REPORT NUMBER 124-GTL-04-005

2/6
HS#
637305

SAFETY COMPLIANCE TESTING FOR FMVSS 124H ACCELERATOR CONTROL SYSTEMS

LANDROVER IN THE UK
2004 LANDROVER FREELANDER, MPV
NHTSA NO. C40600

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

AUGUST 6, 2004

FINAL REPORT

PREPARED FOR

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

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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 7th Street, S.W., Room 6115 Washington, DC 20590	13. Type of Report and Period Covered Final Test Report April 27, 2004
	14. Sponsoring Agency Code NSA-30

15. Supplementary Notes

16. Abstract

Compliance tests were conducted on the subject 2004 Landrover Freelander 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: Throttle Return Times

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Compliance Testing Safety Engineering FMVSS 124	Copies of this report are available from NHTSA NHTSA Technical Reference Div., Rm. 5108 (NAD-52) 400 7th St., S.W. Washington, DC 20590 Telephone No. (202) 366-4946

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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 LANDROVER FREELANDER, MPV, NHTSA No. C40600 in accordance with the National Highway Traffic Safety Administration (NHTSA) Laboratory Procedure TP-124-06.

The drive-by wire vehicle was equipped with an Accelerator Pedal Position Sensor (APS), Throttle Plate Position Sensor (TPS), Electronic Control Module (ECM), and Air Throttle Plate Actuator Motor (TPM).

Output from the 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. Normal operation testing was conducted to simulate the normal removal of the driver's foot from the accelerator pedal. Return to idle times were determined for various throttle plate positions with the accelerator control system complete and with each of the wires to the TPS/TPM acutator motor and APS independently severed and also shorted to ground. Return to idle times were also determined for severance of the connectors to the APS, and TPS/TPM actuator motor. Removal of two springs in the accelerator pedal was also performed and return to idle times individually checked. A motor return spring in the TPM was not removed due to the unit being a non serviceable unit. The ECM connectors were also tested for severance and affect on throttle return times.

The Laboratory by observation, did not experience any failures which resulted in a runaway engine. System failures were induced approximately simultaneously with release of pedal

force. Some tests were conducted only at 100% W.O.T. as it represented the worst case return time scenario.

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 LANDROVER FREELANDER MPV
VEHICLE NHTSA NO.: C40600
VEHICLE VIN: SALNY22214A[redacted]
DATE OF TEST: APRIL 27, 2004
TEST LAB: GENERAL TESTING LABORATORIES
VEHICLE ENGINE TYPE: V6 GVWR: 2060 KG
VEHICLE ENGINE SIZE: 2.5 L
VEHICLE ACCEL. CONTROL SYSTEM (ACS) (Air or Fuel Throttled): AIR
MAX. BHP ENGINE SPEED: 174 HP
MFR. IDLE RPM: COMPUTER CONTROLLED (750)
FUEL METERING DEVICE (Carburetor, fuel injection, etc): FUEL INJECTION

REMARKS:

RECORDED BY: _____ DATE: 04/27/04

APPROVED BY: _____

DATA SHEET 2
NORMAL OPERATION TEST
(fully operational system)

VEHICLE MY/MAKE/MODEL/BODY STYLE: 2004 LANDROVER FREELANDER MPV
VEHICLE NHTSA NO.: C40600
DATE OF TEST: APRIL 27, 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	6750	120.1	120.7	8%	2437	F
50%	50	6750	130.4	120.7	8%	2731	F
75%	75	6750	145.3	121.0	8%	1958	F
100%	100	6750	148.5	121.2	8%	1862	F

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 _____ FAIL X

REMARKS:

RECORDED BY: [signature] DATE: 04/27/04

APPROVED BY: D. Messier

DATA SHEET 3 (1 of 9)
FAIL-SAFE OPERATION DISCONNECTION

VEHICLE MY/MAKE/MODEL/BODY STYLE: 2004 LANDROVER FREELANDER, MPV
VEHICLE NHTSA NO.: C40600
DATE OF TEST: APRIL 27, 2004

Check one:

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

SYSTEM CONDITION: #1 SPRING DISCONNECTED IN APS

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	6750	136.0	120.4	8%	1573	F
50%	50	6750	142.2	120.4	8%	1969	F
75%	75	6750	160.5	120.5	8%	1818	F
100%	100	6750	165.6	120.5	8%	1882	F

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 _____ FAIL X

REMARKS:

RECORDED BY: [signature] DATE: 04/27/04

APPROVED BY: D. Messel

DATA SHEET 3 (2 of 9)
FAIL-SAFE OPERATION DISCONNECTION

VEHICLE MY/MAKE/MODEL/BODY STYLE: 2004 LANDROVER FREELANDER, MPV
VEHICLE NHTSA NO.: C40600
DATE OF TEST: APRIL 27, 2004

Check one:

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

SYSTEM CONDITION: #2 SPRING DISCONNECTED IN APS

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	6750	136.4	121.4	8%	1858	F
50%	50	6750	138.2	121.4	8%	1961	F
75%	75	6750	140.7	121.6	8%	2079	F
100%	100	6750	145.0	121.7	8%	1901	F

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 _____ FAIL X

REMARKS:

RECORDED BY: [signature] DATE: 04/27/04

APPROVED BY: D. Messel

DATA SHEET 3 (3 of 9)
FAIL-SAFE OPERATION DISCONNECTION

VEHICLE MY/MAKE/MODEL/BODY STYLE: 2004 LANDROVER FREELANDER, MPV
VEHICLE NHTSA NO.: C40600
DATE OF TEST: APRIL 27, 2004

Check one:

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

SYSTEM CONDITION: TPS/TPM CONNECTOR DISCONNECT

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%							
50%							
75%							
100%	100	6750	155	121.4	8%	5	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: [signature] DATE: 04/27/04

APPROVED BY: D. Mossil

DATA SHEET 3 (4 of 9)
FAIL-SAFE OPERATION DISCONNECTION

VEHICLE MY/MAKE/MODEL/BODY STYLE: 2004 LANDROVER FREELANDER, MPV
VEHICLE NHTSA NO.: C40600
DATE OF TEST: APRIL 27, 2004

Check one:

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

SYSTEM CONDITION: APS CONNECTOR DISCONNECT

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%							
50%							
75%							
100%	100	6750	146	121.6	8%	7	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: G. Farrand DATE: 04/27/04

APPROVED BY: D. Messier

DATA SHEET 3 (5 of 9)
FAIL-SAFE OPERATION DISCONNECTION

VEHICLE MY/MAKE/MODEL/BODY STYLE: 2004 LANDROVER FREELANDER, MPV
VEHICLE NHTSA NO.: C40600
DATE OF TEST: APRIL 27, 2004

Check one:

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

SYSTEM CONDITION: ECM CONNECTOR DISCONNECT

CONN NO.	ACCELERATOR POSITION % WIDE OPEN THROTTLE (WOT)	THROTTLE POSITION SENSOR READING	RPM	TEMPERATURE (°F)		THROTTLE POSITION SENSOR READING @ IDLE (BASELINE)	RETURN TIME TO IDLE (Msec) OR LIMP MODE	PASS/ FAIL
				ENGINE COOLANT	AMBIENT			
1	100%	100	6750	155	121.2	8%	13	P*
2	100%	100	6750	156	121.2	8%	138	P*
3	100%	100	6750	165	121.5	8%	28	P*
4	100%	100	6750	177	121.7	8%	2250	F
5	100%	100	6750	178	121.8	8%	1316	F

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 _____ FAIL X

REMARKS: * Engine stopped during all of the above disconnects.

RECORDED BY: S. Gerard DATE: 04/27/04

APPROVED BY: D Messier

DATA SHEET 3 (6 of 9)
FAIL-SAFE OPERATION DISCONNECTION

VEHICLE MY/MAKE/MODEL/BODY STYLE: 2004 LANDROVER FREELANDER, MPV
VEHICLE NHTSA NO.: C40600
DATE OF TEST: APRIL 27, 2004

Check one:

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

SYSTEM CONDITION: TPS/TPM INDIVIDUAL WIRES SEVERED

WIRE NO.	ACCELERATOR POSITION % WIDE OPEN THROTTLE (WOT)	THROTTLE POSITION SENSOR READING	RPM	TEMPERATURE (°F)		THROTTLE POSITION SENSOR READING @ IDLE (BASELINE)	RETURN TIME TO IDLE (Msec) OR LIMP MODE	PASS/ FAIL
				ENGINE COOLANT	AMBIENT			
1	100%	100	6750	146.6	121.8	8%	2255	F
2	100%	100	6750	165.6	121.8	8%	180	P
3	100%	100	6750	176.8	121.9	8%	114	P
4	100%	100	6750	175.3	122.0	8%	3389	F
5	100%	100	6750	180.1	122.1	8%	18	P
6	100%	100	6750	193.8	122.4	8%	3307	F

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 _____ FAIL X

REMARKS:

RECORDED BY: L. Fernandez DATE: 04/27/04

APPROVED BY: D. Masi

DATA SHEET 3 (7 of 9)
FAIL-SAFE OPERATION DISCONNECTION

VEHICLE MY/MAKE/MODEL/BODY STYLE: 2004 LANDROVER FREELANDER, MPV
VEHICLE NHTSA NO.: C40600
DATE OF TEST: APRIL 27, 2004

Check one:

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

SYSTEM CONDITION: TPS/TPM INDIVIDUAL WIRES SHORTED TO GROUND

WIRE NO.	ACCELERATOR POSITION % WIDE OPEN THROTTLE (WOT)	THROTTLE POSITION SENSOR READING	RPM	TEMPERATURE (°F)		THROTTLE POSITION SENSOR READING @ IDLE (BASELINE)	RETURN TIME TO IDLE (Msec) OR LIMP MODE	PASS/ FAIL
				ENGINE COOLANT	AMBIENT			
1	100%	100	6750	167.7	121.6	8%	3549	F
2	100%	100	6750	178.3	122.3	8%	2789	F
3	100%	100	6750	178.8	122.5	8%	156	P
4	100%	100	6750	182.5	122.6	8%	67	P
5	100%	100	6750	193.8	122.9	8%	2936	F
6	100%	100	6750	193.6	12	8%	27	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 _____ FAIL X

REMARKS:

RECORDED BY: [signature] DATE: 04/27/04

APPROVED BY: [signature]

DATA SHEET 3 (8 of 9)
FAIL-SAFE OPERATION DISCONNECTION

VEHICLE MY/MAKE/MODEL/BODY STYLE: 2004 LANDROVER FREELANDER, MPV
VEHICLE NHTSA NO.: C40600
DATE OF TEST: APRIL 27, 2004

Check one:

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

SYSTEM CONDITION: APS INDIVIDUAL WIRES SEVERED

WIRE NO.	ACCELERATOR POSITION % WIDE OPEN THROTTLE (WOT)	THROTTLE POSITION SENSOR READING	RPM	TEMPERATURE (°F)		THROTTLE POSITION SENSOR READING @ IDLE (BASELINE)	RETURN TIME TO IDLE (Msec) OR LIMP MODE	PASS/ FAIL
				ENGINE COOLANT	AMBIENT			
11	100%	100	6750	152.4	122.9	8%	2328	F
12	100%	100	6750	175.5	122.8	8%	2388	F
13	100%	100	6750	179.4	123.0	8%	3027	F
14	100%	100	6750	185.5	123.0	8%	2697	F
15	100%	100	6750	190.1	123.1	8%	2665	F
16	100%	100	6750	194.7	123.2	8%	2395	F

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 _____ FAIL X

REMARKS:

RECORDED BY: [signature] DATE: 04/27/04

APPROVED BY: D Musick

DATA SHEET 3 (9 of 9)
FAIL-SAFE OPERATION DISCONNECTION

VEHICLE MY/MAKE/MODEL/BODY STYLE: 2004 LANDROVER FREELANDER, MPV
VEHICLE NHTSA NO.: C40600
DATE OF TEST: APRIL 27, 2004

Check one:

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

SYSTEM CONDITION: APS INDIVIDUAL WIRES SHORTED TO GROUND

WIRE NO.	ACCELERATOR POSITION % WIDE OPEN THROTTLE (WOT)	THROTTLE POSITION SENSOR READING	RPM	TEMPERATURE (°F)		THROTTLE POSITION SENSOR READING @ IDLE (BASELINE)	RETURN TIME TO IDLE (Msec) OR LIMP MODE	PASS/ FAIL
				ENGINE COOLANT	AMBIENT			
11	100%	100	6750	154.6	121.9	8%	18	P
12	100%	100	6750	174.6	120.2	8%	2132	F
13	1005	100	6750	185.8	120.1	8%	1927	F
14	100%	100	6750	190.0	120.4	8%	2036	F
15	100%	100	6750	190.8	121.0	8%	1881	F
16	100%	100	6750	190.9	121.2	8%	2130	F

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 _____ FAIL X

REMARKS:

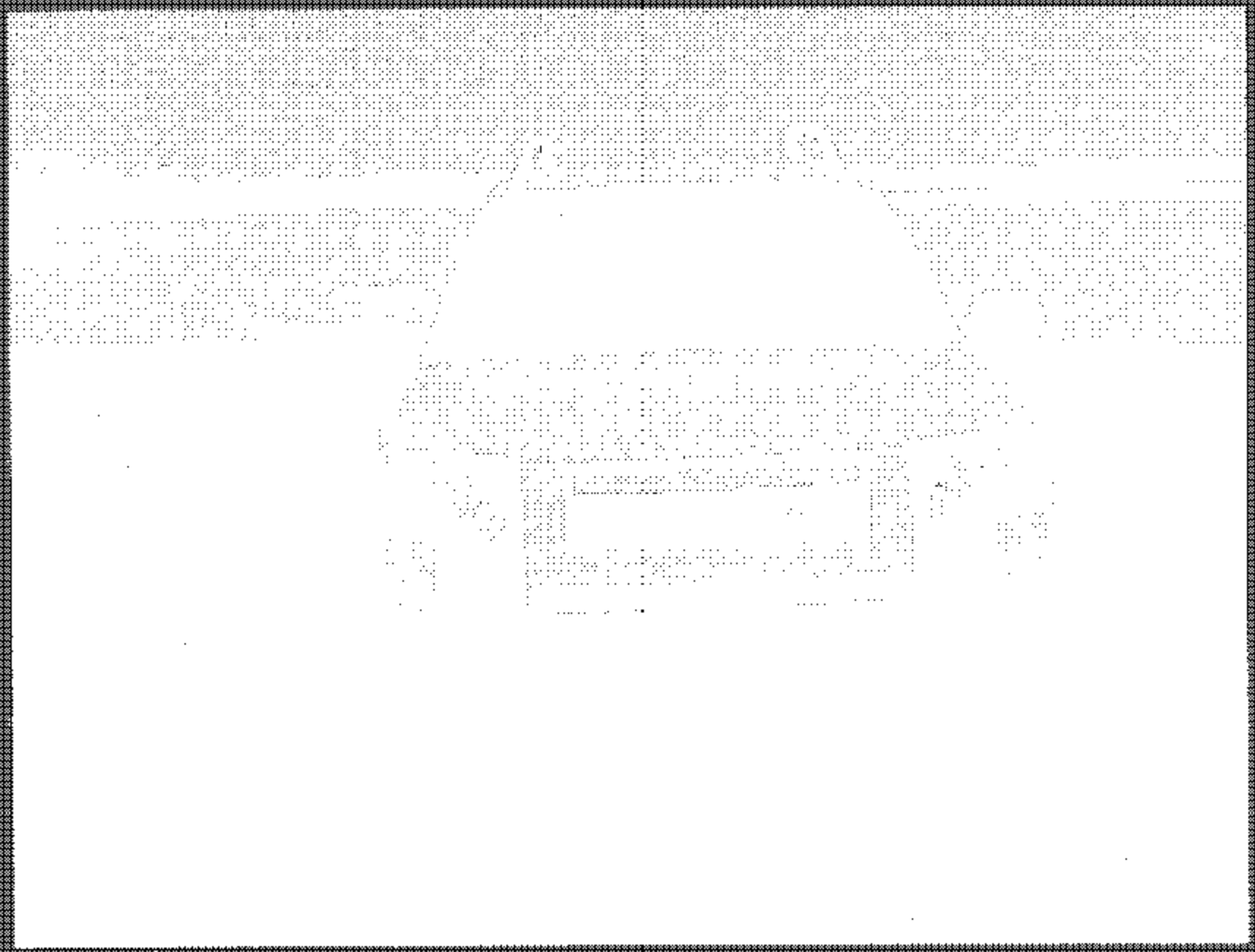
RECORDED BY: _____ DATE: 04/27/04

APPROVED BY: _____

SECTION 4
TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

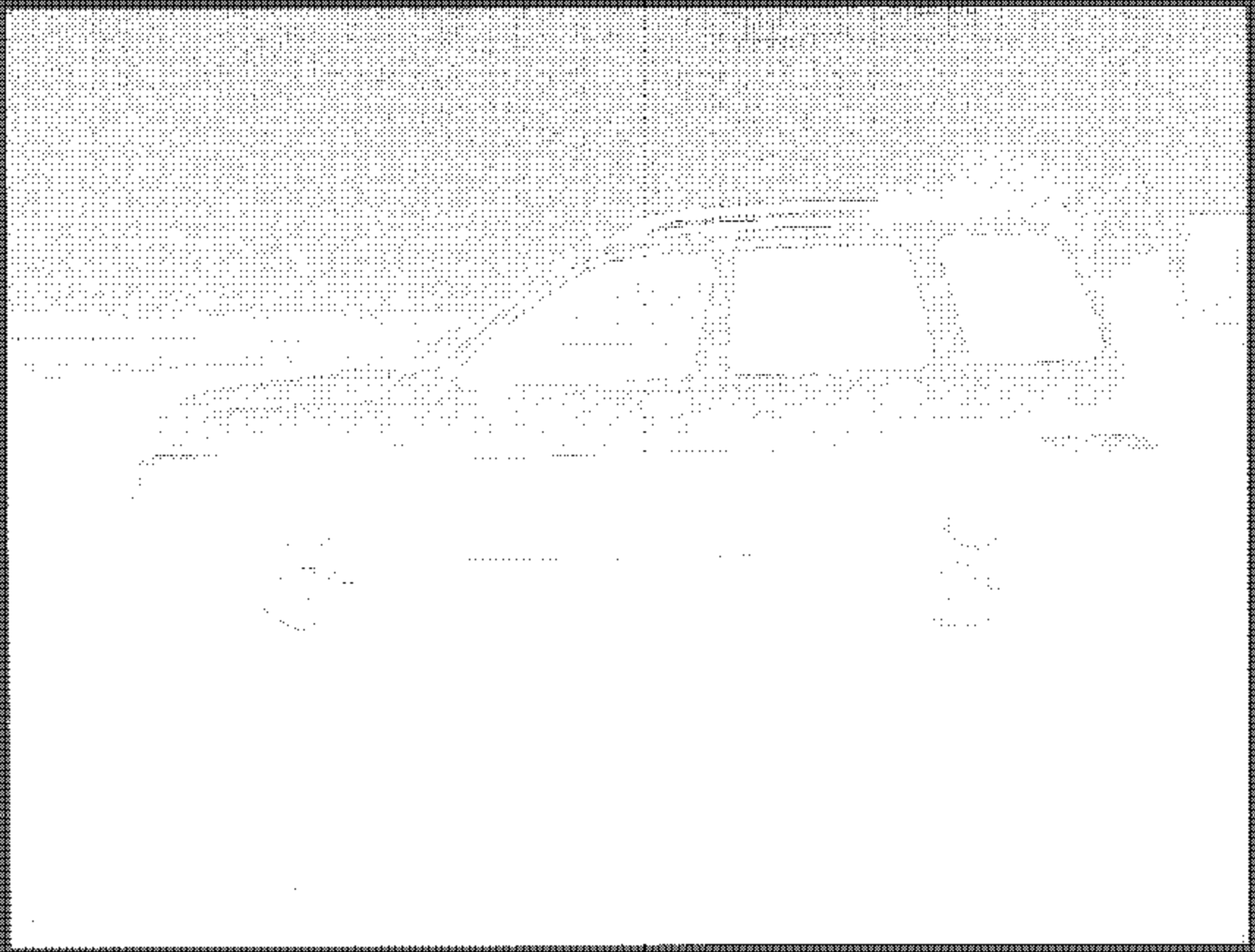
EQUIPMENT	DESCRIPTION	MODEL/ SERIAL NO.	CAL. DATE	NEXT CAL. DATE
CONTINUOUS RECORDER	OMEGA	55662	03/04	03/05
ENGINE RECORDING	FLUKE	7471026	03/04	03/05
ENGINE RECORDING	MONARCH	1444664	01/04	07/05
SOFTWARE	GTL	N/A	BEFORE USE	BEFORE USE
CHAMBER	GTL	N/A	N/A	N/A
EXHAUST DUCT	GTL	N/A	N/A	N/A

