

DOT 484

# RESEARCH RABBIT (MIV) Modified Integrated Vehicle

## Phase 1



VOLKSWAGENWERK  
Aktiengesellschaft  
WOLFSBURG

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Final Report

Volume III/1 Frontal Impact

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|                                                                                                                                                                                                                                     |                             |                                                                                 |                         |
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| 16. Abstract<br><br>Vehicle and vehicle occupant response data and technical data from frontal fixed wall impact with a Modified 4 door Rabbit (MIV) at 90° impact angle and v = 35 mph impact speed are summarized in this report. |                             |                                                                                 |                         |
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Volume III/1 F

## Volume III/1 F

### Table of Contents

|                                         | Page    |
|-----------------------------------------|---------|
| o Technical Report Documentation Page   | 2       |
| o List of Illustrations and Tables      | 5 - 6   |
| 1. Introduction                         | 7       |
| 2. Method                               | 8       |
| 2.1 List of Accelerometer Location      | 9       |
| 2.1.1 Vehicle Instrumentation           | 10      |
| 2.1.2 Dummy Instrumentation             | 11      |
| 2.2 Camera Location and Frame Rate      | 12 - 13 |
| 3. Test Parameter and Results           | 14      |
| 3.1 Pre-Test Conditions                 |         |
| 3.1.1 Driver Pre-Test Position          | 15      |
| 3.1.2 Front Passenger Pre-Test Position | 16      |
| 3.2 Crash Test Summary                  | 17 - 18 |
| 3.3 Dummy Test Response                 |         |
| 3.3.1 Dummy Loads                       | 19      |
| 3.3.2 Dummy Displacement                | 20 - 21 |
| 3.4 Vehicle Test Response               |         |
| 3.4.1 Pre- and Post Measurement Points  | 22      |
| 3.4.2 Vehicle Measurement               | 23      |
| 3.4.3 Pre- and Post Test Profiles       | 24      |
| 3.4.4 Windshield Protection-Zone        | 25      |
| 3.4.5 Fuel System Integrity             | 26 - 30 |

Appendix A  
Photographs

Appendix B

Vehicle and Dummy Test Response

- B.1 Load Cell Fixed Barrier
- B.2 Vehicle Test Response
- B.3 Dummy Test Response
  - B.3.1 Driver
  - B.3.2 Front Passenger
- B.4 Dummy Calibration Test Data

## List of Illustrations

| Figure |                                       | Page |
|--------|---------------------------------------|------|
| 1      | Vehicle Accelerometer Locations       | 10   |
| 2      | Dummy Instrumentation                 | 11   |
| 3      | Camera Positions for Frontal Impact   | 12   |
| 4      | Forward Displacement - Driver         | 20   |
| 5      | Forward Displacement - Passenger      | 21   |
| 6      | Pre- and Post Test Measurement Points | 22   |
| 7      | Pre- and Post Test Profiles           | 24   |
| 8      | Windshield Protection-Zone            | 25   |

## List of Tables

| Table |                                   | Page |
|-------|-----------------------------------|------|
| 1     | List of Accelerometer Location    | 9    |
| 2     | High Speed Camera Information     | 13   |
| 3     | Driver Pre-Test Position          | 15   |
| 4     | Front Passenger Pre-Test Position | 16   |
| 5     | Crash Test Summary                | 17   |
| 6     | Dummy Loads                       | 19   |
| 7     | Vehicle Measurement               | 23   |
| 8     | Fuel System Integrity             | 26   |
| 9     | Fuel System Integrity             | 27   |
| 10    | Fuel System Integrity             | 28   |
| 11    | Fuel System Integrity             | 29   |
| 12    | Fuel System Integrity             | 30   |

## 1. Introduction

The Objective of the MIV project was to optimize the contradictory design aspects of a high degree of passive safety and low fuel consumption.

The project was arranged in Phase I and II. The results of Phase I are the basis of this report. Phase II was redefined by NHTSA. According to this, the three engine/transmission concepts that were to be newly developed are no longer part of Phase II.

Possibilities were to be found for a 4 door Rabbit for further increasing occupant protection in specified side and frontal impacts. The Rabbit Modifications should be possible to implement on the production line. NHTSA's design goals were the 35 mph frontal fixed barrier impact and the 30', 35 or 40 mph side impact with the new 1.565 kg (3,450 lbs) deformable Crabbed Barrier and the new HSRI Dummy which were specially conceived for the side impact and are presently still under development.

Modifications for the 4 door Rabbit were derived from Crabbed Barrier/Production Rabbit baseline tests.

NHTSA contract specifications called for a maximum weight increase of 20 lbs for the modified 4 door Rabbit.

The NHTSA goal to achieve the greatest possible reduction in dummy loads, in keeping with the objective of lowest possible weight together with the prerequisite that the design be suited to mass production at the lowest possible cost, required the development of a new "Integrated Structure" for the 4 Door Modified Rabbit. This concept requires that the greatest number of components be effective during a frontal and a side impact. The "Integrated Structure" approach, rather than the Budd strategy to use add-on parts, is necessary to achieve the goals established by NHTSA.

## 2. Method

- 2.1 List of Accelerometer Location
  - 2.1.1 Vehicle Instrumentation
  - 2.1.2 Dummy Instrumentation
- 2.2 Camera Location and Frame Rate

TABLE 1 : LIST OF ACCELEROMETER LOCATION

VEHICLE

| No. | Location                    | Shortened Form      | Direction |
|-----|-----------------------------|---------------------|-----------|
| 1   | Right Front-Doorsill        | TSVR <del>RFS</del> | X         |
| 2   | Left Front-Doorsill         | TSVL <del>LFS</del> | X         |
| 3   | Right Rear-Doorsill         | TSHR <del>RRS</del> | X         |
| 4   | Left Rear-Doorsill          | TSHL <del>LRS</del> | X         |
| 5   | Vehicle Center of Gravity   | RTVO <del>VCG</del> | X, Y, Z   |
| 6   | Rear Deck over Centerline   | KOBO <del>RDK</del> | X, Y, Z   |
| 7   | Underneath Right Front-Seat | SGBF <del>TRF</del> | X         |
| 8   | Underneath Left Front-Seat  | SGFA <del>TLF</del> | X         |

DRIVER

|                     |                       |         |
|---------------------|-----------------------|---------|
| Head Triaxial       | K001 <del>HGD</del>   | X, Y, Z |
| Chest Triaxial      | BR01 <del>CSF</del>   | X, Y, Z |
| Pelvis Triaxial     | BE01 <del>Pel</del>   | X, Y, Z |
| Right Femur Load    | OS01R <del>RFM</del>  |         |
| Left Femur Load     | OS01L <del>LFM</del>  |         |
| Shoulder Beltforce  | GU01SA <del>SHB</del> |         |
| Head <u>Contact</u> | K001K <del>HED</del>  |         |

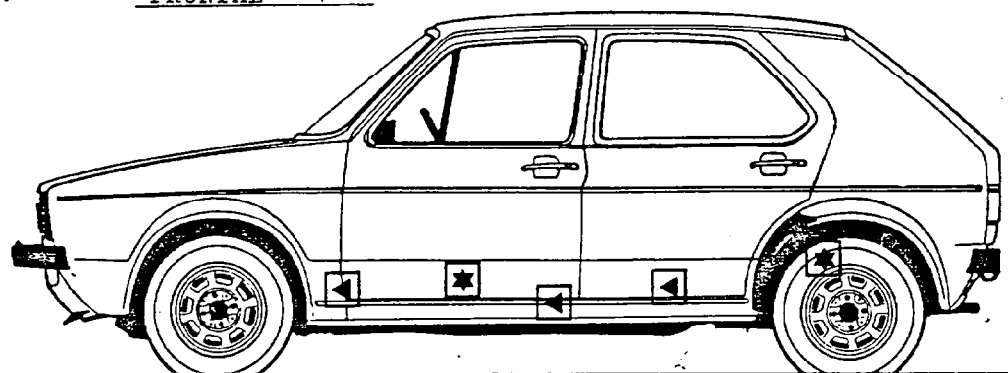
FRONT PASSENGER

|                     |                       |         |
|---------------------|-----------------------|---------|
| Head Triaxial       | K002 <del>HED</del>   | X, Y, Z |
| Chest Triaxial      | BR02 <del>CSF</del>   | X, Y, Z |
| Pelvis Triaxial     | BE02 <del>Pel</del>   | X, Y, Z |
| Right Femur Load    | OS02R <del>RFM</del>  |         |
| Left Femur Load     | OS02L <del>LFM</del>  |         |
| Shoulder Beltforce  | GU02SA <del>SHB</del> |         |
| Head <u>Contact</u> | K002K <del>HED</del>  |         |

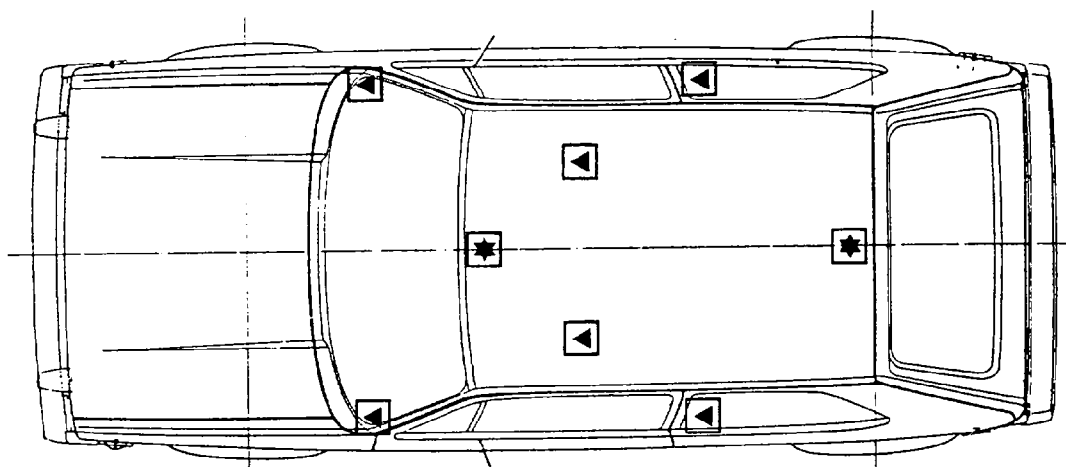
LOAD CELL FIXED BARRIER

|                       |                  |
|-----------------------|------------------|
| Load Cell No. 1 to 18 | KMPL01 to KMPL18 |
|-----------------------|------------------|

TEST NO: FRONTAL - 1

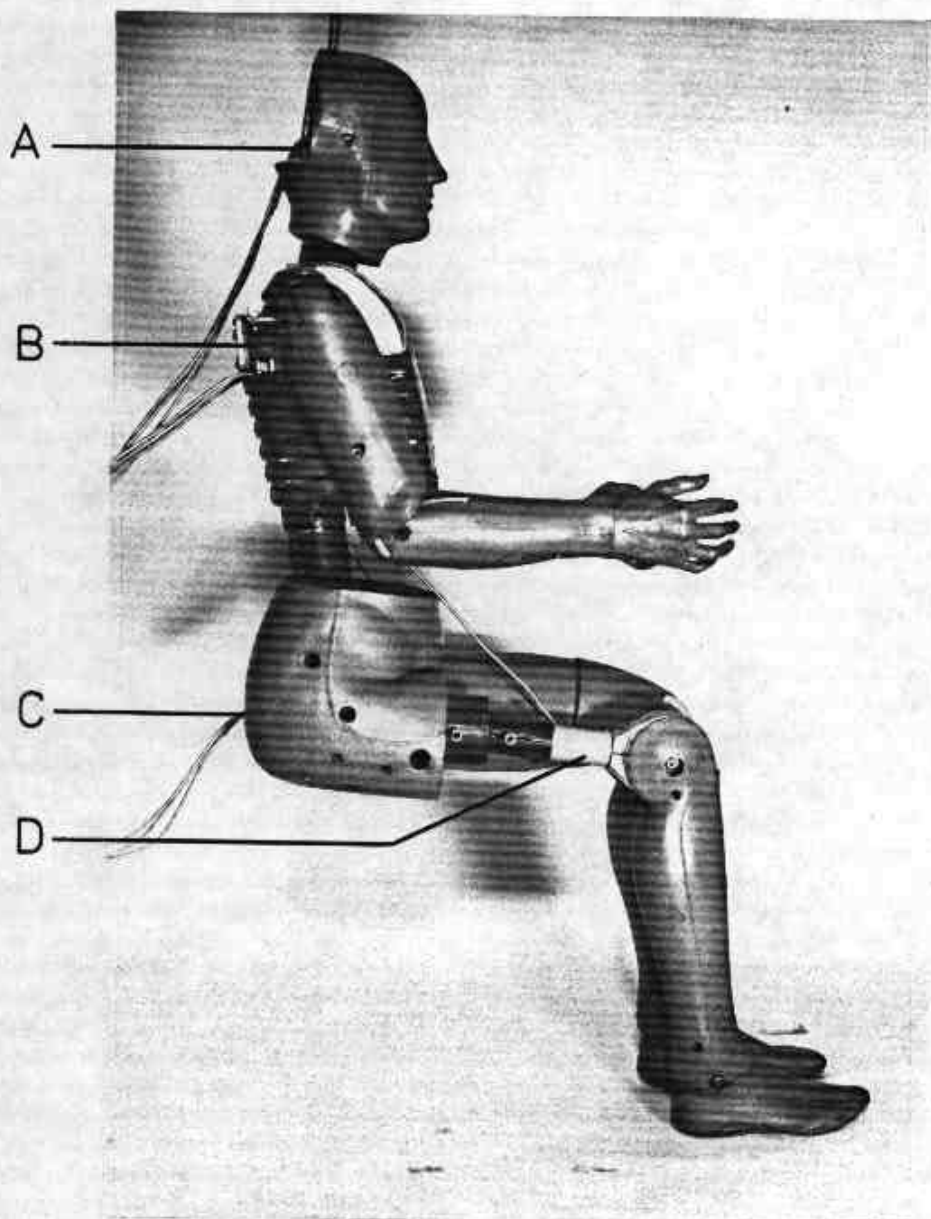


- ◀ Axial Accelerometer ( X - Direction)  
 ★ Triaxial Accelerom. (X,Y,Z-Direction)



| Accelerometer<br>NO. | Accelerometer Location      | Direction (g Max.) |    |    |
|----------------------|-----------------------------|--------------------|----|----|
|                      |                             | X                  | Y  | Z  |
| 1                    | Right Front-Door-Sill       | 46                 |    |    |
| 2                    | Left Front-Door-Sill        | 49                 |    |    |
| 3                    | Right Rear-Door-Sill        | 65                 |    |    |
| 4                    | Left Rear-Door-Sill         | 39                 |    |    |
| 5                    | Vehicle Center of Gravity   | 47                 | 28 | 53 |
| 6                    | Rear Deck over Centerline   | 36                 | 11 | 22 |
| 7                    | Underneath Right Front-Seat | 43                 |    |    |
| 8                    | Underneath Left Front-Seat  |                    |    |    |

**Figure 1 : Vehicle Accelerometer Locations**



A. Head Triaxial

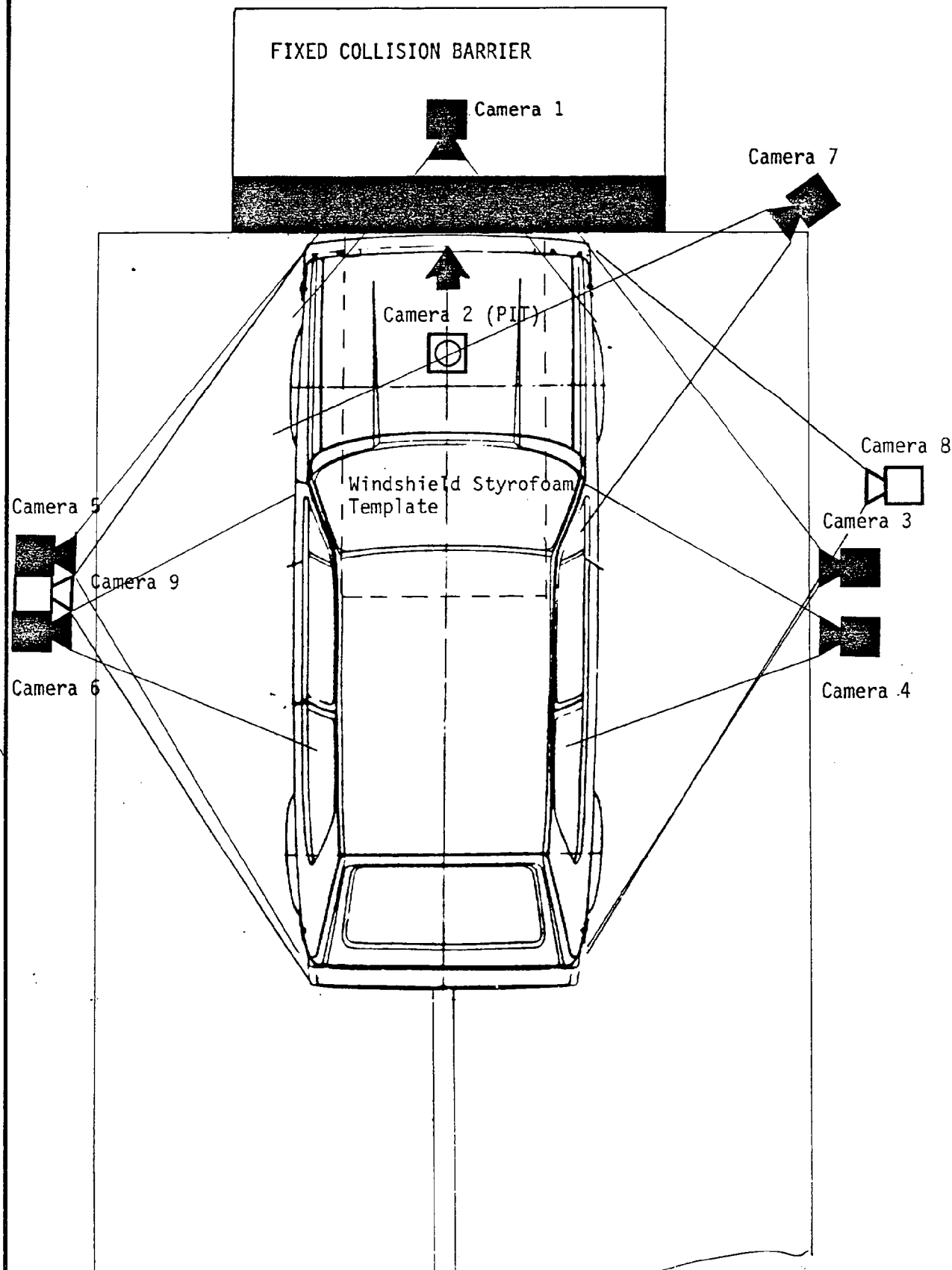
B. Chest Triaxial

C. Pelvis Triaxial

D. Femur (right and left)

FIGURE 2 : DUMMY INSTRUMENTATION (HYBRID II)

**Figure 3: Camera Positions for Frontal Impact**



TEST NO : Frontal 1

| CAMERA NO. | LOCATION        | TYPE         | LENS (mm) | SPEED (fps) |
|------------|-----------------|--------------|-----------|-------------|
| 1          | Barrier Face    | Locam        | 10        | 350         |
| 2          | Pit Front       | Photo sonics | 13        | 850         |
| 3          | Right View      | Locam        | 28        | 400         |
| 4          | Front Passenger | Photo sonics | 50        | 900         |
| 5          | Left View       | Locam        | 28        | 400         |
| 6          | Driver          | Photo sonics | 50        | 850         |
| 7          | Windshield      | Locam        | Vario     | 400         |
| 8          | Right View      | Arri / Bolex | Vario     | 25          |
| 9          | Left View       | 35 mm        | --        |             |

**Table 2: High Speed Camera Information**

### 3. Test Parameter and Results

#### 3.1 Pre-Test Conditions

##### 3.1.1 Driver Pre-Test Position

##### 3.1.2 Front Passenger Pre-Test Position

#### 3.2 Crash Test Summary

#### 3.3 Dummy Test Response

##### 3.3.1 Dummy Loads

##### 3.3.2 Dummy Displacement

#### 3.4 Vehicle Test Response

##### 3.4.1 Pre- and Post Test Measurement Points

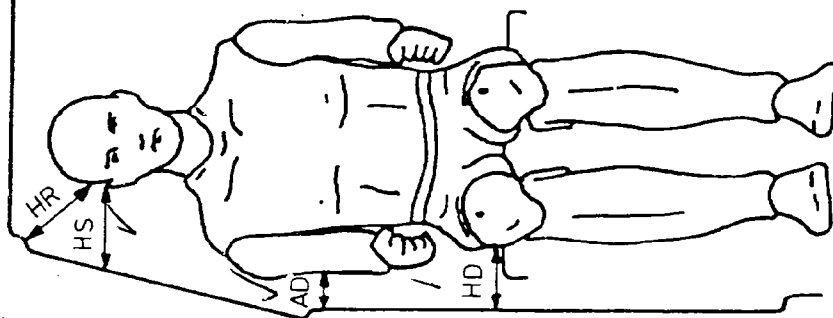
##### 3.4.2 Vehicle Measurement

##### 3.4.3 Pre- and Post Test Profiles

##### 3.4.4 Windshield Protection Zone

##### 3.4.5 Fuel System Integrity

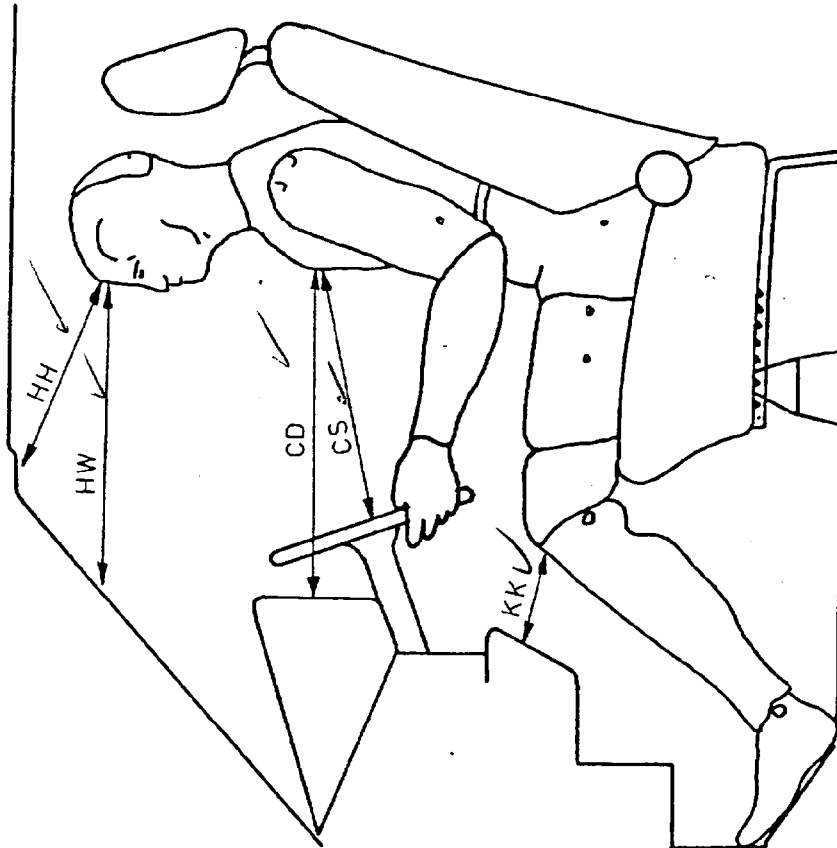
TEST NO : FRONTAL 1



HR = 125 ✓  
 HS = 115 ✓  
 AD = 80 ✓  
 HD = 140 ✓

4.9 ✓  
4.5 ✓  
3.1 ✓  
5.5 ✓

(ALL DIMENSION IN MM)

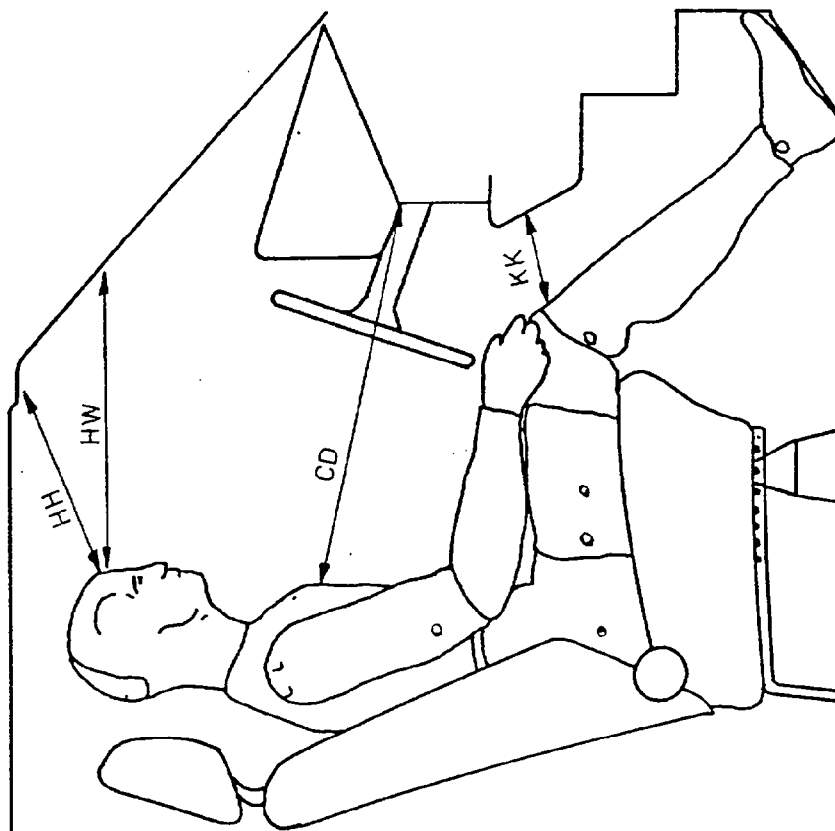


HH = 360 ✓  
 HW = 530 ✓  
 CD = 520 ✓  
 CS = 310 ✓  
 KK = 110 ✓

14.2 ✓  
20.9 ✓  
20.5 ✓  
12.0 ✓  
4.3 ✓

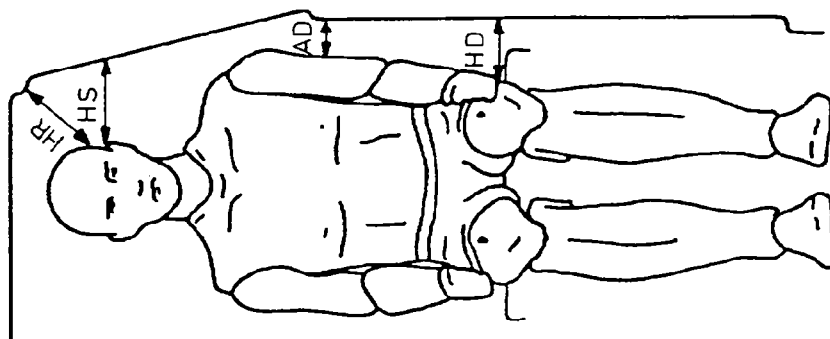
**Table 3 : Driver Pre - Test Position**

TEST NO : FRONTAL 1 (Mod.)



HH = 365 14.4  
 HW = 545 21.4  
 CD = 550 21.6  
 KK = 110 4.3

(ALL DIMENSION IN MM)



HR = 120 4.7  
 HS = 115 4.5  
 AD = 85 3.3  
 HD = 145 5.7

Table 4 : Front Passenger Pre - Test Position

### 3.2 Crash Test Summary

The modified Rabbit complied in all respects with applicable FMVSS.

Table 1 presents pertinent crash test information. Maximum crush of the vehicle was 552 mm measured at the vehicle centerline (position X1 in Figure 6 and Table 7). The average crush measured from the rear surface to the right side of front bumper (position X 19) is 547 mm and rear surface to left side of front bumper (position X 20) is 530 mm.

The driver and right front passenger positions were occupied by two Part 572 50th percentile anthropometric test devices (ATDs) and both were restrained with a simulated new Restraint Automatic System. These both ATDs were instrumented in the head, chest and pelvic regions with triaxial accelerometers and were also equipped with femur load cells.

Dummy injury criteria measurements are presented in Table 6 and the response data diagrams are found in Appendix B.

TEST NO. Frontal - 1 PROJECT: DTNH 22 - 81 - C - 17085

DATE: 01. 18. 1982

VEHICLE Modified Rabbit - 710 113

TEST WEIGHT (KG) 1178 2592

IMPACT ANGLE (DEG) 0° Frontal Impact

IMPACT VELOCITY (MPH) 35.35

MAX. CRUSH (MM) STATIC: 552 / DYNAMIC: 660

MAX. INTRUSION (MM) see: Vehicle Measurement

DUMMIES

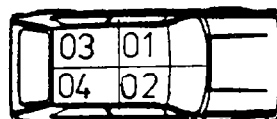
TYPE Hybrid II / Part 572 Hybrid II / Part 572

LOCATION 01 02

RESTRAINT Simulated New Restraint Automatic PAS

NUMBER OF DATA CHANNELS 56

NUMBER OF HIGH SPEED CAMERAS 7



**Table 5 : Crash Test Summary**

|          | Maximum Acceleration (g) $\geq 3$ ms |      |      |      |       |      |      |      |        |      |      |      |
|----------|--------------------------------------|------|------|------|-------|------|------|------|--------|------|------|------|
|          | Head                                 |      |      |      | Chest |      |      |      | Pelvis |      |      |      |
|          | X                                    | Y    | Z    | Res  | X     | Y    | Z    | Res  | X      | Y    | Z    | Res  |
| Dummy 01 | 56.5                                 | 13.5 | 51.1 | 74.9 | 38.0  | 14.1 | 7.7  | 38.1 | 42.6   | 21.8 | 18.6 | 46.5 |
| Dummy 02 | 34.5                                 | 19.0 | 47.6 | 64.0 | 40.0  | 10.0 | 10.3 | 40.3 | 47.7   | 8.0  | 17.0 | 48.2 |
| Dummy 03 |                                      |      |      |      |       |      |      |      |        |      |      |      |
| Dummy 04 |                                      |      |      |      |       |      |      |      |        |      |      |      |

|          | Maximum Force Femur Load (kN) |            |
|----------|-------------------------------|------------|
|          | Right Femur                   | Left Femur |
| Dummy 01 | 6.211                         | 6.650      |
| Dummy 02 | 6.040                         | 7.205      |
| Dummy 03 |                               |            |
| Dummy 04 |                               |            |

|          | Maximum Force Seat Belts Load (kN) |                              |                             |
|----------|------------------------------------|------------------------------|-----------------------------|
|          | Shoulder Strap<br>Upper Belt Load  | Lap Strap<br>Right Belt Load | Lap Strap<br>Left Belt Load |
| Dummy 01 | 8.512                              | --                           | --                          |
| Dummy 02 | 10.816                             | --                           | --                          |
| Dummy 03 |                                    |                              |                             |
| Dummy 04 |                                    |                              |                             |

|          | Head Injury Criteria |                      |                      |  | Severity Index |        |
|----------|----------------------|----------------------|----------------------|--|----------------|--------|
|          | HIC                  | t <sub>1</sub> (sec) | t <sub>2</sub> (sec) |  | Chest          | Pelvis |
| Dummy 01 | 554                  | 52                   | 109                  |  | 335            | 381    |
| Dummy 02 | 639                  | 52                   | 116                  |  | 359            | 371    |
| Dummy 03 |                      |                      |                      |  |                |        |
| Dummy 04 |                      |                      |                      |  |                |        |

Head Impact Time : Dummy 01 63 ms  
 Dummy 02 none ms

**Table 6 : Dummy Loads**

FIGURE 4 :

## FORWARD DISPLACEMENT - DRIVER

TEST NO.: Frontal 1 (Modified Rabbit)

MAXIMUM DISPLACEMENT: HEAD : 44 cm

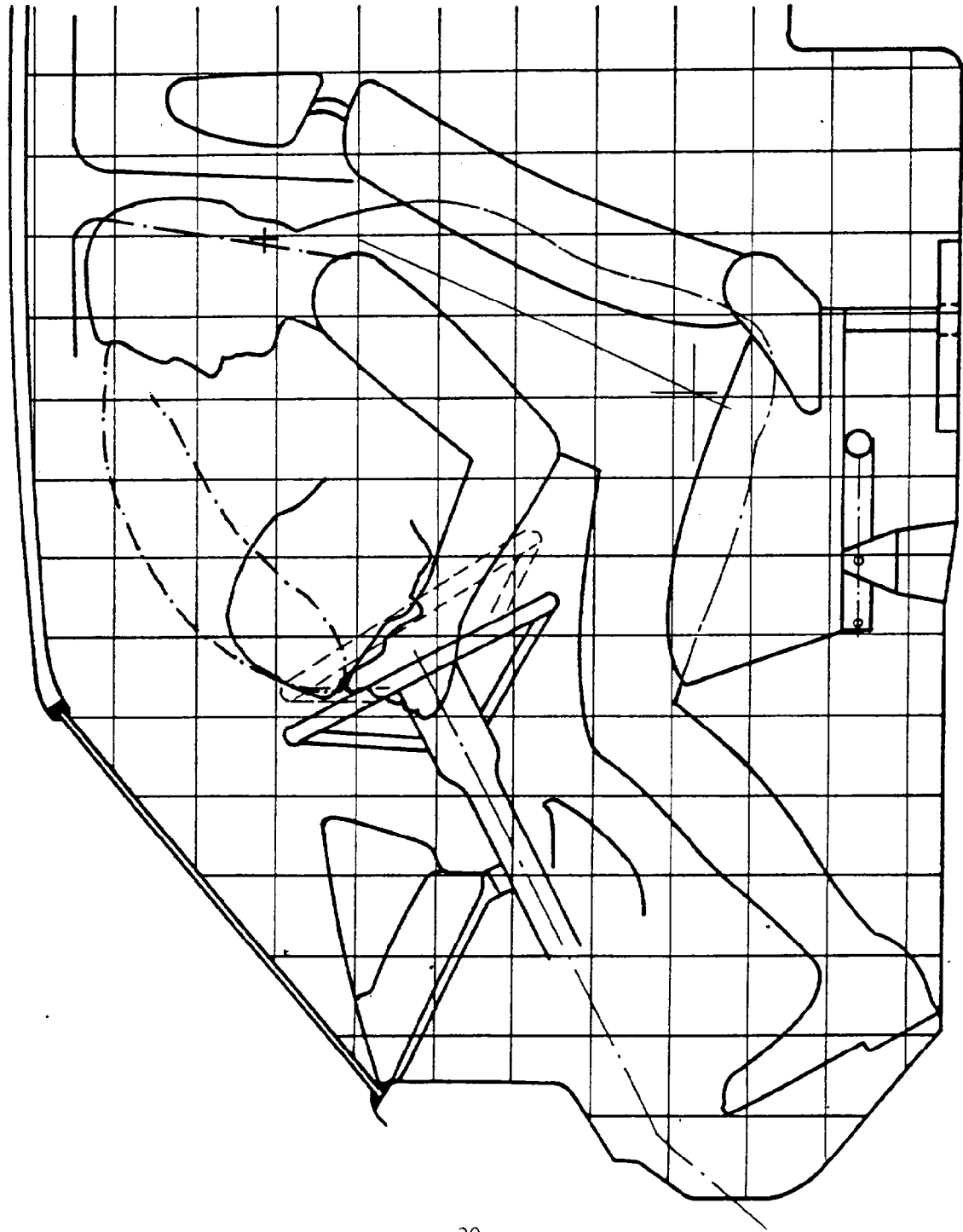
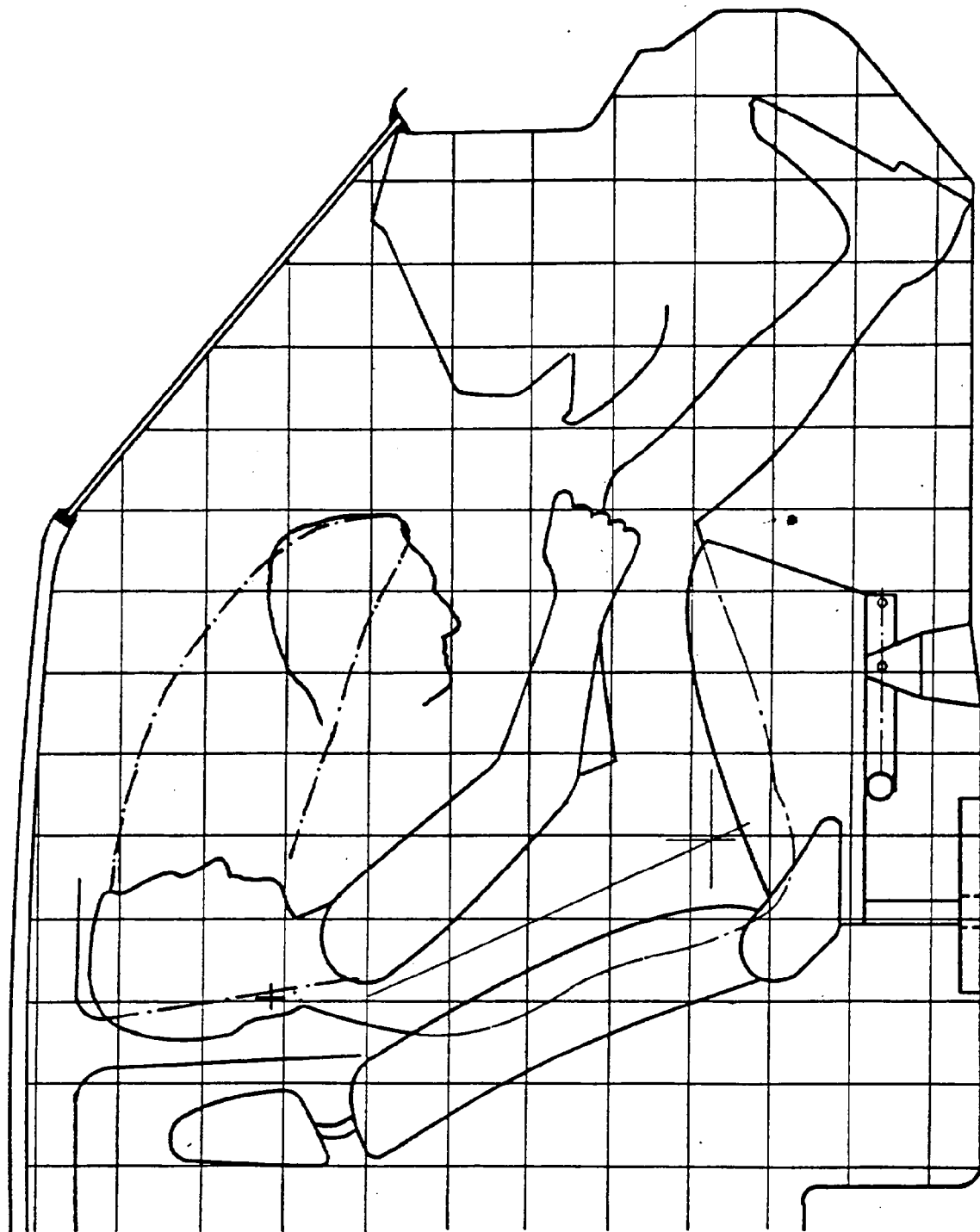


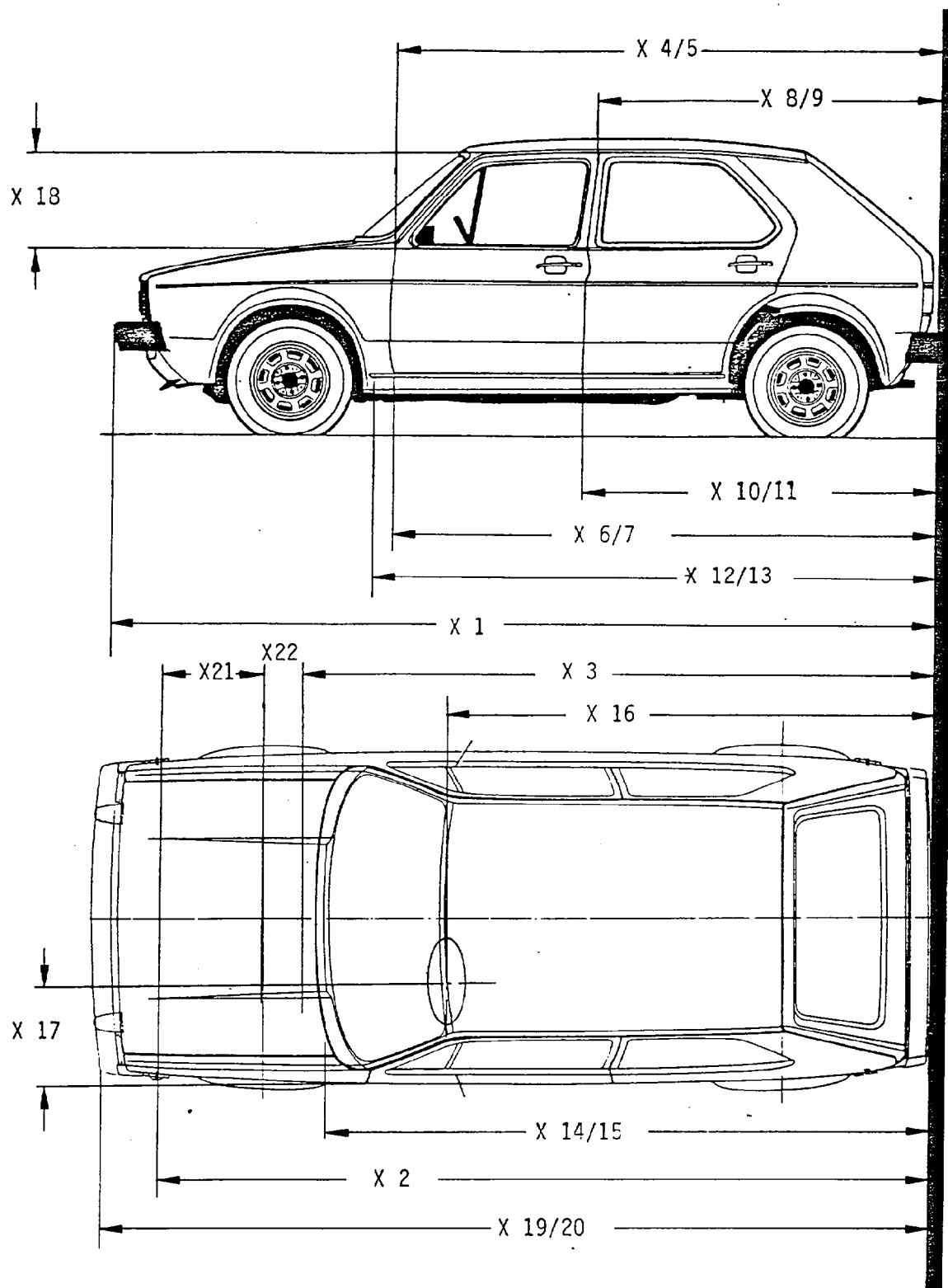
FIGURE 5 :  
**FORWARD DISPLACEMENT-PASSENGER**

TEST NO.: FRONTAL 1 (Modified Rabbit)

