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HS#
637143

REPORT NUMBER 124L-GTL-04-003

SAFETY COMPLIANCE TESTING FOR FMVSS 124L 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 14, 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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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		
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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 to be performed at low ambient temperature of -40° C (-0 +5° C) in accordance with the NHTSA Test Procedure TP-124-06 however, due to the inability of prior test vehicles to start at this extreme temperature the test was performed at -13° C (-25° F).

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: MAY 5, 2004
TEST LAB: GENERAL TESTING LABORATORIES
VEHICLE ENGINE TYPE: V6 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: 05/05/04

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: MAY 5, 2004

Check one:

Mid Temp. Test:___ Low Temp. Test:__X___ High Temp. Test:_____

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	-25	-25	6%	73	P
50%	50	4000	-25	-25	6%	232	P
75%	75	4000	-25	-25	6%	314	P
100%	100	4000	-22	-25	6%	304	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: 05/05/04

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: MAY 5, 2004

Check one:

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

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		114	-22	6%	30	P
50%	50		114	-22	6%	40	P
75%	75		114	-22	6%	34	P
100%	100		114	-22	6%	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: 05/05/04

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: MAY 5, 2004

Check one:

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

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	113	-21	6%	34	P
50%	50	4000	112	-21	6%	34	P
75%	75	4000	112	-21	6%	34	P
100%	100	4000	112	-21	6%	42	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: 05/05/04

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: MAY 5, 2004

Check one:

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

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		80	-24	6%	24	P
50%	50		116	-24	6%	24	P
75%	75		117	-24	6%	25	P
100%	100		117	-24	6%	31	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: 05/05/04

APPROVED BY: _____

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	01/04	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. 124L

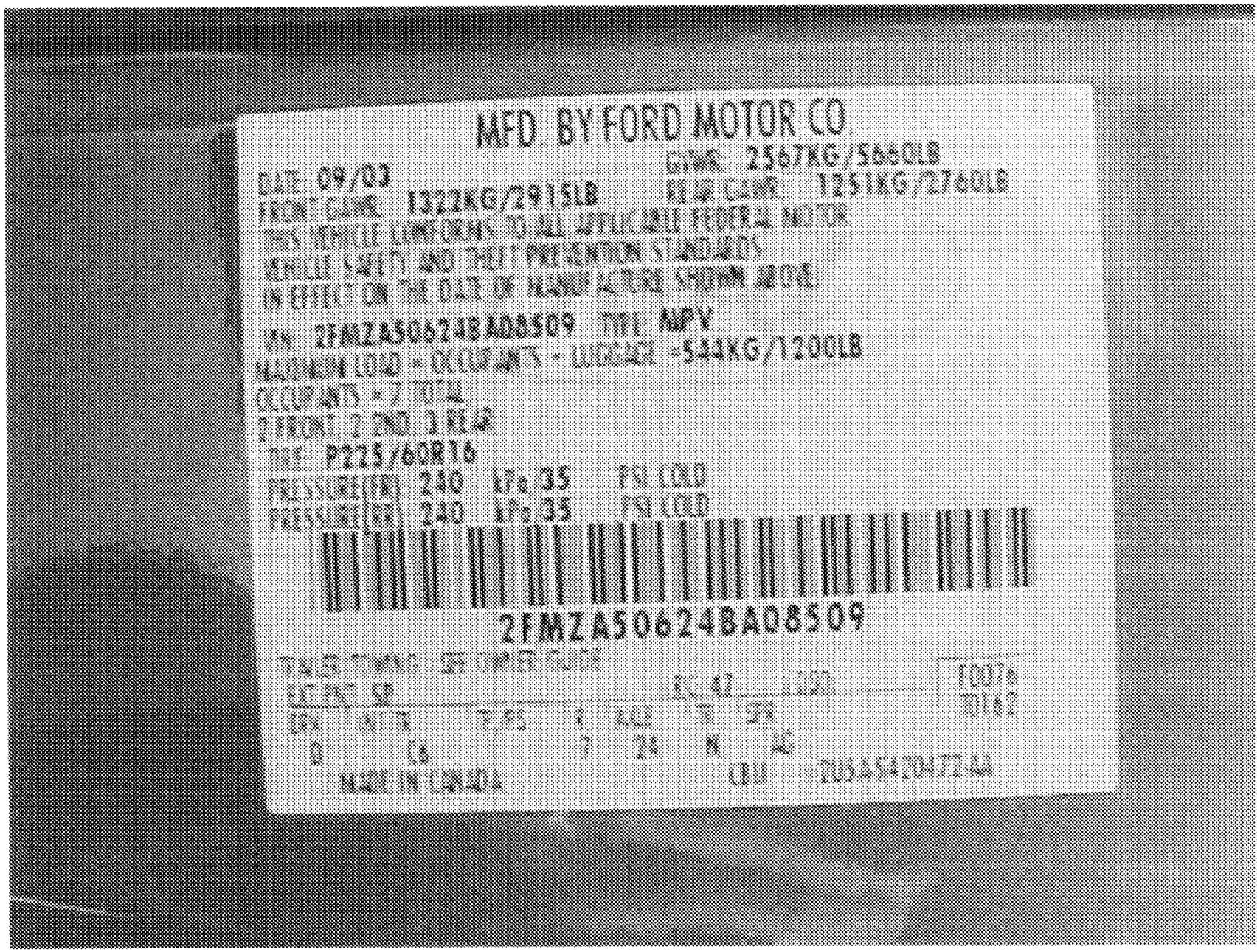
FIGURE 5.1
FRONT VIEW OF VEHICLE

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

FIGURE 5.2
LEFT SIDE VIEW OF VEHICLE

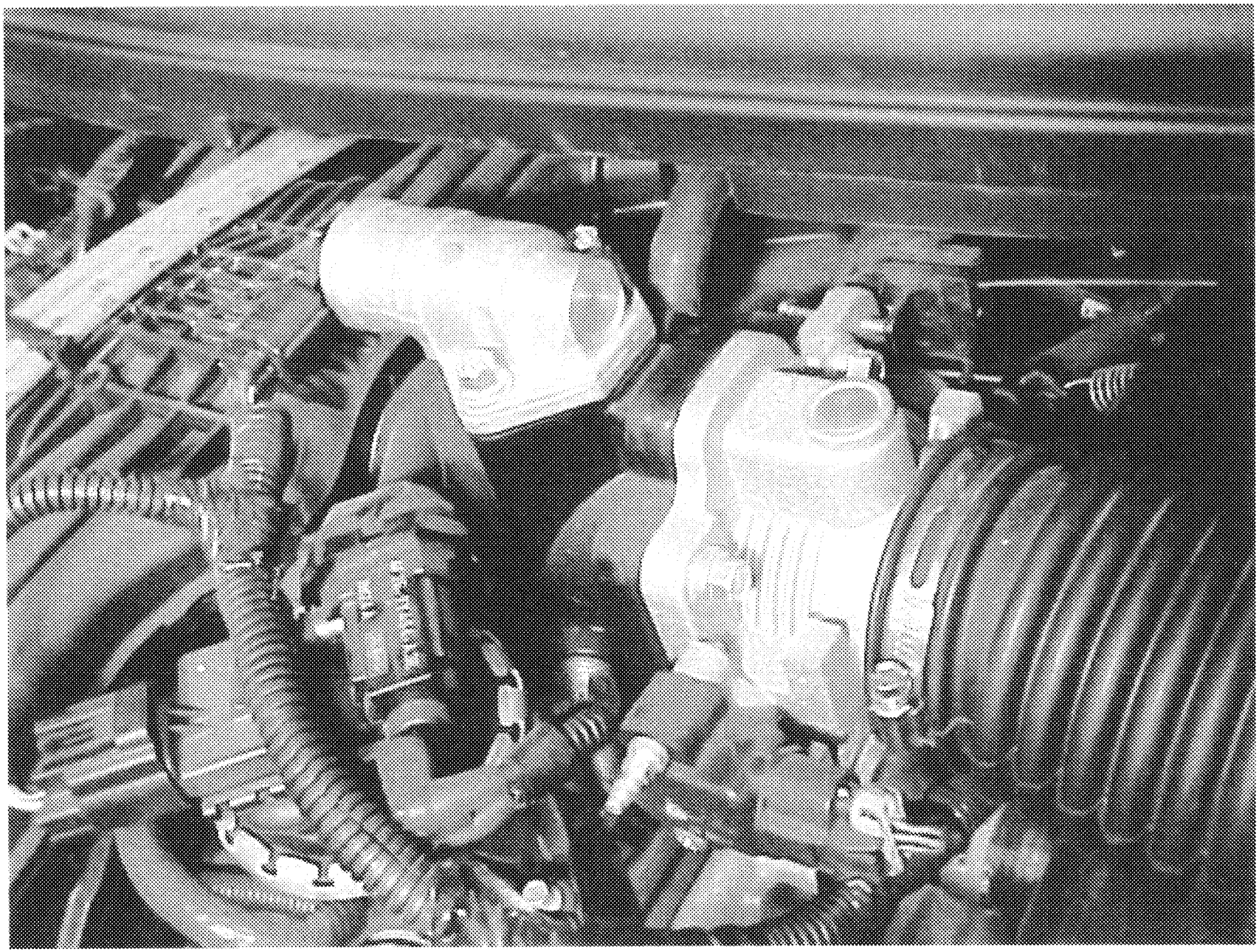
2004 FORD FREESTAR
NHTSA NO. C40203
FMVSS NO. 124L

FIGURE 5.3
RIGHT SIDE VIEW OF VEHICLE



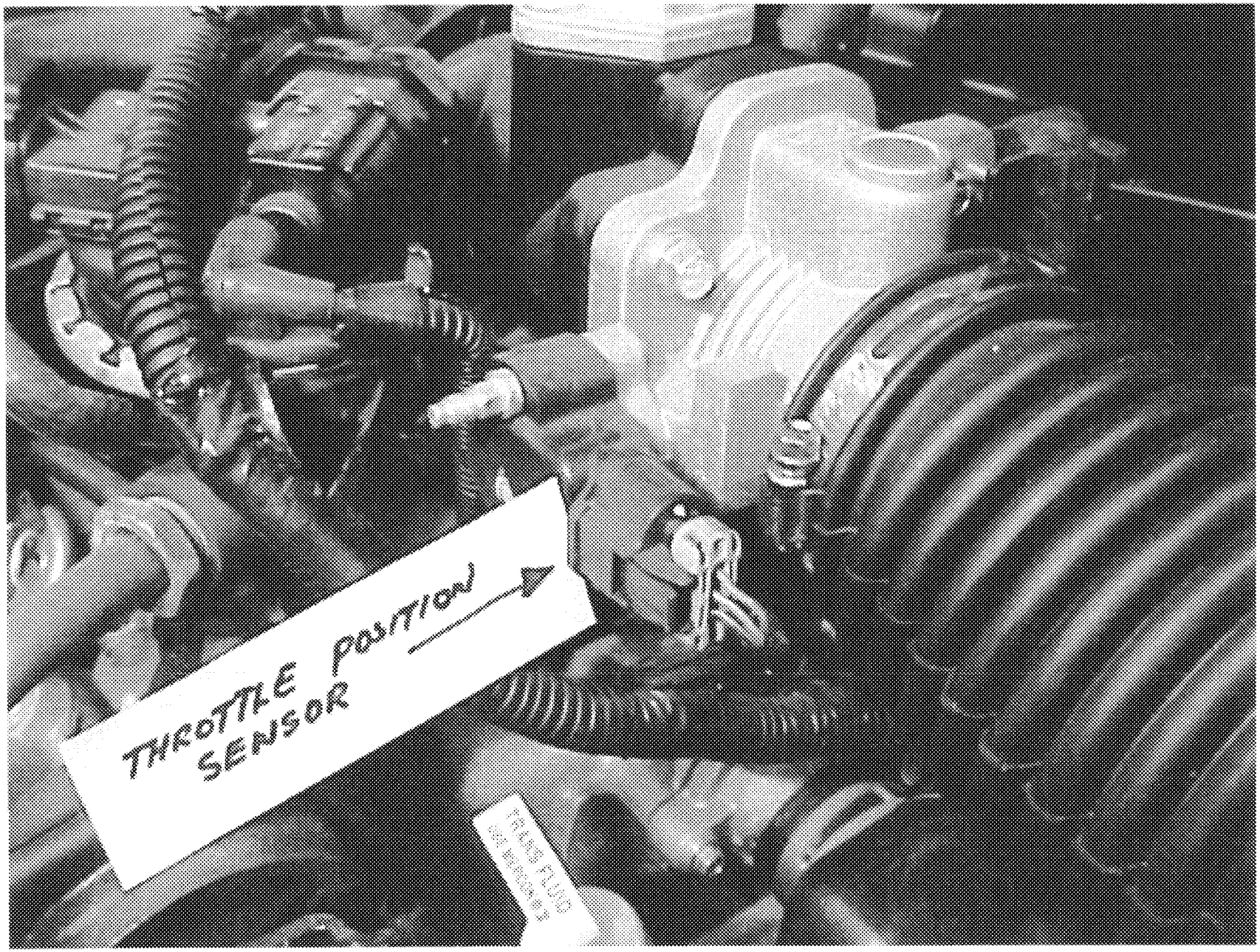
2004 FORD FREESTAR
NHTSA NO. C40203
FMVSS NO. 124L

