

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

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

**GENERAL TESTING LABORATORIES, INC.
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AUGUST 17, 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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Acceptance Date: 8/24/04

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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-124-08 for the determination of FMVSS 124 compliance. Test failures identified were as follows: Throttle Return Times					
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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 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 actuator and APS ~~motor~~ 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 to be performed at low ambient temperature of -40°C ($-0, +5^{\circ}\text{C}$) in accordance with the NHTSA Test Procedure TP-124-06, however due to the vehicle engine not starting at -40°C , the ambient temperature was raised from -40°C at an approximate rate of $5^{\circ}/\text{HR}$. The vehicle started at -9.5°C (15°F) and the test was performed.

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: SALNY22214
DATE OF TEST: MAY 4, 2004
TEST LAB: GENERAL TESTING LABORATORIES
VEHICLE ENGINE TYPE: V6 GVWR: 2080 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: [Signature]DATE: 05/04/04APPROVED BY: [Signature]

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: MAY 4, 2004

Check one:

Mld 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	5100	15	15	8%	1091	F
50%	50	2780	15	15	8%	451	P
75%	75	2600	45	15	8%	138	P
100%	100	3060	80	15	8	741	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: AFTER COLD SOAK PERIOD AT -40° THE VEHICLE WOULD NOT START. CHAMBER AND VEHICLE TEMPERATURES WERE RAISED TO -25° PER COTR'S REQUEST. VEHICLE STILL WOULD NOT START AT -25°. THE CHAMBER WAS BROUGHT DOWN TO -15°, NO START, 0° NO START, 10° F NO START. VEHICLE STARTED AT 15° F AND TESTS WERE CONDUCTED.

RECORDED BY: *P. Hernandez*

DATE: 05/04/04

APPROVED BY: *D. Messick*

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: MAY 4, 2004

Check one:

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

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	3540	44	16	8%	291	P
50%	50	2518	44	16	8%	114	P
75%	75	2600	44	17	8%	106	P
100%	100	2670	50	17	8%	165	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: 05/04/04

APPROVED BY: *[Signature]*

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: MAY 4, 2004

Check one:

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

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	6050	52	17	8%	667	P
50%	50	2600	65	17	8%	129	P
75%	75	3435	70	17	8%	38	P
100%	100	4000	73	17	8%	405	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: 05/04/04

APPROVED BY: *[Signature]*

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: MAY 4, 2004

Check one:

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

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	6550	88	16	8%	9	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: 05/04/04

APPROVED BY: *[Signature]*

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: MAY 4, 2004

Check one:

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

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	6550	105	16	8%	16	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]
 APPROVED BY: [Signature]

DATE: 05/04/04

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

VEHICLE MY/MAKE/MODEL/BODY STYLE: 2004 LANDROVER FREELANDER, MPV
 VEHICLE NHTSA NO.: C40800
 DATE OF TEST: MAY 4, 2004

Check one:

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

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	6760	40	17	8%	156	P
2	100%	100	6760	55	17	8%	15	P
3	100%	100	6800	85	18	8%	1806	F
4	100%	100	6600	88	18	8%	1331	F
5	100%	100	6675	96	18	8%	13	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: 05/04/04

APPROVED BY: [Signature]

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: MAY 4, 2004

Check one:

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

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	6870	72	17	8%	1609	F
2	100%	100	6850	90	17	8%	1384	F
3	100%	100	6850	92	17	8%	36	P
4	100%	100	6850	95	17	8%	95	P
5	100%	100	6850	97	17	8%	2604	F
6	100%	100	6850	102	18	8%	13	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: S. Fernandez

DATE: 05/04/04

APPROVED BY: D. Messick

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: MAY 4, 2004

Check one:

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

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	6680	62	17	8%	402	*
2	100%	100	6680	66	17	8%	2128	F
3	100%	100	6680	77	18	8%	181	P
4	100%	100	6680	86	18	8%	72	P
5	100%	100	6680	92	18	8%	2271	F
6	100%	100		99	18	8%	15	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: * Throttle only returned to 9% idle state

RECORDED BY: *[Signature]*

DATE: 05/04/04

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: MAY 4, 2004

Check one:

Mild Temp. Test: Low Temp. Test: X High Temp. Test:

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	6800	61	17	8%	3396	F
12	100%	100	6800	62	17	8%	3632	F
13	100%	100	6800	64	17	8%	3082	F
14	100%	100	6800	69	17	8%	2343	F
15	100%	100	6800	78	18	8%	2582	F
16	100%	100	6800	85	18	8%	2204	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: 05/04/04

APPROVED BY: *[Signature]*

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: MAY 4, 2004

Check one:

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

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	6850	91	18	8%	4	P
12	100%	100	6850	92	18	8%	2051	F
13	100%	100	6850	101	18	8%	2086	F
14	100%	100	6850	105	18	8%	2232	F
15	100%	100	6850	107	19	8%	1535	F
16	100%	100	6850	110	19	8%	2036	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: *S. J. [Signature]*

DATE: 05/04/04

APPROVED BY: *D. [Signature]*

SECTION 4
TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

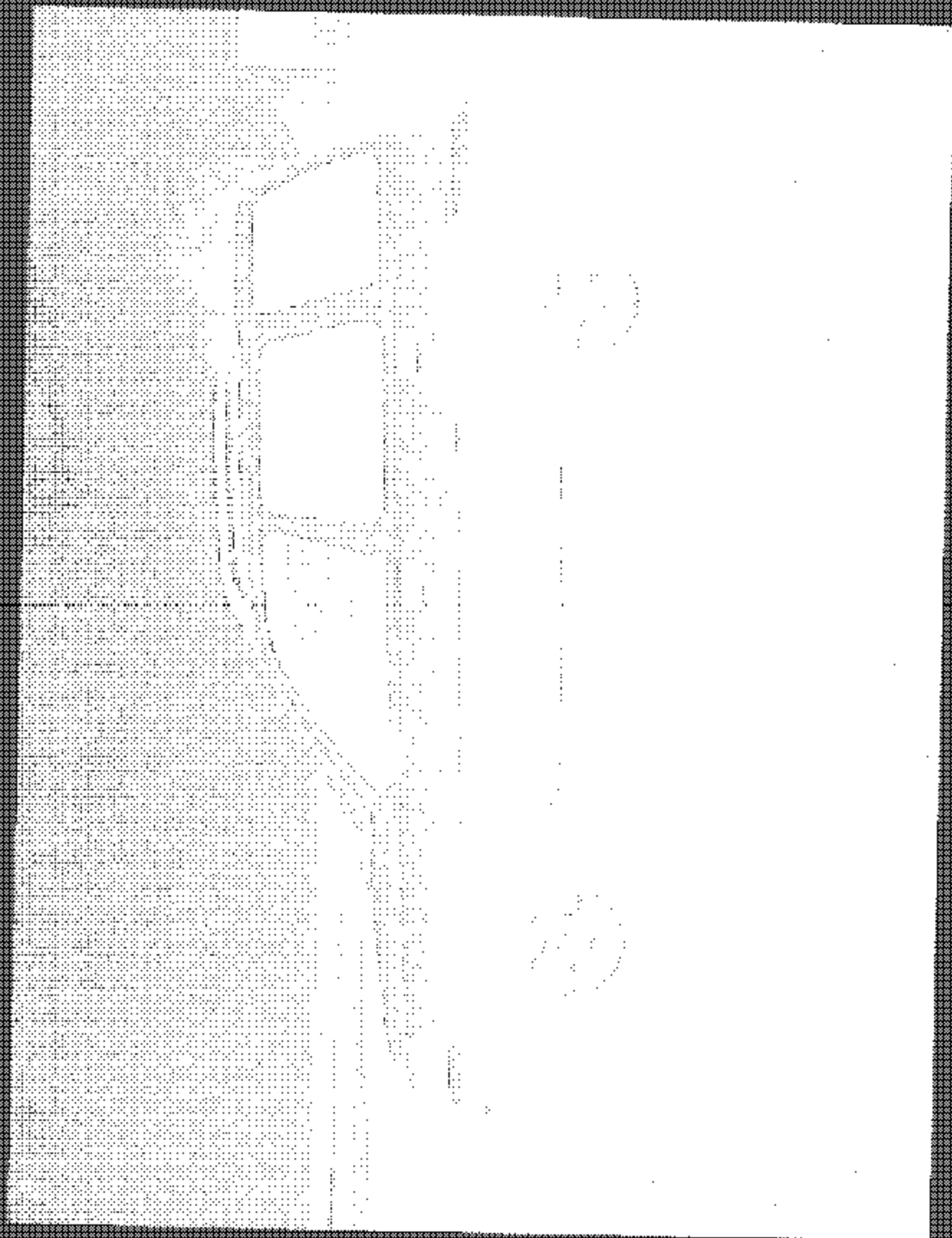
EQUIPMENT	DESCRIPTION	MODEL/ SERIAL NO.	CAL. DATE	NEXT CAL. DATE
CONTINUOUS RECORDER	OMEGA	55862	03/04	03/05
ENGINE RECORDING	FLUKE	7471026	03/04	03/05
ENGINE RECORDING	MONARCH	1444864	01/04	07/05
SOFTWARE	GTL	N/A	BEFORE USE	BEFORE USE
CHAMBER	GTL	N/A	N/A	N/A
EXHAUST DUCT	GTL	N/A	N/A	N/A

SECTION 5
PHOTOGRAPHS



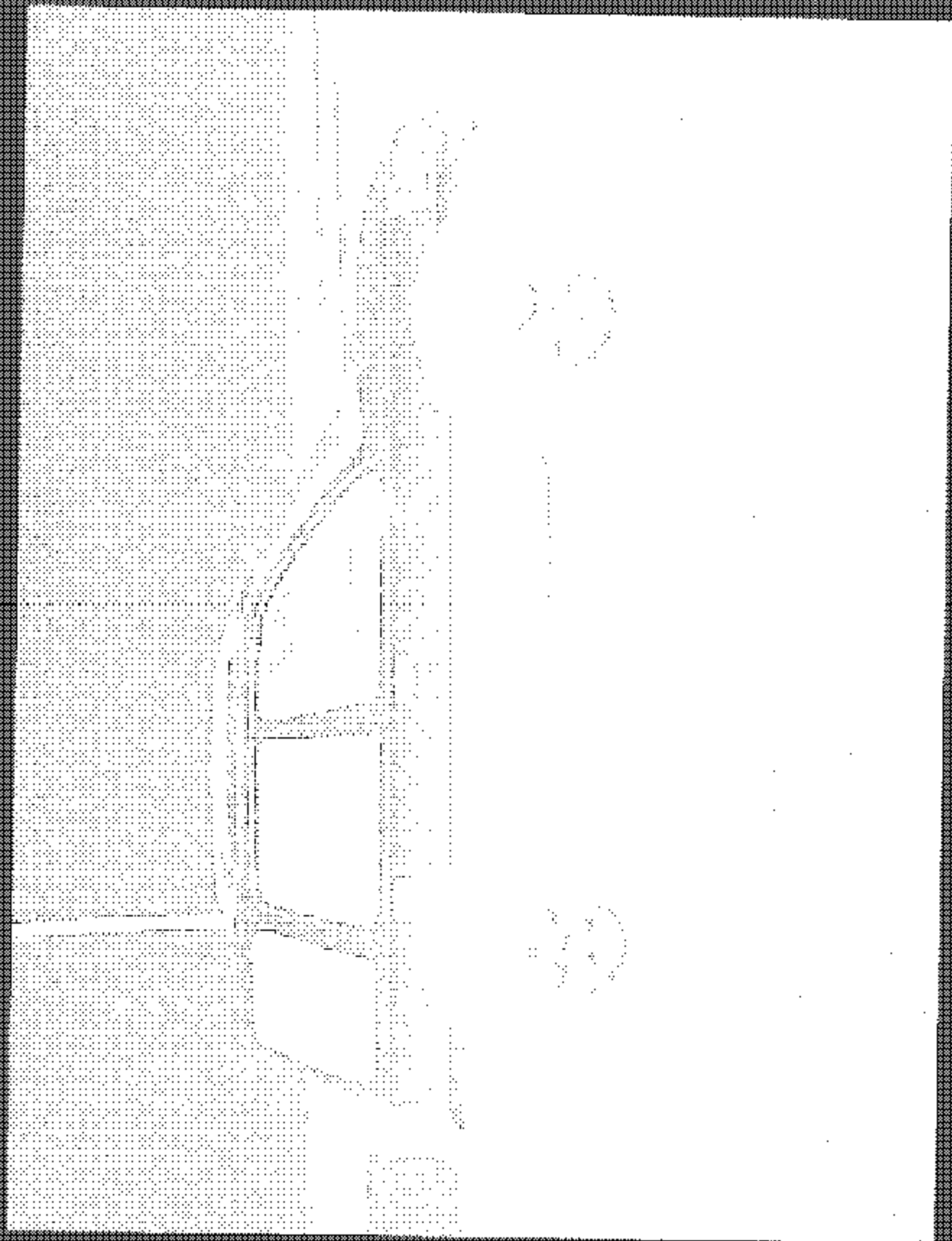
FIGURE 5.1
FRONT VIEW OF VEHICLE

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



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

FIGURE 62
LEFT SIDE VIEW OF VEHICLE



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

FIGURE 5.3
RIGHT SIDE VIEW OF VEHICLE



MADE BY LAND ROVER IN THE UK

DATE: 10/03/04 CHASSIS NO: 1454213

1.330 FROM: 10000 738743

1. FRONT TIRE, 150/70 R15, AT 20000 MILES
2. FRONT TIRE, 150/70 R15, AT 20000 MILES
3. FRONT TIRE, 150/70 R15, AT 20000 MILES
4. FRONT TIRE, 150/70 R15, AT 20000 MILES
5. FRONT TIRE, 150/70 R15, AT 20000 MILES

6. FRONT TIRE, 150/70 R15, AT 20000 MILES
7. FRONT TIRE, 150/70 R15, AT 20000 MILES
8. FRONT TIRE, 150/70 R15, AT 20000 MILES
9. FRONT TIRE, 150/70 R15, AT 20000 MILES
10. FRONT TIRE, 150/70 R15, AT 20000 MILES

THIS VEHICLE CONFORMS TO ALL THE
RELEVANT EUROPEAN SAFETY AND
ENVIRONMENTAL STANDARDS IN EFFECT
AT THE TIME OF MANUFACTURE.

SALE NO: 222144

LAND ROVER FINANCE
FINANCE NO: 1244

LAND ROVER FINANCE
FINANCE NO: 1244

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

2004 LAND ROVER FREELANDER
NHTSA NO. 040600
FINANCE NO. 1244

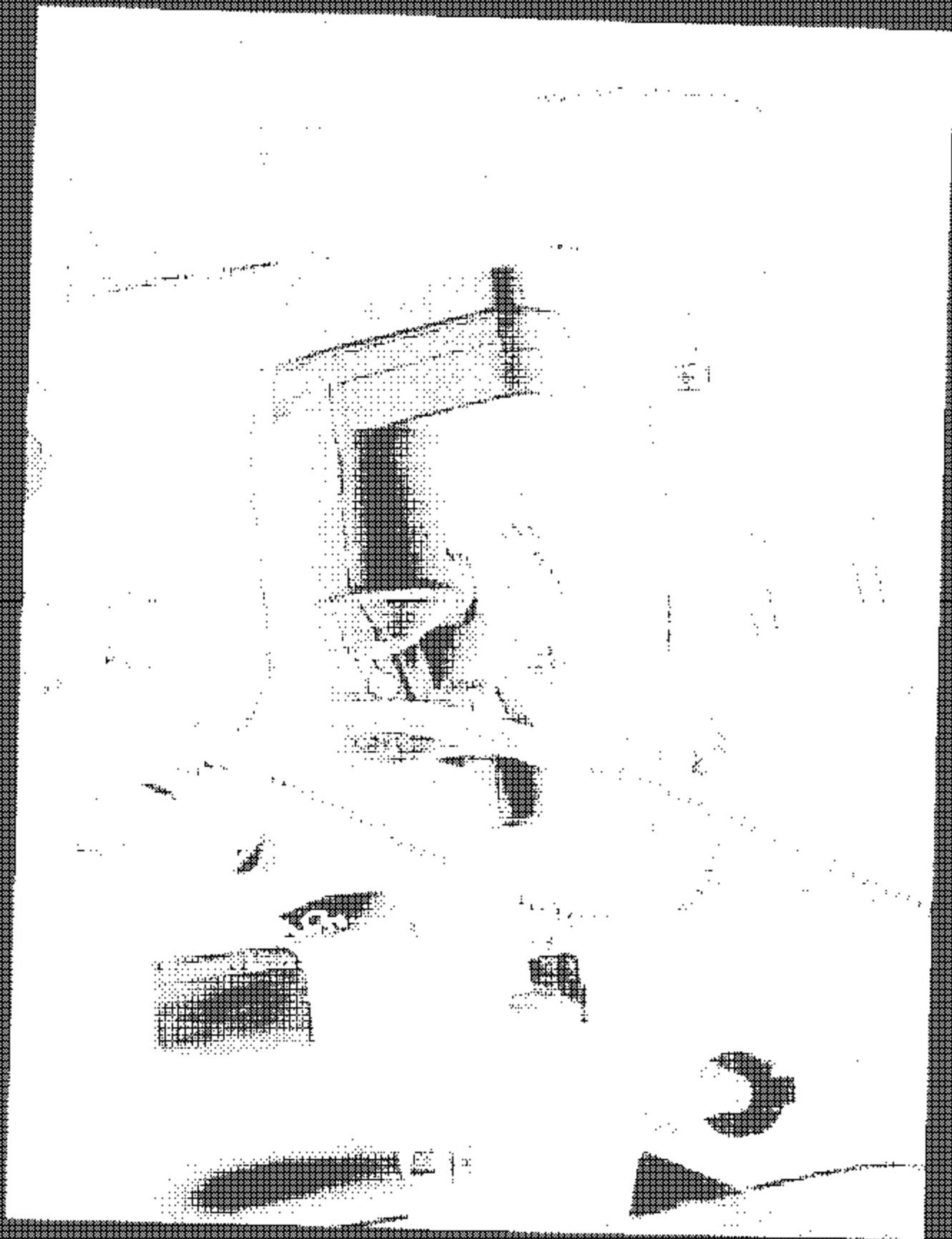


FIGURE 5.5
VIEW OF THROTTLE BODY ON ENGINE

2004 LAND ROVER FREELANDER
NHTSA NO. C400000
FMVSS NO. 124L

THROTTLE CONTROL MOTOR
AND THROTTLE POSITION
SENSOR



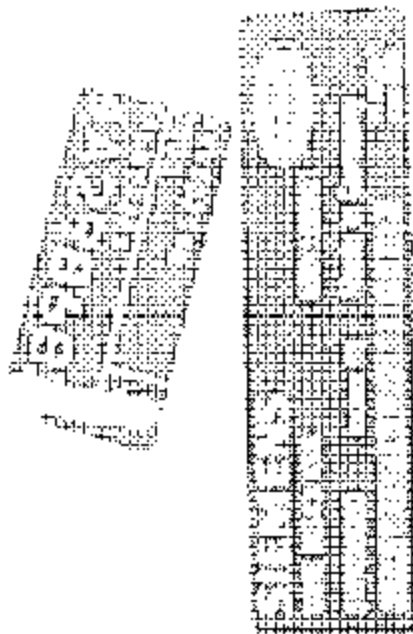
2004 LAND ROVER FREELANDER
NHTSA NO. C49600
FMVSS NO. 124L

FIGURE 5.6
LOCATION OF TPS AND TPM



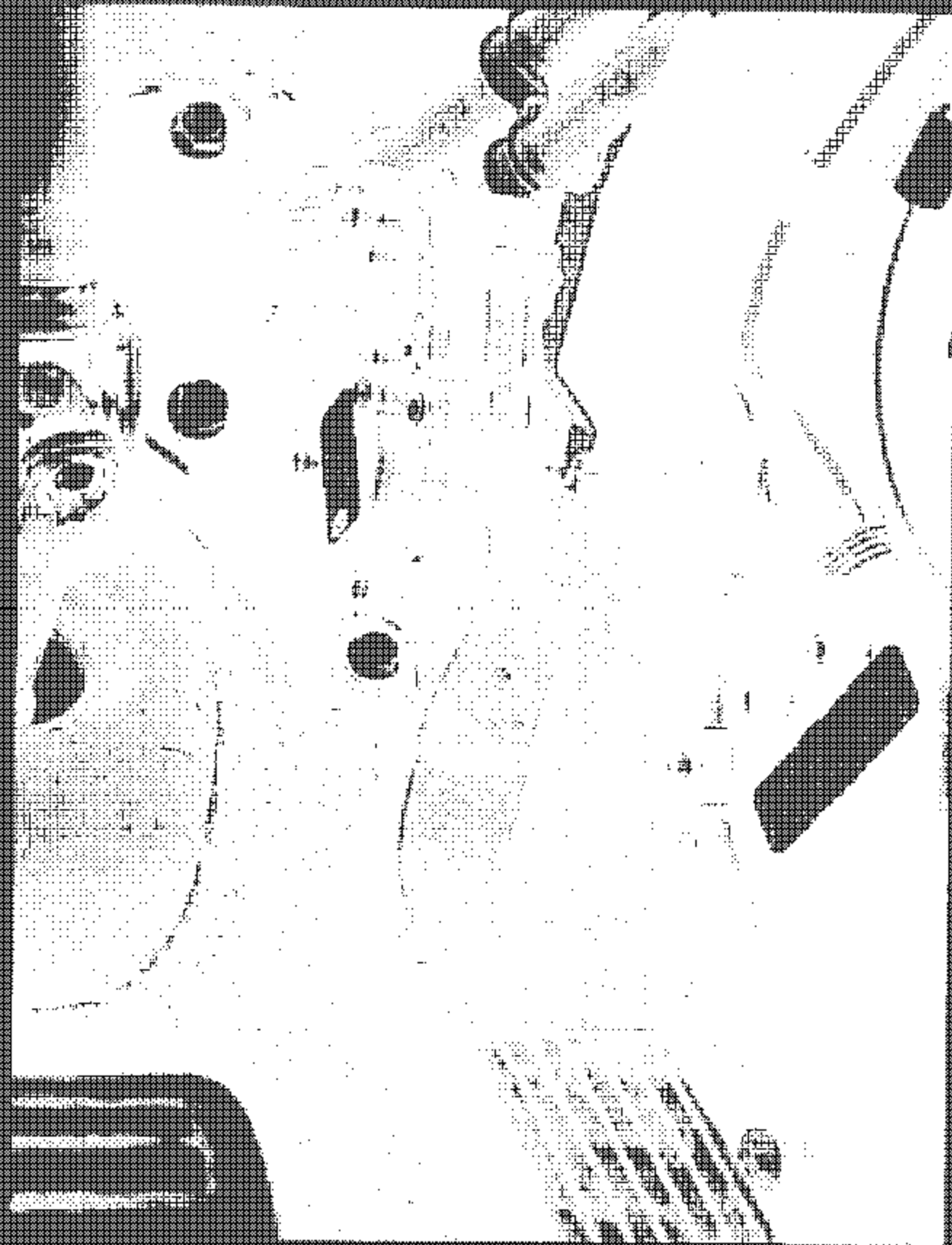
2004 LAND ROVER FREELANDER
NHTSA NO. C40000
FMVSS NO. 124L

FIGURE 57
TPS AND TPM CONNECTOR



2004 LAND ROVER FREELANDER
 NHISA NO. C40800
 FMVSS NO. 124L

FIGURE 8.6
 ECM CONNECTORS #1THRU #5



2004 LAND ROVER FREELANDER
NHTSA NO. C400300
FIATSS NO. 124L

FIGURE 6.8
ACCELERATOR PEDAL ASSEMBLY IN CAR

FIGURE 5.10
ACCELERATOR CONNECTOR

2004 LAND ROVER FREELANDER
NHTSA NO. D40303
FMVSS NO. 124L

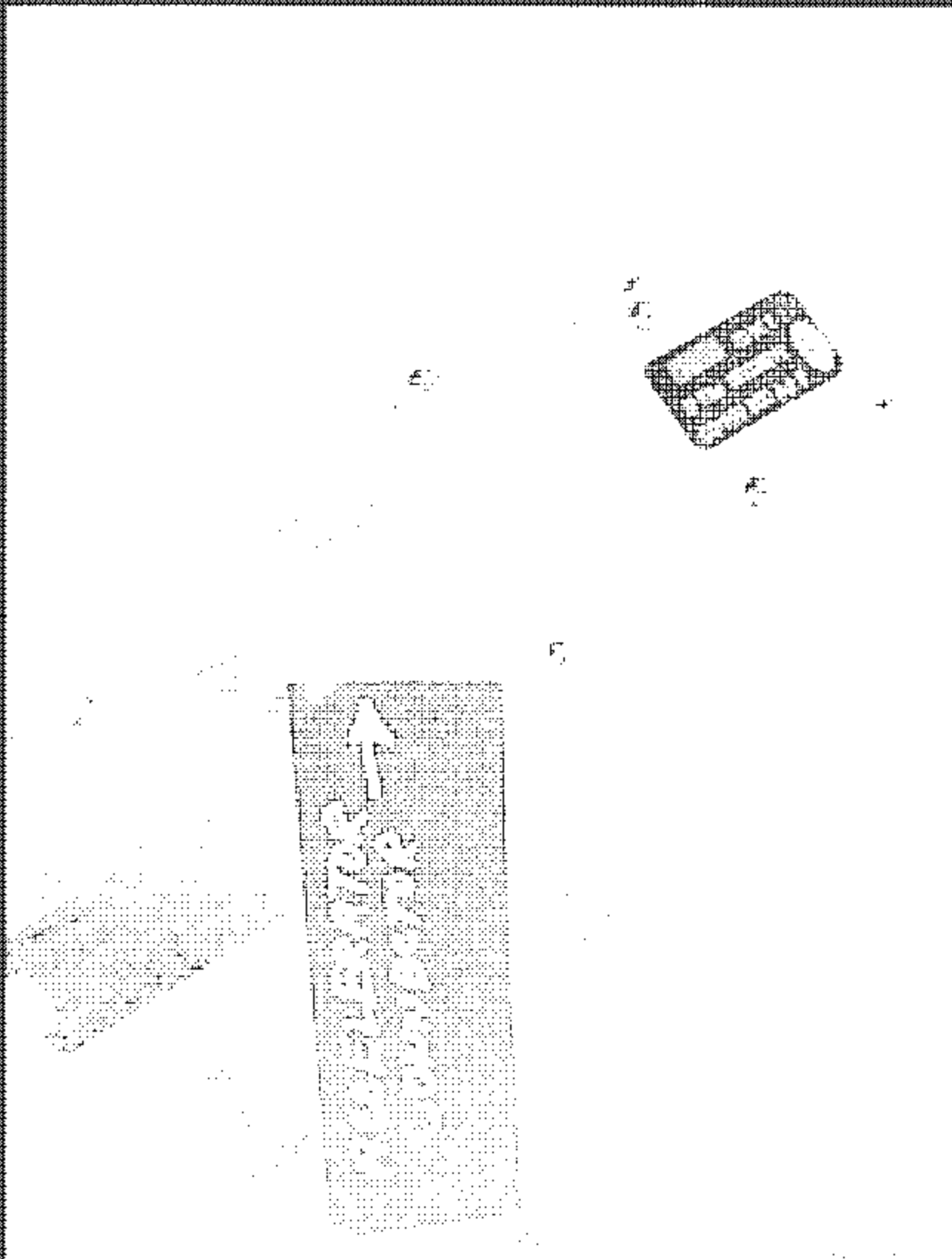
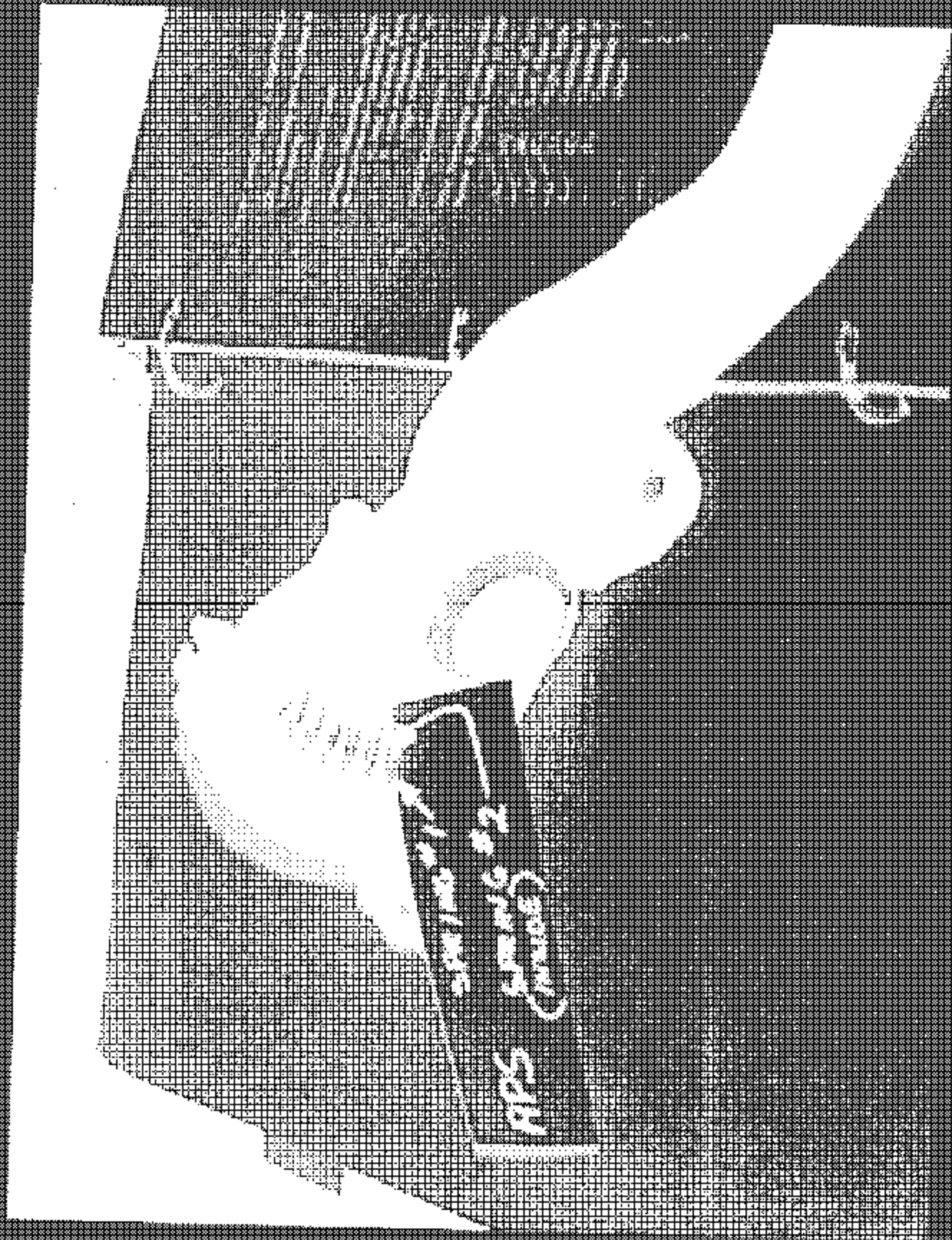




