

Chicago Transit Authority
5000 Series Cars

Deceleration Performance
Qualification Test Report (CTA)


DRAWING AND DATA REVIEW

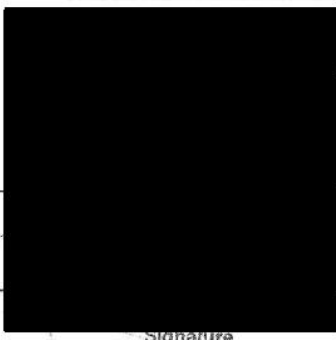
- NO COMMENTS**
- SEE COMMENTS**
- REQUEST FOR ADDITIONAL INFORMATION**

with 1062

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Revision Log

Revision	Date YYYY-MM-DD	Description of Changes
0	2009-11-08	Original Issue
0.1	2009-11-30	Internal review - Incorporates BTNA comments
0.2	2009-12-01	Internal review - Incorporates BTNA/PPC additional comments
0.3	2009-12-01	Internal review - Incorporates BTNA/PPC additional comments
0.4	2009-12-07	Internal review - Incorporates additional PPC comments
0.5	2009-12-15	Internal review - Incorporates additional PPC comments

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1 Objective

This Qualification Test Report demonstrates that the CTA 5000-Series Propulsion System meets the deceleration performance and jerk rate requirements of the CTA Technical Specification.

The deceleration performance is demonstrated at two different locations:

1. The low speed performance demonstration (up to 30 mph) was done at the Bombardier test track facility in Plattsburgh, New York, with one (1) Married Pair loaded at AW0 + 1500 lbs. (See test report: 076-BTR-3064)
2. The second part of the performance demonstrations (up to 70 mph) was conducted on the railroad's property on the Red line between Howard and Addison stations with one (1) Married Pair loaded at AW0 + 1500 lbs.

This report demonstrates the following performance:

- Service Dynamic Braking performance from 55 and 70 mph;
- Service Friction Braking performance from 55 and 70 mph;
- Emergency Braking performance from 55 and 70 mph;

2 Criteria

This report verifies compliance with the specification requirements, as defined below:

Section 10.02.B The performance specified herein shall be accomplished with a fully completed and equipped married pair with a load not exceeding 1,500 pounds per car of personnel and instrumentation. All performance requirements shall be achieved with a 550 Vdc third rail voltage. For conditions below 550 Vdc third rail voltage, the base speed may be reduced proportionally to the voltage reduction, but maximum tractive effort shall not be reduced. For conditions below 500 Vdc third rail voltage, the maximum tractive effort shall be reduced to minimize under-voltage shutdowns. Operation under these conditions shall not cause damage to the equipment.

The propulsion system shall not adjust performance based on passenger loads.

Section 10.02.B.4

"MINIMUM SERVICE BRAKE"	0.5 mphps	Electric Brake: PTU adjustable from 0.3 mphps to 1.0 mphps.
	0.5-1.0 mphps	Friction
"MAXIMUM SERVICE BRAKE"	2.8 ±0.1 mphps	From maximum speed to electric brake fade out then supplement by friction brakes to stop.
"EMERGENCY BRAKE"	2.8 ±0.1 mphps plus 2.5 ±0.1 mphps plus Track Brake	Electric Brake Friction Brake

- Sections 10.02.B.5 Jerk Limit: The rate of change of acceleration and deceleration shall be limited under all conditions other than emergency braking. The rate of change shall be PTU adjustable between 1.0 mphpsps and 3.0 mphpsps. The initially setting shall be 2.0 mphpsps.
- Sections 10.07.C.1 Friction brake rates shall be continuously variable as specified in Section 10.02 B, and shall be controlled by the Propulsion System. The friction only brake rates with the Master Controller in the "MINIMUM SERVICE BRAKE" and "MAXIMUM SERVICE BRAKE" positions shall be measured from an entry speed of thirty miles per hour (30 mph).
- Sections 10.07.C.2 Normal service stops shall be made with electric brake which shall maintain the rate to approximately three miles per hour (3 mph). As the electric brake fades, the friction brake shall be smoothly blended in to complete the stop and hold the train. The blending shall be controlled by the Propulsion System and the characteristics shall be PTU-adjustable. There shall be a "soft stop" feature to reduce jerk as the train stops. The exact settings shall be determined on the prototype cars.
- Sections 10.07.C.4 In the event of a complete electric brake failure on a car, friction brakes shall automatically apply at the same rate as called for by the Master Controller and maintain the rate to a complete stop.
- Section 16.01.E.3 On one (1) of the prototype two-car units, make tests to confirm all requirements specified in Section 10.02, B.

3 Test Conditions

- 3.1.1 Cars 5011 and 5012 were used to demonstrate the deceleration performance. The cars were completed in all respects with interior furnishing installed.
- 3.1.2 Before delivery of the cars, car 5011 was weighted at 55,561 lbs and car 5012 was weighted at 55,551 lbs.
- 3.1.3 All deceleration tests were done on tangent and level sections of the Red Line subdivision between Granville and Sheridan stations. As much as possible opposite direction test runs were done over the same portion of track.
- 3.1.4 The tests were performed on November 2nd and 3rd, 2009 under light cloud conditions and dry rails. Temperature were in the mid 50 degrees. No significant winds during the tests were observed.
- 3.1.5 The diameter of each wheel reported by the propulsion controllers was as follow

	Car 5011	Car 5012
axle # 1:	27.99"	27.99"
axle # 2:	27.95"	27.95"
axle # 3:	27.95"	27.87"
axle # 4:	27.95"	27.95"

- 3.1.6 The propulsion system software versions were as follow:

Equipment Name	Description	Software Version	
		A Car	B Car
High voltage Box	VCU Software	CTPAVC0156	CTPAVC0156
Propulsion Inverter Box	DCU Software	CTADMAG	CTADMAG

3.1.7 During the two days of tests there was approximately 12 people onboard including CTA's transportation crew.

For Bombardier the following personnel were involved in the tests: Gaston Tremblay, Jean Beauchemin, Joe Torres, Sylvain Labbé, Keith Dolph.

For CTA, the following personnel were onboard: Robert Kielba, Jorge Silva on Nov 2nd and 3rd, while Mr. Walter Keevil was present on Nov. 3rd.

4 Instrumentation

4.1 Instrument list

Qty	Description	Model	Characteristics
1	Accelerometer Jewell	LCF-200	+/- 0.5 g
2	4 Ax modules Suitcase	Mitrac	8 Analog Outputs +/- 10 V
1	"TNET" Data acquisition system		16 analog channels data acquisition system

Table 1 - Instrumentation List

4.2 Channel List

The analog signals which are not provided by an external transducer are obtained from the propulsion system analog output "suitcase" modules.

Ch. #	Ch. Name	Description	Origin	Ext. Transducer	Analog	Digital
1	M/C	Master Controller Handle Position	A-Car or B-Car		√	
2	Spd	Speed	A-Car or B-Car		√	
3	Acc	Acceleration	A-Car or B-Car	√	√	
4	LV	Line Voltage	A-Car or B-Car		√	
5	LC-A	Propulsion Line Current A-Car	A-Car		√	
6	LC-B	Propulsion Line Current B-Car	B-Car		√	
7	TE-A	Tractive Effort Command A-Car	A-Car		√	
8	TE-B	Tractive Effort Command B-Car	B-Car		√	
9	BC-A	Hydraulic Pressure A-Car	A-Car		√	
10	BC-B	Hydraulic Pressure B-Car	B-Car		√	
11	FWD	Forward (TW#1)	A-Car or B-Car			√
12	REV	Reverse (TW#2)	A-Car or B-Car			√
13	DRC	Door Closed (TW#21)	A-Car or B-Car			√
14	PEN	Penalty (TW#7)	A-Car or B-Car			√
15	TB	Track Brake (TW#14)	A-Car or B-Car			√
16	FBa	FB Applied (TW#13)	A-Car or B-Car			√
17	TBC-A	Track Brake Command from Prop.	A-Car			√
18	TBC-B	Track Brake Command from Prop.	B-Car			√
19	EMY	Emergency (TW #17)	A-Car or B-Car			√
20	S/S-A	Spin/Slide Status A-Car	A-Car			√
21	S/S-B	Spin/Slide Status B-Car	B-Car			√

Table 2 - Channel List

5 Data Acquisition

5.1 General

- 5.1.1 The data acquisition package consisted of the instrumentation listed in Section 4.1. The files recorded by the data acquisition system have been used to generate the charts presented in this report.

5.2 Recorded Signals and Channel Assignment

- 5.2.1 The signals recorded for all the runs presented in this report, are listed in Appendix 4. The run # 1 is typical of all signals recorded on those two days.

5.3 Consist Configuration Identification Method

All deceleration test runs were done using one single married pair made of cars 5011 and 5012. Car 5012 was the leading car for southbound runs and 5011 leading for the northbound runs.

5.4 Performance Calculation Method

5.4.1 Test runs were done as defined in section 6.2. Braking and jerk rates were calculated as follow:

Braking Rate Calculation Method (Dynamic, Friction and Emergency):

The braking rate was calculated by taking the average deceleration rate read from the accelerometer trace on the constant portion of the braking curve. On each report, two vertical red cursors indicate the starting and ending speed where rates were calculated.

Jerk Rate:

The jerk rate was obtained by calculating the slope of the accelerometer trace in the linear portion of the transition from Coast to Brake or Power to Brake.

6 Test Method

6.1 Method

- 6.1.1 All deceleration runs were performed as listed in the table at section 6.2 provided below.
- 6.1.2 The vehicle was accelerated until the "Brake Initiating Speed", defined in the table below, was exceeded by approximately 2 mph or until maximum attainable speed was reached.
- 6.1.3 The Master Controller was moved to "Coast" for a few seconds.
- 6.1.4 Then the brake command was initiated as appropriate (Master Controllers or else).

6.2 Maximum Braking Performance Test Runs with 1MP at AW0 + 1,500 lbs.

Run Number	Direction	Brake Initiation Method	Brake Initiating Speed (+ 2/- 0 mph)	Braking Mode
8030-B1	Southbound	M/C	55 mph	Maximum Brake - Blended
8030-B2	Northbound	M/C	55 mph	Maximum Brake - Blended
8030-B3	Southbound	M/C	55 mph	Maximum Brake - Friction
8030-B7	Southbound	Deadman	55 mph	Max. Brake - Blended
8030-B8	Northbound	Deadman	55 mph	Max. Brake - Blended
8030-B9	Southbound	M/C	55 mph	Emergency Brake - All
8030-B11	Southbound	Operators's Emergency SW (MES)	55 mph	Emergency Brake - All
8030-B13	Southbound	M/C	70 mph *	Maximum Brake - Blended
8030-B14	Northbound	M/C	70 mph *	Maximum Brake - Blended
8030-B15	Southbound	M/C	70 mph *	Maximum Brake - Friction
8030-B19	Southbound	Deadman	70 mph *	Max. Brake - Blended
8030-B20	Northbound	Deadman	70 mph *	Max. Brake - Blended
8030-B21	Southbound	M/C	70 mph *	Emergency Brake - All
8030-B24	Northbound	Operators's Emergency SW (MES)	70 mph	Emergency Brake - All

*: 70 mph or maximum attainable speed on the track section selected for the test.

7 Test Results

- 7.1.1 The deceleration runs test data sheets summarizing the actual test results are provided in Appendix 1.
- 7.1.2 The low speed "55 mph" braking charts are provided in Appendix 2.
- 7.1.3 The high speed "70 mph" braking run charts are provided in appendix 3.

8 Discussion

8.1 Dynamic Braking effort increase.

- 8.1.1 At CTA`s request during initial Engineering runs done at Chicago, the dynamic braking efforts were increased by 5 % in order to get effective braking rates in the upper range of the tolerances.

8.2 Low speed runs - "55 mph".

- 8.2.1 The low speed runs were done on overlapping segments of the track.
- 8.2.2 All low speed dynamic brake runs meets the specification requirements.
- 8.2.3 The low speed friction only brake run (# 8030-B3) exhibited rates which are consistent with the dyno test results (refer to test report 076-BTR-1040 and Wabtec letter # 076-WA/BO-0198R attached in appendix 5.).
- 8.2.4 The low speed friction only brake run (# 8030-B3) jerk rate of 4.3 mph/s² was considered acceptable since the friction only brake stop is a degraded mode of operation which could happen on a per car basis.

8.3 High speed runs - "70 mph".

- 8.3.1 Due to the characteristics of the section of the track used (limited length, crossovers and rail gaps), the high speed runs could not all be done from 70 mph because of the limited length of the level tangent track braking zone.. The runs were typically done from 68 mph.
- 8.3.2 In addition since the high speed runs were taking the full length of the test track, braking could not be done over overlapping segments of the track.
- 8.3.3 All high speed dynamic brake runs meets the specification requirements.
- 8.3.4 The high speed friction brake run (# 8030-B15) exhibited braking rates which are consistent with the dyno test results (refer to test report 076-BTR-1040 and Wabtec letter # 076-WA/BO-0198R in appendix 5).
- 8.3.5 The high speed friction only brake run (# 8030-B15) jerk rate of 1.2 mph/s^2 was considered acceptable since the friction only brake stop is a degraded mode of operation which could happen on a per car basis.

8.4 Soft Stop

8.4.1 During the qualification tests, it was noticed that the soft stop functions gave results that were varying between runs. One factor contributing to the variations was caused by the fact that some dynamic brake runs were interlaced with friction brake only runs. In order to optimize the track test time, the disks were not allowed to cool down before a dynamic brake run as they should be during normal operation.

8.4.2 After these qualification tests it was noticed that some variations from stops to stops were observed even in the cases where the disks were at normal operating temperature. It was agreed at time of tests with CTA that this functionality would be monitored during normal operations as the cars are going through revenue service.

8.5 Emergency brake runs

8.5.1 The emergency brake runs were done by pulling the Motorman Emergency Switch (MES) "Red Ball" and with the Master controller Emergency Handle. The braking rates observed in emergency are consistent with the addition of the dynamic brake rates, frictions brake rates obtained during the full service brake runs and track brake rates when applicable.

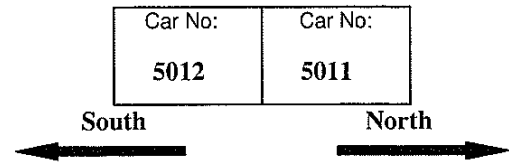
8.5.2 The high speed Emergency brake run (# 8030-B24) exhibited braking rates which are consistent with the dyno test results (refer to test report 076-BTR-1040 and Wabtec letter # 076-WA/BO-0198R in appendix 5).

9 Conclusion

9.1.1 The results obtained during the decelerations tests satisfactorily comply with the requirements of the CTA technical specification for the 5000-series cars.

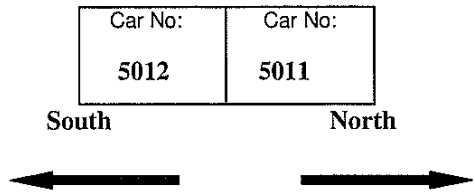
APPENDIX 1: Data Sheets

Date of Test: 2009 / 11 / 02
(yy/mm/dd)



Run ID	Brake Initiating Method	Brake Type	Brake Initiating Speed (mph)	Brake Rate Per Run	Average Brake Rate (Min= 0.5 mphps +/- .1) (Max.=2.8 mphps +/- .1)	Brake Rate Pass/Fail	Jerk Rate Per Run	Jerk Rate 2 mphps ² +/-10%
8030-B1	M/C	Max-BB	55	2.9	2.85	Pass	1.9	Pass
8030-B2	M/C	Max-BB	56	2.8			1.9	Pass
8030-B3	M/C	Max-FF	56	2.4	2.4	n/a	4.3	n/a
8030-B7	DM	Max-BB	55	2.9	2.85	Pass	2.0	Pass
8030-B8	DM	Max-BB	56	2.8			1.9	Pass
8030-B13	M/C	Max-BB	68	2.9	2.85	Pass	2.0	Pass
8030-B14	M/C	Max-BB	66	2.8			1.9	Pass
8030-B15	M/C	Max-FF	65	1.7	1.7	n/a	1.2	n/a
8030-B19	DM	Max-BB	69	2.9	2.85	Pass	2.1	Pass
8030-B20	DM	Max-BB	68	2.8			1.9	Pass

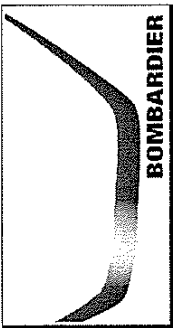
Date of Test: 2009 / 11 / 02
_____ (yy/mm/dd)



Run ID	Brake Initiating Method	Brake Type	Brake Initiating Speed (mph)	Brake Rate Per Run	Criteria	Brake Rate Pass/ Fail
8030-B9	M/C	EMY-All	54	7	> 5 mphps	Pass
8030-B11	EMY SW	EMY	56	5.1	> 5 mphps	Pass
8030-B21	M/C	EMY-All	68	5.8	> 5 mphps	Pass
8030-B24	EMY SW	EMY	68	4.4	> 5 mphps	n/a

APPENDIX 2: Low speed “55 mph” braking runs

Run Number	Brake Initiating Speed (+ 2/- 0 mph)	Braking Charts File Name
8030-B1	55 mph	76-BTP-8030-B1 Max DB @ 55 mph – South.pdf
8030-B2	55 mph	76-BTP-8030-B2 Max DB @ 55 mph – North.pdf
8030-B3	55 mph	76-BTP-8030-B3 Max Fbc @ 55 mph – South.pdf
8030-B7	55 mph	76-BTP-8030-B7 Max DB (DM) @ 55 mph – Southbound.pdf
8030-B8	55 mph	76-BTP-8030-B2 Max DB (DM) @ 55 mph – North.pdf
8030-B9	55 mph	76-BTP-8030-B9 Emergency (M-C) @ 55 mph – South.pdf
8030-B11	55 mph	76-BTP-8030-B11 Emergency Brake (MES) @ 55 mph – South.pdf



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Project No: 76 System: **Braking Performances Test** Report Date: 11/10/2009 12:12:38

Lead Technician: G. Tremblay / J. Beauchemin BTP-No: 8030 Sheet No: 1 / 6

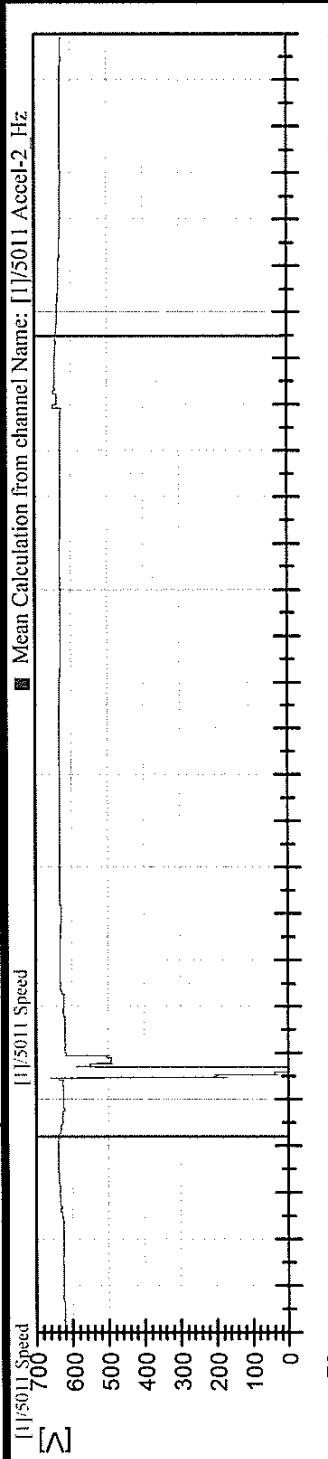
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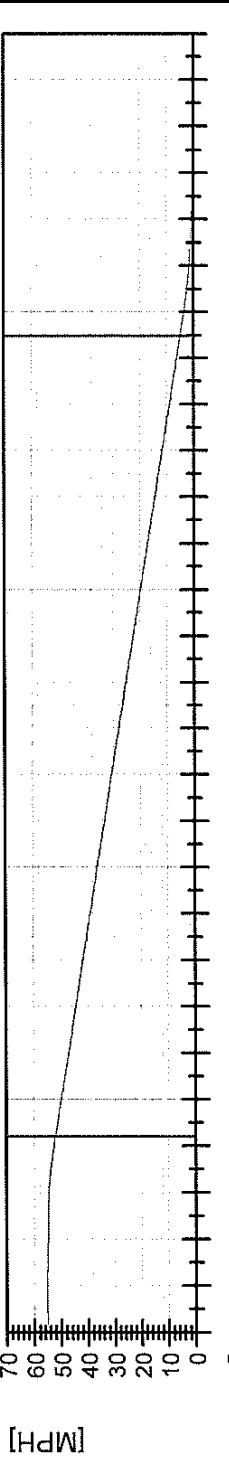
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- 5011 Line Voltage



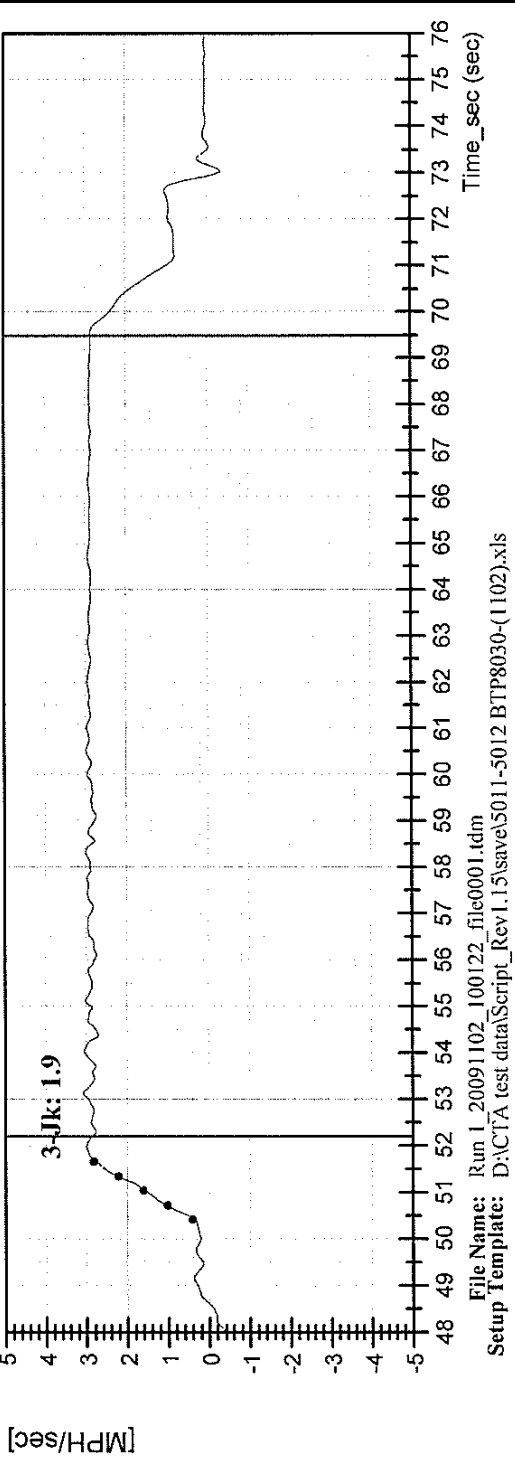
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- 5011 Speed

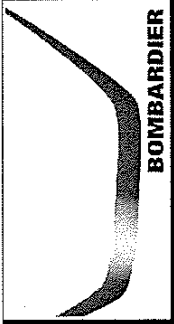


Legend Graph#3

- 5011 Accel-2_Hz
- JK_3



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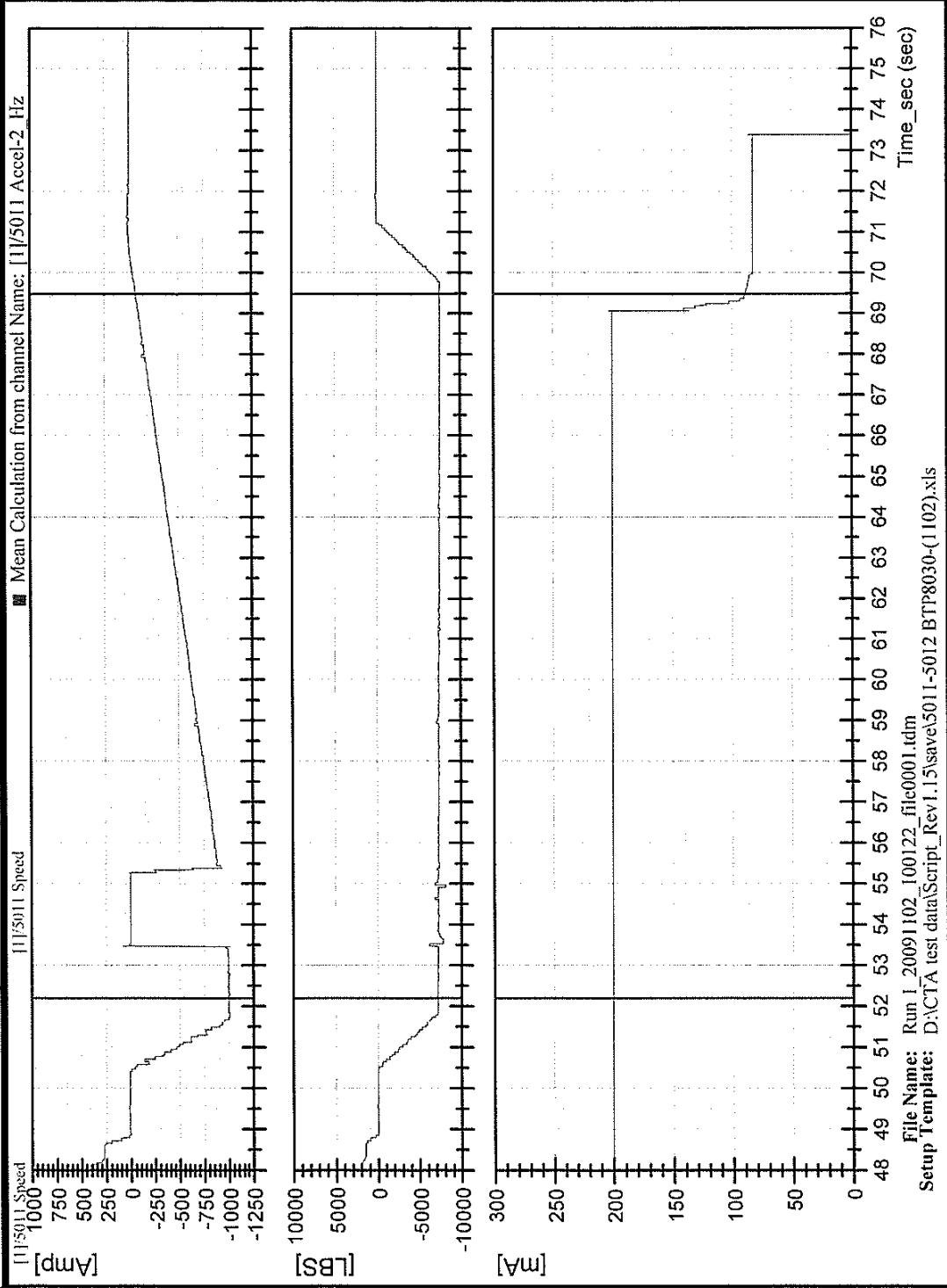


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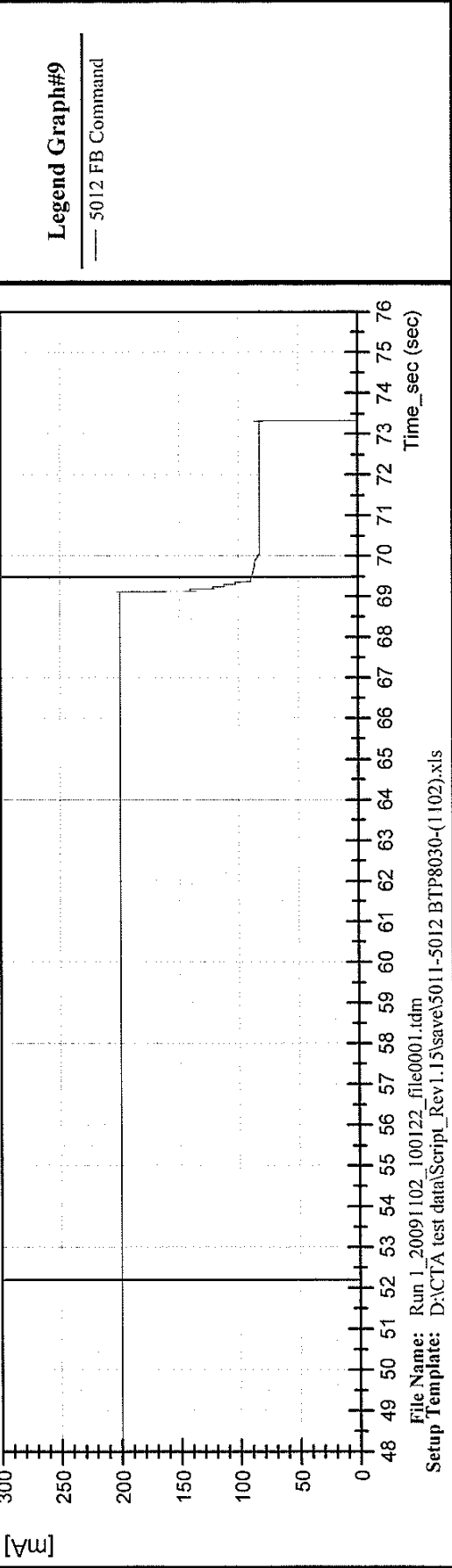
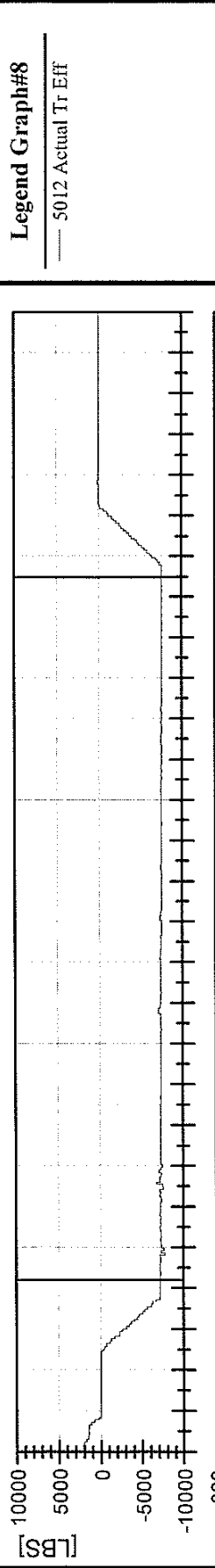
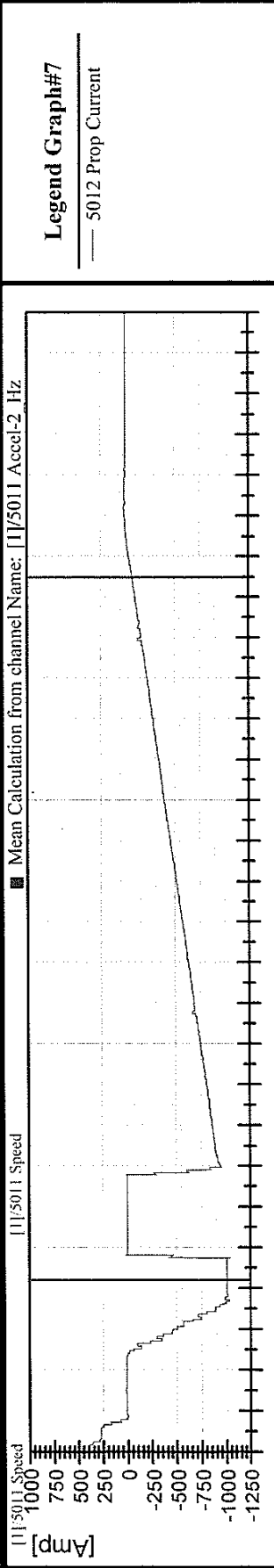
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 Lead Technician : G. Tremblay / J. Beauchemin
 Run Number : 8030-B1
 Cursor 1 : 52.204

System : **Braking Performances Test**
 Report Date : 11/10/2009 12:12:38
 BTP-No : 8030
 Sheet No : 2 / 6

Test Description : Maximum Dynamic Brake @ 55 mph - Southbound
 Distance : 597
 Time : 17.276
 Rate : 2.9
 Cursor 2 : 69.480

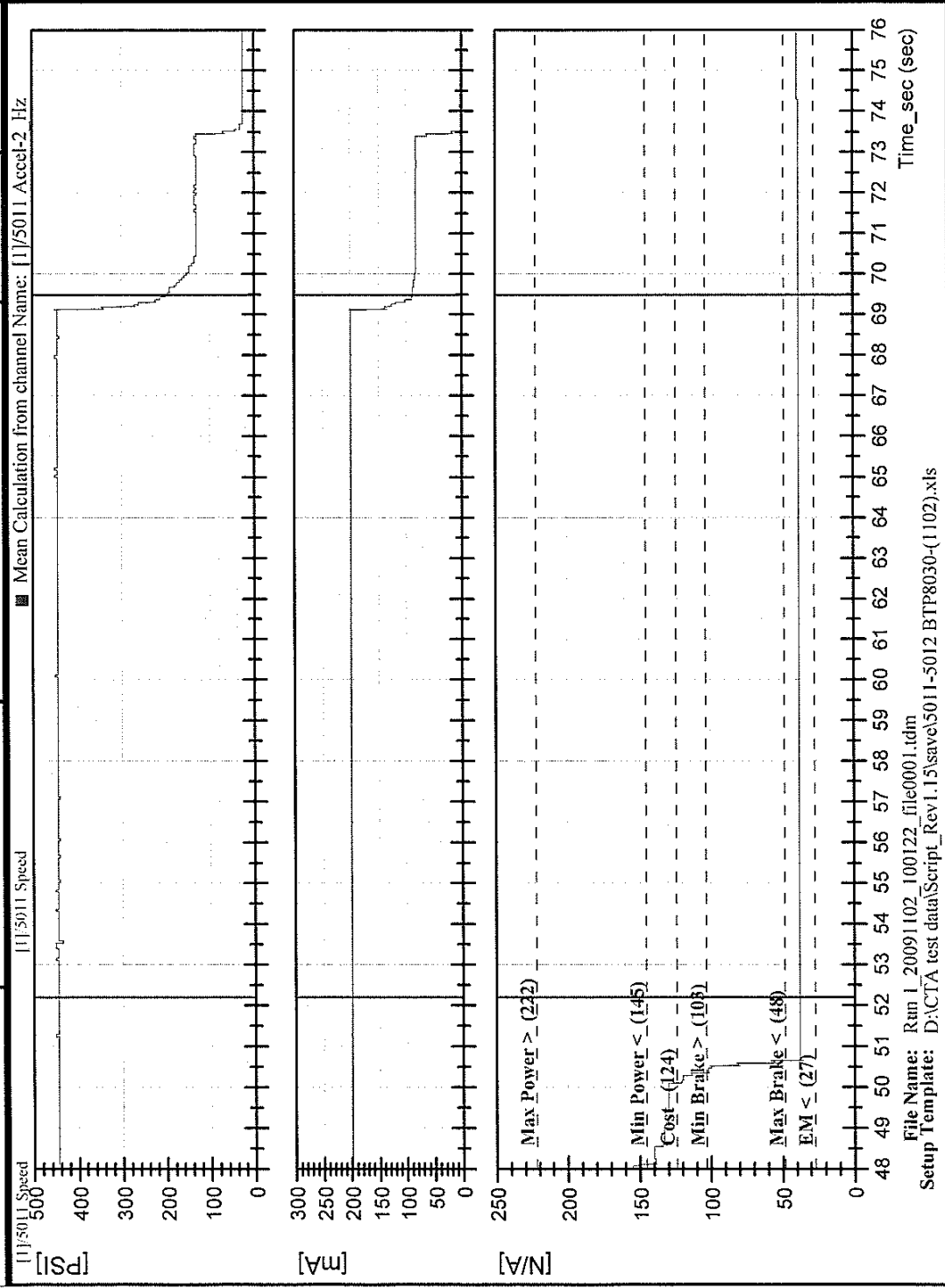
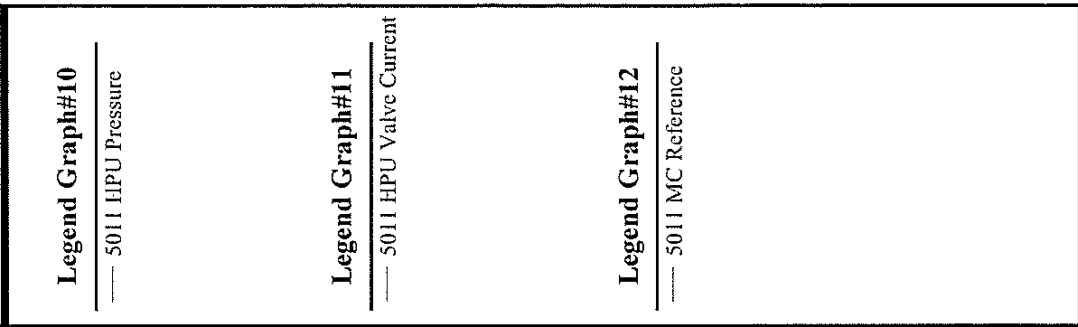


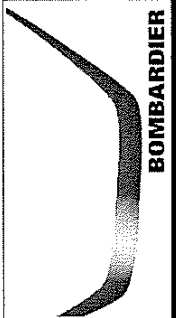
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BTP-No: 8030
Sheet No: 3 / 6
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Distance: 597
Time: 17.276
Rate: 2.9
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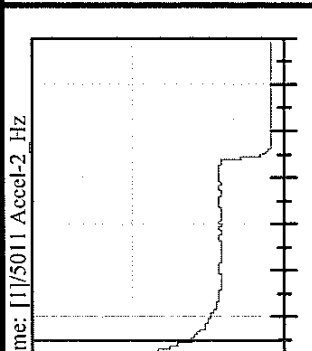
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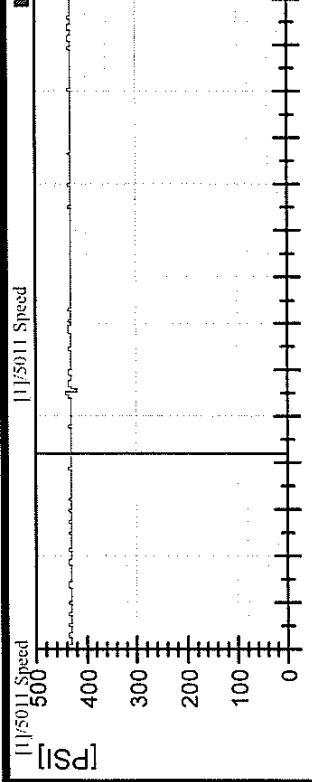
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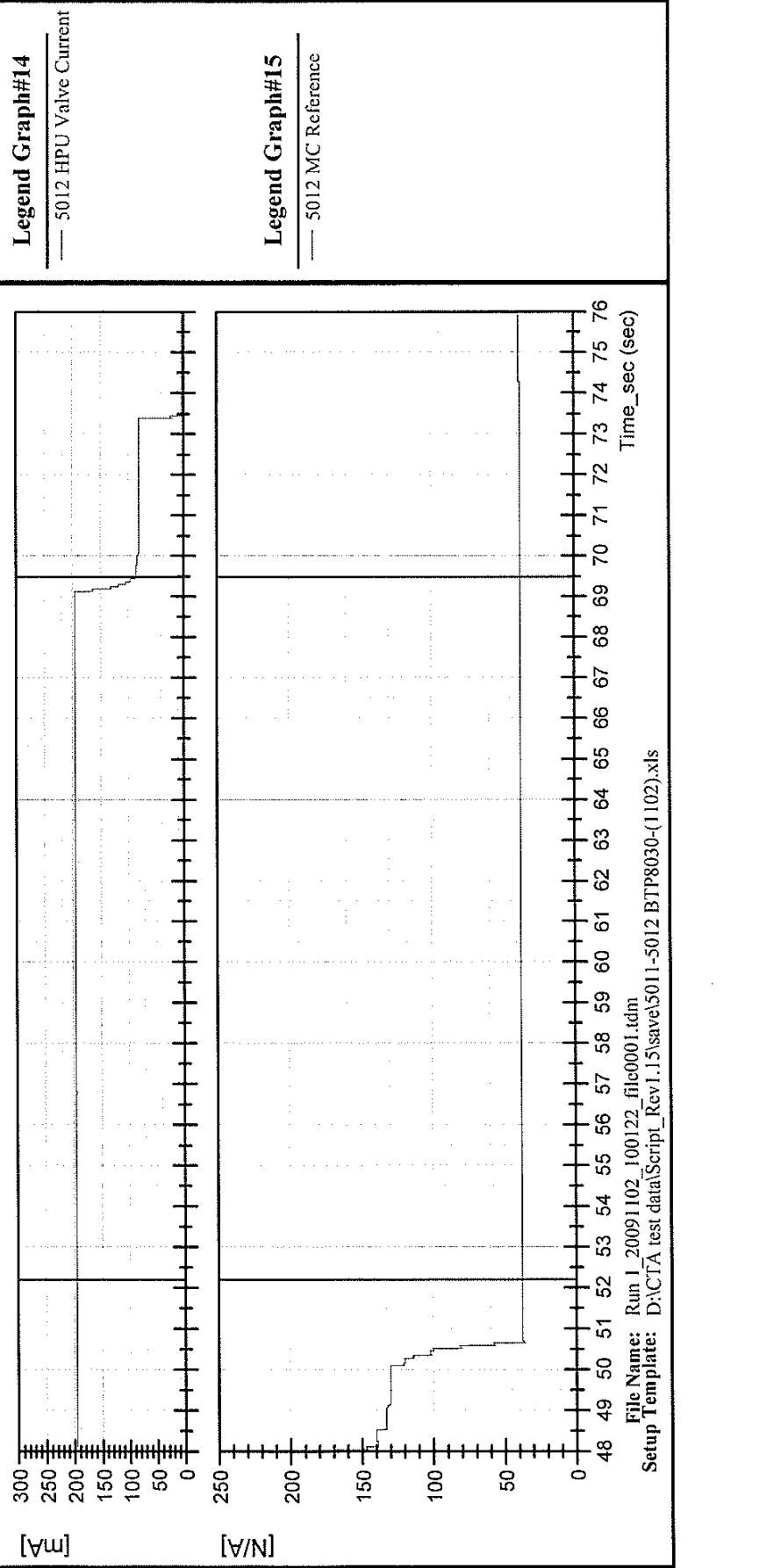
Legend Graph#13
 — 5012 HPU Pressure



Legend Graph#14
 — 5012 HPU Valve Current



Legend Graph#15
 — 5012 MC Reference



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	Time : 17.276	Rate : 2.9

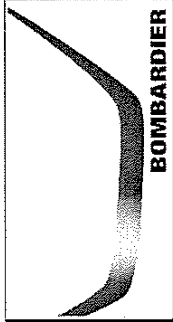
Mean Calculation from channel Name: [I]/5011 Accel-2_Hz

Name	Jerk#	Time 1	Time 2	Y1	Y2	dX	dY	Slope
StandStill To Power	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Power To Coast	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coast To Brake	3	50.416	51.712	0.354	2.854	1.296	2.500	1.9
Power To Brake (No Coast)	4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Caution Stop	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brake To Coast	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coast To Power	7	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brake To Power (No Coast)	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Not Used	9	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Acceleration/Deceleration Data Table Calculation

Name	Type#	Time 1	Time 2	Y1	Y2	dX	Distance	Rate
Deceleration	1	52.204 Sec	69.480 Sec	52.0 MPH	5.0 MPH	17.276 Sec	597 Ft	2.9 Mph/Sec
Acceleration	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Mean Calculation from channel Name [I]/5011 Accel-2_Hz



Project No: 76

Lead Technician: G. Tremblay / J. Beauchemin

Run Number: 8030-B2

Cursor 1: 73.768

System:

Braking Performances Test

Report Date:

11/11/2009 13:22:04

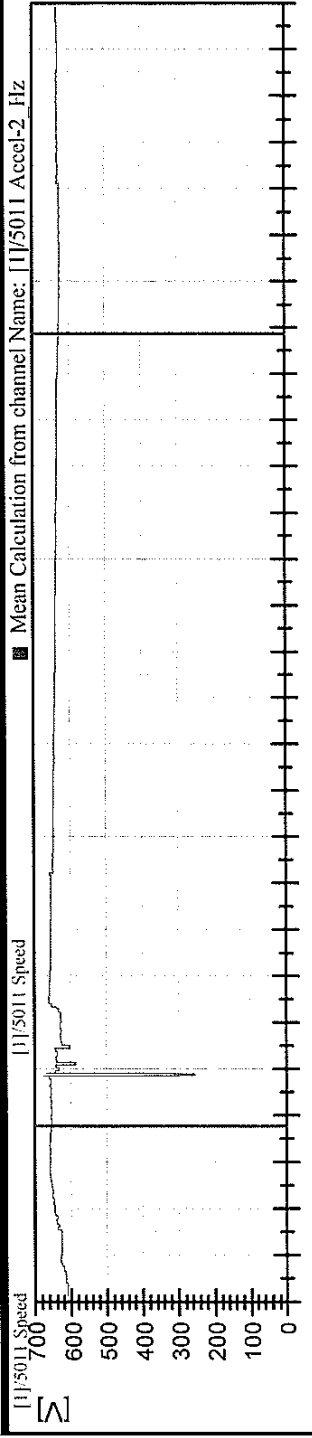
BTP-No: 8030

Sheet No: 1 / 6

Test Description: Maximum Dynamic Brake @ 55 mph - Northbound

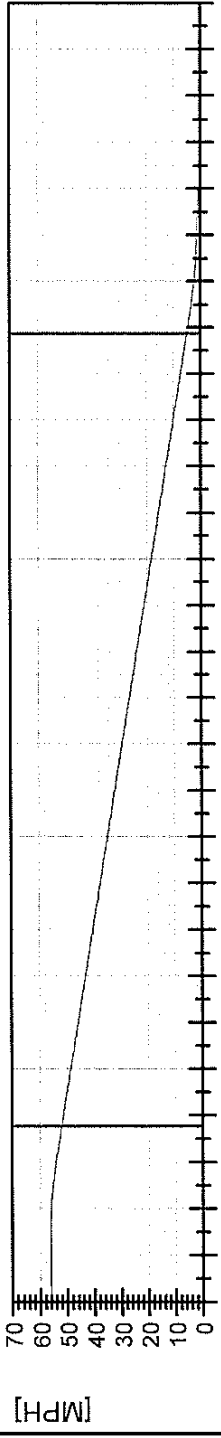
Cursor 2: 90.874 Distance: 592 Time: 17.106 Rate: -2.8

Mean Calculation from channel Name: [1]/5011 Accel-2_Hz



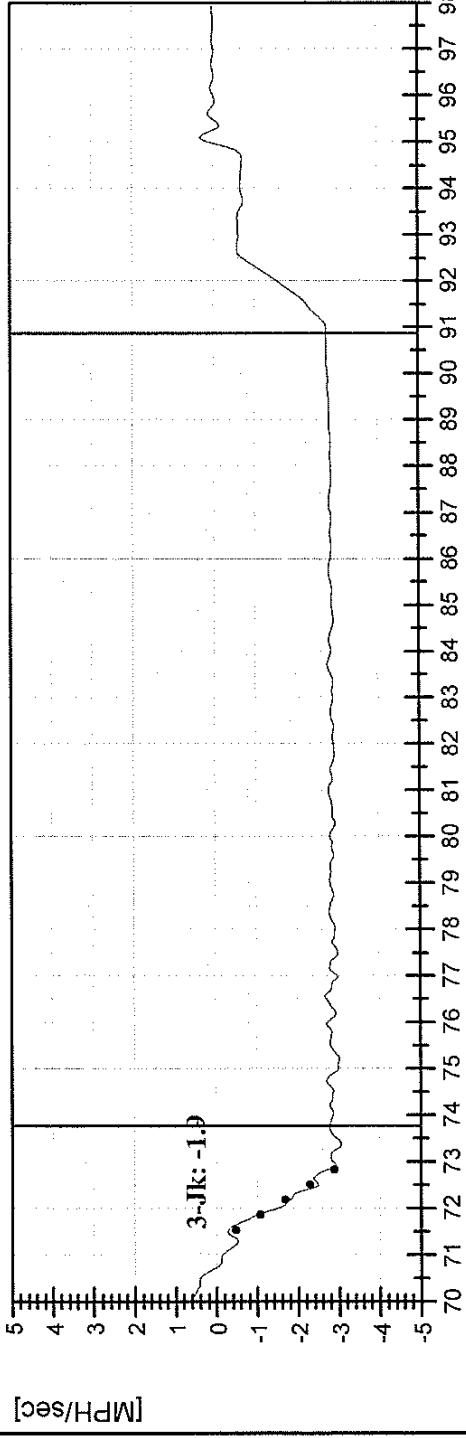
Legend Graph#1

— 5011 Line Voltage



Legend Graph#2

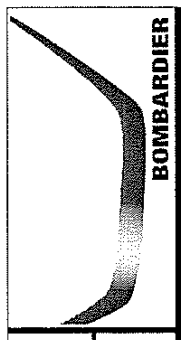
— 5011 Speed



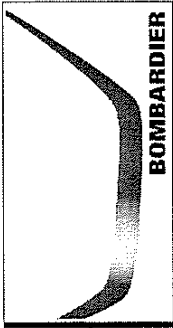
Legend Graph#3

— 5011 Accel-2_Hz
•• Jk_3

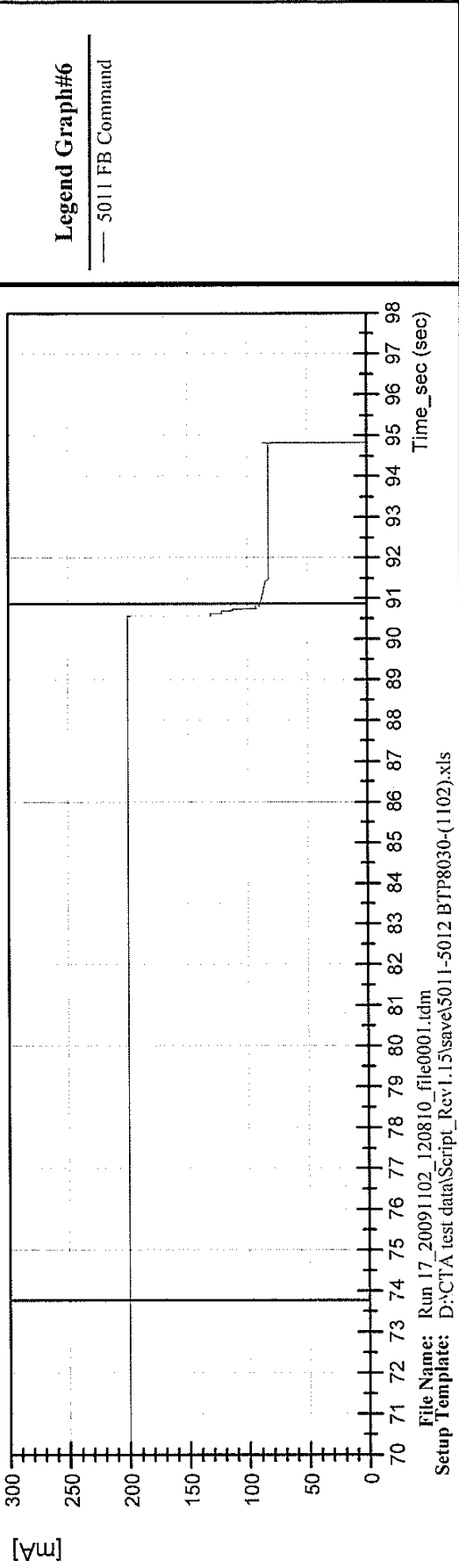
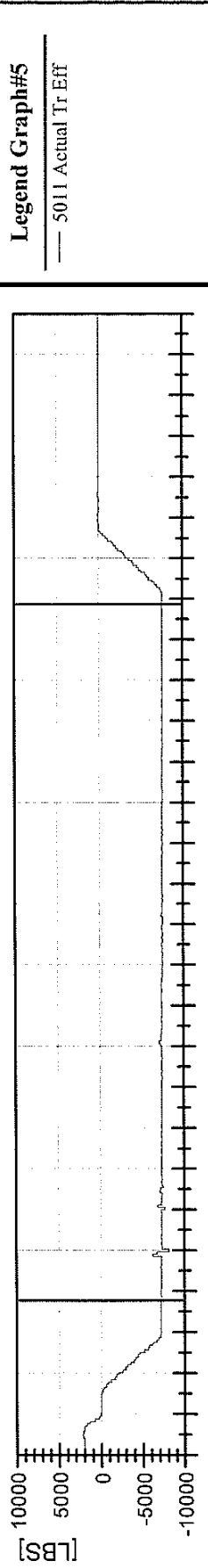
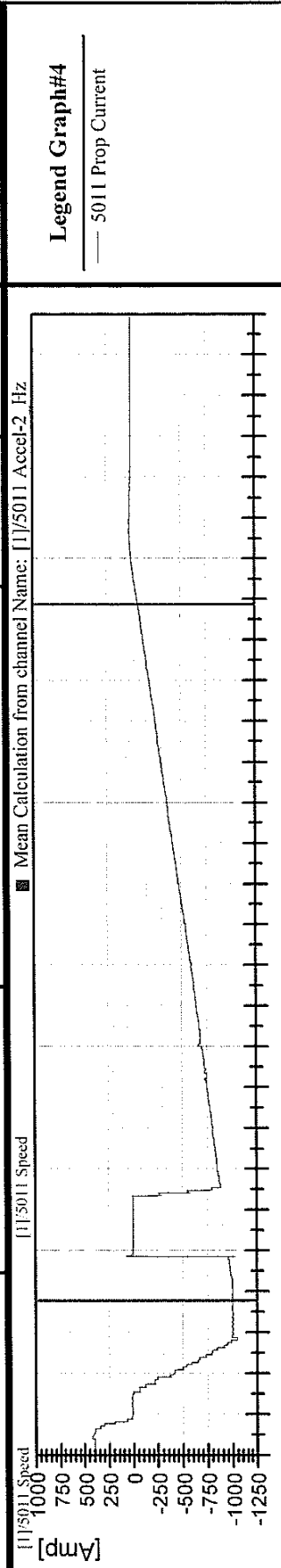
File Name: Run 17_20091102_120810_file0001.tdm
Setup Template: D:\CTA test data\Script_Rev1.15\save\5011-5012 BTP8030-(1102).xls