SECTION 5
PHOTOGRAPHS



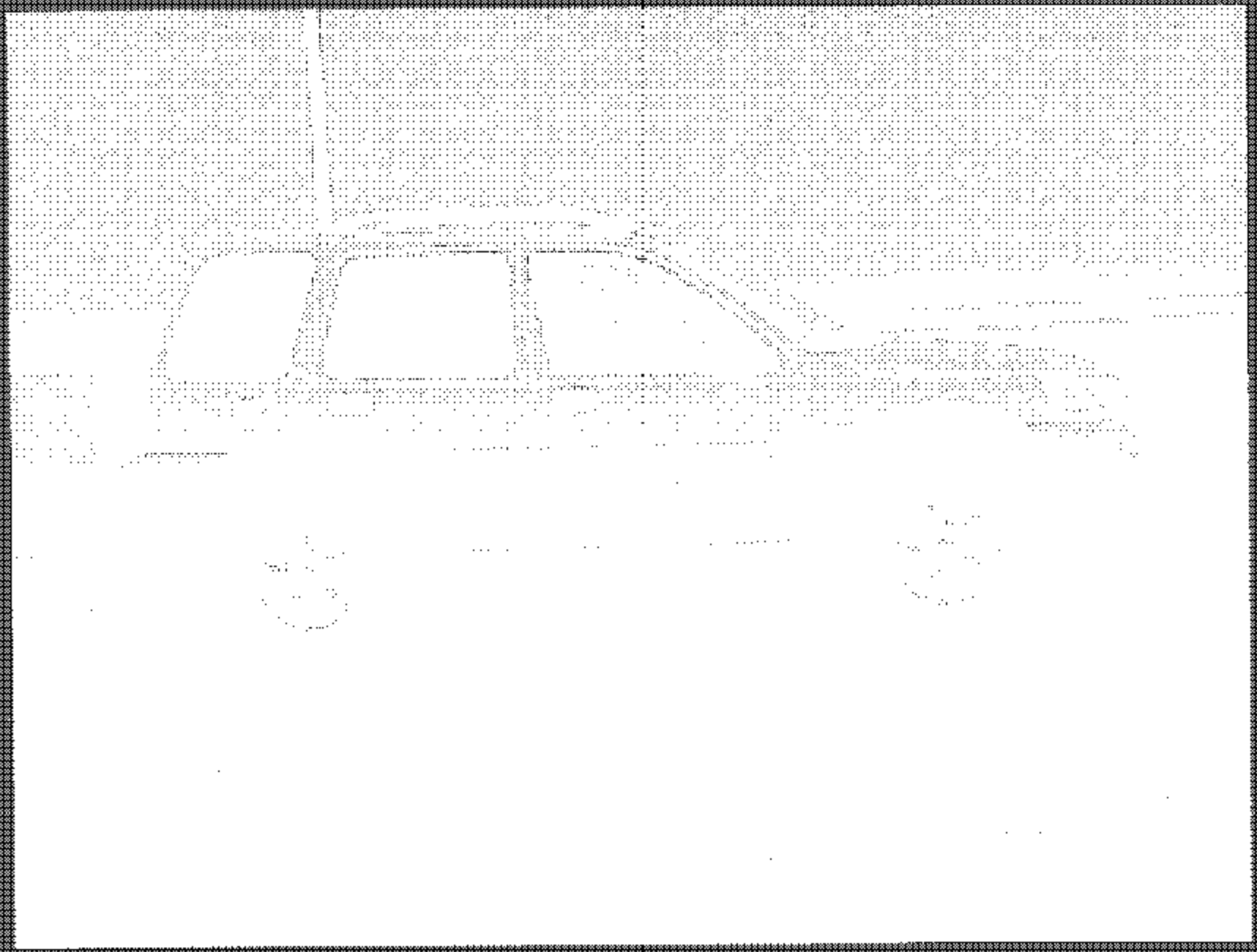
2004 LAND ROVER FREELANDER
NHTSA NO. C40600
FMVSS NO. 124H

FIGURE 5.1
FRONT VIEW OF VEHICLE



2004 LAND ROVER FREELANDER
NHTSA NO. C40600
FMVSS NO. 124H

FIGURE 5.2
LEFT SIDE VIEW OF VEHICLE

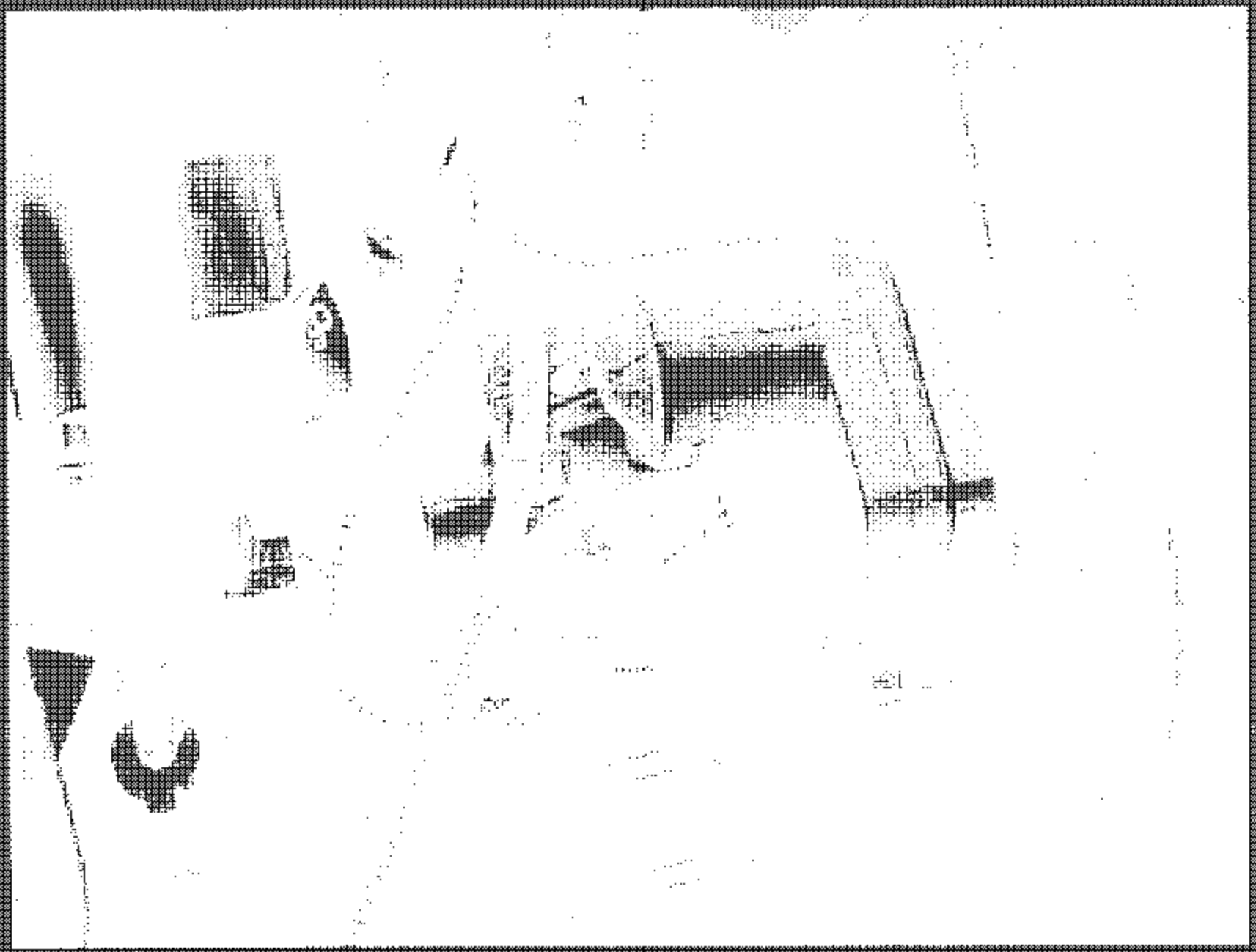


2004 LAND ROVER FREELANDER
NHTSA NO. C40600
FMVSS NO. 124H

FIGURE 5.3
RIGHT SIDE VIEW OF VEHICLE

2004 LAND ROVER FREELANDER
NHTSA NO. C40600
FMVSS NO. 124H

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

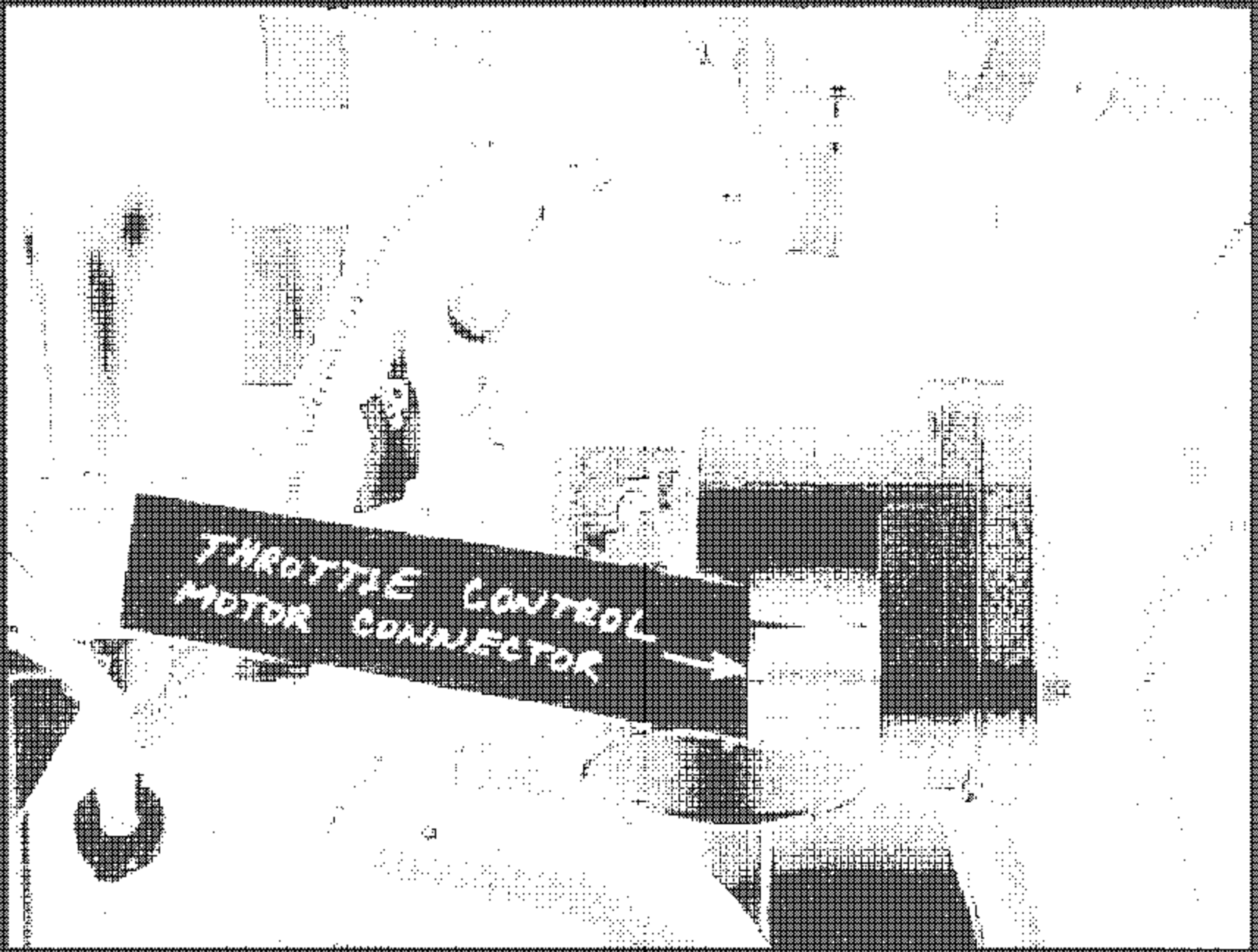


2004 LAND ROVER FREELANDER
NHTSA NO. C40800
FMVSS NO. 124H

FIGURE 5.5
VIEW OF THROTTLE BODY ON ENGINE

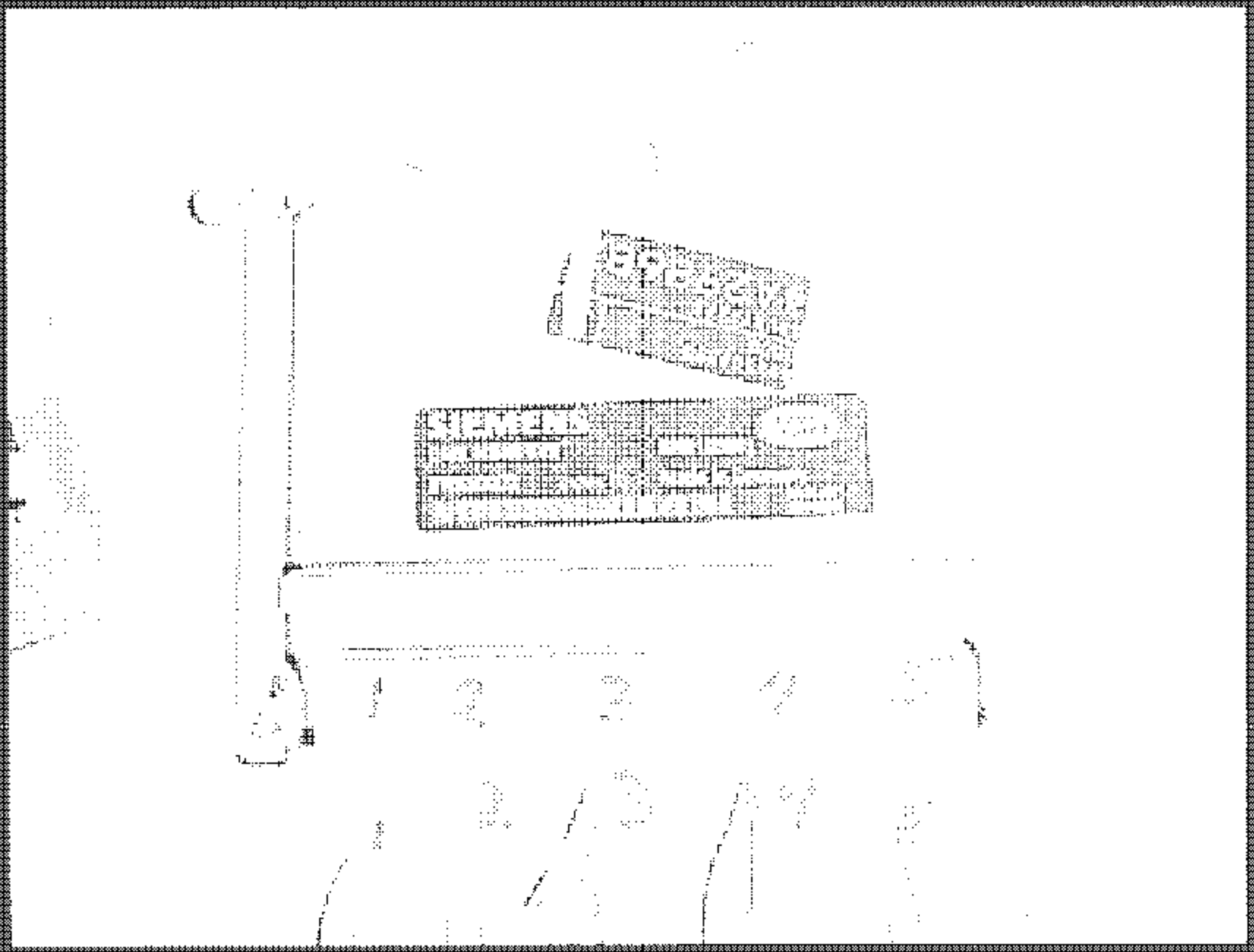
2004 LAND ROVER FREELANDER
NHTSA NO. C40600
FMVSS NO. 124H

FIGURE 5.6
LOCATION OF TPS AND TPM



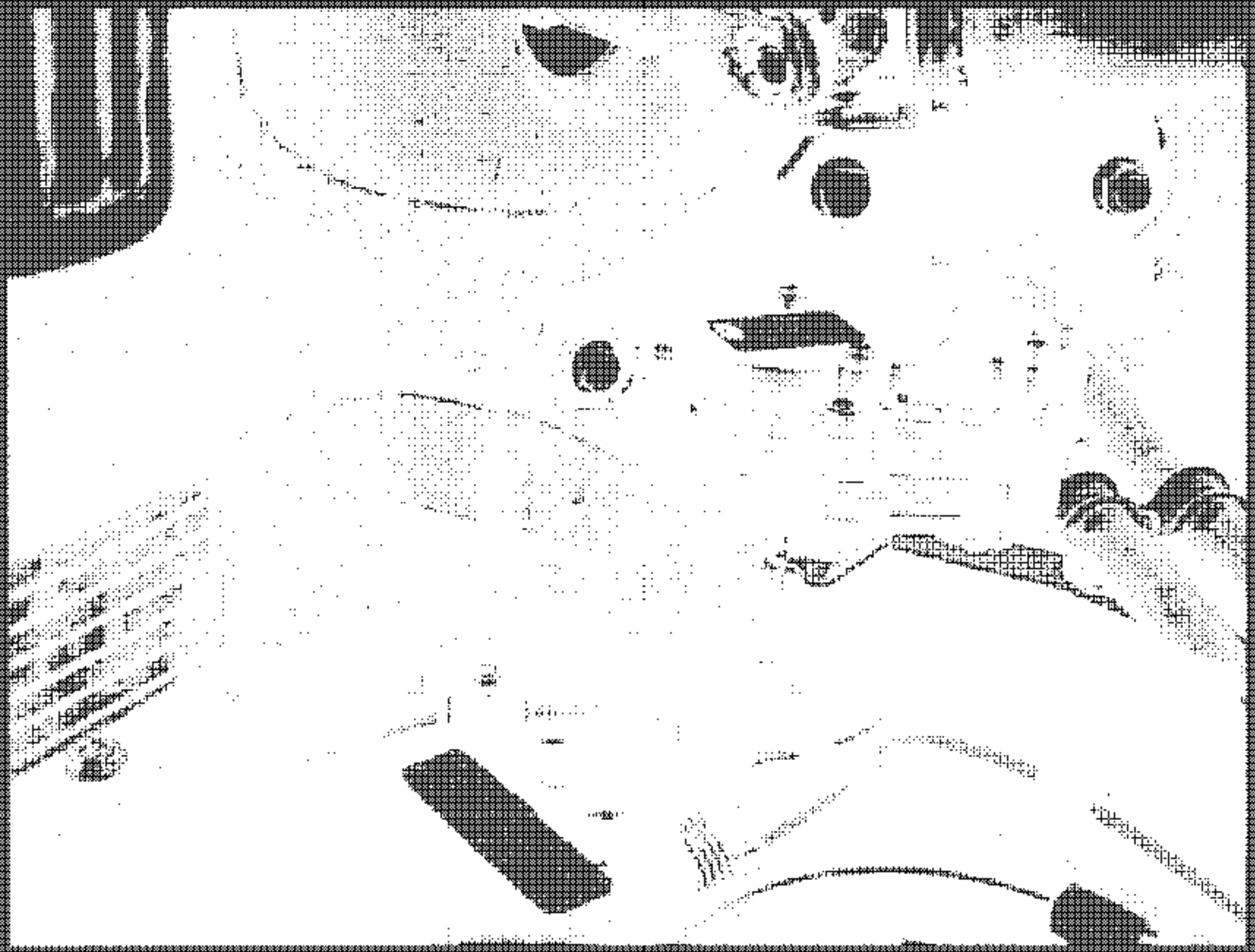
2004 LAND ROVER FREELANDER
NHTSA NO. C40600
FMVSS NO. 124H

FIGURE 5.7
TPS AND TPM CONNECTOR



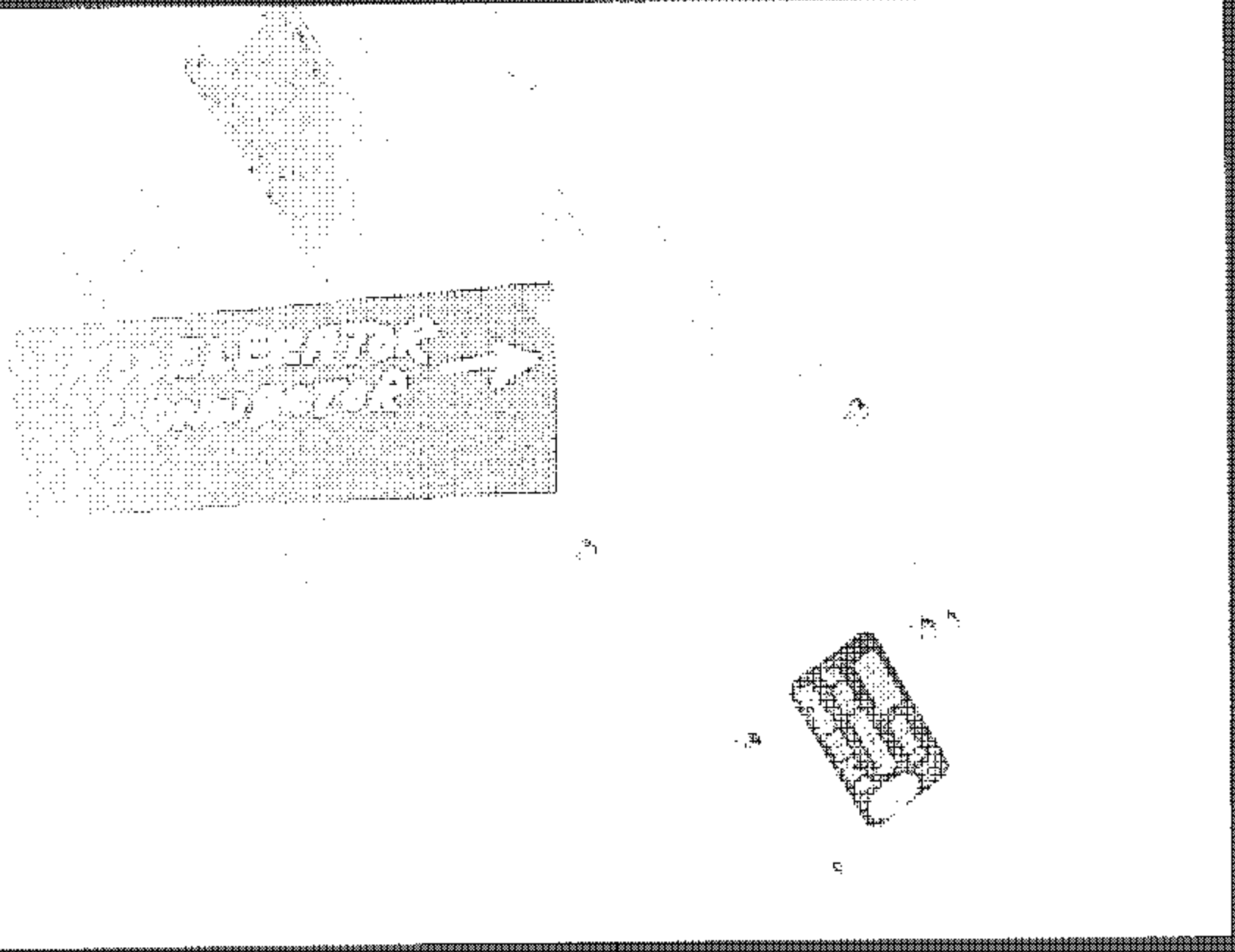
2004 LAND ROVER FREELANDER
NHTSA NO. C40800
FMVSS NO. 124H

FIGURE 5.8
ECM CONNECTORS #1THRU #5



2004 LAND ROVER FREELANDER
NHTSA NO. C40600
FMVSS NO. 124H

FIGURE 5.9
ACCELERATOR PEDAL ASSEMBLY IN CAR

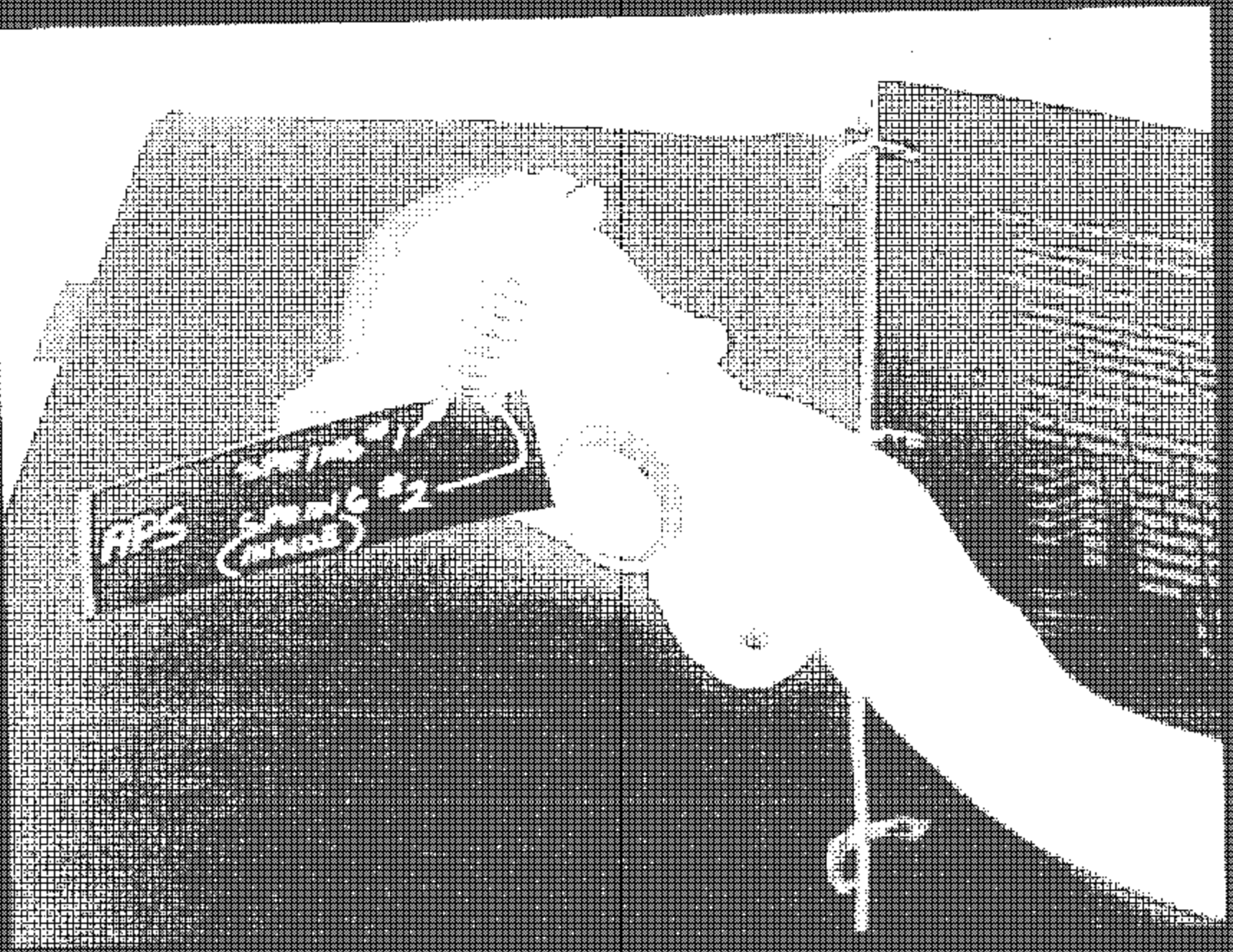


2004 LAND ROVER FREELANDER
NHTSA NO. C40603
FMVSS NO. 124H

FIGURE 5.10
ACCELERATOR CONNECTOR

2004 LAND ROVER FREELANDER
NHTSA NO. C40500
FMVSS NO. 124H

FIGURE 5.11
ACCELERATOR PEDAL SPRINGS #1 & #2
CLOSE-UP



2004 LAND ROVER FREELANDER
NHTSA NO. C40800
FMVSS NO. 124H

FIGURE 5.12
ACCELERATOR PEDAL ASSEMBLY

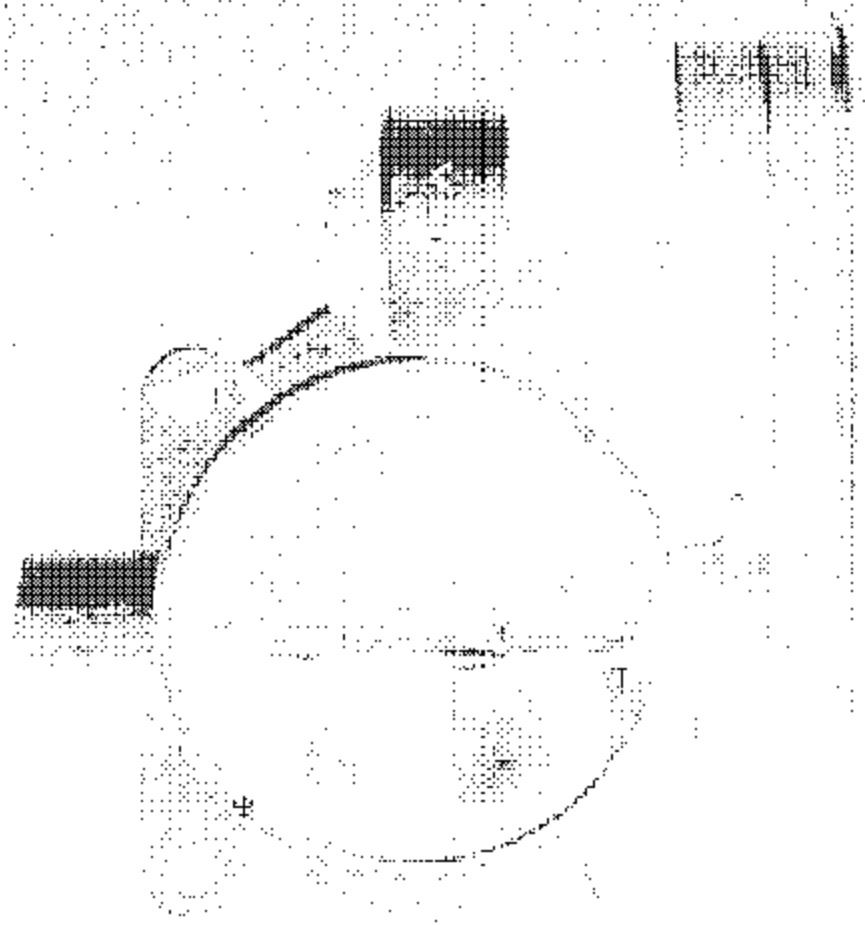


FIGURE 5.13
THROTTLE BODY ASSEMBLY FRONT VIEW

FIGURE 6.14
THROTTLE BODY ASSEMBLY SIDE VIEW

2004 LAND ROVER FREELANDER
NHTSA NO. C40800
FMVSS NO. 124H

FIGURE 5.15
VEHICLE IN TEST CHAMBER

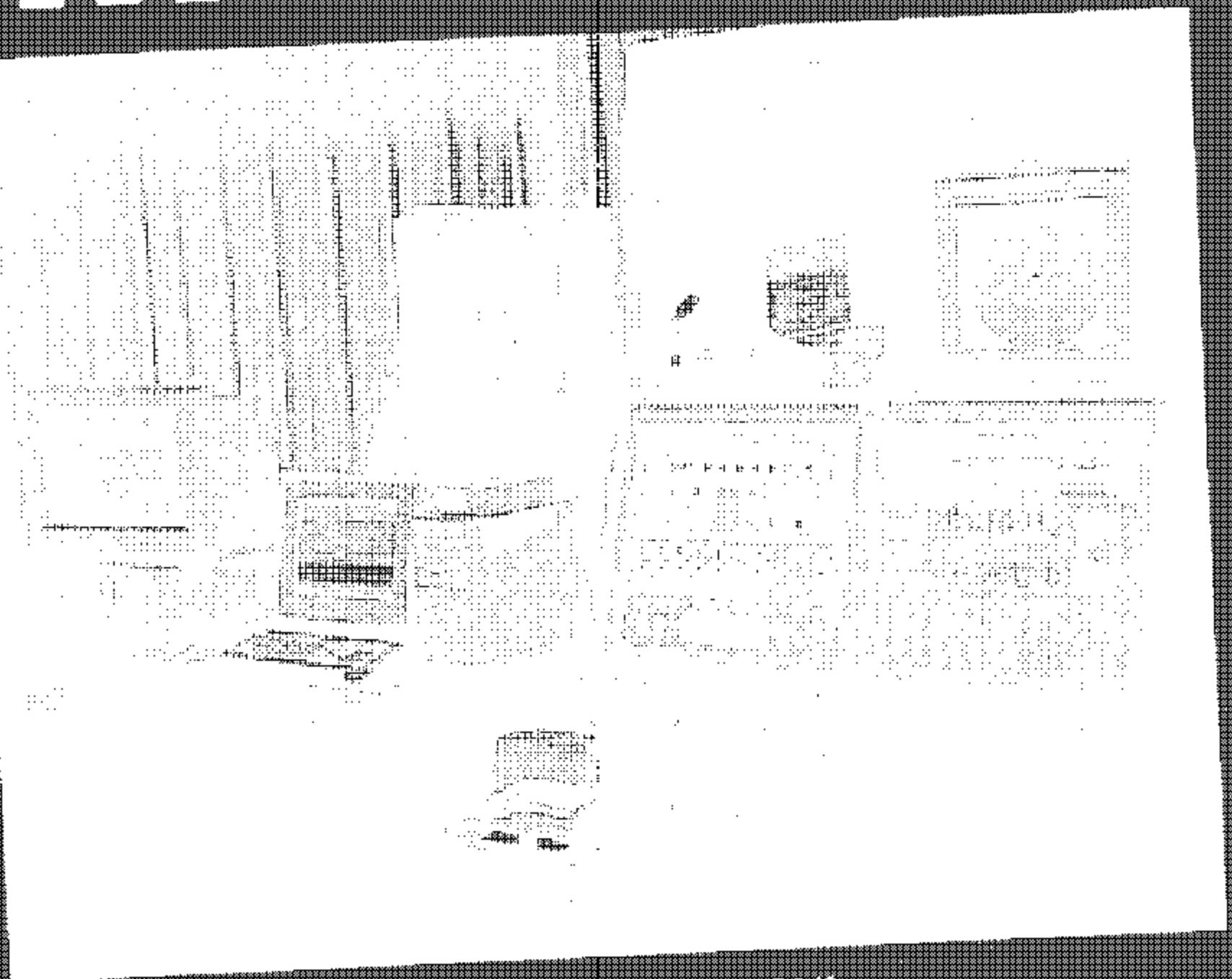


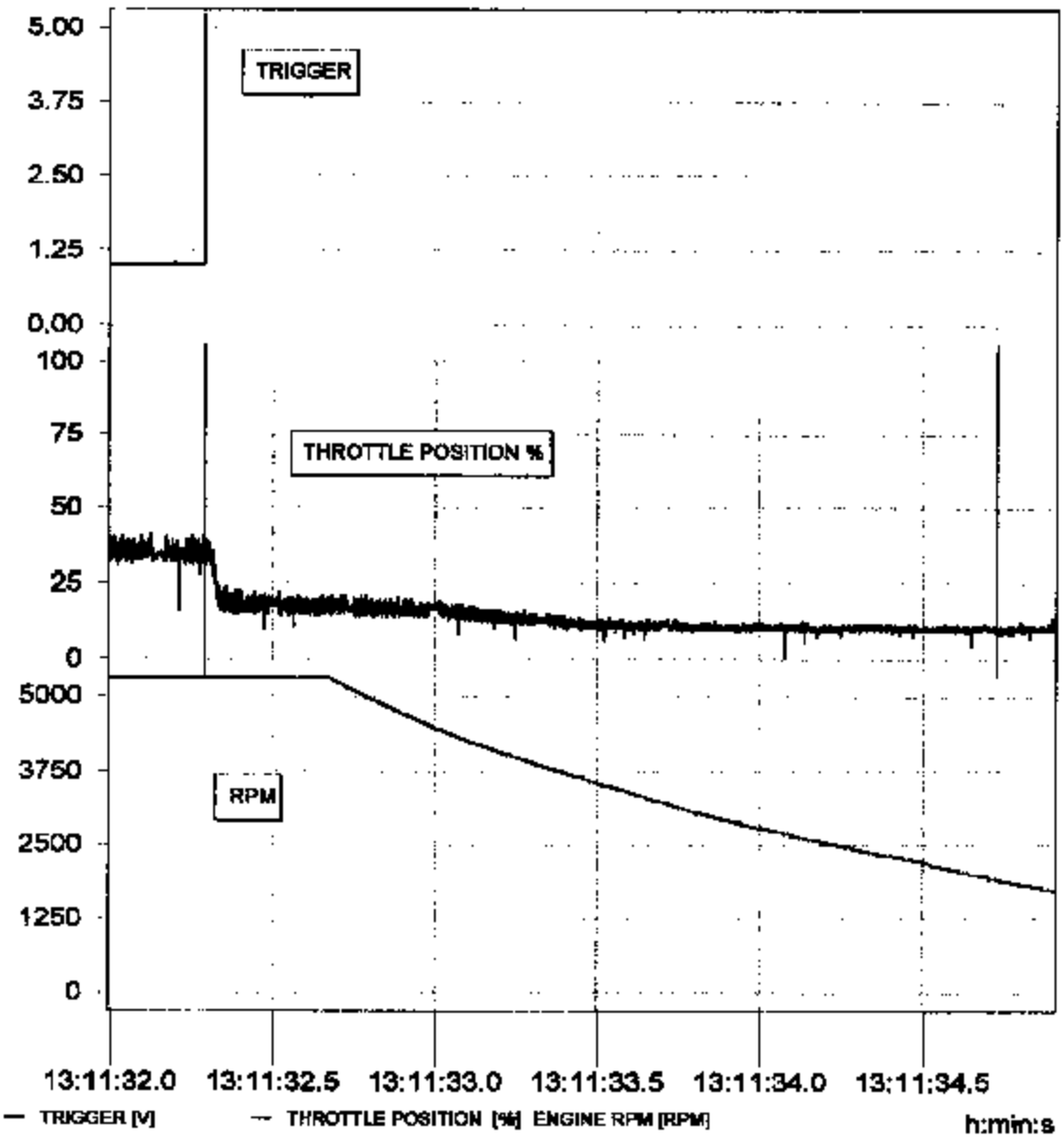
FIGURE 5.16
124 TEST INSTRUMENTATION SET-UP

SECTION 6
PLOTS

FMVSS 124 THROTTLE RETURN TEST

124 HOT / NORMAL/25% WOT 9:37:23 AM 4/28/04

NHTSA C40600 FREELANDER



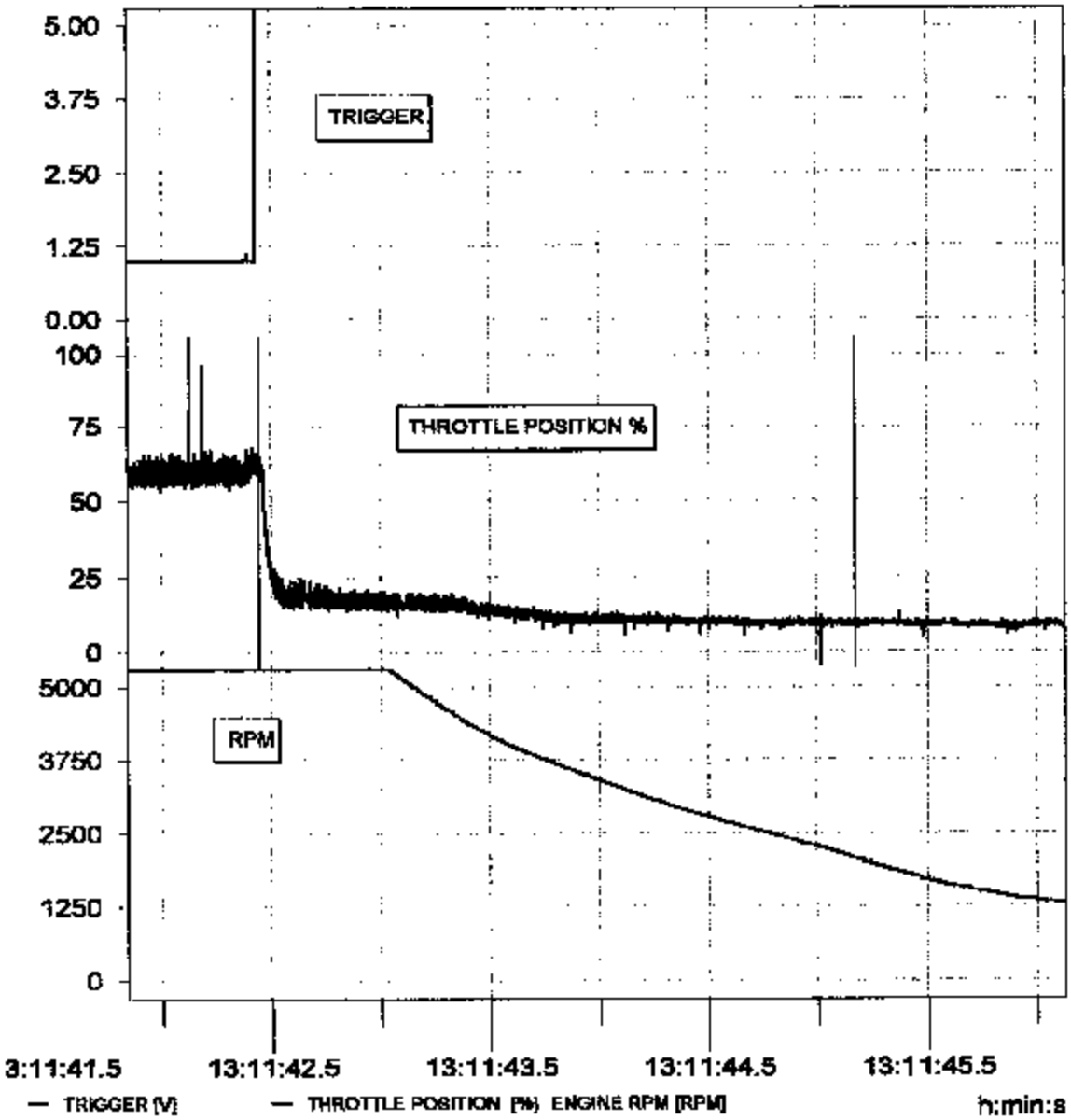
Channel:THROTTLE POSITION

Y1:	35.245 %	Y2:	8.466 %
t1:	-54711.000 ms	t2:	-52274.000 ms
dt:	2.437 s	f:	0.410 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT / NORMAL/ 50 % WOT 9:45:49 AM 4/26/04

