

**SAFETY COMPLIANCE TESTING FOR
FMVSS 124H
ACCELERATOR CONTROL SYSTEMS**

**FORD MOTOR CO.
2004 FORD FREESTAR, MPV
NHTSA NO. C40203**

**GENERAL TESTING LABORATORIES, INC.
1623 LEEDSTOWN ROAD
COLONIAL BEACH, VIRGINIA 22443**



MAY 10, 2004

FINAL REPORT

PREPARED FOR

**U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
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ROOM 6115 (NVS-220)
WASHINGTON, D.C. 20590**

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FINAL REPORT ACCEPTANCE BY OVSC:

Accepted By: W/LB
Acceptance Date: 5/13/04

1. Report No. 124H-GTL-04-002	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle Final Report of FMVSS 124 Compliance Testing of 2004 FORD FREESTAR, MPV NHTSA No. C40203		5. Report Date May 10, 2004
		6. Performing Organ. Code GTL
7. Author(s) Grant Farrand, Project Engineer Debbie Messick, Project Manager		8. Performing Organ. Rep# GTL-DOT-04-124-002
9. Performing Organization Name and Address General Testing Laboratories, Inc. 1623 Leedstown Road Colonial Beach, Va 22443		10. Work Unit No. (TRAIS)
		11. Contract or Grant No. DTNH22-01-C-11025
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Admin. Enforcement Office of Vehicle Safety Compliance (NVS-220) 400 7 th Street, S.W., Room 6115 Washington, DC 20590		13. Type of Report and Period Covered Final Test Report April 19, 2004
		14. Sponsoring Agency Code NSA-30
15. Supplementary Notes		
16. Abstract Compliance tests were conducted on the subject 2004 Ford Freestar MPV in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-124-06 for the determination of FMVSS 124 compliance. Test failures identified were as follows: NONE		
17. Key Words Compliance Testing Safety Engineering FMVSS 124		18. Distribution Statement Copies of this report are available from NHTSA NHTSA Technical Reference Div., Rm. 5108 (NAD-52) 400 7 th St., S.W. Washington, DC 20590 Telephone No. (202) 366-4946
19. Security Classif. (of this report) UNCLASSIFIED	21. No. of Pages 47	22. Price
20. Security Classif. (of this page) UNCLASSIFIED		

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SECTION 1 PURPOSE OF COMPLIANCE TEST

FMVSS 124 specifies requirements for the return of a vehicle's throttle to the idle position when the driver removes the actuating force from the accelerator control, or in the event of a severance or disconnection in the accelerator control system. The purpose of FMVSS 124 is to reduce deaths and injuries resulting from engine overspeed caused by malfunctions in the accelerator control system. This standard applies to passenger cars, multipurpose passenger vehicles (MPV's), trucks and buses.

SECTION 2 TEST PROCEDURES AND DISCUSSION OF RESULTS

Compliance testing was conducted on a 2004 Ford Freestar, MPV, NHTSA No. C40203 in accordance with the National Highway Traffic Safety Administration (NHTSA) Laboratory Procedure TP-124-06.

Output from the vehicle throttle position sensor on the air throttle plate shaft was used to measure throttle position and data was recorded at 1000 HZ with GTL's data acquisition system. Testing was conducted to simulate the normal removal of the driver's foot from the accelerator pedal. Testing was performed with the vehicle in park and the engine running. Return to idle times were determined for four throttle plate positions with the accelerator control system complete and with each of the two throttle return springs on the throttle plate shaft independently disconnected. The severed linkage test was also performed by disconnecting the throttle cable from the throttle body. As the air throttle plate was mechanically linked to the accelerator pedal, no electrical disconnections were required.

This testing was performed at high ambient temperature of 52° C (-5 +0) in accordance with the NHTSA Test Procedure TP-124-06.

**SECTION 3
COMPLIANCE TEST DATA**

Test data for this test can be found on the following pages. Photographs are found in Section 5 and Test Plots are found in Section 6.

DATA SHEET 1
VEHICLE DESCRIPTION

VEHICLE MY/MAKE/MODEL/BODY STYLE: 2004 FORD FREESTAR MPV
VEHICLE NHTSA NO.: C40203
VEHICLE VIN: 2FMZA50624BA08509
DATE OF TEST: APRIL 19, 2004
TEST LAB: GENERAL TESTING LABORATORIES
VEHICLE ENGINE TYPE: V8 GVWR: 2567 KG
VEHICLE ENGINE SIZE: 3.9 L
VEHICLE ACCEL. CONTROL SYSTEM (ACS) (Air or Fuel Throttled): AIR
MAX. BHP ENGINE SPEED: UNK
MFR. IDLE RPM: COMPUTER CONTROLLED (750)
FUEL METERING DEVICE (Carburetor, fuel injection, etc): FUEL INJECTION

REMARKS:

RECORDED BY: [Signature]

DATE: 04/19/04

APPROVED BY: [Signature]

DATA SHEET 2
NORMAL OPERATION TEST
 (fully operational system)

VEHICLE MY/MAKE/MODEL/BODY STYLE: 2004 FORD FREESTAR, MPV
 VEHICLE NHTSA NO.: C40203
 DATE OF TEST: APRIL 19, 2004

Check one:

Mid Temp. Test: Low Temp. Test: High Temp. Test: X

SYSTEM CONDITION: COMPLETE (no modifications) Normal Operation

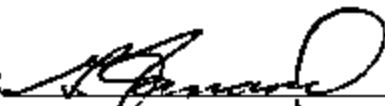
ACCELERATOR POSITION % WIDE OPEN THROTTLE (WOT)	THROTTLE POSITION SENSOR READING	RPM	TEMPERATURE (°F)		THROTTLE POSITION SENSOR READING @ IDLE (BASELINE)	RETURN TIME TO IDLE (Msec)	PASS/ FAIL
			ENGINE COOLANT	AMBIENT			
25%	25	4000	120	120.7	6.5%	14	P
50%	50	4000	140	120.8	6.5%	18	P
75%	75	4000	142	120.8	6.5%	38	P
100%	100	4150	144	120.8	6.5%	24	P

RETURN TIME REQUIREMENTS:

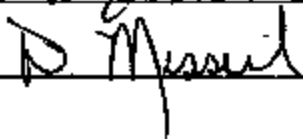
- 1 second (1000 ms) for vehicles less than 4536 kg.
- 2 seconds (2000 ms) for vehicles more than 4536 kg.
- 3 seconds (3000 ms) for vehicles exposed to -18° C or less

PASS X FAIL

REMARKS:

RECORDED BY: 

DATE: 04/19/04

APPROVED BY: 

DATA SHEET 3 (1 of 2)
FAIL-SAFE OPERATION DISCONNECTION

VEHICLE MY/MAKE/MODEL/BODY STYLE: 2004 FORD FREESTAR, MPV
 VEHICLE NHTSA NO.: C40203
 DATE OF TEST: APRIL 19, 2004

Check one:

Mld Temp. Test: Low Temp. Test: High Temp. Test: X

SYSTEM CONDITION: #1 SPRING DISCONNECTED

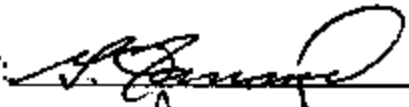
ACCELERATOR POSITION % WIDE OPEN THROTTLE (WOT)	THROTTLE POSITION SENSOR READING	RPM	TEMPERATURE (°F)		THROTTLE POSITION SENSOR READING @ IDLE (BASELINE)	RETURN TIME TO IDLE (Msec)	PASS/ FAIL
			ENGINE COOLANT	AMBIENT			
25%	25	4000	143.6	120.6	6.5%	19	P
50%	50	4000	144.3	120.0	6.5%	28	P
75%	75	4000	145.2	120.0	6.5%	32	P
100%	100	4180	146	120.0	6.5%	41	P

RETURN TIME REQUIREMENTS:

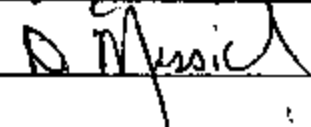
- 1 second (1000 ms) for vehicles less than 4536 kg.
- 2 seconds (2000 ms) for vehicles more than 4536 kg.
- 3 seconds (3000 ms) for vehicles exposed to -18° C or less

PASS X FAIL

REMARKS:

RECORDED BY: 

DATE: 04/19/04

APPROVED BY: 

DATA SHEET 3 (2 of 2)
FAIL-SAFE OPERATION DISCONNECTION

VEHICLE MY/MAKE/MODEL/BODY STYLE: 2004 FORD FREESTAR, MPV

VEHICLE NHTSA NO.: C40203

DATE OF TEST: APRIL 19, 2004

Check one:

Mid Temp. Test: Low Temp. Test: High Temp. Test: X

SYSTEM CONDITION: #2 SPRING DISCONNECTED

ACCELERATOR POSITION % WIDE OPEN THROTTLE (WOT)	THROTTLE POSITION SENSOR READING	RPM	TEMPERATURE (°F)		THROTTLE POSITION SENSOR READING @ IDLE (BASELINE)	RETURN TIME TO IDLE (Msec)	PASS/ FAIL
			ENGINE COOLANT	AMBIENT			
25%	25	4000	141.0	121.7	6.5%	17	P
50%	50	4000	141.4	121.6	6.5%	31	P
75%	75	4000	141.5	121.6	6.5%	36	P
100%	100	4150	141.5	121.6	6.5%	38	P

RETURN TIME REQUIREMENTS:

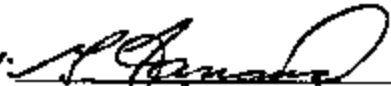
1 second (1000 ms) for vehicles less than 4536 kg.

2 seconds (2000 ms) for vehicles more than 4536 kg.

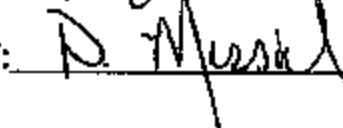
3 seconds (3000 ms) for vehicles exposed to -18° C or less

PASS X FAIL

REMARKS:

RECORDED BY: 

DATE: 04/19/04

APPROVED BY: 

**DATA SHEET 4
FAIL-SAFE OPERATION SEVERED**

VEHICLE MY/MAKE/MODEL/BODY STYLE: 2004 FORD FREESTAR MPV
 VEHICLE NHTSA NO.: C40203
 DATE OF TEST: APRIL 19, 2004

Check one:

Mid Temp. Test: Low Temp. Test: High Temp. Test: X

SYSTEM CONDITION: SEVERANCE

ACCELERATOR POSITION % WIDE OPEN THROTTLE (WOT)	THROTTLE POSITION SENSOR READING	RPM	TEMPERATURE (°F)		THROTTLE POSITION SENSOR READING @ IDLE (BASELINE)	RETURN TIME TO IDLE (Msec)	PASS/ FAIL
			ENGINE COOLANT	AMBIENT			
25%	25	4000	148.2	121.4	6.5%	7	P
50%	50	4000	148.5	121.4	6.5%	10	P
75%	75	4000	150.0	121.5	6.5%	14	P
100%	100	4150	150.6	121.4	6.5%	33	P

RETURN TIME REQUIREMENTS:

- 1 second (1000 ms) for vehicles less than 4536 kg.
- 2 seconds (2000 ms) for vehicles more than 4536 kg.
- 3 seconds (3000 ms) for vehicles exposed to -18° C or less

PASS X FAIL

REMARKS:

RECORDED BY: *J. Ferraro*

DATE: 04/19/04

APPROVED BY: *D. Musich*

SECTION 4
TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

EQUIPMENT	DESCRIPTION	MODEL/ SERIAL NO.	CAL. DATE	NEXT CAL. DATE
CONTINUOUS RECORDER	OMEGA	55662	03/04	03/05
ENGINE RECORDING	FLUKE	7471026	03/04	03/05
ENGINE RECORDING	MONARCH	1444664	0 /04	07/05
SOFTWARE	GTL	N/A	BEFORE USE	BEFORE USE
CHAMBER	GTL	N/A	N/A	N/A
EXHAUST DUCT	GTL	N/A	N/A	N/A