MAXIMUM DISPLACEMENT: HEAD : 48 cm



TEST NO : Frontal - 1



**Figure 6 : Pre-and Post Measurement Points**

| No.  | Type of Measurement                                          | Pre-Test |       |
|------|--------------------------------------------------------------|----------|-------|
|      |                                                              | Change   |       |
| X 1  | Total Length of Vehicle at Centerline                        | 3880     | - 552 |
| X 2  | Rear Surface of Vehicle to Front of Engine                   | 3400     | - 300 |
| X 3  | Rear Surface of Vehicle to Firewall                          | 2820     | - 230 |
| X 4  | Rear Surface of Vehicle to Upper Leading Edge of Right Door  | 2510     | - 40  |
| X 5  | " " " " " " " Left Door                                      | 2510     | - 30  |
| X 6  | Rear Surface of Vehicle to Lower Leading Edge of Right Door  | 2540     | - 80  |
| X 7  | " " " " " " " Left Door                                      | 2540     | - 20  |
| X 8  | Rear Surface of Vehicle to Upper Trailing Edge of Right Door | 1530     | - 30  |
| X 9  | " " " " " " " Left Door                                      | 1530     | - 20  |
| X 10 | Rear Surface of Vehicle to Lower Trailing Edge of Right Door | 1600     | - 65  |
| X 11 | " " " " " " " Left Door                                      | 1600     | - 10  |
| X 12 | Rear Surface of Vehicle to Bottom of A-Post of Right Side    | 2600     | - 80  |
| X 13 | " " " " " " " Left Side                                      | 2600     | - 20  |
| X 14 | Rear Surface of Vehicle to Firewall - Right Side             | 2770     | - 110 |
| X 15 | " " " " " - Left Side                                        | 2770     | - 60  |
| X 16 | Rear Surface of Vehicle to Steering Column                   | 2160     | - 55  |
| X 17 | Center of Steering Column to A-Post                          | 470      | - 5   |
| X 18 | Center of Steering Column to Headliner                       | 510      | - 30  |
| X 19 | Rear Surface of Vehicle to Right Side of Front Bumper        | 3825     | - 547 |
| X 20 | " " " " Left " " "                                           | 3825     | - 530 |
| X 21 | Length of Engine Block                                       | 350      | 0     |
| X 22 | Engine to Firewall                                           | 270      | - 110 |

TEST NO : Frontal 1

**Table 7 : Vehicle Measurement**

TEST NO : Frontal 1

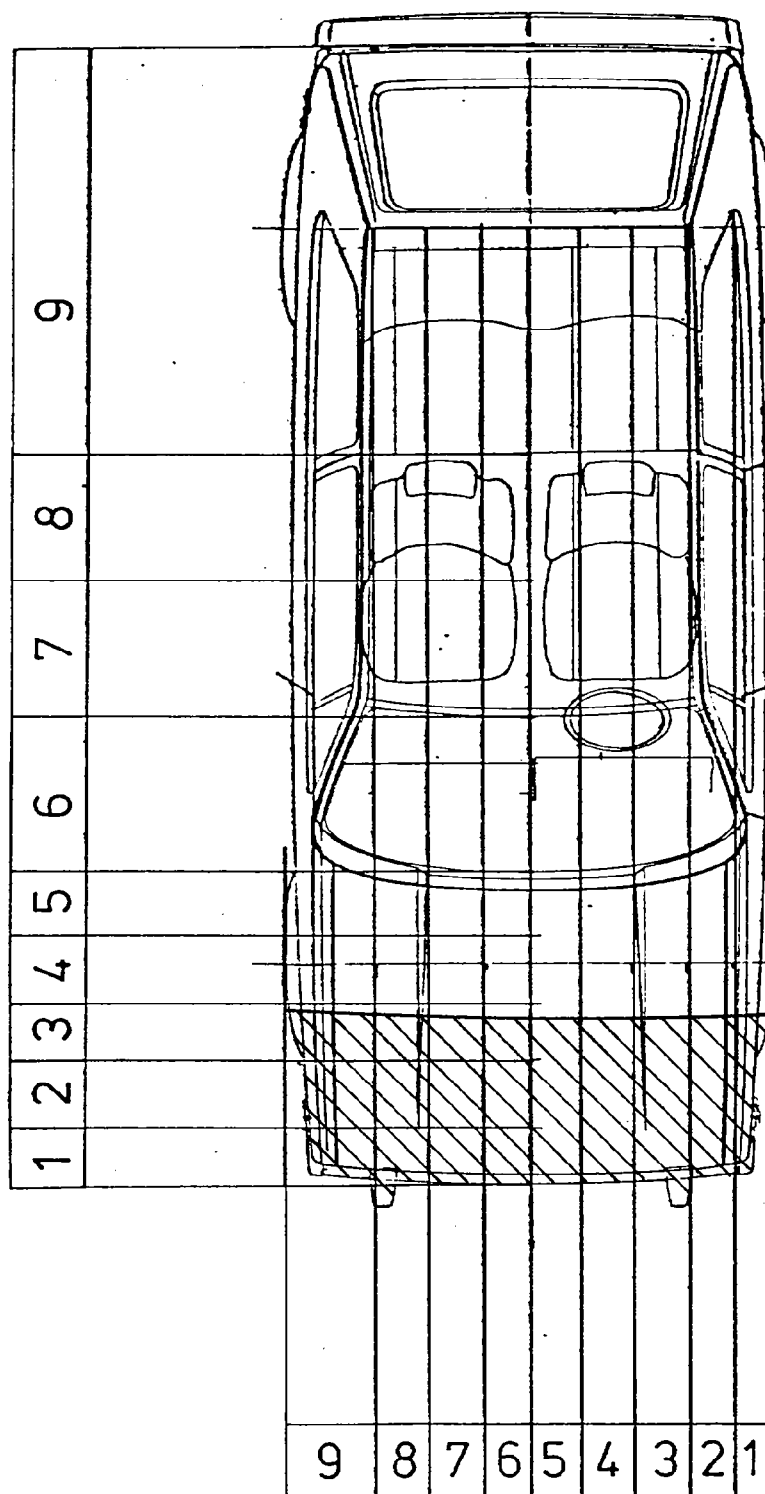
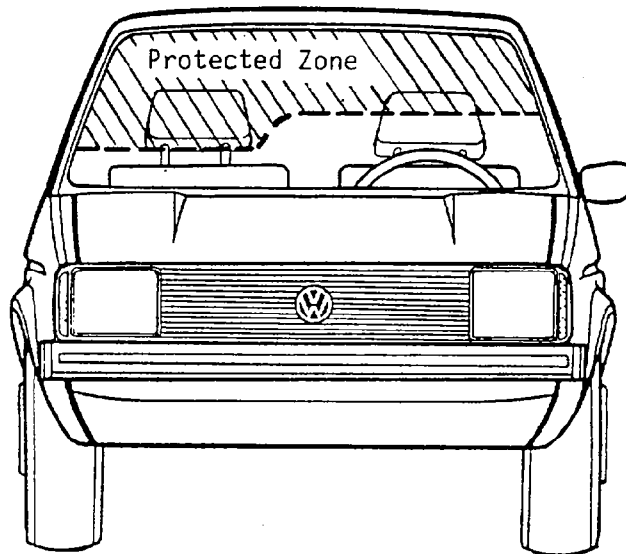


FIGURE 7 : PRE- AND POST TEST PROFILES



The standard requires that POST-TEST be a minimum of 75 percent of the PRE-TEST total periphery measurement for vehicle not equipped with passive occupant restraints and 50 % for each side of the windshield for vehicles which are equipped with passive occupant restraints.

FMVSS 212 : Windshield no Separation or Fracture.

FMVSS 219 : No Intrusion into the Area of Protected  
Zone

TEST NO : FRONTAL 1

FIGURE 8 : WINDSHIELD PROTECTION-ZONE

# P O S T   I M P A C T   S U M M A R Y

VEHICLE : Modified Rabbit (705 113)

TEST DATE : 01.18.1982

|                                                                                            | ACTUAL  | MAX. ALLOWED         |
|--------------------------------------------------------------------------------------------|---------|----------------------|
| FUEL SPILLAGE FROM IMPACT UNTIL<br>VEHICLE MOTION CEASES                                   | - 0 -   | 1 OUNCE              |
| FUEL SPILLAGE FOR 5 MINUTE PERIOD<br>FOLLOWING CESSATION OF VEHICLE<br>MOTION AFTER IMPACT | - 0 -   | 5 OUNCES             |
| FUEL SPILLAGE FOR NEXT 25 MINUTE<br>PERIOD                                                 | - 0 -   | 1 OUNCE/<br>1 MINUTE |
| TIME DURATION FROM IMPACT UNTIL<br>START OF ROLLOVER TEST PERIODS                          | 27 min. | 30 MINUTES           |

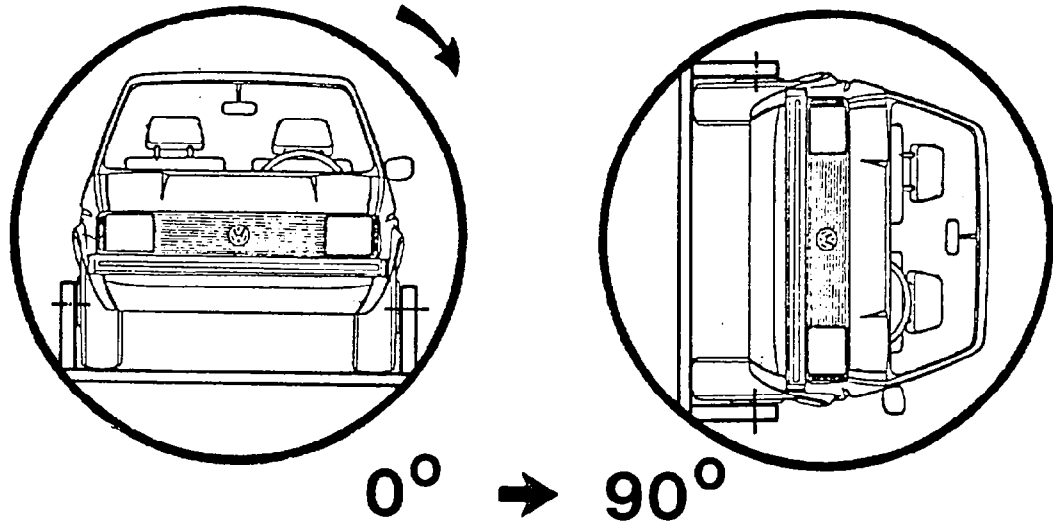
FUEL SPILLAGE LOCATION: Not Applicable

**Table 8 : Fuel System Integrity - FMVSS 301-75**

# STATIC ROLLOVER

VEHICLE : Modified Rabbit (705 113)

TEST DATE : 01.18.1982



|                                                               | ACTUAL            | MAX. ALLOWED   |
|---------------------------------------------------------------|-------------------|----------------|
| ROLLOVER FIXTURE 90° ROTATION TIME                            | 1 min.<br>15 sec. | 1 TO 3 MINUTES |
| FUEL SPILLAGE DURING 5 MINUTE PERIOD FROM ONSET OF ROTATION   | - 0 -             | 5 OUNCES       |
| FUEL SPILLAGE DURING 6th MINUTE PERIOD FROM ONSET OF ROTATION | - 0 -             | 1 OUNCE        |
| FUEL SPILLAGE DURING 7th MINUTE PERIOD FROM ONSET OF ROTATION | - 0 -             | 1 OUNCE        |

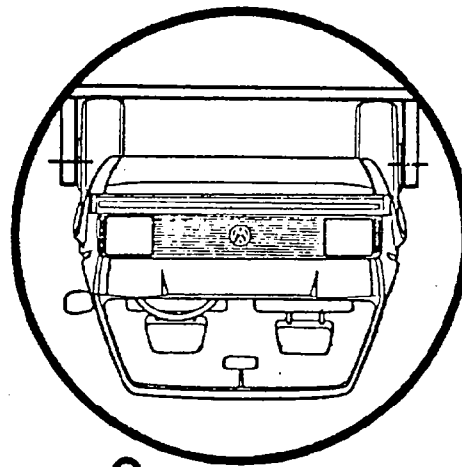
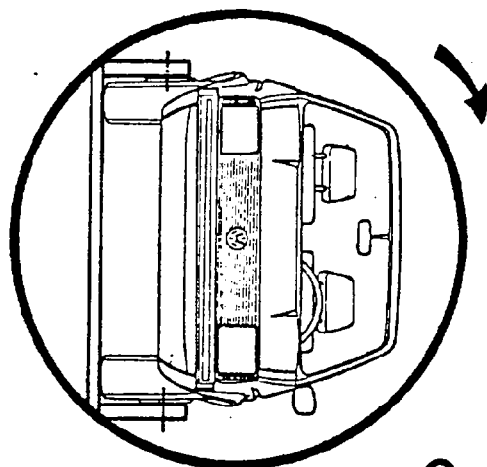
FUEL SPILLAGE LOCATION : Not Applicable

**Table 9: Fuel System Integrity - FMVSS 301-75**

# STATIC ROLLOVER

VEHICLE : Modified Rabbit (705 113)

TEST DATE : 01.18.1982



90° → 180°

|                                                                  | ACTUAL            | MAX. ALLOWED      |
|------------------------------------------------------------------|-------------------|-------------------|
|                                                                  | 1 min.<br>10 sec. | 1 TO 3<br>MINUTES |
| ROLLOVER FIXTURE 90° ROTATION<br>TIME                            |                   |                   |
| FUEL SPILLAGE DURING 5 MINUTE<br>PERIOD FROM ONSET OF ROTATION   | - 0 -             | 5 OUNCES          |
| FUEL SPILLAGE DURING 6th MINUTE<br>PERIOD FROM ONSET OF ROTATION | - 0 -             | 1 OUNCE           |
| FUEL SPILLAGE DURING 7th MINUTE<br>PERIOD FROM ONSET OF ROTATION | - 0 -             | 1 OUNCE           |

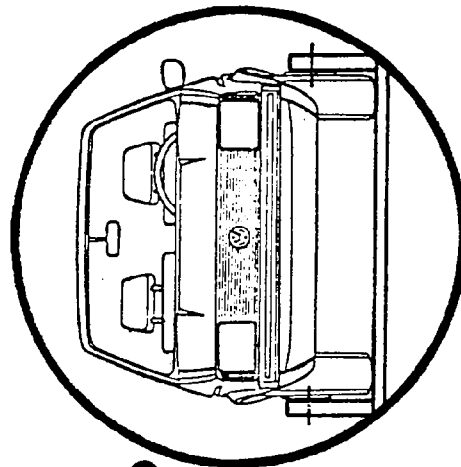
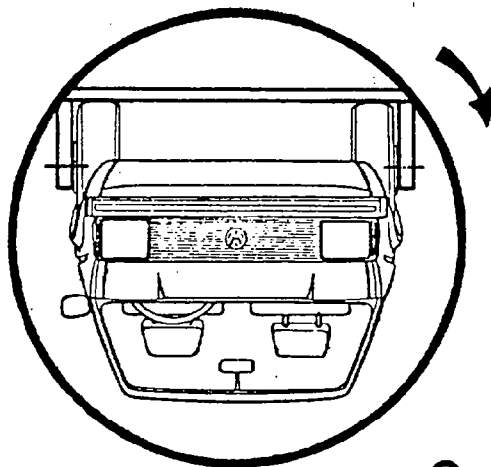
FUEL SPILLAGE LOCATION : Not Applicable

**Table 10: Fuel System Integrity - FMVSS 301-75**

# STATIC ROLLOVER

VEHICLE : Modified Rabbit (705 113)

TEST DATE : 01.18.1982



180° → 270°

|                                                                  | ACTUAL           | MAX! ALLOWED      |
|------------------------------------------------------------------|------------------|-------------------|
| ROLLOVER FIXTURE 90° ROTATION<br>TIME                            | 1 min.<br>8 sec. | 1 TO 3<br>MINUTES |
| FUEL SPILLAGE DURING 5 MINUTE<br>PERIOD FROM ONSET OF ROTATION   | - 0 -            | 5 OUNCES          |
| FUEL SPILLAGE DURING 6th MINUTE<br>PERIOD FROM ONSET OF ROTATION | - 0 -            | 1 OUNCE           |
| FUEL SPILLAGE DURING 7th MINUTE<br>PERIOD FROM ONSET OF ROTATION | - 0 -            | 1 OUNCE           |

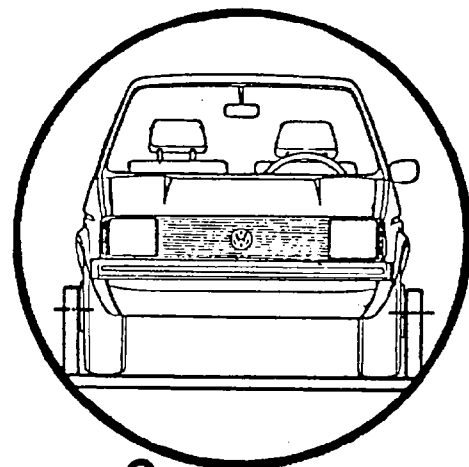
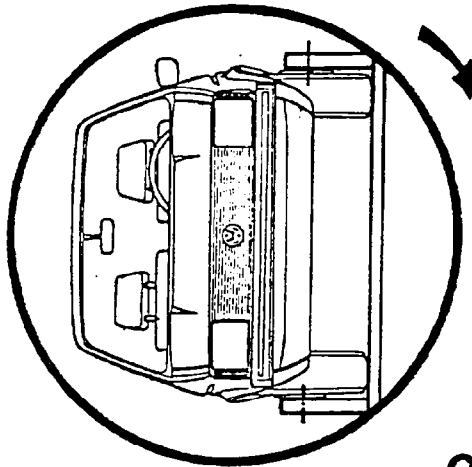
FUEL SPILLAGE LOCATION : Not Applicable

**Table 11 : Fuel System Integrity - FMVSS 301-75**

# STATIC ROLLOVER

VEHICLE : Modified Rabbit (705 113)

TEST DATE : 01.18.1982



270° → 360°

|                                                               | ACTUAL           | MAX. ALLOWED   |
|---------------------------------------------------------------|------------------|----------------|
| ROLLOVER FIXTURE 90° ROTATION TIME                            | 1 min.<br>4 sec. | 1 TO 3 MINUTES |
| FUEL SPILLAGE DURING 5 MINUTE PERIOD FROM ONSET OF ROTATION   | - 0 -            | 5 OUNCES       |
| FUEL SPILLAGE DURING 6th MINUTE PERIOD FROM ONSET OF ROTATION | - 0 -            | 1 OUNCE        |
| FUEL SPILLAGE DURING 7th MINUTE PERIOD FROM ONSET OF ROTATION | - 0 -            | 1 OUNCE        |

FUEL SPILLAGE LOCATION : Not Applicable

**Table 12: Fuel System Integrity - FMVSS 301-75**

A P P E N D I X    A

Photographs

## List of Illustrations

| Figure |                                | Page   |
|--------|--------------------------------|--------|
| A 1    | Left Full Side Pre Test View   | A - 2  |
| A 2    | Left Full Side Post Test View  | A - 3  |
| A 3    | Right Full Side Pre Test View  | A - 4  |
| A 4    | Right Full Side Post Test View | A - 5  |
| A 5    | Area of Engine Pre Test View   | A - 6  |
| A 6    | Area of Engine Post Test View  | A - 7  |
| A 7    | Windshield Pre Test View       | A - 8  |
| A 8    | Windshield Post Test View      | A - 9  |
| A 9    | Driver Position Pre Test View  | A - 10 |
| A 10   | Driver Position Post Test View | A - 11 |
| A 11   | Front Passenger Pre Test View  | A - 12 |
| A 12   | Front Passenger Post Test View | A - 13 |

