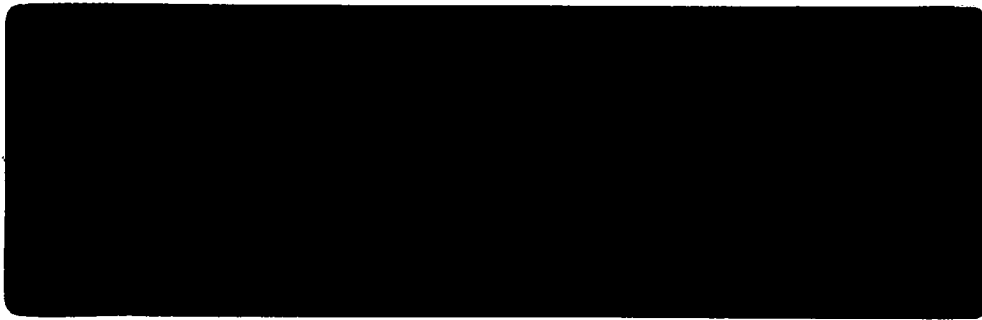


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CALSPAN ADVANCED TECHNOLOGY CENTER



technical report

CALSPAN ADVANCED TECHNOLOGY CENTER

IMPROVED LIGHTWEIGHT SUBCOMPACT SIDE STRUCTURE CRASH TEST REPORT

Donald A. Alianello

Calspan Report No. 6225-V-14

Prepared For:

THE BUDD COMPANY
TECHNICAL CENTER
FORT WASHINGTON, PA 19034

PURCHASE ORDER NO. TC 14436

TEST:	TEST NO. 12
TYPE OF TEST:	CAR-TO-CAR FRONT-TO-SIDE OBLIQUE
TEST DATE:	19 OCTOBER 1978

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TEST OBJECTIVE

The test objective was to obtain data on the side structure of a 1976 Volkswagen Rabbit modified by the Budd Company. The test vehicle had a structural change to the mid-weight (30 lbs) modification due to a failure in the floor structure at the B-pillar. This test, a 20 mph car-to-car front-to-side oblique impact, involved a 1978 Impala striking the modified side of the VW Rabbit.

The test program is part of the National Highway Traffic Safety Administration (NHTSA) Contract DOT-HS-7-01588 to improve subcompact side structures.

PRESENTATION OF RESULTS

This test report presents all the test results obtained from this car-to-car, front-to-side impact. Included in this document are still photographs, all vehicle and dummy response data in plotted form, vehicle interior and exterior damage sketches, figures of pre- and post-test vehicle side intrusion measurements and instrumentation identification. High speed motion pictures and color slides of pre- and post-test conditions were obtained, and have been submitted to the sponsor.

Calspan Report No. ZP-6144-V-1, Baseline Crash Test No. 1, of the Improved Lightweight Subcompact Side Structure Contract, Appendix A, contains information on the crash test facility and supporting equipment at Calspan.

TABLE 1

CRASH TEST SUMMARY

TEST NO. 12 PROJECT IMPROVED LIGHTWEIGHT SUBCOMPACT SIDE STRUCTURE

DATE 10/19/78 TIME 11:25 TEMP. 52°F

TEST CONDITION CAR-TO-CAR, 60° SIDE OBLIQUE

VEHICLE NO. 1 1978 CHEVROLET IMPALA (4-Door Sedan)

VEHICLE NO. 2 1976 VOLKSWAGEN RABBIT

	VEH. NO. 1	VEH. NO. 2
TEST WEIGHT (lbs)	<u>3770</u>	<u>2260</u>
IMPACT ANGLE (deg)*	<u>60</u>	<u>0</u>
IMPACT VELOCITY (mph)**	<u>19.99</u>	<u>0</u>
MAX. CRUSH (in)	<u>See Fig. 11</u>	<u>4-9/16</u>
MAX. INTRUSION (in)	<u>----</u>	<u>4.51</u>

DUMMIES	VEH. NO. 1	VEH. NO. 2
TYPE	<u>Hybrid II, Part 572</u>	<u>Hybrid II, Part 572</u>
LOCATION	<u>LF (1), RF (2)</u>	<u>LF (1), RF (2)</u>
RESTRAINT	<u>PRODUCTION 3-POINT SYSTEM</u>	<u>UNRESTRAINED DUMMIES</u>

NUMBER OF DATA CHANNELS	<u>63</u>
NUMBER OF HIGH SPEED CAMERAS	<u>10</u>

*WITH RESPECT TO TOW TRACK CENTERLINE

**SPEED TRAP MEASUREMENT (±0.5% ACCURACY)

OBSERVATIONS (VEHICLE NO. 1) - 1978 CHEVROLET IMPALA

GLAZING UNDAMAGED

DOORS UNDAMAGED

SEAT ANCHORAGES INTACT

RESTRAINTS INTACT

OBSERVATIONS (VEHICLE NO. 2) - 1976 VOLKSWAGEN RABBIT

GLAZING DRIVER'S DOOR GLASS BROKE.

DOORS PASSENGER DOOR WAS OPERABLE.

SEAT ANCHORAGES INTACT

RESTRAINTS NOT USED

GENERAL COMMENTS

- ALL CAMERA'S OPERATED PROPERLY
- ON VEHICLE NO. 1 - DRIVER'S LEFT LAP LOAD SIGNAL WAS
LOST DUE TO BAD TRANSDUCER.
- ON VEHICLE NO. 2 RIGHT REAR COMPARTMENT ANGULAR X
ACCELERATION WAS LOST DUE TO BAD CABLE.

TABLE 2
VEHICLE TEST WEIGHTS - TEST NO. 12

BULLET VEHICLE

CAR 1 - 1978 CHEVROLET IMPALA

Left Front	<u>1080</u> lbs.		Left Rear	<u>820</u> lbs.
Right Front	<u>1060</u> lbs.		Right Rear	<u>810</u> lbs.
Total Front	<u>2140</u> lbs.		Total Rear	<u>1630</u> lbs.
Total Weight =	<u>2140</u> lbs.	+	<u>1630</u> lbs.	= <u>3770</u> lbs.
Wheel Base	<u>116.5</u> in.			
Cg _{FW}	= $\frac{1630 \text{ lbs.}}{3770 \text{ lbs.}}$	<u>116.5</u> in.		= <u>60.37</u> in.

TARGET VEHICLE

CAR 2 - 1976 VOLKSWAGEN RABBIT

Left Front	<u>690</u> lbs.		Left Rear	<u>430</u> lbs.
Right Front	<u>700</u> lbs.		Right Rear	<u>440</u> lbs.
Total Front	<u>1390</u> lbs.		Total Rear	<u>870</u> lbs.
Total Weight =	<u>1390</u> lbs.	+	<u>870</u> lbs.	= <u>2260</u> lbs.
Wheel Base	<u>95.5</u> in.			
Cg _{FW}	= $\frac{870 \text{ lbs.}}{2260 \text{ lbs.}}$	<u>95.5</u> in.		= <u>36.76</u> in.



Figure 1 PRE-TEST NO. 12 – VEHICLE IMPACT CONFIGURATION



Figure 2 PRE- AND POST-TEST NO. 12 — CAR 1, 1978 CHEVROLET IMPALA EXTERIOR



Figure 3 PRE- AND POST-TEST NO. 12 – CAR 2, 1976 V.W. RABBIT EXTERIOR



Figure 4 PRE- AND POST-TEST NO. 12 – CAR 1, 1978 CHEVROLET IMPALA INTERIOR



Figure 5 PRE- AND POST-TEST NO. 12 – CAR 2, 1976 V.W. RABBIT INTERIOR



Figure 6 IMPACT AND POST IMPACT OF TEST NO. 12

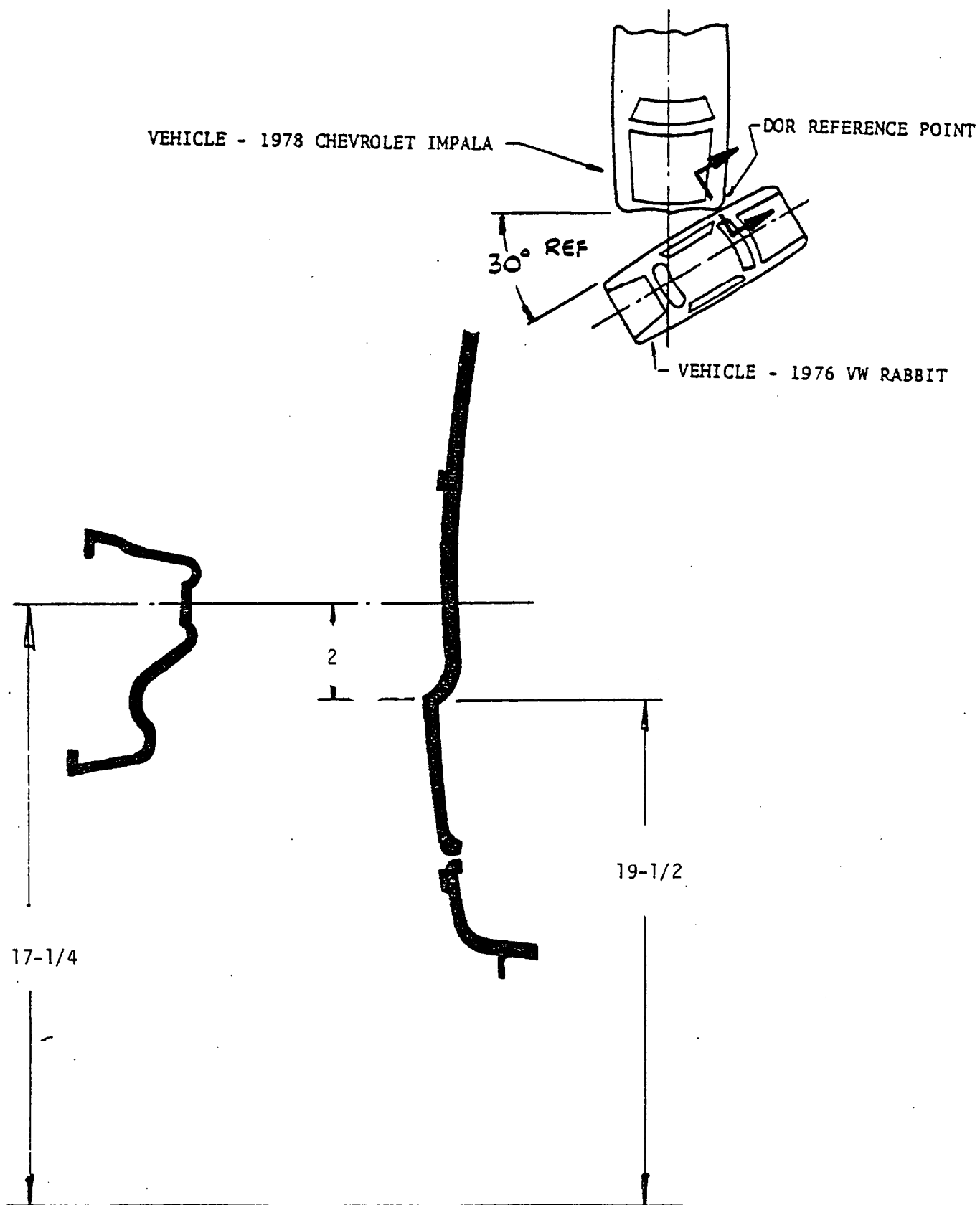


FIGURE 7 VEHICLE CRASH ATTITUDE

TABLE 2
VEHICLE TEST WEIGHTS - TEST NO. 12

BULLET VEHICLE

CAR 1 - 1978 CHEVROLET IMPALA

Left Front	<u>1080</u> lbs.		Left Rear	<u>820</u> lbs.
Right Front	<u>1060</u> lbs.		Right Rear	<u>810</u> lbs.
Total Front	<u>2140</u> lbs.		Total Rear	<u>1630</u> lbs.
Total Weight =	<u>2140</u> lbs.	+	<u>1630</u> lbs.	= <u>3770</u> lbs.
Wheel Base	<u>116.5</u> in.			
Cg _{FW}	= <u>1630</u> lbs.	<u>116.5</u> in.		= <u>60.37</u> in.
	<u>3770</u> lbs.			

TARGET VEHICLE

CAR 2 - 1976 VOLKSWAGEN RABBIT

Left Front	<u>690</u> lbs.		Left Rear	<u>430</u> lbs.
Right Front	<u>700</u> lbs.		Right Rear	<u>440</u> lbs.
Total Front	<u>1390</u> lbs.		Total Rear	<u>870</u> lbs.
Total Weight =	<u>1390</u> lbs.	+	<u>870</u> lbs.	= <u>2260</u> lbs.
Wheel Base	<u>95.5</u> in.			
Cg _{FW}	= <u>870</u> lbs.	<u>95.5</u> in.		= <u>36.76</u> in.
	<u>2260</u> lbs.			



Figure 1 PRE-TEST NO. 12 – VEHICLE IMPACT CONFIGURATION



Figure 2 PRE- AND POST-TEST NO. 12 — CAR 1, 1978 CHEVROLET IMPALA EXTERIOR



Figure 3 PRE- AND POST-TEST NO. 12 — CAR 2, 1976 V.W. RABBIT EXTERIOR



Figure 4 PRE- AND POST-TEST NO. 12 – CAR 1, 1978 CHEVROLET IMPALA INTERIOR



Figure 5 PRE- AND POST-TEST NO. 12 — CAR 2, 1976 V.W. RABBIT INTERIOR



Figure 6 IMPACT AND POST IMPACT OF TEST NO. 12

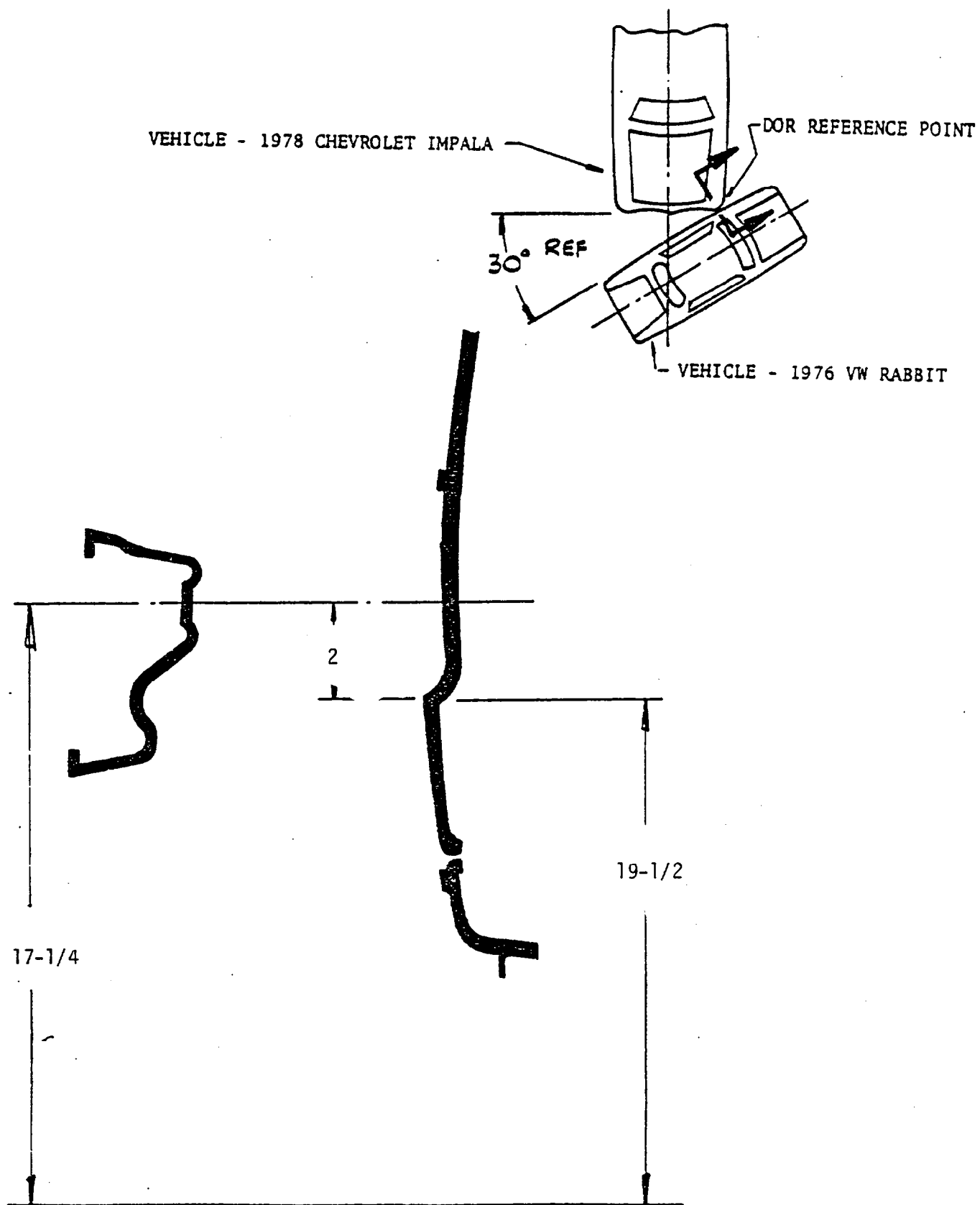


FIGURE 7 VEHICLE CRASH ATTITUDE

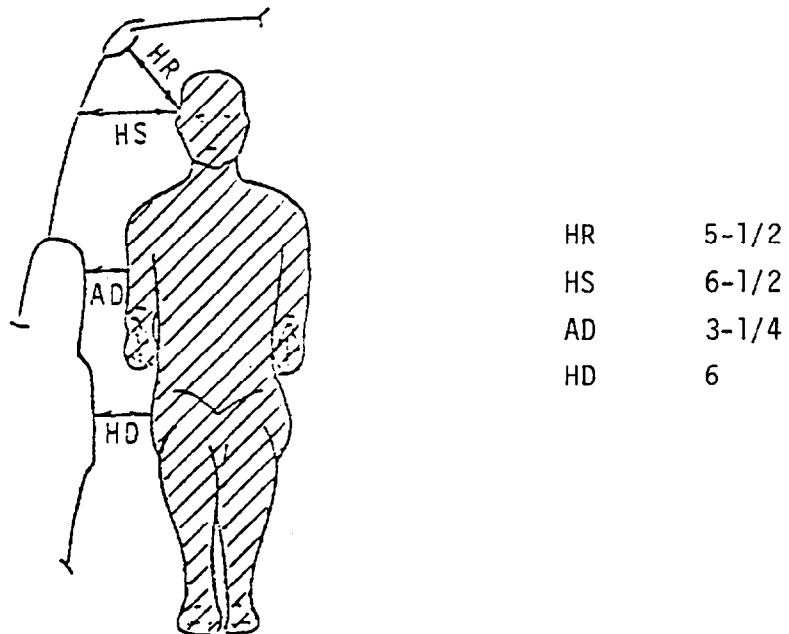
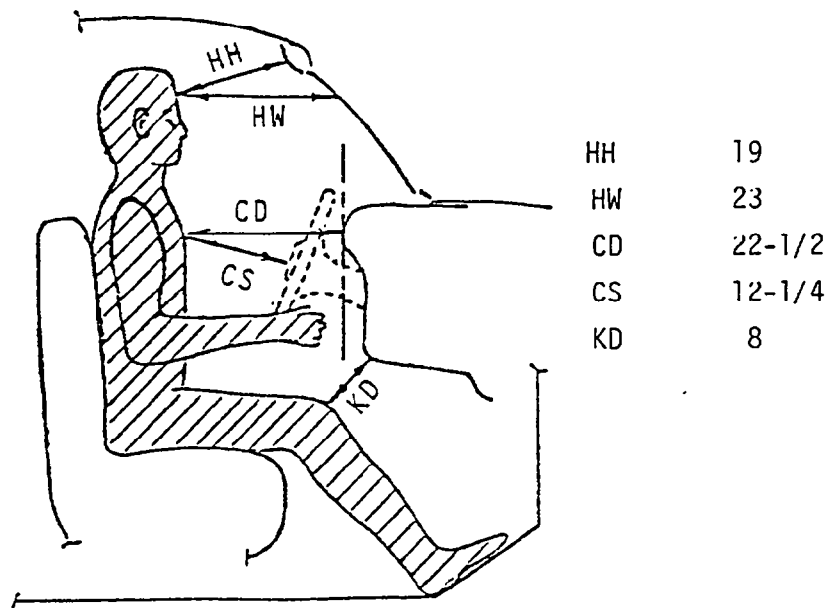
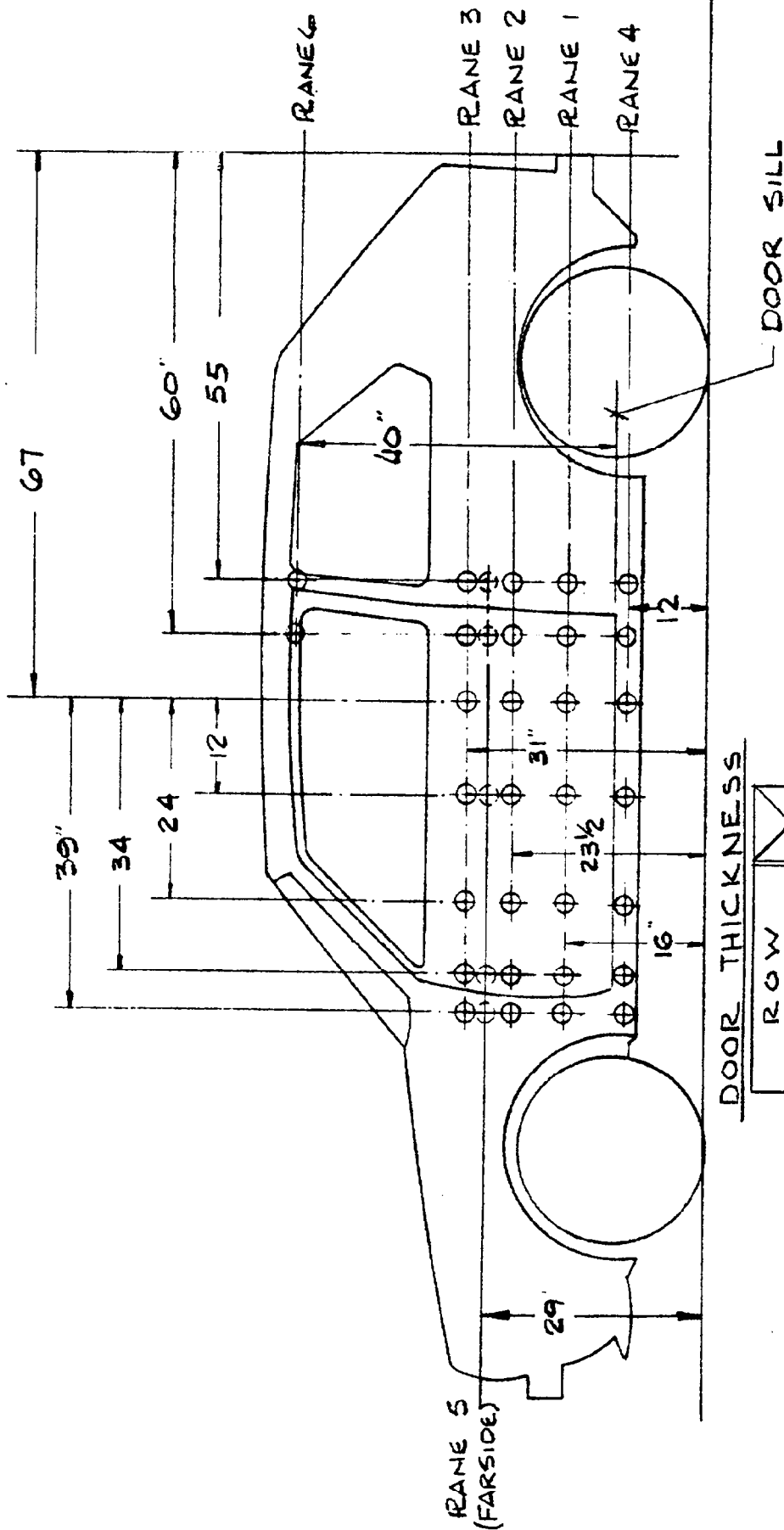


Figure 8. OCCUPANT CLEARANCE DIMENSIONS



PRE-TEST LOCATION MEASUREMENTS

FIGURE 9 SIDE INTRUSION MEASUREMENTS

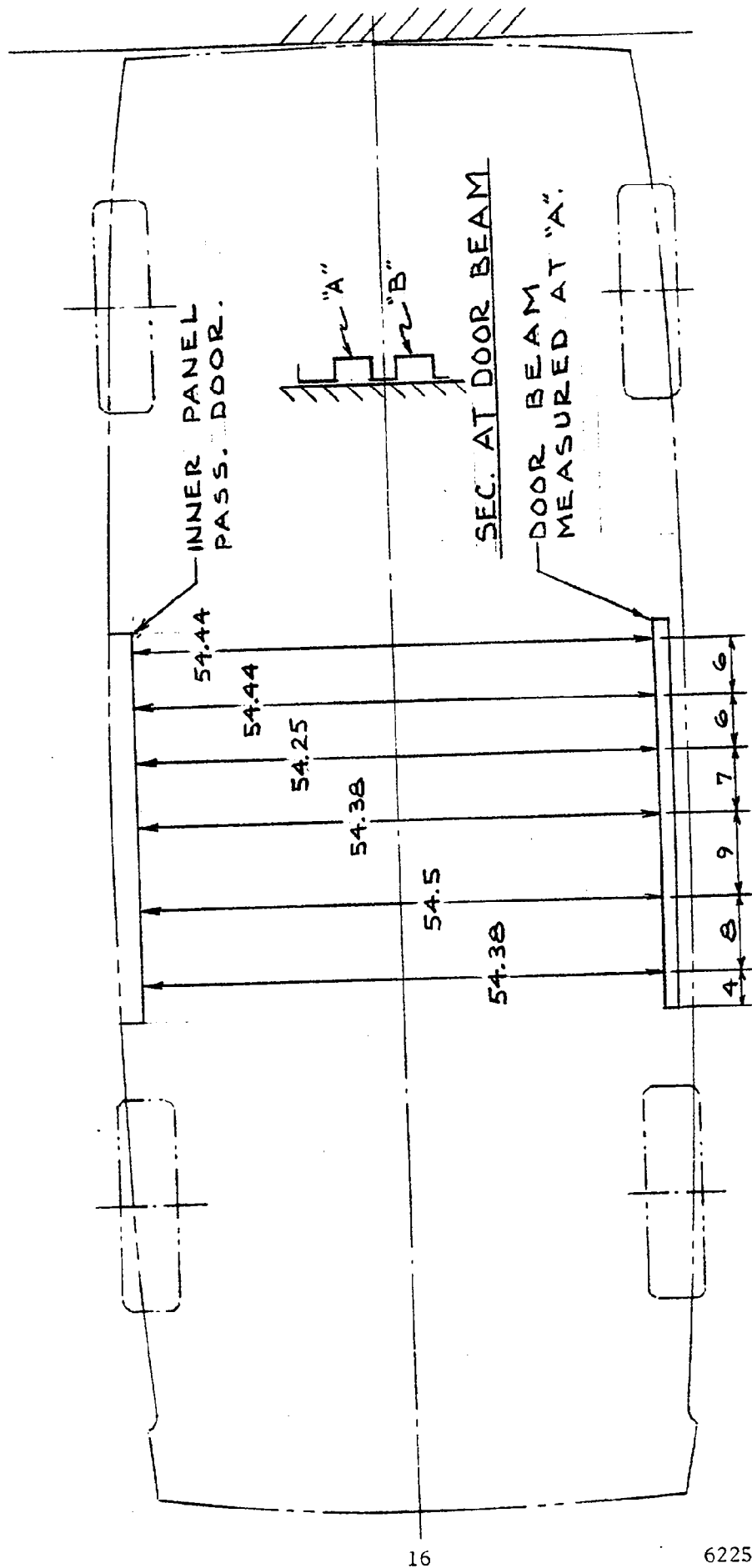
1976 V.W. RABBIT

TABLE 3

SIDE INTRUSION MEASUREMENTS

DIMENSIONS LISTED BELOW ARE FROM POINTS SHOWN ON FIGURE 9 TO REFERENCE PLACES LOCATED PARALLEL TO AND OUTBOARD FROM ϕ OF VEHICLE (L. SIDE 34" R. SIDE 34")
(ROWS ARE FROM REAR TO FRONT OF VEHICLE)

PLANE NUMBER	DIMENSIONS (Inches)						
	ROW						
	1	2	3	4	5	6	7
1 PRE POST DIFF.	$\frac{4-1/2}{4-7/8}$ $\frac{3}{8}$	$\frac{4-13/16}{6-3/16}$ $\frac{1-3/8}{1-3/8}$	$\frac{4-3/4}{8-1/16}$ $\frac{3-5/16}{3-5/16}$	$\frac{4-11/16}{8-1/16}$ $\frac{3-3/8}{3-3/8}$	$\frac{4-13/16}{6-1/16}$ $\frac{1-1/4}{1-1/4}$	$\frac{4-7/8}{5-9/16}$ $\frac{11/16}{11/16}$	$\frac{4-15/16}{5-1/8}$ $\frac{3/16}{3/16}$
2 PRE POST DIFF.	$\frac{3-3/4}{5}$ $\frac{1-1/4}{1-1/4}$	4 $\frac{8-1/8}{4-1/8}$ $\frac{4-1/8}{4-1/8}$	$\frac{3-7/8}{9-7/8}$ $\frac{6}{6}$	$\frac{3-7/8}{8-7/8}$ $\frac{5}{5}$	$\frac{3-7/8}{6-5/8}$ $\frac{2-3/4}{2-3/4}$	$\frac{3-15/16}{5-1/8}$ $\frac{1-3/16}{1-3/16}$	4 $\frac{4-5/16}{5/16}$ $\frac{4}{4}$
3 PRE POST DIFF.	$\frac{4-1/8}{4-5/8}$ $\frac{1/2}{1/2}$	$\frac{4-1/8}{6-5/8}$ $\frac{2-1/2}{2-1/2}$	4 $\frac{8-9/16}{4-9/16}$ $\frac{4-9/16}{4-9/16}$	$\frac{3-7/8}{7-1/2}$ $\frac{3-5/8}{3-5/8}$	$\frac{3-15/16}{5-1/16}$ $\frac{1-1/8}{1-1/8}$	$\frac{3-15/16}{4-1/2}$ $\frac{9/16}{9/16}$	4 $\frac{4-3/8}{3/8}$ $\frac{4}{4}$
4 PRE POST DIFF.	$\frac{5-5/8}{6-1/16}$ $\frac{7/16}{7/16}$	$\frac{5-7/8}{6-9/16}$ $\frac{11/16}{11/16}$	$\frac{5-7/8}{6-5/8}$ $\frac{3/4}{3/4}$	6 $\frac{6-3/4}{3/4}$ $\frac{3/4}{3/4}$	$\frac{6-1/8}{6-9/16}$ $\frac{7/16}{7/16}$	$\frac{6-1/4}{6-1/2}$ $\frac{1/4}{1/4}$	$\frac{6-1/4}{6-7/16}$ $\frac{3/16}{3/16}$
5 PRE POST DIFF.	$\frac{3-5/8}{3-1/2}$ $\frac{1/8}{1/8}$	$\frac{3-9/16}{3-7/16}$ $\frac{1/8}{1/8}$		$\frac{3-1/2}{3-3/8}$ $\frac{1/8}{1/8}$		$\frac{3-11/16}{3-5/8}$ $\frac{1/16}{1/16}$	$\frac{3-11/16}{3-11/16}$ $\frac{3-11/16}{3-11/16}$
6 PRE POST DIFF.						$\frac{12-1/16}{11-11/16}$ $\frac{12-1/8}{12-1/8}$	$\frac{12-1/16}{12-1/8}$ $\frac{1/16}{1/16}$
7 PRE POST DIFF.							



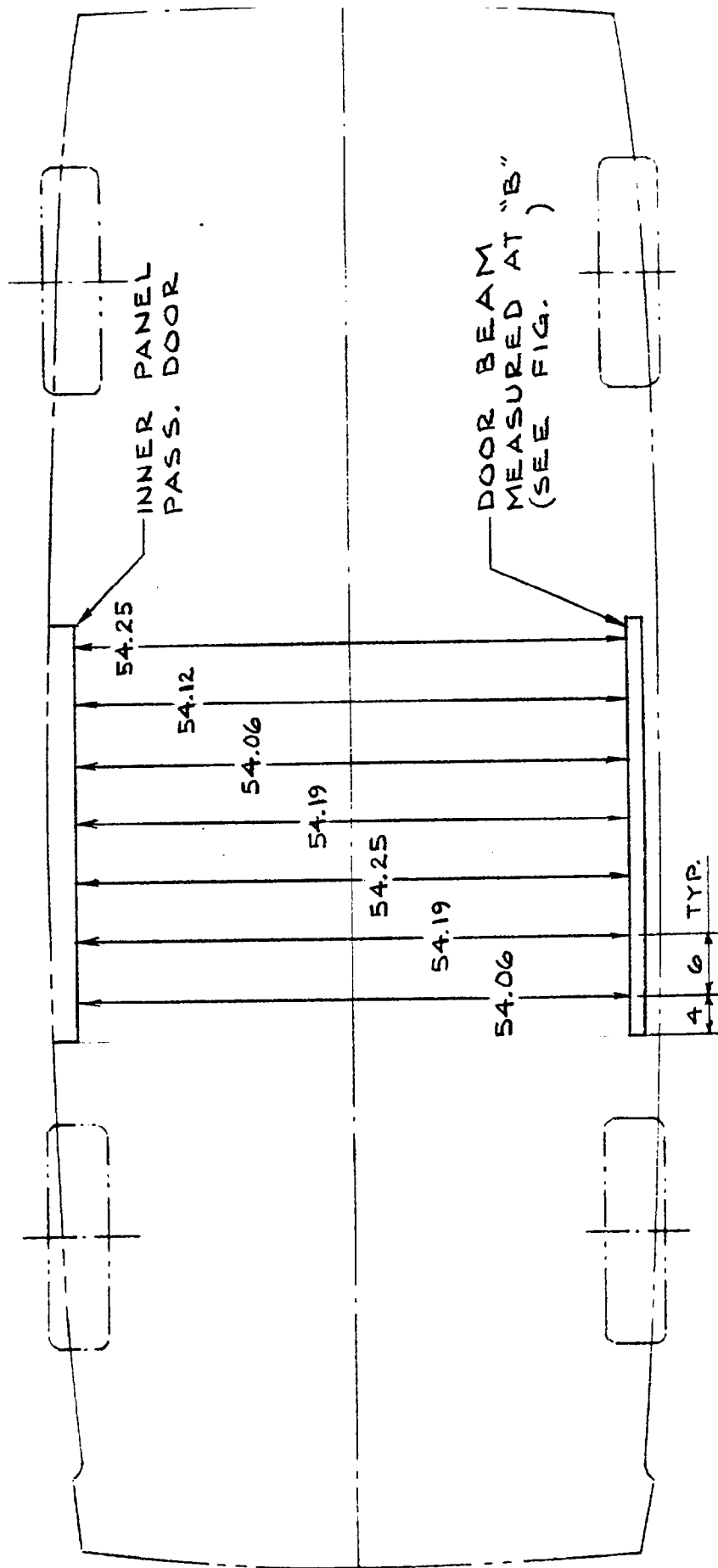
1976 V.W. RABBIT

SCALE .06" = 1"

PLANE "A"

TEST NO. 12

Figure 10A PRE-TEST DOOR BEAM INTRUSION MEASUREMENTS



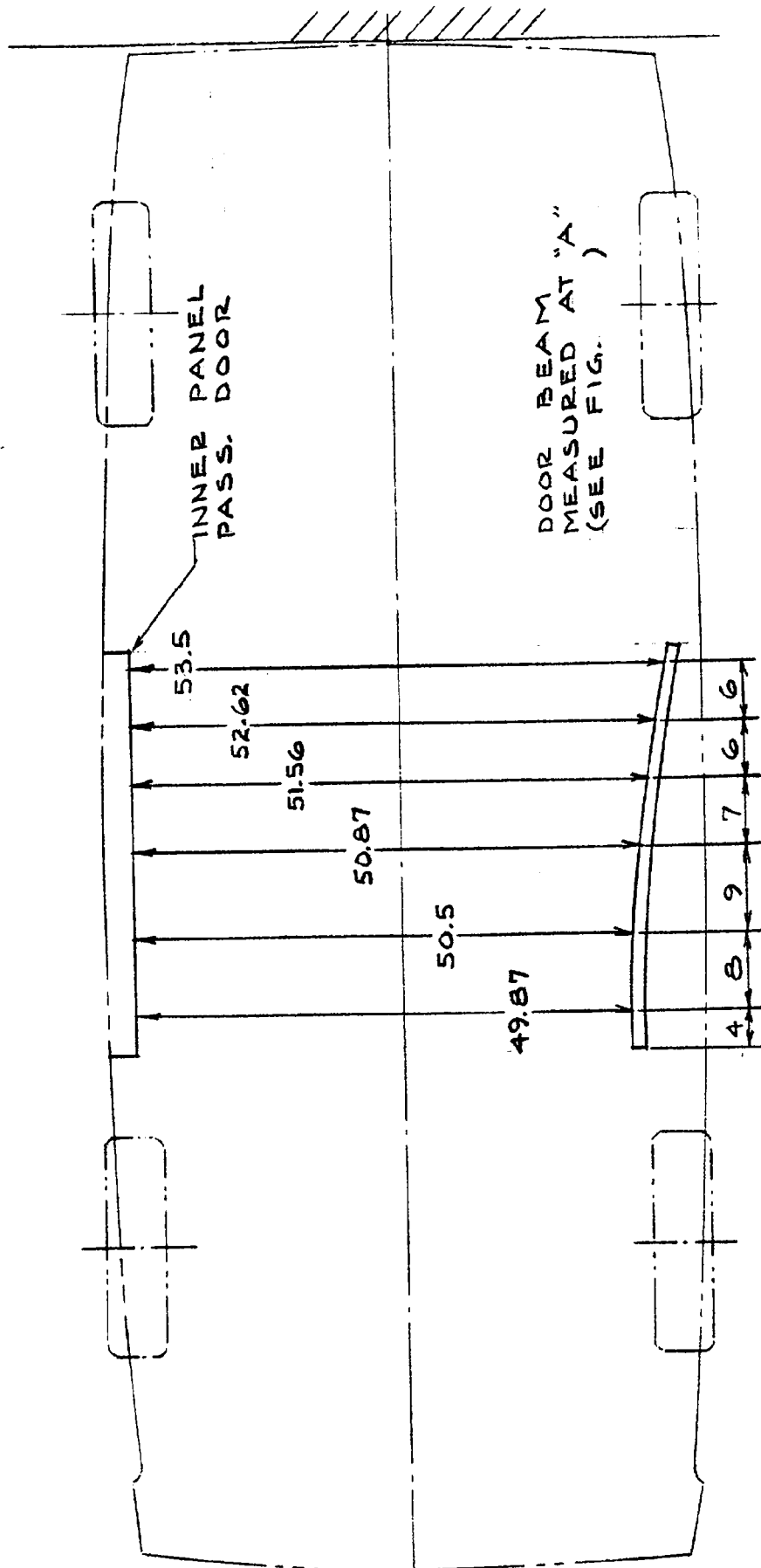
1976 V.W. RABBIT

SCALE .06" = 1"

PLANE "B"

Figure 10B PRE-TEST DOOR BEAM INTRUSION MEASUREMENTS

TEST NO. 12



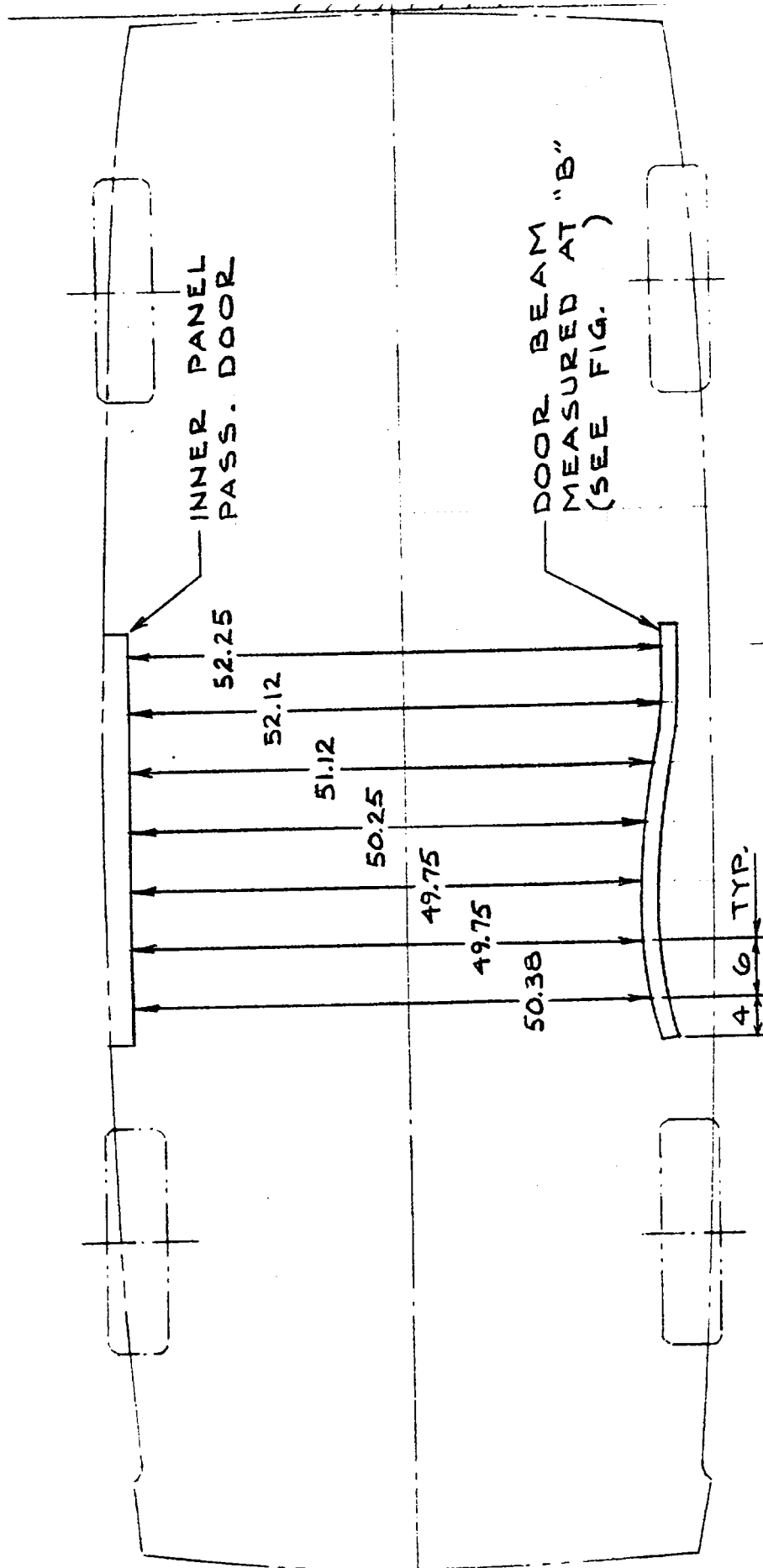
1976 V.W. RABBIT

SCALE .06" = 1"

PLANE "A"

Figure 10C POST-TEST DOOR BEAM INTRUSION MEASUREMENTS

TEST NO. 12



1976 V.W. RABBIT
SCALE .06" = 1"

PLANE "B"

TEST NO. 12

Figure 10D POST-TEST DOOR BEAM INTRUSION MEASUREMENTS

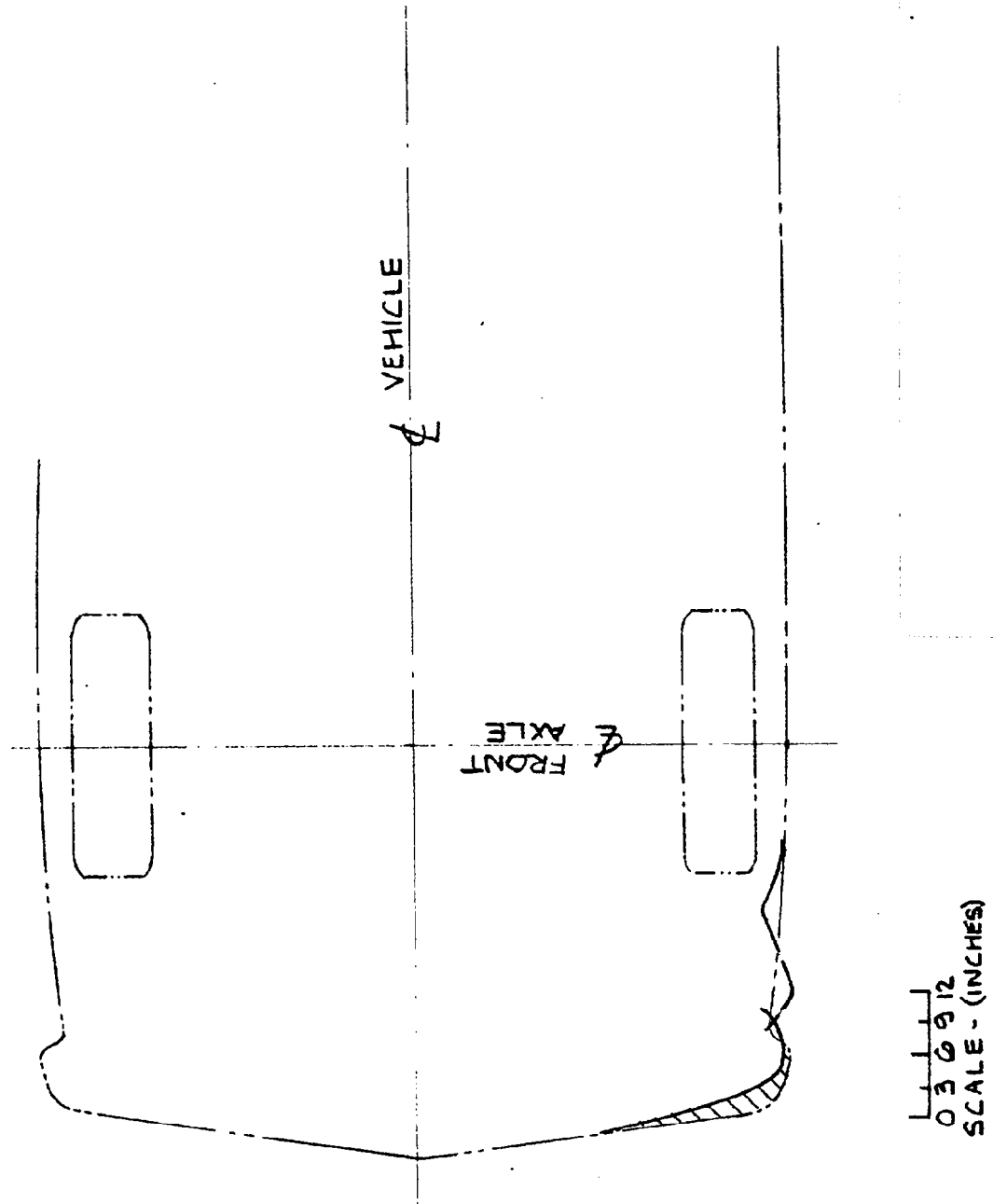


Figure 11 PRE- AND POST-TEST DEFORMATION.- CAR NO. 1 - 1978 CHEVROLET IMPALA

TABLE 4

ELECTRONIC INSTRUMENTATION TEST NO. 12

Car 1 - Bullet Vehicle - 1978 Chevrolet Impala

TRANSDUCER DESCRIPTION OR ACCELEROMETER LOCATION*	DIRECTION OF PARAMETER BEING MEASURED	LOCATION ON VEHICLE	DESCRIPTION LISTED ON DATA PLOTS
<u>VEHICLE ACCELEROMETER</u>			
1	X	Left Sill next to rear seat	Left Compartment
2	X	Right Sill next to rear seat	Right Compartment
3	X, Y, Z	Deck over rear Axle	Rear deck
4	X, Y, Z	Firewall	Firewall
5	X	Rear Compartment	Left Rear Compartment - Angular X
6	X, Y, Z	Top of Engine, Carburetor	Engine
7	X	Front Crossmember	Front Crossmember
9	X	Rear Compartment	Right Rear Compartment - Angular X
<u>DUMMY</u>			
LF Head (Dummy (1))	X, Y, Z	Left Front Seat	Dummy (LF) Head
LF Chest "	X, Y, Z	Left Front Seat	Dummy (LF) Chest
LF Femurs "	R, L**	Left Front Seat	Dummy (LF) femurs
LF Belts "	U, R, L***	Left Front Seat	Self-explanatory
<u>MISCELLANEOUS</u>			
10	Yaw Rate	Centerline behind Front Seats	Tunnel Yaw Rate
12	X-Accel.	Bumper (rear face)	Bumper