FIGURE 5.4
CLOSE UP VIEW OF VEHICLE'S CERTIFICATION
AND TIRE INFORMATION LABEL



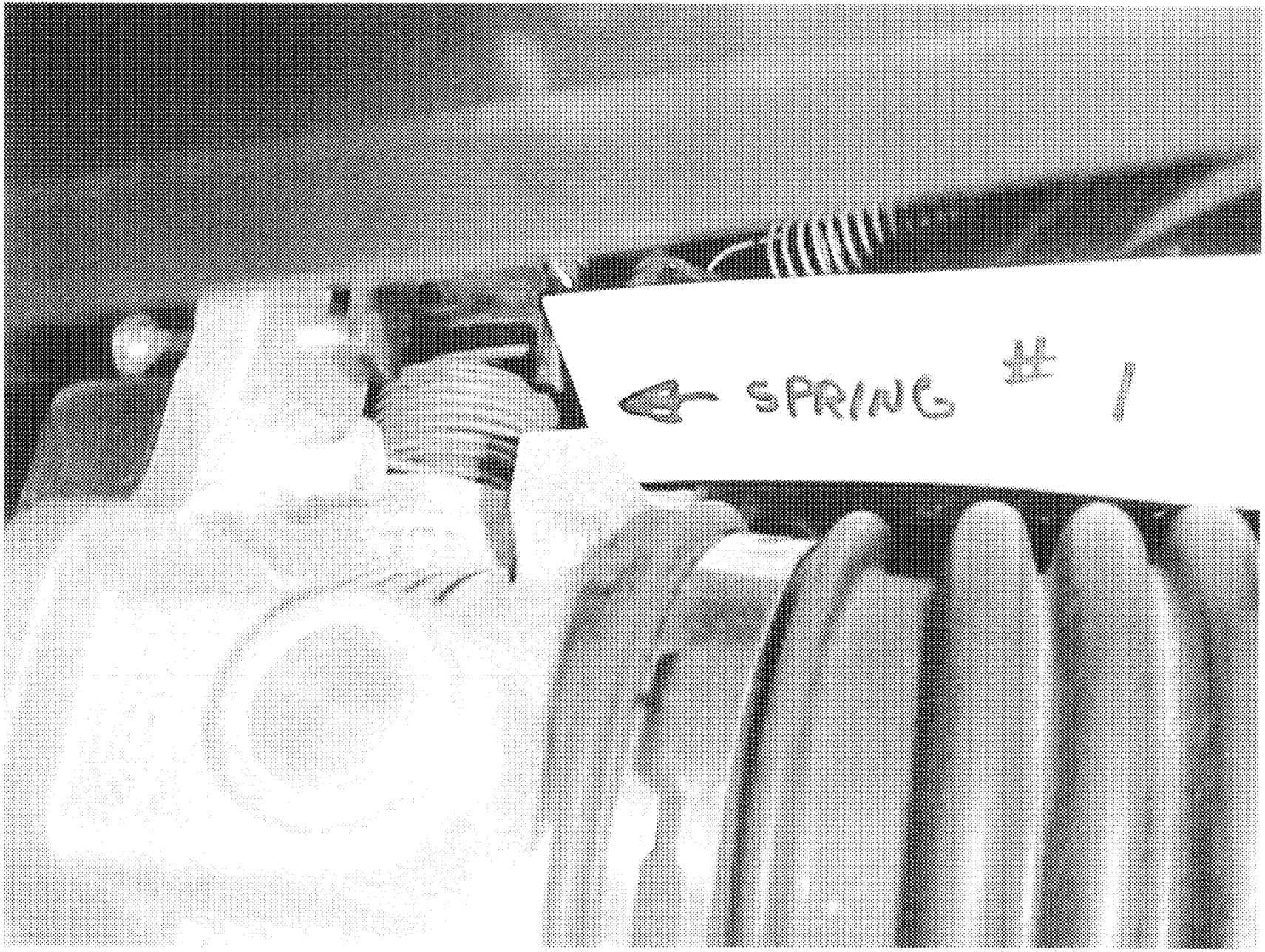
2004 FORD FREESTAR
NHTSA NO. C40203
FMVSS NO. 124L

FIGURE 5.5
VIEW OF THROTTLE BODY



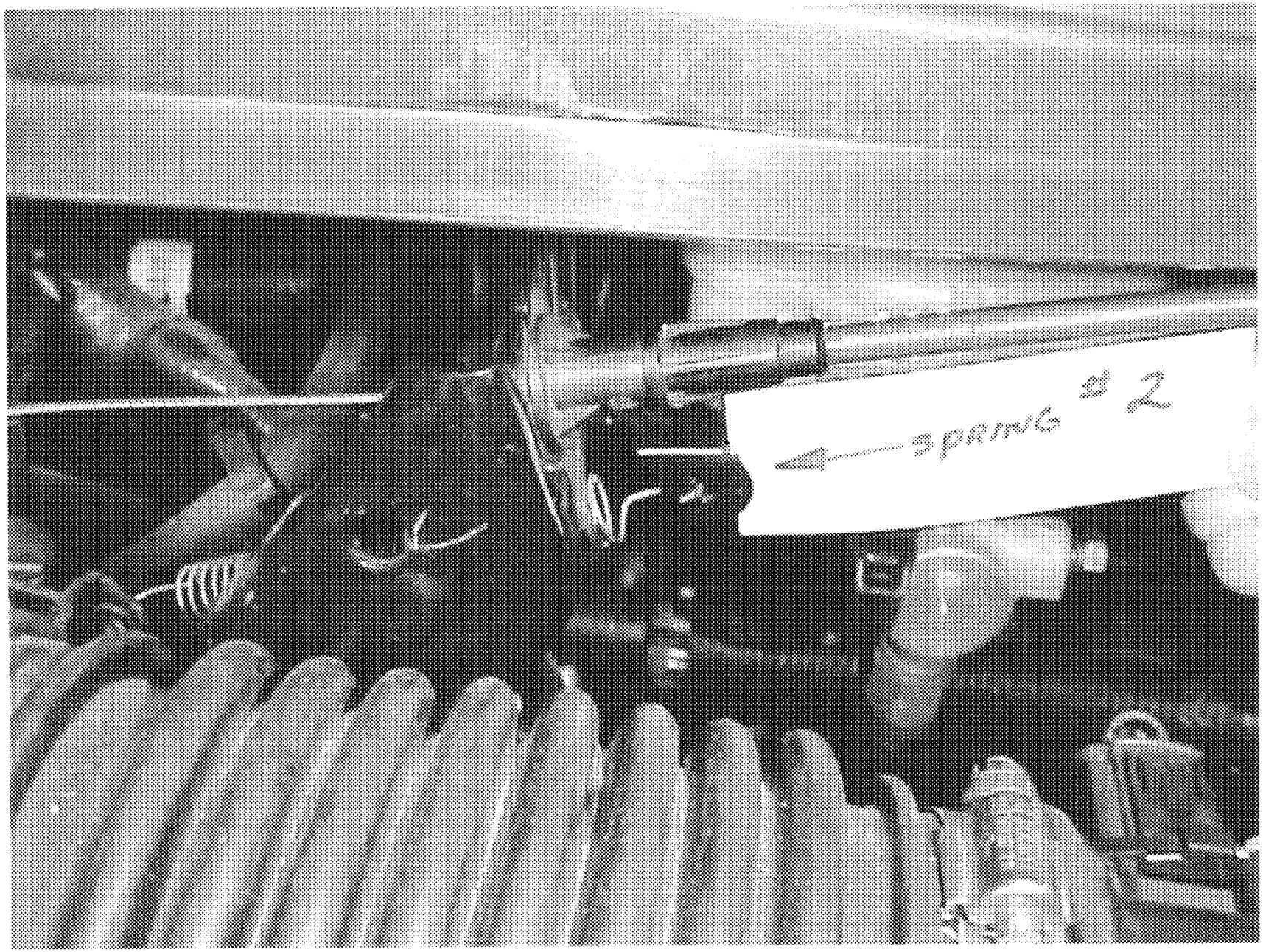
2004 FORD FREESTAR
NHTSA NO. C40203
FMVSS NO. 124L

FIGURE 5.6
THROTTLE POSITION SENSOR



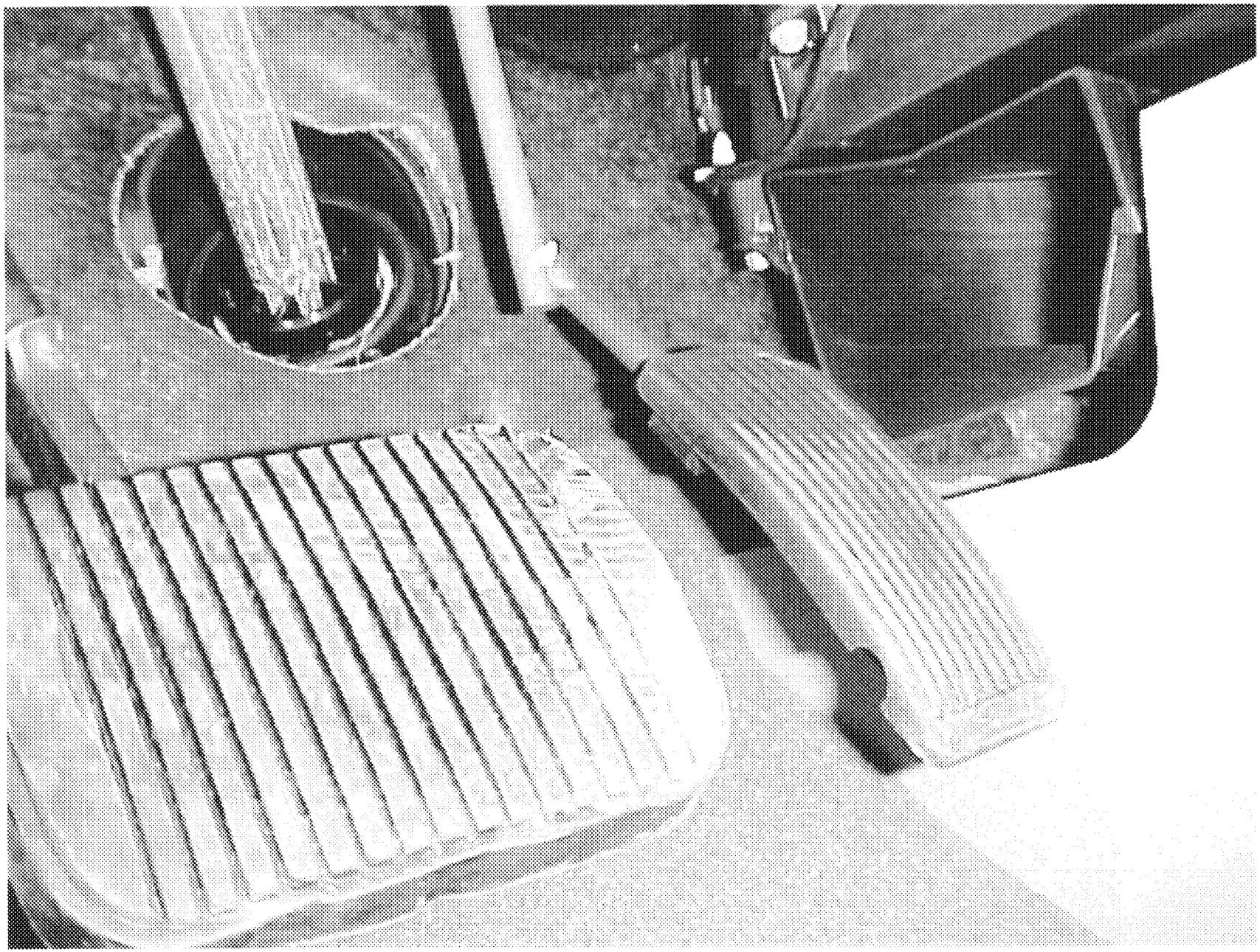
2004 FORD FREESTAR
NHTSA NO. C40203
FMVSS NO. 124L