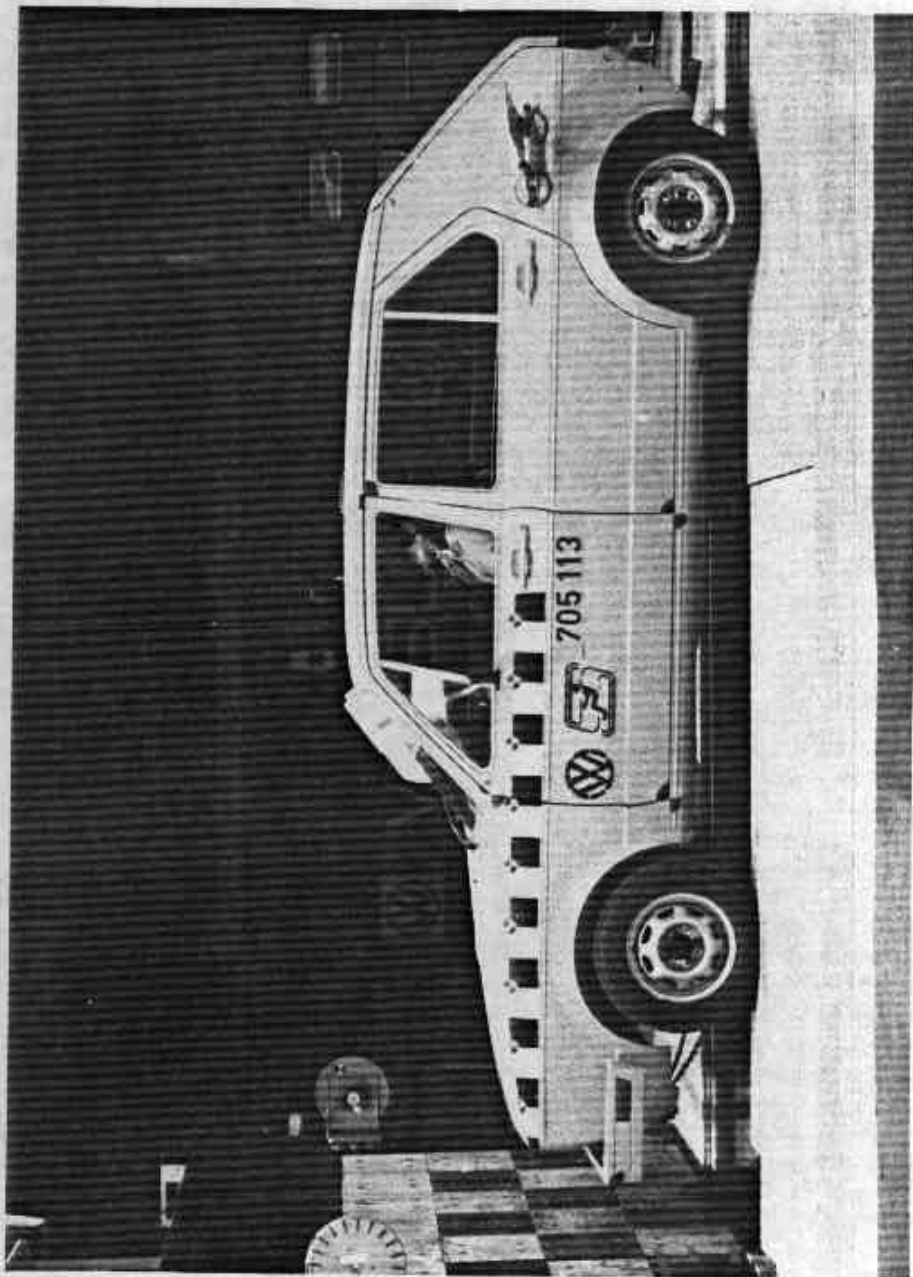


FIGURE A 1 : LEFT FULL SIDE PRE TEST VIEW

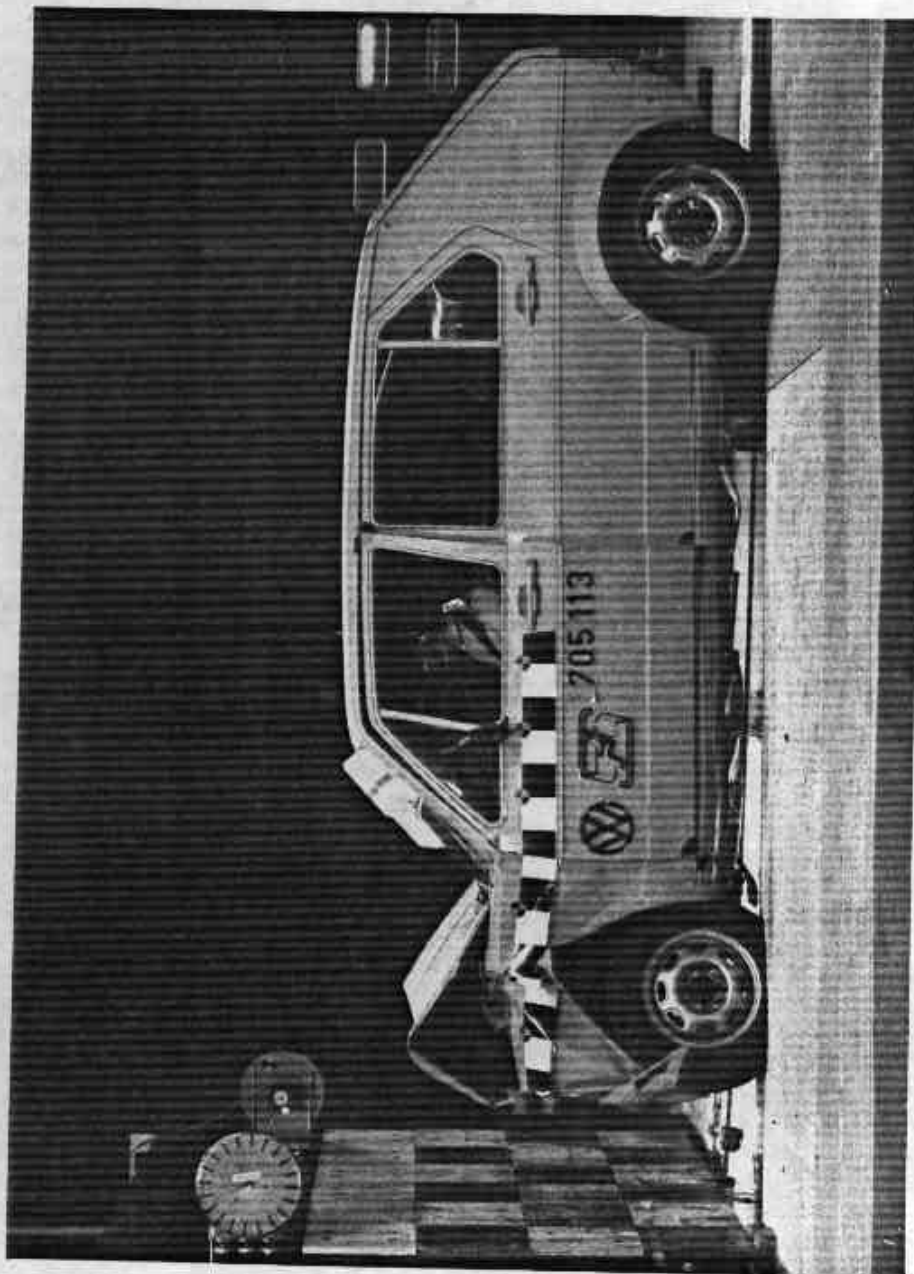


FIGURE A 2 : LEFT FULL SIDE POST TEST VIEW

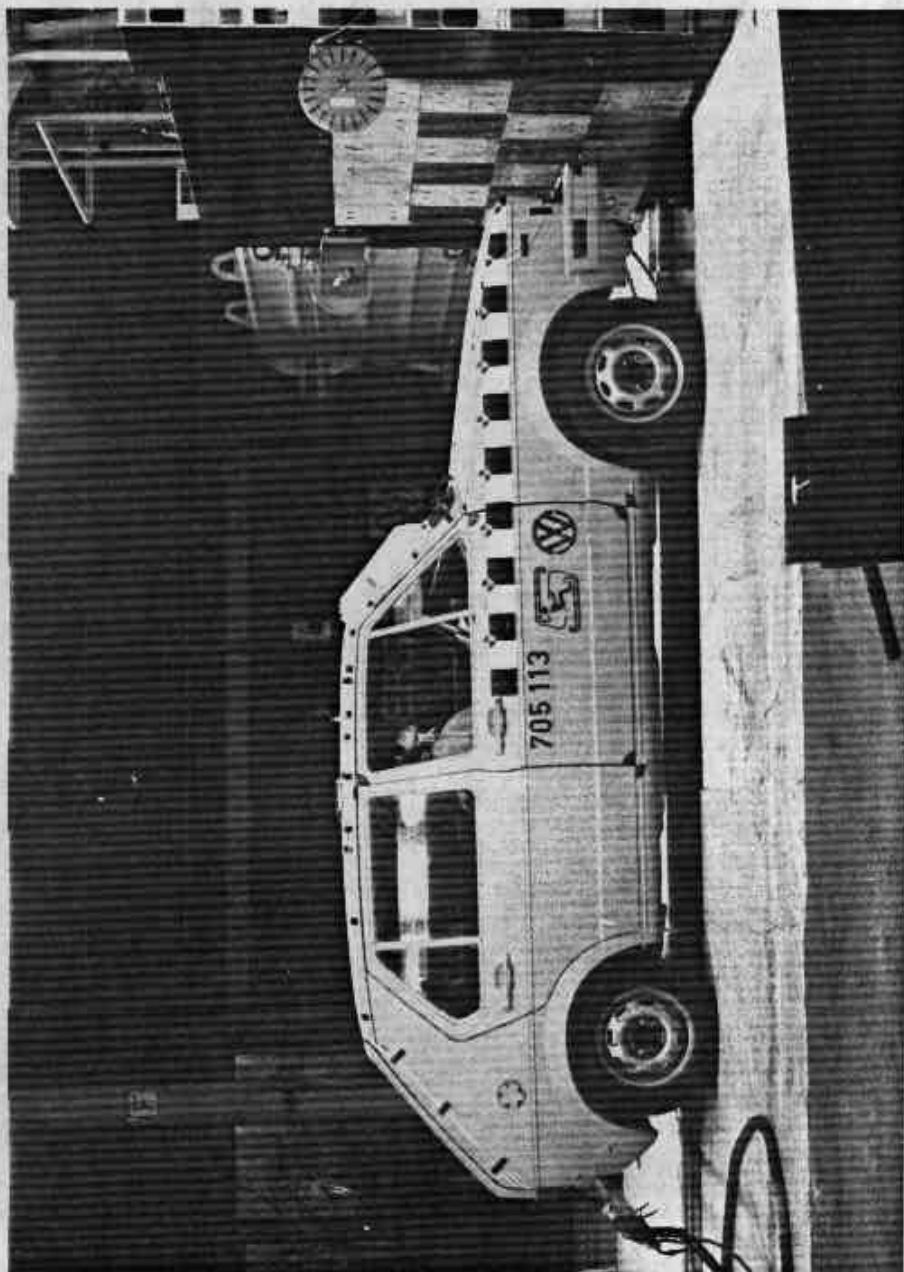


FIGURE A 3 : RIGHT FULL SIDE PRE TEST VIEW

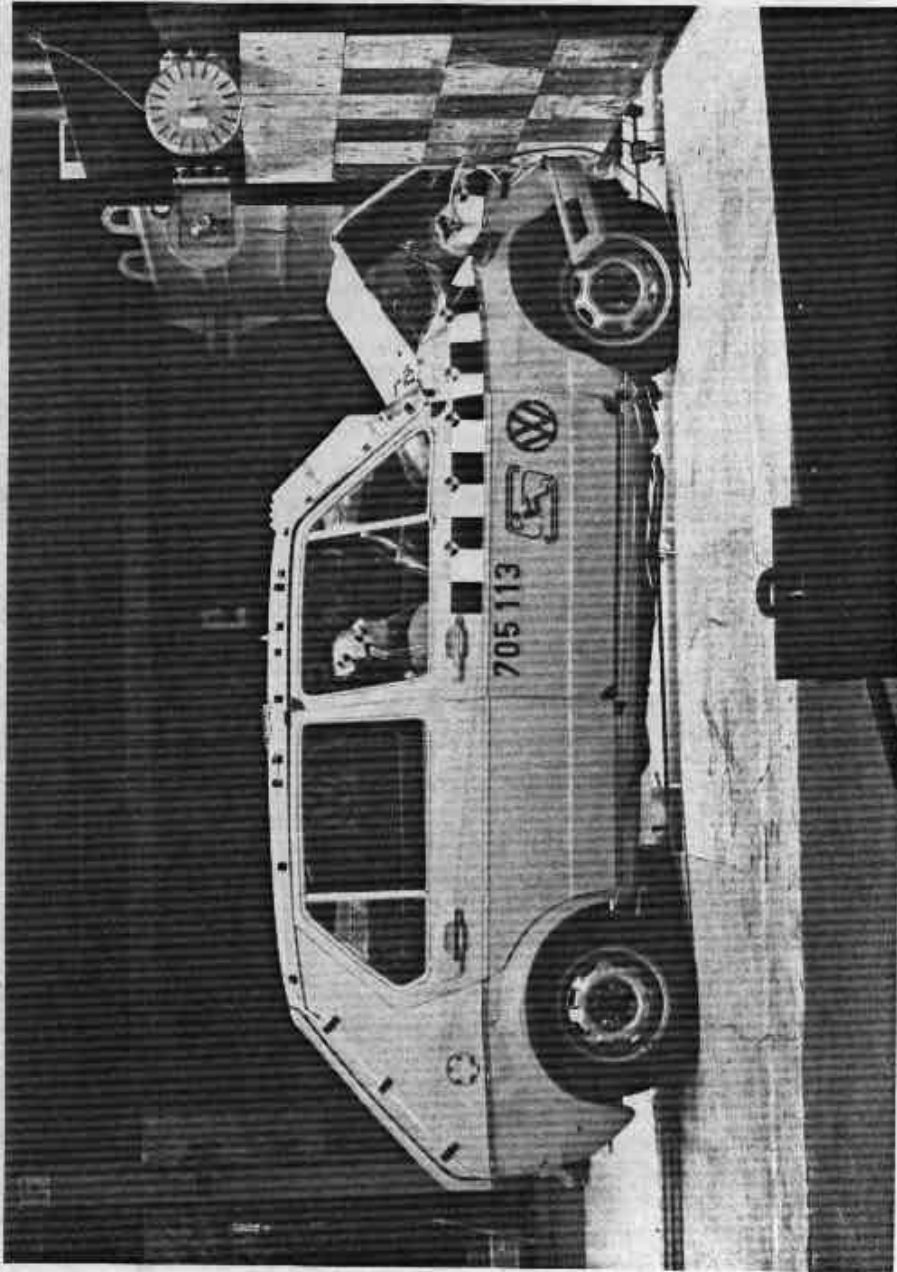


FIGURE A 4 : RIGHT FULL SIDE POST TEST VIEW

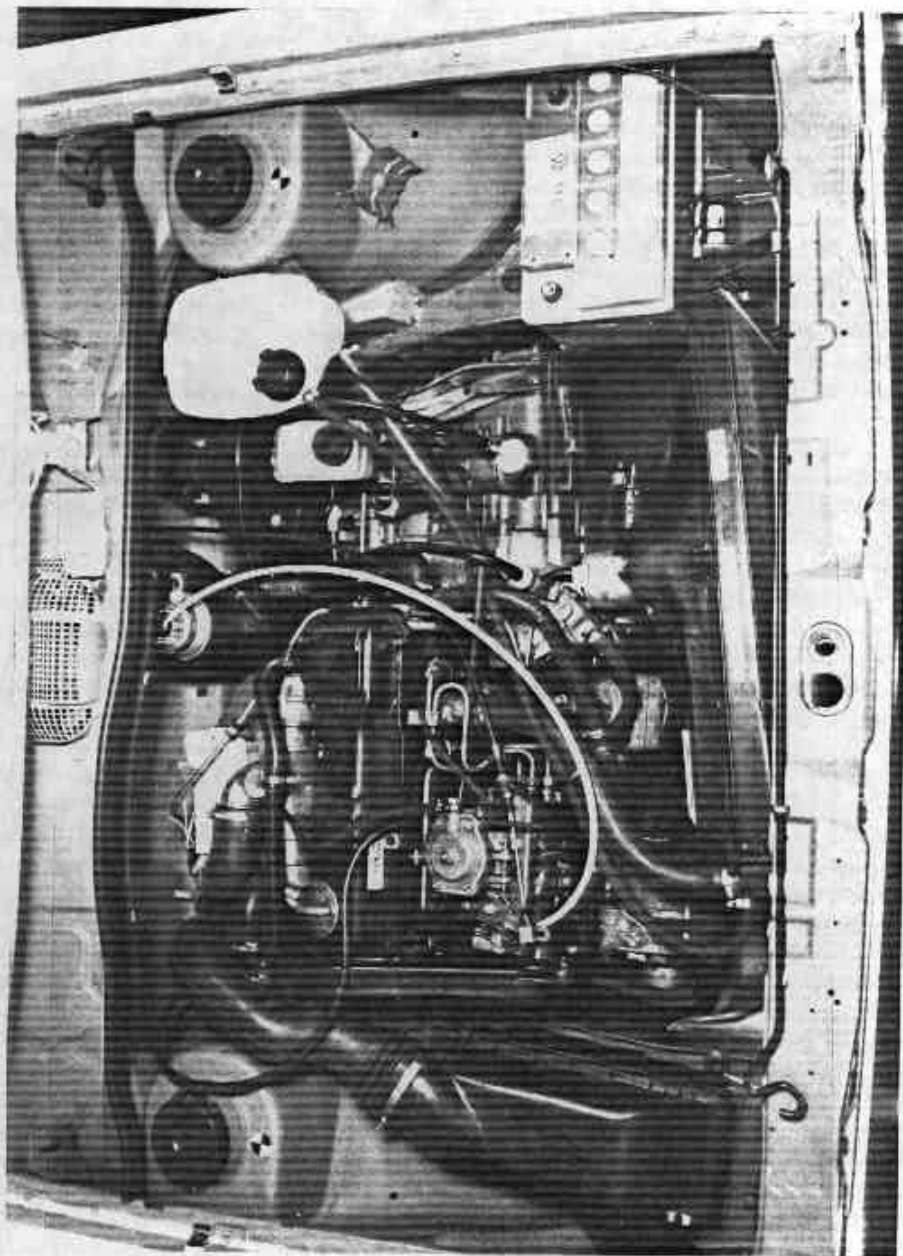


FIGURE A 5 : AREA OF ENGINE PRE TEST VIEW

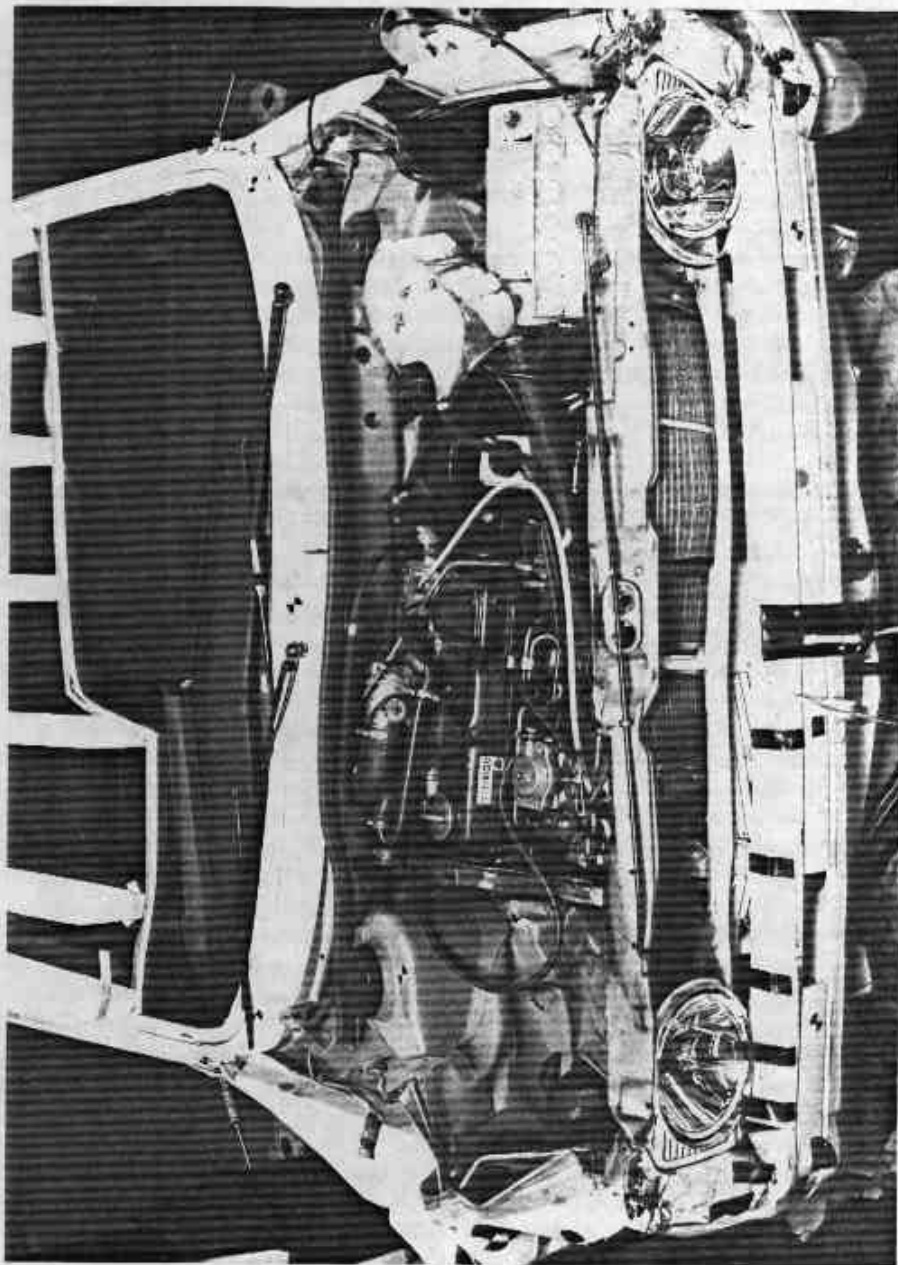


FIGURE A 6 : AREA OF ENGINE POST TEST VIEW

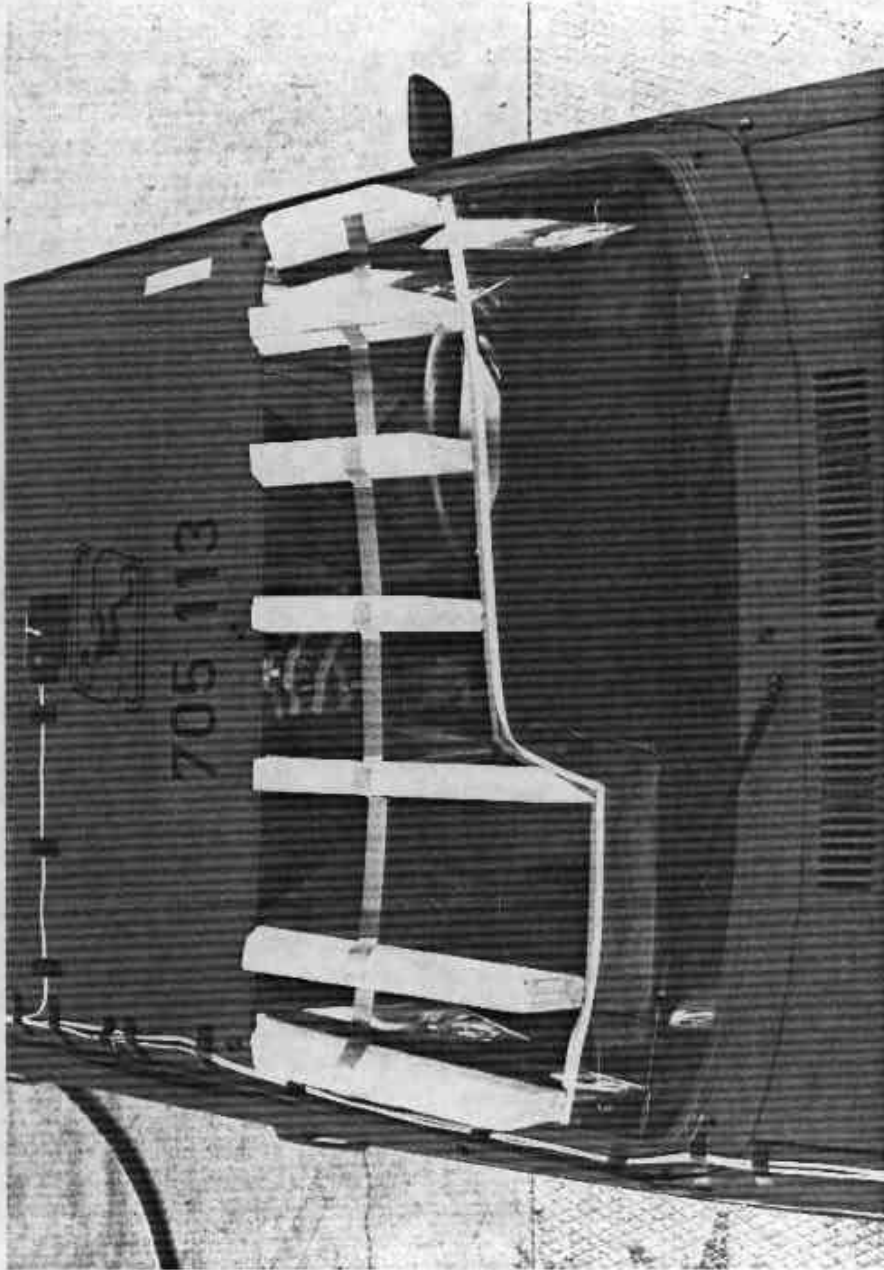


FIGURE A 7 : WINDSHIELD PRE TEST VIEW

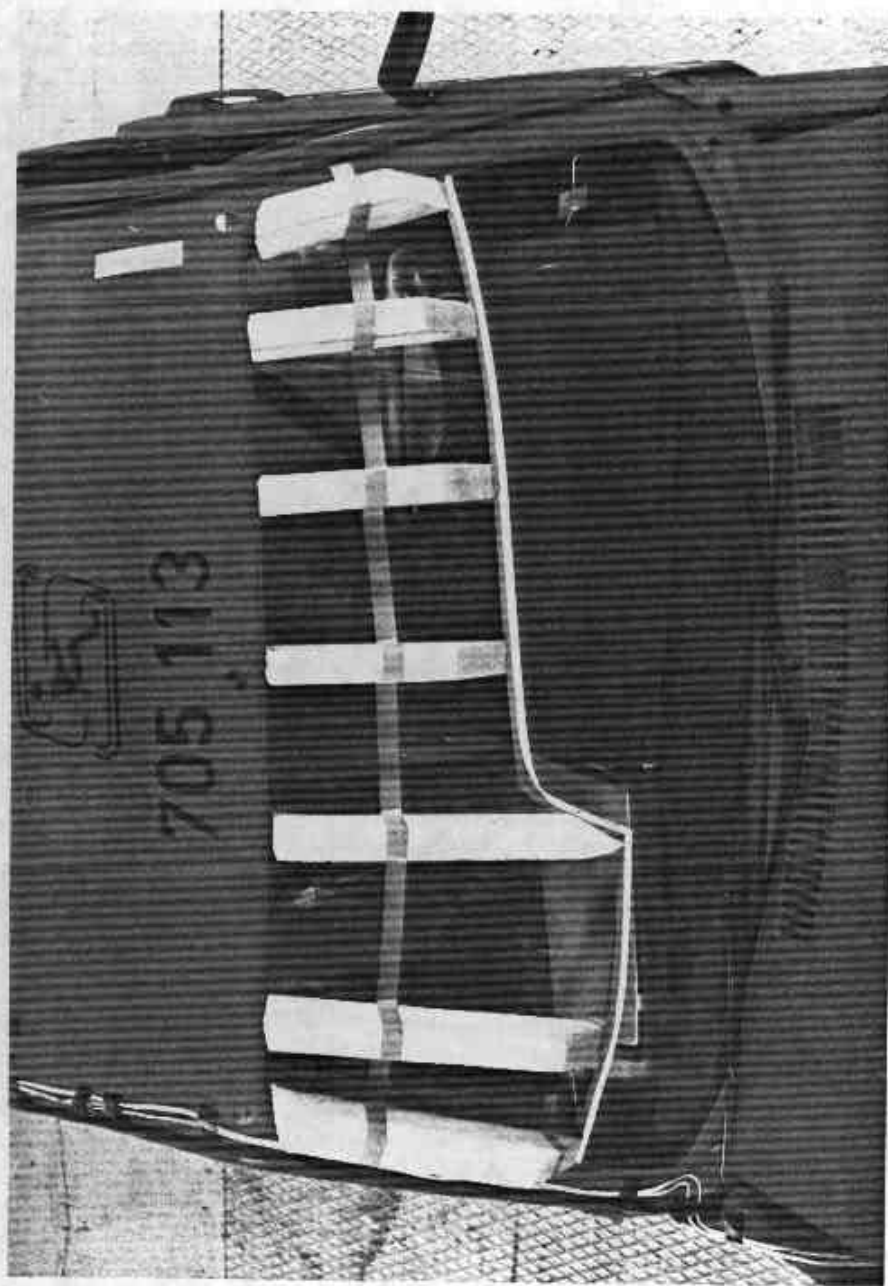


FIGURE A 8 : WINDSHIELD POST TEST VIEW



FIGURE A 9 : DRIVER POSITION PRE TEST VIEW



FIGURE A 10 : DRIVER POSITION POST TEST VIEW



FIGURE A 11 : FRONT PASSENGER PRE TEST VIEW



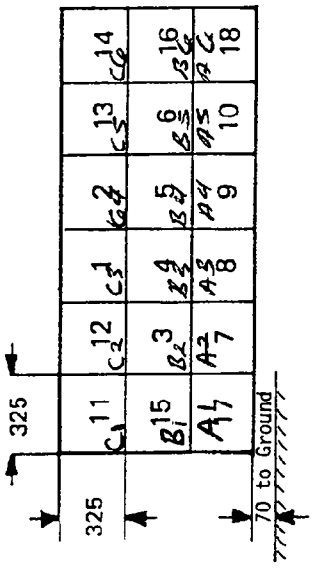
FIGURE A 12 : FRONT PASSENGER POST TEST VIEW

## A P P E N D I X    B

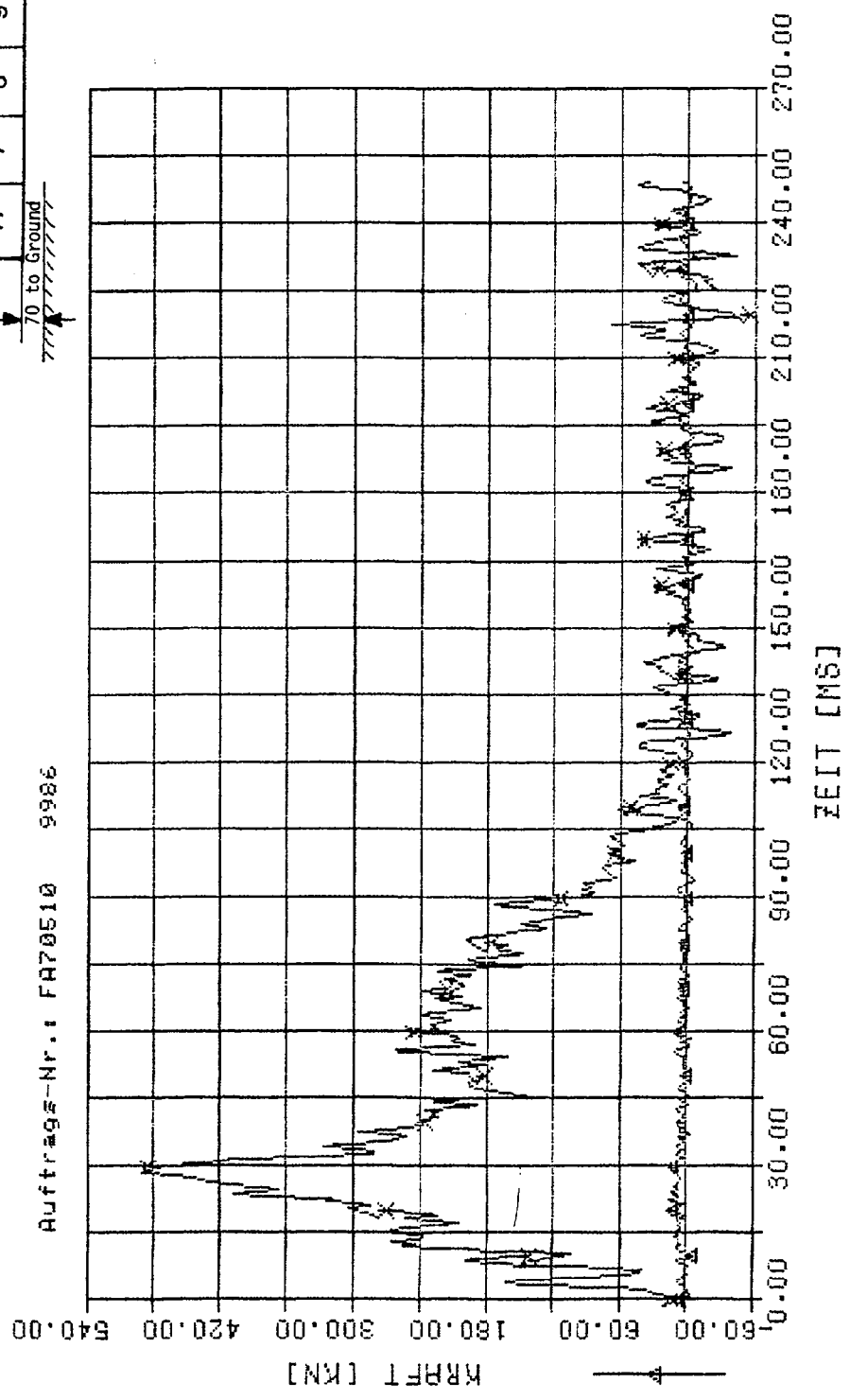
- B    Vehicle and Dummy Test Response
  - B.1    Load Cell Fixed Barrier
  - B.2    Vehicle Test Response
  - B.3    Dummy Test Response
    - B.3.1    Driver
    - B.3.1    Front Passenger
  - B.4    Dummy Calibration Test Data

## B.1 Load Cell Fixed Barrier

- Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 9986



| Mess-Stelle | UP | ber.  | Extremum | t     | 3MS  |
|-------------|----|-------|----------|-------|------|
| KMPL01      | W  | KR kN | 13.714   | 22.50 | 0.00 |
| KMPL        | W  | KR kN | 488.317  | 29.00 | 0.00 |

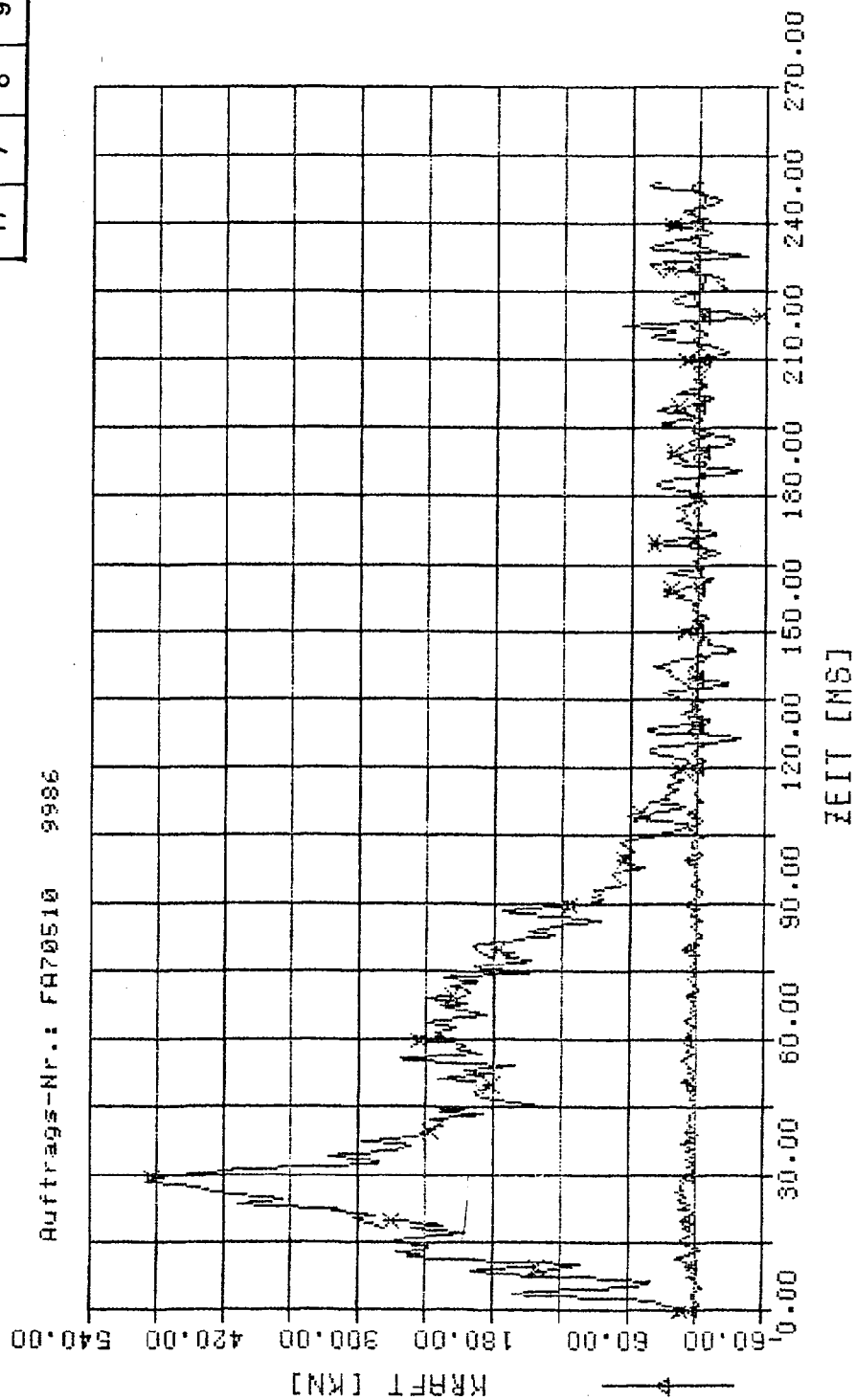


KMPL01020304050607080910111213141516

- Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 9986

| Mess-Stelle | UP | ber.    | Extremum | t     | 3MS  |
|-------------|----|---------|----------|-------|------|
| KMPL02      | W  | Groesse | 17.475   | Extr. | 0.00 |
| KMPL        | W  | KR KN   | 488.317  | 29.00 | 0.00 |

Auftrags-Nr.: FA70510 9986

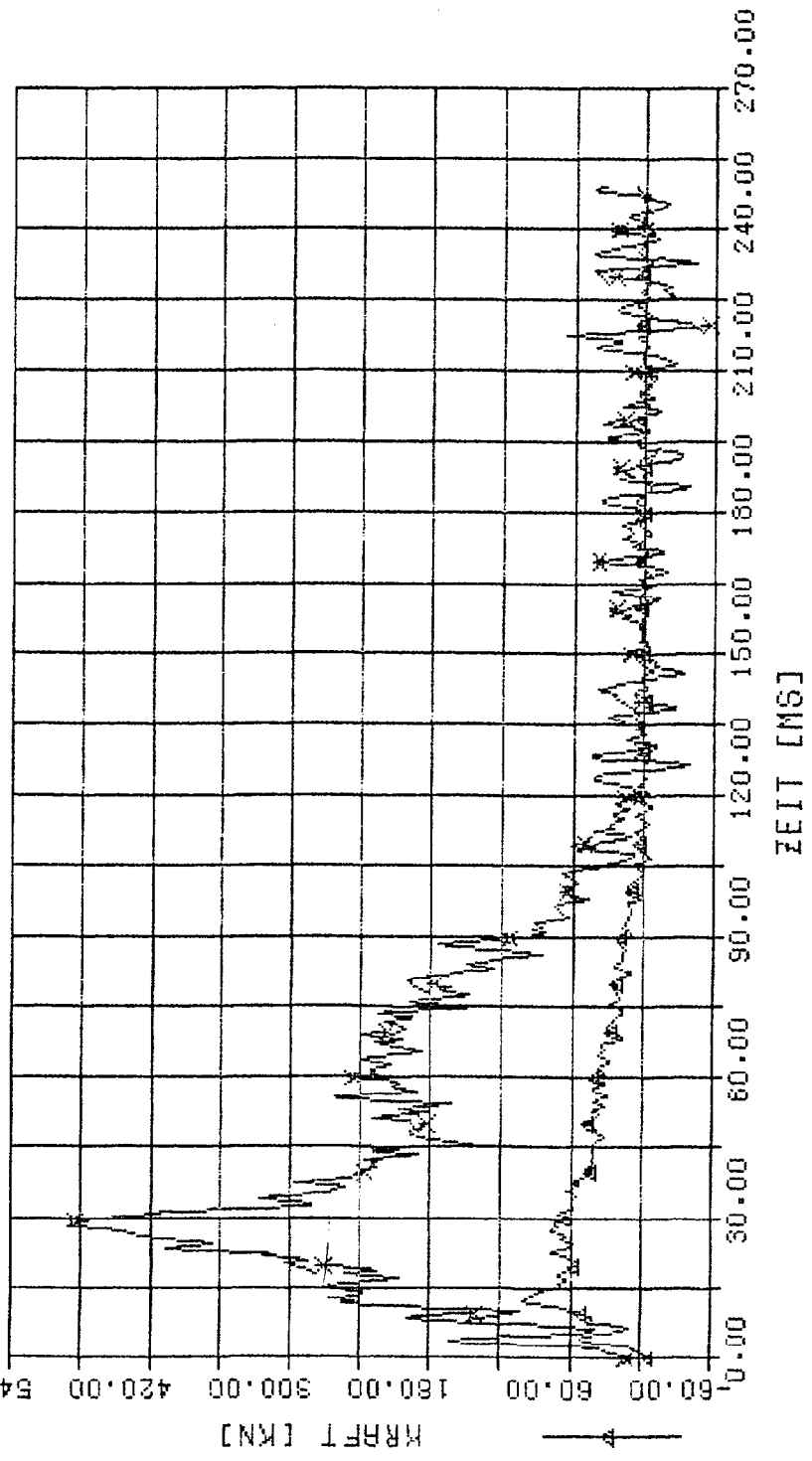


KMPL02  
KMPL01020304050607080910111213141516

- Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 9986

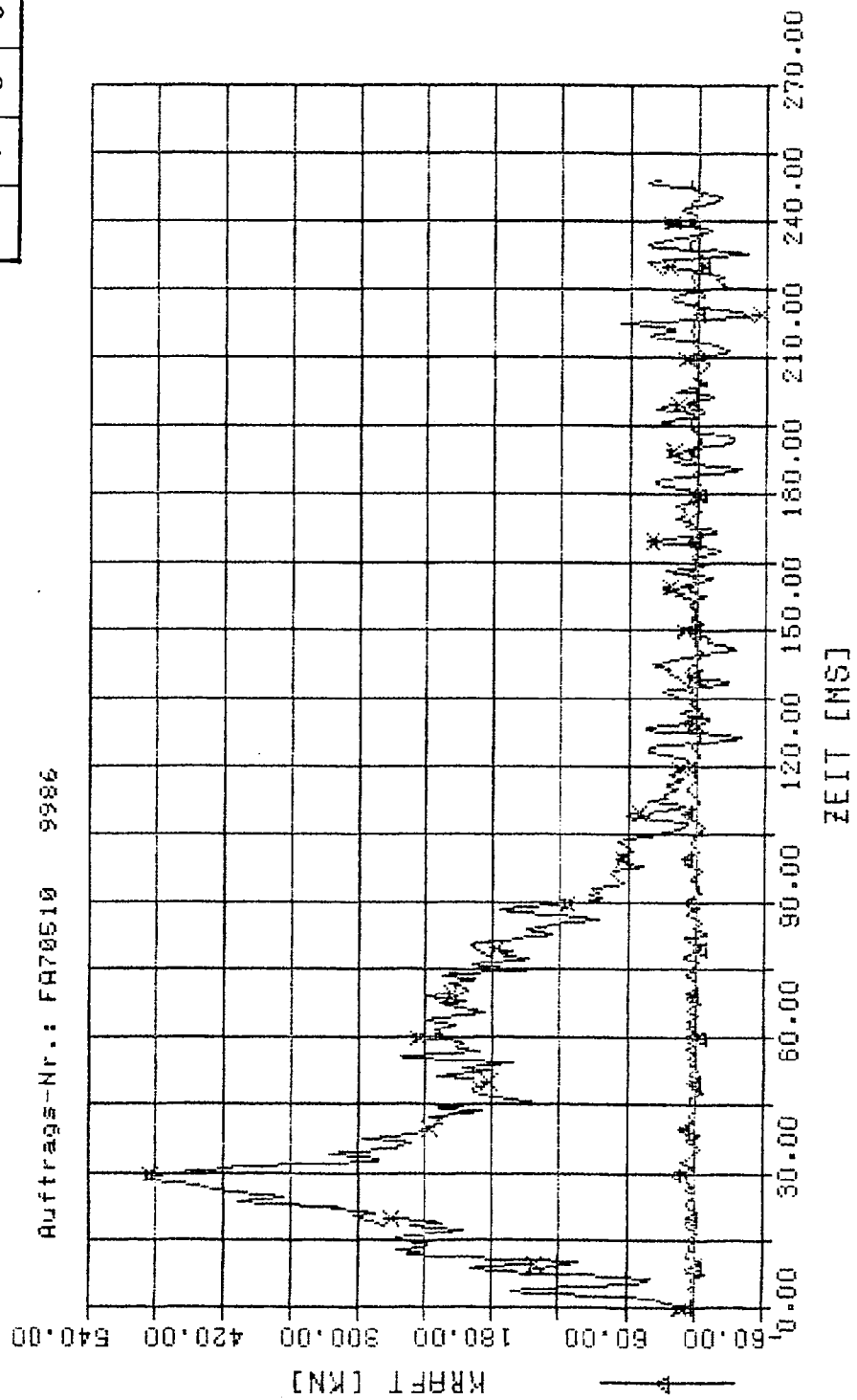
| Mess-Stelle | UP | ber.    | Extremum | t     | 3MS  |
|-------------|----|---------|----------|-------|------|
| KNPL03      | W  | Groesse | 99.352   | Extr. | 0.00 |
| KNPL        | W  | KR kN   | 488.317  | 29.00 | 0.00 |

Auftrags-Nr.: FA70510 9986



- Kenn-Werte: — Auftrags-Nr.: FA70510 Versuchs-Nr.: 9986

| Mess-Stelle | UP | ber.  | Extremum | t     | 3MS  | 325 |    |    |   |   |    |
|-------------|----|-------|----------|-------|------|-----|----|----|---|---|----|
|             |    |       |          |       |      | 325 | 11 | 12 | 1 | 2 | 13 |
| KMPL04      | W  | KR kN | 14.402   | 30.00 | 0.00 |     |    |    |   |   |    |
| KMPL        | W  | KR kN | 488.317  | 29.00 | 0.00 |     | 15 | 3  | 4 | 5 | 6  |
|             |    |       |          |       |      |     | 17 | 7  | 8 | 9 | 10 |
|             |    |       |          |       |      |     |    |    |   |   | 16 |
|             |    |       |          |       |      |     |    |    |   |   | 18 |



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- Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 9986

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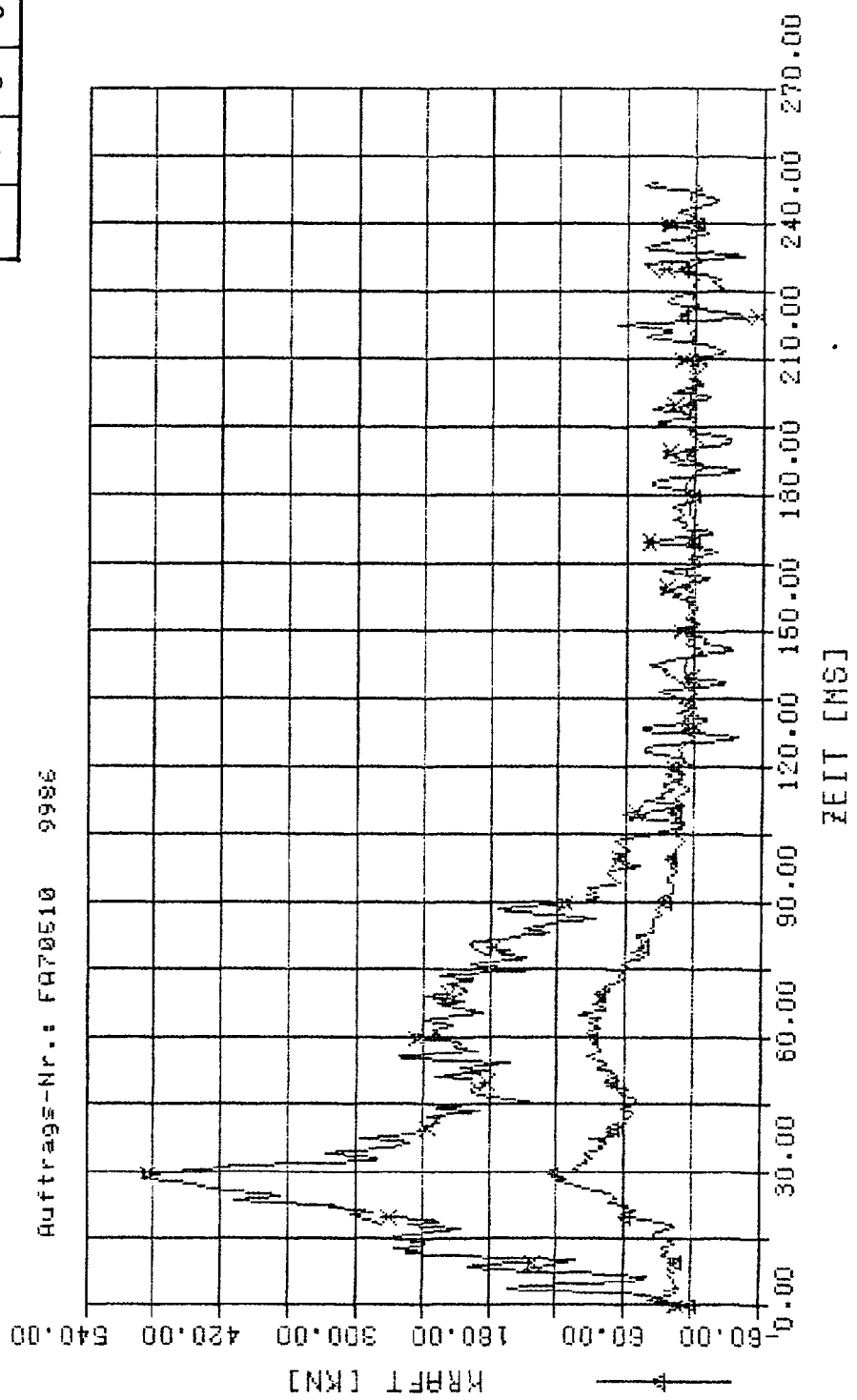
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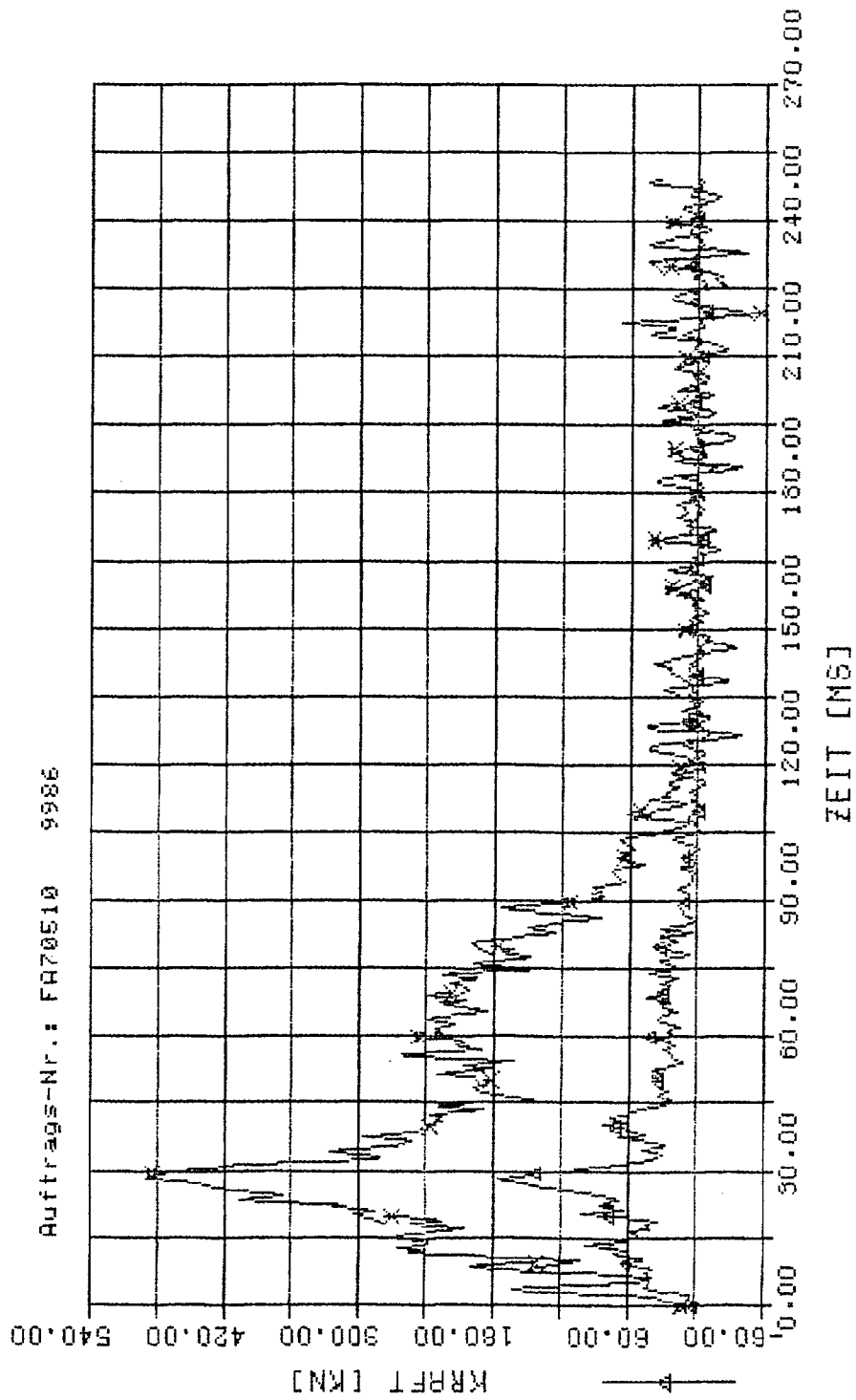
Auftrags-Nr.: FA70510 9986



KMPL01020304050607080910111213141516

- Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 9986

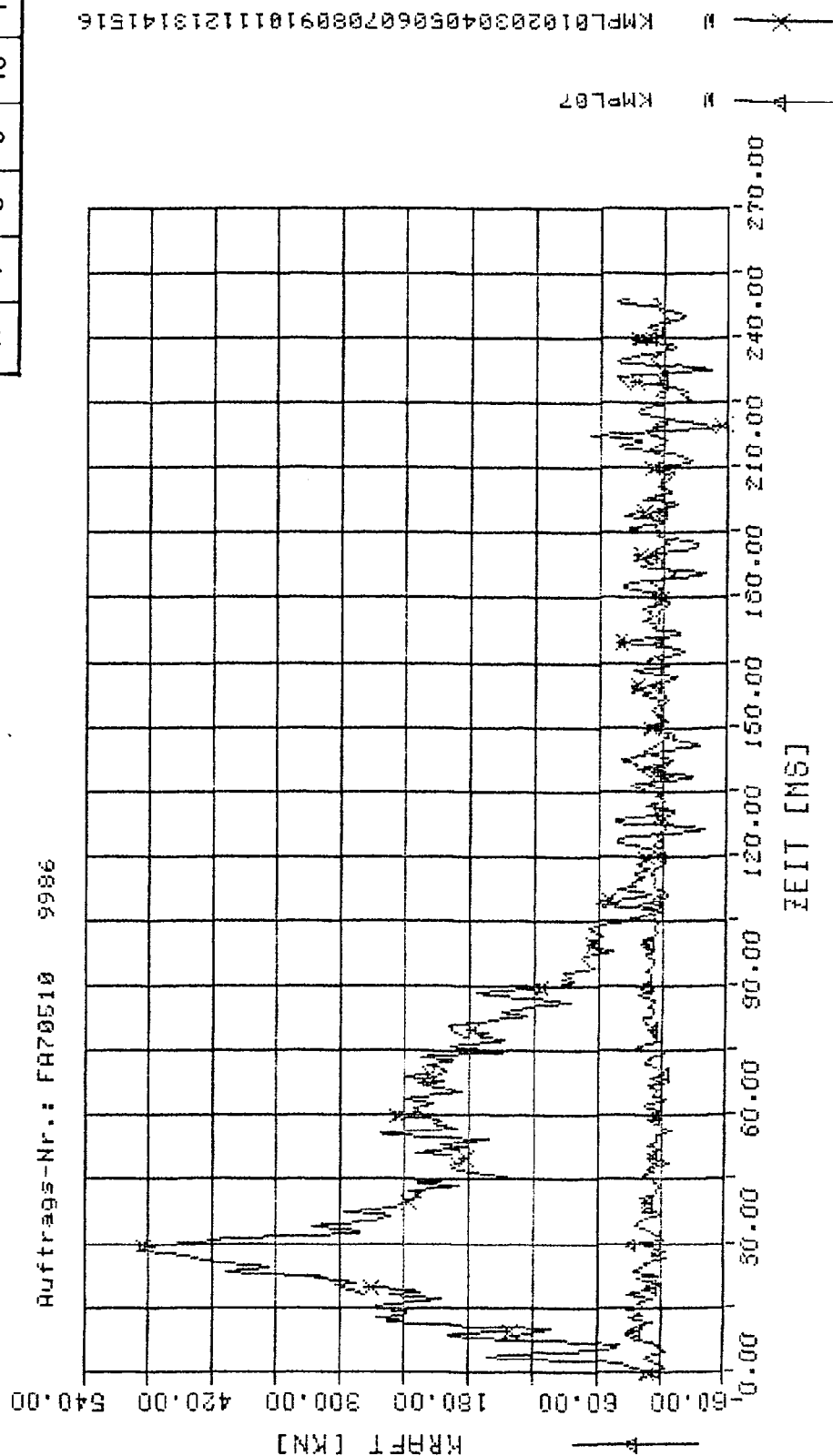
| Mess-Stelle | UP | ber.  | Extremum | t     | 3MS  |
|-------------|----|-------|----------|-------|------|
| KMPL06      | W  | KR kN | 175.194  | 28.50 | 0.00 |
| KMPL        | W  | KR kN | 488.317  | 29.00 | 0.00 |



W KMPL06  
W KMPL06

Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 9986

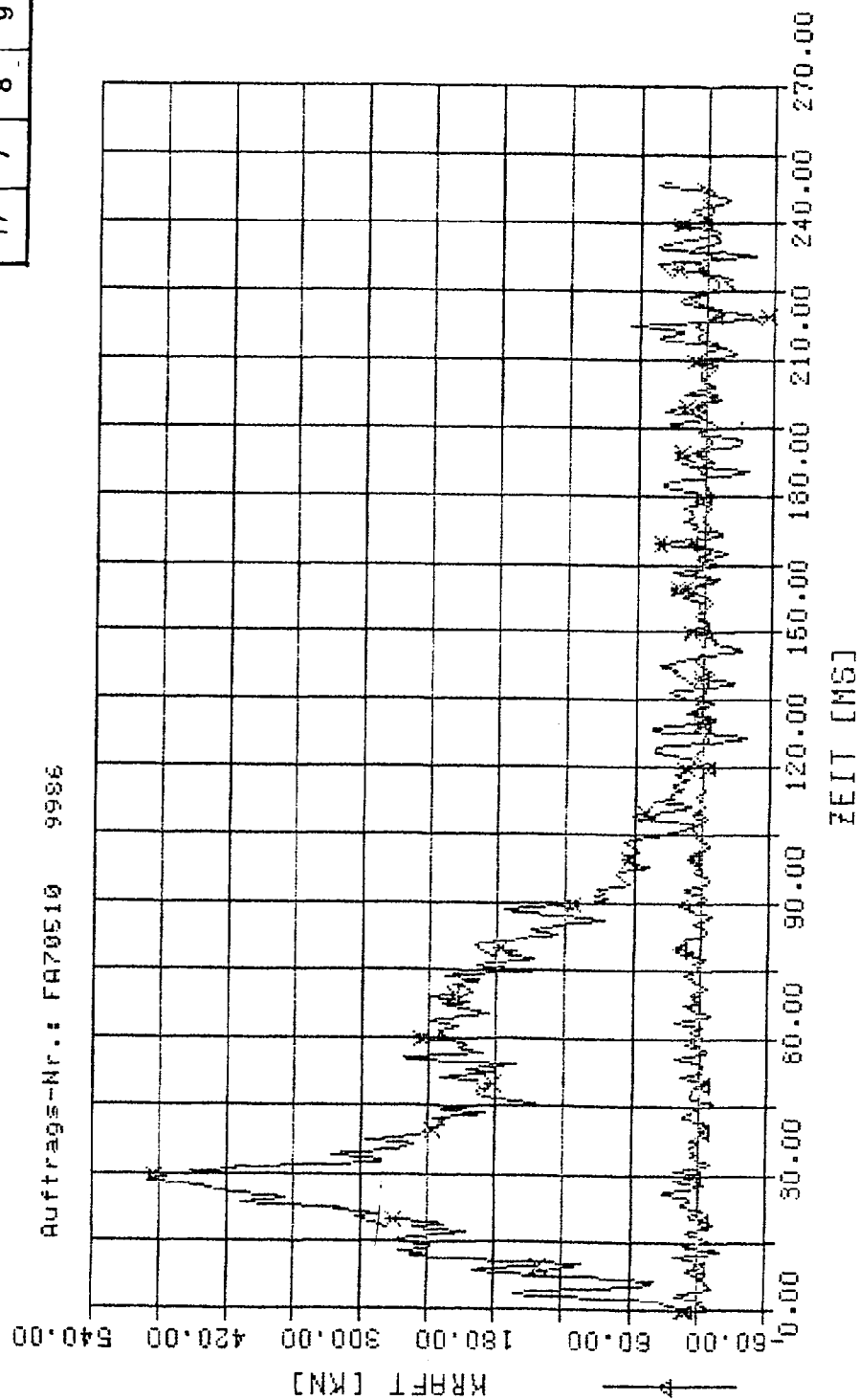
| Mess-Stelle | UP | ber.  | Extremum | t     | 3MS  | 325 |    |    |   |   |    |
|-------------|----|-------|----------|-------|------|-----|----|----|---|---|----|
|             |    |       |          |       |      | 325 | 11 | 12 | 1 | 2 | 13 |
| KMPL07      | W  | KR KN | 32.361   | 14.50 | 0.00 |     |    |    |   |   |    |
| KMPL        | W  | KR KN | 488.317  | 29.00 | 0.00 |     | 15 | 3  | 4 | 5 | 6  |
|             |    |       |          |       |      |     | 17 | 7  | 8 | 9 | 10 |
|             |    |       |          |       |      |     |    |    |   |   | 14 |
|             |    |       |          |       |      |     |    |    |   |   | 16 |
|             |    |       |          |       |      |     |    |    |   |   | 18 |



- Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 9986

| Mess-Stelle | UP | ber.  | Extremum | t     | 3MS  |
|-------------|----|-------|----------|-------|------|
| KMPL08      | W  | KR KN | 31.422   | 25.00 | 0.00 |
| KMPL        | W  | KR KN | 488.317  | 29.00 | 0.00 |

Auftrags-Nr.: FA70510 9986



KMPL01020304050607080910111213141516

Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 9986

Mess-Stelle

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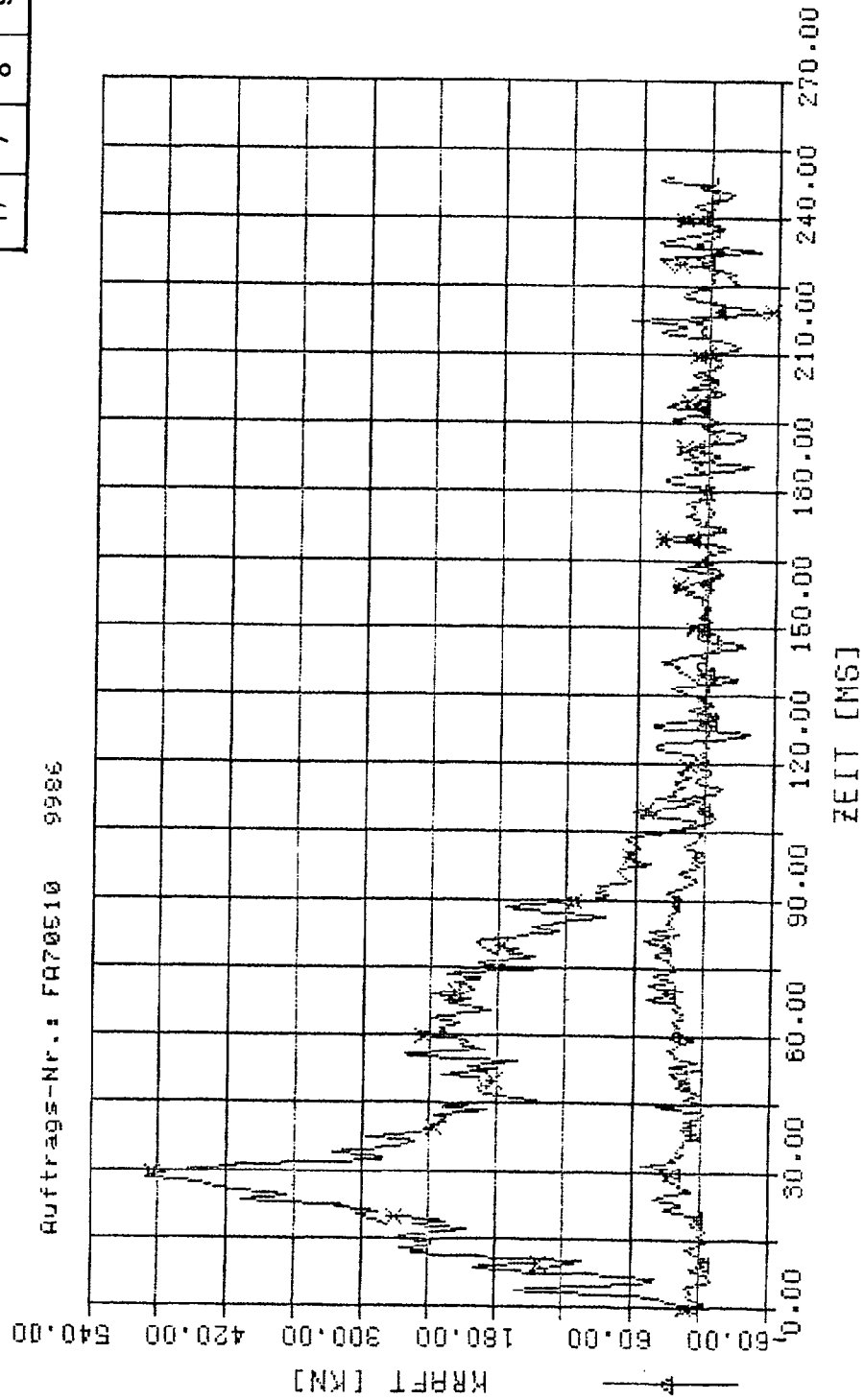
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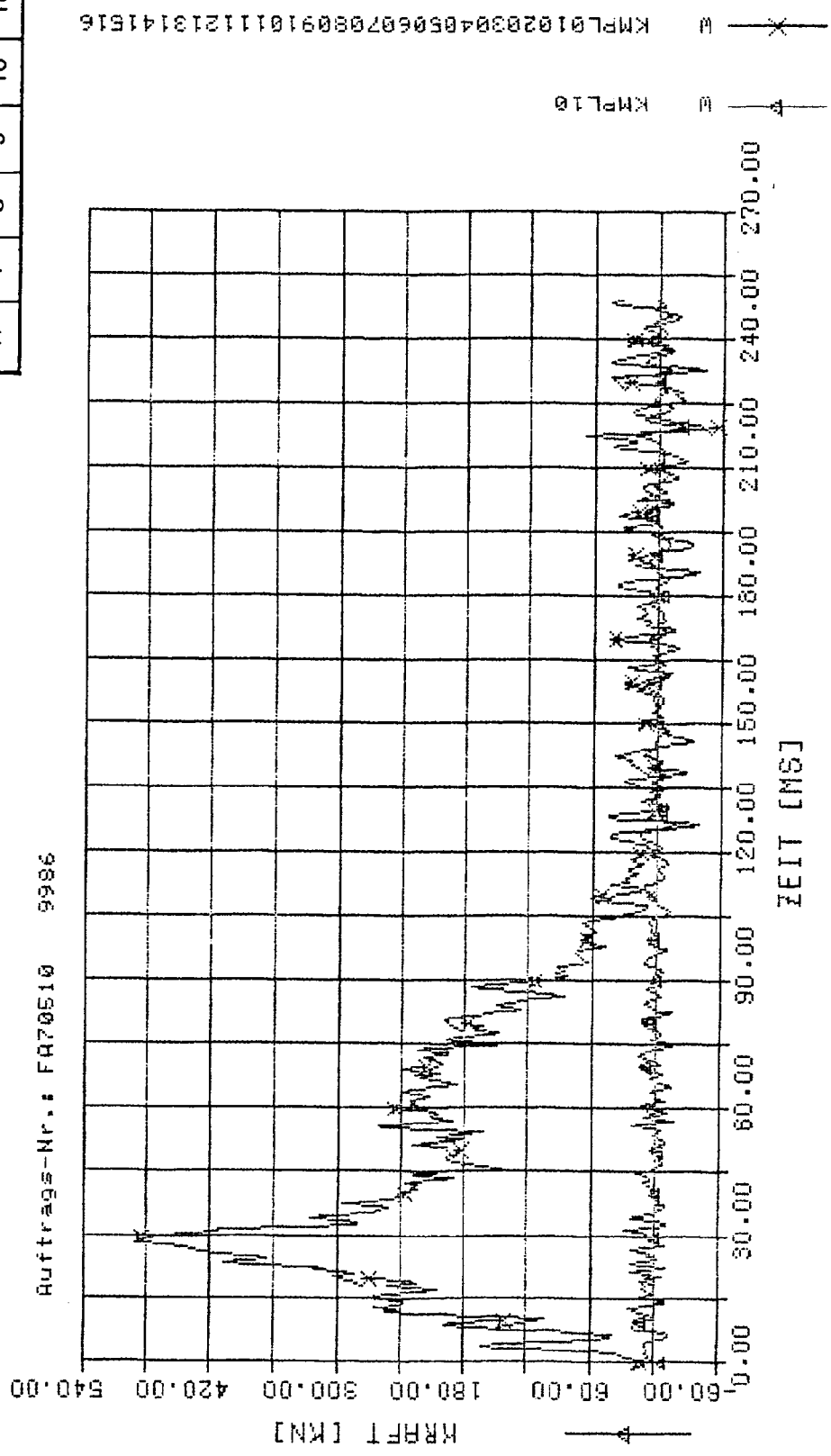
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Auftrags-Nr.: FA70510 9986



- Kennwerte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 9986

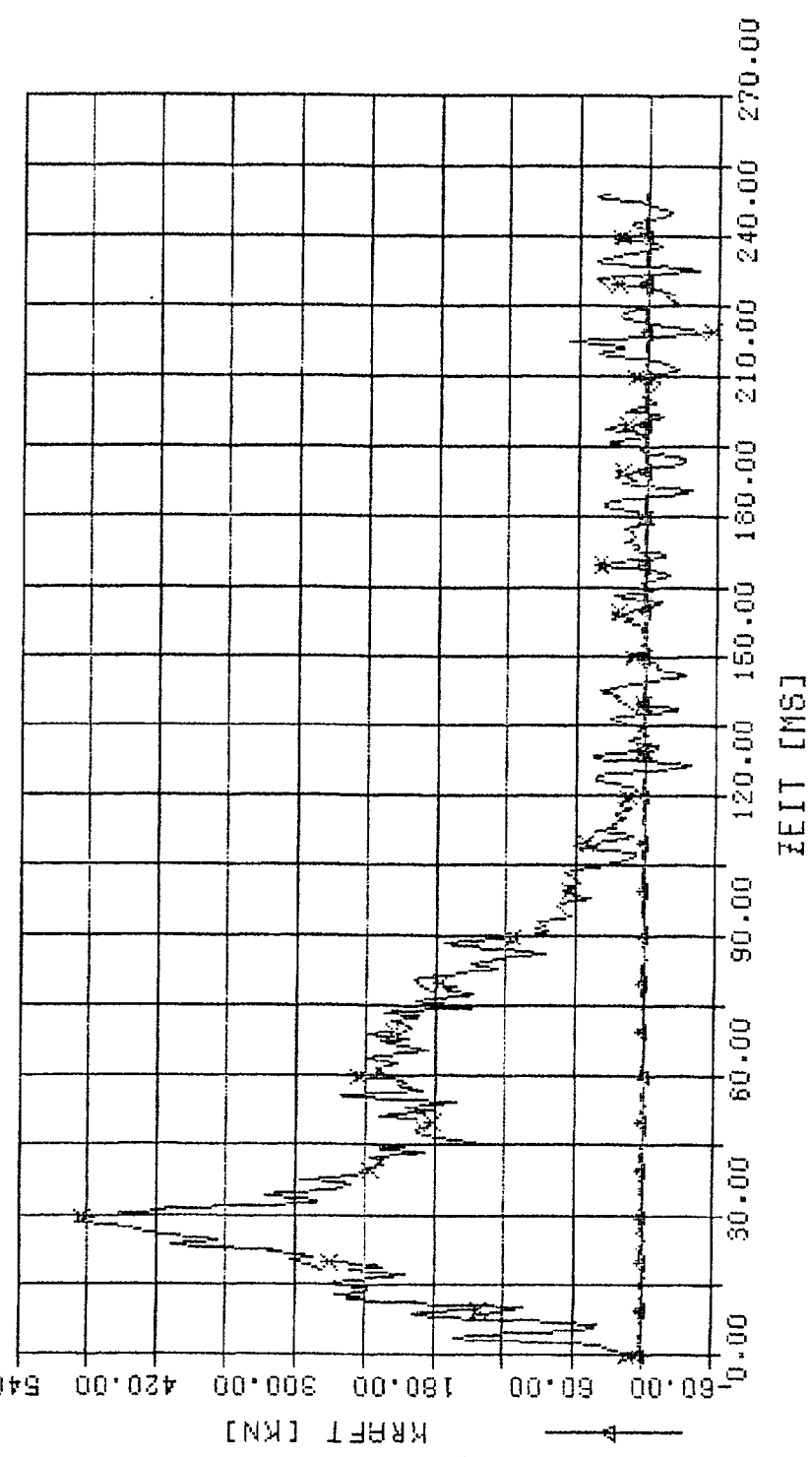
| Mess-Stelle | UP | ber.  | Extremum | t     | 3MS  | 325 |    |    |   |   |    |
|-------------|----|-------|----------|-------|------|-----|----|----|---|---|----|
|             |    |       |          |       |      | 325 | 11 | 12 | 1 | 2 | 13 |
| KMPL10      | W  | KR kN | 28.150   | 32.00 | 0.00 |     |    |    |   |   |    |
| KMPL        | W  | KR kN | 488.317  | 29.00 | 0.00 |     | 15 | 3  | 4 | 5 | 6  |
|             |    |       |          |       |      |     | 17 | 7  | 8 | 9 | 10 |
|             |    |       |          |       |      |     |    |    |   |   | 16 |
|             |    |       |          |       |      |     |    |    |   |   | 18 |



- Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 9986

| Mess-Stelle | UP | ber.  | Extremum | t     | 3MS  | 325 |    |    |   |   |    |
|-------------|----|-------|----------|-------|------|-----|----|----|---|---|----|
|             |    |       |          |       |      | 325 | 11 | 12 | 1 | 2 | 13 |
| KNPL11      | W  | KR kN | 3.643    | Extr. | 0.00 | 325 | 15 | 3  | 4 | 5 | 6  |
| KNPL        | W  | KR kN | 488.317  | 29.00 | 0.00 |     | 17 | 7  | 8 | 9 | 10 |
|             |    |       |          |       |      |     |    |    |   |   | 16 |
|             |    |       |          |       |      |     |    |    |   |   | 18 |

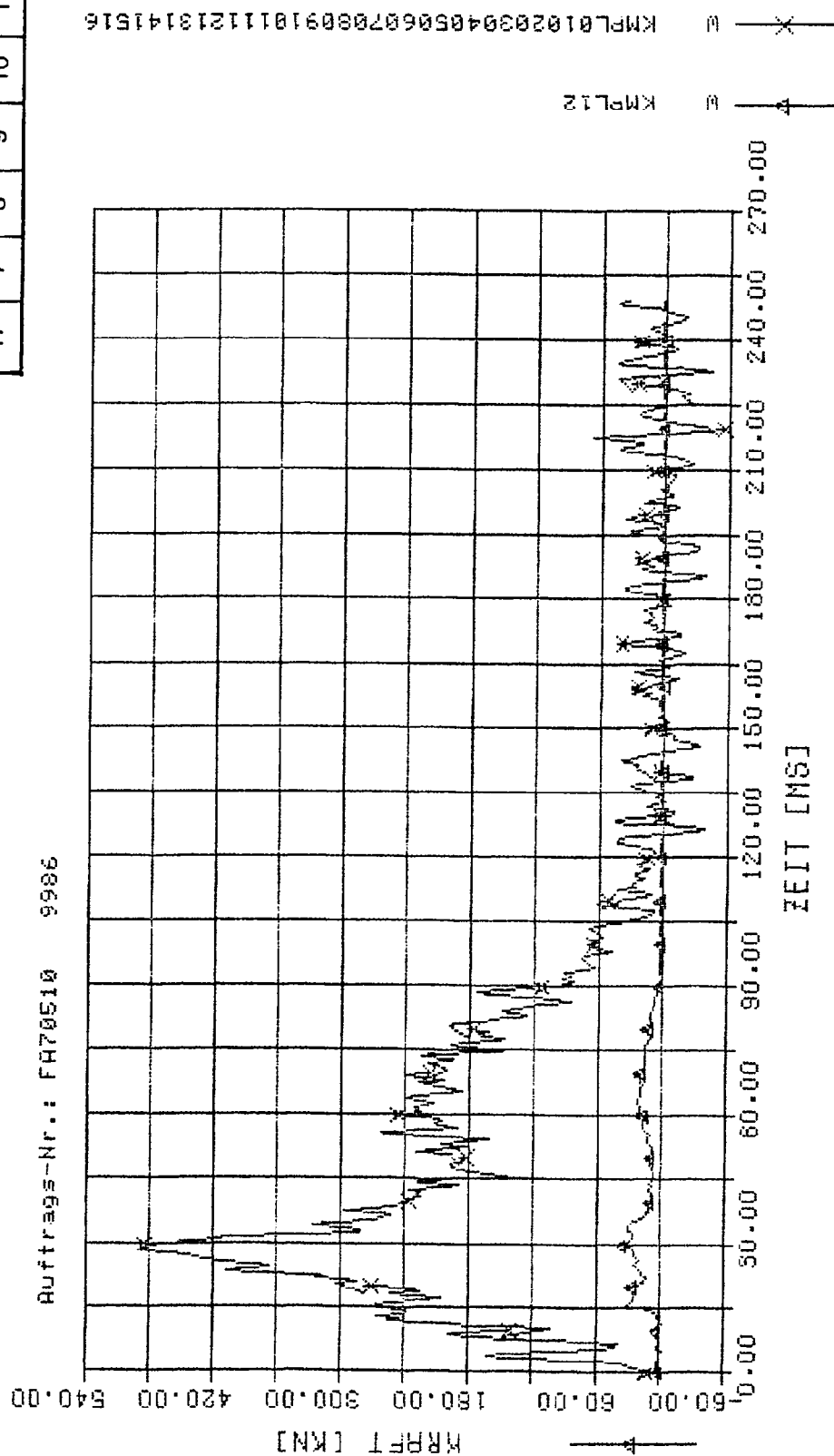
Auftrags-Nr.: FA70510 9986



KNPL01020304050607080910111213141516

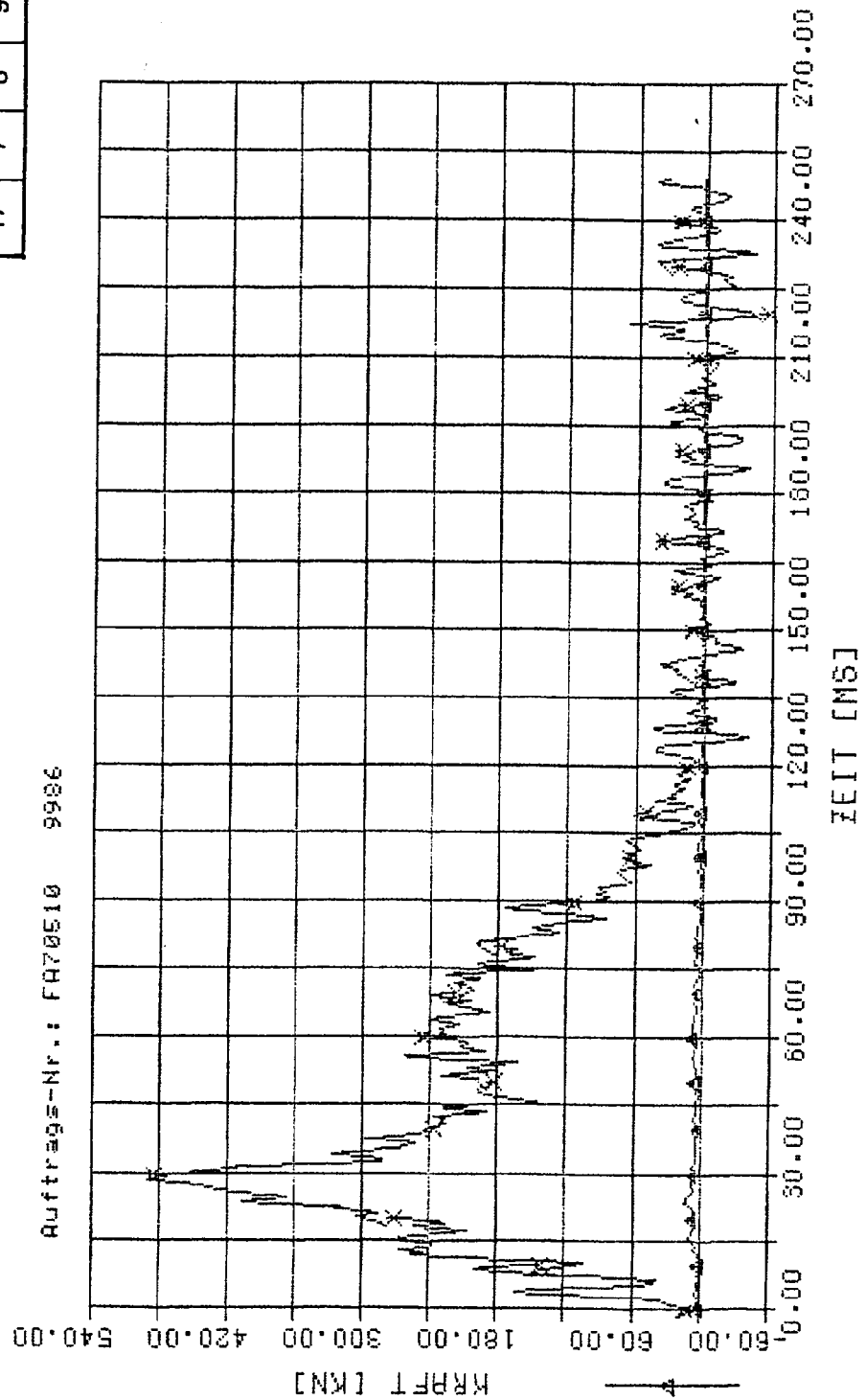
- Kenn-Werte:      Auftrags-Nr.: FA70510      Versuchs-Nr.: 9986

| Mess-Stelle | UP | ber.  | Extremum | t     | 3MS  | 325 |    |    |   |   |    |
|-------------|----|-------|----------|-------|------|-----|----|----|---|---|----|
|             |    |       |          |       |      | 325 | 11 | 12 | 1 | 2 | 13 |
| KMPL12      | W  | KR KN | 34.379   | 30.50 | 0.00 |     | 15 | 3  | 4 | 5 | 6  |
| KMPL        | W  | KR KN | 488.317  | 29.00 | 0.00 |     | 17 | 7  | 8 | 9 | 10 |
|             |    |       |          |       |      |     |    |    |   |   | 14 |
|             |    |       |          |       |      |     |    |    |   |   | 16 |
|             |    |       |          |       |      |     |    |    |   |   | 18 |



- Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 9986

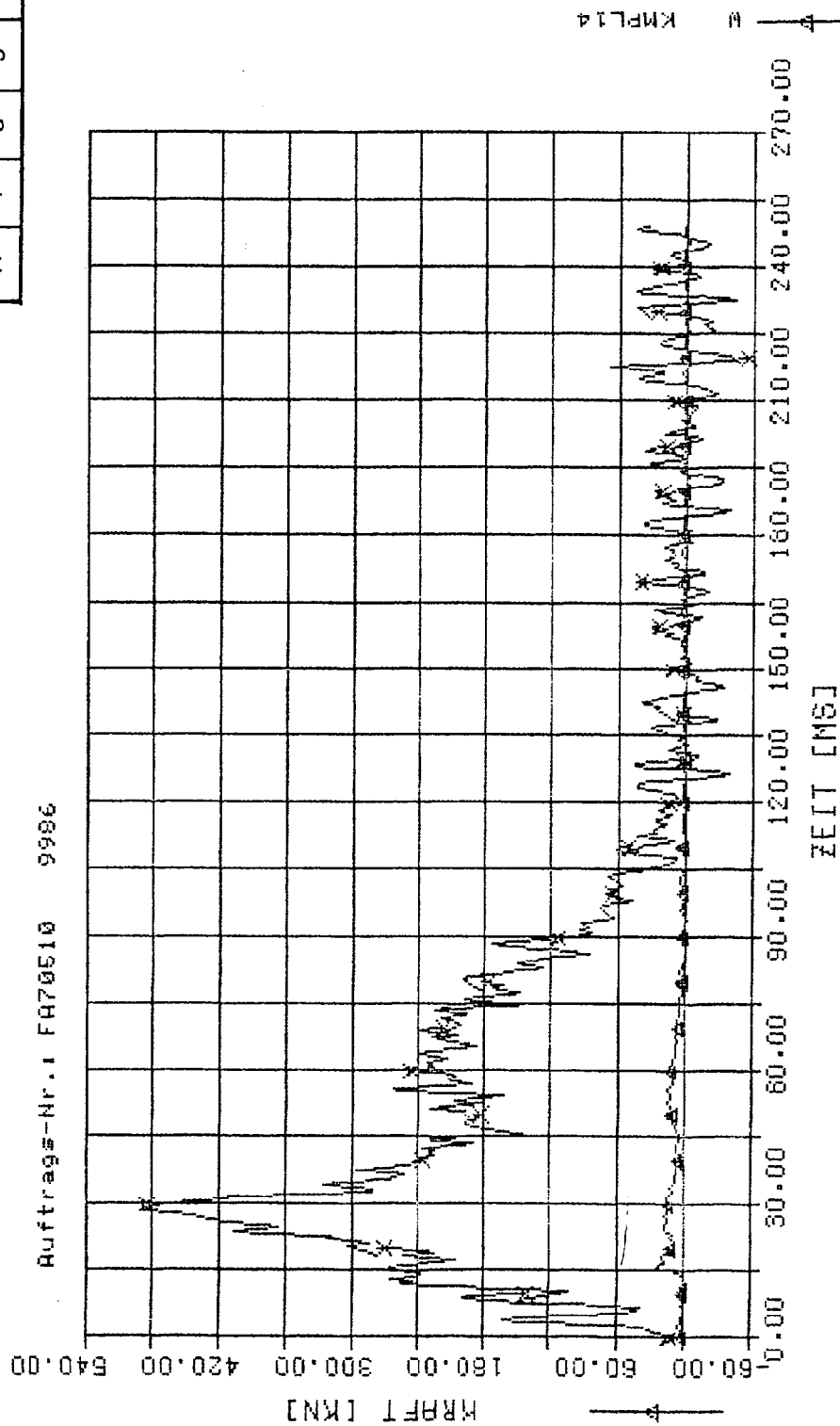
| Mess-Stelle | UP | ber.   | Extremum | t     | 3MS  |
|-------------|----|--------|----------|-------|------|
| KMPL13      | W  | Grösse | 13.334   | Extr. | 0.00 |
| KMPL        | W  | KR kN  | 488.317  | 24.00 | 0.00 |
|             |    | KR kN  |          | 29.00 |      |



Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 9986

| Mess-Stelle | UP | ber.    | Extremum | t     | 3MS  |
|-------------|----|---------|----------|-------|------|
| KMPL14      | W  | Groesse | 22.560   | Extr. | 0.00 |
| KMPL        | W  | KR KN   | 488.317  | 29.00 | 0.00 |

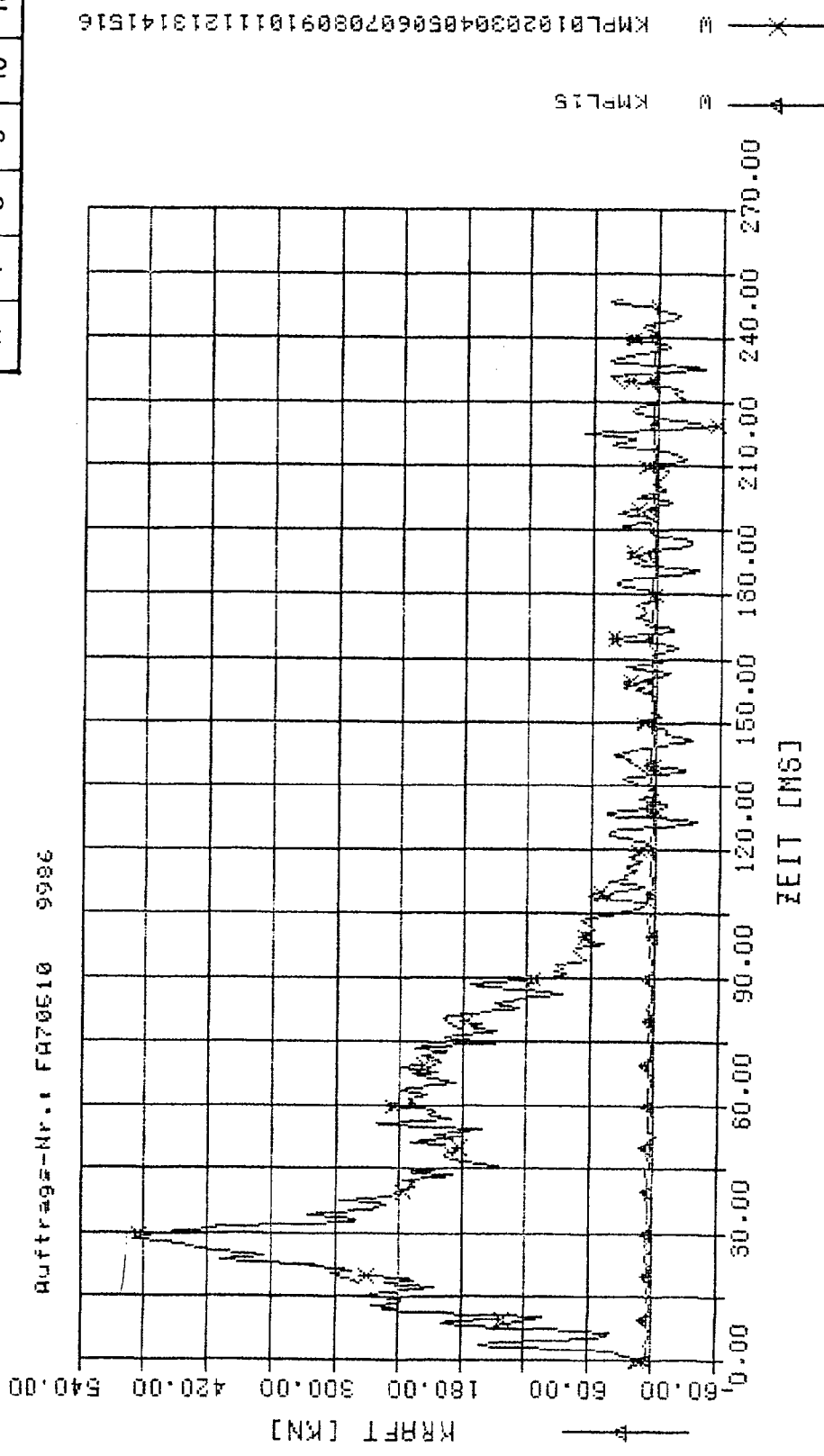
Auftrags-Nr.: FA70510 9986



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- Kenn-Werte:      Auftrags-Nr.: FA70510      Versuchs-Nr.: 9986

| Mess-Stelle | UP | ber.    | Extremum | t     | 3MS  |
|-------------|----|---------|----------|-------|------|
| KMPL15      | W  | Groesse | 7.242    | Extr. | 0.00 |
| KMPL        | W  | KR kN   | 488.317  | 29.00 | 0.00 |



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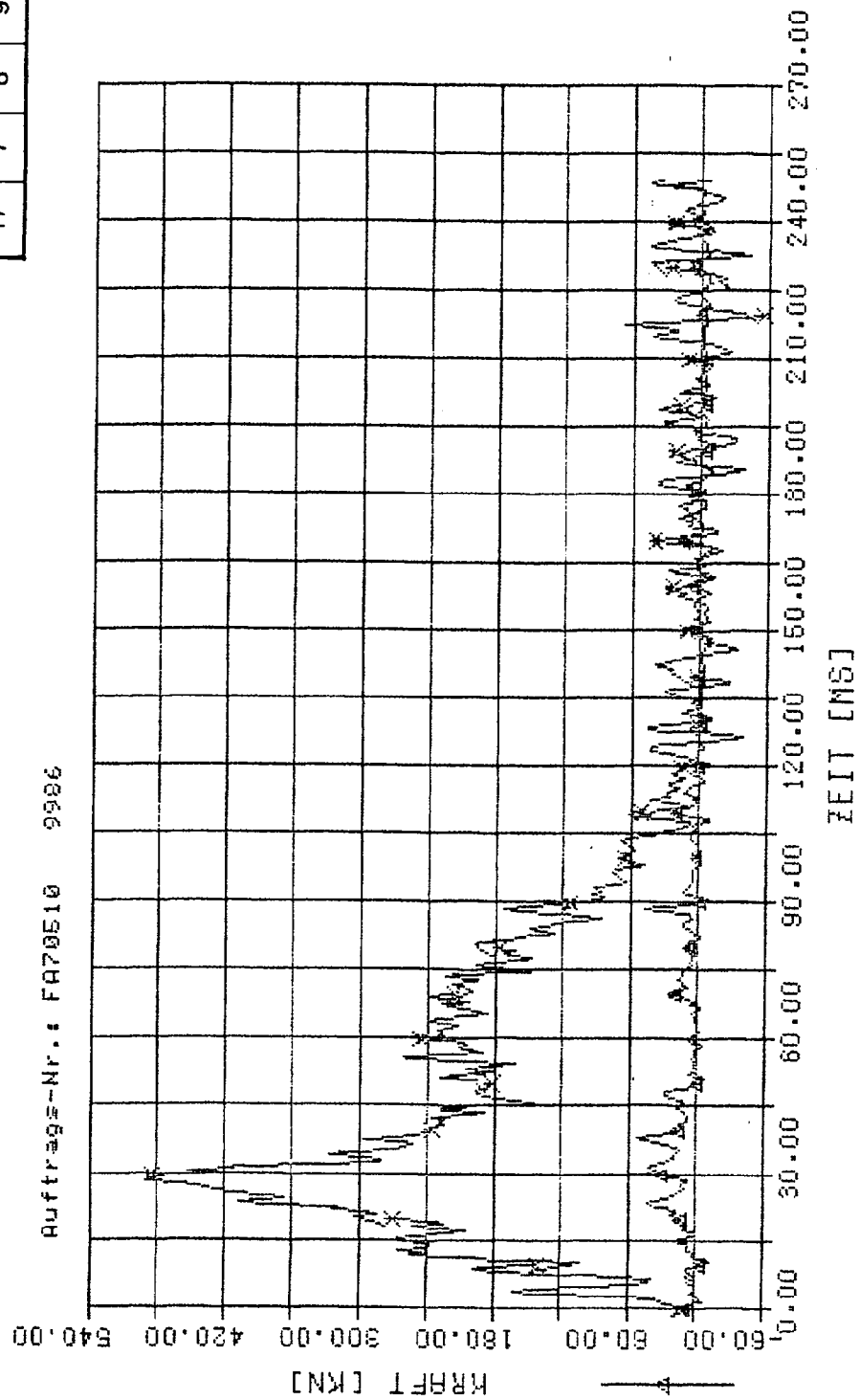
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|     |    |    |   |   |    |    |
|-----|----|----|---|---|----|----|
| 325 | 11 | 12 | 1 | 2 | 13 | 14 |
| 325 | 15 | 3  | 4 | 5 | 6  | 16 |
| 325 | 17 | 7  | 8 | 9 | 10 | 18 |

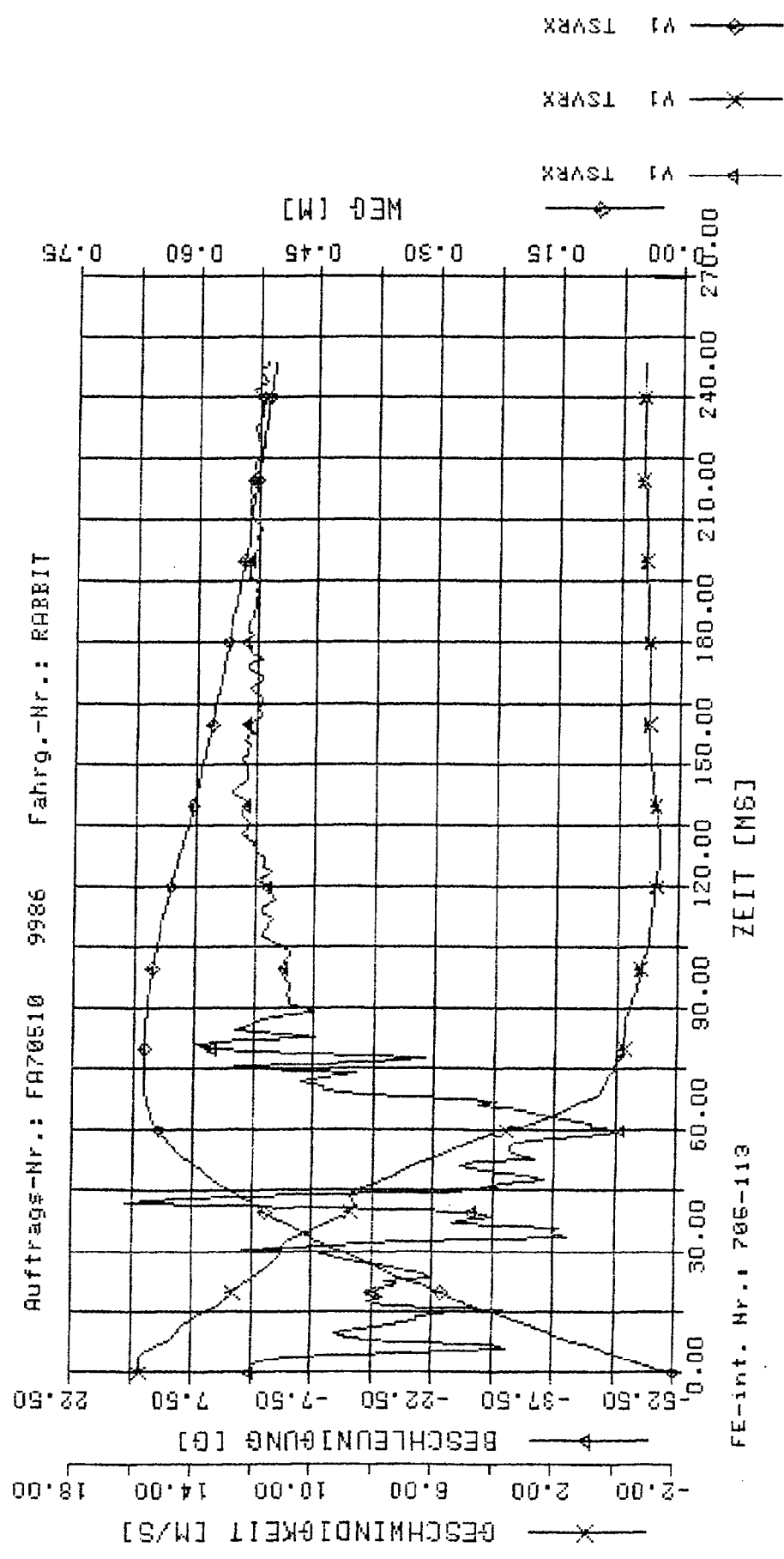
Auftrag-Nr.: FA70510 9926

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## B.2 Vehicle Test Response

