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MAY 1993

REPORT NO. 93-20

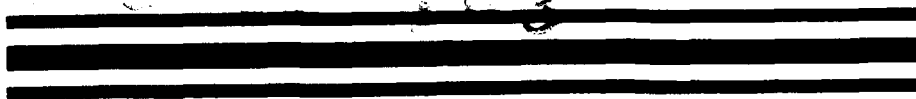
TRANSPORTATION TEST OF
M876A1 U.S. MARINE CORPS
(USMC) TELEPHONE
MAINTENANCE TRUCK (TMT)

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MAR 03 1994
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Prepared for:
U.S. Marine Corps Systems Command
ATTN: SSCMT
Quantico, VA 22134-5080

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94-07014



VALIDATION ENGINEERING DIVISION
SAVANNA, ILLINOIS 61074-9639

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FIELD	GROUP	SUB-GROUP			
19. ABSTRACT (Continue on reverse if necessary and identify by block number) The U.S. Army Defense Ammunition Center and School (USADACS), Validation Engineering Division (SMCAC-DEV), was tasked by the U.S. Marine Corps Systems Command (MCSC) to test an M876A1 Telephone Maintenance Truck (TMT). The TMT is a modified M939A1 chassis fitted with a commercially-produced Telephone Maintenance Truck Bed (TMTB). The objective of the test was to test the modified vehicle for transportation by subjecting the truck to rail impact and road tests as specified in MIL-STD-810, Environmental Test Methods and Engineering Guidelines, and TP-91-01, Transportability Testing Procedures, July 1991. The M876A1 TMT satisfied the test requirements after hardware replacement and modifications were accomplished.					
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U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL
VALIDATION ENGINEERING DIVISION
SAVANNA, IL 61074-9639

REPORT NO. 93-20

TRANSPORTATION TEST OF M876A1 U.S. MARINE CORPS (USMC) TELEPHONE
MAINTENANCE TRUCK (TMT)

MAY 1993

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PART 1

INTRODUCTION

A. **BACKGROUND.** The U.S. Army Defense Ammunition Center and School (USADACS), Validation Engineering Division (SMCAC-DEV), was tasked by the U.S. Marine Corps Systems Command (MCSC) to conduct transportability tests on the M876A1 Telephone Maintenance Truck (TMT) by subjecting the TMT to rail impact and road tests as specified in MIL-STD-810, Environmental Test Methods and Engineering Guidelines, and TP-91-01, Transportability Testing Procedures, July 1991.

B. **AUTHORITY.** These tests were conducted IAW mission responsibility delegated by U.S. Army Armament, Munitions and Chemical Command (AMCCOM), Rock Island, IL 61299-1974. Reference is made to Change 4, 4 October 1974, to AR 740-1, 23 April 1971, Storage and Supply Operations; AMCCOMR 10-17, 31 August 1991, Mission and Major Functions of U.S. Army Defense Ammunition Center and School.

C. **OBJECTIVE.** The objective of these transportability tests is to validate the design of integrating the M939A1 vehicle chassis with the commercially-produced Altec Telephone Maintenance Truck Bed (TMTB). The transportability tests subject the vehicle to rail, road hazard, road, panic stops, and washboard test sequences.

D. **CONCLUSIONS:**

1. Tests Conducted 28 April 1993.

a. Rail Impact Testing. Rear tiedown clevises had to be replaced with clevises of higher strength. Following the first impact at 4.46 mph, it was noted that the 30-inch auger mounted on top of the equipment cabinets was deforming and tearing the mounts on the

equipment cabinet lids. The auger was removed to prevent further damage. The next impact at 6.41 mph pulled a clevis pin through the clevis mounting block. The fracture surface showed no evidence of foreign matter or previous defect from visual examination. A set of used mounts was located and the test continued. The third impact caused deformation in the lateral structural crossmember in the vicinity of the bracket bolt holes. Following the fourth impact, additional deformation was observed in the lateral crossmember.

b. Road Hazard Course Testing. During this test, the boom mounted auger rotated excessively around the center clamp and also caused excessive load on the auger power unit. There were no failures; however, the excessive loading of the clamp and power unit could fatigue to a point where failure could occur. This unit is also mounted above the driver and could cause injury to the operator. In addition, when the TMT was driven over the road hazard course at 5 mph, the boom became disengaged from the rest pedestal. The free-moving boom broke the lens on the MARS light.

2. Tests Conducted 7-11 May 1993.

a. Rail Impact Testing. Reinforcing plates were added to the rear lateral crossmembers. The truck was impacted at 4, 6, 8.1, and 8.1 mph in reverse. Additional deformation was observed in the rear crossmember. The additional deformation was attributed to the fact that the crossmember was over stressed and deformed prior to rail impact testing. An undamaged crossmember that is reinforced should not deform during rail transportation.

b. Road Hazard Course Testing. Two modifications were made to the TMTB boom assembly. First, plates were welded to the boom rest pedestal and drilled so that the boom could be pinned to the pedestal. Secondly, a shim was welded into the auger clamp on the boom with the intent that the reduced tolerance on the clamp would reduce the rotation.

E. RECOMMENDATIONS:

1. The rear tiedown clevises that were shipped with the TMT are not strong enough for rail transportation and should be replaced with clevises equal to NSN 4030-01-222-6037.

2. The 30-inch auger mounted on the equipment cabinets should either be removed or mounted in another location on the vehicle where it can be substantially secured.

3. The clevis mount that broke during rail impact testing should be reported to the equipment supplier as a quality defect.

4. Clevis mounts on the rear lateral crossmember of the M939A1 chassis are not strong enough to allow rail transportation. This problem was solved by adding a metal plate behind the lateral crossmembers as is found on the M939A2. Recommend considering the M939A2 for additional TMTs.

5. The TMTB boom should be mechanically locked to the boom rest stand. Any pin-type lock should be fabricated from material equivalent to grade 8 steel.

6. The TMTB boom mounted auger is deficiently mounted such that during road hazard course testing, the auger rotated sufficiently to damage the boom covers, and, therefore, should be more positively mounted/fastened.

PART 2

28 APRIL 1993

ATTENDEES

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7-11 MAY 1993

ATTENDEES

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PART 3

TEST PROCEDURES

A. These test procedures were extracted from TP-91-01, Transportability Testing Procedures, July 1991, for tactical vehicle transportation by tactical truck or tactical truck on railcar.

B. The M876A1 TMT was a completely loaded vehicle, since the TMTB was the vehicle payload, no additional material was added to the vehicle for load simulation. This vehicle is not expected to transport explosive material.

C. Tests for the M876A1 TMT are as follows:

1. Rail Impact (test method no. 1).
2. Road Hazard Course (test method no. 2).
3. Road Trip (test method no. 3).
4. Road Hazard Course (test method no. 2).
5. Washboard Course (test method no. 6).

D. The test methods are as follows:

1. Test Method No. 1 (Rail Impact Test). The M876A1 TMT was positioned on a flatcar. The truck was secured to the friction draft gear railcar with looped wire rope of appropriate strength. Equipment needed to perform the test included the specimen (hammer) car, five empty railroad cars connected together to serve as the anvil, and a railroad locomotive. The anvil cars were positioned on a level section of track with air and hand brakes set and with the draft gears

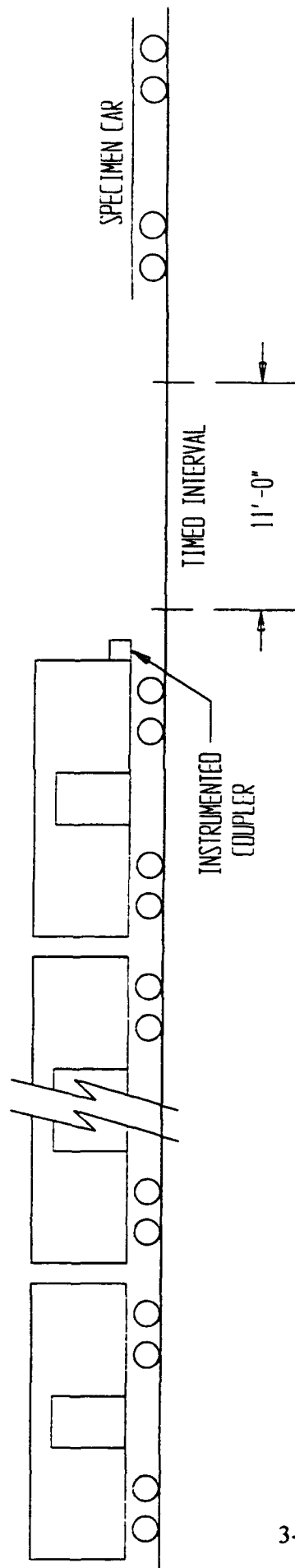
compressed. The locomotive unit pulled the specimen car several hundred yards away from the anvil cars, then pushed the specimen car toward the anvil at a predetermined speed, then disconnected from the specimen car approximately 50 yards away from the anvil cars, which allowed the specimen car to roll freely along the track until it struck the anvil. This constituted an impact. Impacting was accomplished at 4, 6, and 8.1 mph in one direction and at a speed of 8.1 mph in the opposite direction. The 4 and 6 mph impact speeds were approximate; the 8.1 mph speed was a minimum. Impact speeds were determined by using an electronic counter to measure the time required for the specimen car to traverse an 11-foot-distance immediately prior to contact with the anvil cars (see figure 1, page 3-3).

2. Test Method No. 2 (Road Hazard Course). This step required the M876A1 TMT be driven over the 200-foot-long segment of the concrete-paved road which consists of two series of railroad ties projecting 6-inches above the level road surface. The truck traversed this course two times. The road hazard course is constructed as shown in figure 2, page 3-4.

3. Test Method No. 3 (Road Trip). The M876A1 TMT was driven a distance of 30 miles over a combination of roads surfaced with gravel, concrete, or asphalt. The test route included curves, corners, railroad crossings, cattle guards, and stops and starts. The truck traveled at the maximum speed suitable for the particular road being traversed, except as limited by legal restrictions.

4. Test Method No. 6 (Washboard Course). The M876A1 TMT was driven over the washboard course (figure 3) at a speed which produced the most violent response in the vehicle. The washboard course is constructed as shown in figure 3, page 3-4.

ASSOCIATION OF AMERICAN RAILROADS (AAR) STANDARD TEST PLAN



3-3

5 BUFFER CARS (ANVIL) WITH DRAFT GEAR
COMPRESSED AND AIR BRAKES IN A SET
POSITION

ANVIL CAR TOTAL WT 250,000 LBS (APPROX)

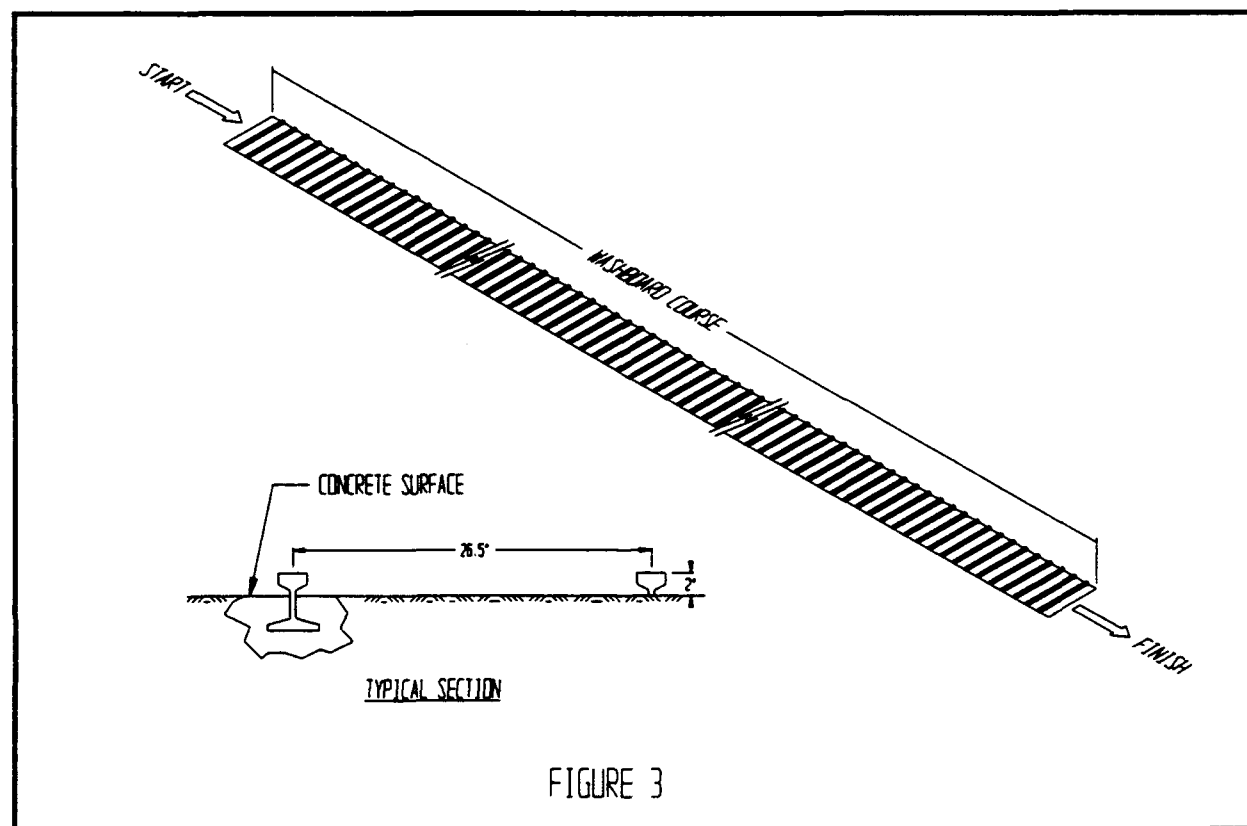
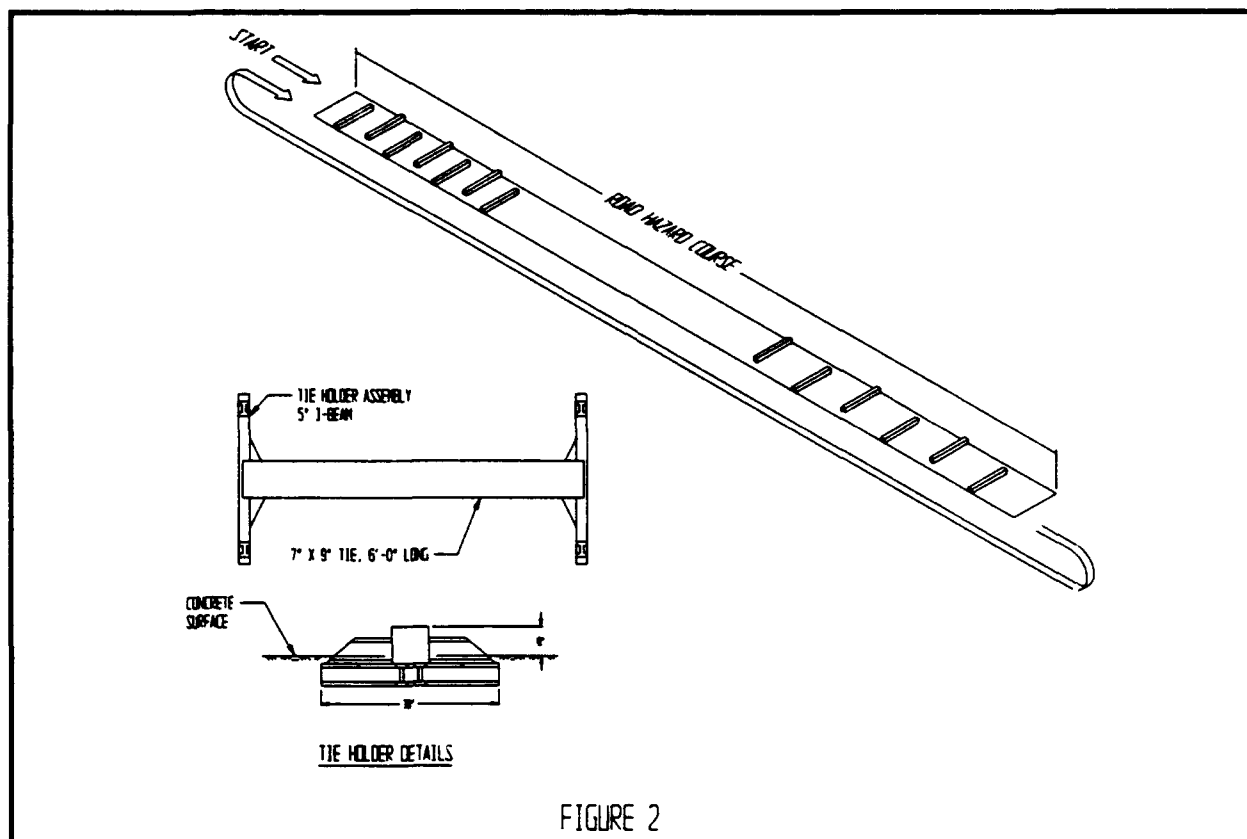
SPECIMEN CAR
IS RELEASED BY
SWITCH ENGINE TO

ATTAIN: IMPACT NO. 1 @ 4 MPH
IMPACT NO. 2 @ 6 MPH
IMPACT NO. 3 @ 8.1 MPH

THEN THE CAR IS REVERSED AND
RELEASED BY SWITCH ENGINE TO

ATTAIN: IMPACT NO 4. @ 8.1 MPH

FIGURE 1



PART 4

TEST RESULTS

RAIL IMPACT DATA

TEST NO. 1

DATE: 28 April 1993

Specimen Load: M876A1 TMT

Flatcar No.: SLSF 2132

Lt. Wt.: 54,600 pounds

M876A1 TMT

Wt.: 35,000 pounds

Total Specimen WT.: 89,600 pounds

Buffer Car (five cars) Wt.: 50,000 pounds

<u>Impact</u>	<u>End Struck</u>	<u>Velocity</u>	<u>Remarks</u>
1	Forward	4.46	30-inch auger mounts deforming. Auger removed.
2	Forward	6.41	Clevis pin pulled through mount. Both mounts replaced.
3	Forward	5.25	Lateral rear crossmember, to which the clevis mounts were secured, deformed.
4	Forward	6.12	Increase crossmember deformation. Testing stopped pending reinforcement of real lateral crossmembers.

TEST SPECIMEN AND RESULTS

ROAD TEST DATA

TEST NO.: 2

DATE: 28 April 1993

Specimen: M876A1 TMT

ROAD HAZARD COURSE:

PASS 1-A OVER FIRST SERIES OF TIES:	6.23 SEC	5.47 MPH
-------------------------------------	----------	----------

PASS 1-B OVER SECOND SERIES OF TIES:	6.55 SEC	5.20 MPH
--------------------------------------	----------	----------

REMARKS: The boom mounted auger pivoted excessively around its mounting clamp on the boom. Endwise displacement is estimated at +/- 12 inches from the normal stowed position.

PASS 2-A OVER FIRST SERIES OF TIES:	6.63 SEC	5.14 MPH
-------------------------------------	----------	----------

PASS 2-B OVER SECOND SERIES OF TIES:	5.94 SEC	5.73 MPH
--------------------------------------	----------	----------

REMARKS: The boom disengaged from its resting pedestal and began to swing freely over the vehicle operator and broke the lens on the yellow warning light. The boom mounted auger pivoted excessively around its mounting clamp on the boom. Endwise displacement is estimated at +/- 12 inches from the normal stowed position.

Testing of the M876A1 TMT was suspended until a positive clamp was fabricated to secure the boom to the rest pedestal.

TEST SPECIMEN AND RESULTS

ROAD TEST DATA

TEST NO.: 3

DATE: 7-11 May 1993

Specimen: M876A1 TMT with pinned boom.

ROAD HAZARD COURSE:

PASS 1-A OVER FIRST SERIES OF TIES:	6.16 SEC	5.53 MPH
-------------------------------------	----------	----------

PASS 1-B OVER SECOND SERIES OF TIES:	6.88 SEC	4.95 MPH
--------------------------------------	----------	----------

REMARKS: The pin used to secure the boom to the rest pedestal deformed after one pass over the course. It was replaced with a grade 8-equivalent steel bolt.

TEST SPECIMEN AND RESULTS

ROAD TEST DATA

TEST NO.: 4

DATE: 7-11 May 1993

Specimen: M876A1 TMT with pinned boom (grade 8 steel bolt).

ROAD HAZARD COURSE:

PASS 1-A OVER FIRST SERIES OF TIES:	5.77 SEC	5.91 MPH
-------------------------------------	----------	----------

PASS 1-B OVER SECOND SERIES OF TIES:	5.88 SEC	5.80 MPH
--------------------------------------	----------	----------

REMARKS: No deformation of the boom locking pin.

PASS 2-A OVER FIRST SERIES OF TIES:	6.49 SEC	5.25 MPH
-------------------------------------	----------	----------

PASS 2-B OVER SECOND SERIES OF TIES:	6.54 SEC	5.21 MPH
--------------------------------------	----------	----------

REMARKS: The four bolts that mounted the boom rest assembly to the boom loosened up. All four bolts were secured with Locktight adhesive.

TEST SPECIMEN AND RESULTS

ROAD TEST DATA

TEST NO.: 5

DATE: 7-11 May 1993

Specimen: M876A1 TMT with pinned boom. Bolts secured with Locktight-type adhesive.

ROAD HAZARD COURSE:

PASS 1-A OVER FIRST SERIES OF TIES:	6.39 SEC	5.34 MPH
-------------------------------------	----------	----------

PASS 1-B OVER SECOND SERIES OF TIES:	6.75 SEC	5.05 MPH
--------------------------------------	----------	----------

REMARKS: No pin deformation. Bolts remained in place.

PASS 2-A OVER FIRST SERIES OF TIES:	6.40 SEC	5.32 MPH
-------------------------------------	----------	----------

PASS 2-B OVER SECOND SERIES OF TIES:	6.65 SEC	5.13 MPH
--------------------------------------	----------	----------

REMARKS: No pin deformation. Bolts remained in place. Damage was caused to the boom cover due to the rotational deflection of the auger. An additional plate was welded to the auger locking clamp to reduce tolerances. This modification reduced the auger rotational displacement by approximately 50 percent and prevented it from striking the boom cover.

TEST SPECIMEN AND RESULTS

ROAD TEST DATA

TEST NO.: 6

DATE: 7-11 May 1993

Specimen: M876A1 TMT with pinned boom and plated auger.

ROAD HAZARD COURSE:

PASS 1-A OVER FIRST SERIES OF TIES:	6.99 SEC	4.88 MPH
-------------------------------------	----------	----------

PASS 1-B OVER SECOND SERIES OF TIES:	6.63 SEC	5.14 MPH
--------------------------------------	----------	----------

REMARKS: No deformation of the TMTB or securing devices.

PASS 2-A OVER FIRST SERIES OF TIES:	6.55 SEC	5.14 MPH
-------------------------------------	----------	----------

PASS 2-B OVER SECOND SERIES OF TIES:	6.37 SEC	5.35 MPH
--------------------------------------	----------	----------

REMARKS: No deformation of the TMTB or securing devices.

30-MILE ROAD TEST: No observable damage.

PANIC STOP TEST: No panic stops were performed since this load was previously rail impact tested.

ROAD HAZARD COURSE:

PASS 3-A OVER FIRST SECTION OF TIES	6.81 SEC	5.01 MPH
-------------------------------------	----------	----------

PASS 3-B OVER SECOND SERIES OF TIES	6.77 SEC	5.04 MPH
-------------------------------------	----------	----------

REMARKS: No observable deformation of the TMTB or securing devices.

PASS 4-A OVER FIRST SERIES OF TIES	6.32 SEC	5.39 MPH
------------------------------------	----------	----------

PASS 4-B OVER SECOND SERIES OF TIES	6.02 SEC	5.66 MPH
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REMARKS: No observable deformation of the TMTB or securing devices.

WASHBOARD COURSE: No observable damage to the TMT, TMTB, or securing devices.

RAIL IMPACT DATA

TEST NO. 7

DATE: 7 May 1993

Specimen Load: M876A1 TMT

Flatcar No.: SLSF 2132

Lt. Wt.: 54,600 pounds

M876A1 TMT

Wt.: 35,000 pounds

Total Specimen WT.: 89,600 pounds

Buffer Car (five cars) Wt.: 250,000 pounds

<u>Impact</u>	<u>End Struck</u>	<u>Velocity</u>	<u>Remarks</u>
1	Forward	4.26	No additional deformation in rear mount plates.
2	Forward	6.30	Slight deformation observed.
3	Forward	8.15	Slight deformation observed in mounting plate. Mounting hardware loosened.
4	Rear	8.62	No additional deformation of rear mount assemblies.

Note: The reinforcement plate that is used on the M939A2 chassis was added to a deformed lateral rear crossmember prior to retesting the M786A1 TMT. The crossmember sustained deformation during prior impact testing. With the reinforcement plate mounted on an undamaged rear lateral crossmember, the tiedown fittings will safely secure the TMT during rail transportation.

PART 5

PHOTOGRAPHS



U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

PHOTO NO. A0317 SCN93-152-1868. This photo shows U.S. Marine Corp M876A1 TMT with a commercially-fabricated truck bed. The truck is undergoing rail impact testing to verify its multimode-transportability capability.



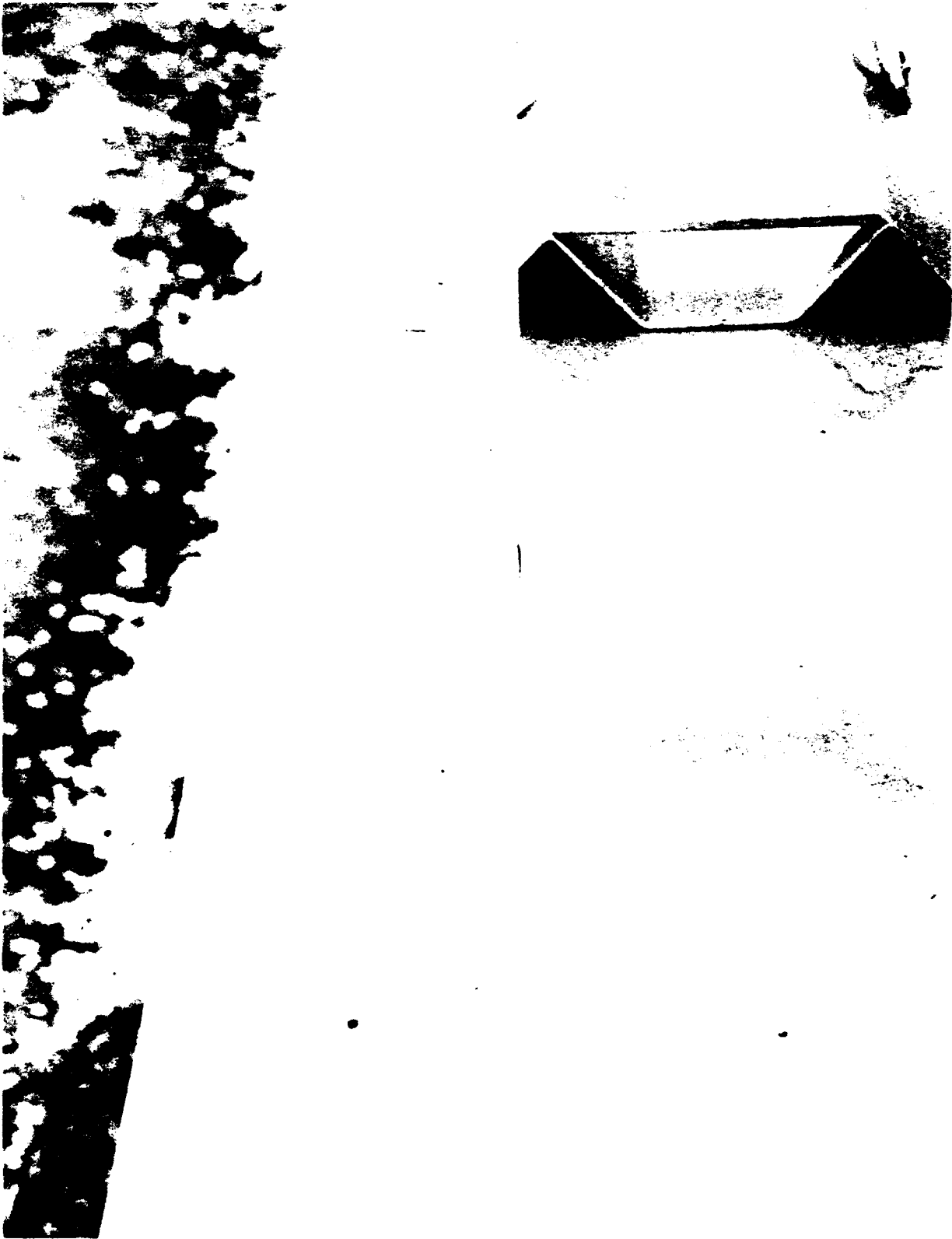
U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

PHOTO NO. A0317 SCN93-152-1870. This iphoto shows the 30-inch auger which was delivered with the M876A1 TMT. It is mounted to the top of the equipment cabinets for stowage when not in use. The auger could not be shipped with these mounts because the mounts would tear out of the equipment cabinet covers. It was decided that the 30-inch auger was not required to be carried on the vehicle.



U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

PHOTO NO. A0317 SCN93-152-1871. This photo shows a closeup view of the 30-inch auger mounting brackets which display the welding of the equipment cabinet tops. This mounting configuration was insufficient to secure the auger during rail transportation.



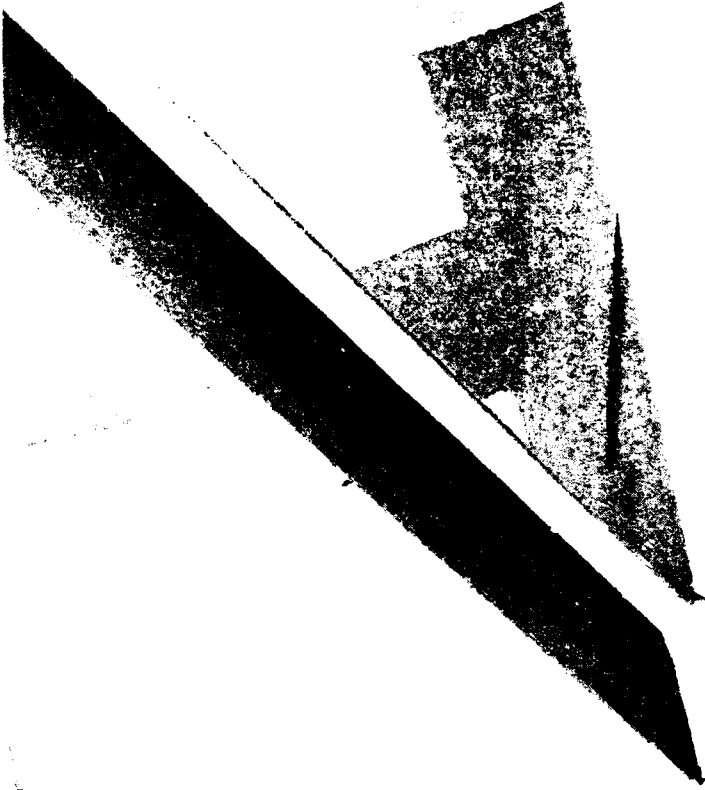
U.S. ARMY DEFENSE AMMUNITION CENTER AND
SCHOOL - SAVANNA, IL

PHOTO NO. A0317 SCN93-152-1872. This photo shows a closeup of the 30-inch auger mounting brackets showing the welding to the equipment cabinet tops. This mounting configuration is insufficient to secure the auger during rail transportation.



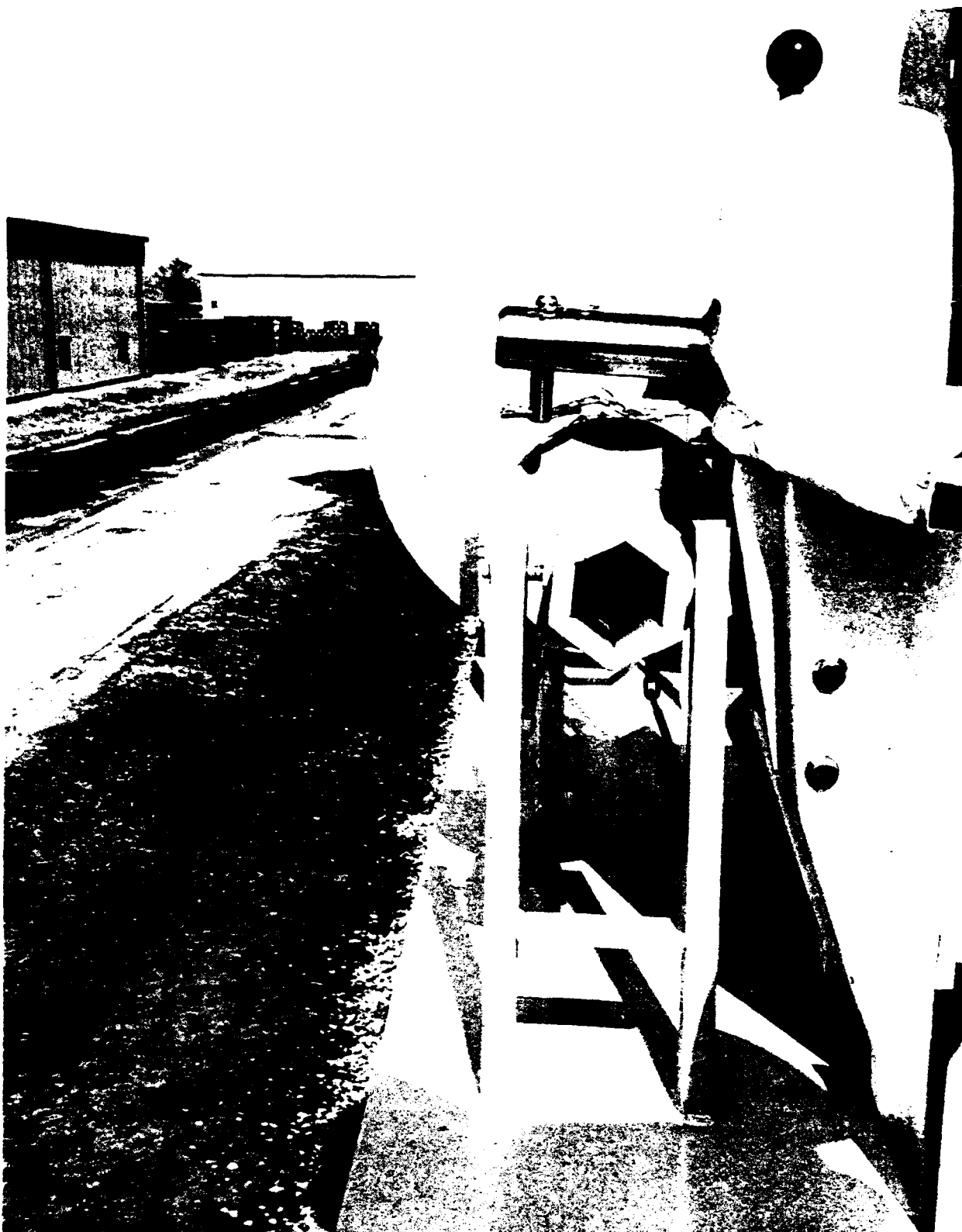
U.S. ARMY DEFENSE AMMUNITION CENTER AND
SCHOOL - SAVANNA, IL

PHOTO NO. A0317 SCN93-152-1874. This photo shows a closeup of the 30-inch auger mounting brackets showing the welding to the equipment cabinet tops. This mounting configuration is insufficient to secure the auger during rail transportation.



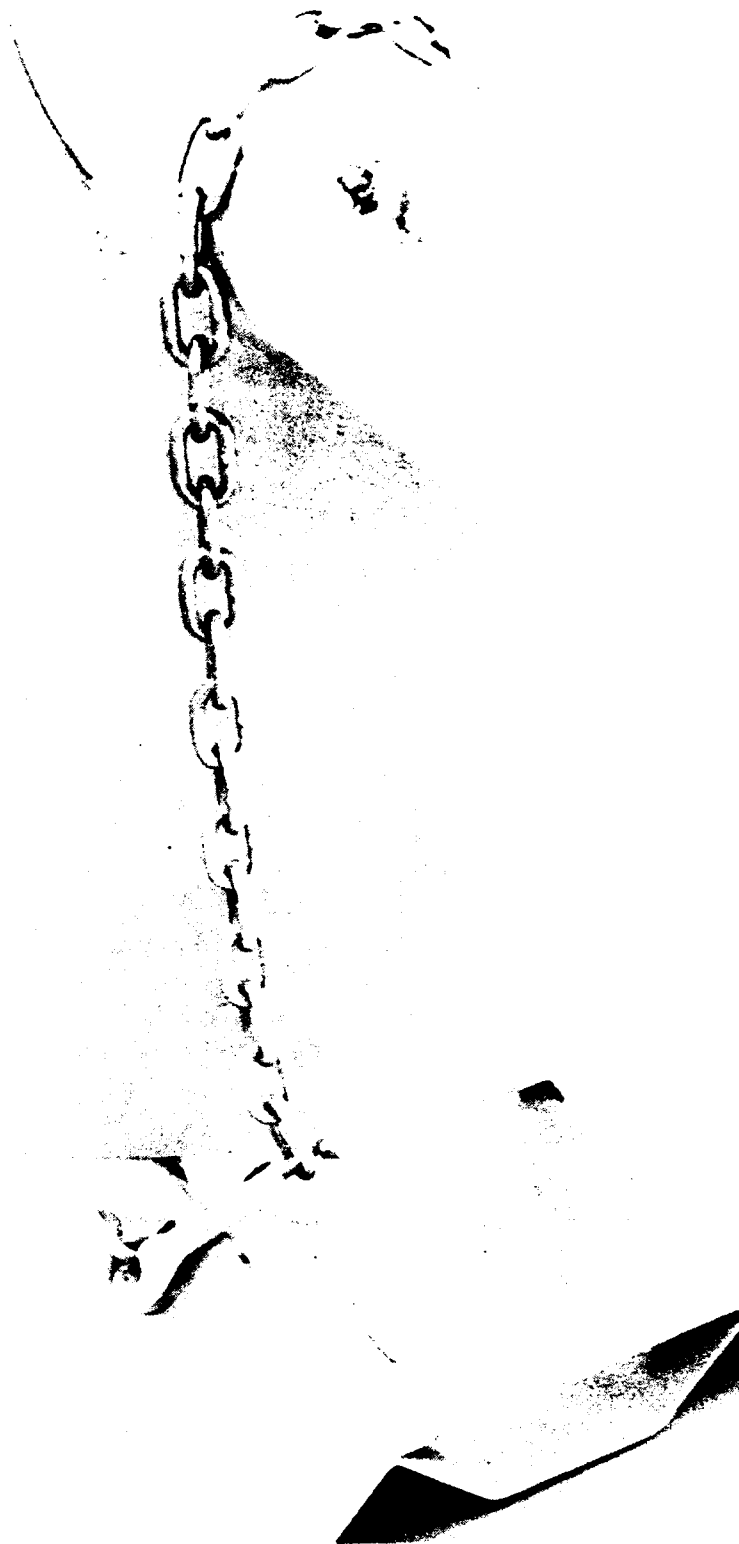
U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL SAVANNAH GA

PHOTO NO. A0317 SCH93-152-1875 This photo shows a closeup of the 30-inch auger mounting brackets showing the welding to the equipment cabinet top. This mounting configuration is insufficient to secure the auger during rail transportation.



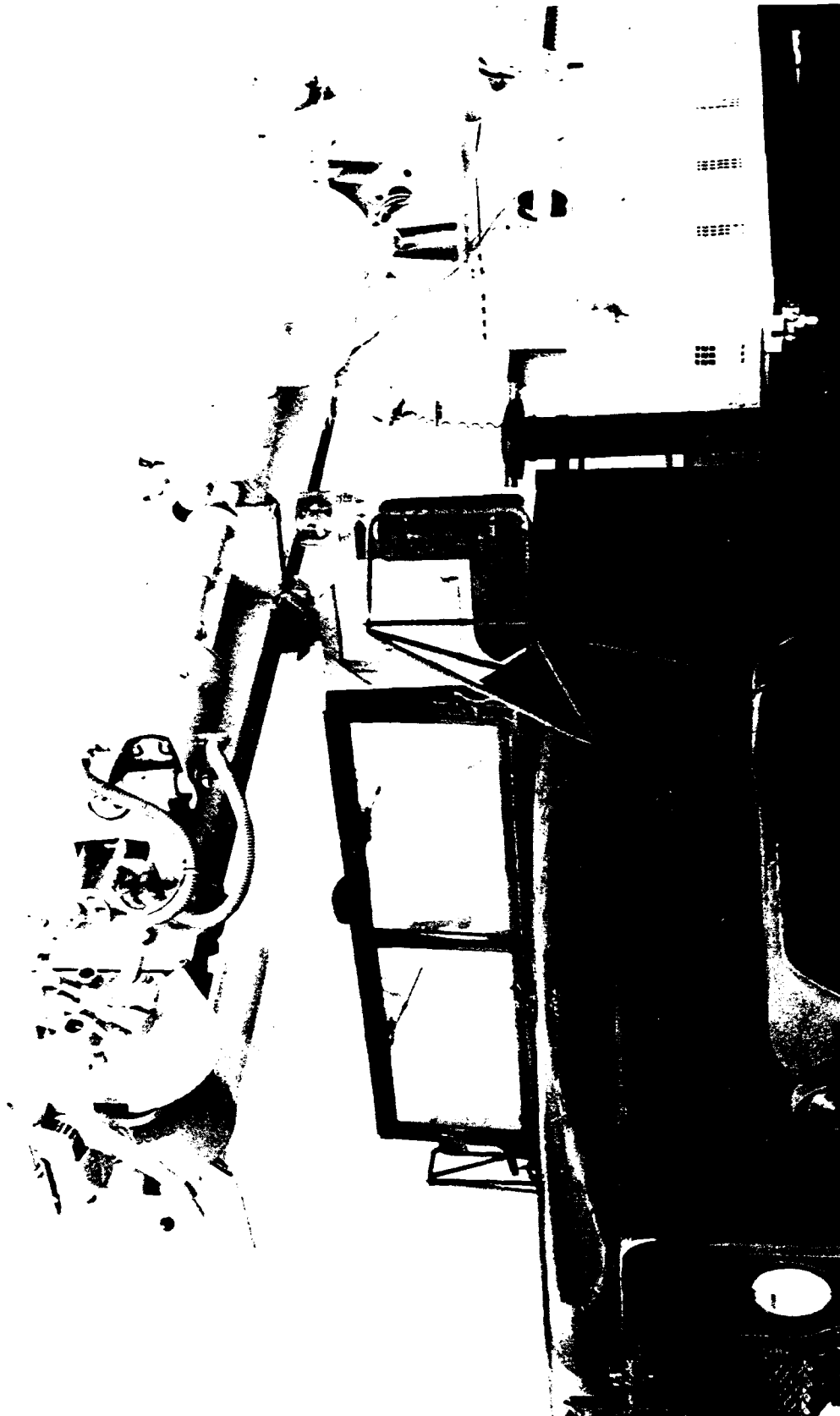
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PHOTO NO. A0317 SCN93-152-1873. This photo shows a closeup of the 30-inch auger mounting brackets showing the welding to the equipment cabinet tops. This mounting configuration is insufficient to secure the auger during rail transportation. Note the chain looped over the auger shaft.



