Left Side = 4390 mm

Centerline = 4550 mm

021

Figure 1

PRE-TEST CONDITIONS

VEHICLE IDENTIFICATION:

Vehicle: 1993 Ford Probe

NHTSA No. MP0208

FRONT SEAT CUSHION PLACEMENT:

Total Length of Adjustment Travel: 230 mm

Total Number of Adjustment Positions or Detents: 23

FRONT SEAT BACK ADJUSTMENT POSITION:

Seat Back Torso Angle = 21 degrees

SECOND POSITION SEAT:

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

Seat Back Adjustment Position: Non-Adjustable

ADJUSTABLE STEERING COLUMN POSITION:

N/A

WINDOW POSITIONS: Left Front Closed Left Rear Closed (fixed window)

Right Front Open Right Rear N/A

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:

14.4 gallons

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

Wheelbase: = 2604 mm

Impact Point is 362 mm rearward of front axle centerline (which is 37 inches forward of the wheelbase midpoint)

Table 3

CRASH TEST SUMMARY FOR TEST VEHICLE

VEHICLE IDENTIFICATION:

Vehicle Year/Make/Model: 1993/Ford/Probe

Body Style: 2-Door Coupe VIN: 1ZVCT20A1P5118934

NHTSA No.: MP0208 Test Date: 4-29-93

Overall Length = 4550 mm; Overall Width = 1765 mm

TEST WEIGHT:

Left Front	= 408 kg.	Left Rear	= 245 kg.
Right Front	= 408 kg.	Right Rear	= 298 kg.
TOTAL FRONT	= 816 kg.	TOTAL REAR	= 543 kg.

TOTAL VEHICLE WEIGHT 1359 kg.

Wheelbase = 2604 mm

Longitudinal C.G. front Center of Front Axle = 1040 mm

Impact Angle with Respect to Impactor = 90 degrees

MAXIMUM EXTERIOR STATIC CRUSH:

1.	LEVEL 1 (229 mm above ground)	= 277 mm
2.	LEVEL 2 (419 mm above ground)	= 448 mm
3.	LEVEL 3 (556 mm above ground)	= 452 mm
4.	LEVEL 4 (826 mm above ground)	= 327 mm
5.	LEVEL 5 (1238 mm above ground)	= 86 mm

Maximum Post-Test Intrusion = 452 mm

OCCUPANTS:	Front Passenger	Rear Passenger
Type of Dummy	SID	SID
Restraints Used	3 pt. lap & shoulder belt	3 pt. lap & shoulder belt

INSTRUMENTATION:

Number of Vehicle Data Channels: = 15

Number of Cameras: Onboard = 3

Offboard = 7

TOTAL = 10

023

Table 4

CRASH TEST SUMMARY FOR SIDE IMPACTOR

POSITION OF IMPACT (MDB) ON MONORAIL:

Crabbed 27° to left

MDB DETAILS:

Overall Width of Framework Carriage	= 1251	mm
Overall Length of MDB (incl. honeycomb impact face)	= 4114.8	mm
Wheelbase of Framework Carriage	= 2590.8	mm
Tread of Framework Carriage (Front & Rear)	= 1879.6	mm
C.G. Location Rearward of Front Axle	= 1099.7	mm

MDB WEIGHT:

Left Front	= 477.2	kg.	Left Rear	= 219.1	kg.
Right Front	= 307.5	kg.	Right Rear	= 359.7	kg.
TOTAL FRONT	= 784.7	kg.	TOTAL REAR	= 578.8	kg.
TOTAL MDB WEIGHT	1363.5	kg.			

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

Impact Speed = 38.3 mph (61.6 kph)

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE:

1.	Row A at Bumper Level (432)	= 225	mm
2.	Row B at Mid-Stack Level (559)	= 243	mm
3.	Row C at Top of Stack Level (813)	= 244	mm

INSTRUMENTATION:

Number of MDB Data Channels = 5

Table 5

POST-TEST OBSERVATIONS

TEST VEHICLE: 1993 Ford Probe 2 Door NHTSA No. MP0208

VISIBLE DUMMY CONTACT POINTS:

	LEFT FRONT SID	LEFT REAR SID
Head	Driver Door Glass	C-Pillar
Chest	N/A	N/A
Abdomen	N/A	N/A
Left Knee	LH Door	LH Interior
Right Knee	-	-

DOOR OPENING:

	LEFT SIDE	RIGHT SIDE
Front	Closed	Closed
Rear	N/A	N/A

MDB DISTANCE FROM TARGET IMPACT POINT: 17.5 mm rearward

ARM REST LOCATIONS:

Front:

Rear:

SEAT MOVEMENT:

GLAZING DAMAGE:

Side windows broken &
Windshield cracked

PILLAR PERFORMANCE:

None

SILL SEPARATION:

Separated for 70 mm starting at a distance of 1522 mm rearward of front spindle centerline

OTHER NOTABLE IMPACT EFFECTS:

None

Section 4
OCCUPANT AND VEHICLE INFORMATION

Table 6
SIDE IMPACT DUMMY (SID) TEST DATA SUMMARY

Vehicle: 1993 Ford Probe 2-Door Coupe Test Date: 4-29-93

	Front Dummy ID # 136				Rear Dummy ID # 137			
	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	106.6	8.7	-18.8	176.0	149.1	19.3	-23.4	176.0
Upper Rib Lateral....Y(R)	110.3	8.7	-18.5	176.0	145.6	19.3	-22.8	176.0
Lower Rib Lateral.....Y	*91.1	*10.6	*	*	153.0	20	-24.6	176.0
Lower Rib Lateral.....Y(R)	93.0	10.6	-31.6	46.8	141.8	20	-25.0	45.0
SPINE ACCELERATIONS:								
Upper Lateral.....Y	130.6	18.7	-51.2	41.2	113.7	25.6	-51.3	50.0
Upper Lateral.....Y(R)	128.2	18.7	-51.2	41.2	115.2	25.6	-52.8	50.0
Lower Lateral.....Y	141.6	11.8	-52.1	40.6	104.7	23.7	-34.6	49.3
Lower Lateral.....Y(R)	141.3	11.8	-50.6	40.6	104.1	23.7	-35.5	49.3
PELVIC ACCELERATIONS:								
Lateral.....Y	176.1	8.7	-29.2	35.6	83.1	11.2	-14.2	62.5
Lateral.....Y(R)	178.1	8.7	-28.4	35.6	83.3	11.2	-13.7	62.5

REFERENCE:

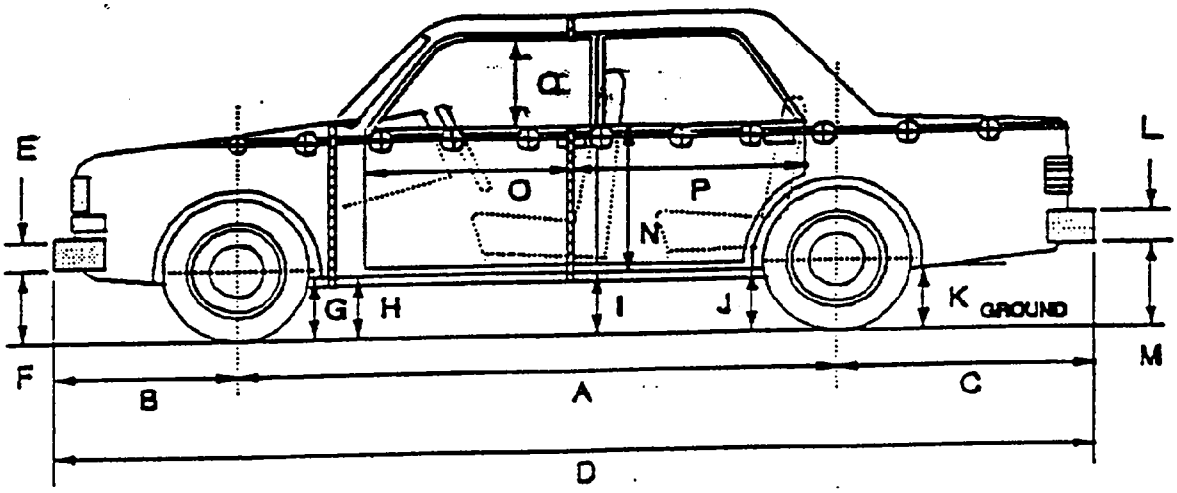
Positive Direction - Longitudinal (X) = forward Negative Direction - Longitudinal (X) = rearward
Lateral (Y) = to right Lateral (Y) = to left
Vertical (Z) = up Vertical (Z) = down

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

* Data Loss at Approximately 15 msec.

Figure 2

PRE- AND POST-TEST MEASUREMENTS



LEFT SIDE VIEW

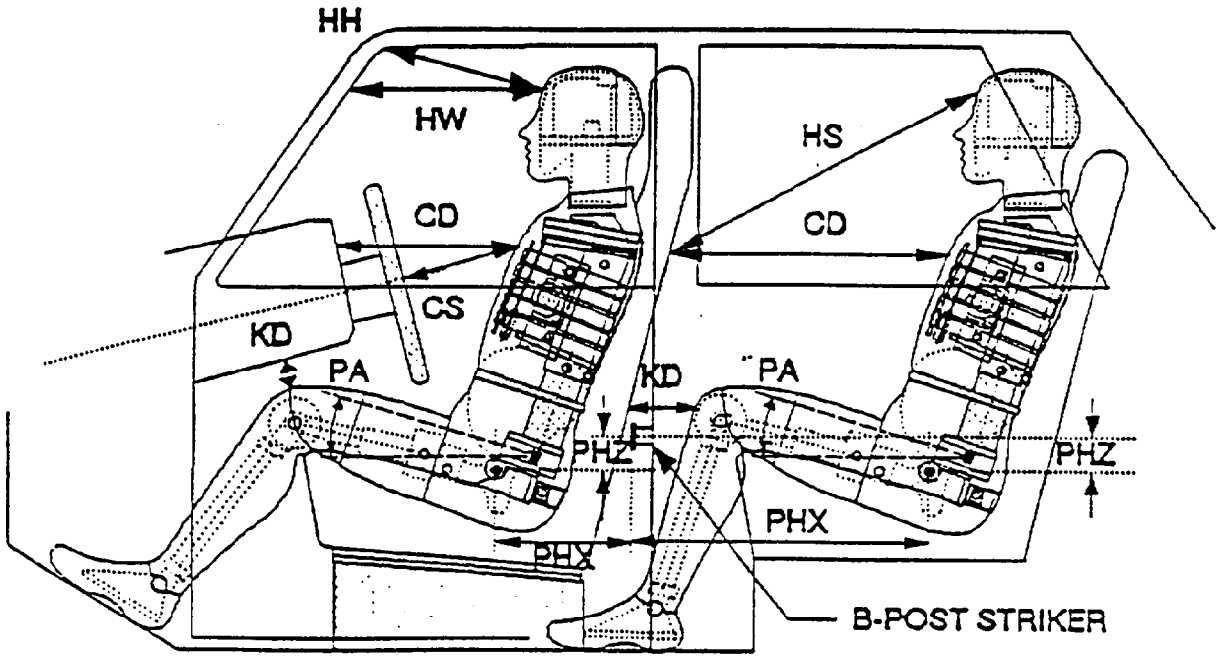
Units: mm

	PRE-TEST	POST-TEST	Δ CHANGE
A	26Ø3	2579	24
B	1Ø26	1ØØØ	26
C	924	977	-53
D	455Ø	4556	-6
E	26Ø	247	13
F	362	4Ø8	-46
G	178	197	-19
H	181	2Ø3	-22
I	178	235	-57
J	184	241	-57
K	229	278	-49
L	257	267	-1Ø
M	286	349	-63
N	699	615	84
O	664	65Ø	14
P	676	664	12
Q	371	35Ø	21
R	439Ø	4396	-6
S	439Ø	4358	32
T	1765	16Ø8	157

029

Figure 3

SIDE IMPACT DUMMY (SID) LONGITUDINAL CLEARANCE DIMENSIONS



LEFT SIDE VIEW

NOTE: All dimensions are in mm

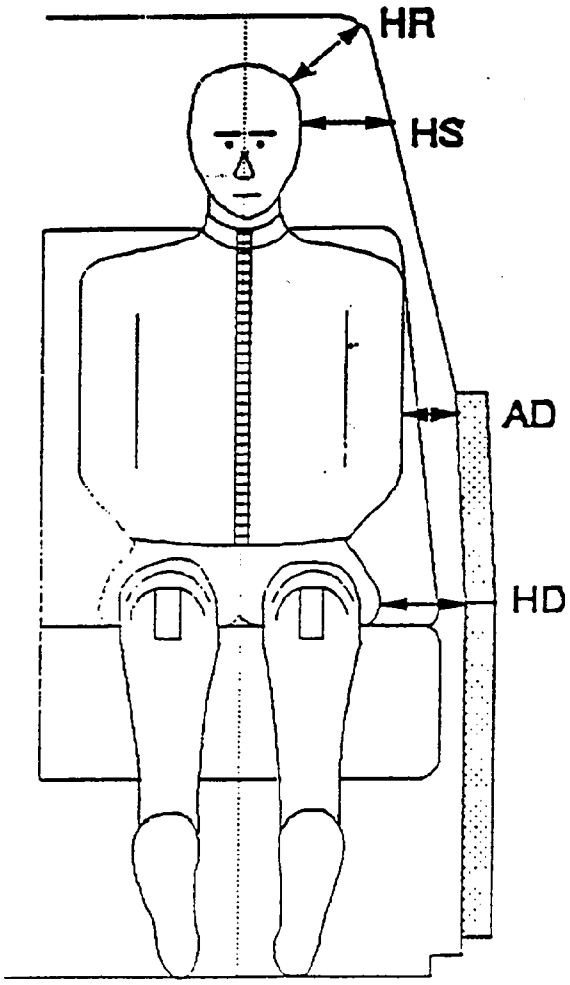
	DRIVER ID # 136	LEFT REAR PASSENGER ID # 137
HH	292	-
HW	622	-
HS	-	514
CD	479	384
CS	305	-
KDL	140	92
KDR	146	98
PA	24.2°	16.3°
PHX	489	279
PHZ	197	215

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

030

Figure 4

SIDE IMPACT DUMMY (SID) LATERAL CLEARANCE DIMENSIONS



NOTE: All dimensions are in mm

	DRIVER ID # 136	LEFT REAR PASSENGER ID # 137
HR	83	29
HS	203	260
AD	57	117
HD	165	159

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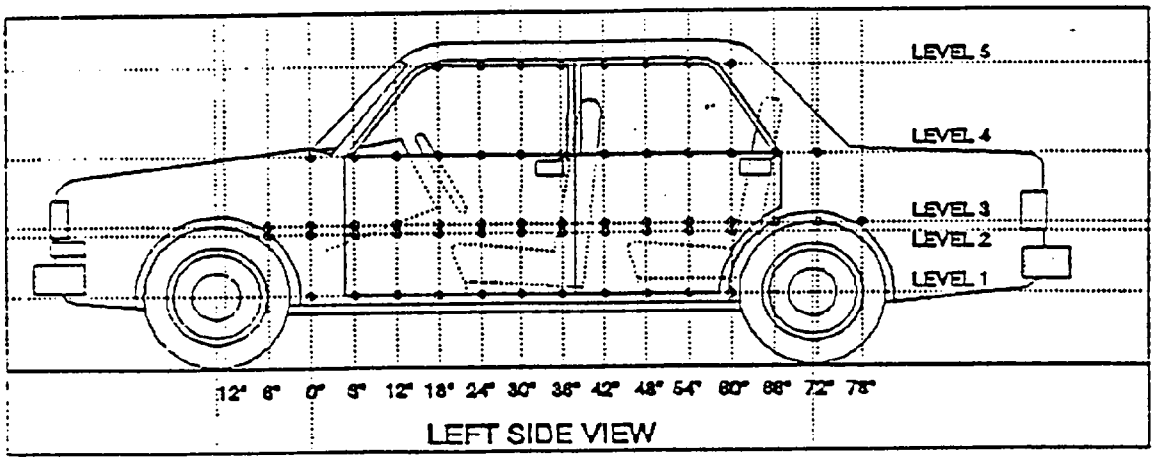
Figure 5

VEHICLE SIDE MEASUREMENTS



Measurements Along the Vertical 30" Line Shown Above:

	30" Side Profile	
Level 5 @ Window Top	= 1238	mm
Level 4 @ Window Sill	= 826	mm
Level 3 @ Mid Door	= 556	mm
Level 2 @ Occupant H-Point	= 419	mm
Level 1 @ Axle Centerline Height (or Sill Top Height	= 229	mm

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Table 7
TEST VEHICLE EXTERIOR PROFILES FROM REFERENCE PLANE AND STATIC CRUSH

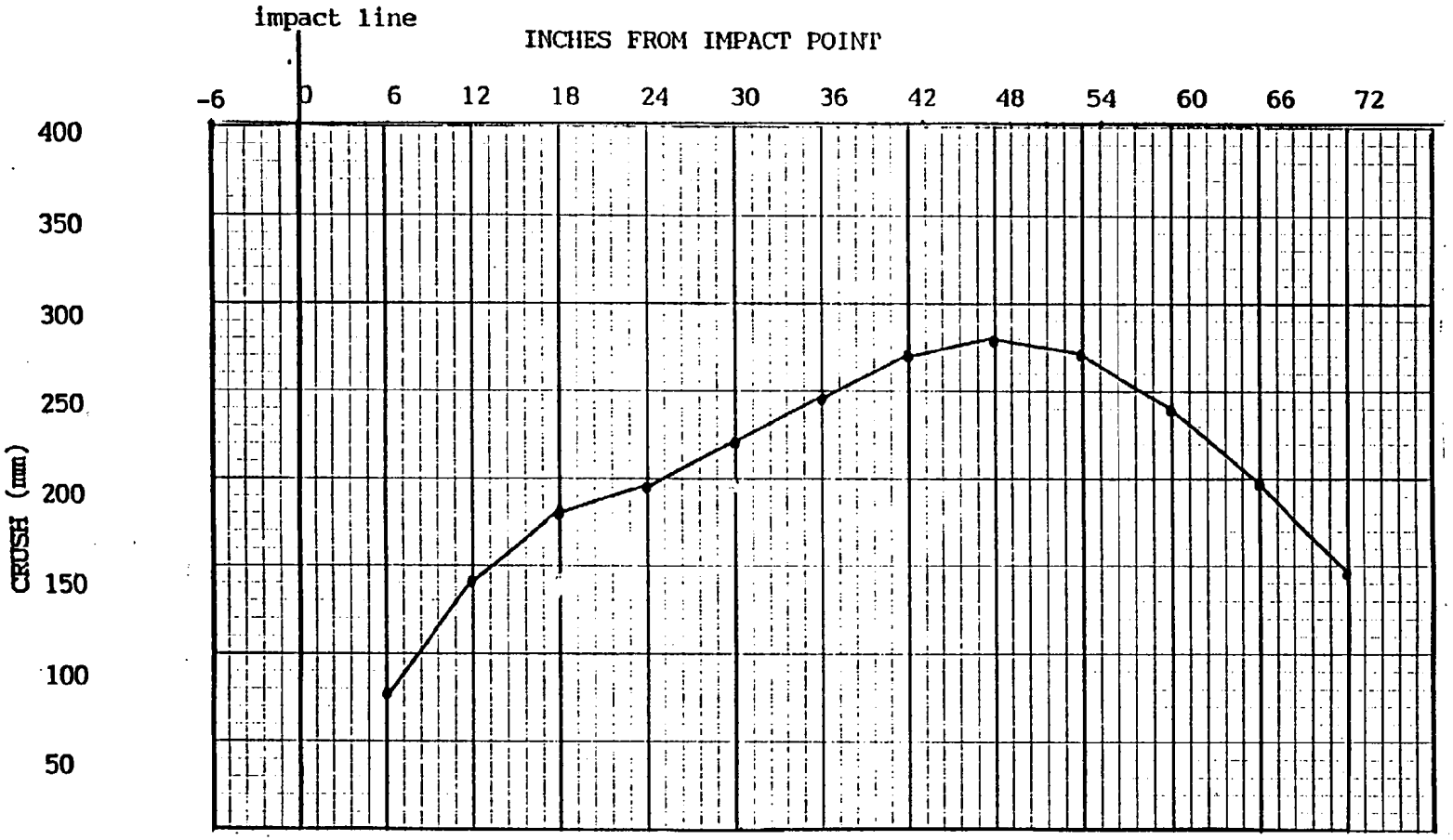
Test Date: 4-29-93 Vehicle: 1993 Ford Probe

	Location	Level 1 Side Sill	Level 2 H-Point	Level 3 Mid-Door	Level 4 Window Sill	Level 5 Window Top
	Height (mm)	229	419	556	826	1238
		PRE/POST/CRUSH (mm)	PRE/POST/CRUSH (mm)	PRE/POST/CRUSH (mm)	PRE/POST/CRUSH (mm)	PRE/POST/CRUSH (mm)
INCHES FROM IMPACT POINT	-6	---	---	---	701/690/11	---
	0	---	681/587/94	676/578/98	704/68/16	---
	6	713/635/78	776/585/191	735/579/156	727/685/42	---
	12	786/645/141	924/585/339	896/580/316	831/685/146	---
	18	830/648/182	974/585/389	937/581/356	888/679/209	---
	24	851/655/196	999/585/414	964/584/380	907/680/227	---
	30	876/655/221	1013/585/428	966/585/381	916/680/236	---
	36	906/660/246	1025/587/438	980/585/395	926/680/246	954/915/39
	42	928/660/268	1032/589/443	1003/585/418	932/678/254	971/921/50
	48	936/660/277	1038/590/448	1008/585/423	942/678/264	991/925/66
	54	926/655/271	1035/592/443	1032/585/447	953/675/278	1016/930/86
	60	876/640/236	1010/595/415	1036/584/452	999/672/327	988/938/50
	66	826/630/196	970/595/375	1010/581/429	961/675/286	987/950/37
	72	768/622/146	909/595/314	960/575/385	872/675/197	1007/963/44

Reference plane is parallel to and 48 inches from test vehicle longitudinal centerline
Given dimensions = reference plane to car body

Figure 6

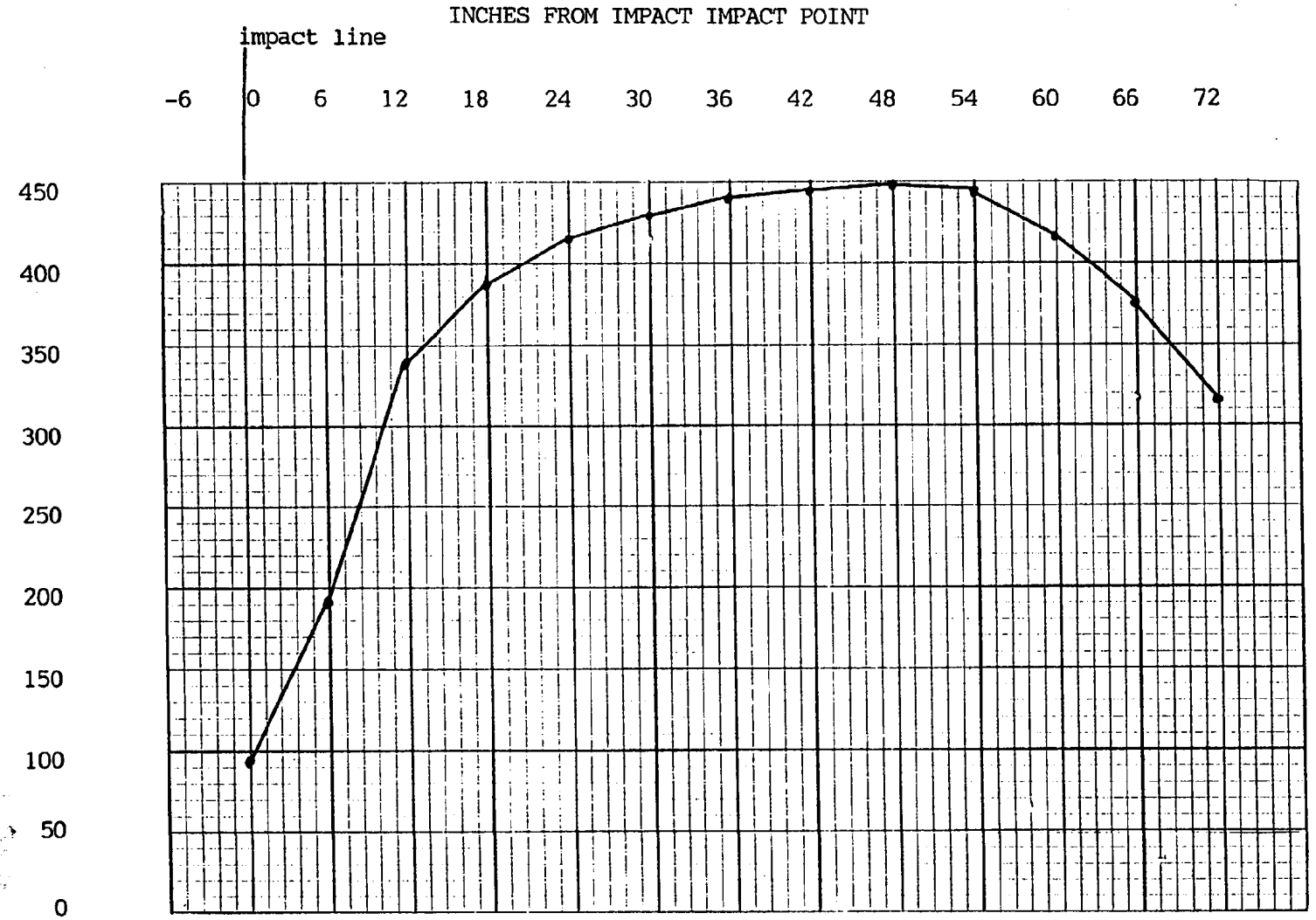
VEHICLE EXTERIOR STATIC CRUSH



Level 1 Side Sill

Figure 6 (Continued)

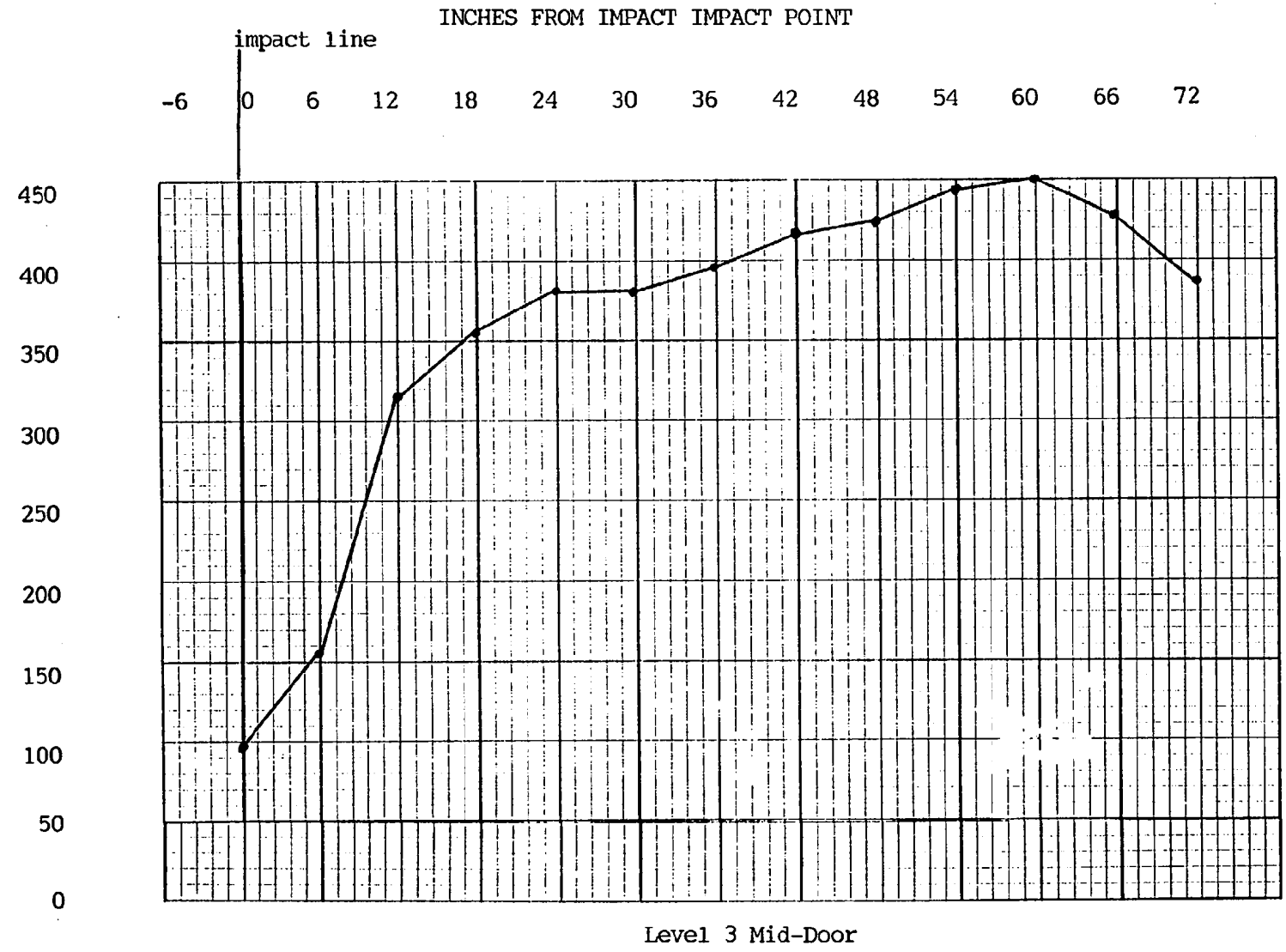
VEHICLE EXTERIOR STATIC CRUSH



Level 2 H-Point

Figure 6 (Continued)

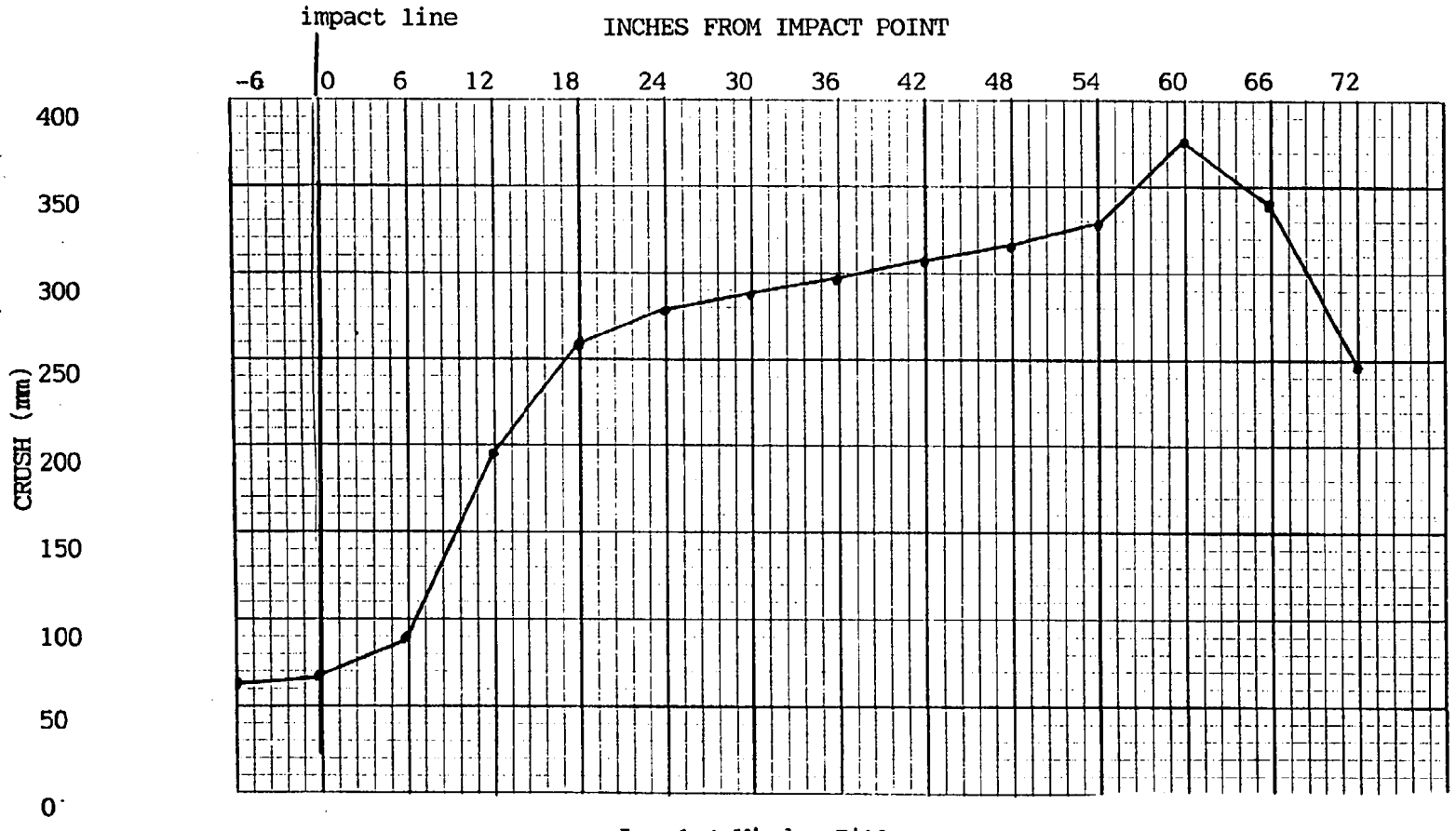
VEHICLE EXTERIOR STATIC CRUSH



Level 3 Mid-Door

Figure 6 (Continued)

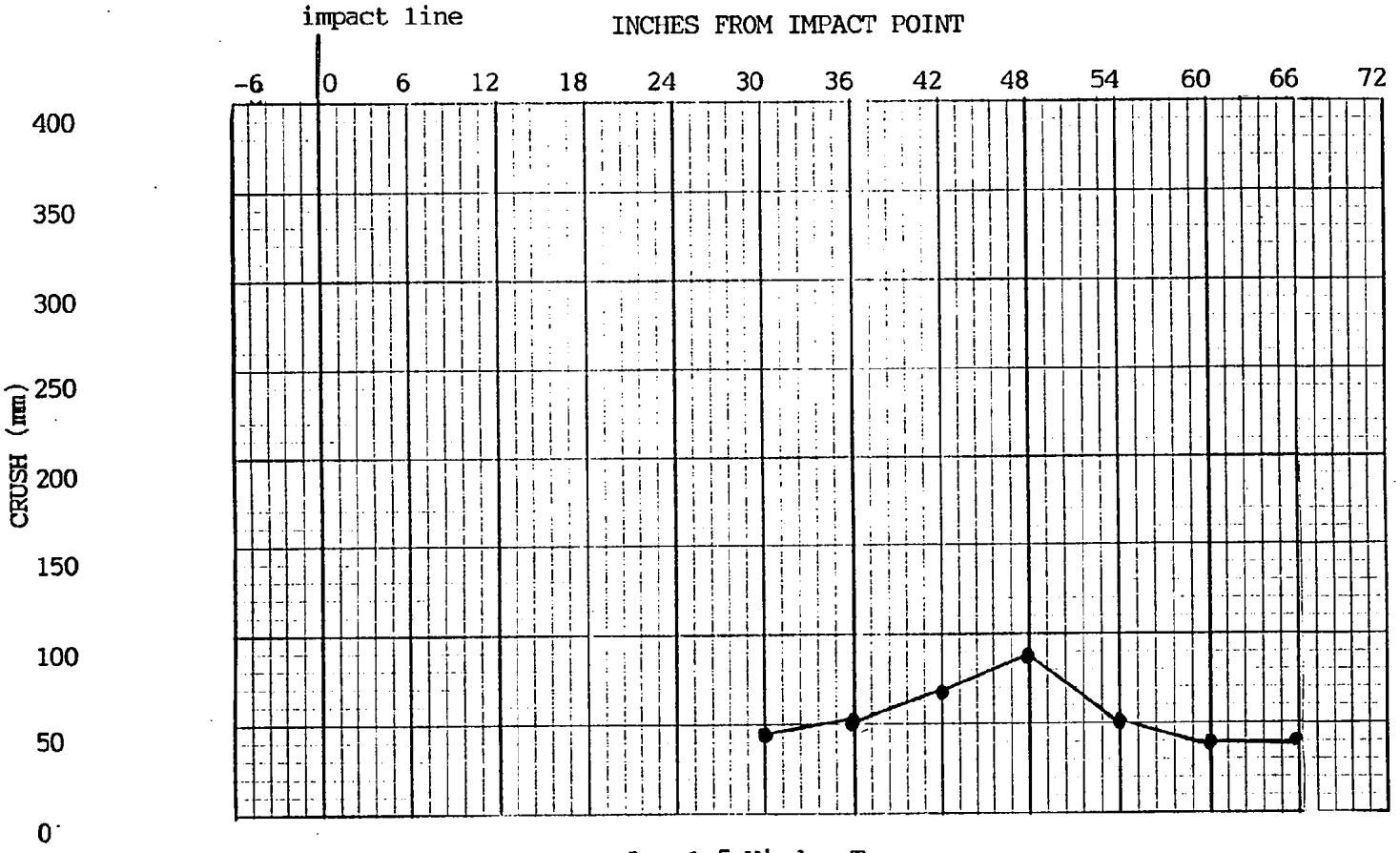
VEHICLE EXTERIOR STATIC CRUSH



Level 4 Window Sill

Figure 6 (Continued)

VEHICLE EXTERIOR STATIC CRUSH



Level 5 Window Top

Figure 7

TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Test Vehicle: 1993 Ford Probe 2 Door NHTSA No.: MP0208

Test Date: 4-29-93

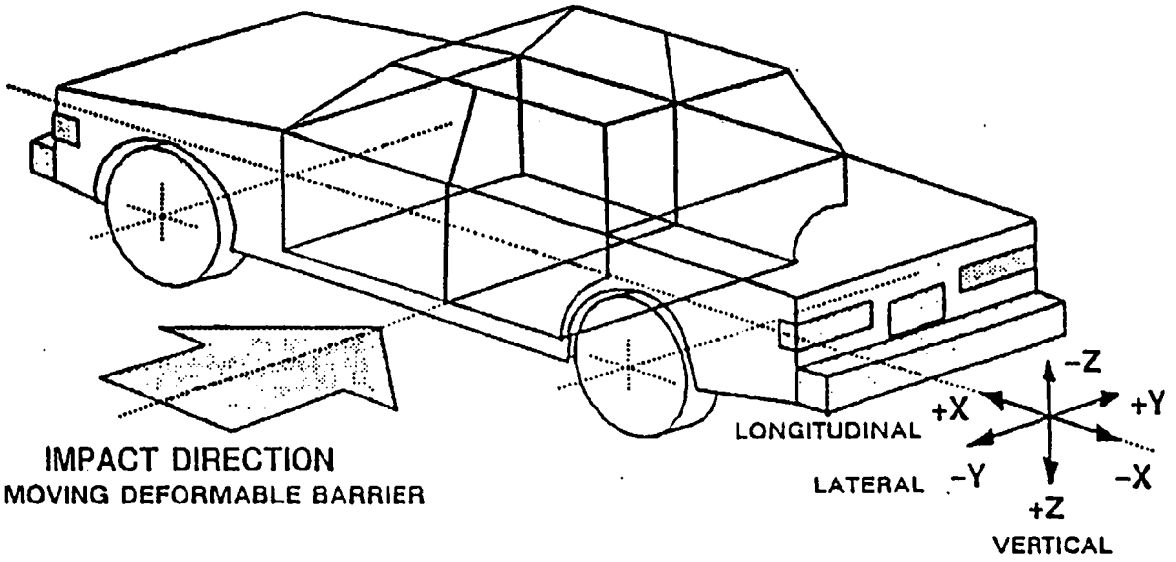


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Table 8

EXTERIOR STATIC CRUSH FOR SIDE IMPACTOR

Test Date: 4-29-93 Vehicle: 1993 Ford Probe

Location	Top of Stack Level	Mid-Stack Level	Bumper Level**	
Height at C_L*	32"	22"	17"	
32"	138	49	14	Left Side as viewed from front
28"	83	37	3	
24"	31	29	7	
20"	21	21	12	
16"	22	12	15	
12"	24	13	19	
8"	28	17	21	
4"	30	20	26	
0"	27	18	27	
4"	33	20	25	Right Side as viewed from front
8"	42	22	27	
12"	48	23	29	
16"	59	30	34	
20"	85	55	62	
24"	115	99	90	
28"	180	168	172	
32"	244	243	225	

4-14

Crush measured in mm.

* Heights measured above ground level.

** Front covering of bumper stuck in vehicle (post-test crush measured to surface of hexcell)

Table 9
TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

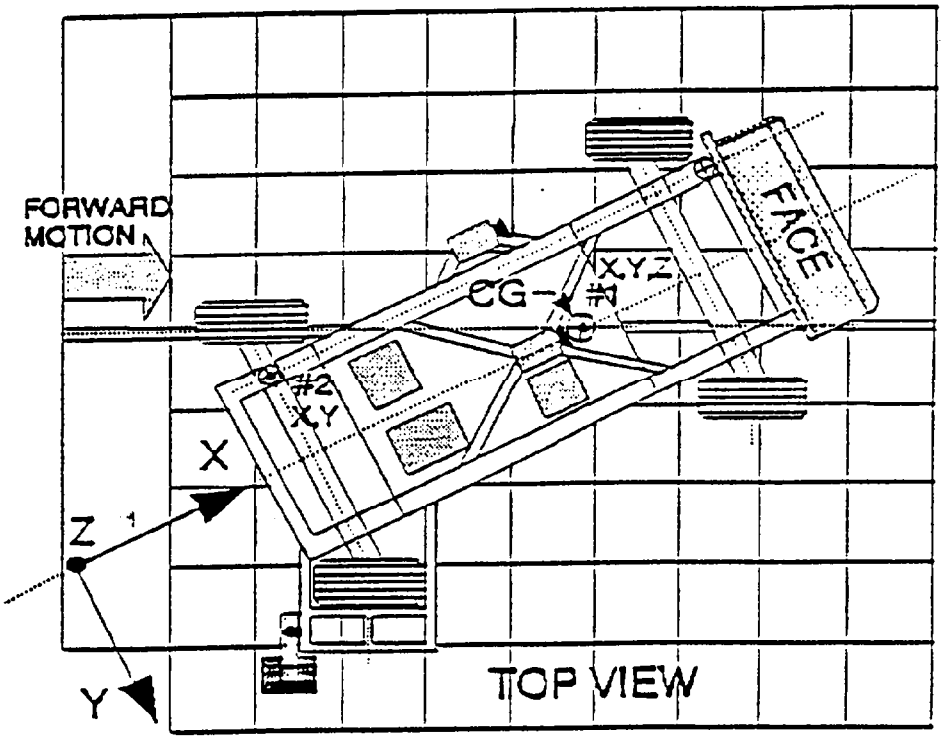
Accel. Time No.	Location	Coordinates (mm)			Long. (X) Pos./Neg.		Lat. (Y) Pos./Neg.		Vert. (Z) Pos./Neg.		Resultant Pos./Neg.	
		X	Y	Z								
1	Rt. Side Sill @ Front Seat	2526	685	280	3.8	-6.2	17.1	-1.7	5.8	-6.5	29.5	-
2	Rt. Side Sill @ Rear Seat	1735	625	285	4.5	-5.2	22.9	-2.2	3.9	-4.9	28.8	-
3	Rr. Floorpan Above Axle	1116	0	459	8.6	-12.2	22.4	-2.1	6.0	-7.9	26.7	-
4	Left Side Sill @ Rr. Seat	1587	-686	343	-	-	142.4	-34.5	-	-	-	-
5	Left Side Sill @ Frt. Seat	2439	-706	305	-	-	74.7	-30.9	-	-	-	-
6	Left Frt. Door On Centerline	2362	-685	279	-	-	282.7	-138.5	-	-	-	-
7	Right Rear Occupant Compartment	714	300	408	-	-	22.2	-4.5	-	-	-	-
8	Midrear of Left Frt. Door	1904	-750	305	-	-	165.0	-76.6	-	-	-	-
9	Left Frt. Door Upper Centerline	2388	-738	482	-	-	214.9	-112.7	-	-	-	-
10	Midrear of Left Rear Door	-	-	-	-	-	-	-	-	-	-	-
11	Left Rear Door Upper Centerline	-	-	-	-	-	-	-	-	-	-	-

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

Figure 8

MOVING DEFORMABLE BARRIER (MDB) ACCELEROMETER LOCATIONS

Test Vehicle: 1993 Ford Probe 2 Door Test Date: 4-29-93



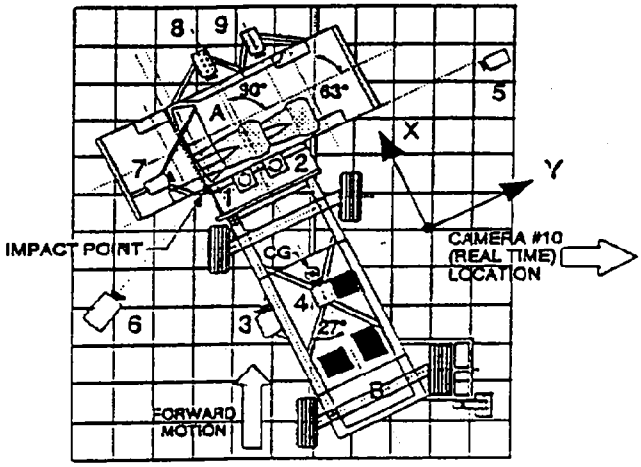
Accel. No.	Location	Coordinates (mm)			Pos. Direct.		Neg. Direct.	
		X*	Y*	Z*	Max (g)	Time (msec)	Max (g)	Time (msec)
1	MDB Center of Gravity							
	Longitudinal ... X	1854	Ø	353	1.6	148	-17.4	41.6
	Lateral ..... Y				7.2	31.4	-1.7	68.6
	Vertical ..... Z				6.9	35.9	-9.Ø	4Ø.8
	Resultant ..... R				25.4	41.Ø	-6.3	-1.4
2	Rear Frame Member							
	Longitudinal ... X	4ØØ	-629	622	1Ø.7	132	-2Ø.5	42.3
	Lateral ..... Y				4.2	3Ø.9	-1.1	115

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

042

Figure 9

HIGH SPEED CAMERA LOCATIONS AND DATA



Camera No.	View	Coordinates (mm)			Angle	Film Plane To Head Target	Lens (mm)	Film Speed (fps)
		X*	Y*	Z*				
10	Real Time						10	24
1	Overhead Qverall View	380	0	5086	-	-	13	926
2	Overhead Closeup View of Impact	180	670	4100	-	-	25	1092
3	MDB Onboard Closeup of Impact	-	-	-	-	-	35	1020
4	MDB Onboard View of Dummy	-	-	-	-	-	13	1020
5	Right Side Ground Overall View	4150	8715	1075	-	-	25	1000
6	Left Side Ground Overall View	4150	2790	2050	-	-	13	1087
7	Test Vehicle Onboard Driver Front View	-	-	-	-	-	13	1020
8	Test Vehicle Onboard Driver Side View	-	-	-	-	-	7.5	1026
9	Test Vehicle Onboard Passenger Side View	-	-	-	-	-	7.5	667
	Right Overall	4200	8900	1220	90°	8545	13	885

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

Table 10

FUEL SYSTEM INTEGRITY POST IMPACT TEST DATA

FMVSS NO. 301

TEST VEHICLE NHTSA NO.: MP0208 Test Date: 4-29-93

Vehicle Mfgr./Make/Model: 1993 Ford Probe 2 Door

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:

_____ Frontal (35 mph)

_____ Oblique (30 mph) with ____° barrier face first contacting _____ (driver/passenger) side

_____ Rear Moving Barrier (30 mph)

__X__ Side Impact MDB (38.5 mph)

FUEL SPILLAGE MEASUREMENT:

1. From impact until vehicle motion ceases

ACTUAL	MAX ALLOWED
0	102
0	502
0	102/1 MIN

2. For 5 minute period after vehicle motion ceases

3. For next 25 minutes

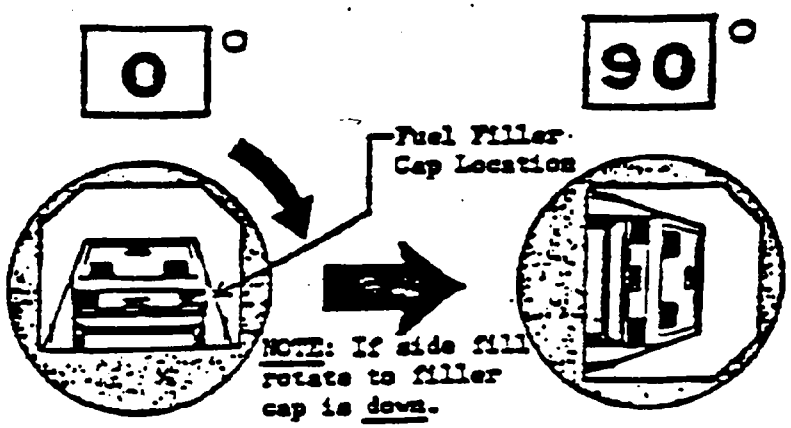
SOLVENT SPILLAGE DETAILS:

044

Table 11

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: Vehicle NHTSA ID No.: MP0208



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.

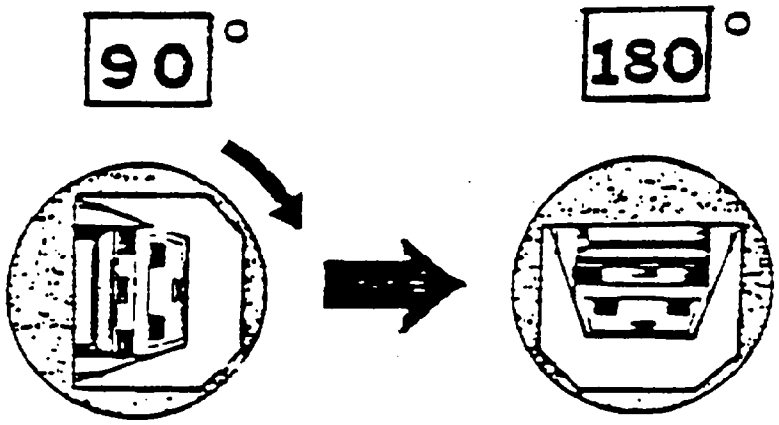
IV. SOLVENT SPILLAGE LOCATIONS(S):

045

Table 11

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

TEST PHASE: Vehicle NHTSA ID No.: MP0208



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

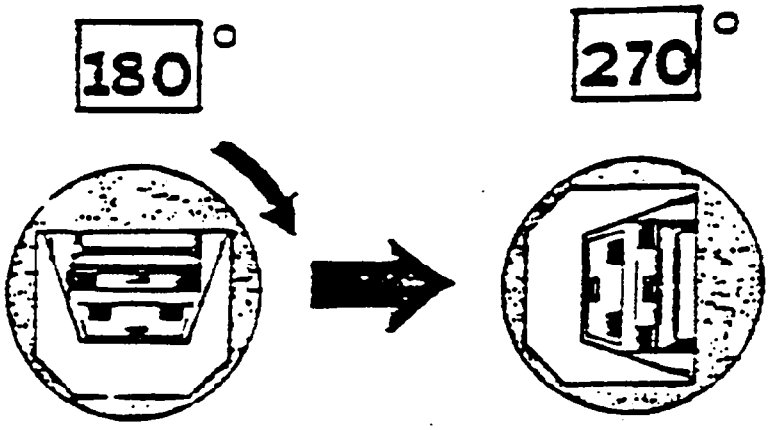
Note: Record Spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATIONS(S):

Table 11

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

TEST PHASE: Vehicle NHTSA ID No.: MP0208



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.