* See Accelerometer Layout Diagram Figure 12 ** Right & Left Forces *** Upper, Lower Belt Forces

TABLE 5

ELECTRONIC INSTRUMENTATION TEST NO. 12

Car 2 - Target Vehicle - 1976 Volkswagen Rabbit

TRANSDUCER DESCRIPTION OR ACCELEROMETER LOCATION *	DIRECTION OF PARAMETER BEING MEASURED	LOCATION ON VEHICLE	DESCRIPTION LISTED ON DATA PLOTS
<u>VEHICLE ACCELEROMETER</u>			
1	X, Y, Z	Right Sill next to Front Seat	Right Front Compartment
2	X, Y, Z	Right Sill next to Rear Seat	Right Rear Compartment
3	X, Y, Z	Deck over Rear Axle	Rear Deck
6	Y	Lower Left Door Centerline	Lower Door Center
7	X	Rear Compartment	Left Compartment-Angular X
8	X	Rear Compartment	Right Compartment-Angular X
9	Y	Mid-rear of Left Door	Mid-aft of Door
10	Y	Upper Left Door Centerline	Upper Door Center
11	Y	Mid-Front of Left Door	Mid-front of Door
<u>DUMMY</u>			
LF Head (Dummy (1))	X, Y, Z	Left Front Seat	Dummy (LF) Head
LF Chest (Dummy (1))	X, Y, Z	Left Front Seat	Dummy (LF) Chest
LF Pelvis (Dummy (1))	X, Y	Left Front Seat	Dummy (LF) Pelvis
RF Head (Dummy (2))	X, Y, Z	Right Front Seat	Dummy (RF) Head
RF Chest (Dummy (2))	X, Y, Z	Right Front Seat	Dummy (RF) Chest
RF Pelvis (Dummy (2))	X, Y	Right Front Seat	Dummy (RF) Pelvis
<u>MISCELLANEOUS</u>			
12	Yaw Rate	Centerline behind Front Seats	Tunnel Yaw Rate
13 - 16	Side Intrusion	Side Intrusion (Driver Side)	Side Intrusion

*SEE ACCELEROMETER LAYOUT DIAGRAM FIGURE 13

Car 1 - Bullet Vehicle - 1978 Chevrolet Impala

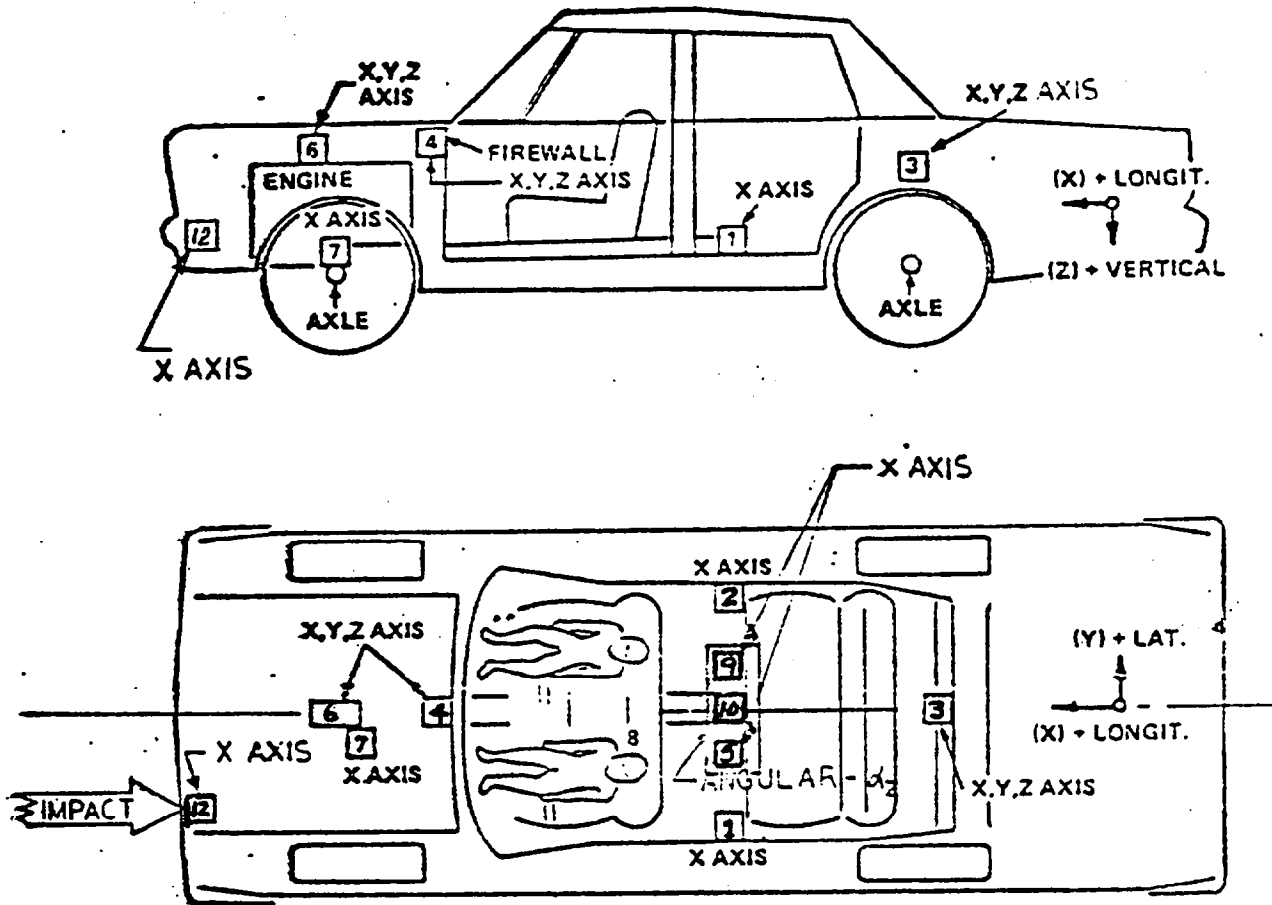
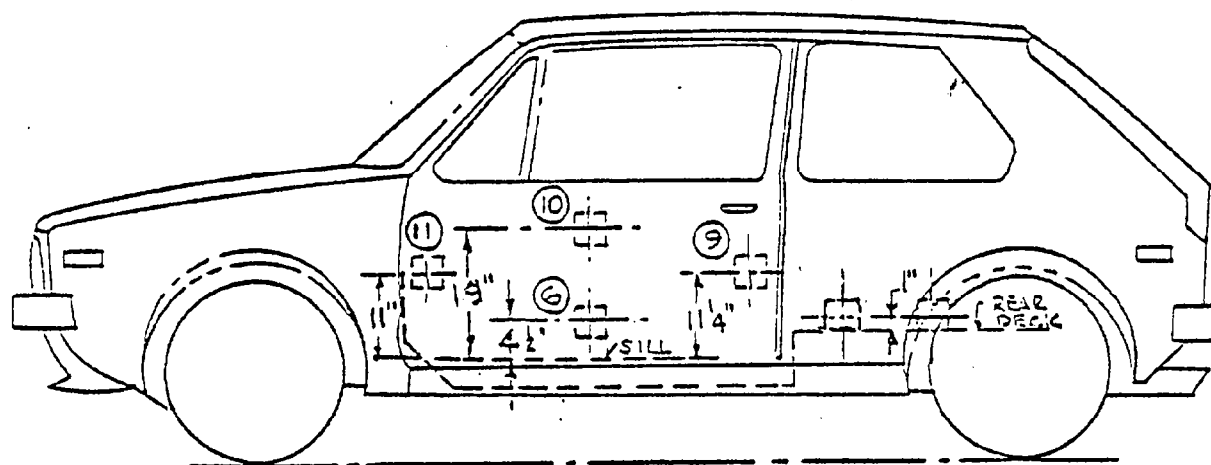
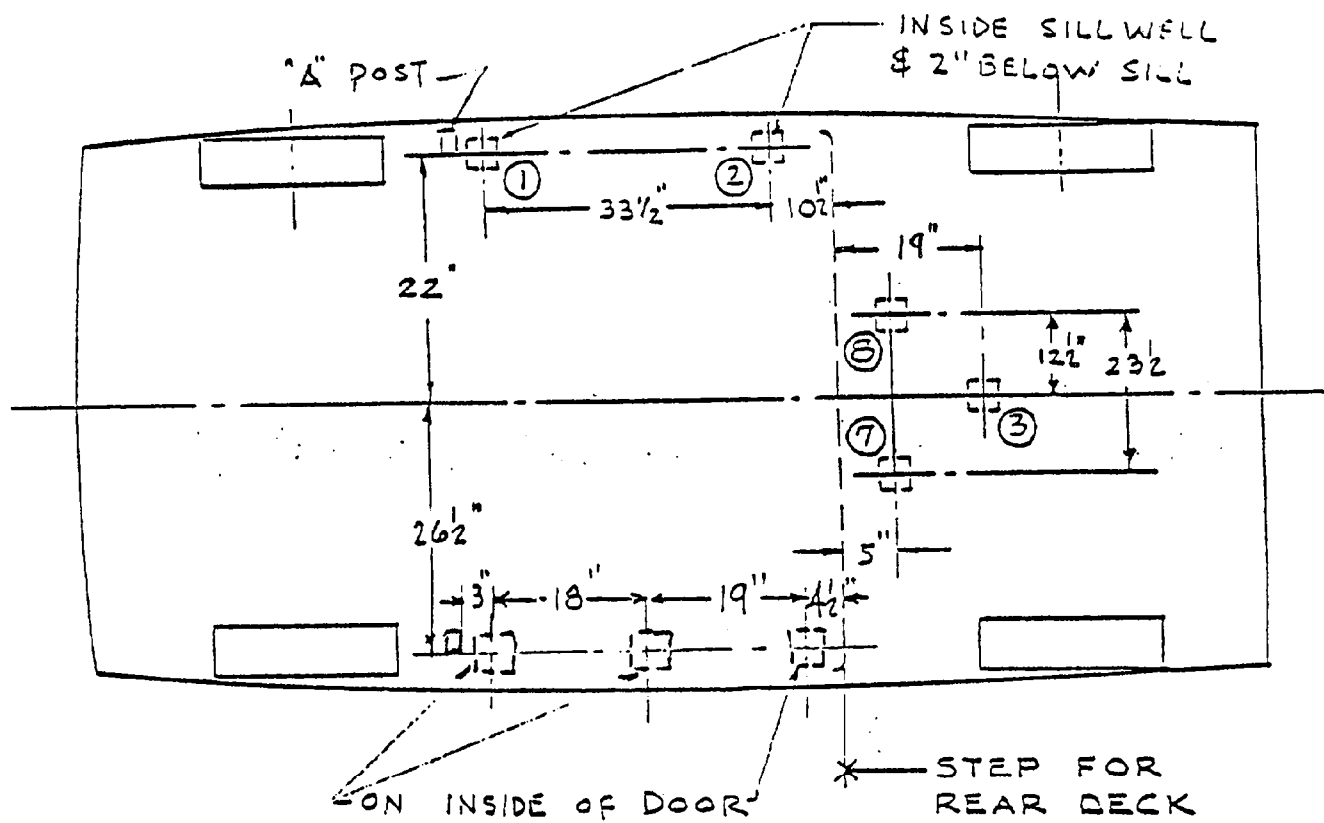


FIGURE 12 - VEHICLE ACCELEROMETER LOCATIONS



CAR NO. 2 - TARGET VEHICLE - 1976 VOLKSWAGEN RABBIT

Figure 13 VEHICLE ACCELEROMETER LOCATIONS

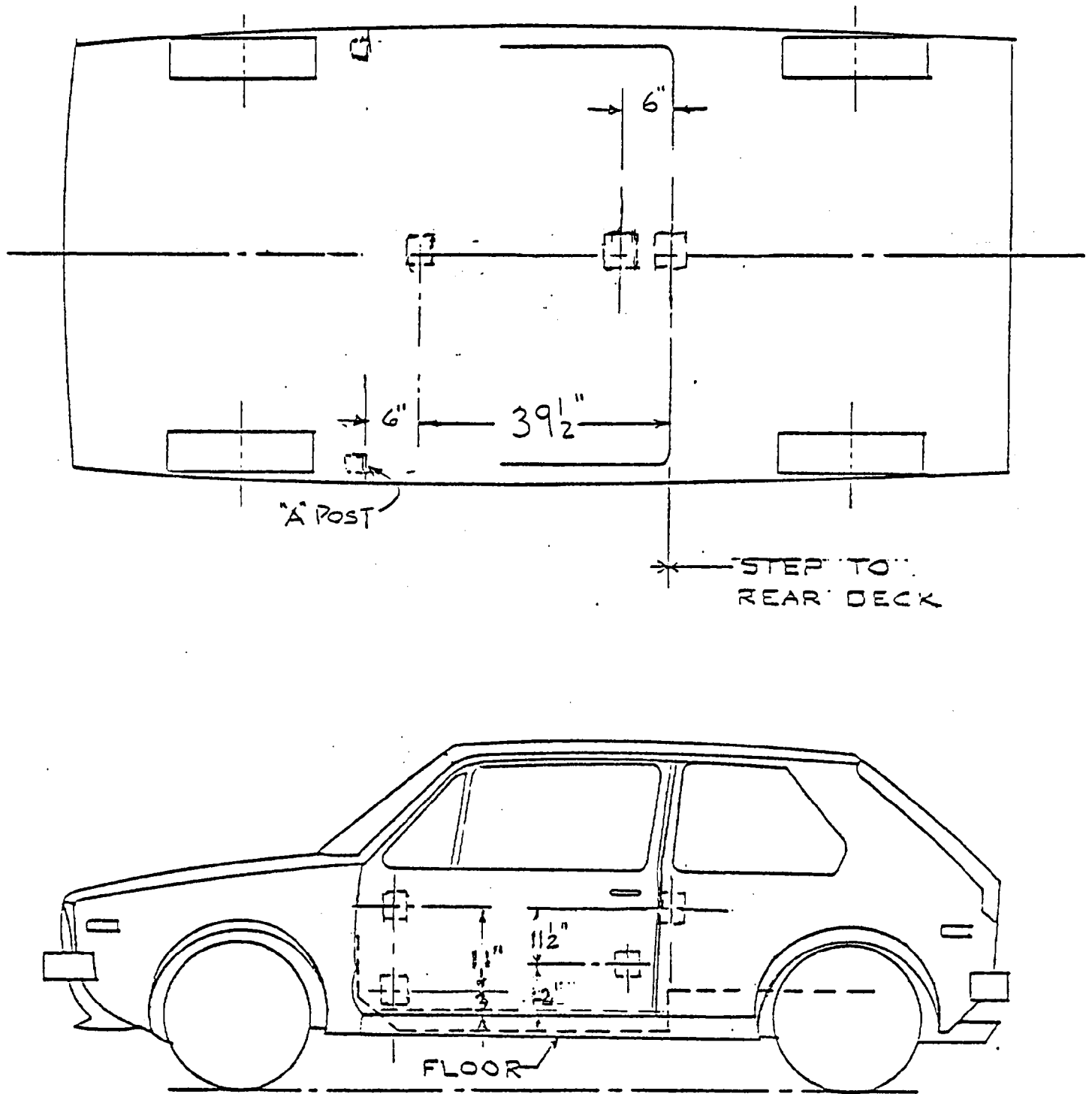


Figure 14 VEHICLE POTENTIOMETER LOCATIONS

TABLE 6

HIGH SPEED CAMERA INFORMATION (TEST NO. 12)

CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)
1. SOUTH WIDE	A = 23 ft. B = 2 ft. 10 in	PHOTOSONIC	13 MM	NO PULSE
2. SOUTH CLOSE	C = 24 ft. 10 in D = 5 ft.	PHOTOSONIC	25 MM	NO PULSE
3. NORTH WIDE	E = 26 ft. F = 14 ft.	PHOTOSONIC	13 MM	800
4. NORTH CLOSE	G = 26 ft. 8 in H = 19 ft.	PHOTOSONIC	25 MM	700
5. NORTH TOWER	L = 29 ft. M = 16 ft.	PHOTOSONIC	35 MM	700
6. TOWER 45°	J = 21 ft. 7 in. K = 11 ft.	PHOTOSONIC	13 MM	600
7. TOWER	31 ft. 6 in.	PHOTOSONIC	13 MM	600
8. OB HOOD	ON-BOARD	STALEX	8 MM	1250
9. OB DOOR	ON-BOARD	STALEX	8 MM	1450
10. OB REAR	ON-BOARD	STALEX	8 MM	1250

NOTE: CAMERAS ARE NUMBERED ACCORDING TO SPLICING SEQUENCE OF FILM.

(24 fps) REAL TIME MOVIE FILM COVERAGE OF PRE-CRASH, POST-CRASH
AND CRASH EVENT SPLICED AT START AND END OF FILM.

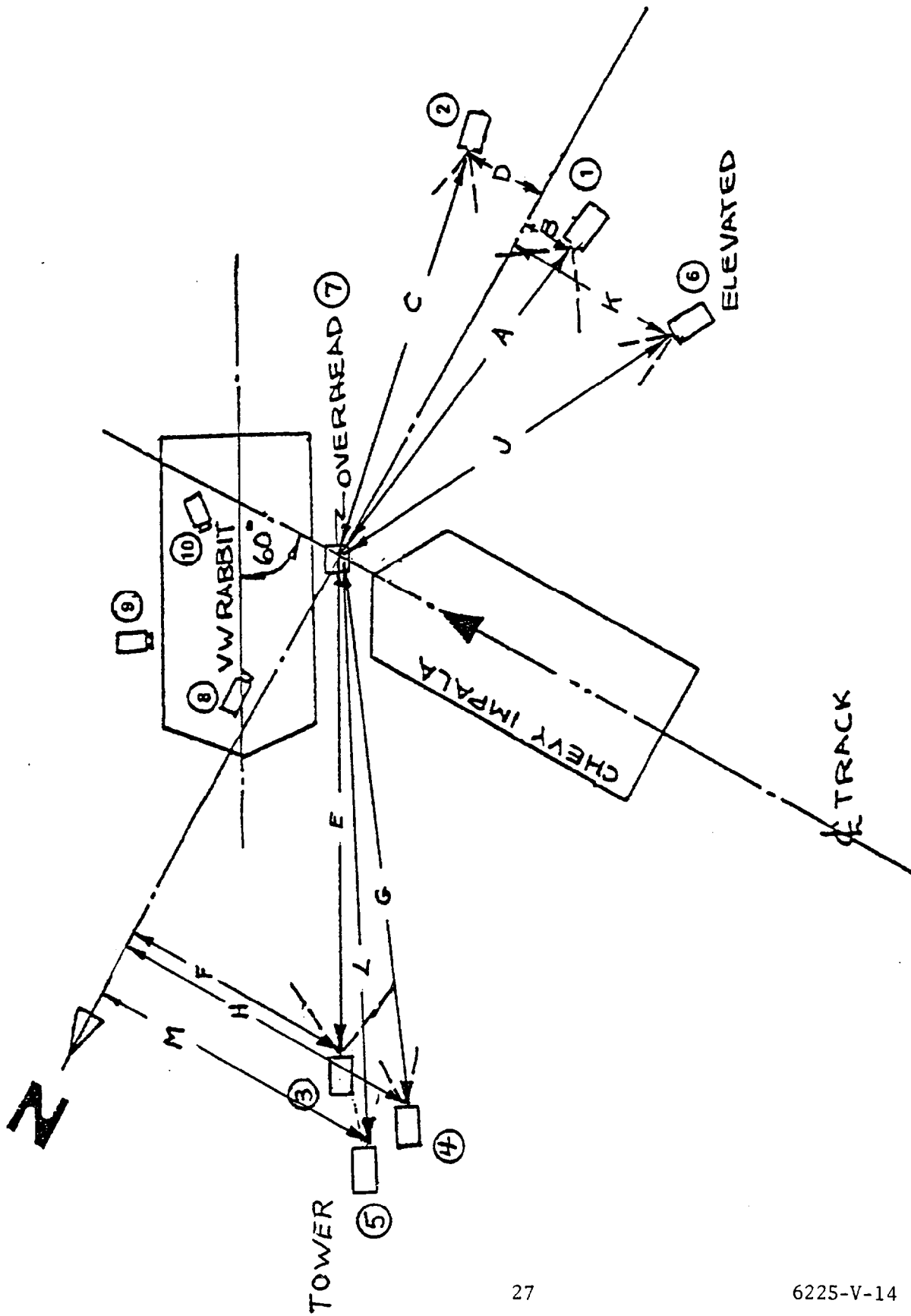


Figure 15 HIGH SPEED CAMERA LOCATIONS

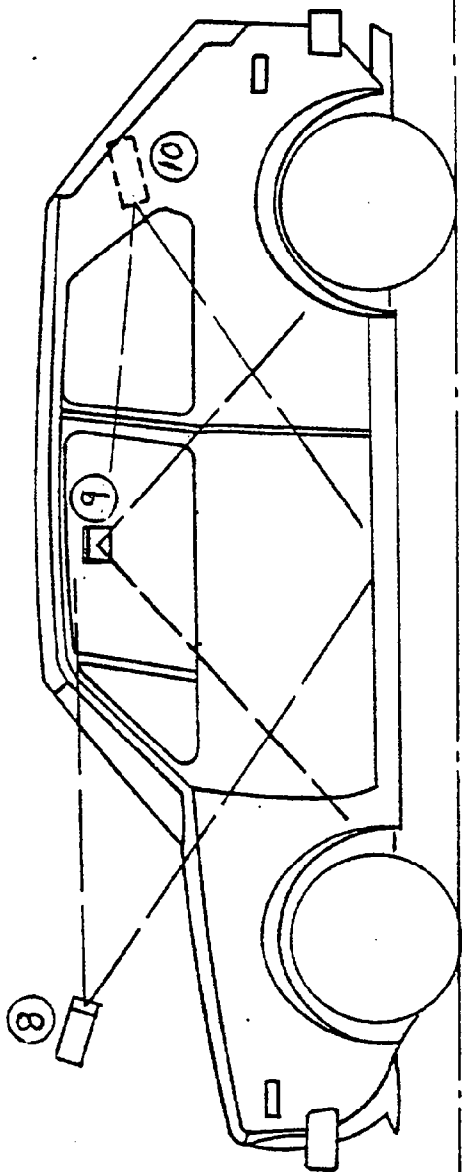


FIGURE 16 - ON-BOARD HIGH SPEED CAMERA LOCATIONS

DUMMY INJURY CRITERIA VALUES

CAR 1 - STRIKING VEHICLE - 1978 CHEVROLET IMPALA

	MAXIMUM ACCELERATION ("G") *											
	HEAD				CHEST				PELVIS			
	X	Y	Z	R	X	Y	Z	R	X	Y	Z	R
DUMMY (1)	-9	3	6	10.5	-8.2	2.6	-2.4	9				
DUMMY (2)												
DUMMY (3)												
DUMMY (4)												

	MAXIMUM FORCE-FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)		
DUMMY (2)		
DUMMY (3)		
DUMMY (4)		

	MAXIMUM FORCE-SEAT BELTS LOADS (LBS)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD	LAP STRAP LEFT BELT LOAD
DUMMY (1)	280	***	500
DUMMY (2)			
DUMMY (3)			
DUMMY (4)			

	HEAD INJURY CRITERIA**				SEVERITY INDEX	
	HIC	t ₁ (SEC)	t ₂ (SEC)	AVE. ACC. (g) t ₁ TO t ₂	HEAD	CHEST
DUMMY (1)	11.9	.106	.176	7.8	14.69	7.6
DUMMY (2)						
DUMMY (3)						
DUMMY (4)						

*DEFINED AS EXCEEDING 0.003 SEC. DURATION

**AS DEFINED IN FMVSS NO. 208

*** Signal was bad from transducer - data lost.

TABLE 8

DUMMY INJURY CRITERIA VALUES

CAR 2 - STRUCK VEHICLE - 1976 VOLKSWAGEN RABBIT

	MAXIMUM ACCELERATION ("G") *											
	HEAD				CHEST				PELVIS			
	X	Y	Z	R	X	Y	Z	R	X	Y	Z	R
DUMMY (1)	-6.5	-20	12	22	-12	18	6	18.5	-11	30		
DUMMY (2)	3	18	16	22	3	39	-3	40	-4.5	10		
DUMMY (3)												
DUMMY (4)												

	MAXIMUM FORCE-FEMUR LOAD (LBS)		DUMMY LOCATION
	RIGHT FEMUR	LEFT FEMUR	
DUMMY (1)			Left Front Passenger Right Front Passenger
DUMMY (2)			
DUMMY (3)			
DUMMY (4)			

	MAXIMUM FORCE-SEAT BELTS LOADS (LBS)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD	LAP STRAP LEFT BELT LOAD
DUMMY (1)			
DUMMY (2)			
DUMMY (3)			
DUMMY (4)			

	HEAD INJURY CRITERIA**				SEVERITY INDEX	
	HIC	t ₁ (SEC)	t ₂ (SEC)	AVE. ACC. (g) t ₁ TO t ₂	HEAD	CHEST
DUMMY (1)	66.5	.075	.168	13.8	84.1	46.0
DUMMY (2)	46.9	.121	.181	14.4	61.0	70.0
DUMMY (3)						
DUMMY (4)						

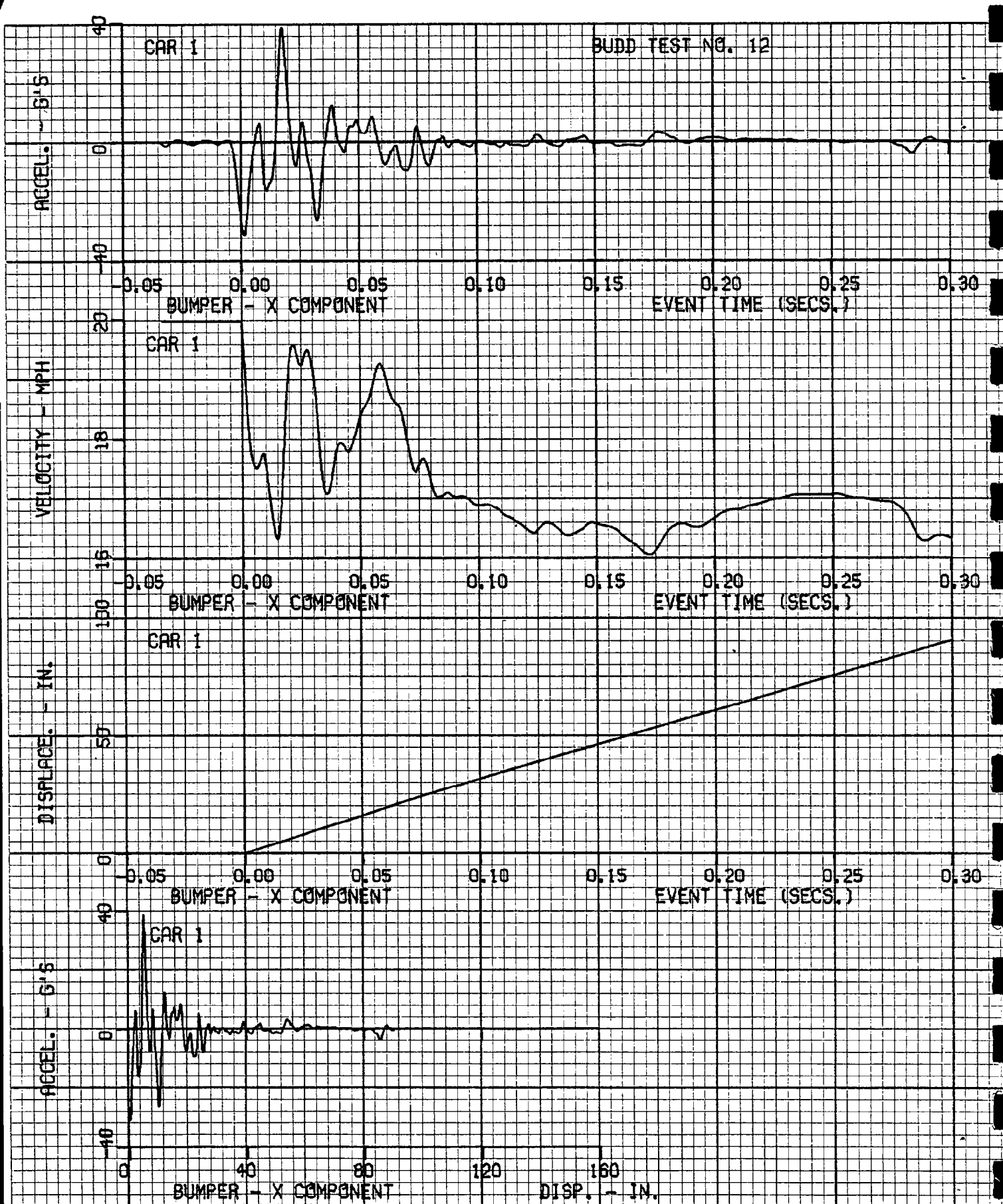
*DEFINED AS EXCEEDING 0.003 SEC. DURATION