SECTION 5
PHOTOGRAPHS



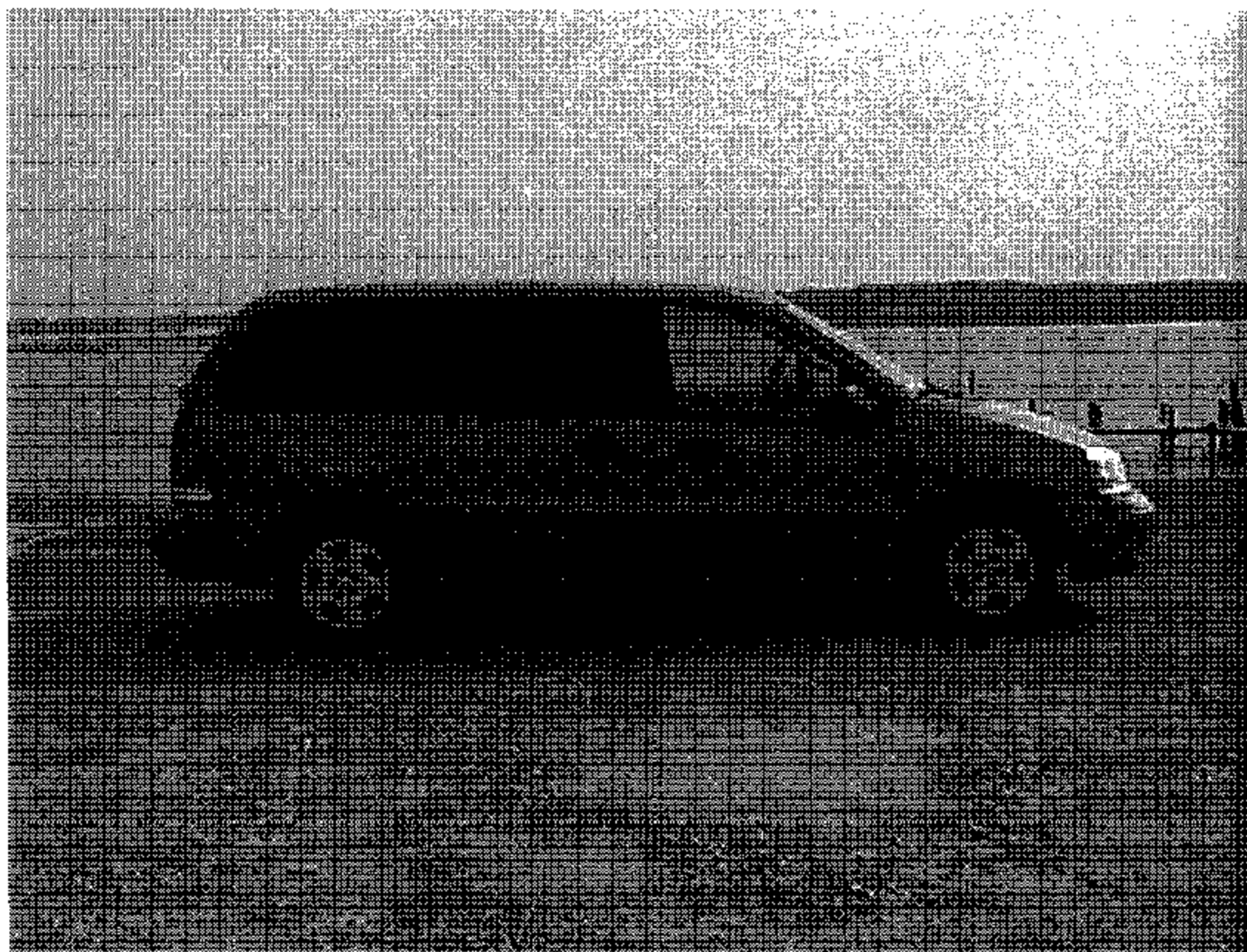
2004 FORD FREESTAR
NHTSA NO. C40203
FMVSS NO. 124H

FIGURE 5.1
FRONT VIEW OF VEHICLE



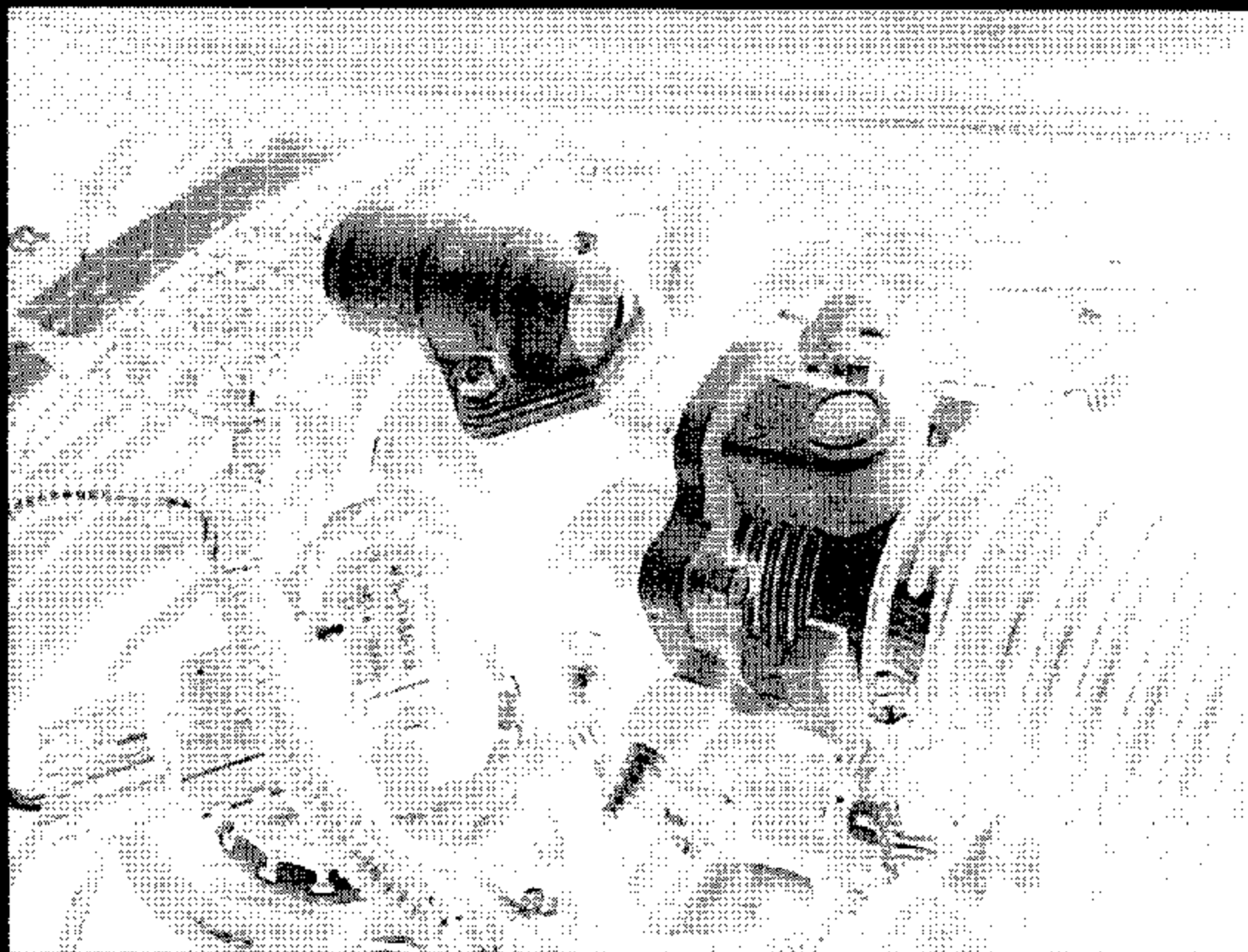
2004 FORD FREESTAR
NHTSA NO. C40203
FMVSS NO. 124H

FIGURE 5.2
LEFT SIDE VIEW OF VEHICLE



2004 FORD FREESTAR
NHTSA NO. C40203
FMVSS NO. 124H

FIGURE 5.3
RIGHT SIDE VIEW OF VEHICLE



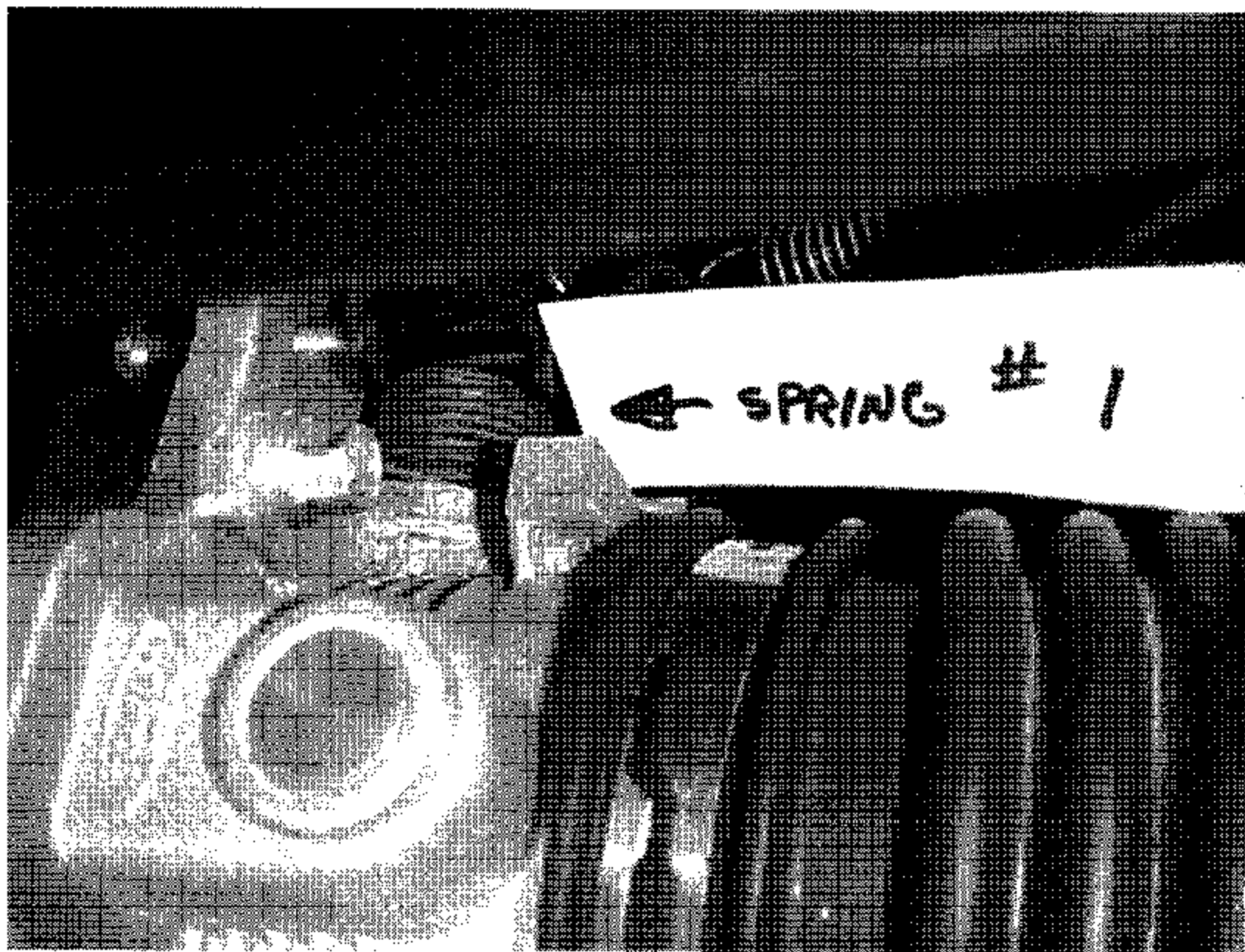
2004 FORD FREESTAR
NHTSA NO. C40203
FMVSS NO. 124H

FIGURE 5.5
VIEW OF THROTTLE BODY



2004 FORD FREESTAR
NHTSA NO. C40203
FMVSS NO. 124H

FIGURE 5.8
THROTTLE POSITION SENSOR



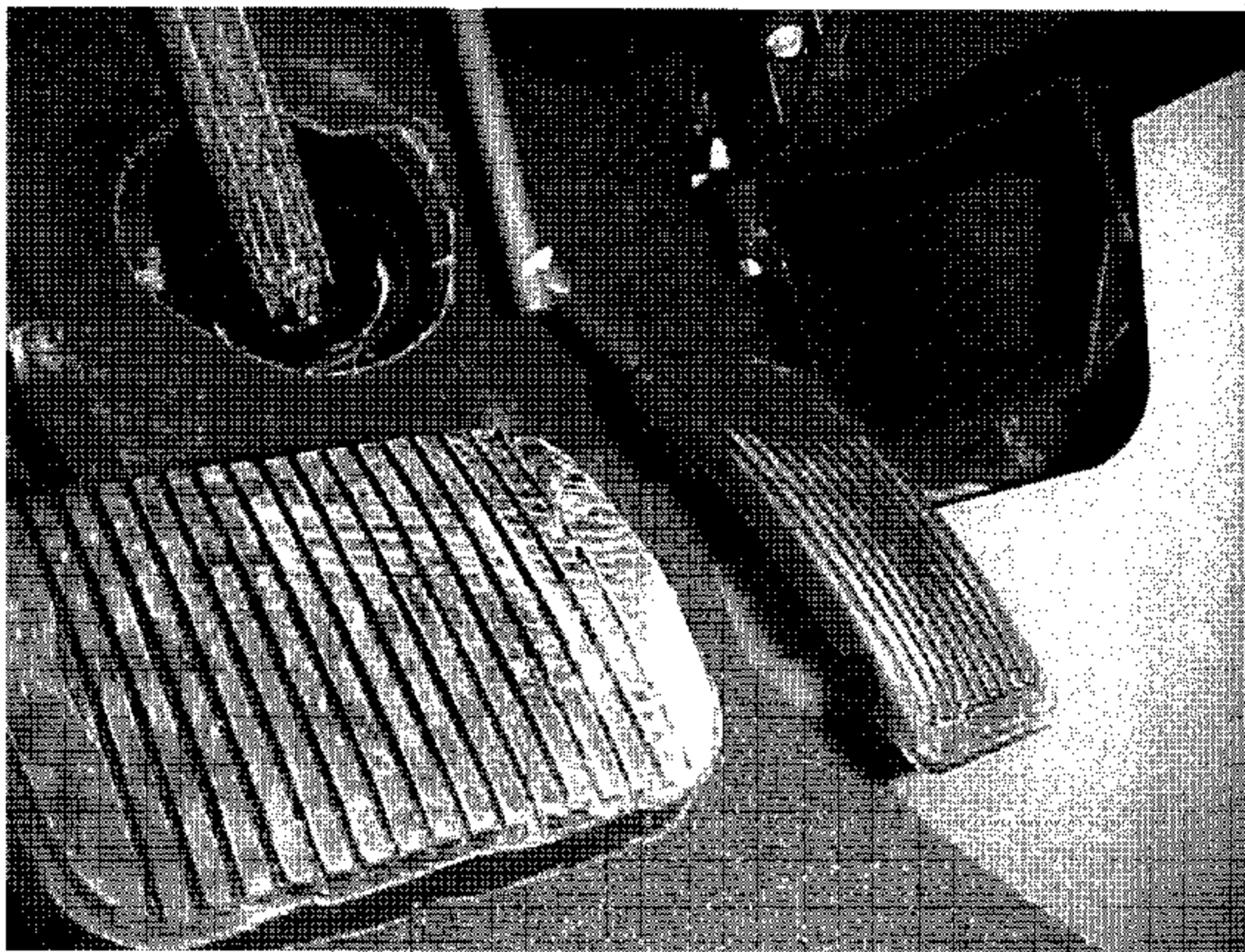
2004 FORD FREESTAR
NHTSA NO. C40203
FMVSS NO. 124H

