

**LOS ANGELES COUNTY SHERIFF'S
DEPARTMENT**



**LAW ENFORCEMENT
MOTORCYCLE TEST
AND
EVALUATION PROGRAM**

NOVEMBER 2011

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 on November 18, 2010, 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, Honda, and Kawasaki each submitted motorcycles for evaluation. The motorcycles submitted were:

2010 BMW R 1200 RT-P

2009 Honda ST 1300-PA9

2011 Harley-Davidson Electra Glide

2011 Harley-Davidson Road King

2010 Kawasaki Concours 14 ABS

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 2.45 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 transitional 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.

During the dry/wet 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 wet roadway surface. 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

2010 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:	88 Nm @ 6,000 rpm
Final Drive (shaft, chain, belt):	Shaft 1:1.882 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:	Self-adjusting hydraulic actuating single plate 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 Fork
Fork Angle:	63.4 degrees
Trail:	4.3 inches (castor in normal position)
Fuel Tank Capacity:	7.1 gallons with one gallon reserve
EPA Fuel Mileage:	65 hwy / 43 city
Seat Height:	32.2 inches, 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

2011 HARLEY-DAVIDSON ELECTRA GLIDE

Vehicle Description:	Full size, Touring, Police Package motorcycle
Engine Type:	103 cu in, air/oil cooled, 2 cylinders Twin Cam
Bore and Stroke:	3.875 in x 4.375 in
Compression Ratio:	9.6: 1
Valve Train:	Pushrod operated, overhead hydraulic self-adjusting lifters; 2 valves per cylinder
Carburetor / Fuel Injection:	Electronic Sequential Port Fuel Injection (ESPFI)
Ignition:	Electronic
Horsepower:	N/A
Torque :	102 lb.ft@ 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 Cruise Drive
Clutch:	multi-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 11.81 in. x .28 in.
Rear:	Single disc w/ABS 11.81 in. x .28 in
Tires:	Dunlop® Harley-Davidson Series, bias blackwall Front – D408F BW 130/80B17 Rear – D407 BW 180/65B16
Wheels:	Black, Slotted disc cast aluminum
Wheelbase:	63.5 inches
Rake:	26 degrees
Fork Angle	29.25 degrees
Trail:	6.69 inches
Fuel Tank Capacity:	6.0 gallons with one gallon reserve
EPA Fuel Mileage:	54 hwy / 35 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:	Approx 2000 cubic inches each, top opening

MOTORCYCLE SPECIFICATIONS

2011 HARLEY-DAVIDSON ROAD KING

Vehicle Description:	Full size, Touring, Police Package motorcycle
Engine Type:	103 cu in, air/oil cooled, 2 cylinders Twin Cam
Bore and Stroke:	3.875 in x 4.375 in
Compression Ratio:	9.6: 1
Valve Train:	Pushrod operated, overhead hydraulic self-adjusting lifters; 2 valves per cylinder
Carburetor / Fuel Injection:	Electronic Sequential Port Fuel Injection (ESPFI)
Ignition:	Electronic
Horsepower:	N/A
Torque :	102 lb.ft @ 3500 rpm
Final 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, 270 cca
Transmission:	6 speed Cruise Drive
Clutch:	multi-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 11.81 in. x .28 in.
Rear:	Single disc w/ABS 11.81 in. x .28 in
Tires:	Dunlop® Harley-Davidson Series, bias blackwall Front – D408F BW 130/80B17 Rear – D407 BW 180/65B16
Wheels:	Black, Slotted disc cast aluminum
Wheelbase:	63.5 inches
Rake:	26 degrees
Fork Angle	29.25 degrees
Trail:	6.69 inches
Fuel Tank Capacity:	6.0 gallons with one gallon reserve
EPA Fuel Mileage:	54 hwy / 35 city
Seat Height:	27.3 in. (laden) 30.7 in. (unladen)
Adjustments:	Air adjustable
Windscreen:	Fork-mounted clear, breakaway Lexan® windshield
Foot peg / Floorboard Position:	Floorboard
Saddlebag Storage Capacity:	Approx 200o cubic inches each, 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 with 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

2010 KAWASAKI CONCOURS 14 ABS

Vehicle Description:	Full size, Sport Touring, Police Package motorcycle
Engine Type:	1352cc liquid cooled inline 4 cylinder
Bore and Stroke:	84mm x 61mm
Compression Ratio:	10.7:1
Valve Train:	DOHC, 4 valves per cylinder, shim under bucket valve adjustment
Carburetor / Fuel Injection:	Electronic fuel injection
Ignition:	Transistorized
Horsepower:	155 bhp @ 88000 rpm
Torque:	102 lb.ft. @ 66000 rpm
Final Drive (shaft, chain, belt):	Shaft
Wet Weight:	689 lbs
Alternator Output:	581 watts @ 5,000 rpm
Battery:	14 amp/hour, 12 volt
Transmission:	6 speed
Clutch:	Multi-plate in oil bath
Suspension,	
Front:	43mm male-slider fork, adjustable preload and rebound damping, 4.4 inches travel
Rear:	Monoshock, adjustable preload and rebound damping, 5.4 inches travel
Brakes,	
Front:	Dual 310 mm petal discs with four piston radial mount calipers - ABS
Rear:	Single 240 mm petal disc, two piston, double action caliper
Tires:	Fr – 120/70ZR17 Rr – 190/50ZR17
Wheels:	Cast aluminum rims
Wheelbase:	59.8 inches
Rake:	26.1 degrees
Trail:	4.4 inches
Fuel Tank Capacity:	5.8 gallons
EPA Fuel Mileage:	Combined 36 mpg
Seat Height:	32 inches
Adjustments:	no
Windscreen:	
Adjustable / Fixed	Fixed
Foot Peg / Floorboard Position:	Foot peg
Saddlebag Storage Capacity:	35 liters (does not include radio box volume)

BASIC MOTORCYCLE PATTERNS

BASIC MOTORCYCLE PATTERNS

2010 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	YES
PATTERN		CONSIDERATION			RATING**
30 MPH Cone Weave		Counter steering effort / Bike Drag			4.7
RIDER COMMENTS					
<p>Slow Cone Exercise – Fairly effortless. With lower 1st gear the slow speed control was improved.</p> <p>30 MPH Cone Weave – Counter steering effort, agility, and rider feedback was excellent. Plenty of ground clearance.</p>					

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

2010 KAWASAKI CONCOURS 14 ABS					
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	NO
PATTERN		CONSIDERATION			RATING**
30 MPH Cone Weave		Counter steering effort / Bike Drag			3.8
RIDER COMMENTS					
<p>Slow Cone Exercise – Bars turn with very little input but the rider feels the weight immediately when leaning over.</p> <p>30 MPH Cone Weave – Plenty of lean angle for maneuvering. Side crash bars and saddle bags tend to hang out too far.</p>					

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

2011 HARLEY-DAVIDSON ELECTRA GLIDE					
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	YES
PATTERN		CONSIDERATION			RATING**
30 MPH Cone Weave		Counter steering effort / Bike Drag			3
RIDER COMMENTS					
Slow Cone Exercise – Bars turn in very well, good for slow riding. Lean angle is average but begins to drag quickly.					
30 MPH Cone Weave – Much more maneuverable than previous models.					

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

2011 HARLEY-DAVIDSON ROAD KING					
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	YES
PATTERN		CONSIDERATION			RATING**
30 MPH Cone Weave		Counter steering effort / Bike Drag			4
RIDER COMMENTS					
30 mph Cone Weave – The footboards can drag if pushed too hard.					

** Rating Scale – 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	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 – Poor 3.5 – Average 5 – Outstanding

32 LAP HIGH-SPEED COURSE

MOTORCYCLE DYNAMICS

EVALUATION

32 LAP HIGH-SPEED COURSE MOTORCYCLE DYNAMICS EVALUATION

2010 BMW R 1200 RT-P

RIDER	LAPS	AVG. TIME	AVG. SPEED
Officer M. Nowlen, LAPD	1 thru 8	1:26.97	60.14
Deputy M. Brown, LASD	9 thru 16	1:27.86	59.63
Officer J. Poland, LAPD	17 thru 23	1:29.63	58.30
Deputy S. Bryant, LASD	24 thru 32	1:24.28	62.45

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

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

RIDER COMMENTS

Officer Noland – Smooth shifts at all speeds. Brakes consistent with no fade. Slight wheel hop with rear wheel but tracks straight. Feels very light in tight turns with smooth and quick transitions.

Deputy Brown – Steering very light. Suspension was medium firm which handled roadway imperfections very well. No brakes fade experienced. Overbraking caused slight wheel hop of the rear wheel. Braking was positive providing excellent rider feedback.

Officer Poland – Great lean angle and steering. Transitions very well through the turns. Very consistent power throughout the rpm range. Bike is very agile giving the rider confidence through the turns.

Deputy Bryant – The bike steers and handles extremely well. At extreme angle the foot peg and front engine guard drag. Brakes very good, hard braking tends to loosen up the rear a bit.

32 LAP HIGH-SPEED COURSE MOTORCYCLE DYNAMICS EVALUATION

2010 KAWASAKI CONCOURS 14 ABS

RIDER	LAPS	AVG. TIME	AVG. SPEED
Officer M. Nowlen, LAPD	1 thru 8	1:28.32	59.49
Deputy M. Brown, LASD	9 thru 16	1:27.12	60.27
Officer J. Poland, LAPD	17 thru 23	1:31.14	57.57
Deputy S. Bryant, LASD	24 thru 32	1:26.74	60.87

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

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

RIDER COMMENTS

Officer Noland –Accelerates hard with smooth transmission operation. Very good lean angle. Suspension does well absorbing bumps in the corners. Power comes on quick with good traction control management. Rear wheel floats slightly under hard braking. Bar input is smooth and consistent.

Deputy Brown – Steering is light providing good rider feedback. Lean angle good with slight peg scrape in turns. Suspension was firm and provided good handling. Some brake fade experienced in lap 6, 7, and 8. ABS operation smooth and predictable.

Officer Poland – Bike is very comfortable to ride, great steering and lean angle. Very consistent power throughout. Minimal brake fade. Traction control very efficient, compensates for slight over riding by the rider. Could use a slightly taller windscreen.

Deputy Bryant – The bike steers and handles very well. Lean angle is good. Traction control works well although you can still feel the rear tire breaking loose in the turns. Bike pulls very hard at higher rpm's.

32 LAP HIGH-SPEED COURSE MOTORCYCLE DYNAMICS EVALUATION

2011 HARLEY-DAVIDSON ELECTRA GLIDE

RIDER	LAPS	AVG. TIME	AVG. SPEED
Officer M. Nowlen, LAPD	1 thru 8	1:35.15	55.11
Deputy M. Brown, LASD	9 thru 16	1:35.31	55.08
Officer J. Poland, LAPD	17 thru 23	1:39.46	52.78
Deputy S. Bryant, LASD	24 thru 32	1:34.65	55.90

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

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

RIDER COMMENTS
<p>Officer Noland – Bike comes up to speed slow but smooth. Brakes were predictable even in the later laps, no fade. Bars turn easy even under braking while entering corners. Lean angle was average. Floorboards scrape and pivot very little. Frame drags often. Lots of wind turbulence under fairing while at high speeds.</p> <p>Deputy Brown – Steering was smooth with good feedback. Lean angle slightly better than prior models, however dragging occurred in corners. Suspension provided good rider feedback. ABS operation was positive and predictable.</p> <p>Officer Poland – Transmission shifts well. Good power through all the gears. Not much lean angle in the turns. Floorboards drag in the corners. Good ABS operation, only slight pulsation felt when in ABS mode. Fairing provides good protection from wind.</p> <p>Deputy Bryant – The steering was light and easy. Lean angle is limited due to the floorboards and frame dragging. The bike accelerates hard out of the corners. There was no brake fade. The ABS works well however you can feel slight pulsations</p>

32 LAP HIGH-SPEED COURSE MOTORCYCLE DYNAMICS EVALUATION

2011 HARLEY-DAVIDSON ROAD KING

RIDER	LAPS	AVG. TIME	AVG. SPEED
Officer M. Nowlen, LAPD	1 thru 8	1:35.51	54.87
Deputy M. Brown, LASD	9 thru 16	1:36.36	54.41
Officer J. Poland, LAPD	17 thru 23	1:44.35	50.50
Deputy S. Bryant, LASD	24 thru 32	1:36.24	54.96

ITEM	RATING**
STEERING	7
LEAN ANGLE	6
SUSPENSION	7
BRAKE FADE	7
ABS OPERATION	6

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

RIDER COMMENTS

Officer Noland – Smooth acceleration, builds speed slowly. Transmission shifts well and smooth. Brakes hard with no fade, very predictable. Lean angle is average. No wobble or stability issues. Throttle is consistent.

Deputy Brown – Steering very light and predictable. Lean angle slightly improved. Suspension worked well while accelerating and braking, even on rough pavement. ABS operation was smooth and predictable.

Officer Poland – Not enough lean angle, floorboards and frame SCRAPE. Consistent handling through turns. Good ABS, no heavy pulsations. Stable in acceleration and braking.

Deputy Bryant – Steering was light and easy. The lean angle is limited due to floorboards and frame dragging. The bike accelerates hard out of corners. I experienced no brake fade. The ABS works well however slight pulsations can still be felt.

32 LAP HIGH-SPEED COURSE MOTORCYCLE DYNAMICS EVALUATION

2009 HONDA ST 1300-PA9

RIDER	LAPS	AVG. TIME	AVG. SPEED
Officer M. Nowlen, LAPD	1 thru 8	1:26.24	60.61
Deputy M. Brown, LASD	9 thru 16	1:28.14	59.44
Officer J. Poland, LAPD	17 thru 23	1:31.09	57.43
Deputy S. Bryant, LASD	24 thru 32	1:26.03	61.51

ITEM	RATING**
STEERING	8
LEAN ANGLE	7
SUSPENSION	9
BRAKE FADE	9
ABS OPERATION	9

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

RIDER COMMENTS

Officer Noland – Smooth hard acceleration with consistent shifts up through the gears. Steering is light entering a corner and holds even feedback through the exit. Runs out of lean angle quick. On acceleration out of corners the rear wheel tends to wash out. Hard consistent braking with the rear wheel bouncing slightly.

Deputy Brown – Steering very light. Smooth transitions through the turns. Lean angle is adequate. No brake fade noticed. ABS activated while braking over moderate bumps. ABS operation was predictable and provided straight line braking.

Officer Poland – Not much lean angle, boots and peg feeler would contact the ground when leaning over in a turn. This caused a reduction of speed when entering a corner for fear of a foot contacting the ground. Windscreen provides adequate protection from the wind. Noticed minimal pulsation when ABS was activated.

Deputy Bryant – The bike steers and handles very well. The lean angle is limited to the foot peg and your feet dragging the ground. Rear tire breaks loose under hard acceleration. Traction control would help this. Brakes very good, hard braking tends to loosen up the rear a bit.

**PURSUIT COURSE
MOTORCYCLE DYNAMICS
EVALUATION**

PURSUIT COURSE MOTORCYCLE DYNAMICS EVALUATION

2010 BMW R 1200 RT- P

RIDER	TOTAL TIME	AVG. SPEED
Officer M. Nowlen, LAPD	4:10.52	35.14
Deputy S. Bryant, LASD	4:09.83	35.28

ITEM	RATING**
STEERING	9
LEAN ANGLE	9
SUSPENSION	9
BRAKE FADE	10
ABS OPERATION	9

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

RIDER COMMENTS
<p><u>Brakes</u> - Brakes worked well with no fade, very consistent from the first application. Slight rear wheel balance under heavy braking. Front and rear brakes work well together.</p> <p><u>Cornering/Handling</u> – Very quick roll in, solid traction. Smooth corners even when encountering small bumps. Smooth weight transfers. Lean angle is good.</p> <p><u>Transmission</u> – Shifts consistent under acceleration and deceleration. Shift points are good and evenly matched.</p> <p><u>Engine</u> – Low end power is good and continues to pull throughout the rpm range. Power band is smooth and controllable.</p>

PURSUIT COURSE MOTORCYCLE
DYNAMICS EVALUATION

2011 HARLEY-DAVIDSON ELECTRA GLIDE

RIDER	TOTAL TIME	AVG. SPEED
Officer J. Poland, LAPD	4:45.25	30.94
Deputy M. Brown, LASD	4:35.09	32.07

ITEM	RATING**
STEERING	7
LEAN ANGLE	5
SUSPENSION	6
BRAKE FADE	8
ABS OPERATION	8

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

RIDER COMMENTS
<p><u>Brakes</u> – Brake operation was strong and positive providing good rider feedback. ABS operated predictably with slight pulsations.</p> <p><u>Cornering/Handling</u> – Lean angle is limited allowing motorcycle to drag floorboards and frame. This caused the cornering performance to suffer.</p> <p><u>Transmission</u> – Transmission performed well, no issues.</p> <p><u>Engine</u> – Good torque throughout the rpm range.</p>

PURSUIT COURSE MOTORCYCLE
DYNAMICS EVALUATION

2011 HARLEY-DAVIDSON ROAD KING

RIDER	TOTAL TIME	AVG. SPEED
Deputy M. Brown, LASD	4:33.09	32.19
Officer J. Poland, LAPD	4:42.01	31.28

ITEM	RATING**
STEERING	7
LEAN ANGLE	5
SUSPENSION	7
BRAKE FADE	9
ABS OPERATION	7

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

RIDER COMMENTS
<p><u>Brakes</u> – Brakes had good response and were strong, no brake fade noticed. ABS worked adequately and was predictable.</p> <p><u>Cornering/Handling</u> - Lean angle is limited allowing motorcycle to drag floorboards and frame. This caused the cornering performance to suffer.</p> <p><u>Transmission</u> - Transmission performed well, no issues.</p> <p><u>Engine</u> – Good torque throughout the rpm range.</p>

PURSUIT COURSE MOTORCYCLE
DYNAMICS EVALUATION

2009 HONDA ST 1300-PA9

RIDER	TOTAL TIME	AVG. SPEED
Officer J. Poland, LAPD	4:18.98	34.19
Deputy M. Brown, LASD	4:14.69	34.58

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

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

RIDER COMMENTS

Brakes – Brakes very responsive with excellent rider feedback. No brake fade noticed.
Cornering/Handling – Good lean angle. Bike cornered very well giving the rider confidence and control
Transmission – Transmission shifts smooth and positive.
Engine – Good power felt throughout the rpm range.

PURSUIT COURSE MOTORCYCLE DYNAMICS EVALUATION

2010 KAWASAKI CONCOURS 14 ABS

RIDER	TOTAL TIME	AVG. SPEED
Deputy S. Bryant, LASD	4:13.55	34.72
Officer M. Nowlen, LAPD	4:17.40	34.32

ITEM	RATING**
STEERING	8
LEAN ANGLE	9
SUSPENSION	9
BRAKE FADE	10
ABS OPERATION	9

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

RIDER COMMENTS
<p><u>Brakes</u> – Brakes smooth and consistent no fade issue. ABS is smooth and predictable. Rear foot brake in natural spot when leaned over in corners. Rider can carry the brakes deep into the turn with confidence.</p> <p><u>Cornering/Handling</u> – Bars are smooth with little resistance through full range. No slip from the front wheel. Feels heavy when transitioning from a hard lean angle, right or left.</p> <p><u>Transmission</u> – Shifts very smooth under hard acceleration. Easy to find the shifter.</p> <p><u>Engine</u> – Smooth with great power for cornering exits. Rear wheel breaks loose under hard acceleration out of corners, traction control seems delayed.</p>

BRAKING

DEBRIS FIELD BRAKING
SANDY SURFACE – 40 MPH TO ZERO

2010 BMW R 1200 RT-P	
RIDER	STOPPING DISTANCE
Deputy M. Brown, LASD	97.4 feet
RIDER COMMENTS	
ABS activated immediately upon entering the debris field. The bike continued to brake steadily in a straight line until stopped. Bike was very controllable.	

2010 KAWSAKI CONCOURS 14 ABS	
RIDER	STOPPING DISTANCE
Officer J. Poland, LAPD	94.9 feet
RIDER COMMENTS	
Motorcycle stayed centered and straight through the debris field when braking. Needed minimal hand pressure on front brake to apply and maintain ABS.	

2011 HARLEY-DAVIDSON ELECTRA GLIDE	
RIDER	STOPPING DISTANCE
Deputy S. Bryant, LASD	101.6 feet
RIDER COMMENTS	
The ABS worked well in the debris field. The bike braked straight and consistent.	

2011 HARLEY-DAVIDSON ROAD KING	
RIDER	STOPPING DISTANCE
Officer J. Poland, LAPD	95.9 feet
RIDER COMMENTS	
The front brake requires a very heavy pull and very firm hand pressure when in ABS operation. Once in ABS operation I noticed moderate chug and pulsation until motorcycle stopped.	

2009 HONDA ST 1300-PA9	
RIDER	STOPPING DISTANCE
Officer M. Nowlen, LAPD	90.6 feet
RIDER COMMENTS	
Front and rear brakes apply smooth with no hesitation. Motorcycle settles with a smooth weight transfer. Felt like a delayed ABS activation in the front wheel but bike tracked straight.	

TRANSITORY BRAKING DRY TO WET - 40 MPH TO ZERO

2010 BMW R 1200RT-P	
Officer M. Nowlen, LAPD	61.8 feet
RIDER COMMENTS	
Brakes applied very smooth. ABS comes on immediately. Weight transfer is very manageable. Easy to control with good feedback to the rider.	

2010 KAWASAKI CONCOURS 14 ABS	
RIDER	DRY TO WET STOP
Officer J. Poland, LAPD	67.1 feet
RIDER COMMENTS	
Motorcycle did not feel like it was on a wet surface, stopped smoothly. Front brake is an easy pull and light hand pressure in ABS mode. Bike stayed centered and straight through the stop.	

2011 HARLEY-DAVIDSON ELECTRA GLIDE	
RIDER	DRY TO WET STOP
Deputy S. Bryant, LASD	78.1 feet
RIDER COMMENTS	
The ABS worked well on the wet surface. I can tell no difference between the wet/dry and debris/dry braking	

2011 HARLEY-DAVIDSON ROAD KING	
RIDER	DRY TO WET STOP
Officer J. Poland, LAPD	69.3 feet
RIDER COMMENTS	
Motorcycle stayed centered and straight through the braking. Needed to pull hard on the front brake lever to apply and maintain ABS.	

2009 HONDA ST 1300-PA9	
RIDER	DRY TO WET STOP
Deputy M. Brown, LASD	66.0 feet
RIDER COMMENTS	
Dry to wet braking on the Honda was excellent. There was very little sensation of the bike entering ABS mode during full application of the brakes. Stopped in a straight line completely under control. Feedback to the rider was excellent.	

HARD BRAKING
60 MPH TO ZERO

2010 BMW R 1200 RT-P	
Braking Distance	126.45 feet @ 59.9 MPH
Evidence of Severe Fading Prior to Stopping?	NO
Did the Bike Stop in a Straight Line?	YES

2010 KAWASAKI CONCOURS 14 ABS	
Braking Distance	136.60 feet @ 59.8 MPH
Evidence of Severe Fading Prior to Stopping?	NO
Did the Bike Stop in a Straight Line?	YES

2011 HARLEY-DAVIDSON ELECTRA GLIDE	
Braking Distance	156.70 feet @ 60.2 MPH
Evidence of Severe Fading Prior to Stopping?	NO
Did the Bike Stop in a Straight Line?	YES

2011 HARLEY-DAVIDSON ROAD KING	
Braking Distance	140.2 feet @ 60.1 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	148.1 feet @ 59.0 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**

2010 BMW R 1200 RT-P

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

RIDING POSITION	CONSIDERATIONS	RATING
Seat Comfort	Padding, Springs, Width	9
Seat Position	Range of Adjustment	9
Riding Position	Lean Angle, Comfort	9
Floorboards / Pegs	Access to Foot Controls	9
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.</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 riding position is slightly lean forward which helps take pressure of the lower back</p>		

INSTRUMENT PANEL	CONSIDERATIONS	RATING
Controls	Position, Usability	9
Visibility	Instruments	8
Reflection / Glare	Windshield, Instruments	8
Instruments	Adequacy, Legibility	8
RIDER COMMENTS		
<p>The controls on the console/panel are easy to read and illuminated well during night operations. The switches were well thought out and placed on the handlebars. The instrument panel is easy to read at a glance. The instrument panel benefited from a hood that reduced glare off the instrument panel.</p>		

MIRRORS	CONSIDERATIONS	RATING
Road Visibility	Distortion, Obstruction	8
Reflections	Instruments, Controls	9
Mirror Coverage	Adjustment, Rear Visibility, Flat or Convex	9
Mirror Location	Accessibility, Visibility, Obstruction	9
RIDER COMMENTS		
<p>The rider's hands obstructed a portion of the view to the rear. The bottom half is very useable. Reflection was not an issue. The mirrors are placed inside the fairing which kept them from being an issue of striking other mirrors while splitting lanes. Provided rider with good visibility to the sides and rear.</p>		

WIND SCREEN	CONSIDERATIONS	RATING
Height / Width	Wind / Debris Protection	9
Adjustability	Electric or Manual, Ease of Use	9
Top Edge	Clear View Over Top of Windshield, (Bifocal Effect)	9
RIDER COMMENTS		
<p>The top edge of the windscreen was widened and re-shaped from last year's design. Wind and debris protection was much improved. The windscreen was electrically adjustable and was very easy to operate. Windshield height was adjustable on the fly which allowed for optimal visibility over the top of the windscreen.</p>		

CONTROLS	CONSIDERATIONS	RATING
Handlebars	Angle, Size, Position	9
Shift Levers	Usability, Shift Pad Position	9
Switches	Reach, Markings, Visibility, Accessibility	8
Rear Brake Pedal	Location, Feedback, Ease of Use	9
Front Brake Lever	Location, Feedback, Adjustability	9
Clutch Lever	Lever Resistance, Adjustability	9
RIDER COMMENTS		
<p>The handlebar angle, size, and position felt very natural. Handlebar switches are within easy reach and were marked with universal symbols. The shift lever was toe operated and was rider adjustable for height. The rear brake pedal was well positioned and provided good rider feedback. The front brake lever was adjustable for reach and provided good feedback. The clutch lever was adjustable for reach and provided light to medium resistance.</p>		

MOUNT / DISMOUNT	CONSIDERATIONS	RATING
Trunk Height	Ample Leg Swing Room	7
Foot Peg / Floorboard	Interferes With Mounting / Dismounting	8
Lean Angle	Side Stand of Adequate Length	9
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	9
Rider Size	Adjustability	9
RIDER COMMENTS		
<p>The ride quality and comfort was exceptionally smooth in both roadway and freeway riding with very minimal road irregularities transferred 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	9
Locks	Same Key, Security, Sturdiness	9
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 saddlebags open from the top and are not removable. The ignition key secures the saddlebag locks providing good equipment security.</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

2010 KAWASKI CONCOURS 14 ABS

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

RIDING POSITION	CONSIDERATIONS	RATING
Seat Comfort	Padding, Springs, Width	3
Seat Position	Range of Adjustment	N/A
Riding Position	Lean Angle, Comfort	5
Floorboards / Pegs	Access to Foot Controls	7
RIDER COMMENTS		
<p>The seat has very little padding and is shaped narrow in front, with a dished out contour to the rear. It is mounted solid to the frame with no adjustment. The seat did allow the rider to adjust the riding position slightly throughout the ride. Very little padding for long duty shifts, whether riding or sitting static to perform traffic enforcement. The riding position is forward, bent over at the hip with the rider's arms extended out. The position tends to get fatiguing when performing enforcement duties in a city or urban environment. The foot pegs are wide and well placed low on the motorcycle, allowing for a natural foot placement in relation to the foot controls.</p>		

INSTRUMENT PANEL	CONSIDERATIONS	RATING
Controls	Position, Usability	8
Visibility	Instruments	8
Reflection / Glare	Windshield, Instruments	7
Instruments	Adequacy, Legibility	8
RIDER COMMENTS		
<p>The instrument panel is configured with large dials for the speedometer and tachometer with a lighted information display, which provides tons of useful information (tire pressures, fuel level, mileage, engine temp). The instrument display is centrally located just below the windscreen, allowing the rider to glance down with little distraction from the road.</p>		

MIRRORS	CONSIDERATIONS	RATING
Road Visibility	Distortion, Obstruction	8
Reflections	Instruments, Controls	8
Mirror Coverage	Adjustment, Rear Visibility, Flat or Convex	8
Mirror Location	Accessibility, Visibility, Obstruction	8
RIDER COMMENTS		
<p>The fairing mounted, fold away convex mirror provided a clear wide angle view of traffic behind the motorcycle. The tops of the saddlebags were visible in the bottom of each mirror. The mirrors were vibration free and held position well.</p>		

WIND SCREEN	CONSIDERATIONS	RATING
Height / Width	Wind / Debris Protection	5
Adjustability	Electric or Manual, Ease of Use	8
Top Edge	Clear View Over Top of Windshield, (Bifocal Effect)	8
RIDER COMMENTS		
The windshield offered minimal wind and debris protection for the rider. It is electrically adjustable via an easy to use rocker switch. In the fully up position the windshield was too low causing wind noise and excessive helmet buffeting.		

CONTROLS	CONSIDERATIONS	RATING
Handlebars	Angle, Size, Position	5
Shift Levers	Usability, Shift Pad Position	8
Switches	Reach, Markings, Visibility, Accessibility	9
Rear Brake Pedal	Location, Feedback, Ease of Use	9
Front Brake Lever	Location, Feedback, Adjustability	9
Clutch Lever	Lever Resistance, Adjustability	8
RIDER COMMENTS		
The handlebars are spaced shoulder width apart and positioned well forward over the front of the gas tank. This forces the rider into a bent over riding position, placing a lot of downward pressure on the arms and hands. Gear shift lever is placed in a natural position, providing plenty of room for both up and down shifting. Switches are big enough to allow the rider quick manipulation. Both the clutch and front brake levers were mounted in close proximity to the grips and provide a wide range of adjustment.		

MOUNT / DISMOUNT	CONSIDERATIONS	RATING
Trunk Height	Ample Leg Swing Room	8
Foot Peg / Floorboard	Interferes With Mounting / Dismounting	8
Lean Angle	Side Stand of Adequate Length	9
RIDER COMMENTS		
The trunk is noticeably high in relation to the driver, requiring a high leg swing to get on and off. Foot pegs are wide and positioned well. The side stand is positioned just behind the left foot peg and difficult to deploy quickly. The length of the side stand provided adequate lean angle.		

SUSPENSION	CONSIDERATIONS	RATING
Quality of Ride	Dampening, Rebound	4
Rider Size	Adjustability	5
RIDER COMMENTS		
The front and rear suspensions are both adjustable for the rider. The ride was extremely firm and rough on both city rides and highway rides. The suspension had to be softened considerably to complete the ride.		

STORAGE	CONSIDERATIONS	RATING
Saddlebags	Angle, Size and Position of Opening	6
Locks	Same Key, Security, Sturdiness	8
RIDER COMMENTS		
<p>The saddlebags open clamshell style and are very large. This significantly adds to the width of the rear of the motorcycle. The ignition key operates the saddlebag locks providing good security and sturdiness. The saddlebags can only be opened using a key. The key cannot be removed from the saddlebag lock while it in the opened position. The inner saddlebag storage and outer saddlebag lid storage was divided by an elastic cross strap.</p>		

ADDITIONAL RIDER COMMENTS
<p>The motorcycle has great acceleration and braking performance but has a surprisingly heavy bar feel when inputting counter steer. The motorcycle is really wide and a lot of work to maneuver in and around heavy traffic, on city streets. Difficult to split lanes. Adding a taller windshield, making some suspension improvements, and moving the handlebars back towards the rider would be very welcome improvements.</p>

ERGONOMICS EVALUATION SUBJECTIVE **EVALUATION – 157 MILE RIDE**

2011 HARLEY DAVIDSON ELECTRA GLIDE

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

RIDING POSITION	CONSIDERATIONS	RATING
Seat Comfort	Padding, Springs, Width	7
Seat Position	Range of Adjustment	6
Riding Position	Lean Angle, Comfort	7
Floorboards / Pegs	Access to Foot Controls	7
RIDER COMMENTS		
<p>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.</p>		

INSTRUMENT PANEL	CONSIDERATIONS	RATING
Controls	Position, Usability	7
Visibility	Instruments	7
Reflection / Glare	Windshield, Instruments	7
Instruments	Adequacy, Legibility	6
RIDER COMMENTS		
<p>The instrument panel is configured with large dials for speedo and tach but only has a small display for fuel, turn signals, and high beams indicators. The lighted display was dim and hard to read in the bright sunlight.</p>		

MIRRORS	CONSIDERATIONS	RATING
Road Visibility	Distortion, Obstruction	7
Reflections	Instruments, Controls	8
Mirror Coverage	Adjustment, Rear Visibility, Flat or Convex	6
Mirror Location	Accessibility, Visibility, Obstruction	7
RIDER COMMENTS		
<p>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 but are small and do not provide the rider with much for a field of view. Convex mirror would be better. The mirrors vibrated on the freeway and at idle which caused the view to become distorted.</p>		

WIND SCREEN	CONSIDERATIONS	RATING
Height / Width	Wind / Debris Protection	6
Adjustability	Electric or Manual, Ease of Use	N/A
Top Edge	Clear View Over Top of Windshield, (Bifocal Effect)	9
RIDER COMMENTS		
<p>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.</p>		

CONTROLS	CONSIDERATIONS	RATING
Handlebars	Angle, Size, Position	7
Shift Levers	Usability, Shift Pad Position	7
Switches	Reach, Markings, Visibility, Accessibility	8
Rear Brake Pedal	Location, Feedback, Ease of Use	8
Front Brake Lever	Location, Feedback, Adjustability	7
Clutch Lever	Lever Resistance, Adjustability	7
RIDER COMMENTS		
<p>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.</p>		

MOUNT / DISMOUNT	CONSIDERATIONS	RATING
Trunk Height	Ample Leg Swing Room	N/A
Foot Peg / Floorboard	Interferes With Mounting / Dismounting	8
Lean Angle	Side Stand of Adequate Length	8
RIDER COMMENTS		
<p>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.</p>		

SUSPENSION	CONSIDERATIONS	RATING
Quality of Ride	Dampening, Rebound	7
Rider Size	Adjustability	N/A
RIDER COMMENTS		
<p>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.</p>		

STORAGE	CONSIDERATIONS	RATING
Saddlebags	Angle, Size and Position of Opening	4
Locks	Same Key, Security, Sturdiness	4
RIDER COMMENTS		
<p>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 sealed good, when locked down. Lids were a bit flimsy.</p>		

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. 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 is 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.</p>

ERGONOMICS EVALUATION SUBJECTIVE **EVALUATION – 157 MILE RIDE**

2011 HARLEY-DAVIDSON ROAD KING

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

RIDING POSITION	CONSIDERATIONS	RATING
Seat Comfort	Padding, Springs, Width	7
Seat Position	Range of Adjustment	6
Riding Position	Lean Angle, Comfort	7
Floorboards / Pegs	Access to Foot Controls	7
RIDER COMMENTS		
<p>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 forward with a slight angle back. Position felt awkward at slower speeds. Floorboards are close to the ground with minimal road clearance when lean angles are input in the handlebars.</p>		

INSTRUMENT PANEL	CONSIDERATIONS	RATING
Controls	Position, Usability	7
Visibility	Instruments	4
Reflection / Glare	Windshield, Instruments	7
Instruments	Adequacy, Legibility	5
RIDER COMMENTS		
<p>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.</p>		

MIRRORS	CONSIDERATIONS	RATING
Road Visibility	Distortion, Obstruction	6
Reflections	Instruments, Controls	8
Mirror Coverage	Adjustment, Rear Visibility, Flat or Convex	6
Mirror Location	Accessibility, Visibility, Obstruction	7
RIDER COMMENTS		
<p>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.</p>		

WIND SCREEN	CONSIDERATIONS	RATING
Height / Width	Wind / Debris Protection	5
Adjustability	Electric or Manual, Ease of Use	N/A
Top Edge	Clear View Over Top of Windshield, (Bifocal Effect)	9
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. Protection is adequate for warmer days. Lots of buffeting at higher speeds, lots of wind noise.</p>		

CONTROLS	CONSIDERATIONS	RATING
Handlebars	Angle, Size, Position	8
Shift Levers	Usability, Shift Pad Position	7
Switches	Reach, Markings, Visibility, Accessibility	9
Rear Brake Pedal	Location, Feedback, Ease of Use	8
Front Brake Lever	Location, Feedback, Adjustability	7
Clutch Lever	Lever Resistance, Adjustability	7
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	8
Lean Angle	Side Stand of Adequate Length	8
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	7
Rider Size	Adjustability	N/A
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 suspension offered a very firm quality of ride.</p>		

STORAGE	CONSIDERATIONS	RATING
Saddlebags	Angle, Size and Position of Opening	9
Locks	Same Key, Security, Sturdiness	7
RIDER COMMENTS		
<p>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 sealed good, when locked down. Lids were a bit flimsy.</p>		

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 does not corner well due to limited lean angle.</p>

ERGONOMICS EVALUATION SUBJECTIVE
EVALUATION – 157 MILE RIDE

2009 HONDA ST 1300-PA9

RIDING POSITION	CONSIDERATIONS	RATING
Seat Comfort	Padding, Springs, Width	7
Seat Position	Range of Adjustment	7
Riding Position	Lean Angle, Comfort	7
Floorboards / Pegs	Access to Foot Controls	8
RIDER COMMENTS		
<p>The seat is shaped well and has sufficient padding. The seat has three settings for height adjustment. The seat was firm, provided good support, and did not become objectionable. Riding position lean angle is slightly forward putting the handlebars within easy reach. Access to the toe shifter and rear brake control felt natural and was easy to operate.</p>		

INSTRUMENT PANEL	CONSIDERATIONS	RATING
Controls	Position, Usability	8
Visibility	Instruments	8
Reflection / Glare	Windshield, Instruments	8
Instruments	Adequacy, Legibility	8
RIDER COMMENTS		
<p>The instrument panel is configured on the fairing, well within proximity of the rider's view making it easy to refer to at a glance. The digital display is centrally located on the instrument cluster. Having a gear indicator display would be a nice feature.</p>		

MIRRORS	CONSIDERATIONS	RATING
Road Visibility	Distortion, Obstruction	9
Reflections	Instruments, Controls	8
Mirror Coverage	Adjustment, Rear Visibility, Flat or Convex	8
Mirror Location	Accessibility, Visibility, Obstruction	8
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	9
Adjustability	Electric or Manual, Ease of Use	9
Top Edge	Clear View Over Top of Windshield, (Bifocal Effect)	8
RIDER COMMENTS		
<p>The windscreen is electrically operated and can be adjusted quickly to the changing riding conditions. The rider is well protected from the wind and roadway debris. The windscreen deflects the wind around the rider with no turbulence or buffeting. Very good clarity with no visual distortion.</p>		

CONTROLS	CONSIDERATIONS	RATING
Handlebars	Angle, Size, Position	8
Shift Levers	Usability, Shift Pad Position	8
Switches	Reach, Markings, Visibility, Accessibility	8
Rear Brake Pedal	Location, Feedback, Ease of Use	8
Front Brake Lever	Location, Feedback, Adjustability	8
Clutch Lever	Lever Resistance, Adjustability	8
RIDER COMMENTS		
<p>The handlebars were adjusted with bar risers and were extended high enough to be comfortable on long rides yet forward enough to maintain good riding position. The foot shifter is mounted low in relationship to the left foot peg. Switches are within quick reach and clearly labeled. Both the clutch and front brake levers are adjustable with the standard rotary knob. Brakes have smooth application with good feedback to the rider.</p>		

MOUNT / DISMOUNT	CONSIDERATIONS	RATING
Trunk Height	Ample Leg Swing Room	8
Foot Peg / Floorboard	Interferes With Mounting / Dismounting	8
Lean Angle	Side Stand of Adequate Length	8
RIDER COMMENTS		
<p>Trunk height on the Honda was not objectionable. There was ample leg swing room while mounting and dismounting from either side of the bike. The foot pegs did not interfere at all. Side stand length was adequate to safely support the motorcycle at a proper lean angle.</p>		

SUSPENSION	CONSIDERATIONS	RATING
Quality of Ride	Dampening, Rebound	8
Rider Size	Adjustability	7
RIDER COMMENTS		
The overall quality of the ride is good although the suspension is moderately stiff but still provides good roadway feedback.		

STORAGE	CONSIDERATIONS	RATING
Saddlebags	Angle, Size and Position of Opening	7
Locks	Same Key, Security, Sturdiness	7
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
Motorcycle was easy to mount and sat at a nice height. Very agile and maneuverable, felt comfortable to ride. Adjustments to the suspension to smooth out roadway imperfections and top opening saddlebags designed to better handle patrol gear would be welcome improvements

ACCELERATION & FUEL EFFICIENCY

ACCELERATION EVALUATION

SPEED	BMW R1200 RT-P	HD – ELECTRA GLIDE	HONDA ST1300
0-30 MPH	2:31	2:41	2:01
0-60 MPH	5:22	6:63	4:26
0-100 MPH	11:90	19:32	10:74
30-60 MPH	2:66	3:68	2:27
60-100 MPH	6:43	15:33	6:00
¼ MILE	13:65 @ 105.70	15:72@87.84	12:89@106.70

SPEED	KAWASAKI CONCOURS	HD – ROAD KING GLIDE	
0-30 MPH	2:32	2:53	
0-60 MPH	4:21	6:03	
0-100 MPH	9:00	22:05	
30-60 MPH	1:89	3:77	
60-100 MPH	4:49	16:41	
¼ MILE	12:55@115.92	15:02@91.66	

FUEL EFFICIENCY EVALUATION

MOTORCYCLE	COMBINED AVERAGE Four 157 Mile Loops
2010 BMW R-1200RT-P	38.4 MPG
2010 KAWASKI CONCOURS 14 ABS	29.0 MPG
2011 HARLEY DAVIDSON ELECTRA GLIDE	35.0 MPG
2011 HARLEY DAVIDSON ROAD KING	36.0 MPG
2009 HONDA ST-1300 PA9	36.1 MPG

HEAT EVALUATION

HEAT EVALUATION
IMMEDIATELY FOLLOWING 32 LAP COURSE

2010 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-134° Rear-170°	
Engine	235°	
Transmission	117°	
Exhaust	191°	

2010 KAWASAKI CONCOURS 14 ABS		
ITEM	MANUFACTURERS RECOMMENDATION	TEST RESULT
Radiator Water	180° to 220°	Pass
Engine Oil	180° to 250°	Pass
Transmission Oil	N/A Part of the engine case	N/A
RADIANT HEAT		
Radiator	158°	
Brake Rotors	Front-294° Rear-220°	
Engine	236°	
Transmission	N/A	
Exhaust	190°	

2011 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	Front-203° Rear-171°	
Engine	316°	
Transmission	256°	
Exhaust	170°	

2011 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-147° Rear-226°	
Engine	300.5°	
Transmission	227°	
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	200°	
Brake Rotors	Front-232° Rear-314°	
Engine	194°	
Transmission	N/A	
Exhaust	228°	

SOUND LEVEL EVALUATION

SOUND LEVEL EVALUATION

2010 BMW R 1200 RT-P	
SPEED	MEASURED dB
40 MPH (Sustained Speed)	96.8dB
60 MPH (Sustained Speed)	105.6dB
80 MPH (Sustained Speed)	105.3dB
Accelerate zero to 80 mph	116.8dB

2010 KAWASAKI CONCOURS 14 ABS	
SPEED	MEASURED dB
40 MPH (Sustained Speed)	104.2dB
60 MPH (Sustained Speed)	110.0dB
80 MPH (Sustained Speed)	109.7dB
Accelerate zero to 80 mph	119.8dB

2011 HARLEY DAVIDSON ELECTRA GLIDE	
SPEED	MEASURED dB
40 MPH (Sustained Speed)	103.5dB
60 MPH (Sustained Speed)	110.7dB
80 MPH (Sustained Speed)	118.4dB
Accelerate zero to 80 mph	126.5dB

2011 HARLEY DAVIDSON ROAD KING	
SPEED	MEASURED dB
40 MPH (Sustained Speed)	103.0dB
60 MPH (Sustained Speed)	111.1dB
80 MPH (Sustained Speed)	113.4dB
Accelerate zero to 80 mph	123.2dB

2009 HONDA ST 1300-PA9	
SPEED	MEASURED dB
40 MPH (Sustained Speed)	98.6dB
60 MPH (Sustained Speed)	106.7dB
80 MPH (Sustained Speed)	106.1dB
Accelerate zero to 80 mph	117.8dB

MECHANICAL EVALUATION

MECHANICAL EVALUATION

2010 BMW R 1200 RT-P

ELECTRICAL SYSTEM	CONSIDERATIONS	RATING
Battery	Accessibility, Group, Size	6
Alternator	Accessibility, Amperage	4
Stator	Accessibility, Amperage	5
Starter	Accessibility, Power	6
Ignition	Accessibility	6
Spark Plugs	Accessibility	6
Lights	Accessibility of Headlight Adjustment, Ease of Replacement	6
Fuse Box	Accessibility, Serviceability	7
FUEL SYSTEM	CONSIDERATIONS	RATING
Fuel Injection	Accessibility, Serviceability	6
Fuel Pump	Accessibility, Serviceability	6
Fuel Filter	Accessibility, Serviceability	6
Fuel Tank / Lines	Accessibility, Puncture Resistant	6
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	2
Drain Plug	Ease of Removal, Protection	6
Fluid Level Sight Glass	Accessibility, Night Usability	4
Clutch	Accessibility, Serviceability	4
Cooler	Accessibility, Protection	N/A
BRAKES	CONSIDERATIONS	RATING
Master Cylinder	Accessibility, Protection	6
Power Brake Assist	Accessibility	N/A
Front Wheel Brakes	Accessibility	7
Rear Wheel Brakes	Accessibility	7
ABS System	Accessibility, Serviceability, Reparability	6
EXHAUST SYSTEM	CONSIDERATIONS	RATING
Catalytic Converter	Accessibility, Protection	6
Muffler	Accessibility	7
Pipes	Accessibility, Support	6
Header Pipes	Accessibility, Protection	6

MECHANICAL EVALUATION **BMW R 1200 RT-P - Continued**

BODY	CONSIDERATIONS	RATING
Windshield	Ease of Removal	7
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	6
Foot Controls	Accessibility, Serviceability, Protection	6
Saddlebags	Accessibility, Protection	6
ENGINE & ACCESSORIES	CONSIDERATIONS	RATING
Engine	Accessibility, Ease of Removal	4
Cylinder Head	Accessibility, Ease of Removal	7
Valve Covers	Accessibility, Valve Train Serviceability	7
Cylinder Removal	Accessibility, Serviceability,	7
Drain Plug	Ease of Removal, Durability	7
Fluid Level Sight Glass	Accessibility, Night Usability	6
Oil Filter	Accessibility, Capacity, Protection	7
Engine Mounts	Accessibility	4
Oil Coolers	Accessibility, Protection	7
STEERING & SUSPENSION	CONSIDERATIONS	RATING
Front Forks	Accessibility, Serviceability, Adjustability	6
Front Suspension	Accessibility, Serviceability	6
Rear Shock Absorbers	Accessibility, Serviceability	6
Rear Swing Arm	Accessibility, Serviceability	6
Front Tire	Accessibility, Ease of Removal	6
Axle Bearings & Seals	Accessibility, Serviceability	6
REAR AXLE DRIVE SHAFT	CONSIDERATIONS	RATING
Rear Gearbox	Accessibility, Serviceability	6
Drive Chain	Accessibility, Serviceability	N/A
Axle Bearings & Seals	Accessibility, Serviceability	5
Drive Shaft	Accessibility, Serviceability	6
Universal Joints	Accessibility, Serviceability	6
Rear Tire	Accessibility, Ease of Removal	8

MECHANICAL EVALUATION

2010 KAWASAKI CONCOURS 14 ABS

ELECTRICAL SYSTEM	CONSIDERATIONS	RATING
Battery	Accessibility, Group, Size	4
Alternator	Accessibility, Amperage	N/A
Stator	Accessibility, Amperage	4
Starter	Accessibility, Power	3
Ignition	Accessibility	3
Spark Plugs	Accessibility	3
Lights	Accessibility of Headlight Adjustment, Ease of Replacement	6
Fuse Box	Accessibility, Serviceability	6
FUEL SYSTEM	CONSIDERATIONS	RATING
Fuel Injection	Accessibility, Serviceability	5
Fuel Pump	Accessibility, Serviceability	6
Fuel Filter	Accessibility, Serviceability	6
Fuel Tank / Lines	Accessibility, Puncture Resistant	6
COOLING SYSTEM	CONSIDERATIONS	RATING
Radiator	Accessibility, Protection, Adequate Size	7
Water Pump	Accessibility, Belt Arrangement	7
Hoses	Accessibility	7
Coolant Recovery	Accessibility, Capacity	7
TRANSMISSION	CONSIDERATIONS	RATING
Transmission / Gearbox	Ease of Removal, Serviceability	3
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	5
Power Brake Assist	Accessibility	N/A
Front Wheel Brakes	Accessibility	5
Rear Wheel Brakes	Accessibility	5
ABS System	Accessibility, Serviceability, Reparability	5
EXHAUST SYSTEM	CONSIDERATIONS	RATING
Catalytic Converter	Accessibility, Protection	N/A
Muffler	Accessibility	6
Pipes	Accessibility, Support	5
Header Pipes	Accessibility, Protection	4

MECHANICAL EVALUATION
KAWASAKI CONCOURS 14 ABS - Continued

BODY	CONSIDERATIONS	RATING
Windshield	Ease of Removal	7
Crash Bars	Accessibility, Ease of Removal	5
Patrol Equipment, Lights	Ease of Installation	5
Instrument Panels	Accessibility, Serviceability	5
Body Wiring	Accessibility, Serviceability, Protection	5
Seat	Ease of Removal	4
Body Panels	Ease of Removal	5
Handlebar Controls	Accessibility, Serviceability, Protection	6
Foot Controls	Accessibility, Serviceability, Protection	6
Saddlebags	Accessibility, Protection	6
ENGINE & ACCESSORIES	CONSIDERATIONS	RATING
Engine	Accessibility, Ease of Removal	5
Cylinder Head	Accessibility, Ease of Removal	4
Valve Covers	Accessibility, Valve Train Serviceability	3
Cylinder Removal	Accessibility, Serviceability,	3
Drain Plug	Ease of Removal, Durability	7
Fluid Level Sight Glass	Accessibility, Night Usability	8
Oil Filter	Accessibility, Capacity, Protection	8
Engine Mounts	Accessibility	6
Oil Coolers	Accessibility, Protection	N/A
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	5
REAR AXLE DRIVE SHAFT	CONSIDERATIONS	RATING
Rear Gearbox	Accessibility, Serviceability	5
Drive Chain	Accessibility, Serviceability	N/A
Axle Bearings & Seals	Accessibility, Serviceability	5
Drive Shaft	Accessibility, Serviceability	5
Universal Joints	Accessibility, Serviceability	4
Rear Tire	Accessibility, Ease of Removal	4

MECHANICAL EVALUATION

2011 HARLEY-DAVIDSON ELECTRA GLIDE

ELECTRICAL SYSTEM	CONSIDERATIONS	RATING
Battery	Accessibility, Group, Size	5
Alternator	Accessibility, Amperage	5
Stator	Accessibility, Amperage	5
Starter	Accessibility, Power	5
Ignition	Accessibility	5
Spark Plugs	Accessibility	6
Lights	Accessibility of Headlight Adjustment, Ease of Replacement	6
Fuse Box	Accessibility, Serviceability	5
FUEL SYSTEM	CONSIDERATIONS	RATING
Fuel Injection	Accessibility, Serviceability	4
Fuel Pump	Accessibility, Serviceability	4
Fuel Filter	Accessibility, Serviceability	4
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	3
Drain Plug	Ease of Removal, Protection	7
Fluid Level Sight Glass	Accessibility, Night Usability	8
Clutch	Accessibility, Serviceability	7
Cooler	Accessibility, Protection	N/A
BRAKES	CONSIDERATIONS	RATING
Master Cylinder	Accessibility, Protection	5
Power Brake Assist	Accessibility	N/A
Front Wheel Brakes	Accessibility	5
Rear Wheel Brakes	Accessibility	4
ABS System	Accessibility, Serviceability, Reparability	4
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	7
Crash Bars	Accessibility, Ease of Removal	5
Patrol Equipment, Lights	Ease of Installation	6
Instrument Panels	Accessibility, Serviceability	3
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	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	5
Fluid Level Sight Glass	Accessibility, Night Usability	5
Oil Filter	Accessibility, Capacity, Protection	4
Engine Mounts	Accessibility	3
Oil Coolers	Accessibility, Protection	4
STEERING & SUSPENSION	CONSIDERATIONS	RATING
Front Forks	Accessibility, Serviceability, Adjustability	3
Front Suspension	Accessibility, Serviceability	3
Rear Shock Absorbers	Accessibility, Serviceability	4
Rear Swing Arm	Accessibility, Serviceability	3
Front Tire	Accessibility, Ease of Removal	4
Axle Bearings & Seals	Accessibility, Serviceability	4
REAR AXLE DRIVE SHAFT	CONSIDERATIONS	RATING
Rear Gearbox	Accessibility, Serviceability	N/A
Drive Chain	Accessibility, Serviceability	2
Axle Bearings & Seals	Accessibility, Serviceability	4
Drive Shaft	Accessibility, Serviceability	N/A
Universal Joints	Accessibility, Serviceability	N/A
Rear Tire	Accessibility, Ease of Removal	3

MECHANICAL EVALUATION

2011 HARLEY-DAVIDSON ROAD KING

ELECTRICAL SYSTEM	CONSIDERATIONS	RATING
Battery	Accessibility, Group, Size	5
Alternator	Accessibility, Amperage	5
Stator	Accessibility, Amperage	5
Starter	Accessibility, Power	5
Ignition	Accessibility	5
Spark Plugs	Accessibility	8
Lights	Accessibility of Headlight Adjustment, Ease of Replacement	6
Fuse Box	Accessibility, Serviceability	5
FUEL SYSTEM	CONSIDERATIONS	RATING
Fuel Injection	Accessibility, Serviceability	4
Fuel Pump	Accessibility, Serviceability	4
Fuel Filter	Accessibility, Serviceability	4
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	3
Drain Plug	Ease of Removal, Protection	7
Fluid Level Sight Glass	Accessibility, Night Usability	7
Clutch	Accessibility, Serviceability	7
Cooler	Accessibility, Protection	N/A
BRAKES	CONSIDERATIONS	RATING
Master Cylinder	Accessibility, Protection	5
Power Brake Assist	Accessibility	N/A
Front Wheel Brakes	Accessibility	5
Rear Wheel Brakes	Accessibility	4
ABS System	Accessibility, Serviceability, Reparability	4
EXHAUST SYSTEM	CONSIDERATIONS	RATING
Muffler	Accessibility	6
Pipes	Accessibility, Support	6
Header Pipes	Accessibility, Protection	6

MECHANICAL EVALUATION

ROAD KING - Continued

BODY	CONSIDERATIONS	RATING
Windshield	Ease of Removal	7
Crash Bars	Accessibility, Ease of Removal	5
Patrol Equipment, Lights	Ease of Installation	6
Instrument Panels	Accessibility, Serviceability	5
Body Wiring	Accessibility, Serviceability, Protection	5
Seat	Ease of Removal	6
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	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	5
Fluid Level Sight Glass	Accessibility, Night Usability	5
Oil Filter	Accessibility, Capacity, Protection	4
Engine Mounts	Accessibility	3
Oil Coolers	Accessibility, Protection	4
STEERING & SUSPENSION	CONSIDERATIONS	RATING
Front Forks	Accessibility, Serviceability, Adjustability	3
Front Suspension	Accessibility, Serviceability	3
Rear Shock Absorbers	Accessibility, Serviceability	4
Rear Swing Arm	Accessibility, Serviceability	3
Front Tire	Accessibility, Ease of Removal	4
Axle Bearings & Seals	Accessibility, Serviceability	4
REAR AXLE DRIVE SHAFT	CONSIDERATIONS	RATING
Rear Gearbox	Accessibility, Serviceability	N/A
Drive Chain	Accessibility, Serviceability	2
Axle Bearings & Seals	Accessibility, Serviceability	4
Drive Shaft	Accessibility, Serviceability	N/A
Universal Joints	Accessibility, Serviceability	N/A
Rear Tire	Accessibility, Ease of Removal	3

MECHANICAL EVALUATION

HONDA ST 1300-PA9

ELECTRICAL SYSTEM	CONSIDERATIONS	RATING
Battery	Accessibility, Group, Size	5
Alternator	Accessibility, Amperage	3
Stator	Accessibility, Amperage	3
Starter	Accessibility, Power	3
Ignition	Accessibility	3
Spark Plugs	Accessibility	3
Lights	Accessibility of Headlight Adjustment, Ease of Replacement	4
Fuse Box	Accessibility, Serviceability	4
FUEL SYSTEM	CONSIDERATIONS	RATING
Fuel Injection	Accessibility, Serviceability	5
Fuel Pump	Accessibility, Serviceability	4
Fuel Filter	Accessibility, Serviceability	4
Fuel Tank / Lines	Accessibility, Puncture Resistant	4
COOLING SYSTEM	CONSIDERATIONS	RATING
Radiator	Accessibility, Protection, Adequate Size	4
Water Pump	Accessibility, Belt Arrangement	4
Hoses	Accessibility	4
Coolant Recovery	Accessibility, Capacity	4
TRANSMISSION	CONSIDERATIONS	RATING
Transmission / Gearbox	Ease of Removal, Serviceability	2
Drain Plug	Ease of Removal, Protection	5
Fluid Level Sight Glass	Accessibility, Night Usability	5
Clutch	Accessibility, Serviceability	5
Cooler	Accessibility, Protection	N/A
BRAKES	CONSIDERATIONS	RATING
Master Cylinder	Accessibility, Protection	5
Power Brake Assist	Accessibility	N/A
Front Wheel Brakes	Accessibility	5
Rear Wheel Brakes	Accessibility	5
ABS System	Accessibility, Serviceability, Reparability	5
EXHAUST SYSTEM	CONSIDERATIONS	RATING
Catalytic Converter	Accessibility, Protection	5
Muffler	Accessibility	5
Pipes	Accessibility, Support	5
Header Pipes	Accessibility, Protection	5

MECHANICAL EVALUATION

HONDA ST1300- 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	5
Body Wiring	Accessibility, Serviceability, Protection	5
Seat	Ease of Removal	4
Body Panels	Ease of Removal	5
Handlebar Controls	Accessibility, Serviceability, Protection	6
Foot Controls	Accessibility, Serviceability, Protection	5
Saddlebags	Accessibility, Protection	4
ENGINE & ACCESSORIES	CONSIDERATIONS	RATING
Engine	Accessibility, Ease of Removal	4
Cylinder Head	Accessibility, Ease of Removal	4
Valve Covers	Accessibility, Valve Train Serviceability	4
Cylinder Removal	Accessibility, Serviceability,	3
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	4
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	5
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	4

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.

***Note – Communications evaluations were not performed on the test motorcycles during this year's Annual Vehicle Test.**