FIGURE 5.11
ACCELERATOR PEDAL SPRINGS #1 & #2
CLOSE-UP

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



2004 LAND ROVER FREELANDER
NHTSA NO. C40010
FMVSS NO. 124L

FIGURE 5.12
ACCELERATOR PEDAL ASSEMBLY

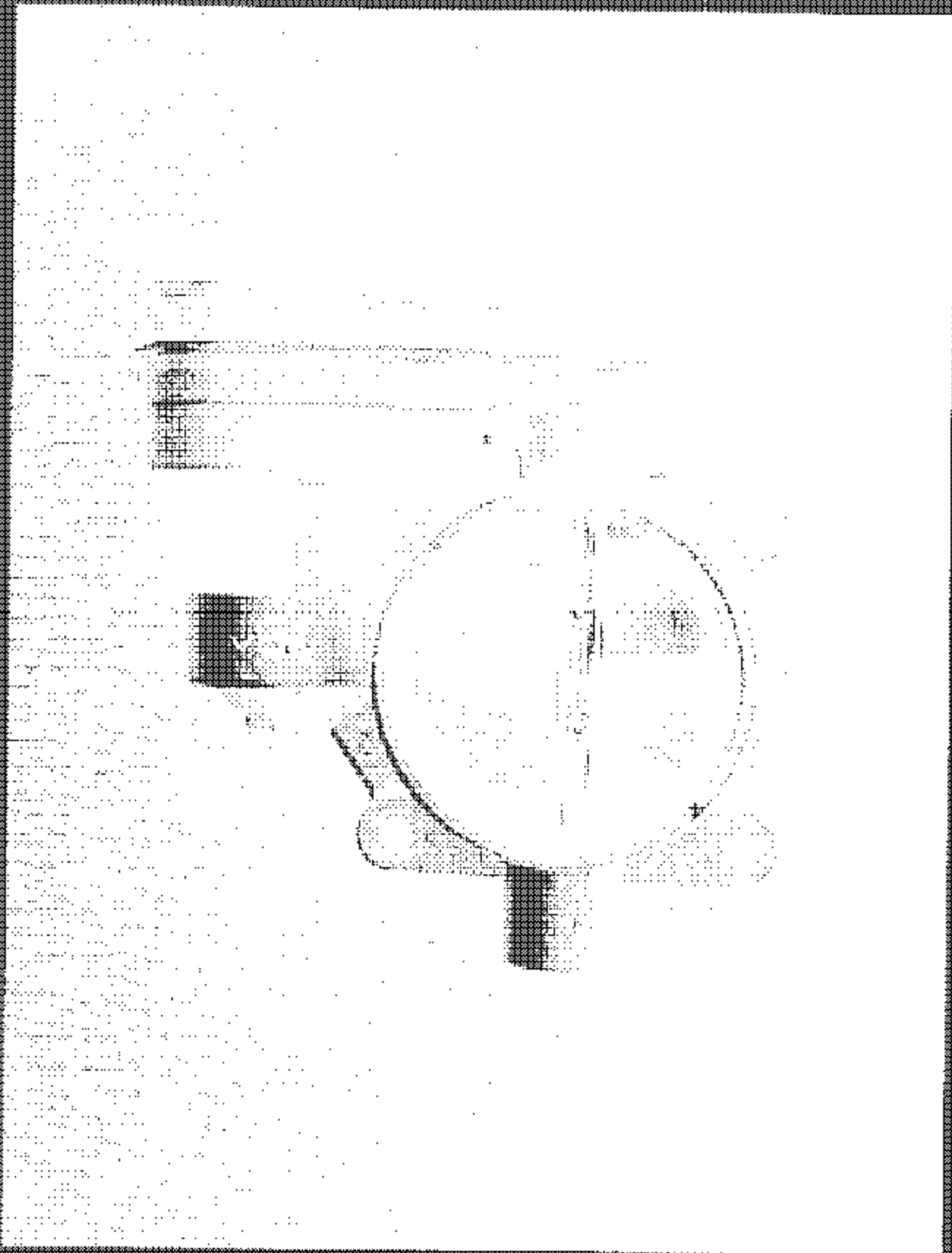


FIGURE 5.13
THROTTLE BODY ASSEMBLY FRONT VIEW

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



2004 LAND ROVER FREELANDER
NHTSA NO. 040800
FLVSS NO. 124

FIGURE 5.14
THROTTLE BODY ASSEMBLY SIDE VIEW

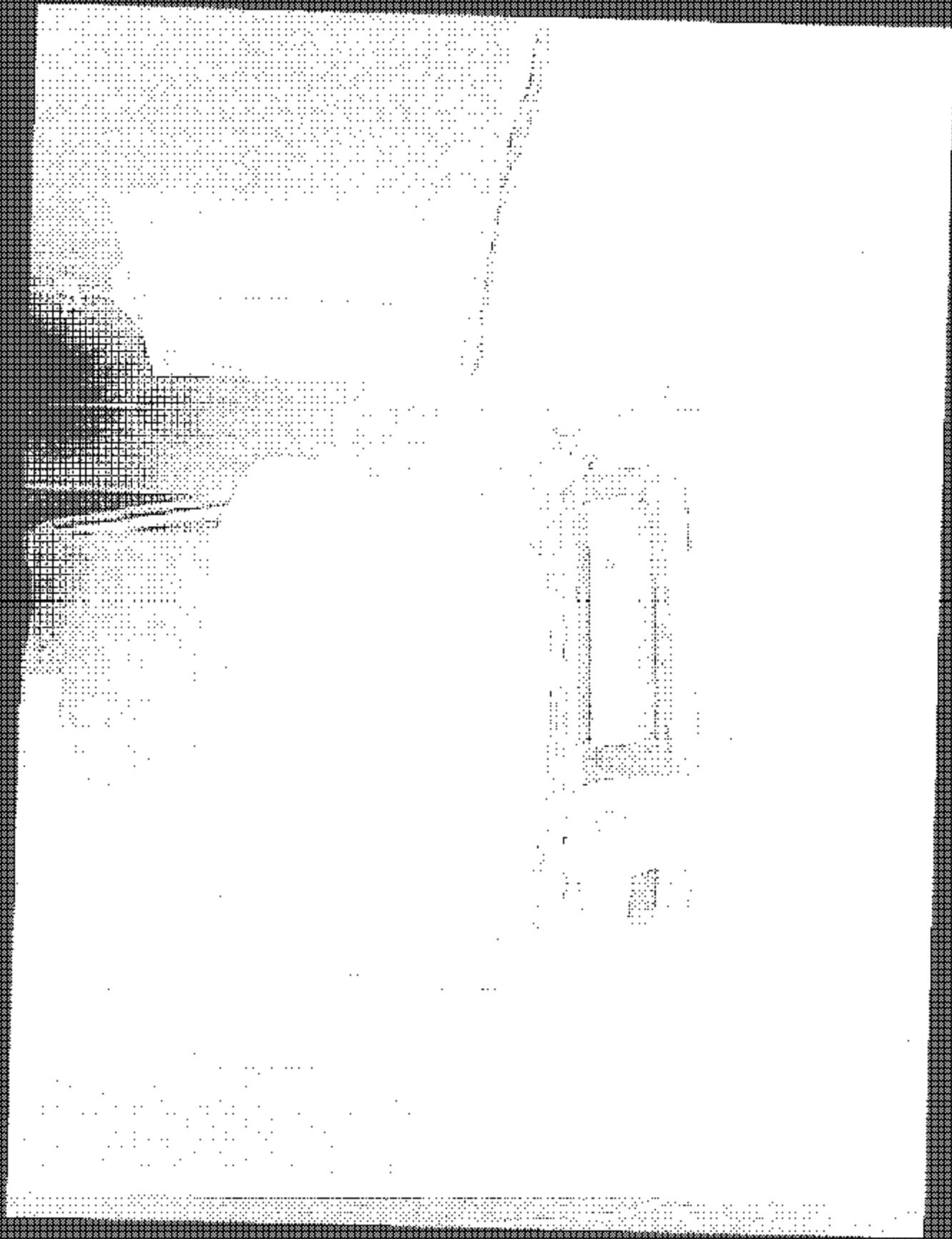
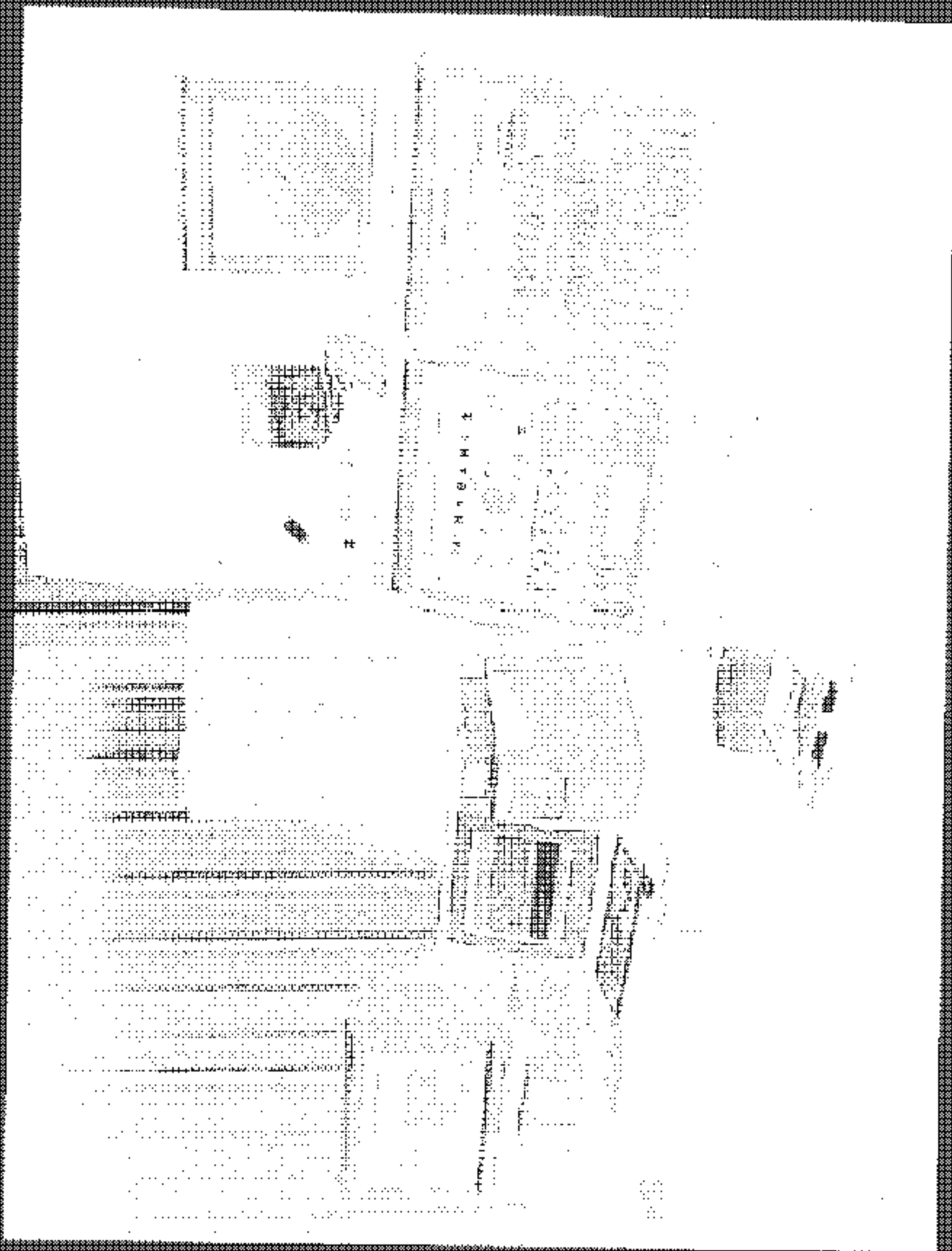


FIGURE 5.15
VEHICLE IN TEST CHAMBER

2004 LAND ROVER FREELANDER
NHTSA NO. C406800
FMVSS NO. 124L

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

FIGURE 5.16
124 TEST INSTRUMENTATION SET-UP



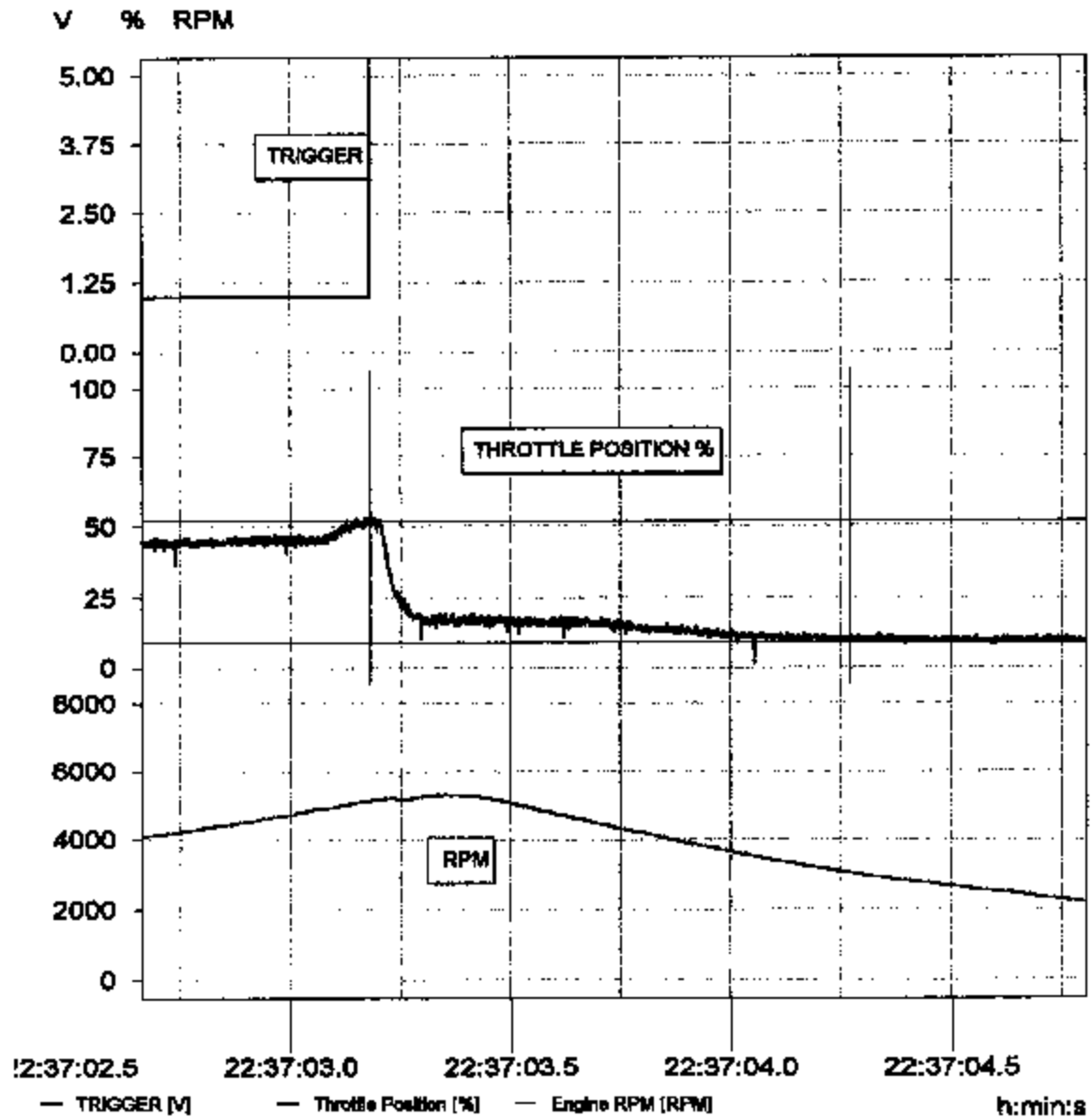
SECTION 6
PLOTS

FMVSS 124 THROTTLE RETURN TEST

124 COLD/NORMAL/ 25% WOT

10:40:44 PM 5/3/04

NHTSA C40600 FREELANDER



Channel: Throttle Position

Y1: 51.731 %

t1: -43820.846 ms

dt: 1.001 s

Y2: 8.849 %

t2: -42729.840 ms

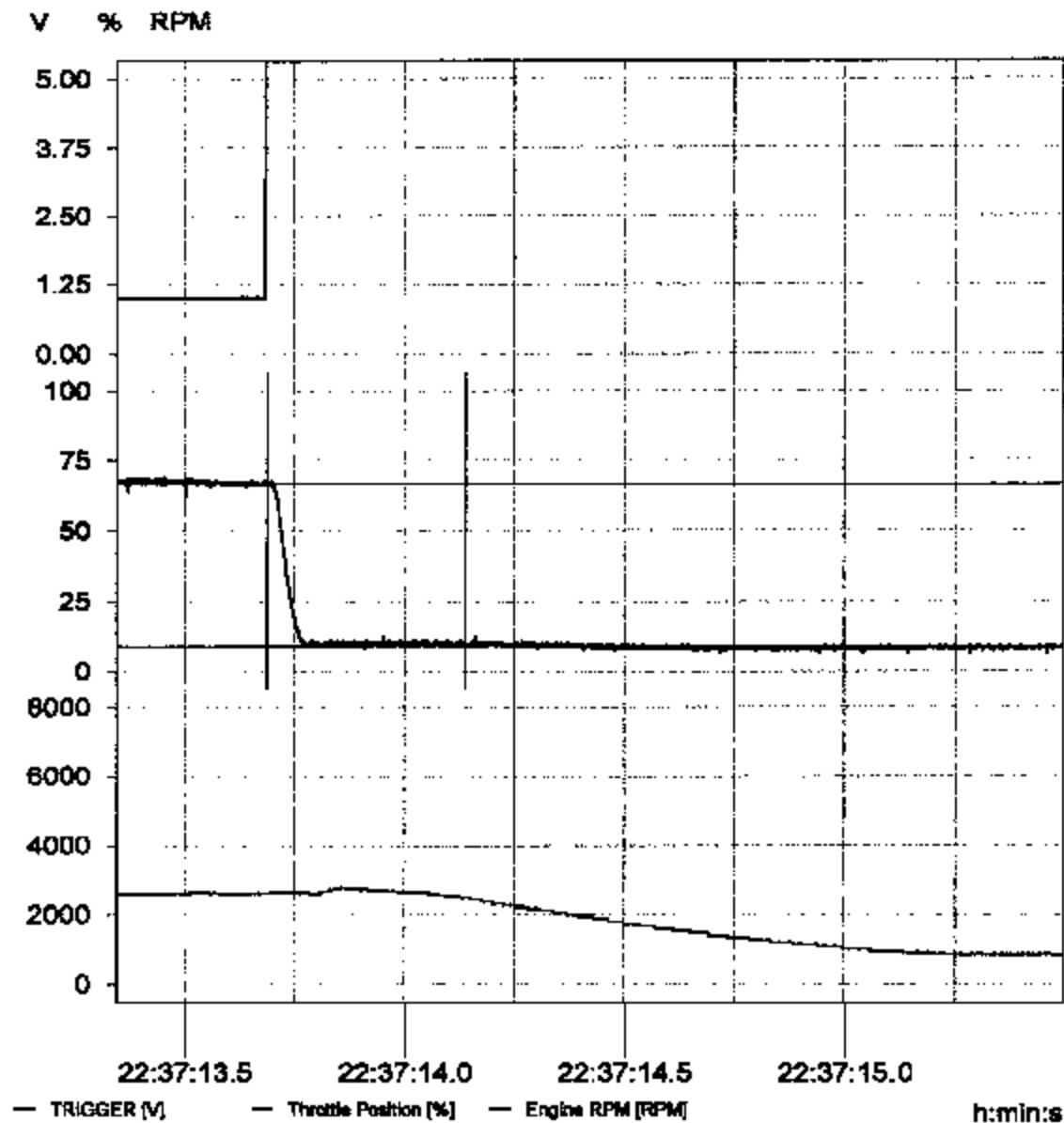
f: 0.917 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/NORMAL/ 50% WOT

10:42:39 PM 5/3/04

NHTSA C40600 FREELANDER



Channel: Throttle Position

Y1: 65.272 %

t1: -33314.646 ms

dt: 0.451 s

Y2: 8.962 %

t2: -32863.646 ms

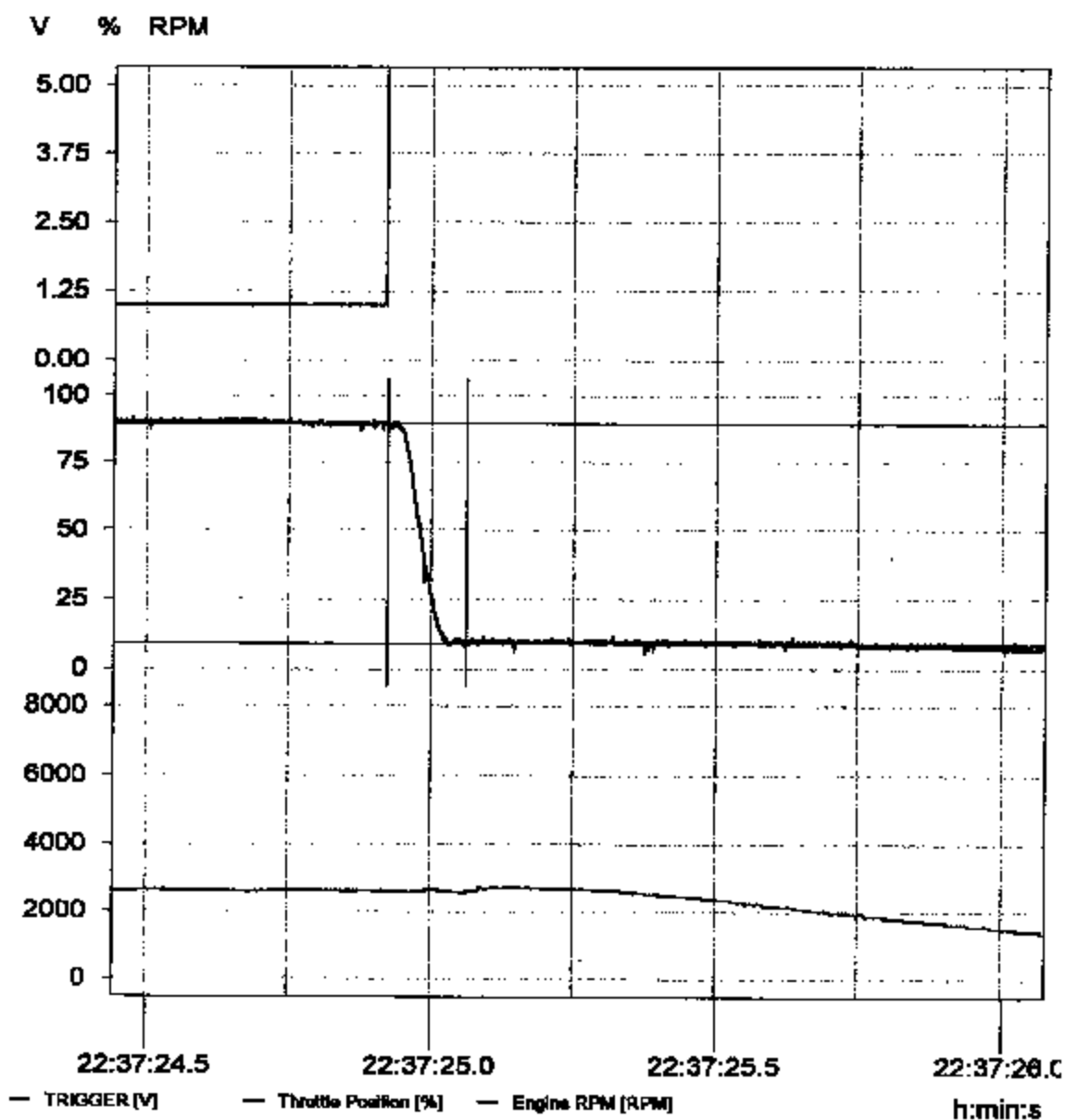
f: 2.217 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/NORMAL/ 75% WOT