FIGURE 5.7
THROTTLE RETURN SPRING #1



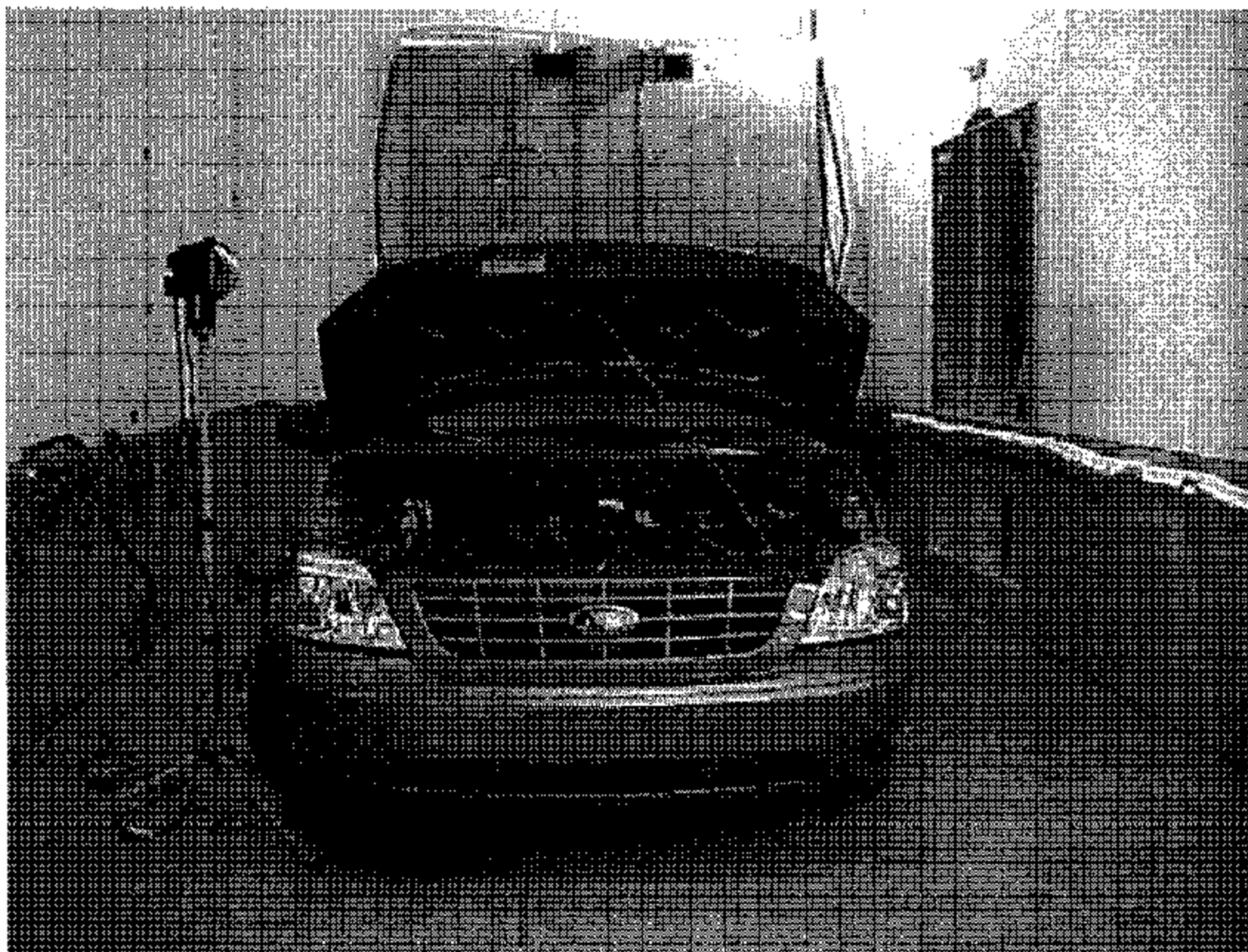
2004 FORD FREESTAR
NHTSA NO. C40203
FMVSS NO. 124H

FIGURE 5.8
THROTTLE RETURN SPRING #2



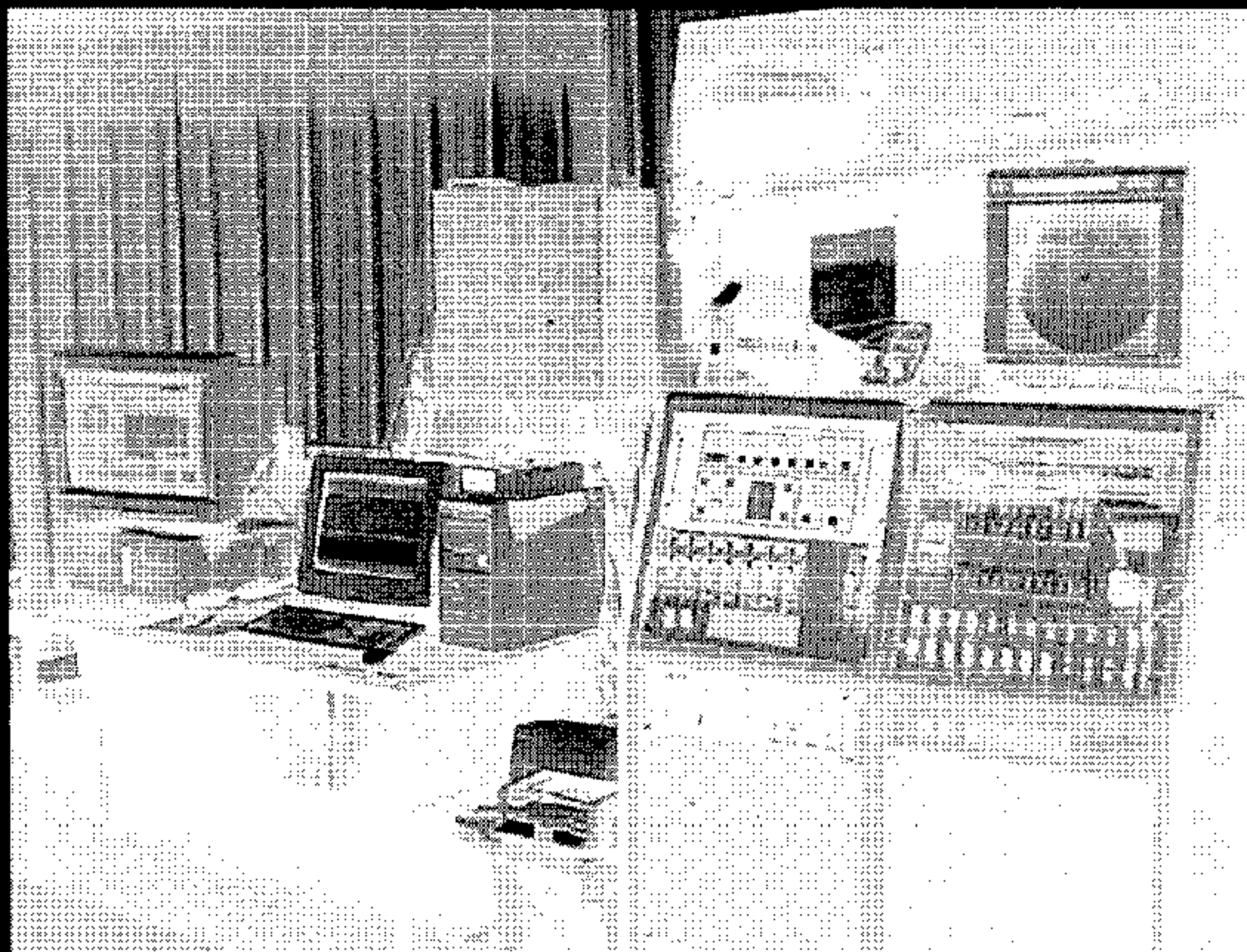
2004 FORD FREESTAR
NHTSA NO. C40203
FMVSS NO. 124H

