National Law Enforcement and Corrections Technology Center

Equipment Performance Report:

2000 Evaluation of Replacement Brake Pads for Police Patrol Vehicles

National Law Enforcement and Corrections Technology Center

U.S. Department of Justice
Office of Justice Programs
National Institute of Justice

Equipment Performance Report: 2000 Evaluation of Replacement Brake Pads for Police Patrol Vehicles

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Preface

The National Institute of Justice's National Law Enforcement and Corrections Technology Center is pleased to present the results of its second comprehensive evaluation of replacement brake pads for police patrol vehicles. When the project was first visualized, the goal was to provide law enforcement agencies across the country with information that would help them make more informed decisions about which brake pads would be best for their patrol vehicle fleets.

Readers familiar with the first replacement brake pad evaluation report, published in April 1998, will notice several significant changes in both the test methodologies employed and the primary focus of several of the tests, as well as the removal of the brake pad and rotor wear tests. These changes were a direct result of a meeting held in March 1998, after the draft of the first report was completed. At this meeting, representatives from the participating brake pad companies, brake specialists from the vehicle manufacturers, and other companies that supported the testing program provided feedback on the first round of tests.

While all participants were in agreement that this first attempt to evaluate replacement brake pads for police vehicles was a positive "first step," it was noted that several modifications to the methodology would further enhance the value of the information presented. It was generally agreed that while the deceleration rate attainable and stopping distances achieved in a panic stop are important to law enforcement, far more decelerations are made under normal driving and traffic conditions. Consequently, the group's recommendation was for future brake pad test programs to focus more on comparing pedal effort required to maintain targeted deceleration rate, with particular attention paid to pedal force as it relates to brake pad temperature. *(**Note:** When braking to a targeted deceleration rate, where the speed of the vehicle at brake application is the same, the stopping distance should also theoretically be the same, making any measurement of stopping distances irrelevant.)*

When reviewing the test data summaries contained in this report, the reader should consider the following points:

1. Generally speaking, when ***lower pedal force*** is required to maintain a given deceleration rate, the brake pad is working more efficiently. Clearly, low pedal force requirements can reduce driver fatigue, particularly in heavy traffic, stop-and-go situations, or any time that frequent brake applications are needed. Likewise, it can be of extreme importance to smaller drivers who may be less able to apply high levels of pressure to the brake when needed in pursuit or panic situations.

2. ***Low pedal force*** indicates that the friction material used in a given brake pad is more effective than that used in brake pads that require more pedal force. The more effective friction material could, in certain cases, translate into somewhat faster brake pad or rotor wear.

3. While a certain temperature level is necessary for proper functioning, ***excessive heat*** is generally the enemy of any type of mechanical device or system. In terms of brake system performance, excessively high temperatures can contribute to premature breakdown of rubber components, such as hoses and seals, as well as certain electronic components, such as Antilock Braking System (ABS) sensors. In addition, as brake fluid absorbs moisture from the atmosphere, high operating temperatures can raise the temperature of the brake fluid/water mixture in the cylinders and calipers to the point where the moisture turns to steam, or vaporizes. This produces a condition known as "vapor lock," resulting in reduced braking capability (evidenced by a "spongy" feeling when the brake pedal is depressed, or, in severe cases, the total loss of braking ability).

This report contains a large amount of data generated throughout the evaluation, which was conducted under a variety of test conditions. Score sheets compare the various brake pads' performance in several test categories but do not identify any overall

"winner" or "loser." Because driving conditions in different parts of the country vary widely, individual agencies are left with the task of identifying the most suitable brake pads for their patrol vehicles based on their own driving conditions and needs. It is important for agencies to place the appropriate weight on those portions of the test data most representative of the conditions they may encounter. For example, the brake pad that best meets the needs of an urban or suburban law enforcement agency that has a strict nonpursuit or non-high-speed policy may be different from what is best for a State police or highway patrol agency that is frequently involved in high-speed emergency or pursuit driving. In addition, the most suitable brake pad may also depend on the make and model of the patrol vehicle—under certain conditions, the best brake pads for use on a Ford Police Interceptor may be different from the best brake pads for a Chevrolet Impala.

The major manufacturers of replacement brake pads for police patrol vehicles were invited to participate and submit samples of brake pads for evaluation. In total, 12 aftermarket brands of brake pads were submitted for testing on the Ford Police Interceptor, and 10 brands for testing on the Chevrolet Impala. In addition, the original equipment brake pads that are supplied on each of the test cars by the factory were tested. (These OEM materials would typically be available at authorized Chevrolet or Ford dealership parts departments.)

The specific brake pad models that we tested, along with their appropriate part numbers and edge codes, are listed on pages 4–6 of this report. Also included in this listing are the company names, addresses, telephone numbers, e-mail addresses, and contact persons for each company providing test samples. (This will be particularly useful for those brake pad materials not readily available at normal wholesale or retail businesses.) We can speak with some certainty about the brake pads that we tested. We cannot, however, make any recommendations regarding a brake pad that we did not test, because we have no knowledge of its performance characteristics.

Each brand of brake pad was tested on two vehicles: a Ford Police Interceptor and a Chevrolet Impala. These two cars were selected for use as test vehicles because they represent the vast majority of police cars currently in use and will, we believe, continue to be the primary patrol vehicles over the next 2 to 3 years.

All of the test procedures were conducted on the 2-mile oval of Michigan Speedway (formerly known as Michigan International Speedway) in Brooklyn, Michigan. The asphalt surface used for the testing is very abrasive and has an extremely high-friction coefficient. This contributed to our achieving some unusually short stopping distances. Unfortunately, it would be unrealistic to expect similar stops on the more normal pavement surfaces of most public streets and roads. Regardless, the stopping distances reported are valid for comparison purposes.

The results presented in this report were calculated on a computer spreadsheet program with an infinite number of decimal places. Some calculations made on an adding machine or calculator will result in slightly different totals.

Acknowledgments

This evaluation of replacement brake pads for police patrol vehicles is the result of a recommendation made by the Law Enforcement and Corrections Technology Advisory Council (LECTAC). LECTAC consists of criminal justice officials from Federal, State, and local agencies who assess equipment needs and set priorities for developing equipment standards, guides, test reports, and other publications. LECTAC felt that an evaluation of police replacement brake pads was crucial to addressing the informational needs of law enforcement agencies in procuring equipment critical to the operation of their patrol vehicle fleets. It is hoped that this evaluation will help agencies to select, in a cost-effective manner, the best brake pads for their fleets.

The National Institute of Justice's National Law Enforcement and Corrections Technology Center (NLECTC) thanks Michigan Speedway for providing a test facility in Brooklyn, Michigan, that was well equipped to meet the needs for this evaluation, and for the assistance and hospitality of Michigan Speedway personnel during the testing process.

NLECTC thanks the Ford Motor Company and the Chevrolet Division of General Motors Corporation for the use of "police-package" vehicles for this evaluation.

A debt of gratitude is owed to Greening Laboratories, Inc., for making available its dynomometers and personnel to burnish each brake pad and rotor set prior to the testing.

The companies that submitted the brake pads for testing deserve special recognition and thanks as well; they are listed on pages 4–6 of this report.

Table of Contents

About the National Institute of Justice

The National Institute of Justice (NIJ), a component of the Office of Justice Programs, is the research agency of the U.S. Department of Justice. Created by the Omnibus Crime Control and Safe Streets Act of 1968, as amended, NIJ is authorized to support research, evaluation, and demonstration programs, development of technology, and both national and international information dissemination. Specific mandates of the Act direct NIJ to:

- Sponsor special projects and research and development programs that will improve and strengthen the criminal justice system and reduce or prevent crime.
- Conduct national demonstration projects that employ innovative or promising approaches for improving criminal justice.
- Develop new technologies to fight crime and improve criminal justice.
- Evaluate the effectiveness of criminal justice programs and identify programs that promise to be successful if continued or repeated.
- Recommend actions that can be taken by Federal, State, and local governments as well as by private organizations to improve criminal justice.
- Carry out research on criminal behavior.
- Develop new methods of crime prevention and reduction of crime and delinquency.

In recent years, NIJ has greatly expanded its initiatives, the result of the Violent Crime Control and Law Enforcement Act of 1994 (the Crime Act), partnerships with other Federal agencies and private foundations, advances in technology, and a new international focus. Examples of these new initiatives include:

- Exploring key issues in community policing, violence against women, violence within the family, sentencing reforms, and specialized courts such as drug courts.
- Developing dual-use technologies to support national defense and local law enforcement needs.
- Establishing four regional National Law Enforcement and Corrections Technology Centers (NLECTC), a Border Research and Technology Center, and three special offices to join the National Center in Rockville, Maryland, to form the NLECTC system.
- Strengthening NIJ's links with the international community through participation in the United Nations network of criminological institutes, the U.N. Criminal Justice Information Network, and the NIJ International Center.
- Improving the online capability of NIJ's criminal justice information clearinghouse.
- Establishing the ADAM (Arrestee Drug Abuse Monitoring) program—formerly the Drug Use Forecasting (DUF) program—to increase the number of drug-testing sites and study drug-related crime.

The Institute Director establishes the Institute's objectives, guided by the priorities of the Office of Justice Programs, the Department of Justice, and the needs of the criminal justice field. The Institute actively solicits the views of criminal justice professionals and researchers in the continuing search for answers that inform public policymaking in crime and justice.

About the Law Enforcement and Corrections Standards and Testing Program

The Law Enforcement and Corrections Standards and Testing Program is sponsored by the Office of Science and Technology of the National Institute of Justice (NIJ), U.S. Department of Justice. The program responds to the mandate of the Justice System Improvement Act of 1979, which directed NIJ to encourage research and development to improve the criminal justice system and to disseminate the results to Federal, State, and local agencies.

The Law Enforcement and Corrections Standards and Testing Program is an applied research effort that determines the technological needs of justice system agencies, sets minimum performance standards for specific devices, tests commercially available equipment against those standards, and disseminates the standards and the test results to criminal justice agencies nationwide and internationally.

The program operates through the following:

- The **Law Enforcement and Corrections Technology Advisory Council** (LECTAC), consisting of nationally recognized criminal justice practitioners from Federal, State, and local agencies, assesses technological needs and sets priorities for research programs and items to be evaluated and tested.

- The **Office of Law Enforcement Standards** (OLES) at the National Institute of Standards and Technology develops voluntary national performance standards for compliance testing to ensure that individual items of equipment are suitable for use by criminal justice agencies. The equipment standards developed by OLES are based upon laboratory evaluation of commercially available products in order to devise precise test methods that can be universally applied by any qualified testing laboratory and to establish minimum performance requirements for each attribute of a piece of equipment that is essential to how it functions. OLES-developed standards can serve as design criteria for manufacturers or as the basis for equipment evaluation. The application of the standards, which are highly technical in nature, is augmented through the publication of equipment performance reports and user guides. Individual jurisdictions may use the standards in their own laboratories to test equipment, have equipment tested on their behalf using the standards, or cite the standards in procurement specifications.

- The **National Law Enforcement and Corrections Technology Center** (NLECTC), operated by a grantee, supervises a national compliance testing program conducted by independent laboratories. The standards developed by OLES serve as performance benchmarks against which commercial equipment is measured. The facilities, personnel, and testing capabilities of the independent laboratories are evaluated by OLES prior to testing each item of equipment. In addition, OLES helps NLECTC staff review and analyze data. Test results are published in consumer product reports designed to help justice system procurement officials make informed purchasing decisions.

Publications are available at no charge through NLECTC. Some documents are also available online through the Justice Technology Information Network (JUSTNET), the center's Internet/World Wide Web site. To request a document or additional information, call 800–248–2742 or 301–519–5060, or write:

National Law Enforcement and Corrections Technology Center
P.O. Box 1160
Rockville, MD 20849–1160
E-mail: *asknlectc@nlectc.org*
World Wide Web address: *http://www.nlectc.org*

About the National Law Enforcement and Corrections Technology Center System

The National Law Enforcement and Corrections Technology Center (NLECTC) system exists to support the Nation's structure of State and local law enforcement and corrections. The United States has more than 18,000 law enforcement agencies, 50 State correctional systems, and thousands of prisons and jails. The fragmented nature of law enforcement and corrections impedes the dissemination of valuable new information, fosters a patchwork marketplace that discourages the commercialization of new technologies, and underscores the need for uniform performance standards for equipment and technologies.

The National Institute of Justice's (NIJ's) Office of Science and Technology (OS&T) created NLECTC in 1994 as a national system of technology centers that are clearinghouses of information and sources of technology assistance and that also attend to special needs, including technology commercialization and standards development.

The NLECTC system's purpose is to determine the needs of the law enforcement and corrections communities and assist them in understanding, using, and benefitting from new and existing technologies that, increasingly, are vital levers of progress in criminal justice. It is especially important to note that NIJ/OS&T and the NLECTC system are the only current programs developed by the Federal Government that focus solely on the development and transfer of technologies to State and local law enforcement and corrections.

NLECTC is a program of NIJ, the research and development arm of the U.S. Department of Justice. The system currently consists of a national center, four regional centers, and three speciality centers. Also contributing to the initiatives of the center system is the Office of Law Enforcement Standards. The centers are colocated with a host organization or agency that specializes in one or more areas of technology research and development.

The National Center, located in Rockville, Maryland, is the system's information hub. Regional centers are currently located in California, Colorado, New York, and South Carolina. Speciality centers located around the country deal with border matters (California), commercialization of law enforcement and corrections technologies (West Virginia), and forensic science (Florida).

Each center shares roles with the other centers and has distinctive characteristics. All are focused on helping law enforcement and corrections take full advantage of technology's rapidly growing capacity to serve the purposes of crime control and the criminal justice system.

A national body of criminal justice professionals, the Law Enforcement and Corrections Technology Advisory Council (LECTAC), helps identify research and development priorities, thereby influencing the work of the NLECTC system. In addition, each NLECTC center has a regional advisory council of law enforcement and corrections officials. Together, LECTAC and the advisory councils help to keep the NLECTC system attentive to technological priorities and the needs of law enforcement and corrections. They help to link the end user with the developer to create technologies that adequately meet operational requirements and establish which potential technologies should be pursued for development.

All of the current regional centers have distinctive roles or focus areas, that, in many cases, are aligned with the expertise of host organizations and agencies. The centers are currently operated under cooperative agreements or interagency agreements with host organizations and agencies whose employees staff the centers.

To receive more information or to add your name to the NLECTC mailing list, call 800–248–2742 or 301–519–5060, or write:

National Law Enforcement and Corrections Technology Center
P.O. Box 1160
Rockville, MD 20849–1160
E-mail: *asknlectc@nlectc.org*
World Wide Web address: *http://www.nlectc.org*

The following is a list of NLECTC regional and affiliated facilities that assist NIJ in fulfilling its mission:

NLECTC–Northeast
26 Electronic Parkway
Rome, NY 13441–4514
(p) 888–338–0584
(f) 315–330–4315
E-mail: *nlectc_ne@rl.af.mil*

NLECTC–Southeast
5300 International Boulevard
North Charleston, SC 29418
(p) 800–292–4385
(f) 843–760–4611
E-mail: *nlectc-se@nlectc-se.org*

NLECTC–Rocky Mountain
2050 East Iliff Avenue
Denver, CO 80208
(p) 800–416–8086
(f) 303–871–2500
E-mail: *nlectc@du.edu*

NLECTC–West
c/o The Aerospace Corporation
2350 East El Segundo Boulevard
El Segundo, CA 90245–4691
(p) 888–548–1618
(f) 310–336–2227
E-mail: *nlectc@law-west.org*

Border Research and Technology Center
1010 Second Avenue
Suite 1920
San Diego, CA 92101–4912
(p) 888–656–2782
(f) 888–660–2782
E-mail: *brtcchrisa@aol.com*

Office of Law Enforcement Standards
100 Bureau Drive, Stop 8102
Gaithersburg, MD 20899–8102
(p) 301–975–2757
(f) 301–948–0978
E-mail: *oles@nist.gov*

Office of Law Enforcement Technology Commercialization
Wheeling Jesuit University
316 Washington Avenue
Wheeling, WV 26003
(p) 888–306–5382
(f) 304–243–2131
E-mail: *oletc@nttc.edu*

National Center for Forensic Science
University of Central Florida
P.O. Box 162367
Orlando, FL 32816–2367
(p) 407–823–6469
(f) 407–823–3162
E-mail: *natlctr@mail.ucf.edu*

About the Office of Law Enforcement Standards

The Office of Law Enforcement Standards (OLES) was established as a matrix management organization in 1971 through a Memorandum of Understanding between the U.S. Departments of Justice and Commerce based upon the recommendations of the President's Commission on Crime. OLES' mission is to apply science and technology to the needs of the criminal justice community, including law enforcement, corrections, forensic science, and the fire service. While its major objective is to develop minimum performance standards, which are promulgated as voluntary national standards, OLES also undertakes studies leading to the publication of technical reports and user guides.

The areas of research investigated by OLES include clothing, communication systems, emergency equipment, investigative aids, protective equipment, security systems, vehicles, weapons, and analytical techniques and standard reference materials used by the forensic science community. The composition of OLES' projects varies depending upon priorities of the criminal justice community at any given time and, as necessary, draws upon the resources of the National Institute of Standards and Technology.

OLES assists law enforcement and criminal justice agencies in acquiring, on a cost-effective basis, the high-quality resources they need to do their jobs. To accomplish this, OLES:

- Develops methods for testing equipment performance and examining evidentiary materials.
- Develops standards for equipment and operating procedures.
- Develops standard reference materials.
- Performs other scientific and engineering research as required.

Since the program began in 1971, OLES has coordinated the development of nearly 200 standards, user guides, and advisory reports. Topics range from performance parameters of police patrol vehicles, to performance reports on various speed-measuring devices, to soft body armor testing, to analytical procedures for developing DNA profiles.

The application of technology to enhance the efficiency and effectiveness of the criminal justice community continues to increase. The proper adoption of the products resulting from emerging technologies and the assessment of equipment performance, systems, methodologies, etc., used by criminal justice practitioners constitute critical issues having safety and legal ramifications. The consequences of inadequate equipment performance or inadequate test methods can range from inconvenient to catastrophic. In addition, these deficiencies can adversely affect the general population when they increase public safety costs, preclude arrest, or result in evidence found to be inadmissible in court.

General Comments on Statistical Analysis

The statistical techniques used in this analysis were standard parametric methods. As such, they assume a normally distributed base population. Although testing for normality was not done, there is no reason to believe that the data presented in this report should not follow such a distribution.

In all cases, the objective of the analysis was to determine if significant differences existed between two or more populations of measurements as represented by experimental sampling. Two-sample T-tests were performed to assess specific differences between pairs.

In all cases, a 95-percent confidence limit was used to define significance.

Where the evaluation shows minor performance differences between the original equipment brake pads and one or more of the aftermarket brands on a given test, but analysis of the data indicates the differences are not statistically significant, a specific notation has been made on the individual score pages and the summary score pages for that test, as well as on the overall score pages, and detailed explanations are given in the Appendix—Analysis To Determine Statistical Significance.

The appendix was compiled by Carl Davis of the Trident Corporation, who analyzed the data to determine their statistical significance.

Brake Burnish Procedure

All brake pads and rotors tested were burnished prior to testing by Greening Testing Laboratories, Inc., 19465 Mount Elliott Avenue, Detroit, MI 48234–2786.

The burnish procedure was preprogrammed on a computer, and then run on a dynomometer being "driven," in effect, by the computer. This methodology assured absolute consistency during the burnish procedure. Each pad was burnished on the rotor that it was ultimately mated to on the test vehicle.

The burnish procedure used was similar to the "green fade" process currently used by many law enforcement agencies prior to putting a patrol vehicle with fresh brakes into patrol service.

The burnish procedure consisted of the following:

Ten stops from 45 mph at an average deceleration rate of approximately 15 ft/s^2, with brake applications at 2-mile intervals.

Six stops from 60 mph at an average deceleration rate of 27 ft/s^2, with brake applications at 15-second intervals.

Testing Equipment

The following test equipment was used in this evaluation:

DATRON TECHNOLOGY, INC.
33533 West Twelve Mile Road, Suite 180
Farmington Hills, MI 48331
M–2 Microwave Speed and Distance Sensor with integrated signal conditioning and DLSX Software.

AEP–2 Data Acquisition System.

Brake Pedal Force Sensor with digital display.

BELL PRO POLICE
Box 927
Rantol, IL 61866
Bell MC–500VBL76 NASCAR Style Driving Helmet.

TEMBREL, INC.
206 Industrial Park
Boyne City, MI 49712
Type K Brake Thermocouple—Model K22–4–305.

OMEGA ENGINEERING, INC.
One Omega Drive
Stamford, CT 06907–0047
Thermocouple Extension Wire—
Model EXPP–K–20–25.

Sub-Mini Yellow Thermocouple Connectors—
Model SMP–K–M.

Brake Pad Descriptions

Company	Brand Name		Part No.	Edge Code
A C Delco 6200 Grand Pointe Drive Grand Blanc, MI 48439 Contact: Kurt Pursche (810) 606–3759 www.acdelco.com	**A C Delco**			
	Chevrolet	Front:	17D699M	DEL–612–EE
		Rear:	17D698M	DEL–612–EE
	Ford	Front:	17D748MX	DEL–612–EE
		Rear:	17D674AMX	DEL–612–EE
Advance Auto Parts 5673 Airport Road Roanoke, VA 24012 Contact: Guy Broyles (540) 561–1601 www.advanceautoparts.com	**Selectra**			
	Chevrolet	Front:	SSD699	FA SD1–EE
		Rear:	SSD698	FA SD2–EE
	Ford	Front:	SSD748	FA SD1–EE
		Rear:	SSD674	FA SD1–EE
Carquest Corp. 12596 W. Bayaud Avenue, Suite 400 Lakewood, CO 80228 Contact: Steve Switzer (720) 963–3000 www.carquest.com	**Carquest**			
	Chevrolet	Front:	GMD699F	CG–832–EE
		Rear:	GMD698F	CG–832–EE
	Ford	Front:	GMD748F	CG–832–EE
		Rear:	GMD690F	CG–832–EE
DANA Brake and Chassis (Ceramic)* 4400 Prime Parkway McHenry, IL 60050–7033 (800) 270–2124	**Carquest - Gold Ceramic**			
	Chevrolet	Front:	GCD699	CG–758C–FF
		Rear:	GCD698	CG–758C–FF
	Ford	Front:	GCD748	CG–758C–FF
		Rear:	GCD690	CG–758C–FF
	NAPA - Ceramix			
	Chevrolet	Front:	CMX7574	CMX–55–FF
		Rear:	CMX7387A	CMX–55–FF
	Ford	Front:	CMX7617	CMX–55–FF
		Rear:	CMX7555A	CMX–55–FF
	Raybestos - Quiet Stop			
	Chevrolet	Front:	PGD699QS	BPI–0508–FF
		Rear:	PGD698QS	BPI–0508–FF
	Ford	Front:	PGD748QS	BPI–0508–FF
		Rear:	PGD674AQS	BPI–0508–FF

* The identical ceramic friction material produced by DANA Brake and Chassis is marketed by Carquest, NAPA, and Raybestos, and will be listed throughout this report as DANA B&C (Ceramic).

Brake Pad Descriptions (continued)

Company	Brand Name		Part No.	Edge Code
DANA Brake and Chassis	**Raybestos**			
4400 Prime Parkway	Chevrolet	Front:	SSD699	BPI–912–EE
McHenry, IL 60050		Rear:	SSD698	BPI–912–EE
Contact: Wally Marciniak				
(800) 270–2124, ext. 4378	Ford	Front:	SSD748	BPI–912–EE
www.raybestos.com		Rear:	SSD674A	BPI–912–EE
Federal-Mogul Corporation	**Wagner Severe Duty Disc Pads**			
26555 Northwestern Highway	Ford	Front:	SX748	WAG–SX1–EE
Southfield, MI 48034		Rear:	SX674A	WAG–SX5–EE
Contact: Walter Britland				
(540) 665–2260				
www.federal-mogul.com				
Hawkhead Automotive, Inc.	**Force 4**			
200 Industrial Loop	Chevrolet	Front:	M–7574–Z–D699	P 360–EE
Orange Park, FL 32073		Rear:	M–7387–Z–D814	P 360–EE
Contact: Russell Ross				
(800) 252–4295	Ford	Front:	M–7617–Z–748	P 360–EE
www.hawkhead.com		Rear:	M–7610–Z–D674	P 360–EE
Honeywell Friction Materials	**Bendix - Premium Grade (Chevrolet)/Fleet Metlock (Ford)**			
105 Pawtucket Avenue	Chevrolet	Front:	MKD699	BX TMA–FF
Rumford, RI 02916		Rear:	MKD698	BX ZA–FF
Contact: Thomas Harkin				
(401) 431–3617	Ford	Front:	MKD748FM	BX FM2–FF
thomas.harkin@honeywell.com		Rear:	MKD674CFM	BX FM–EE
NAPA Raylock	**SD (Severe Duty) and AE (Application Engineered) Disc Brake Pads**			
600 Raylock Drive, S.W.	Chevrolet	Front:	SD7574M	SD 66–EE
Atlanta, GA 30336–1633		Rear:	AE7387AM	AE 49–EE
Contact: Jerry Niemeyer				
(404) 691–3780, ext.2260	Ford	Front:	SD7617M	SD 66–EE
www.napaonline.com		Rear:	AE7555A	AE 46–EE
Performance Friction Corp.	**Carbon Metallic**			
P.O. Box 819	Ford	Front:	0748.20	PFC 08–FF
Clover, SC 29710–0819		Rear:	0690.20	PFC 08–FF
Contact: Craig F. Henning				
(800) 521–8874, ext.8115				
www.chenning@performancefriction.com				

Brake Pad Descriptions (continued)

Company	Brand Name		Part No.	Edge Code
Satisfied Brake Products	**Satisfied**			
805 Education Road	Chevrolet	Front:	FL699	SAT SV30–EE
Cornwall, Ont. K6H 6C7		Rear:	PR814	SAT NA10–GG
Contact: Carolyn McDonald				
(800) 363–6500, Ext. 300	Ford	Front:	FL748	SAT SV30–EE
www.satisfied.ca		Rear:	PR674	SAT NA10–GG
TMD Friction, Inc.	**TMD Friction**			
3994 Pepperell Way	Chevrolet	Front:	7574–2014T	BBA–2015 TA–FF
Dublin, VA 24084		Rear:	7387–2014T	BBA–2015 TA–FF
Contact: Paulette Akers				
(800) 853–6511	Ford	Front:	7617–2004T	BBA–2015 TB–FF
www.pakers@tmdfrictioninc.com		Rear:	7610–2016T	BBA–2016 TB–FF
Original Equipment	**OEM**			
Ford and Chevrolet Dealers	Chevrolet	Front:	18029828	AK NS166H–FF
		Rear:	18042417	AK NS166H–FF
	Ford	Front:	YW7Z–2001–AA	BBA 2004TA–FF
		Rear:	F8AZ–2200–AA	BX ZC–FF

Comparative Evaluations

Ambient Temperature (Cold) Braking Performance Test

Test Objective

Determine the stopping performance characteristics of the test brake pads when the entire brake system is at, or slightly above, ambient rather than normal or optimal temperature. *(This information will be particularly pertinent to law enforcement officers in rural areas or small towns where brake applications are infrequent, or to officers who regularly respond to emergency situations in a patrol vehicle that has been parked for several hours and who must use the brakes in an emergency stop before normal or optimal temperatures have been reached.)*

Test Methodology

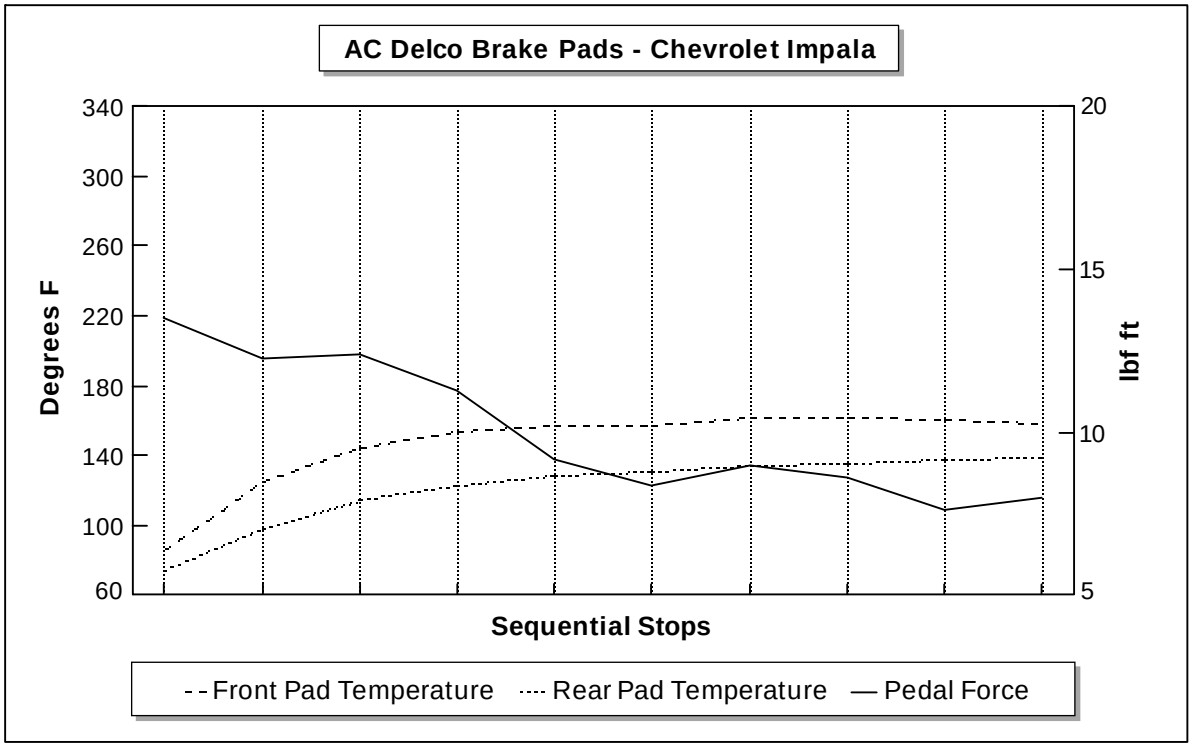
Each of the test brake pad/rotor sets will be evaluated by performing 10 decelerations (at a specific predetermined location on the test track) from 45 mph to 15 mph at a deceleration rate of 10 ft/s^2. After each deceleration, the test vehicle will be accelerated back to 45 mph and driven for approximately 2 miles (back to the predetermined deceleration point) in order to allow the brake components to cool before the next deceleration in the series. Temperature increases during each deceleration and brake pedal force necessary to maintain the target deceleration rate will be recorded.

Cold Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: AC Delco

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
44.5	13.5	86.1	74.6	72.7
46.2	12.3	125.7	99.1	73.4
46.1	12.4	144.6	114.4	74.3
45.8	11.3	153.7	123.4	73.6
45.8	9.2	158.1	128.8	73.8
45.6	8.4	158.1	131.5	74.5
45.7	9.0	161.7	134.2	74.8
44.5	8.6	161.7	136.0	74.5
45.4	7.6	160.8	137.8	74.5
45.8	8.0	159.0	139.6	74.5
AVERAGE: **45.5**	**10.0**			



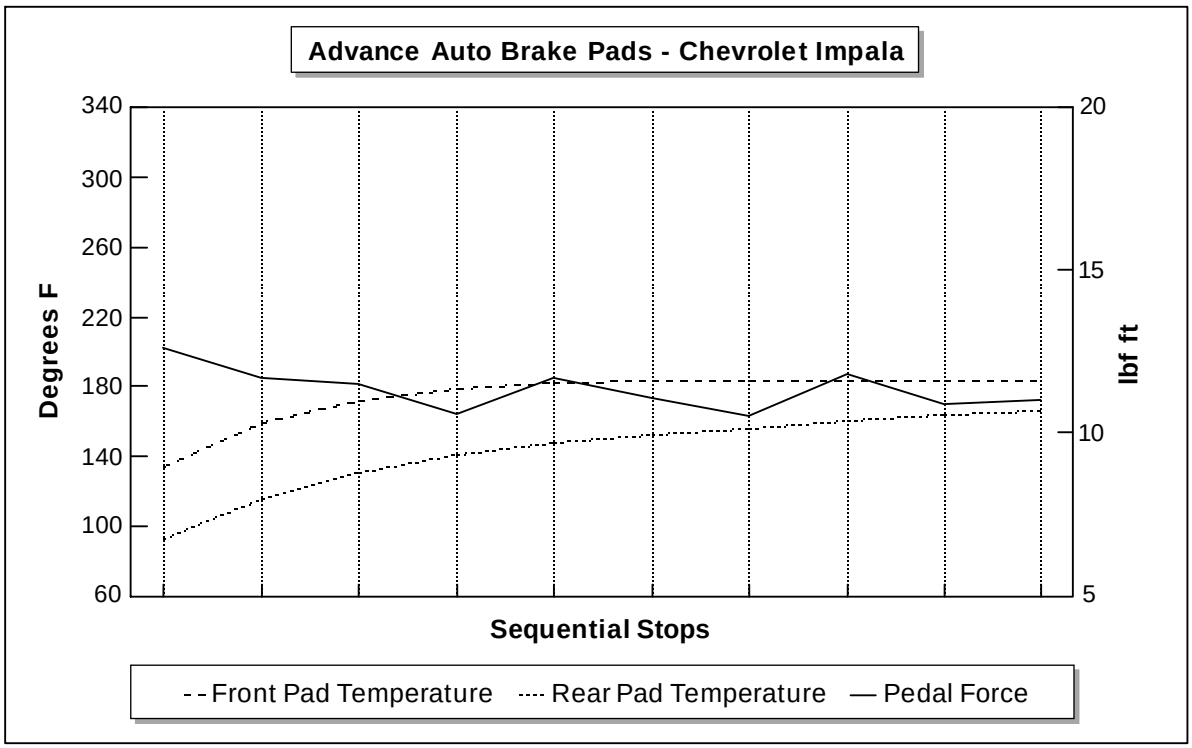
Cold Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: Advance Auto

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
44.9	12.6	133.8	93.1	74.6
45.4	11.7	159.9	116.2	72.4
45.4	11.5	172.0	131.0	71.7
46.2	10.6	179.2	141.4	71.2
44.8	11.7	182.4	147.7	71.8
45.1	11.1	184.2	152.2	71.7
45.2	10.5	184.2	155.8	71.8
45.7	11.8	184.2	160.3	72.3
46.3	10.9	184.2	163.9	72.7
45.5	11.0	183.3	166.6	72.7
AVERAGE:	**45.5**	**11.3***		

* Analysis showed no statistically significant difference between the original equipment pads and the Advance Auto pads on this test.

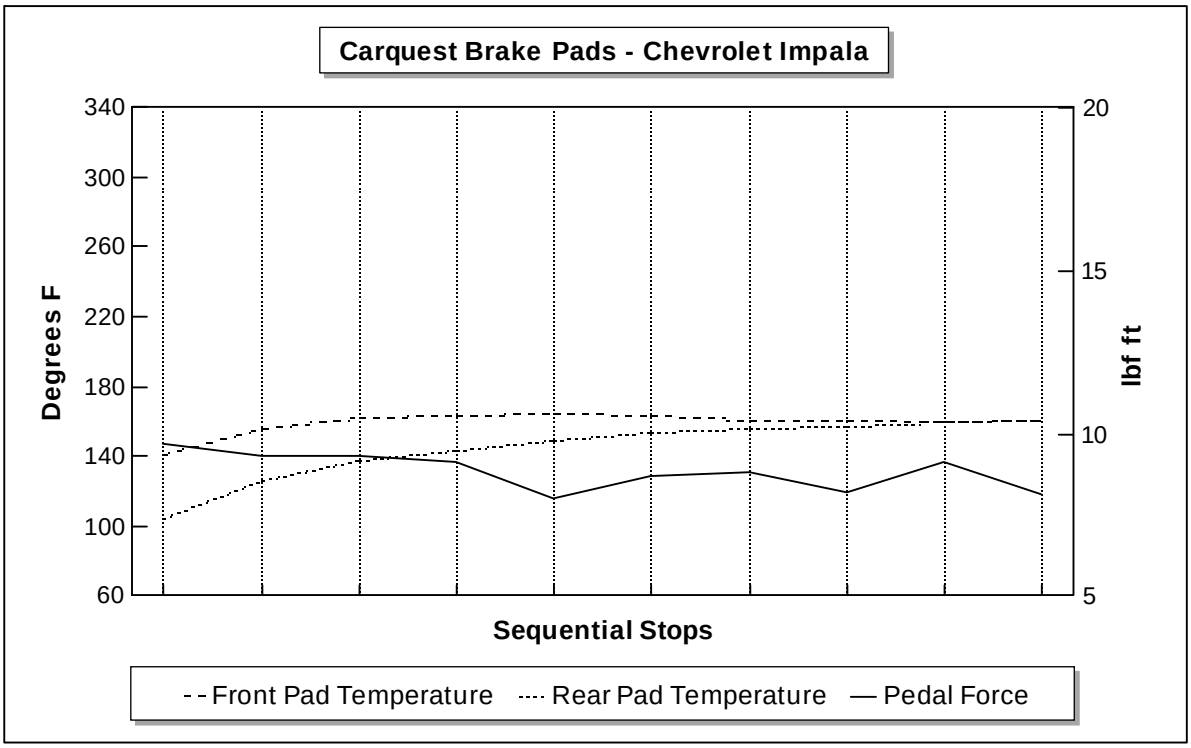


Cold Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: Carquest

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
45.1	9.7	141.0	104.5	76.4
46.1	9.3	156.3	126.1	75.7
45.9	9.3	162.6	137.8	75.4
45.9	9.1	162.8	144.2	75.4
46.2	8.0	164.4	149.5	75.4
45.4	8.7	162.8	154.0	75.4
46.1	8.8	161.2	156.7	75.4
47.1	8.2	160.8	157.6	74.5
46.7	9.1	159.9	160.3	74.3
46.2	8.1	160.8	161.2	73.2
AVERAGE: **46.1**	**8.8**			



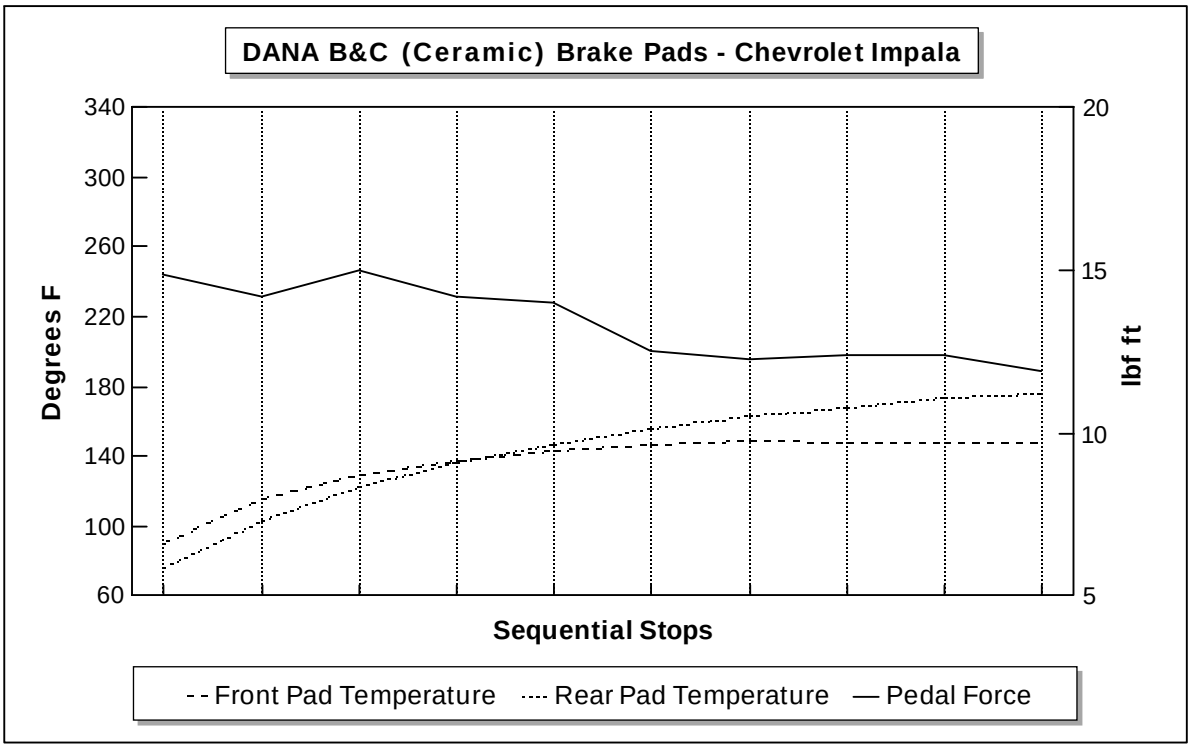
Cold Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: DANA B&C (Ceramic)

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
45.3	14.9	90.6	76.6	67.3
45.3	14.2	115.8	102.7	66.7
45.4	15.0	130.2	123.4	66.4
45.5	14.2	138.3	136.9	66.4
46.3	14.0	143.3	146.8	66.4
46.2	12.5	147.3	156.7	66.0
45.1	12.3	149.0	163.9	66.3
46.3	12.4	148.2	168.4	66.4
45.7	12.4	148.2	173.8	66.4
45.5	11.9	148.2	176.5	66.4
AVERAGE:	**45.7**	**13.4***		

* Analysis showed no statistically significant difference between the original equipment pads and the DANA B&C (Ceramic) pads on this test.

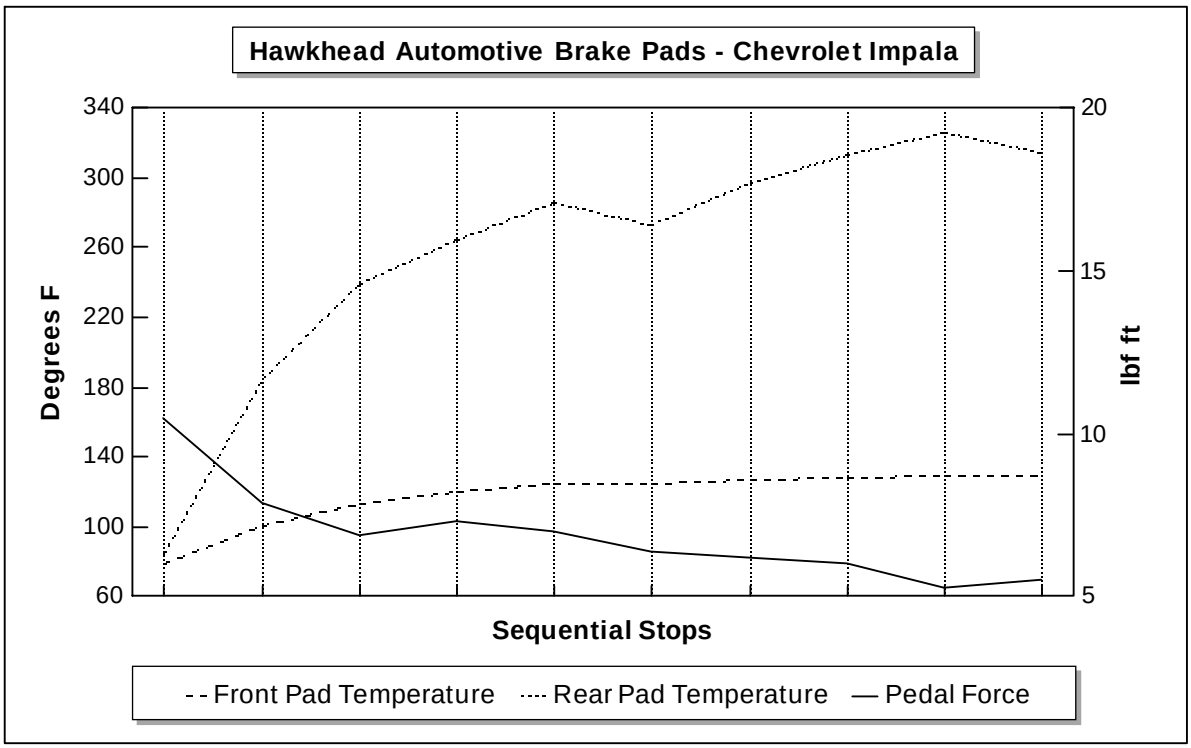


Cold Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: Hawkhead

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
45.2	10.5	78.9	84.7	64.6
45.3	7.9	100.5	185.5	64.6
45.1	6.9	113.1	239.5	65.4
45.1	7.3	120.3	264.7	65.5
45.5	7.0	124.8	286.3	65.5
45.5	6.4	125.7	272.8	65.5
45.1	6.2	127.5	298.0	65.6
44.7	6.0	128.4	314.2	65.7
46.0	5.3	129.3	326.3	66.4
45.7	5.5	130.3	315.1	66.4
AVERAGE: **45.3**	**6.9**			

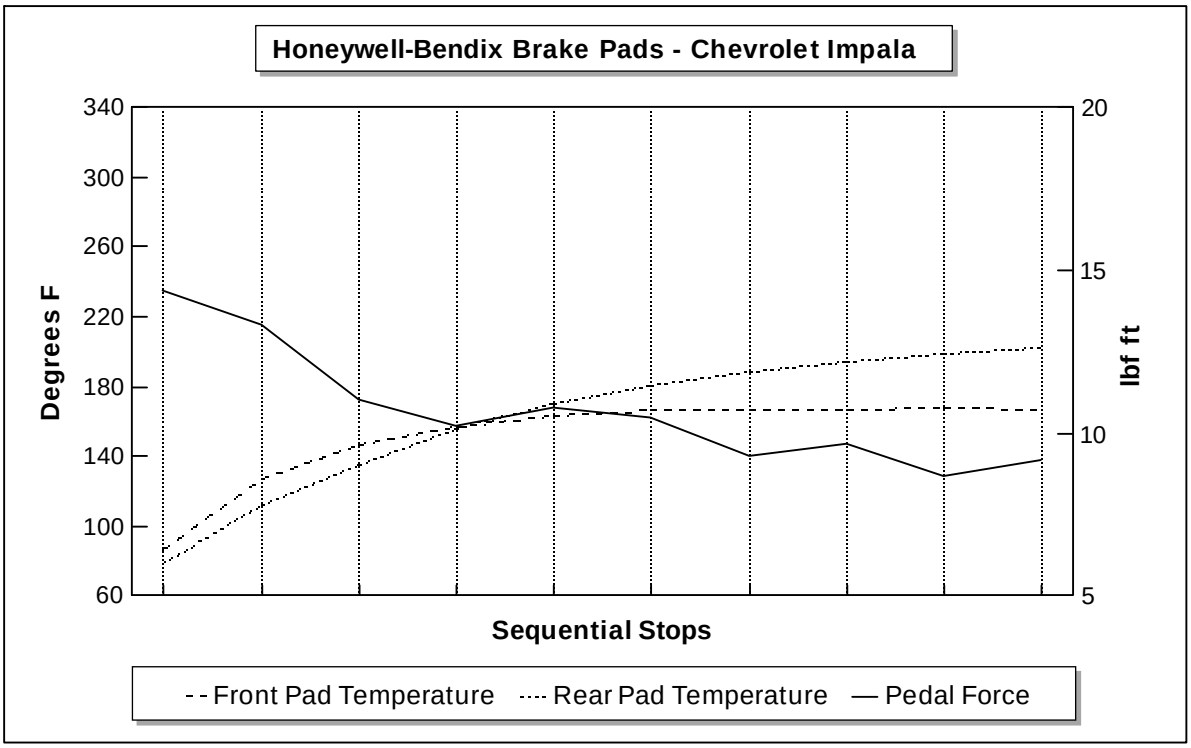


Cold Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: Honeywell-Bendix

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
45.5	14.4	87.3	79.3	70.0
45.6	13.3	127.5	112.6	71.9
45.4	11.0	147.3	136.0	73.6
45.5	10.2	158.1	156.2	73.6
46.5	10.8	163.5	170.2	74.4
44.7	10.5	167.1	181.0	74.5
45.7	9.3	166.2	189.1	73.5
45.7	9.7	166.2	194.5	72.7
46.4	8.7	168.0	199.0	72.4
45.6	9.2	166.8	202.6	73.6
AVERAGE: **45.7**	**10.7**			

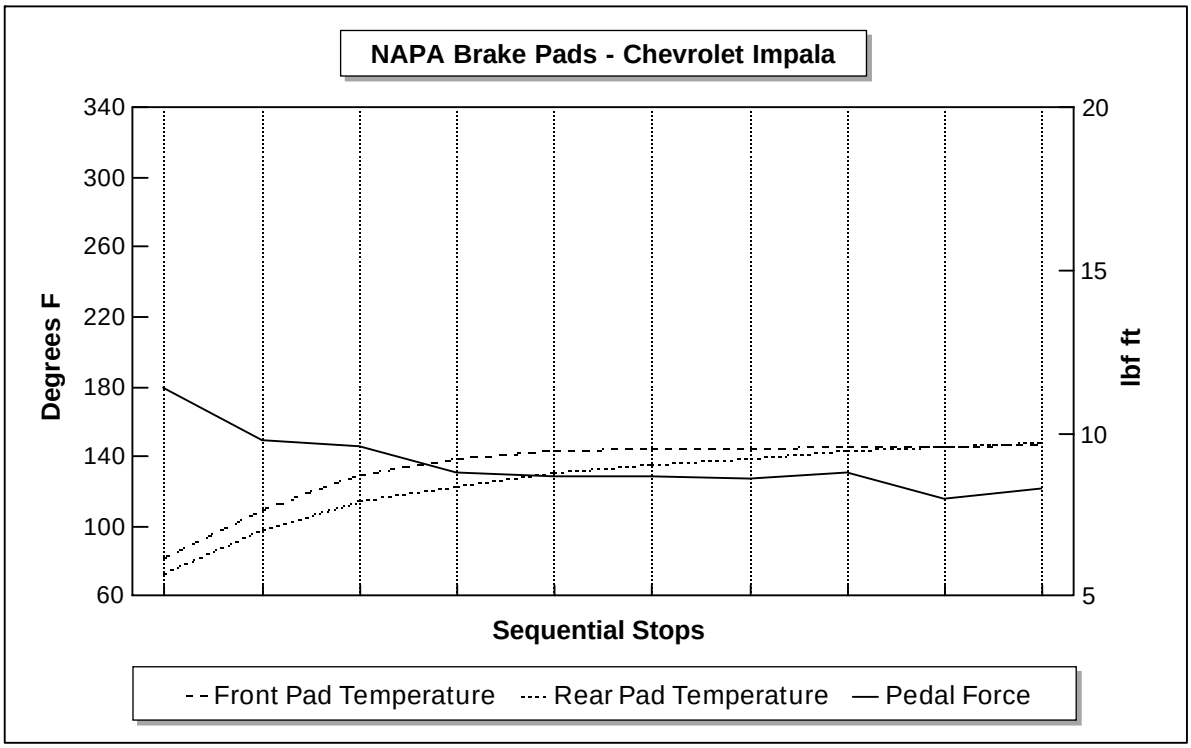


Cold Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: NAPA

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
46.2	11.4	82.5	73.5	62.2
46.0	9.8	110.3	98.2	61.5
45.3	9.6	129.5	114.4	61.2
45.7	8.8	139.2	123.4	61.0
45.8	8.7	143.7	130.6	61.1
45.2	8.7	144.6	136.0	61.8
45.7	8.6	144.9	139.6	61.8
45.9	8.8	145.7	143.2	61.8
45.9	8.0	146.3	145.9	61.5
45.0	8.3	147.6	148.6	61.5
AVERAGE: **45.7**	**9.1**			

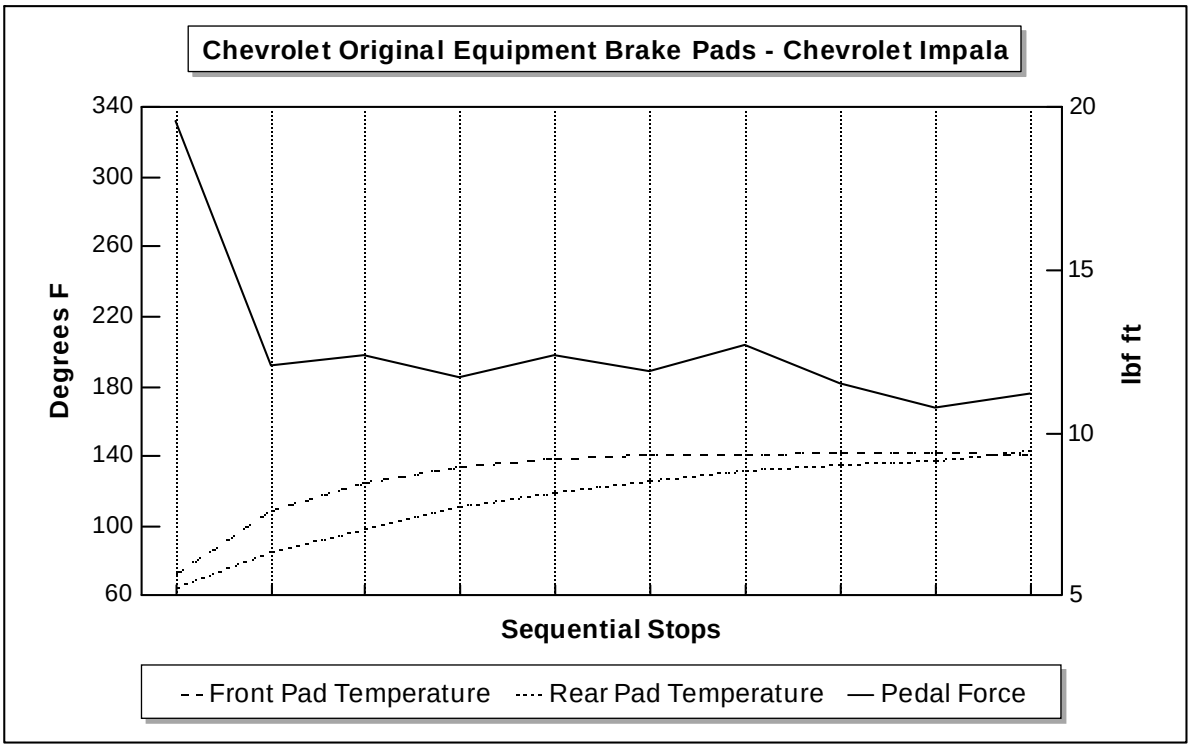


Cold Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: Original Equipment - (Chevrolet)

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
45.2	19.6	73.5	64.9	66.6
45.2	12.1	109.2	85.9	65.6
45.6	12.4	124.8	98.8	65.5
44.9	11.7	134.1	111.4	65.4
46.2	12.4	139.2	119.8	65.0
46.0	11.9	141.1	126.1	64.8
45.5	12.7	141.9	132.5	65.4
45.7	11.5	142.8	135.1	65.1
45.6	10.8	142.8	138.2	65.0
44.4	11.2	141.9	143.5	64.6
AVERAGE: **45.4**	**12.6**			

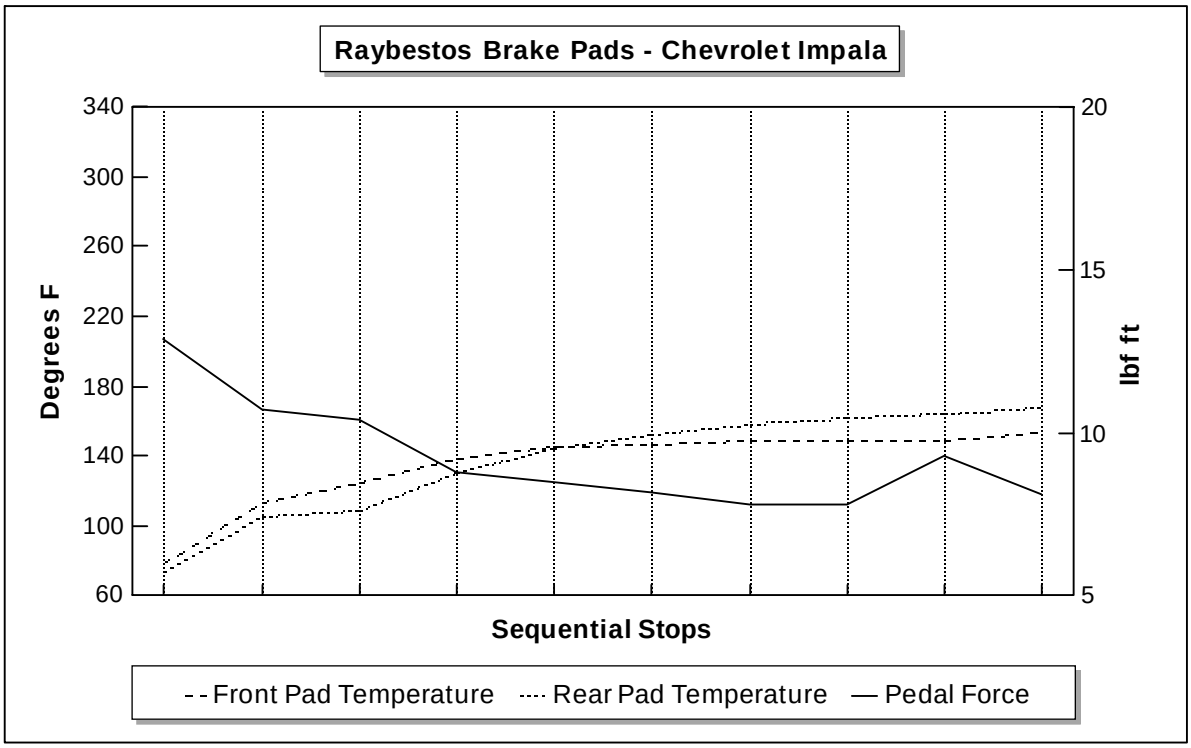


Cold Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: Raybestos

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
45.3	12.9	78.9	73.9	70.9
45.7	10.7	113.1	105.4	71.8
44.9	10.4	125.7	109.0	70.9
45.7	8.8	139.2	130.6	72.7
45.1	8.5	145.5	145.0	72.7
45.1	8.2	147.3	153.1	71.0
45.7	7.8	150.0	158.5	72.7
44.9	7.8	150.0	162.1	71.8
45.9	9.3	150.0	164.8	72.7
45.8	8.1	153.6	167.5	72.9
AVERAGE: **45.4**	**9.3**			

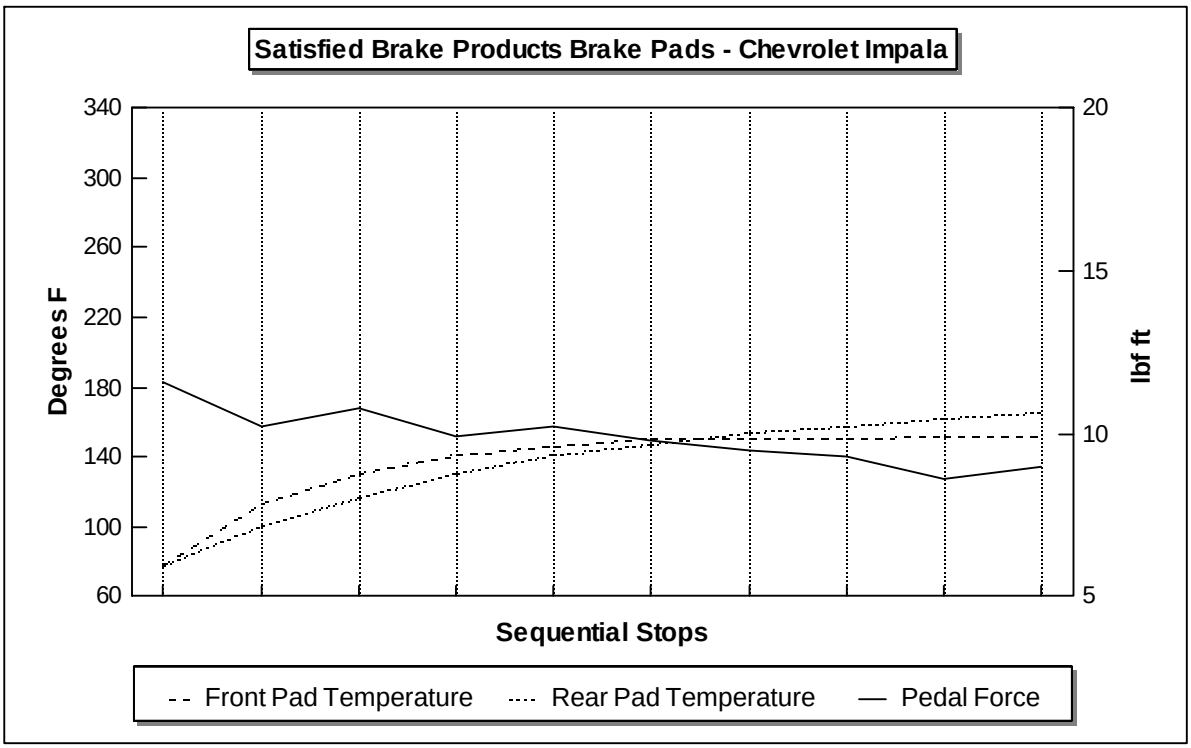


Cold Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: Satisfied Brake

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
45.9	11.6	77.5	78.0	72.7
45.5	10.2	113.5	101.4	72.6
46.4	10.8	131.5	117.6	72.7
45.4	9.9	141.4	131.1	72.7
45.2	10.2	145.9	141.0	72.7
45.0	9.8	150.4	147.3	72.7
45.8	9.5	151.0	153.6	72.7
46.4	9.3	150.4	158.1	71.1
45.0	8.6	152.2	162.6	72.0
45.1	9.0	151.3	165.3	72.6
AVERAGE: **45.6**	**9.9**			

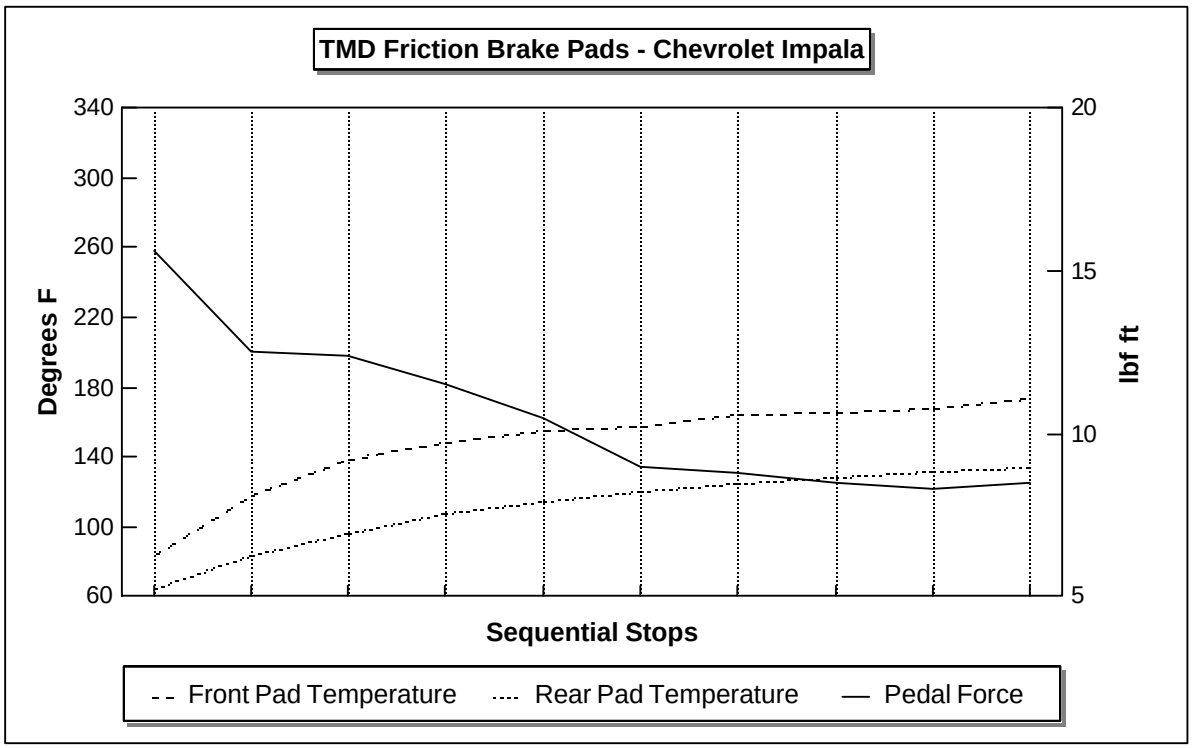


Cold Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: TMD Friction

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
44.6	15.6	83.4	64.9	60.1
45.3	12.5	118.5	83.8	60.1
45.4	12.4	138.3	96.4	60.3
45.7	11.5	148.2	107.2	61.0
44.9	10.5	155.4	114.4	61.0
44.7	9.0	157.8	120.7	61.0
45.4	8.8	163.9	125.2	61.8
44.8	8.5	165.3	128.8	61.9
45.5	8.3	168.0	131.5	62.7
45.2	8.5	173.4	134.2	62.8
AVERAGE: **45.2**	**10.6**			

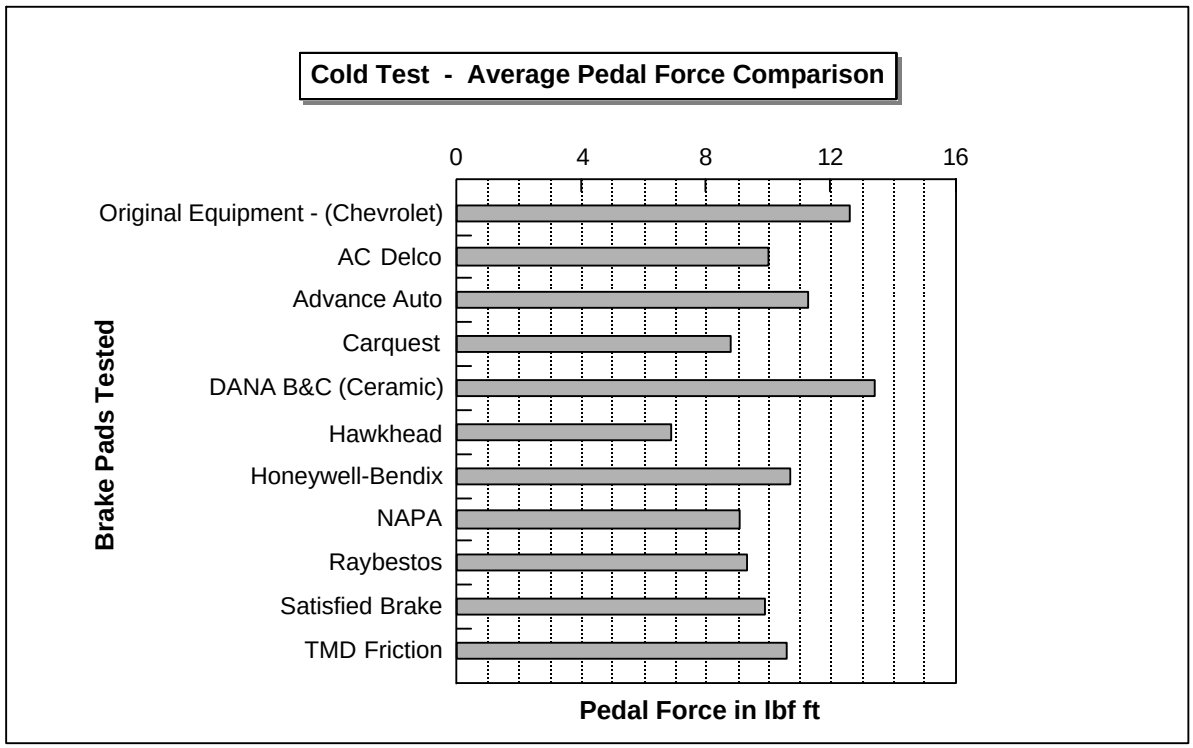


Summary of Cold Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD	AVERAGE INITIAL SPEED mph	AVERAGE PEDAL FORCE lbf ft	AVERAGE AMBIENT TEMP deg. F
Original Equipment - (Chevrolet)	45.4	**12.6**	65.3
AC Delco	45.5	**10.0**	74.1
Advance Auto	45.5	**11.3***	72.3
Carquest	46.1	**8.8**	75.1
DANA B&C (Ceramic)	45.7	**13.4***	66.5
Hawkhead	45.3	**6.9**	65.5
Honeywell-Bendix	45.7	**10.7**	73.0
NAPA	45.7	**9.1**	61.5
Raybestos	45.4	**9.3**	72.0
Satisfied Brake	45.6	**9.9**	72.5
TMD Friction	45.2	**10.6**	61.3

* Analysis showed no statistically significant difference between the original equipment pads and either the Advance Auto or the DANA B&C (Ceramic) pads on this test. However, these two aftermarket pads are not necessarily equal to each other.

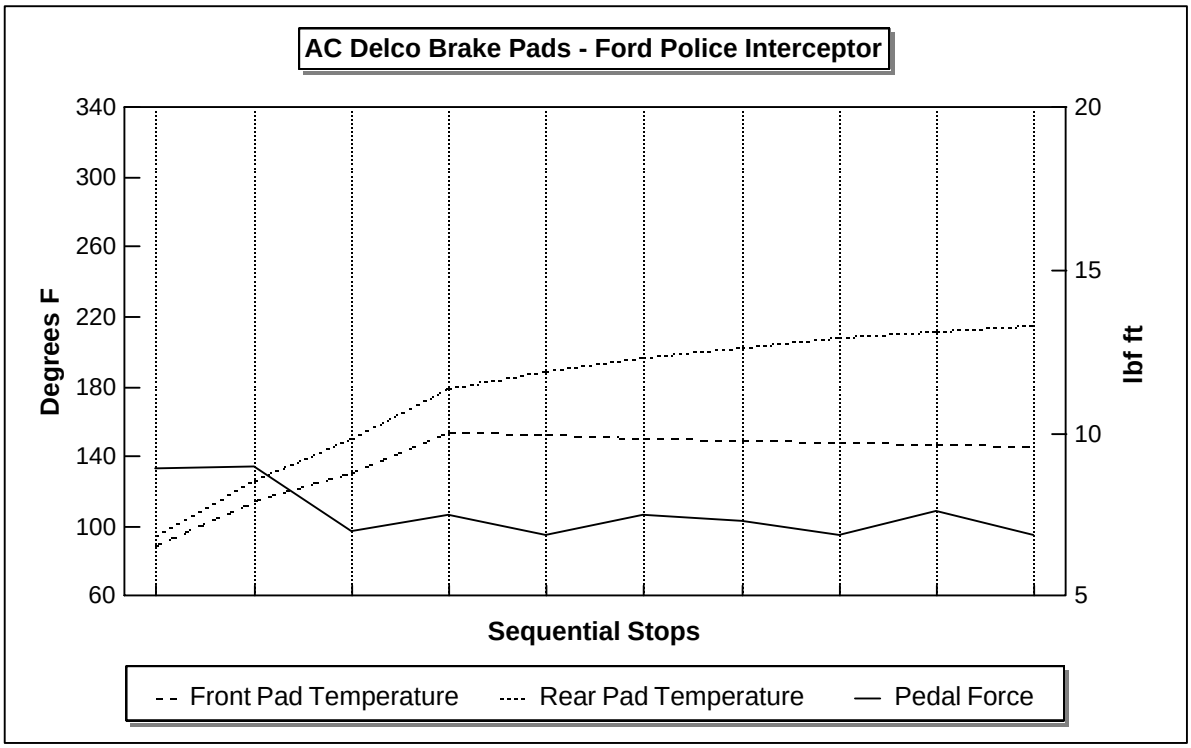


Cold Test Results

TEST VEHICLE: Ford Police Interceptor

BRAKE PAD: AC Delco

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
45.1	8.9	89.8	94.8	67.3
46.0	9.0	114.9	126.6	66.7
44.8	7.0	131.2	150.8	67.1
46.0	7.5	154.5	179.5	68.2
45.8	6.9	152.7	189.1	68.2
45.6	7.5	150.9	197.2	67.3
45.6	7.3	150.0	202.6	67.5
46.5	6.9	148.2	208.6	67.5
45.8	7.6	147.3	212.5	68.2
45.4	6.9	146.4	215.2	68.1
AVERAGE:	**45.7**	**7.6**		



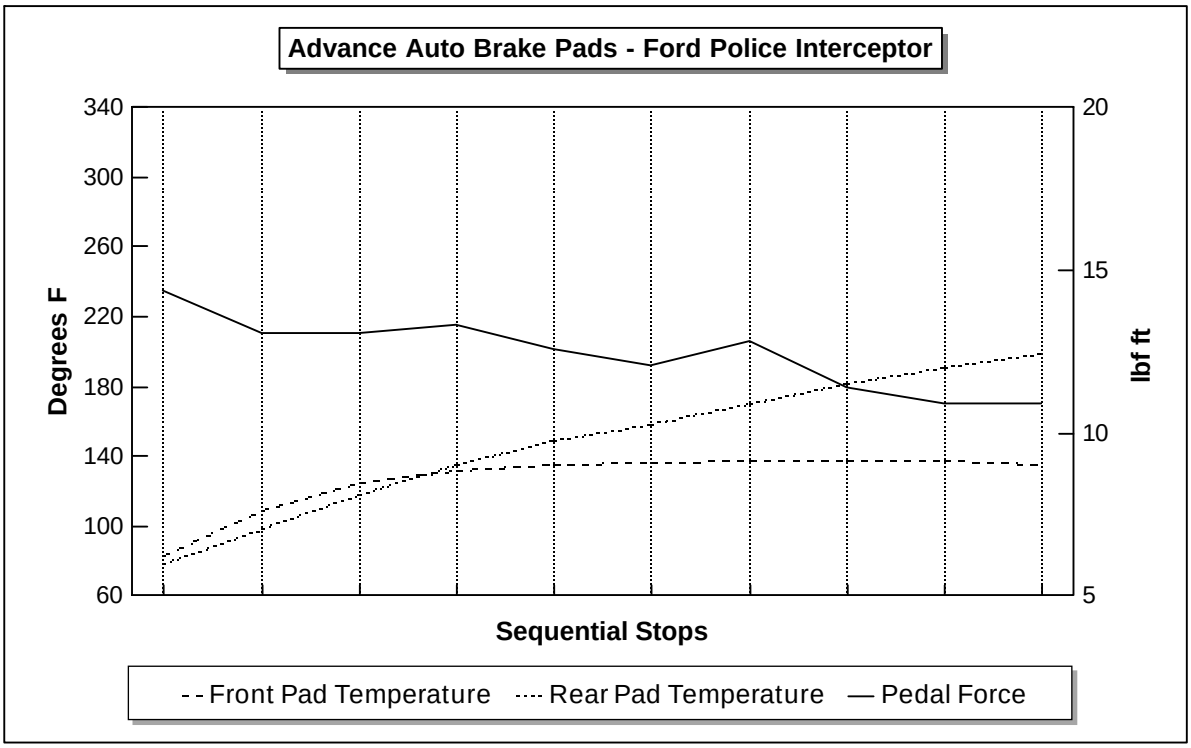
Cold Test Results

TEST VEHICLE: Ford Police Interceptor

BRAKE PAD: Advance Auto

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
46.1	14.4	83.4	79.5	75.4
46.0	13.1	109.5	99.1	75.7
46.4	13.1	124.8	118.1	75.9
45.1	13.3	132.0	135.7	76.1
45.6	12.6	135.6	149.5	76.3
45.7	12.1	136.5	159.1	76.0
45.2	12.8	137.4	170.8	76.2
45.3	11.4	137.4	181.8	75.4
45.3	10.9	137.4	190.8	76.3
44.8	10.9	135.6	199.0	76.3
AVERAGE: **45.6**	**12.5***			

* Analysis showed no statistically significant difference between the original equipment pads and the Advance Auto pads on this test.

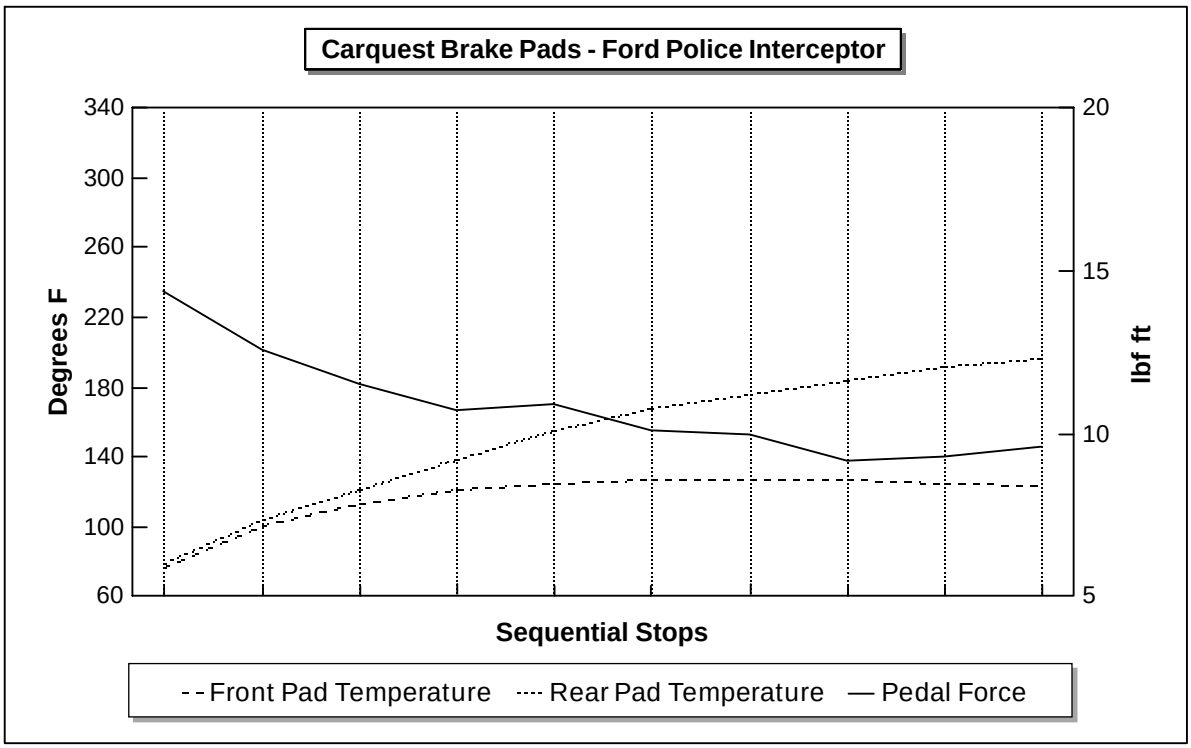


Cold Test Results

TEST VEHICLE: Ford Police Interceptor

BRAKE PAD: Carquest

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
45.3	14.4	77.1	78.6	74.5
45.3	12.6	100.5	104.2	75.4
45.2	11.5	114.0	121.5	75.6
46.0	10.7	122.1	138.7	75.4
45.4	10.9	125.7	155.6	75.4
45.5	10.1	127.1	168.5	75.4
45.3	10.0	127.6	176.5	75.4
44.9	9.2	127.5	184.6	76.5
45.7	9.3	125.7	192.1	77.2
45.9	9.6	123.9	196.5	75.4
AVERAGE: **45.5**	**10.8**			



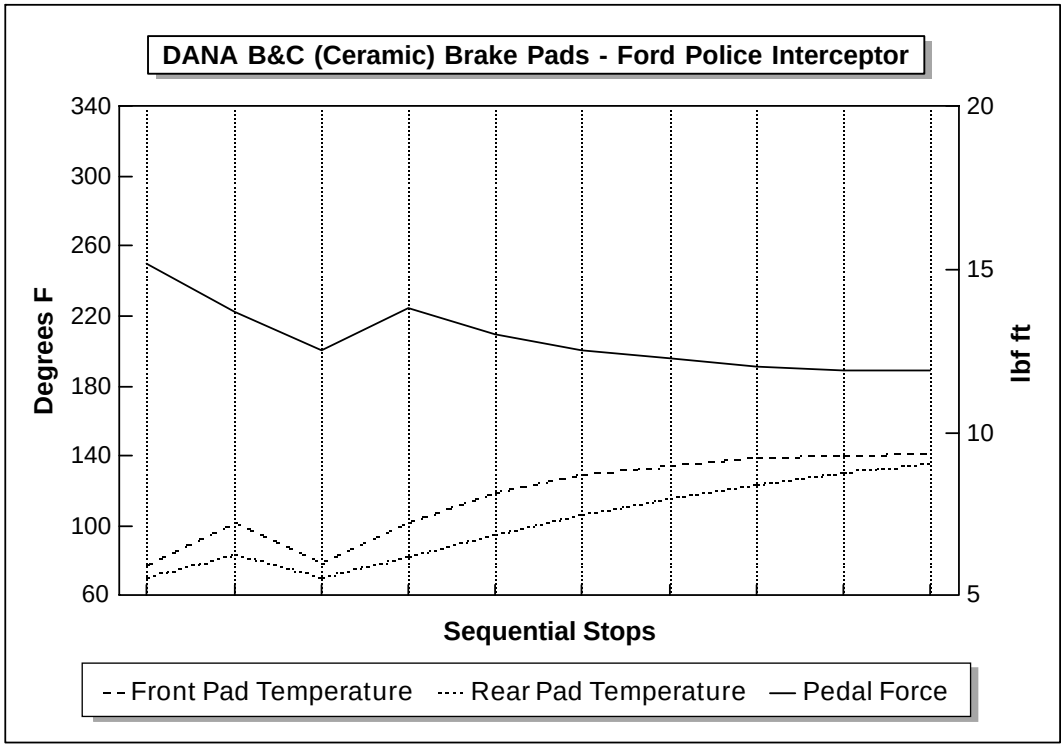
Cold Test Results

TEST VEHICLE: Ford Police Interceptor

BRAKE PAD: DANA B&C (Ceramic)

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
46.3	15.2	77.8	71.2	71.8
46.1	13.7	102.3	83.2	71.8
45.6	12.5	78.9	71.2	67.3
46.3	13.8	102.3	82.0	68.2
46.0	13.0	119.4	94.6	68.5
46.0	12.5	129.3	106.6	69.1
46.8	12.3	134.7	116.2	68.9
45.6	12.0	139.2	124.3	70.0
46.1	11.9	140.1	130.6	70.7
47.1	11.9	141.0	136.0	70.9
AVERAGE:	**46.2**	**12.9***		

* Analysis showed no statistically significant difference between the original equipment pads and the DANA B&C (Ceramic) pads on this test.

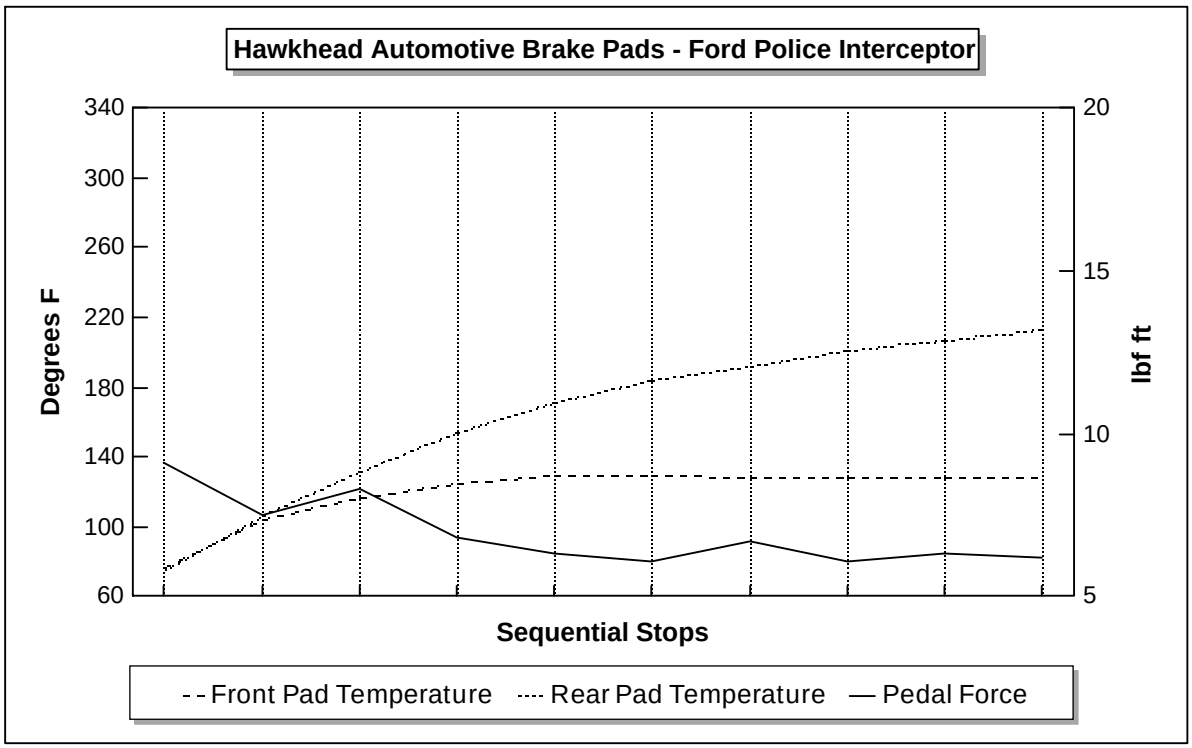


Cold Test Results

TEST VEHICLE: Ford Police Interceptor

BRAKE PAD: Hawkhead

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
45.7	9.1	77.1	73.9	71.8
45.4	7.5	104.1	106.3	72.7
46.0	8.3	117.6	132.4	72.7
45.8	6.8	125.7	154.0	73.6
45.4	6.3	129.3	171.1	72.7
45.8	6.1	129.3	183.7	73.6
46.6	6.7	128.4	192.7	72.7
46.1	6.1	128.4	201.7	71.8
46.1	6.3	128.4	207.1	72.7
46.5	6.2	128.4	213.4	72.7
AVERAGE: **45.9**	**6.9**			

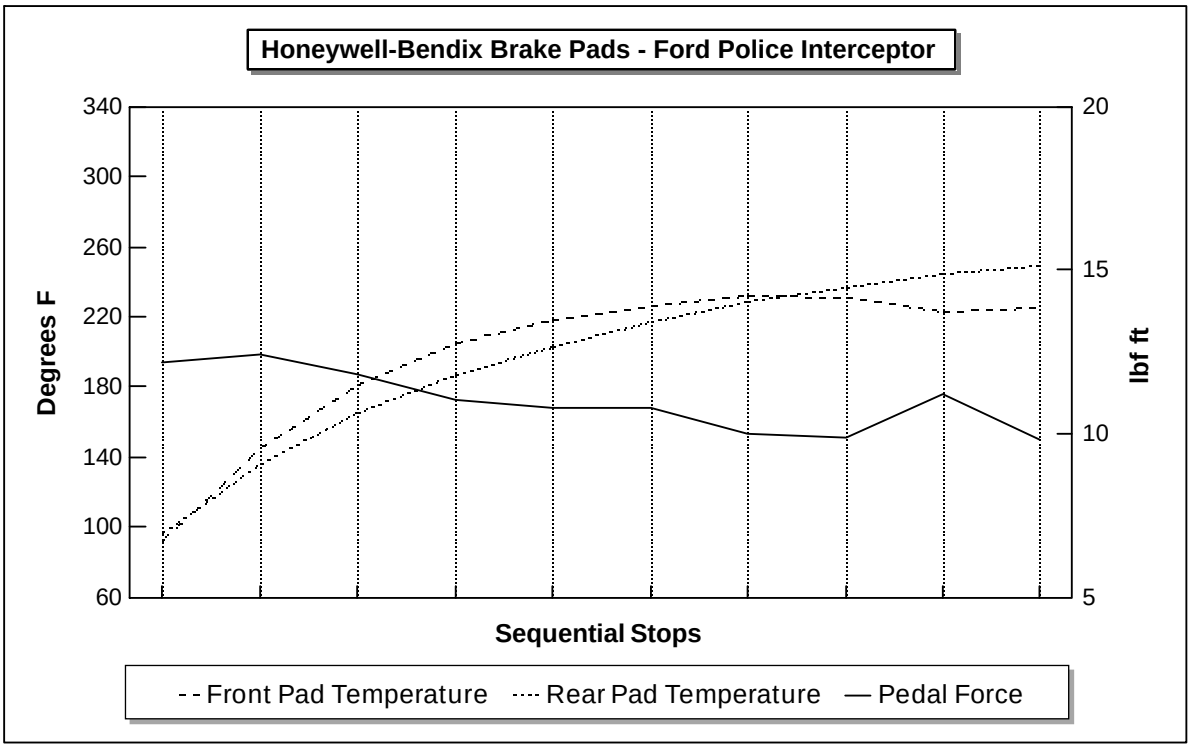


Cold Test Results

TEST VEHICLE: Ford Police Interceptor

BRAKE PAD: Honeywell-Bendix

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
47.1	12.2	92.4	97.3	72.8
45.7	12.4	145.2	136.0	73.6
45.9	11.8	181.2	165.7	72.7
45.9	11.0	204.9	187.3	72.7
45.7	10.8	219.3	203.5	72.7
45.0	10.8	226.5	217.9	72.7
45.6	10.0	231.9	228.7	72.7
45.8	9.9	231.0	237.3	72.5
44.6	11.2	223.8	244.9	72.7
44.8	9.8	225.6	249.4	72.5
AVERAGE: **45.6**	**11.0**			

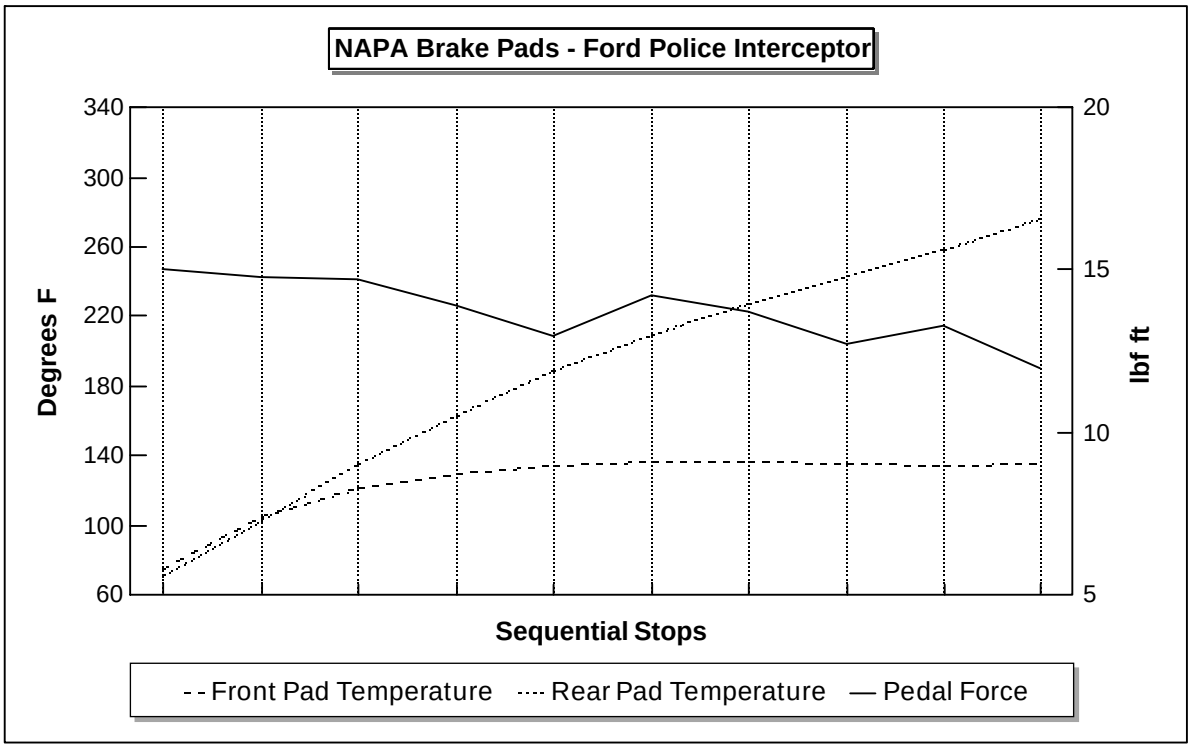


Cold Test Results

TEST VEHICLE: Ford Police Interceptor

BRAKE PAD: NAPA

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
45.4	15.0	75.3	70.8	70.9
45.3	14.8	105.0	103.6	71.0
45.4	14.7	121.2	135.1	70.9
45.9	13.9	129.3	164.1	71.1
45.9	13.0	134.7	189.1	71.7
45.1	14.2	136.5	209.8	70.9
44.9	13.7	136.5	227.8	70.9
45.3	12.7	135.6	244.0	71.1
45.5	13.3	134.7	259.3	72.7
45.2	12.0	135.6	276.4	72.7
AVERAGE:	**45.4**	**13.7**		

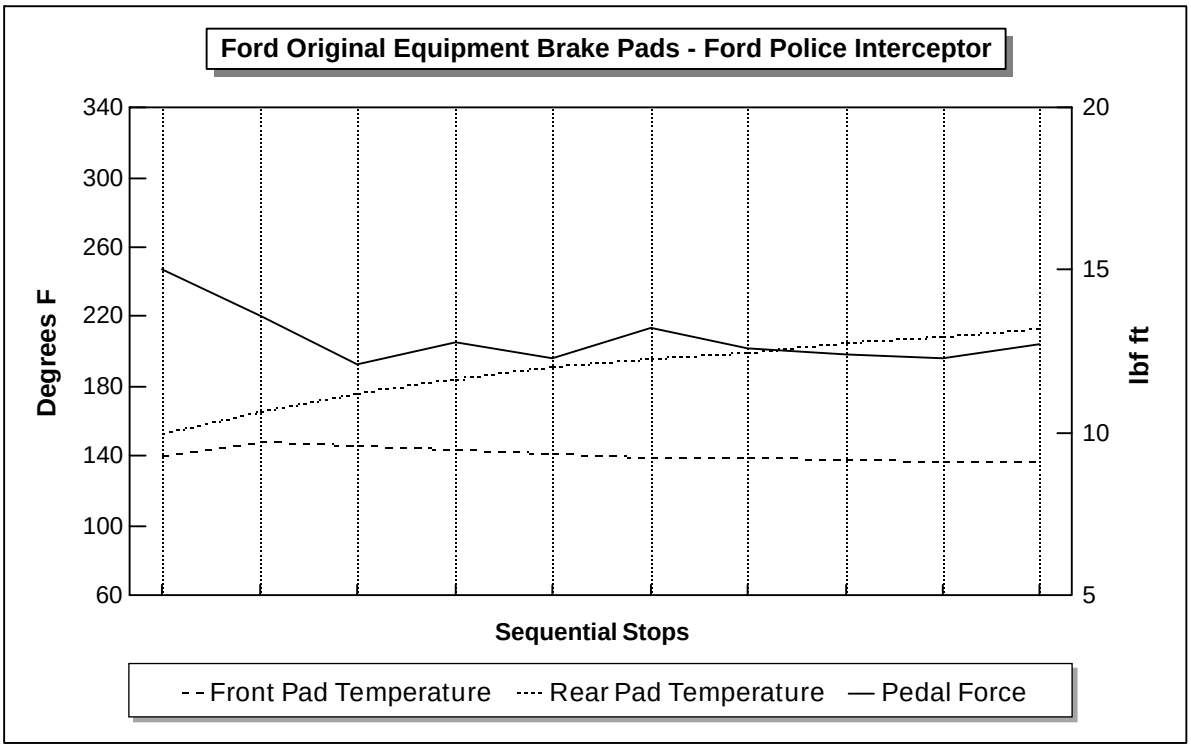


Cold Test Results

TEST VEHICLE: Ford Police Interceptor

BRAKE PAD: Original Equipment - (Ford)

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
45.2	15.0	140.1	153.1	70.5
45.6	13.6	148.2	165.7	68.2
45.5	12.1	146.4	176.4	68.2
45.6	12.8	143.7	184.4	68.2
45.4	12.3	141.0	190.9	69.1
45.7	13.2	139.2	196.3	69.1
45.8	12.6	139.2	200.1	70.0
46.1	12.4	138.3	205.3	70.0
45.3	12.3	137.3	208.9	70.4
46.5	12.7	136.5	213.4	70.9
AVERAGE:	**45.7**	**12.9**		



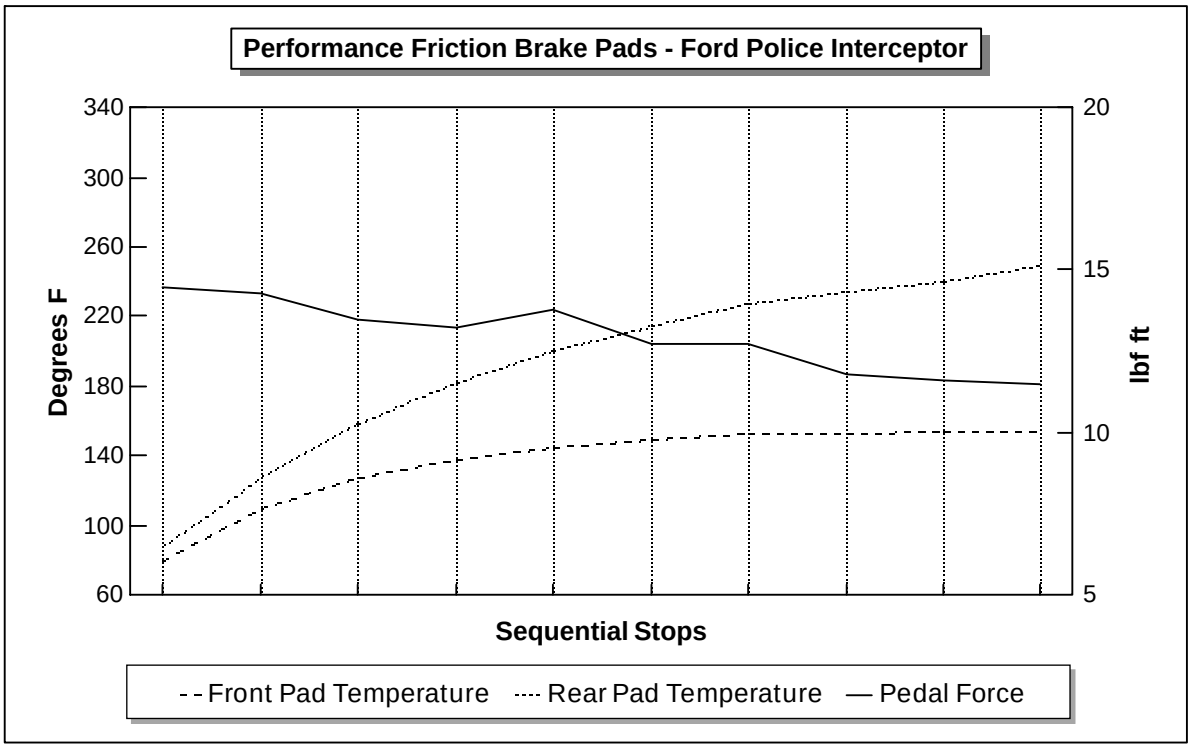
Cold Test Results

TEST VEHICLE: Ford Police Interceptor

BRAKE PAD: Performance Friction

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
45.1	14.5	79.3	88.3	74.4
46.0	14.3	109.5	127.9	72.7
47.2	13.5	127.0	159.4	72.7
45.6	13.2	137.9	181.9	73.0
44.7	13.8	145.5	200.8	75.4
46.6	12.7	149.5	214.3	75.4
44.6	12.7	152.7	227.8	75.4
45.5	11.8	153.6	235.0	76.1
46.4	11.6	154.5	239.9	74.5
45.9	11.5	154.5	249.4	73.4
AVERAGE:	**45.8**	**13.0***		

* Analysis showed no statistically significant difference between the original equipment pads and the Performance Friction pads on this test.

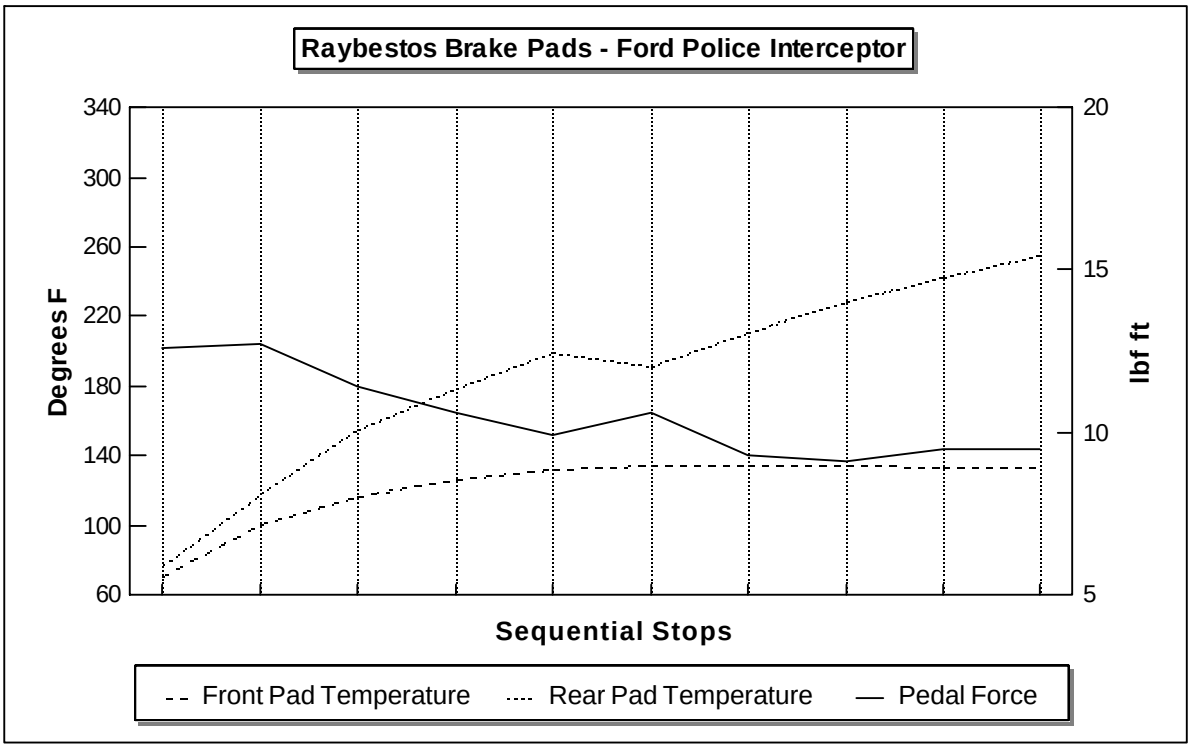


Cold Test Results

TEST VEHICLE: Ford Police Interceptor

BRAKE PAD: Raybestos

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
45.1	12.6	70.8	76.6	68.4
45.4	12.7	100.5	118.0	69.1
46.7	11.4	117.0	154.9	69.1
45.5	10.6	126.6	178.3	69.1
46.6	9.9	132.0	199.9	70.1
45.8	10.6	134.2	191.8	70.9
45.1	9.3	134.7	210.7	70.0
45.1	9.1	134.7	228.2	69.7
45.4	9.5	133.8	243.1	70.0
45.4	9.5	133.8	255.1	70.6
AVERAGE: **45.6**	**10.5**			



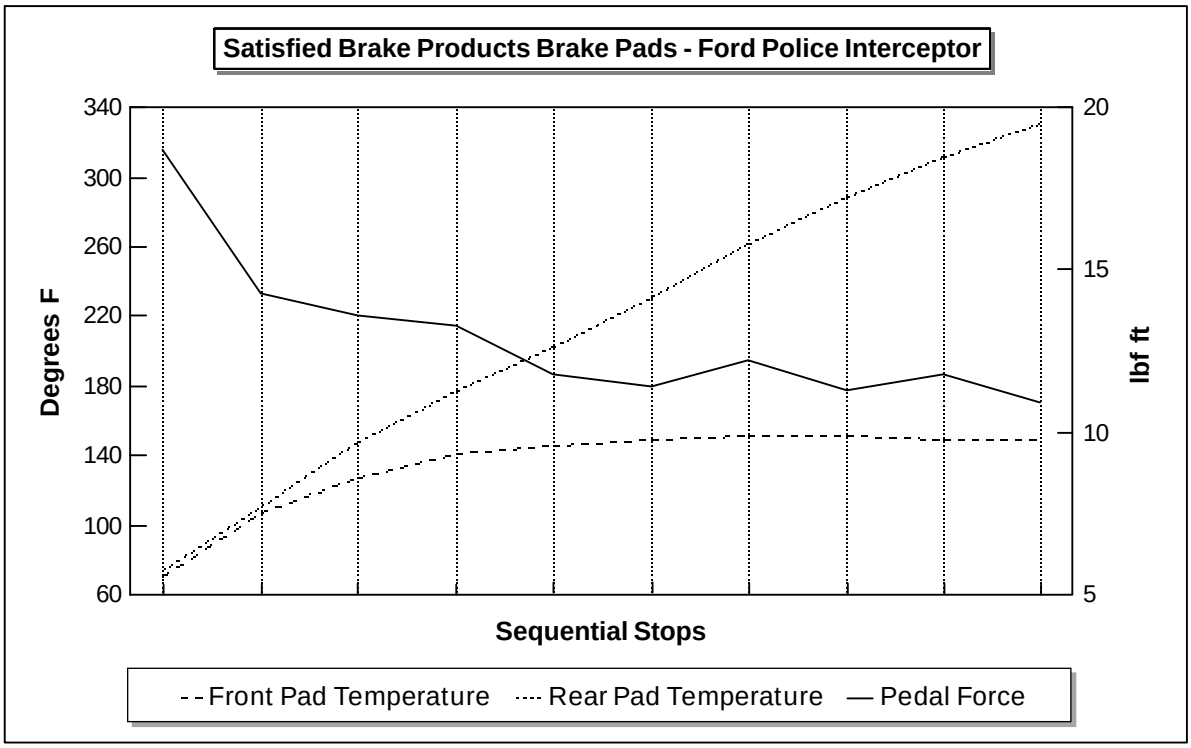
Cold Test Results

TEST VEHICLE: Ford Police Interceptor

BRAKE PAD: Satisfied Brake

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
46.0	18.7	70.8	73.9	58.3
45.9	14.3	107.7	111.7	58.3
46.6	13.6	127.5	148.6	58.4
45.9	13.3	141.6	177.1	59.2
46.5	11.8	146.4	202.6	60.1
45.7	11.4	149.5	231.4	60.1
45.5	12.2	151.7	262.0	60.1
46.1	11.3	151.8	289.0	60.9
46.4	11.8	150.1	312.4	60.9
46.0	10.9	149.1	330.4	60.9
AVERAGE: **46.1**	**12.9***			

* Analysis showed no statistically significant difference between the original equipment pads and the Satisfied Brake pads on this test.

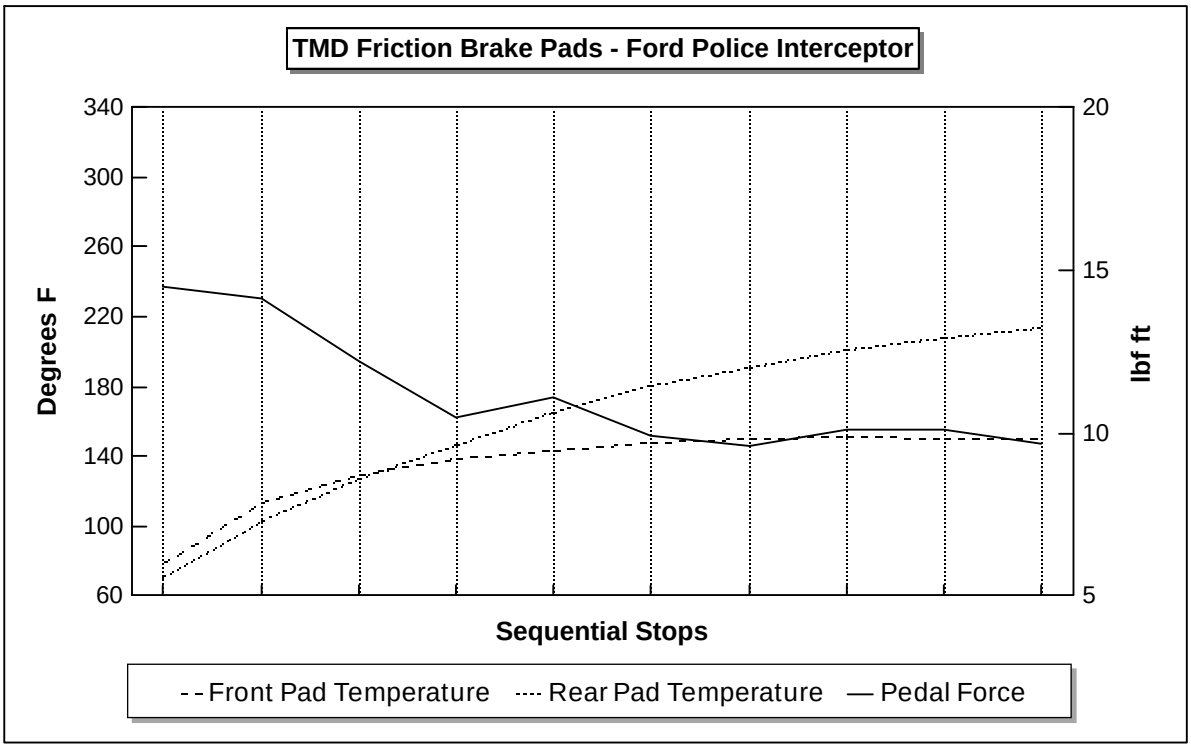


Cold Test Results

TEST VEHICLE: Ford Police Interceptor

BRAKE PAD: TMD Friction

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
45.9	14.5	79.3	71.2	70.3
45.7	14.1	114.0	102.7	70.9
46.3	12.2	129.3	127.6	70.0
45.8	10.5	139.2	147.7	70.0
47.0	11.1	143.7	165.7	70.0
45.6	9.9	148.2	181.0	70.9
46.0	9.6	150.9	190.9	70.5
45.5	10.1	151.8	201.7	70.7
46.5	10.1	150.9	208.0	70.9
45.9	9.7	150.9	214.3	71.8
AVERAGE: **46.0**	**11.2**			



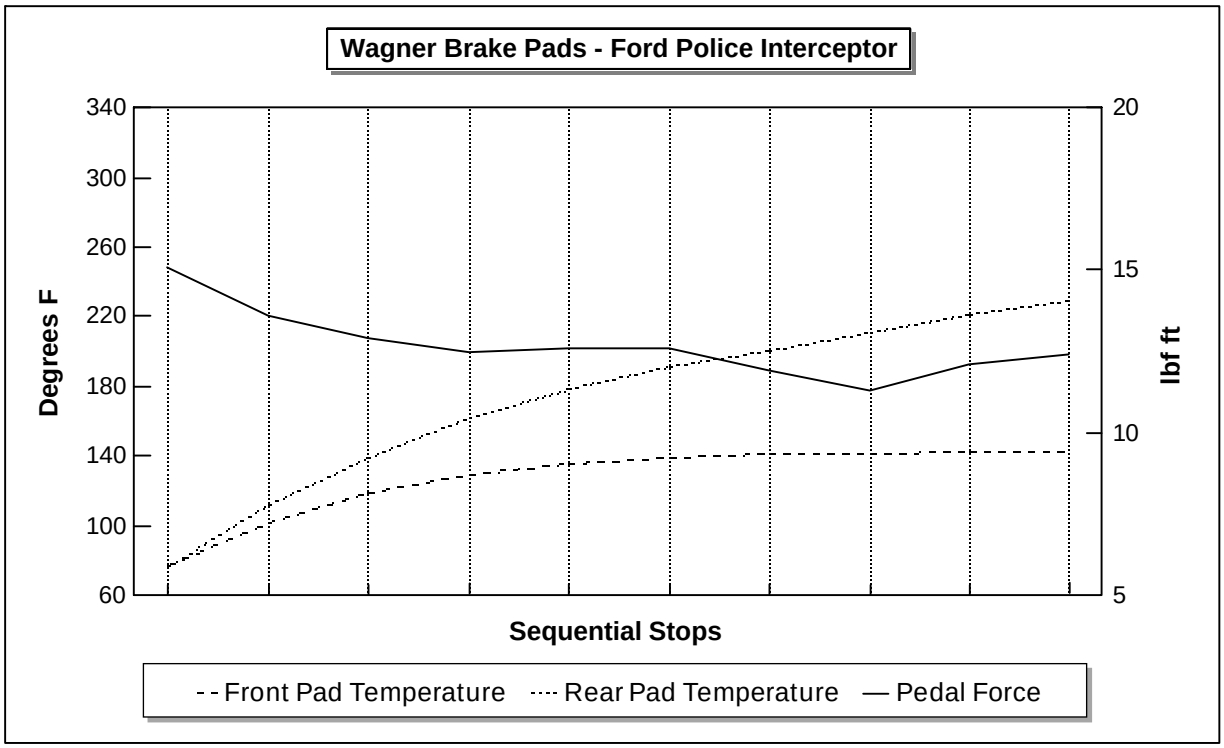
Cold Test Results

TEST VEHICLE: Ford Police Interceptor

BRAKE PAD: Wagner

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
45.5	15.1	78.0	76.2	68.2
46.3	13.6	102.3	112.6	67.4
45.9	12.9	119.4	139.7	68.2
46.1	12.5	129.4	162.1	67.4
46.4	12.6	135.6	178.3	68.2
46.6	12.6	139.2	190.9	68.2
46.4	11.9	141.0	200.8	68.2
45.5	11.3	141.9	210.9	68.2
46.3	12.1	142.6	221.5	69.1
46.3	12.4	142.8	229.6	69.2
AVERAGE: 46.1	**12.7***			

* Analysis showed no statistically significant difference between the original equipment pads and the Wagner pads on this test.

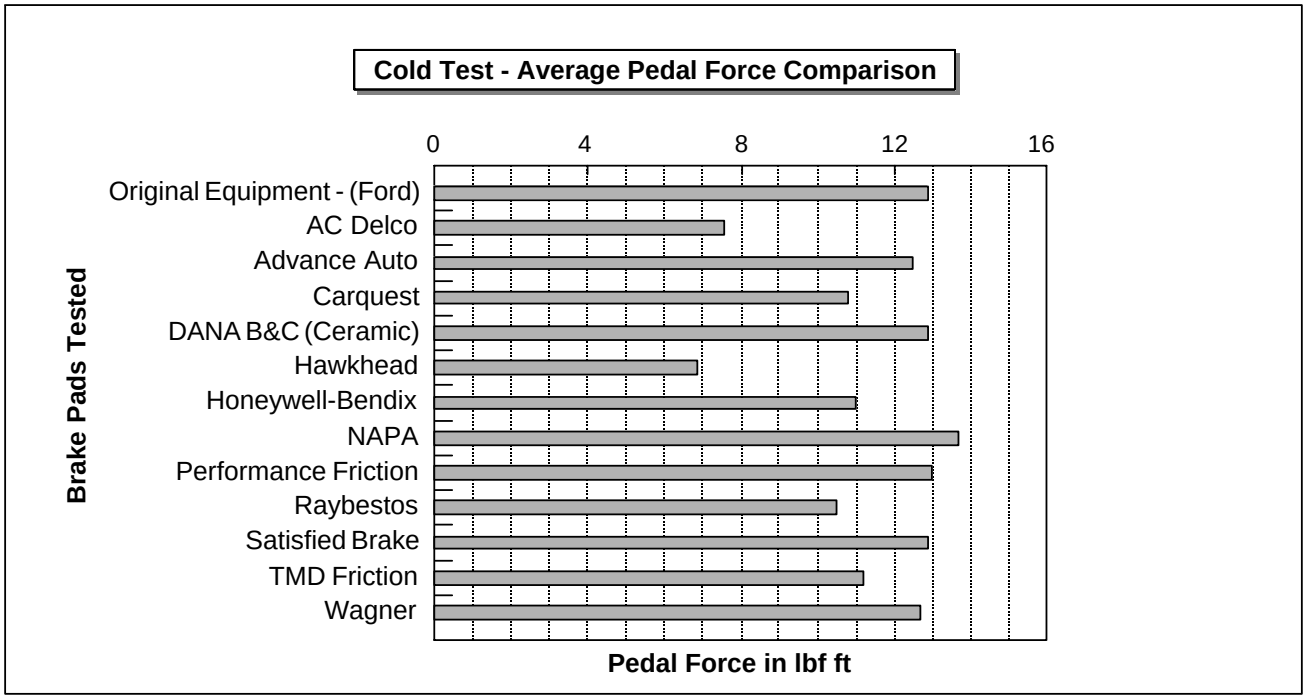


Summary of Cold Test Results

TEST VEHICLE: Ford Police Interceptor

BRAKE PAD	AVERAGE INITIAL SPEED mph	AVERAGE PEDAL FORCE lbf ft	AVERAGE AMBIENT TEMP deg. F
Original Equipment - (Ford)	45.7	**12.9**	69.5
AC Delco	45.7	**7.6**	67.6
Advance Auto	45.6	**12.5***	76.0
Carquest	45.5	**10.8**	75.6
DANA B&C (Ceramic)	46.2	**12.9***	69.7
Hawkhead	45.9	**6.9**	72.7
Honeywell-Bendix	45.6	**11.0**	72.8
NAPA	45.4	**13.7**	71.4
Performance Friction	45.8	**13.0***	74.3
Raybestos	45.6	**10.5**	69.7
Satisfied Brake	46.1	**12.9***	59.7
TMD Friction	46.0	**11.2**	70.6
Wagner	46.1	**12.7***	68.2

* Analysis showed no statistically significant difference between the original equipment pads and the Advance Auto, DANA B&C (Ceramic), Performance Friction, Satisfied, and Wagner pads on this test. However, these aftermarket pads are not necessarily equal to each other.



Comparative Evaluations (continued)

Normal Operating Temperature Braking Performance Test

Test Objective

Determine the stopping performance characteristics of the test brake pads under normal or optimal operating temperature conditions. *(A high percentage of a law enforcement officer's day is spent on normal patrol, driving at normal speeds. Heat produced in the braking system, and the resulting changes in the pedal force required to make normal stops, can be of great importance, particularly for officers whose size, weight, or strength make them less able to produce the higher pedal efforts required by some brake pad materials.)*

Test Methodology

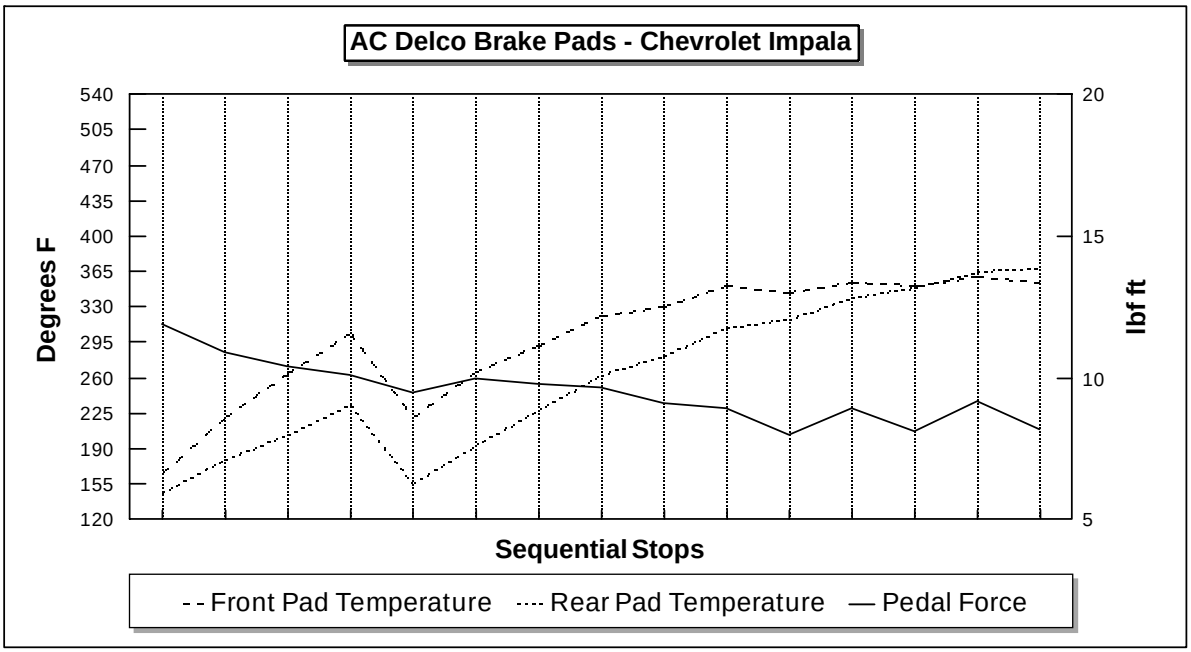
Each of the test brake pad/rotor sets will be evaluated to determine their normal operating temperature braking characteristics by performing 15 decelerations (at specific predetermined locations on the test track) from 60 mph to 20 mph at a deceleration rate of 15 ft/s^2. After each deceleration, the test vehicle will be accelerated back to 60 mph and driven for approximately 1 mile (to another predetermined deceleration location) in order to allow the brake components to cool before the next deceleration in the series. Temperature increases during each deceleration and throughout the entire test process, as well as brake pedal force necessary to maintain the target deceleration rate, will be recorded.

Normal Operating Temperature Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: AC Delco

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
61.3	11.9	165.3	145.9	75.4
61.4	10.9	222.0	179.2	75.4
61.5	10.4	264.0	204.4	75.4
61.1	10.1	304.8	234.1	75.4
60.4	9.5	222.0	154.9	74.5
60.1	10.0	266.1	193.6	74.5
60.9	9.8	293.1	228.9	74.5
59.9	9.7	322.1	263.6	74.5
60.6	9.1	330.0	282.5	74.5
60.5	8.9	350.7	309.7	74.5
61.1	8.0	345.3	318.7	74.5
61.0	8.9	355.2	339.4	75.0
61.0	8.1	351.6	349.3	75.4
60.9	9.2	359.6	364.6	75.4
61.1	8.2	355.2	369.1	75.4
AVERAGE: **60.9**	**9.5**			

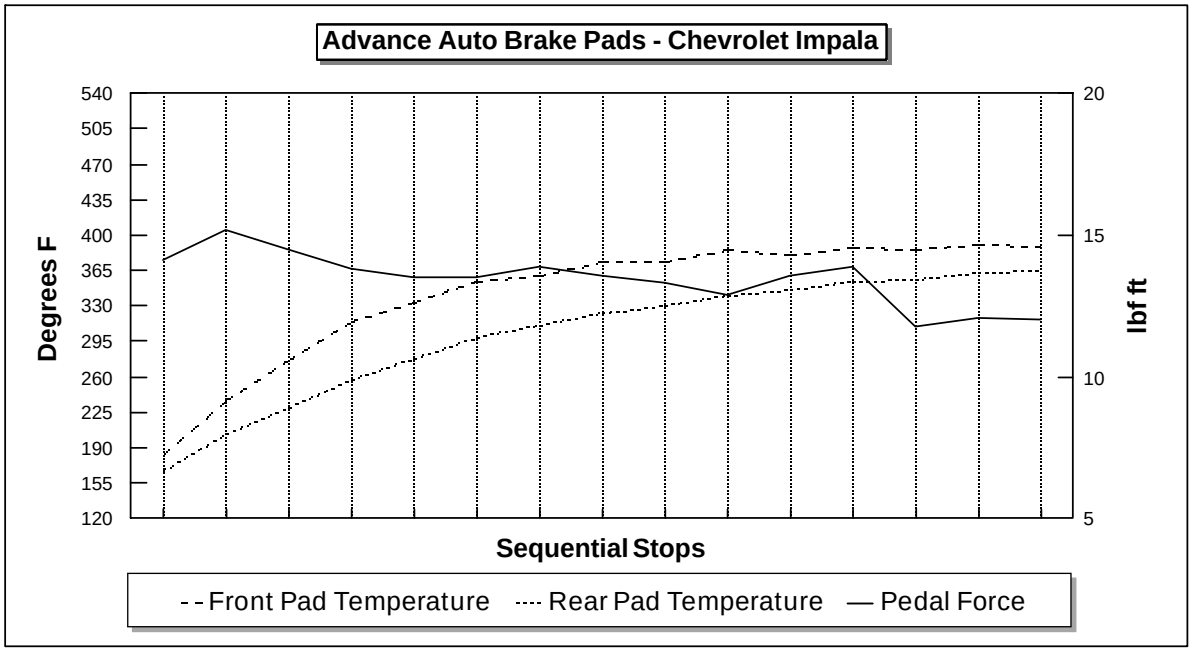


Normal Operating Temperature Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: Advance Auto

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
60.3	14.1	183.1	167.5	72.7
60.5	15.2	237.3	204.4	72.7
60.8	14.5	276.0	229.5	72.6
59.9	13.8	315.6	257.5	72.7
60.7	13.5	333.6	279.1	72.6
59.5	13.5	355.2	299.8	72.7
60.6	13.9	360.6	311.5	72.7
60.6	13.6	373.2	323.2	72.7
60.5	13.3	373.8	330.4	72.7
59.5	12.9	385.8	341.0	72.7
60.4	13.6	380.8	345.7	72.7
60.3	13.9	387.8	354.7	72.7
61.0	11.8	385.8	356.3	72.7
60.6	12.1	391.2	362.8	72.7
60.6	12.0	389.4	364.6	72.7
AVERAGE: **60.4**	**13.4**			

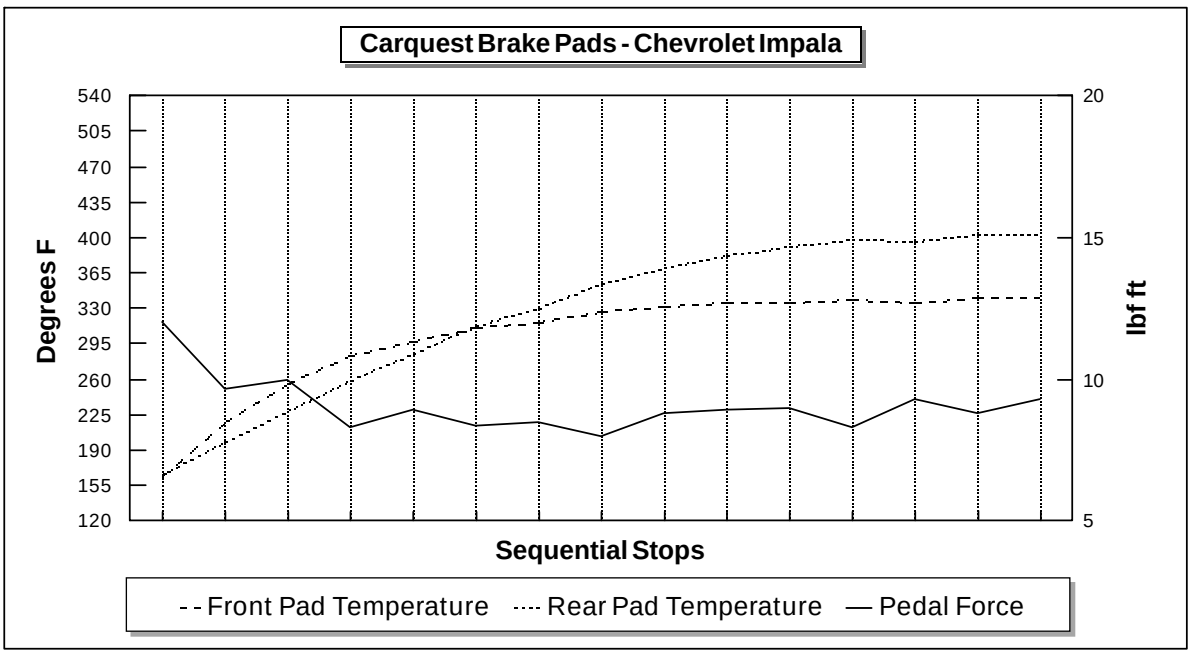


Normal Operating Temperature Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: Carquest

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
60.4	12.0	163.5	166.6	72.7
59.6	9.7	218.4	199.0	72.7
60.1	10.0	255.3	228.0	72.7
60.1	8.3	283.2	260.2	72.6
60.5	8.9	297.9	285.7	73.6
60.1	8.4	312.0	313.3	72.7
62.0	8.5	317.3	331.3	72.9
60.9	8.0	327.3	354.7	72.7
59.5	8.8	331.8	370.0	72.7
60.4	8.9	336.3	382.6	72.7
60.5	9.0	336.3	391.6	72.6
59.5	8.3	339.9	398.8	71.9
60.4	9.3	336.3	396.1	71.8
60.6	8.8	341.6	403.3	71.8
59.9	9.3	340.8	403.4	71.8
AVERAGE: **60.3**	**9.1**			



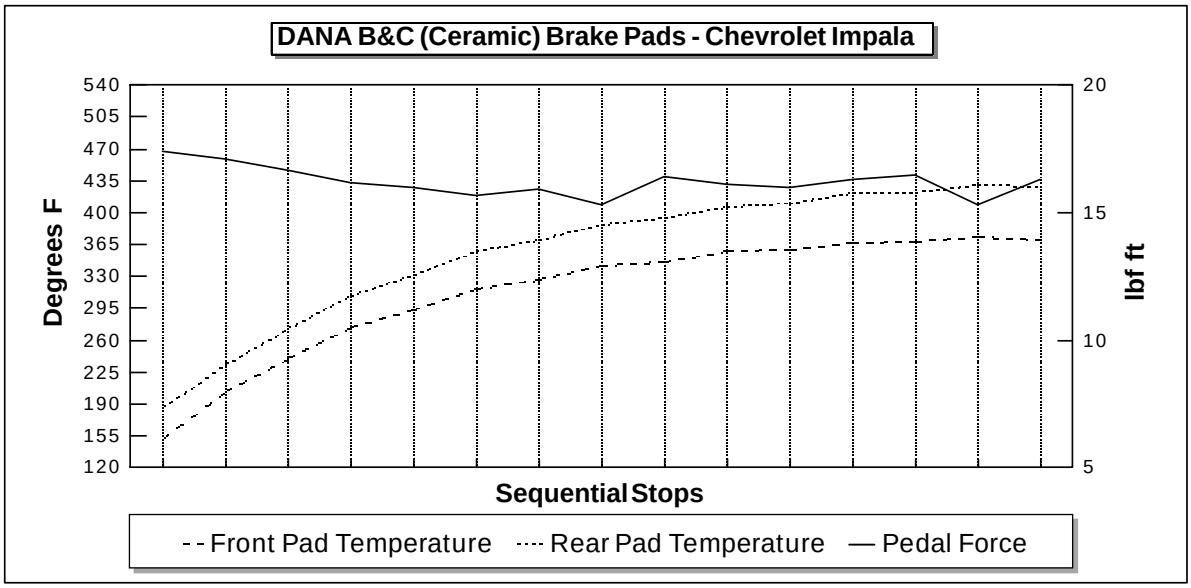
Normal Operating Temperature Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: DANA B&C (Ceramic)

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
60.9	17.4	152.7	186.4	66.9
60.4	17.1	203.1	234.1	67.3
61.3	16.7	240.0	273.7	67.3
60.7	16.2	275.1	309.7	67.3
61.5	16.0	294.9	333.1	68.1
59.8	15.7	316.5	358.0	68.2
60.4	15.9	327.3	370.9	68.2
61.5	15.3	342.6	387.3	68.2
61.0	16.4	346.3	394.3	68.2
60.1	16.1	357.9	406.9	68.4
61.8	16.0	359.4	410.5	69.1
61.7	16.3	367.6	422.4	69.2
61.0	16.5	367.8	422.2	70.0
60.4	15.3	374.1	431.2	70.0
61.2	16.3	370.5	429.6	70.9
AVERAGE:	**60.9**	**16.2***		

* Analysis showed no statistically significant difference between the original equipment pads and the DANA B&C (Ceramic) pads on this test.

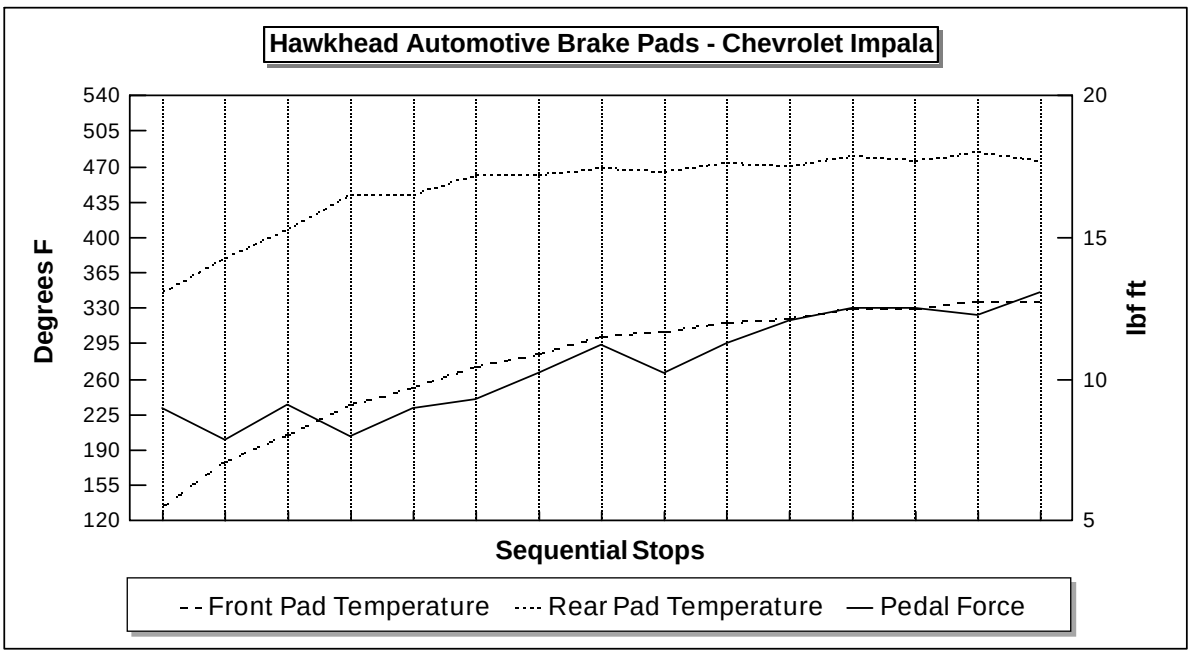


Normal Operating Temperature Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: Hawkhead

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
61.1	9.0	134.7	346.6	66.5
59.6	7.9	178.8	380.8	66.4
60.3	9.1	205.8	407.8	67.3
59.7	8.0	235.5	442.5	66.6
60.1	9.0	251.7	443.8	67.2
59.9	9.3	273.3	462.7	66.9
60.9	10.2	285.9	462.7	67.3
60.3	11.2	302.1	469.9	67.1
60.1	10.2	308.4	465.4	67.3
60.1	11.3	317.4	475.3	67.3
59.8	12.1	320.1	470.9	67.3
60.4	12.5	330.2	480.7	67.3
60.6	12.5	330.9	476.7	67.3
59.6	12.3	338.2	485.2	67.3
61.1	13.1	338.1	477.1	67.3
AVERAGE: **60.2**	**10.5**			

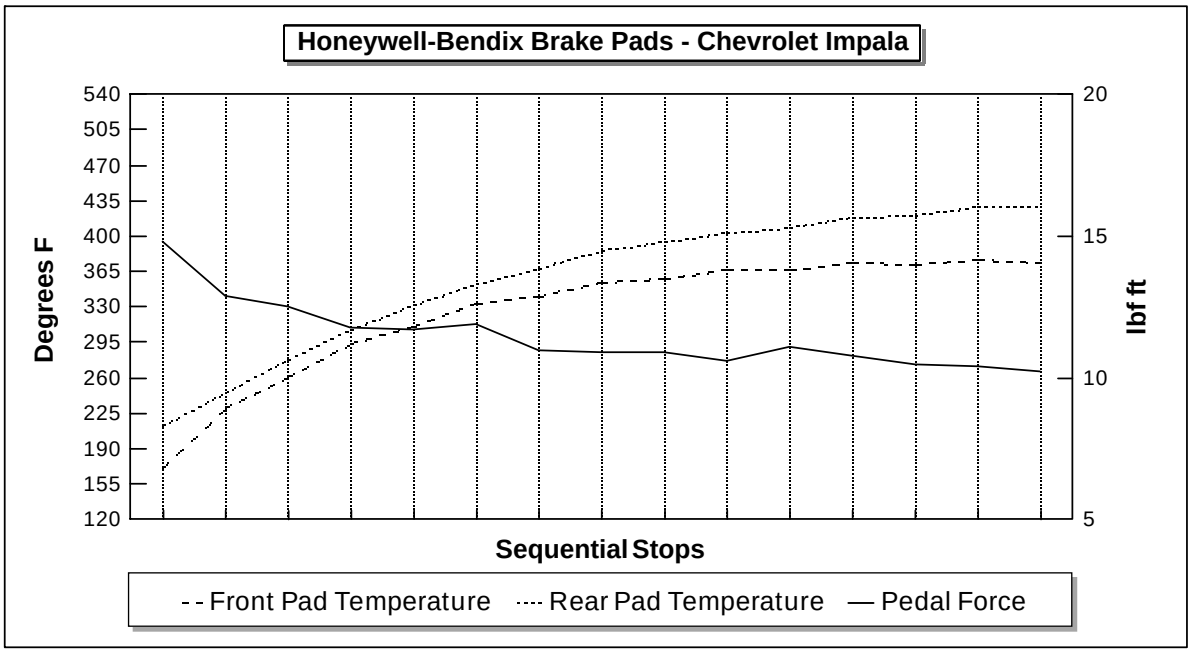


Normal Operating Temperature Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: Honeywell-Bendix

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
60.5	14.8	170.7	213.3	72.7
60.6	12.9	229.2	245.8	72.9
61.0	12.5	261.6	278.6	72.7
59.0	11.8	294.0	308.8	73.6
60.4	11.7	312.0	332.2	73.9
59.6	11.9	333.6	354.0	74.1
60.7	11.0	341.7	369.1	73.6
61.0	10.9	355.2	385.3	73.6
60.1	10.9	358.8	394.3	73.6
59.7	10.6	366.9	404.2	73.6
61.1	11.1	366.9	409.2	73.8
60.0	10.8	373.4	418.4	72.8
60.4	10.5	371.4	421.3	72.7
61.9	10.4	376.8	429.0	72.7
59.2	10.2	373.2	429.4	73.6
AVERAGE:	**60.3**	**11.5**		

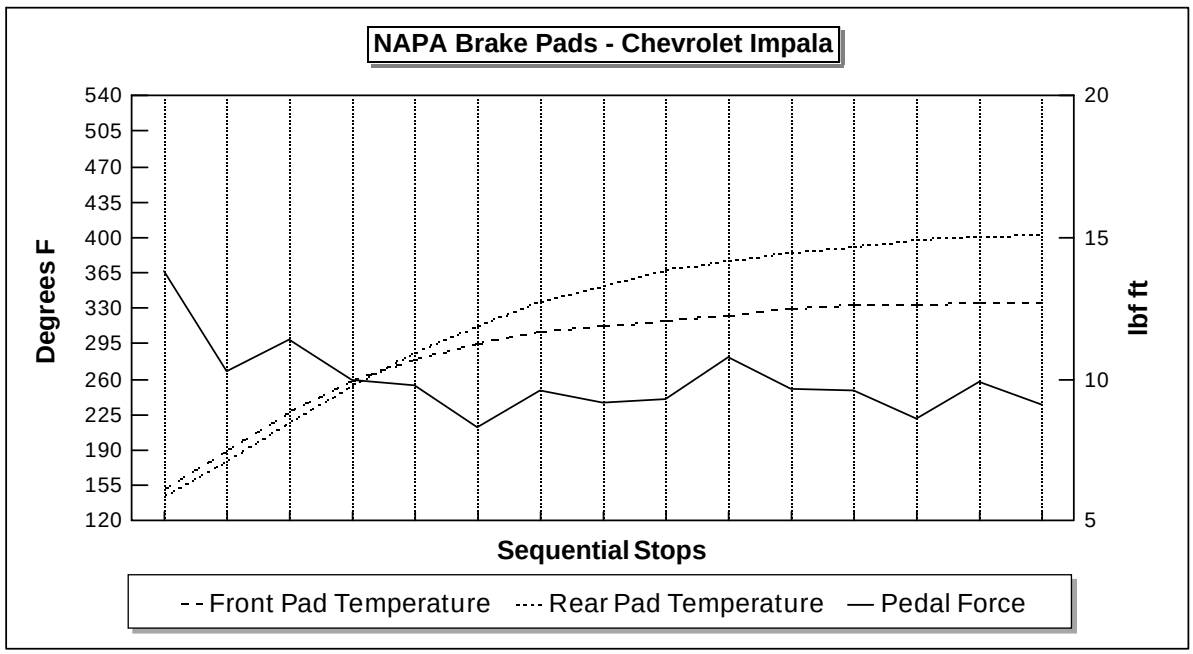


Normal Operating Temperature Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: NAPA

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
59.9	13.8	151.4	145.0	62.3
60.8	10.3	190.5	180.1	61.9
61.2	11.4	227.6	217.9	62.1
60.5	10.0	258.9	254.8	61.9
61.2	9.8	280.5	286.3	62.1
61.0	8.3	296.7	313.3	61.9
60.5	9.6	308.4	337.6	62.2
61.0	9.2	312.9	353.8	61.8
61.1	9.3	318.3	368.2	62.0
61.4	10.8	323.0	376.5	62.0
60.0	9.7	329.9	386.2	62.3
60.5	9.6	333.6	391.6	62.6
60.1	8.6	334.5	397.9	62.8
60.6	9.9	335.2	401.5	62.9
61.1	9.1	335.4	403.3	62.9
AVERAGE:	**60.7**	**10.0**		

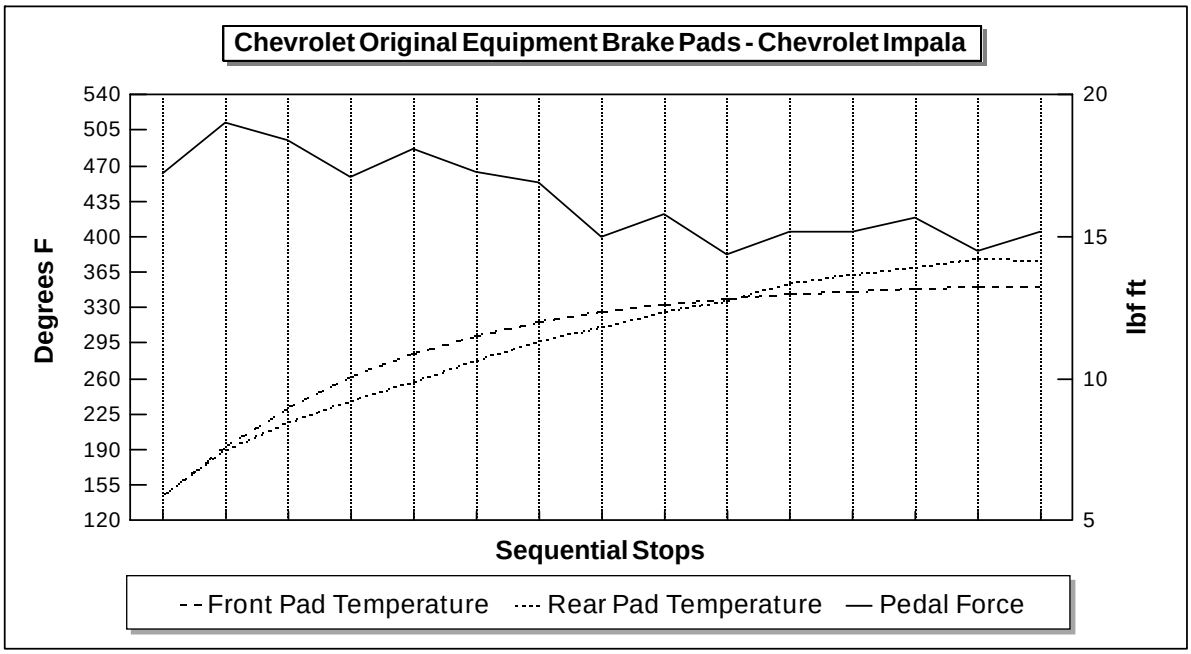


Normal Operating Temperature Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: Original Equipment - (Chevrolet)

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
60.4	17.2	145.5	145.0	64.6
60.3	19.0	193.2	190.3	65.1
61.2	18.4	232.3	217.2	65.4
60.5	17.1	262.5	238.7	65.3
60.9	18.1	285.0	257.7	65.5
60.7	17.3	302.1	277.8	65.4
60.5	16.9	316.5	297.5	65.5
59.9	15.0	326.4	310.7	65.5
60.3	15.8	334.5	326.7	65.6
60.6	14.4	339.2	336.9	65.5
60.8	15.2	344.0	354.8	65.7
61.5	15.2	346.9	363.5	65.5
60.7	15.7	349.8	370.4	65.5
60.4	14.5	351.1	378.8	65.5
60.0	15.2	351.6	377.6	66.0
AVERAGE:	**60.6**	**16.3**		

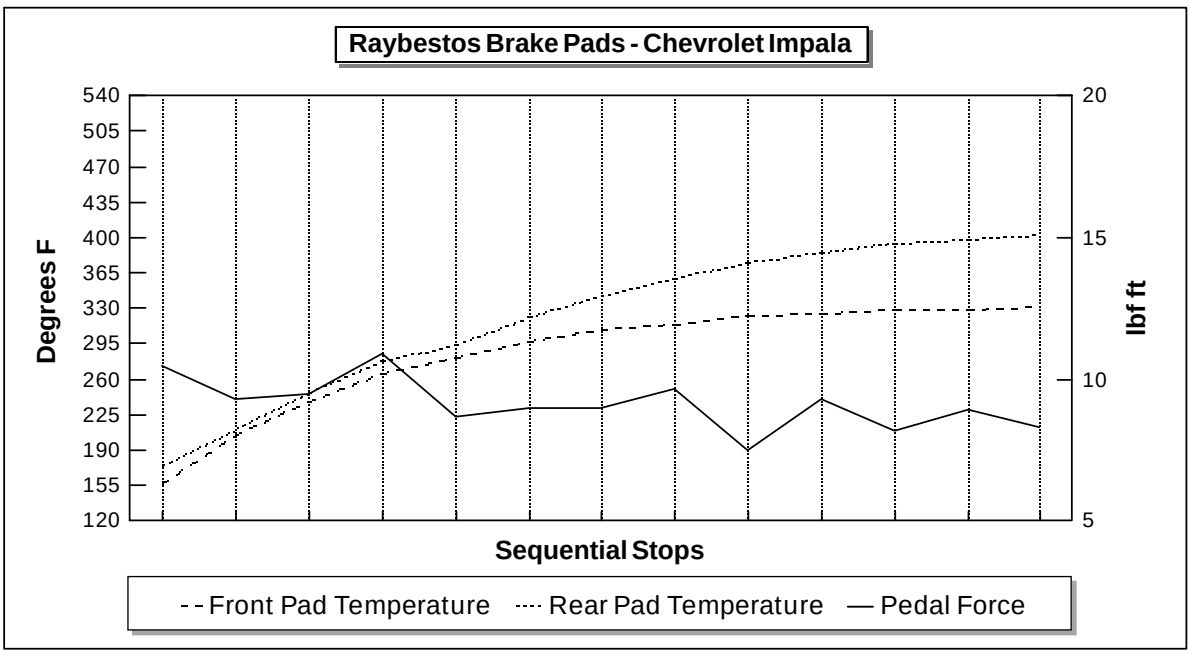


Normal Operating Temperature Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: Raybestos

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
60.6	10.5	156.3	173.8	73.6
59.8	9.3	205.2	211.6	72.7
60.9	9.5	239.1	246.7	73.3
57.5	10.9	266.1	278.2	72.8
61.0	8.7	281.4	294.6	73.6
60.6	9.0	297.6	321.4	72.6
60.3	9.0	309.3	343.0	72.4
61.0	9.7	315.6	360.1	72.7
59.7	7.5	323.3	375.4	73.6
59.7	9.3	325.5	386.2	73.0
59.5	8.2	329.1	394.3	72.7
60.9	8.9	329.1	397.9	72.8
61.0	8.3	332.7	404.2	73.4
AVERAGE: **60.2**	**9.1**			

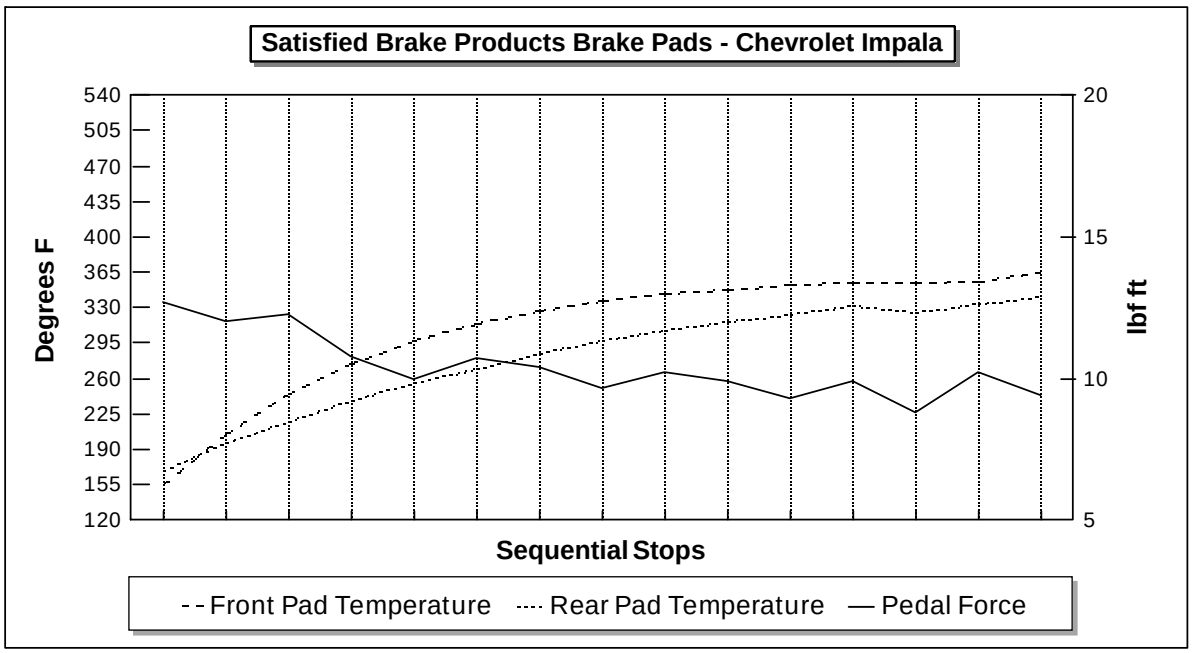


Normal Operating Temperature Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: Satisfied Brake

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
61.2	12.7	154.9	169.8	72.7
59.3	12.0	205.3	196.8	72.7
59.7	12.3	245.8	218.4	72.7
60.0	10.8	275.3	239.3	72.7
61.2	10.0	298.0	256.2	72.7
59.8	10.7	314.7	270.6	72.7
60.2	10.4	326.8	284.6	72.5
59.8	9.7	336.7	297.6	71.3
59.8	10.2	343.9	307.5	72.6
59.6	9.9	348.4	317.4	72.0
59.9	9.3	352.5	323.7	72.7
60.6	9.9	355.6	331.8	71.8
59.8	8.8	354.7	325.5	72.7
60.9	10.2	357.4	334.5	71.8
61.1	9.4	365.0	341.7	71.8
AVERAGE: **60.2**	**10.4**			

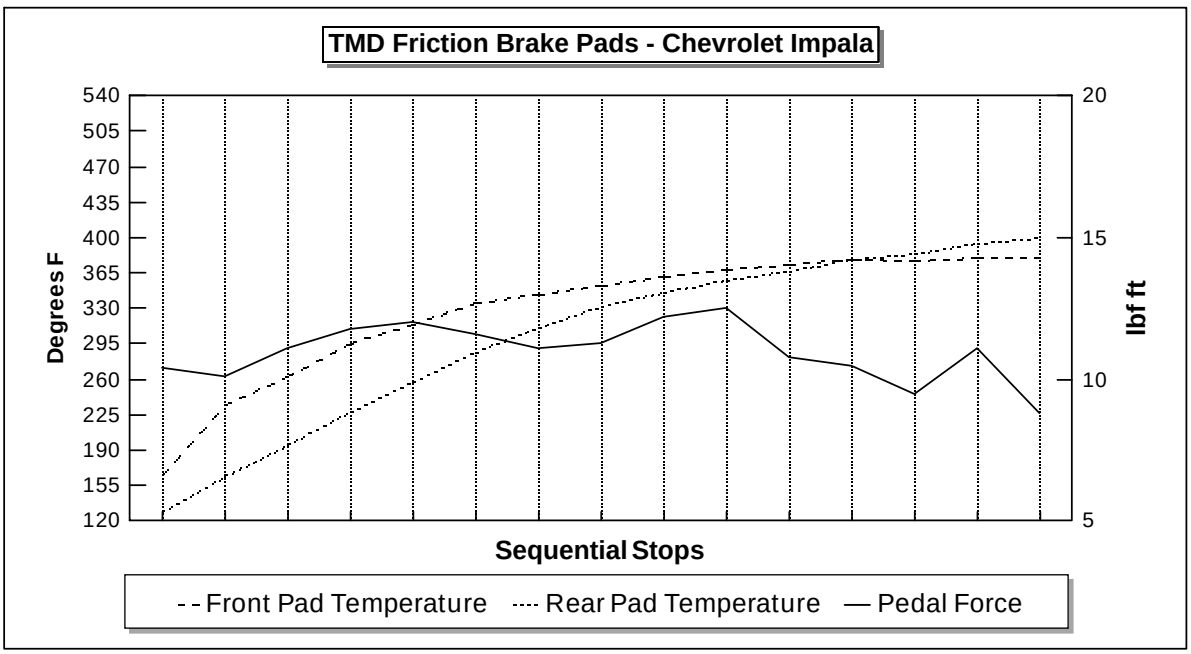


Normal Operating Temperature Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: TMD Friction

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
60.0	10.4	165.3	129.7	63.7
58.8	10.1	234.6	163.9	63.7
60.5	11.1	263.4	194.5	63.7
59.0	11.8	296.7	228.7	63.7
59.7	12.0	315.6	257.5	63.8
60.7	11.6	336.3	287.6	63.8
59.8	11.1	344.7	310.6	64.3
59.8	11.3	352.5	332.2	64.6
59.5	12.2	361.1	345.7	64.6
59.2	12.5	368.7	358.3	64.6
60.1	10.8	373.2	366.4	65.3
60.3	10.5	378.6	379.0	65.5
60.3	9.5	377.7	384.1	65.5
61.2	11.1	381.7	394.7	65.6
61.3	8.8	381.3	399.4	65.9
AVERAGE:	**60.0**	**11.0**		

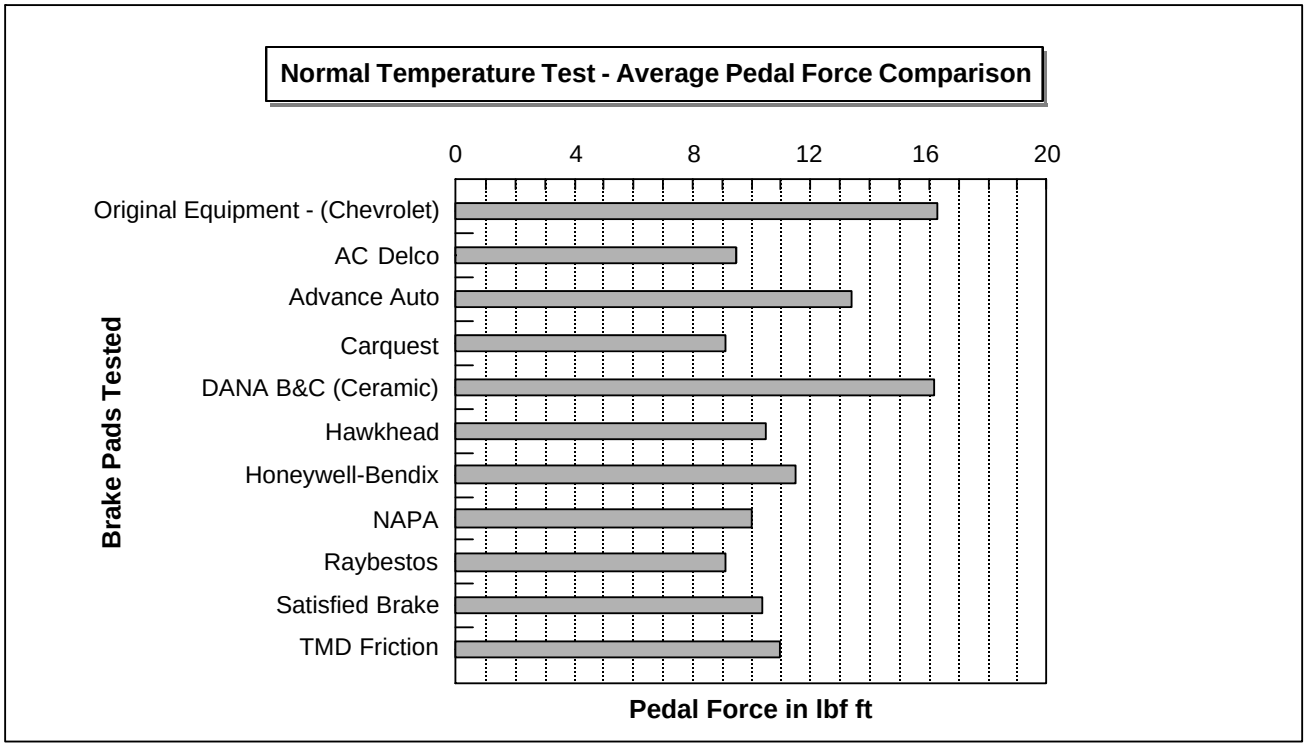


Summary of
Normal Operating Temperature Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD	AVERAGE INITIAL SPEED mph	AVERAGE PEDAL FORCE lbf ft	AVERAGE AMBIENT TEMP deg. F
Original Equipment - (Chevrolet)	60.6	**16.3**	65.4
AC Delco	60.9	**9.5**	75.0
Advance Auto	60.4	**13.4**	72.7
Carquest	60.3	**9.1**	72.5
DANA B&C (Ceramic)	60.9	**16.2***	68.5
Hawkhead	60.2	**10.5**	67.1
Honeywell-Bendix	60.3	**11.5**	73.3
NAPA	60.7	**10.0**	62.2
Raybestos	60.2	**9.1**	73.0
Satisfied Brake	60.2	**10.4**	72.4
TMD Friction	60.0	**11.0**	64.6

* Analysis showed no statistically significant difference between the original equipment pads and the DANA B&C (Ceramic) pads on this test.

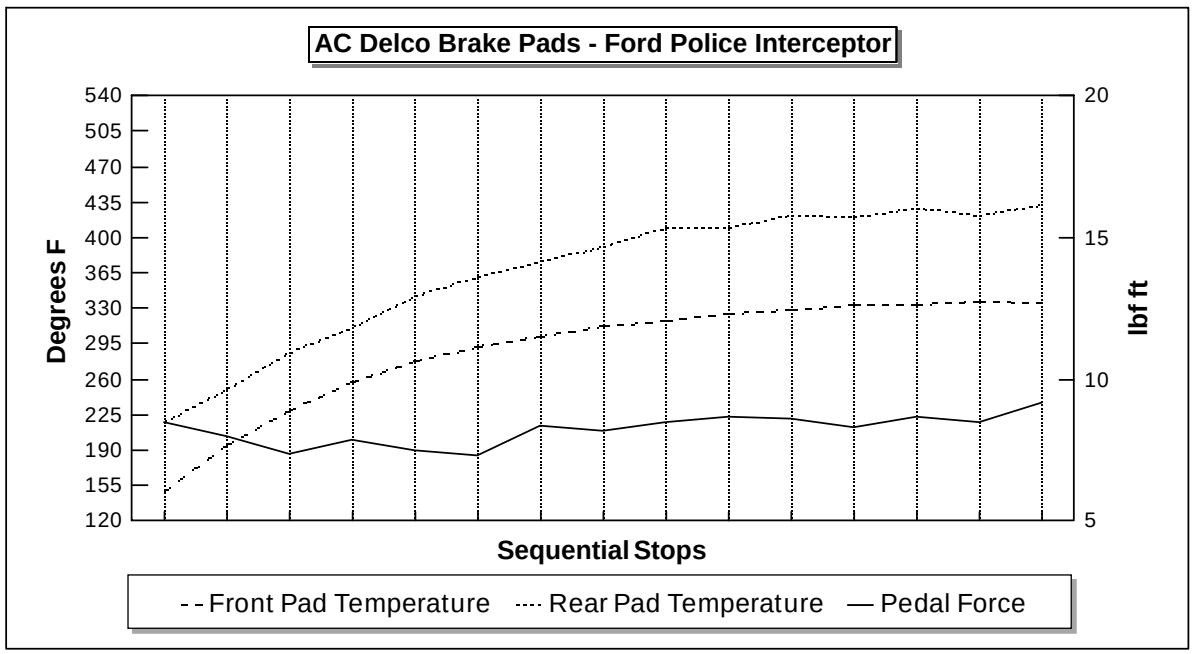


Normal Operating Temperature Test Results

TEST VEHICLE: Ford Police Interceptor

BRAKE PAD: AC Delco

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
60.5	8.5	150.0	217.9	65.7
60.6	8.0	195.0	250.3	65.5
60.1	7.4	230.1	286.3	66.4
60.3	7.9	258.0	311.5	65.5
60.4	7.5	277.8	342.1	66.3
60.7	7.3	293.1	361.9	65.8
61.1	8.4	302.1	378.1	66.4
59.8	8.2	313.8	390.7	66.4
60.9	8.5	319.2	409.6	66.4
60.7	8.7	325.6	409.6	66.4
60.5	8.6	328.2	423.1	66.4
60.1	8.3	333.6	420.0	66.4
61.1	8.7	333.6	429.4	66.5
59.7	8.5	338.1	423.1	66.5
61.4	9.2	335.4	432.8	66.5
AVERAGE:	**60.5**	**8.2**		

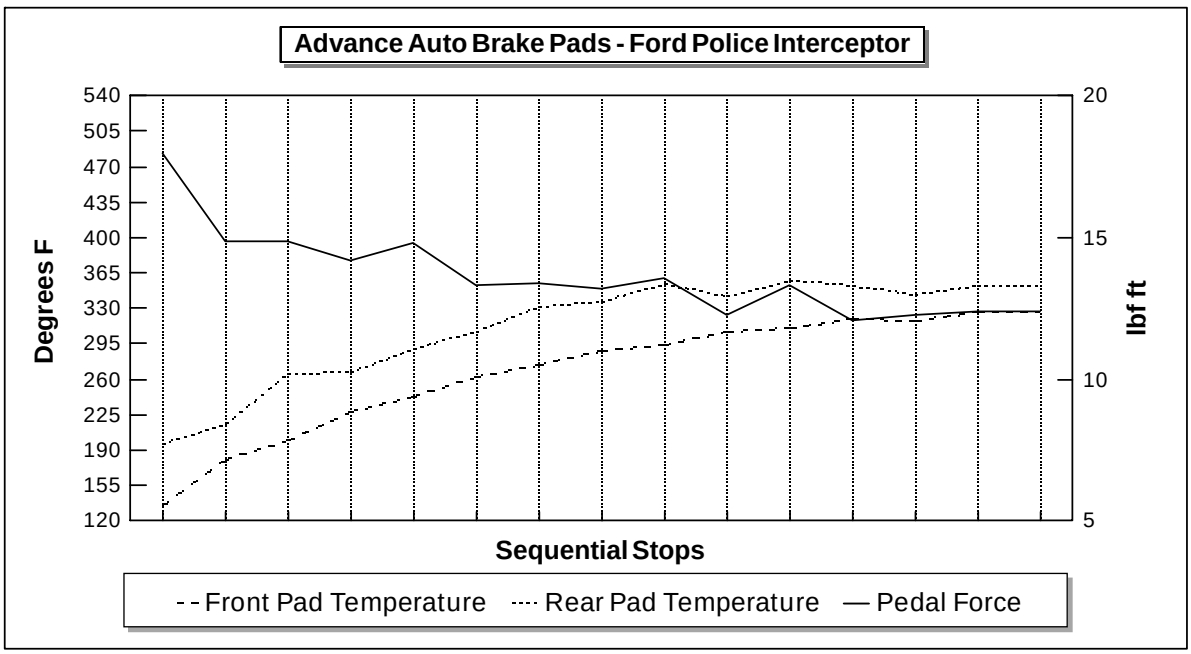


Normal Operating Temperature Test Results

TEST VEHICLE: Ford Police Interceptor

BRAKE PAD: Advance Auto

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
60.7	18.0	136.5	197.4	75.4
60.7	14.9	180.5	216.1	75.6
60.2	14.9	200.0	266.0	75.9
60.2	14.2	227.4	268.6	75.4
60.8	14.8	243.6	291.4	75.4
60.2	13.3	263.4	307.8	75.4
60.6	13.4	274.2	332.0	75.4
60.2	13.2	289.5	337.6	75.0
60.2	13.6	294.9	354.5	75.4
60.6	12.3	307.8	342.5	75.4
60.3	13.3	310.8	357.9	75.3
60.3	12.1	319.6	353.3	74.8
59.9	12.3	319.2	345.3	75.4
60.4	12.4	326.7	352.5	74.6
60.5	12.4	326.4	353.9	75.4
AVERAGE: **60.4**	**13.7**			

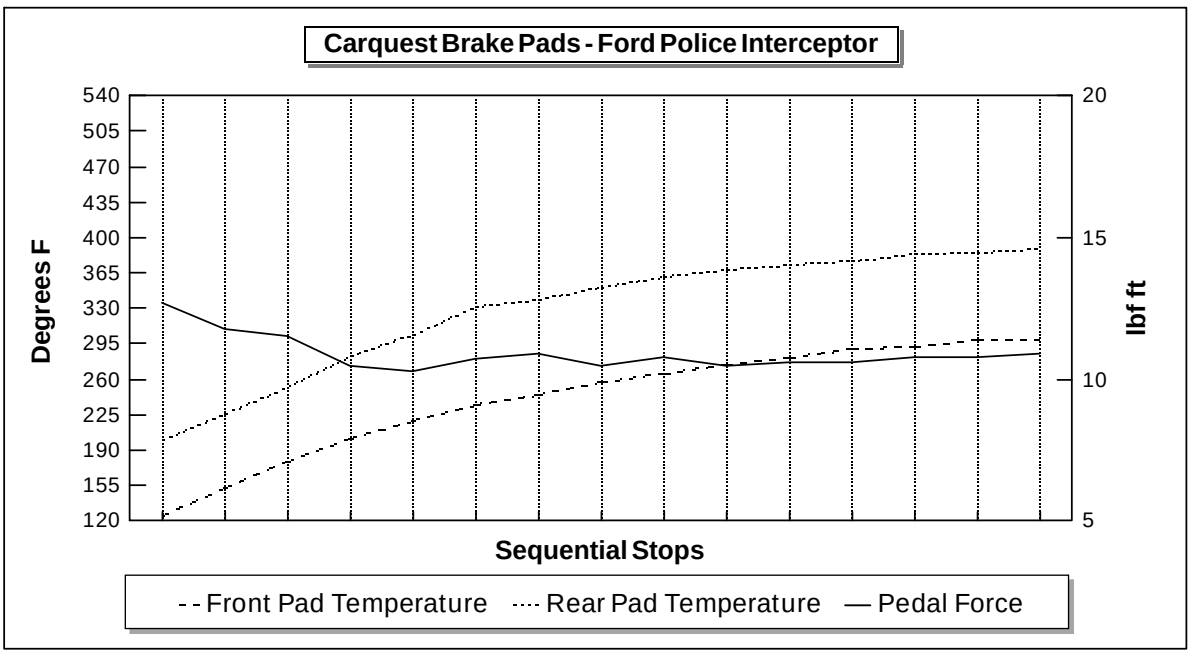


Normal Operating Temperature Test Results

TEST VEHICLE: Ford Police Interceptor

BRAKE PAD: Carquest

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
60.7	12.7	126.6	200.8	75.4
60.8	11.8	153.8	226.9	74.6
60.9	11.5	179.7	252.1	74.7
60.1	10.5	202.2	283.9	74.6
60.7	10.3	219.0	304.8	75.3
60.0	10.7	234.6	331.7	75.4
60.6	10.9	245.4	338.5	75.4
59.9	10.5	258.0	352.0	74.9
60.9	10.8	266.1	361.7	75.4
59.9	10.5	275.6	368.4	75.4
60.3	10.6	281.4	374.5	75.4
59.8	10.6	290.2	377.0	75.5
60.6	10.8	292.2	383.5	76.2
60.3	10.8	299.4	386.2	75.4
61.0	10.9	299.4	389.8	74.7
AVERAGE: **60.4**	**10.9**			



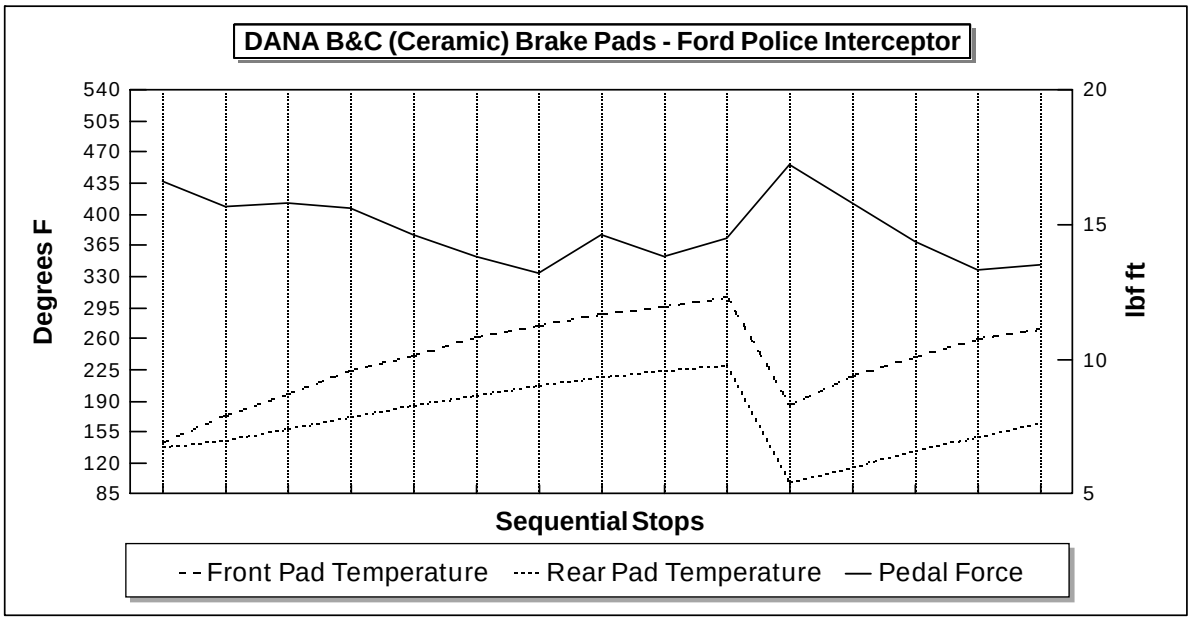
Normal Operating Temperature Test Results

TEST VEHICLE: Ford Police Interceptor

BRAKE PAD: DANA B&C (Ceramic)

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
59.1	16.6	143.7	138.4	70.9
60.0	15.7	174.3	145.9	70.9
60.1	15.8	198.1	158.5	70.9
59.3	15.6	224.7	172.0	71.6
60.5	14.6	241.8	185.5	70.0
60.6	13.8	262.5	197.2	70.0
59.3	13.2	275.1	208.0	68.2
60.7	14.6	289.5	218.1	69.0
60.2	13.8	296.7	224.2	69.1
59.8	14.5	307.6	230.6	69.5
*	*	*	*	*
61.4	17.2	186.0	99.1	63.3
60.2	15.8	218.5	116.2	63.7
61.4	14.4	240.0	134.2	63.7
60.7	13.3	260.7	149.5	63.7
60.4	13.5	272.4	166.6	63.7
AVERAGE: **60.2**	**14.8**			

* A brief rain shower caused a delay in testing. When the rain stopped and the pavement dried, the test sequence was restarted where it left off.

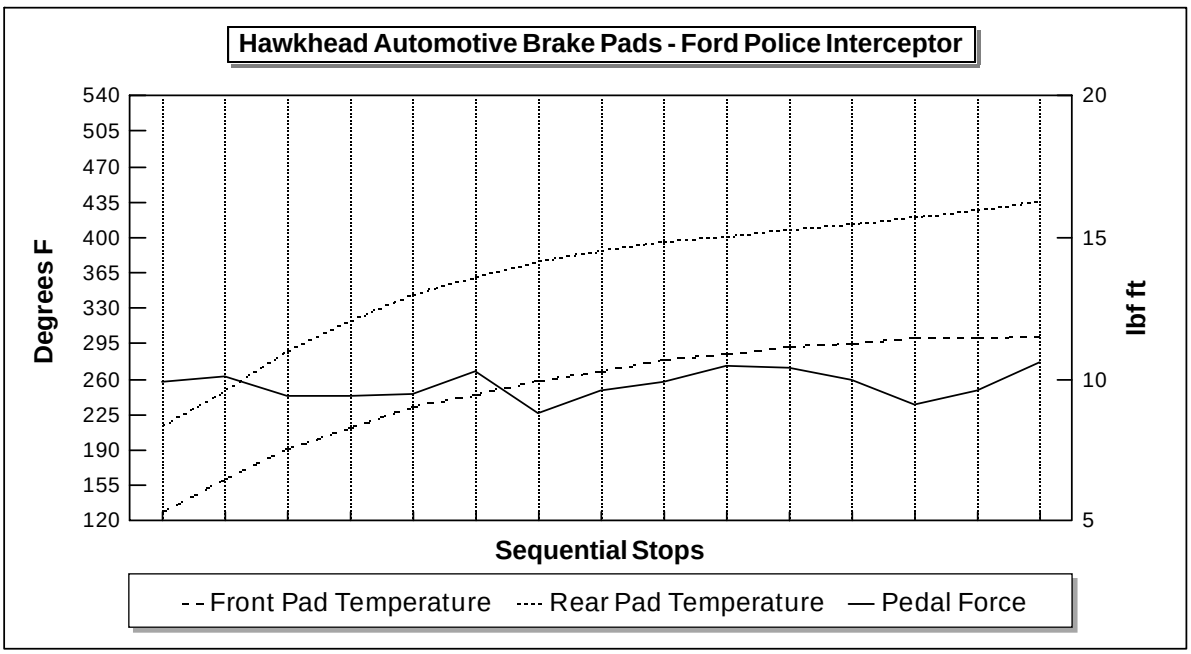


Normal Operating Temperature Test Results

TEST VEHICLE: Ford Police Interceptor

BRAKE PAD: Hawkhead

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
59.8	9.9	129.3	214.7	72.7
59.7	10.1	162.6	249.6	72.7
60.0	9.4	191.5	288.2	72.8
59.9	9.4	213.0	317.8	72.7
59.5	9.5	234.2	343.9	72.7
60.4	10.3	246.3	361.0	71.8
59.9	8.8	260.2	377.2	71.9
59.7	9.6	268.8	388.0	71.8
60.4	9.9	279.6	397.0	71.8
60.0	10.5	285.5	402.4	71.8
60.0	10.4	292.8	408.7	72.7
60.1	10.0	296.6	413.2	72.0
60.6	9.1	300.3	421.3	72.7
60.5	9.6	300.3	428.5	72.7
59.6	10.6	303.0	436.6	73.8
AVERAGE: **60.0**	**9.8**			

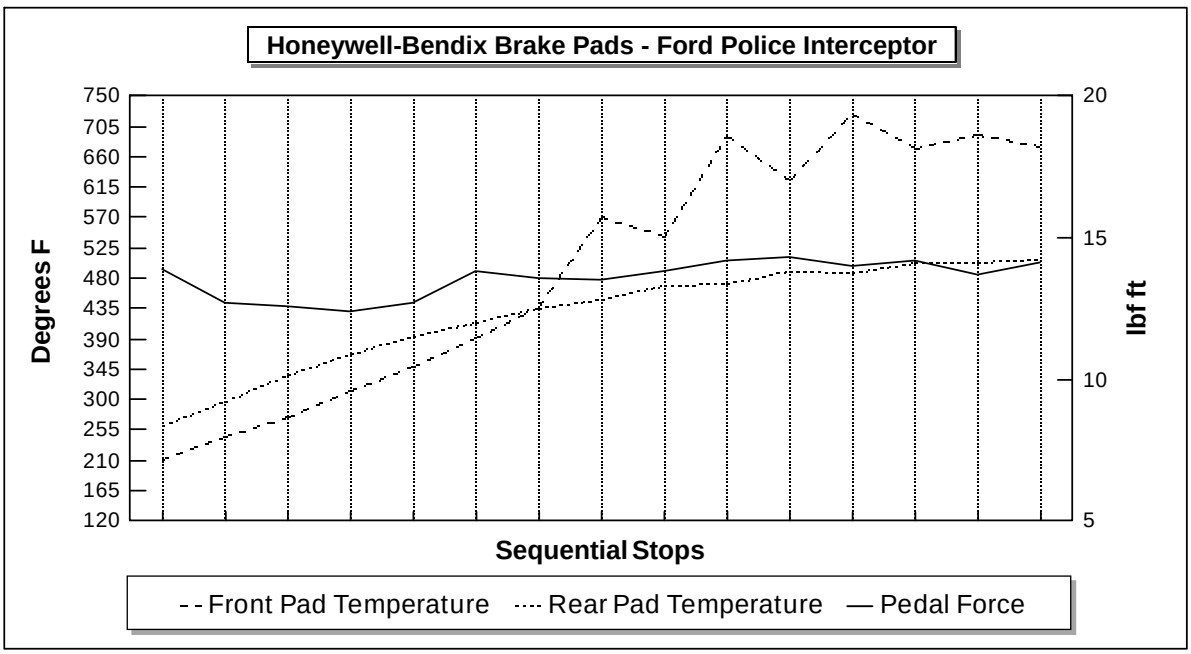


Normal Operating Temperature Test Results

TEST VEHICLE: Ford Police Interceptor

BRAKE PAD: Honeywell-Bendix

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
60.3	13.9	211.2	260.7	72.7
59.5	12.7	245.4	297.1	72.7
59.6	12.6	275.3	335.8	72.7
60.4	12.4	313.8	368.2	72.7
59.9	12.7	349.8	395.2	72.7
60.0	13.8	392.1	415.5	72.7
59.6	13.6	438.9	436.6	72.7
60.5	13.5	571.2	448.3	72.8
60.2	13.8	541.5	469.0	73.5
59.7	14.2	690.8	472.6	74.3
59.2	14.3	625.2	491.5	74.5
59.6	14.0	725.5	487.5	74.5
59.9	14.2	672.0	503.2	74.5
60.1	13.7	692.7	503.4	74.6
60.1	14.1	674.7	509.5	74.6
AVERAGE:	**59.9**	**13.6**		

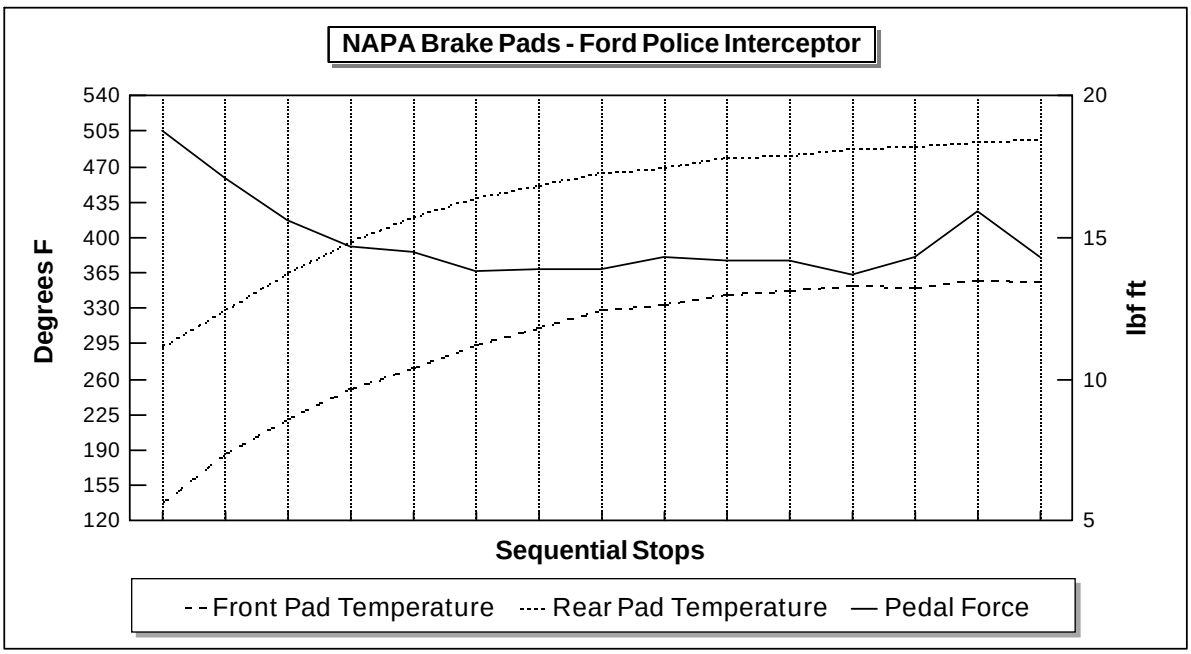


Normal Operating Temperature Test Results

TEST VEHICLE: Ford Police Interceptor

BRAKE PAD: NAPA

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
60.8	18.8	138.3	291.7	72.7
60.2	17.1	186.0	329.5	72.5
60.4	15.6	221.1	365.2	72.6
60.2	14.7	250.8	397.1	72.7
61.0	14.5	272.4	421.0	72.7
60.8	13.8	294.9	440.2	71.6
60.5	13.9	311.1	451.9	70.9
59.9	13.9	329.1	464.5	71.0
61.3	14.3	333.6	469.9	71.9
60.7	14.2	345.3	478.9	71.7
60.9	14.2	347.1	481.6	71.2
60.5	13.7	353.4	488.8	70.9
60.4	14.3	351.6	489.7	72.7
59.8	15.9	358.8	496.0	71.8
60.5	14.3	357.0	497.8	72.7
AVERAGE: **60.5**	**14.9**			

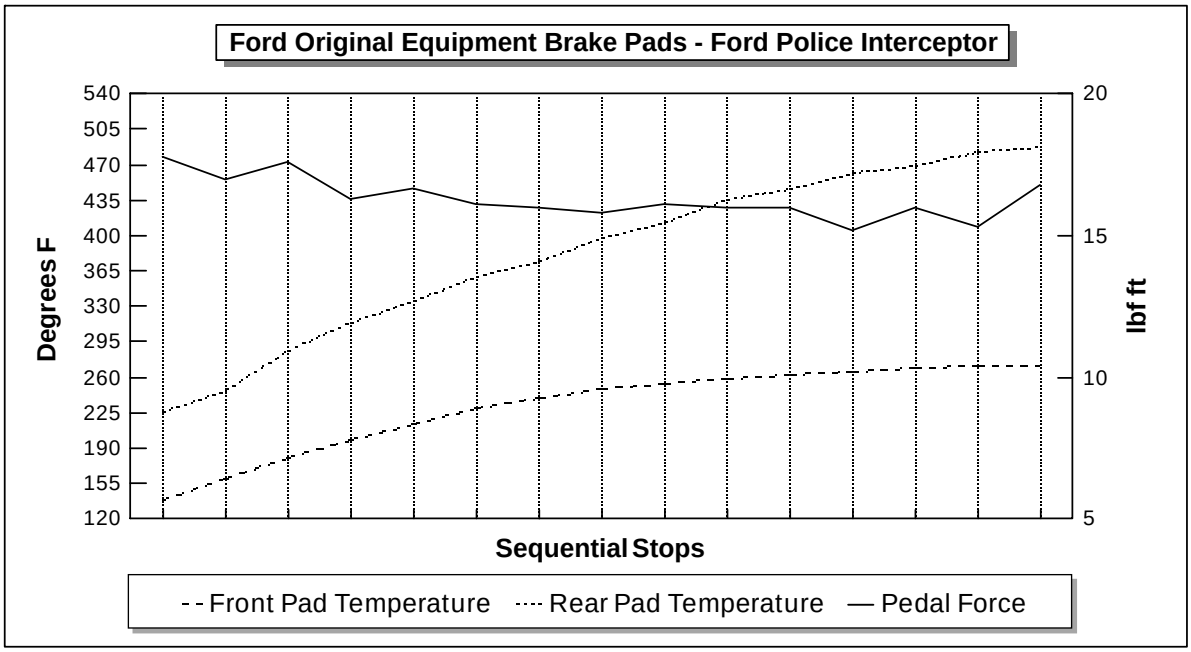


Normal Operating Temperature Test Results

TEST VEHICLE: Ford Police Interceptor

BRAKE PAD: Original Equipment - (Ford)

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
59.3	17.8	140.1	227.0	70.9
60.4	17.0	160.8	247.6	70.9
60.0	17.6	180.6	287.2	70.9
60.0	16.3	198.6	314.2	70.8
60.5	16.7	214.8	335.8	70.9
60.8	16.1	229.2	359.2	70.9
60.2	16.0	240.0	376.3	71.1
61.1	15.8	248.3	397.9	70.9
60.3	16.1	254.4	413.2	70.9
60.7	16.0	259.8	435.7	70.9
60.8	16.0	263.4	446.7	70.9
61.0	15.2	267.0	462.7	70.9
60.6	16.0	269.0	469.0	71.4
61.2	15.3	271.1	483.4	70.9
60.4	16.8	272.4	487.9	71.0
AVERAGE:	**60.5**	**16.3**		



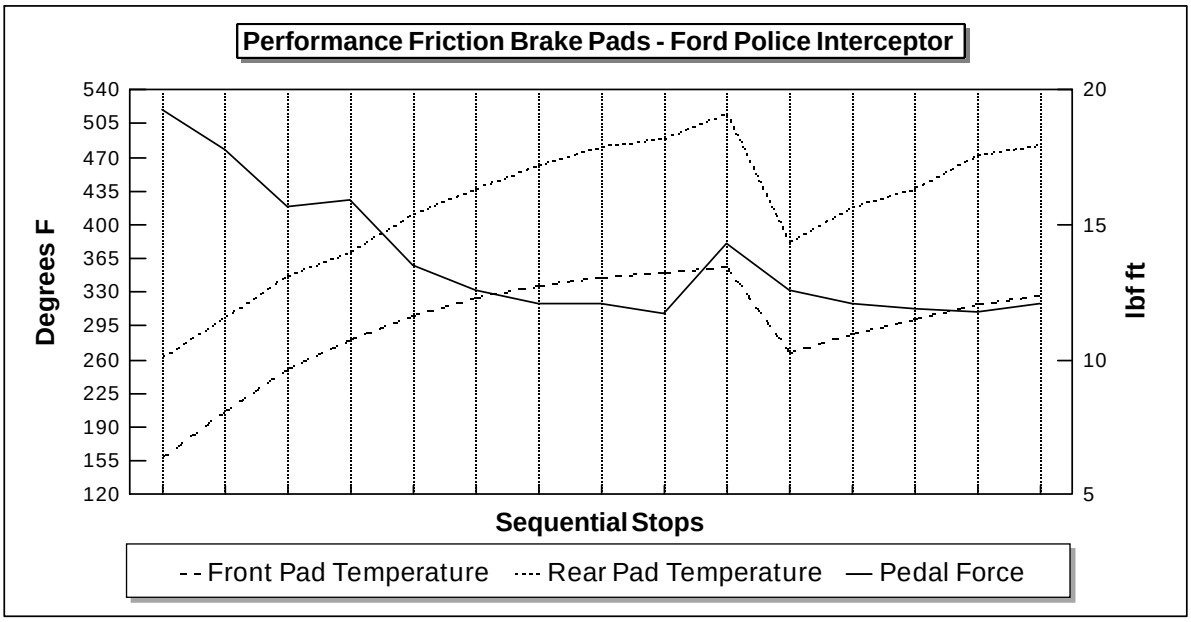
Normal Operating Temperature Test Results

TEST VEHICLE: Ford Police Interceptor

BRAKE PAD: Performance Friction

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
60.1	19.3	158.1	263.8	74.5
60.8	17.8	207.6	304.1	74.5
59.4	15.7	249.9	348.4	74.5
59.3	15.9	282.3	371.8	73.5
60.9	13.5	306.6	411.4	74.5
60.8	12.6	324.6	438.8	73.6
59.8	12.1	337.2	461.8	74.4
61.2	12.1	346.2	481.6	73.6
60.4	11.7	351.6	490.9	73.9
60.4	14.3	357.0	515.3	73.6
*	*	*	*	*
60.6	12.6	268.0	381.8	76.3
60.8	12.1	287.7	419.5	75.4
61.5	11.9	302.5	438.4	75.4
61.1	11.8	318.3	473.5	74.5
60.1	12.1	326.4	482.5	74.6
AVERAGE:	**60.5**	**13.7**		

* A minor computer malfunction caused a 14-minute delay. After rebooting the computer, the test sequence was restarted where it left off.

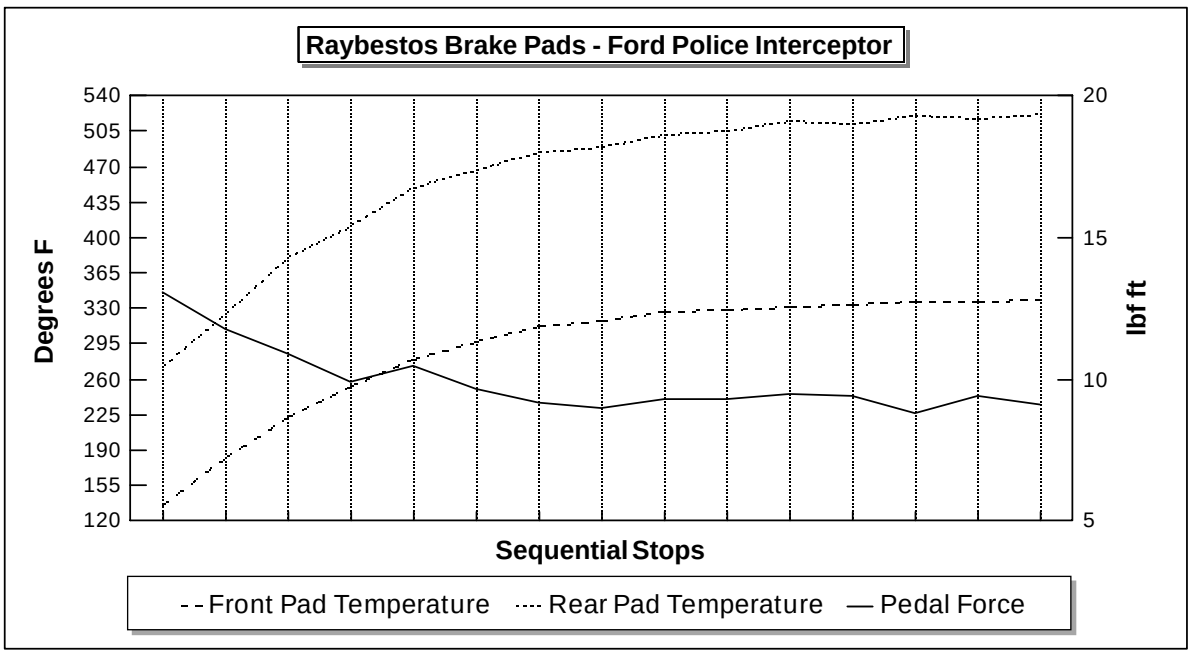


Normal Operating Temperature Test Results

TEST VEHICLE: Ford Police Interceptor

BRAKE PAD: Raybestos

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
60.3	13.1	136.5	273.7	70.9
59.9	11.8	182.4	325.9	70.9
60.9	10.9	222.9	380.8	70.9
59.8	9.9	254.4	412.3	70.9
61.0	10.5	280.3	451.0	70.9
60.7	9.7	297.6	467.2	70.9
60.1	9.2	313.8	485.2	71.0
61.4	9.0	318.3	489.7	70.9
60.8	9.3	326.4	502.5	71.8
60.4	9.3	328.2	505.0	70.9
60.2	9.5	332.7	516.7	71.8
60.0	9.4	333.6	513.1	71.3
61.2	8.8	337.2	521.2	71.8
60.6	9.4	337.2	517.6	71.8
61.3	9.1	338.5	523.4	71.8
AVERAGE: 60.6	**9.9**			

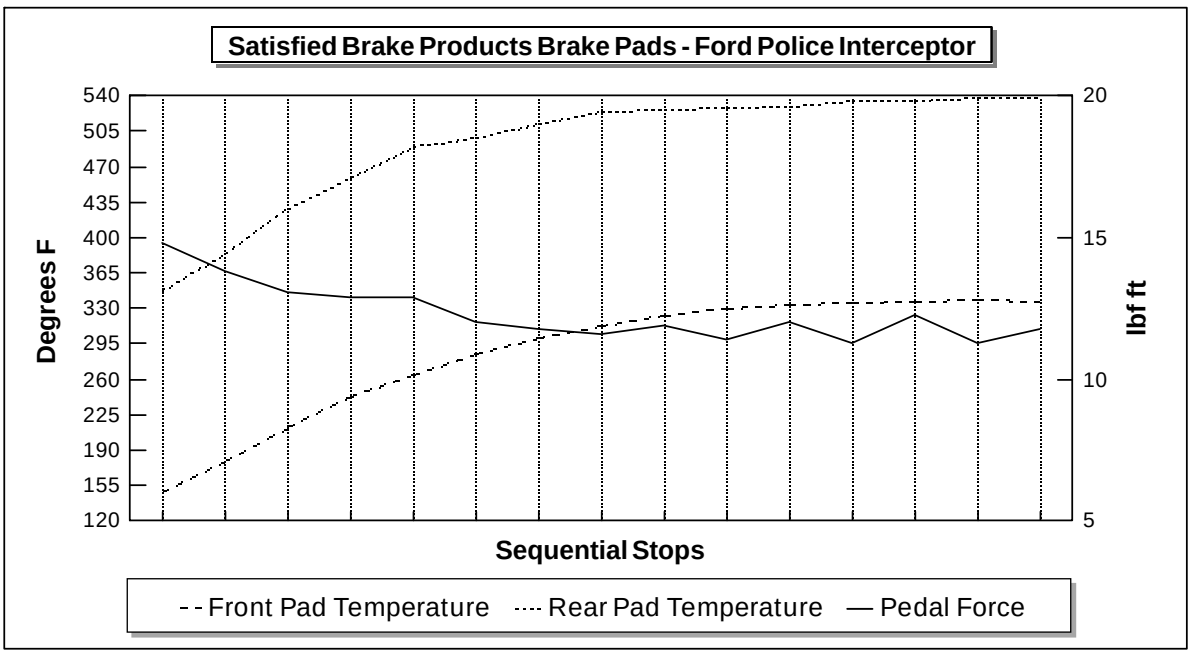


Normal Operating Temperature Test Results

TEST VEHICLE: Ford Police Interceptor

BRAKE PAD: Satisfied Brake

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
60.3	14.8	149.1	347.5	61.0
59.7	13.8	179.7	384.4	61.0
59.7	13.1	212.1	429.4	61.0
60.2	12.9	243.0	459.1	61.0
60.1	12.9	265.2	490.6	61.0
59.9	12.0	285.0	499.6	61.0
59.9	11.8	301.1	513.1	61.2
60.1	11.6	312.9	524.8	61.0
59.4	11.9	322.8	526.3	61.8
59.9	11.4	330.0	528.4	62.1
59.2	12.0	333.7	530.2	61.9
59.8	11.3	336.6	535.6	61.9
59.9	12.3	337.2	534.7	61.7
59.5	11.3	339.0	539.2	61.9
59.5	11.8	338.1	539.2	61.9
AVERAGE: **59.8**	**12.3**			

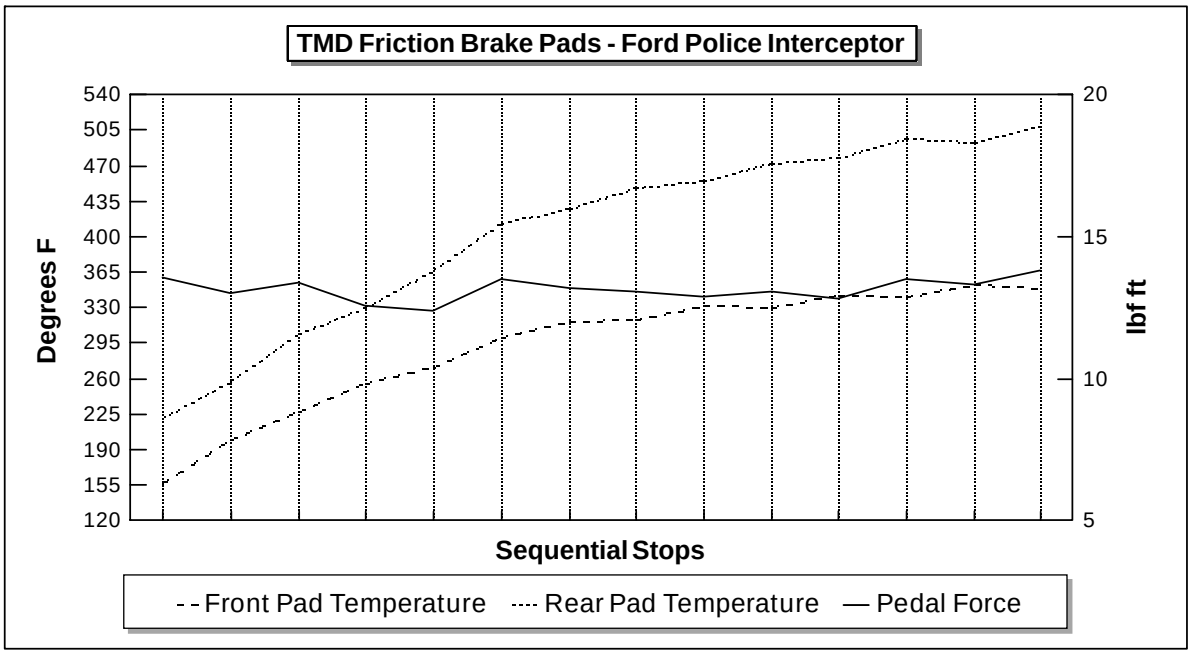


Normal Operating Temperature Test Results

TEST VEHICLE: Ford Police Interceptor

BRAKE PAD: TMD Friction

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
61.5	13.6	157.2	220.6	71.8
60.9	13.0	200.0	256.9	71.8
60.9	13.4	227.4	305.2	72.7
60.4	12.6	256.2	331.3	72.7
61.2	12.4	271.5	366.4	71.8
60.1	13.5	301.2	414.1	71.0
61.5	13.2	317.4	427.6	70.9
61.1	13.1	319.2	448.3	70.9
61.2	12.9	332.7	454.6	71.0
61.1	13.1	330.3	473.5	71.1
61.2	12.8	342.6	478.0	70.9
60.8	13.5	340.8	497.8	71.2
60.9	13.3	352.5	493.3	71.1
60.8	13.8	349.8	509.4	71.8
AVERAGE:	**61.0**	**13.2**		



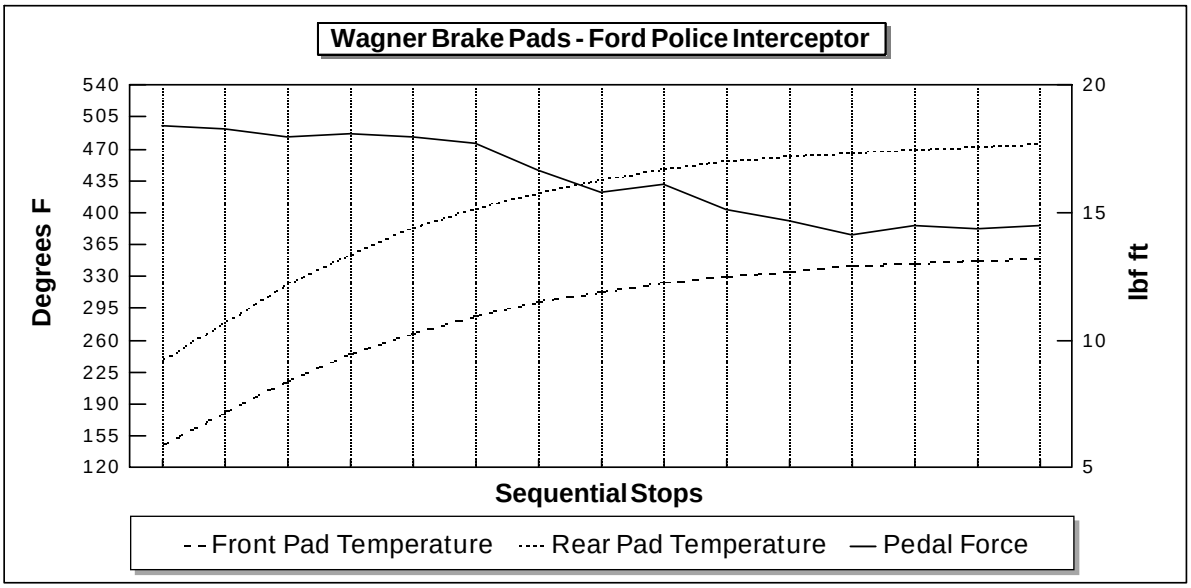
Normal Operating Temperature Test Results

TEST VEHICLE: Ford Police Interceptor

BRAKE PAD: Wagner

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
59.4	18.4	145.5	238.6	70.2
59.0	18.3	182.0	280.9	69.9
60.2	18.0	216.6	321.4	70.0
59.8	18.1	245.4	354.7	69.6
60.9	18.0	268.8	383.5	69.9
59.7	17.7	287.7	405.1	69.2
60.4	16.7	302.1	423.1	70.0
59.2	15.8	313.4	436.6	70.9
60.1	16.1	322.8	448.3	70.0
59.8	15.1	330.0	456.4	70.0
59.8	14.7	336.3	462.7	70.9
59.7	14.1	342.6	465.4	70.9
60.6	14.5	344.4	469.9	70.9
59.8	14.4	347.1	472.6	70.9
60.0	14.5	348.9	476.2	70.9
AVERAGE: **59.9**	**16.3***			

* Analysis showed no statistically significant difference between the original equipment pads and the Wagner pads on this test.

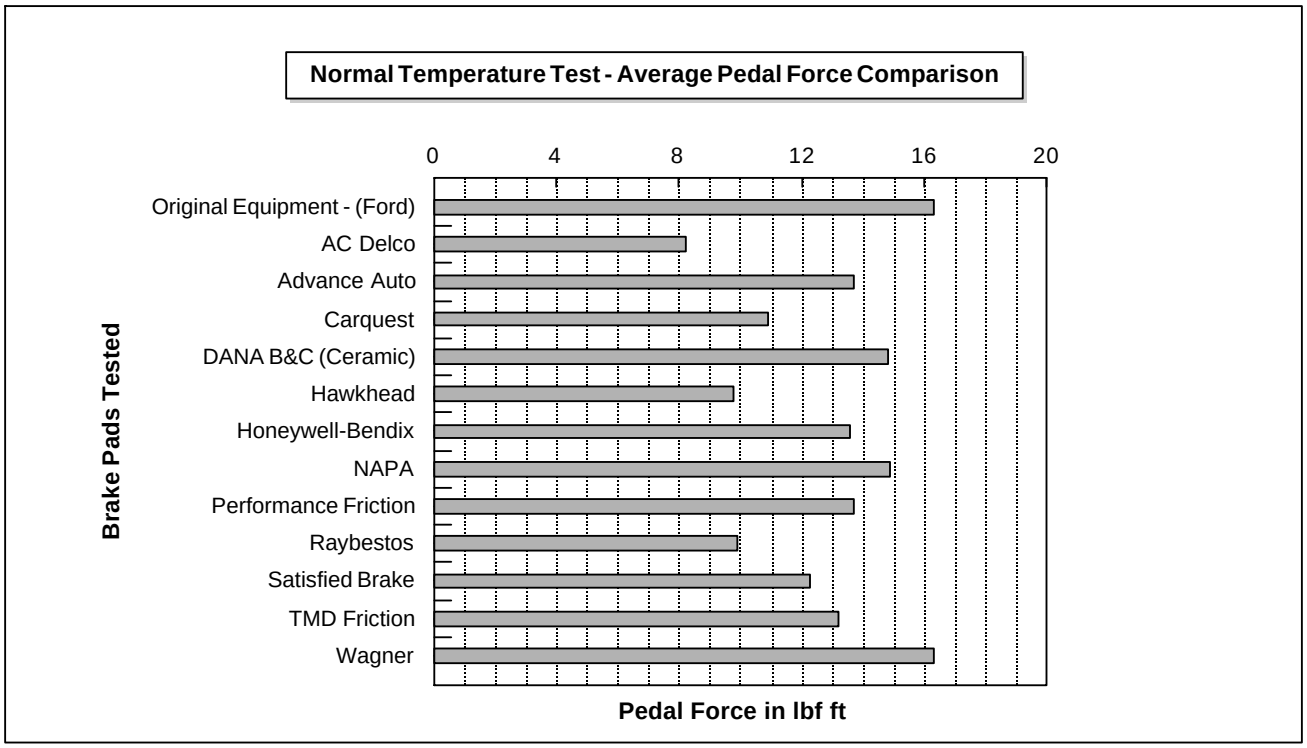


Summary of
Normal Operating Temperature Test Results

TEST VEHICLE: Ford Police Interceptor

BRAKE PAD	AVERAGE INITIAL SPEED mph	AVERAGE PEDAL FORCE lbf ft	AVERAGE AMBIENT TEMP deg. F
Original Equipment - (Ford)	60.5	**16.3**	70.9
AC Delco	60.5	**8.2**	66.2
Advance Auto	60.4	**13.7**	75.3
Carquest	60.4	**10.9**	75.2
DANA B&C (Ceramic)	60.2	**14.8**	67.9
Hawkhead	60.0	**9.8**	72.4
Honeywell-Bendix	59.9	**13.6**	73.5
NAPA	60.5	**14.9**	72.0
Performance Friction	60.5	**13.7**	74.5
Raybestos	60.6	**9.9**	71.2
Satisfied Brake	59.8	**12.3**	61.4
TMD Friction	61.0	**13.2**	71.5
Wagner	59.9	**16.3***	70.3

* Analysis showed no statistically significant difference between the original equipment pads and the Wagner pads on this test.



Comparative Evaluations (continued)

Hot Pursuit (Fade Resistance) Braking Performance Test

Test Objective

Determine the stopping performance characteristics and the resistance to fade of the test brake pads under severe high-temperature operating conditions. *(On regular occasions, law enforcement officers are required to respond to emergency or pursuit situations that require emergency driving, including frequent hard-brake applications from high speeds. The ability of the brakes to provide high deceleration rates without significant brake fade and without unacceptable increases in pedal effort during these extreme conditions is of critical importance to the success of the law enforcement mission, as well as the safety of the officers and the general public.)*

Test Methodology

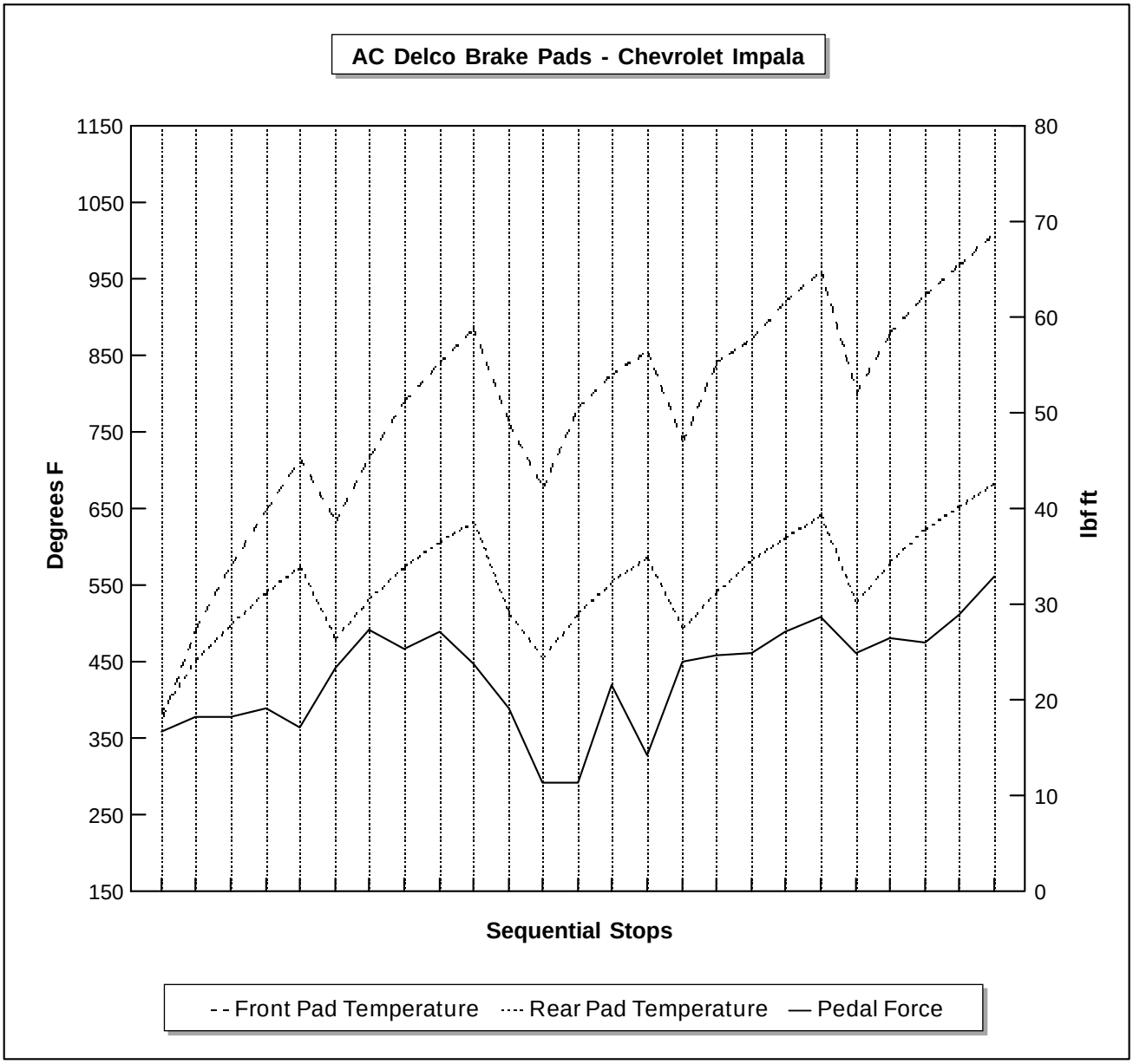
Each of the test brake pad/rotor sets will be evaluated to determine their performance characteristics in a simulated "hot pursuit" mode by performing two decelerations in rapid succession from 90 mph to 30 mph at 22 ft/s^2, in order to heat up the brake pads and rotors. These two "heat up" stops will be followed immediately by three decelerations from 70 mph to 30 mph at a deceleration rate of 22 ft/s^2, performed in rapid succession (approximately 1/4-mile intervals). The car will then remain stationary for a 3-minute heat soak. After the heat soak, the entire procedure will be repeated 4 additional times, for a total of 25 decelerations. Temperature increases during each individual deceleration, each deceleration series, and throughout the entire test process, as well as brake pedal force necessary to maintain the target deceleration rate, will be recorded.

Hot Pursuit (Fade Resistance) Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: AC Delco

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
88.9	16.7	380.0	386.2	76.2
88.0	18.4	496.0	454.6	76.3
71.1	18.4	577.5	499.6	76.2
71.2	19.2	650.6	541.2	76.2
72.0	17.2	717.4	577.0	76.7
91.1	23.4	633.3	481.6	76.5
90.9	27.4	720.6	532.9	75.7
72.6	25.4	791.7	577.0	75.4
70.4	27.1	842.1	608.5	75.4
70.9	23.9	888.0	635.5	75.4
90.8	19.2	762.9	513.5	75.4
90.8	11.5	677.7	457.3	74.6
72.1	11.5	783.6	514.6	74.5
71.3	21.7	827.9	555.4	74.5
70.4	14.3	857.7	588.1	74.5
91.6	24.0	740.4	494.2	74.5
89.3	24.8	841.2	543.7	74.5
71.2	25.0	872.9	584.2	74.5
70.1	27.2	923.1	614.7	74.5
70.6	28.8	962.1	641.9	74.5
90.3	25.0	802.1	529.3	75.0
91.0	26.5	882.6	580.2	74.5
71.6	26.0	932.1	625.6	74.5
70.7	29.0	970.8	654.4	74.5
70.7	32.9	1013.0	683.1	74.5
AVERAGE: 78.8	**22.6**			
Highest Temperature Recorded:		**1169.4**	**724.1**	


AC Delco Brake Pads - Chevrolet Impala
1150
1050
950
850
750
650
550
450
350
250
150
Degrees F
80
70
60
50
40
30
20
10
0
lbf ft
Sequential Stops
Front Pad Temperature
Rear Pad Temperature
Pedal Force

Hot Pursuit (Fade Resistance) Test Results

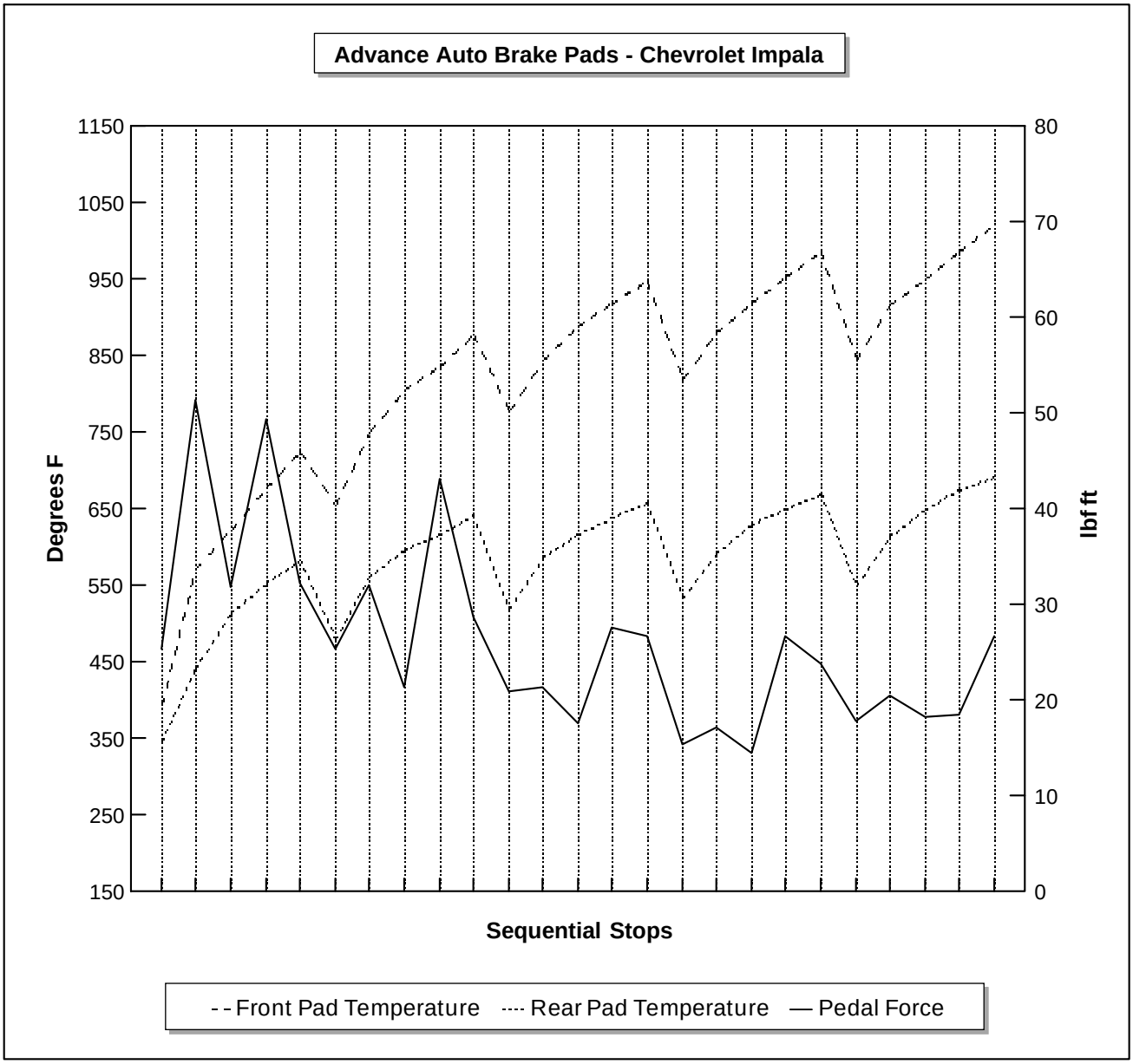
TEST VEHICLE: Chevrolet Impala

BRAKE PAD: Advance Auto

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
90.7	25.4	394.8	349.1	74.9
91.6	51.5	573.9	443.8	74.5
71.8	31.9	621.6	514.0	74.5
70.7	49.3	679.2	554.7	74.5
73.0	32.3	727.0	584.2	74.5
91.1	25.5	656.7	482.5	78.9
89.3	32.0	751.2	561.7	76.5
70.7	21.3	806.1	596.8	76.0
71.4	43.2	835.4	618.4	76.3
71.6	28.8	878.1	642.7	76.6
89.8	21.0	778.2	521.2	79.8
90.1	21.4	844.9	587.8	77.4
71.3	17.7	889.0	616.6	76.2
69.9	27.7	920.4	640.9	76.2
70.3	26.7	949.2	659.1	76.3
90.5	15.5	819.7	533.8	76.4
89.8	17.1	880.4	593.2	76.3
71.3	14.6	920.4	630.0	75.4
69.6	26.8	953.0	650.8	75.4
70.9	23.9	987.0	671.5	75.5
91.4	17.9	844.8	552.0	78.1
90.0	20.5	916.8	613.9	76.4
72.4	18.3	951.0	650.1	76.2
70.8	18.6	987.5	675.1	76.3
70.5	26.7	1022.2	693.1	76.3
78.8	**26.2***			
Highest Temperature Recorded:		**1126.5**	**697.1**	

AVERAGE:

* Analysis showed no statistically significant difference between the original equipment pads and the Advance Auto pads on this test.

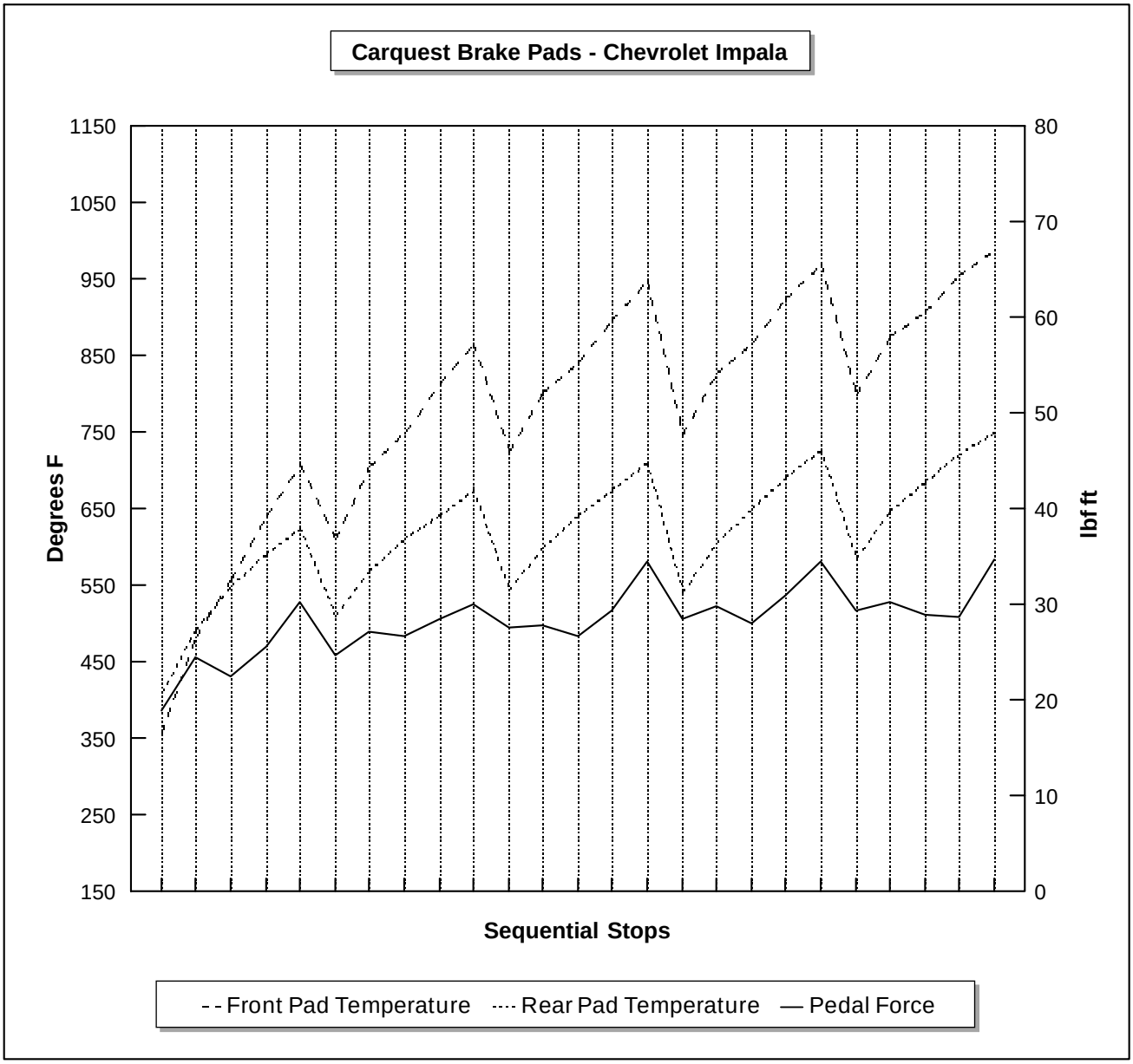

Advance Auto Brake Pads - Chevrolet Impala
1150
1050
950
850
750
650
550
450
350
250
150
Degrees F
80
70
60
50
40
30
20
10
0
lbf ft
Sequential Stops
Front Pad Temperature
Rear Pad Temperature
Pedal Force

Hot Pursuit (Fade Resistance) Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: Carquest

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
89.5	19.0	359.7	412.8	71.8
89.4	24.6	484.8	492.2	72.2
69.6	22.5	558.6	550.0	72.6
70.2	25.7	641.5	592.3	72.7
70.6	30.3	708.7	626.3	72.7
88.2	24.7	612.6	511.3	73.9
89.6	27.2	706.3	569.9	72.7
71.0	26.8	752.1	613.0	72.7
71.0	28.5	813.3	641.8	72.7
70.2	30.0	868.3	674.3	72.7
89.9	27.6	725.1	545.3	74.3
89.6	27.8	803.3	599.5	72.8
70.6	26.7	843.3	641.8	72.7
70.3	29.4	898.3	677.3	72.9
70.9	34.5	949.2	711.1	72.7
89.9	28.5	748.0	541.9	74.6
89.1	29.9	828.6	606.7	73.6
70.9	28.0	868.2	651.7	72.9
70.0	31.0	925.2	693.1	72.9
70.6	34.6	970.2	728.5	72.7
90.8	29.5	801.6	586.2	74.5
89.7	30.4	875.2	647.2	72.7
70.9	28.9	908.0	685.9	73.3
70.8	28.8	956.8	721.9	73.3
70.3	34.7	989.0	751.7	73.0
78.1	**28.4**			
Highest Temperature Recorded:		**1176.1**	**829.4**	


Carquest Brake Pads - Chevrolet Impala
1150
1050
950
850
750
650
550
450
350
250
150
Degrees F
80
70
60
50
40
30
20
10
0
lbf ft
Sequential Stops
Front Pad Temperature
Rear Pad Temperature
Pedal Force

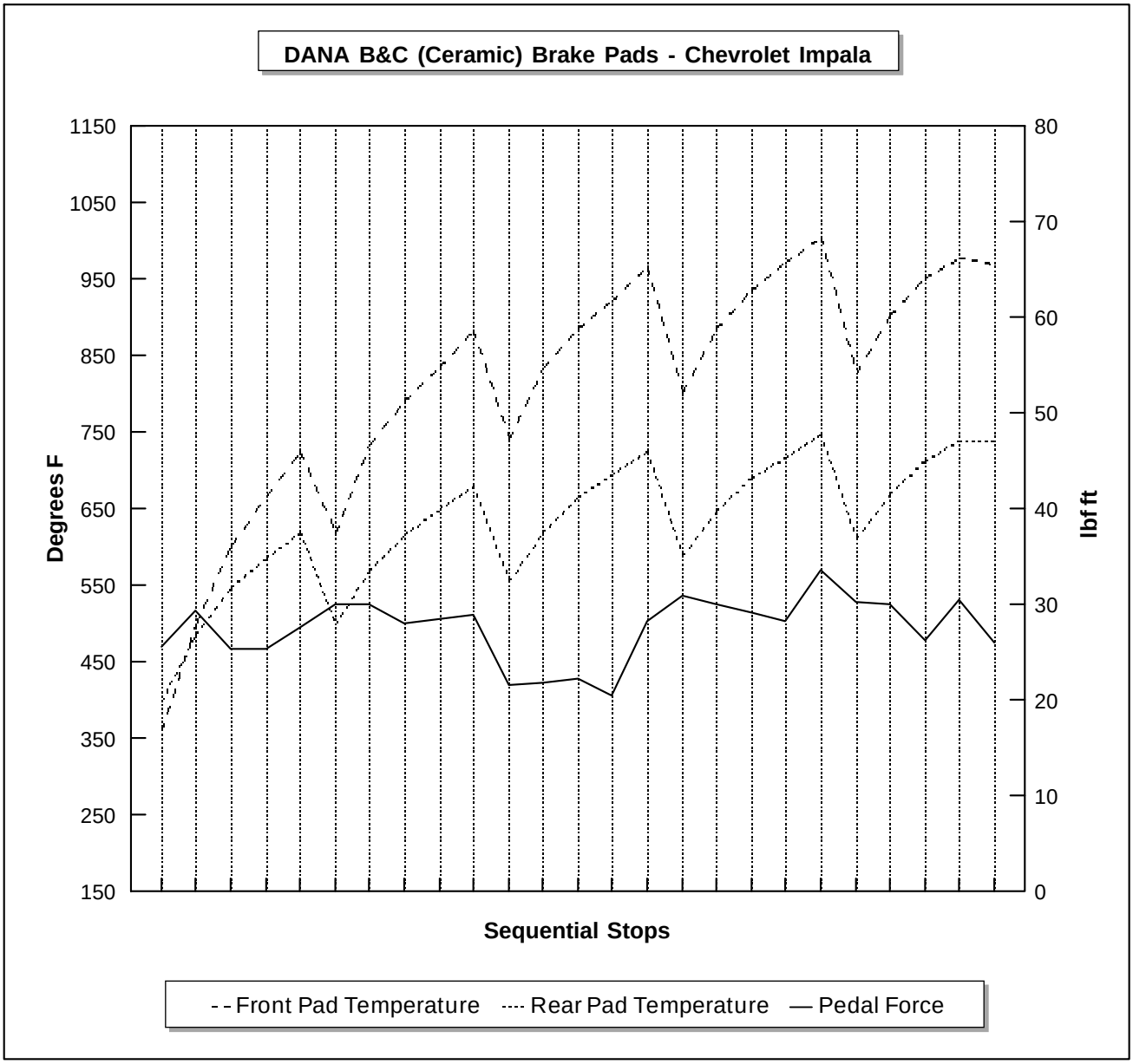
Hot Pursuit (Fade Resistance) Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: DANA B&C (Ceramic)

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
89.0	25.7	360.6	401.5	72.2
89.0	29.5	500.1	487.0	70.9
71.3	25.4	603.6	549.1	70.9
69.7	25.3	667.5	586.0	70.2
70.4	27.6	726.0	621.1	70.0
90.2	30.1	619.7	500.5	72.7
89.3	30.0	734.1	569.8	71.0
70.3	28.0	792.9	618.1	70.9
70.1	28.6	837.6	649.9	70.9
71.7	28.9	885.4	680.5	71.0
90.5	21.6	742.7	556.3	73.9
90.5	21.9	834.0	619.3	72.7
71.1	22.3	887.4	667.0	71.8
70.6	20.6	922.2	695.8	71.9
70.4	28.2	966.3	724.6	72.5
89.4	31.0	803.4	590.5	74.5
89.5	30.1	886.3	649.1	72.7
69.9	29.1	936.4	692.2	72.7
70.6	28.3	972.6	718.9	72.7
71.0	33.7	1006.8	747.1	72.7
90.6	30.3	828.2	612.1	75.2
89.3	30.1	902.4	669.7	73.0
69.9	26.3	953.7	713.8	72.7
69.2	30.6	978.8	738.9	72.7
71.0	26.1	971.1	740.8	72.6
AVERAGE: 78.2	**27.6***			
Highest Temperature Recorded:		**1045.8**	**759.5**	

* Analysis showed no statistically significant difference between the original equipment pads and the DANA B&C pads on this test.


DANA B&C (Ceramic) Brake Pads - Chevrolet Impala
1150
1050
950
850
750
650
550
450
350
250
150
Degrees F
80
70
60
50
40
30
20
10
0
lbf ft
Sequential Stops
Front Pad Temperature
Rear Pad Temperature
Pedal Force

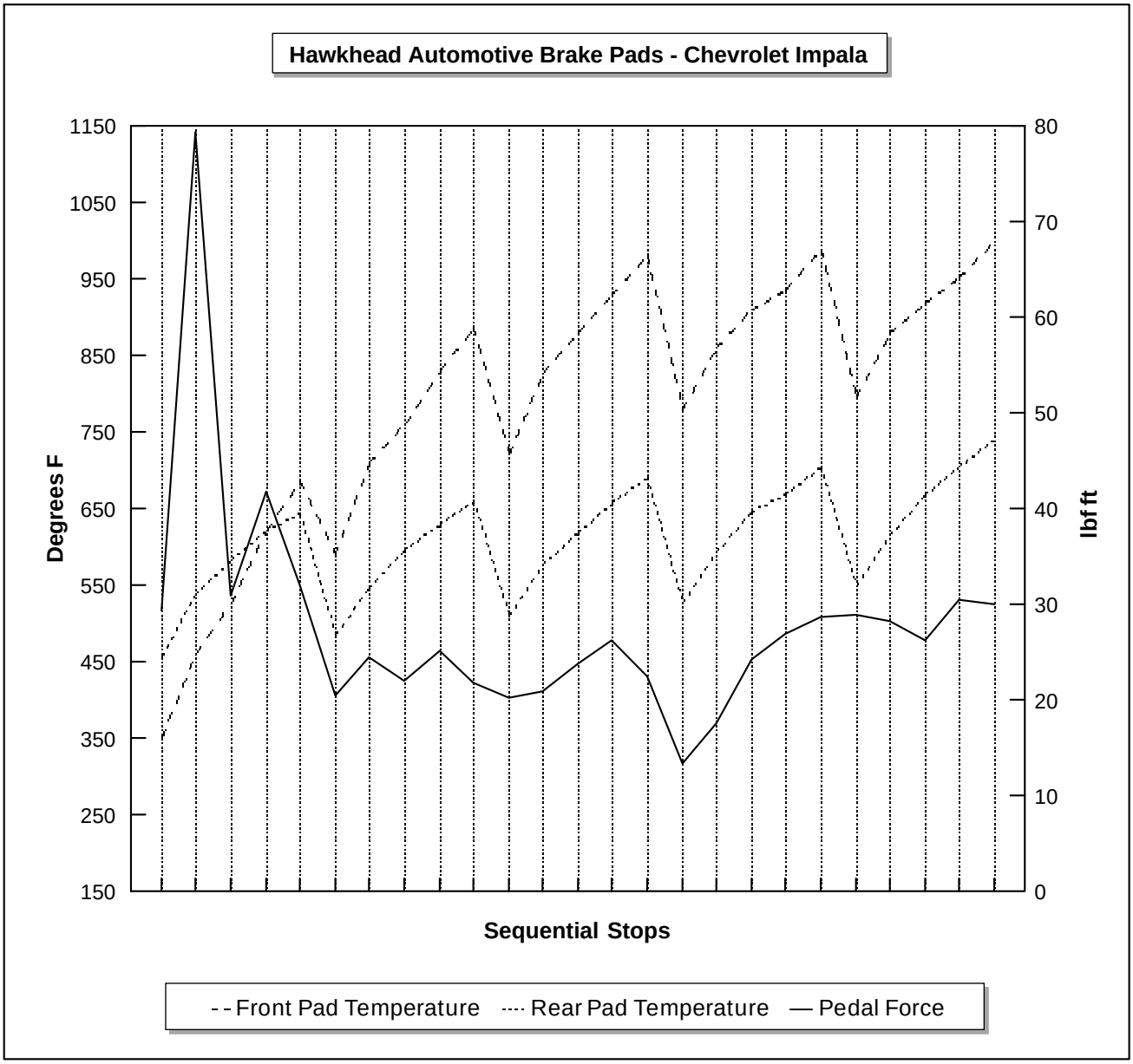
Hot Pursuit (Fade Resistance) Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: Hawkhead

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
89.7	29.4	354.3	458.2	68.2
90.0	79.4	462.5	538.5	68.0
71.9	31.0	528.9	585.5	68.2
70.1	41.8	622.5	622.0	68.2
70.9	32.0	688.2	645.9	69.0
90.0	20.6	591.9	486.1	71.9
88.9	24.6	712.0	548.2	70.9
70.3	22.0	761.1	596.8	70.8
71.1	25.1	830.4	632.8	70.8
70.8	21.9	887.1	661.4	70.9
90.8	20.2	722.4	510.8	72.7
90.5	20.9	829.5	577.9	71.6
69.8	23.8	881.5	620.2	70.9
70.5	26.3	932.6	659.8	70.9
69.7	22.5	982.5	693.1	71.2
89.6	13.5	781.8	529.3	72.7
90.6	17.6	862.4	595.0	71.7
69.1	24.2	911.8	648.5	70.9
71.3	26.9	935.9	669.9	70.9
69.9	28.7	989.3	707.7	70.9
91.2	28.9	798.0	550.0	72.7
89.9	28.2	881.9	617.5	71.8
71.9	26.3	920.0	669.7	70.9
70.7	30.5	952.2	706.0	70.9
70.5	30.1	1001.6	743.6	70.8
AVERAGE: 78.4	**27.9***			
Highest Temperature Recorded:		**1202.6**	**742.7**	

* Analysis showed no statistically significant difference between the original equipment pads and the Hawkhead pads on this test.


Hawkhead Automotive Brake Pads - Chevrolet Impala
1150
1050
950
850
750
650
550
450
350
250
150
Degrees F
80
70
60
50
40
30
20
10
0
lbf ft
Sequential Stops
Front Pad Temperature
Rear Pad Temperature
Pedal Force

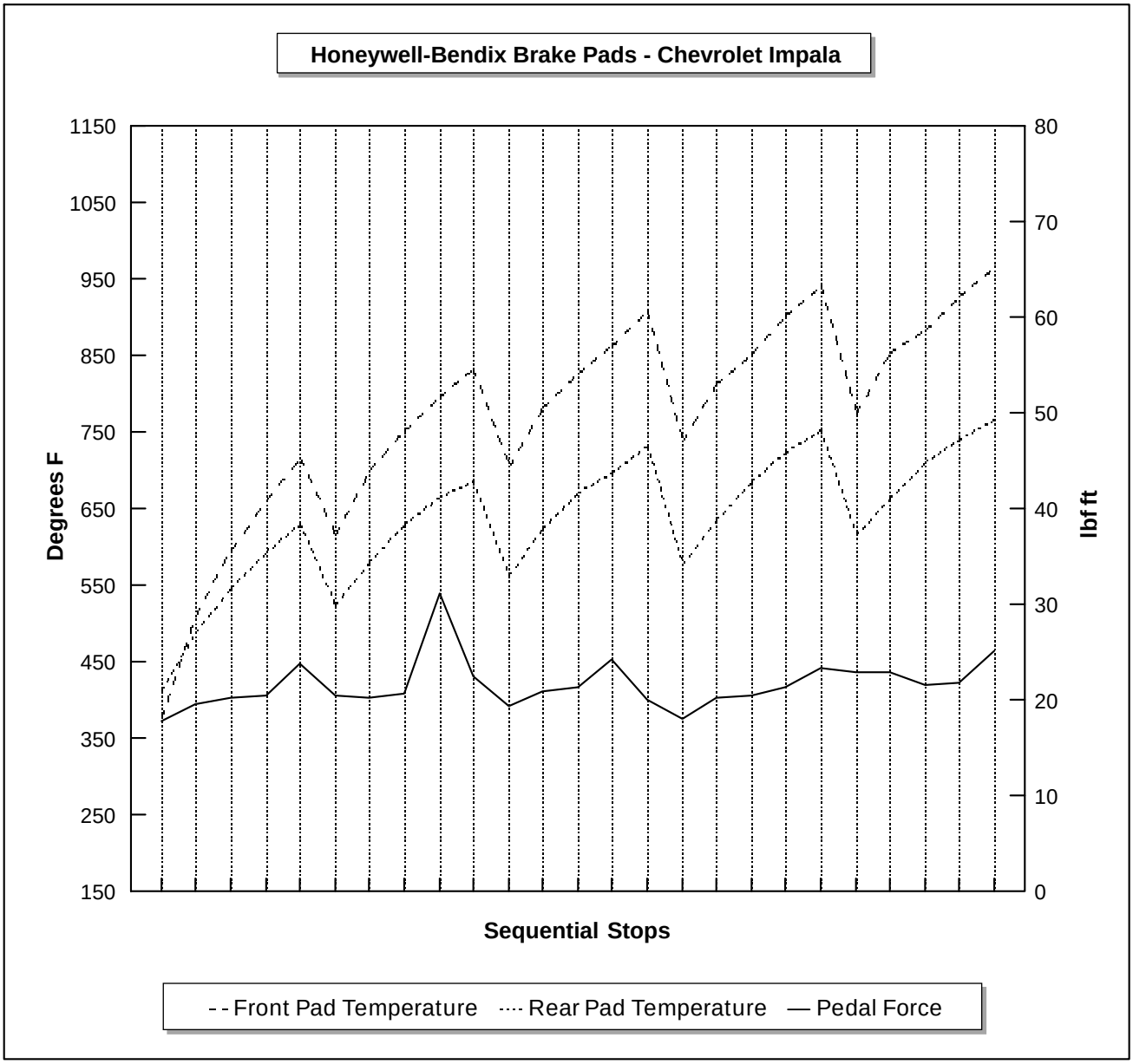
Hot Pursuit (Fade Resistance) Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: Honeywell-Bendix

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
90.6	17.8	377.7	415.0	74.5
88.4	19.6	511.8	490.6	74.1
69.4	20.2	597.3	548.2	73.5
68.9	20.4	662.1	594.1	73.5
69.3	23.8	718.8	632.8	72.8
90.1	20.4	618.1	524.8	75.4
89.3	20.3	701.6	581.5	74.5
70.0	20.8	754.6	631.0	74.2
71.0	31.2	798.9	667.1	74.0
71.7	22.6	834.0	687.5	74.4
90.2	19.3	707.1	565.3	75.4
88.4	21.0	785.4	626.5	74.5
70.6	21.5	829.8	672.4	73.4
69.9	24.2	863.7	699.4	73.6
70.3	20.0	908.8	733.7	73.1
89.3	18.0	738.6	578.8	75.4
87.5	20.2	814.5	638.2	74.5
70.6	20.6	854.2	687.7	74.5
69.1	21.3	902.4	724.6	74.9
70.5	23.4	941.5	753.4	74.7
89.5	22.9	776.4	616.6	78.2
89.6	22.9	855.6	666.1	76.3
71.0	21.6	884.4	712.0	75.4
69.7	21.9	927.6	743.5	75.4
70.6	25.1	968.1	768.6	75.6
77.8	**21.6**			

Highest Temperature Recorded: 1094.7 821.3

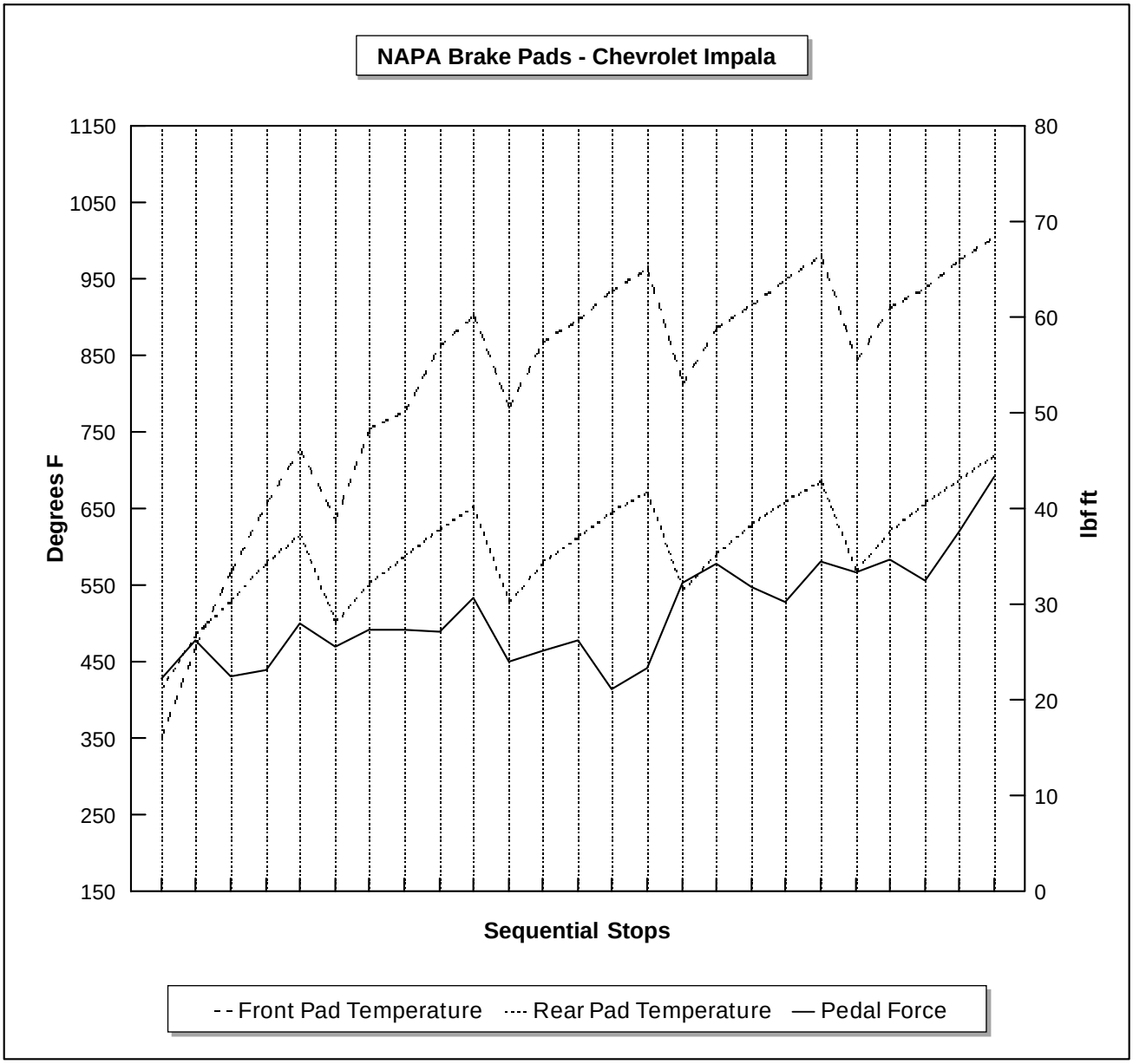

Honeywell-Bendix Brake Pads - Chevrolet Impala
1150
1050
950
850
750
650
550
450
350
250
150
Degrees F
80
70
60
50
40
30
20
10
0
lbf ft
Sequential Stops
Front Pad Temperature
Rear Pad Temperature
Pedal Force

Hot Pursuit (Fade Resistance) Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: NAPA

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
89.6	22.2	353.3	416.8	63.7
89.1	26.2	474.3	487.2	63.7
69.8	22.5	570.3	532.0	63.7
69.7	23.1	660.2	582.4	63.7
69.6	28.1	727.2	618.4	63.7
90.1	25.6	636.9	502.3	66.2
90.3	27.4	756.6	553.1	65.3
70.5	27.3	777.5	590.5	64.5
69.3	27.1	865.5	624.7	64.5
67.6	30.8	904.0	653.5	63.8
90.1	24.0	783.6	528.4	65.7
89.6	25.1	869.2	580.6	64.6
70.5	26.3	897.9	615.3	64.6
69.6	21.2	936.3	649.3	64.6
69.6	23.5	963.6	673.3	64.6
88.9	32.2	815.2	545.5	68.2
89.7	34.3	888.0	592.3	67.3
69.9	31.9	917.0	631.0	66.4
70.4	30.2	950.1	661.6	66.3
70.6	34.5	981.9	686.8	66.4
90.1	33.3	844.8	571.6	70.0
90.3	34.7	915.5	623.4	68.2
71.0	32.6	939.4	658.1	67.4
69.8	37.7	974.4	690.4	67.3
70.3	43.3	1006.4	719.7	67.3
AVERAGE: 77.8	**29.0**			
Highest Temperature Recorded:		**1179.3**	**792.3**	

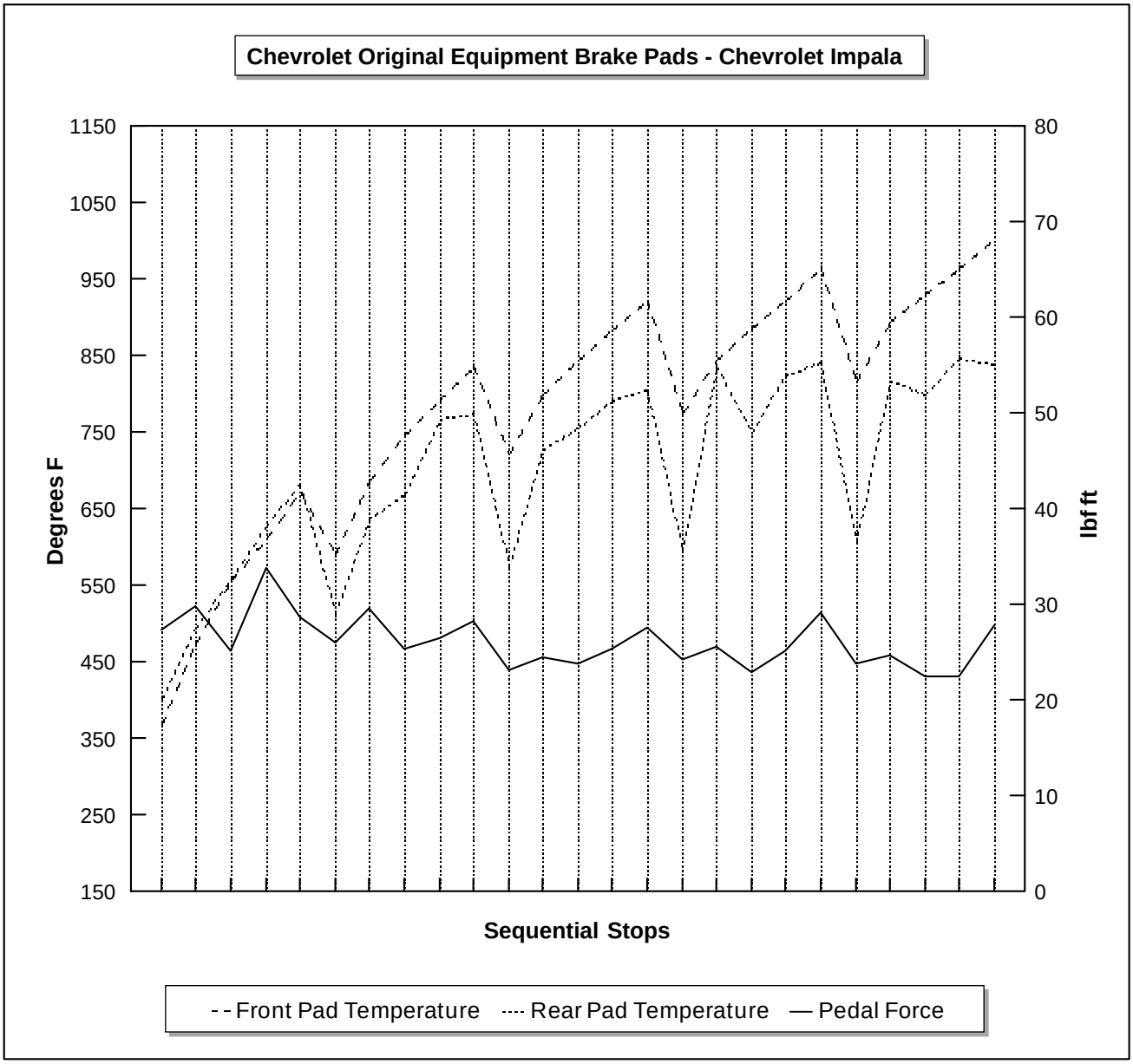

NAPA Brake Pads - Chevrolet Impala
1150
1050
950
850
750
650
550
450
350
250
150
Degrees F
80
70
60
50
40
30
20
10
0
lbf ft
Sequential Stops
Front Pad Temperature
Rear Pad Temperature
Pedal Force

Hot Pursuit (Fade Resistance) Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: Chevrolet Original Equipment

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
89.6	27.4	371.4	404.9	66.4
89.0	29.8	474.9	496.6	66.4
70.2	25.1	556.8	559.7	66.7
70.5	33.9	612.6	628.1	66.5
70.4	28.7	673.2	683.5	66.9
90.4	26.1	593.0	514.0	70.0
89.0	29.6	685.5	635.7	68.9
69.7	25.4	748.5	669.6	67.5
70.4	26.4	792.6	766.4	67.4
71.6	28.4	836.7	775.0	68.0
88.9	23.1	724.2	575.7	70.7
90.3	24.6	800.7	729.5	68.2
70.7	23.9	845.7	756.2	67.5
70.1	25.3	883.7	791.2	67.3
70.1	27.7	924.0	806.2	67.3
89.6	24.2	777.0	594.4	69.7
88.3	25.7	843.9	836.9	68.4
70.4	22.9	886.0	749.5	68.1
70.4	25.1	924.1	825.5	68.0
71.1	29.3	963.8	843.7	67.4
91.2	23.8	818.4	607.4	70.4
88.8	24.7	894.7	817.4	69.1
70.3	22.6	931.2	801.6	68.3
70.6	22.6	964.5	847.7	68.4
71.0	27.9	1003.2	840.4	68.3
AVERAGE: 78.1	**26.2**			
Highest Temperature Recorded:		**1105.6**	**1130.3**	


Chevrolet Original Equipment Brake Pads - Chevrolet Impala
1150
1050
950
850
750
650
550
450
350
250
150
Degrees F
80
70
60
50
40
30
20
10
0
lbf ft
Sequential Stops
Front Pad Temperature
Rear Pad Temperature
Pedal Force

Hot Pursuit (Fade Resistance) Test Results

TEST VEHICLE: Chevrolet Impala

BRAKE PAD: Raybestos

INITIAL SPEED (mph)	PEDAL FORCE (lbf ft)	FRONT PAD INITIAL TEMP (deg. F)	REAR PAD INITIAL TEMP (deg. F)	AMBIENT TEMP (deg. F)
89.6	22.2	355.2	419.5	74.0
89.6	28.6	472.2	496.1	74.5
70.6	25.3	528.0	543.4	73.4
70.9	29.5	608.6	583.3	73.6
69.8	34.9	682.5	612.7	72.9
89.2	26.4	592.8	491.5	76.5
89.9	30.5	689.1	550.0	75.4
69.9	25.0	741.2	592.2	74.5
69.7	29.2	805.6	624.7	74.6
70.0	35.2	857.9	651.7	74.6
89.4	25.1	719.7	522.1	78.0
90.4	28.0	801.6	577.0	75.5
69.9	23.2	845.4	618.4	74.9
70.9	28.6	895.5	649.9	75.4
71.2	30.5	941.5	676.0	74.9
90.5	28.4	783.4	547.3	77.0
89.6	29.1	855.4	605.8	74.7
70.3	26.7	893.5	646.3	74.2
71.5	29.0	935.7	677.8	74.3
71.6	34.5	976.1	704.8	73.3
90.3	30.0	813.3	565.3	75.4
90.4	29.2	889.7	622.0	73.6
70.7	29.7	914.1	660.7	72.6
71.5	31.0	958.1	693.0	72.7
70.7	34.2	1001.5	725.5	72.7
78.3	**29.0**			
Highest Temperature Recorded:		**1193.6**	**800.8**	