FIGURE 5.7
THROTTLE RETURN SPRING #1



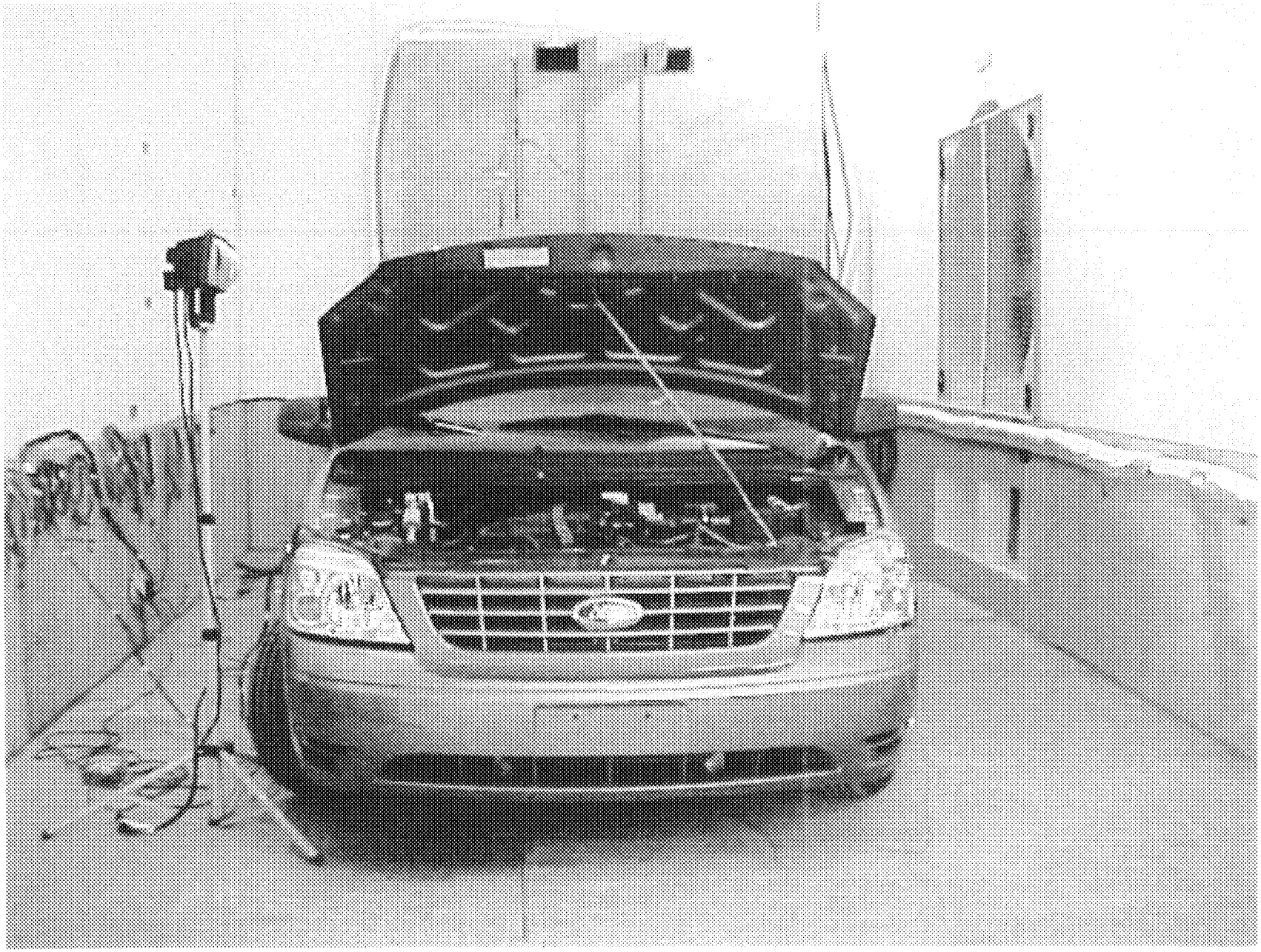
2004 FORD FREESTAR
NHTSA NO. C40203
FMVSS NO. 124L

FIGURE 5.8
THROTTLE RETURN SPRING #2



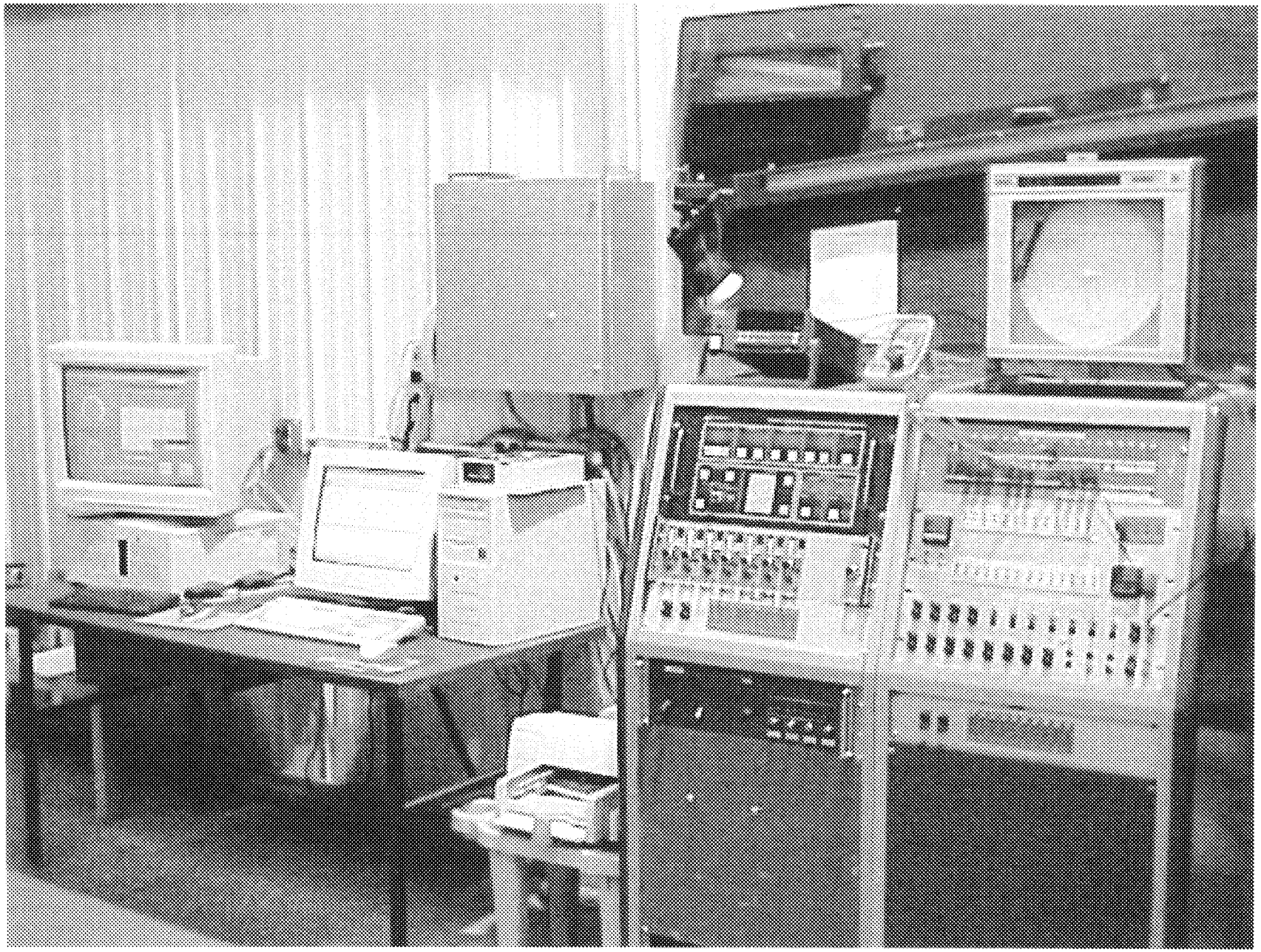
2004 FORD FREESTAR
NHTSA NO. C40203
FMVSS NO. 124L

FIGURE 5.9
ACCELERATOR PEDAL



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

FIGURE 5.10
VEHICLE IN TEST CHAMBER



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

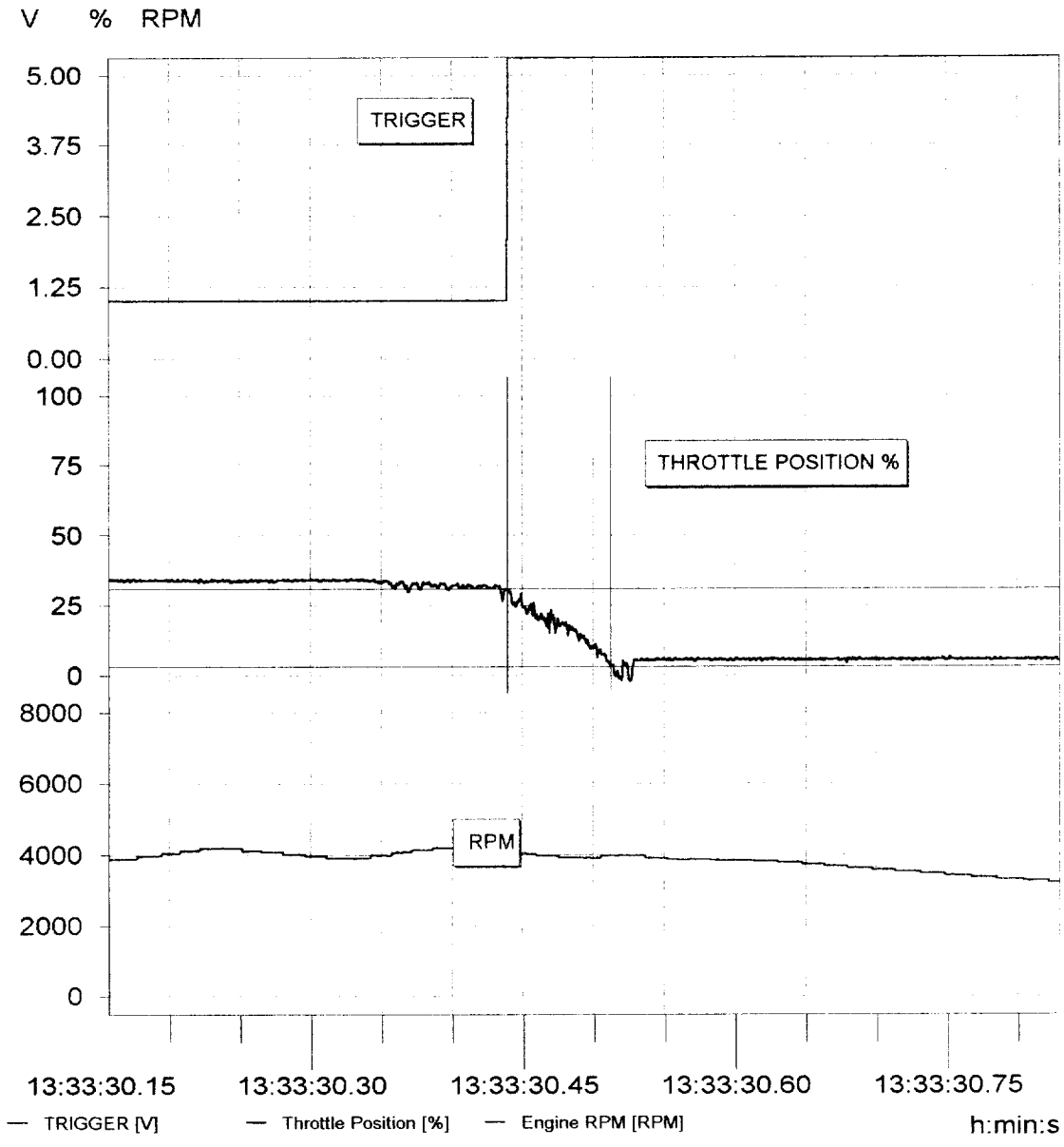
FIGURE 5.11
124 TEST INSTRUMENTATION SET-UP

SECTION 6
PLOTS

FMVSS 124 THROTTLE RETURN TEST

124 COLD/ NORMAL/ 25% WOT 1:37:53 PM 5/5/04

NHTSA C40203 FORD FREESTAR



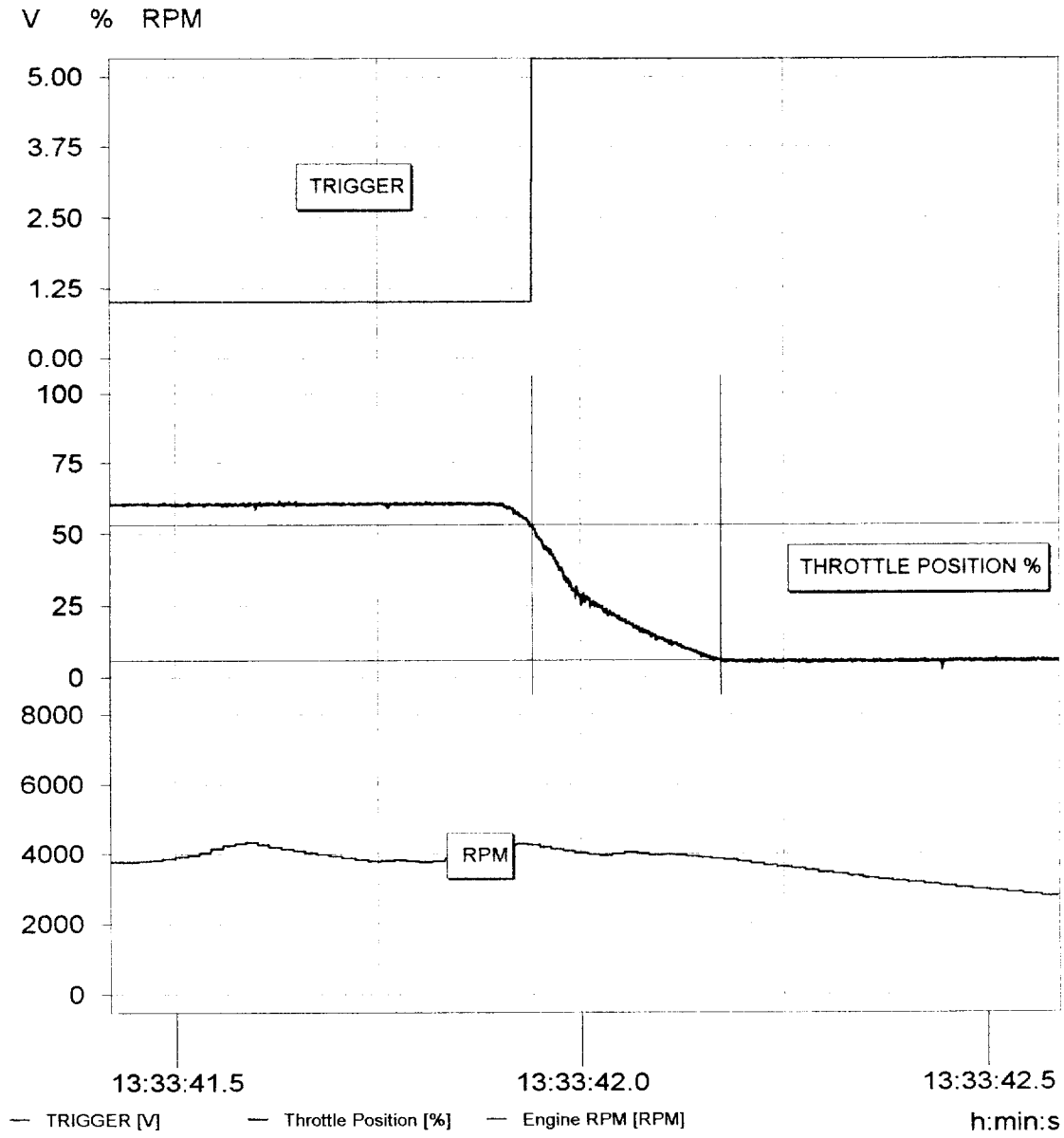
Channel:Throttle Position

Y1:	30.845 %	Y2:	2.972 %
t1:	-34585.671 ms	t2:	-34512.671 ms
dt:	0.073 s	f:	13.699 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/ NORMAL/ 50% WOT 1:40:05 PM 5/5/04

