

Test Book For:

FMVSS 122 Motorcycle Brake Testing

August 2006

Project No.: P32023-01

Test Vehicle: ZAP X6004

Test Date: 05/16/12 - 06/27/12

Assigned Engineer: M. NUGARD

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1. Ensure that the Test Vehicle has been properly checked in using form TA0003 Test Vehicle Check In.

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2. Test Vehicle Start Date 05/16/12

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3. Remove any license plates and/or frames that may be on the vehicle.

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4. Have photography department take receiving photographs.
Put Motorcycle on center stand if available.

As Received Front.



As Received Left Front ¾.



As Received Left Side.



As Received Left Rear ¾.



As Received Rear.



As Received Right Rear ¾.



As Received Right Side.



As Received Right Front ¾.



Also take the following photographs.

Vehicle Identification Number.

Manufacturer's Label.

Tire Placard.

Lights and Gauges.

Location of Front Brake Master Cylinder Reservoir.

Front Brake Master Cylinder Reservoir Label.

Location of Rear Brake Master Cylinder Reservoir.

Rear Brake Master Cylinder Reservoir Label.

Same

SP27



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initials 5. Test Vehicle Information:

Supplier	ZAP	
Manufacturer	Q 2N402 C100P MOTORCYCLE CO. LTD	
Year	2008	
Make	ZAP	
Model	X050A	
Manufacturer Date	10/2008	
Vin	LA6MA246089	
Color	CONTO	
Received Date	05/15/12	mm/dd/yy
Wheel Base	63.5	
Odometer	478	Miles

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Front	663	lb
Rear	602 L 622 R	lb
Total	1688	lb

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GVWR	1275 kg	2805	lb
GAWR Front	400 kg	879	lb
GAWR Rear	799 kg	1759	lb

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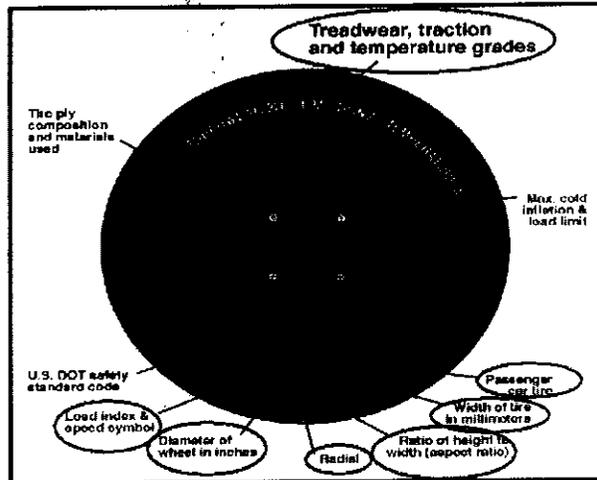
Front Tire Pressure	360/51	kPa / psi
Rear Tire Pressure	350/51	kPa / psi
Recommended Tire Size Front	145 R 12C	
Recommended Tire Size Rear	145R 12C	

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initials 9. Inflate all tires to the recommended pressure.



10. Tire Information:

Collect year, make, model, VIN, items circled in red, and tire manufacturer and tire name.



	Front	Rear	
Max. Tire Pressure	350/51	350/51	kpa / psi
Cold Tire Pressure	350/51	350/51	kpa / psi
Tire Size	195R12C	195R12C	
Tire Manufacturer	Maxxis/er-X	Maxxis/er-X	
Tire Model	GT Radial	GT Radial	
Treadware Rating	—	—	
Traction Rating	—	—	
Temperature Rating	—	—	
Tire Plies Sidewall	1 polymer	1 polymer	
Tire Plies Body	2 steel 1 polymer	2 steel 1 polymer	
Load Index/Speed Symbol	6PR	6PR	
Tire Material	Steel polymer	Steel polymer	
DOT Safety Code Left	SWFF 2608	SWFF 2608	
DOT Safety Code Right	—	SWFF 2608	

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11. Engine and Drivetrain Data:

a. Engine Data:

Fuel Type	Electric
Displacement	N/A
Type and No. of Cylinders	N/A
Placement	N/A
Air Cooled, Water Cooled	N/A
Carburetor, Injected	N/A

b. Drivetrain Data:

Transmission Type	CVT
Transmission Speeds	1
Drive Side	N/A
Final Drive	Road

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12. Brake Specifications:

Front Brake

Disc, Drum	Disc
Hydraulic, Mechanical	Hydraulic
Lever, Pedal	Pedal
Twin Disc	No
Independent, Split Service	Split
Fluid Type	DOT 4
Fluid Capacity	100ml

Rear Brake

Disc, Drum	Disc
Hydraulic, Mechanical	Hydraulic
Lever, Pedal	Pedal
Twin Disc	No
Independent, Split Service	Split
Fluid Type	DOT 4
Fluid Capacity	100ml

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13. Vehicle Instrumentation:

Speedometer	
Digital, Analog	Analog
mph, km/h	both
Lighted, (yes, no)	yes

Odometer	
Digital, Analog	Digital
mi, km	mi.
Lighted, (yes, no)	yes

Tachometer	
Digital, Analog	N/A
Lighted, (yes, no)	N/A

max hhr

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1. Measure Brake Components.