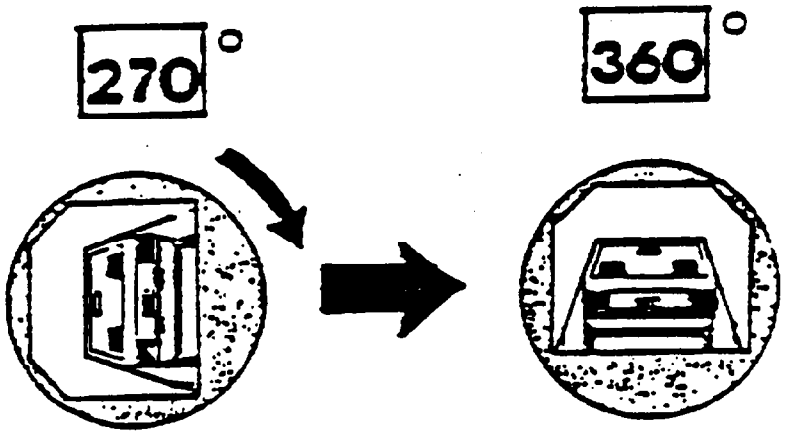
IV. SOLVENT SPILLAGE LOCATIONS(S):

047

Table 11

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

TEST PHASE: Vehicle NHTSA ID No.: MP0208



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 50 seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 50 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

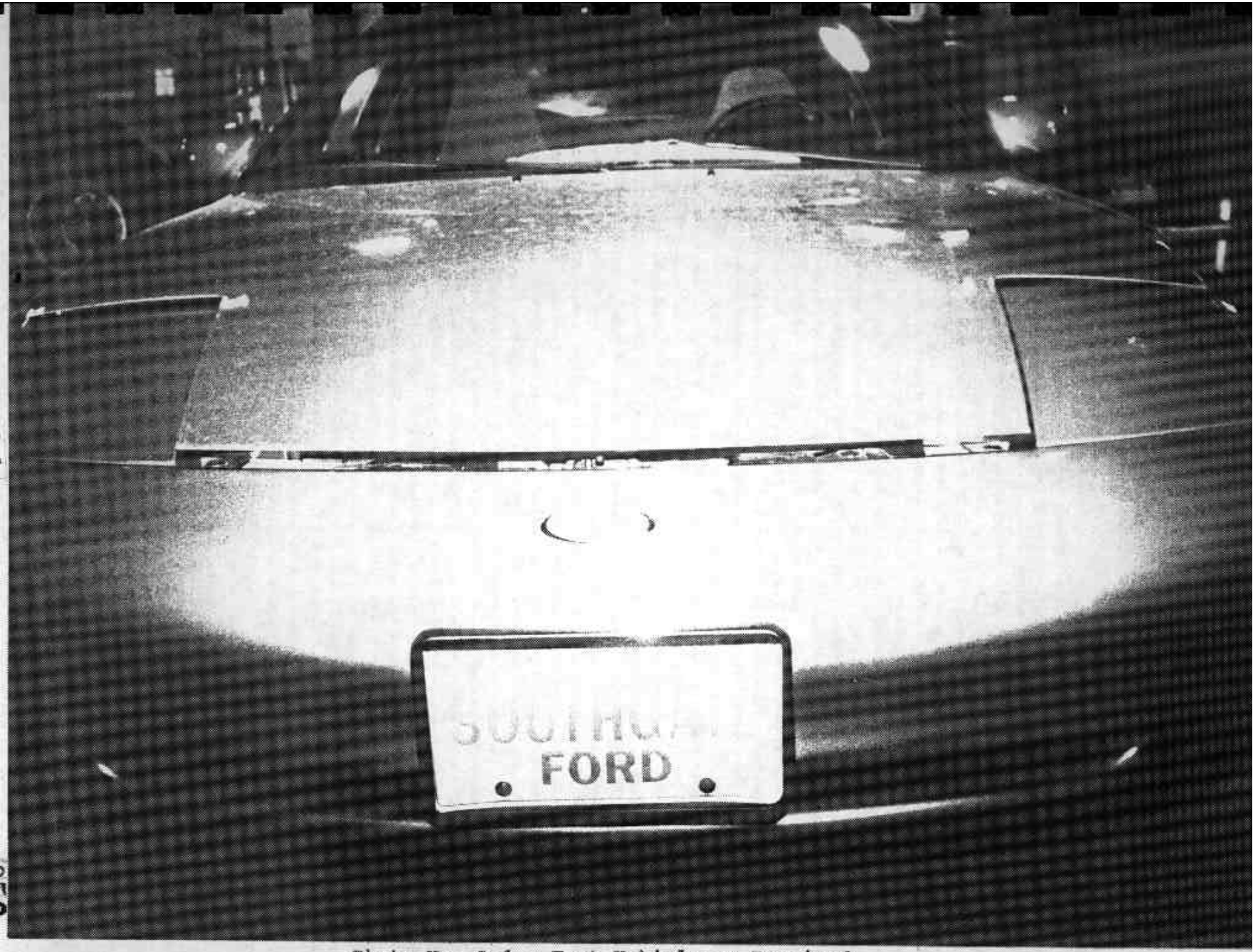
Note: Record Spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATIONS(S):

APPENDIX A - PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

TABLE OF PHOTOGRAPHS



A-1

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Photo No. A-1 - Test Vehicle as Received

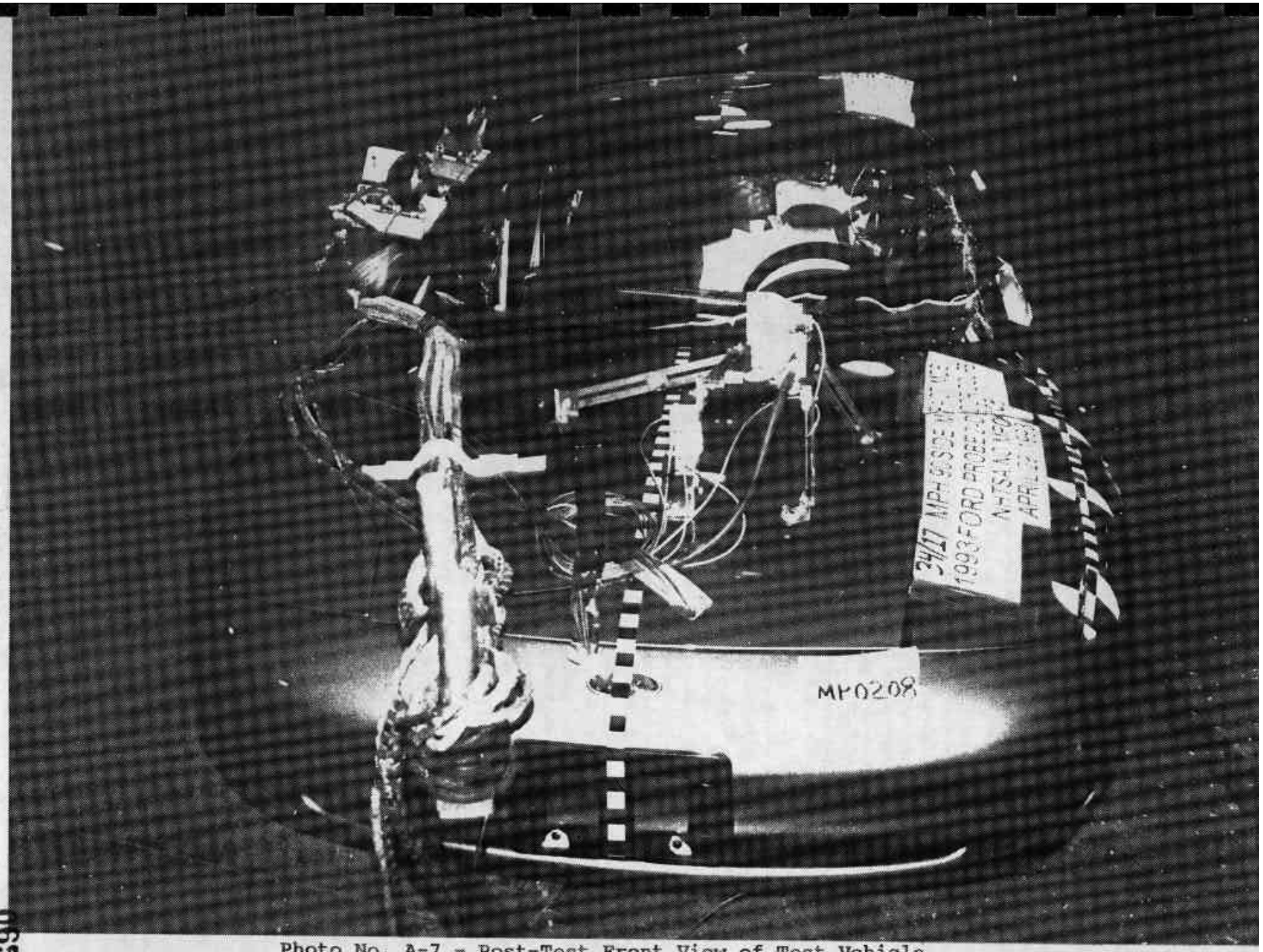
Photo No. A-2 - Test Vehicle as Received

Photo No. A-3 - Test Vehicle as Received

Photo No. A-4 - Test Vehicle as Received

Photo No. A-5 - Test Vehicle as Received

Photo No. A-6 - Pre-Test Front View of Test Vehicle

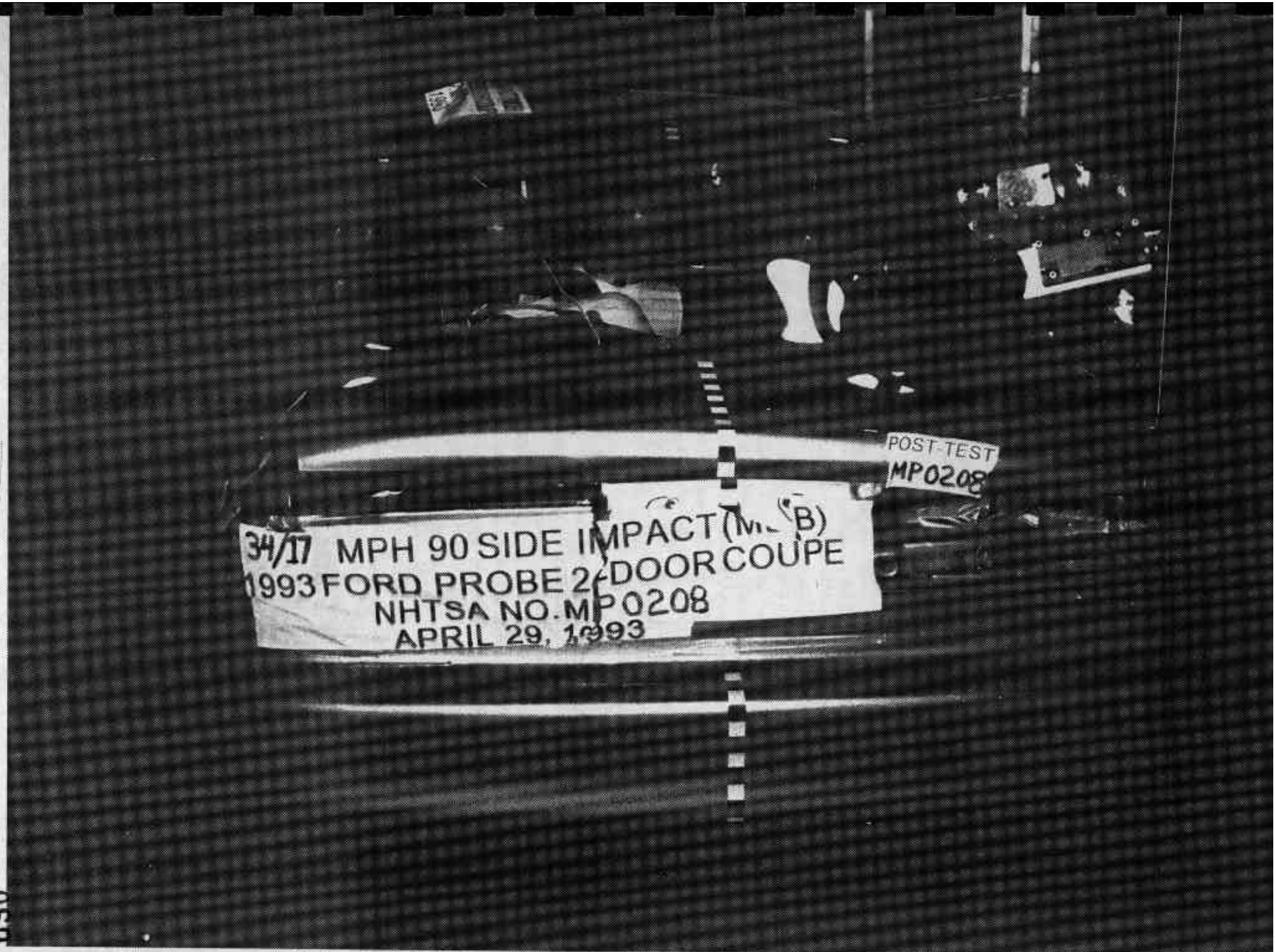


A-7

Photo No. A-7 - Post-Test Front View of Test Vehicle

A-8

Photo No. A-8 - Pre-Test Rear View of Test Vehicle



A-9

Photo No. A-9 - Post-Test Rear View of Test Vehicle

Photo No. A-10 - Pre-Test Left Side View of Test Vehicle

Photo No. A-11 - Post-Test Left Side View of Test Vehicle

Photo No. A-12 - Pre-Test MDB and Vehicle Left Side Front View

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Photo No. A-13 - Post-Test MDB and Vehicle Left Side Front View

Photo No. A-14 - Pre-Test MDB and Vehicle Left Side Rear View

Photo No. A-15 - Post-Test MDB and Vehicle Left Side Rear View

Photo No. A-16 - Pre-Test MDB Top View

Photo No. A-17 - Post-Test MDB Top View

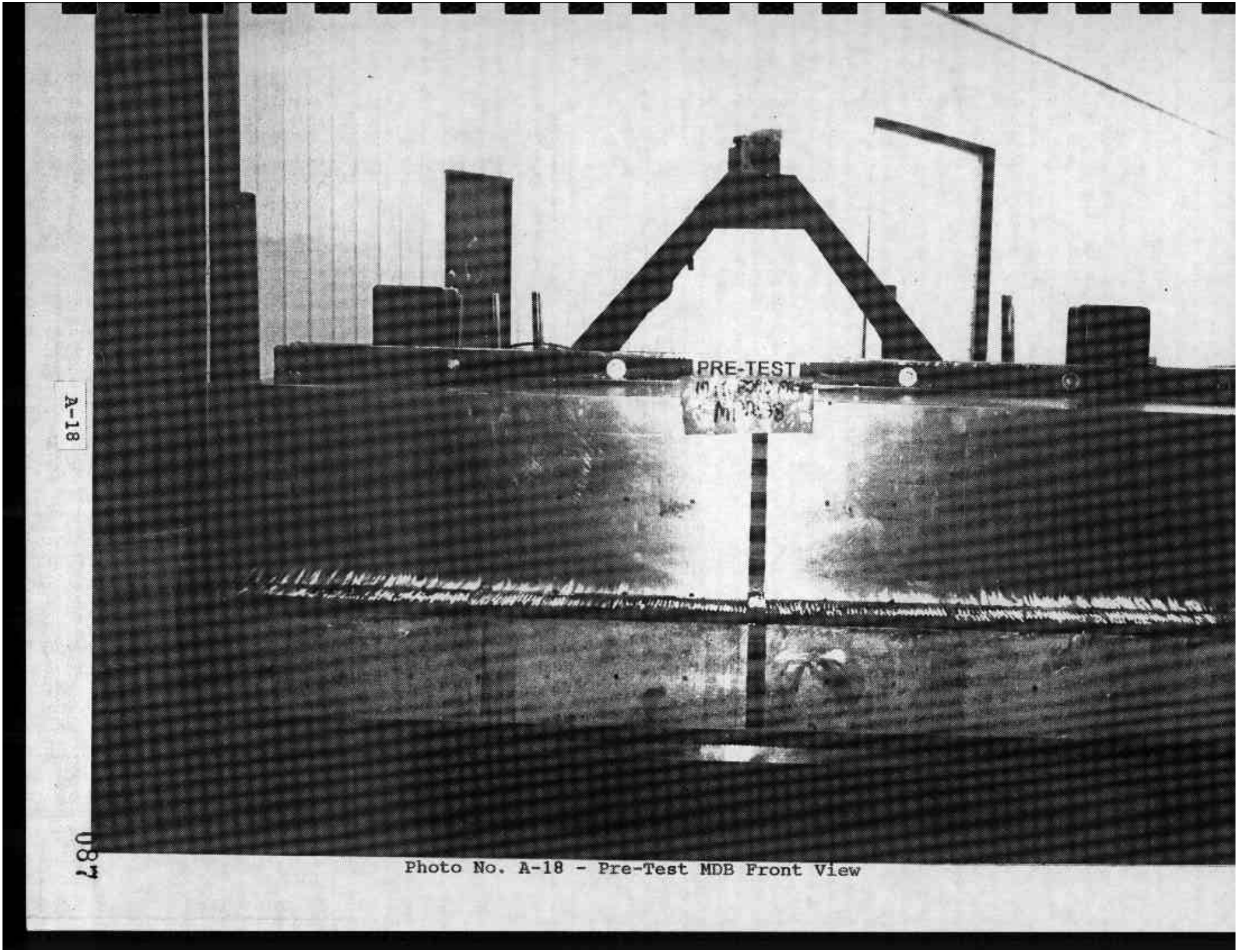

Photo No. A-18 - Pre-Test MDB Front View

Photo No. A-19 - Post-Test MDB Front View

Photo No. A-20 - Pre-Test MDB Left Side View

Photo No. A-21 - Post-Test MDB Left Side View

Photo No. A-22 - Pre-Test MDB Right Side View

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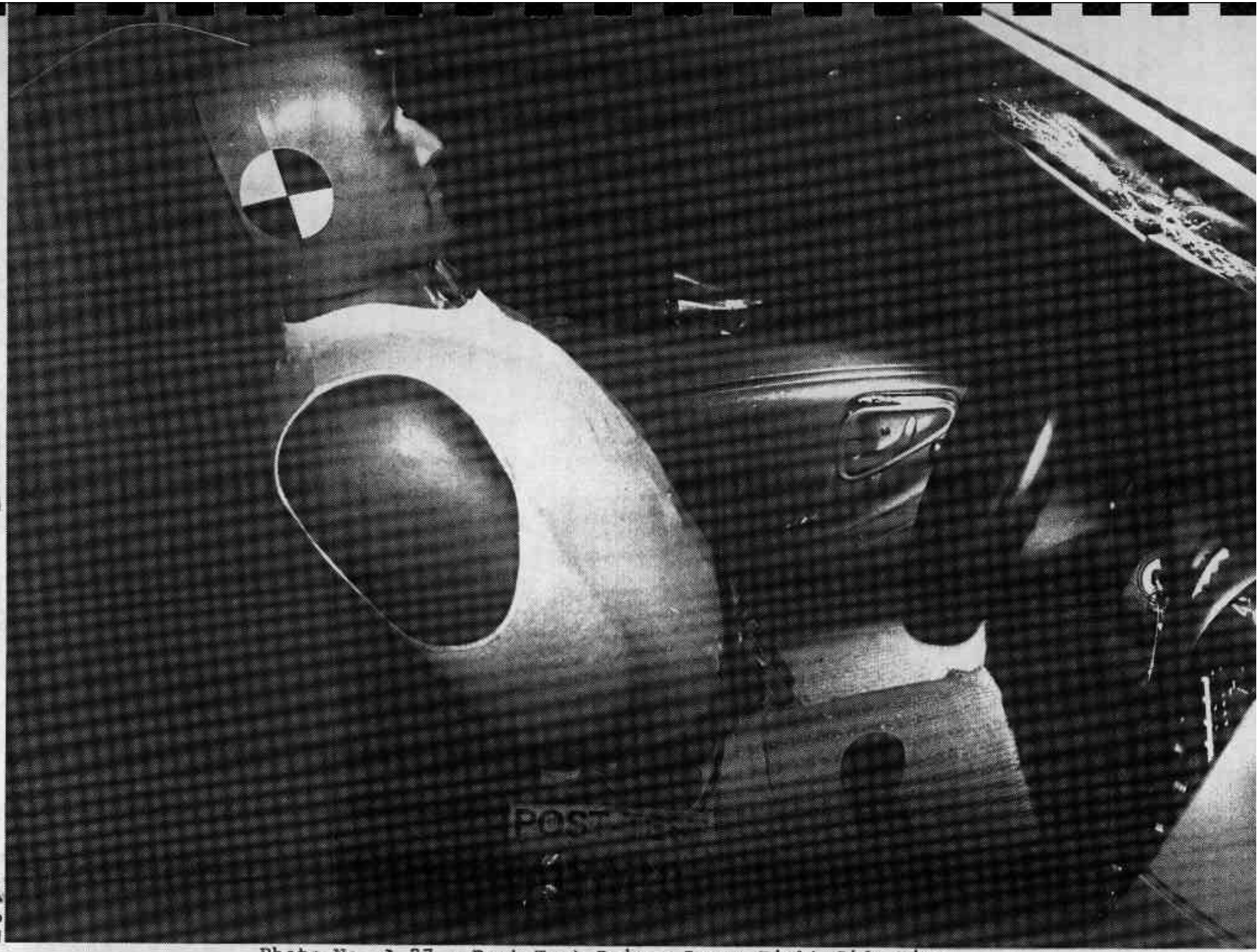
Photo No. A-23 - Post-Test MDB Right Side View

Photo No. A-24 - Pre-Test Barrier Position Against Vehicle
Overhead View

Photo No. A-25 - Post-Test Overhead View

Photo No. A-26 - Pre-Test Driver Dummy Right Side View



A-27

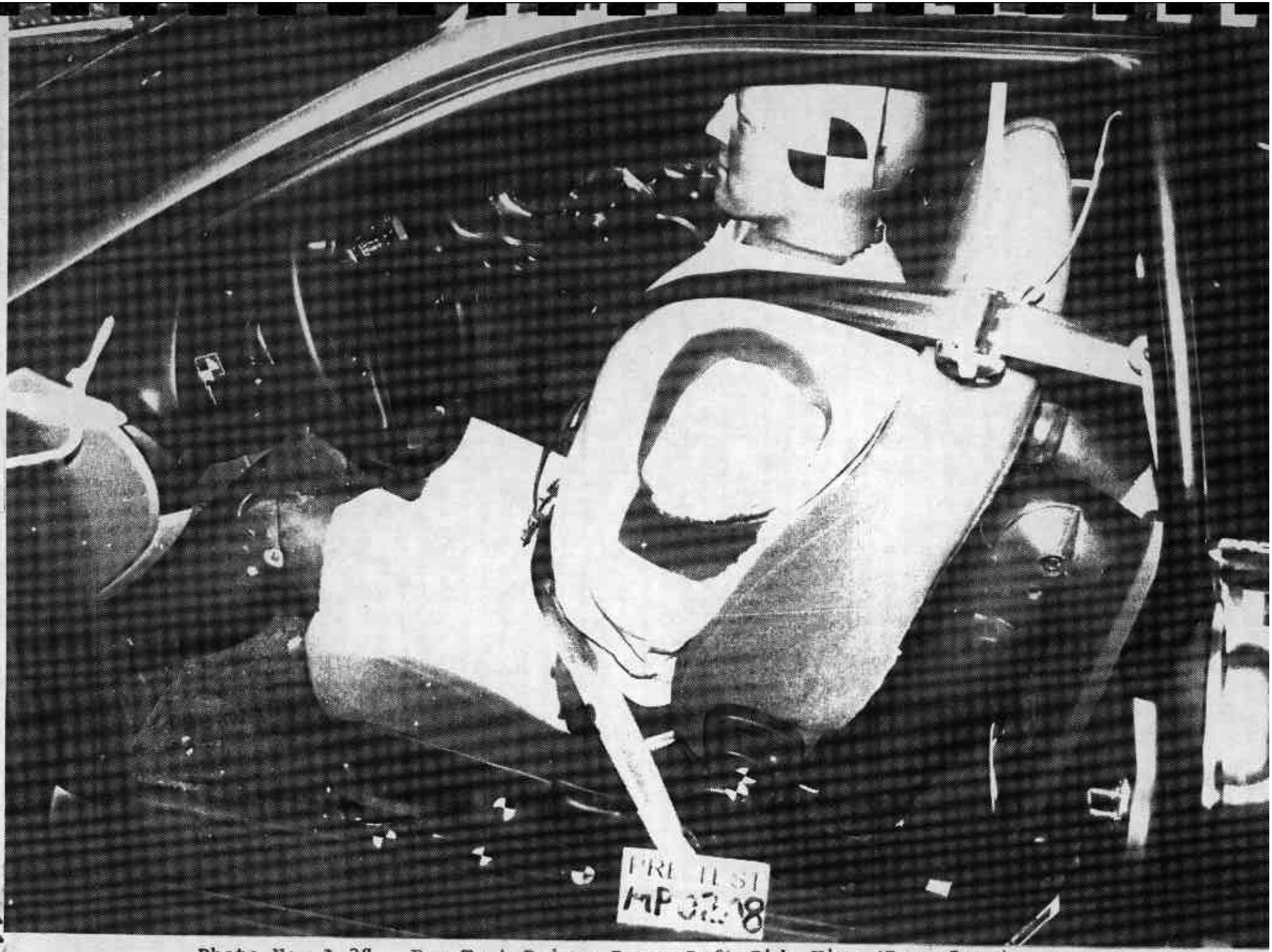
Photo No. A-27 - Post-Test Driver Dummy Right Side View

A-28

Photo No. A-28 - Pre-Test Driver Dummy Left Side View

A-29

Photo No. A-29 - Post-Test Driver Dummy Left Side View



A-30

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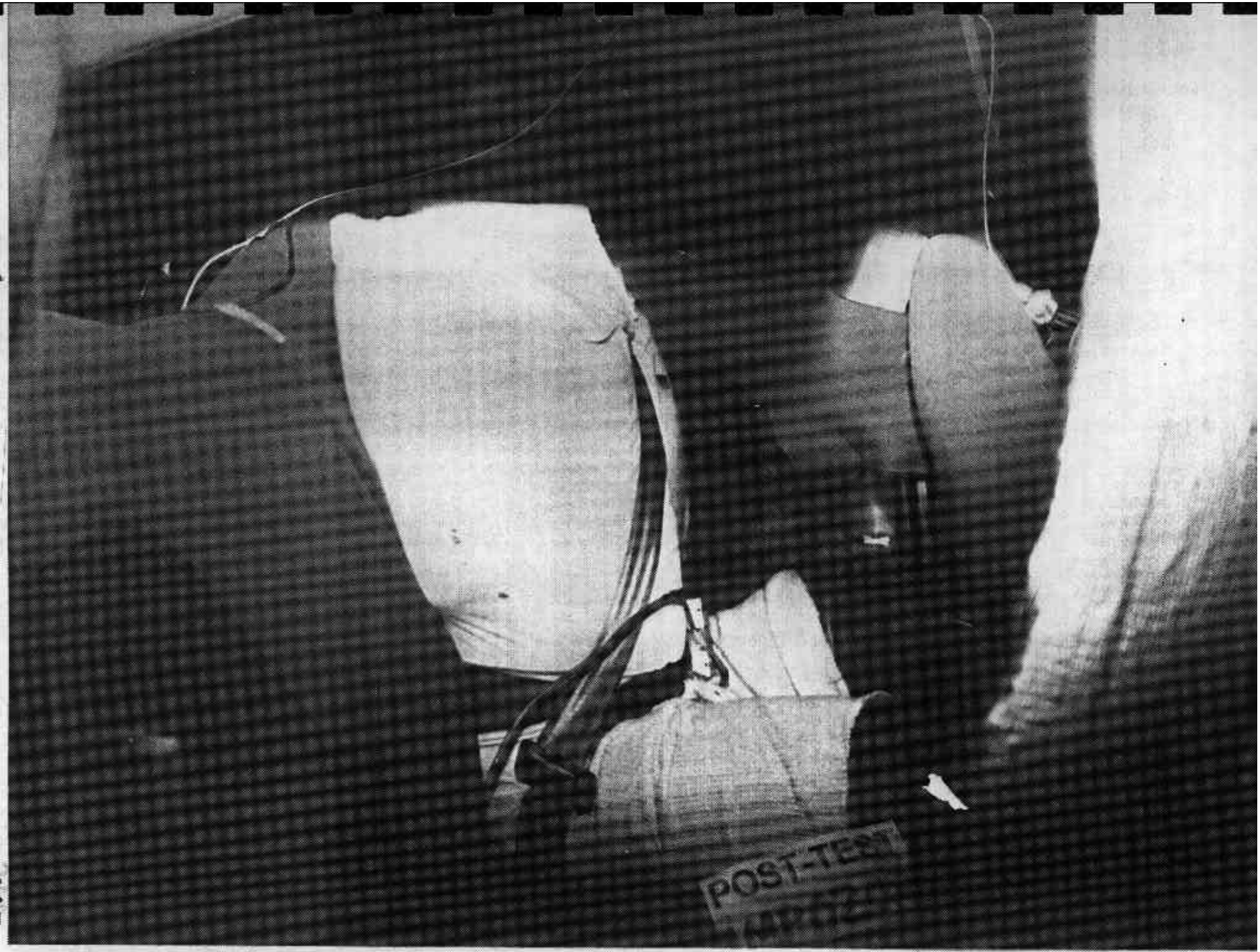
Photo No. A-30 - Pre-Test Driver Dummy Left Side View (Door Open)

Photo No. A-31 - Pre-Test Passenger Dummy Right Side View



A-32

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Photo No. A-32 - Post-Test Passenger Dummy Right Side View

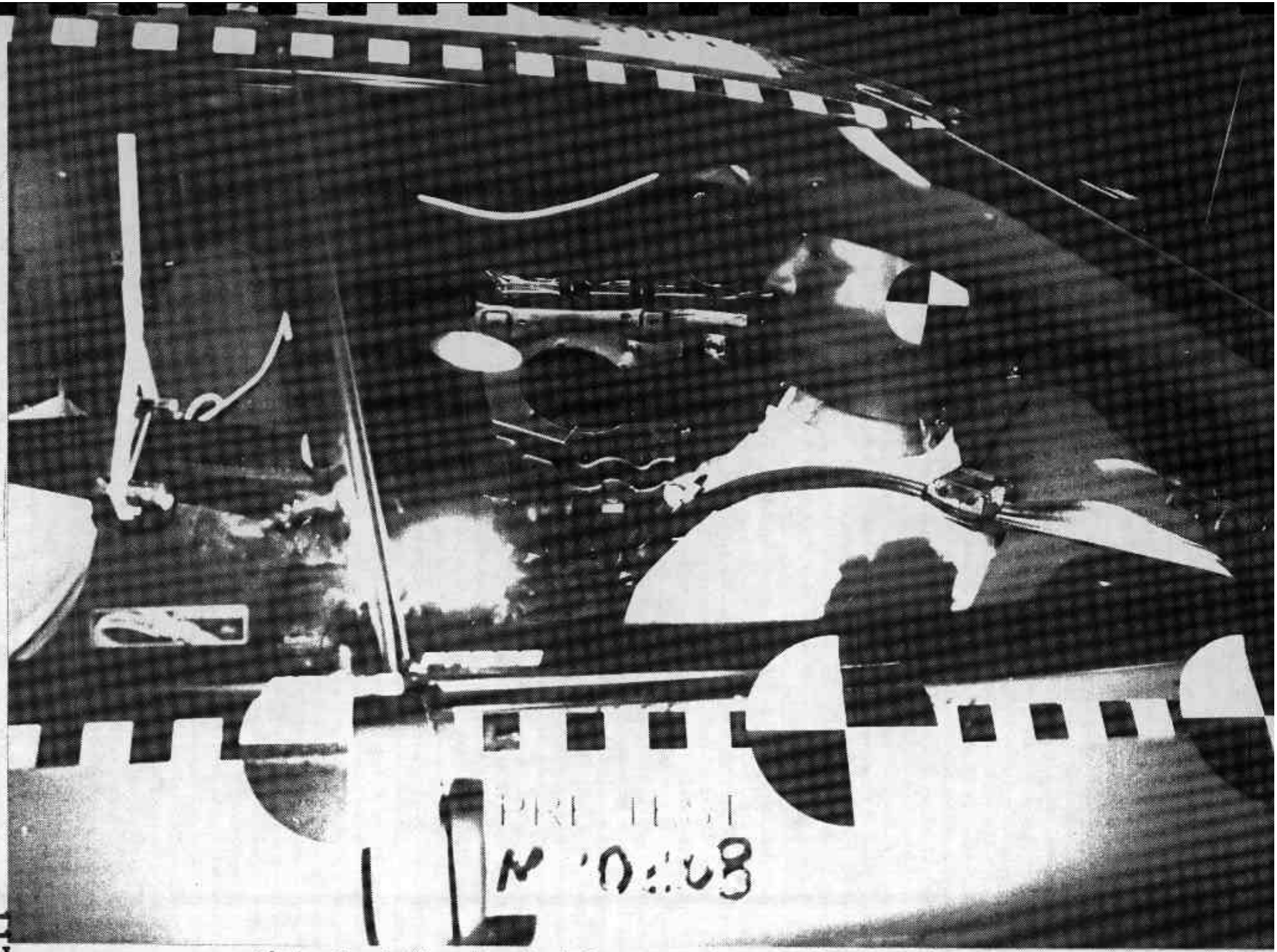


Photo No. A-33 - Pre-Test Passenger Dummy Left Side View

Photo No. A-34 - Post-Test Passenger Dummy Left Side View

A-34

Photo No. A-35 - Pre-Test Driver Dummy Front View

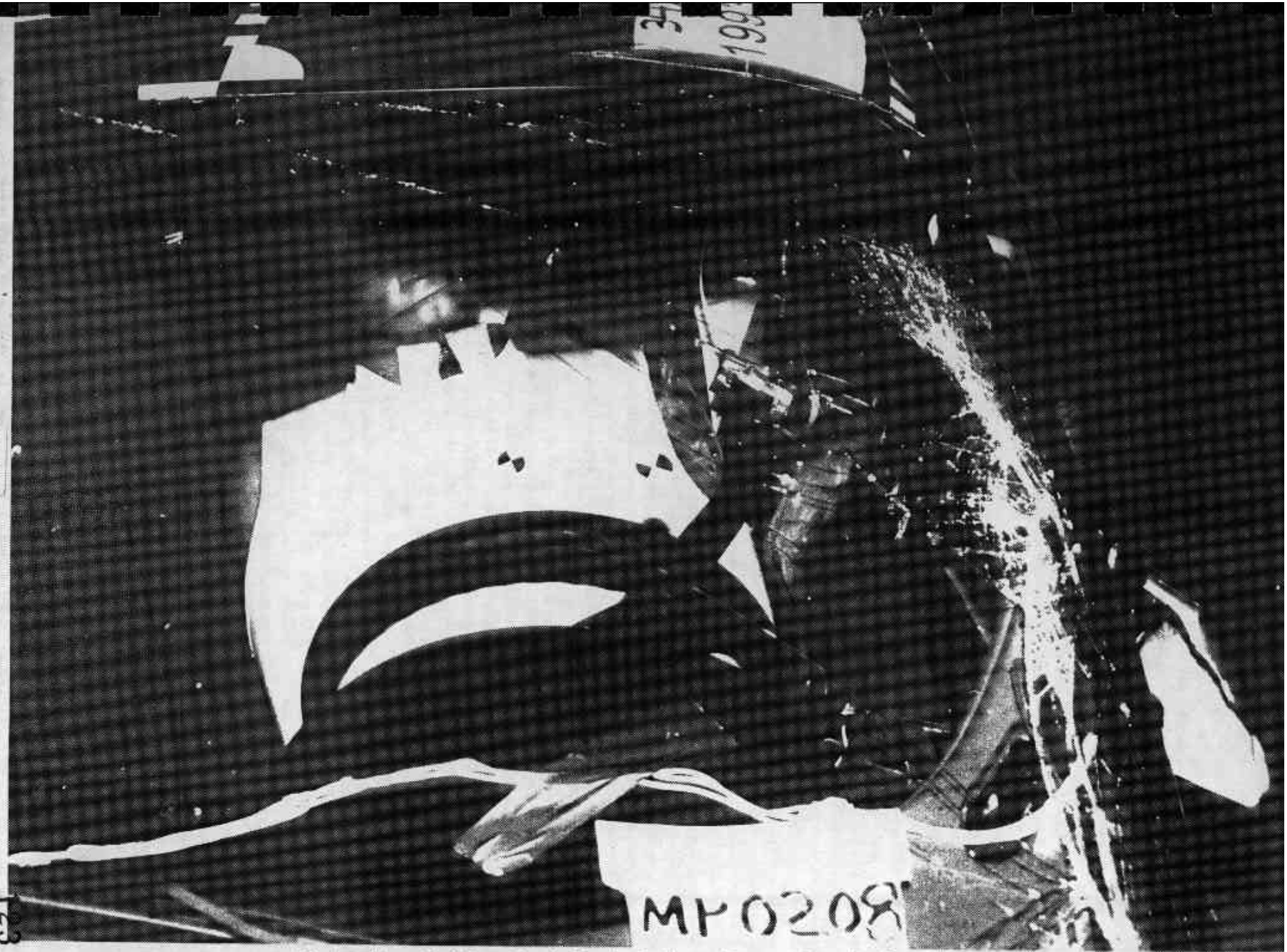
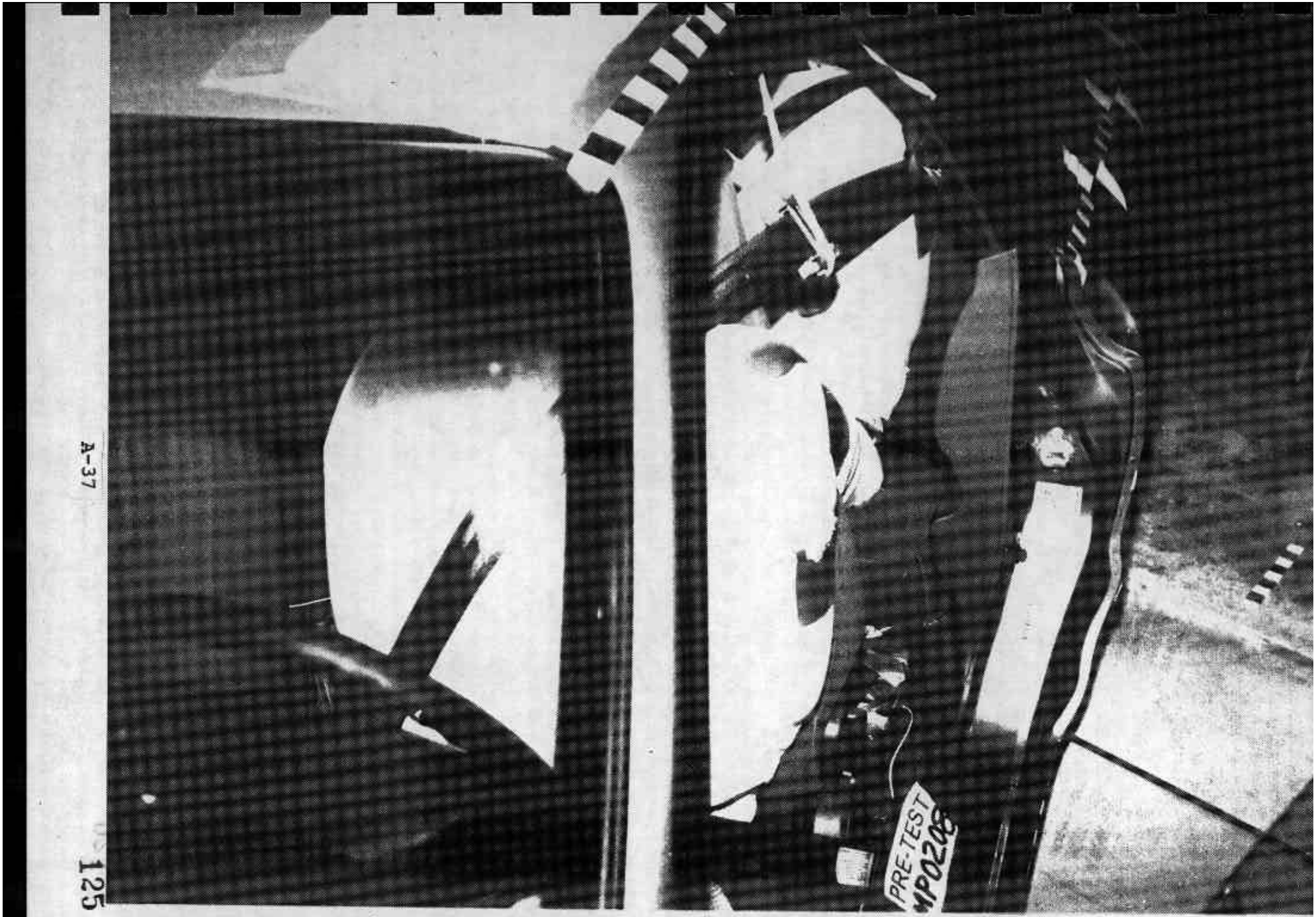


Photo No. A-36 - Post-Test Driver Dummy Front View



A-37

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Photo No. A-37 - Pre-Test Driver Dummy Front 1/4 View

Photo No. A-38 - Pre-Test Passenger Dummy Front 1/4 View

Photo No. A-39 - Driver Impact

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Photo No. A-40 - Passenger Impact

Photo No. A-41 - Rollover 0'

Photo No. A-42 - Rollover 90°

Photo No. A-43 - Rollover 180°

Photo No. A-44 - Rollover 270°

Photo No. A-45 - Vehicle Barrier Impact

APPENDIX B - DATA PLOTS

Table of Data Plots

* Data loss at approximately 15 msec.

Table of Data Plots (continued)

Table of Data Plots (continued)

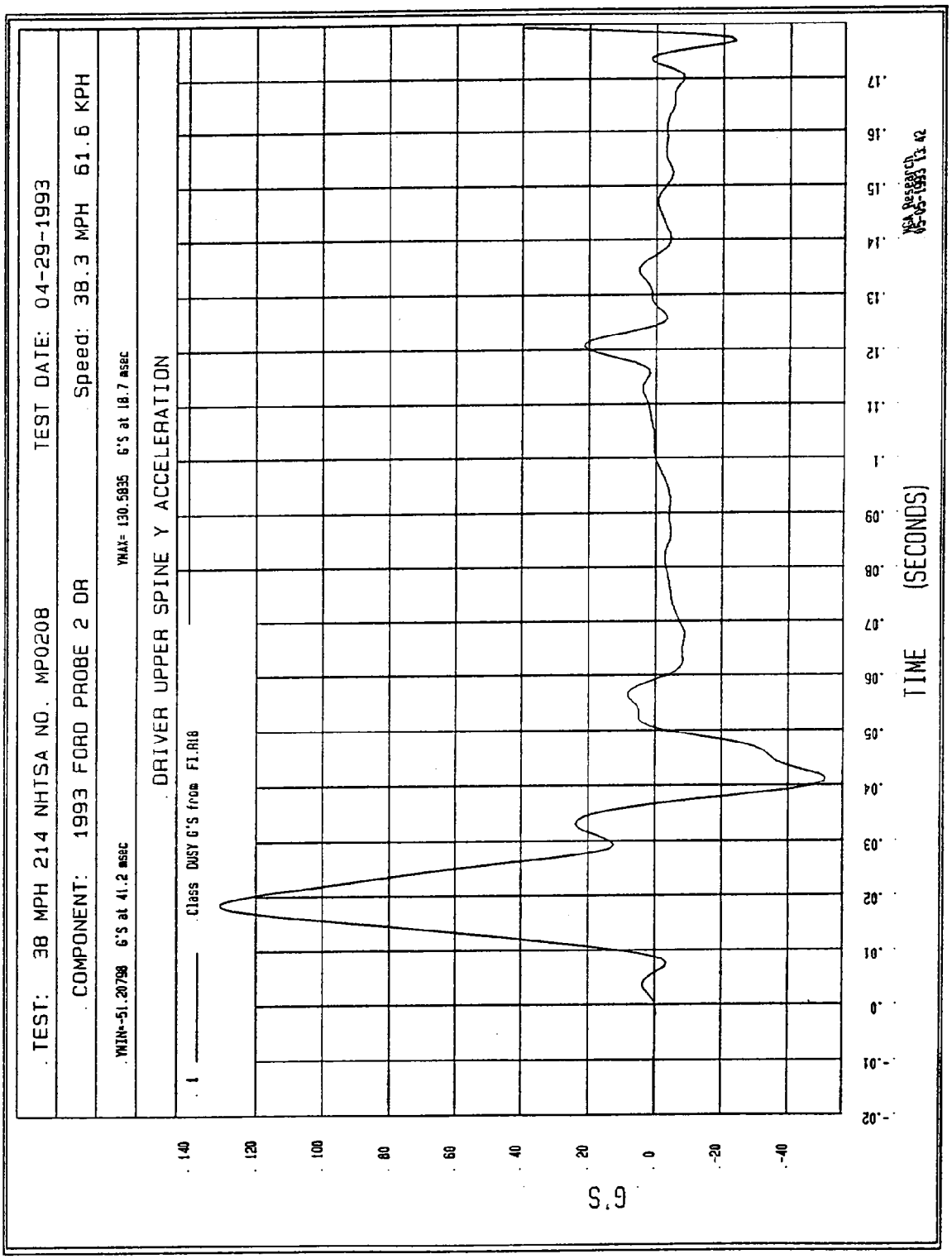
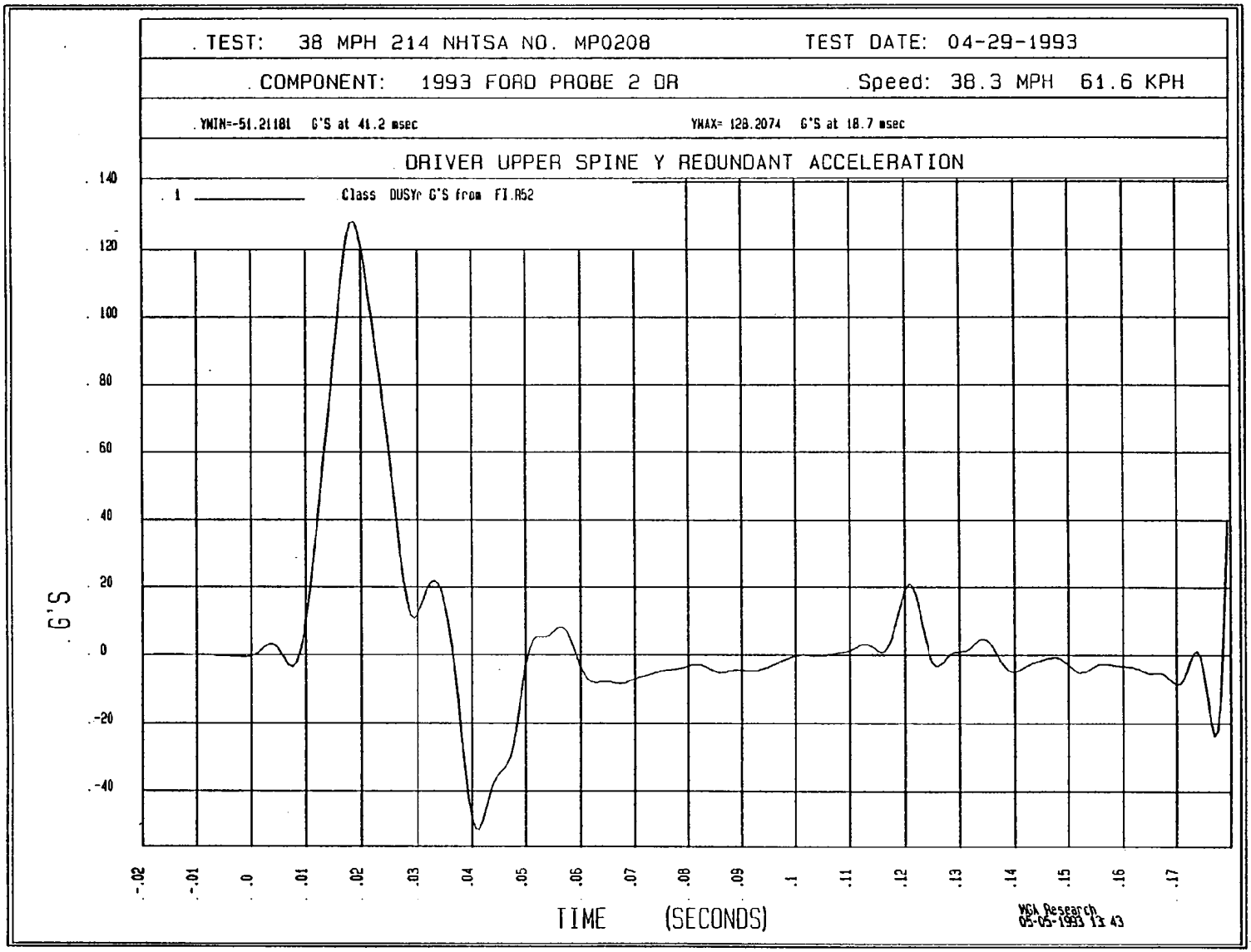


Figure B-1 - Driver Upper Spine Y Acceleration vs. Time



B-2

Figure B-2 - Driver Upper Spine Y Redundant Acceleration vs. Time

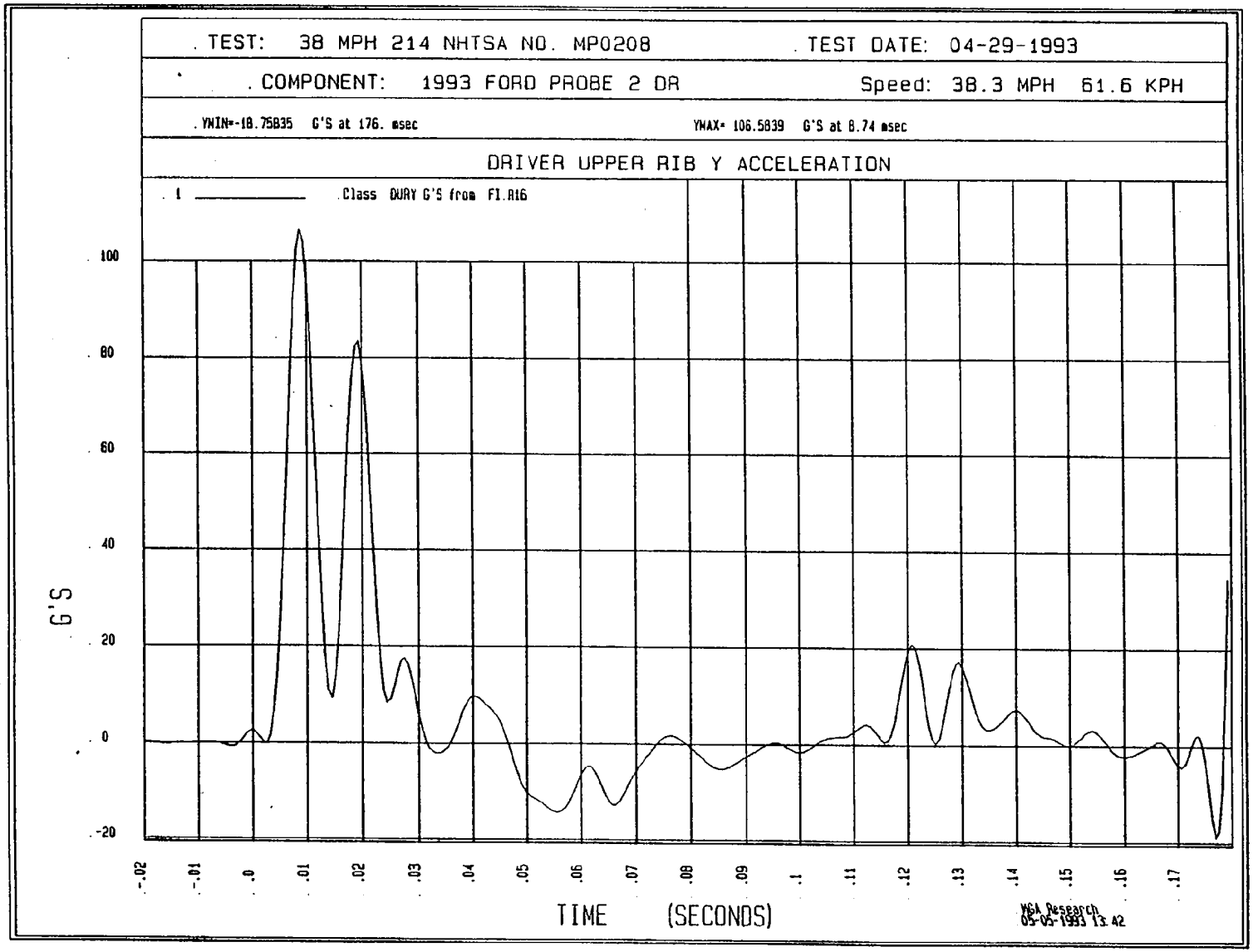


Figure B-3 - Driver Upper Rib Y Acceleration vs. Time

Data loss at approximately 15 msec.

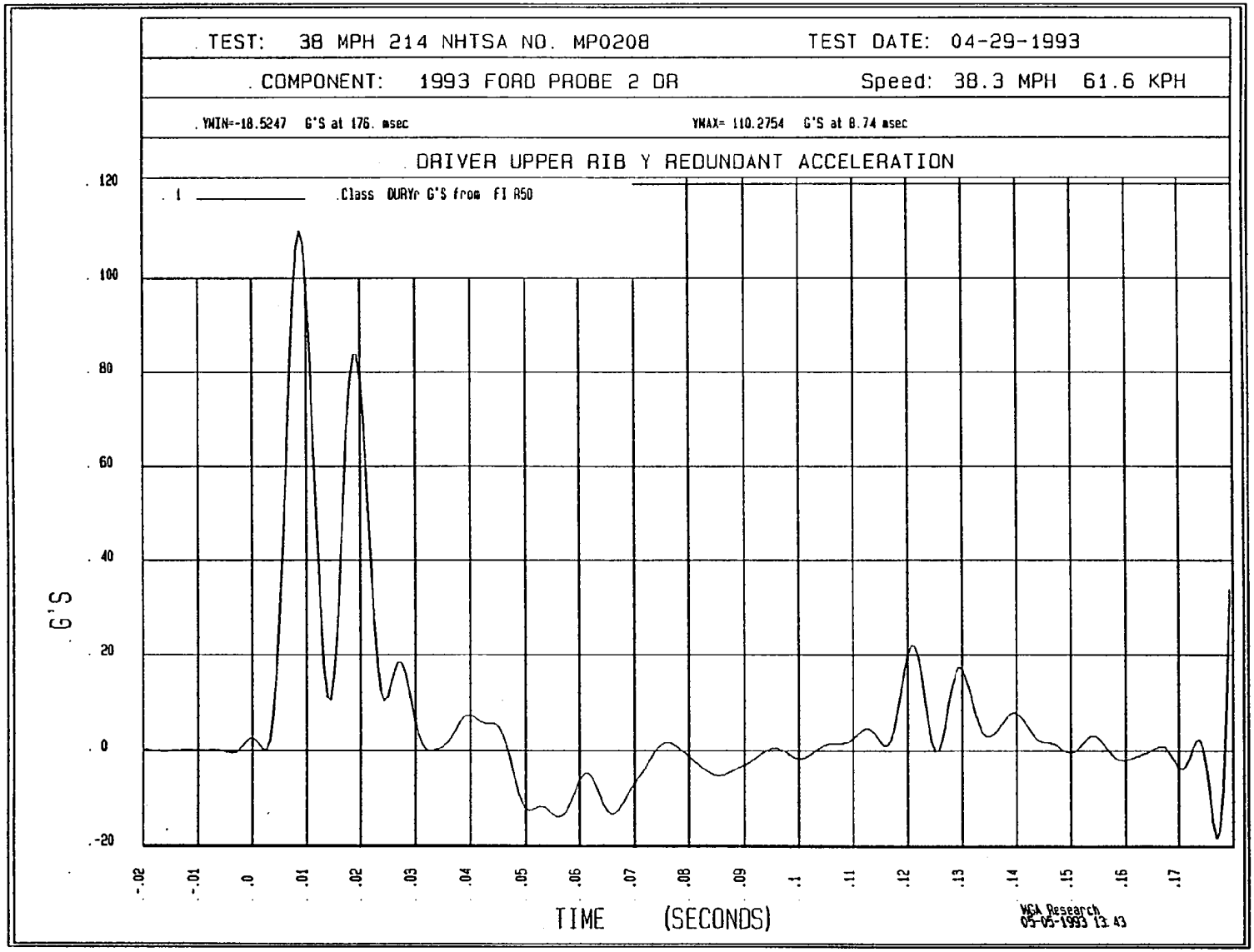
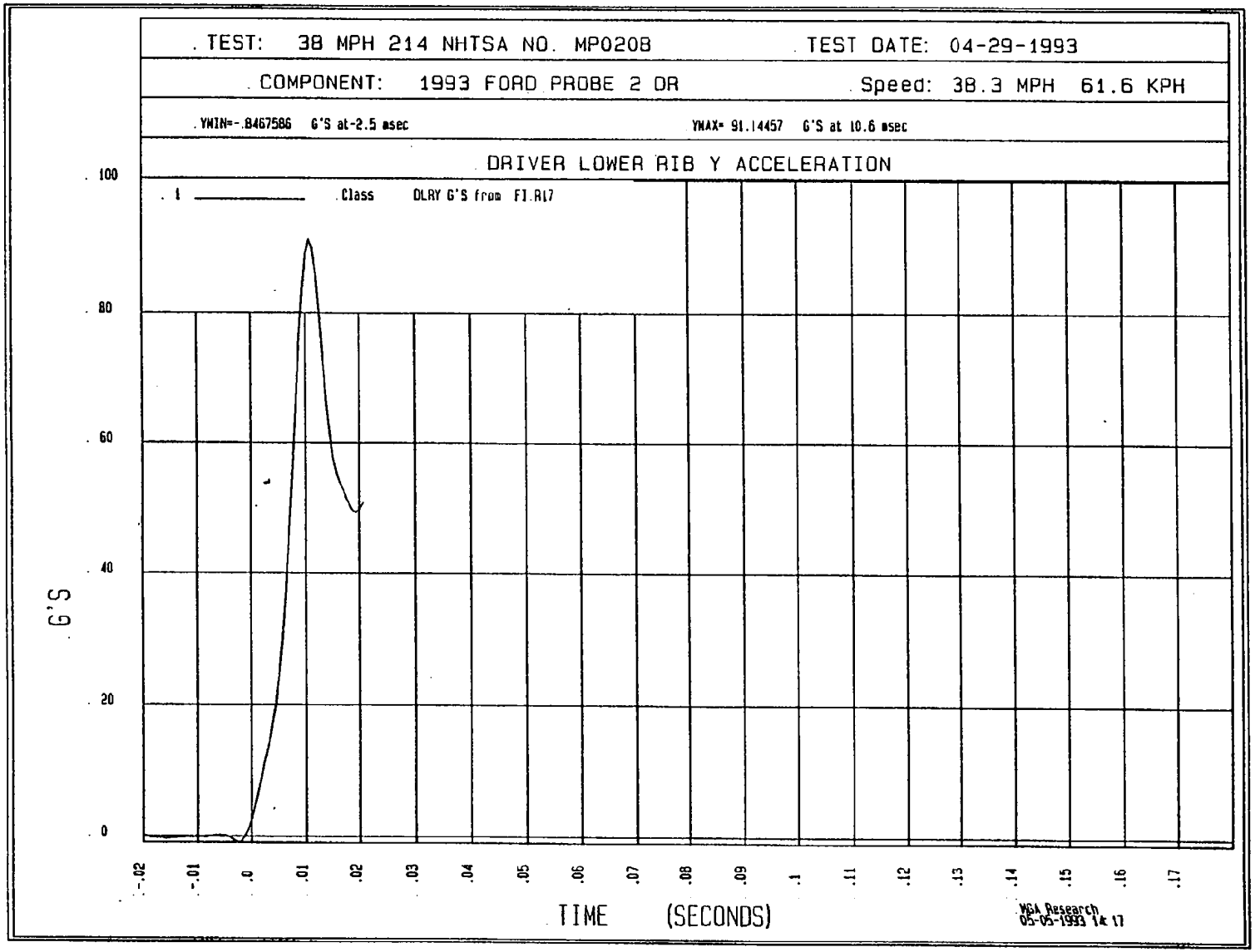


Figure B-4 - Driver Upper Rib Y Redundant Acceleration vs. Time



B-5

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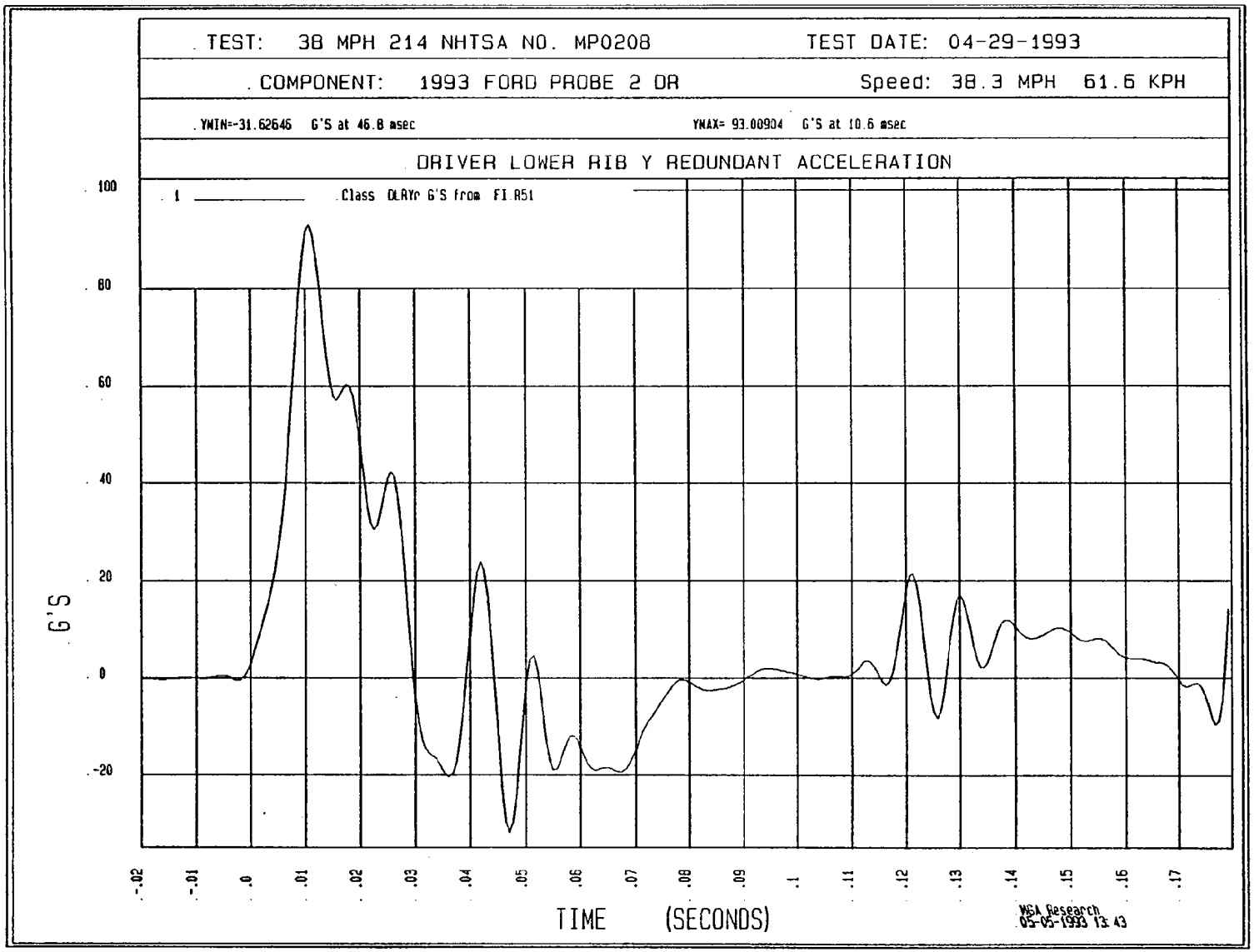
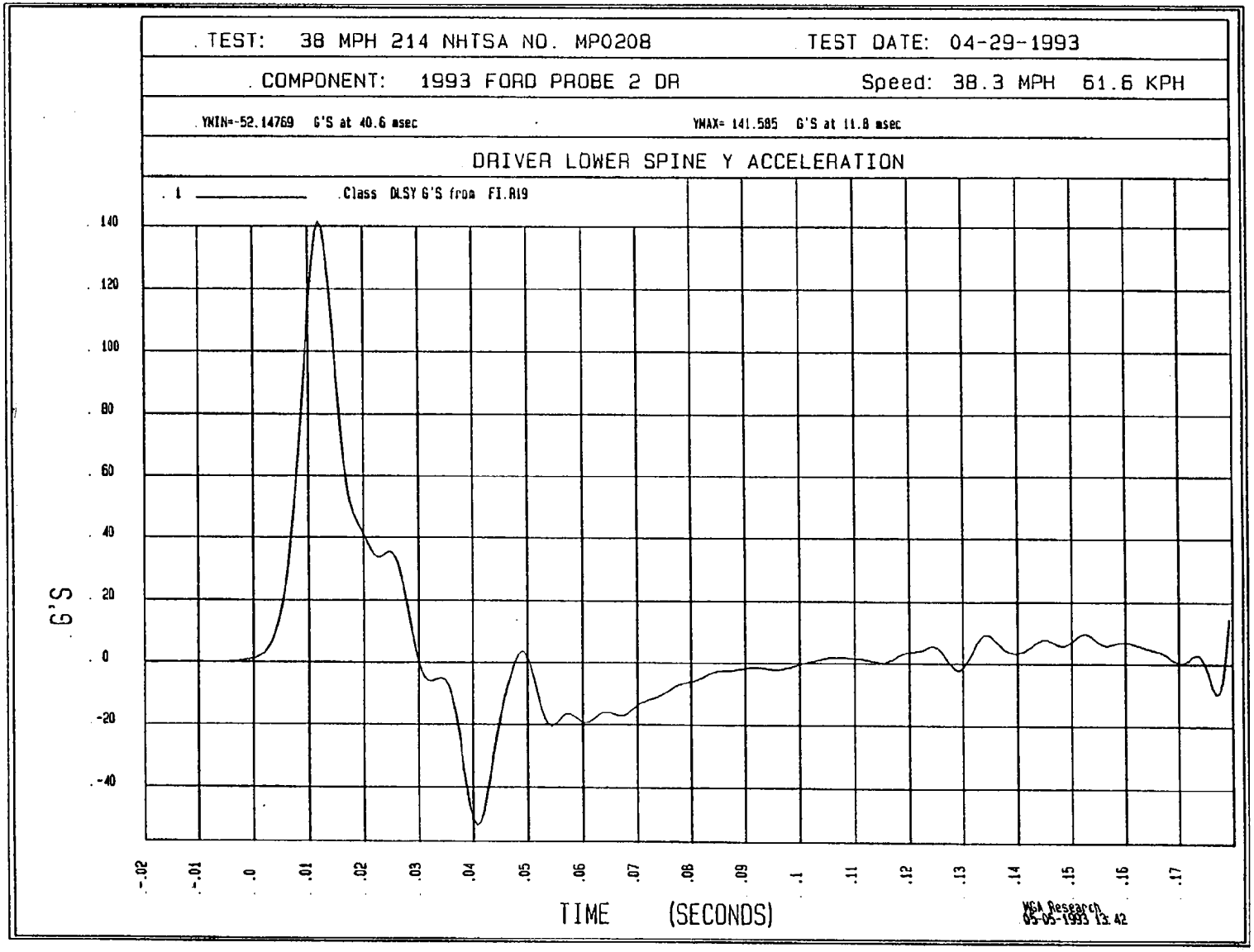
Figure B-5 - Driver Lower Rib Y Acceleration vs. Time