NHTSA C40203 FORD FREESTAR



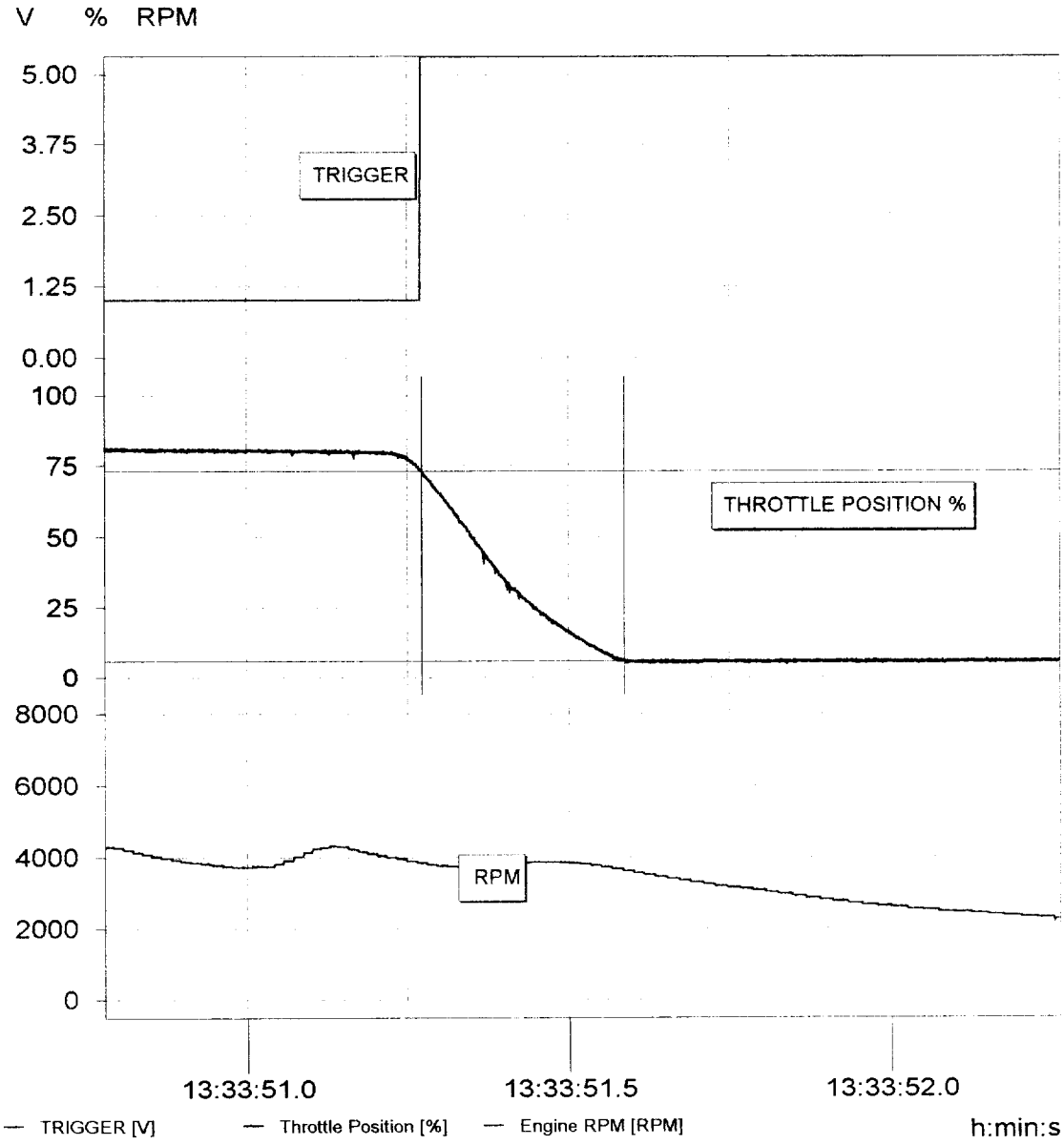
Channel: Throttle Position

Y1:	52.948 %	Y2:	5.674 %
t1:	-23084.671 ms	t2:	-22852.671 ms
dt:	0.232 s	f:	4.310 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/ NORMAL/ 75% WOT 1:41:46 PM 5/5/04

NHTSA C40203 FORD FREESTAR



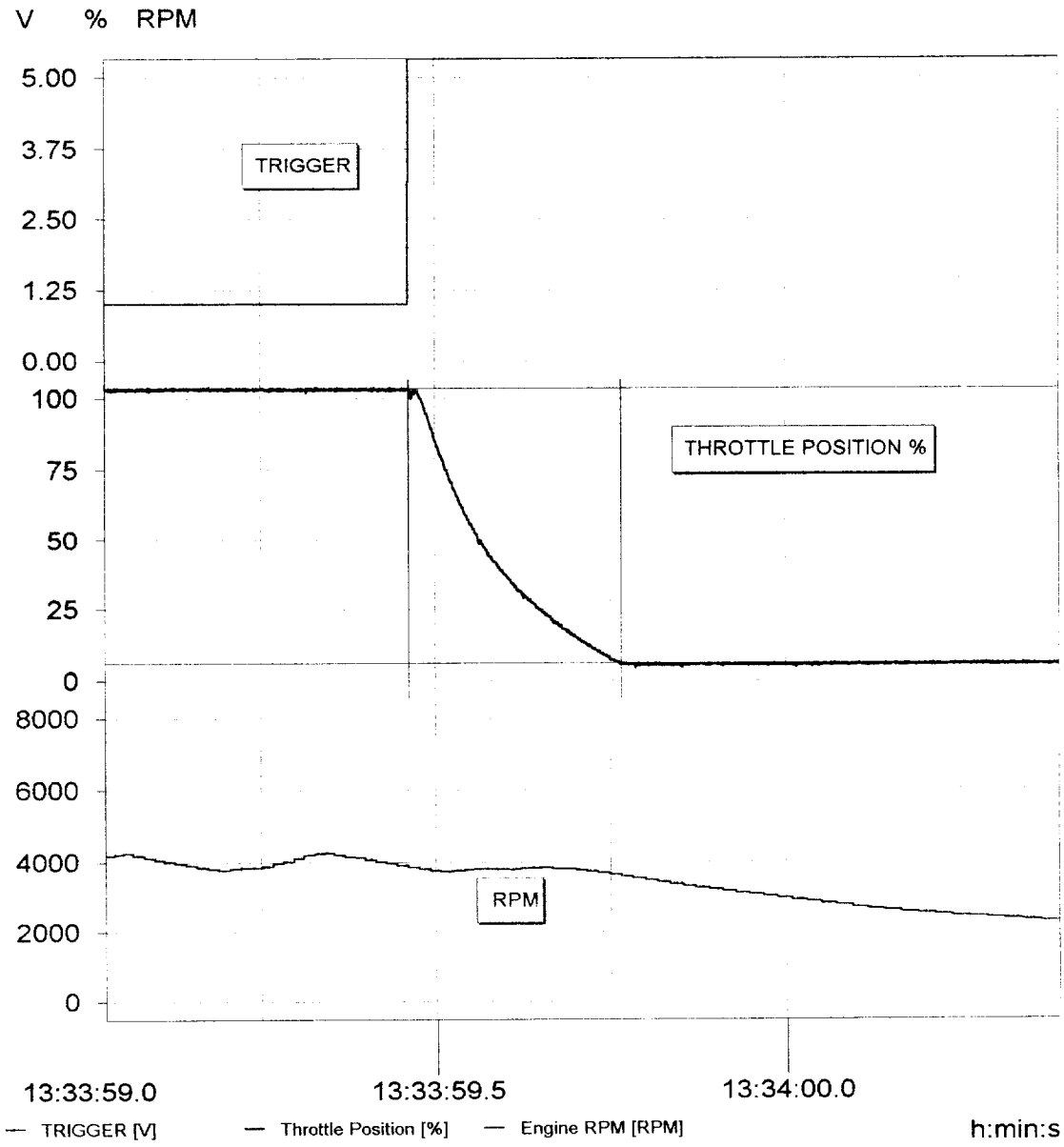
Channel:Throttle Position

Y1:	73.171 %	Y2:	5.796 %
t1:	-13752.671 ms	t2:	-13438.671 ms
dt:	0.314 s	f:	3.185 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/ NORMAL/ 100% WOT 1:42:57 PM 5/5/04

NHTSA C40203 FORD FREESTAR



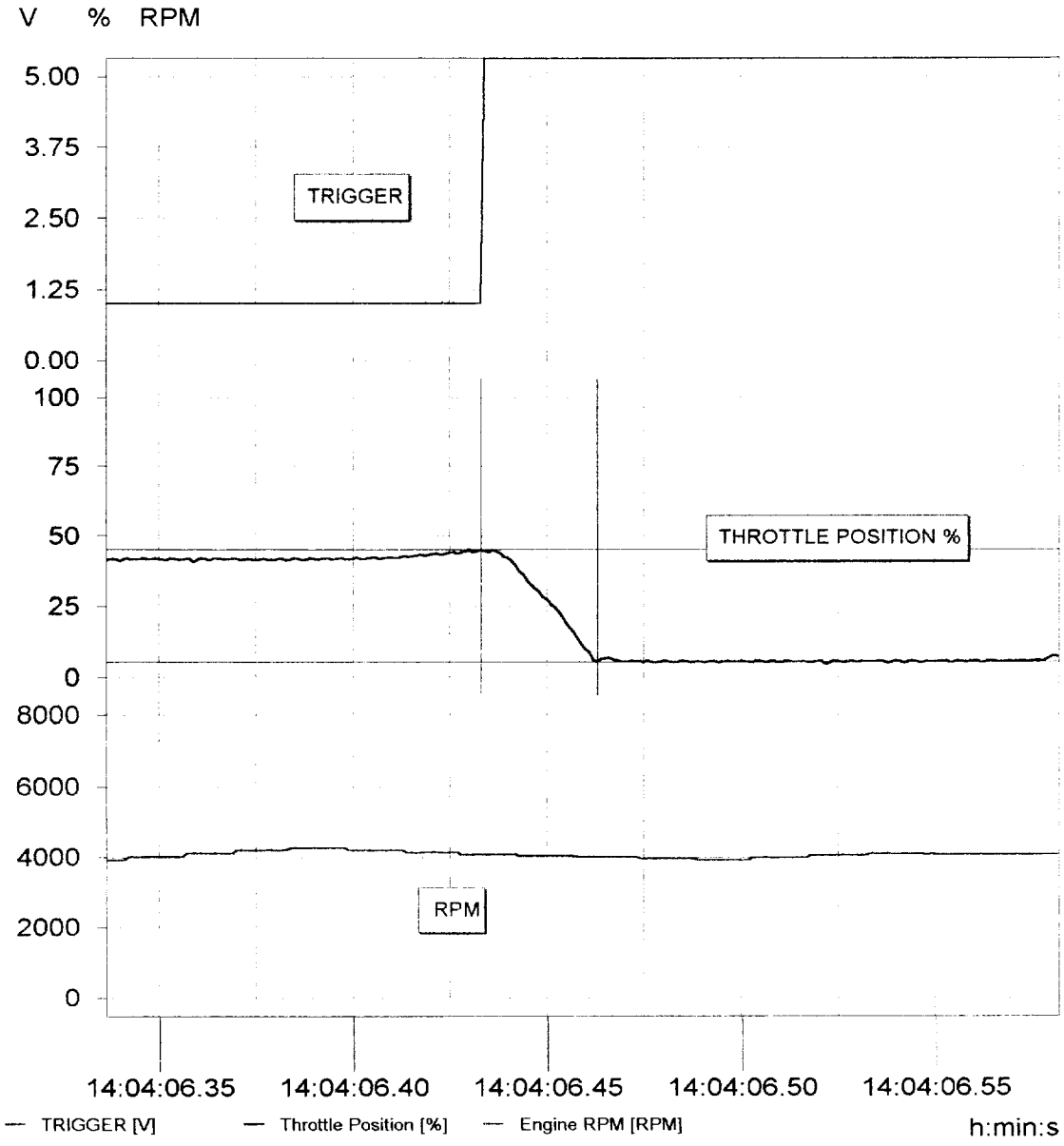
Channel:Throttle Position

Y1:	103.334 %	Y2:	5.922 %
t1:	-5563.671 ms	t2:	-5259.671 ms
dt:	0.304 s	f:	3.289 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/ SPRING 1/25% WOT 2:07:15 PM 5/5/04

