

LOS ANGELES COUNTY SHERIFF'S DEPARTMENT



LAW ENFORCEMENT MOTORCYCLE TEST AND EVALUATION PROGRAM

OCTOBER 2010

LEROY D. BACA, SHERIFF

INTRODUCTION

The Los Angeles County Sheriff's Department first implemented its police vehicle testing program in 1974, and motorcycle testing in 2008. Since that time, our Department has become nationally recognized as a major source of information relative to police vehicles and their use.

This year's motorcycle evaluation was conducted in October 22, 2009, by the Los Angeles County Sheriff's Department, together with the Los Angeles Police Department.

All major manufacturers of police motorcycles were invited to participate. BMW, Harley-Davidson, and Honda each submitted motorcycles for evaluation. The motorcycles submitted were:

2009 BMW R 1200 RT-P

2009 BMW G650 GS-P

2009 Honda ST 1300-PA9

2010 Harley-Davidson Electra Glide

2010 Harley-Davidson Road King

All of the motorcycles that were submitted completed the test satisfactorily.

The testing process is designed to address the law enforcement officer's operational requirements in terms of motorcycle performance, safety, and comfort. The fleet maintenance interest is addressed by performing an extensive mechanical evaluation on each motorcycle submitted.

Each test is designed and executed to simulate actual field use conditions as closely as possible. Law enforcement motorcycle personnel conduct the evaluations on city streets, freeways, and the performance track.

This booklet is not intended as a recommendation for any specific motorcycle contained within, nor is it designed to rank the motorcycles in any order. Our motorcycle testing program is conducted in order to accomplish two primary goals. To provide law enforcement agencies with the data necessary to assist those in the motorcycle selection process, and to provide the various motorcycle manufacturers with the input necessary to better meet the needs of law enforcement.

We recognize the fact that individual agency needs can be influenced by cost, operational considerations and other factors. As such, interpretation of test results is the responsibility of each agency, and should be made based upon that agency's needs.

It is our goal to provide law enforcement agencies with the information they require to successfully evaluate and select the right motorcycle for their needs. We believe that we have accomplished that goal.

TABLE OF CONTENTS

Evaluation Protocol	4
Motorcycle Specifications	10
Basic Motorcycle Patterns	16
32 Lap High-Speed Course	20
Pursuit Course	26
Braking	32
Ergonomics	38
Acceleration and Fuel Efficiency	54
Heat Evaluation	56
Sound Level Evaluation	59
Mechanical Evaluation	61
Communication Noise Evaluation	72

MOTORCYCLE EVALUATION PROTOCOL

32 LAP HIGH-SPEED COURSE

TEST RIDER'S SUBJECTIVE EVALUATION

This evaluation is conducted on a high-speed riding course. It is designed to evaluate, identify and eliminate the obvious unacceptable motorcycles (i.e., those motorcycles that are demonstrably unstable or otherwise exhibit unsafe characteristics).

For this evaluation, four riders are utilized for each motorcycle. Each rider completes eight laps around our 1.46 mile test track at the Auto Club Speedway in Fontana, for a total of 32 timed laps. Lap timing is via a GPS based "VBOX Datalogger", mounted on the motorcycle. The fastest and the slowest lap times are eliminated, the remaining six lap times are averaged. The average time and speed are recorded next to the rider's name.

Four Emergency Vehicle Operations Center motorcycle training instructors, two each from the Los Angeles County Sheriff's Department and Los Angeles Police Department, share the riding and evaluation of these motorcycles.

At the conclusion of the preliminary handling portion of the evaluation, each rider completes a "Rider's Subjective Evaluation" form. If the motorcycle is judged unacceptable in this preliminary review, it is rejected and not subjected to further evaluation.

PURSUIT COURSE

This evaluation is for motorcycles identified by the manufacturer as intended for law enforcement use. This evaluation is conducted on a closed 2.16 mile city street course which closely represents the environment most urban law enforcement agencies must contend with. The course has virtually no straight-a-ways and consists of right and left turns and obstacles in the roadway.

This is the final track evaluation, and the manufacturers, if they so choose, are allowed to rebuild the motorcycle's brake system prior to this portion of the evaluation process.

For this evaluation, two riders are utilized for each motorcycle. Each rider completes two laps around the city or "pursuit" course. Lap timing is via a GPS based "VBOX Datalogger" timing device, mounted on the motorcycle. The combined times of the two laps are recorded next to the rider's name.

BASIC MOTORCYCLE PATTERNS

Five circle patterns will be used to determine each motorcycle's minimum turning radius. The diameters of the circles will be 20, 19, 18, 17 and 16 feet. The circle pattern will be entered at a speed of 2-3 MPH. Once inside the circle, the rider will make three revolutions in one direction, exit the circle and make three more revolutions in the opposite direction. The circle pattern will be ridden in first gear.

Each motorcycle will be ridden in five different 180 degree U-Turn patterns. The diameters of the U-Turns will be 20, 19, 18, 17, and 16 feet. The U-Turn will be entered at a speed of 2-3 MPH in first gear. The rider will fully turn the handlebars and lean the motorcycle as necessary to complete the turn. This is done in both directions.

The 30 MPH cone weave consists of seven sets of three cones each, alternately offset from a center line at 36 foot intervals. The rider will approach the pattern from a sufficient distance to establish and maintain a speed of 30 MPH. Using counter steering, the rider will weave the motorcycle around the seven sets of cones maintaining 30 MPH, plus or minus 2 MPH. The 30 MPH cone weave represents steering or negotiating around debris or other hazards on the roadway.

The Short Cone Weave pattern utilizes eight single cones placed in a straight line at various distances. The cones will be placed at 11, 10 ½, 10 and 9 ½ foot intervals measured from cone center to cone center. The rider will negotiate the cone weave at about 1-2 MPH in first gear, utilizing the rear brake as needed. Lock-to-lock turns will be used to successfully ride the course. This exercise represents typical motorcycle maneuverability used in slow-speed enforcement riding.

All of the Basic Motorcycle Pattern Evaluation protocols will be conducted by all four riders.

ACCELERATION PERFORMANCE EVALUATION

This evaluation is designed to measure motorcycle performance and control in terms of acceleration, including speed and time elapsed at the quarter mile. Although the top speed is not recorded, a minimum speed of 100 MPH is generally obtained to satisfy the requirements for high-speed law enforcement patrol. Special attention will be paid to overall acceleration, stability, loss of rear wheel traction, and whether or not the front wheel lifts off the ground uncontrollably. Three runs will be made with each motorcycle. The results will be averaged.

All of the information gathered during the acceleration and subsequent brake evaluation is gathered using a "VBOX Datalogger". The "Datalogger" is a GPS based measuring device. This electronic device measures distance, time and speed.

BRAKE EVALUATION

This evaluation procedure measures the braking response and efficiency of the motorcycle. There are three different brake evaluations. A hard braking evaluation, a transitional braking evaluation from a dry to a wet surface, and a debris field braking evaluation from a smooth surface to a sandy surface.

The hard brake evaluation is conducted by first accelerating the motorcycle to 80 MPH, then decelerating to a stop, maintaining an average deceleration rate of 22 feet per second. This procedure is repeated three additional times. The motorcycle is then immediately accelerated to 60 MPH and then stopped as quickly as possible, simulating a panic stop. That stopping distance is measured and recorded.

The transitional brake evaluation incorporates transitioning from a dry to wet surface during braking. The motorcycle will be accelerated to 40 MPH, and at a predetermined location, the brakes will be applied. The braking application will begin on dry pavement for approximately 25 feet, and will transition to and conclude on wet pavement. Controllability of the motorcycle and its ABS operation will be evaluated.

During the debris field braking evaluation, the motorcycle will be accelerated to 40 mph, and at a predetermined position, the brakes will be applied. The entire brake application will take place on a roadway strewn with sand and gravel. Controllability of the motorcycle and its ABS operation will be evaluated.

If a brake malfunction is experienced (i.e., severe brake fading), an effort is made to detect the cause of the brake failure. If it is decided that the failure is inherent in the engineering of the brake system of the motorcycle, the evaluation is discontinued and the motorcycle is disqualified from further evaluation. If the failure is associated with a correctable situation, it is corrected and the evaluation is run again. The defect and any remedial action taken are noted in the evaluation results.

ERGONOMICS & RIDEABILITY EVALUATION

157 MILE RIDE

This portion evaluates the fuel efficiency and ergonomics of the motorcycle during extended field operations. It is designed to simulate the types of situations that an officer may encounter during an eight hour shift. Each motorcycle is driven four times through a 157 mile loop, once by each of the four EVOC riders. The loop covers 33 miles of city streets, 75 miles of California freeways, 20 miles of coastal highway, and 29 miles of mountain canyons. No attempt is made to "baby" the motorcycle through the loop, and hard acceleration starts are avoided.

During the rideability evaluation, a minimum of ten simulated traffic stops will be performed while on city streets. The rider will be required to properly position the motorcycle in a safe traffic enforcement position, dismount the motorcycle, pause for a minimum of two minutes per stop, remount the motorcycle, and accelerate into traffic.

The numerical results of the evaluation are recorded and then averaged between the four riders. This average is then recorded as the final result of this portion of the evaluation. Each rider will also submit a subjective evaluation of each motorcycle at the end of the ride.

The fuel efficiency evaluation is an attempt to estimate MPG (miles per gallon) based on actual riding conditions. It is the average gas usage of all four riders, for all four loops.

This subjective evaluation is a rating of human factors done individually and independently by all four riders. The ratings are averaged to minimize personal prejudices that individuals may have for or against any given motorcycle. This evaluation rates each motorcycle comparatively for its general suitability and efficiency for patrol operations.

HEAT EVALUATION

The heat evaluation is a "PASS-FAIL" scenario and is based on manufacturer's allowable operating temperatures.

Heat from each engine component is measured by means of a digital thermometer with a bi-metallic probe and infrared heat gun at the conclusion of the 32 high-speed laps. This process is accomplished in the following manner:

- | | |
|-----------------------|--|
| 1. Transmission Fluid | The probe is inserted into the transmission via the oil fill hole. |
| 2. Engine Oil | The probe is inserted into the engine case via the oil fill hole. |
| 3. Radiator Coolant | Temperature is measured via the infrared heat gun aimed below the top radiator tank. |

MECHANICAL EVALUATION

The mechanical evaluation evaluates the day to day serviceability and maintenance of the motorcycle. It is performed by mechanics employed by Penske Truck Leasing, the maintenance contractor for the Los Angeles County Sheriff's Department.

Major consideration is given toward the accessibility and ease of repair of component parts for the purpose of obtaining a predictive evaluation of the time, and ease of major repairs. The specific factors considered in evaluating each component are enumerated on the Mechanical Evaluation form.

SOUND LEVEL EVALUATION

The sound level evaluation measures the sound levels of the motorcycle at different speeds. This evaluation is conducted at 40 MPH, 60 MPH, 80 MPH, and while accelerating from 0 to 80 MPH. The dB ratings are recorded with an EXTECH digital sound level meter. The sound level meter's microphone is mounted at the riders shoulder level, approximately 6 inches from his ear. During the fixed speed portion of the evaluation, the rider will accelerate to the identified speed, and after attaining that speed, will turn on the EXTECH meter and record the result. During the acceleration portion of the evaluation, the meter will be turned on, and the motorcycle will be accelerated to 80 MPH. The meter will record the highest dB rating achieved during the entire acceleration of the motorcycle.

MOTORCYCLE SPECIFICATIONS

MOTORCYCLE SPECIFICATIONS

2009 BMW POLICE MOTORCYCLE R 1200 RT-P

Vehicle Description:	Full size, Sport Touring, Police Package motorcycle
Engine Type:	1170cc air/oil cooled, 2 cylinders
Bore and Stroke:	101mm x 73mm
Compression Ratio:	12.0:1
Valve Train:	4 valves per cylinder
Carburetor / Fuel Injection:	Electronic intake pipe injection
Ignition:	Digital engine management BMS-K with dual ignition and overrun fuel cut-off
Horsepower:	110 bhp @ 7,500 rpm
Torque:	115 Nm @ 6000 rpm
Final Drive (shaft, chain, belt):	Shaft 1:2.75 ratio
Wet Weight:	Approximately 650 lbs
Alternator Output:	720 watt, 27 amps @ idle
Battery:	19 amp/hour linked gel (2)
Transmission:	Constant Mesh 6 speed
Clutch:	Single disc, dry clutch
Suspension,	
Front:	Special front shock strut police application, 4.7 inches of travel
Rear:	Special travel-dependent damping system, 5.3 inches of travel
Brakes,	
Front:	Dual front disc ABS II partial integral system
Rear:	Single rear disc, independent rear brake control
Tires:	Fr - 120/70ZR-17 Rr - 180/55ZR-17
Wheels:	Die cast aluminum
Wheelbase:	58.4 inches
Rake:	63.4 degree
Trail:	4.3 inches castor
Fuel Tank Capacity:	7.1 gallons with one gallon reserve
EPA Fuel Mileage:	
Seat Height:	800-820 mm, Solo Seat
Adjustments:	yes
Windscreen:	
Adjustable / Fixed	Adjustable, electric
Foot peg / Floorboard Position:	Foot Peg
Saddlebag Storage Capacity:	23 liters each, top opening

MOTORCYCLE SPECIFICATIONS

2010 HARLEY-DAVIDSON ELECTRA GLIDE

Vehicle Description:	Full size, Touring, Police Package motorcycle
Engine Type:	1690cc air/oil cooled, 2 cylinders Twin Cam
Bore and Stroke:	98.4mm x 111.1mm
Compression Ratio:	9.6: 1
Valve Train:	2 valves per cylinder
Carburetor / Fuel Injection:	Electronic Sequential Port Fuel Injection (ESPFI)
Ignition:	Electronic
Horsepower:	84 bhp @ 5000 rpm
Torque :	136 Nm @ 3500 rpm
Final Drive (shaft, chain, belt):	Drive belt, 32/68 ratio
Wet Weight:	831 lbs
Alternator Output:	Three-phase 50-Amp system, 585w @ 13V, 2000 rpm, 650 watt max @ 13V
Battery:	Sealed, maintenance-free; 12 volt, 28 amp/hour, 270 cca
Transmission:	6 speed
Clutch:	9 plate, wet
Suspension,	
Front:	41.3mm telescopic cartridge, 4.6 inches of travel
Rear:	Air adjustable shocks, 3.0 inches of travel
Brakes,	
Front:	Dual front disc w/ABS 11.5 in. x .20 in.
Rear:	Single disc w/ABS 11.5 in. x .23 in
Tires:	Dunlop® Harley-Davidson Series, bias blackwall Front – D408F BW 130/80B17 Rear – D407 BW 180/65B16
Wheels:	Black, 9 – spoke cast aluminum
Wheelbase:	63.5 inches
Rake:	26 degrees
Trail:	6.69 inches
Fuel Tank Capacity:	6.0 gallons
EPA Fuel Mileage:	46 hwy / 39 city
Seat Height:	27.3 in. (laden) 30.7 in. (unladen)
Adjustments:	Air adjustable
Windscreen:	Fork-mounted fairing; clear, breakaway Lexan® windshield
Foot peg / Floorboard Position:	Floorboard
Saddlebag Storage Capacity:	1690 cubic inches each, (without ABS) top opening

MOTORCYCLE SPECIFICATIONS

2010 HARLEY-DAVIDSON ROAD KING

Vehicle Description:	Full size, Touring, Police Package motorcycle
Engine Type:	1690cc air/oil cooled, 2 cylinders Twin Cam
Bore and Stroke:	98.4mm x 111.1mm
Compression Ratio:	9.6:1
Valve Train:	2 valves per cylinder
Carburetor / Fuel Injection:	Electronic Sequential Port Fuel Injection (ESPFI)
Ignition:	Electronic
Horsepower:	84 bhp @ 5000 rpm
Torque :	102 ft. /lbs. @ 2500 rpm
Drive (shaft, chain, belt):	Drive belt, 32/68 ratio
Wet Weight:	828 lbs.
Alternator Output:	Three-phase 50-Amp system, 585w @ 13V, 2000 rpm, 650 watt max @ 13V
Battery:	Sealed, maintenance-free; 12 volt, 28 amp/hour.
Transmission:	6 speed
Clutch:	9 plate, wet
Suspension,	
Front:	41.3mm telescopic cartridge, 4.6 inches of travel
Rear:	Air adjustable shocks, 3.0 inches of travel
Brakes,	
Front:	Dual front disc w/ABS 11.5 in. x .20 in.
Rear:	Single disc w/ABS 11.5 in. x .23 in
Tires:	Dunlop® Harley-Davidson Series, bias blackwall Front – D408F BW 130/80B17 Rear – D407 BW 180/65B16
Wheels:	Black, 9 – spoke cast aluminum
Wheelbase:	63.5 inches
Rake:	26 degrees
Trail:	6.69 inches
Fuel Tank Capacity:	6.0 gallons
EPA Fuel Mileage:	46 hwy / 39 city
Seat Height:	27.3 inches (laden) 30.7 inches (unladen)
Adjustments:	Air adjustable
Windscreen:	Clear, breakaway Lexan® windshield
Foot peg / Floorboard Position:	Floorboard
Saddlebag Storage Capacity:	1690 inches each, (without ABS) top opening

MOTORCYCLE SPECIFICATIONS

2009 HONDA POLICE MOTORCYCLE ST 1300-PA9

Vehicle Description:	Full size, Sport Touring, Police Package motorcycle
Engine Type:	1261cc liquid cooled 90 degree V-4
Bore and Stroke:	78mm x 66mm
Compression Ratio:	10.8:1
Valve Train:	DOHC, 4 valves per cylinder
Carburetor / Fuel Injection:	PGM-FI with automatic enricher circuit
Ignition:	Computer Controlled digital with three dimensional mapping and electronic advance
Horsepower:	125 bhp @ 8000 rpm
Torque:	85 lb. /ft. @ 6000 rpm
Final Drive (shaft, chain, belt):	Shaft
Dry Weight:	679 lbs
Alternator Output:	660 watt, high output
Battery:	Odyssey P.C. 545 Gel Battery w ith 6 Amp Battery Charger
Transmission:	Five speed
Clutch:	8 plate wet, hydraulic
Suspension,	
Front:	45mm HMAS cartridge fork, 4.6 inches of travel
Rear:	HMAS gas-charged single shock, 4.8 inches of travel
Brakes,	
Front:	Dual full floating 310mm floating front discs w/ABS
Rear:	Single 316mm rear disc w/ABS
Tires:	Fr - 120/70ZR-18 Rr - 170/60ZR-17
Wheels:	3 spoke U-section cast aluminum
Wheelbase:	58.7 inches
Rake:	26.0 degree
Trail:	98mm / 3.9 inches
Fuel Tank Capacity:	7.7 gallons
EPA Fuel Mileage:	
Seat Height:	31.1 inches (+/- 0.6 inches)
Adjustments:	3 positions
Windscreen:	
Adjustable / Fixed	Adjustable, electric, 7.4 inches & 13 degrees adjustability
Foot peg / Floorboard Position:	Foot Peg
Saddlebag Storage Capacity:	35 liters each, side opening, detachable

MOTORCYCLE SPECIFICATIONS

2009 BMW POLICE MOTORCYCLE G650 GS-P

Vehicle Description:	Dual Purpose, Police Package motorcycle
Engine Type:	652cc liquid cooled, single cylinder
Bore and Stroke:	100mm x 83mm
Compression Ratio:	11.5:1
Valve Train:	DOHC, chain-driven with bucket tappets
Carburetor / Fuel Injection:	Electronic fuel injection
Ignition:	BMW Compact (BMS) engine management, electronic ignition
Horsepower:	50 bhp @ 6,500 rpm
Torque:	44 lb/ft @ 5,000 rpm
Final Drive (shaft, chain, belt):	520 O-ring chain
Wet Weight:	495 lbs
Alternator Output:	400 watt with linked battery system
Battery:	12 amp/hour main battery, 6 amp/hour linked battery
Transmission:	5 speed
Clutch:	Multi-plate in oil bath
Suspension,	
Front:	41mm telescopic fork with stabilizer bridge, 6.7 inches of travel
Rear:	Central spring strut actuated by lever-linkage, 6.5 inches of travel
Brakes,	
Front:	Single 11.8 in diameter rotor with 2-piston caliper w/ABS
Rear:	Single 9.5 in diameter rotor with single-piston floating caliper w/ABS
Tires:	Fr – 100/90 x 19 tube-type Rr – 130/80 x 17 tube-type
Wheels:	Wire-spoke
Wheelbase:	58.2 inches
Rake:	29.2 degrees
Trail:	4.5 inches
Fuel Tank Capacity:	4 gallons with one gallon reserve
EPA Fuel Mileage:	69 mpg at 55 mph
Seat Height:	30.7 inches
Adjustments:	no
Windscreen:	
Adjustable / Fixed	Fixed
Foot Peg / Floorboard Position:	Foot peg
Saddlebag Storage Capacity:	23 liters each, top opening

BASIC MOTORCYCLE PATTERNS

BASIC MOTORCYCLE PATTERNS

2009 BMW R 1200 RT-P					
PATTERN	20 FT.	19 FT.	18 FT.	17 FT.	16 FT.
Circle	YES	YES	YES	NO	NO
U-Turn	YES	YES	YES	YES	YES
PATTERN	11 FT.	10 ½ FT.	10 FT.	9 ½ FT.	
Short Cone Weave	YES	YES	YES	YES	
PATTERN		CONSIDERATION		RATING**	
30 MPH Cone Weave		Counter steering effort / Bike Drag		4.4	
RIDER COMMENTS					
30 mph Cone Weave – The suspension compresses and rebounds through the cone weave. The bike counter steers with very little effort. The suspension and steering felt very tight and handled the pattern well. Smooth handlebar transition. Felt the weight transfer due to high center of gravity. The bike is top heavy. Handles the cone weave with quick weight transfer.					

** Rating Scale – 1 thru 5; 1 - Poor; 3.5 - Average; 5 – Outstanding

2009 BMW G650 GS-P					
PATTERN	20 FT.	19 FT.	18 FT.	17 FT.	16 FT.
Circle	YES	YES	YES	YES	YES
U-Turn	YES	YES	YES	YES	YES
PATTERN	11 FT.	10 ½ FT.	10 FT.	9 ½ FT.	
Short Cone Weave	YES	YES	YES	YES	
PATTERN		CONSIDERATION		RATING**	
30 MPH Cone Weave		Counter steering effort / Bike Drag		3.8	
RIDER COMMENTS					
30 mph Cone Weave – The suspension really compresses and rebounds. The front-end feels light while counter steering. Was very responsive and quick handling. The weight of the large saddlebags were really felt during the cone weave. Handlebar’s transition felt light and easily maneuverable through the cone weave.					

** Rating Scale – 1 thru 5; 1 - Poor; 3.5 - Average; 5 – Outstanding

2010 HARLEY-DAVIDSON ELECTRA GLIDE					
PATTERN	20 FT.	19 FT.	18 FT.	17 FT.	16 FT.
Circle	YES	YES	YES	YES	NO
U-Turn	YES	YES	YES	YES	YES
PATTERN	11 FT.	10 ½ FT.	10 FT.	9 ½ FT.	
Short Cone Weave	YES	YES	YES	YES	YES
PATTERN		CONSIDERATION			RATING**
30 MPH Cone Weave		Counter steering effort / Bike Drag			3.1
RIDER COMMENTS					
30 mph Cone Weave – Counter steering requires more effort than other motorcycles. Bike felt heavy. Counter steering is a little heavy. Suspension travel seemed to load up quickly. Ground clearance is low resulting in board dragging. The motorcycle is very heavy and slow to respond. The footboards drag if pushed too hard.					

** Rating Scale – 1 thru 5; 1 – Poor; 3.5 – Average; 5 – Outstanding

2010 HARLEY-DAVIDSON ROAD KING					
PATTERN	20 FT.	19 FT.	18 FT.	17 FT.	16 FT.
Circle	YES	YES	YES	YES	NO
U-Turn	YES	YES	YES	YES	YES
PATTERN	11 FT.	10 ½ FT.	10 FT.	9 ½ FT.	
Short Cone Weave	YES	YES	YES	YES	YES
PATTERN		CONSIDERATION			RATING**
30 MPH Cone Weave		Counter steering effort / Bike Drag			3.1
RIDER COMMENTS					
30 mph Cone Weave – Counter steering requires more effort than other motorcycles. Bike felt heavy. Counter steering is a little heavy. Suspension travel seemed to load up quickly. The motorcycle is long and heavy but is deceptively nimble and smooth in handlebar transition. The footboards can drag if pushed too hard.					

** Rating Scale – 1 thru 5; 1 - Poor; 3.5 - Average; 5 – Outstanding

2009 HONDA ST 1300- PA9					
PATTERN	20 FT.	19 FT.	18 FT.	17 FT.	16 FT.
Circle	YES	YES	YES	NO	NO
U-Turn	YES	YES	YES	YES	YES
PATTERN	11 FT.	10 ½ FT.	10 FT.	9 ½ FT.	
Short Cone Weave	YES	YES	YES	NO	
PATTERN		CONSIDERATION			RATING**
30 MPH Cone Weave		Counter steering effort / Bike Drag			5
RIDER COMMENTS					
30 mph Cone Weave – Handles and responds well. Suspension is firm and counter steers easily. Steering felt smooth and controlled. The motorcycle lean and handlebar transition and lean input was smooth and effortless. Very smooth and controlled with minimum feel of weight transfer.					

** Rating Scale – 1 thru 5; 1 - Poor; 3.5 - Average; 5 – Outstanding

32 LAP HIGH-SPEED COURSE

MOTORCYCLE DYNAMICS

EVALUATION

32 LAP HIGH-SPEED COURSE **MOTORCYCLE DYNAMICS EVALUATION**

2009 BMW R 1200RT-P

RIDER	LAPS	AVG. TIME	AVG. SPEED
Officer T. Ragland, LAPD	1 thru 8	1:25.53	61.45
Deputy S. Bryant, LASD	9 thru 16	1:23.69	62.80
Officer M. Kilpatrick, LAPD	17 thru 23	1:24.40	62.27
Deputy R. Birkett, LASD	24 thru 32	1:22.86	63.43

ITEM	RATING**
STEERING	9.25
LEAN ANGLE	9
SUSPENSION	8.75
BRAKE FADE	9.4
ABS OPERATION	9.4

****Rating Scale 1 – 10 / 1 -Poor / 5 – Average / 10 - Outstanding**

RIDER COMMENTS
<p>The motorcycle steering requires little effort with weight transfer from side-to-side being smooth and predictable. The bike has good lean angle even in aggressive turning maneuvers with minimal peg pressing. The acceleration/power band is exceptionally responsive and smooth. Overall handling was good with positive feedback to the rider.</p> <p>The bike accelerates very well. The tachometer was monitored during the first few gears to make sure it did not hit the rev limiter. The steering and handling is very good. The bike corners very well and turns very securely. The lean angle is very good. The bike can be leaned considerably until the foot peg drags. A lower lean would cause the front engine guard to drag. Under hard acceleration coming out of the corners the rear tire “walked out.” The tire is not breaking loose, but movement was felt.</p> <p>The steering is light and responsive. This motorcycle will go where the rider wants it to go. The lean angle is excellent, allowing plenty of room to avoid the foot pegs from contacting the roadway. The suspension is compliant and works well at both slow and high speeds, making for a predictable ride. Under extreme braking, the front dives and gives a light feeling in the rear as if the rear wheel is coming off the ground. No brake fade was experienced. No effects were noticed on handling or lengthened stopping distances while in ABS mode.</p> <p>The bike has a strong acceleration off the line and the turns. The suspension was maxed out and it held the track well. Felt very safe during all aspects of the track.</p>

32 LAP HIGH-SPEED COURSE **MOTORCYCLE DYNAMICS EVALUATION**

2009 BMW G650 GS-P

RIDER	LAPS	AVG. TIME	AVG. SPEED
Officer T. Ragland, LAPD	1 thru 8	1:33.86	55.99
Deputy S. Bryant, LASD	9 thru 16	1:28.19	59.59
Officer M. Kilpatrick, LAPD	17 thru 23	1:29.98	58.41
Deputy R. Birkett, LASD	24 thru 32	1:29.62	58.64

ITEM	RATING**
STEERING	7.25
LEAN ANGLE	8
SUSPENSION	7.25
BRAKE FADE	8
ABS OPERATION	7

****Rating Scale 1 – 10 / 1 -Poor / 5 – Average / 10 - Outstanding**

RIDER COMMENTS
<p>The motorcycle is a light motorcycle with very good acceleration in all ranges. It is quite easy to lift the front end up as the engine supplies plenty of torque. The suspension is firm and provides good feedback to the rider. The brakes are firm and responsive with no brake fade or ABS engagement. Overall the motorcycle is very maneuverable and nimble.</p> <p>For a 650 motorcycle, acceleration is good. It is able to really rev up the RPM's. Steering is light and easy and drives into the turn. The lean angle is good. Placing the arches and balls of the riders feet on the pegs still cause dragging while turning corners. During a left turn the side stands drags minimally. The suspension is good on the bike. It is a dual sport bike, so there is more travel in the suspension. When applying hard front brakes the front end compresses a lot more than a regular street bike.</p> <p>Steering is quick and responsive. The bike can be leaned over at the extreme angle without dragging the foot pegs. The suspension is firm giving a good feel for the road. Bumps and turns did not upset the handling. Brake fade was not noticed. No ill effects were found while in ABS. Acceleration was good on the long straightaway. Breaking into turns was firm. Bike tracked steady and firm in the turns. Suspension never bottomed out and absorbed bumps on the track very well. Overall, it was an impressive performance.</p>

32 LAP HIGH-SPEED COURSE **MOTORCYCLE DYNAMICS EVALUATION**

2010 HARLEY-DAVIDSON ELECTRA GLIDE

RIDER	LAPS	AVG. TIME	AVG. SPEED
Officer T. Ragland, LAPD	1 thru 8	1:34.69	56.09
Deputy S. Bryant, LASD	9 thru 16	1:31.94	57.16
Officer M. Kilpatrick, LAPD	17 thru 23	1:32.64	56.73
Deputy R. Birkett, LASD	24 thru 32	1:32.40	56.88

ITEM	RATING**
STEERING	7.25
LEAN ANGLE	3.9
SUSPENSION	6
BRAKE FADE	9.5
ABS OPERATION	8.75

****Rating Scale 1 – 10 / 1 -Poor / 5 – Average / 10 - Outstanding**

RIDER COMMENTS
<p>The motorcycle has good acceleration. The brakes are firm and responsive with ABS engagement set off at the end of the basic straight. While traveling over small bumps on the roadway, it seemed to lose stopping ability. Steering was smooth on straightaway during moderate turns. Angles were good with positive feedback to the rider.</p> <p>The motorcycle accelerates well, however it hits the rev limiter quickly in the low gears. The lean angle is limited due to the floor boards dragging. A few more degrees of lean angle would have caused the frame to drag. In a left turn the frame hit hard enough that the bike slid sideways. The bike could have gone faster but was limited by the lean angel. The suspension is a little stiff; however most of the bumps are absorbed by the air seat. Brake fade was not experienced with this bike. The ABS works properly, however really felt the ABS pulsate on the front brake and in the motion of the bike.</p> <p>Steering was moderate with a heavy feel to the front end. The bike accelerates well, good low end power and good gear spacing. The lean angle is poor. The footboards dragged making it difficult to hold a line. The suspension is firm but uses its travel quickly. The bike is upset easily when leaned over in a turn and hitting bumps. The frame hits and can cause the rear wheel to step out. When going into ABS the stopping distance increased. A strong pulsation was felt in the front end while in ABS.</p> <p>Acceleration was good off the line. Braking was strong and firm during entire ride. Once into the turn, the frame dragged and lost the lean angle. Suspension bottoms out during leaned turns, but felt good and firm on the straights.</p>

32 LAP HIGH-SPEED COURSE **MOTORCYCLE DYNAMICS EVALUATION**

2010 HARLEY-DAVIDSON ROAD KING

RIDER	LAPS	AVG. TIME	AVG. SPEED
Officer T. Ragland, LAPD	1 thru 8	1:35.44	55.07
Deputy S. Bryant, LASD	9 thru 16	1:33.81	56.02
Officer M. Kilpatrick, LAPD	17 thru 23	1:36.08	54.70
Deputy R. Birkett, LASD	24 thru 32	1:34.97	55.34

ITEM	RATING**
STEERING	6.4
LEAN ANGLE	3.4
SUSPENSION	6.1
BRAKE FADE	8
ABS OPERATION	7.25

****Rating Scale 1 – 10 / 1 -Poor / 5 – Average / 10 - Outstanding**

RIDER COMMENTS
<p>The motorcycle has good straight line acceleration with smooth decisive shift ranges. The suspension or air ride was very responsive in roadway irregularities even in aggressive cornering. The bikes deficiency in lean angle input is significant. Navigating the road course through multiple corners without dragging the floor boards or lower frame with proper speed and stable steering proved a challenge. The rider did not experience any brake fade or ABS engagement even during aggressive braking due to solid combination braking.</p> <p>The motorcycle accelerates well, however it hits the rev limiter quickly in the low gears. The lean angle is limited due to the floor boards dragging. A few more degrees of lean angle would have caused the frame to drag. In a left turn the frame hit hard enough that the bike slide sideways. The bike could have gone faster but was limited by the lean angle. The suspension is a little stiff; however most of the bumps are absorbed by the air seat. Brake fade was not experienced with this bike. The brakes are firm and respond well. The ABS works properly, however I really felt the ABS pulsate on the front brake and in the motion of the bike.</p> <p>The steering is on the heavy side. It takes extra effort to hold a line. The floor boards and the frame drag quickly. When encountering bumps in the road while leaned into the turn, the frame will hit the ground making it difficult to hold a line. The suspension is firm but runs out of travel quickly. Once, while in ABS the front end shimmied from side-to-side.</p> <p>It braked aggressively during the entire ride. Once into the first hard right, limited lean angle was noticed. The suspension bottomed out numerous times throughout the ride. The bike rode smoothly in the straightaway and felt very stable.</p>

32 LAP HIGH-SPEED COURSE **MOTORCYCLE DYNAMICS EVALUATION**

2009 HONDA ST 1300-PA9

RIDER	LAPS	AVG. TIME	AVG. SPEED
Officer T. Ragland, LAPD	1 thru 8	1:23.95	62.60
Deputy S. Bryant, LASD	9 thru 16	1:23.43	62.99
Officer M. Kilpatrick, LAPD	17 thru 23	1:23.83	62.69
Deputy R. Birkett, LASD	24 thru 32	1:24.66	62.08

ITEM	RATING**
STEERING	8.75
LEAN ANGLE	7.5
SUSPENSION	9
BRAKE FADE	9
ABS OPERATION	7.9

****Rating Scale 1 – 10 / 1 -Poor / 5 – Average / 10 - Outstanding**

RIDER COMMENTS
<p>The motorcycle steering and handling ability is very responsive and stable. The acceleration and power band through all ranges is powerful and consistent. At full throttle pull, when exiting a couple of tight turns, a break in rear traction was noted. The pull from the engine can easily lift the front end off the ground. The suspension was firm with good feedback to the rider. The lean angle was above average with moderate peg dragging when negotiating tight turns on the track. Aggressive braking from high speeds played a consistent role in applications with no brake fade experienced.</p> <p>The motorcycle accelerates very good and very hard. The lean angle is good. The bike sits low so that foot pegs drag. The suspension is very good. The bike is smooth and stable and handles very well. During heavy braking there was very little front end dive. The ABS operation was very disappointing. While in ABS mode it was smooth with no pulsing sensation, however, it felt like it was only applying 50% braking. Effectiveness of the brakes was very noticeable. The bike's steering was light and responsive. The bike handled exceptionally well. The lean angle is fairly good. A higher foot peg would increase the lean angle. It is important to be in the proper gear prior to entering a turn. If not, shifting is very difficult when leaned to the left. The brakes were very good. There were no issues with the ABS.</p> <p>The bike has strong and smooth pull. It seems to continue to pull hard throughout all the gears. The lean angle is adequate but could still be improved. The suspension was solid as it held the track very well. ABS mode worked very well.</p>

**PURSUIT COURSE
MOTORCYCLE DYNAMICS
EVALUATION**

PURSUIT COURSE **MOTORCYCLE DYNAMICS EVALUATION**

2009 BMW R 1200 RT-P

RIDER	TOTAL TIME	AVG. SPEED
Officer T. Ragland, LAPD	3:14.28	40.02
Deputy S. Bryant, LASD	3:04.49	42.15

ITEM	RATING**
STEERING	8.5
LEAN ANGLE	8
SUSPENSION	8.5
BRAKE FADE	10
ABS OPERATION	10

**Rating Scale 1 – 10 / 1 -Poor / 5 – Average / 10 - Outstanding

RIDER COMMENTS
<p>The steering on the motorcycle is quick and easy. It handles very well and turns very well in the sharp turns. The suspension is good and smooth. Brake fade or ABS was not experienced. The motorcycle handling through the numerous corners and turning radius was smooth tracked well throughout the predictable and positive feedback in the steering. The lean angle was above average with minimal peg dragging experience during more aggressive lean input. Overall an above average riding experience.</p>

PURSUIT COURSE **MOTORCYCLE DYNAMICS EVALUATION**

2009 BMW G650 GS-P

RIDER	TOTAL TIME	AVG. SPEED
Officer M. Kilpatrick, LAPD	3:12.08	40.48
Deputy R. Birkett, LASD	3:08.33	41.29

ITEM	RATING**
STEERING	8.5
LEAN ANGLE	9
SUSPENSION	9
BRAKE FADE	9.5
ABS OPERATION	9.5

**Rating Scale 1 – 10 / 1 -Poor / 5 – Average / 10 - Outstanding

RIDER COMMENTS
<p>The motorcycles steering was easy and precise. The bike has an extremely good lean angle. Toes must be kept on pegs to prevent dragging of feet. When leaning to the left the riders should be in the correct gear because the rider's foot will drag if shift change is attempted. It is also important to be in the correct gear for the turns as the rider cannot lug the motor as it will not pull at lower RPMs. The suspension was firm with good feedback. Brake fade was not experienced. No issues with the ABS.</p> <p>Good acceleration off the line. Steering was smooth throughout the course. Lean angle was very good, but made aware the balls of rider's feet were on top of the foot pegs to avoid dragging. Suspension was firm and the bike felt very stable on the track.</p>

PURSUIT COURSE

MOTORCYCLE DYNAMICS EVALUATION

2010 HARLEY-DAVIDSON ELECTRA GLIDE

RIDER	TOTAL TIME	AVG. SPEED
Officer M. Kilpatrick, LAPD	3:17.56	39.36
Deputy R. Birkett, LASD	3:18.29	39.21

ITEM	RATING**
STEERING	8
LEAN ANGLE	6
SUSPENSION	6.5
BRAKE FADE	10
ABS OPERATION	10

**Rating Scale 1 – 10 / 1 -Poor / 5 – Average / 10 - Outstanding

RIDER COMMENTS
<p>The motorcycles steering was a little heavy. The bike has good low end and accelerates quickly out of corners. The bike scrapes the boards and frame early. It is difficult to push the bike without dragging. Suspension is firm and uses travel quickly. No brake fade was experienced. No issues with ABS.</p> <p>The bikes steering is very precise. Bike quickly ran out of lean angle and the suspension bottomed out several times. The frame drug in tight turns and the rear wheel kicked out one time. Low and mid range acceleration was very good.</p>

PURSUIT COURSE **MOTORCYCLE DYNAMICS EVALUATION**

2010 HARLEY-DAVIDSON ROAD KING

RIDER	TOTAL TIME	AVG. SPEED
Deputy S. Bryant, LASD	3:12.75	40.34
Officer T. Ragland, LAPD	3:16.44	39.58

ITEM	RATING**
STEERING	6
LEAN ANGLE	2.5
SUSPENSION	5.5
BRAKE FADE	10
ABS OPERATION	10

**Rating Scale 1 – 10 / 1 -Poor / 5 – Average / 10 - Outstanding

RIDER COMMENTS
<p>The motorcycle accelerates well. When accelerating hard out of some turns there was enough power to break the rear tire loose. The lean angle is very restrictive. It is very easy to drag the frame in the tight turns. There were bumps in the track in a right turn where the bike bottomed out and hit the frame, causing the bike to actually turn sideways. Brake fade or ABS operation was not experienced.</p> <p>The motorcycle accelerates well on the straightaway, however significantly lacks lean angle ability necessary to achieve a “pursuit mode” without dragging the boards and frame in the many corners and negatively effecting the steering. The brakes were firm and responsive.</p>

PURSUIT COURSE **MOTORCYCLE DYNAMICS EVALUATION**

2009 HONDA ST 1300-PA9

RIDER	TOTAL TIME	AVG. SPEED
Officer T. Ragland, LAPD	3:04.19	42.21

ITEM	RATING**
STEERING	8
LEAN ANGLE	7.5
SUSPENSION	8
BRAKE FADE	9
ABS OPERATION	8

**Rating Scale 1 – 10 / 1 -Poor / 5 – Average / 10 - Outstanding

RIDER COMMENTS
The motorcycle's steering and handling was good. The bike had very good acceleration in the straight away; however sound throttle management for proper speed and good handling is a must. At no time was ABS necessary but good to have readily available if needed. Overall, above average riding experience.

BRAKING

DEBRIS FIELD BRAKING

SANDY SURFACE – 40 MPH TO ZERO

2009 BMW R 1200 RT-P	
RIDER	STOPPING DISTANCE
Deputy S. Bryant, LASD	63.3 feet
RIDER COMMENTS	
The ABS system was smooth and effective. Braking in a straight line, the rider can hear and feel the ABS working more on the sandy surface.	

2009 BMW G650 GS-P	
RIDER	STOPPING DISTANCE
Deputy S. Bryant, LASD	65.6 feet
RIDER COMMENTS	
The braking was smooth and effective. There was a noticeable difference on the sandy surface with feel and sound of the bike in ABS mode. Braking was straight and even.	

2010 HARLEY-DAVIDSON ELECTRA GLIDE	
RIDER	STOPPING DISTANCE
Deputy S. Bryant, LASD	72.1 feet
RIDER COMMENTS	
The ABS braking was effective and in a straight line. The rider can hear and feel the ABS more so in the sand. The rider can feel the ABS system pulsate in the braking of the bike. The front brake lever was also felt pulsating.	

2010 HARLEY-DAVIDSON ROAD KING	
RIDER	STOPPING DISTANCE
Deputy S. Bryant, LASD	60.6 feet
RIDER COMMENTS	
The ABS braking was effective and in a straight line. The rider can hear and feel the ABS more so in the sand. The rider can feel the ABS system pulsate in the braking of the bike. The front brake lever was also felt pulsating.	

2009 HONDA ST 1300-PA9	
RIDER	STOPPING DISTANCE
Deputy S. Bryant, LASD	70.7 feet
RIDER COMMENTS	
The braking was smooth and effective. When in ABS mode while in the sand, felt less pressure being applied to the brakes.	

TRANSITORY BRAKING

DRY TO WET - 40 MPH TO ZERO

2009 BMW R 1200RT-P	
Deputy S. Bryant, LASD	56.3 feet
RIDER COMMENTS	
The ABS system was very smooth and effective. There was no noticeable difference when transitioning from dry to wet pavement during ABS mode braking.	

2009 BMW G650 GS-P	
RIDER	DRY TO WET STOP
Deputy S. Bryant, LASD	55.6 feet
RIDER COMMENTS	
There was no difference in ABS mode braking when transitioning between dry to wet pavement. The braking was smooth and effective and in a straight line.	

2010 HARLEY-DAVIDSON ELECTRA GLIDE	
RIDER	DRY TO WET STOP
Deputy S. Bryant, LASD	58.9 feet
RIDER COMMENTS	
The ABS braking was effective. There was no noticeable difference when transitioning between dry to wet pavement. When in ABS mode the rider can hear the tire “chip” or “bark” and then release over and over until the bike is stopped. The rider can also feel pulsation in the front brake lever.	

2010 HARLEY-DAVIDSON ROAD KING	
RIDER	DRY TO WET STOP
Deputy S. Bryant, LASD	52.1 feet
RIDER COMMENTS	
The ABS braking was effective. There was no noticeable difference when transitioning between dry to wet pavement. When in ABS mode the rider can hear the tire “chip” or “bark” and then release over and over until the bike is stopped. The rider can also feel pulsation in the front brake lever.	

2009 HONDA ST 1300-PA9	
RIDER	DRY TO WET STOP
Deputy S. Bryant, LASD	57.7 feet
RIDER COMMENTS	
The ABS system was smooth and effective. There was no noticeable difference when transitioning from dry to wet pavement during ABS mode braking.	

HARD BRAKING

60 MPH TO ZERO

2009 BMW R 1200 RT-P	
Braking Distance	4.3 sec 154.5 feet @ 55.6 MPH
Evidence of Severe Fading Prior to Stopping?	NO
Did the Bike Stop in a Straight Line?	YES

2009 BMW G650 GS-P	
Braking Distance	4.8 sec 130.4 feet @ 55 MPH
Evidence of Severe Fading Prior to Stopping?	NO
Did the Bike Stop in a Straight Line?	YES

2010 HARLEY-DAVIDSON ELECTRA GLIDE	
Braking Distance	3.5 sec 116.6 feet @ 53.3 MPH
Evidence of Severe Fading Prior to Stopping?	NO
Did the Bike Stop in a Straight Line?	YES

2010 HARLEY-DAVIDSON ROAD KING	
Braking Distance	3.9 sec 112.2 feet @ 49 MPH
Evidence of Severe Fading Prior to Stopping?	NO
Did the Bike Stop in a Straight Line?	YES

2009 HONDA ST 1300-PA9	
Braking Distance	4.5 sec 133.9 feet @ 54.8 MPH
Evidence of Severe Fading Prior to Stopping?	NO
Did the Bike Stop in a Straight Line?	YES

ERGONOMICS

157 MILE RIDE

ERGONOMICS EVALUATION

SUBJECTIVE EVALUATION – 157 MILE RIDE

2009 BMW R 1200 RT-P

RIDING POSITION	CONSIDERATIONS	RATING
Seat Comfort	Padding, Springs, Width	3.75
Seat Position	Range of Adjustment	4.4
Riding Position	Lean Angle, Comfort	4.4
Floorboards / Pegs	Access to Foot Controls	4.1
RIDER COMMENTS		
<p>Comfortable upright position to ride for traffic enforcement riding. Seat cushion/padding is not padded enough for extended riding, although back rest is comforting and supportive on back. Foot pegs are positioned well and accessible to shifter, however extended riding (50 miles or more) in seated position (wearing motor breeches and boots) with knees bent and angles causes knee and leg discomfort. Adjusting the seat higher to compensate for knee/leg discomfort helps but raises the rider in saddle subsequently subjecting you to wind by hitting on helmet even with windshield fully extended. A higher and wider windshield would solve the issues.</p> <p>The motorcycle felt very comfortable. The seat is wide and semi firm. The riding position is upright with no real pressure on your hands.</p> <p>The seat is comfortable and has two height settings. The seating position is upright with no noticeable lean forward. The pegs are in a comfortable position which makes it easy to access the controls.</p> <p>The seat and foot pegs are positioned to allow the rider's feet and shoulders to line up straight up and down. This riding position has a natural and comfortable feel. The bike also sits high which allows the rider to see over traffic and increases the lean angle.</p>		

INSTRUMENT PANEL	CONSIDERATIONS	RATING
Controls	Position, Usability	3.9
Visibility	Instruments	3.9
Reflection / Glare	Windshield, Instruments	4.25
Instruments	Adequacy, Legibility	3.9
RIDER COMMENTS		
<p>The controls on the console/panel are easy to read and illuminated well during night operations; however the handle bar controls (thumb switches) should have also been designed to illuminate at night for easy access and identification to switch during night operations. Speed meter lock is a nice feature as well as the gear selector indicator.</p> <p>There is a slight glare on the instrument panel from the gas tank.</p> <p>A few switches require that you remove your hand from the grip. The instrument panel is easy to read at a glance.</p> <p>The sun did cause a certain amount of glare on the instruments and at times were difficult to read.</p>		

MIRRORS	CONSIDERATIONS	RATING
Road Visibility	Distorsion, Obstruction	3.4
Reflections	Instruments, Controls	3.6
Mirror Coverage	Adjustment, Rear Visibility, Flat or Convex	3.6
Mirror Location	Accessibility, Visibility, Obstruction	3.6
RIDER COMMENTS		
The top quarter of the mirror creates a reflection of the handle grip. The rider's hands obstructed a portion of the view to the rear. The bottom half is very useable. Reflection was not an issue, but mirror coverage was limited. The mirrors are placed inside the fairing which kept them from being an issue of striking other mirrors while splitting lanes.		

WIND SCREEN	CONSIDERATIONS	RATING
Height / Width	Wind / Debris Protection	3.4
Adjustability	Electric or Manual, Ease of Use	4.75
Top Edge	Clear View Over Top of Windshield, (Bifocal Effect)	4
RIDER COMMENTS		
The windscreen height and width provides fair protection from wind, debris and water, however a wider and taller shield would be preferred especially during extended rides (50 miles or more) and for taller riders for comfort and noise reduction. The electronic adjustment is a great feature. There is a slight distortion around the edge of the windshield. The windshield is removable and could accept an after market windshield which might be taller and wider. The top edge of the windshield did not obstruct the riders view.		

CONTROLS	CONSIDERATIONS	RATING
Handlebars	Angle, Size, Position	4.25
Shift Levers	Usability, Shift Pad Position	4.5
Switches	Reach, Markings, Visibility, Accessibility	3.6
Rear Brake Pedal	Location, Feedback, Ease of Use	4.9
Front Brake Lever	Location, Feedback, Adjustability	4.9
Clutch Lever	Lever Resistance, Adjustability	4.9
RIDER COMMENTS		
The shift levers are positioned well and easy to use. The switches are easy to see, but many switches require the hands to come off the handle bars to use. The front brake and clutch levers are positioned nicely and offer good feed back. The front brake lever and clutch lever have adjustable engagement points for added rider control.		

MOUNT / DISMOUNT	CONSIDERATIONS	RATING
Trunk Height	Ample Leg Swing Room	2.75
Foot Peg / Floorboard	Interferes With Mounting / Dismounting	4.5
Lean Angle	Side Stand of Adequate Length	4.25
RIDER COMMENTS		
<p>The foot pegs are positioned not to interfere with mounting or dismounting and are more than adequate in width to locate easily with foot.</p> <p>The trunk is very high and the rider really has to swing his leg high to get over it. Shorter riders would probably have to step through the seat. The positive aspect of the tall trunk is the padded back rest it provides.</p> <p>The side stand was generally easy to locate. An extension near the base would be nice. The lean angle of the side stand should be fine for most roads.</p>		

SUSPENSION	CONSIDERATIONS	RATING
Quality of Ride	Dampening, Rebound	4.75
Rider Size	Adjustability	4.4
RIDER COMMENTS		
<p>The ride quality and comfort was exceptionally smooth in both roadway and freeway riding. With very minimal road irregularities transfers to the rider. Taller riders would probably need a taller windshield to deflect the wind over their helmet. The suspension can handle a wide variety of rider sizes. The dampening and rebound are easily adjustable and provide a long range of adjustability. The suspension was softened for the freeway riding and stiffened for the canyons. The quality of the ride was always excellent.</p>		

STORAGE	CONSIDERATIONS	RATING
Saddlebags	Angle, Size and Position of Opening	4
Locks	Same Key, Security, Sturdiness	4.4
RIDER COMMENTS		
<p>The saddlebags were substantial in size and provided room for necessary work equipment but it would be nice if they were a little deeper. They are also a little high. The rider who wears a drop down holster may find that it will sit on top of the saddle bag while riding. The top box could be improved to securely hold additional equipment. The top box design makes it difficult to keep smaller items organized. The saddlebags open from the top and are not removable. One key is used for the saddlebags and ignition.</p>		

ADDITIONAL RIDER COMMENTS
<p>This motorcycle would be very easy to ride and comfortable for an entire shift. It handles very well and provides great braking performance. This bike is confident and inspiring. This is an exciting motorcycle. So many aspects are so well thought out. Good acceleration, comfort, suspension, braking and handling. Rider felt safe on this motorcycle and it operated well in the city and in the rural areas. Very little fatigue was experienced after 157 miles of riding.</p>

ERGONOMICS EVALUATION

SUBJECTIVE EVALUATION – 157 MILE RIDE

2009 BMW G650 GS-P

RIDING POSITION	CONSIDERATIONS	RATING
Seat Comfort	Padding, Springs, Width	2.5
Seat Position	Range of Adjustment	2.5
Riding Position	Lean Angle, Comfort	2.9
Floorboards / Pegs	Access to Foot Controls	4
RIDER COMMENTS		
<p>The motorcycle's riding position is ideal for short distance riding, however any extended period in the saddle can be less than comfortable to the rider's backside to say the least. The bike's seat angles downward and causes the riders upper body and hips to lean forward against the tank, further adding to the discomfort the rider experiences. The seat needs to be a little higher. The seat is wide but the padding is minimal, and there is no adjustment for the seat. The foot pegs are positioned comfortably and access to the foot control is easy. The handlebars are in a comfortable position. There was an excess amount of heat from the motorcycle engine that was transmitted to the plastic body work that the inside of the rider's legs were resting against. The heat made it very uncomfortable to grip with the riders legs.</p>		

INSTRUMENT PANEL	CONSIDERATIONS	RATING
Controls	Position, Usability	4.4
Visibility	Instruments	4.1
Reflection / Glare	Windshield, Instruments	4
Instruments	Adequacy, Legibility	4
RIDER COMMENTS		
<p>The instrument panel with gauges and indicators are at a position that makes it clearly visible to the rider with a quick glance. However, the indicator lights could be brighter. There is no noticeable glare/reflection on the instrument panel.</p> <p>There is no fuel gauge, only a warning light</p>		

MIRRORS	CONSIDERATIONS	RATING
Road Visibility	Distorsion, Obstruction	2.5
Reflections	Instruments, Controls	2.75
Mirror Coverage	Adjustment, Rear Visibility, Flat or Convex	3.25
Mirror Location	Accessibility, Visibility, Obstruction	3.25
RIDER COMMENTS		
<p>The mirrors are extended well from both hand grips and provide a good view of real traffic, however at higher speeds, noticeable vibration does distort the visibility of image reflected.</p>		

WIND SCREEN	CONSIDERATIONS	RATING
Height / Width	Wind / Debris Protection	N/A
Adjustability	Electric or Manual, Ease of Use	N/A
Top Edge	Clear View Over Top of Windshield, (Bifocal Effect)	N/A
RIDER COMMENTS		
The small/low windscreen provides no protection to the rider.		

CONTROLS	CONSIDERATIONS	RATING
Handlebars	Angle, Size, Position	4
Shift Levers	Usability, Shift Pad Position	4
Switches	Reach, Markings, Visibility, Accessibility	4
Rear Brake Pedal	Location, Feedback, Ease of Use	3.75
Front Brake Lever	Location, Feedback, Adjustability	3.75
Clutch Lever	Lever Resistance, Adjustability	4
RIDER COMMENTS		
The handlebars and grips are positioned well, allowing the rider to access controls, levers and switches easily. The brake pedal and shift lever are accessible to the rider with little effort. All the controls are positioned well and marked clearly with symbols. All the switches are large and easy to operate with gloves.		

MOUNT / DISMOUNT	CONSIDERATIONS	RATING
Trunk Height	Ample Leg Swing Room	N/A
Foot Peg / Floorboard	Interferes With Mounting / Dismounting	3.75
Lean Angle	Side Stand of Adequate Length	4.25
RIDER COMMENTS		
The motorcycle is light and maneuverable with exceptional lean angle. The side stand is easily accessible, retractable and does not interfere with mounting/dismounting the motorcycle. The rider had to swing his leg high to miss the rear compartment. No trunk was mounted to this motorcycle. The motorcycle has a low seat height and it is easy to mount/dismount without interference from the foot pegs.		

SUSPENSION	CONSIDERATIONS	RATING
Quality of Ride	Dampening, Rebound	3.9
Rider Size	Adjustability	2.25
RIDER COMMENTS		
The bike rides very smooth. The seat should be higher because the current riding position feels cramped. On mountain roads when going fast into corners, the front end seems to float around and feels light. When the suspension compressed it rebounded in a controlled manner without upsetting the position of the motorcycle, such as while leaned over in a turn. The only adjustability noted was for the dampening of the rear shock. The adjustment knob was easy to reach and operate.		

STORAGE	CONSIDERATIONS	RATING
Saddlebags	Angle, Size and Position of Opening	4
Locks	Same Key, Security, Sturdiness	4.25
RIDER COMMENTS		
<p>The saddlebags provide sufficient storage space for equipment and supplies and closed securely. The saddlebags lock and are removable. However, they almost seem to be too big during heavy freeway traffic. They are so tall and big it felt the bags might be an obstruction during lane splitting. They have a metal lid and can dent easily. They did not have any sort of dividers. With the saddlebags opening to the side, it would be difficult to organize and access all items that were carried in them. They also used the same key as the ignition.</p>		

ADDITIONAL RIDER COMMENTS
<p>This motorcycle was not comfortable for extend periods of time. It lacked rider compartment adjustability making it worse for taller riders. Without any sort of fairing/windscreen it would be uncomfortable to ride at high speed. If the rider takes his hands off the handlebars the front end starts to shake heavily. It is difficult to see this type of motorcycle being used as a police motorcycle for a major metropolitan city or any city/county that covers a large area. It would probably be best used on a college campus or very small cities.</p>

ERGONOMICS EVALUATION

SUBJECTIVE EVALUATION – 157 MILE RIDE

2010 HARLEY DAVIDSON ELECTRA GLIDE

RIDING POSITION	CONSIDERATIONS	RATING
Seat Comfort	Padding, Springs, Width	4.1
Seat Position	Range of Adjustment	3
Riding Position	Lean Angle, Comfort	2.75
Floorboards / Pegs	Access to Foot Controls	2.75
RIDER COMMENTS		
The air ride suspension provides a comfortable saddle and supportive feel to the rider even for extended riding periods. The seat is positioned well; however the floorboards in relation to the seat are positioned noticeably forward from the center creating a stretched feel to the legs, coupled with the straight handle bar feel of the motorcycle. The rider's posture leans forward all together resulting in a less than comfortable riding experience without constantly adjusting the rider's position in the saddle.		

INSTRUMENT PANEL	CONSIDERATIONS	RATING
Controls	Position, Usability	4.6
Visibility	Instruments	4.25
Reflection / Glare	Windshield, Instruments	4.5
Instruments	Adequacy, Legibility	3.9
RIDER COMMENTS		
The instrument panel is well positioned and provides the rider with a clear and simple view of the motorcycles performance. The indicator lights are small. Instrument glare was not an issue.		

MIRRORS	CONSIDERATIONS	RATING
Road Visibility	Distortion, Obstruction	4
Reflections	Instruments, Controls	4
Mirror Coverage	Adjustment, Rear Visibility, Flat or Convex	3.75
Mirror Location	Accessibility, Visibility, Obstruction	4.25
RIDER COMMENTS		
Visibility is good due to the small size of the windshield. It is very easy to look over the top and around the side. Mirror location is good and visibility is good. Convex mirror would be better. The mirrors are mounted in a position that is easy to see at a glance. The mirrors vibrated on the freeway and the view became distorted.		

WIND SCREEN	CONSIDERATIONS	RATING
Height / Width	Wind / Debris Protection	4
Adjustability	Electric or Manual, Ease of Use	N/A
Top Edge	Clear View Over Top of Windshield, (Bifocal Effect)	3.5
RIDER COMMENTS		
The medium windscreen coupled with the short fairing provides the rider with moderate forward protection, however noticeable air flow and wind turbulence is felt by the rider from the low portion of the fairing even at moderate speeds. The windshield provides a clear view but is not adjustable. The rider's arms and hands are well protected. The top edge of the windshield is well placed and easy to see over.		

CONTROLS	CONSIDERATIONS	RATING
Handlebars	Angle, Size, Position	2.9
Shift Levers	Usability, Shift Pad Position	3.5
Switches	Reach, Markings, Visibility, Accessibility	4.25
Rear Brake Pedal	Location, Feedback, Ease of Use	3.9
Front Brake Lever	Location, Feedback, Adjustability	4
Clutch Lever	Lever Resistance, Adjustability	3.5
RIDER COMMENTS		
All controls and switches are user friendly, positioned well and easily accessible. The clutch lever pull is rather heavy, but the brake and shift levers are smooth and decisive. The handlebars are positioned forward resulting in a "stretched arm" feel while the rider sits centered on the motorcycle, this consequently affected the rider's posture negatively. The heel toe shifter was in a good location and very easy to use. The rear brake pedal is mounted forward of the floorboard. When using it, the rider found that he had to pick up his whole foot from the floorboard rather than being able to just pivot on the heel.		

MOUNT / DISMOUNT	CONSIDERATIONS	RATING
Trunk Height	Ample Leg Swing Room	N/A
Foot Peg / Floorboard	Interferes With Mounting / Dismounting	3.75
Lean Angle	Side Stand of Adequate Length	3.25
RIDER COMMENTS		
The low ride provides limited lean angle input even in moderate cornering, resulting in immediate side stand/footboard or bottom frame dragging on roadway service. The motorcycle is not equipped with a top box. Mounting and dismounting were quite easy. This is a good motorcycle for a shorter rider. The floorboards did not interfere with mounting or dismounting. The side stand was tucked in well though it does drag before the floorboard when leaned to the left. The side stand length was good for moderately crowned roads.		

SUSPENSION	CONSIDERATIONS	RATING
Quality of Ride	Dampening, Rebound	3.25
Rider Size	Adjustability	2.75
RIDER COMMENTS		
The overall ride was comfortable for long distances. Small bumps are absorbed well. The larger bumps would cause the rider to bounce out of the seat when traveling at freeway speeds. There is not much adjustability for different size riders. The handlebars have little adjustment room and the seat height is only adjustable by running less air in the seat bladder or rear shocks. The soft seat seems to mask much of the stiff suspension.		

STORAGE	CONSIDERATIONS	RATING
Saddlebags	Angle, Size and Position of Opening	4.4
Locks	Same Key, Security, Sturdiness	4.4
RIDER COMMENTS		
The saddlebags are large and lockable. They have a large round knob on top to open and close the bag; however did not have dividers.		

ADDITIONAL RIDER COMMENTS
In 6 th gear the bike cruises very nice on the freeway however, if the rider accelerates hard to pass a vehicle, the bike is slow to respond. It sometimes seems better if shifting down to 5 th gear would help. There is a great deal of heat that comes off the engine in stop and go traffic, especially on the right side of the engine. The rider can feel the heat on the back of his right thigh. At times the rider can even feel that heat on the freeway. The rider can also feel the heat rise on his face even during a cool morning. The engine drops to one cylinder when idling at high temperature. The rider had to throttle up before engaging the clutch or it felt as if the motor would stall. Engine vibration so too severe at idle. Acceleration is barely adequate. The lean angle during canyon rides leaves much to be desired. The turning radius is very good at low speeds.

ERGONOMICS EVALUATION

SUBJECTIVE EVALUATION – 157 MILE RIDE

2010 HARLEY-DAVIDSON ROAD KING

RIDING POSITION	CONSIDERATIONS	RATING
Seat Comfort	Padding, Springs, Width	4.25
Seat Position	Range of Adjustment	2.5
Riding Position	Lean Angle, Comfort	3.1
Floorboards / Pegs	Access to Foot Controls	3.4
RIDER COMMENTS		
The seat is comfortable especially with the added air cushion feature making it adjustable to rider's preference. The rider's position aboard the motorcycle although comfortable on extended rides with minimal shifting or braking, makes the rider feel stretched both in legs and arms. The footboards and foot controls are extended noticeably forward resulting in an uncomfortable sitting posture (rounding rider's back) and a lot of adjustment of feet to shift gears or apply rear brake. Floorboards are close to the ground with minimal road clearance when lean angles are input in the handlebars.		

INSTRUMENT PANEL	CONSIDERATIONS	RATING
Controls	Position, Usability	3.75
Visibility	Instruments	2
Reflection / Glare	Windshield, Instruments	3.75
Instruments	Adequacy, Legibility	2.9
RIDER COMMENTS		
The control switches are accessible to the rider while hands are holding on to the handlebars and are clearly displayed and visible. The tank mounted dials (speedometer and gas gauge) would be better suited if mounted higher to prevent the rider from looking down to monitor his speed or gauge his fuel consumption. The instrument indicators are legible but they are small and hard to see in the bright sunlight.		

MIRRORS	CONSIDERATIONS	RATING
Road Visibility	Distorsion, Obstruction	3.5
Reflections	Instruments, Controls	3.5
Mirror Coverage	Adjustment, Rear Visibility, Flat or Convex	3.75
Mirror Location	Accessibility, Visibility, Obstruction	4.25
RIDER COMMENTS		
The mirrors are extended from the handlebars and provide good visibility of rear traffic, especially while operating on freeway conditions with minimal vibration; however vibration is more prominent in normal stop and go traffic and distorts the visibility considerably. Visibility is good due to the small size of the windshield.		

WIND SCREEN	CONSIDERATIONS	RATING
Height / Width	Wind / Debris Protection	3
Adjustability	Electric or Manual, Ease of Use	N/A
Top Edge	Clear View Over Top of Windshield, (Bifocal Effect)	4
RIDER COMMENTS		
<p>The windshield is small giving you minimal wind protection especially on the freeway. The rider has clear view over the top of the windshield due to its size.</p> <p>Protection is adequate for warmer days. For cold weather you would want more protection. The rider could easily see over the top of the windshield and did not notice any distortion.</p>		

CONTROLS	CONSIDERATIONS	RATING
Handlebars	Angle, Size, Position	3.6
Shift Levers	Usability, Shift Pad Position	3
Switches	Reach, Markings, Visibility, Accessibility	4
Rear Brake Pedal	Location, Feedback, Ease of Use	3.5
Front Brake Lever	Location, Feedback, Adjustability	4
Clutch Lever	Lever Resistance, Adjustability	3.75
RIDER COMMENTS		
<p>The handlebars and footboards position causes the rider to sit astride the motor with arms and legs stretched forward resulting in a less than comfortable riding posture especially on the lower back. Floorboards and foot controls would be better suited if positioned back with less strain on hips and lower back. They also take away some of the footboard space. The front brake lever and clutch lever were of good size and easy to use. The clutch pull was firm.</p>		

MOUNT / DISMOUNT	CONSIDERATIONS	RATING
Trunk Height	Ample Leg Swing Room	N/A
Foot Peg / Floorboard	Interferes With Mounting / Dismounting	4
Lean Angle	Side Stand of Adequate Length	3.25
RIDER COMMENTS		
<p>This test bike did not come equipped with a top box thus boarding the motor was effortless. The motor has a low center of gravity and allows for limited lean angle inputs or the rider will drag the boards on road surface. The side stand was easily accessible by the rider.</p>		

SUSPENSION	CONSIDERATIONS	RATING
Quality of Ride	Dampening, Rebound	3.25
Rider Size	Adjustability	2.5
RIDER COMMENTS		
<p>The motorcycle's quality of ride was comfortable in the saddle due to the bike's air ride assisted suspension with minimal road irregularities transferred to the rider. The adjustability of the seat by simply adding air to the bladder is convenient and simple. The bike has minimal wind protection. The suspension is stiff.</p>		

STORAGE	CONSIDERATIONS	RATING
Saddlebags	Angle, Size and Position of Opening	4.6
Locks	Same Key, Security, Sturdiness	4.1
RIDER COMMENTS		
The motorcycle's storage bags (saddlebags) are large and ample in depth to more than adequately accommodate equipment or storage items. The twist top closure on the bags although simple in application when closed, failed when jarred by irregular road surfaces causing the saddlebags to open		

ADDITIONAL RIDER COMMENTS
<p>In 6th gear the bike cruises very nice on the freeway however; if the rider accelerates hard to pass a vehicle, the bike is slow to respond. It sometimes seems better if shifting down to 5th gear would help. There is a great deal of heat that comes off the engine in stop and go traffic. Especially on the right side of the engine. The rider can feel the heat on the back of his right thigh. At times the rider can even feel that heat on the freeway. This is not good in hot weather. It is an easy to ride motorcycle but can be challenging during high speed cornering. The motorcycle does many things well. It rides too stiff and does not corner well due to limited lean angle. Overall it is very fatiguing to ride.</p>

ERGONOMICS EVALUATION

SUBJECTIVE EVALUATION – 157 MILE RIDE

2009 HONDA ST 1300-PA9

RIDING POSITION	CONSIDERATIONS	RATING
Seat Comfort	Padding, Springs, Width	3
Seat Position	Range of Adjustment	3.25
Riding Position	Lean Angle, Comfort	3.7
Floorboards / Pegs	Access to Foot Controls	4
RIDER COMMENTS		
<p>The motorcycle's seat is firm, wide and lacked padding to make it uncomfortable on long rides. The seat is sloped forward causing the rider to slide up against the gas tank. This in turn causes the rider to sit on a narrower part of the seat. This also causes the rider to feel the heat between the seat and the gas tank a lot more. The riding position is comfortable with only a very slight lean forward. The pegs are low to the ground and with the rider's foot placed in the middle of the foot pegs cause the rider to drag the tip of the boot in the corners.</p> <p>The rider is a taller rider and felt cramped while sitting. The rider required to place the balls of his feet on the top of the foot pegs to avoid dragging the boots in the leaned turn.</p>		

INSTRUMENT PANEL	CONSIDERATIONS	RATING
Controls	Position, Usability	3.75
Visibility	Instruments	3.75
Reflection / Glare	Windshield, Instruments	3.5
Instruments	Adequacy, Legibility	3.75
RIDER COMMENTS		
<p>The turn signal indicator lights are impossible to see in direct sunlight. At times there is a noticeable glare of the gas tank and the rider's body on the instrument panel.</p> <p>Controls are well placed and easy to use. The speedometer and tachometer are easy to read.</p>		

MIRRORS	CONSIDERATIONS	RATING
Road Visibility	Distorsion, Obstruction	4.25
Reflections	Instruments, Controls	4
Mirror Coverage	Adjustment, Rear Visibility, Flat or Convex	4
Mirror Location	Accessibility, Visibility, Obstruction	3.75
RIDER COMMENTS		
<p>Although the motorcycle's mirrors are positioned low causing the rider to lower his head and eyes to view, they provide a clear and wide reflection with no noticeable vibration distorting the image reflecting. The mirrors are easily adjustable.</p>		

WIND SCREEN	CONSIDERATIONS	RATING
Height / Width	Wind / Debris Protection	4.1
Adjustability	Electric or Manual, Ease of Use	4.6
Top Edge	Clear View Over Top of Windshield, (Bifocal Effect)	4.4
RIDER COMMENTS		
The motorcycle's adjustable windscreen provides a clear and above average coverage for the rider both in height and width. Additionally, the automatic adjustability offers a good range of positions for the rider.		

CONTROLS	CONSIDERATIONS	RATING
Handlebars	Angle, Size, Position	3.5
Shift Levers	Usability, Shift Pad Position	4
Switches	Reach, Markings, Visibility, Accessibility	4.75
Rear Brake Pedal	Location, Feedback, Ease of Use	4.25
Front Brake Lever	Location, Feedback, Adjustability	4.4
Clutch Lever	Lever Resistance, Adjustability	4.4
RIDER COMMENTS		
The handlebars are low but not objectionable in position. The angle affords the rider a comfortable posture while astride the motorcycle. The levers engaged decisively and the switches were easily accessible with a flip of a thumb. The diameter of the grips seemed too small. Bigger grips would be more comfortable to the rider. Most of the switches are numbered with no symbols which can become confusing. The shift lever and rear brake pedal were well placed and easy to use.		

MOUNT / DISMOUNT	CONSIDERATIONS	RATING
Trunk Height	Ample Leg Swing Room	4.5
Foot Peg / Floorboard	Interferes With Mounting / Dismounting	3.75
Lean Angle	Side Stand of Adequate Length	2.75
RIDER COMMENTS		
The height of the rider posed no challenge mounting/dismounting as the motorcycle sits low to the ground. The lean angle is limited somewhat especially during aggressive cornering, resulting in the rider dragging the foot pegs. The side stand is rather difficult to extend due to its close proximity between the foot peg and the center stand. The rider found himself having to look down most of the time to find the side stand.		

SUSPENSION	CONSIDERATIONS	RATING
Quality of Ride	Dampening, Rebound	3.75
Rider Size	Adjustability	3
RIDER COMMENTS		
The overall quality of the ride is ideal for sport touring providing moderately stiff suspension with good roadway feedback, however extended rides quickly causes physical fatigue to the rider. It is very quick in turns. The bike leans very easy in the corners on mountain roads. The seat is adjustable; however it is not easy to do. Adjusting the rear suspension did not change the ride very much.		

STORAGE	CONSIDERATIONS	RATING
Saddlebags	Angle, Size and Position of Opening	3.75
Locks	Same Key, Security, Sturdiness	3.75
RIDER COMMENTS		
The saddlebags are not equipped with dividers but provide adequate storage space for equipment and storage items easily secured with lock.		

ADDITIONAL RIDER COMMENTS
The bike is fun to ride but also has a tremendous amount of power. In 1 st gear the rider is able to get the front tire off the ground when accelerating hard. The rider can also break the back tire loose if you accelerate too hard out of a corner. In stop and go traffic the rider can feel heat between the seat, the gas tank and on the lower half of the rider's legs. Overall this motorcycle is fun to ride. The seat could use better padding and shape. The limited lean angle makes it difficult to ride in the canyons.

ACCELERATION & FUEL EFFICIENCY

ACCELERATION EVALUATION

SPEED	BMW 1200	BMW 650	HD – ELECTRA GLIDE	HD – ROAD KING	HONDA
0-30 MPH	2.04	2.47	2.04	2.01	1.97
0-60 MPH	4.52	6.54	5.60	5.43	4.20
0-100 MPH	11.17	**	**	**	9.99
30-60 MPH	2.49	3.95	3.37	3.55	2.12
60-100 MPH	6.64	**	13.68	14.12	5.70
¼ MILE	13.17	15/11	14.49	14.30	12.72

** Unable to achieve desired speed given the size constraints of the track.

SPEED	BMW 1200	BMW 650	HD – ELECTRA GLIDE	HD – ROAD KING	HONDA
0-30 MPH	2.15	2.71	2.05	2.06	2.20
0-60 MPH	4.87	7.00	5.64	5.51	4.48
0-100 MPH	11.52	**	**	**	10.18
30-60 MPH	2.71	4.37	3.50	4.52	2.22
60-100 MPH	6.65	**	14.64	**	5.79
¼ MILE	13.40	**	14.54	14.35	12.93

** Unable to achieve desired speed given the size constraints of the track.

FUEL EFFICIENCY EVALUATION

MOTORCYCLE	COMBINED AVERAGE Four 157 Mile Loops
2009 BMW R-1200RT-P	41.6 MPG
2009 BMW G-650 GS-P	49.9 MPG
2010 HARLEY DAVIDSON ELECTRA GLIDE	32.9 MPG
2010 HARLEY DAVIDSON ROAD KING	34.8 MPG
2009 HONDA ST-1300 PA9	35.6 MPG

HEAT EVALUATION

HEAT EVALUATION
IMMEDIATELY FOLLOWING 32 LAP COURSE

2009 BMW R 1200 RT-P		
ITEM	MANUFACTURERS RECOMMENDATION	TEST RESULT
Radiator Water	N/A	N/A
Engine Oil	260° to 300°	Pass
Transmission Oil	N/A Part of the engine case	N/A
RADIANT HEAT		
Radiator	N/A	
Brake Rotors	Front-178° Rear-363°	
Engine	178°	
Transmission	160°	
Exhaust	158°	

2009 BMW G650 GS-P		
ITEM	MANUFACTURERS RECOMMENDATION	TEST RESULT
Radiator Water	244°	Pass
Engine Oil	176°	Pass
Transmission Oil	N/A Part of the engine case	N/A
RADIANT HEAT		
Radiator	194°	
Brake Rotors	Front-198° Rear-131.5°	
Engine	210°	
Transmission	229.5°	
Exhaust	261°	

2010 HARLEY-DAVIDSON ELECTRA GLIDE		
ITEM	MANUFACTURERS RECOMMENDATION	TEST RESULT
Radiator Water	N/A	N/A
Engine Oil	280° to 410°	Pass
Transmission Oil	N/A Part of the engine case	N/A
RADIANT HEAT		
Radiator	N/A	
Brake Rotors		
Engine		
Transmission		
Exhaust		

2010 HARLEY-DAVIDSON ROAD KING		
ITEM	MANUFACTURERS RECOMMENDATION	TEST RESULT
Radiator Water	N/A	N/A
Engine Oil	280° to 410°	Pass
Transmission Oil	N/A Part of the engine case	N/A
RADIANT HEAT		
Radiator	N/A	
Brake Rotors	Front-205° Rear-178.5°	
Engine	300.5°	
Transmission	278.5°	
Exhaust	201°	

2009 HONDA ST 1300-PA9		
ITEM	MANUFACTURERS RECOMMENDATION	TEST RESULT
Radiator Water	208° to 216° Max.	Pass
Engine Oil	176° to 248° Max.	Pass
Transmission Oil	N/A Part of the engine case	N/A
RADIANT HEAT		
Radiator	185°	
Brake Rotors	Front-313° Rear-432°	
Engine	209°	
Transmission	209°	
Exhaust	228°	

SOUND LEVEL EVALUATION

SOUND LEVEL EVALUATION

2009 BMW R 1200 RT-P	
SPEED	MEASURED dB
40 MPH (Sustained Speed)	99.6dB
60 MPH (Sustained Speed)	105.7dB
80 MPH (Sustained Speed)	113.2dB
Accelerate zero to 80 mph	123.3dB

2009 BMW G650 GS-P	
SPEED	MEASURED dB
40 MPH (Sustained Speed)	103.5dB
60 MPH (Sustained Speed)	123.0dB
80 MPH (Sustained Speed)	125.6dB
Accelerate zero to 80 mph	129.3dB

2010 HARLEY DAVIDSON ELECTRA GLIDE	
SPEED	MEASURED dB
40 MPH (Sustained Speed)	106.4dB
60 MPH (Sustained Speed)	114.4dB
80 MPH (Sustained Speed)	120.8dB
Accelerate zero to 80 mph	121.6dB

2010 HARLEY DAVIDSON ROAD KING	
SPEED	MEASURED dB
40 MPH (Sustained Speed)	107.3dB
60 MPH (Sustained Speed)	114.8dB
80 MPH (Sustained Speed)	117.6dB
Accelerate zero to 80 mph	123.3dB

2009 HONDA ST 1300-PA9	
SPEED	MEASURED dB
40 MPH (Sustained Speed)	103.5dB
60 MPH (Sustained Speed)	113.4dB
80 MPH (Sustained Speed)	117.3dB
Accelerate zero to 80 mph	116.8dB

MECHANICAL EVALUATION

MECHANICAL EVALUATION

2009 BMW R 1200 RT-P

ELECTRICAL SYSTEM	CONSIDERATIONS	RATING
Battery	Accessibility, Group, Size	8
Alternator	Accessibility, Amperage	5
Stator	Accessibility, Amperage	N/A
Starter	Accessibility, Power	7
Ignition	Accessibility	7
Spark Plugs	Accessibility	7
Lights	Accessibility of Headlight Adjustment, Ease of Replacement	8
Fuse Box	Accessibility, Serviceability	8
FUEL SYSTEM	CONSIDERATIONS	RATING
Fuel Injection	Accessibility, Serviceability	7
Fuel Pump	Accessibility, Serviceability	7
Fuel Filter	Accessibility, Serviceability	5
Fuel Tank / Lines	Accessibility, Puncture Resistant	7
COOLING SYSTEM	CONSIDERATIONS	RATING
Radiator	Accessibility, Protection, Adequate Size	N/A
Water Pump	Accessibility, Belt Arrangement	N/A
Hoses	Accessibility	N/A
Coolant Recovery	Accessibility, Capacity	N/A
TRANSMISSION	CONSIDERATIONS	RATING
Transmission / Gearbox	Ease of Removal, Serviceability	6
Drain Plug	Ease of Removal, Protection	7
Fluid Level Sight Glass	Accessibility, Night Usability	6
Clutch	Accessibility, Serviceability	6
Cooler	Accessibility, Protection	N/A
BRAKES	CONSIDERATIONS	RATING
Master Cylinder	Accessibility, Protection	8
Power Brake Assist	Accessibility	N/A
Front Wheel Brakes	Accessibility	9
Rear Wheel Brakes	Accessibility	8
ABS System	Accessibility, Serviceability, Reparability	7
EXHAUST SYSTEM	CONSIDERATIONS	RATING
Muffler	Accessibility	8
Pipes	Accessibility, Support	8
Header Pipes	Accessibility, Protection	8

MECHANICAL EVALUATION

BMW R 1200 RT-P - Continued

BODY	CONSIDERATIONS	RATING
Windshield	Ease of Removal	9
Crash Bars	Accessibility, Ease of Removal	8
Patrol Equipment, Lights	Ease of Installation	9
Instrument Panels	Accessibility, Serviceability	8
Body Wiring	Accessibility, Serviceability, Protection	7
Seat	Ease of Removal	9
Body Panels	Ease of Removal	8
Handlebar Controls	Accessibility, Serviceability, Protection	7
Foot Controls	Accessibility, Serviceability, Protection	8
Saddlebags	Accessibility, Protection	8
ENGINE & ACCESSORIES	CONSIDERATIONS	RATING
Engine	Accessibility, Ease of Removal	7
Cylinder Head	Accessibility, Ease of Removal	7
Valve Covers	Accessibility, Valve Train Serviceability	8
Cylinder Removal	Accessibility, Serviceability,	7
Drain Plug	Ease of Removal, Durability	9
Fluid Level Sight Glass	Accessibility, Night Usability	8
Oil Filter	Accessibility, Capacity, Protection	9
Engine Mounts	Accessibility	8
Oil Coolers	Accessibility, Protection	6
STEERING & SUSPENSION	CONSIDERATIONS	RATING
Front Forks	Accessibility, Serviceability, Adjustability	6
Front Suspension	Accessibility, Serviceability	7
Rear Shock Absorbers	Accessibility, Serviceability	7
Rear Swing Arm	Accessibility, Serviceability	7
Front Tire	Accessibility, Ease of Removal	8
Axle Bearings & Seals	Accessibility, Serviceability	6
REAR AXLE DRIVE SHAFT	CONSIDERATIONS	RATING
Rear Gearbox	Accessibility, Serviceability	7
Drive Chain	Accessibility, Serviceability	N/A
Axle Bearings & Seals	Accessibility, Serviceability	6
Drive Shaft	Accessibility, Serviceability	7
Universal Joints	Accessibility, Serviceability	7
Rear Tire	Accessibility, Ease of Removal	8

MECHANICAL EVALUATION

2009 BMW G650 GS-P

ELECTRICAL SYSTEM	CONSIDERATIONS	RATING
Battery	Accessibility, Group, Size	6
Alternator	Accessibility, Amperage	6
Stator	Accessibility, Amperage	6
Starter	Accessibility, Power	7
Ignition	Accessibility	8
Spark Plugs	Accessibility	6
Lights	Accessibility of Headlight Adjustment, Ease of Replacement	7
Fuse Box	Accessibility, Serviceability	5
FUEL SYSTEM	CONSIDERATIONS	RATING
Fuel Injection	Accessibility, Serviceability	5
Fuel Pump	Accessibility, Serviceability	7
Fuel Filter	Accessibility, Serviceability	7
Fuel Tank / Lines	Accessibility, Puncture Resistant	7
COOLING SYSTEM	CONSIDERATIONS	RATING
Radiator	Accessibility, Protection, Adequate Size	7
Water Pump	Accessibility, Belt Arrangement	9
Hoses	Accessibility	7
Coolant Recovery	Accessibility, Capacity	7
TRANSMISSION	CONSIDERATIONS	RATING
Transmission / Gearbox	Ease of Removal, Serviceability	5
Drain Plug	Ease of Removal, Protection	N/A
Fluid Level Sight Glass	Accessibility, Night Usability	N/A
Clutch	Accessibility, Serviceability	6
Cooler	Accessibility, Protection	N/A
BRAKES	CONSIDERATIONS	RATING
Master Cylinder	Accessibility, Protection	7
Power Brake Assist	Accessibility	N/A
Front Wheel Brakes	Accessibility	8
Rear Wheel Brakes	Accessibility	8
ABS System	Accessibility, Serviceability, Reparability	7
EXHAUST SYSTEM	CONSIDERATIONS	RATING
Muffler	Accessibility	7
Pipes	Accessibility, Support	7
Header Pipes	Accessibility, Protection	7

MECHANICAL EVALUATION

BMW G650 GS-P - Continued

BODY	CONSIDERATIONS	RATING
Windshield	Ease of Removal	8
Crash Bars	Accessibility, Ease of Removal	N/A
Patrol Equipment, Lights	Ease of Installation	8
Instrument Panels	Accessibility, Serviceability	7
Body Wiring	Accessibility, Serviceability, Protection	7
Seat	Ease of Removal	8
Body Panels	Ease of Removal	8
Handlebar Controls	Accessibility, Serviceability, Protection	8
Foot Controls	Accessibility, Serviceability, Protection	8
Saddlebags	Accessibility, Protection	7
ENGINE & ACCESSORIES	CONSIDERATIONS	RATING
Engine	Accessibility, Ease of Removal	5
Cylinder Head	Accessibility, Ease of Removal	5
Valve Covers	Accessibility, Valve Train Serviceability	5
Cylinder Removal	Accessibility, Serviceability,	5
Drain Plug	Ease of Removal, Durability	8
Fluid Level Sight Glass	Accessibility, Night Usability	7
Oil Filter	Accessibility, Capacity, Protection	7
Engine Mounts	Accessibility	7
Oil Coolers	Accessibility, Protection	N/A
STEERING & SUSPENSION	CONSIDERATIONS	RATING
Front Forks	Accessibility, Serviceability, Adjustability	8
Front Suspension	Accessibility, Serviceability	8
Rear Shock Absorbers	Accessibility, Serviceability	6
Rear Swing Arm	Accessibility, Serviceability	6
Front Tire	Accessibility, Ease of Removal	8
Axle Bearings & Seals	Accessibility, Serviceability	7
REAR AXLE DRIVE SHAFT	CONSIDERATIONS	RATING
Rear Gearbox	Accessibility, Serviceability	N/A
Drive Chain	Accessibility, Serviceability	5
Axle Bearings & Seals	Accessibility, Serviceability	5
Drive Shaft	Accessibility, Serviceability	N/A
Universal Joints	Accessibility, Serviceability	N/A
Rear Tire	Accessibility, Ease of Removal	5

MECHANICAL EVALUATION

2010 HARLEY-DAVIDSON ELECTRA GLIDE

ELECTRICAL SYSTEM	CONSIDERATIONS	RATING
Battery	Accessibility, Group, Size	5
Alternator	Accessibility, Amperage	4
Stator	Accessibility, Amperage	5
Starter	Accessibility, Power	5
Ignition	Accessibility	6
Spark Plugs	Accessibility	9
Lights	Accessibility of Headlight Adjustment, Ease of Replacement	8
Fuse Box	Accessibility, Serviceability	4
FUEL SYSTEM	CONSIDERATIONS	RATING
Fuel Injection	Accessibility, Serviceability	5
Fuel Pump	Accessibility, Serviceability	5
Fuel Filter	Accessibility, Serviceability	5
Fuel Tank / Lines	Accessibility, Puncture Resistant	5
COOLING SYSTEM	CONSIDERATIONS	RATING
Radiator	Accessibility, Protection, Adequate Size	N/A
Water Pump	Accessibility, Belt Arrangement	N/A
Hoses	Accessibility	N/A
Coolant Recovery	Accessibility, Capacity	N/A
TRANSMISSION	CONSIDERATIONS	RATING
Transmission / Gearbox	Ease of Removal, Serviceability	5
Drain Plug	Ease of Removal, Protection	8
Fluid Level Sight Glass	Accessibility, Night Usability	6
Clutch	Accessibility, Serviceability	6
Cooler	Accessibility, Protection	N/A
BRAKES	CONSIDERATIONS	RATING
Master Cylinder	Accessibility, Protection	7
Power Brake Assist	Accessibility	N/A
Front Wheel Brakes	Accessibility	6
Rear Wheel Brakes	Accessibility	5
ABS System	Accessibility, Serviceability, Reparability	5
EXHAUST SYSTEM	CONSIDERATIONS	RATING
Muffler	Accessibility	6
Pipes	Accessibility, Support	6
Header Pipes	Accessibility, Protection	6

MECHANICAL EVALUATION

ELECTRA GLIDE - Continued

BODY	CONSIDERATIONS	RATING
Windshield	Ease of Removal	6
Crash Bars	Accessibility, Ease of Removal	6
Patrol Equipment, Lights	Ease of Installation	6
Instrument Panels	Accessibility, Serviceability	5
Body Wiring	Accessibility, Serviceability, Protection	5
Seat	Ease of Removal	5
Body Panels	Ease of Removal	5
Handlebar Controls	Accessibility, Serviceability, Protection	5
Foot Controls	Accessibility, Serviceability, Protection	5
Saddlebags	Accessibility, Protection	5
ENGINE & ACCESSORIES	CONSIDERATIONS	RATING
Engine	Accessibility, Ease of Removal	4
Cylinder Head	Accessibility, Ease of Removal	6
Valve Covers	Accessibility, Valve Train Serviceability	6
Cylinder Removal	Accessibility, Serviceability,	6
Drain Plug	Ease of Removal, Durability	8
Fluid Level Sight Glass	Accessibility, Night Usability	8
Oil Filter	Accessibility, Capacity, Protection	5
Engine Mounts	Accessibility	5
Oil Coolers	Accessibility, Protection	2
STEERING & SUSPENSION	CONSIDERATIONS	RATING
Front Forks	Accessibility, Serviceability, Adjustability	4
Front Suspension	Accessibility, Serviceability	4
Rear Shock Absorbers	Accessibility, Serviceability	5
Rear Swing Arm	Accessibility, Serviceability	5
Front Tire	Accessibility, Ease of Removal	5
Axle Bearings & Seals	Accessibility, Serviceability	4
REAR AXLE DRIVE SHAFT	CONSIDERATIONS	RATING
Rear Gearbox	Accessibility, Serviceability	N/A
Drive Chain	Accessibility, Serviceability	4
Axle Bearings & Seals	Accessibility, Serviceability	4
Drive Shaft	Accessibility, Serviceability	N/A
Universal Joints	Accessibility, Serviceability	N/A
Rear Tire	Accessibility, Ease of Removal	4

MECHANICAL EVALUATION

2010 HARLEY-DAVIDSON ROAD KING

ELECTRICAL SYSTEM	CONSIDERATIONS	RATING
Battery	Accessibility, Group, Size	5
Alternator	Accessibility, Amperage	4
Stator	Accessibility, Amperage	5
Starter	Accessibility, Power	5
Ignition	Accessibility	6
Spark Plugs	Accessibility	8
Lights	Accessibility of Headlight Adjustment, Ease of Replacement	8
Fuse Box	Accessibility, Serviceability	4
FUEL SYSTEM	CONSIDERATIONS	RATING
Fuel Injection	Accessibility, Serviceability	5
Fuel Pump	Accessibility, Serviceability	5
Fuel Filter	Accessibility, Serviceability	5
Fuel Tank / Lines	Accessibility, Puncture Resistant	5
COOLING SYSTEM	CONSIDERATIONS	RATING
Radiator	Accessibility, Protection, Adequate Size	N/A
Water Pump	Accessibility, Belt Arrangement	N/A
Hoses	Accessibility	N/A
Coolant Recovery	Accessibility, Capacity	N/A
TRANSMISSION	CONSIDERATIONS	RATING
Transmission / Gearbox	Ease of Removal, Serviceability	5
Drain Plug	Ease of Removal, Protection	8
Fluid Level Sight Glass	Accessibility, Night Usability	6
Clutch	Accessibility, Serviceability	5
Cooler	Accessibility, Protection	N/A
BRAKES	CONSIDERATIONS	RATING
Master Cylinder	Accessibility, Protection	7
Power Brake Assist	Accessibility	N/A
Front Wheel Brakes	Accessibility	6
Rear Wheel Brakes	Accessibility	5
ABS System	Accessibility, Serviceability, Reparability	5
EXHAUST SYSTEM	CONSIDERATIONS	RATING
Muffler	Accessibility	8
Pipes	Accessibility, Support	7
Header Pipes	Accessibility, Protection	7

MECHANICAL EVALUATION

ROAD KING - Continued

BODY	CONSIDERATIONS	RATING
Windshield	Ease of Removal	6
Crash Bars	Accessibility, Ease of Removal	6
Patrol Equipment, Lights	Ease of Installation	5
Instrument Panels	Accessibility, Serviceability	6
Body Wiring	Accessibility, Serviceability, Protection	5
Seat	Ease of Removal	6
Body Panels	Ease of Removal	6
Handlebar Controls	Accessibility, Serviceability, Protection	5
Foot Controls	Accessibility, Serviceability, Protection	7
Saddlebags	Accessibility, Protection	6
ENGINE & ACCESSORIES	CONSIDERATIONS	RATING
Engine	Accessibility, Ease of Removal	5
Cylinder Head	Accessibility, Ease of Removal	6
Valve Covers	Accessibility, Valve Train Serviceability	5
Cylinder Removal	Accessibility, Serviceability,	6
Drain Plug	Ease of Removal, Durability	6
Fluid Level Sight Glass	Accessibility, Night Usability	9
Oil Filter	Accessibility, Capacity, Protection	7
Engine Mounts	Accessibility	5
Oil Coolers	Accessibility, Protection	2
STEERING & SUSPENSION	CONSIDERATIONS	RATING
Front Forks	Accessibility, Serviceability, Adjustability	5
Front Suspension	Accessibility, Serviceability	5
Rear Shock Absorbers	Accessibility, Serviceability	5
Rear Swing Arm	Accessibility, Serviceability	5
Front Tire	Accessibility, Ease of Removal	5
Axle Bearings & Seals	Accessibility, Serviceability	4
REAR AXLE DRIVE SHAFT	CONSIDERATIONS	RATING
Rear Gearbox	Accessibility, Serviceability	N/A
Drive Chain	Accessibility, Serviceability	5
Axle Bearings & Seals	Accessibility, Serviceability	5
Drive Shaft	Accessibility, Serviceability	N/A
Universal Joints	Accessibility, Serviceability	N/A
Rear Tire	Accessibility, Ease of Removal	5

MECHANICAL EVALUATION

HONDA ST 1300-PA9

ELECTRICAL SYSTEM	CONSIDERATIONS	RATING
Battery	Accessibility, Group, Size	3
Alternator	Accessibility, Amperage	3
Stator	Accessibility, Amperage	3
Starter	Accessibility, Power	4
Ignition	Accessibility	4
Spark Plugs	Accessibility	5
Lights	Accessibility of Headlight Adjustment, Ease of Replacement	4
Fuse Box	Accessibility, Serviceability	4
FUEL SYSTEM	CONSIDERATIONS	RATING
Fuel Injection	Accessibility, Serviceability	4
Fuel Pump	Accessibility, Serviceability	5
Fuel Filter	Accessibility, Serviceability	5
Fuel Tank / Lines	Accessibility, Puncture Resistant	5
COOLING SYSTEM	CONSIDERATIONS	RATING
Radiator	Accessibility, Protection, Adequate Size	5
Water Pump	Accessibility, Belt Arrangement	5
Hoses	Accessibility	5
Coolant Recovery	Accessibility, Capacity	5
TRANSMISSION	CONSIDERATIONS	RATING
Transmission / Gearbox	Ease of Removal, Serviceability	4
Drain Plug	Ease of Removal, Protection	4
Fluid Level Sight Glass	Accessibility, Night Usability	N/A
Clutch	Accessibility, Serviceability	3
Cooler	Accessibility, Protection	N/A
BRAKES	CONSIDERATIONS	RATING
Master Cylinder	Accessibility, Protection	5
Power Brake Assist	Accessibility	N/A
Front Wheel Brakes	Accessibility	6
Rear Wheel Brakes	Accessibility	5
ABS System	Accessibility, Serviceability, Reparability	5
EXHAUST SYSTEM	CONSIDERATIONS	RATING
Muffler	Accessibility	6
Pipes	Accessibility, Support	5
Header Pipes	Accessibility, Protection	5

MECHANICAL EVALUATION

HONDA - Continued

BODY	CONSIDERATIONS	RATING
Windshield	Ease of Removal	6
Crash Bars	Accessibility, Ease of Removal	N/A
Patrol Equipment, Lights	Ease of Installation	5
Instrument Panels	Accessibility, Serviceability	4
Body Wiring	Accessibility, Serviceability, Protection	5
Seat	Ease of Removal	3
Body Panels	Ease of Removal	4
Handlebar Controls	Accessibility, Serviceability, Protection	5
Foot Controls	Accessibility, Serviceability, Protection	5
Saddlebags	Accessibility, Protection	6
ENGINE & ACCESSORIES	CONSIDERATIONS	RATING
Engine	Accessibility, Ease of Removal	4
Cylinder Head	Accessibility, Ease of Removal	3
Valve Covers	Accessibility, Valve Train Serviceability	2
Cylinder Removal	Accessibility, Serviceability,	2
Drain Plug	Ease of Removal, Durability	5
Fluid Level Sight Glass	Accessibility, Night Usability	5
Oil Filter	Accessibility, Capacity, Protection	5
Engine Mounts	Accessibility	5
Oil Coolers	Accessibility, Protection	5
STEERING & SUSPENSION	CONSIDERATIONS	RATING
Front Forks	Accessibility, Serviceability, Adjustability	5
Front Suspension	Accessibility, Serviceability	5
Rear Shock Absorbers	Accessibility, Serviceability	4
Rear Swing Arm	Accessibility, Serviceability	4
Front Tire	Accessibility, Ease of Removal	5
Axle Bearings & Seals	Accessibility, Serviceability	5
REAR AXLE DRIVE SHAFT	CONSIDERATIONS	RATING
Rear Gearbox	Accessibility, Serviceability	4
Drive Chain	Accessibility, Serviceability	N/A
Axle Bearings & Seals	Accessibility, Serviceability	4
Drive Shaft	Accessibility, Serviceability	4
Universal Joints	Accessibility, Serviceability	4
Rear Tire	Accessibility, Ease of Removal	5

COMMUNICATIONS EVALUATION RESULTS

The communications evaluation of each vehicle is conducted by technicians assigned to the Los Angeles County Sheriff's Department's Communications and Fleet Management Bureau. This evaluation concerns itself with the radio installation, the effect of radio operation on motorcycle performance and the effect of the motorcycle on radio performance.

The Electromagnetic Interference Susceptibility test is intended for use in the presence of electromagnetic fields resulting from use of public safety two-way radios.

Motorcycle performance must not be affected in any way by transmissions from a radio and antenna installed on the motorcycle and operating in any of the frequency ranges of 450 to 512 MHz, and having a radio frequency output no more than 50 watts. Motorcycle performance shall not be effected by the presence of another motorcycle equipped with the above described radio and operated next to the subject motorcycle.

Radiated and conducted electromagnetic interference motorcycle systems and accessories shall be designed to reduce interference with the use of public safety radio receivers or electronic sirens or sound amplifiers. The effective sensitivity of a receiver installed on the motorcycle shall not be reduced by more than the amount tabulated below for each frequency band:

FREQUENCY BAND	ALLOWABLE DEGRADATION
450 to 512 MHz	3 dB

Degradation is the difference in effective receiver sensitivity measured with the vehicle engine and accessories turned off as compared to that measured with the engine and accessories turned on.

Sensitivity is measured in terms of the 12 dB Sinad signal as defined in EIA Standard RS-204. To determine effective sensitivity, the receiver is connected to the antenna through an isolating tee connector which allows introduction of the signal generator through the isolated port. Comparative signal strength readings are then taken with and without the interference present.

COMMUNICATION NOISE EVALUATION

2009 BMW R 1200 RT-P

RADIO MAKE	MODEL NO.	ANTENNA TYPE	LOCATION
Motorola XTL-5000	M20SSS9PW1AN	2dB Gain Whip	Rear

FREQUENCY: 482.8375 MHz

WITH ANTENNA	12 dB SINAD	20 dB QUIETING	DESENS dB
Engine Off	-91dBm	-95dBm	0dBm
Engine Idle (No Acc)	-90dBm	-94dBm	1dBm
Engine High RPM (No Acc)	-90dBm	-94dBm	1dBm
Engine Idle W/ Lights	-90dBm	-94dBm	1dBm
Engine Idle W/All Acc	-90dBm	-94dBm	1dBm
Engine High RPM W/All Acc	-90dBm	-94dBm	1dBm

Also Tested:

Monitored approximately 300 frequencies between 470 and 510MHz. One spurious signal was detected at 483.3375MHz coming from the rear of the motorcycle possibly from lights/siren amplifier box at a close range under 12". Radio used Motorola XTS-5000 hand held.

COMMUNICATION NOISE EVALUATION

2010 BMW G650 GS-P

RADIO MAKE	MODEL NO.	ANTENNA TYPE	LOCATION
Motorola XTL-5000	M20SSS9PW1AN	2dB Gain Whip	Rear

FREQUENCY: 482.8375 MHz

WITH ANTENNA	12 dB SINAD	20 dB QUIETING	DESENS dB
Engine Off	-88dBm	-92dBm	5dBm
Engine Idle (No Acc)	-88dBm	-92dBm	5dBm
Engine High RPM (No Acc)	-88dBm	-92dBm	5dBm
Engine Idle W/ Lights	-88dBm	-92dBm	5dBm
Engine Idle W/All Acc	-88dBm	-92dBm	5dBm
Engine High RPM W/All Acc	-88dBm	-92dBm	5dBm

Also Tested:

Monitored approximately 300 frequencies between 470 and 510MHz. No spurious signal detected. Radio used Motorola XTS 5000 hand held.

COMMUNICATION NOISE EVALUATION

2010 HARLEY-DAVIDSON ELECTRA GLIDE

RADIO MAKE	MODEL NO.	ANTENNA TYPE	LOCATION
Motorola XTL-5000	M20SSS9PW1AN	2dB Gain Whip	Rear

FREQUENCY: 482.8375 MHz

WITH ANTENNA	12 dB SINAD	20 dB QUIETING	DESENS dB
Engine Off	-91dBm	-96dBm	0dBm
Engine Idle (No Acc)	-91dBm	-95dBm	1dBm
Engine High RPM (No Acc)	-91dBm	-95dBm	1dBm
Engine Idle W/ Lights	-91dBm	-95dBm	1dBm
Engine Idle W/All Acc	-91dBm	-95dBm	1dBm
Engine High RPM W/All Acc	-91dBm	-95dBm	1dBm

Also Tested:

Monitored approximately 300 frequencies between 470 and 510MHz. No spurious signal detected. Radio used Motorola XTS 5000 hand held.

COMMUNICATION NOISE EVALUATION

2010 HARLEY-DAVIDSON ROAD KING

RADIO MAKE	MODEL NO.	ANTENNA TYPE	LOCATION
Motorola XTL-5000	M20SSS9PW1AN	2dB Gain Whip	Rear

FREQUENCY: 482.8375 MHz

WITH ANTENNA	12 dB SINAD	20 dB QUIETING	DESENS dB
Engine Off	-90dBm	-94dBm	2dBm
Engine Idle (No Acc)	-90dBm	-94dBm	2dBm
Engine High RPM (No Acc)	-90dBm	-94dBm	2dBm
Engine Idle W/ Lights	-90dBm	-94dBm	2dBm
Engine Idle W/All Acc	-90dBm	-94dBm	2dBm
Engine High RPM W/All Acc	-90dBm	-94dBm	2dBm

Also Tested:

Monitored approximately 300 frequencies between 470 and 510MHz. No spurious signal detected. Radio used Motorola XTS 5000 hand held.

COMMUNICATION NOISE EVALUATION

2009 HONDA ST 1300-PA9

RADIO MAKE	MODEL NO.	ANTENNA TYPE	LOCATION
Motorola XTL-5000	M20SSS9PW1AN	2dB Gain Whip	Rear

FREQUENCY: 482.8375 MHz

WITH ANTENNA	12 dB SINAD	20 dB QUIETING	DESENS dB
Engine Off	-89dBm	-92dBm	3dBm
Engine Idle (No Acc)	-89dBm	-92dBm	3dBm
Engine High RPM (No Acc)	-89dBm	-92dBm	3dBm
Engine Idle W/ Lights	-89dBm	-92dBm	3dBm
Engine Idle W/All Acc	-89dBm	-92dBm	3dBm
Engine High RPM W/All Acc	-89dBm	-92dBm	3dBm

Also Tested:

Monitored approximately 300 frequencies between 470 and 510MHz. No spurious signal detected. Radio used Motorola XTS 5000 hand held.