B-6

Figure B-6 - Driver Lower Rib Y Redundant Acceleration vs. Time



B-7

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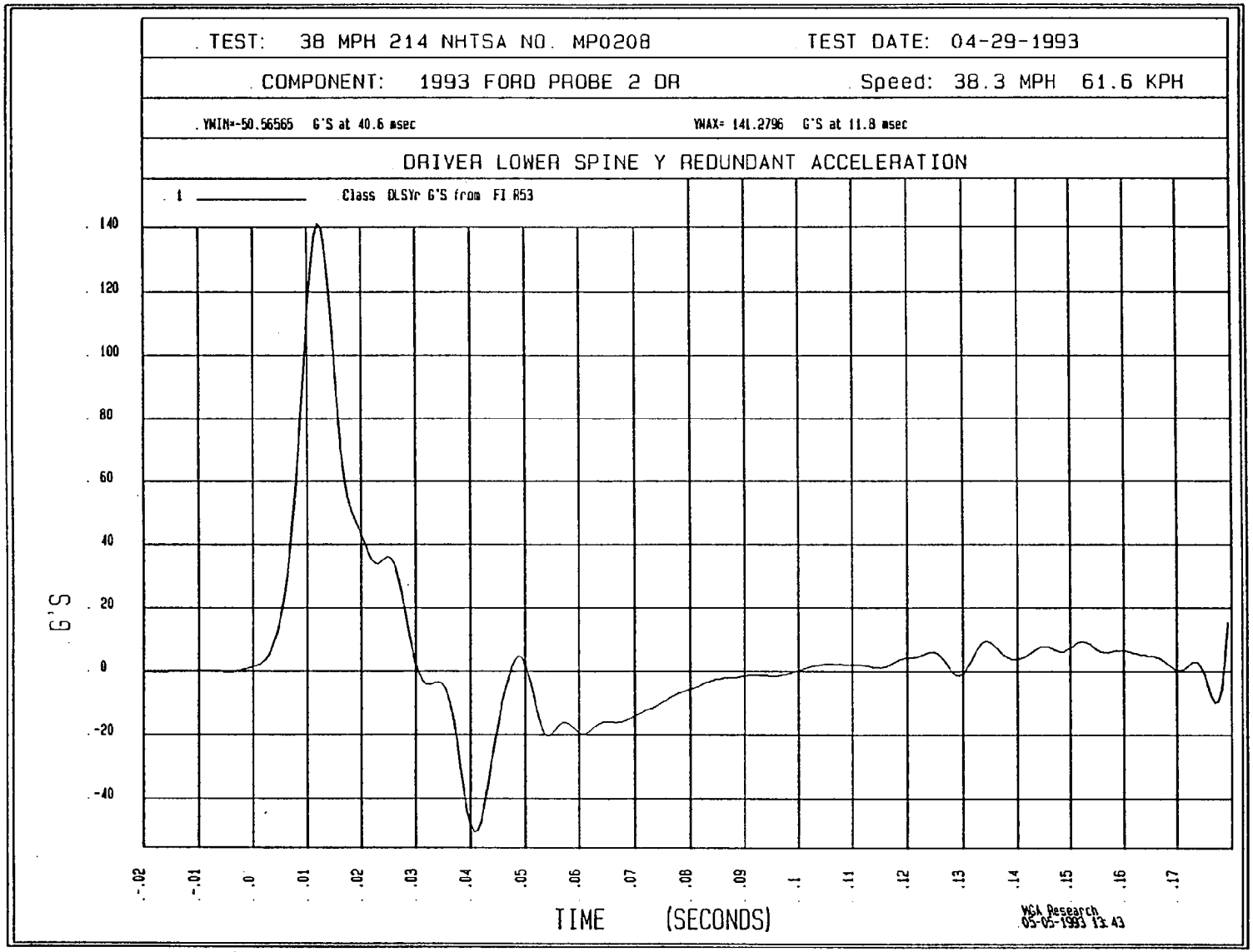
Figure B-7 - Driver Lower Spine Y Acceleration vs. Time



B-8

Figure B-8 - Driver Lower Spine Y Redundant Acceleration vs. Time

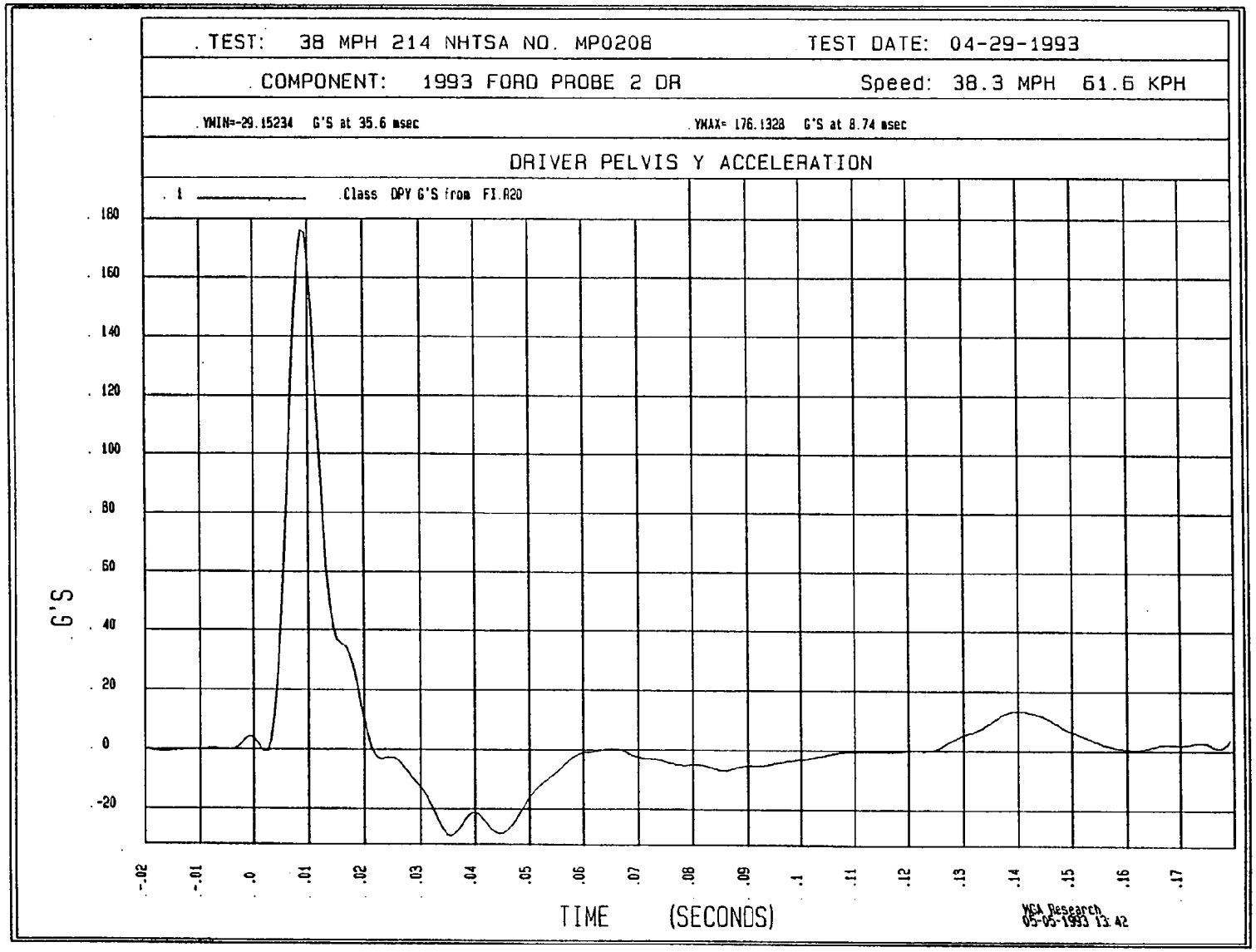


Figure B-9 - Driver Pelvis Y Acceleration vs. Time

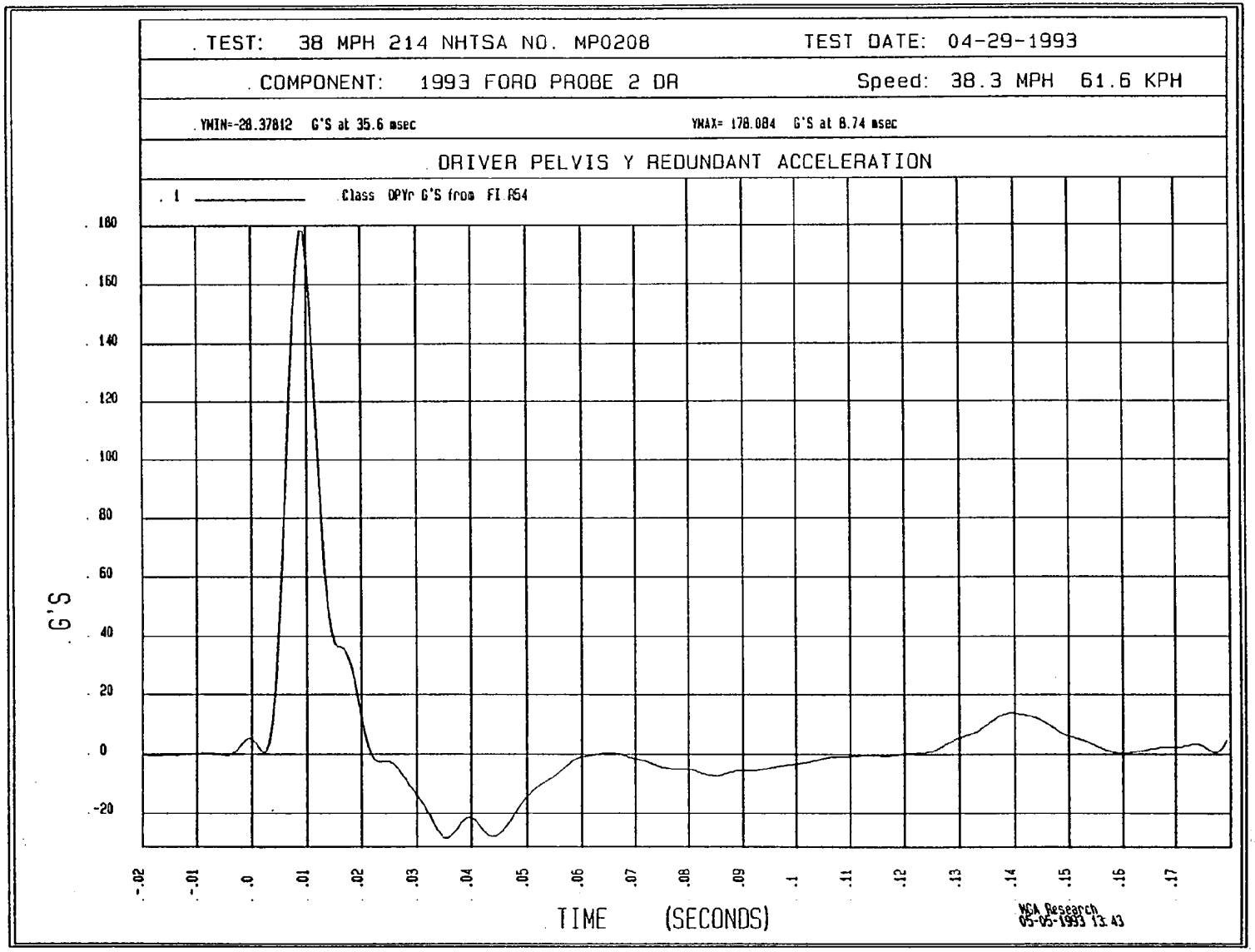


Figure B-10 - Driver Pelvis Y Redundant Acceleration vs. Time

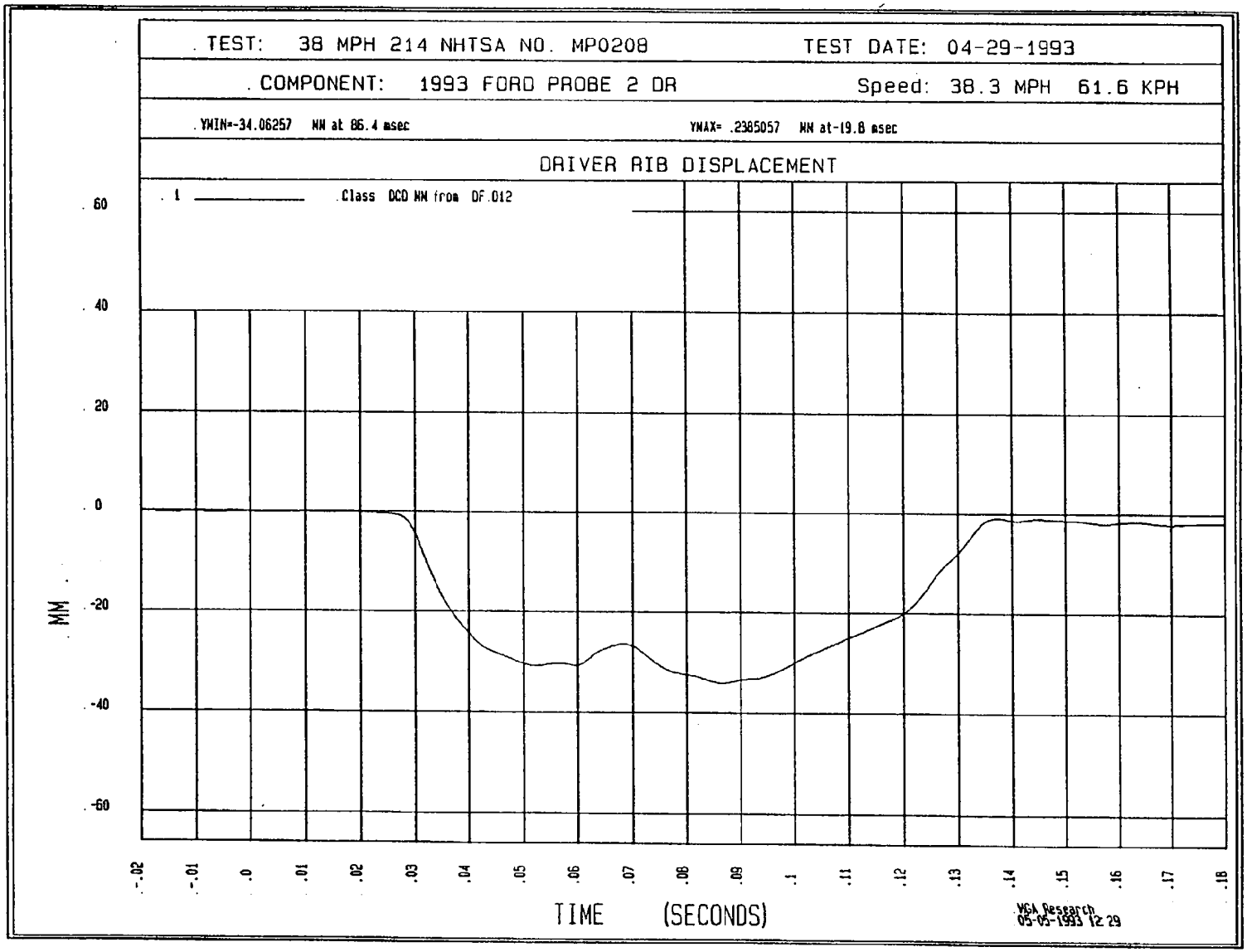


Figure B-11 - Driver Rib Displacement vs. Time

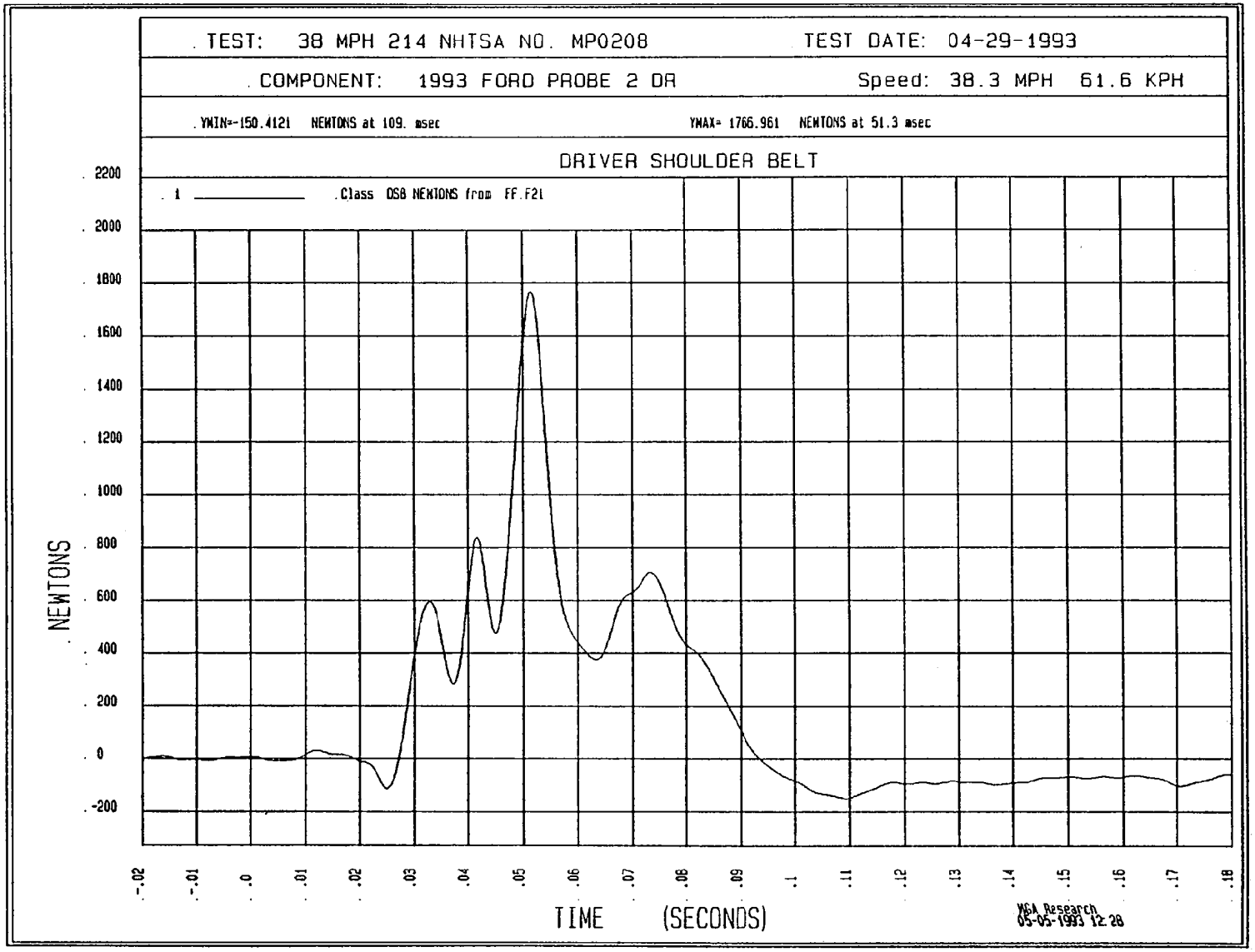


Figure B-12 - Driver Shoulder Belt Force vs. Time

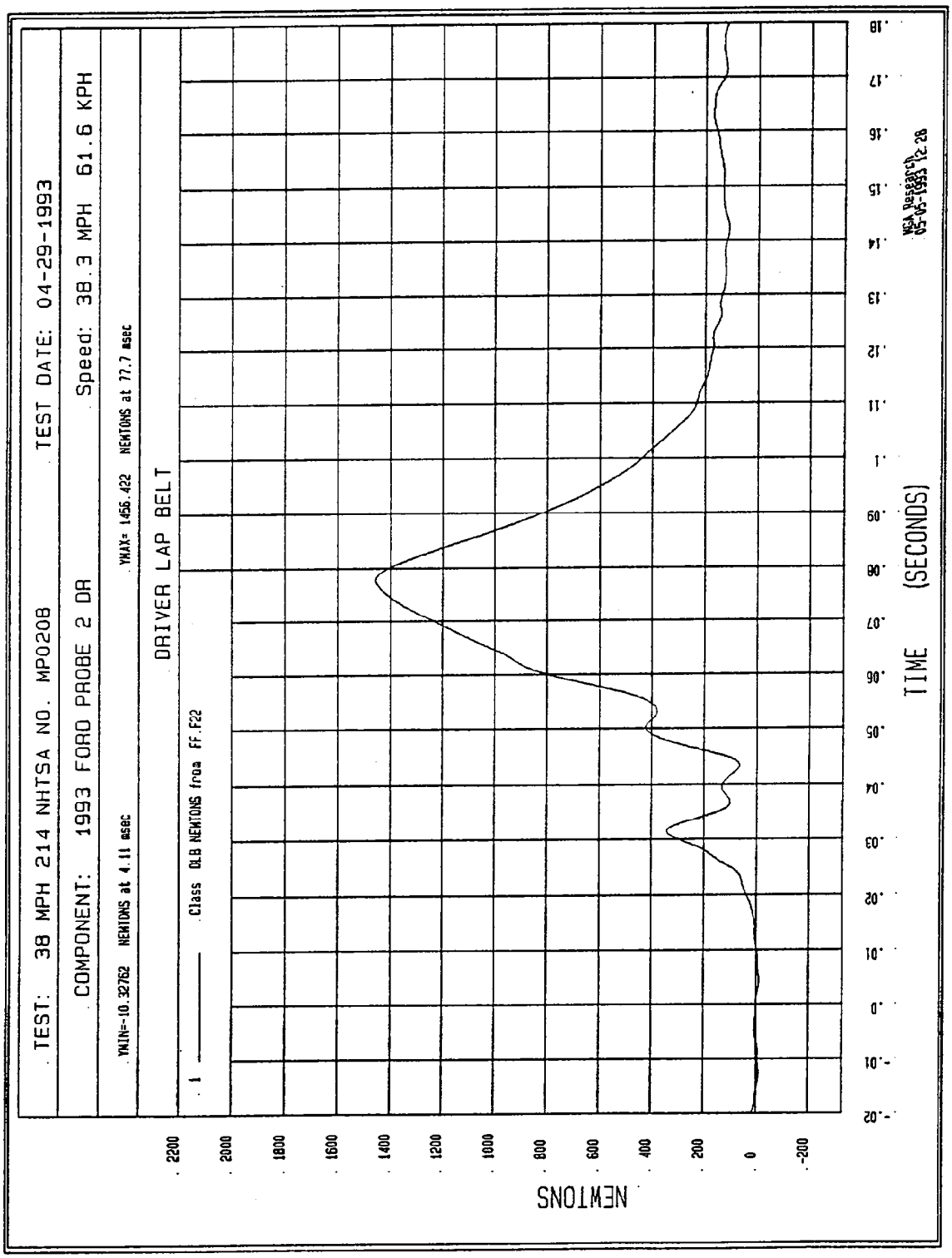
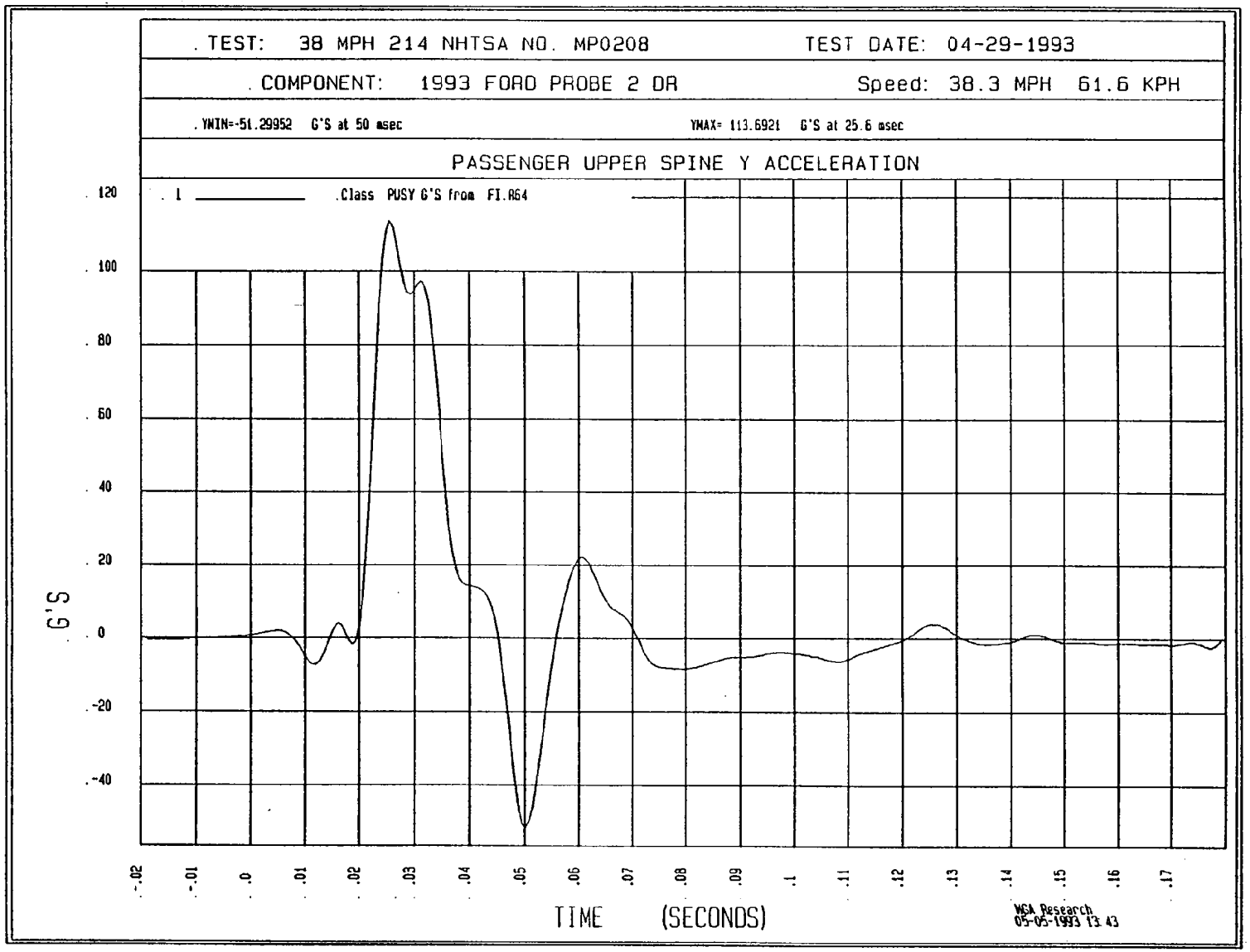
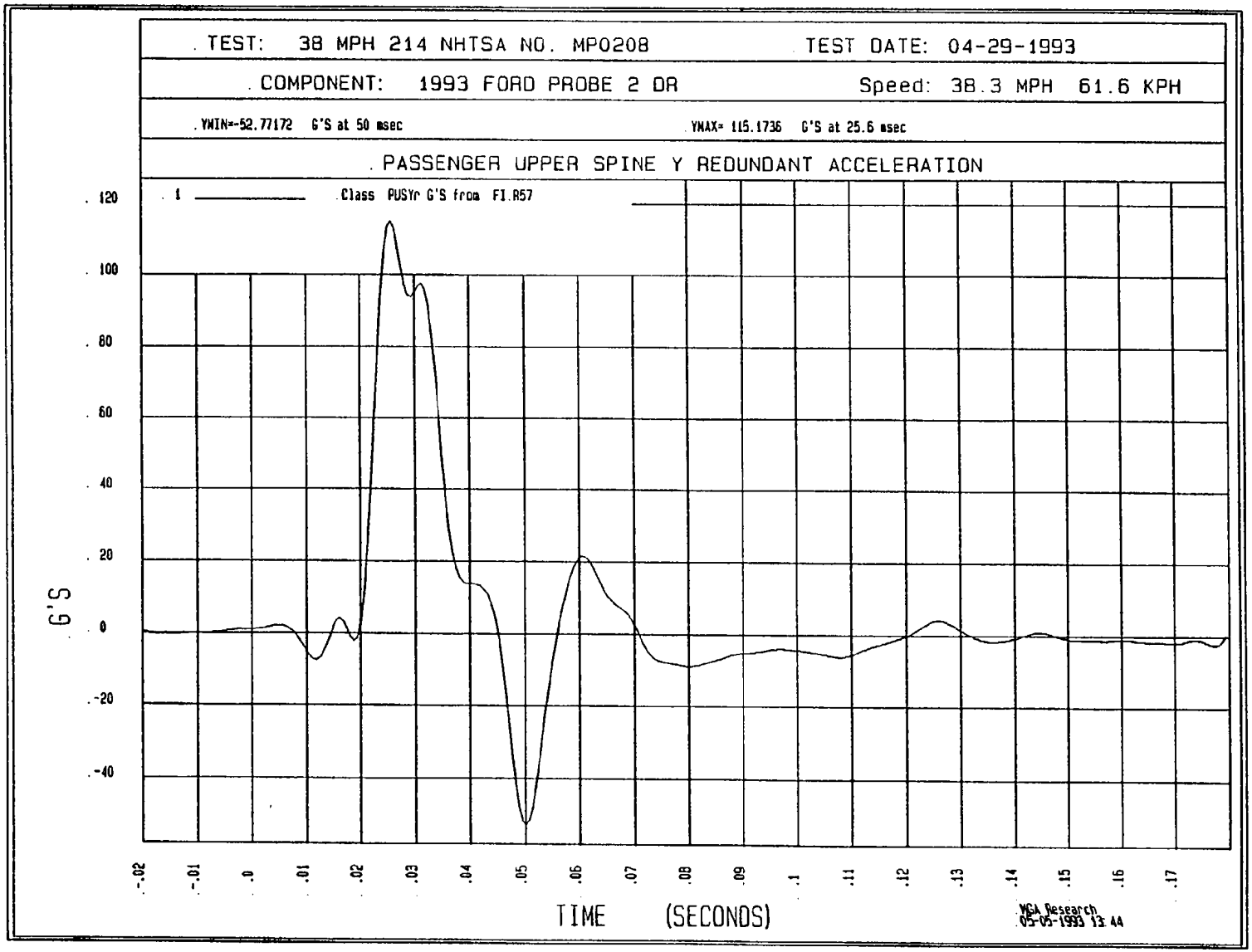


Figure B-13 - Driver Lap Belt Force vs. Time



B-14

Figure B-14 - Passenger Upper Spine Y Acceleration vs. Time



B-15

Figure B-15 - Passenger Upper Spine Y Redundant Acceleration vs. Time

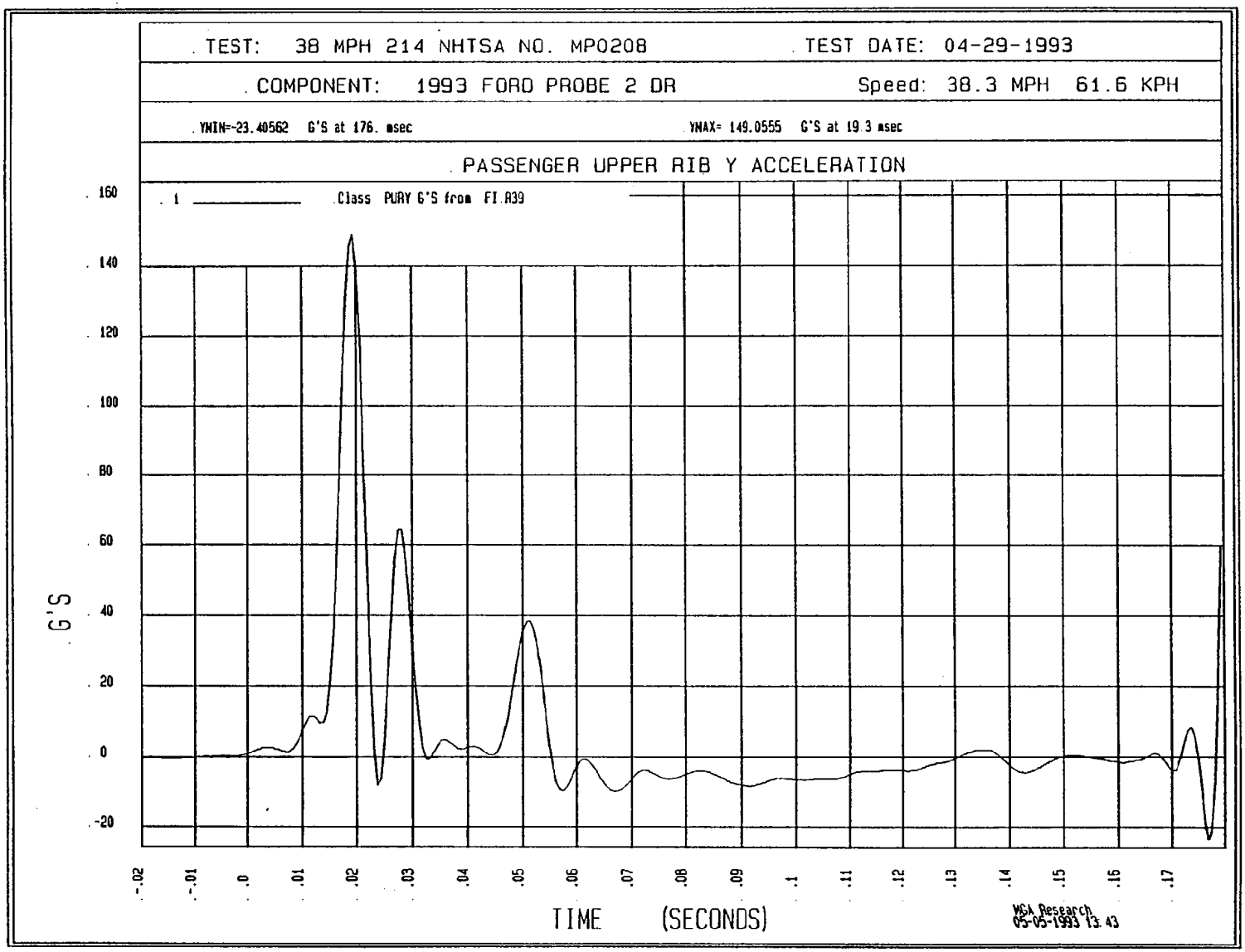
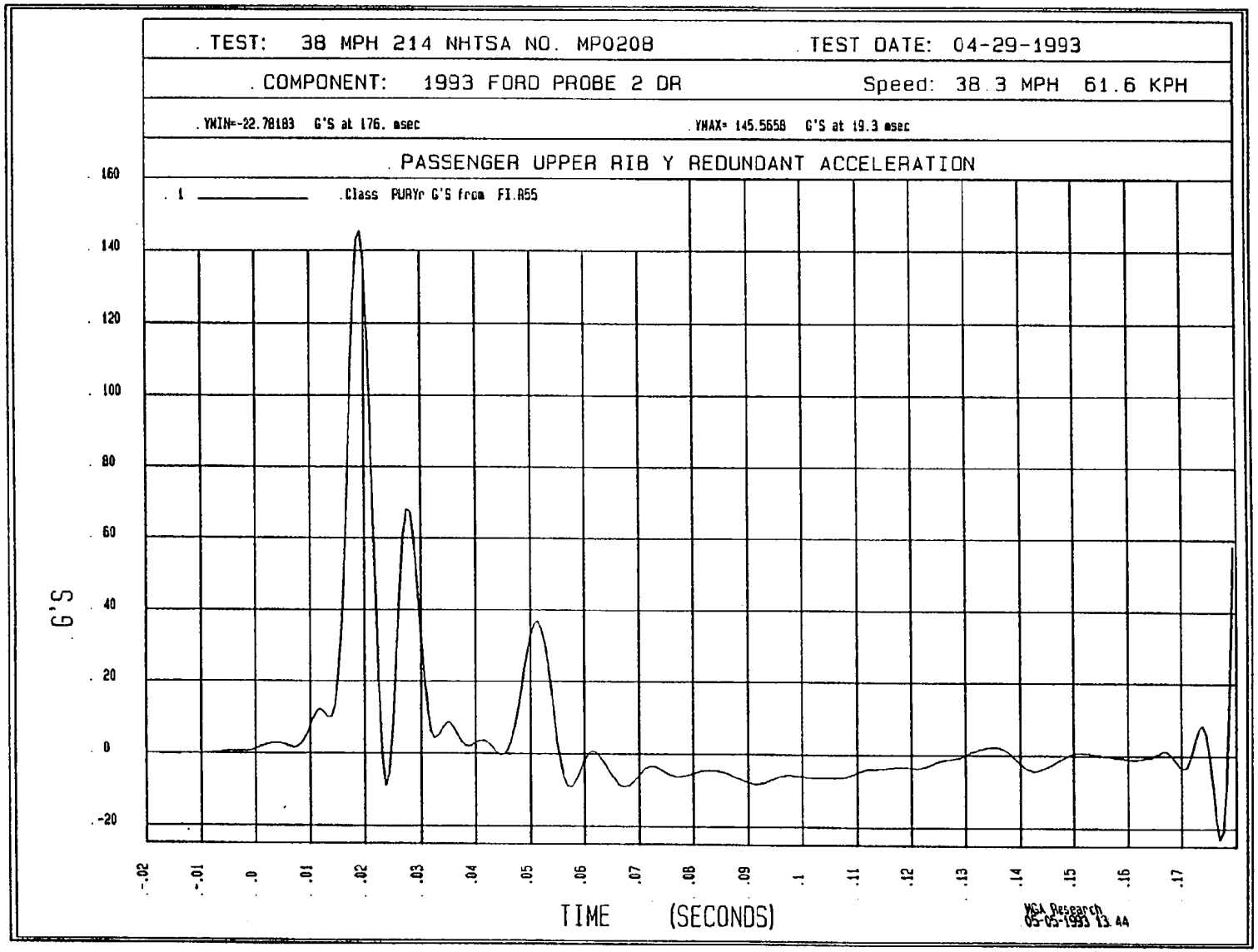


Figure B-16 - Passenger Upper Rib Y Acceleration vs. Time



B-17

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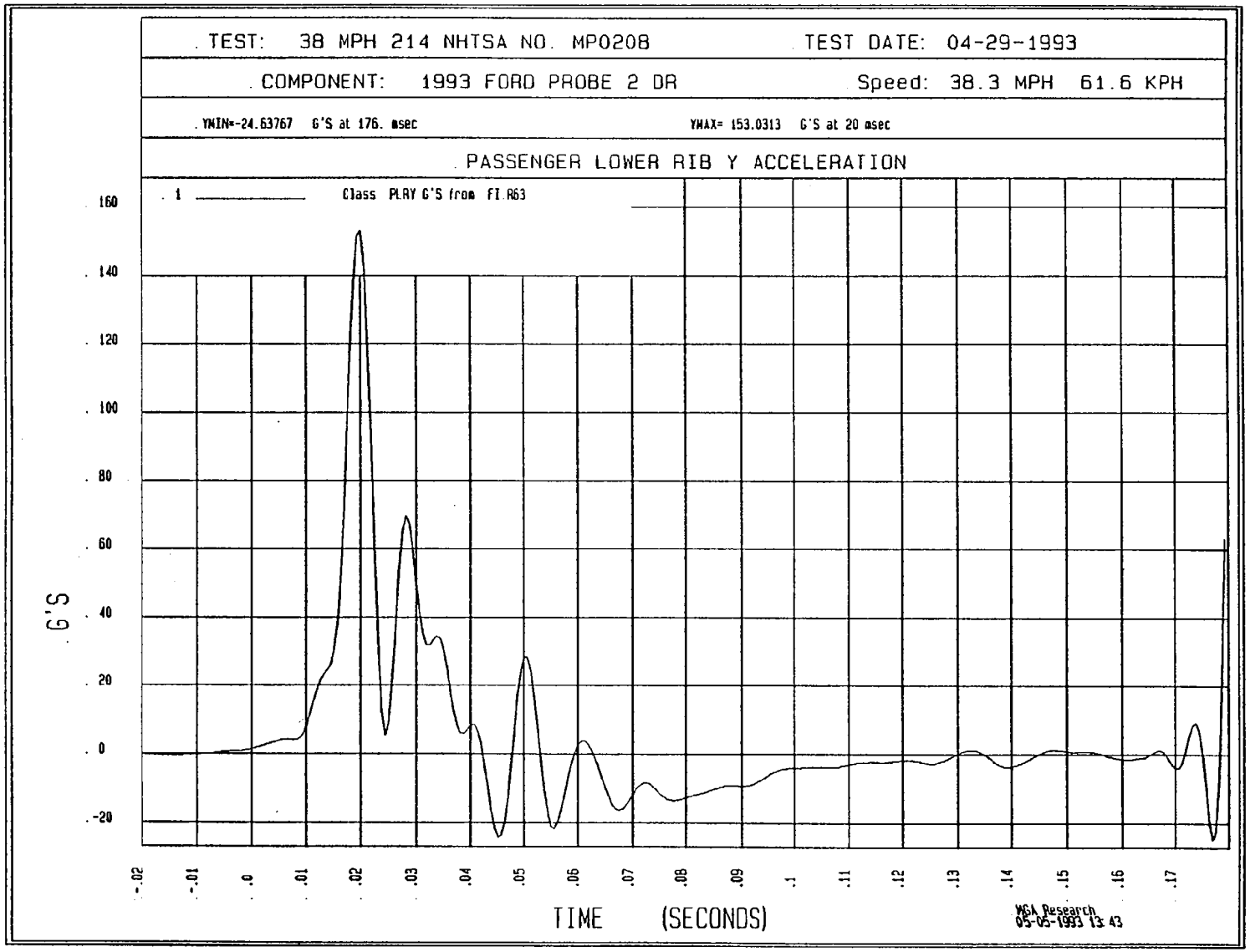
Figure B-17 - Passenger Upper Rib Y Redundant Acceleration vs. Time



B-18

Figure B-18 - Passenger Lower Rib Y Acceleration vs. Time

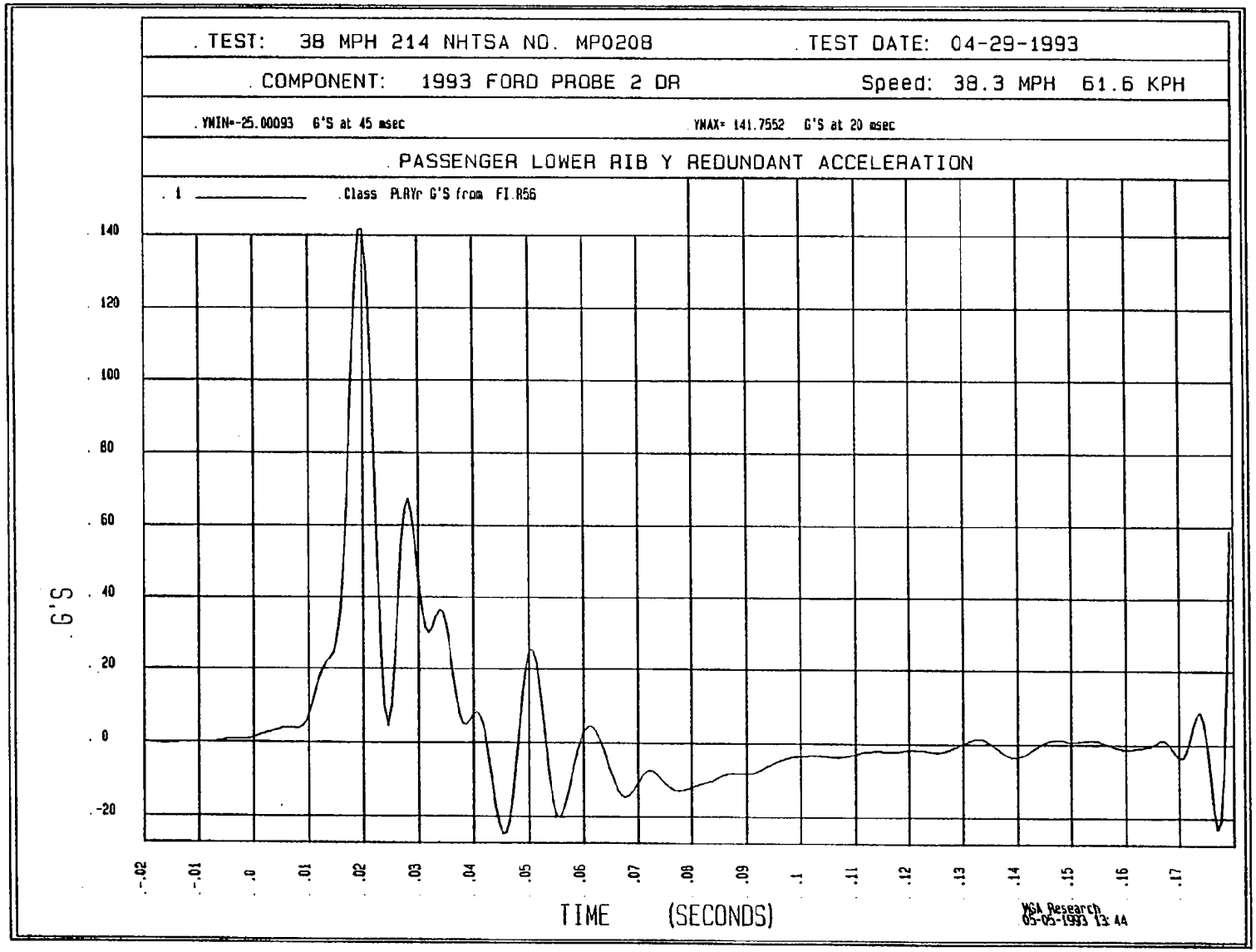


Figure B-19 - Passenger Lower Rib Y Redundant Acceleration

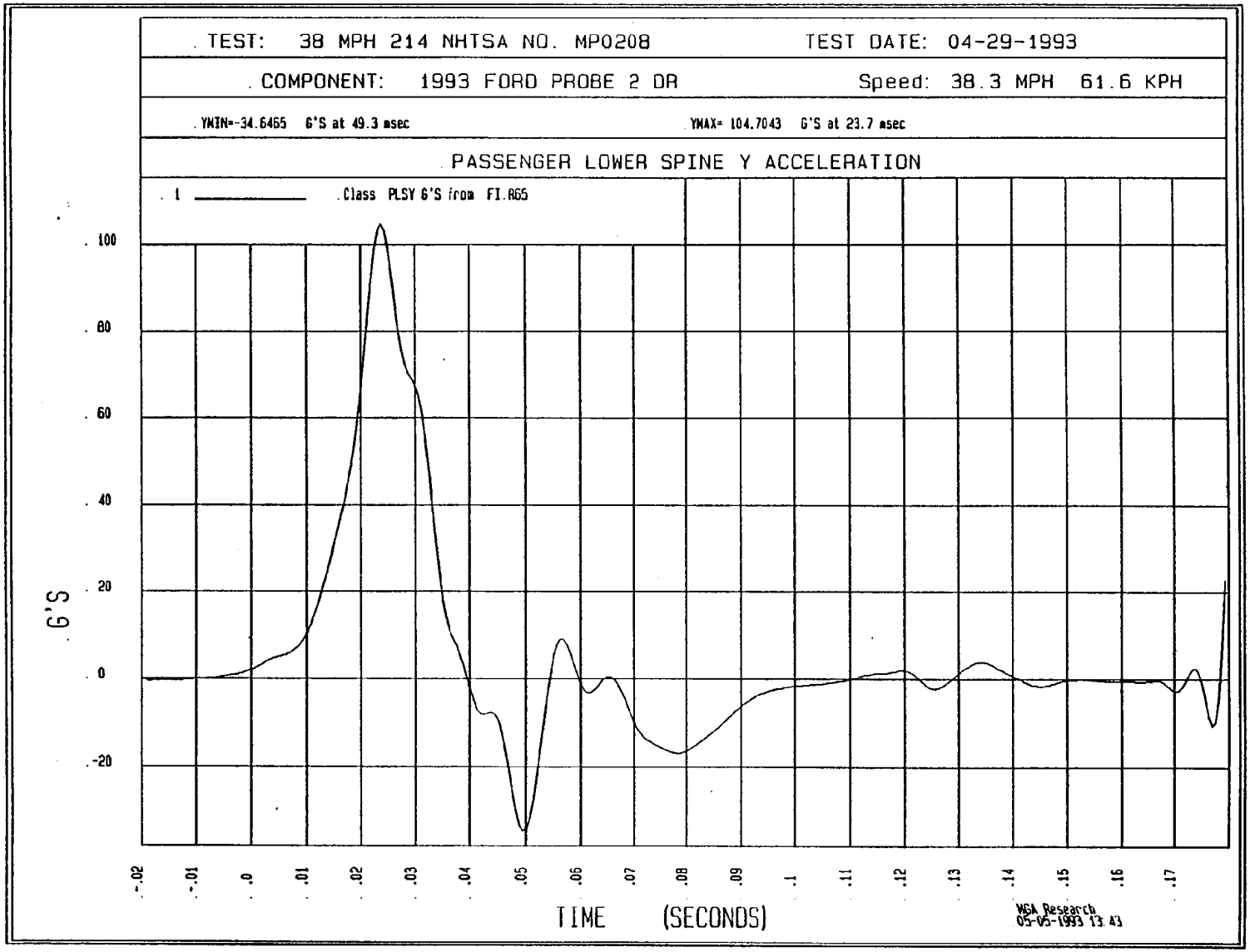


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Figure B-20 - Passenger Lower Spine Y Acceleration vs. Time

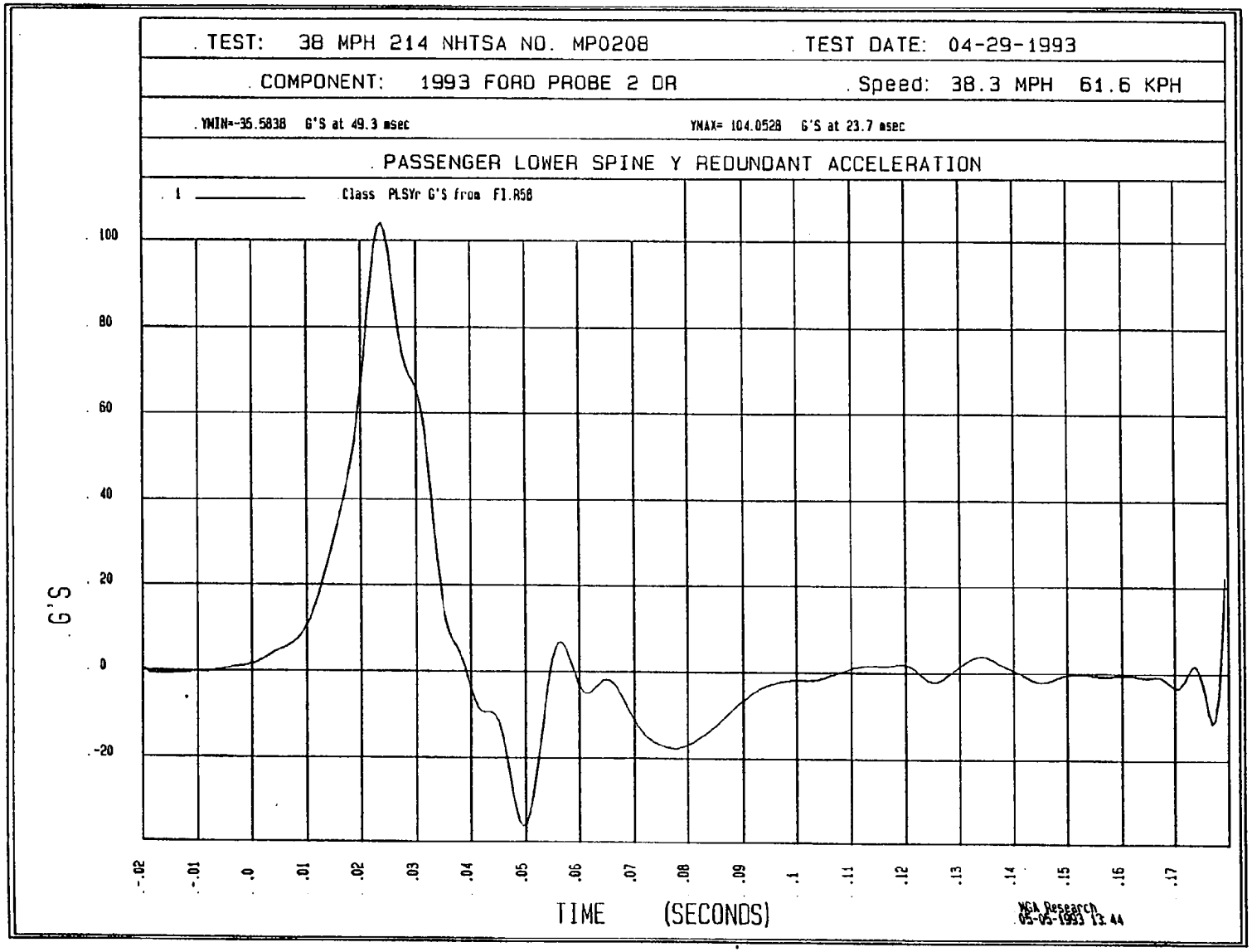

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Figure B-21 - Passenger Lower Spine Y Redundant Acceleration vs. Time

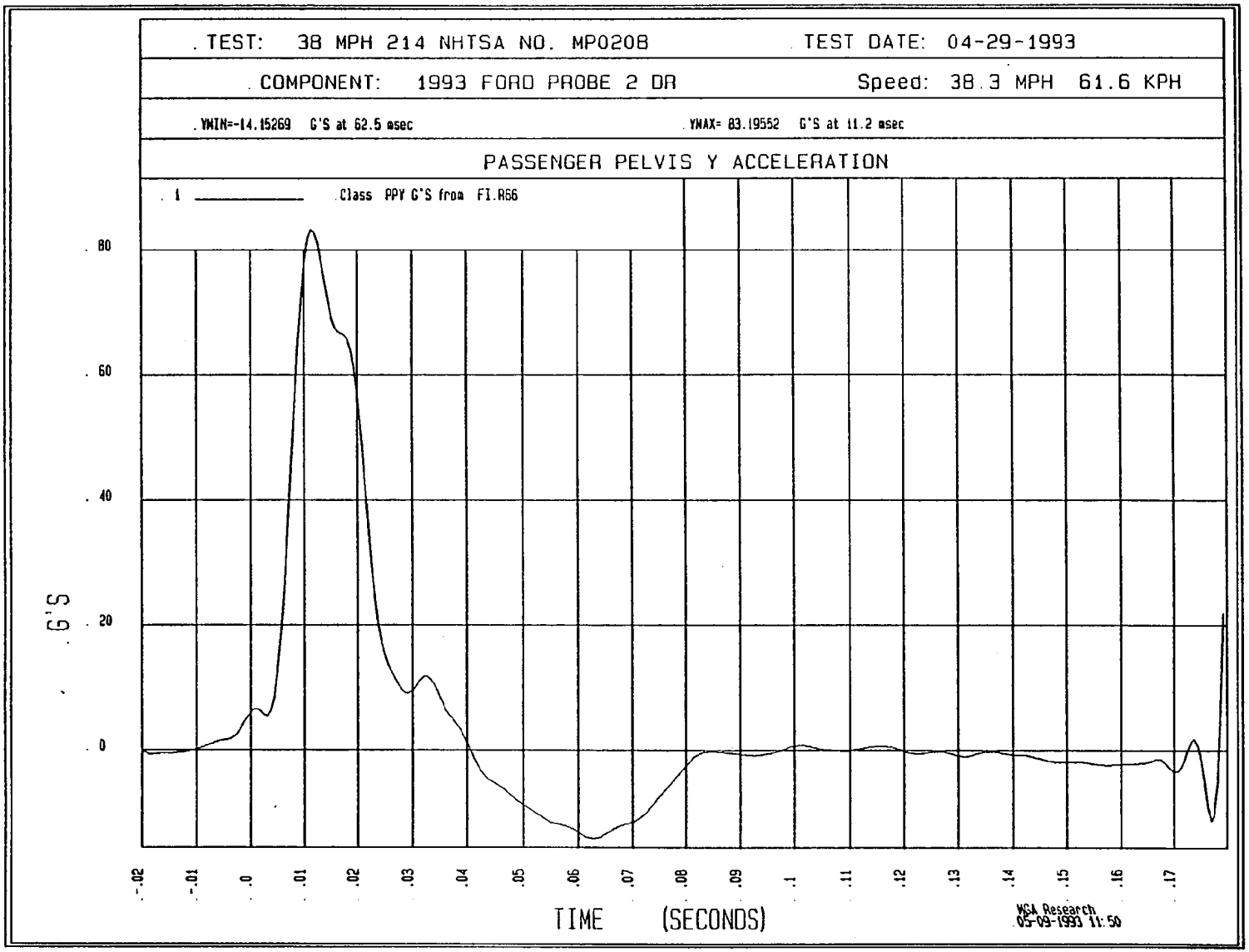

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Figure B-22 - Passenger Pelvis Y Acceleration vs. Time