NHTSA C40203 FORD FREESTAR



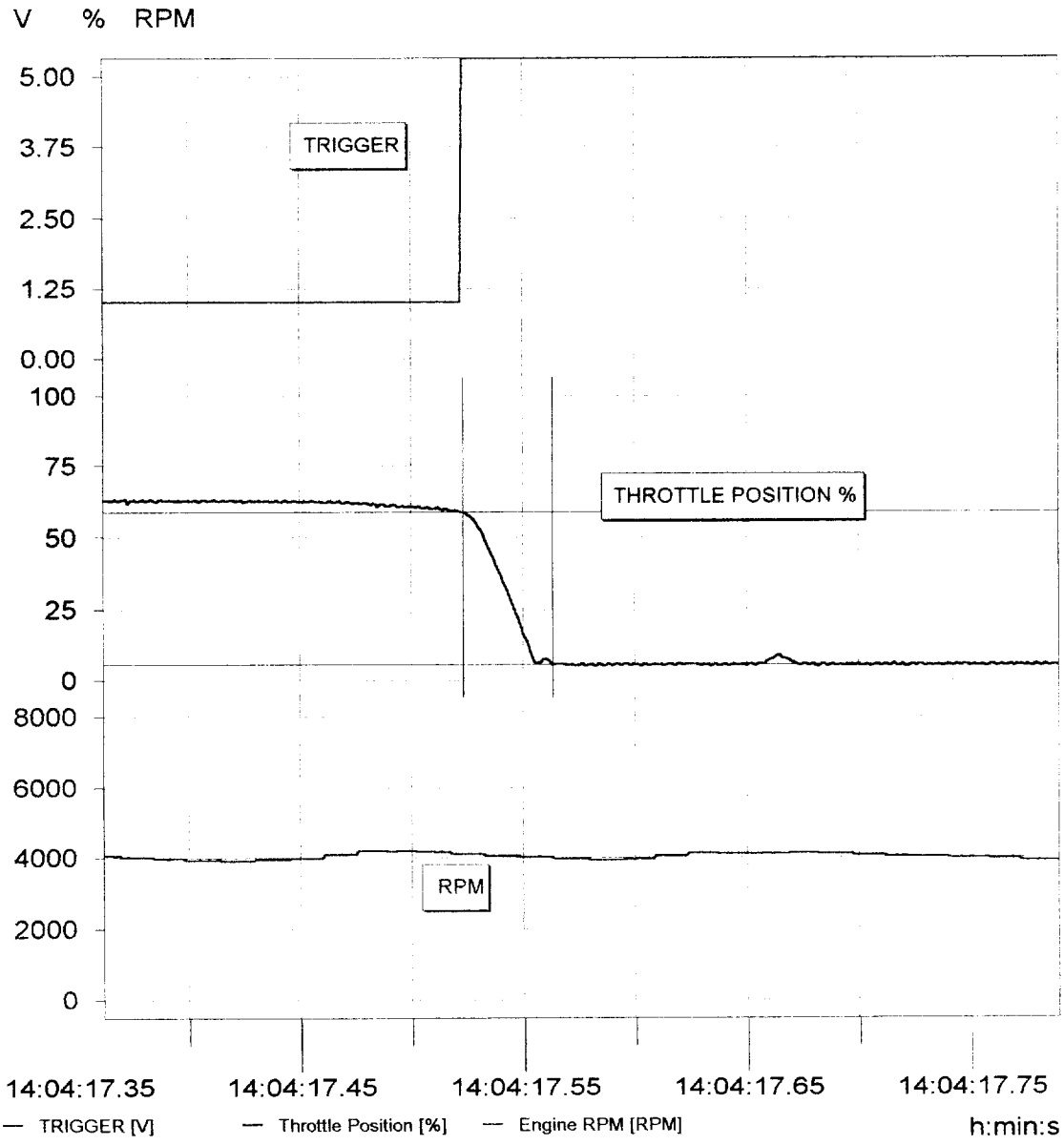
Channel: Throttle Position

Y1:	44.924 %	Y2:	5.239 %
t1:	-45181.662 ms	t2:	-45151.662 ms
dt:	0.030 s	f:	33.333 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/ SPRING 1/50% WOT 2:08:38 PM 5/5/04

NHTSA C40203 FORD FREESTAR



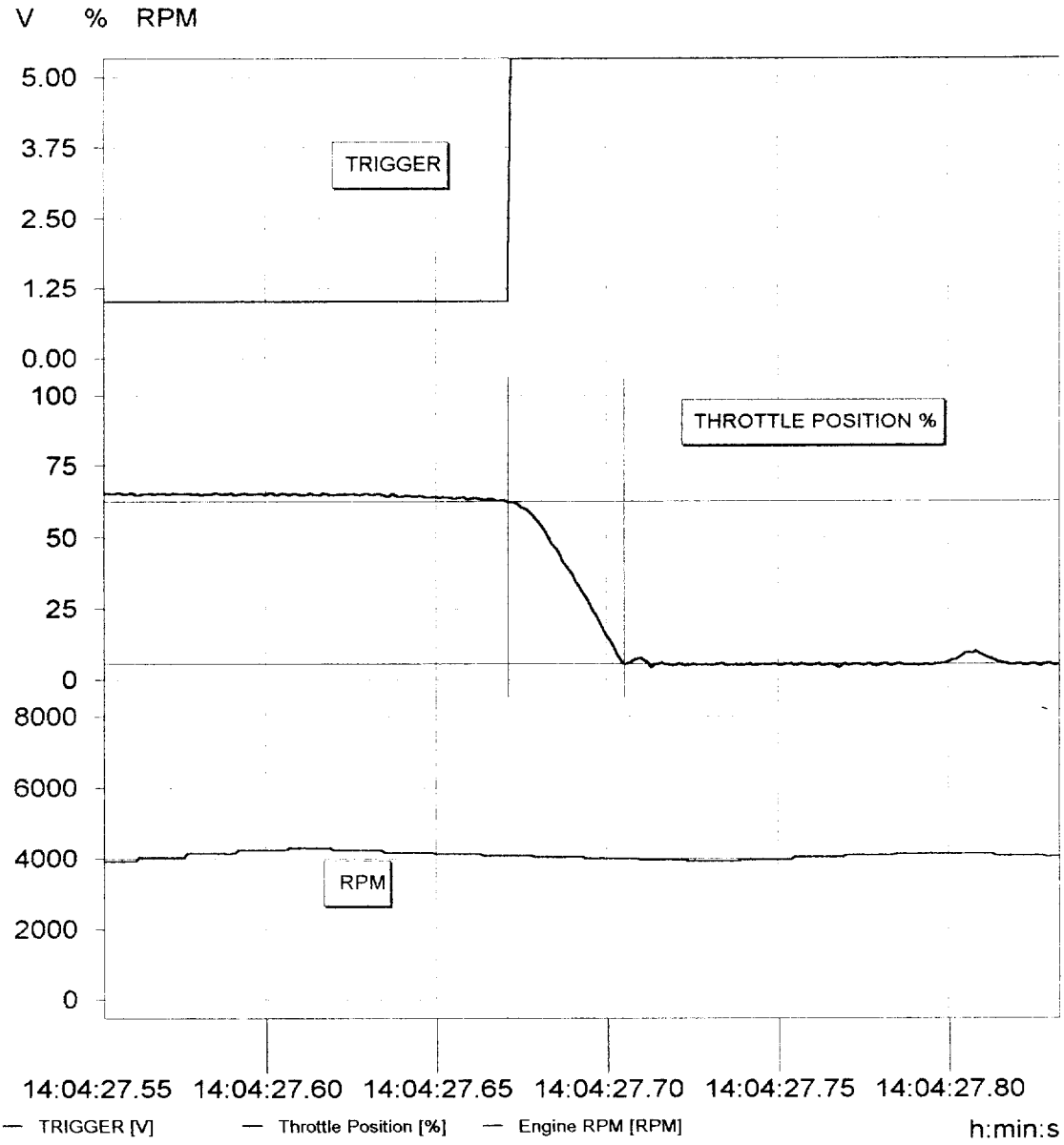
Channel:Throttle Position

Y1:	58.681 %	Y2:	5.605 %
t1:	-34091.662 ms	t2:	-34051.662 ms
dt:	0.040 s	f:	25.000 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/ SPRING 1/75% WOT 2:09:50 PM 5/5/04

NHTSA C40203 FORD FREESTAR



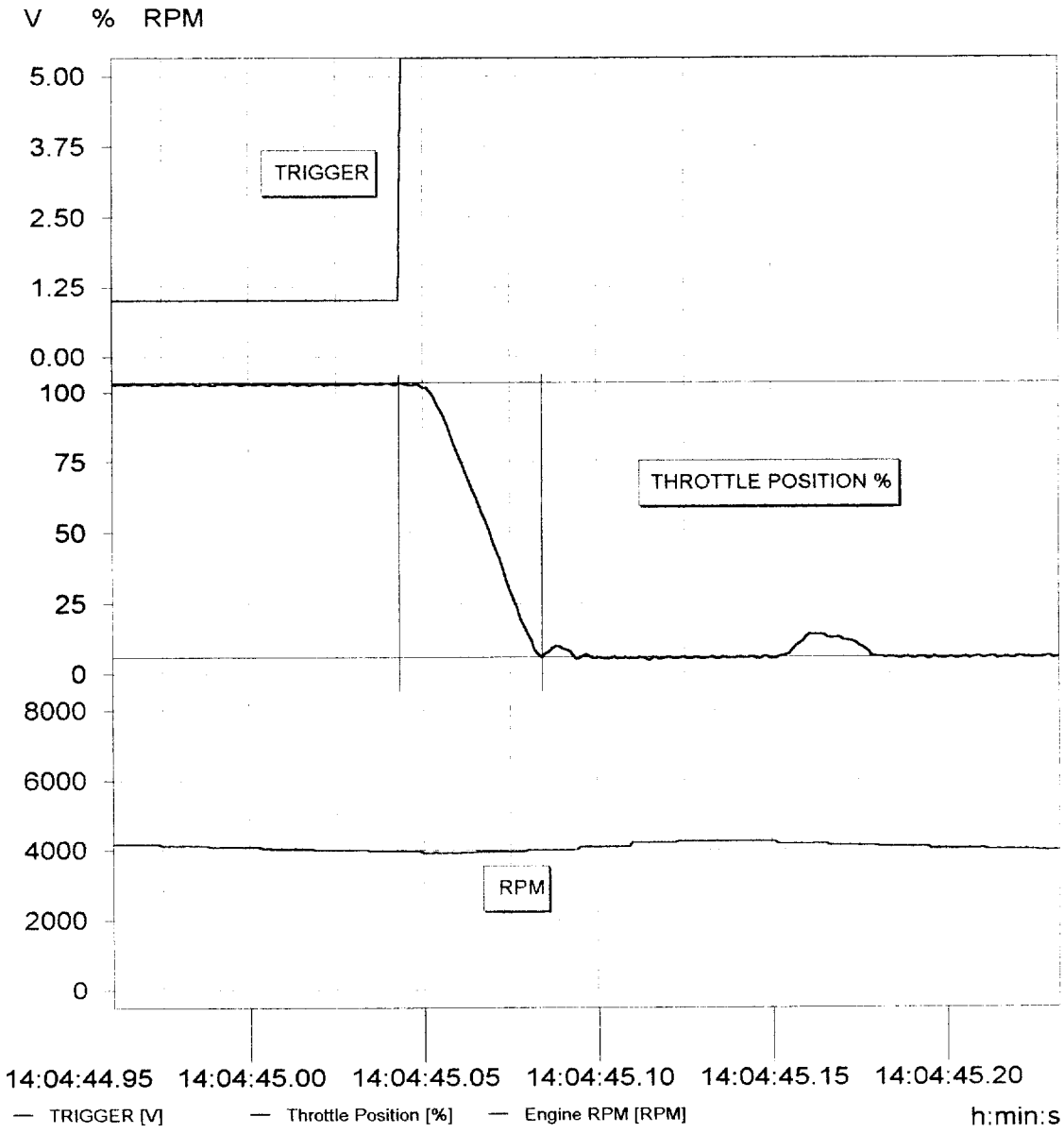
Channel: Throttle Position

Y1:	62.416 %	Y2:	5.650 %
t1:	-23943.662 ms	t2:	-23909.662 ms
dt:	0.034 s	f:	29.412 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/ SPRING 1/100% WOT 2:11:15 PM 5/5/04

