

Arrow Master Pro Manual

Introduction

Arrow Master is a computer program for help in the selection of a point weight for a particular archery arrow and for comparing different arrow configurations. It is meant to give the user control and knowledge of arrow configurations to help in optimizing arrow flight for improved grouping.

Arrow Master Pro is for arrow makers who design their own arrows. It will allow the user to input all of the components of an arrow design and determine where the balance position will be and what point weight it will require for a desired F.O.C balance.

Note: Arrow Master and Arrow Master Pro are both described in this manual. Installation of both programs is identical. Throughout the manual, when Arrow Master is mentioned, the information contained there is for both programs. In the manual when the "M"ake function is described it is only applicable to Arrow Master Pro.

Hardware Requirements

Arrow Master can be installed on any 100% IBM compatible computer with DOS version 3.3 or greater, a base memory of 640k, a VGA graphics adapter and monitor that supports 640x480 resolution with 16 colors.

Installation

Installation to a hard drive

Install Arrow Master by copying the entire contents of the diskette supplied by Lindsay Graphics onto a hard drive or by running the install program directly off the floppy diskette.

1: Place the program disk into the floppy drive and at a DOS prompt type **A:** and Enter.

*NOTE: If the floppy drive is drive B, type **B:** and Enter.*

2. Next run the install program by typing **INSTALL** and Enter. The install program will begin. Follow the procedures presented there.

Installation for running Arrow Master from a floppy diskette

Arrow Master has an animation logo sign on that may be deleted from a backup copy so Arrow Master can load faster from a floppy drive. To run Arrow Master from a diskette, do the following:

1. First write protect the distribution diskette and make a backup copy.
2. Place the backup disk in the A drive and get at an A> prompt by typing **A:** and Enter.
- 3: Skip to 4 if you **do not** wish to delete the animation logo file. To delete the logo file type **DEL LOGO.FLI** and Enter.
4. Start the program by typing **ARROW** and Enter.

*NOTE: Start Arrow Master Pro by typing **ARROWPRO** and Enter.*

Getting Started

After installation on a hard drive, Arrow Master may be started as follows:

1. At a DOS prompt make sure the root directory is present that was selected in the install program by typing **CD** and Enter.
2. Start the program by typing **ARROW** and Enter.

*NOTE: If the program is Arrow Master Pro, type **ARROWPRO** and Enter to start the program. Arrow Master has an animation sign on screen. If Arrow Master takes longer than desired to load or hard disk space is limited, the animation may be deleted from the hard disk. To delete it from the Arrow Master directory, type **DEL LOGO.FLI** and Enter. Arrow Master will then use a smaller sign on screen.*

To run Arrow Master from a floppy drive do the following:

1. Place a backup copy of Arrow Master in drive A: and type **A:** and Enter.
2. Start the program by typing **ARROW** and Enter.

*NOTE: If the program is Arrow Master Pro, type **ARROWPRO** and Enter to start the program.*

Description of the variables

Front of Center percent

The distance that the balance point lies in front of center of the total length of the arrow is referred to as the F.O.C. (front of center) position and is given as a percent of the total length. Each shaft with a different size or length will require a different weight point to create the same F.O.C. Every bow and arrow combination can require a different F.O.C. position to create the best arrow grouping. Usually good arrow flight and grouping can be achieved with a F.O.C. position within the 5% to 15% range.

Balance position without point

This is the distance from the front tip of the shaft (without a point installed) to the balance position of the arrow (without a point).

Length of arrow without point

This is the distance from the front tip of the shaft (without a point on) to the very tip of the nock.

Weight of arrow without point

This is the total weight in grains of the entire arrow except for the point. If a scale is not available to determine total weight in grains, the utility, "A"rrow weight, will figure it using a point of known weight.

Length of point

This is the length of the point from the shoulder (where it butts up to the shaft) to the tip. This is a number that may not be known since the point may not have been selected yet. However, it should be possible to give a reasonably close number since it is probably known if a field point or broadhead will be shot and approximately how long it is. This number is not as critical as the balance position measurements.

Balance position of point

This is the distance of the balance position of the point measured from the shoulder on the point (where it butts up to the shaft) to the balance position of the point itself. (example: a 125 grain field point's balance position is usually around 1/8 of an inch). It is possible to have a negative number. If a light point such as 75 grains is used it may balance behind the shoulder. Enter that distance as a negative number. This, again, is a variable that depends on what type of point will be used.

Procedures

When Arrow Master is started, it opens to the default arrow configuration which is an Easton 27" 2117.

NOTE: The variables that require a distance can be any type of linear measurement as long as they are all the same type. All entries must be entered as decimals. (To convert fractions to a decimal divide the top number by the bottom number. Example: 1/8 1 divided by 8 equals .125) Be as accurate as possible in the balancing and measuring. Entering of the weights can also be any type of weight measurement as long as they are all the same type. In some of the functions the weight may be referred to as grains and may have a g after the number, but any type of weight measurement can be entered and the answer will be given in that measure. Grains are mentioned in this manual because most arrow manufacturers use grains as a unit of measure.

1. Begin with a new arrow by moving the red highlight bar (by pressing the space bar, tab key or up down arrow key) over "Balance position without point". Press "E"dit or press the Enter key to bring up the input box. Using a knife blade or something similar, balance the arrow without a point installed and mark that place with a pencil on the arrow shaft. With a tape, measure the distance from the tip of the shaft to the pencil mark. Enter that distance into the input box.

2. Move the highlight bar down to the next variable, "Length of arrow without point". Measure the over all distance of the arrow (From the tip of shaft to the very tip of the nock) without a point installed and enter that variable.

3. Move the highlight bar down to the next variable, "Weight of arrow without point", and enter the weight of the entire arrow without a point installed in grains. If a scale is not available, use the utility "Arrow Weight" to determine this. *NOTE: The procedure for Arrow Weight utility is described on the next page.*

4. Move the highlight bar down to the next variable, "Length of point", and enter in the length of the point that may be used. Measure from the shoulder of the point to the very tip of the point. *NOTE: This is a number that may not be known since the point may not be selected yet. However, a reasonably close number can be given since it should be known if a field point or broadhead will be used and approximately how long it is. This number is not as critical as the balance position measurements.*

5. Move the highlight bar down to the next variable "Balance position of point" and enter the distance from the balance position of the point itself to the shoulder of the point. *NOTE: This also, is a number that will have to be determined from the type of point that will possibly be used.*

6. Move the highlight bar over "Front of Center percent" and enter a desired percent.

7. Next push the C key to "C"alculate the weight of point necessary to create an arrow with the current configuration. This "C"alculate command will also update the dimensions surrounding the arrow on screen using the current variables.

8. After the initial entries, the "Front of Center Percent", "Length of point" and "Balance position of point" may be readjusted to try other types of points and F.O.C. positions. This will allow experimenting with what weight and length of point this arrow might require and to give knowledge of what happens by changing weights and balance positions. Also, it may be desirable to enter different F.O.C. percents until the answer from "C"alculate is a weight of point that is predetermined. This allows the determination of the F.O.C. position for that particular weight of point. It is also interesting to enter in different arrows to discover their F.O.C. positions. This may help give ideas of why one arrow seems to work better than another.

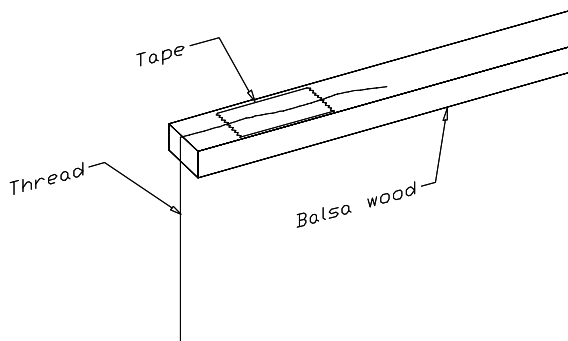
"W"eight (function)

Push "W" from the main screen to begin "W"eight. This function will determine the weight of an arrow without a point by using a point of known weight. The prompts will request the weight of point, the balance position with the point installed, the balance position without the point installed and the balance position of the point. It will then tell the weight of the entire arrow without the point installed and ask if these variables should be placed into the main screen variables. "Y"es will place the answer for "Enter the balance position without the point installed", the weight of the arrow and the balance position of the point into the main screen's variables. "N"o will not change any of the main screen's variables.

Using "W"eight to determine the weight of specific components.

Arrow Master Pro requests the weight of the individual components. It is preferable to have a scale to determine these weights but if a scale is unavailable there is a method that will determine the weight using the "W"eight function.

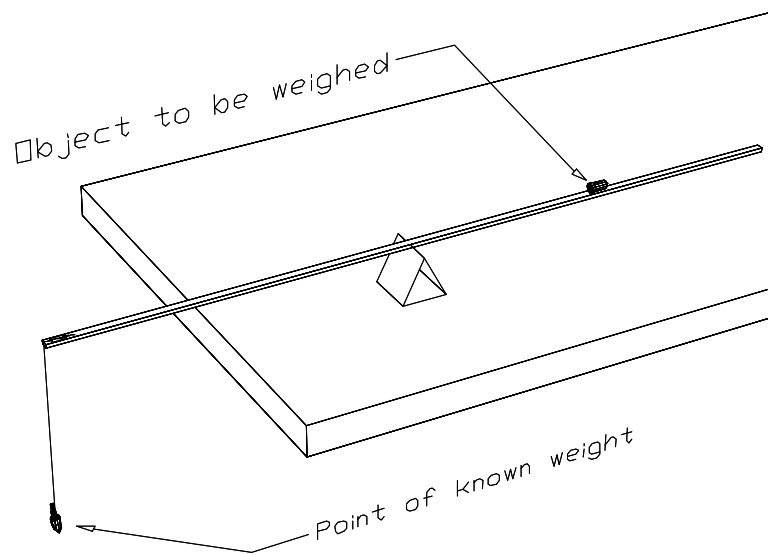
A light long stick is needed. A 36" x 3/16" x 3/8" balsa wood stick will work very well. This should be available at a local hobby shop. Anything that is fairly long and light will work. The lighter (e.g. 100 grains) the stick the more accurate the final answer will be. First, the weight of the stick is needed. Using a small piece of tape, tape a piece of sewing thread (e.g. 6" long) close to the end so the thread is hanging over the tip (see illustration).



Note: The tape and thread will be weighed with the stick and will be considered as part of the stick.

Next, balance the stick and tape on a sharp edge. It is necessary to find an edge that will sit on a table or that can be clamped in a vise that will stay upright by itself as it is rather hard to hand hold this and do a accurate job. Mark on the stick with a pencil where the balance position is. Tie a point of known weight onto the end of the string. It is usually better to use a heavier point (e.g. 125 grains or heavier) as most points do not weigh exactly what they are labeled. If the weight of a 75 grain point is inaccurate by one grain the result will be of a greater inaccuracy in proportion with a 125 grain being inaccurate by one grain. Balance the stick with the point hanging off the end of the stick. Mark that place with a pencil. Next use a yard stick or tape measure to measure each mark from the end of stick where the thread is hanging to the marks. Begin the "W"eight function and at the first prompt enter the weight of point that was tied to the thread. At the next prompt enter the length for the balance position with the point and at the next prompt enter the length of measure without the point. Enter zero at the prompt that requests the balance position of the point since it was hung right off the tip of the stick. The answer is the weight of the stick, tape and thread. Write this number down as it will be needed later. Repeat the entire procedure except this time

place the object whose weight needs to be determined on the stick. It does not matter where it is placed, but it is usually more conventional to place it towards the other end. (see illustration)



It is important that the object stay in the same position on the stick during both balancings. If the object will not stay in place, it may be necessary to place a piece of double sticky tape on the stick where the object is placed or another piece of thread may be used to tie the object on in a manner similar to the point. If either of these methods are used, make sure they are placed on before the initial weighing of the stick so they will be included in the weight of the stick. After completing the procedure with the object in place, the answer given will be the weight of the stick and the object. To determine the weight of the object, subtract the weight of the stick from the weight of the stick and the object.

Weighing of objects this way can not result in a completely accurate weight. If a point labeled 125 grains was actually 126 grains, the 1 grain difference would proportionately affect the resulting weight of the object (e.g. a 62.5 grain object will be inaccurate by .5 of a grain). Also, it is necessary to have a long, very light stick. If a steel bar is used instead of the balsa stick, the balance positions would be much closer together and it would require methods with a great deal more accuracy to measure them.

"M"ake function (Arrow Master Pro only)

The "M"ake function will determine the balance position and weight of a hypothetical arrow design. This function will work together with the main screen and the user can try different points and F.O.C. balance positions of a new arrow design.

Pressing "M" from the main screen will begin the function. The highlight bar can be moved from variable to variable with the up and down arrow keys. Pressing "E"dit or the enter key will bring up the input box where a new variable may be entered. Pressing "C"alculate will display the balance position and weight. It will then give an option to place these variables into the main screen so that a point and F.O.C. position may be placed on the design.

Note: Wood shafts will not work accurately with the balance position portion of this function. Wood varies in density and will therefore weigh different amounts per inch.

Description of the "M"ake variables (Arrow Master Pro only)

Weight of shaft per inch

The weight of the shaft material per inch. If this is unknown, use the "Weight" function and a point of known weight to determine the weight of a shaft made from the same material. Divide the total weight of the shaft by the length of the shaft weight. This will give the weight of the material per inch.

Note: Most manufacturers of shafts tell the weight of their various shafts in charts. If the weight is given for the entire shaft rather than the weight per inch divide the total weight of the shaft by the length to determine the weight per inch.

Length of shaft

The shaft length.

Weight of insert

The weight of the point insert. If a point insert is not used, leave all of the insert related variables set at zero.

Length of insert

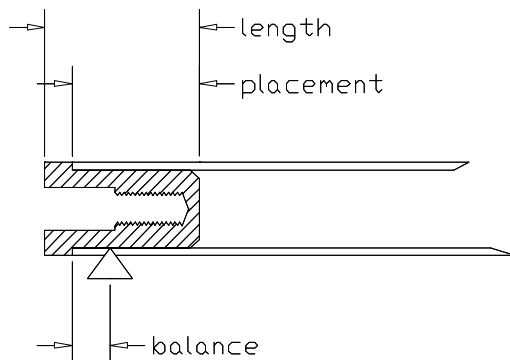
The length of the insert. Refer to the insert illustration.

Balance position of insert

The balance position of the insert itself. Refer to the insert illustration for measurement location.

Placement of insert

The placement of the insert in relation to the shaft. Refer to the insert illustration for measurement location.



Insert Illustration

Weight of fletching

The weight of the fletching material. If there are three veins or feathers enter the weight of all three combined.

Length of fletching

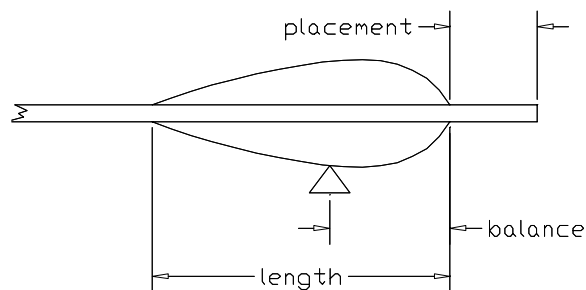
The length of the fletching. Refer to the fletching illustration.

Balance position of fletching

The balance position of the fletching itself. Refer to the fletching illustration for measurement location.

Placement of fletching

The placement of the fletching material in relation to the shaft. Refer to the fletching illustration for measurement location.



Fletching Illustration

Weight of fletching glue

The weight of the glue that will be holding the fletching. Usually around 4 grains for a 5 inch fletching. To determine this accurately, place the size of bead of glue that will be used the same length as the fletching on a sheet of glass. After it dries remove it with a razor blade and weigh it with a scale or with the "W"eight function. Multiply this weight times three if there are three veins.

Length of nock

The length of the nock. Refer to the two nock illustrations.

Note: If a bushing is used the length is the total length of the two together with the nock in place in the bushing.

Balance position of nock

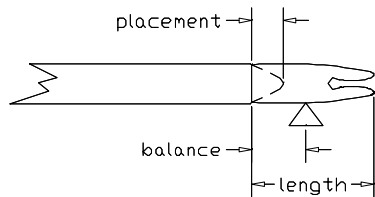
The balance position of the nock itself. Refer to the two nock illustrations.

Note: If a bushing is used, the balance position should be determined with the nock in place in the bushing.

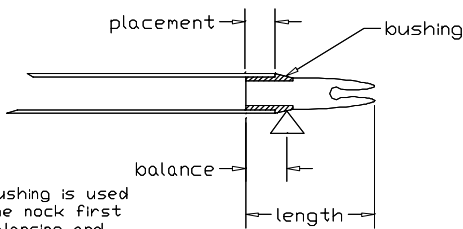
Placement of nock

The placement of the nock in relation to the shaft. Refer to the two nock illustrations.

Note: If a bushing is used, the placement position should be determined with the nock in place in the bushing.



Standard Nock Illustration



Note: If a bushing is used place it on the nock first and do the balancing and measuring as if they were one.

Nock and Bushing Illustration

"F"ile menu

Pushing **"F"** from the main screen will bring up the File menu. In the file menu there are three commands, **"S"**ave, **"O"**pen and **"D"**elele.

"S"ave

Enter a 48 character description of the current arrow configuration.

"O"pen

Enter a number of a description to be opened.

"D"elele

Enter a number of a description to be erased.

NOTE: The file menu will hold up to two hundred arrow configurations. Use the arrow keys or Page Up and Down keys to scroll through the file menu. The configurations are stored in a file called SAVEARW.DTA. Arrow Master Pro will store all of the "M"ake variables along with the main screen variables when a configuration is saved.

"P"rint menu

Pushing **"P"** from the main screen will bring up the Print menu. Select either **1.** text printout or **2.** graphics printout.

Text printout

By default Arrow Master will print on port LPT1.

If the printer is on a different port, push **"S"**elect to select a different port. Make sure the printer has paper and is on line then push **"P"**rint to start printing. *NOTE: Text printout does not send a form feed after it finishes printing. Instead it will skip down two lines and will be ready for the next text printout so several configurations can be printed on one page.*

Graphics printout

Graphics printout uses DOS 5 or 6 GRAPHICS.COM and profile. If DOS 5 or 6 is not present, this option will be unavailable. The first time Graphics printout is selected and DOS 5 or 6 is present, a selection of printers will be shown. Select the printer graphics driver that best fits the description of the printer. Make sure the printer has paper and

is on line. Push **"P"**rint to begin printing. GRAPHICS.COM is a screen print utility and depending on the speed of the computer, may take a while. It will take 5.8k of memory from the base memory to run. This memory will be returned the next time the computer is rebooted. If there are any problems with the graphics printout it can usually be resolved by making sure the correct printer driver is selected (use the **"S"**elect command to select a different printer). If the problem persists, reboot the computer so that GRAPHICS.COM can reload fresh the next time a graphics printout is selected.

Help file

Press **"H"**elp or **F1** from Arrow Master's main screen to open the Help text file. Use the Page up, Page down and arrow keys to scroll through it. In the Help file there is basic help on how to get around and the procedure for using Arrow Master.

Error Messages

1. * Cannot open file *****

This message will occur when **"F"**ile is pressed and Arrow Master cannot find the file SAVEARW.DTA. Check that SAVEARW.DTA is in the Arrow Master directory. If it is, make sure Arrow Master is starting from its directory (example: CD\ARROW) or include the Arrow Master directory in the AUTOEXEC.BAT file PATH statement.

2. Cannot open Help

This message will occur when **"H"**elp is pressed and Arrow Master cannot find the file ARW.HLP. Check that ARW.HLP is in the Arrow Master directory. If it is, make sure Arrow Master is starting from its directory (example: CD\ARROW) or include the Arrow Master directory in the AUTOEXEC.BAT file PATH statement.

3. Graphics System Error: Device driver file not found (EGAVGA.BGI)

This message will occur when Arrow Master attempts to start and cannot find the file EGAVGA.BGI. Check that EGAVGA.BGI is in the Arrow Master directory. If it is, make sure Arrow Master is starting from its directory (example: CD\ARROW) or include the Arrow Master directory in the AUTOEXEC.BAT file PATH statement.

4. Graphics System Error: Font file not found (GOTH.CHR)

This message will occur when Arrow Master attempts to start and cannot find the file GOTH.CHR. Check that EGAVGA.BGI is in the Arrow Master directory. If it is, make sure Arrow Master is starting from its directory (example: CD\ARROW) or include the Arrow Master directory in the AUTOEXEC.BAT file PATH statement.

5. I/O error on your printer port

This message will occur when attempting to print and Arrow Master finds that the printer is not ready. Check that the printer has paper and is ON LINE.

6. Bad command or file name

This message can occur within the Arrow Master graphics screen when an attempt is made to print in graphics mode and Arrow Master cannot find the DOS 5 or 6 command GRAPHICS.COM and GRAPHICS.PRO. Check in the DOS 5 or 6 directory to make sure the files GRAPHICS.COM and GRAPHICS.PRO are there, if so, make sure the PATH statement in the AUTOEXEC.BAT file contains the DOS directory (example: PATH=C:\DOS).