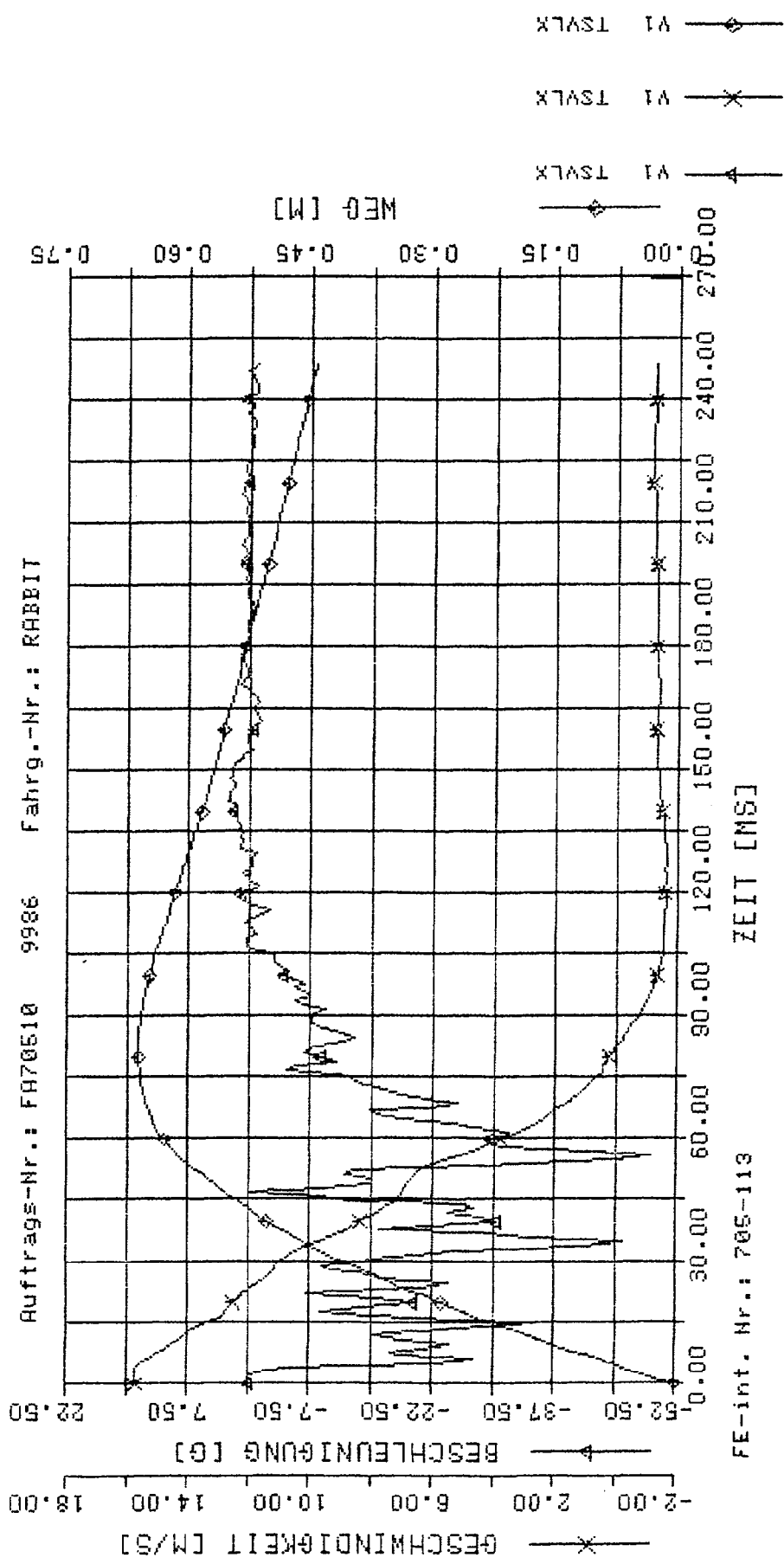
Kenn-Werte: Auftrags-Nr.: F 0510 Versuchs-Nr.: 9986

| Mess-Stelle | UP | ber.   | Extremum | t     | 3MS  |
|-------------|----|--------|----------|-------|------|
| TSVRX       | V1 | Grösse |          | Extr. |      |
| TSVRX       | V1 | 8E g   | -45.828  | 60.00 | 0.00 |
| TSVRX       | V1 | GE m/s | 15.714   | 1.00  | 0.00 |
| TSVRX       | V1 | WE m   | .662     | 77.00 | 0.00 |



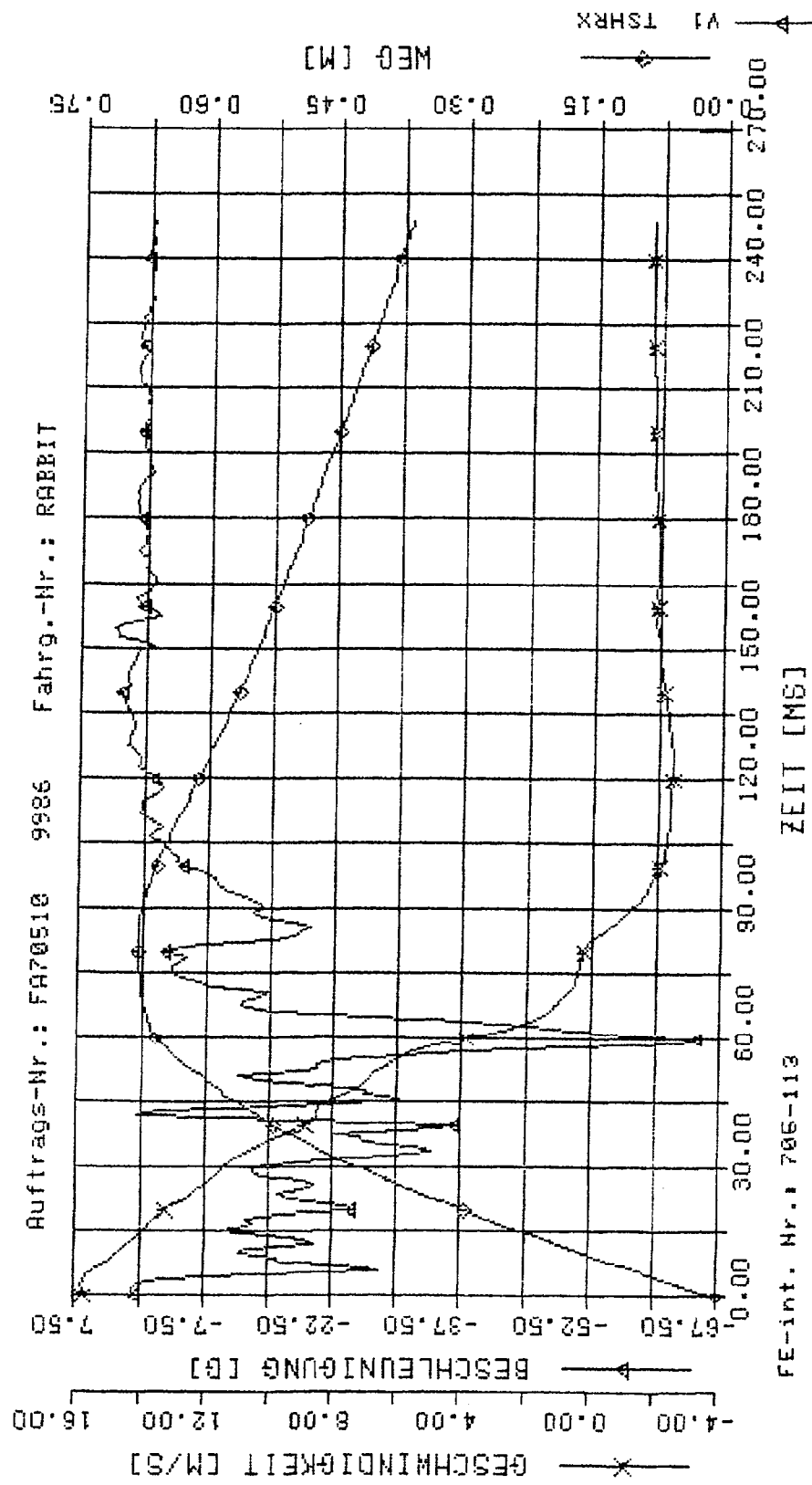
Kenn-Werte: Auftrags-Nr.: F70510 Versuchs-Nr.: 9986

| Mess-Stelle | UP | ber.    | Extremum | t     | 3MS  |
|-------------|----|---------|----------|-------|------|
| TSVLX       | V1 | Groesse | -49.294  | 56.00 | 0.00 |
| TSVLX       | V1 | GE m/s  | 15.714   | 0.00  | 0.00 |
| TSVLX       | V1 | WE m    | .661     | 83.00 | 0.00 |



Kenn-Werte: Auftrags-Nr.: FA 3510 Versuchs-Nr.: 9986

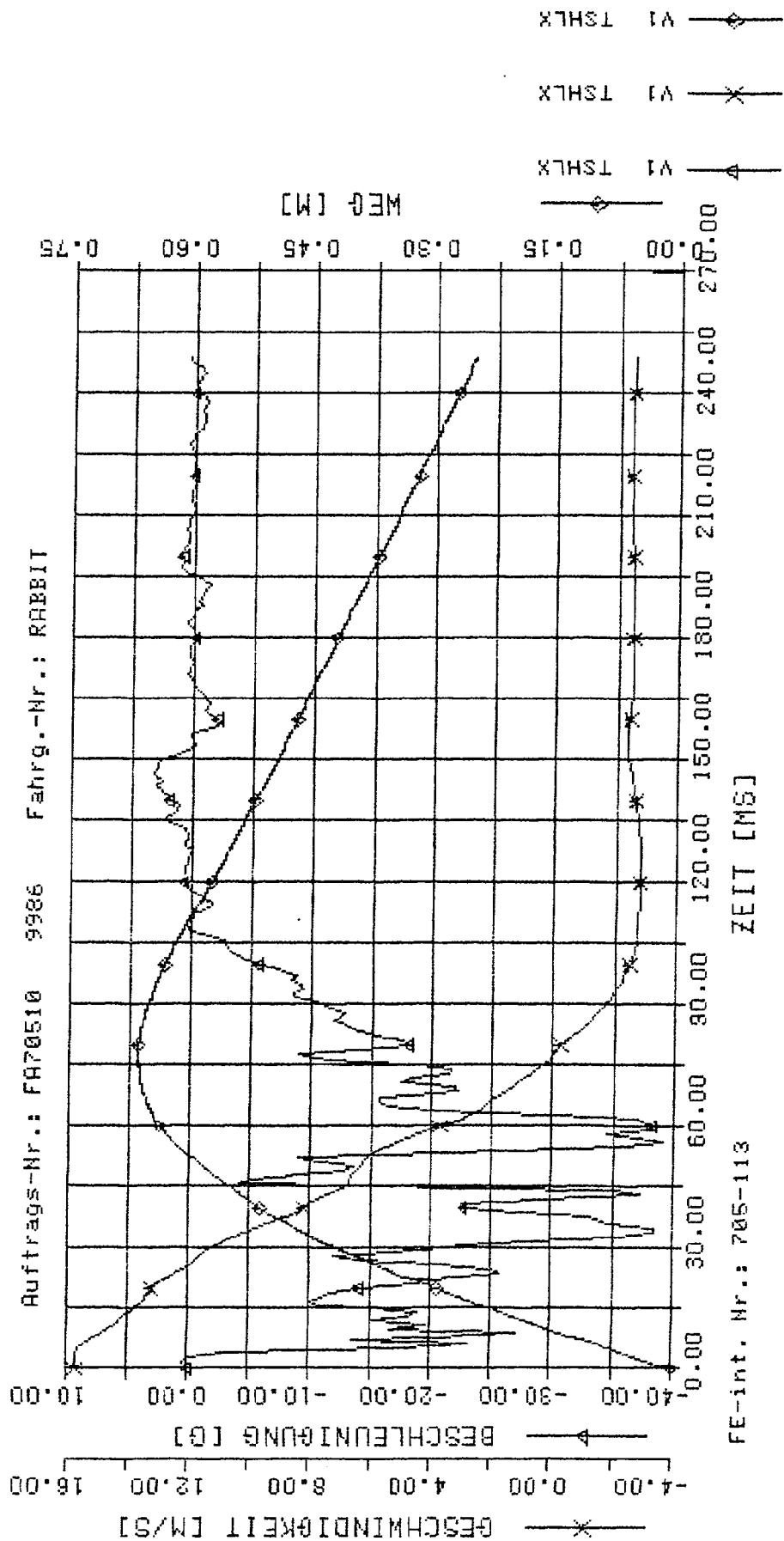
| Mess-Stelle | UP | ber. | Extremum | t     | 3MS  |
|-------------|----|------|----------|-------|------|
| TSHRX       | V1 | BE   | -64.991  | Extr. | 0.00 |
| TSHRX       | V1 | GE   | 15.729   | 3.00  | 0.00 |
| TSHRX       | V1 | WE   | .681     | 83.00 | 0.00 |



FE-int. Nr.: 706-113

Kenn-Werte: Auftrags-Nr.: Ff 1510 Versuchs-Nr.: 9986

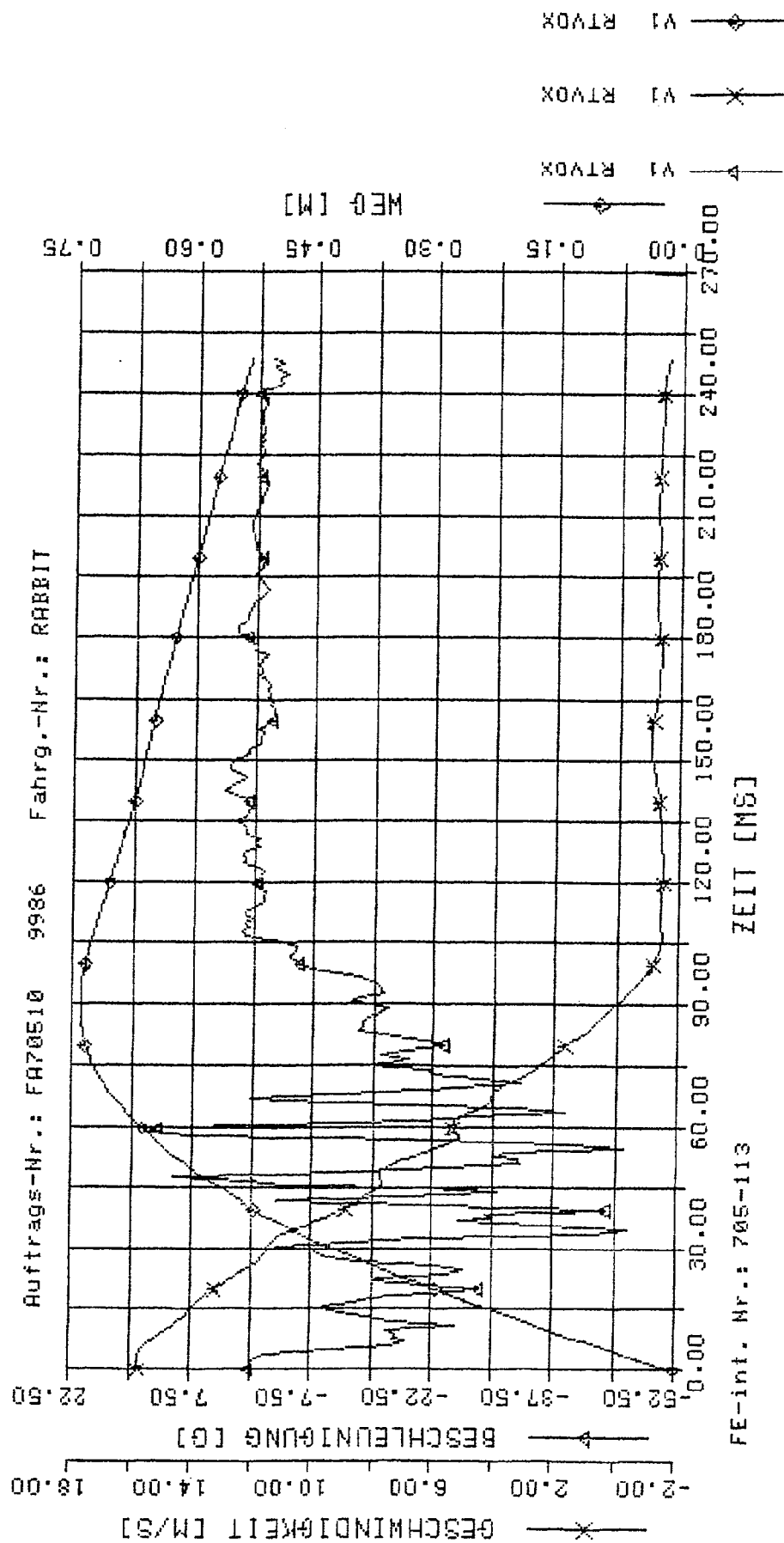
| Mess-Stelle | UP | ber.   | Extremum | t     | 3MS  |
|-------------|----|--------|----------|-------|------|
| TSHLX       | V1 | Grösse |          | Extr. |      |
| TSHLX       | V1 | BE g   | -39.126  | 56.00 | 0.00 |
| TSHLX       | V1 | GE m/s | 15.717   | 3.00  | 0.00 |
| TSHLX       | V1 | WE m   | .663     | 77.00 | 0.00 |



Kenn-Werte: Auftrags-Nr.: FA 0510 Versuchs-Nr.: 9986

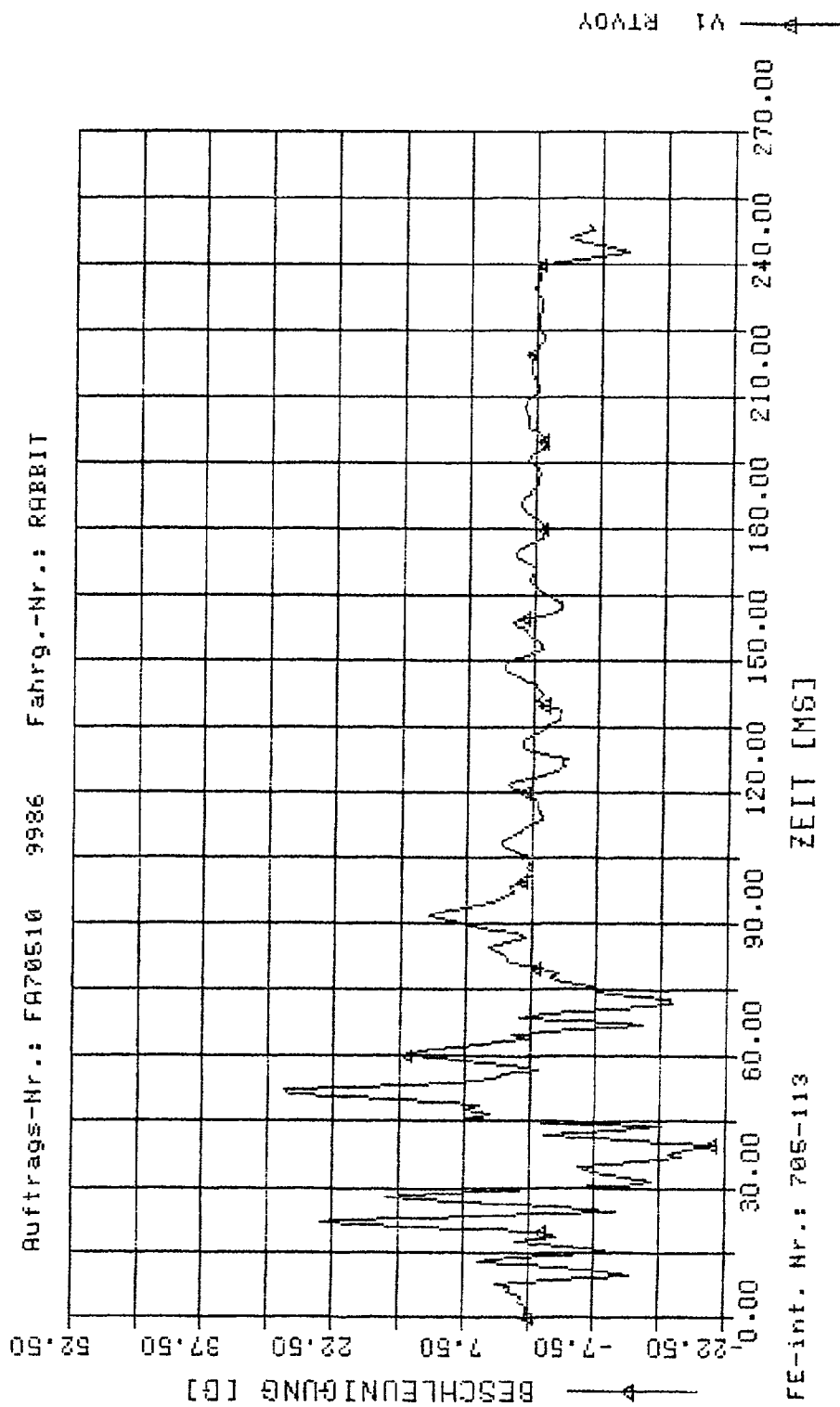
Mess-Stelle

| UP    | ber.      | Extremum | t     | 3MS  |
|-------|-----------|----------|-------|------|
|       | Groesse   |          | Extr. |      |
| RTVOX | V1 BE g   | -46.745  | 35.00 | 0.00 |
| RTVOX | V1 GE m/s | 15.714   | 0.00  | 0.00 |
| RTVOX | V1 WE m   | .740     | 90.00 | 0.00 |

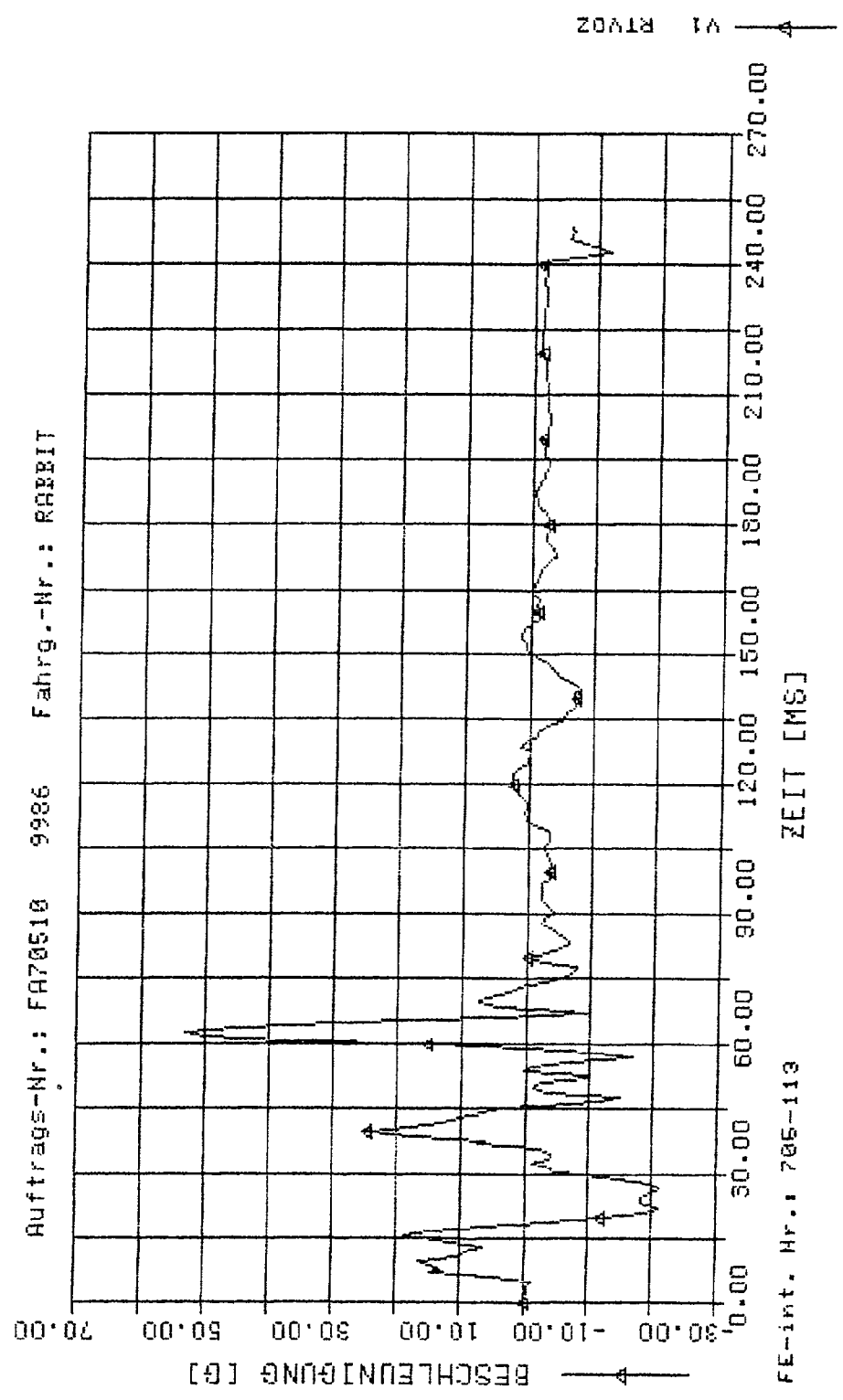


- Kenn-Werte: Auftrags-Nr.: F70510 Versuchs-Nr.: 9986

Mess-Stelle RTVOY  
UP ber. Extremum t 3MS  
V1 BE g 28.065 Extr. 52.00 0.00

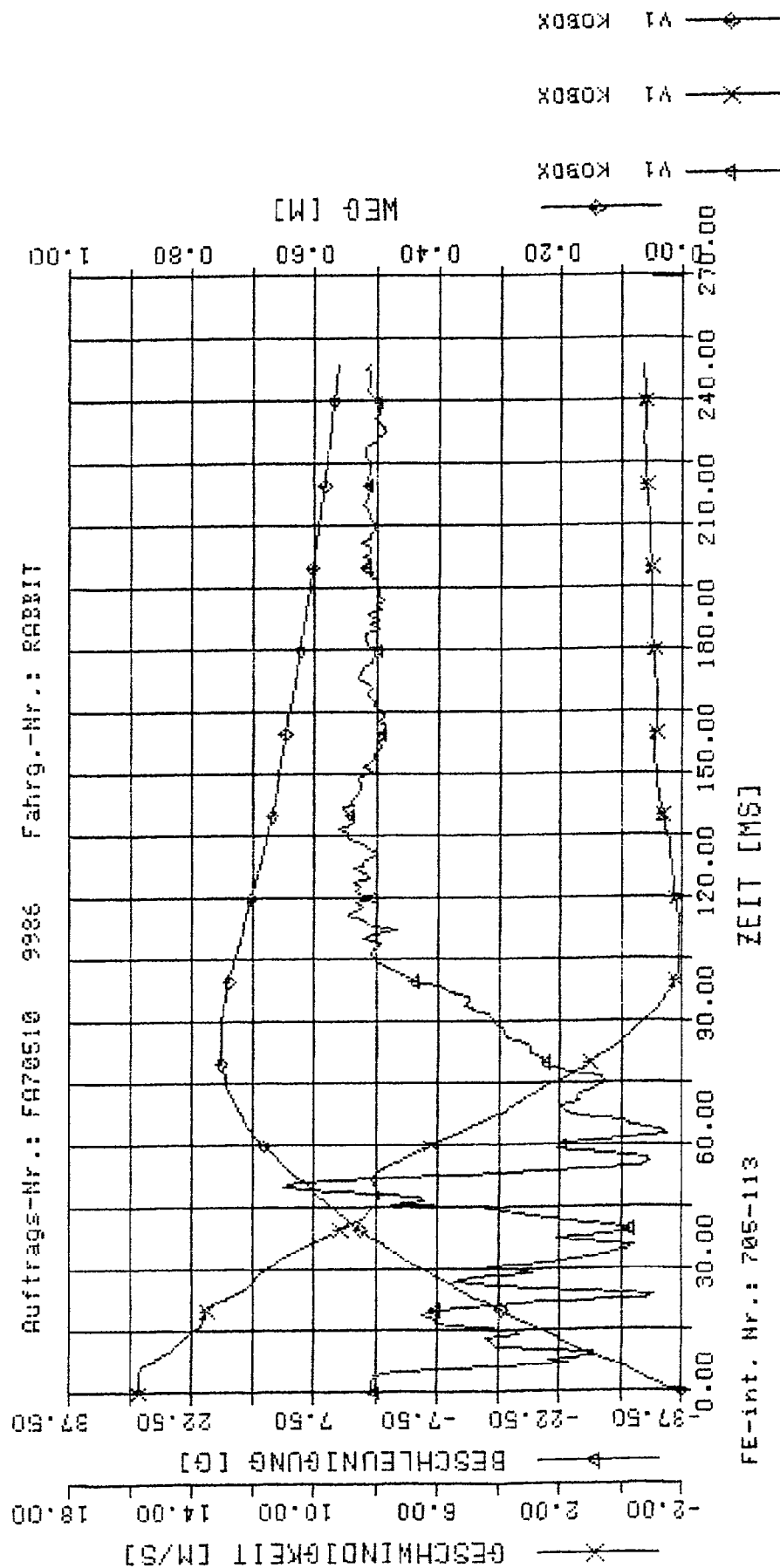


Kenn-Werte: Auftrags-Nr.: F 0510 Versuchs-Nr.: 9986  
 Mess-Stelle UP ber. Extremum t 3MS  
 RTVOZ V1 BE 9 Grösse 53.007 Extr. 63.00 0.00



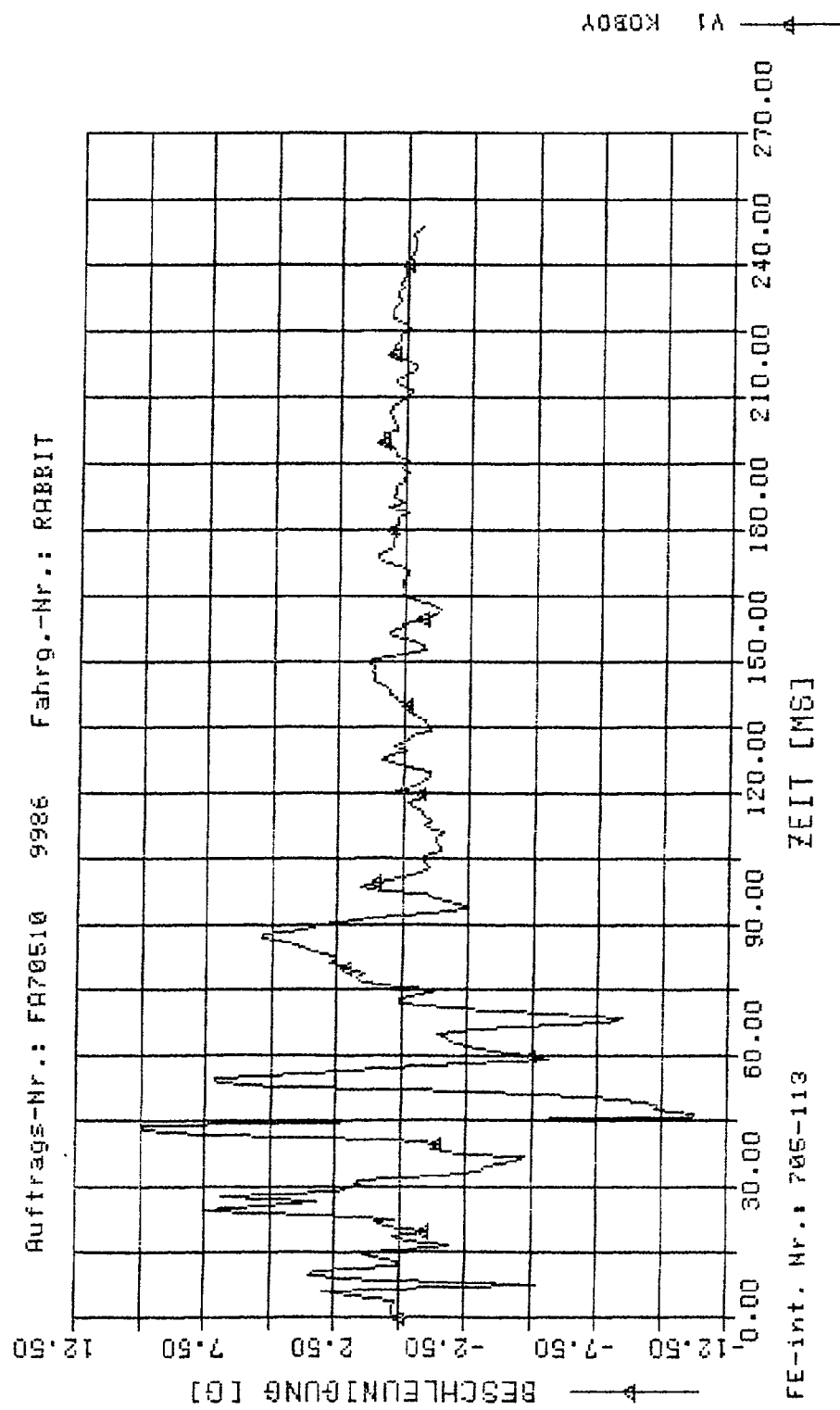
- Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 9986

| Mess-Stelle | UP | ber. | Grösse | Extremum | t     | 3MS  |
|-------------|----|------|--------|----------|-------|------|
| KOBX        | V1 | BE   | g      | -35.725  | 63.00 | 4.48 |
| KOBX        | V1 | GE   | m/s    | 15.727   | 4.00  | 0.00 |
| KOBX        | V1 | WE   | m      | .753     | 85.00 | 0.00 |



FE-int. Nr.: 705-113

Kenn-Werte: Auftrags-Nr.: F 0510 Versuchs-Nr.: 9986  
 Mess-Stelle UP ber. Extremum t 3MS  
 KOBAY Groesse Extr. 47.00  
 V1 BE g -11.245 7.53

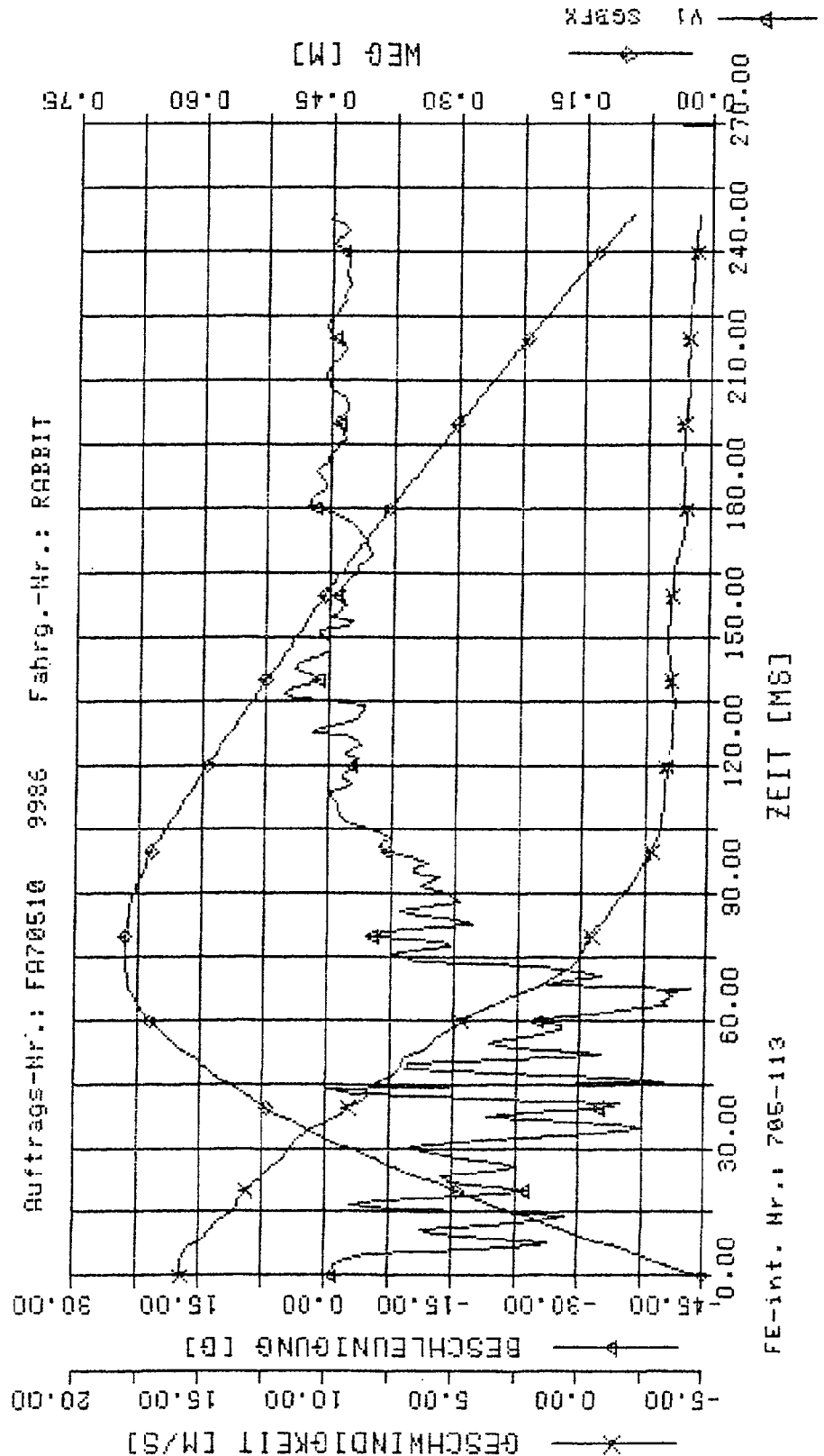


| Mess-Stelle | UP | ber.    | Extremum | t     | 3MS  |
|-------------|----|---------|----------|-------|------|
|             |    | Groesse |          | Extr. |      |
| KOB02       | V1 | BE 9    | -21.615  | 50.00 | 9.58 |



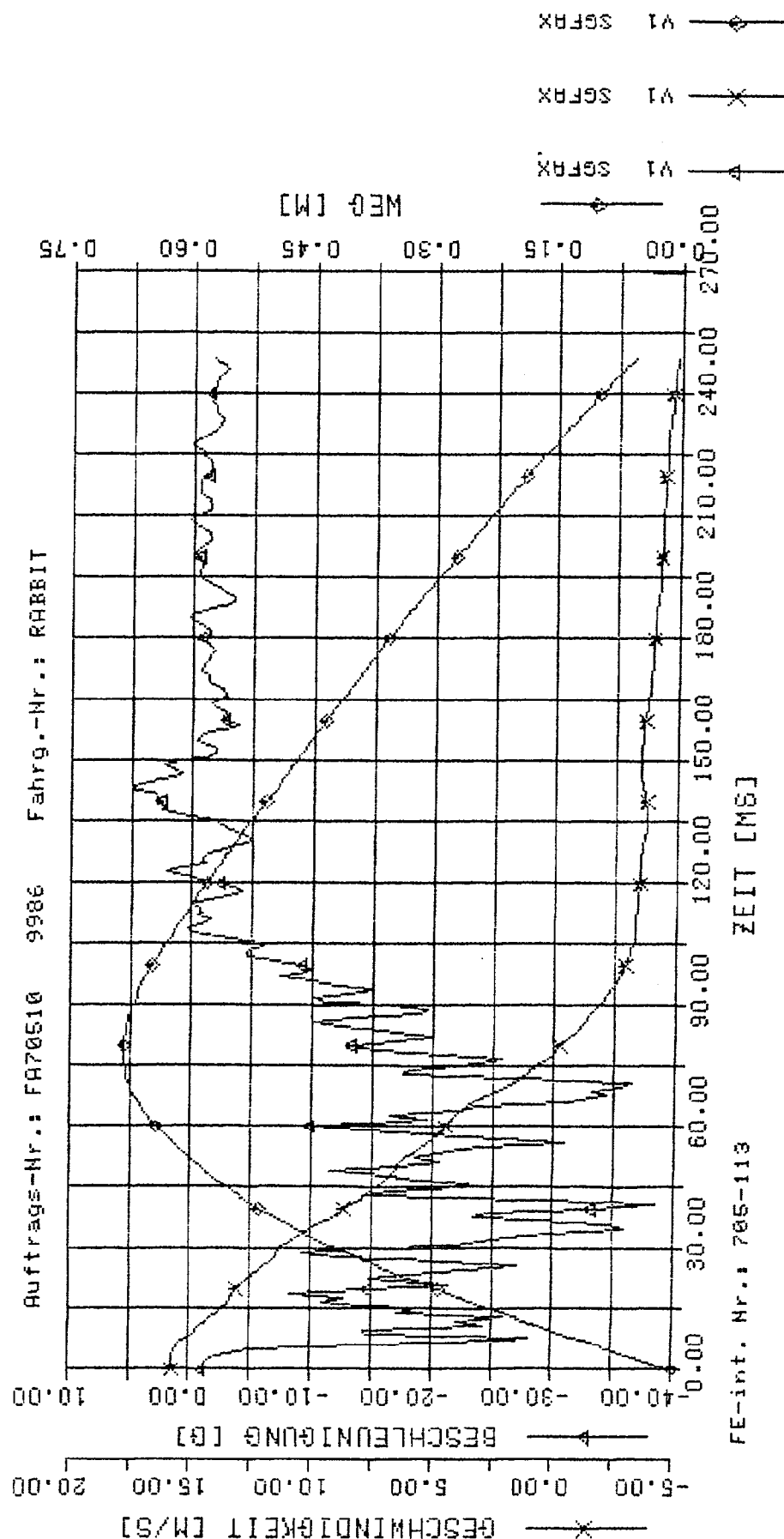
Kenn-Werte: Auftrags-Nr.: F1 0510 Versuchs-Nr.: 9986

| Mess-Stelle | UP | ber.    | Extremum | t     | 3MS  |
|-------------|----|---------|----------|-------|------|
|             |    | Groesse |          | Extr. |      |
| SCBFX       | V1 | BE g    | -43.238  | 68.00 | 0.00 |
| SCBFX       | V1 | GE m/s  | 15.714   | 0.00  | 0.00 |
| SCBFX       | V1 | WE m    | .691     | 76.00 | 0.00 |