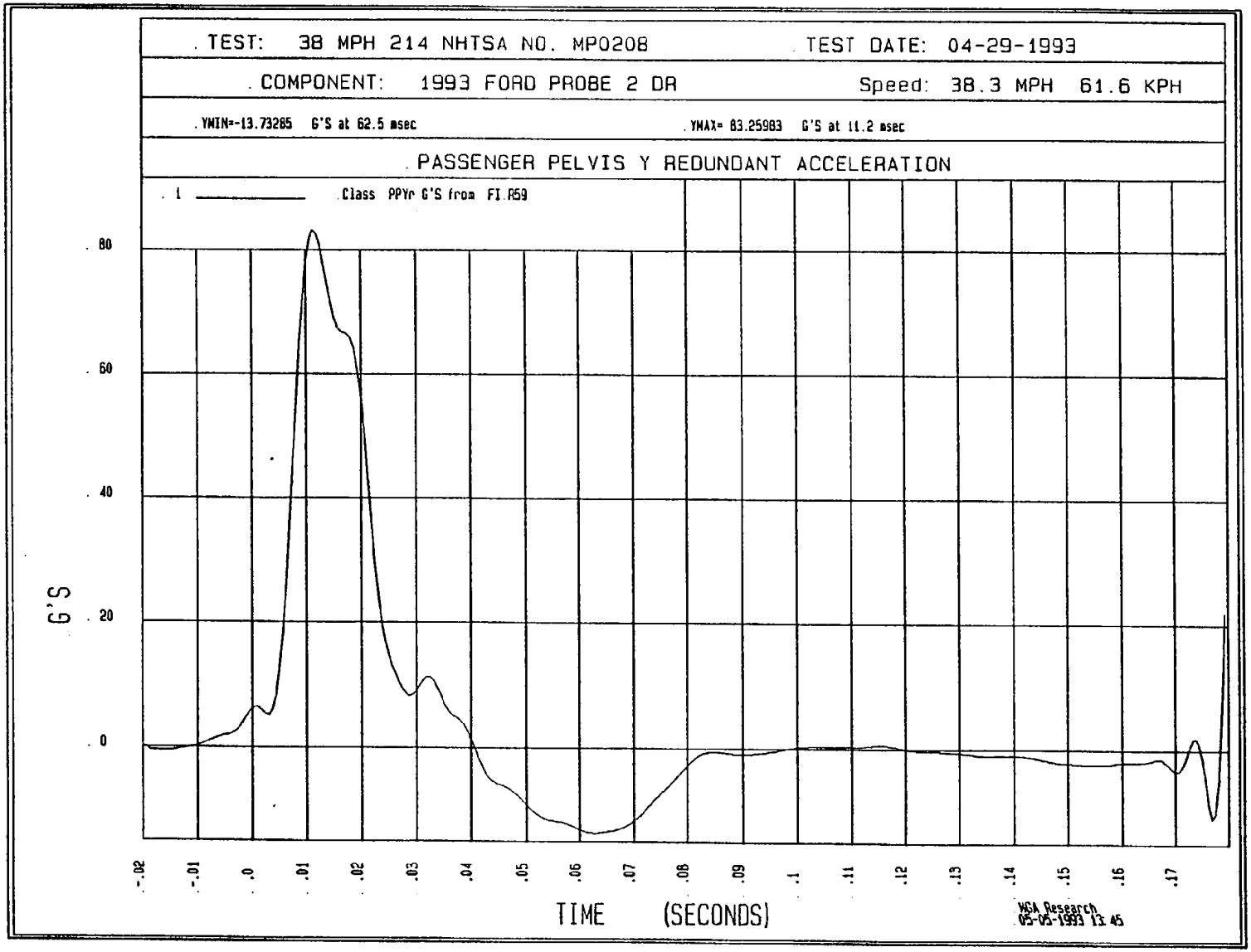

Figure B-23 - Passenger Pelvis Y Redundant Acceleration vs. Time

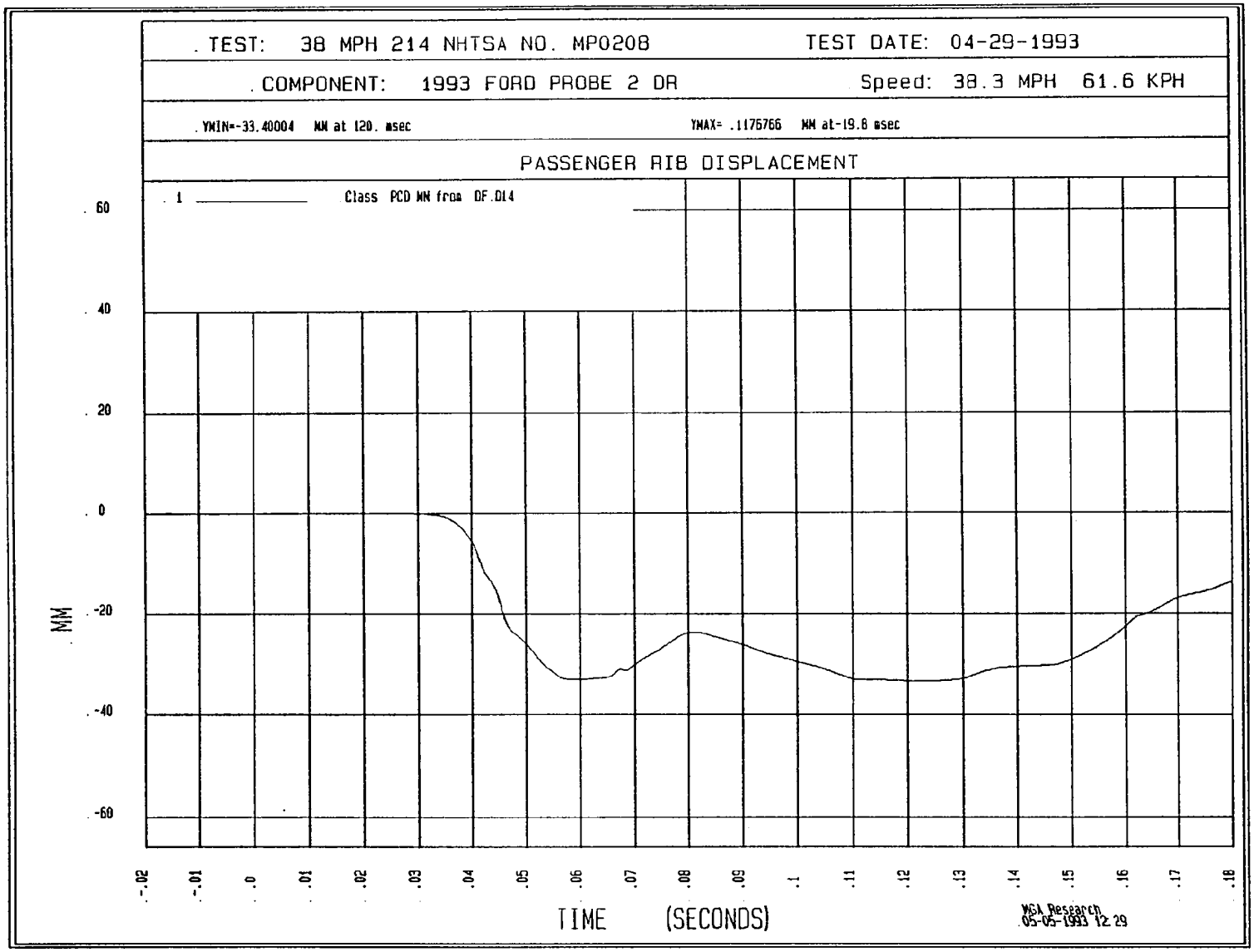

Figure B-24 - Passenger Rib Displacement vs. Time

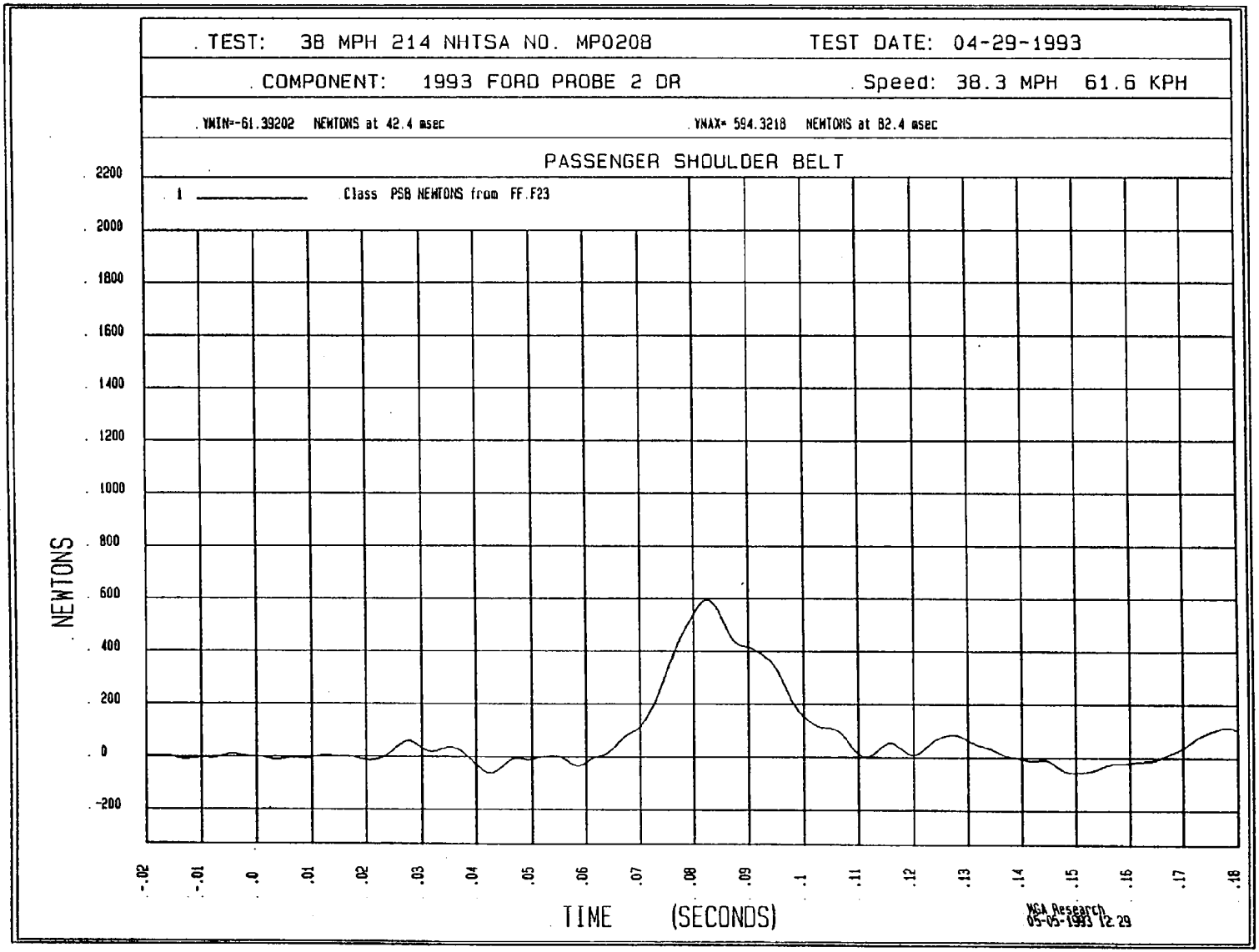

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Figure B-25 - Passenger Shoulder Belt Force vs. Time

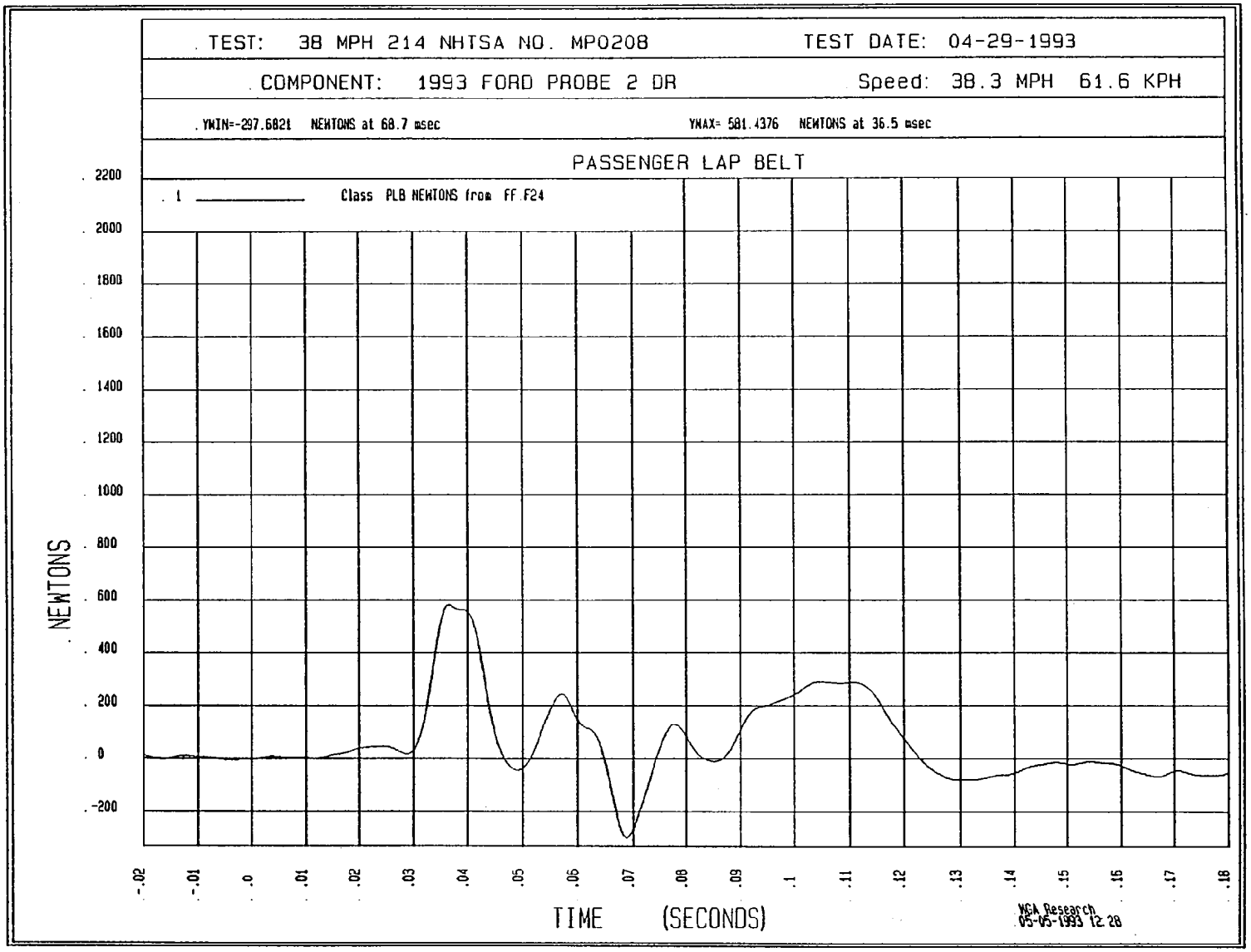

Figure B-26 - Passenger Lap Belt Force vs. Time

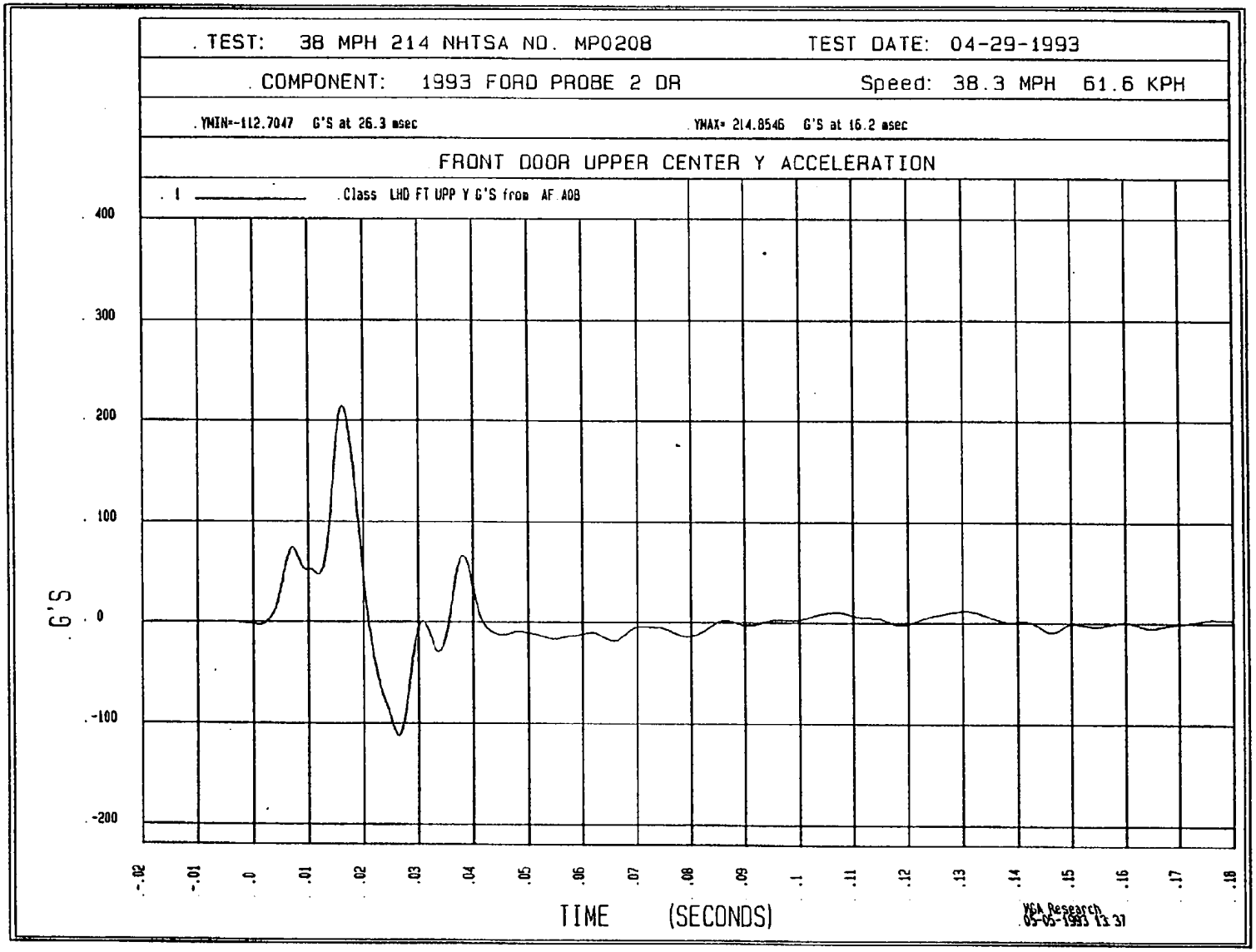

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Figure B-27 - Front Door Upper Center Y Acceleration vs. Time

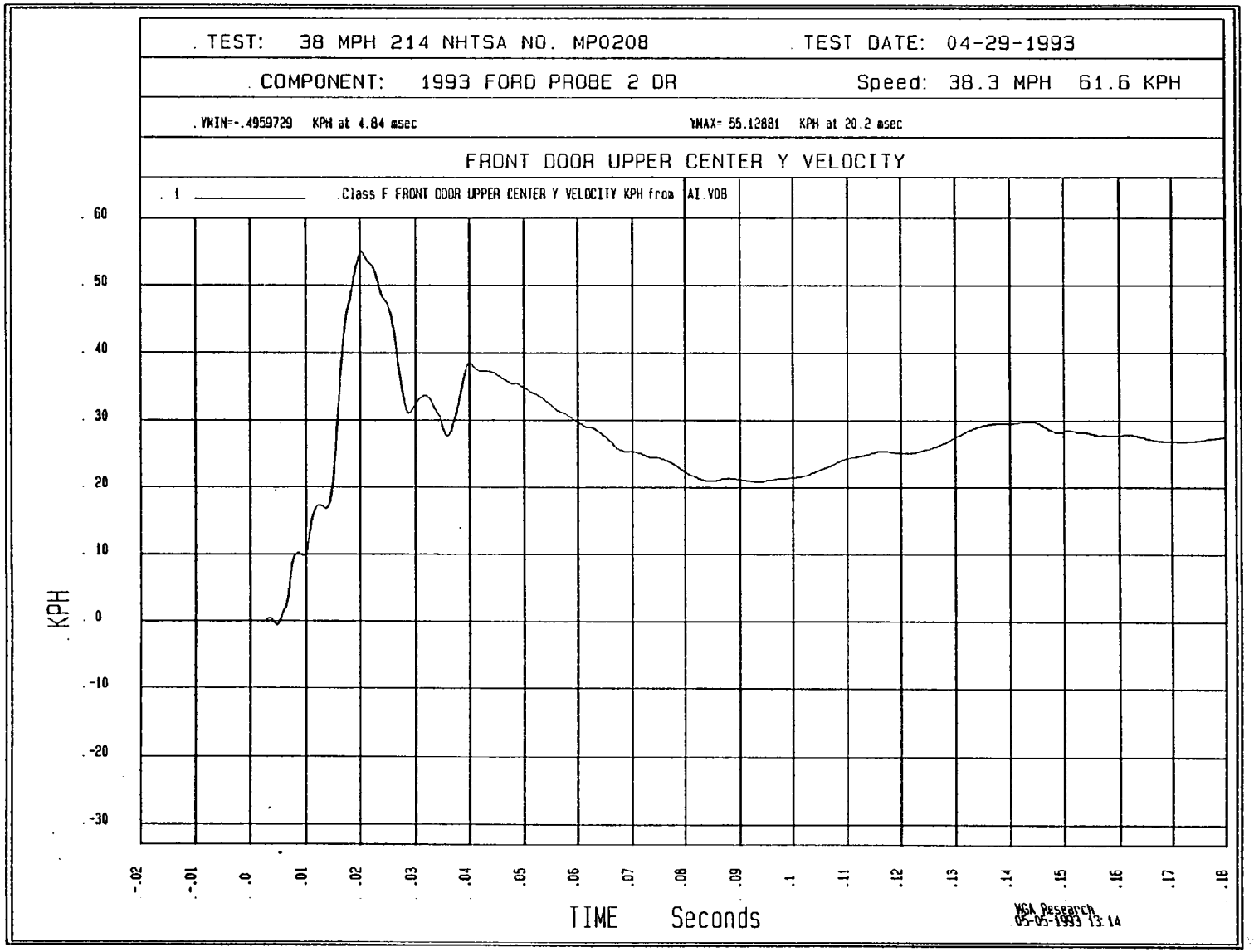

Figure B-28 - Front Door Upper Center Y Velocity vs. Time

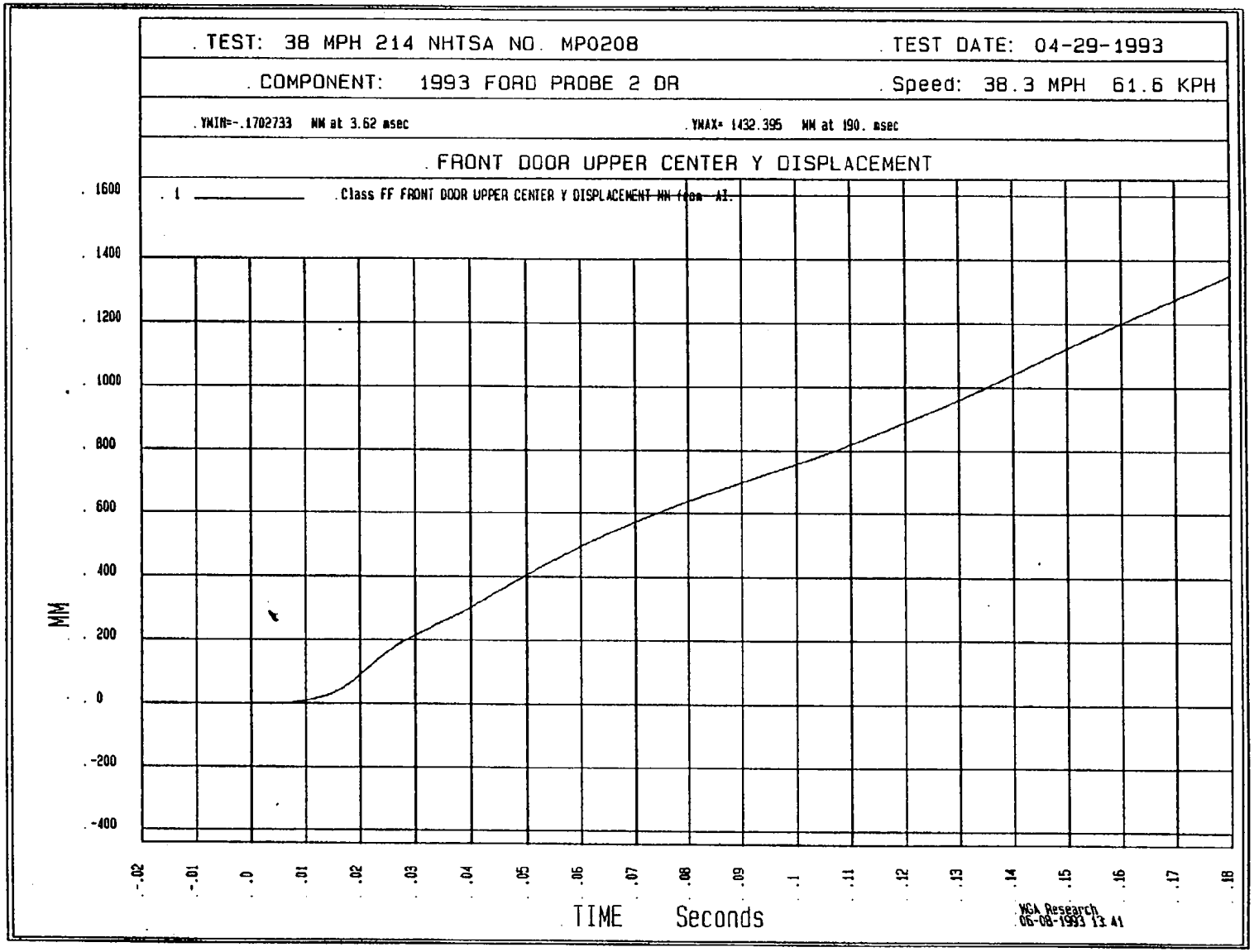

Figure B-29 - Front Door Upper Center Y Displacement vs. Time

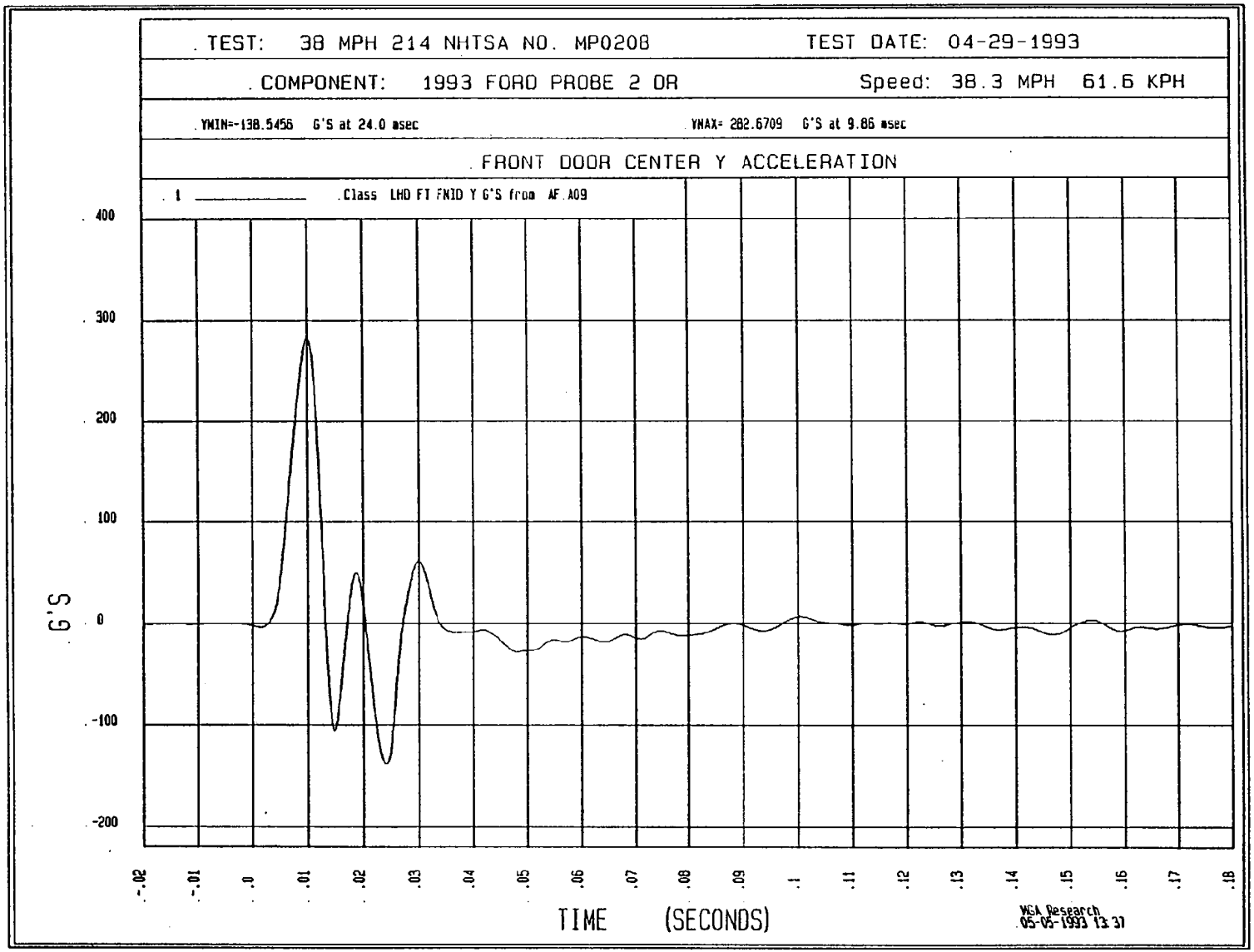

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Figure B-30 - Front Door Center Y Acceleration vs. Time