NHTSA C40600 FREELANDER



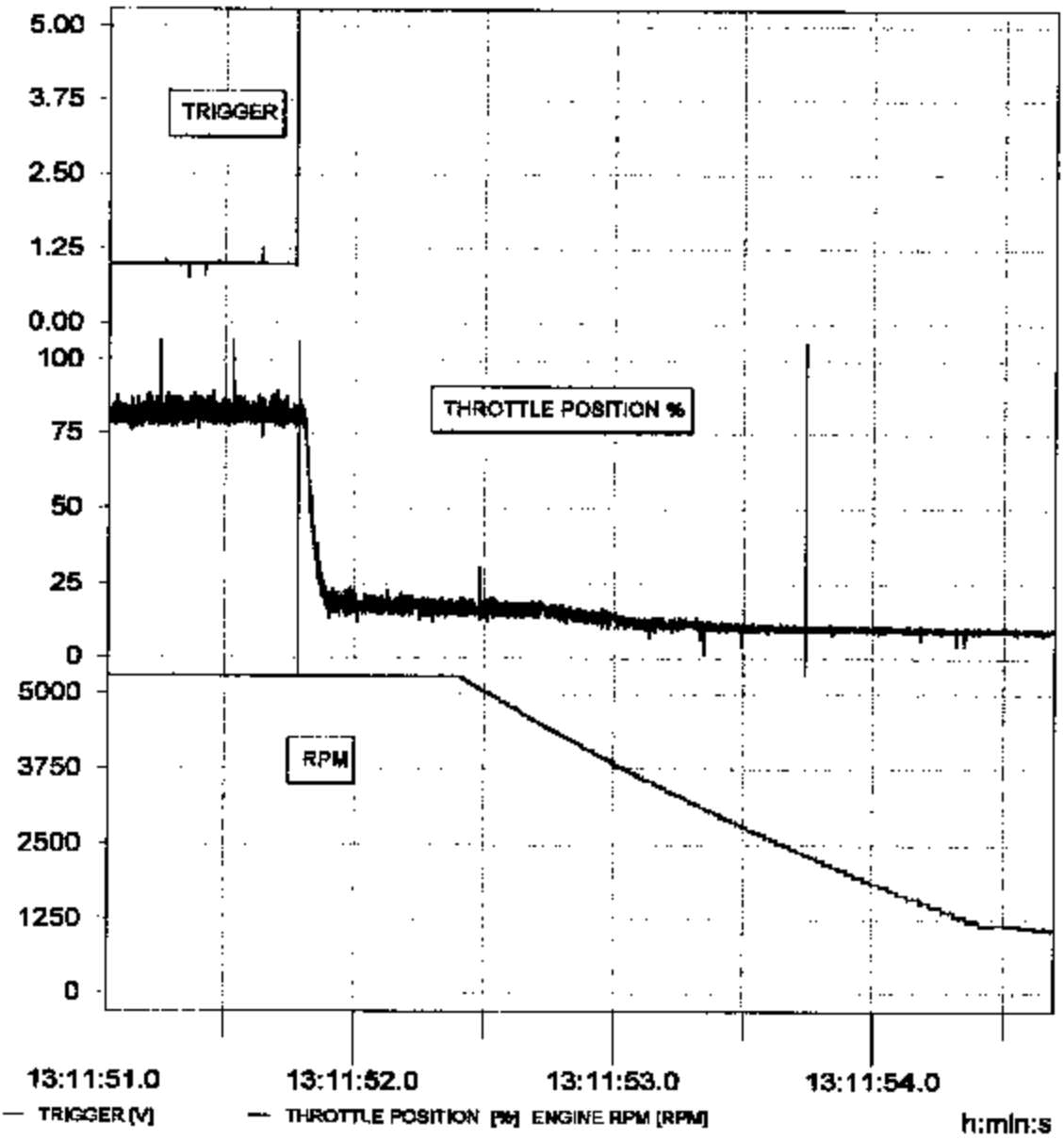
Channel:THROTTLE POSITION

Y1:	58.489 %	Y2:	6.829 %
t1:	-44558.000 ms	t2:	-41827.000 ms
dt:	2.731 s	f:	0.366 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT / NORMAL/ 75 % WOT 9:49:24 AM 4/28/04

NHTSA C40600 FREELANDER



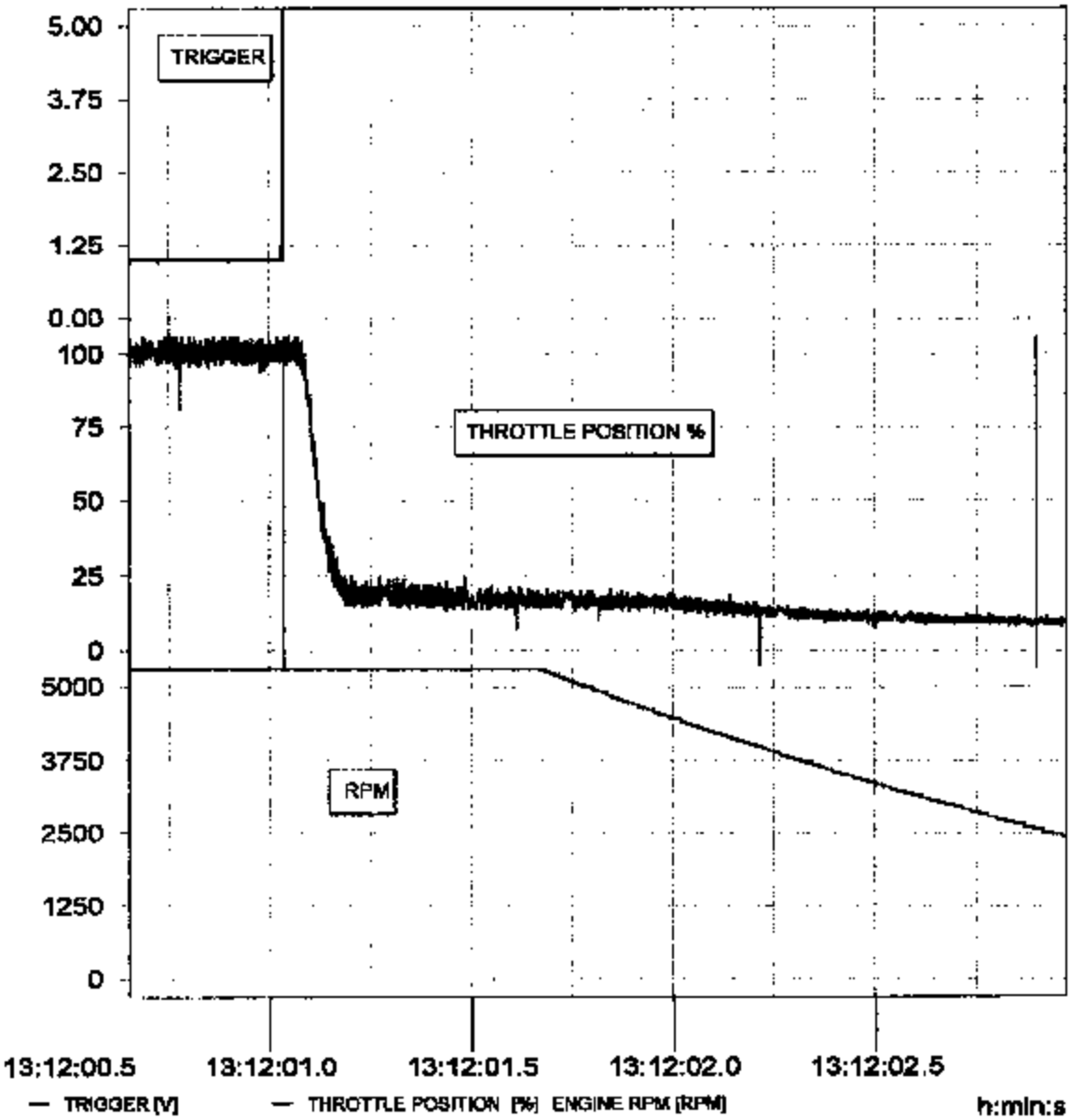
Channel:THROTTLE POSITION

Y1:	62.269 %	Y2:	8.914 %
t1:	-35220.000 ms	t2:	-33262.000 ms
dt:	1.958 s	f:	0.511 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT / NORMAL/ 100 % WOT 9:52:57 AM 4/28/04

NHTSA C40600 FREELANDER



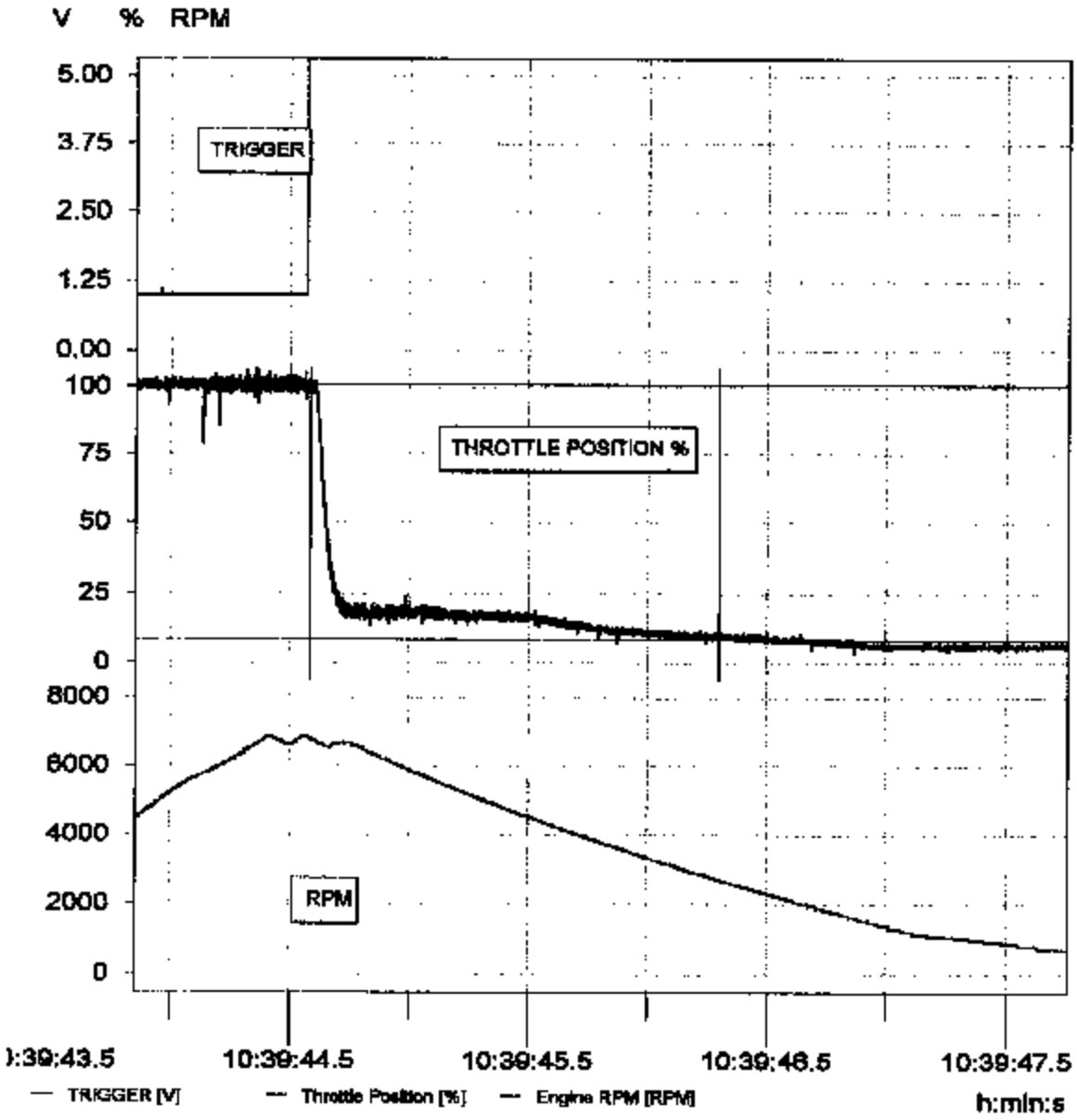
Channel:THROTTLE POSITION

Y1:	102.485 %	Y2:	8.825 %
t1:	-25966.000 ms	t2:	-24104.000 ms
dt:	1.862 s	f:	0.537 Hz

FMVSS 124 THROTTLE RETURN TEST

124 AMBIENT/NORMAL/ 100% WOT 10:51:33 AM 4/28/04

NHTSA C40600 FREELANDER



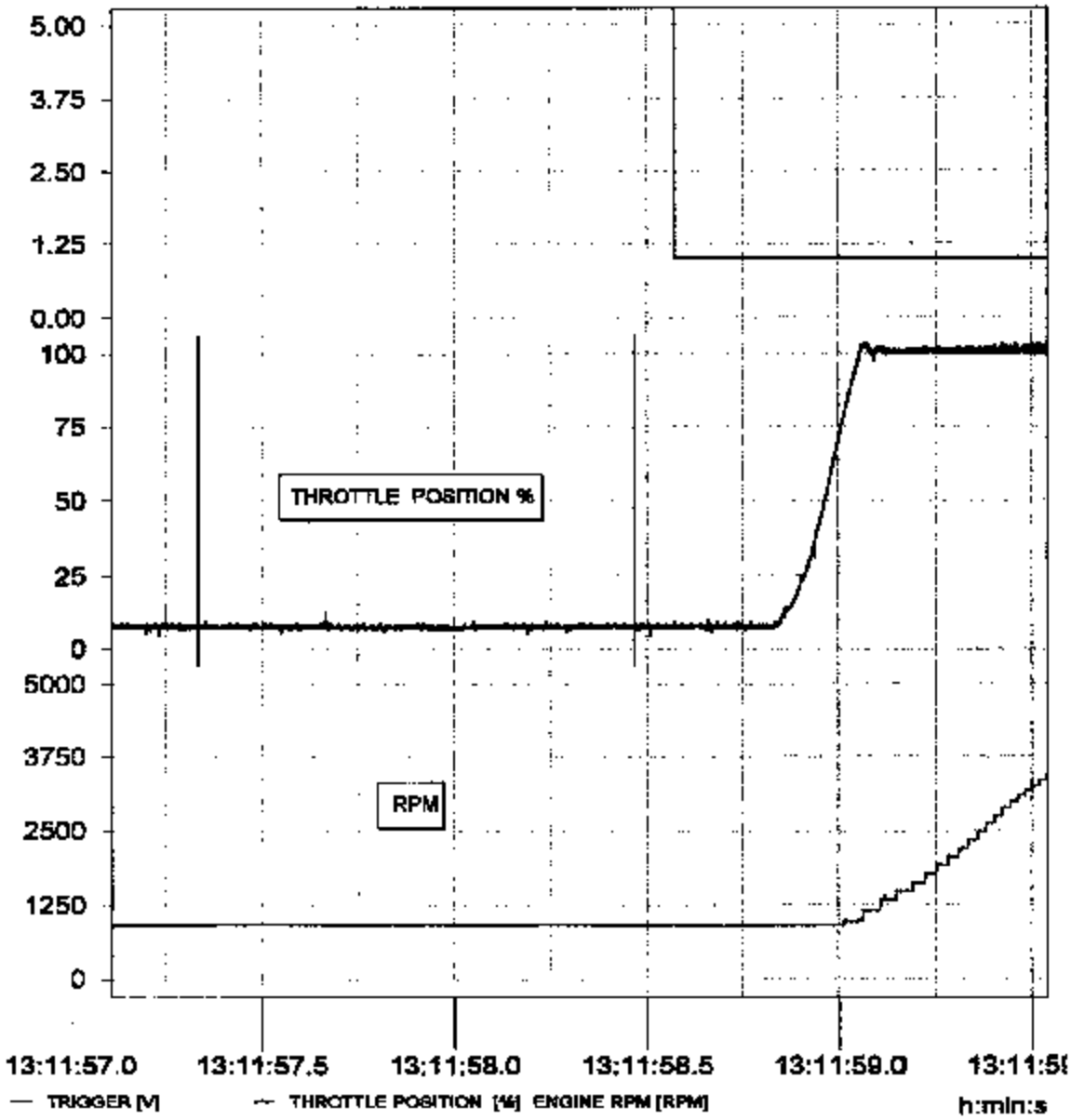
Channel:Throttle Position

Y1:	100.660 %	Y2:	8.460 %
t1:	-5436.365 ms	t2:	-3725.365 ms
dt:	1.711 s	f:	0.584 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT / NORMAL/ BASELINE IDLE 9:59:36 AM 4/28/04

NHTSA C40600 FREELANDER



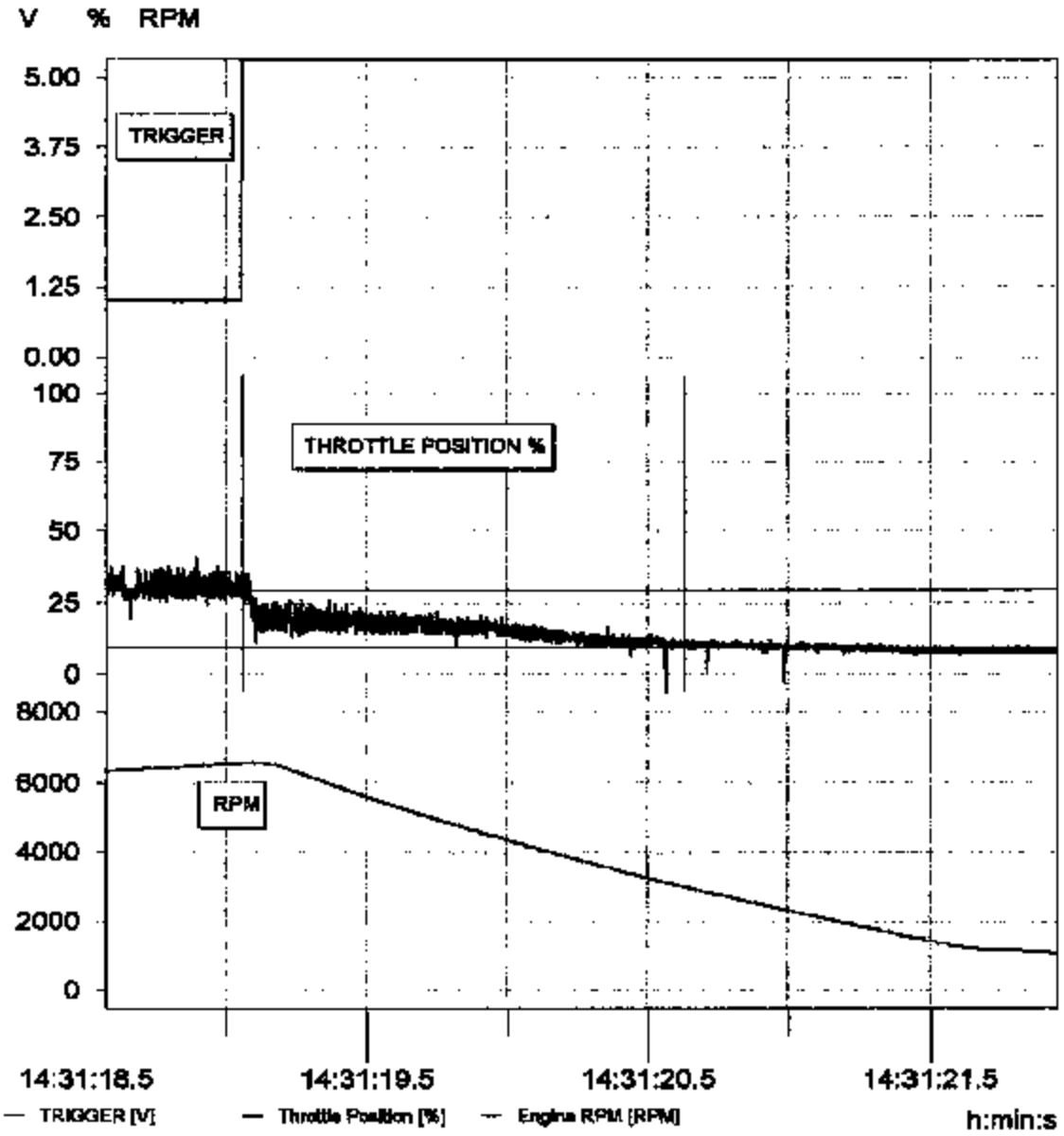
Channel:THROTTLE POSITION

Y1:	8.381 %	Y2:	8.171 %
t1:	-29668.000 ms	t2:	-28533.000 ms
dt:	1.135 s	f:	0.881 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/ SPRING 1/ 25% WOT 3:07:14 PM 4/27/04

NHTSA C40600 FREELANDER



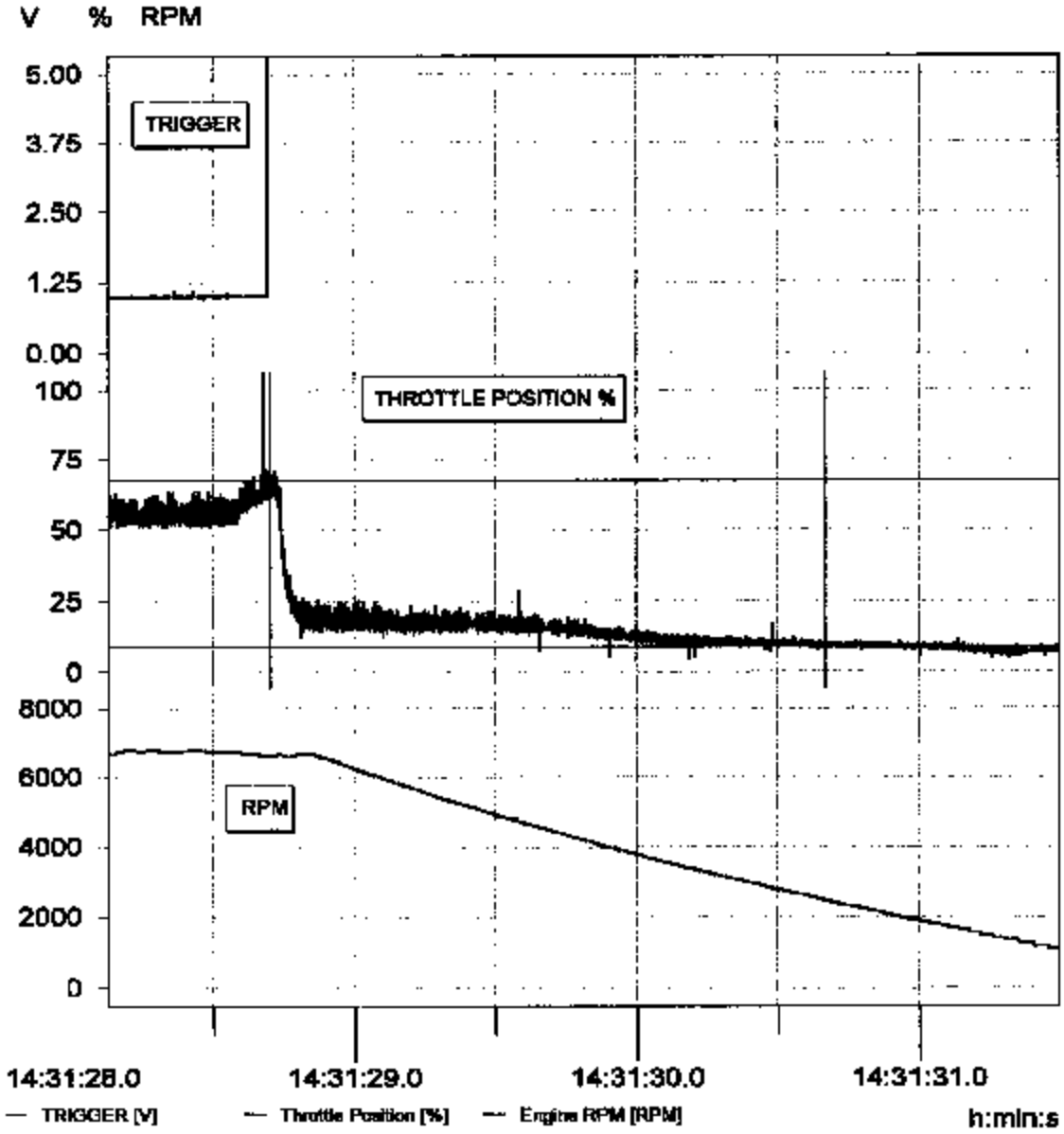
Channel:Throttle Position

Y1:	29.424 %	Y2:	8.968 %
t1:	-33976.992 ms	t2:	-32403.992 ms
dt:	1.573 s	f:	0.636 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/ SPRING 1/ 50% WOT 3:04:33 PM 4/27/04

NHTSA C40600 FREELANDER



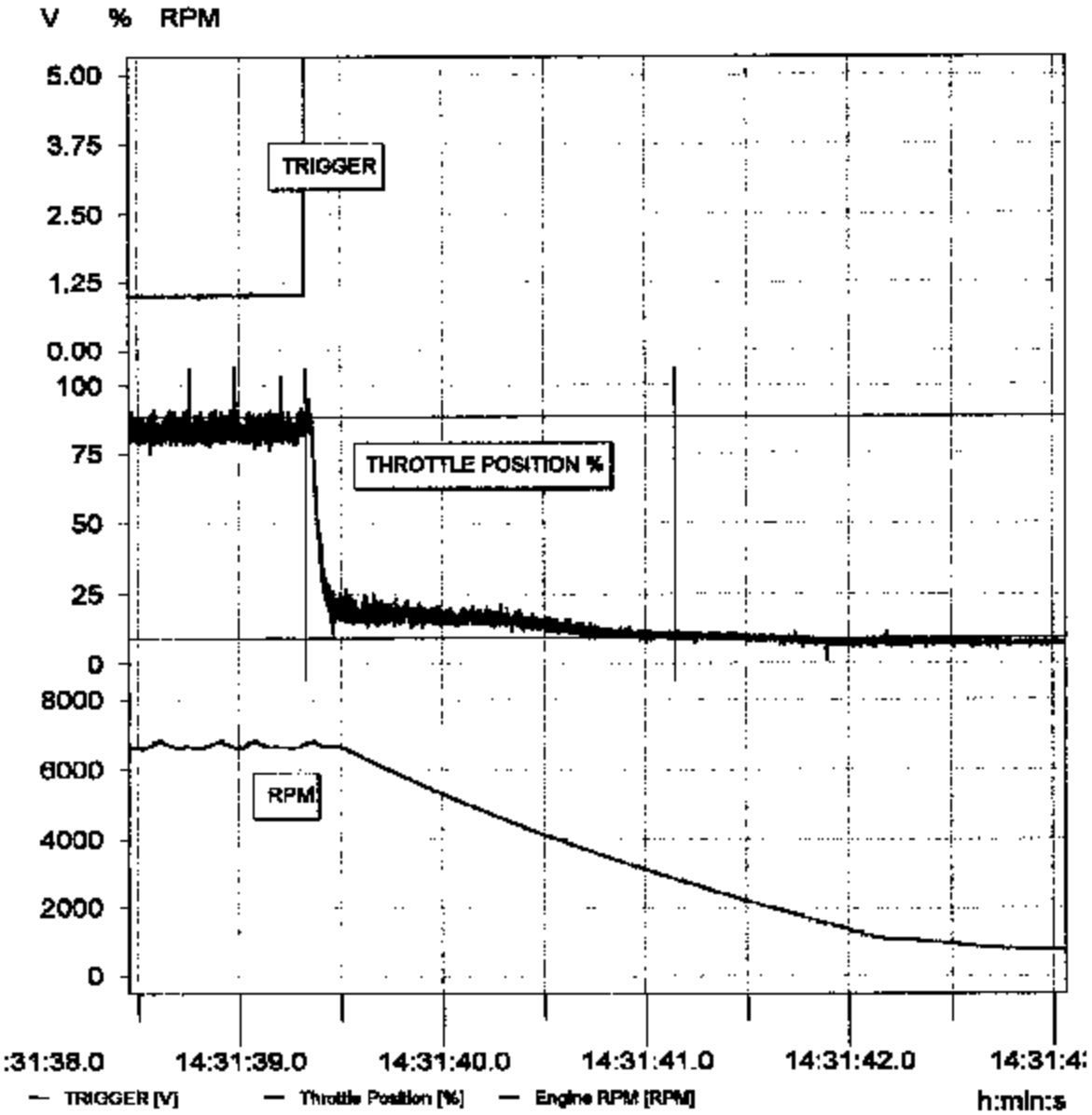
Channel:Throttle Position

Y1:	67.466 %	Y2:	8.662 %
t1:	-24333.992 ms	t2:	-22364.992 ms
dt:	1.969 s	f:	0.508 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/ SPRING 1/ 75% WOT 3:02:31 PM 4/27/04