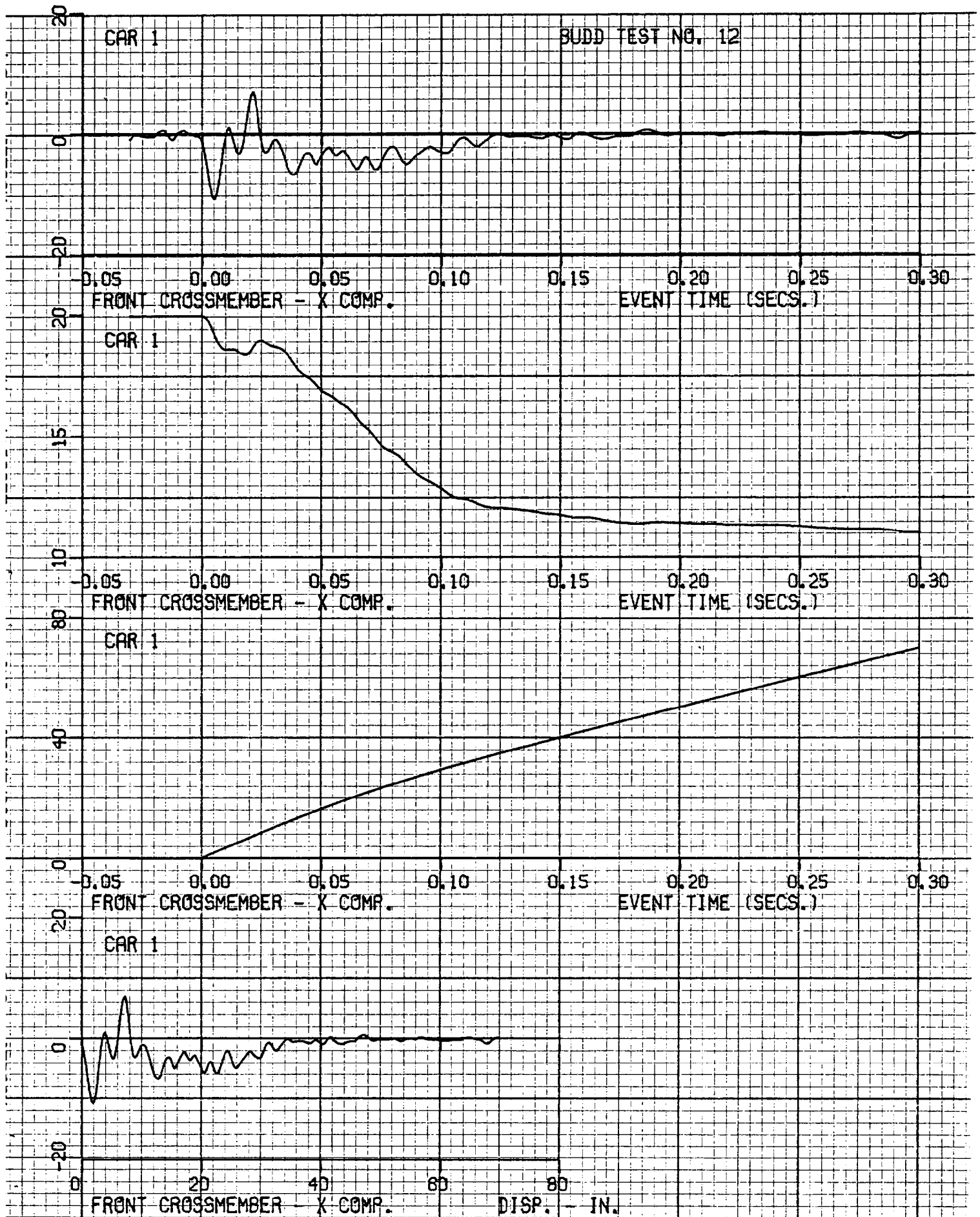
**AS DEFINED IN FMVSS NO. 208

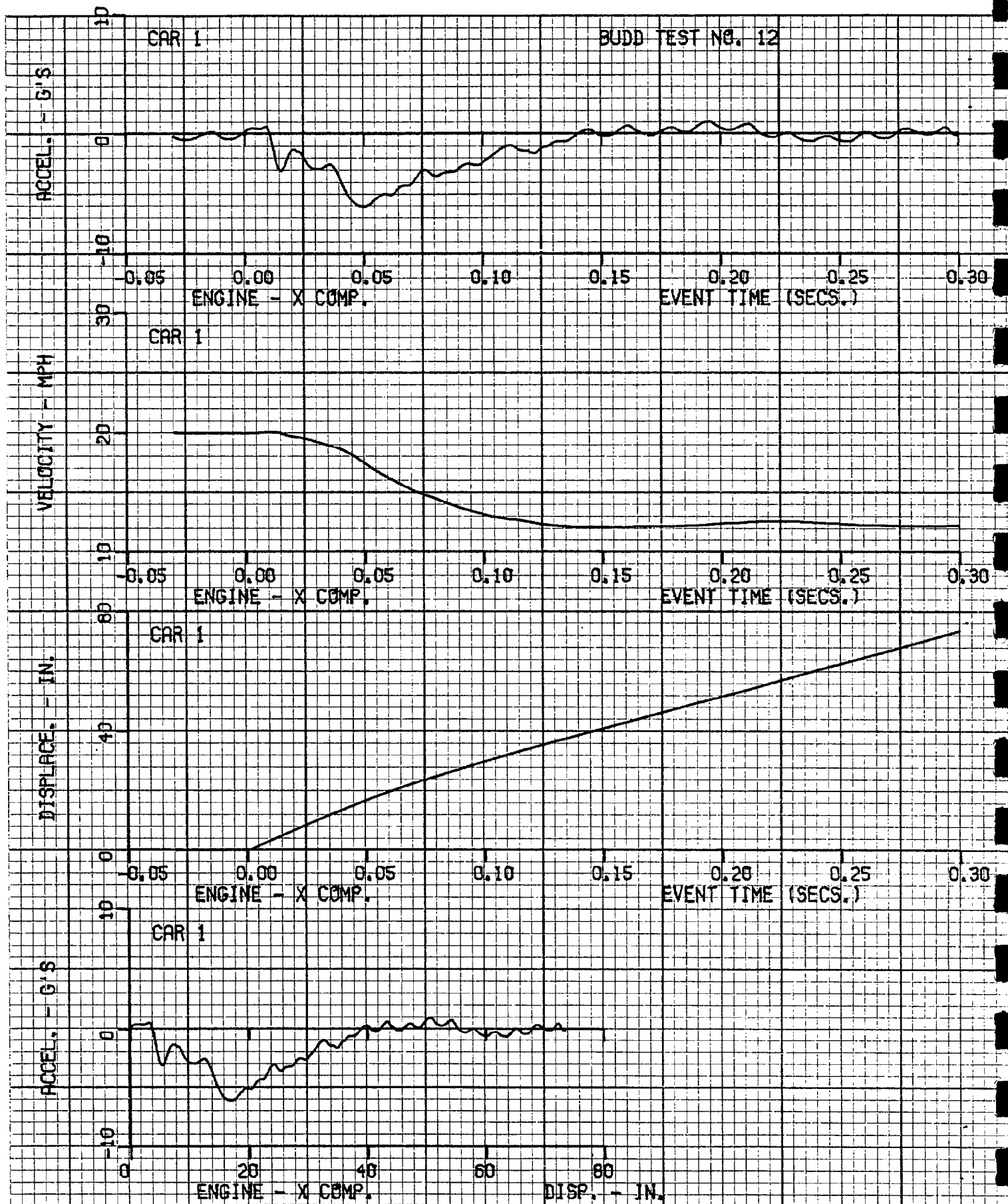
TEST NO. 12

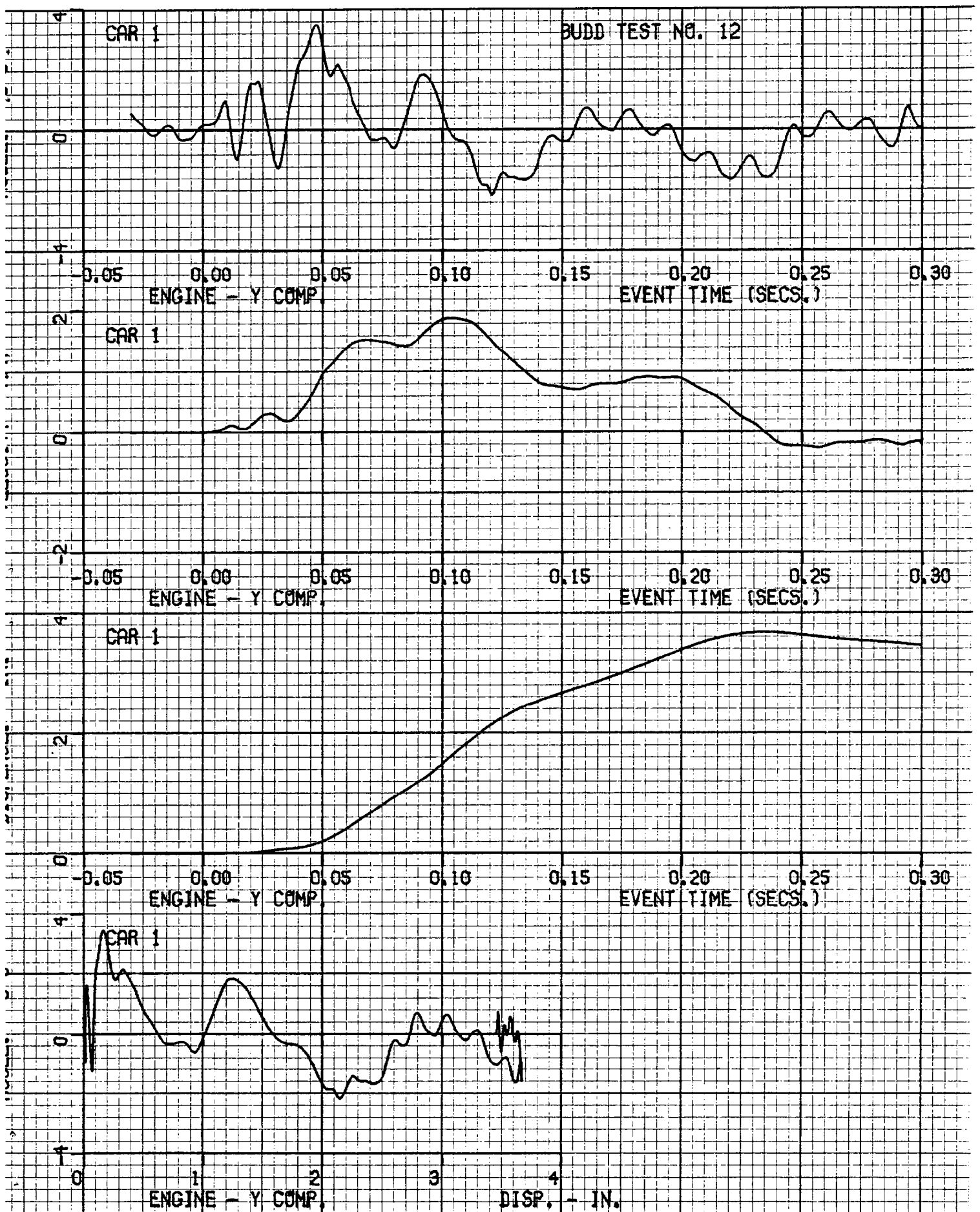
CAR NO. 1 - 1978 CHEVROLET IMPALA

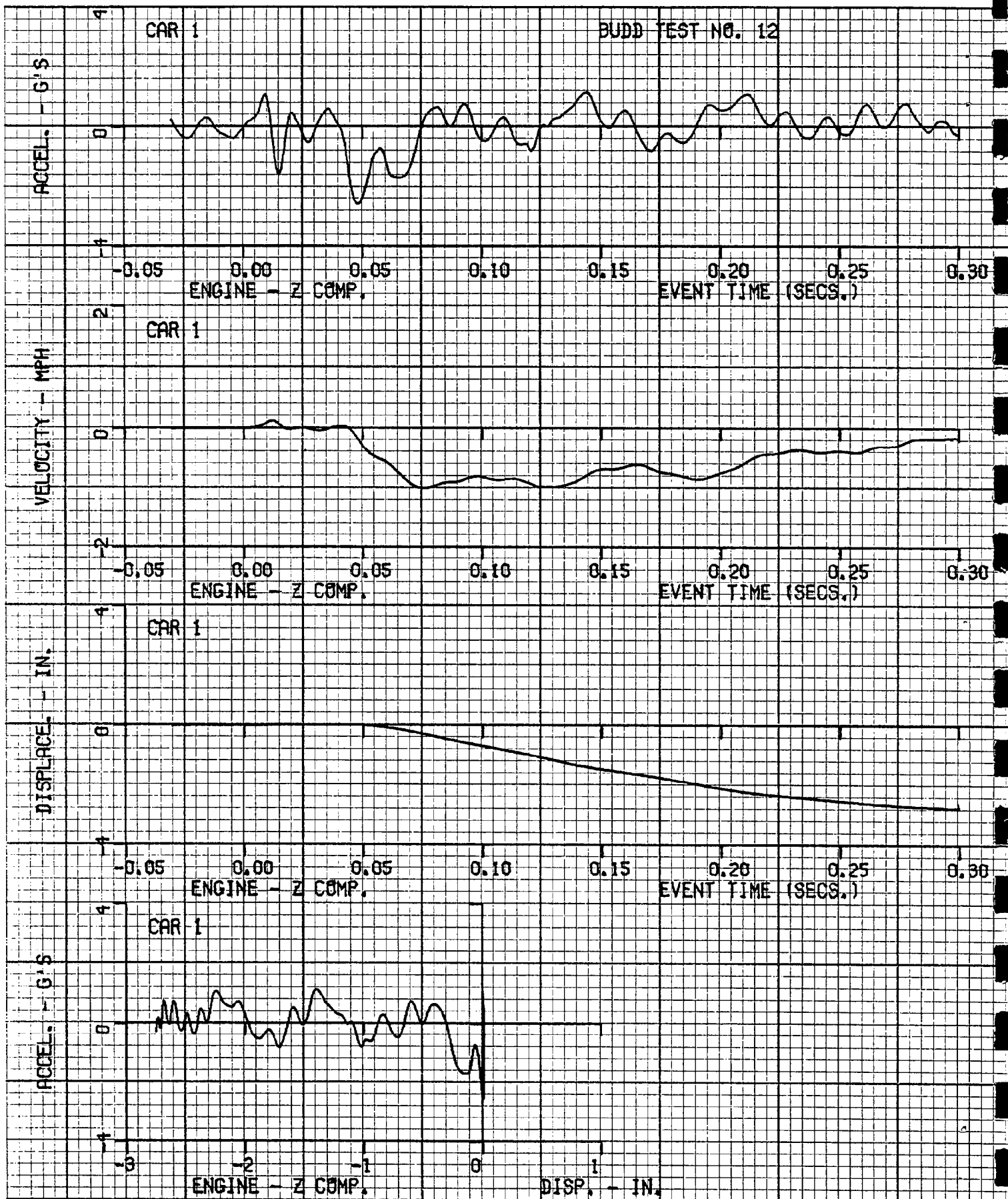
VEHICLE DATA - 60 HZ CHANNEL CLASS

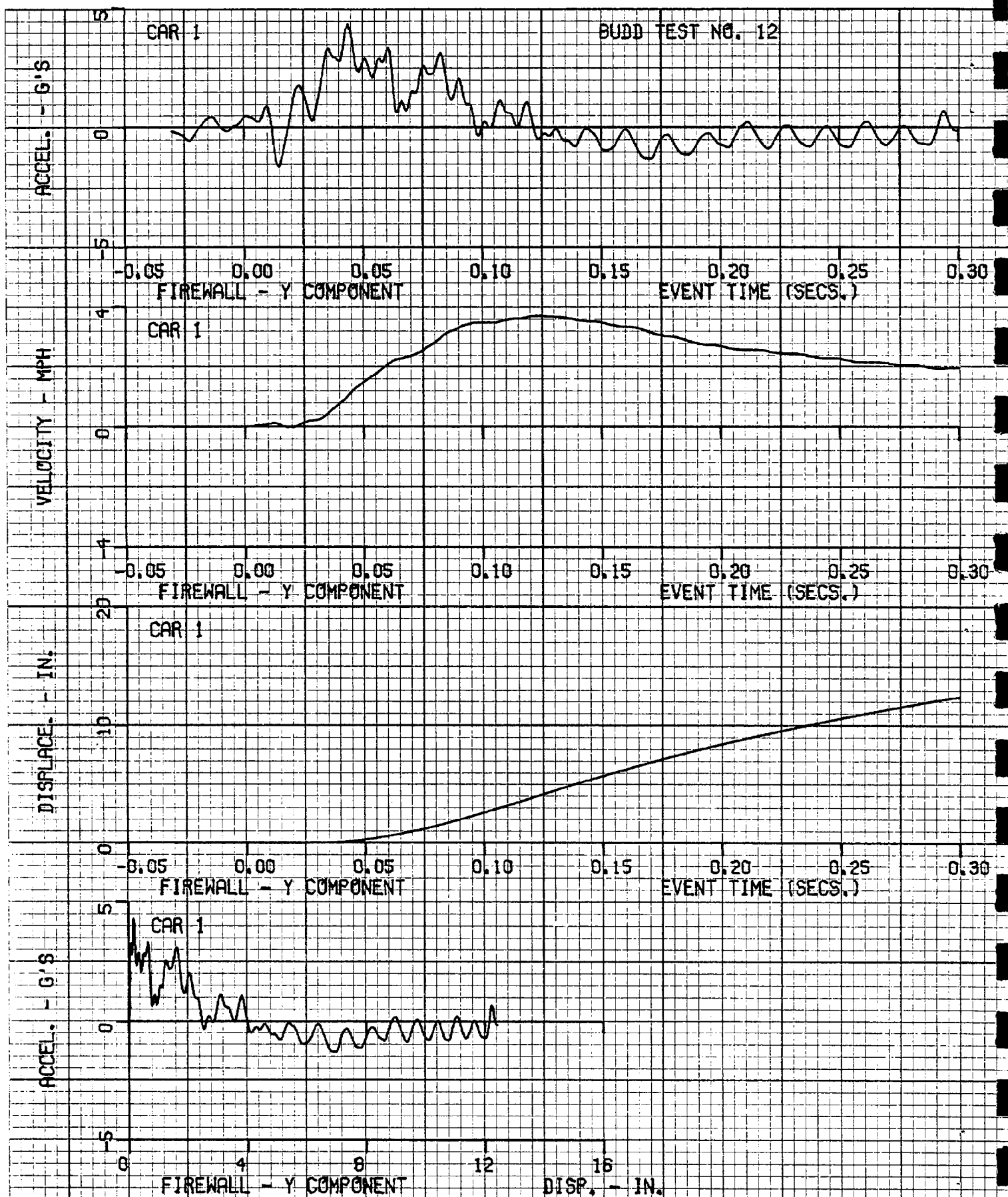


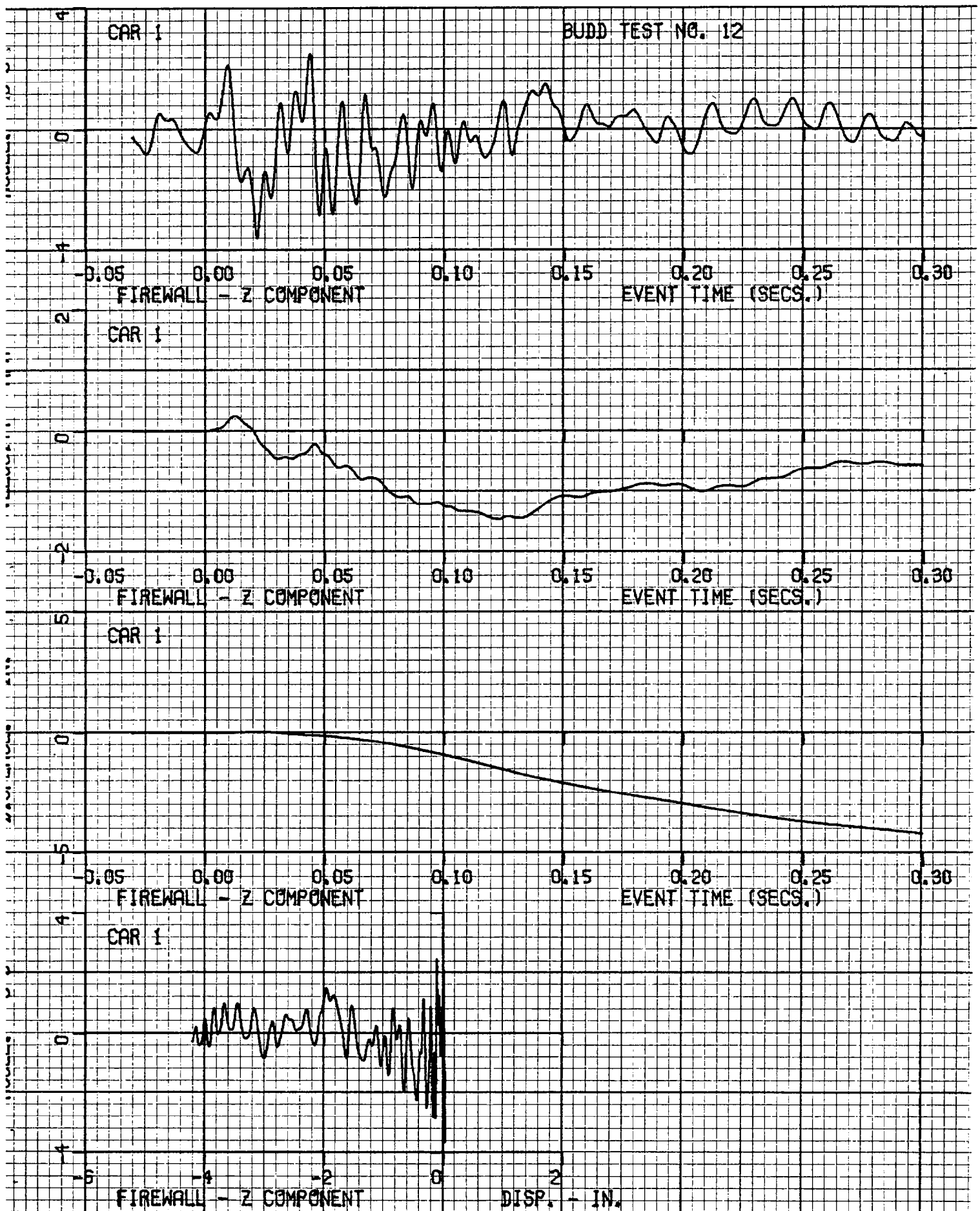


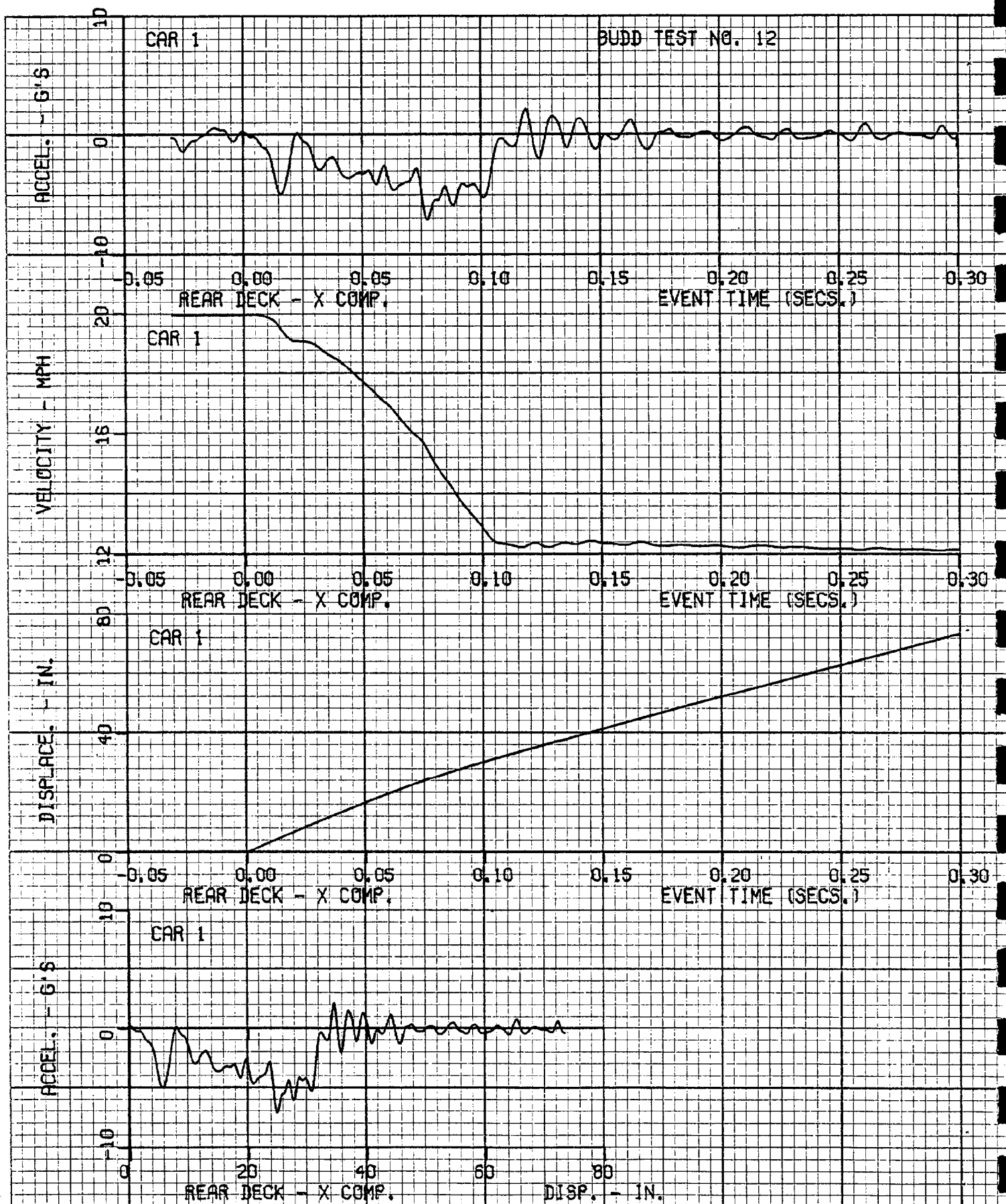


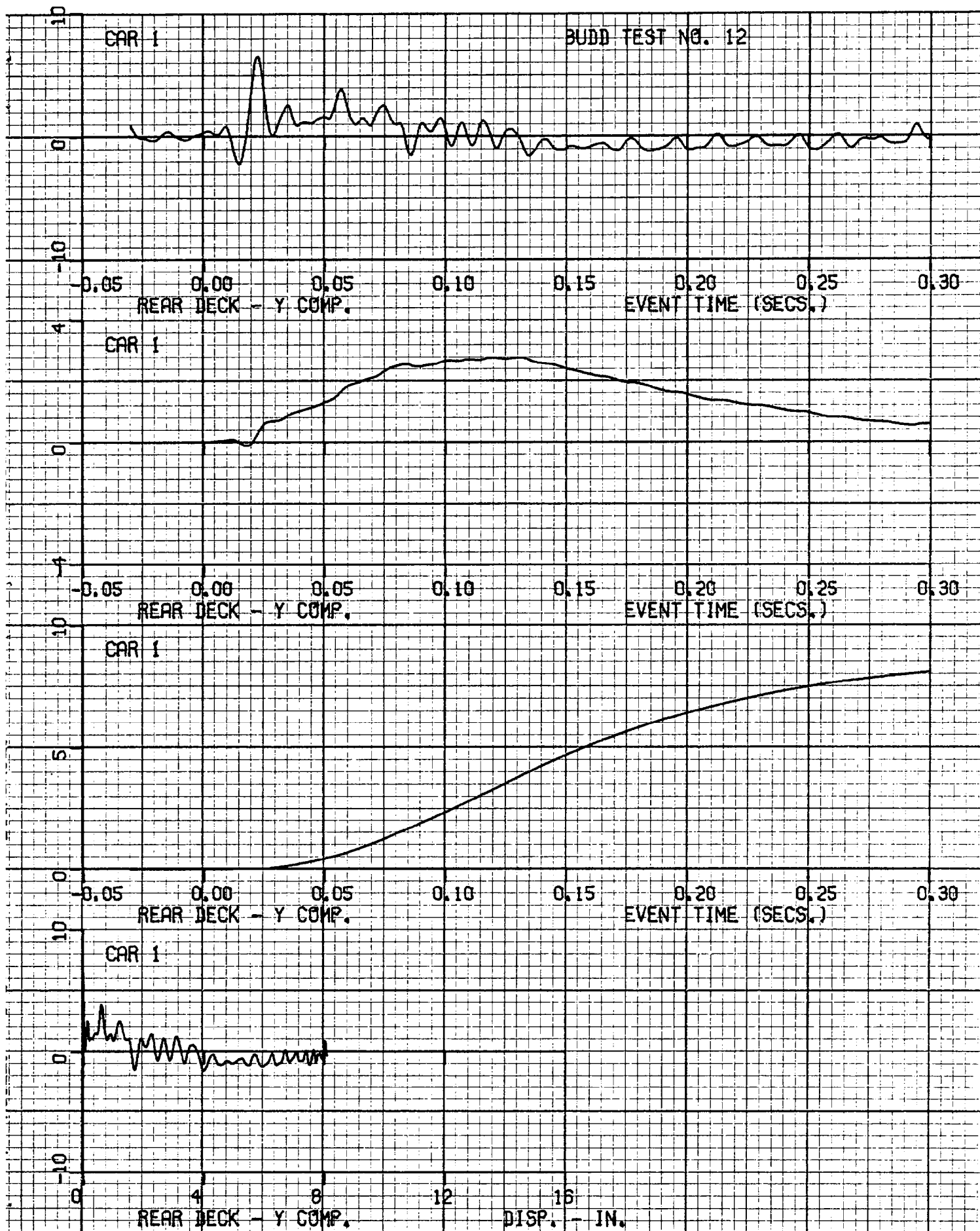


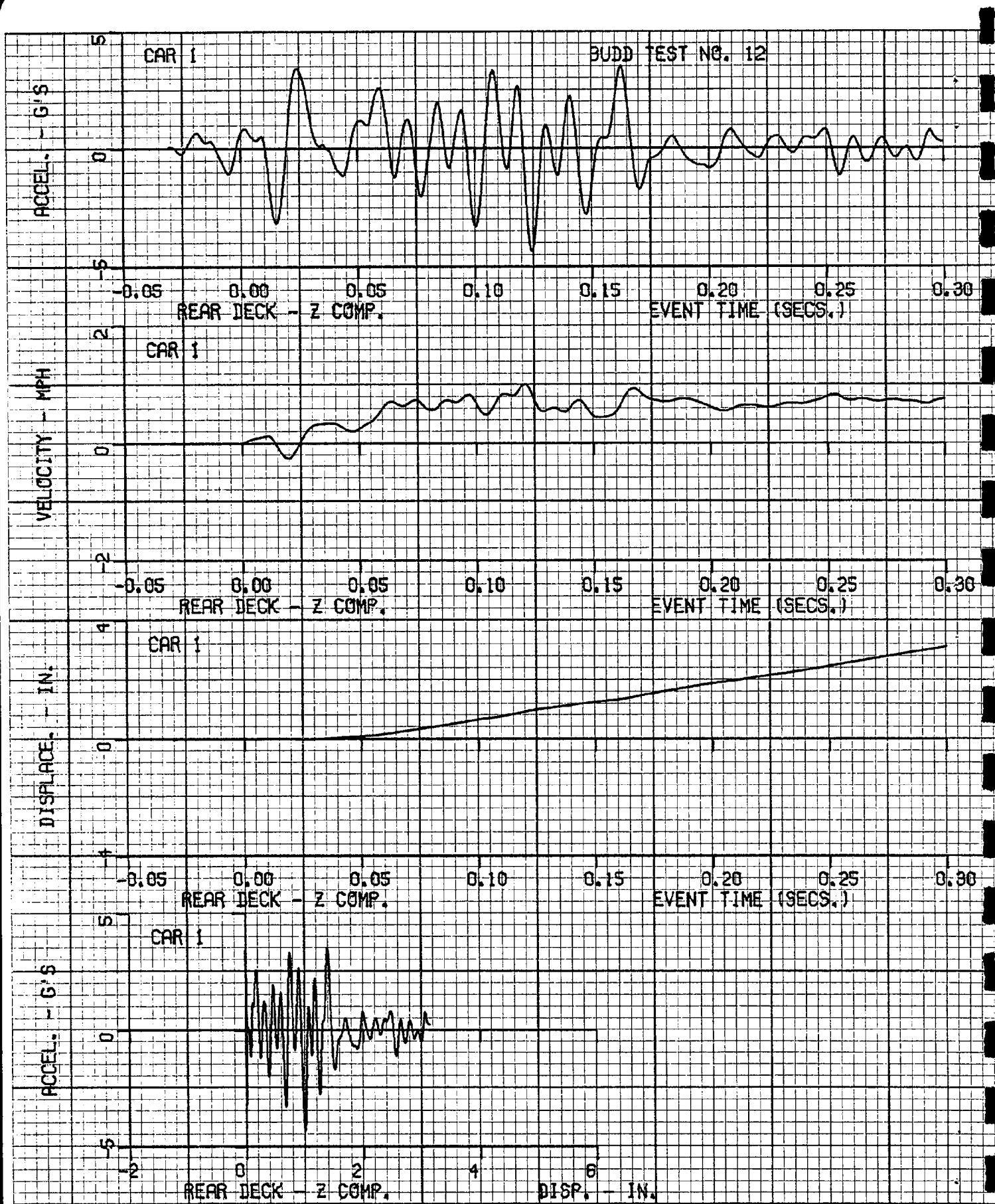






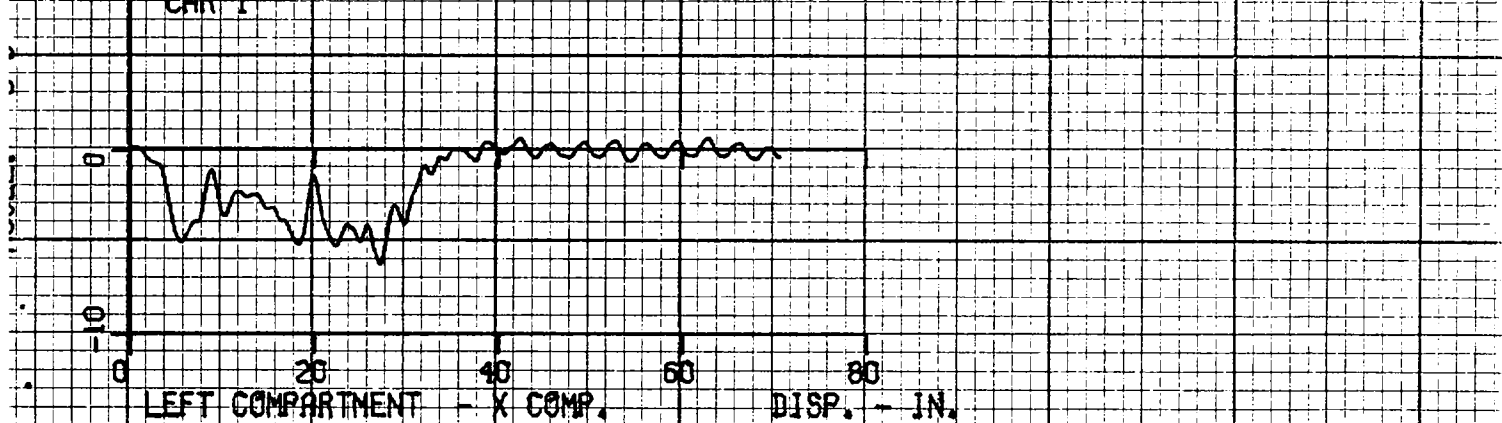
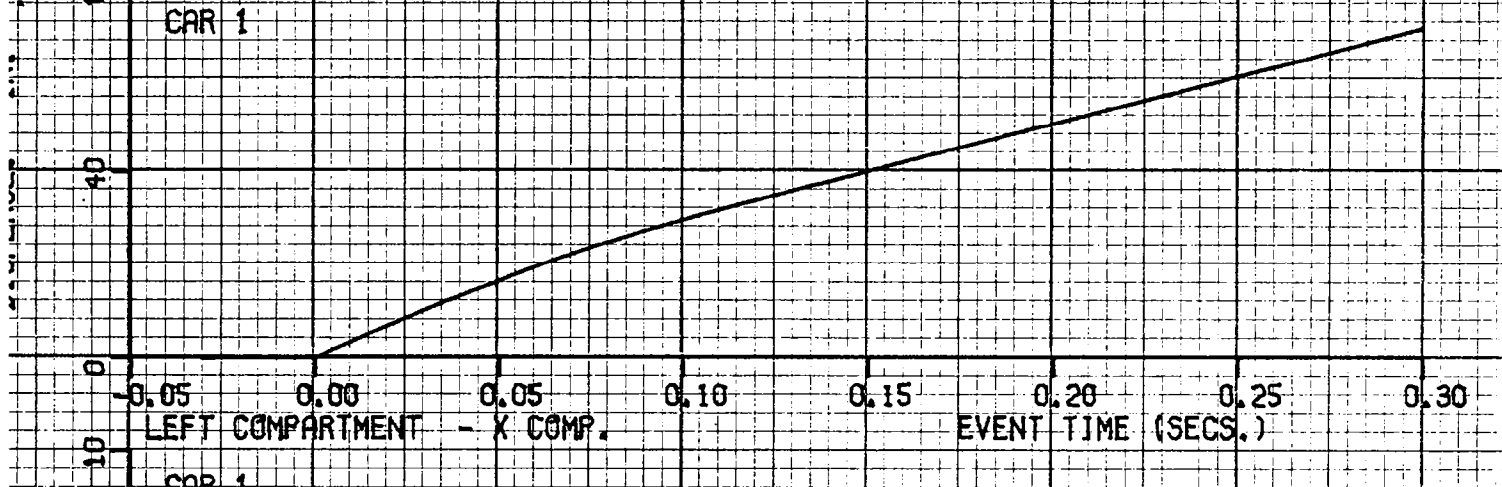
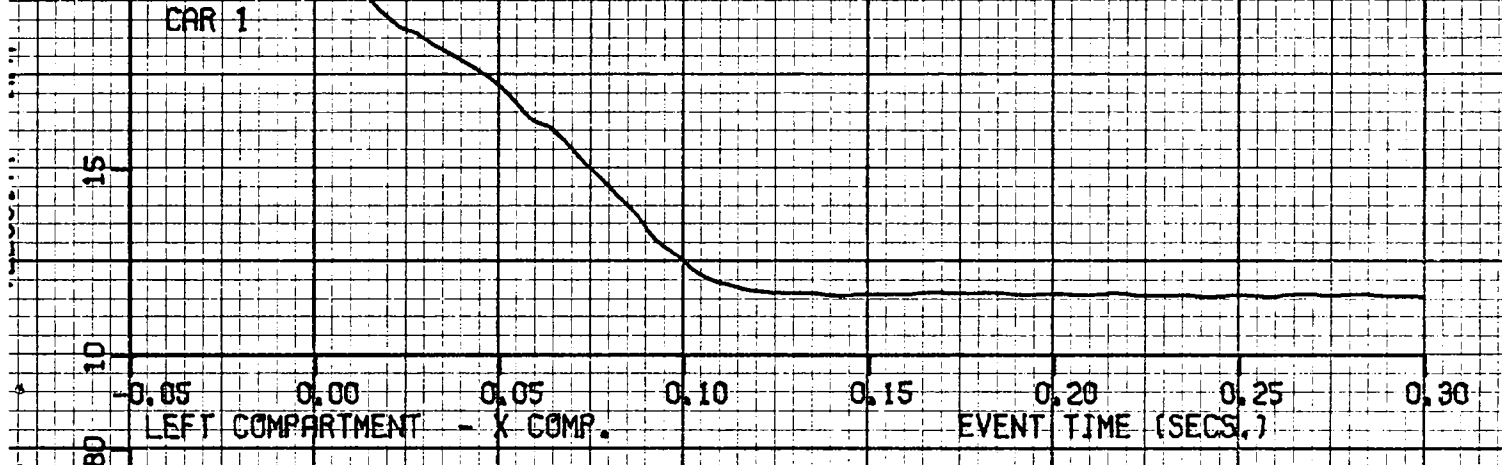
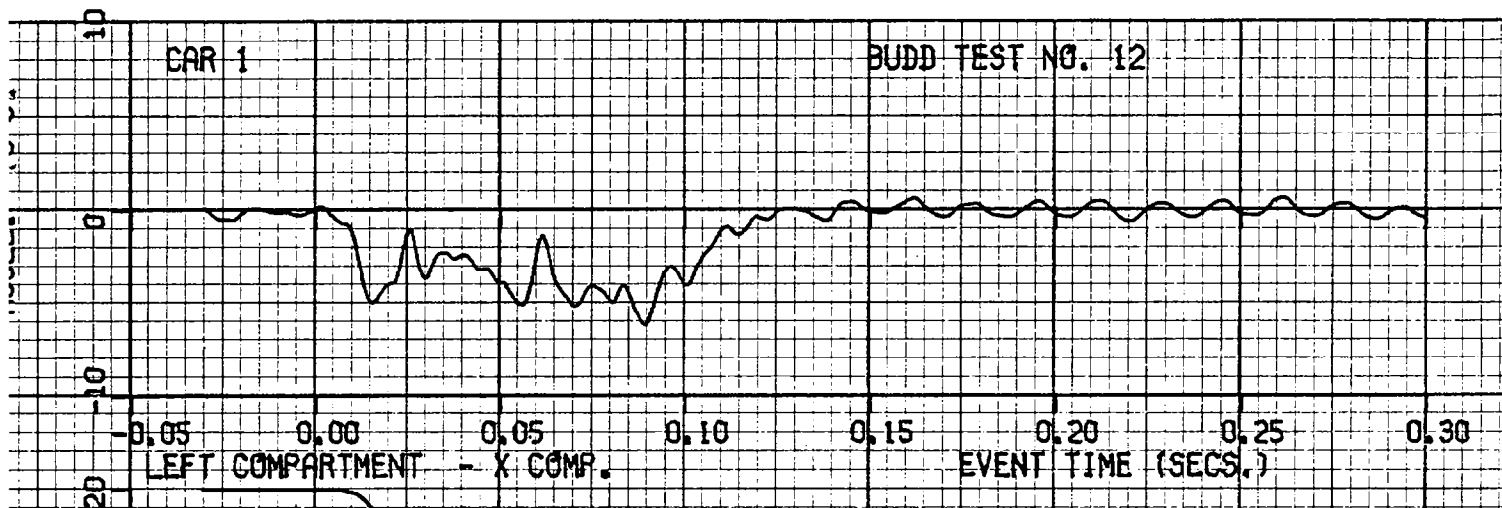