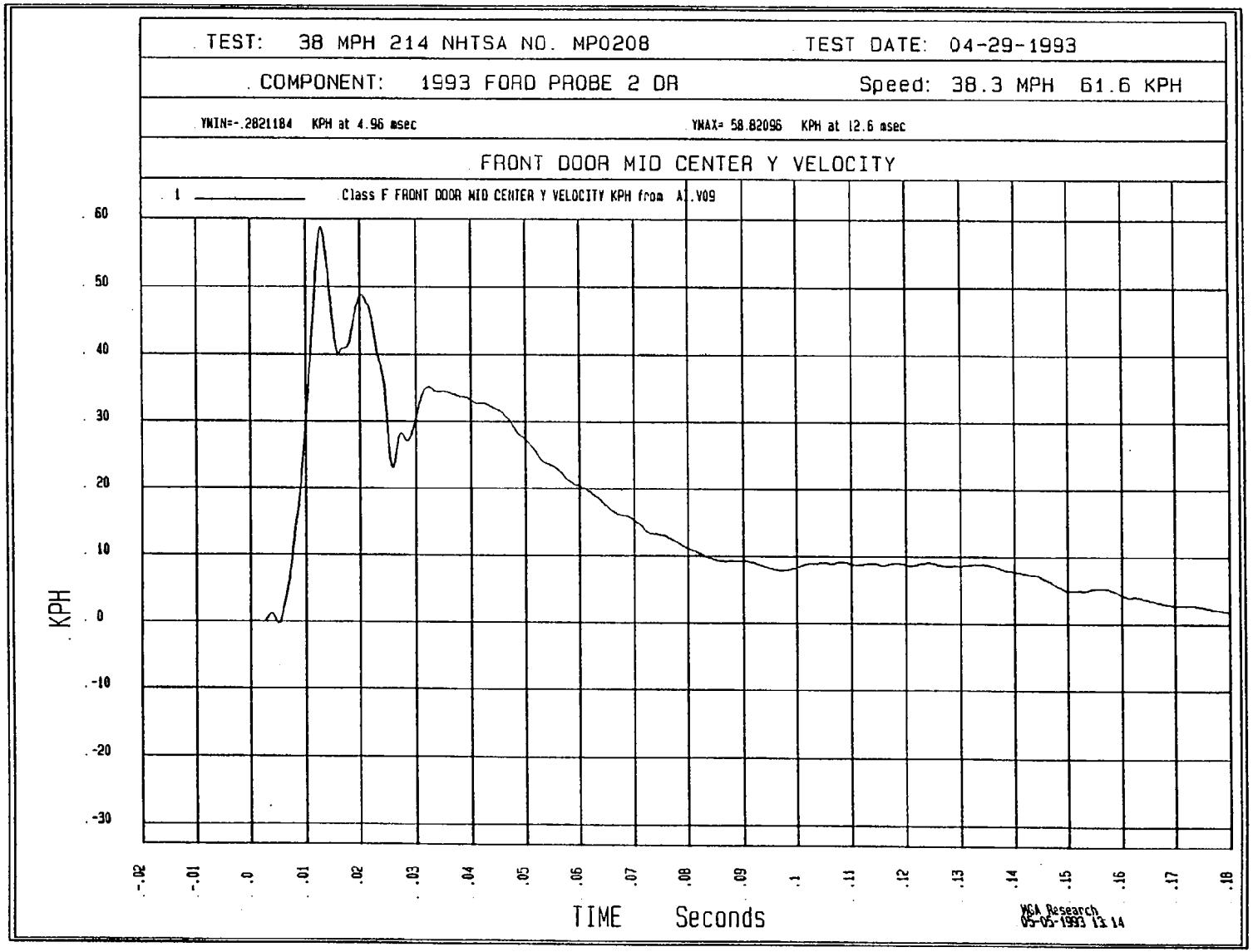


Figure B-31 - Front Door Mid Center Y Velocity vs. Time

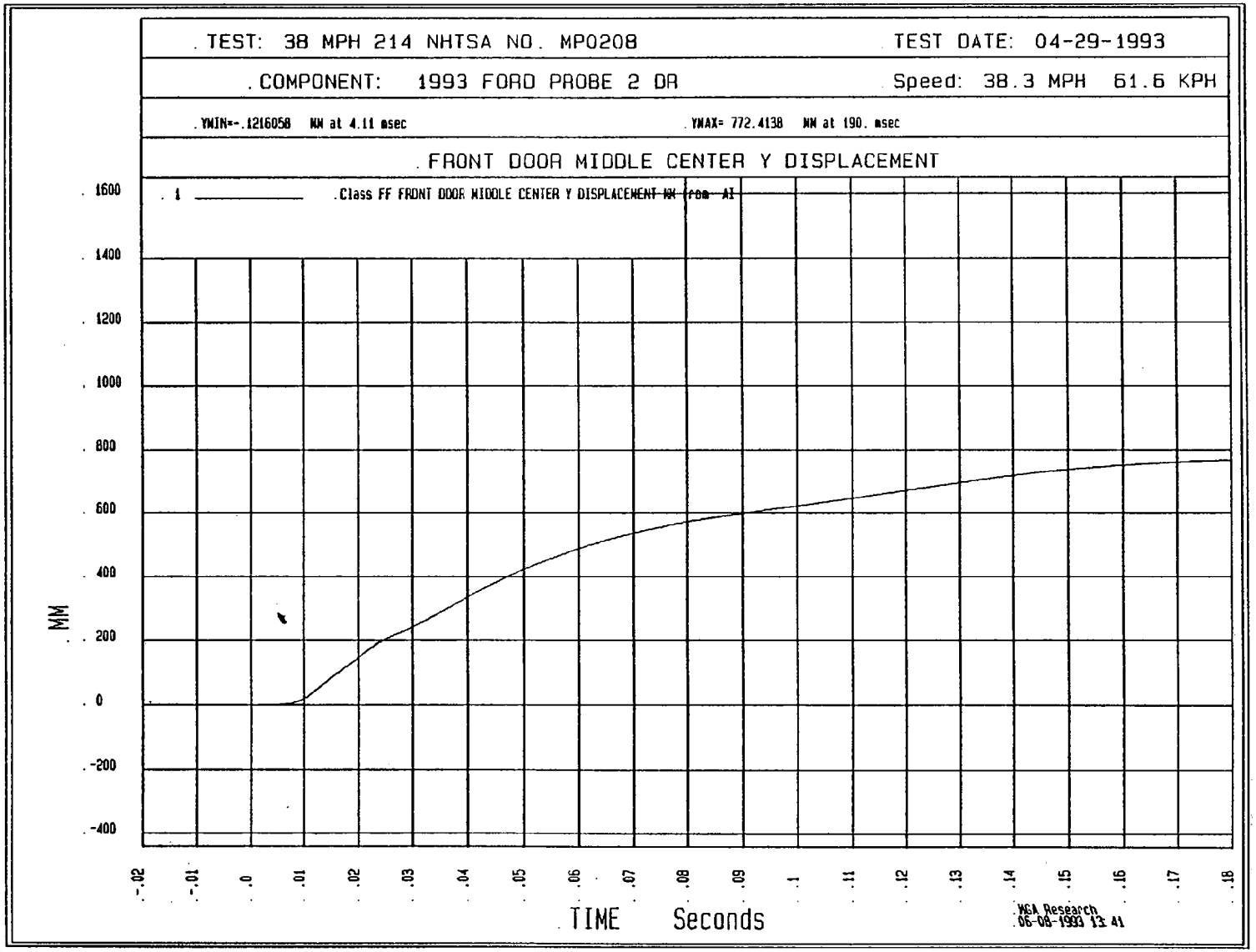


Figure B-32 - Front Door Mid Center Y Displacement vs. Time

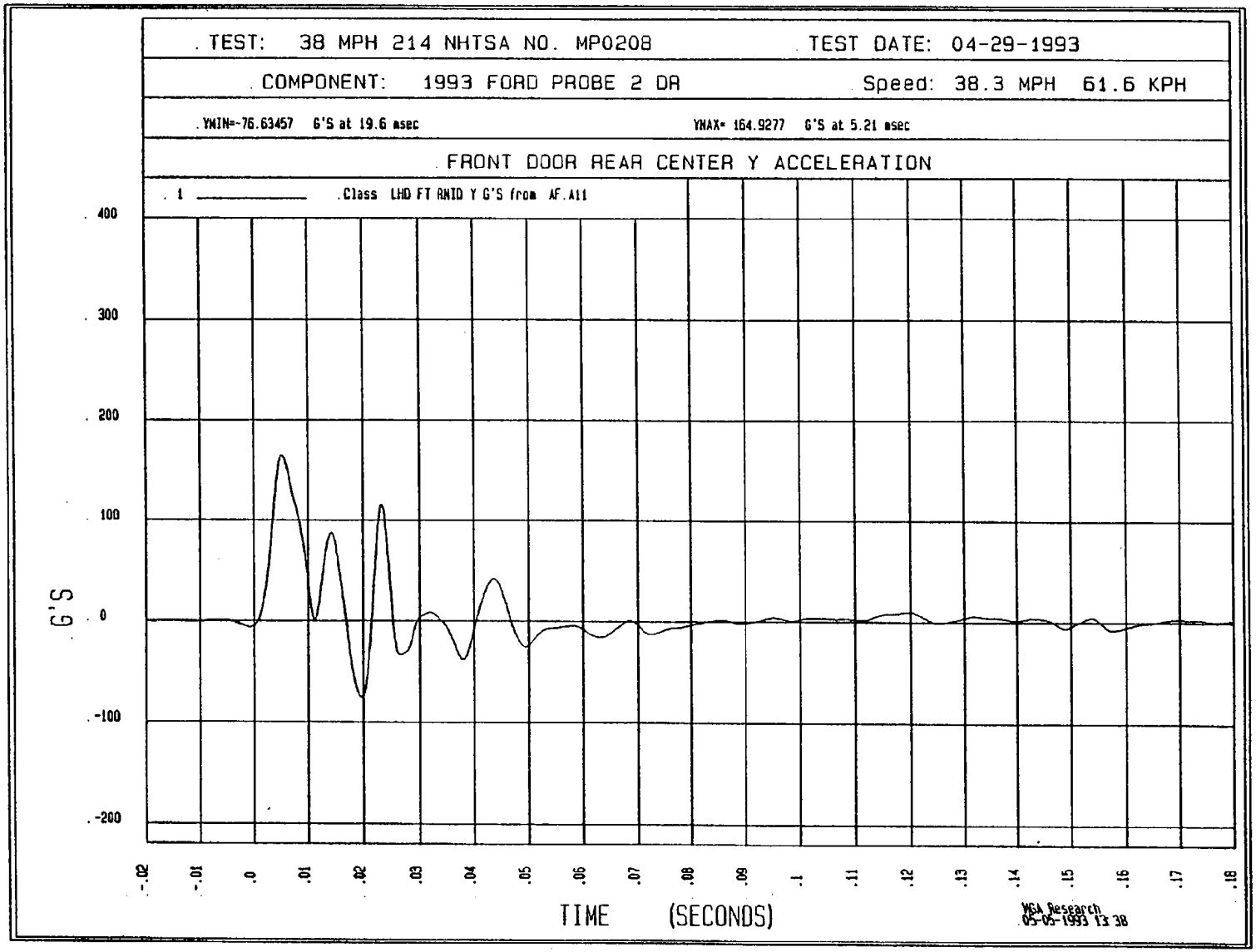


Figure B-33 - Front Door Rear Center Y Acceleration vs. Time

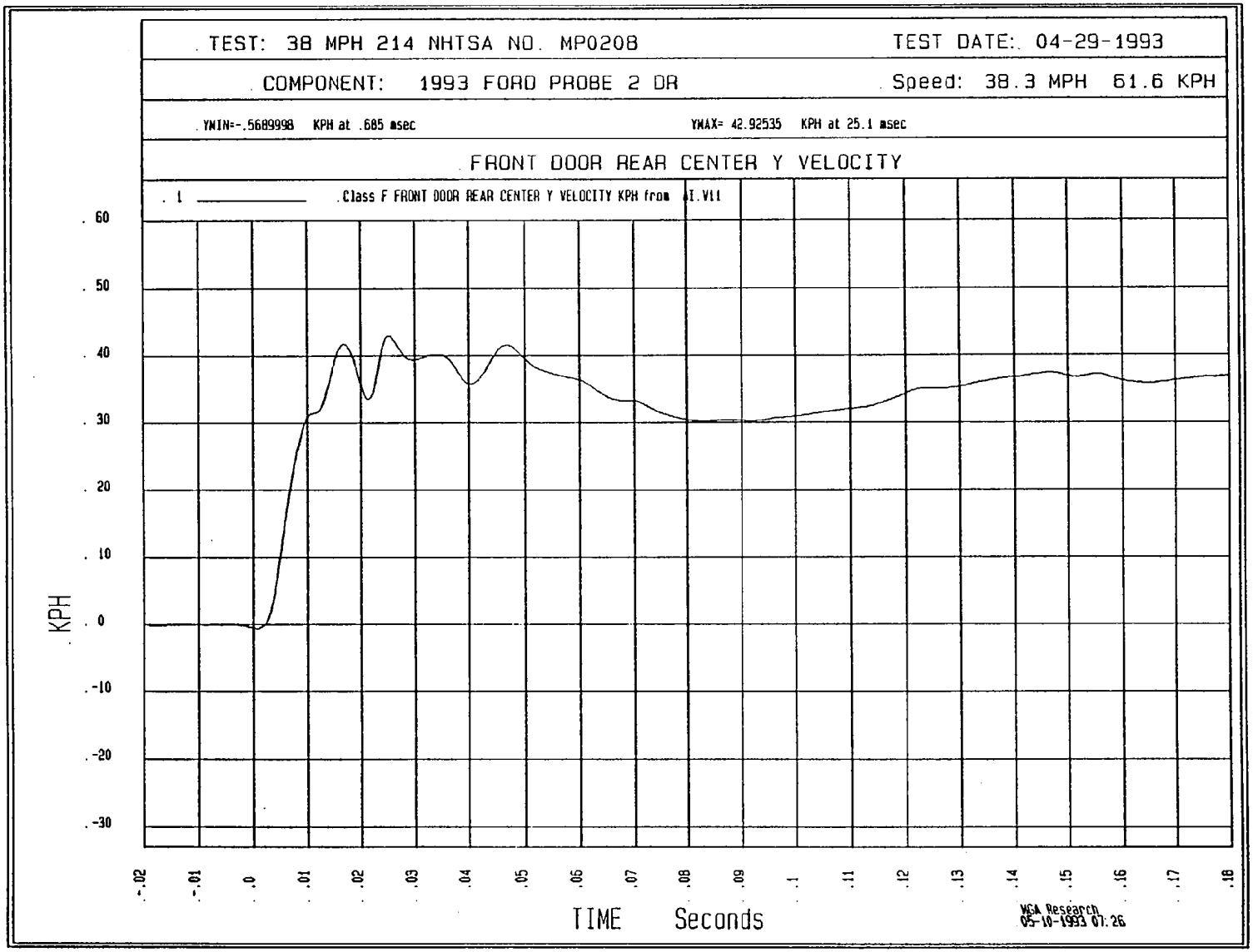


Figure B-34 - Front Door Rear Center Y Velocity vs. Time

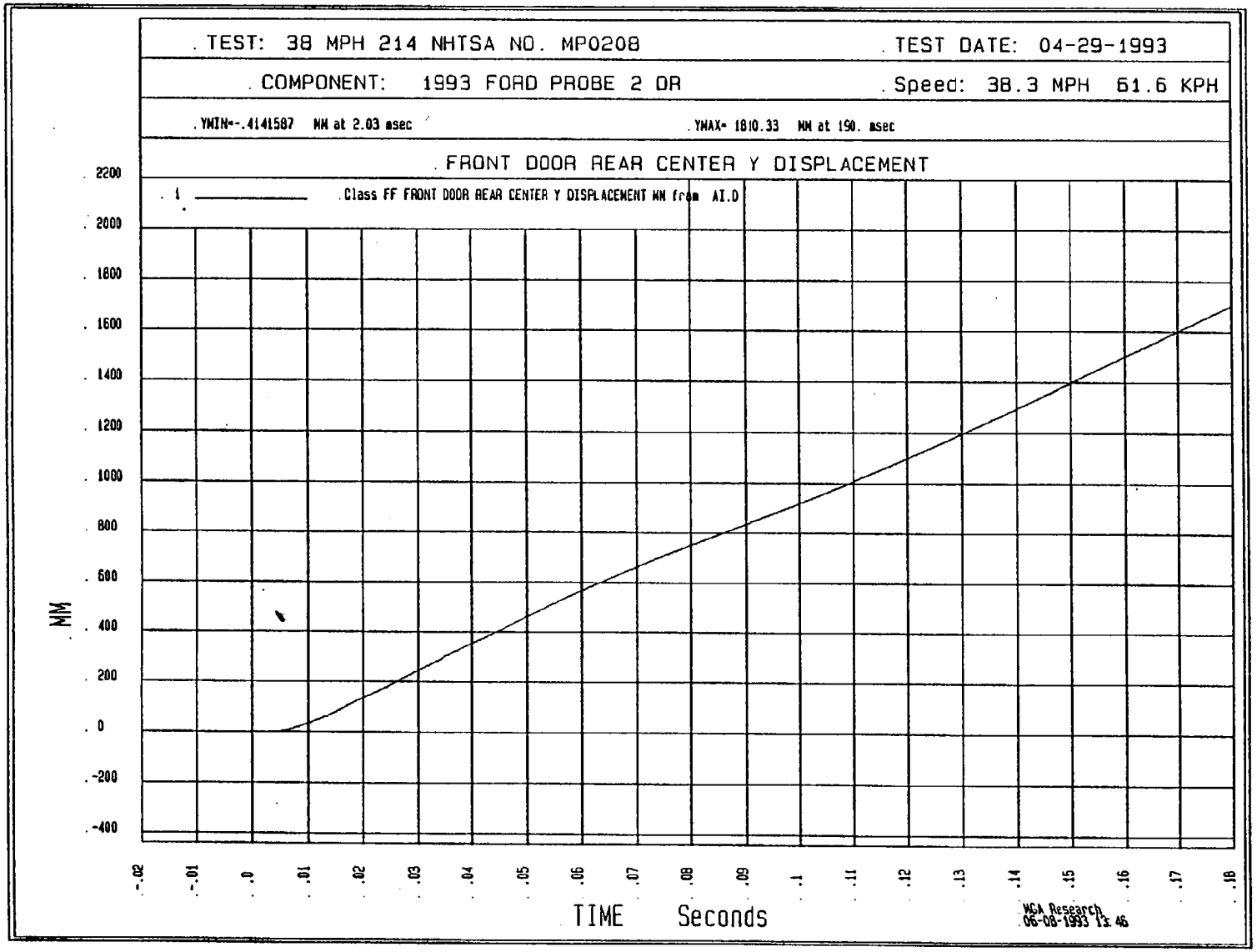


Figure B-35 - Front Door Rear Center Y Displacement vs. Time

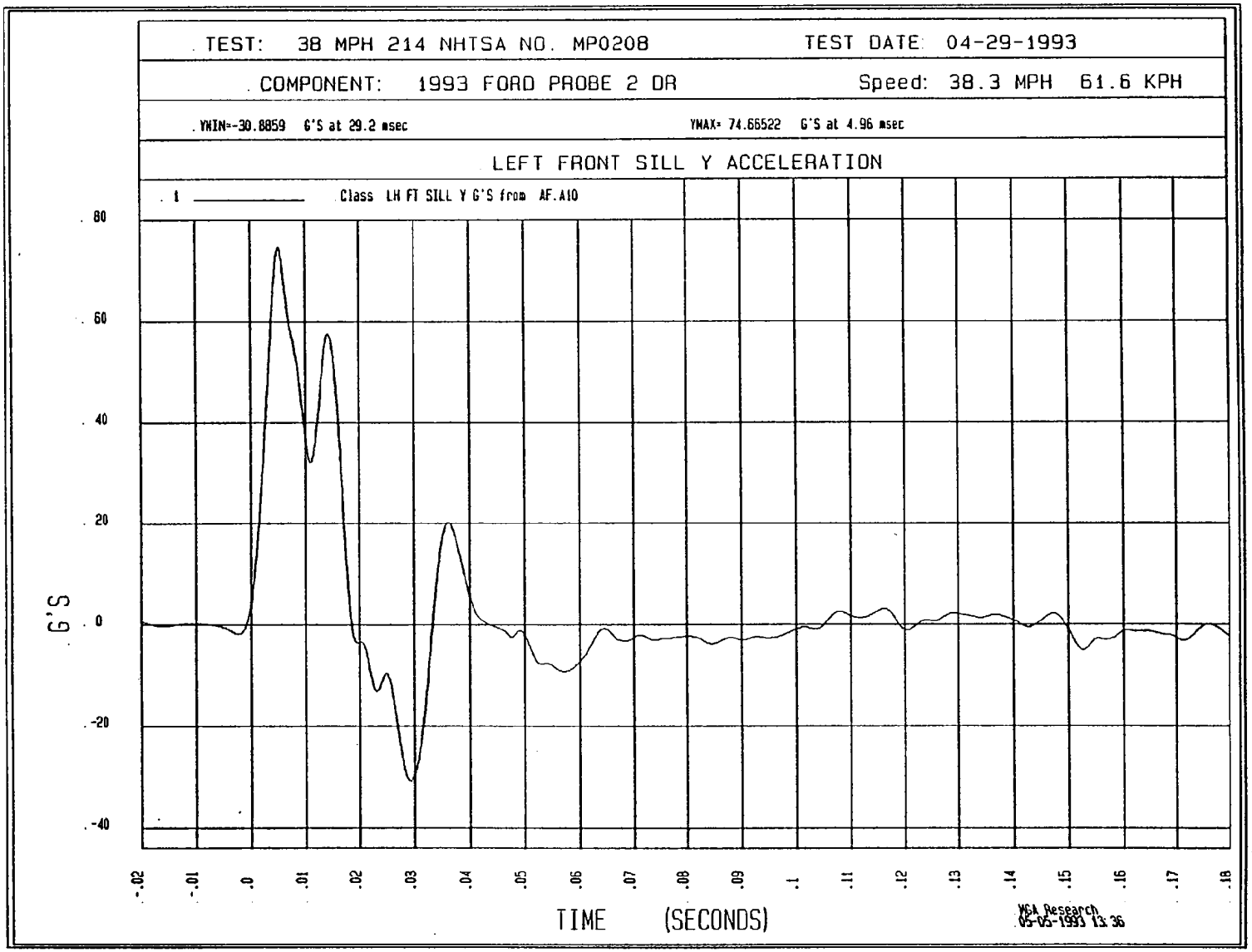


Figure B-36 - Left Front Sill Y Acceleration vs. Time

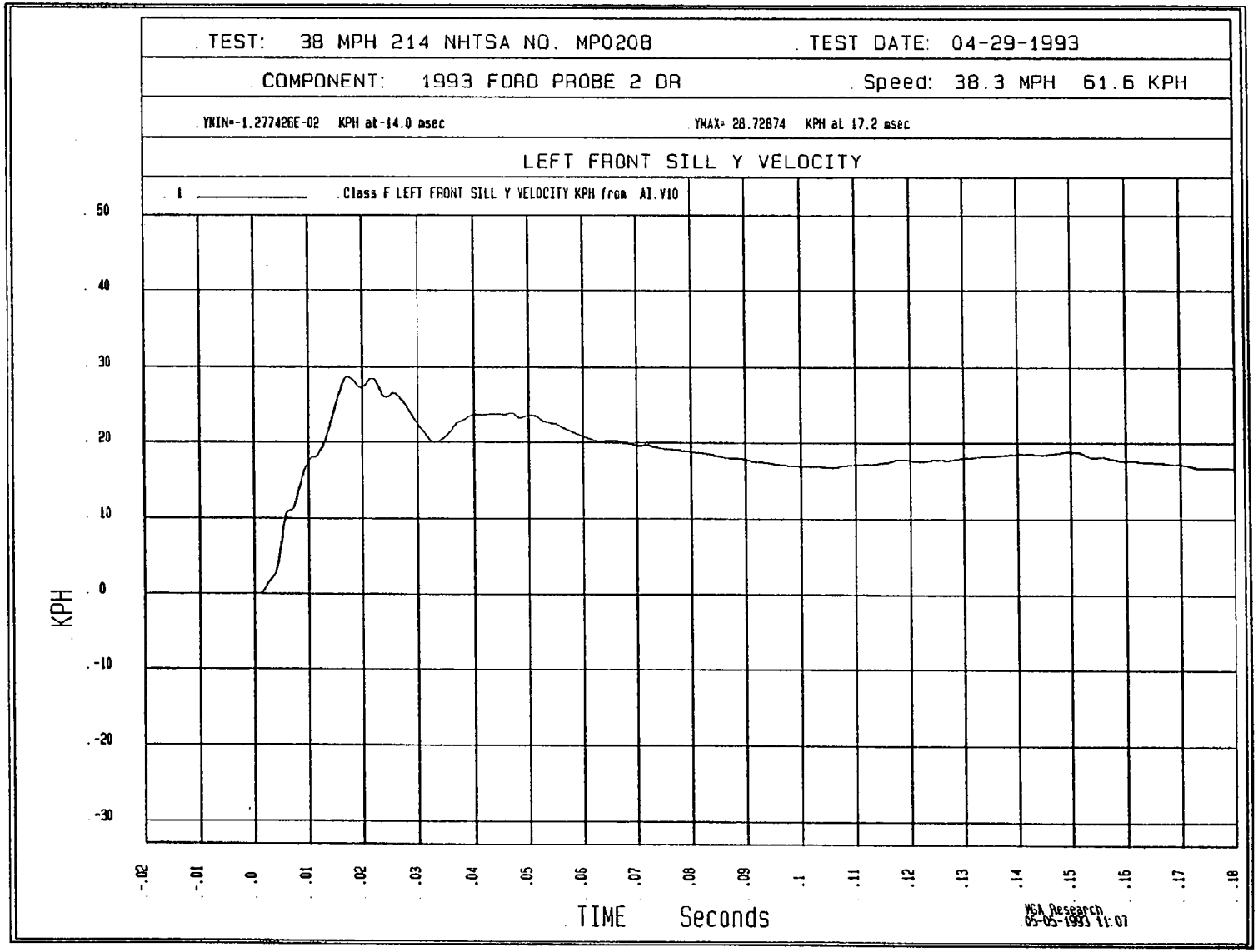


Figure B-37 - Left Front Sill Y Velocity vs. Time

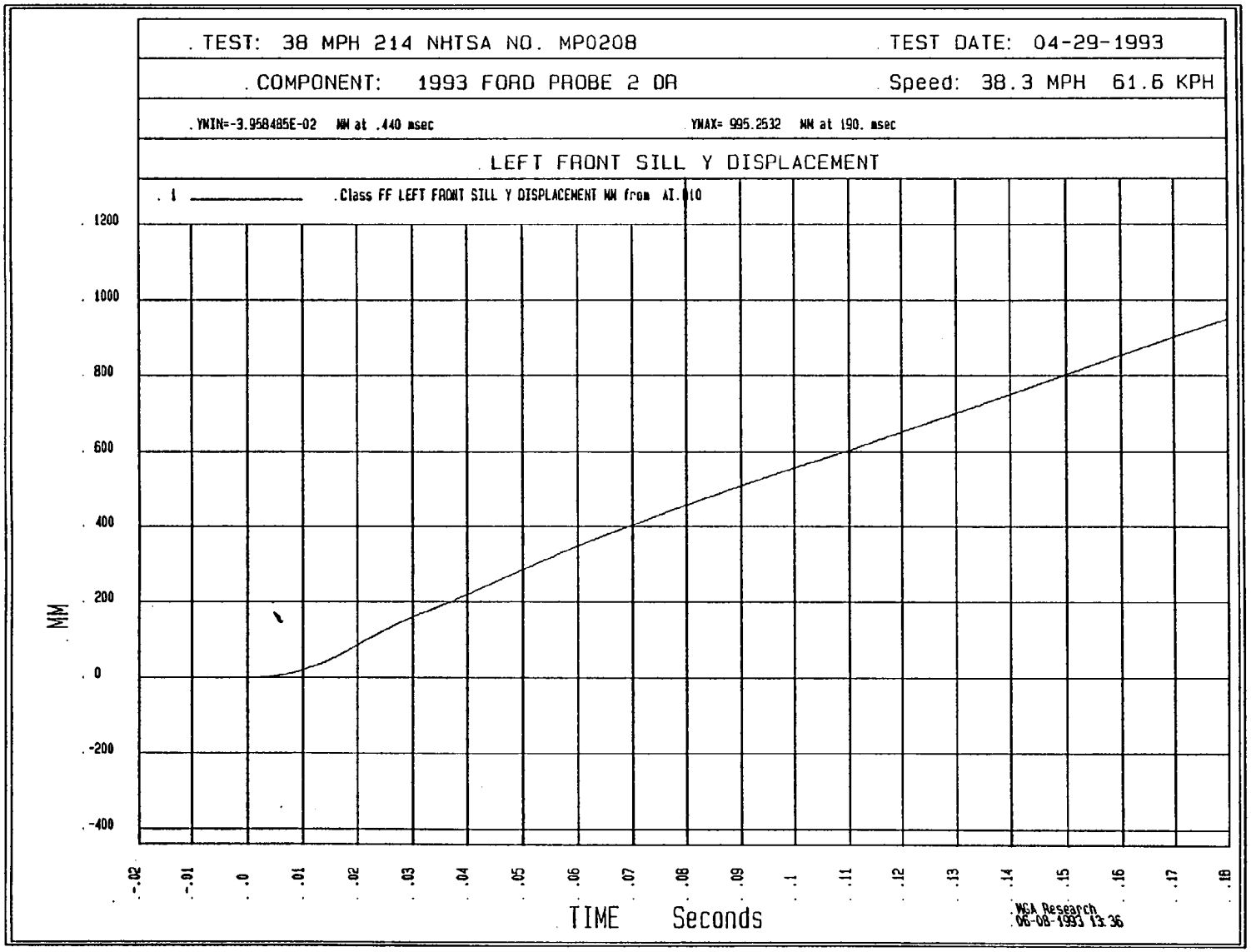


Figure B-38 - Left Front Sill Y Displacement vs. Time

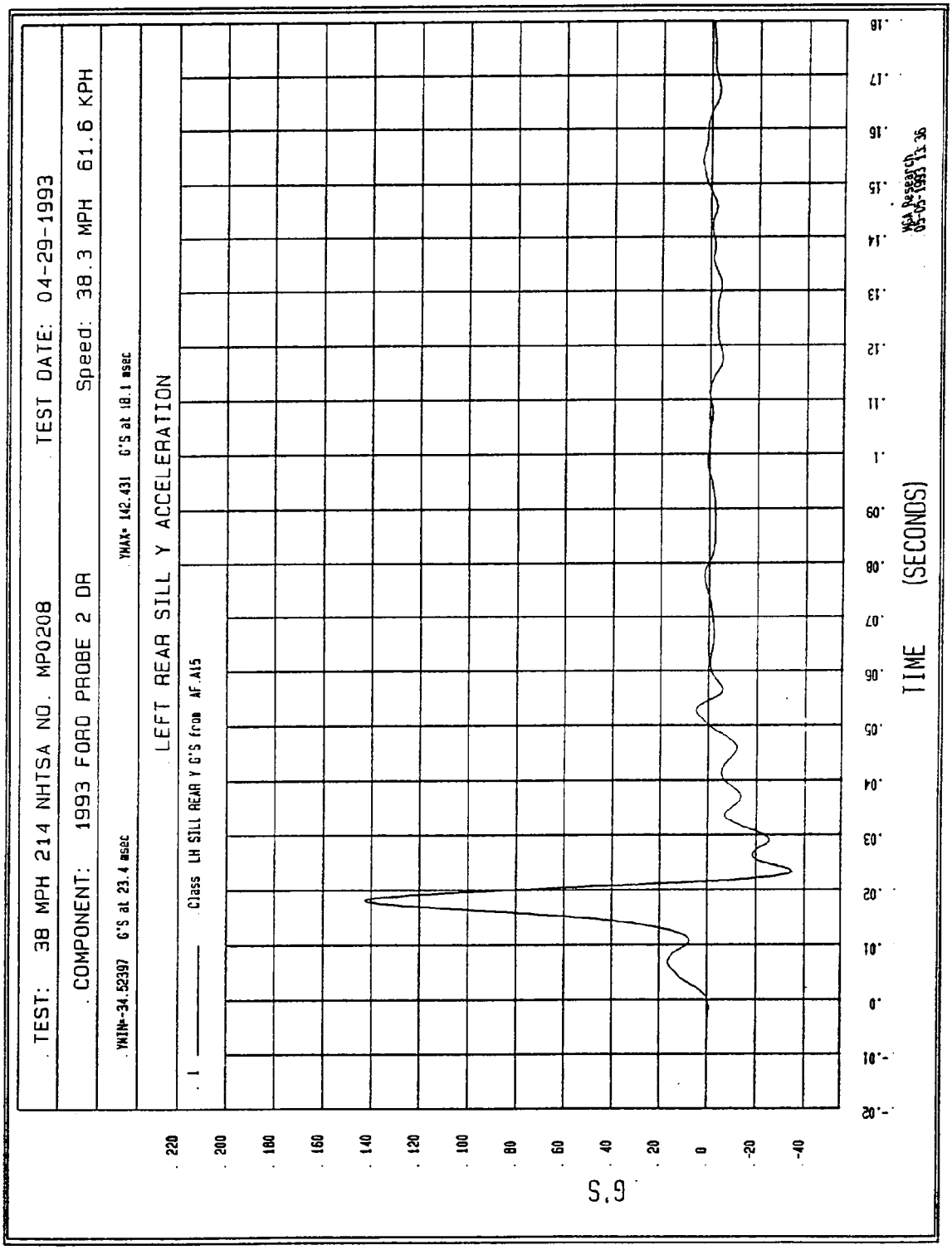


Figure B-39 - Left Rear Sill Y Acceleration vs. Time

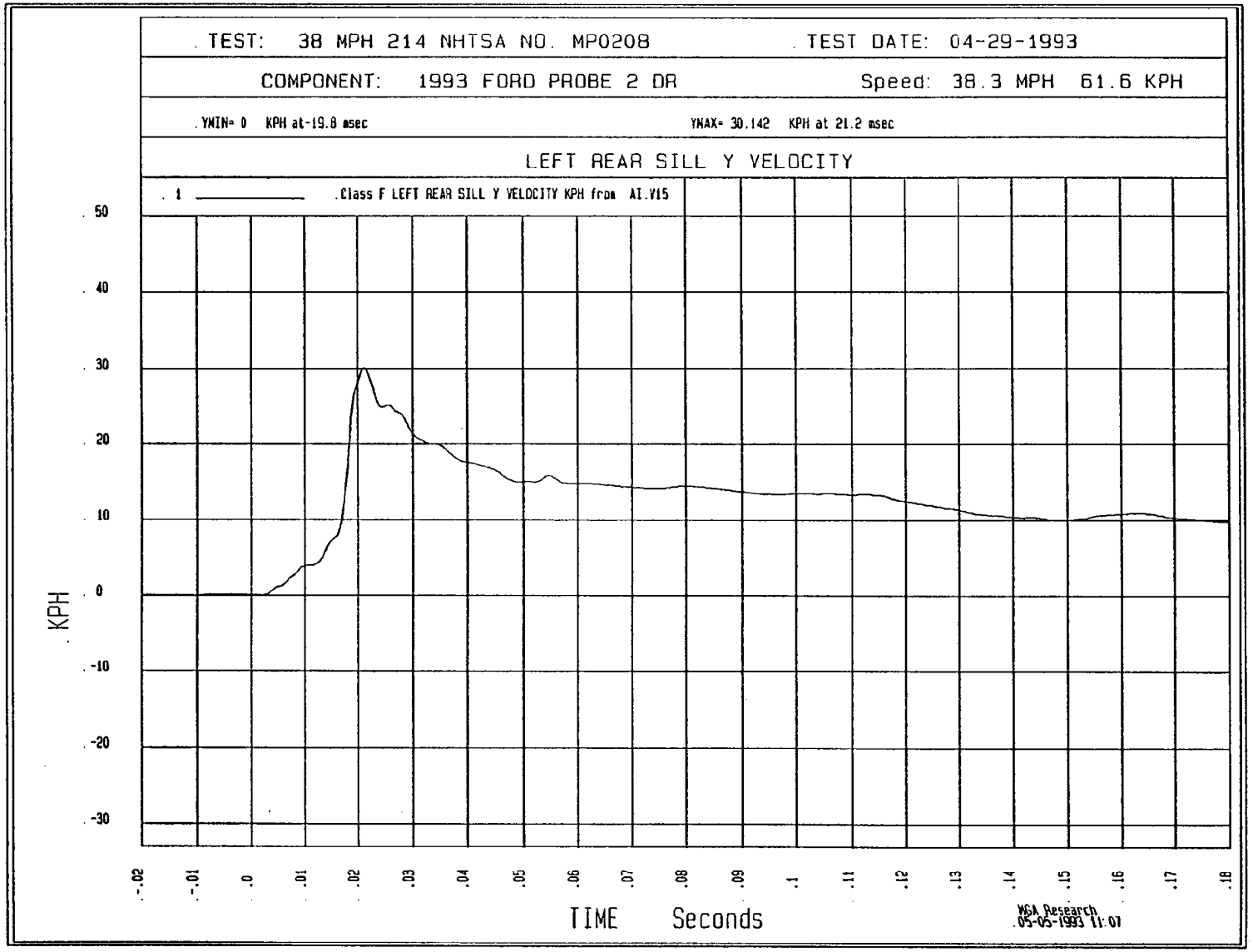


Figure B-40 - Left Rear Sill Y Velocity vs. Time

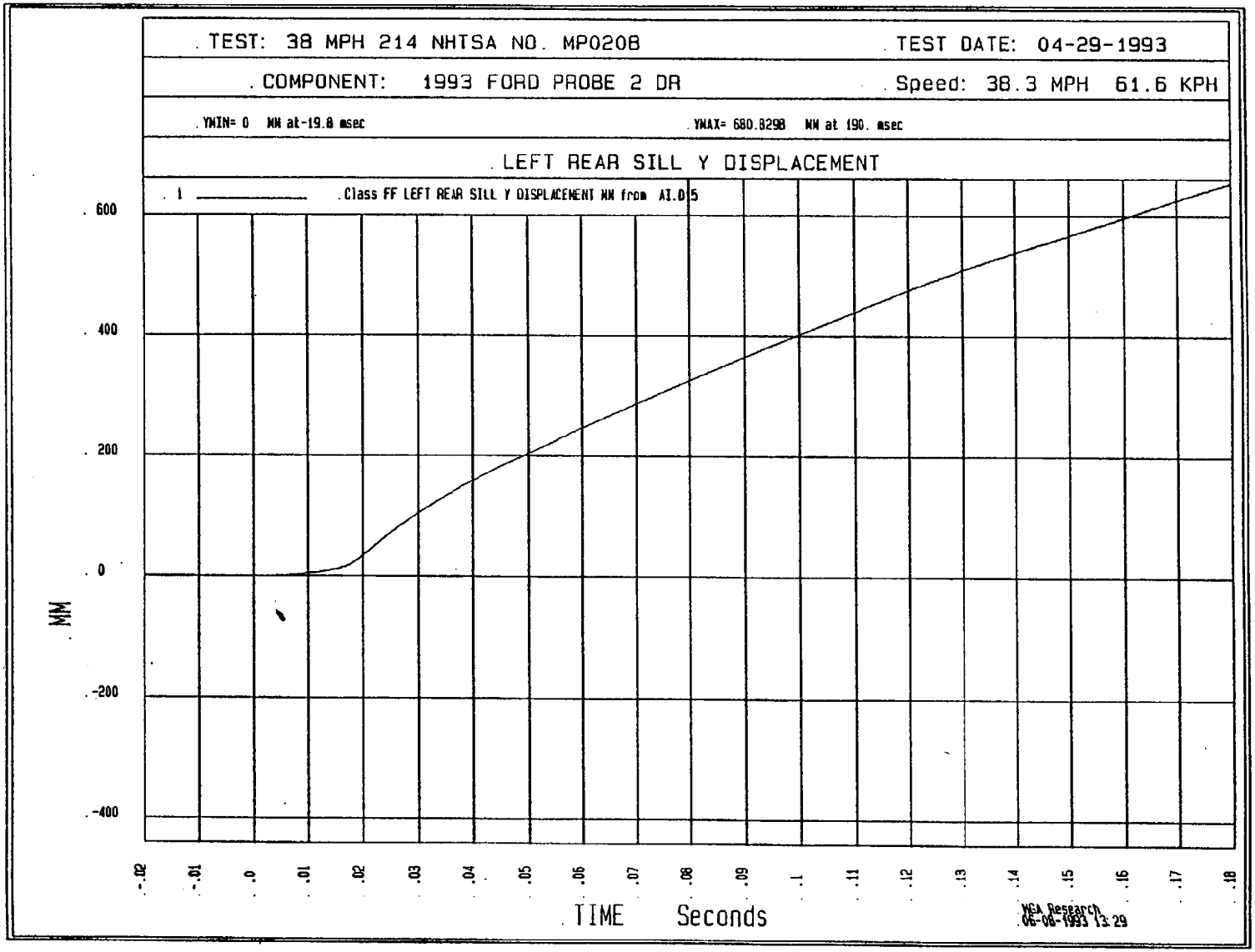


Figure B-41 - Left Rear Sill Y Displacement vs. Time

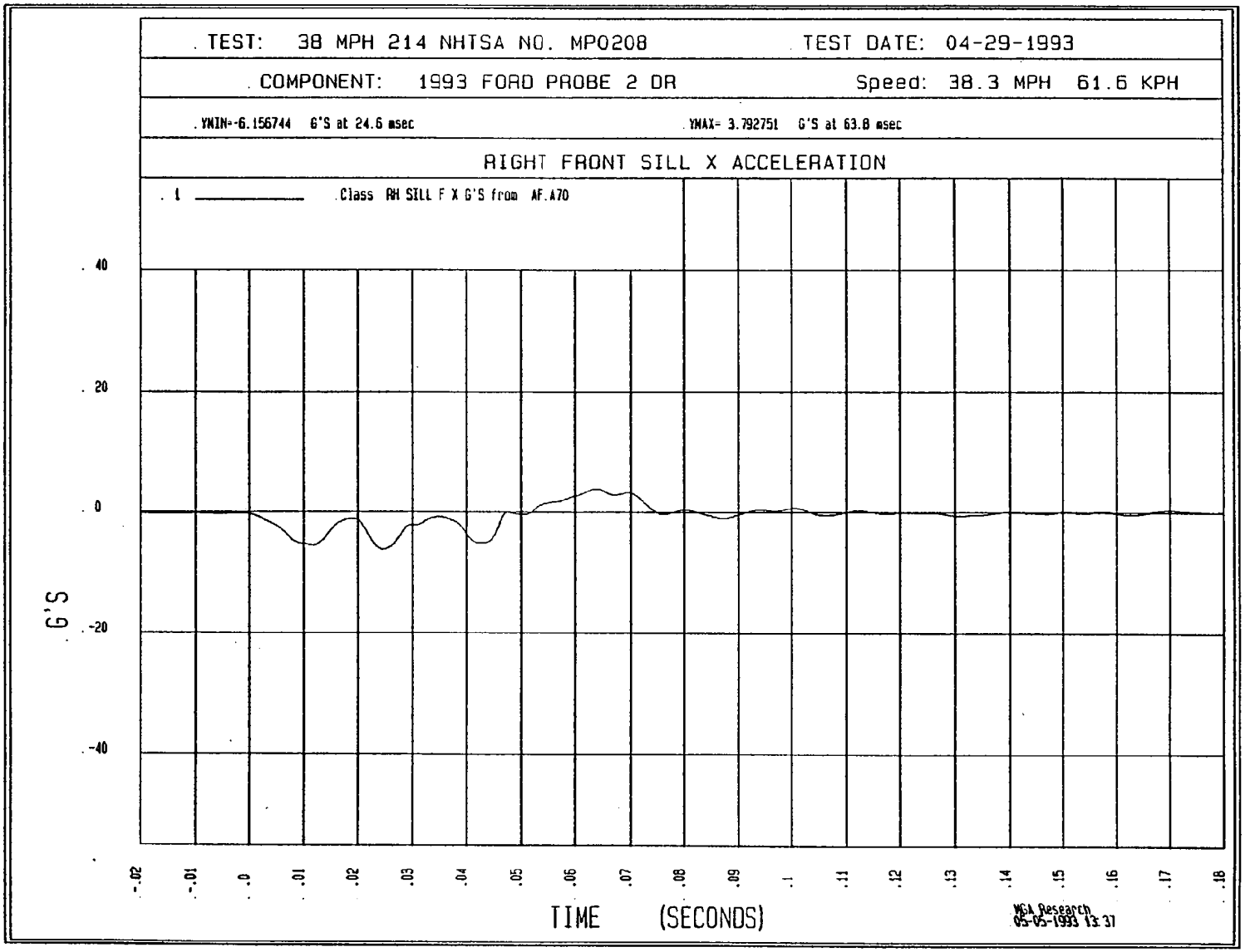
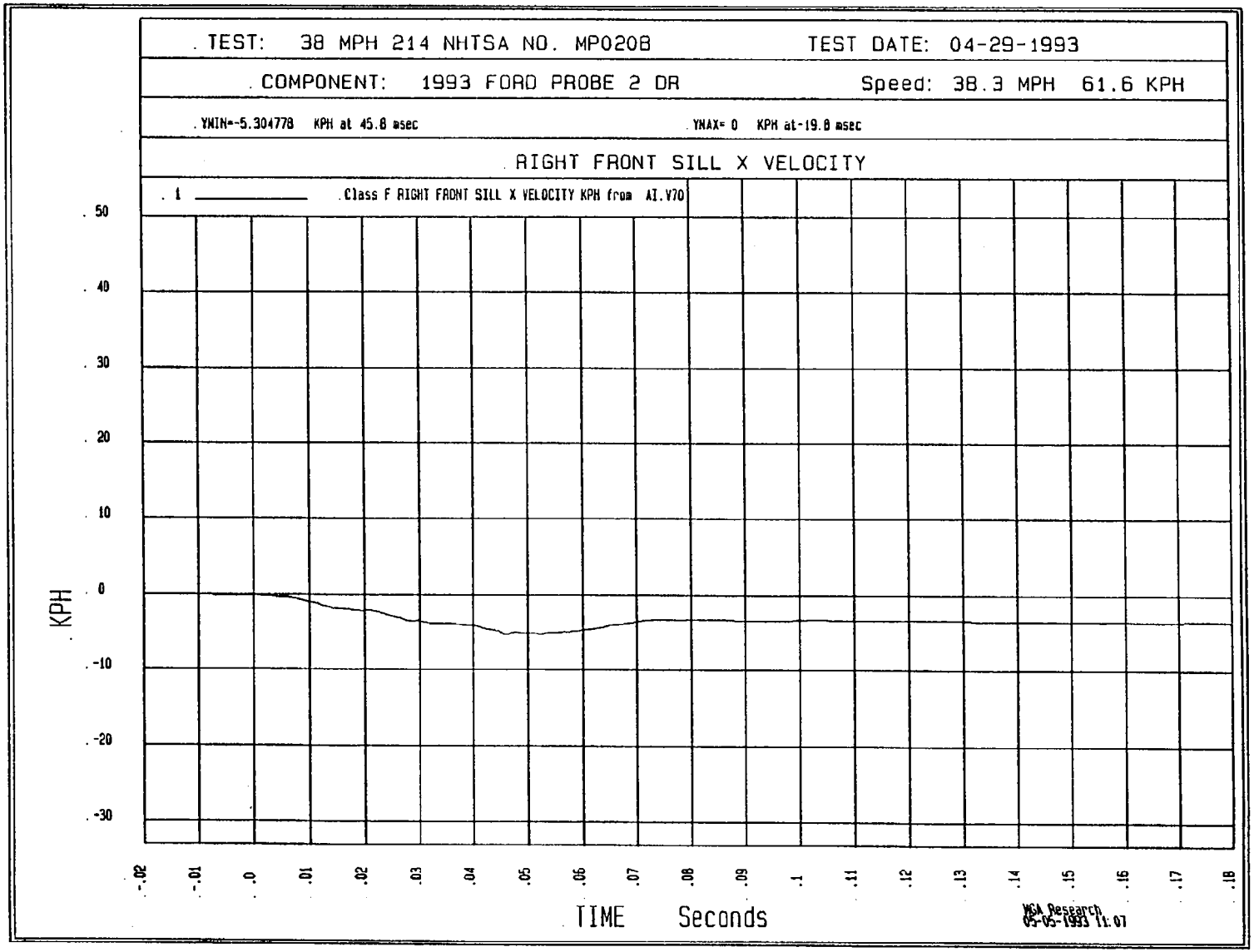


Figure B-42 - Right Front Sill X Acceleration vs. Time



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0189

Figure B-43 - Right Front Sill X Velocity vs. Time

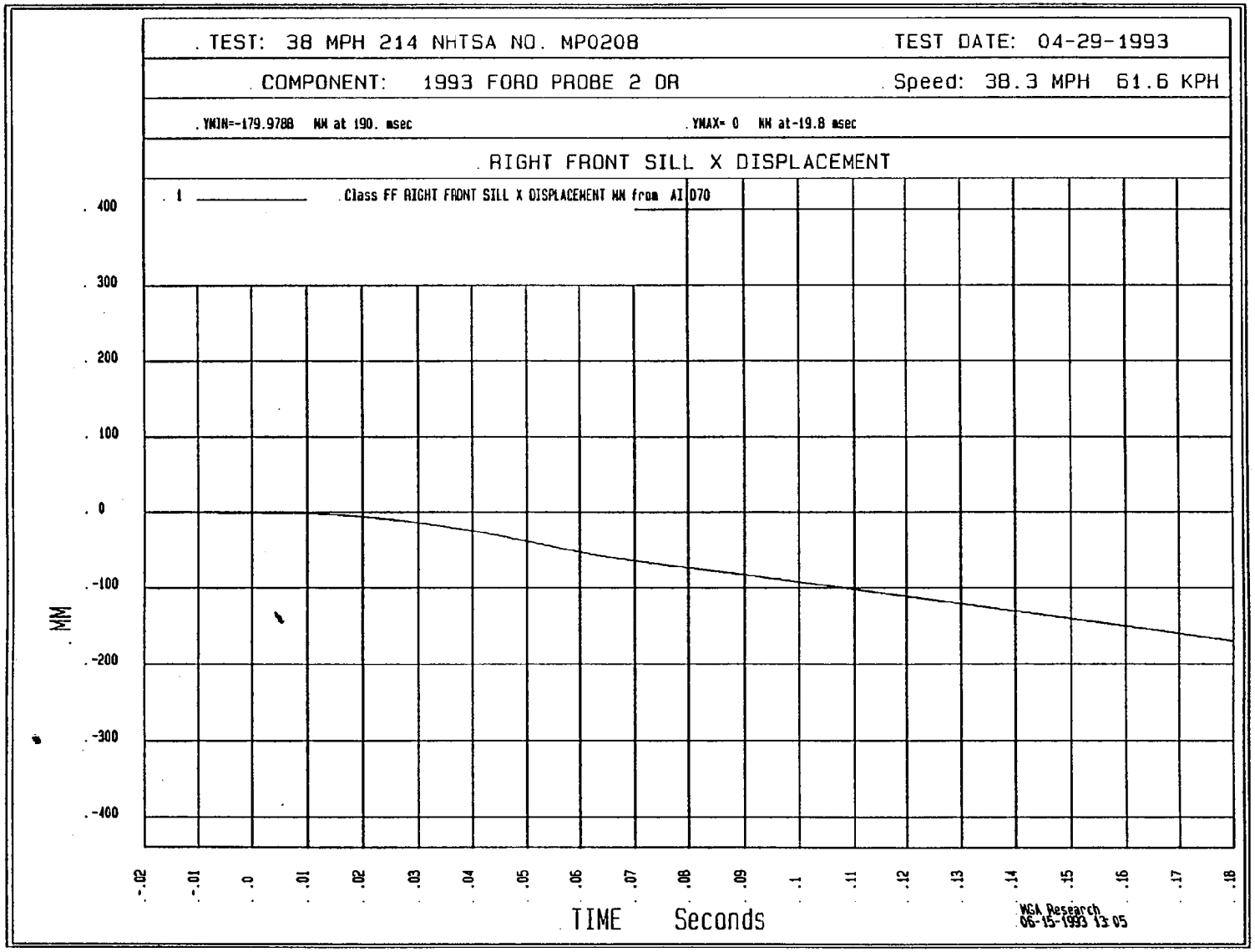


Figure B-44 - Right Front Sill X Displacement vs. Time

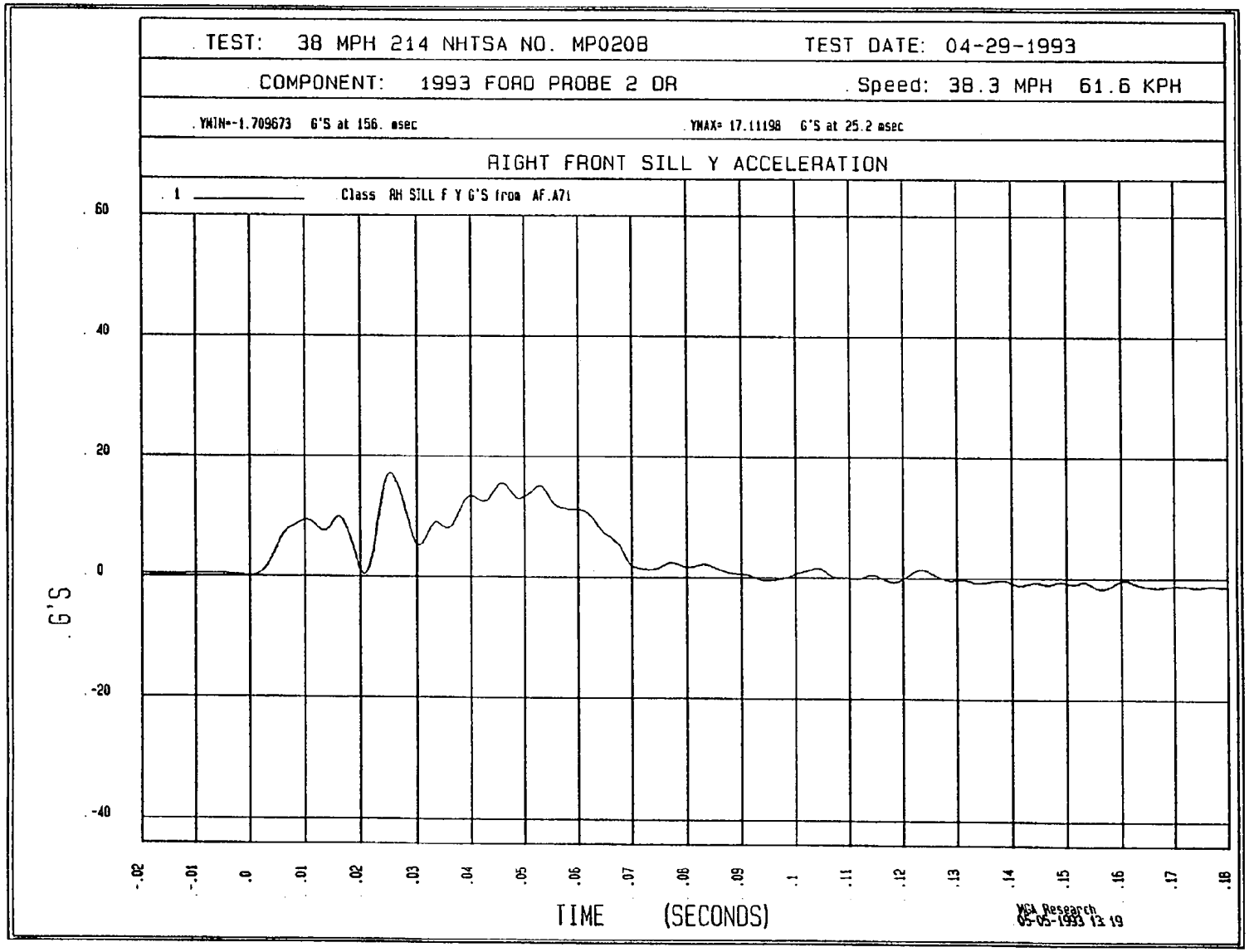


Figure B-45 - Right Front Sill Y Acceleration vs. Time

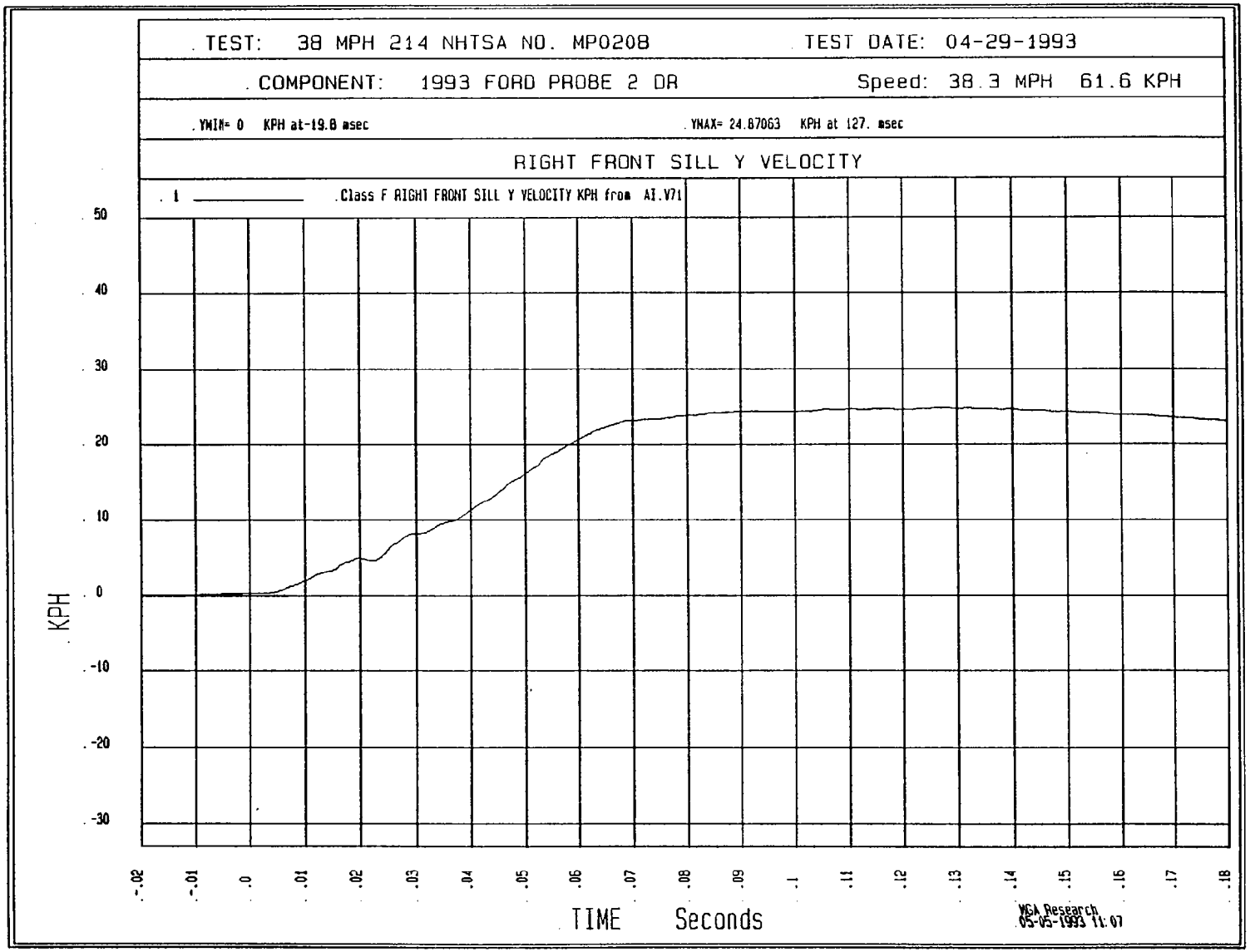


Figure B-46 - Right Front Sill Y Velocity vs. Time

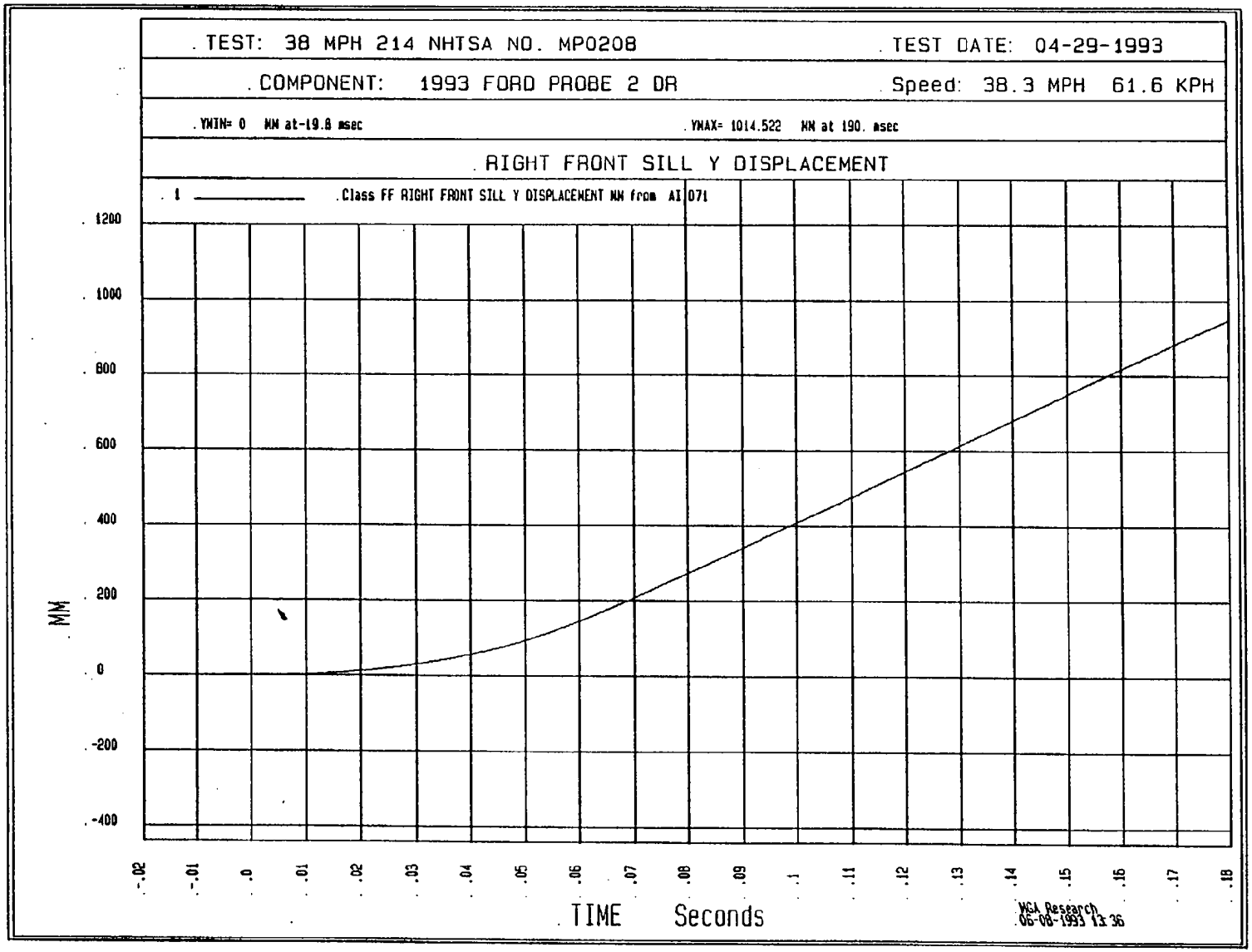


Figure B-47 - Right Front Sill Y Displacement vs. Time

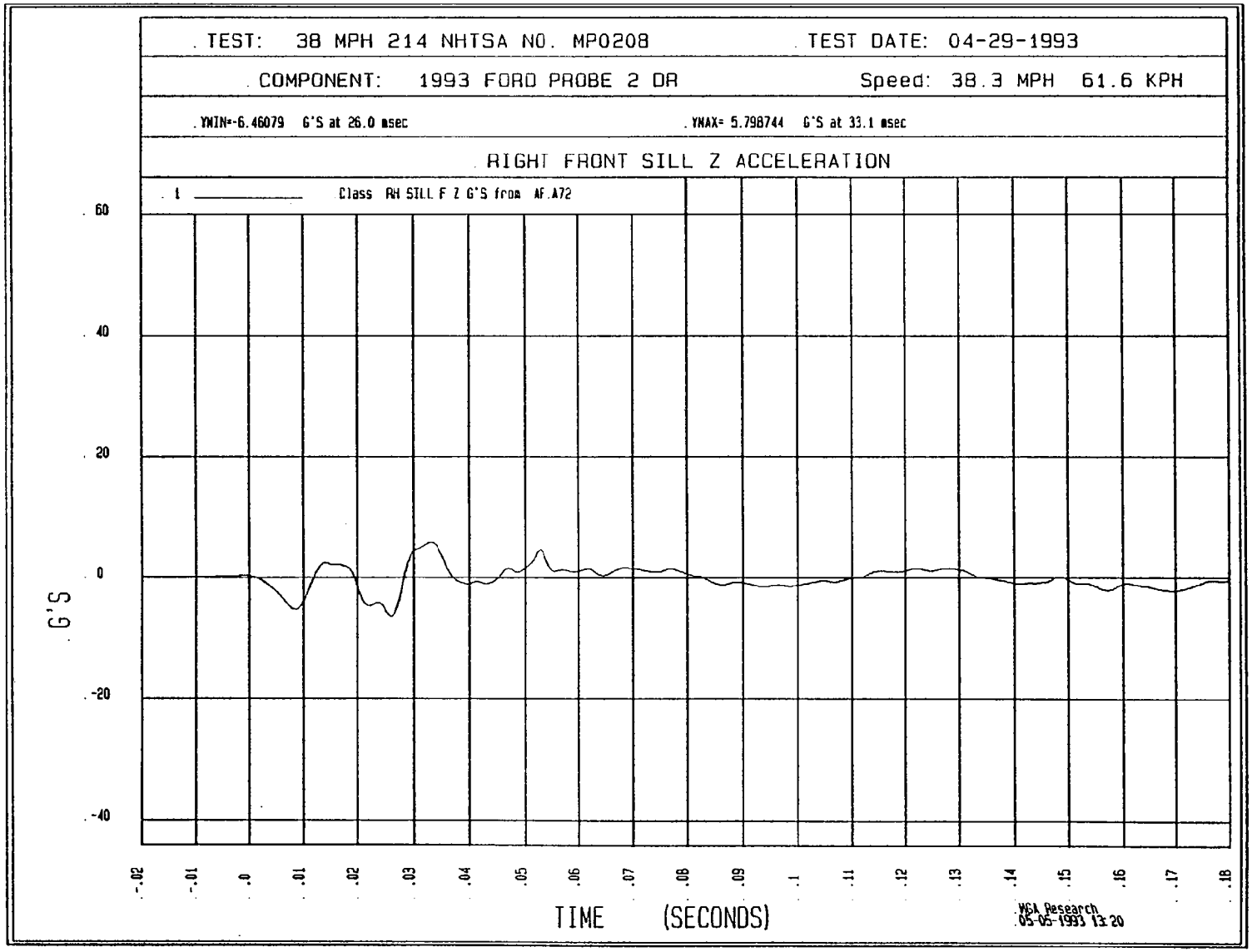
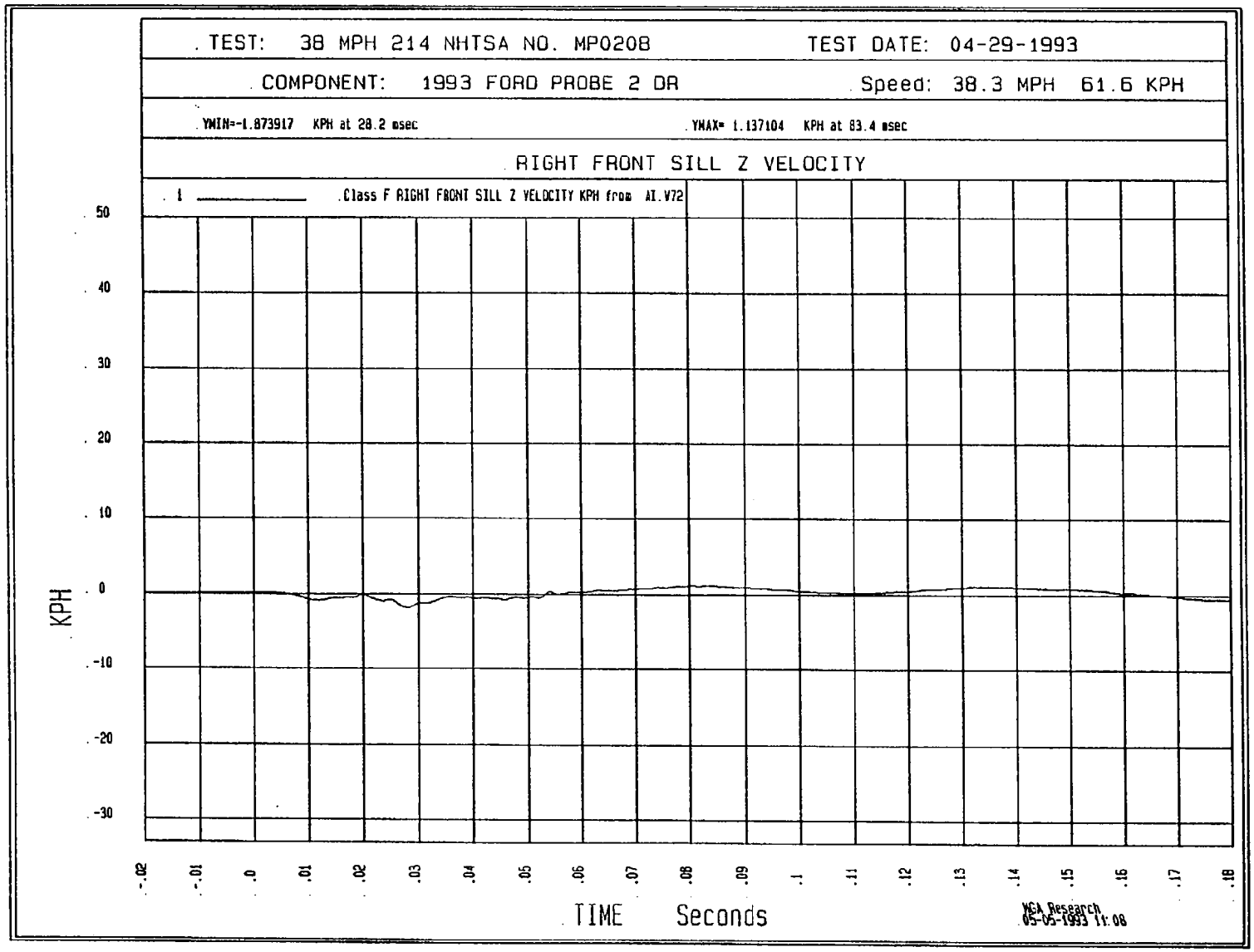


Figure B-48 - Right Front Sill Z Acceleration vs. Time



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1995

Figure B-49 - Right Front Sill Z Velocity vs. Time

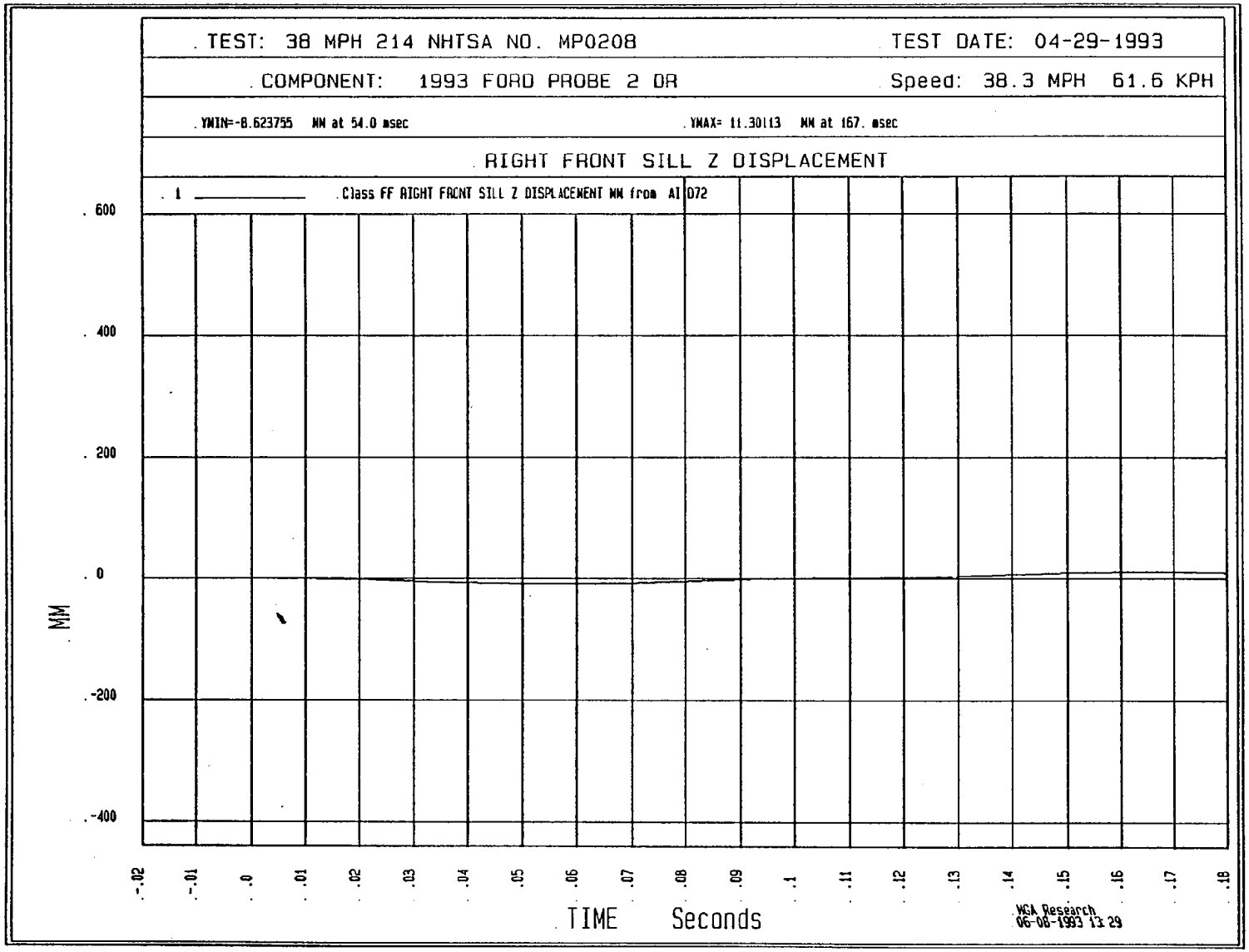

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Figure B-50 - Right Front Sill Z Displacement vs. Time

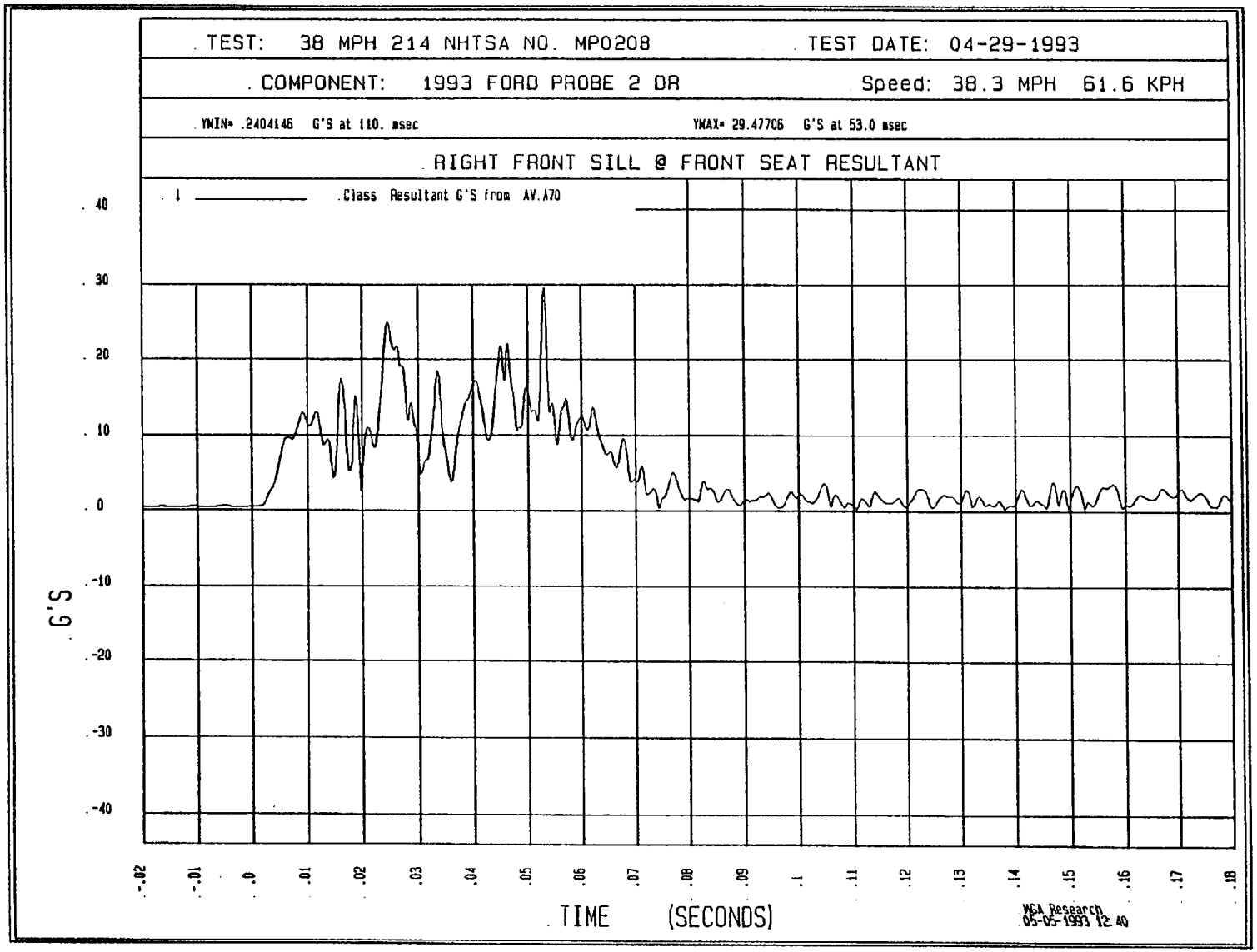

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Figure B-51 - Right Front Sill at Front Seat Resultant vs. Time

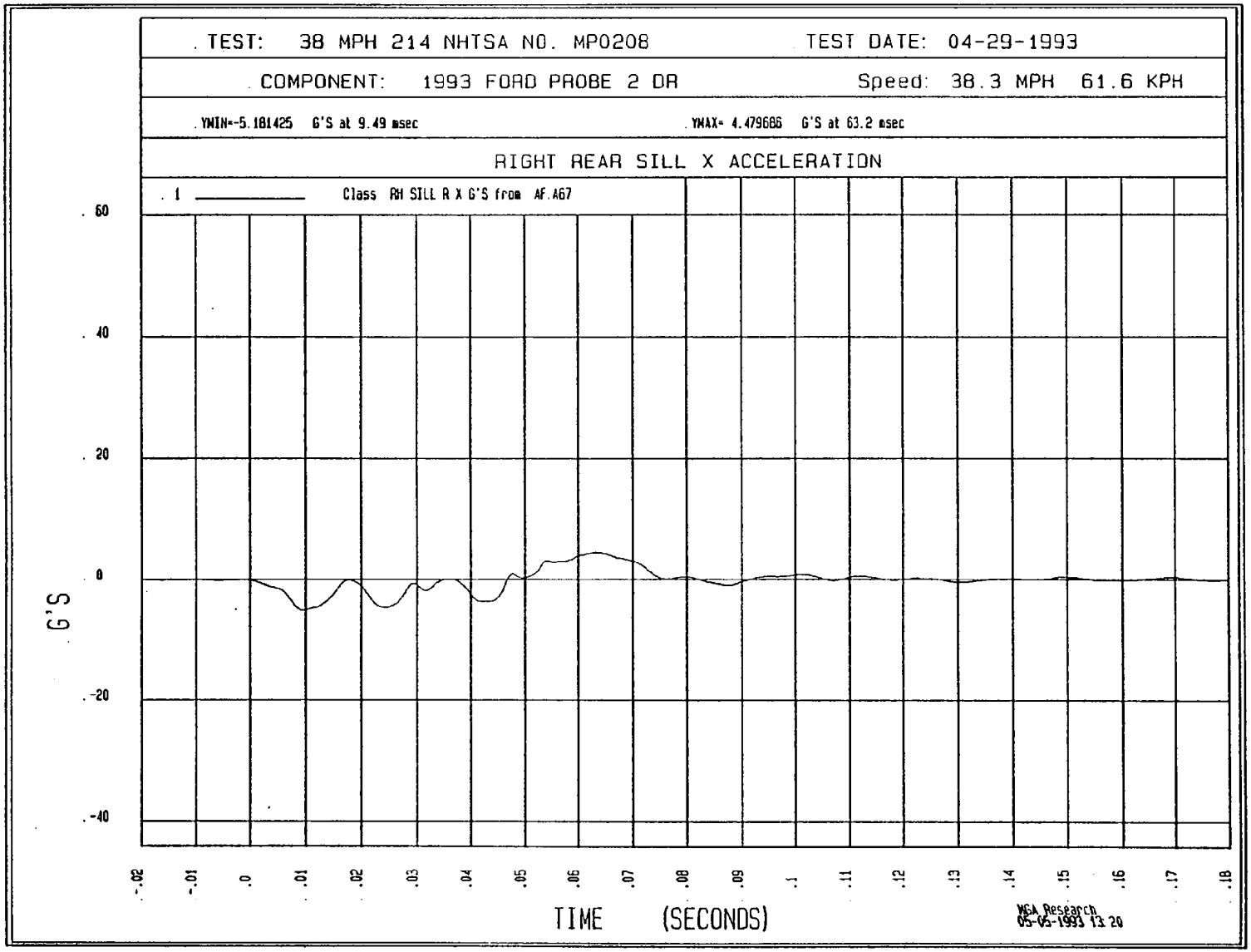

Figure B-52 - Right Rear Sill X Acceleration vs. Time

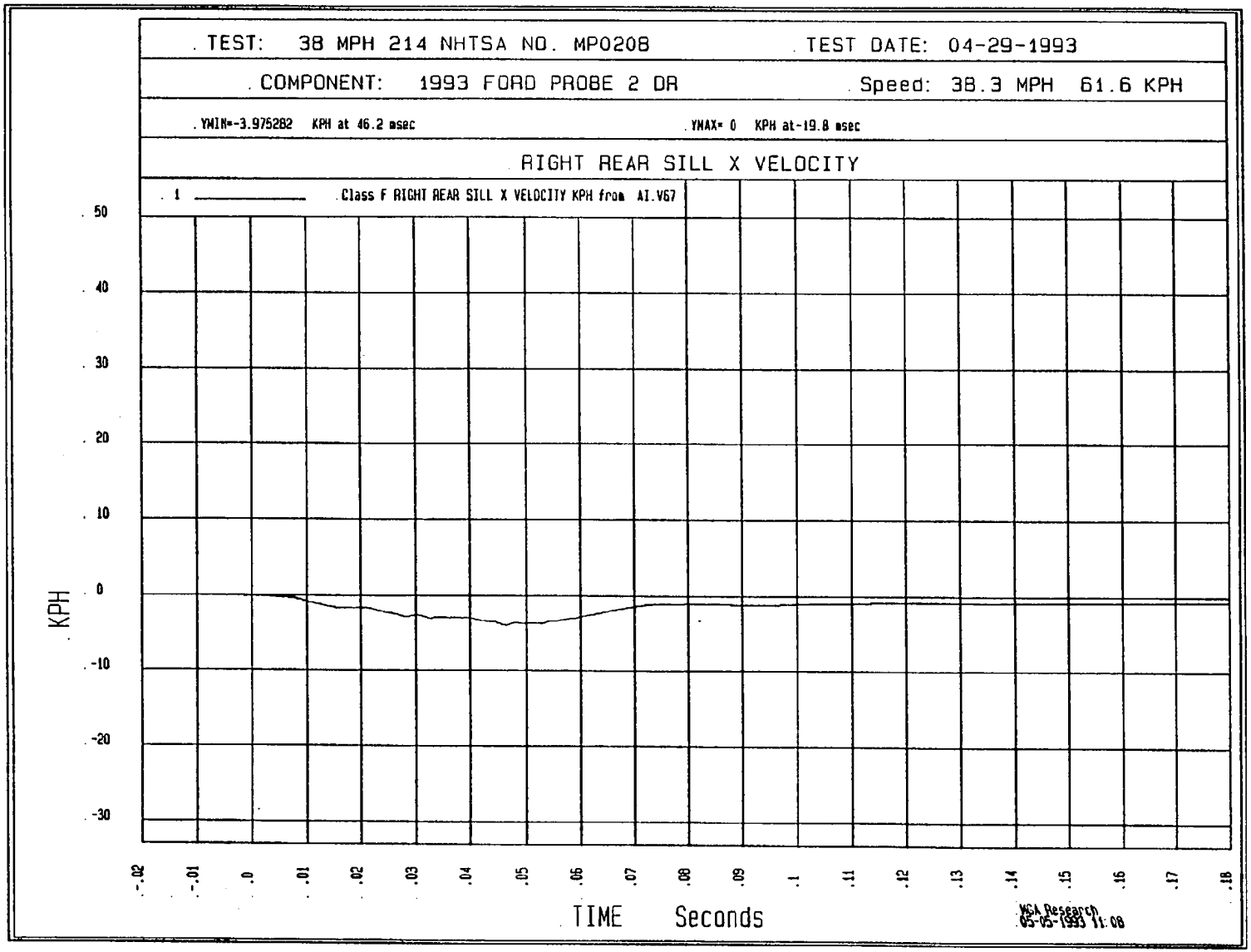

Figure B-53 - Right Rear Sill X Velocity vs. Time

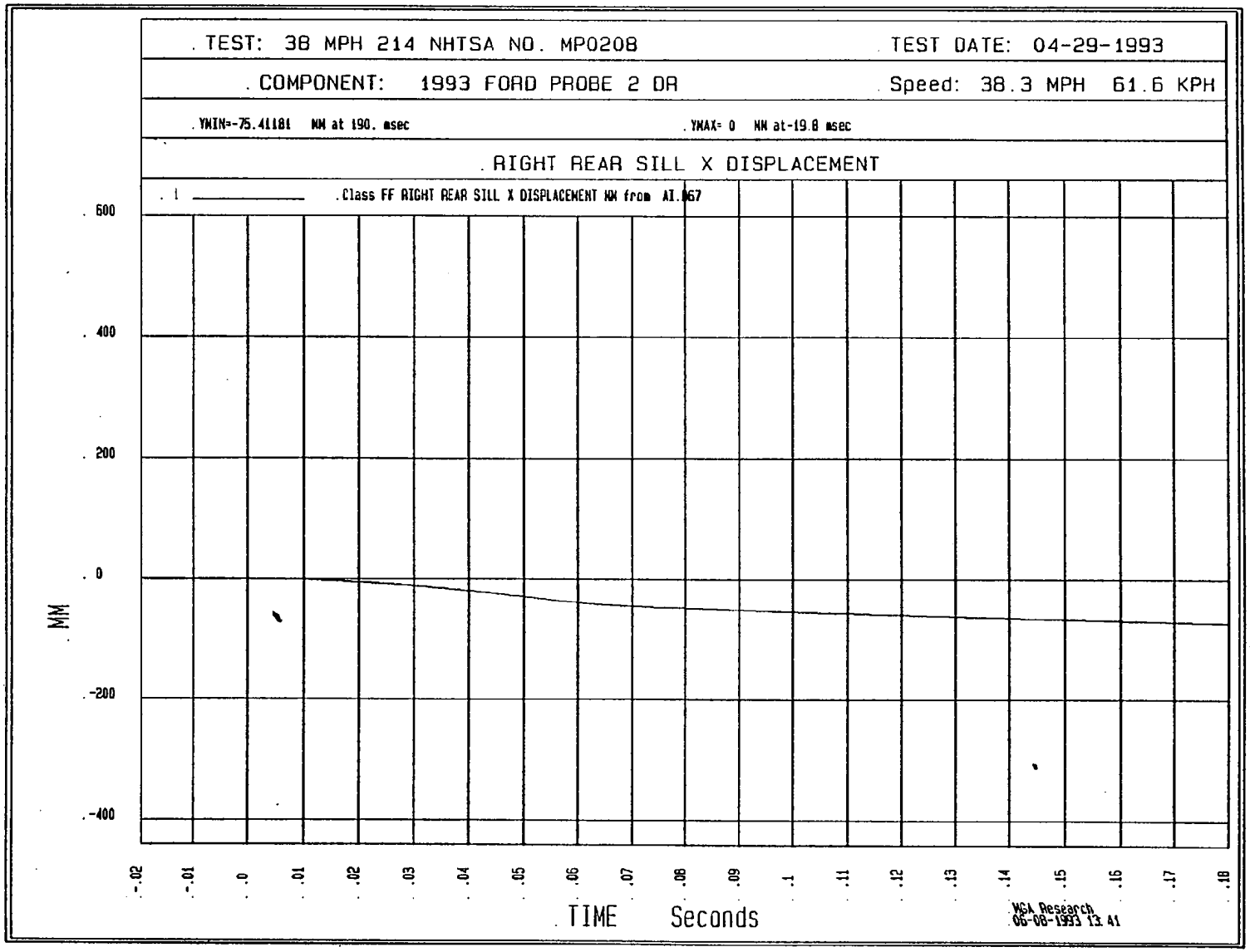

Figure B-54 - Right Rear Sill X Displacement vs. Time

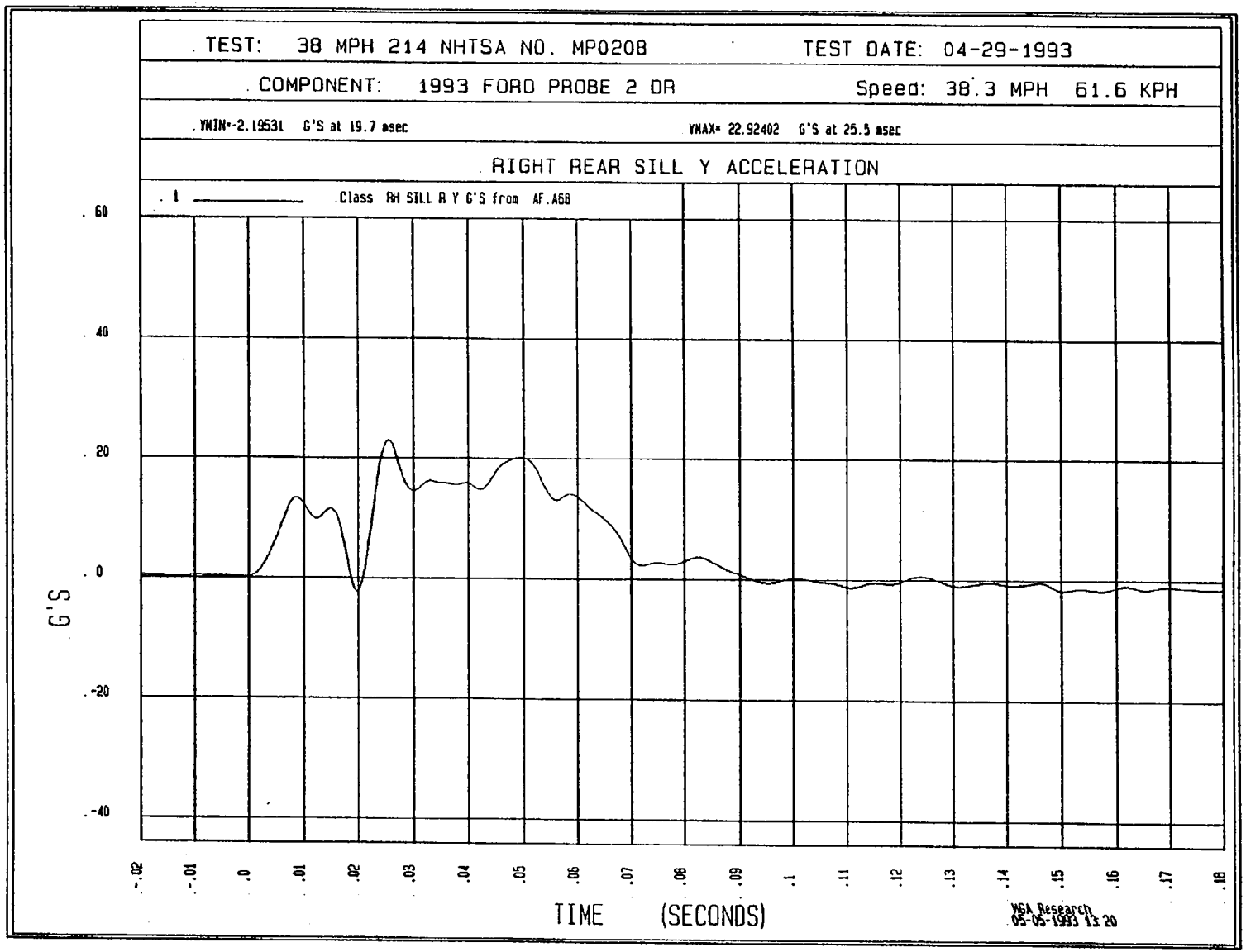

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Figure B-55 - Right Rear Sill Y Acceleration vs. Time

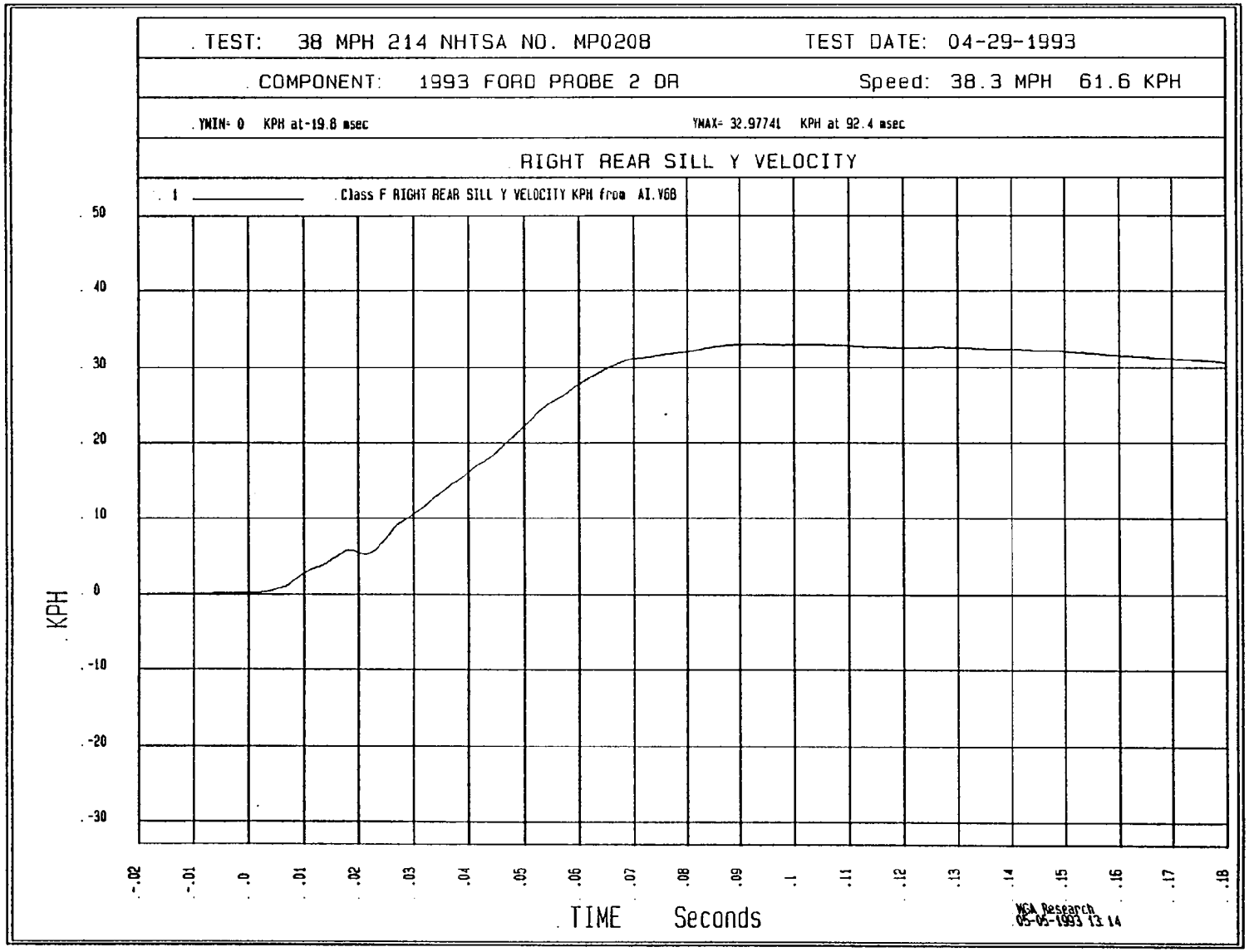

Figure B-56 - Right Rear Sill Y Velocity vs. Time

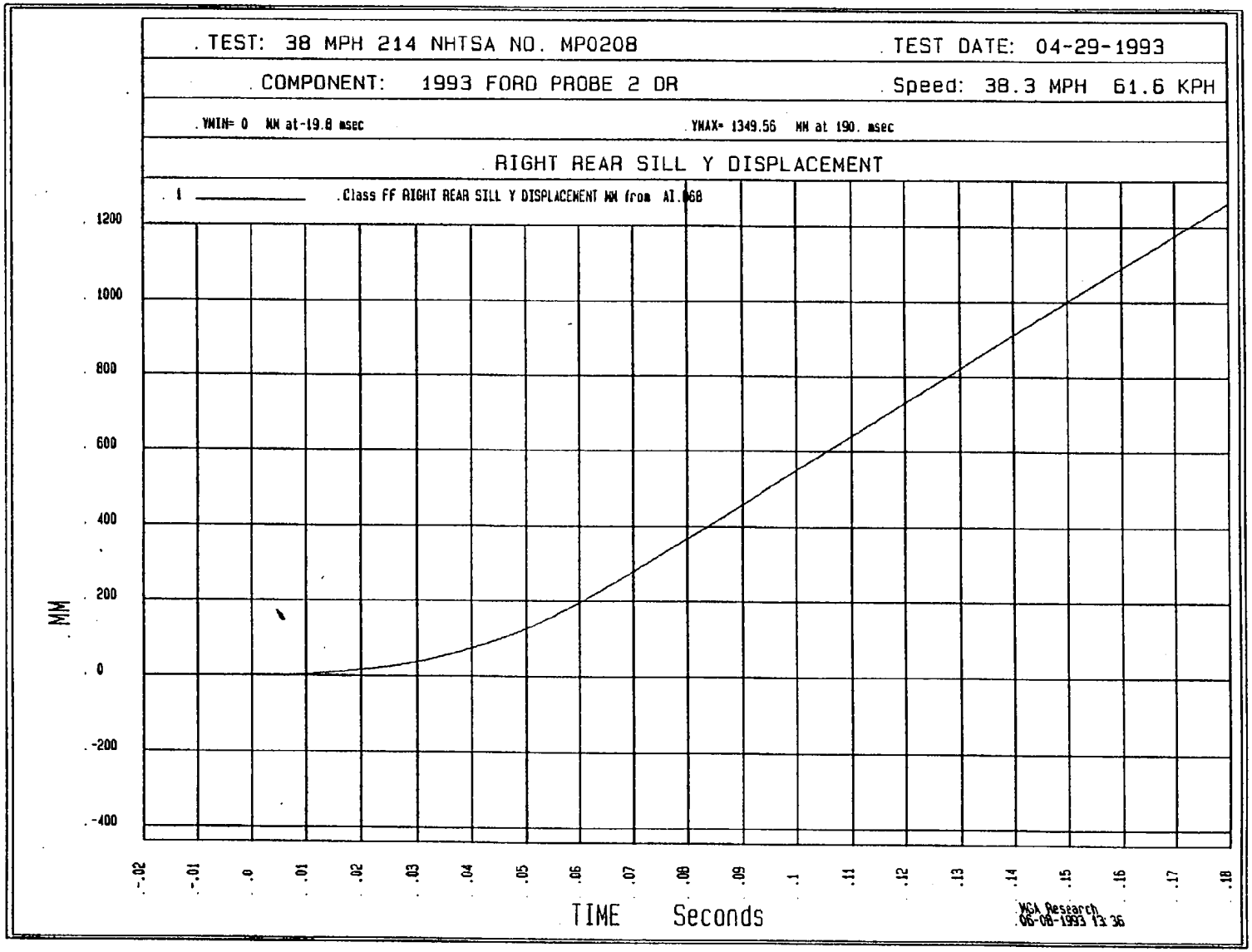

Figure B-57 - Right Rear Sill Y Displacement vs. Time

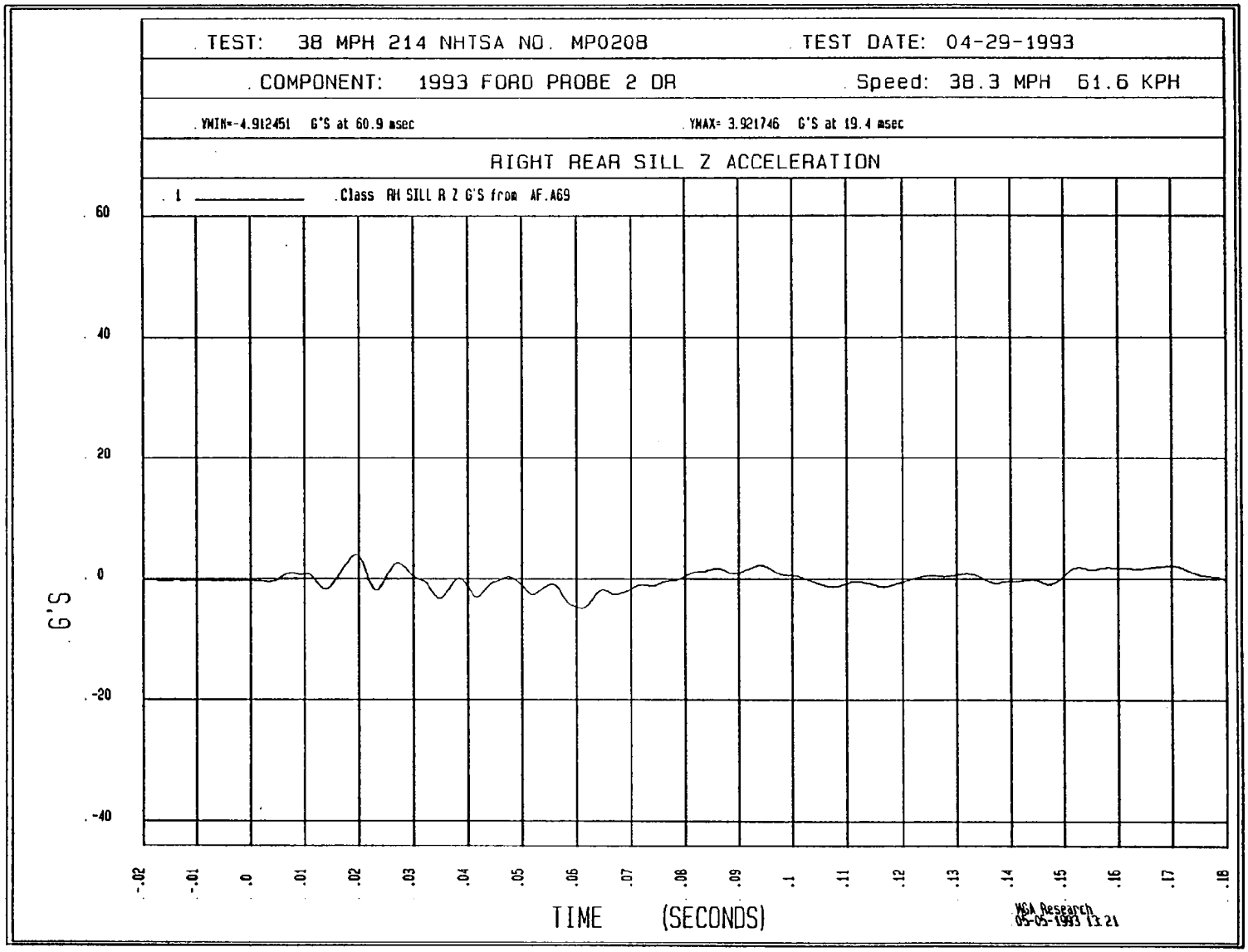

Figure B-58 - Right Rear Sill Z Acceleration vs. Time

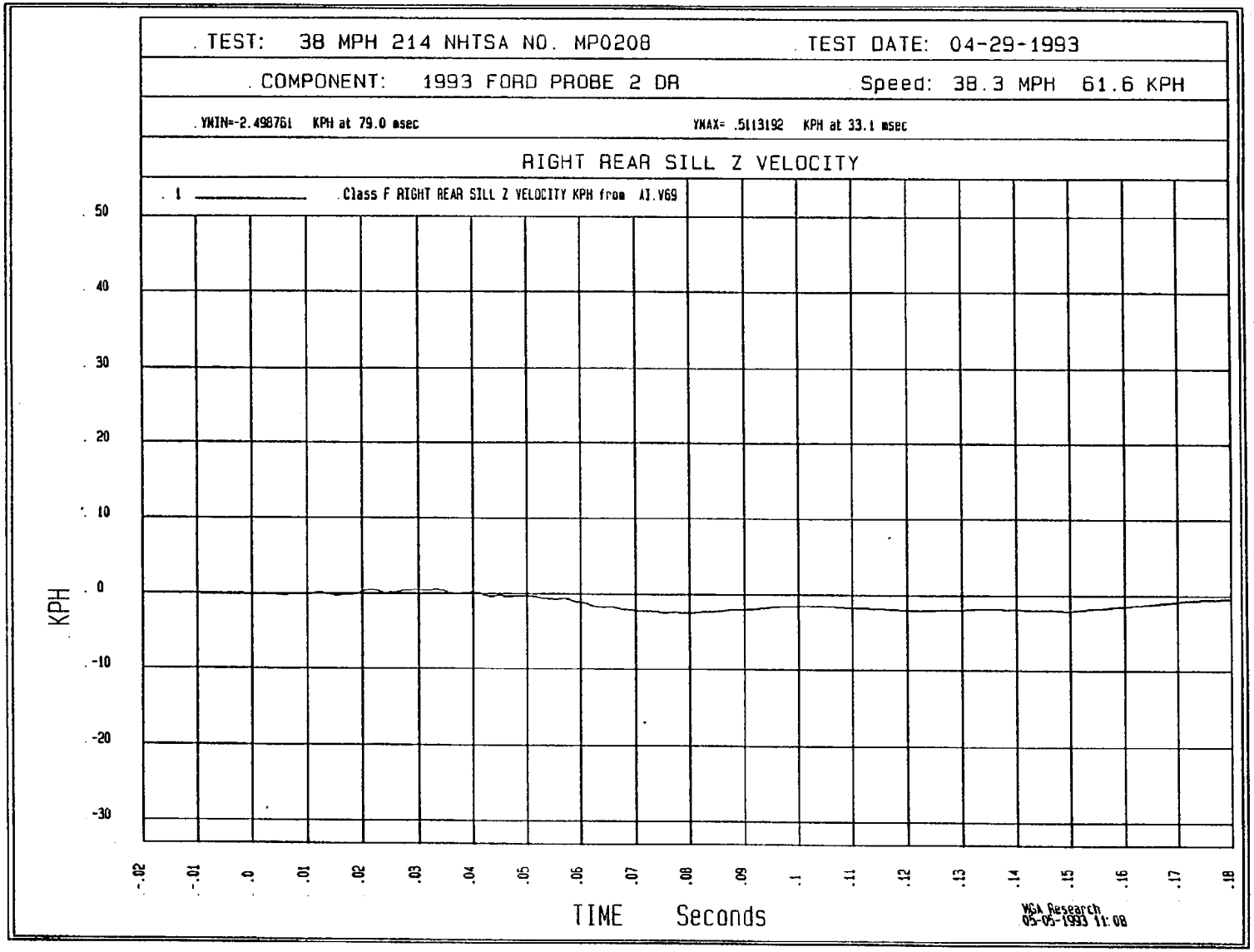

Figure B-59 - Right Rear Sill Z Velocity vs. Time

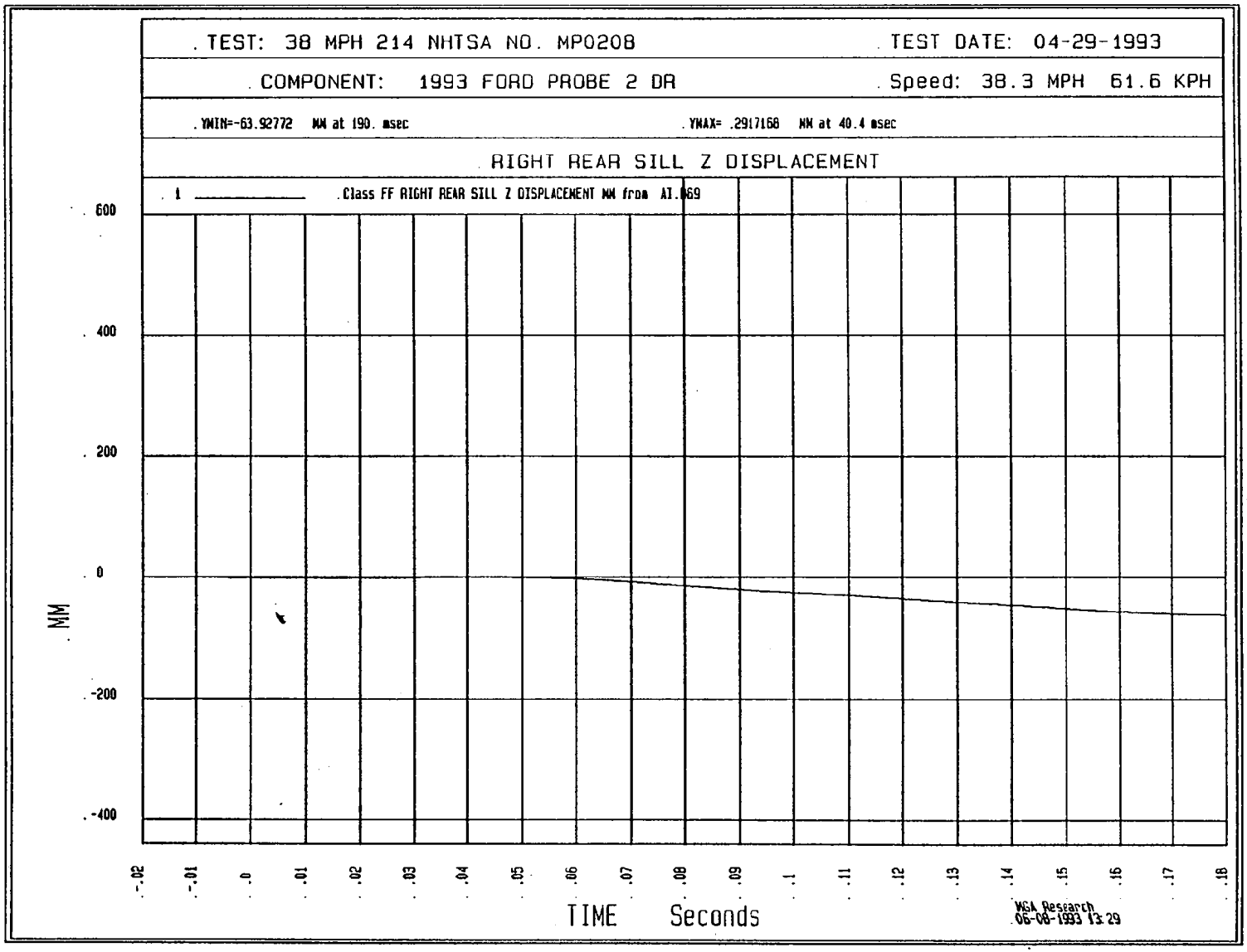

Figure B-60 - Right Rear Sill Z Displacement vs. Time

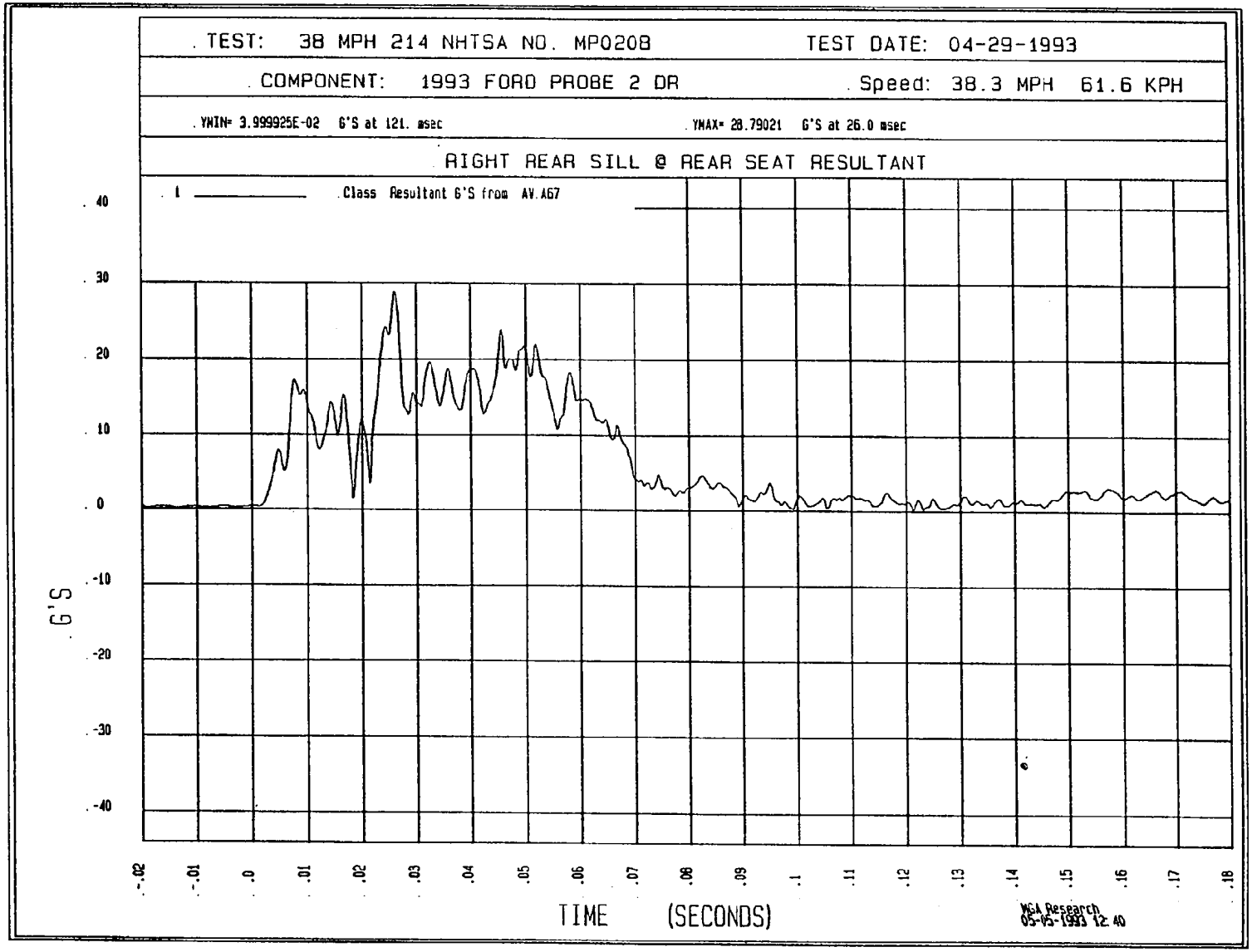

Figure B-61 - Right Rear Sill at Rear Seat Resultant vs. Time

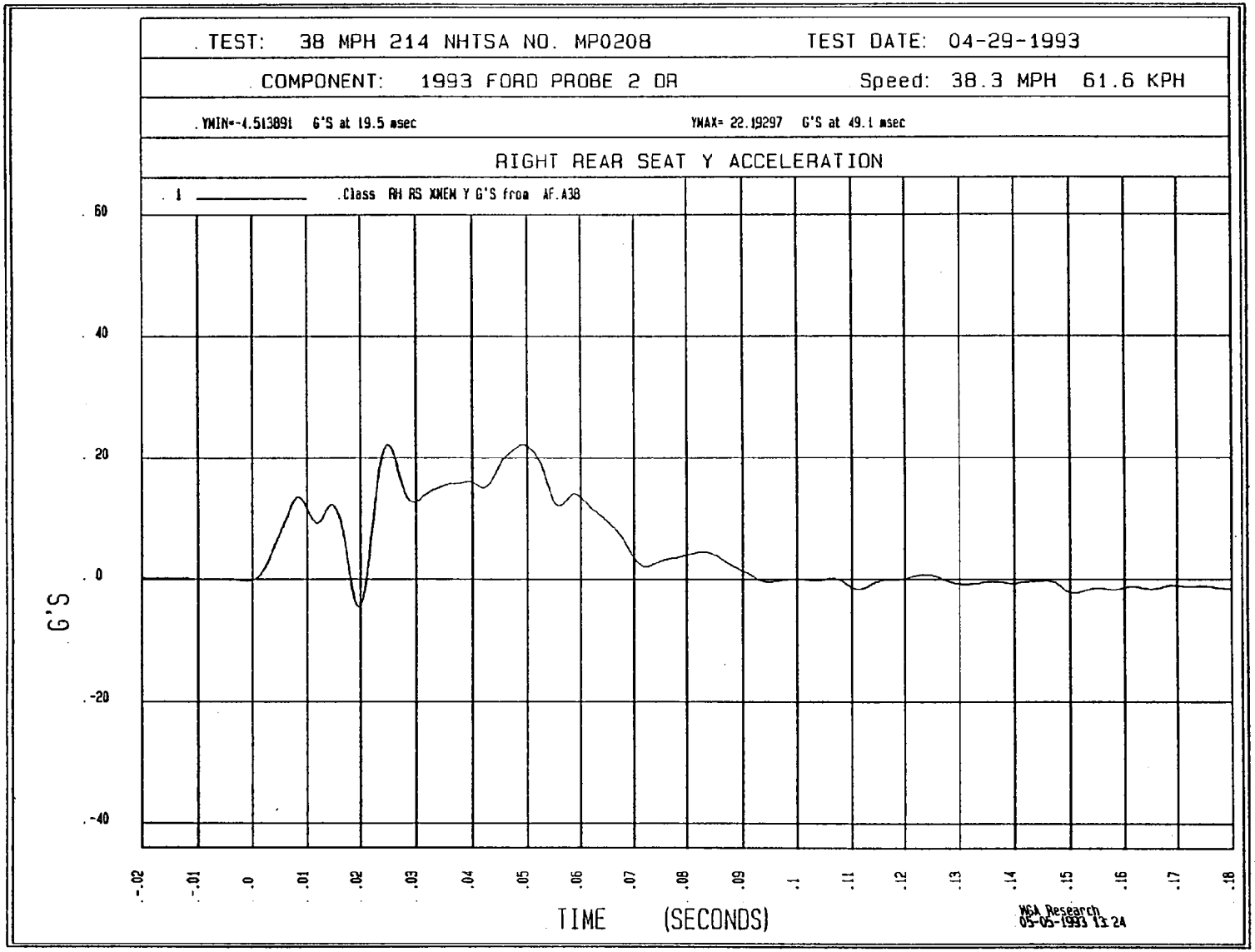

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Figure B-62 - Right Rear Seat Y Acceleration vs. Time

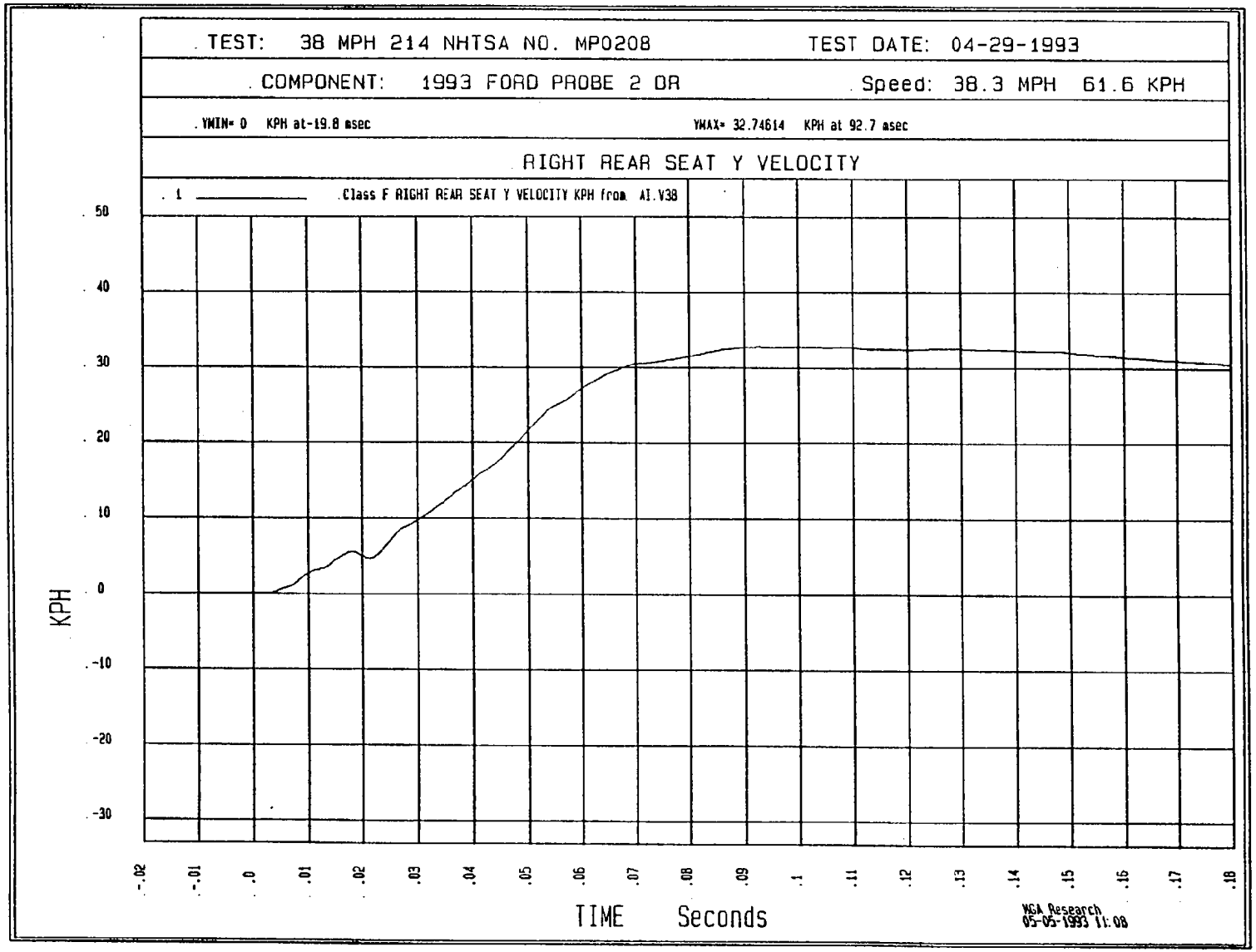

Figure B-63 - Right Rear Seat Y Velocity vs. Time

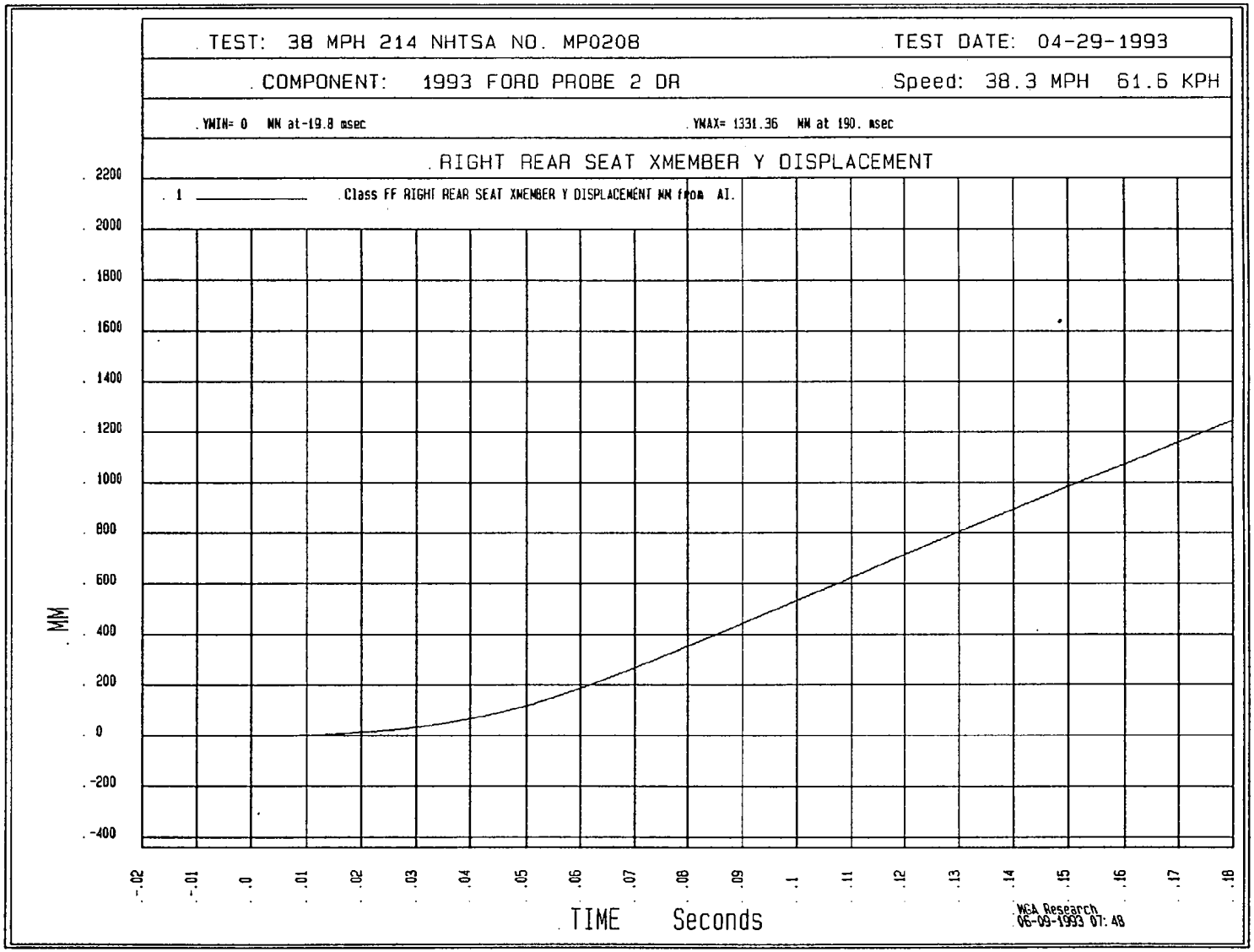

Figure B-64 - Right Rear Seat Y Displacement vs. Time

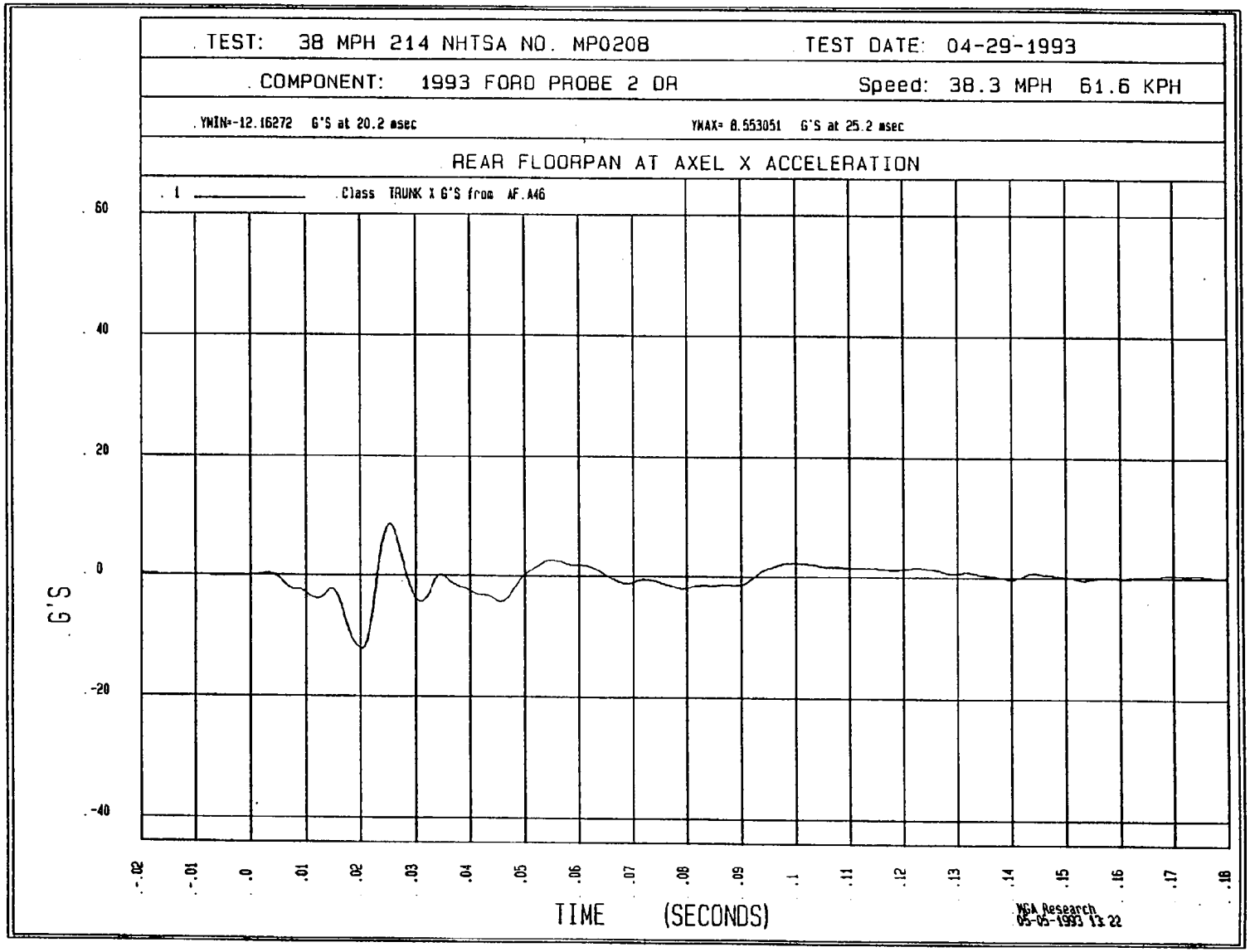

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Figure B-65 - Rear Floorpan at Axle X Acceleration vs. Time