NHTSA C40203 FORD FREESTAR



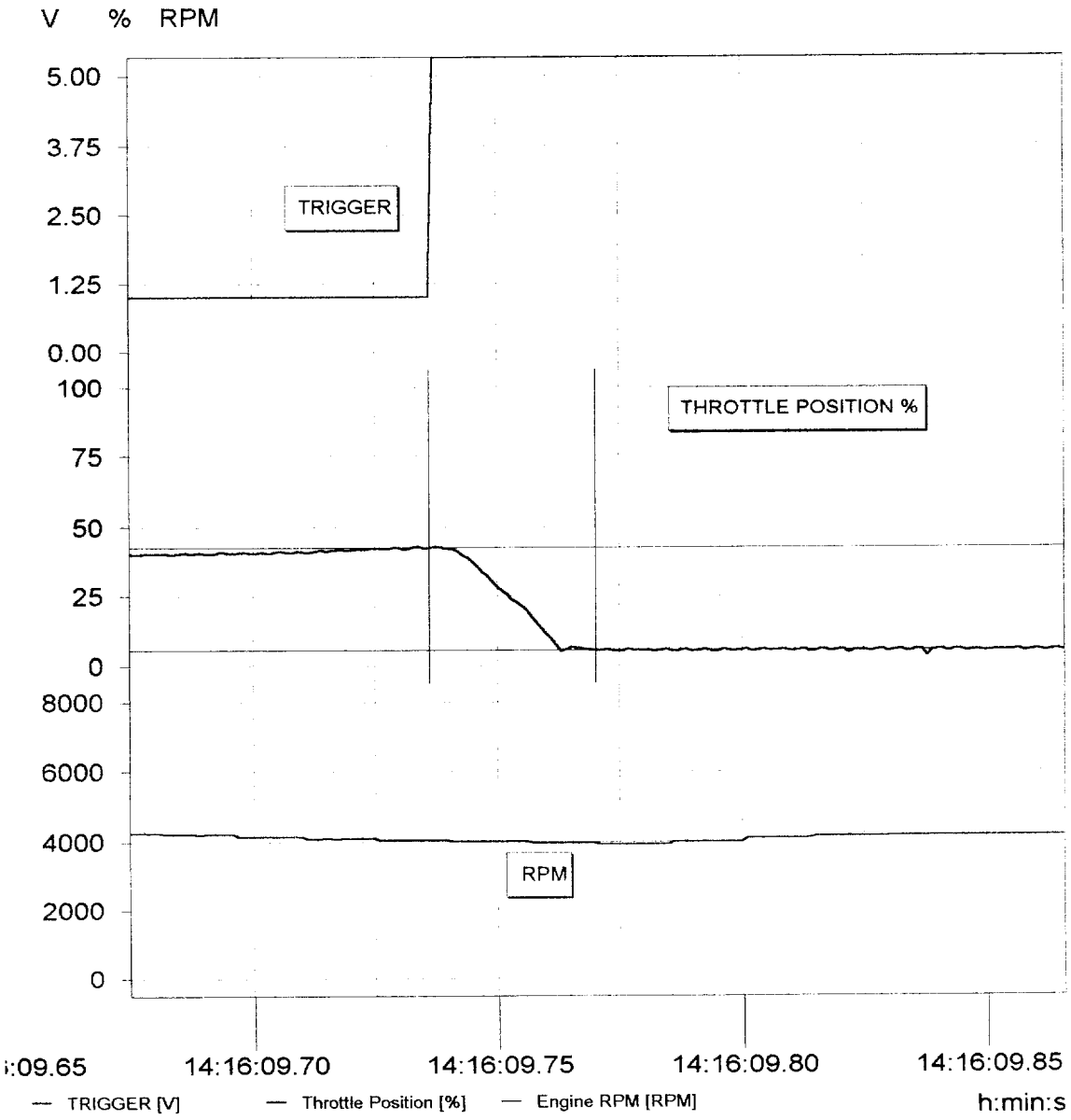
Channel:Throttle Position

Y1:	103.513 %	Y2:	5.715 %
t1:	-6571.662 ms	t2:	-6530.662 ms
dt:	0.041 s	f:	24.390 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/ SPRING 2 /25% WOT 2:19:58 PM 5/5/04

NHTSA C40203 FORD FREESTAR



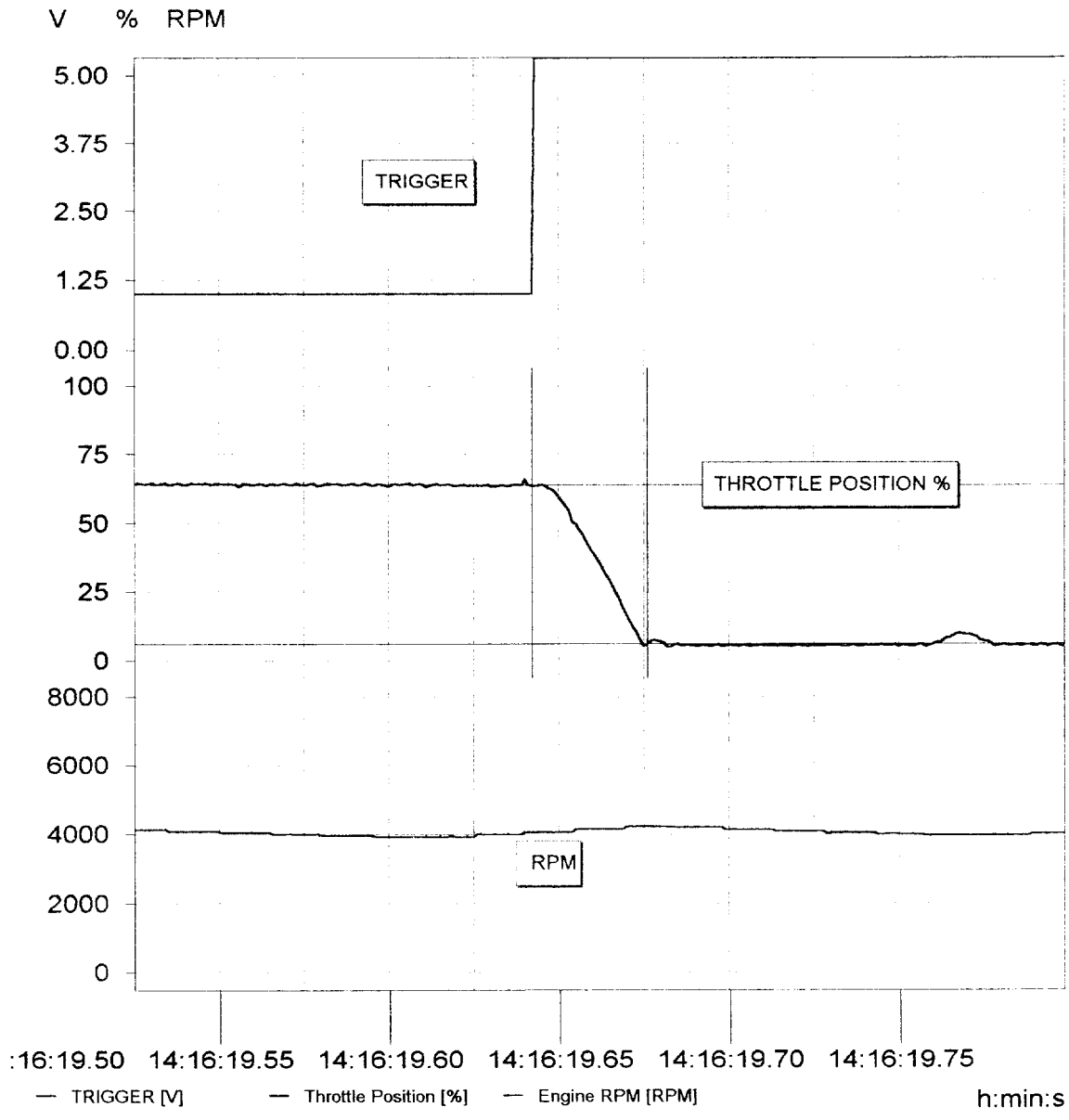
Channel:Throttle Position

Y1:	42.438 %	Y2:	5.454 %
t1:	-34265.061 ms	t2:	-34231.061 ms
dt:	0.034 s	f:	29.412 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/ SPRING 2 /50% WOT 2:22:00 PM 5/5/04

NHTSA C40203 FORD FREESTAR



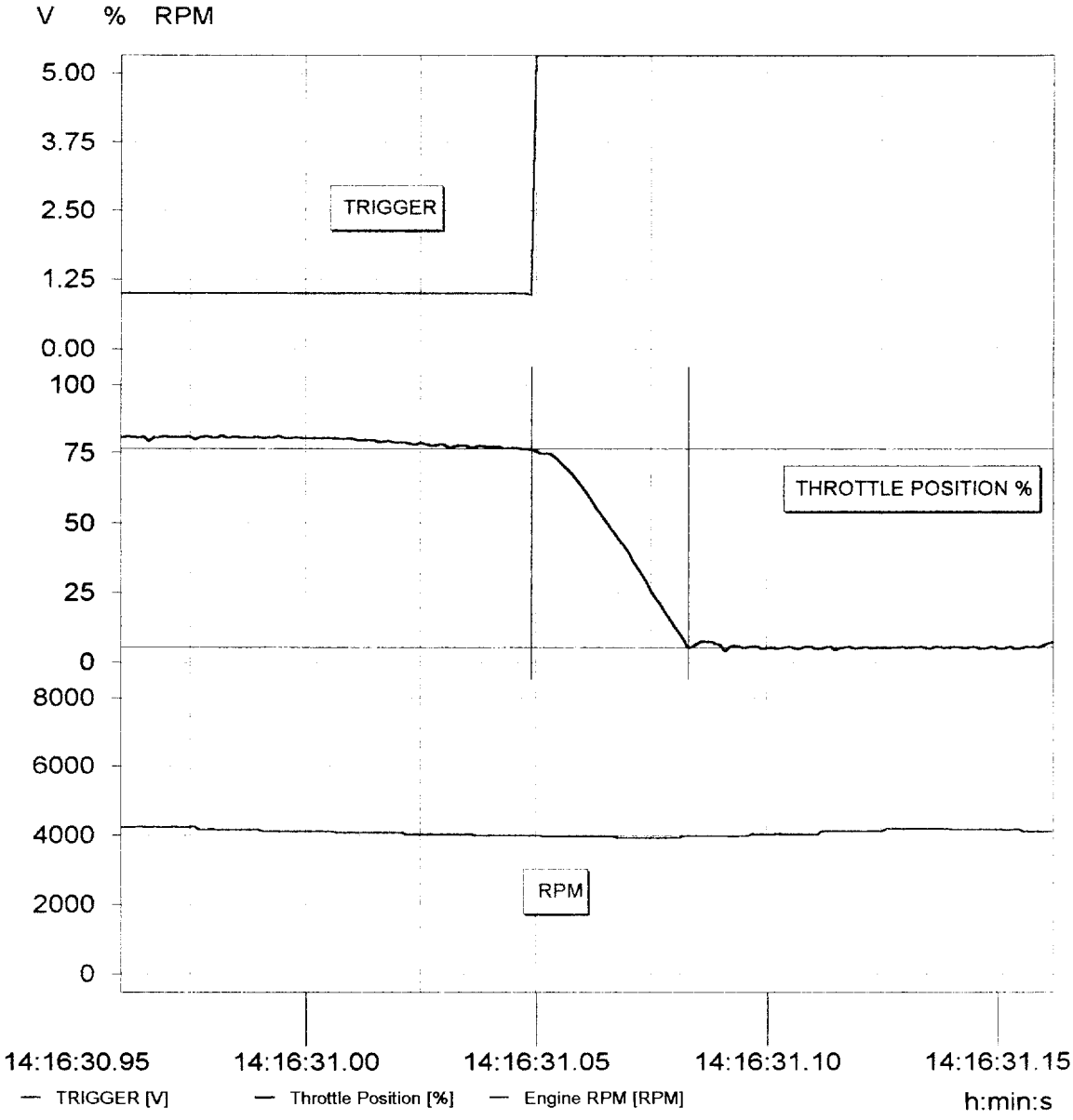
Channel:Throttle Position

Y1:	63.893 %	Y2:	5.991 %
t1:	-24359.061 ms	t2:	-24325.061 ms
dt:	0.034 s	f:	29.412 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/ SPRING 2 /75% WOT 2:23:45 PM 5/5/04