FIGURE 5.9
ACCELERATOR PEDAL



2004 FORD FREESTAR
NHTSA NO. C40203
FMVSS NO. 124H

FIGURE 5.10
VEHICLE IN TEST CHAMBER



2004 FORD FREESTAR
NHTSA NO. C40203
FMVSS NO. 124H

FIGURE 5.11
124 TEST INSTRUMENTATION SET-UP

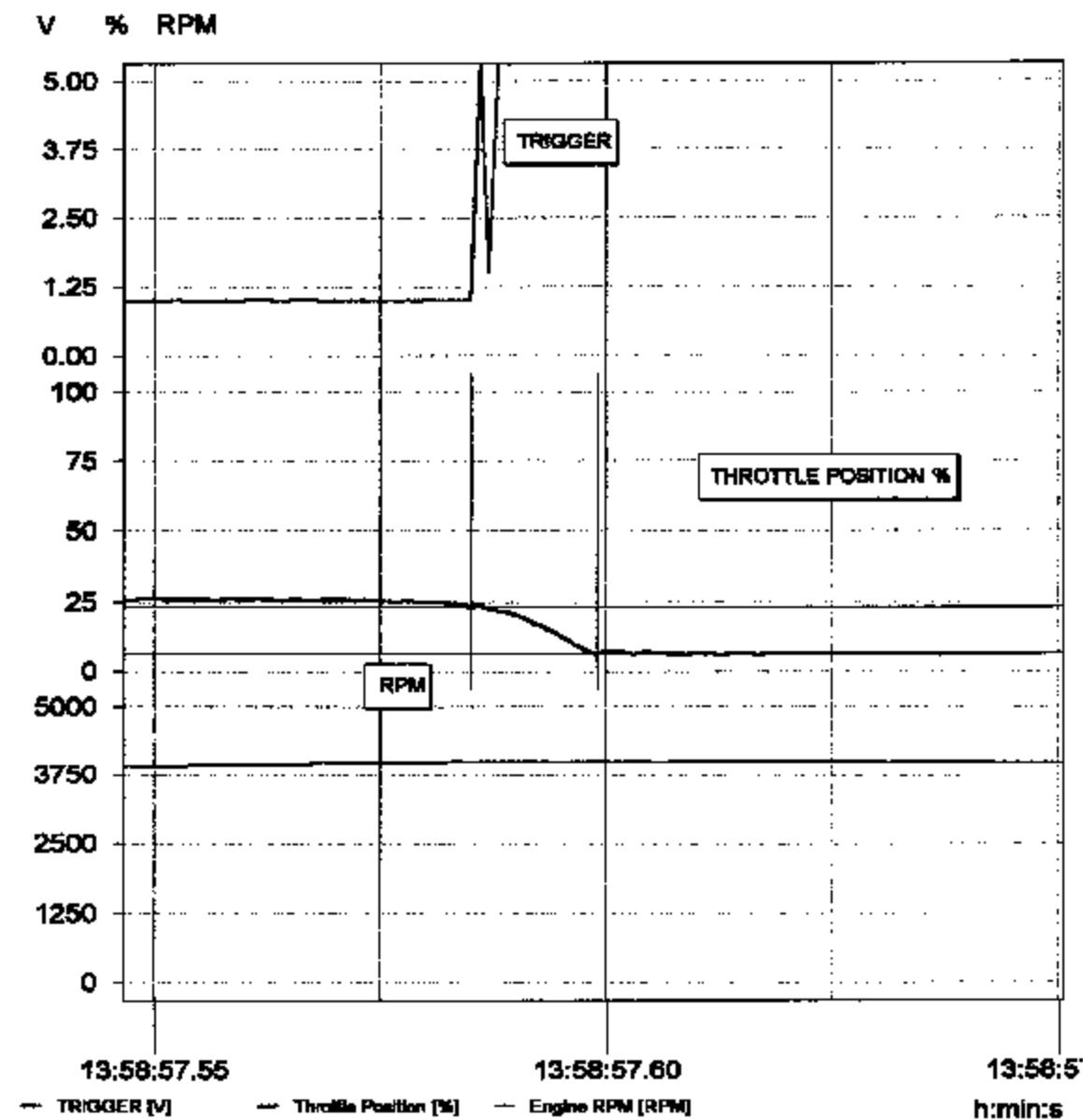
SECTION 6 PLOTS

FMVSS 124 THROTTLE RETURN TEST

124 HOT/NORMAL/ 25% WOT

2:51:44 PM 4/19/04

NHTSA C40203 FORD FREESTAR



Channel: Throttle Position

Y1: 23.210 %
t1: -44415.000 ms
dt: 0.014 s

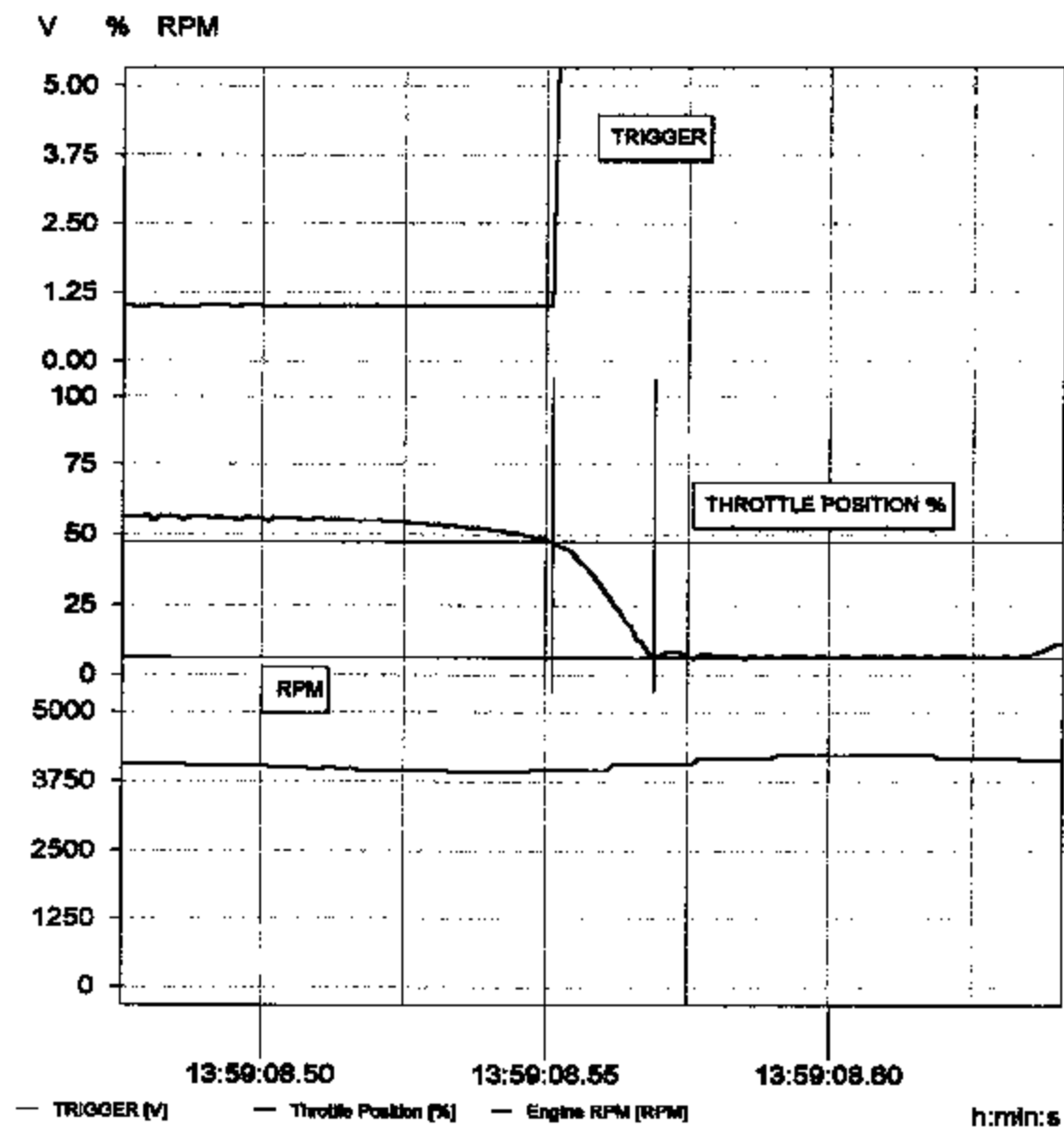
Y2: 6.429 %
t2: -44401.000 ms
f: 71.429 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/NORMAL/ 50% WOT

2:31:08 PM 4/19/04

NHTSA C40203 FORD FREESTAR



Channel: Throttle Position

Y1: 47.250 %
t1: -33449.000 ms
d1: 0.018 s

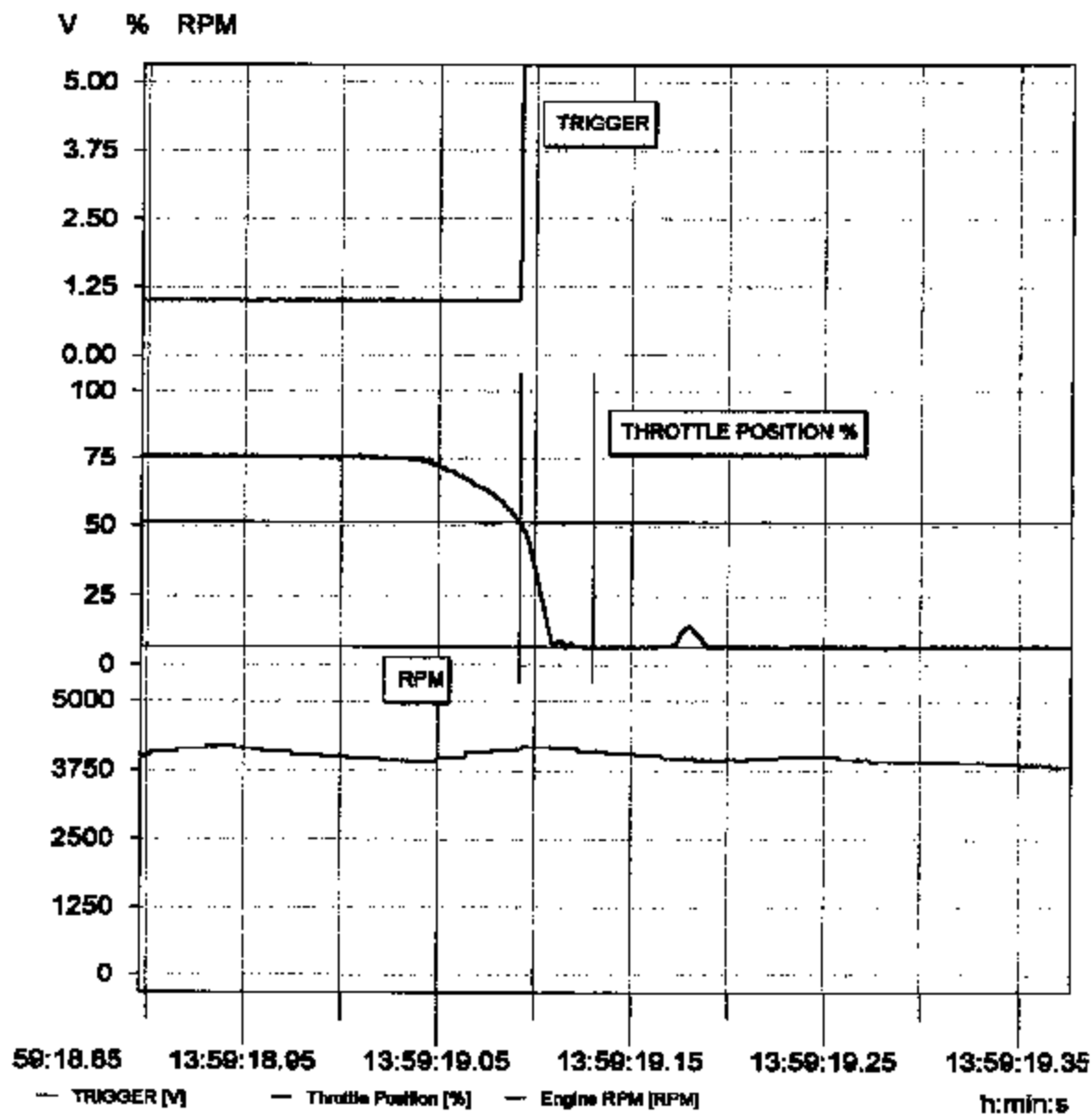
Y2: 5.884 %
t2: -33431.000 ms
f: 55.658 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/NORMAL/ 75% WOT

2:57:18 PM 4/19/04

NHTSA C40203 FORD FREESTAR



Channel: Throttle Position

Y1: 51.276 %
t1: -22908.000 ms
dt: 0.036 s

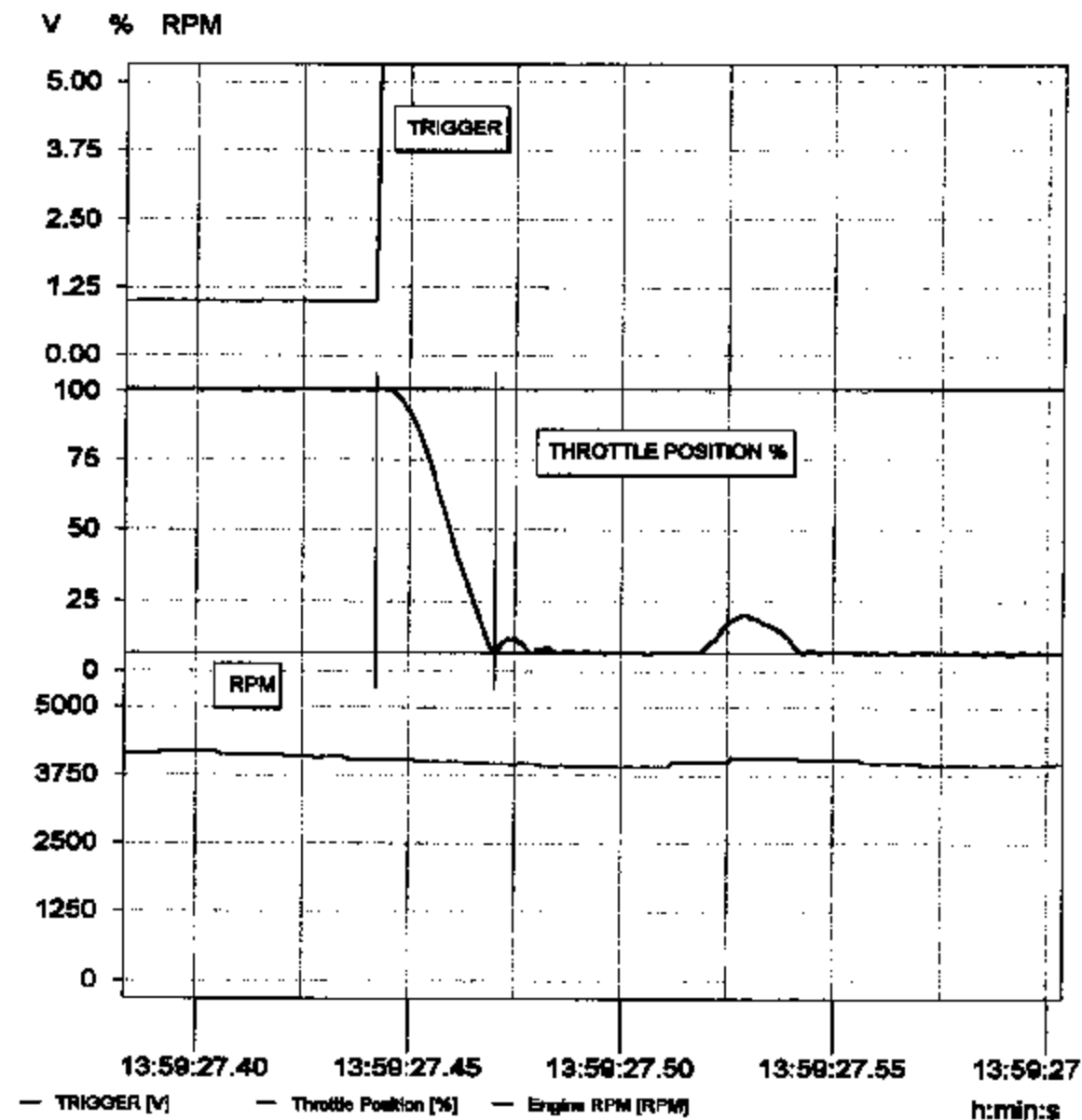
Y2: 6.602 %
t2: -22870.000 ms
f: 26.316 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/NORMAL/ 100% WOT