10:48:44 PM 5/3/04

NHTSA C40900 FREELANDER



Channel: Throttle Position

Y1: 89.402 %

t1: -22077.646 ms

dt: 0.136 s

Y2: 8.758 %

t2: -21839.646 ms

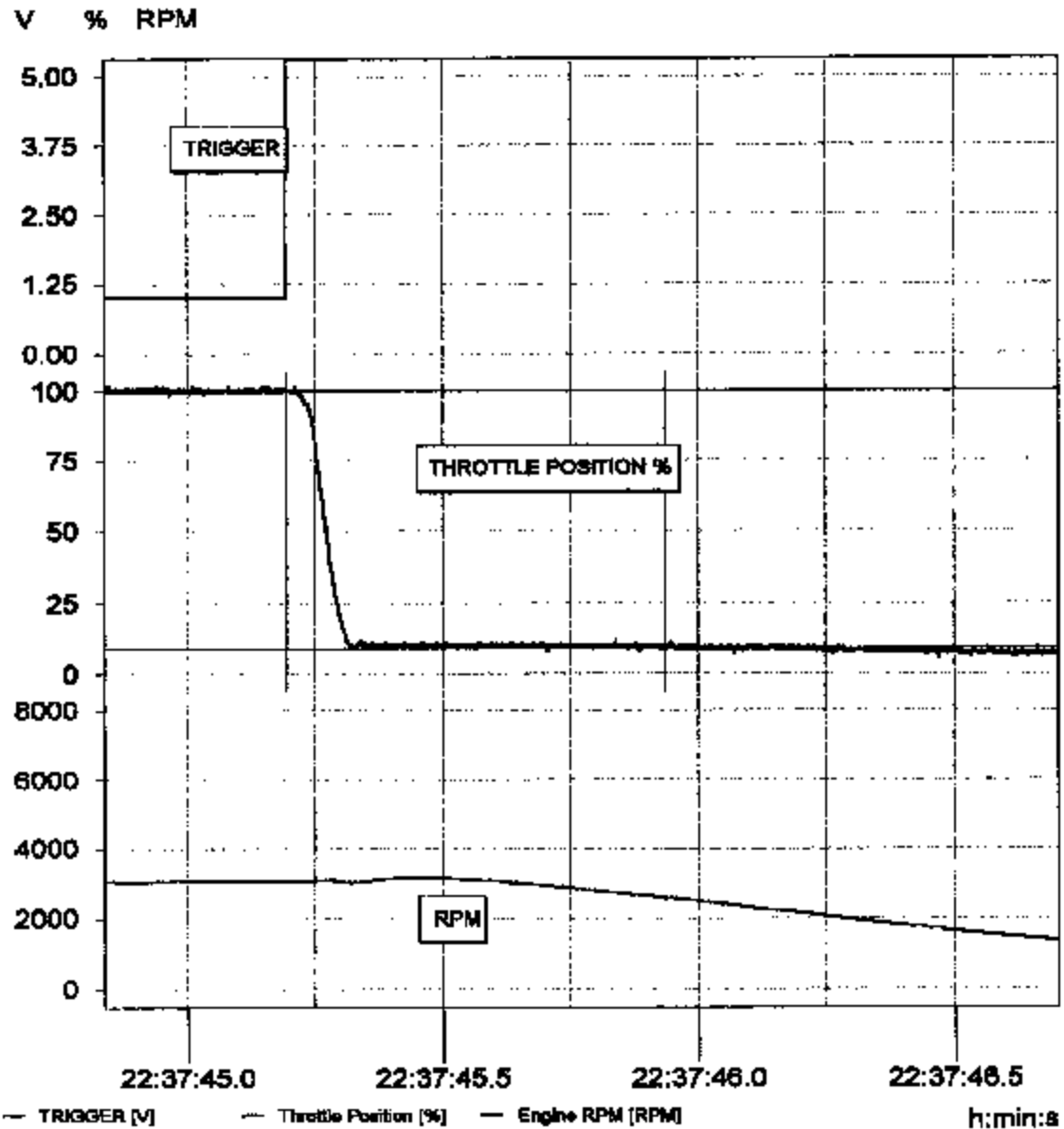
f: 7.248 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/NORMAL/ 100% WOT

10:49:44 PM 5/3/04

NHT8A C40600 FREELANDER



Channel: Throttle Position

Y1: 100.168 %

t1: -1800.646 ms

dt: 0.741 s

Y2: 8.926 %

t2: -1085.646 ms

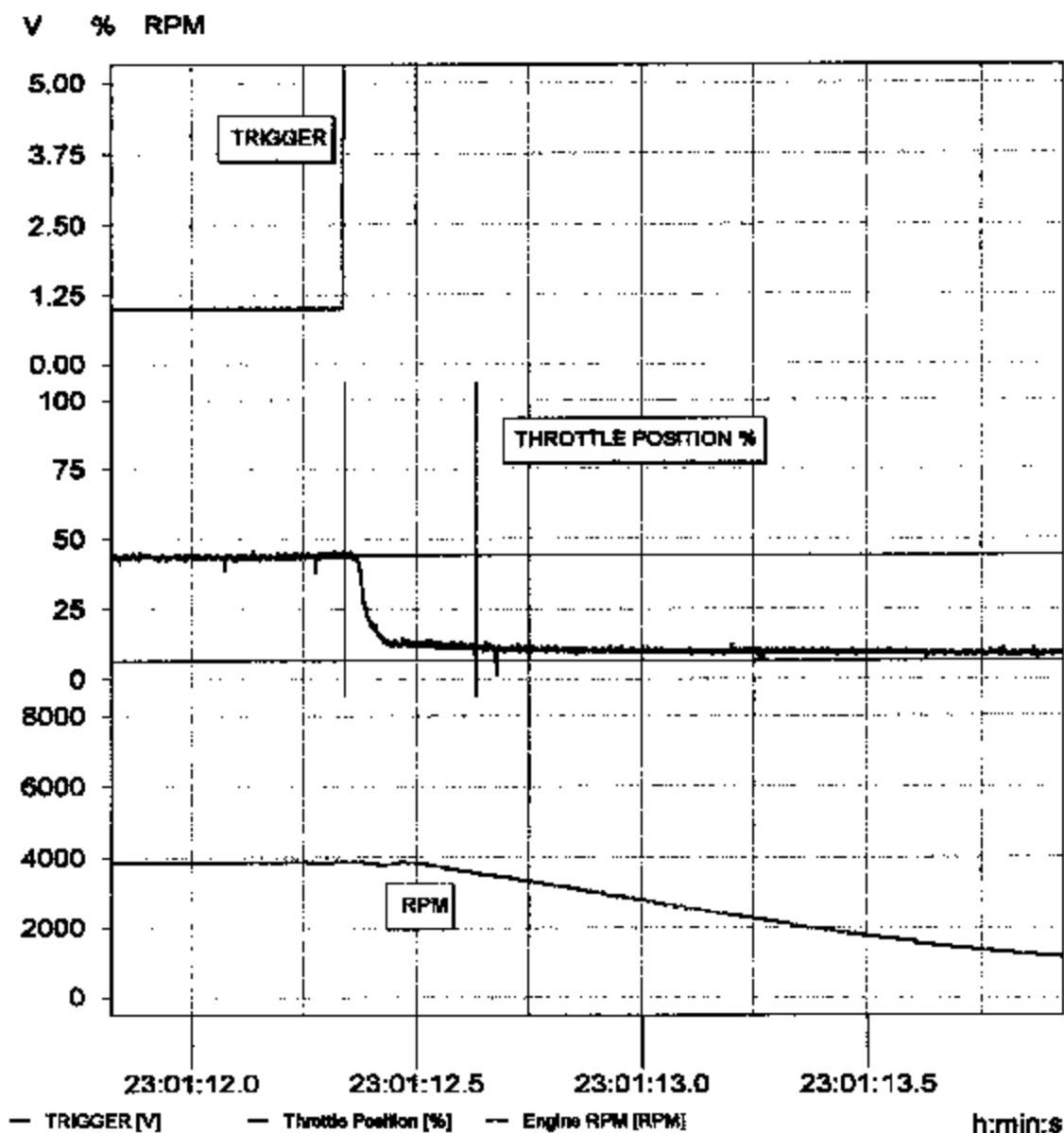
f: 1.350 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/SPRING 1/25% WOT

11:04:27 PM 5/3/04

NHTSA C40800 FREELANDER



Channel: Throttle Position

Y1: 43.936 %
t1: -33688.539 ms
dt: 0.291 s

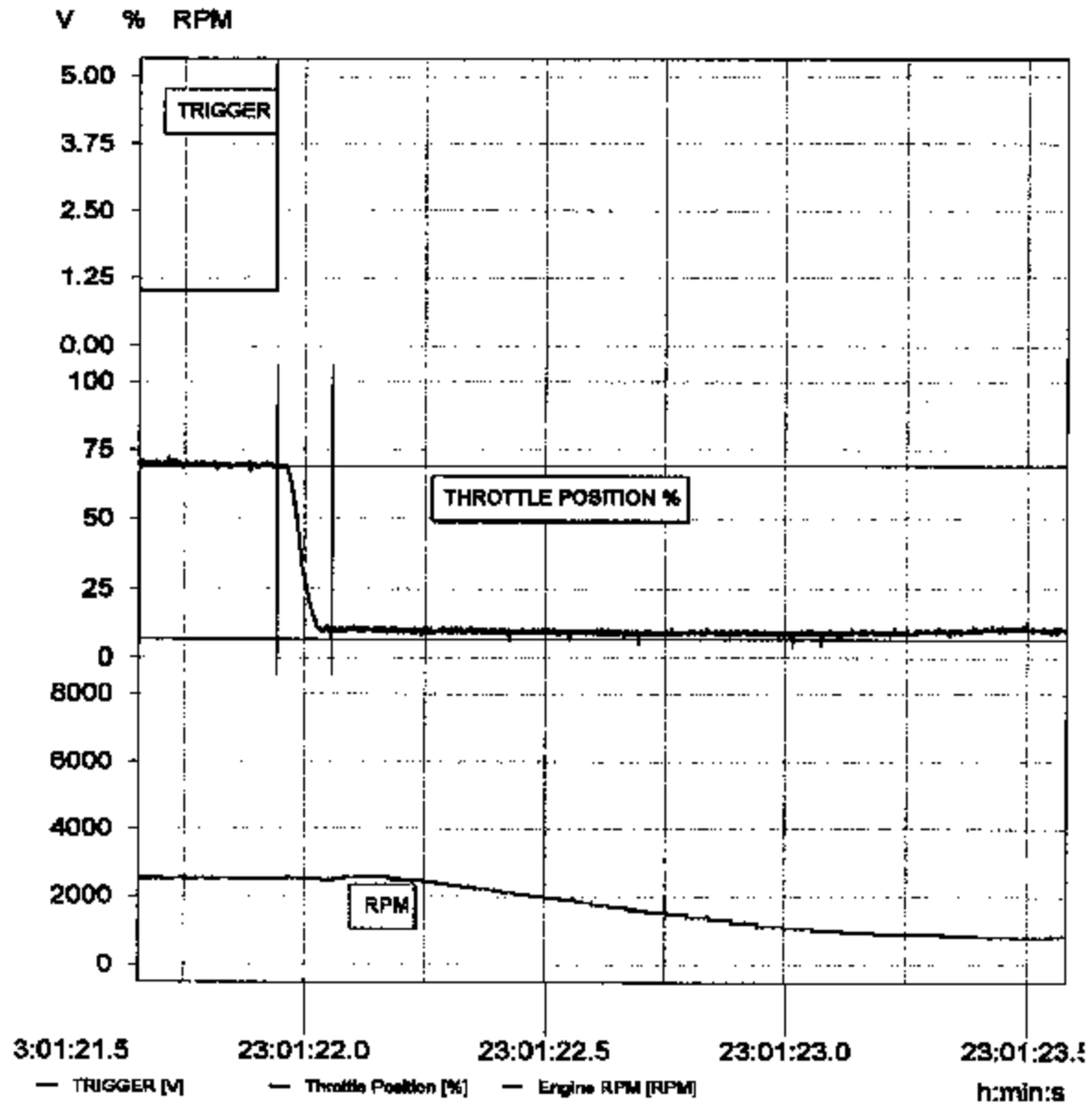
Y2: 6.628 %
t2: -33395.539 ms
f: 3.438 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/SPRING 1/ 50% WOT

11:06:19 PM 5/3/04

NHTSA C40600 FREELANDER



Channel: Throttle Position

Y1: 68.659 %

t1: -24085.539 ms

dt: 0.114 s

Y2: 0.653 %

t2: -23971.539 ms

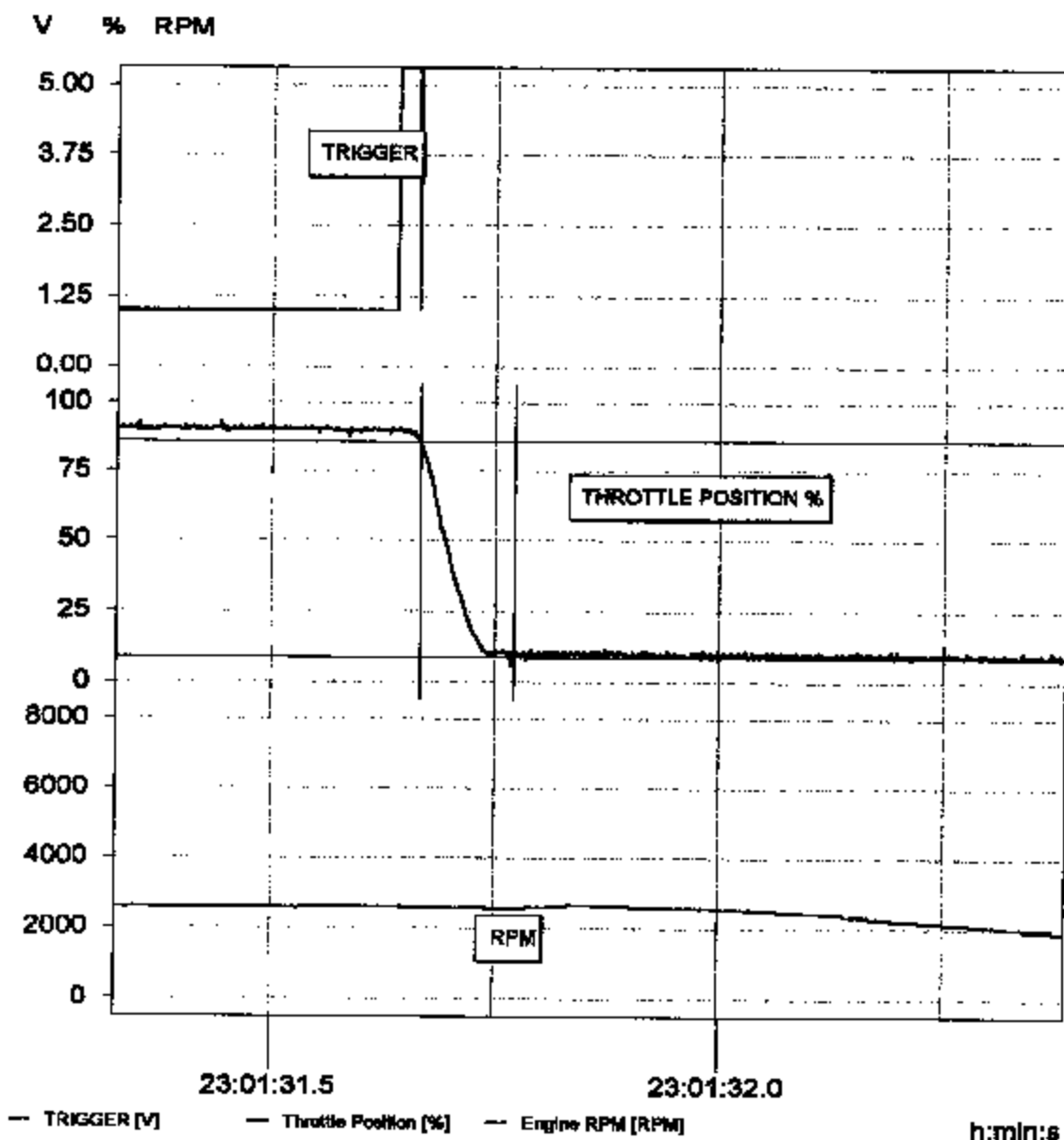
f: 0.772 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/SPRING 1/ 75% WOT

11:09:22 PM 5/3/04

NHTSA C40600 FREELANDER



Channel: Throttle Position

Y1: 85.777 %

t1: -14361.539 ms

dt: 0.106 s

Y2: 8.672 %

t2: -14255.539 ms

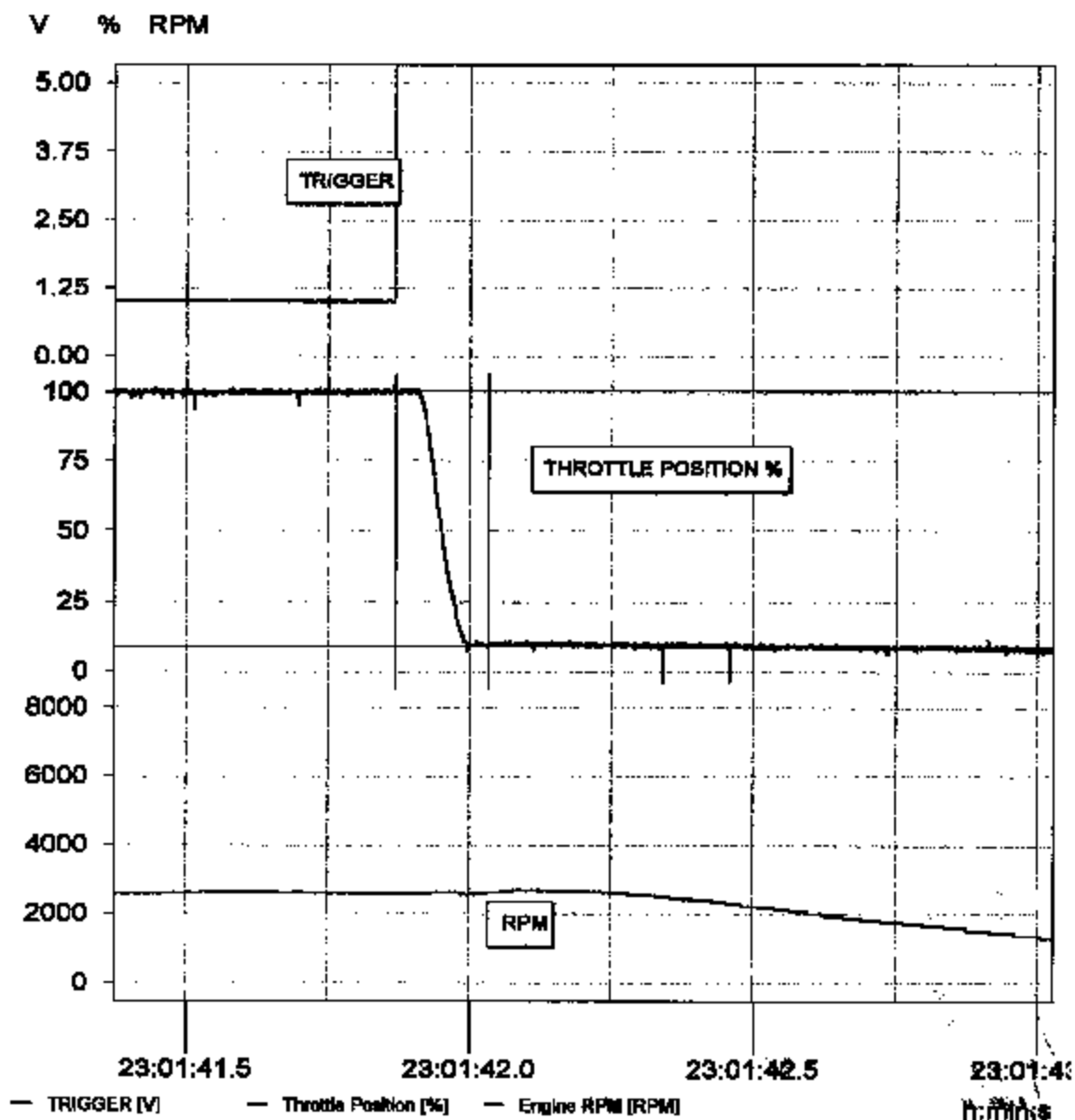
f: 9.434 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/SPRING 1/ 100% WOT

11:12:02 PM 5/3/04

NHTSA C40600 FREELANDER



Channel: Throttle Position

Y1: 100.487 %
t1: -4158.338 ms
dt: 0.165 s

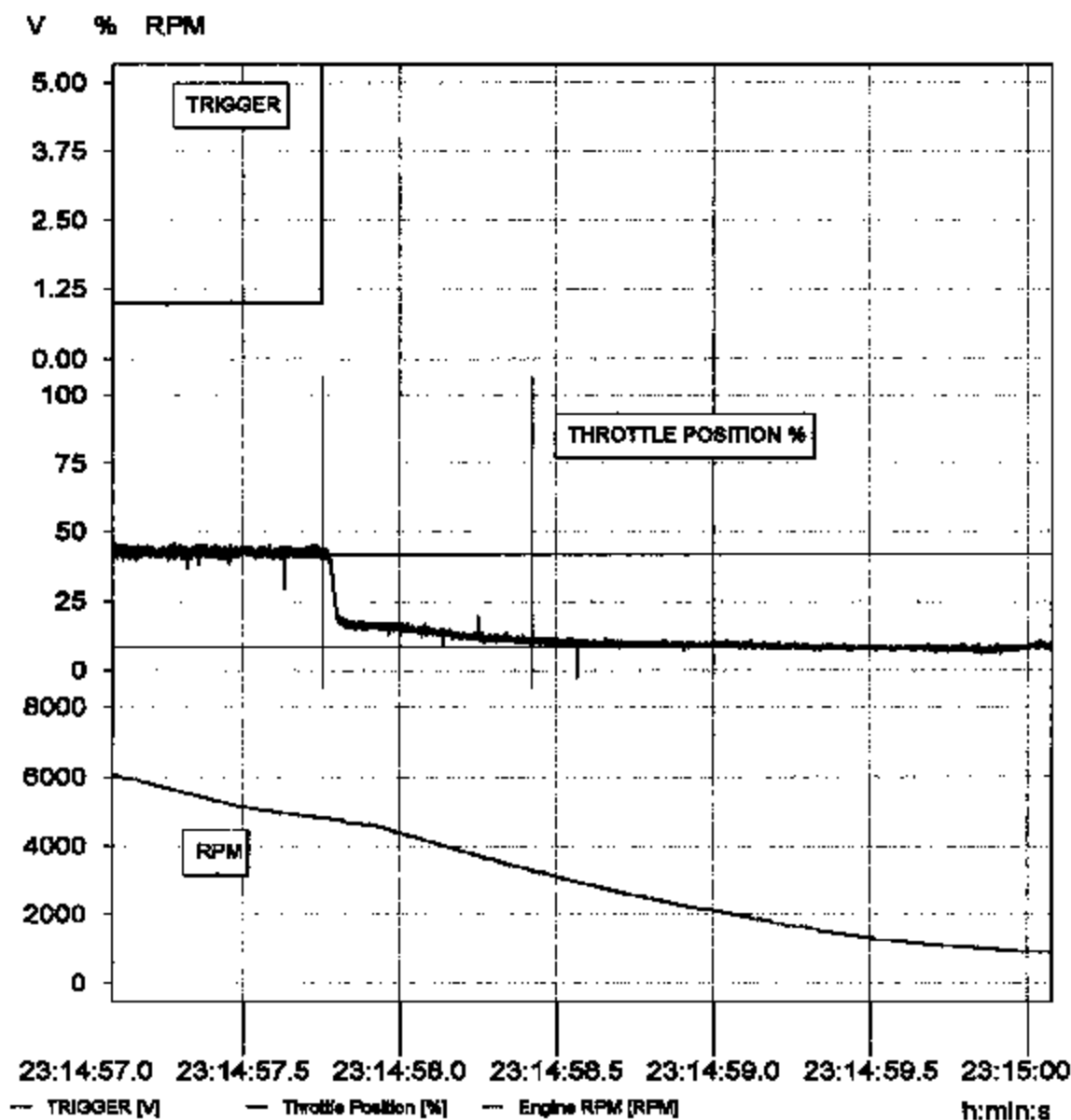
Y2: 8.882 %
t2: -3893.538 ms
f: 6.061 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/SPRING 2/ 25% WOT

11:18:38 PM 5/3/04

NHTSA C40600 FREELANDER



Channel: Throttle Position

Y1: 42.164 %

t1: -33252.182 ms

dt: 0.687 s

Y2: 8.651 %

t2: -32585.182 ms

f: 1.400 Hz

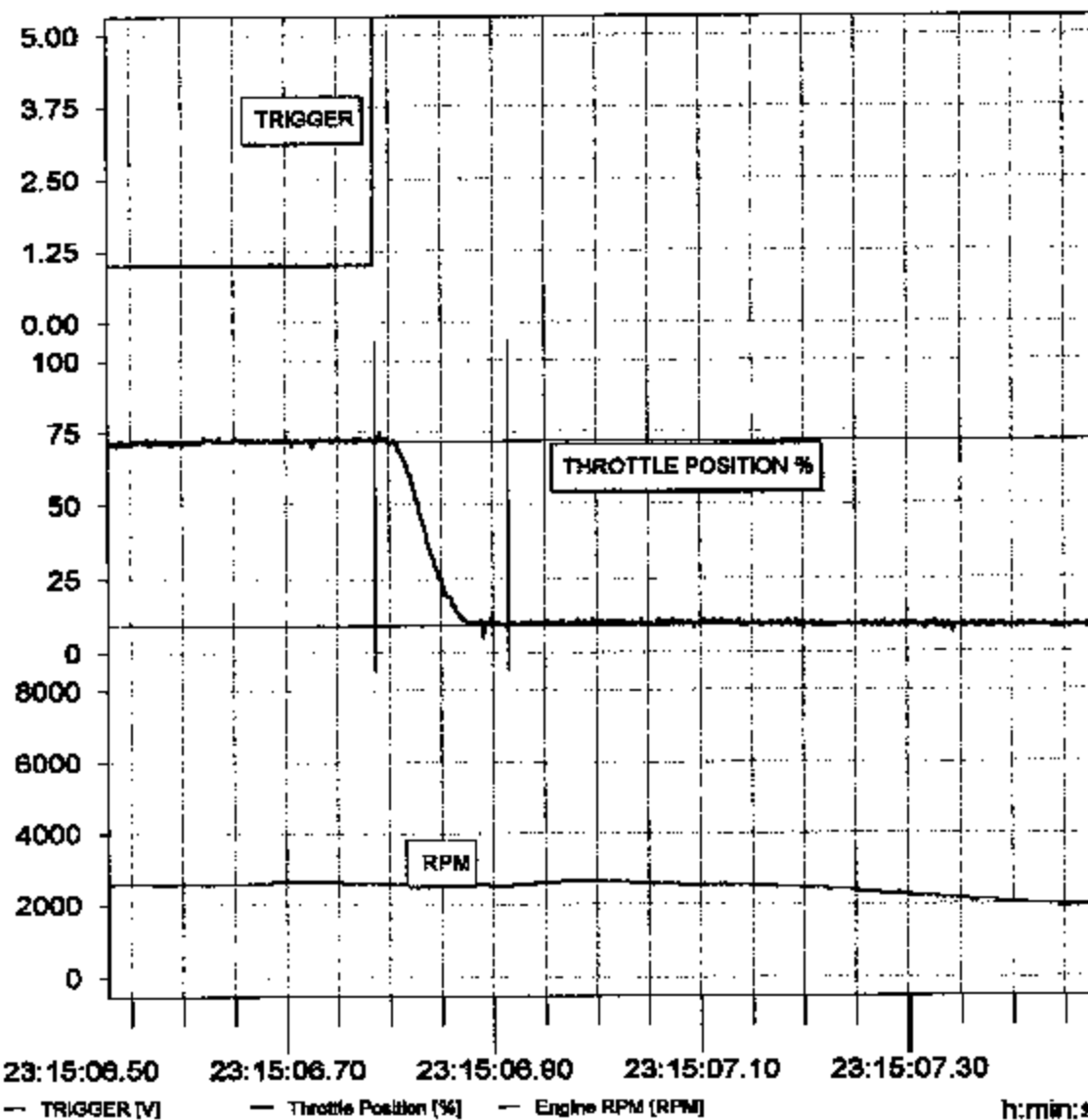
FMVSS 124 THROTTLE RETURN TEST

124 COLD/SPRING 2/ 50% WOT

11:21:09 PM 5/3/04

NHTSA C40600 FREELANDER

V % RPM



Channel: Throttle Position

Y1: 71.886 %

t1: -24219.182 ms

dt: 0.129 s

Y2: 8.954 %

t2: -24090.182 ms

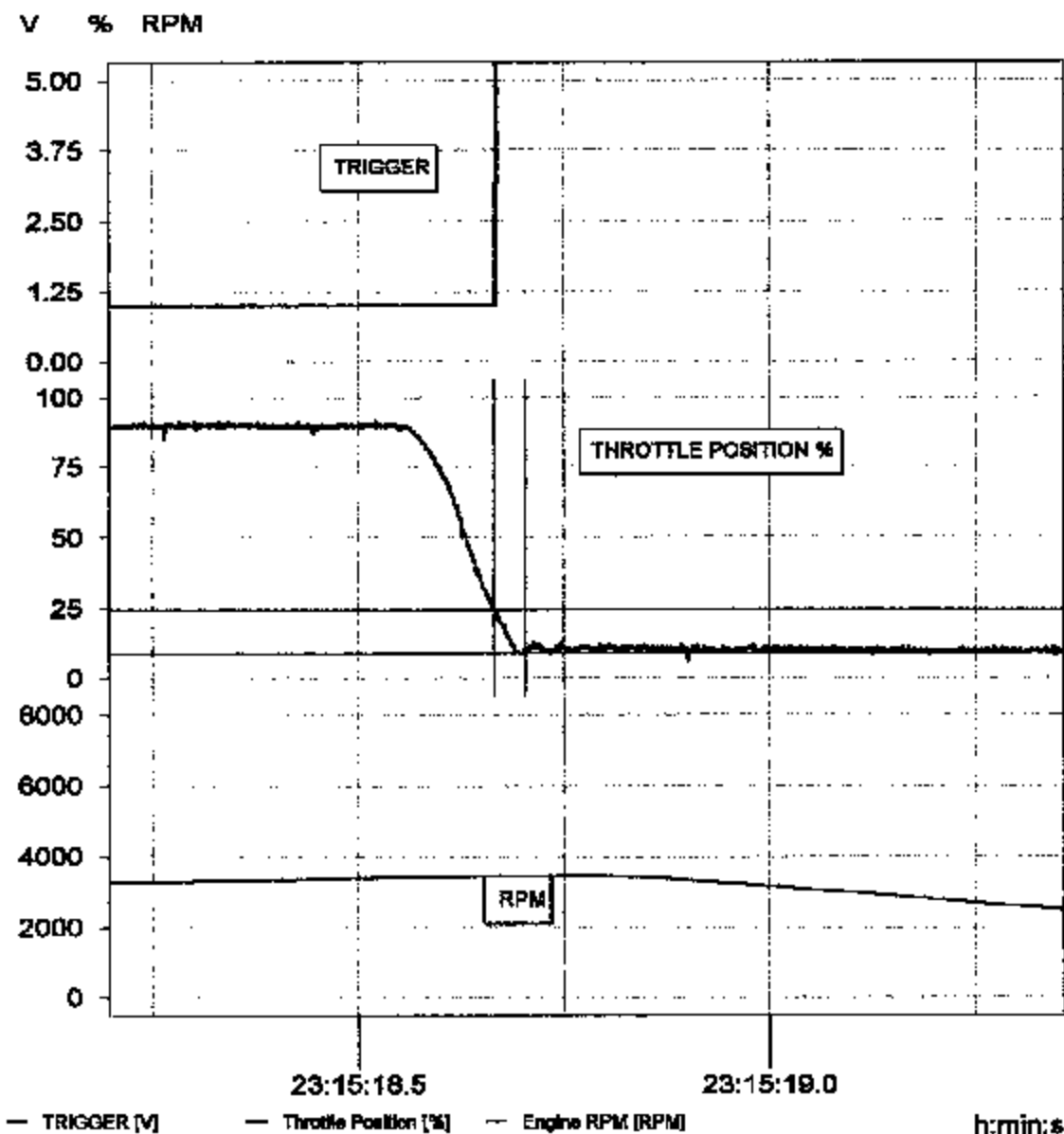
f: 7.752 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/SPRING 2/ 75% WOT