NHTSA C40203 FORD FREESTAR



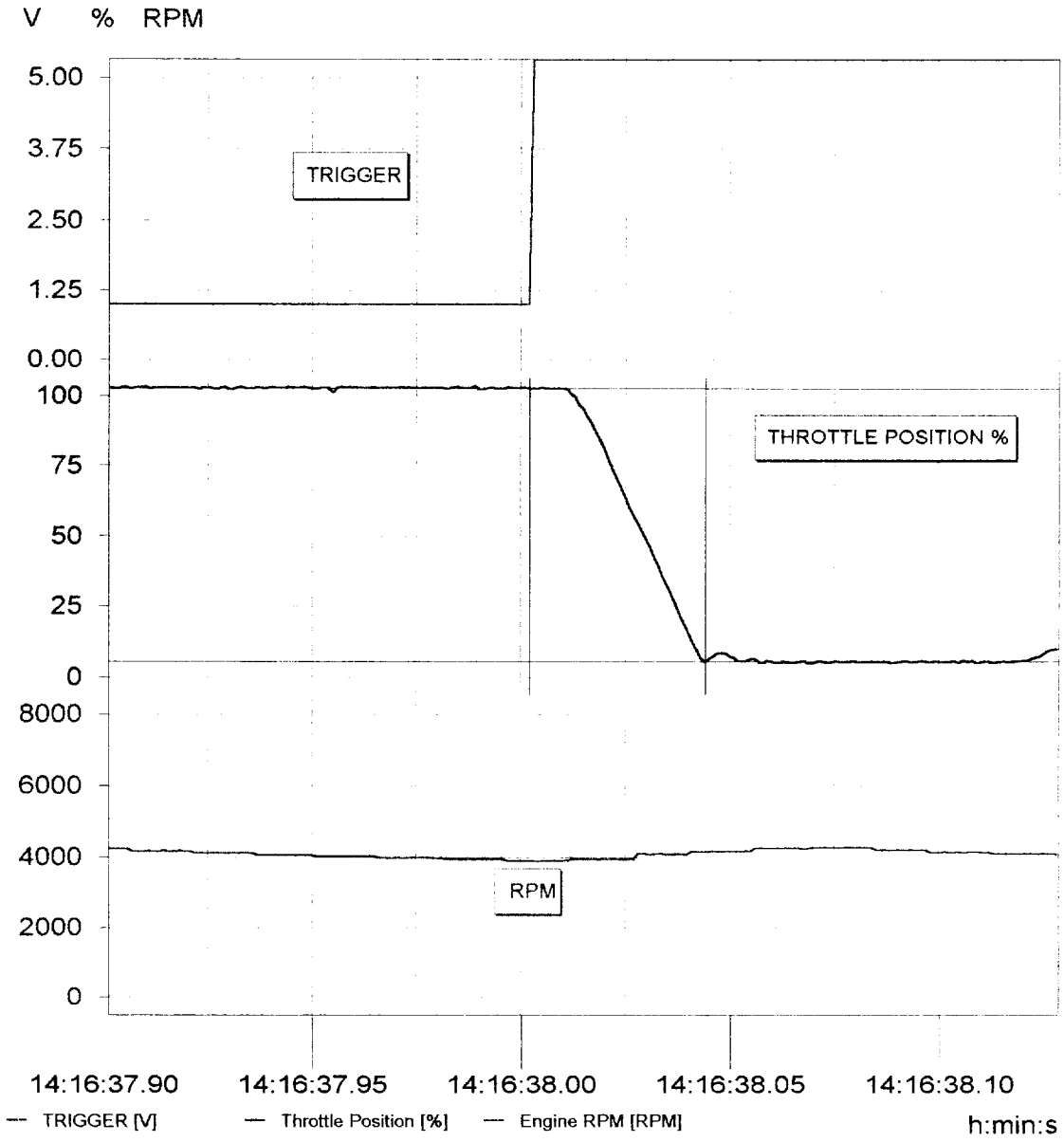
Channel:Throttle Position

Y1:	76.450 %	Y2:	5.401 %
t1:	-12952.061 ms	t2:	-12918.061 ms
dt:	0.034 s	f:	29.412 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/ SPRING 2 /100% WOT 2:25:10 PM 5/5/04

NHTSA C40203 FORD FREESTAR



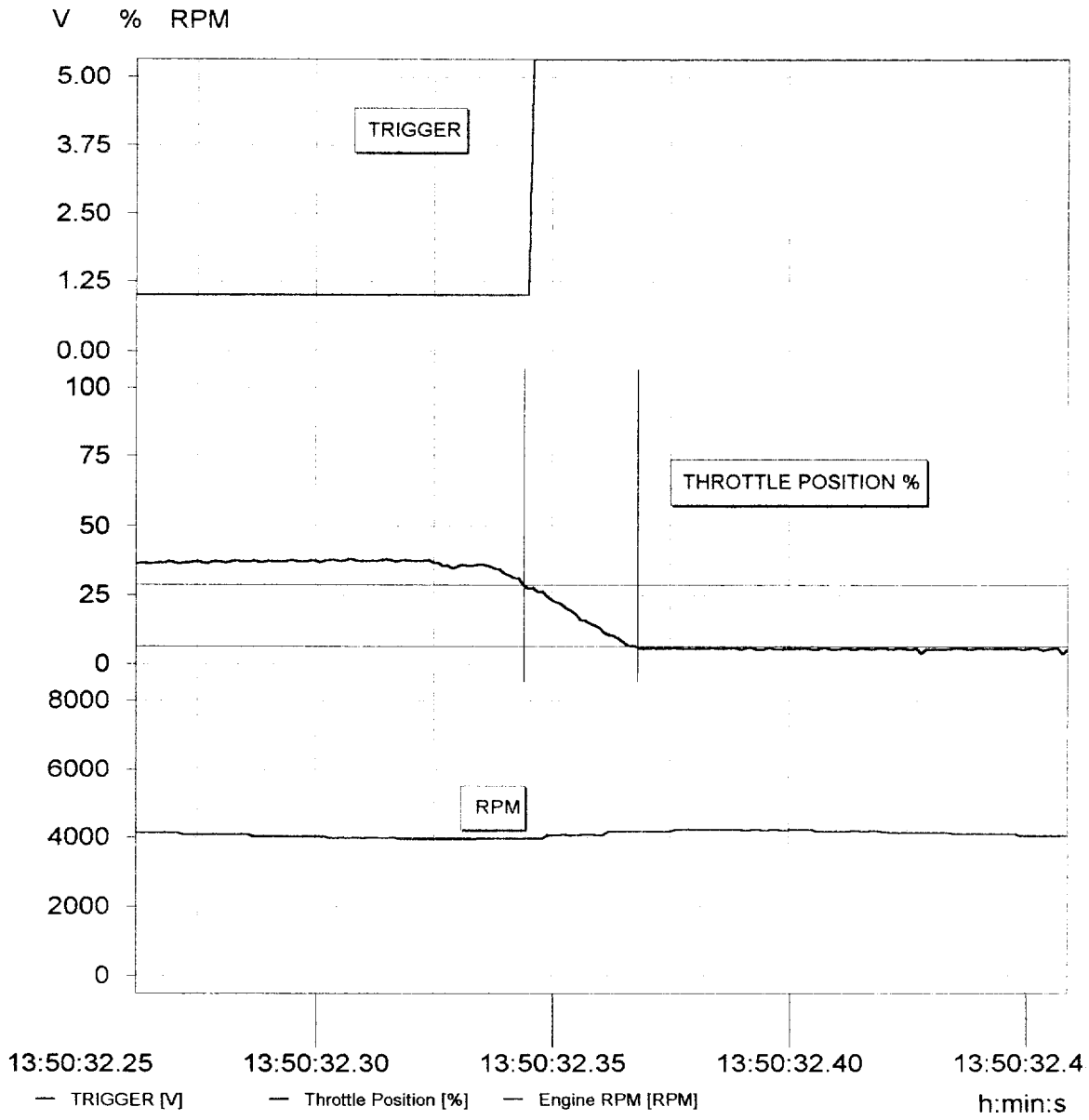
Channel:Throttle Position

Y1:	102.752 %	Y2:	5.434 %
t1:	-5999.061 ms	t2:	-5957.061 ms
dt:	0.042 s	f:	23.810 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/ SEVERED/ 25% WOT 1:53:32 PM 5/5/04

NHTSA C40203 FORD FREESTAR



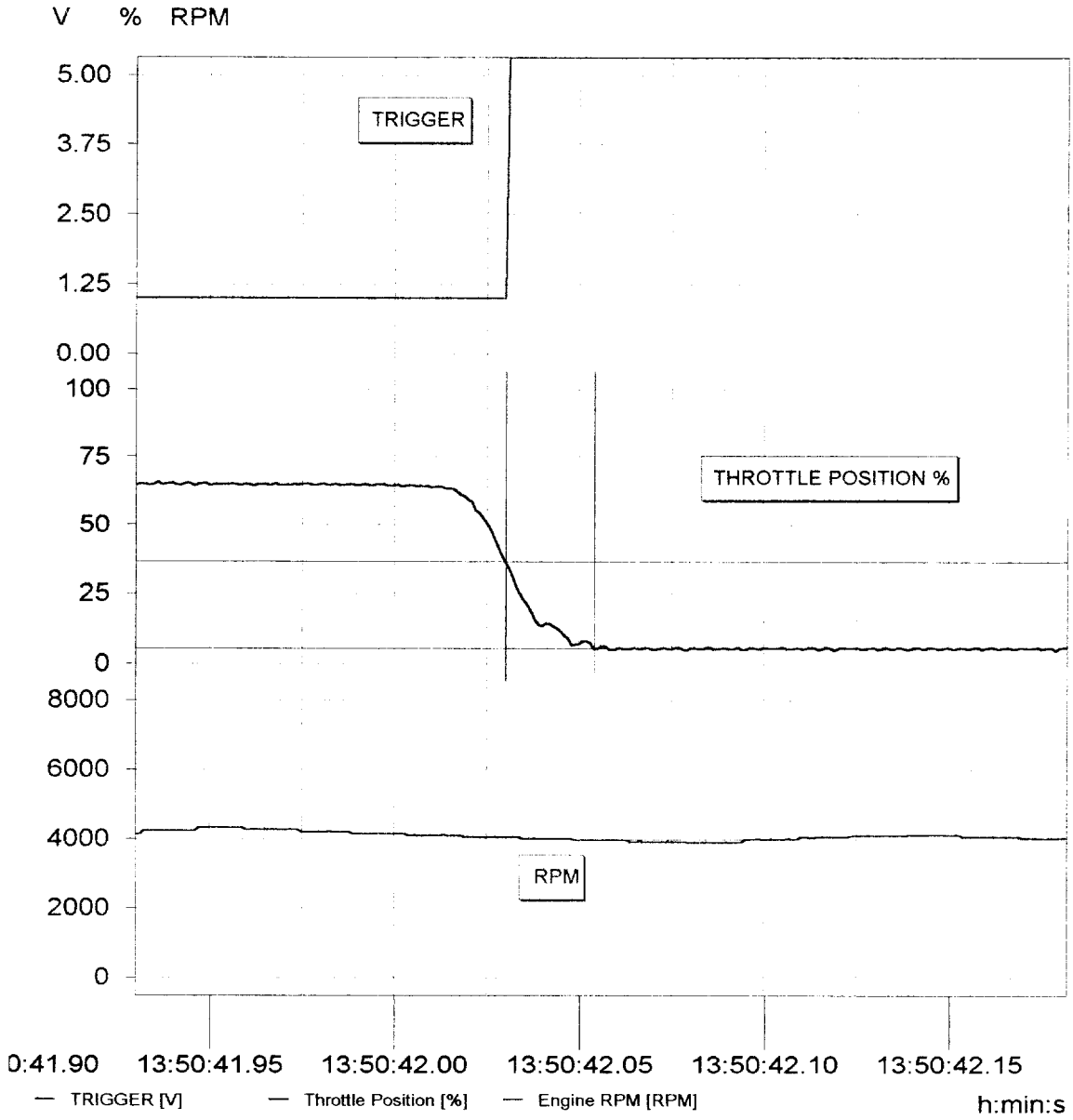
Channel:Throttle Position

Y1:	28.583 %	Y2:	6.158 %
t1:	-34666.924 ms	t2:	-34642.924 ms
dt:	0.024 s	f:	41.667 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/ SEVERED/ 50% WOT 1:55:24 PM 5/5/04

NHTSA C40203 FORD FREESTAR



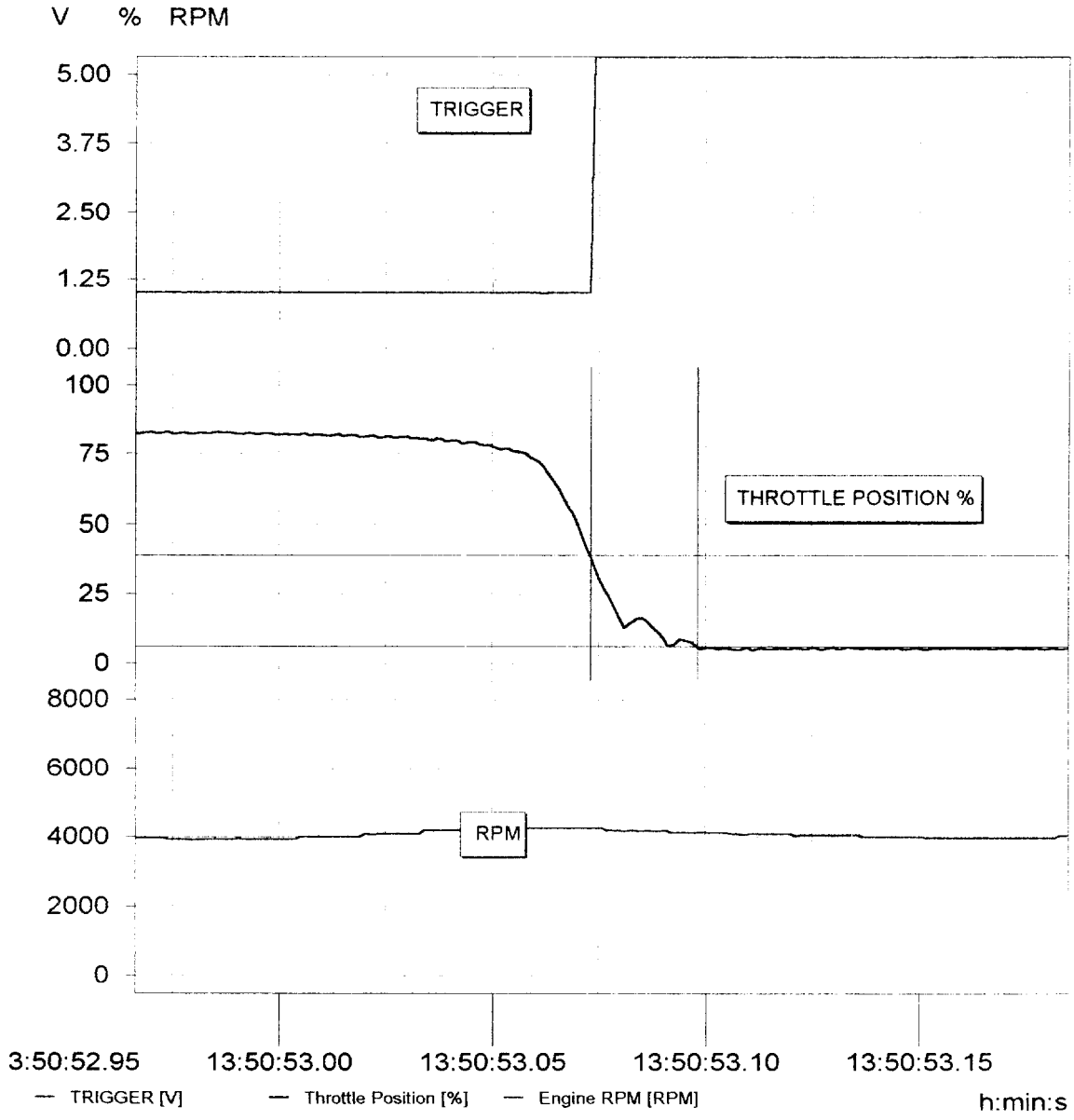
Channel:Throttle Position

Y1:	36.269 %	Y2:	5.410 %
t1:	-24980.924 ms	t2:	-24956.924 ms
dt:	0.024 s	f:	41.667 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/ SEVERED/75% WOT 1:56:51 PM 5/5/04

NHTSA C40203 FORD FREESTAR



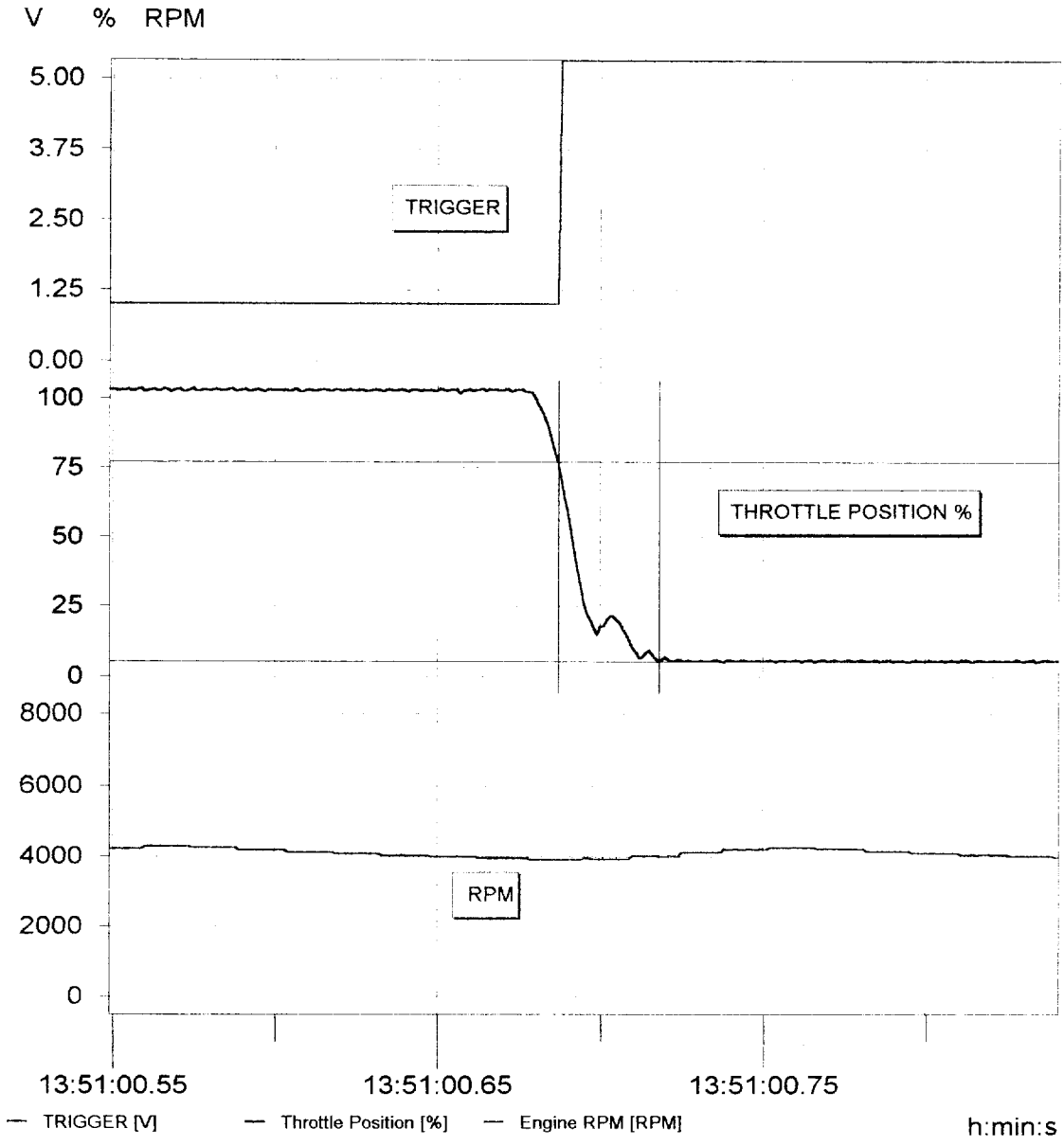
Channel:Throttle Position

Y1:	38.865 %	Y2:	6.085 %
t1:	-13937.924 ms	t2:	-13912.924 ms
dt:	0.025 s	f:	40.000 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/ SEVERED/100% WOT 1:58:04 PM 5/5/04

NHTSA C40203 FORD FREESTAR



Channel: Throttle Position

Y1:	76.943 %	Y2:	5.064 %
t1:	-6323.924 ms	t2:	-6292.924 ms
dt:	0.031 s	f:	32.258 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
FMVSS 124 - Accelerator Control Systems
2004 Ford Freestar

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.

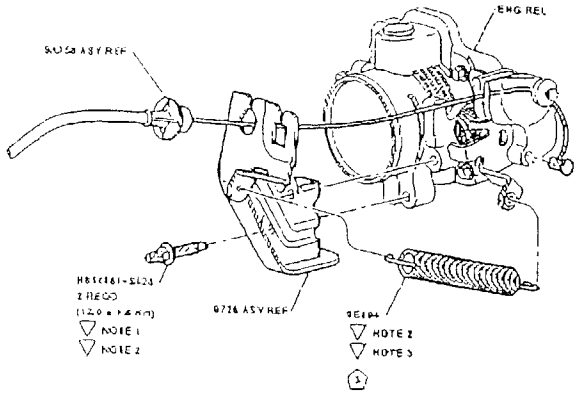
The ACS has a torsion spring mounted on the throttle body and a secondary extension spring positioned between the throttle cam and accelerator bracket. During testing, only the torsion spring is initially disconnected and the system tested. Following that, only the extension spring is disconnected and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

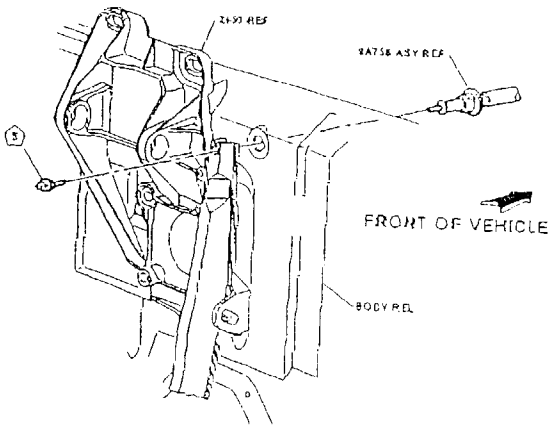
10.) If fuel delivery rate is used to demonstrate return to idle state, provide:
- A. The method used to measure this signal i.e. connection to standard SAE J1587 data bus.
- B. Equipment required to measure signal.
- C. Fuel rate signal output range at the idle state.

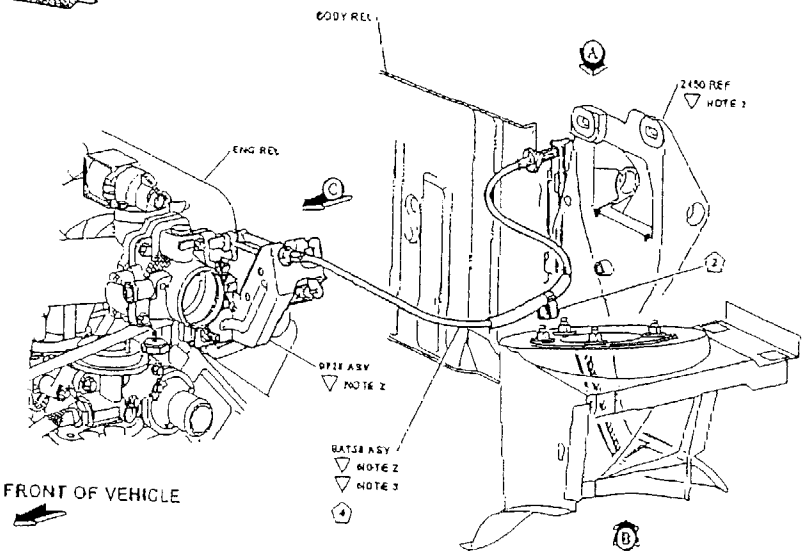
Not applicable.

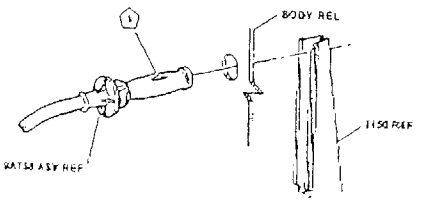
11.) Is the ACS equipped with a limp home mode? If yes, provide operation description.

No.









▽ NO SURROUNDING ENGINE COMPARTMENT COMPONENTS (E.G. WIRING, HOSES) MAY CONTACT ANY MOVING MEMBER OF THE ACCELERATOR CONTROLS. ALL VEHICLES ASSEMBLED ARE TO BE CHECKED FOR RETURN TO IDLE AS FOLLOWS: NO PERCEPTABLE HESITATION OR PREVENTION OF RETURN TO THE IDLE POSITION MAY OCCUR DURING SLOW REMOVAL OF THE FOOT FROM THE ACCELERATOR PEDAL, STARTING AT THE FULLY DEPRESSED WIDE OPEN THROTTLE ("W.O.T.") POSITION.

▽ (1) ACCELERATOR CABLE 9A758 RETAINER MUST BE FULLY SEATED IN SLOTTED HOLE ON ACCELERATOR PEDAL BRACKET ASY 9F926.

▽ (4) VERIFY CABLE SEATING BY PULLING BACK ON CABLE AFTER INSERTION.

(3) COLOR CODE: SILVER-STAINLESS STEEL.

(2) CLIP PIN TO CABLE. SECURE TO BRACKET TOWER BY SNAP-ON RETENTION.

(1) AFTER RETENTION OF CABLE REMOVE PROTECTIVE CAP. COLOR CODE-BLACK.

—— DESIGNATES LATEST ENGINEERING CHANGES.

*OBTAIN LATEST PREFIX, SUFFIX, AND TORQUE SPECIFICATIONS SEE APPROPRIATE "WORKS" SCREEN

030219

▽ NOTE 4	AVOID CONTAMINATION
▽ NOTE 3	INSTALL AS SHOWN
▽ NOTE 2	NO PART SUBSTITUTION OR SUBSTITUTION
▽ NOTE 1	TORQUE CONTROL

NO.	DESCRIPTION

▽ CONTROL ITEM - THE ▽ ALSO IDENTIFIES CRITICAL CHARACTERISTICS DESIGNATED BY THE CROSS FUNCTIONAL TEAMS DEVELOPING THE PRODUCT. THESE, AND ADDITIONAL CRITICAL CHARACTERISTICS IDENTIFIED BY PROCESS REVIEWS, MUST APPEAR ON THE CONTROL PLANS ACCORDING TO QS 9000. THESE CONTROL PLANS REQUIRE PRODUCT ENGINEERING APPROVAL.

X	03/13/97	WP15-E-1N6C677-000	PA
DR	DATE	ENGINEERING RELEASE	QA

ISSUED BY PARKERS	DATE 03/01	PRODUCT ENGINEERING
STORED BY CLASSIE	03/02	02 HITSCHE
APPROVAL		UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES
ENGR		ANTI-LOCK
ESATIVA	03/01	2WD V234
		PURPOSE
		WP-4F23-XXXE04-01

NOMENCLATURE

FOOT OPERATED THROTTLE CONTROL

PART NUMBER

▽ IL-4F23-031801-01