NHTSA C40600 FREELANDER



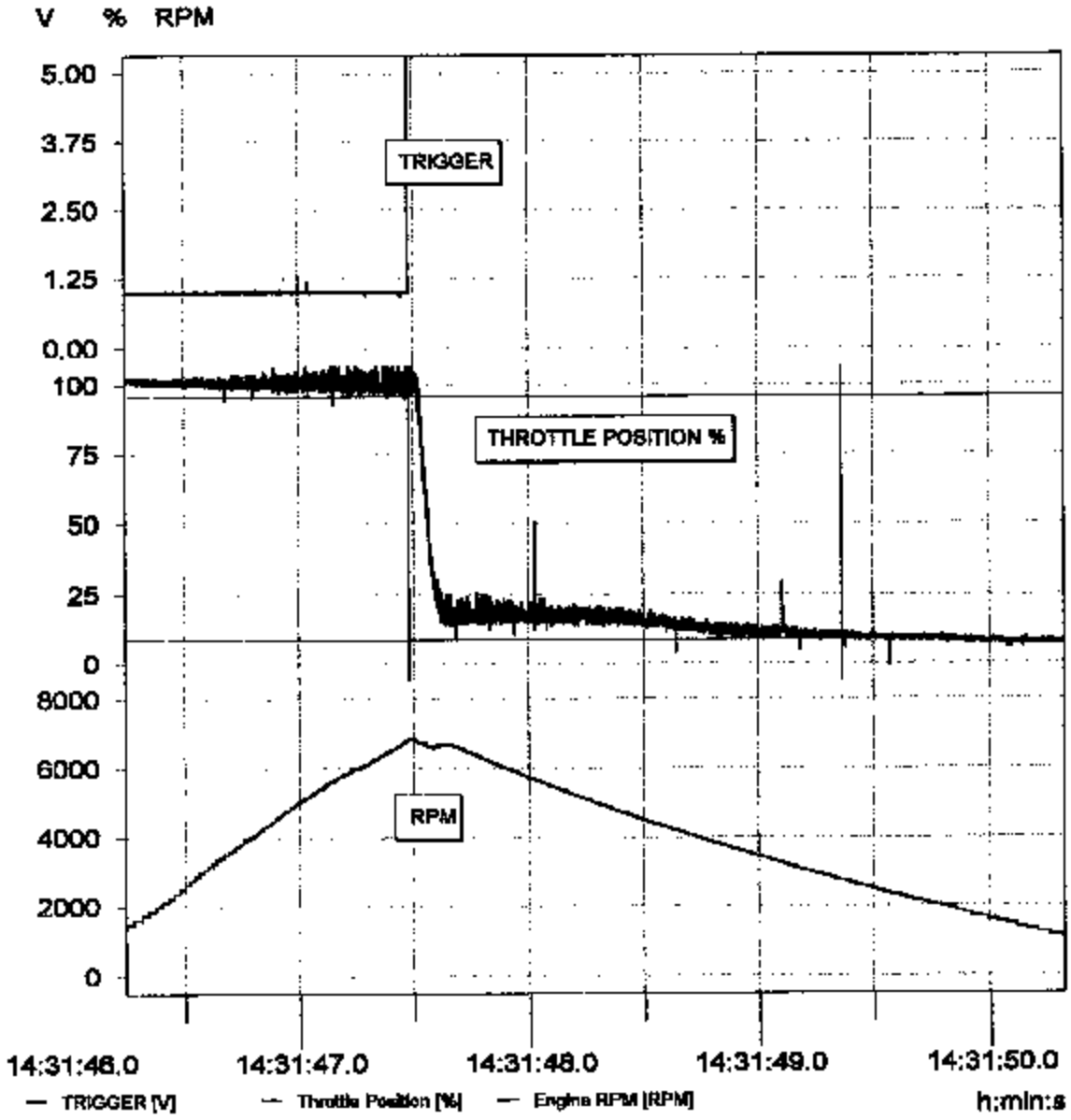
Channel: Throttle Position

Y1:	88.312 %	Y2:	8.963 %
t1:	-13708.992 ms	t2:	-11890.992 ms
dt:	1.818 s	f:	0.550 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/ SPRING 1/ 100% WOT 2:57:22 PM 4/27/04

NHTSA C40600 FREELANDER



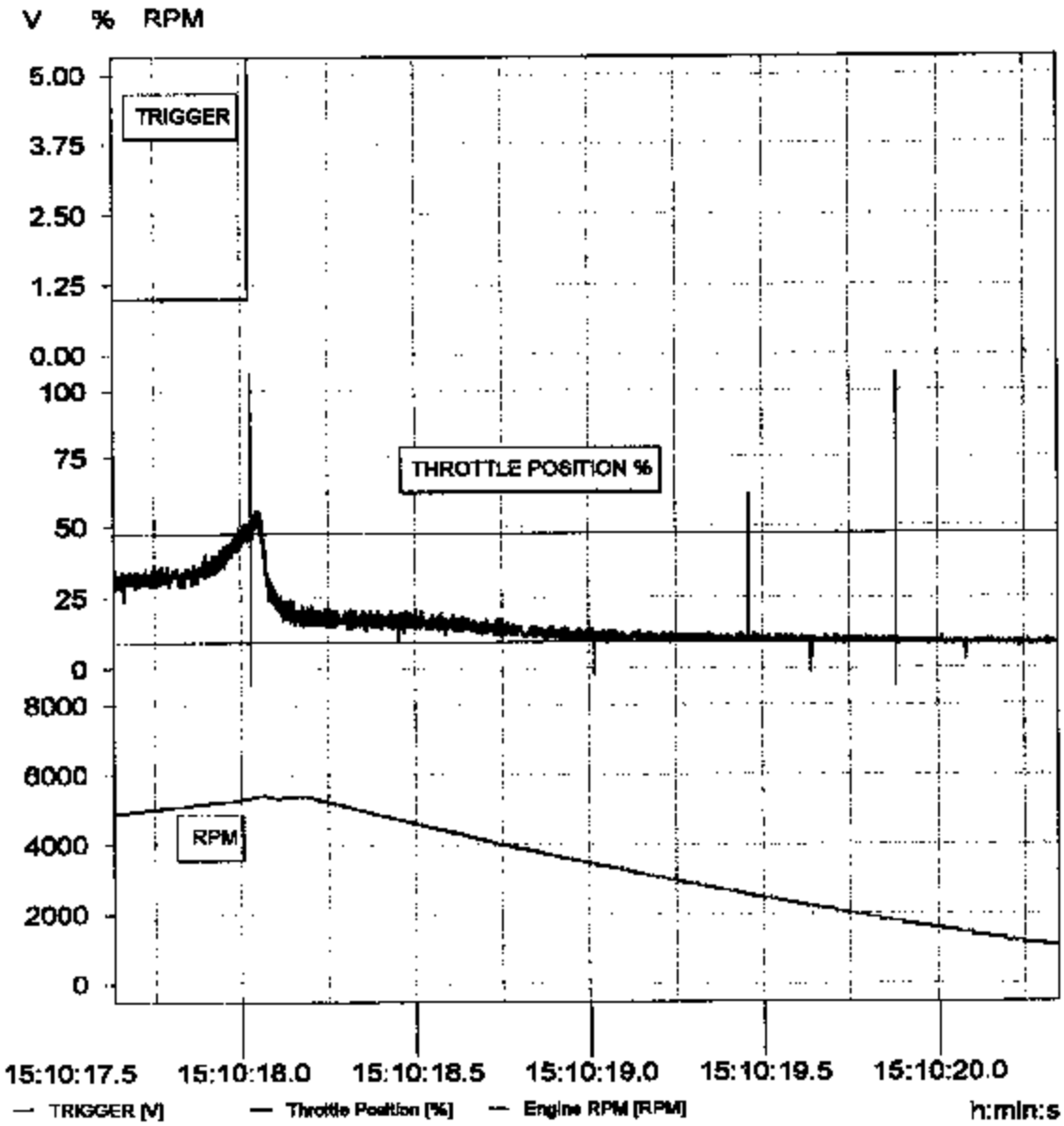
Channel:Throttle Position

Y1:	85.776 %	Y2:	5.266 %
t1:	-5555.992 ms	t2:	-3673.992 ms
dt:	1.882 s	f:	0.531 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/ SPRING 2/ 25% WOT **3:13:12 PM 4/27/04**

NHTSA C40600 FREELANDER



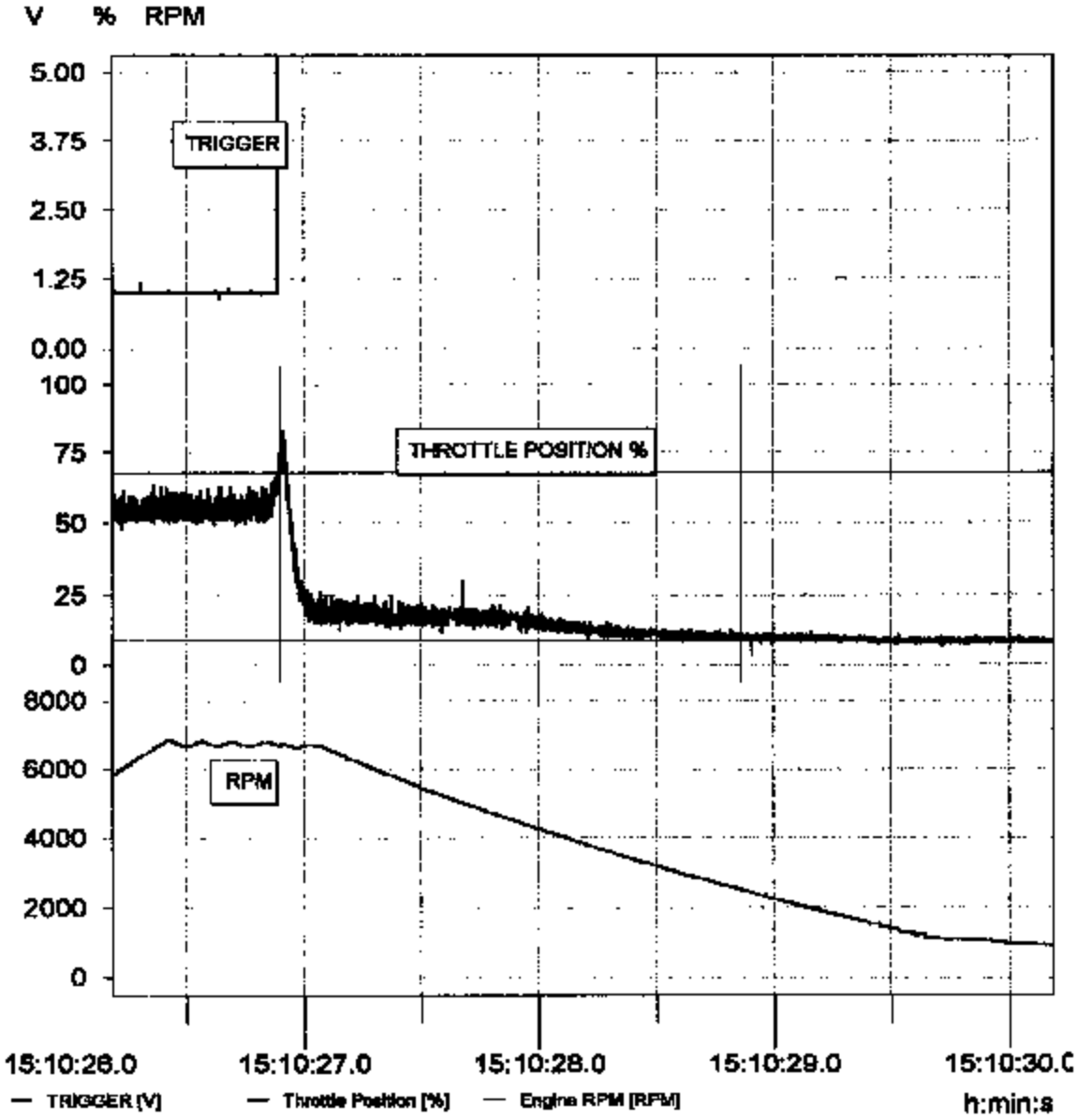
Channel:Throttle Position

Y1:	47.412 %	Y2:	6.954 %
t1:	-34017.888 ms	t2:	-32159.866 ms
dt:	1.858 s	f:	0.538 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/ SPRING 2/ 50% WOT 3:15:46 PM 4/27/04

NHTSA C40600 FREELANDER



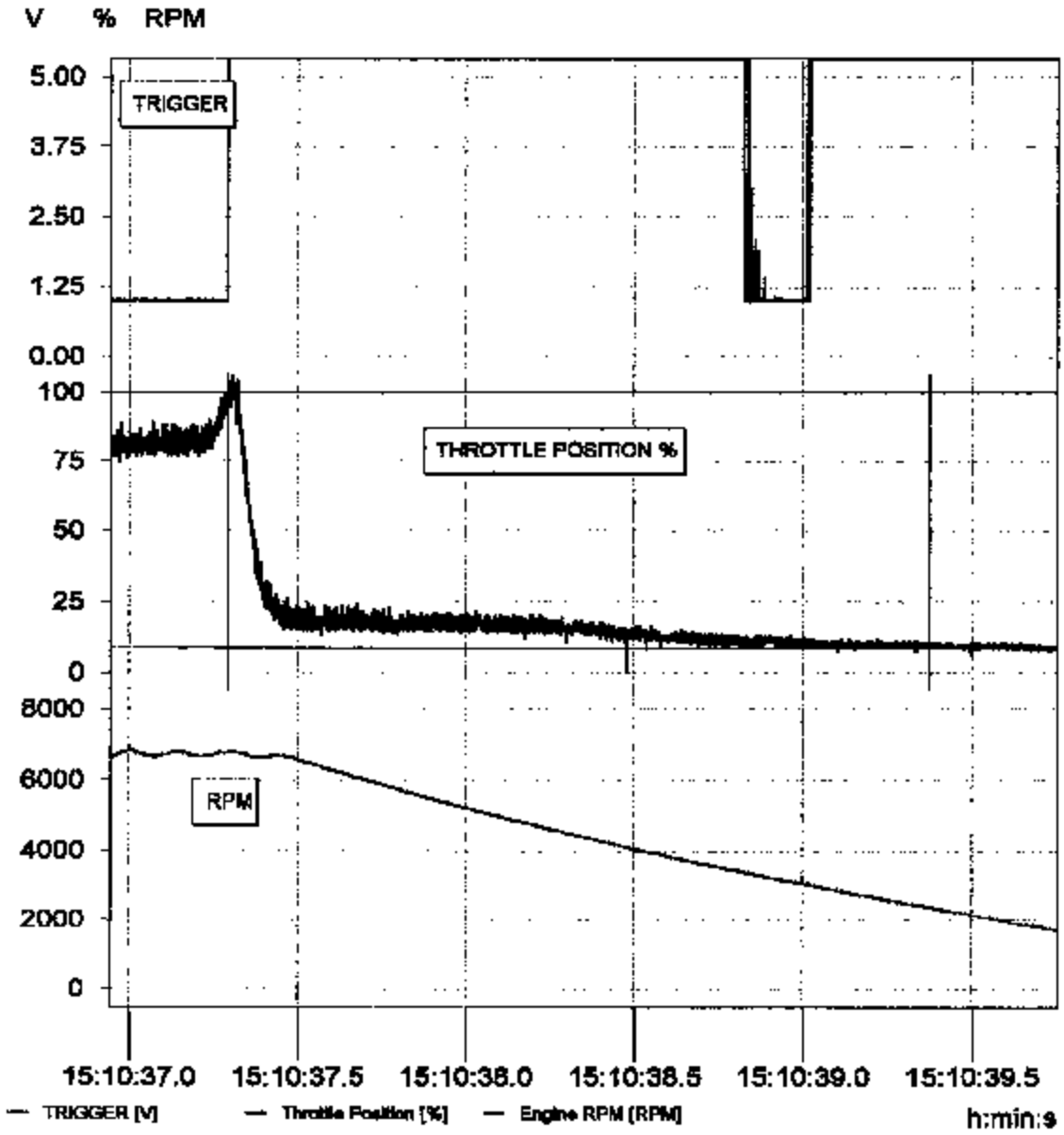
Channel:Throttle Position

Y1:	67.612 %	Y2:	8.649 %
t1:	-25147.888 ms	t2:	-23166.888 ms
dt:	1.981 s	f:	0.510 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/ SPRING 2/ 75% WOT **3:19:48 PM 4/27/04**

NHTSA C40600 FREELANDER



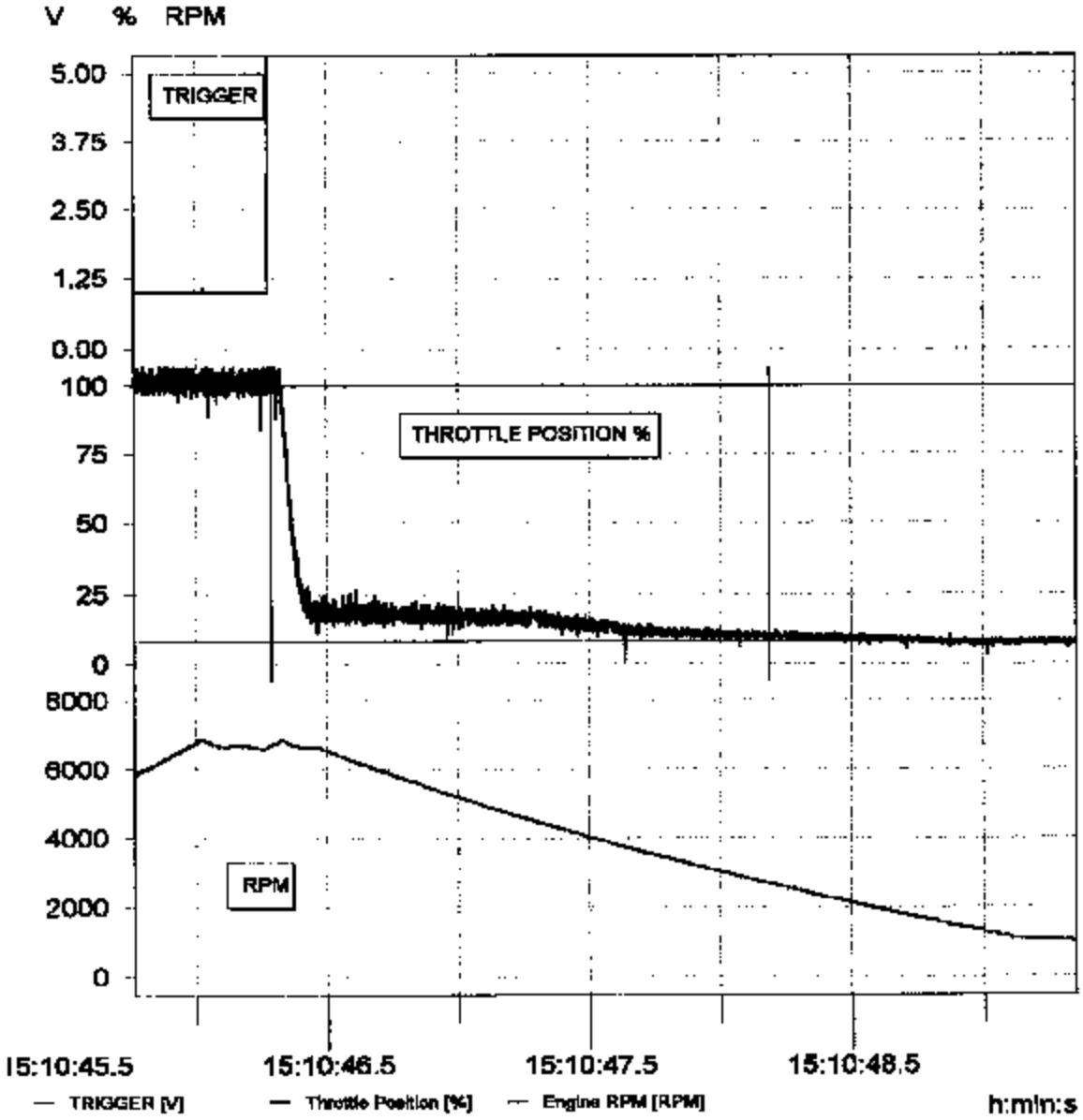
Channel:Throttle Position

Y1:	100.083 %	Y2:	8.704 %
t1:	-14750.888 ms	t2:	-12671.888 ms
dt:	2.079 s	f:	0.481 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/ SPRING 2/ 100% WOT 3:22:32 PM 4/27/04

NHTSA C40600 FREELANDER



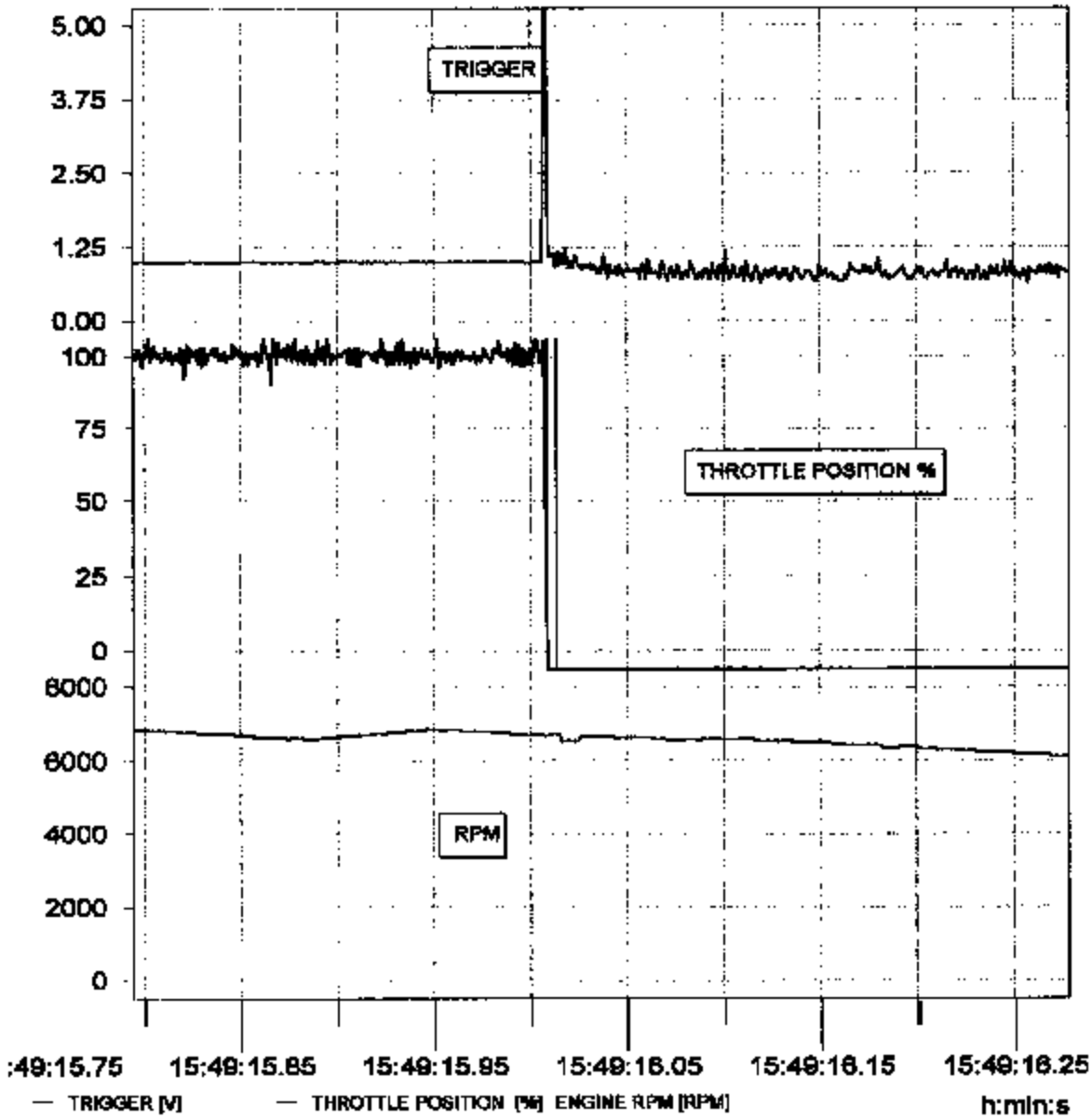
Channel:Throttle Position

Y1:	99.671 %	Y2:	6.026 %
t1:	-5757.888 ms	t2:	-3856.888 ms
dt:	1.901 s	f:	0.526 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT / TPS DISCONNECT/ 100% WOT 10:25:54 AM 4/28/04

NHTSA C40600 FREELANDER



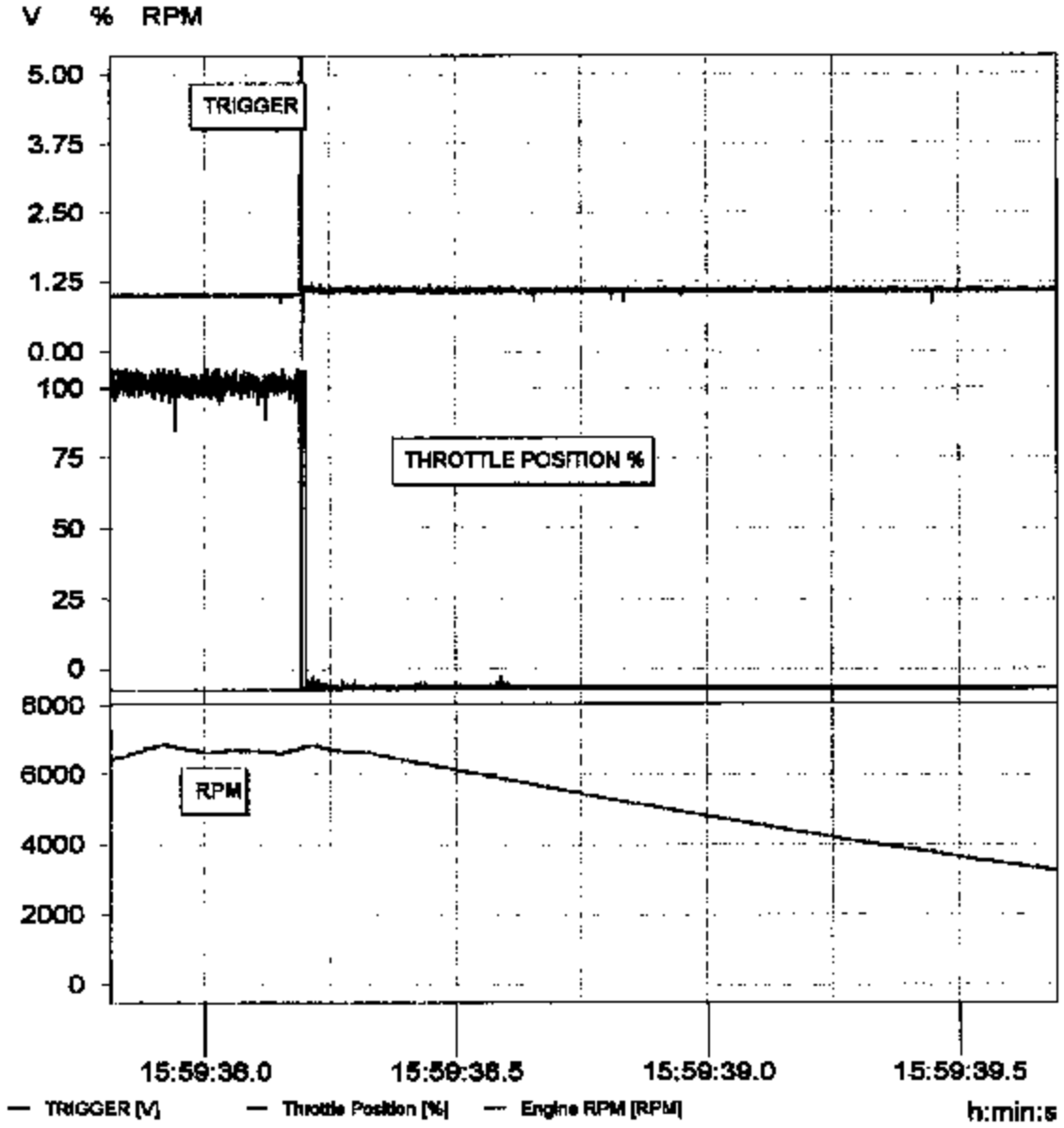
Channel:THROTTLE POSITION

Y1:	13.140 %	Y2:	-10.684 %
t1:	-43992.000 ms	t2:	-43867.000 ms
dt:	0.005 s	f:	200.000 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/ APS DISCONNECT/ 100% WOT 4:02:41 PM 4/27/04

NHTSA C40600 FREELANDER



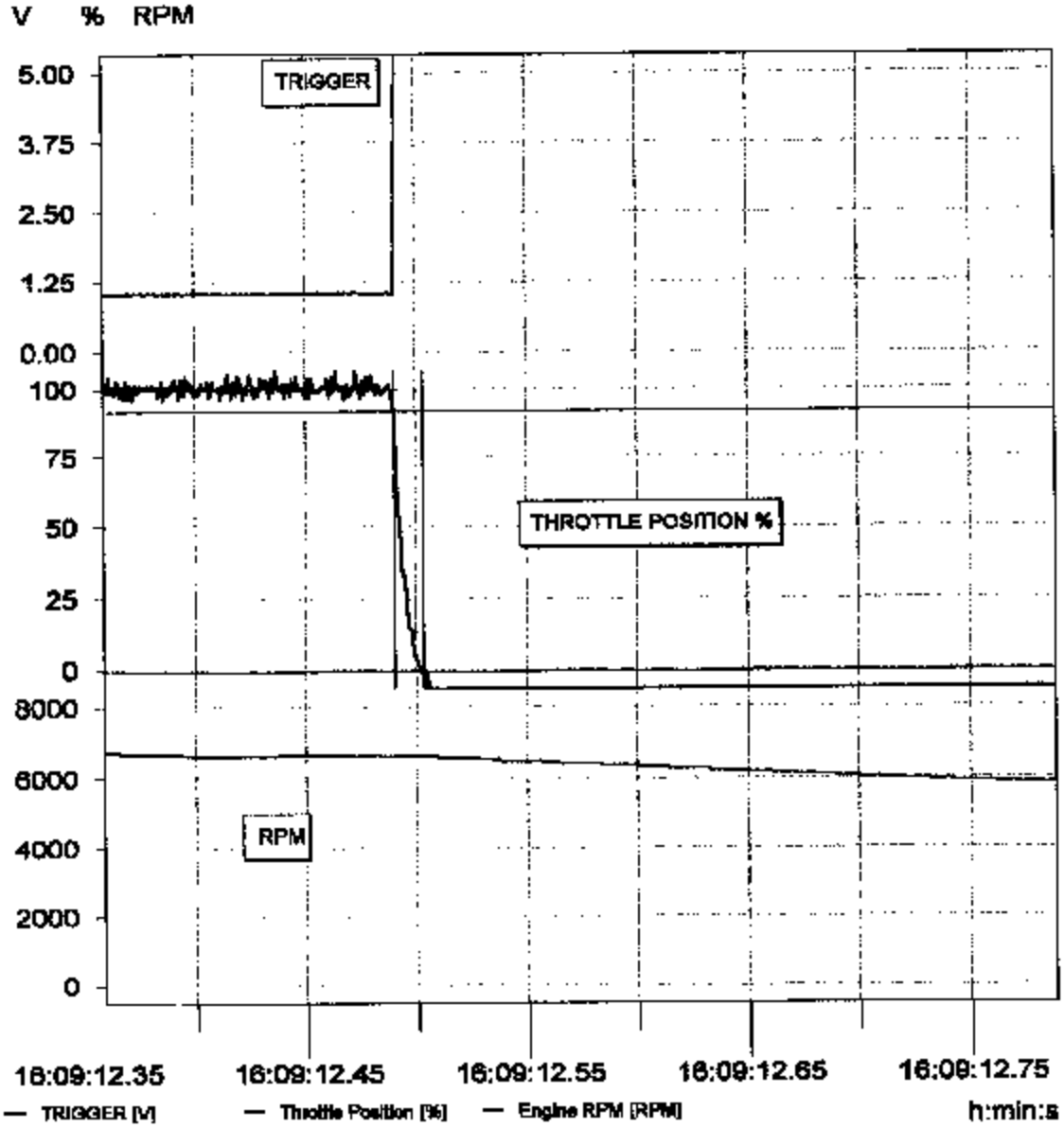
Channel:Throttle Position

Y1:	-7.633 %	Y2:	-12.686 %
t1:	-3611.782 ms	t2:	-3904.782 ms
dt:	0.007 s	f:	142.857 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/ECM CONNECTOR 1/ 100% WOT 4:15:39 PM 4/27/04

NHTSA C40600 FREELANDER



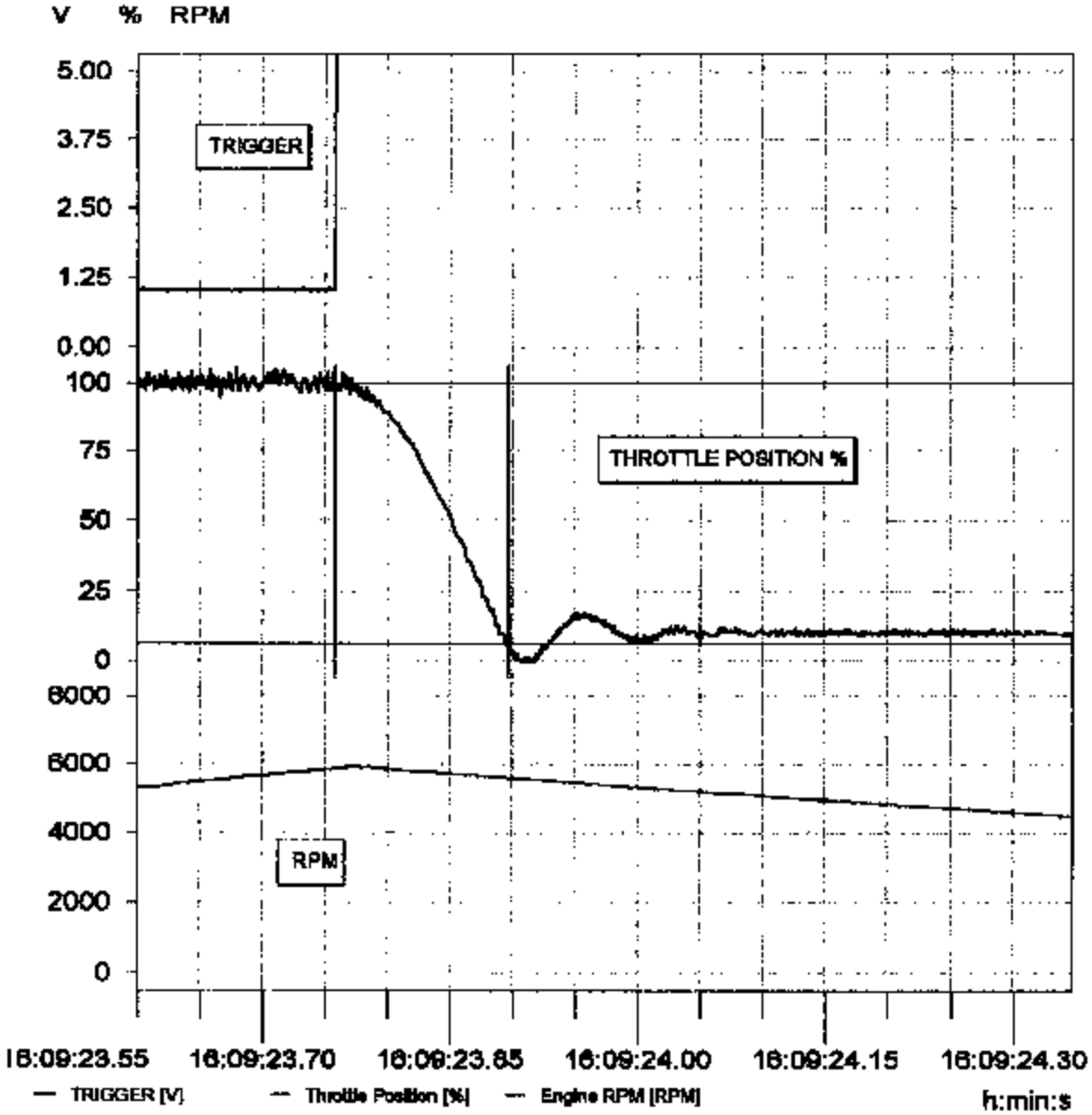
Channel:Throttle Position

Y1:	91.852 %	Y2:	-0.669 %
t1:	-47527.709 ms	t2:	-47514.709 ms
dt:	0.013 s	f:	76.923 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/ECM CONNECTOR 2/ 100% WOT 4:17:24 PM 4/27/04

NHTSA C40600 FREELANDER



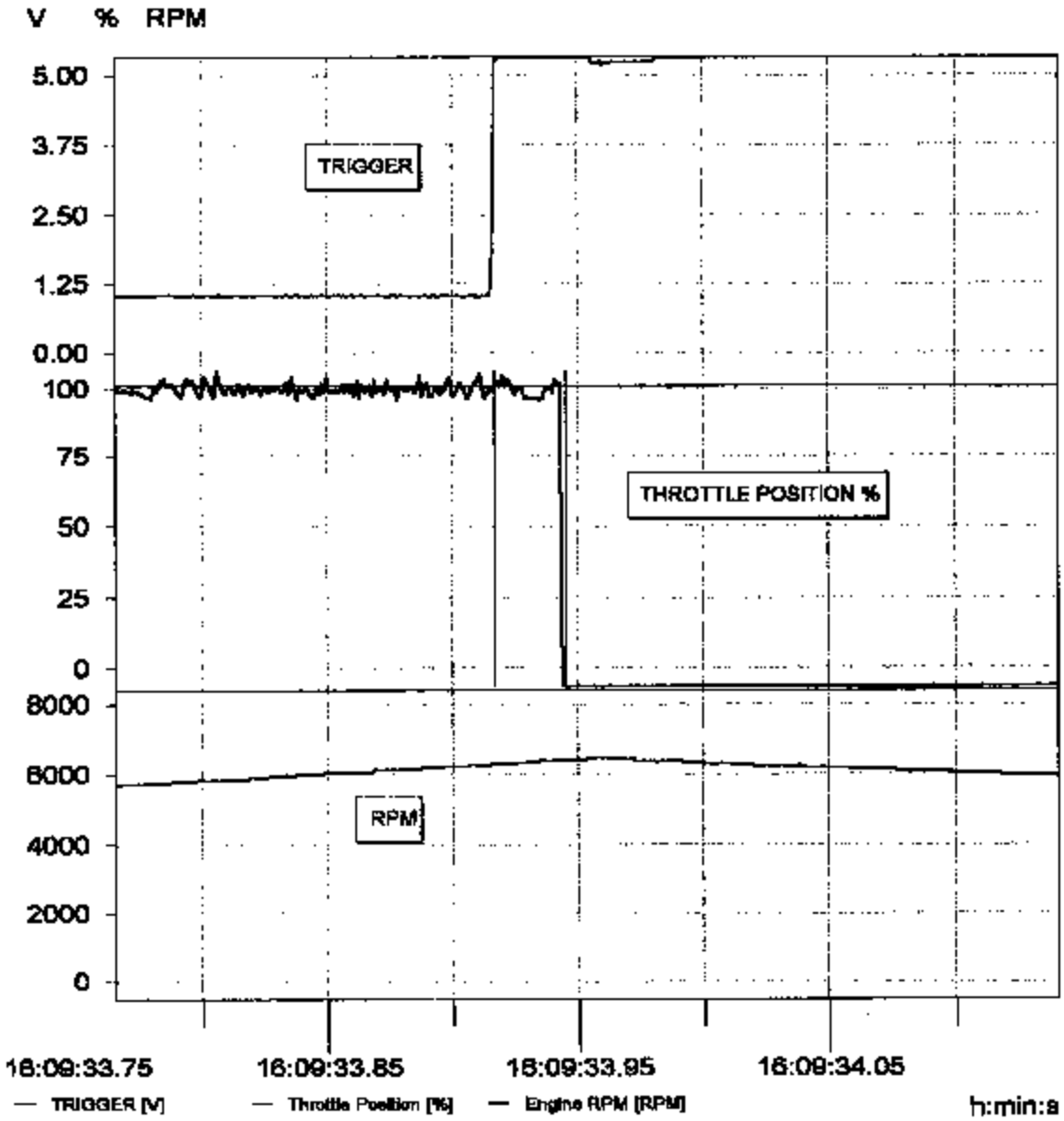
Channel:Throttle Position

Y1:	99.849 %	Y2:	6.225 %
t1:	-36259.709 ms	t2:	-36121.709 ms
dt:	0.138 s	f:	7.246 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/ECM CONNECTOR 3/ 100% WOT 4:19:31 PM 4/27/04

NHTSA C40600 FREELANDER



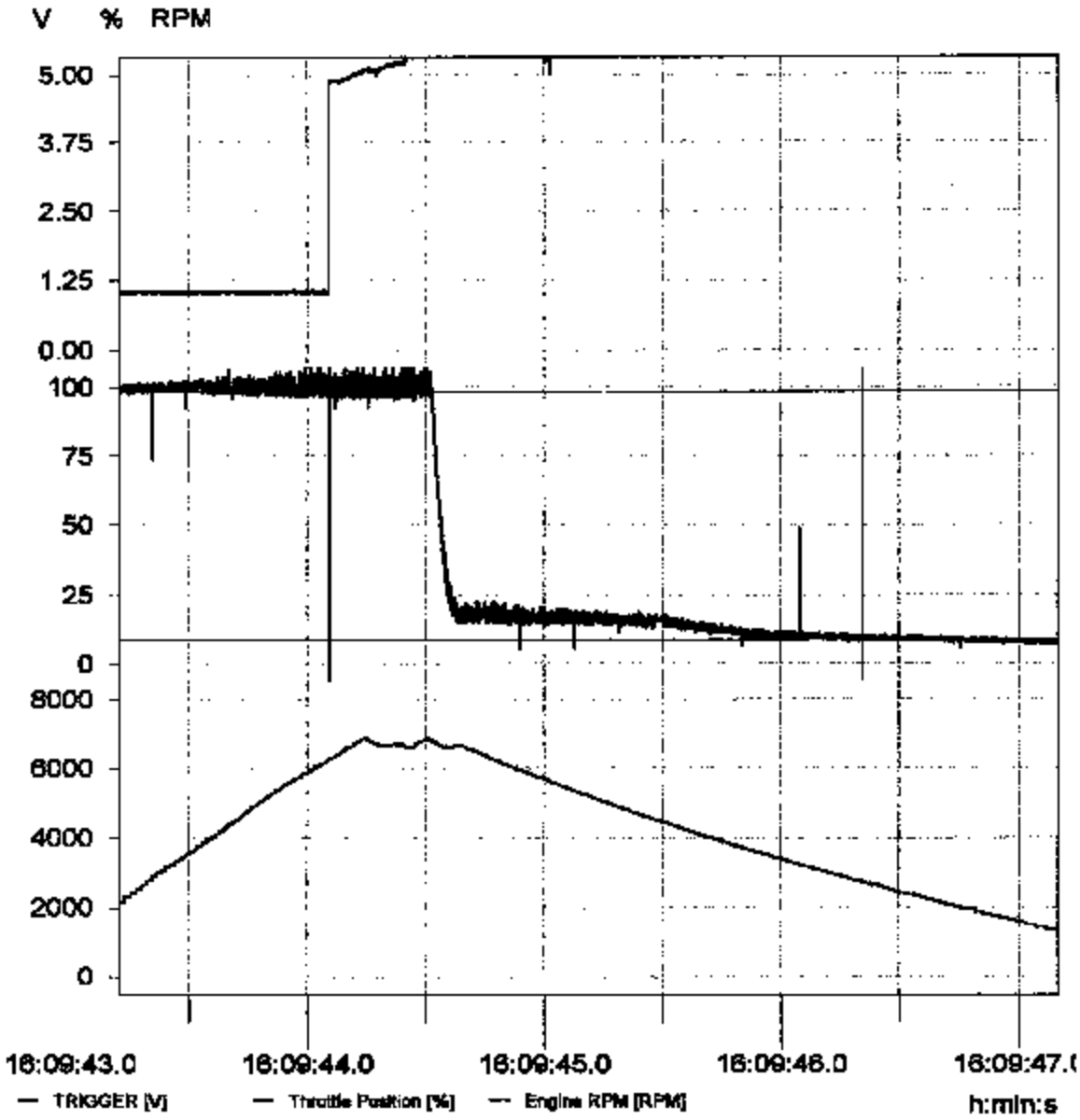
Channel:Throttle Position

Y1:	100.741 %	Y2:	-8.210 %
t1:	-26100.709 ms	t2:	-26072.709 ms
dt:	0.028 s	f:	35.714 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/ECM CONNECTOR 4/ 100% WOT 4:28:02 PM 4/27/04

NHTSA C40600 FREELANDER



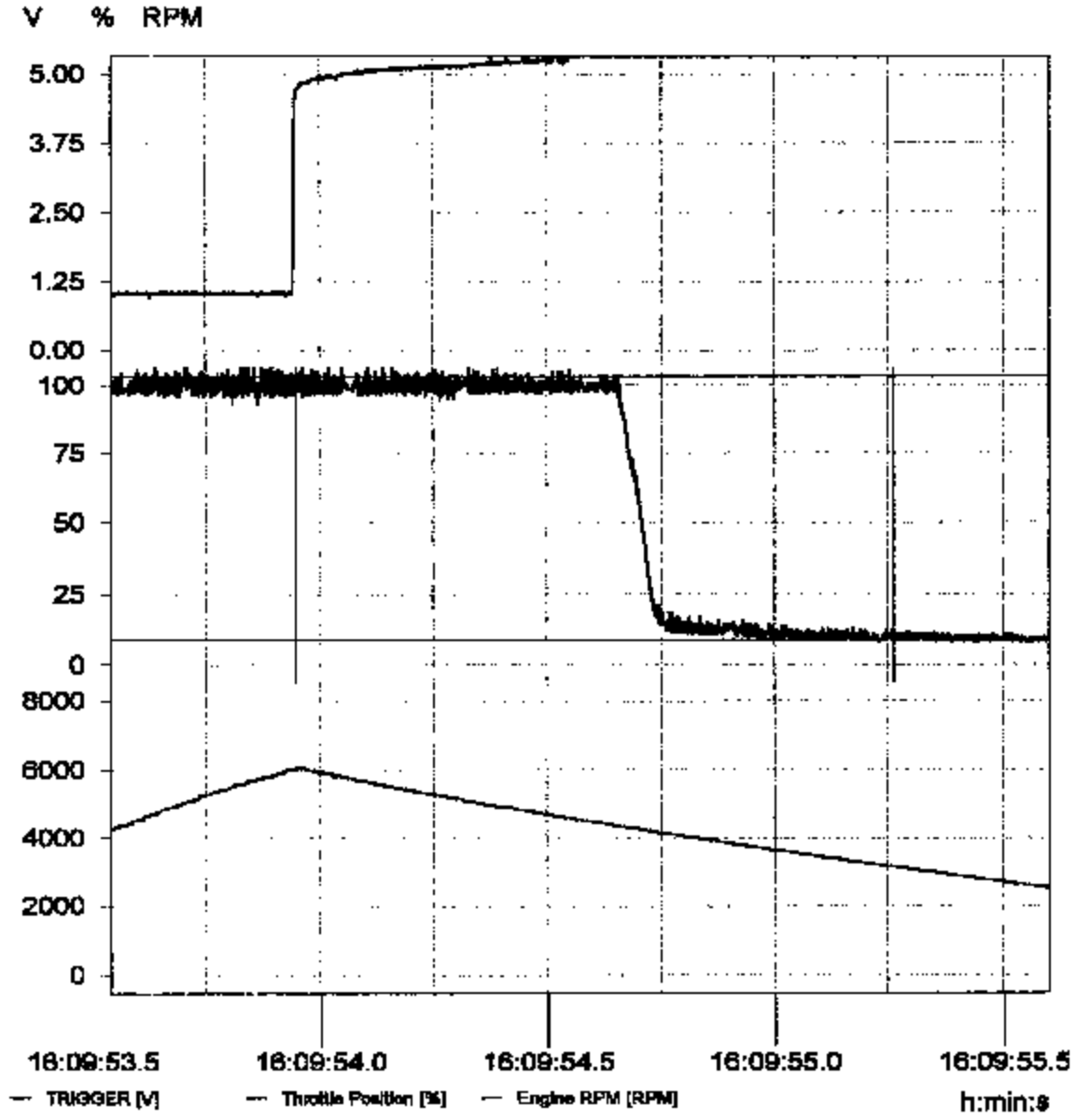
Channel:Throttle Position

Y1:	96.162 %	Y2:	8.643 %
t1:	-15923.709 ms	t2:	-13673.709 ms
dt:	2.250 s	f:	0.444 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/ECM CONNECTOR 5/ 100% WOT 4:29:29 PM 4/27/04

NHTSA C40600 FREELANDER



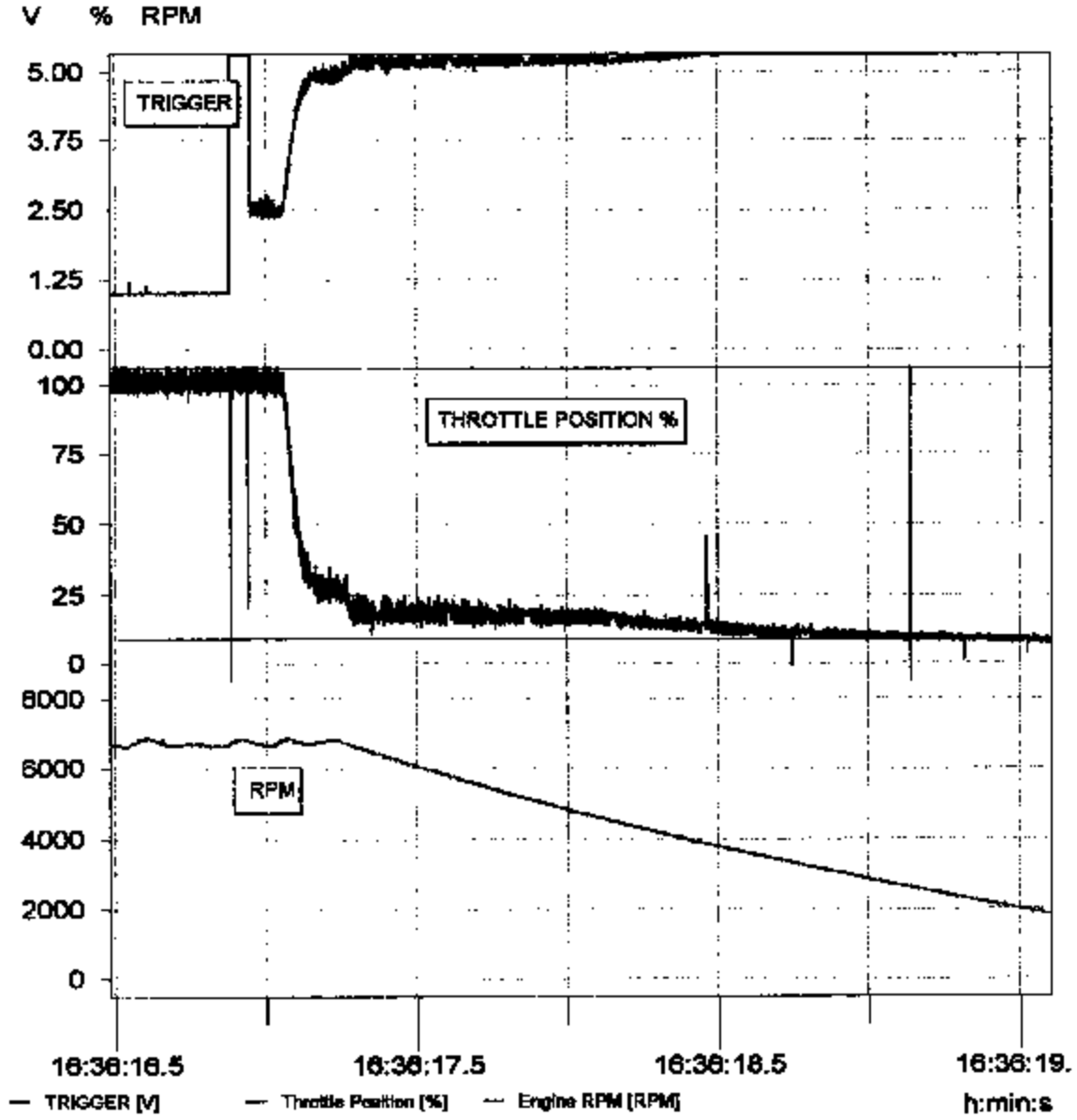
Channel:Throttle Position

Y1:	103.272 %	Y2:	6.833 %
t1:	-6071.709 ms	t2:	-4755.709 ms
dt:	1.316 s	f:	0.760 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/TPS/TPM WIRE 1/ 100% WOT 4:42:37 PM 4/27/04

NHTSA C40600 FREELANDER



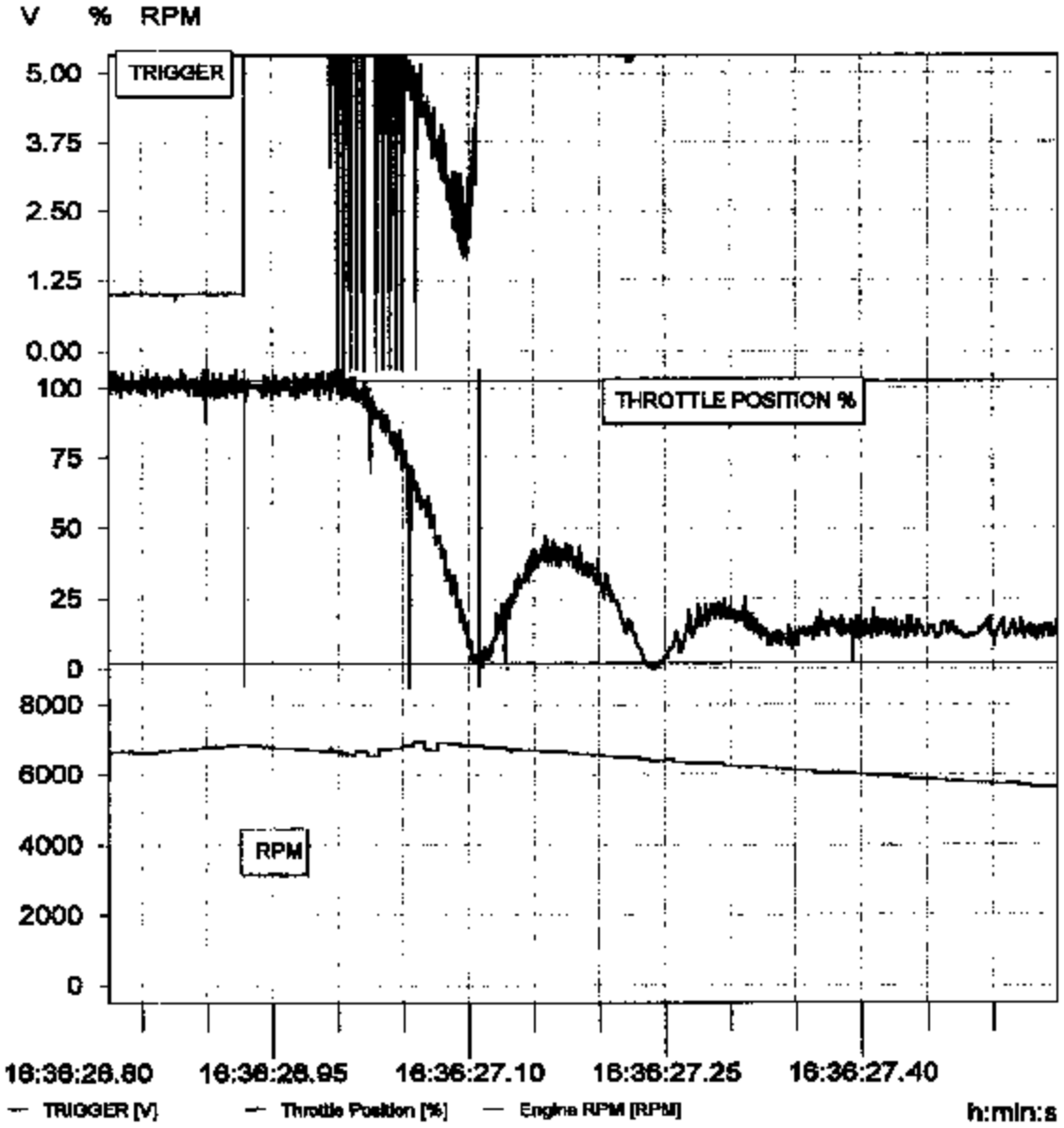
Channel:Throttle Position

Y1:	105.021 %	Y2:	5.910 %
t1:	-55149.740 ms	t2:	-52894.740 ms
dt:	2.255 s	f:	0.443 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/TPS/TPM WIRE 2/ 100% WOT 4:46:06 PM 4/27/04

NHTSA C40600 FREELANDER



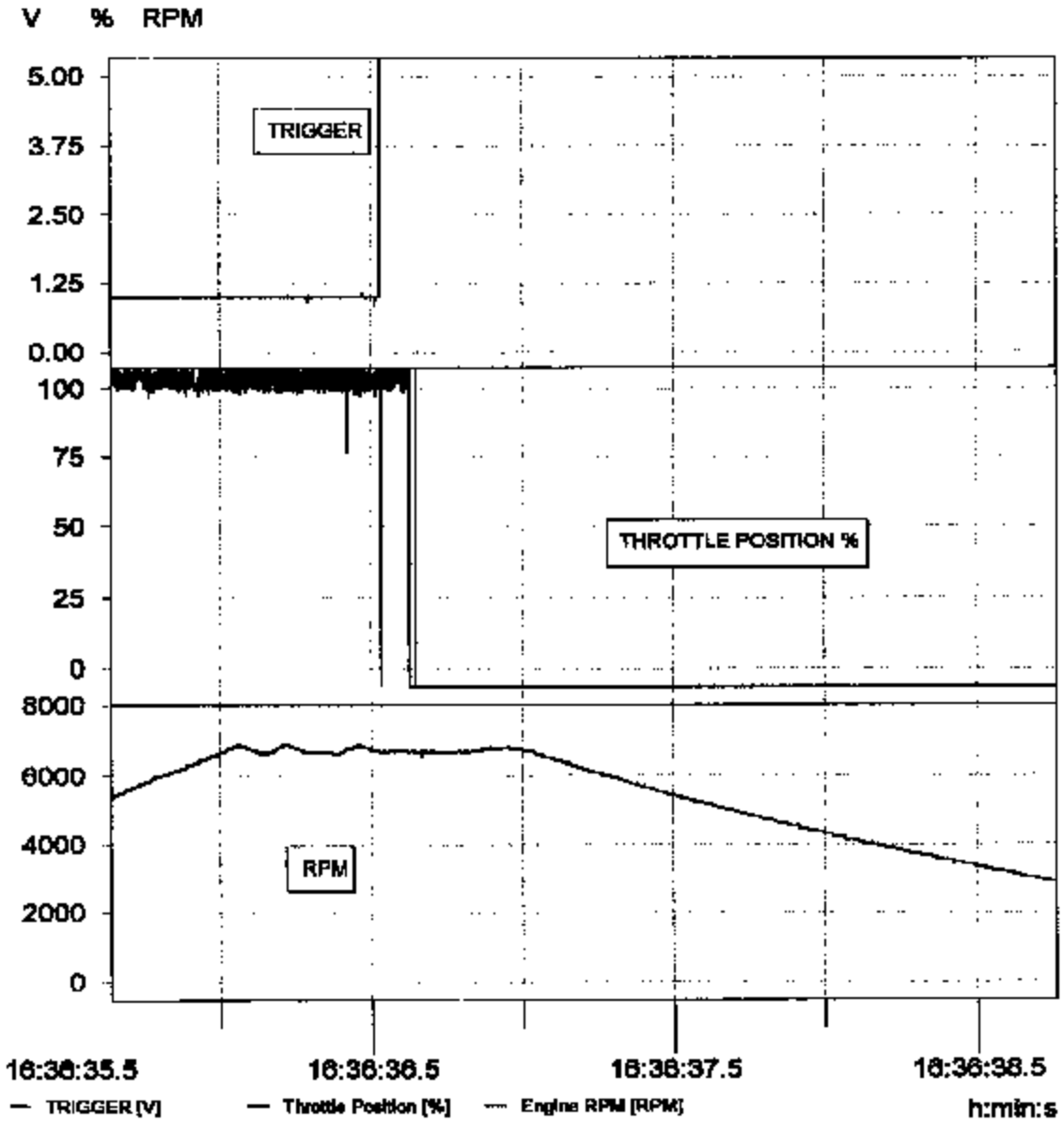
Channel:Throttle Position

Y1:	102.449 %	Y2:	1.858 %
t1:	-45101.740 ms	t2:	-44921.740 ms
dt:	0.180 s	f:	5.556 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/TPS/TPM WIRE 3/ 100% WOT 4:48:40 PM 4/27/04

NHTSA C40600 FREELANDER



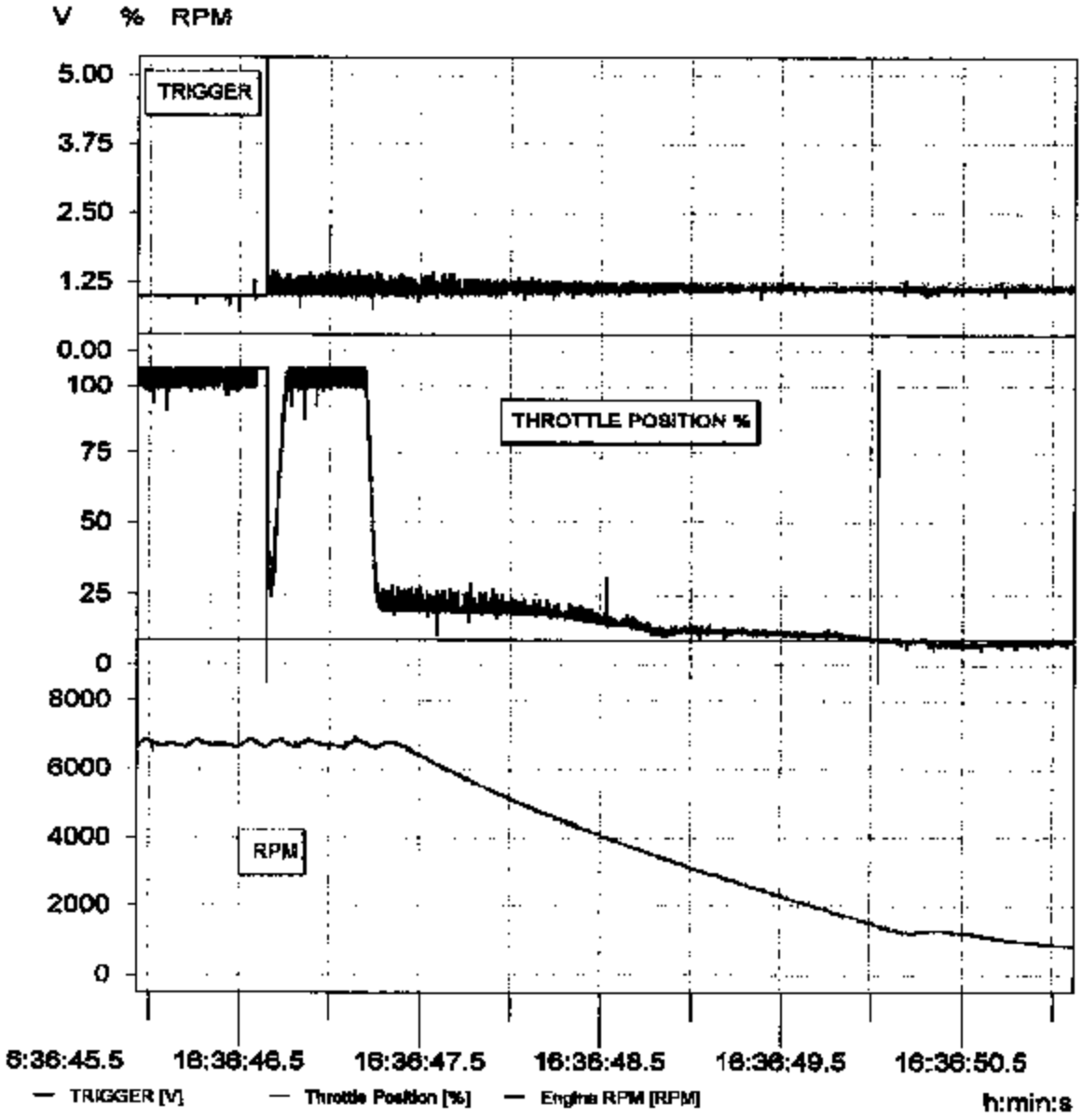
Channel:Throttle Position

Y1:	107.313 %	Y2:	-12.933 %
t1:	-35496.740 ms	t2:	-35384.740 ms
dt:	0.114 s	f:	8.772 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/TPS/TPM WIRE 4/ 100% WOT 4:51:57 PM 4/27/04

NHTSA C40600 FREELANDER



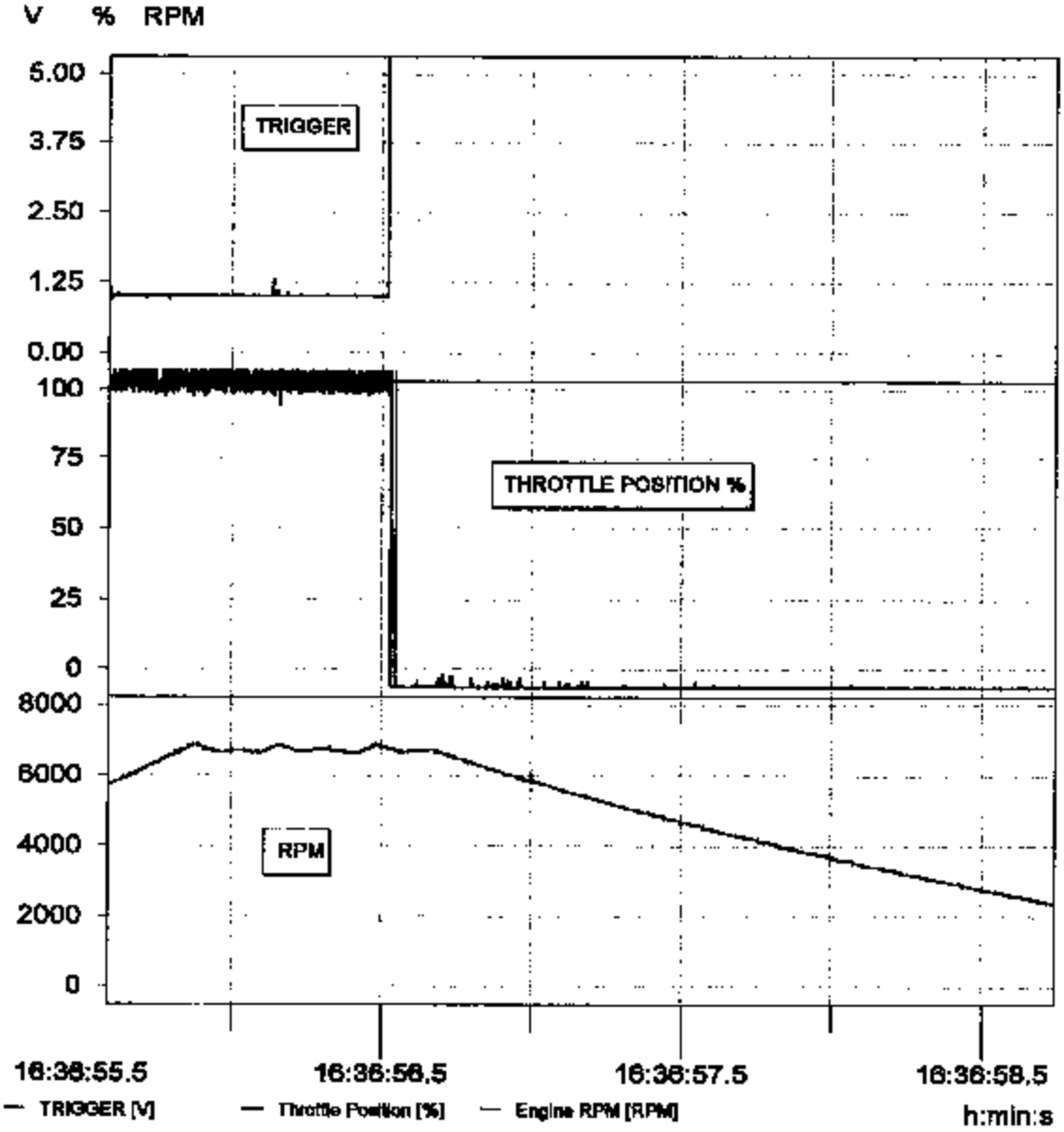
Channel:Throttle Position

Y1:	119.048 %	Y2:	8.748 %
t1:	-25380.740 ms	t2:	-21991.740 ms
dt:	3.389 s	f:	0.295 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/TPS/TPM WIRE 5/ 100% WOT 4:53:51 PM 4/27/04

NHTSA C40600 FREELANDER



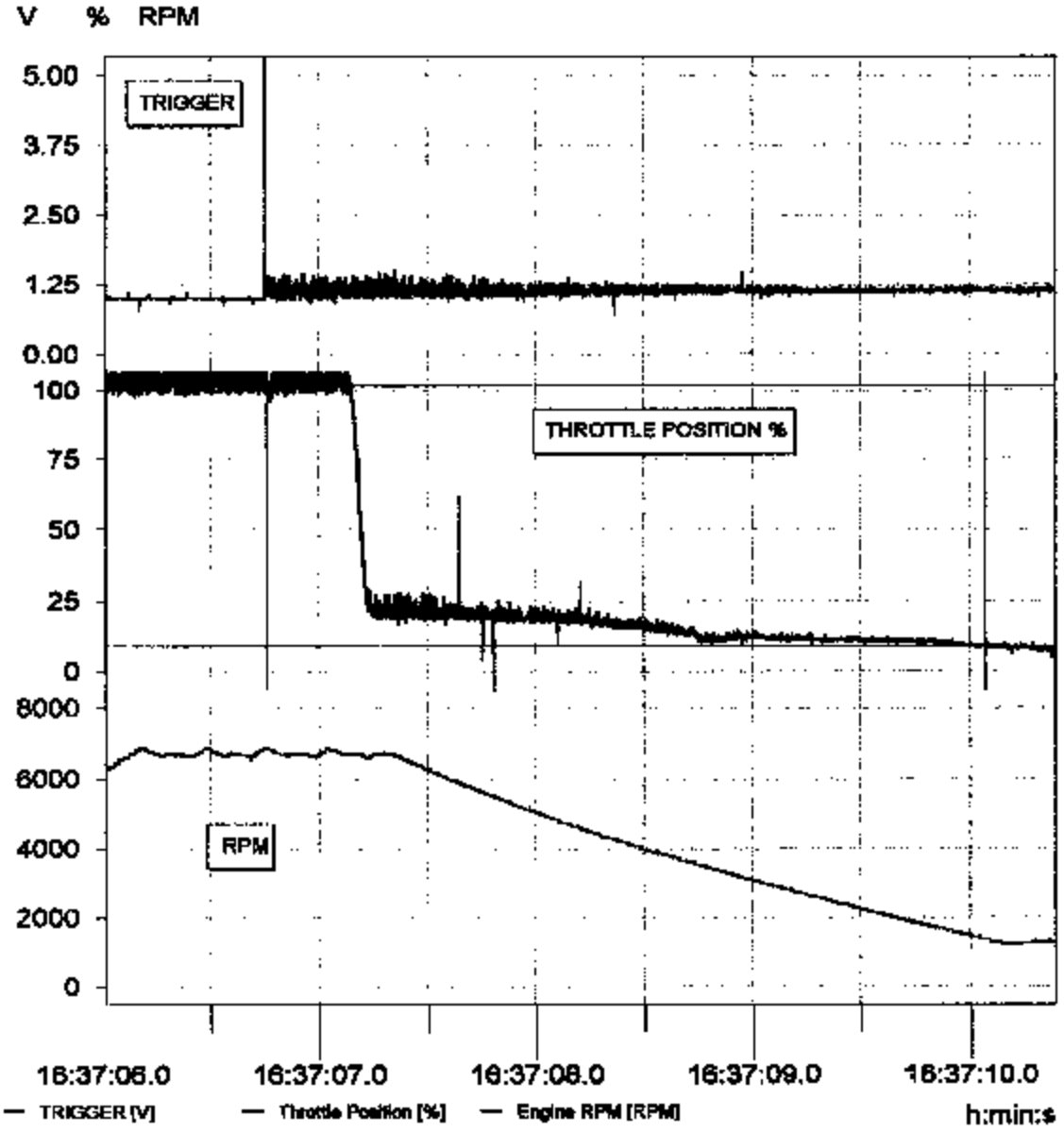
Channel:Throttle Position

Y1:	102.906 %	Y2:	-10.362 %
t1:	-15503.740 ms	t2:	-15485.740 ms
dt:	0.018 s	f:	55.556 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/TPS/TPM WIRE 6/ 100% WOT 4:57:52 PM 4/27/04

NHTSA C40600 FREELANDER



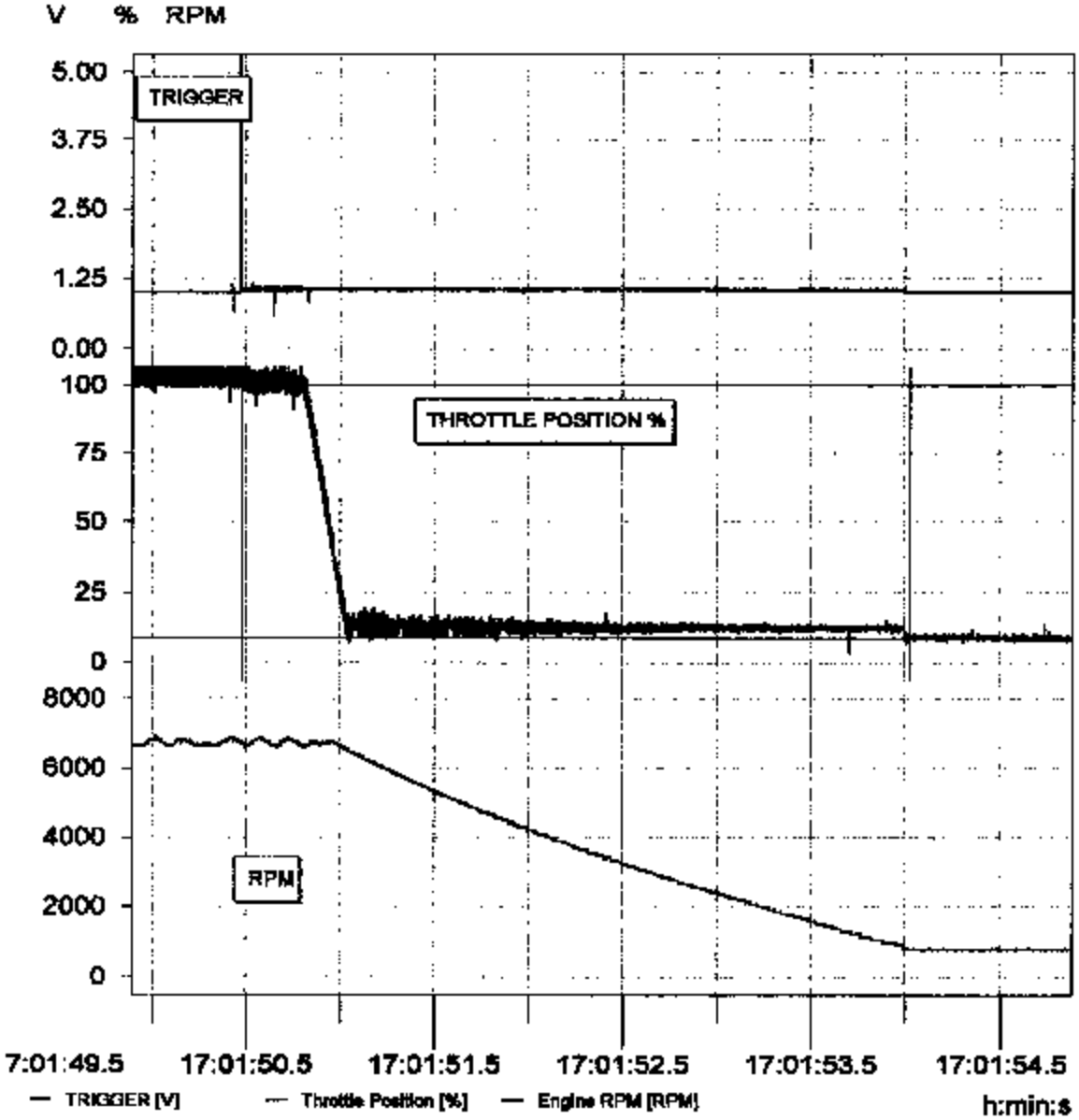
Channel:Throttle Position

Y1:	101.738 %	Y2:	6.950 %
t1:	-5270.740 ms	t2:	-1963.740 ms
dt:	3.307 s	f:	0.302 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/TPS/TPM WIRE 1 SHORTED/ 100% WOT 5:10:11 PM 4/27/04

NHTSA C40600 FREELANDER



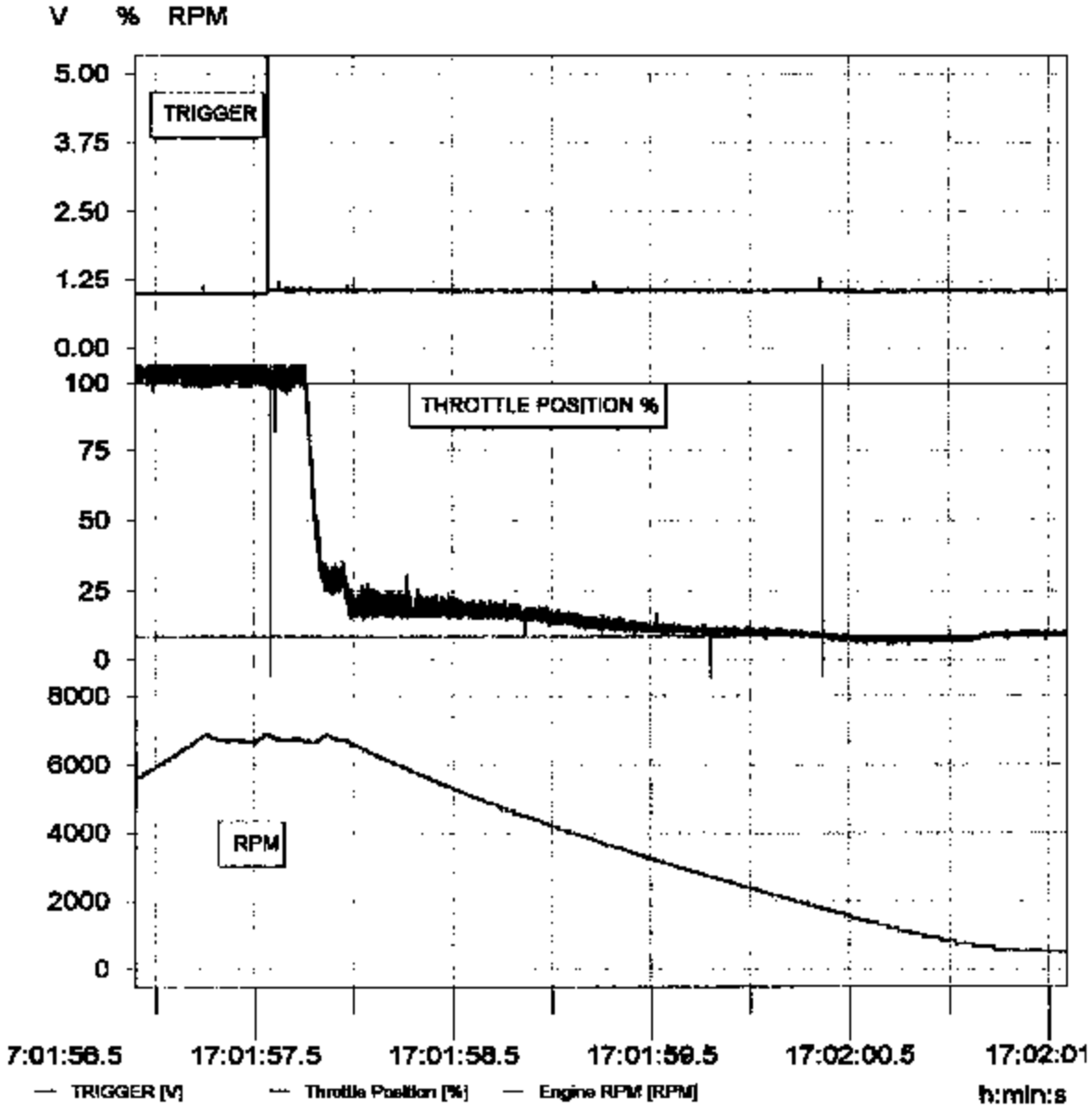
Channel:Throttle Position

Y1:	99.901 %	Y2:	8.595 %
t1:	-52574.996 ms	t2:	-49025.996 ms
dt:	3.549 s	f:	0.282 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/TPS/TPM WIRE 2 SHORTED/ 100% WOT 5:11:57 PM 4/27/04

NHTSA C40600 FREELANDER



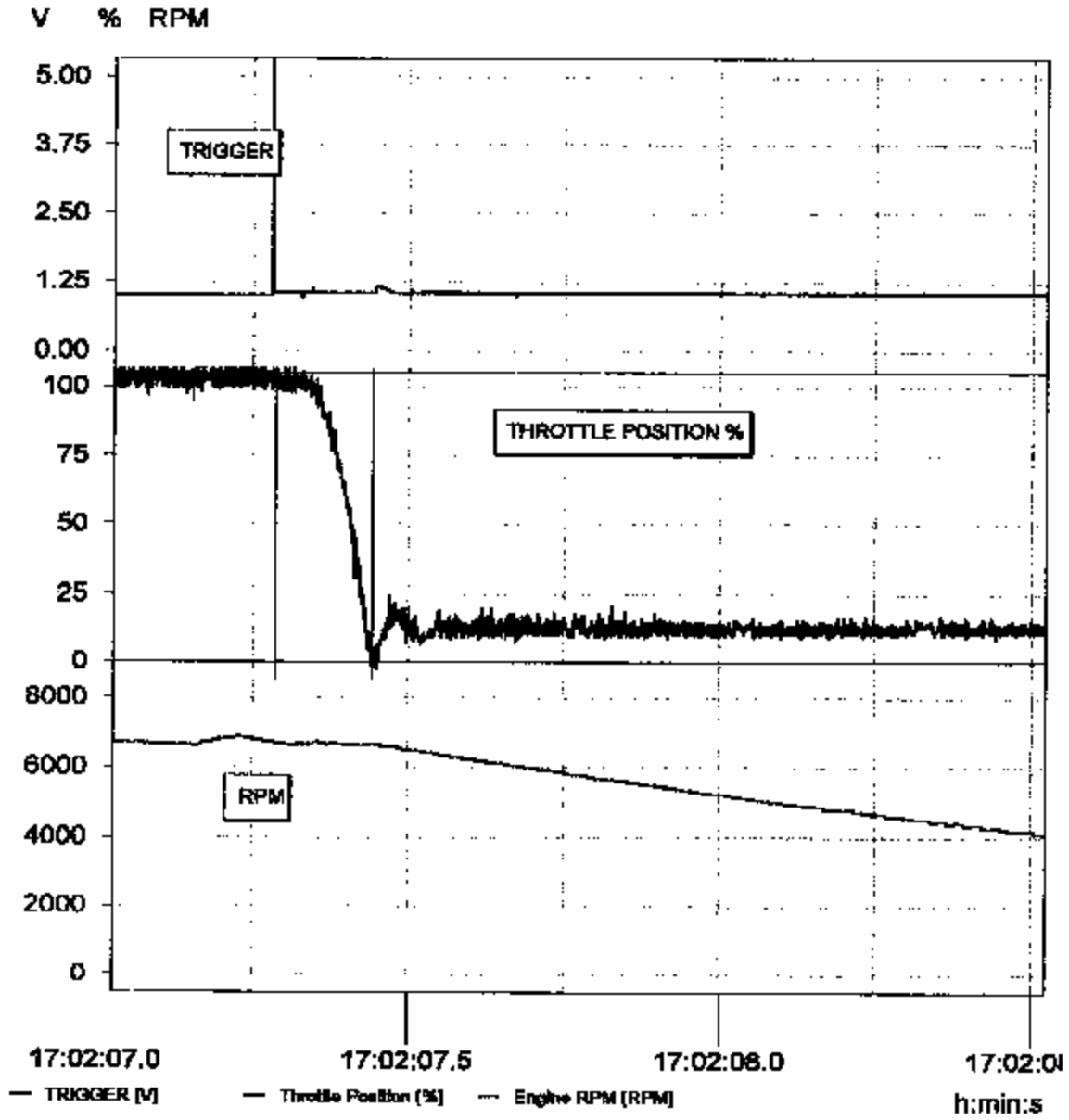
Channel:Throttle Position

Y1:	99.821 %	Y2:	6.470 %
t1:	-45469.996 ms	t2:	-42680.996 ms
dt:	2.789 s	f:	0.359 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/TPS/TPM WIRE 3 SHORTED/ 100% WOT 5:15:32 PM 4/27/04

NHTSA C40600 FREELANDER



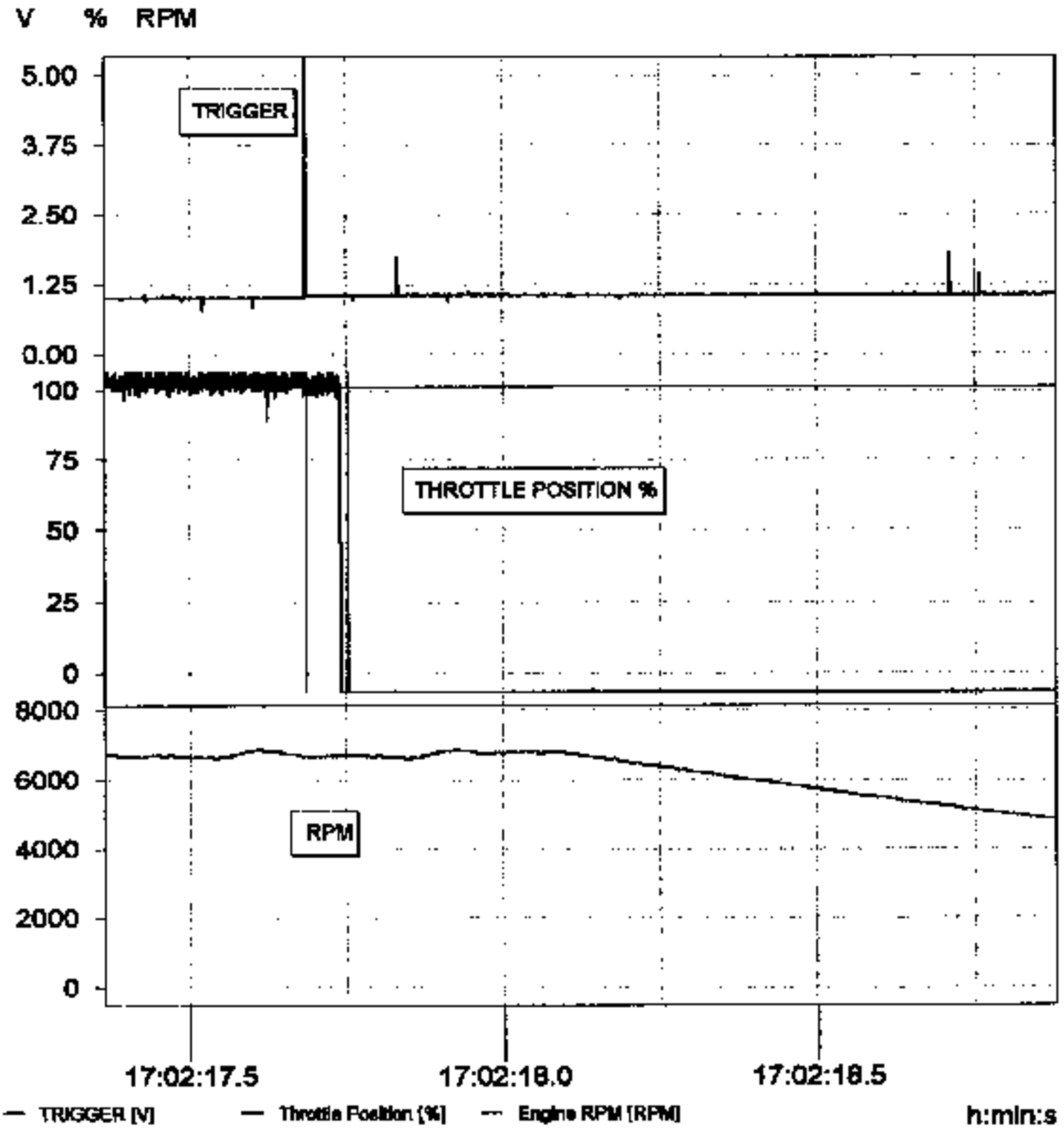
Channel:Throttle Position

Y1:	105.186 %	Y2:	0.049 %
t1:	-35754.996 ms	t2:	-35606.996 ms
dt:	0.156 s	f:	6.410 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/TPS/TPM WIRE 4 SHORTED/ 100% WOT 5:17:25 PM 4/27/04

NHTSA C40600 FREELANDER



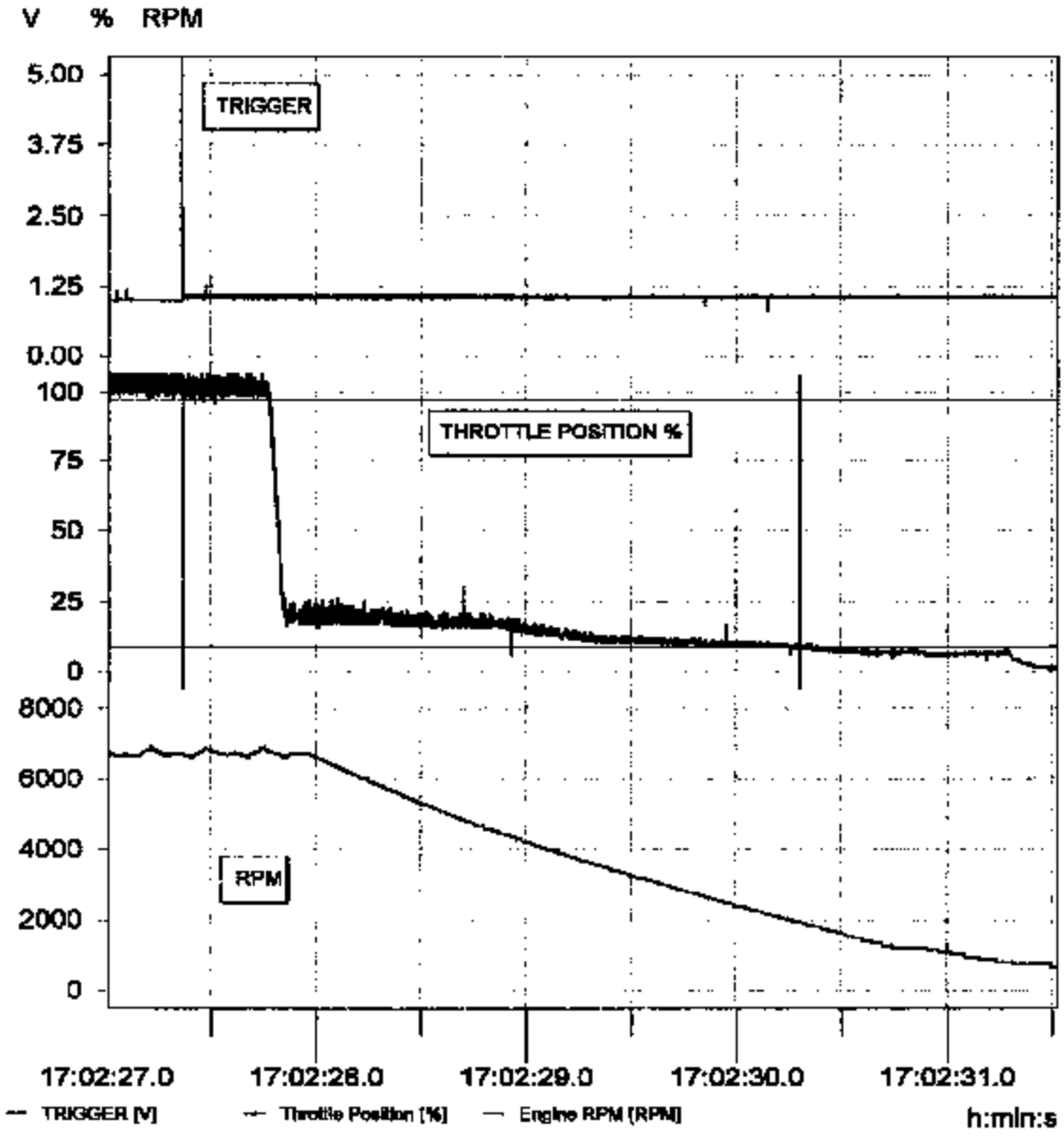
Channel:Throttle Position

Y1:	101.153 %	Y2:	-11.427 %
t1:	-25364.996 ms	t2:	-25297.996 ms
dt:	0.067 s	f:	14.925 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/TPS/TPM WIRE 5 SHORTED/ 100% WOT 5:19:20 PM 4/27/04

NHTSA C40600 FREELANDER



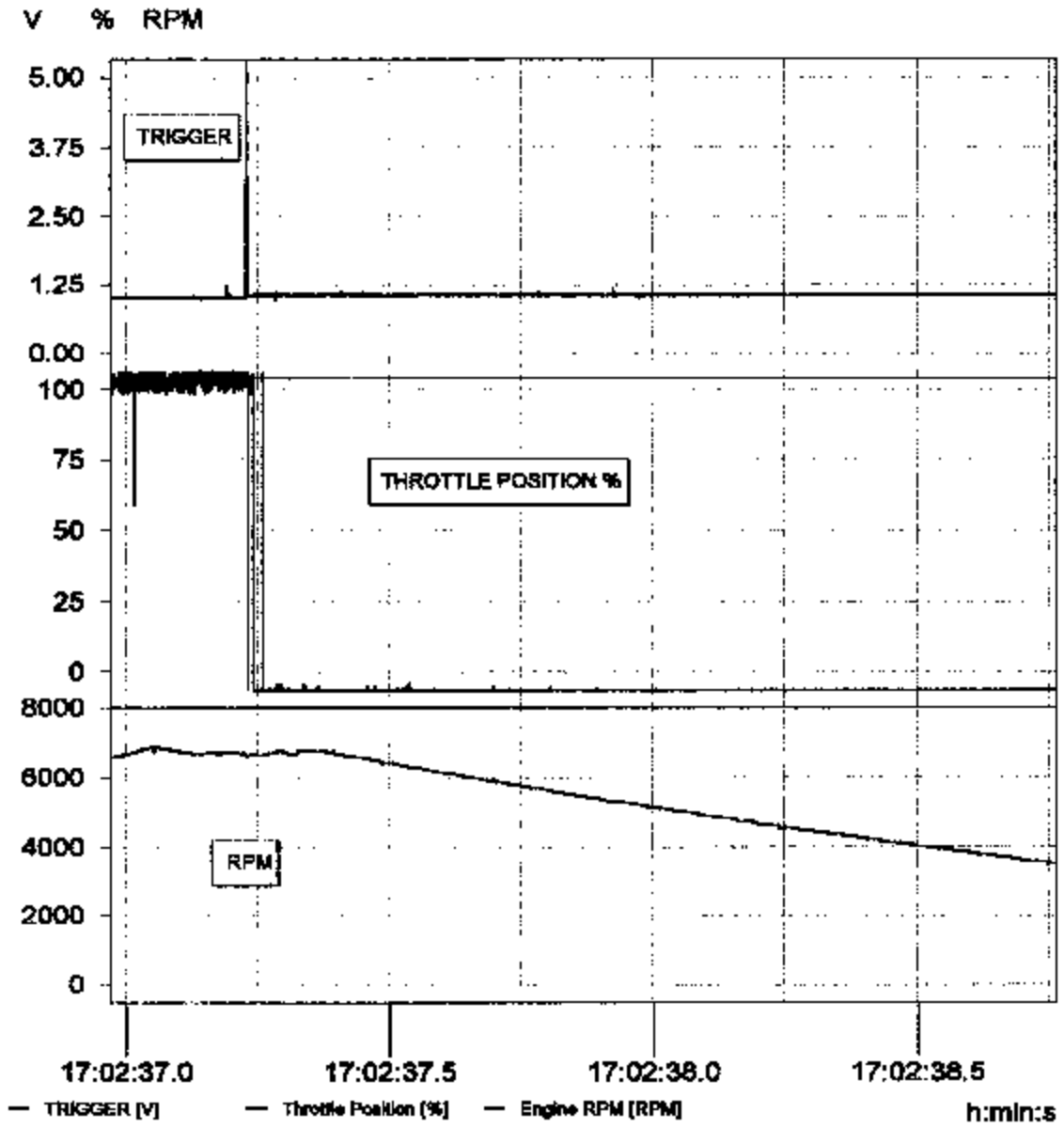
Channel:Throttle Position

Y1:	98.963 %	Y2:	6.653 %
t1:	-15685.996 ms	t2:	-12749.996 ms
dt:	2.936 s	f:	0.341 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/TPS/TPM WIRE 6 SHORTED/ 100% WOT 5:20:50 PM 4/27/04

NHTSA C40600 FREELANDER



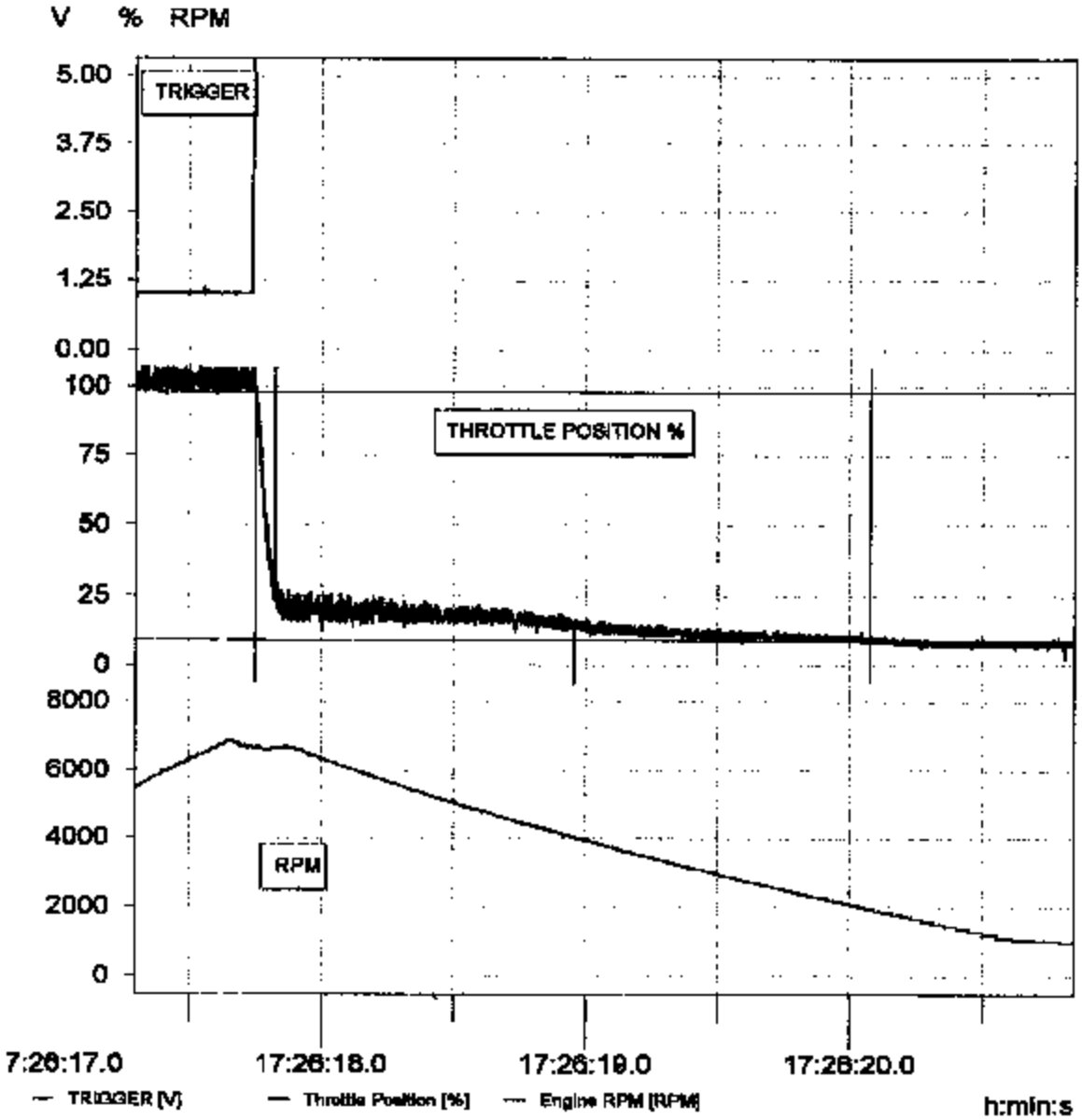
Channel:Throttle Position

Y1:	103.967 %	Y2:	-12.913 %
t1:	-5819.996 ms	t2:	-5792.996 ms
dt:	0.027 s	f:	37.037 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/APS WIRE 11 OPEN/ 100% WOT 5:31:48 PM 4/27/04

NHTSA C40600 FREELANDER



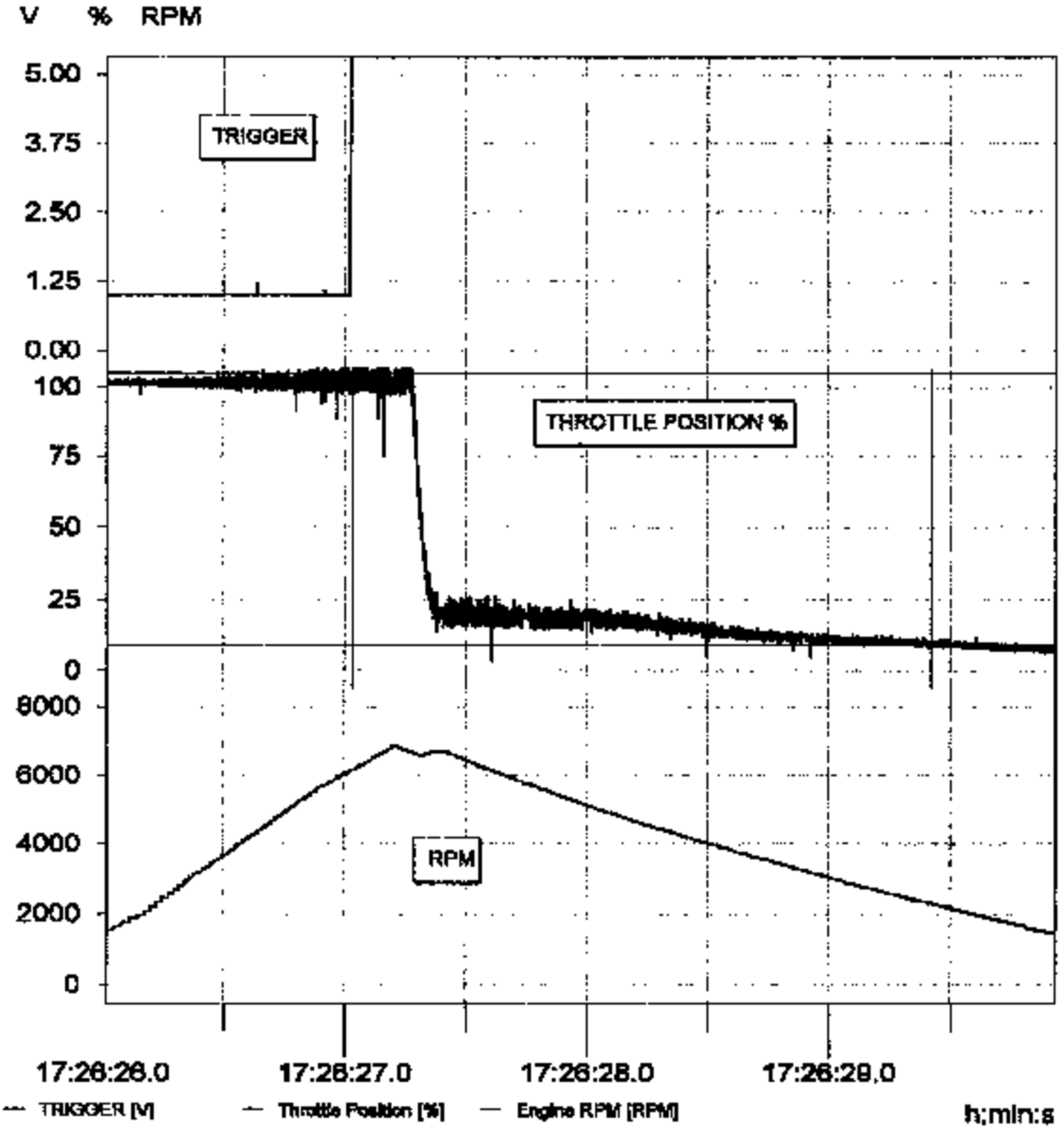
Channel:Throttle Position

Y1:	97.960 %	Y2:	8.857 %
t1:	-55261.318 ms	t2:	-52933.318 ms
dt:	2.328 s	f:	0.430 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/APS WIRE 12 OPEN/ 100% WOT **5:33:44 PM 4/27/04**

NHTSA C40600 FREELANDER



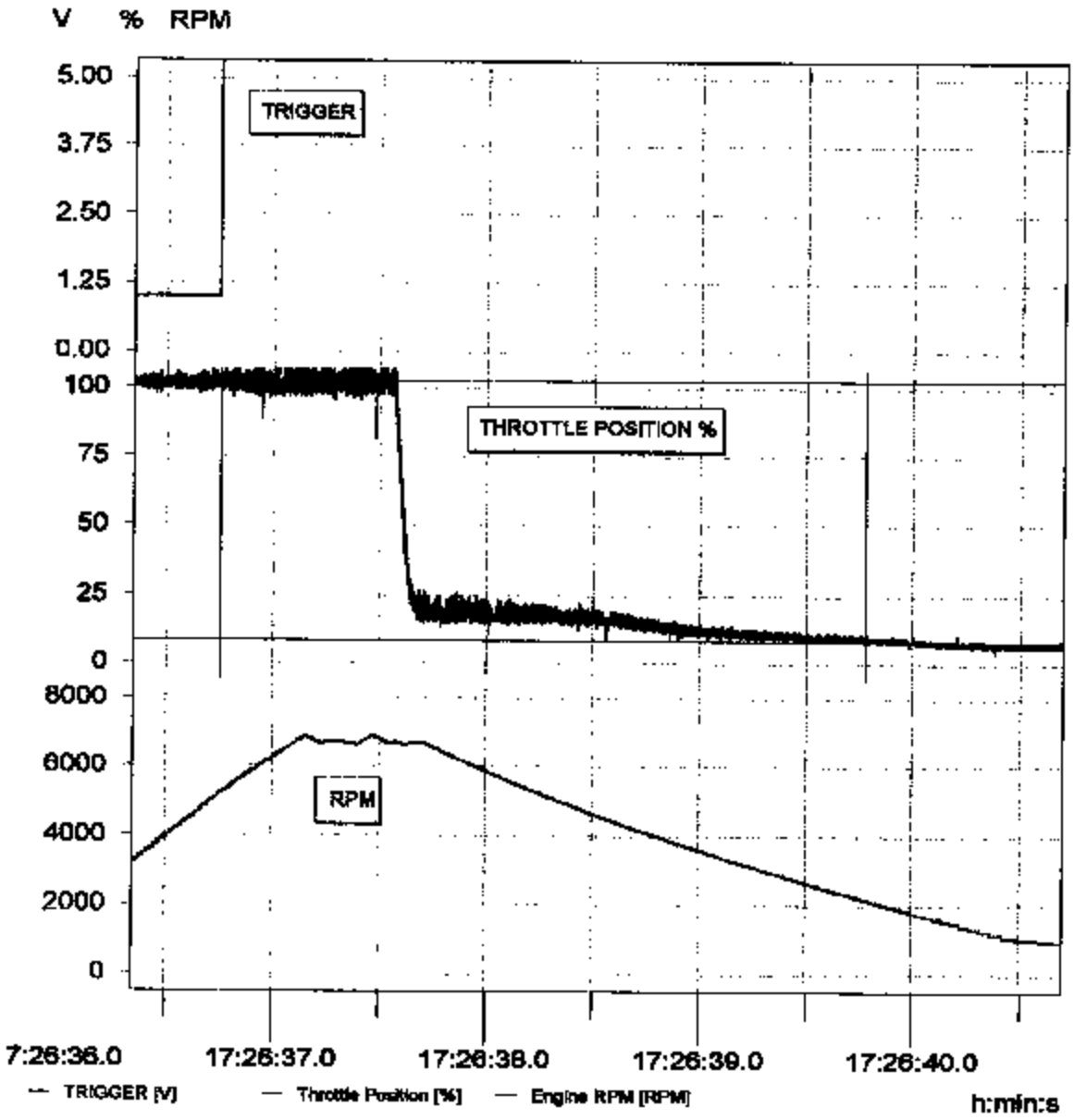
Channel:Throttle Position

Y1:	104.935 %	Y2:	8.934 %
t1:	-45978.318 ms	t2:	-43590.316 ms
dt:	2.388 s	f:	0.419 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/APS WIRE 13 OPEN/ 100% WOT 5:35:26 PM 4/27/04

NHTSA C40600 FREELANDER



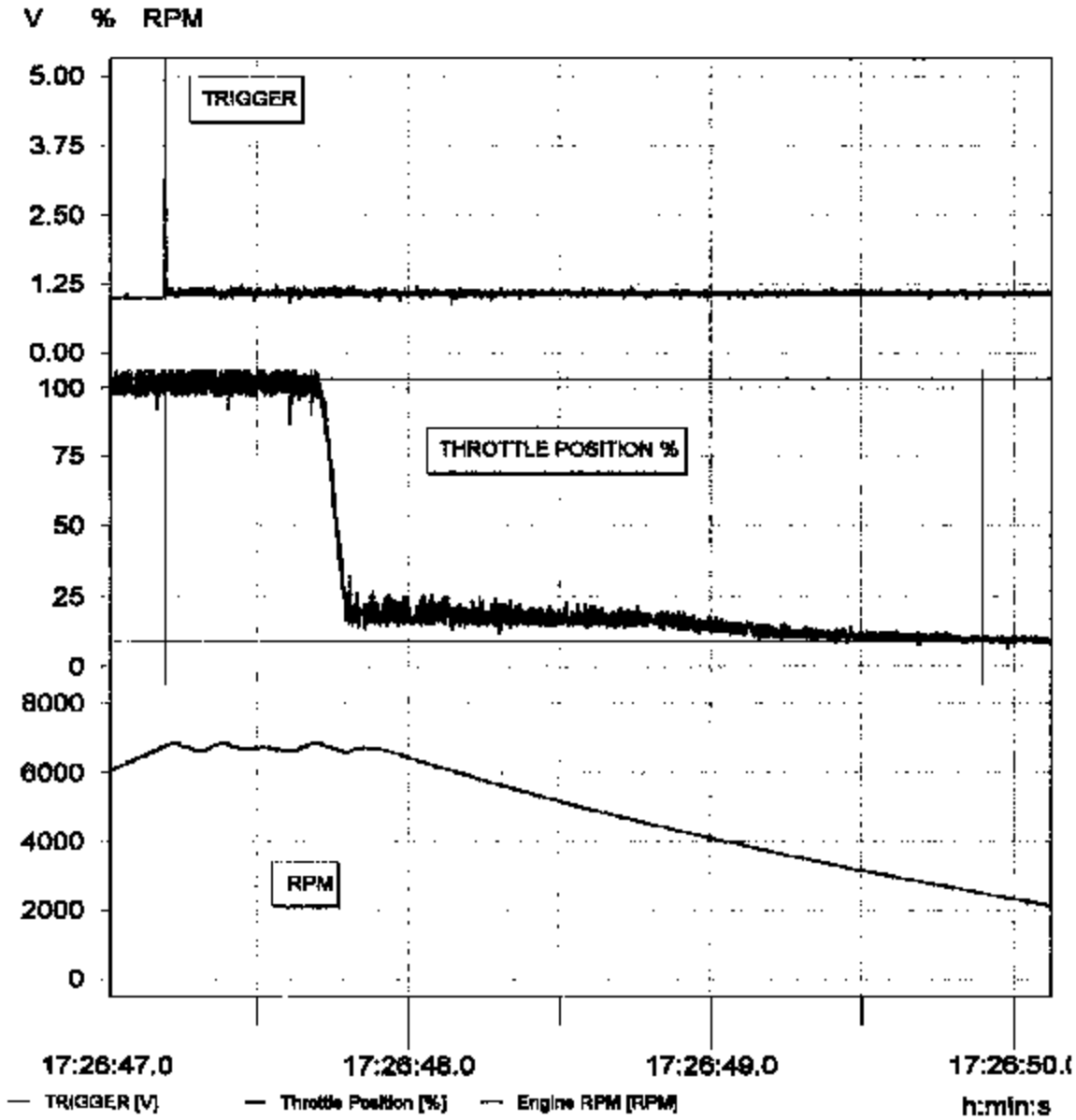
Channel:Throttle Position

Y1:	102.606 %	Y2:	8.417 %
t1:	-38258.318 ms	t2:	-33231.318 ms
dt:	3.027 s	f:	0.330 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/APS WIRE 14 OPEN/ 100% WOT 5:37:16 PM 4/27/04

NHTSA C40600 FREELANDER



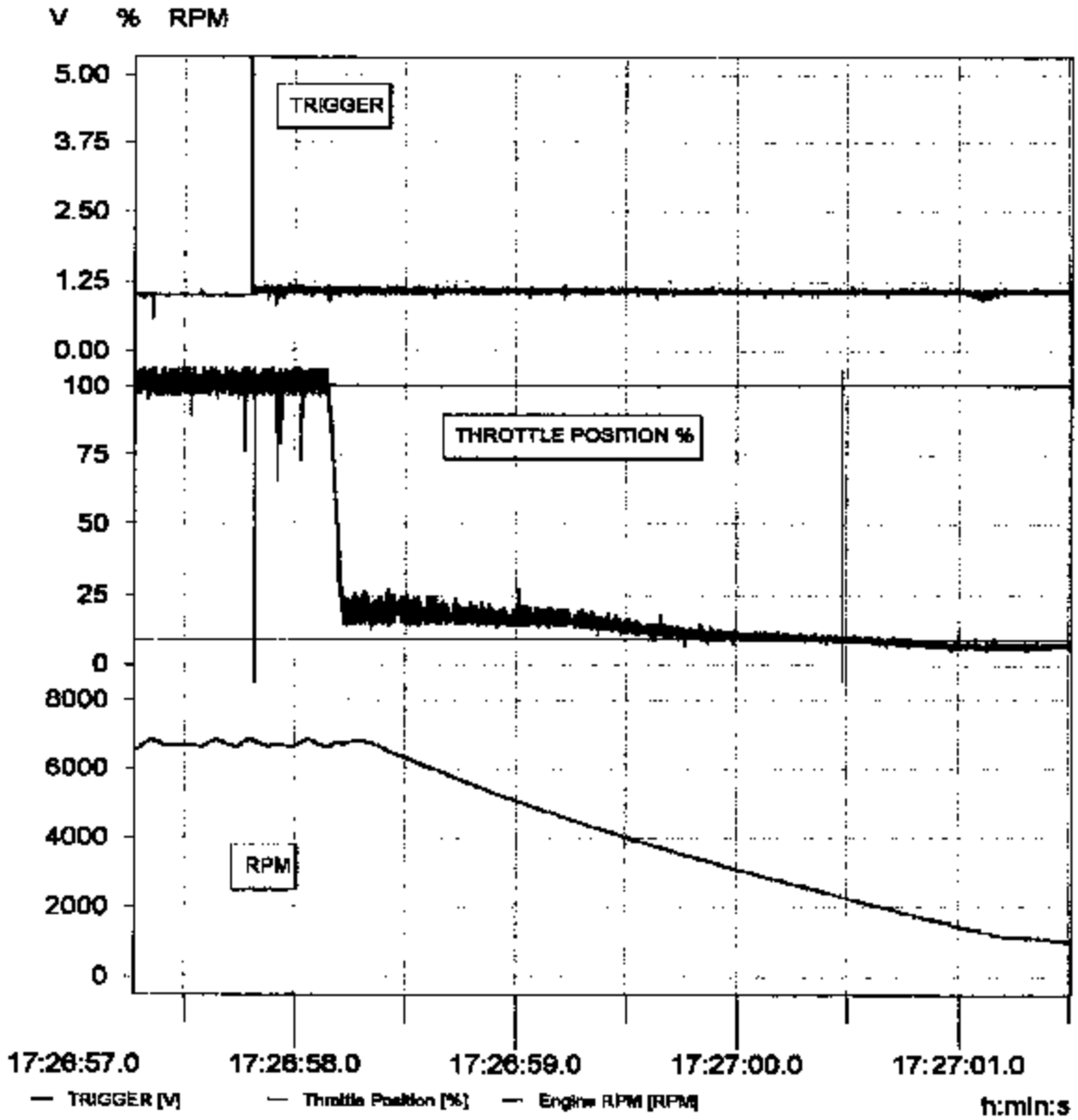
Channel:Throttle Position

Y1:	103.466 %	Y2:	8.958 %
t1:	-25811.318 ms	t2:	-23114.318 ms
dt:	2.697 s	f:	0.371 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/APS WIRE 15 OPEN/ 100% WOT 5:39:10 PM 4/27/04

NHTSA C40600 FREELANDER



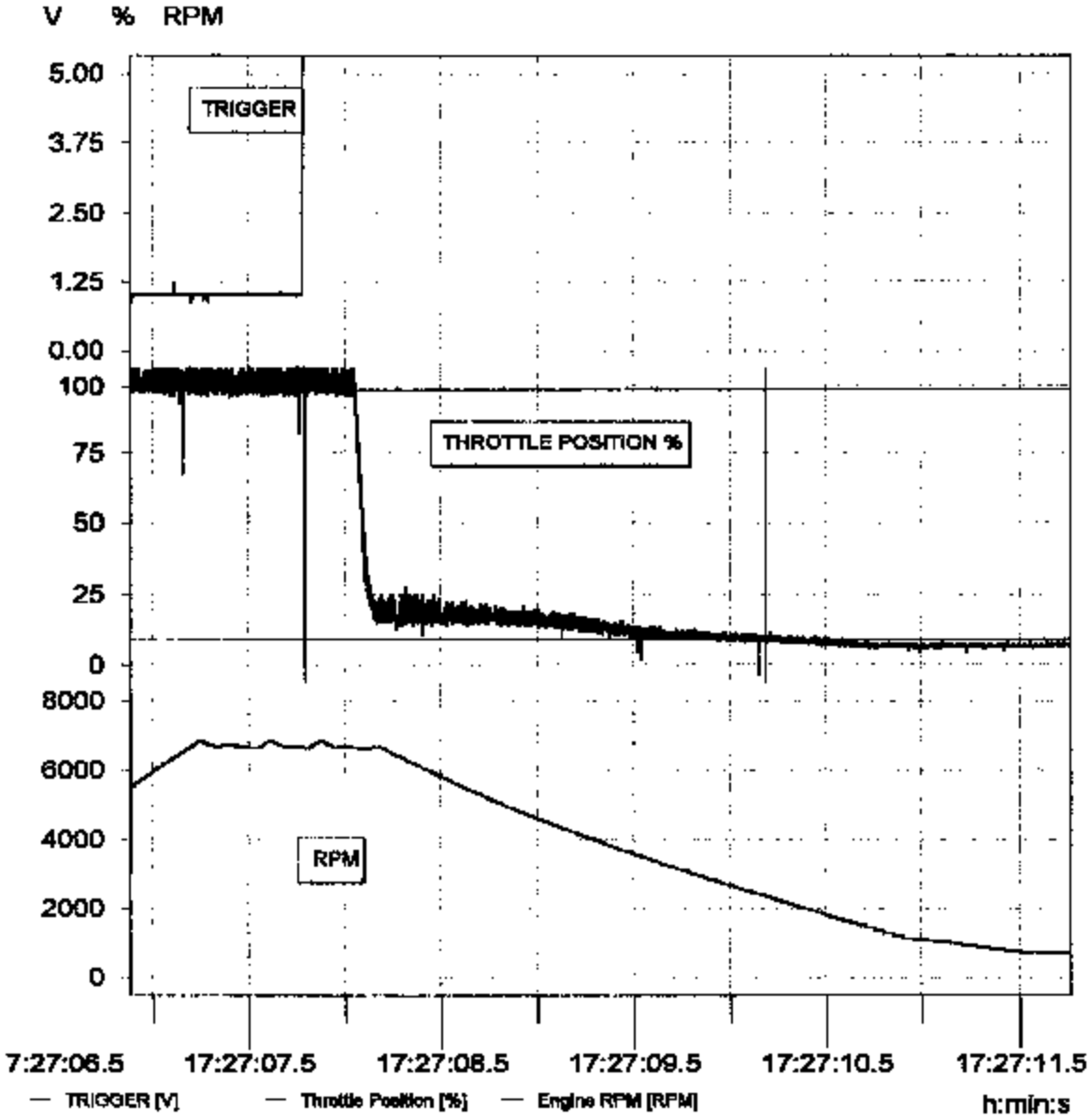
Channel:Throttle Position

Y1:	100.531 %	Y2:	6.958 %
t1:	-15194.316 ms	t2:	-12529.316 ms
dt:	2.665 s	f:	0.375 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/APS WIRE 16 OPEN/ 100% WOT 5:40:38 PM 4/27/04

NHTSA C40600 FREELANDER



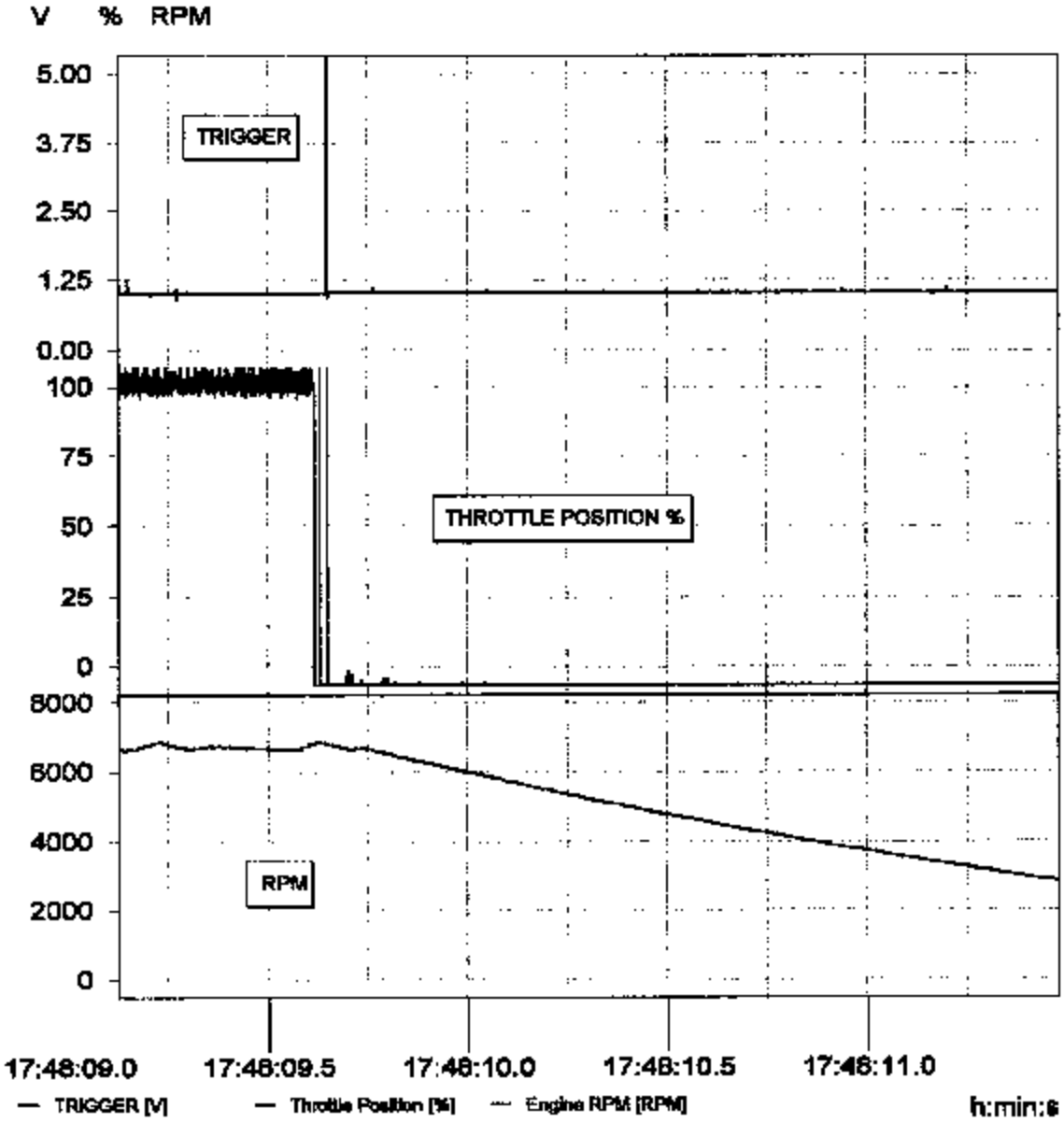
Channel:Throttle Position

Y1:	98.662 %	Y2:	8.958 %
t1:	-5218.318 ms	t2:	-2823.318 ms
dt:	2.395 s	f:	0.418 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/APS WIRE 11 SHORTED/ 100% WOT 5:54:40 PM 4/27/04