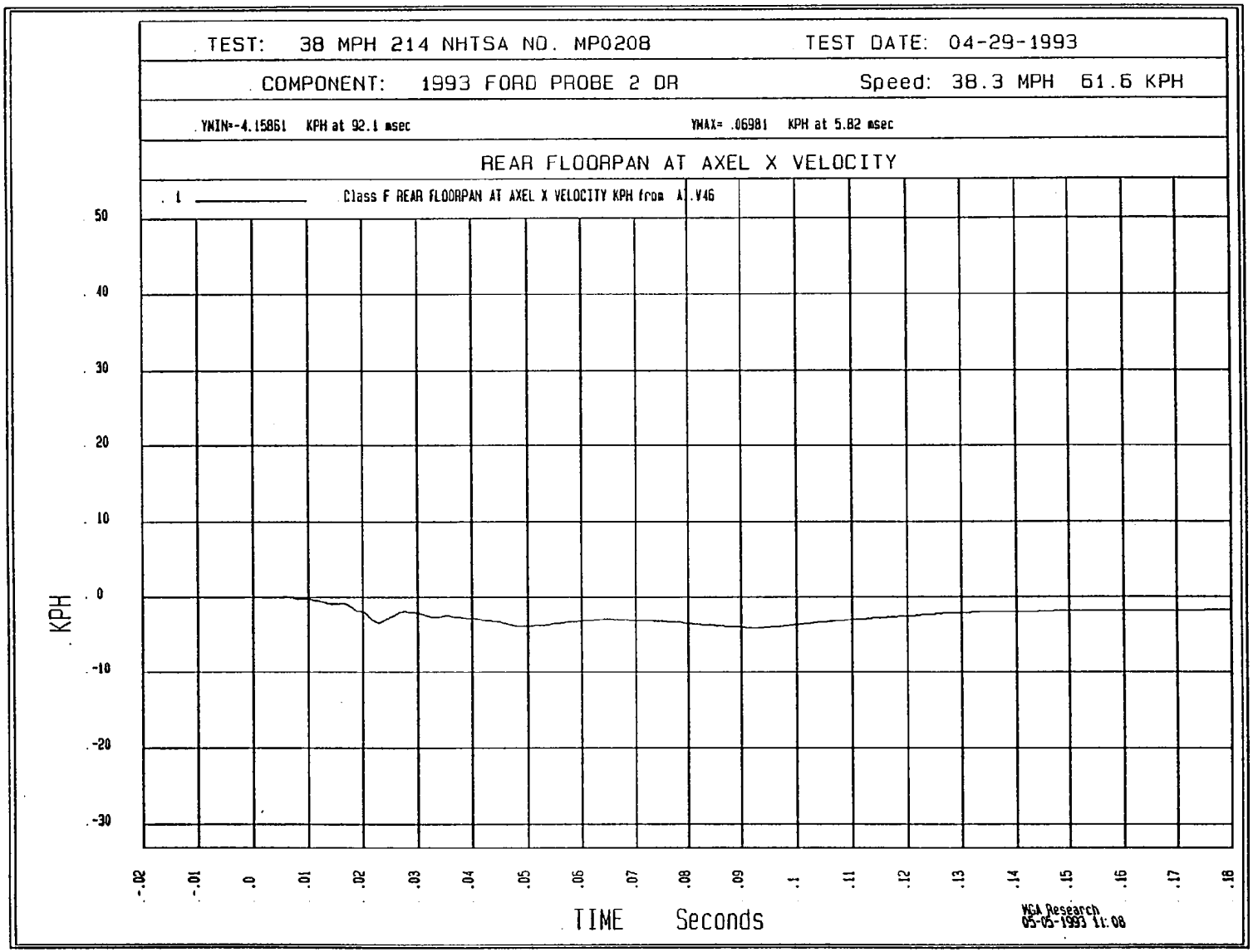


Figure B-66 - Rear Floorpan at Axle X Velocity vs. Time

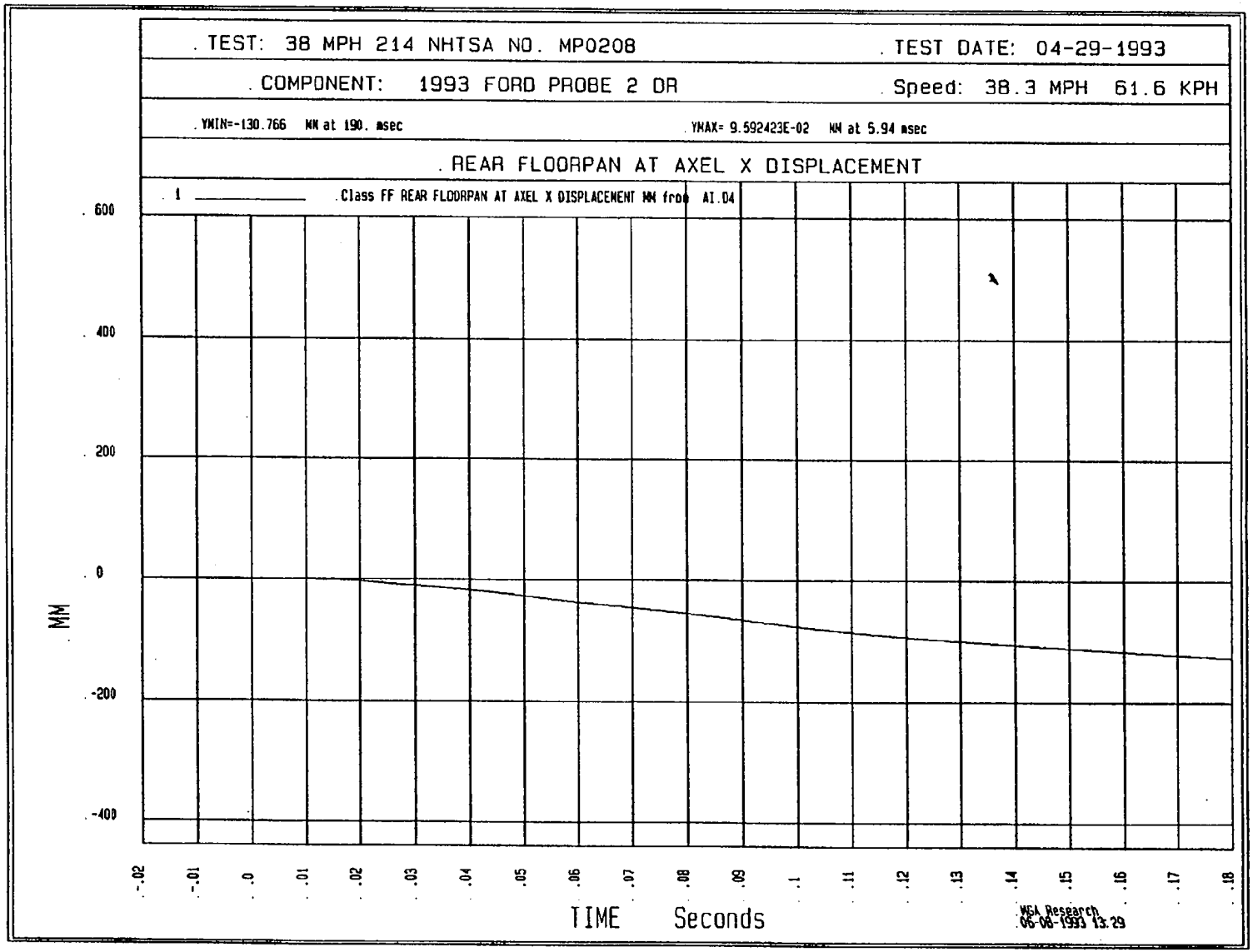


Figure B-67 - Rear Floorpan at Axle X Displacement vs. Time

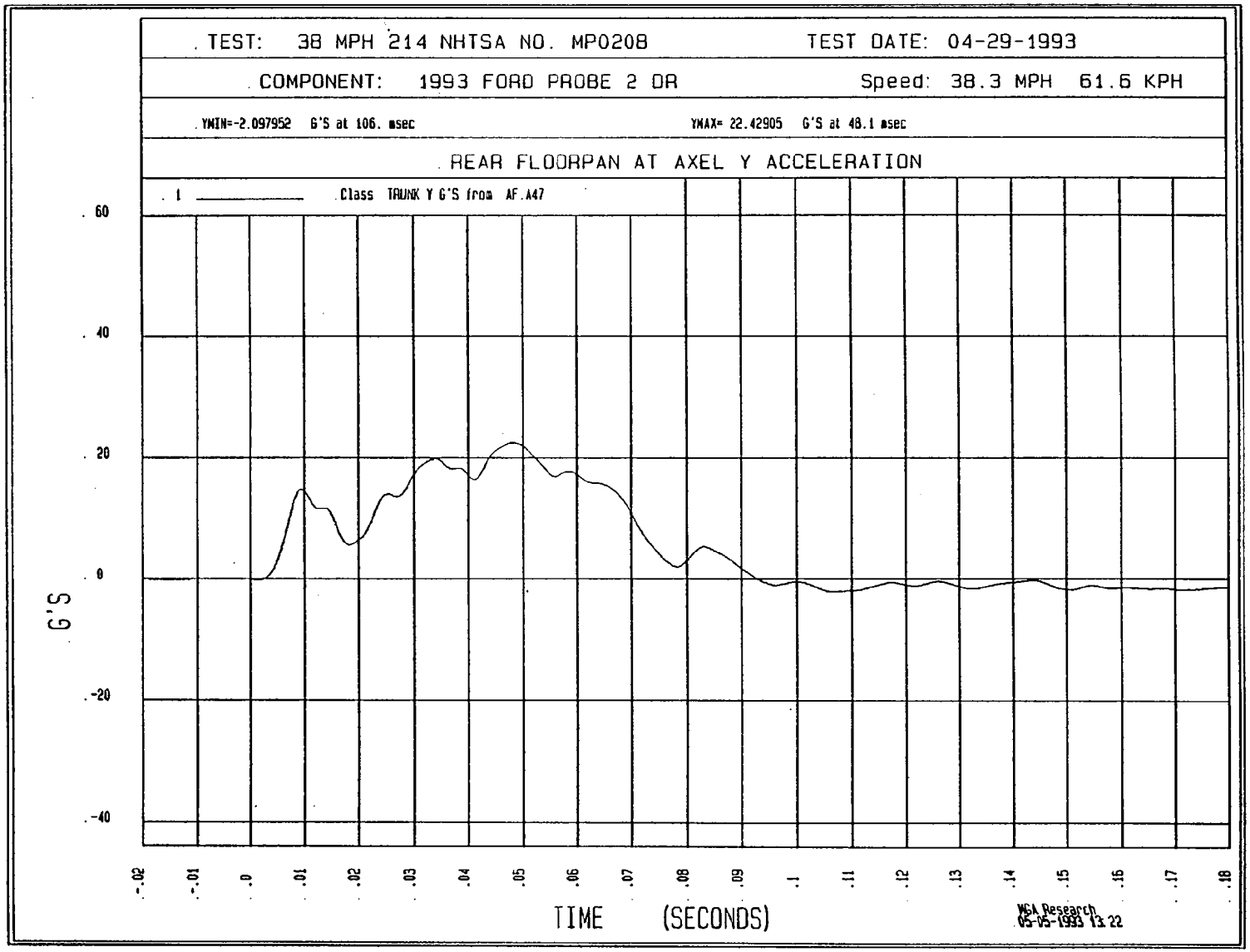


Figure B-68 - Rear Floorpan at Axle Y Acceleration vs. Time

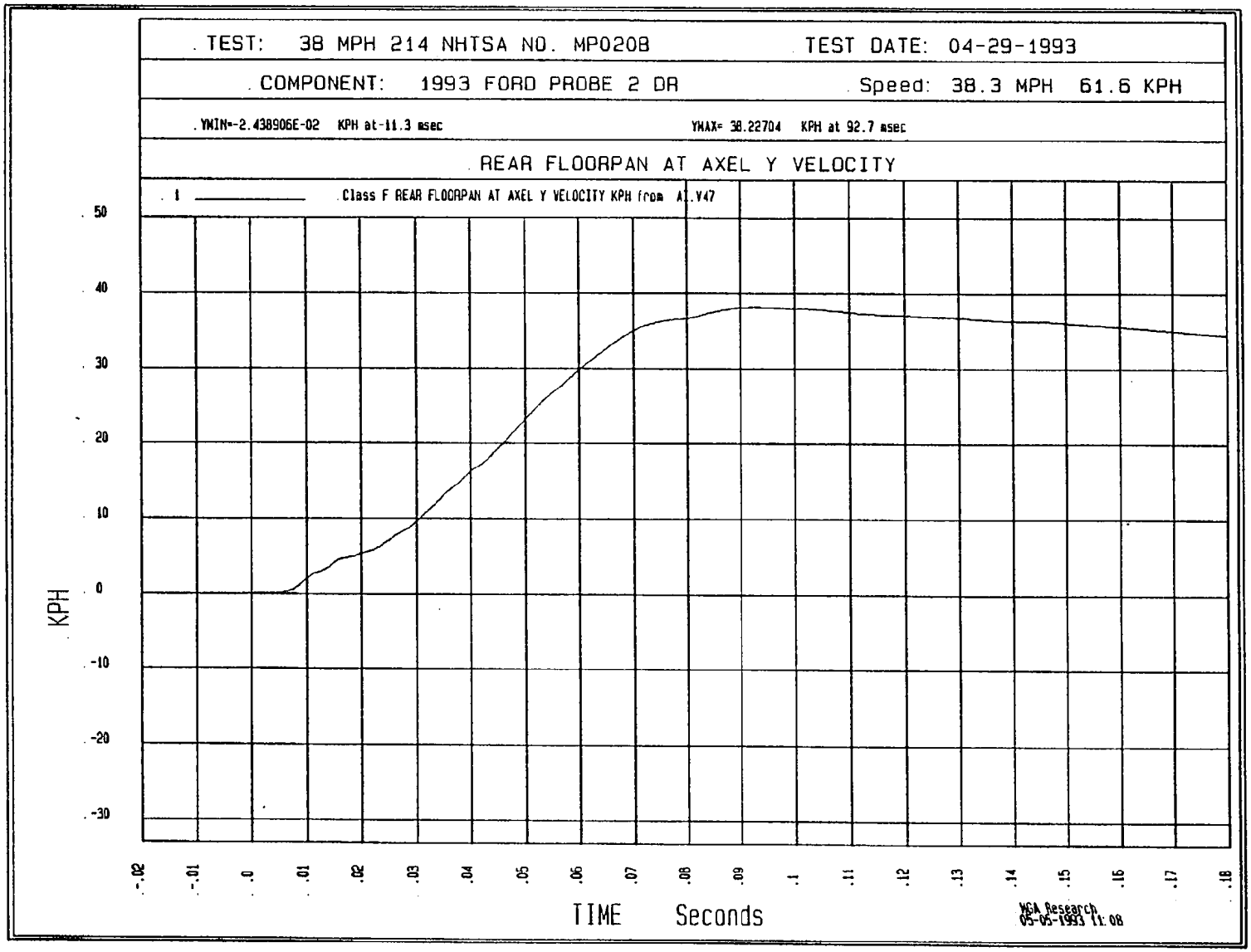


Figure B-69 - Rear Floorpan at Axle Y Velocity vs. Time

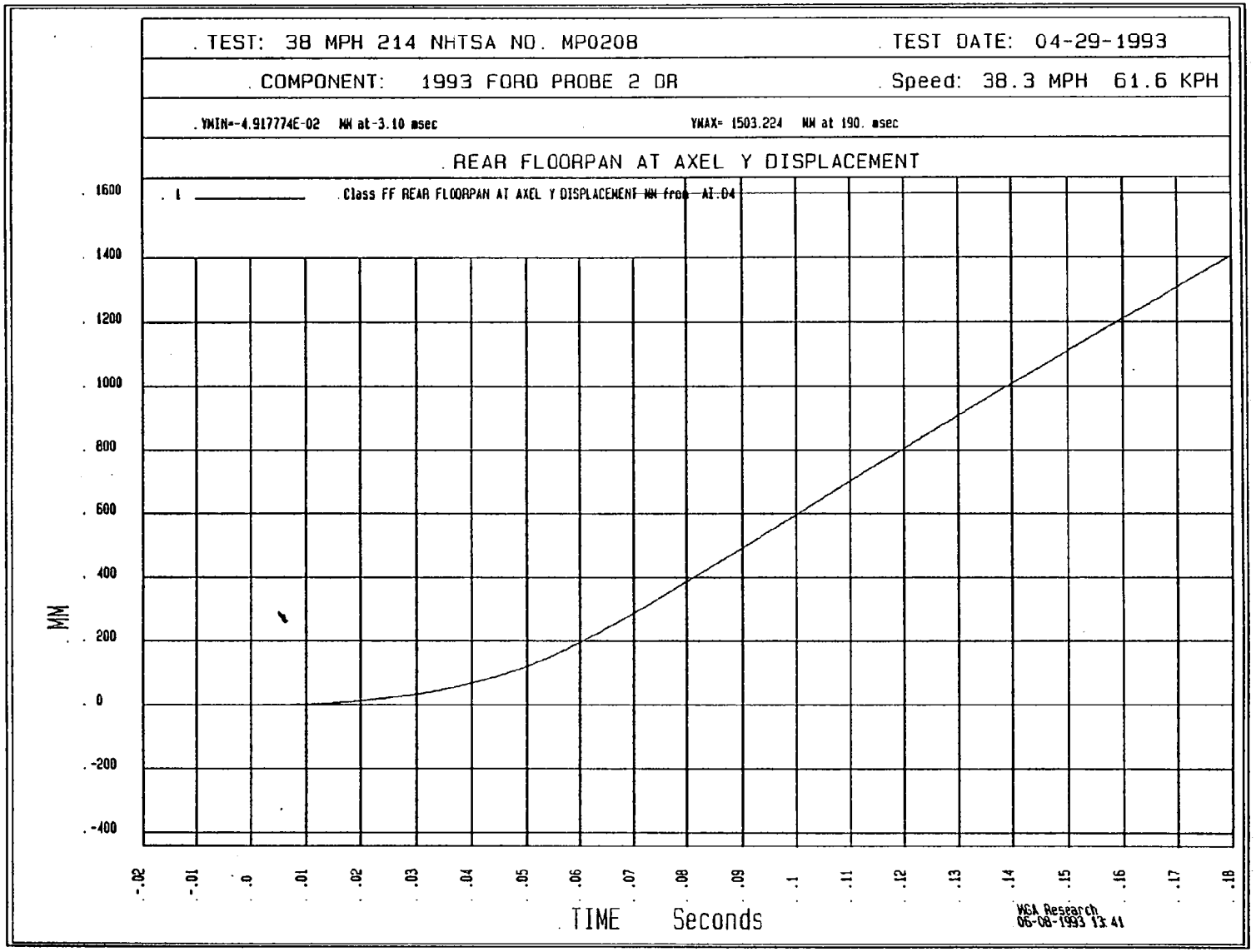


Figure B-7Ø - Rear Floorpan at Axle Y Displacement vs. Time

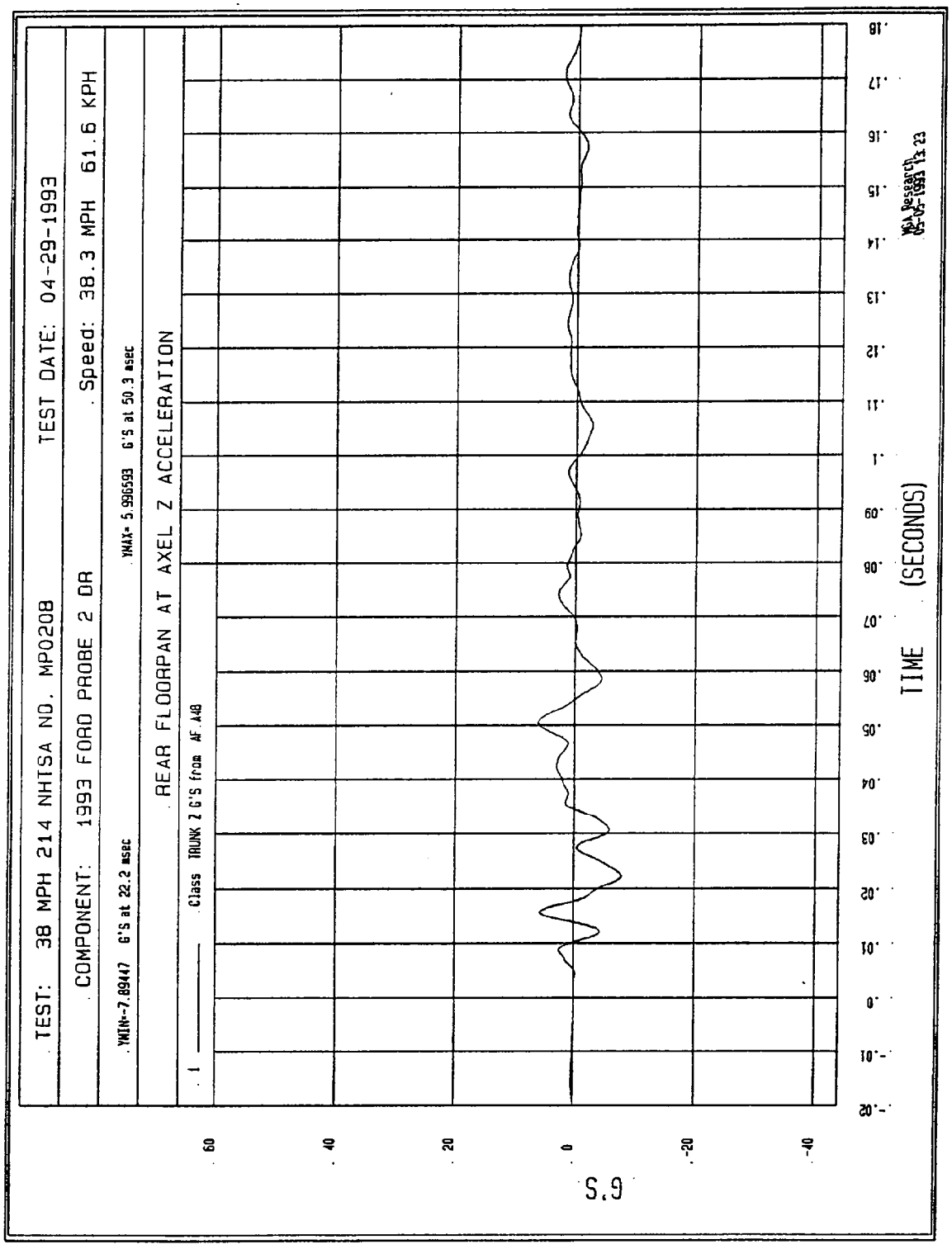


Figure B-71 - Rear Floorpan at Axle Z Acceleration vs. Time

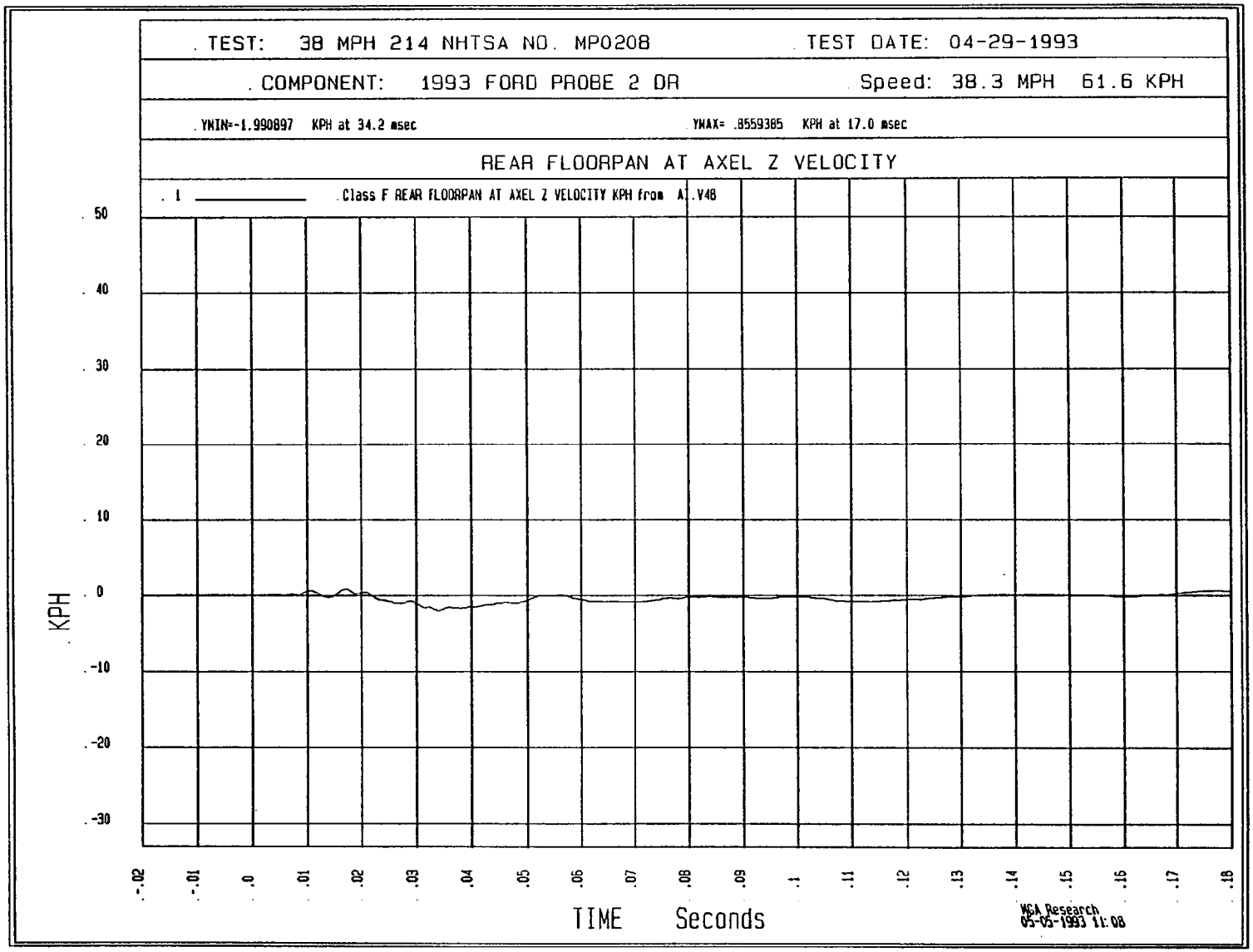


Figure B-72 - Rear Floorpan at Axle Z Velocity vs. Time

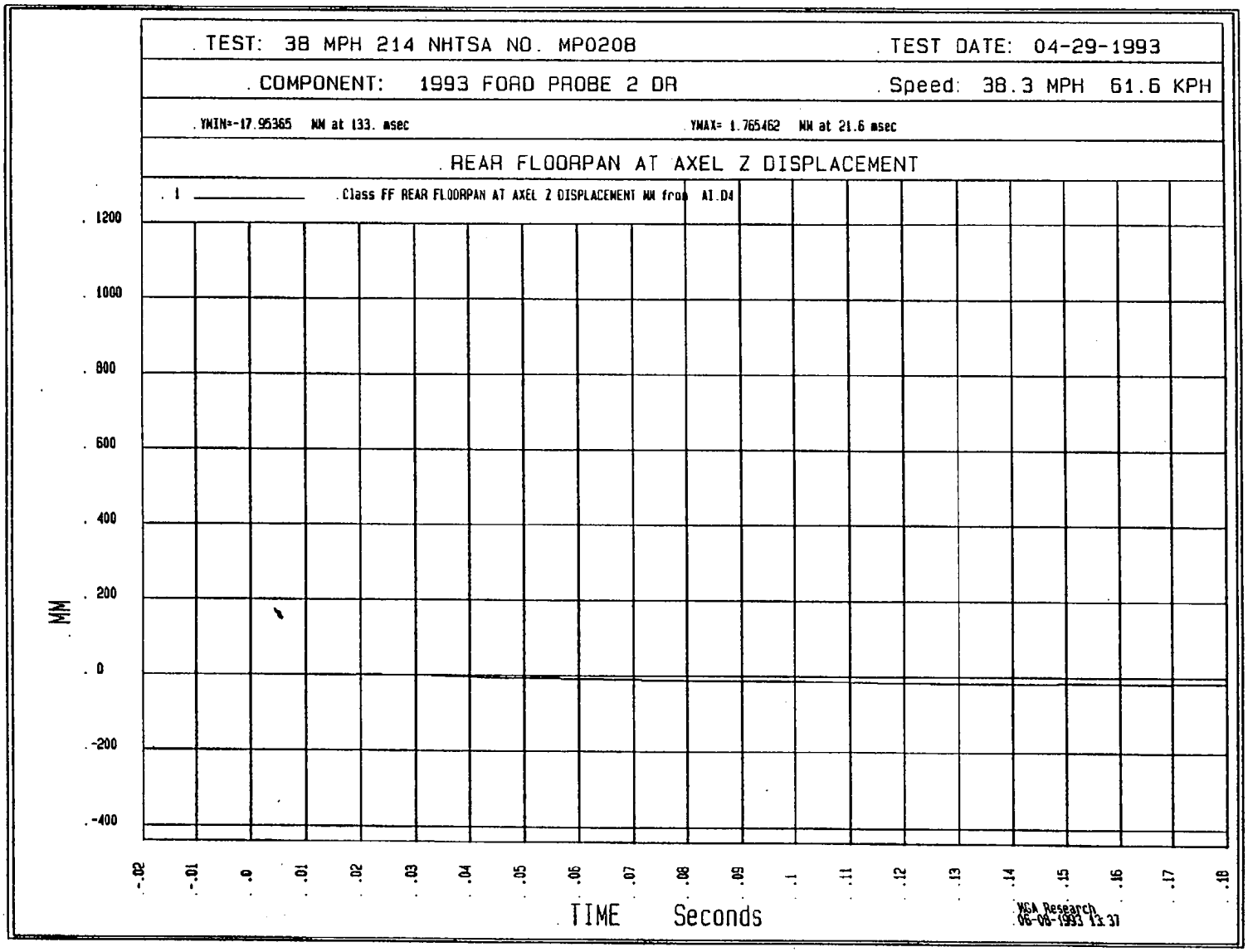


Figure B-73 - Rear Floorpan at Axle Z Displacement vs. Time

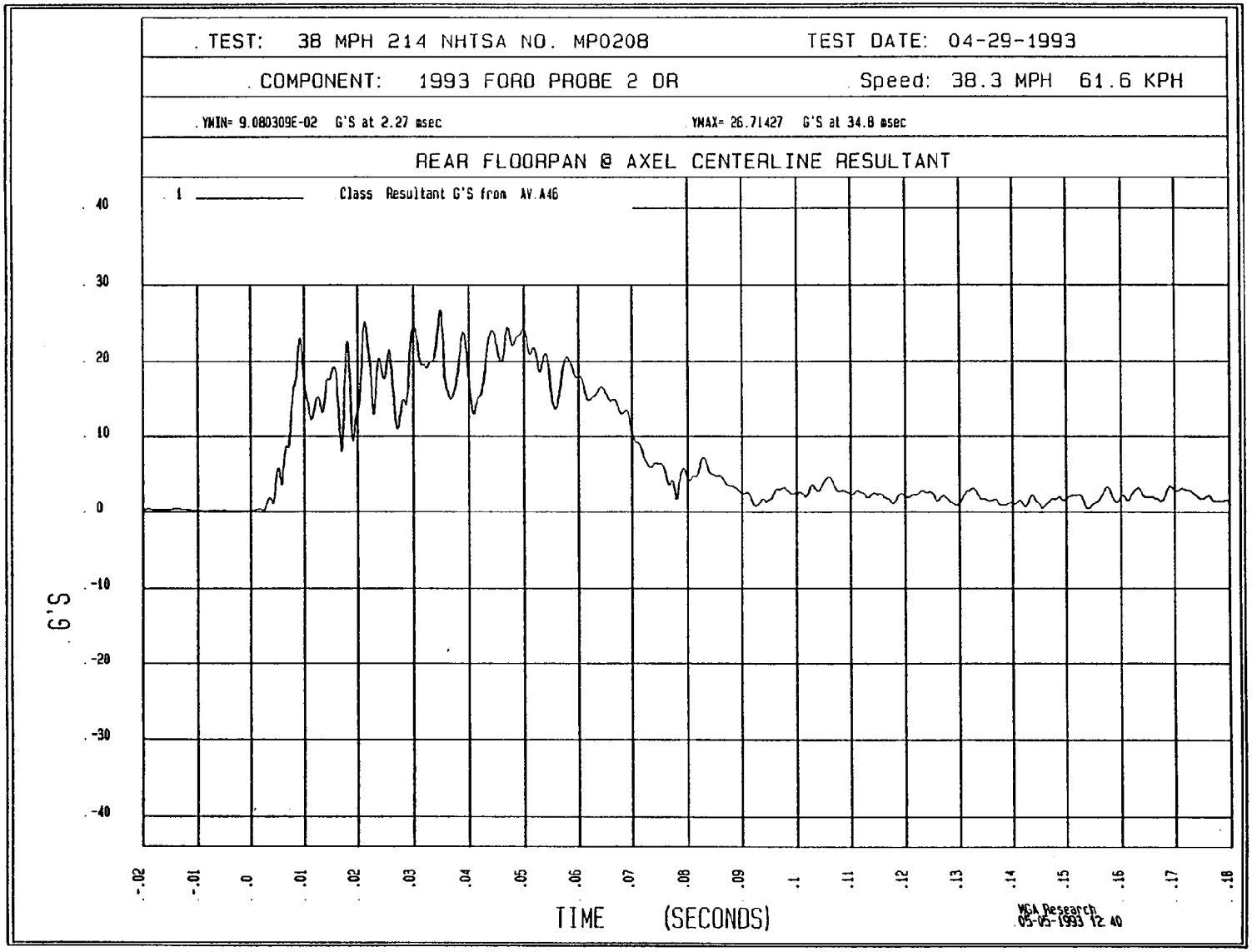


Figure B-74 - Rear Floorpan at Axle Centerline Resultant

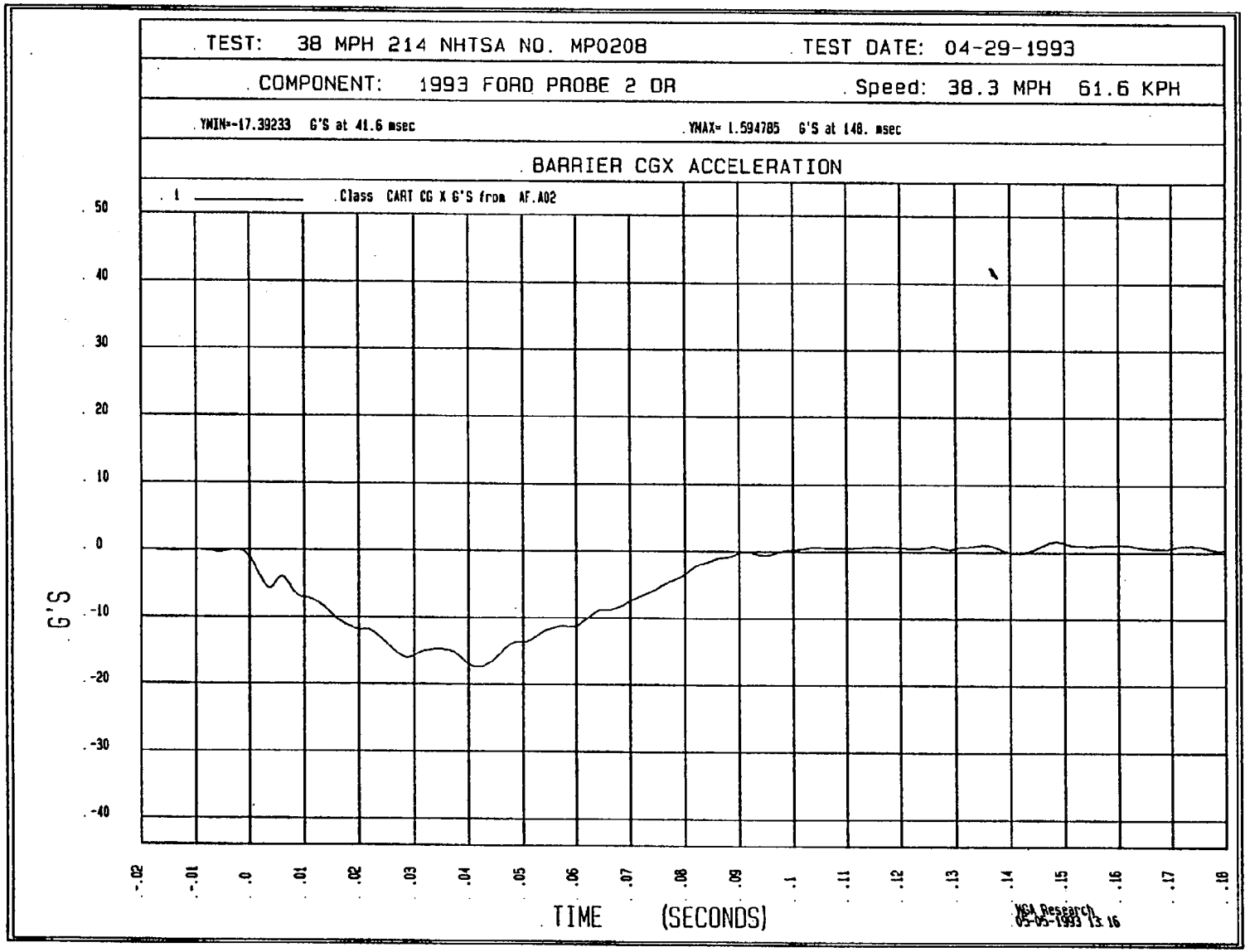


Figure B-75 - MDB Center of Gravity X Accel. vs. Time

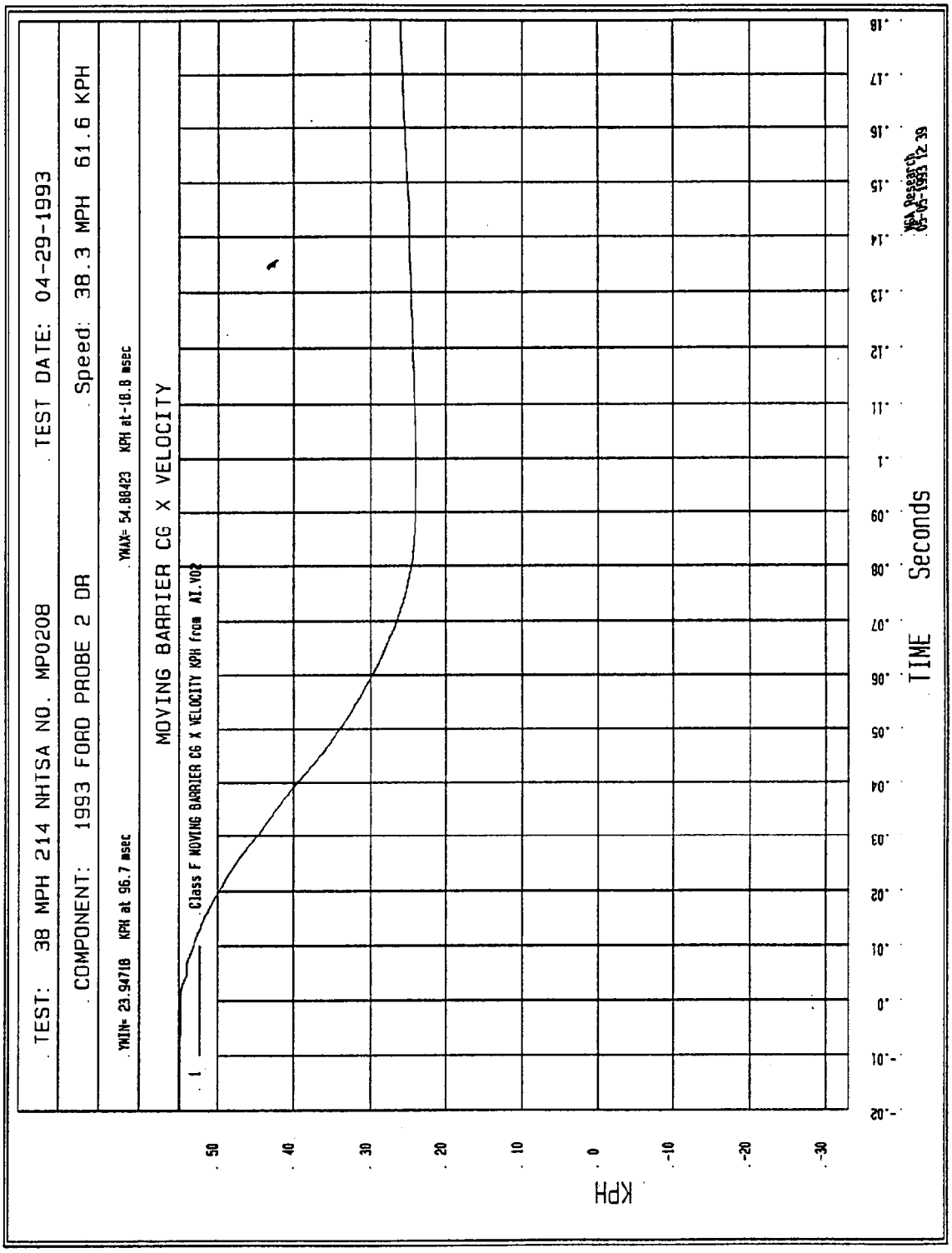


Figure B-76 - MDB Center of Gravity X Velocity vs. Time

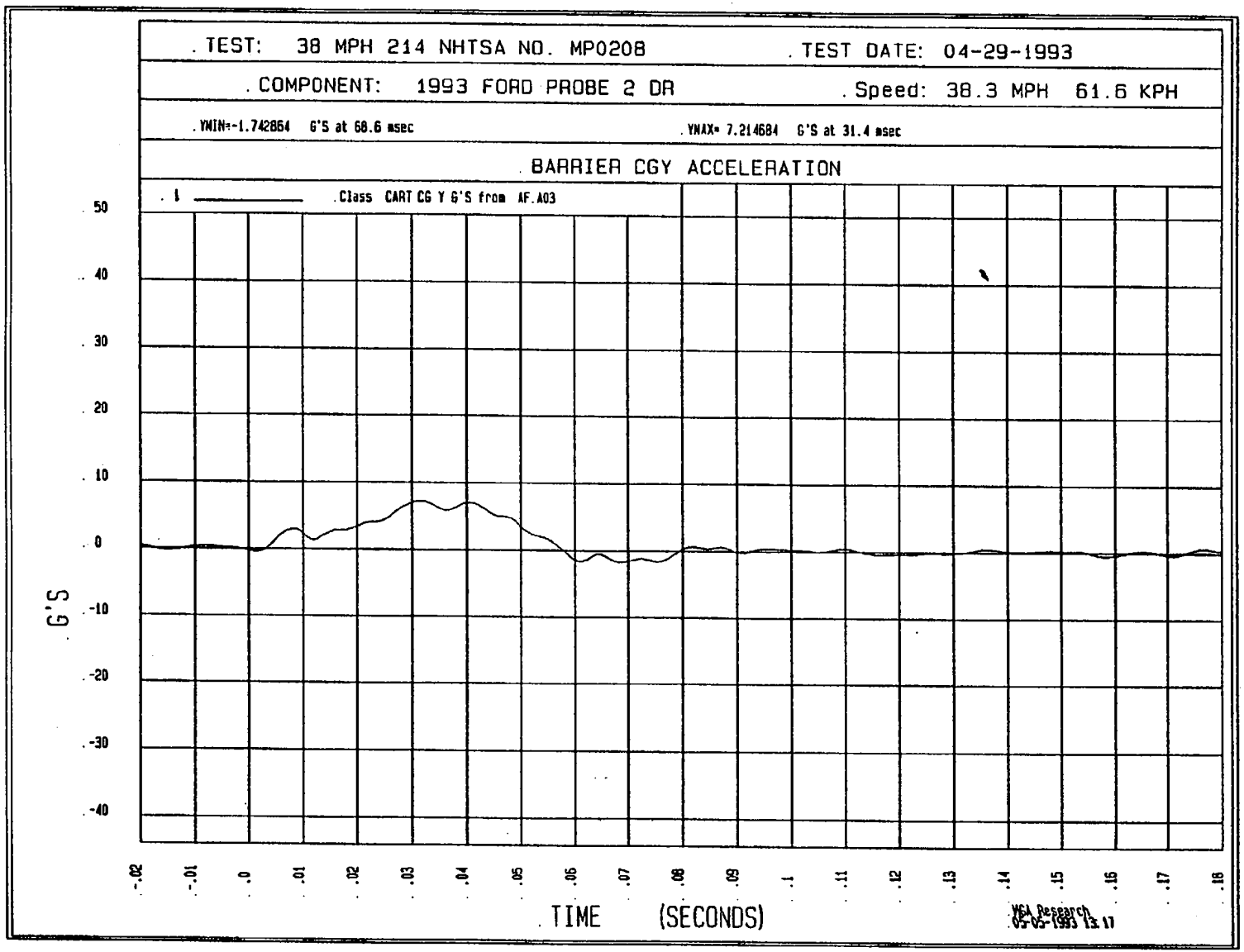


Figure B-77 - MDB Center of Gravity Y Accel. vs. Time

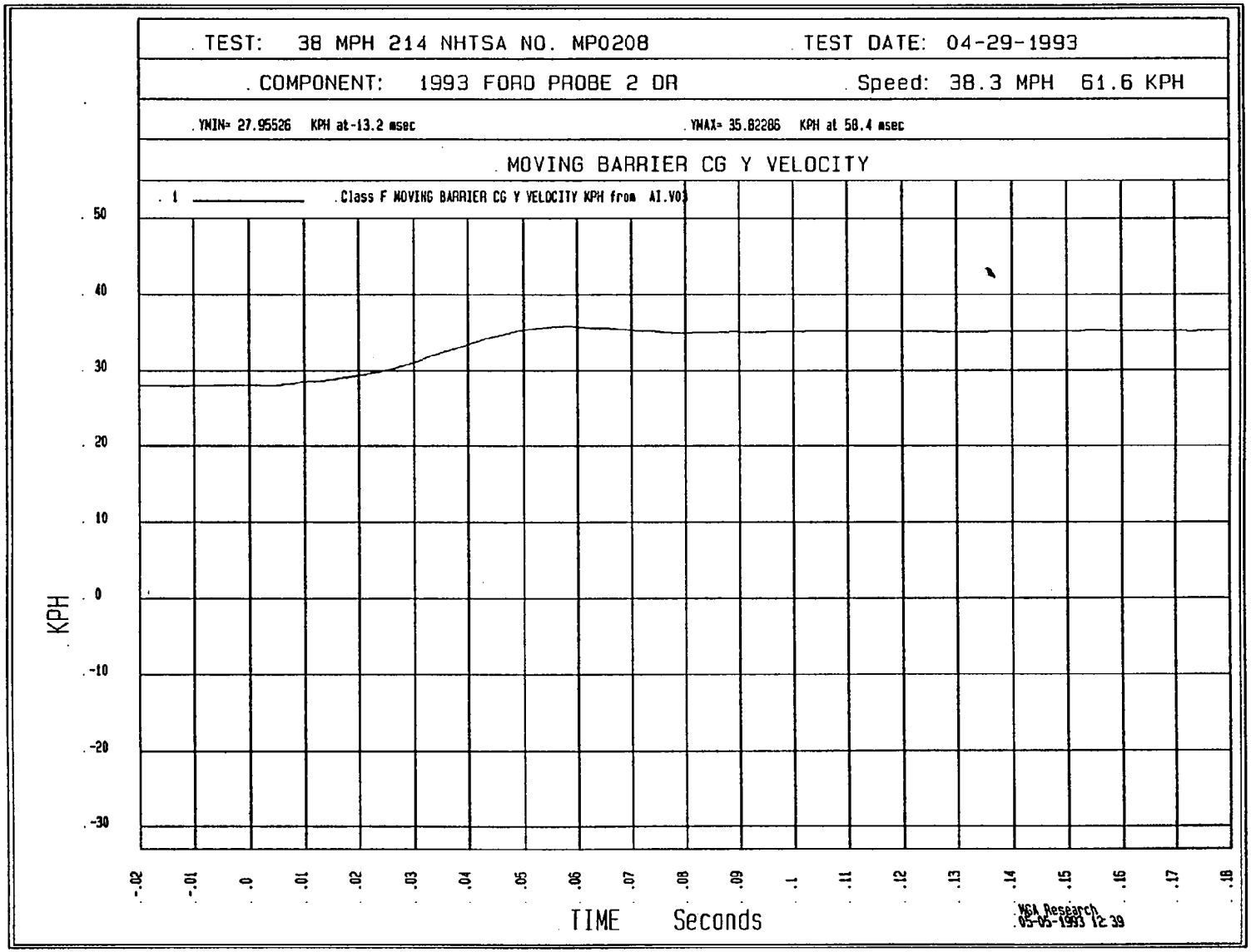


Figure B-78 - MDB Center of Gravity Y Velocity vs. Time

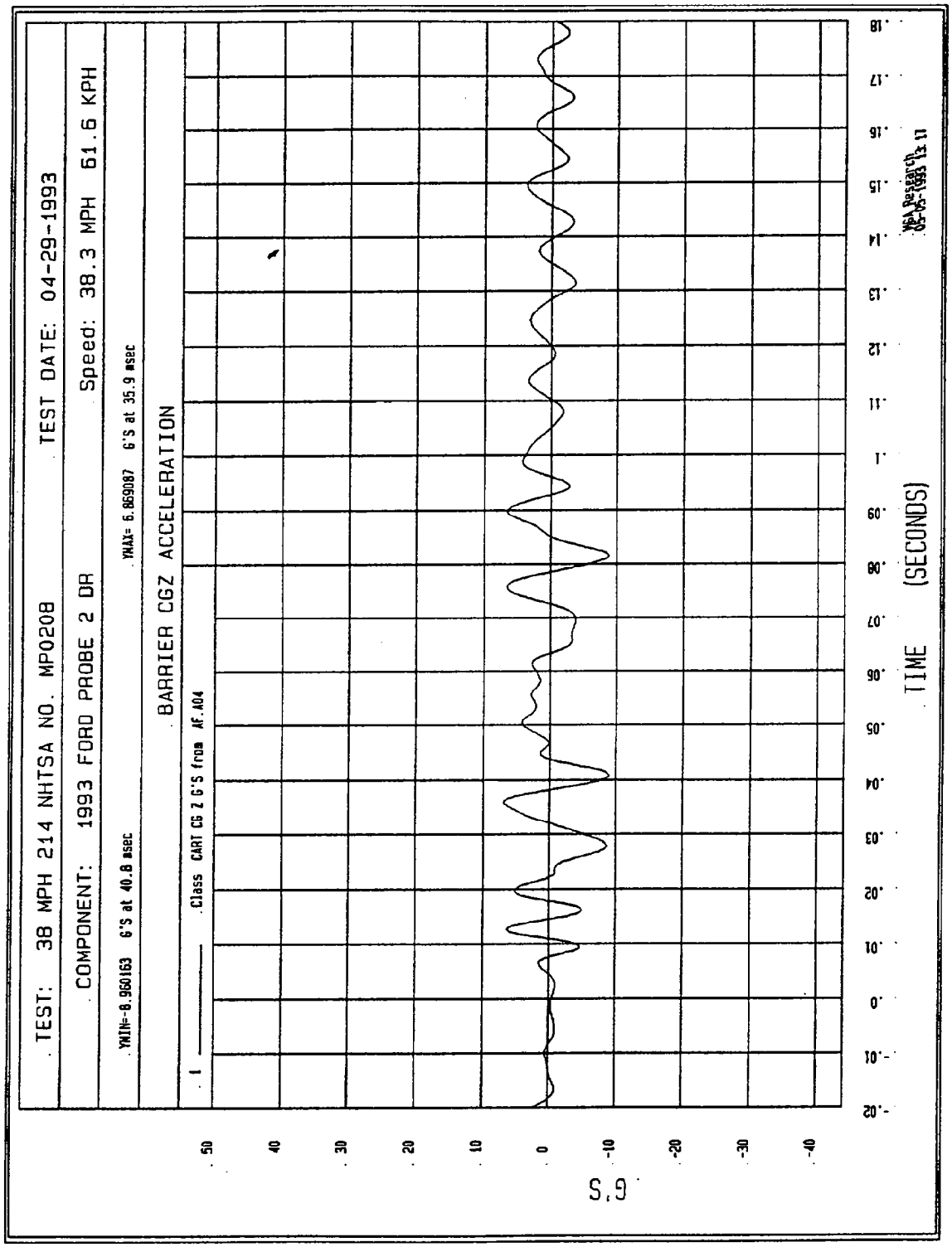


Figure B-79 - MDB Center of Gravity Z Accel. vs. Time

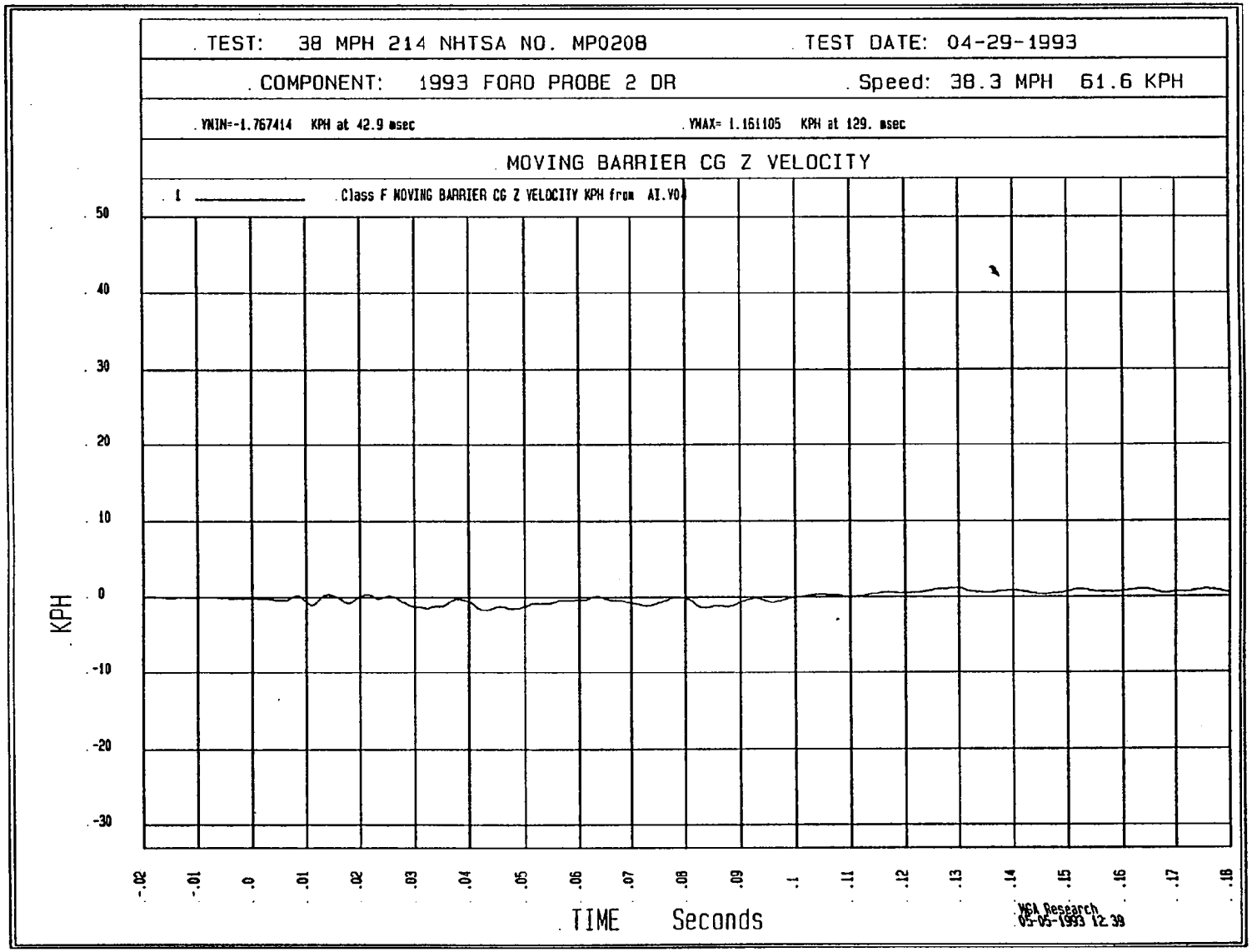


Figure B-8Ø - MDB Center of Gravity Z Velocity vs. Time

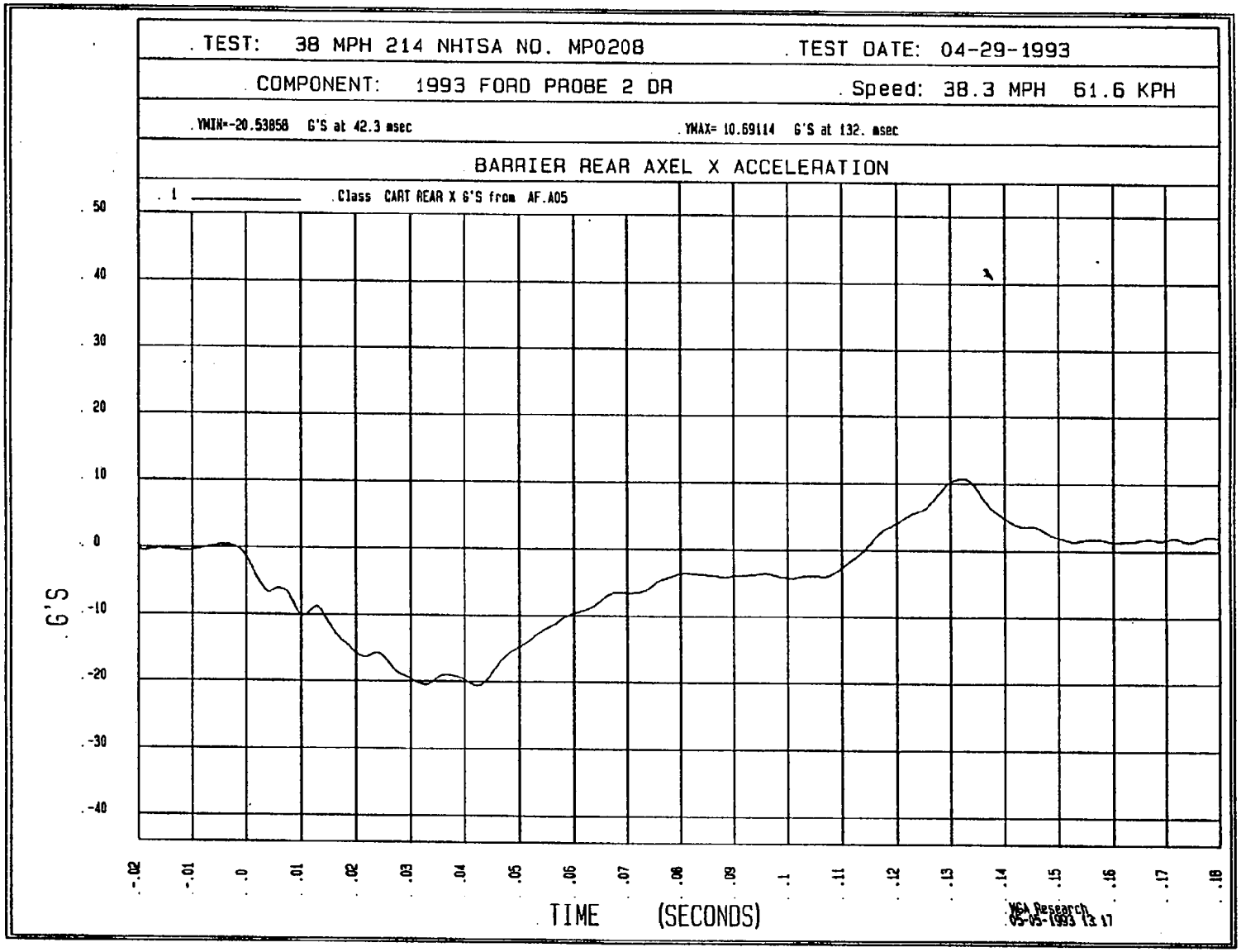


Figure B-81 - MDB Rear X Acceleration vs. Time

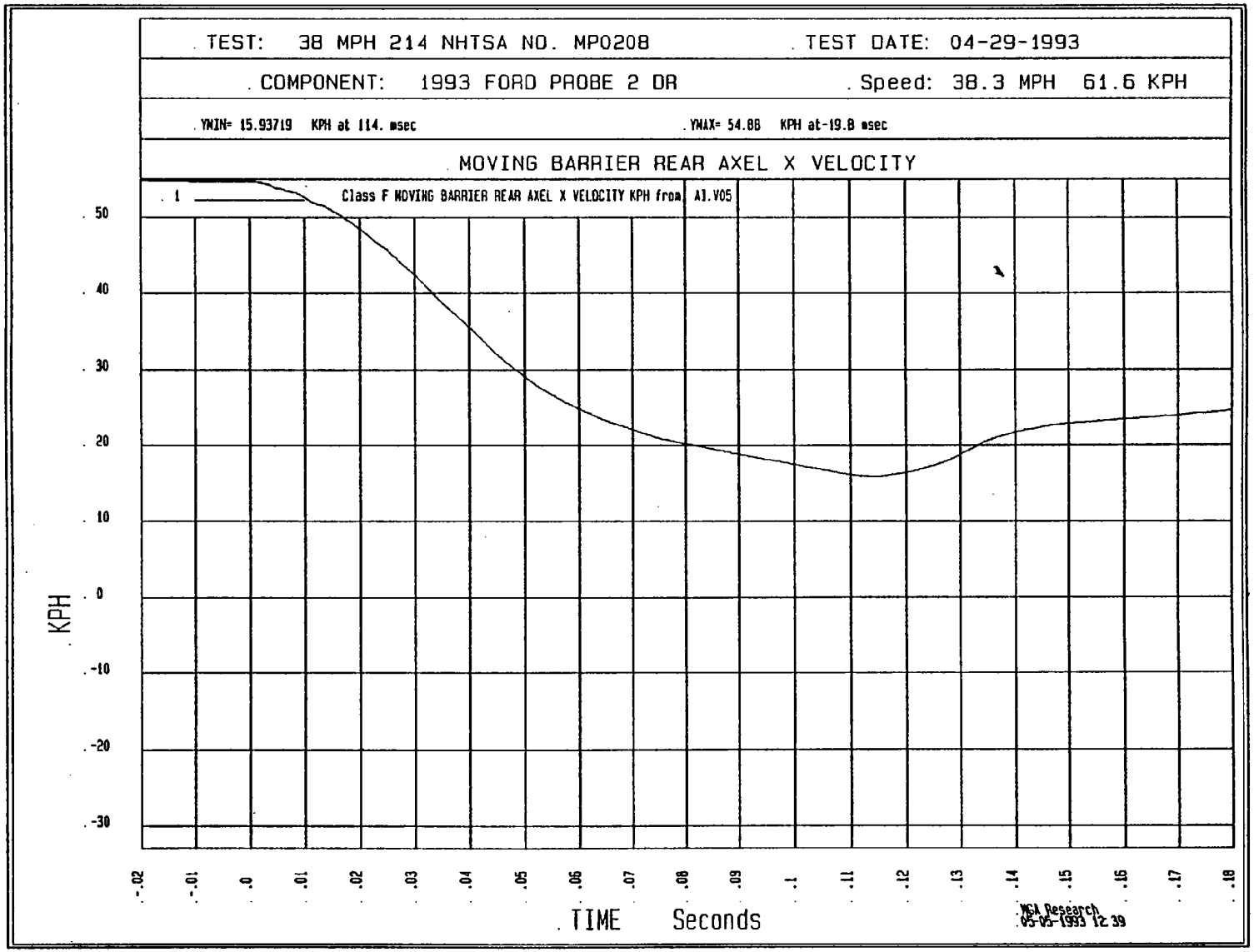


Figure B-82 - MDB Rear X Velocity vs. Time

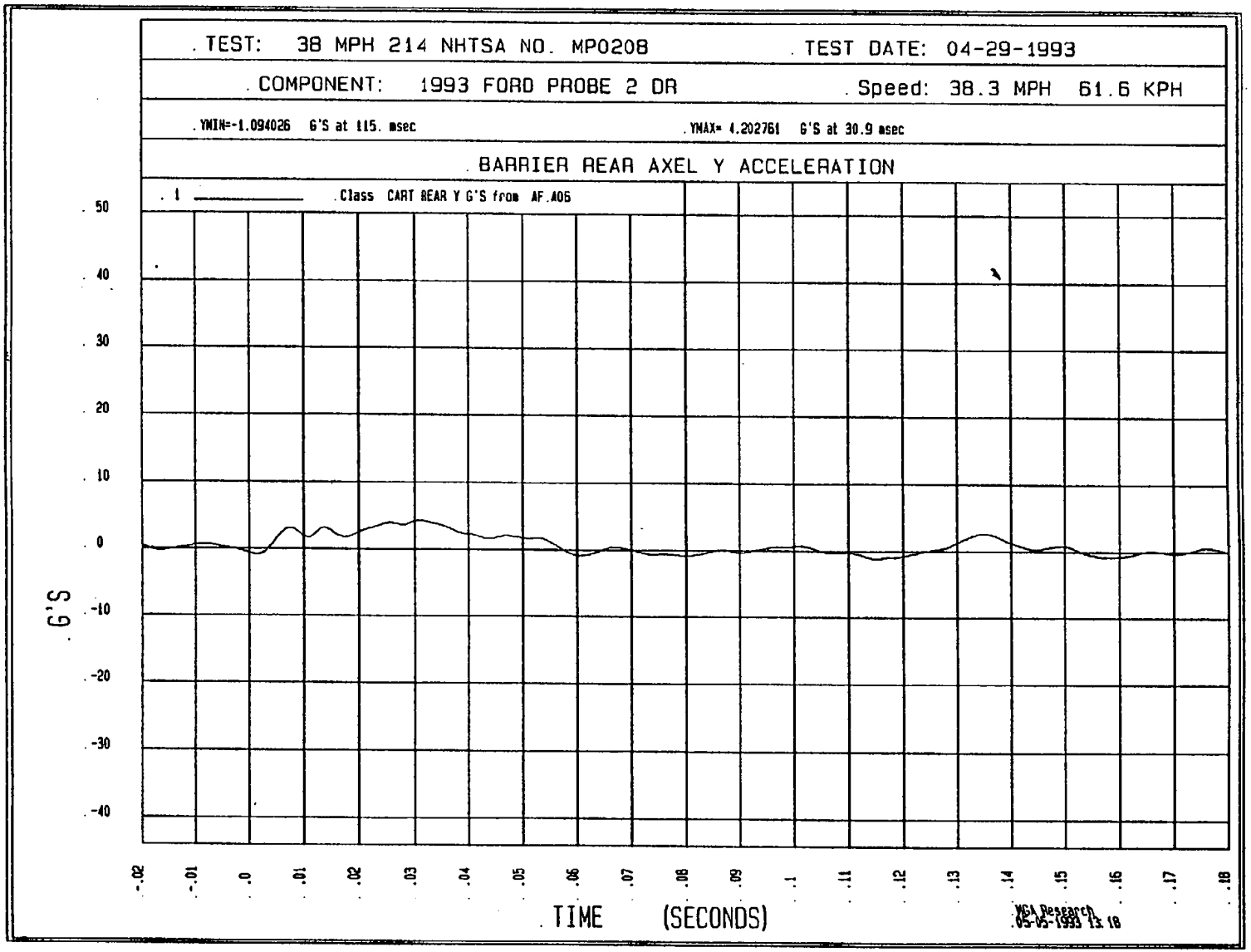


Figure B-83 - MDB Rear Y Acceleration vs. Time

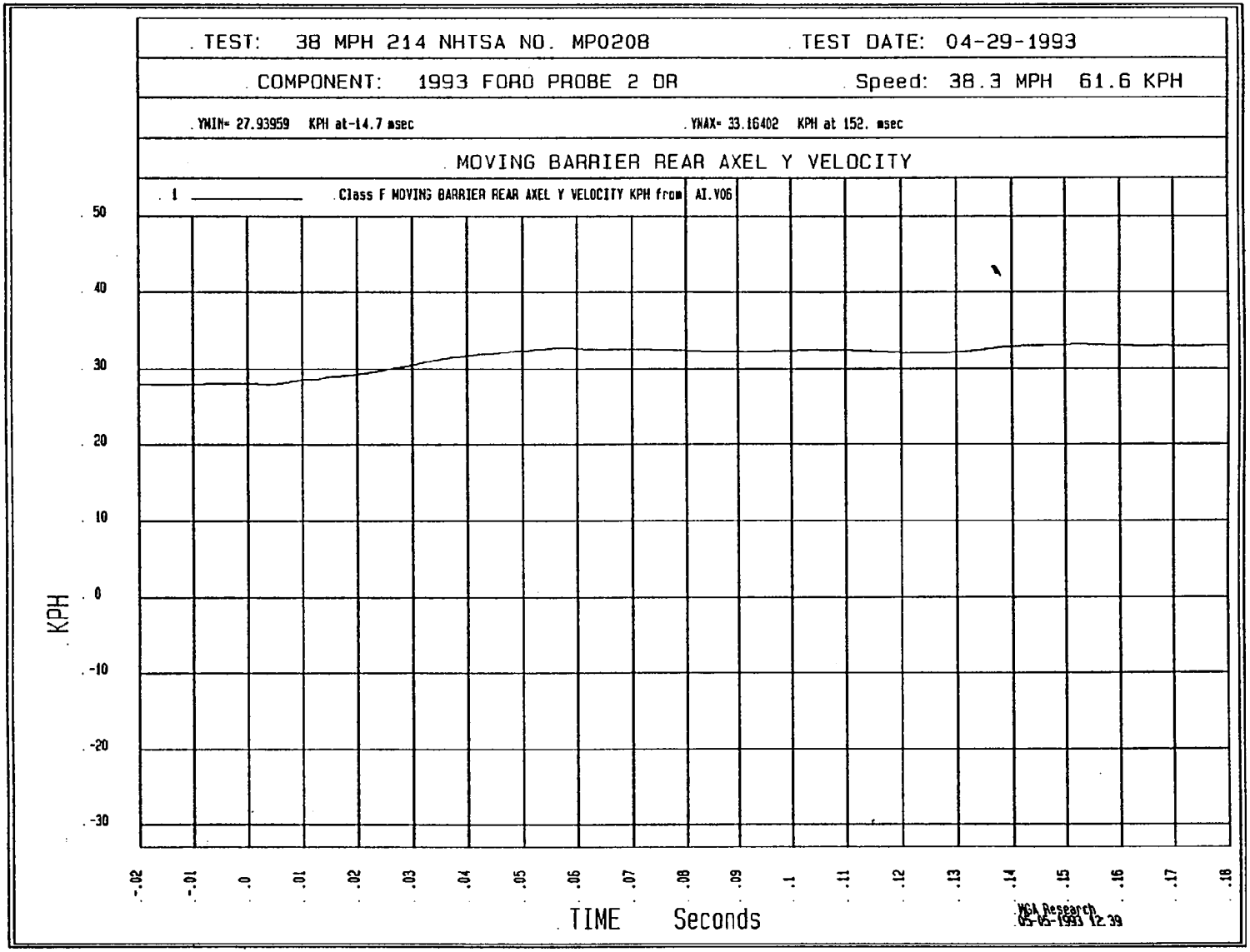


Figure B-84 - MDB Rear Y Velocity vs. Time

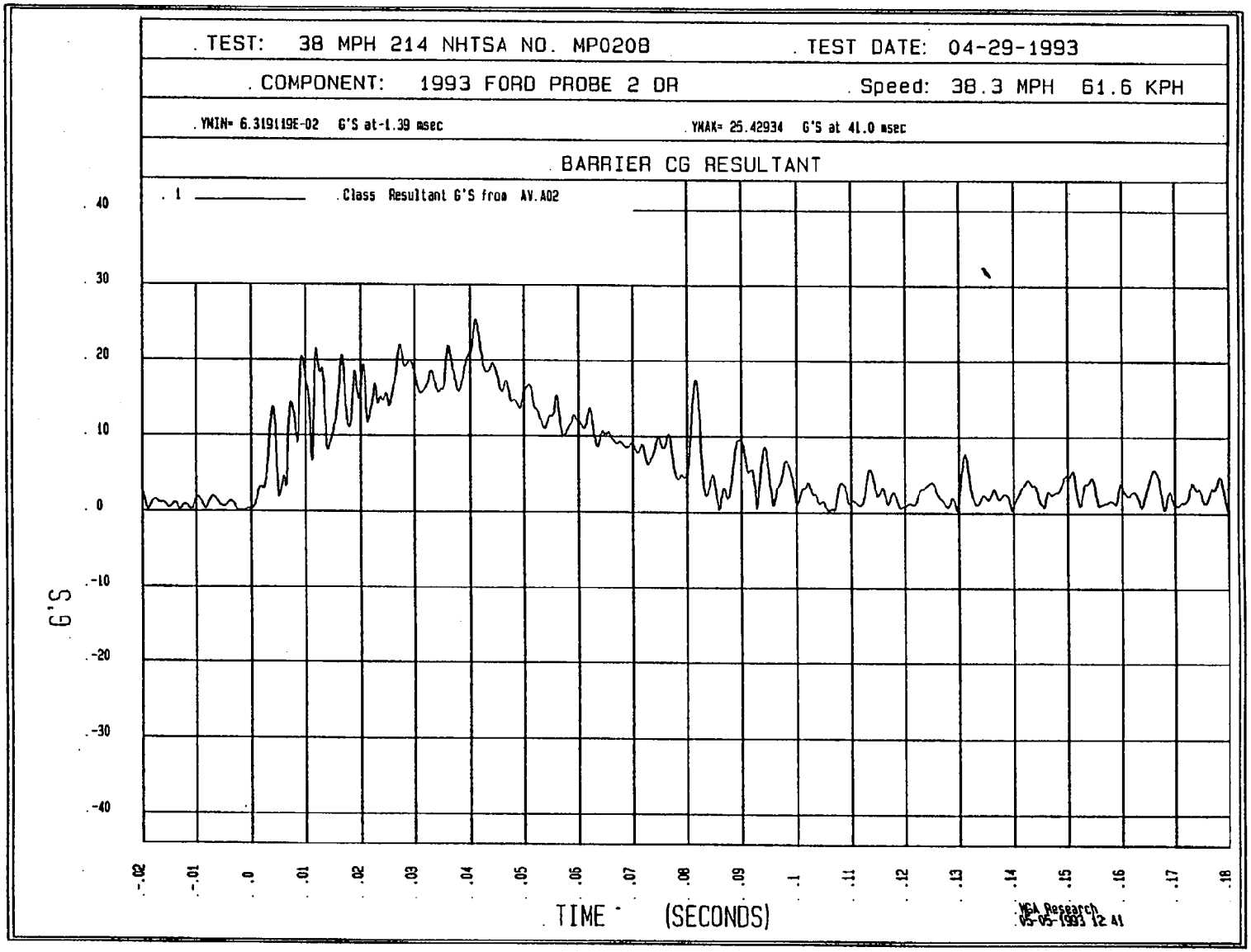


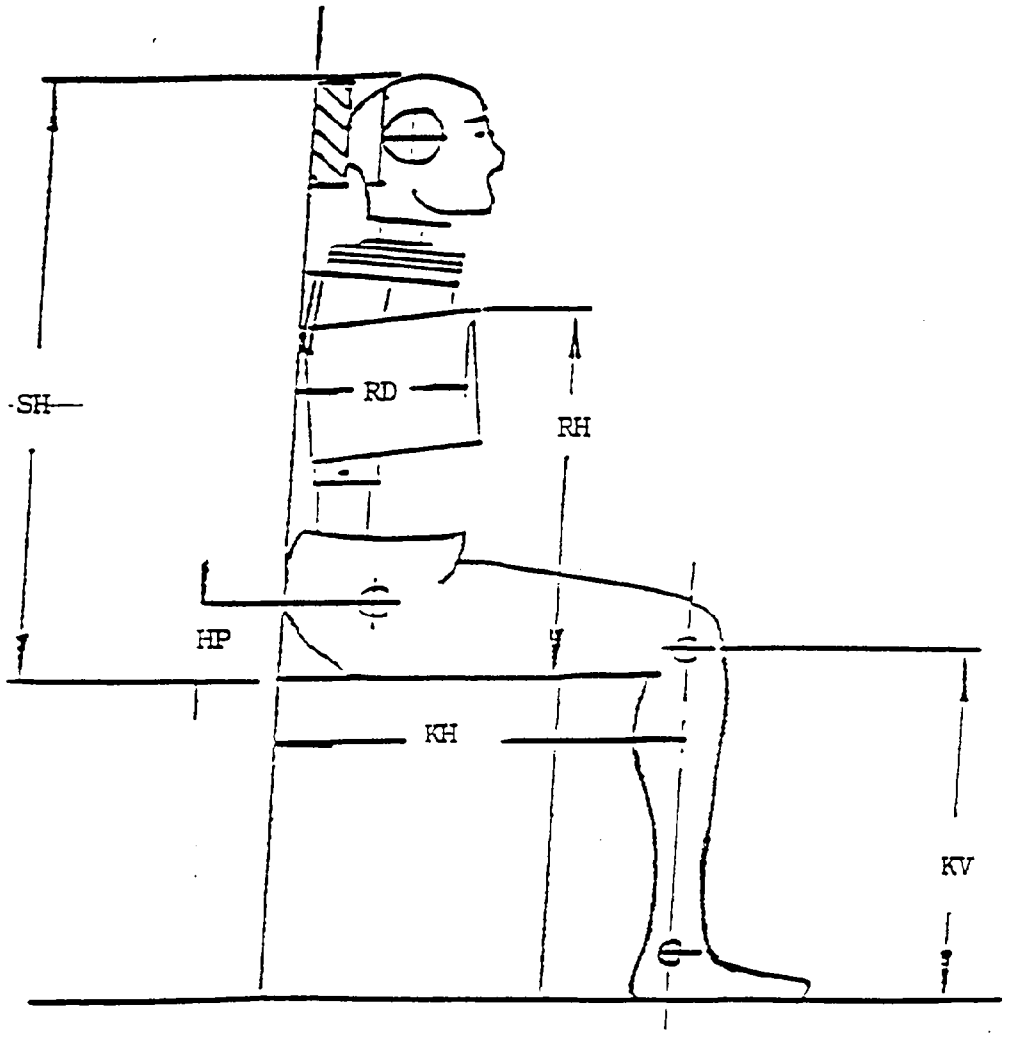
Figure B-85 - MDB Center of Gravity Resultant vs. Time

APPENDIX C
SID CONFIGURATION AND PERFORMANCE VERIFICATION DATA

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 136 DUMMY CALIBRATION BY: Rod McClelland

I. CONFIGURATION VERIFICATION DATA



DATE OF CONFIGURATION VERIFICATION: 4-30-93

DESCRIPTION	SPECIFICATION	ACTUAL MEASUREMENT
SH - Seated Height	35.6" to 35.8"	35.7
RH - Rib Height	19.75" to 20.5"	20.5
HP - Hip Pivot Height	3.9" ref.	3.8
RD - Rib From Backline	9.0" to 9.5"	9.0
KH - Knee Pivot From Backline	20.1" to 20.7"	20.5
KV - Knee Pivot to Floor	19.3" to 19.9"	19.5
HW - Hip Width	14.0" to 15.4"	15.4

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE (CONT.)