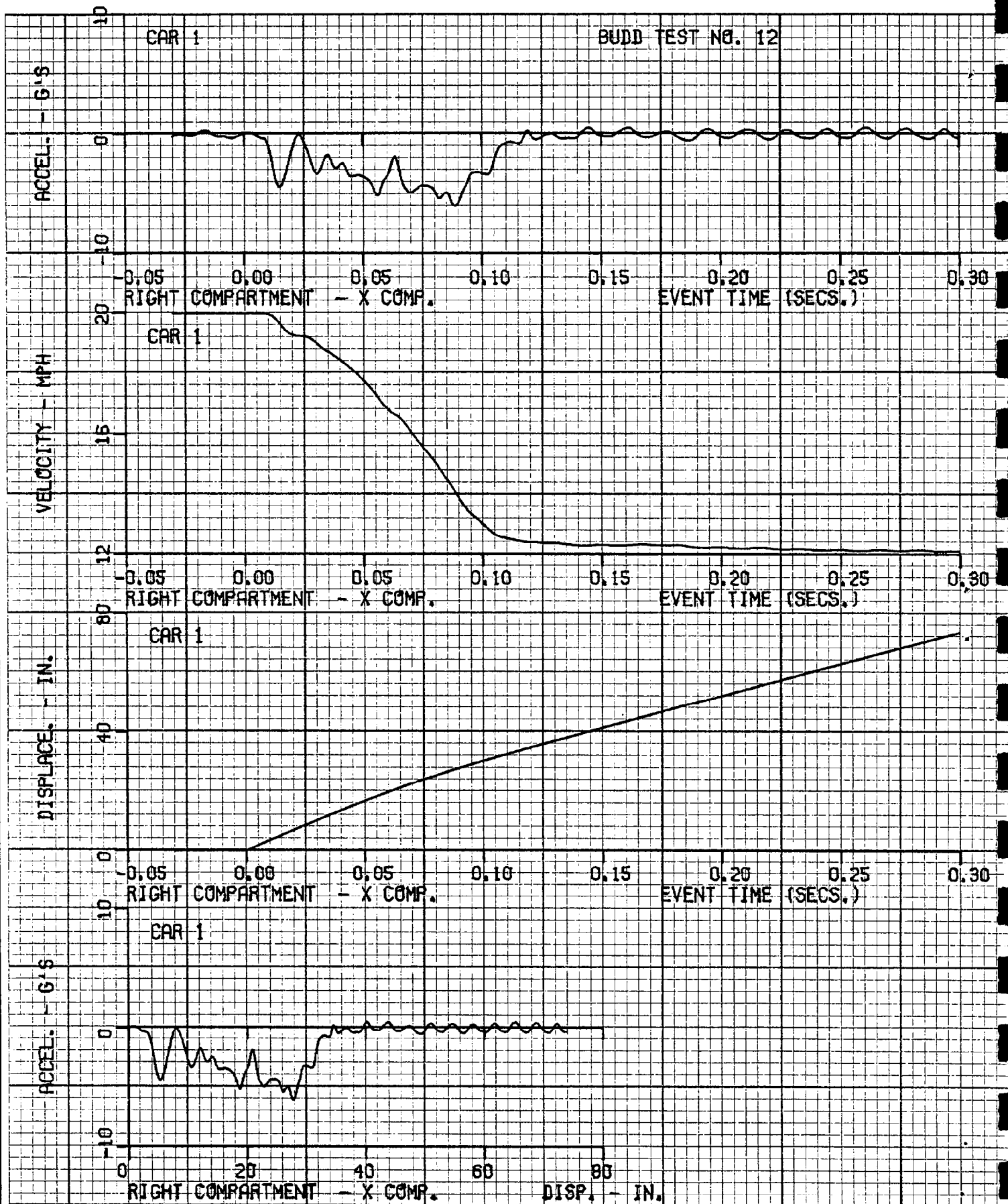




CAR 1

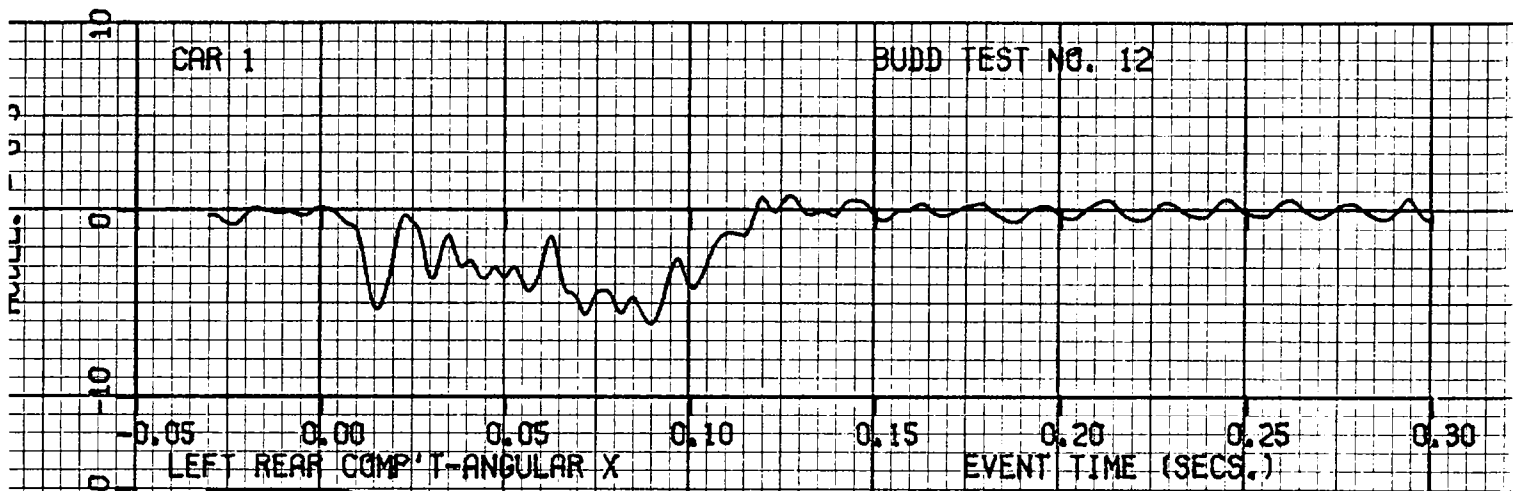
BUDD TEST NO. 12



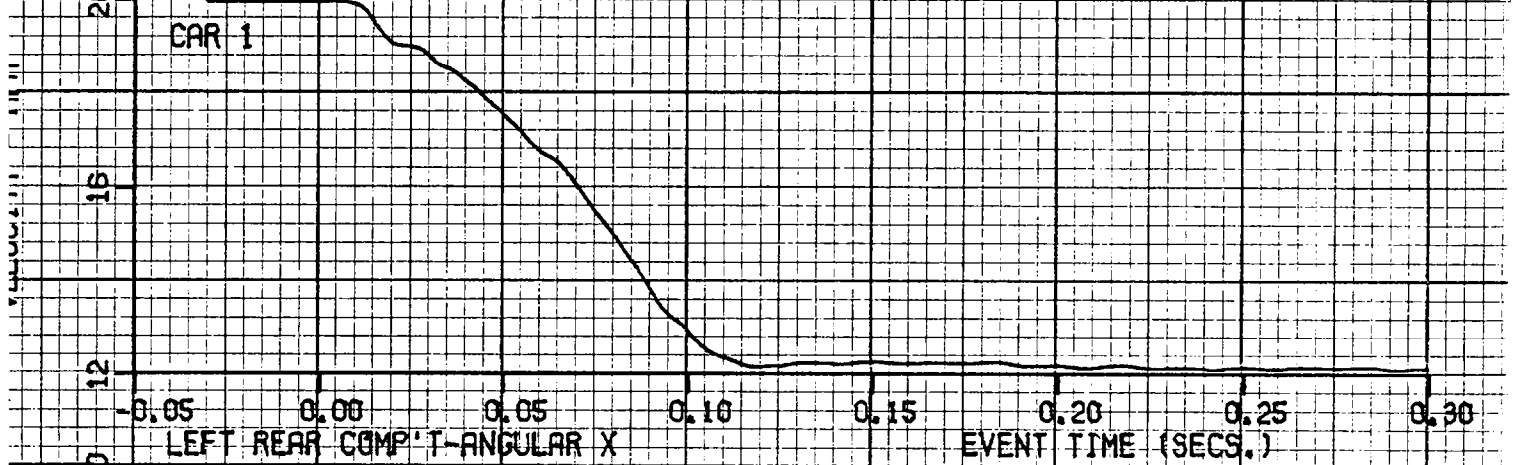


CAR 1

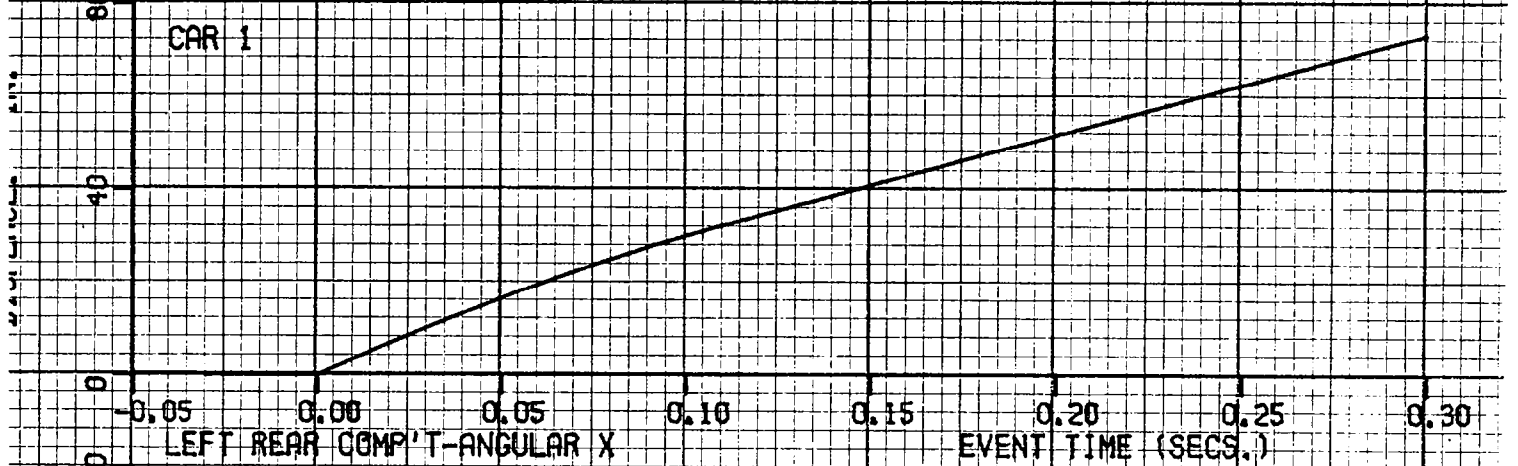
BUDD TEST NO. 12



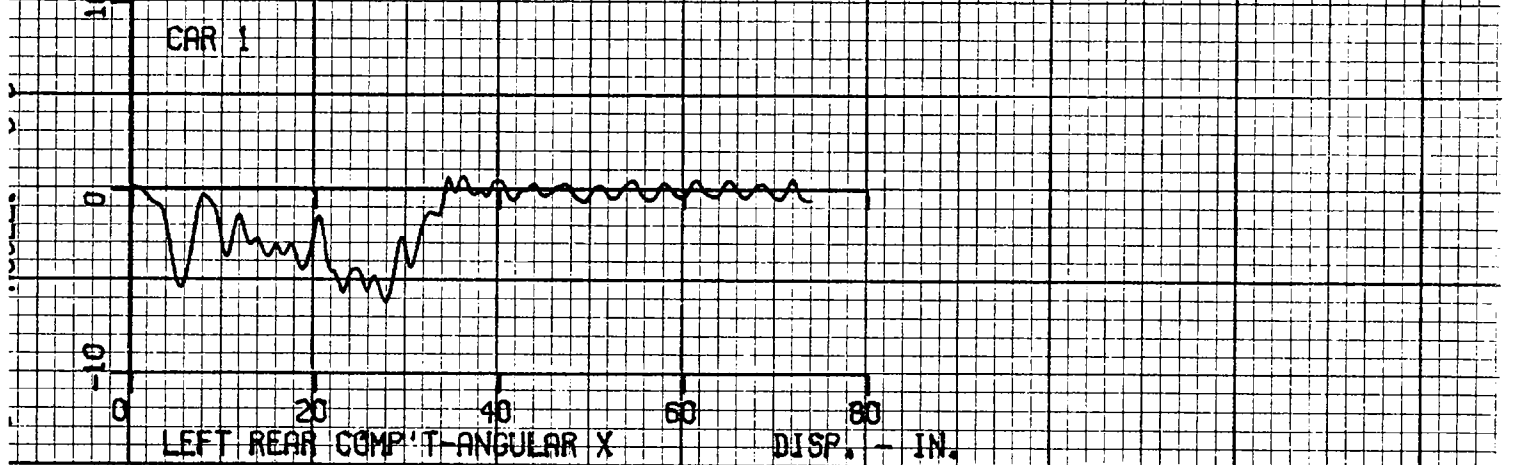
CAR 1

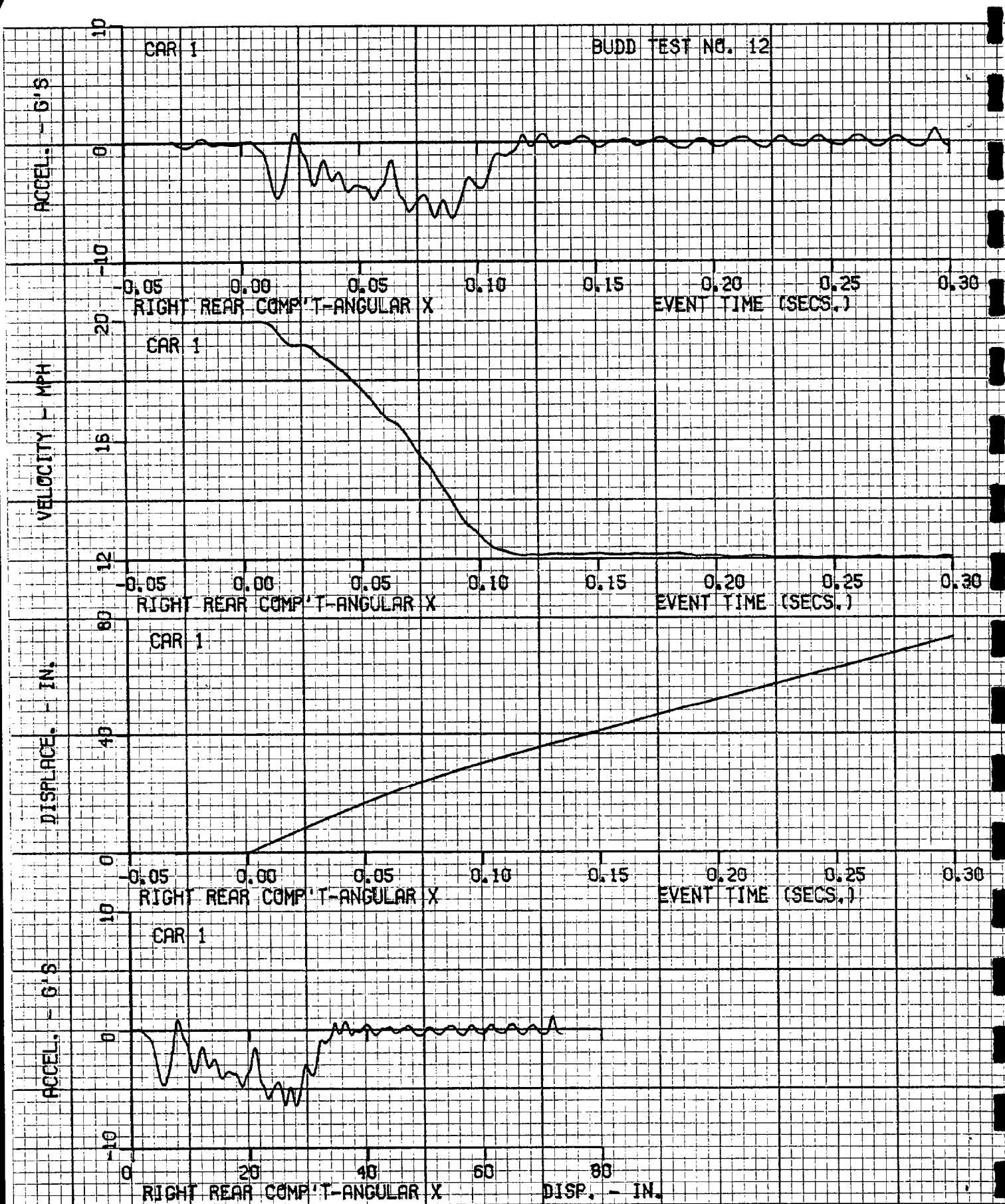


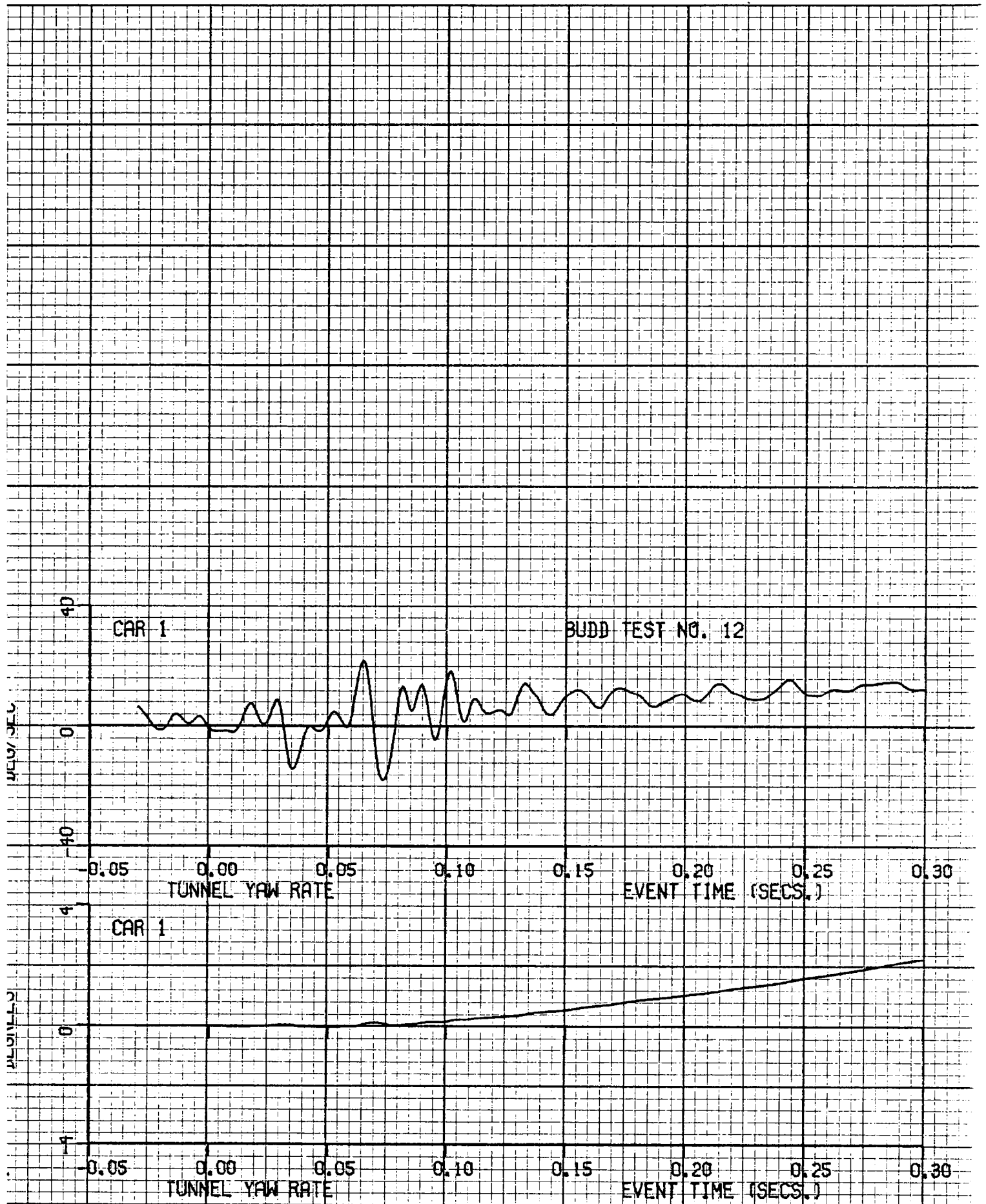
CAR 1



CAR 1



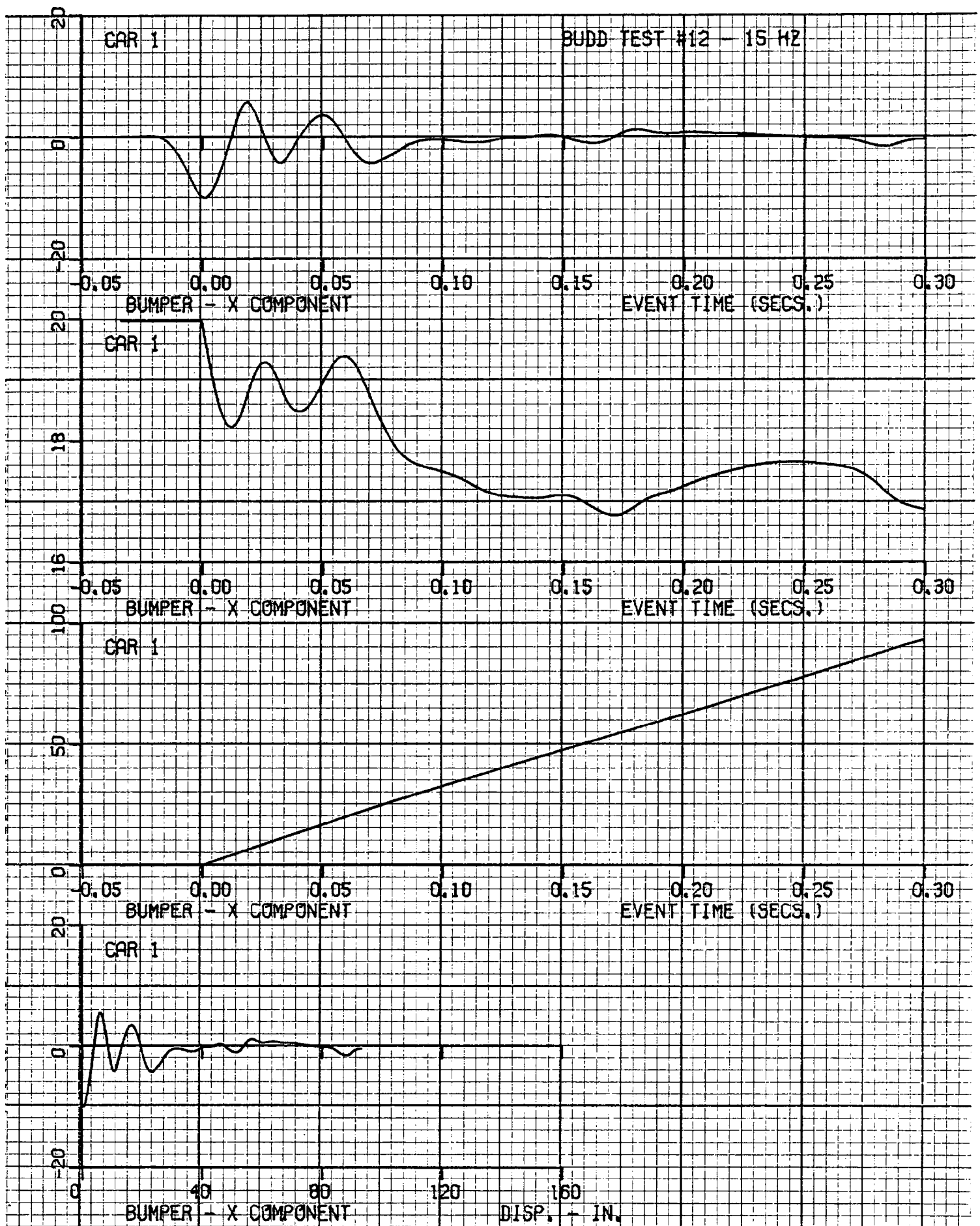


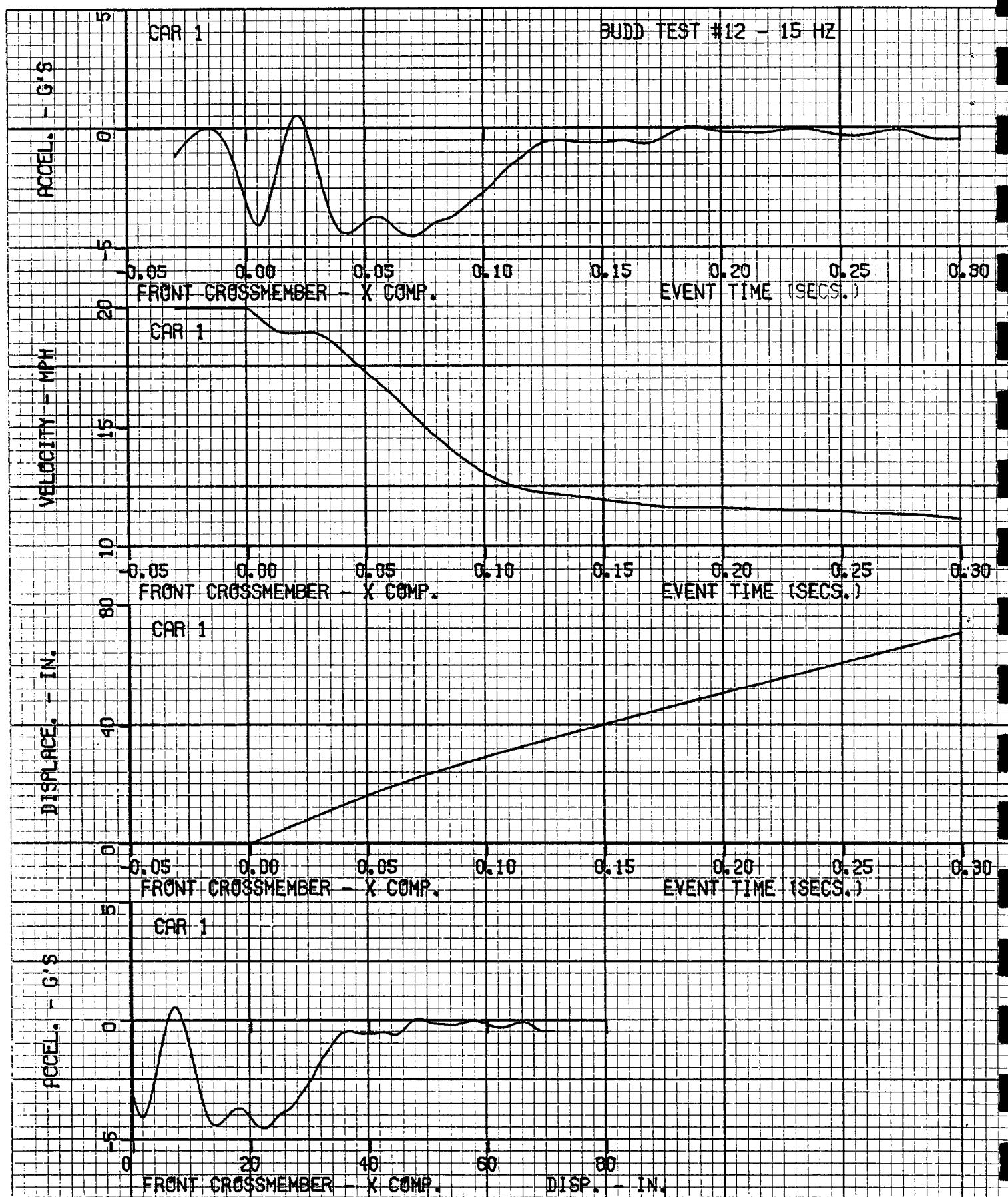


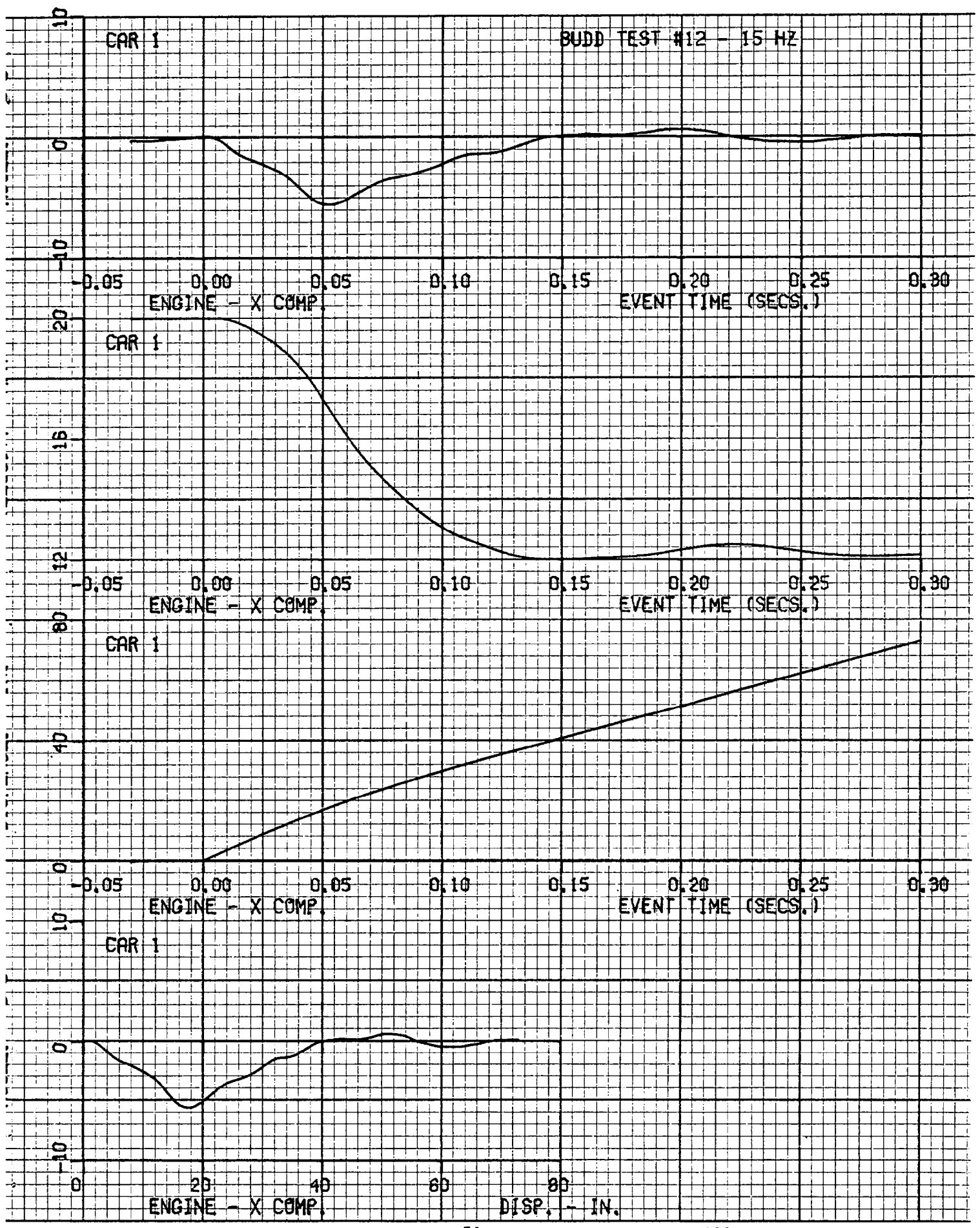
TEST NO. 12

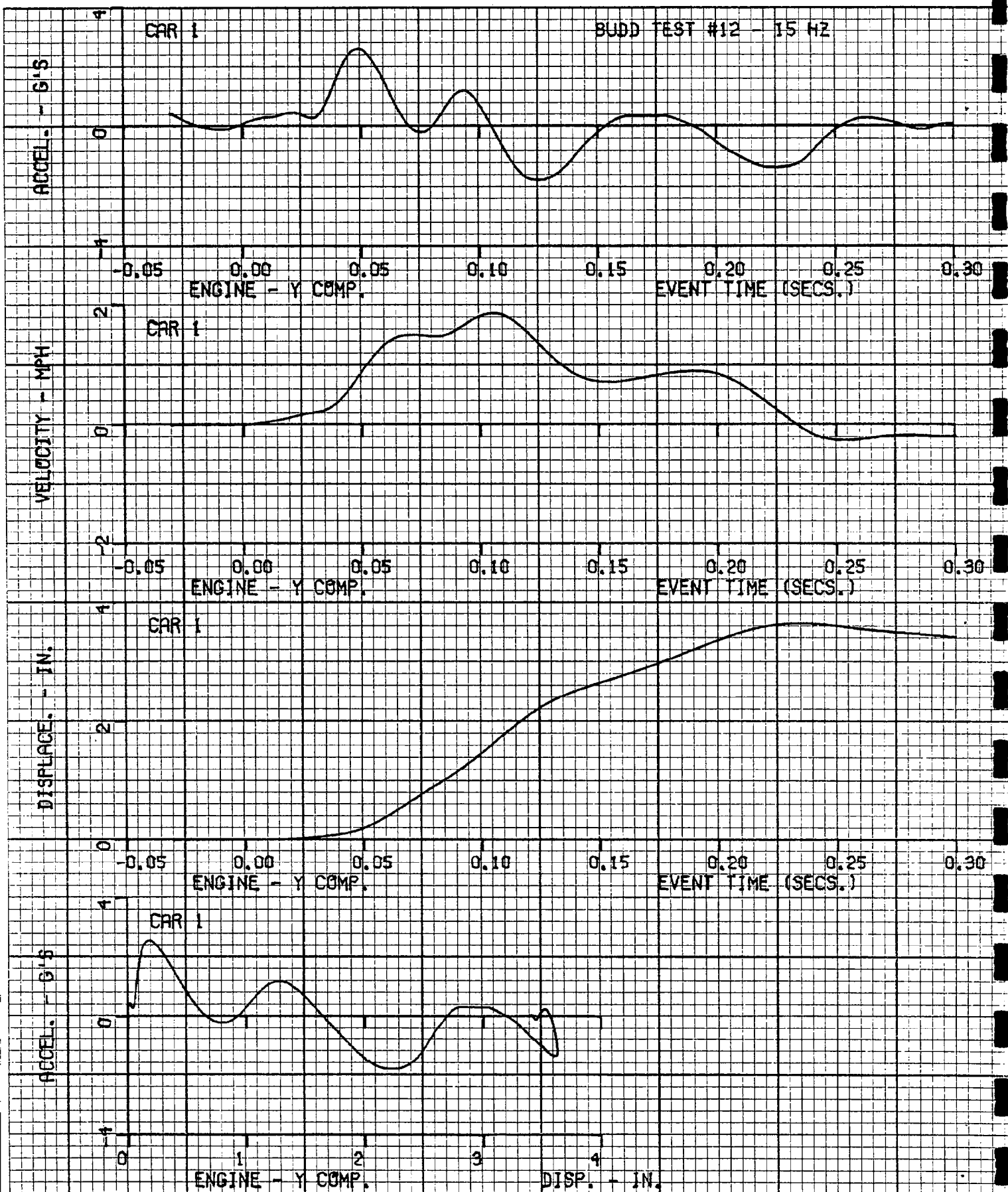
CAR NO. 1 - 1978 CHEVROLET IMPALA

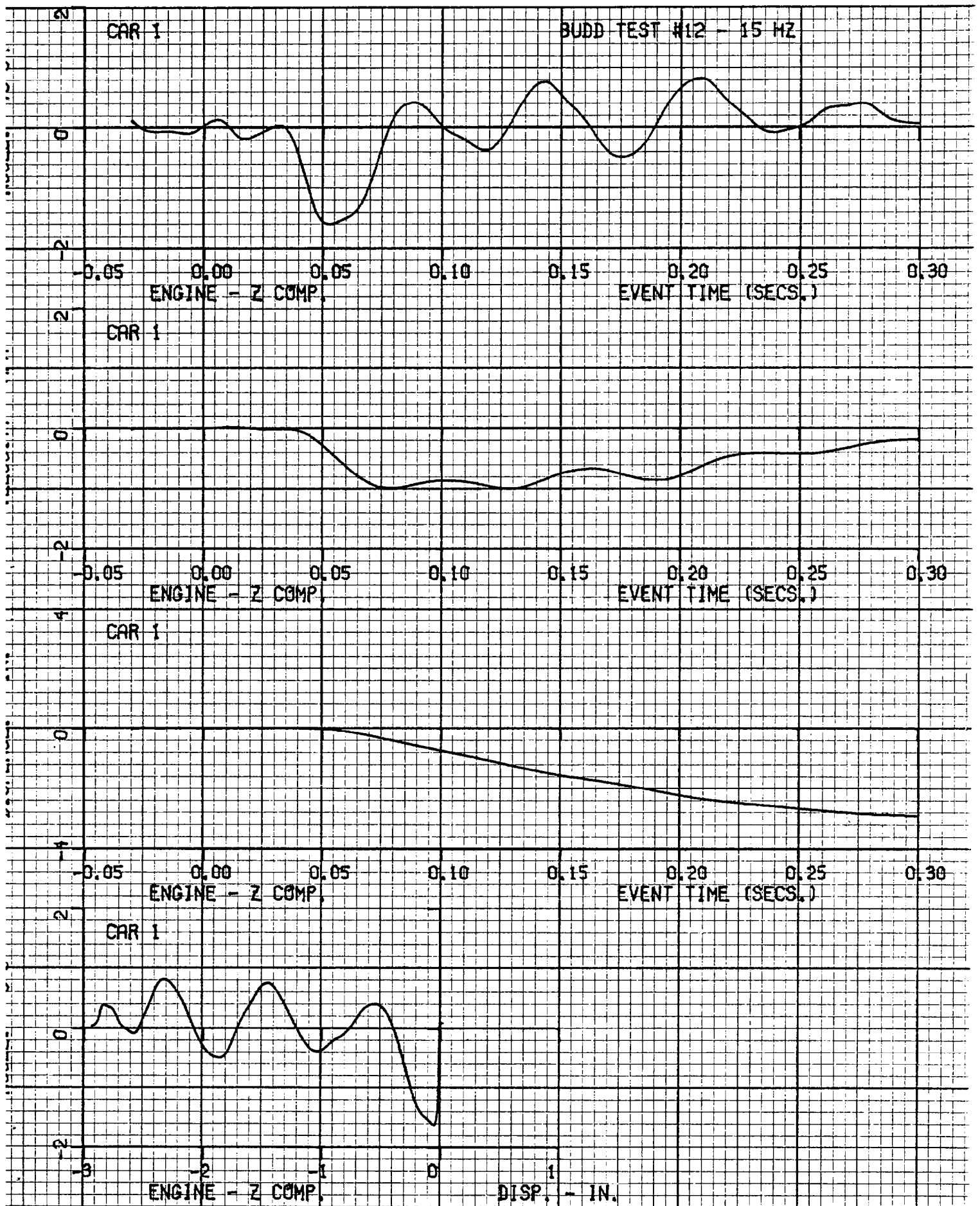
VEHICLE DATA - 15 HZ CHANNEL CLASS

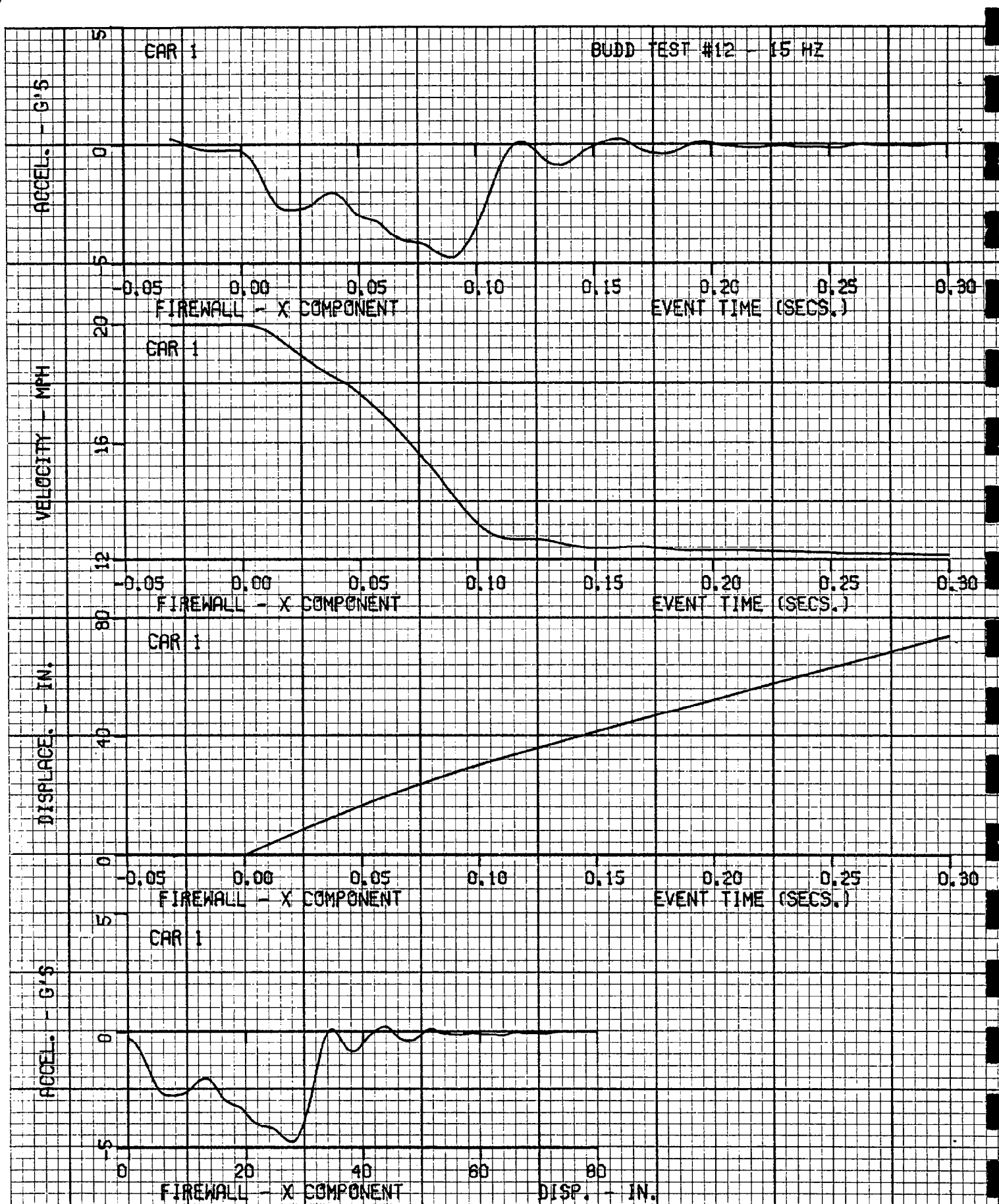


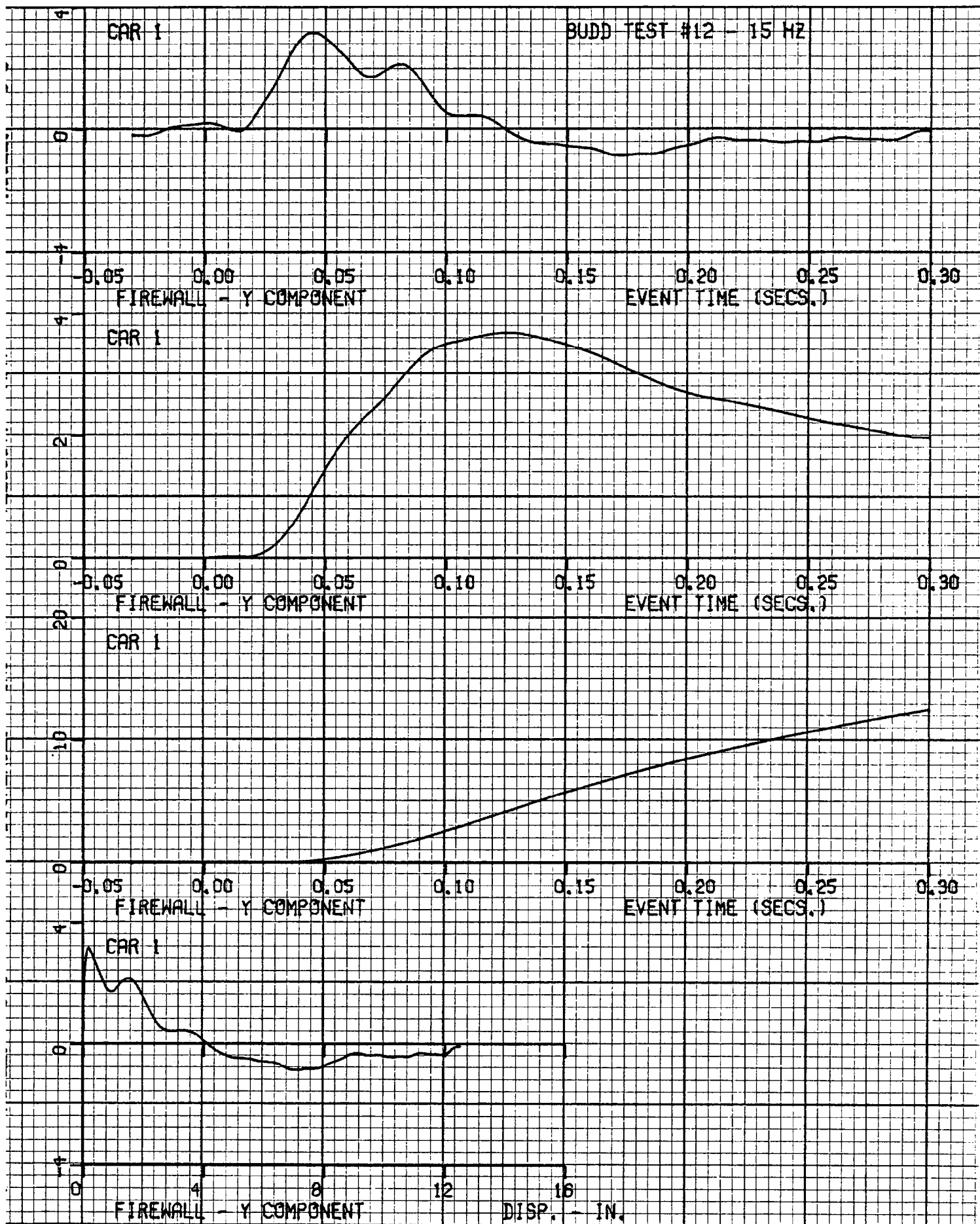


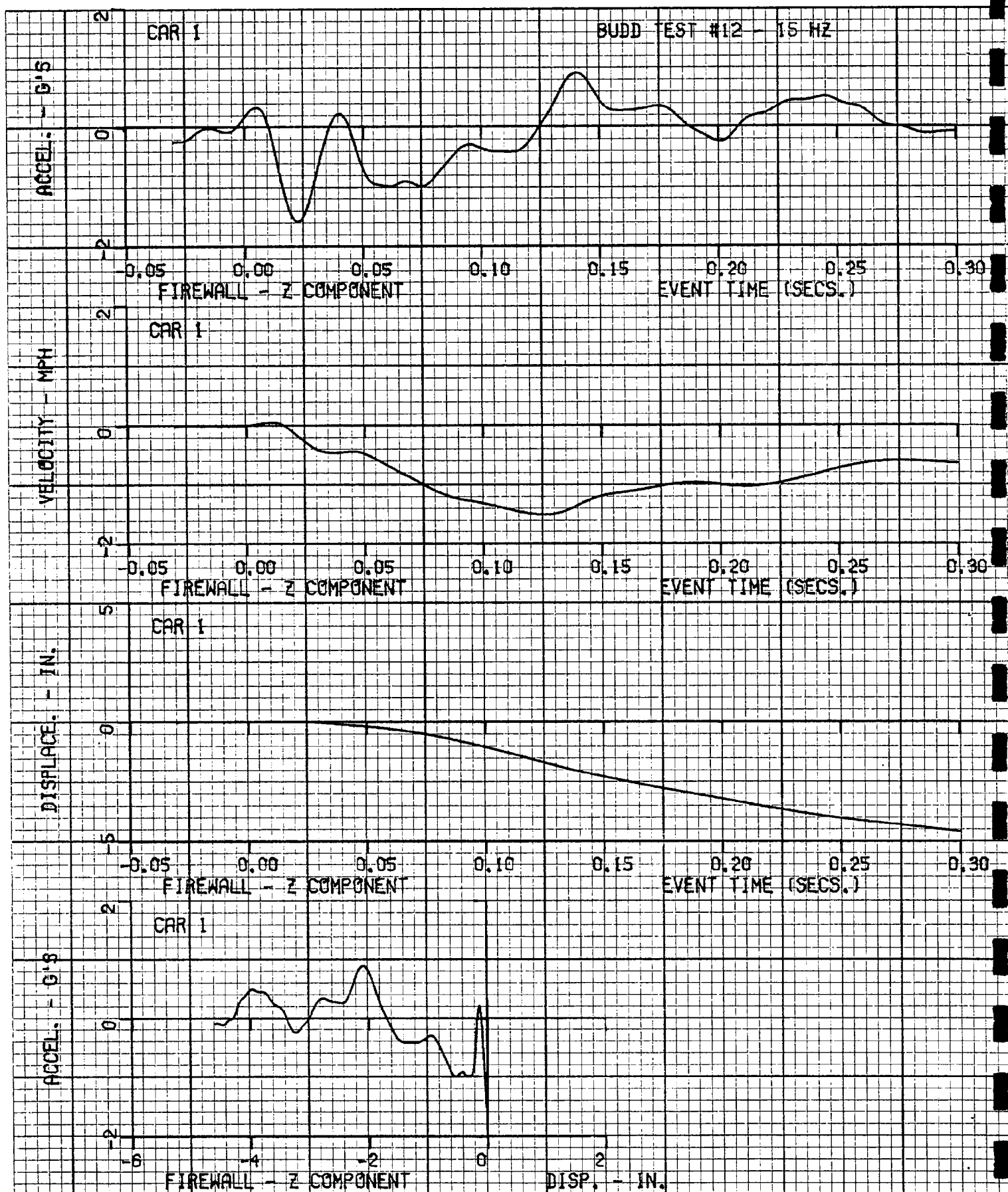


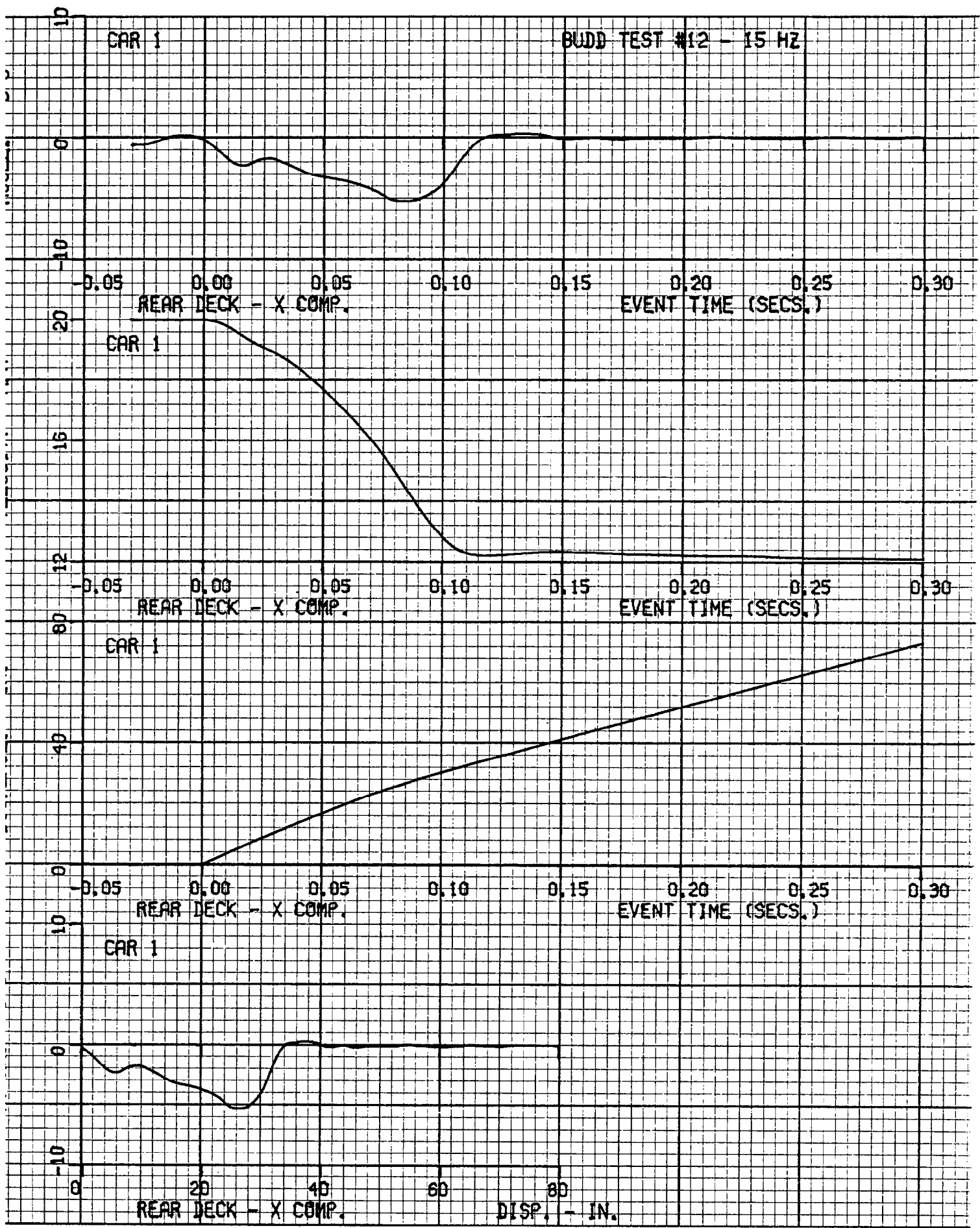


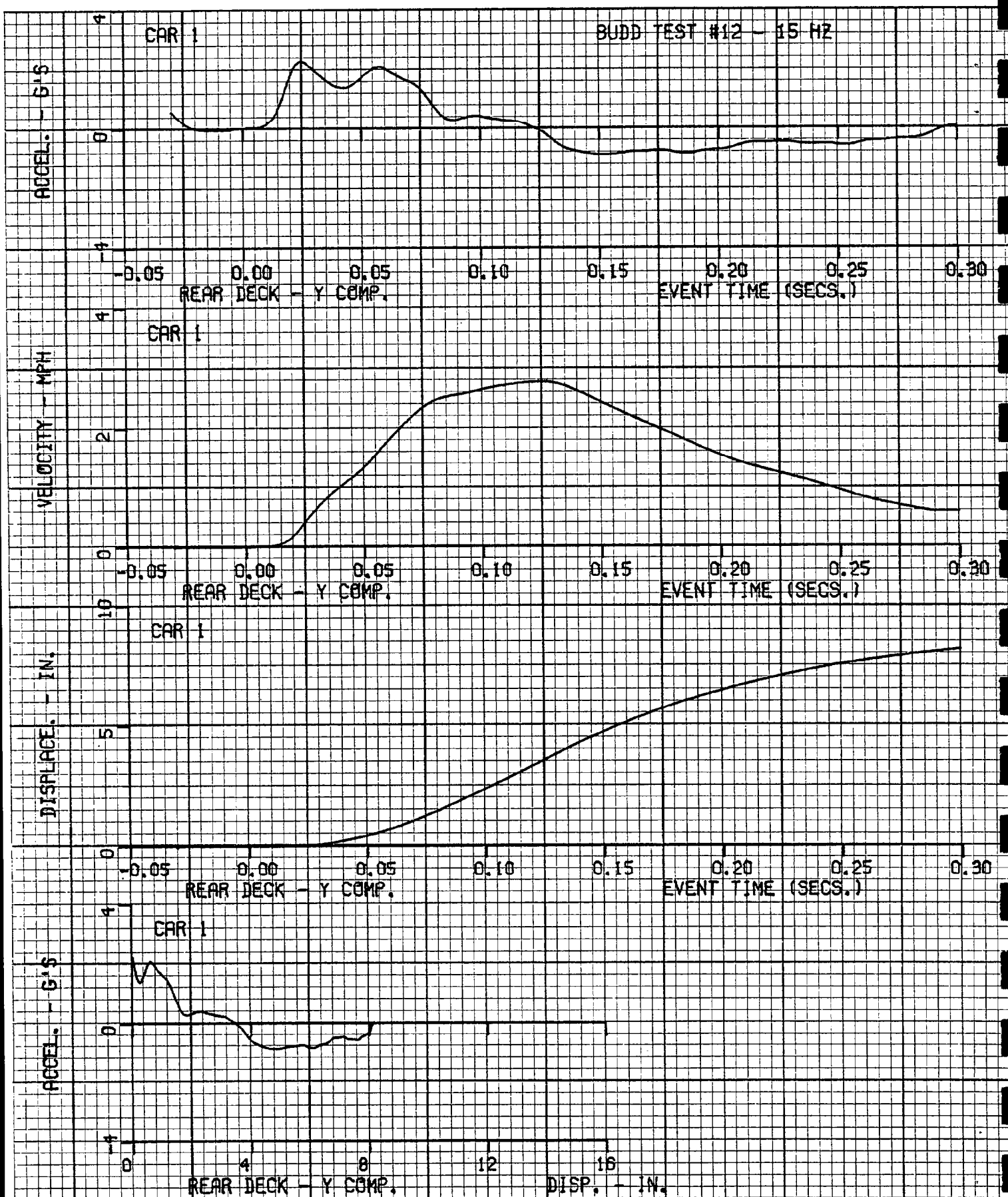


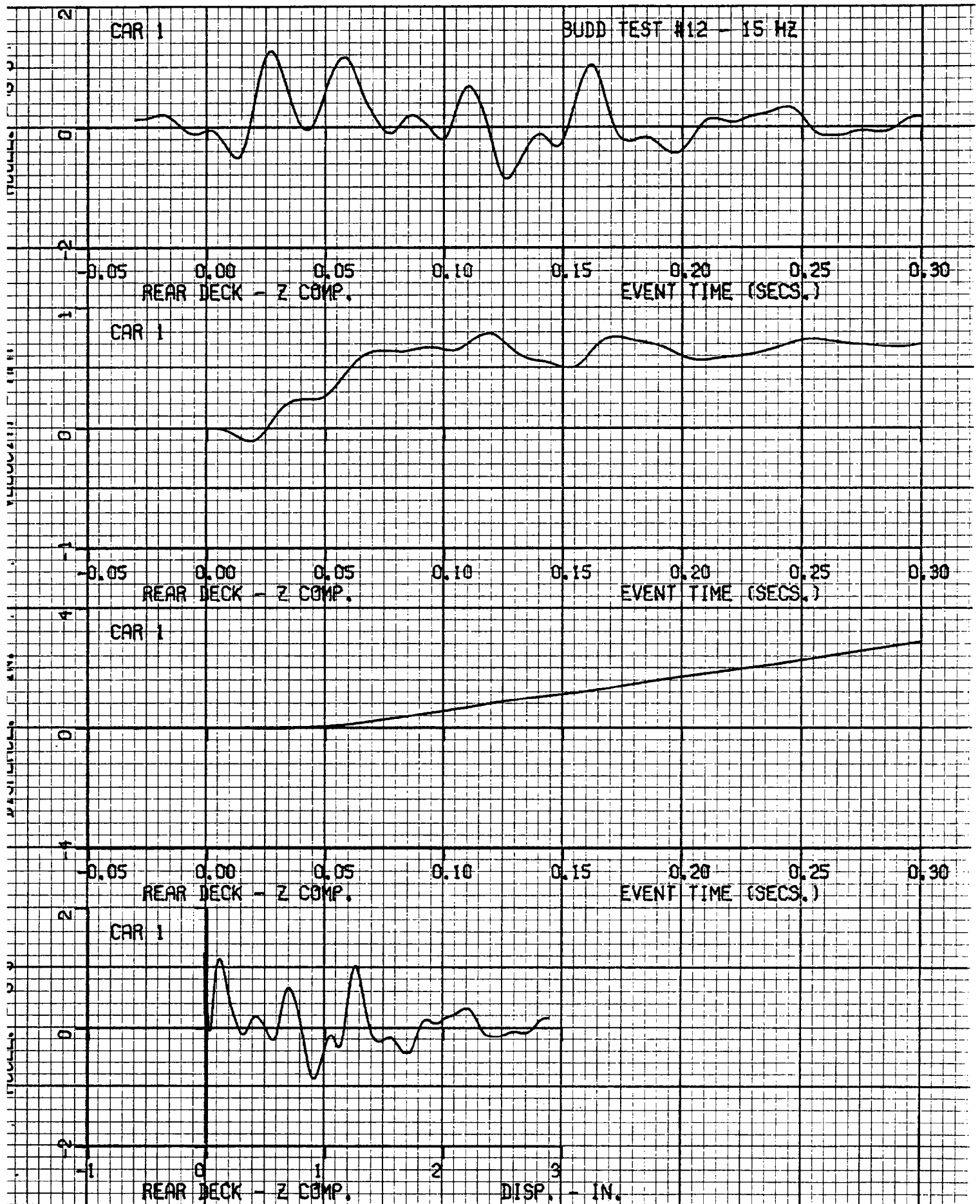


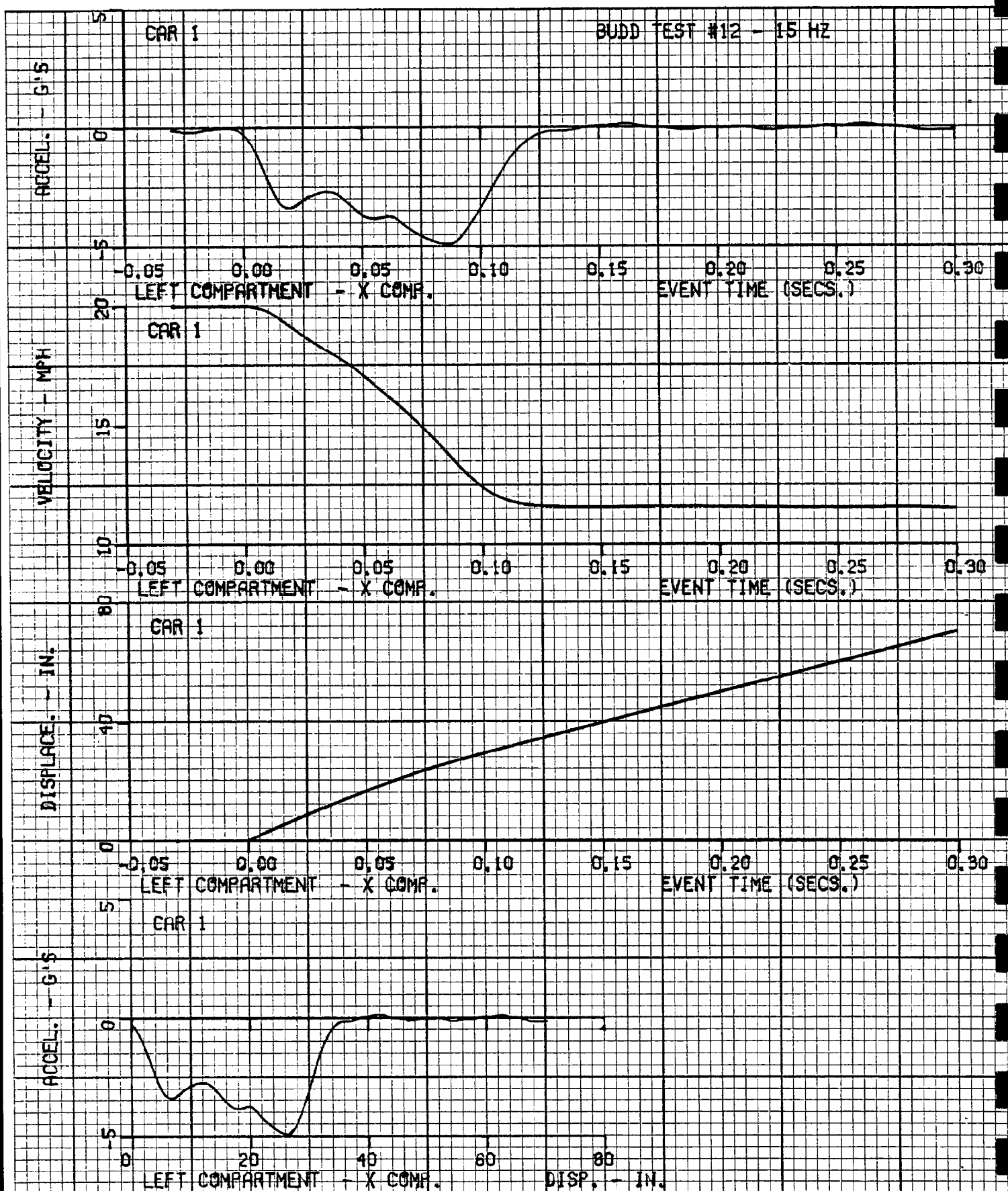


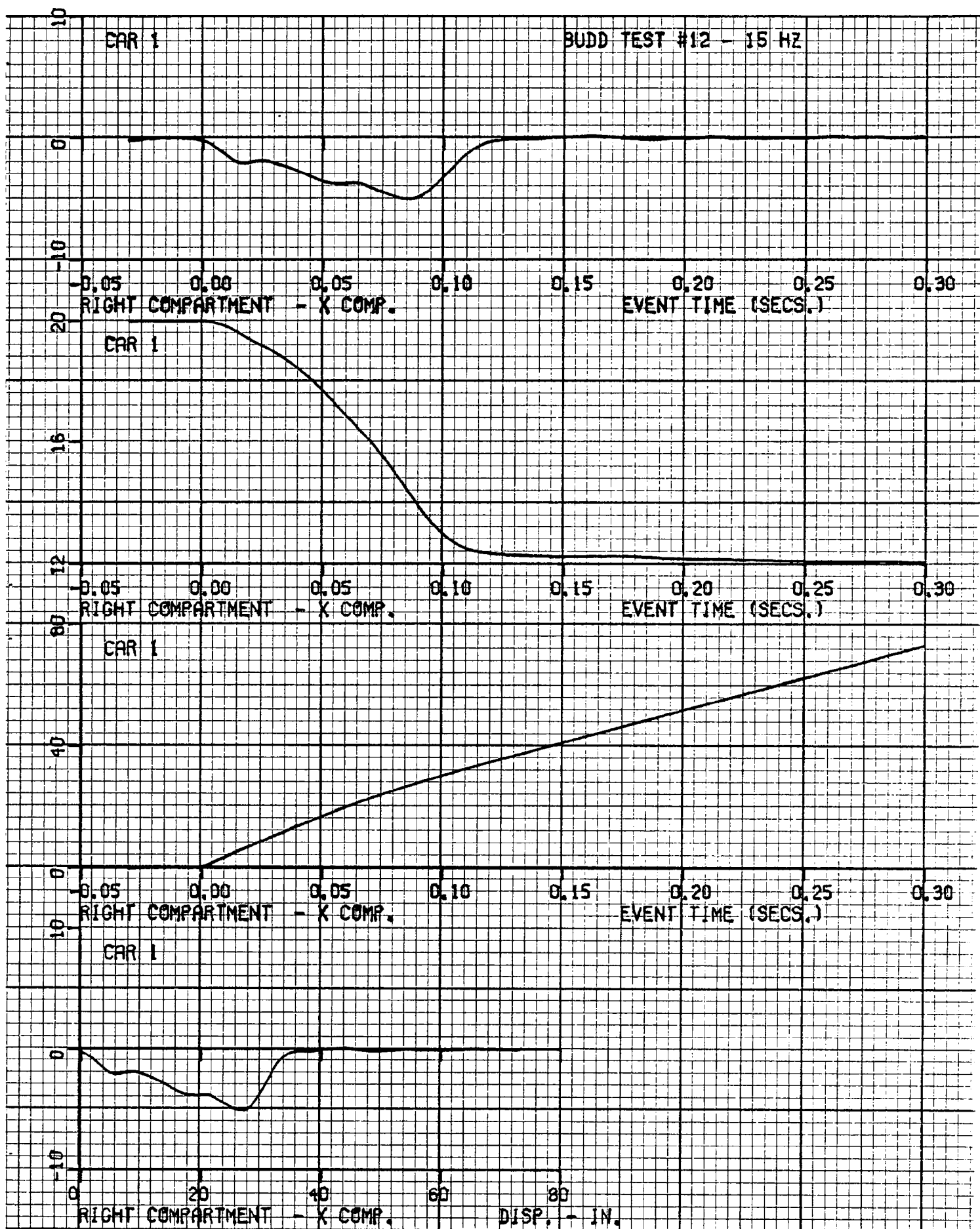


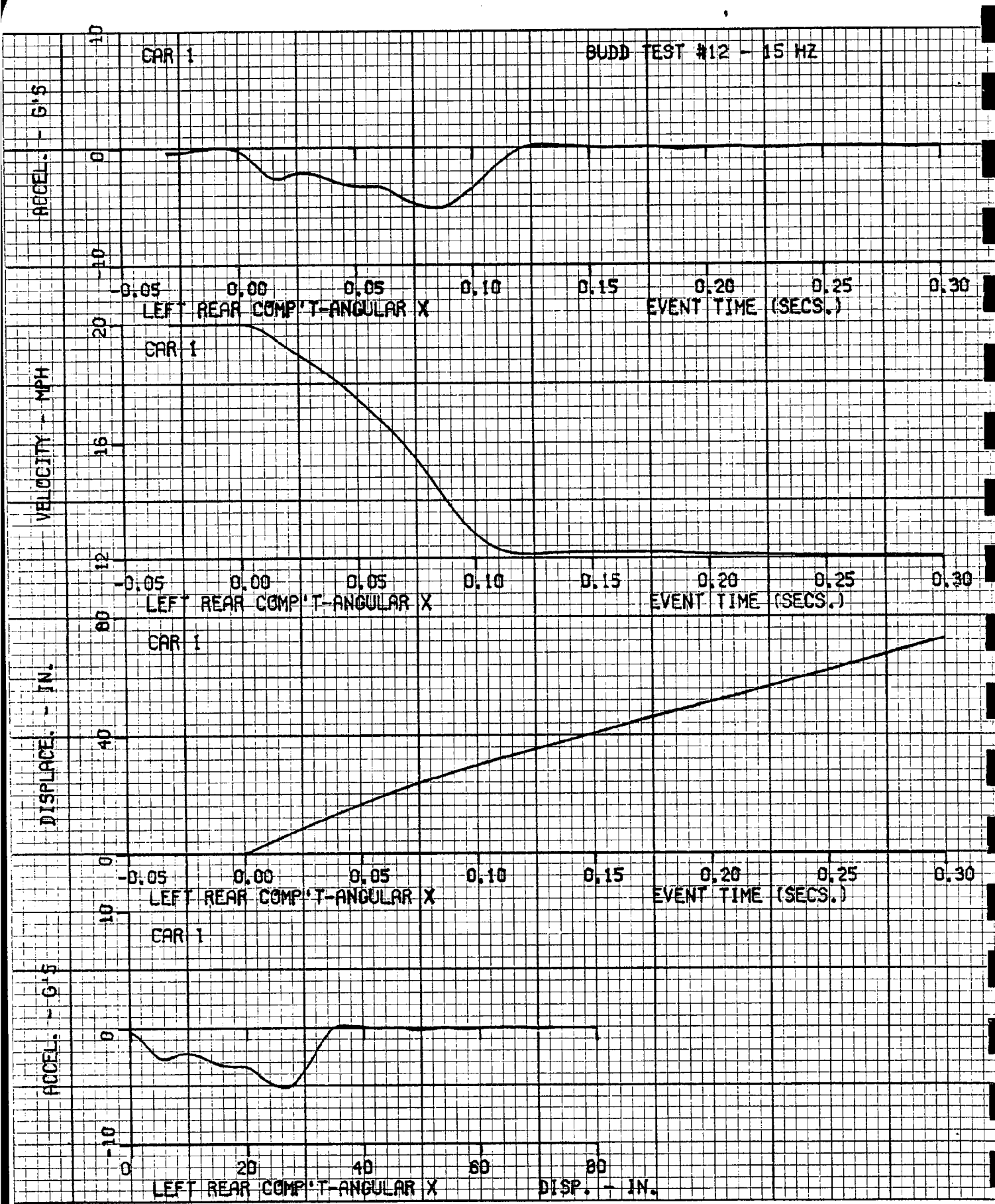


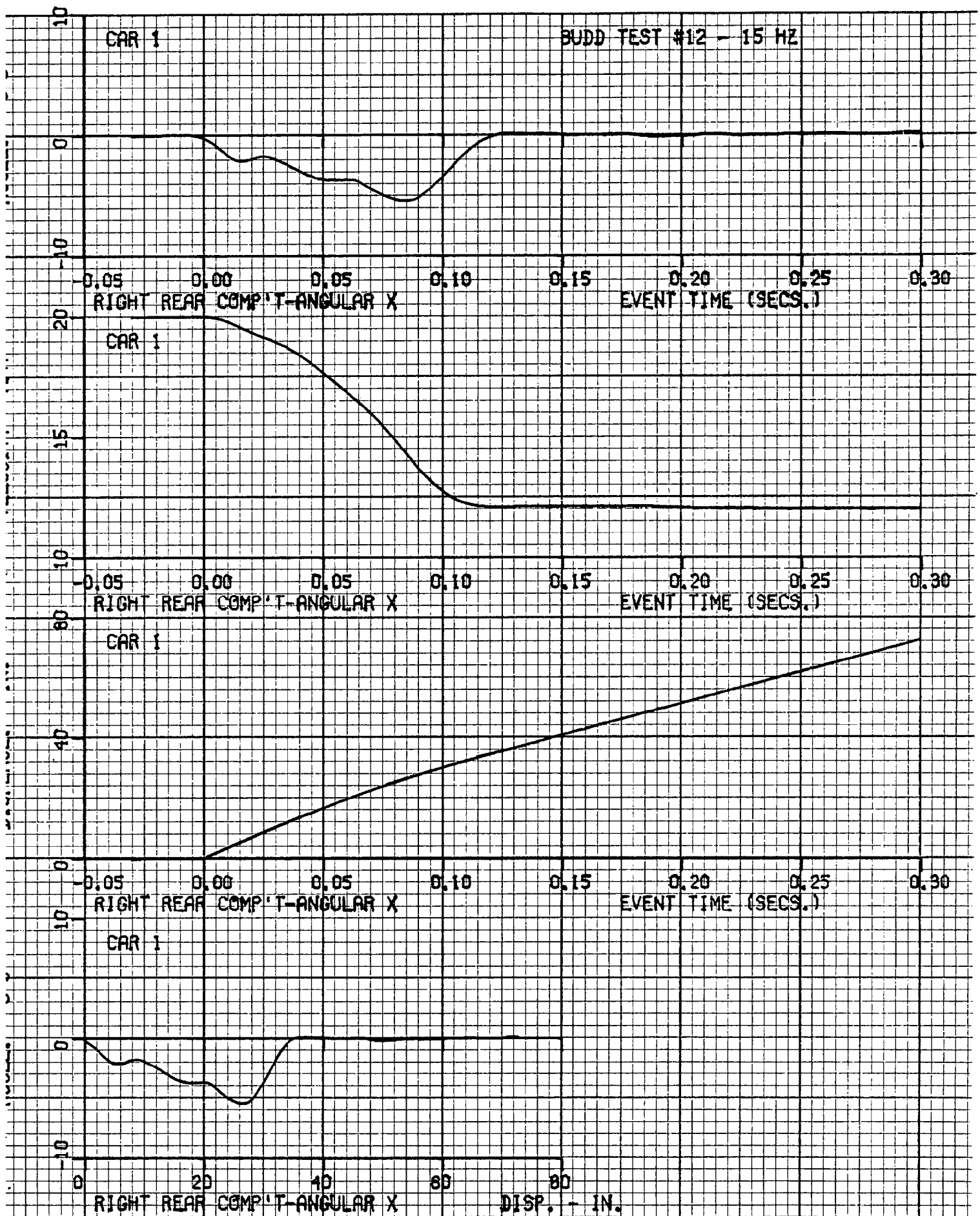