NHTSA C40600 FREELANDER



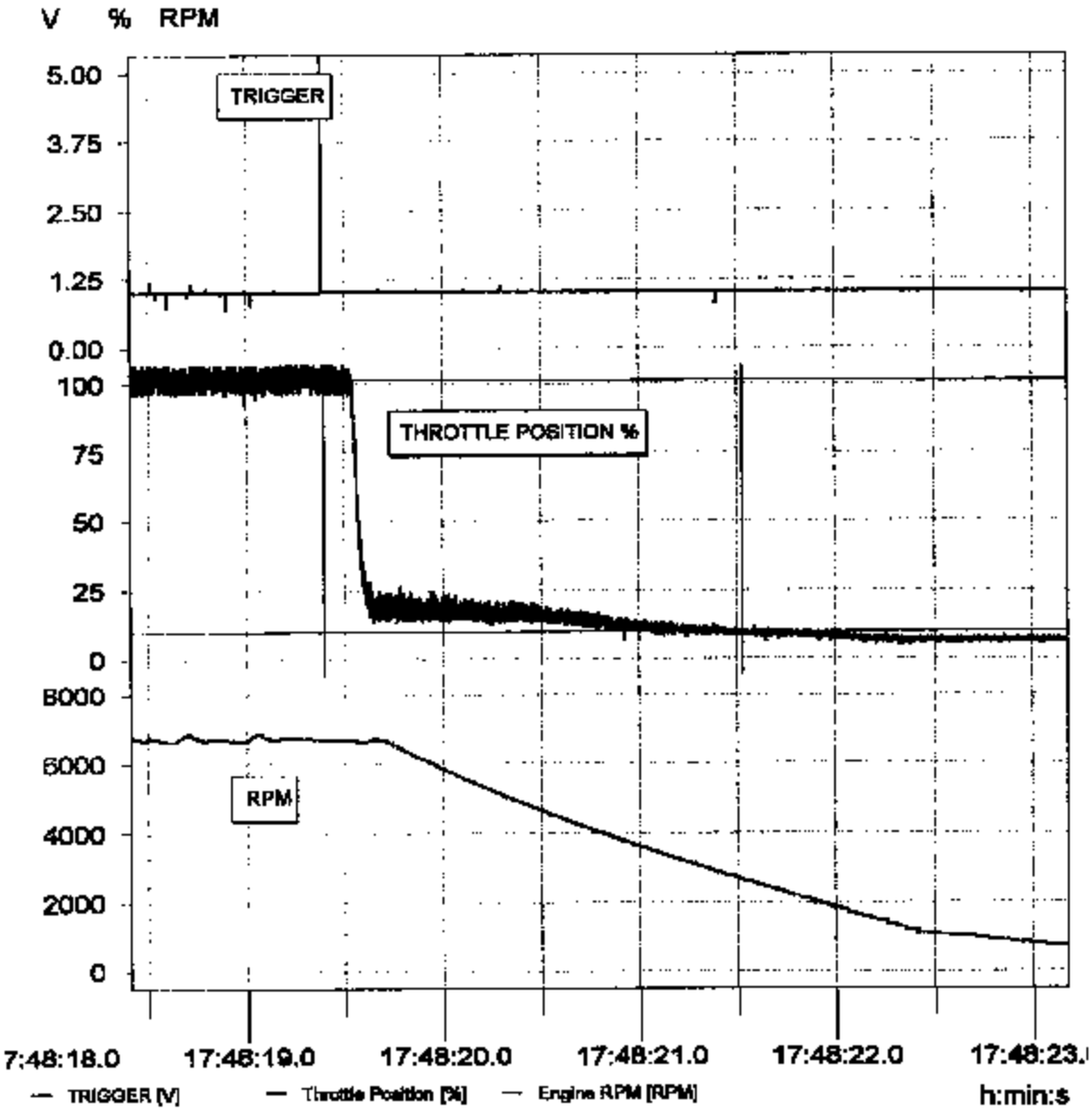
Channel:Throttle Position

Y1:	-10.511 %	Y2:	-10.216 %
t1:	-54367.942 ms	t2:	-54369.942 ms
dt:	0.016 s	f:	55.556 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/APS WIRE 12 SHORTED/ 100% WOT 5:56:28 PM 4/27/04

NHTSA C40600 FREELANDER



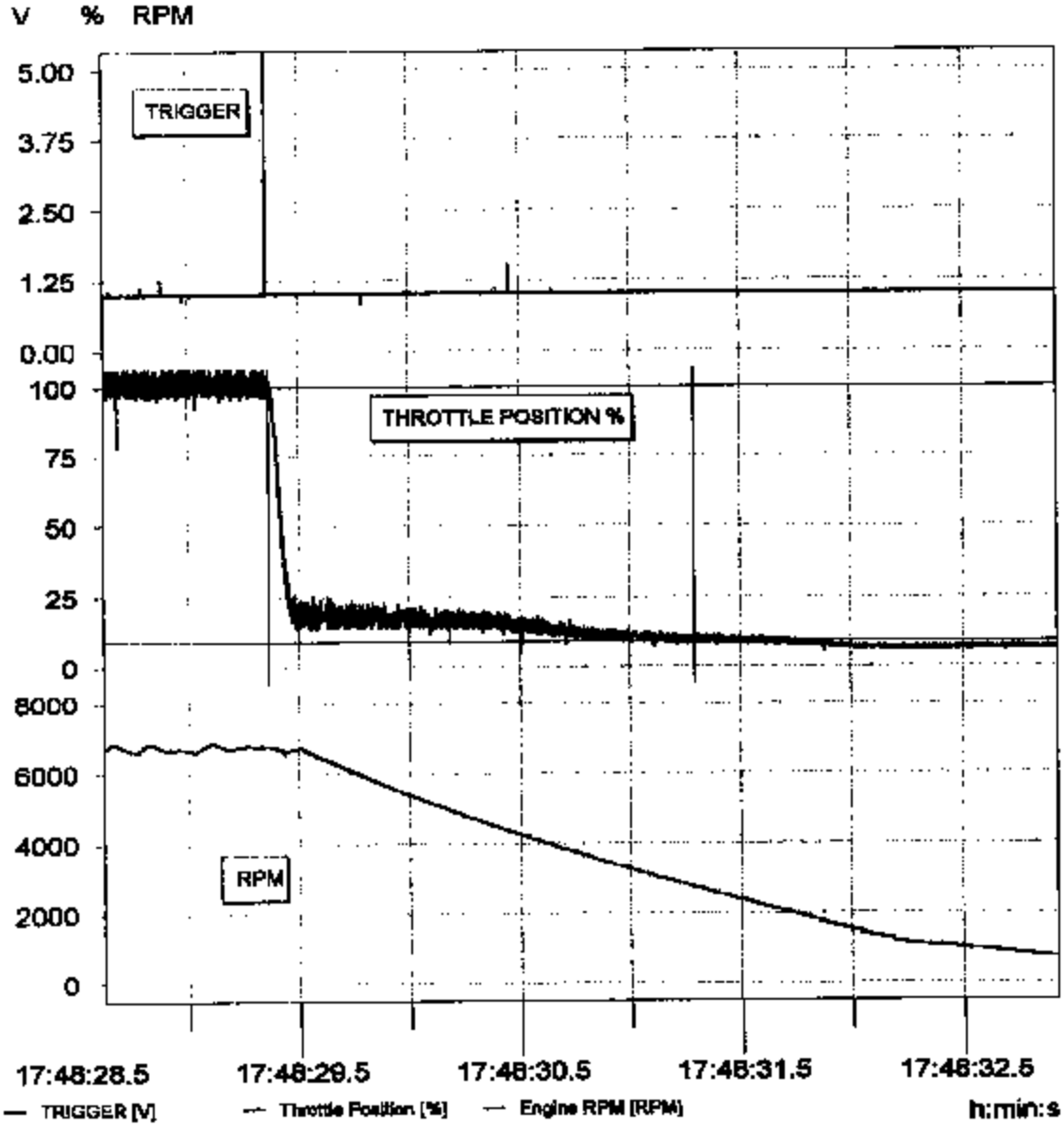
Channel:Throttle Position

Y1:	100.931 %	Y2:	9.386 %
t1:	-44624.942 ms	t2:	-42492.942 ms
dt:	2.132 s	f:	0.469 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/APS WIRE 13 SHORTED/ 100% WOT 5:58:08 PM 4/27/04

NHTSA C40600 FREELANDER



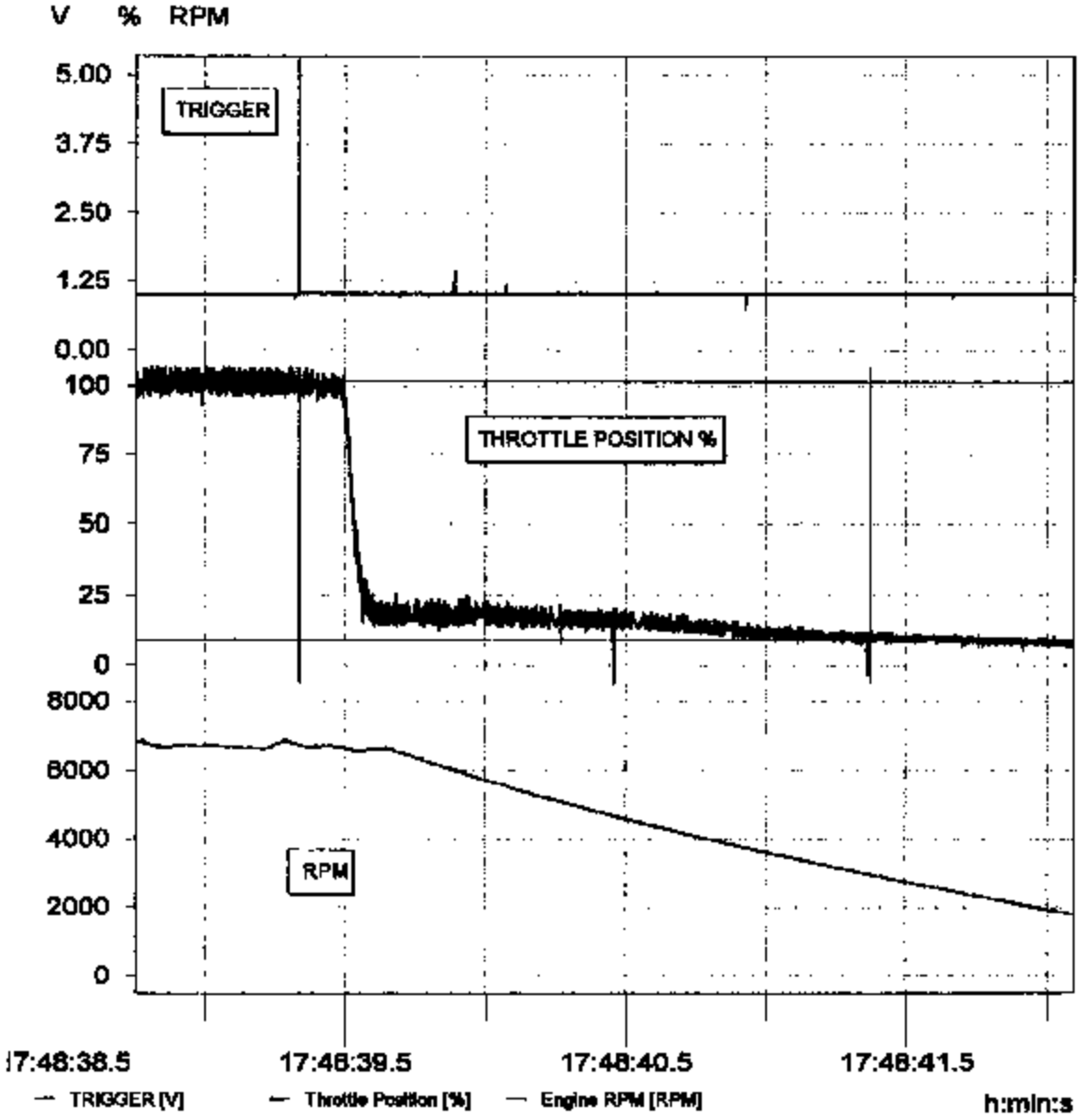
Channel:Throttle Position

Y1:	99.792 %	Y2:	8.690 %
t1:	-34656.942 ms	t2:	-32729.942 ms
dt:	1.927 s	f:	0.519 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/APS WIRE 14 SHORTED/ 100% WOT 5:59:52 PM 4/27/04

NHTSA C40600 FREELANDER



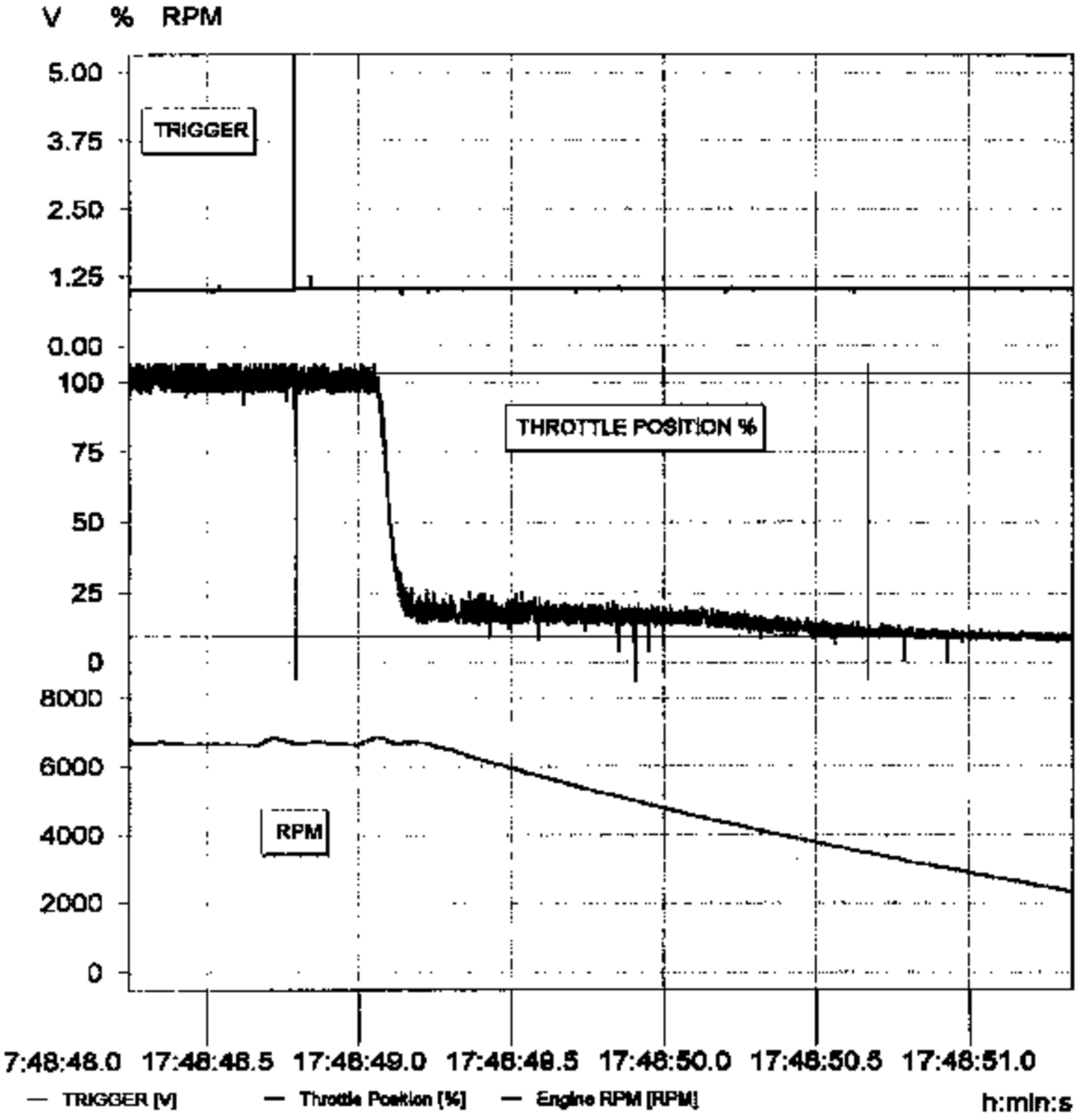
Channel:Throttle Position

Y1:	101.484 %	Y2:	6.846 %
t1:	-24682.942 ms	t2:	-22646.942 ms
dt:	2.036 s	f:	0.491 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/APS WIRE 15 SHORTED/ 100% WOT 6:01:28 PM 4/27/04

NHTSA C40600 FREELANDER



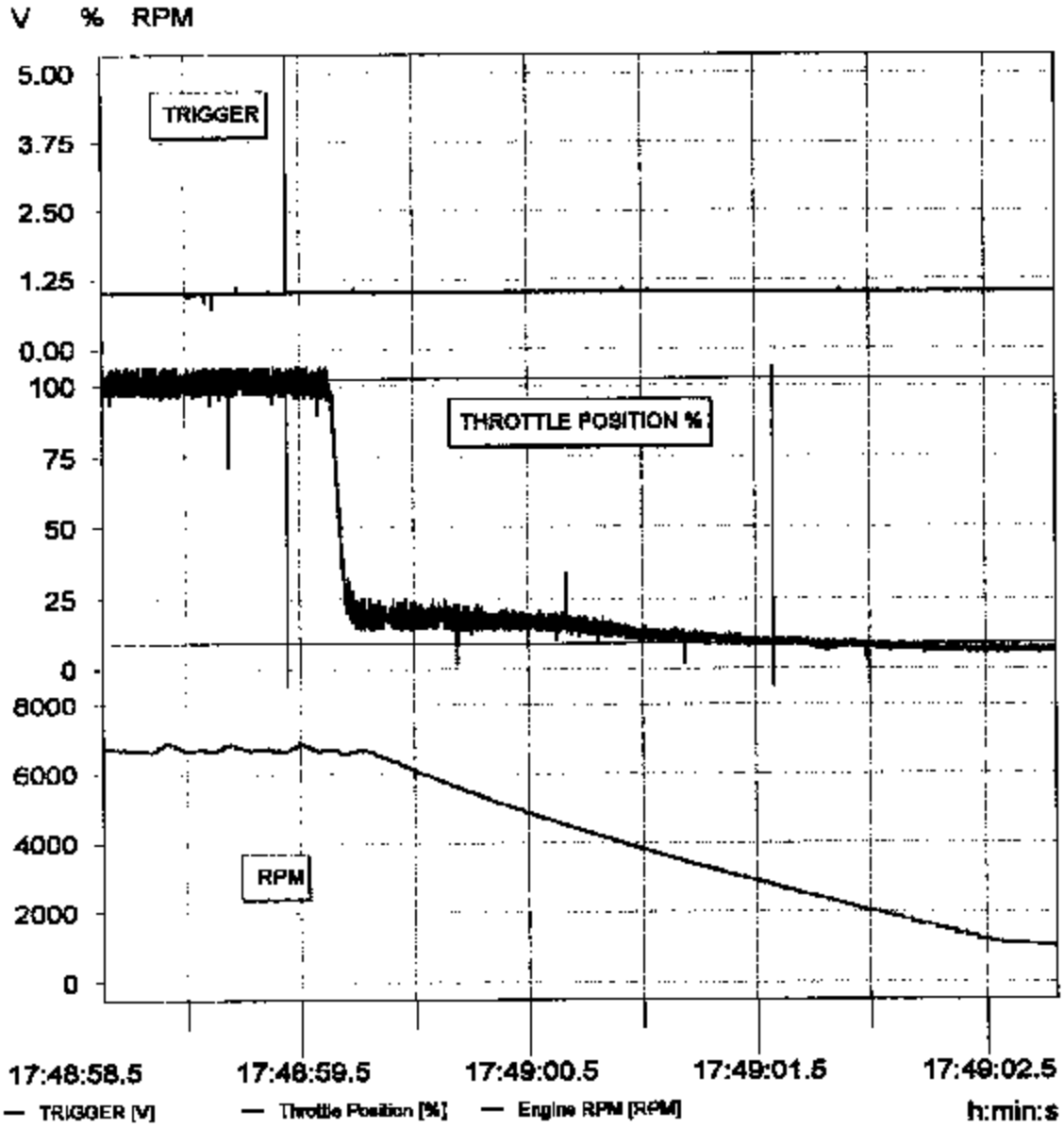
Channel:Throttle Position

Y1:	102.929 %	Y2:	8.946 %
t1:	-15226.942 ms	t2:	-13346.942 ms
dt:	1.881 s	f:	0.532 Hz

FMVSS 124 THROTTLE RETURN TEST

124 HOT/APS WIRE 16 SHORTED/ 100% WOT 6:03:29 PM 4/27/04

NHTSA C40600 FREELANDER



Channel:Throttle Position

Y1:	102.065 %	Y2:	8.621 %
t1:	-4573.942 ms	t2:	-2443.942 ms
dt:	2.130 s	f:	0.469 Hz

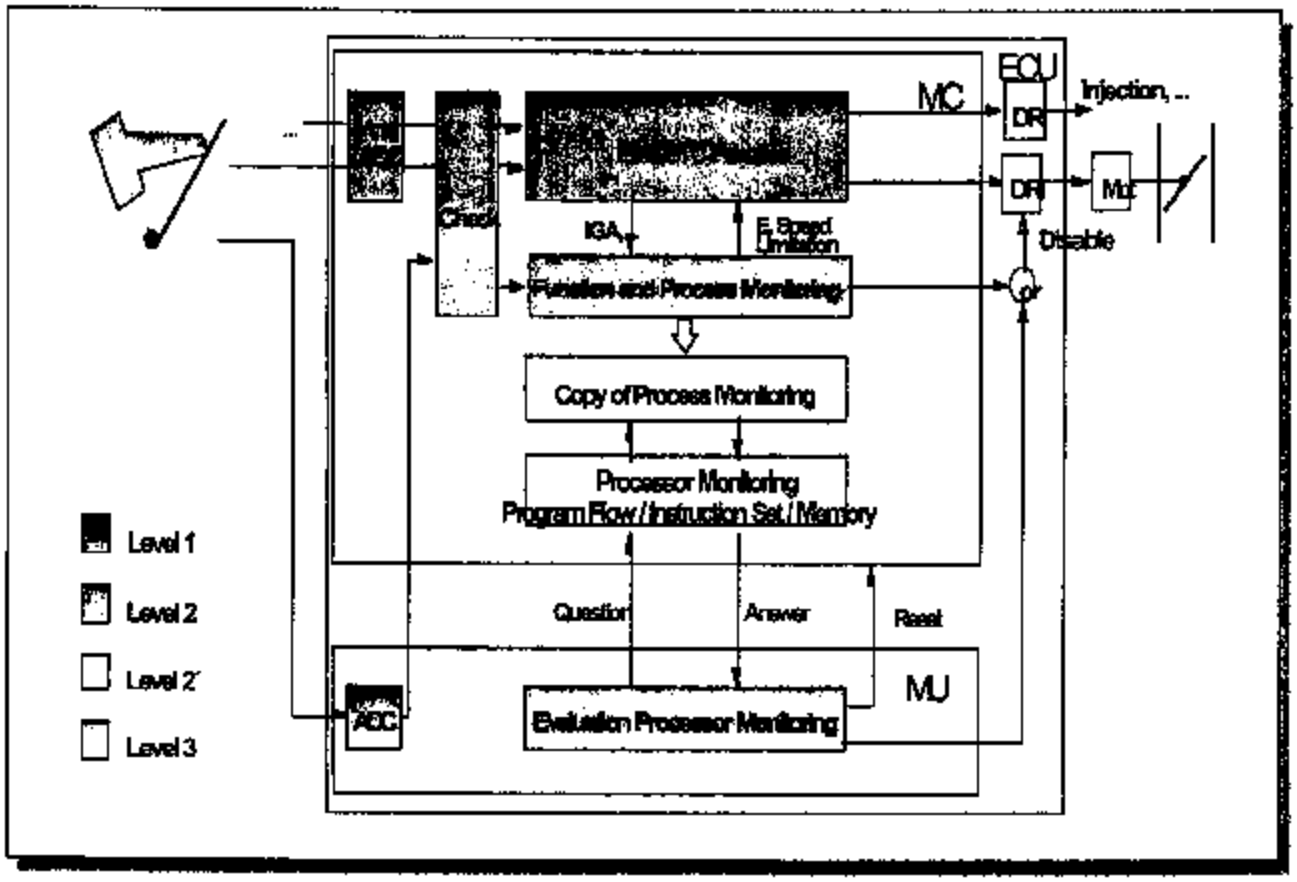
SECTION 7
MANUFACTURER'S DRAWINGS

FORM 12

VEHICLE INFORMATION/TEST SPECIFICATIONS
FMVSS 124 - Accelerator Control Systems

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).



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

- A setpoint idle speed is determined and the ECM tries to achieve this setpoint primarily through throttle opening angle, with adjustments to ignition angle and fuelling to suit momentary changes in load and mass airflow.

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)

- The first reaction to a fault as described above is reversible Fuel Cut-off, also known as reversible SAS, until the throttle plate has arrived at the Limp Home position through spring activation.

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

- All of the above.

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.

Measure voltage across pins 3-19 (TPS1 signal) and 3-20 (TPS ground) at the ECM or the corresponding pins at the TPS sensor. The absolute throttle angle is then given by;

TPS = (measured value/5V) * 100%

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

See Items under 7.)

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.

- **CAM (Camshaft) sensor: fault reaction test at start, idle and Part Load with and without engine speed fault.**
- **CRK (Crankshaft) sensor: fault reaction test at start, idle and Part Load with and without engine speed fault.**
- **MAF sensor: fault reaction test for MAF signal line break at start and Part Load.**
- **Throttle control motor: fault reaction test for break in supply line to Air Throttle plate actuator motor.**
- **APS sensors: fault reaction test for disconnection of each line (supply, ground, signal) separately and the whole plug of each pot.**
- **ECT sensor: fault reaction test for signal line disconnection at start and Part Load.**
- **TPS sensors: fault reaction test for disconnection of each line (supply, ground, signal) separately and the whole plug of each pot.**

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

- **Data available, but not analyzed to this purpose.**

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

- Limp home position return spring used for air throttle plate. Accelerator pedal spring loaded to return to uppermost position.

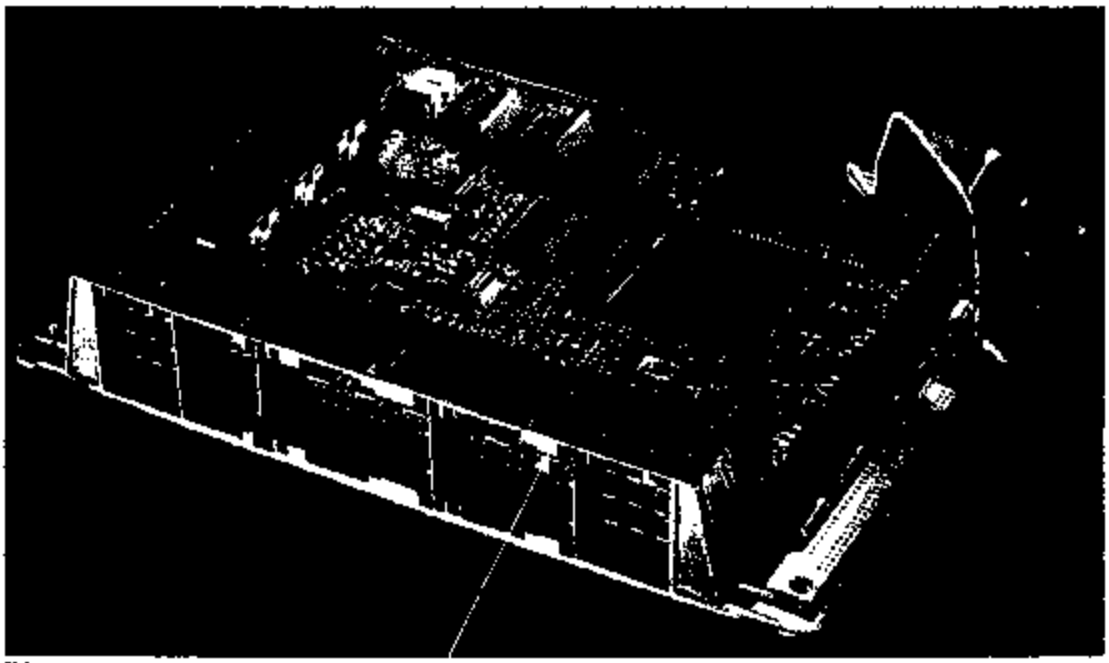
10.) If fuel delivery rate is used to demonstrate return to idle state, provide:

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.

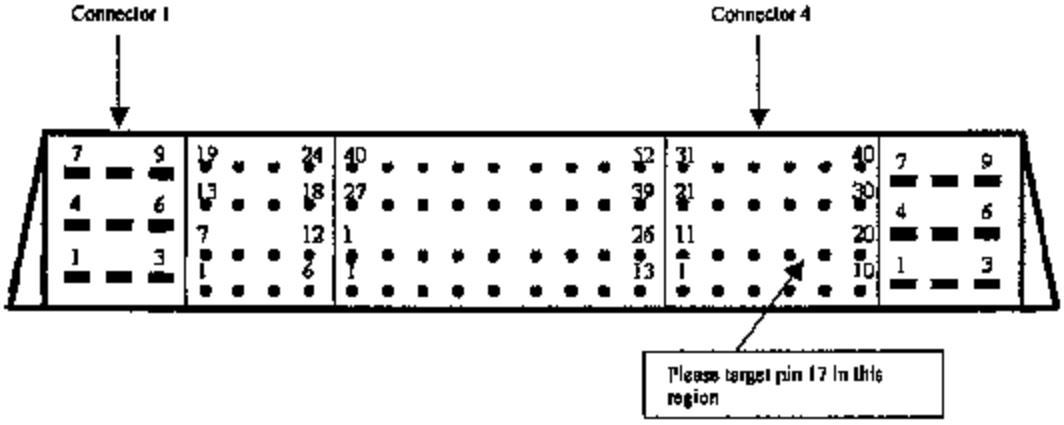
N/A

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

When a failure that requires limp home mode is detected, the ECM deactivates, when possible, the air throttle plate motor whilst reversible fuel cut-off is activated. The throttle plate acquires it's limp home position through spring action. When appropriate, fuel injection is reinstated when the throttle plate has assumed the limp home position.



Please target pin 17 in this region



SECTION 8
NOTICE OF POSSIBLE NON-COMPLIANCE

LABORATORY NOTICE OF TEST FAILURE TO OVSC

FMVSS NO.: 124 TEST DATE: 04/27/04

LABORATORY: General Testing Laboratories, Inc.

CONTRACT NO.: DTNH22-01-C-11025 ; DELV. ORDER NO.:

LABORATORY PROJECT ENGINEER'S NAME: Grant Farrand

TEST VEHICLE MAKE/MODEL/BODY STYLE: 2004 Landrover Freelander MPV

VEHICLE NHTSA NO.: C40600 : VIN: SALNY22214A[redacted]

VEHICLE MODEL YEAR: 2004 : BUILD DATE: 10/03

TEST FAILURE DESCRIPTION: During various failure modes of the accelerator control system, return time to base idle exceeds the allowed 1 second maximum

S124 REQUIREMENT, PARAGRAPH S5.3 : Except as provided below, maximum time to return to idle position shall be 1 second for vehicles of 4536 kg or less GVWR

NOTIFICATION TO NHTSA (COTR): Stu Seigel

DATE: 08/06/04 BY: Grant Farrand

REMARKS: