

2006 Compound Hunting Bow Face-Off

By Anthony Barnum & Jon Teater

www.ArcheryEvolution.com



Introduction:

Welcome to the 2006 Compound Hunting Bow Face-Off. The focus of this event is **hunting** style Compound Bows that highlight the cutting edge of those products currently available in the archery marketplace. The goal is to provide those archers who enjoy hunting with appropriate objective information for aiding in the purchasing process. That being said, this evaluation is by no means conclusive; some tests could not be performed due to limitations in resources, time, or budget. Each archer should assess what is important to him or her and interpret the results accordingly. We hope that we have been able to address the objective issues concerning most “demanding” archers with regards to Compound Hunting Bows.

The test consists of **20** different compound hunting bows from 19 different companies for this evaluation. We hope you enjoy the results and find the information provided to be both useful and helpful in your quest to find the best compound hunting bow for you!

Evaluators:

The individuals involved in this assessment have no affiliation with any of the participating companies. We do everything possible to remain objective throughout the testing process and hope that this is reflected in the presentation of the results.

Participants:

The archery companies whose product was used during the Face-Off testing conduct are as follows:

- **APA Innovations**
- **Ben Pearson**
- **Bowtech**
- **CSS**
- **Darton**
- **Diamond**
- **Fred Bear**
- **Hickory Creek**
- **Hoyt**
- **Liberty**
- **Martin**
- **Mathews**
- **C.P. Oneida**
- **Parker**
- **PSE**
- **Reflex**
- **Ross**
- **Rytera**
- **Whisper Creek**

Introduction

Initial Conditions and Test Categories:

Each company was asked to provide the compound hunting bow that they felt best represented their company and would best suit the following categories:

- **Adaptability / Adjustability**
- **Dynamic Efficiency**
- **Retained Velocity**
- **Noise Output**
- **Vibration**

Note: The criteria outlined in this evaluation were deemed to be the important factors to consider for a compound bow. This evaluation in no way represents all areas that are important to archers. Personal experience and preference were used to derive these criteria. Also note that no subjective testing was performed. The evaluators recommend that anyone who is in the market for a compound bow shoot as many different makes / models as possible to determine what best suits their individual needs and desires.

Upon receiving each bow, a string loop of BCY's #24 Poly loop / release rope is installed, after which the bow is set to precisely 30 inches in AMO draw length. An Apple bow drawing machine and Coffey Marketing US Game Scale are then used to set the peak draw weight to 70 pounds. This draw weight is checked with an Easton BowForce Mapper hand-held digital scale to ensure consistency in the draw weight readings. Each bow is then fitted with a New Archery Products QuickTune 3000 arrow rest, after which paper tuning commences. For consistency, a Hooter Shooter is used during the paper tuning process to reduce human induced errors. After completion of the paper tuning process, performance testing based on the test categories can begin.

For the performance tests, 350 grain Gold Tip Ultralight Pro Series 22 carbon arrows and 540 grain Easton XX75 2514 arrows are utilized. Each arrow uses 4 inch duravane fletches and a Coffey Marketing US Reloader Digital Pocket Scale is used to ensure weight consistency. A Hooter Shooter is used throughout the performance testing to minimize human induced errors. A Model 35 Proof Chronograph from Oehler Research and a Pro Chrono Digital Chronograph from Competition Electronics, reading within 1 fps of one another, were used for all speed measurements. For further details on testing procedures and equipment, please see the individual sections for each test category.

Each bow is evaluated on the 5 objective criteria outlined above, which are equally waited for providing the overall results of the Face-Off. A separate spreadsheet is provided to allow the individual to customize the weighting of each category to what he or she feels is important in a compound hunting bow.

Test Category	Assessment
Adaptability / Adjustability	Provides an indication of how “customizable” a bow is through the range of draw weights, lengths, etc. as well as the upgrades, finish options and configurations available.
Dynamic Efficiency	Provides an indication of the amount of energy output by a bow relative to the energy expended through drawing the bow back. An assessment is made with both a 350 grain and 540 grain arrow
Noise Output	Provides an indication of the noise output characteristics of a bow at both “point blank” and 20 yard ranges utilizing a series of shots with 350 grain and 540 grain arrows
Retained Velocity	Provides an indication of the percentage of retained velocity of a 350 grain arrow from measurements captured at 1 yard and 40 yards. An assessment of velocity of 540 grain arrows at 1 yard is also made relative to the velocity of the 350 grain arrow at 1 yard.
Vibration	Provides an indication of the vibration characteristics at the front of the grip during and after shot execution with both 350 grain and 540 grain arrows.

Guidelines:

At a minimum, one (1) “Results” table is provided for each section of the test. **In this table, the companies that ranked in the Top 7 for that category are listed.** This is done to provide information on the best performing compound bows for a given test, without “blasting” those bows that may not have done well when compared against the competition but still perform the function. Please note that when a tie occurs, the bows are listed in alphabetical order based on company name.

Bows Tested



APA Innovations Black Mamba Xtreme

Contact Info: APA Innovations
www.apaarchery.com

Tested Speed: 334 fps **MSRP:** \$799
Draw Weight: 50-90 lbs. **Draw Length:** 26" – 31"
Let-Off: 70% **Brace Height:** 6 5/8"
Axle to Axle: 35 3/16" **Mass Weight:** 4.5 lbs
Stored Energy: 106.2 ft-lbs

Finish: Skyline Camo
Cam Type: Venom Twin Cam
Limb Type: Solid Limb
String Type: Bowman Black Mamba Xtreme Strings
Dampening: Bow Jax
Warranty: Limited Lifetime Warranty to original owner.



Ben Pearson Stealth

Contact Info: Ben Pearson Archery
www.benpearson.com

Tested Speed: 305 fps **MSRP:** \$769
Draw Weight: 50, 60, 70 lbs. **Draw Length:** 25" – 30"
Let-Off: 75% **Brace Height:** 7 3/8"
Axle to Axle: 33 3/8" **Mass Weight:** 4.9 lbs.
Stored Energy: 91.3 ft-lbs

Finish: Mossy Oak Obsession
Cam Type: Hybrid
Limb Type: Solid Limb
String Type: Vapor Trail Custom Strings
Dampening: Vib-X & Bow Jax
Warranty: Lifetime warranty to original owner.



Bowtech Tribute

Contact Info: Bowtech Archery
www.bowtecharchery.com

Tested Speed: 312 fps **MSRP:** \$749
Draw Weight: 50-60-70-80 lbs. **Draw Length:** 26" – 30"
Let-Off: 65-85% **Brace Height:** 7 1/2"
Axle to Axle: 31 1/2" **Mass Weight:** 4.46 lbs
Stored Energy: 93.8 ft-lbs

Finish: Mossy Oak Obsession
Cam Type: Binary (smooth mod)
Limb Type: Solid Limb
String Type: BCY452X
Dampening: Hush Kit
Warranty: Lifetime Warranty



CSS System 37

Contact Info: Custom Shooting Systems
www.customshootingystems.com

Tested Speed: 289 fps **MSRP:** \$555
Draw Weight: 40 – 80+ lbs. **Draw Length:** 24" – 34"
Let-Off: 60-75% **Brace Height:** 7 1/4"
Axle to Axle: 37" **Mass Weight:** 4.44 lbs
Stored Energy: 92.3 ft-lbs

Finish: Mossy Oak
Cam Type: Hybrid (tested)
Limb Type: Solid Limb
String Type: Duplex String BCY8125
Dampening: TunerZ
Warranty: Warranted against defects for life to original owner



Darton Marauder

Contact Info: Darton Archery
www.dartonarchery.com

Tested Speed: 292 fps **MSRP:** \$599
Draw Weight: 50-60-70 lbs. **Draw Length:** 26" – 30"
Let-Off: 80% **Brace Height:** 7 5/8"
Axle to Axle: 32" **Mass Weight:** 4.38 lbs
Stored Energy: 85.7 ft-lbs

Finish: Realtree Hardwoods HD Green
Cam Type: Hybrid
Limb Type: Solid Limb
String Type: BCY 452X
Dampening: Sims Limb Savers, String Leeches
Warranty: Limited-Lifetime Warranty



Diamond Liberty

Contact Info: Diamond Archery
www.diamondarchery.com

Tested Speed: 293 fps **MSRP:** \$649
Draw Weight: 50-60-70 lbs. **Draw Length:** 25" – 30"
Let-Off: 65-80% **Brace Height:** 7 1/2"
Axle to Axle: 33 1/4" **Mass Weight:** 3.98 lbs
Stored Energy: 82.4 ft-lbs

Finish: Mossy Oak Breakup
Cam Type: Single
Limb Type: Solid Limb
String Type: BCY452X
Dampening: Hush Kit
Warranty: Lifetime Warranty



Fred Bear Instinct

Contact Info: Escalade Sports
www.fredbearoutdoors.com

Tested Speed: 282 fps **MSRP:** \$399
Draw Weight: 50-60-70 lbs. **Draw Length:** 26" – 31"
Let-Off: 75% **Brace Height:** 7 1/2"
Axle to Axle: 31" **Mass Weight:** 4.34 lbs
Stored Energy: 83.2 ft-lbs

Finish: Realtree Hardwoods HD Green
Cam Type: Single
Limb Type: Split Limb
String Type: BCY Dynaflight 97
Dampening: String Leeches
Warranty: Lifetime Warranty



Hickory Creek HD 24

Contact Info: Hickory Creek
www.drawloc.com

Tested Speed: 256 fps **MSRP:** \$595
Draw Weight: 55-75 lbs. **Draw Length:** 25" – 31"
Let-Off: 75% **Brace Height:** 11 1/2"
Axle to Axle: 24" **Mass Weight:** 4.34 lbs
Stored Energy: 72.5 ft-lbs

Finish: Outback
Cam Type: Single
Limb Type: Solid Limb
String Type: Taylor Maid Tuxx Strings
Dampening: None
Warranty: Lifetime Warranty



Hoyt Trykon

Contact Info: Hoyt
www.hoyt.com

Tested Speed: 304 fps **MSRP:** \$749
Draw Weight: 40-80 lbs. **Draw Length:** 25" – 31"
Let-Off: 65-85% **Brace Height:** 7"
Axle to Axle: 33" **Mass Weight:** 4.96 lbs
Stored Energy: 92.5 ft-lbs

Finish: Realtree Hardwoods HD Green
Cam Type: Hybrid
Limb Type: Split
String Type: Brownell TS1
Dampening: StringShox and AlphaShox
Warranty: Warranted 100% to original owner for life of product

Bows Tested



Liberty I

Contact Info: Liberty Archery
www.libertyarchery.com

Tested Speed: 297 fps **MSRP:** \$699
Draw Weight: 40-75 lbs. **Draw Length:** 26 3/8" – 32"
Let-Off: 85% **Brace Height:** 7"
Axle to Axle: 20 1/2" **Mass Weight:** 2.3 lbs
Stored Energy: 93.1 ft-lbs

Finish: Realtree Hardwoods HD Green
Cam Type: Dual
Limb Type: Split Limb
String Type: Winners Choice (prestretched)
Dampening: String Leeches & Bow Jax cable silencers
Warranty: Limited 5- Year Warranty



Martin Bengal

Contact Info: Martin Archery
www.martinarchery.com

Tested Speed: 288 fps **MSRP:** \$399
Draw Weight: 50-70 lbs. **Draw Length:** 25" – 30"
Let-Off: 65/75% **Brace Height:** 6 3/4"
Axle to Axle: 32" **Mass Weight:** 4.68 lbs
Stored Energy: 87.4 ft-lbs

Finish: Mossy Oak Breakup
Cam Type: Single
Limb Type: Solid Limb
String Type: BCY Blend
Dampening: V.E.M
Warranty: Lifetime Bumper to bumper Warranty



Mathews Switchback XT

Contact Info: Mathews
www.mathewsinc.com

Tested Speed: 301 fps **MSRP:** \$795
Draw Weight: 40-50-60-70 lbs. **Draw Length:** 25" – 30"
Let-Off: 65 or 80% **Brace Height:** 7 1/2"
Axle to Axle: 31" **Mass Weight:** 4.24 lbs
Stored Energy: 93.0 ft-lbs

Finish: Realtree Hardwoods HD
Cam Type: Single
Limb Type: Solid Limb
String Type: Zebra Barracuda
Dampening: Harmonic Dampeners
Warranty: Lifetime Warranty



C.P. Oneida Black Eagle II

Contact Info: C.P. Oneida Eagle Bows
www.oneidaeaglebows.com

Tested Speed: 284 fps **MSRP:** \$795
Draw Weight: 25-70 lbs. **Draw Length:** 28 – 31.5"
Let-Off: 40-80% **Brace Height:** 6 5/8"
Axle to Axle: 45 1/2" **Mass Weight:** 4.4 lbs
Stored Energy: 88.4 ft-lbs

Finish: Realtree Hardwoods HD Green
Cam Type: Other
Limb Type: Solid Limb
String Type: Flast Flight 450 plus
Dampening: Bow Jax
Warranty: Lifetime Warranty



C.P. Oneida Extreme Eagle

Contact Info: C.P. Oneida Eagle Bows
www.oneidaeaglebows.com

Tested Speed: 289 fps **MSRP:** \$1095
Draw Weight: 25-70 lbs. **Draw Length:** 28" – 31.5"
Let-Off: 40-80% **Brace Height:** 6 5/8"
Axle to Axle: 44 3/4" **Mass Weight:** 4.74 lbs
Stored Energy: 89.8 ft-lbs

Finish: Realtree Hardwoods HD Green
Cam Type: Other
Limb Type: Solid Limb
String Type: Fast Flight 450 plus
Dampening: Bow Jax
Warranty: Lifetime Warranty



Parker Frontier

Contact Info: Parker Compound Bows
www.parkerbows.com

Tested Speed: 296 fps **MSRP:** \$719.95
Draw Weight: 50-70 lbs. **Draw Length:** 26" – 31"
Let-Off: 65 or 80% **Brace Height:** 6 3/4"
Axle to Axle: 33 1/2" **Mass Weight:** 4.36 lbs
Stored Energy: 85.5 ft-lbs

Finish: Mossy Oak New Break-Up
Cam Type: Single
Limb Type: Solid Limb
String Type: Stone Mountain
Dampening: Sims L/S Vibration Reduction Modules
Warranty: Lifetime Warranty to original owner



PSE Mach X

Contact Info: Precision Shooting Equipment
www.pse-archery.com

Tested Speed: 293 fps **MSRP:** \$749
Draw Weight: 60-70 lbs. **Draw Length:** 27" – 31"
Let-Off: 65-80% **Brace Height:** 7 1/4"
Axle to Axle: 33" **Mass Weight:** 4.42 lbs
Stored Energy: 85.5 ft-lbs

Finish: Mossy Oak New Break-Up
Cam Type: Single
Limb Type: Split Limb
String Type: Dynaflight 97
Dampening: String Chubs, Limb Dampers
Warranty: Limited lifetime warranty to original owner for life of the product.



Reflex Super Slam

Contact Info: Reflex
www.reflexbow.com

Tested Speed: 306 fps **MSRP:** \$499
Draw Weight: 50-60-70lbs. **Draw Length:** 25" – 30"
Let-Off: 65/75% **Brace Height:** 7"
Axle to Axle: 35" **Mass Weight:** 4.66 lbs
Stored Energy: 95.7 ft-lbs

Finish: Realtree Hardwoods HD Green
Cam Type: Hybrid
Limb Type: Split Limb
String Type: D75
Dampening: AlphaShox and String Leeches
Warranty: Warranted 100% to original owner for life of product



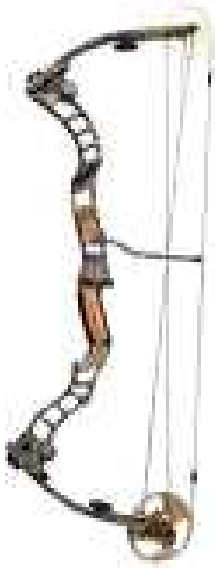
Ross CR334

Contact Info: Ross Archery
www.rossarchery.com

Tested Speed: 295 fps **MSRP:** \$705
Draw Weight: 40-70 lbs. **Draw Length:** 26.5" – 31"
Let-Off: 80 or 65% **Brace Height:** 7 3/4"
Axle to Axle: 34" **Mass Weight:** 4.42 lbs
Stored Energy: 84.9 ft-lbs

Finish: Realtree Harwoods
Cam Type: Single
Limb Type: Solid Limb
String Type: Winners Choice
Dampening: Sims Leeches and Ultra Limbsavers
Warranty: Lifetime Warranty

Bows Tested



Rytera Bullet X

Contact Info: Rytera Archery
www.rytera.com

Tested Speed:	293 fps	MSRP:	\$1024
Draw Weight:	50-70 lbs.	Draw Length:	24" – 30"
Let-Off:	65-85%	Brace Height:	7 1/4"
Axle to Axle:	33"	Mass Weight:	4.82 lbs
Stored Energy:	90.6 ft-lbs		

Finish: Mossy Oak Breakup
Cam Type: Single
Limb Type: Solid Limb
String Type: BCY Blend
Dampening: V.E.M and Sims Leeches
Warranty: Lifetime Bumper to bumper Warranty



Whisper Creek Innovator Pro

Contact Info: Whisper Creek Archery
www.whispercreekarchery.com

Tested Speed:	289 fps	MSRP:	\$869
Draw Weight:	50-70 lbs.	Draw Length:	25" – 30"
Let-Off:	65 or 80%	Brace Height:	7"
Axle to Axle:	31"	Mass Weight:	4.9 lbs
Stored Energy:	92.2 ft-lbs		

Finish: Realtree Hardwoods HD Green
Cam Type: Single
Limb Type: Solid Limb
String Type: H&M Custom Bow Strings
Dampening: BowDAMP
Warranty: Lifetime Warranty



Results at a Glance

Test Section	Adaptability / Adjustability	Dynamic Efficiency		Noise Output				Retained Velocity		Vibration	
Test Parameter	Adjustability	350 Grain Efficiency	540 Grain Efficiency	350 Grain Point Blank	540 Grain Point Blank	350 Grain 20 Yards	540 Grain 20 Yards	540 Grain Vel / 350 Grain Vel	Speed Retention 1 to 40 Yards	350 Grain Vibration	540 Grain Vibration
Bow	Rank	Rank	Rank	Rank	Rank	Rank	Rank	Rank	Rank	Rank	Rank
APA Innovations Black Mamba Xtreme		1	1								
Ben Pearson Stealth		6	6	3	3				5	7	7
Bowtech Tribute	1	3	3			7			6	5	5
CSS System 37	2							3			
Darton Marauder										1	3
Diamond Liberty	3	2	4	7		4	6		4	6	6
Fred Bear Instinct				5	2	6	1				
Hickory Creek HD 24					3	3	2				
Hoyt Trykon	5		6	1	1	1	5	5		4	4
Liberty I								2			
Martin Bengal	6							3			
Mathews Switchback XT				4	5	1	3		7	3	1
C.P. Oneida Black Eagle II Medium	7							7	7		
C.P. Oneida Extreme Eagle	7							5	3		
Parker Frontier		4	5			7			7		
PSE Mach X	4	7		2	6						
Reflex Super Slam							7				
Ross CR334		5	2						2		
Rytera BulletX											
Whisper Creek Innovator Pro				5	7	4	4	1	1	2	2

Innovative Features

Innovative Features:

Below is a list of innovative and unique features provided by each individual bow; this list is not inclusive of all of the features of a given bow, but highlights those that were felt to be important by the evaluators. This portion of the evaluation is meant to highlight some of the technology used by various manufacturers to provide great products to the consumer. The order of the list is alphabetical and has no correlation to a comparative ranking.

Compound Hunting Bow	Features
APA Black Mamba Xtreme	Bow carrying support structure and multi tool center, which includes broadhead wrench, nock wrench, carbide blade sharpener
Ben Pearson Stealth	Vib-X technology, angel wing grip
Bowtech Tribute	Beyond parallel limb configuration at full draw; smooth and fast module options.
CSS System 37	Interchangeable Cams with 3 options (dual, single or hybrid)
Darton Marauder	Molded black rubber grip; lockable limb screw
Diamond Liberty	Factory installed hush kit and pivoting limb pockets.
Fred Bear Instinct	Green anodized perimeter weighted eccentrics with felt material located on grip for comfort
Hickory Creek HD 24	24" Axle-to-Axle and 11 ½" Brace Height
Hoyt Trykon	Factory installed RizerShox and Hoyt's new 5 layer laminated Parallel Split Limbs
Liberty I	Shoot through system with cam symmetry top to bottom.
Martin Bengal	Vibration Escape Module and modular riser design
Mathews Switchback XT	Harmonic dampening cable guard and center shot alignment guide in grip
Oneida Black Eagle II	Dead middle string alignment with lever action energy storage
Oneida Extreme Eagle	Dead middle string alignment with more efficient cam design than BEII
Parker Frontier	Synprene Grip and anodized camo eccentrics
PSE Mach X	Four 9" Split Limbs with independently adjustable pivoting limb pockets.
Reflex Super Slam	Slam & 1/2 Cam System, and AlphaShox standard
Ross CR334	Broadhead guard on shelf with sealed cam / idler wheel bearings
Rytera BulletX	Metal limb mounting system and teflon plated cable guard
Whisper Creek Innovator Pro	HyperSuspension Technology and ABS Technology

Adaptability / Adjustability

Adaptability / Adjustability:

Objective: The objective of the Adaptability / Adjustability test is to provide information about possible upgrades, modifications, finishes or other customization options available as well as the range of adjustments that is standard for each bow tested. This help to assess the versatility of a given bow.

Rationale: The number of configurations, adaptations, or upgrades a given bow provides equates to the number of different applications a rest can be used for.

Procedure: Literature and information provided by each manufacturer, along with on-line research, were used to assess this category.

Assumptions: The more adjustable / adaptable a bow is to different configurations and setups, the more versatile and customizable it is and the more marketable it is for future resale.

Note: Not all companies who participated in this evaluation intend for their bow to be resold after a short time period of use (e.g. Liberty I, C.P. Oneida). The design philosophy behind some of these bows does not allow for many updates or refreshes, which they view as a benefit. These bows are intended to be used and owned by the same individual over the long term and this is the target market for these bows. Some companies may not have scored as high due to this design philosophy. To account for this, the interactive spreadsheet at the end of this report can be modified such that Adaptability / Adjustability does not impact the overall results for the individual archer.

Results:

Bow	Adaptability / Adjustability (pts)	Rank
Bowtech Tribute	9.20	1
CSS System 37	8.30	2
Diamond Liberty	7.76	3
PSE Mach X	7.42	4
Hoyt Trykon	6.90	5
Martin Bengal	6.26	6
Oneida Black Eagle II	6.20	7
Oneida Extreme Eagle	6.20	7



Figure 1 Miscellaneous Test Setup 1

Dynamic Efficiency

Dynamic Efficiency:

Objective: The objective of the Dynamic Efficiency test is to provide an assessment of the amount of energy output by a bow relative to the amount of energy expended by drawing the bow back.

Rationale: The purpose of the compound bow is to transfer the energy expended in drawing the bow back (Potential or Stored Energy) into the energy propelling the arrow downrange (Kinetic Energy). Unfortunately, not all of the Potential Energy is turned into Kinetic Energy. This could be due to various reasons, but regardless of the cause you are not getting all the energy out of the bow that you have put into it. The reason for testing dynamic efficiency is to determine which bows perform the best in transferring the energy that is “stored” into the energy in motion that is released through the arrow.

Procedure: The Easton Bow Force Mapper system is used to create Force – Draw curves for each bow. The plot information obtained from the Mapper is then analyzed to obtain the amount of energy expended in drawing the bow back (See Figure 2 below). This value in pound-feet (lb-ft), considered “potential energy” (or stored energy) for this assessment, is then compared with the Kinetic Energy output by the bow during shot execution with both 350 grain and 540 grain arrows. The Kinetic Energy is calculated with the following formula:

$$KE = \frac{ArrowWeight * Velocity^2}{450240}$$

Where “KE” is in pound-feet, “Arrow Weight” is in grains, “Velocity” is in feet per second (fps) and 450240 is a conversion factor that accounts for unit changes between grains and fps. The ratio of the Kinetic Energy to the Potential Energy for both arrow weights is assessed.

Example: The speed of a 350 grain arrow out of the APA Innovations Black Mamba XTreme used in this evaluation was measured to be 334 feet per second (fps). The speed of a 540 grain arrow out of the same bow was measured to be 277 fps. Using the formula for KE above, we can show that the Kinetic Energy of the 350 grain arrow is 86.7 lb-ft, while the Kinetic Energy of the 540 grain arrow is 91.7 lb-ft. Dividing these two KE values by the Potential Energy (106.2 lb-ft), a dynamic efficiency of 81.6% and 86.4% is achieved, respectively.

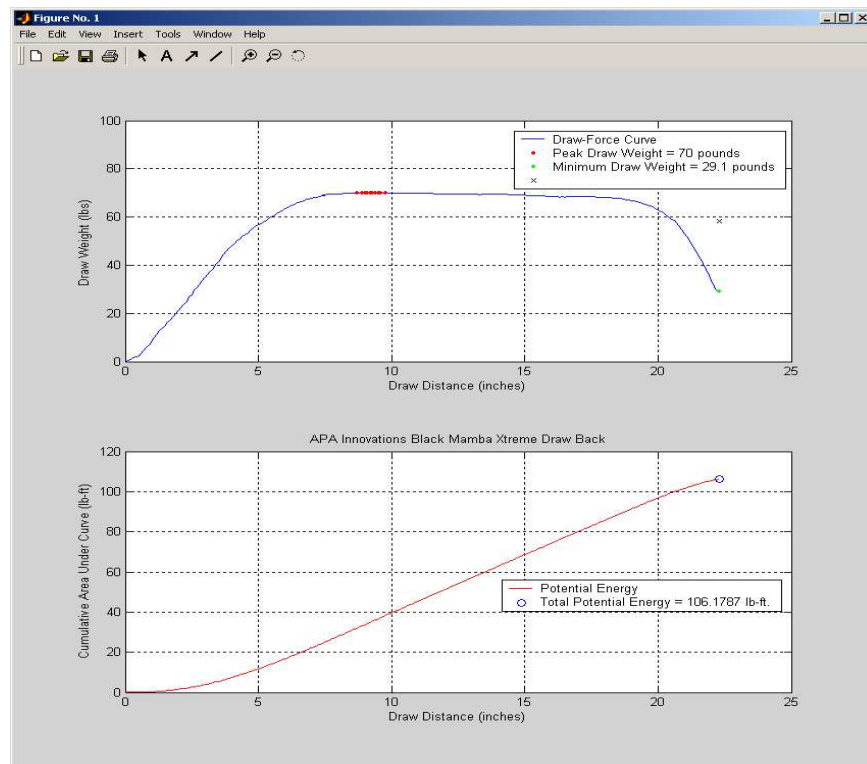


Figure 2 Force-Draw Curve and Calculated Potential Energy

Dynamic Efficiency

Results:

Compound Bow	350 Grain Arrow Dynamic Efficiency	Rank
APA Black Mamba Xtreme	81.6%	1
Diamond Liberty	80.8%	2
Bowtech Tribute	80.6%	3
Parker Frontier	79.6%	4
Ross CR334	79.4%	5
Ben Pearson Stealth	79.2%	6
PSE Mach X	78.0%	7

Compound Bow	540 Grain Arrow Dynamic Efficiency	Rank
APA Black Mamba Xtreme	86.4%	1
Ross CR334	84.8%	2
Bowtech Tribute	84.7%	3
Diamond Liberty	84.5%	4
Parker Frontier	83.6%	5
Ben Pearson Stealth	83.4%	6
Hoyt Trykon	83.4%	6



Figure 3 Miscellaneous Test Setup 2

Noise Output

Noise Output:

Objective: The objective of this section is to determine the noise output properties for each bow at both point blank and 20 yard distances.

Rationale: The noise output of a compound bow has multiple components: a) how much noise is output as perceived by the shooter. b) how much of the initial noise output is carried down range to a potential target. Compounding the complexity of a) and b) is the different noise output characteristics of a given bow with varying arrow weights. Many hunters use heavier arrows for increased down range kinetic energy. Because of these issues, noise output readings are measured at both point blank and 20 yard ranges for 350 grain and 540 grain arrows.

Procedure: Each bow is mounted to the Hooter Shooter. One Extech digital sound level meter is mounted on a tripod and positioned 8 inches in front of a standard measuring point on the Hooter Shooter, directly in front of the bow, with the microphone set at a height of 36 inches. A second Extech digital sound level meter is positioned 20 yards down range at an offset of 15 feet from the direct path of the arrow, again with the microphone set at a height of 36 inches. The digital sound meter frequency weighting is set to 'A' (which allows the meter to respond as the human ear would) with the "Max Hold" feature implemented from shot to shot to capture the peak noise output. A series of seven (7) shots is executed for both 350 grain and 540 grain arrows from each bow, during which the peak sound measurements (dBa) are recorded. The lowest and highest measurements are excluded from the results, with the remaining five (5) measurements for each arrow weight and distance included in the average noise output calculation for each bow.

Assumptions: An assumption associated with this test is that the sample size of seven firings per arrow size, with five measurements being used for averaging, is sufficient to correctly characterize the noise output of the bow at both the point blank and 20 yard ranges.

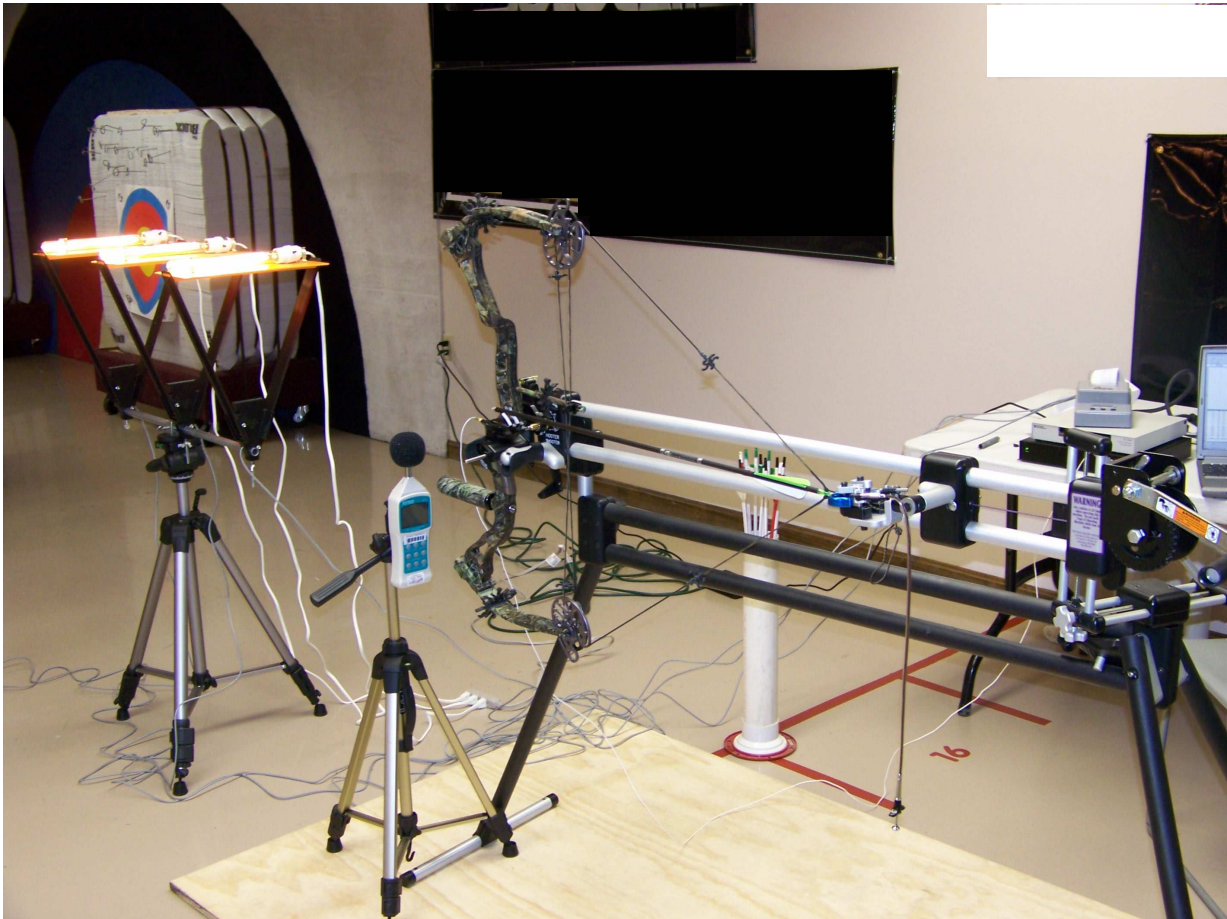


Figure 4 Noise Output Measurements taken at Point Blank and 20 Yards

Noise Output

350 Grain Arrow Results:

Compound Bow	350 Grain Arrow Point Blank (dBa)	Rank
Hoyt Trykon	85.5	1
PSE Mach X	86.0	2
Ben Pearson Stealth	86.1	3
Mathews Switchback XT	86.3	4
Fred Bear Instinct	86.5	5
Whisper Creek Innovator Pro	86.5	5
Diamond Liberty	86.8	7

540 Grain Arrow Results:

Compound Bow	540 Grain Arrow Point Blank (dBa)	Rank
Hoyt Trykon	84.8	1
Fred Bear Instinct	85.0	2
Ben Pearson Stealth	85.2	3
Hickory Creek HD 24	85.2	3
Mathews Switchback XT	85.7	5
PSE Mach X	85.9	6
Whisper Creek Innovator Pro	86.0	7

Compound Bow	350 Grain Arrow 20 Yards (dBa)	Rank
Hoyt Trykon	78.7	1
Mathews Switchback XT	78.7	1
Hickory Creek HD 24	78.8	3
Diamond Liberty	78.9	4
Whisper Creek Innovator Pro	78.9	4
Fred Bear Instinct	79.0	6
Bowtech Tribute	79.5	7
Parker Frontier	79.5	7

Compound Bow	540 Grain Arrow 20 Yards (dBa)	Rank
Fred Bear Instinct	75.4	1
Hickory Creek HD 24	75.6	2
Mathews Switchback XT	76.7	3
Hoyt Trykon	76.8	4
Whisper Creek Innovator Pro	77.1	5
Diamond Liberty	77.3	6
Reflex Super Slam	77.4	7

Noise Output

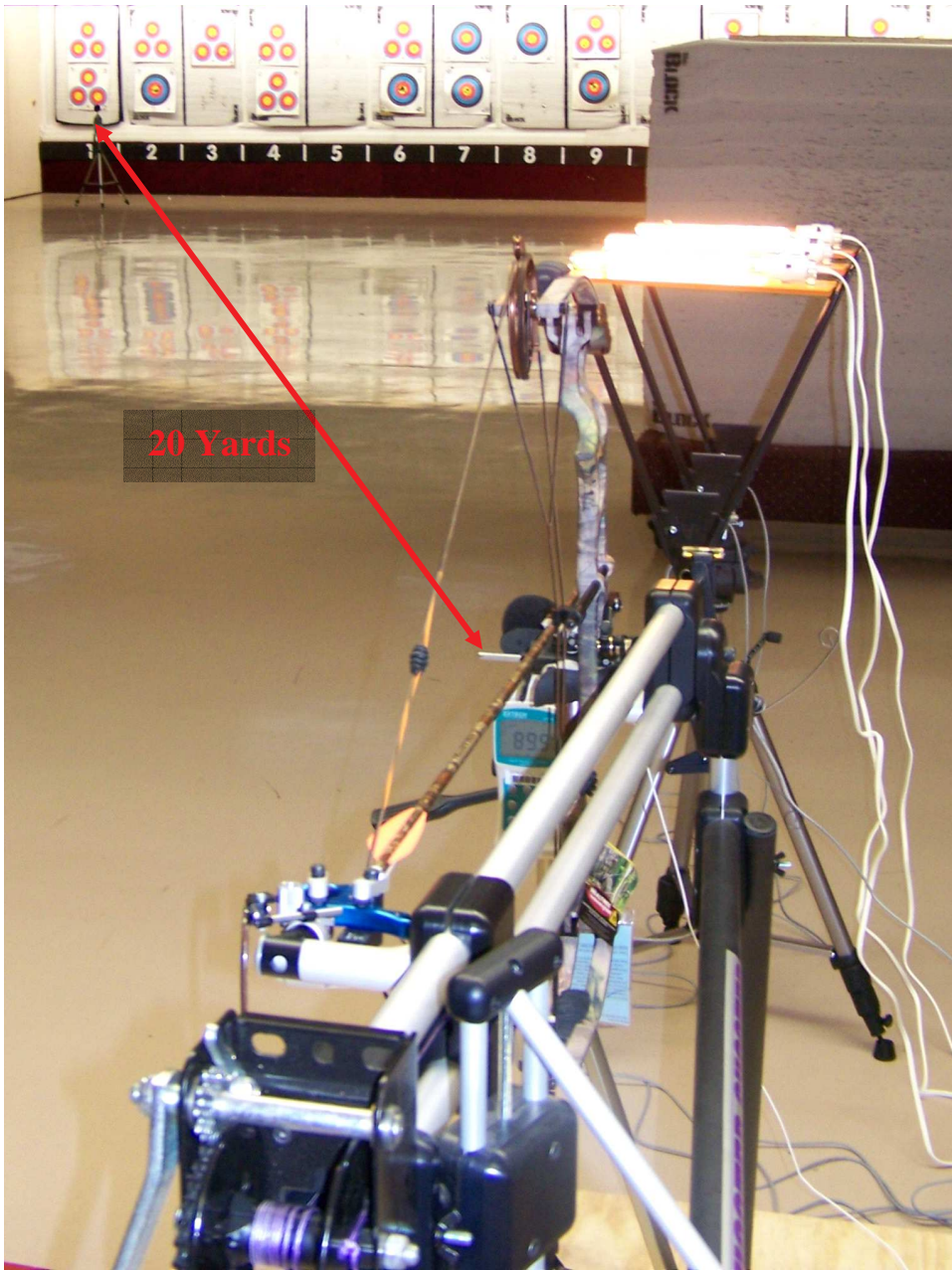


Figure 5 Noise Output Test Setup Sound Meter at 20 Yards

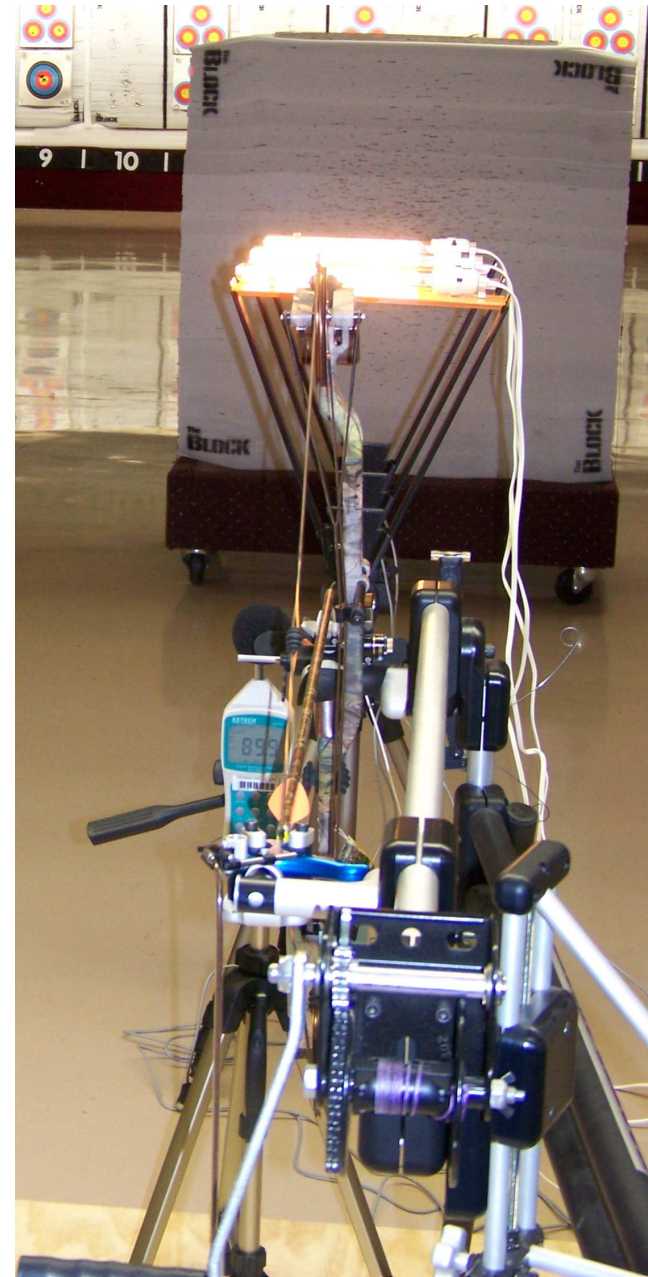


Figure 6 Noise Output Test Setup Sound Meter at 8 inches

Retained Velocity

Retained Velocity:

Objective: The objective of this test is to measure the retained velocity characteristics of a bow for a 350 grain arrow from 1 yard to 40 yards. An assessment is also made of the retained amount of velocity retained when the arrow weight is increased.

Rationale: The amount of velocity retained down range provides a direct correlation to the amount of retained Kinetic Energy. The more Kinetic Energy that is retained down range, the better potential there is for increased penetration. Also, providing an assessment of the ratio of retained velocity between a 350 grain and 540 grain arrow provides insight into the ability of a bow to handle increased arrow weights effectively. These increased arrow weights translate into an increase in kinetic energy.

Procedure: Each bow is mounted on the Hooter Shooter. The Oehler Research M35 Proof Chronograph is positioned 3 feet in front of the Hooter Shooter. The Competition Electronics ProChrono Digital Chronograph is positioned 120 feet (40 yards) in front of the Hooter Shooter. A series of seven (7) shots with the 350 grain GoldTip arrows is then executed, with Chronograph measurements being made at both 1 yard and 40 yards for each arrow. The lowest and highest measurements are excluded from the results, with the remaining five (5) measurements for each distance included in the average 350 grain velocity at 1 and 40 yards for each bow. The 40 yard velocity is then divided by the 1 yard velocity, which provides a percentage of retained velocity from 1 to 40 yards. Also, a series of seven (7) shots with the 540 grain Easton arrows is executed, using the M35 Proof Chronograph to obtain velocity measurements at 1 yard. Again, the lowest and highest measurements are excluded from the results, with the remaining five (5) measurements included in the average 540 grain velocity at 1 yard for each bow. The results of these measurements are then divided by the results of the 350 grain 1 yard measurements, which provide an indication of the velocity retained with an increase in arrow weight.



Figure 7 Retained Velocity Setup 1

Retained Velocity

Results:

Compound Bow	Speed Retention from 1 to 40 Yards	Rank
Whisper Creek Innovator Pro	92.9%	1
Ross CR334	91.9%	2
Oneida Extreme Eagle	91.6%	3
Diamond Liberty	91.5%	4
Ben Pearson Stealth	91.4%	5
Bowtech Tribute	91.3%	6
Mathews Switchback XT	91.2%	7
Oneida Black Eagle II	91.2%	7
Parker Frontier	91.2%	7

Compound Bow	Speed Retention 350 Gr. to 540 Gr.	Rank
Whisper Creek Innovator Pro	85.1%	1
Liberty I	84.5%	2
CSS System 37	83.6%	3
Martin Bengal	83.6%	3
Hoyt Trykon	83.5%	5
Oneida Extreme Eagle	83.5%	5
Oneida Black Eagle II	83.4%	7



Figure 8 Miscellaneous Test Setup 3

Retained Velocity



Figure 9 Retained Velocity Setup at 1 & 40 Yards



Figure 10 Retained Velocity Test Setup 2

Vibration

Vibration:

Objective: The objective of the Vibration Test is to provide an indication of the amount of hand shock each bow produces under shot execution with two different arrow weights. Due to limitations of test equipment, the vibration data is collected at the front of the grip instead of the ideal location at the throat of the grip.

Rationale: The less vibration output by a bow and felt by the archer during and after shot execution, the more pleasurable a bow is to shoot, especially during long practice sessions. Our test equipment is highly sensitive; an archer may not be able to distinguish between some of the calculated vibration outputs of given bows.

Procedure: An accelerometer (Dytran, model 3030A4) is attached to each bow in a standard location at the front of the grip, just below the shelf. A shot is taken with both the 350 grain GoldTip arrows and the 540 grain Easton arrows, during which vibration data is collected (see "Equipment Used" section for equipment details). After data collection is completed, each raw data set is analyzed to determine the maximum amplitude of the vibration centered at the dominant frequency of the wave.

Assumptions: An assumption is made that the dominant frequency of the vibration "wave" is what is most likely to be felt by an archer.

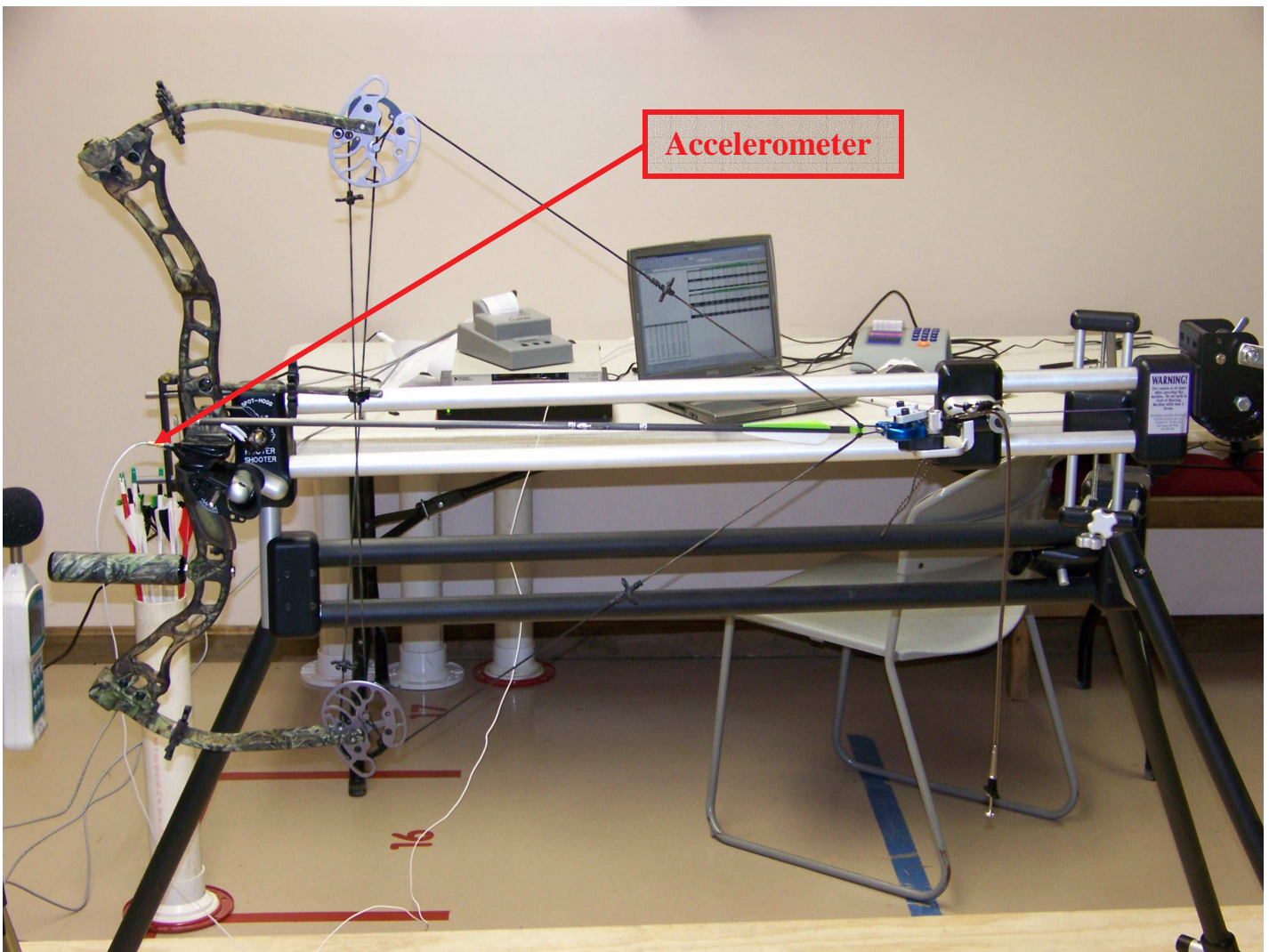


Figure 11 Vibration Data Collection Setup

Vibration

Results:

Compound Bow	350 Grain Arrow Vibration (m/s ²)	Rank
Darton Marauder	4.5851	1
Whisper Creek Innovator Pro	4.8813	2
Mathews Switchback XT	5.0251	3
Bowtech Tribute	5.8915	4
Hoyt Trykon	6.4159	5
Diamond Liberty	8.6284	6
Ben Pearson Stealth	8.9694	7

Compound Bow	540 Grain Arrow Vibration (m/s ²)	Rank
Mathews Switchback XT	2.9720	1
Whisper Creek Innovator Pro	3.1183	2
Darton Marauder	3.8779	3
Bowtech Tribute	4.5650	4
Hoyt Trykon	5.1218	5
Diamond Liberty	6.0053	6
Ben Pearson Stealth	7.0554	7

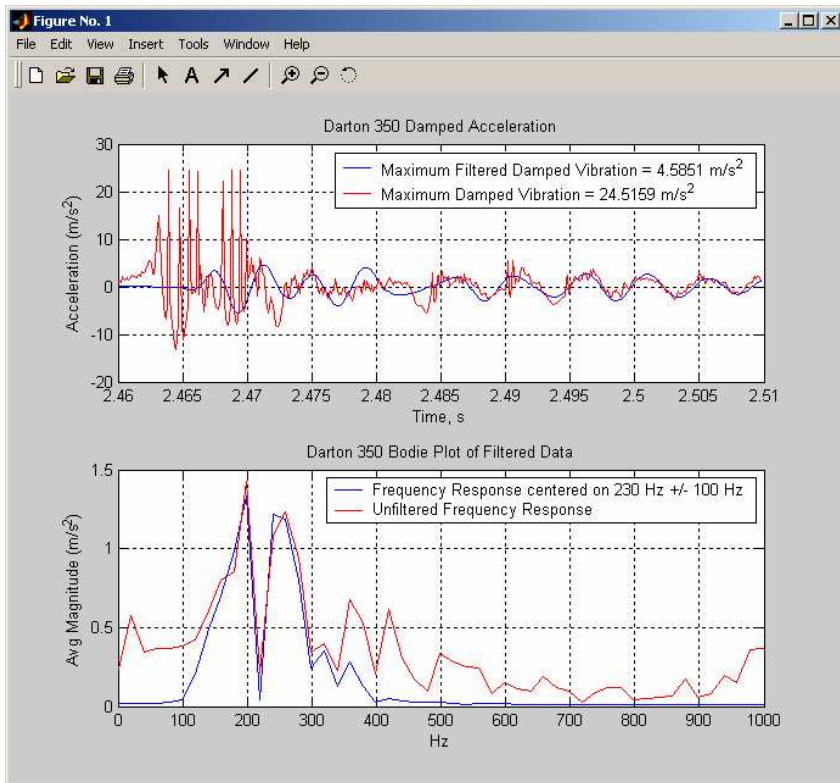


Figure 12 Darton Marauder Vibration Output - 350 Grain Arrow

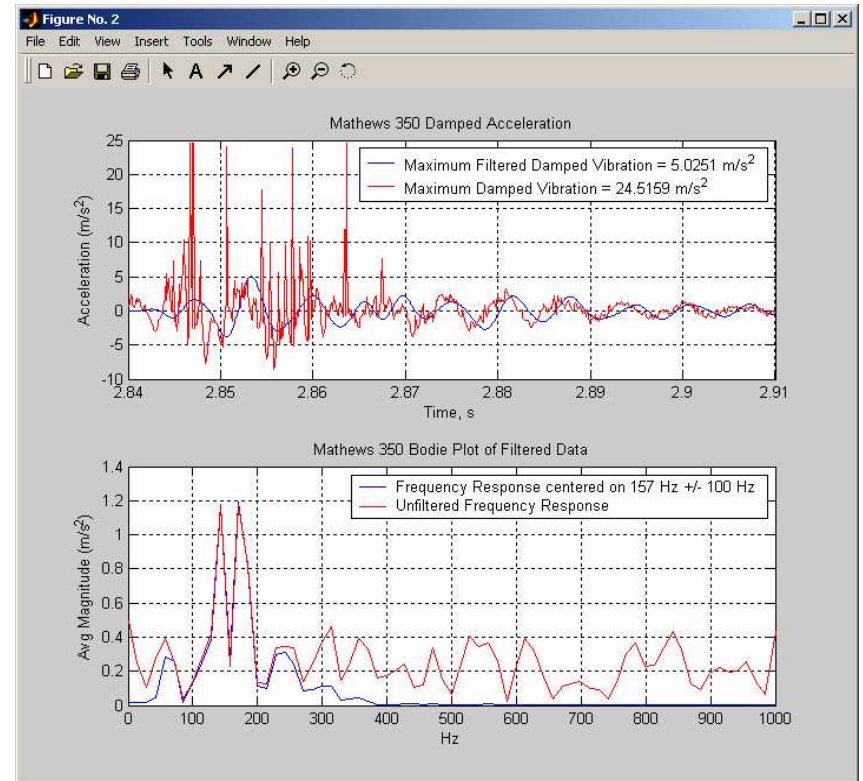


Figure 13 Mathews Switchback XT Vibration Output - 540 Grain Arrow

Best Picks

Overall Performance Best Picks:

The “Overall Performance Best Picks” are provided in the following table. The percentage of points each bow received with respect to the highest scoring bow in each of the test categories was used to determine the total number of percentage points (highest scoring bow for a test category receives 100 percentage points for that category). This provides a truly comparative analysis of how each bow placed relative to its competitors based solely on the criteria outlined in this test with no additional weighting added. For personalized rankings of each rest, please see the Hunting Bow Results spreadsheet (see **Note** below).

Compound Bow	MSRP	Total Percentage Points	Rank
Bowtech Tribute	\$749.00	461.80%	1
Hoyt Trykon	\$749.00	429.23%	2
Diamond Liberty	\$649.00	426.39%	3
Whisper Creek Innovator Pro	\$869.00	423.01%	4
Mathews Switchback XT	\$795.00	420.57%	5
Darton Marauder	\$599.00	417.82%	6
Ben Pearson Stealth	\$769.00	401.95%	7

“Bang for the Buck” Best Picks:

The “Bang for the Buck” Best Picks are provided in the following table. The percentage of points each bow received with respect to the highest scoring each in each of the test categories was used to determine the total number of percentage points (see “Overall Performance” Best Picks section above). The MSRP for each bow was then divided into the total percentage points, providing a “percentage points per dollar” assessment. This assessment is based solely on the criteria outlined in this test and no additional weighting is added. For personalized rankings of each bow, please see the Hunting Bow Results spreadsheet (see **Note** below).

Compound Bow	MSRP	Total Percentage Points per Dollar	Rank
Martin Bengal	\$399.00	0.955%	1
Fred Bear Instinct	\$399.00	0.915%	2
Reflex Super Slam	\$499.00	0.717%	3
CSS System 37	\$555.00	0.702%	4
Darton Marauder	\$599.00	0.698%	5
Diamond Liberty	\$649.00	0.657%	6
Bowtech Tribute Smooth Mods	\$749.00	0.617%	7

Note: The Hunting Bow Results spreadsheet reflects rankings of the top 3 rests in Performance and “Bang for the Buck” according to the weightings and costs input by the individual archer as well as the results of the Face-Off test categories. It is not intended to lead anyone to a purchase decision as there are important factors for consideration that were not or could not be tested during this evaluation. Rather, this table is for reference only and is provided solely as a convenience to the user. Rankings should be viewed within this context and do not represent a recommendation by the authors of this report.

2006 Compound Hunting Bow Face-Off Sponsors

Special Thanks to each of our sponsors:



BCY Fibers: Provided the #24 Poly Rope for string loops, which helped to maintain consistency for each bow.



Field Logic: Provided The Block 4x4 Pro for use during retained velocity testing.



Carter Enterprises: Provided the chocolate addiction release for use with the Hooter Shooter.



Lancaster Archery Supply: Provided use of facilities and equipment; their facilities and equipment are top-notch.



Coffey Marketing: Provided the US Game Scale and Electronic Grain Scale to verify both draw and arrow weight.



New Archery Products: Provided the Quicktune 3000 rests, which provided easy adjustment during paper tuning.



Competition Electronics: Provided the ProChrono Digital Chronograph to collect speed measurements.



Oehler Research, Inc: Provided the Model 35 Proof Chronograph to collect speed measurements



Easton Archery: Provided Easton XX75 2514 arrows in 540 grains and use of the Bow Force Mapping System.



Rinehart: Provided the 18-1 Rinehart Block for use during retained velocity testing.



Gold Tip: Provided Ultralight Pro Series 22 arrows in 350 grains for use throughout testing.



Wildwood Sports Center: Provided use of facilities and equipment; great people to work with and very helpful.

2006 Compound Hunting Bow Face-Off Miscellaneous Pictures

Equipment Used:

General:

- Hooter Shooter by Spot Hogg

Instruments for weight measurements:

- Coffey Marketing US Game Scale

Instruments used for Noise Output Test:

- Extech Instruments Digital Sound Level Meters

Instruments used for Vibration Test:

- National Instruments Data Acquisition Pad (NI DAQpad-6015)
- National Instruments Signal Conditioning Connector Block (model SC-2345)
- National Instruments Signal Conditioner Module (model SCC-ACC01)
- National Instruments Measurement & Automation Explorer Software
- Dytran Accelerometer (model 3030A4)

Special Thanks:

We would like to thank all of the manufacturers and sponsors who provided bows and test equipment for this evaluation; without them and their support, this evaluation never would have been possible



Jonathan Teater



Anthony Barnum