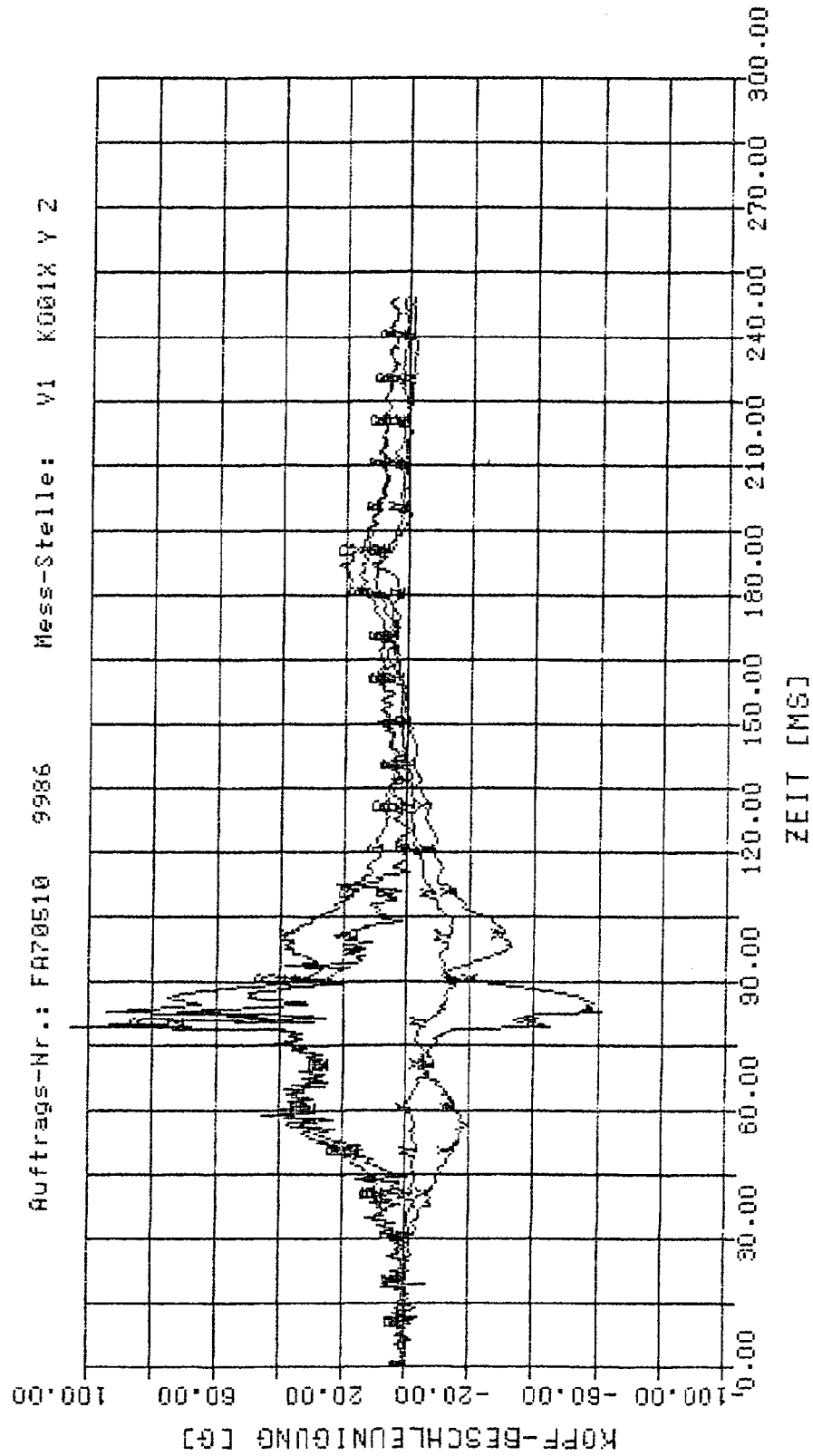
Kenn-Werte: Auftrags-Nr.: F 0510 Versuchs-Nr.: 9986

| Mess-Stelle | UP | ber.   | Extremum | t     | 3MS  |
|-------------|----|--------|----------|-------|------|
| SGFAX       | V1 | BE g   | -38.528  | 41.00 | 0.00 |
| SGFAX       | V1 | GE m/s | 15.714   | 0.00  | 0.00 |
| SGFAX       | V1 | WE m   | .682     | 78.00 | 0.00 |



B.3 Dummy Test Response  
B.3.1 Driver

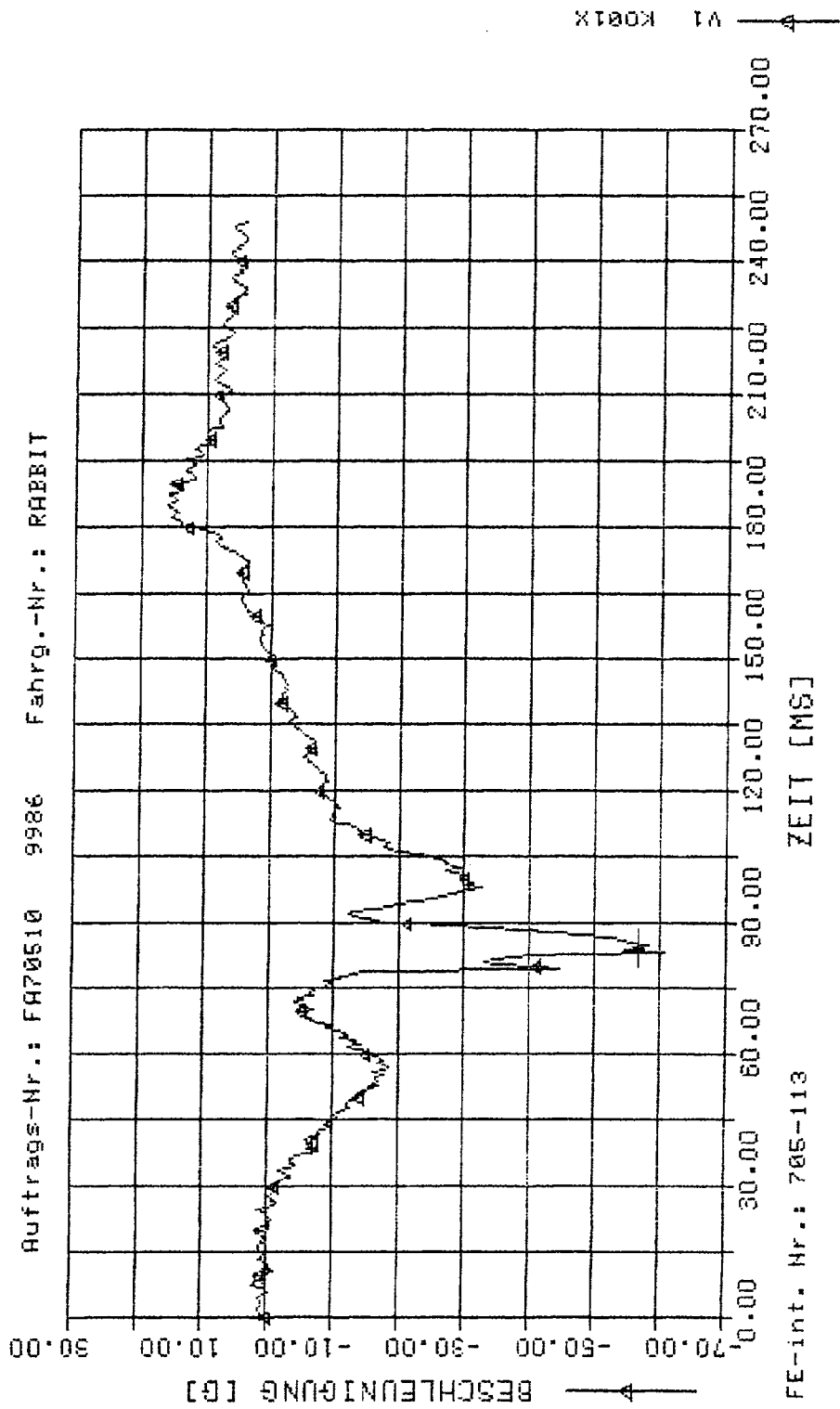
- HIC-Werte: Auftrags-Nr.: 170510 Versuchs-Nr.: 9986  
 Mess-Stelle UP HIC T0 T1 t0 t1  
 Kopf -01 V1 554.16 30.00 150.00 52.08 109.31



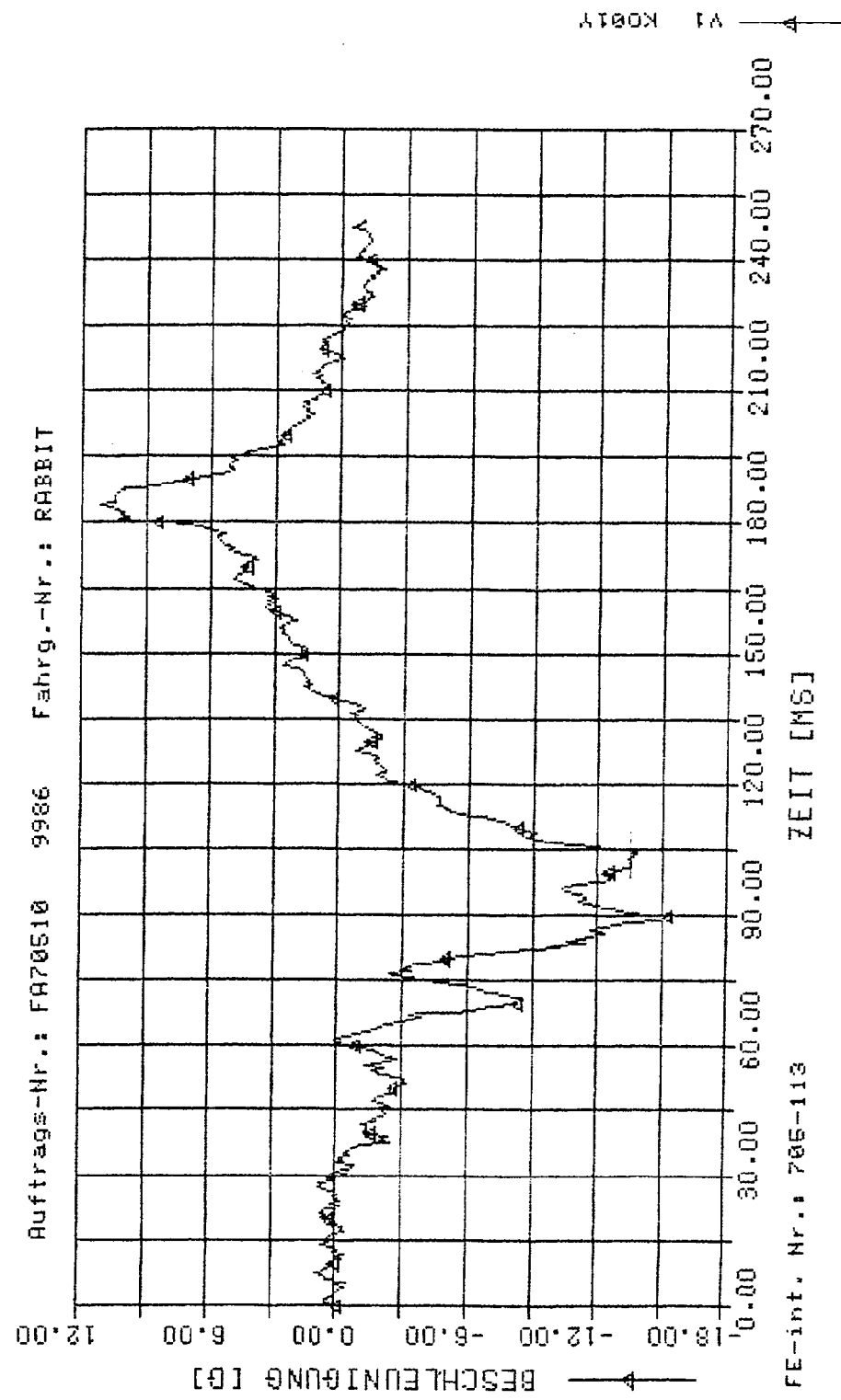
Fahrgesstell-Nr.: RABBIT  
 FE-interne Nr.: 705-113

Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 9986

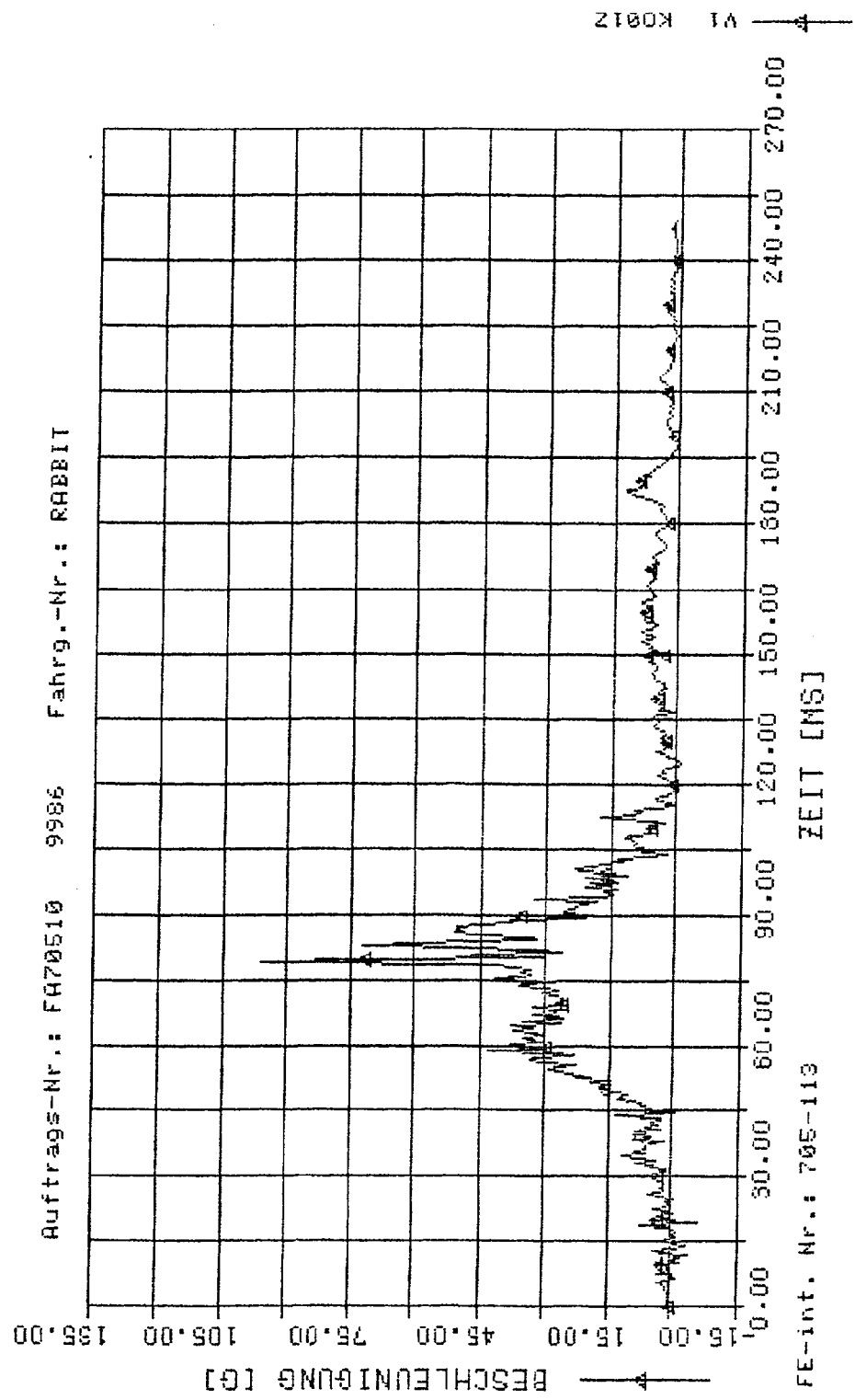
Mess-Stelle UP ber. Extremum t 3MS  
 K001X V1 BE g -60.654 Extr. 83.50 14.99



Kenn-Werte: Auftrags-Nr. FA70510 Versuchs-Nr.: 998  
 Mess-Stelle UP ber. Extremum t 3MS  
 K001Y V1 WE g -15.650 89.80 10.23

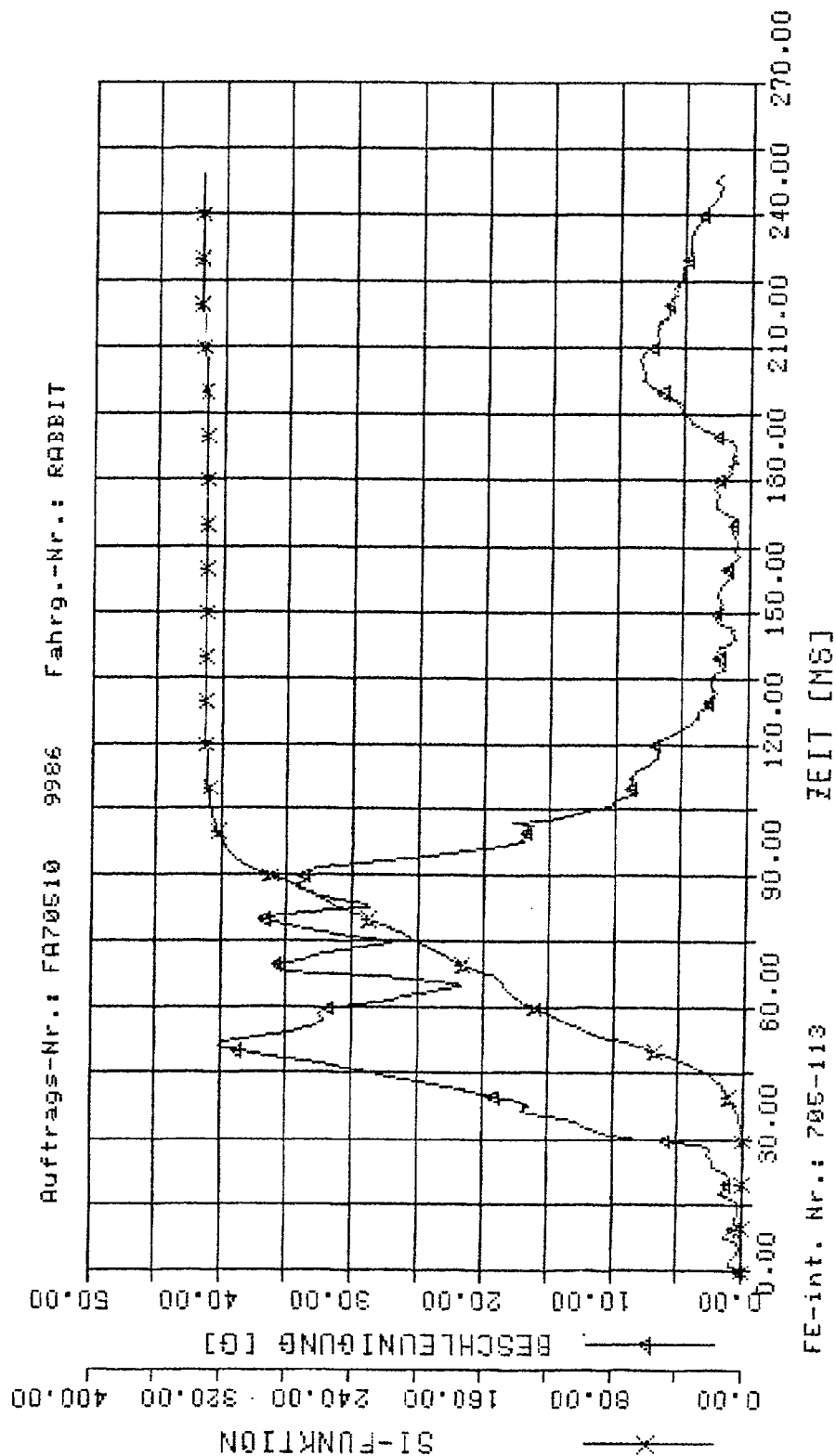


Kenn-Werte:    Auftrags-Nr.: FA70510    Versuchs-Nr.: 9986  
 Mess-Stelle    UP    ber.    Extremum    t    3MS  
 K001Z    V1    BE    g    95.849    79.50    51.12



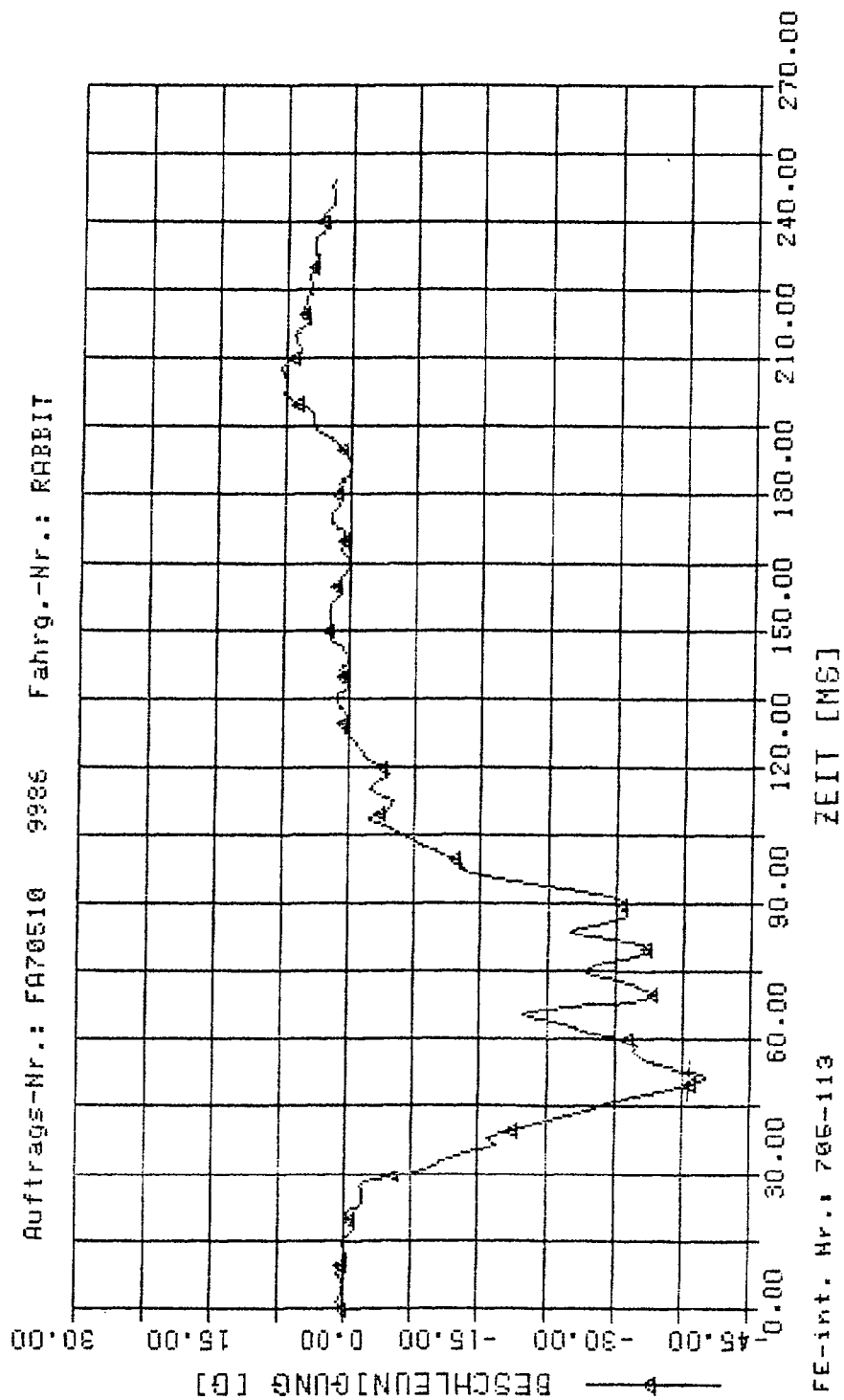
Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 9986

| Mess-Stelle | UP | ber. | Extremum | t      | 3MS   |
|-------------|----|------|----------|--------|-------|
| BR01        | V1 | BE g | 40.050   | 51.00  | 38.08 |
| ER01        | V1 | SI   | 334.518  | 250.00 | 0.00  |

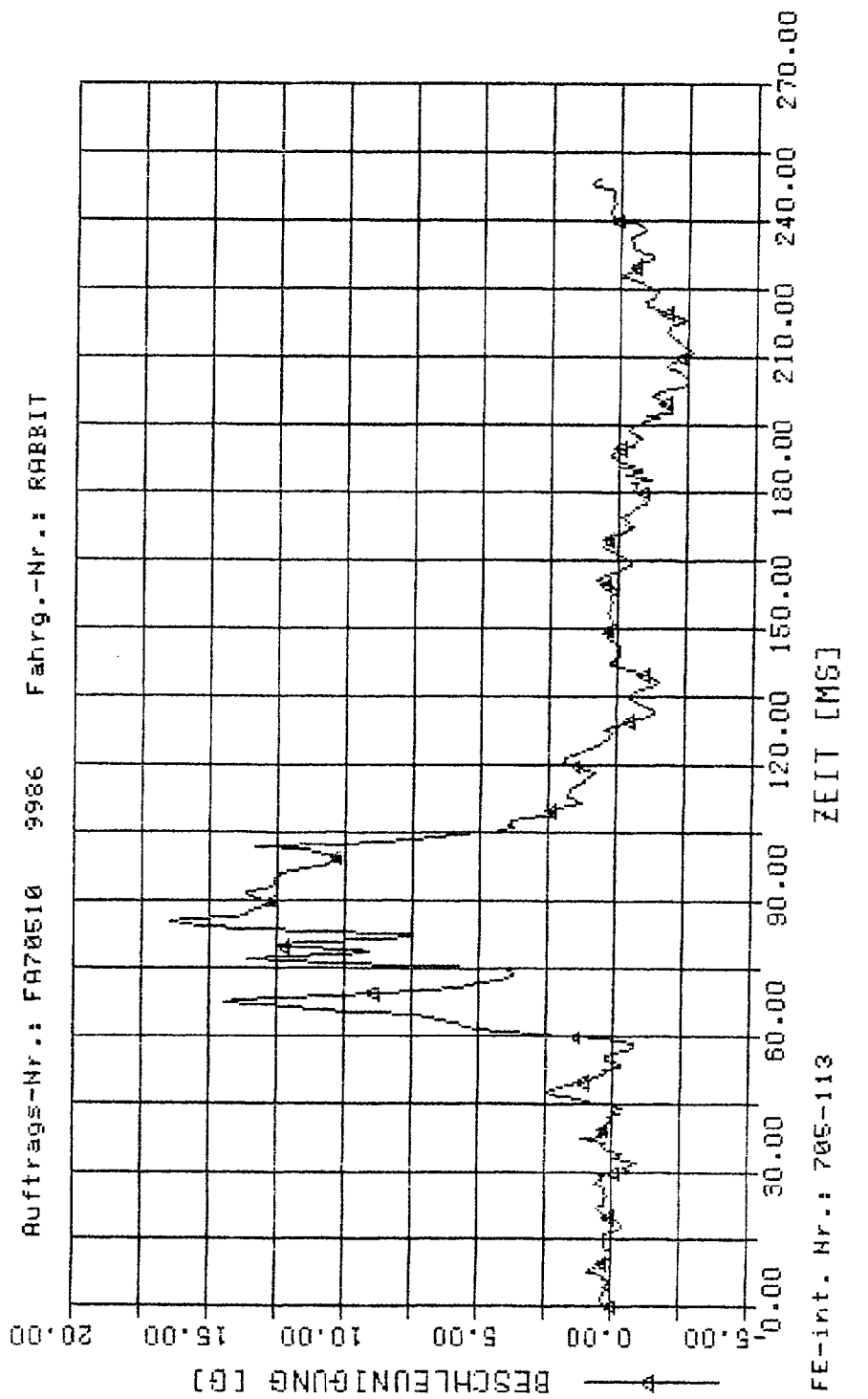


Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 9986

Mess-Stelle UP ber. Extremum t 3MS  
BR01X V1 BE g -40.040 Extr. 51.00 7.60

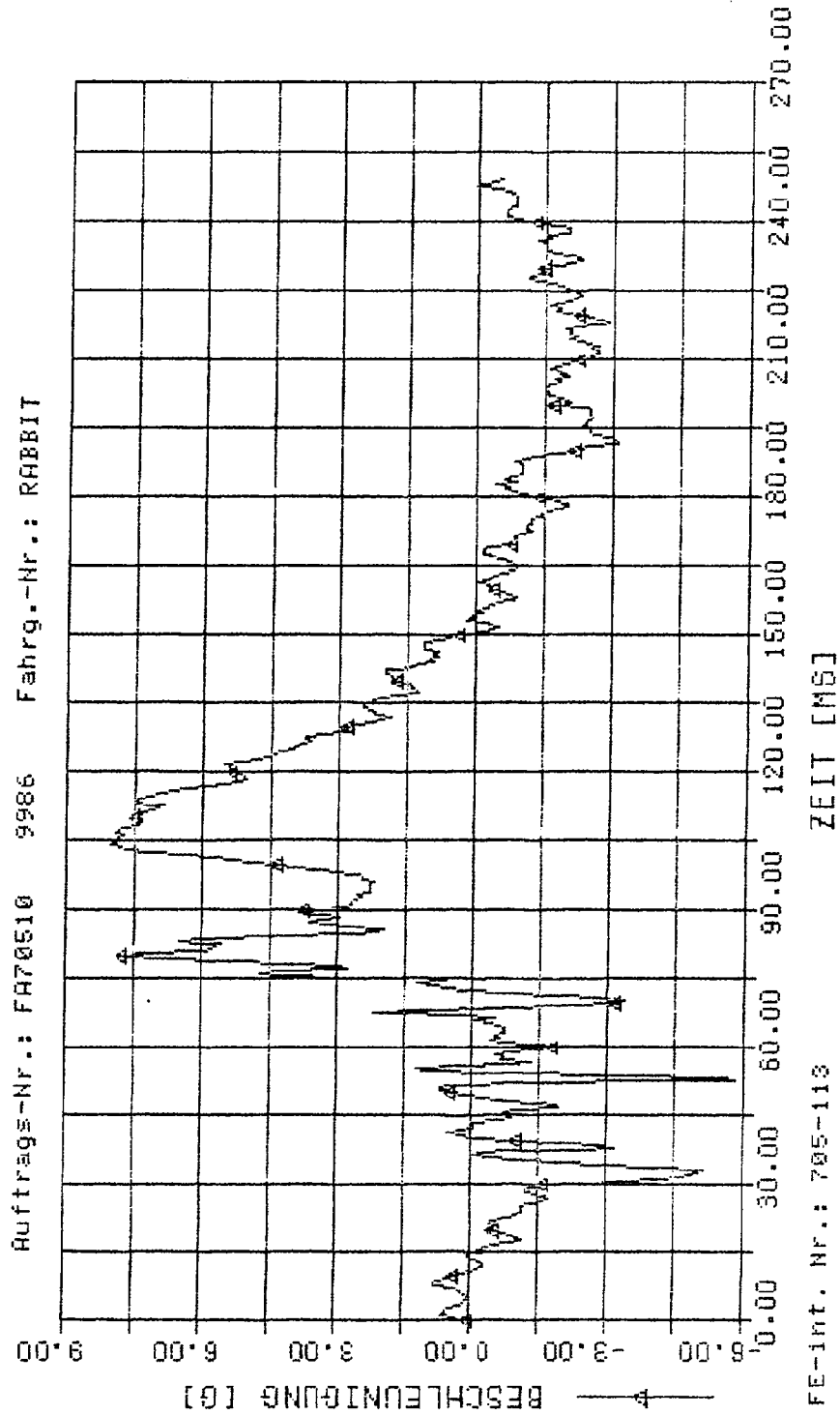


Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 9986  
 Mess-Stelle UP ber. Extremum t 3MS  
 BR01Y Groesse Extr.  
 V1 BE g 16.410 85.50 14.13



Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 9986

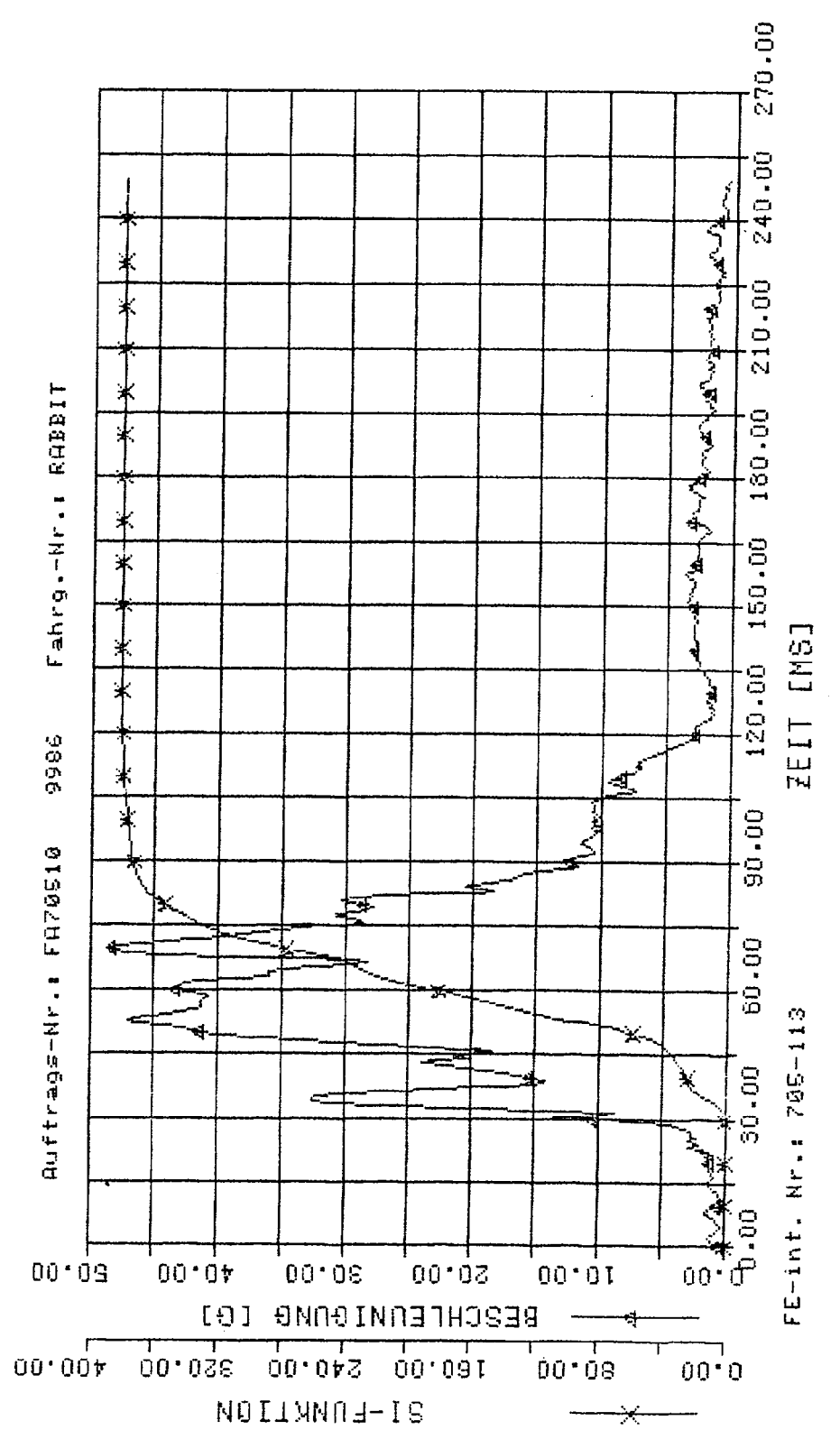
Mess-Stelle UP ber. Extremum t 3MS  
BR01Z V1 BE g 3.017 104.00 7.72



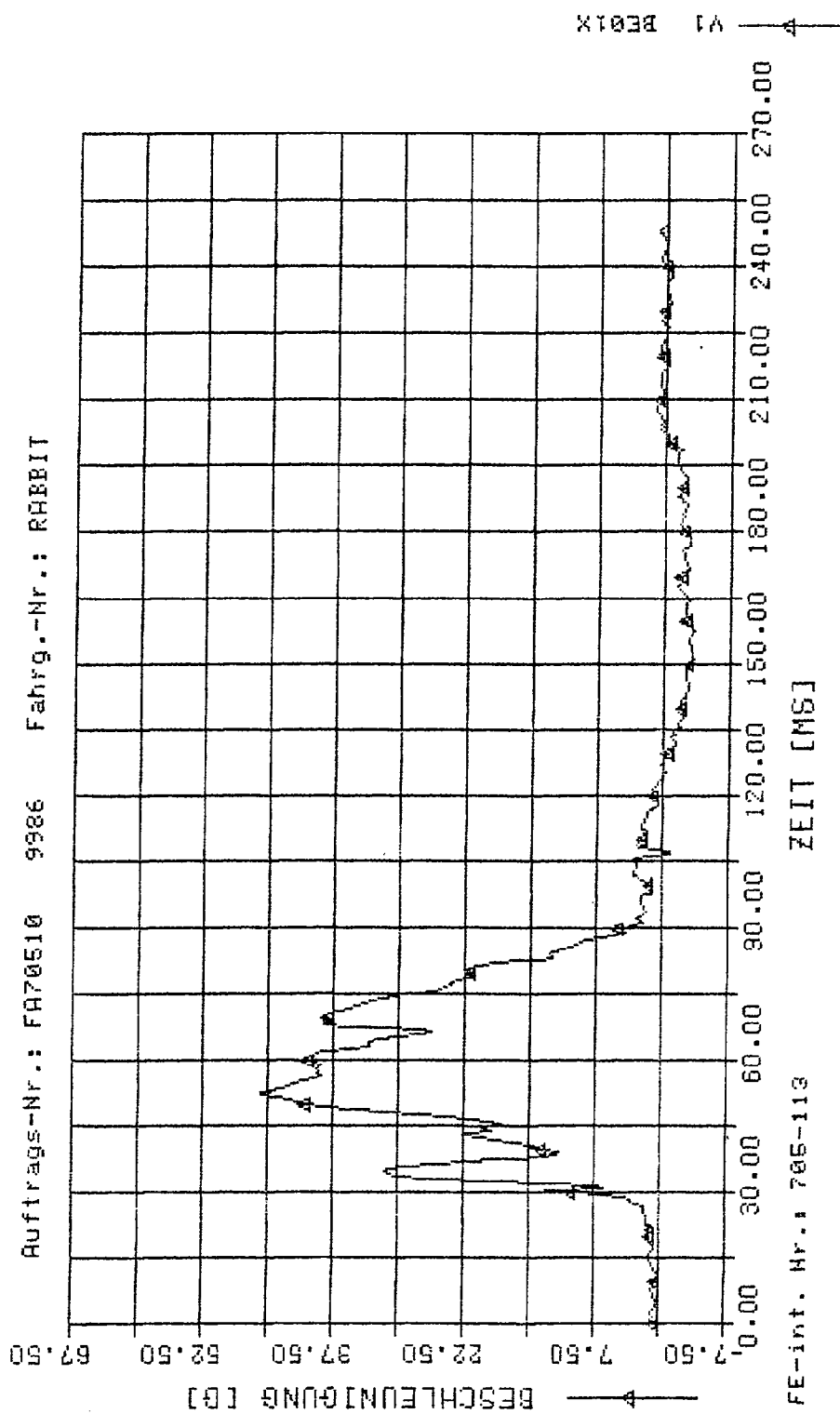
V1 BR01Z 4

Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 998

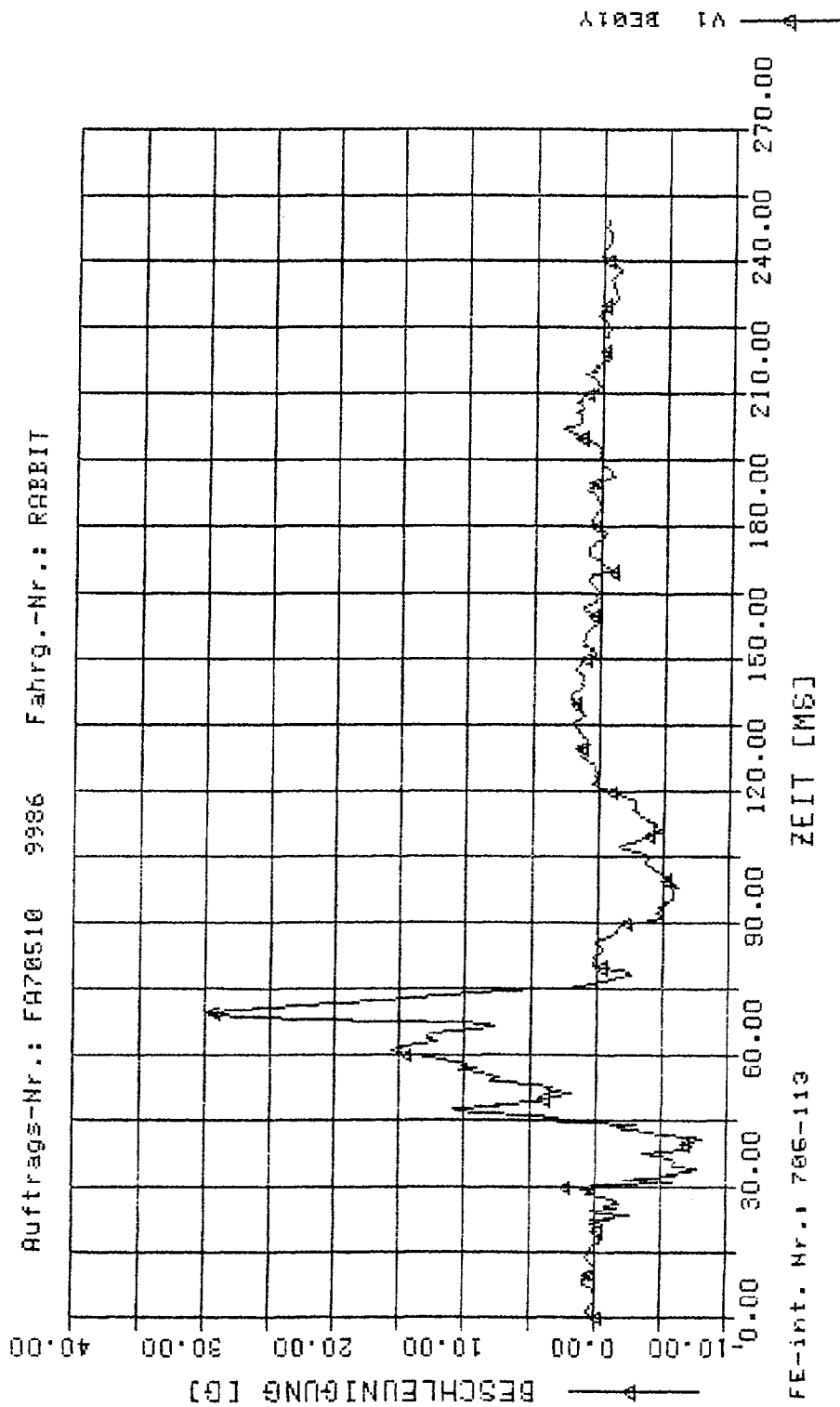
| Mess-Stelle | UP | ber. Groesse | Extremum | t      | 3MS   |
|-------------|----|--------------|----------|--------|-------|
| BE01        | V1 | BE 9         | 48.213   | 70.00  | 46.47 |
| BE01        | V1 | SI           | 381.414  | 250.00 | 0.00  |