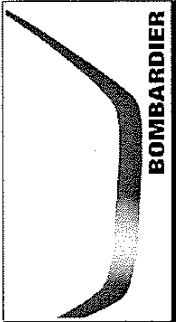
BOMBARDIER



Project No : 76
Lead Technician : G. Trenblay / J. Beauchemin
Run Number : 8030-B2
Cursor 1 : 73.768
Cursor 2 : 90.874
Distance : 592
Time : 17.106
Rate : -2.8
System : Braking Performances Test
Report Date : 11/11/2009 13:22:06
BTP-No : 8030
Sheet No : 2 / 6



File Name: Run_17_20091102_120810_file0001.idm
 Setup Template: D:\CTA test data\Script_Rev1.15\save5011-5012 BTP8030-(1102).xls

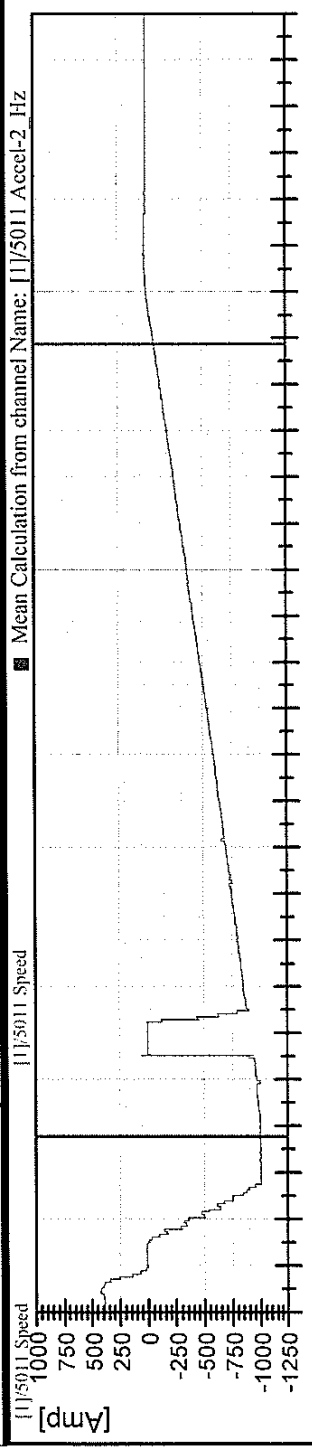


BOMBARDIER

Project No: 76
 Lead Technician: G. Tremblay / J. Beauchemin
 Run Number: 8030-B2
 Cursor 1: 73.768
 Cursor 2: 90.874
 Time: 17.106
 Rate: -2.8

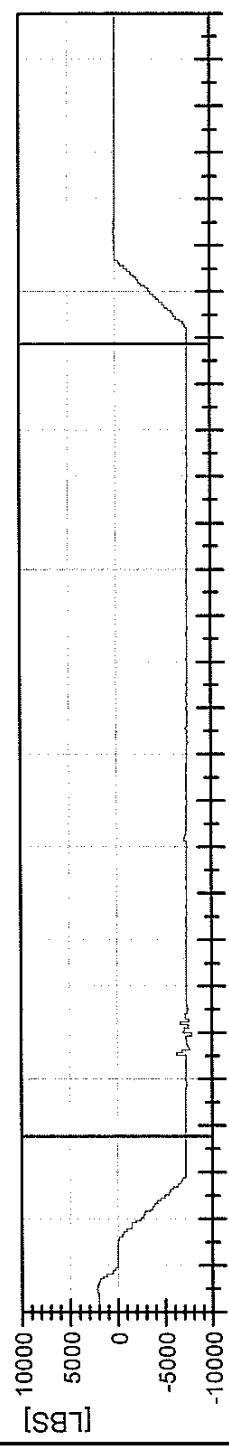
System: **Braking Performances Test**
 Report Date: 11/11/2009 13:22:06
 BTP-No: 8030
 Sheet No: 3 / 6

Test Description: Maximum Dynamic Brake @ 55 mph - Northbound
 Mean Calculation from channel Name: [1]/5011 Accel-2 Hz



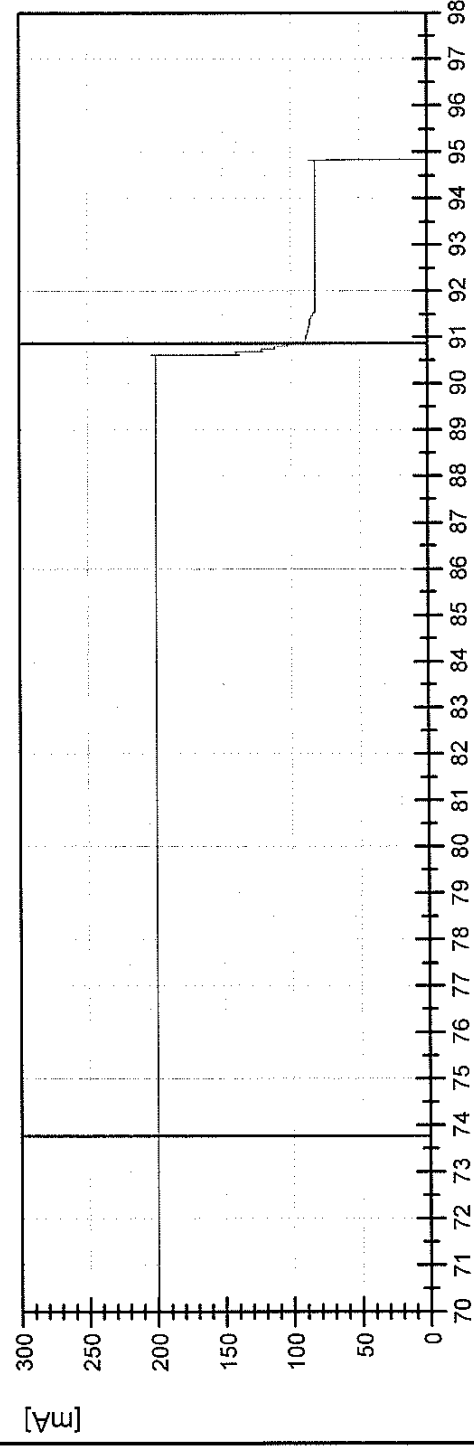
Legend Graph#7

— 5012 Prop Current



Legend Graph#8

— 5012 Actual Tr Eff

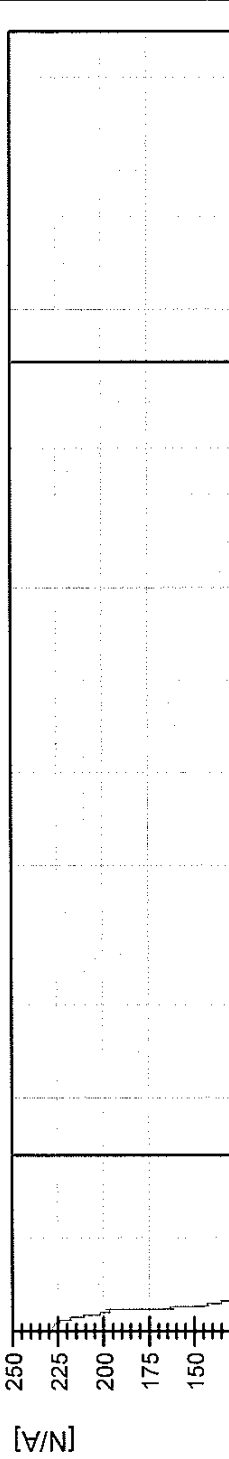
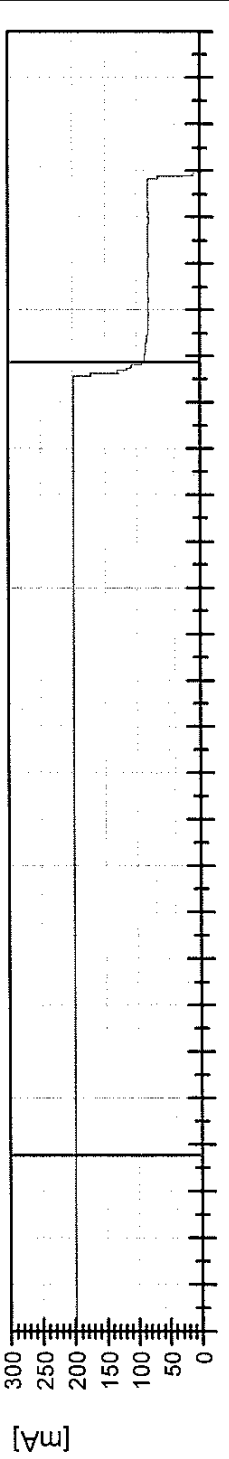
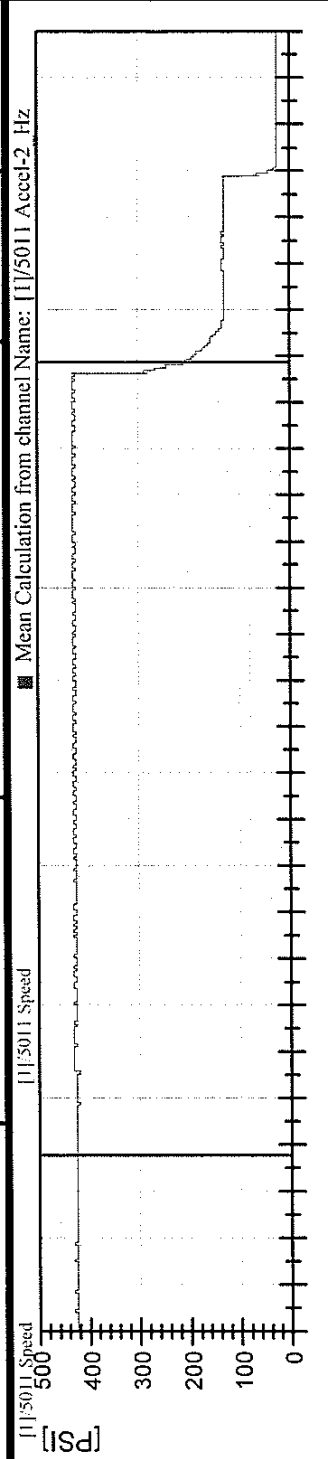
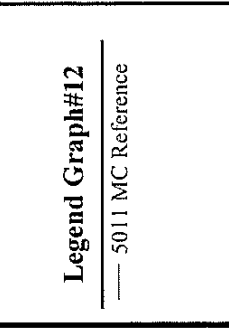
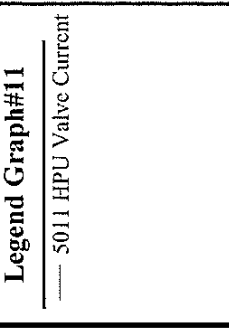
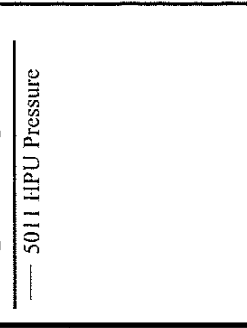


Legend Graph#9

— 5012 FB Command

File Name: Run 17 20091102_120810_file0001.tdm
 Setup Template: D:\CTA test data\Script_Rev1.15(save)\5011-5012 BTP8030-(1102).xls

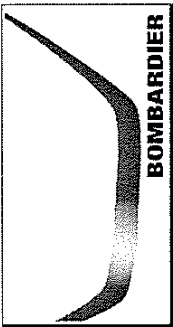
Project No : 76	System : Braking Performances Test	Report Date : 11/11/2009 13:22:07
Lead Technician : G. Tremblay / J. Beauchemin		BTP-No : 8030 Sheet No : 4 / 6
Run Number : 8030-B2	Test Description : Maximum Dynamic Brake @ 55 mph - Northbound	
Cursor 1 : 73.768	Cursor 2 : 90.874 Distance : 592 Time : 17.106 Rate : -2.8	



Mean Calculation from channel Name: [1]/5011 Accel-2_Hz

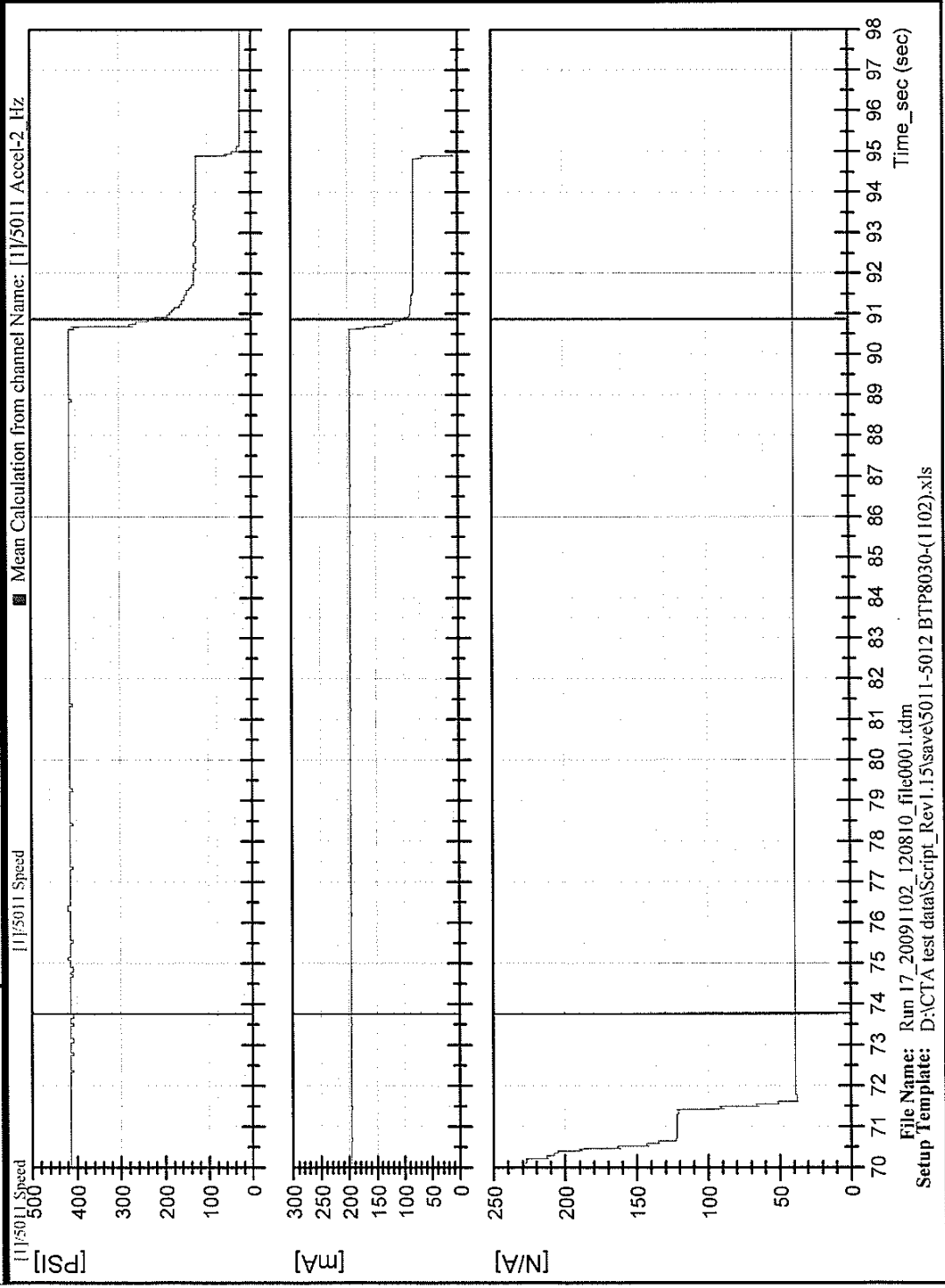
File Name: Run 17_20091102_120810_file0001.tdm

Setup Template: D:\CTA test data\Script_Rev1.15\save\5011-5012 BTP8030-(1102).xls



BOMBARDIER

Project No: 76
 Lead Technician: G. Tremblay / J. Beauchemin
 Run Number: 8030-B2
 Cursor 1: 73.768
 System: Braking Performances Test
 Report Date: 11/11/2009 13:22:07
 BTP-No: 8030
 Sheet No: 5 / 6



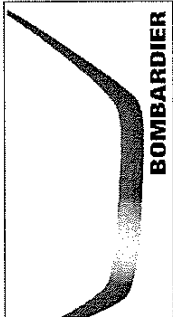
Project No : 76	System : Braking Performances Test	Report Date : 11/11/2009 13:22:07
Lead Technician : G. Tremblay / J. Beauchemin		
Run Number : 8030-B2	Test Description : Maximum Dynamic Brake @: 55 mph - Northbound	BTP-No : 8030
Cursor 1 : 73.768	Cursor 2 : 90.874	Sheet No : 6 / 6
	Distance : 592	
	Time : 17.106	
	Rate : -2.8	

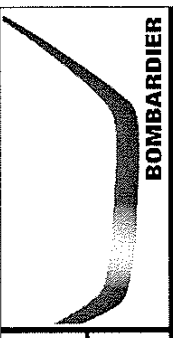
Mean Calculation from channel Name: [1]/5011 Accel-2_Hz

Name	Jerk#	Time 1	Time 2	Y1	Y2	dX	dY	Slope
StandStill To Power	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Power To Coast	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coast To Brake	3	71.546	72.910	-0.300	-2.919	1.364	-2.619	-1.9
Power To Brake (No Coast)	4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Caution Stop	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brake To Coast	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coast To Power	7	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brake To Power (No Coast)	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Not Used	9	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Acceleration/Deceleration Data Table Calculation							
Name	Type#	Time 1	Time 2	Y1	Y2	dX	Rate
Deceleration	1	73.768 Sec	90.874 Sec	51.9 MPH	5.0 MPH	17.106 Sec	-2.8 Mph/Sec
Acceleration	2	N/A	N/A	N/A	N/A	N/A	N/A

Mean Calculation from channel Name[1]/5011 Accel-2_Hz





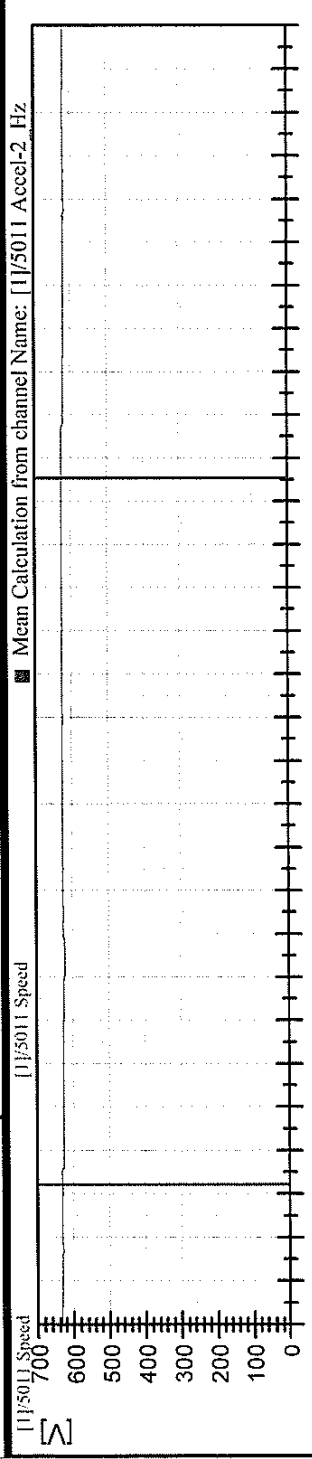
BOMBARDIER

Project No : 76
 Lead Technician : G. Tremblay / J. Beauchemin
 Run Number : 8030-B3
 Cursor 1 : 67.220

System : **Braking Performances Test**
 Report Date : 11/10/2009 12:07:07
 BTP-No : 8030
 Sheet No : 1 / 6

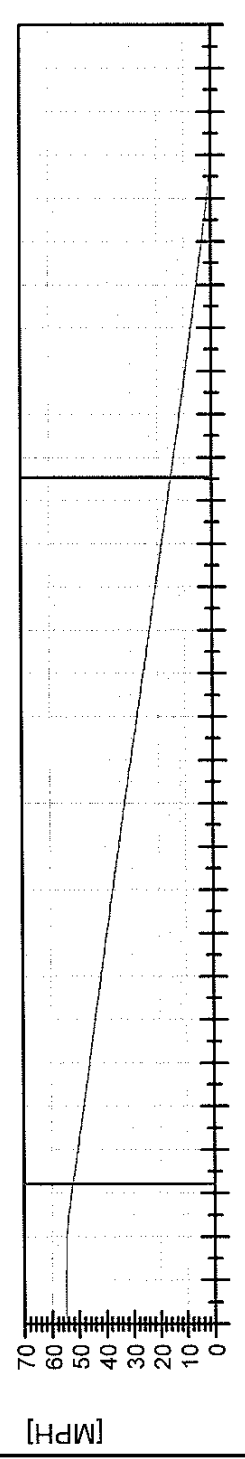
Test Description : Maximum Friction Brake @ 55 mph - Southbound
 Distance : 432
 Time : 16.316
 Rate : 2.4
 Cursor 2 : 83.536

Mean Calculation from channel Name: [1]/5011 Accel-2, Hz



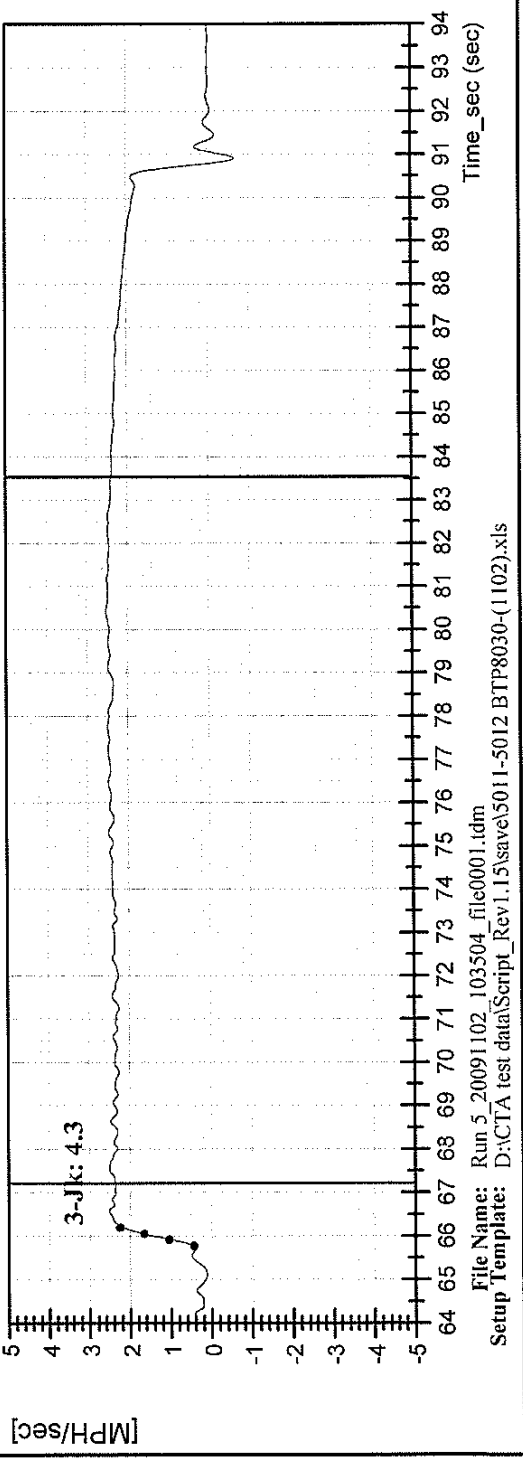
Legend Graph#1

— 5011 Line Voltage



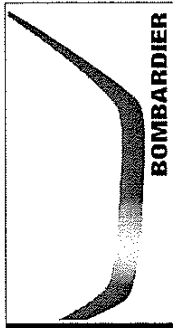
Legend Graph#2

— 5011 Speed

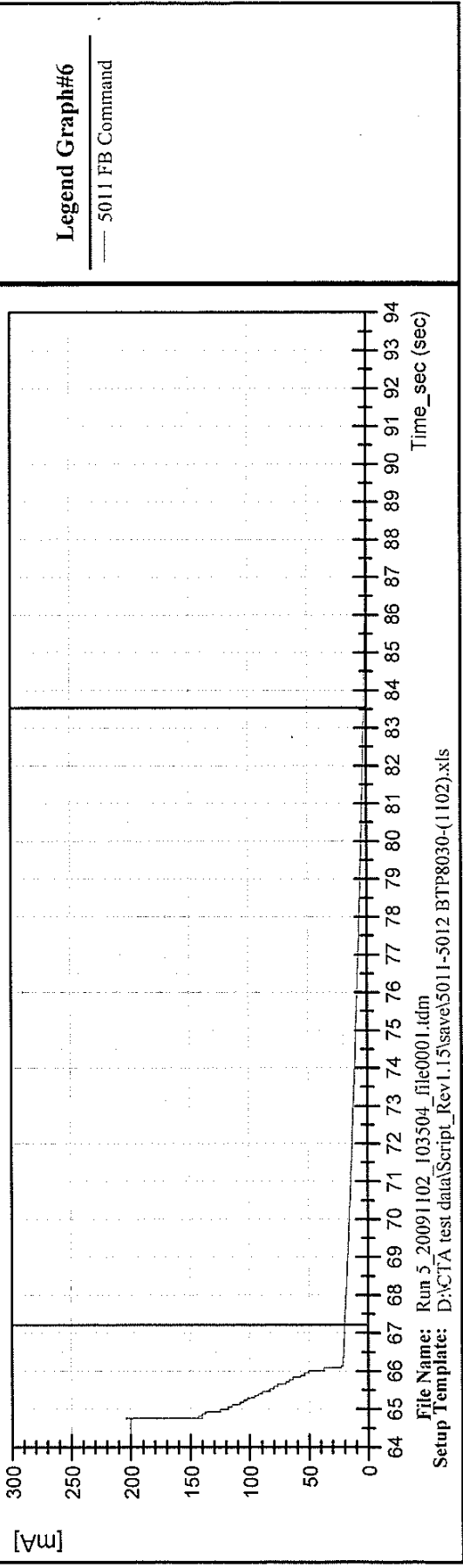
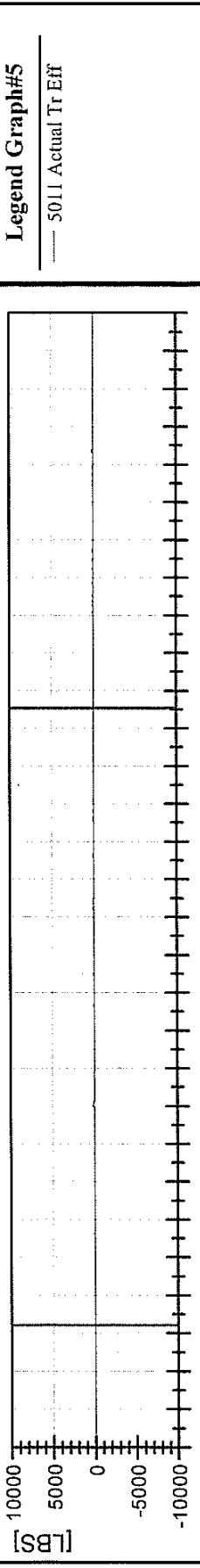
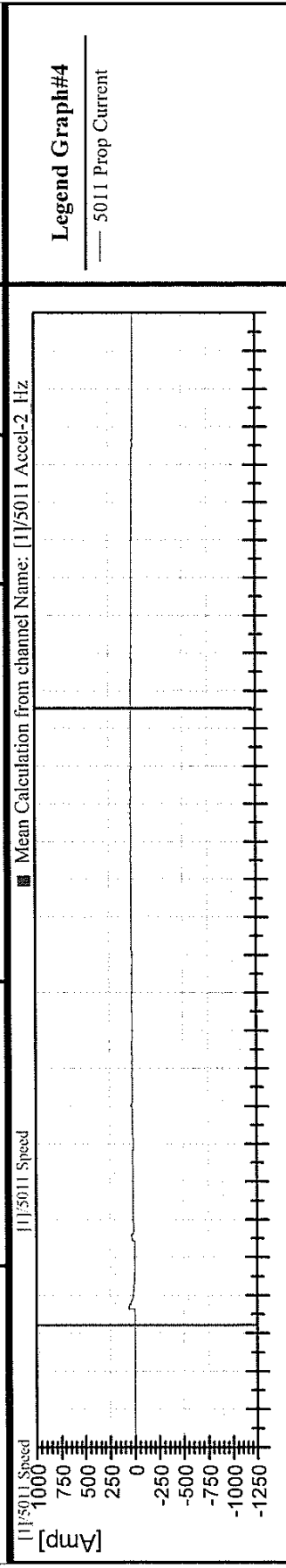


Legend Graph#3

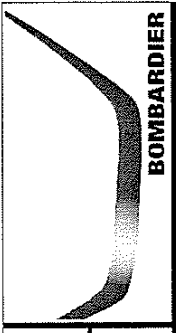
— 5011 Accel-2, Hz
 •• Jk_3



Project No : 76
Lead Technician : G. Tremblay / J. Beauchemin
Run Number : 8030-B3
Cursor 1 : 67.220
System : Braking Performances Test
Report Date : 11/10/2009 12:07:07
Sheet No : 2 / 6
Test Description : Maximum Friction Brake @ 55 mph - Southbound
Cursor 2 : 83.536 **Distance :** 452 **Time :** 16.316 **Rate :** 2.4
BTP-No : 8030



Mean Calculation from channel Name: [1]/5011 Accel-2 Hz
 File Name: Run_5_20091102_103504_file0001.tdm
 Setup Template: D:\CTA test data\Script_Rev1.1\save\5011-5012 BTP8030-(1102).xls



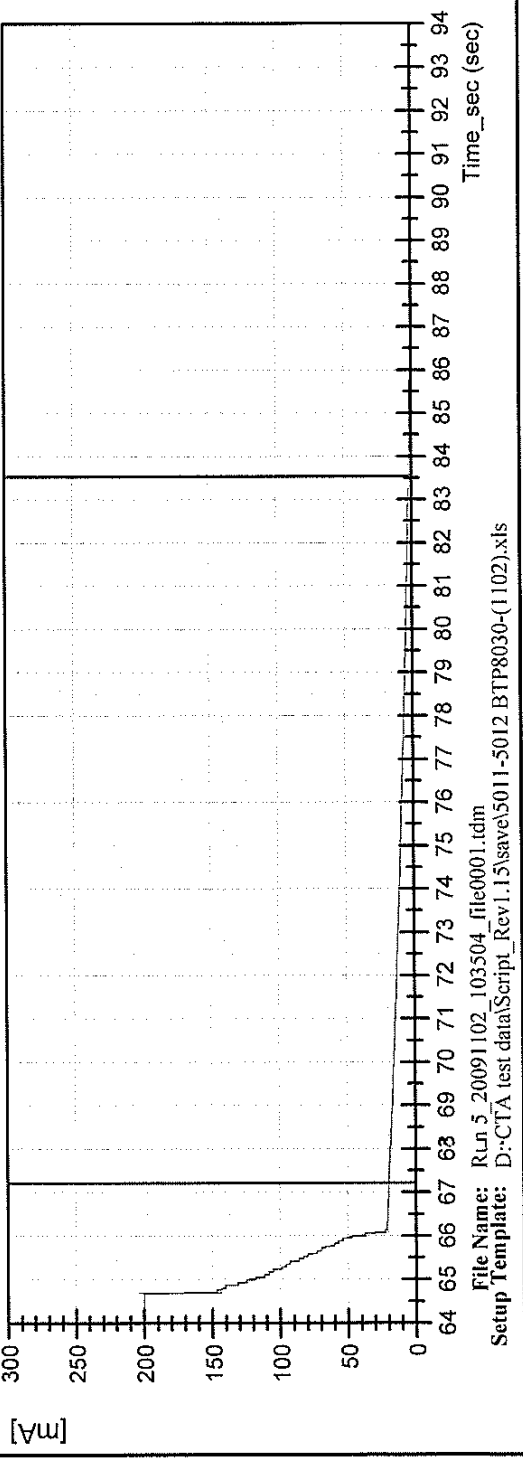
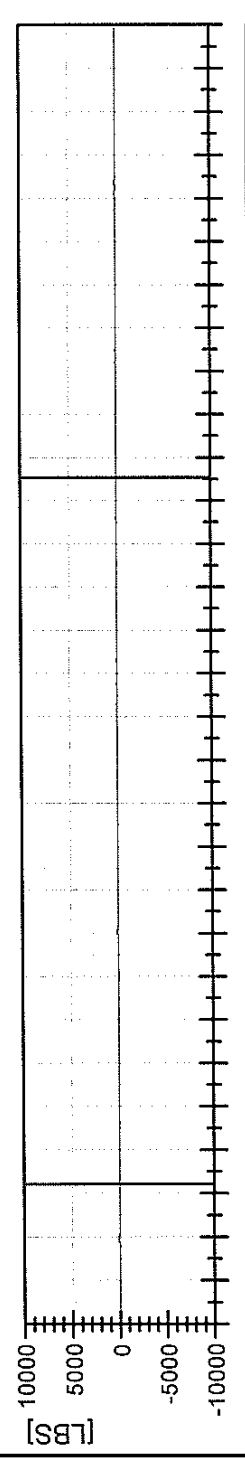
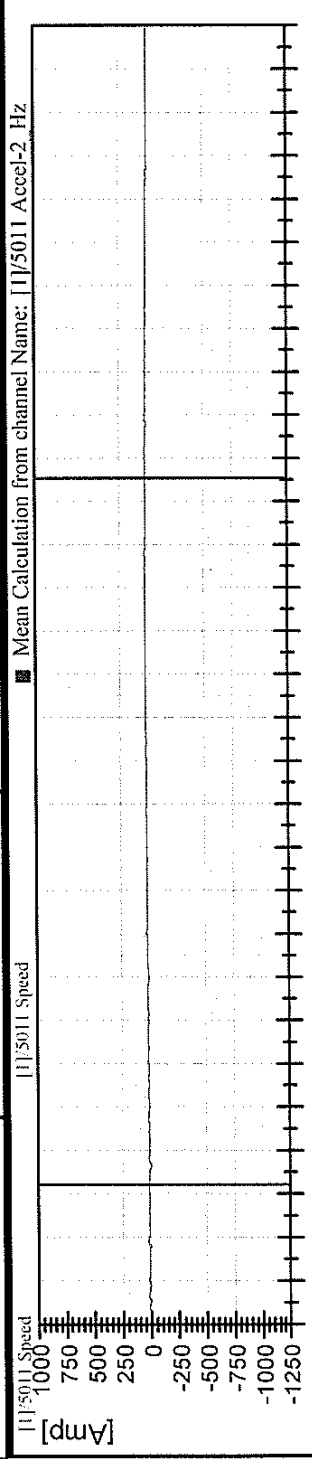
BOMBARDIER

Project No : 76
 Lead Technician : G. Tremblay / J. Beauchemin
 Run Number : 8030-B3
 Cursor 1 : 67.223

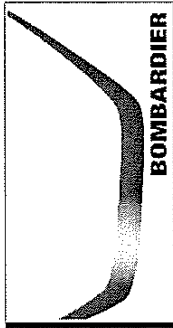
System : **Braking Performances Test**
 Report Date : 11/10/2009 12:07:08
 RTP-No : 8030
 Sheet No : 3 / 6

Test Description : Maximum Friction Brake @ 55 mph - Southbound
 Distance : 432
 Time : 16.316
 Rate : 2.4
 Cursor 2 : 83.536

Mean Calculation from channel Name: [I]5011 Accel-2_Hz

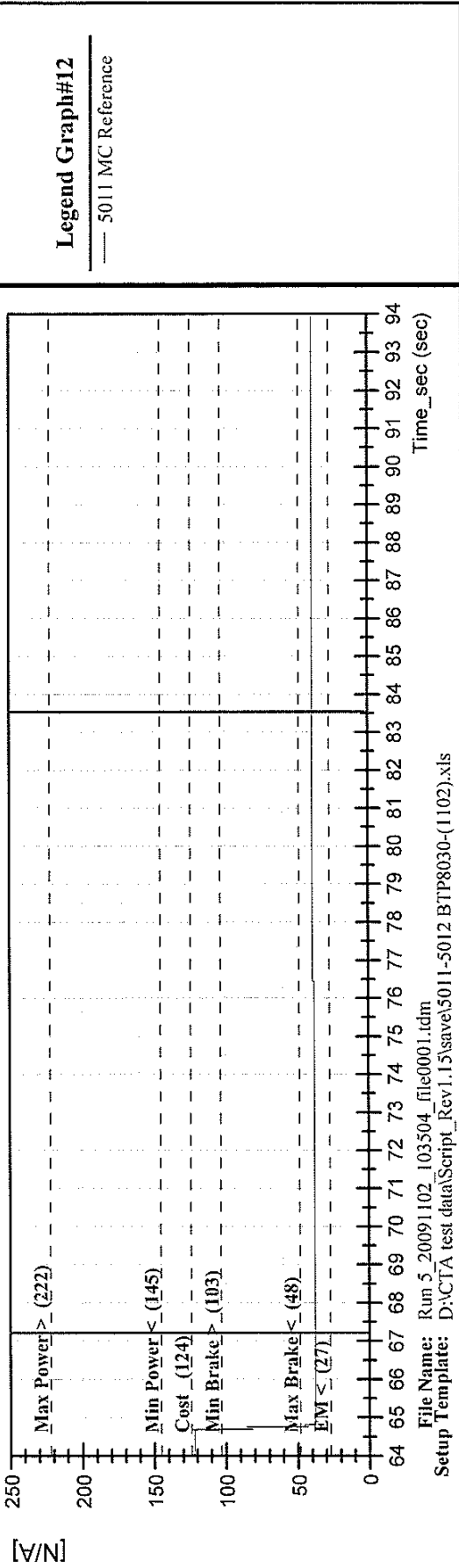
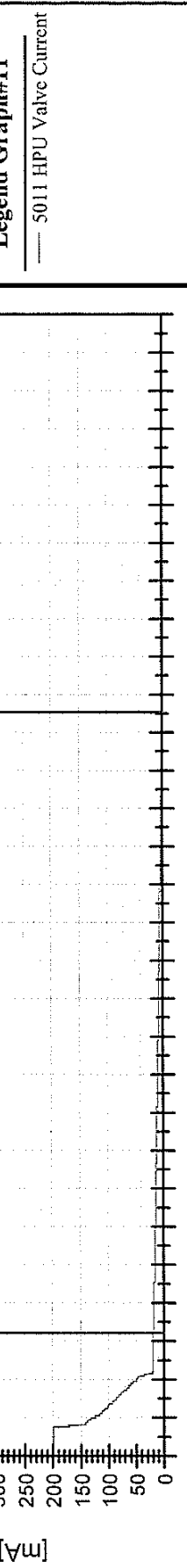
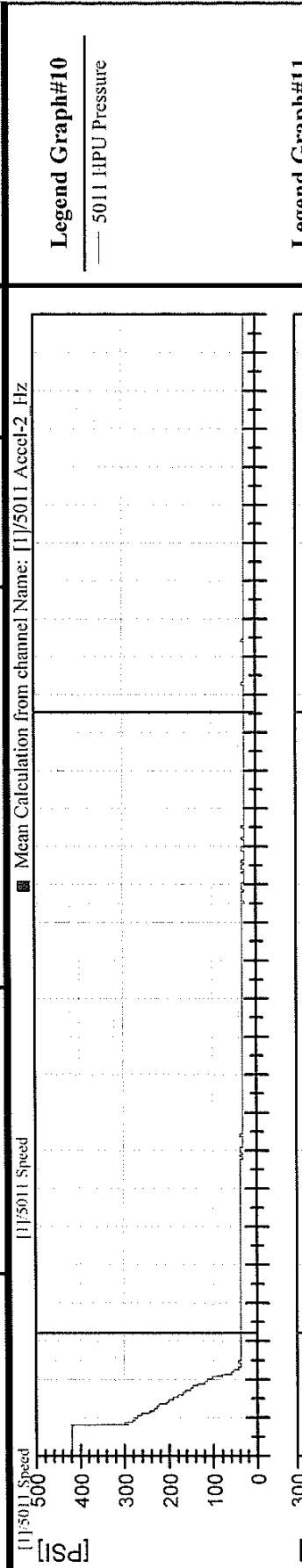


File Name: Run 5 20091102_103504_file0001.tdm
 Setup Template: D:\CTA test data\Script_Rev1.15\save\5011-5012 BTP8030-(1102).xls

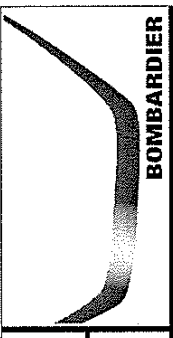


BOMBARDIER

Project No : 76
 Lead Technician : G. Tremblay / J. Beauchemin
 Run Number : 8030-B3
 Cursor 1 : 67.220
 System : Braking Performances Test
 Report Date : 11/10/2009 12:07:08
 BTP-No : 8030
 Sheet No : 4 / 6

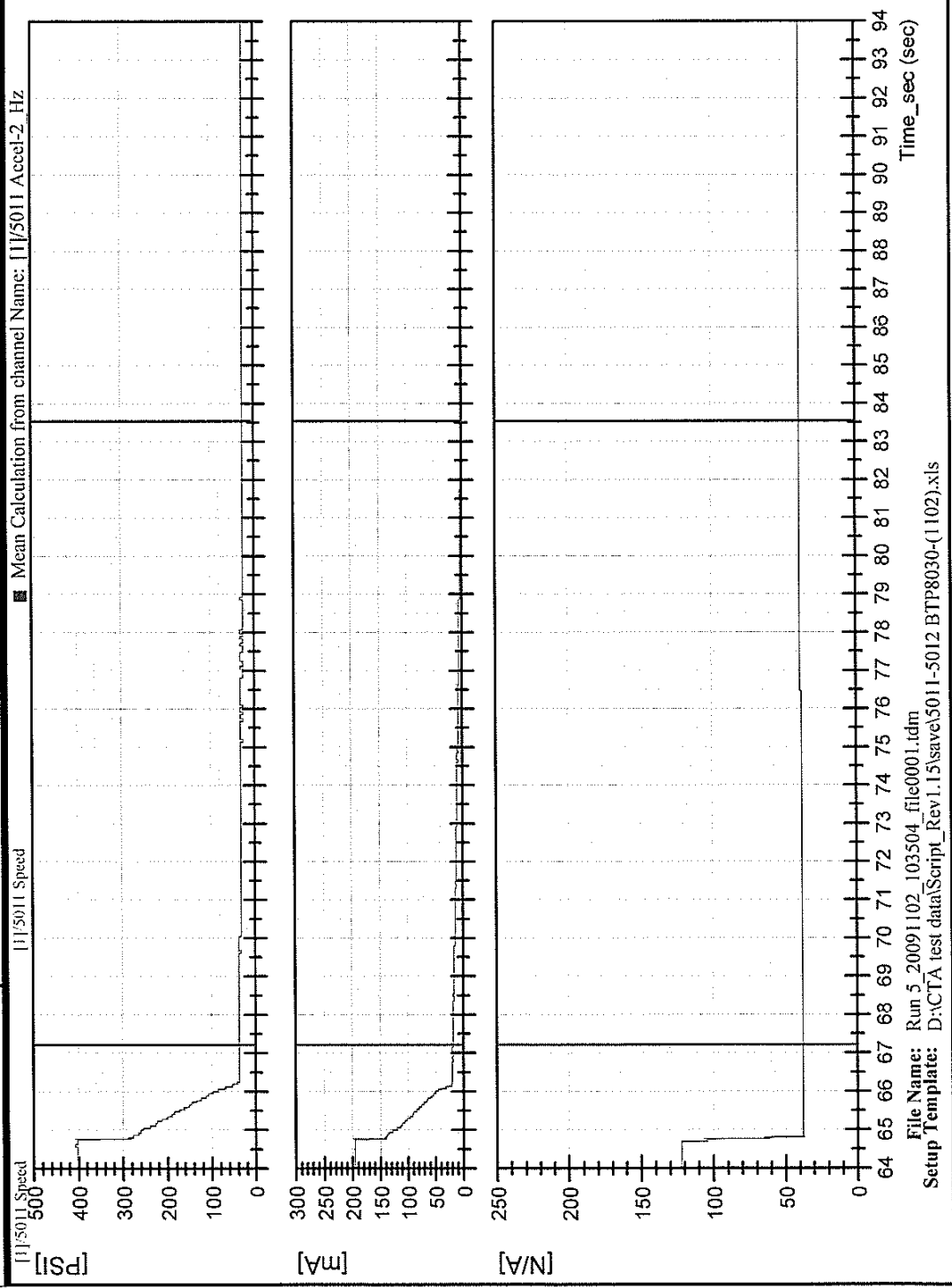


File Name: Run 5_20091102_103504 file0001.idm
 Setup Template: D:\CTA test data\Script_Rev1.15\save\5011-5012 BTP8030-(1102).xls



BOMBARDIER

Project No : 76
 Lead Technician : G. Tremblay / J. Beauchemin
 Run Number : 8030-B3
 Cursor 1 : 67.220
 System : Braking Performances Test
 Report Date : 11/10/2009 12:07:09
 BTP-No : 8030
 Sheet No : 5 / 6



Project No : 76	System : Braking Performances Test	Report Date : 11/10/2009 12:07:09
Lead Technician : G. Tremblay / J. Beauchemin		BTP-No : 8030
Run Number : 8030-B3	Test Description : Maximum Friction Brake @ 55 mph - Southbound	Sheet No : 6 / 6
Cursor 1 : 67.220	Cursor 2 : 83.536	
	Time : 16.316	Rate : 2.4

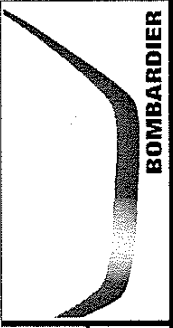


Mean Calculation from channel Name: [1]/5011 Accel-2_Hz

Name	Jerk#	Time 1	Time 2	Y1	Y2	dX	dY	Slope
StandStill To Power	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Power To Coast	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coast To Brake	3	65.778	66.246	0.474	2.282	0.468	1.808	4.3
Power To Brake (No Coast)	4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Caution Stop	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brake To Coast	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coast To Power	7	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brake To Power (No Coast)	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Not Used	9	N/A	N/A	N/A	N/A	N/A	N/A	N/A

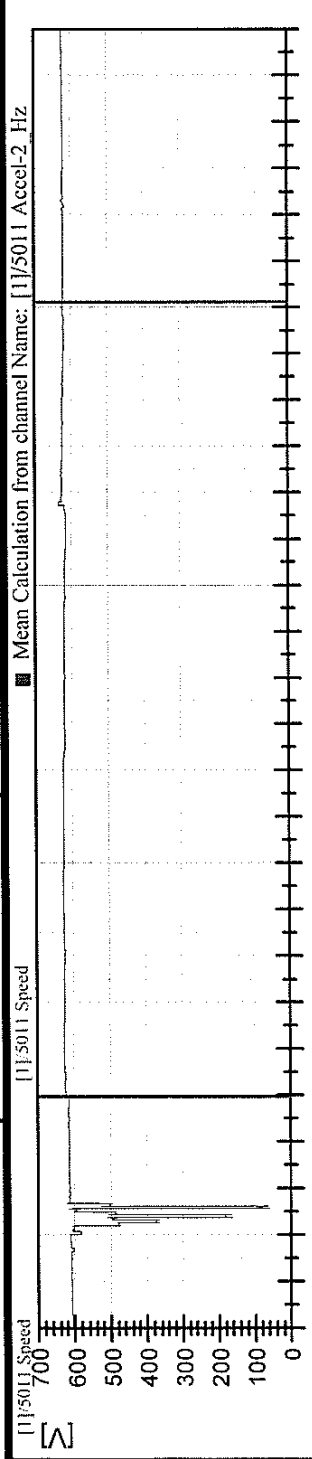
Acceleration/Deceleration Data Table Calculation								
Name	Type#	Time 1	Time 2	Y1	Y2	dX	Distance	Rate
Deceleration	1	67.220 Sec	83.536 Sec	52.0 MPH	15.0 MPH	16.316 Sec	452 Ft	2.4 Mph/Sec
Acceleration	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Mean Calculation from channel Name [1]/5011 Accel-2_Hz

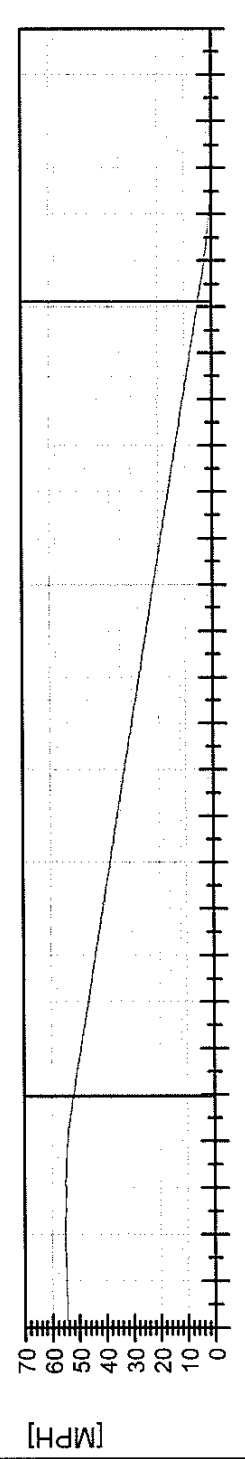


Project No : 76
Lead Technician : G. Tremblay / J. Beauchemin
Run Number : 8030-B7
Cursor 1 : 46.966
System : Braking Performances Test
Report Date : 11/10/2009 13:16:17
BTP-No : 8030
Sheet No : 1 / 6
Test Description : Maximum Dynamic Brake (Deadman) @ 55 mph - Southbound
Distance : 64.116
Time : 17.150
Rate : 2.9
Cursor 2 : [] 5011 Speed
 Mean Calculation from channel Name: [] 5011 Accel-2_Hz

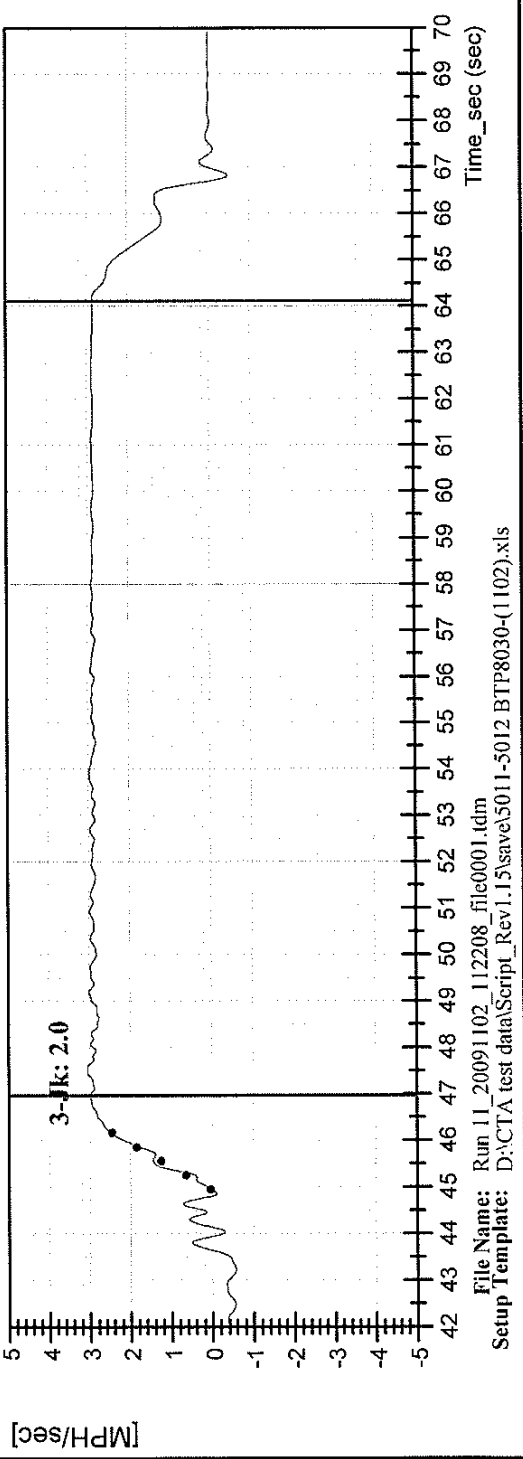
Legend Graph#1
 — 5011 Line Voltage



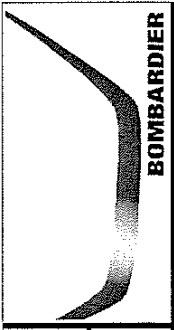
Legend Graph#2
 — 5011 Speed



Legend Graph#3
 — 5011 Accel-2_Hz
 •• Jk_3



File Name: Run 11_20091102_112208_flic0001.idm
 Setup Template: D:\CTA_test data\Script_Rev1.15\save\5011-5012_BTP8030-(1102).xls



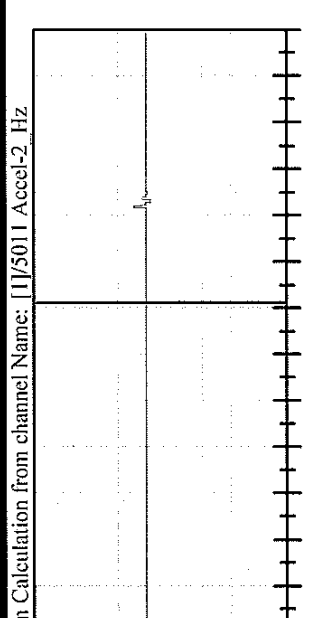
BOMBARDIER

Project No : 76
 Lead Technician : G. Tremblay / J. Beauchemin
 Run Number : 8030-B7
 Cursor 1 : 46.966

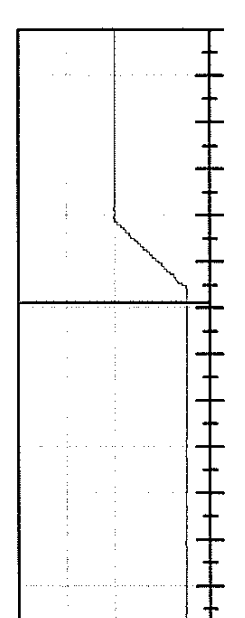
System : Braking Performances Test
 Report Date : 11/10/2009 13:16:17
 BTP-No : 8030
 Sheet No : 2 / 6

Test Description : Maximum Dynamic Brake (Deadman) @ 55 mph - Southbound
 Cursor 2 : 64.116 Distance : 594 Time : 17.150 Rate : 2.9
 Mean Calculation from channel Name: [1]/5011 Speed

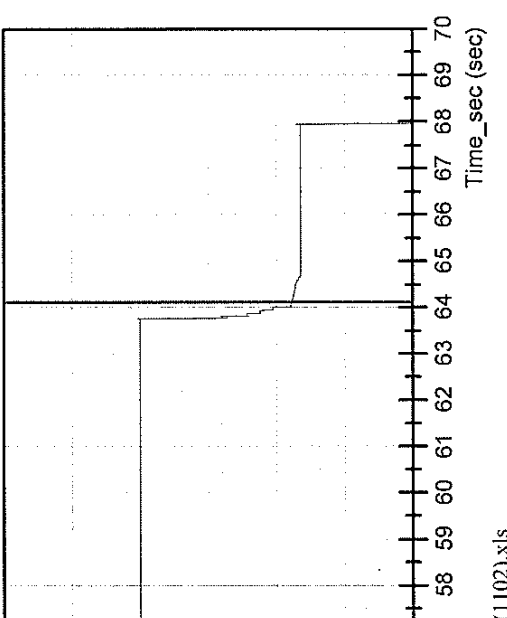
Legend Graph#4
 — 5011 Prop Current



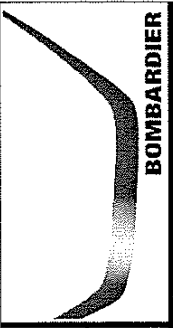
Legend Graph#5
 — 5011 Actual Tr Eff



Legend Graph#6
 — 5011 FB Command



Time_sec (sec)
 File Name: Run 11_20091102_112208_file0001.rdm
 Setup Template: D:\CTA test data\Script_Rev1.15\save\5011-5012 BTP8030-(1102).xls



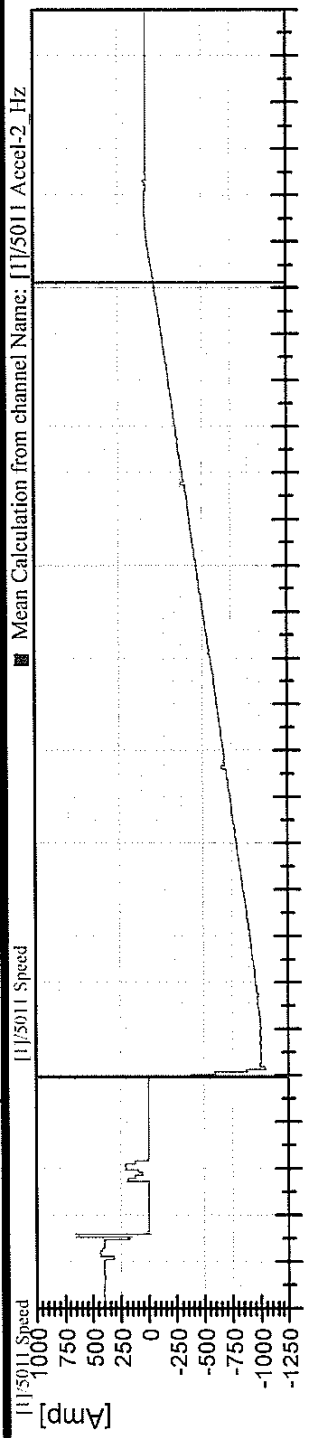
BOMBARDIER

Project No : 76
 Lead Technician : G. Trenblay / J. Beauchemin
 Run Number : 8030-B7
 Cursor 1 : 46.966

System : **Braking Performances Test**
 Report Date : 11/10/2009 13:16:18

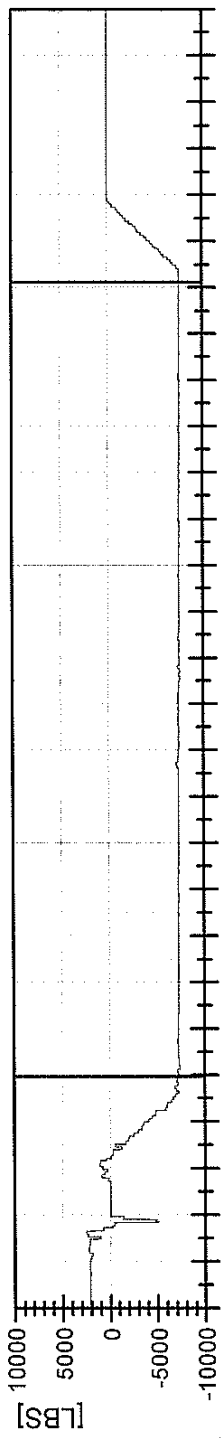
BTP-No : 8030
 Sheet No : 3 / 6

Test Description : Maximum Dynamic Brake (Deadman) @ 55 mph - Southbound
 Distance : 594 Time : 17.150 Rate : 2.9
 Cursor 2 : 64.116
 Mean Calculation from channel Name: [1]/5011 Accel-2_Hz



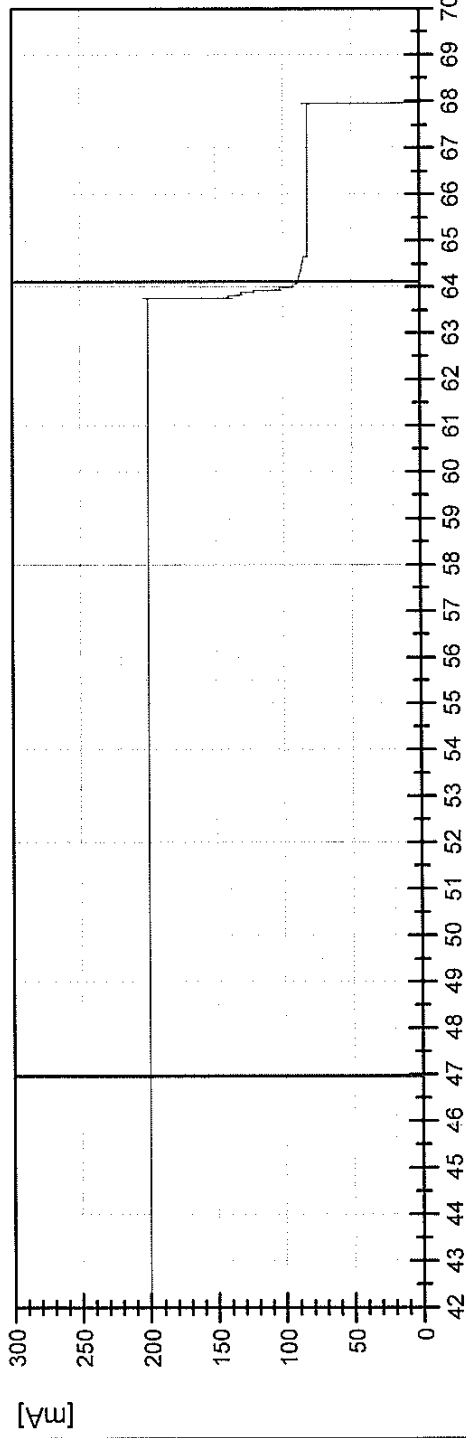
Legend Graph#7

— 5012 Prop Current



Legend Graph#8

— 5012 Actual Tr Eff

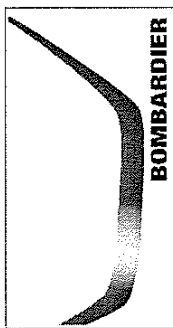


Legend Graph#9

— 5012 FB Command

Time_sec (sec)
 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70

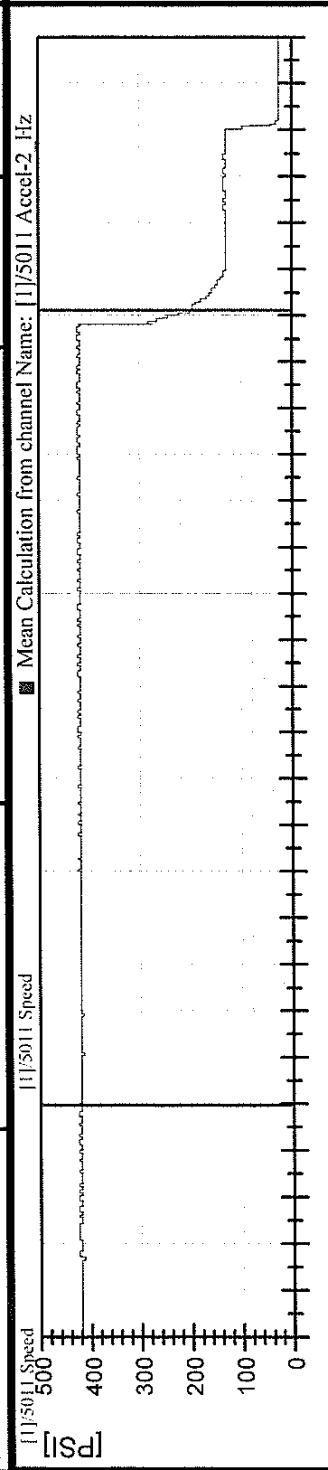
File Name: Run_11_20091102_112208_file0001.tdm
 Setup Template: D:\CTA test data\Script_Rev1.15\save\5011-5012 BTP8030-(1102).xls



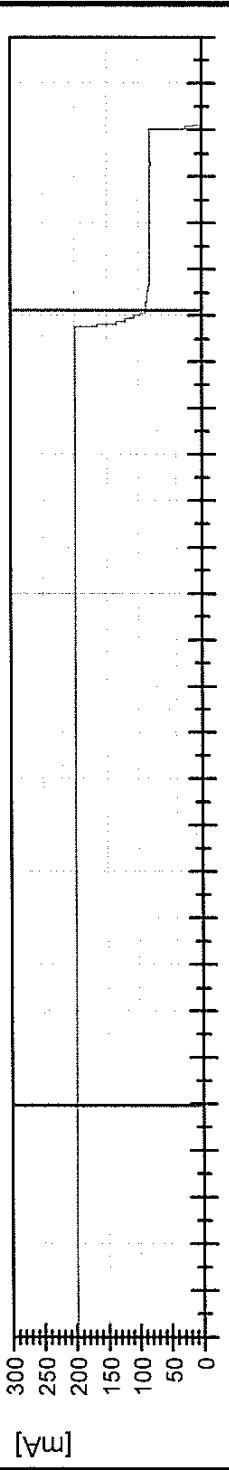
BOMBARDIER

Project No : 76
 Lead Technician : G. Tremblay / J. Beauchemin
 Run Number : 8030-B7
 Cursor 1 : 46.966
 System : Braking Performances Test
 Report Date : 11/10/2009 13:16:18
 Sheet No : 4 / 6
 BTP-No : 8030
 Test Description : Maximum Dynamic Brake (Deadman) @ 55 mph - Southbound
 Cursor 2 : 64.116 Distance : 594 Time : 17.150 Rate : 2.9
 Mean Calculation from channel Name: [1]/5011 Accel-2 Hz

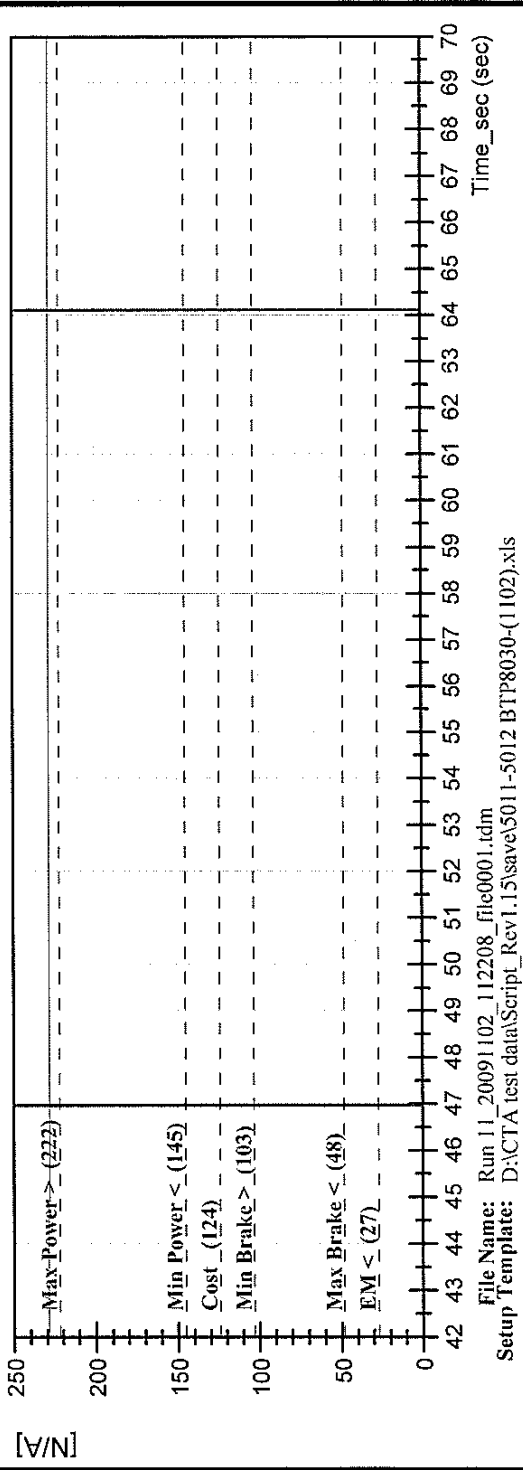
Legend Graph#10
 — 5011 HPU Pressure



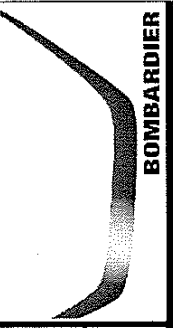
Legend Graph#11
 — 5011 HPU Valve Current



Legend Graph#12
 — 5011 MC Reference



File Name: Run 11_20091102_112208_file0001.idm
 Setup Template: D:\CTA test data\Script_Rev1.15\save\5011-5012 BTP8030-(1102).xls

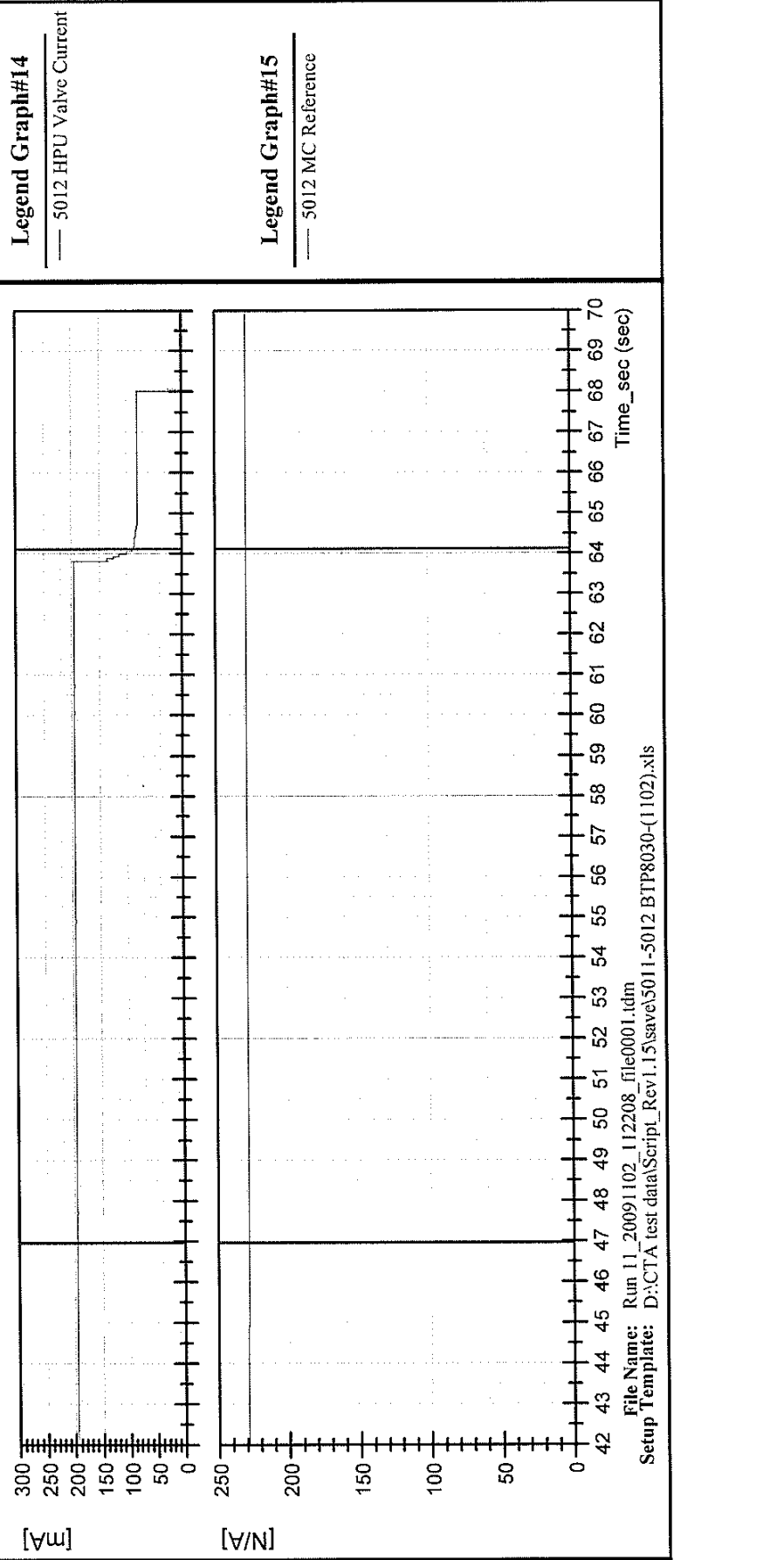
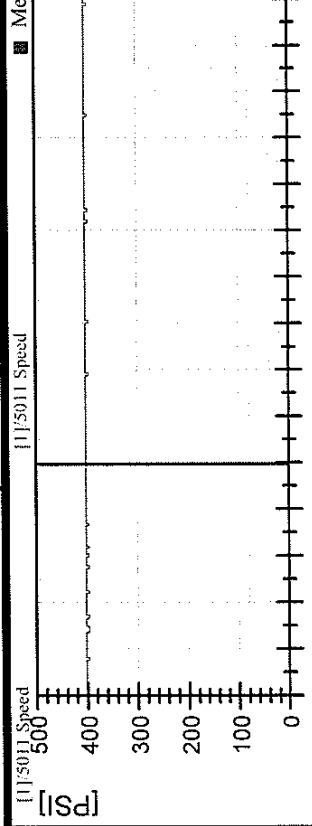
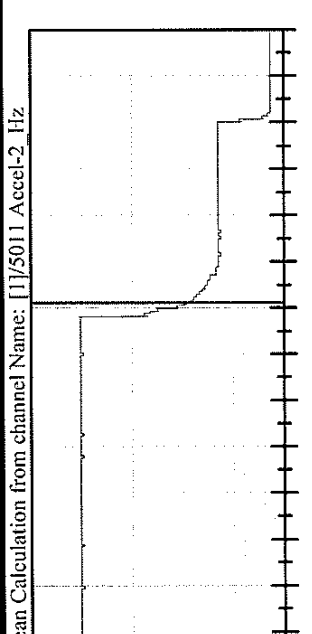


Project No : 76
Lead Technician : G. Trenblay / J. Beauchemin
Run Number : 8030-B7
Cursor 1 : 46.966

System : Braking Performances Test
Report Date : 11/10/2009 13:16:18
BTP-No : 8030
Sheet No : 5 / 6

Test Description : Maximum Dynamic Brakes (Deadman) @ 55 mph - Southbound
Cursor 2 : 64.116
Distance : 594
Time : 17.150
Rate : 2.9

Mean Calculation from channel Name: [1]5011 Accel-2_Hz



File Name: Run 11_20091102_112208_file0001.idm
Setup Template: D:\CTA test data\Script_Rev1.15\save\5011-5012 BTP8030-(1102).xls

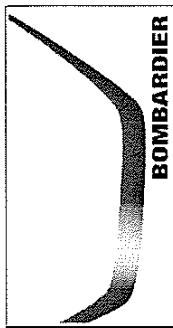
Project No : 76	System : Braking Performances Test	Report Date : 11/10/2009 13:16:19
Lead Technician : G. Tremblay / J. Beauchemin		BTP-No : 8030 Sheet No : 6 / 6
Run Number : 8030-B7	Test Description : Maximum Dynamic Brake (Deadman) @ 55 mph - Southbound	
Cursor 1 : 46.966	Cursor 2 : 64.116	Distance : 594 Time : 17.150 Rate : 2.9

Mean Calculation from channel Name: [I]/5011 Accel-2_Hz

Name	Jerk#	Time 1	Time 2	Y1	Y2	dX	dY	Slope
StandStill To Power	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Power To Coast	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coast To Brake	3	44.952	46.328	0.005	2.666	1.376	2.661	2.0
Power To Brake (No Coast)	4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Caution Stop	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brake To Coast	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coast To Power	7	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brake To Power (No Coast)	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Not Used	9	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Acceleration/Deceleration Data Table Calculation								
Name	Type#	Time 1	Time 2	Y1	Y2	dX	Distance	Rate
Deceleration	1	46.966 Sec	64.116 Sec	52.0 MPH	5.0 MPH	17.150 Sec	594 Ft	2.9 Mph/Sec
Acceleration	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Mean Calculation from channel Name [I]/5011 Accel-2_Hz

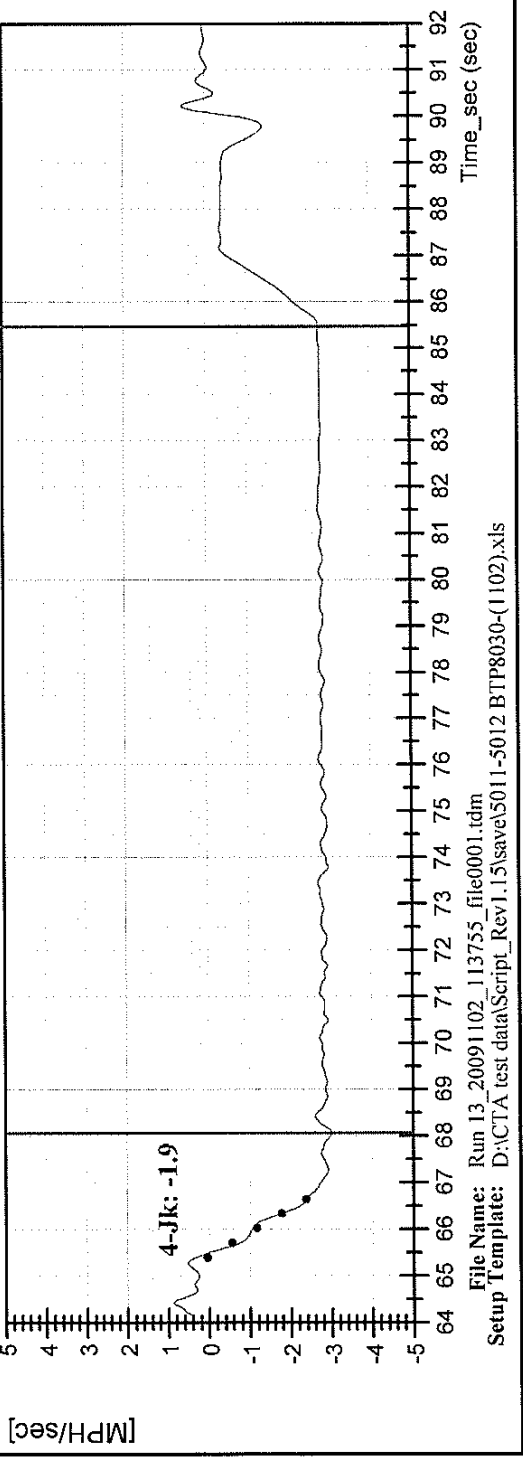
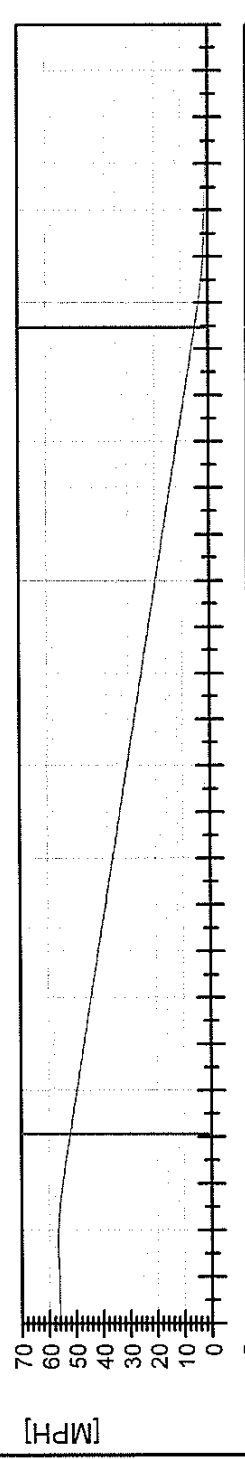
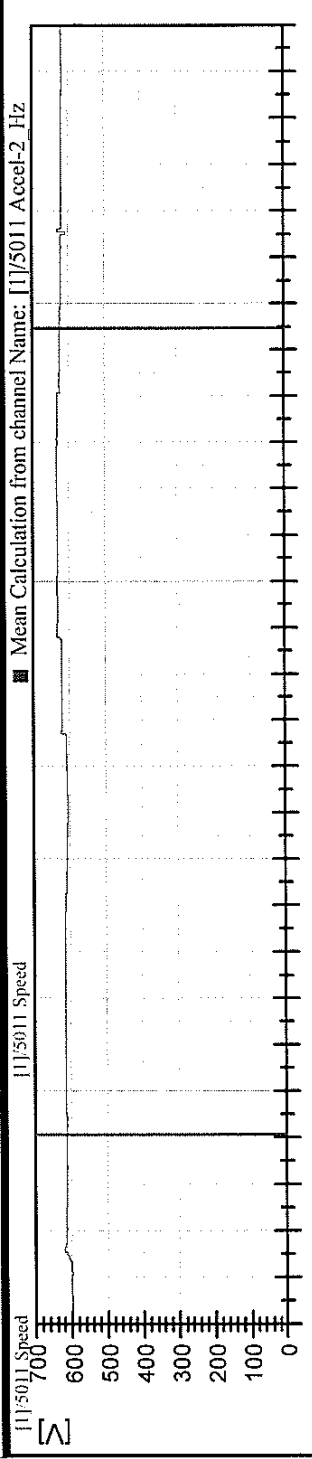
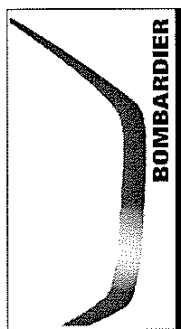


Project No : 76
 Lead Technician : G. Tremblay / J. Beauchemin
 Run Number : 8030-B8
 Cursor 1 : 68.058

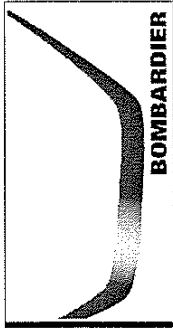
System : **Braking Performances Test**
 Report Date : 11/10/2009 13:22:13
 BTP-No : 8030
 Sheet No : 1 / 6

Test Description :
 Maximum Dynamic Brake (Deadman) @ 55 mph - Northbound
 Distance : 605 Time : 17.406 Rate : -2.8
 Cursor 2 : 85.464

Mean Calculation from channel Name: [1]/5011 Accel-2_Hz

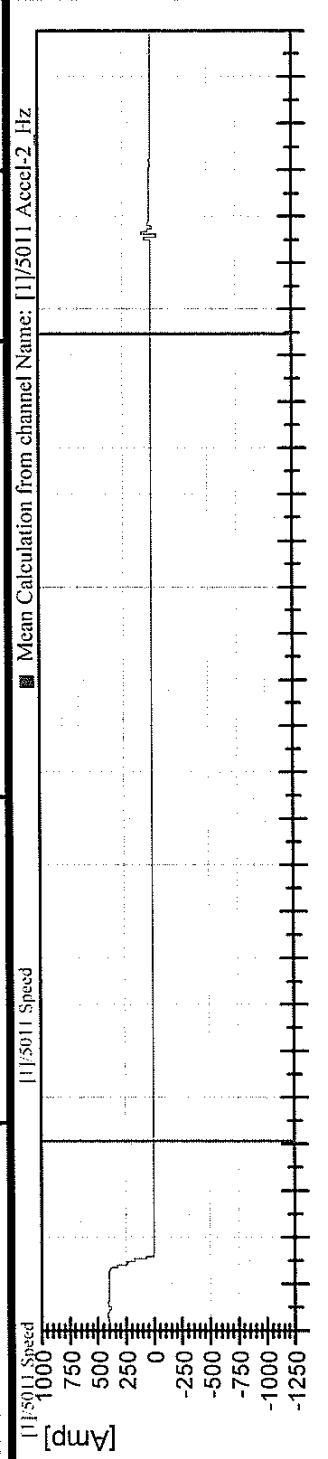


File Name: Run 13_20091102_113755_file0001.tdm
 Setup Template: D:\CTA test data\Script_Rev1.15\save\5011-5012 BTP8030-(1102).xls



Project No : 76
Lead Technician : G. Tremblay / J. Beauchemin
Run Number : 8030-B8
Cursor 1 : 68.038
System : Braking Performances Test
Report Date : 11/10/2009 13:22:14
Sheet No : 2 / 6
BTP-No : 8030
Test Description : Maximum Dynamic Brake (Deadman) @.55 mph - Northbound
Cursor 2 : 68.038
Distance : 605
Time : 17:406
Rate : -2.8

BOMBARDIER

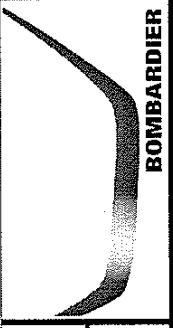


Legend Graph#5
 — 5011 Actual Tr Eff

Legend Graph#6
 — 5011 FB Command

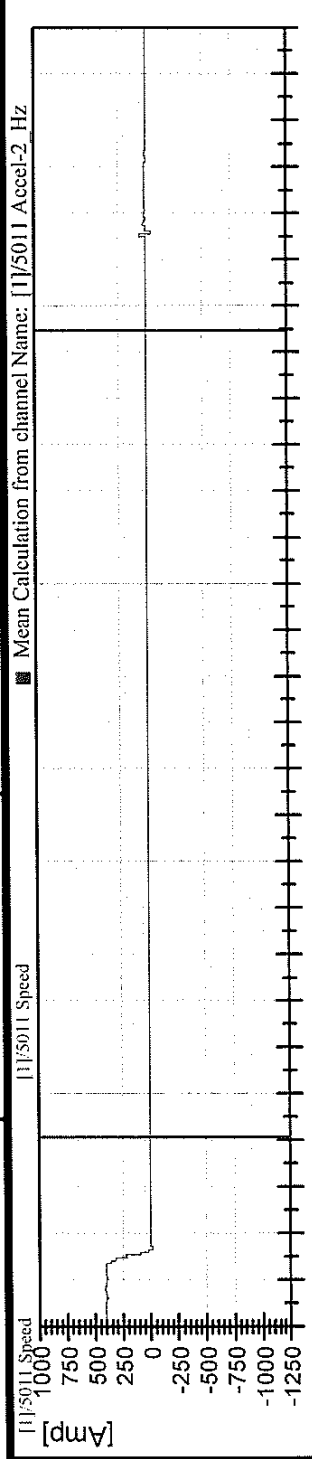
Mean Calculation from channel Name: [1]/5011 Accel-2_Hz

File Name: Run 13_20091102_113755_file0001.tdm
 Setup Template: D:\CTA test data\Script_Rev1.1\save\5011-5012 BTP8030-(1102).xls

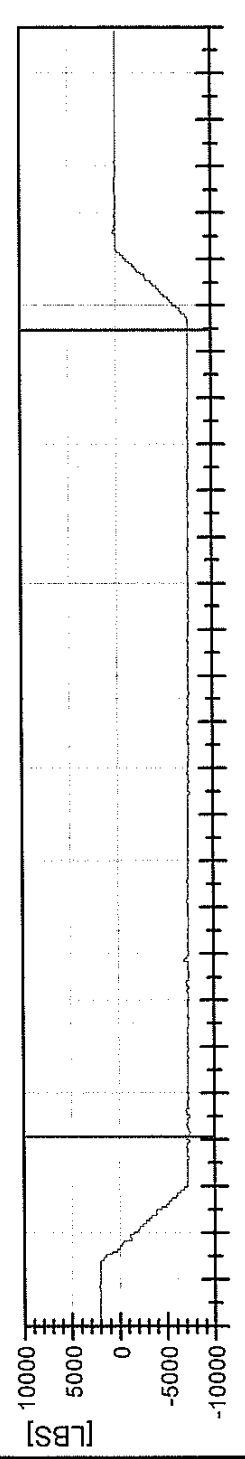


Project No : 76
Lead Technician : G. Tremblay / J. Beauchemin
Run Number : 8030-B8
Cursor 1 : 68.058
System : Braking Performances Test
Report Date : 11/10/2009 13:22:14
BTP-No : 8030
Sheet No : 3 / 6
Test Description : Maximum Dynamic Brake (Deadman) @ 55 mph - Northbound
Cursor 2 : 85.464
Time : 17.406
Rate : -2.8
Distance : 605
 Mean Calculation from channel Name: [1]/5011 Accel-2_Hz

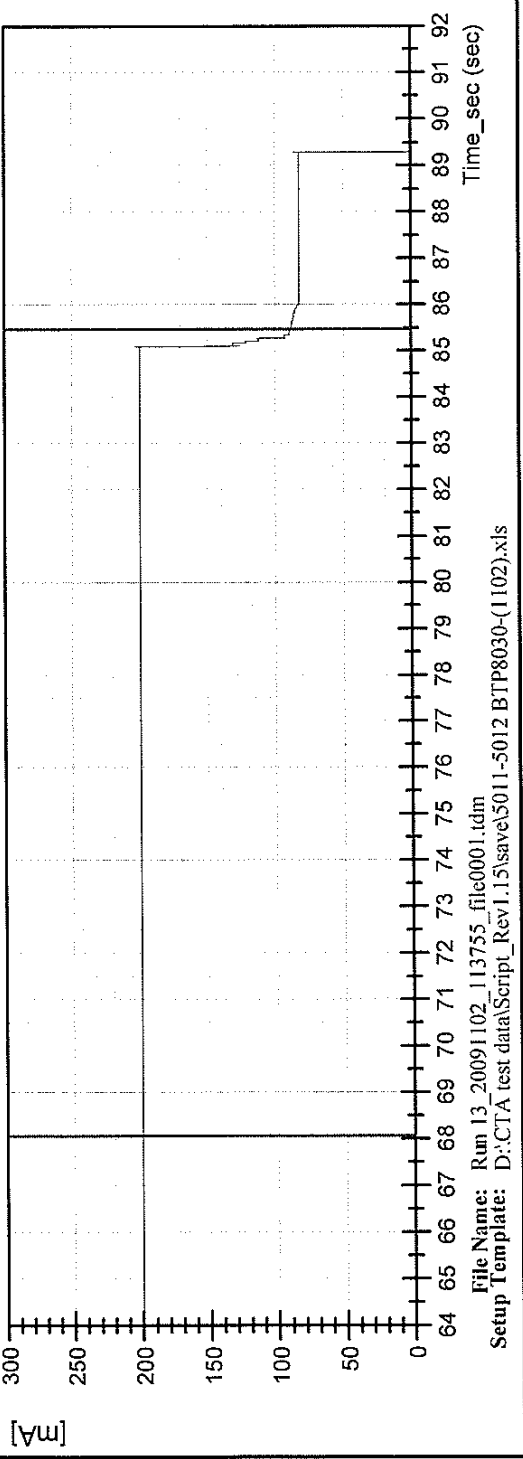
Legend Graph#7
 — 5012 Prop Current



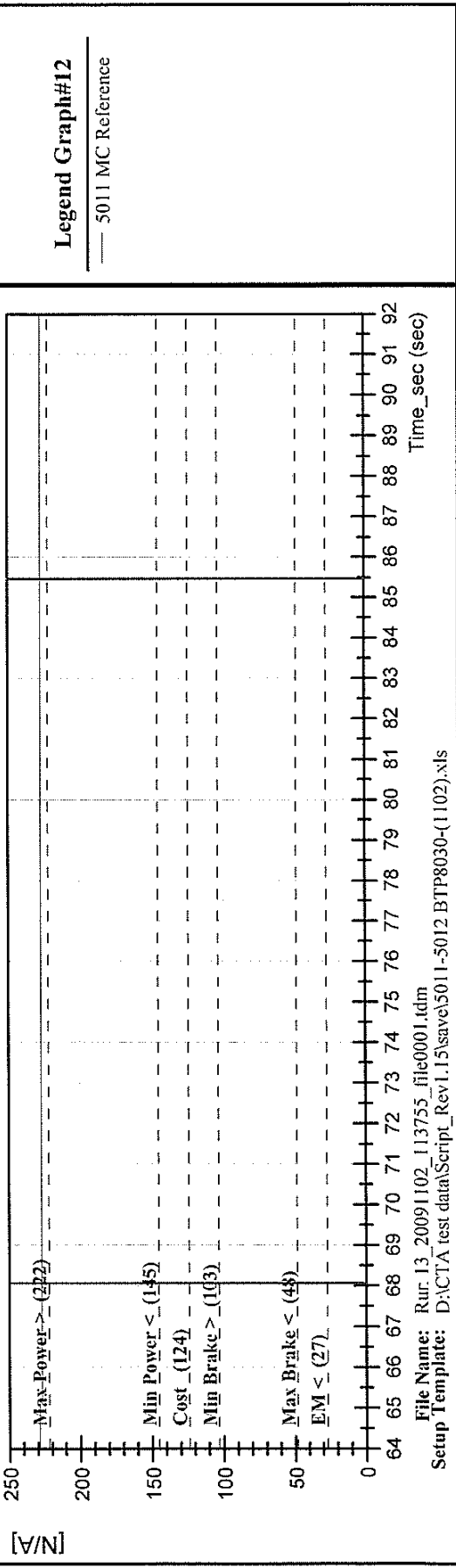
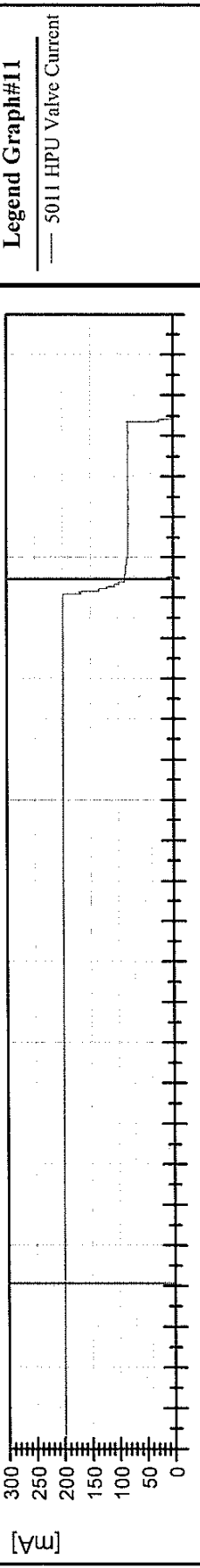
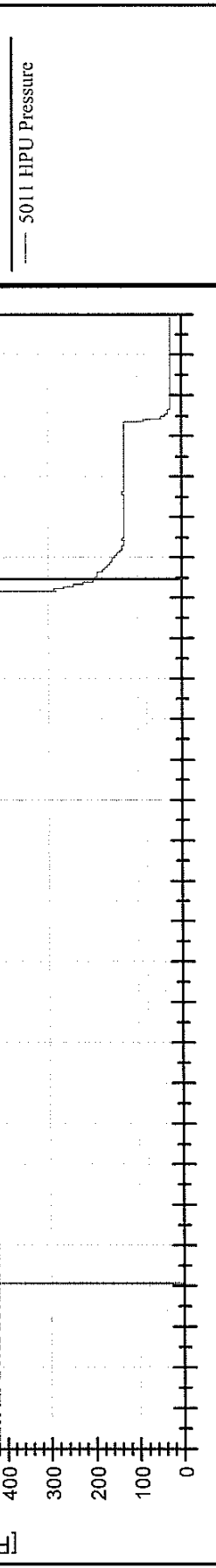
Legend Graph#8
 — 5012 Actual Tr Eff



Legend Graph#9
 — 5012 FB Command



File Name: Run 13_20091102_113755 file0001.idm
 Setup Template: D:\CTA test data\Script_Rev1.15\save\5011-5012 BTP8030-(1102).xls



Mean Calculation from channel Name: [1]/5011 Accel-2_Hz

■ [1]/5011 Speed

Max Power > (222)

Min Power < (145)

Cost (124)

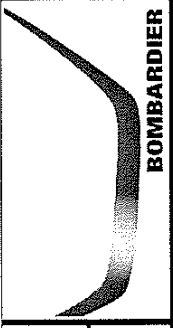
Min Brake > (103)

Max Brake < (48)

EM < (27)

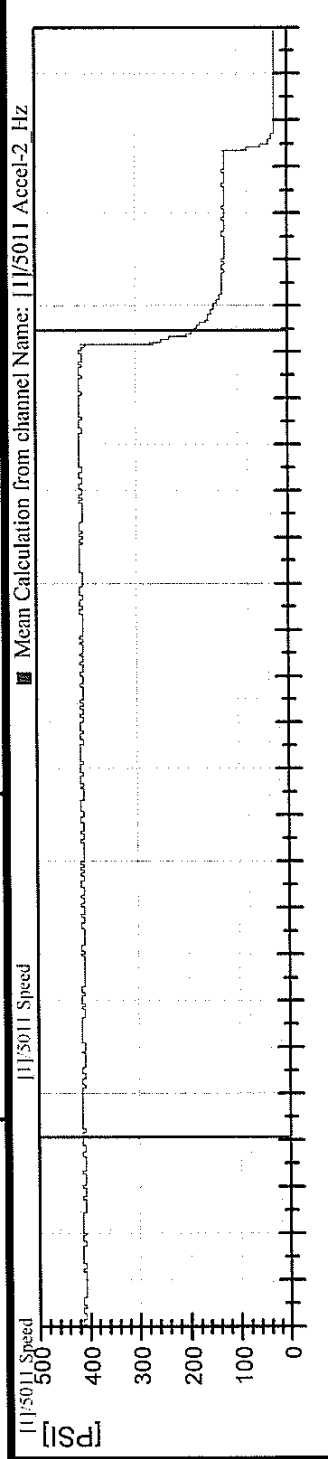
File Name: Run_13_20091102_113755_file0001.rdm

Setup Template: D:\CTA_test_data\Script_Rev1.15\save\5011-5012_BTP8030-(1102).xls

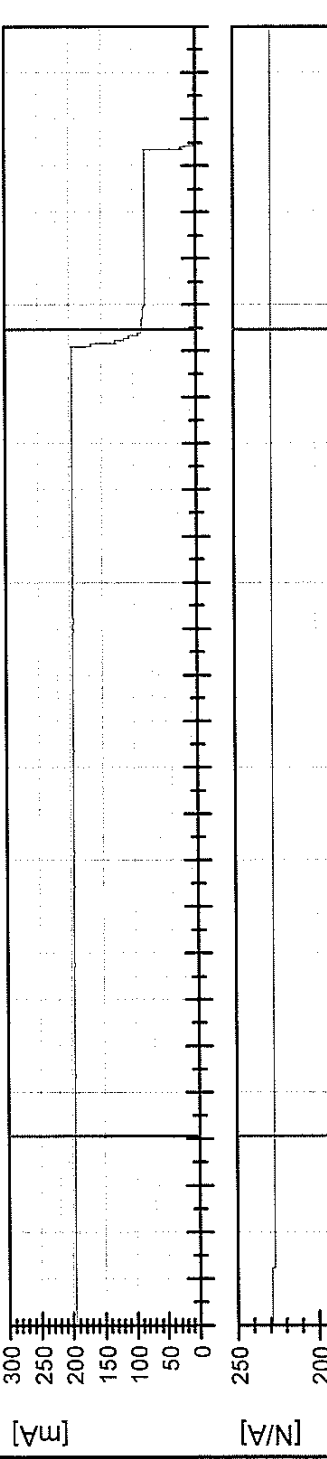


Project No : 76
Lead Technicien : G. Tremblay / J. Beauchemin
Run Number : 8030-B8
Cursor 1 : 68.058
System : Braking Performances Test
Report Date : 11/10/2009 13:22:15
BTP-No : 8030
Sheet No : 5 / 6
Test Description : Maximum Dynamic Brake (Deadman) @ 55 mph - Northbound
Cursor 2 : 85.464
Time : 17.406
Rate : -2.8
Distance : 605
 Mean Calculation from channel Name: |||5011 Speed

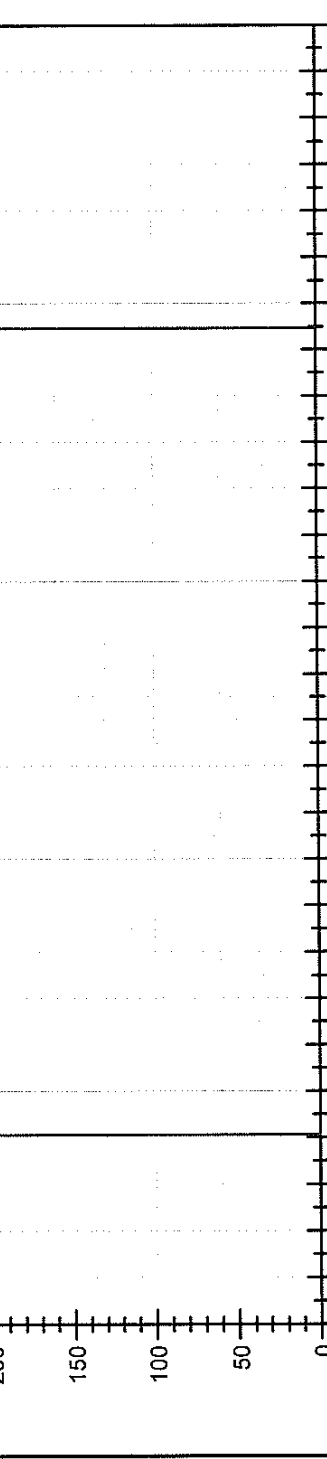
Legend Graph#13
 — 5012 HPU Pressure



Legend Graph#14
 — 5012 HPU Valve Current



Legend Graph#15
 — 5012 MC Reference



File Name: Run 13_20091102_113755_flic0001.tdm
 Setup Template: D:\CTA_test_data\Script_Rev1.15\save\5011-5012 BTP8030-(1102).xls

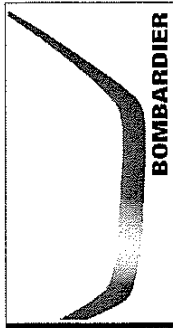
Project No : 76	System : Braking Performances Test	Report Date : 11/10/2009 13:22:16
Lead Technician : G. Tremblay / J. Beauchemin		
Run Number : 8030-B8	Test Description : Maximum Dynamic Brake (Deadman) @ 55 mph - Northbound	BTP-No : 8030
Cursor 1 : 68.058	Cursor 2 : 85.464	Sheet No : 6 / 6
	Distance : 605	
	Time : 17.406	
	Rate : -2.8	

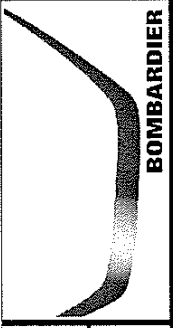
Mean Calculation from channel Name: [I]/5011 Accel-2_Hz

Name	Jerk#	Time 1	Time 2	Y1	Y2	dX	dY	Slope
StandStill To Power	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Power To Coast	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coast To Brake	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Power To Brake (No Coast)	4	65.404	66.878	0.306	-2.652	1.474	-2.958	-1.9
Caution Stop	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brake To Coast	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coast To Power	7	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brake To Power (No Coast)	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Not Used	9	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Acceleration/Deceleration Data Table Calculation								
Name	Type#	Time 1	Time 2	Y1	Y2	dX	Distance	Rate
Deceleration	1	68.058 Sec	85.464 Sec	52.0 MPH	4.9 MPH	17.406 Sec	605 Ft	-2.8 Mph/Sec
Acceleration	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A

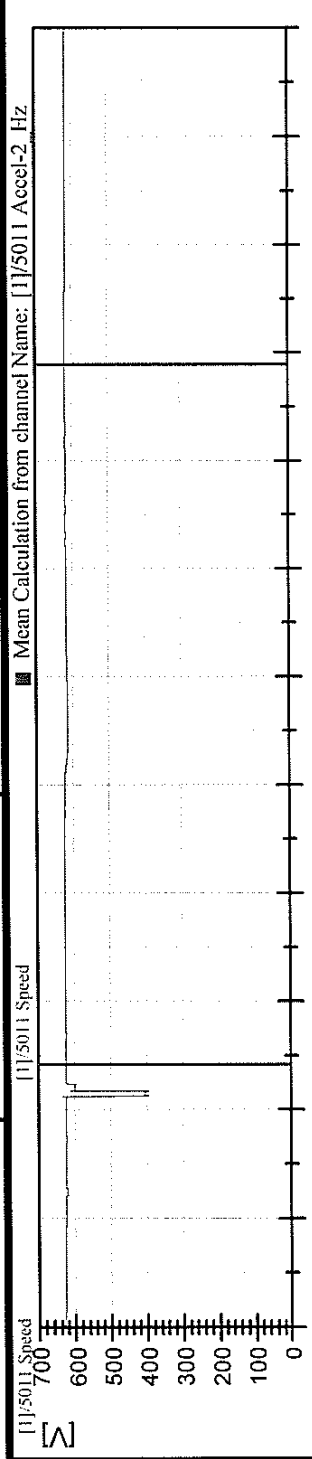
Mean Calculation from channel Name[I]/5011 Accel-2_Hz



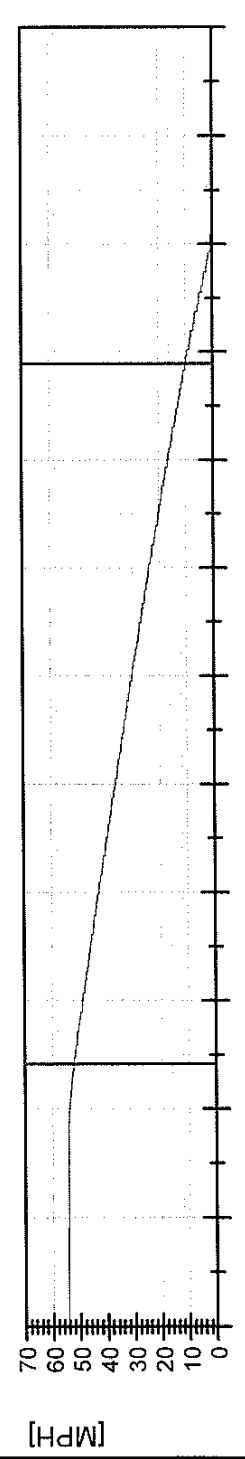


Project No : 76
Lead Technician : G. Tremblay / M-A. Pelletier
Run Number : 8030-B9
Cursor 1 : 14.414
System : Braking Performances Test
Report Date : 11/11/2009 11:38:53
Test Description : Emergency (Master Controller) @ 55 mph - Southbound
BTP-No : 8030
Sheet No : 1 / 6
Cursor 2 : 14.414
Time : 6.478
Rate : 7.0
Distance : 212
Mean Calculation from channel Name: [1]/5011 Accel-2_Hz

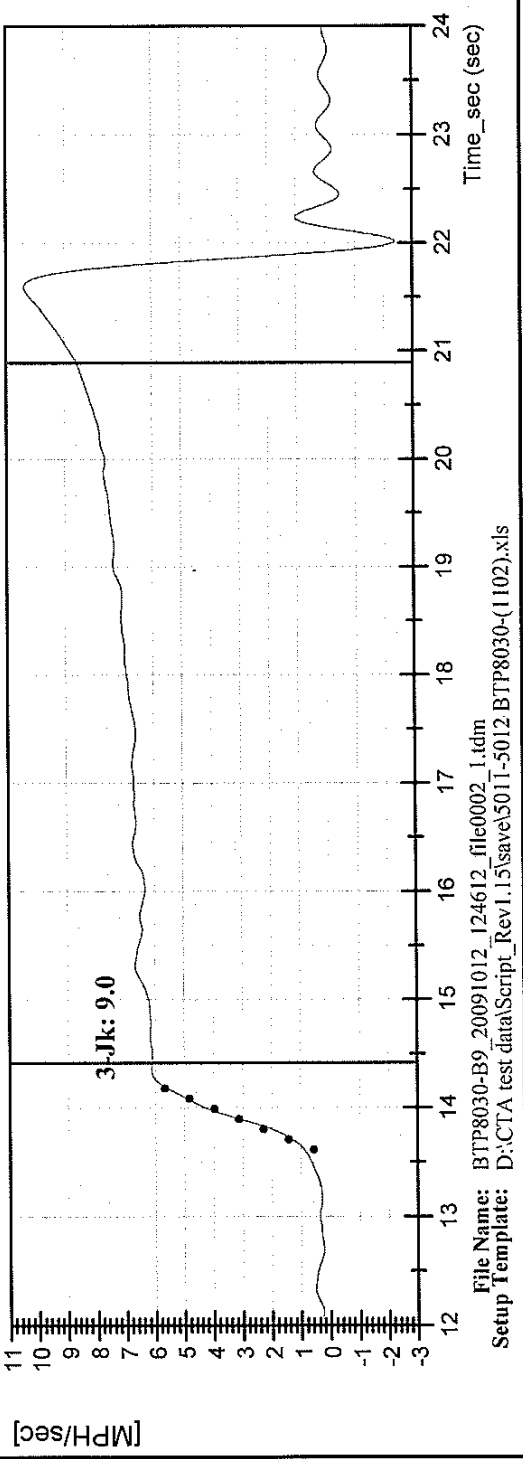
Legend Graph#1
 — 5011 Line Voltage

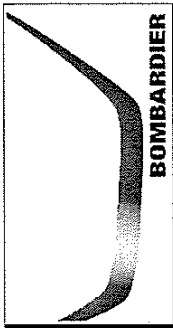


Legend Graph#2
 — 5011 Speed



Legend Graph#3
 — 5011 Accel-2_Hz
 •• Jk_3





BOMBARDIER

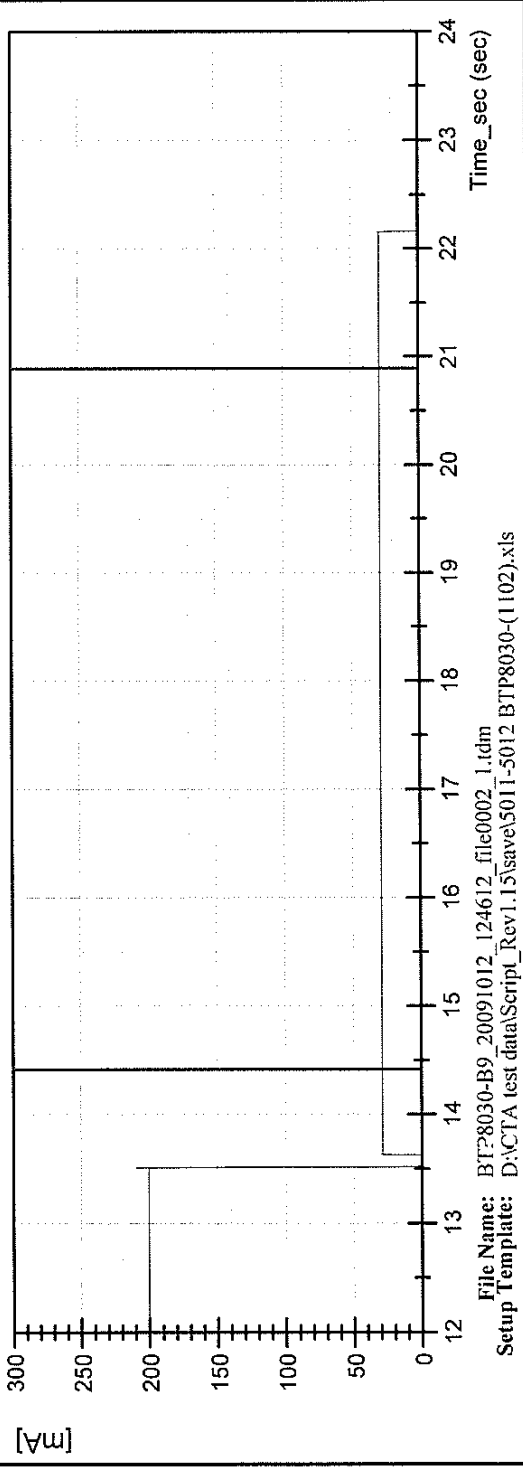
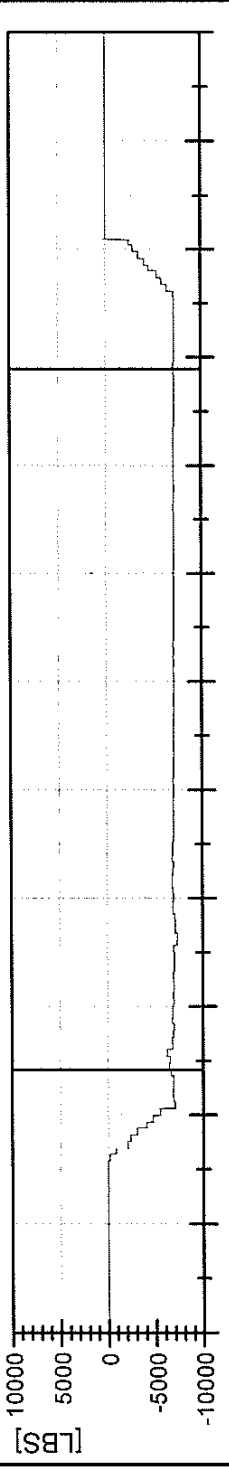
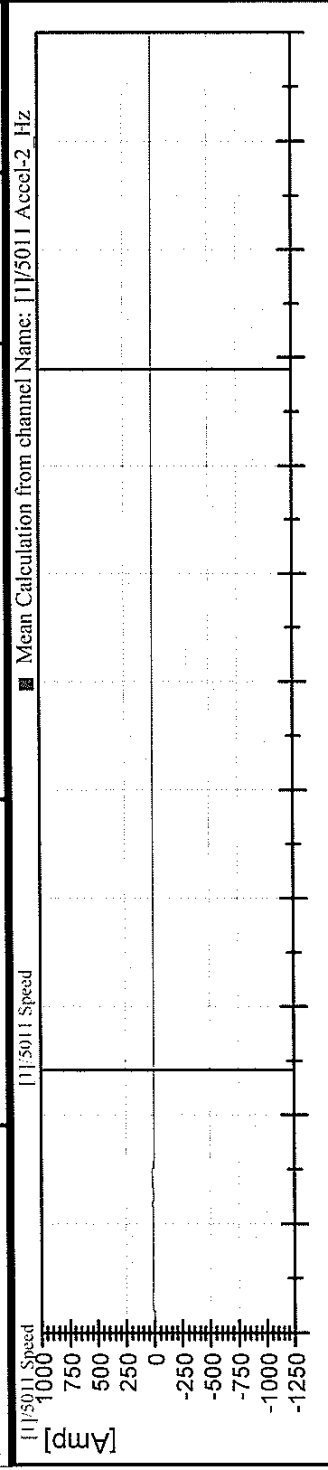
Project No : 76
 Lead Technician : G. Tremblay / M-A. Pelletier

System : **Braking Performances Test**

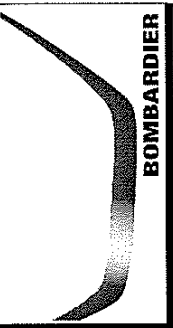
Report Date : 11/11/2009 11:38:54
 BTP-No : 8030
 Sheet No : 2 / 6

Run Number : 8030-B9
 Cursor 1 : 14.41
 Test Description : Emergency (Master Controller) @ 55 mph - Southbound
 Distance : 212
 Time : 6.478
 Rate : 7.0
 Cursor 2 :

Mean Calculation from channel Name: [1]/5011 Accol-2 Hz



File Name: BTP8030-B9_20091012_124612_file0002_1.rdm
 Setup Template: D:\CTA test data\Script_Rev1.15\save5011-5012 BTP8030-(1102).xls

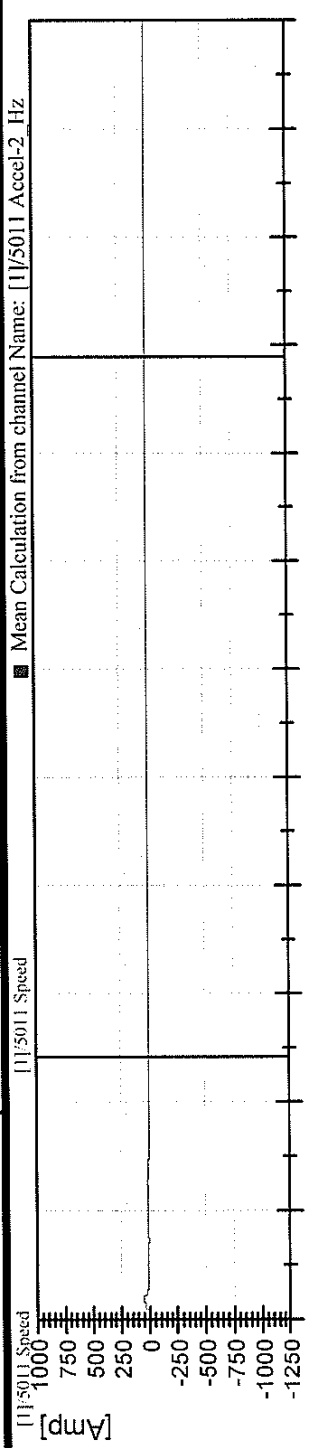


BOMBARDIER

Project No : 76
 Lead Technician : G. Tremblay / M.-A. Pelletier
 Run Number : 8030-B9
 Cursor 1 : 14.414

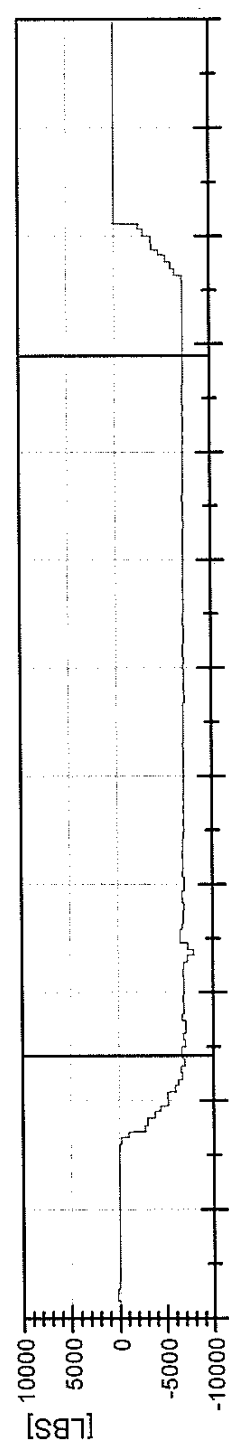
System : Braking Performances Test
 Report Date : 11/11/2009 11:38:54
 BTP-No : 8030
 Sheet No : 3 / 6

Test Description : Emergency (Master Controller) @ 55 mph - Southbound
 Distance : 20.892
 Time : 6.478
 Rate : 7.0
 Cursor 2 : 20.892



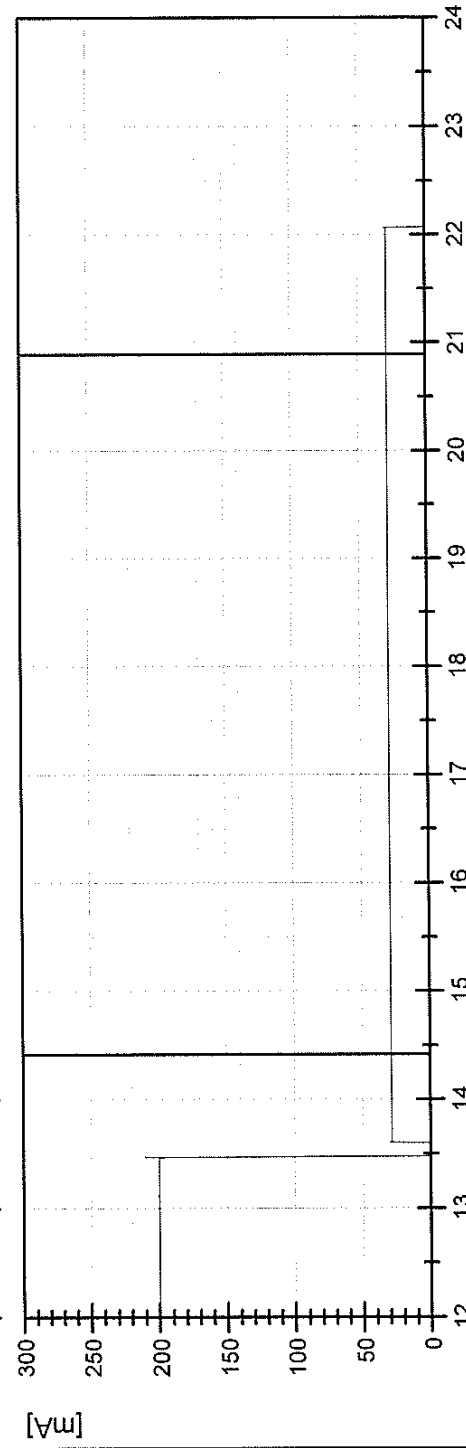
Legend Graph#7

— 5012 Prop Current



Legend Graph#8

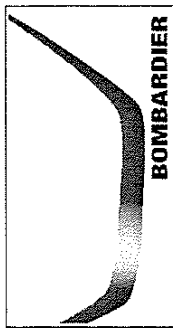
— 5012 Actual Tr Eff



Legend Graph#9

— 5012 FB Command

Mean Calculation from channel Name: [1]/5011 Accel-2_Hz
 File Name: BTP8030-B9_20091012_124612_file0002_1.idm
 Setup Template: D:\CTA test data\Script_Rev1.15\save\5011-5012.BTP8030-(1102).xls



BOMBARDIER

Project No : 76
 Lead Technician : G. Tremblay / M-A. Pelletier
 Run Number : 8030-B9
 Cursor 1 : 14.414

System : Braking Performances Test
 Report Date : 11/11/2009 11:38:54
 BTP-No : 8030
 Sheet No : 4 / 6

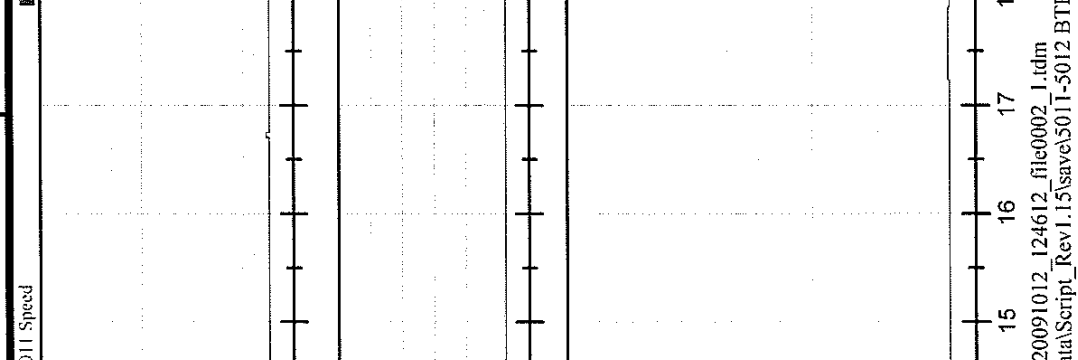
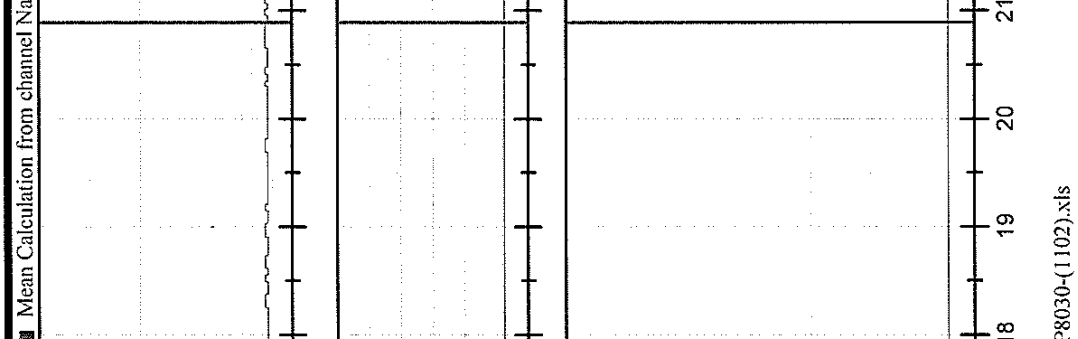
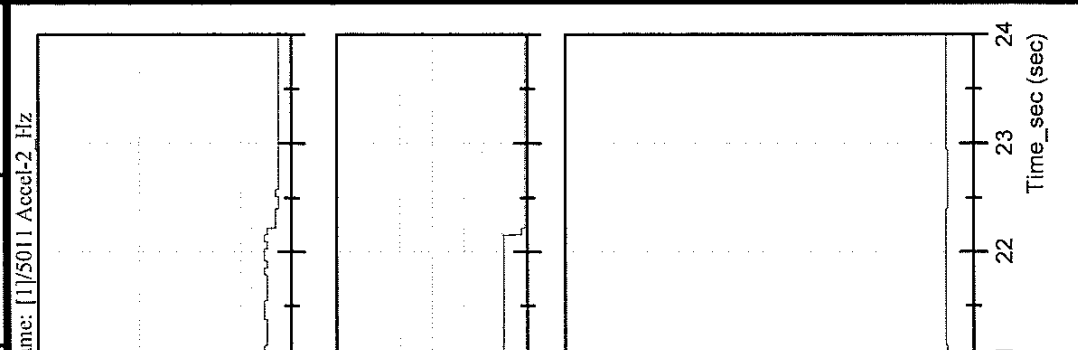
Test Description : Emergency (Master Controller) @ 55 mph - Southbound
 Cursor 2 : 20.892
 Distance : 212
 Time : 6.478
 Rate : 7.0

Mean Calculation from channel Name: [1]/5011 Accel-2_Hz

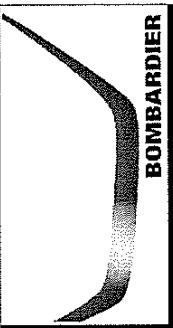
Legend Graph#10
 — 5011 HPU Pressure

Legend Graph#11
 — 5011 HPU Valve Current

Legend Graph#12
 — 5011 MC Reference



File Name: BTP8030-B9_20091012_124612_file0002_1.tdm
 Setup Template: D:\CTA test data\Script_Rev1.15\save\5011-5012 BTP8030-(1102).xls

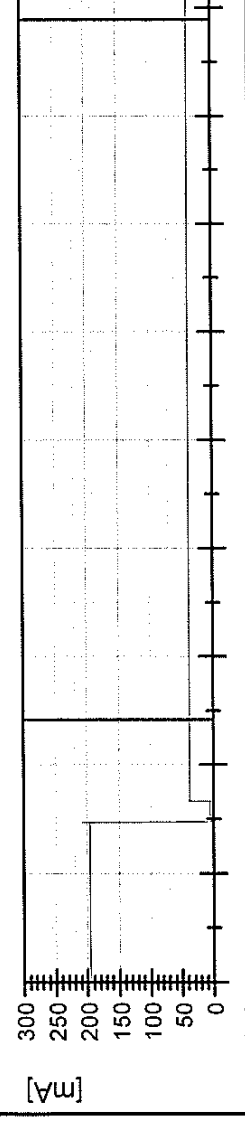
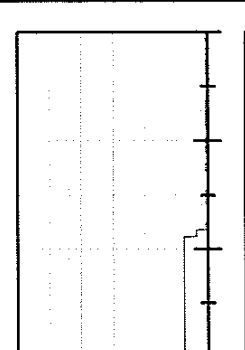
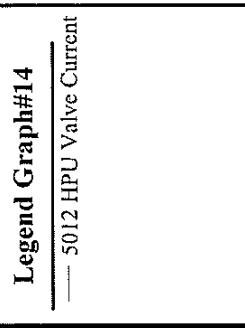
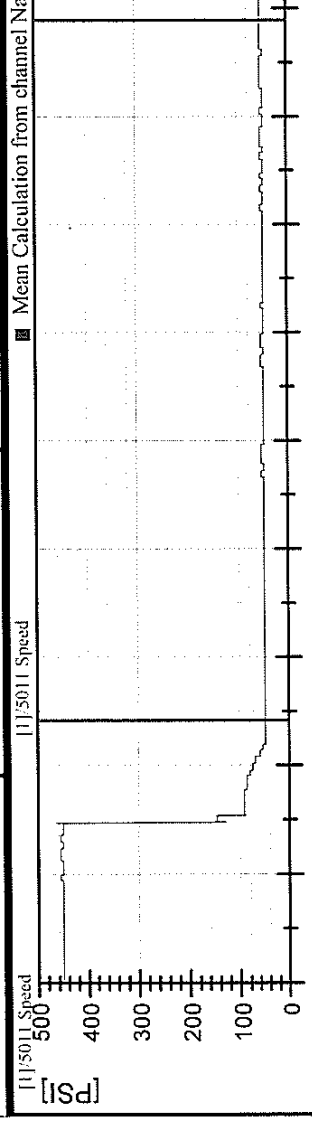
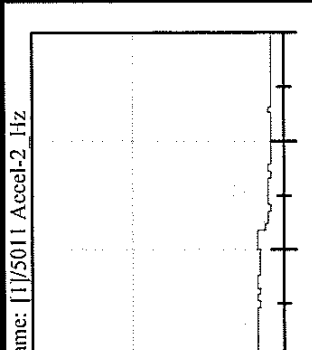
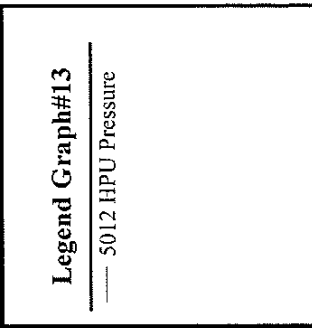


BOMBARDIER

Project No : 76
 Lead Technician : G. Tremblay / M.-A. Pelletier
 Run Number : 8030-B9
 Cursor 1 : 14.14

System : Braking Performances Test
 Report Date : 11/11/2009 11:38:54
 BTP-No : 8030
 Sheet No : 5 / 6

Test Description : Emergency (Master Controller) @ 55 mph - Southbound
 Distance : 212
 Time : 6.478
 Rate : 7.0
 Cursor 2 : 20.892
 Mean Calculation from channel Name: [1]/5011 Accel-2_Hz



File Name: BTP8030-B9_20091012_124612_file0002_1.tdm
 Setup Template: D:\CTA test data\Script_Rev1.15\save\5011-5012 BTP8030-(1102).xls

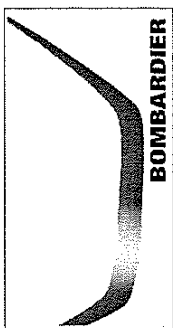
Project No : 76	System : Braking Performances Test	Report Date : 11/11/2009 11:38:55
Lead Technician : G. Tremblay / M-A. Pelletier		Sheet No : 6 / 6
Run Number : 8030-B9	Test Description : Emergency (Master Controller) @ 55 mph - Southbound	BTP-No : 8030
Cursor 1 : 14.414	Cursor 2 : 20.892	Rate : 7.0
	Distance : 212	Time : 6.478

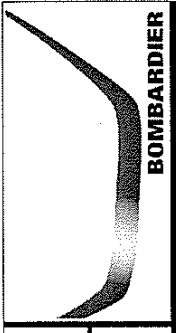
Mean Calculation from channel Name: [I]/5011 Accel-2_Hz

Name	Jerk#	Time 1	Time 2	Y1	Y2	dX	dY	Slope
StandStill To Power	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Power To Coast	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coast To Brake	3	14.260	13.616	5.989	0.904	-0.644	-5.085	9.0
Power To Brake (No Coast)	4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Caution Stop	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brake To Coast	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coast To Power	7	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brake To Power (No Coast)	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Not Used	9	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Name	Type#	Time 1	Time 2	Y1	Y2	dX	Distance	Rate
Deceleration	1	14.414 Sec	20.892 Sec	51.9 MPH	10.0 MPH	6.478 Sec	212 Ft	7.0 Mph/Sec
Acceleration	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Mean Calculation from channel Name[I]/5011 Accel-2_Hz



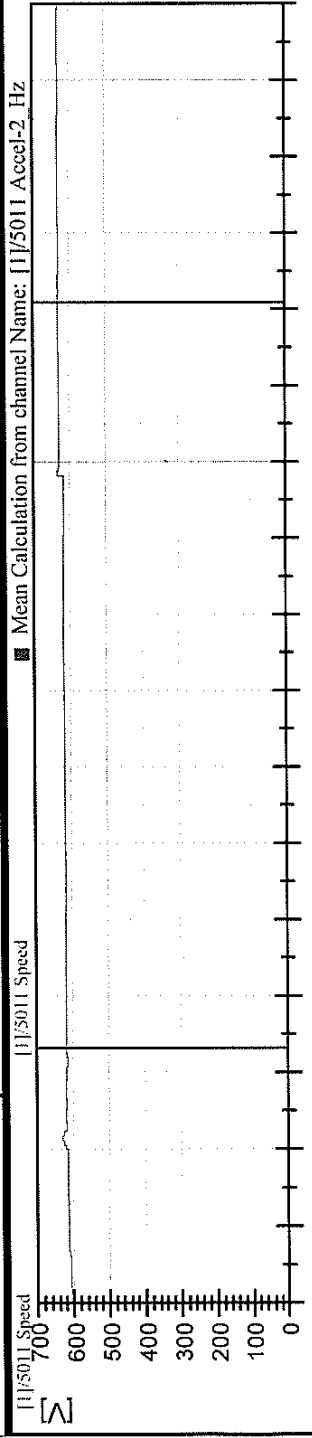


BOMBARDIER

Project No : 76
 Lead Technician : G. Tremblay / J. Beauchemin
 Run Number : 8030-B11
 Cursor 1 : 57.316

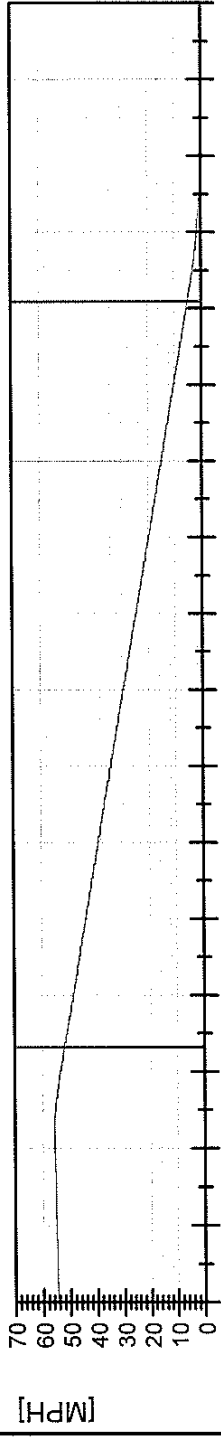
System : Braking Performances Test
 Report Date : 11/10/2009 15:02:17
 RFP-No : 8030
 Sheet No : 1 / 6

Test Description :
 Emergency Brake (MES) @.55 mph - Southbound
 Distance : 341 Time : 9.776 Rate : 5.1
 Cursor 2 : 67.092



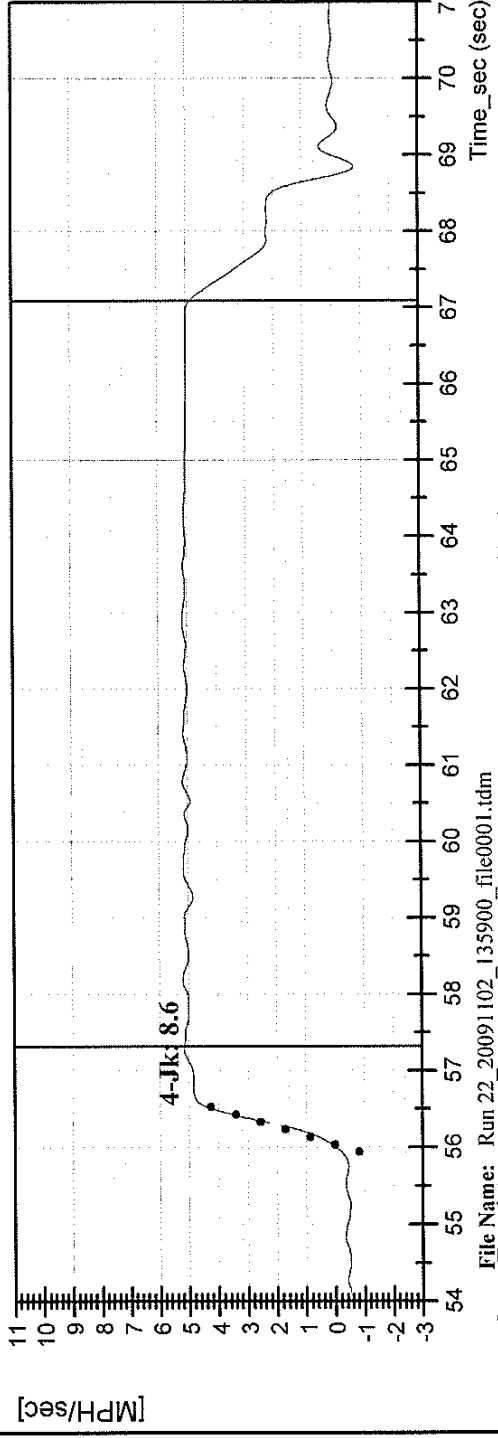
Legend Graph#1

— 5011 Line Voltage



Legend Graph#2

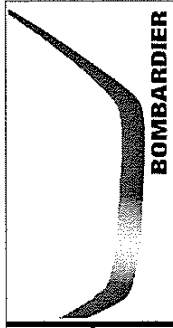
— 5011 Speed



Legend Graph#3

— 5011 Accel-2_Hz
 •• JK_4

File Name: Run 22 20091102_135900_file0001.tdm
 Setup Template: D:\CTA test data\Script_Rev1.15\save\5011-5012 BTP8030-(1102).xls

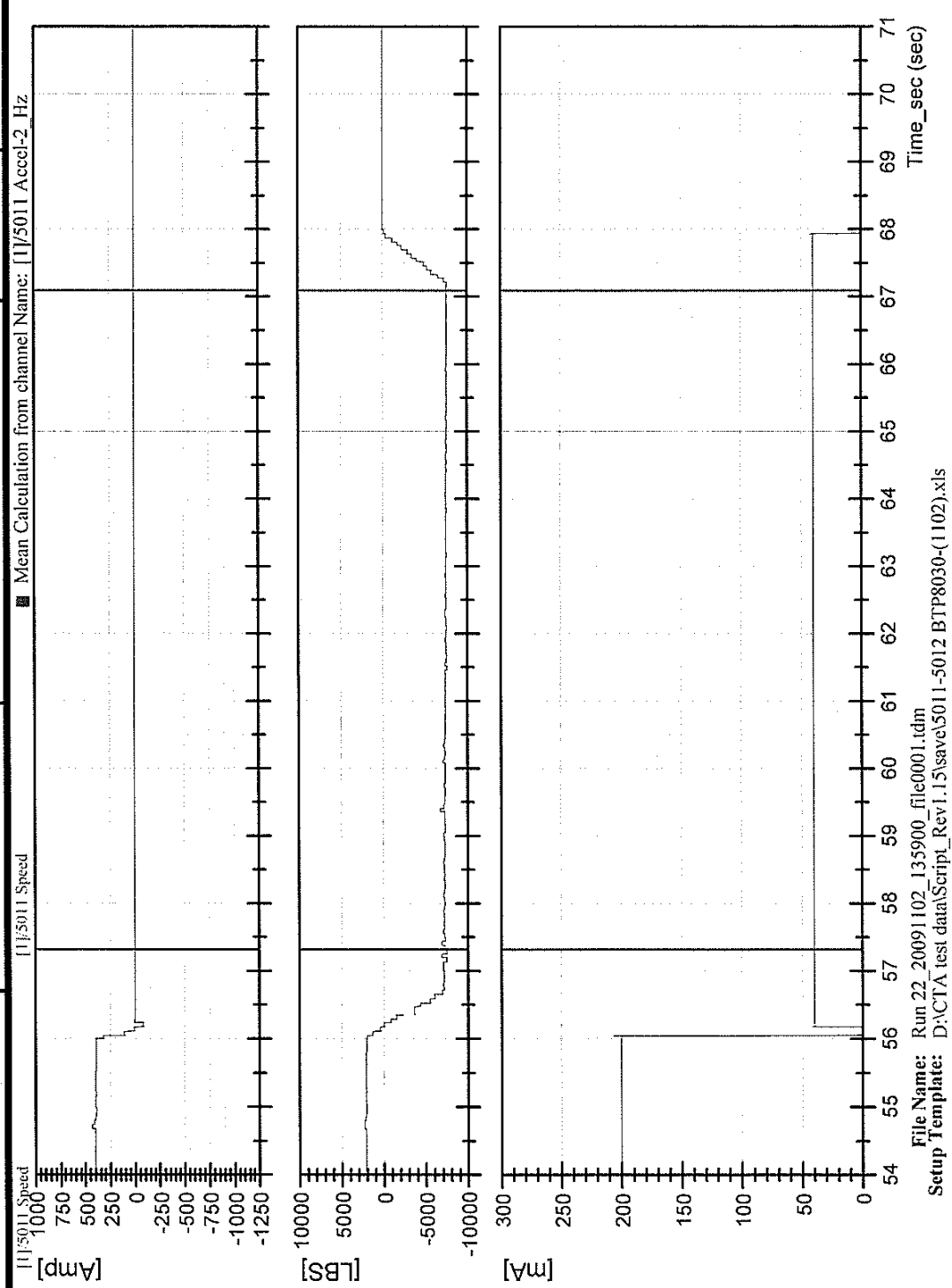


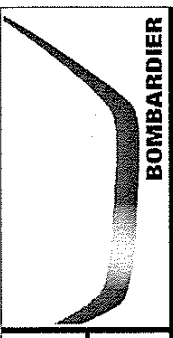
BOMBARDIER

Project No : 76
 Lead Technician : G. Tremblay / J. Beauchemin
 Run Number : 8030-B11
 Cursor 1 : 57.316

System : **Braking Performances Test**
 Report Date : 11/10/2009 15:02:17
 BTP-No : 8030
 Sheet No : 2 / 6

Test Description : Emergency Brake (MES) @ 55 mph - Southbound
 Distance : 341
 Time : 9.776
 Rate : 5.1
 Cursor 2 : 57.316





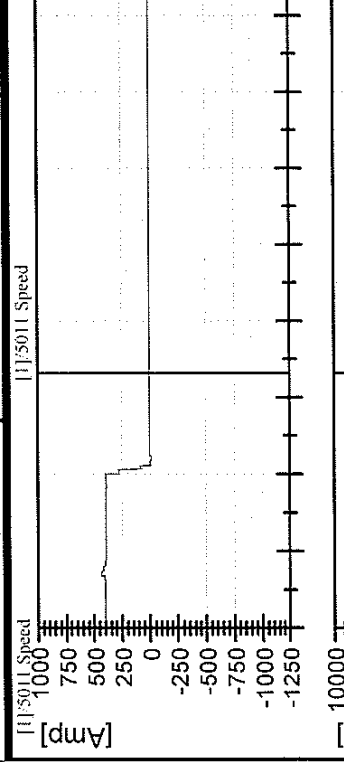
BOMBARDIER

Project No : 76
 Lead Technician : G. Tremblay / J. Beauchemin
 Run Number : 8030-B11
 Cursor 1 : 57.315

System : Braking Performances Test
 Report Date : 11/10/2009 15:02:17
 BTP-No : 8030
 Sheet No : 3 / 6

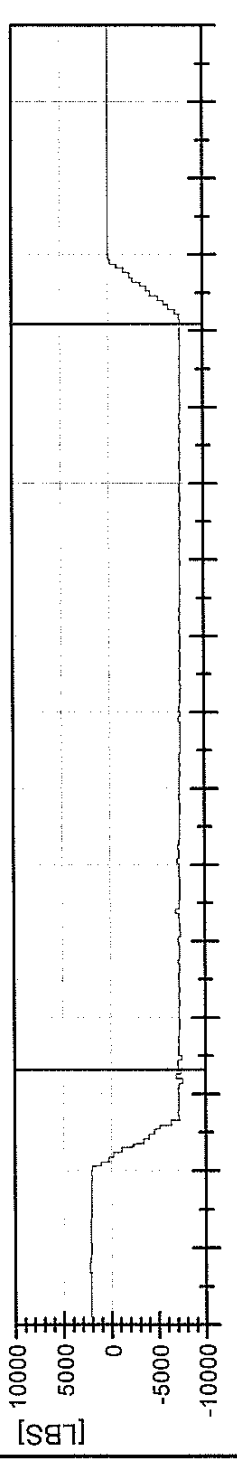
Test Description : Emergency Brake (MES) @ 55 mph - Southbound
 Distance : 341 Time : 9.776 Rate : 5.1
 Cursor 2 : 57.315

Mean Calculation from channel Name: [I]5011 Accel-2_Hz



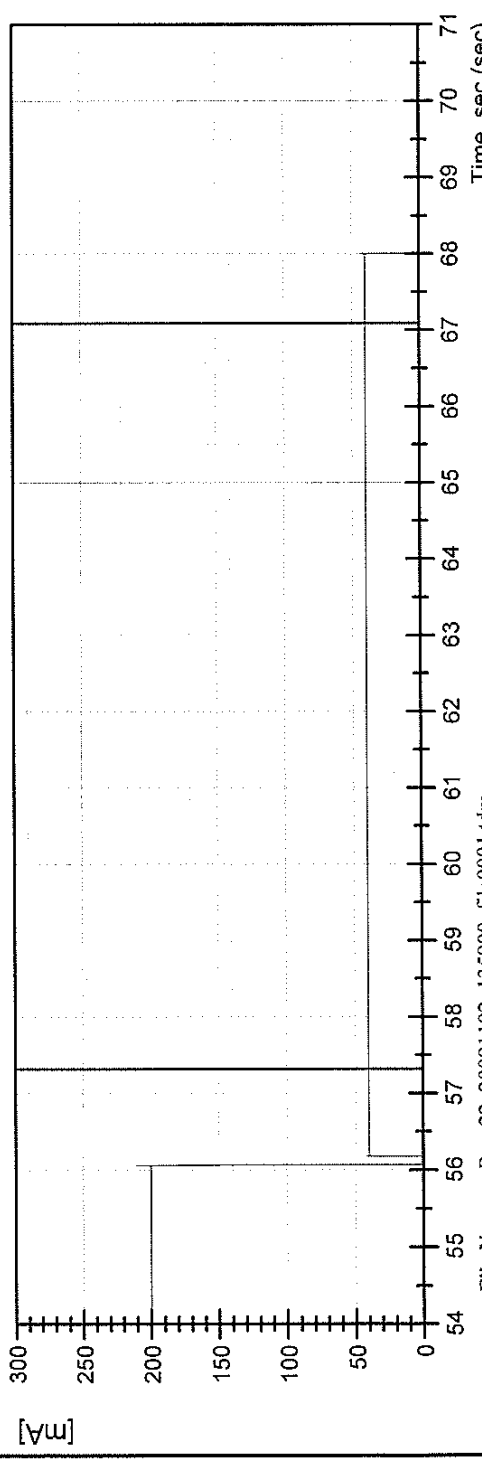
Legend Graph#7

— 5012 Prop Current



Legend Graph#8

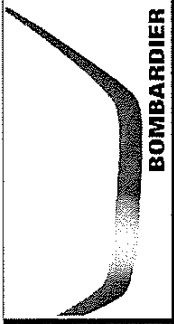
— 5012 Actual Tr Eff



Legend Graph#9

— 5012 FB Command

File Name: Run 22 20091102 135900 file0001.tdm
 Setup Template: D:\CTA test data\Script_Rev1.15\save\5011-5012 BTP8030-(1102).xls

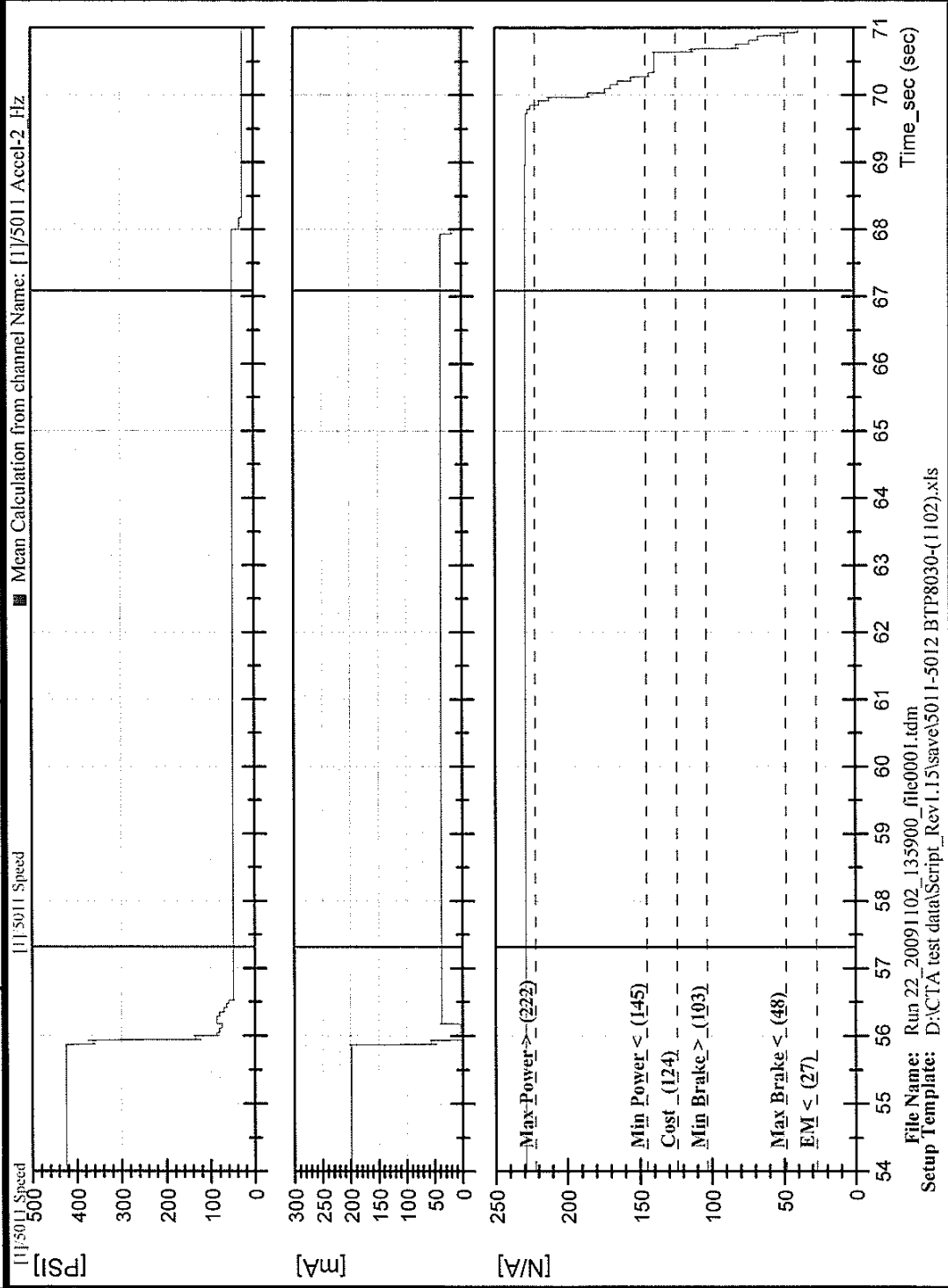


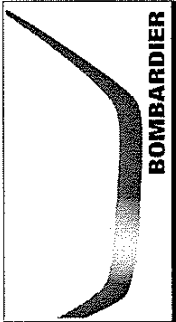
BOMBARDIER

Project No : 76
 Lead Technician : G. Tremblay / J. Beauchemin
 Run Number : 8030-B11
 Cursor 1 : 57.316

System : **Braking Performances Test**
 Report Date : 11/10/2009 15:02:18
 BTP-No : 8030
 Sheet No : 4 / 6

Test Description : Emergency Brake (MES) @ 55 mph - Southbound
 Cursor 2 : 67.092
 Distance : 341
 Time : 9.776
 Rate : 5.1





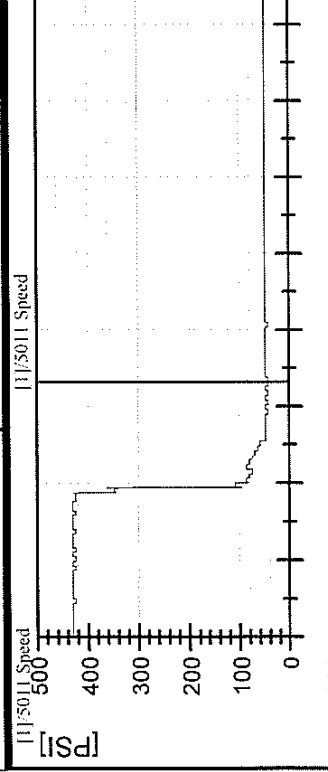
BOMBARDIER

Project No : 76
 Lead Technician : G. Tremblay / J. Beauchemin
 Run Number : 8030-B11
 Cursor 1 : 57.316

System : **Braking Performances Test**
 Report Date : 11/10/2009 15:02:18
 BTP-No : 8030
 Sheet No : 5 / 6

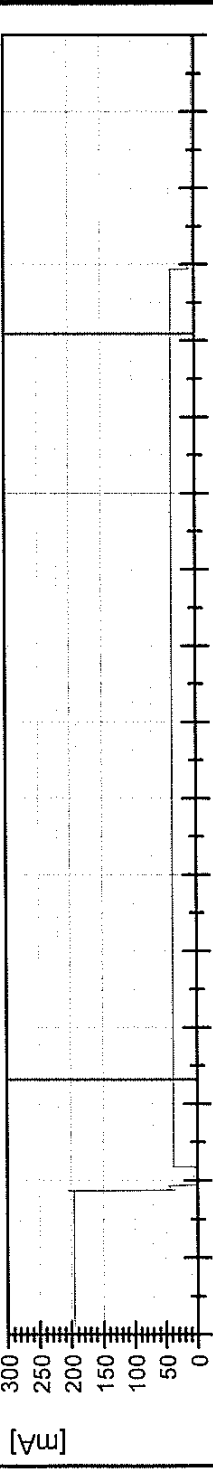
Test Description :
 Emergency Brake (MES) @ 55 mph - Southbound
 Distance : 341 Time : 9.776 Rate : 5.1
 Cursor 2 : 67.092

Mean Calculation from channel Name: [1]/5011 Accel-2, Hz



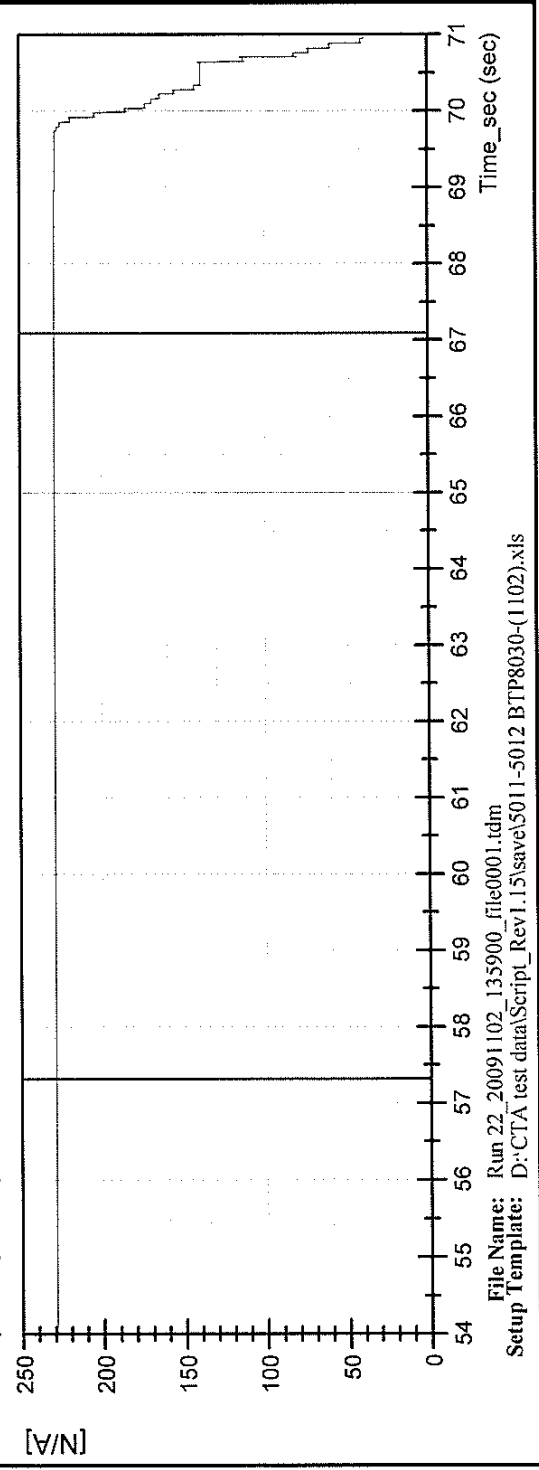
Legend Graph#13

— 5012 HPU Pressure



Legend Graph#14

— 5012 HPU Valve Current



Legend Graph#15

— 5012 MC Reference

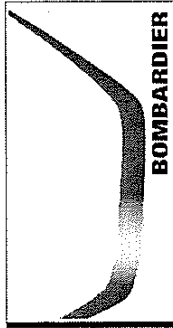
Project No : 76	System : Braking Performances Test	Report Date : 11/10/2009 15:02:18
Lead Technician : G. Fromblay / J. Beauchemin		BTP-No : 8030
Run Number : 8030-B11	Test Description : Emergency Brake (MES) @ 55 mph - Southbound	Sheet No : 6 / 6
Cursor 1 : 57.316	Cursor 2 : 67.092	
	Distance : 341	Time : 9.776
		Rate : 5.1

Mean Calculation from channel Name: [1]/5011 Accel-2_Hz

Name	Jerk#	Time 1	Time 2	Y1	Y2	dX	dY	Slope
StandStill To Power	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Power To Coast	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coast To Brake	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Power To Brake (No Coast)	4	55.940	56.542	-0.214	4.482	0.602	4.696	8.6
Caution Stop	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brake To Coast	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coast To Power	7	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brake To Power (No Coast)	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Not Used	9	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Acceleration/Deceleration Data Table Calculation								
Name	Type#	Time 1	Time 2	Y1	Y2	dX	Distance	Rate
Deceleration	1	57.316 Sec	67.092 Sec	51.9 MPH	4.9 MPH	9.776 Sec	341 Ft	5.1 Mph/Sec
Acceleration	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A


Mean Calculation from channel Name[1]/5011 Accel-2_Hz

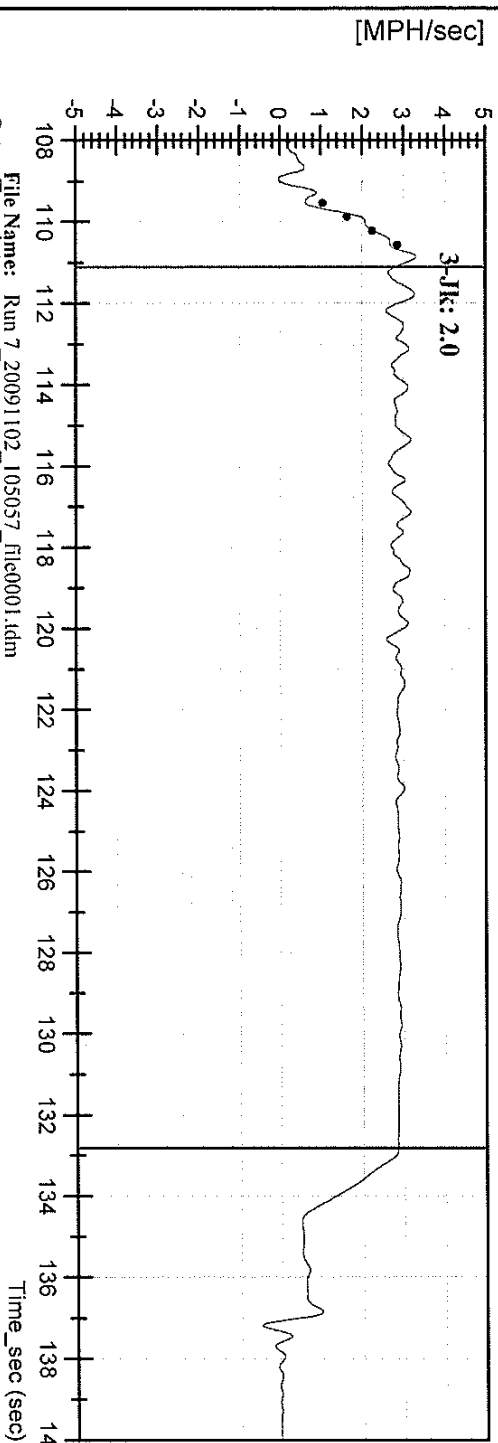
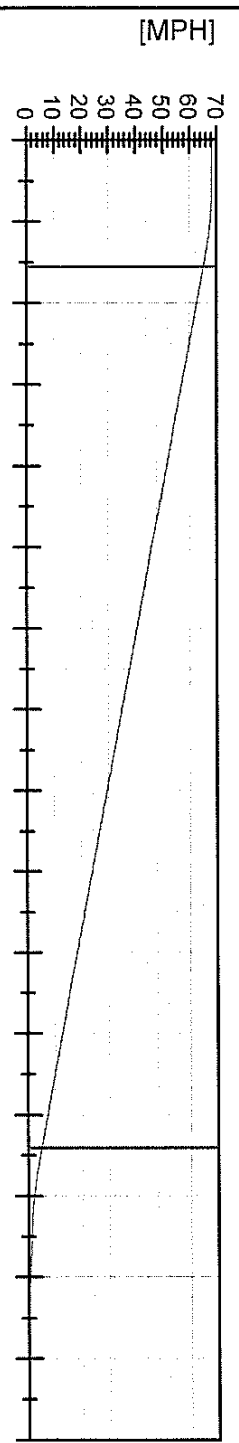
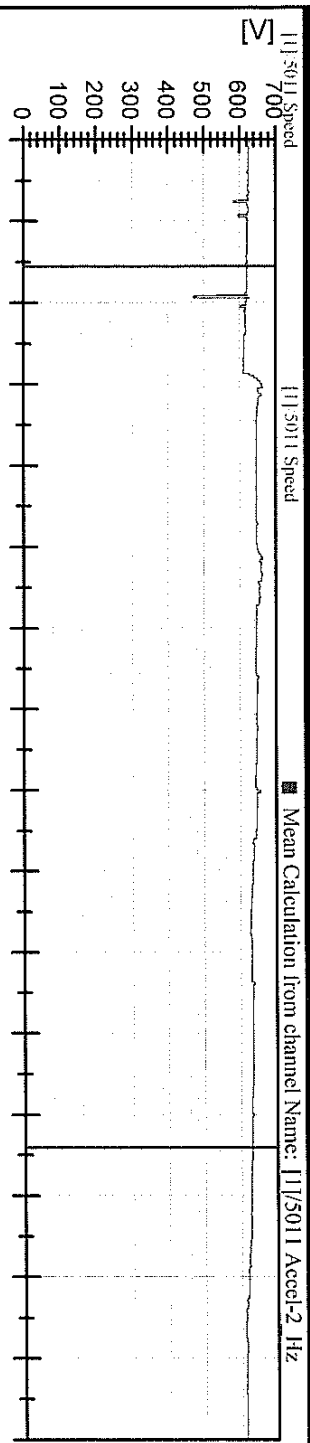


APPENDIX 3: High speed “70 mph” braking runs

Run Number	Brake Initiating Speed (+ 2/- 0 mph)	Braking Charts File Name
8030-B13	70 mph *	76-BTP-8030-B13 Max DB @ 70 mph – South.pdf
8030-B14	70 mph *	76-BTP-8030-B14 Max DB @ 70 mph – North.pdf
8030-B15	70 mph *	76-BTP-8030-B15 Max Fbo @ 70 mph – North.pdf
8030-B19	70 mph *	76-BTP-8030-B19 Max DB (Deadman) @ 70 mph – Southbound.pdf
8030-B20	70 mph *	76-BTP-8030-B2 Max DB (DM) @ 70 mph – North.pdf
8030-B21	70 mph *	76-BTP-8030-B21 EMY (M-C) @ 70 mph – Northbound.pdf
8030-B24	70 mph *	76-BTP-8030-B24 EMY (MES) @ 70 mph – South.pdf

*: 70 mph or maximum attainable speed on the track section selected for the test.

Project No : 76	System : Braking Performances Test	Report Date : 11/11/2009 10:43:00
Lead Technician : G. Tremblay / J. Beauchemin	Test Description : Maximum Dynamic Brake @ 70 mph - Southbound	BTP-No : 8030
Run Number : 8030-B13	Cursor 1 : 111.112	Cursor 2 : 132.820
Distance : 962	Time : 21.708	Rate : 2.9
Sheet No : 1 / 6		



File Name: Run 7 20091102_105057_flec001.adm
 Setup Template: D:\CTA\test_data\Script_Rev1.15\save\5011-5012_BTP8030-(1102).xls

Project No : 76

Lead Technician : G. Tremblay / J. Beauchemin

System : Braking Performances Test

Report Date : 11/11/2009 10:43:00

Run Number : 8030-B13

Test Description : Maximum Dynamic Brake @ 70 mph - Southbound

BTP-No : 8030

Sheet No : 2 / 6

Cursor 1 : 111.112

Cursor 2 : 132.820

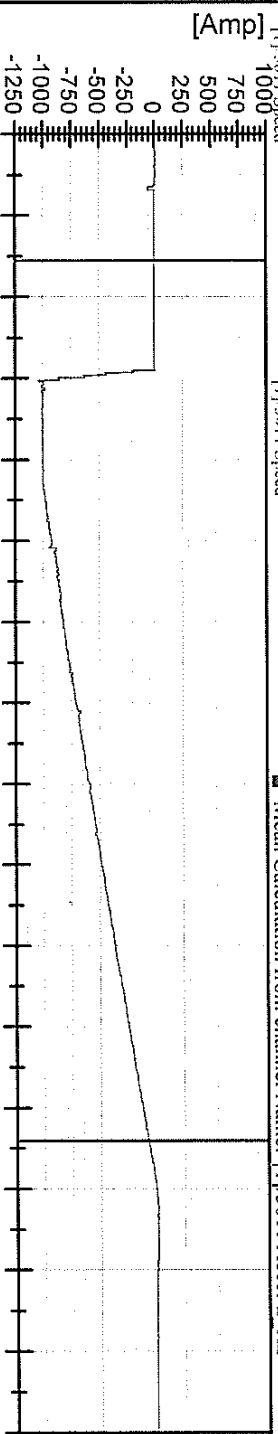
Distance : 962

Time : 21.708

Rate : 2.9

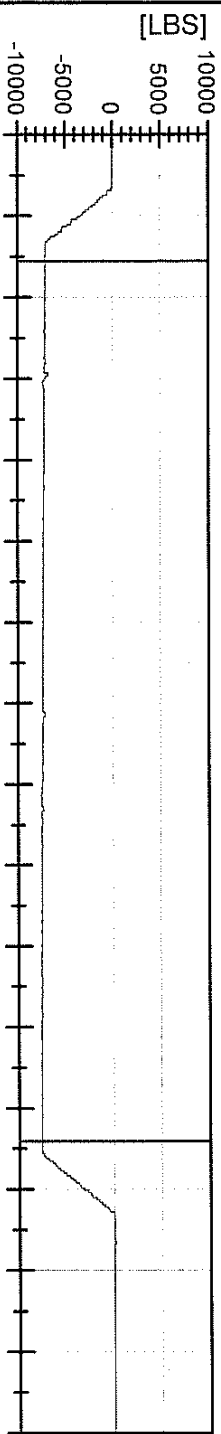
||| 5011 Speed

Mean Calculation from channel Name: ||| 5011 Accel-2 Hz



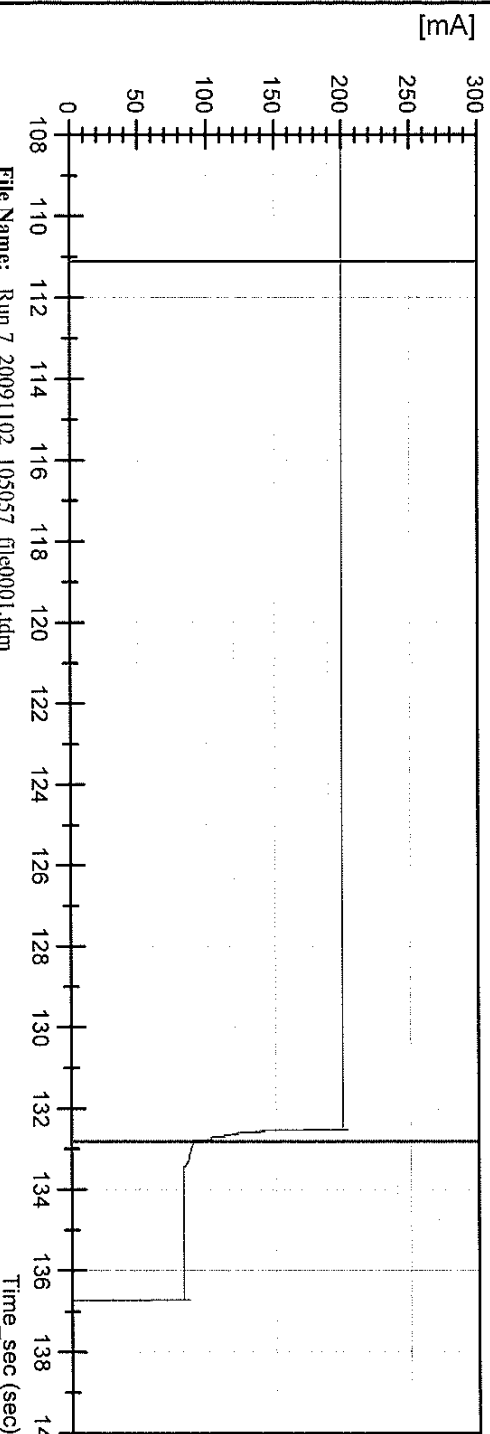
Legend Graph#4

— 5011 Prop Current



Legend Graph#5

— 5011 Actual Tr Eff



Legend Graph#6

— 5011 FB Command

File Name: Run 7_20091102_105057_file0001.adm
Setup Template: D:\CTA test data\Script_Rev1.15\save5011-5012 BTP8030-(1102).xls



Project No: 76

Lead Technician: G. Tremblay / J. Beauchemin

Run Number: 8030-B13

Cursor 1: 111.112

System : Braking Performances Test

Test Description : Maximum Dynamic Brake @ 70 mph - Southbound

Cursor 2: 132.820

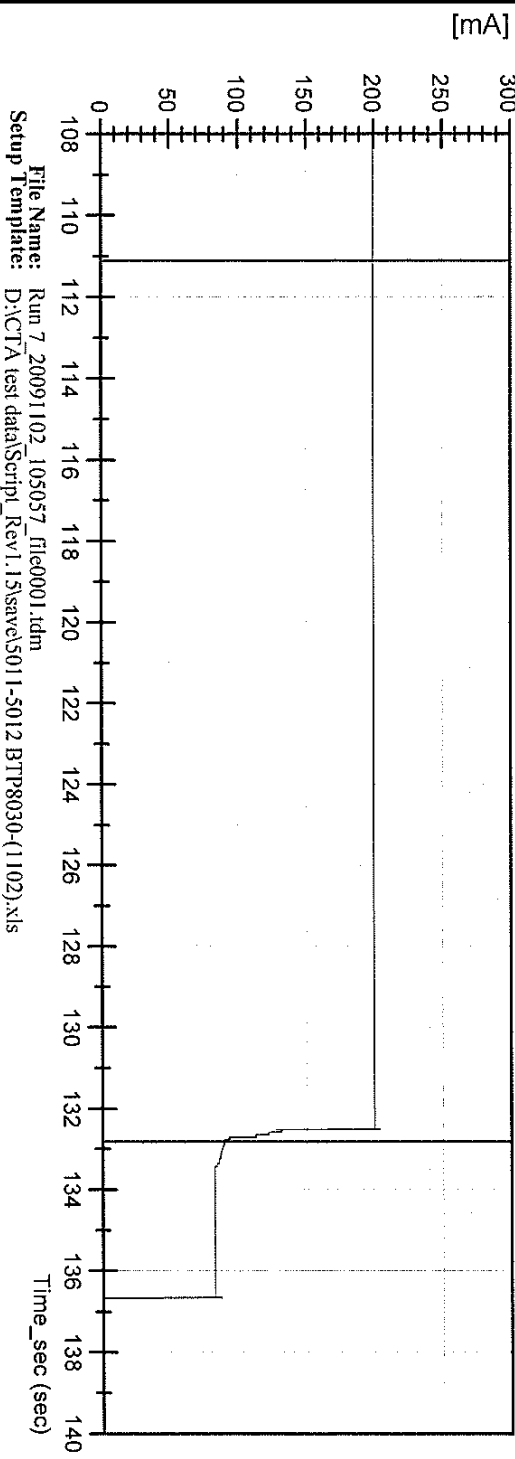
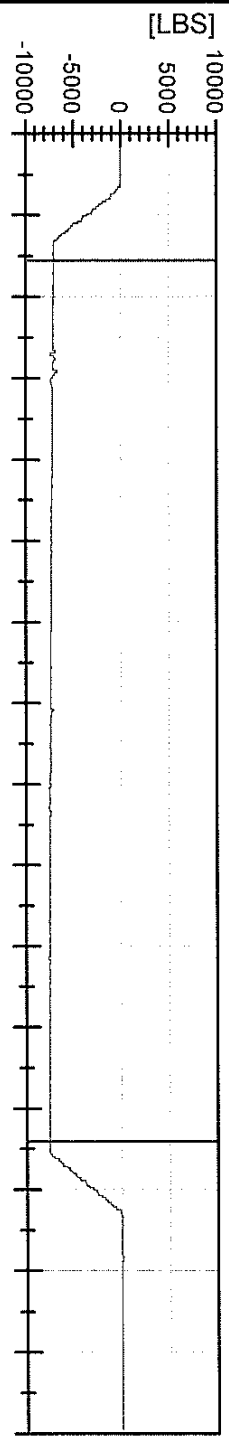
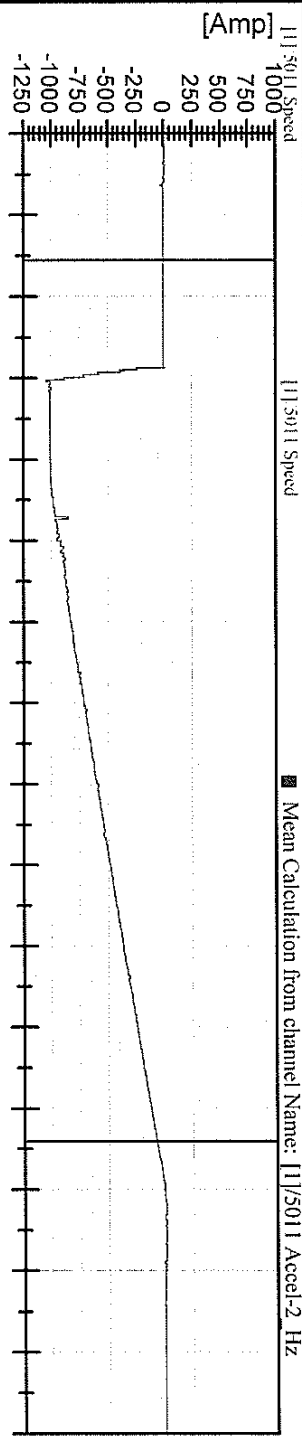
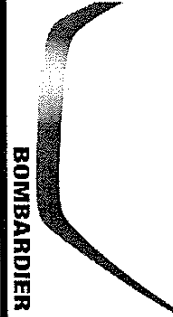
Distance: 962 Time: 21.708 Rate: 2.9

Mean Calculation from channel Name: [1] 5011 Speed

Report Date: 11/11/2009 10:43:00

BTP-No: 8030 Sheet No: 3 / 6

132.820 Distance: 962 Time: 21.708 Rate: 2.9

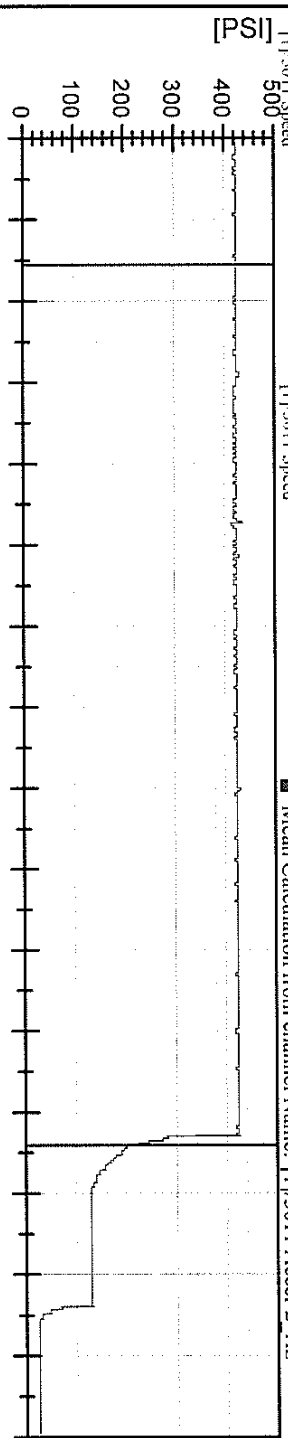


File Name: Run 7_20091102_105057_fle0001.tdm
Setup Template: D:\CTA test data\Script_Rev1.15save\5011-5012 BTP8030-(1102).xls

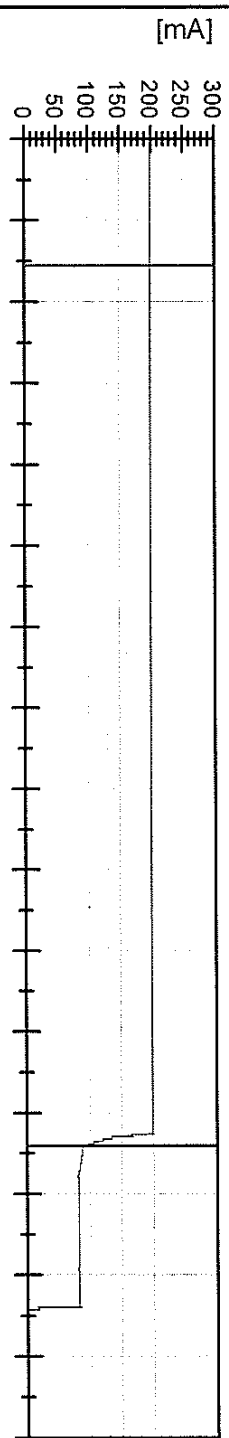
Project No : 76
 Lead Technician : G. Tremblay / J. Beauchemin
 Run Number : 8030-B13
 Cursor 1 : 111.112

System : **Braking Performances Test**
 Test Description : Maximum Dynamic Brake @ 70 mph - Southbound
 Cursor 2 : 132.820
 Distance : 962 Time : 21.708 Rate : 2.9

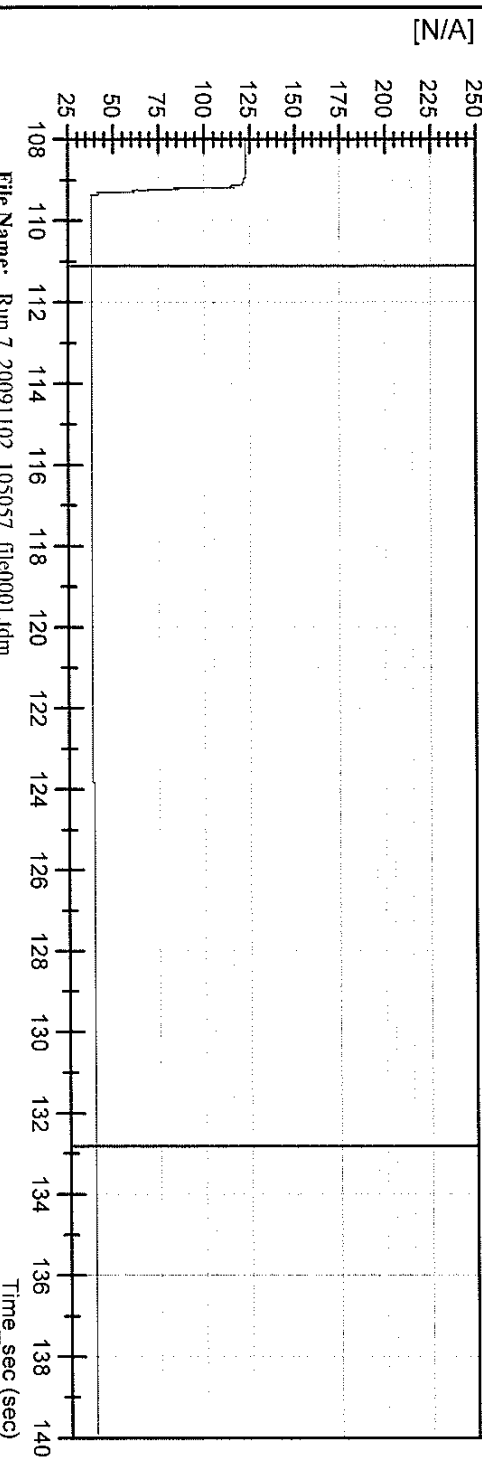
Report Date : 11/11/2009 10:43:01
 BTP-No : 8030
 Sheet No : 4 / 6



Legend Graph#10
 — 5011 HPU Pressure



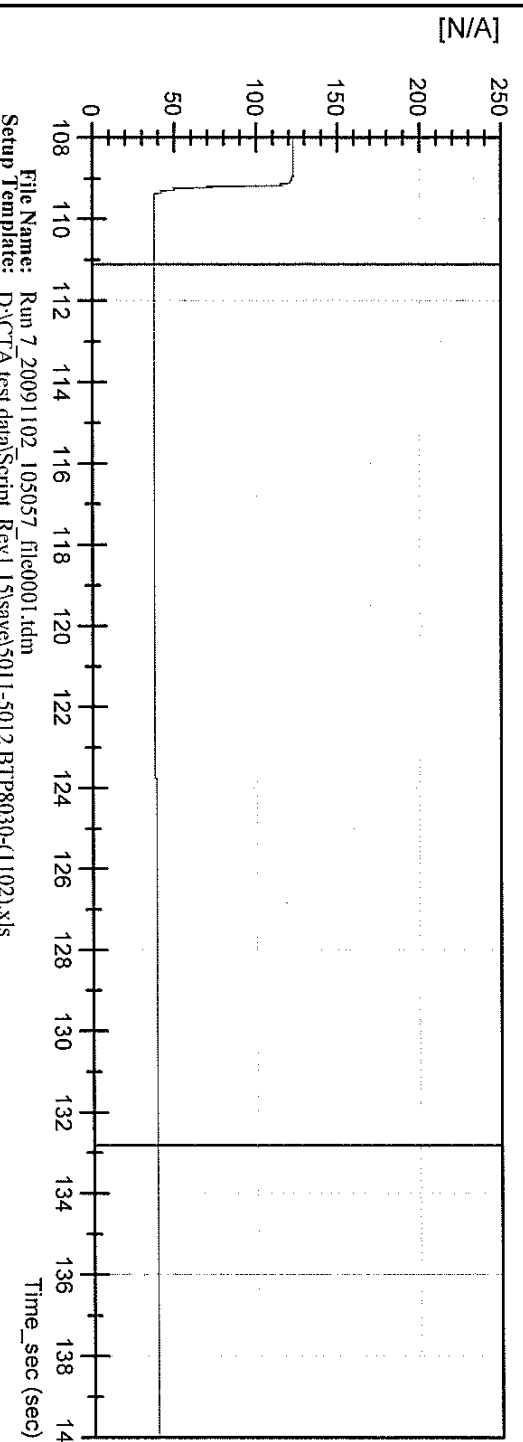
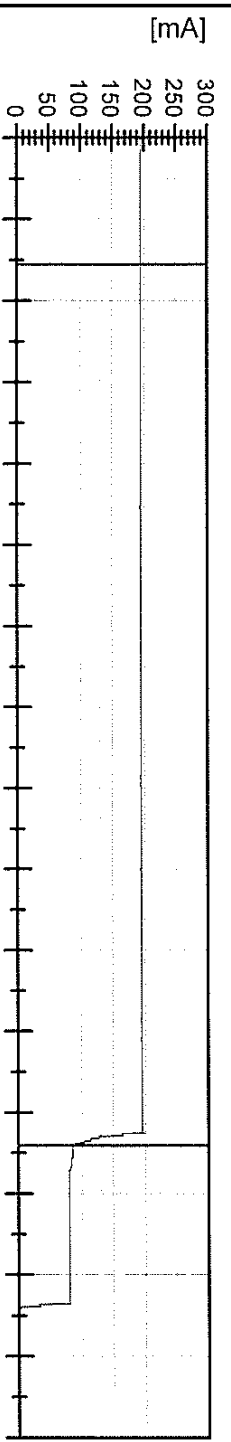
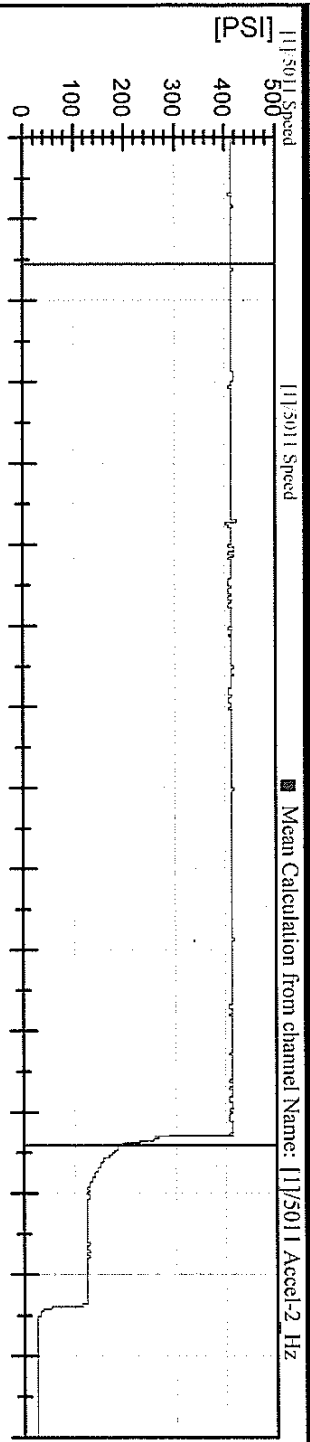
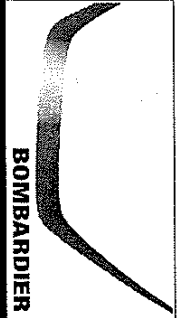
Legend Graph#11
 — 5011 HPU Valve Current




Legend Graph#12
 — 5011 MC Reference

File Name: Run 7_20091102_105057_file0001.kdm
 Setup Template: D:\CTA test data\Script_Rev1.15save\5011-5012 BTP8030-(1102).xls

Project No : 76	System : Braking Performances Test	Report Date : 11/11/2009 10:43:01
Lead Technician : G. Tremblay / J. Beauchemin	Test Description : Maximum Dynamic Brake @ 70 mph - Southbound	RTF-No : 8030
Run Number : 8030-B13	Cursor 1 : 111.112	Cursor 2 : 132.820
Cursor 1 : 111.112	Distance : 962	Time : 21.708
	Rate : 2.9	Sheet No : 5 / 6



File Name: Run 7_20091102_105057_flic0001.adm
 Setup Template: D:\CTA test data\Script_Rev1.15save\5011-5012_BTTP8030-(1102).xls

Project No : 76	System : Braking Performances Test	Report Date : 11/11/2009 10:43:01
Lead Technician : G. Tremblay / J. Beauchemin	Test Description : Maximum Dynamic Brake @ 70 mph - Southbound	BTP-No : 8030
Run Number : 8030-B13	Cursor 1 : 111.112	Cursor 2 : 132.820
Distance : 962	Time : 21.708	Rate : 2.9
Sheet No : 6 / 6		

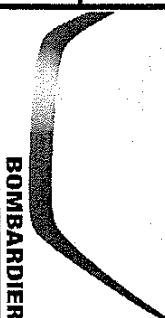
Mean Calculation from channel Name: [1]5011 Accel-2_Hz

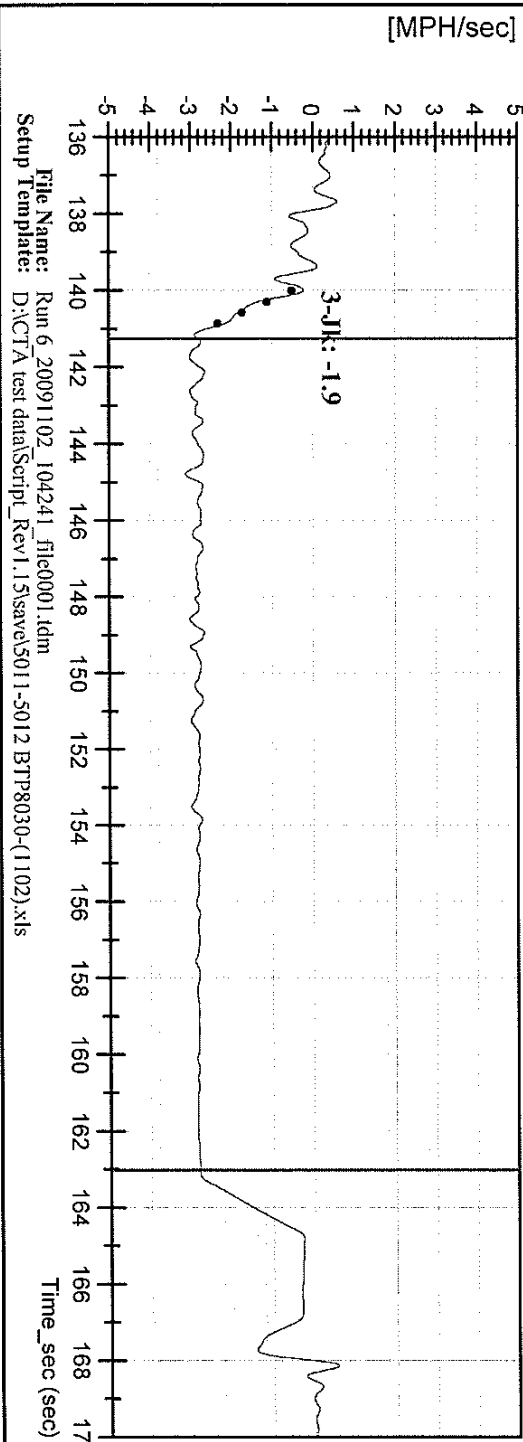
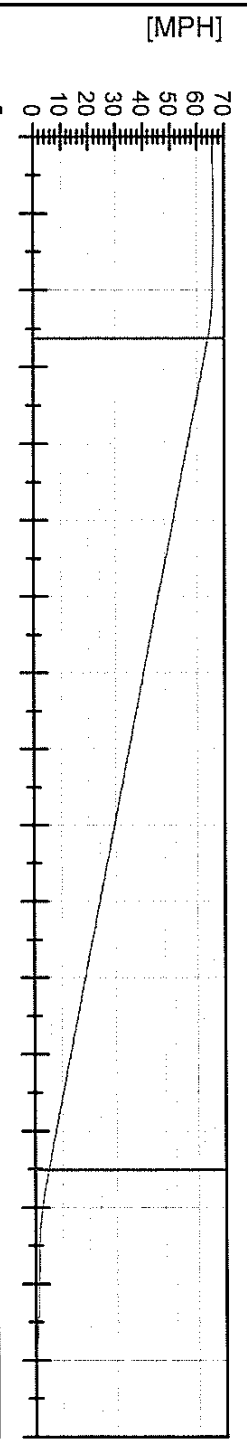
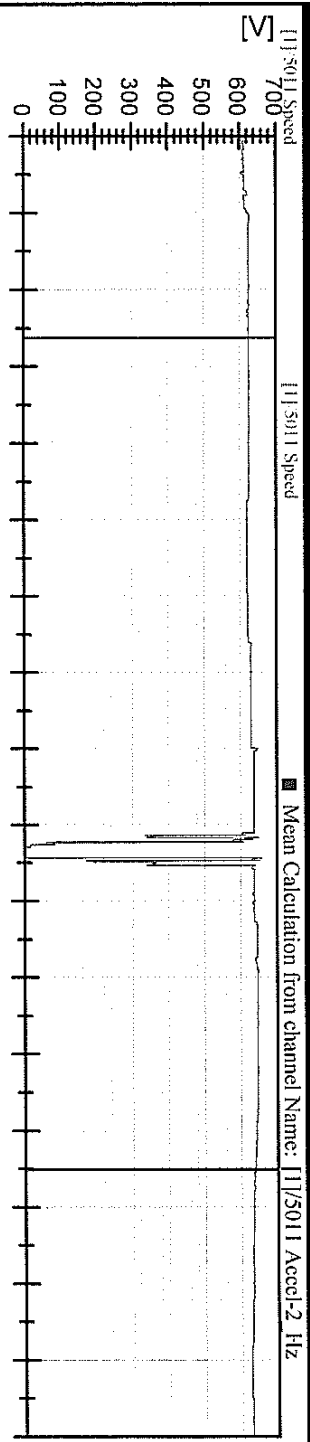
Name	Jerk#	Time 1	Time 2	Y1	Y2	dX	dY	Slope
StandStill To Power	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Power To Coast	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coast To Brake	3	109.534	110.740	0.635	3.079	1.206	2.444	2.0
Power To Brake (No Coast)	4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Caution Stop	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brake To Coast	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coast To Power	7	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brake To Power (No Coast)	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Not Used	9	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Acceleration/Deceleration Data Table Calculation

Name	Type#	Time 1	Time 2	Y1	Y2	dX	Distance	Rate
Deceleration	1	111.112 Sec	132.820 Sec	65.0 MPH	5.0 MPH	21.708 Sec	962 Ft	2.9 Mph/Sec
Acceleration	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Mean Calculation from channel Name[1]5011 Accel-2_Hz

Project No : 76	System : Braking Performances Test	Report Date : 11/11/2009 10:59:01
Lead Technician : G. Tremblay / J. Beauchemin	Test Description : Maximum Dynamic Brake @ 70 mph - Northbound	BTF-No : 8030
Run Number : 8030-B14	Cursor 1 : 141.236	Cursor 2 : 163.030
Distance : 948	Time : 21.774	Rate : -2.8
Sheet No : 1 / 6		

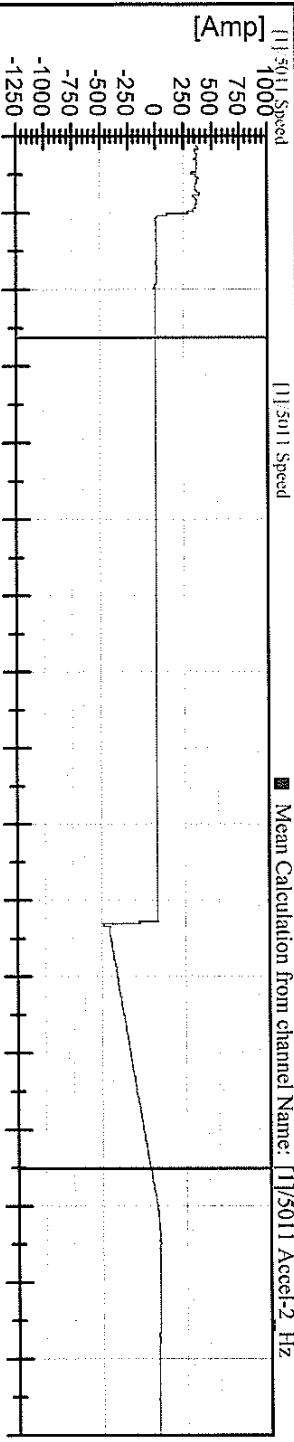


File Name: Run 6 20091102_104241_flic0001.idm
 Setup Template: D:\CTA test data\Script_Rev1.15save\5011-5012_BTTP8030-(1102).xls

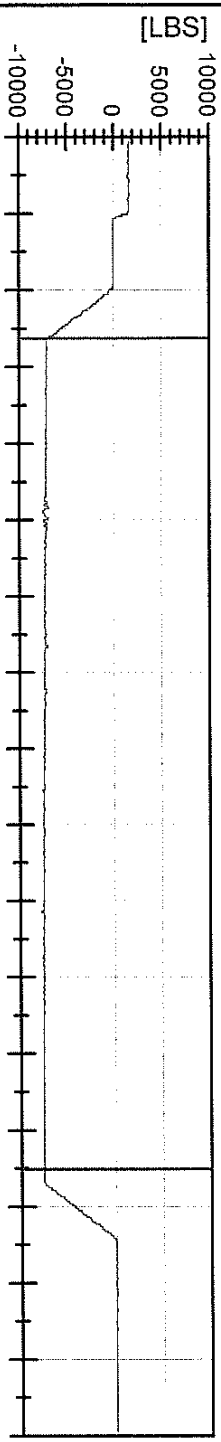
Project No : 76
 Lead Technician : G. Tremblay / J. Beaulémin
 Run Number : 8030-B14
 Cursor 1 : 141.256

System : **Braking Performances Test**
 Test Description : Maximum Dynamic Brake @ 70 mph - Northbound
 Cursor 2 : 163.030
 Distance : 948
 Time : 21.774
 Rate : -2.8

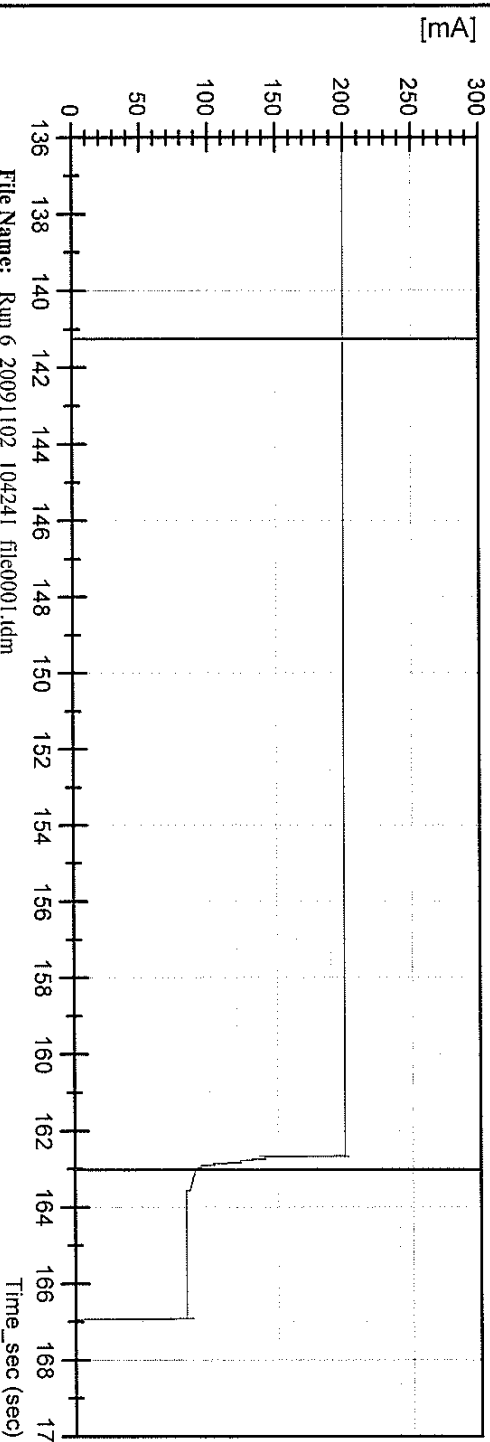
Report Date : 11/11/2009 10:59:01
 BTP-No : 8030
 Sheet No : 2 / 6



Legend Graph#4
 — 5011 Prop Current



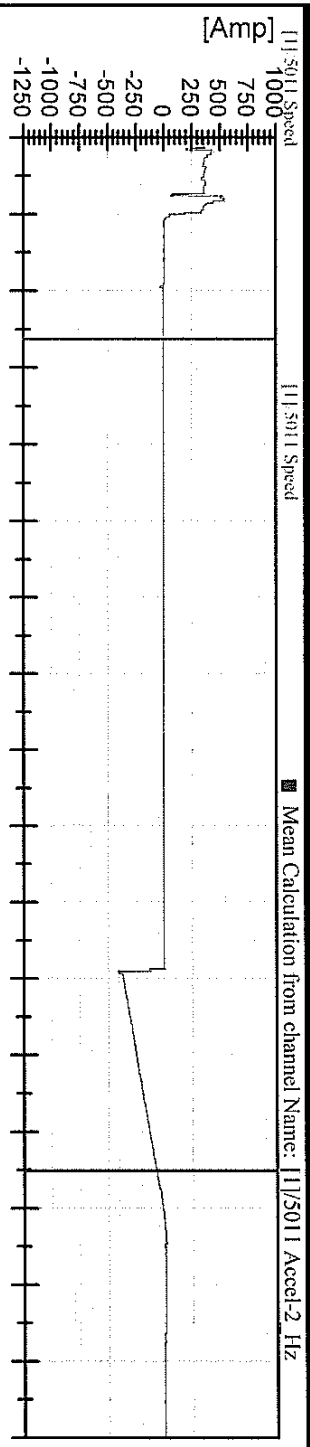
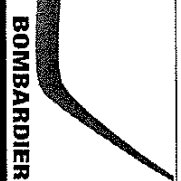
Legend Graph#5
 — 5011 Actual Tr Eff



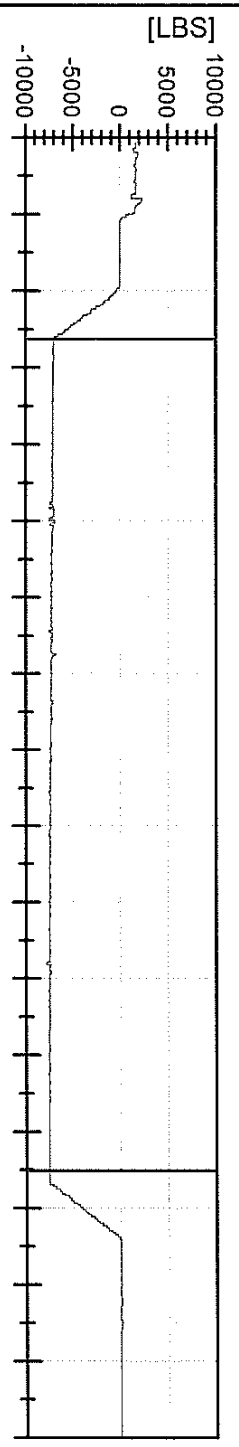
Legend Graph#6
 — 5011 FB Command

File Name: Run 6_20091102_104241_file0001.adm
 Setup Template: D:\CTA test data\Script_Rev1.1\save\5011-5012 BTP8030-(1102).xls

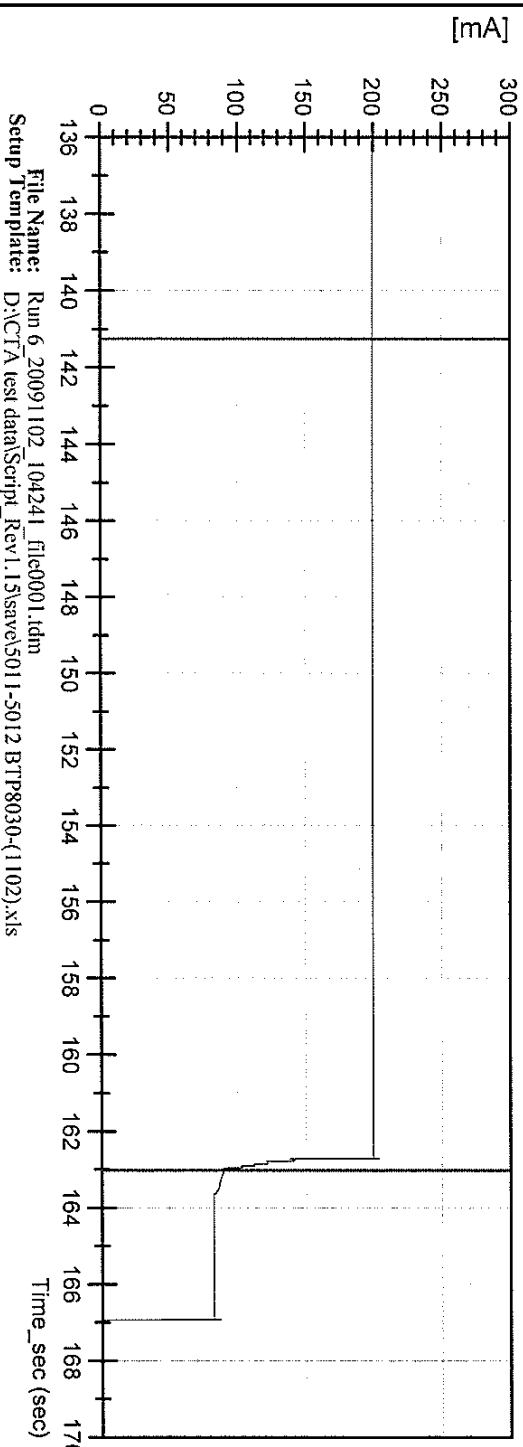
Project No : 76	System : Braking Performances Test	Report Date : 11/11/2009 10:59:02
Lead Technician : G. Tremblay / J. Beauchemin	Test Description : Maximum Dynamic Brake @ 70 mph - Northbound	BTP-No : 8030
Run Number : 8030-B14	Cursor 1 : 141.256	Cursor 2 : 163.030
Cursor 1 : 141.256	Distance : 948	Time : 21.774
Cursor 2 : 163.030	Rate : -2.8	Sheet No : 3 / 6



Legend Graph#7
— 5012 Prop Current



Legend Graph#8
— 5012 Actual Tr Eff



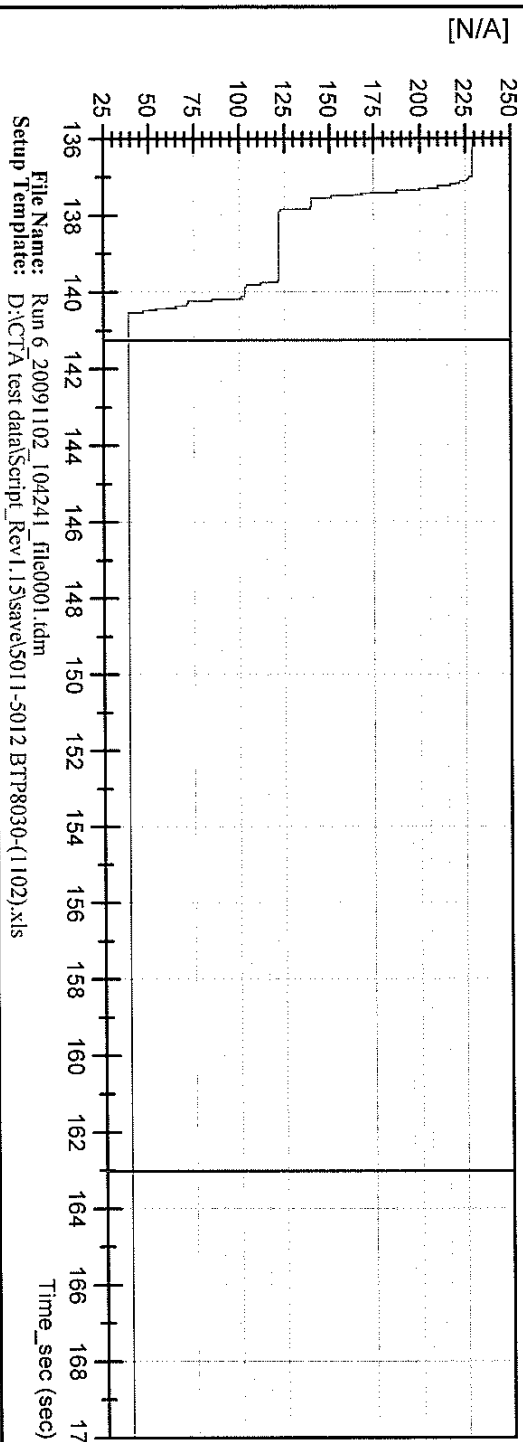
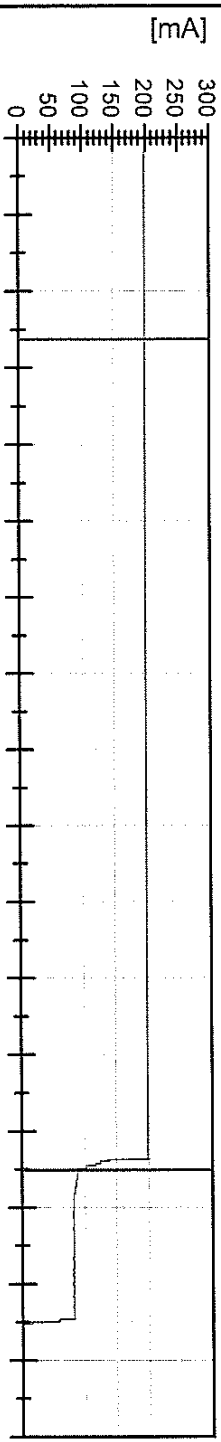
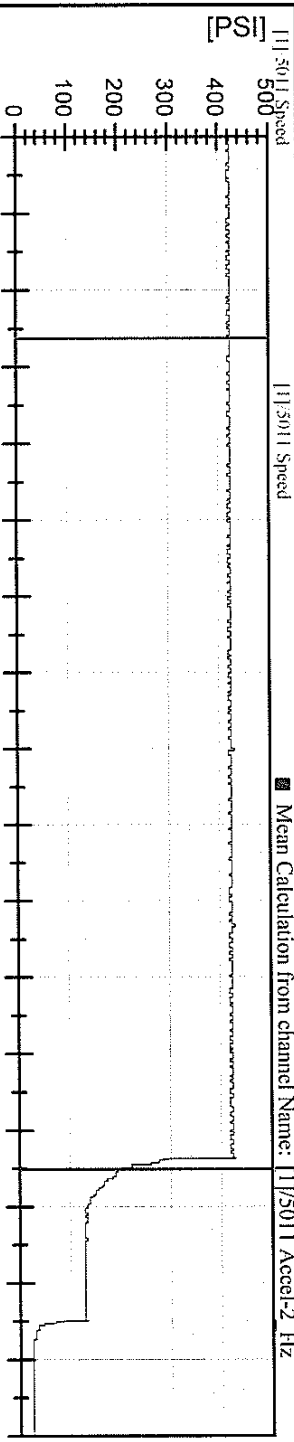
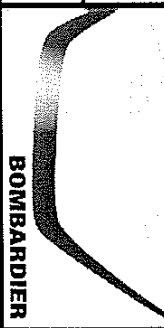
Legend Graph#9
— 5012 FB Command

File Name: Run 6_20091102_104241_Mic0001.idm
Setup Template: D:\CTA test data\Script_Rev1.15save\5011-5012 BTP8030-(1102).xis

Project No: 76
 Lead Technician: G. Tremblay / J. Beauchemin
 Run Number: 8030-B14
 Cursor 1: [4] 256

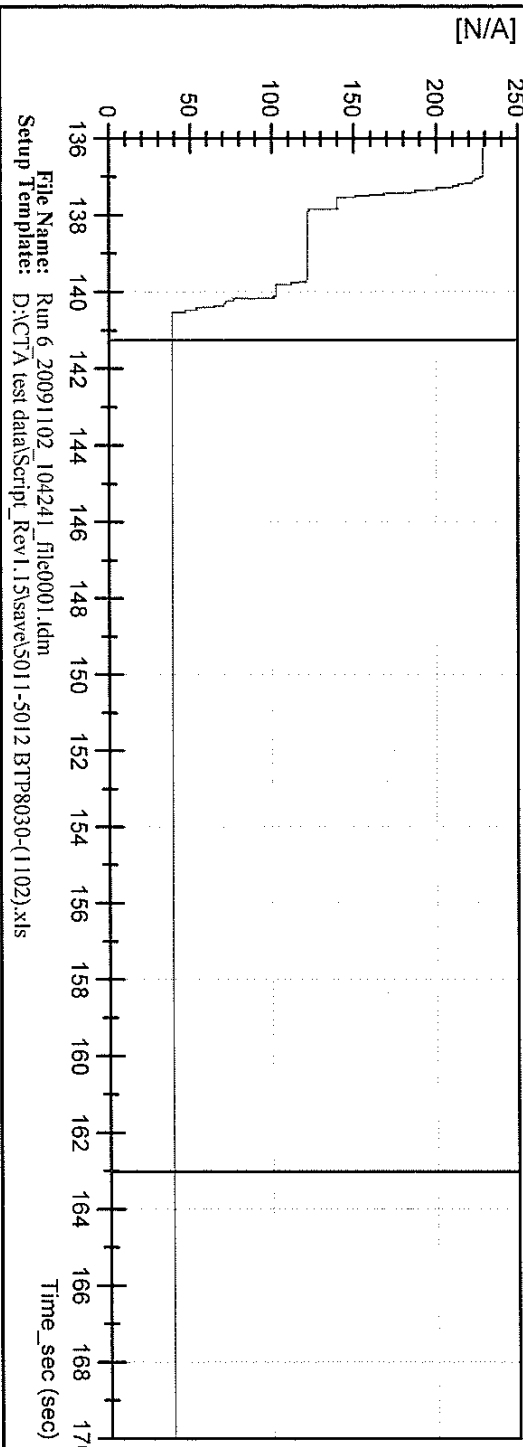
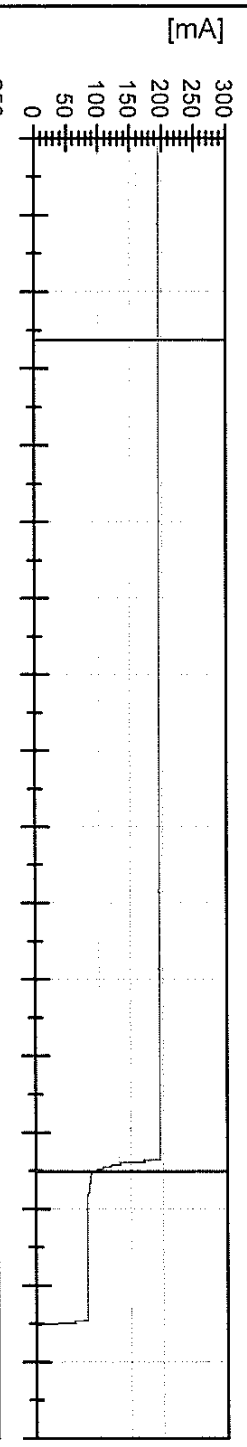
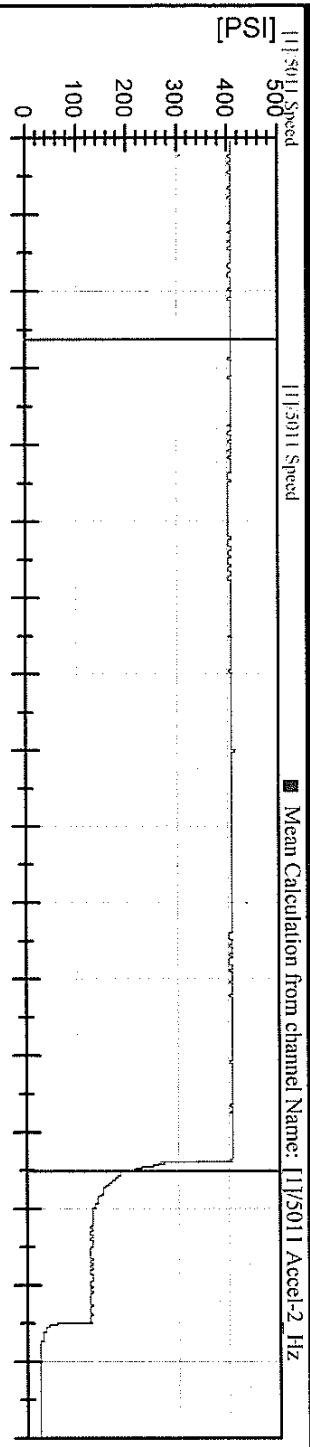
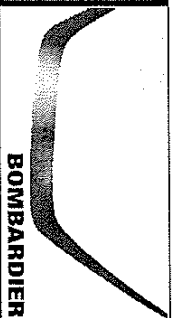
System: Braking Performances Test
 Test Description: Maximum Dynamic Brake @ 70 mph - Northbound
 Cursor 2: [4] 256
 Distance: 948
 Time: 21.774
 Rate: -2.8

Report Date: 11/11/2009 10:59:02
 BTP-No: 8030
 Sheet No: 4 / 6




File Name: Run 6 20091102_104241_file0001.dtm
 Setup Template: D:\CTA test data\Script_Rev1.1\Save\5011-5012 BTP8030-(1102).xls

Project No : 76	System : Braking Performances Test	Report Date : 11/11/2009 10:59:02
Lead Technician : G. Tremblay / J. Beauchemin	Test Description : Maximum Dynamic Brake @ 70 mph - Northbound	BTP-No : 8030
Run Number : 8030-B14	Cursor 1 : 141.256	Cursor 2 : 163.030
Cursor 1 : 141.256	Distance : 948	Time : 21.774
Cursor 2 : 163.030	Rate : -2.8	Rate : -2.8
Mean Calculation from channel Name: [1]5011 Accel-2_Hz		Sheet No : 5 / 6



File Name: Run 6_20091102_104241 file0001.idm
Setup Template: D:\CTA test data\Script_Rev1.15save\5011-5012 BTP8030-(1102).xls

Project No : 76	System : Braking Performances Test	Report Date : 11/11/2009 10:59:03
Lead Technician : G. Tremblay / J. Beauchemin	Test Description : Maximum Dynamic Brake @ 70 mph - Northbound	BTF-No : 8030
Run Number : 8030-B14	Cursor 1 : 141.256	Cursor 2 : 163.030
Distance : 948	Time : 21.774	Rate : -2.8
Sheet No : 6 / 6		

JerK Data Table Calculation

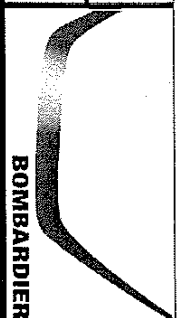
Name	JerK#	Time 1	Time 2	Y1	Y2	dX	dY	Slope
StandStill To Power	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Power To Coast	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coast To Brake	3	140.008	141.314	-0.226	-2.751	1.306	-2.525	-1.9
Power To Brake (No Coast)	4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Caution Stop	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brake To Coast	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coast To Power	7	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brake To Power (No Coast)	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Not Used	9	N/A	N/A	N/A	N/A	N/A	N/A	N/A

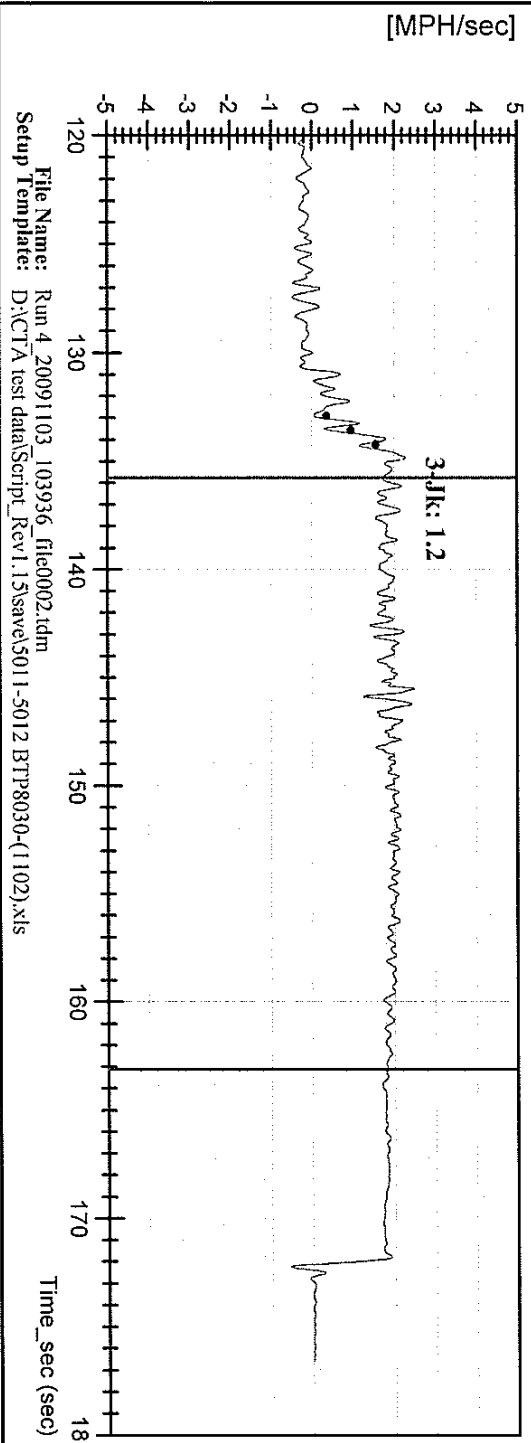
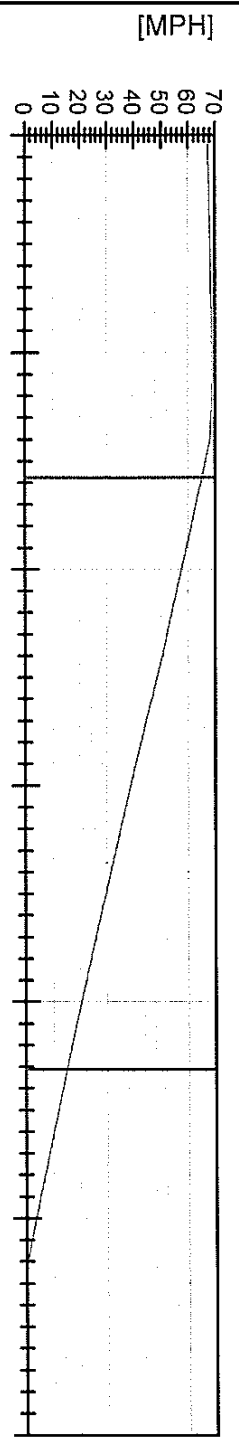
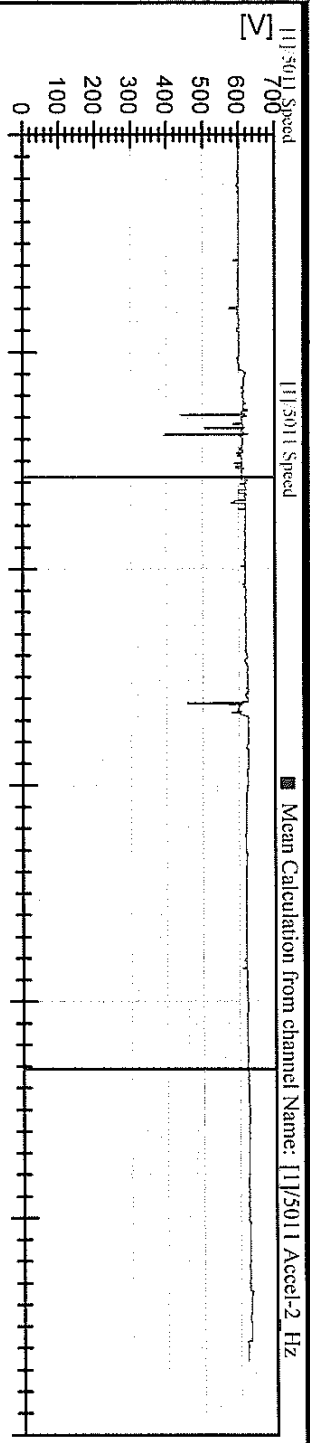
Acceleration/Deceleration Data Table Calculation

Name	Type#	Time 1	Time 2	Y1	Y2	dX	Distance	Rate
Deceleration	1	141.256 Sec	163.030 Sec	64.0 MPH	4.9 MPH	21.774 Sec	948 Ft	-2.8 Mph/Sec
Acceleration	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Mean Calculation from channel Name[1]/5011 Accel-2_Hz

File Name: Run 6_20091102_104241_file0001.rdm
 Setup Template: D:\CTA test data\Script_Rev1.15\save\5011-5012 BTP8030-(1102).xls

Project No: 76	System: Braking Performances Test	Report Date: 11/11/2009 11:20:37	
Lead Technician: G. Tremblay / J. Beaulémin	Test Description: Maximum Friction Brake @ 70 mph - Southbound	BTP-No: 8030	
Run Number: 8030-BIS	Cursor 1: 135.766	Cursor 2: 163.124	Sheet No: 1 / 6
File Name: Run 4 20091103_103936_file0002.tdm	Distance: 107	Time: 27.358	Rate: 1.7
Setup Template: D:\CTA test data\Script_Rev1.15save\5011-5012 BTP8030-(1102).xls	Mean Calculation from channel Name: [1]5011 Accel-2_Hz		



File Name: Run 4 20091103_103936_file0002.tdm
 Setup Template: D:\CTA test data\Script_Rev1.15save\5011-5012 BTP8030-(1102).xls

Project No : 76

Lead Technician : G. Tremblay / J. Beauchemin

System : Braking Performances Test

Report Date : 11/11/2009 11:20:38

Run Number : 8030-B15

Test Description : Maximum Friction Brake @ 70 mph - Southbound

BRP-No : 8030

Sheet No : 2 / 6

Cursor 1 : 135.766

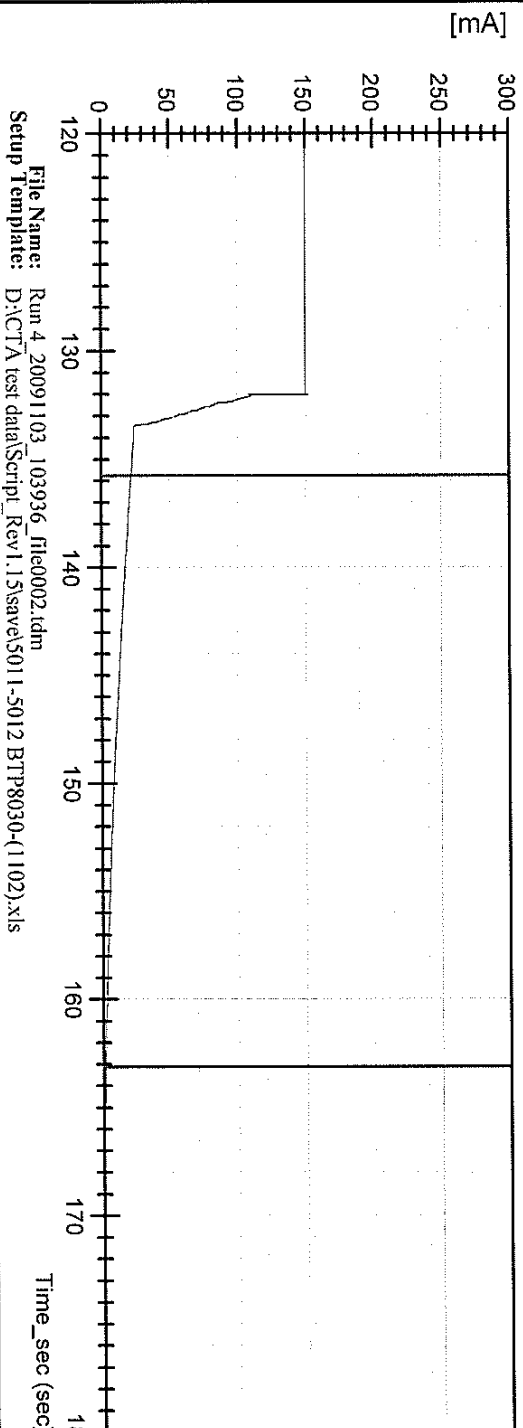
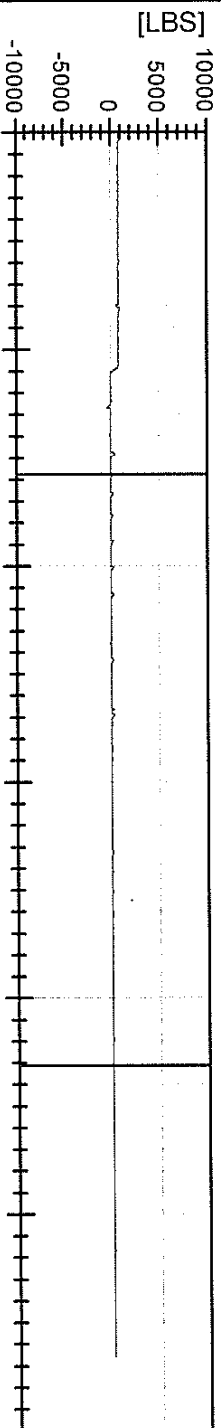
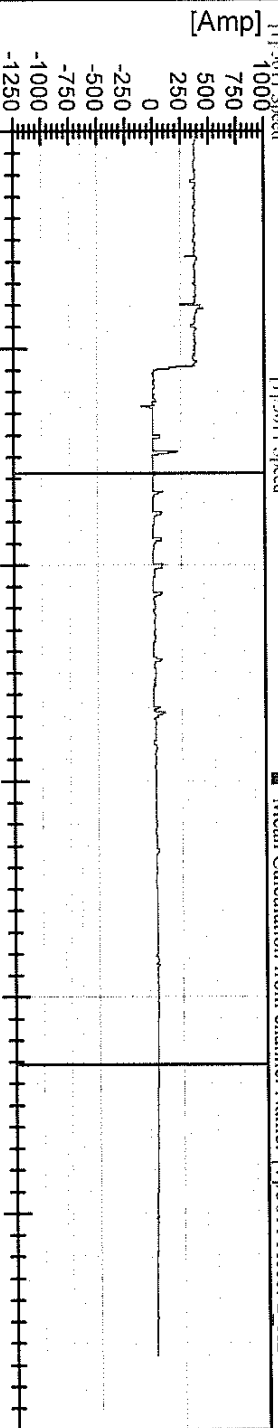
Cursor 2 : 163.124

Distance : 107 Time : 27.358 Rate : 1.7

|||5011 Speed

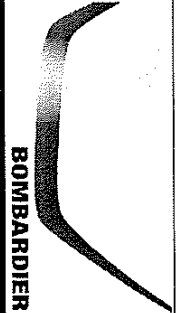
|||5011 Speed

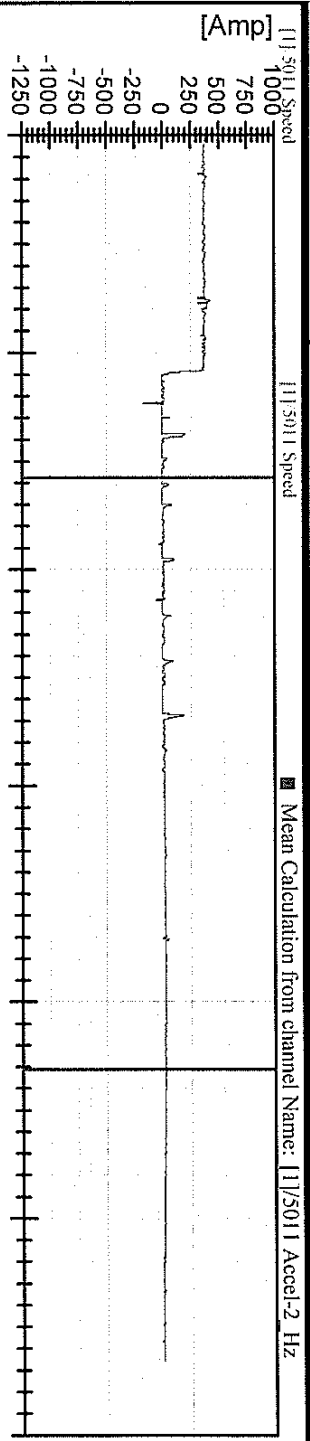
Mean Calculation from channel Name: |||5011 Accel-2_Hz



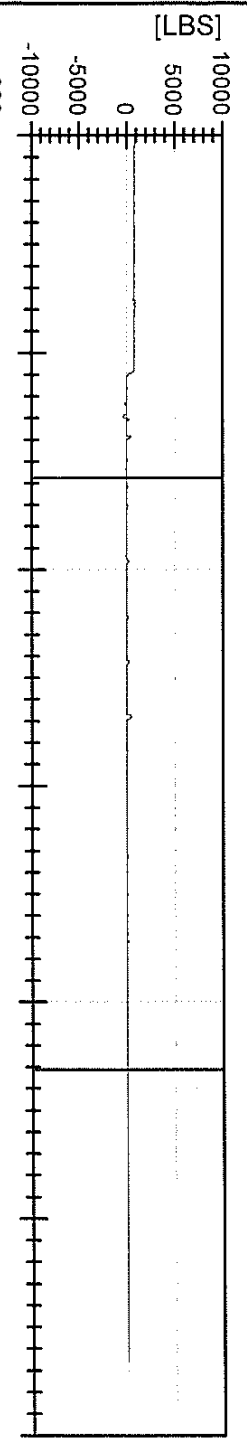
File Name: Run_4_20091103_103936_file0002.idm
 Setup Template: D:\CTA test data\Script_Rev1.1\save\5011-5012_BTP8030-(1102).xls



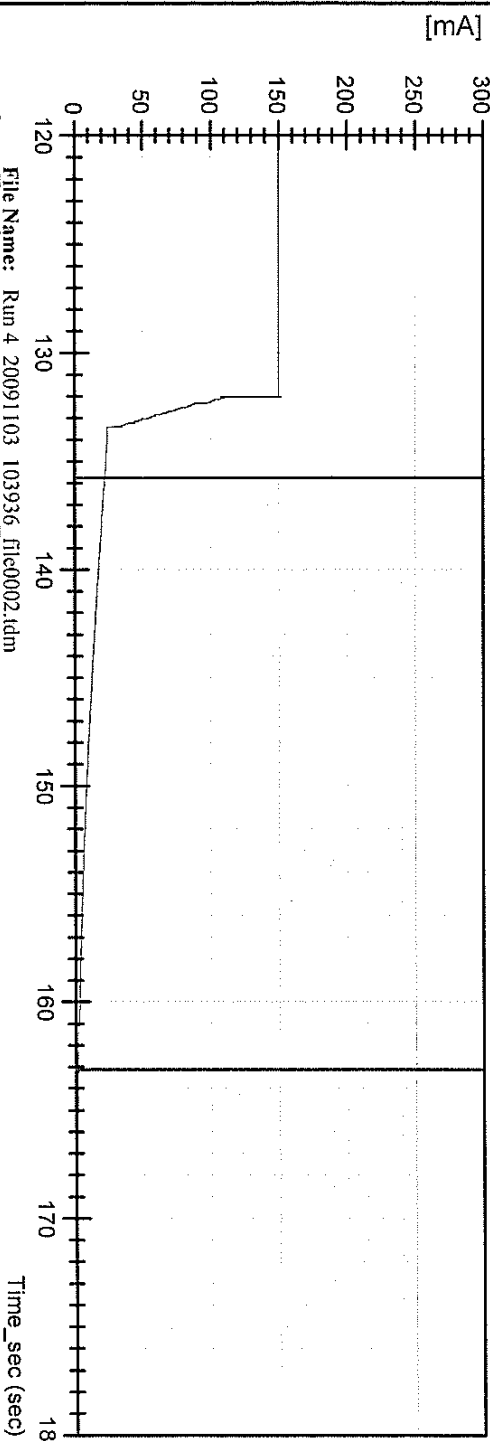
Project No : 76	System : Braking Performances Test	Report Date : 11/11/2009 11:20:39
Lead Technician : G. Tenhlay / J. Beauchemin	Test Description : Maximum Friction Brake @ 70 mph - Southbound	BTP-No: 8030
Run Number : 8030-B15	Cursor 1 : 135.766	Cursor 2 : 163.124
Distance : 107	Time : 27.358	Rate : 1.7
Sheet No: 3 / 6		



Legend Graph#7
 — 5012 Prop Current



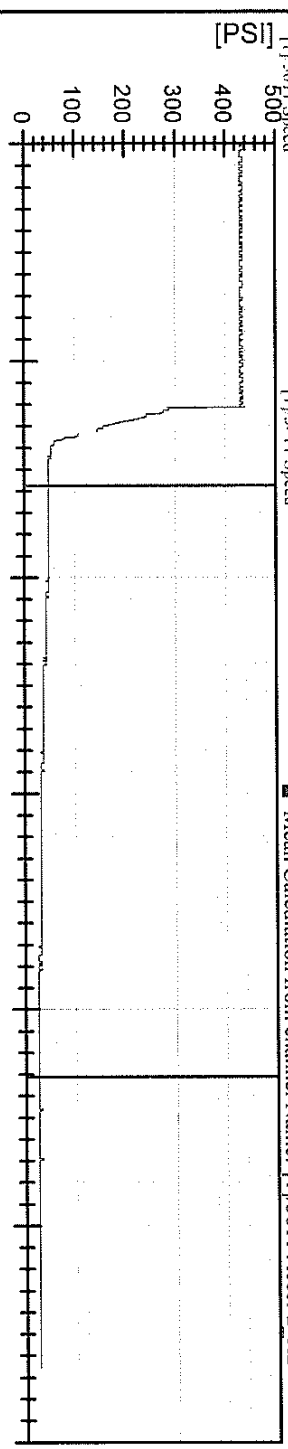
Legend Graph#8
 — 5012 Actual Tr Eff



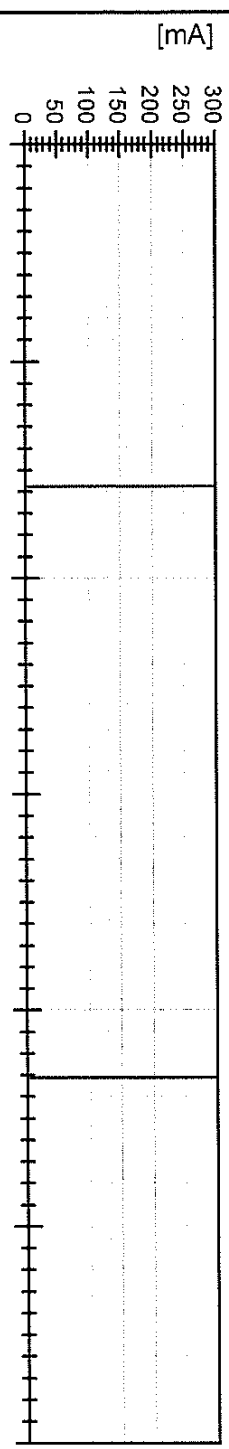
Legend Graph#9
 — 5012 FB Command

File Name: Run 4_20091103_103936_frlc-0002.ldm
 Setup Template: D:\CTA test data\Script_Rev1.1\save\5011-5012 BTP8030-(1102).xls

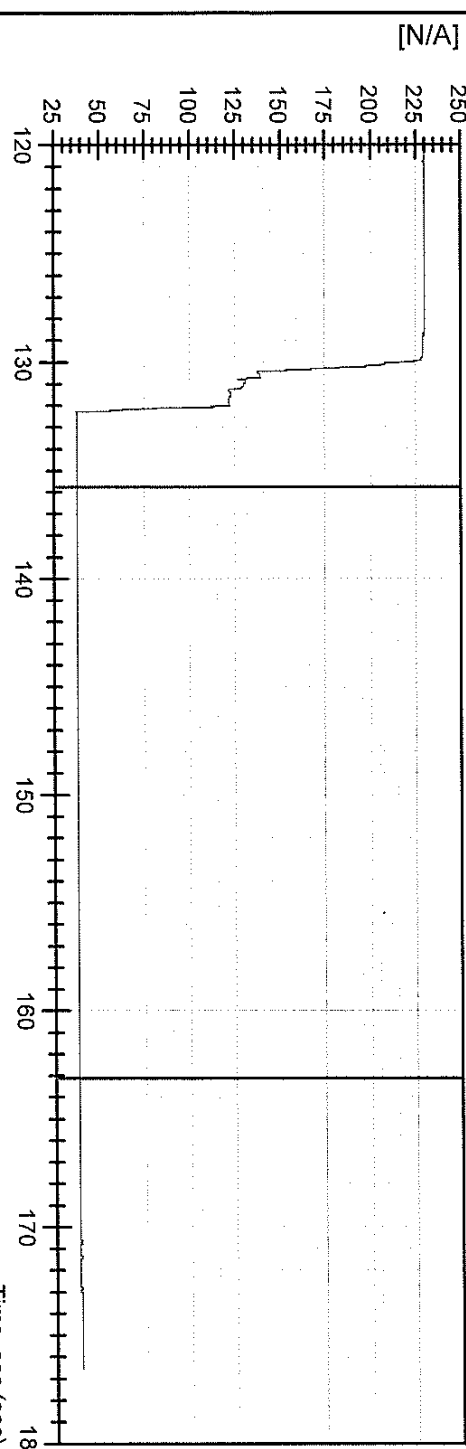
Project No : 76	System : Braking Performances Test		Report Date : 11/11/2009 11:20:39
Lead Technician : G. Tremblay / J. Beauchemin	Test Description : Maximum Friction Brake @ 70 mph - Southbound		BTP-No : 8030
Run Number : 8030-B15	Cursor 1 : 135.766	Cursor 2 : 163.124	Distance : 107 Time : 27.358 Rate : 1.7
Mean Calculation from channel Name: [1]/5011 Accel-2_Hz			Sheet No : 4 / 6



Legend Graph#10
 — 5011 HPU Pressure




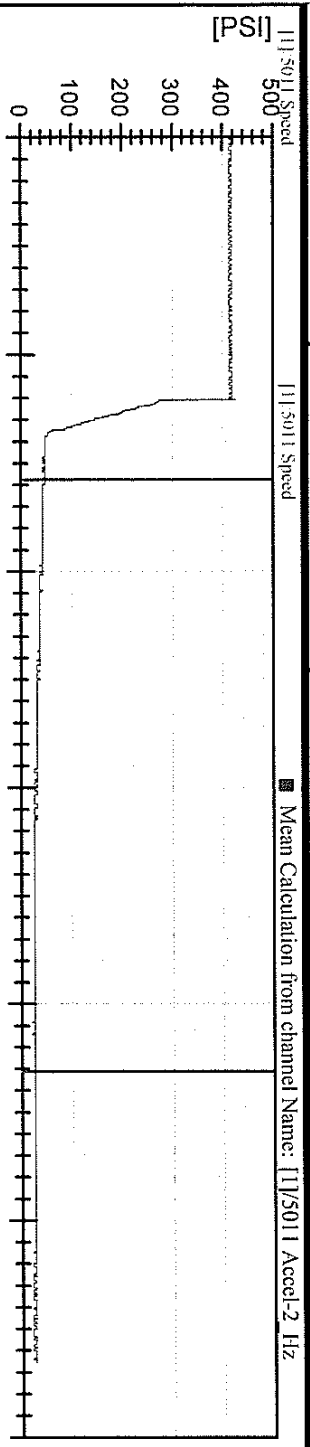
Legend Graph#11
 — 5011 HPU Valve Current



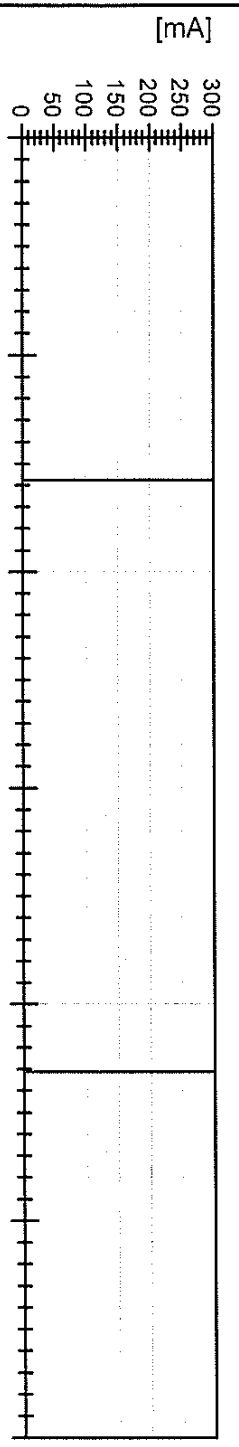
Legend Graph#12
 — 5011 MC Reference

File Name: Run_4_20091103_103936_file0002.idm
 Setup Template: D:\CTA test data\Script_Rev1.15\save\5011-5012 BTP8030-(1102).xls

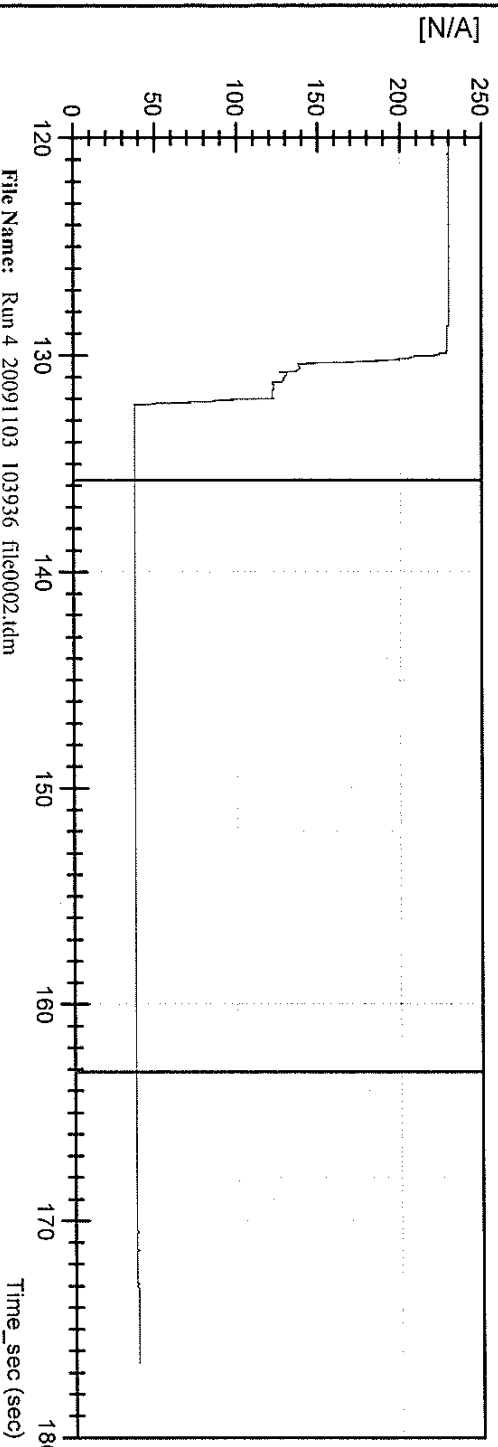
Project No : 76	System : Braking Performances Test	Report Date : 11/11/2009 11:20:40	
Lead Technician : G. Tremblay / J. Beaulhem	Test Description : Maximum Friction Brake @ 70 mph - Southbound	BTP-No : 8030	
Run Number : 8030-B15	Cursor 1 : 135.766	Cursor 2 : 163.124	Sheet No : 5 / 6
Mean Calculation from channel Name: [1]5011 Accel-2 Hz	Distance : 107	Time : 27.358	Rate : 1.7



Legend Graph#13
 — 5012 HPU Pressure




Legend Graph#14
 — 5012 HPU Valve Current



Legend Graph#15
 — 5012 MC Reference

File Name: Run 4_20091103_103936_file0002.tdm
 Setup Template: D:\CTA test data\Script_Rev1.1\save\5011-5012 BTP8030-(1102).xls

Project No : 76	System : Braking Performances Test	Report Date : 11/11/2009 11:20:40
Lead Technician : G. Tremblay / J. Beauchemin	Test Description : Maximum Friction Brake @70 mph - Southbound	RRP-No : 8030
Run Number : 8030-B15	Cursor 1 : 135.766	Cursor 2 : 163.124
Distance : 107	Time : 27.358	Rate : 1.7
Sheet No : 6 / 6		

11/5011 Speed
 Jerk Data Table Calculation
 11/5011 Speed

Mean Calculation from channel Name: [11/5011 Accel-2_Hz]

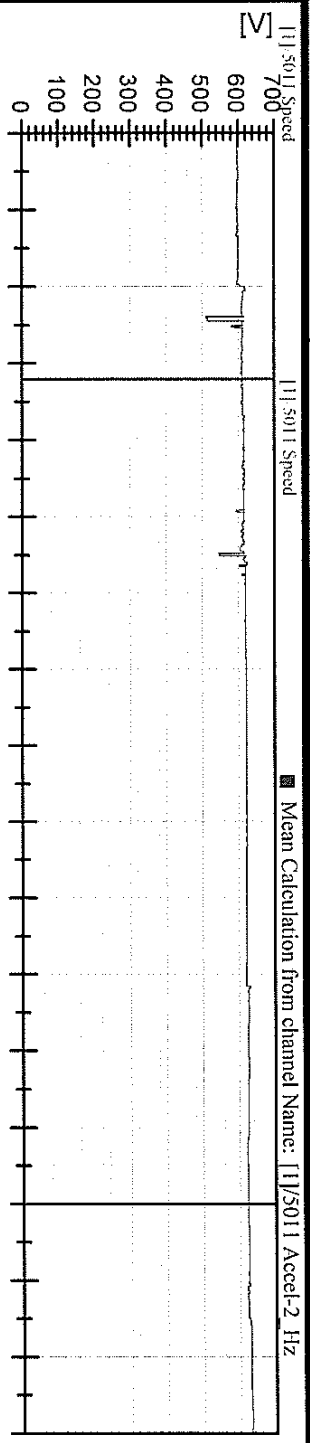
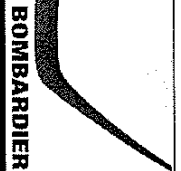
Name	Jerk#	Time 1	Time 2	Y1	Y2	dx	dy	Slope
StandStill To Power	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Power To Coast	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coast To Brake	3	132.900	134.778	0.066	2.241	1.878	2.175	1.2
Power To Brake (No Coast)	4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Caution Stop	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brake To Coast	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coast To Power	7	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brake To Power (No Coast)	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Not Used	9	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Acceleration/Deceleration Data Table Calculation

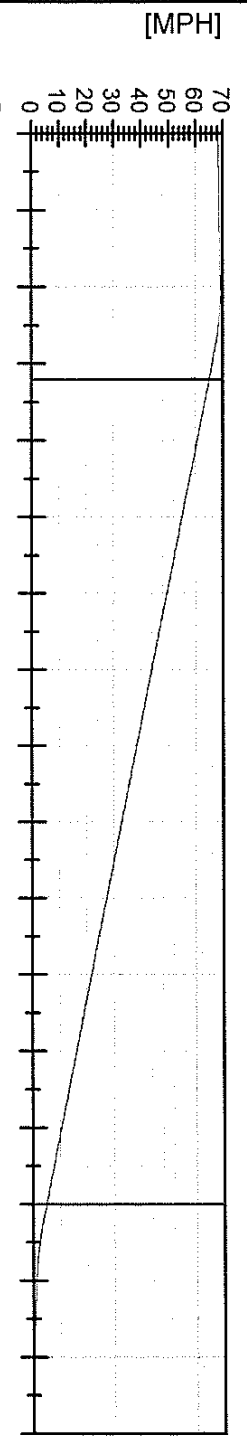
Name	Type#	Time 1	Time 2	Y1	Y2	dx	Distance	Rate
Deceleration	1	135.766 Sec	163.124 Sec	65.0 MPH	49.4 MPH	27.358 Sec	107 Ft	1.7 Mph/Sec
Acceleration	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Mean Calculation from channel Name[11/5011 Accel-2_Hz]

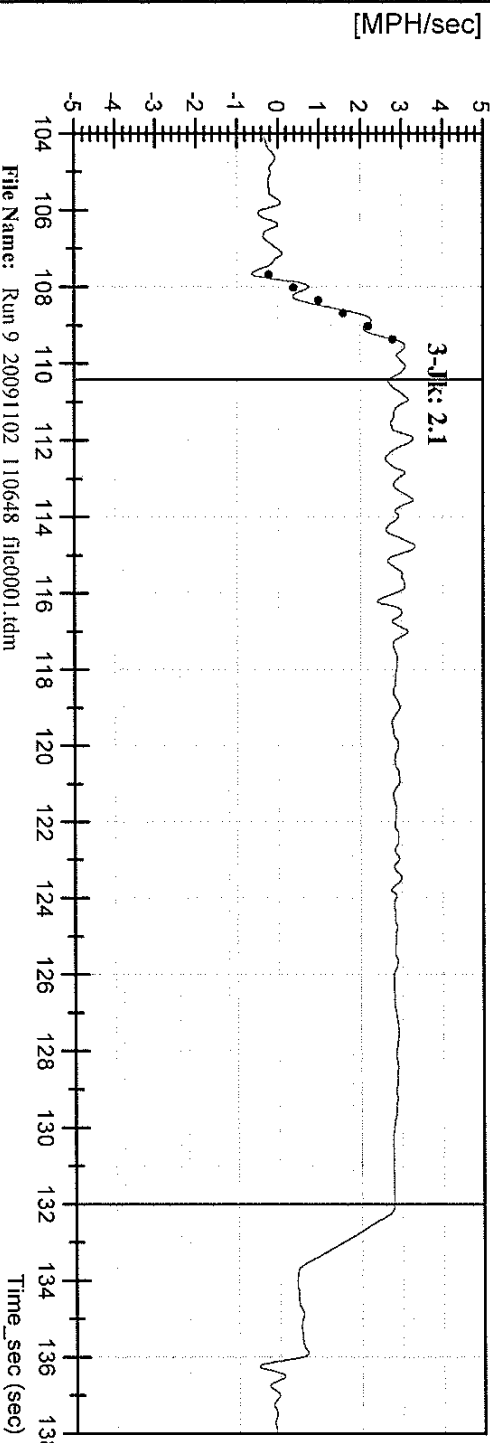
Project No: 76	System: Braking Performances Test	Report Date: 11/11/2009 11:05:34
Lead Technician: G. Tremblay / J. Beauchemin	Test Description: Maximum Dynamic Brake (Deadman) @ 70 mph - Southbound	BTP-No: 8030
Run Number: 8030-B19	Cursor 1: 110.412	Cursor 2: 132.010
Cursor 1: 110.412	Distance: 958	Time: 21.598
Cursor 2: 132.010	Rate: 2.9	Sheet No: 1 / 6



Legend Graph#1
— 5011 Line Voltage



Legend Graph#2
— 5011 Speed



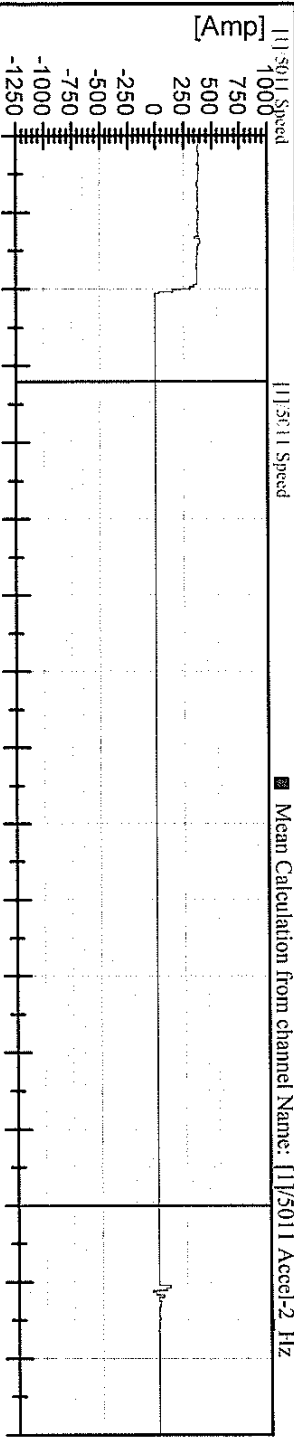
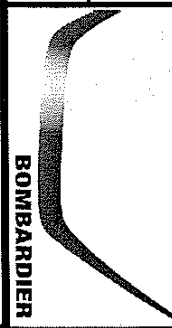
Legend Graph#3
— 5011 Accel-2_Hz
••• Jk_3

File Name: Run 9_20091102_110648_mlc0001.tdm
Setup Template: D:\CTA test data\Script_Rev1.15save\5011-5012 BTP8030-(1102).xls

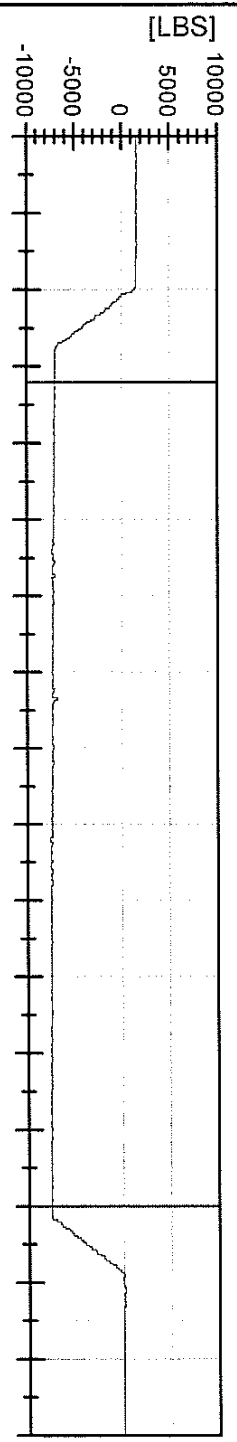
Project No : 76
 Lead Technician : G. Tremblay / J. Beauchemin
 Run Number : 8030-B19

System : Braking Performances Test
 Test Description : Maximum Dynamic Brake (Deadman) @ 70 mph - Southbound
 Cursor 1 : 110.412
 Cursor 2 : 132.010
 Distance : 958
 Time : 21.598
 Rate : 2.9

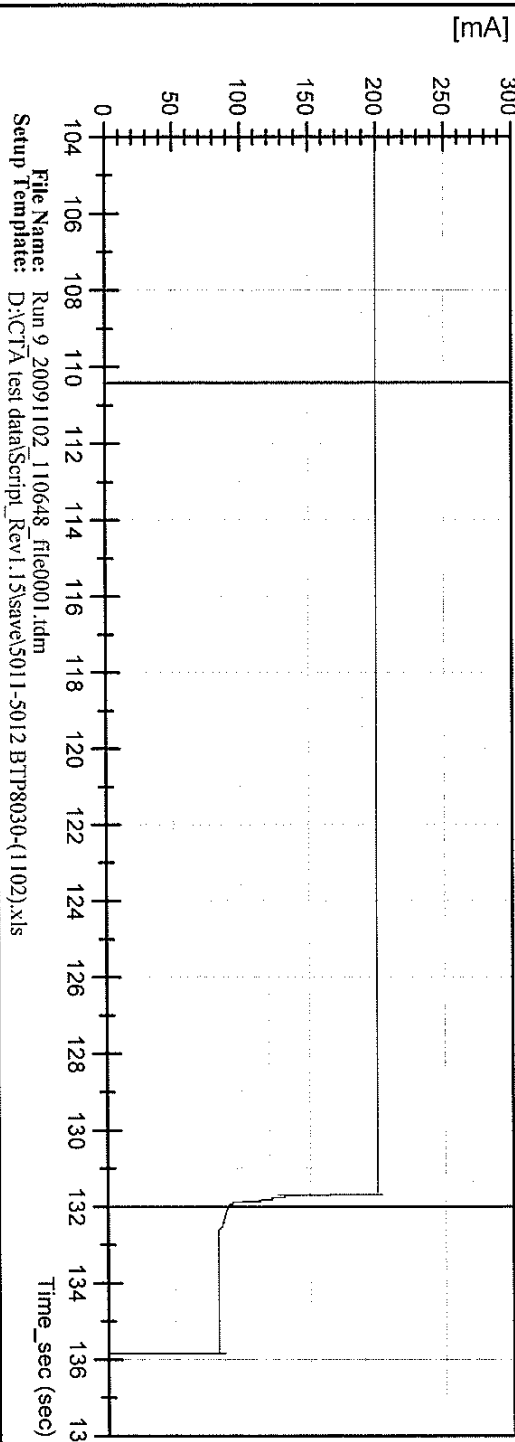
Report Date : 11/11/2009 11:05:34
 BRP-No : 8030
 Sheet No : 2 / 6



Legend Graph#4
 — 5011 Prop Current



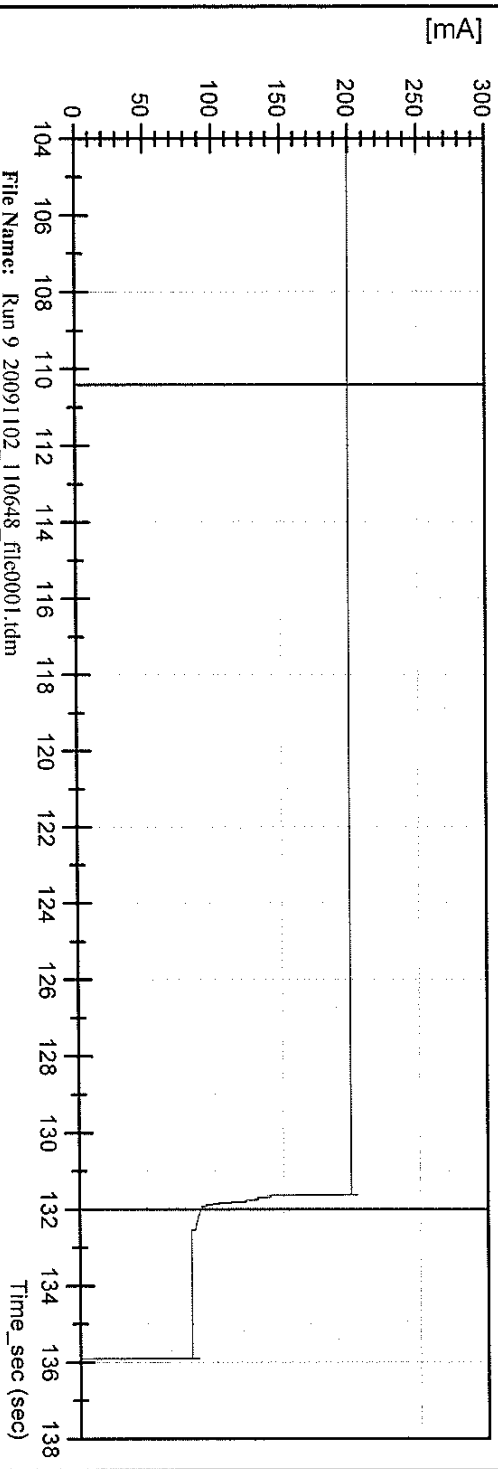
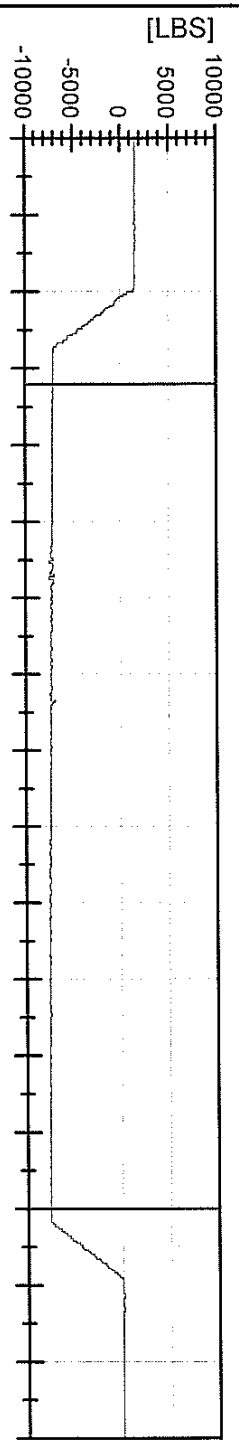
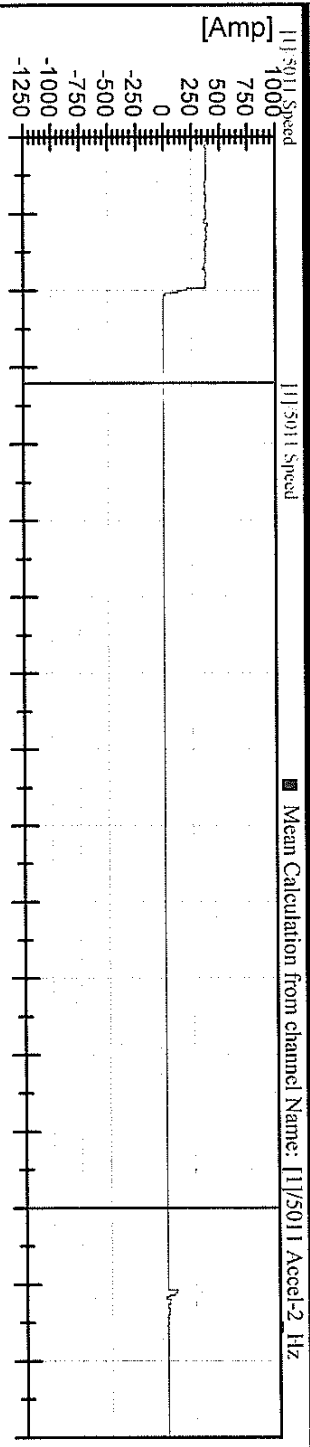
Legend Graph#5
 — 5011 Actual Tr Eff



Legend Graph#6
 — 5011 FB Command

File Name: Run 9 20091102_110648_file0001.idm
 Setup Template: D:\CTA test data\Script_Rev1.1\save\5011-5012 BTR8030-(1102).xls

Project No: 76	System: Braking Performances Test	Report Date: 11/11/2009 11:05:35
Lead Technician: G. Tremblay / J. Beauchemin	Test Description: Maximum Dynamic Brake (Deadman) @ 70 mph - Southbound	BTP-No: 8030
Run Number: 8030-B19	Cursor 1: 110.412	Cursor 2: 132.010
Cursor 1: 110.412	Distance: 958	Time: 21.598
Cursor 2: 132.010	Rate: 2.9	Sheet No: 3 / 6



File Name: Run 9_20091102_110648_file0001.tdm
 Setup Template: D:\CTA test data\Script_Rev1.15save\5011-5012 BTP8030-(1102).xls

Project No : 76

Lead Technician : G. Tremblay / J. Beauchemin

Run Number : 8030-B19

Cursor 1 : 110.412

Braking Performances Test

System :

Test Description : Maximum Dynamic Brake (Deadman) @ 70 mph - Southbound

Cursor 2 : 132.010

Distance : 958 Time : 21.598 Rate : 2.9

Mean Calculation from channel Name: [11]/5011 Accel-2 Hz

Report Date : 11/11/2009 11:05:35

BTP-No : 8030

Sheet No : 4 / 6

File Name: Run_9_20091102_110648_file0001.idm

Setup Template: D:\CTA test data\Script_Rev1.15\save\5011-5012.BTF8030-(1102).xls



Legend Graph#10

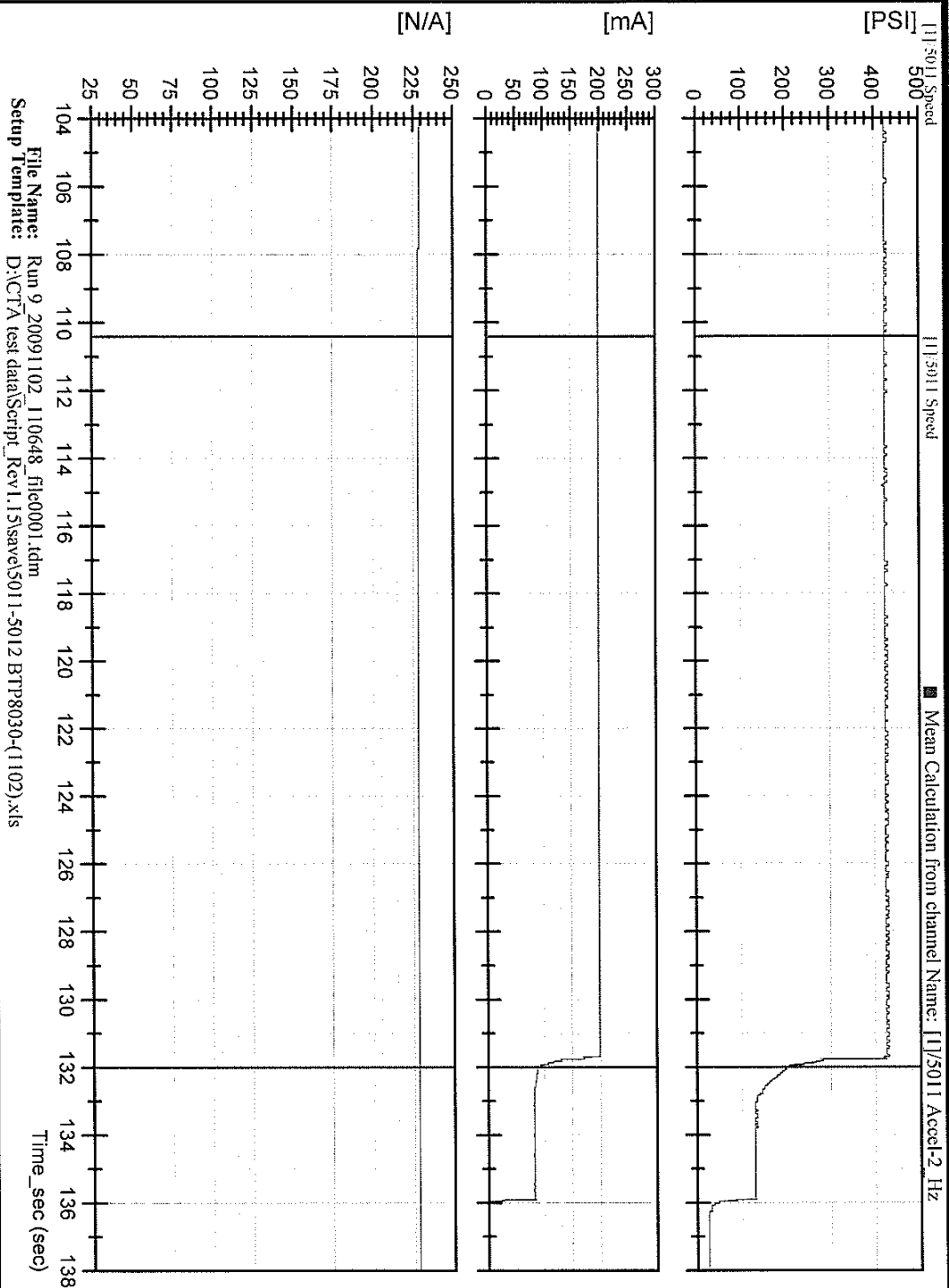
5011 HPU Pressure

Legend Graph#11

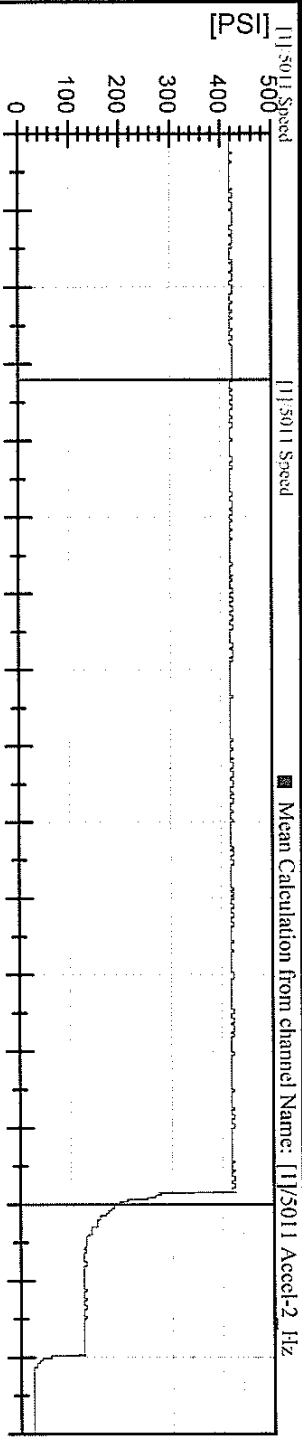
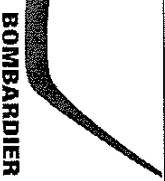
5011 HPU Valve Current

Legend Graph#12

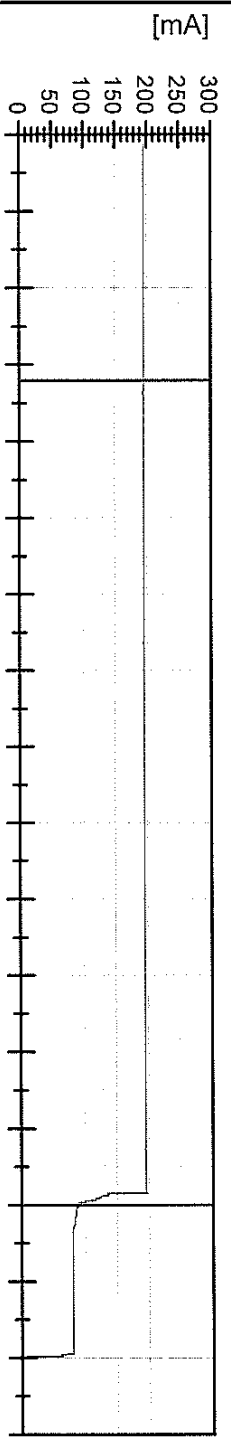
5011 MC Reference



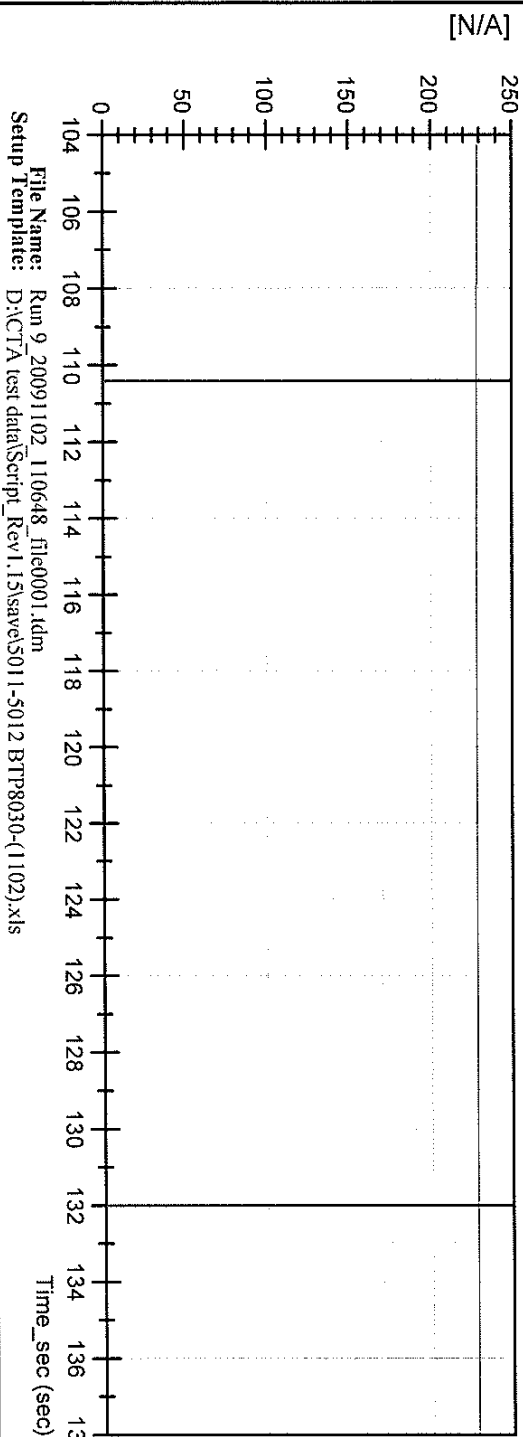
Project No : 76	System : Braking Performances Test	Report Date : 11/11/2009 11:05:35
Lead Technicien : G. Tremblay / J. Beuchemin	Test Description : Maximum Dynamic Brake (Deadman) @ 70 mph - Southbound	BTP-No : 8030
Run Number : 8030-B19	Cursor 1 : 110.412	Cursor 2 : 132.010
Cursor 1 : 110.412	Distance : 958	Time : 21.598
Cursor 2 : 132.010	Rate : 2.9	Sheet No : 5 / 6



Legend Graph#13
 — 5012 HPU Pressure



Legend Graph#14
 — 5012 HPU Valve Current



Legend Graph#15
 — 5012 MC Reference

File Name: Run 9_20091102_110648_file0001.tdm
 Setup Template: D:\CTA_test_data\Script_Rev1.15\save\5011-5012_BTP8030-(1102).xls

Project No : 76

System :

Braking Performances Test

Report Date:

11/11/2009 11:05:36

Lead Technician : G. Tremblay / J. Beauchemin

Run Number : 8030-B19

Test Description : Maximum Dynamic Brake (Deadman) @ 70 mph - Southbound

BTP-No :

8030

Sheet No :

6 / 6

Cursor 1 : 110.412

Cursor 2 : 132.010

Distance : 958 Time : 21.598 Rate : 2.9

Mean Calculation from channel Name: [1]/5011 Accel-2_Hz

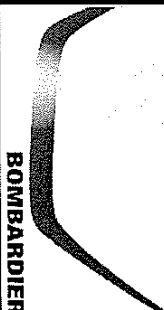
Jerk Data Table Calculation


Name	Jerk#	Time 1	Time 2	Y1	Y2	dX	dY	Slope
StandStill To Power	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Power To Coast	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coast To Brake	3	107.676	109.436	-0.622	3.007	1.760	3.629	2.1
Power To Brake (No Coast)	4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Caution Stop	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brake To Coast	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coast To Power	7	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brake To Power (No Coast)	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Not Used	9	N/A	N/A	N/A	N/A	N/A	N/A	N/A

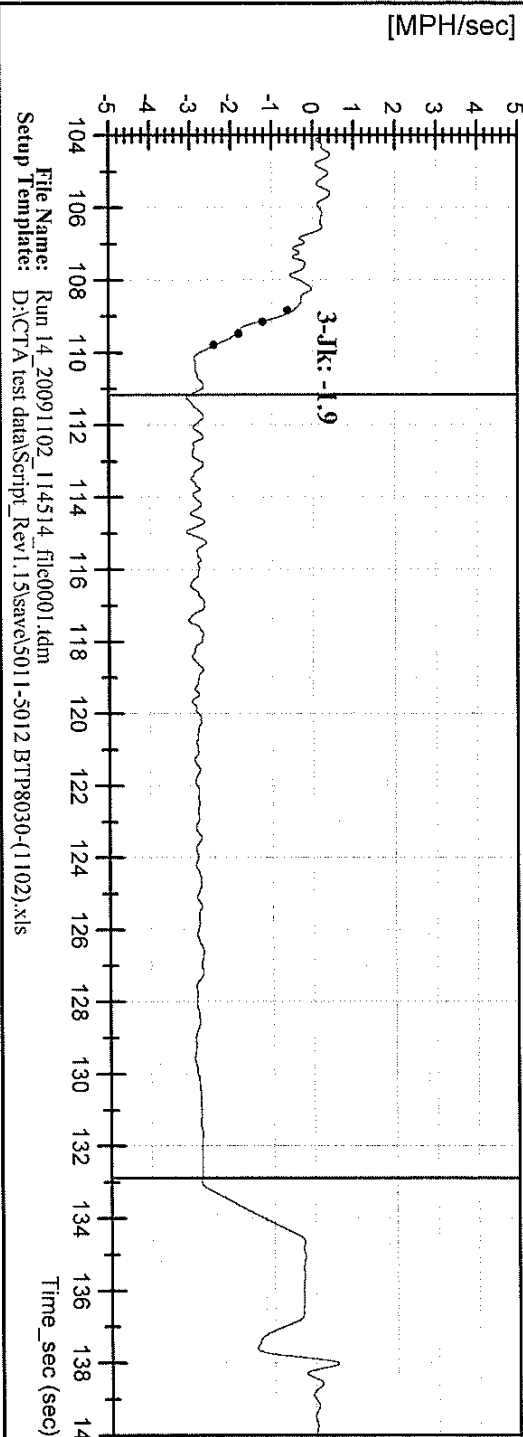
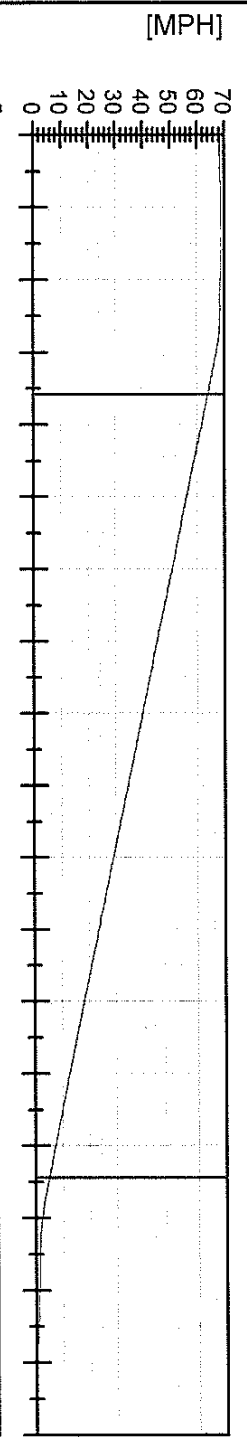
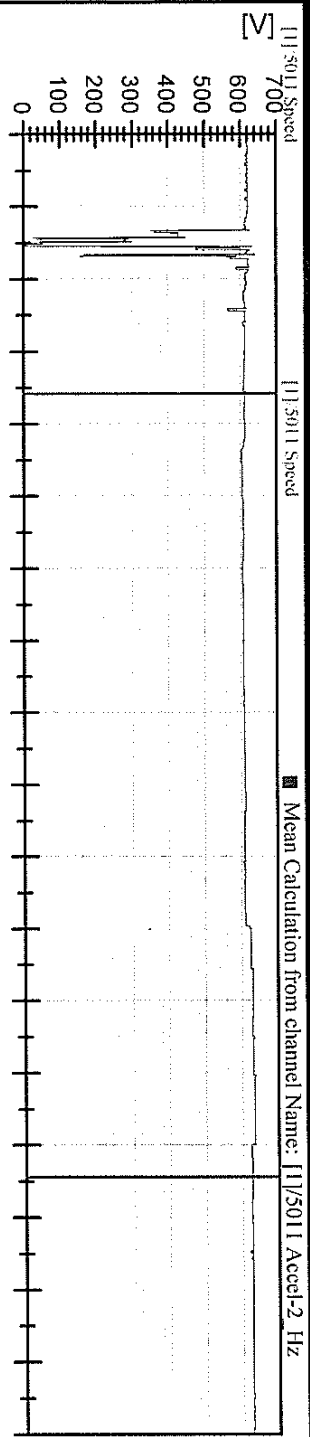
Acceleration/Deceleration Data Table Calculation

Name	Type#	Time 1	Time 2	Y1	Y2	dX	Distance	Rate
Deceleration	1	110.412 Sec	132.010 Sec	64.9 MPH	4.9 MPH	21.598 Sec	958 Ft	2.9 Mph/Sec
Acceleration	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Mean Calculation from channel Name[1]/5011 Accel-2_Hz



Project No : 76	System : Braking Performances Test	Report Date : 11/10/2009 15:57:01
Lead Technician : G. Tremblay / J. Beauchemin	Test Description : Maximum Dynamic Brake (Deadman) @ 70 mph - Northbound	BTP-No : 8030
Run Number : 8030-B20	Cursor 1 : 111.160	Cursor 2 : 132.888
Distance : 943	Time : 21.728	Rate : -2.8
Sheet No : 1 / 6		

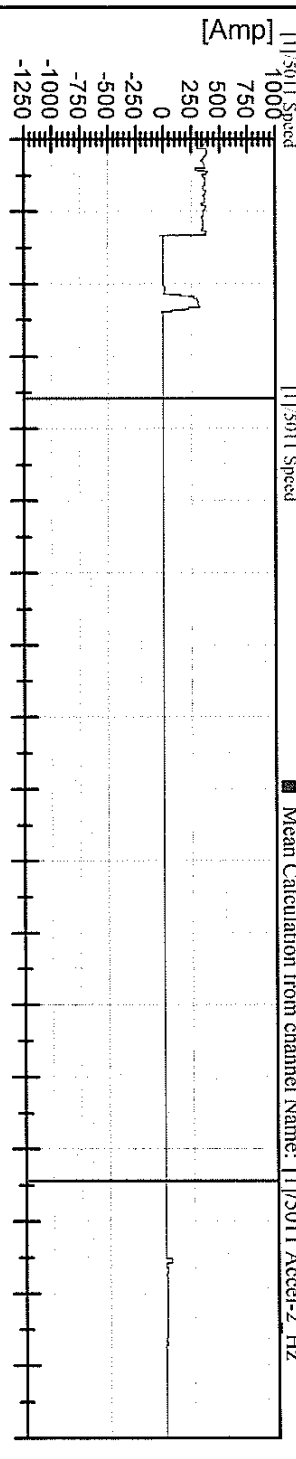
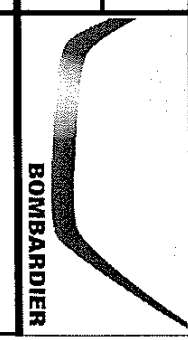


File Name: Run_14_20091102_114514_flic0001.adm
 Setup Template: D:\CTA test data\Script_Rev1.15save\5011-5012_BTP8030-(1102).xis

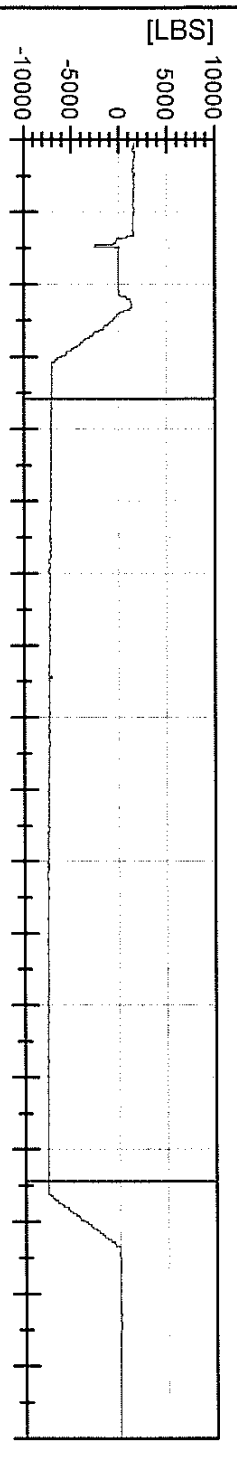
Project No : 76
 Lead Technician : G. Tremblay / J. Beauchemin
 Run Number : 8030-B20
 Cursor 1 : [1].160

System : **Braking Performances Test**
 Test Description : Maximum Dynamic Brake (Deadman) @ 70 mph - Northbound
 Cursor 2 : [1].5011 Speed
 132.888 Distance : 943 Time : 21.728 Rate : -2.8

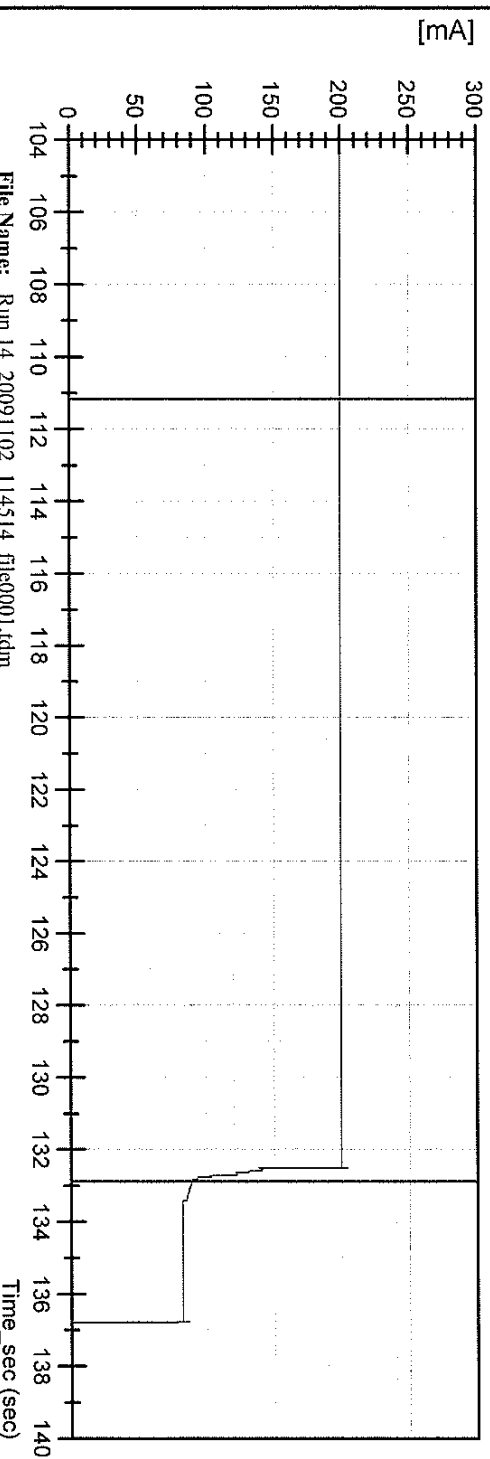
Report Date : 11/10/2009 15:57:01
 BTP-No : 8030
 Sheet No : 2 / 6



Legend Graph#4
 — 5011 Prop Current



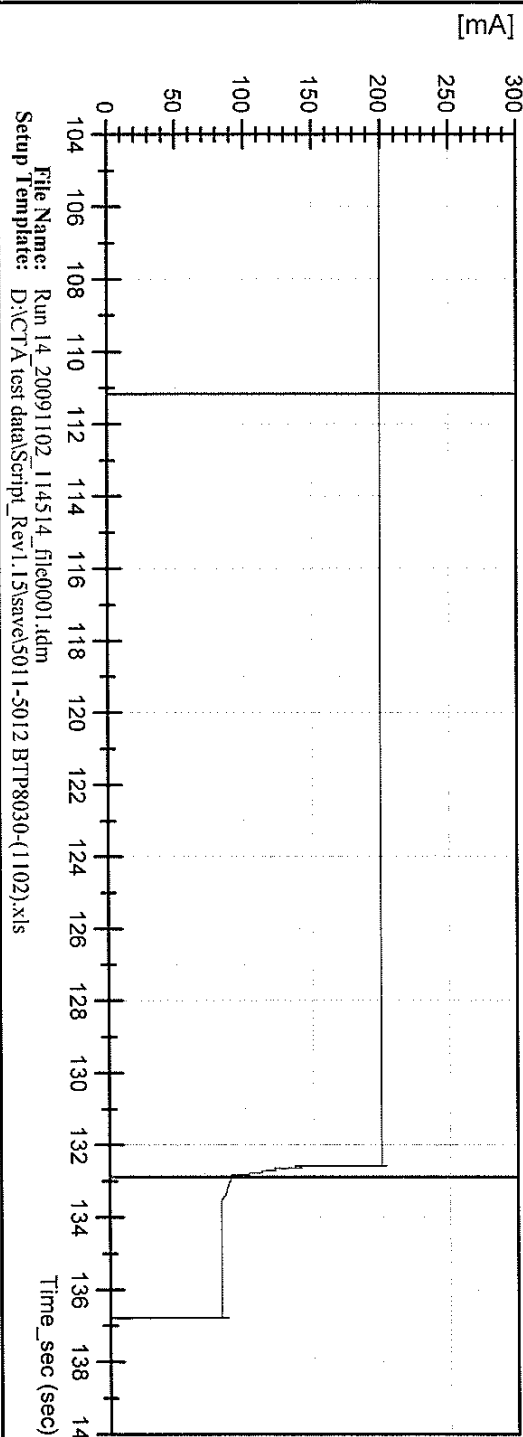
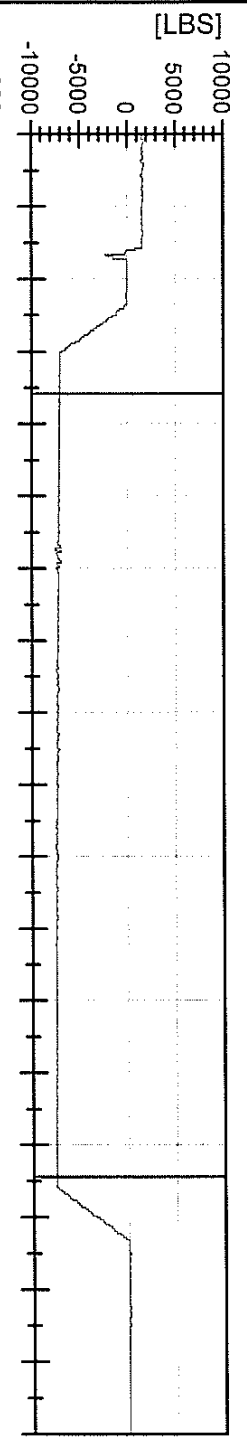
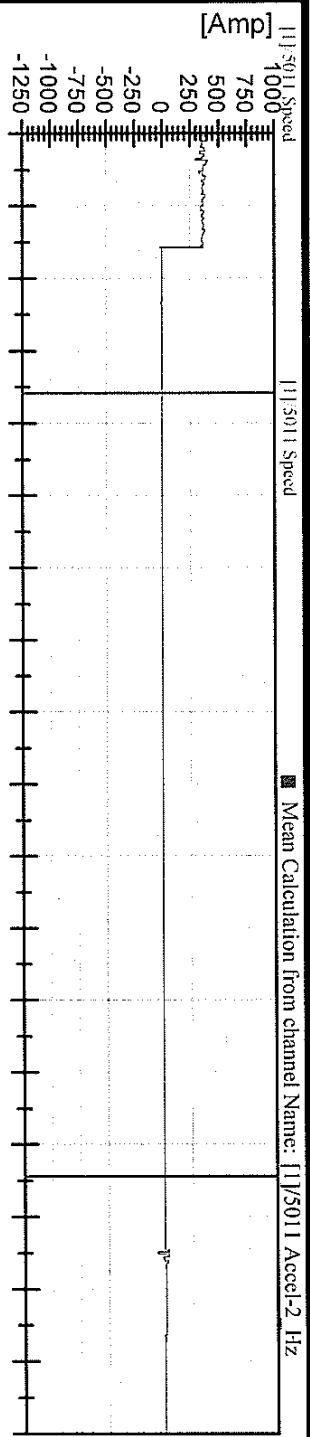
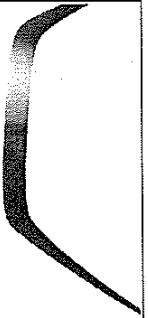
Legend Graph#5
 — 5011 Actual Tr Eff



Legend Graph#6
 — 5011 FB Command

File Name: Run 14_20091102_114514_file0001.dtm
 Setup Template: D:\CTA test data\Script_Rev1.15\save\5011-5012 BTP8030-(1102).xls

Project No : 76	System : Braking Performances Test	Report Date : 11/10/2009 15:57:02
Lead Technician : G. Tremblay / J. Beaulhem	Test Description : Maximum Dynamic Brake (Deadman) @ 70 mph - Northbound	BTP-No : 8030
Run Number : 8030-B20	Cursor 1 : 111.160	Cursor 2 : 132.888
Cursor 1 : 111.160	Distance : 943	Time : 21.728
Cursor 2 : 132.888	Rate : -2.8	Sheet No : 3 / 6

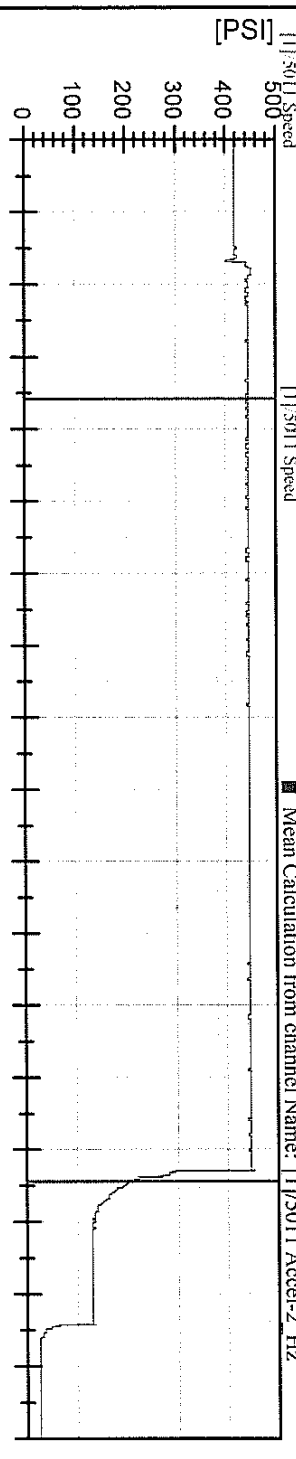
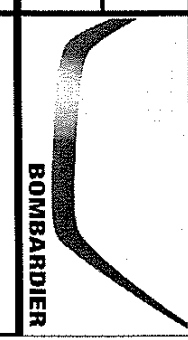


File Name: Run_14_20091102_114514_flec001.adm
 Setup Template: D:\CTA_test_data\Script_Rev1.15\save\5011-5012_BTP8030-(1102).xls

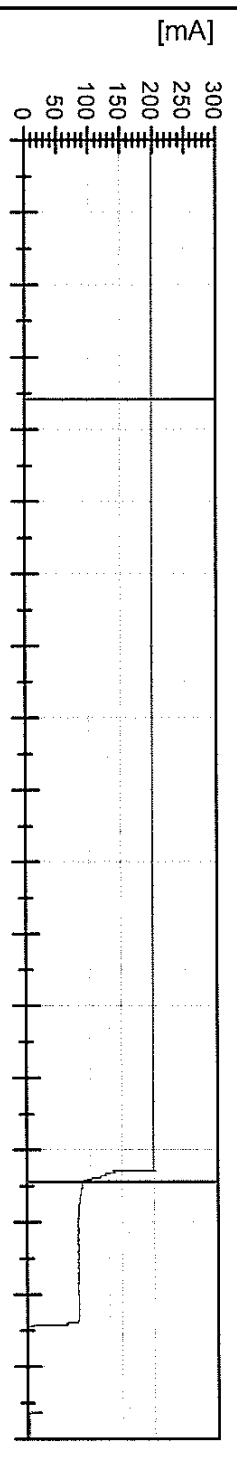
Project No : 76
 Lead Technicien : G. Tremblay / J. Beauchemin
 Run Number : 8030-B20
 Cursor 1 : 111.160

System : **Braking Performances Test**
 Test Description : Maximum Dynamic Brake (Deadman) @ 70 mph - Northbound
 Cursor 2 : 132.888
 Distance : 943 Time : 21.728 Rate : -2.8

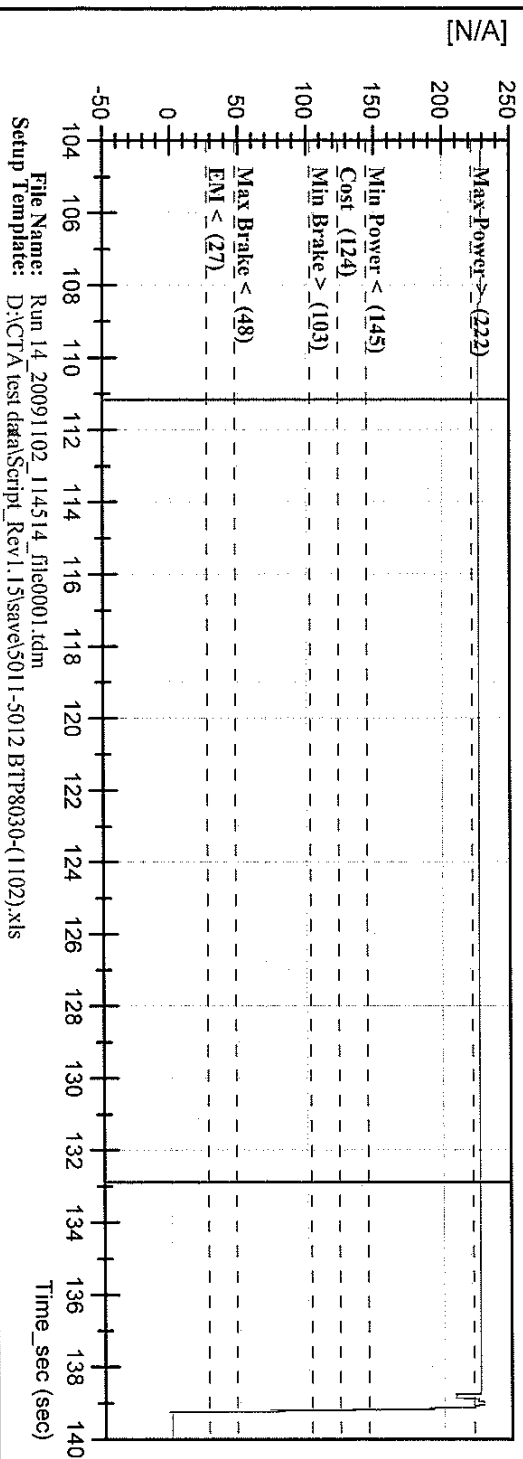
Report Date : 11/10/2009 15:57:02
 BTP-No : 8030
 Sheet No : 4 / 6



Legend Graph#10
 — 5011 HPU Pressure



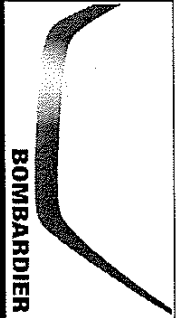
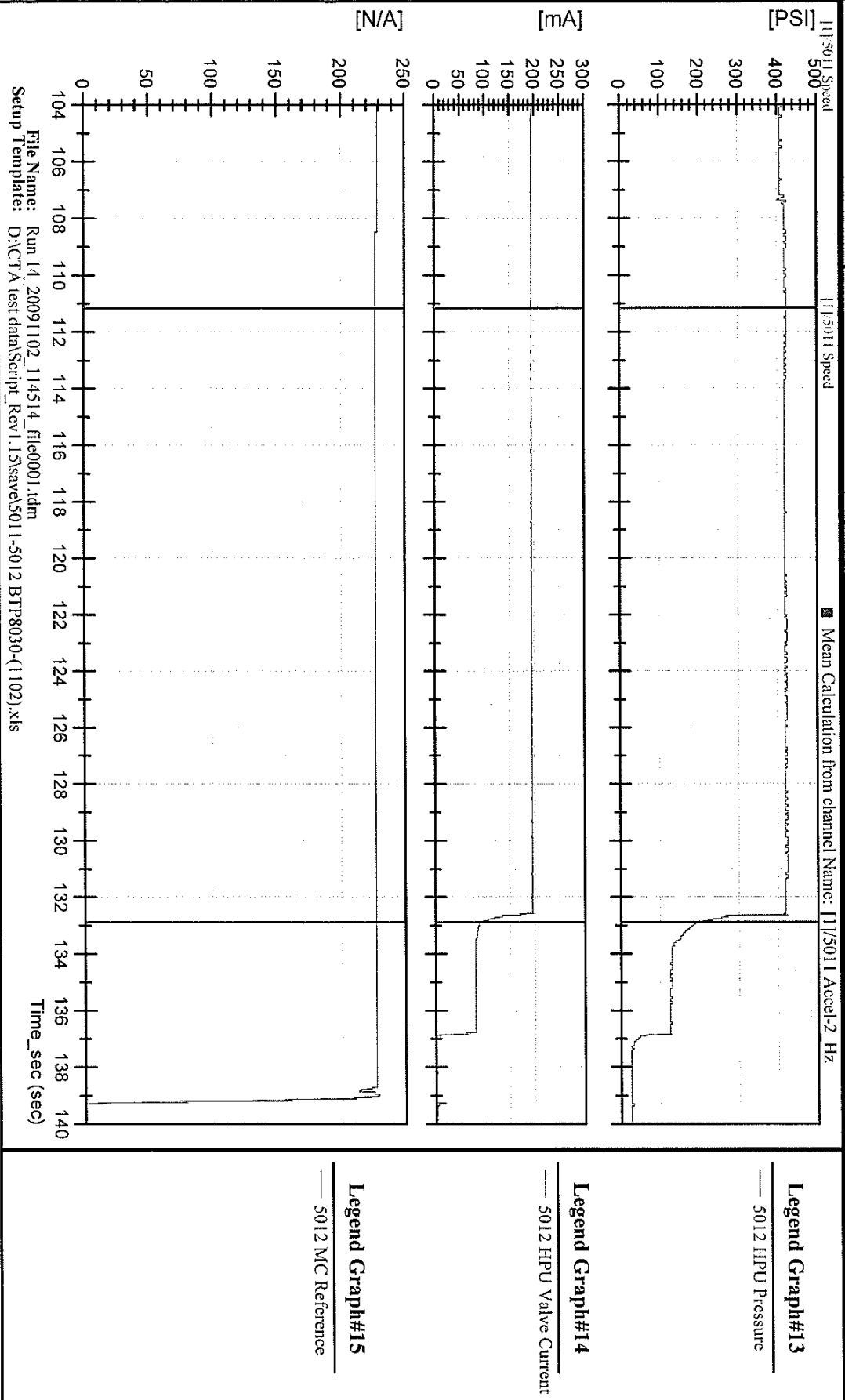
Legend Graph#11
 — 5011 HPU Valve Current



Legend Graph#12
 — 5011 MC Reference

File Name: Run 14_20091102_114514_file0001.tdm
 Setup Template: D:\CTA test\data\Script_Rev1.15\save5011-5012 BTP8030-(1102).xls

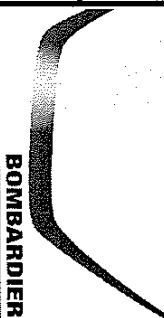
Project No : 76	System : Braking Performances Test	Report Date : 11/10/2009 15:57:02
Lead Technician : G. Tremblay / J. Beuchemin	Test Description : Maximum Dynamic Brake (Deadman) @ 70 mph - Northbound	BTP-No : 8030
Run Number : 8030-B30	132.888 Distance : 943 Time : 21.728 Rate : -2.8	Sheet No : 5 / 6
Cursor 1 : 111.160	Cursor 2 : 115.011	



Legend Graph#13
 — 5012 HPU Pressure

Legend Graph#14
 — 5012 HPU Valve Current

Legend Graph#15
 — 5012 MC Reference

Project No : 76	System : Braking Performances Test	Report Date : 11/10/2009 15:57:03	
Lead Technician : G. Tremblay / J. Beauchemin	Test Description : Maximum Dynamic Brake (Deadman) @ 70 mph - Northbound	BTP-No : 8030	
Run Number : 8030-B20	Cursor 1 : 111.160	Cursor 2 : 132.888	Sheet No : 6 / 6
Distance : 943		Time : 21.728	Rate : -2.8

[[1]] 5011 Speed [[1]] 5011 Speed Mean Calculation from channel Name: [[1]] 5011 Accel-2_Hz


Jerk Data Table Calculation

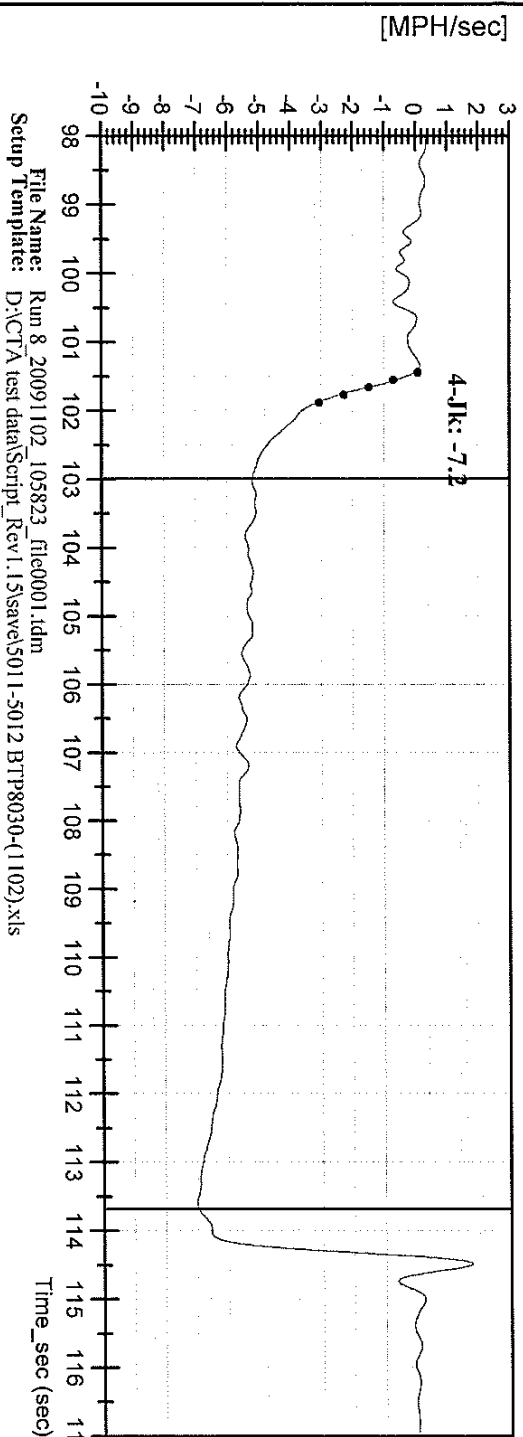
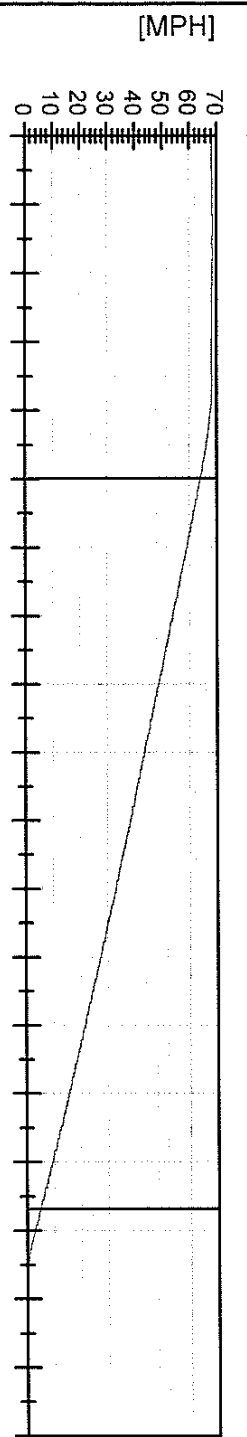
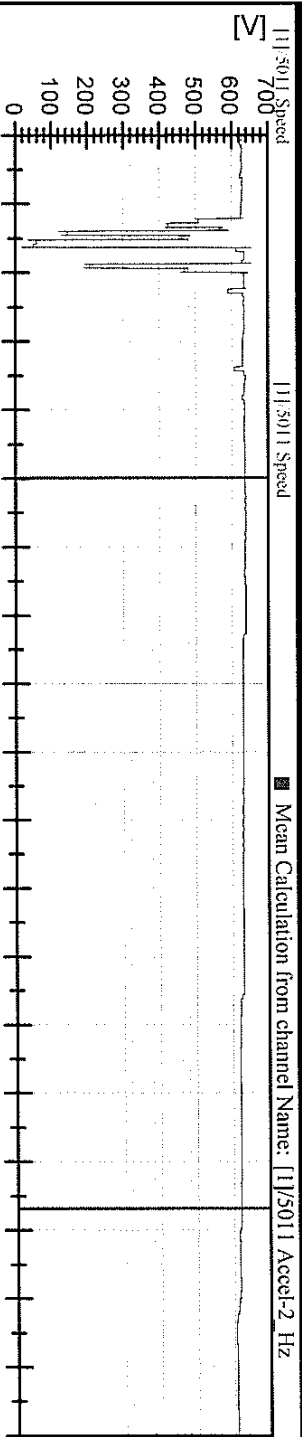
Name	Jerk#	Time 1	Time 2	Y1	Y2	dX	dY	Slope
StandStill To Power	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Power To Coast	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coast To Brake	3	108.834	110.086	-0.466	-2.870	1.252	-2.404	-1.9
Power To Brake (No Coast)	4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Caution Stop	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brake To Coast	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coast To Power	7	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brake To Power (No Coast)	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Not Used	9	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Acceleration/Deceleration Data Table Calculation

Name	Type#	Time 1	Time 2	Y1	Y2	dX	Distance	Rate
Deceleration	1	111.160 Sec	132.888 Sec	64.0 MPH	5.0 MPH	21.728 Sec	943 Ft	-2.8 Mph/Sec
Acceleration	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Mean Calculation from channel Name[[1]] 5011 Accel-2_Hz

Project No : 76	System : Braking Performances Test	Report Date : 11/10/2009 16:15:38
Lead Technician : G. Tremblay / J. Beauchemin	Test Description : Emergency Brake (Master Controller) @ 70 mph - Northbound	BTP-No : 8030
Run Number : 8030-B21	Cursor 1 : 102.994	Cursor 2 : 113.684
	Distance : 488	Time : 10.690
	Rate : -5.8	Sheet No : 1 / 6
Mean Calculation from channel Name: [1]5011 Accel-2_Hz		



File Name: Run 8 20091102_105823_file0001.rdm
Setup Template: D:\CTA test data\Script_Rev1.15save\5011-5012 BTP8030-(1102).xls

Project No: 76

Lead Technician: G. Tremblay / J. Beauchemin

Braking Performances Test

Report Date: 11/10/2009 16:15:39

Run Number: 8030-B21

Test Description: Emergency Brake (Master Controller) @ 70 mph - Northbound

BTP-No: 8030

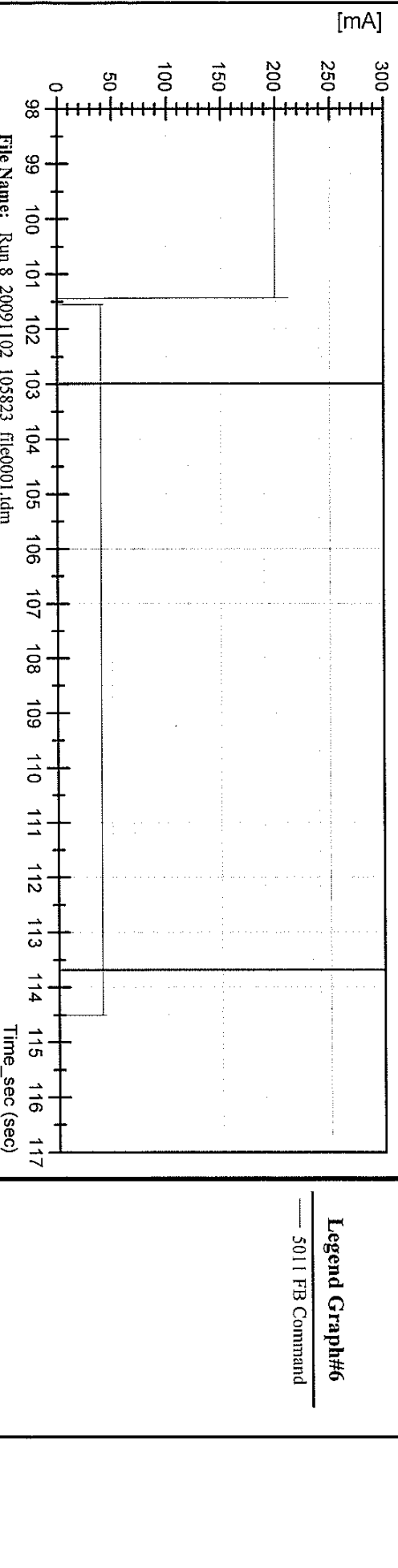
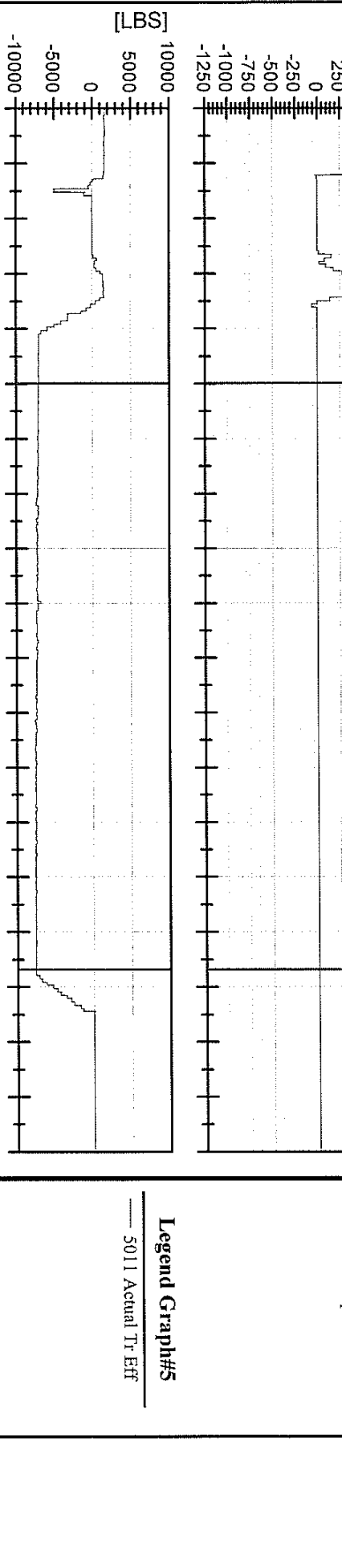
Sheet No: 2 / 6

Cursor 1: 102.994

Cursor 2: 113.684

Distance: 488 Time: 10.690 Rate: -5.8

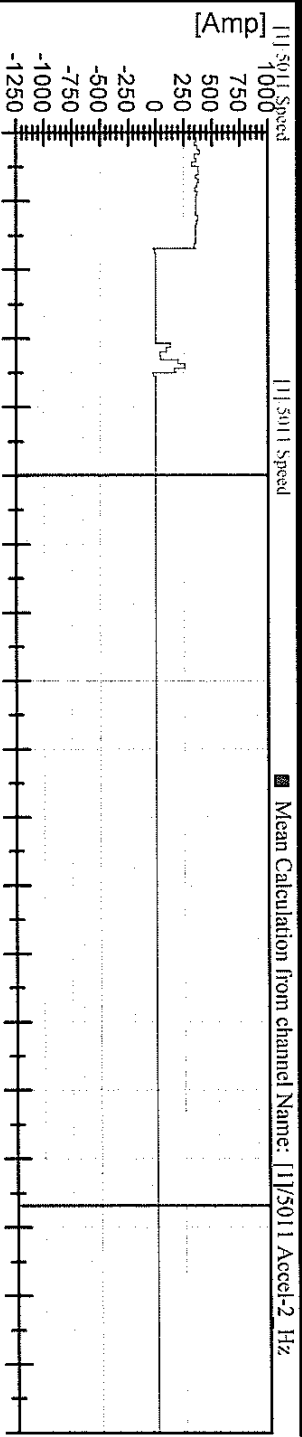
Mean Calculation from channel Name: [1]/5011 Accel-2 Hz



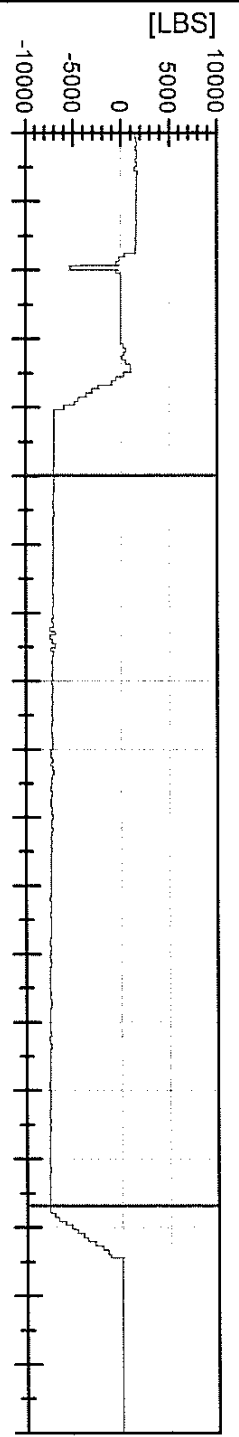
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Setup Template: D:\CTA test data\Script_Rev1.15save\5011-5012 BTP8030-(1102).xls



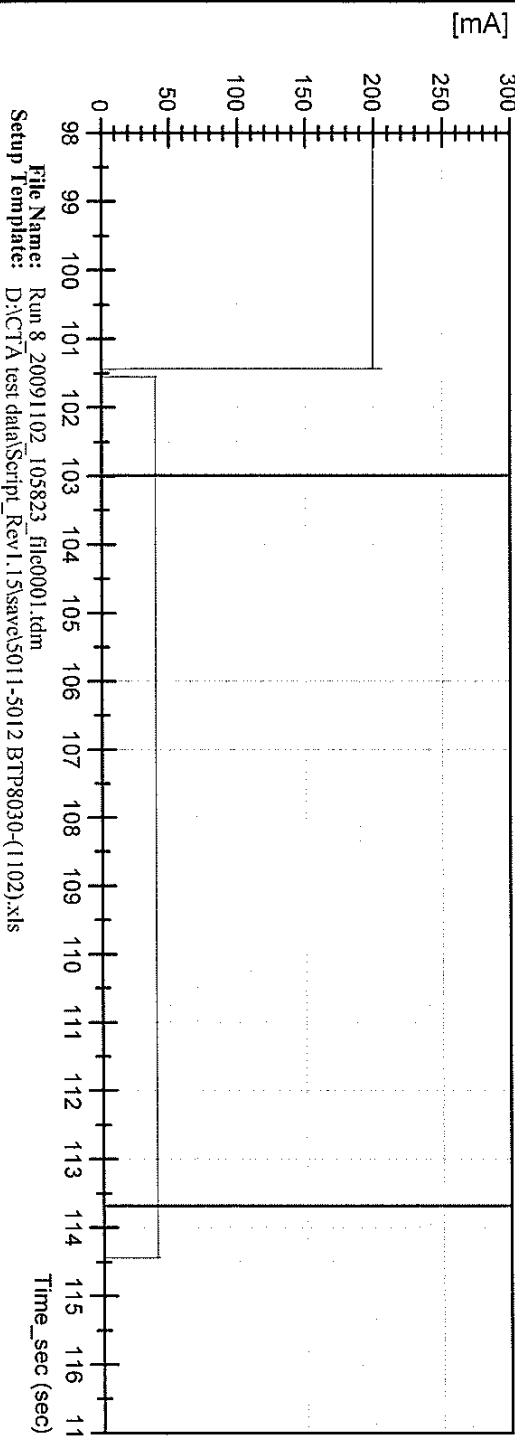
Project No : 76	System : Braking Performances Test	Report Date : 11/10/2009 16:15:39
Lead Technicien : G. Tremblay / J. Beauchemin	Test Description : Emergency Brake (Master Controller) @ 70 mph - Northbound	BTP-No : 8030
Run Number : 8030-B21	Cursor 1 : 102.994	Cursor 2 : 113.684
Distance : 488	Time : 10.690	Rate : -5.8
Sheet No : 3 / 6	Mean Calculation from channel Name : [1]/5011 Accel-2_Hz	



Legend Graph#7
— 5012 Prop Current



Legend Graph#8
— 5012 Actual Tr Eff



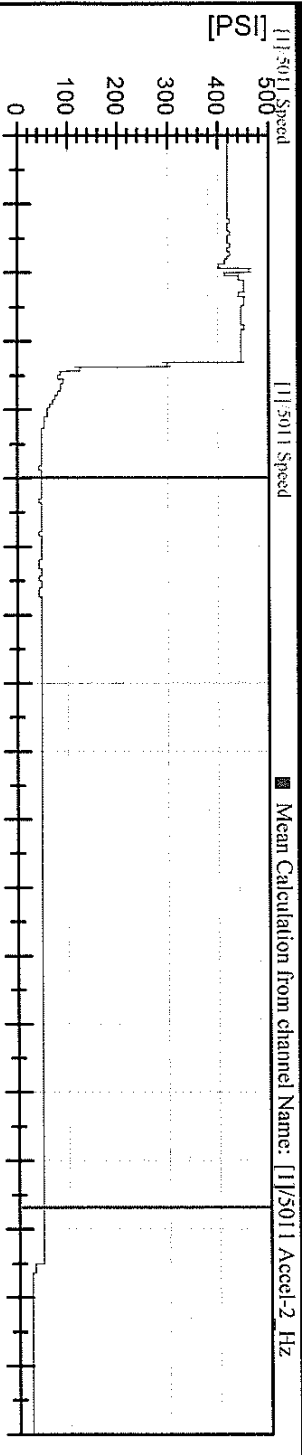
Legend Graph#9
— 5012 FB Command

File Name: Run 8 20091102_105823_file0001.tdm
Setup Template: D:\CTA test data\Script_Rev.1.15\save\5011-5012_BTP8030-(1102).xls

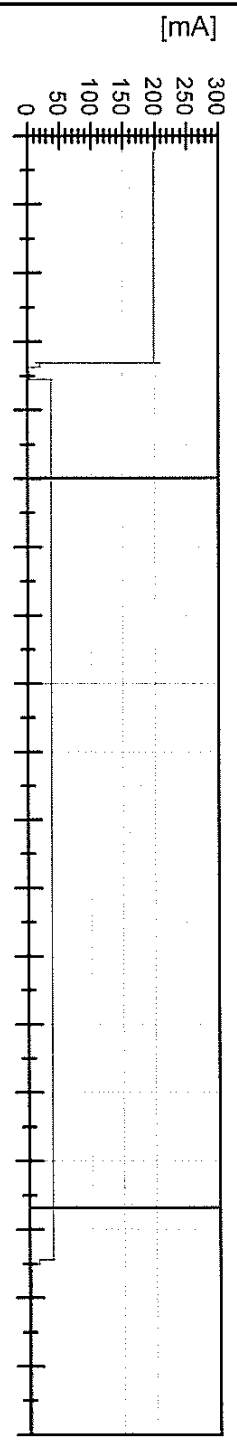
Project No : 76
 Lead Technician : G. Tremblay / J. Beauchemin
 Run Number : 8030-B21
 Cursor 1 : 102.994

System : **Braking Performances Test**
 Test Description : Emergency Brake (Master Controller) @ 70 mph - Northbound
 Cursor 2 : 113.684
 Distance : 488
 Time : 10.690
 Rate : -5.8

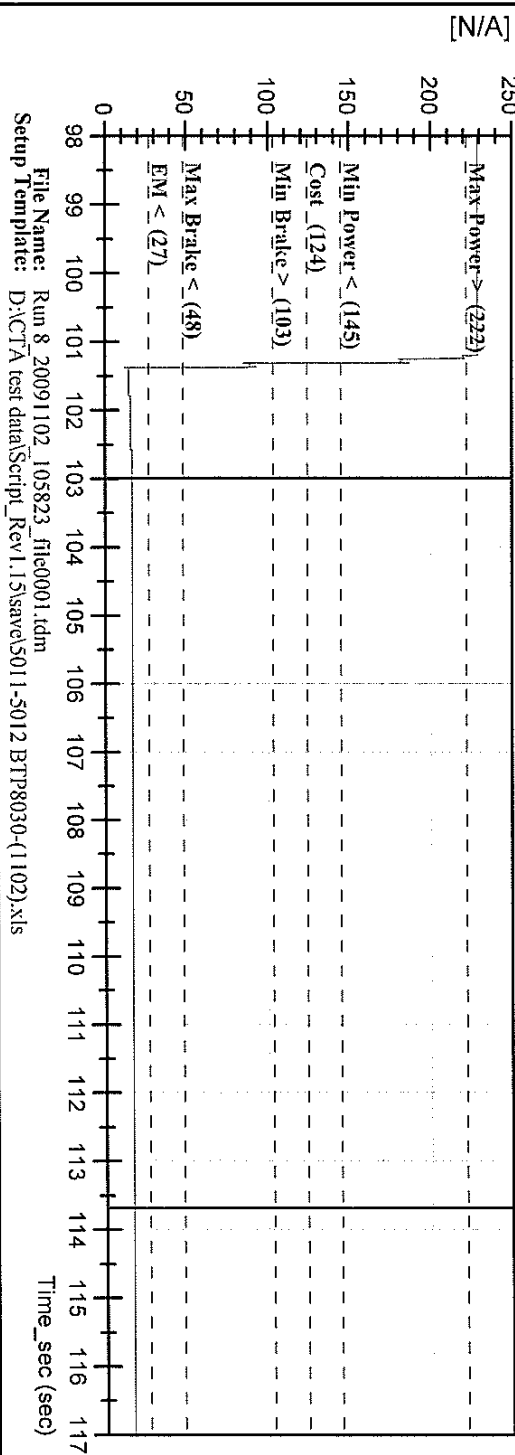
Report Date : 11/10/2009 16:15:40
 BTP-No : 8030
 Sheet No : 4 / 6



Legend Graph#10
 — 5011 HPU Pressure



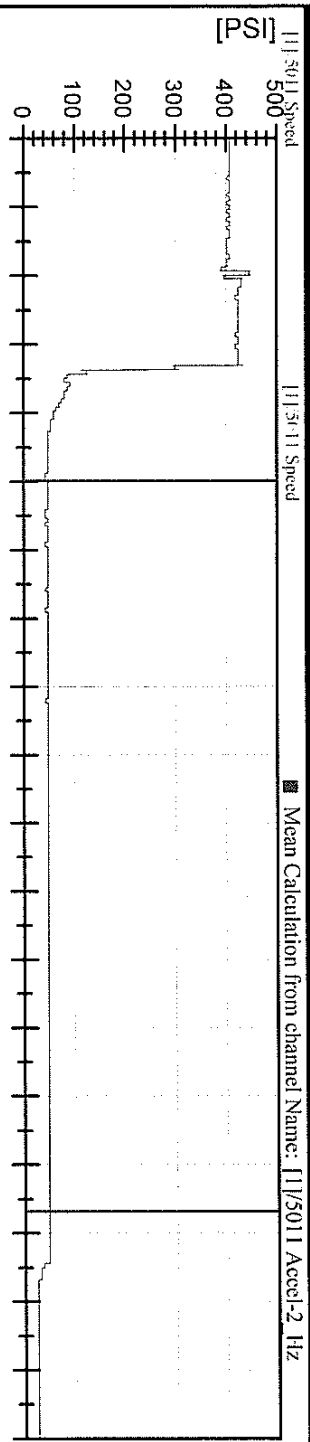
Legend Graph#11
 — 5011 HPU Valve Current



Legend Graph#12
 — 5011 MC Reference

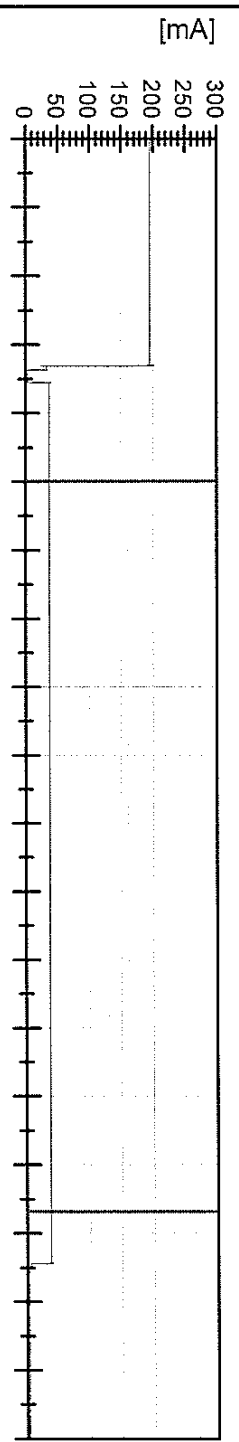
File Name: Run 8_20091102_105823_flic0001.tdm
 Setup Template: D:\CTA test\data\Script_Rev1.15\save5011-5012 BTP8030-(1102).xls

Project No : 76	System : Braking Performances Test	Report Date : 11/10/2009 16:15:40
Lead Technician : G.Tremblay / J. Beauchemin	Test Description : Emergency Brake (Master Controller) @ 70 mph - Northbound	BTP-No : 8030
Run Number : 8030-B31	Cursor 1 : 102.994	Cursor 2 : 113.684
Distance : 488	Time : 10.690	Rate : -5.8
Sheet No : 5 / 6	Mean Calculation from channel Name: [1]/5011 Accel-2_Hz	



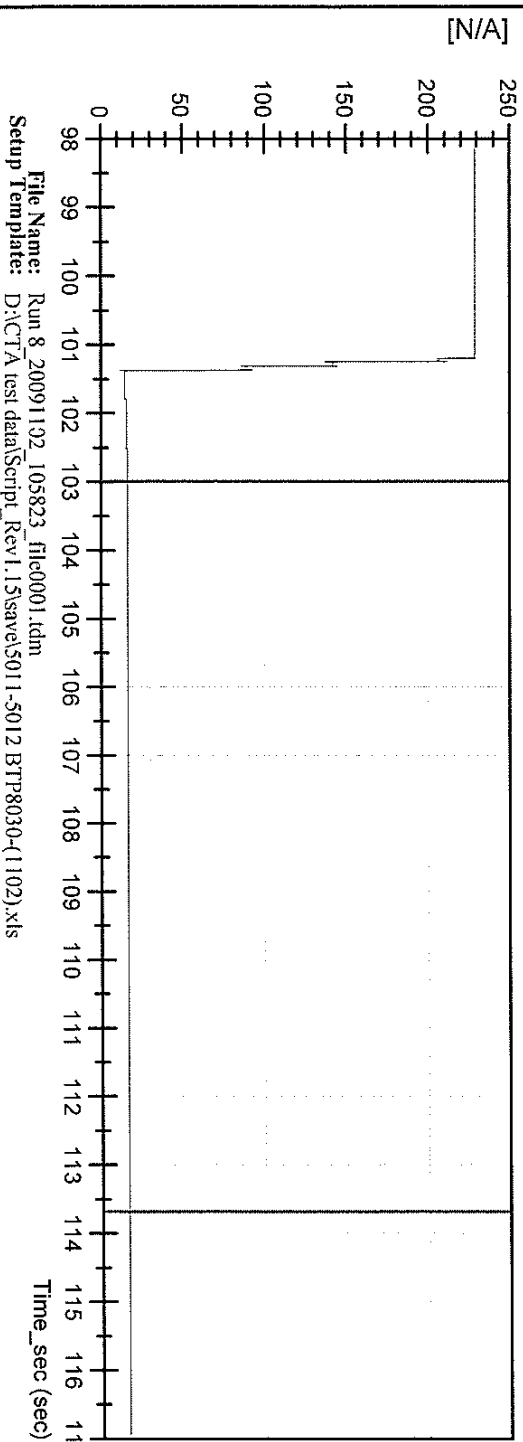
Legend Graph#13

— 5012 HPU Pressure



Legend Graph#14

— 5012 HPU Valve Current



Legend Graph#15

— 5012 MC Reference

File Name: Run 8_20091132_105823_file0001.tdm
 Setup Template: D:\CTA test data\Script_Rev1.15\save\5011-5012_BTP8030-(1102).xls

Project No : 76	System :	Report Date :	
Lead Technician : G. Tremblay / J. Beauchemin	Braking Performances Test	11/10/2009 16:15:40	
Run Number : 8030-B21	Test Description : Emergency Brake (Master Controller) @ 70 mph - Northbound	BTP-No : 8030	
Cursor 1 : 102.994	Cursor 2 : 113.684	Sheet No : 6 / 6	
Distance : 488		Time : 10.690	
Rate : -5.8		Mean Calculation from channel Name: [1]/5011 Accel-2_Hz	

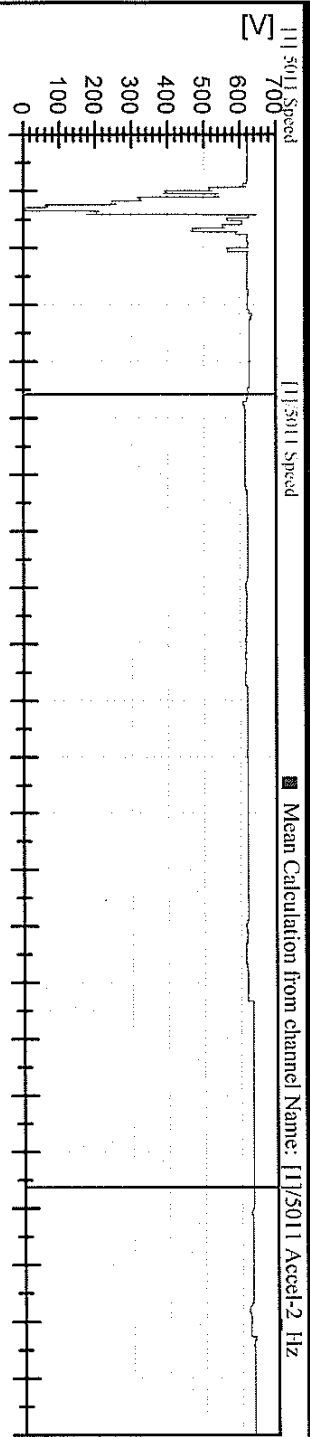
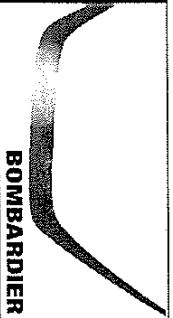
Name	Jerk#	Time 1	Time 2	Y1	Y2	dX	dY	Slope
StandStill To Power	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Power To Coast	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coast To Brake	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Power To Brake (No Coast)	4	101.990	101.442	-3.584	-0.012	-0.548	3.572	-7.2
Caution Stop	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brake To Coast	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coast To Power	7	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brake To Power (No Coast)	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Not Used	9	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Name	Type#	Time 1	Time 2	Y1	Y2	dX	Distance	Rate
Deceleration	1	102.994 Sec	113.684 Sec	63.9 MPH	5.0 MPH	10.690 Sec	488 Ft	-5.8 Mph/Sec
Acceleration	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A

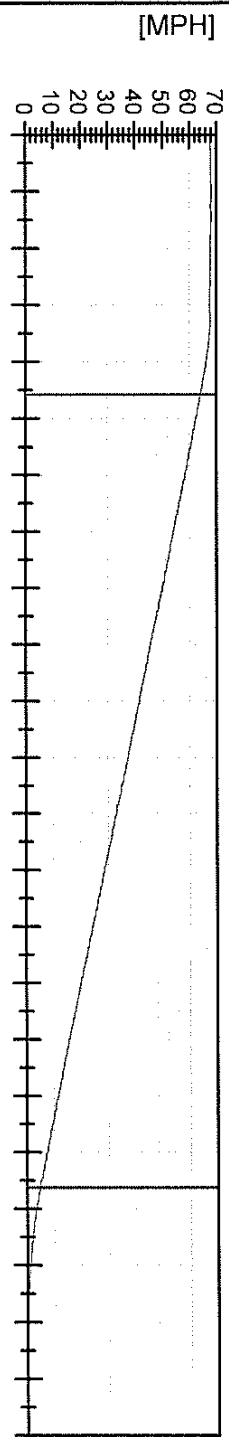
Mean Calculation from channel Name[1]/5011 Accel-2_Hz



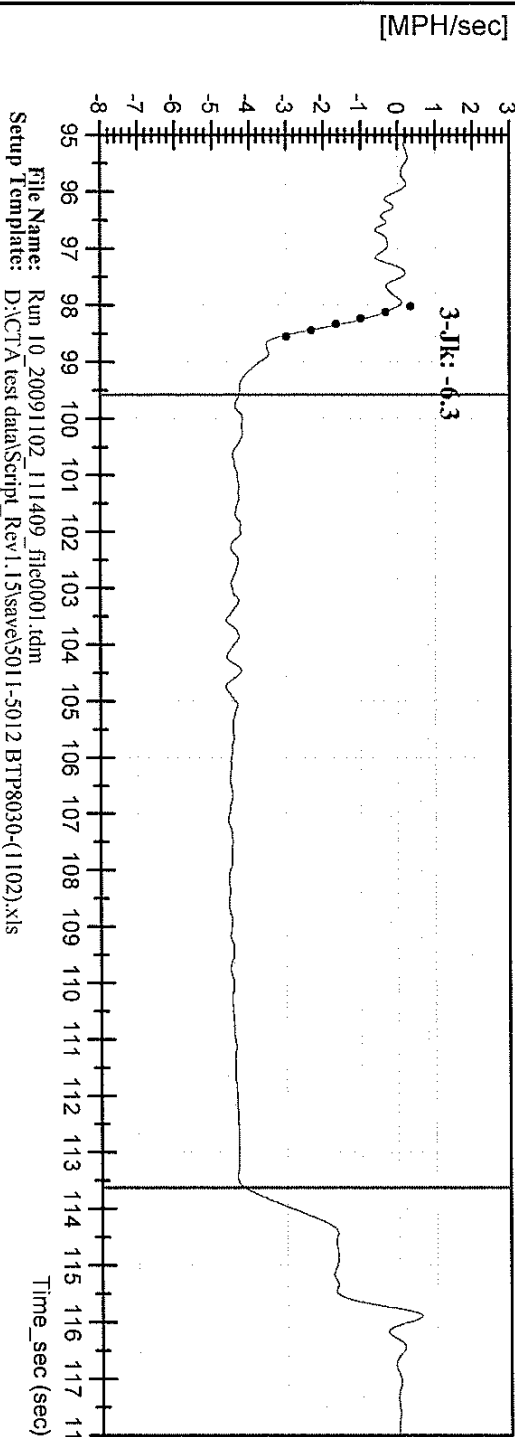
Project No : 76	System : Braking Performances Test	Report Date : 1/10/2009 16:26:15
Lead Technician : G. Tremblay / J. Beauchemin	Test Description : Emergency Brake (MES) @ 70 mph - Northbound	BTP-No : 8030
Run Number : 8030-B24	Emergency Brake (MES) @ 70 mph - Northbound	Sheet No : 1 / 6
Cursor 1 : 99.582	Cursor 2 : 113.628	Distance : 615
		Time : 14.046
		Rate : -4.4
		Mean Calculation from channel Name: [1]5011 Accel-2_Hz



Legend Graph#1
 — 5011 Line Voltage



Legend Graph#2
 — 5011 Speed



Legend Graph#3
 — 5011 Accel-2_Hz
 ••• Jk_3

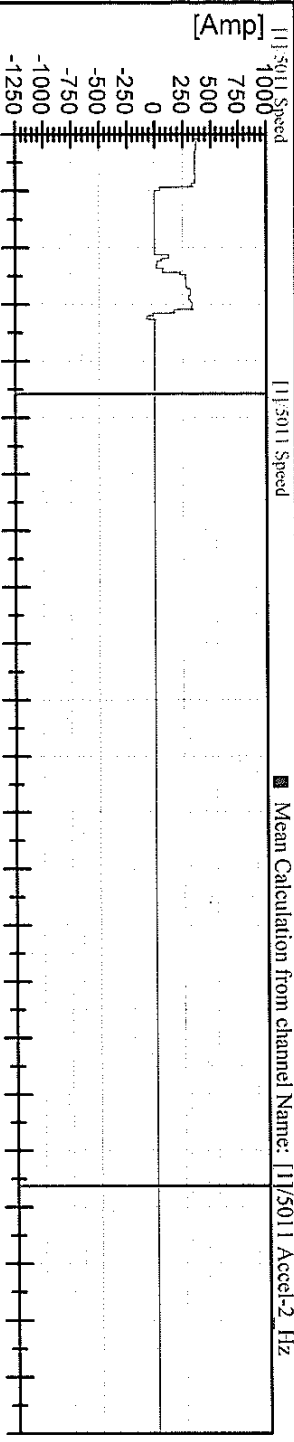
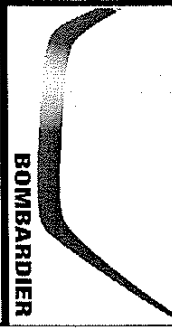
File Name: Run_10_20091102_111409_jfic0001.idm
 Setup Template: D:\CTA test data\Script_Rev1.15\save\5011-5012 BTP8030-(1102).xis

Time_sec (sec)

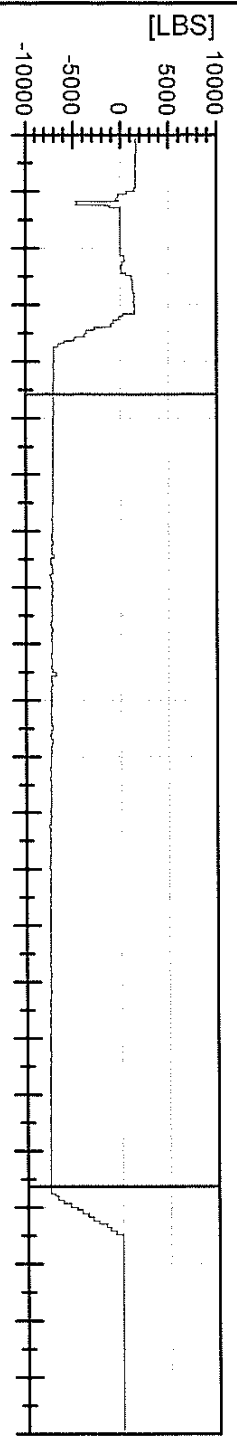
Project No : 76
 Lead Technician : G. Tremblay / J. Beauchemin
 Run Number : 8030-B24
 Cursor 1 : 99.582

System : **Braking Performances Test**
 Test Description : Emergency Brake (MES) @ 70 mph - Northbound
 Cursor 2 : 113.628
 Distance : 615
 Time : 14.046
 Rate : -4.4

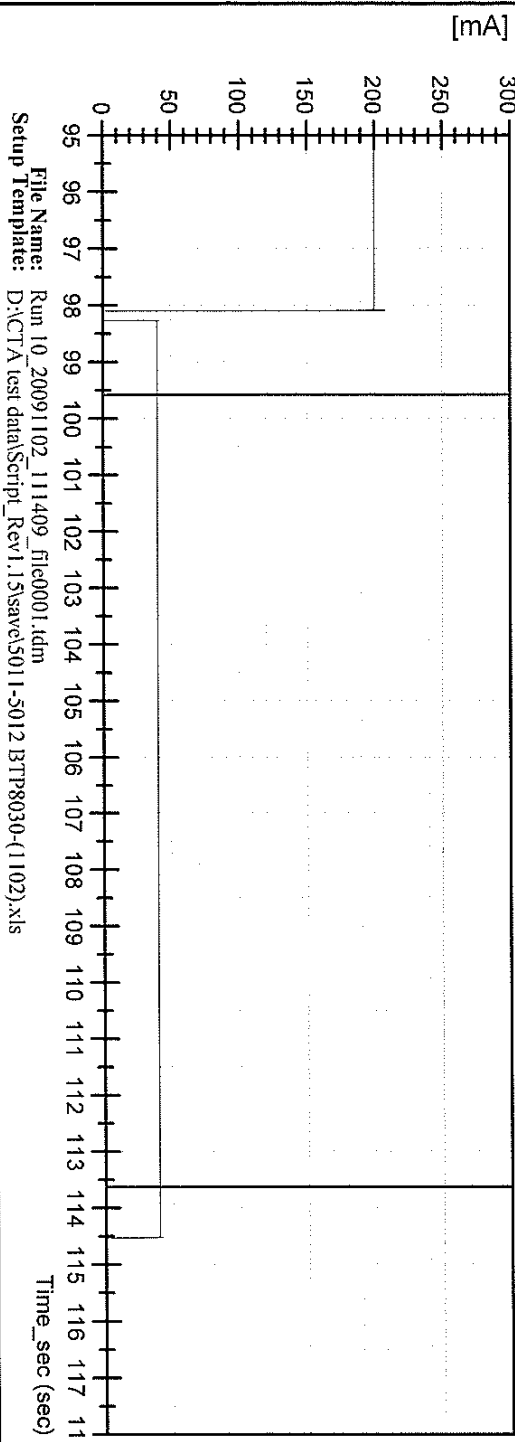
Report Date : 11/10/2009 16:26:15
 BTP-No : 8030
 Sheet No : 2 / 6



Legend Graph#4
 — 5011 Prop Current



Legend Graph#5
 — 5011 Actual Tr Eff



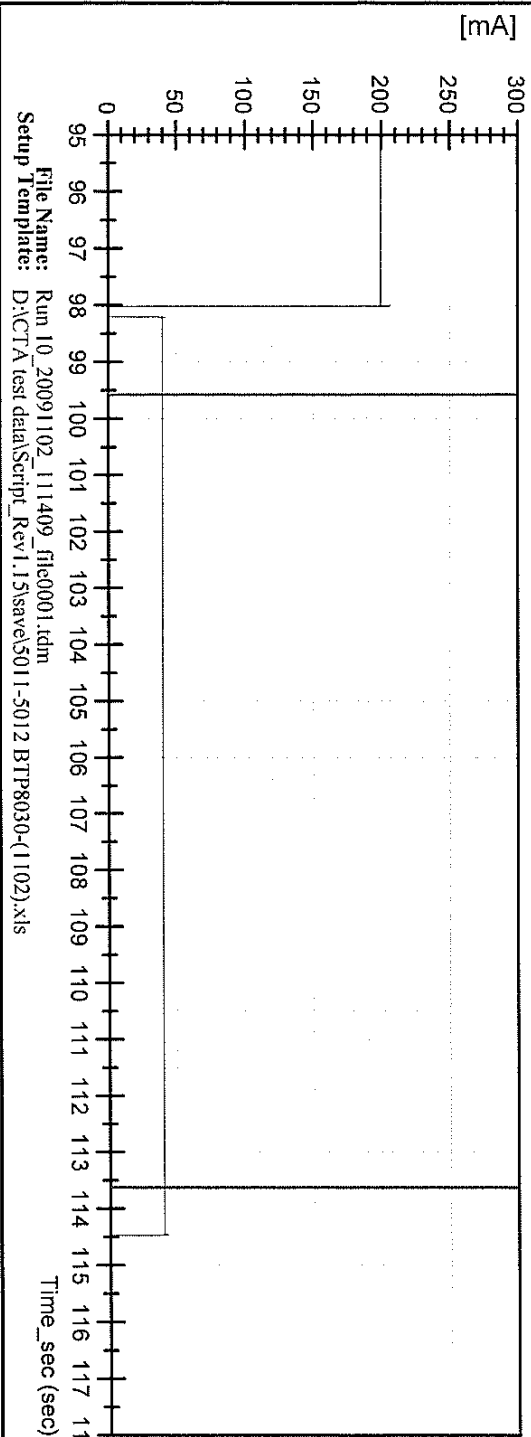
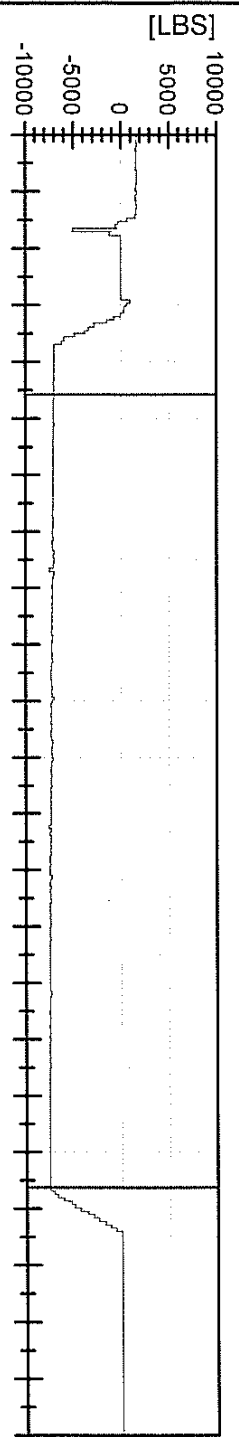
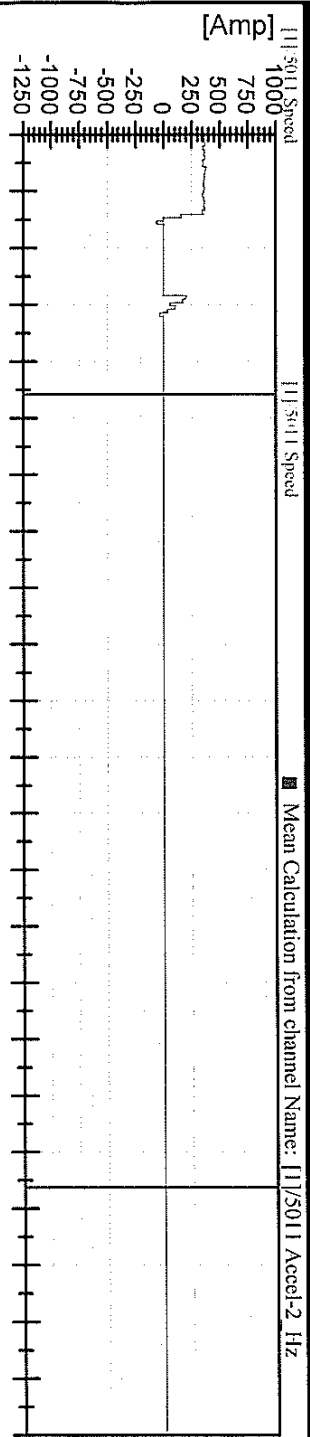
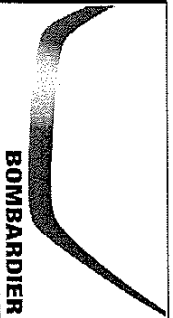
Legend Graph#6
 — 5011 FB Command

File Name: Run 10_20091102_111409_file0001.tdm
 Setup Template: D:\CTA test data\Script_Rev1.1\save5011-5012 BTT8030-(1102).xls

Time_sec (sec)

Mean Calculation from channel Name: 11/5011 Accel-2 Hz

Project No : 76	System : Braking Performances Test	Report Date : 11/10/2009 16:26:16
Lead Technician : G. Tremblay / J. Beauchemin	Test Description : Emergency Brake (MES) @ 70 mph - Northbound	BTP-No : 8030
Run Number : 8030-B24	Cursor 1 : 99.582	Cursor 2 : 113.628
Distance : 615	Time : 14.046	Rate : -4.4
Sheet No : 3 / 6	Mean Calculation from channel Name: [1]5011 Accel-2_Hz	



File Name: Run_10_20091102_111409_flec0001.adm
 Setup Template: D:\CTA\test_data\Script_Rev1.15\save\5011-5012_BTP8030-(1102).xls



Legend Graph#10

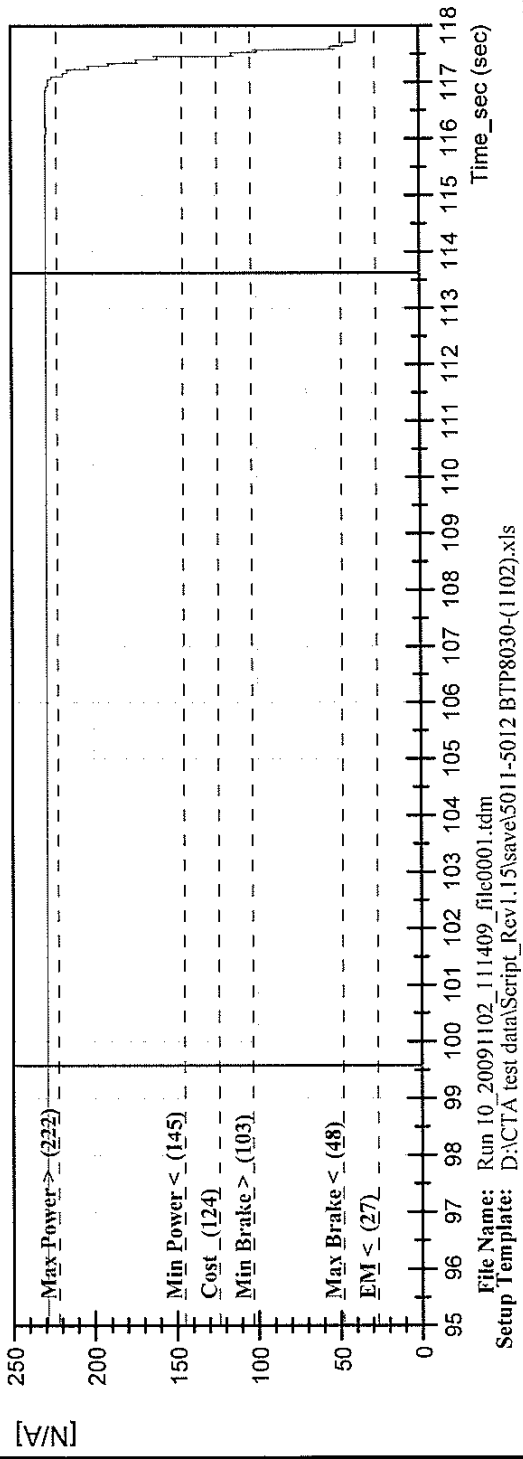
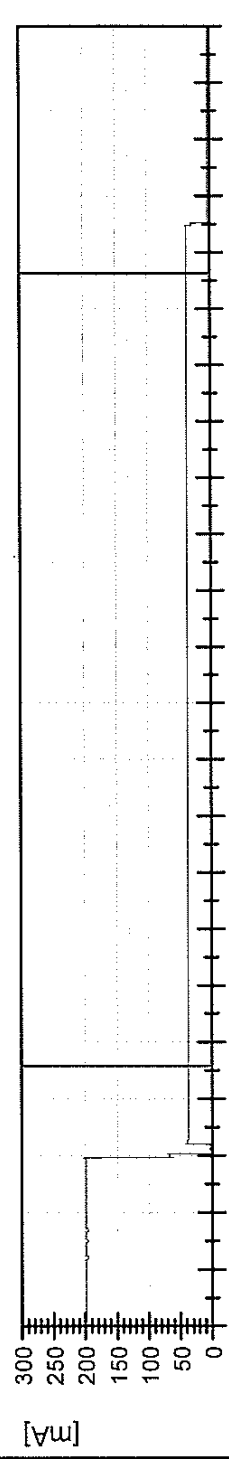
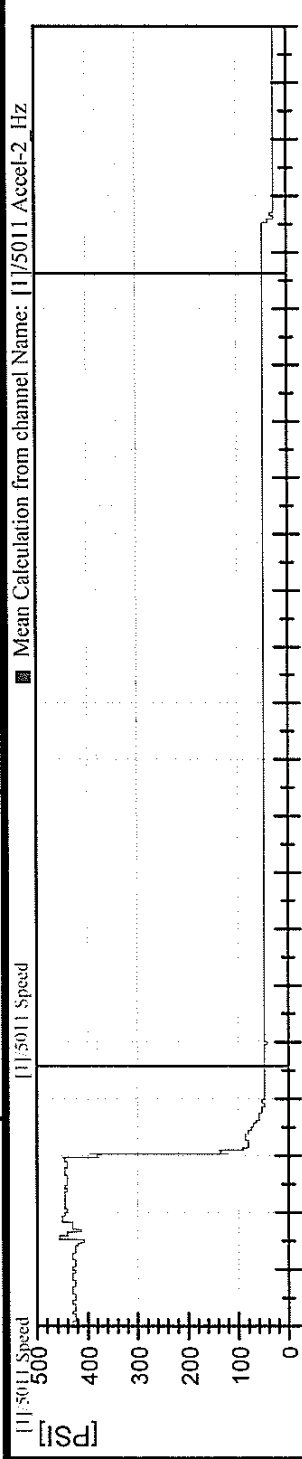
— 5011 HPU Pressure

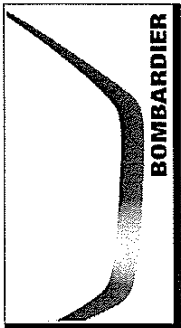
Legend Graph#11

— 5011 HPU Valve Current

Legend Graph#12

— 5011 MC Reference





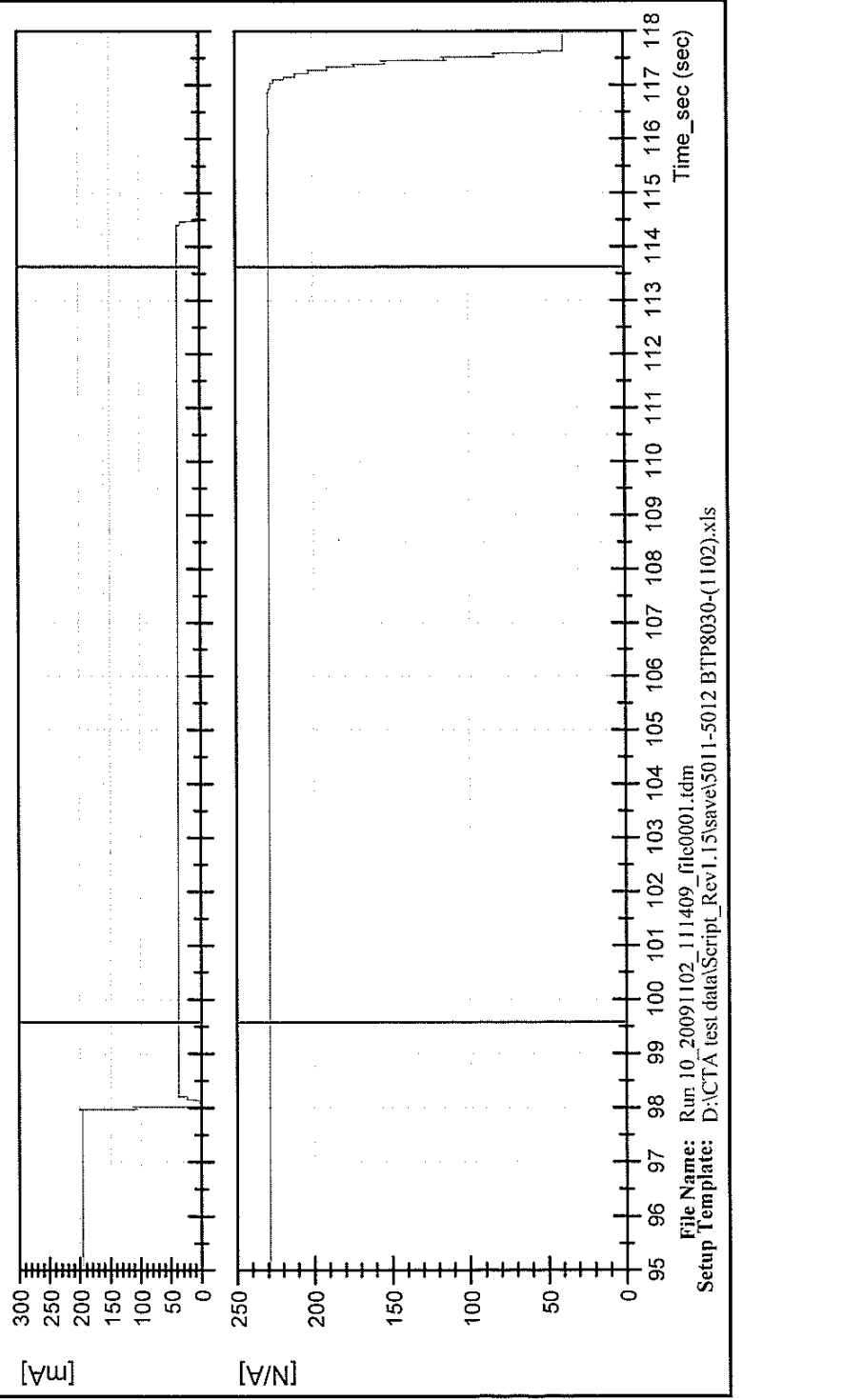
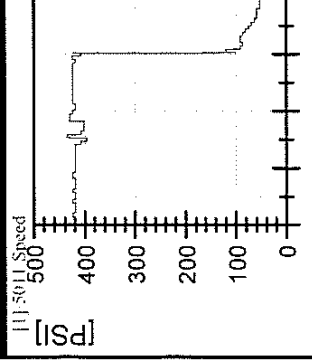
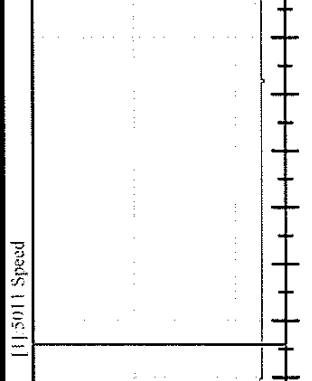
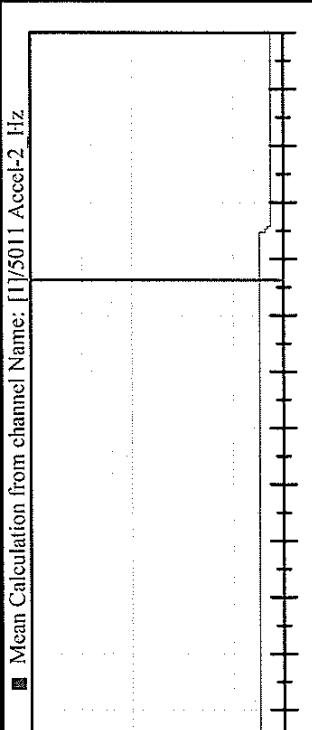
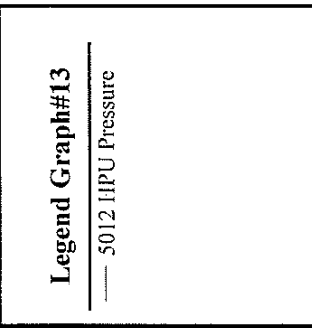
BOMBARDIER

Project No : 76
 Lead Technician : G. Tremblay / J. Beauchemin

System : **Braking Performances Test**
 Report Date : 11/10/2009 16:26:16

Run Number : 8030-B24
 Test Description : Emergency Brake (MES) @ 70 mph - Northbound
 BTP-No : 8030
 Sheet No : 5 / 6

Cursor 1 : 99.582
 Cursor 2 : 113.628
 Distance : 615
 Time : 14.046
 Rate : -4.4
 Mean Calculation from channel Name: [1]/5011 Accel-2_Hz



File Name: Run 10_20091102_111409_file0001.tdm
 Setup Template: D:\CTA test data\Script_Rev1.15\save\5011-5012 BTP8030-(1102).xls

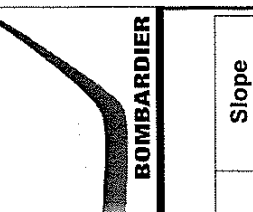
Project No : 76	System :	Report Date : 11/10/2009 16:26:17	
Lead Technician : G. Trenblay / J. Beauchemin		BTP-No : 8030	Sheet No : 6 / 6
Run Number : 8030-B24	Test Description : Emergency Brake (MES) @ 70 mph - Northbound		
Cursor 1 : 99.582	Cursor 2 : 113.628	Distance : 615	Time : 14.046
		Rate : -4.4	

Mean Calculation from channel Name: [1]/5011 Accel-2_Hz

Jerk Data Table Calculation		[1]/5011 Speed						
Name	Jerk#	Time 1	Time 2	Y1	Y2	dX	dY	Slope
StandStill To Power	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Power To Coast	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coast To Brake	3	98.016	98.600	0.022	-3.375	0.584	-3.397	-6.3
Power To Brake (No Coast)	4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Caution Stop	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brake To Coast	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coast To Power	7	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Brake To Power (No Coast)	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Not Used	9	N/A	N/A	N/A	N/A	N/A	N/A	N/A


Acceleration/Deceleration Data Table Calculation						
Name	Type#	Time 1	Time 2	Y1	Y2	Rate
Deceleration	1	99.582 Sec	113.628 Sec	64.0 MPH	4.9 MPH	-4.4 Mph/Sec
Acceleration	2	N/A	N/A	N/A	N/A	N/A

Mean Calculation from channel Name[1]/5011 Accel-2_Hz



Run Number	Braking Charts File Name
8030-B1	76-BTP-8030-B1 Max DB @ 55 mph - South.pdf


APPENDIX 4: Signals recorded for each test run

Project No : NOVALUE	System :	NOVALUE		Report Date :	11/24/2009 12:59:25
Lead Technician : Gasion/Keith/lean	Test Description : 5011 5012 Brake Runs	RTF-No :	NOVALUE	Sheet No :	1 / 2
Run Number : Run 1					

Data for Signals Sheet#1

Index # / Channel Name	Unit	Channel	Cond_ID	Cond_Input	Sensor_ID	Gain	Offset	Signal_Type	TNET_Source
1 / Time	ms								
2 / 5011 Accel	MPH/sec	9	ANALOG	V	LTC-1311	2.2620	-0.020000	Amplitude	ANTON
3 / 5011 Actual Tr Eff	LBS	6	ANALOG	V	AX module	1,000.0000	0.000000	Amplitude	ANTON
4 / 5011 D.P. Line Voltage	Volt	16	ANALOG	V	SB-4xxxx	500.0000	0.000000	Amplitude	ANTON
5 / 5011 FB Command	mA	8	ANALOG	V	AX module	15.0000	-10.000000	Amplitude	ANTON
6 / 5011 HPU Pressure	PSI	7	ANALOG	V	AX module	50.0000	-10.000000	Amplitude	ANTON
7 / 5011 HPU Thermocouple	C	10	ANALOG	V	K Type	100.0000	0.000000	Amplitude	ANTON
8 / 5011 HPU Valve Current	mA	5	ANALOG	V	AX module	15.0000	-10.000000	Amplitude	ANTON
9 / 5011 Line Voltage	V	3	ANALOG	V	AX module	50.0000	-10.000000	Amplitude	ANTON
10 / 5011 MC Reference	N/A	1	ANALOG	V	AX module	15.0000	-10.000000	Amplitude	ANTON
11 / 5011 Prop Current	Amp	4	ANALOG	V	AX module	200.0000	0.000000	Amplitude	ANTON
12 / 5011 Speed	MPH	2	ANALOG	V	AX module	5.0000	-10.000000	Amplitude	ANTON
13 / 5011 Total Current	Amp	12	ANALOG	V	LTC 0301	200.0000	0.000000	Amplitude	ANTON
14 / 5012 Actual Tr Eff	LBS	6		V	AX Module	1,000.0000	0.000000	Amplitude	JAMES
15 / 5012 DRC TW-23	On-Off	11		V	Train Wire	1.0000	0.000000	Amplitude	JAMES
16 / 5012 EB TW-17	On-Off	15		V	Train Wire	1.0000	0.000000	Amplitude	JAMES
17 / 5012 FB Command	mA	8		V	AX Module	15.0000	-10.000000	Amplitude	JAMES
18 / 5012 FBA TW-13	On-Off	14		V	Train Wire	1.0000	0.000000	Amplitude	JAMES

File Name: Run 1_20091102_100122_file0001.rdm
 Setup Template: D:\CTA test data\Script_Rev1.1\save\NOVALUE.xls

Project No : NOVALUE	System :	NOVALUE		Report Date :	11/24/2009 12:59:25
Lend Technician : Gaston/Keith/Iean				BITP-No :	NOVALUE
Run Number : Run 1	Test Description : 5011 5012 Brake Runs			Sheet No :	2 / 2
					

Data for Signals Sheet#2

Index # / Channel Name	Unit	Channel	Cond_ID	Cond_Input	Sensor_ID	Gain	Offset	Signal_Type	TNET_Source
19 / 5012 FWD TW-1	On-Off	13		V	Train Wire	1.0000	0.000000	Amplitude	JAMES
20 / 5012 HPU Pressure	PSI	7		V	AX Module	50.0000	-10.000000	Amplitude	JAMES
21 / 5012 HPU Valve Current	mA	5		V	AX Module	15.0000	-10.000000	Amplitude	JAMES
22 / 5012 Line Voltage	V	3		V	AX Module	50.0000	-10.000000	Amplitude	JAMES
23 / 5012 MC Reference	N/A	1		V	AX Module	15.0000	-10.000000	Amplitude	JAMES
24 / 5012 PEN TW-7	On-Off	12		V	Train Wire	1.0000	0.000000	Amplitude	JAMES
25 / 5012 Prop Current	Amp	4		V	AX Module	200.0000	0.000000	Amplitude	JAMES
26 / 5012 REV TW-2	On-Off	16		V	Train Wire	-1.0000	0.000000	Amplitude	JAMES
27 / 5012 Speed	MPH	2		V	AX Module	5.0000	-10.000000	Amplitude	JAMES
28 / 5012 TBRK TW-14	On-Off	9		V	Train Wire	1.0000	0.000000	Amplitude	JAMES
29 / 5012 Total Current	Amp	15	ANALOG	V	LTC-0316	200.0000	0.000000	Amplitude	ANTON

File Name: Run 1_20091102_100122_file0001.kdm
 Setup Template: D:\CTA test data\Script_Rev1.15save\NOVALUE.xls

APPENDIX 5: Dynamometer & On-Car Tests Results assessment

Wabtec letter # 076-WA/BO-0198R:

Dynamometer & On-Car Tests Results and Wear Characteristics of Brake
Pad Material D633 and D733



PO Box 11
Spartanburg, SC 29304

Phone: 864.433.5900
Fax: 864.433.0176
www.wabtec.com

December 21, 2009

076-WA/BO-0198R

Mr. Michel Martel
Bombardier Transportation Canada Inc.
1101 Parent Street
Saint-Bruno, Quebec J3V 6E6
Canada

Subject: **Dynamometer & On-Car Test Results and Wear Characteristics of Brake Pad Materials D633 and D733**
Ref: **11/23/2009 Email from M. Jean Beauchemin, Bombardier, to Mike Pittinaro, Wabtec**

Dear Mr. Martel:

Per your referenced email correspondence with Mike Pittinaro, the following information was requested to be transmitted to Bombardier Transportation (BT) via letter from Wabtec Passenger Transit (WPT):

1. *Friction only stops from 55 and 70 mph, for which we need a letter from Wabtec indicating if the train results match the dyno test result, and a comparison with the characteristics (decal & wear rate) of the former CTA material.*

The dynamometer test results for the D733 material (RFP Document Number DTR-08-0005 Rev 00) show that, with a net pad force (NPF) of 2,005 pounds, a deceleration rate of 2.5 mphps (Emergency 30 MPH rate) is attained within tolerance. In the dynamometer testing, an NPF of 2,005 pounds is attained with an hydraulic pressure of 155 psi; however, this will differ from the hydraulic pressure needed to obtain this specific NPF on the actual vehicle brake system due to differences in design characteristics of the production brake calipers and the dynamometer calipers. For the Full Service 30 MPH rate of 2.8 mphps, an NPF of 2,189 pounds is required; on the test equipment, this corresponded to an hydraulic pressure of 133 psi.

At higher speeds, holding NPFs at the Emergency level, deceleration rates averaged 2.25 mphps at 55 MPH and 1.67 mphps at 70 MPH. Holding NPF at the Full Service level, deceleration rates averaged 2.60 mphps at 55 MPH and 2.02 mphps at 70 MPH. These deceleration rates compare closely with those recorded during track testing. Additionally, these deceleration rates are similar to those obtained with the D633 material that CTA uses on its existing fleet. The wear rate of the D633 material was approximately twice that of the D733 material and, thus, was deemed not acceptable for use in the new cars. This higher wear rate was due to higher maximum operational speeds and higher net car weight of the new cars.

Please contact me if you have any questions or comments.

Sincerely,



Dave Preuninger
Program Manager

Action: Open
Code: 32.00

DP:fps