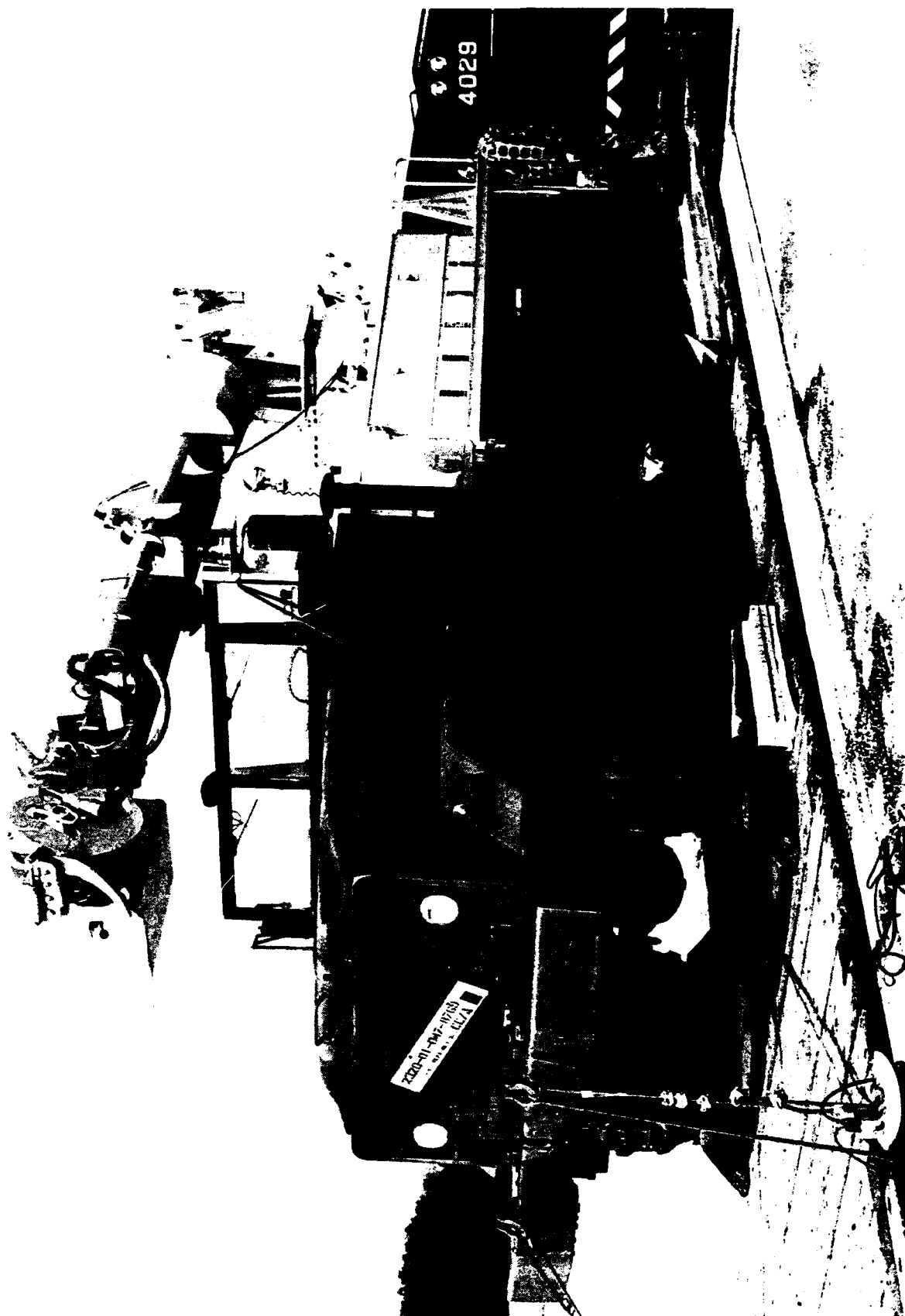
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PHOTO NO. A0317 SCN93-152-1876. This photo shows a closeup of the 30-inch auger mounting brackets showing the welding to the equipment cabinet tops. This mounting configuration is insufficient to secure the auger during rail transportation. The chain is looped over the auger shaft and welded to the mount.



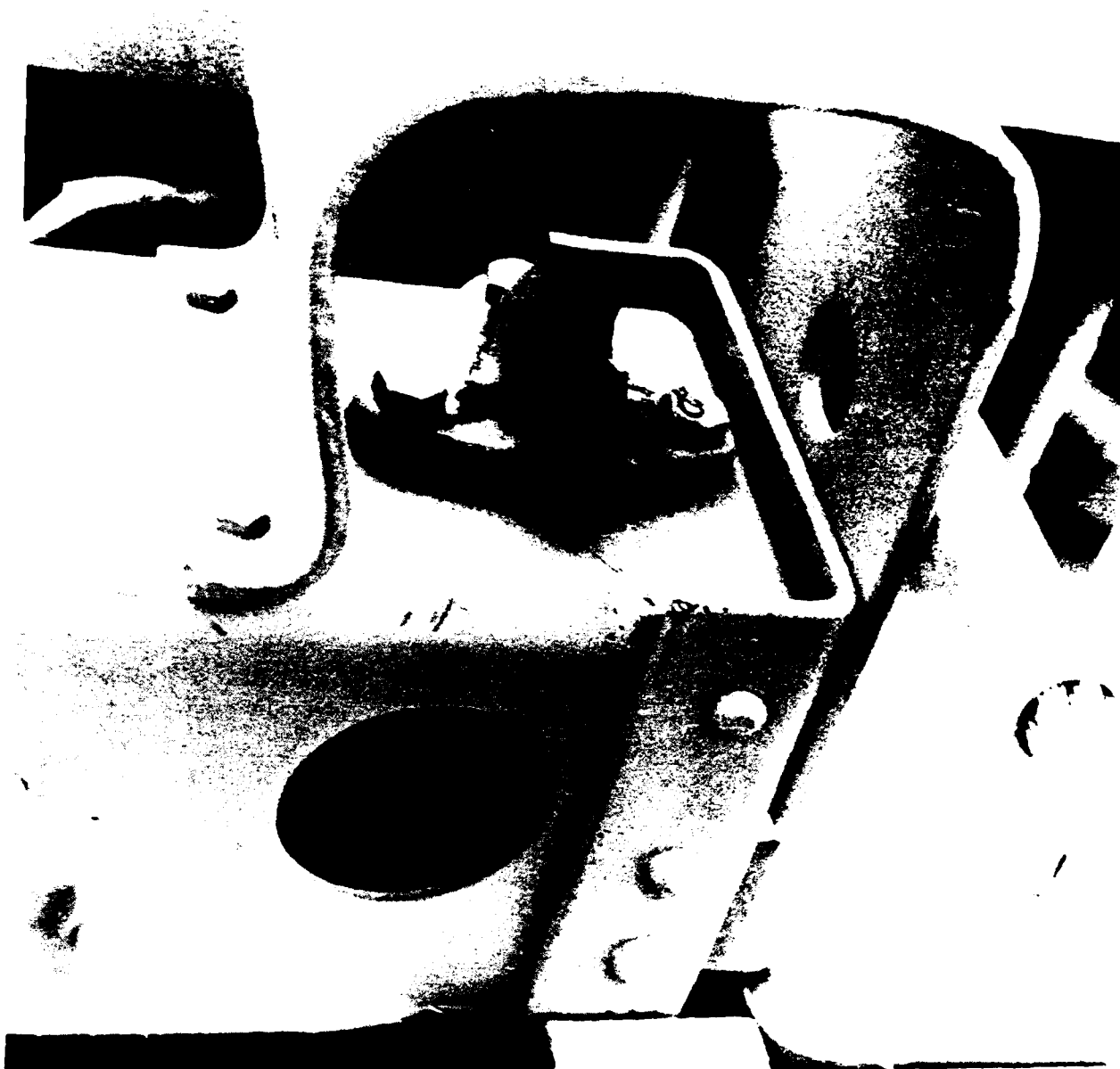
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PHOTO NO. A0317 SCN93-152-1877. This photo shows the U.S. Marine Corp M876A1 TMT with a commercially-fabricated truck bed. The truck is undergoing rail impact testing to verify its multimode transportability.



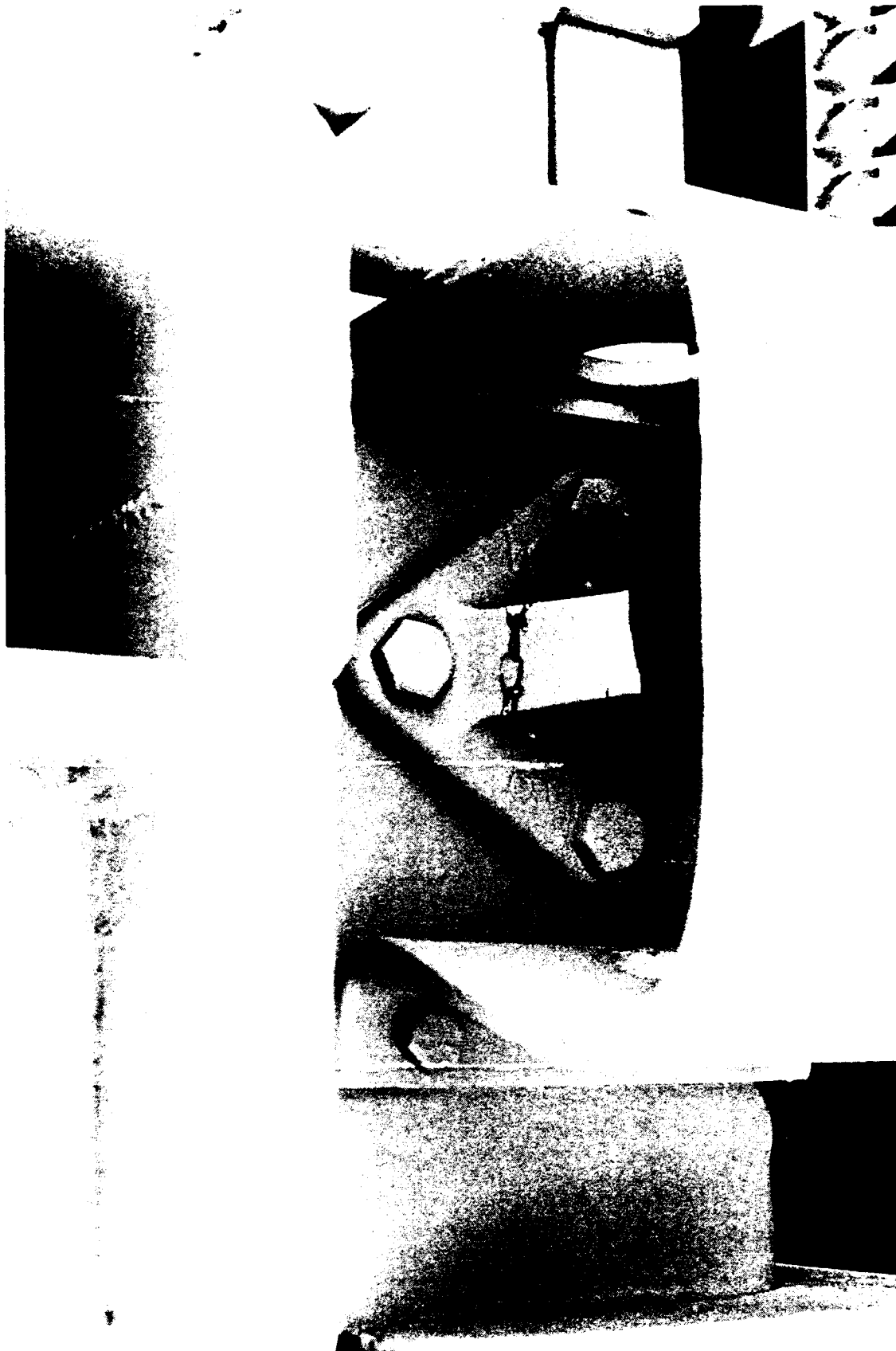
U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

PHOTO NO. A0317-SCN93-152-1856. This photo shows the U.S. Marine Corp M876A1 TMT with a commercially-fabricated truck bed. The truck is undergoing rail impact testing to verify its multimode transportability.



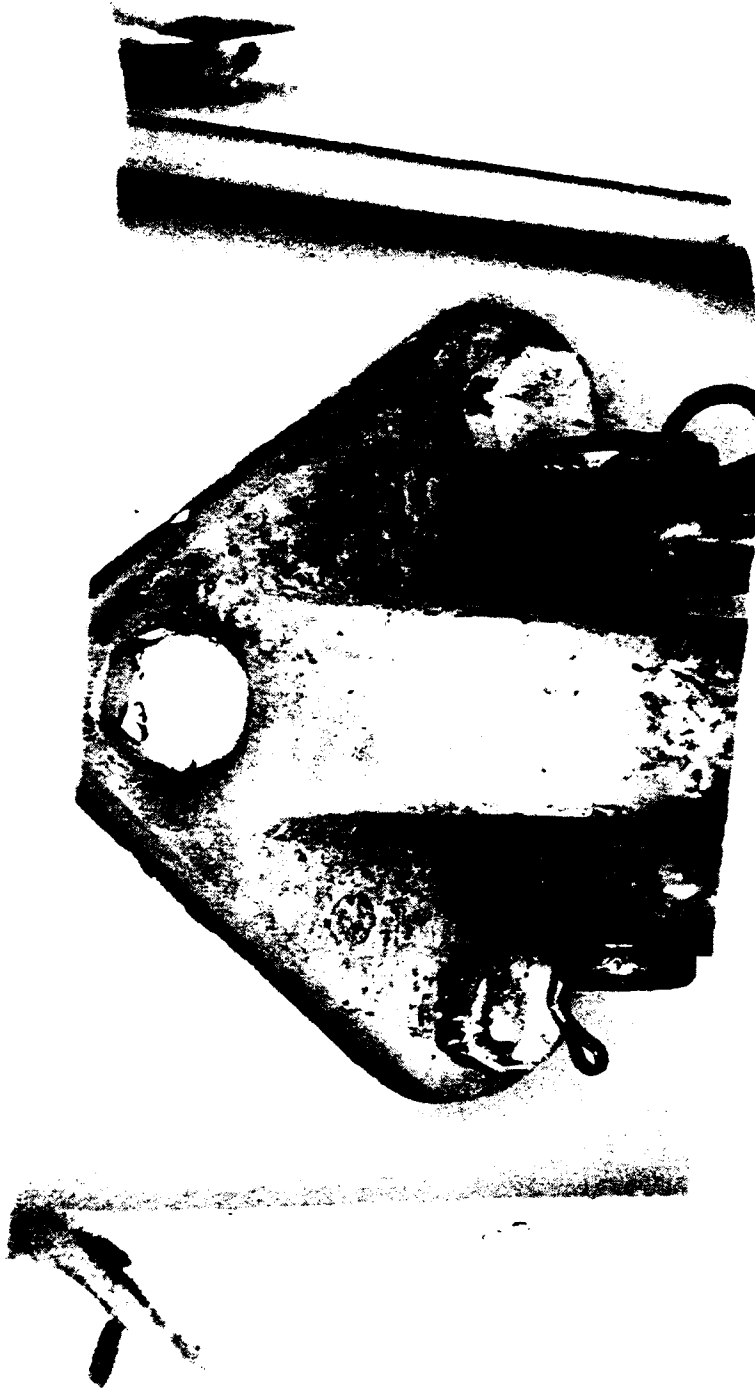
	U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL	
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PHOTO NO. A0317-SCN93-152-1858. After an impact at 6.41 mph, the right rear clevis pin pulled through the mounting bracket. Note the damage to the casting. Visual observation of the mounting assembly showed no defects.



U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

PHOTO NO. A0317-SCN93-152-1878. After an impact at 6.41 mph, the right rear clevis pin pulled through the mounting bracket. Note the damage to the casting. Visual observation of the mounting assembly showed no defects.



U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

PHOTO NO. A0317-SCN93-152-1883. This photo shows the replaced clevis mount on the right side of the vehicle. Slippage was due to rail impact testing and a previously-deformed lateral crossmember. Reinforcement plates behind the lateral crossmember and correct mounting bolts should prevent this slippage.



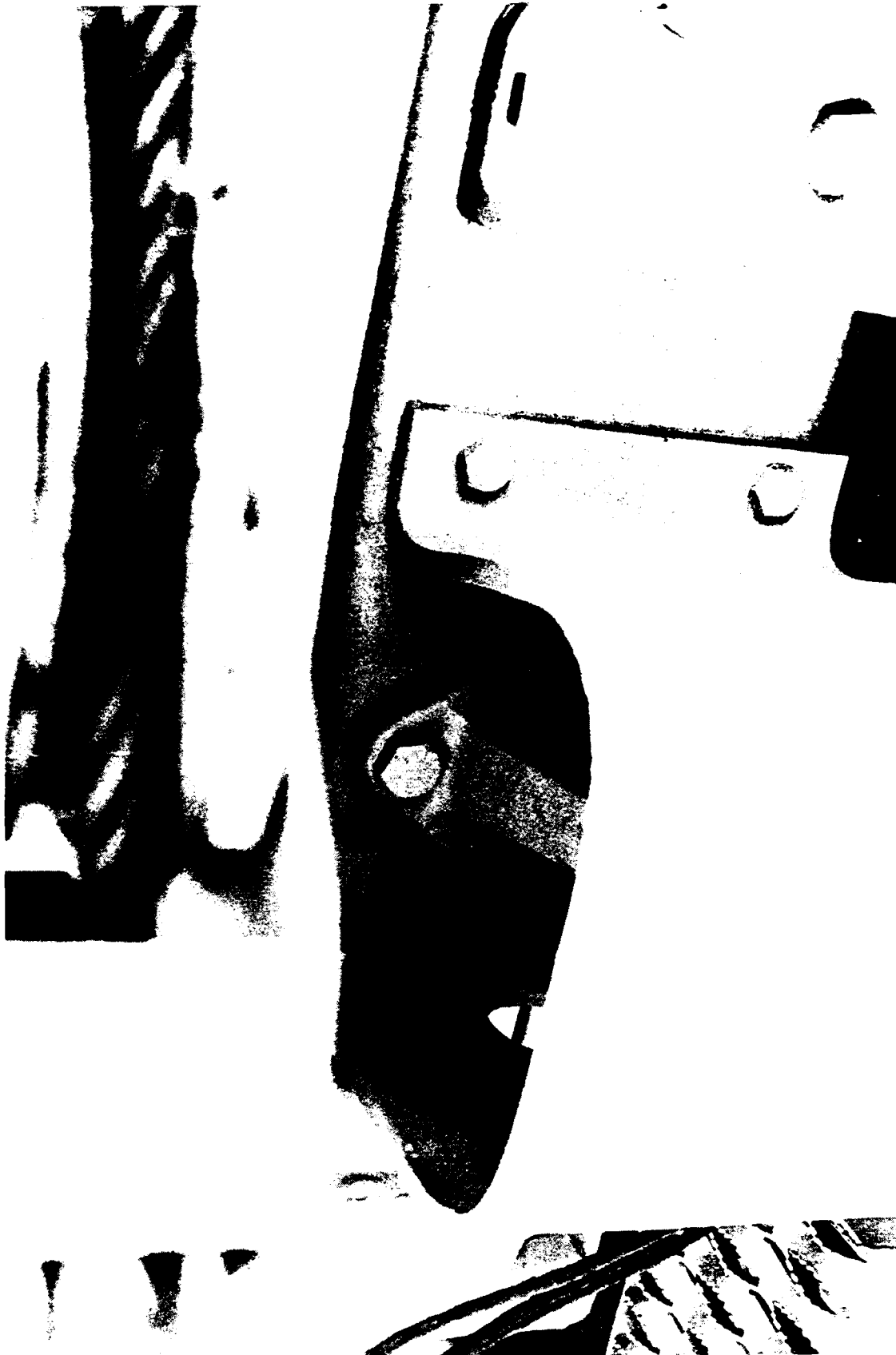
U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

PHOTO NO. A0317-SCN93-152-1882. This photo shows the replaced clevis mount on the left side of the vehicle. Slippage was due to rail impact testing and a previously-deformed lateral crossmember. Reinforcement plates behind the lateral crossmember and correct mounting bolts should prevent this slippage.



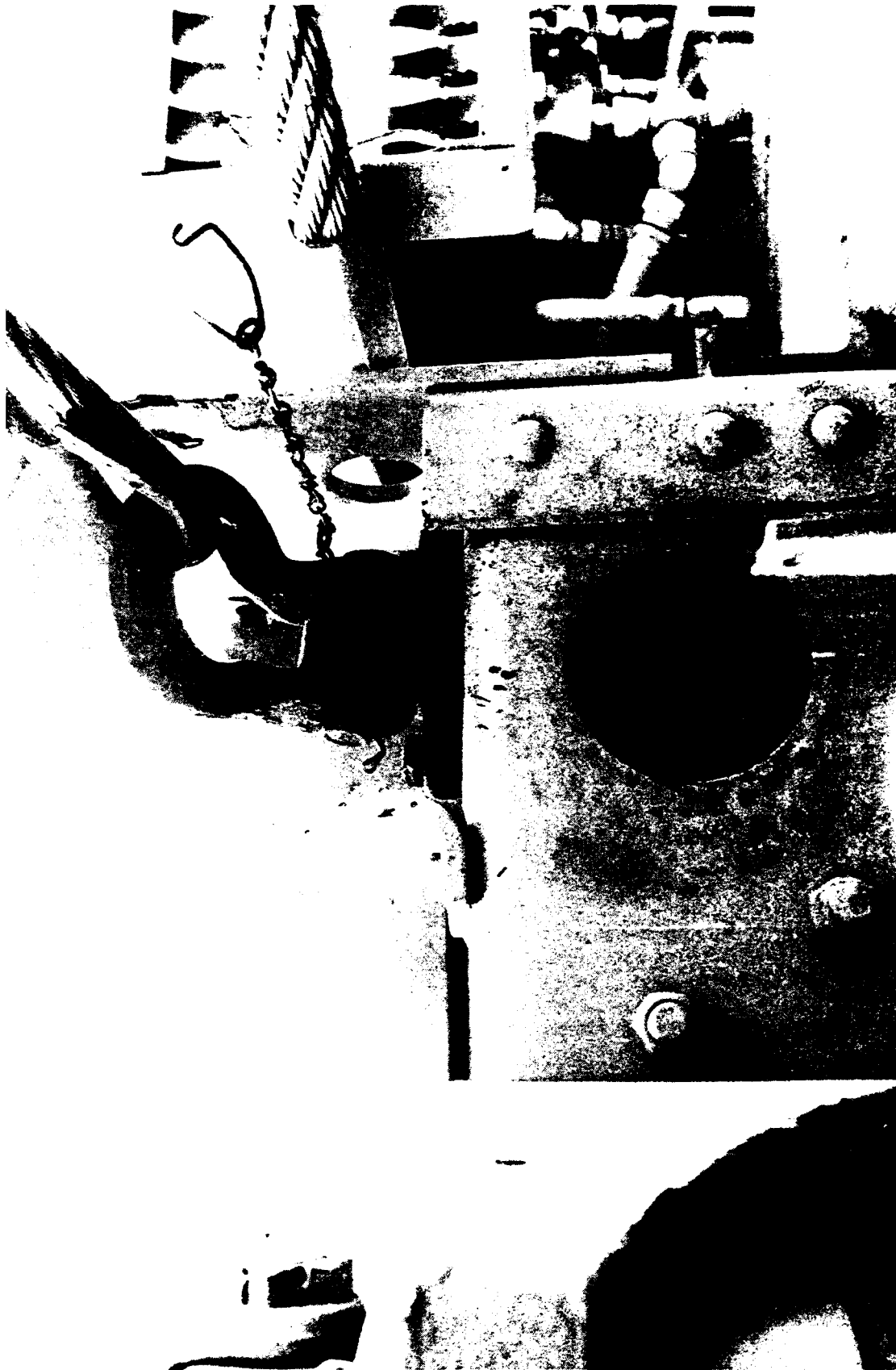
U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

PHOTO NO. A0317-SCN93-152-1885. This photo shows the replaced clevis mount on the left side of the vehicle. Slippage was due to rail impact testing and a previously-deformed lateral crossmember. Reinforcement plates behind the lateral crossmember and correct mounting bolts should prevent this slippage.



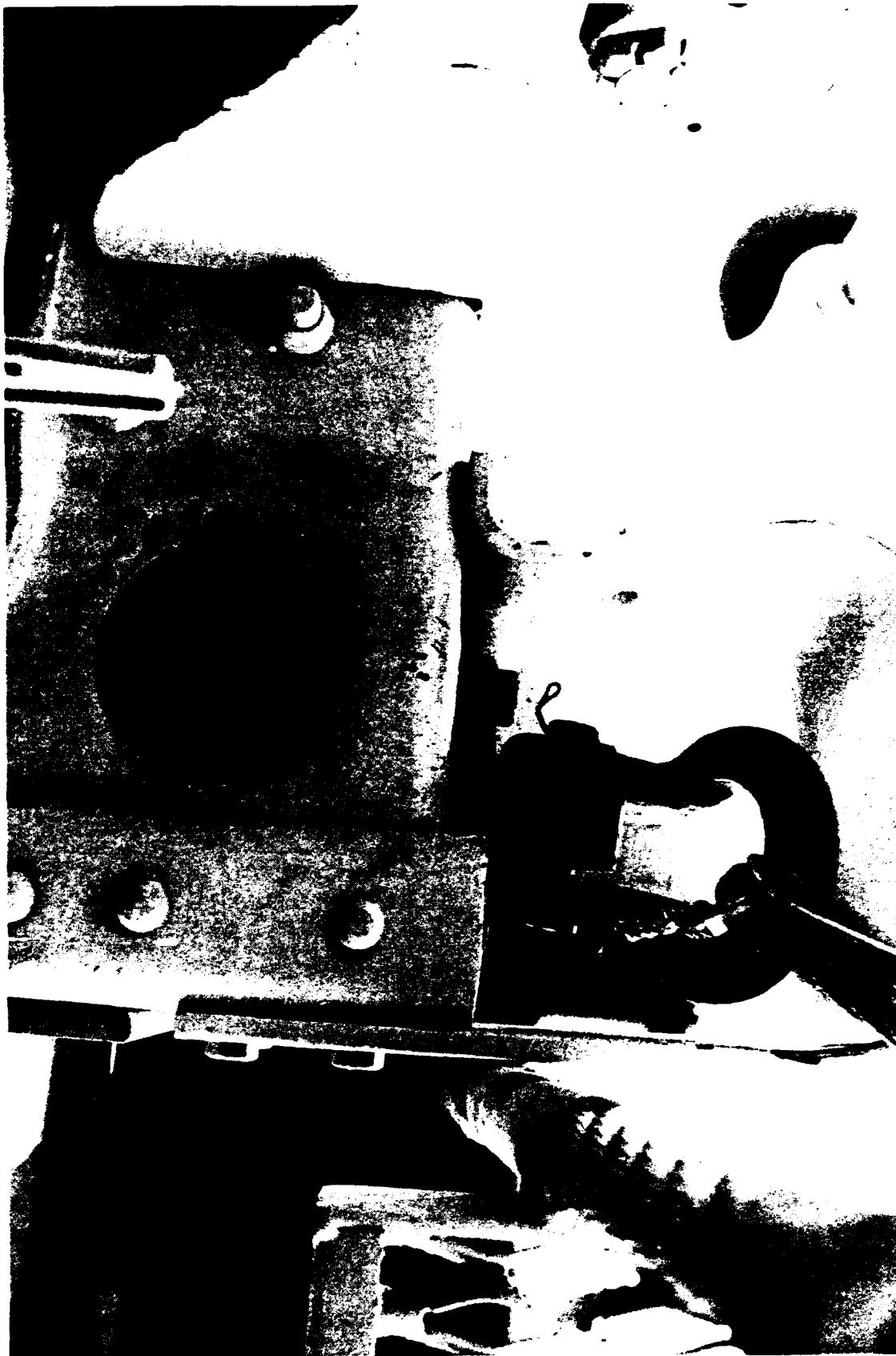
U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

PHOTO NO. A0317-SCN93-152-1879. This photo shows the replaced clevis mount on the left side of the vehicle. Slippage was due to rail impact testing and a previously-deformed lateral crossmember. Reinforcement plates behind the lateral crossmember and correct mounting bolts should prevent this slippage.



U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

PHOTO NO. A0317-SCN93-152-1889. This photo shows the clevis mount on the right side of the M876A1 TMT after rail impact with the replaced clevis mounts. Note the deformation in the end of the lateral crossmember. Deformation occurred because the metal was not thick enough to support the load. The M939A2 chassis has a reinforcing plate behind the lateral crossmember.



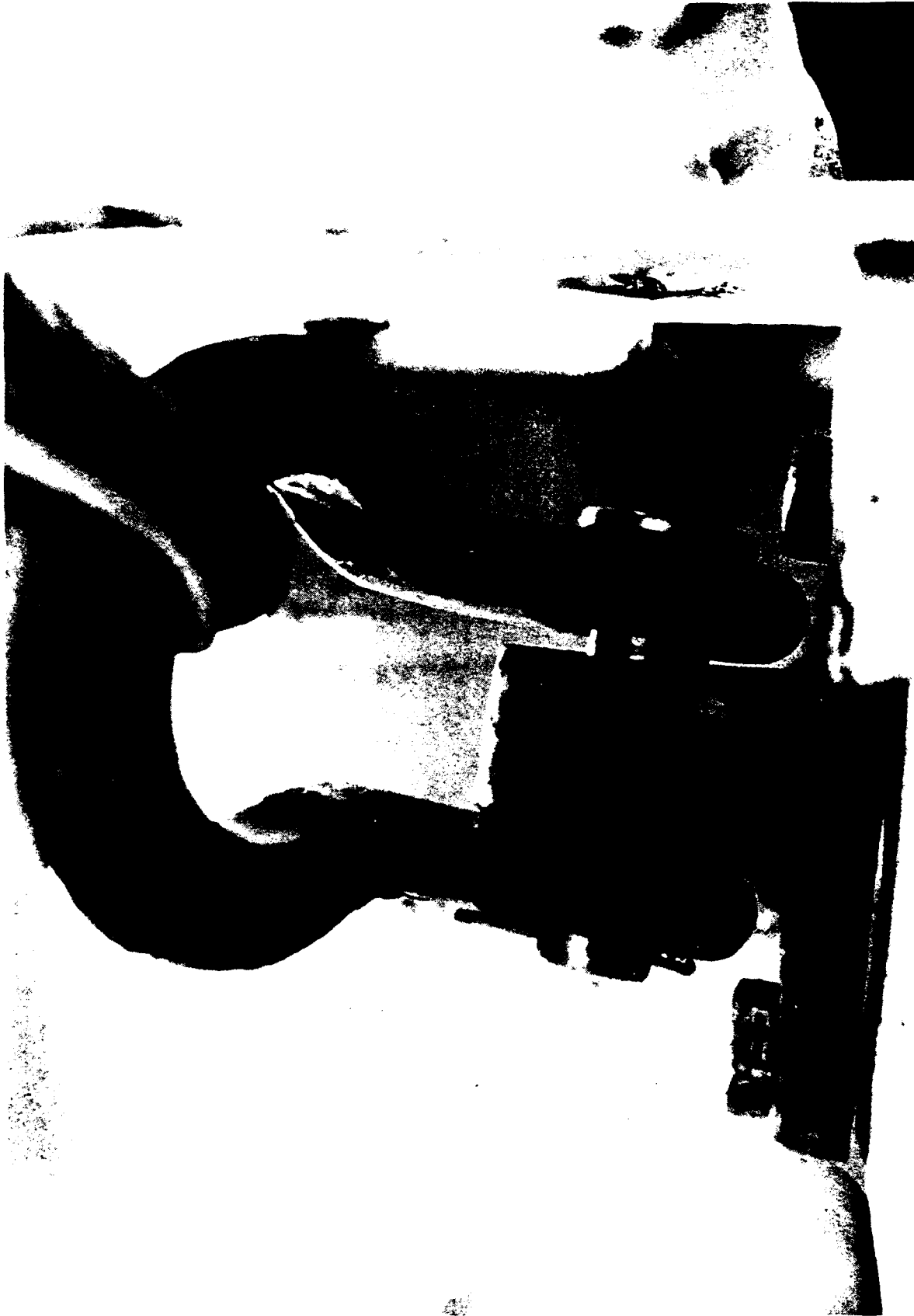
U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

PHOTO NO. A0317-SCN93-152-2218. This photo shows the clevis mount on the right side of the M876A1 TMT after rail impact with the replaced clevis mounts. Note the deformation in the end of the lateral crossmember. Deformation occurred because the metal was not thick enough to support the load. The M939A2 chassis has a reinforcing plate behind the lateral crossmember.



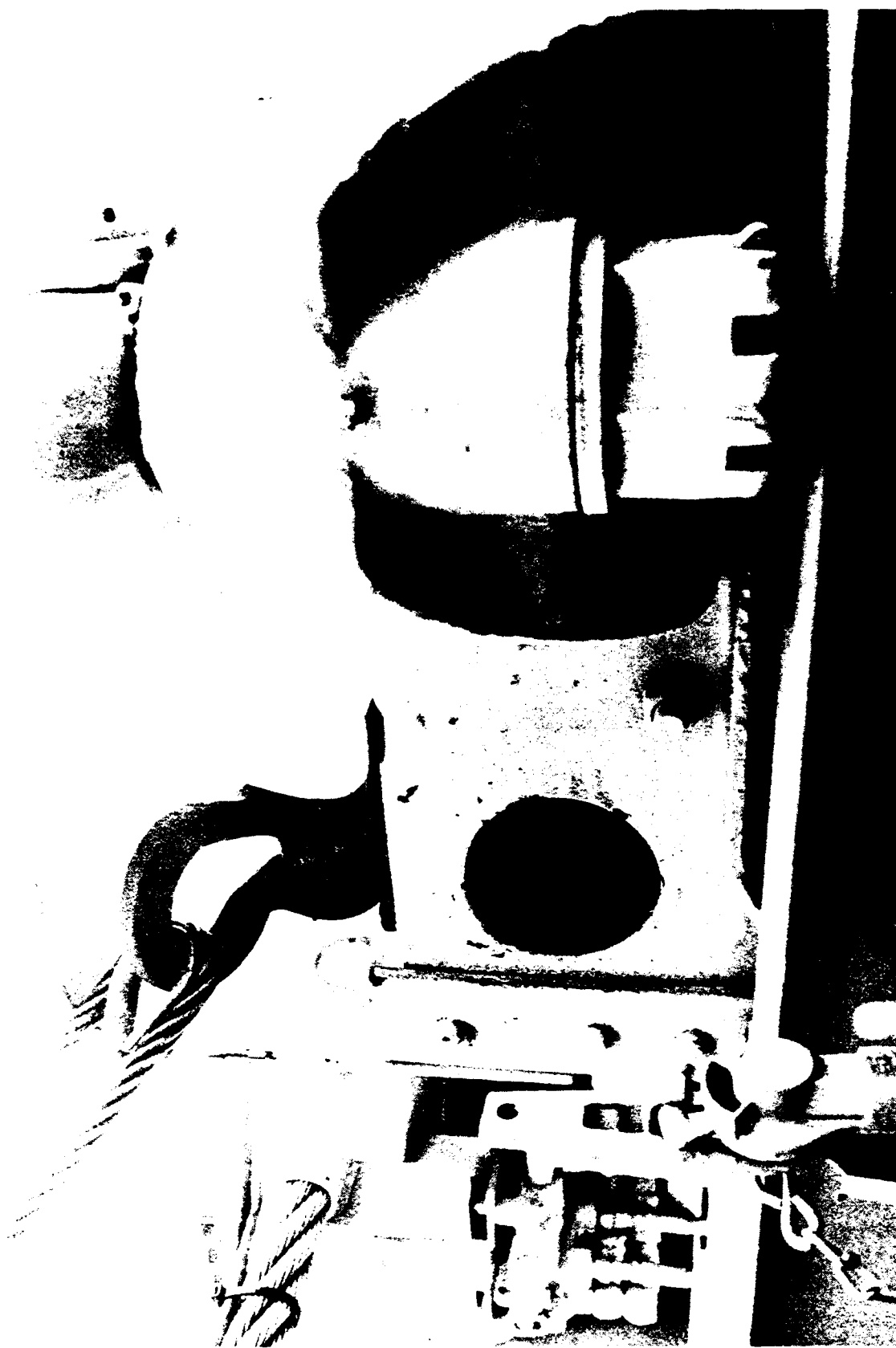
	U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL	
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PHOTO NO. A0317-SCN93-152-2203. This photo shows the clevis mount on the right side of the M876A1 TMT after a rail impact with the replaced clevis mounts. Note the deformation in the end of the lateral crossmember. Deformation occurred because the metal was not thick enough to support the load. The M939A2 chassis has a reinforcing plate behind the lateral crossmember.



U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

PHOTO NO. A0317-SCN93-152-2217. This photo shows the clevis mount on the right side of the M876A1 TMT after a rail impact with the replaced clevis mounts. Note the deformation in the end of the lateral crossmember. Deformation occurred because the metal was not thick enough to support the load. The M939A2 chassis has a reinforcing plate behind the lateral crossmember.



U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

PHOTO NO. A0317-SCN93-152-1887. This photo shows the clevis mount on the left side of the M876A1 TMT after a rail impact with the replaced clevis mounts. Note the deformation in the end of the lateral crossmember. Deformation occurred because the metal was not thick enough to support the load. The M939A2 chassis has a reinforcing plate behind the lateral crossmember.



U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

PHOTO NO. A0317-SCN93-152-1888. This photo shows the clevis mount on the left side of the M876A1 TMT after a rail impact with the replaced clevis mounts. Note the deformation in the end of the lateral crossmember. Deformation occurred because the metal was not thick enough to support the load. The M939A2 chassis has a reinforcing plate behind the lateral crossmember.



U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

PHOTO NO. A0317-SCN93-152-2205. This photo shows the clevis mount on the left side of the M876A1 TMT after a rail impact with the replaced clevis mounts. Note the deformation in the end of the lateral crossmember. Deformation occurred because the metal was not thick enough to support the load. The M939A2 chassis has a reinforcing plate behind the lateral crossmember.



U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

PHOTO NO. A0317-SCN93-152-2208. This photo shows the M876A1 TMT secured to a flatcar with four 5/8-inch cables for rail impact testing. The black box strapped to the railcar is an instrumentation package used to record impact acceleration.



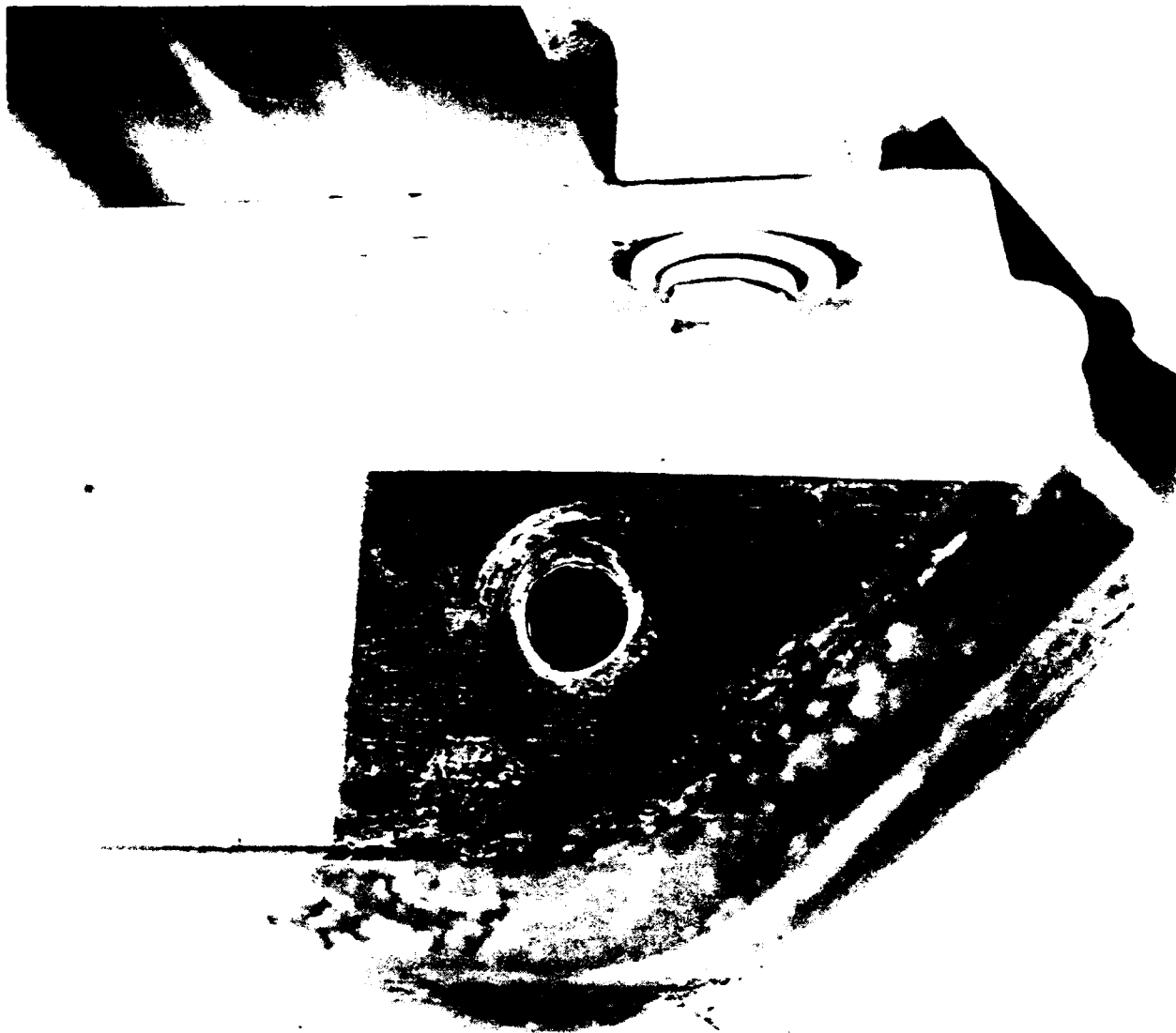
U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

PHOTO NO. A0317-SCN93-152-2207. This photo shows the rear of the M876A1 TMT displaying one 5/8-inch wire rope cable used to secure the truck to a flatcar for rail impact testing.



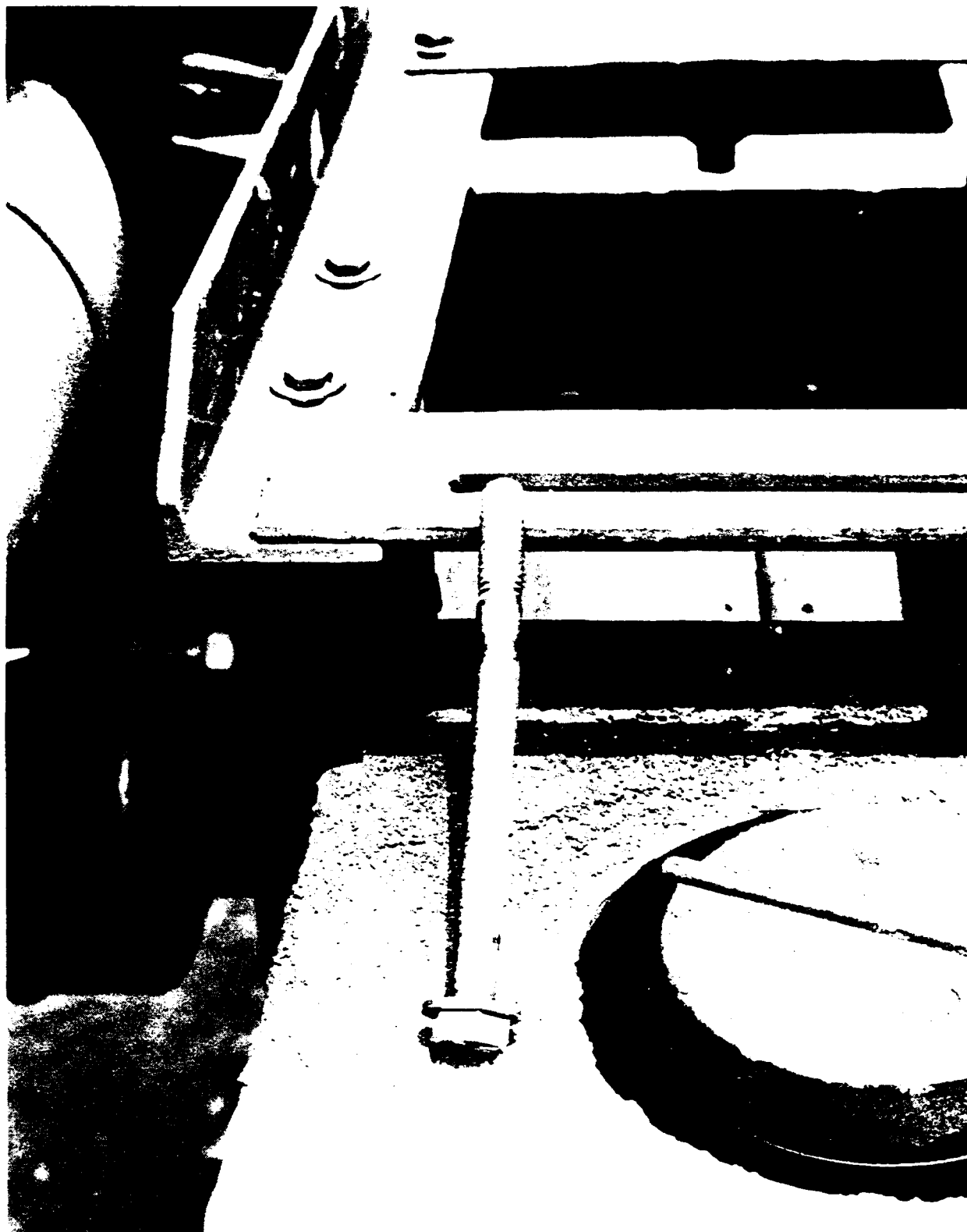
U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

PHOTO NO. A0317-SCN93-152-2233. This photo shows the TMTB boom rest pedestal with the boom in the stowed position. A plate was welded to the pedestal and drilled through for a pin to lock the boom to the pedestal. The bolts used to secure the boom pedestal interface were resecured with Locktite adhesive to prevent them from vibrating out while going through the road hazard course.



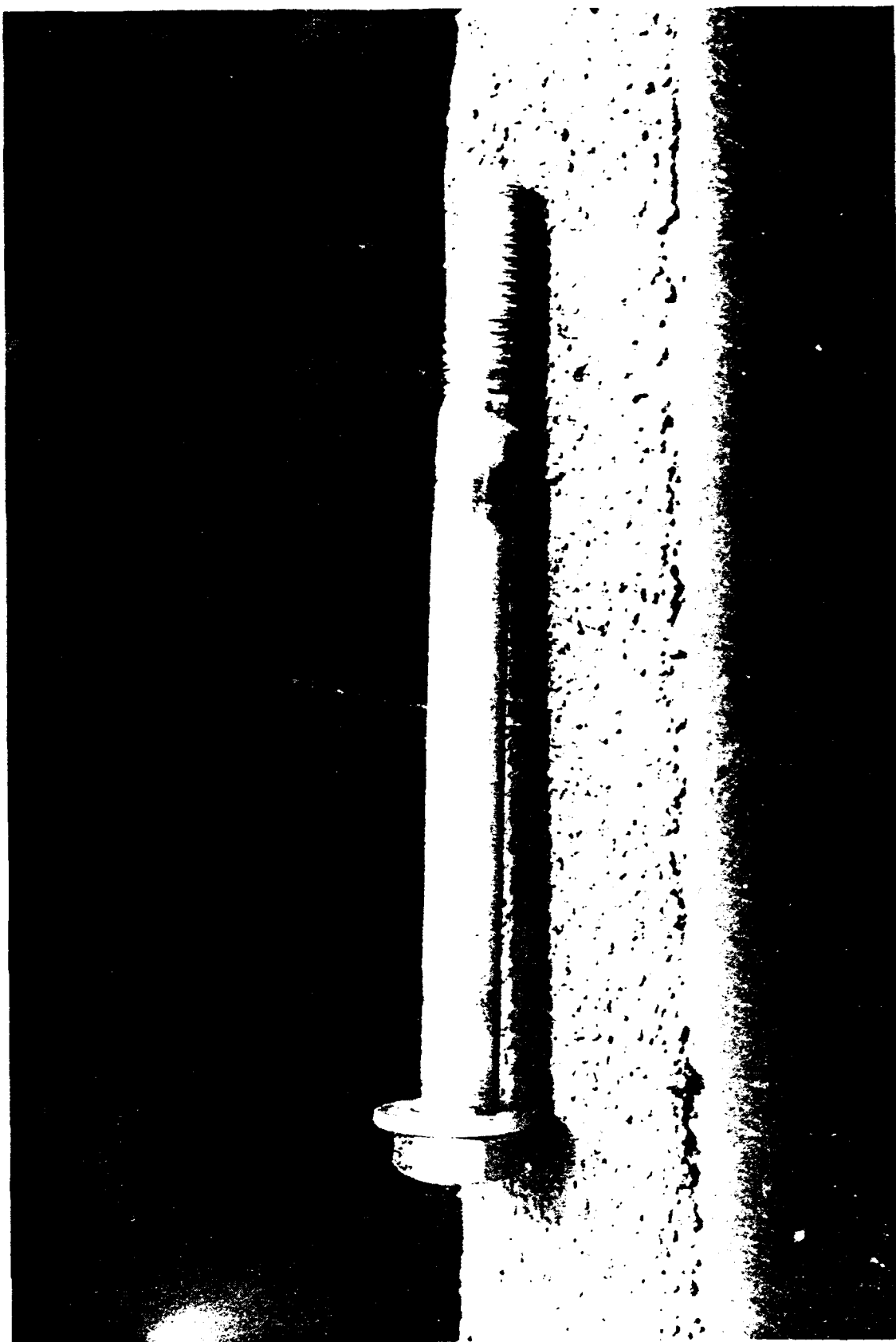
	U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL	
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PHOTO NO. A0317-SCN93-152-2232. This photo shows the TMTB boom rest pedestal with the boom in the stowed position. A plate was welded to the pedestal and drilled through for a pin to lock the boom to the pedestal. The bolts used to secure the boom pedestal interface were resecured with Locktite adhesive to prevent them from vibrating out while going through the road hazard course.



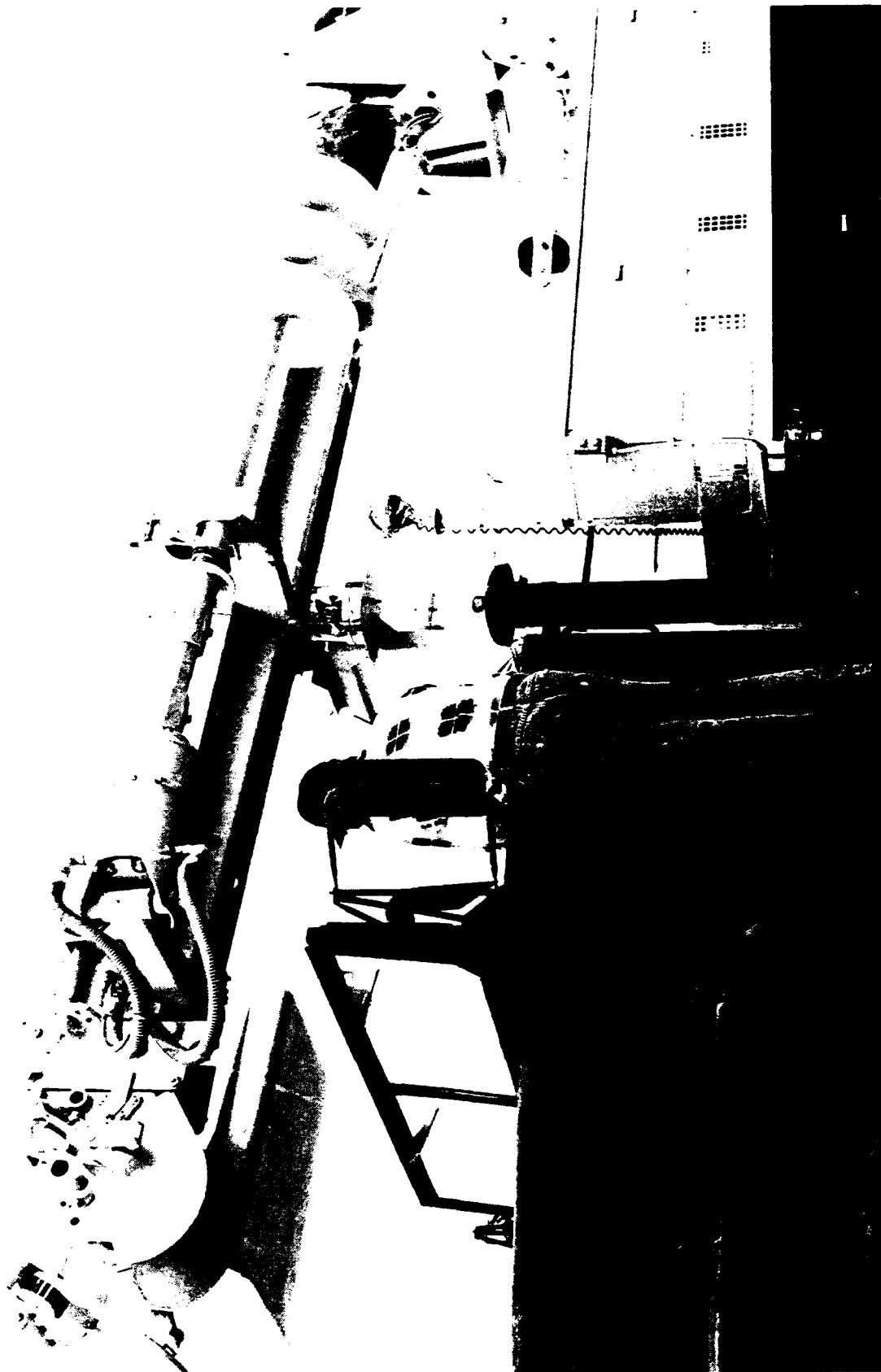
U.S. ARMY DEFENSE AMMUNITION CENTER AND
SCHOOL - SAVANNA, IL

PHOTO NO. A0317-SCN93-152-2230. This bolt was originally used to secure the TMTB boom to the rest pedestal. Note the deformation. This bolt was replaced with a grade 8-equivalent bolt. No damage occurred to the grade 8 bolt during road hazard course testing.



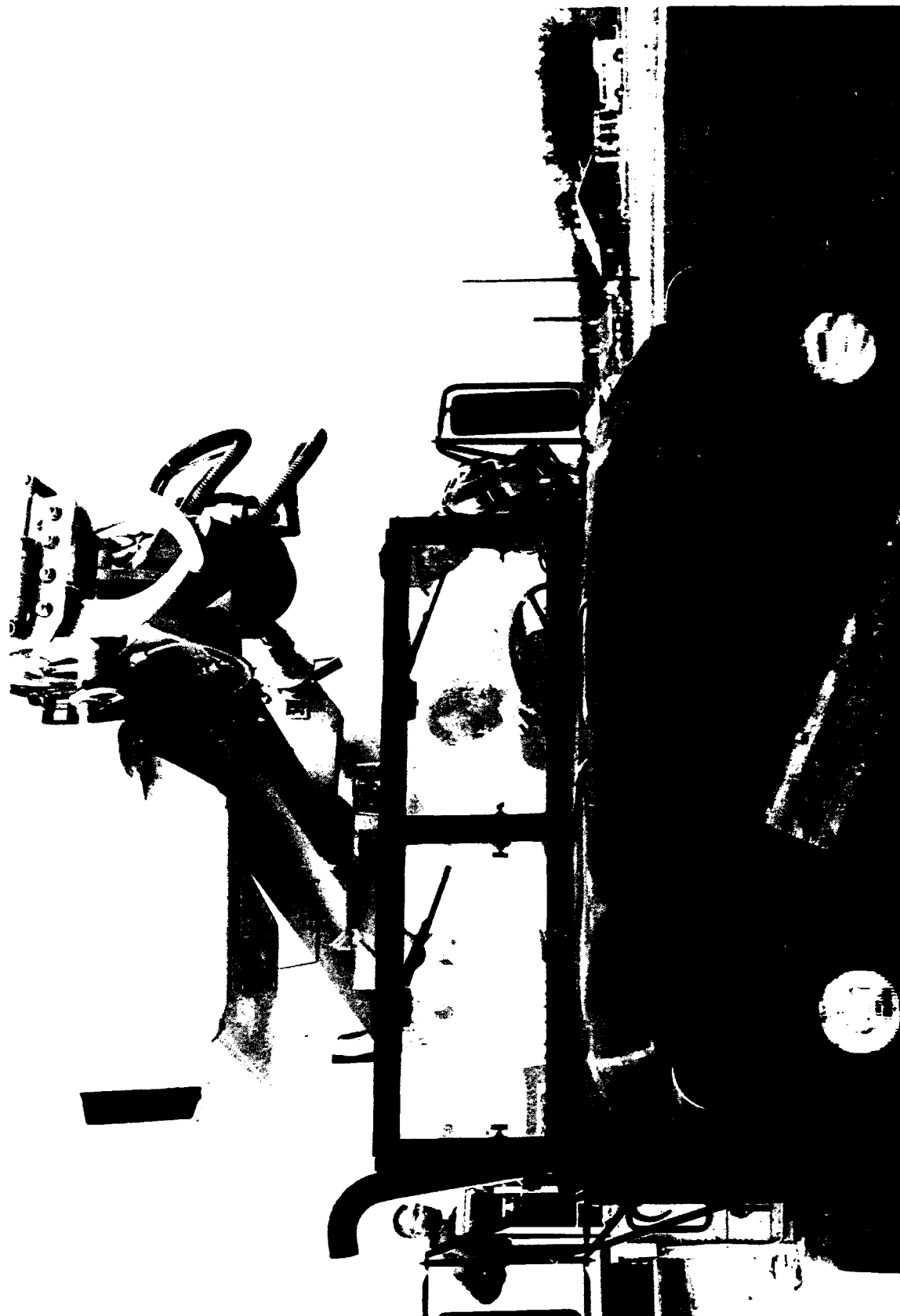
U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

PHOTO NO. A0317-SCN93-152-2231. This bolt was originally used to secure the TMTB boom to the rest pedestal. Note the deformation. This bolt was replaced with a grade 8-equivalent bolt. No damage occurred to the grade 8 bolt during road hazard course testing.



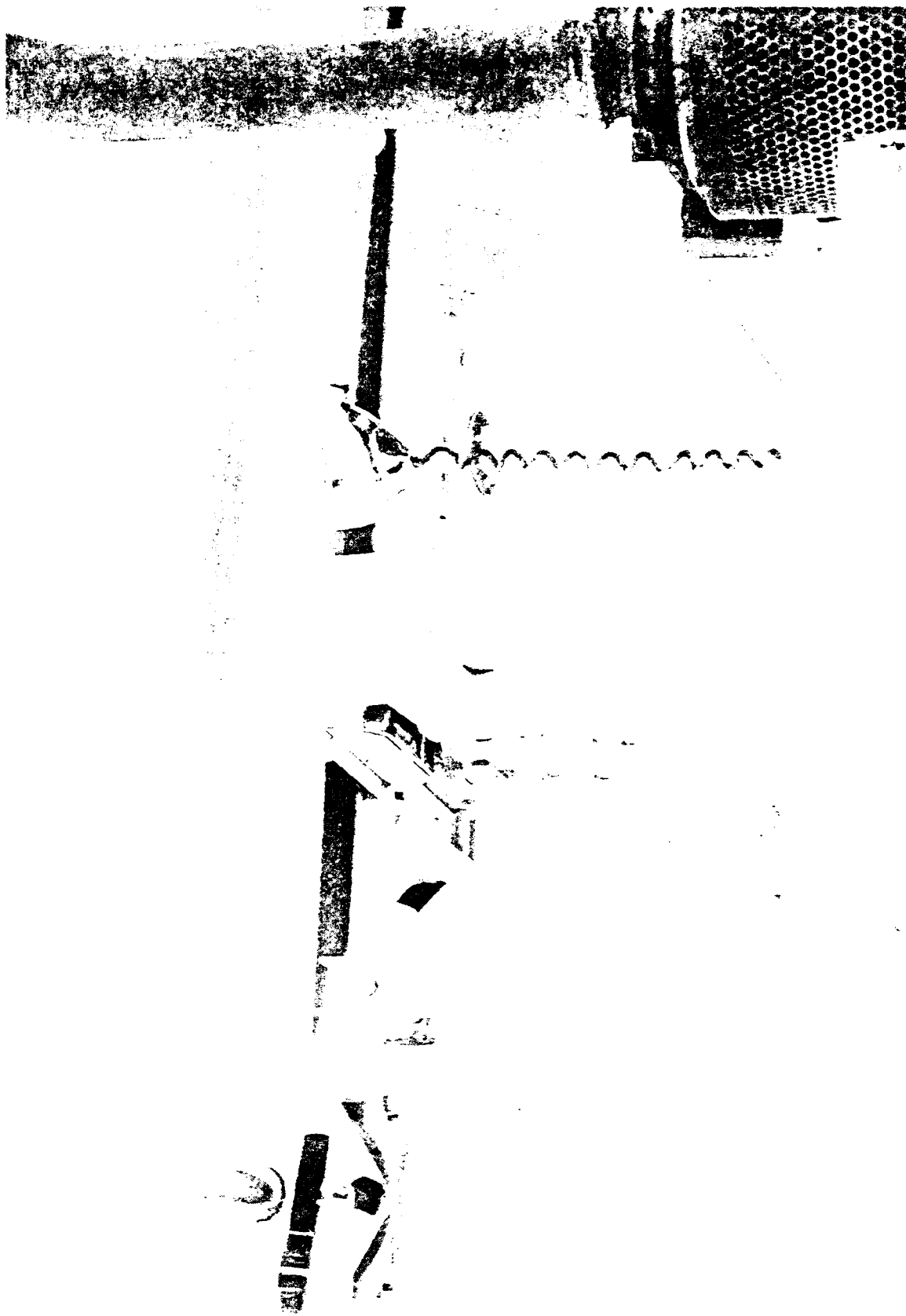
U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

PHOTO NO. A0317-SPN93-152-1844. This photo shows the TMTB boom resting between the warning light and mounting pedestal. This is the result of driving the TMT over the road hazard course at 5 mph. The boom was not pinned to the pedestal; therefore, the boom broke the lens on the warning light.



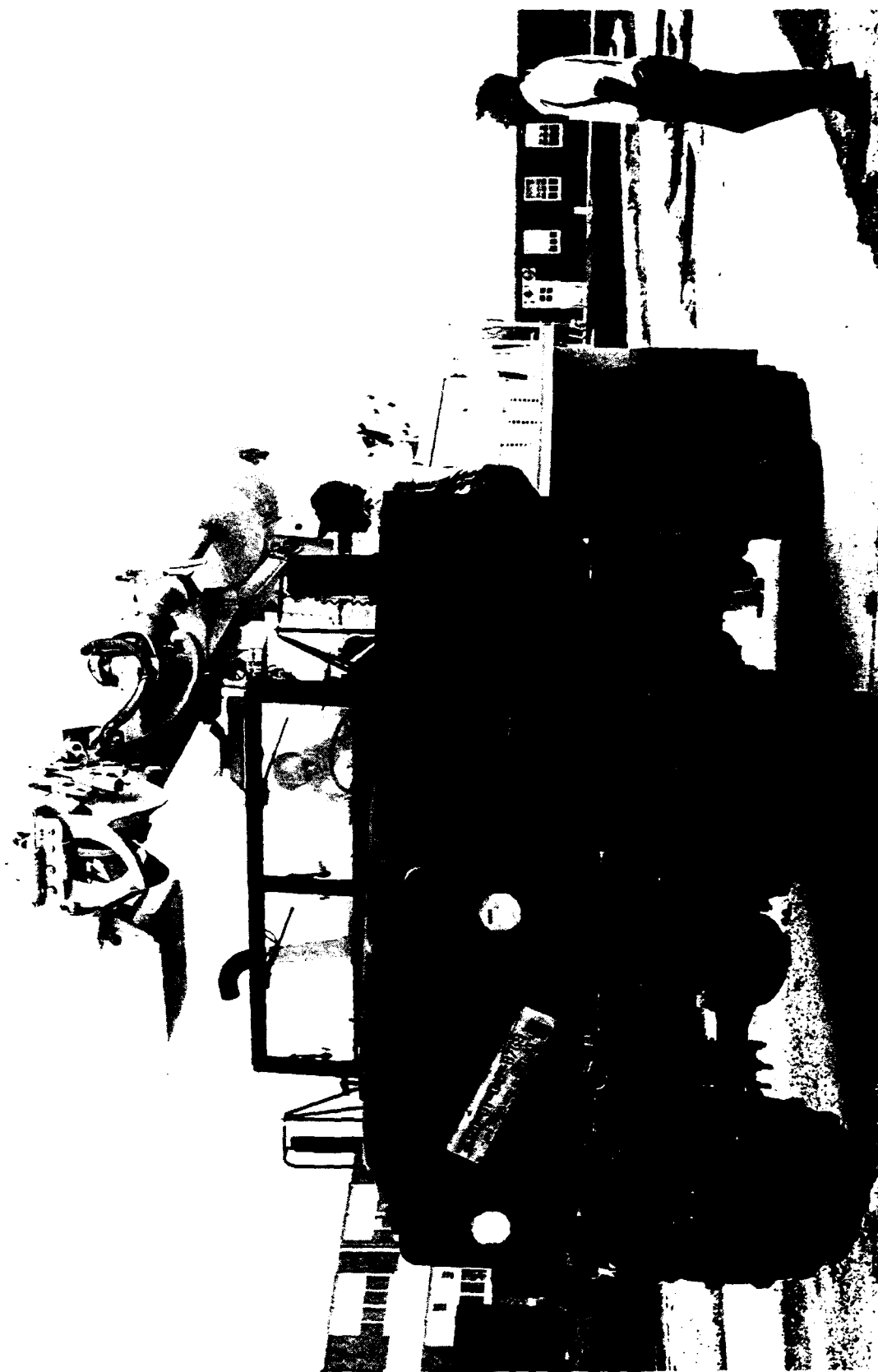
U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

PHOTO NO. A0317-SPN93-152-1845. This photo shows the TMTB boom resting between the warning light and mounting pedestal. This is the result of driving the TMT over the road hazard course at 5 mph. The boom was not pinned to the pedestal; therefore, the boom broke the lens on the warning light.



U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - CANAWA, N.J.

PHOTO NO. A0317 CPT 193-152-1846 This photo shows the TM1B boom resting against the mounting and mounting pedestal. This is the result of driving the TM1 over the road hazard course at Fort Monmouth. The boom was not pinned to the pedestal, therefore, the boom did not fall on the roadway.



U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

PHOTO NO. A0317-SPN93-152-1847. This photo shows the TMTB boom resting between the warning light and mounting pedestal. This is the result of driving the TMT over the road hazard course at 5 mph. The boom was not pinned to the pedestal; therefore, the boom broke the lens on the warning light.



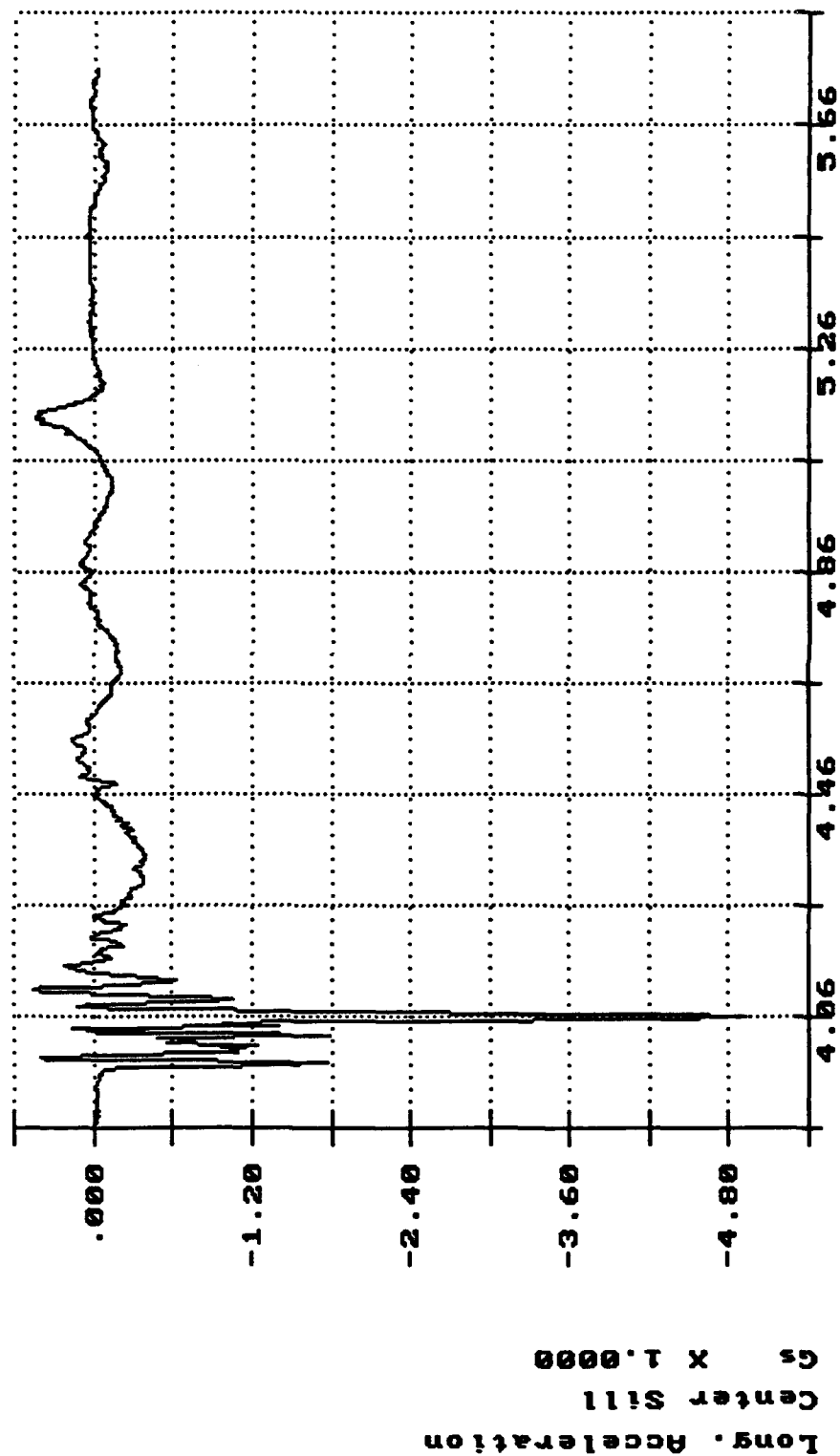
U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

PHOTO NO. A0317-SPN93-152-1851. This photo shows the TMTB boom resting between the warning light and mounting pedestal. This is the result of driving the TMT over the road hazard course at 5 mph. The boom was not pinned to the pedestal; therefore, the boom broke the lens on the warning light.

PART 6

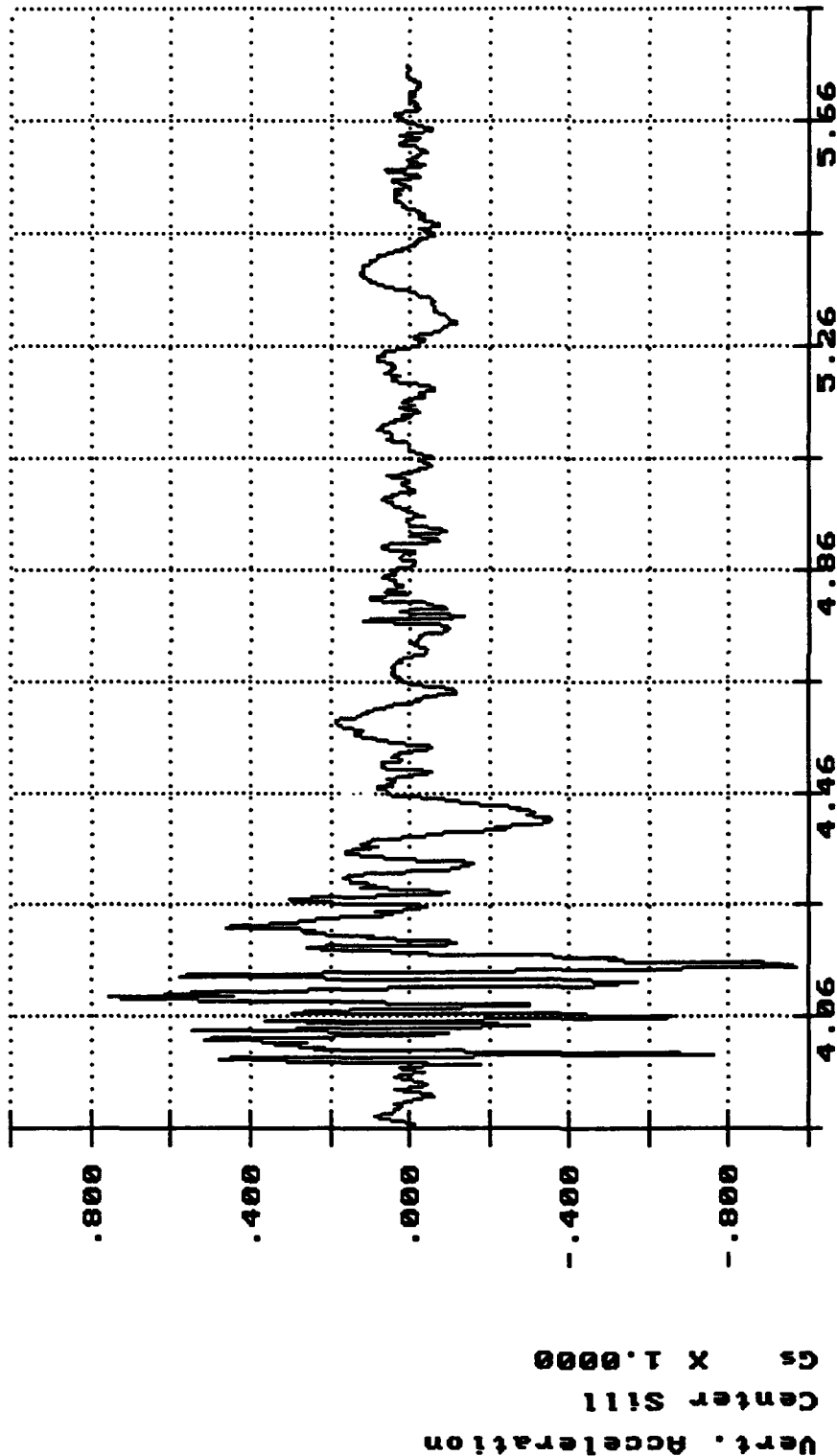
GRAPHS

R.I. of M876A1 Tel. Truck, #1: 4.46 MPH Apr 28 09:48:41 1993

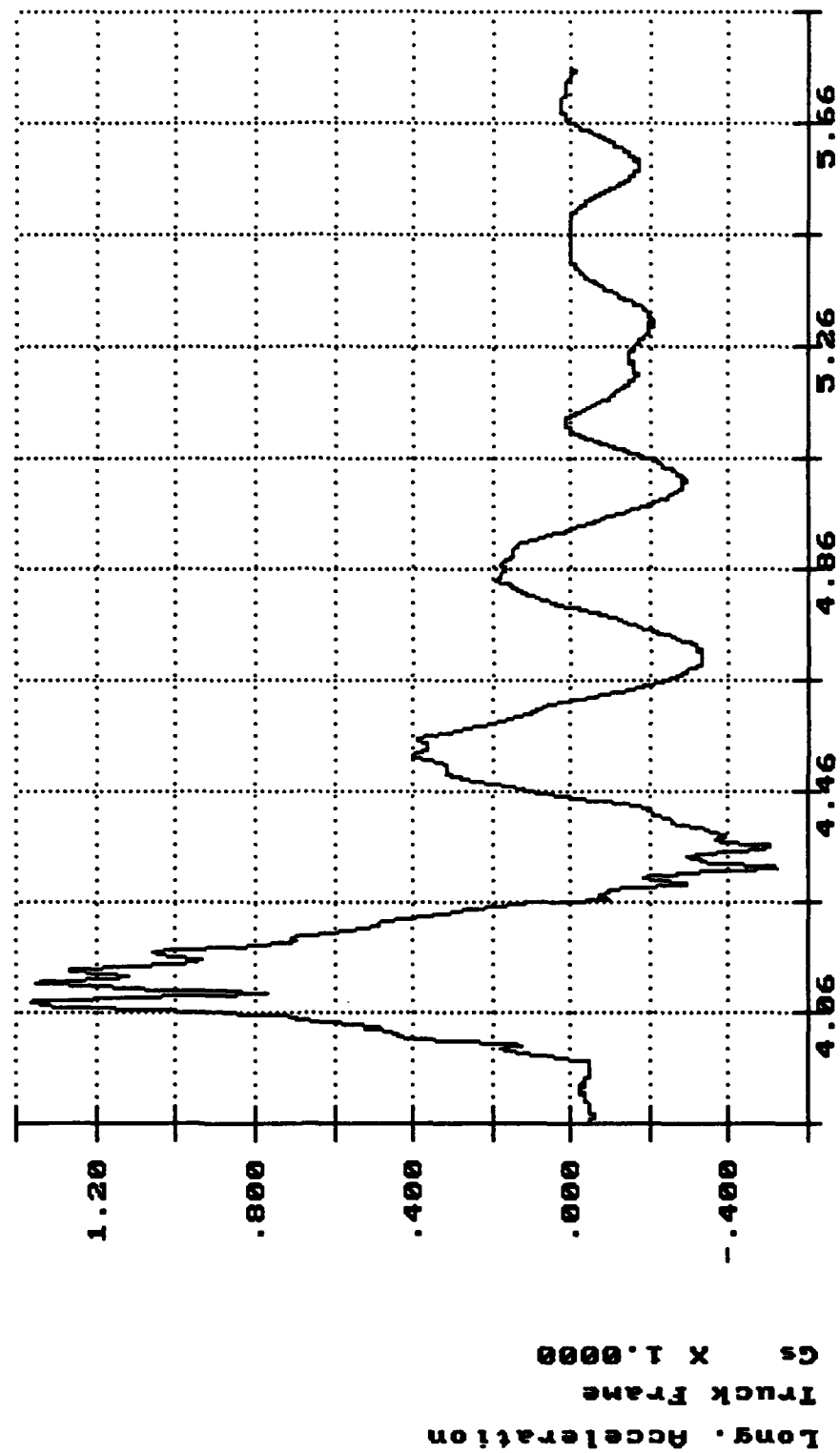


Time of Sample
Seconds X 1.0000

R.I. of M876A1 Tel. Truck, #1: 4.46 MPH Apr 28 09:48:41 1993

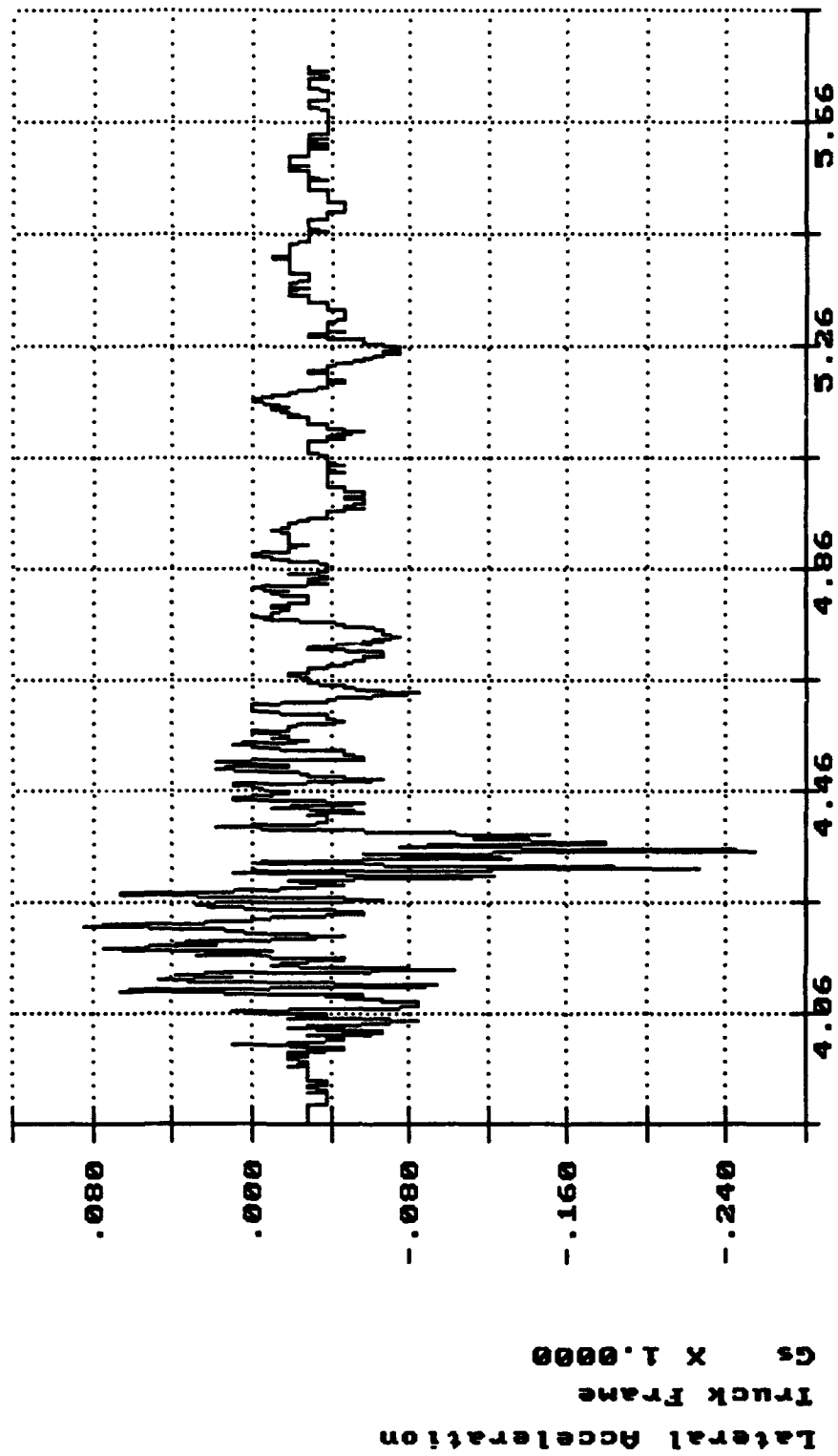


R.I. of M876A1 Tel. Truck, #1: 4.46 MPH Apr 28 09:48:41 1993

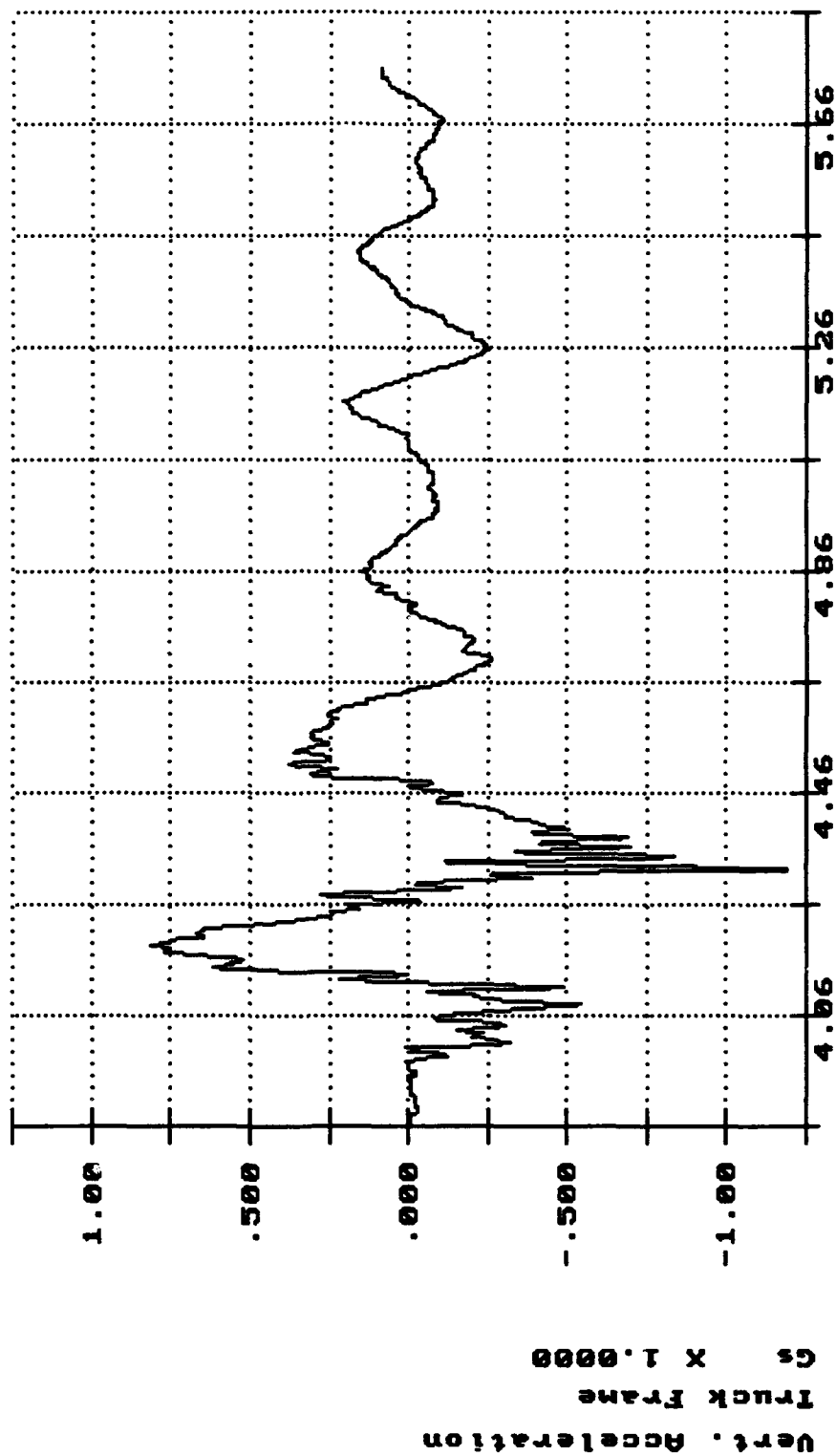


Time of Sample
Seconds X 1.0000

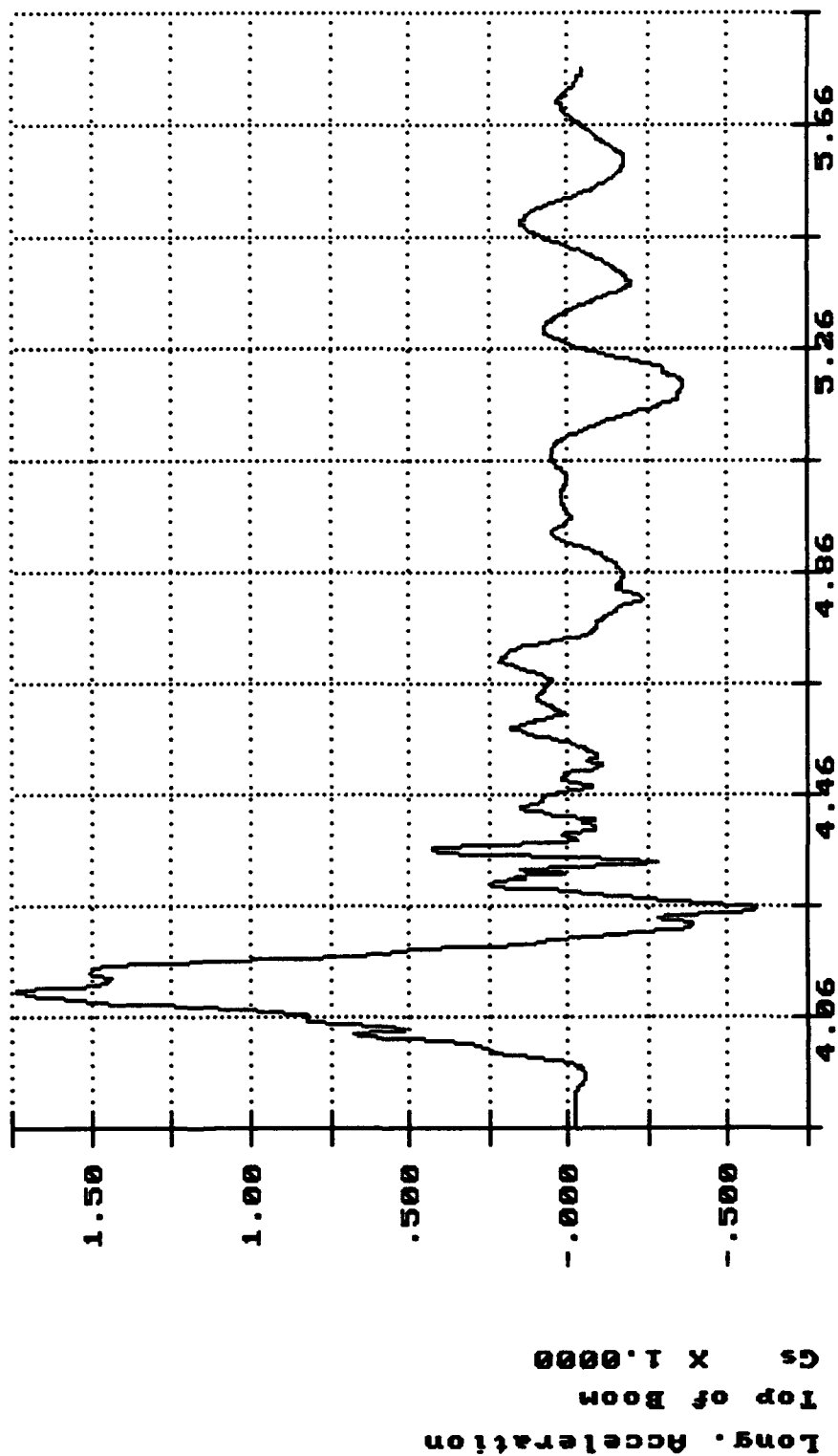
R.I. of M876A1 Tel. Truck, #1: 4.46 MPH Apr 28 09:48:41 1993



R.I. of M876A1 Tel. Truck, #1: 4.46 MPH Apr 28 09:48:41 1993

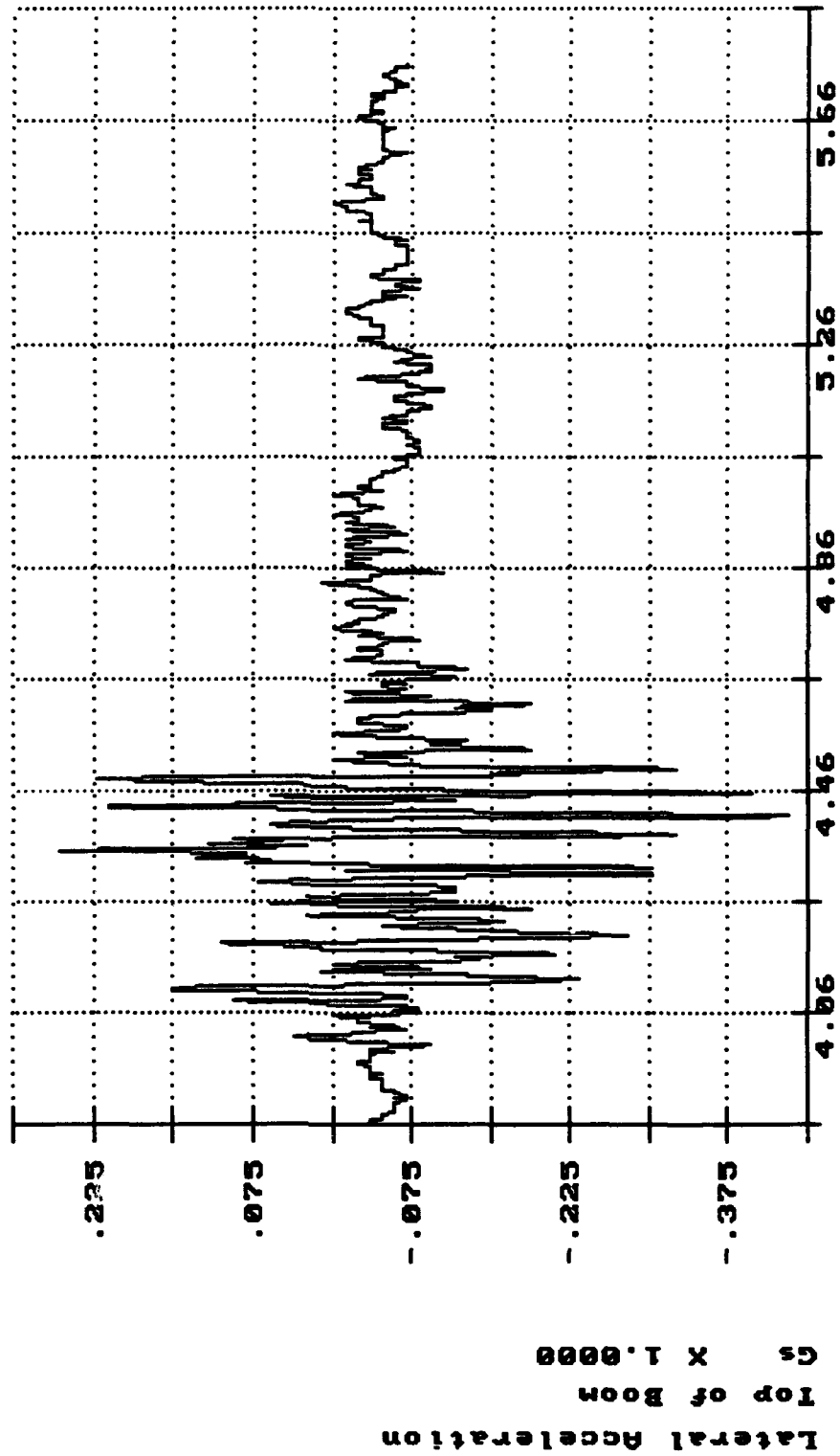


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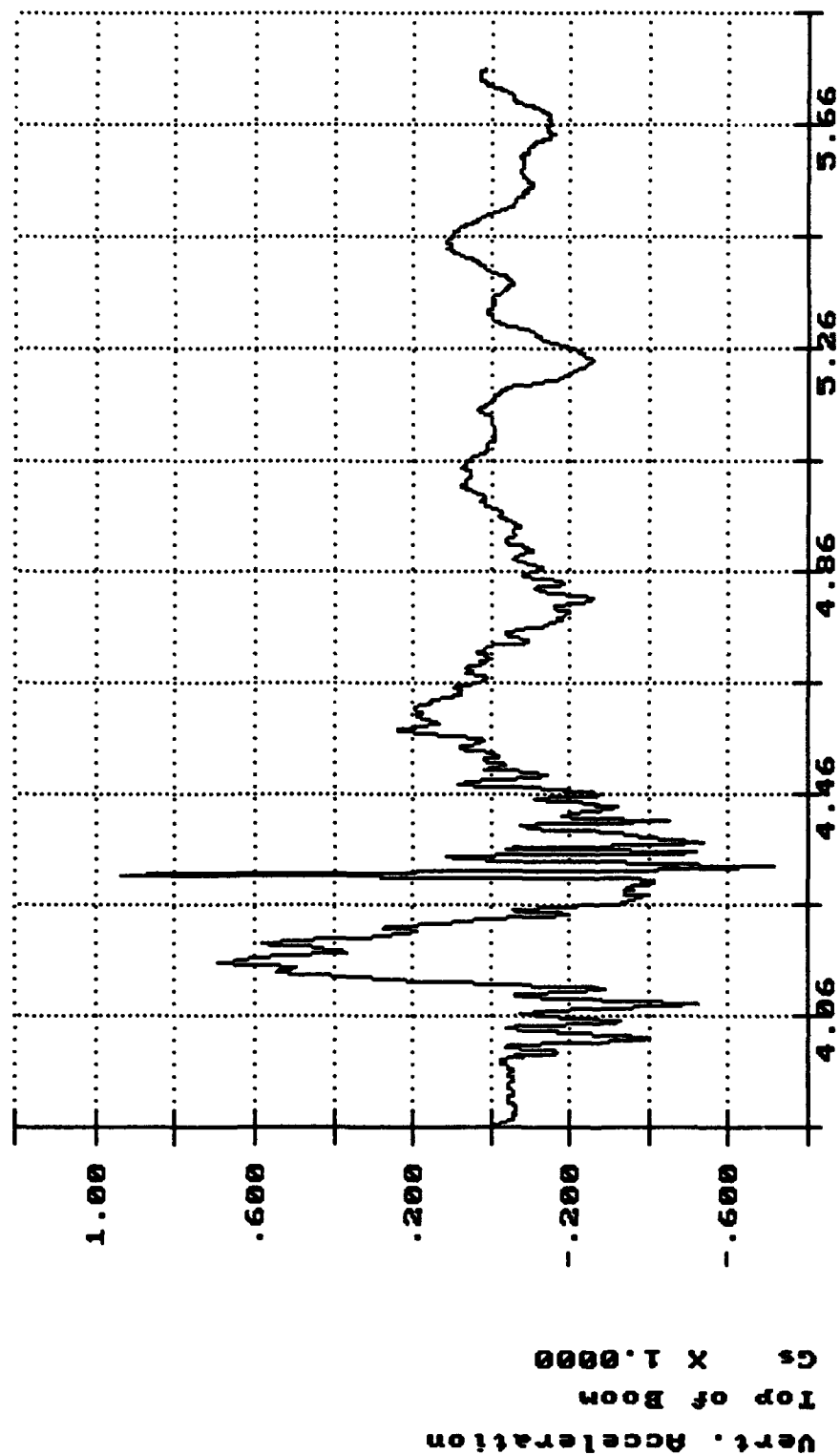


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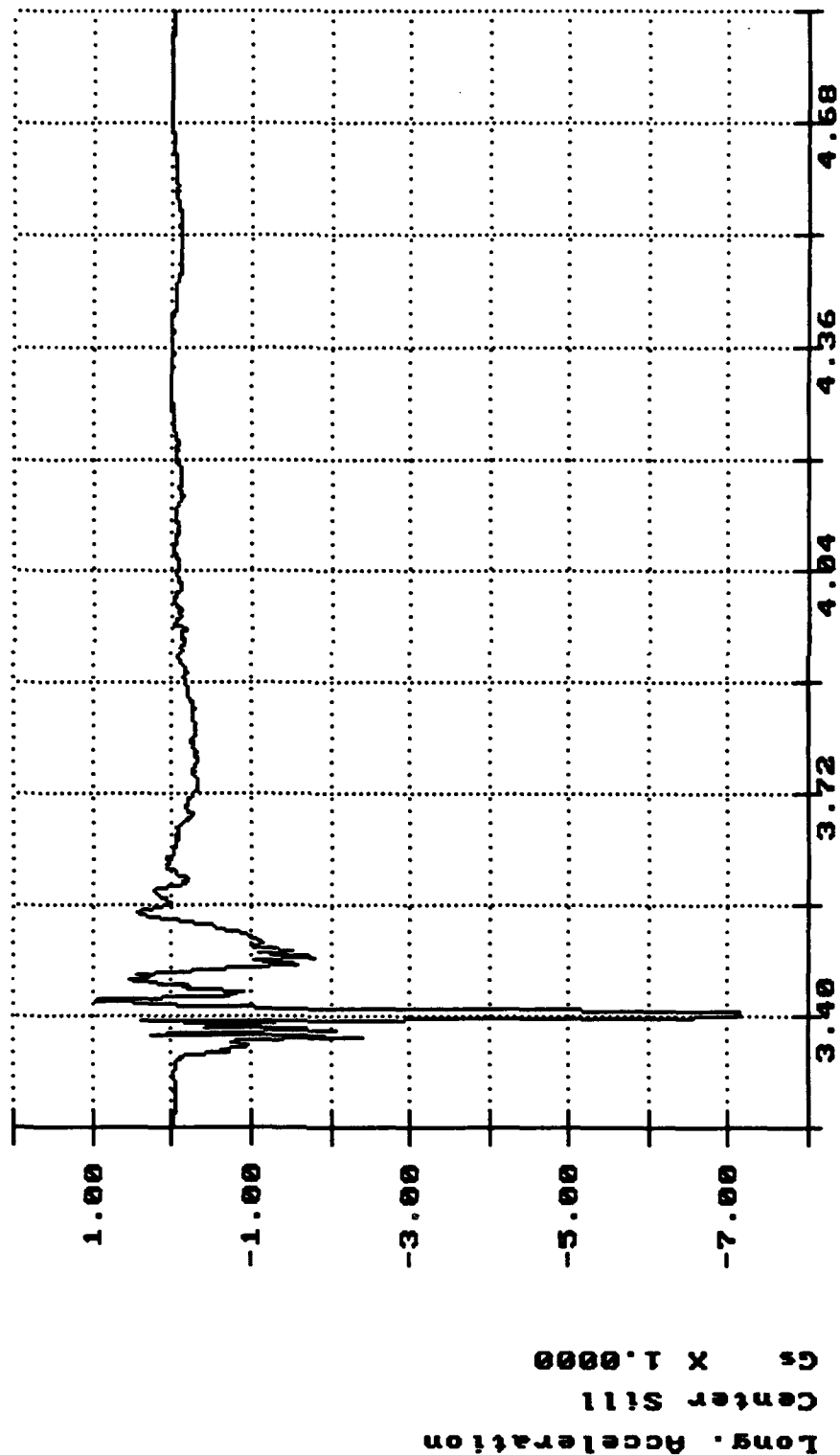
R.I. of M876A1 Tel. Truck, #1: 4.46 MPH Apr 28 09:48:41 1993



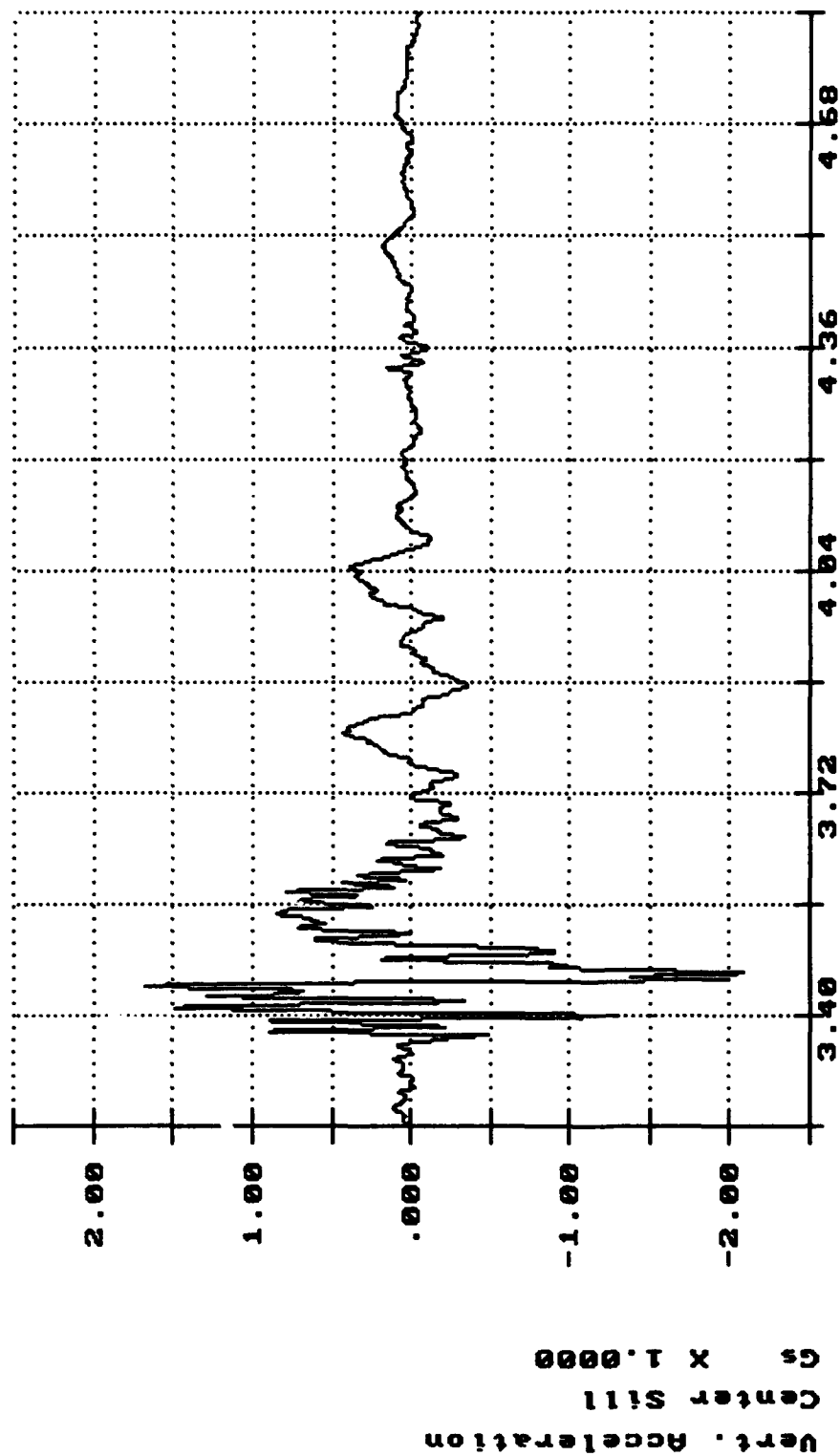
R.I. of M876A1 Tel. Truck, #1: 4.46 MPH Apr 28 09:48:41 1993



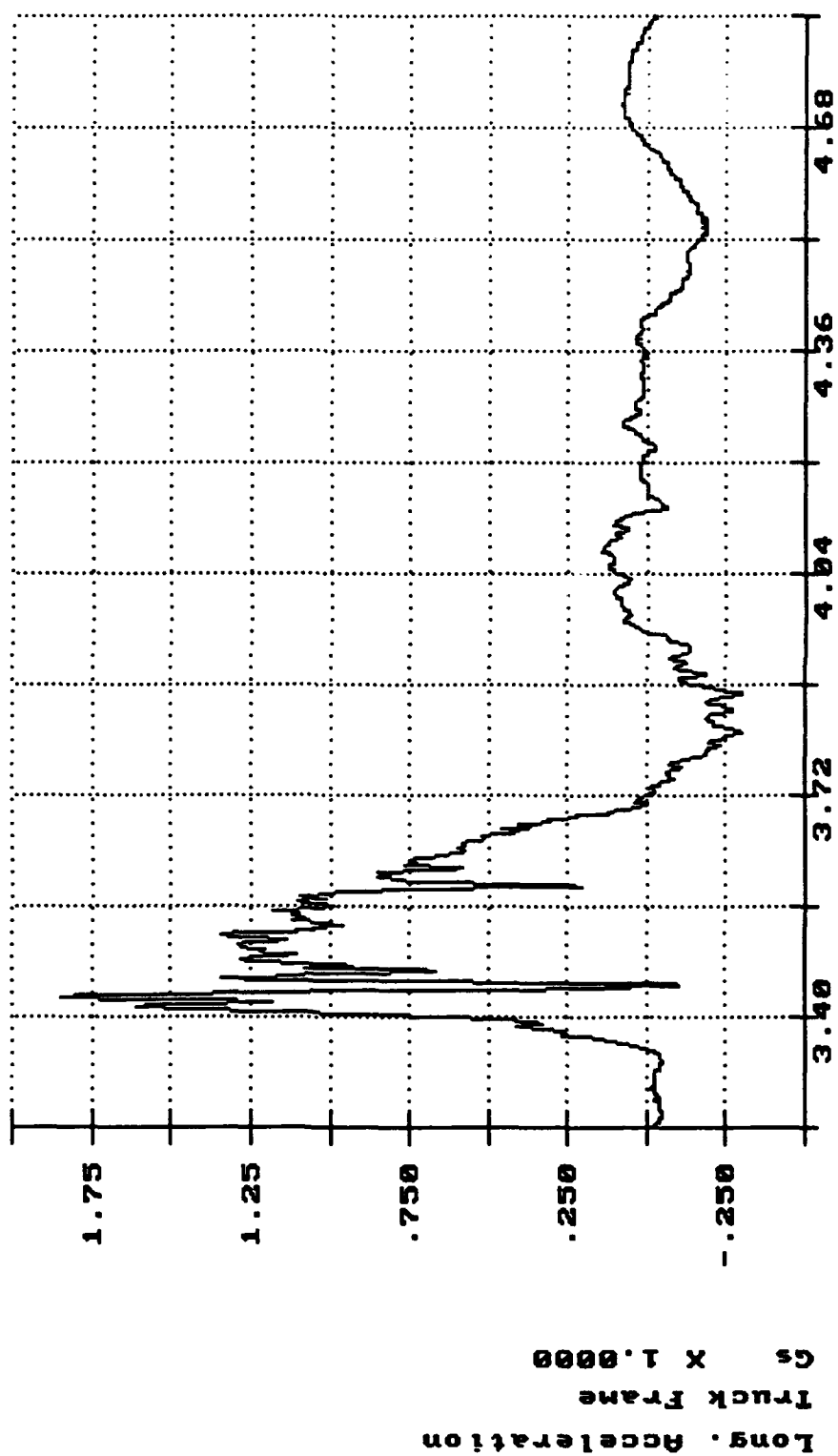
R.I. of M876A1 Tel. Truck, #2: 6.41 MPH Apr 28 10:17:17 1993



Time of Sample
Seconds X 1.0000

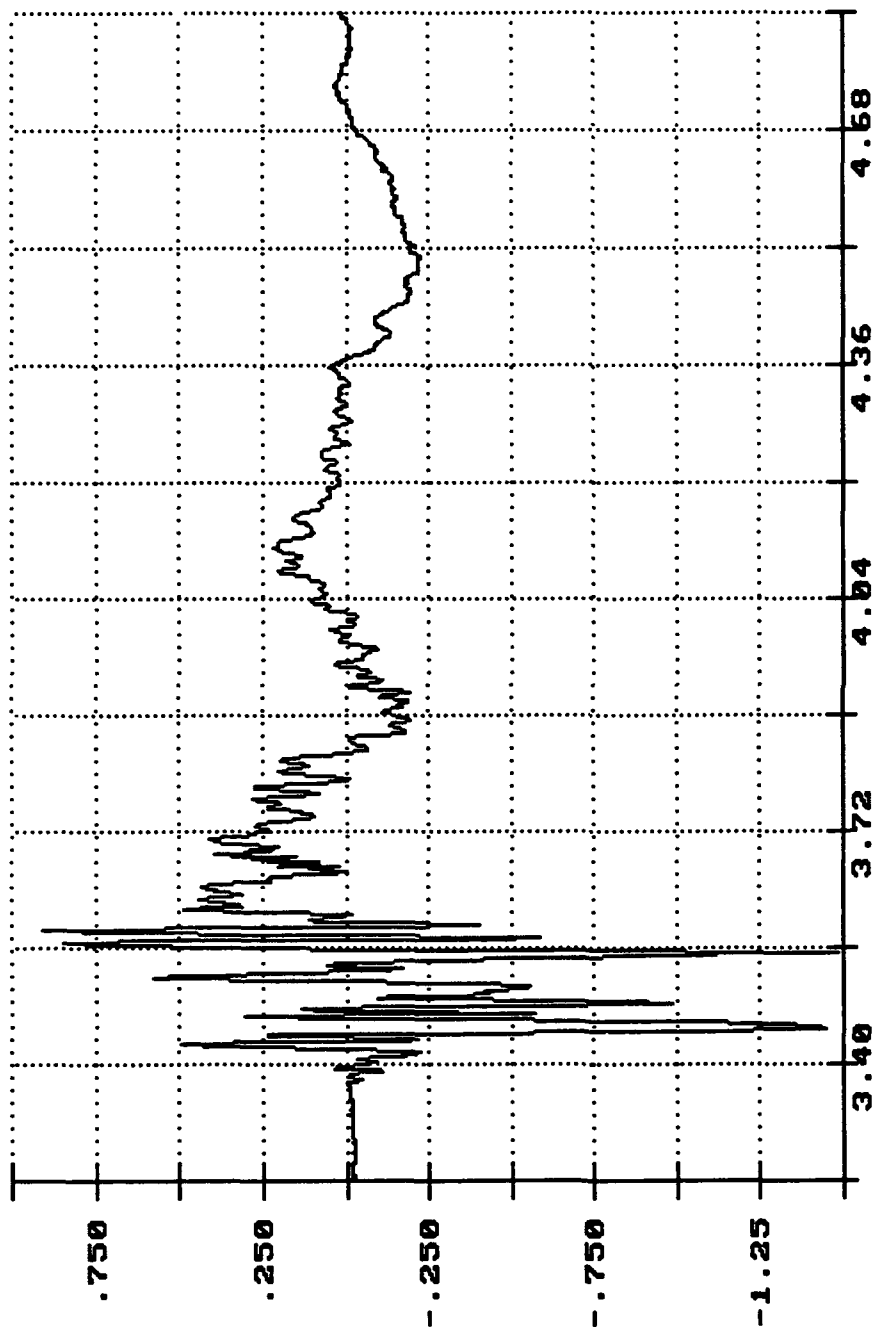


R.I. of M876A1 Tel. Truck, #2: 6.41 MPH Apr 28 10:17:17 1993



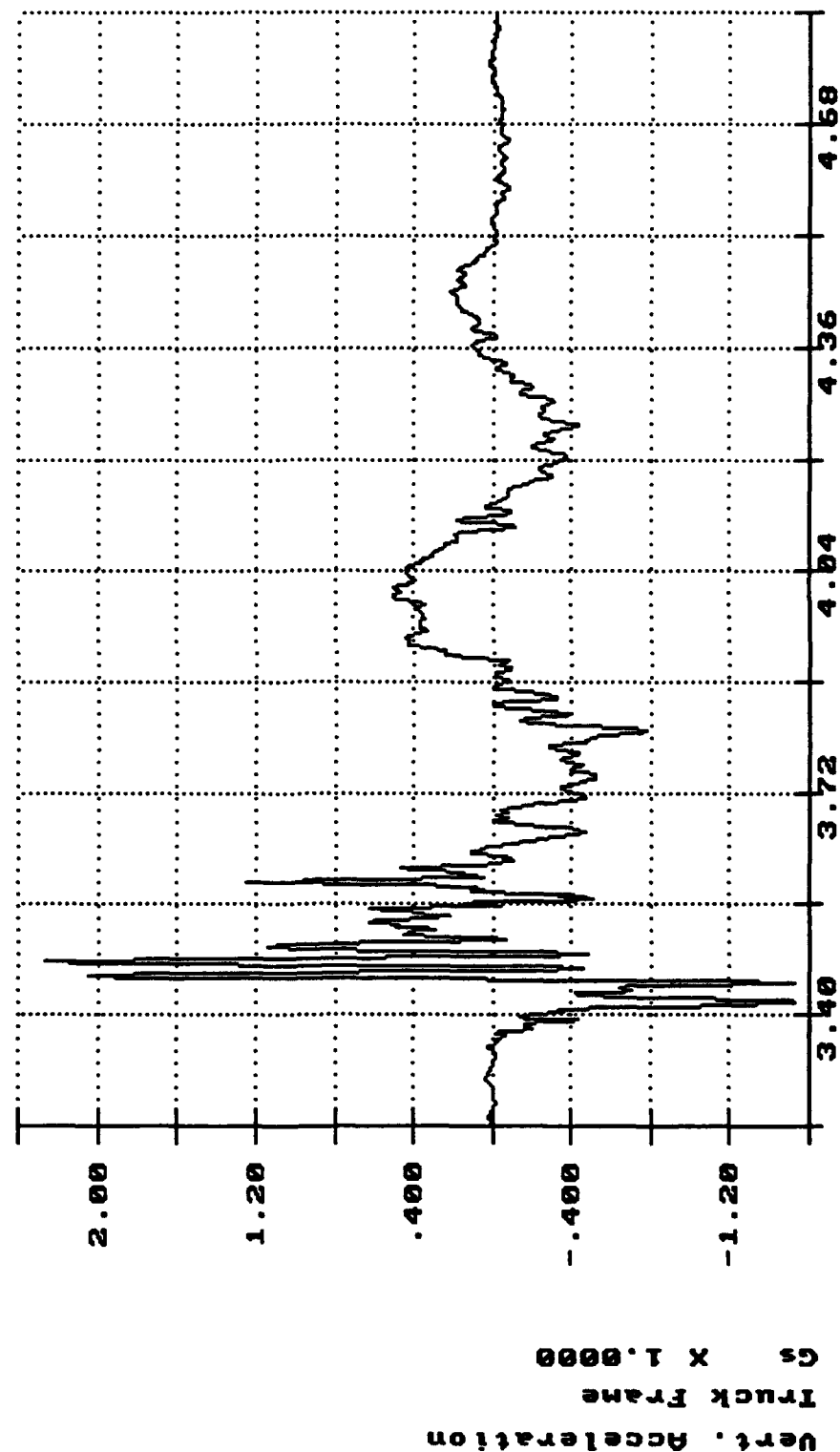
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R.I. of M876A1 Tel. Truck, #2: 6.41 MPH Apr 28 10:17:17 1993



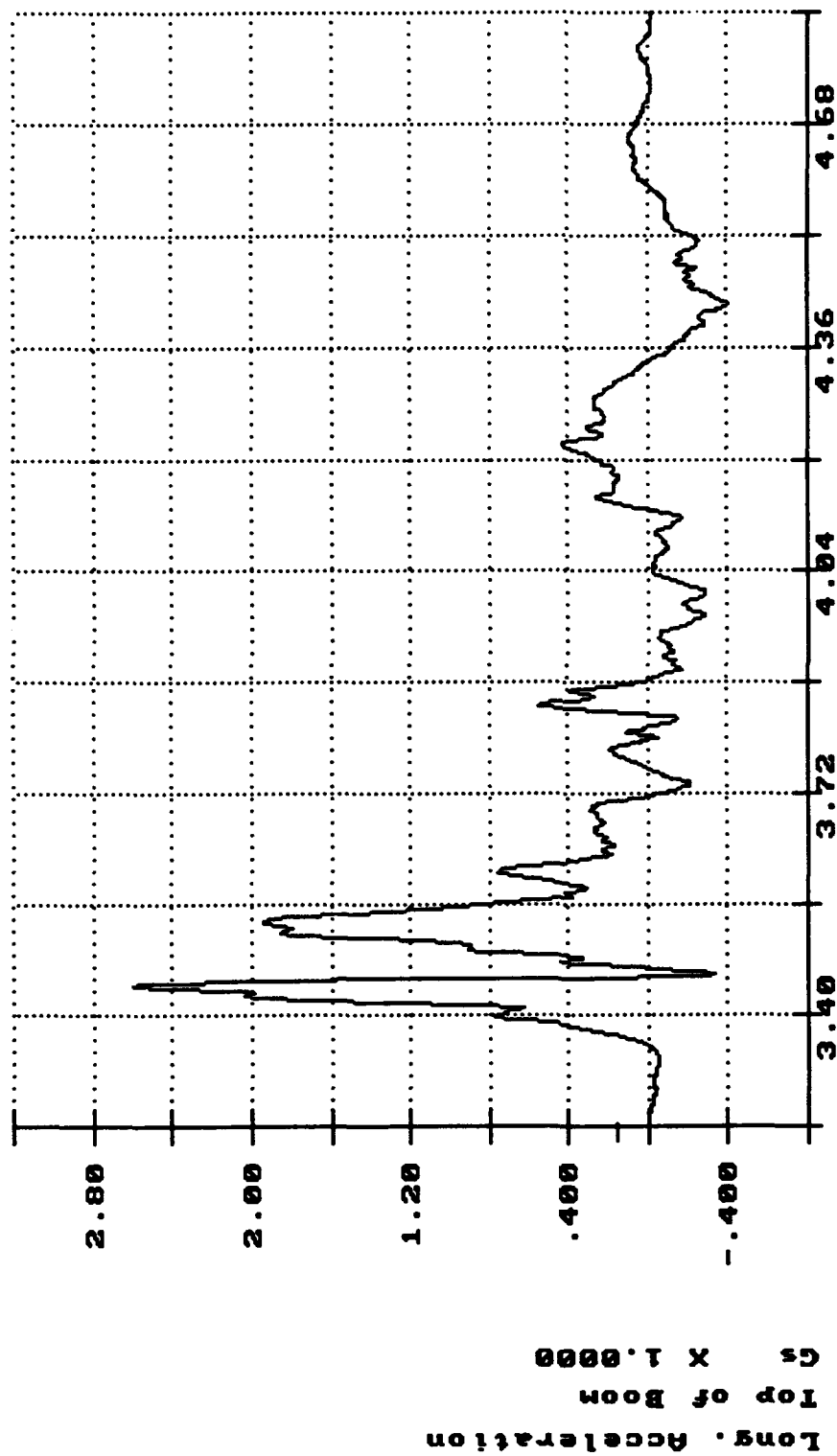
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R.I. of M876A1 Tel. Truck, #2: 6.41 MPH Apr 28 10:17:17 1993



Time of Sample
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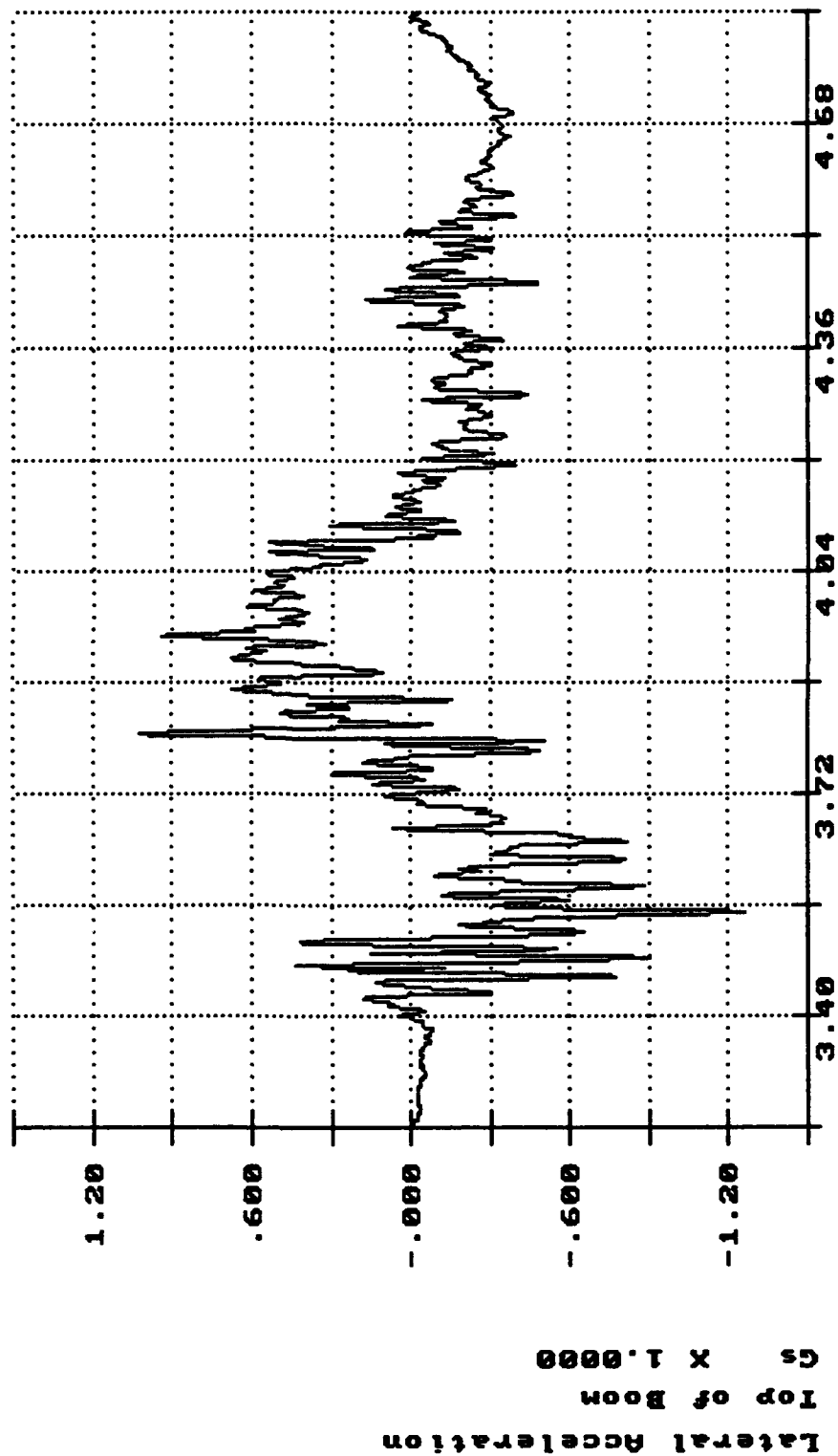
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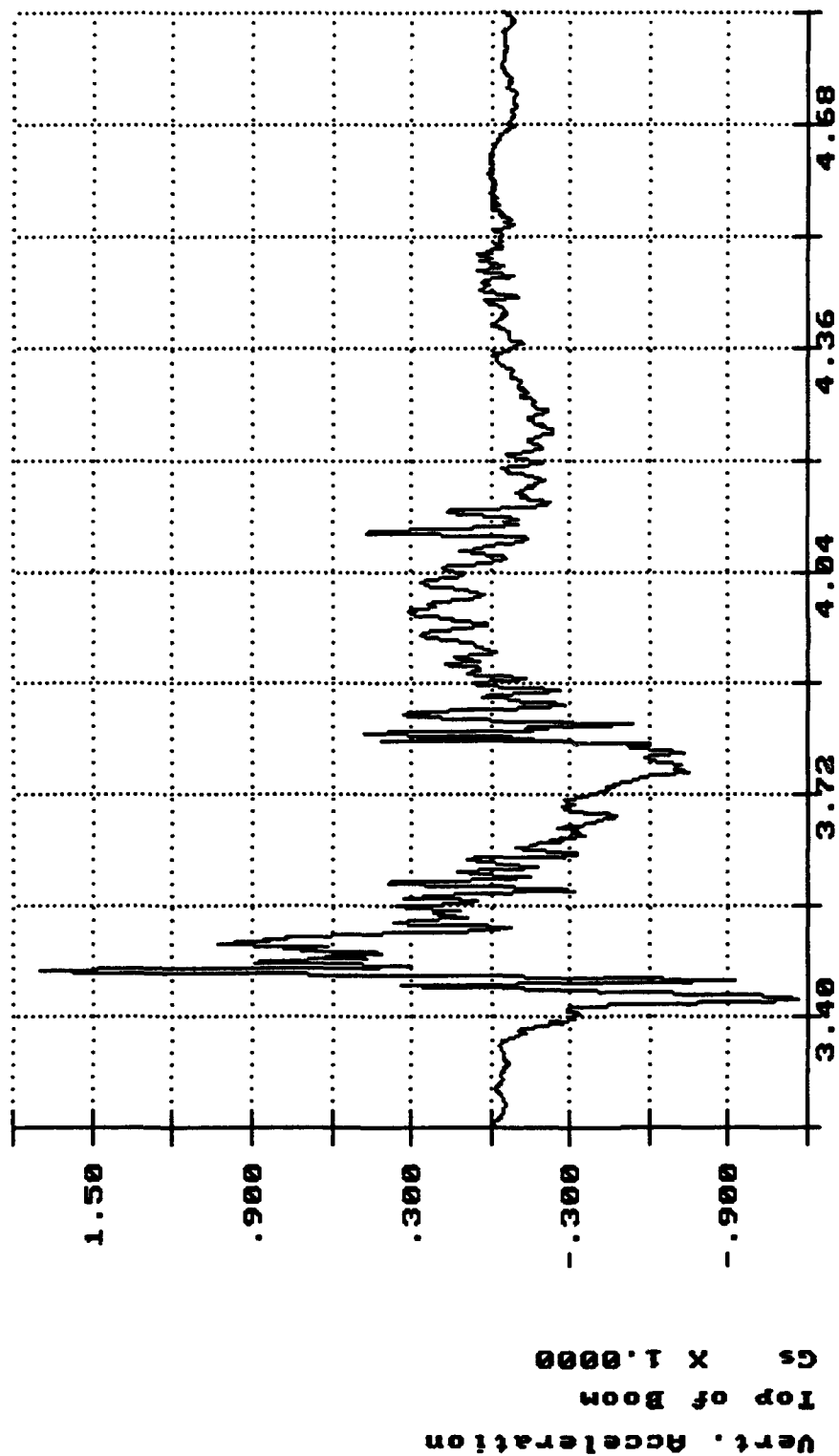
Time of Sample

Seconds X 1.0000

R.I. of M876A1 Tel. Truck, #2: 6.41 MPH Apr 28 10:17:17 1993

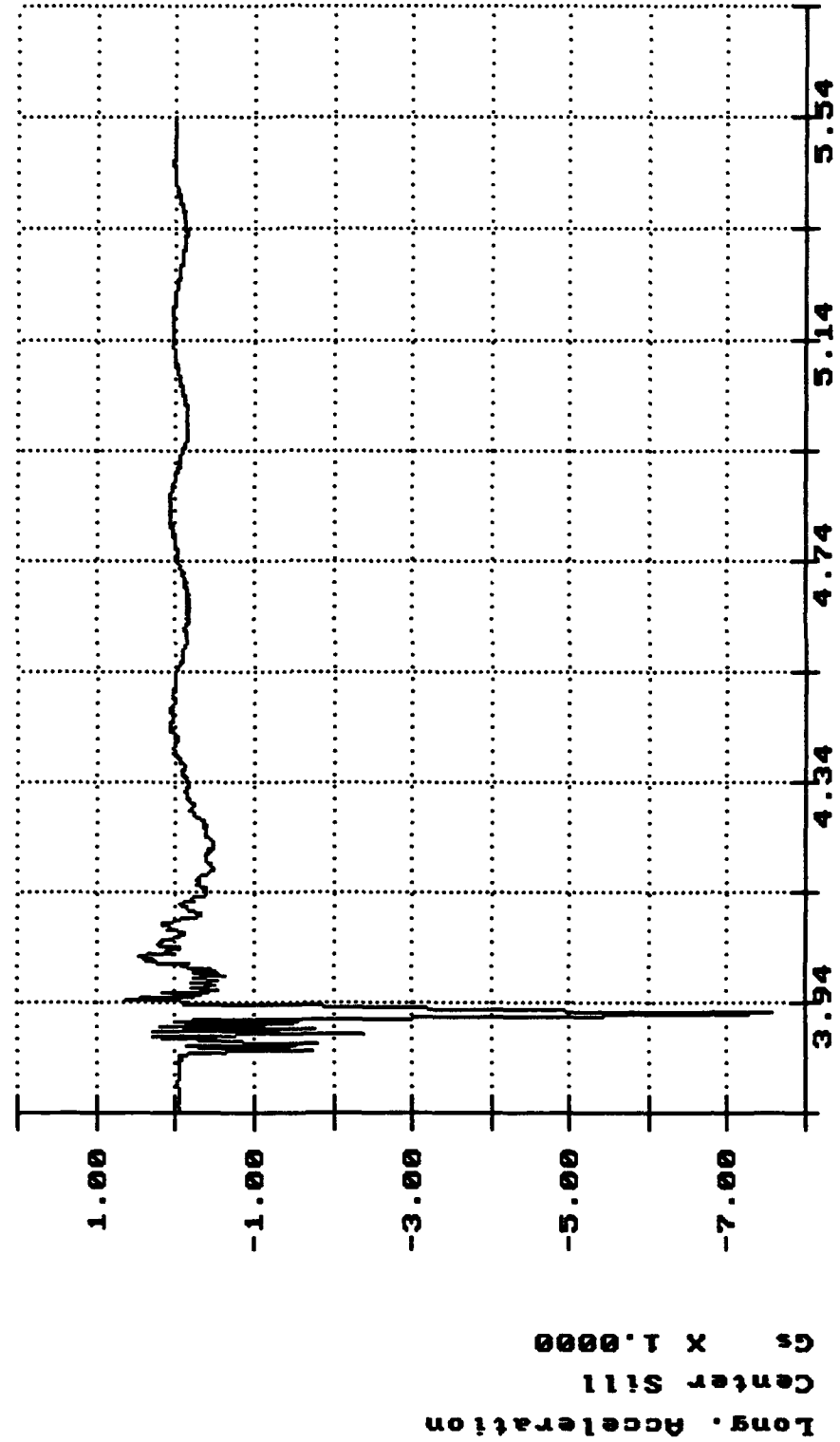


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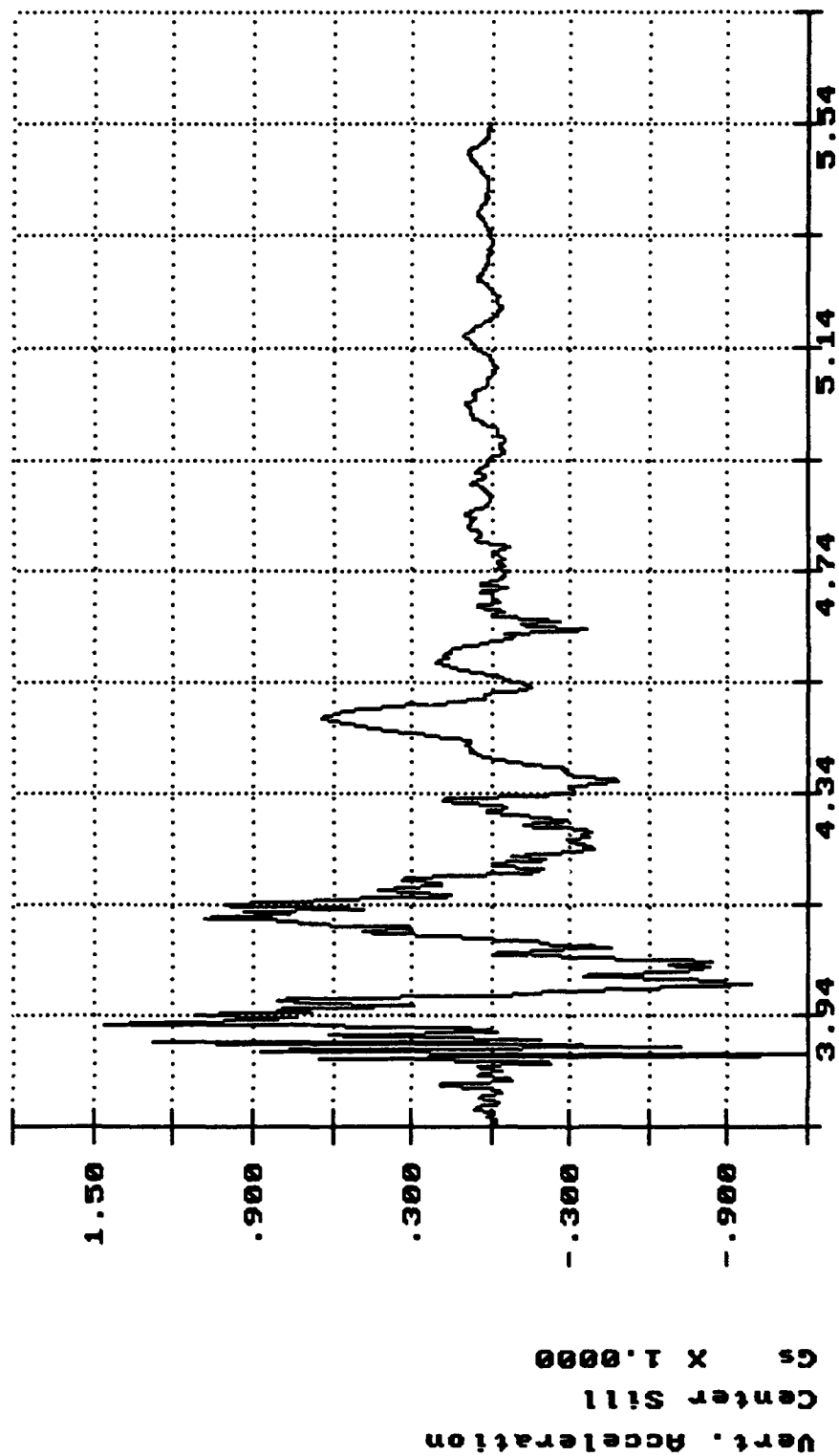
R.I. of M876A1 Tel. Truck, #3: 5.25 MPH Apr 28 13:43:35 1993