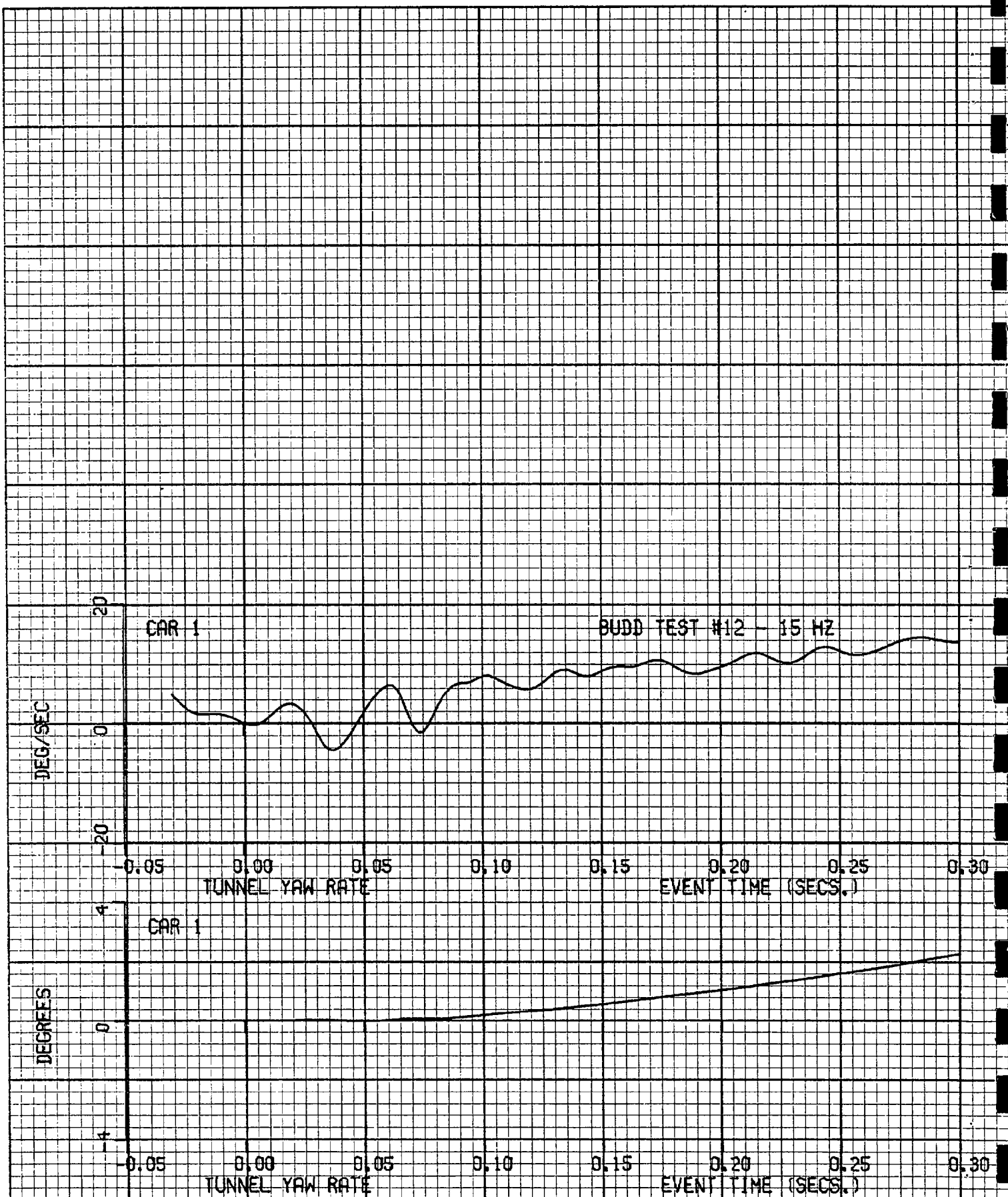












TEST NO. 12

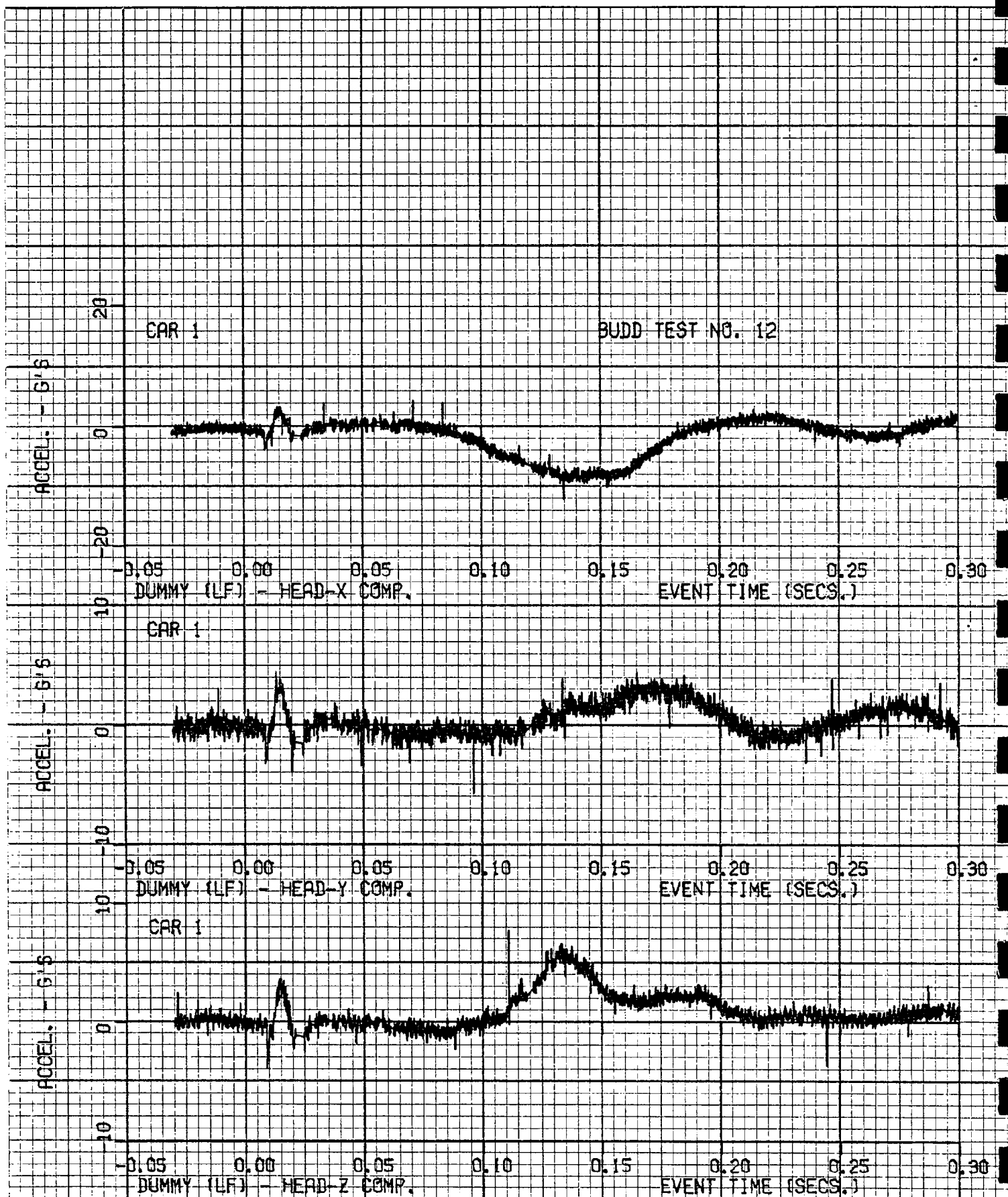
CAR NO. 1 - 1978 CHEVROLET IMPALA

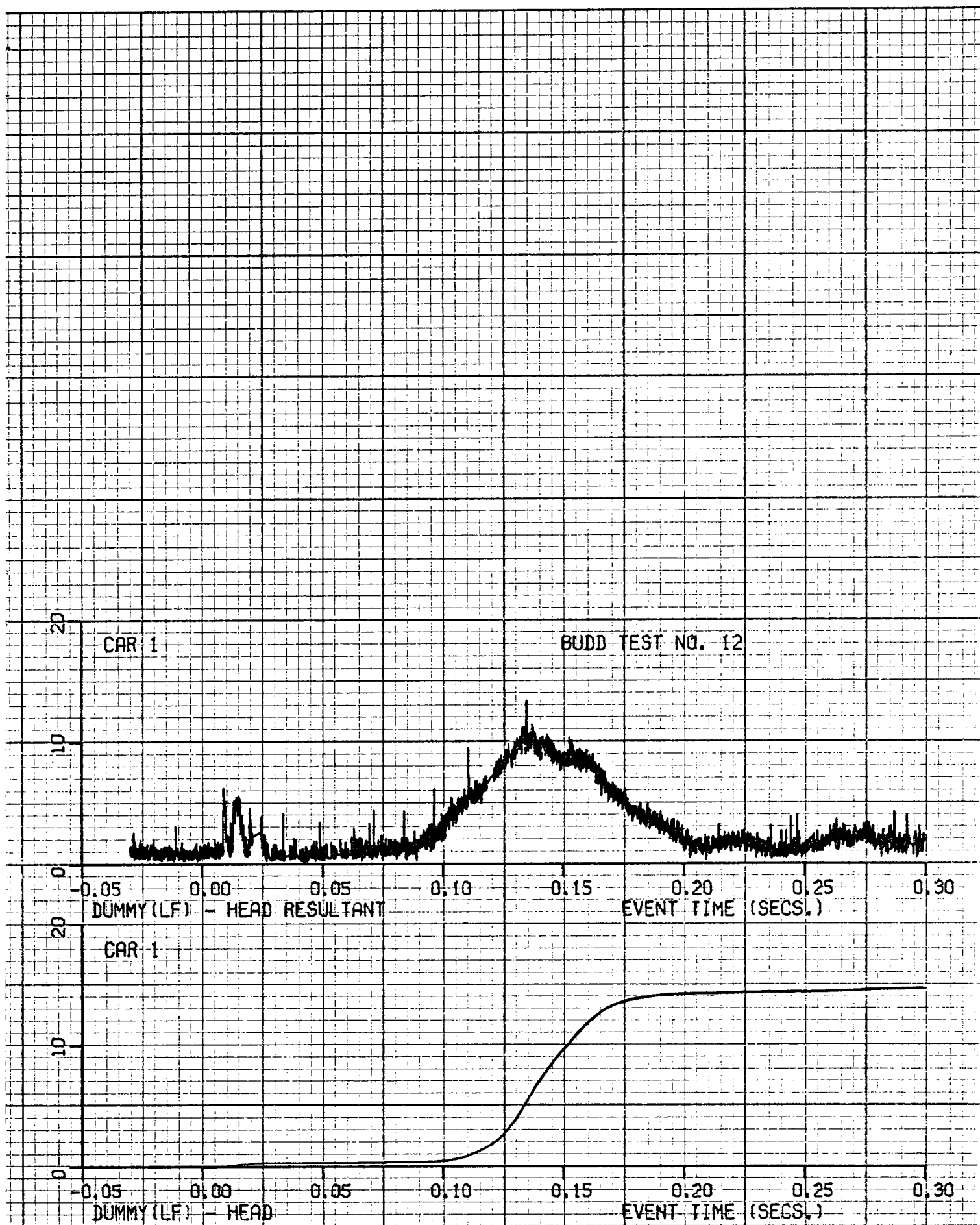
DUMMY DATA

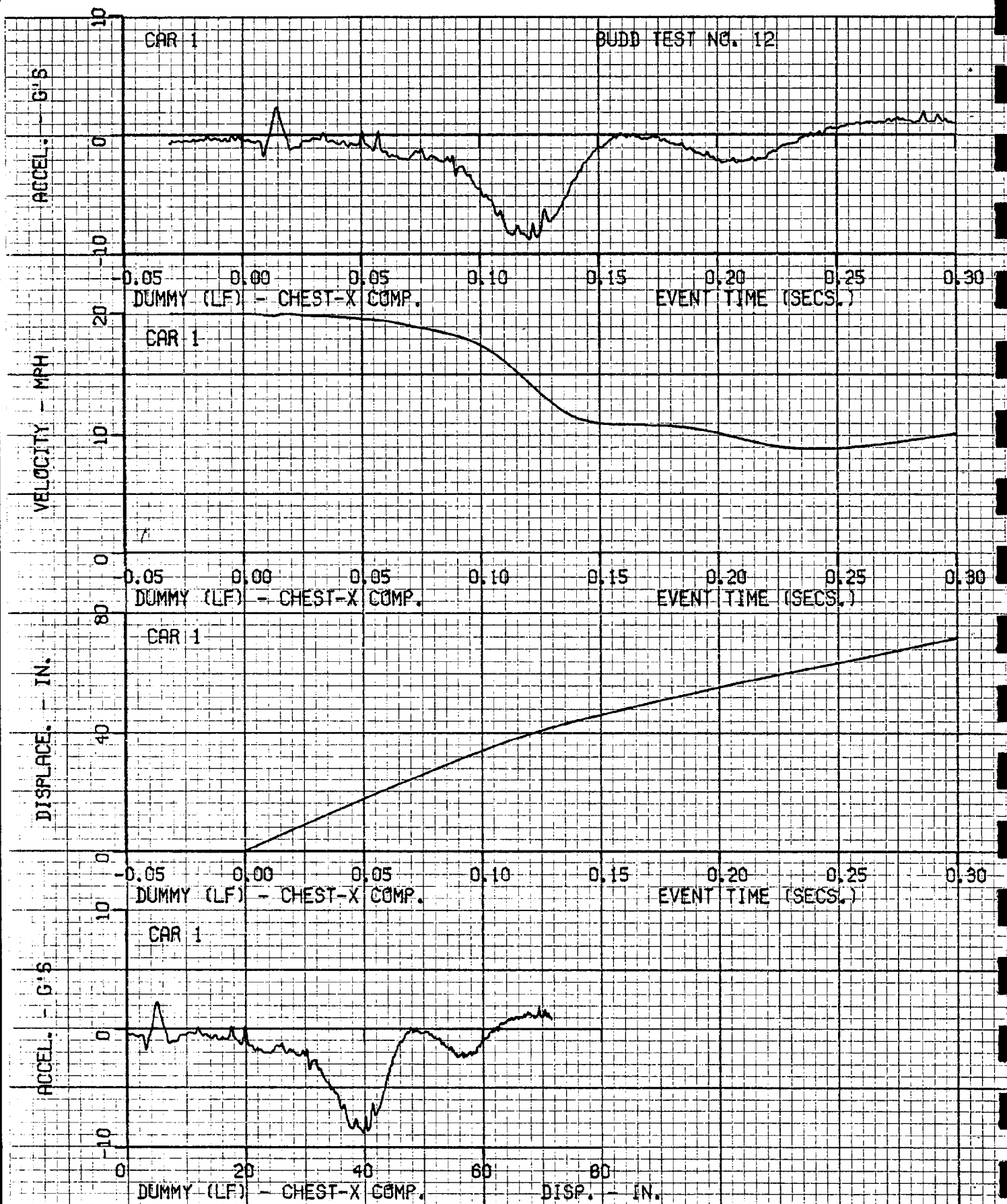
FILTER CHANNEL CLASS

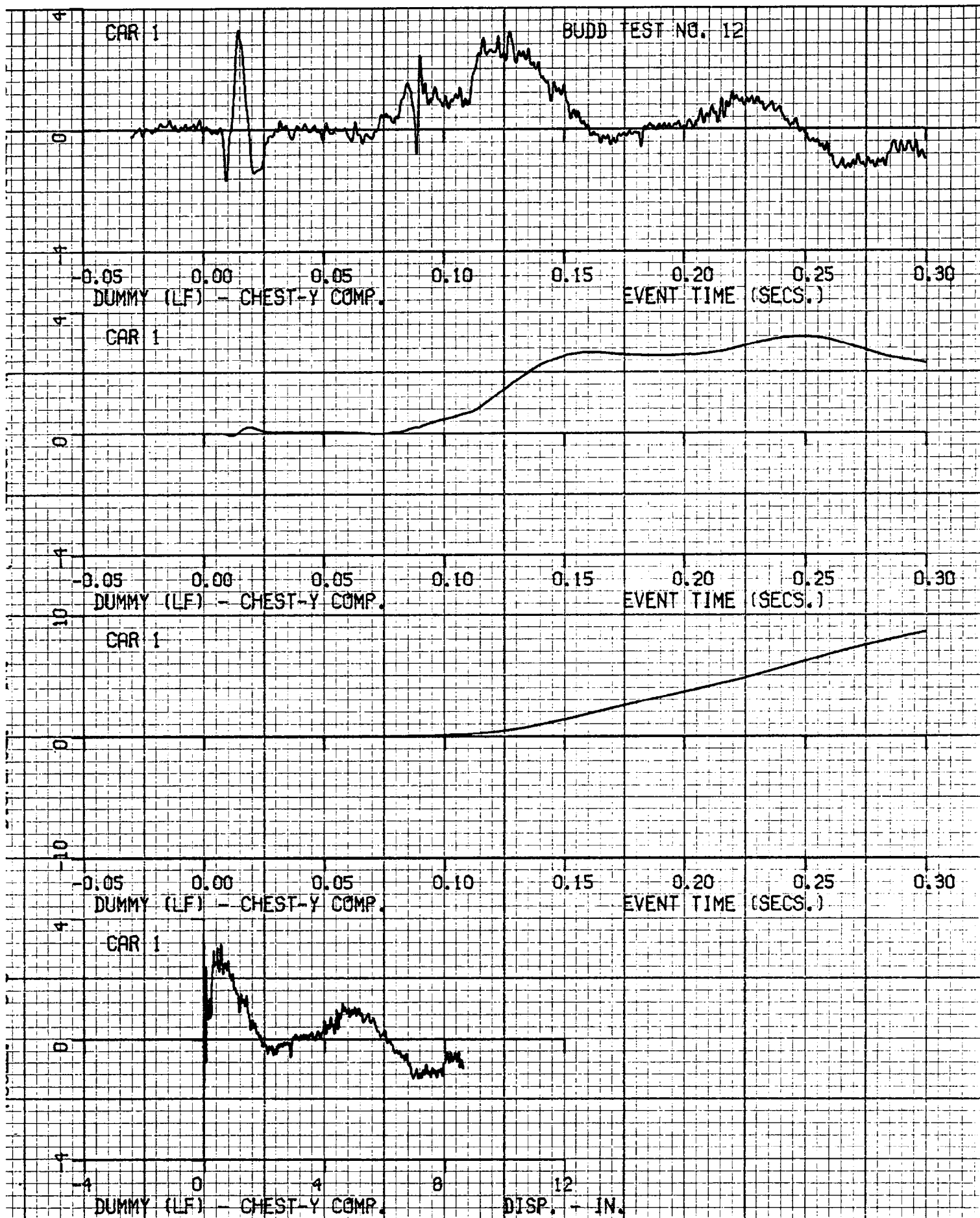
Head Acceleration	1000
Chest Acceleration	180
Femur Forces	600
Belt Loads	60

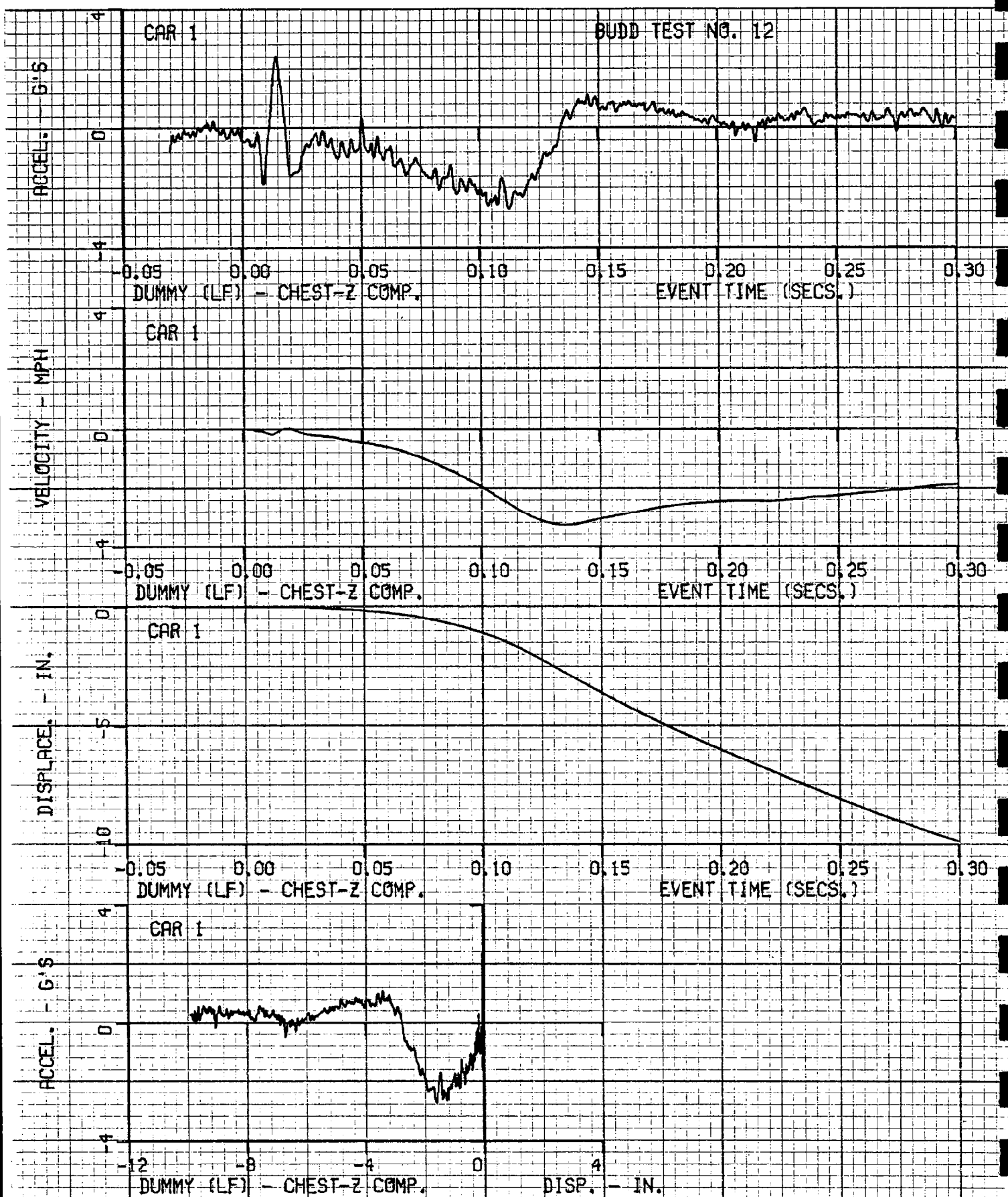
DUMMY (1) (DRIVER) LEFT LAP BELT DATA LOST DUE TO BAD TRANSDUCER.

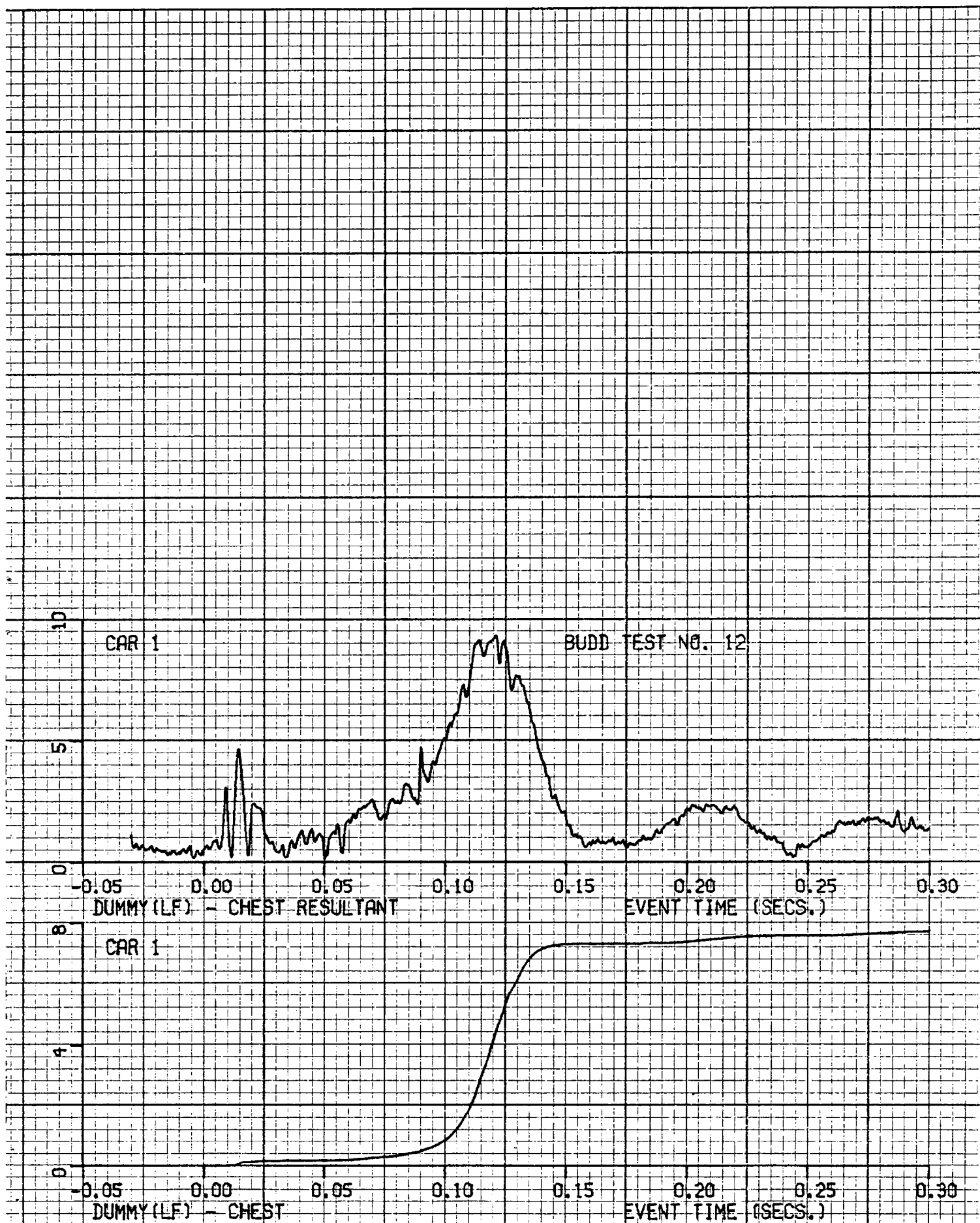


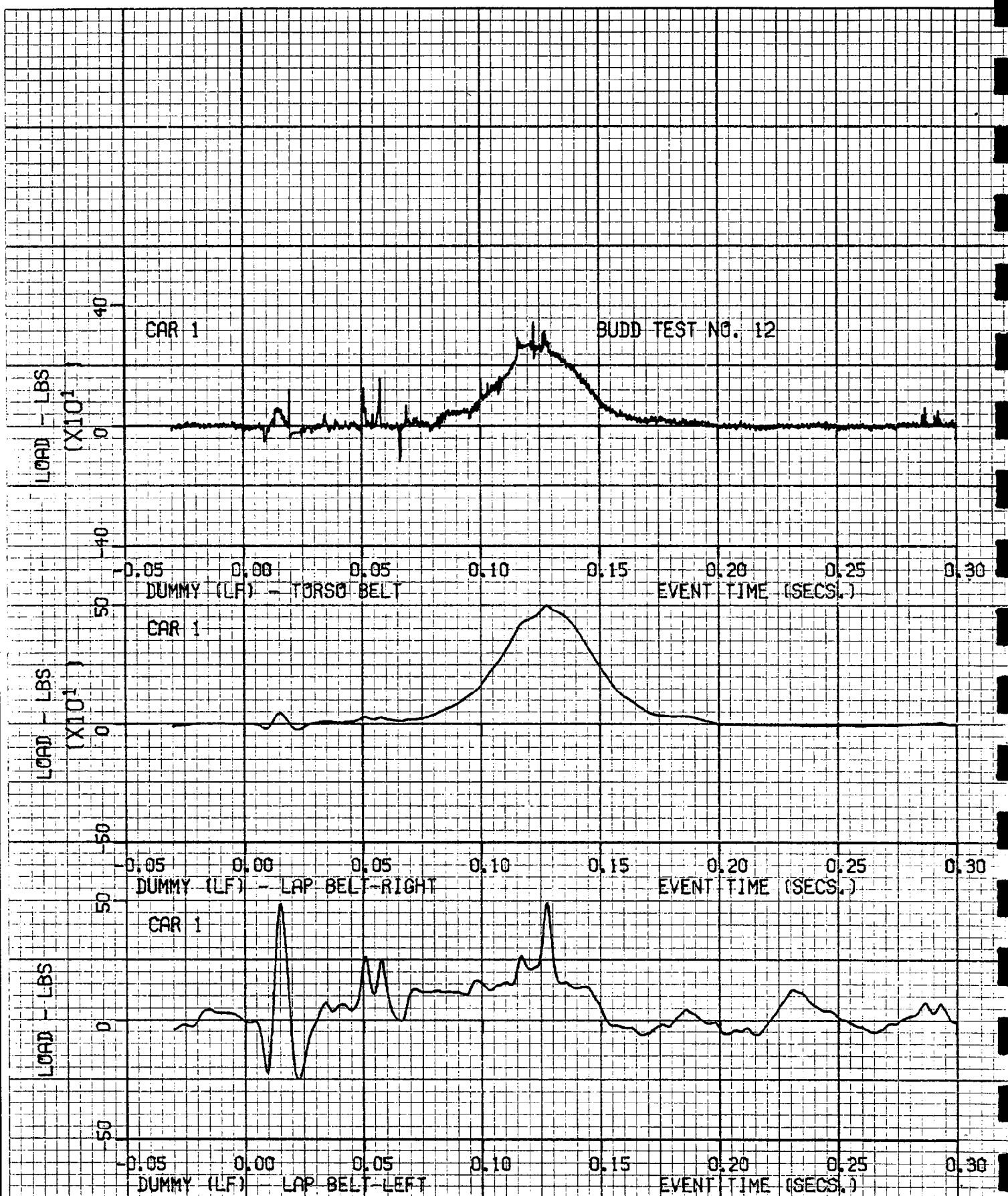












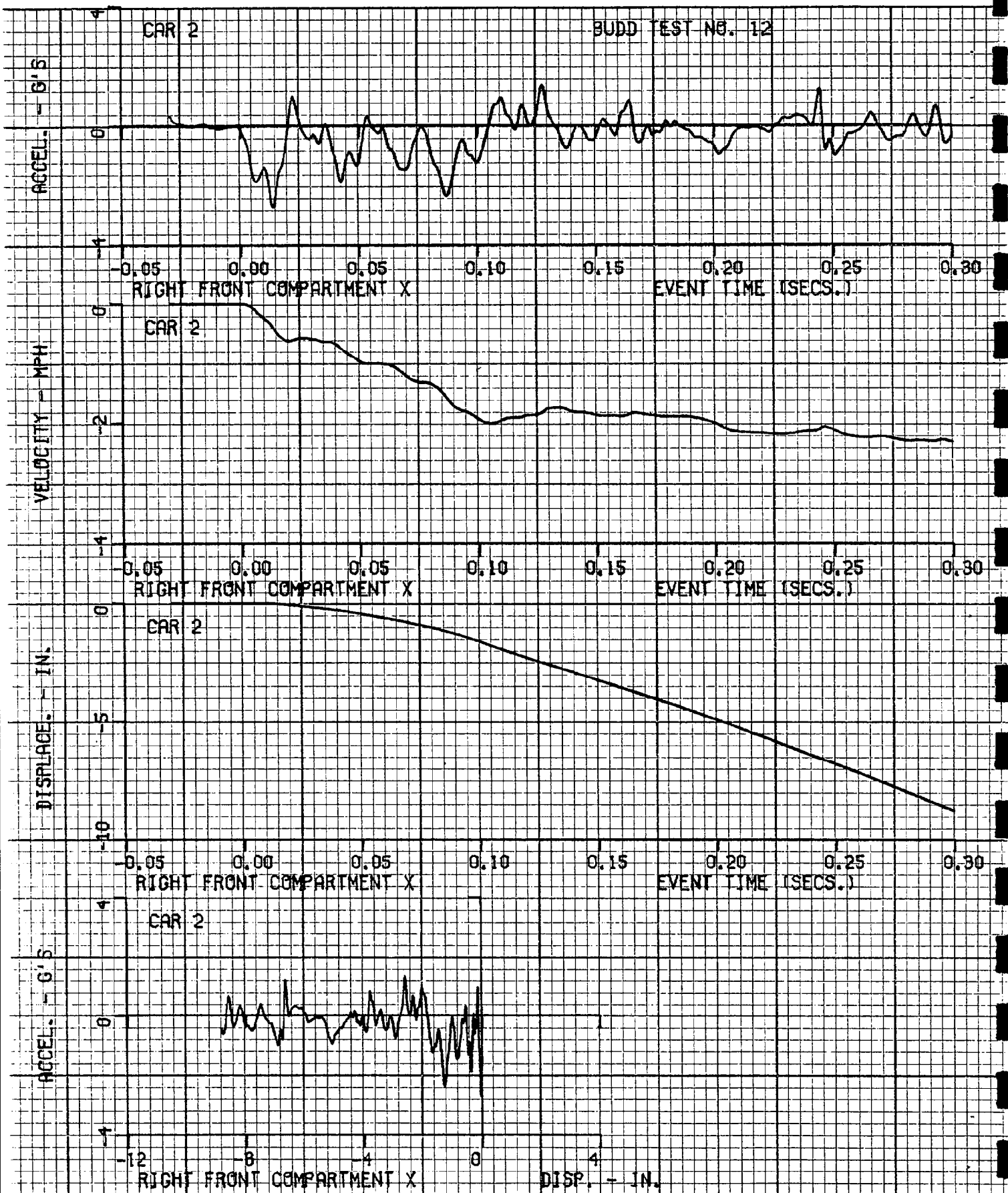
TEST NO. 12

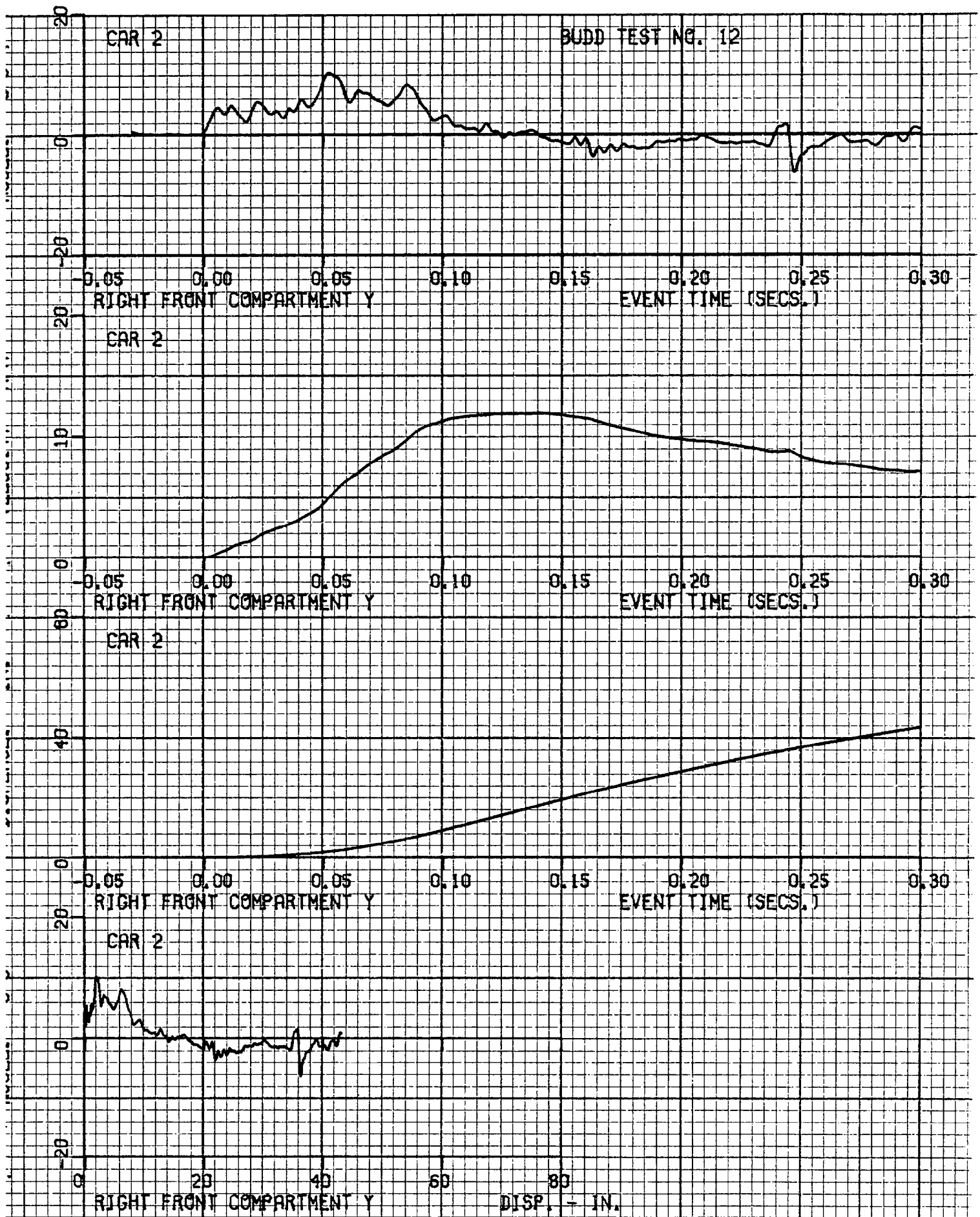
CAR NO. 2 - 1976 VOLKSWAGEN RABBIT

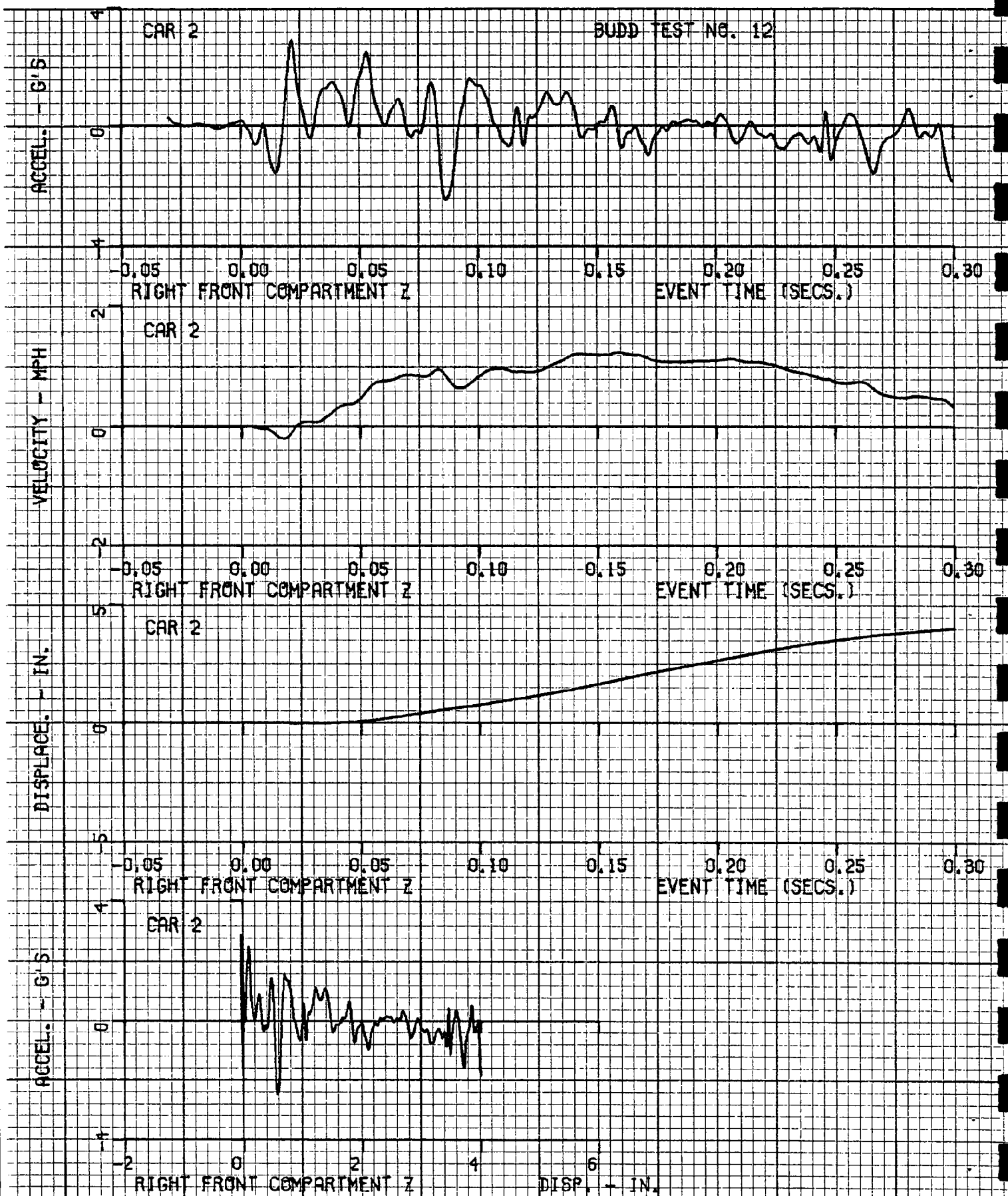
FILTER CHANNEL CLASS

Vehicle Data	60
Side Intrusion Data	1000

RIGHT COMPARTMENT - ANGULAR X ACCELEROMETER DATA LOST DUE
TO OPEN CABLE.

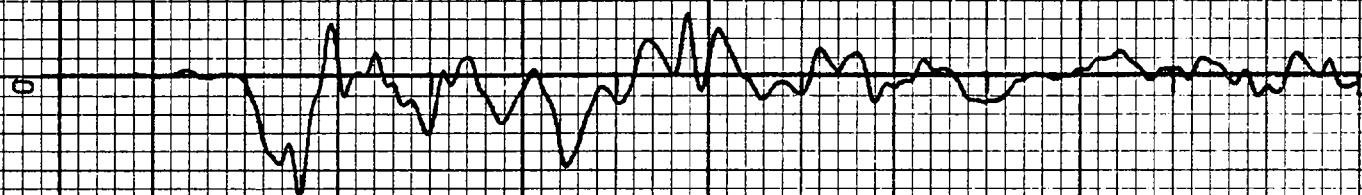






CAR 2

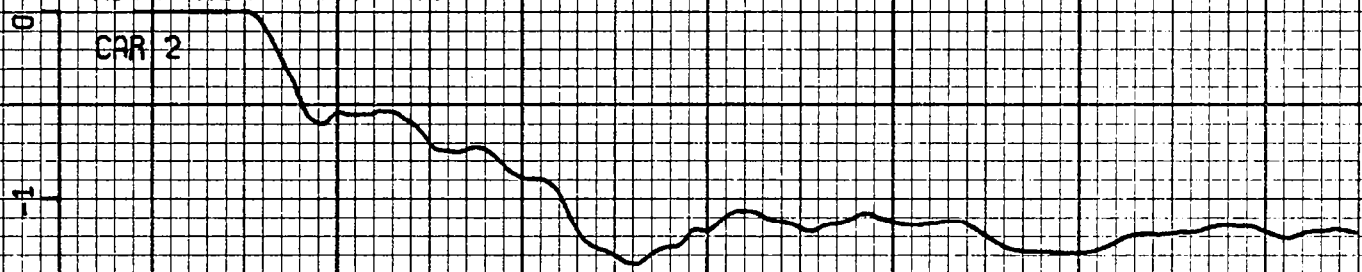
BUDD TEST NO. 12



RIGHT REAR COMPARTMENT X

EVENT TIME (SECS.)

CAR 2



RIGHT REAR COMPARTMENT X

EVENT TIME (SECS.)

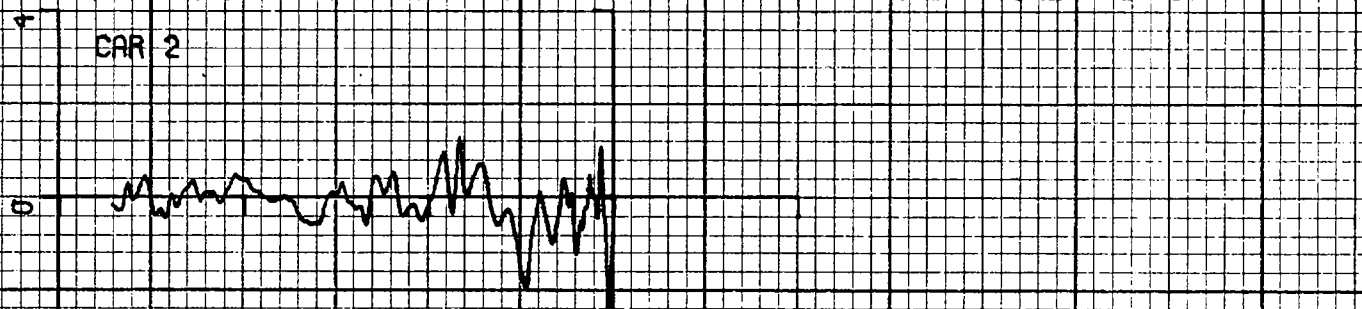
CAR 2



RIGHT REAR COMPARTMENT X

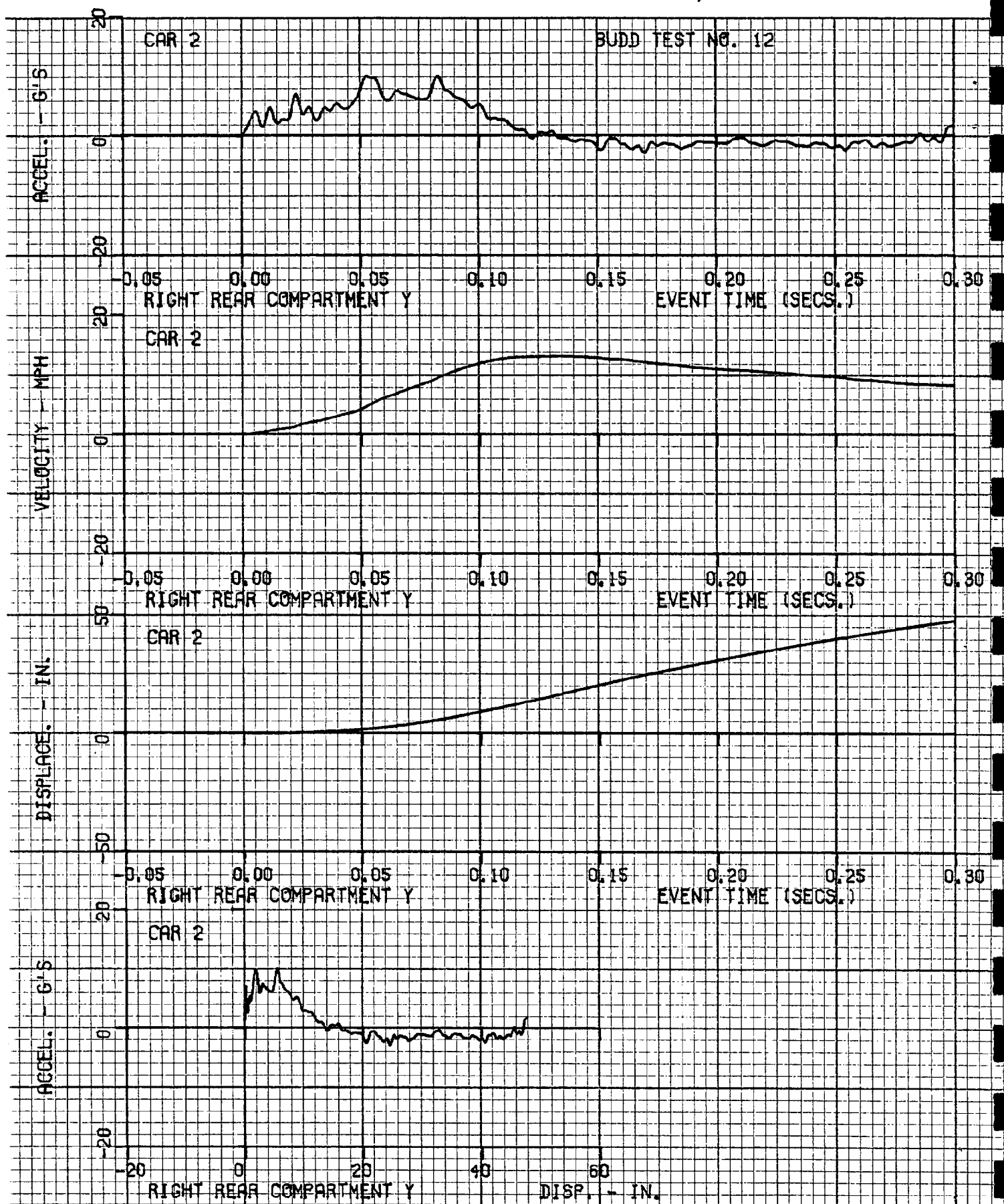
EVENT TIME (SECS.)

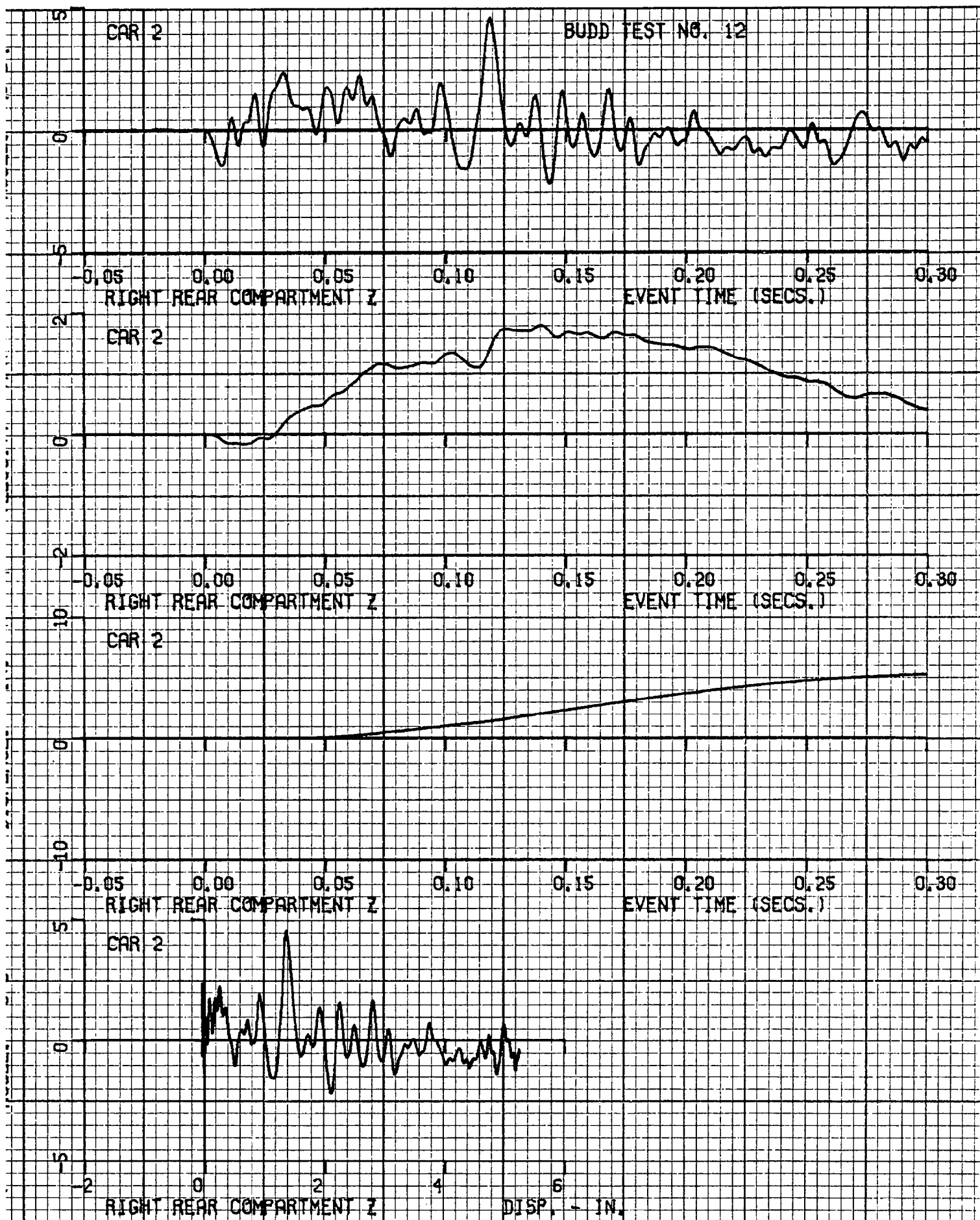
CAR 2

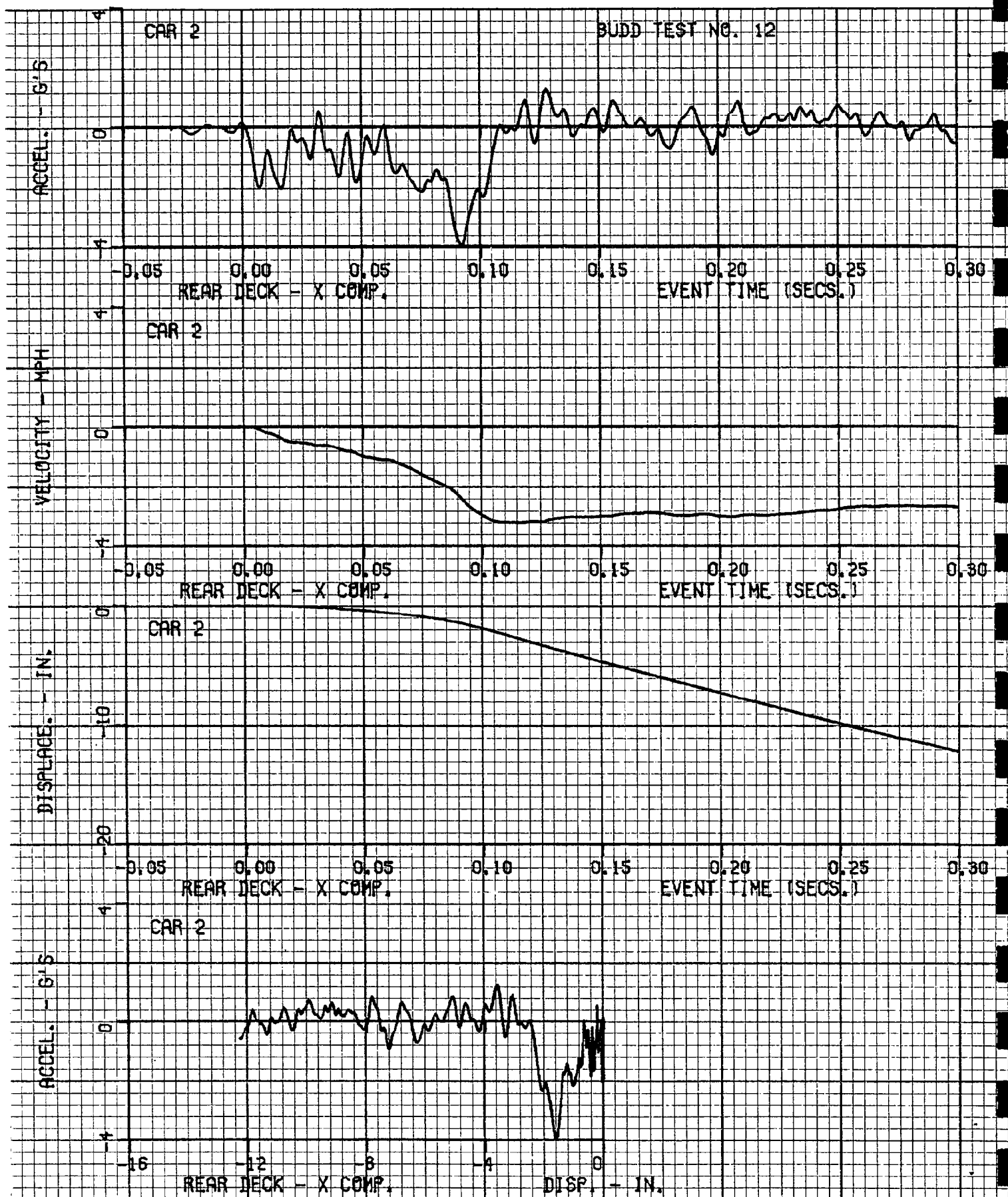


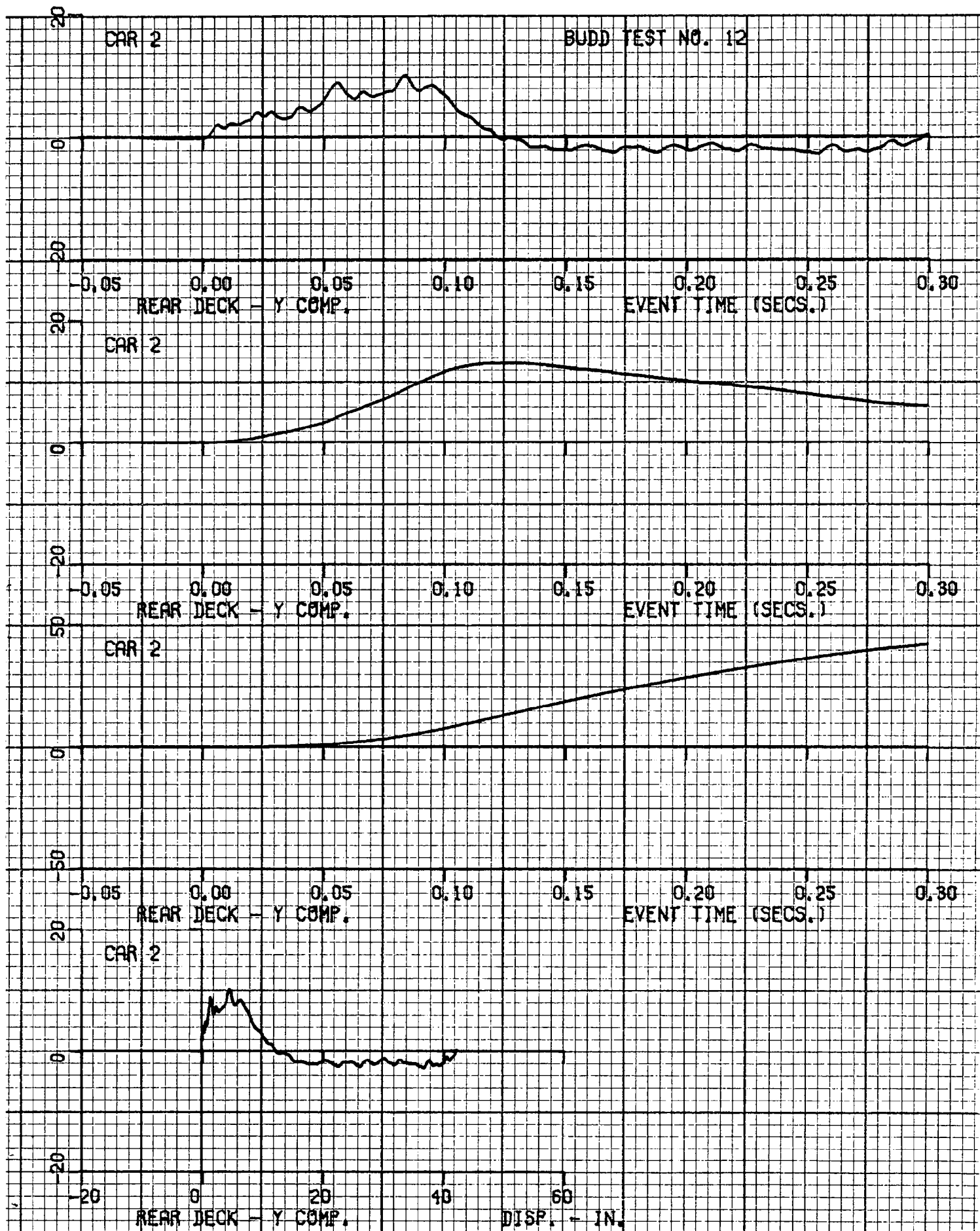
RIGHT REAR COMPARTMENT X

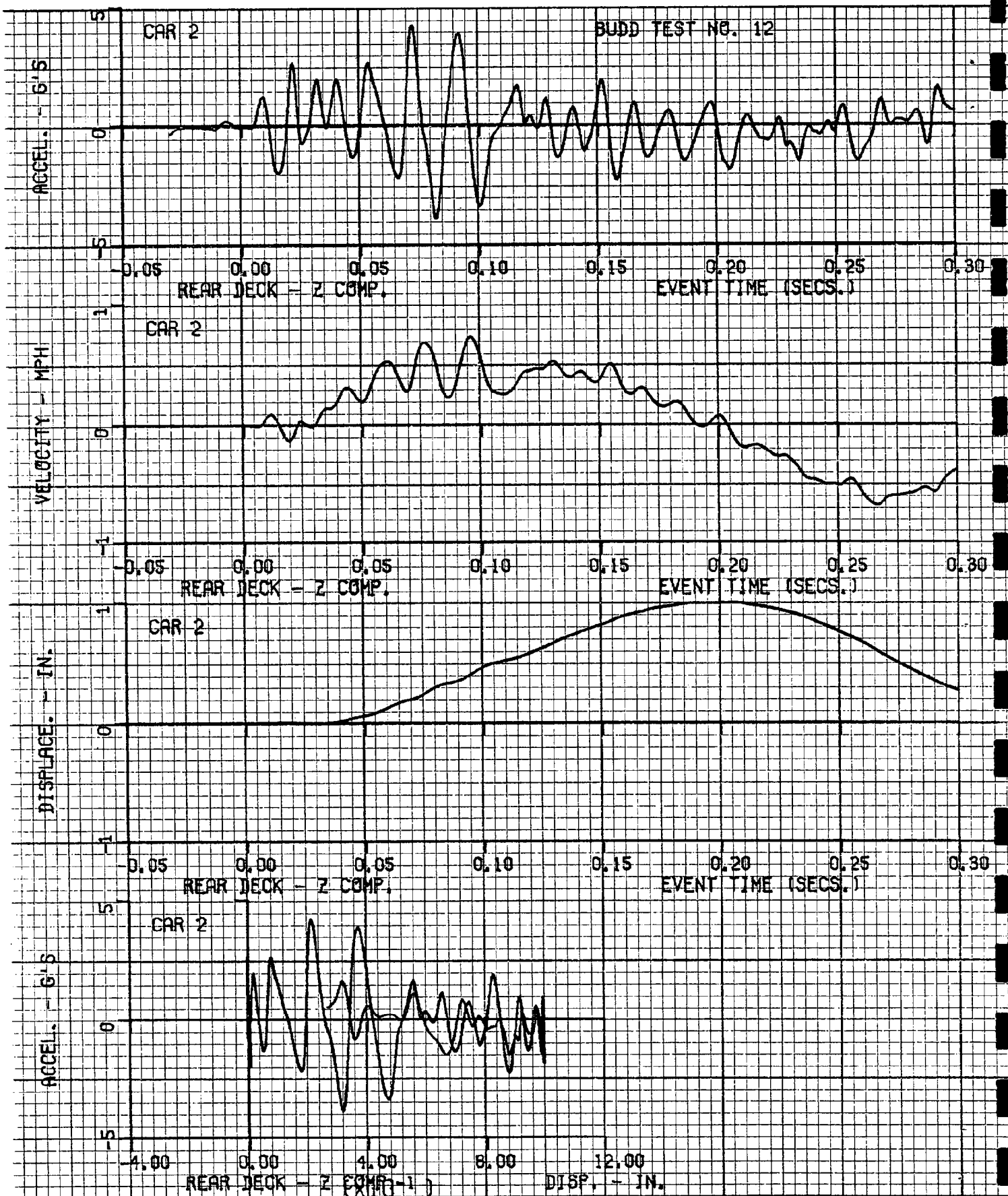
DISP. - IN.

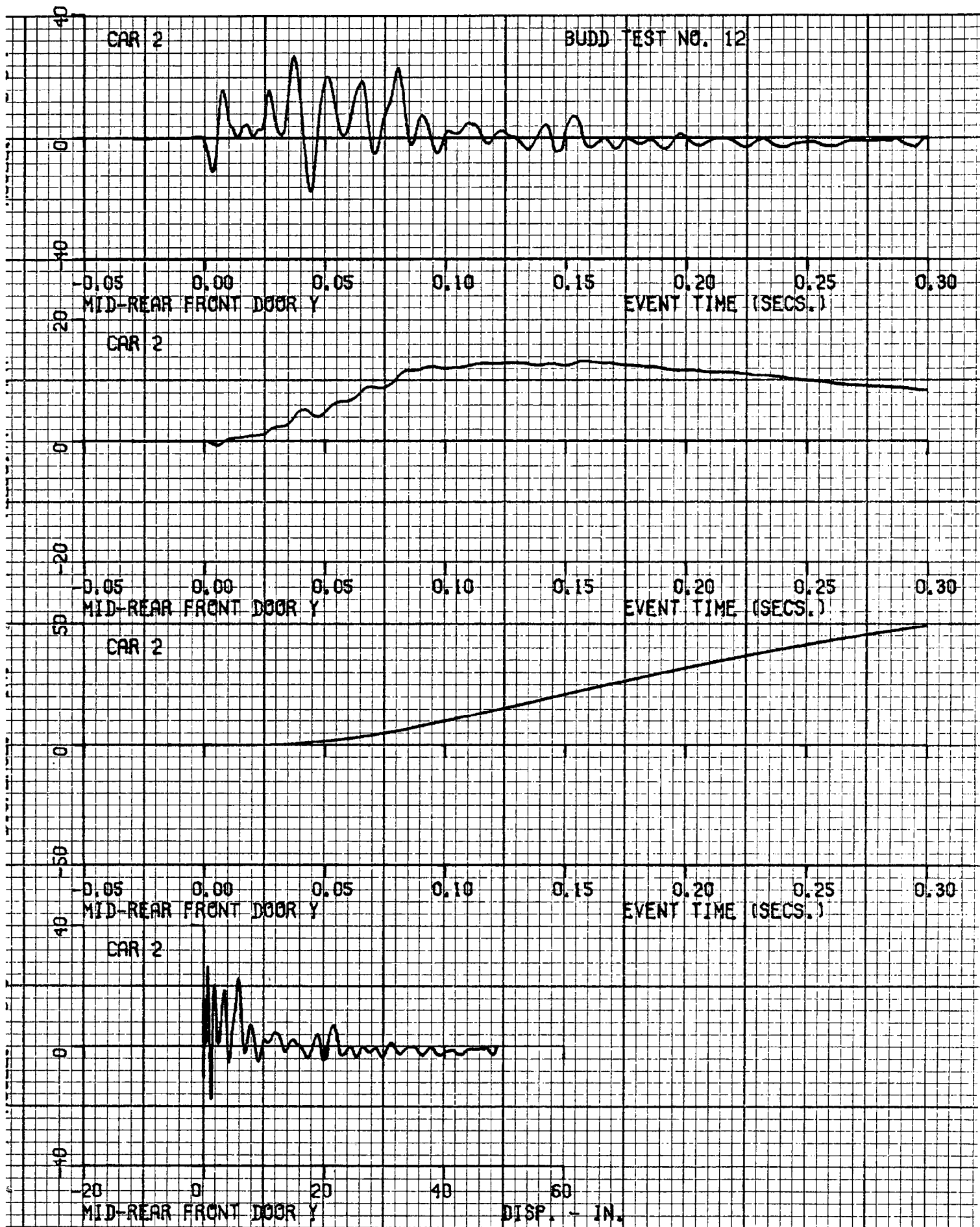


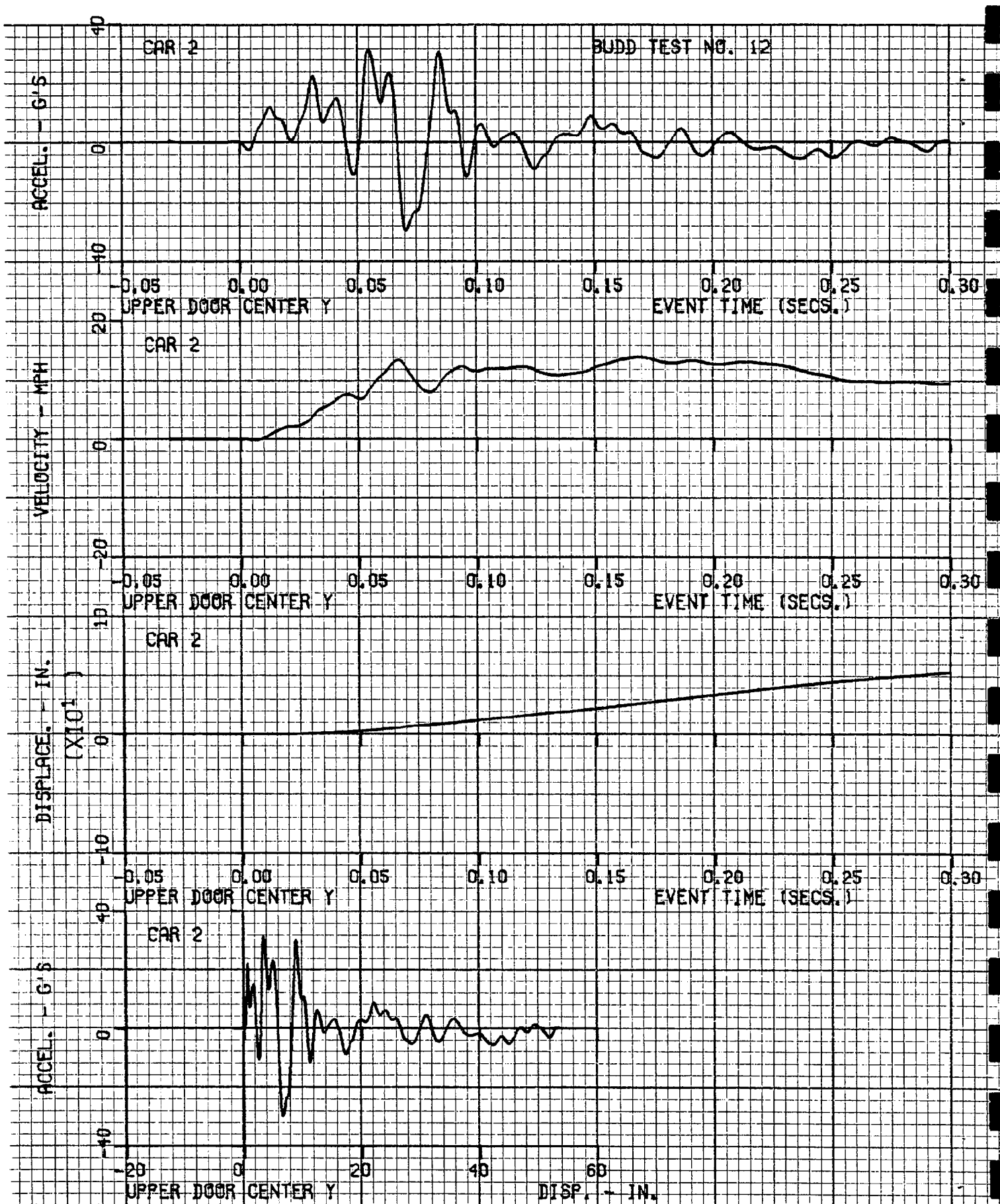


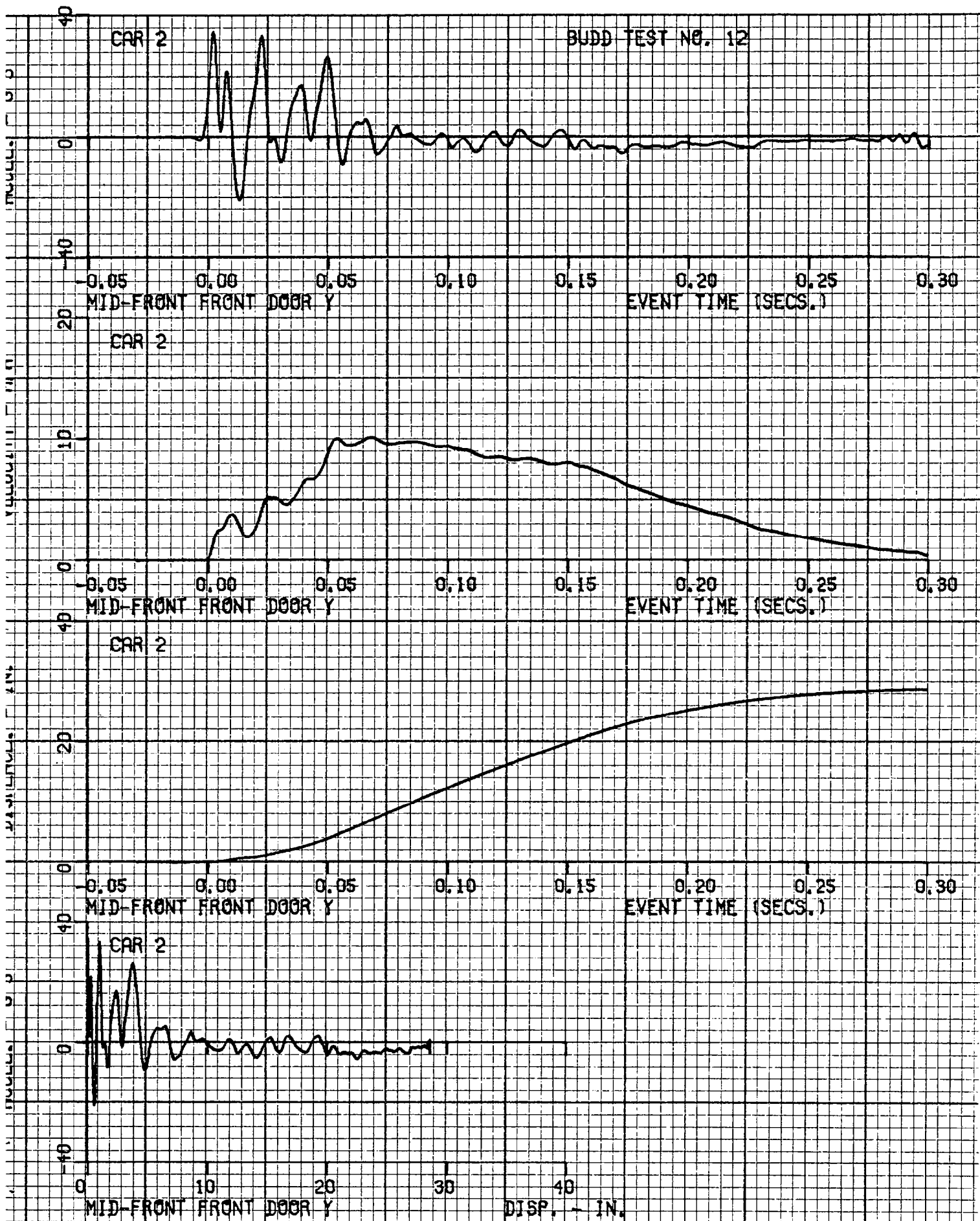


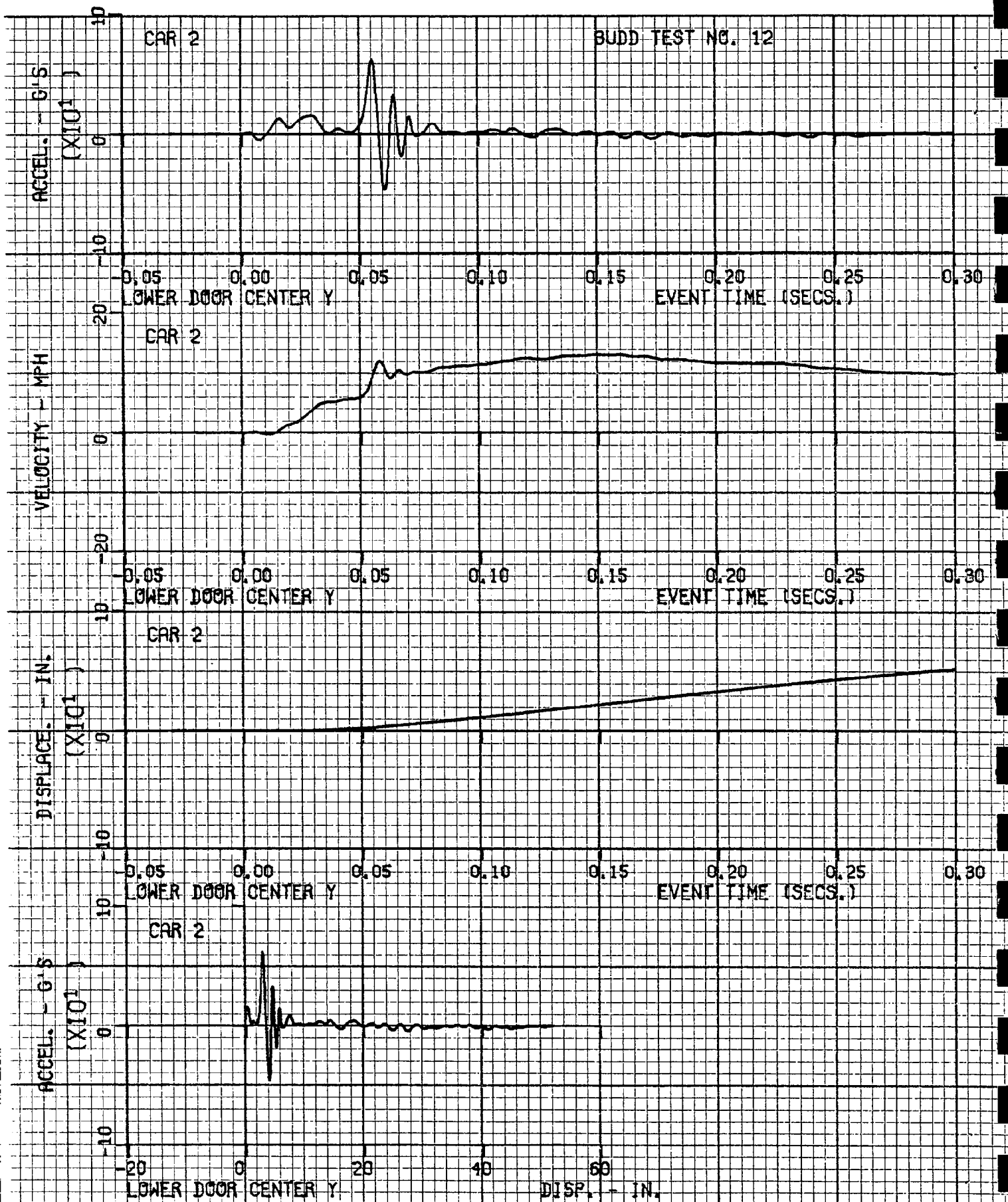


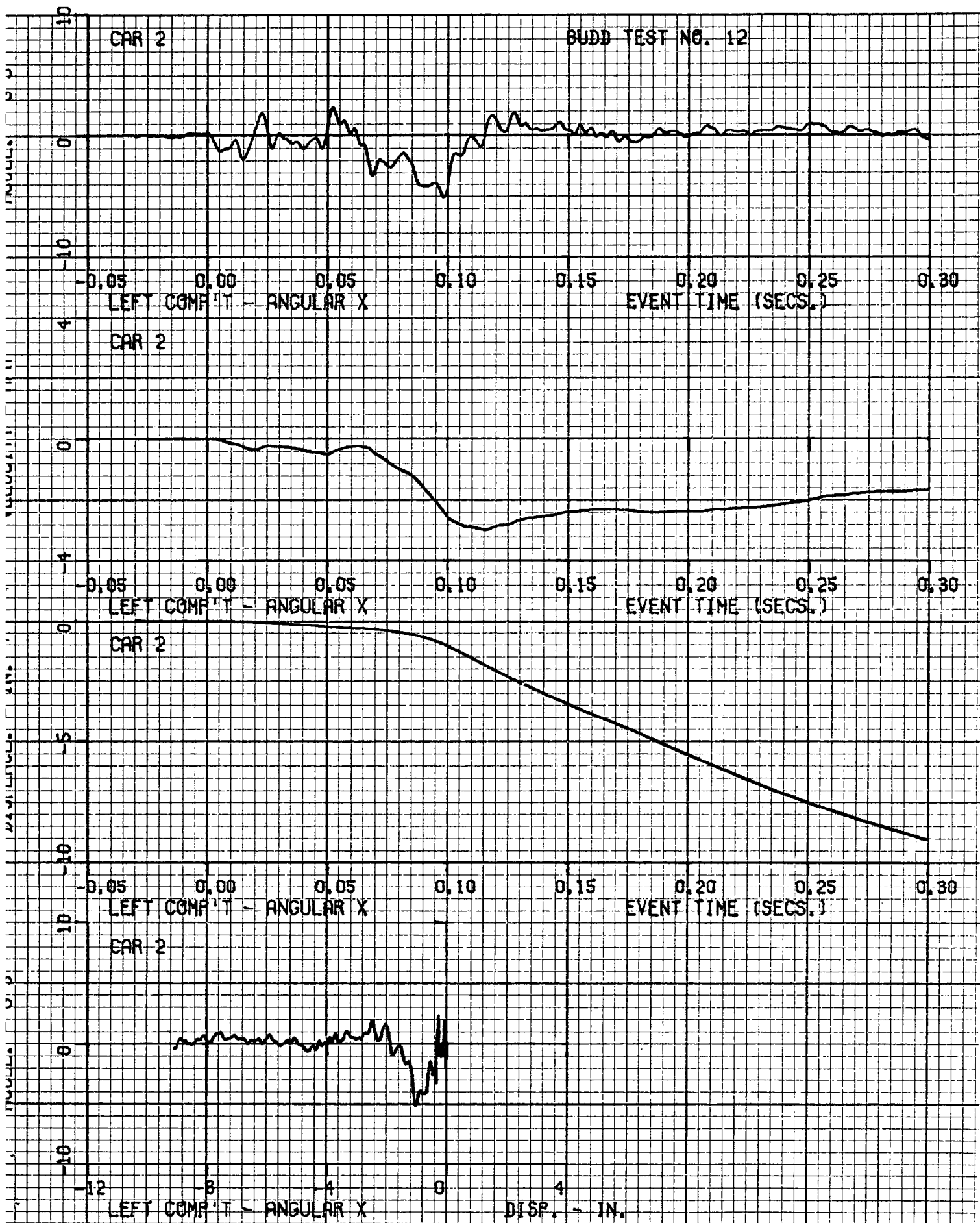


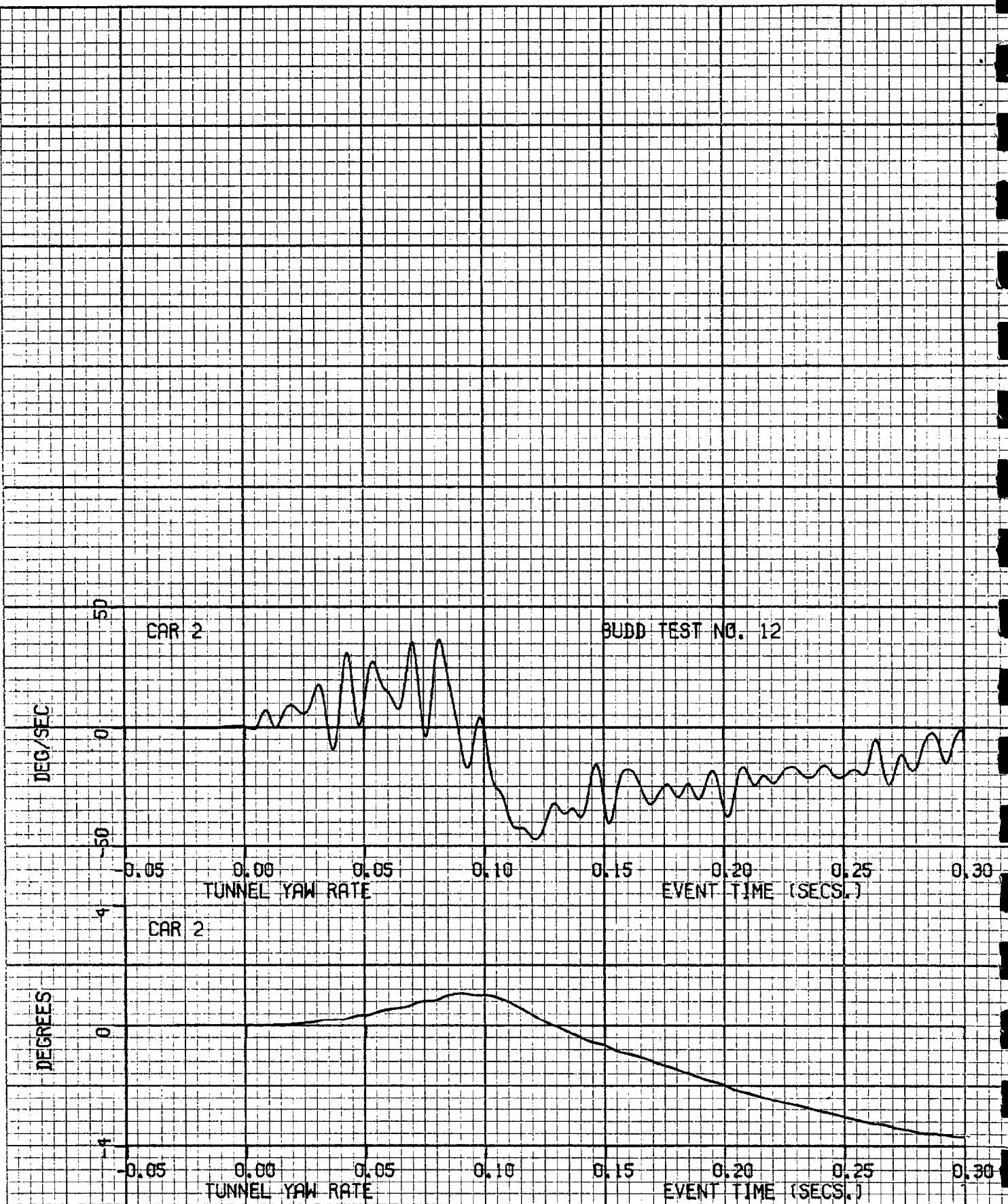


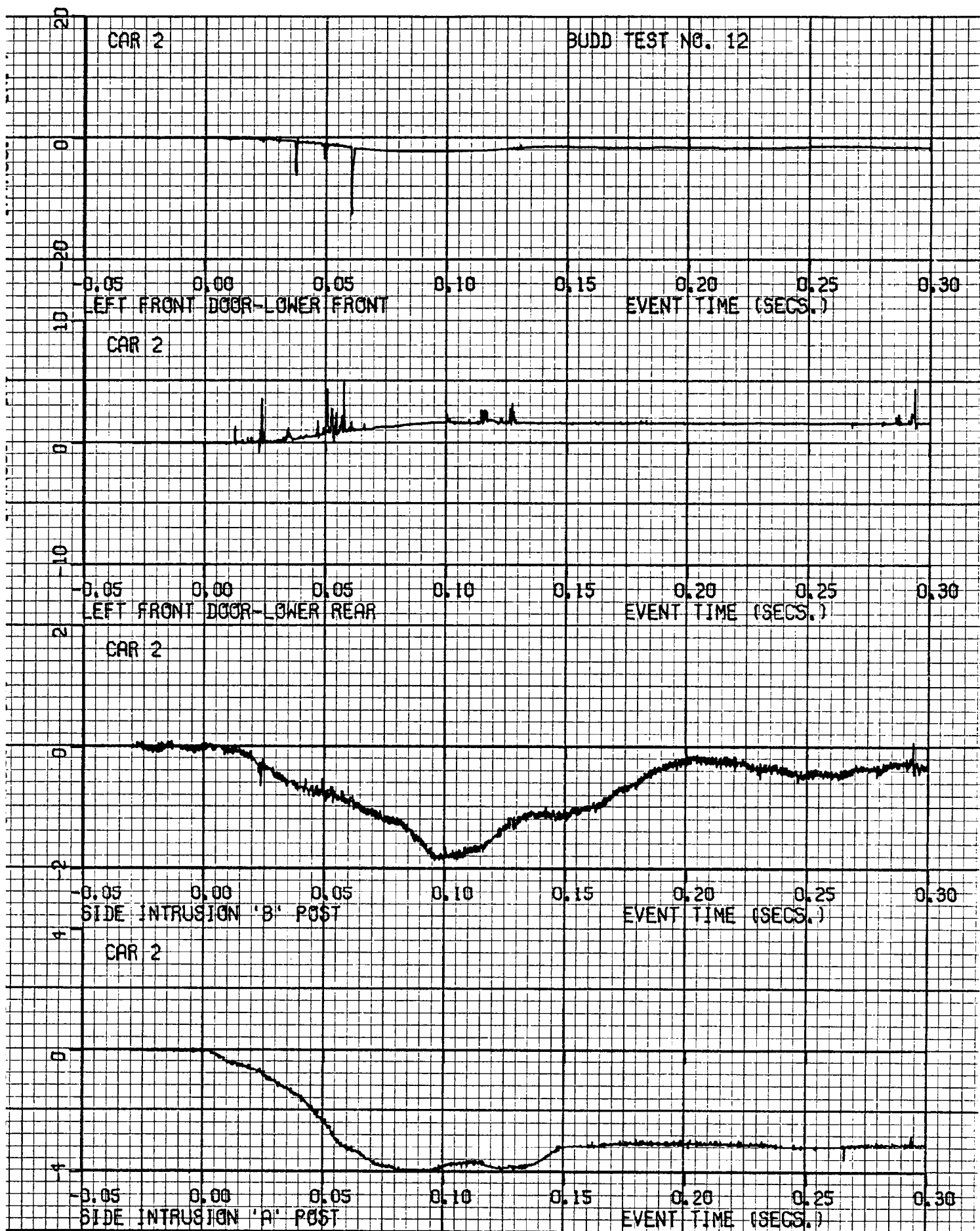








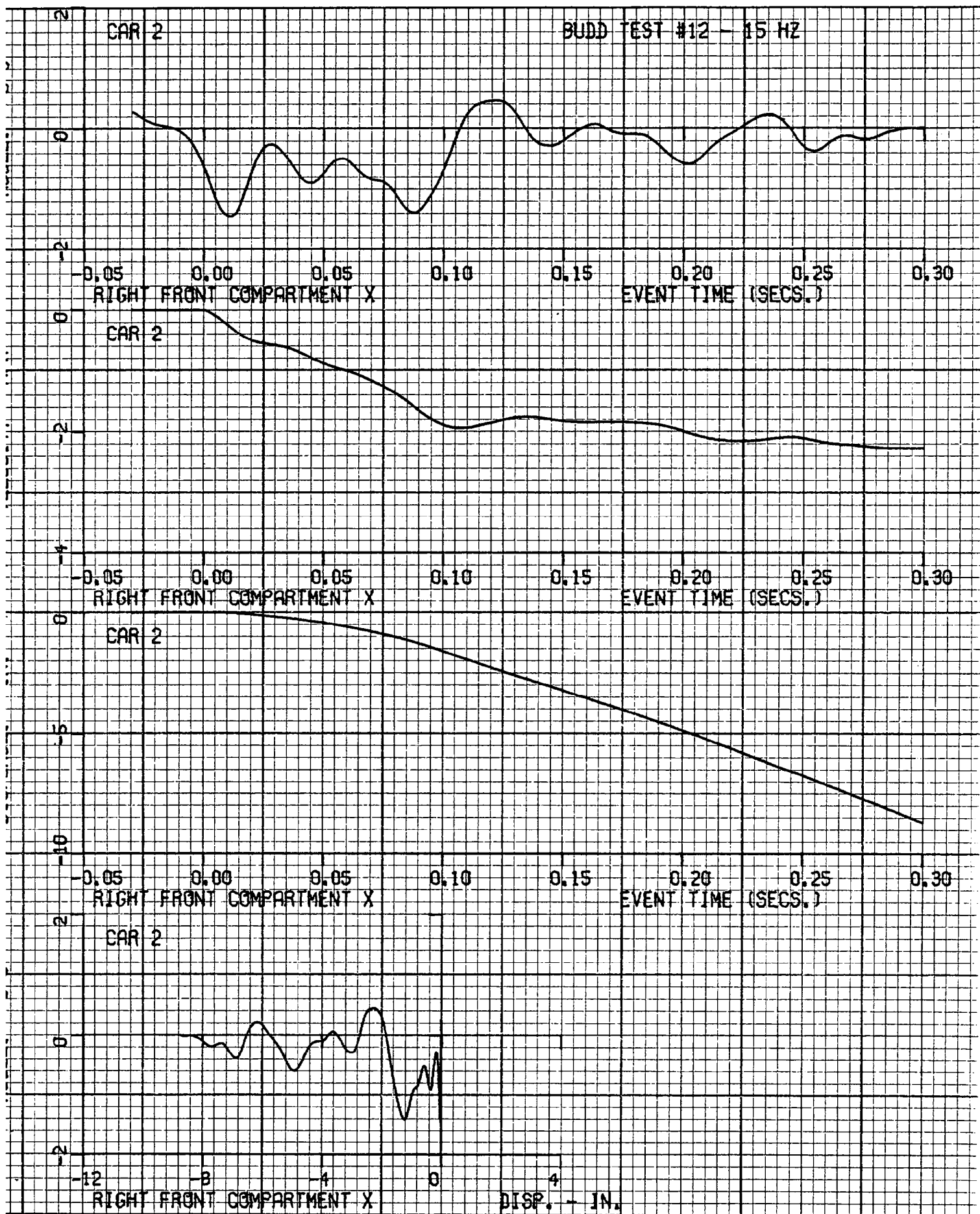


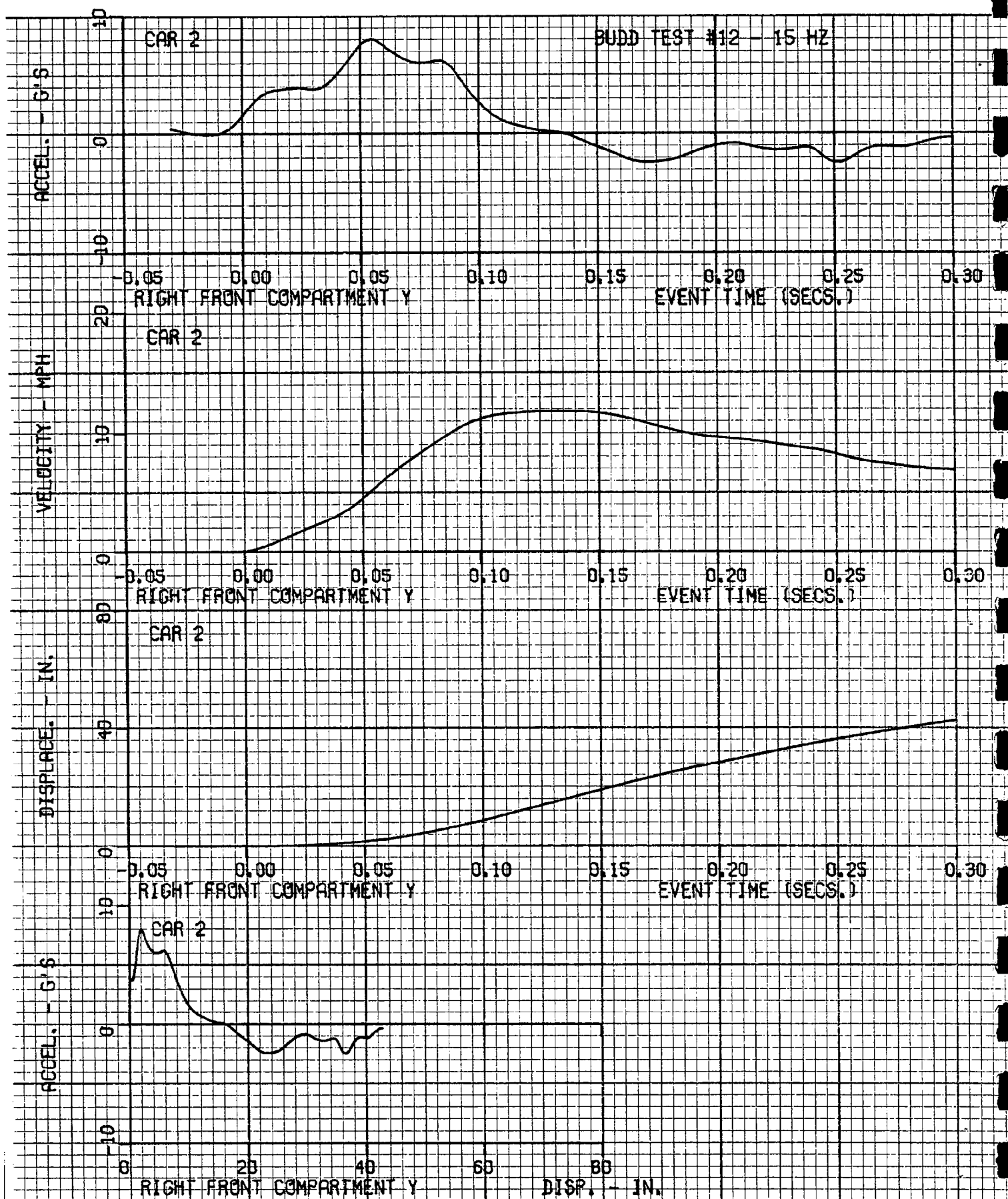


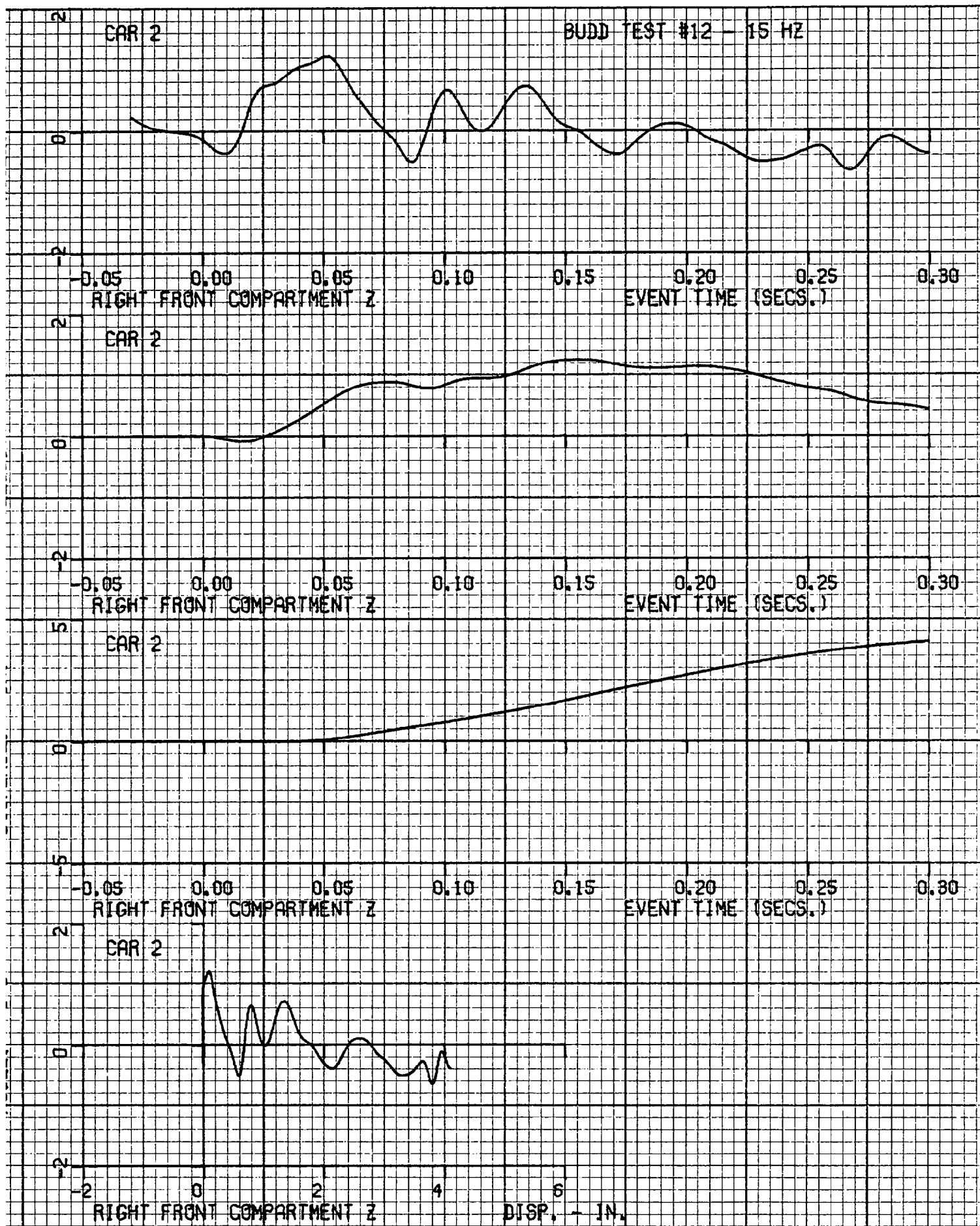
TEST NO. 12

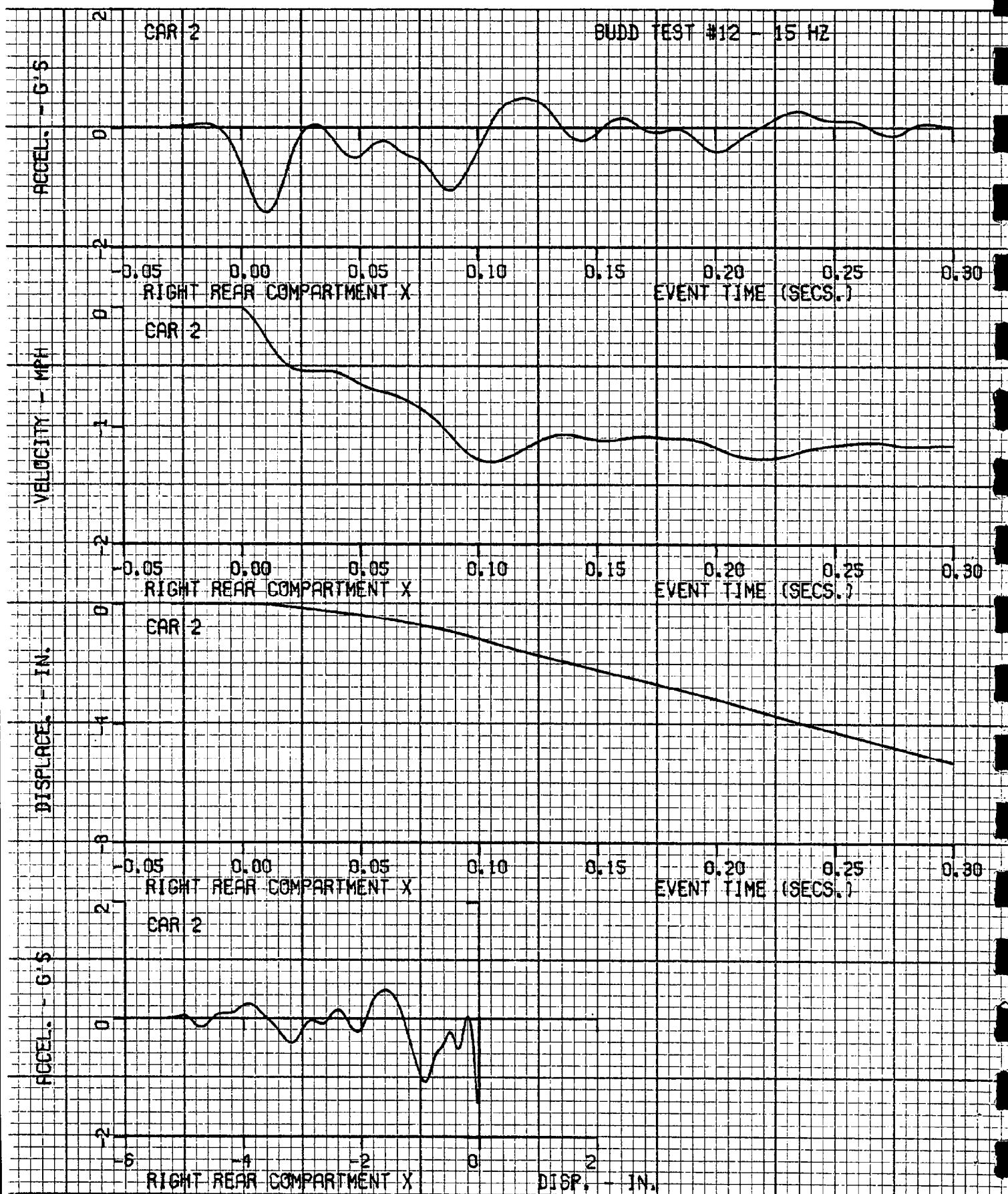
CAR NO. 2 - 1976 VOLKSWAGEN RABBIT

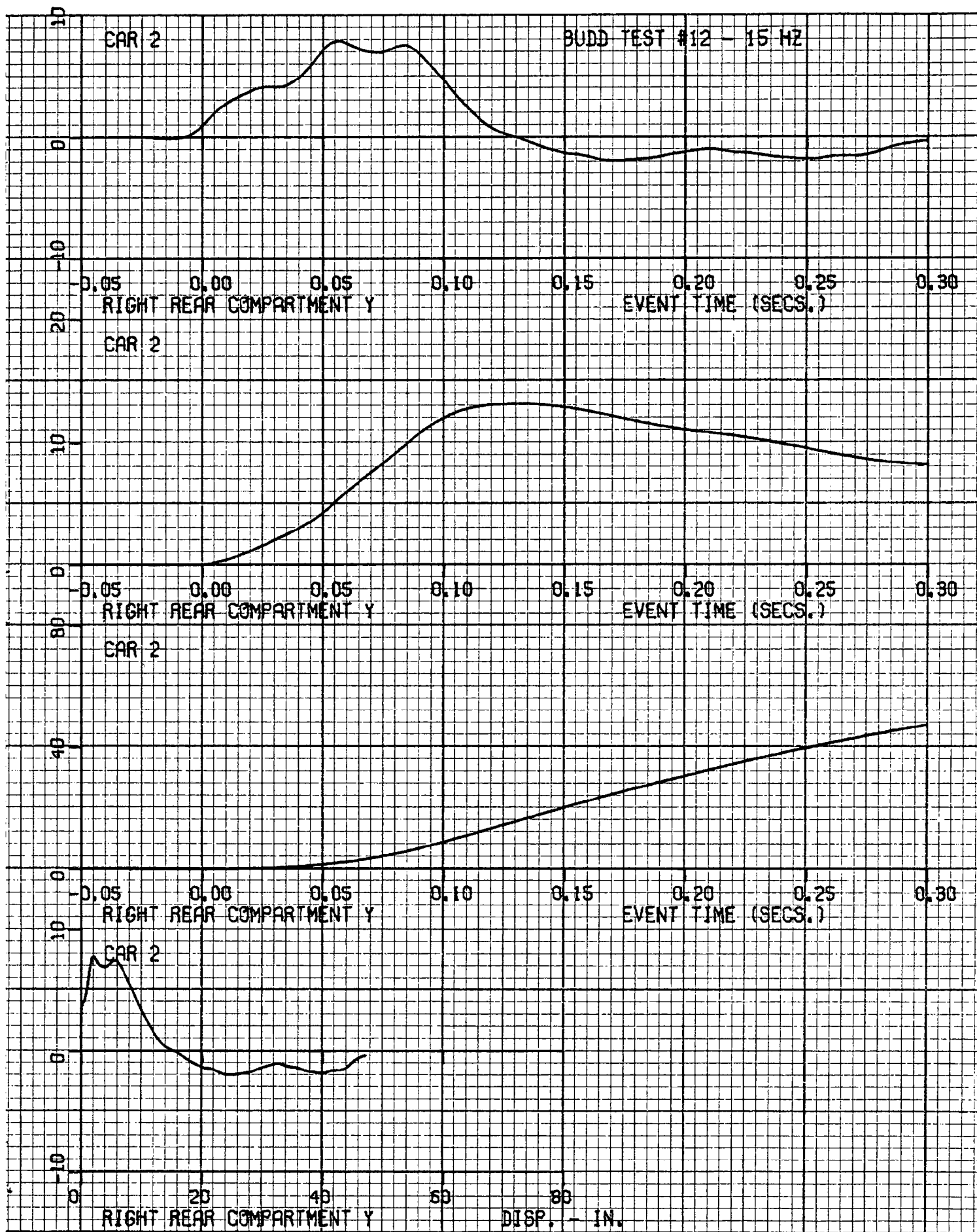
VEHICLE DATA - 15 HZ CHANNEL CLASS

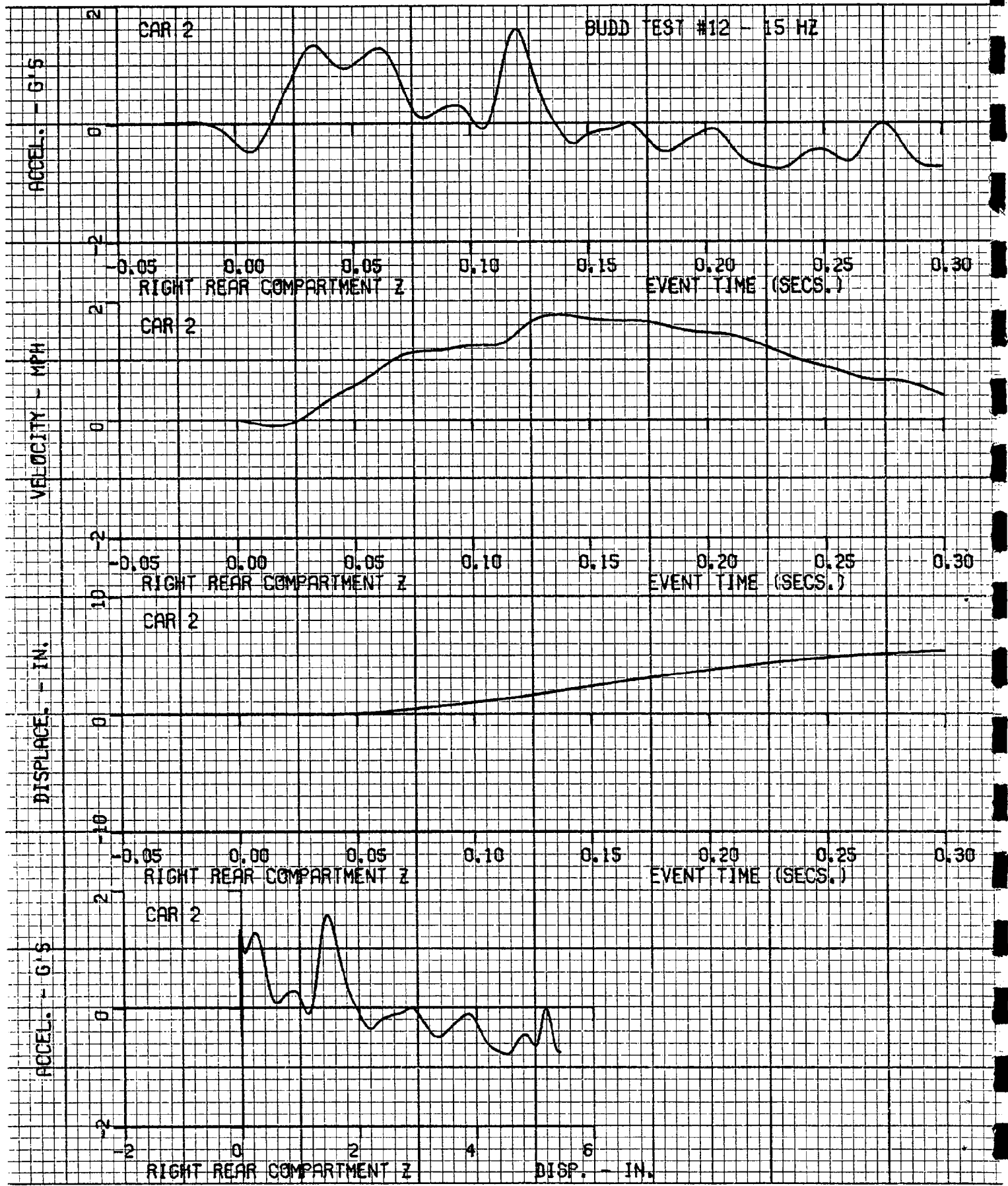


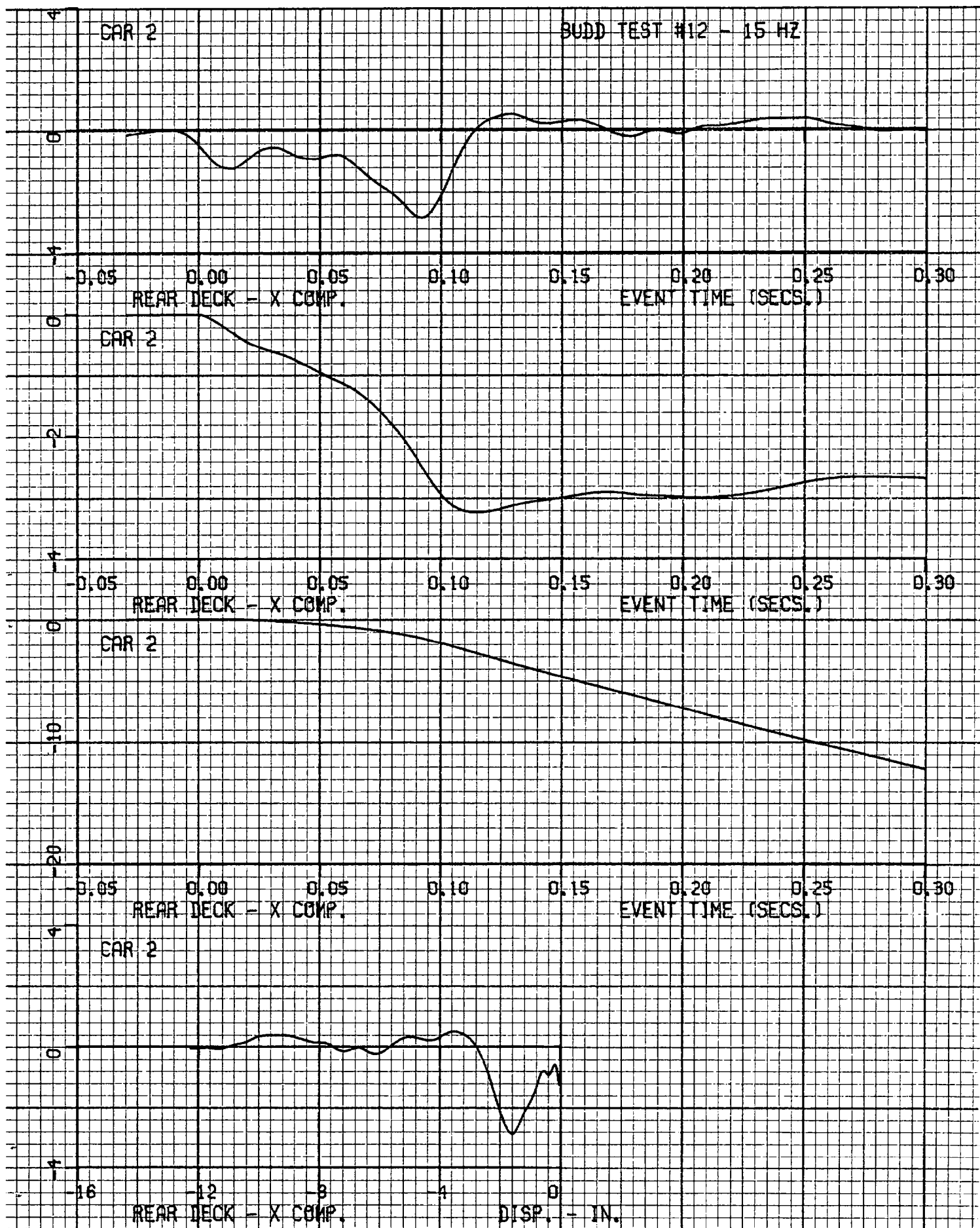


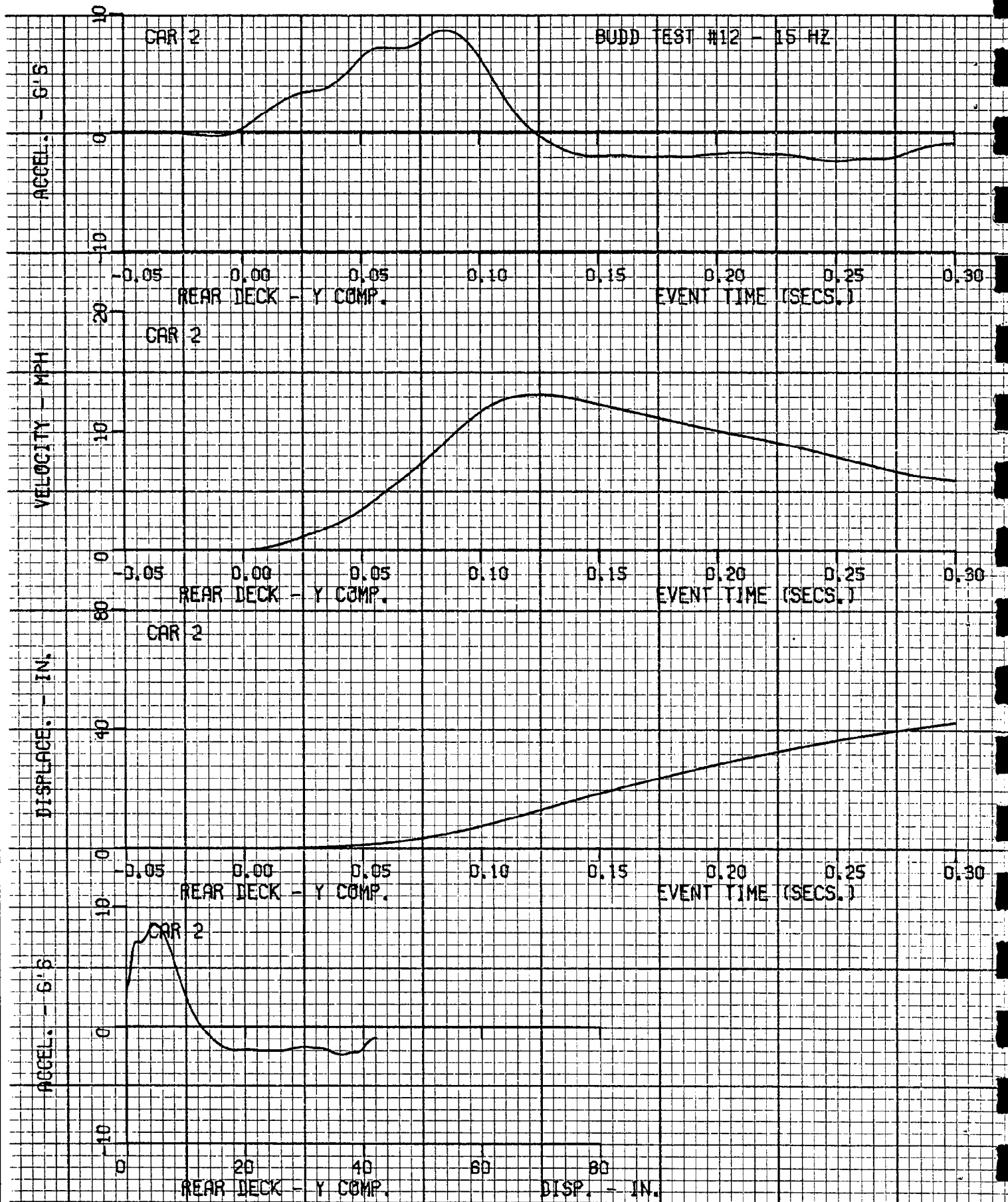


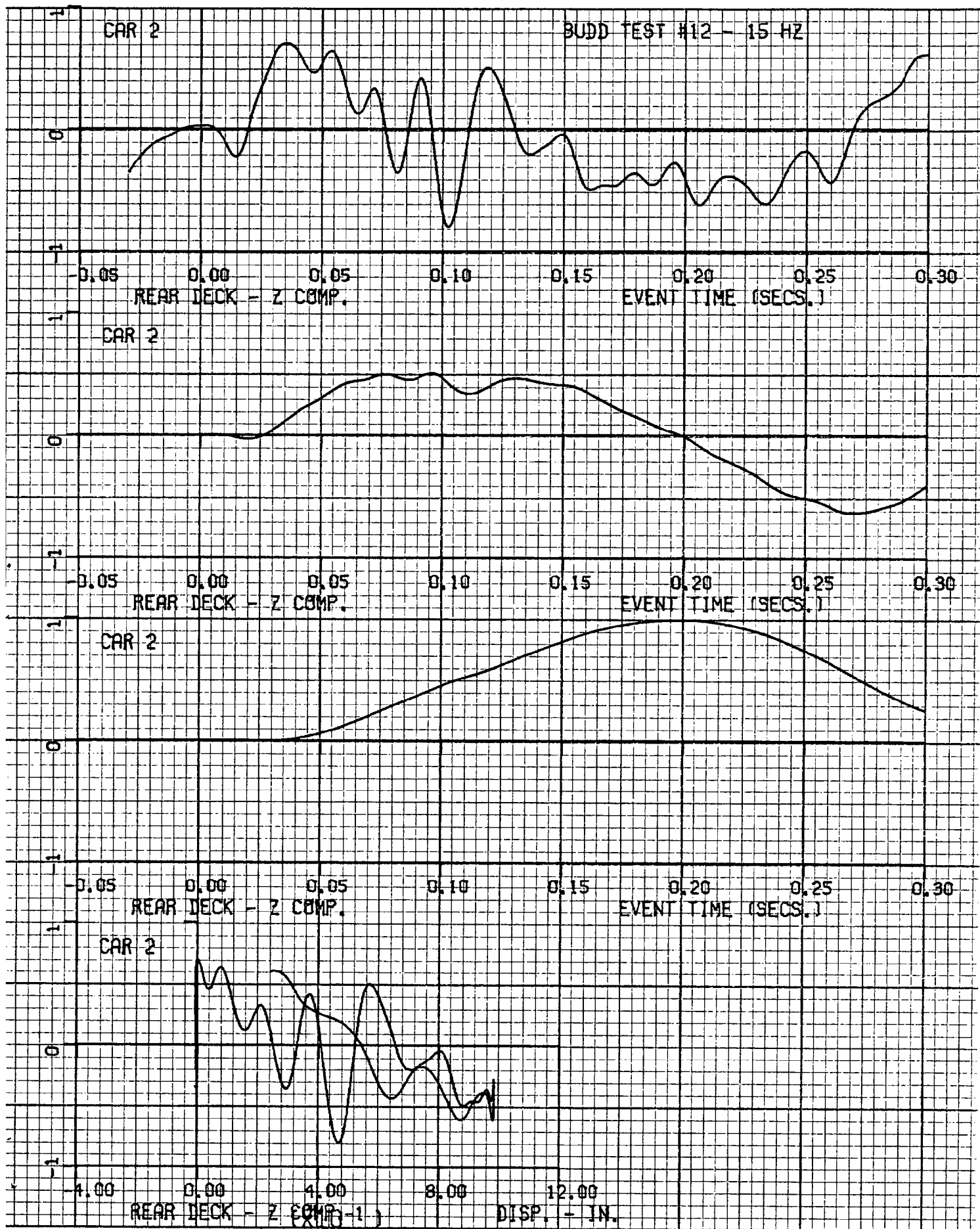


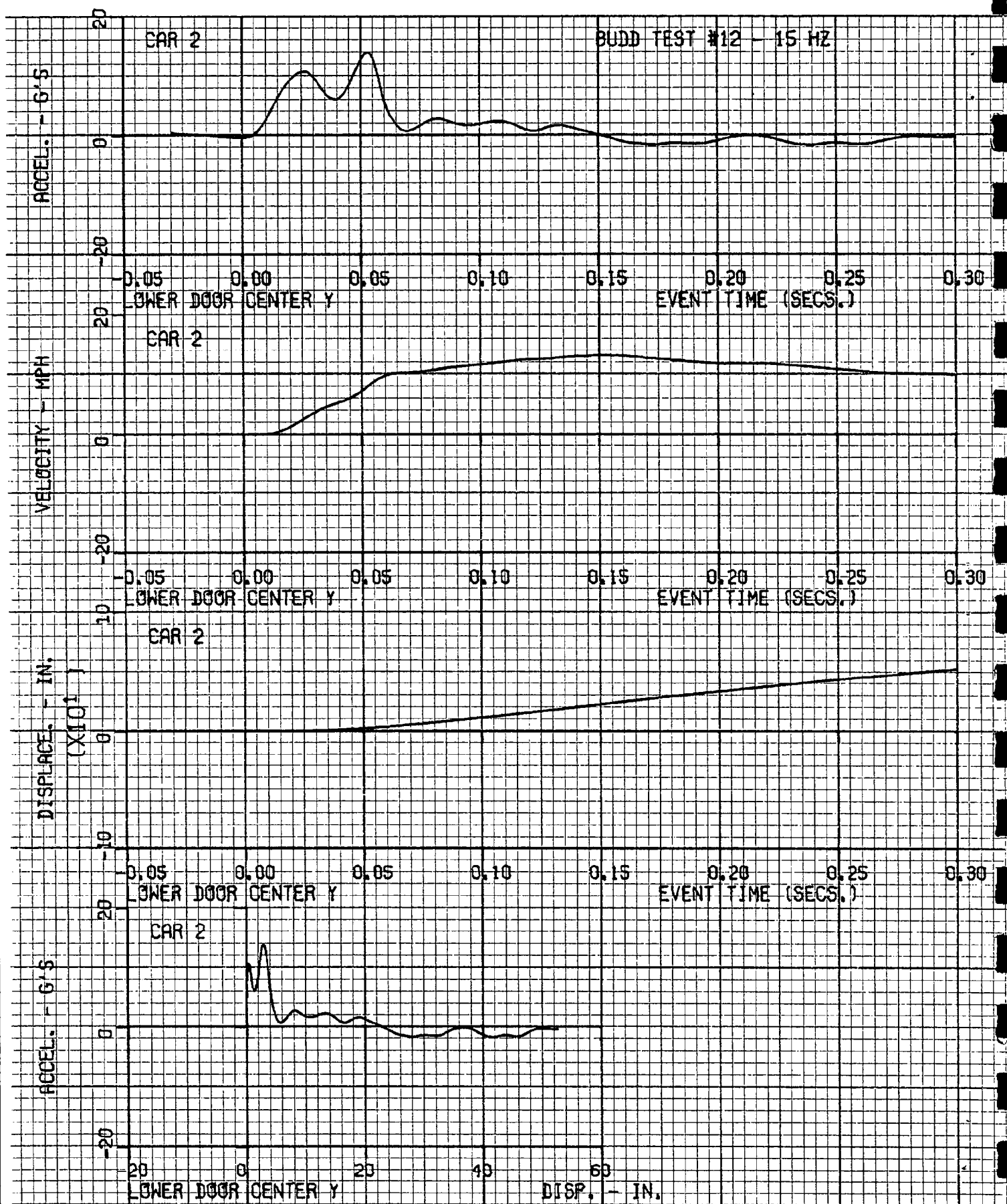


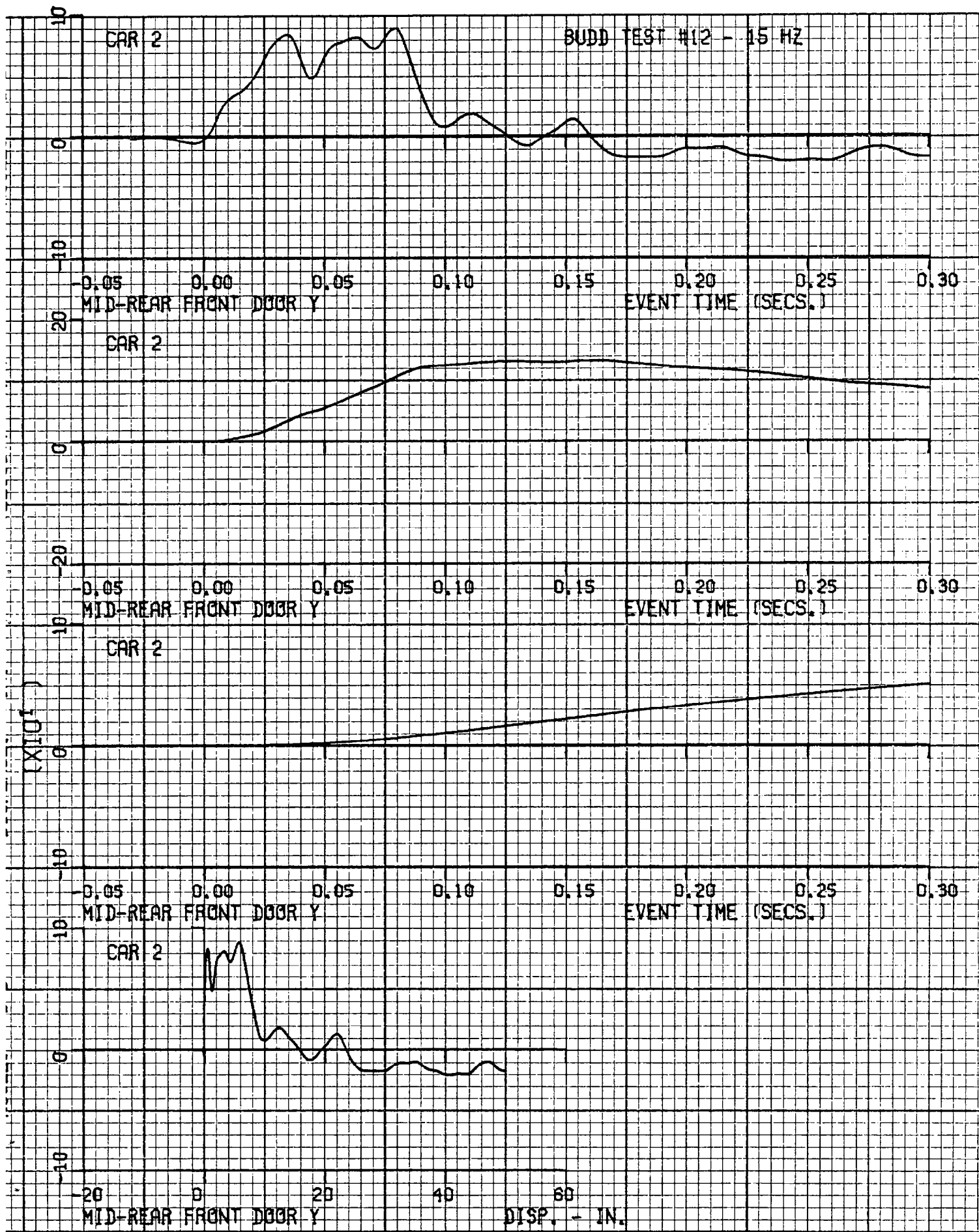


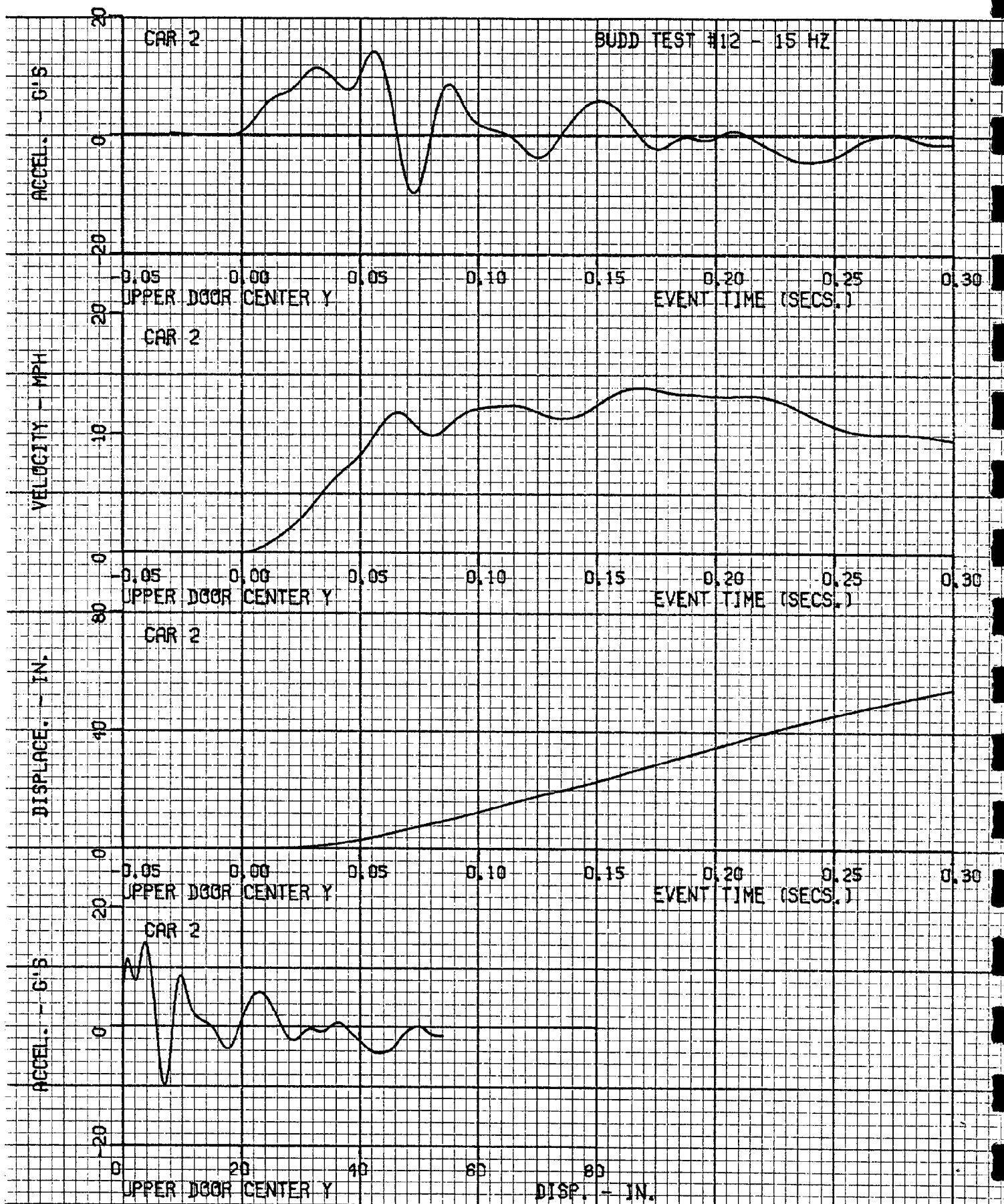


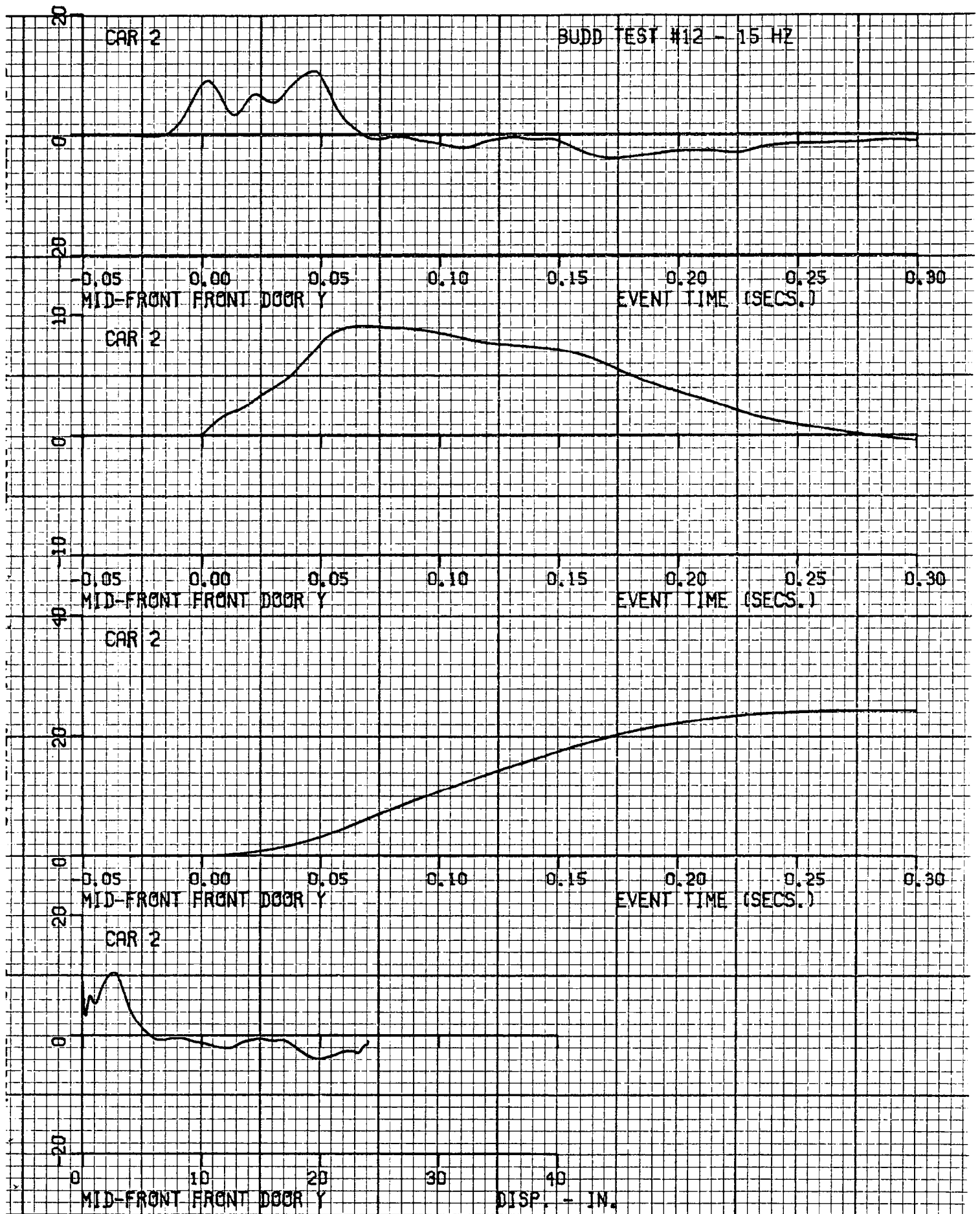


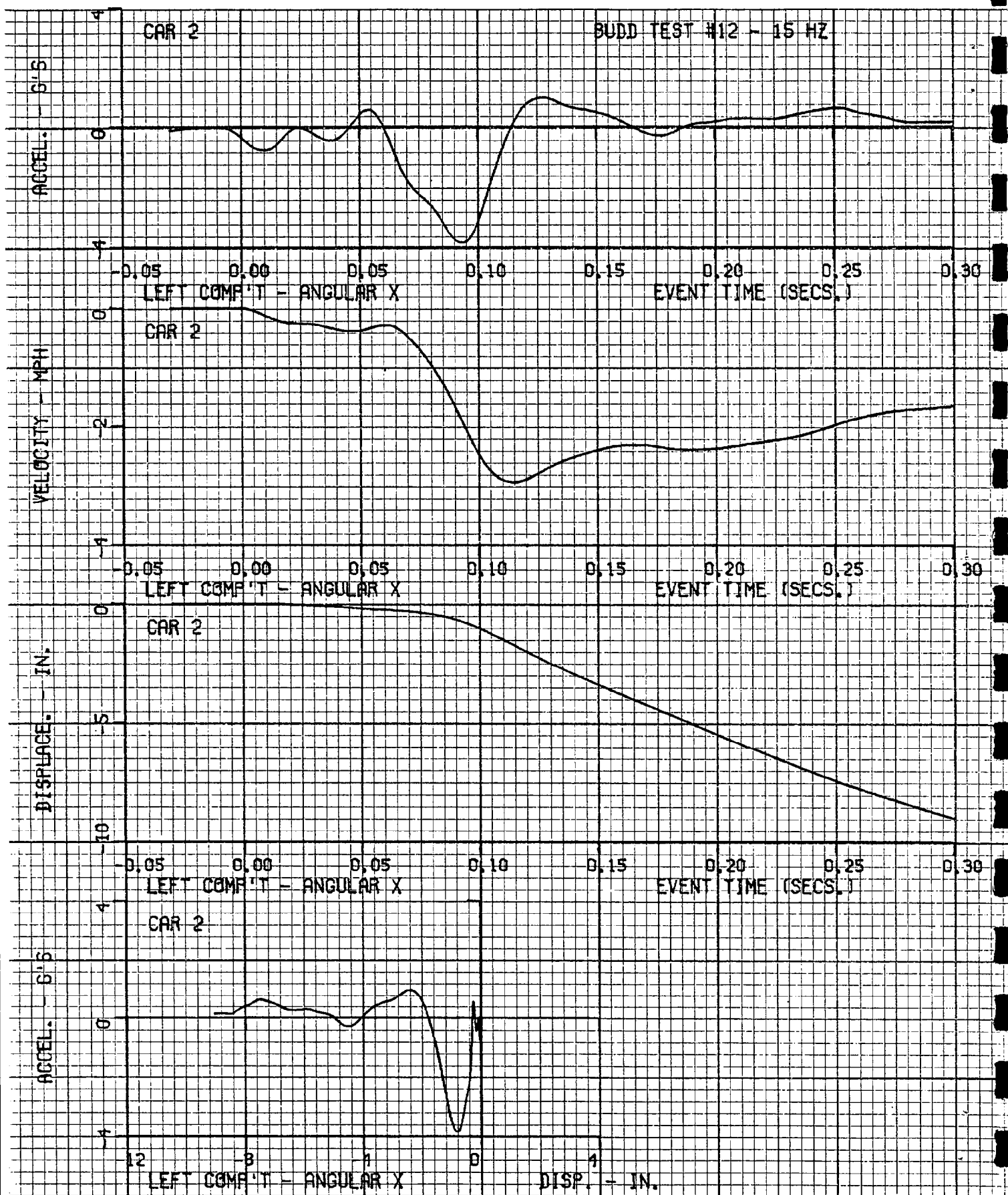


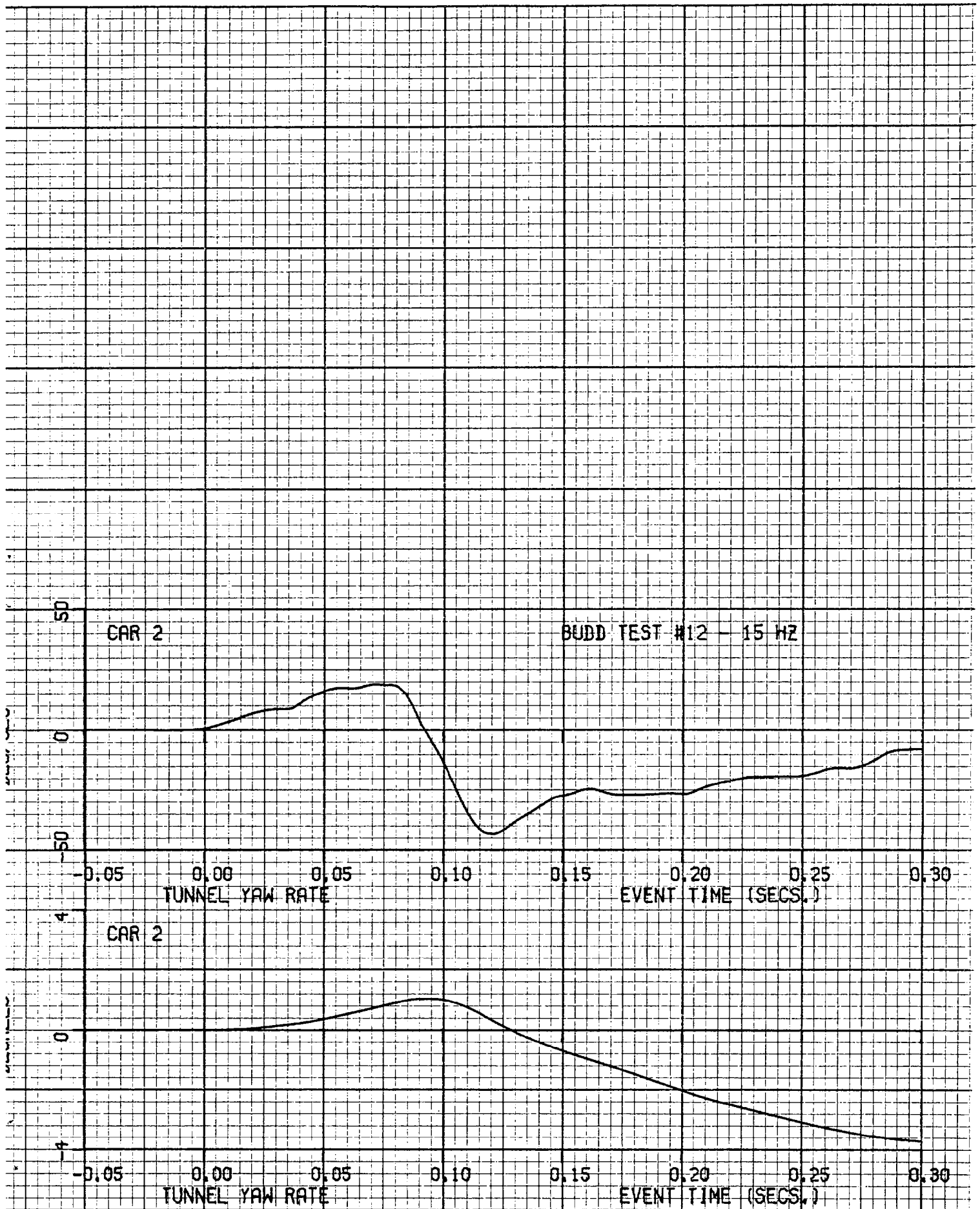












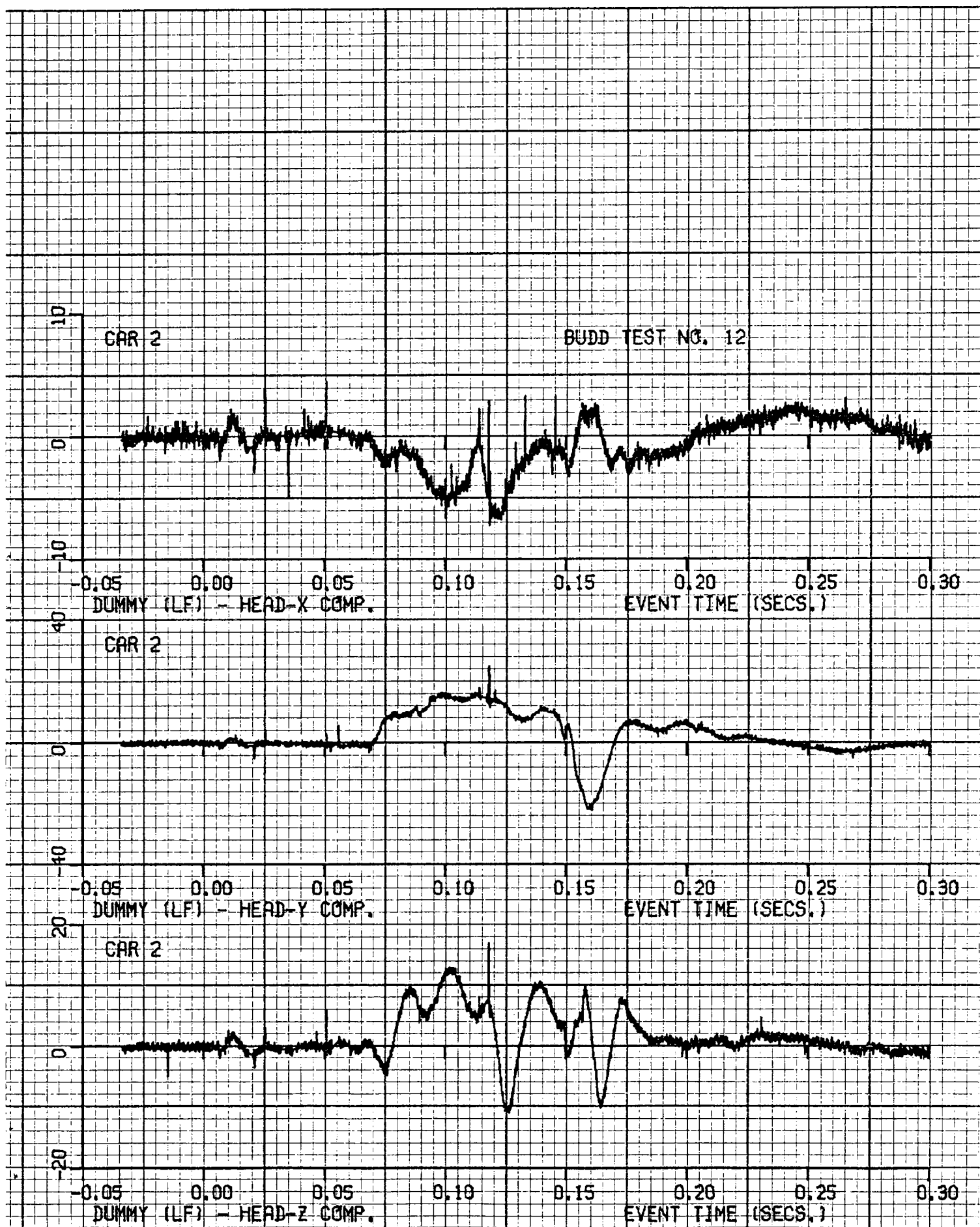
TEST NO. 12

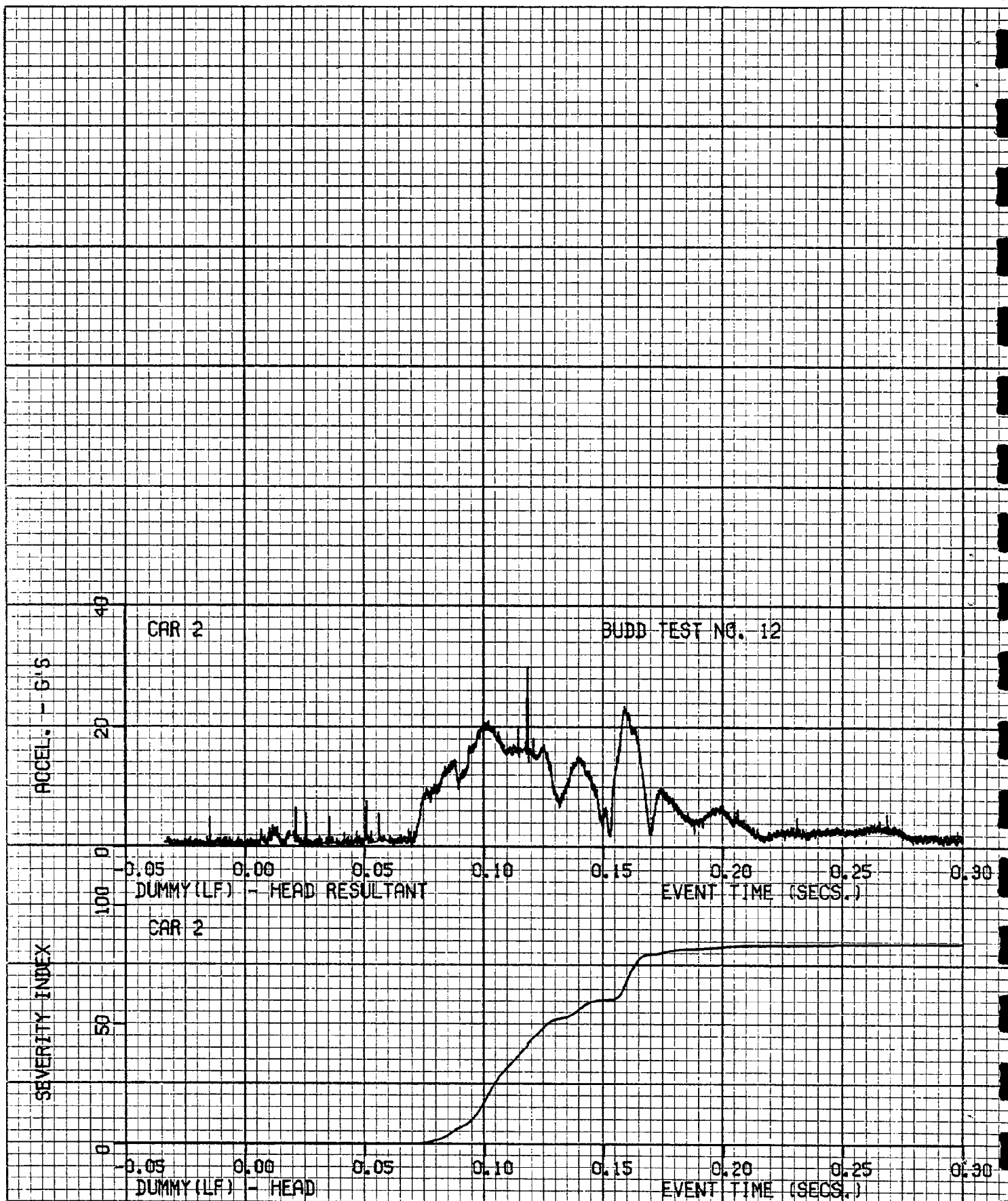
CAR NO. 2 - 1976 VOLKSWAGEN RABBIT

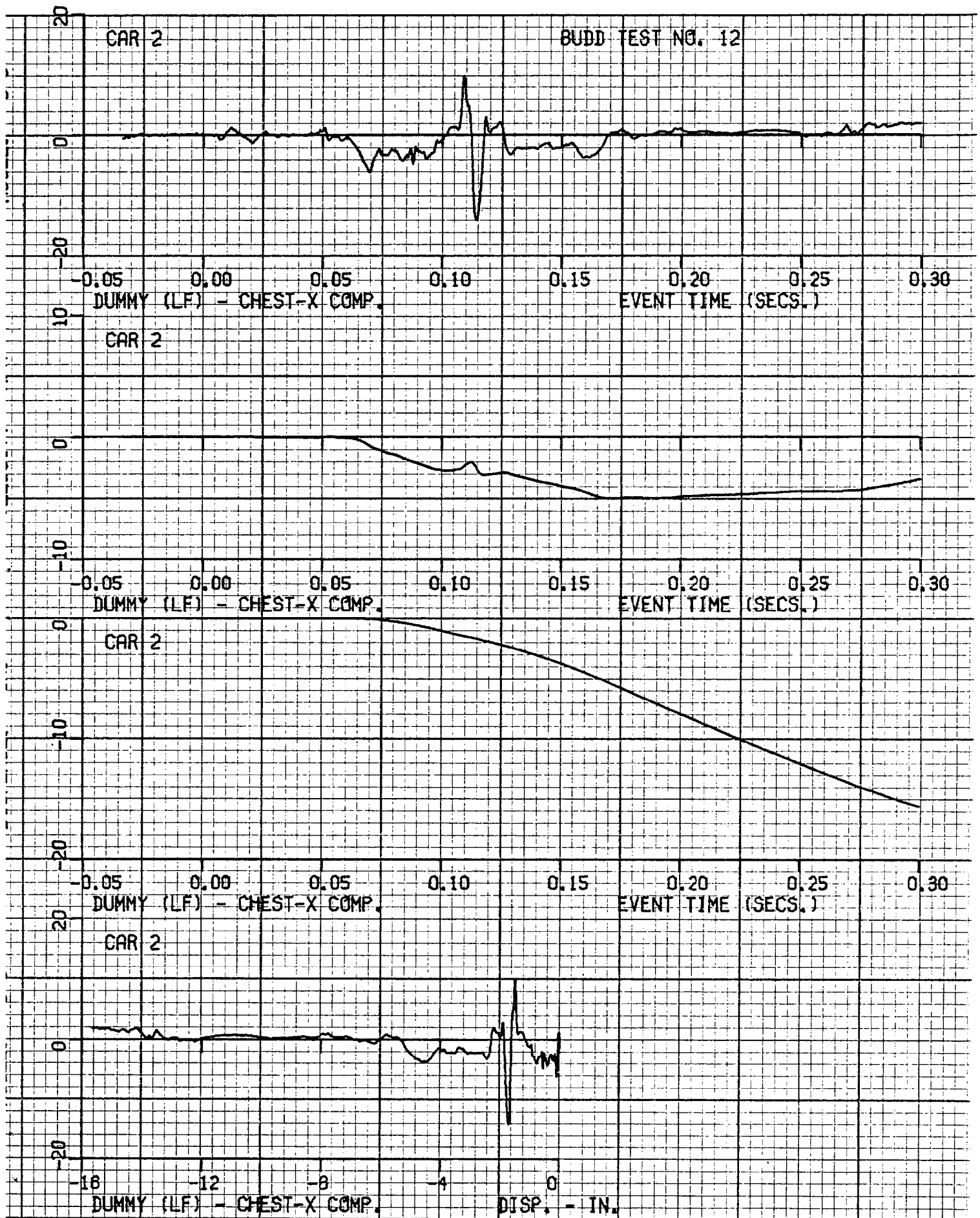
DUMMY DATA

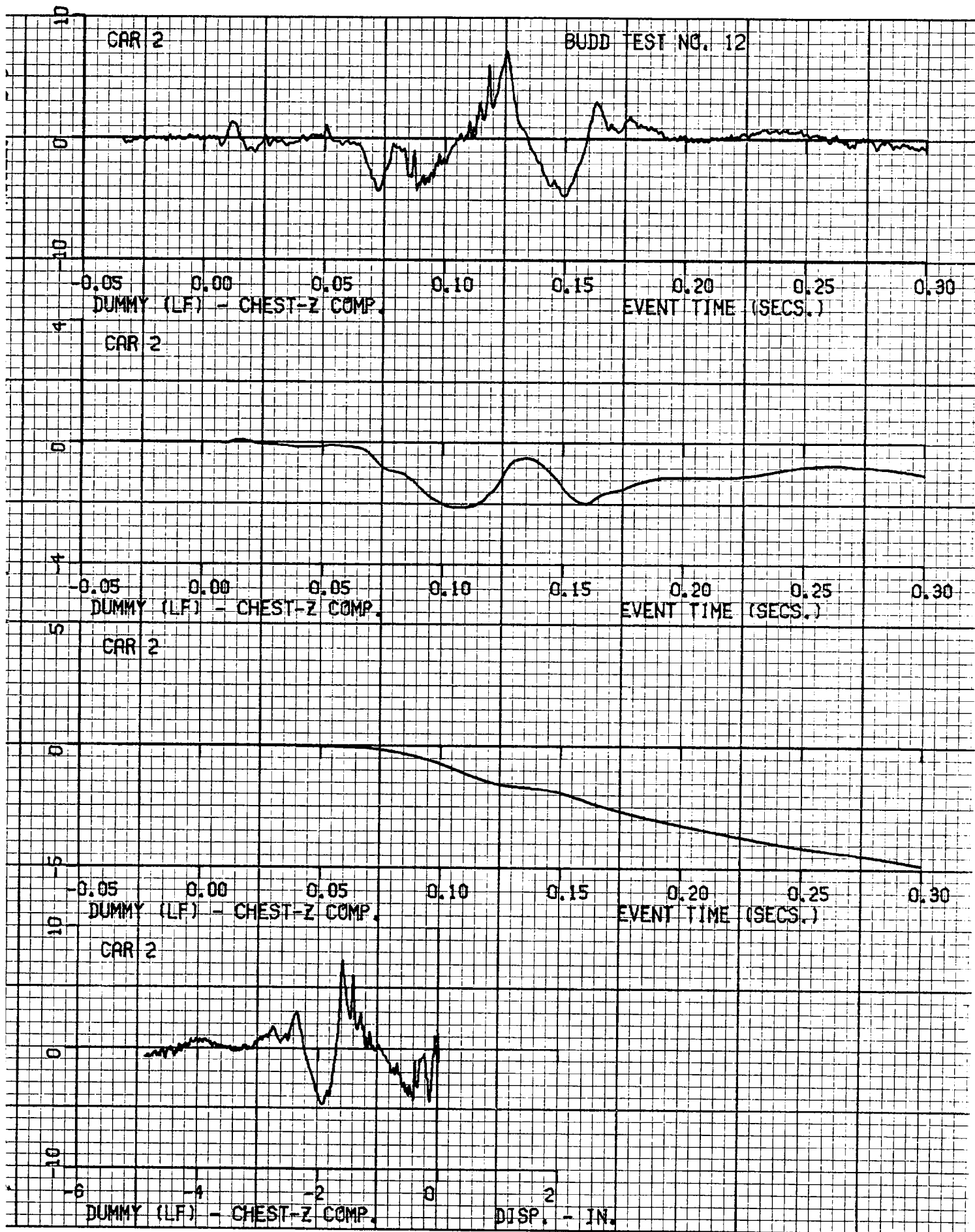
FILTER CHANNEL CLASS

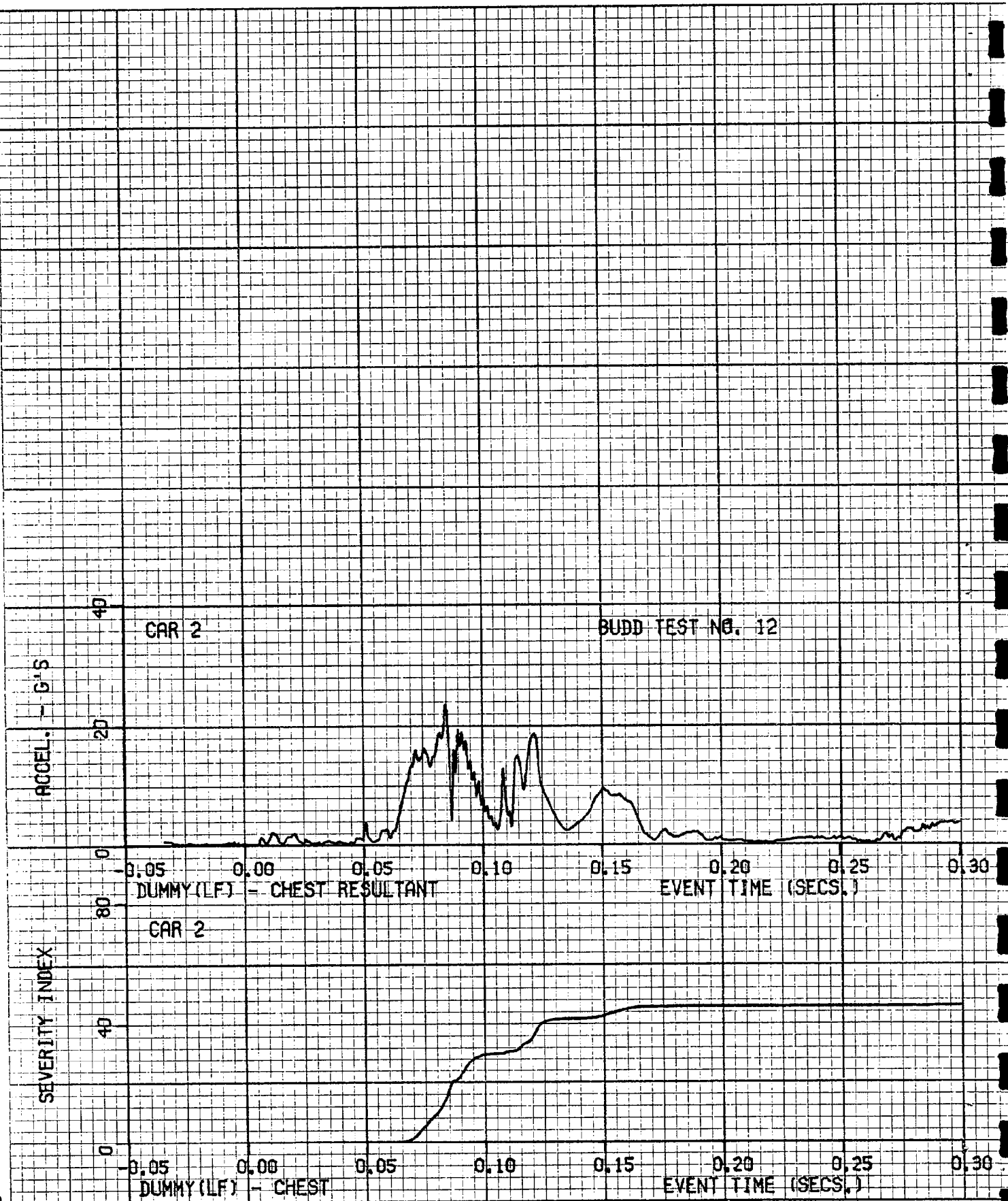
Head Acceleration	1000
Chest Acceleration	180
Pelvic Acceleration	180

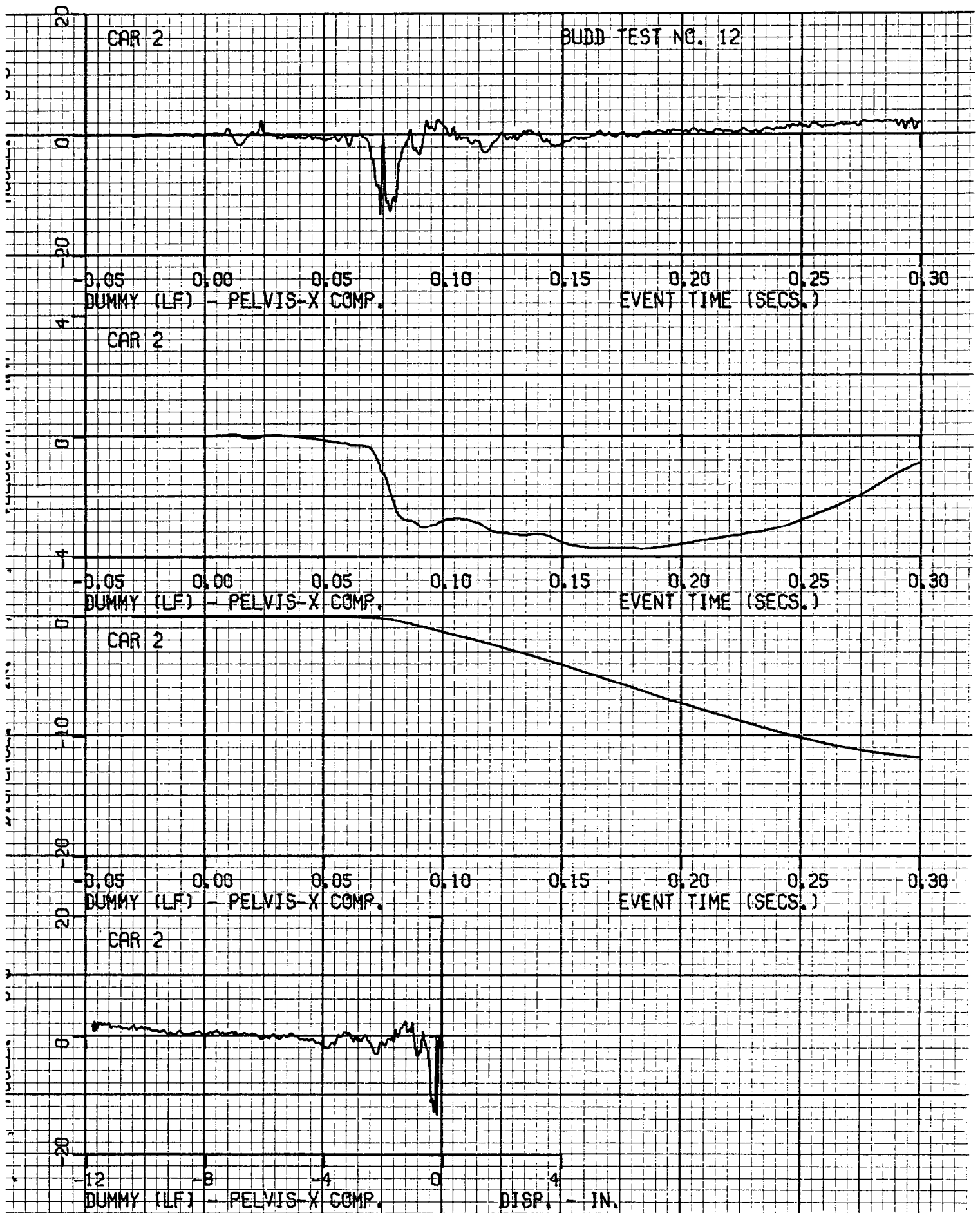


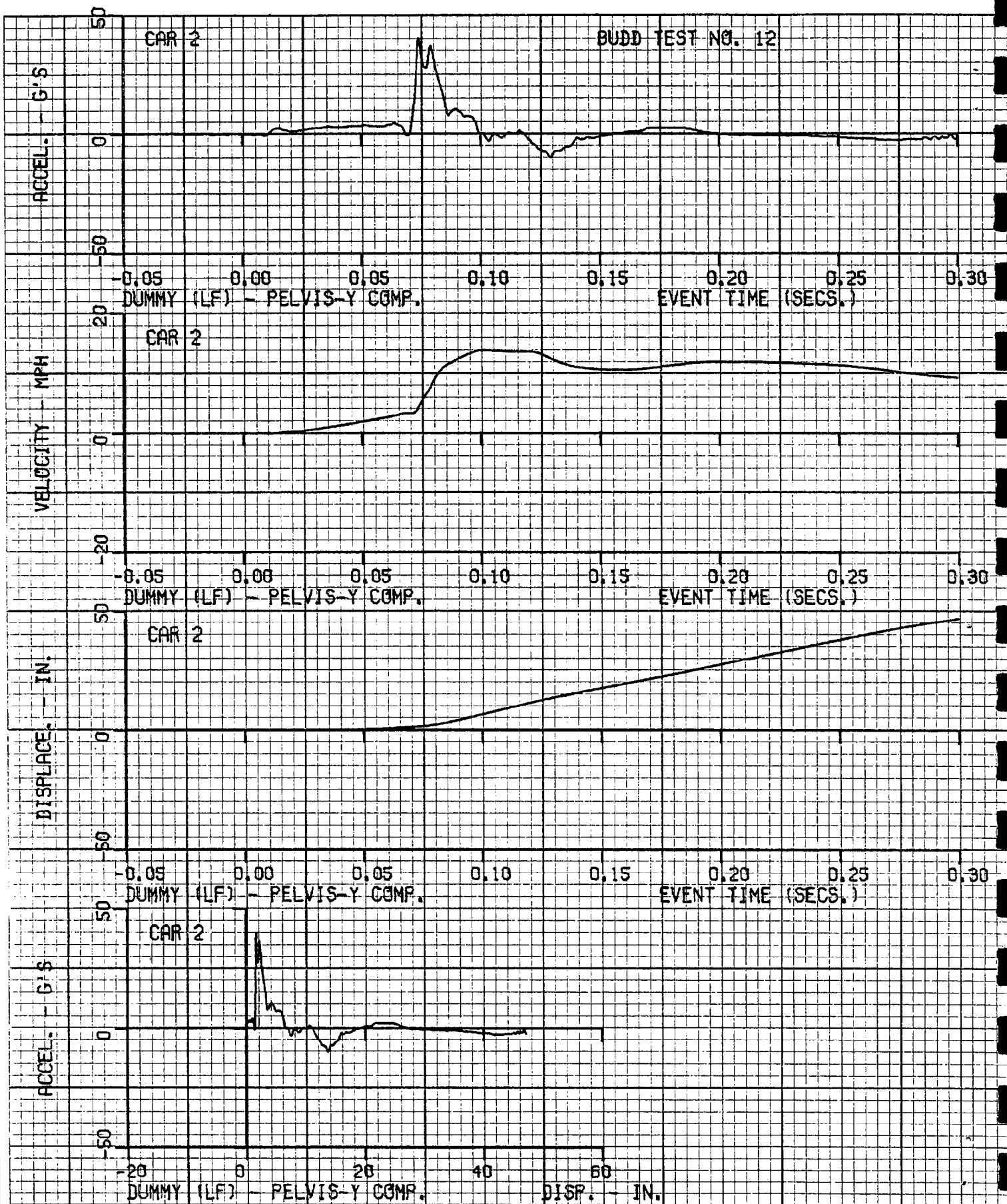


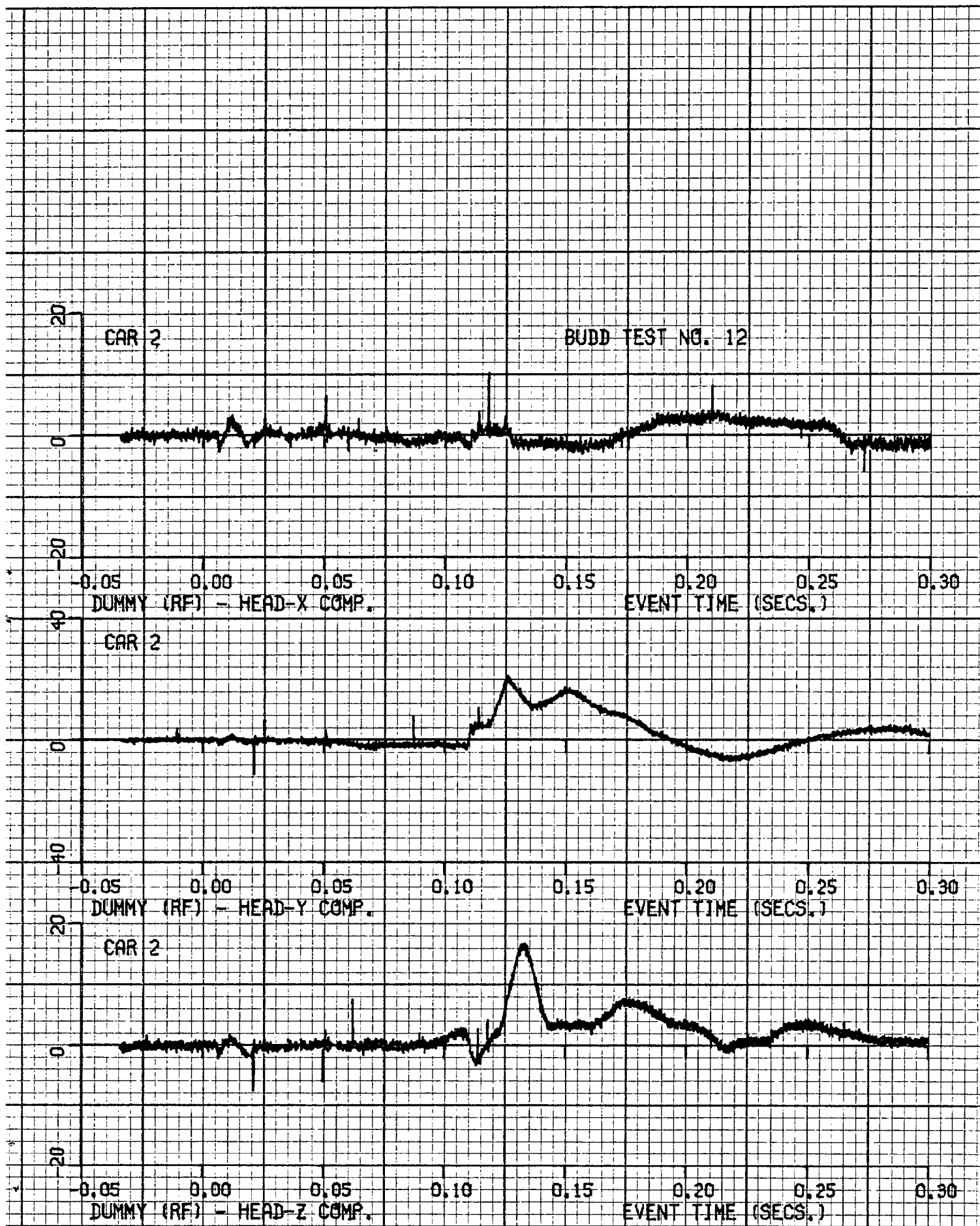


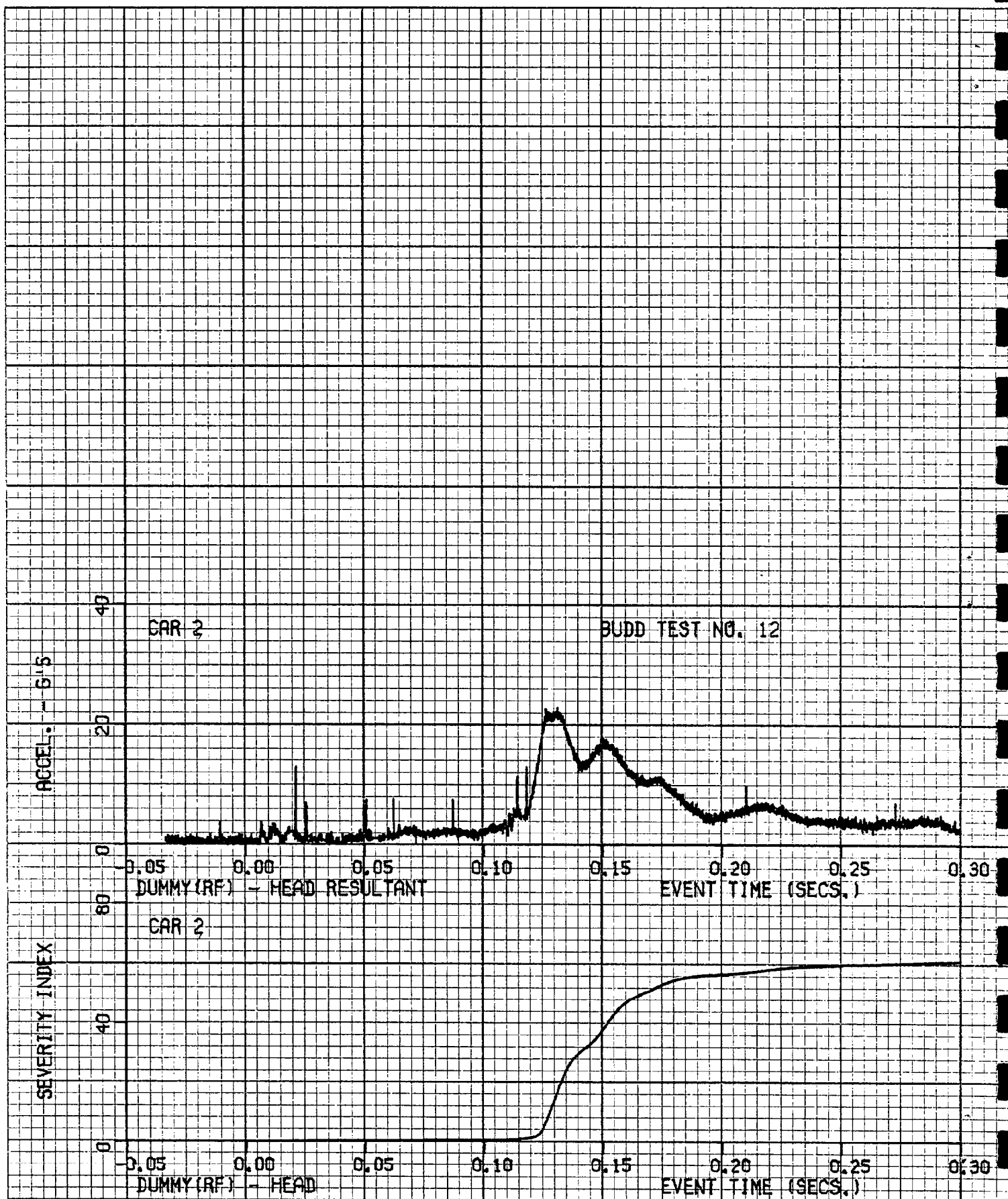


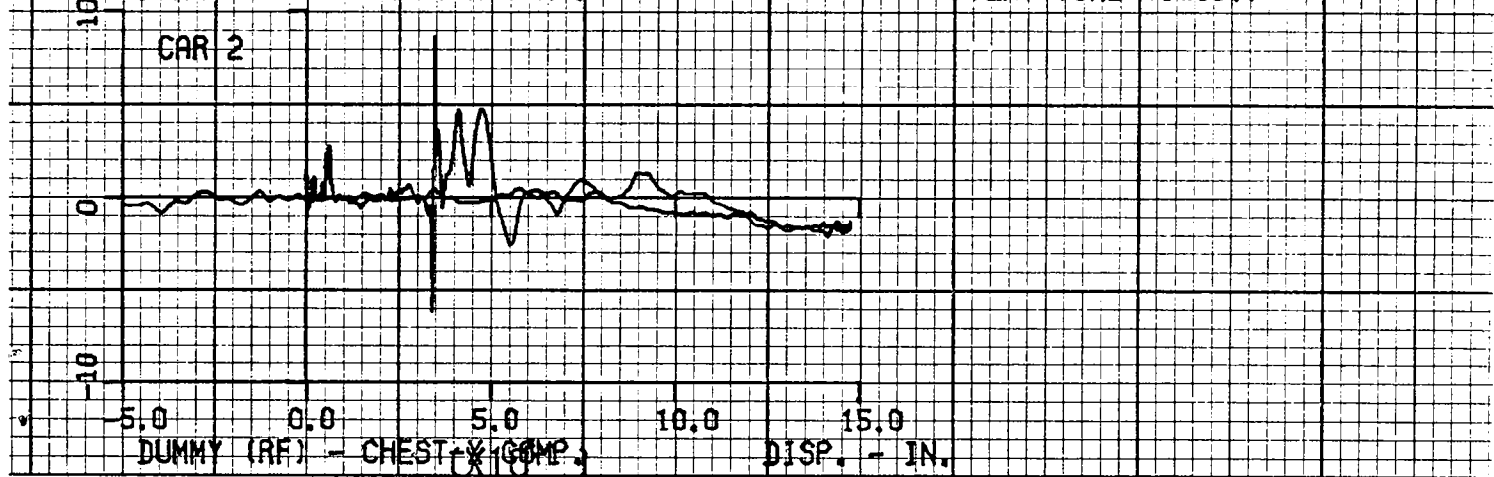
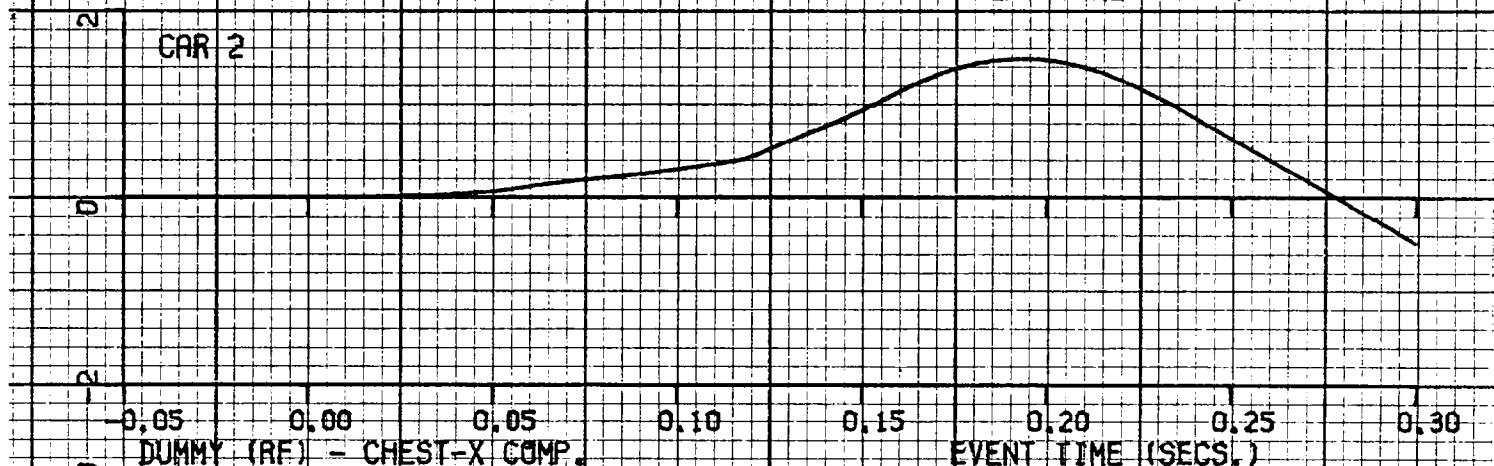
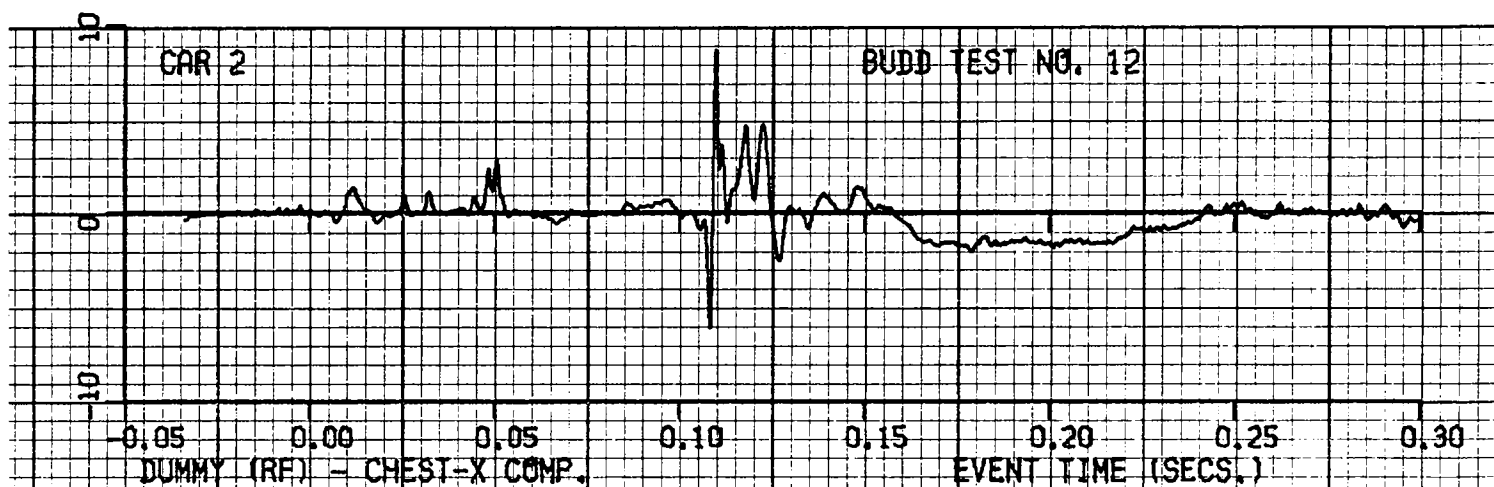


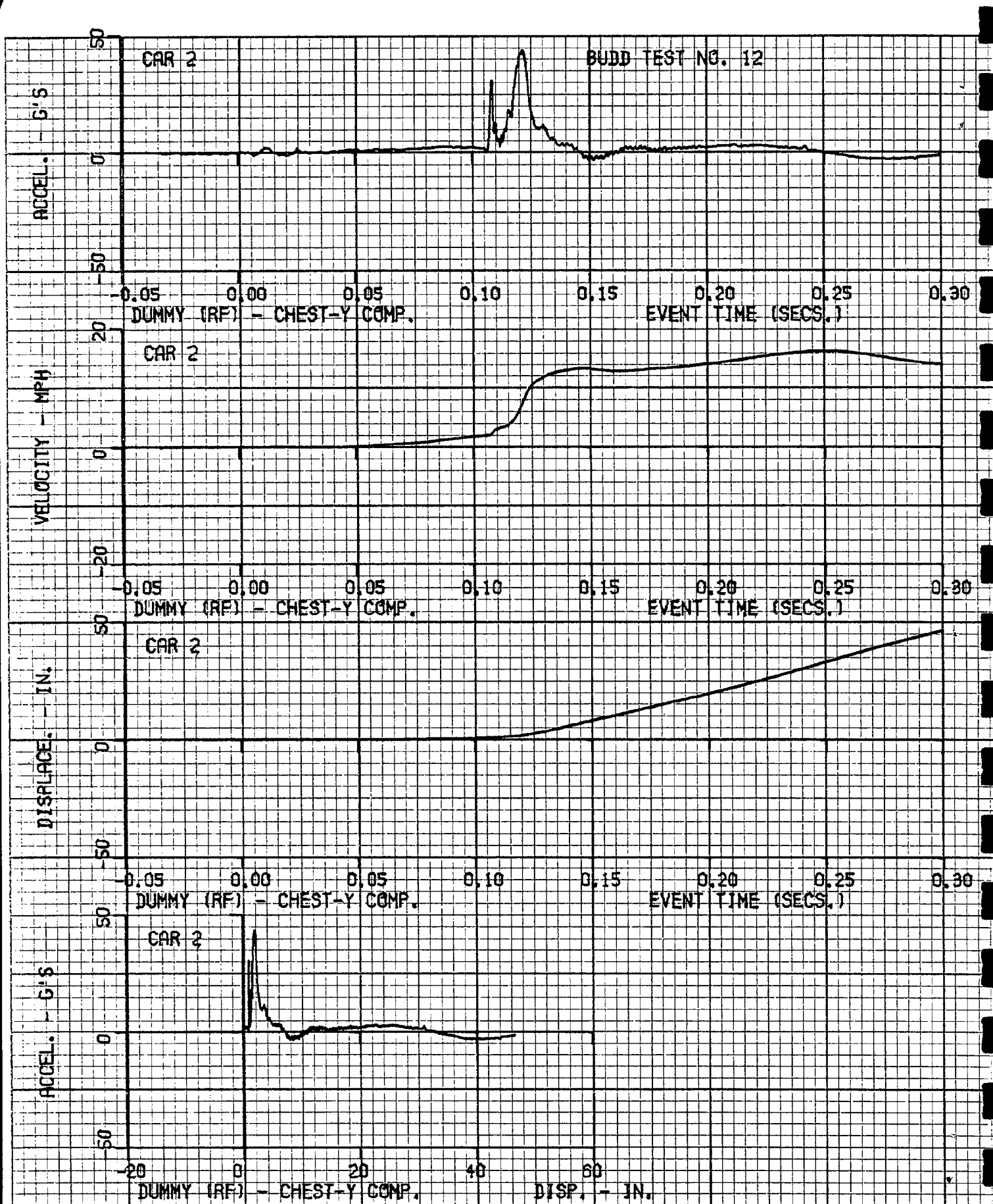












BUDD TEST NO. 12