3:00:48 PM 4/19/04

NHTSA C40203 FORD FREESTAR



Channel: Throttle Position

Y1: 100.704 %
t1: -14558.000 ms
dt: 0.028 s

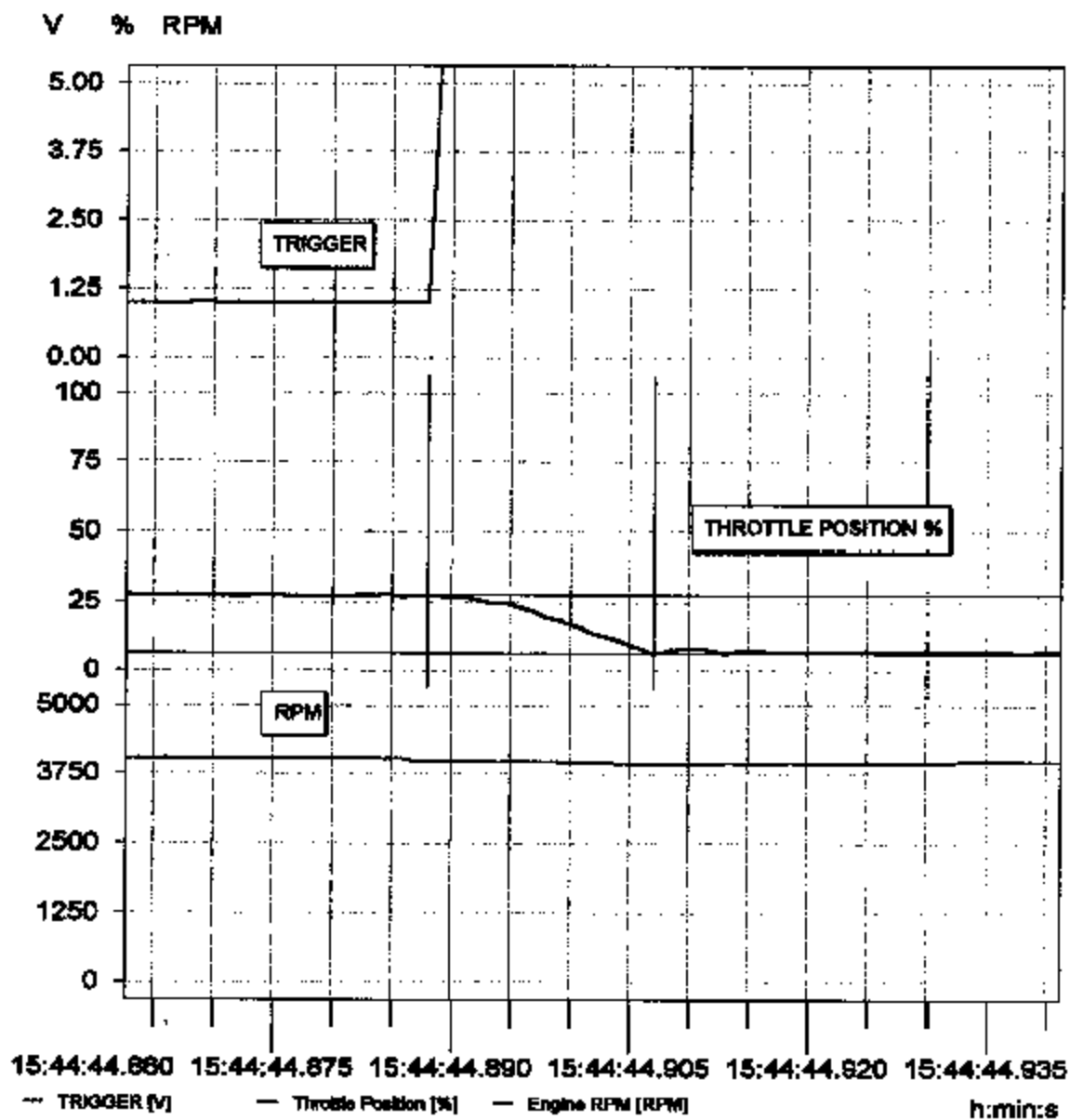
Y2: 0.368 %
t2: -14530.000 ms
f: 35.714 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/ SPRING 1/ 25% WOT

3:50:20 PM 4/19/04

NHTSA C40203 FORD FREESTAR



Channel: Throttle Position

Y1: 27.551 %
t1: -34322.148 ms
d1: 0.019 s

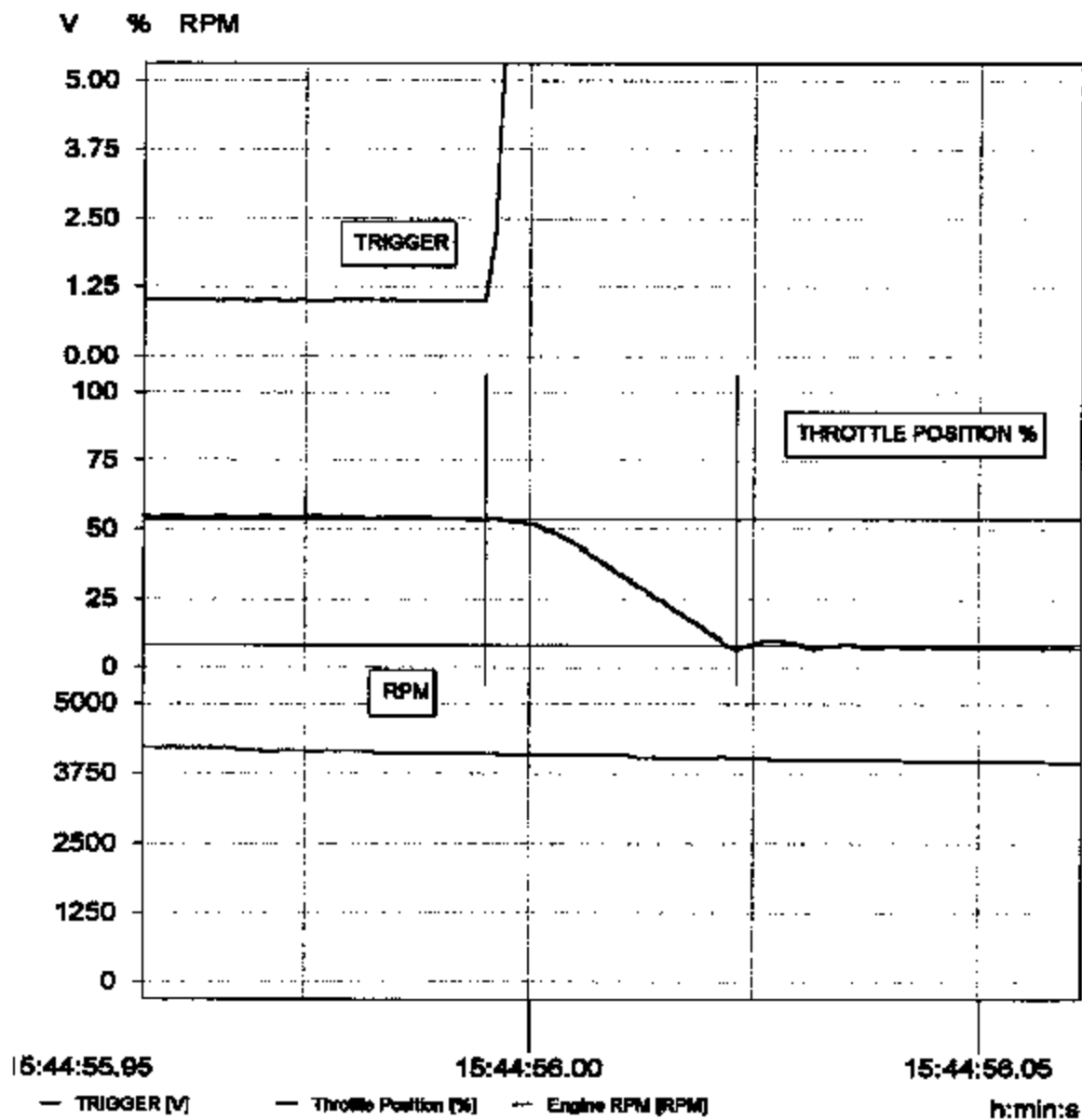
Y2: 5.155 %
t2: -34303.148 ms
f: 52.632 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/ SPRING 1/ 50% WOT

