REPORT NUMBER 124-GTL-07-003

SAFETY COMPLIANCE TESTING FOR FMVSS 124 ACCELERATOR CONTROL SYSTEMS

NISSAN MOTOR CO., LTD.
2007 NISSAN VERSA,
4-DOOR PASSENGER CAR
NHTSA NO. C75201

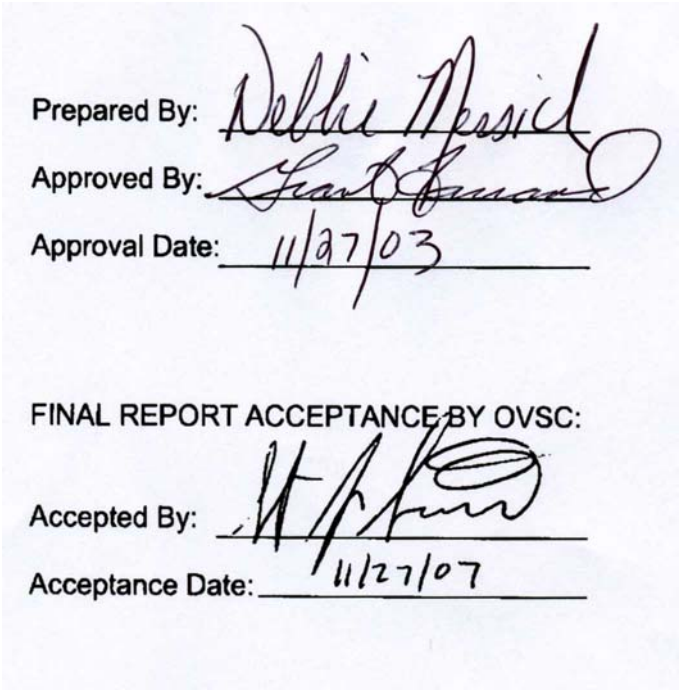
GENERAL TESTING LABORATORIES, INC.
1623 LEEDSTOWN ROAD
COLONIAL BEACH, VIRGINIA 22443

NOVEMBER 27, 2007

FINAL REPORT

PREPARED FOR

U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
1200 NEW JERSEY AVE, SE
WASHINGTON, D.C. 20590



Technical Report Documentation Page

1. Report No. 124-GTL-07-003	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle Final Report of FMVSS 124 Compliance Testing of 2007 NISSAN VERSA, 4-DOOR PASSENGER CAR NHTSA No. C75201		5. Report Date November 27, 2007 6. Performing Organ. Code GTL
7. Author(s) Grant Farrand, Project Engineer Debbie Messick, Project Manager		8. Performing Organ. Rep# GTL-DOT-07-124-003
9. Performing Organization Name and Address General Testing Laboratories, Inc. 1623 Leedstown Road Colonial Beach, Va 22443		10. Work Unit No. (TRAIS) 11. Contract or Grant No. DTNH22-06-C-00032
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Enforcement Office of Vehicle Safety Compliance (NVS-220) 1200 New Jersey Ave., S.E. Washington, DC 20590		13. Type of Report and Period Covered Final Test Report August 27-28, 2007 14. Sponsoring Agency Code NVS-220
15. Supplementary Notes		
16. Abstract Compliance tests were conducted on the subject 2007 Nissan Versa 4-door Passenger Car in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-124-06 for the determination of FMVSS 124 compliance. Test failures identified were as follows: None		
17. Key Words Compliance Testing Safety Engineering FMVSS 124	18. Distribution Statement Copies of this report are available from NHTSA Technical Information Services (TIS) NPO-411 1200 New Jersey Ave., S.E. Washington, DC 20590 Email: tis@dot.gov Fax: 202-493-2833	
19. Security Classif. (of this report) UNCLASSIFIED	21. No. of Pages 66	22. Price
20. Security Classif. (of this page) UNCLASSIFIED		

Form DOT F 1700.7 (8-72)

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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 the number of 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 2007 Nissan Versa Passenger Car, NHTSA No. C75201 in accordance with the National Highway Traffic Safety Administration (NHTSA) Laboratory Procedure TP-124-06.

The vehicle is equipped with an electronic throttle control system with an Accelerator Pedal Position Senson (APS), a Throttle Plate Position Sensor (TPS), an Electronic control Module (ECM) and an Air Throttle Plate Actuator Motor.

Output from the vehicle throttle position sensor on the air throttle plate shaft was used to measure throttle position and data was recorded at 100 HZ with GTL' s data acquisition system. Testing was conducted to simulate the normal removal of the driver's foot from the accelerator pedal. This was performed by depressing the accelerator with a gloved hand which incorporated an electrical contact strip in the depressing forefinger. The accelerator was depressed to the required amount and then the forefinger was quickly removed from the pedal, releasing the accelerator and activating the contact strip for time zero. Failures were induced simultaneously with release of 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 (25%, 50%, 75% and 100%) with the accelerator control system complete. With each of the wires to the APS and throttle plate position sensor disconnected and shorted to ground, return to idle times were determined at the worst case condition – wide open throttle (100%).

SECTION 2 (Continued)

Some system faults resulted in no data output as the TPS used for throttle position data was itself disconnected for that part of the test. For these cases, return to idle state was determined by laboratory personnel observation. A number of induced failures resulted in the throttle plate return to or below the idle state then shifting to a Limp-Home mode position which allows the vehicle to be removed from the roadway.

The return times fro some normal operation and fault conditions resulted in return times greater than 1 second. In these cases, throttle angle position decreased rapidly followed by a controlled ramp down to the original idle position. Manufacturers sometimes use this ramp-down strategy for improved emission control which may be the case here. No engine “racing” was observed at any point in the testing.

This testing was performed at mid ambient temperature of 10º C to 46º C, 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: 2007 NISSAN VERSA PSGR. CAR
VEHICLE NHTSA NO.: C75201
VEHICLE VIN: 3N1BC11E57L394885
DATE OF TEST: APRIL 27-28, 2007
TEST LAB: GENERAL TESTING LABORATORIES
VEHICLE ENGINE TYPE: GAS GVWR: 1710 KG
VEHICLE ENGINE SIZE: 1.8 L 4 CYL.
VEHICLE ACCEL. CONTROL SYSTEM (ACS) (Air or Fuel Throttled): AIR
MAX. BHP ENGINE SPEED: 122 HP
MFR. IDLE RPM: 675 RPM
FUEL METERING DEVICE (Carburetor, fuel injection, etc): FUEL INJECTION

REMARKS: The failed return spring tests were not performed on this vehicle as the accelerator pedal assembly and throttle body units are sealed, non-serviceable and cannot be taken apart.

RECORDED BY: G. FARRAND DATE: 08/27/07

APPROVED BY: D. MESSICK

DATA SHEET 2
NORMAL OPERATION TEST
(fully operational system)

VEHICLE MY/MAKE/MODEL/BODY STYLE: 2007 NISSAN VERSA PSGR. CAR
VEHICLE NHTSA NO.: C75201
DATE OF TEST: AUGUST 28, 2007

Check one:

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

SYSTEM CONDITION: COMPLETE (no modifications) Normal Operation

GTL #	ACCELERATOR POSITION % WIDE OPEN THROTTLE (WOT)	THROTTLE POSITION SENSOR READING	RPM	TEMPERATURE (ºC)		THROTTLE POSITION SENSOR READING @ IDLE (BASELINE)	RETURN TIME TO IDLE (Msec)	PASS/ FAIL
				ENGINE COOLANT	AMBIENT			
5799	25%	28%	715	87	26	0-2%	130	P
5800	50%	61%	715	87	26	0-2%	1210	*
5801	75%	68%	710	87	26	0-2%	1420	*
5802	100%	88%	710	87	26	0-2%	2150	*

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 -18º C or less

PASS * FAIL

REMARKS: * See Section 2 – Discussion of Results

RECORDED BY: G. FARRAND DATE: 08/28/07

APPROVED BY: D. MESSICK

DATA SHEET 3
FMVSS 124

VEHICLE MY/MAKE/MODEL/BODY STYLE: 2007 NISSAN VERSA PSGR. CAR
VEHICLE NHTSA NO.: C75201
DATE OF TEST: AUGUST 28, 2007

GTL #	CONNECTOR	WIRE/PIN DESCRIPTION	FAULT CONDITION	ENGINE TEMP. °C	% THROTTLE/ RETURN TIME (MS)	PASS/FAIL/NOTES
5803	TPS	#1/BLUE	OPEN	87	100/230	P Limp Home @6%
5804	TPS	#2/PINK	OPEN	87	100/200	P Limp Home @6%
5805	TPS	#3/YELLOW	OPEN	87	100/10	P Limp Home @6%
5806	TPS	#4/ORANGE	OPEN	87	100/1930	*
5807	TPS	#5/PURPLE	OPEN	87	100/10	P Limp Home @6%
5808	TPS	#6/GREEN	OPEN	87	100/1830	*
5809	APS	#7/GRAY	OPEN	87	100/2030	*
5810	APS	#8 LT. BLUE	OPEN	87	100/2000	*
5811	APS	#9/PINK	OPEN	87	100/1760	*
5812	APS	#10/GREEN	OPEN	87	100/2180	*
5813	APS	#11/RED	OPEN	87	100/2050	*
5814	APS	#12/YELLOW	OPEN	87	100/2140	*
5815	TPS	#1/BLUE	SHORT	87	100/2480	*
5816	TPS	#2/PINK	SHORT	87	100/340	P Limp Home @6%
5817	TPS	#3/YELLOW	SHORT	87	100/4020	*
5818	TPS	#4/ORANGE	SHORT	87	100/0 No Data after Short	**P
5819	TPS	#5/PURPLE	SHORT	87	No Data after Short	P **Limp Home @6%
5820	TPS	#6/GREEN	SHORT	87	100/2240	*
5821	APS	#7/GRAY	SHORT	87	100/1420	*
5822	APS	#8/LT. BLUE	SHORT	87	100/0 Engine Stopped	P
5823	APS	#9/PINK	SHORT	87	No Data	P **Limp Home
5824	APS	#10/GREEN	SHORT	87	100/2060	*
5825	APS	#11/RED	SHORT	87	100/2470	*
5826	APS	#12/YELLOW	SHORT	87	100/2540	*
5827	TPS	CONNECTOR	DISCONNECT	87	100/10	P Limp Home
5828	APS	CONNECTOR	DISCONNECT	87	100/90 Engine Stopped	P

REMARKS: * See Section 2 – Discussion of Results

** By Lab Observation, engine returns to idle and in some cases shifts to Limp-Home mode.

RECORDED BY: G. FARRAND DATE: 08/28/07

APPROVED BY: D. MESSICK

SECTION 4
TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

EQUIPMENT	DESCRIPTION	MODEL/ SERIAL NO.	CAL. DATE	NEXT CAL. DATE
CONTINUOUS RECORDER	OMEGA	CT485	06/07	06/08
ENGINE RECORDING	GTL COMPUTER	CPU1	BEFORE USE	BEFORE USE
ENGINE RECORDING	MONARCH	1444664	08/07	08/08
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

2007 NISSAN VERSA
NHTSA NO. C75201
FMVSS NO. 124

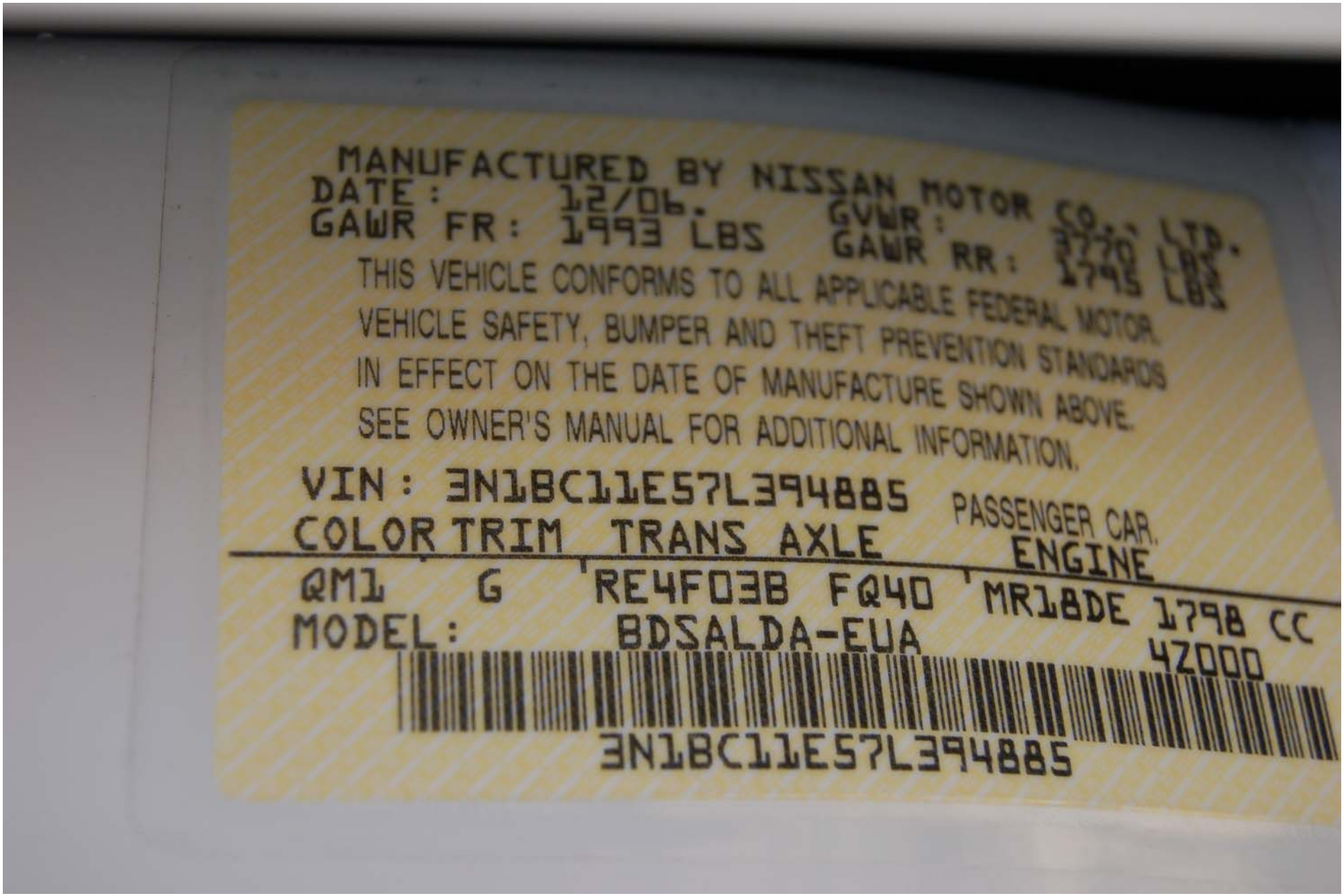
FIGURE 5.1
FRONT VIEW OF VEHICLE

2007 NISSAN VERSA
NHTSA NO. C75201
FMVSS NO. 124

FIGURE 5.2
LEFT SIDE VIEW OF VEHICLE

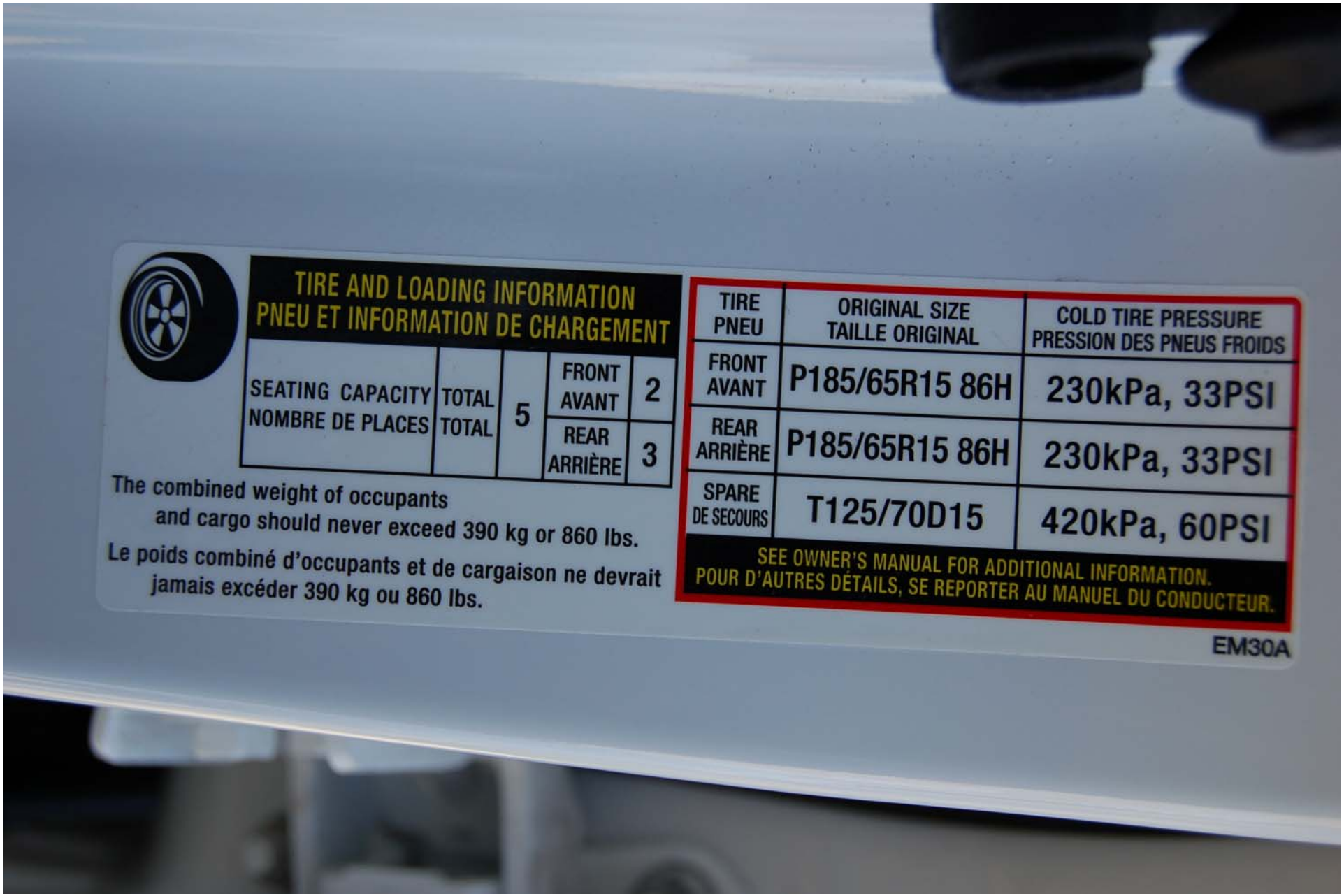
2007 NISSAN VERSA
NHTSA NO. C75201
FMVSS NO. 124