11:23:06 PM 5/3/04

NHTSA C40600 FREELANDER



Channel: Throttle Position

Y1: 24.354 %
t1: -12340.182 ms
dt: 0.038 s

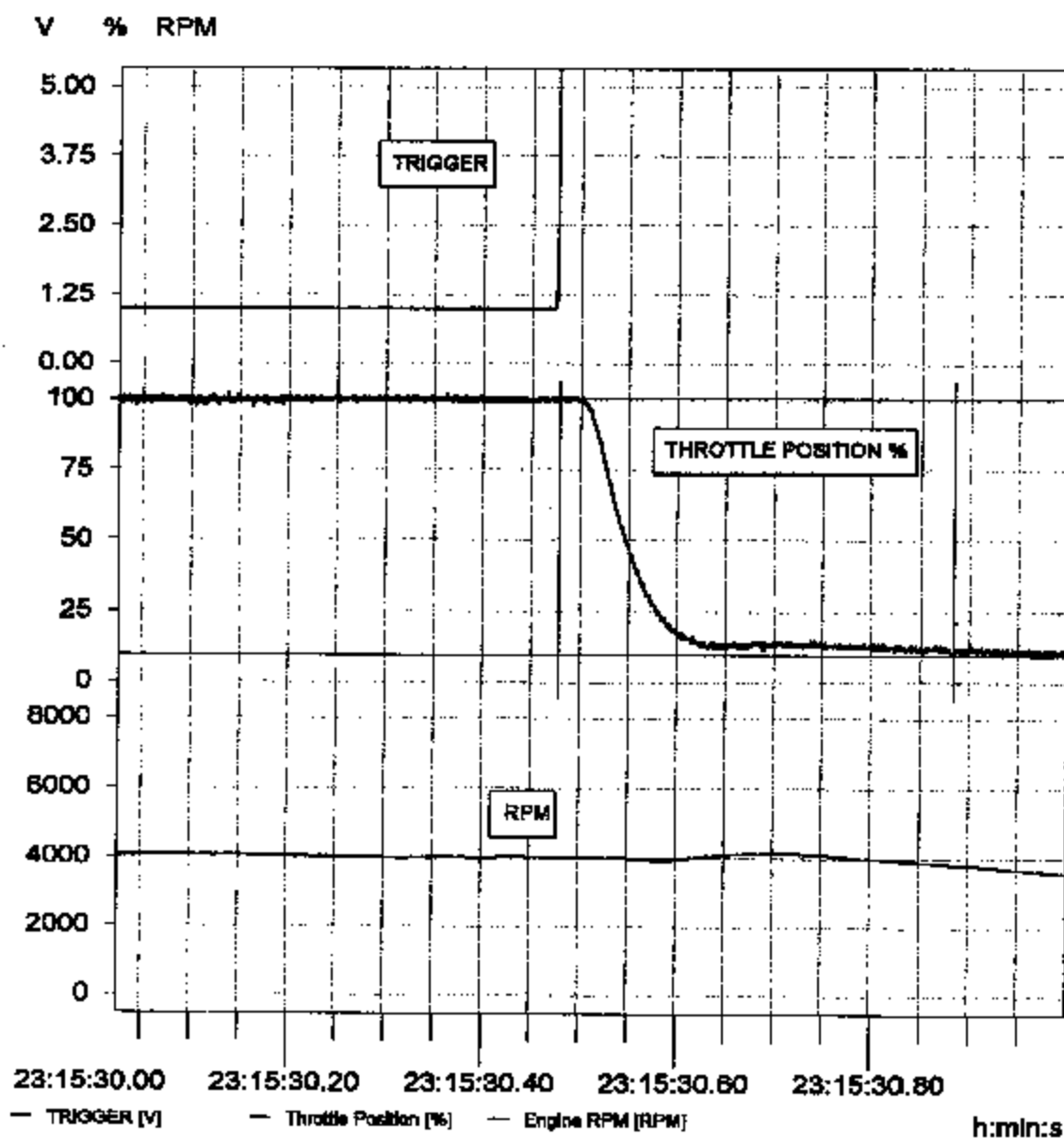
Y2: 8.930 %
t2: -12302.182 ms
f: 20.316 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/SPRING 2/ 100% WOT

11:29:56 PM 5/3/04

NHTSA C40600 FREELANDER



Channel: Throttle Position

Y1: 100.527 %
t1: -627.182 ms
dt: 0.405 s

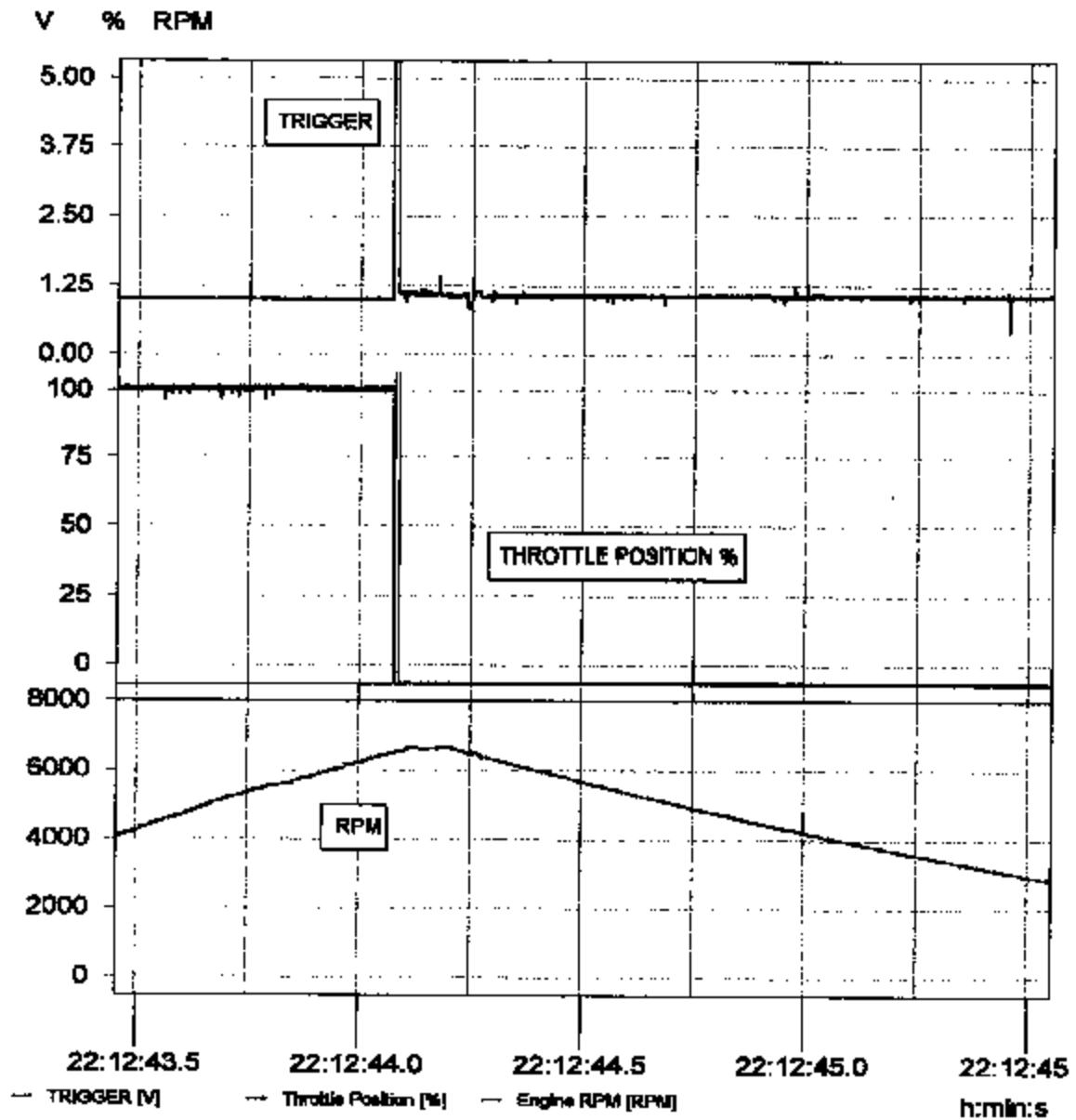
Y2: 9.374 %
t2: -122.182 ms
f: 2.469 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/TPS/TPM,DISC/100% WOT

10:27:25 PM 5/3/04

NHTSA C40600 FREELANDER



Channel: Throttle Position

Y1: -7.288 %

T1: -15920.104 ms

dt: 0.009 s

Y2: -12.040 %

T2: -15917.104 ms

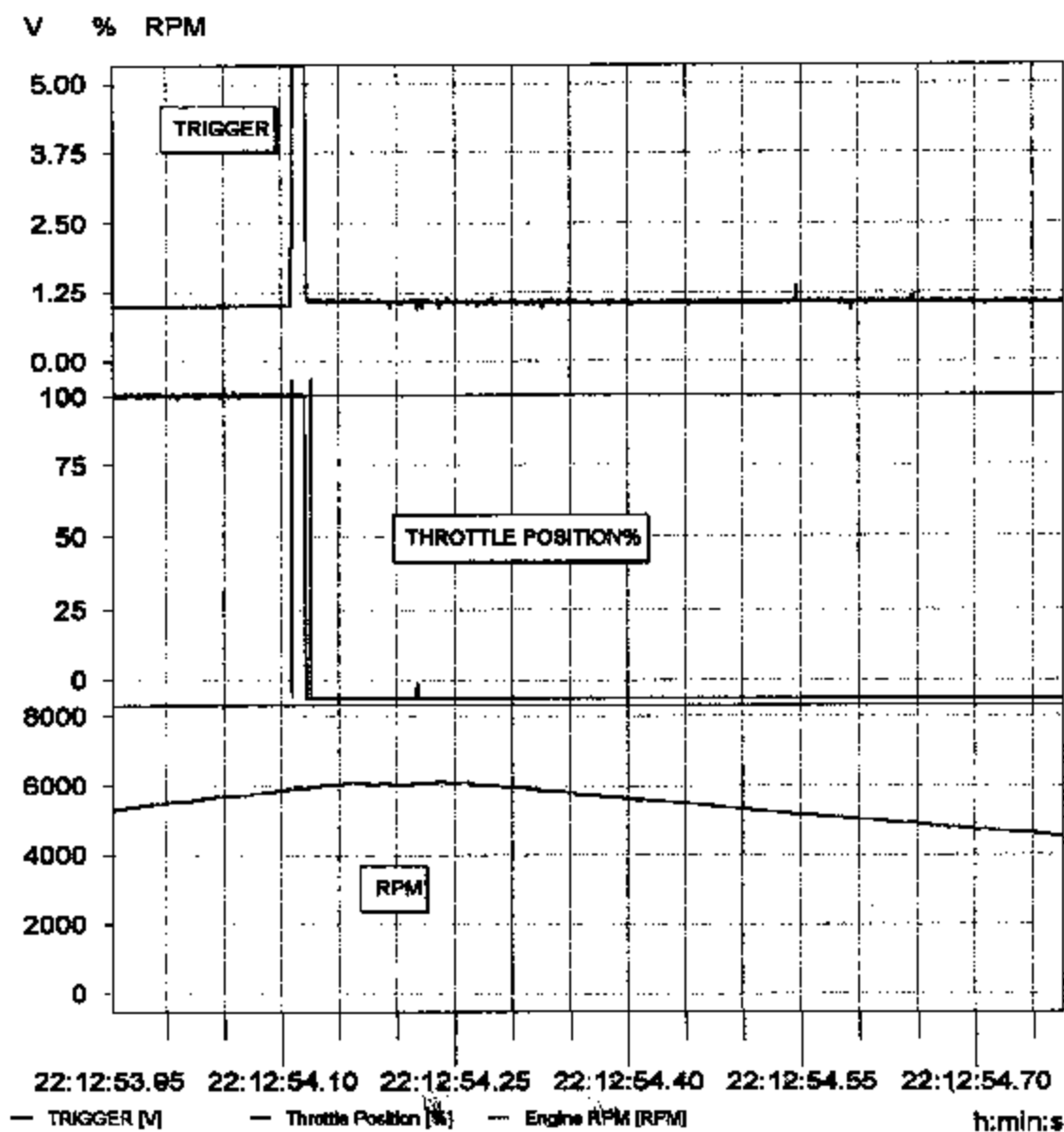
f: 111.111 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/APS DISC/100% WOT

10:30:10 PM 5/3/04

NHTSA C40600 FREELANDER



Channel: Throttle Position

Y1: 100.527 %
t1: -5894.104 ms
dt: 0.016 s

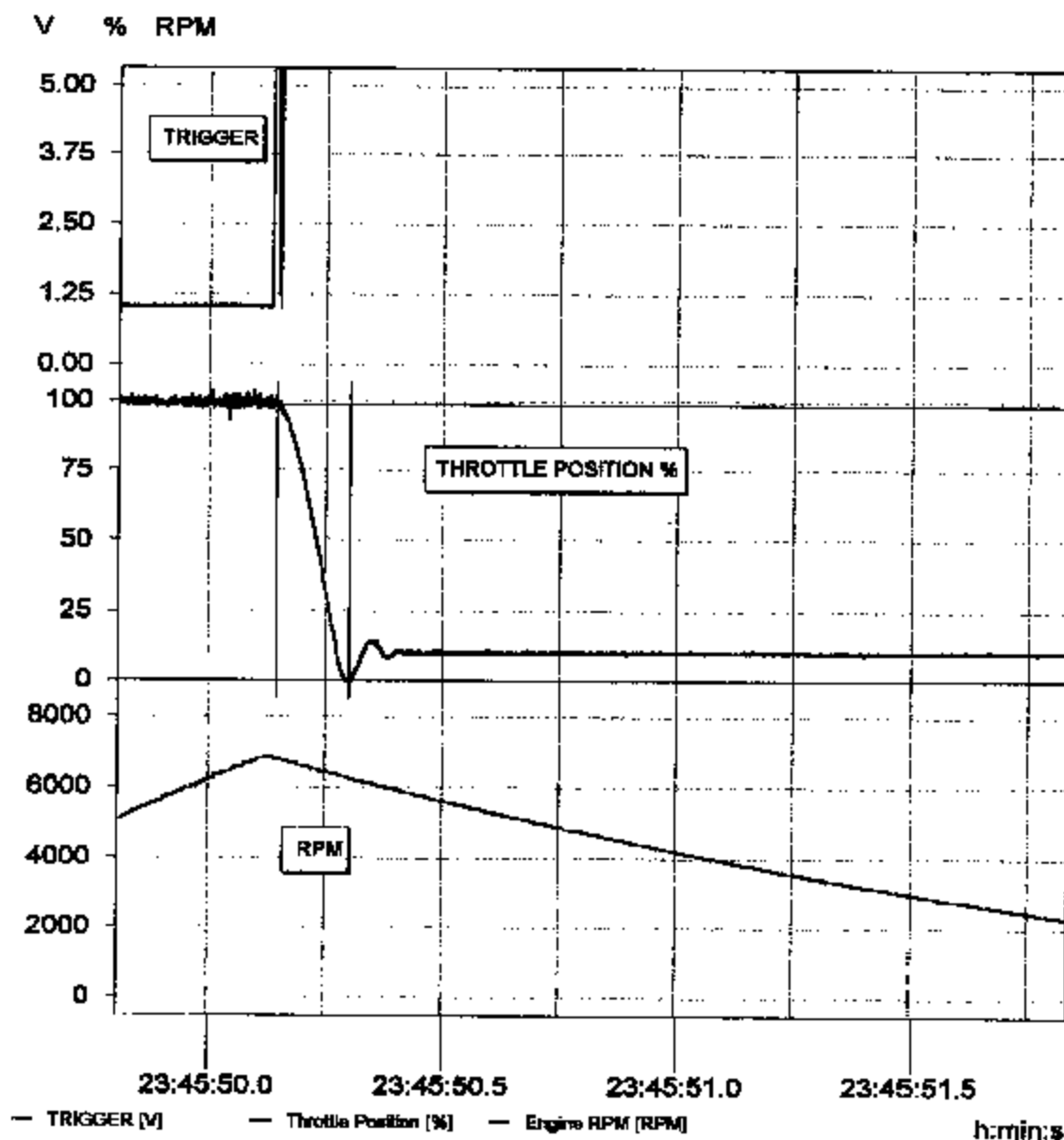
Y2: -0.175 %
t2: -5873.104 ms
f: 62.500 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/ECM CONNECTOR 1 / 100% WOT

11:52:54 PM 5/3/04

NHTSA C40600 FREELANDER



Channel: Throttle Position

Y1: 98.662 %

t1: -54933.823 ms

dt: 0.156 s

Y2: 0.170 %

t2: -54777.923 ms

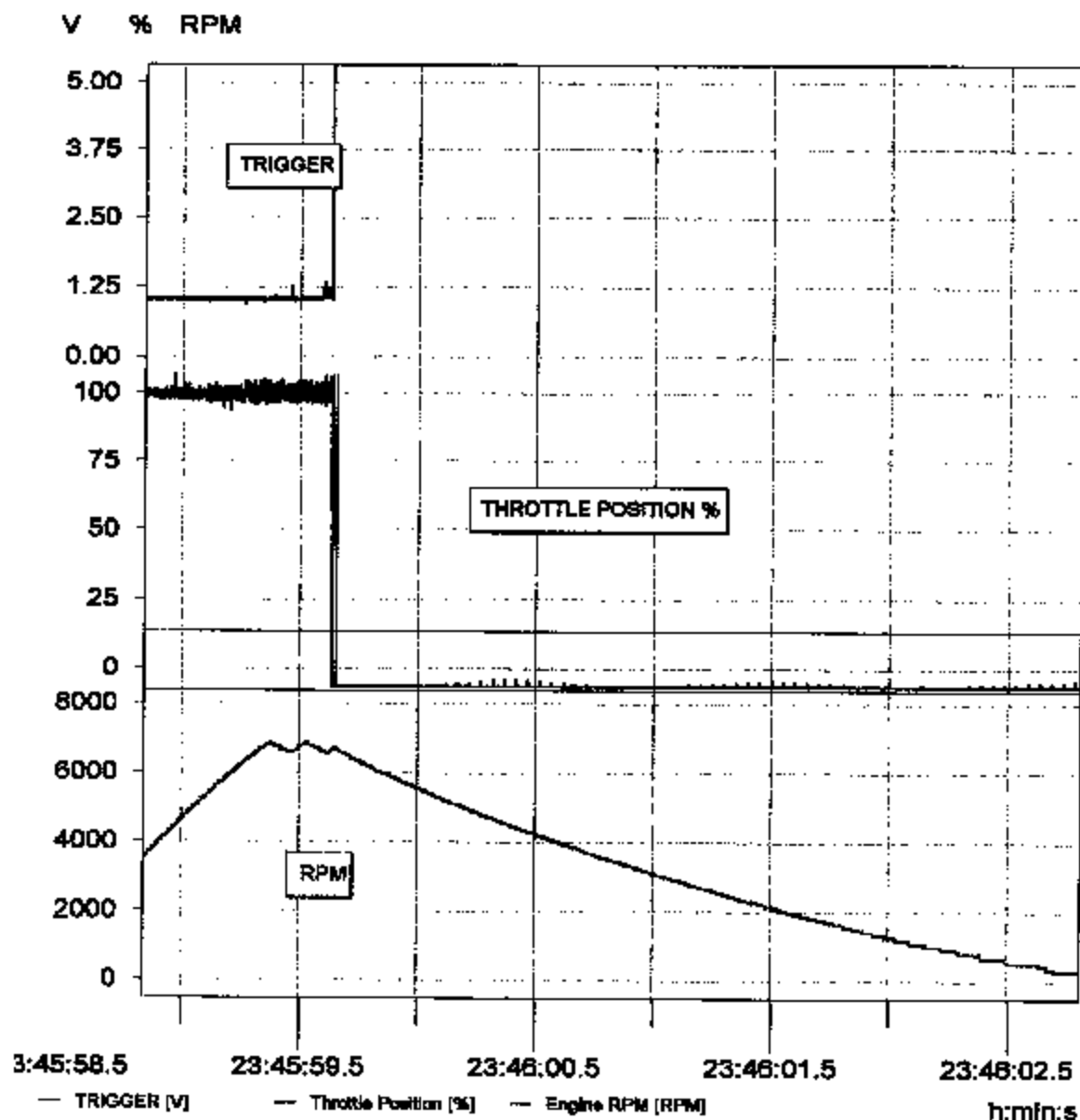
f: 6.410 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/ECM CONNECTOR 2/ 100% WOT

11:54:22 PM 5/3/04

NHTSA C40600 FREELANDER



Channel: Throttle Position

Y1: 13.269 %

t1: -45440.923 ms

dt: 0.015 s

Y2: -8.448 %

t2: -45425.923 ms

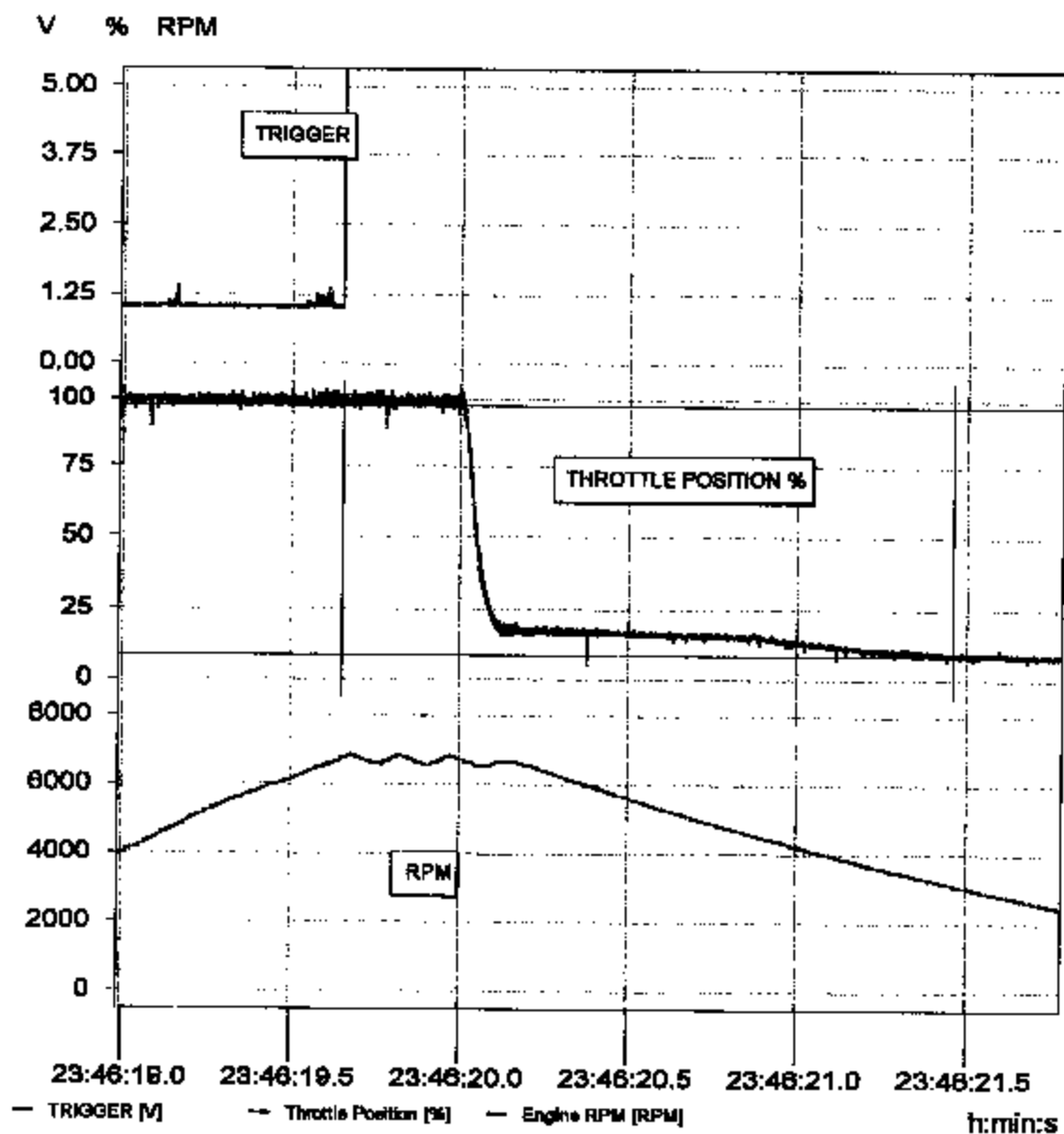
f: 68.987 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/ECM CONNECTOR 3/ 100% WOT