3:56:02 PM 4/19/04

NHTSA C40203 FORD FREESTAR



Channel: Throttle Position

Y1: 53.486 %
t1: -23215.146 ms
dt: 0.028 s

Y2: 7.871 %
t2: -23157.146 ms
f: 35.714 Hz

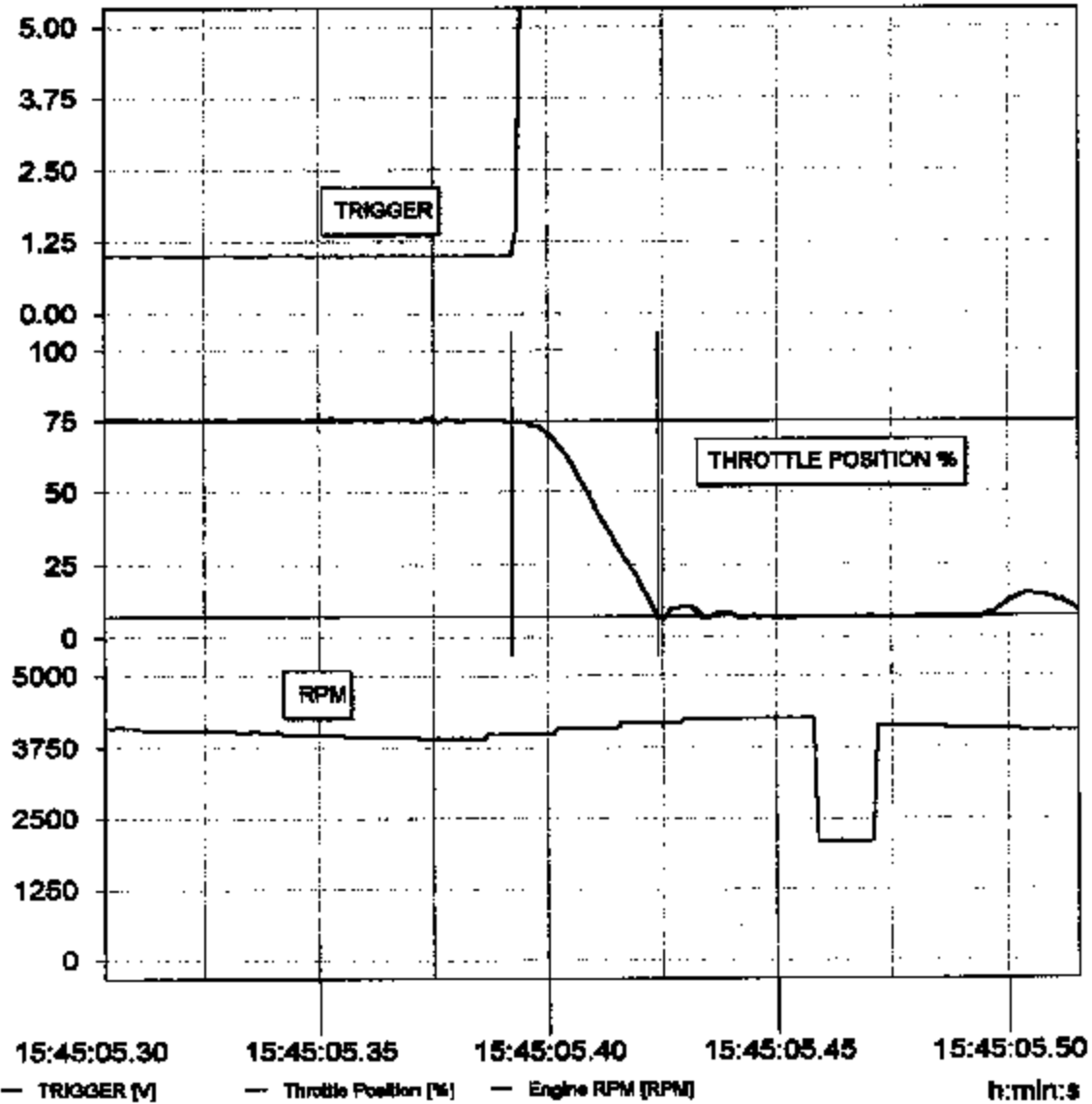
FMVSS 124 THROTTLE RETURN TEST

124 HOT/ SPRING 1/ 75% WOT

4:01:27 PM 4/19/04

NHTSA C40203 FORD FREESTAR

V % RPM



Channel: Throttle Position

Y1: 74.801 %
t1: -13818.146 ms
d1: 0.032 s

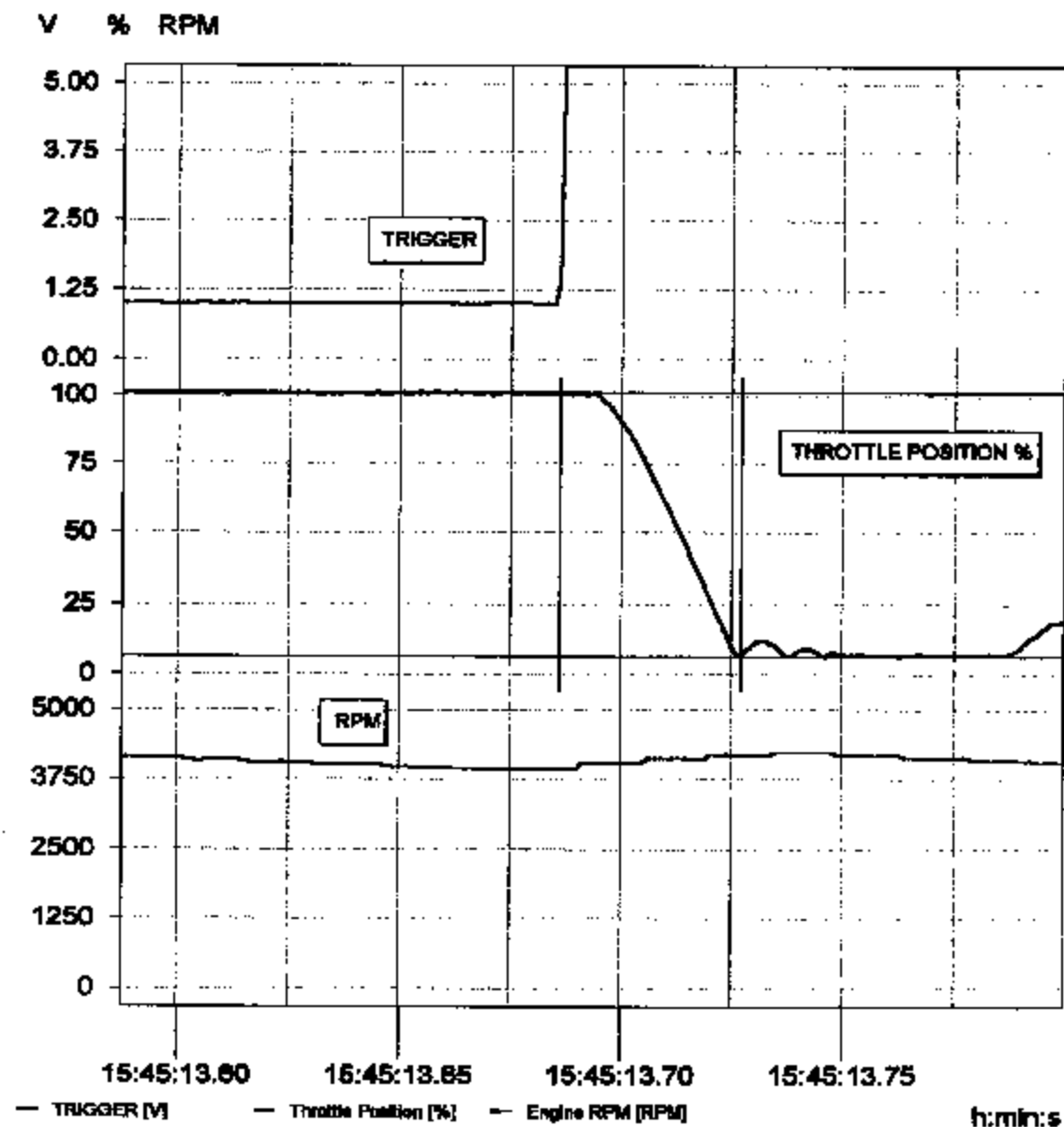
Y2: 7.138 %
t2: -13788.146 ms
f: 31.250 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/ SPRING 1/ 100% WOT

4:06:25 PM 4/19/04

NHTSA C40203 FORD FREESTAR



Channel: Throttle Position

Y1: 101.060 %
t1: -5524.146 ms
dt: 0.041 s

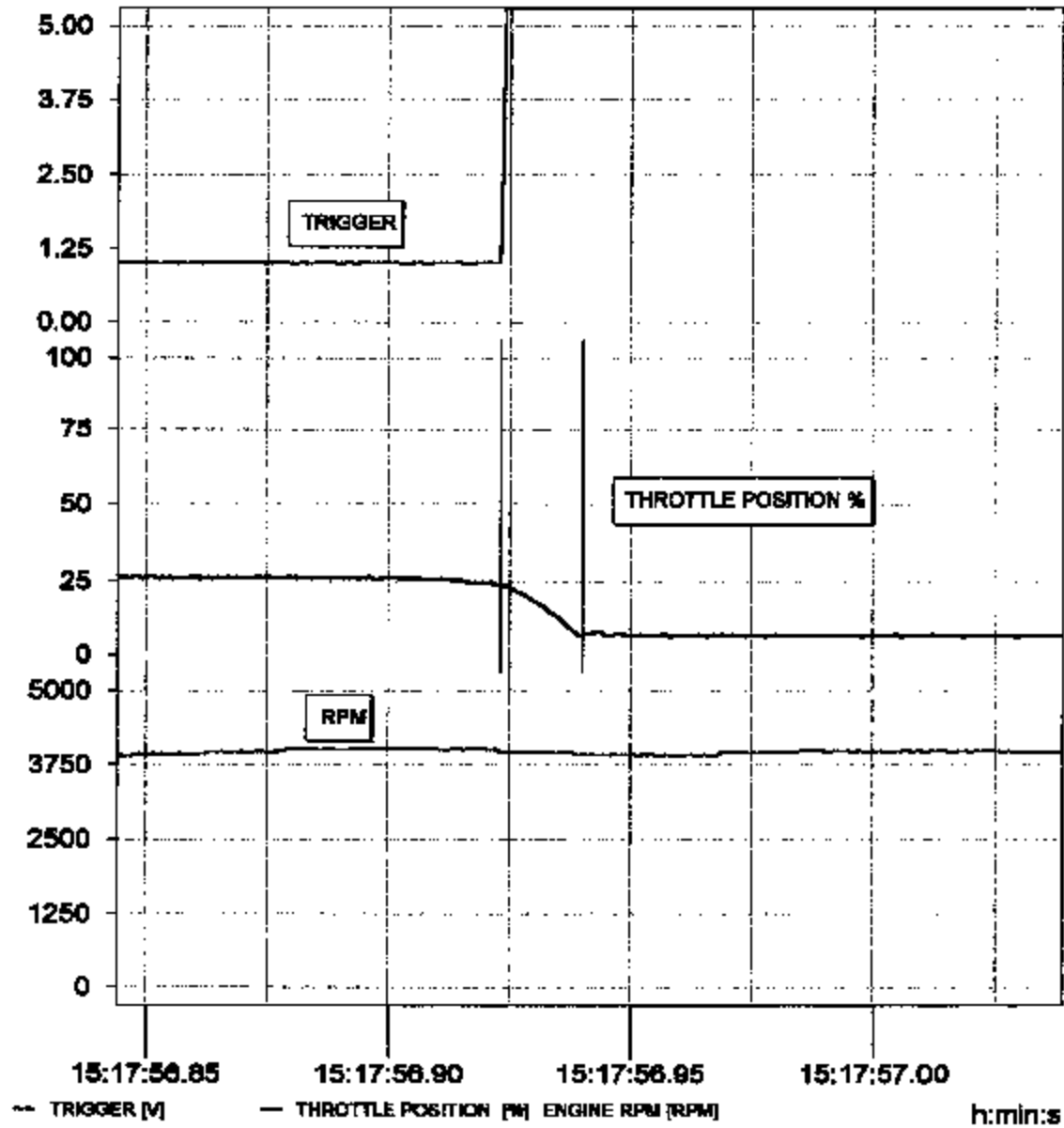
Y2: 6.132 %
t2: -5483.146 ms
f: 24.390 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT / SPRING 2 / 25% WOT

5:14:31 PM 4/20/04

NHT8A C40203 FORD FREESTAR



Channel: THROTTLE POSITION

Y1: 23.623 %
t1: -53077.000 ms
dt: 0.017 s

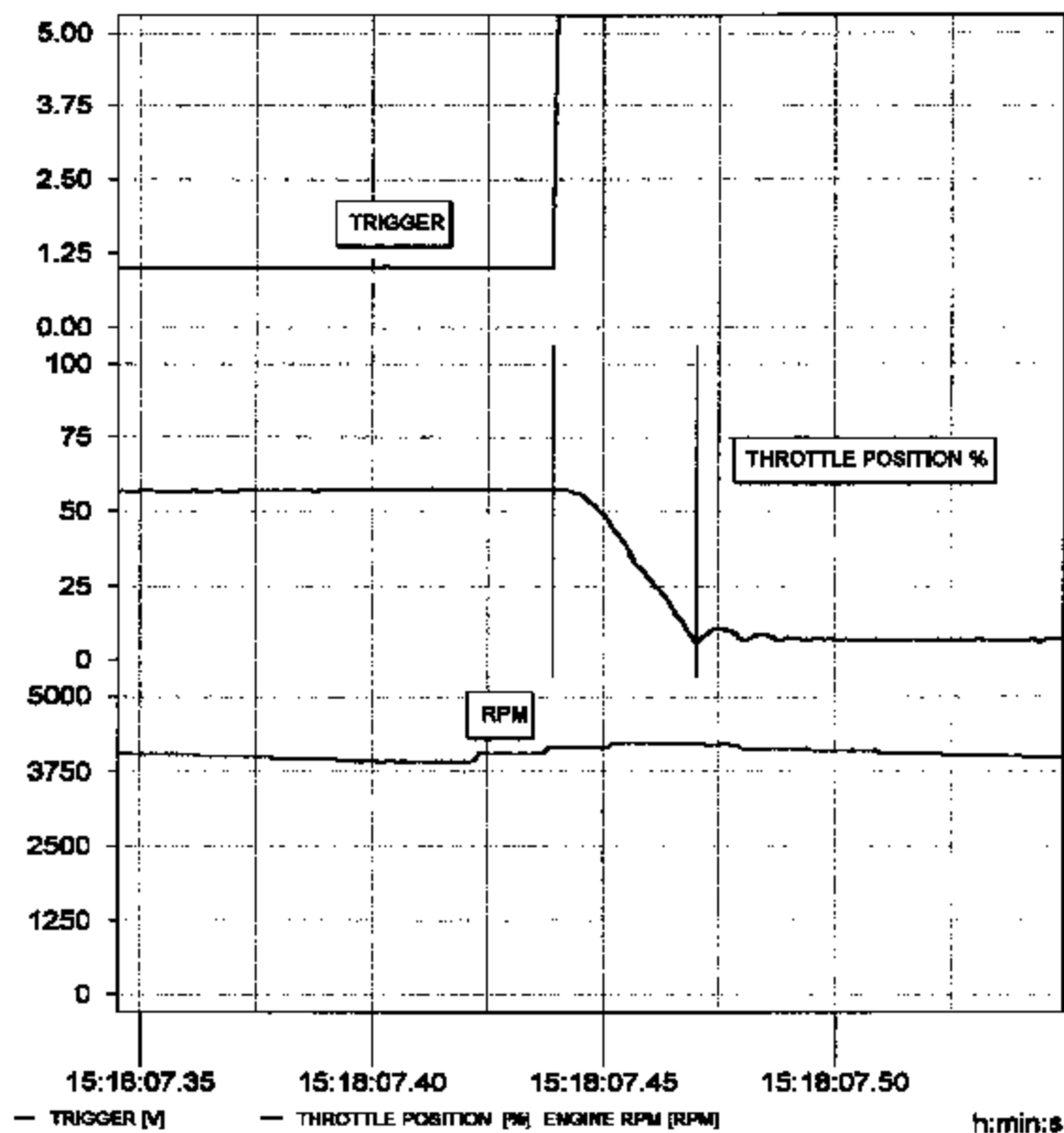
Y2: 6.811 %
t2: -55060.000 ms
f: 58.824 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT / SPRING 2 / 50% WOT

5:43:06 PM 4/20/04

NHTSA C40203 FORD FREESTAR



Channel: THROTTLE POSITION

Y1: 57.121 %
t1: -44561.000 ms
d1: 0.031 s

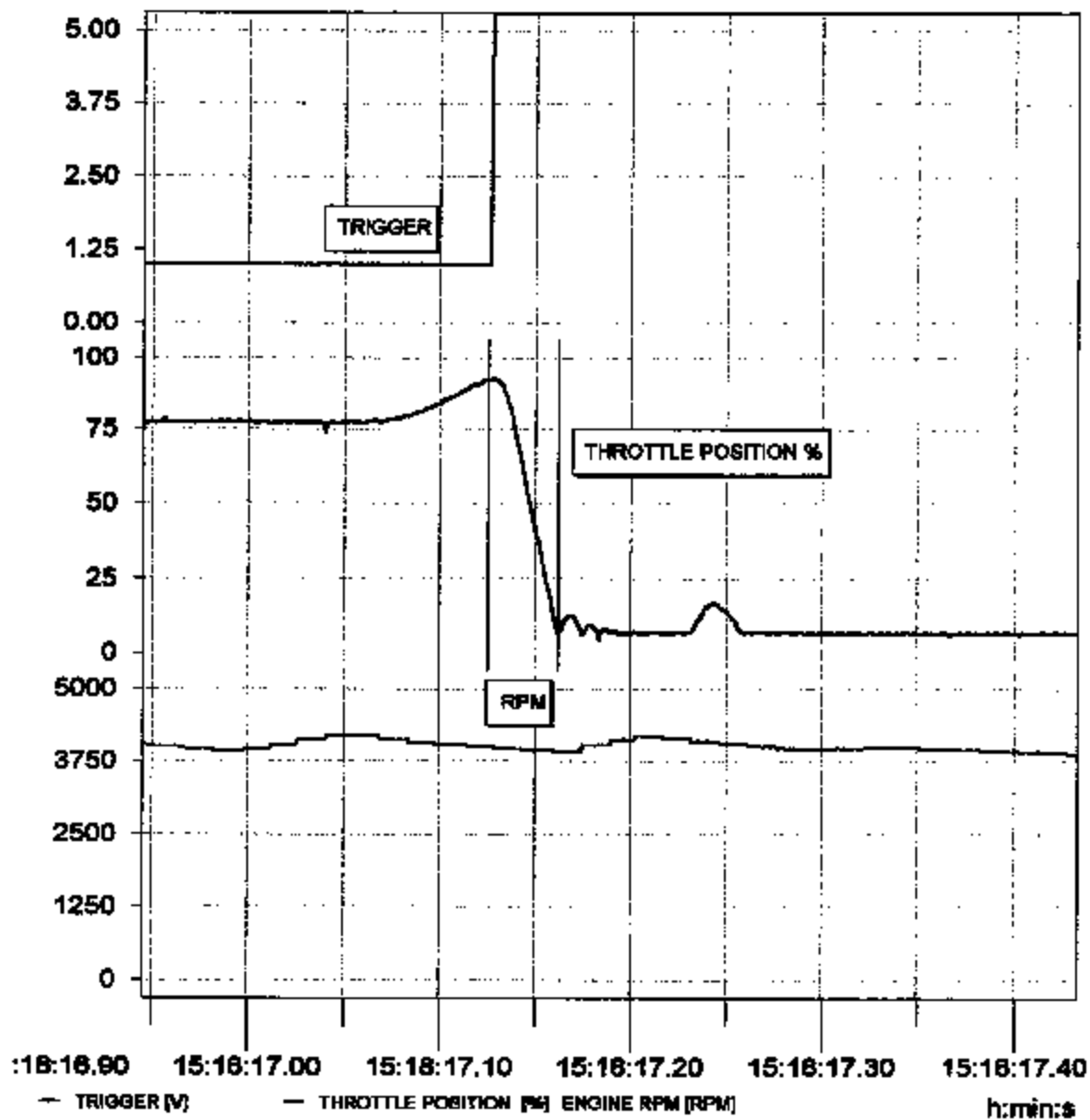
Y2: 6.787 %
t2: -44530.000 ms
f: 32.258 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT / SPRING 2 / 75% WOT

5:48:48 PM 4/20/04

NHTSA C40203 FORD FREESTAR



Channel:THROTTLE POSITION

Y1: 92.453 %
t1: -34875.000 ms
dt: 0.037 s

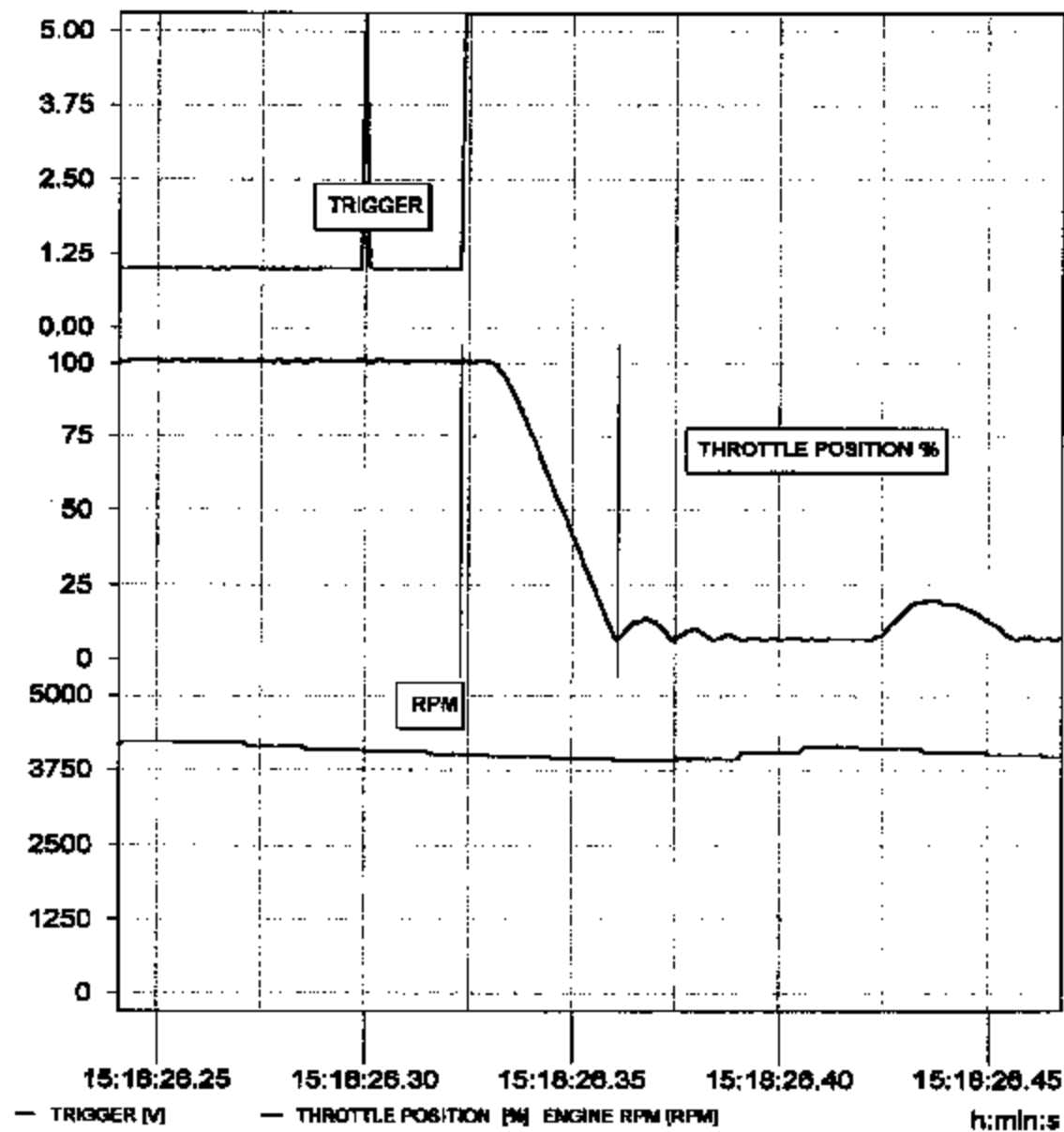
Y2: 6.485 %
t2: -34838.000 ms
f: 27.027 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT / SPRING 2 / 100% WOT

5:50:13 PM 4/20/04

NHTSA C40203 FORD FREESTAR



Channel: THROTTLE POSITION

Y1: 100.582 %
t1: -25677.000 ms
dt: 0.038 s

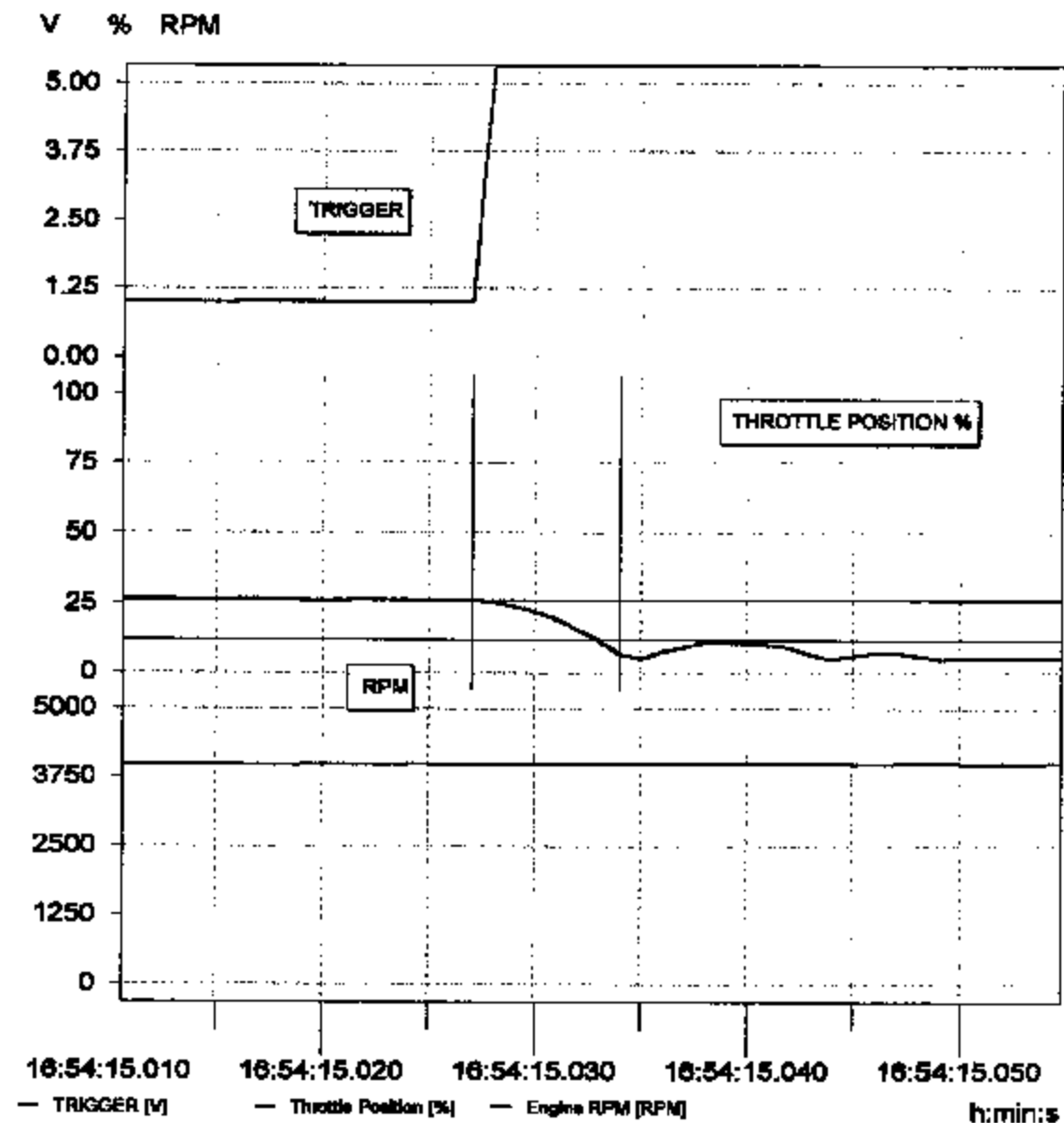
Y2: 8.590 %
t2: -25639.000 ms
f: 26.318 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/ SEVERANCE/ 25% WOT

5:15:07 PM 4/19/04

NHTSA C40203 FORD FREESTAR



Channel: Throttle Position

Y1: 26.181 %
t1: -44197.390 ms
dt: 0.007 s

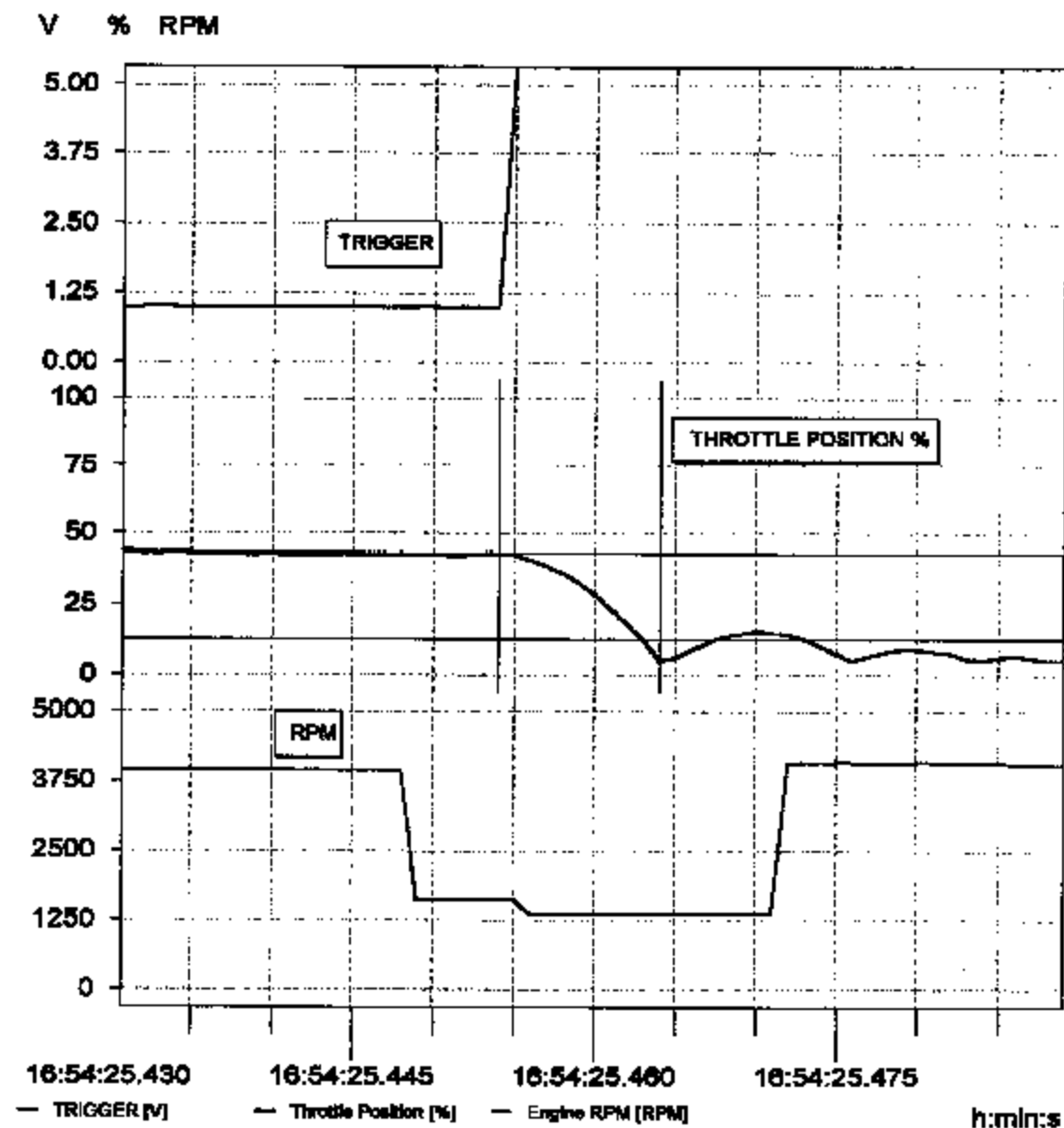
Y2: 11.875 %
t2: -44190.390 ms
f: 142.857 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/ SEVERANCE/ 50% WOT

5:18:40 PM 4/19/04

NHTSA C40203 FORD FREESTAR



Channel: Throttle Position

Y1: 43.082 %
t1: -33770.360 ms
dc: 0.010 s

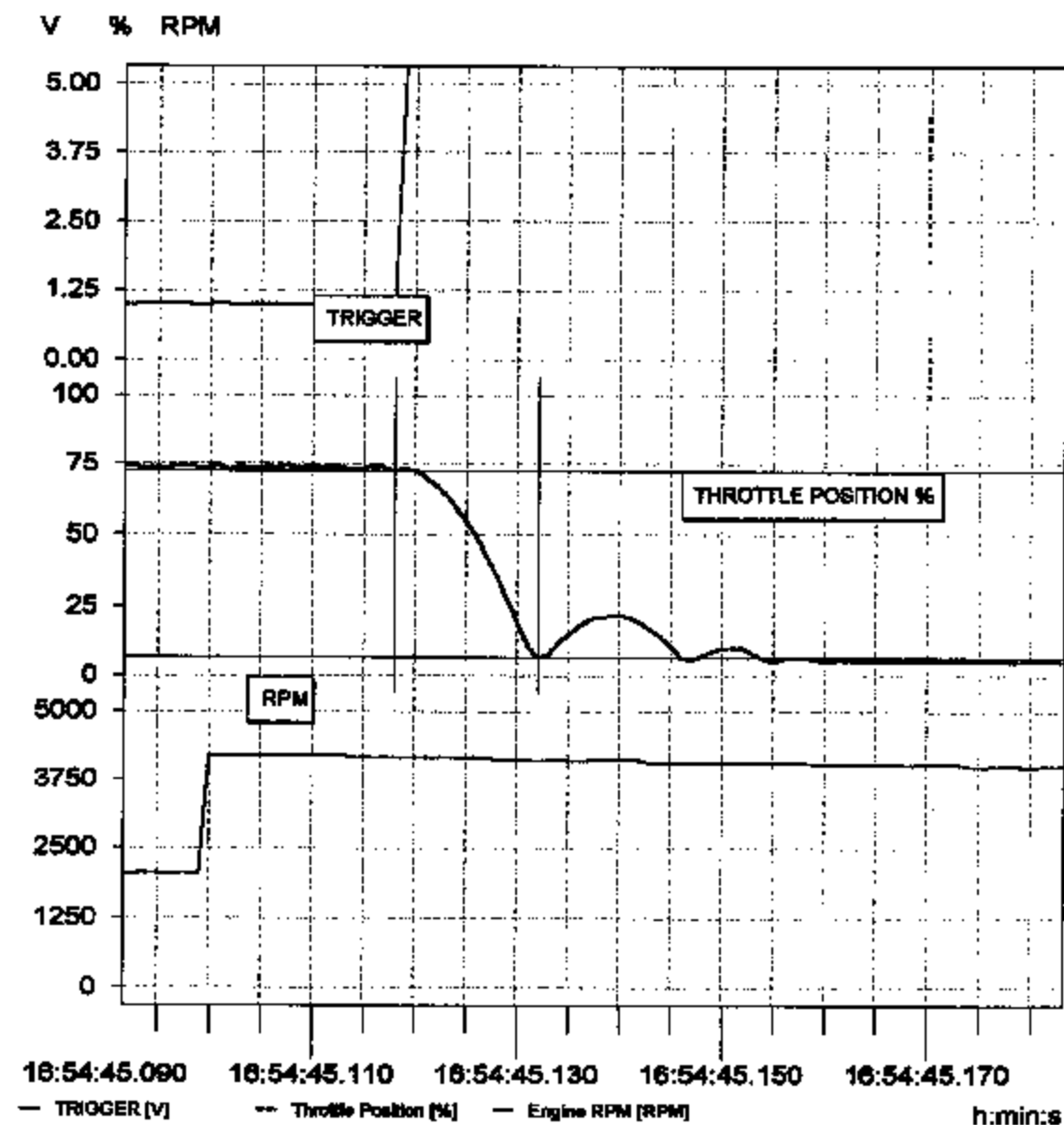
Y2: 12.689 %
t2: -33780.360 ms
f: 100.000 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/ SEVERANCE/ 75% WOT

5:22:11 PM 4/19/04

NHTSA C40203 FORD FREESTAR



Channel: Throttle Position

Y1: 72.287 %
t1: -14108.360 ms
dc: 0.014 s

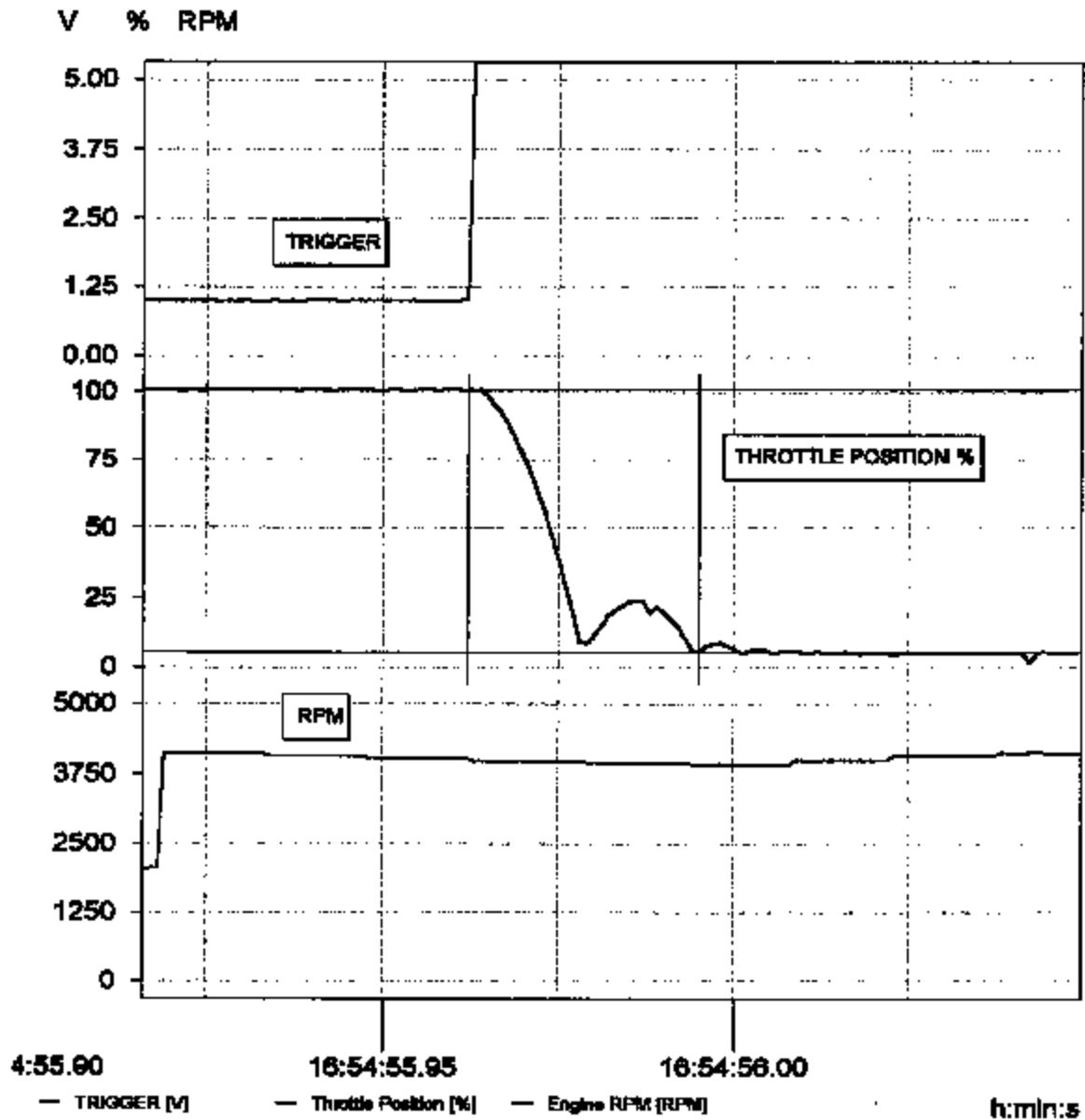
Y2: 6.722 %
t2: -14092.360 ms
f: 71.428 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/ SEVERANCE/ 100% WOT

5:25:29 PM 4/19/04

NHTSA C40203 FORD FREESTAR



Channel: Throttle Position

Y1: 100.805 %
t1: -3262.360 ms
dt: 0.033 s

Y2: 5.429 %
t2: -3229.360 ms
f: 30.303 Hz

SECTION 7
MANUFACTURER'S DRAWINGS

VEHICLE INFORMATION/TEST SPECIFICATIONS
FMVSS 124 - Accelerator Control Systems
2004 Ford Freestar

Requested Information:

1.) A sketch of the driver operated accelerator control system (ACS) starting from the accelerator pedal up to and including the fuel metering device (carburetor, fuel injectors, fuel distributor, or fuel injection pump).

The sketch is attached. The ACS is a mechanical system.

2.) For Normal ACS operation, the method utilized to determine the engine idle state (air throttle plate position, fuel delivery rate, other).

Throttle plate position.

3.) For Fail-Safe operation of the ACS (disconnection or severance), the method utilized to determine return of engine power to the idle state (air throttle plate position, fuel delivery rate, air intake, engine rpm, other)

Throttle plate position is monitored during testing to determine if the throttle plate has returned to idle.

4.) Is the vehicle ACS equipped with any of the following:

- A. Accelerator Pedal Position Sensor (APS)
- B. Throttle Plate Position Sensor (TPS)
- C. Electronic Control Module (ECM)
- D. Air throttle plate actuator motor

It is equipped with a TPS.

5.) If air throttle plate equipped, is there a procedure which can be utilized by the test laboratory to measure the position of the throttle plate by tapping into the TPS or ECM? If so, please describe.

Yes, the certification laboratory taps into the TPS signal. The output of the TPS is sent to a Gould chart recorder data acquisition system through appropriate signal conditioning, which records all throttle movement.

6.) Point(s) chosen to demonstrate compliance with FMVSS 124 for single point disconnect and severance.

The accelerator cable is removed during a portion of certification testing to simulate the end slug pulling off the core wire.

VEHICLE INFORMATION/TEST SPECIFICATIONS
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7.) Where applicable, were connections in the ACS beyond the ECM such as the fuel injectors tested for disconnection and severance. If yes, provide details.

No.

8.) Where applicable, were idle return times tested for electrical severance accompanied by shorting to ground? If yes, please provide details.

No.

9.) All sources of return energy (springs) for the accelerator pedal and if applicable, the air throttle plate.

The ACS has a torsion spring mounted on the throttle body and a secondary extension spring positioned between the throttle cam and accelerator bracket. During testing, only the torsion spring is initially disconnected and the system tested. Following that, only the extension spring is disconnected and the test repeated.

10.) If fuel delivery rate is used to demonstrate return to idle state, provide:

- A. The method used to measure this signal i.e. connection to standard SAE J1587 data bus.
- B. Equipment required to measure signal.
- C. Fuel rate signal output range at the idle state.

Not applicable.

11.) Is the ACS equipped with a limp home mode? If yes, provide operation description.

No.