	Left Front (or only)		Right Front	
	Front Section		Front Section	
Pads	Inboard	Outboard	Inboard	Outboard
Length (in.)	 	 	 	
Width (in.)	 	 	 	
Thickness (in.)	 	 	 	
	Rear Section (or only)		Rear Section (or only)	
Length (in.)	4.020	4.020	 	
Width (in.)	1.280	1.280	 	
Thickness (in.)	0.335	0.335	 	
Temp. Code	—		 	
Piston Dia. (in.)	1.950x1		 	
Disc/Drum	Disc		 	
Diameter (in.)	8.325		 	
Thickness (in.)	0.385		 	
	Left Rear (or only)		Right Rear	
	Front Section		Front Section	
Pads	Inboard	Outboard	Inboard	Outboard
Length (in.)	4.020	4.020	4.020	4.020
Width (in.)	1.280	1.280	1.280	1.280
Thickness (in.)	0.335	0.335	0.335	0.335
	Rear Section (or only)		Rear Section (or only)	
Pads	Inboard	Outboard	Inboard	Outboard
Length (in.)	 	 	 	
Width (in.)	 	 	 	
Thickness (in.)	 	 	 	
Temp. Code	—		—	
Piston Dia. (in.)	1.950x1		1.950x1	
Disc/Drum	Disc		Disc	
Diameter (in.)	8.325		8.325	
Thickness (in.)	0.385		0.385	
	L. PARKING BRAKE		R. PARKING BRAKE	
Length	3.995	3.995	3.995	3.995
Width	1.242	1.242	1.242	1.242
Thickness	0.350	0.350	0.350	0.350
Temp Code	—		—	

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While Measuring Brake Components, have photographer take the following photographs:

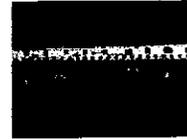
Left Front (or only) Brake Rotor.



Left Front (or only) Brake Calipers and Pistons.



Left Front (or only) Brake Pads Front Side.



Left Front (or only) Brake Pads Back Side.



Right Front Brake Rotor (or N/A).



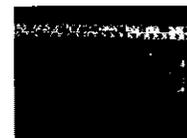
Right Front Brake Calipers and Pistons (or N/A).



Right Front Brake Pads Front Side (or N/A).



Right Front Brake Pads Back Side (or N/A).



Left Rear (or only) Brake Rotor.



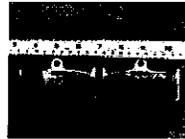
Left Rear (or only) Brake Calipers and Pistons.



Left Rear (or only) Brake Pads Front Side.



Left Rear (or only) Brake Pads Back Side.



Right Rear Brake Rotor (or N/A).



Right Rear Brake Calipers and Pistons (or N/A).



Right Rear Brake Pads Front Side (or N/A).



Right Rear Brake Pads Back Side (or N/A).



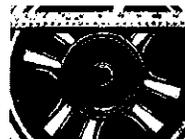
N/A
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3. If motorcycle is equipped with Drum Brakes take the following photographs

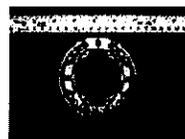
Left Front (or only) Brake Assembly (or N/A).



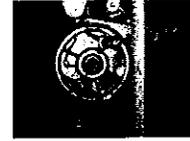
Left Front (or only) Brake Drum (or N/A).



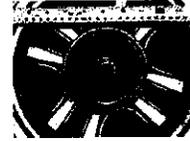
Left Front (or only) Brake Pads (or N/A).



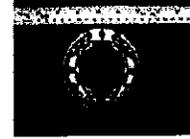
Right Front Brake Assembly (or ~~N/A~~).



Right Front Brake Drum (or ~~N/A~~).



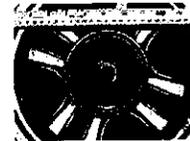
Right Front Brake Pads (or ~~N/A~~).



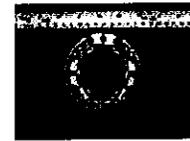
Left Rear (or only) Brake Assembly (or ~~N/A~~).



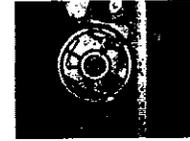
Left Rear (or only) Brake Drum (or ~~N/A~~).



Left Rear (or only) Brake Pads (or ~~N/A~~).



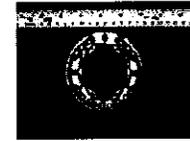
Right Rear Brake Assembly (or ~~N/A~~).



Right Rear Brake Drum (or ~~N/A~~).



Right Rear Brake Pads (or ~~N/A~~).



mt 4. Vehicle Brake System Inspection:
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VEHICLE BRAKE SYSTEM INSPECTION REQUIREMENTS	TEST VEHICLE COMPLIANCE	DATA	
		YES	NO
S5.1 - Motor driven cycle shall have either a split service brake system or two independently actuated service brake systems.	Motor driven cycle has split service brake system?	X	
	Motor driven cycle has two independently actuated service brake systems?		X
S5.1.1 - Failure of any component in a mechanical service brake system shall not result in a loss of braking ability in the other service brake system on the vehicle.	If vehicle has a mechanical service brake system, would component failure result in loss of braking in other service brake system?	N/A	
S5.1.2 - Leakage failure in hydraulic service brake system shall not result in a loss of braking ability in other service brake system on the vehicle.	If vehicle has hydraulic service brake system, would leakage failure in one service brake system result in a loss of braking ability in other service brake system?		X
S5.1.2.1 - Each master cylinder shall have a separate reservoir for each brake circuit, with each reservoir filler opening having its own cover, seal, and cover retention device. Each reservoir shall have a minimum capacity equivalent to one and one-half times the total fluid displacement resulting when all the wheel cylinders or caliper pistons serviced by the reservoir move from a new lining, fully retracted position to a fully worn, fully applied position. Where adjustment is a factor, the worst condition of adjustment shall be used for this measurement. (See Appendix 2 for information on reservoir capacity measurement)	Vehicle meets master cylinder reservoir requirements?	X	
S5.1.2.2 - Each motor driven cycle shall have a brake fluid warning statement that reads as follows, in letters at least three thirty-seconds of an inch high: Warning: clean filler cap before removing. Use only --fluid from a sealed container. (Inserting the recommended type of brake fluid as specified in 49 CFR 571.116, e.g., DOT 3.) The lettering shall be: (A) Permanently affixed, engraved, or embossed (B) Located so as to be visible by direct view, either on or within 4 inches of the brake-fluid reservoir filler plug or cap (C) Of a color that contrasts with its background, if it is not engraved or embossed	Vehicle meets all master cylinder warning statement requirements?	X	
	Type of brake fluid required?	DOT 4	

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5. Vehicle Brake System Inspection Continued.