II. PERFORMANCE VERIFICATION DATA

DUMMY NO.: 136 DUMMY CALIBRATION BY: Rod McClelland

VERIFICATION LABORATORY TEMPERATURE (66° - 78°F): 70°

1.0 LUMBAR FLEXION TEST

	SPECIFICATION	MEASUREMENT
Force @ 20°	22 to 34 lbs	28
Force @ 30°	34 to 46 lbs	40
Force @ 40°	46 to 58 lbs	52
Return Angle	12° Maximum	11°

2.0 ABDOMINAL COMPRESSION TEST
(Preload = 10 lbs)

	SPECIFICATION	MEASUREMENT
Force @ 0.5 in	23.3 to 36.5 lbs	27
Force @ 0.75 in	36.7 to 49.8 lbs	40
Force @ 1.0 in	50 to 63 lbs	56
Force @ 1.3 in	73 to 88 lbs	83

3.0 THORAX IMPACT TEST

	SPECIFICATION	MEASUREMENT
Probe Speed	13.8 TO 14.2 f/s	13.82
Upper Rib	37 to 46 g	45.59
Lower Rib	37 to 46 g	43.97
Lower Spine	15 to 22 g	19.76

4.0 PELVIC IMPACT TEST

	SPECIFICATION	MEASUREMENT
Probe Speed	13.8 to 14.2 f/s	13.8
Pelvis Acceleration	40 to 60 g	55

SIDE IMPACT DUMMY DATA SHEET

DUMMY #: 136

TEST DATE: 4-29-93

DRIVER	PASSENGER
X	

EXPOSURE	DATE	TYPE OF TEST
1st	4-29-93	NHTSA

1) RIB ACCELEROMETERS:

	MANUFACTURER	SERIAL NO.	CAL. DATE	DLR	CHECKED
UR	Endevco	A06M	11-9-92	99.14	X
URR	Endevco	AC764	2-23-93	108.82	X
LR	Endevco	AC8R2	12-29-92	112.43	X
LRR	Endevco	A43M	11-6-92	124.44	X

2) SPINE ACCELEROMETERS

	MANUFACTURER	SERIAL NO.	CAL. DATE	DLR	CHECKED
USY	Endevco	ACC00	11-6-92	119.6	X
USRY	Endevco	A82D	11-6-92	89.23	X
LSY	Endevco	ACC68	12-29-92	112.14	X
LSRY	Endevco	ACCL3	12-29-92	102.65	X

3) PELVIS ACCELEROMETERS

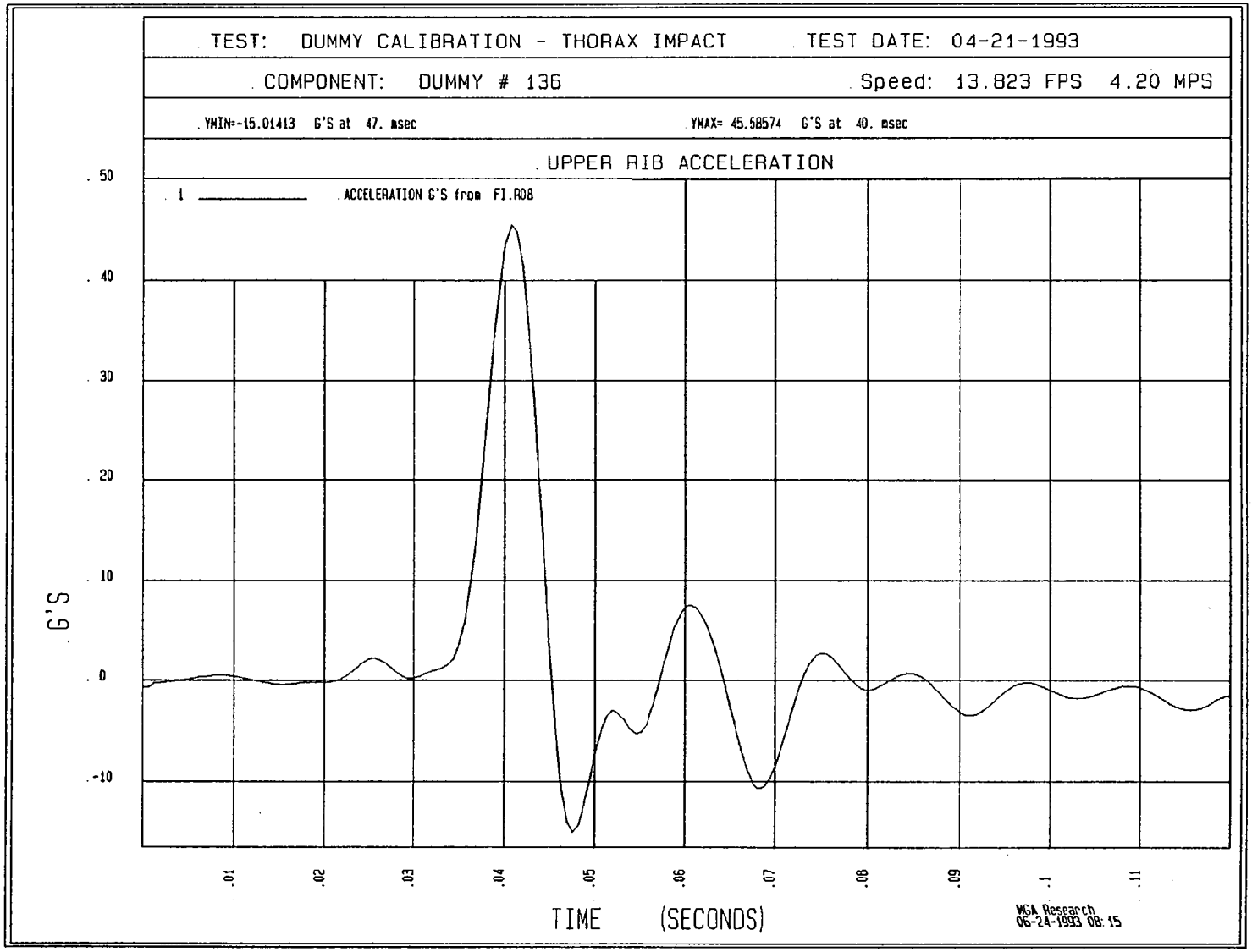
	MANUFACTURER	SERIAL NO.	CAL. DATE	DLR	CHECKED
Y	Endevco	AC758	2-23-93	97.45	X
RY	Endevco	AC8R7	2-23-93	124.15	X

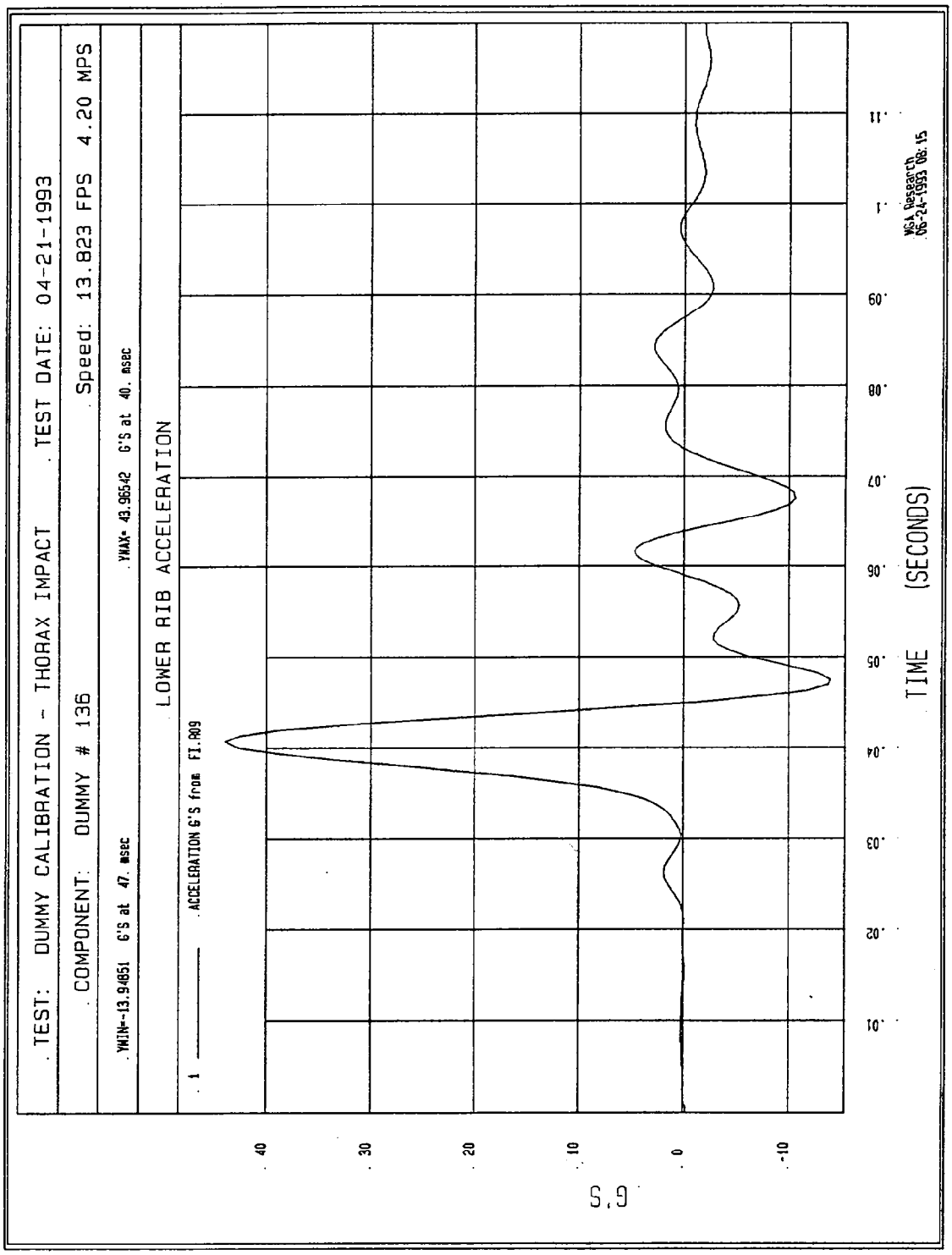
4) OTHER ACCELEROMETERS

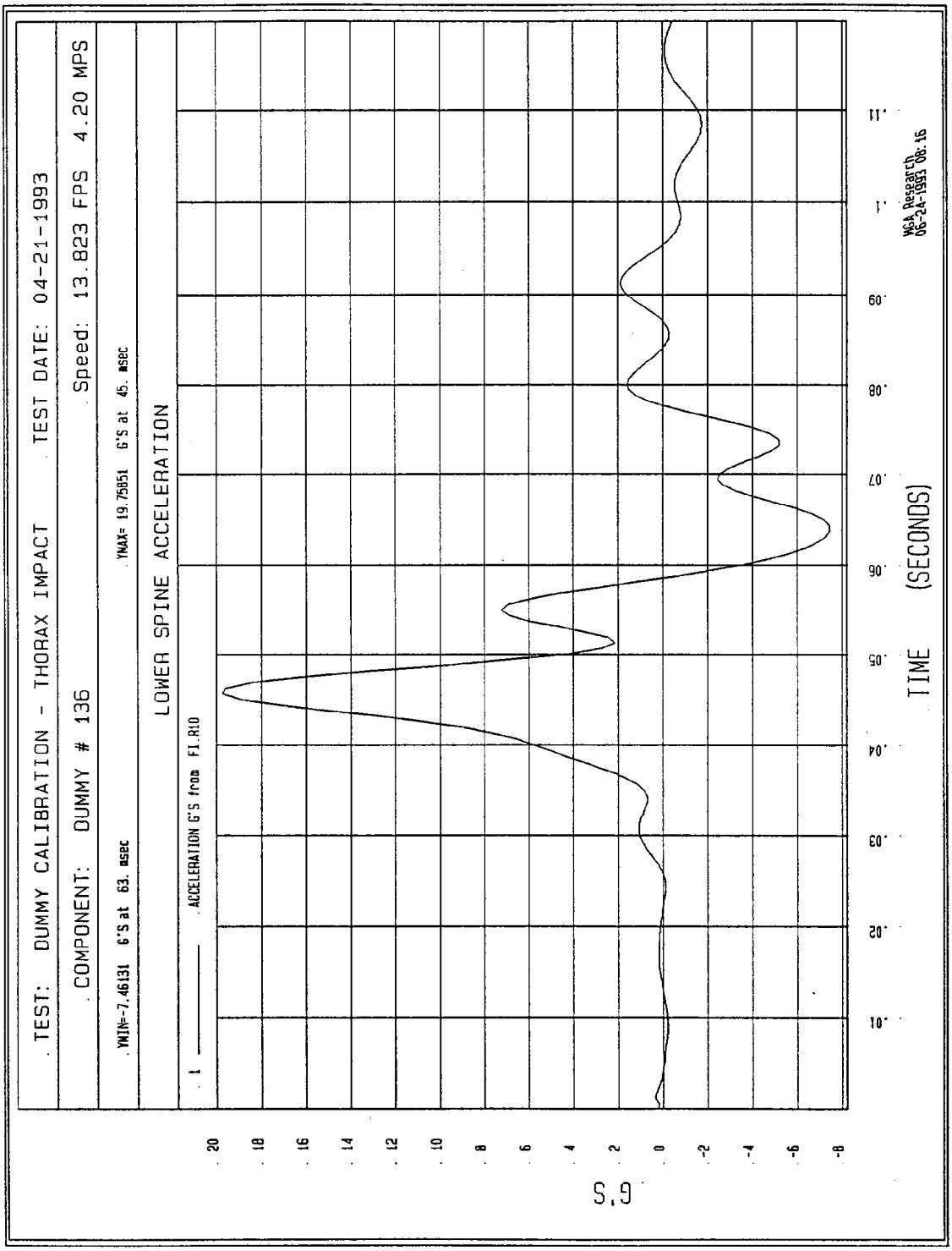
	MANUFACTURER	SERIAL NO.	CAL. DATE	DLR	CHECKED
CHEST DISPLACEMENT	Servco	136	4-20-93	.61 in/v	X

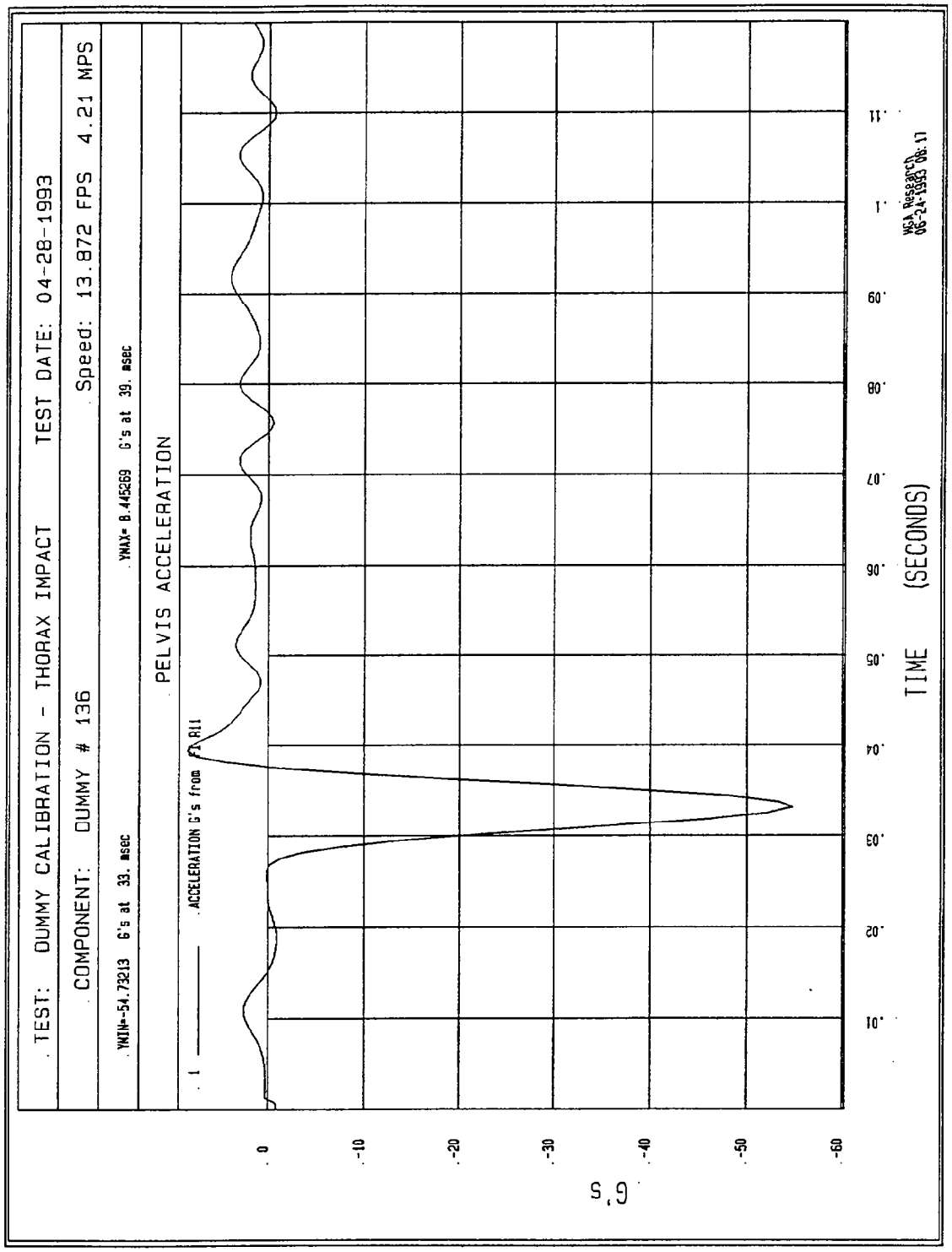
DUMMY INSTRUMENTED BY: Rod McClelland

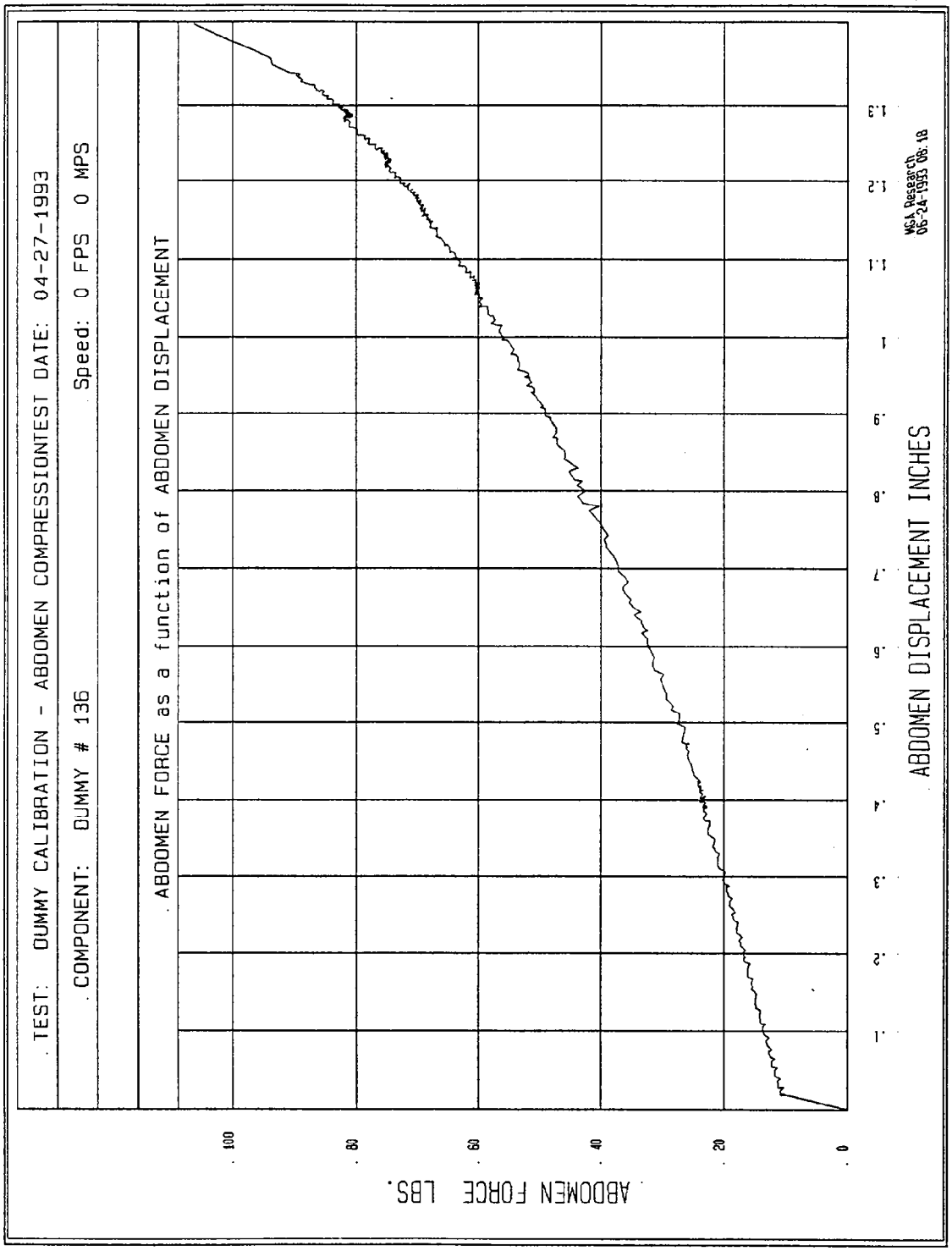
APPROVED BY: Rod McClelland


TEST: DUMMY CALIBRATION - THORAX IMPACT
TEST DATE: 04-21-1993
COMPONENT: DUMMY # 136
Speed: 13.823 FPS 4.20 MPS
YMIN=-15.01413 G'S at 47. msec
YMAX= 45.58574 G'S at 40. msec
UPPER RIB ACCELERATION
1 ACCELERATION G'S from FI.R08
50
40
30
20
10
0
-10
G'S
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
TIME (SECONDS)
WSA Research
06-24-1993 08:15

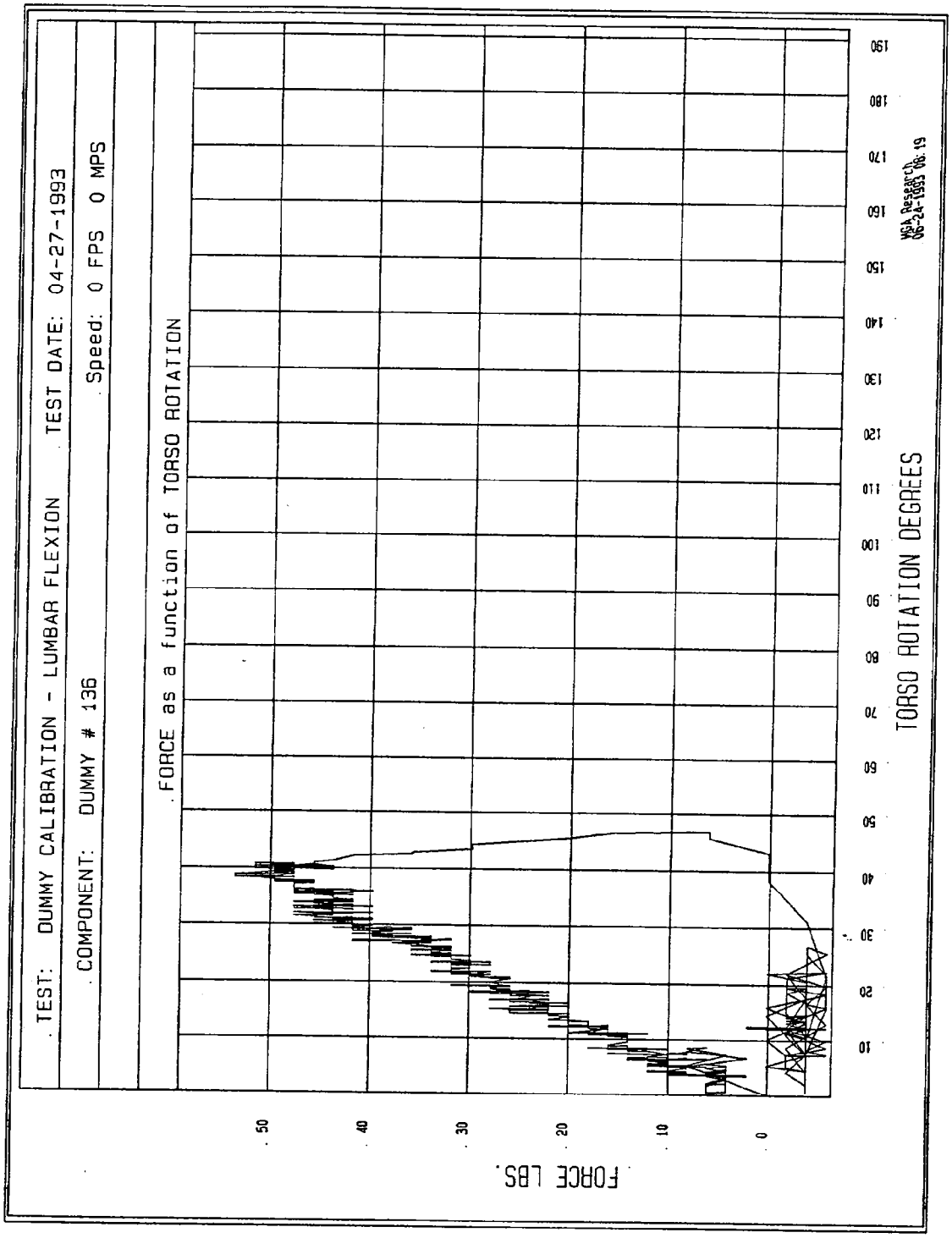

TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 04-21-1993
COMPONENT: DUMMY # 136 Speed: 13.823 FPS 4.20 MPS
YMIN=-13.94651 G'S at 47. msec YMAX= 43.96542 G'S at 40. msec
LOWER RIB ACCELERATION
1 ACCELERATION G'S from F1:R09
40
30
20
10
0
-10
G'S
TIME (SECONDS)
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
MGA Research
06-24-1993 08:15


TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 04-21-1993
COMPONENT: DUMMY # 136 Speed: 13.823 FPS 4.20 MPS
YMIN=-7.46131 G'S at 63. msec YMAX= 19.75851 G'S at 45. msec
LOWER SPINE ACCELERATION
1 ACCELERATION G'S from F1.R10
G'S
TIME (SECONDS)
MGA Research 06-24-1993 08:16


TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 04-28-1993
COMPONENT: DUMMY # 136 Speed: 13.872 FPS 4.21 MPS
YMIN=-54.73213 G's at 33. msec YMAX= 8.445269 G's at 39. msec
PELVIS ACCELERATION
1 ACCELERATION G's from A11
0
-10
-20
-30
-40
-50
-60
G's
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
TIME (SECONDS)
MGA Research 08-24-1993 08:11


TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSIONTEST DATE: 04-27-1993
COMPONENT: DUMMY # 136 Speed: 0 FPS 0 MPS
ABDOMEN FORCE as a function of ABDOMEN DISPLACEMENT
ABDOMEN FORCE LBS.
100
80
60
40
20
0
ABDOMEN DISPLACEMENT INCHES
.1
.2
.3
.4
.5
.6
.7
.8
.9
1
1.1
1.2
1.3
NGA Research
06-24-1993 08:18

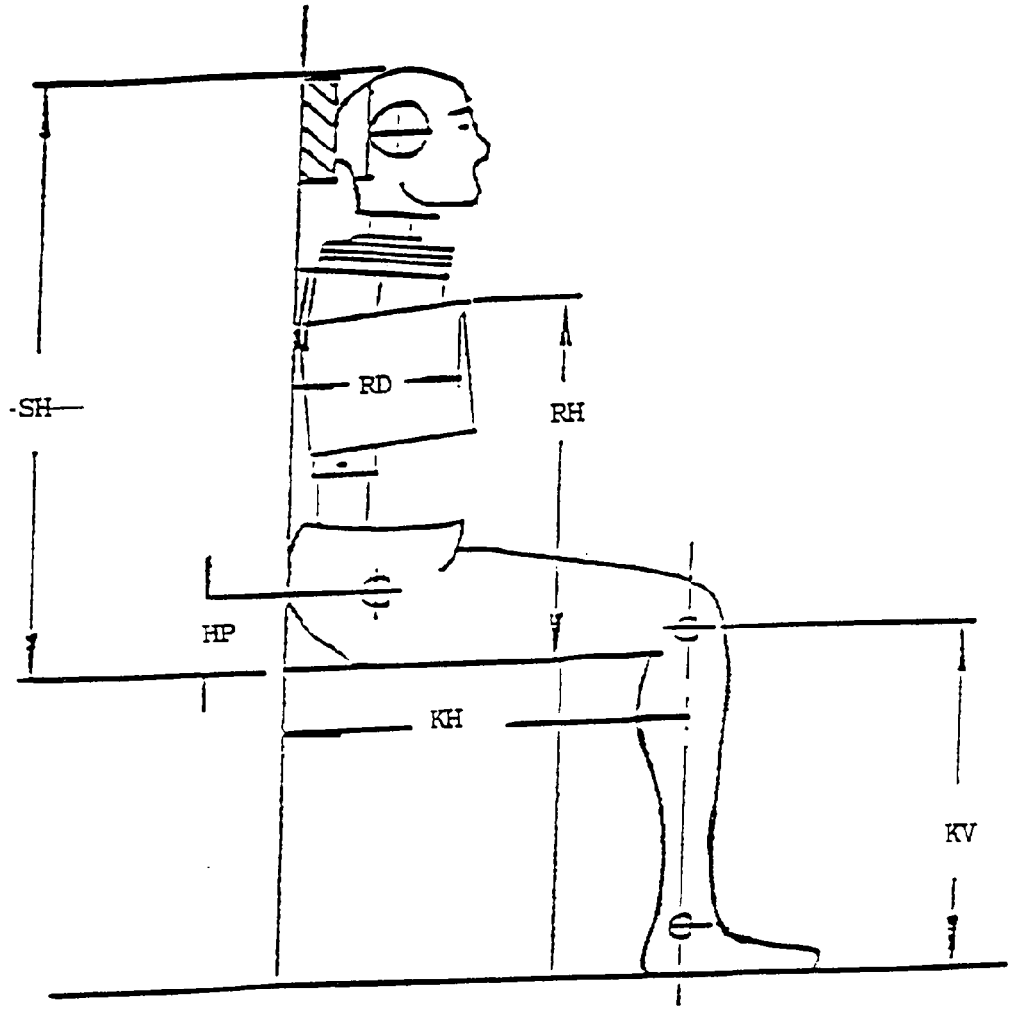
C-10


TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 04-27-1993
COMPONENT: DUMMY # 136 Speed: 0 FPS 0 MPS
FORCE as a function of TORSO ROTATION
FORCE LBS.
50
40
30
20
10
0
TORSO ROTATION DEGREES
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
MGA Research 06-24-1993 06:19

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 137 DUMMY CALIBRATION BY: Rod McClelland

I. CONFIGURATION VERIFICATION DATA



DATE OF CONFIGURATION VERIFICATION: 4-30-93

DESCRIPTION	SPECIFICATION	ACTUAL MEASUREMENT
SH - Seated Height	35.6" to 35.8"	35.7
RH - Rib Height	19.75" to 20.5"	20.3
HP - Hip Pivot Height	3.9" ref.	3.9
RD - Rib From Backline	9.0" to 9.5"	9.2
KH - Knee Pivot From Backline	20.1" to 20.7"	20.2
KV - Knee Pivot to Floor	19.3" to 19.9"	19.5
HW - Hip Width	14.0" to 15.4"	14.5

SIDE IMPACT DUMMY CONFIGURATION AND PERFORMANCE (CONT.)

II. PERFORMANCE VERIFICATION DATA

DUMMY NO.: 137 DUMMY CALIBRATION BY: Rod McClelland

VERIFICATION LABORATORY TEMPERATURE (66° - 78°F): 70°

1.0 LUMBAR FLEXION TEST

	SPECIFICATION	MEASUREMENT
Force @ 20°	22 to 34 lbs	25
Force @ 30°	34 to 46 lbs	38
Force @ 40°	46 to 58 lbs	57
Return Angle	12° Maximum	8°

2.0 ABDOMINAL COMPRESSION TEST
(Preload = 10 lbs)

	SPECIFICATION	MEASUREMENT
Force @ 0.5 in	23.3 to 36.5 lbs	25.5
Force @ 0.75 in	36.7 to 49.8 lbs	39.0
Force @ 1.0 in	50 to 63 lbs	57
Force @ 1.3 in	73 to 88 lbs	78

3.0 THORAX IMPACT TEST

	SPECIFICATION	MEASUREMENT
Probe Speed	13.8 TO 14.2 f/s	13.96
Upper Rib	37 to 46 g	42.33
Lower Rib	37 to 46 g	40.84
Lower Spine	15 to 22 g	20.92

4.0 PELVIC IMPACT TEST

	SPECIFICATION	MEASUREMENT
Probe Speed	13.8 to 14.2 f/s	13.86
Pelvis Acceleration	40 to 60 g	60

SIDE IMPACT DUMMY DATA SHEET

DUMMY #: 137

TEST DATE: 4-29-93

DRIVER	PASSENGER
	X

EXPOSURE	DATE	TYPE OF TEST
1st	4-29-93	NHTSA

1) RIB ACCELEROMETERS:

	MANUFACTURER	SERIAL NO.	CAL. DATE	DLR	CHECKED
UR	Endevco	A11M	11-9-92	124.19	X
URR	Endevco	A07M	11-6-92	88.92	X
LR	Endevco	ACC81	2-23-93	81.89	X
LRR	Endevco	A87M	2-23-93	94.46	X

2) SPINE ACCELEROMETERS

	MANUFACTURER	SERIAL NO.	CAL. DATE	DLR	CHECKED
USY	Endevco	A33D	3-4-93	96.83	X
USRY	Endevco	A67M	1-20-93	89.49	X
LSY	Endevco	AC8J9	2-23-93	113.04	X
LSRY	Endevco	EA71	2-23-93	90.04	X

3) PELVIS ACCELEROMETERS

	MANUFACTURER	SERIAL NO.	CAL. DATE	DLR	CHECKED
Y	Endevco	EH45	11-9-92	129.95	X
RY	Endevco	A99L	11-6-92	102.6	X

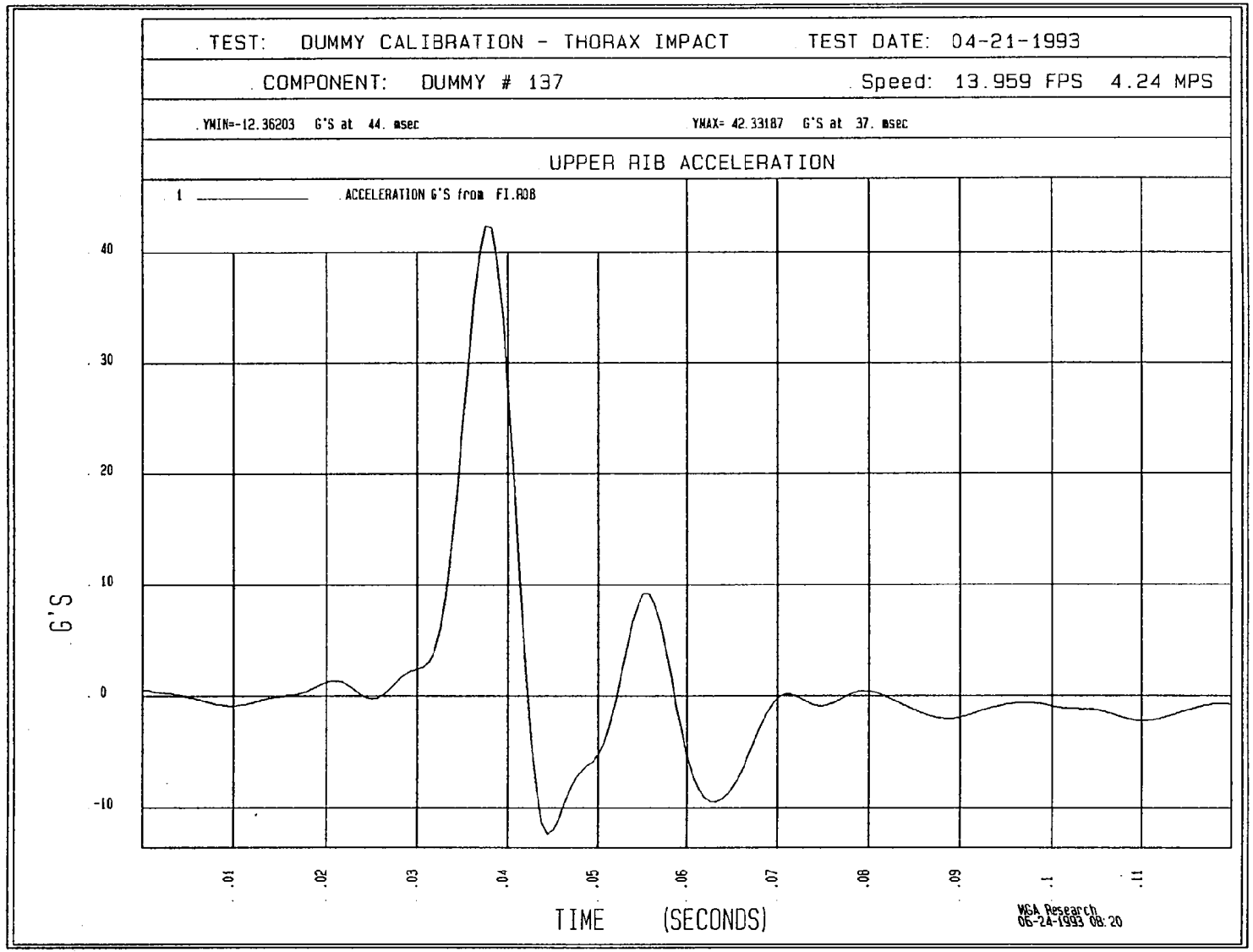
4) OTHER ACCELEROMETERS

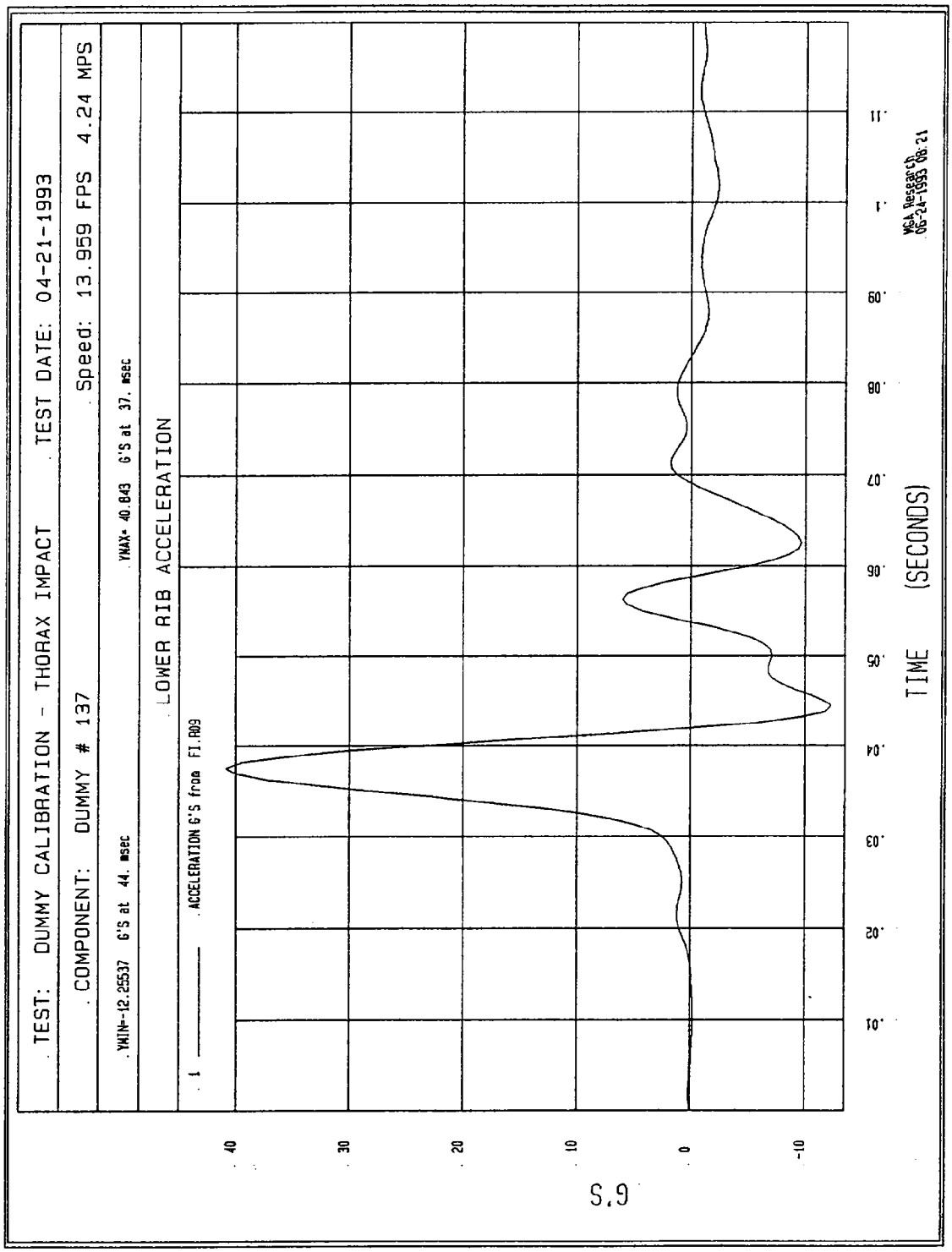
	MANUFACTURER	SERIAL NO.	CAL. DATE	DLR	CHECKED
CHEST DISPLACEMENT	Servco	137	4-20-93	.61 in/v	X

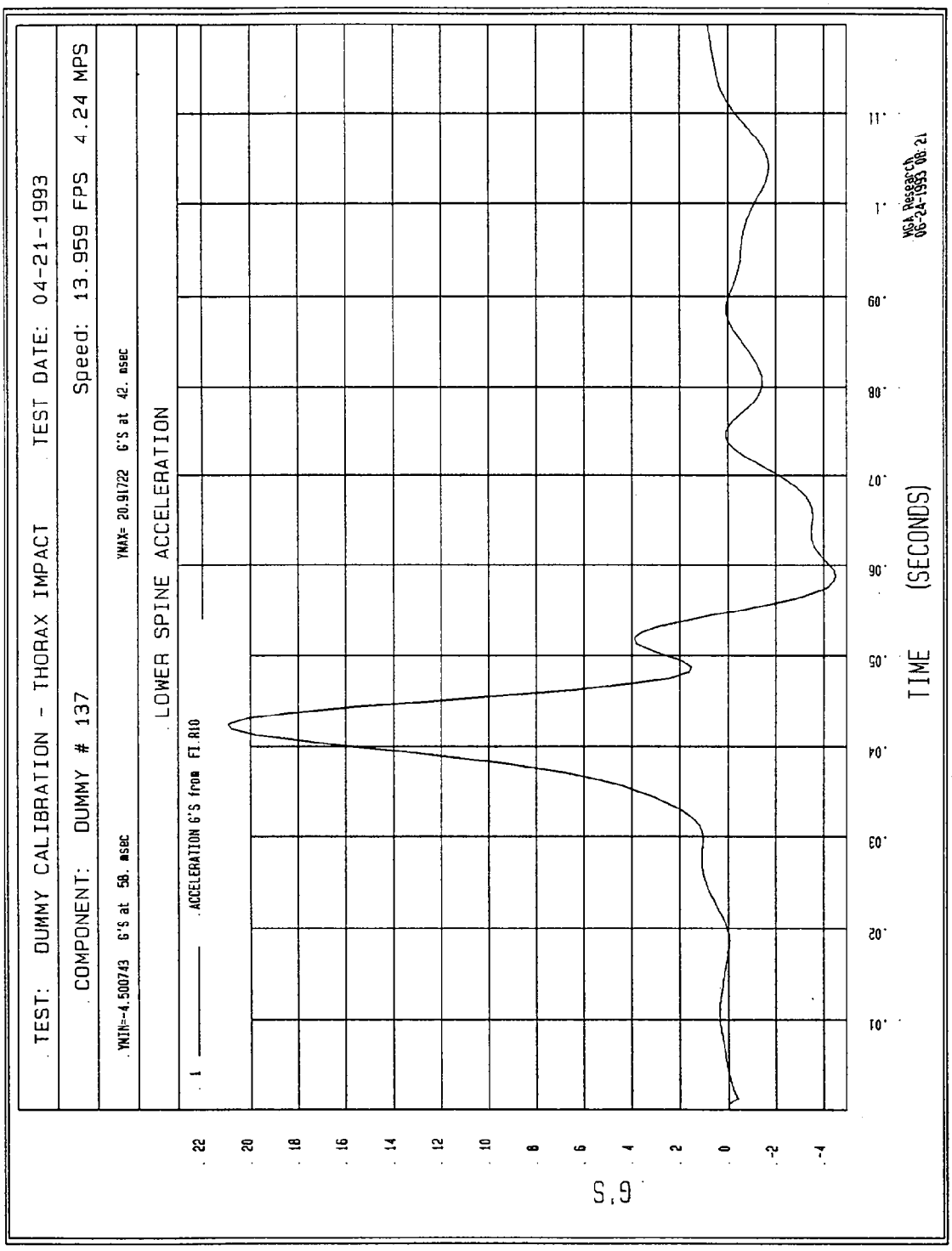
DUMMY INSTRUMENTED BY: Rod McClelland

APPROVED BY: Rod McClelland

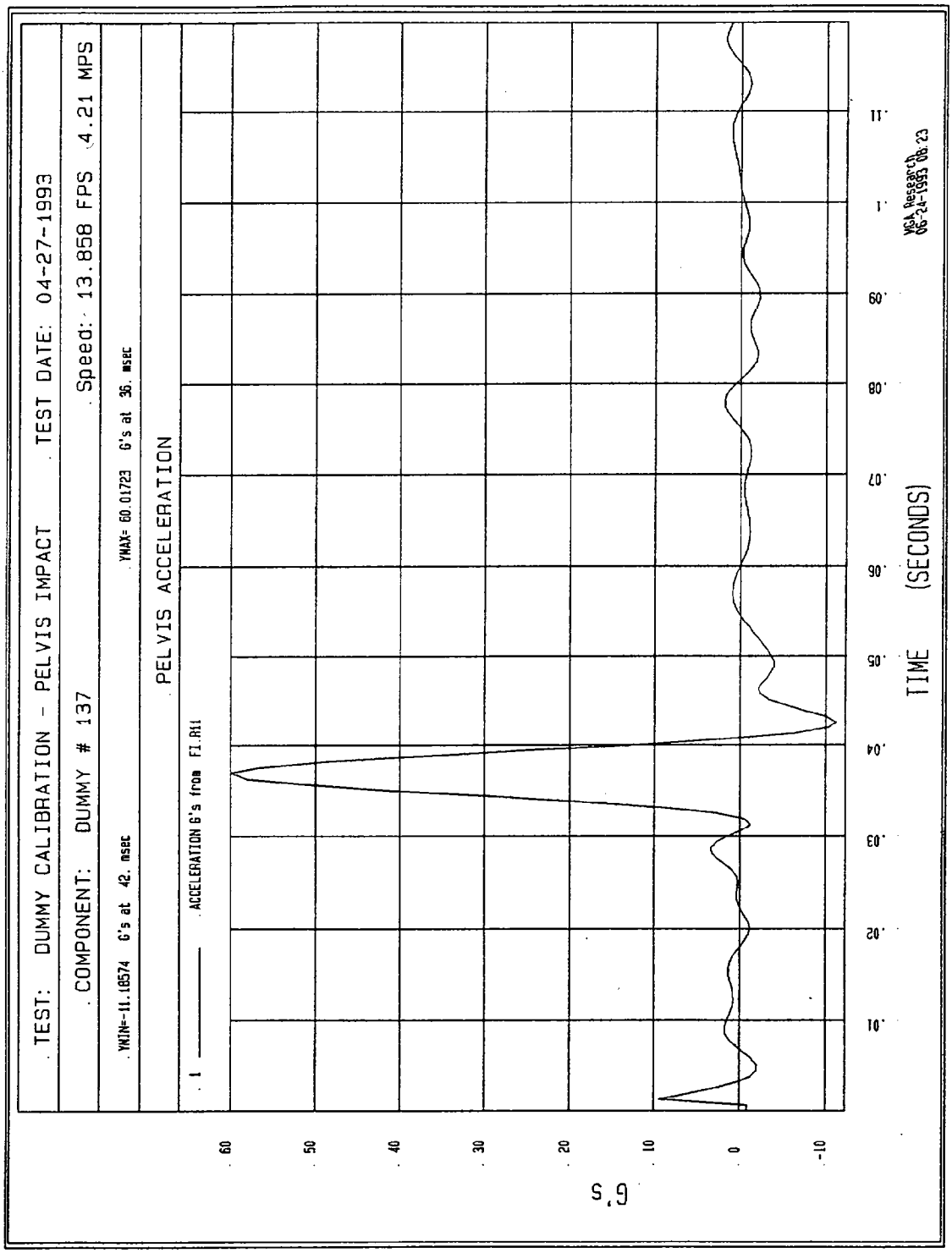
247

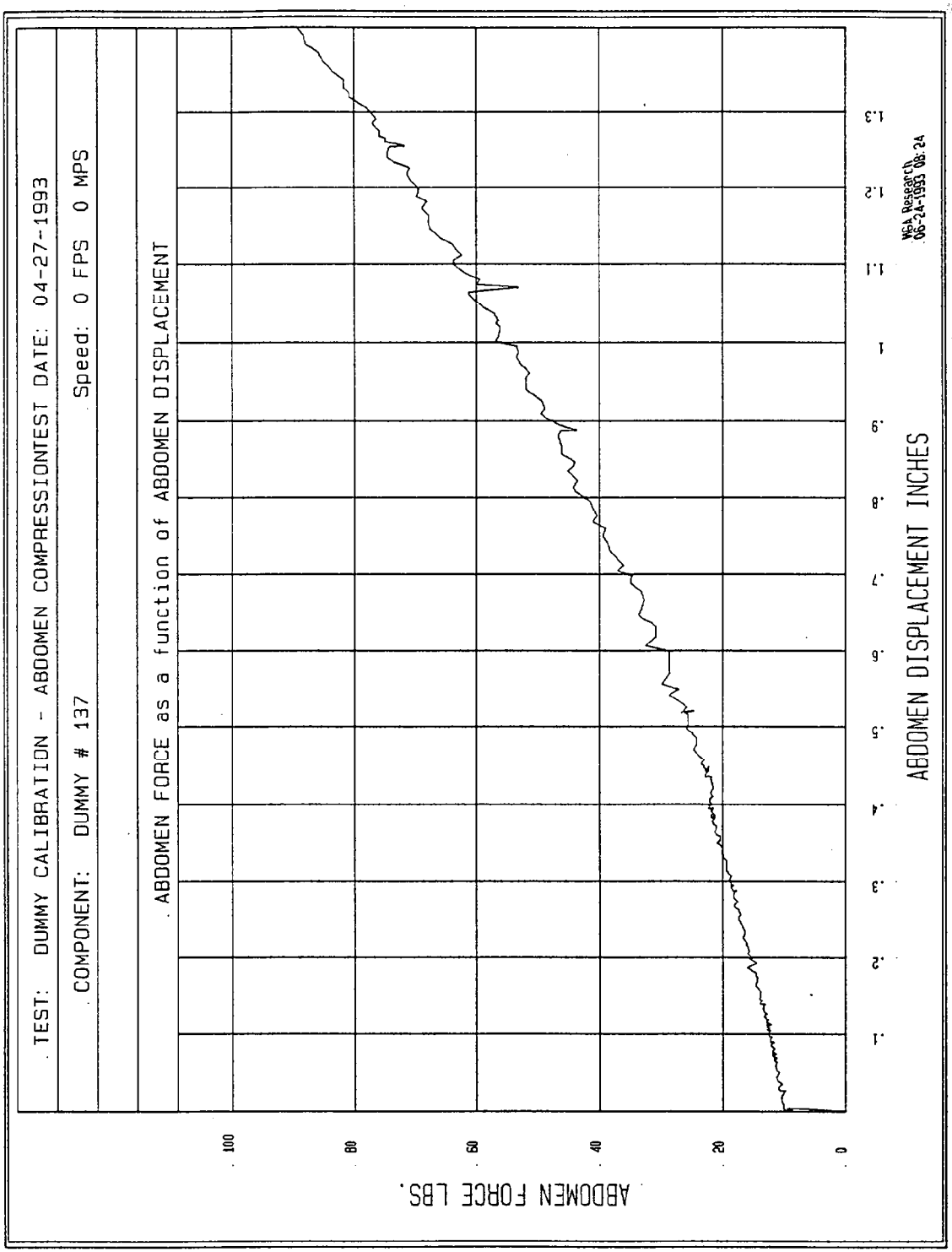

TEST: DUMMY CALIBRATION - THORAX IMPACT
TEST DATE: 04-21-1993
COMPONENT: DUMMY # 137
Speed: 13.959 FPS 4.24 MPS
YMIN=-12.36203 G'S at 44. msec
YMAX= 42.33187 G'S at 37. msec
UPPER RIB ACCELERATION
1 ACCELERATION G'S from FI.ROB
40
30
20
10
0
-10
G'S
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
TIME (SECONDS)
MGA Research
06-24-1993 08:20


TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 04-21-1993
COMPONENT: DUMMY # 137 Speed: 13.959 FPS 4.24 MPS
YMIN=-12.25537 G'S at 44. msec YMAX= 40.843 G'S at 37. msec
LOWER RIB ACCELERATION
1 ACCELERATION G'S from FI.R09
40
30
20
10
0
-10
.01
.02
.03
.04
.05
.06
.07
.08
.09
.1
.11
TIME (SECONDS)
MGA Research 06-24-1993 08:21
G's

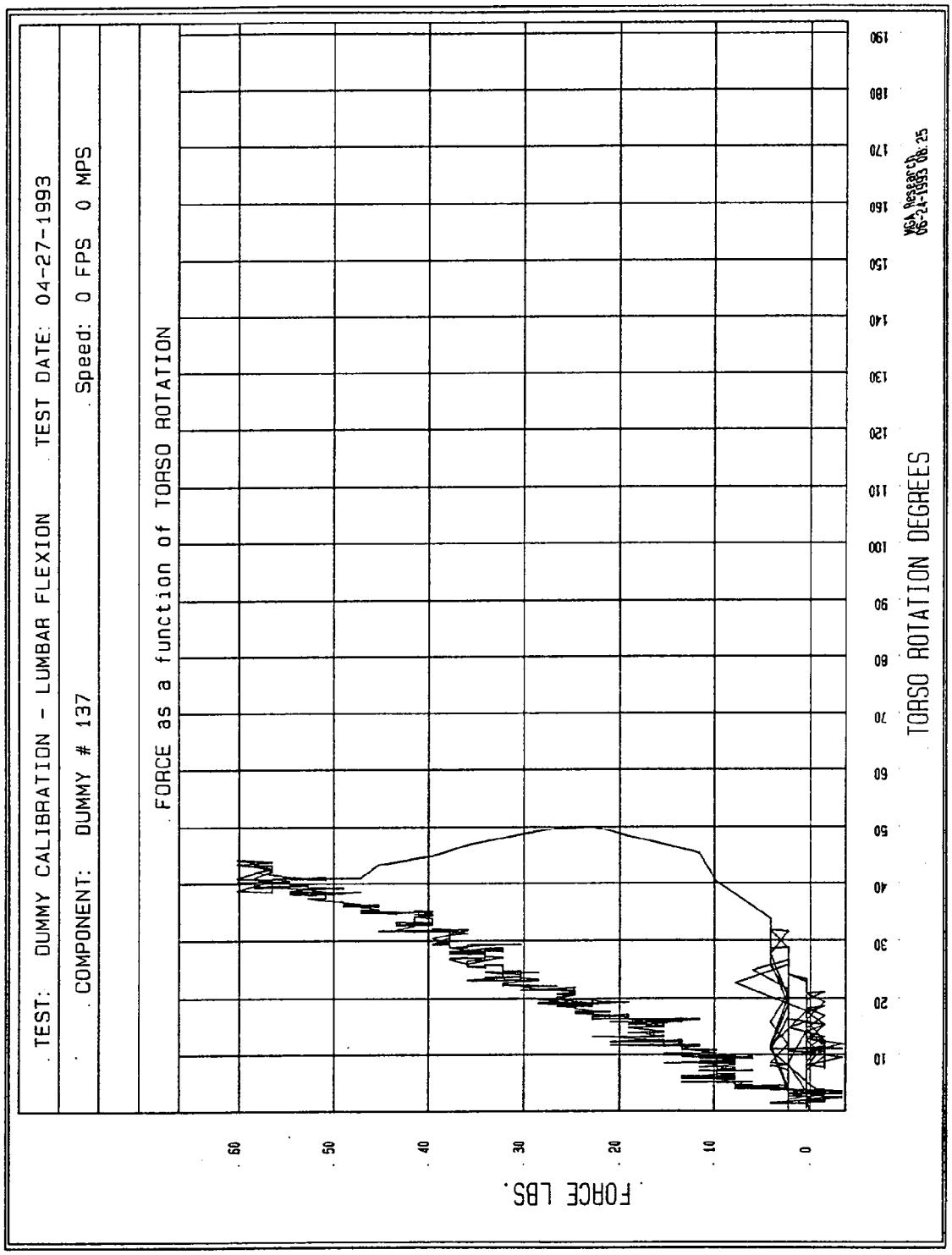

TEST: DUMMY CALIBRATION - THORAX IMPACT TEST DATE: 04-21-1993
COMPONENT: DUMMY # 137 Speed: 13.959 FPS 4.24 MPS
YMIN=-4.500743 G'S at 58. msec YMAX= 20.91722 G'S at 42. msec
LOWER SPINE ACCELERATION
1 ACCELERATION G'S from FI.RIO
G'S
TIME (SECONDS)
MGA Research 06-24-1993 08:21

250


TEST: DUMMY CALIBRATION - PELVIS IMPACT TEST DATE: 04-27-1993
COMPONENT: DUMMY # 137 Speed: 13.858 FPS 4.21 MPS
YMIN=-11.0574 G's at 42. msec YMAX= 60.0123 G's at 36. msec
PELVIS ACCELERATION
1 ACCELERATION G's from FI.R11
G's
TIME (SECONDS)
MGA Research 06-24-1993 08:23


TEST: DUMMY CALIBRATION - ABDOMEN COMPRESSIONTEST DATE: 04-27-1993
COMPONENT: DUMMY # 137 Speed: 0 FPS 0 MPS
ABDOMEN FORCE as a function of ABDOMEN DISPLACEMENT
ABDOMEN FORCE LBS.
100
80
60
40
20
0
.1
.2
.3
.4
.5
.6
.7
.8
.9
1
1.1
1.2
1.3
ABDOMEN DISPLACEMENT INCHES
WSA Research
06-24-1993 08:24

C-20


TEST: DUMMY CALIBRATION - LUMBAR FLEXION TEST DATE: 04-27-1993
COMPONENT: DUMMY # 137 Speed: 0 FPS 0 MPS
FORCE as a function of TORSO ROTATION
FORCE LBS.
TORSO ROTATION DEGREES
MGA Research Corp.
06-24-1993 08:25