7

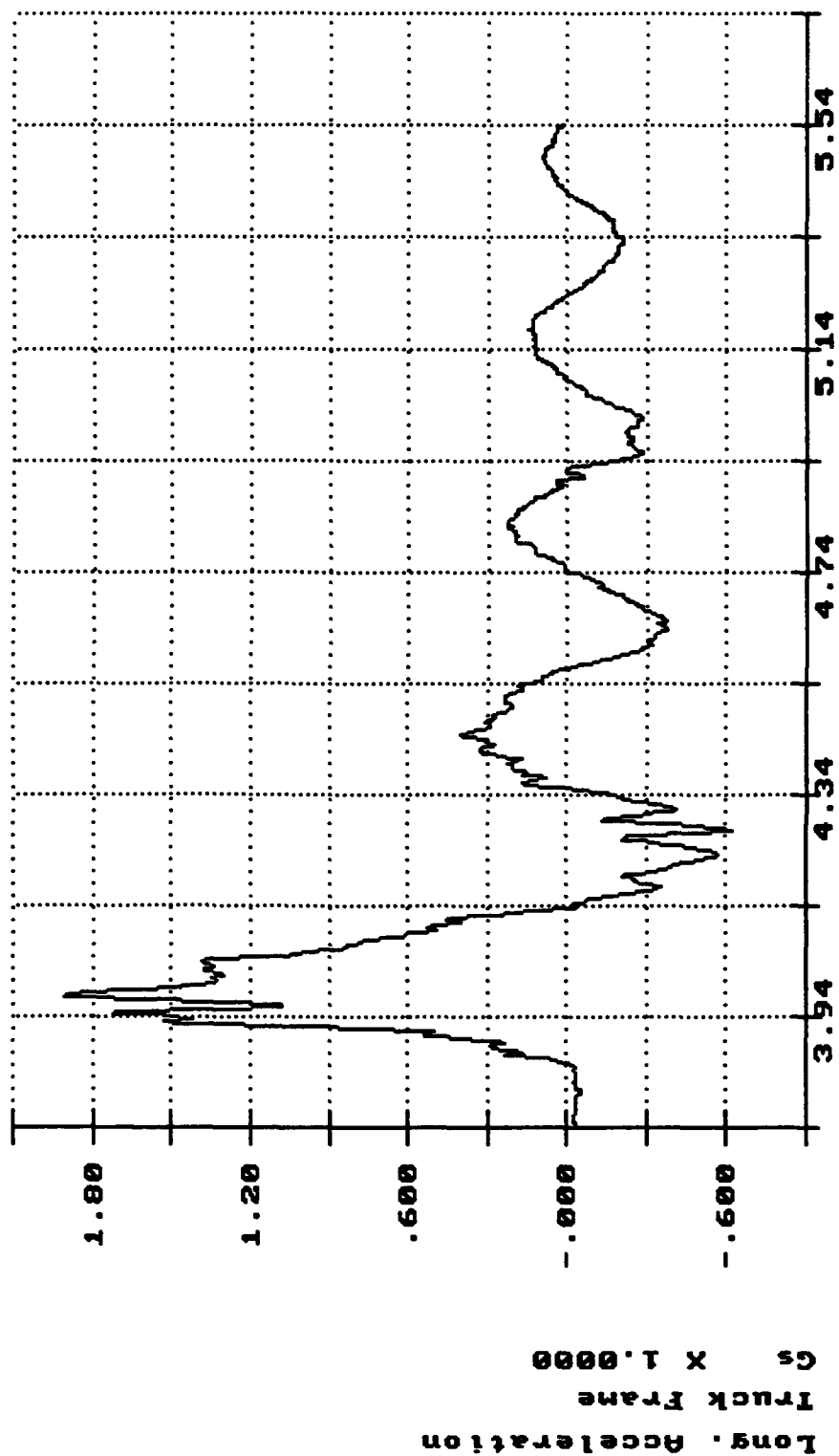


Time of Sample
Seconds X 1.0000

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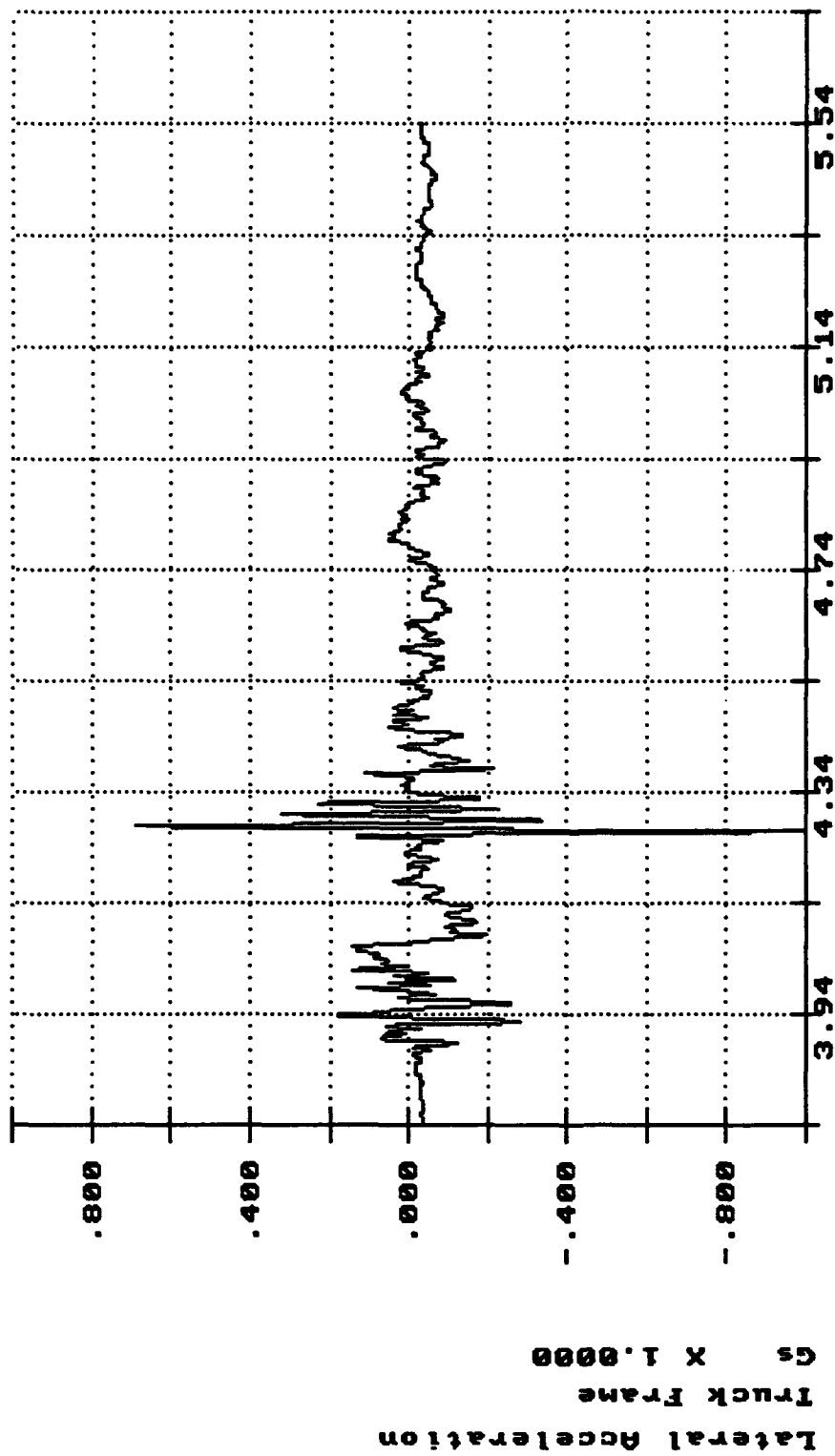


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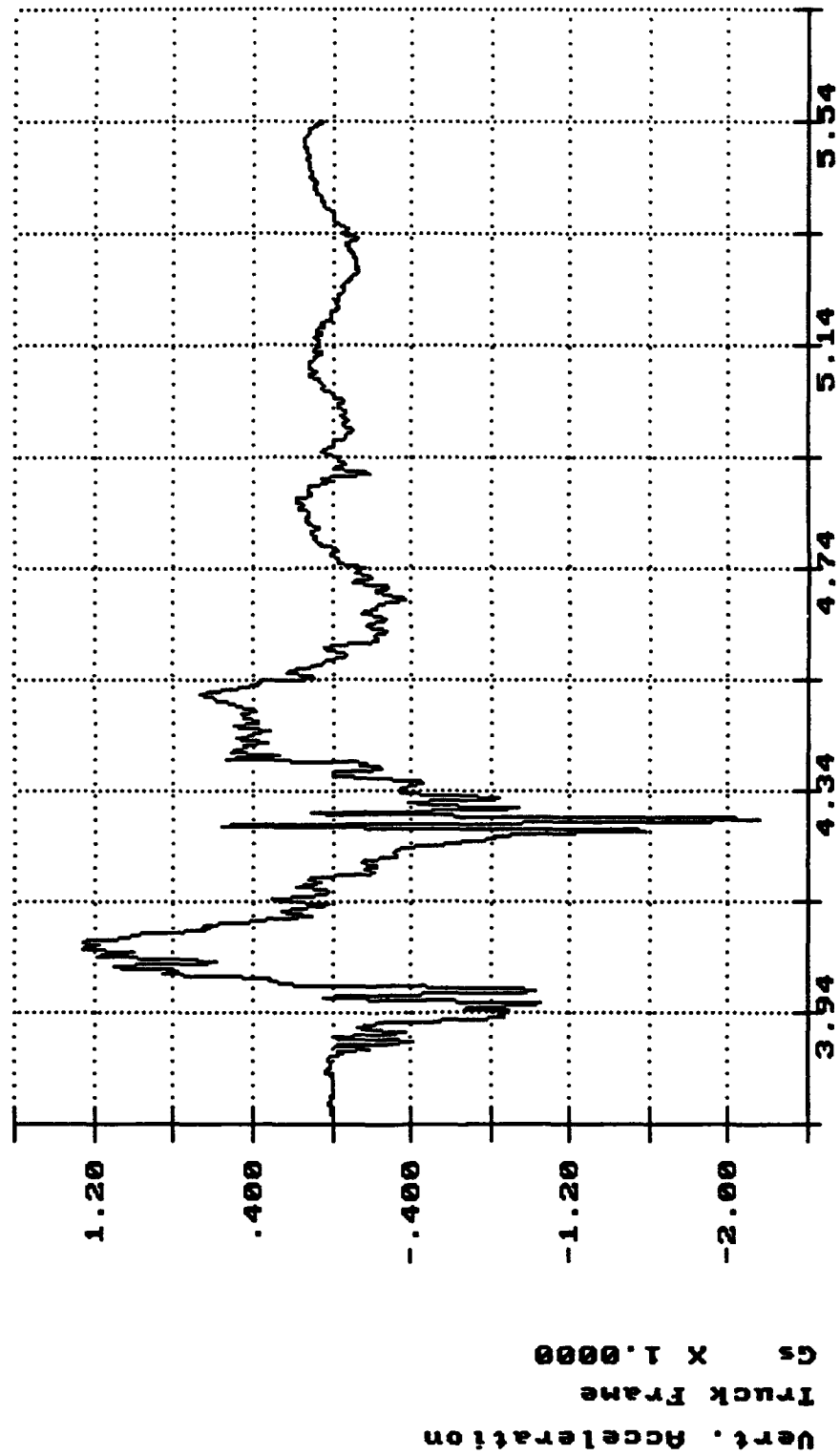


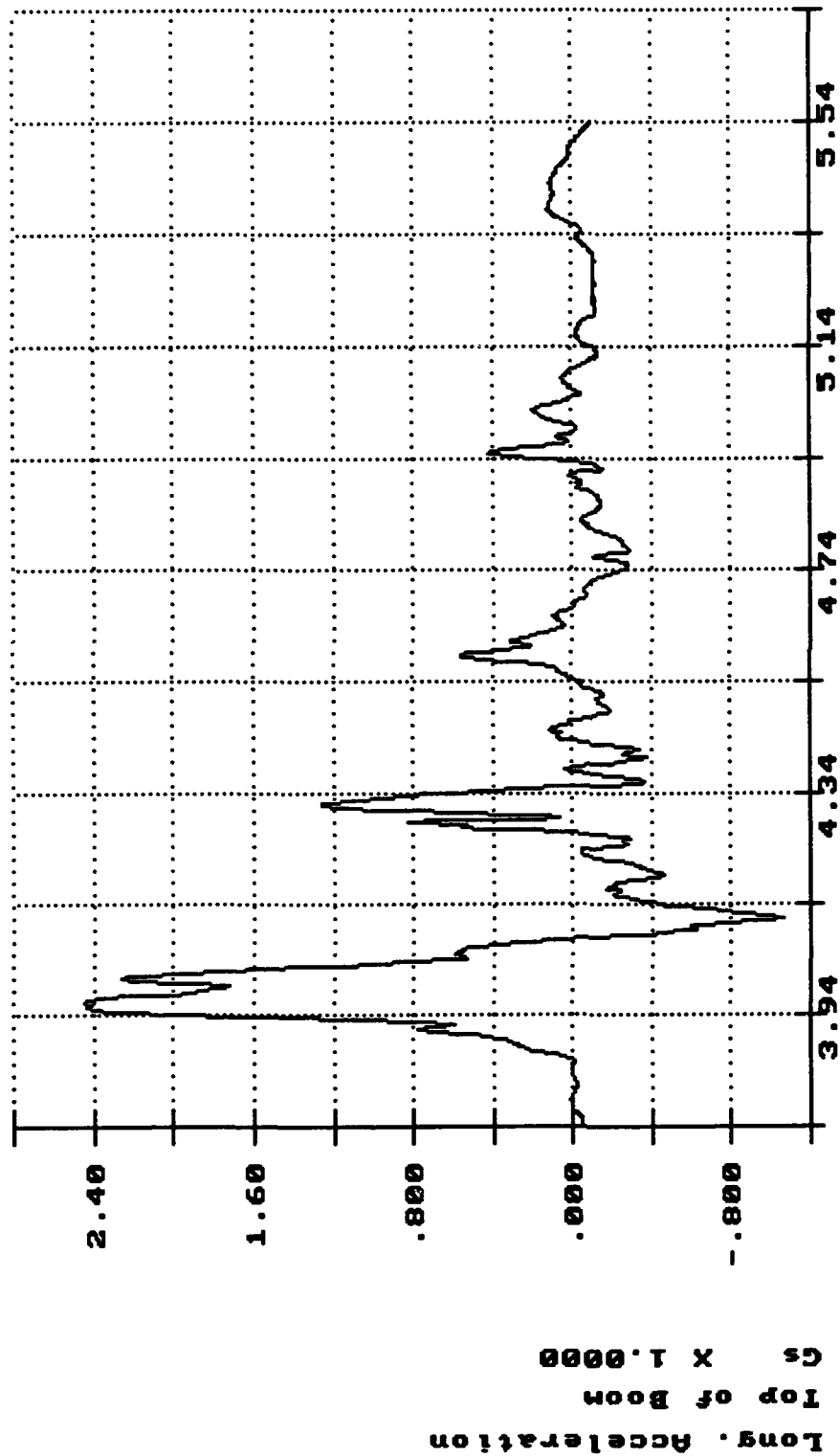
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R.I. of M876A1 Tel. Truck, #3: 5.25 MPH Apr 28 13:43:35 1993



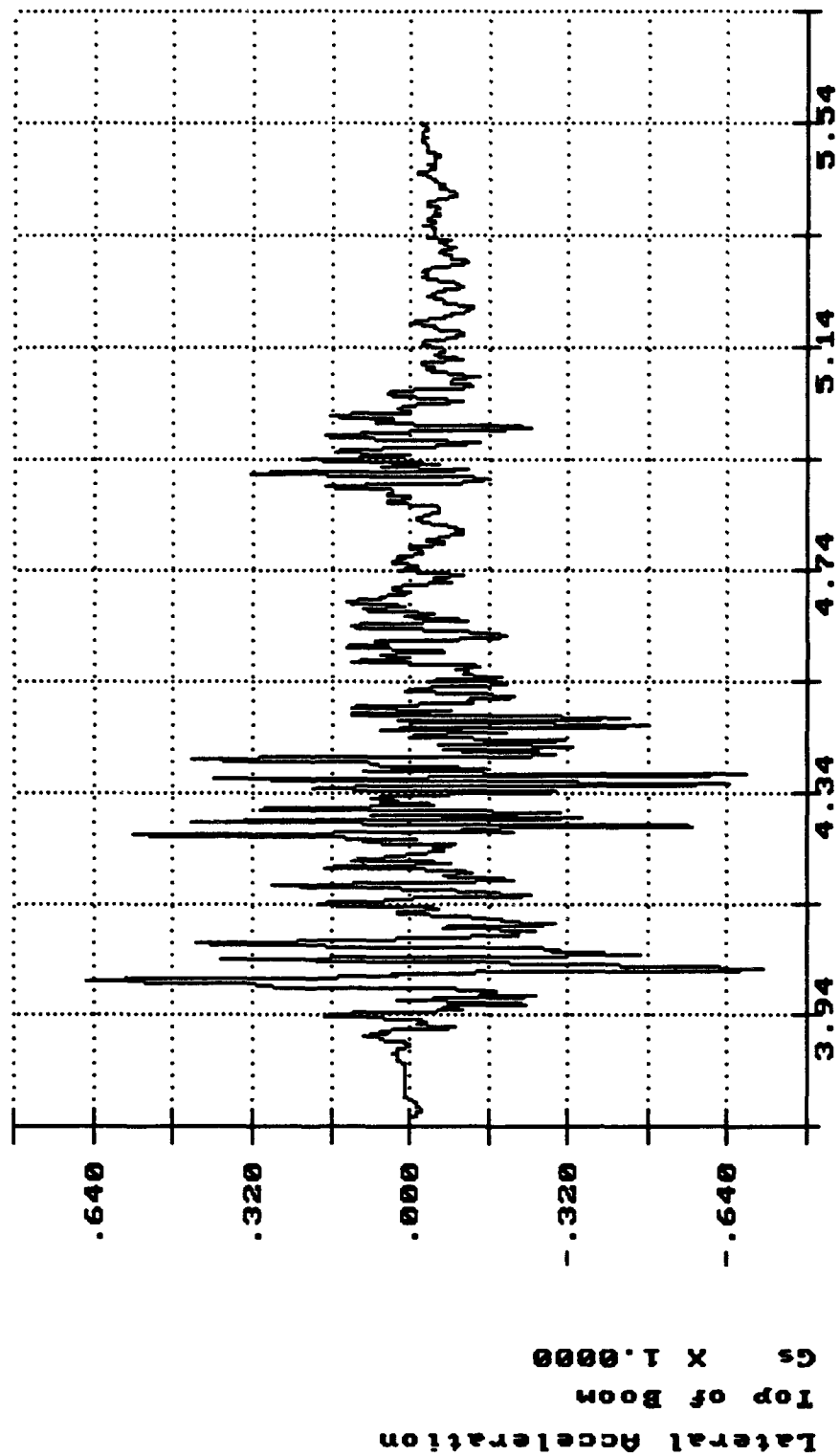
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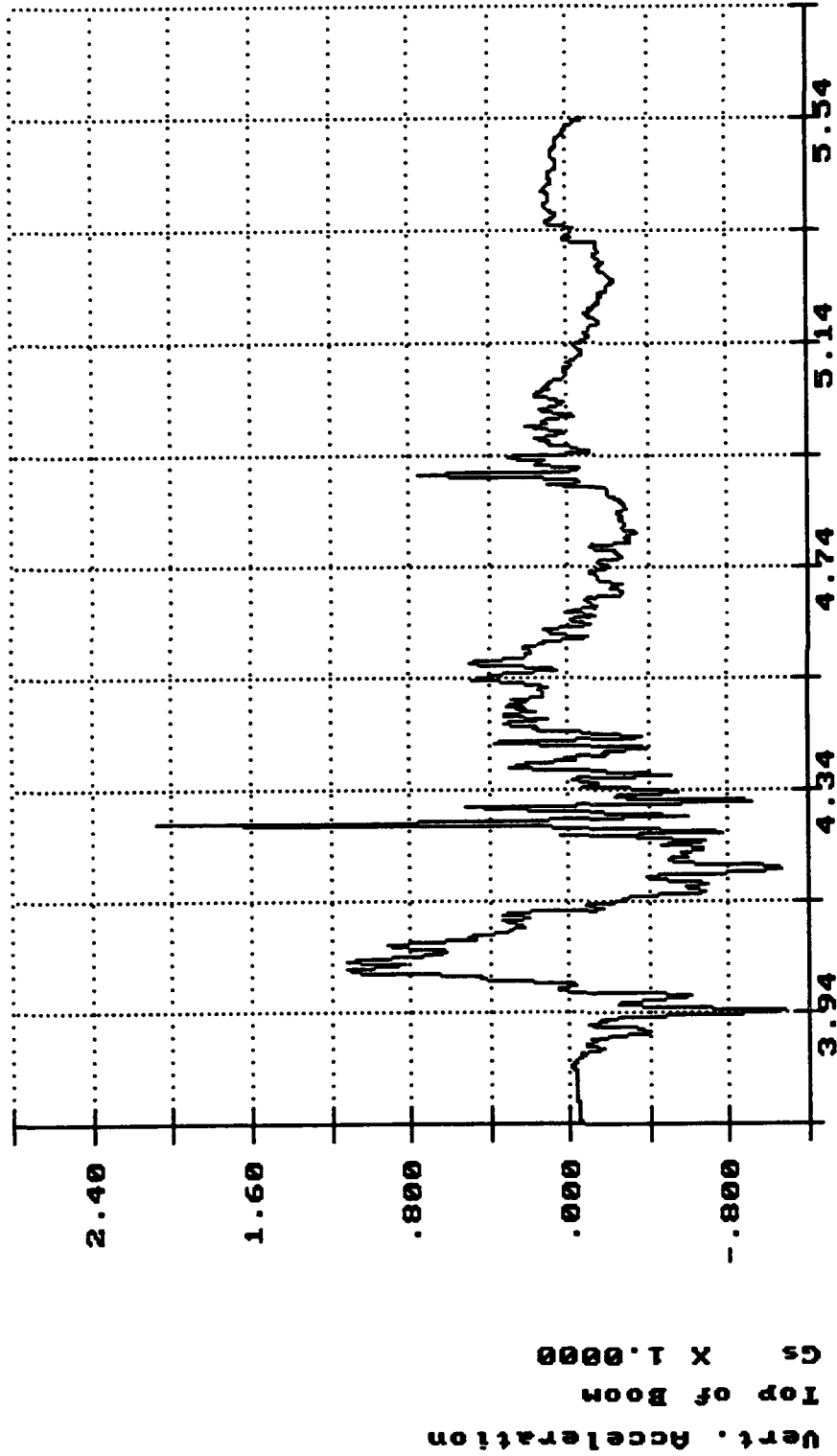




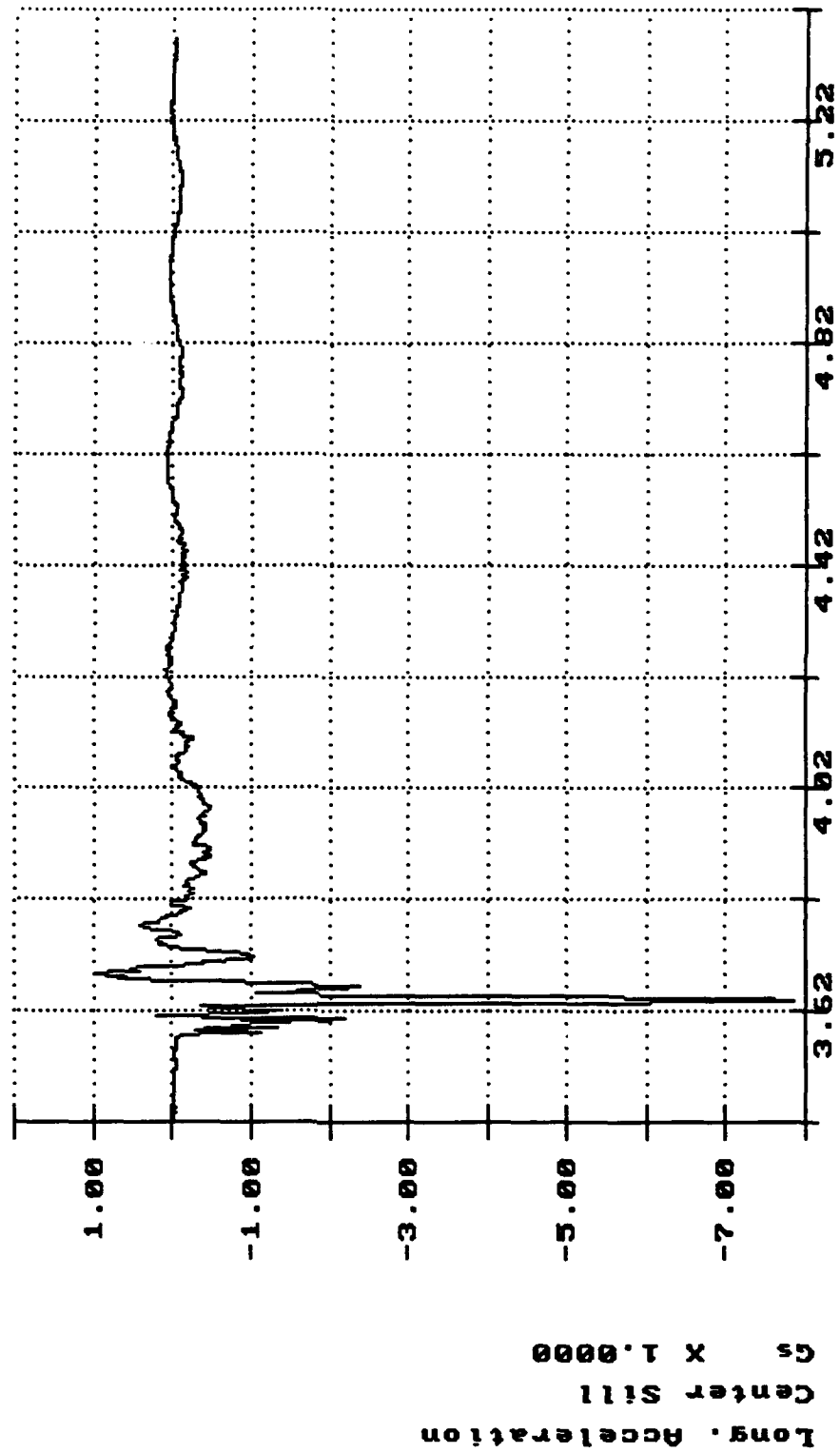
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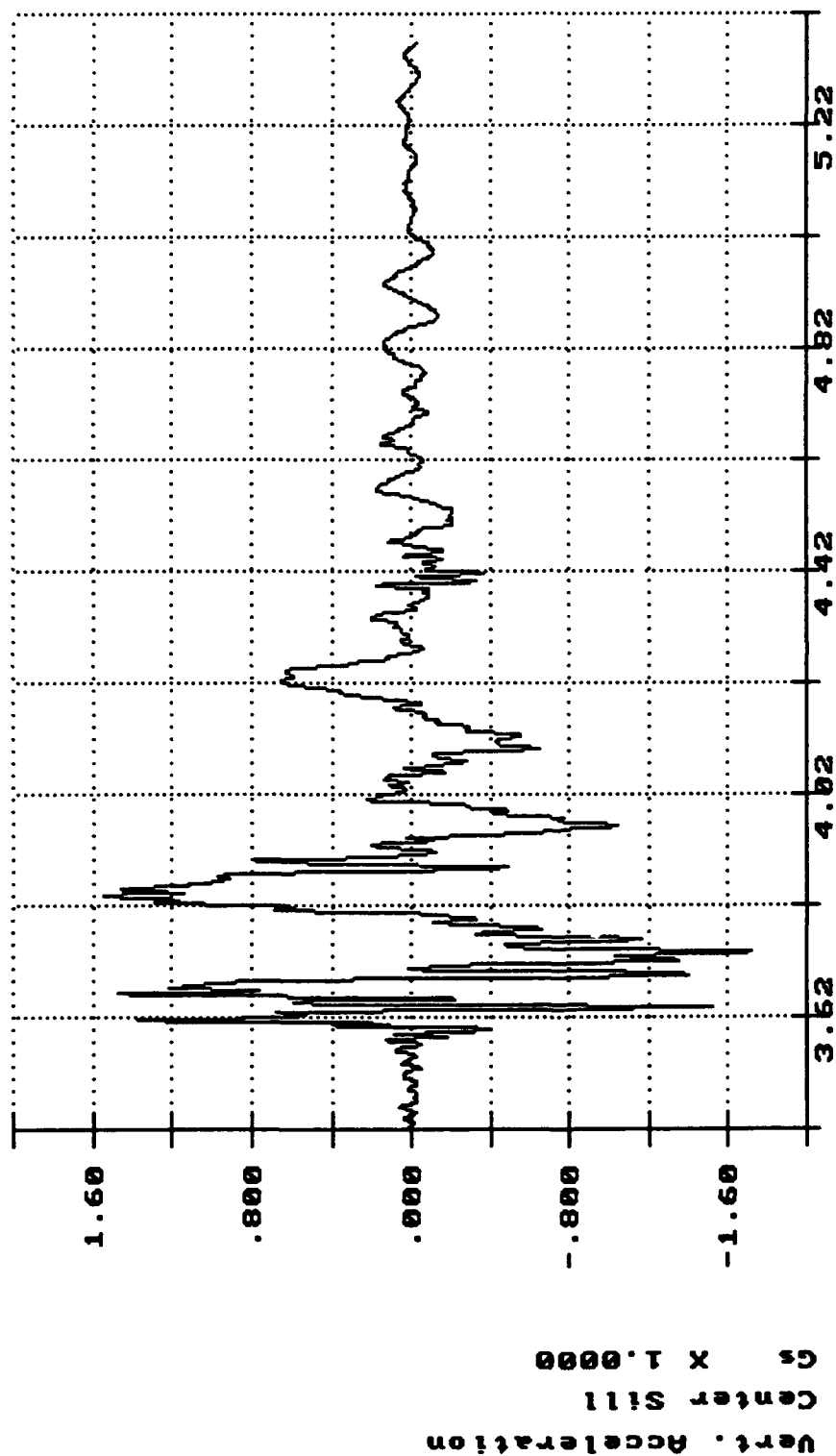


R.I. of M876A1 Tel. Truck, #4: 6.12 MPH Apr 28 13:56:59 1993

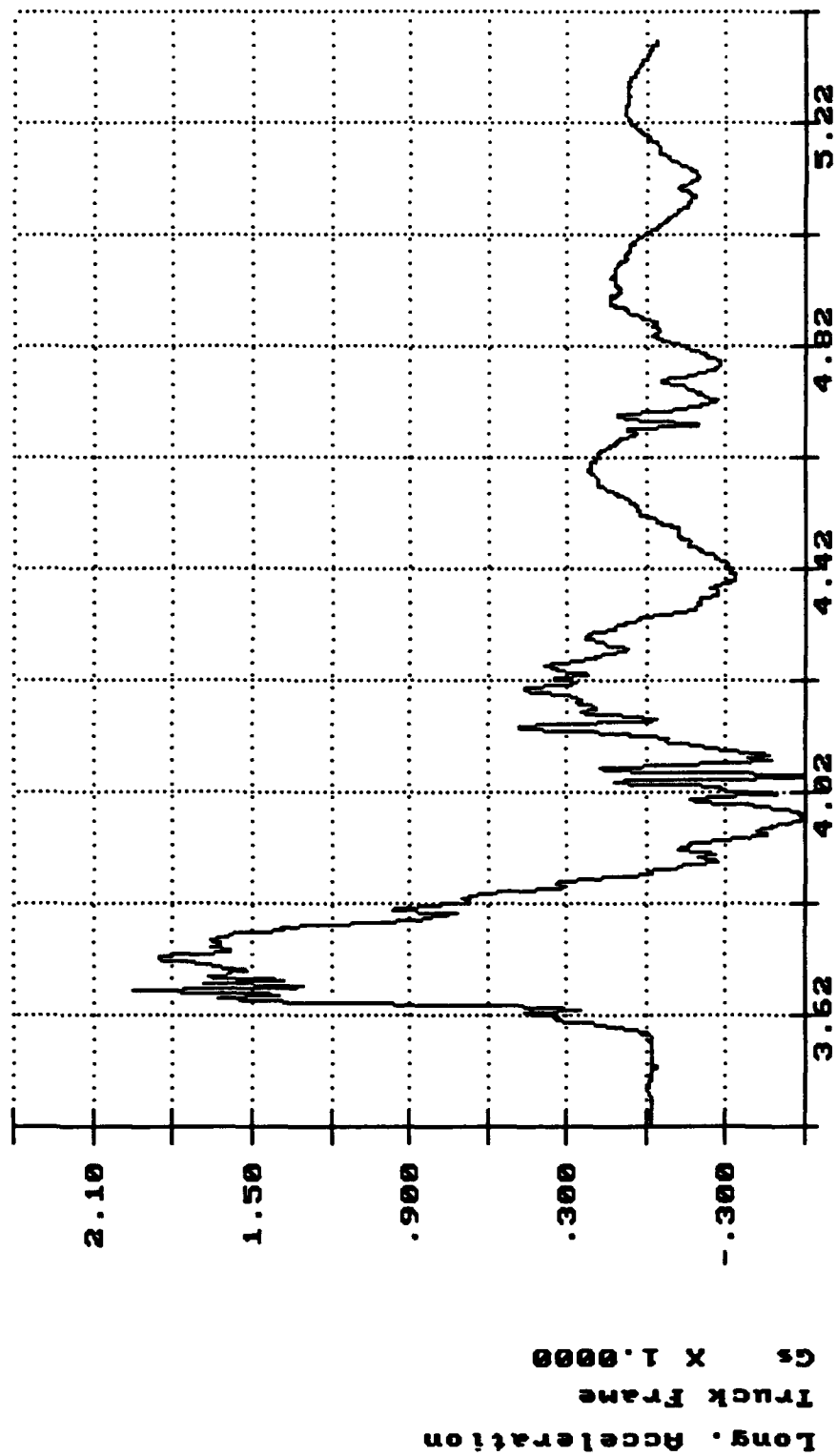


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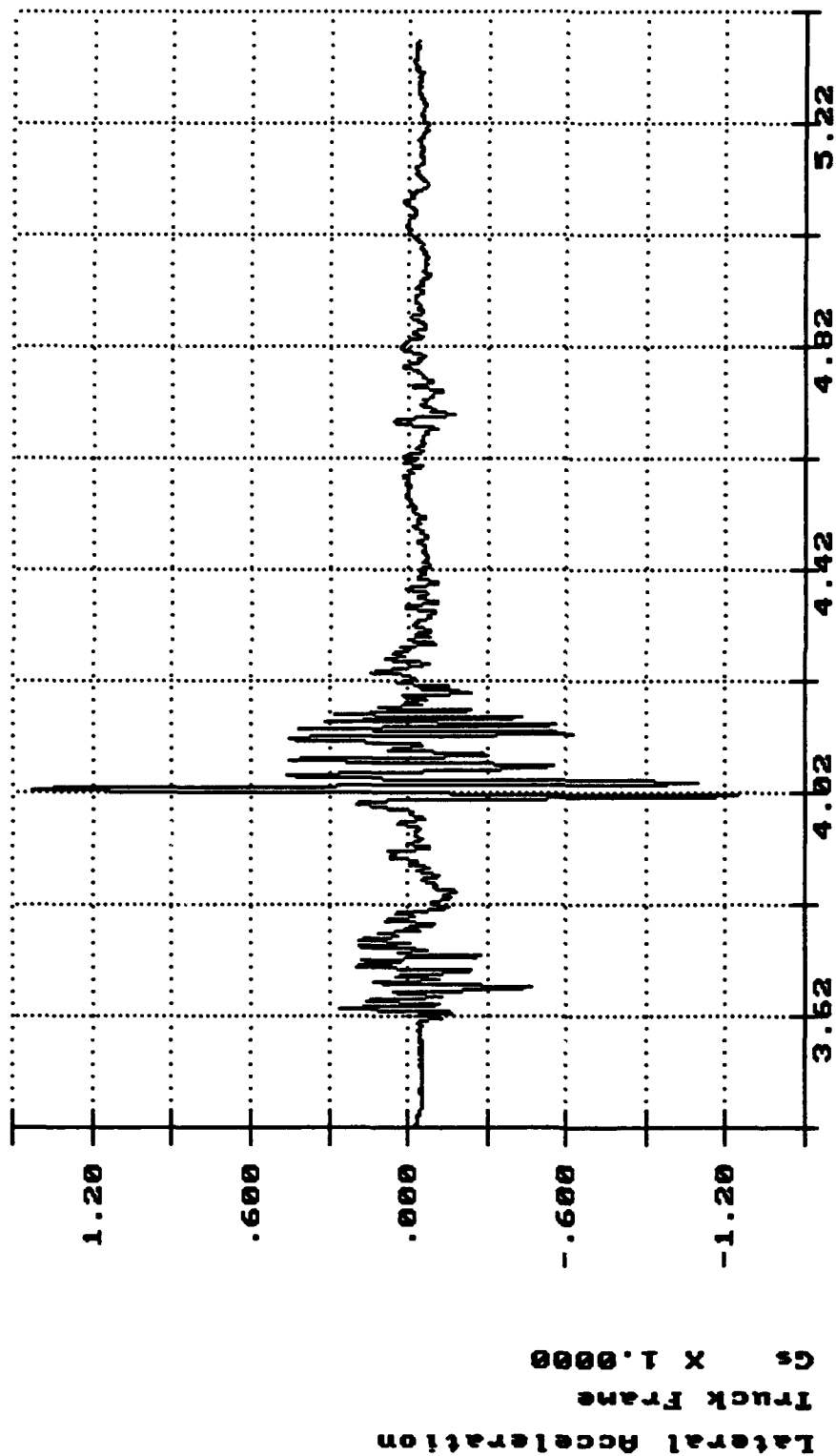


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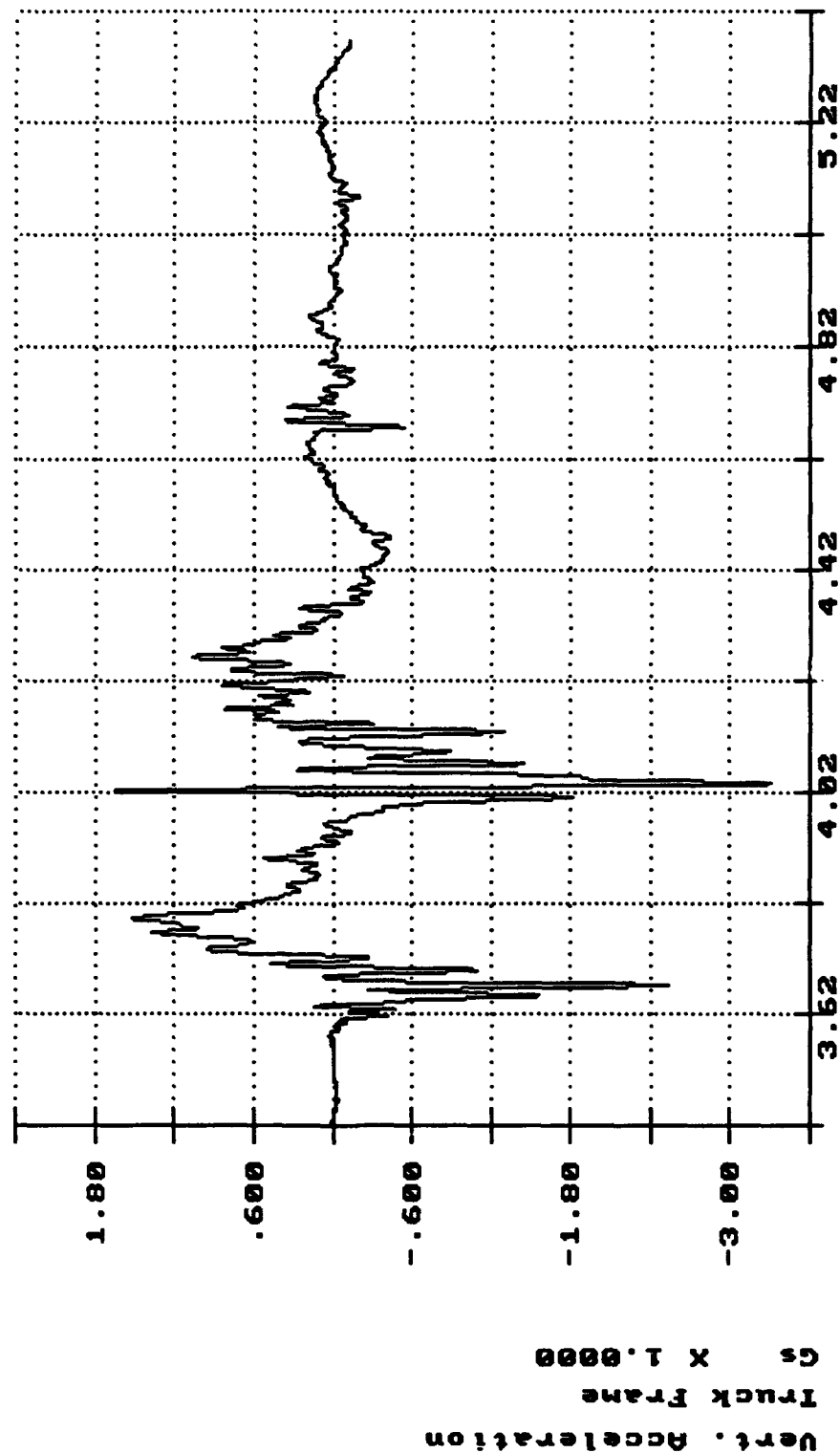


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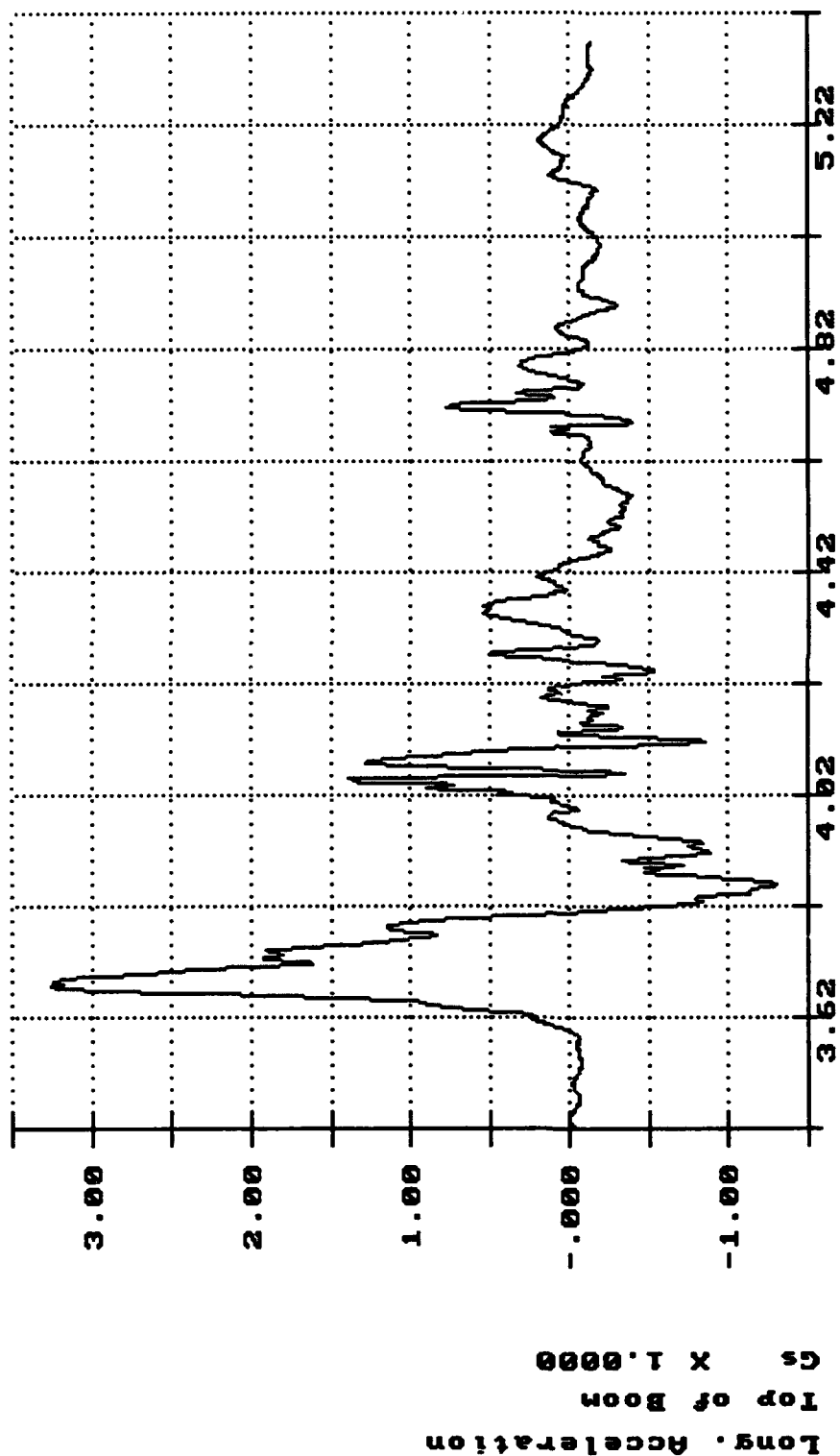
R.I. of M876A1 Tel. Truck, #4: 6.12 MPH Apr 28 13:56:59 1993



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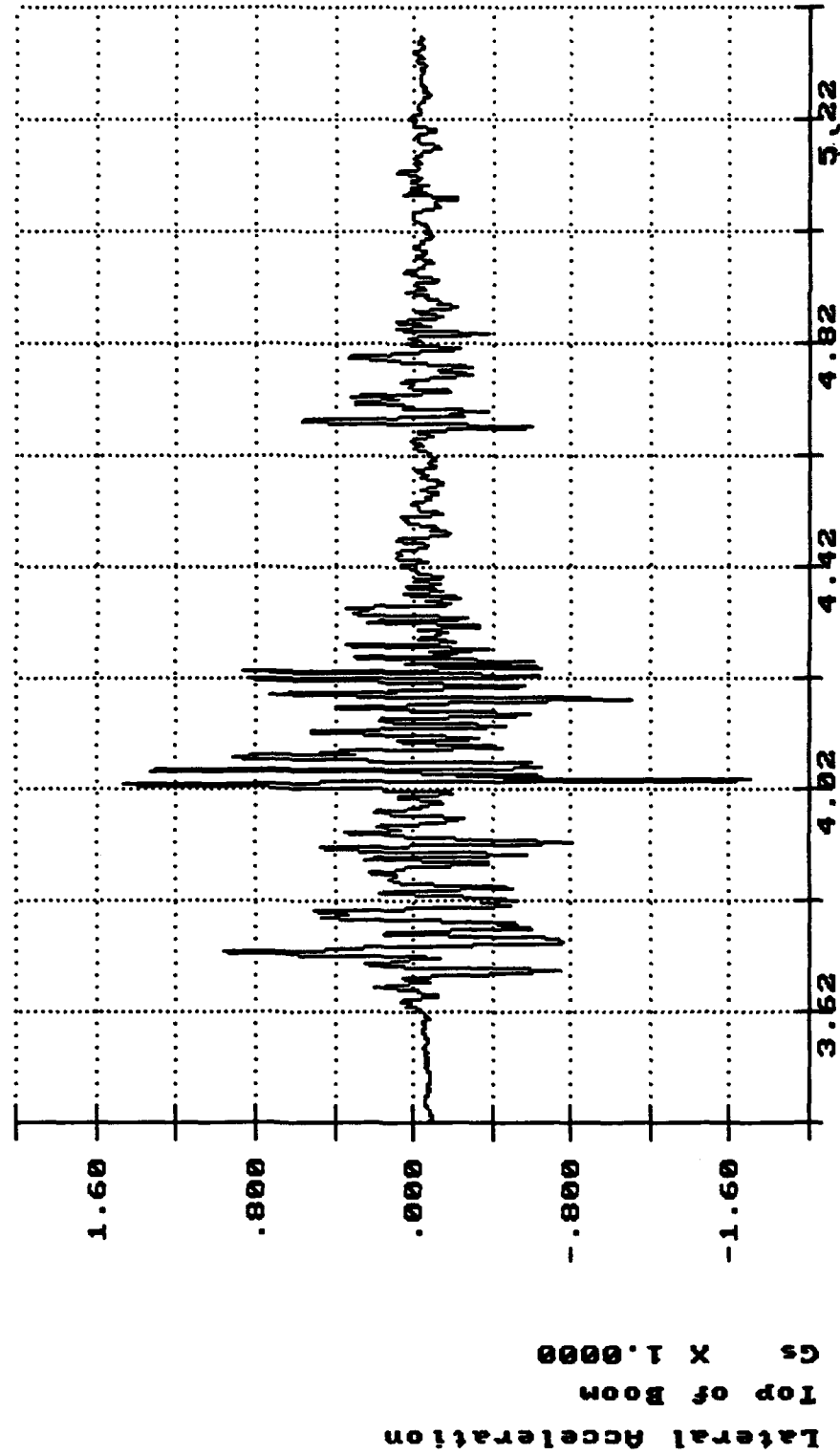


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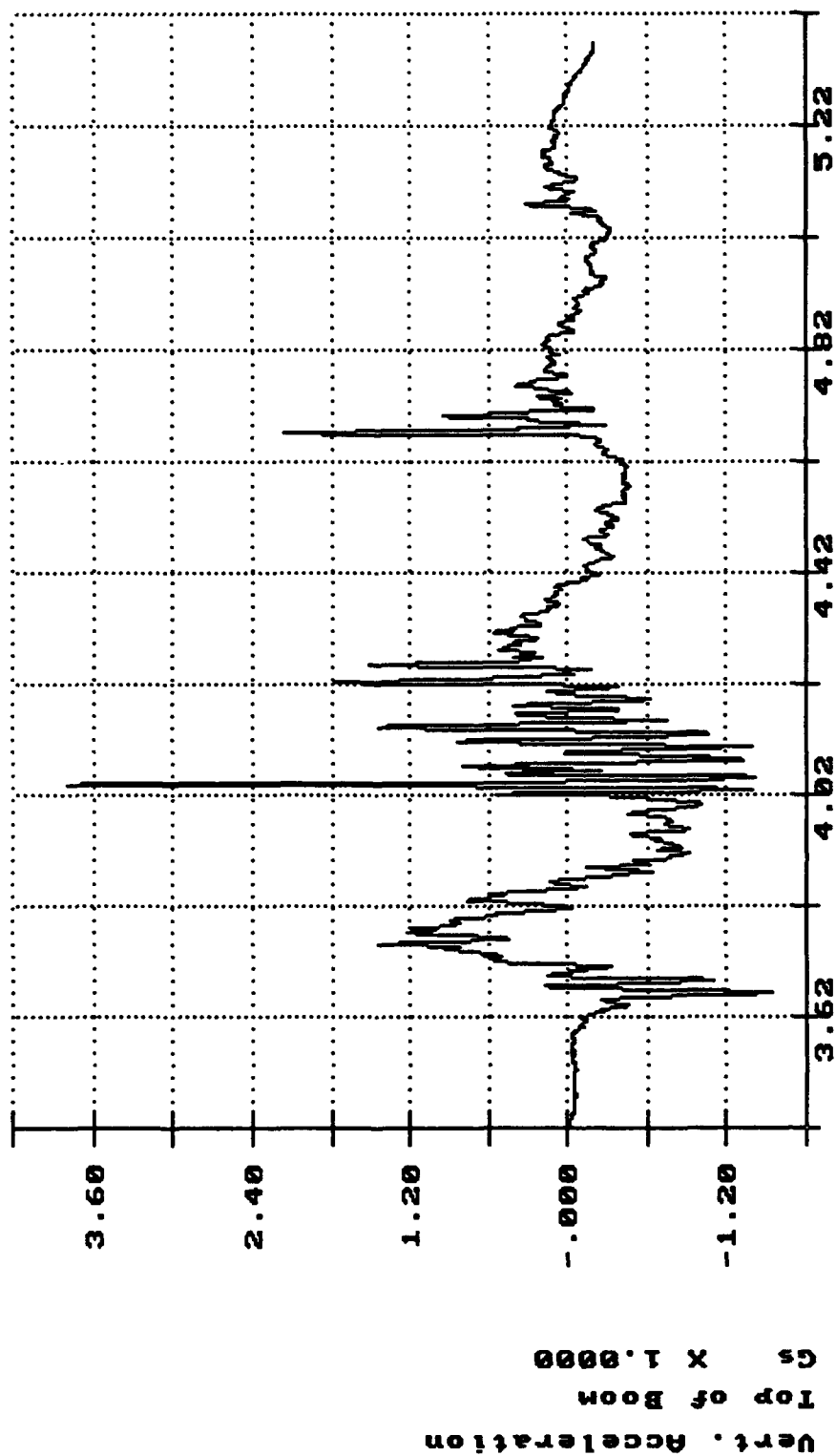
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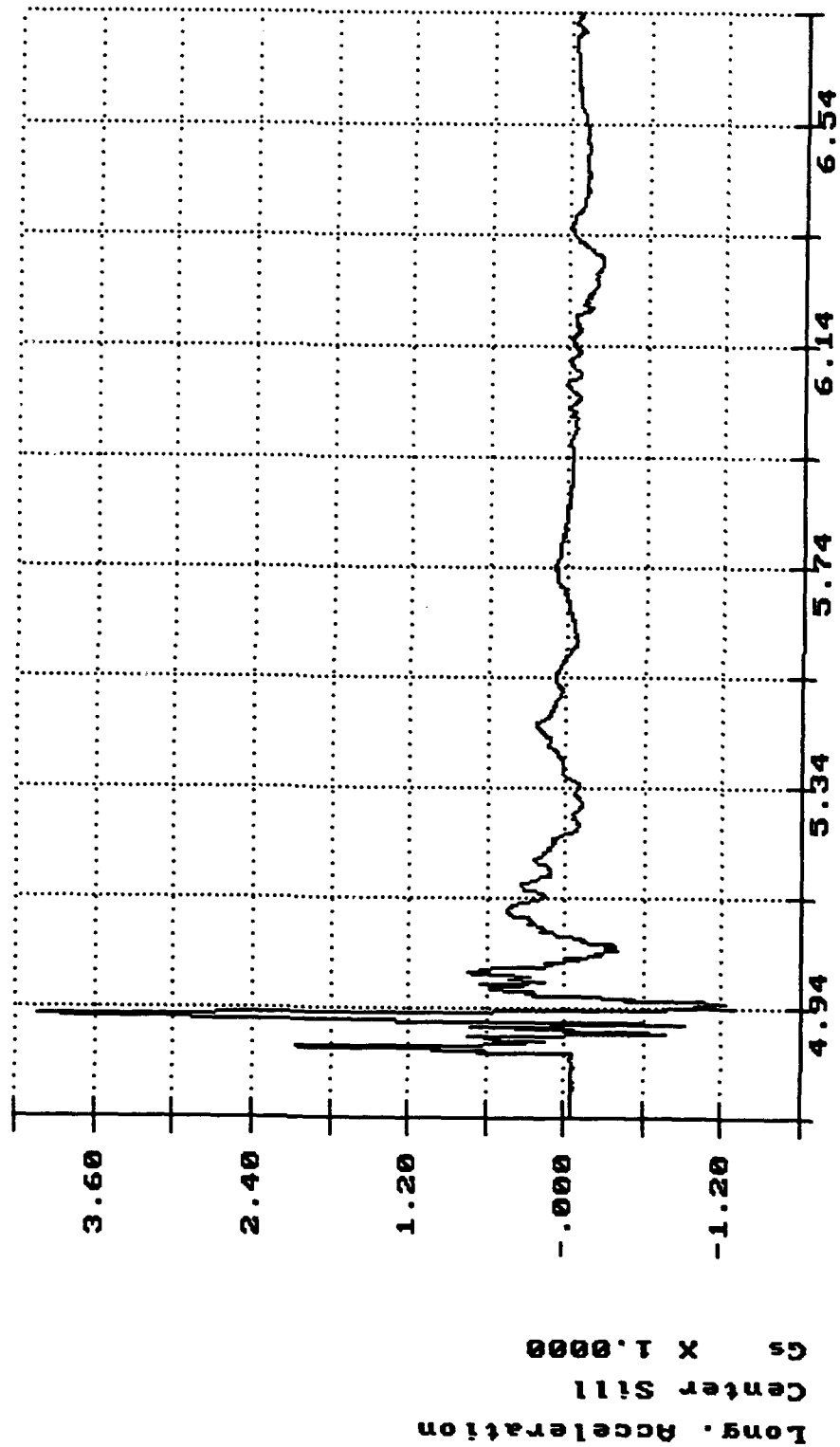


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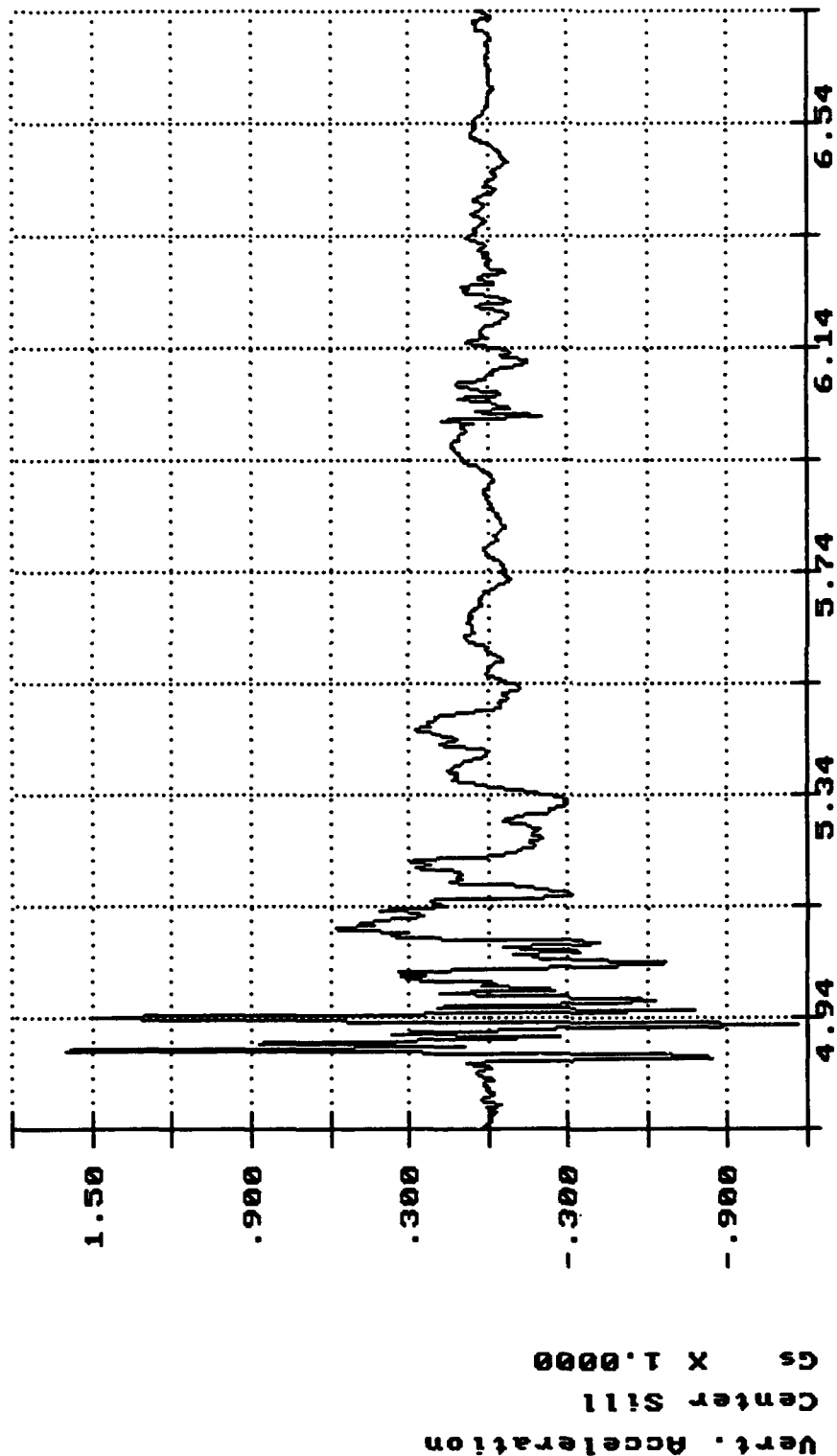
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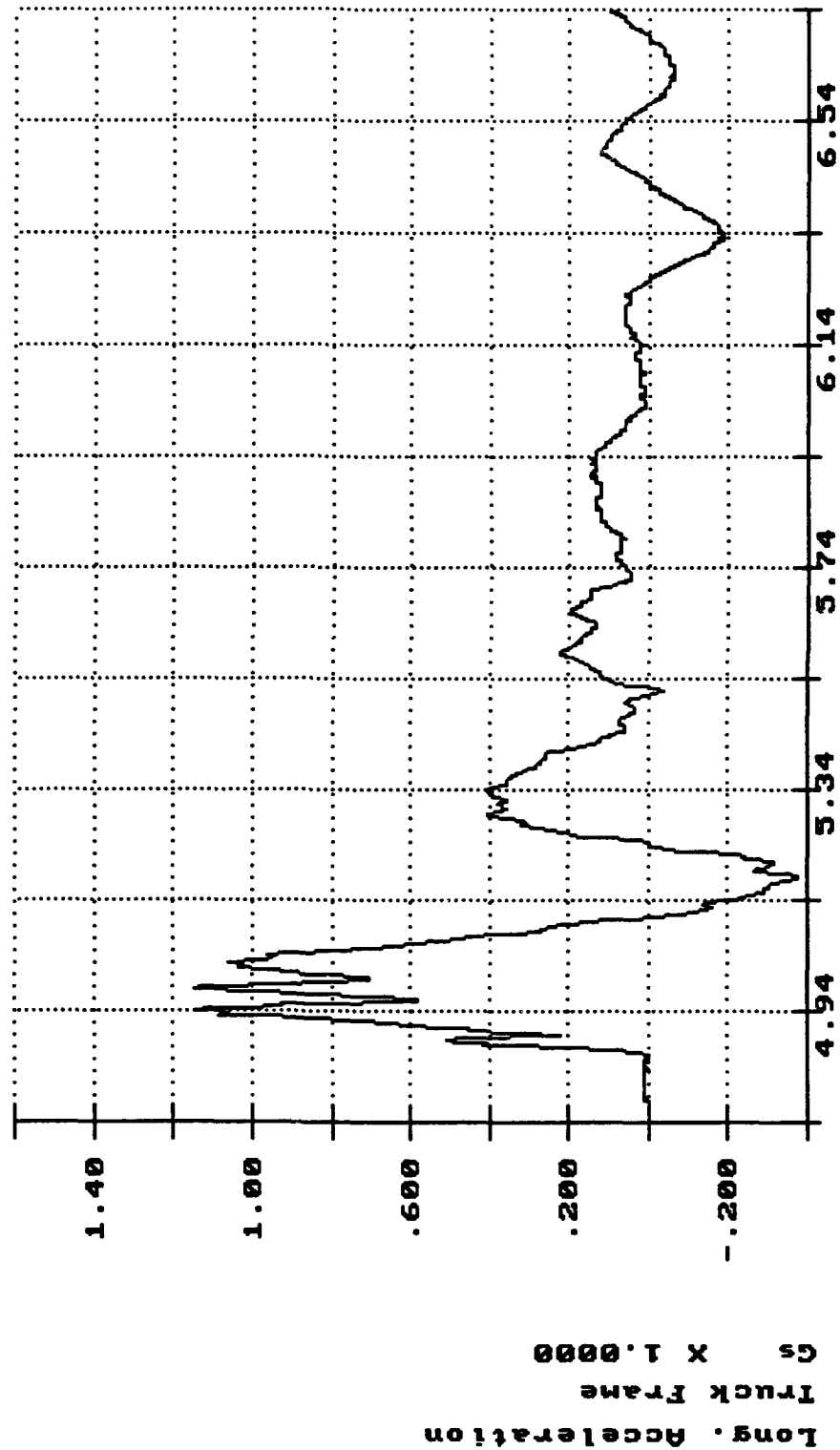
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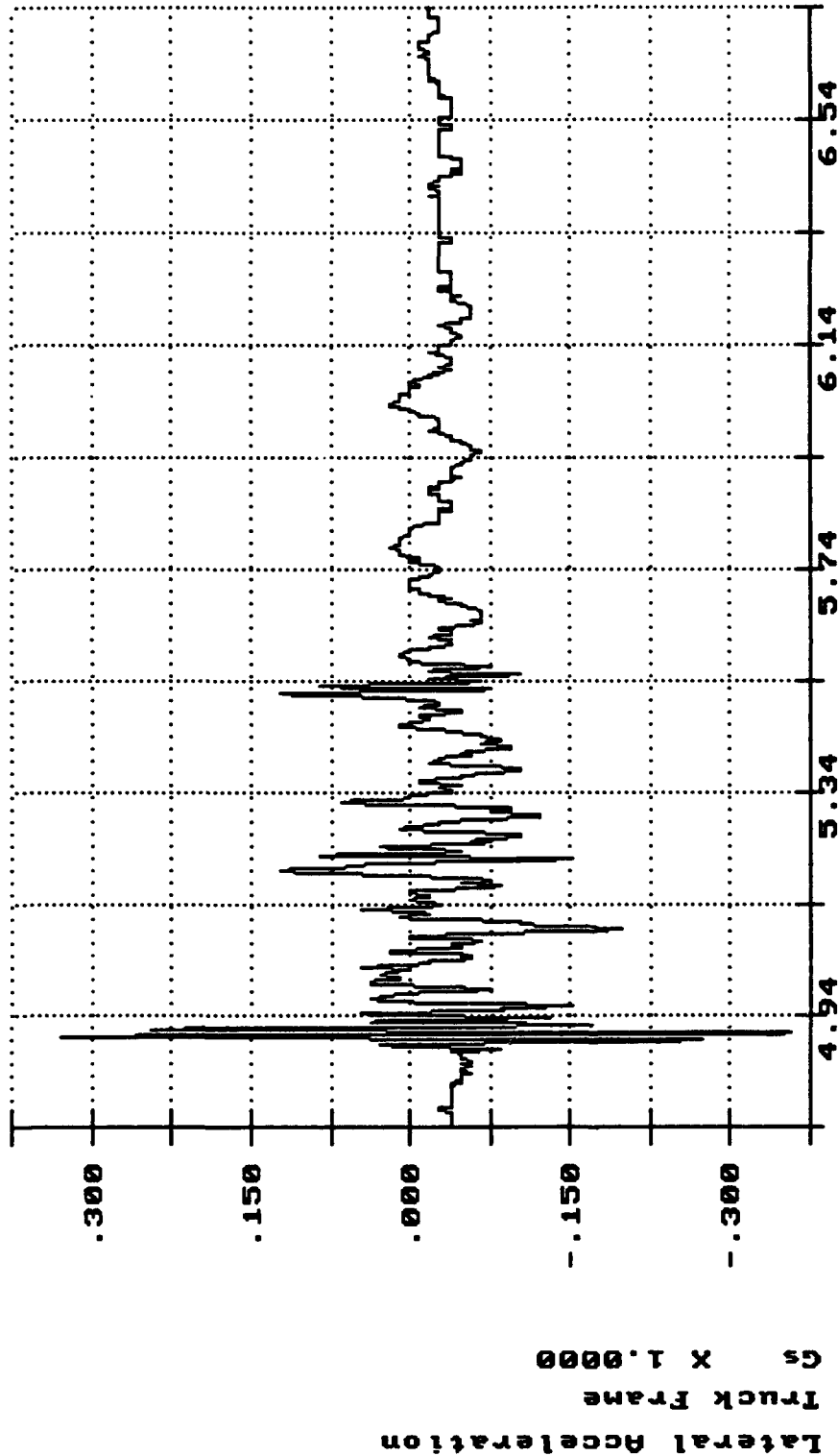


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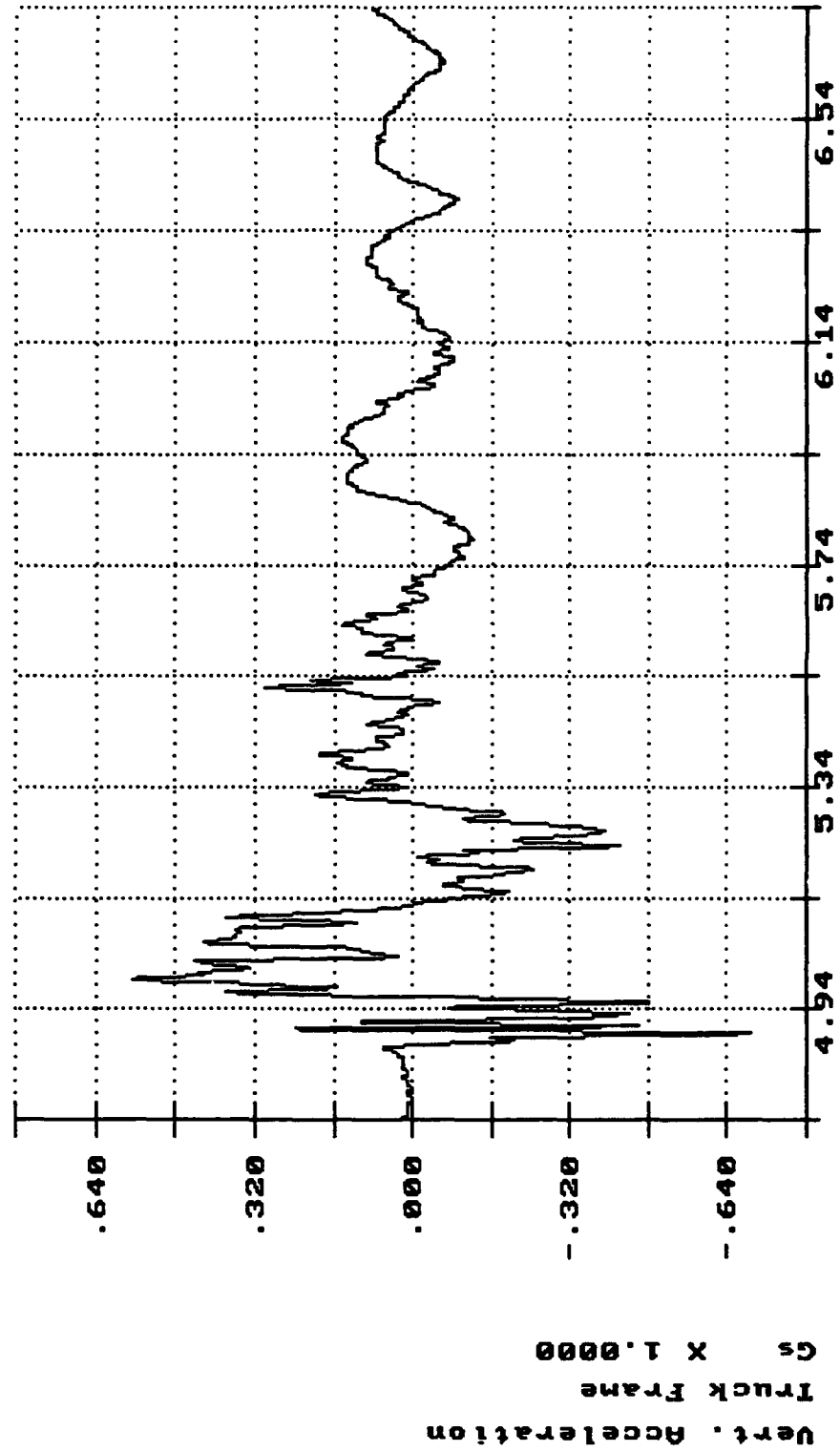


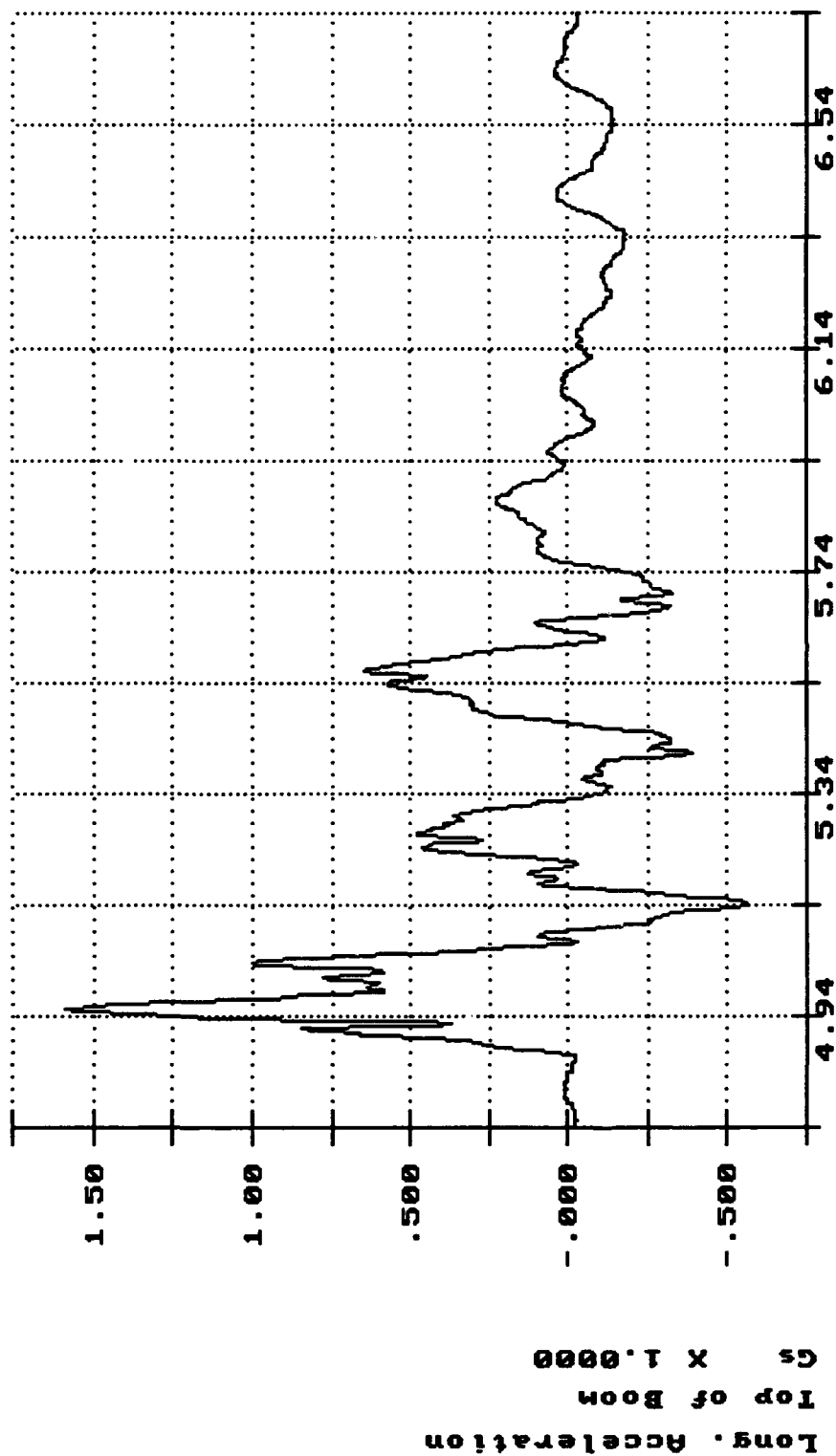
Time of Sample

Seconds X 1.0000



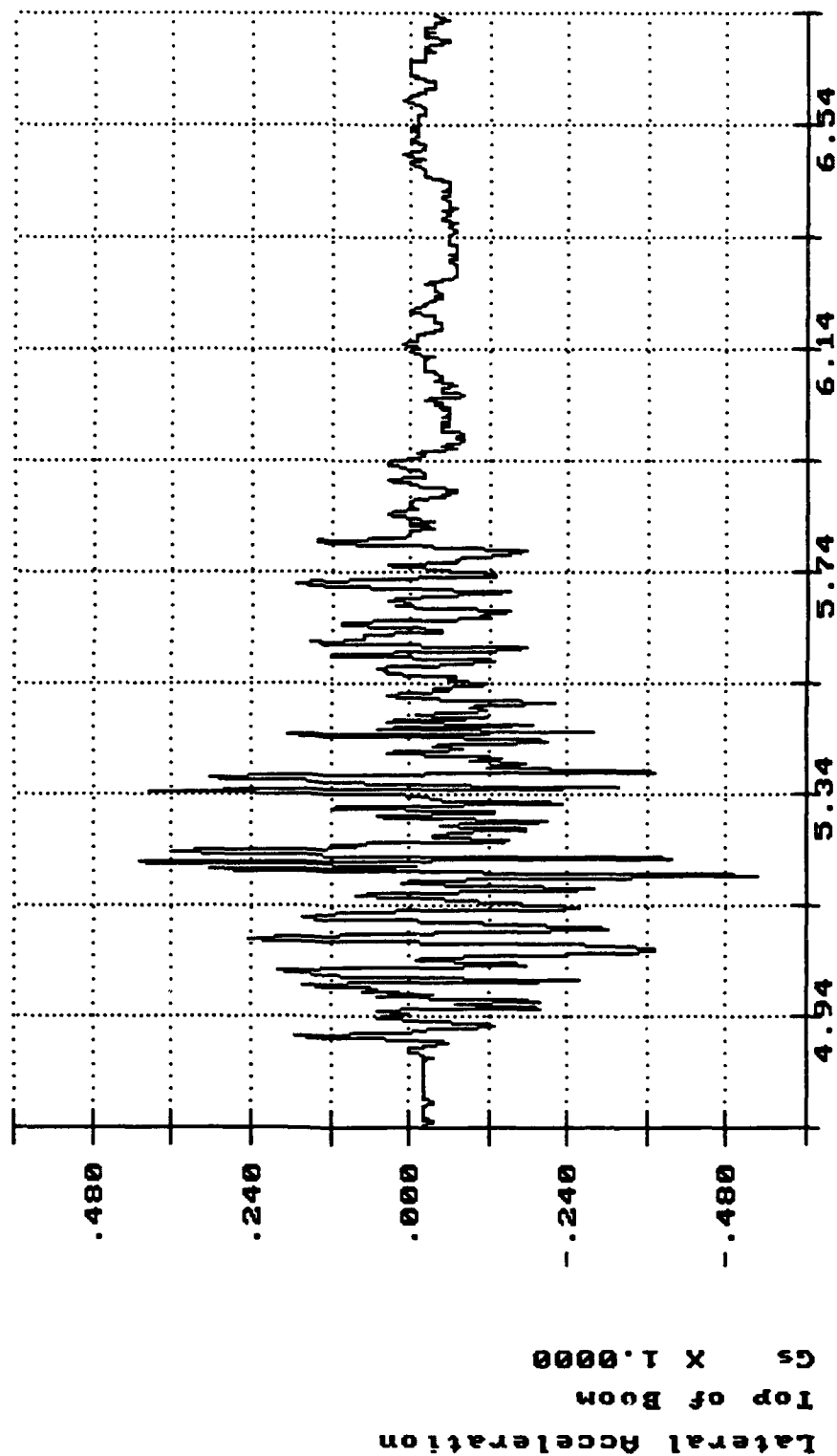
R.I. of M876A1 Tel. Truck, #1: 4.26 MPH May 07 11:25:06 1993



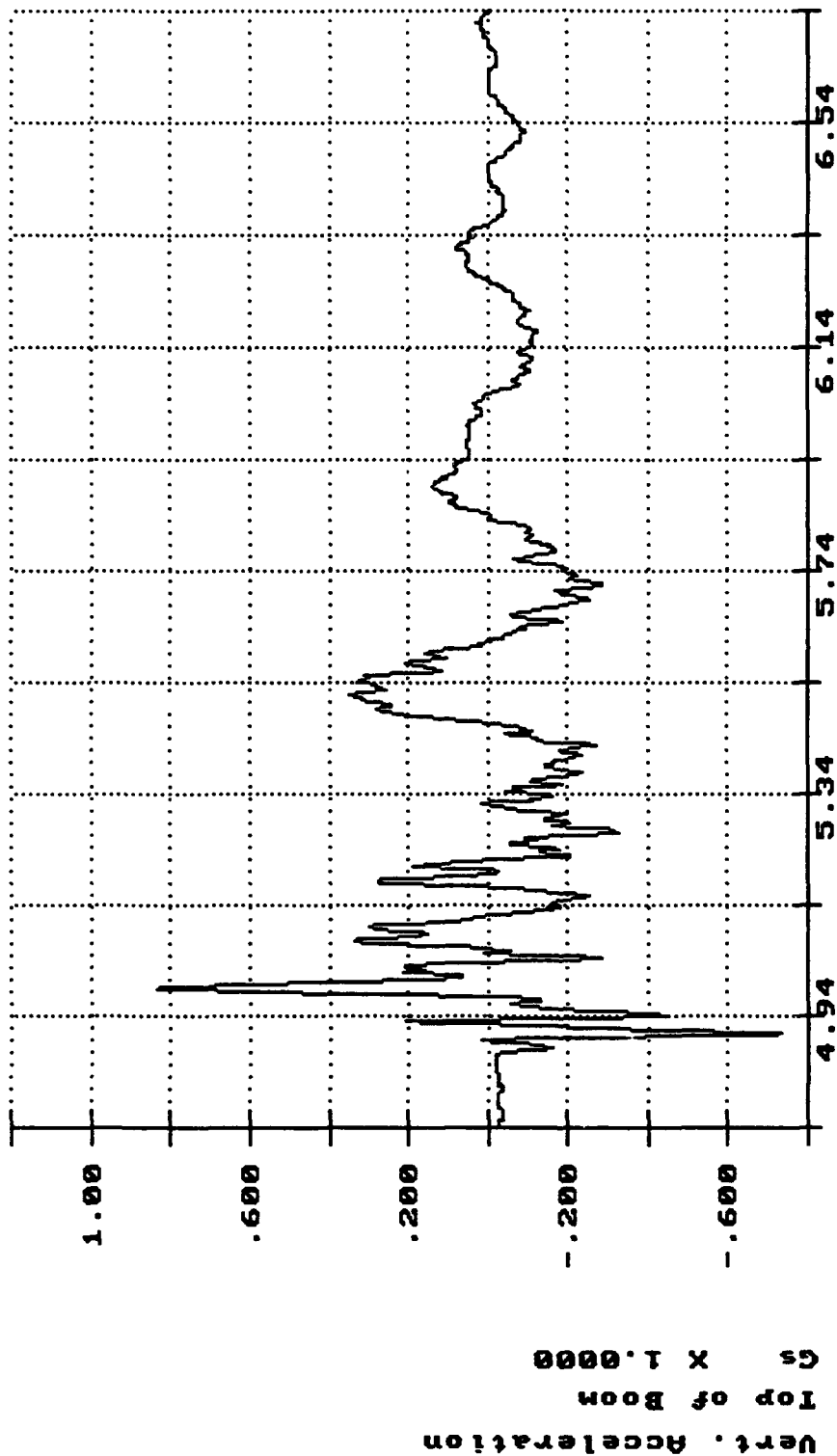


Time of Sample
Seconds X 1.0000

R.I. of M876A1 Tel. Truck, #1: 4.26 MPH May 07 11:25:06 1993

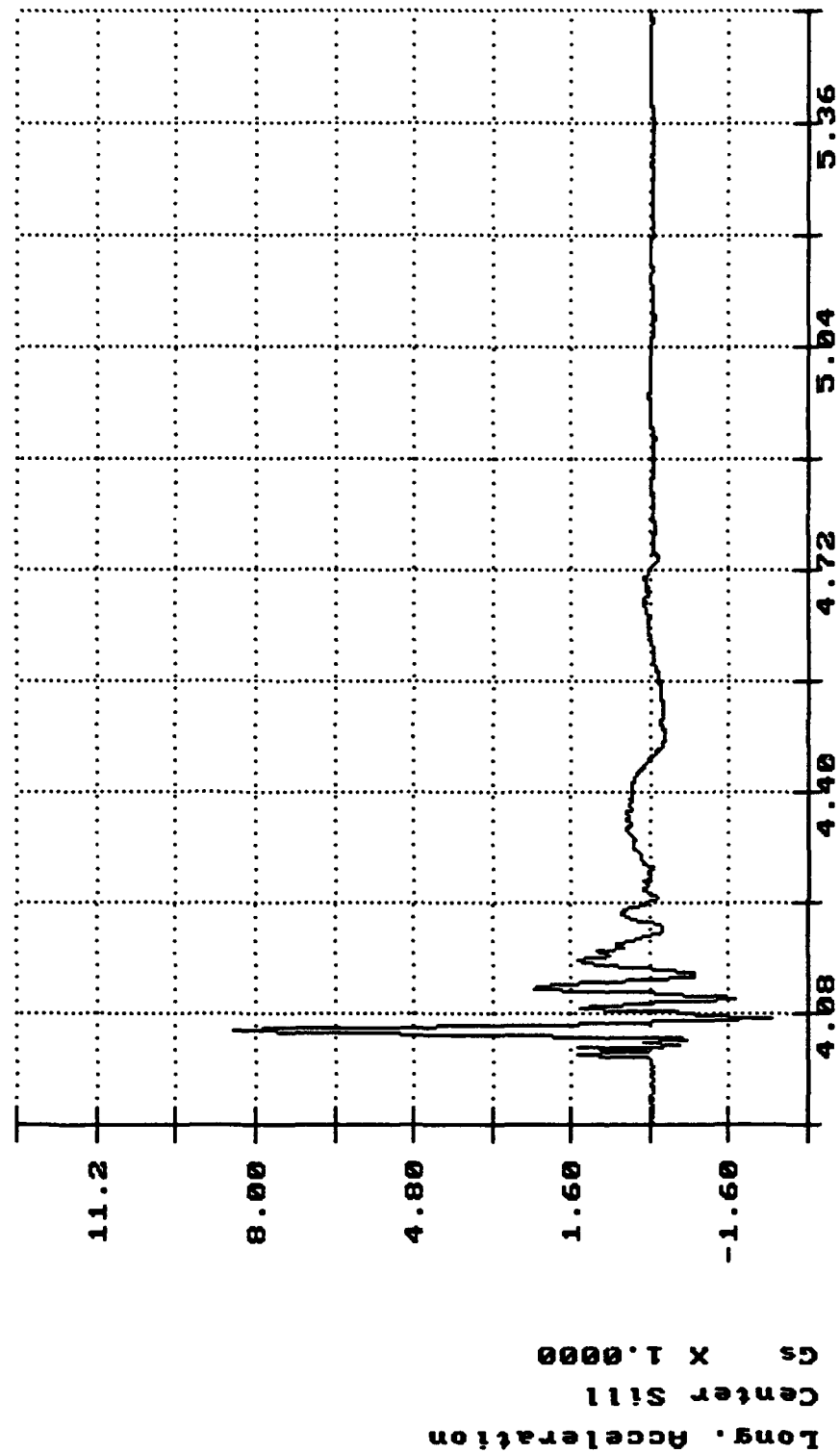


R.I. of M876A1 Tel. Truck, #1: 4.26 MPH May 07 11:25:06 1993



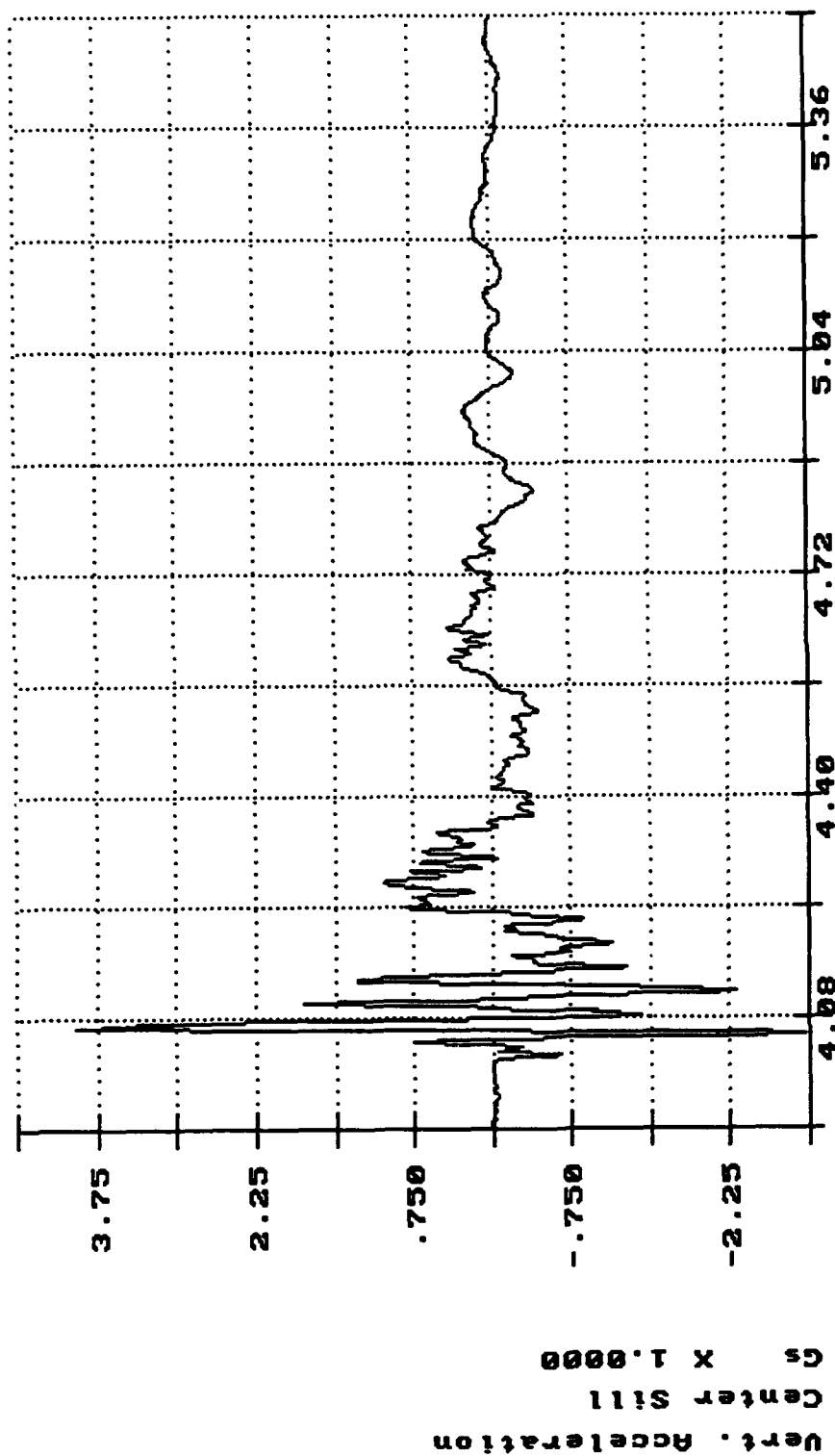
Time of Sample
Seconds X 1.0000

R.I. of M876A1 Tel. Truck, #2: 6.30 MPH May 07 11:31:41 1993

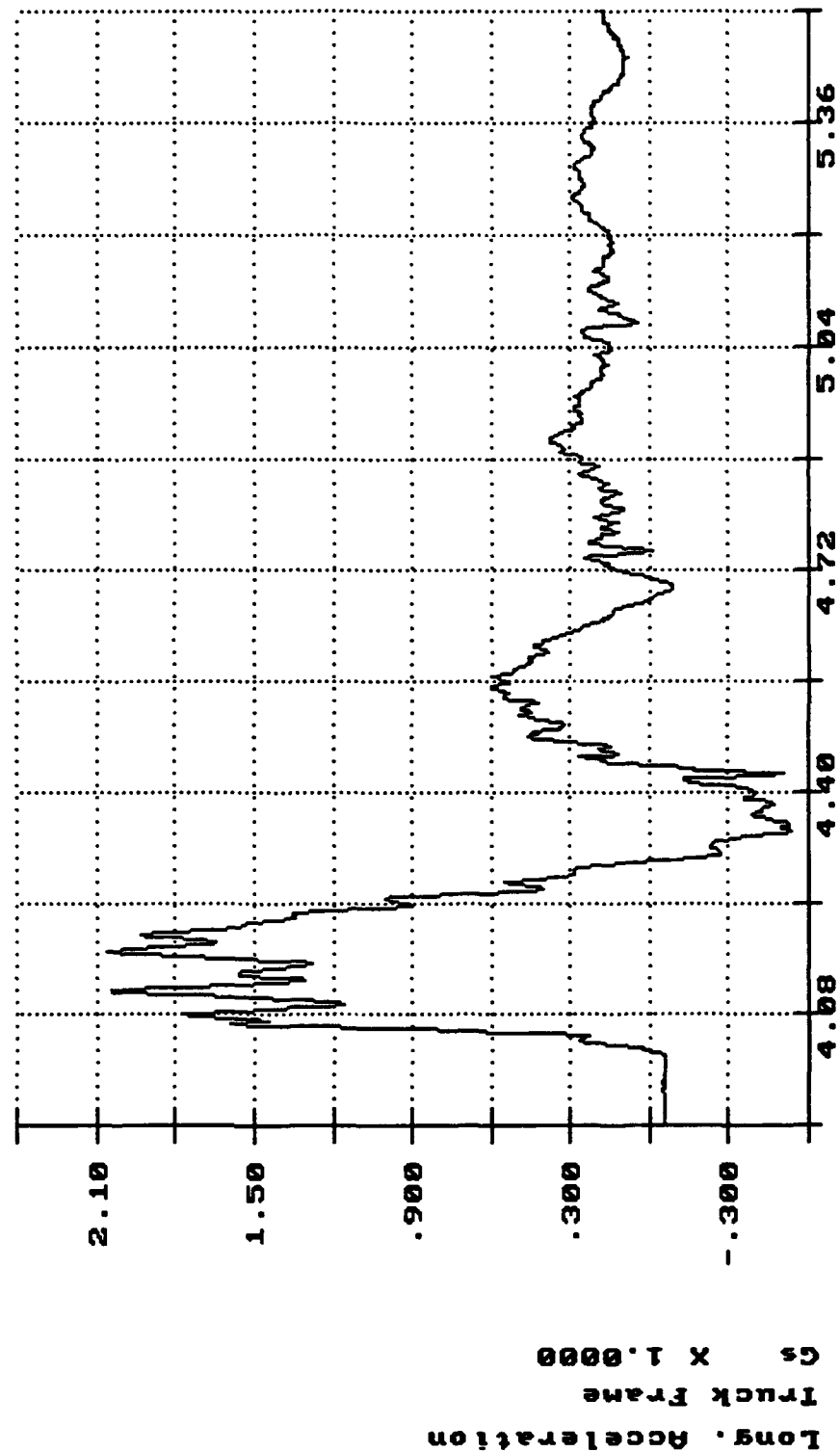


Time of Sample
Seconds X 1.0000

R.I. of M876A1 Tel. Truck, #2: 6.30 MPH May 07 11:31:41 1993

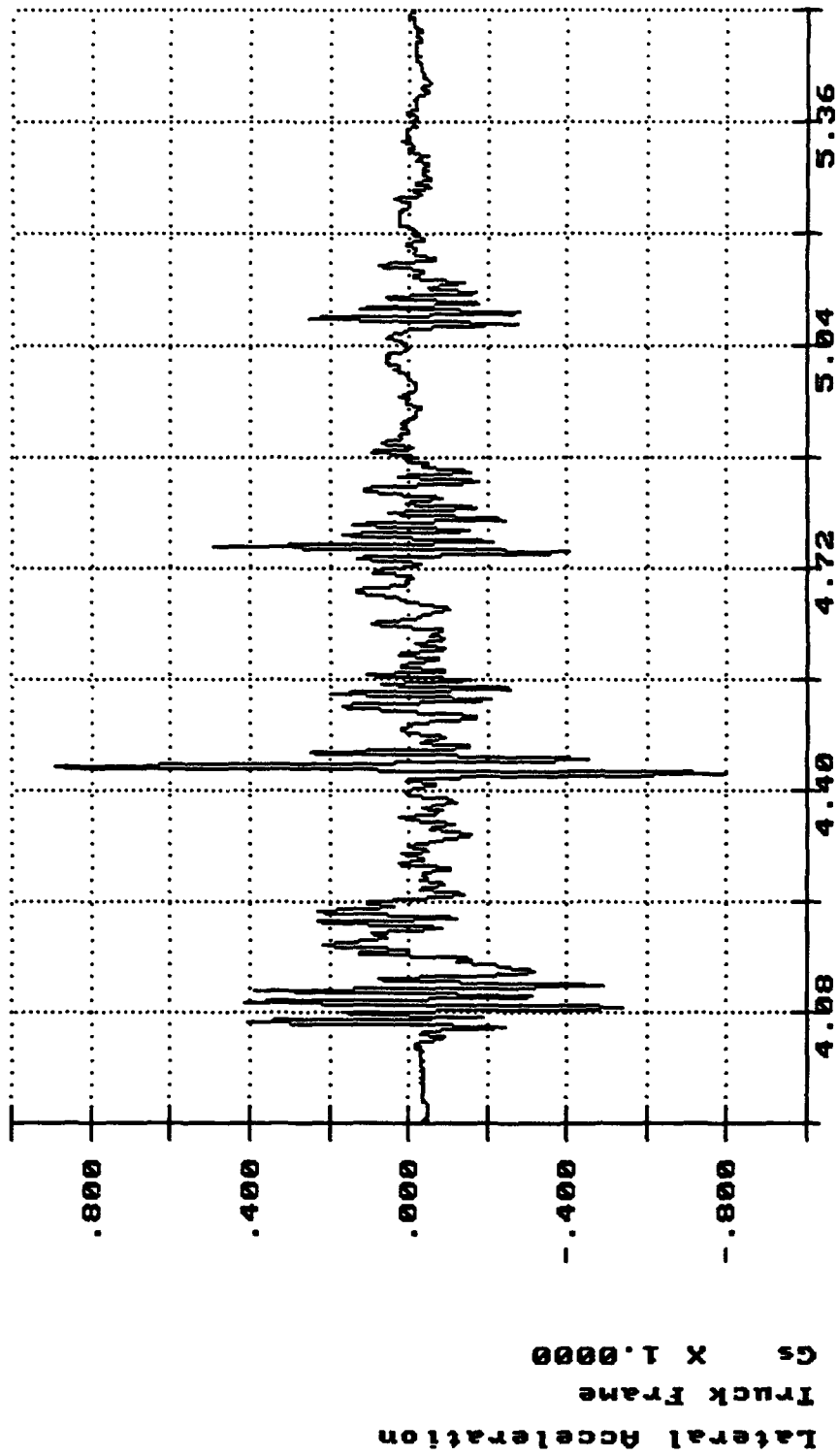


R.I. of M876A1 Tel. Truck, #2: 6.30 MPH May 07 11:31:41 1993

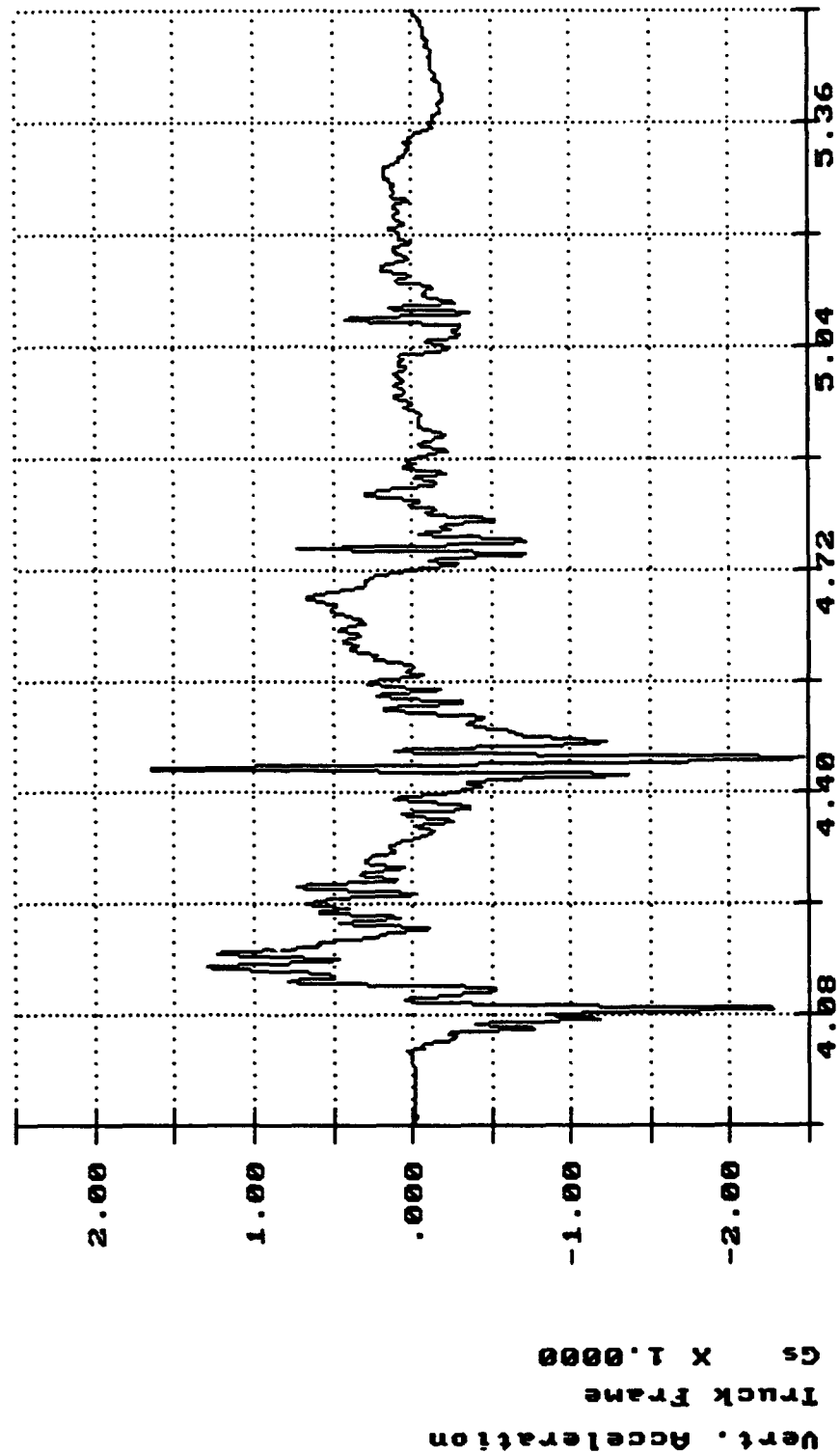


Time of Sample
Seconds X 1.0000

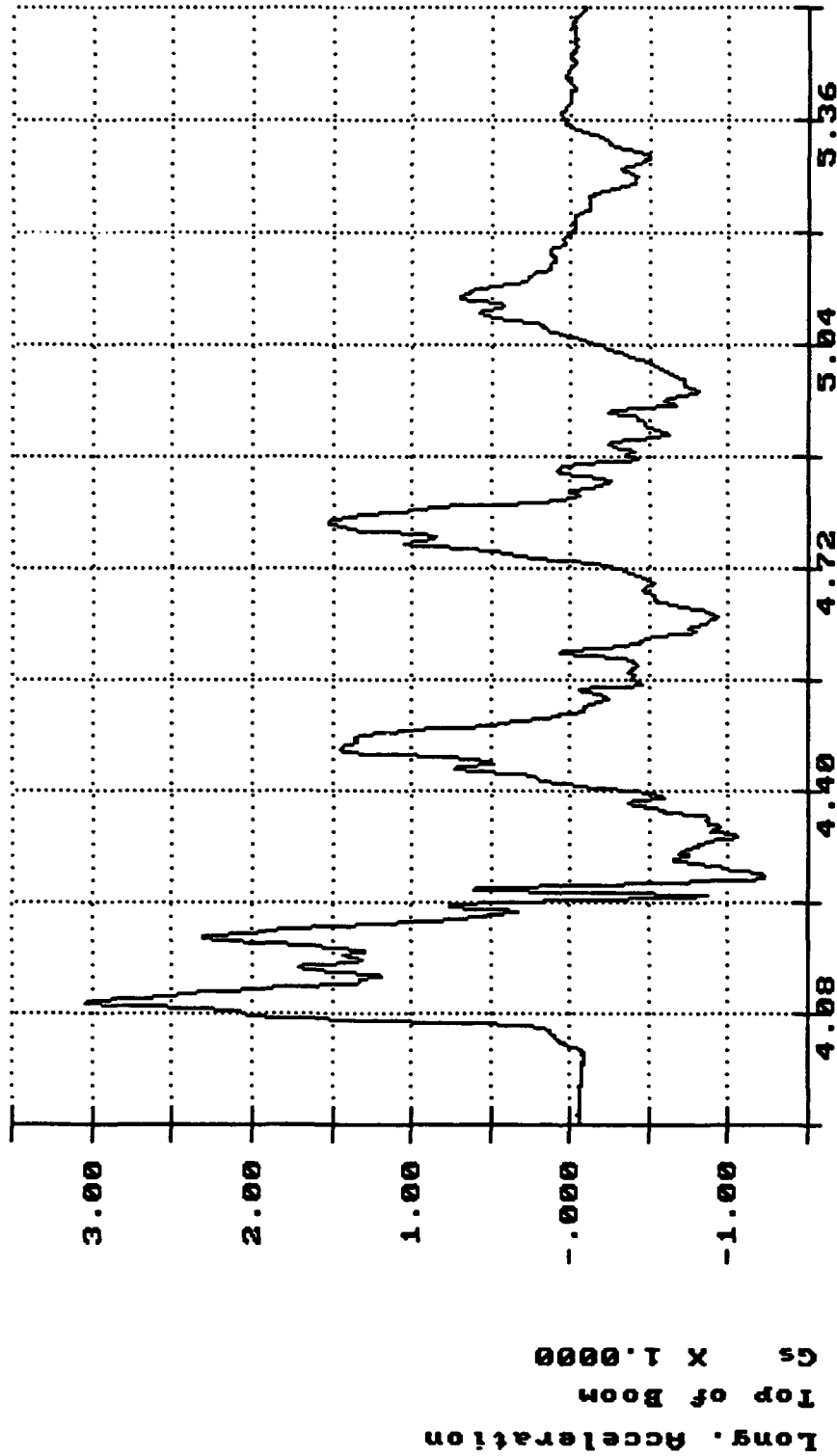
R.I. of M876A1 Tel. Truck, #2: 6.30 MPH May 07 11:31:41 1993



R.I. of M876A1 Tel. Truck, #2: 6.30 MPH May 07 11:31:41 1993



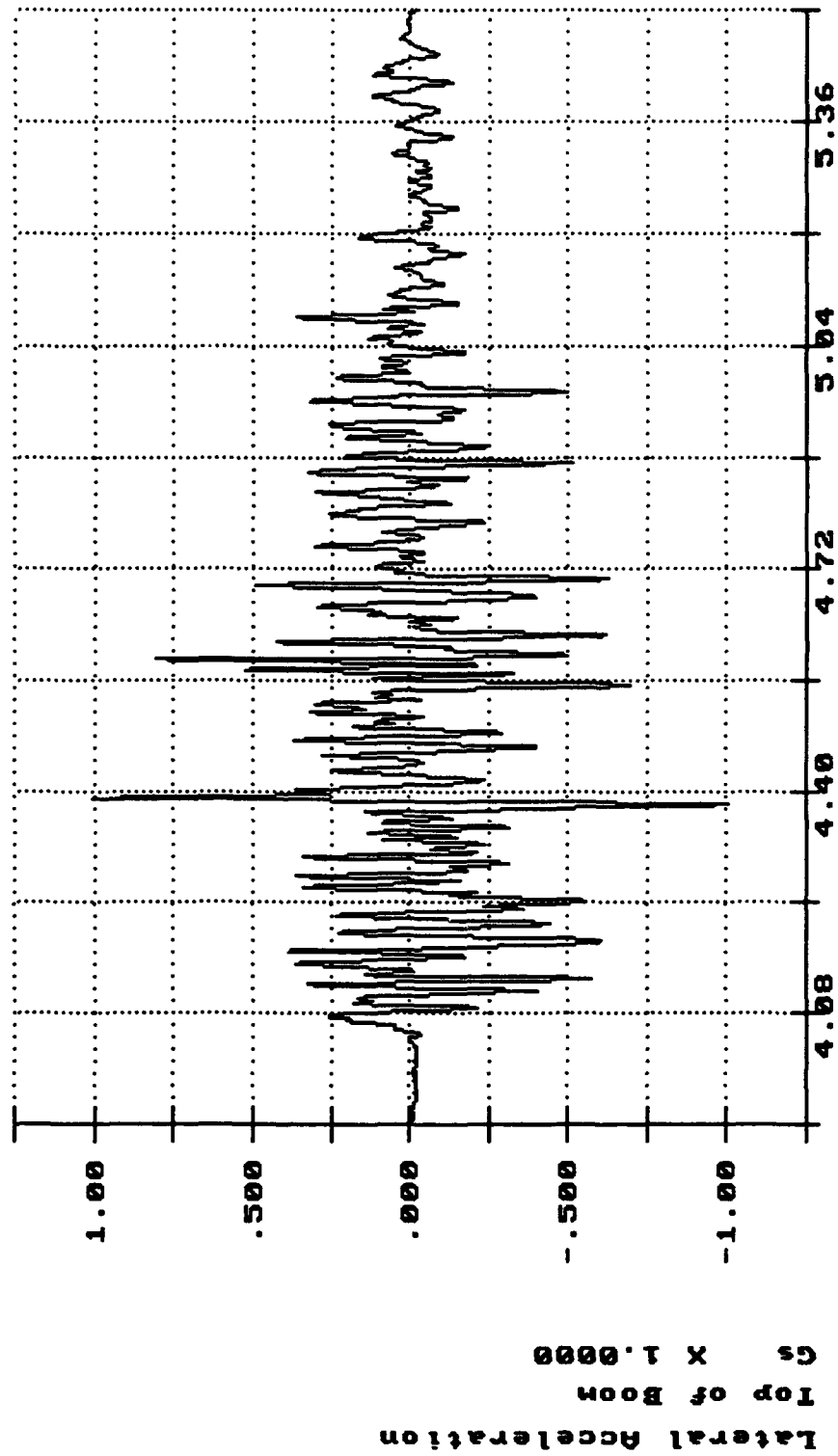
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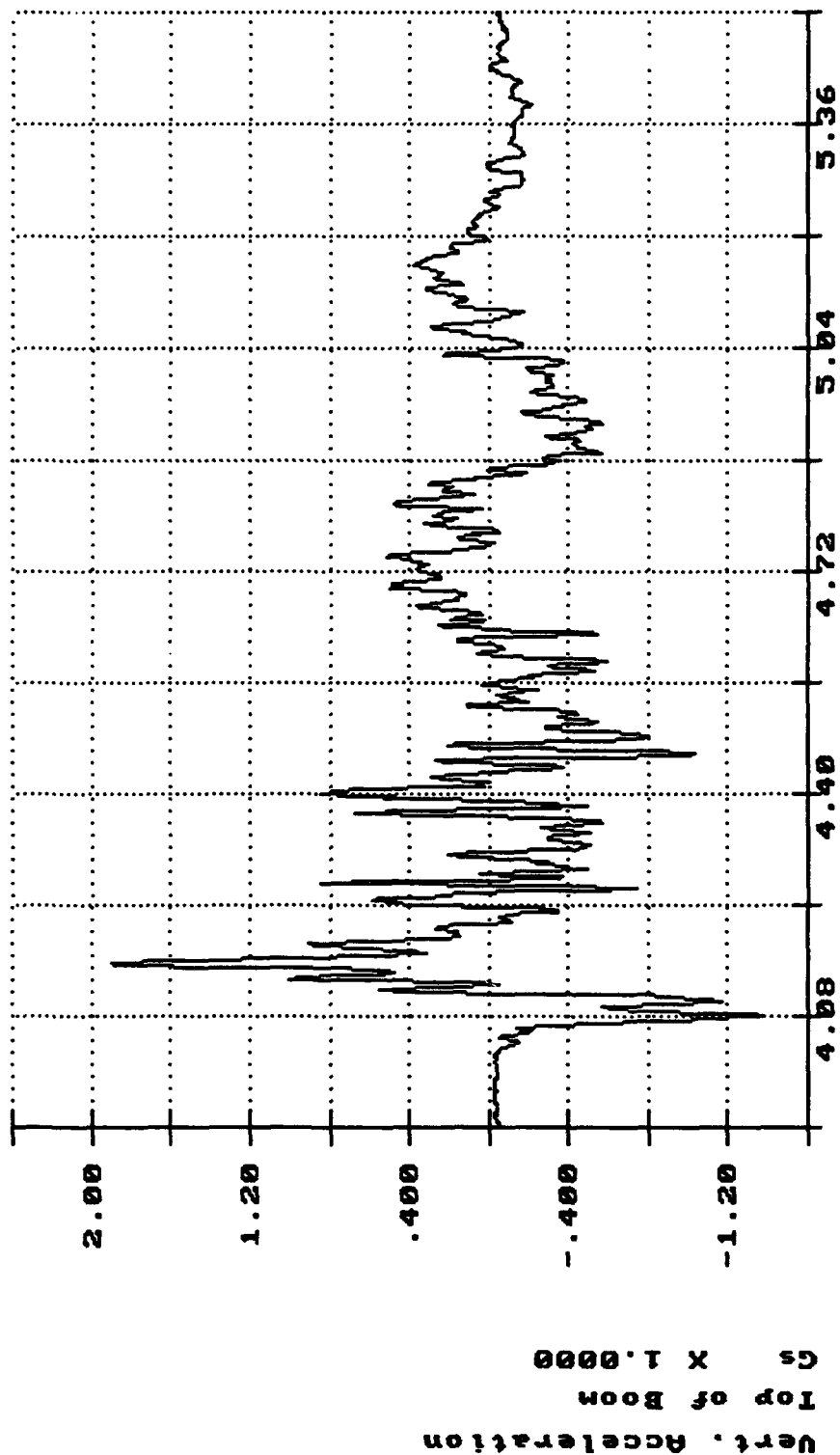
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Seconds X 1.0000

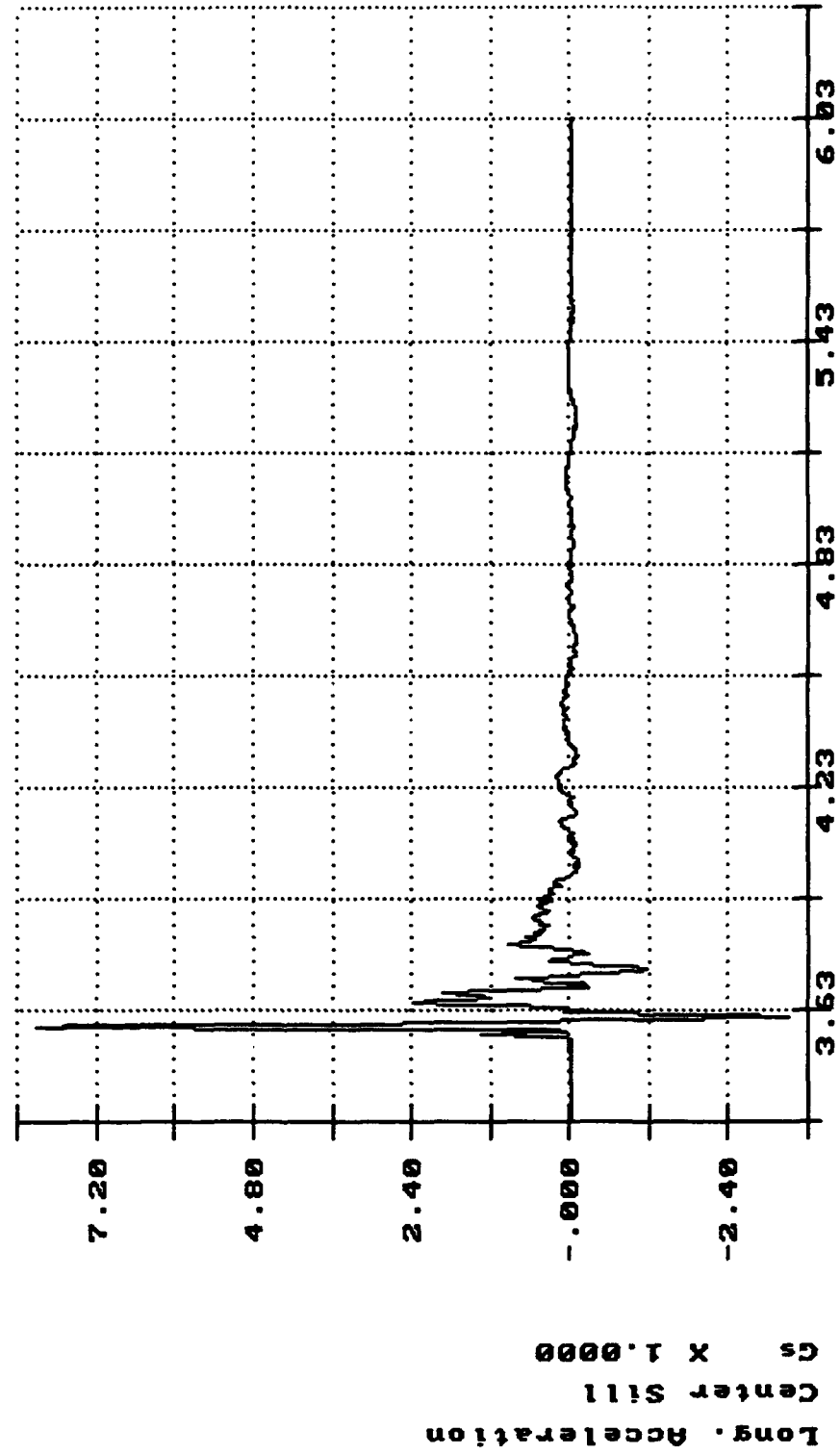
R.I. of M876A1 Tel. Truck, #2: 6.30 MPH May 07 11:31:41 1993



R.I. of M876A1 Tel. Truck, #2: 6.30 MPH May 07 11:31:41 1993

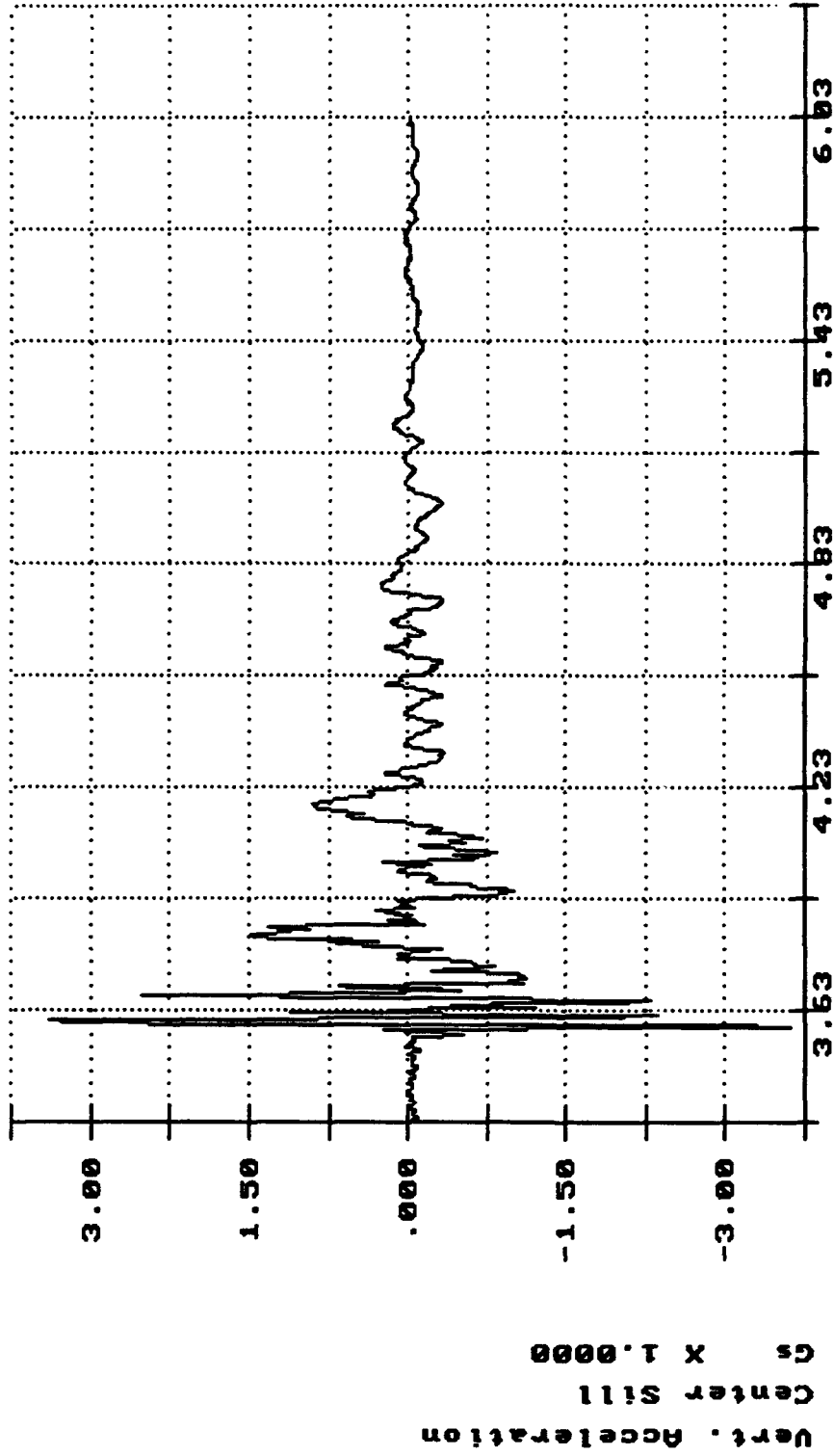


R.I. of M876A1 Tel. Truck, #3: 8.15 MPH May 07 11:40:54 1993

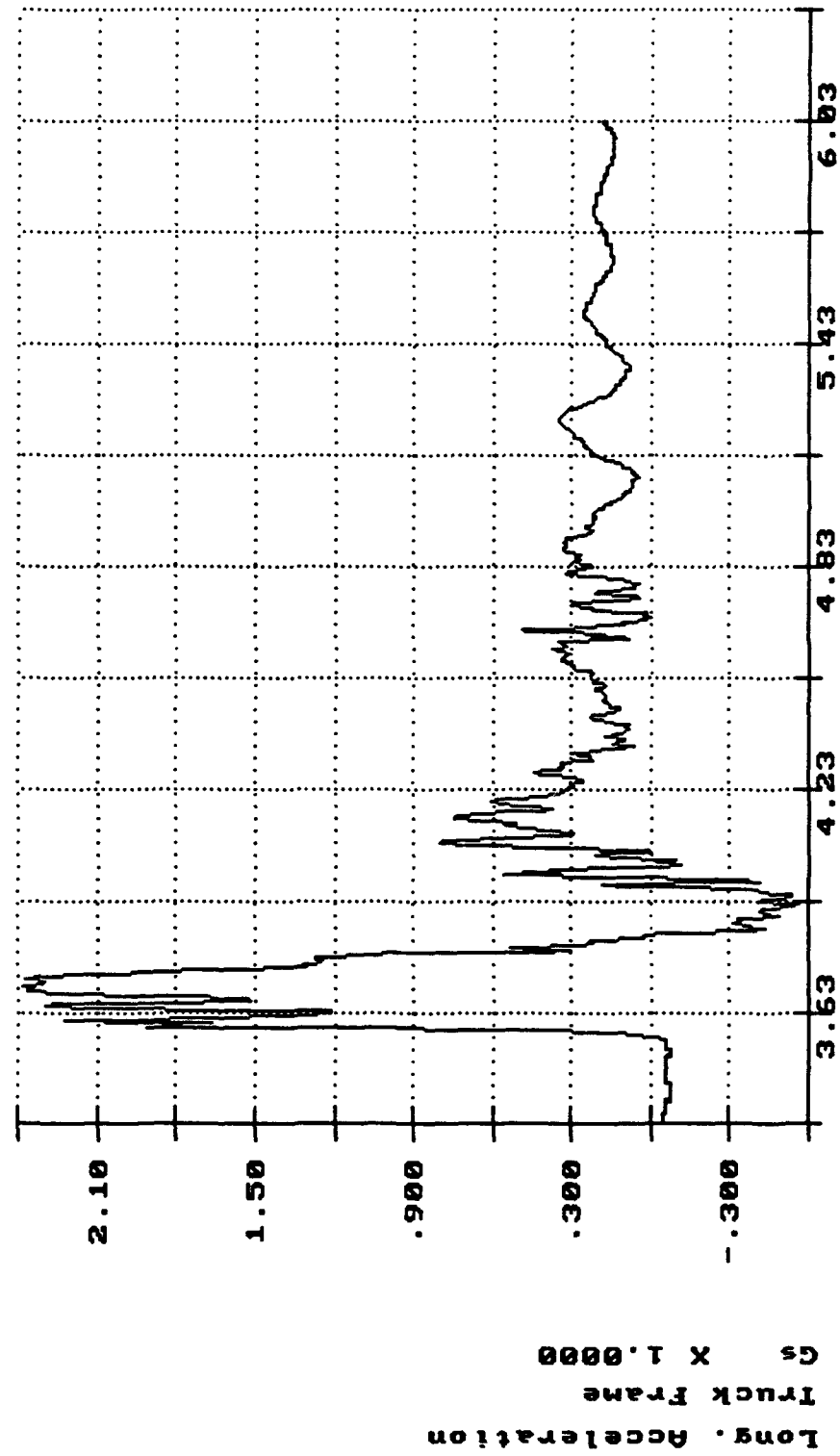


Time of Sample
Seconds X 1.0000

R.I. of M876A1 Tel. Truck, #3: 8.15 MPH May 07 11:40:54 1993

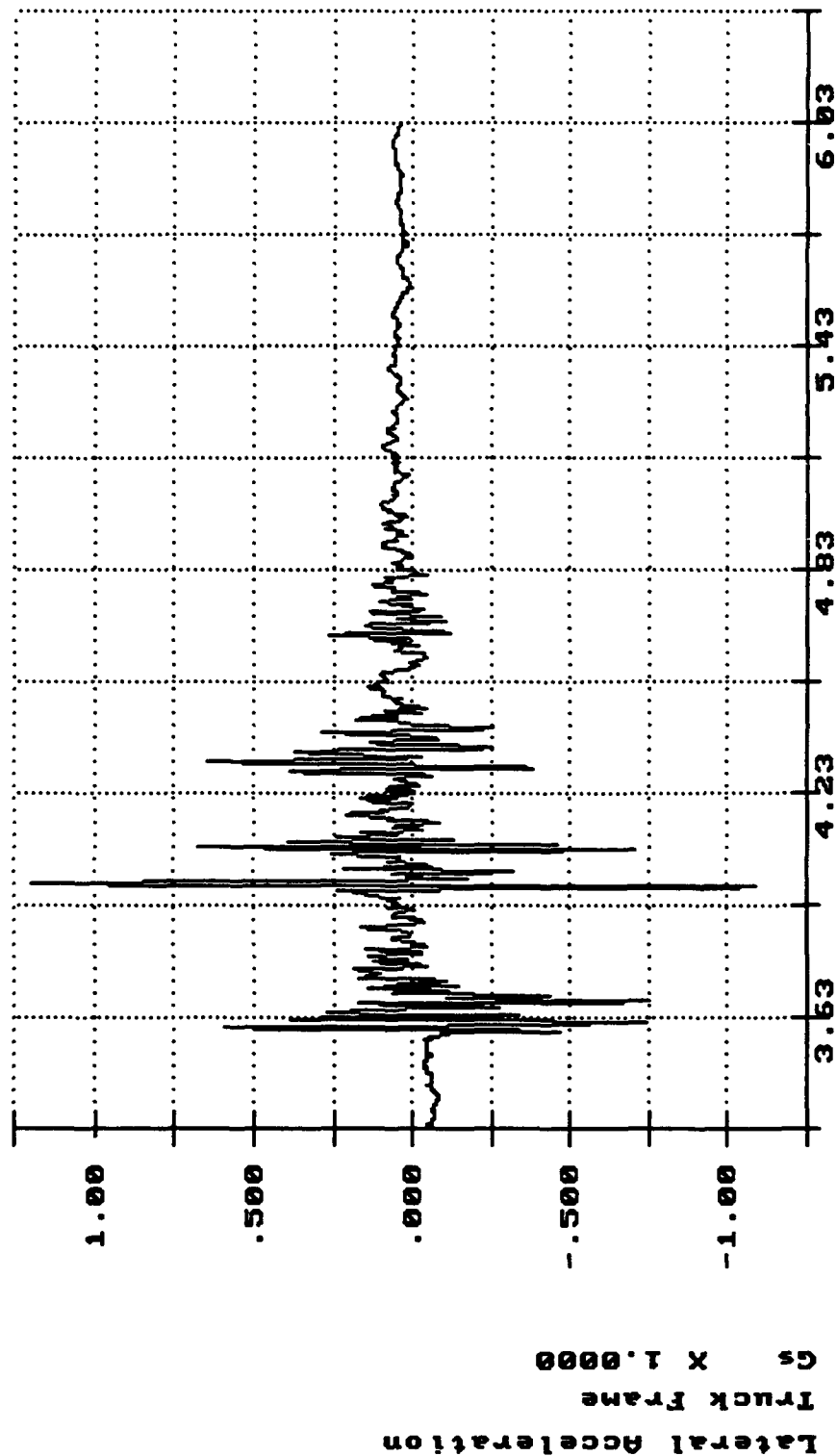


R.I. of M876A1 Tel. Truck, #3: 8.15 MPH May 07 11:40:54 1993

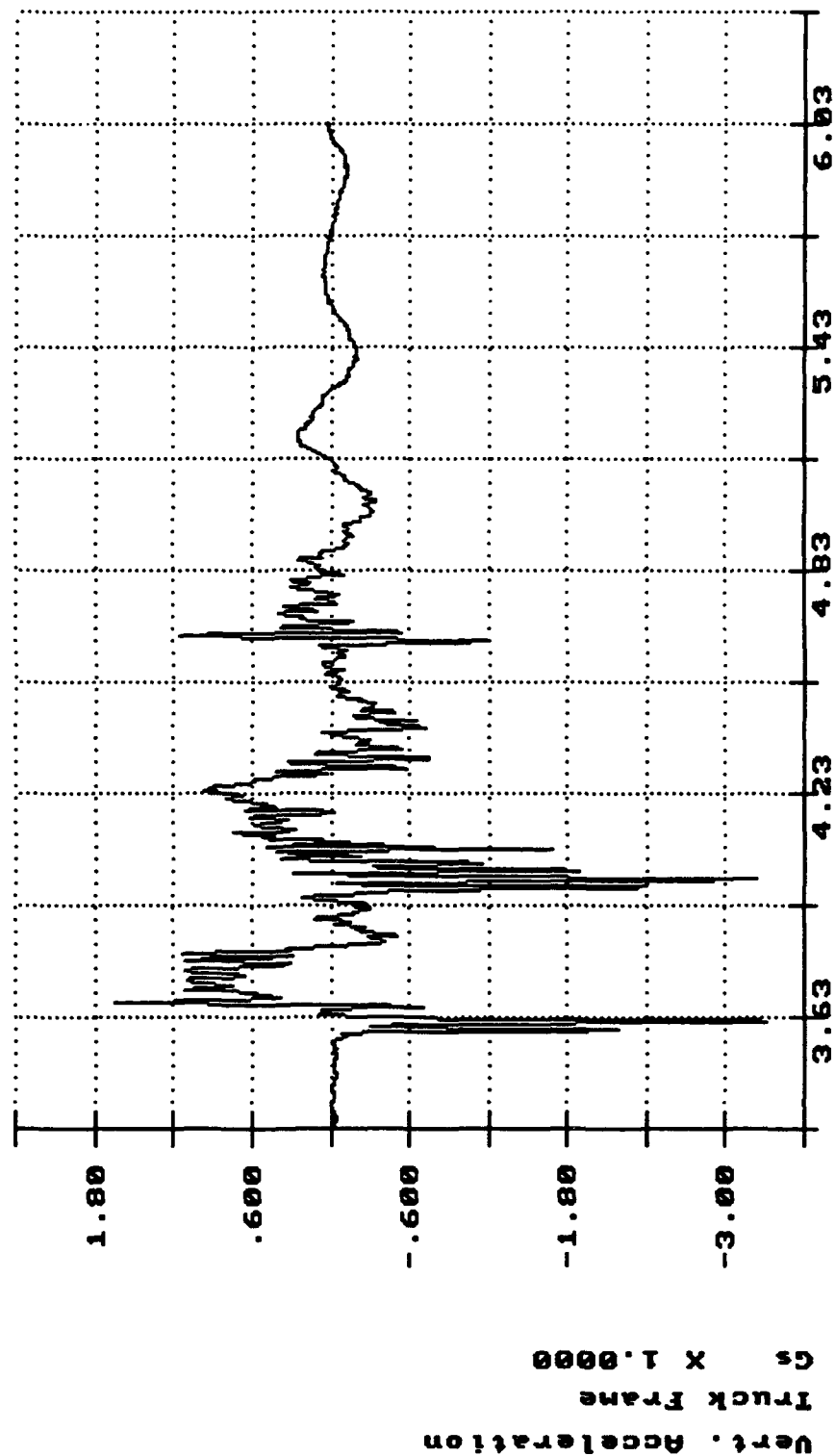


Time of Sample
Seconds X 1.0000

R.I. of M876A1 Tel. Truck, #3: 8.15 MPH May 07 11:40:54 1993

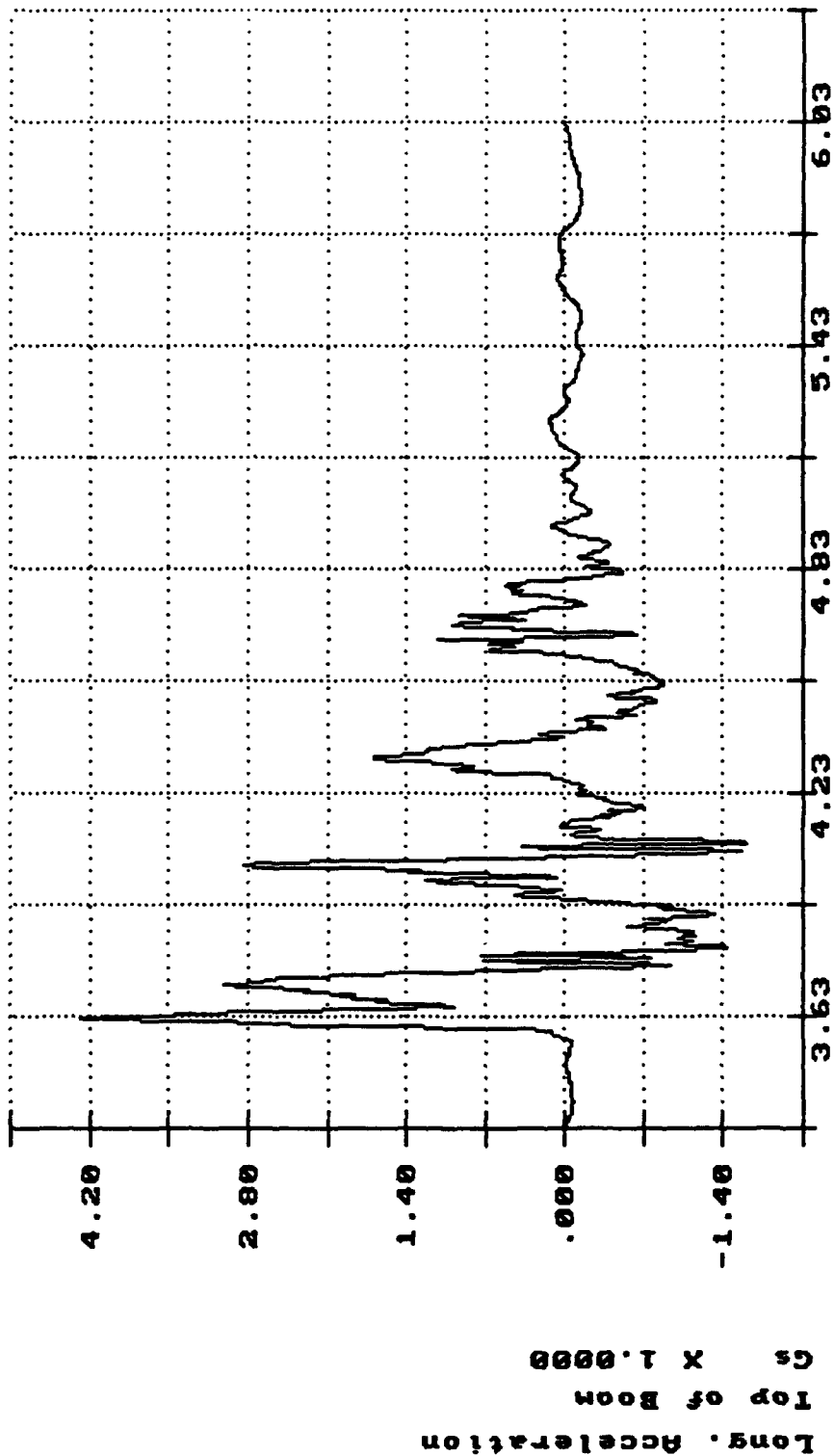


R.I. of M876A1 Tel. Truck, #3: 8.15 MPH May 07 11:40:54 1993



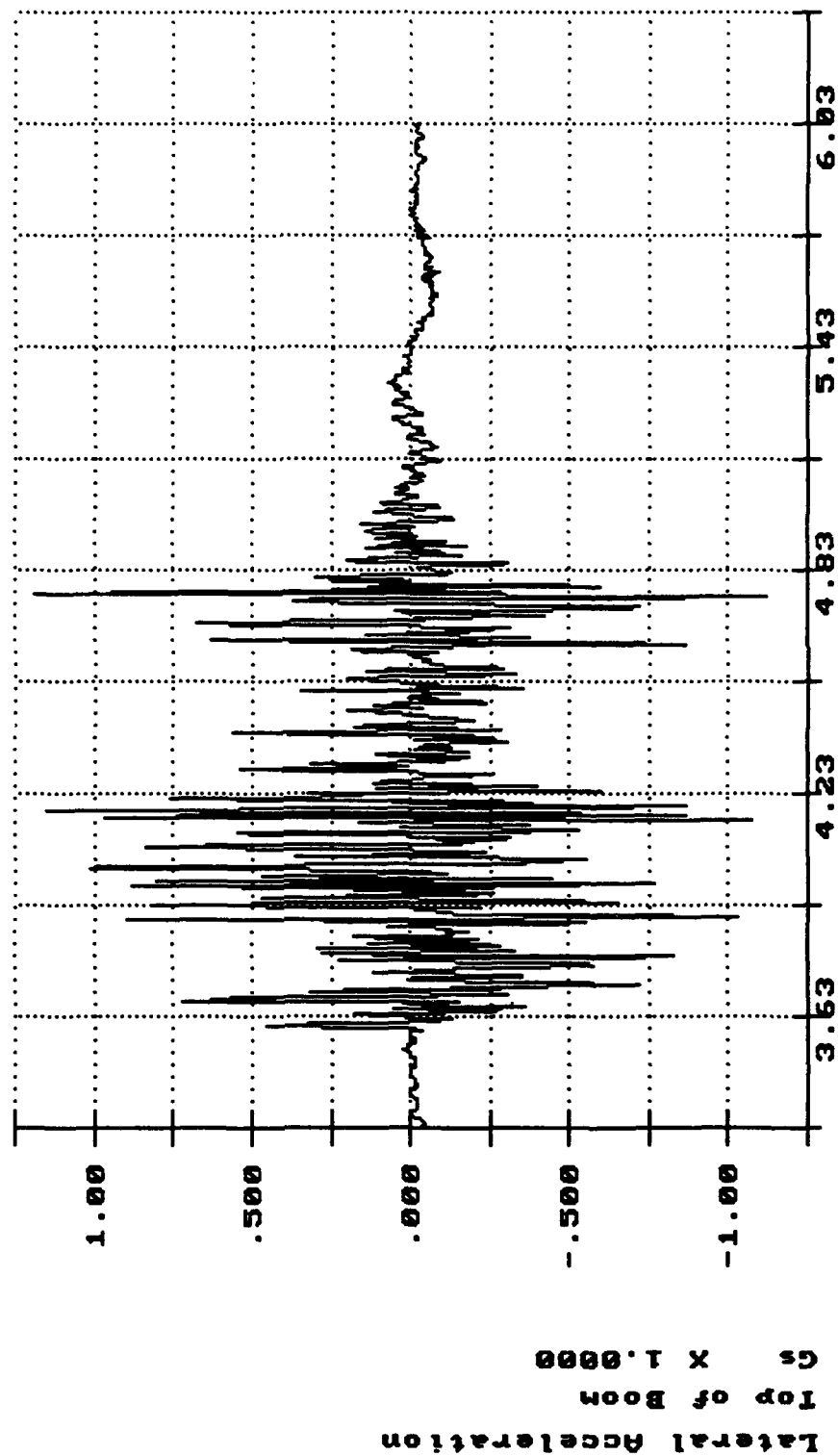
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Seconds X 1.0000

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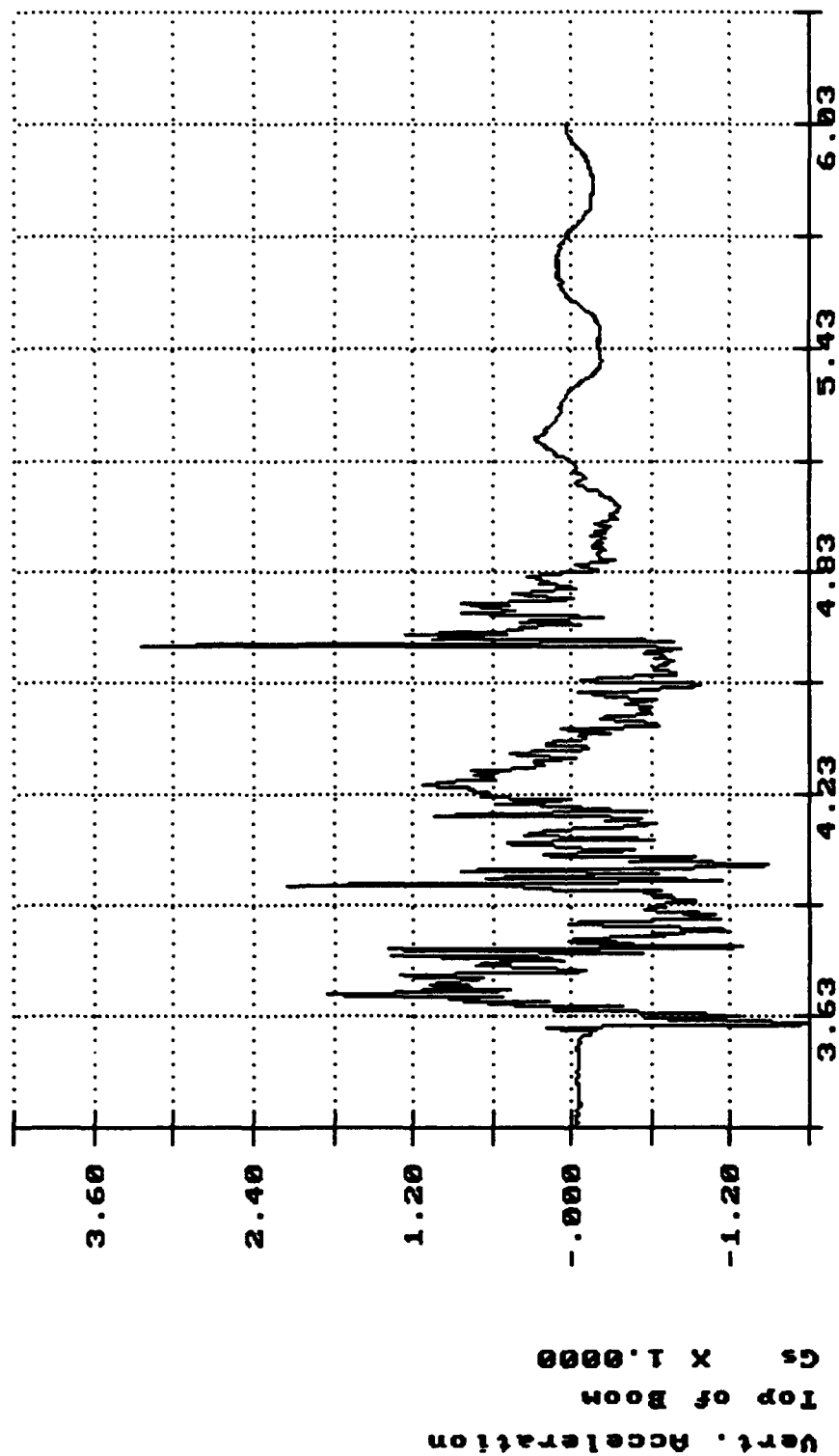
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Seconds X 1.0000

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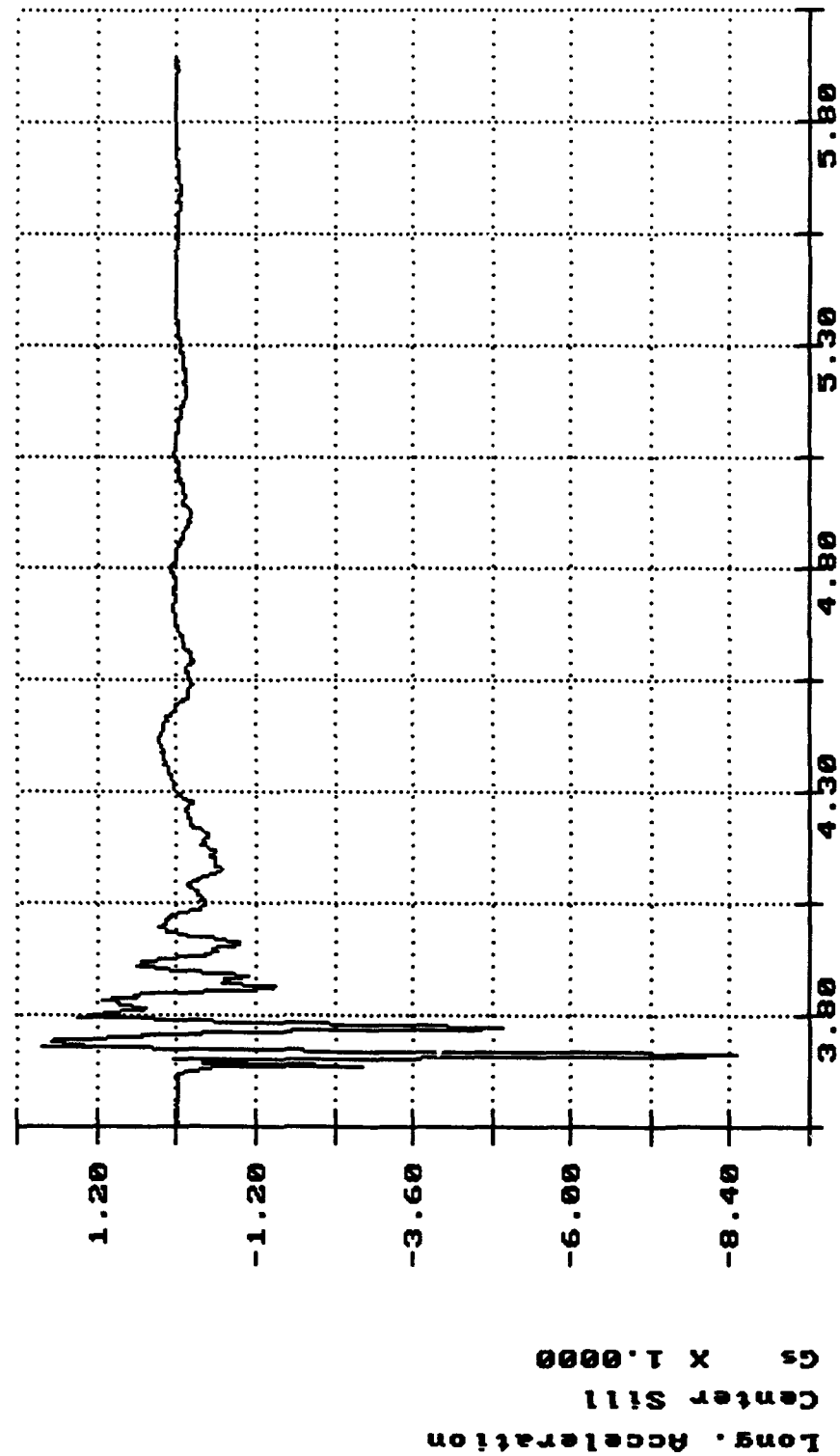


Time of Sample
Seconds X 1.0000

R.I. of M876A1 Tel. Truck, #3: 8.15 MPH May 07 11:40:54 1993



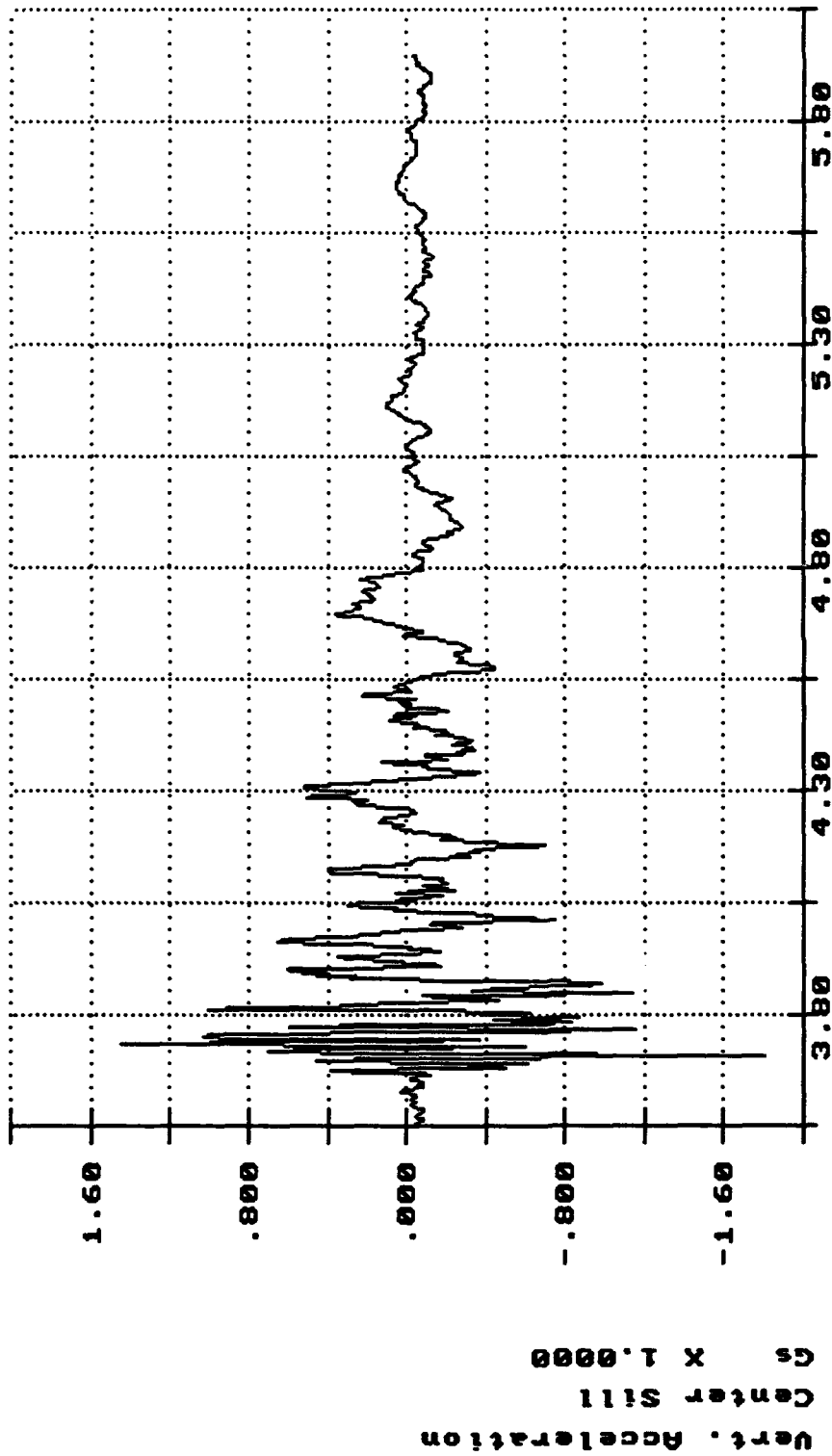
R.I. of M876A1 Tel. Truck, #4: 8.62 MPH May 07 12:04:03 1993



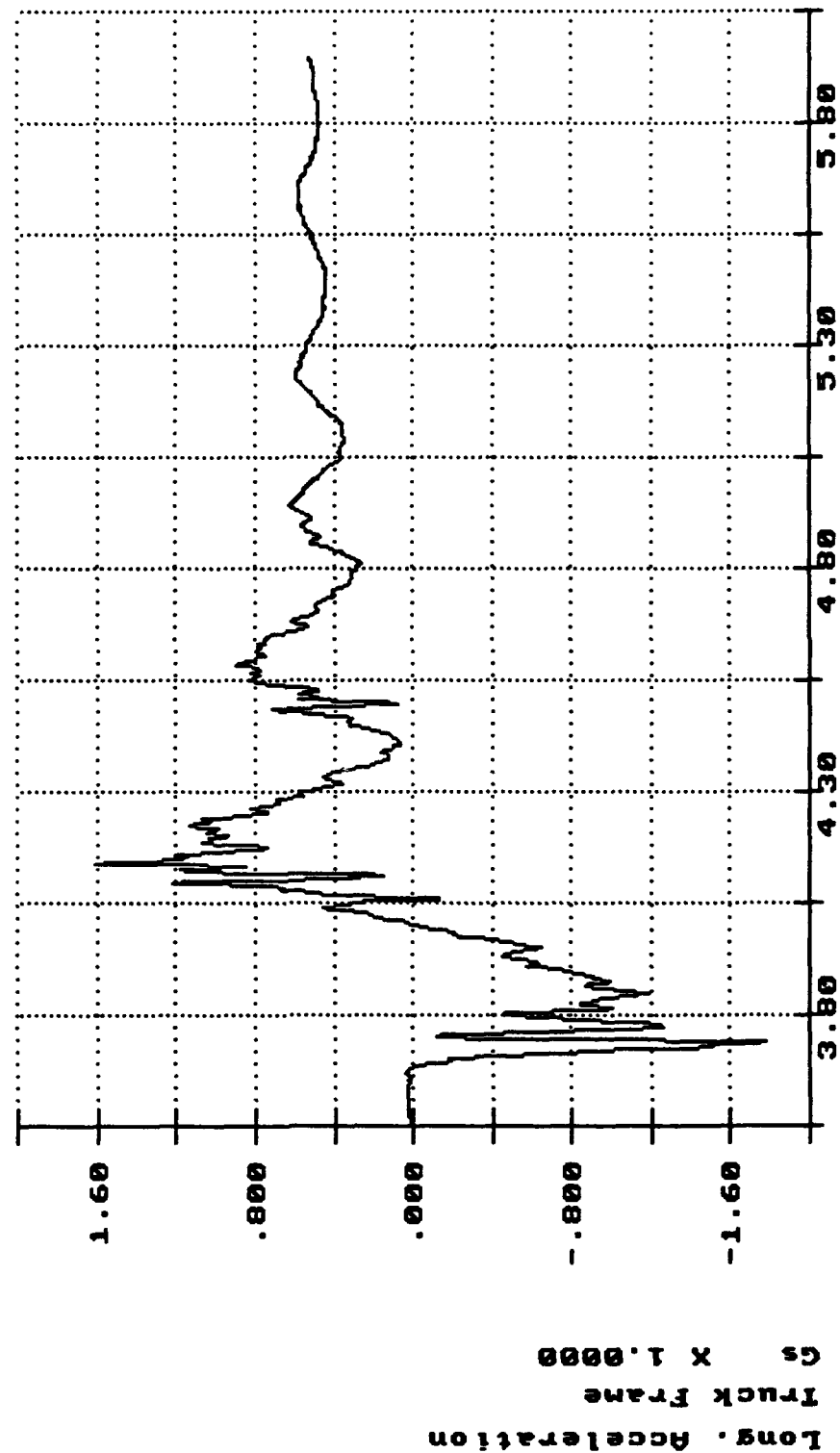
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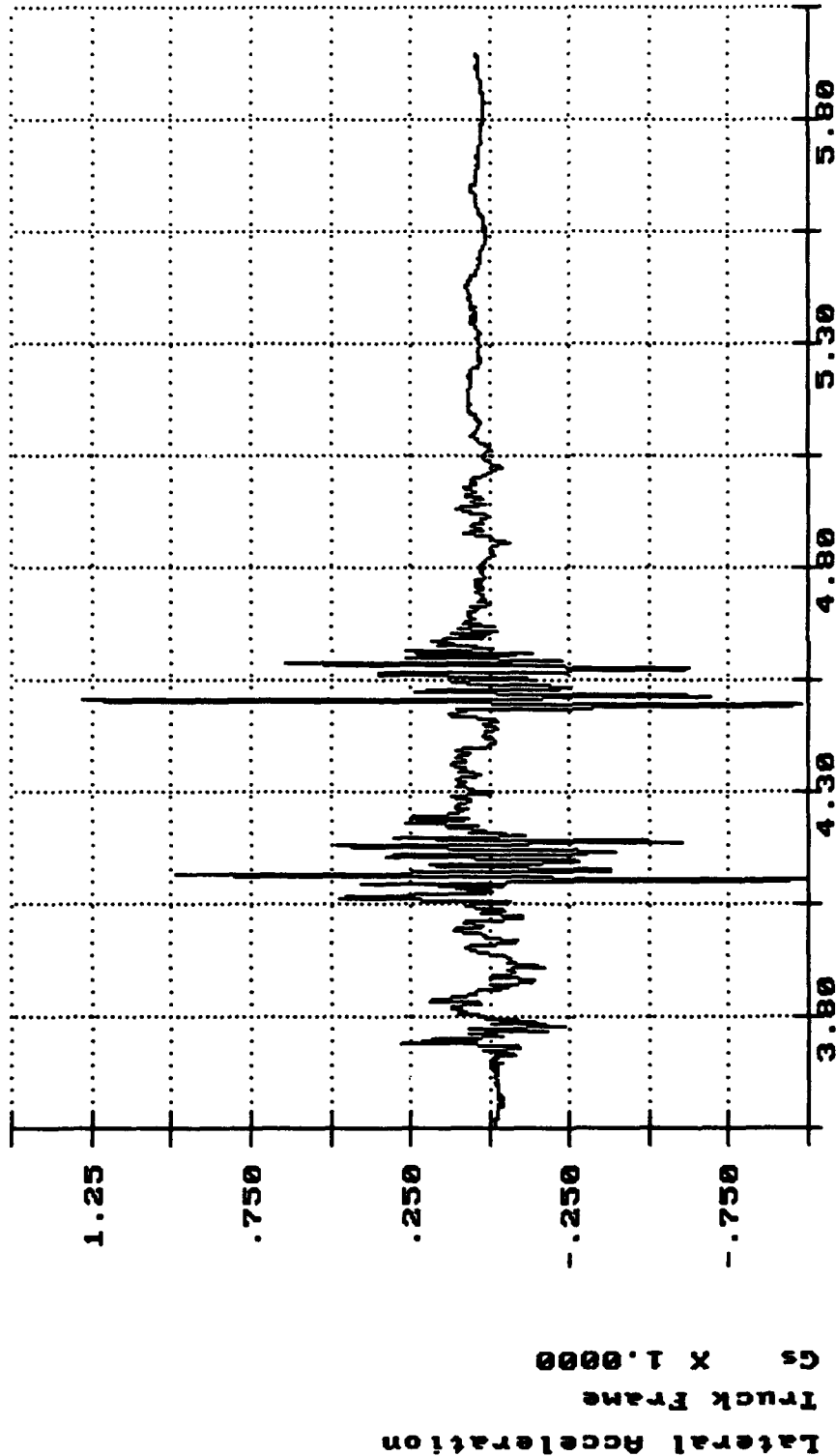
R.I. of M876A1 Tel. Truck, #4: 8.62 MPH May 07 12:04:03 1993



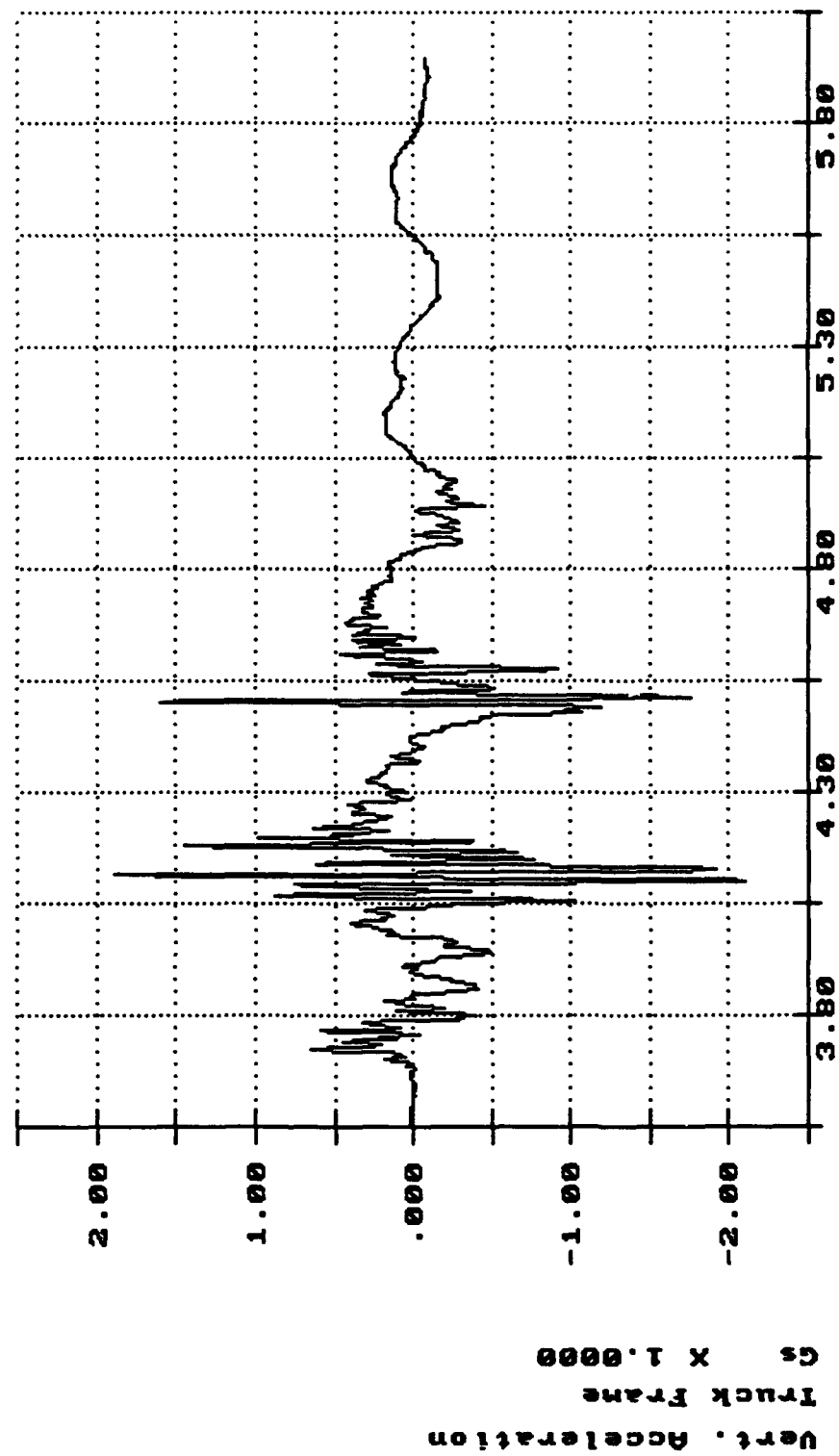
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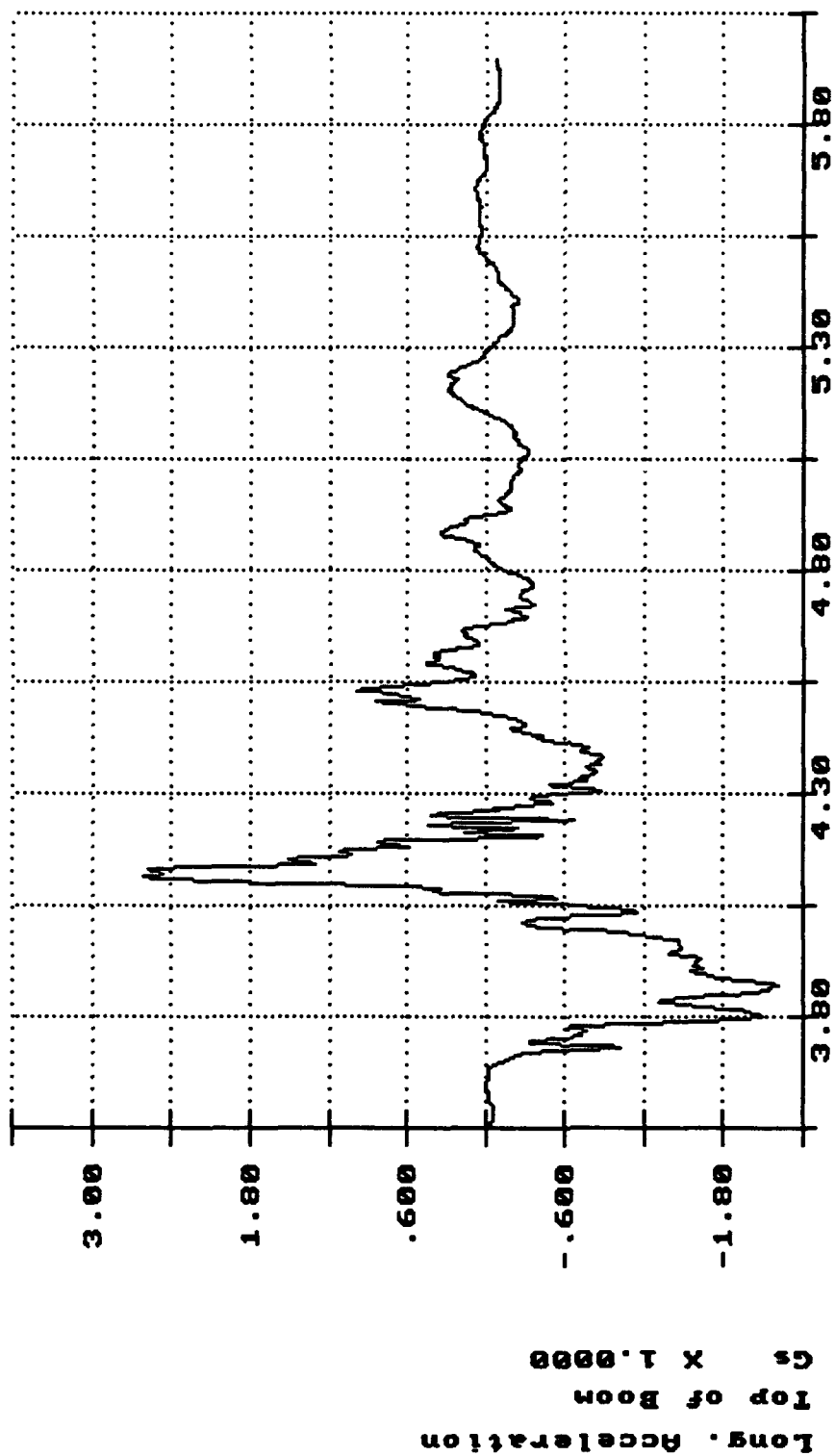
R.I. of M876A1 Tel. Truck, #4: 8.62 MPH May 07 12:04:03 1993



R.I. of M876A1 Tel. Truck, #4: 8.62 MPH May 07 12:04:03 1993

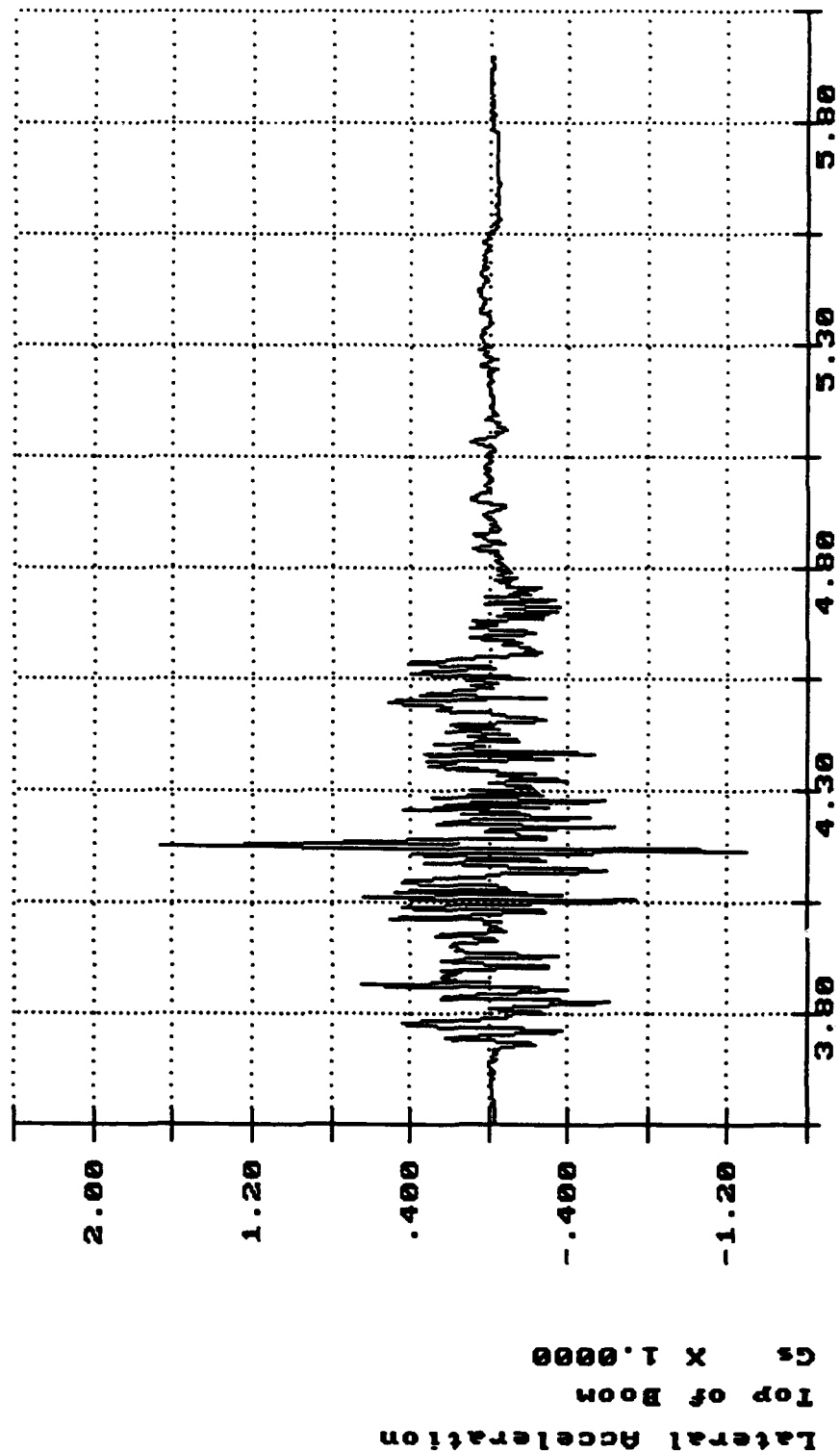


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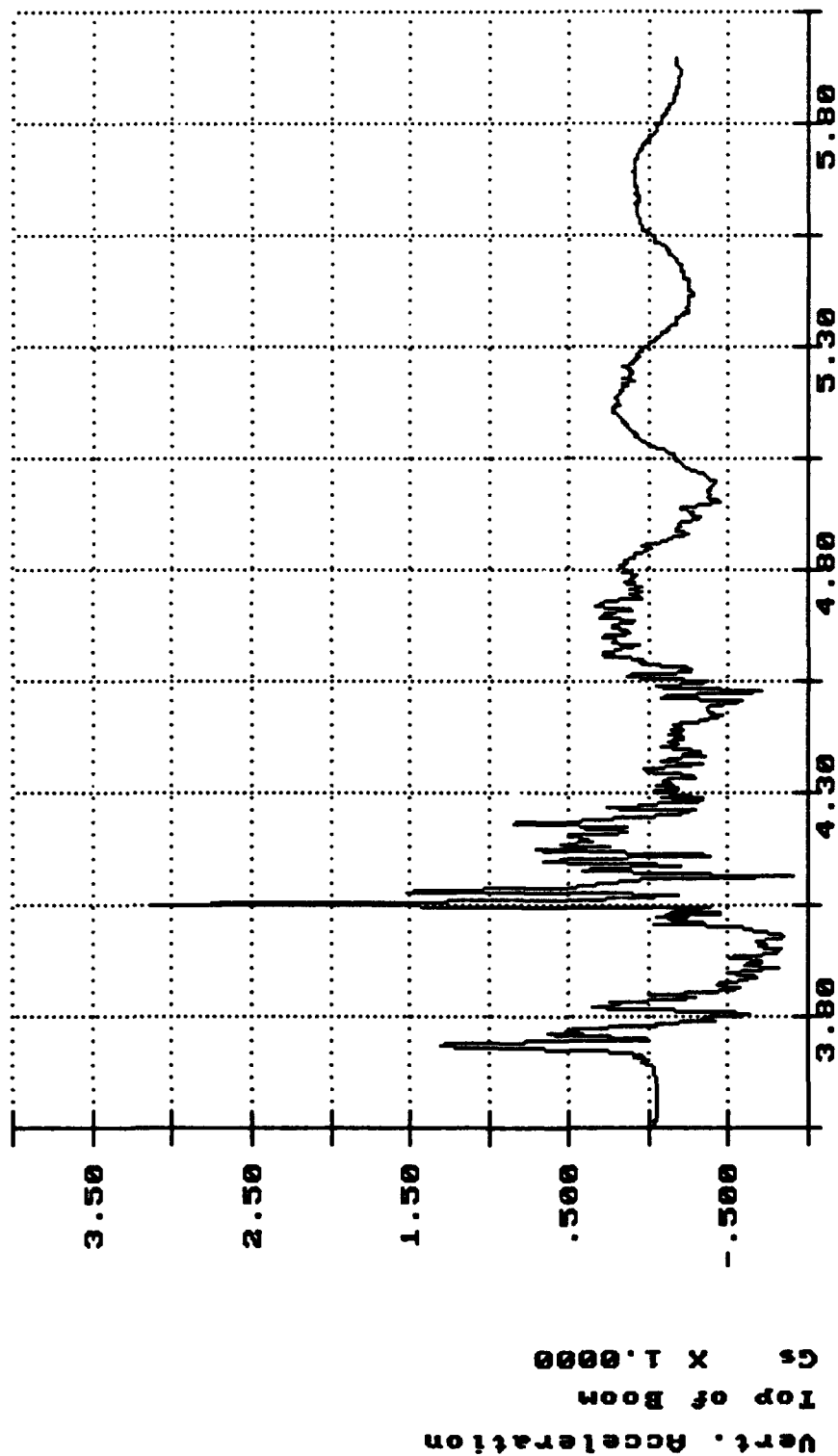
Time of Sample
Seconds X 1.0000

R.I. of M876A1 Tel. Truck, #4: 8.62 MPH May 07 12:04:03 1993



Time of Sample
Seconds X 1.0000

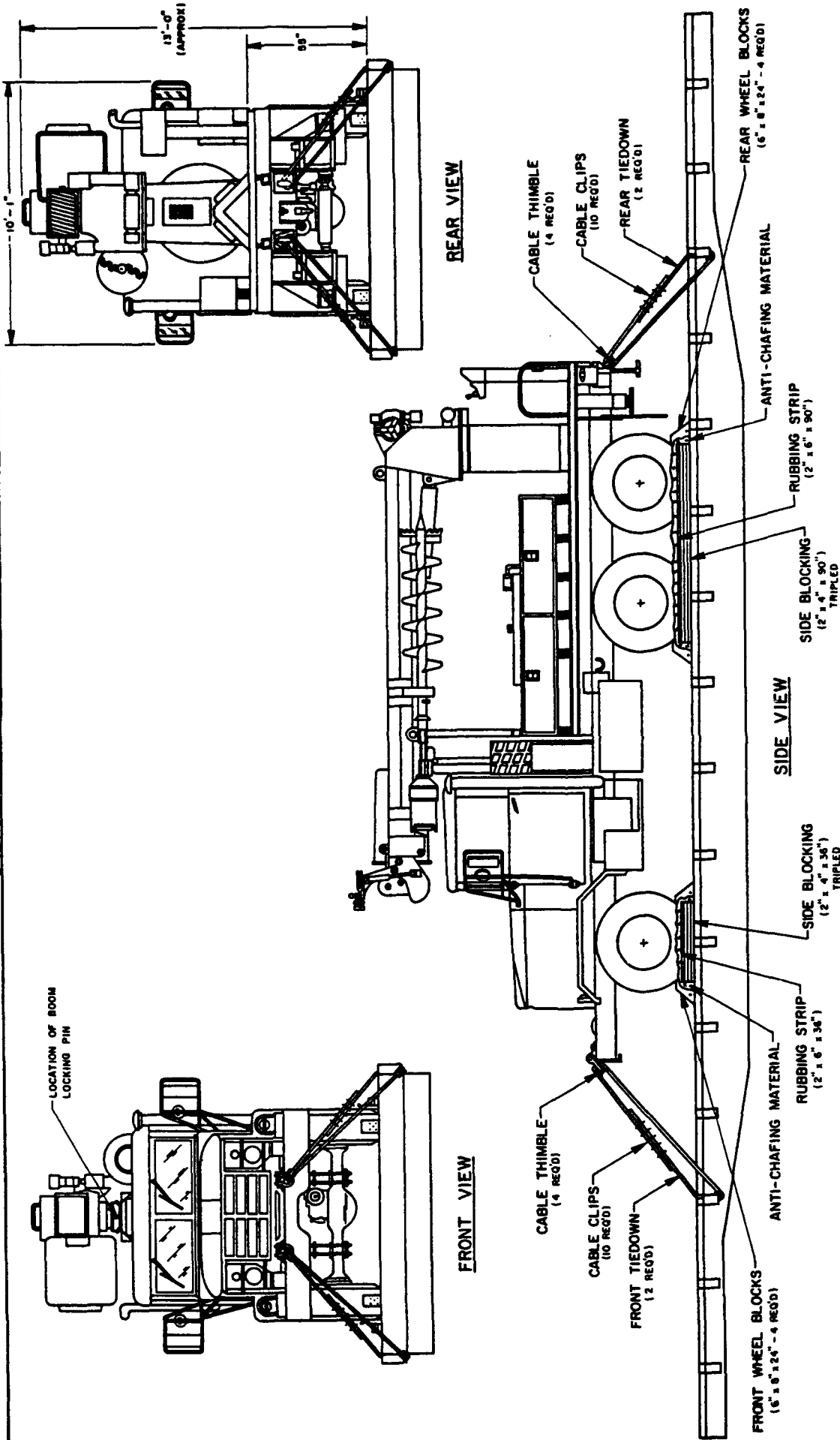
R.I. of M876A1 Tel. Truck, #4: 8.62 MPH May 07 12:04:03 1993



Time of Sample
Seconds X 1.0000

PART 7

TIEDOWN PROCEDURE



VEHICLE DATA

TOTAL WEIGHT:	35,190 LBS (INCLUDES 1,000 LBS OF EQUIPMENT)
OVERALL LENGTH (WITH WINCH):	27'-0" (332 IN)
OVERALL WIDTH:	8'-0" (96 IN)
OVERALL HEIGHT:	13'-0" (156 IN)

NOTE:

FRONT AND REAR TIEDOWN ASSEMBLIES ARE FABRICATED FROM 5/8 IN STANDARD STEEL WIRE ROPE AND 5/8 IN STANDARD STEEL CABLE CLIPS. STANDARD STEEL 5/8 IN CABLE THIMBLES ARE ALSO REQUIRED WHERE CABLE LOOPS AROUND METAL SURFACES.

U.S. ARMY DEFENSE AMMUNITION CENTER & SCHOOL
VALIDATION ENGINEERING DIVISION
SAVANNA, ILLINOIS 61074-9639

DRAFTSMAN
THOMAS R. SIMMONS

TEST ENGINEER
ALFRED C. MCINTOSH

CHEF, VALIDATION ENGINEERING DIV.
JEROME H. KROHN

TITLE
U.S.M.C. M876A1 TELEPHONE
MAINTENANCE TRUCK BED
LOADED ON 10'-6"W x 53'-6"L
FLATCAR

DWG NO. 92-005-0-T00101

DATE 18 MAY 1993

SHEET 1 OF 1