VEHICLE BRAKE SYSTEM INSPECTION REQUIREMENTS	TEST VEHICLE COMPLIANCE	DATA	
		YES	NO
<p>S5.1.3 - (A) Each motor driven cycle equipped with a split service brake system shall have one or more electrically operated service brake system failure indicator lamps that is mounted in front of and in clear view of the driver, and that is activated —</p> <p>(1) In the event of pressure failure in any part of the service brake system, other than a structural failure of either a brake master cylinder body in a split integral body type master cylinder system or a service brake system failure indicator body, before or upon application of not more than 20 lb of pedal force upon the service brake.</p> <p>(2) Without the application of pedal force, when the level of brake fluid in a master cylinder reservoir drops to less than the recommended safe level specified by the manufacturer or to less than one-half the fluid reservoir capacity, whichever is the greater.</p> <p>(B) All failure indicator lamps shall be activated when the ignition switch is turned from the "off" to the "on" or to the "start" position.</p> <p>(C) Except for the momentary activation required by S5.1.3.1(b), each indicator lamp once activated, shall remain activated as long as the condition exists, whenever the ignition switch is in the "on" position. An indicator lamp activated when the ignition is turned to the "start" position will be deactivated upon return of the switch to the "on" position unless a failure exists in the service brake system.</p> <p>(D) Each indicator lamp shall have a red lens with the legend "Brake Failure" on or adjacent to it in letters not less than three thirty-seconds of an inch high that shall be legible to the driver in daylight when lighted</p>	<p>Does vehicle have a brake system failure indicator lamp?</p>		X
	<p>Does failure indicator lamp conform to operational and physical requirements?</p>	Yes	
<p>S5.1.4 - Each three-wheeled motor driven cycle shall be equipped with a parking brake of a friction type with a solely mechanical means to retain engagement.</p>	<p>If vehicle is a three-wheeled motor driven cycle, is vehicle equipped with a parking brake?</p>	Yes	
<p>S5.1.5 - The brake system shall be installed so that the lining thickness of the drum brake shoes may be visually inspected, either directly or by use of a mirror without removing the drums, and so that disc brake friction lining may be visually inspected without removing the pads.</p>	<p>Can the drum brake lining thickness or disc brake friction lining thickness be determined without removal of drum or disc brake pads?</p>	X	

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6. Calculate Master Cylinder Reservoir Capacity Requirement.

VOLUME REQUIRED: $V_r = (\Delta t_i + \Delta t_o) \times \frac{\pi D^2}{4}$								
WHERE								
$V_r =$				Volume Required Per Wheel				
$\Delta t =$				Total Change In Pad Thickness				
$D =$				Caliper Cylinder Diameter				
FRONT WHEEL VOLUME								
$\Delta t \times$	$\frac{\pi \times (1.950^2)}{4}$	=	CUBIC IN.	X	NUMBER OF PISTONS	=		
.670			2		1	2		
Total Cubic Inch Displacement		2	X	16.39ml=	Total Master Cylinder Required Volume (ml)			32.78 ml
Master Cylinder Required Volume		32.78	X	1.5=	49.17 ml	Total Wheel System Requirement		
REAR WHEEL VOLUME								
$\Delta t \times$	$\frac{\pi \times (1.750^2)}{4}$	=	CUBIC IN.	X	NUMBER OF PISTONS	=		
.670			2		each wheel has 2 2	4		
Total Cubic Inch Displacement		4	X	16.39ml=	Total Master Cylinder Required Volume (ml)			65.56 ml
Master Cylinder Required Volume		65.56	X	1.5=	98.34	Total Wheel System Requirement		

Master Cylinder Required Volume	Front Wheel	Pass	Fail	Rear Wheel	Pass	Fail
	49.17 ml	X		98.34 ml	X	
Master Cylinder Measured Volume	100 ml			100 ml		

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7. Install Thermocouples on Front and Rear Brakes

- a. use 3/32 drill bit and drill small hole on the side of the brake pad where it will not interfere with the function of the brakes
- b. Bind Thermocouple wire ends with metal binder.
- c. Place bound thermocouple end into brake pad, use super glue to hold in place.

- Left Front (or only)
- Right Front
- Left Rear (or only)
- Right Rear

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8. Install V-box Equipment on motorcycle

- a. Secure V-box to Seat with Velcro and Gaffers Tape
- b. Zip Tie all wires securely along the side.
- c. Antenna must be placed on top pointing towards sky
- d. Drill ¼ hole in brake levers
- e. Tap holes with ¼ 20 thread
- f. Thread load cells on brake levers

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9. Weigh Motorcycle with rider as tested.

Front	754	lb
Rear	692 693	lb
Total	2089	lb

Add additional weight under seat to total 200lbs over as received weight

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10. Final Weight:

Front	754	lb
Rear	692 693	lb
Total	2089	lb

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11. Have Photographer take photograph of motorcycle being weighed.



- Vehicle being weighed on scale with instrumentation and rider.

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12. Take Motorcycle to a clear area for As Tested Photographs

13. Have Photographer take the following photos:



- Left Front ¾ as tested.

Right Rear ¼ as tested.



Instrumentation.



Instrumentation.



Front Brake Lever with load cell.



Rear Brake pedal with load cell.



Left Front (or only) Brake with Thermocouple Installed.



Right Front Brake with Thermocouple Installed (or N/A).



Left Rear (or only) Brake with thermocouple Installed.



Right Rear Brake with thermocouple Installed (or N/A).



[Signature]

****DO NOT PROCEED UNTIL ASSIGNED ENGINEER HAS SIGNED****

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1. ALL OF SECTION 3 IS PERFORMED IN THE AS-TESTED CONDITION.

Use the following stopping distance table

Vehicle Test Speed, mph	Preburnish effectiveness total system	Preburnish effectiveness partial mechanical systems	Effectiveness total system	Effectiveness partial hydraulic systems
15	13	30	11	25
20	24	54	19	44
25	37	84	30	68
30	54	121	43	97
35	74	165	58	132
40	96	216	75	173
45	121	273	95	218
50	150	337	128	264
55	181	407	155	326
60	216	484	185	388
65	-----	-----	217	455
70	-----	-----	264	527
75	-----	-----	303	606
80	-----	-----	345	689
85	-----	-----	389	778
90	-----	-----	484	872
95	-----	-----	540	971
100	-----	-----	598	1076
105	-----	-----	659	1188
110	-----	-----	723	1302
115	-----	-----	791	1423
120	-----	-----	861	1549

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2. Perform Instrumentation Check:

AMBIENT TEMPERATURE: 83 °F WIND VELOCITY/DIRECTION: 2 mph / south

ODOMETER READING - START: 478 mi. FINISH: 484 mi.

REQUIREMENTS: Check instrumentation by making not more than 10 stops from 30 mph at a deceleration of not more than 10 fpsps, record results, repeat if necessary.

MOTOR DRIVEN CYCLE MAXIMUM SPEED DETERMINATION —

REQUIREMENTS: Measure the speed that the motorcycle will attain in a distance of one mile from a standing start

M/C SPEED ATTAINABLE IN 1 MILE 37 mph

RUN NO.	SPEED (mph)	STOPPING DISTANCE (ft)	MAX LEVER FORCE pedal (lb)	AVG MAX LEVER / PEDAL FORCE (lb)	DECELERATION (fpsps)		TEMPERATURE (°F)				
					MAX.	AVG.	LF	RF	LR	RR	
1	30.73	117.61	23.70	14.80	43.65	9.62	-				116
2	31.21	127.61	24.15	13.51	30.83	9.16	-				122
3	31.22	137.82	16.39	9.91	57.52	8.03	-				130
4	30.63	133.99	17.94	8.35	30.23	7.99	-				135
5	31.06	119.41	21.43	12.83	33.44	9.34	-				146
6	31.49	154.24	15.23	8.21	33.99	7.36	-				153
7	30.66	156.19	15.23	8.12	25.99	7.09	-				162
8	33.42	151.82	16.39	8.30	25.51	8.30	-				-
9	32.12	132.26	18.33	6.72	25.15	8.61	-				-
10	30.50	131.49	36.55	11.52	35.81	8.36	-				-

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3. Perform First Effectiveness:

AMBIENT TEMPERATURE: 80-97 °F WIND VELOCITY/DIRECTION: 2-10 mph / S.

ODOMETER READING - START: 478 mi. FINISH: 526 mi.

REQUIREMENTS:

- A. Utilize both brakes, no wheel lockup, initial brake temperature between 130°F and 150°F.
Make the following stops: (1) 6 stops from 30 mph (2) 6 stops from 60mph
- B. Compliance to S122 requires 1 stop at each of the following:
(1) 30 mph within 54 feet (2) 60mph within 216 feet

30 MPH DATA —

RUN NO.	SPEED (mph)	STOPPING DISTANCE (ft)	MAX LEVER FORCE pedal (lb)	MAX LEVER / PEDAL FORCE (lb)	DECELERATION (fpsps)		TEMPERATURE (°F)			
					MAX.	AVG.	LF	RF	LR	RR
1	30.46	52.03	75.33	53.89	-48.96	-16.97	139			140
2	30.66	57.18	91.74	73.13	-42.01	-16.65	144			144
3	30.79	51.57	100.91	69.43	-45.57	-13.46	127			143
4	30.33	56.35	92.99	67.23	-50.31	-13.97	136			120
5	29.94	53.96	65.64	54.70	-42.29	-11.67	142			121
6	30.23	51.71	81.10	58.23	-42.38	-12.49	145			118

60 MPH DATA —

RUN NO.	SPEED (mph)	STOPPING DISTANCE (ft)	MAX LEVER FORCE pedal (lb)	MAX LEVER / PEDAL FORCE (lb)	DECELERATION (fpsps)		TEMPERATURE (°F)			
					MAX.	AVG.	LF	RF	LR	RR
1	29.94	46.27	93.47	38.93	-61.04	-10.24	141			142
2	30.53	55.23	65.83	43.33	-52.66	-8.39	140			136
3	30.09	51.64	89.71	59.60	-49.14	-13.35	142			138
4	30.09	51.59	79.45	37.16	-43.93	-14.58	137			136
5	30.12	53.92	66.47	65.01	-50.31	-13.82	141			136
6	30.16	53.15	95.96	61.12	-45.38	-12.71	143			132

4. Perform First Effectiveness Partial Brake System Test: *N/A Annual after final*

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AMBIENT TEMPERATURE: _____ °F WIND VELOCITY/DIRECTION: _____

ODOMETER READING - START: _____ mi. FINISH: _____ mi.

REQUIREMENTS:

- A. Utilizing each brake system independently, no wheel lockup, initial brake temperature between 130°F and 150°F.
 Make the following stops: (1) 6 stops from 30 mph (2) 6 stops from 60 mph
- B. Compliance to S122 requires 1 stop at each of the following (for each brake system independently):
 (1) 30 mph within 121 feet (2) 60 mph within 484 feet

30 MPH DATA — Brake System 1, Describe: Front wheel; independent hydraulic brake system.

RUN NO.	SPEED (mph)	STOPPING DISTANCE (ft)	MAX LEVER FORCE (lb)	MAX LEVER / PEDAL FORCE (lb)	DECELERATION (fpsps)		TEMPERATURE (°F)			
					MAX.	AVG.	LF	RF	LR	RR
1				0						
2				0						
3				0						
4				0						
5				0						
6				0						

60 MPH DATA — Brake System 1, Describe: Front wheel; independent hydraulic brake system.

RUN NO.	SPEED (mph)	STOPPING DISTANCE (ft)	MAX LEVER FORCE (lb)	MAX LEVER / PEDAL FORCE (lb)	DECELERATION (fpsps)		TEMPERATURE (°F)			
					MAX.	AVG.	LF	RF	LR	RR
1				0						
2				0						
3				0						
4				0						
5				0						
6				0						

NA Permitted after Check

30 MPH DATA — Brake System 2, Describe: Rear wheel; independent hydraulic brake system.

RUN NO.	SPEED (mph)	STOPPING DISTANCE (ft)	MAX LEVER FORCE (lb)	MAX LEVER / PEDAL FORCE (lb)	DECELERATION (fpsps)		TEMPERATURE (°F)			
					MAX.	AVG.	LF	RF	LR	RR
1			0							
2			0							
3			0							
4			0							
5			0							
6			0							

60 MPH DATA — Brake System 2, Describe: Rear wheel; independent hydraulic brake system.

RUN NO.	SPEED (mph)	STOPPING DISTANCE (ft)	MAX LEVER FORCE (lb)	MAX LEVER / PEDAL FORCE (lb)	DECELERATION (fpsps)		TEMPERATURE (°F)			
					MAX.	AVG.	LF	RF	LR	RR
1			0							
2			0							
3			0							
4			0							
5			0							
6			0							

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5. Perform Burnish Procedure:

AMBIENT TEMPERATURE: 64-67 °F WIND VELOCITY/DIRECTION: 2-10 / SW

ODOMETER READING - START: 526 mi. FINISH: 750 mi.
REQUIREMENTS

- A. Burnish the brakes by making 200 stops from 30 mph at 12 fpsps deceleration
- B. The braking interval shall be either the distance necessary to reduce the brake temperature to between 130°F and 150°F or 1 mile whichever comes first
- C. Accelerate at maximum rate to 30 mph immediately and maintain that speed until making the next stop
- D. Hand lever and foot pedal force limits do not apply during this procedure

30 MPH DATA —

RUN NO.	SPEED (mph)	STOPPING DISTANCE (ft)	MAX LEVER FORCE <i>Debrl</i> (lb)	MAX LEVER / PEDAL FORCE (lb)	DECELERATION (fpsps)		TEMPERATURE (°F)				
					MAX.	AVG.	LF	RF	LR	RR	
1	30.62	103.83	24.23	9.37	-33.26	-9.67	120				157
25	30.70	90.12	24.32	16.38	-21.23	-8.81	112				144
50	30.53	86.30	29.21	14.36	-23.97	-7.65	120				177
75	30.28	89.29	31.37	16.20	-20.60	-9.42	136				245
100	30.77	87.82	26.63	17.27	-16.04	-10.38	143				259
125	30.25	86.99	25.05	14.91	-21.61	-9.49	268				319
150	30.23	85.20	20.23	11.13	-26.77	-8.84	289				269
175	30.81	94.09	24.70	15.31	-21.96	-8.89	159				146
200	30.76	85.27	34.28	16.26	-21.96	-9.84	123				140

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6. Perform Second Effectiveness Test:

AMBIENT TEMPERATURE: 87-26 °F WIND VELOCITY/DIRECTION: 4 mph / S.

ODOMETER READING - START: 750 mi. FINISH: 775 mi.
REQUIREMENTS

A. Make stops as follows:

- (1) 6 stops from 30 mph
- (2) 6 stops from 60 mph
- (3) 4 stops from 80 mph
- (4) 4 stops from vehicle maximum speed not to exceed 120 mph

Utilize both brakes, no wheel lockup, initial brake temperature between 130°F and 150°F.

B. Compliance to S122 requires 1 stop at each of the following:

- (1) 30 mph within 43 feet
- (2) 60 mph within 185 feet
- (3) 80 mph within 345 feet
- (4) 120 mph within 861 feet

Maximum vehicle speed 37 mph within 5280 feet (see column 3, table 12.1).

30 MPH DATA —

RUN NO.	SPEED (mph)	STOPPING DISTANCE (ft)	MAX LEVER FORCE <i>Pedal</i> (lb)	MAX LEVER / PEDAL FORCE (lb)	DECELERATION (fpsps)		TEMPERATURE (°F)				
					MAX.	AVG.	LF	RF	LR	RR	
1	30.57	59.79	92.76	66.66	-27.28	-12.67	123				142
2	30.20	56.36	95.06	73.24	-29.62	-13.55	124				136
3	30.47	61.47	84.72	64.77	-28.43	-11.15	131				135
4	30.45	61.51	92.33	55.51	-27.07	-11.30	132				132
5	30.61	59.00	79.85	51.77	-28.50	-11.62	134				134
6	30.55	58.01	86.25	30.95	-28.16	-11.60	136				130

2/4

60 MPH DATA —

RUN NO.	SPEED (mph)	STOPPING DISTANCE (ft)	MAX LEVER FORCE (lb)	MAX LEVER / PEDAL FORCE (lb)	DECELERATION (fpsps)		TEMPERATURE (°F)				
					MAX.	AVG.	LF	RF	LR	RR	
1											
2											
3											
4											
5											
6											

80 MPH DATA —

RUN NO.	SPEED (mph)	STOPPING DISTANCE (ft)	MAX LEVER FORCE (lb)	MAX LEVER / PEDAL FORCE (lb)	DECELERATION (fpsps)		TEMPERATURE (°F)				
					MAX.	AVG.	LF	RF	LR	RR	
1											
2											
3											
4											

120 MPH DATA / TOP VEHICLE SPEED - Top vehicle Speed is _____ mph. Required Stopping Distance is _____ feet.

RUN NO.	SPEED (mph)	STOPPING DISTANCE (ft)	MAX LEVER FORCE (lb)	MAX LEVER / PEDAL FORCE (lb)	DECELERATION (fpsps)		TEMPERATURE (°F)				
					MAX.	AVG.	LF	RF	LR	RR	
1											
2											
3											
4											

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N/A

7. Perform Fade and Recovery Test:

AMBIENT TEMPERATURE: _____ °F WIND VELOCITY/DIRECTION: _____

ODOMETER READING - START: _____ mi. FINISH: _____ mi.
REQUIREMENTS

Conduct three 30 mph stops at 10-11 fpsps, compute average maximum brake lever and pedal forces and record data.
30 MPH DATA —

RUN NO.	SPEED (mph)	STOPPING DISTANCE (ft)	MAX LEVER FORCE (lb)	MAX LEVER / PEDAL FORCE (lb)	DECELERATION (fpsps)		TEMPERATURE (°F)				
					MAX.	AVG.	LF	RF	LR	RR	
1											
2											
3											

AVERAGE MAX BRAKE LEVER FORCE = _____ lb.

AVERAGE MAX BRAKE LEVER / PEDAL FORCE = _____ lb.

REQUIREMENTS

- A. ^{~12} Conduct 10 fade stops from 60 mph at a deceleration rate of 14-17 fpsps with initial brake temperature between 130°F and 150°F, conduct 5 fade recovery stops from 30 mph at 10-11 fpsps and record data.
- B. Compliance to S122 requires 5 stops with pedal force < 90 lb and hand lever force < 55 lb for first 4 stops; 5th stop within +20, -10 lb of baseline average.
- 60 MPH DATA —

RUN NO.	SPEED (mph)	STOPPING DISTANCE (ft)	MAX LEVER FORCE (lb)	MAX LEVER / PEDAL FORCE (lb)	DECELERATION (fpsps)		TEMPERATURE (°F)				
					MAX.	AVG.	LF	RF	LR	RR	
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											

30 MPH DATA —

RUN NO.	SPEED (mph)	STOPPING DISTANCE (ft)	MAX LEVER FORCE (lb)	MAX LEVER / PEDAL FORCE (lb)	DECELERATION (fpsps)		TEMPERATURE (°F)				
					MAX.	AVG.	LF	RF	LR	RR	
1											
2											
3											
4											
5											

N/A

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8. Perform Re-Burnish Procedure:

AMBIENT TEMPERATURE: _____ °F **WIND VELOCITY/DIRECTION:** _____

ODOMETER READING - START: _____ mi. **FINISH:** _____ mi.

REQUIREMENTS

- A. Burnish the brakes by making 35 stops from 30 mph at 12 fpsps deceleration
- B. The braking interval shall be either the distance necessary to reduce the brake temperature to between 130°F and 150°F or 1 mile whichever comes first
- C. Accelerate at maximum rate to 30 mph immediately and maintain that speed until making the next stop
- D. Hand lever and foot pedal force limits do not apply during this procedure

30 MPH DATA —

RUN NO.	SPEED (mph)	STOPPING DISTANCE (ft)	MAX LEVER FORCE (lb)	MAX LEVER / PEDAL FORCE (lb)	DECELERATION (fpsps)		TEMPERATURE (°F)				
					MAX.	AVG.	LF	RF	LR	RR	
1											
10											
15											
25											
35											

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9. Perform Final Effectiveness Testing:

AMBIENT TEMPERATURE: _____ °F WIND VELOCITY/DIRECTION: _____

ODOMETER READING - START: _____ mi. FINISH: _____ mi.
REQUIREMENTS

A. Make the following stops:

- (1) 6 stops from 30 mph
- (2) 6 stops from 60 mph
- (3) 4 stops from 80 mph
- (4) 4 stops from vehicle maximum speed not to exceed 120 mph

Utilize both brakes, no wheel lockup, initial brake temperature between 130°F and 150°F.

B. Compliance to S122 requires 1 stop at each of the following:

- (1) 30 mph within 43 feet
- (2) 60 mph within 185 feet
- (3) 80 mph within 345 feet
- (4) 120 mph within 861 feet

Maximum vehicle speed _____ mph within 5280 feet (see column 3, table 12.1).

30 MPH DATA —

RUN NO.	SPEED (mph)	STOPPING DISTANCE (ft)	MAX LEVER FORCE (lb)	MAX LEVER / PEDAL FORCE (lb)	DECELERATION (fpsps)		TEMPERATURE (°F)				
					MAX.	AVG.	LF	RF	LR	RR	
1											
2											
3											
4											
5											
6											

N/A

60 MPH DATA —

RUN NO.	SPEED (mph)	STOPPING DISTANCE (ft)	MAX LEVER FORCE (lb)	MAX LEVER / PEDAL FORCE (lb)	DECELERATION (fpsps)		TEMPERATURE (°F)			
					MAX.	AVG.	LF	RF	LR	RR
1										
2										
3										
4										
5										
6										

80 MPH DATA —

RUN NO.	SPEED (mph)	STOPPING DISTANCE (ft)	MAX LEVER FORCE (lb)	MAX LEVER / PEDAL FORCE (lb)	DECELERATION (fpsps)		TEMPERATURE (°F)			
					MAX.	AVG.	LF	RF	LR	RR
1										
2										
3										
4										

120 MPH DATA / TOP VEHICLE SPEED - Top vehicle Speed is _____ mph. Required Stopping Distance is _____ feet.

RUN NO.	SPEED (mph)	STOPPING DISTANCE (ft)	MAX LEVER FORCE (lb)	MAX LEVER / PEDAL FORCE (lb)	DECELERATION (fpsps)		TEMPERATURE (°F)			
					MAX.	AVG.	LF	RF	LR	RR
1										
2										
3										
4										

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10. Perform Final Effectiveness Partial Brake System Test:

(Test Only Conducted if Vehicle is a three-wheeled motorcycle)

AMBIENT TEMPERATURE: _____ °F WIND VELOCITY/DIRECTION: _____

ODOMETER READING - START: _____ mi. FINISH: _____ mi.
REQUIREMENTS:

- A. Utilizing each brake system independently, no wheel lockup, initial brake temperature between 130°F and 150°F.
Make the following stops: (1) 6 stops from 30 mph (2) 6 stops from 60 mph
- B. Compliance to S122 requires 1 stop at each of the following (for each brake system independently): (1) 30 mph within 97 feet (2) 60 mph within 388 feet

30 MPH DATA — Brake System 1, Describe: Front wheel, independent hydraulic brake system.

RUN NO.	SPEED (mph)	STOPPING DISTANCE (ft)	MAX LEVER FORCE (lb)	MAX LEVER / PEDAL FORCE (lb)	DECELERATION (fpsps)		TEMPERATURE (°F)				
					MAX.	AVG.	LF	RF	LR	RR	
1				0							
2				0							
3				0							
4				0							
5				0							
6				0							

60 MPH DATA — Brake System 1, Describe: Front wheel, independent hydraulic brake system.

RUN NO.	SPEED (mph)	STOPPING DISTANCE (ft)	MAX LEVER FORCE (lb)	MAX LEVER / PEDAL FORCE (lb)	DECELERATION (fpsps)		TEMPERATURE (°F)				
					MAX.	AVG.	LF	RF	LR	RR	
1				0							
2				0							
3				0							
4				0							
5				0							
6				0							

N/A

30 MPH DATA — Brake System 2, Describe: Rear wheel; independent hydraulic brake system.

RUN NO.	SPEED (mph)	STOPPING DISTANCE (ft)	MAX LEVER FORCE (lb)	MAX LEVER / PEDAL FORCE (lb)	DECELERATION (fpsps)		TEMPERATURE (°F)			
					MAX.	AVG.	LF	RF	LR	RR
1			0							
2			0							
3			0							
4			0							
5			0							
6			0							

60 MPH DATA — Brake System 2, Describe: Rear wheel; independent hydraulic brake system.

RUN NO.	SPEED (mph)	STOPPING DISTANCE (ft)	MAX LEVER FORCE (lb)	MAX LEVER / PEDAL FORCE (lb)	DECELERATION (fpsps)		TEMPERATURE (°F)			
					MAX.	AVG.	LF	RF	LR	RR
1			0							
2			0							
3			0							
4			0							
5			0							
6			0							

N/A
initials

11. Perform Parking Brake Test:

(Test Only Conducted if Vehicle is a three-wheeled motorcycle)

AMBIENT TEMPERATURE: _____ °F WIND VELOCITY/DIRECTION: _____

ODOMETER READING - START: _____ mi. FINISH: _____ mi.

Requirements

Initial Brake Temperature < 150°F

Park the motorcycle on the longitudinal axis on a downhill grade of 30%.

Apply the service brake < 90lb to stop the motorcycle.
 Transmission in Neutral

Apply Parking Brake not exceeding a force of 55lbs for hand operated and 90lbs for foot operated.

Hold for 5 minutes.

Reverse direction of motorcycle and repeat test uphill.

Direction	Held (Yes / No)	LEVER / PEDAL FORCE OF SERVICE BRAKE (lb)	LEVER / PEDAL FORCE OF PARKING BRAKE (lb)	TEMPERATURE (°F)			
				LF	RF	LR	RR
UPHILL							
DOWNHILL							

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N/A
12. Perform Water Fade and Recovery Test:

AMBIENT TEMPERATURE: _____ °F WIND VELOCITY/DIRECTION: _____

ODOMETER READING - START: _____ mi. FINISH: _____ mi.
REQUIREMENTS

- A. Conduct three 30 mph stops at 10-11 fpsps using full brake system, compute average maximum brake pedal and lever forces and record data.
- B. Immerse rear brake in water fully released for 2 minutes followed by immersion of the front brake in water fully released for 2 minutes.
- C. Conduct 5 fade recovery stops from 30 mph at 10-11 fpsps using full brake system and record data.
- D. Compliance to S122 requires 5 stops with pedal force < 90 lb and hand lever force < 55 lb for first 4 stops; 5th stop within +20, -10 lb of baseline average

30 MPH DATA —

RUN NO.	SPEED (mph)	STOPPING DISTANCE (ft)	MAX LEVER FORCE (lb)	MAX LEVER / PEDAL FORCE (lb)	DECELERATION (fpsps)		TEMPERATURE (°F)				
					MAX.	AVG.	LF	RF	LR	RR	
1											
2											
3											

AVERAGE MAX BRAKE LEVER FORCE = _____ lb.

AVERAGE MAX BRAKE LEVER / PEDAL FORCE = _____ lb.

30 MPH DATA —

RUN NO.	SPEED (mph)	STOPPING DISTANCE (ft)	MAX LEVER FORCE (lb)	MAX LEVER / PEDAL FORCE (lb)	DECELERATION (fpsps)		TEMPERATURE (°F)				
					MAX.	AVG.	LF	RF	LR	RR	
1											
2											
3											
4											
5											

****DO NOT PROCEED UNTIL ASSIGNED ENGINEER HAS SIGNED****

initials 1. Remove all instrumentation and ballast from the test vehicle

initials 2. Perform Final Inspection:

Disassemble all brakes and inspect the following:

- A. The entire brake system for detachment or fracture of any component.
- B. Brake linings for detachment from the shoe or pad.
- C. Wheel cylinder, master cylinder, and axle seals for fluid or lubricant leakage.

OBSERVATIONS:

- A. No fractures or separation of any brake system components.
- B. No fractures or separation of any brake system components.
- C. No fluid leakage of brake system seals or cylinders.

	Left Front (or only)		Right Front	
	Front Section		Front Section	
Pads	Inboard	Outboard	Inboard	Outboard
Length (in.)	 	 	 	
Width (in.)	 	 	 	
Thickness (in.)	 	 	 	
	Rear Section (or only)		Rear Section (or only)	
Length (in.)	4.020	4.020	 	
Width (in.)	1.280	1.280	 	
Thickness (in.)	0.317	0.316	 	
Temp. Code	—		 	
Piston Dia. (in.)	1.950 x 1		 	
Disc/Drum	Disc		 	
Diameter (in.)	8.325		 	
Thickness (in.)	0.385		 	
	Left Rear (or only)		Right Rear	
	Front Section		Front Section	
Pads	Inboard	Outboard	Inboard	Outboard
Length (in.)	 	 	 	
Width (in.)	 	 	 	
Thickness (in.)	 	 	 	
	Rear Section (or only)		Rear Section (or only)	
Pads	Inboard	Outboard	Inboard	Outboard
Length (in.)	4.020	4.020	4.020	4.020
Width (in.)	1.280	1.280	1.280	1.280
Thickness (in.)	0.332	0.319	0.318	0.323
Temp. Code	—		—	
Piston Dia. (in.)	1.950 x 1		1.950 x 1	
Disc/Drum	Disc		Disc	
Diameter (in.)	8.325		8.325	
Thickness (in.)	0.383		0.383	

[Handwritten Signature]

****DO NOT PROCEED UNTIL ASSIGNED ENGINEER HAS SIGNED****

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1. Summary of Test Results:

Take the best performing stop from each testing category and place in summary table:

TEST SUMMARY	SPEED (mph)	STOP. DIST. (ft)	MAX. BRAKE LEVER FRONT Pedal FORCE (lb)	MAX. BRAKE LEVER / PEDAL REAR FORCE (lb)	DECEL.		PASSED
					Max	Avg.	
Maximum Speed	37						
1st Effectiveness Test, 30 mph (Service Brake System)	30.23	51.71	81.10	58.95	-42.38	-12.49	Yes
1st Effectiveness Test, 60 mph (Service Brake System)	30.09	51.68	89.71	59.60	-49.99	-13.35	Yes
1st Effectiveness Test, 30 mph (Partial Failure, Front Wheel Only)	_____						
1st Effectiveness Test, 60 mph (Partial Failure, Front Wheel Only)	_____						
1st Effectiveness Test 30 mph (Partial Failure, Rear Wheel Only)	_____						
1st Effectiveness Test, 60 mph (Partial Failure, Rear Wheel Only)	_____						
2nd Effectiveness Test, 30 mph	30.20	56.36	95.06	73.24	-29.62	-13.86	No
2nd Effectiveness Test, 60 mph	_____						
2nd Effectiveness Test, 80 mph	_____						
2nd Effectiveness Test, 120 mph	_____						
1 st Fade and Recovery (Baseline/Recovery)	_____						
Final Effectiveness Test, 30 mph	_____						
Final Effectiveness Test, 60 mph	_____						
Final Effectiveness Test, 80 mph	_____						
Final Effectiveness Test, 120 mph	_____						
Final Effectiveness Test, 30 mph (Partial Failure, Front Wheel Only)	_____						
Final Effectiveness Test, 60 mph (Partial Failure, Front Wheel Only)	_____						
Final Effectiveness Test 30 mph (Partial Failure, Rear Wheel Only)	_____						
Final Effectiveness Test, 60 mph (Partial Failure, Rear Wheel Only)	_____						
Parking Brake Uphill	_____						
Parking Brake Downhill	_____						
Water Recovery (Baseline/Recovery)	_____						

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2. Test Vehicle Completion Date 6/27/12
Matthew

****ASSIGNED ENGINEER TEST BOOK COMPLETION SIGNATURE****

1. The first part of the document discusses the importance of maintaining accurate records of all transactions.

2. It is essential to ensure that all entries are supported by appropriate documentation and receipts.

3. The second part of the document outlines the procedures for reconciling accounts and identifying discrepancies.