FIGURE 5.3
RIGHT SIDE VIEW OF VEHICLE



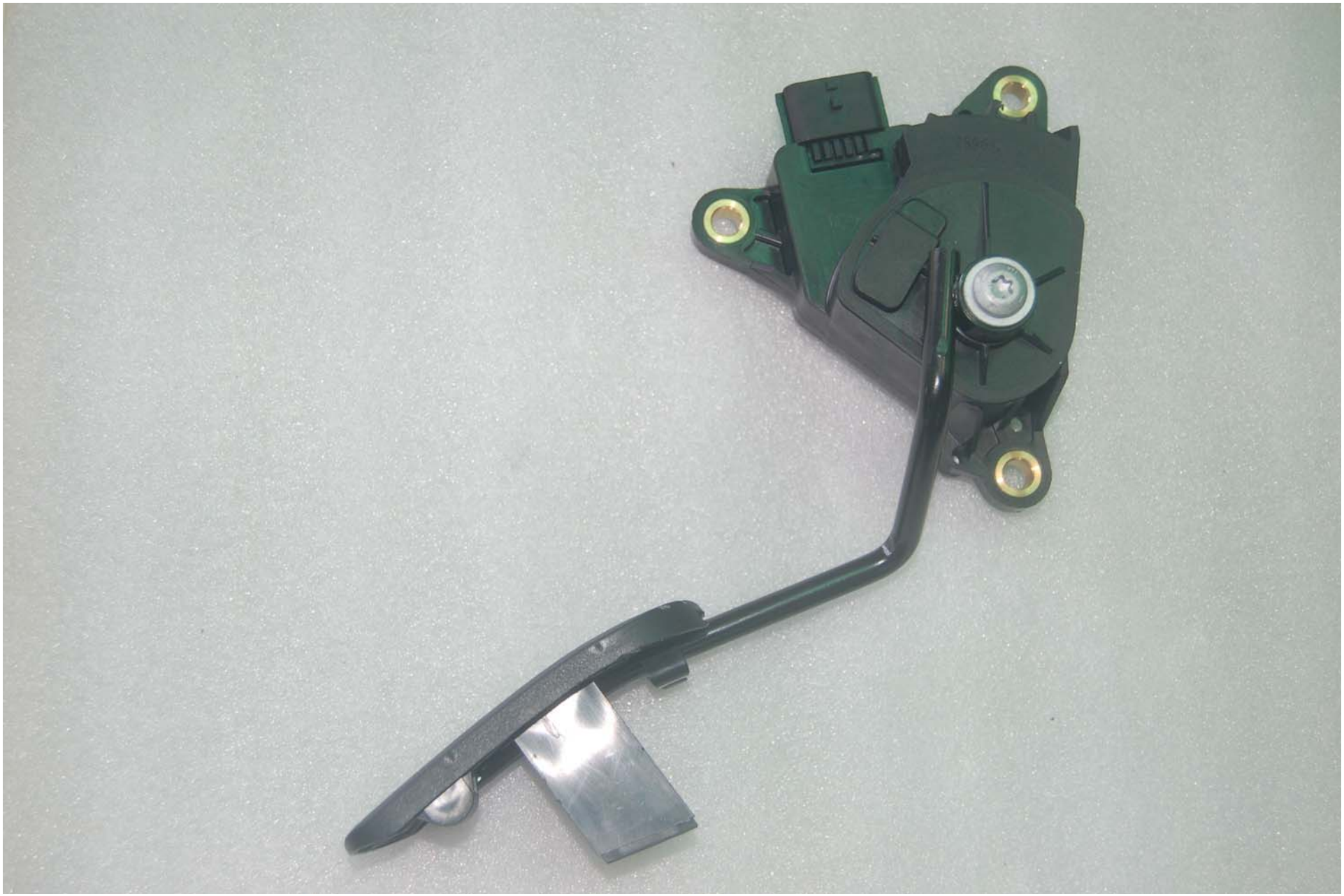
2007 NISSAN VERSA
NHTSA NO. C75201
FMVSS NO. 124

FIGURE 5.4
CLOSE-UP VIEW OF VEHICLE CERTIFICATION LABEL



2007 NISSAN VERSA
NHTSA NO. C75201
FMVSS NO. 124

FIGURE 5.5
CLOSE-UP VIEW OF VEHICLE PLACARD



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FMVSS NO. 124

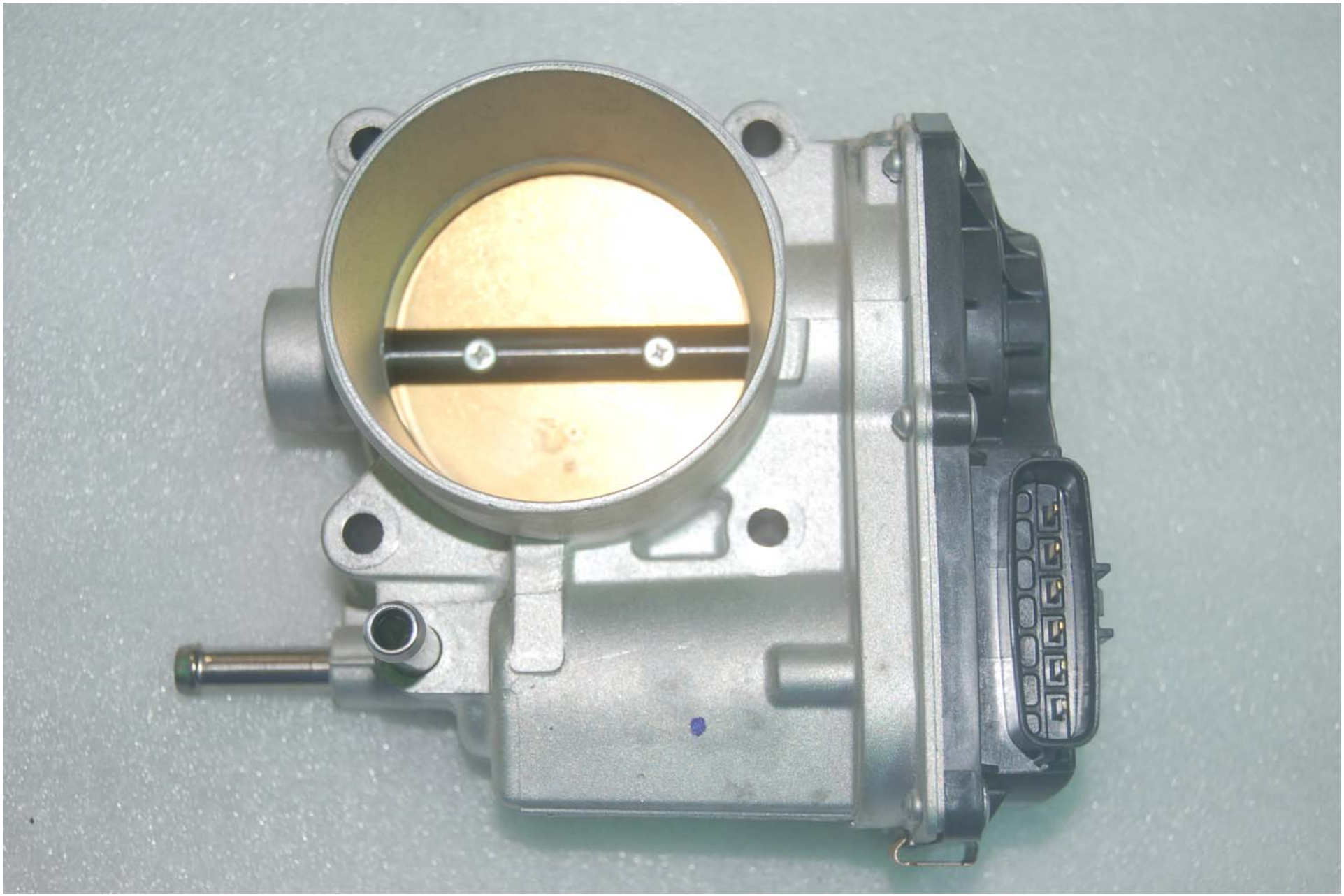
FIGURE 5.6
ACCELERATOR PEDAL ASSEMBLY (APS)

2007 NISSAN VERSA
NHTSA NO. C75201
FMVSS NO. 124

FIGURE 5.7
ACCELERATOR PEDAL ASSEMBLY (APS)

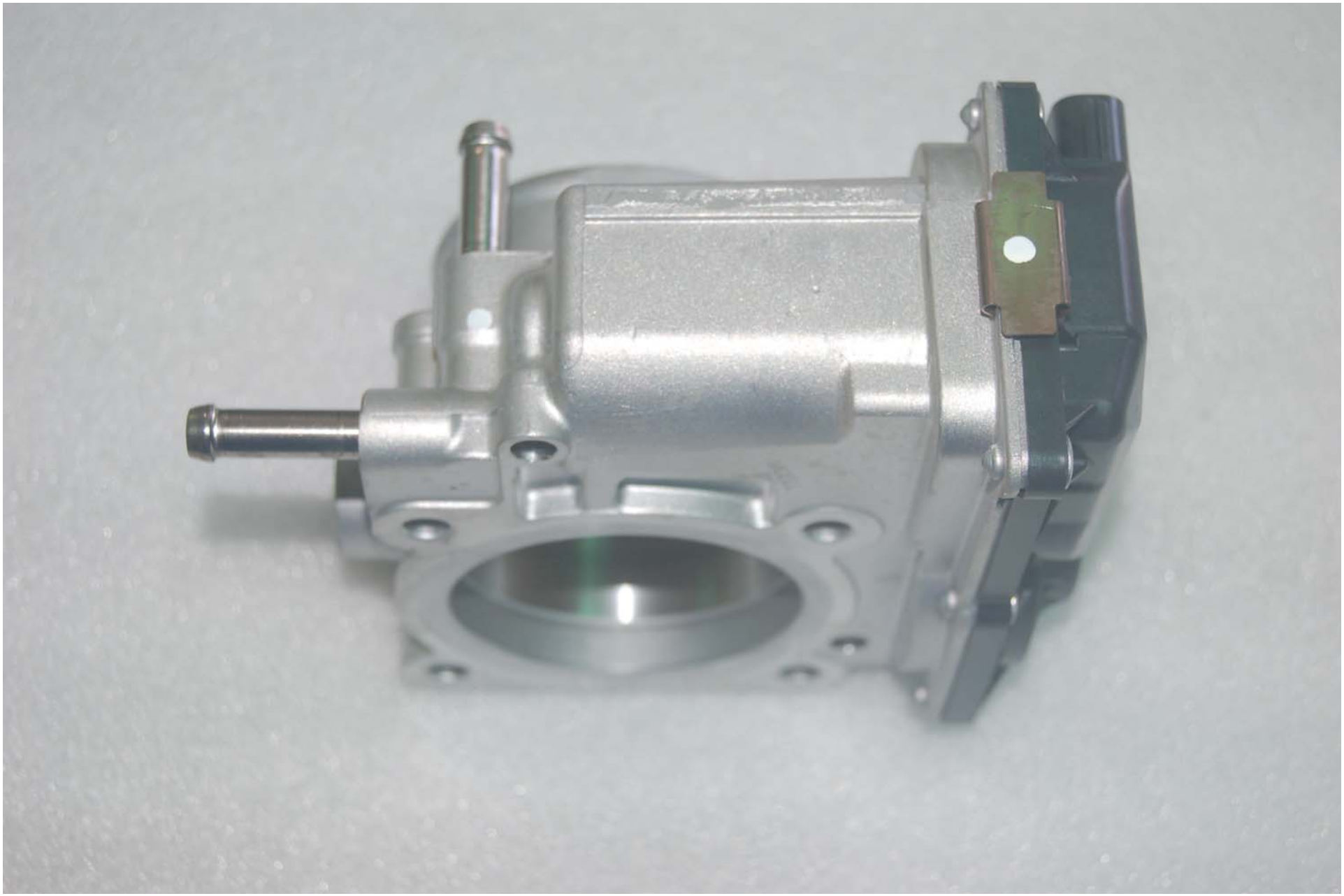
2007 NISSAN VERSA
NHTSA NO. C75201
FMVSS NO. 124

FIGURE 5.8
ACCELERATOR PEDAL ASSEMBLY (APS)



2007 NISSAN VERSA
NHTSA NO. C75201
FMVSS NO. 124

FIGURE 5.9
THROTTLE BODY ASSEMBLY



2007 NISSAN VERSA
NHTSA NO. C75201
FMVSS NO. 124

FIGURE 5.10
THROTTLE BODY ASSEMBLY

2007 NISSAN VERSA
NHTSA NO. C75201
FMVSS NO. 124

FIGURE 5.11
THROTTLE BODY ASSEMBLY

2007 NISSAN VERSA
NHTSA NO. C75201
FMVSS NO. 124

FIGURE 5.12
THROTTLE BODY ASSEMBLY

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NHTSA NO. C75201
FMVSS NO. 124

FIGURE 5.13
CLOSE-UP VIEW OF THROTTLE POSITION SENSOR ASSEMBLY

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NHTSA NO. C75201
FMVSS NO. 124

FIGURE 5.14
TEST SET-UP FOR THROTTLE BODY

2007 NISSAN VERSA
NHTSA NO. C75201
FMVSS NO. 124

FIGURE 5.15
TEST SET-UP FOR THROTTLE BODY

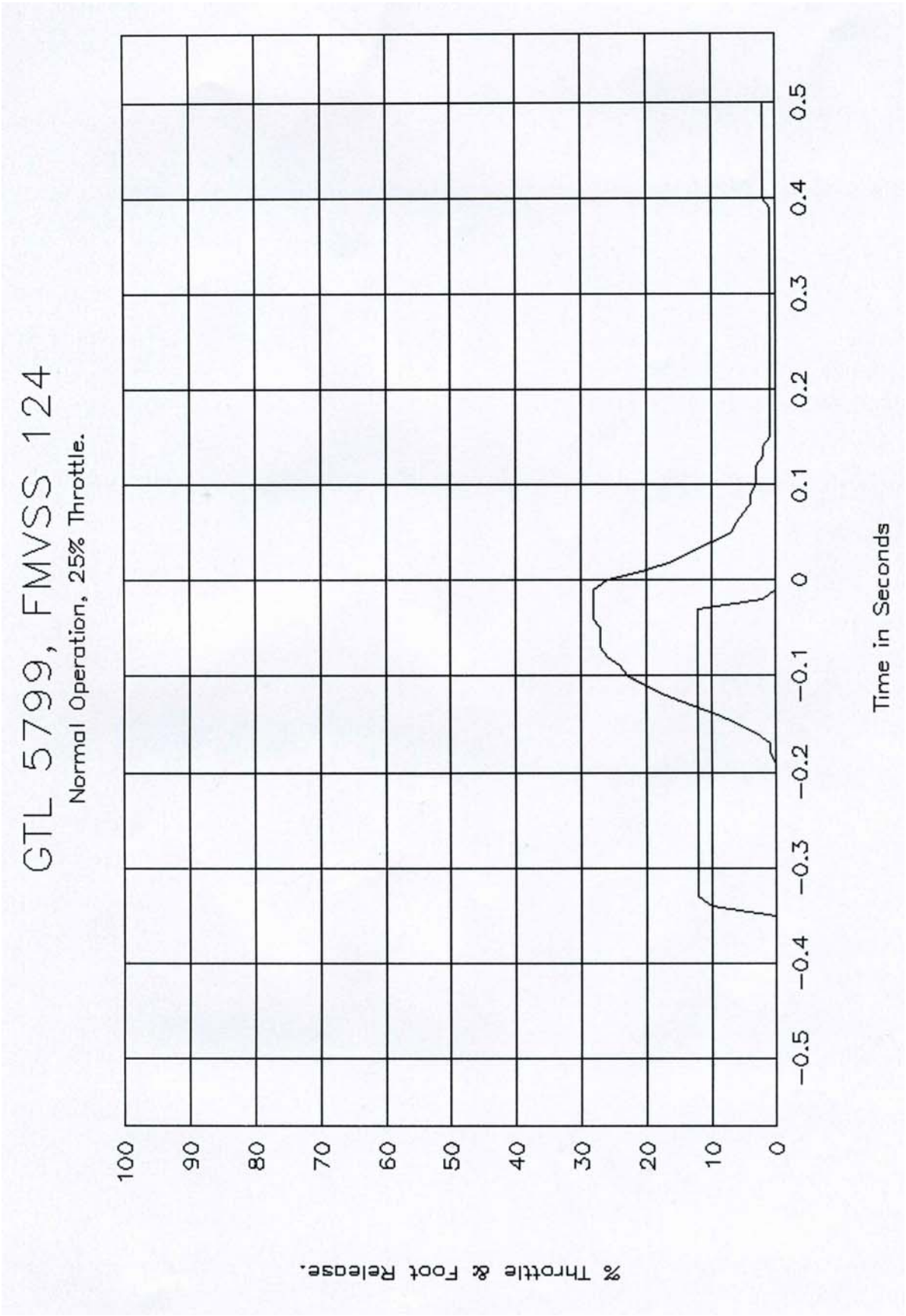
2007 NISSAN VERSA
NHTSA NO. C75201
FMVSS NO. 124

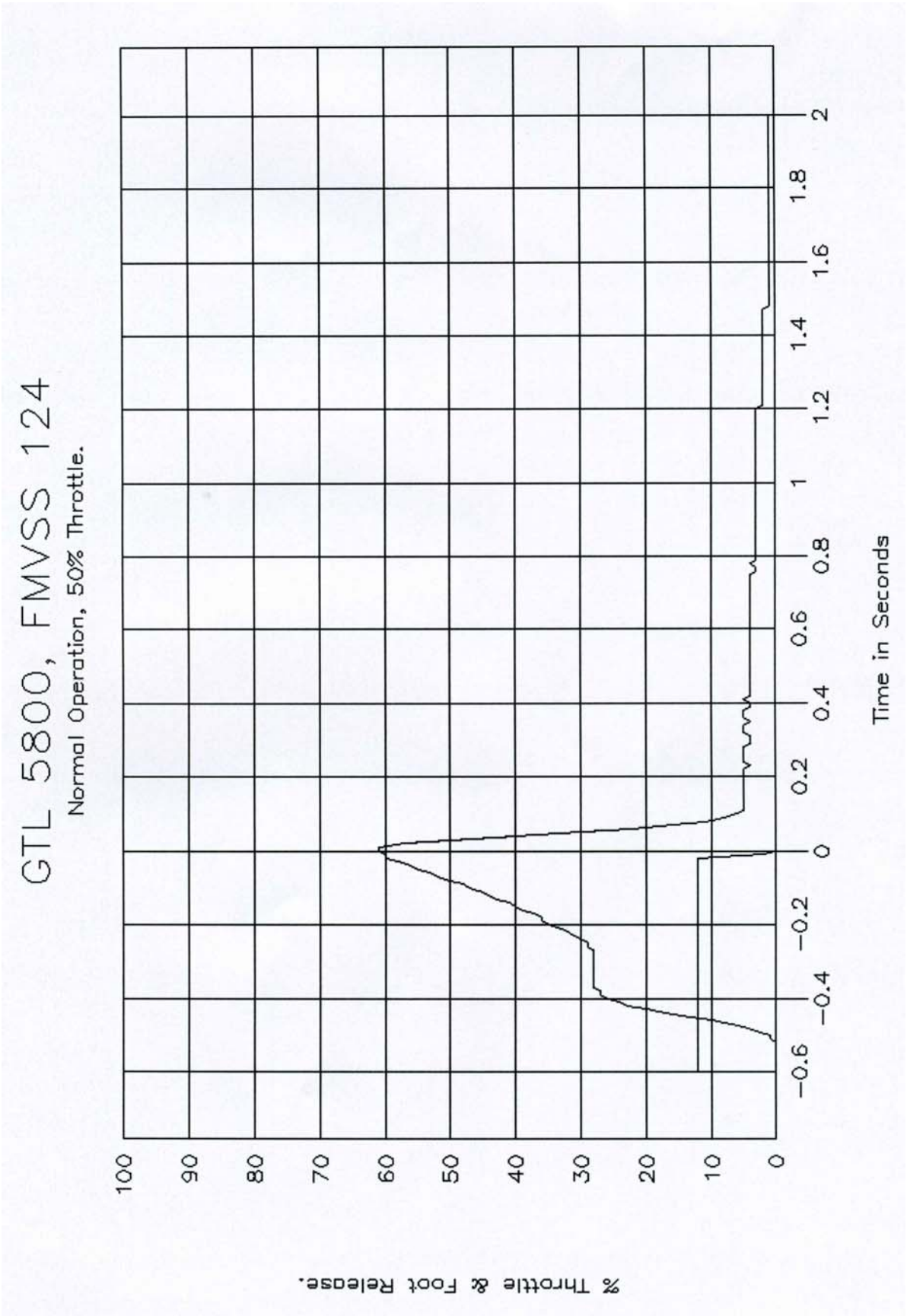
FIGURE 5.16
OVERALL TEST SET-UP

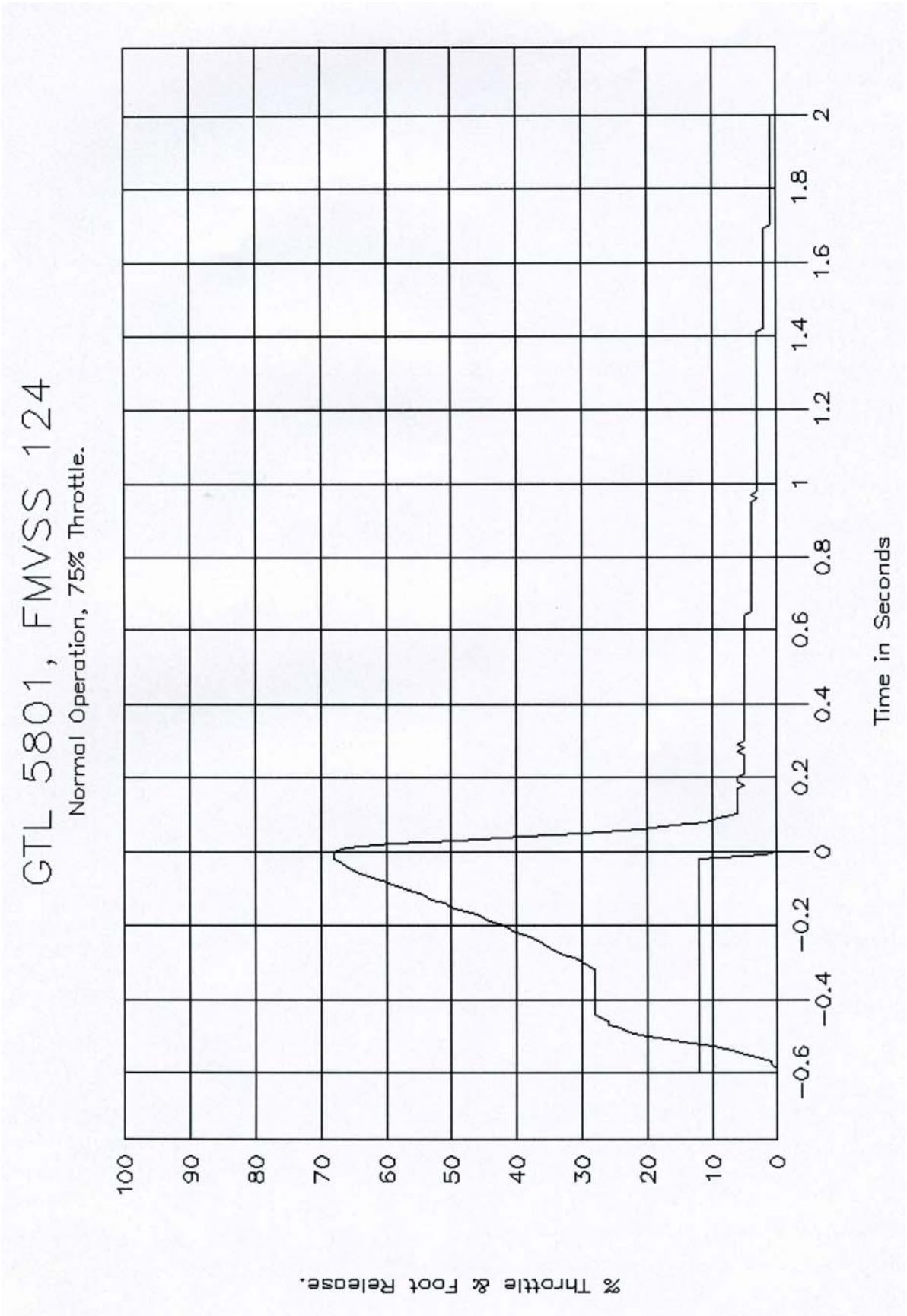
2007 NISSAN VERSA
NHTSA NO. C75201
FMVSS NO. 124

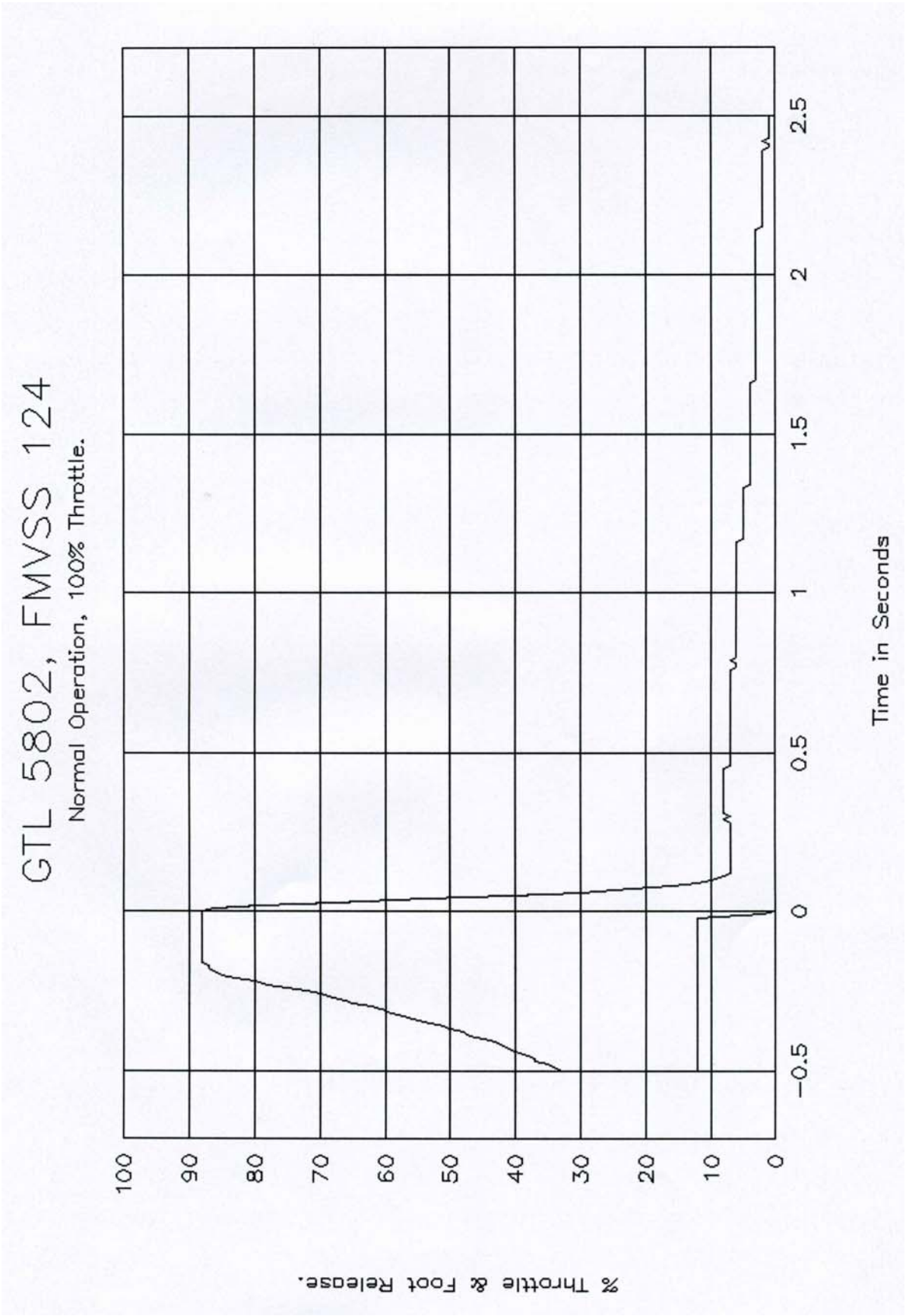
FIGURE 5.17
TEST SET-UP FOR ACCELERATOR

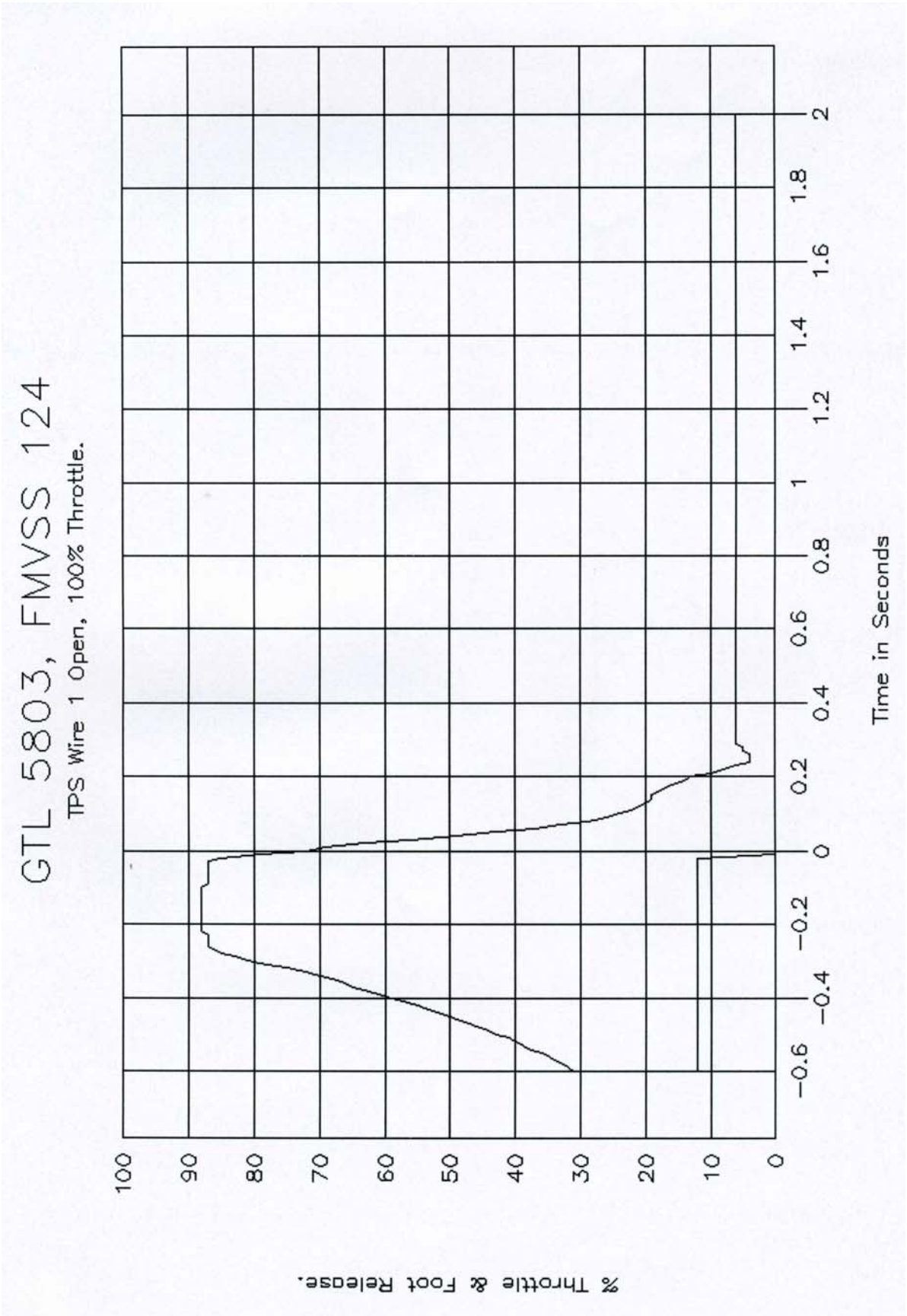
SECTION 6
PLOTS

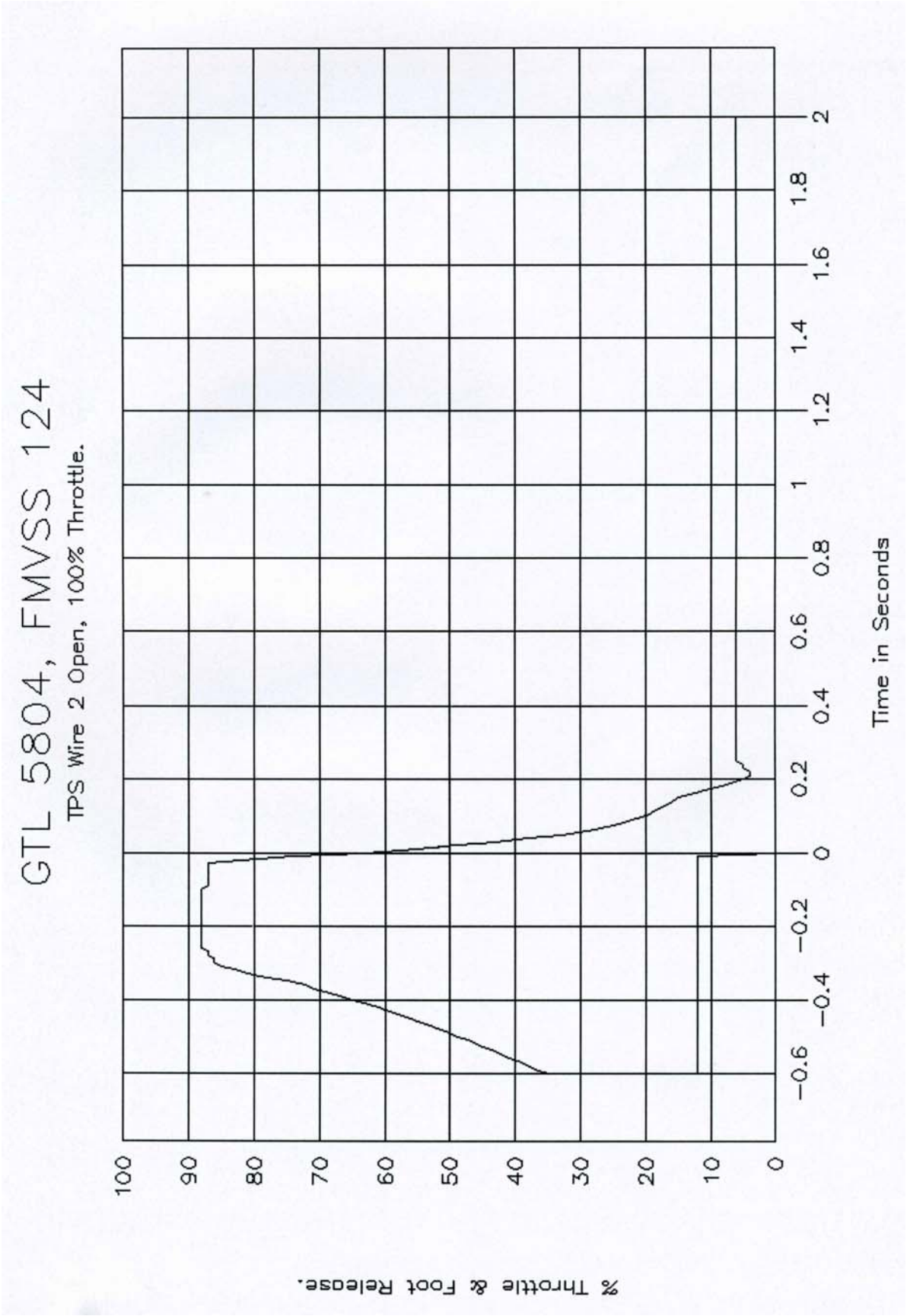

GTL 5799, FMVSS 124
Normal Operation, 25% Throttle.
% Throttle & Foot Release.
100
90
80
70
60
50
40
30
20
10
0
-0.5
-0.4
-0.3
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5
Time in Seconds


GTL 5800, FMVSS 124
Normal Operation, 50% Throttle.
% Throttle & Foot Release.
Time in Seconds
100
90
80
70
60
50
40
30
20
10
0
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2


GTL 5801, FMVSS 124
Normal Operation, 75% Throttle.
% Throttle & Foot Release.
100
90
80
70
60
50
40
30
20
10
0
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
Time in Seconds


GTL 5802, FMVSS 124
Normal Operation, 100% Throttle.
% Throttle & Foot Release.
100
90
80
70
60
50
40
30
20
10
0
−0.5
0
0.5
1
1.5
2
2.5
Time in Seconds


GTL 5803, FMVSS 124
TPS Wire 1 Open, 100% Throttle.
% Throttle & Foot Release.
Time in Seconds
100
90
80
70
60
50
40
30
20
10
0
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2


GTL 5804, FMVSS 124
TPS Wire 2 Open, 100% Throttle.
% Throttle & Foot Release.
100
90
80
70
60
50
40
30
20
10
0
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
1
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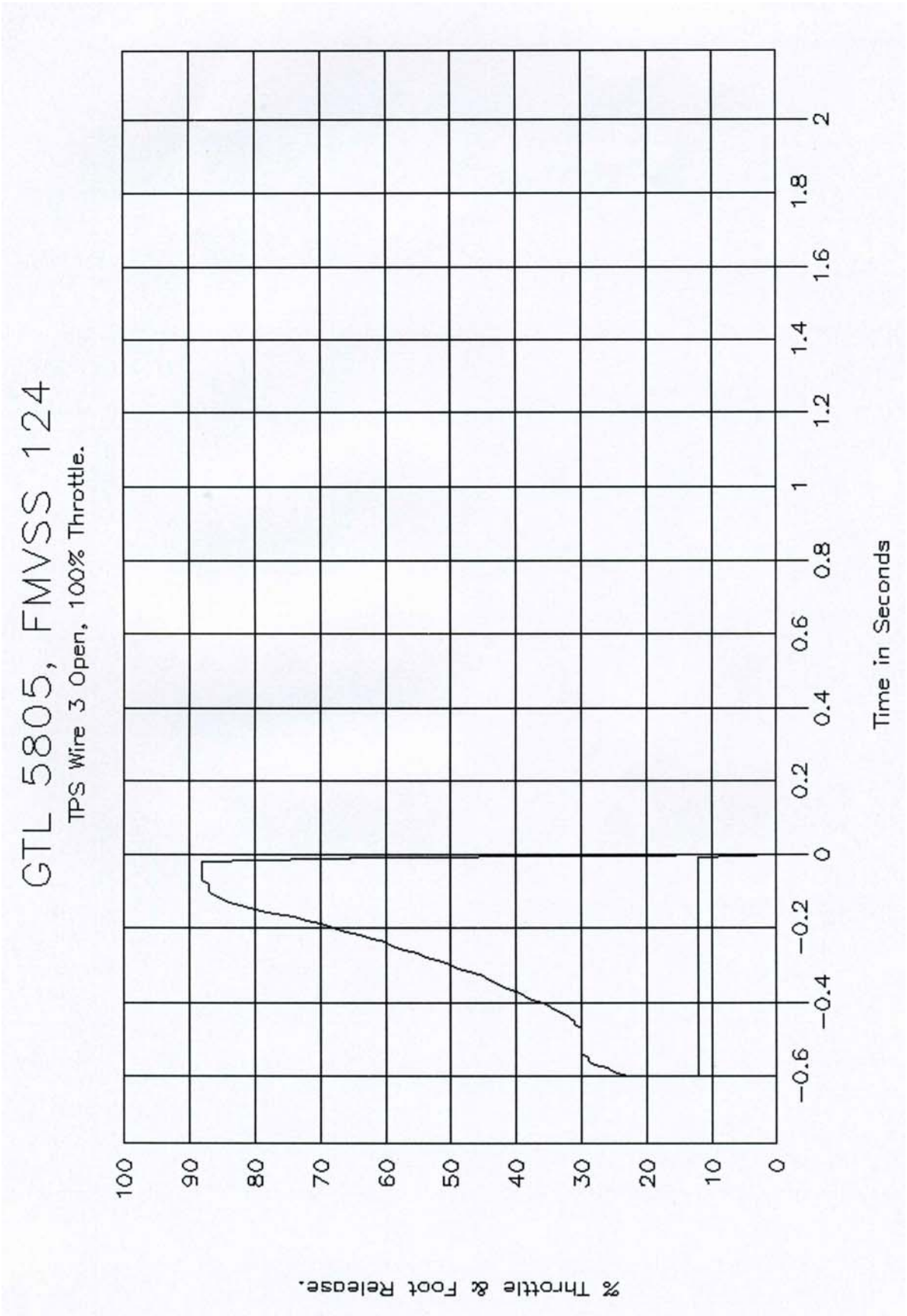
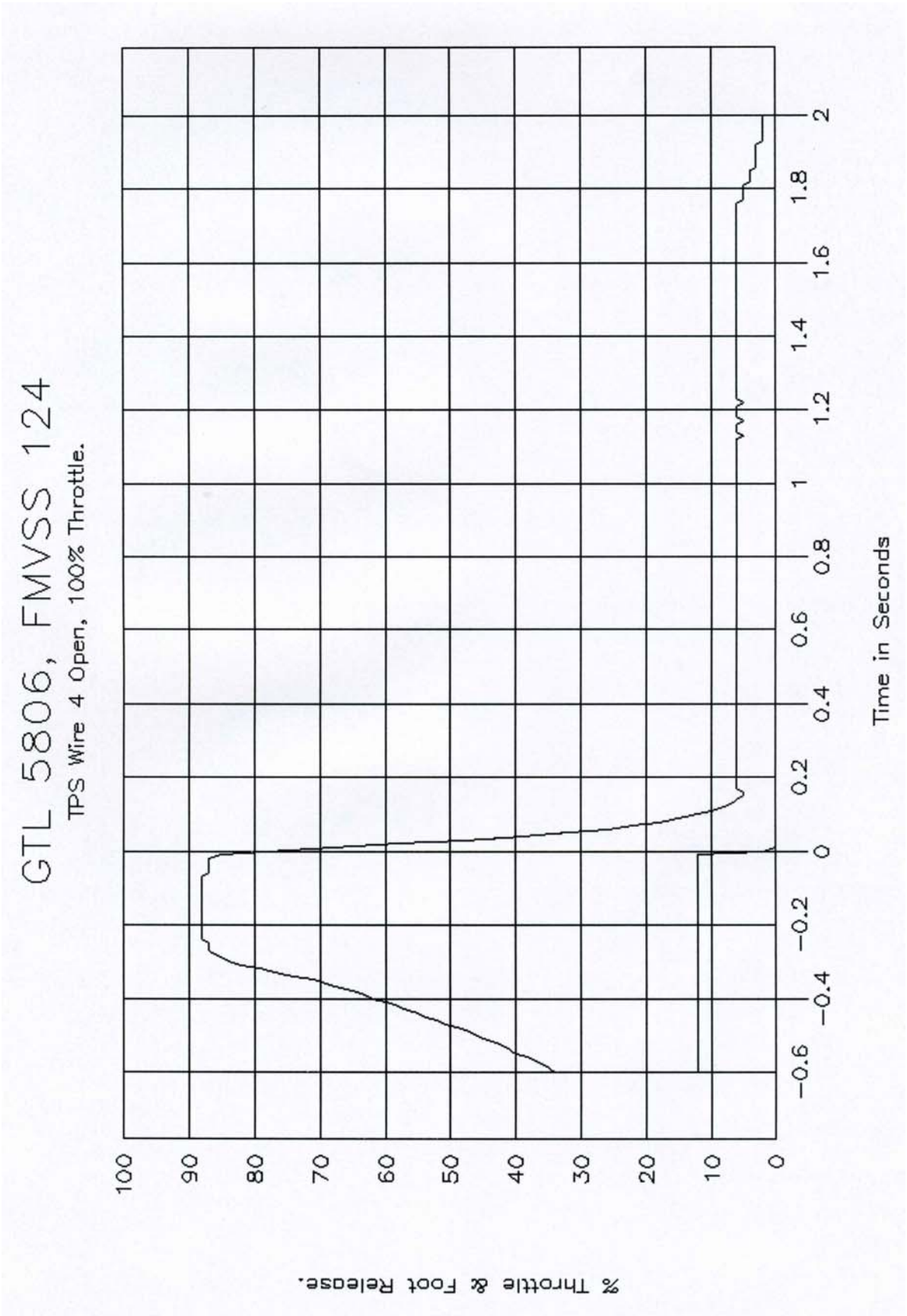
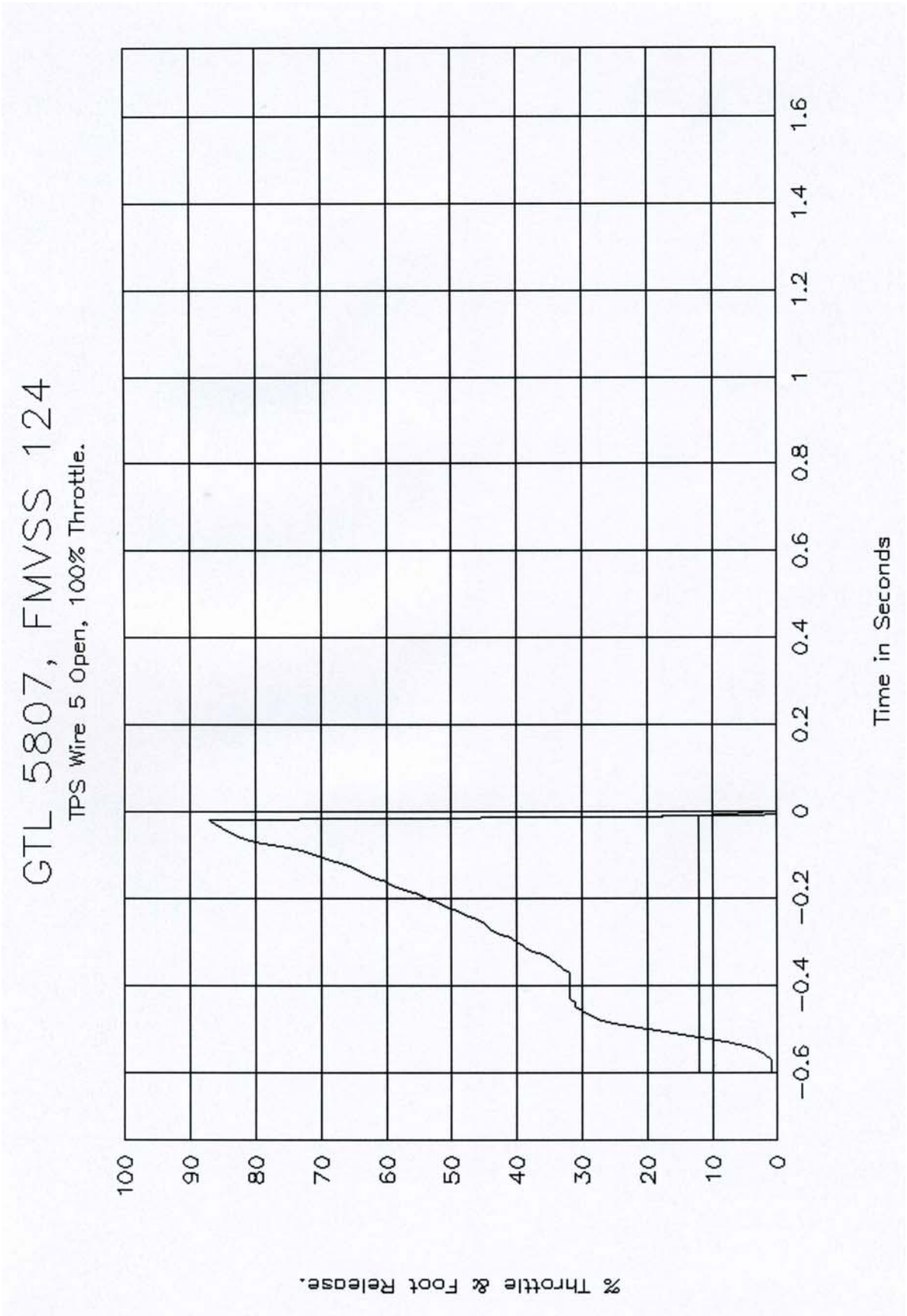
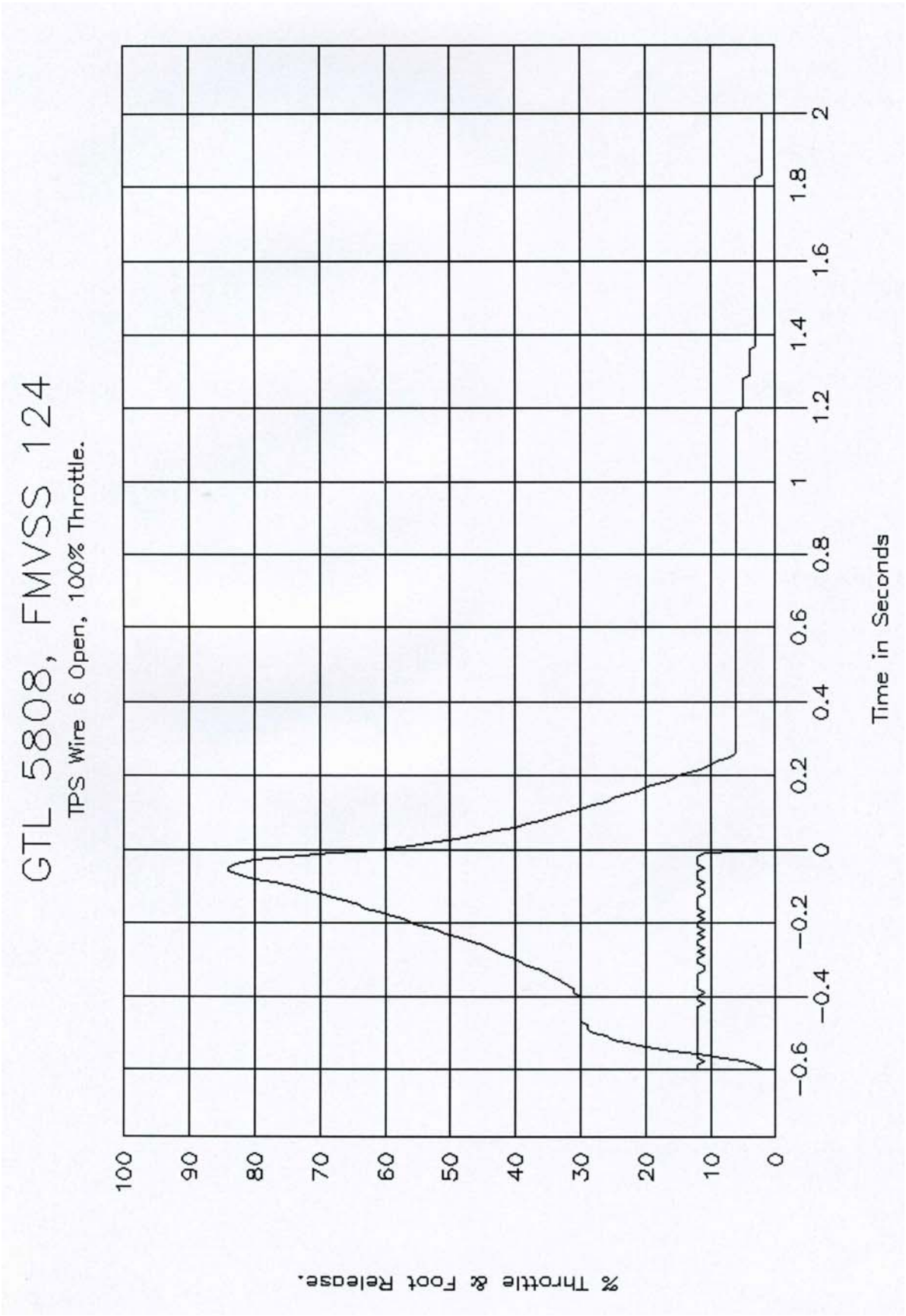
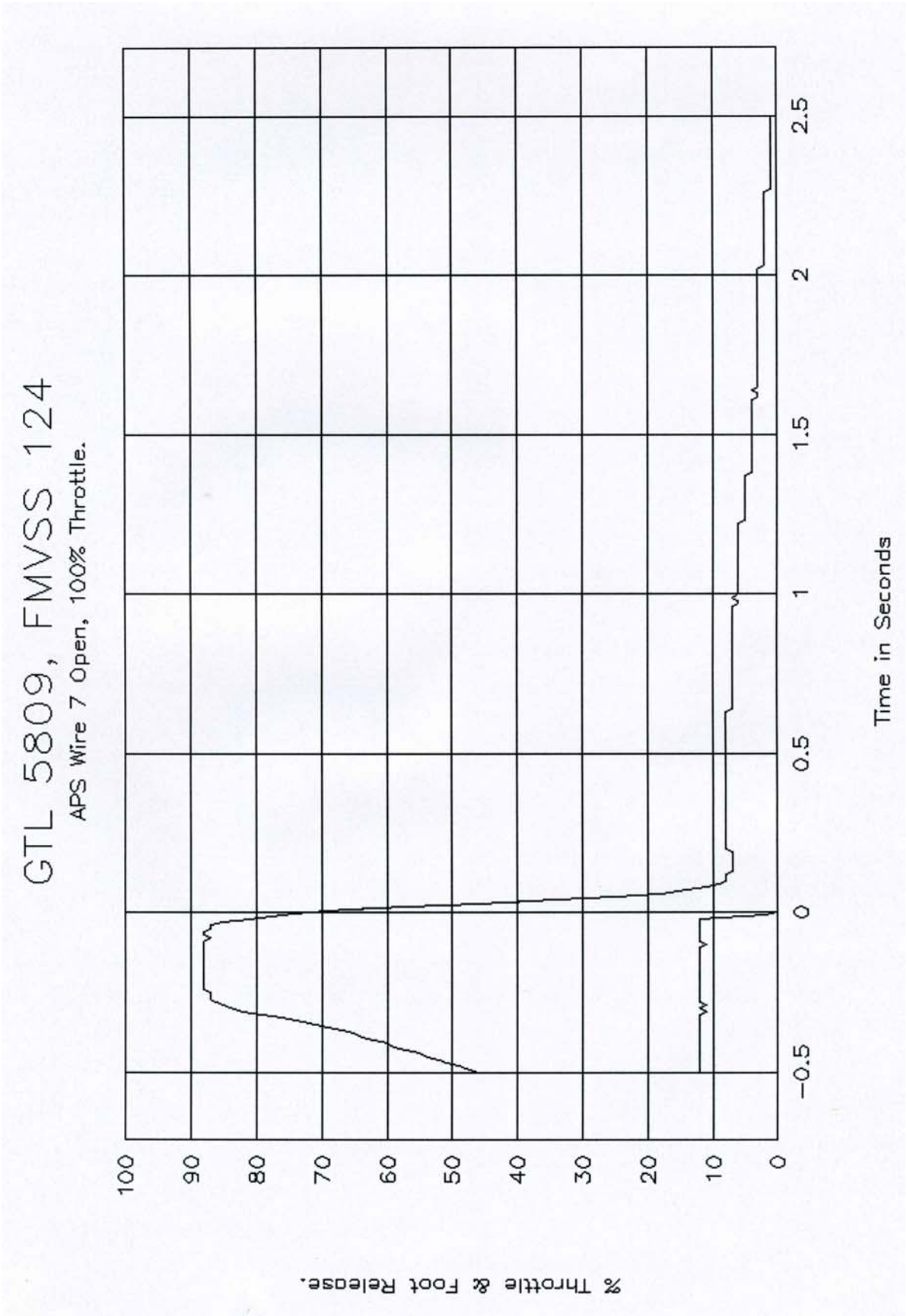
1.4
1.6
1.8
2
Time in Seconds

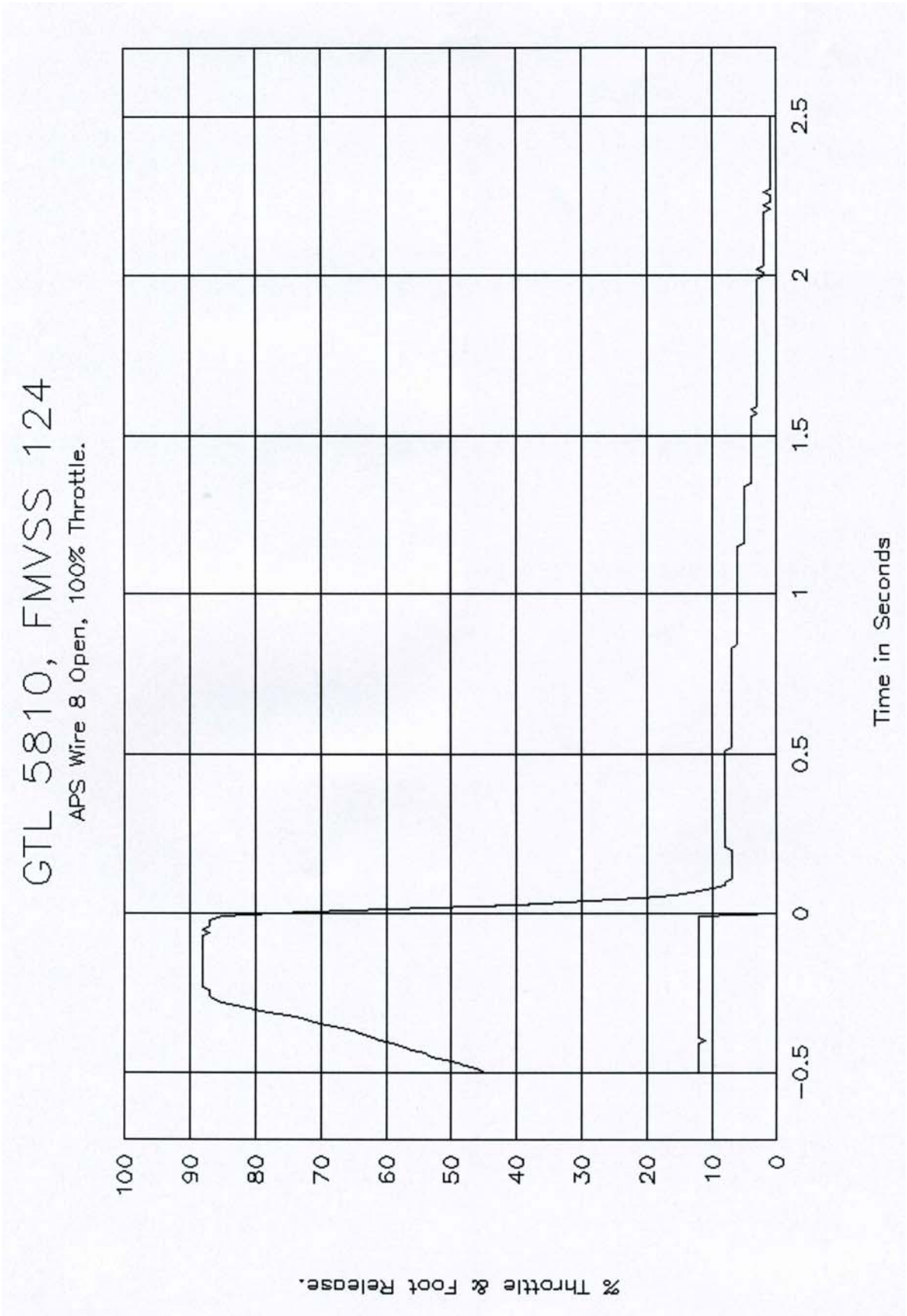

GTL 5805, FMVSS 124
TPS Wire 3 Open, 100% Throttle.
% Throttle & Foot Release.
100
90
80
70
60
50
40
30
20
10
0
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
Time in Seconds

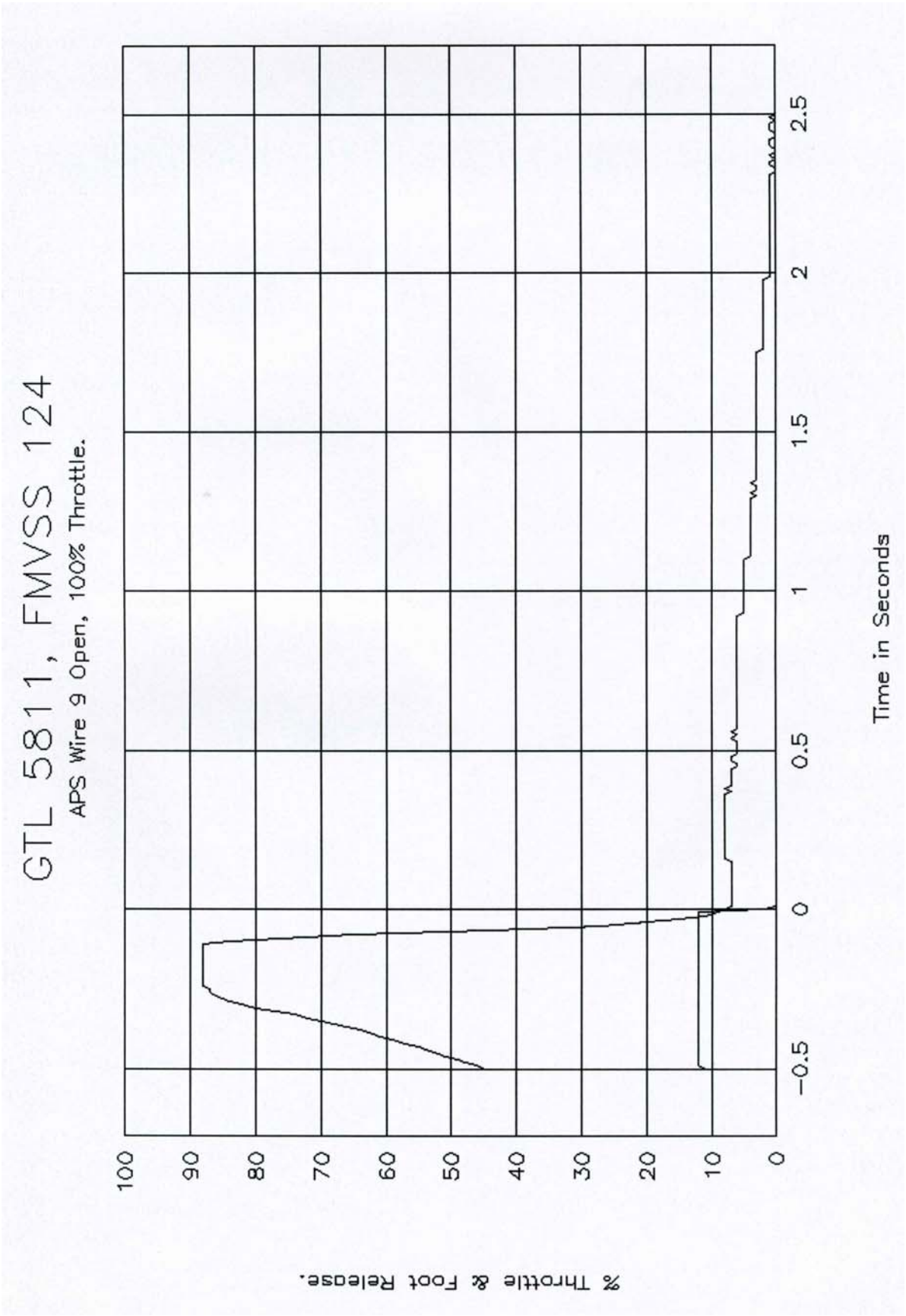

GTL 5806, FMVSS 124
TPS Wire 4 Open, 100% Throttle.
% Throttle & Foot Release.
100
90
80
70
60
50
40
30
20
10
0
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
Time in Seconds

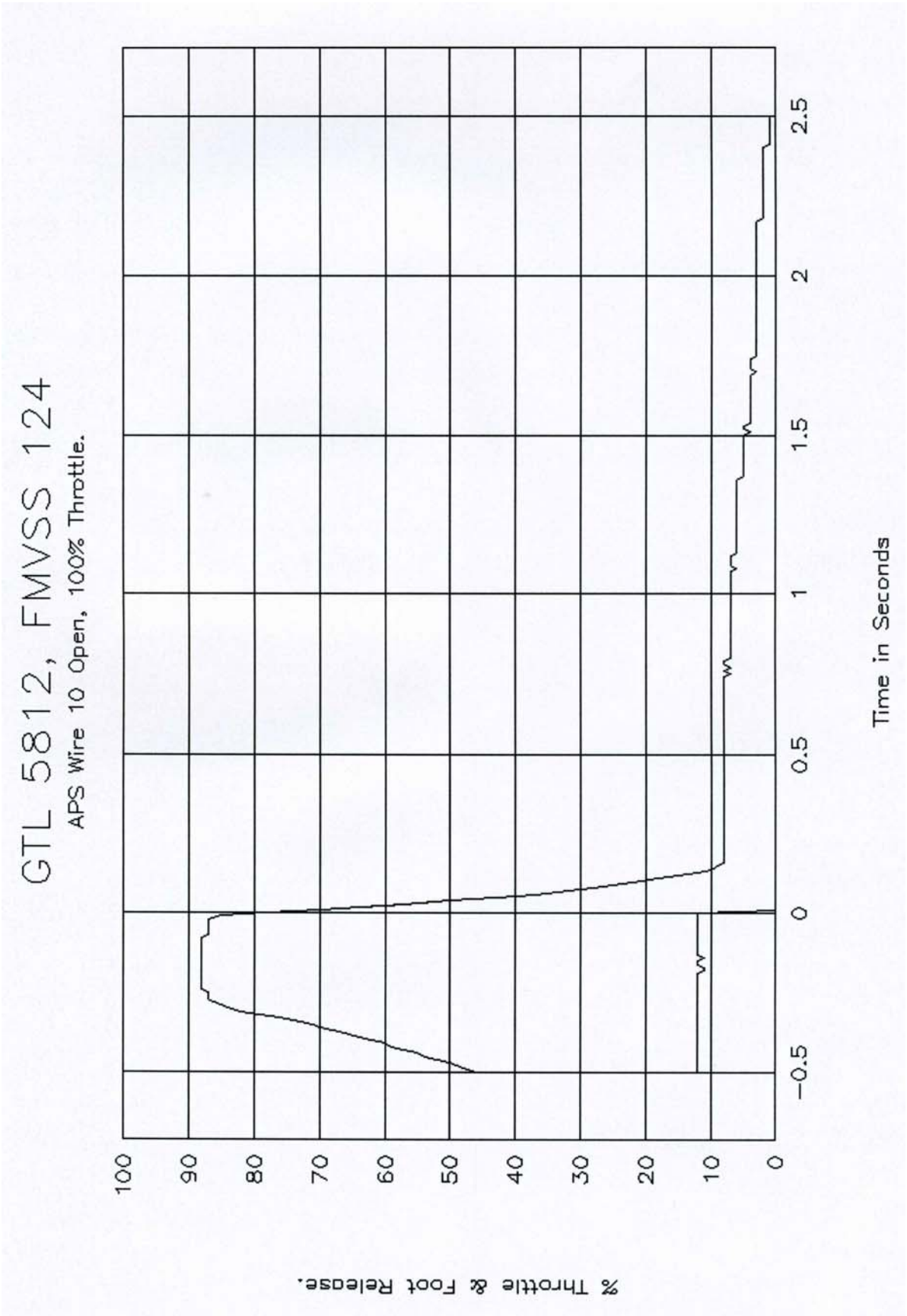

GTL 5807, FMVSS 124
TPS Wire 5 Open, 100% Throttle.
% Throttle & Foot Release.
100
90
80
70
60
50
40
30
20
10
0
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
Time in Seconds

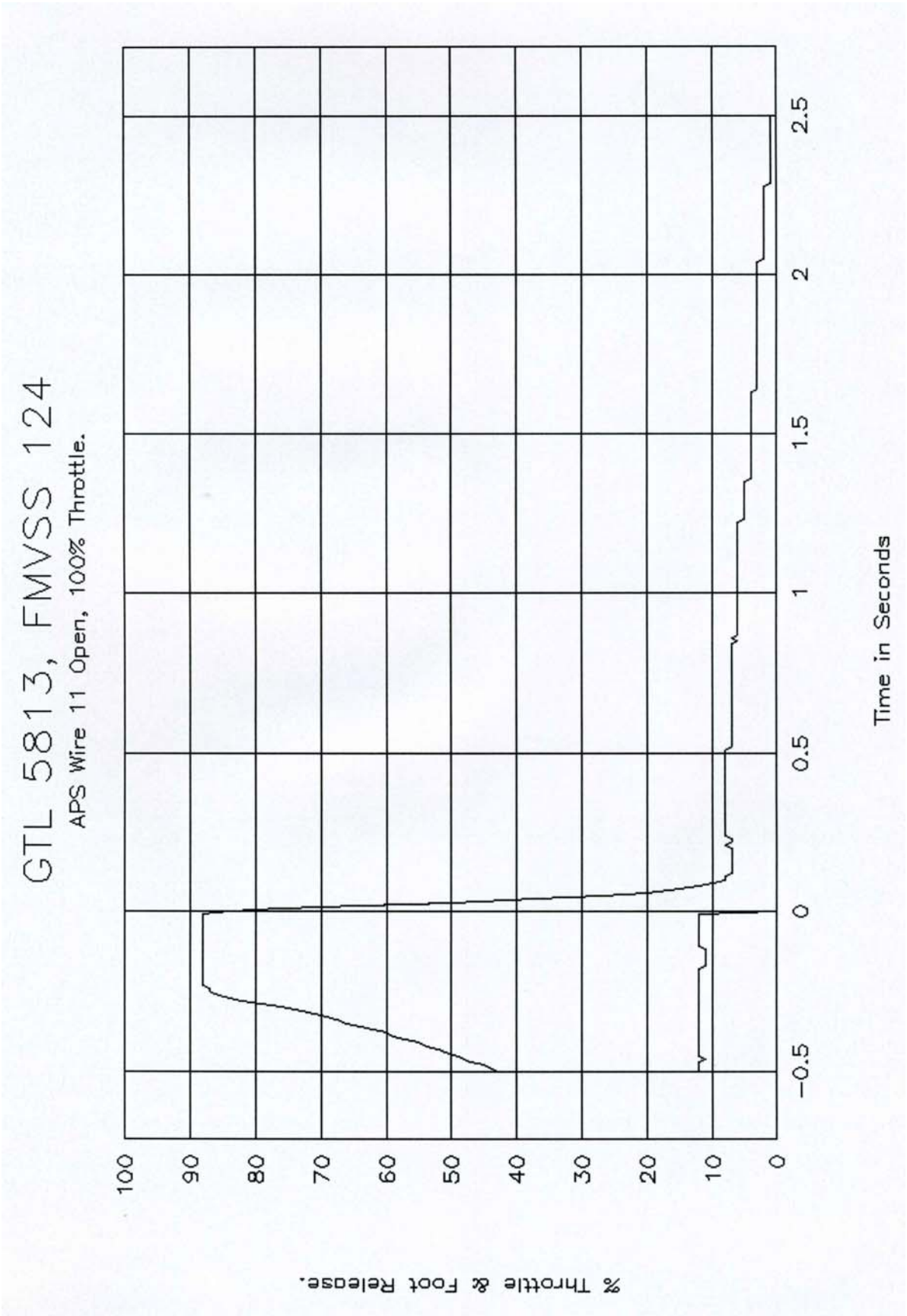

GTL 5808, FMVSS 124
TPS Wire 6 Open, 100% Throttle.
% Throttle & Foot Release.
Time in Seconds
100
90
80
70
60
50
40
30
20
10
0
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2


GTL 5809, FMVSS 124
APS Wire 7 Open, 100% Throttle.
% Throttle & Foot Release.
100
90
80
70
60
50
40
30
20
10
0
−0.5
0
0.5
1
1.5
2
2.5
Time in Seconds


GTL 5810, FMVSS 124
APS Wire 8 Open, 100% Throttle.
% Throttle & Foot Release.
100
90
80
70
60
50
40
30
20
10
0
−0.5
0
0.5
1
1.5
2
2.5
Time in Seconds


GTL 5811, FMVSS 124
APS Wire 9 Open, 100% Throttle.
% Throttle & Foot Release.
100
90
80
70
60
50
40
30
20
10
0
−0.5
0
0.5
1
1.5
2
2.5
Time in Seconds


GTL 5812, FMVSS 124
APS Wire 10 Open, 100% Throttle.
% Throttle & Foot Release.
100
90
80
70
60
50
40
30
20
10
0
−0.5
0
0.5
1
1.5
2
2.5
Time in Seconds


GTL 5813, FMVSS 124
APS Wire 11 Open, 100% Throttle.
% Throttle & Foot Release.
100
90
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1
1.5
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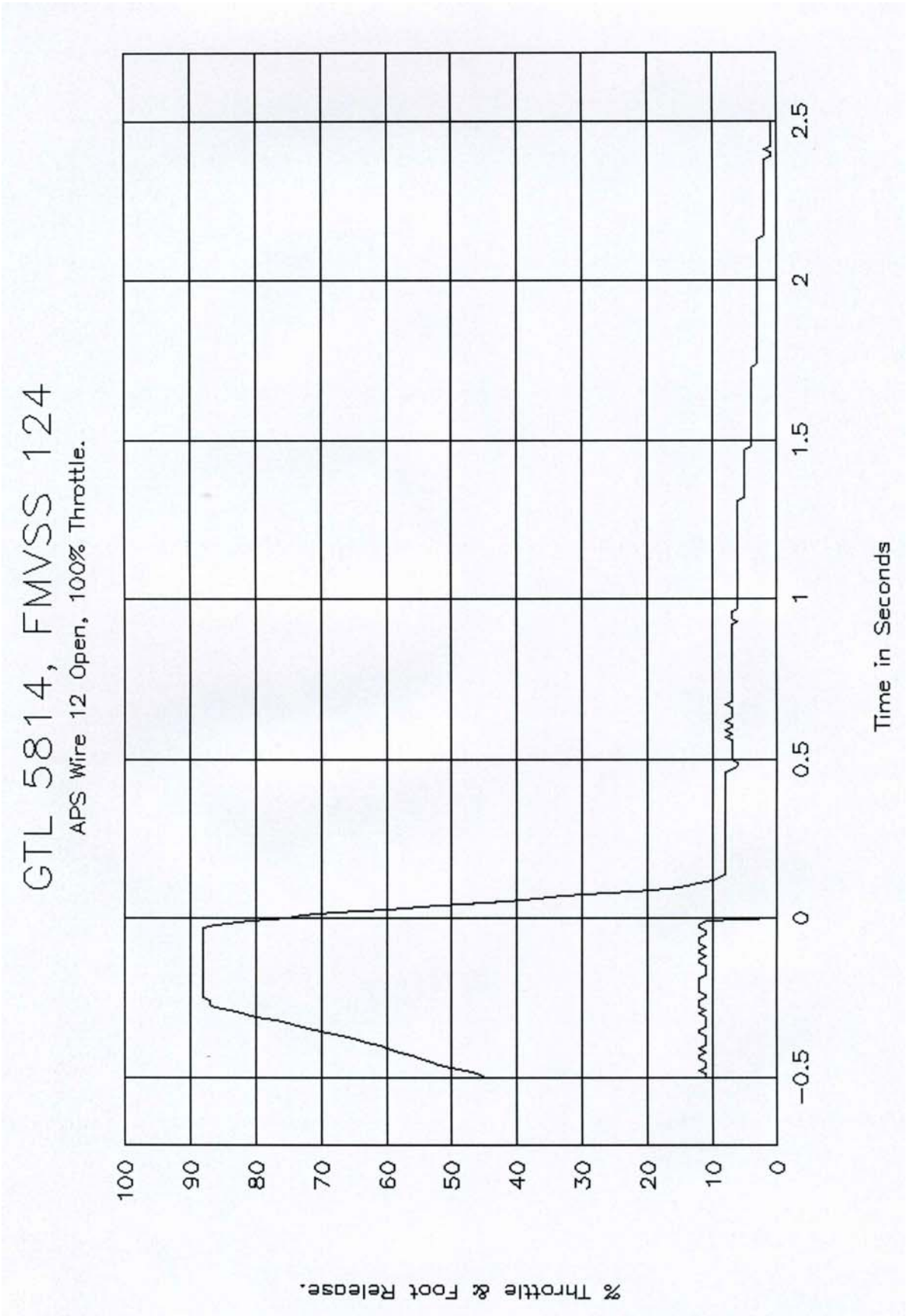
2.5
Time in Seconds


GTL 5814, FMVSS 124
APS Wire 12 Open, 100% Throttle.
% Throttle & Foot Release.
100
90
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30
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0
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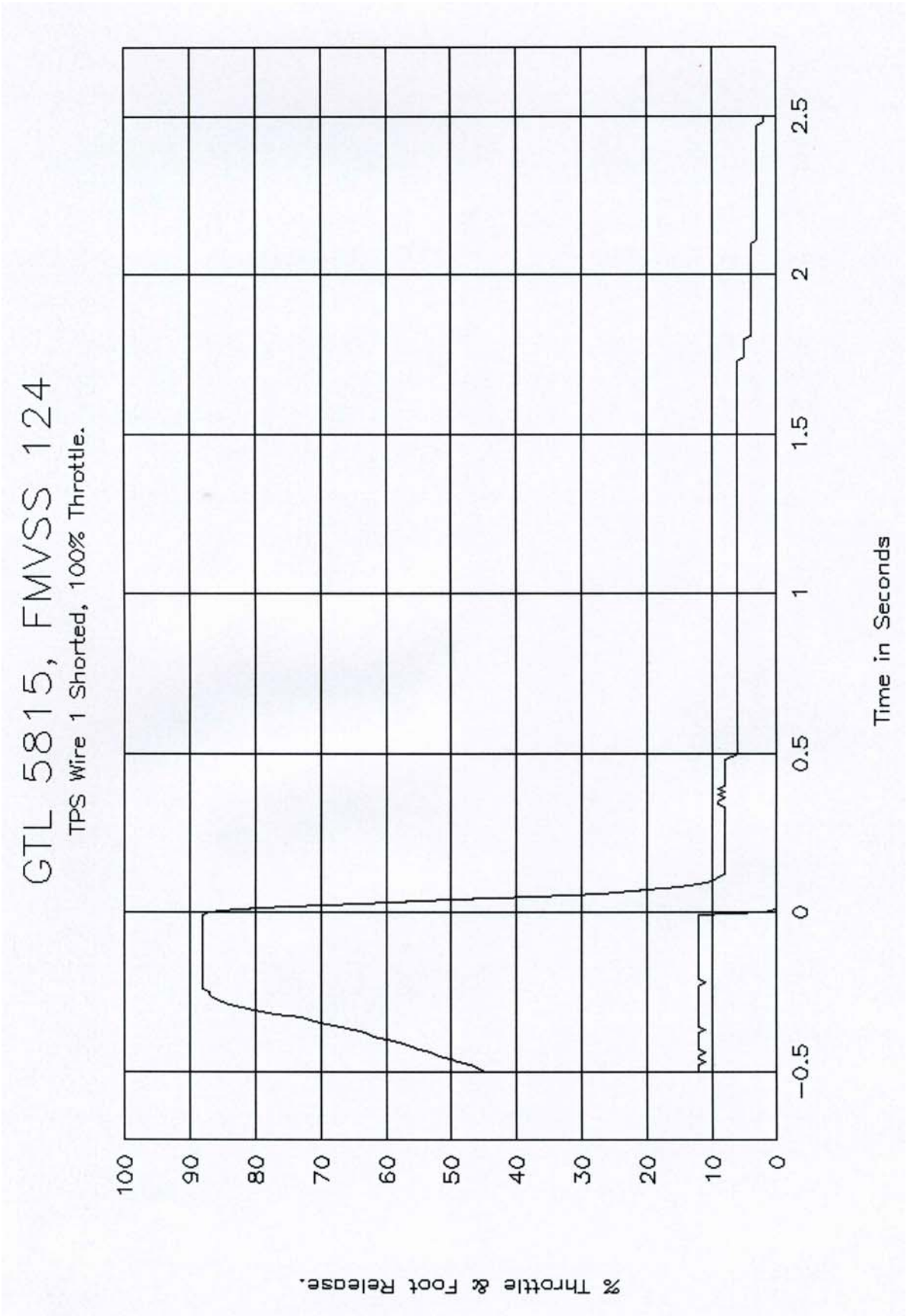
1
1.5
2
2.5
Time in Seconds


GTL 5815, FMVSS 124
TPS Wire 1 Shorted, 100% Throttle.
% Throttle & Foot Release.
100
90
80
70
60
50
40
30
20
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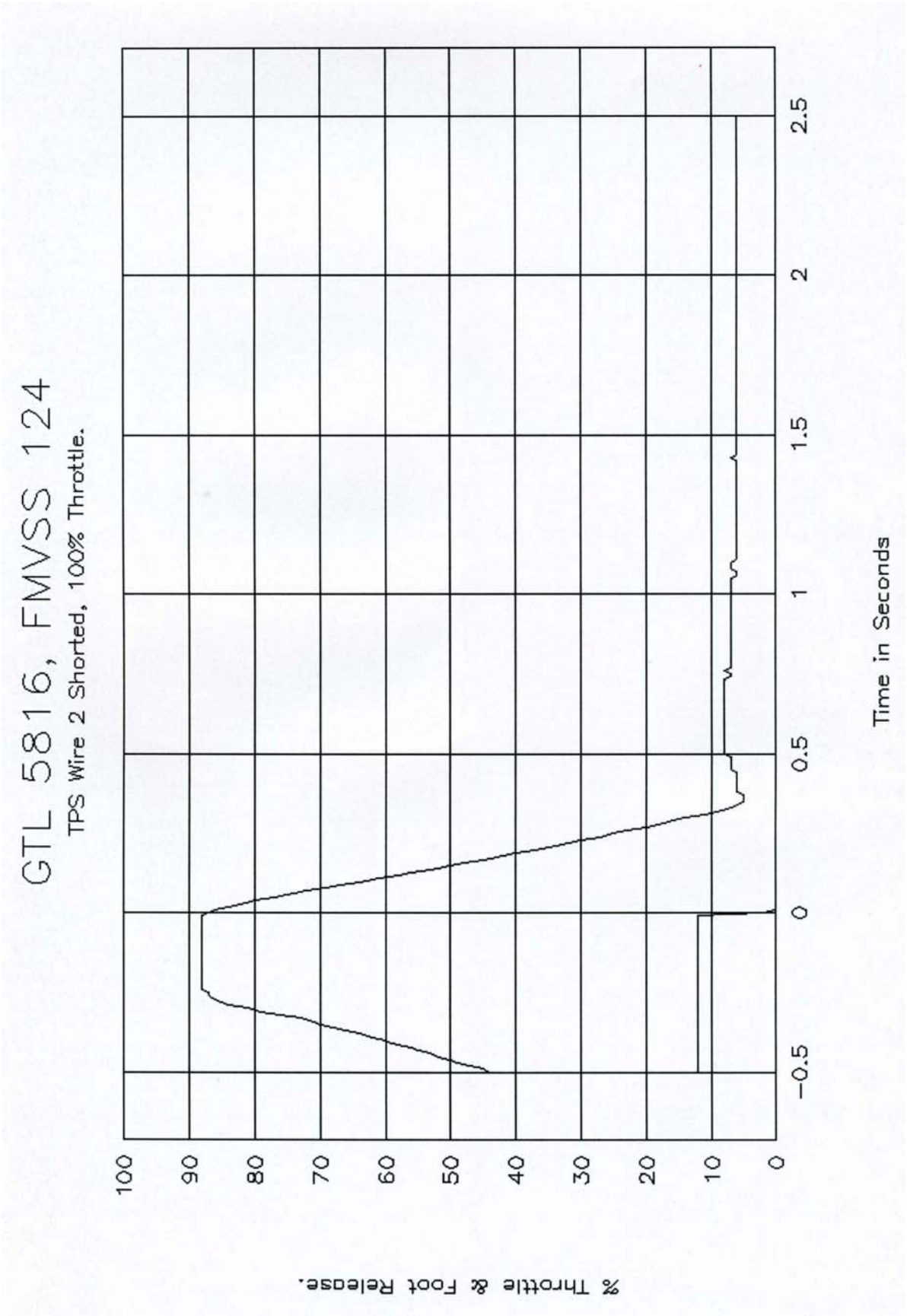
0
-0.5
0
0.5
1
1.5
2
2.5
Time in Seconds


GTL 5816, FMVSS 124
TPS Wire 2 Shorted, 100% Throttle.
% Throttle & Foot Release.
100
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80
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60
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40
30
20
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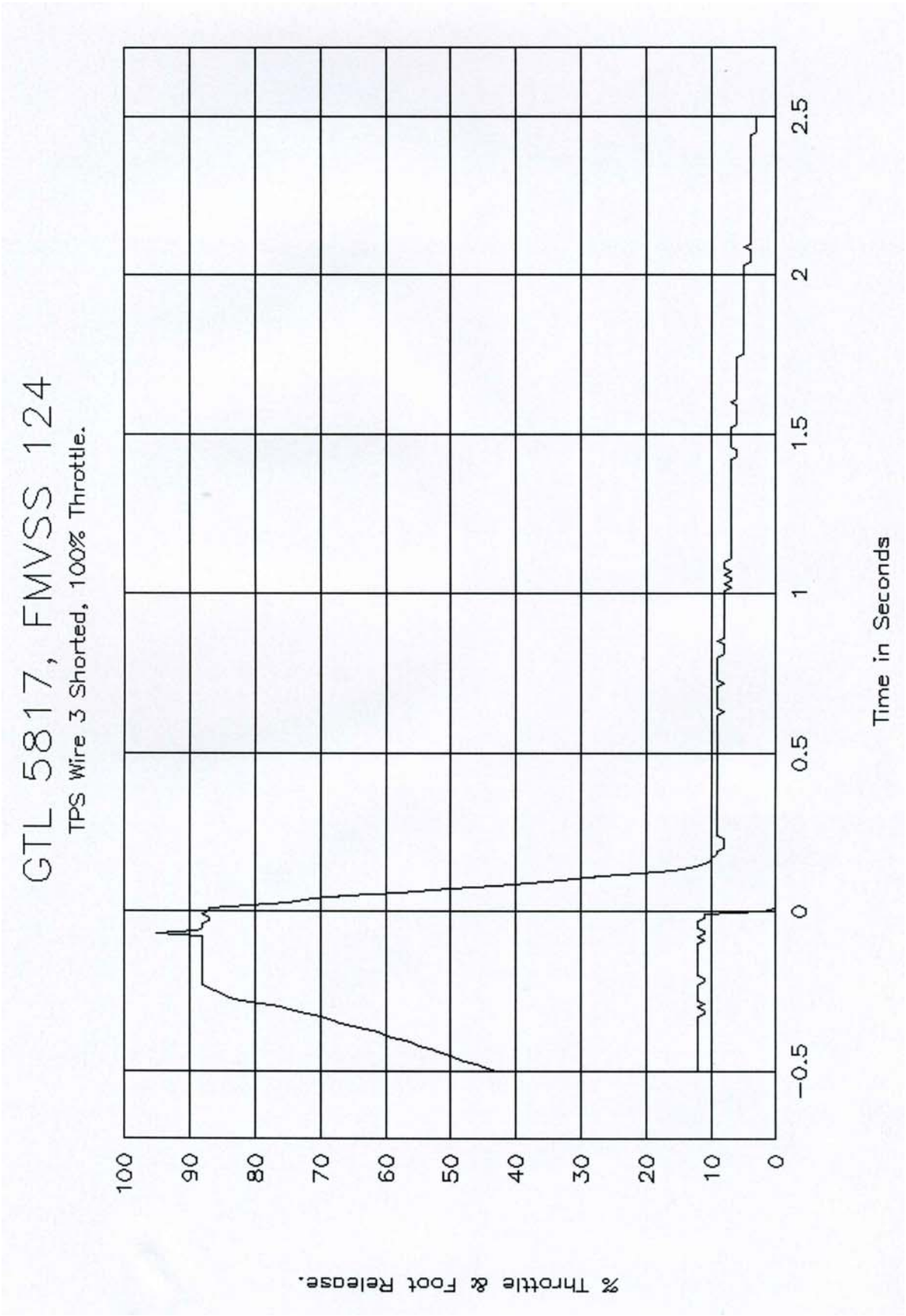
0
−0.5
0
0.5
1
1.5
2
2.5
Time in Seconds


GTL 5817, FMVSS 124
TPS Wire 3 Shorted, 100% Throttle.
% Throttle & Foot Release.
100
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−0.5
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0.5
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1.5
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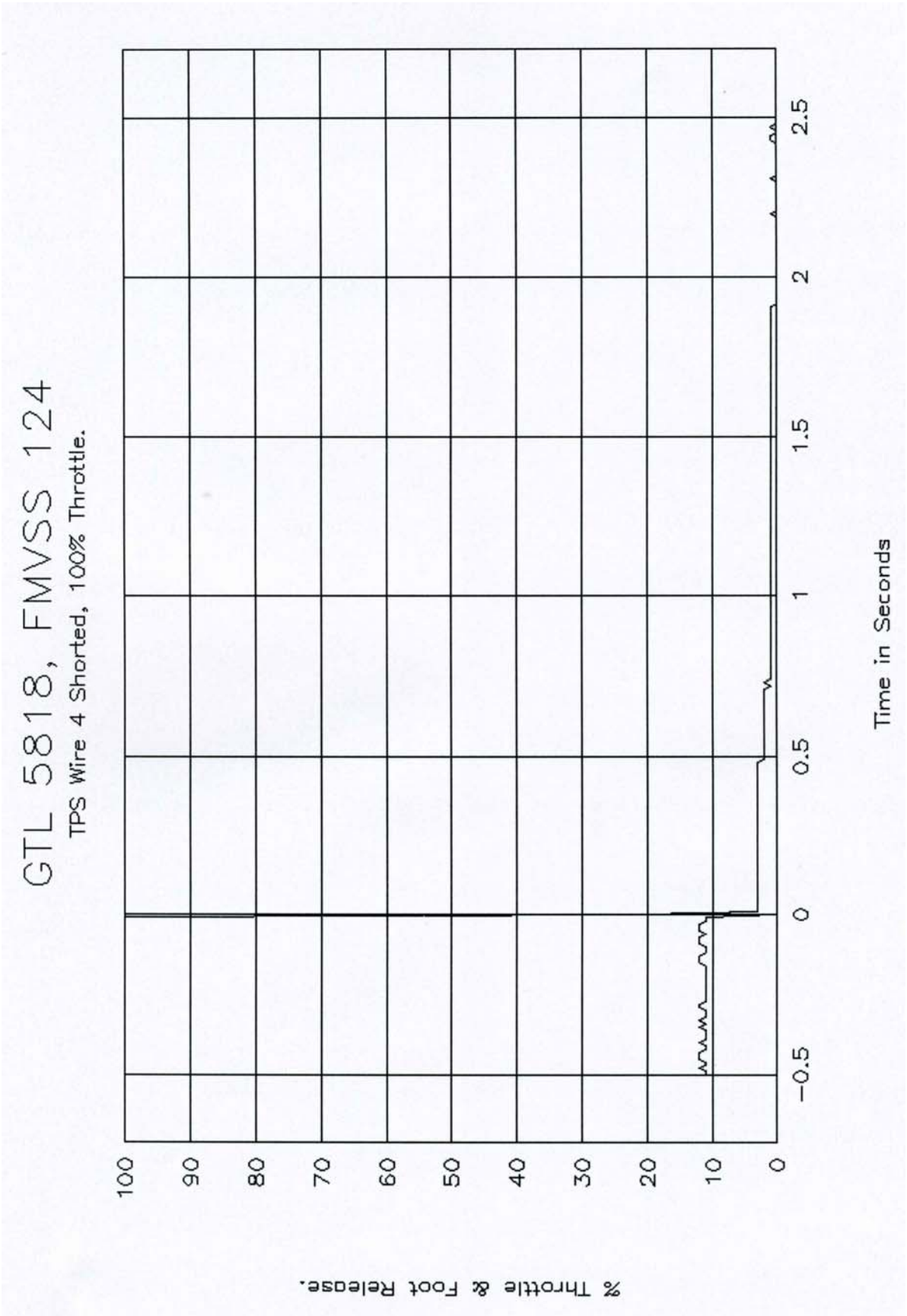
2.5
Time in Seconds


GTL 5818, FMVSS 124
TPS Wire 4 Shorted, 100% Throttle.
% Throttle & Foot Release.
100
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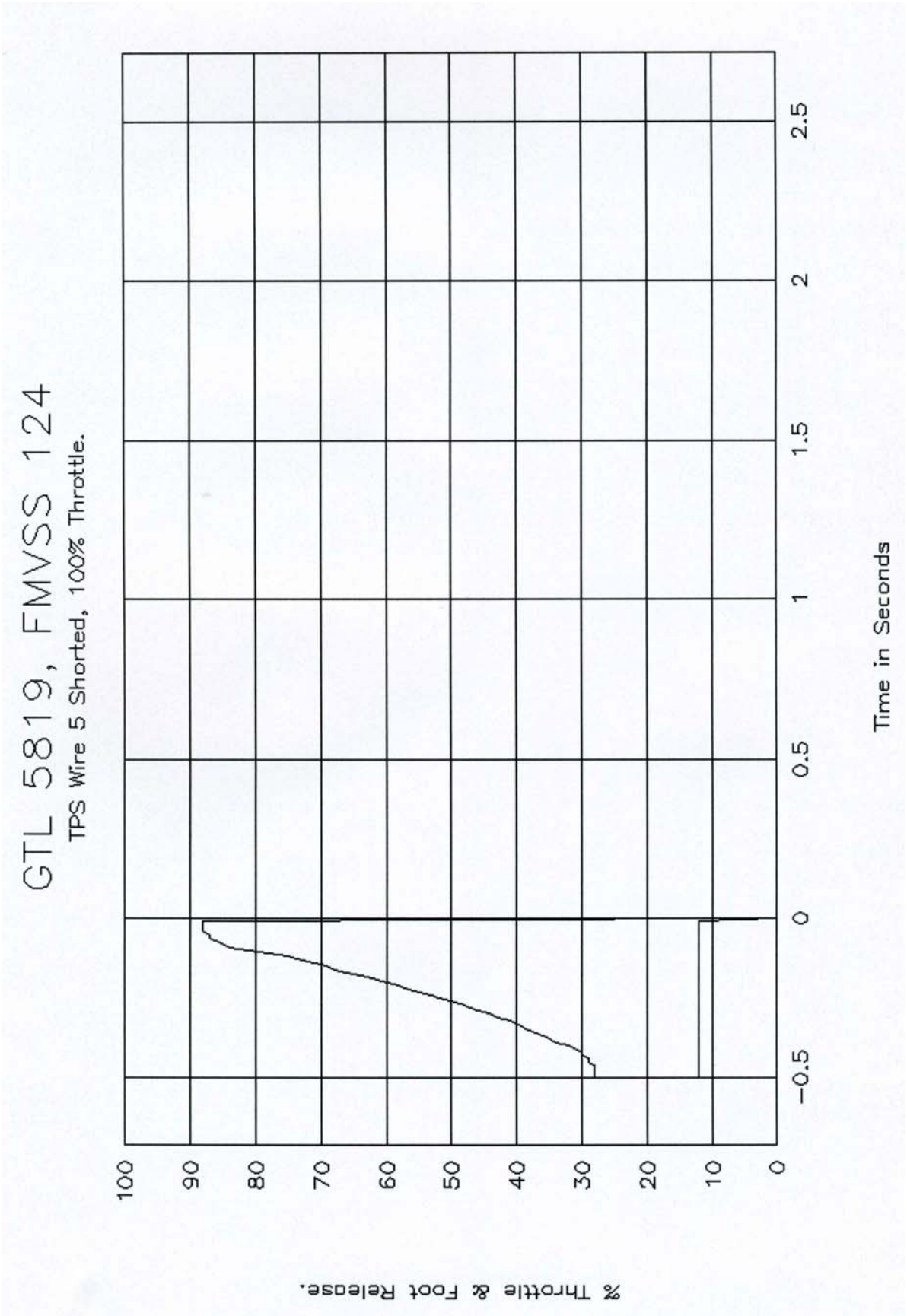
0.5
1
1.5
2
2.5
Time in Seconds


GTL 5819, FMVSS 124
TPS Wire 5 Shorted, 100% Throttle.
% Throttle & Foot Release.
100
90
80
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60
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40
30
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-0.5
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0.5
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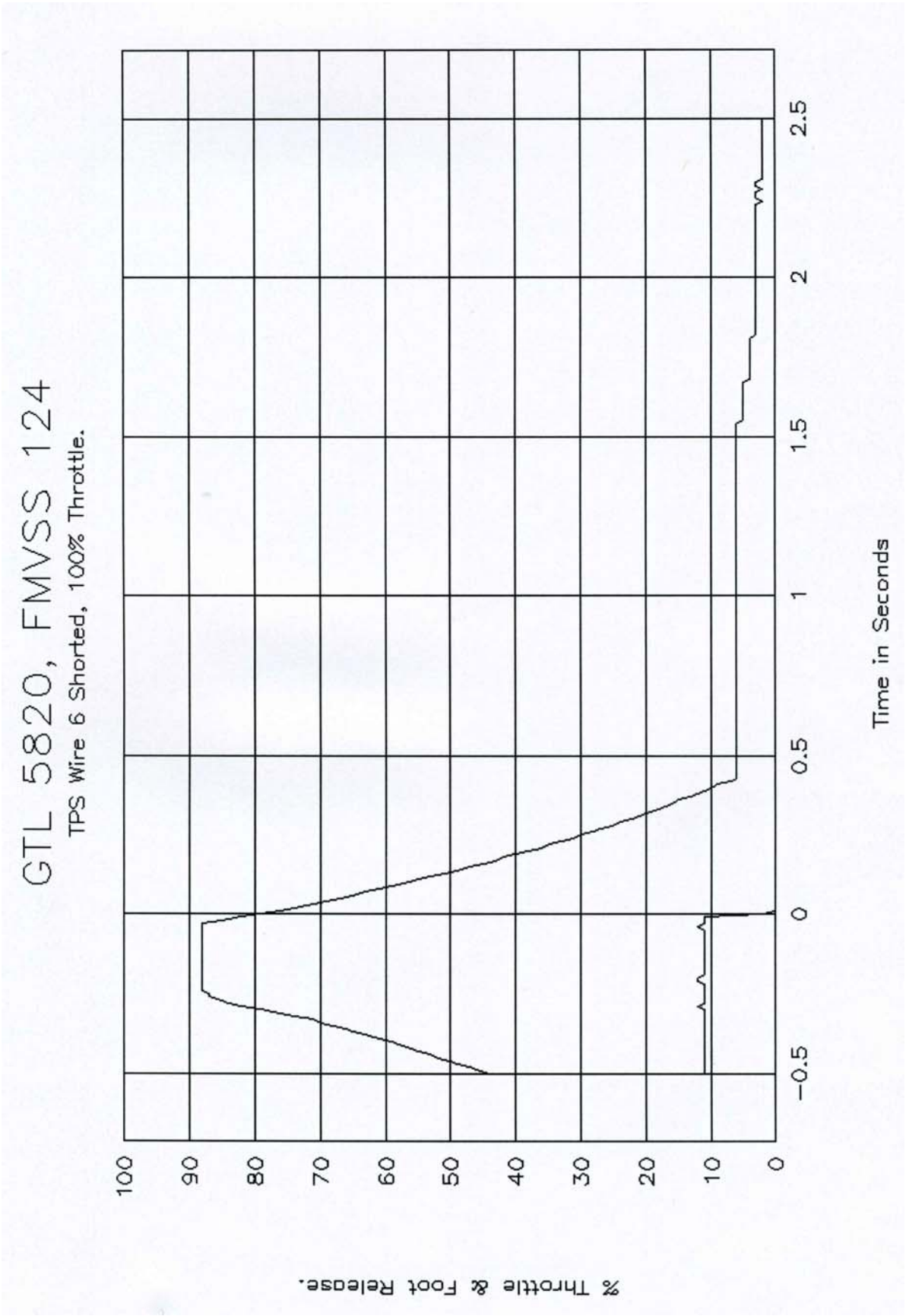
1.5
2
2.5
Time in Seconds


GTL 5820, FMVSS 124
TPS Wire 6 Shorted, 100% Throttle.
% Throttle & Foot Release.
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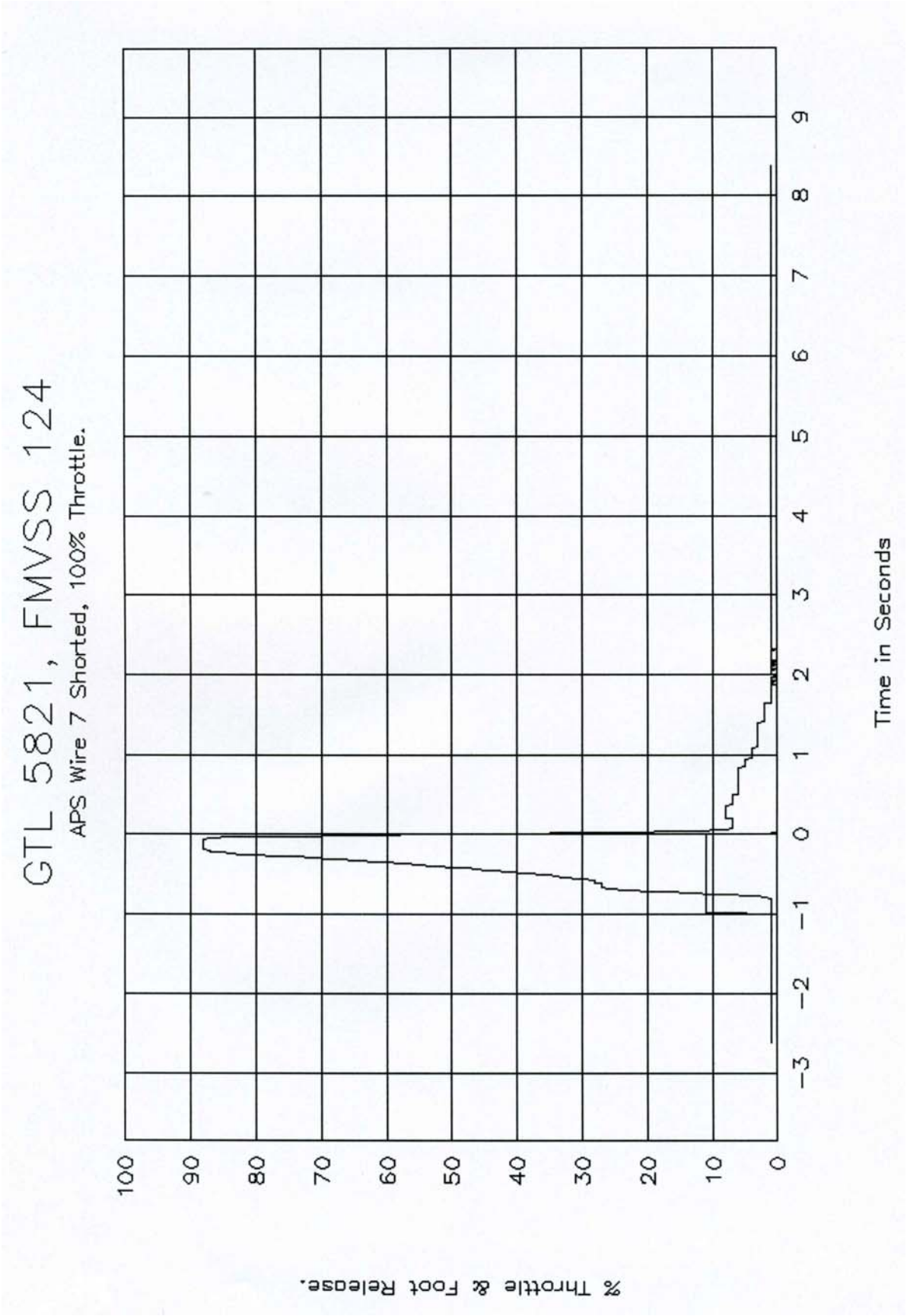
2.5
Time in Seconds


GTL 5821, FMVSS 124
APS Wire 7 Shorted, 100% Throttle.
% Throttle & Foot Release.
100
90
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50
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30
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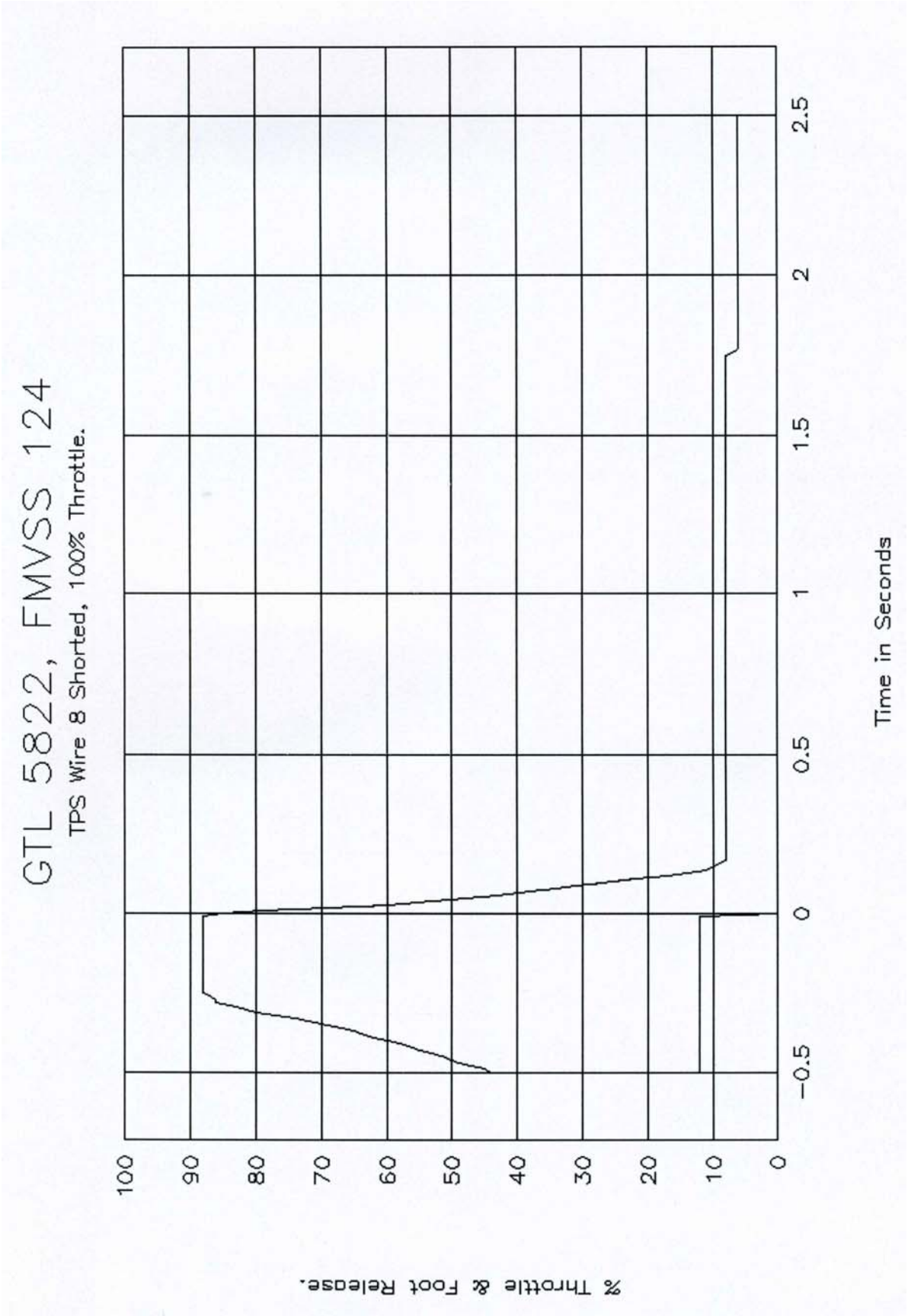
-3
-2
-1
0
1
2
3
4
5
6
7
8
9
Time in Seconds


GTL 5822, FMVSS 124
TPS Wire 8 Shorted, 100% Throttle.
% Throttle & Foot Release.
100
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1.5
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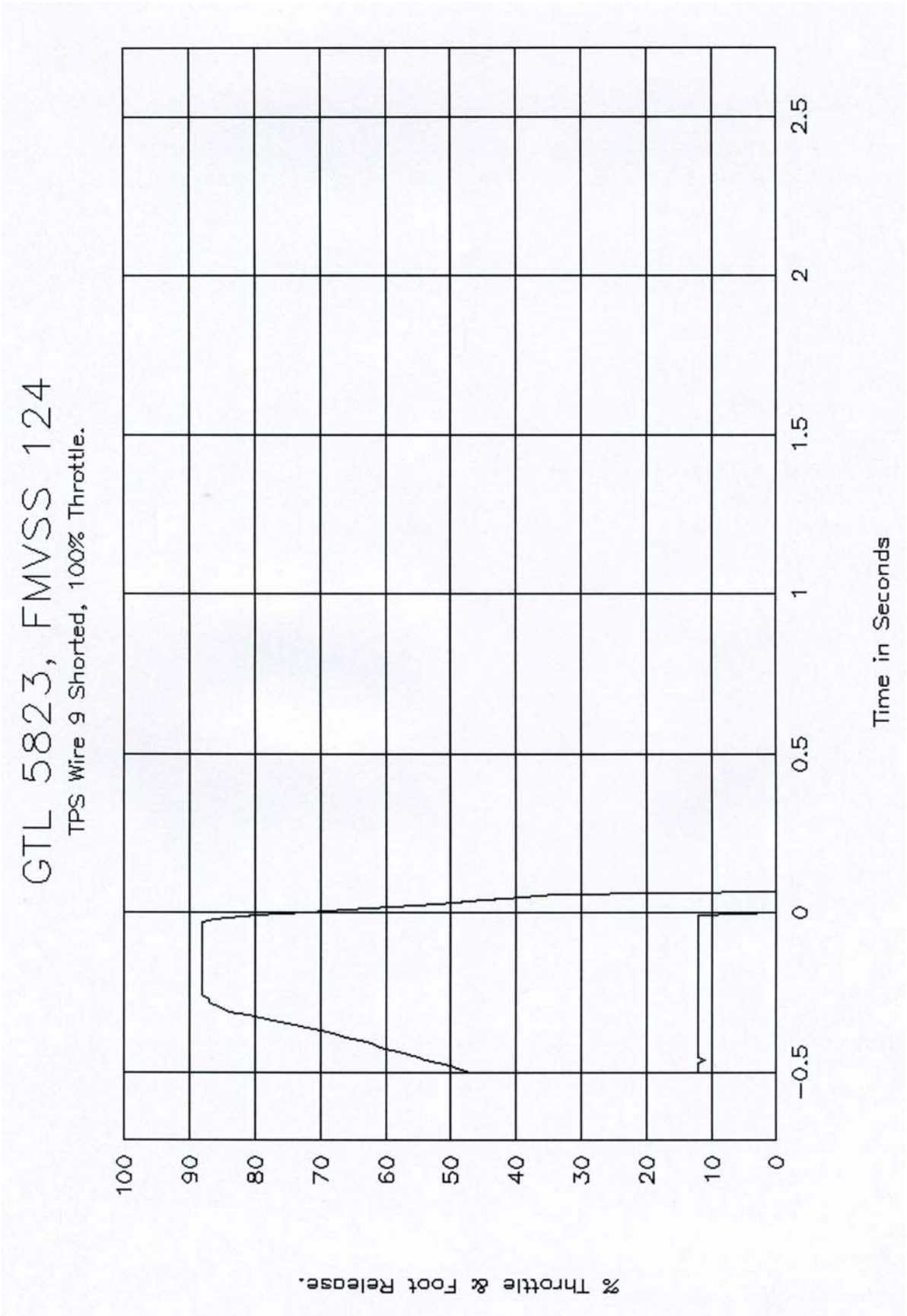
2.5
Time in Seconds


GTL 5823, FMVSS 124
TPS Wire 9 Shorted, 100% Throttle.
% Throttle & Foot Release.
100
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-0.5
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1.5
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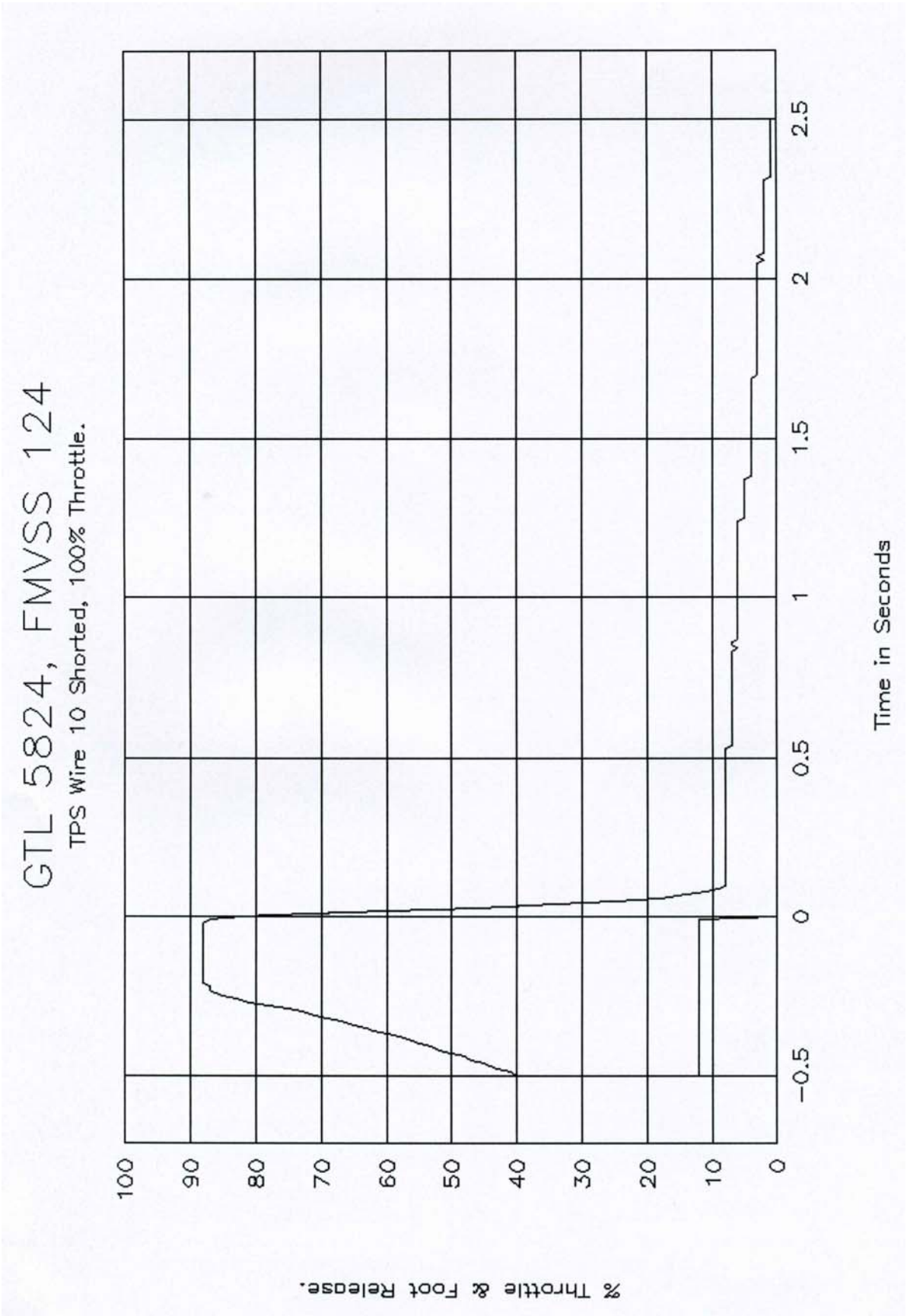
2.5
Time in Seconds


GTL 5824, FMVSS 124
TPS Wire 10 Shorted, 100% Throttle.
% Throttle & Foot Release.
100
90
80
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60
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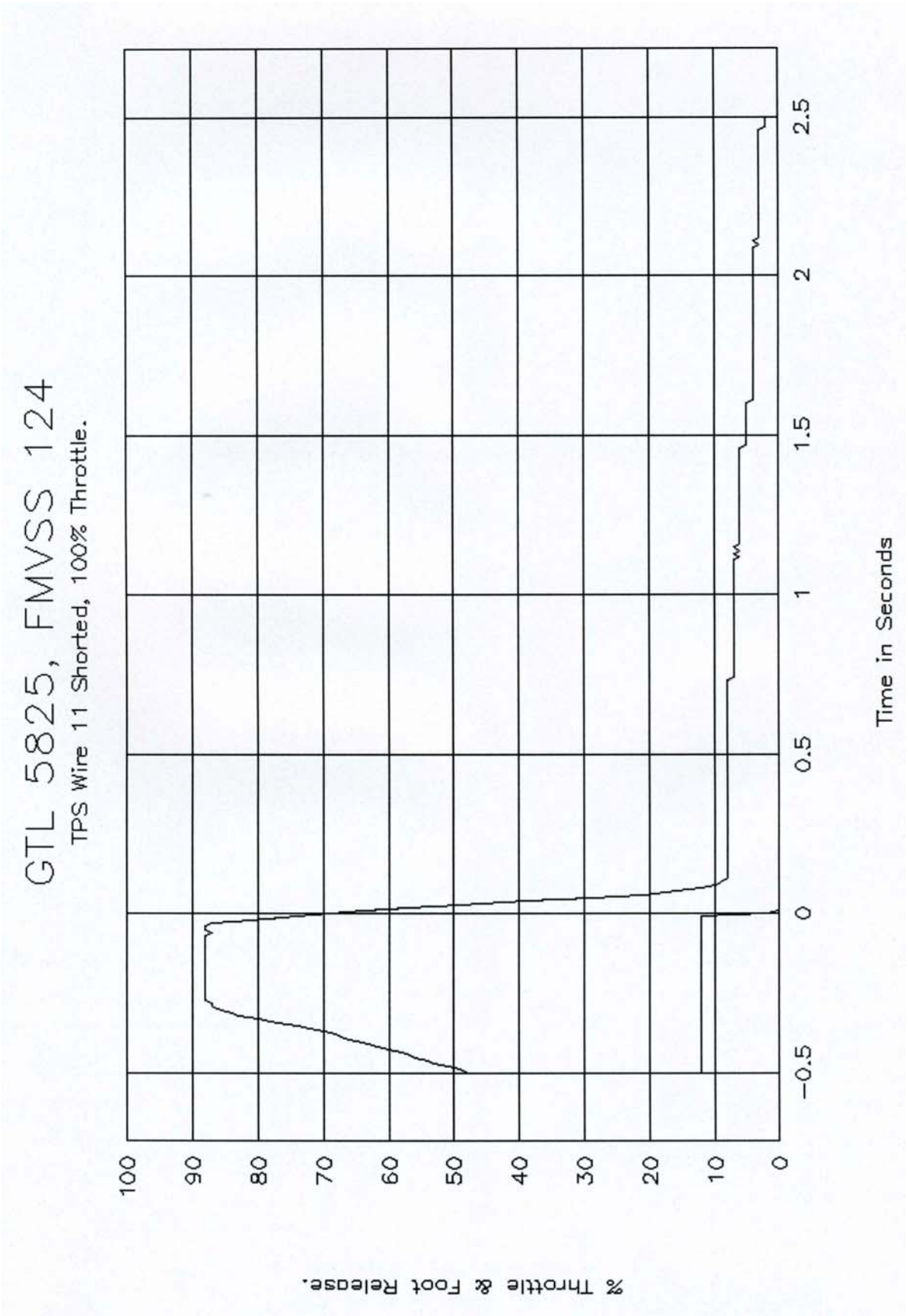
40
30
20
10
0
−0.5
0
0.5
1
1.5
2
2.5
Time in Seconds


GTL 5825, FMVSS 124
TPS Wire 11 Shorted, 100% Throttle.
% Throttle & Foot Release.
100
90
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30
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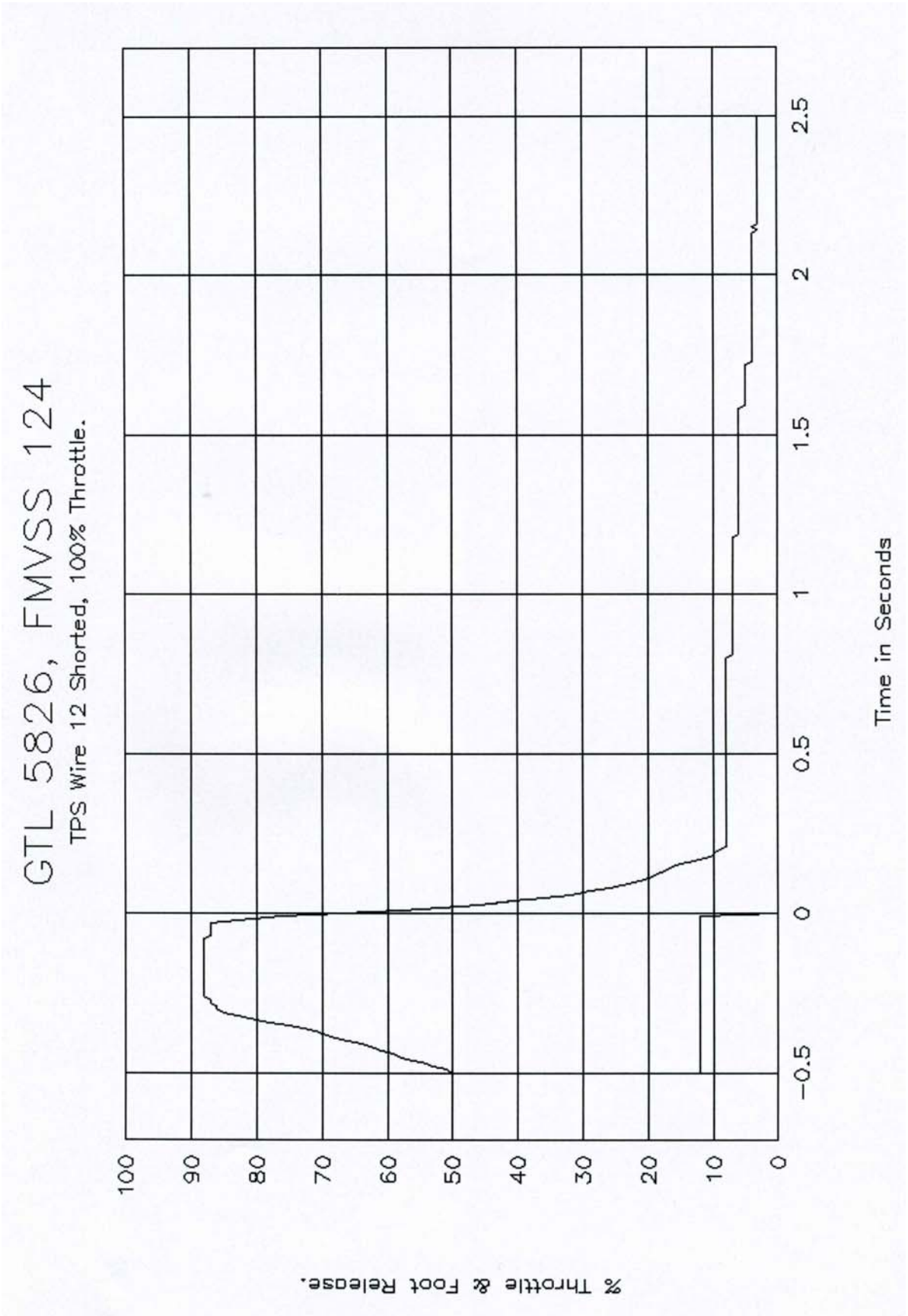
−0.5
0
0.5
1
1.5
2
2.5
Time in Seconds


GTL 5826, FMVSS 124
TPS Wire 12 Shorted, 100% Throttle.
% Throttle & Foot Release.
100
90
80
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−0.5
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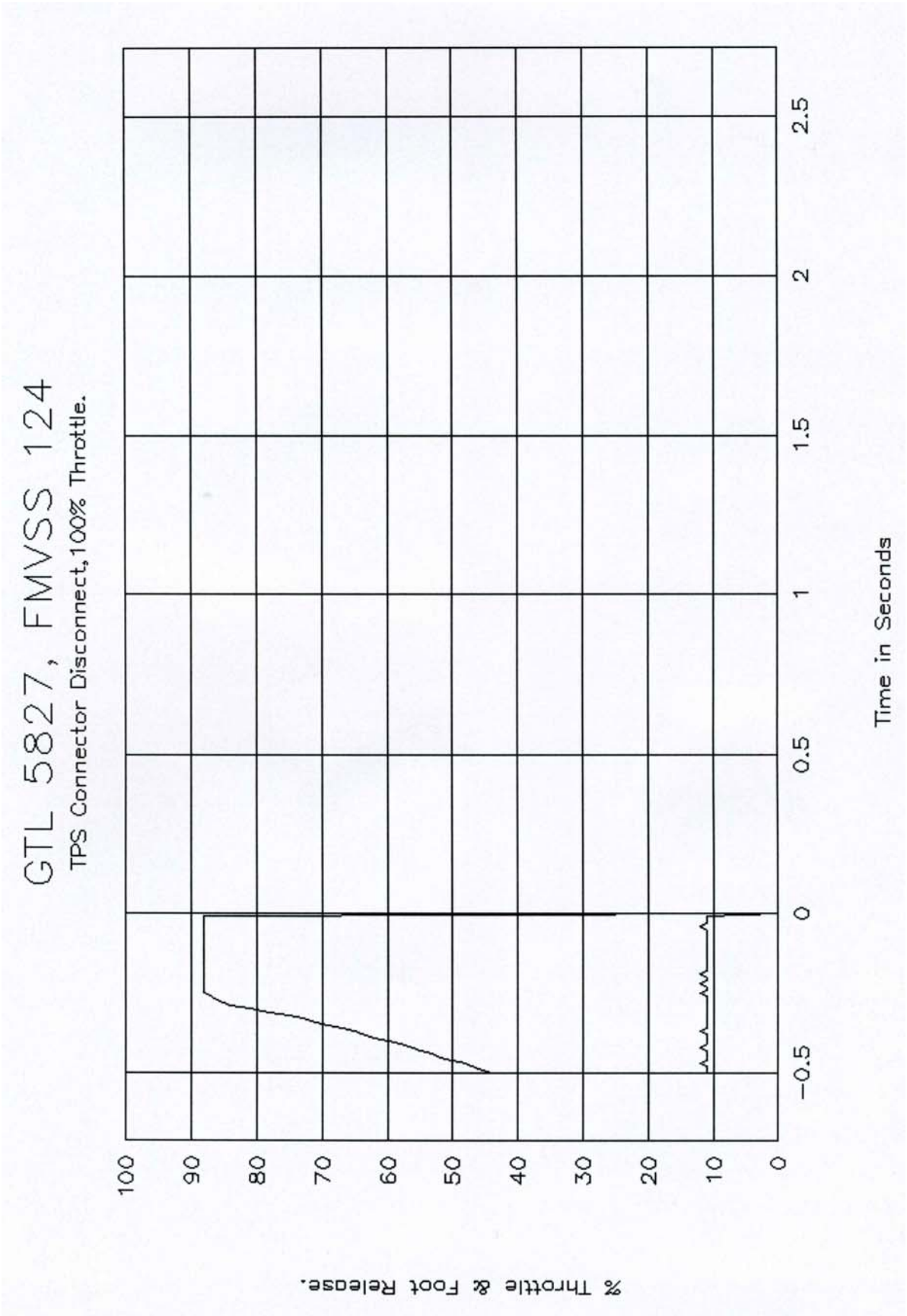
0.5
1
1.5
2
2.5
Time in Seconds


GTL 5827, FMVSS 124
TPS Connector Disconnect, 100% Throttle.
% Throttle & Foot Release.
Time in Seconds
100
90
80
70
60
50
40
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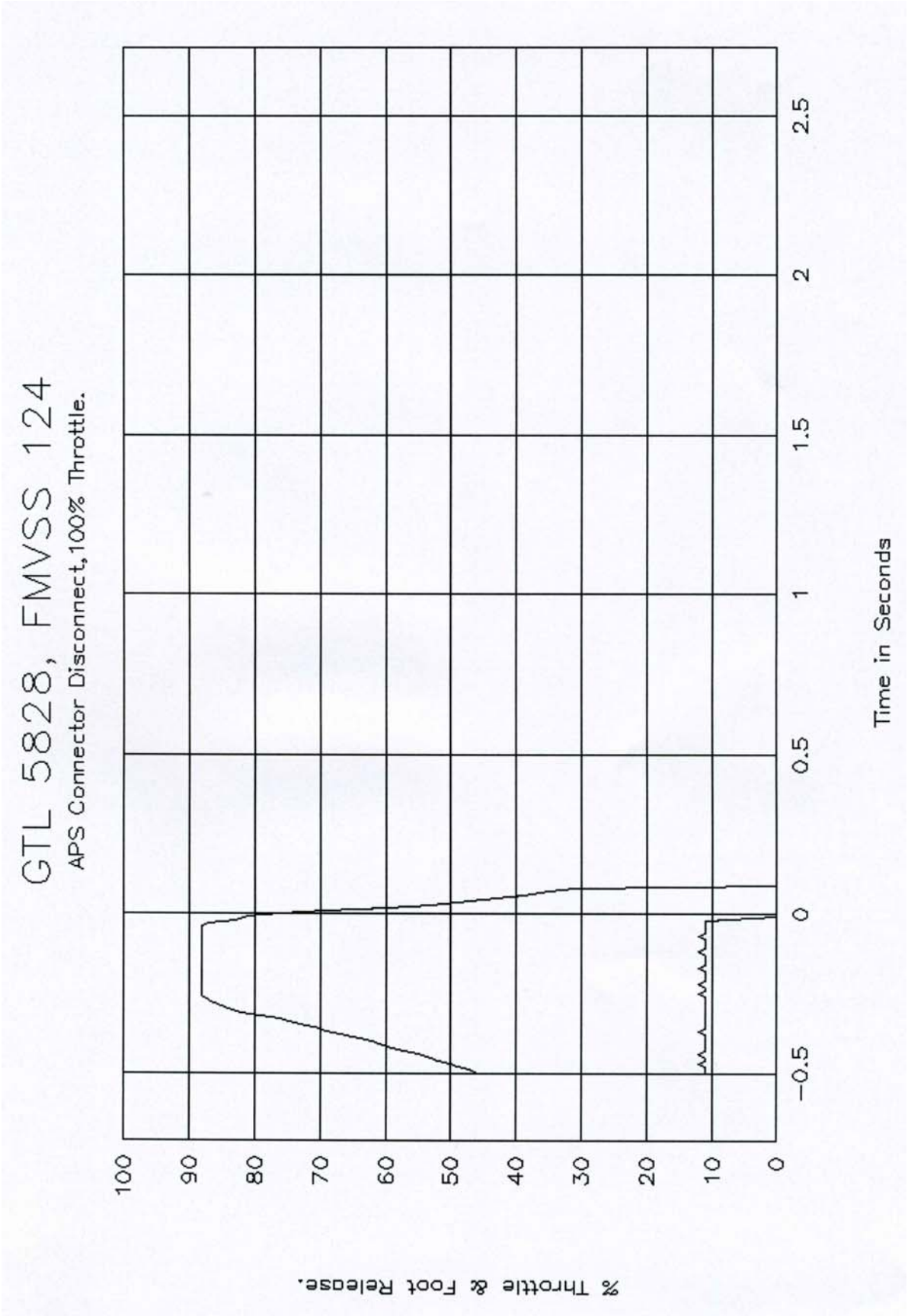
10
0
-0.5
0
0.5
1
1.5
2
2.5


GTL 5828, FMVSS 124
APS Connector Disconnect, 100% Throttle.
% Throttle & Foot Release.
100
90
80
70
60
50
40
30
20
10
0
-0.5
0
0.5
1
1.5
2
2.5
Time in Seconds

MANUFACTURER'S DRAWINGS

FORM – 124
Rev. 10/24/2003

2007MY NISSAN VERSA HATCHBACK

VEHICLE INFORMATION / TEST SPECIFICATIONS

FMVSS No. 124

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).

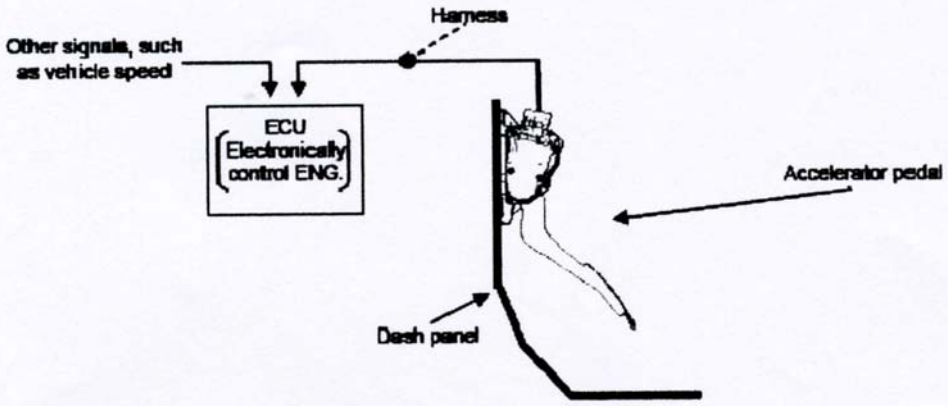


Fig.1-2 Outline of electronically controlled accelerator pedal

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

The engine idle state can be determined by monitoring the Throttle Position Sensor (TPS) output voltage. This information provides throttle plate position data in the form of TPS output voltage (TPS output voltage at idle is available for both TPS sensors, see Nissan service manual for Versa). The engine idle state can also be monitored through the On-Board Diagnostic System (OBD) using the Nissan Consult-3 equipment. This information will be given in the form of engine speed (RPM). The value for engine RPM at idle is available in the Nissan Versa service manual.

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)

For Fail-Safe operation of the ACS (disconnection or severance), the method utilized to determine return of engine power to the idle state is by monitoring the TPS voltage output, which provides the air throttle plate position as a function of TPS output voltage.

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

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

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, there is a means to measure throttle plate position by tapping onto the TPS. Procedure: Splice into the TPS signal at the Throttle Control Motor Connector (located on the throttle body- engine compartment; see service manual for correct wiring termination). Monitor the TPS signal voltage output at the sensor output.

6. Point(s) chosen to demonstrate compliance with FMVSS No. 124 for single point disconnect and severance. **See sketch below**

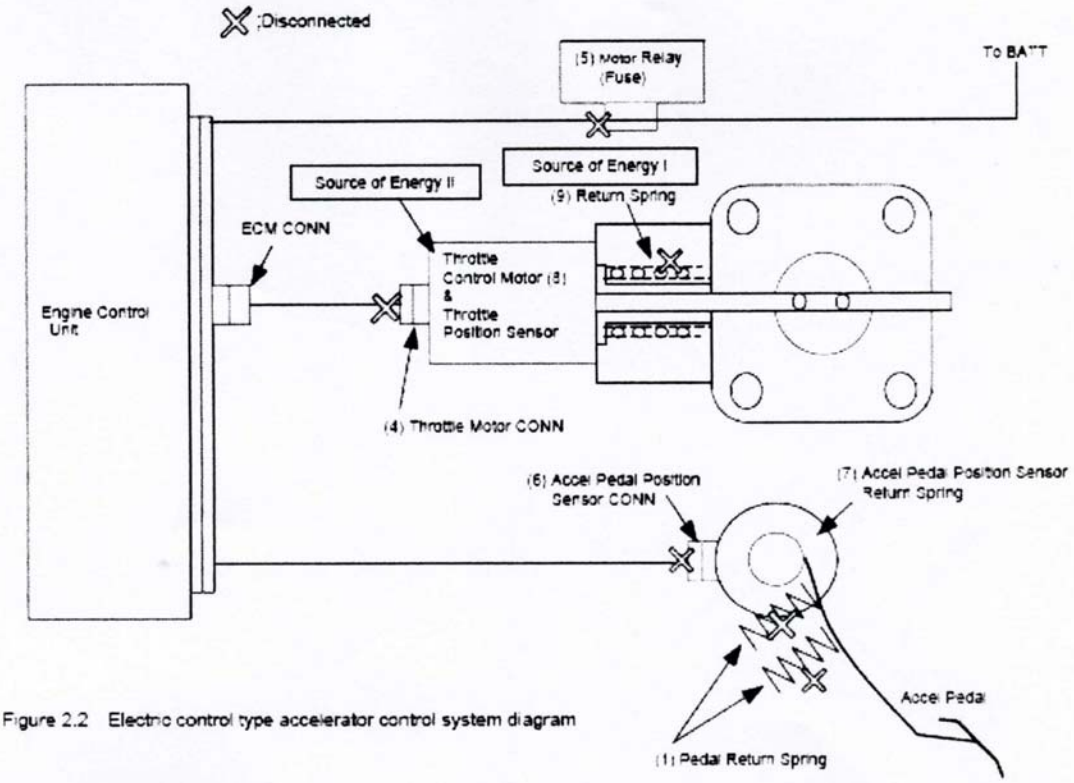


Figure 2.2 Electric control type accelerator control system diagram

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.

Sources of Throttle Return Energy:

1. Throttle Control Motor
2. Throttle Motor Return Springs:
   a. Inner Spring
   b. Outer Spring
3. Accelerator Pedal Return Springs:
   a. Inner Spring
   b. Outer Spring

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.

Fuel delivery rate is not used to demonstrate return to idle state.

11. Fuel rate signal output range at the idle state.

N/A

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

Yes. Upon disconnection or severance of any part of the ACS system the air throttle plate is returned to within +10° of idle position. At the same time, the fuel delivery rate is deceased to slightly above the idle rate. "Service Engine Soon" light is turned on. Acceleration is poor.

13. Method by which the test laboratory can record engine RPM by connection to ECM, OBD connector, etc.

Install Nissan diagnostic equipment (Nissan Consult-3) into the OBD connector of a Nissan vehicle. Engine RPM can be monitored and recorded by Consult-3.