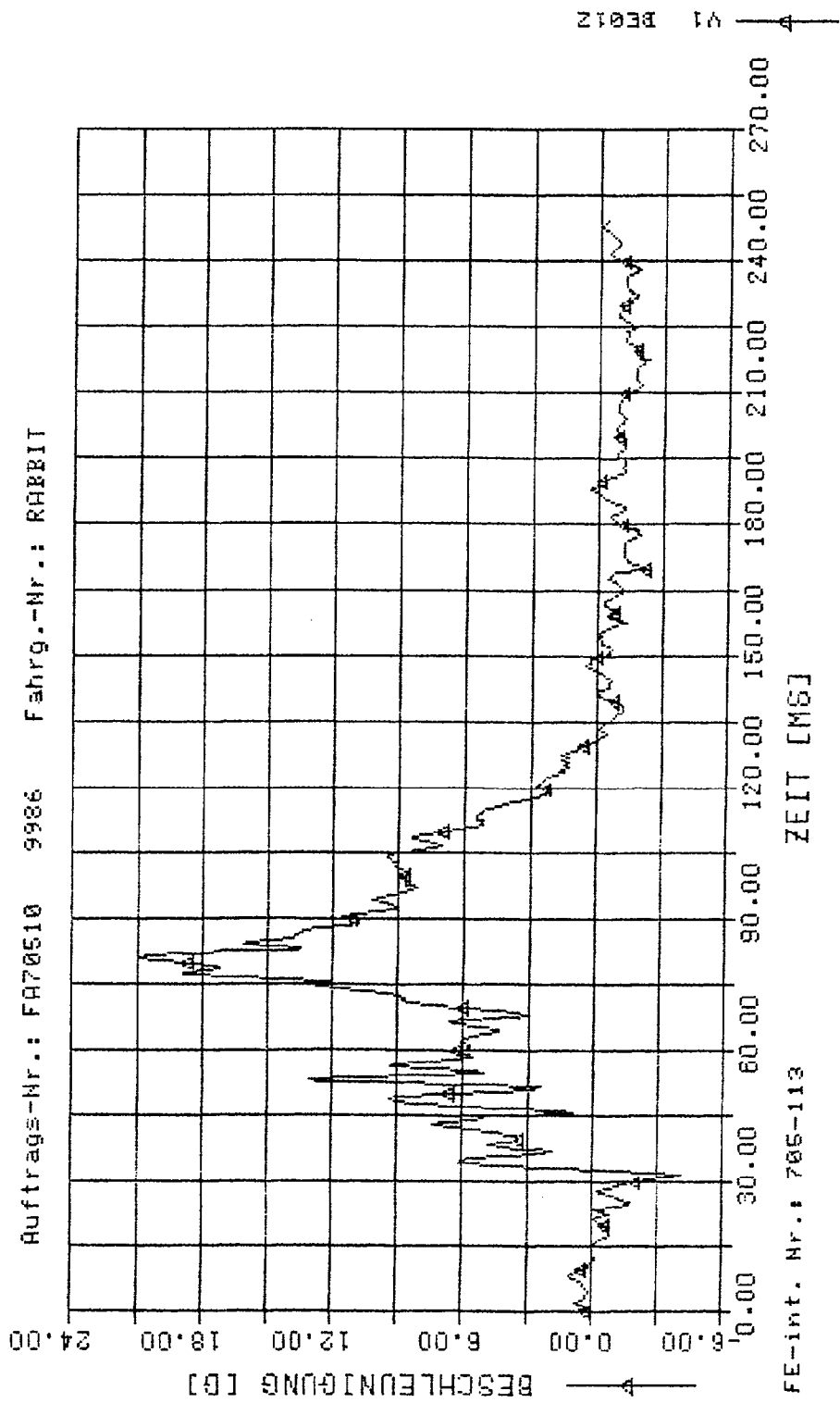
Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 9986  
 Mess-Stelle UP ber. Extremum t 3MS  
 BE01X V1 BE g 45.838 52.00 42.60



Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 9986  
 Mess-Stelle UP ber. Extremum t 3MS  
 BE01Y Groesse Extr. 69.50 21.79  
 V1 BE g

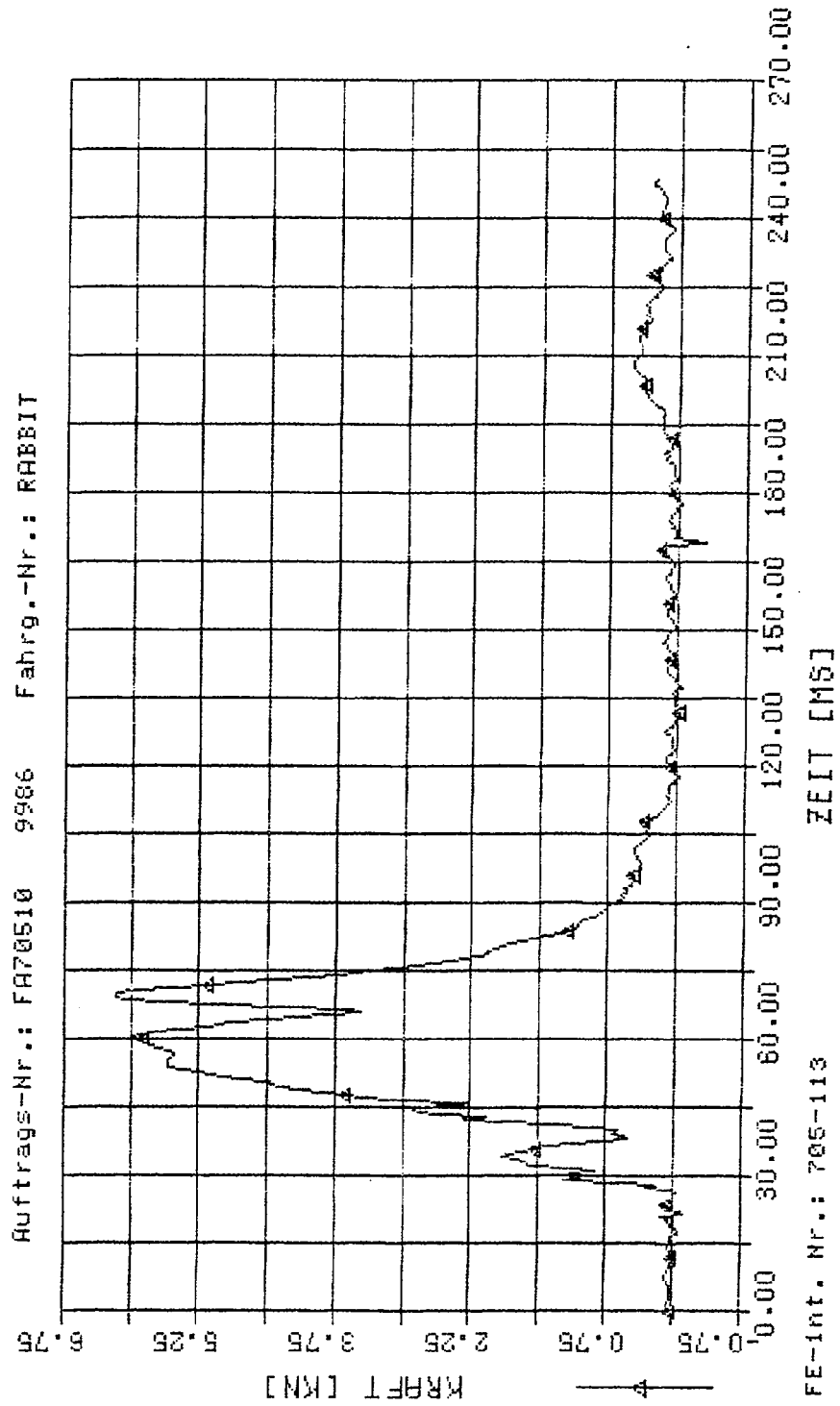


Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 9987  
 Mess-Stelle UP ber. Extremum t 3MS  
 BE01Z V1 BE 9 20.939 81.00 18.56



- Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 9986

Mess-Stelle UP ber. Extremum t 3MS  
OS01R V1 KR KN 6.211 70.00 0.00

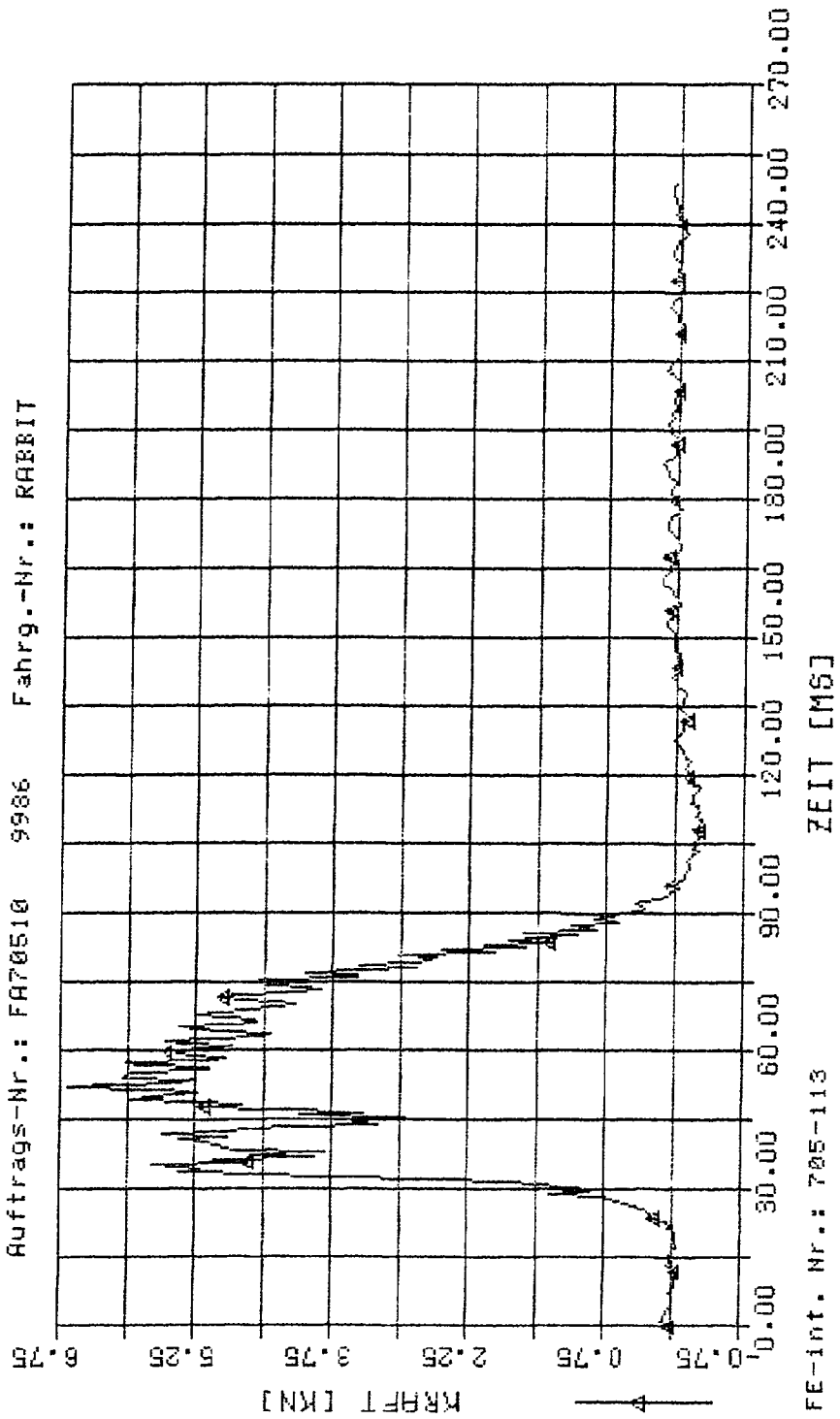


Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 9986

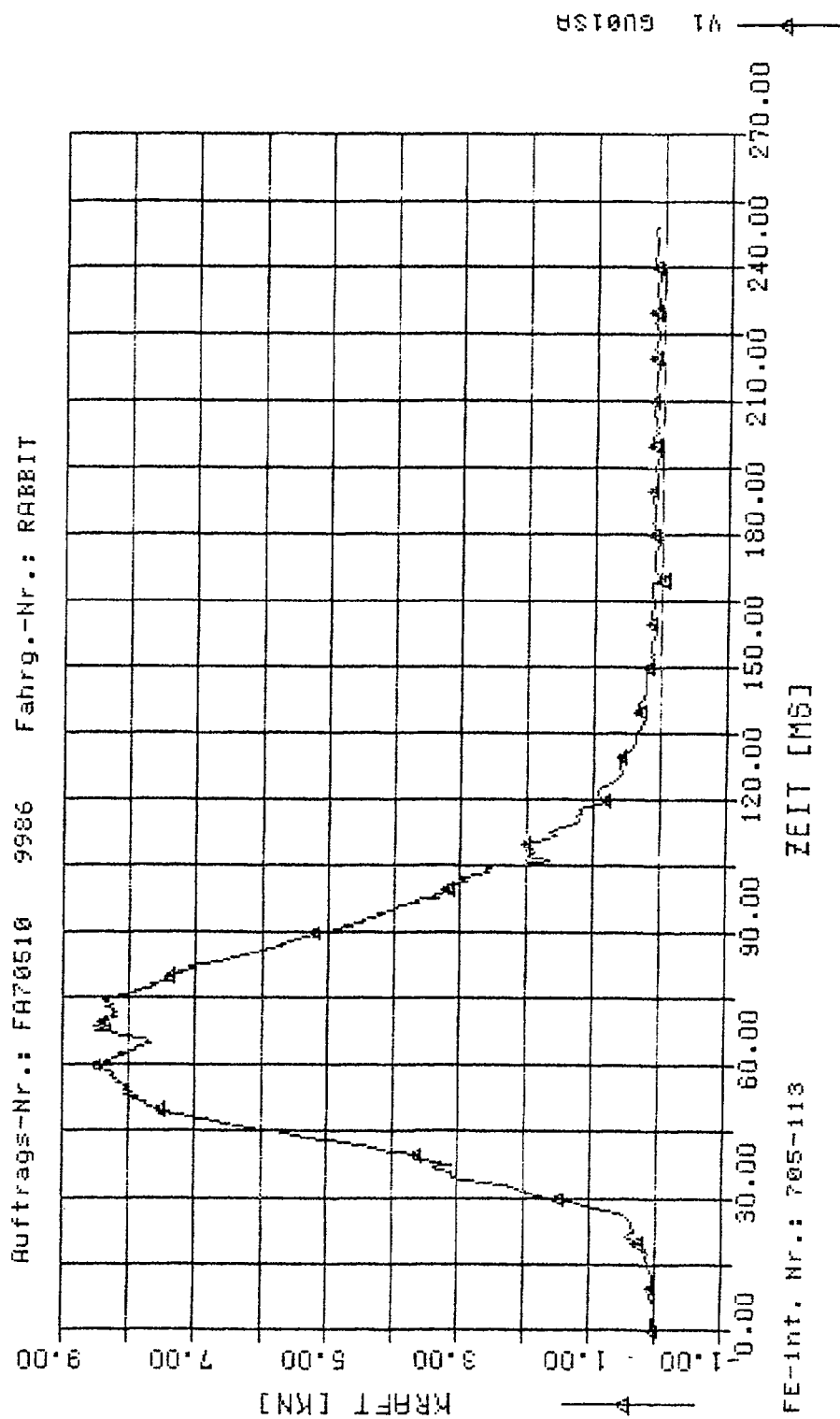
Mess-Stelle  
0501L

|    |       |          |      |       |
|----|-------|----------|------|-------|
| UP | ber.  | Extremum | t    | 3MS   |
| V1 | KR KN | 6.650    | Ext. | 52.20 |
|    |       |          |      | 0.00  |

Auftrags-Nr.: FA70510 9986 Fahrg.-Nr.: RABBIT

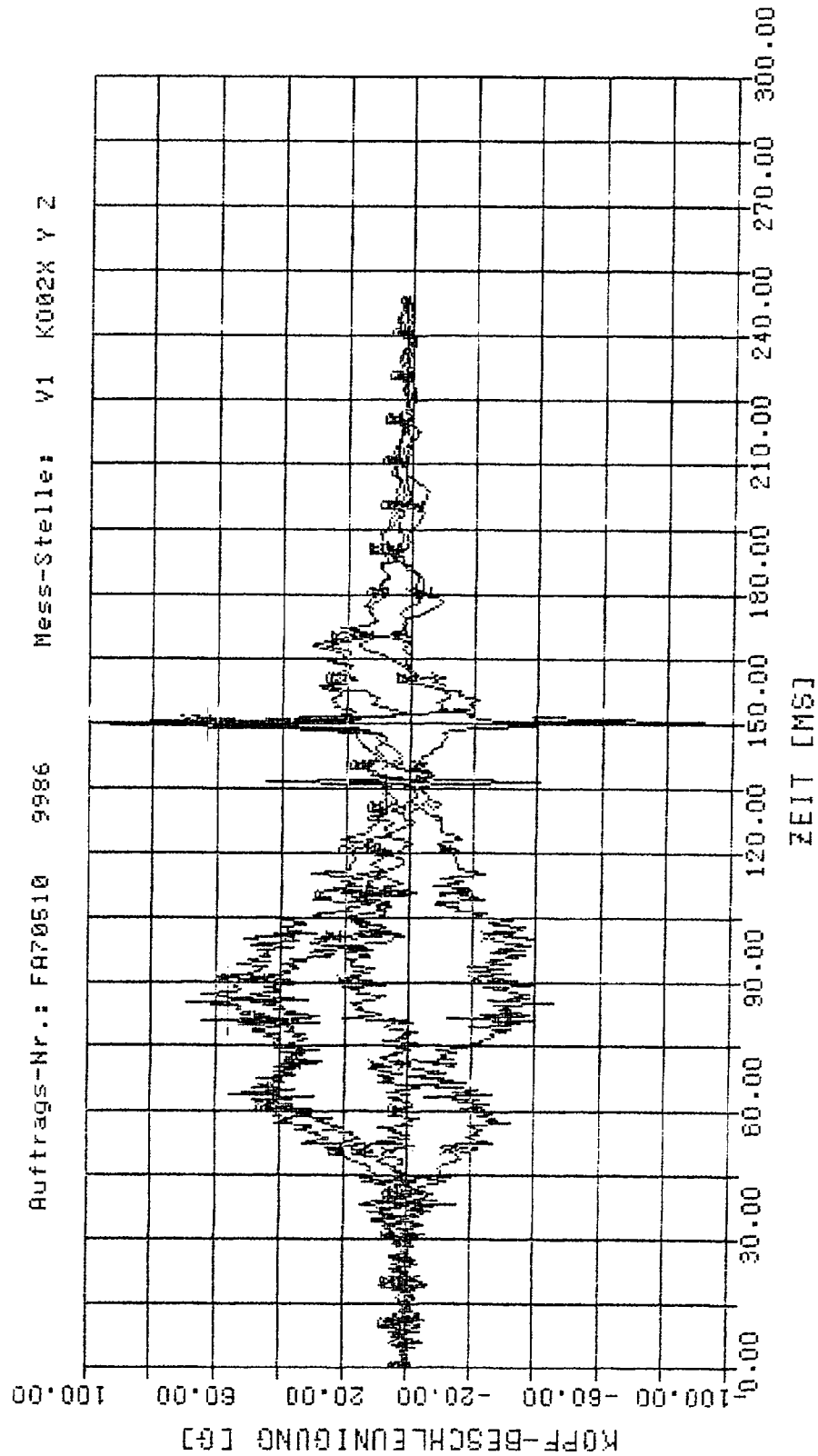


Kenn-Werte:    Auftrags-Nr.: FA70510    Versuchs-Nr.: 9986  
 Mess-Stelle    UP ber.    Extremum    t    3MS  
 GU01SA        V1 KR kN    8.512    69.00    0.00

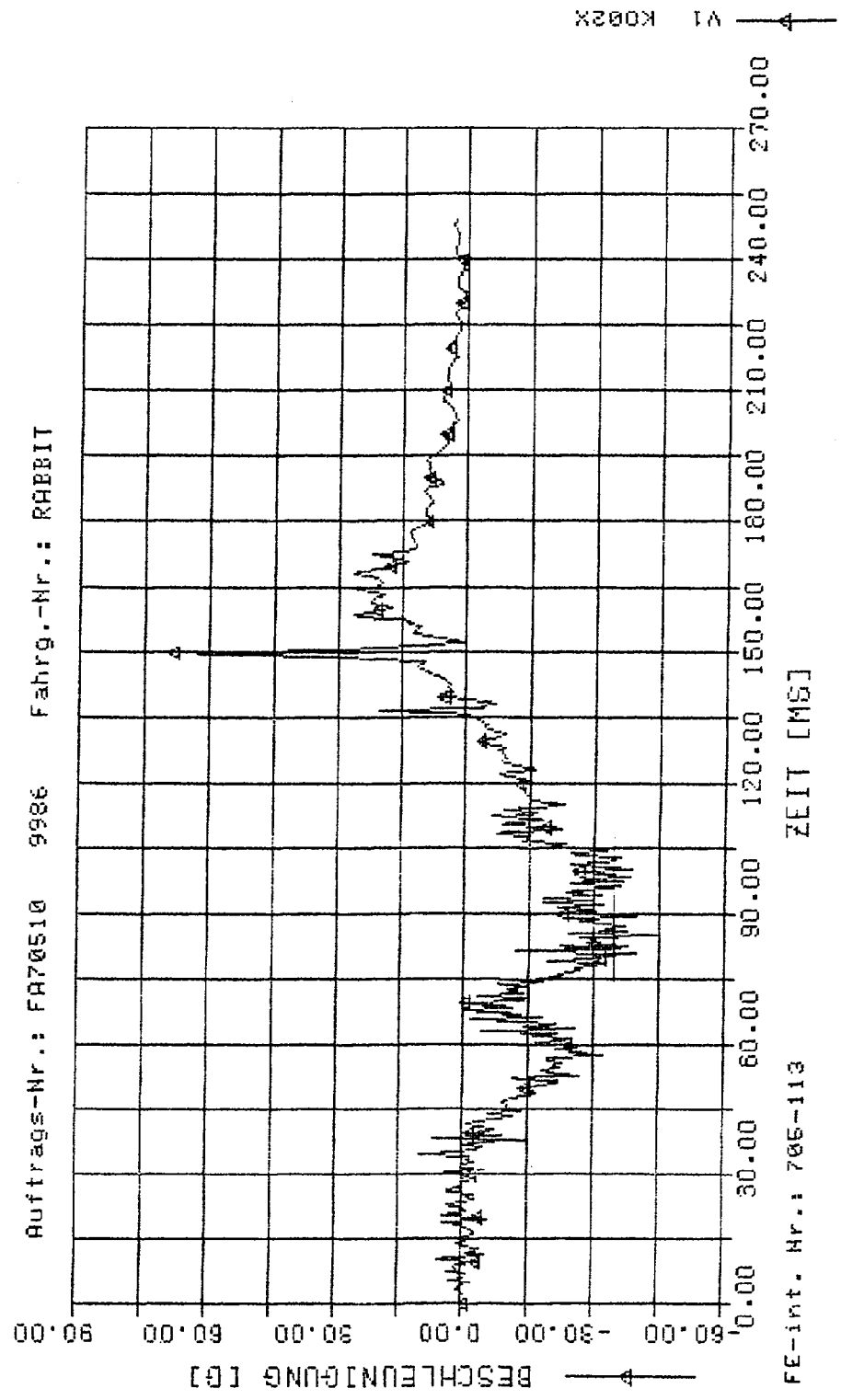


B.3 Dummy Test Response  
B.3.2 Front Passenger

- HIC-Werte: Auftrags-Nr.: 970510 Versuchs-Nr.: 9986  
 Mess-Stelle UP HIC T0 T1 t0 t1  
 Kopf -02 V1 638.89 30.00 135.00 52.31 116.12

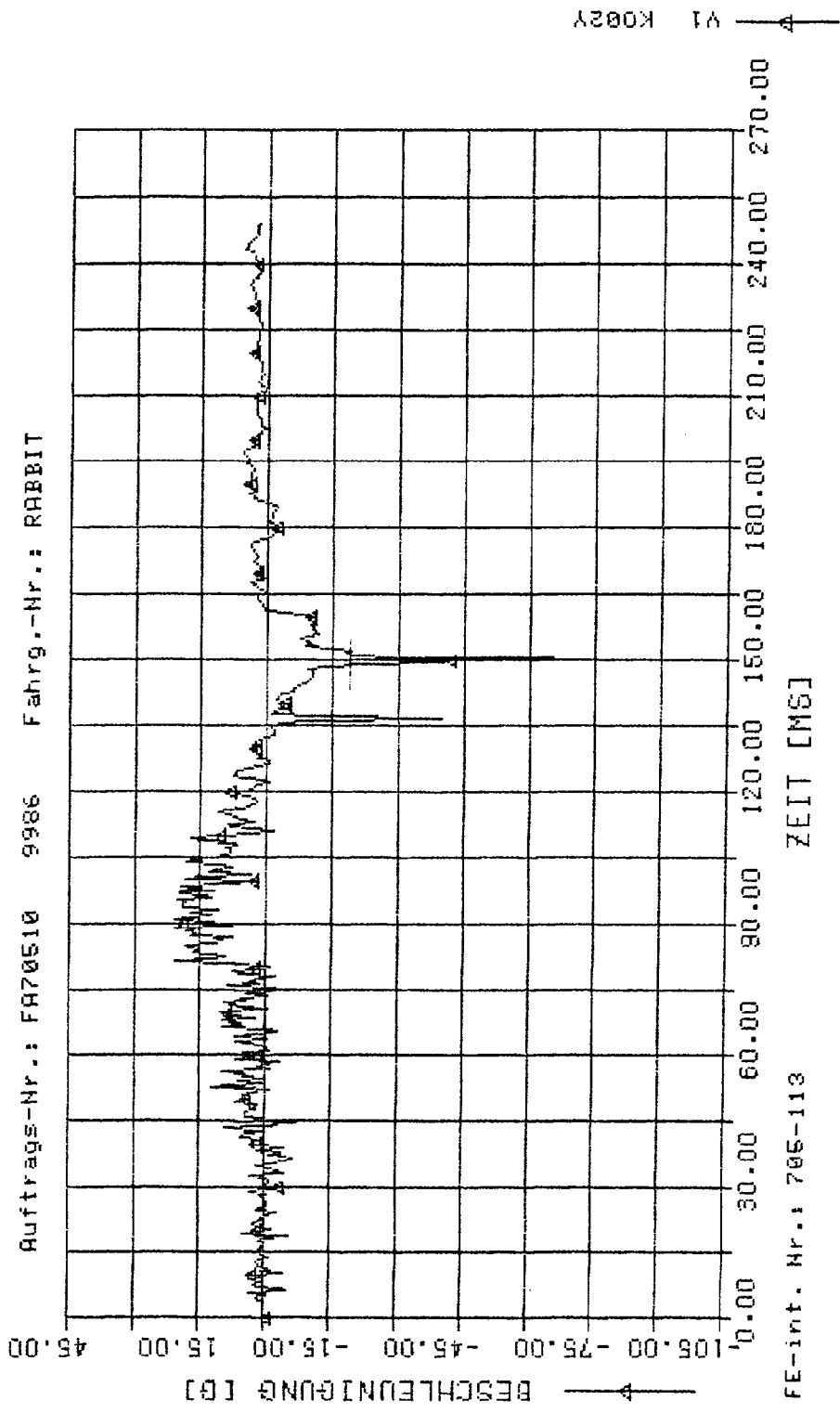


Kenn-Werte:    Auftrags-Nr    FA70510    Versuchs-Nr.:    998  
 Mess-Stelle    Up    ber.    Extremum    t    SMS  
 K002X    V1    BE    g    77.959    150.40    25.09



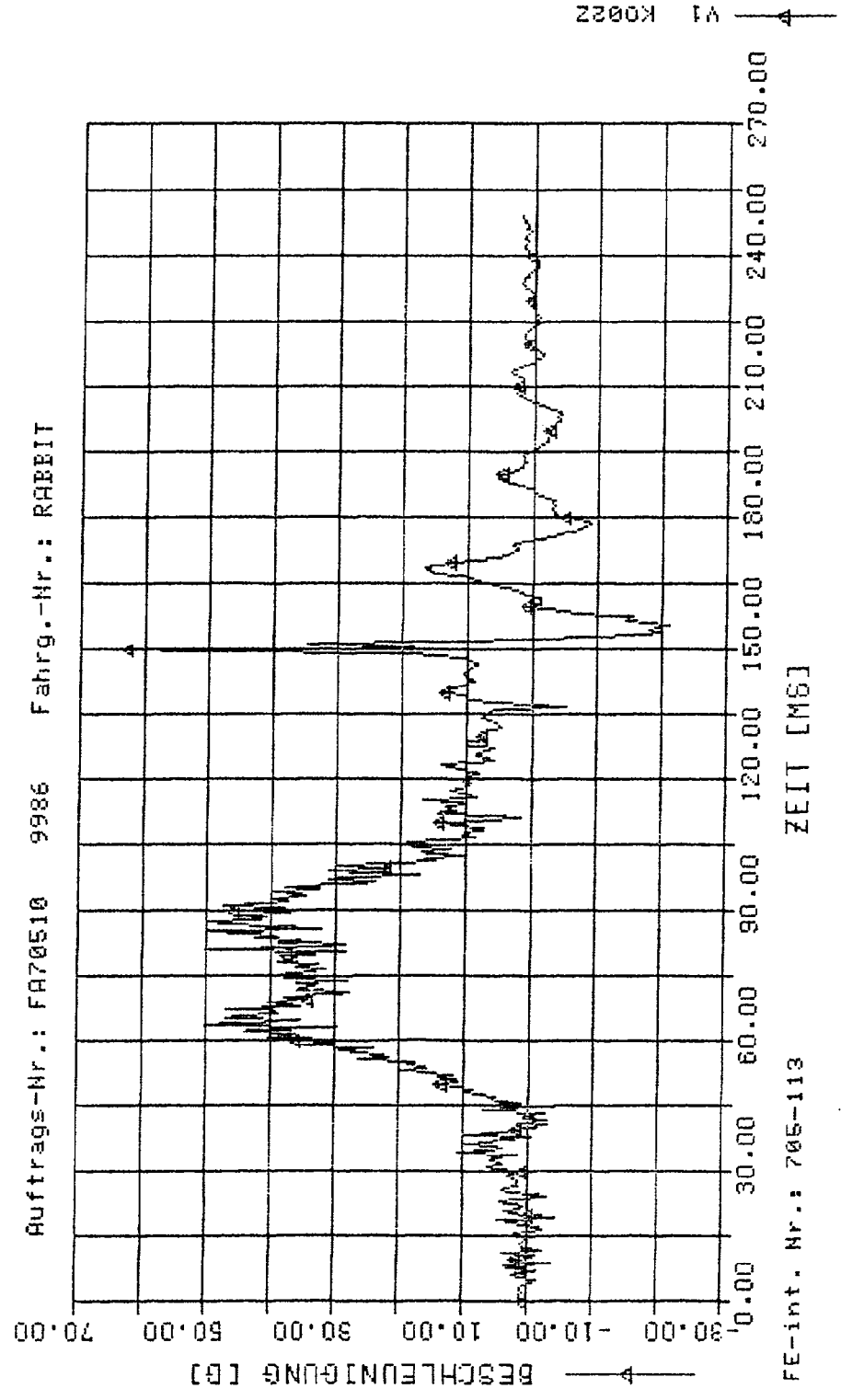
Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 9986

Mess-Stelle  
K002Y  
UP ber. Extremum t 3MS  
Größe Extr.  
V1 BE g -113.392 150.40 17.93



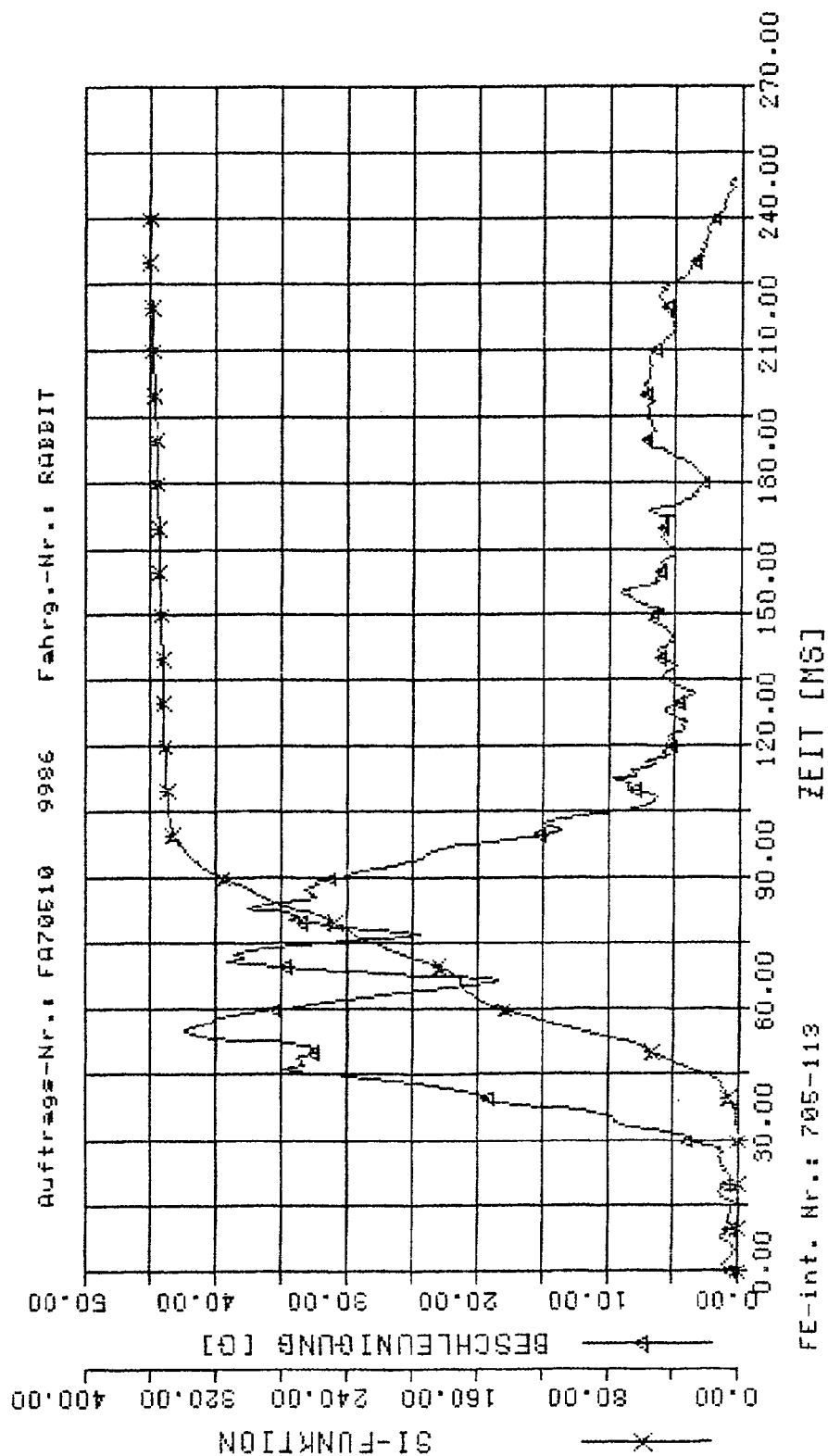
- Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 9986

Mess-Stelle  
K002Z  
UP ber. Extremum t  
V1 BE g 74.829 150.20 3MS 47.58



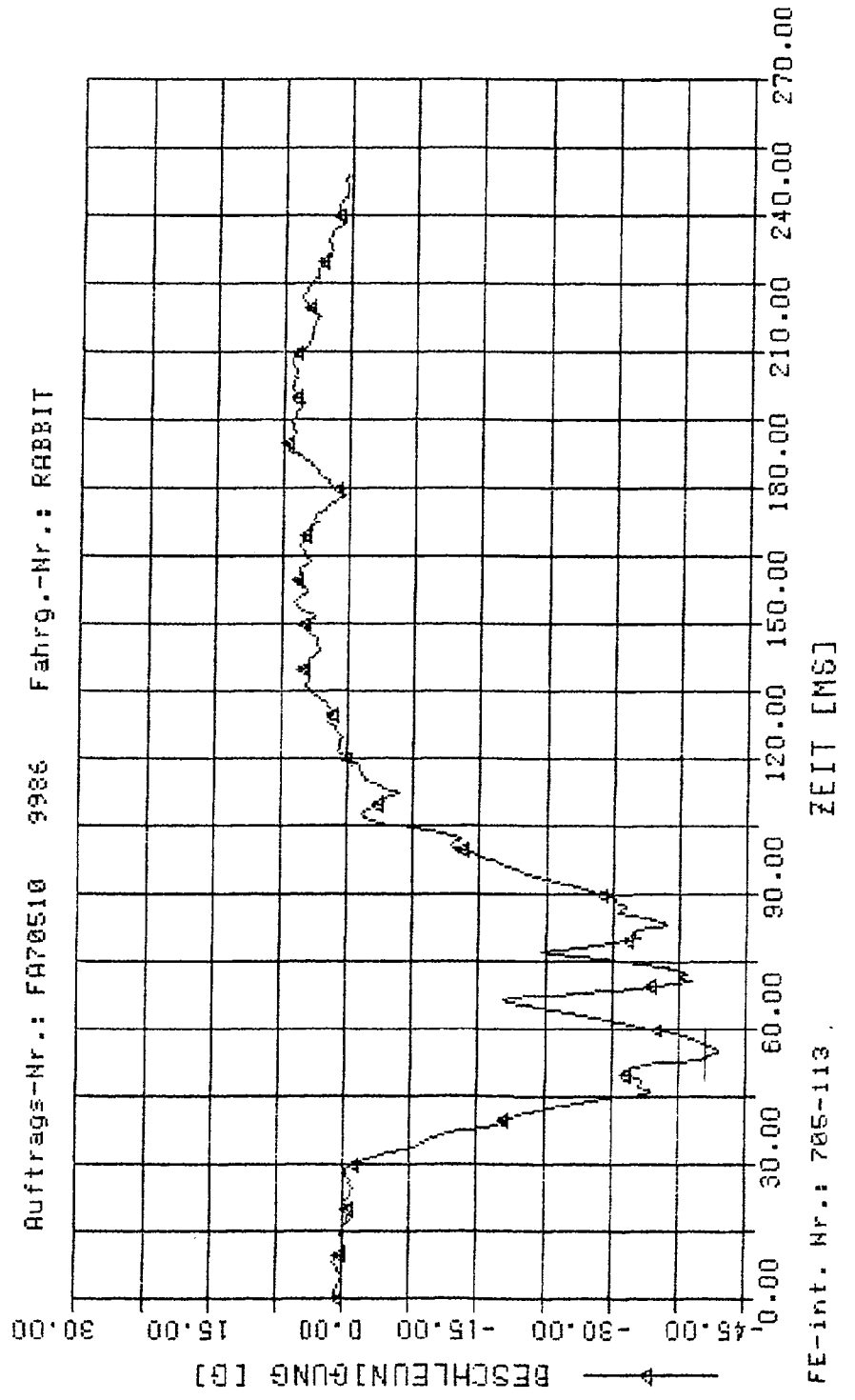
Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 996

| Mess-Stelle | UP | ber. | Extremum | t      | 3MS   |
|-------------|----|------|----------|--------|-------|
| BR02        | V1 | BE g | 42.354   | 55.00  | 40.32 |
| BR02        | V1 | SI   | 359.457  | 250.00 | 0.00  |



Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 998

Mess-Stelle UP ber. Extremum t 3MS  
 BR02X V1 BE g -41.769 Extr. 55.50 6.57



|             |    |         |          |       |      |
|-------------|----|---------|----------|-------|------|
| Mess-Stelle | UP | ber.    | Extremum | t     | 3MS  |
| BR02Y       | V1 | Groesse |          | Extr. |      |
|             |    | BE      | -10.364  | 97.50 | 4.22 |

Auftrags-Nr.: FA70510 9986 Fahrg.-Nr.: RABBIT

FE-int. Nr.: 705-113

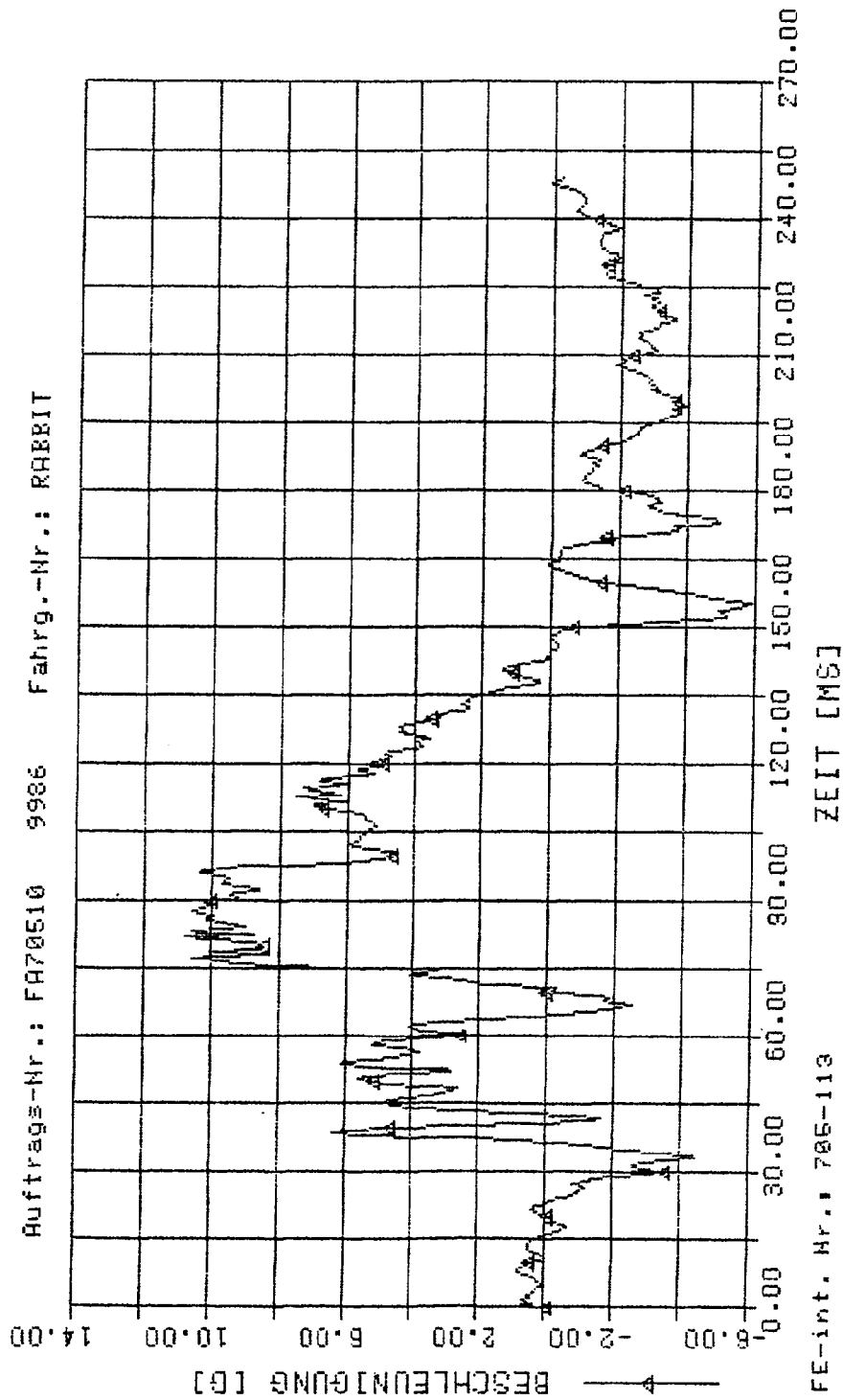
—•— BESCHLEUNIGUNG [G] ZEIT [MS]

8.00  
4.00  
0.00  
-4.00  
-8.00  
-12.00

0.00 30.00 60.00 90.00 120.00 150.00 180.00 210.00 240.00 270.00

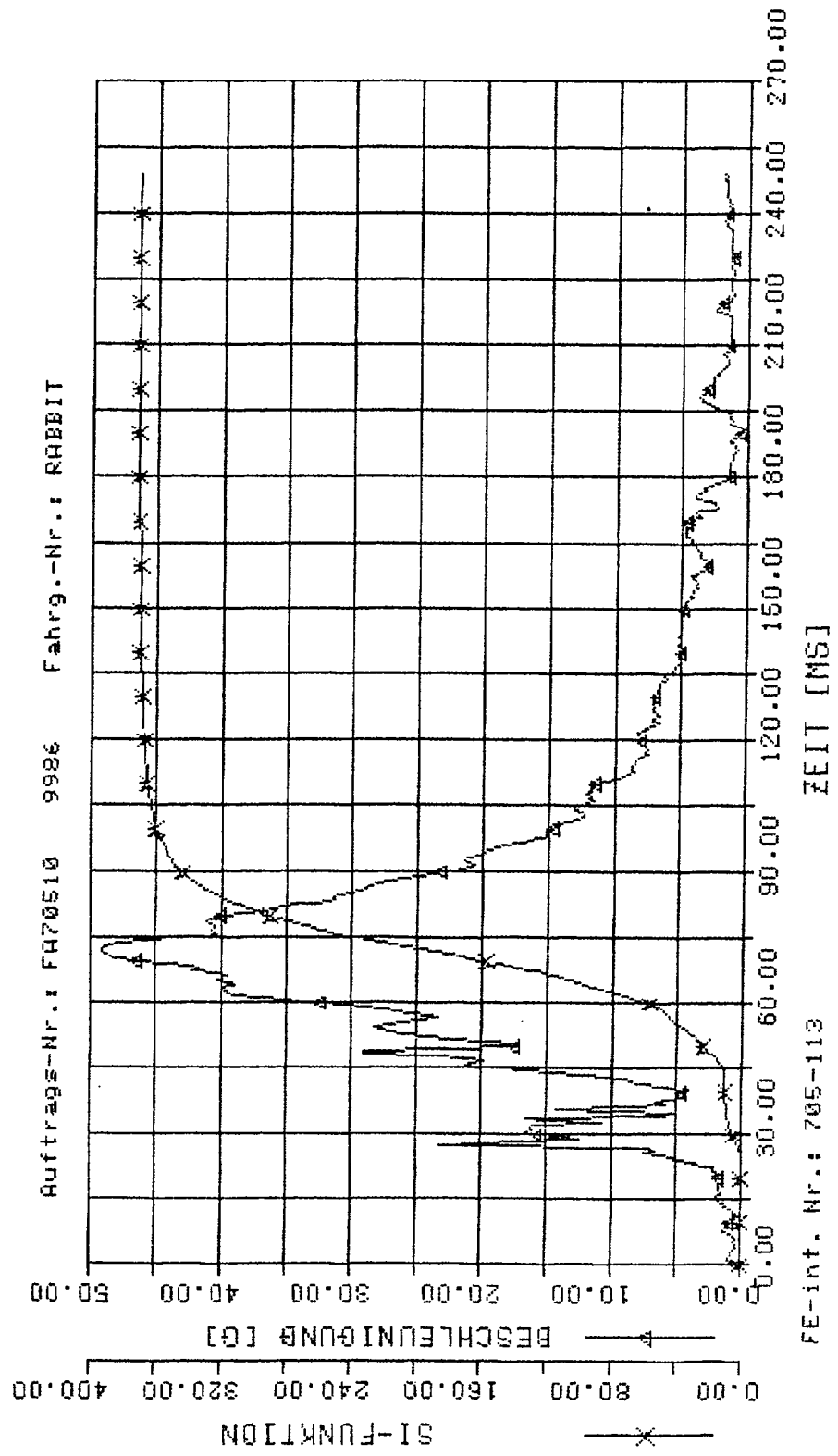
—A— V1 9R02Y

Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 9986  
 Mess-Stelle UP ber. Extremum t 3MS  
 BR02Z Groesse Extr.  
 V1 BE g 10.737 82.00 10.33



Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 998

| Mess-Stelle | UP | ber.    | Extremum | t      | 3MS   |
|-------------|----|---------|----------|--------|-------|
| BE02        | V1 | Groesse | 49.044   | Extr.  | 48.24 |
| BE02        | V1 | SI      | 370.805  | 250.00 | 0.00  |



Kenn-Werte:

Auftrags-Nr.: FA70510 Versuchs-Nr.: 998

Mess-Stelle

UP

ber.

Extremum

t

3MS

BE02X

V1

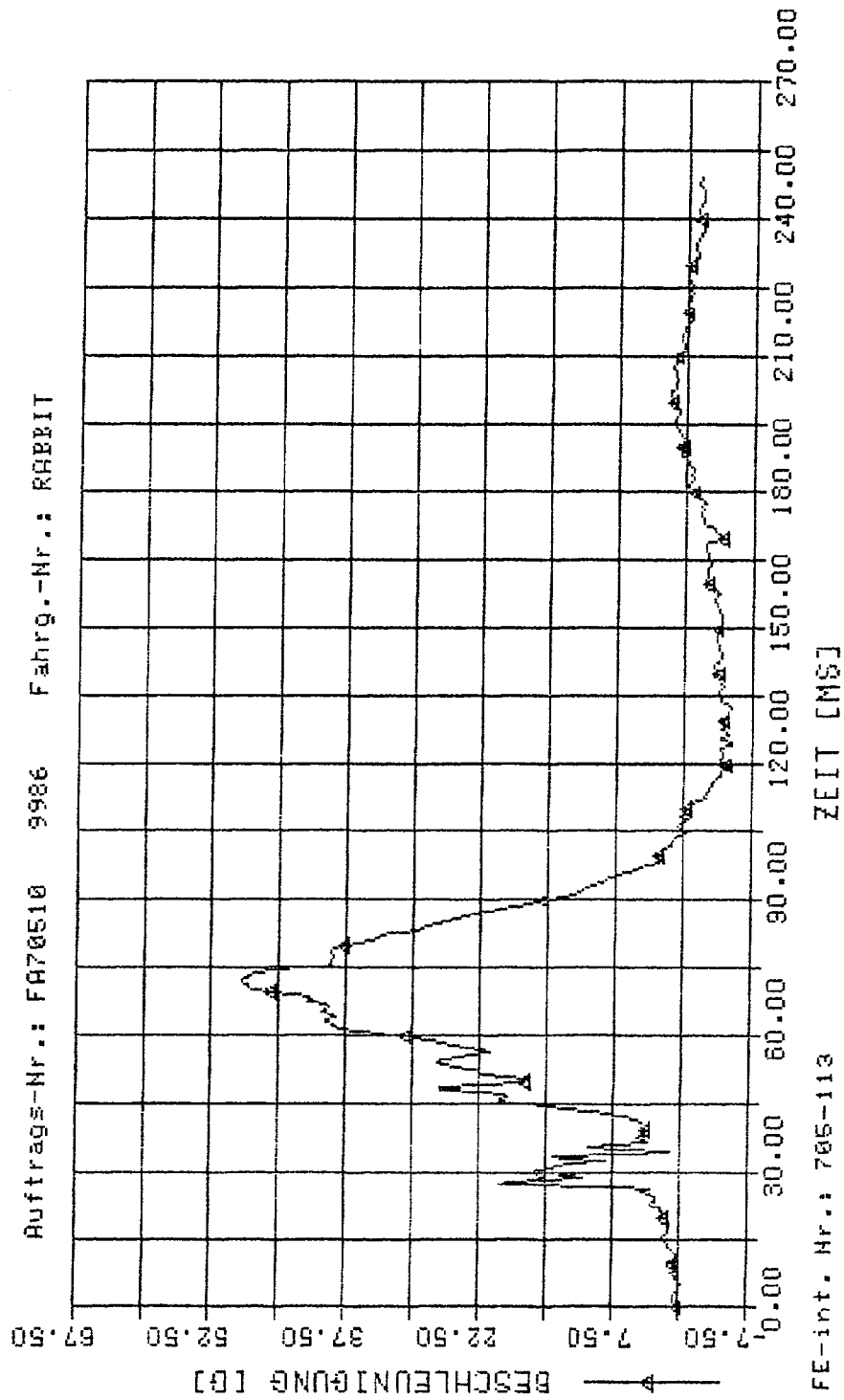
BE g

48.921

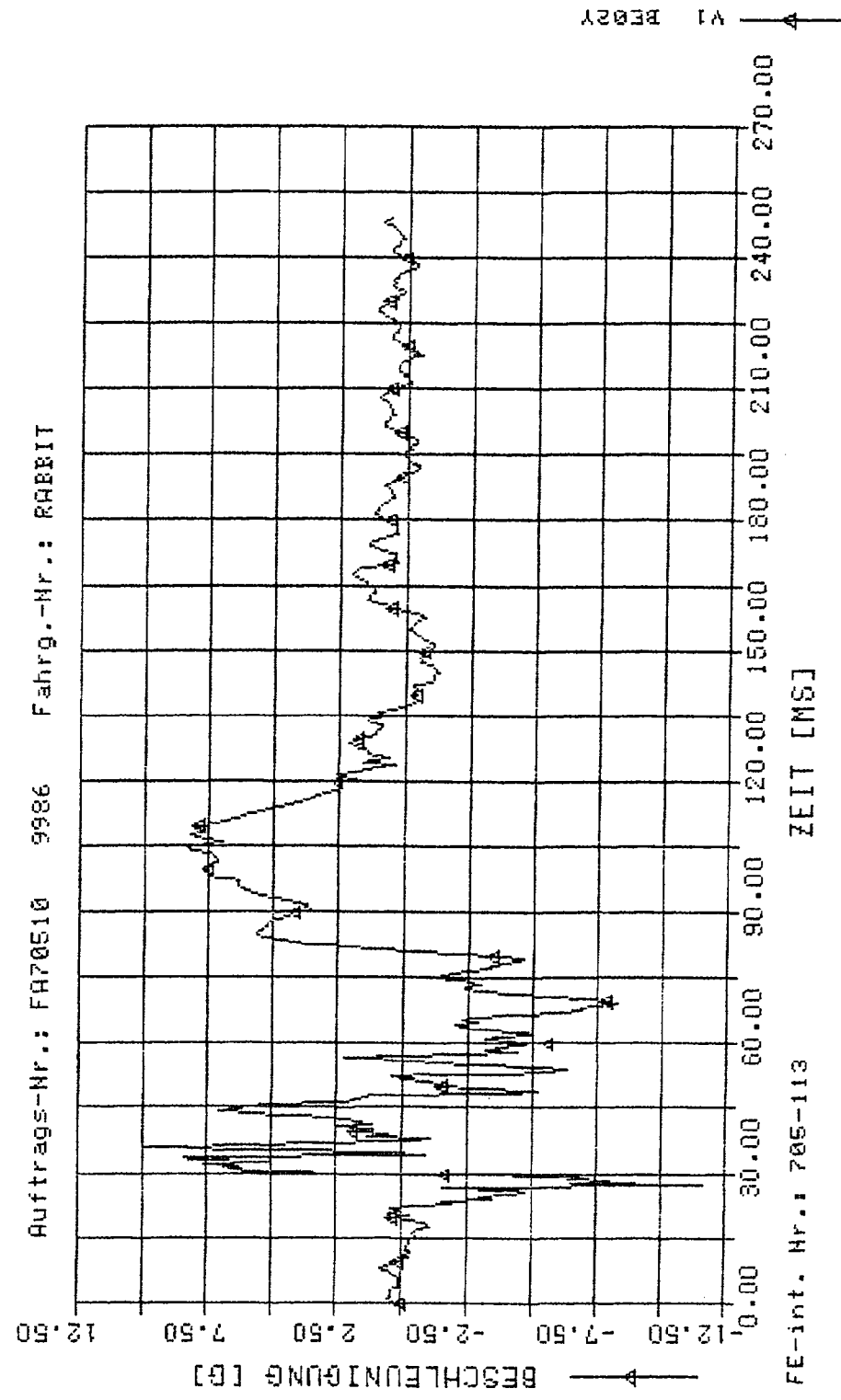
Extr.

72.50

47.73



Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 998  
 Mess-Stelle: UP ber. Extremum t 3MS  
 BE02Y Groesse Extr. 27.50 7.98  
 V1 BE g -11.675



Kennwerte:

Auftrags-Nr.: FA70510 Versuchs-Nr.: 998

Mess-Stelle

3MS

UP ber. Extremum t

BE02Z

V1 BE 9

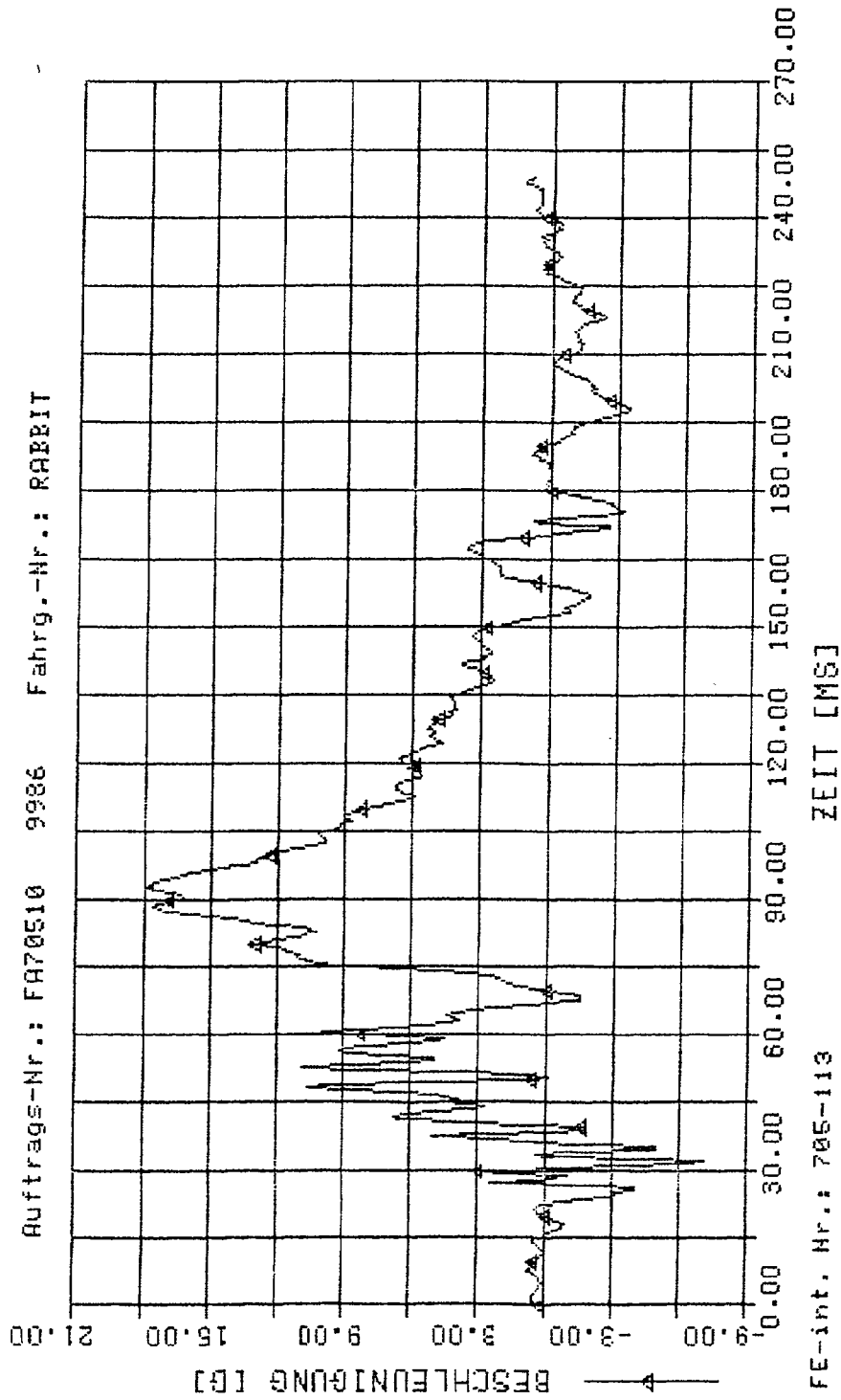
Extr.

17.850

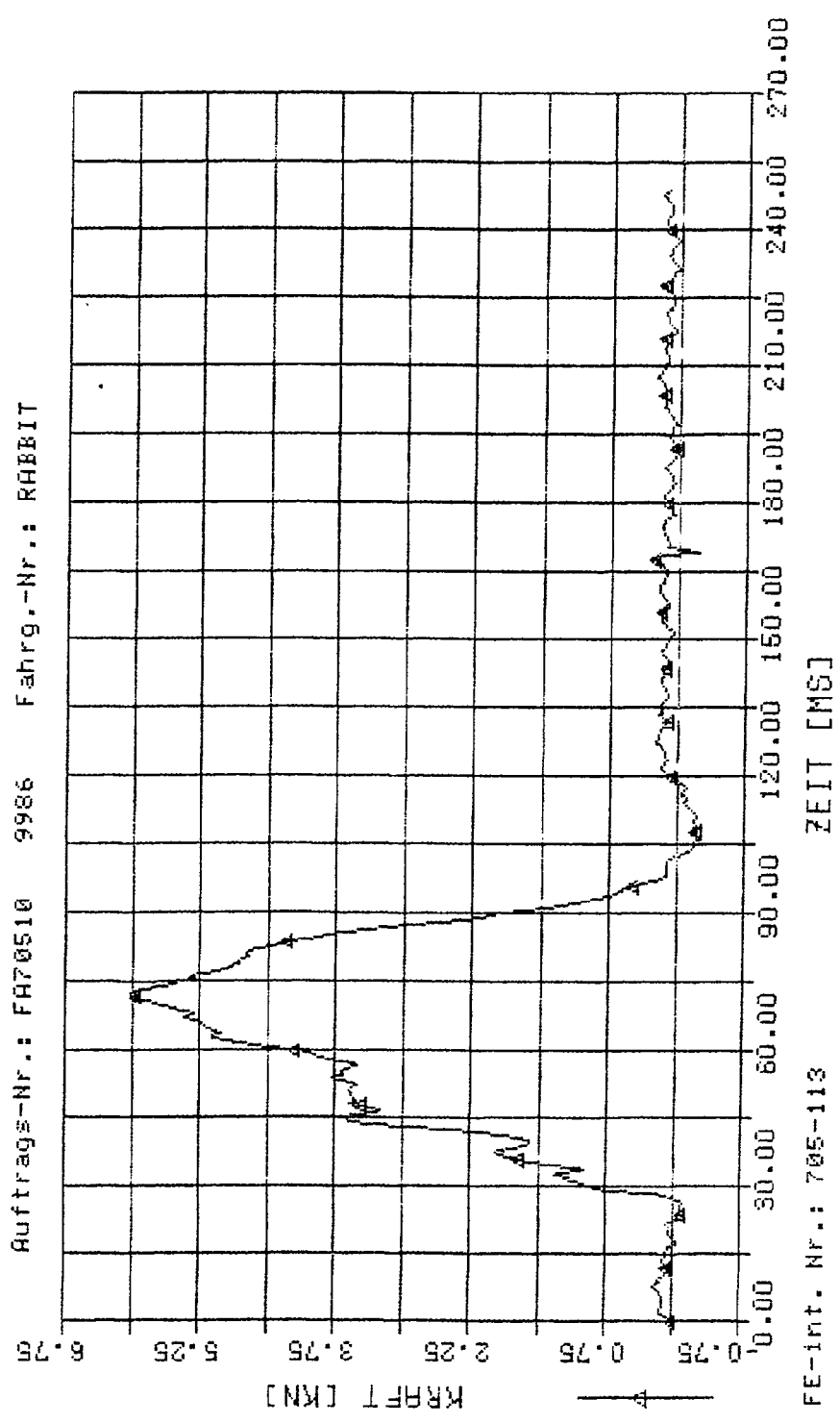
93.00

17.03

Auftrags-Nr.: FA70510 9986 Fahrg.-Nr.: RABBIT



Kenn-Werte: Auftrags-Nr. FA70510 Versuchs-Nr.: 998  
 Mess-Stelle UP ber. Extremum t 3MS  
 OS02R V1 KR kN 6.040 Extr. 72.40 0.00

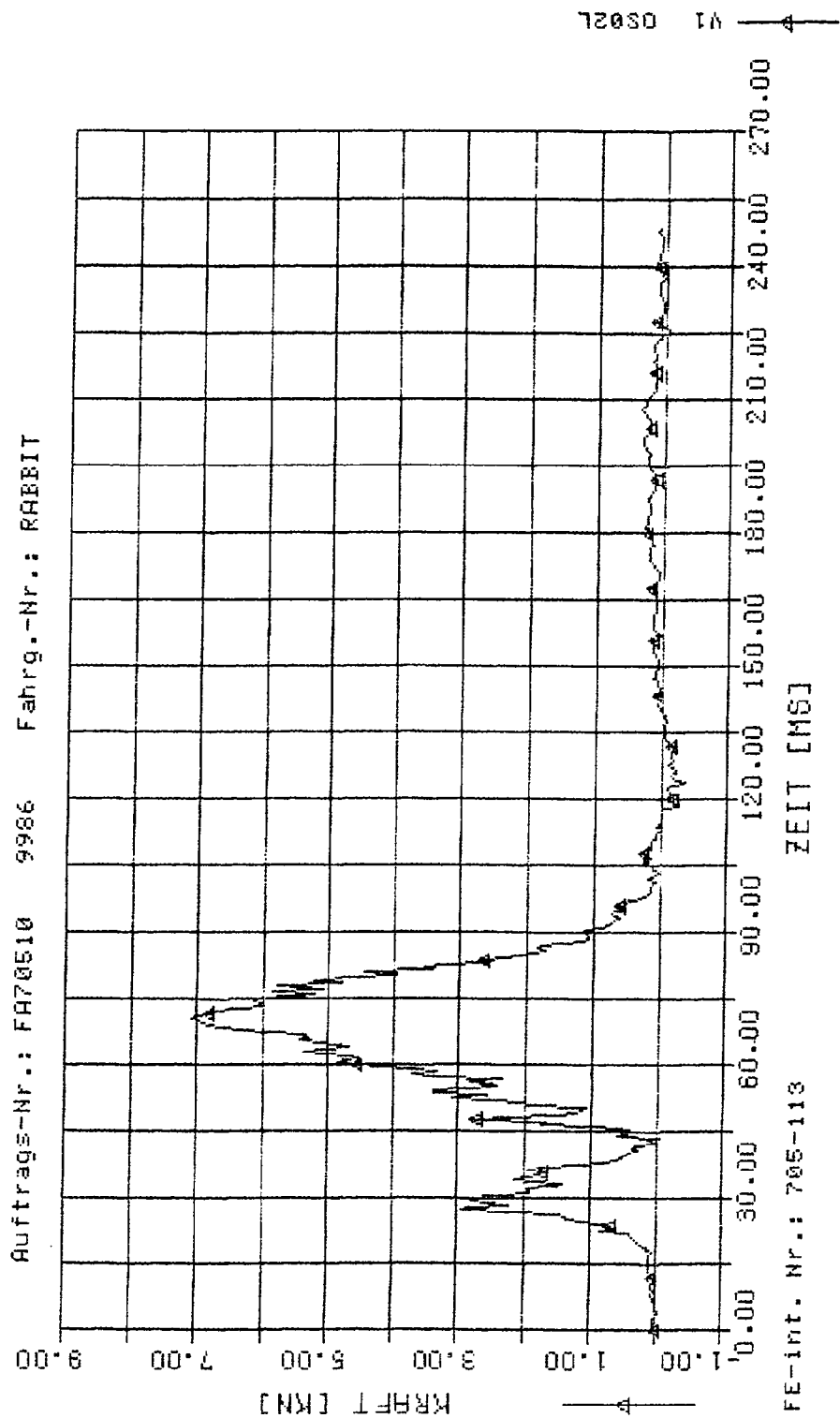


V1 OS02R

Kenn-Werte: Auftrags-Nr.: FA70510 Versuchs-Nr.: 9986

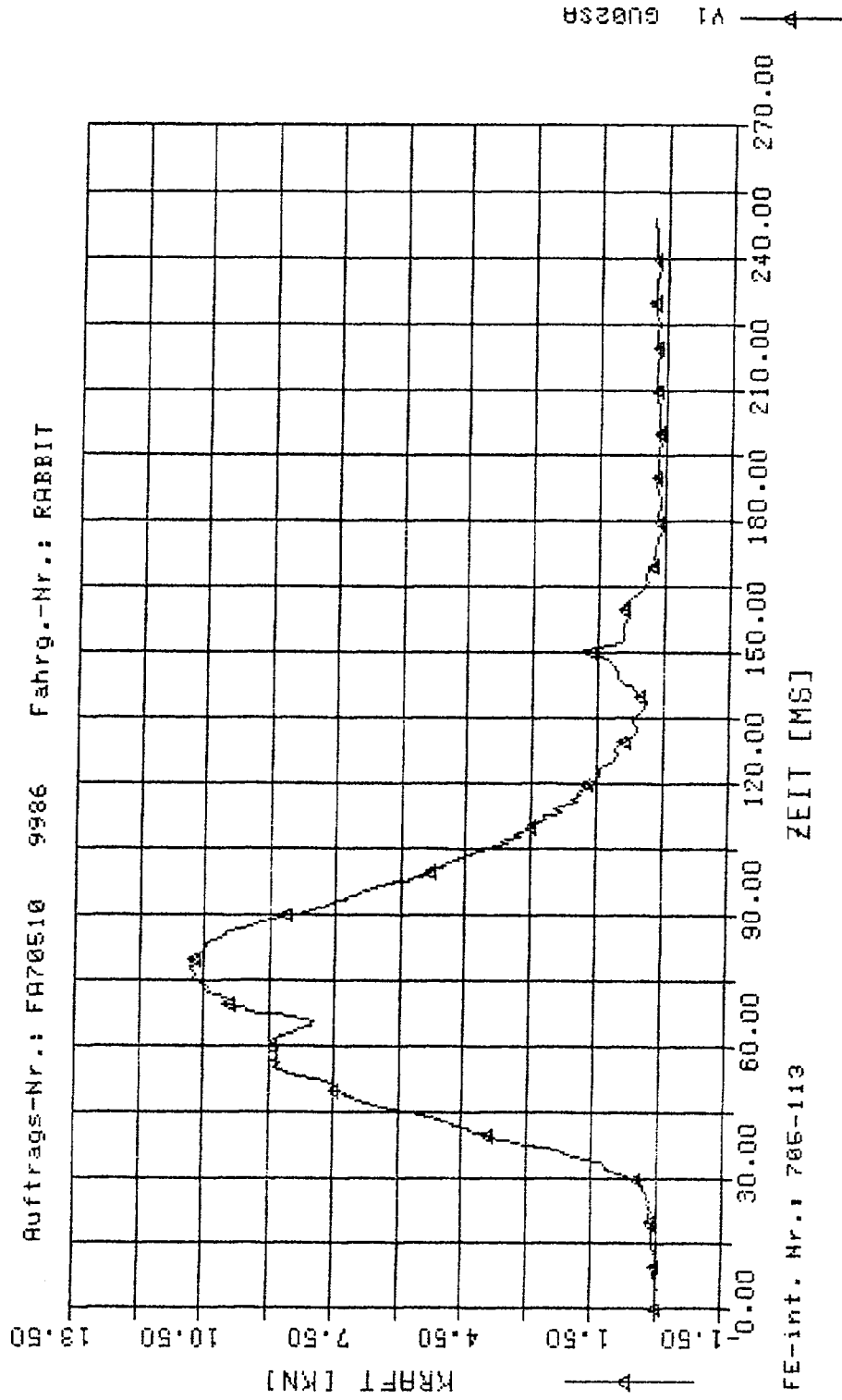
Mess-Stelle  
OS02L

|    |       |          |      |
|----|-------|----------|------|
| UP | ber.  | Extremum | t    |
| V1 | KR kN | 7.205    | 3MS  |
|    |       | Extr.    |      |
|    |       | 72.80    | 0.00 |



Kenn-Werte: Auftrags-Nr. FA70510 Versuchs-Nr.: 9986

Mess-Stelle  
GU02SA  
UP ber. Extremum t 3MS  
V1 KR KN 10.816 Extr. 78.00 0.00



#### B.4 Dummy Calibration Test Data

# PART 572 DUMMY CALIBRATION TEST DATA

Dummy I.D. No.: Driver

Pre-test  
Calibration  
01.11.1982

Date of Dummy Calibration

Calibration Sequential Number for Dummy

Temperature in Lab. (Spec. = 66 to 78 °F)

22 °C

Relative Humidity in Lab.

42

(Spec. = 10 to 70%)

Test Parameter

Specification

## 1. Head Drop Test:

|                          |              |      |
|--------------------------|--------------|------|
| a. Peak Resultant Accel. | 210 - 260G   | 213  |
| b. Peak Lateral Accel.   | <10G         | 5.5  |
| c. Time above 100G       | 0.9 - 1.5 ms | 1.43 |

## 2. Neck Bending Test:

|                                                |                 |      |
|------------------------------------------------|-----------------|------|
| a. Pendulum Speed                              | 21.5 - 25.5 fps | 21.8 |
| b. Pendulum Avg. Decel.<br>(over $t_3 - t_2$ ) | 20 - 24G        | 22.0 |
| c. Peak Resultant Head<br>Acceleration         | 26G Maximum     | 23.0 |
| d. Pendulum Decel.<br>( $t_2 - t_1$ )          | $\leq 3$ ms     | 2.5  |
| e. Pendulum Decel.<br>( $t_3 - t_2$ )          | 25 - 30 ms      | 26.5 |
| f. Pendulum Decel.<br>( $t_4 - t_3$ )          | $\leq 10$ ms    | 3.5  |
| g. Pendulum Direction<br>Reversal Time         | $\geq 123$ ms   |      |
| h. Maximum Head Rotation                       | 63 to 73°       | 64   |
| i. Chordal Displacement:                       |                 |      |

## Head Rotation Angle

|                  |        |                  |       |
|------------------|--------|------------------|-------|
| 0°               | Time   | -2 - 2 ms        | 0     |
|                  | Displ. | -0.5 - 0.5 in.   | 0     |
| 30°              | Time   | 25.6 - 34.4 ms   | 26.5  |
|                  | Displ. | 2.1 - 3.1 in.    | 2.75  |
| 60°              | Time   | 40.3 - 51.7 ms   | 46.0  |
|                  | Displ. | 4.3 - 5.3 in.    | 5.09  |
| Maximum<br>(73°) | Time   | 53.2 - 66.8 ms   | 56.5  |
|                  | Displ. | 5.0 - 6.0 in.    | 5.42  |
| 60°              | Time   | 67.0 - 83.0 ms   | 67.0  |
|                  | Displ. | 4.3 - 5.3 in.    | 5.09  |
| 30°              | Time   | 85.4 - 104.6 ms  | 90.0  |
|                  | Displ. | 2.1 - 3.1 in.    | 2.52  |
| 0°               | Time   | 101.0 - 123.0 ms | 108.0 |
|                  | Displ. | -0.5 - 0.5 in.   | 0.21  |

PART 572 DUMMY CALIBRATION TEST DATA (CONTINUED)

Dummy I.D. No.: Driver

| Test Parameter                                          | Specification   | Pre-test Calibration |
|---------------------------------------------------------|-----------------|----------------------|
| 3. Abdominal Compression Test:<br>(Preload = 10 pounds) |                 |                      |
| a. Force at 0.5 in.                                     | 14 - 26 lb      | 22.95                |
| b. Force at 0.75 in.                                    | 27 - 40 lb      | 36.4                 |
| c. Force at 1.0 in.                                     | 40 - 53 lb      | 50.5                 |
| d. Force at 1.3 in.                                     | 63 - 78 lb      | 70.7                 |
| 4. Lumbar Flexion Test:                                 |                 |                      |
| a. Force at 20°                                         | 22 - 34 lb      | 33.1                 |
| b. Force at 30°                                         | 34 - 46 lb      | 42.3                 |
| c. Force at 40°                                         | 46 - 58 lb      | 51.8                 |
| c. Return Angle                                         | 12° Maximum     | 10.0                 |
| 5. Chest Impact Tests:                                  |                 |                      |
| a. High Speed                                           |                 |                      |
| 1) Probe Speed                                          | 21.78-22.22 fps | 21.96                |
| 2) Peak Deflection                                      | 1.7 in. Maximum | 1.04                 |
| 3) Peak Resistive Force                                 | 2250 lb Maximum | 1931.0               |
| 4) Internal Hysteresis                                  | 50 - 70%        | 53.8                 |
| b. Low Speed:                                           |                 |                      |
| 1) Probe Speed                                          | 13.86-14.14 fps | 13.98                |
| 2) Peak Deflection                                      | 1.1 in. Maximum | 0.73                 |
| 3) Peak Resistive Force                                 | 1450 lb Maximum | 1184.0               |
| 4) Internal Hysteresis                                  | 50 - 70%        | 53.7                 |
| 6. Knee Impact Tests:                                   |                 |                      |
| a. Right Side                                           |                 |                      |
| 1) Probe Speed                                          | 6.76 - 7.04 fps | 6.91                 |
| 2) Maximum Force                                        | 1850 - 2500 lb  | 1945.0               |
| 3) Time 1000 lb                                         | 1.7 ms Minimum  | 1.87                 |
| b. Left Side                                            |                 |                      |
| 1) Probe Speed                                          | 6.76 - 7.04 fps | 6.91                 |
| 2) Maximum Force                                        | 1850 - 2500 lb  | 1896.0               |
| 3) Time 1000 lb                                         | 1.7 ms Minimum  | 1.93                 |

## PART 572 DUMMY CALIBRATION TEST DATA

Dummy I.D. No.: Front Passenger

Pre-test  
Calibration  
01.11.1982

Date of Dummy Calibration

Calibration Sequential Number for Dummy

Temperature in Lab. (Spec. = 66 to 78 °F)

22 °C

Relative Humidity in Lab.

39

(Spec. = 10 to 70%)

## Test Parameter

## Specification

## 1. Head Drop Test:

|                          |              |       |
|--------------------------|--------------|-------|
| a. Peak Resultant Accel. | 210 - 260G   | 234.0 |
| b. Peak Lateral Accel.   | <10G         | 4.3   |
| c. Time above 100G       | 0.9 - 1.5 ms | 1.2   |

## 2. Neck Bending Test:

|                                                |                 |      |
|------------------------------------------------|-----------------|------|
| a. Pendulum Speed                              | 21.5 - 25.5 fps | 21.8 |
| b. Pendulum Avg. Decel.<br>(over $t_3 - t_2$ ) | 20 - 24G        | 23.0 |
| c. Peak Resultant Head<br>Acceleration         | 26G Maximum     | 22.0 |
| d. Pendulum Decel.<br>( $t_2 - t_1$ )          | $\leq 3$ ms     | 2.5  |
| e. Pendulum Decel.<br>( $t_3 - t_2$ )          | 25 - 30 ms      | 26.5 |
| f. Pendulum Decel.<br>( $t_4 - t_3$ )          | $\leq 10$ ms    | 4.0  |
| g. Pendulum Direction<br>Reversal Time         | $\geq 123$ ms   |      |
| h. Maximum Head Rotation                       | 63 to 73°       | 63   |
| i. Chordal Displacement:                       |                 |      |

## Head Rotation Angle

|                  |        |                  |       |
|------------------|--------|------------------|-------|
| 0°               | Time   | -2 - 2 ms        | 0     |
|                  | Displ. | -0.5 - 0.5 in.   | 0     |
| 30°              | Time   | 25.6 - 34.4 ms   | 25.5  |
|                  | Displ. | 2.1 - 3.1 in.    | 2.64  |
| 60°              | Time   | 40.3 - 51.7 ms   | 45.5  |
|                  | Displ. | 4.3 - 5.3 in.    | 4.93  |
| Maximum<br>(73°) | Time   | 53.2 - 66.8 ms   | 55.0  |
|                  | Displ. | 5.0 - 6.0 in.    | 5.21  |
| 60°              | Time   | 67.0 - 83.0 ms   | 67.5  |
|                  | Displ. | 4.3 - 5.3 in.    | 4.94  |
| 30°              | Time   | 85.4 - 104.6 ms  | 89.0  |
|                  | Displ. | 2.1 - 3.1 in.    | 2.43  |
| 0°               | Time   | 101.0 - 123.0 ms | 104.5 |
|                  | Displ. | -0.5 - 0.5 in.   | 0.08  |

## PART 572 DUMMY CALIBRATION TEST DATA (CONTINUED)

Dummy I.D. No.: Front Passenger

| Test Parameter                                          | Specification   | Pre-test Calibration |
|---------------------------------------------------------|-----------------|----------------------|
| 3. Abdominal Compression Test:<br>(Preload = 10 pounds) |                 |                      |
| a. Force at 0.5 in.                                     | 14 - 26 lb      | 22.0                 |
| b. Force at 0.75 in.                                    | 27 - 40 lb      | 34.8                 |
| c. Force at 1.0 in.                                     | 40 - 53 lb      | 50.5                 |
| d. Force at 1.3 in.                                     | 63 - 78 lb      | 71.8                 |
| 4. Lumbar Flexion Test:                                 |                 |                      |
| a. Force at 20°                                         | 22 - 34 lb      | 30.9                 |
| b. Force at 30°                                         | 34 - 46 lb      | 40.8                 |
| c. Force at 40°                                         | 46 - 58 lb      | 51.8                 |
| c. Return Angle                                         | 12° Maximum     | 6                    |
| 5. Chest Impact Tests:                                  |                 |                      |
| a. High Speed                                           |                 |                      |
| 1) Probe Speed                                          | 21.78-22.22 fps | 21.96                |
| 2) Peak Deflection                                      | 1.7 in. Maximum | 1.02                 |
| 3) Peak Resistive Force                                 | 2250 lb Maximum | 1941.0               |
| 4) Internal Hysteresis                                  | 50 - 70%        | 53.5                 |
| b. Low Speed:                                           |                 |                      |
| 1) Probe Speed                                          | 13.86-14.14 fps | 13.98                |
| 2) Peak Deflection                                      | 1.1 in. Maximum | 0.69                 |
| 3) Peak Resistive Force                                 | 1450 lb Maximum | 1236.0               |
| 4) Internal Hysteresis                                  | 50 - 70%        | 57.9                 |
| 6. Knee Impact Tests:                                   |                 |                      |
| a. Right Side                                           |                 |                      |
| 1) Probe Speed                                          | 6.76 - 7.04 fps | 6.91                 |
| 2) Maximum Force                                        | 1850 - 2500 lb  | 1896.0               |
| 3) Time 1000 lb                                         | 1.7 ms Minimum  | 1.77                 |
| b. Left Side                                            |                 |                      |
| 1) Probe Speed                                          | 6.76 - 7.04 fps | 6.91                 |
| 2) Maximum Force                                        | 1850 - 2500 lb  | 1978.0               |
| 3) Time 1000 lb                                         | 1.7 ms Minimum  | 1.86                 |