11:56:30 PM 5/3/04

NHTSA C40000 FREELANDER



Channel: Throttle Position

Y1: 97.532 %
t1: -25425.923 ms
dt: 1.808 s

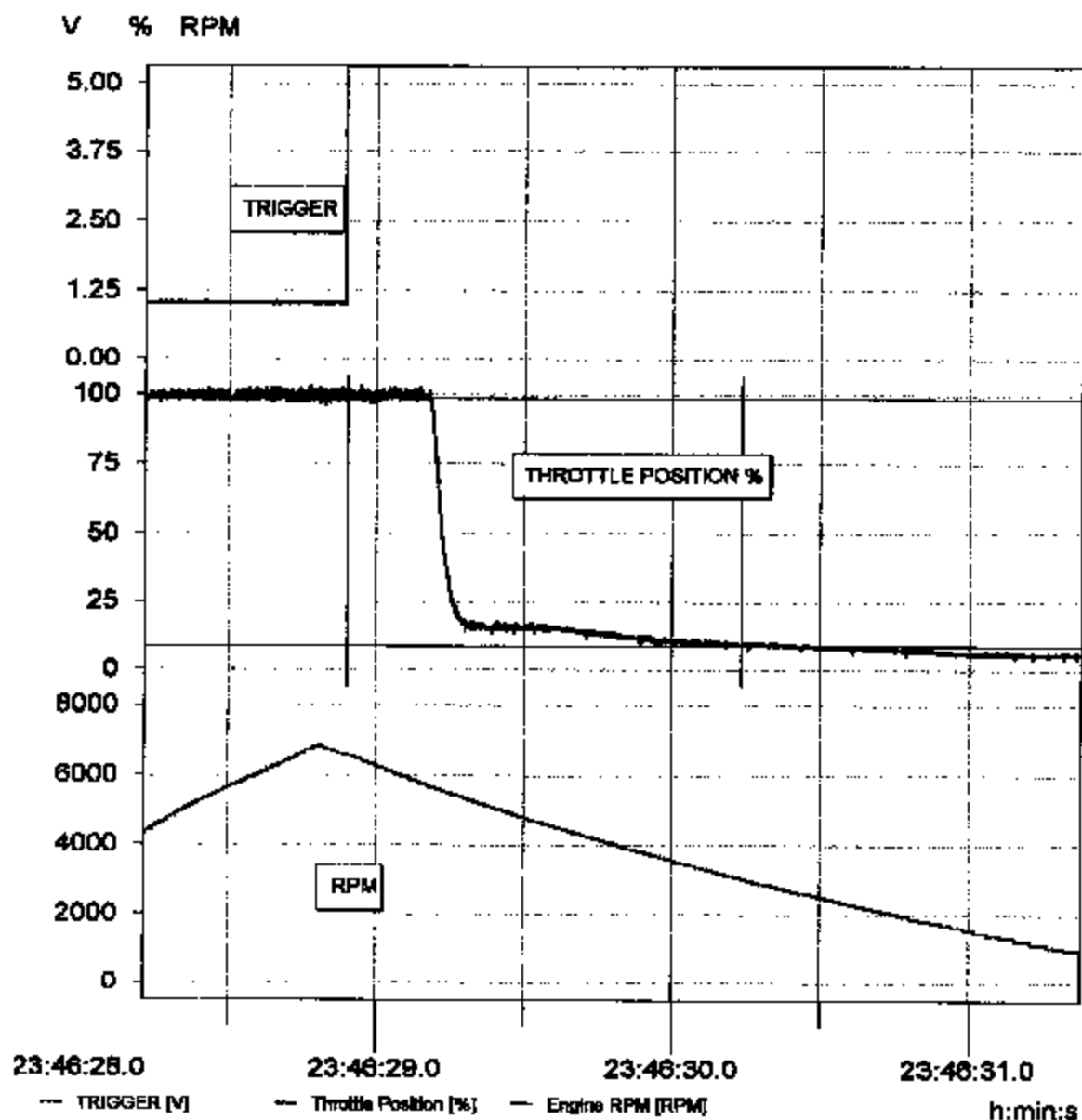
Y2: 8.530 %
t2: -23619.923 ms
f: 0.554 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/ECM CONNECTOR 4/ 100% WOT

11:58:19 PM 5/3/04

NHTSA C40600 FREELANDER



Channel: Throttle Position

Y1: 98.351 %

t1: -16175.823 ms

dt: 1.331 s

Y2: 8.631 %

t2: -14845.923 ms

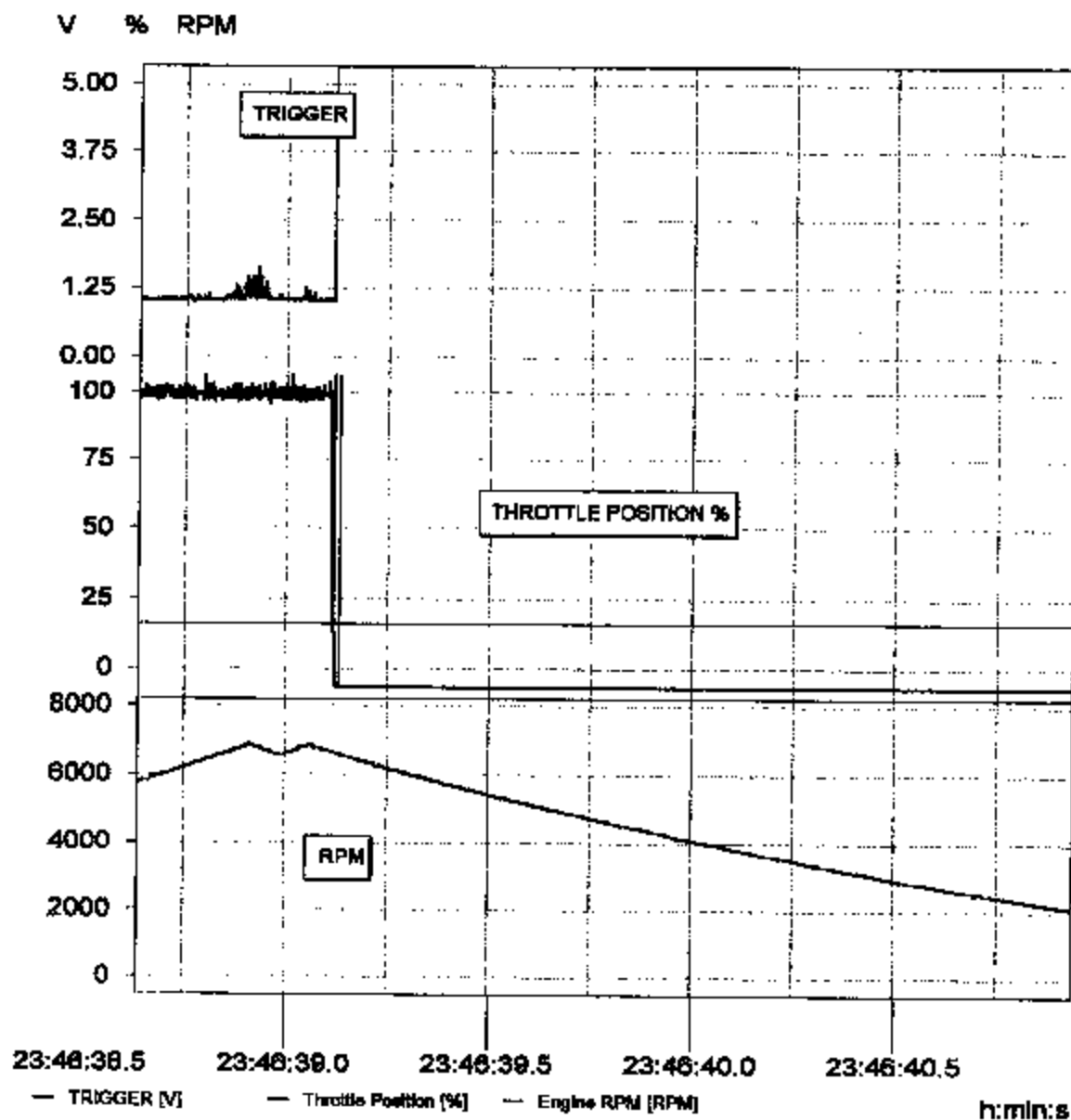
f: 0.751 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/ECM CONNECTOR 5/ 100% WOT

0:00:02 AM 5/4/04

NHTSA C40600 FREELANDER



Channel: Throttle Position

Y1: 15.958 %
t1: -5600.923 ms
dt: 0.013 s

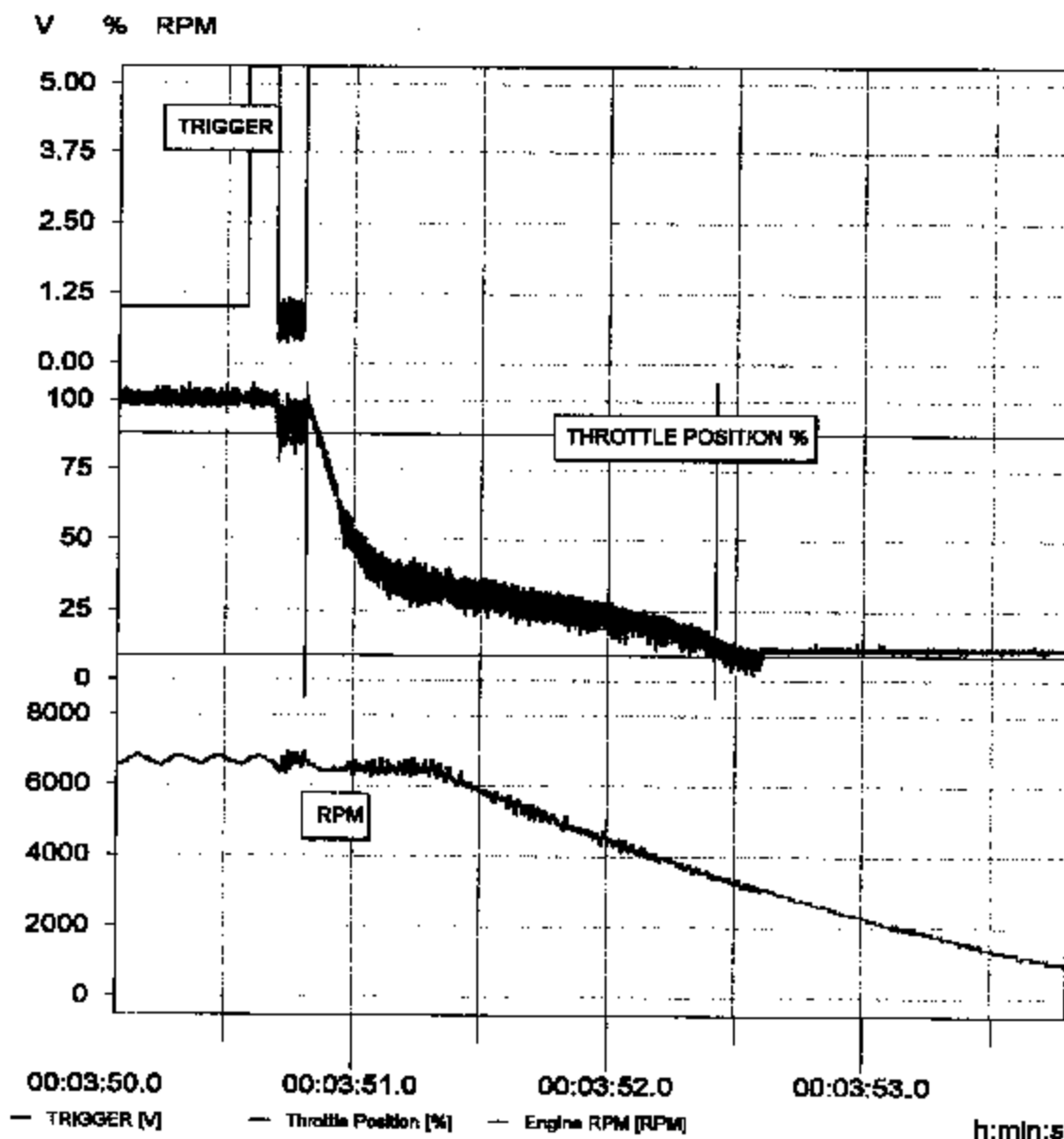
Y2: -10.779 %
t2: -5947.923 ms
f: 76.923 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/TPS/TPM WIRE 1/ 100% WOT

0:08:19 AM 5/4/04

NHTSA C40600 FREELANDER



Channel: Throttle Position

Y1: 87.398 %
t1: -54217.192 ms
dt: 1.809 s

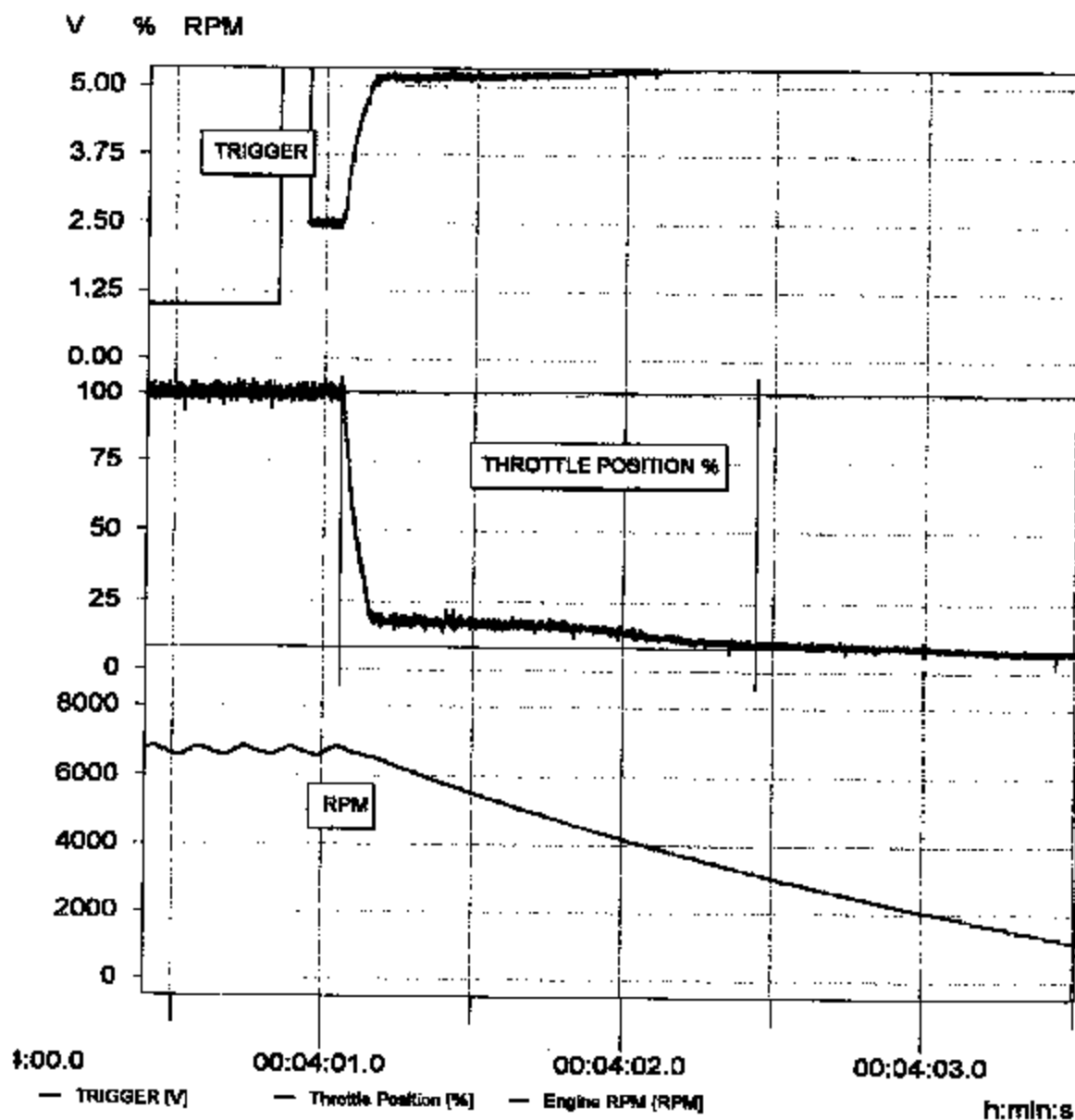
Y2: 8.720 %
t2: -52808.192 ms
f: 0.822 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/TPS/TPM WIRE 2/ 100% WOT

0:10:37 AM 5/4/04

NHTSA C40600 FREELANDER



Channel:Throttle Position

Y1: 100.822 %
t1: -43972.192 ms
dt: 1.364 s

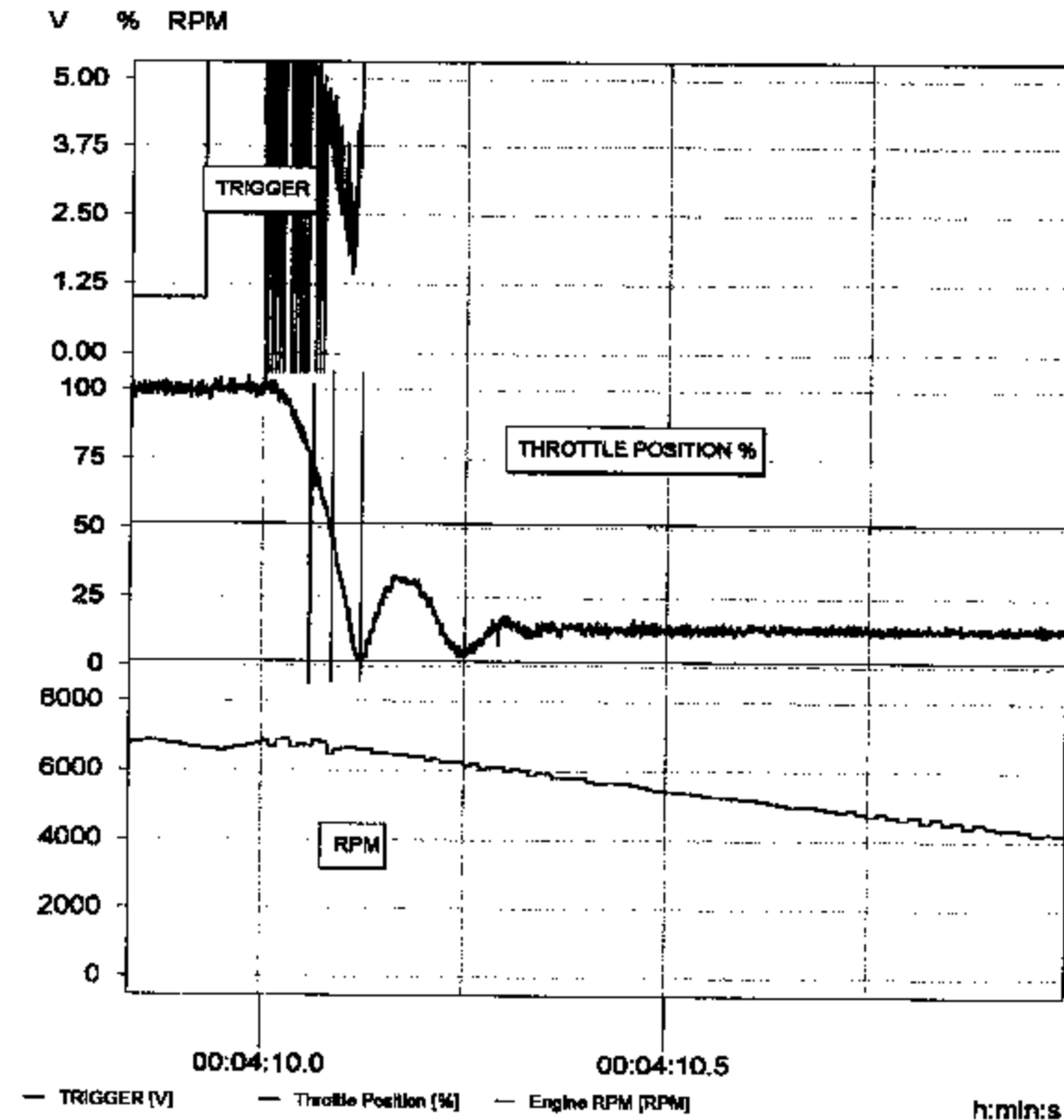
Y2: 8.436 %
t2: -42588.192 ms
f: 0.723 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/TPS/TPM WIRE 3/ 100% WOT

0:12:22 AM 5/4/04

NHTSA C40800 FREELANDER



Channel:Throttle Position

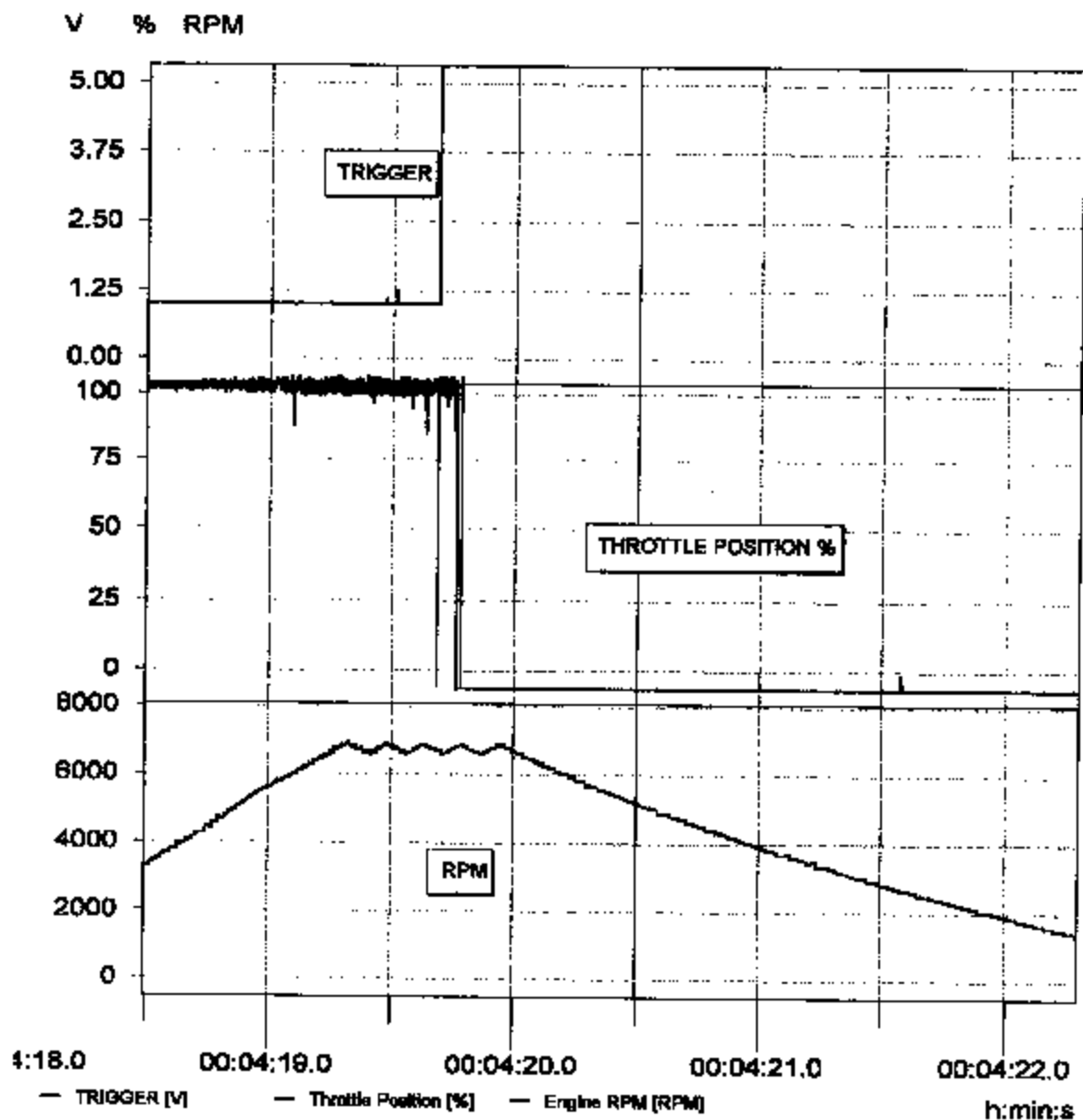
Y1: 51.392 %
t1: -34942.192 ms
dt: 0.036 s

Y2: 1.688 %
t2: -34906.192 ms
f: 27.778 Hz

FMVSS 124 THROTTLE RETURN TEST
124 COLD/TPS/TPM WIRE 4/ 100% WOT

0:13:36 AM 5/4/04

NHTSA C40600 FREELANDER



Channel: Throttle Position

Y1: 103.505 %
t1: -25345.192 ms
dt: 0.085 s

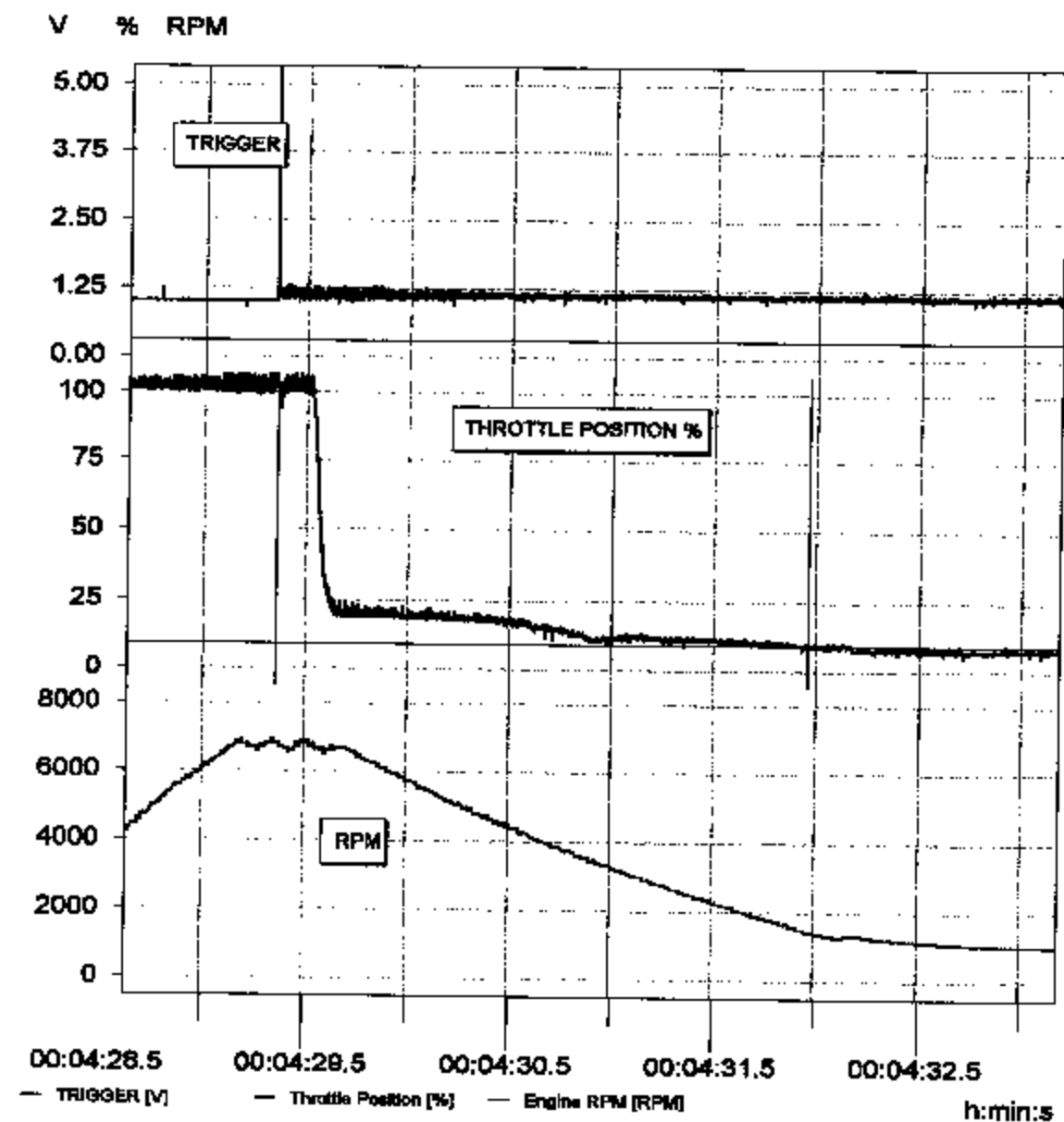
Y2: -12.352 %
t2: -25290.192 ms
f: 10.526 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/TPS/TPM WIRE 5/ 100% WOT

0:16:18 AM 5/4/04

NHTSA C40800 FREELANDER



Channel: Throttle Position

Y1: 119.048 %

t1: -15874.192 ms

d1: 2.604 s

Y2: 8.934 %

t2: -13070.192 ms

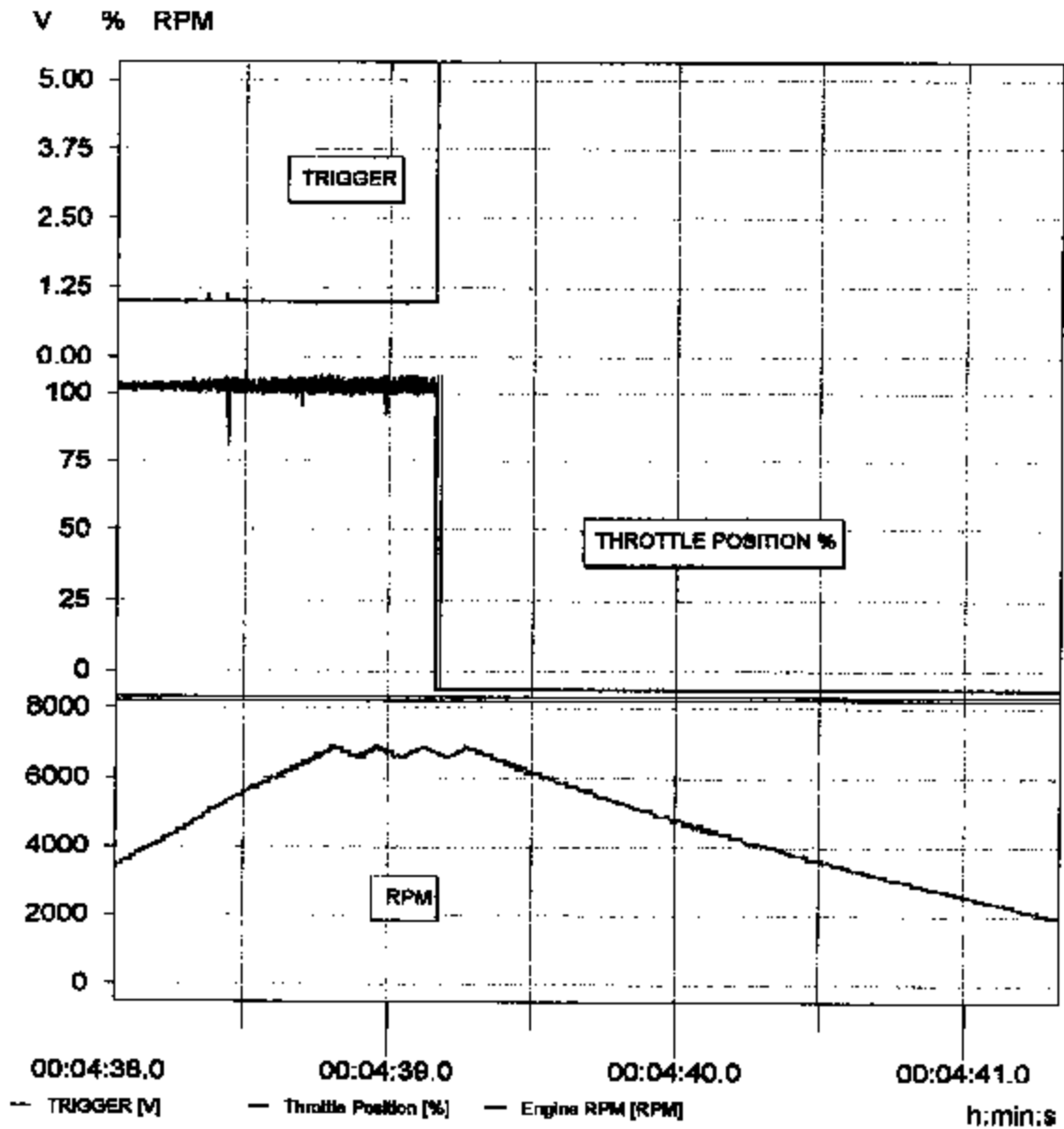
f: 0.384 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/TPS/TPM WIRE & 100% WOT

0:17:38 AM 5/4/04

NHTSA C40600 FREELANDER



Channel: Throttle Position

Y1: -9.340 %

t1: -5852.192 ms

dt: 0.013 s

Y2: -10.664 %

t2: -5849.192 ms

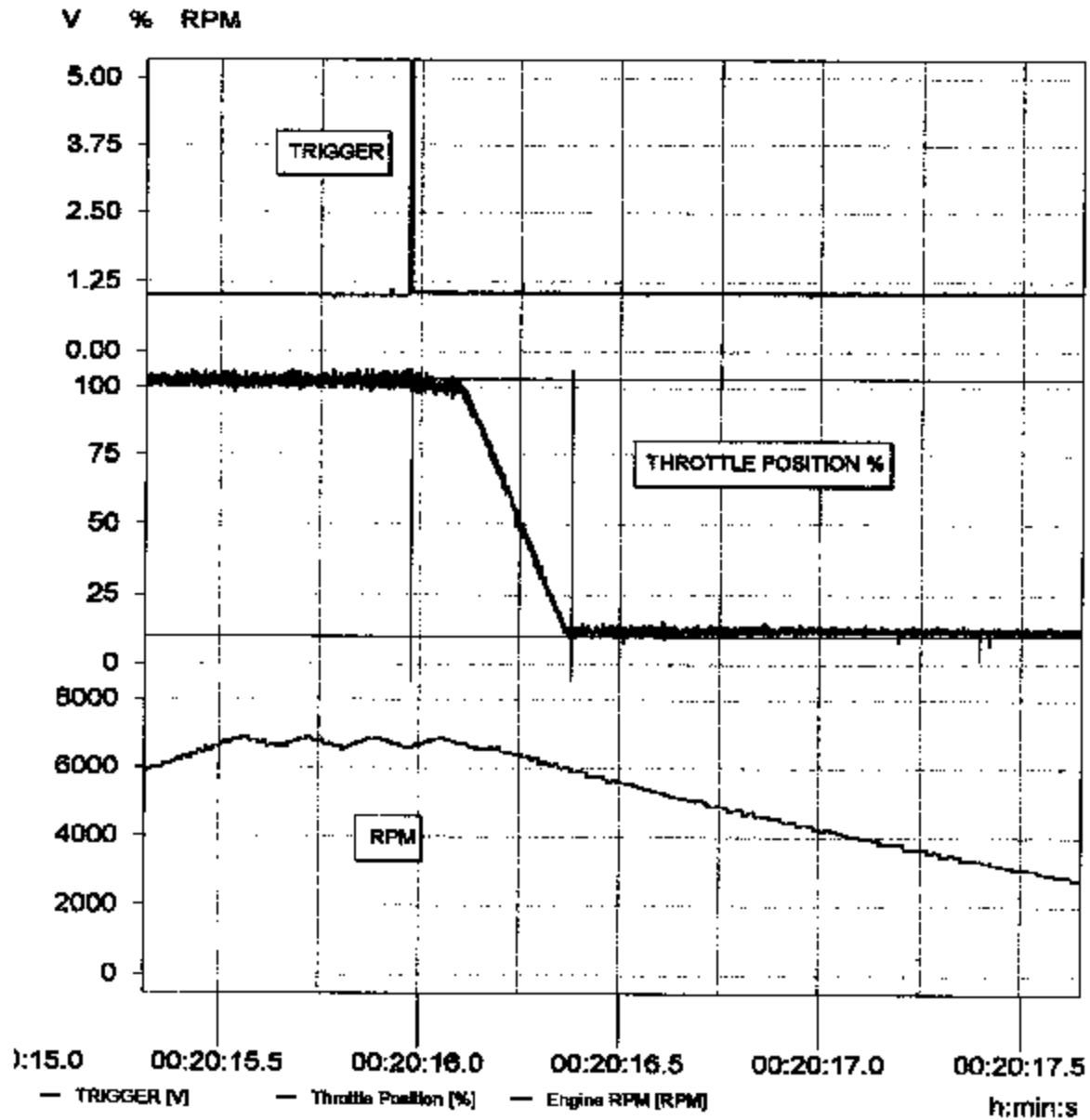
f: 75.623 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/TPS/TPM WIRE 1 GND/ 100% WOT

0:27:50 AM 5/4/04

NHTSA C40600 FREELANDER



Channel: Throttle Position

Y1: 102.917 %

T1: -65030.733 ms

dt: 0.402 s

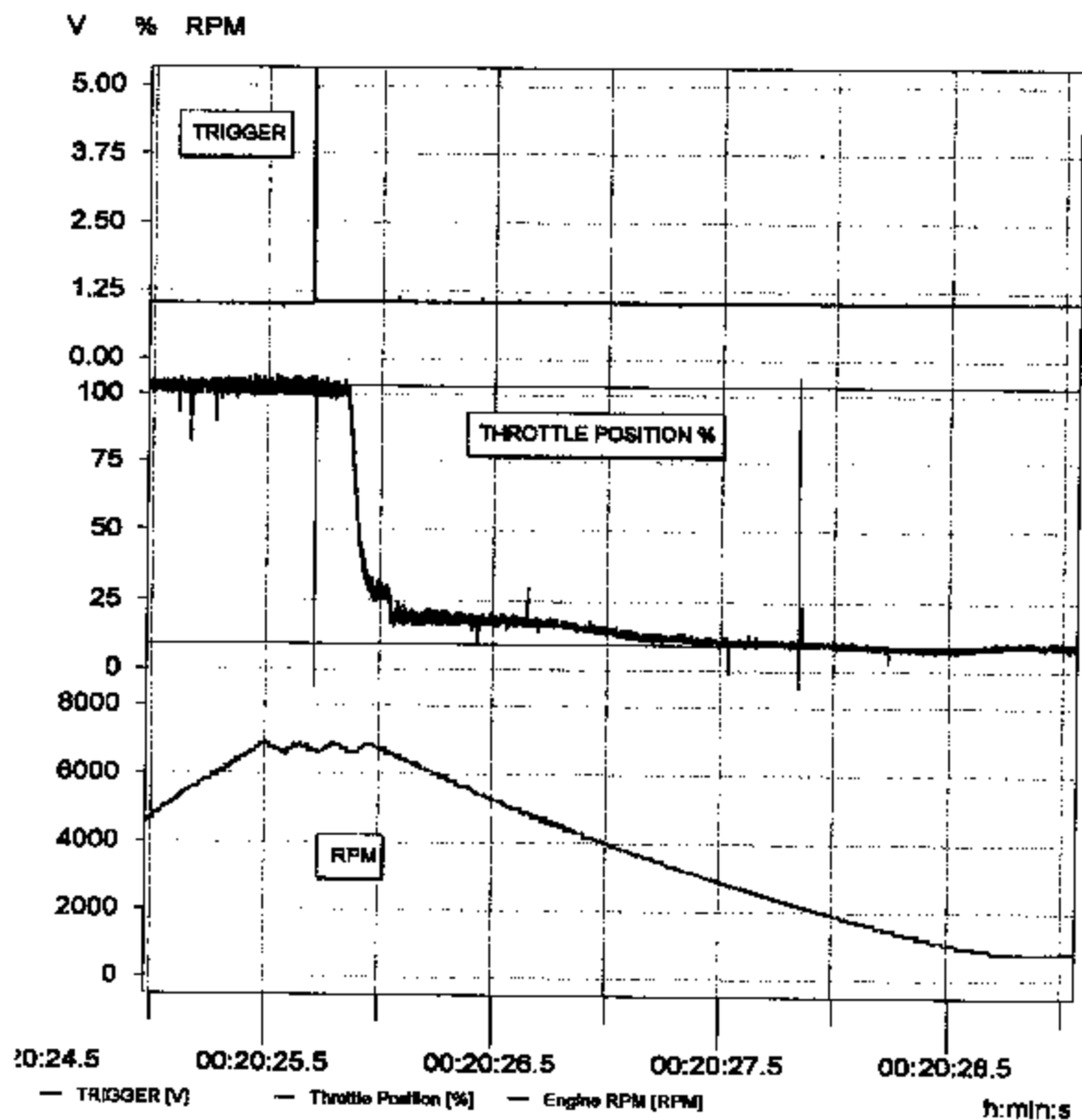
Y2: 9.871 %

T2: -54628.733 ms

f: 2.488 Hz

FMVSS 124 THROTTLE RETURN TEST 124 COLD/TPS/TPM WIRE 2GND/ 100% WOT 0:30:41 AM 5/4/04

NHTSA C40600 FREELANDER



Channel: Throttle Position

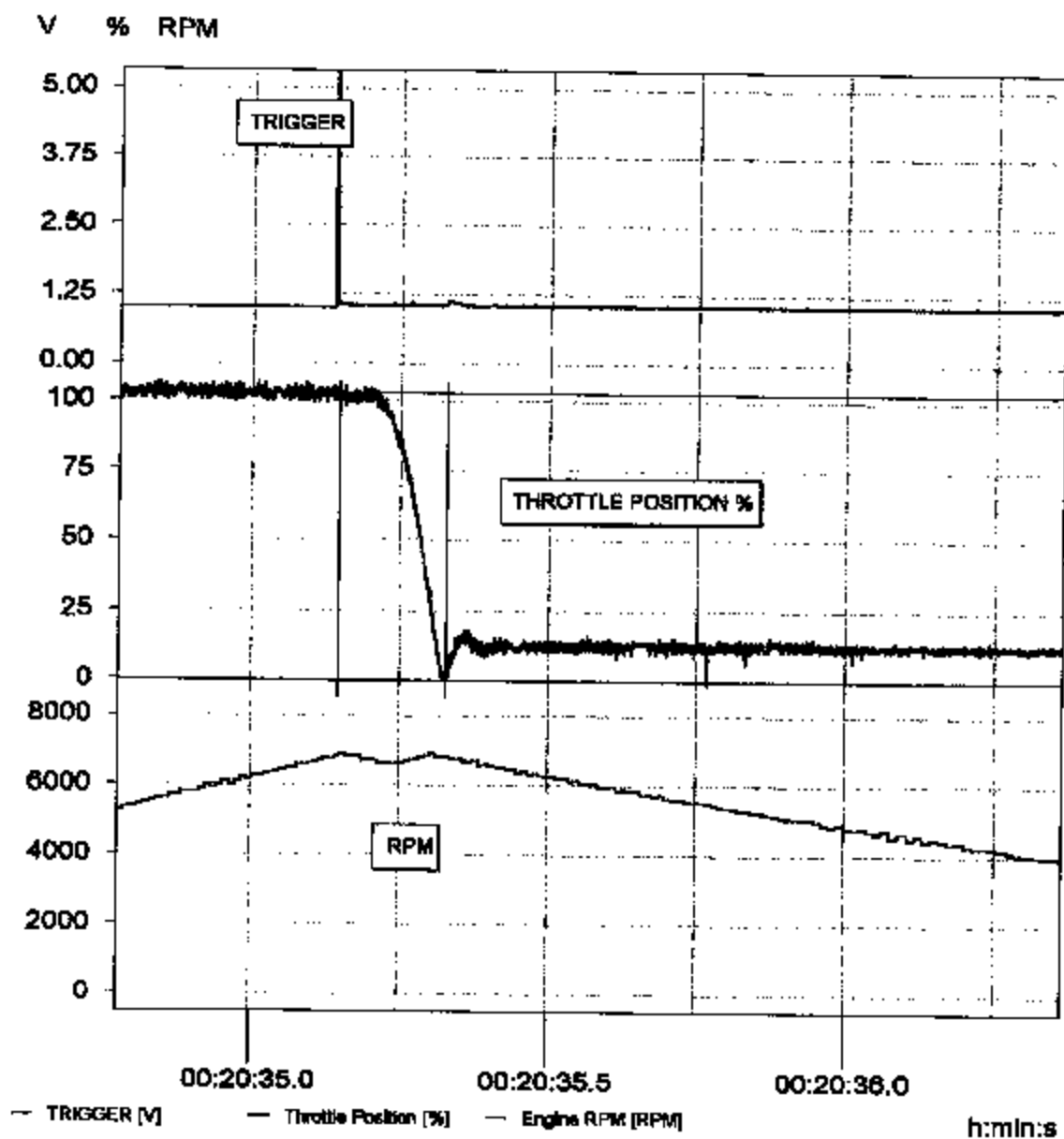
Y1: 103.006 %	Y2: 8.965 %
t1: -46297.733 ms	t2: -43169.733 ms
dt: 2.126 s	f: 0.470 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/TPS/TPM WIRE 3 GND/ 100% WOT

0:32:07 AM 5/4/04

NHTSA C40800 FREELANDER



Channel: Throttle Position

Y1: 102.473 %

t1: -35681.733 ms

dt: 0.181 s

Y2: -0.532 %

t2: -35680.733 ms

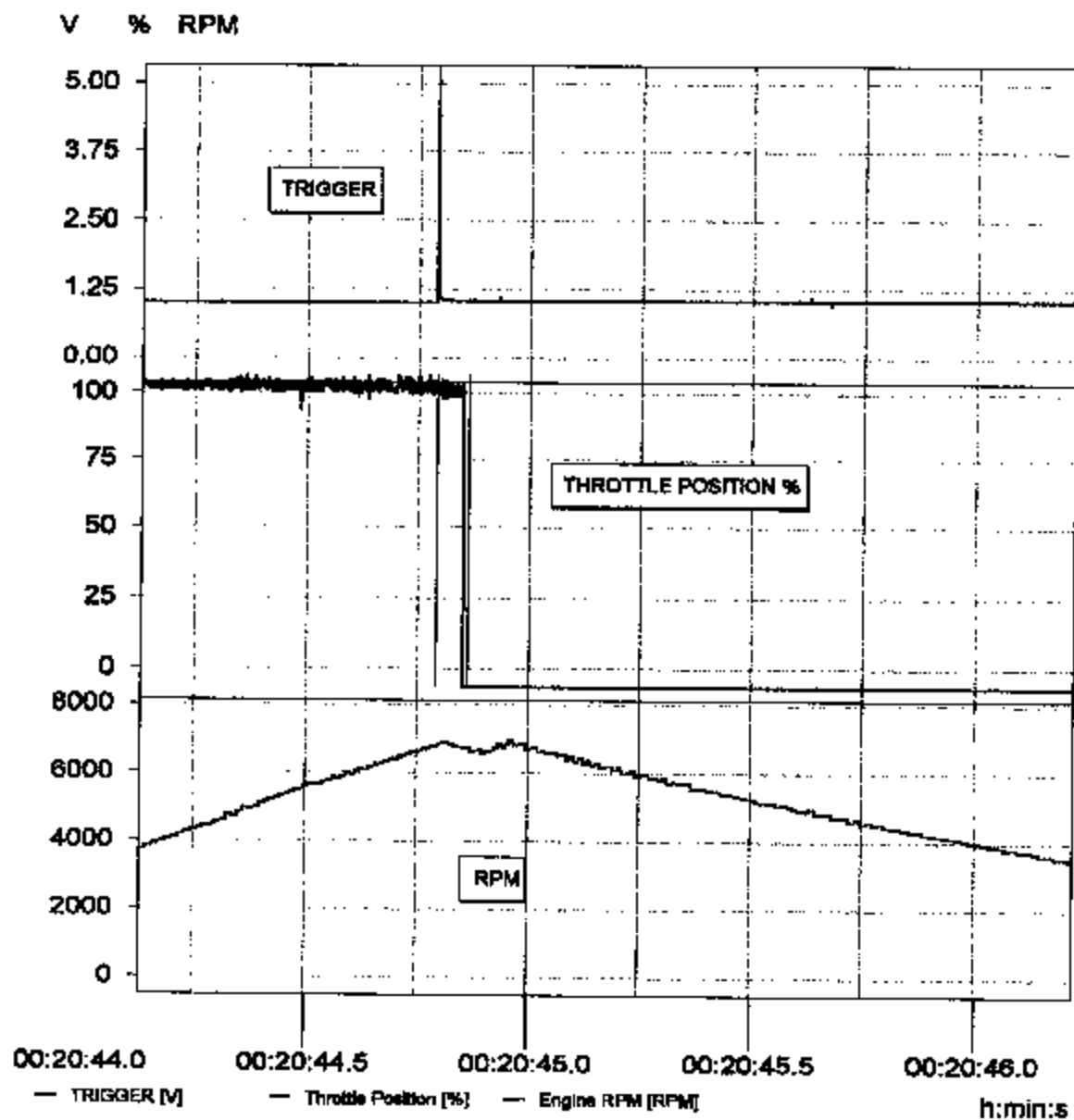
f: 5.525 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/TPS/TPM WIRE 4 GND/ 100% WOT

D:33:25 AM 5/4/04

NHTSA C40800 FREELANDER



Channel: Throttle Position

Y1: 103.748 %

t1: -28217.733 ms

dt: 0.072 s

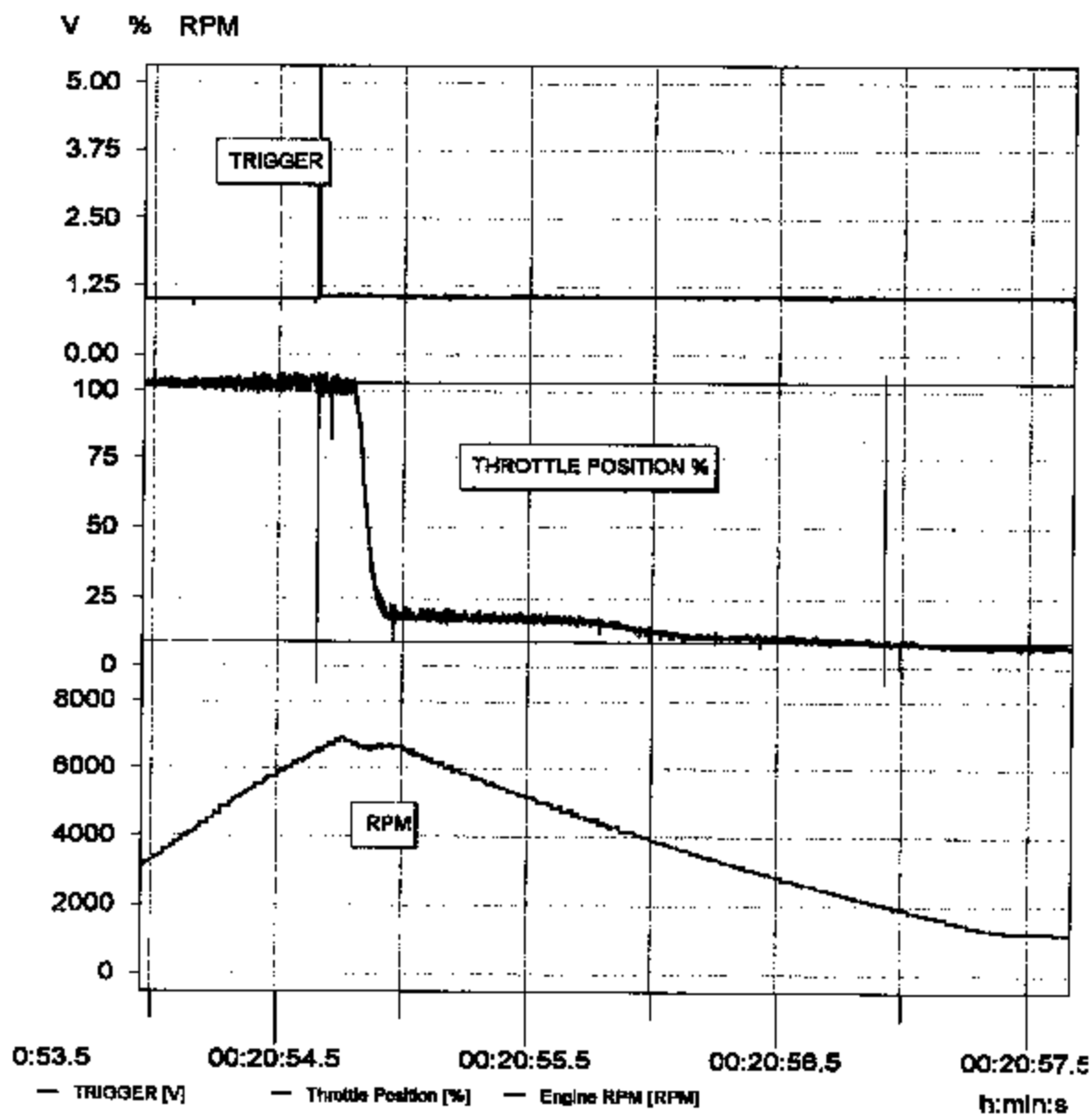
Y2: -11.760 %

t2: -26145.733 ms

f: 13.008 Hz

FMVSS 124 THROTTLE RETURN TEST 124 COLD/TPS/TPM WIRE 5 GND/ 100% WOT 0:35:23 AM 5/4/04

NHTSA C40500 FREELANDER



Channel: Throttle Position

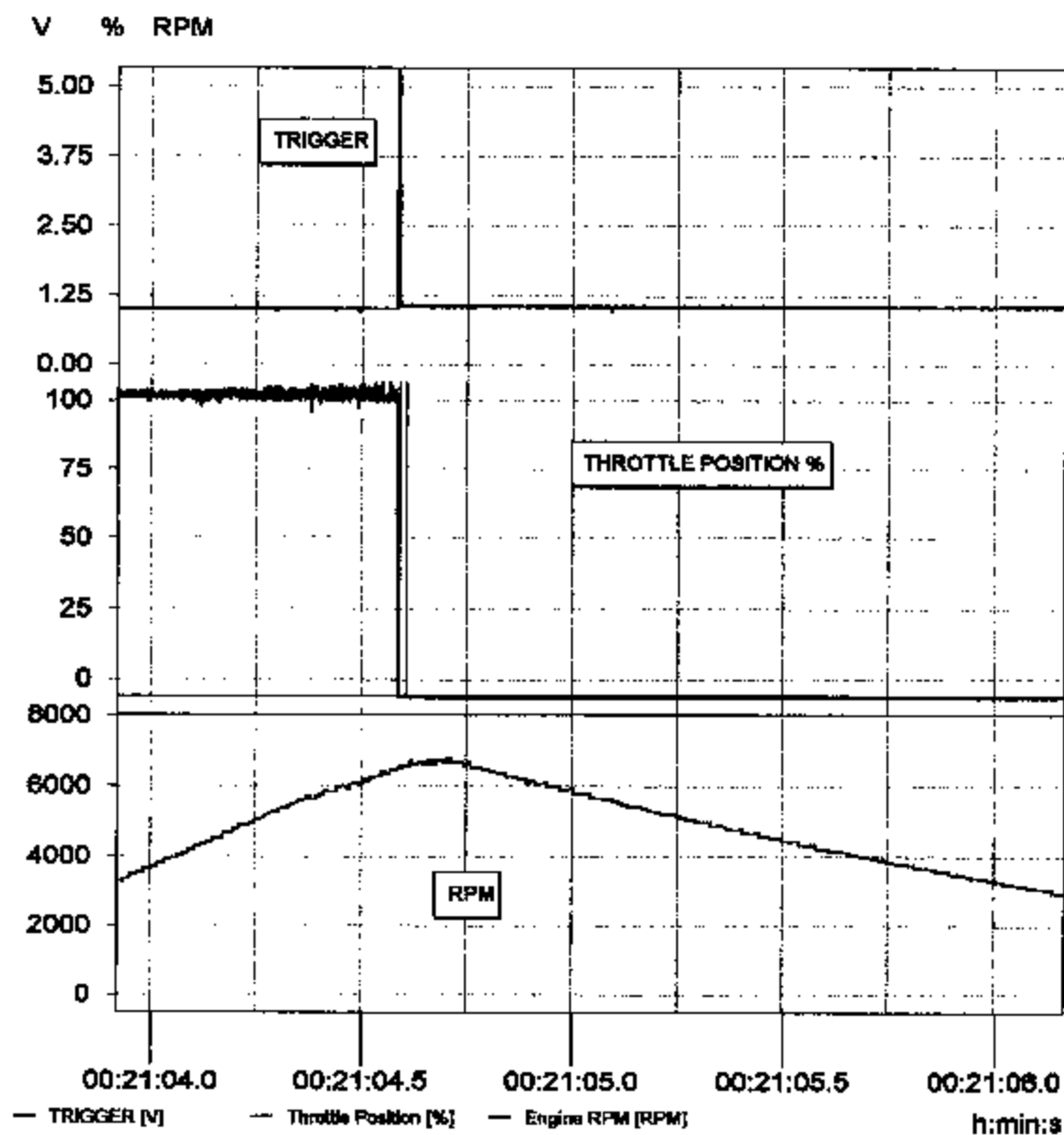
Y1: 103.022 %	Y2: 8.970 %
t1: -16352.733 ms	t2: -14081.733 ms
dt: 2.271 s	f: 0.440 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/TPS/TPM WIRE 6 GND/ 100% WOT

0:37:00 AM 5/4/04

NHTSA C40800 FREELANDER



Channel: Throttle Position

Y1: -5.808 %
t1: -8417.733 ms
dt: 0.016 s

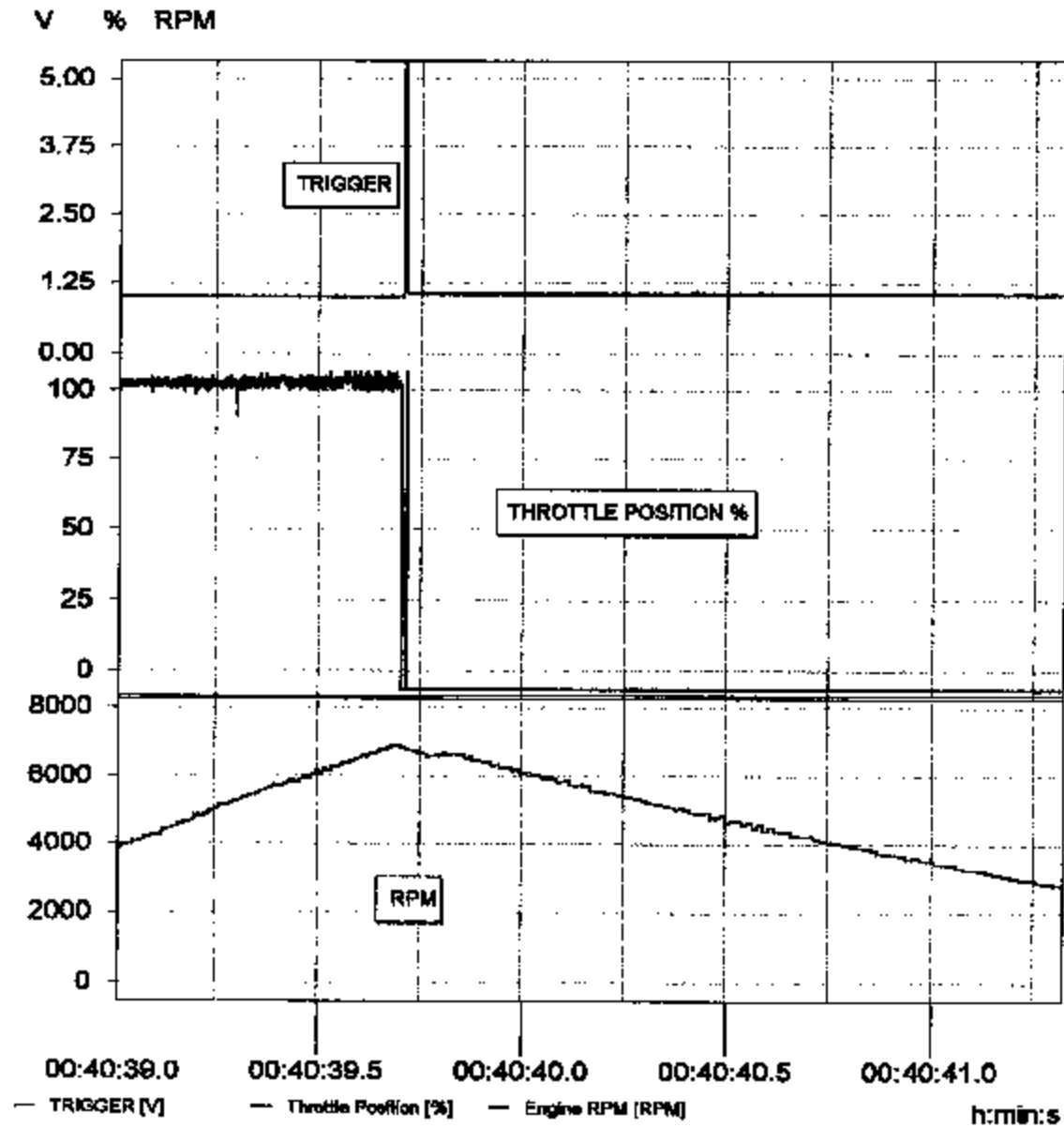
Y2: -12.654 %
t2: -8402.733 ms
f: 68.667 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/APS WIRE 11 GND/ 100% WOT

0:55:16 AM 5/4/04

NHTSA C40600 FREELANDER



Channel: Throttle Position

Y1: -9.033 %

t1: -55291.106 ms

dt: 0.004 s

Y2: -10.166 %

t2: -55267.106 ms

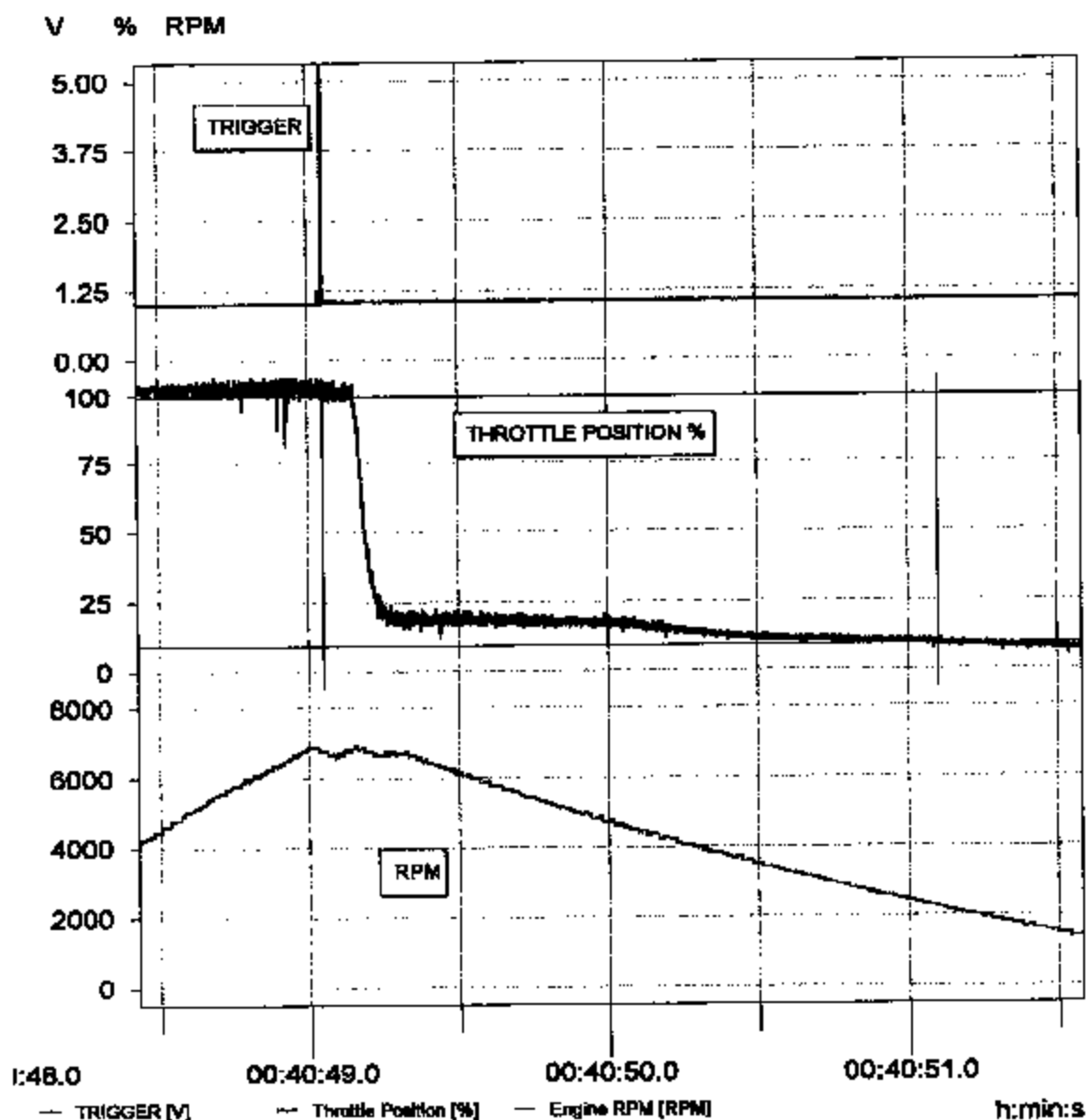
f: 250.000 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/APS WIRE 12 GND/ 100% WOT

0:57:36 AM 5/4/04

NHTSA C40600 FREELANDER



Channel: Throttle Position

Y1: 99.622 %
t1: -45955.106 ms
dt: 2.061 s

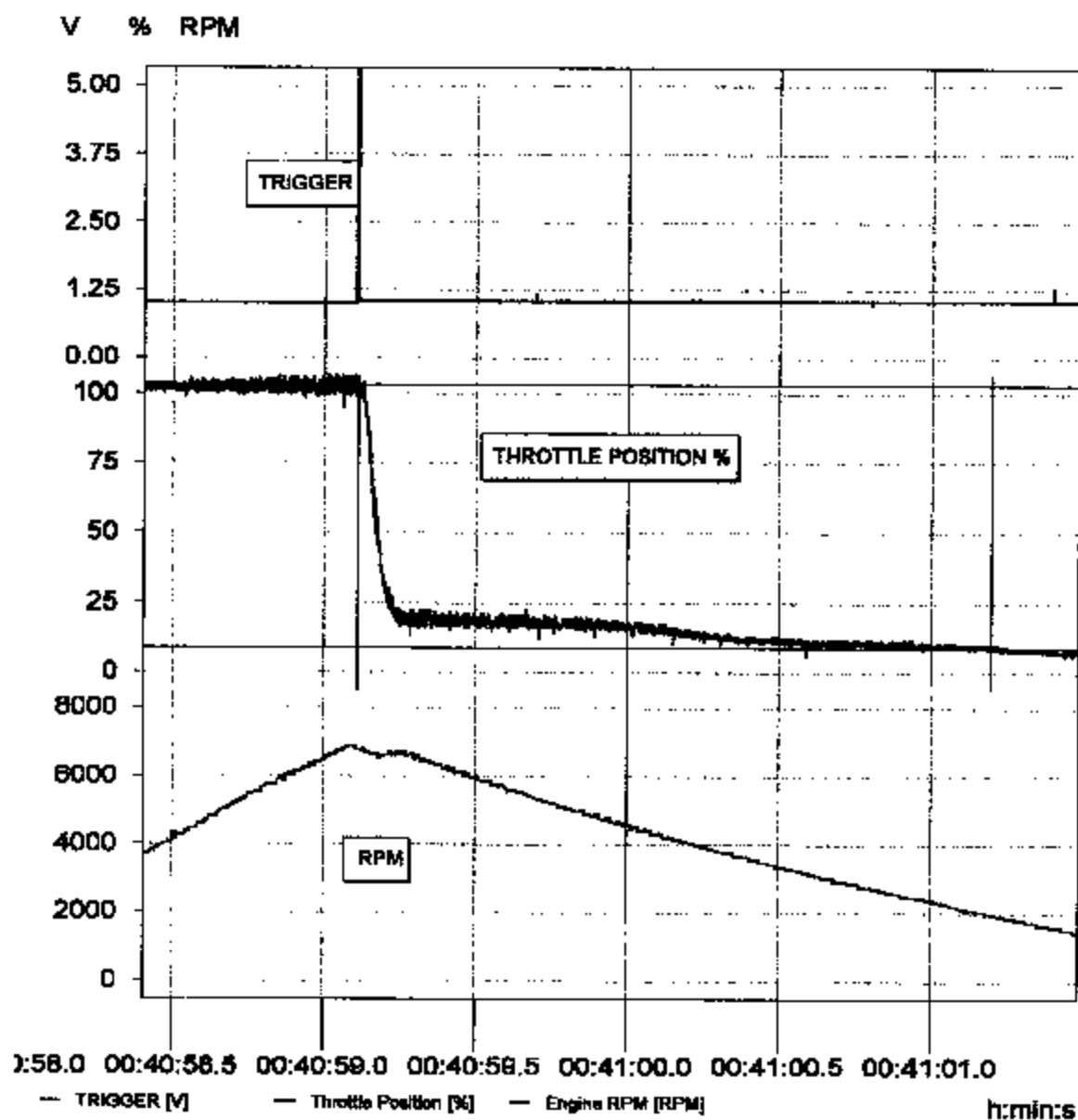
Y2: 8.946 %
t2: -43804.106 ms
f: 0.468 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/APS WIRE 13 GND/ 100% WOT

0:59:25 AM 5/4/04

NHTSA C40600 FREELANDER



Channel: Throttle Position

Y1: 103.171 %

t1: -36893.106 ms

dt: 2.086 s

Y2: 8.886 %

t2: -33807.106 ms

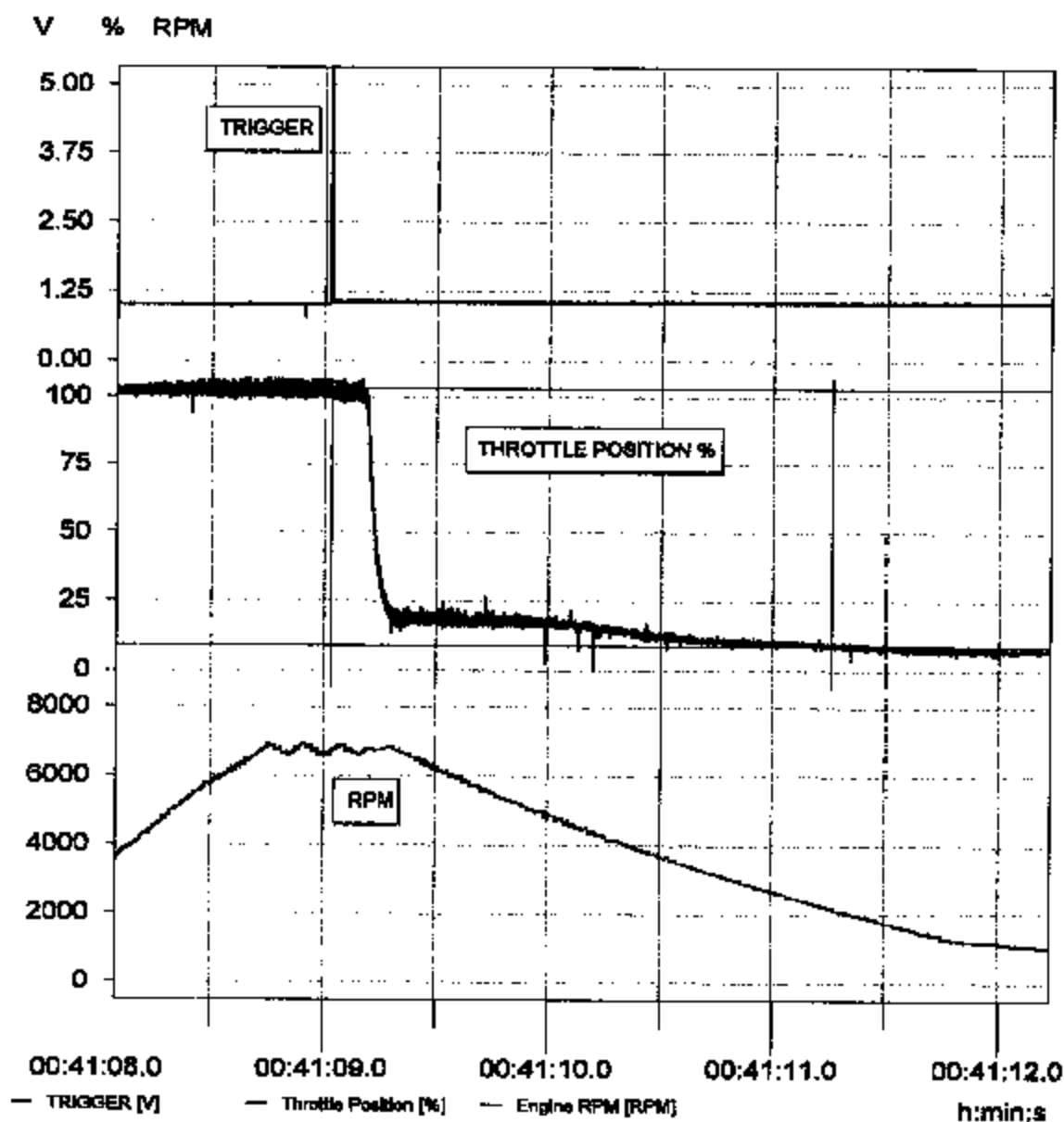
f: 0.478 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/APS WIRE 14 GND/ 100% WOT

1:02:01 AM 5/4/04

NHTSA C40800 FREELANDER



Channel: Throttle Position

Y1: 102.845 %

t1: -23974.106 ms

dt: 2.232 s

Y2: 8.736 %

t2: -23742.106 ms

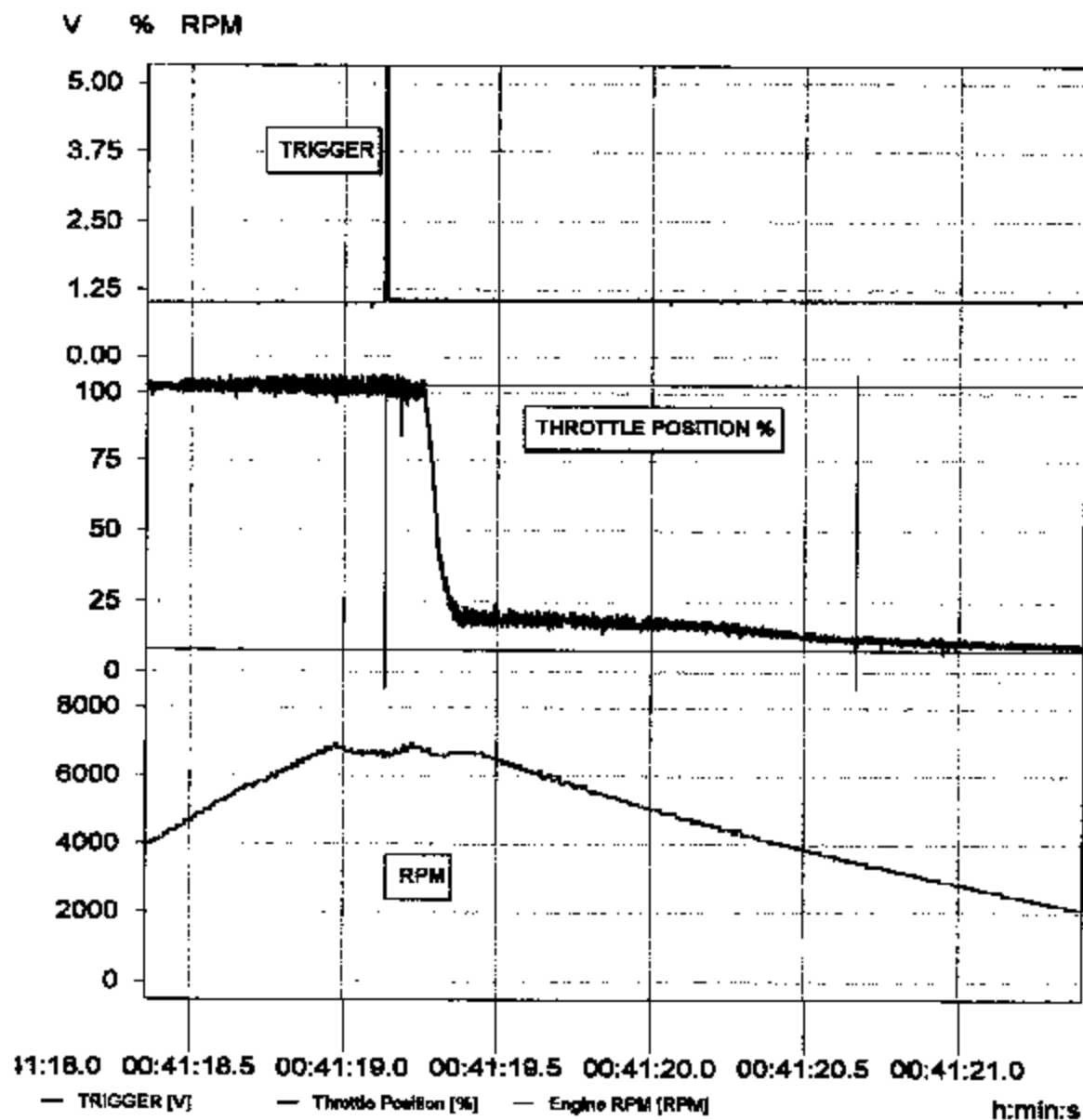
f: 0.446 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/APS WIRE 15 GND/ 100% WOT

1:04:16 AM 5/4/04

NHTSA C40600 FREELANDER



Channel: Throttle Position

Y1: 102.663 %

t1: -15870.106 ms

dt: 1.535 s

Y2: 7.780 %

t2: -14335.106 ms

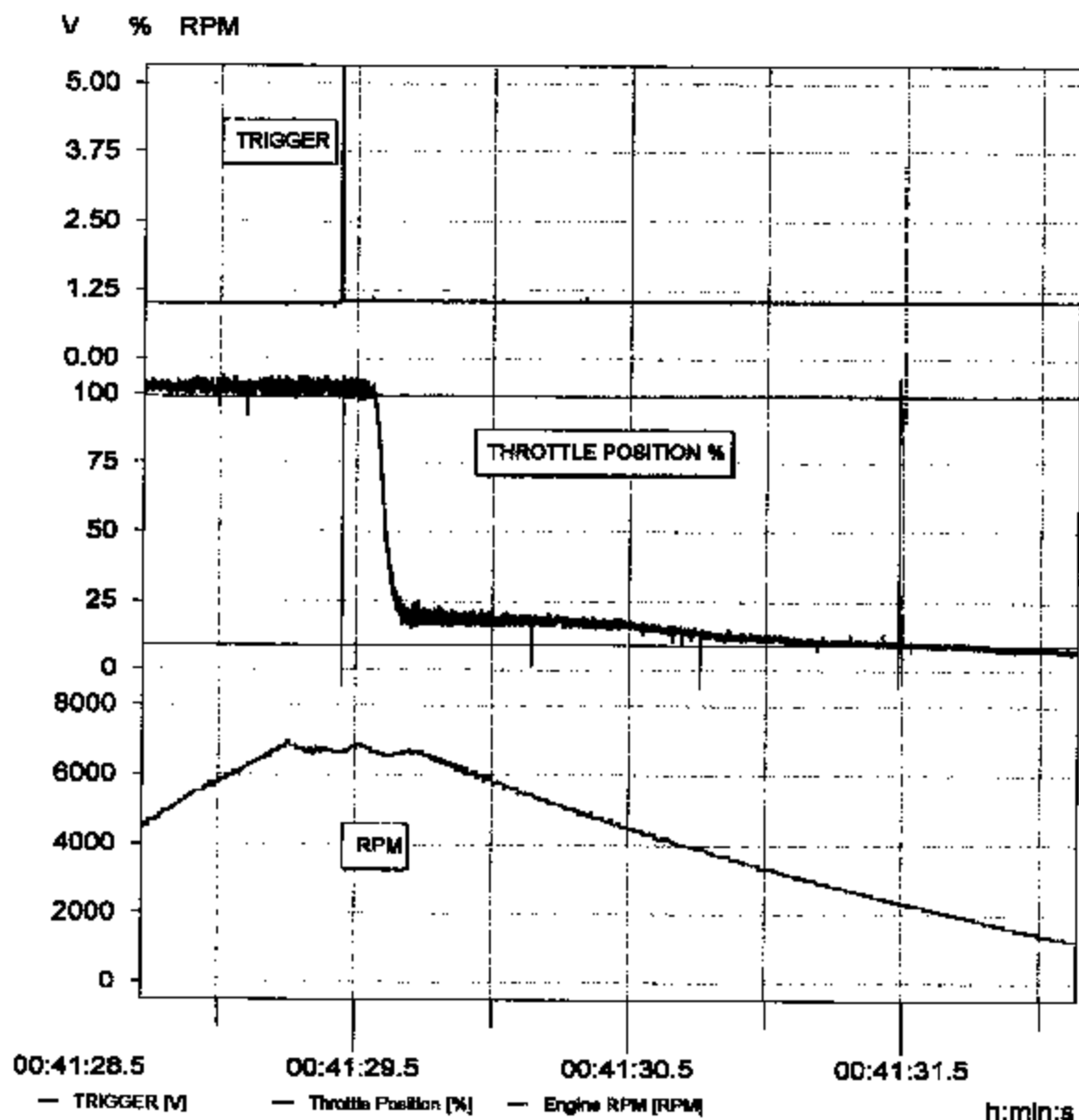
f: 0.651 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/APS WIRE 16 GND/ 100% WOT

1:05:52 AM 5/4/04

NHTSA C40600 FREELANDER



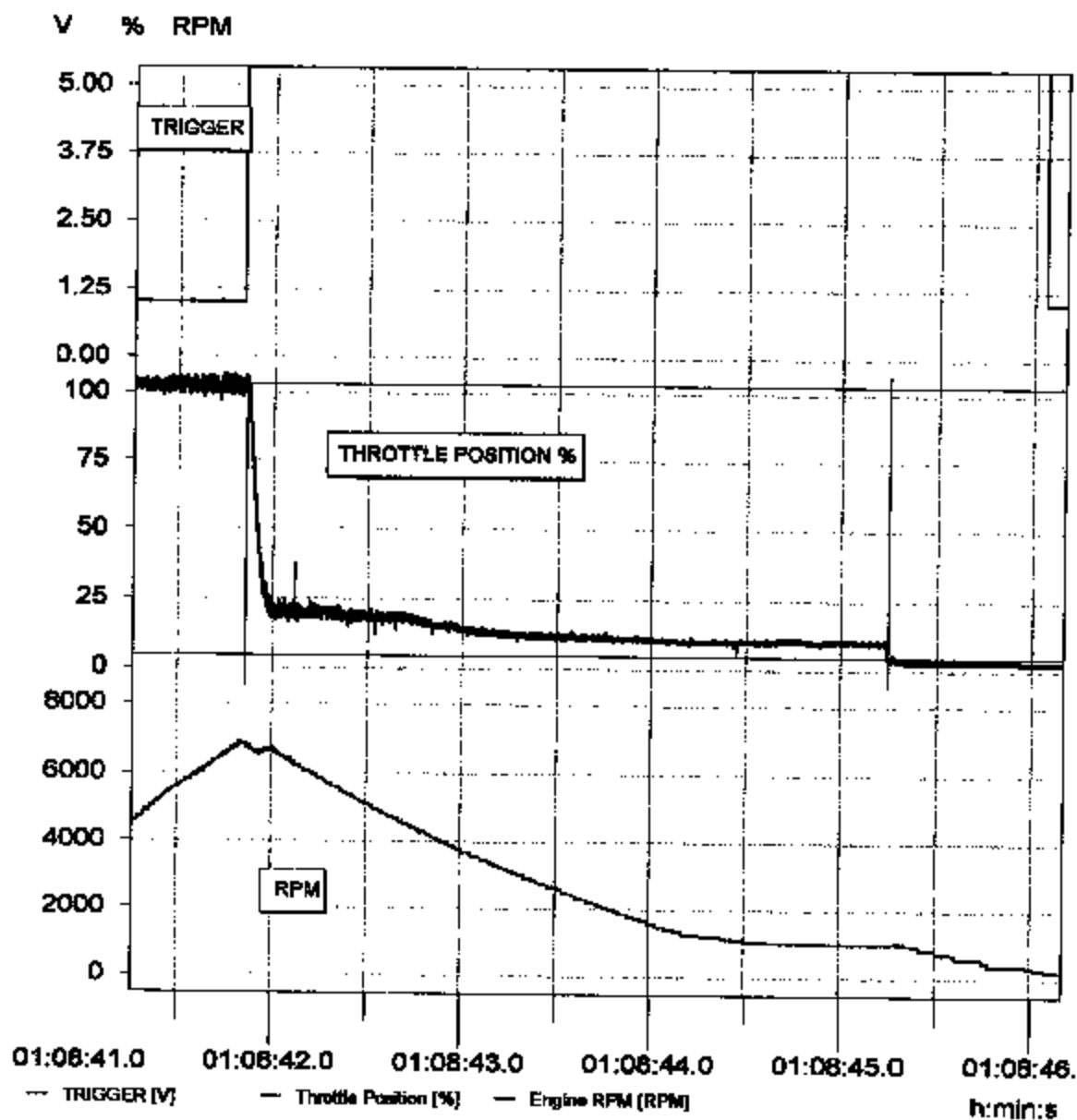
Channel: Throttle Position

Y1: 99.260 %
t1: -5565.106 ms
dt: 2.036 s

Y2: 8.833 %
t2: -3519.106 ms
f: 0.491 Hz

FMVSS 124 THROTTLE RETURN TEST 124 COLD/APS WIRE 11 SEVERED/ 100% WOT 1:22:02 AM 5/4/04

NHTSA C40600 FREELANDER



Channel: Throttle Position

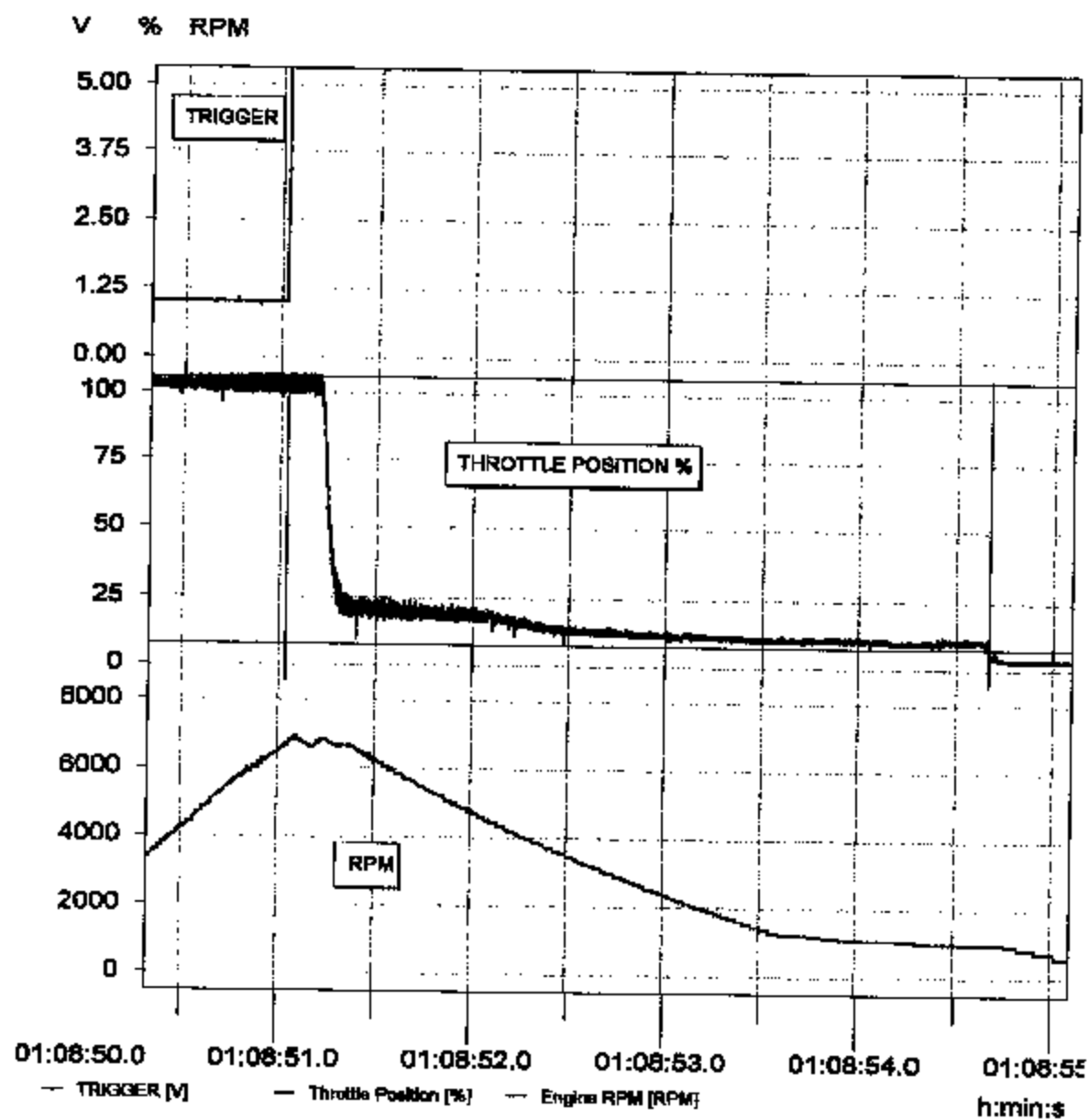
Y1: 103.038 %	Y2: 4.380 %
t1: -55224.923 ms	t2: -51828.923 ms
dt: 3.396 s	f: 0.294 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/APS WIRE 12 SEVERED/ 100% WOT

1:25:44 AM 5/4/04

NHTSA C40000 FREELANDER



Channel: Throttle Position

Y1: 105.694 %

t1: -46042.923 ms

dc: 3.632 u

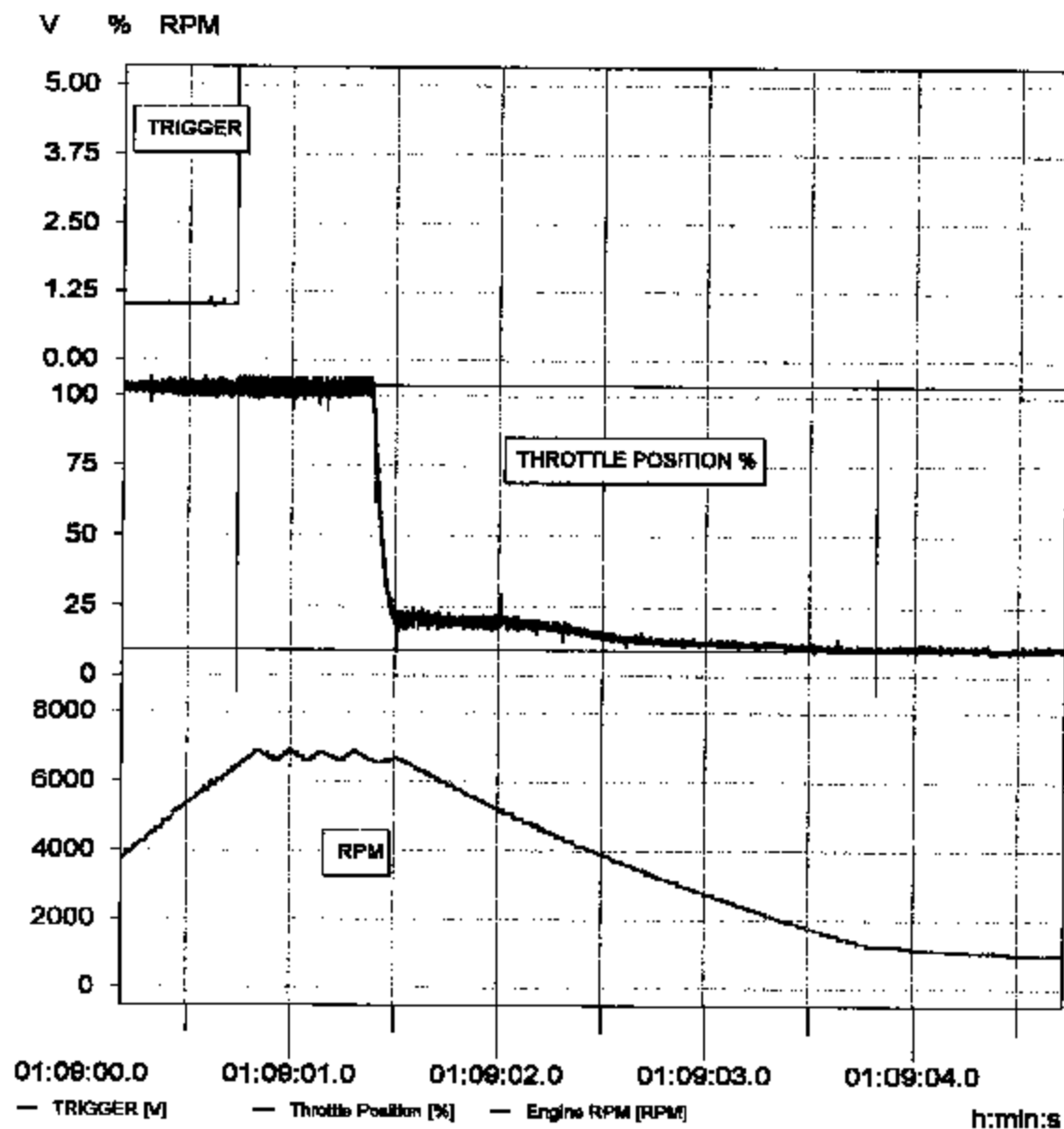
Y2: 7.525 %

t2: -42410.923 ms

f: 0.275 Hz

FMVSS 124 THROTTLE RETURN TEST **124 COLD/APS WIRE 13 SEVERED/ 100% WOT** 1:28:04 AM 5/4/04

NHTSA C40800 FREELANDER

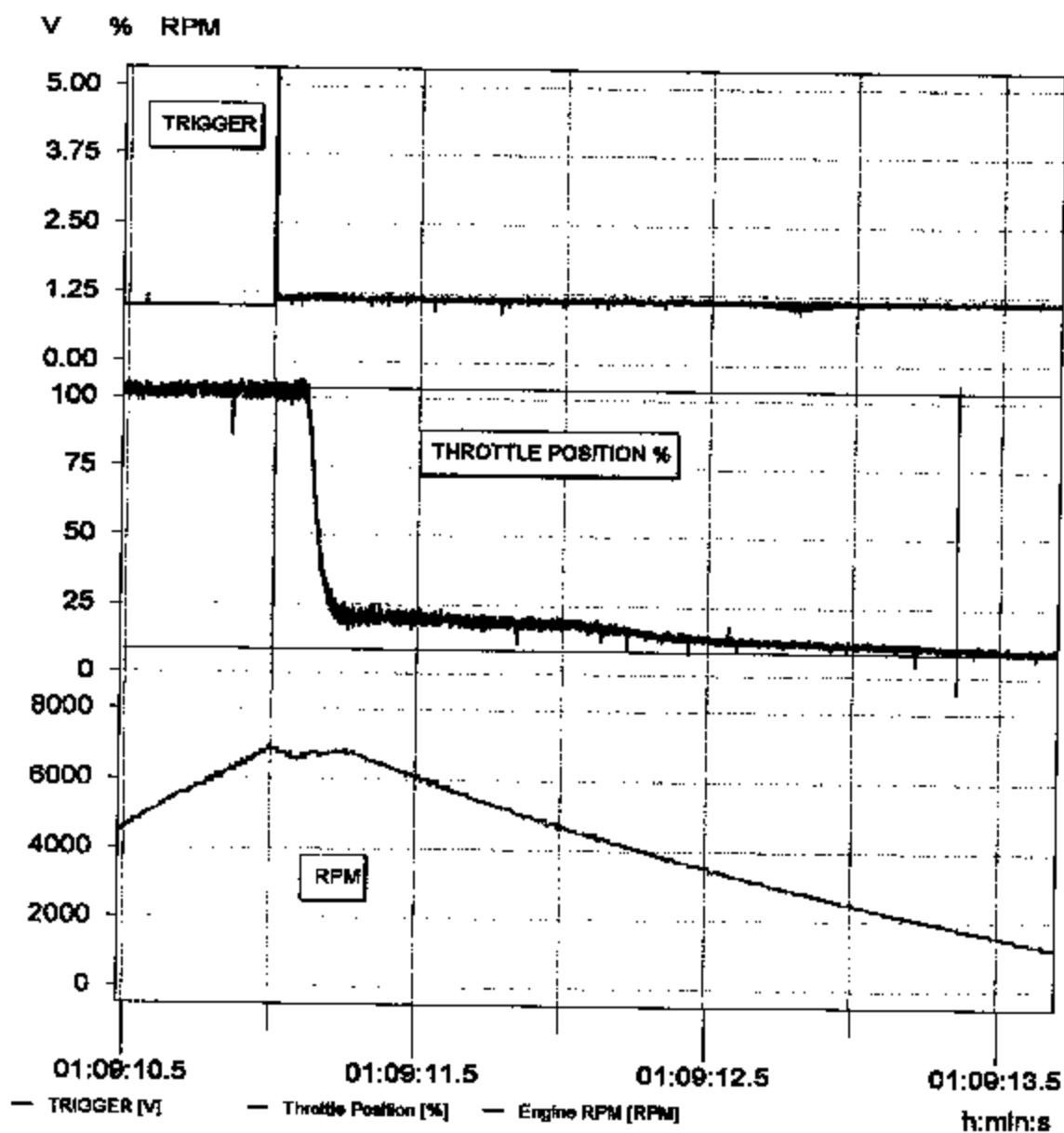


Channel: Throttle Position

Y1: 103.543 %	Y2: 8.966 %
t1: -36342.923 ms	t2: -33260.923 ms
dt: 3.082 s	f: 0.324 Hz

FMVSS 124 THROTTLE RETURN TEST 124 COLD/APS WIRE 14 SEVERED/ 100% WOT 1:30:16 AM 5/4/04

NHTSA C40800 FREELANDER



Channel: Throttle Position

Y1: 103.448 %
t1: -28071.923 ms
dt: 2.343 s

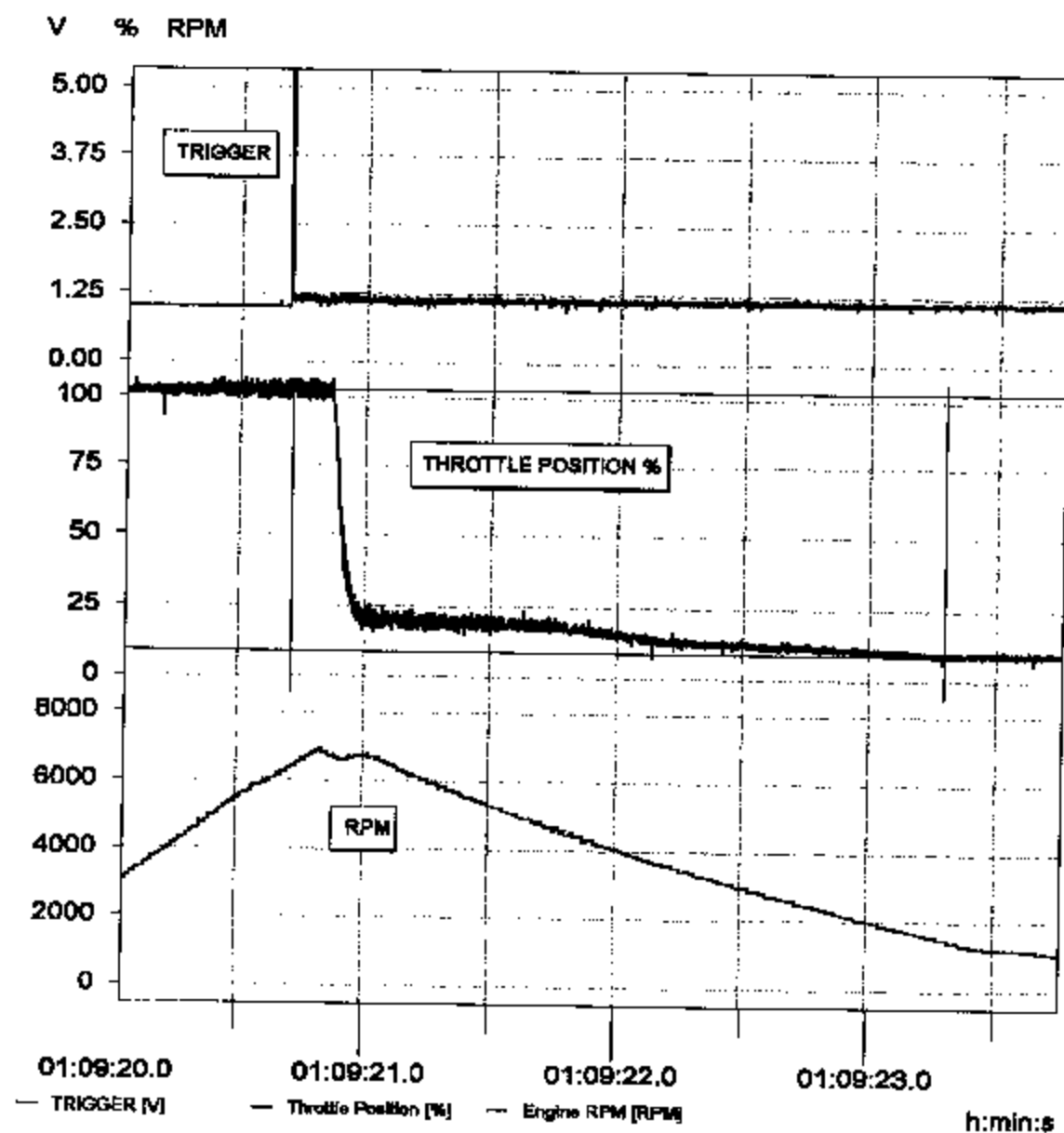
Y2: 8.405 %
t2: -23728.923 ms
f: 0.427 Hz

FMVSS 124 THROTTLE RETURN TEST

124 COLD/APS WIRE 15 SEVERED/ 100% WOT

1:32:06 AM 5/4/04

NHTSA C40600 FREELANDER



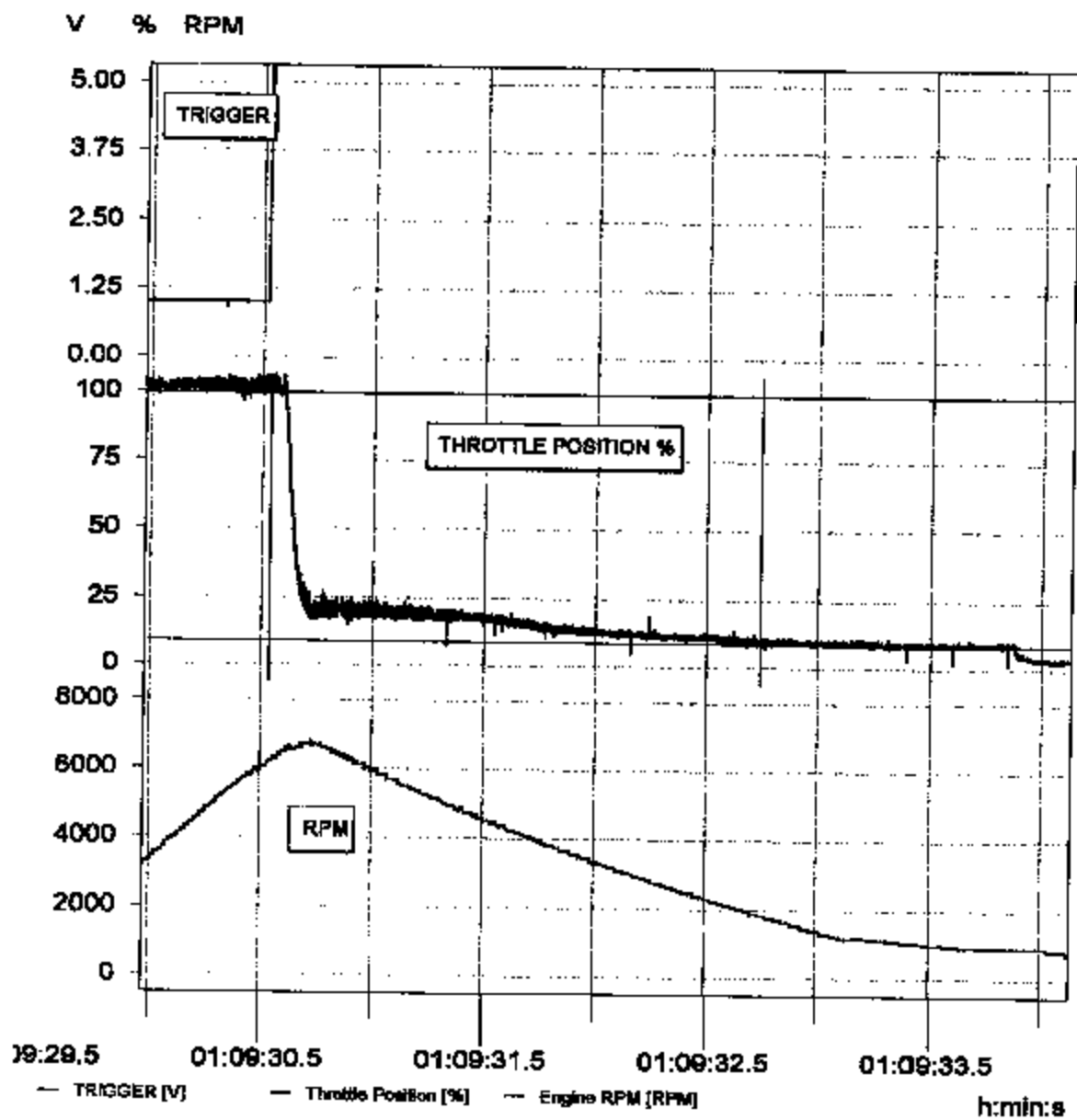
Channel: Throttle Position

Y1: 102.800 %
t1: -16368.823 ms
dt: 2.582 s

Y2: 8.728 %
t2: -13786.023 ms
f: 0.387 Hz

FMVSS 124 THROTTLE RETURN TEST 124 COLD/APS WIRE 16 SEVERED/ 100% WOT 1:33:57 AM 5/4/04

NHTSA C40600 FREELANDER



Channel: Throttle Position

Y1: 99.474 %
 t1: -6543.923 ms
 dt: 2.204 s

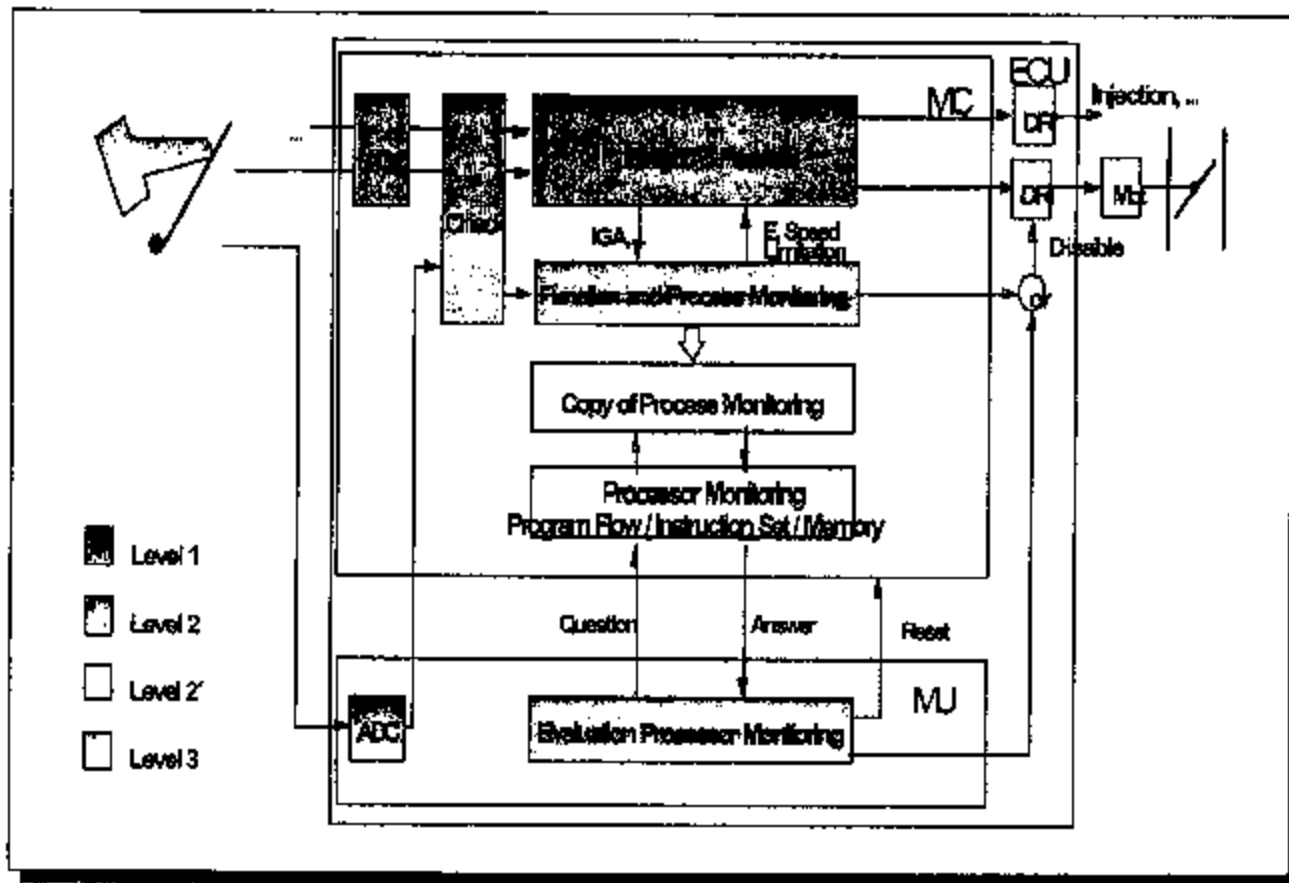
Y2: 5.555 %
 t2: -4339.923 ms
 f: 0.454 Hz

SECTION 7
MANUFACTURER'S DRAWINGS

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;

$$\text{TPS} = (\text{measured value}/5\text{V}) * 100\%$$

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.

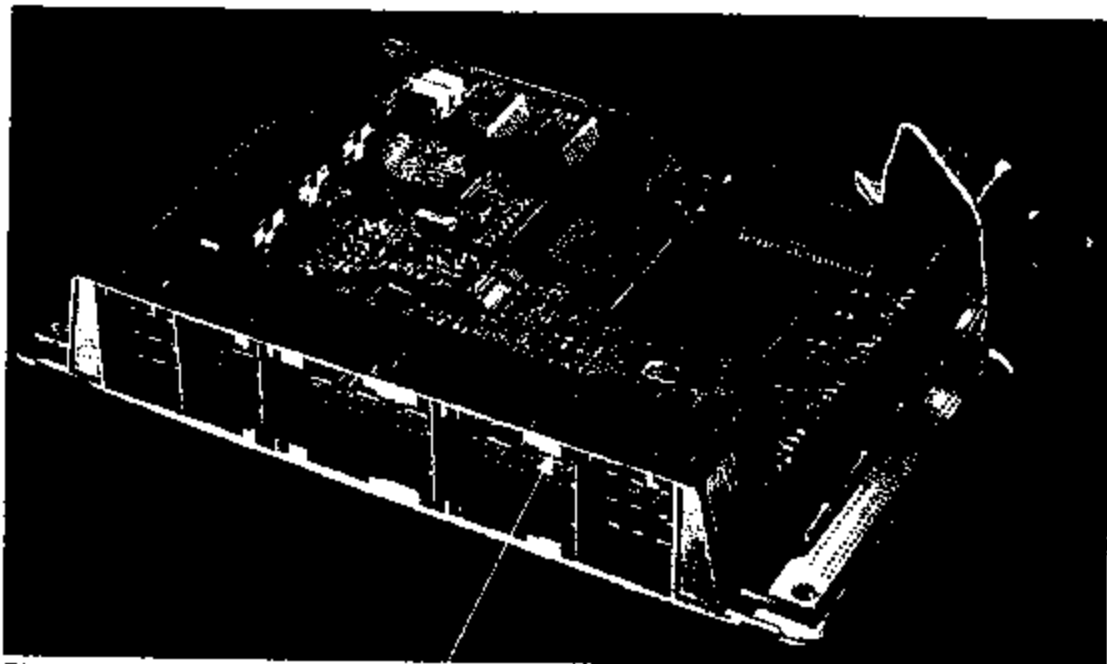
10.) If fuel delivery rate is used to demonstrate return to idle state, provide:

- 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

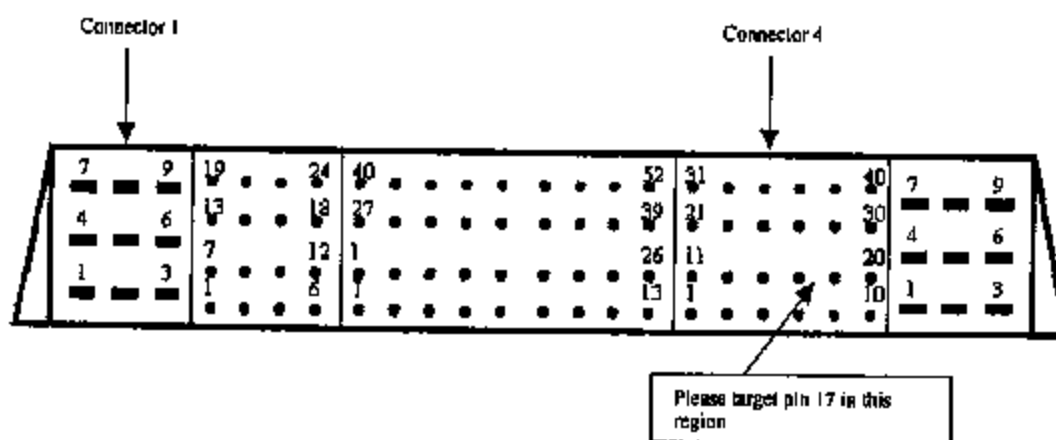
11.) Is the ACS equipped with a limp home mode? If yes, provide operation description.

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

*Land Area
Pin 17/18*



SECTION 8
NOTICE OF POSSIBLE NON-COMPLIANCE

LABORATORY NOTICE OF TEST FAILURE TO OVSC

FMVSS NO.: 124L TEST DATE: 05/04/04LABORATORY: General Testing Laboratories, Inc.CONTRACT NO.: DTNH22-01-C-11025; DELV. ORDER NO.: _____LABORATORY PROJECT ENGINEER'S NAME: Grant FarrandTEST VEHICLE MAKE/MODEL/BODY STYLE: 2004 Landrover Freelander MPVVEHICLE NHTSA NO.: C40600 : VIN: SALNY22214AVEHICLE MODEL YEAR: 2004 : BUILD DATE: 10/03TEST FAILURE DESCRIPTION: During various failure modes of the accelerator control system, return time to base idle exceeds the allowed 1 second maximumS124 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 GVWRNOTIFICATION TO NHTSA (COTR): Stu SelgelDATE: 08/17/04 BY: Grant Farrand

REMARKS: