



Michigan State Police Tests 2002 Patrol Vehicles

Patrol vehicles are one of the most critical purchases that a law enforcement agency makes. For both large and small agencies, patrol vehicle purchases frequently represent the second largest expenditure, after personnel, in their annual operating budgets. Selecting a vehicle that balances both budgetary and performance requirements has become an increasingly challenging task for police fleet administrators. Many agencies are painfully aware of the consequences that result from being “penny wise and pound foolish,” where vehicles with inadequate performance, such as regular production passenger vehicles not specifically designed for police service, are selected because they cost less than police-package vehicles. Although some agencies have had limited success with nontraditional police vehicles, most agencies find that the increased maintenance costs resulting from such vehicles breaking down under the stress of police service quickly offset any initial savings.

For more than 25 years, the Michigan State Police (MSP) has conducted extensive evaluations of the performance capabilities of each new model year’s police vehicles as part of its annual vehicle procurement process. Since 1981, the National Institute of Justice (NIJ), through its National Law Enforcement and Corrections Technology Center (NLECTC), has sponsored these tests through a partnership with MSP. By disseminating these results to State and local law enforcement agencies, NIJ helps these agencies select vehicles that maximize their budgets and ensures that evaluated vehicles provide reliable and safe performance under the increased demands of police service.

The 2002 model year patrol vehicles were evaluated from September 15 through 17, 2001. For the purposes of the MSP evaluation, police-package vehicles are those that are designed and manufactured for use

in the full spectrum of law enforcement patrol service, including pursuits. A special-service vehicle is a vehicle that may be used by law enforcement agencies for specialized use (e.g., off-road, inclement weather, K-9, or commercial vehicle enforcement), but is not designed or manufactured to be used in pursuit situations. By creating this distinction, it is hoped that it will be easier for agencies to realistically assess the capabilities of each vehicle.

Each vehicle is subjected to six major tests and evaluations. The results are weighted to reflect the relative importance of each attribute as related to MSP operational requirements. Table 1 lists the tests and point scores. MSP scores each vehicle’s overall performance, reviews the manufacturer’s bid price, and calculates a final score for each vehicle using a sophisticated formula that combines the overall performance score and the manufacturer’s price.

Six police-package vehicles and eight special-service vehicles were submitted for evaluation. Table 2 provides a complete list and description of each vehicle. This NLECTC bulletin contains a synopsis of the test results; a detailed report also is available. Page 6 of this bulletin contains information on how to obtain the report.

Table 1 Tests and scoring

Test	Points
Vehicle dynamics	30
Acceleration	20
Top speed	15
Braking	20
Ergonomics and communications	10
Fuel economy	5
Total	100

The MSP vehicle specifications, test categories, and scoring reflect MSP needs. If your department employs this or a similar method, consider your own needs carefully and alter the weighting factors accordingly.

What's New for 2002

AM General: The AM General Hummer was once again submitted for testing as a police-package vehicle. There are no significant changes from the 2001 model.

Chevrolet: For the 2002 model year, the Impala is once again available in both the 9C1 police package and the 9C3 unmarked police package. The only change from the 2001 model year is that dual-zone temperature control is now standard.

2002 marks the final year of production for the Camaro B4C special-service police package, as Chevrolet will discontinue production of the entire Camaro model line at the end of the 2002 model year. For the 2002 model year, the Camaro special-service police package will be available only with a 4-speed automatic transmission.

The Tahoe is once again available in either a 2-wheel-drive (2WD) or 4-wheel-drive (4WD) special-service package. In addition to the standard 4.8L (292 cid) engine, a new 5.3L (327 cid) engine, rated at 285 horsepower, is an available option on both models.

DaimlerChrysler: DaimlerChrysler is fielding an entirely new lineup of police-package and special-service vehicles for the 2002 model year. The Jeep Cherokee, DaimlerChrysler's long-time mainstay in the police-package category, was discontinued after the 2001 model year.

The most significant new entry is the Dodge Intrepid sedan, which is the first police-package sedan entered by DaimlerChrysler in the MSP tests since the Dodge Diplomat in 1989. The Intrepid police-package sedan is a front-wheel-drive sedan equipped with a 3.5L Magnum® V6 engine, rated at 242 horsepower and 248 lb-ft of torque, which is connected to a 4-speed automatic transaxle with overdrive. Other standard equipment includes a 160-amp, high-output alternator, heavy-duty cooling and suspension, and 4-wheel antilock disc brakes. The Intrepid is available as both a police-package and a special-service sedan.

To replace the Cherokee, DaimlerChrysler has made the Dodge Durango SLT+ available as a special-service package, available in 2WD and 4WD models. Both models are equipped with a 4.7L (287 cid) V6 engine, rated at 235 horsepower and 295 ft-lbs of torque.

Ford: The 2002 Police Interceptor is a carryover from the 2001 model year and will be manufactured only through the end of the 2001 calendar year. In March 2002, Ford will introduce the 2003 Police Interceptor as a midyear replacement. The exterior sheet metal and interior of the 2003 model will remain basically the same as the 2002. The major differences between the 2002 and 2003 models are enhancements to the frame, suspension, and braking. The 2003 model will feature a new hydro-formed steel frame, which Ford engineers state will improve the strength of the frame and improve front-end crash performance. Also new will be the shocks, springs, suspension, and rack-and-pinion steering. Front- and rear-side airbags will be standard on the 2003, as will the antilock braking system (ABS). The 2003 also will feature new wheels with bolt-on wheel covers.

A compressed natural gas (CNG) version of the Police Interceptor will still be available; however, Ford elected not to submit a CNG version for testing for this model year.

New for the 2002 model year is the Long Wheelbase Crown Victoria special-service package. This model is a Crown Victoria sedan with an extended frame that adds 6 inches to the wheelbase that in turn provide an

Table 2 Vehicles tested

Category	Vehicle	Engine
Police	AM General Hummer HMCS	6.5L (396 cid) Turbo-Diesel
Police	Chevrolet Camaro (Automatic)	5.7L (350 cid) SPFI
Police	Chevrolet Impala	3.8L (231 cid) SPFI
Special service	Chevrolet Tahoe (2-wheel drive)	5.3L (327 cid) SPFI
Special service	Chevrolet Tahoe (4-wheel drive)	5.3L (327 cid) SPFI
Police	DaimlerChrysler Dodge Intrepid	3.5L (214 cid) SPFI
Special service	DaimlerChrysler Dodge Durango SLT+ (2-wheel drive)	4.7L (287 cid) SMPI
Special service	DaimlerChrysler Dodge Durango SLT+ (4-wheel drive)	4.7L (287 cid) SMPI
Police	Ford Police Interceptor	4.6L (281 cid) SPFI
Police	Ford Police Interceptor (2003)	4.6L (281 cid) SPFI
Special service	Ford Excursion (4-wheel drive)	6.8L (415 cid) MPFI
Special service	Ford Expedition (4-wheel drive)	5.4L (330 cid) SMPI
Special service	Ford Explorer (4-wheel drive)	4.6L (281 cid) SFI
Special service	Ford Long Wheelbase Crown Victoria	4.6L (281 cid) SPFI

cid = cubic inch displacement
Turbo = turbocharged
L = liter

SPFI = sequential port fuel injection
SMPI = sequential multipoint fuel injection
MPFI = multipoint fuel injection

SFI = sequential fuel injection

additional 6 inches of rear-seat leg room. This vehicle was developed by Ford engineers in response to comments from law enforcement and taxi fleet managers, who requested a vehicle with additional rear-seat leg room for passengers. This vehicle is available only as a special-service package; however, Ford engineers state that if there is enough interest (sales) in the vehicle from the law enforcement community, they may consider further refinements necessary to make this model pursuit capable.

The 2002 Explorer special-service package was a mid-year replacement during the 2001 model year and was previously tested in the 2001 model year MSP tests. The Expedition and Excursion special-service packages are basically carryovers from the 2001 model year with no major changes or enhancements.

Vehicle Dynamics Testing

Objective: To determine high-speed pursuit handling characteristics. The 2-mile road racing course contains hills, curves, and corners; except for the absence of traffic, it simulates actual pursuit conditions. The evaluation measures each vehicle's blending of suspension components, acceleration capabilities, and braking characteristics.

Methodology: Each vehicle is driven 16 timed laps by four drivers. The final score is the average of the 12 fastest laps.

Table 3 shows the average results of the vehicle dynamics test.

Acceleration and Top-Speed Testing

Acceleration

Objective: To determine the time required for each test vehicle to accelerate from a standing start to 60 mph, 80 mph, and 100 mph.

Methodology: Using a Datron Non-Contact Optical Sensor in conjunction with a personal computer, each vehicle is driven through four acceleration sequences—two northbound and two southbound—to allow for wind direction. The average of the four is the score on the competitive test.

Top Speed

Objective: To determine each vehicle's speed at a distance of 1 mile and 2 miles and the actual top speed attainable within a distance of 14 miles from a standing start.

Methodology: Following the fourth acceleration run, the vehicle continues to accelerate to the top speed attainable within 14 miles from the start of the run. The highest speed attained within the 14 miles is the vehicle's score on the competitive test.

Table 4 summarizes the acceleration and top-speed test results.

Braking Testing

Objective: To determine the deceleration rate attained by each test vehicle on 12,* 60-to-0 mph impending skid (threshold) stops, with ABS in operation if the vehicle is so equipped. Each vehicle will be scored on the average deceleration rate it attains.

Methodology: Each vehicle will make two decelerations at specific, predetermined points on the test road from 90-to-0 mph at 22 ft/sec², with the driver using a decelerometer to maintain the deceleration rate. Immediately after these heat-up stops are completed, the vehicle will be turned around and will make six measured 60-to-0 mph impending skid (threshold) stops with ABS in operation, if the vehicle is so equipped, at specific, predetermined points. Following a 4-minute heat soak, the entire sequence will be repeated. The exact initial velocity at the beginning of each of the 60-to-0 mph decelerations and the exact distance required to make each stop will be recorded by means of a Datron Non-Contact Optical Sensor in conjunction with a personal computer. The data resulting from the 12* stops will be used to calculate the average deceleration rate, which is the vehicle's score for this test. Table 5 shows the results of the braking test.

***Note:** It was mutually agreed on by MSP and the participating vehicle manufacturers that the lowest (worst) deceleration rate recorded in each phase for all vehicles would not be used in determining the vehicle's final score. Therefore, for this year's test, the final scores are the average of the 10 best deceleration rates attained out of a total of 12 stops (for each phase of the test, the 5 best deceleration rates achieved in 6 total stops).

Table 3 Results of vehicle dynamics test

Make/Model	Average*
AM General Hummer HMCS 6.5L Turbo-Diesel	02:01.55
Chevrolet Camaro (Automatic) 5.7L SPFI	01:37.14
Chevrolet Impala 3.8L SPFI	01:44.65
Chevrolet Tahoe (2-wheel drive) 4.8L SPFI	**
Chevrolet Tahoe (4-wheel drive) 4.8L SPFI	**
DaimlerChrysler Dodge Intrepid 3.5L SPFI	1:42.83
DaimlerChrysler Dodge Durango SLT+ (2-wheel drive) 4.7L SMPI	**
DaimlerChrysler Dodge Durango SLT+ (4-wheel drive) 4.7L SMPI	**
Ford Police Interceptor 4.6L SPFI	01:42.55
Ford Police Interceptor (2003) 4.6L SPFI	01:42.60
Ford Excursion (4-wheel drive) 6.8L MPFI	**
Ford Expedition (4-wheel drive) 5.4L SMPI	**
Ford Explorer (4-wheel drive) 4.0L SFI	**
Ford Long Wheelbase Crown Victoria 4.6L SPFI	**

Note: Times are in minutes, seconds, and hundredths of a second; i.e., 1:29.74 = 1 minute, 29 seconds, and 74/100 of a second.
 * Average of the 12 fastest laps.
 ** The vehicle manufacturer has indicated that these vehicles are neither designed for nor intended to be used as pursuit vehicles. Therefore, these vehicles were not subjected to vehicle dynamics testing.

Ergonomics and Communications

Objectives: To rate the vehicle’s ability to provide a suitable environment for patrol officers to perform their job, to accommodate the required communications and emergency warning equipment, and to assess the relative difficulty of installing the equipment.

Methodology: A minimum of four officers independently and individually score each vehicle on comfort and instrumentation. Personnel from the Communications Division who are responsible for new car preparation conduct the communications portion of the evaluation, based on the relative difficulty of the necessary installations. Each factor is graded on a 1-to-10 scale, with 1 representing totally unacceptable and 10 representing superior. The scores are averaged to minimize personal prejudice. Table 6a shows a comparison of the exterior and interior dimensions of the vehicles evaluated. Table 6b shows the results of the ergonomics and communications test. (Only one of each model was tested because the interior dimensions are essentially the same.)

Fuel Economy

Objective: To determine fuel economy potential. The scoring data are valid and reliable for comparison, but may not necessarily be an accurate prediction of the car’s actual fuel economy.

Methodology: The vehicles’ scores are based on estimates of city fuel economy to the nearest one-tenth of a mile per gallon from data supplied by the vehicle manufacturers. Table 7 shows the estimated Environmental Protection Agency (EPA) fuel economy ratings, rounded to the nearest whole number, for city, highway, and combined driving conditions.

Table 4 Results of acceleration* and top-speed** test

Speed (mph)	AM General Hummer HMCS	Chevrolet Camaro (Automatic)	Chevrolet Impala	Chevrolet Tahoe (2WD)	Chevrolet Tahoe (4WD)	DaimlerChrysler Dodge Intrepid	DaimlerChrysler Dodge Durango SLT+ (2WD)	DaimlerChrysler Dodge Durango SLT+ (4WD)	Ford Police Interceptor	Ford Police Interceptor (2003)	Ford Excursion (4WD)	Ford Expedition (4WD)	Ford Explorer (4WD)	Ford Long Wheelbase Crown Victoria
0-20	2.87	1.57	2.06	1.95	1.97	1.98	1.83	1.90	1.85	1.99	2.09	2.03	2.35	2.04
0-30	5.41	2.42	3.28	3.18	3.16	3.21	3.07	3.23	3.14	3.29	3.60	3.66	3.82	3.64
0-40	8.82	3.29	4.71	4.50	4.55	4.60	4.73	5.01	4.49	4.70	5.24	5.37	5.61	5.26
0-50	13.65	4.34	6.70	6.36	6.53	6.40	6.77	7.32	6.17	6.58	7.59	7.57	7.93	7.20
0-60	20.03	5.69	9.21	8.62	8.73	8.72	9.23	10.08	8.42	8.84	10.31	10.58	11.07	9.90
0-70	30.36	7.10	11.98	11.07	11.53	11.30	12.77	14.03	10.84	11.28	13.51	13.88	14.47	13.00
0-80	56.25	8.75	15.44	14.88	15.82	14.35	17.08	19.08	13.77	14.29	17.94	18.21	18.82	16.49
0-90	N/A	10.94	20.47	19.86	20.54	18.80	22.46	25.12	18.14	18.74	23.70	25.94	25.28	21.29
0-100	N/A	13.48	26.27	N/A	N/A	24.27	30.19	34.93	23.34	23.83	N/A	36.27	34.31	29.60
Top speed in mph	83	159	124	98	98	135	114	112	129	127	93	105	105	104

* Figures represent the average of four runs.
 ** All vehicles are equipped with electronic speed limiters.
 N/A = Vehicle did not achieve or exceed speeds of 100 mph.

Table 5 Results of braking test

	AM General Hummer H1MCS	Chevrolet Camaro (Automatic)	Chevrolet Impala	Chevrolet Tahoe (2WD)	Chevrolet Tahoe (4WD)	DaimlerChrysler Dodge Intrepid	DaimlerChrysler Dodge Durango SLT+ (2WD)	DaimlerChrysler Dodge Durango SLT+ (4WD)	Ford Police Interceptor	Ford Police Interceptor (2003)	Ford Excursion (4WD)	Ford Expedition (4WD)	Ford Explorer (4WD)	Ford Long Wheelbase Crown Victoria
Phase I														
Avg. initial speed (mph)*	61.0	60.5	60.5	60.4	60.2	60.7	60.5	60.8	60.6	60.3	60.7	60.7	59.9	60.2
Avg. stopping distance (ft)*	179.04	147.02	154.04	157.20	153.28	156.80	154.94	163.06	141.60	155.58	172.5	172.04	141.32	148.42
Avg. deceleration rate* (ft/sec ²)	22.39	26.79	25.60	24.94	25.44	25.30	25.43	24.38	27.87	25.16	22.98	23.44	27.34	27.44
Phase II														
Avg. initial speed (mph)*	60.7	60.7	60.4	59.9	60.6	60.7	60.8	60.7	60.3	60.8	60.3	60.4	60.3	60.7
Avg. stopping distance (ft)*	172.08	140.4	148.10	159.32	167.80	149.32	161.60	165.88	142.30	159.98	162.78	156.38	141.86	151.24
Avg. deceleration rate* (ft/sec ²)	22.17	28.23	26.52	24.24	23.55	26.54	24.67	23.86	27.47	24.91	24.02	23.70	27.61	27.21
Avg. Deceleration Rate (ft/sec²)**	22.28	27.51	26.06	24.59	24.49	25.92	25.05	24.12	27.67	25.03	23.50	23.57	27.47	27.33
Projected stopping distance from 60 mph based on average deceleration rate (ft)	173.8	140.8	148.6	157.5	158.1	149.4	154.6	160.6	139.9	154.7	164.8	164.3	140.9	141.7

Note: All vehicles have antilocking braking systems.

* Figures represent the average of the five best results of six measured stops.

** Calculated from the average deceleration rate (ft/sec²) of the 10 best results (best 5 from each phase) of 12 measured stops.

Table 6a Summary of exterior and interior dimensions

Make/Model	Length (inches)	Height (inches)	Wheelbase (inches)	Weight (lbs)	Front Head Room (inches)	Rear Head Room (inches)	Front Leg Room (inches)	Rear Leg Room (inches)	
AM General Hummer	184.5 (a)	75.0	130.0	7455	37.5	36.7	36.0	36.0	
Chevrolet Camaro	193.2	51.3	101.1	3462	37.2	35.3	43.0	26.8	
Chevrolet Impala	200.1	57.3	110.5	3593	39.2	36.8	42.2	38.4	
Chevrolet Tahoe	198.9	76.3	116.0	5080/5303 (b)	40.7	39.4	41.3	38.6	
DaimlerChrysler Dodge Intrepid	203.7	55.9	113.0	3583	38.3	37.5	42.2	39.1	
DaimlerChrysler Dodge Durango SLT+	193.5	70.5/72.0 (b)	116.0	4567/4770 (b)	39.8	40.6	41.9	35.4	
Ford Police Interceptor	212.0	58.5	114.7	4043/4154 (c)	39.4	38.0	42.5	39.6	
Ford Excursion (4WD)	226.7	77.2	137.1	6646	41.0	41.1	42.3	40.5	
Ford Expedition (4WD)	204.6	74.3	119.1	5353	39.7	39.8	41.2	38.6	
Ford Explorer (4WD)	189.5	69.2	114.0	4496	39.9	38.9	42.4	37.2	
Ford Long Wheelbase Crown Victoria	218.0	58.5	120.7	4048	39.4	38.0	42.5	45.6	
Make/Model	Front Shoulder Room (inches)	Rear Shoulder Room (inches)	Front Hip Room (inches)	Rear Hip Room (inches)	Interior, Front (cubic feet)	Interior, Rear (cubic feet)	Interior, Combined (cubic feet)	Trunk Capacity/Max. Cargo (cubic feet)	Fuel Capacity (gallons)
AM General Hummer	78.8	78.8	50.6	50.6	61.6	61.6	123.2	57.85	42.0
Chevrolet Camaro	57.4	55.8	52.8	44.4	53.1	28.8	81.9	12.9 (d)	15.5
Chevrolet Impala	59.0	58.9	56.5	55.7	56.5	48.2	104.7	17.6 (e)	17.0
Chevrolet Tahoe	65.2	65.1	61.4	61.3	94.3	57.3	151.6	108.2	26.0
DaimlerChrysler Dodge Intrepid	59.0	58.1	56.3	56.6	55.0	49.5	104.5	18.4	17.0
DaimlerChrysler Dodge Durango SLT+	57.3	57.6	56.7	56.0	55.2	50.1	155.8	88.0	25.0
Ford Police Interceptor	60.8	60.3	57.1	59.0	58.2	51.1	109.3	20.6	19.0
Ford Excursion (4WD)	68.3	67.0	67.5	66.9	101.2	63.8	165.0	108.3	44.0
Ford Expedition (4WD)	63.9	64.4	63.0	62.4	93.2	55.8	149.0	106.1	26.0
Ford Explorer (4WD)	59.1	58.9	55.0	54.2	81.8	44.5	126.3	88.0	22.5
Ford Long Wheelbase Crown Victoria	60.8	60.3	57.1	59.0	58.2	60.1	118.3	20.6	19.0

* Sedans are measured for trunk capacity; SUVs/special-service vehicles are measured for maximum cargo (rear seats folded down).

(a) With winch.

(b) 2-wheel drive/4-wheel drive.

(c) 2002/2003 model year.

(d) Behind second seat; with second seat down = 32.8 cu. ft.

(e) With compact spare tire.

Table 6b Results of ergonomics and communications test

Vehicle	Score*
AM General Hummer	154.40
Chevrolet Camaro	161.98
Chevrolet Impala (9C1)	221.64
Chevrolet Tahoe (2WD)	229.56
Chevrolet Tahoe (4WD)	229.23
DaimlerChrysler Dodge Intrepid	218.34
DaimlerChrysler Dodge Durango SLT+ (2WD)	206.48
DaimlerChrysler Dodge Durango SLT+ (4WD)	205.19
Ford Police Interceptor	221.26
Ford Police Interceptor (2003)	223.08
Ford Excursion (4WD)	235.14
Ford Expedition (4WD)	228.63
Ford Explorer (4WD)	210.75
Ford Long Wheelbase Crown Victoria	223.35

* Scores are the total points the automobile received for each of 29 attributes the MSP considers important in determining the acceptability of the vehicle as a patrol car—for example, front seat adjustability, clarity of instrumentation, and front and back visibility. The higher the number, the better the vehicle scored.

If you would like a copy of the full report, write or call the National Law Enforcement and Corrections Technology Center, P.O. Box 1160, Rockville, MD 20849-1160, 800-248-2742, or 301-519-5060; or download it from JUSTNET, www.justnet.org.

Table 7 Fuel economy

Make/Model	EPA miles per gallon		
	City	Highway	Combined
AM General Hummer HMCS			
6.5L (396 cid) Turbo Diesel	9	10	9*
Chevrolet Camaro (Automatic)			
5.7L (350 cid) SPFI	17	27	20
Chevrolet Impala 3.8L (231 cid) SPFI	20	29	23
Chevrolet Tahoe (2-wheel drive)			
4.8L (292 cid) SPFI	15	20	16.5
Chevrolet Tahoe (4-wheel drive)			
4.8L (292 cid) SPFI	14	18	15
DaimlerChrysler Dodge Intrepid			
3.5L (214 cid) SPFI	18	26	21
DaimlerChrysler Dodge Durango			
SLT+ (2-wheel drive) 4.7L (287 cid) SMPI	14	19	16
DaimlerChrysler Dodge Durango			
SLT+ (4-wheel drive) 4.7L (287 cid) SMPI	13	17	15
Ford Police Interceptor 4.6L (281 cid) SPFI	15	22	18
Ford Police Interceptor (2003)			
4.6L (281 cid) SPFI	TBD	TBD	TBD
Ford Excursion (4-wheel drive)			
6.8L (415 cid) MPFI	N/A	N/A	N/A
Ford Expedition (4-wheel drive)			
5.4L (330 cid) SMPI	12	16	14
Ford Explorer (4-wheel drive)			
4.6L (281 cid) SFI	14	19	16
Ford Long Wheelbase Crown Victoria			
4.6L (281 cid) SPFI	17	25	20

* Estimated; Class III vehicle, not tested to EPA national fuel economy standards.
 N/A = Information not available at press time.
 TBD = Information will not be available until March 2002.

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