

Standard Specification for Designation of the Balance Point Location for Archery Arrows¹

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1. Scope

1.1 This specification covers the method of determining and designating the location of the balance point of an arrow assembly for use with an archery bow.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

2. Terminology

2.1 *Definitions of Terms Specific to This Standard:*

2.1.1 *Archery Trade Association (ATA), n*—the archery industry manufacturer's organization that has originated some standardized terms and configurations that are accepted and used universally.

2.1.2 *ATA arrow length, n*—the length dimension from the bottom of the nock slot forward to a designated point near the front or leading end of the arrow assembly. The designated point varies to accommodate the different designs because of the differences in arrow point design and attachment.

2.1.2.1 For arrows incorporating interchangeable point system inserts and other point or adaptor types that insert into the open forward end of the arrow shaft, the designated point is the front end of the arrow shaft, often referred to as the “cut length” (Fig. 1).

2.1.2.2 For arrows having the front end of the shaft tapered or swaged, the designated point is the most forward extension of the full diameter of the shaft (Fig. 2).

2.1.2.3 For arrows incorporating outserts, the designated point is $\frac{3}{4}$ in. (19 mm) forward of the rearward end of the outsert (Fig. 3).

2.1.2.4 For arrows using heads that have integral cylindrical sockets incorporated within the basic head configuration, the designated point is the rearward end of the socket (Fig. 4).

2.1.3 *arrow point, n*—a general term used to describe any point or head attached to the front end of an arrow.

2.1.4 *balance point, n*—that location along the length of the arrow which, when positioned over a knife edge, will result in

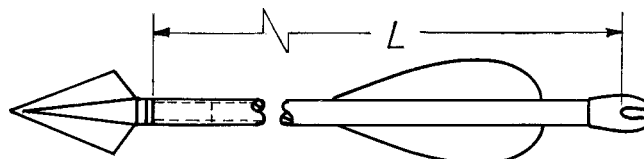


FIG. 1 Arrow Assembly Employing an Interchangeable Point Insert (See 2.1.2.1)

the arrow being in a perfectly balanced condition. It is the longitudinal location of the center of gravity of the arrow assembly.

2.1.5 *front of center (FOC), n*—for good flight characteristics, the balance point or center of gravity of an arrow assembly must be located at some position forward of the longitudinal dimensional center of the arrow. The FOC distance is not a fixed dimension. It can vary with the design of the arrow assembly and its components. It is also not necessarily a precise dimension since satisfactory arrow flight can be

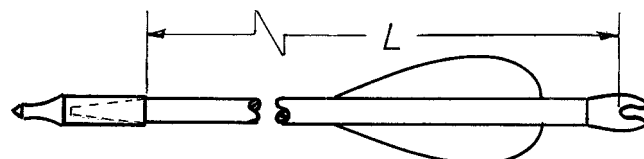


FIG. 2 Arrow Assembly Having the Front End of the Shaft Tapered or Swaged (See 2.1.2.2)

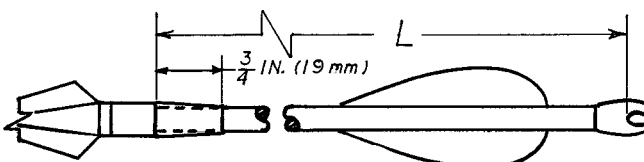


FIG. 3 Arrow Assembly Incorporating an Outsert (See 2.1.2.3)

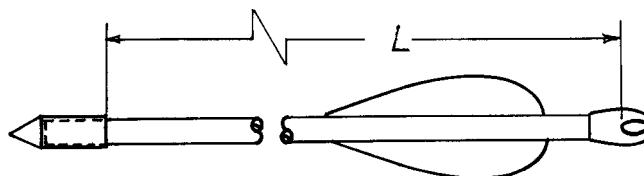


FIG. 4 Arrow Assembly With a Head That Has an Integral Cylindrical Socket (See 2.1.2.4)

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achieved despite minor variations of this factor. Its location is determined by measurement from the longitudinal dimensional center of the ATA arrow length, and it is expressed by a percentage figure related to the length of the arrow and noted as FOC. A typical location would be 9 % FOC.

2.1.6 *insert, n*—a machined or molded component, usually with a flange on the leading end, that is bonded into the front end of the arrow shaft. The insert can have an internal thread to accept the threaded shank of an arrow point. The insert can also have a tapered forward extension to permit mounting an arrow point with a tapered socket. The majority of arrow assemblies are fitted with an insert of the first type to permit the arrow point to be interchanged very readily.

2.1.7 *integral socket arrow points, n*—many arrow points, particularly those used on target or field arrows and including some hunting arrow heads, have integral sockets incorporated into the arrow point itself in order to accept the forward end of the arrow shaft. Arrows using points of these types require special consideration when determining the standard ATA arrow length and method of establishing the FOC distance of the center of gravity or balance point of the arrow assembly.

2.1.8 *nock slot, n*—the slot located at the extreme rear of the arrow to permit it to be positioned on the shooting string of the bow and to be retained on the string during the drawing and launching of that arrow. Almost all arrows being manufactured presently are fitted with independent, replaceable, molded plastic nock units that contain the slot.

2.1.9 *outsert, n*—a component similar to an “insert,” except that the rear is configured to fit over rather than into the forward end of the arrow shaft. In this manner, the “outsert” fits on the outside of the arrow shaft instead of on the inside, as does the insert. Like the insert, the outsert can have an internal thread in its forward end to accept the threaded shank of an arrow point.

3. Establishing the FOC Measurement

3.1 *Arrow Length Base*—The base for determining the percentage location of the balance point of the arrow assembly

shall be the ATA arrow length. This provides a constant base that does not change (except in rare instances) when arrow points of different weight or length, or both, are interchanged.

3.2 *Configuration of the Arrow Assembly*—When the balance point of the arrow is determined, the arrow assembly shall be complete with all components, including the arrow point in place and mounted securely ready for shooting.

3.3 *Determining the Balance Point*—The arrow assembly shall be placed on a knife edge and moved longitudinally until perfect balance is achieved. The location of the balance point shall be marked accurately to permit subsequent measurement.

3.4 *Calculation of Percent FOC*:

3.4.1 *Recommended*—From the bottom of nock slot, measure the distance from the bottom of the nock slot to the balance point. Calculate percent FOC using the following formula:

$$\text{FOC, \%} = 100 \frac{(A - L/2)}{L} \quad (1)$$

where:

A = distance from balance point to bottom of slot, and

L = ATA arrow length (see 2.1.2).

3.4.2 *Optional*—From the front of the shaft assembly, measure the distance from the designated point (see 2.1.2) to the balance point. Make certain to include the added increment when dealing with arrow assemblies using outserts (see 2.1.2.3). Calculate percent FOC using the following formula:

$$\text{FOC, \%} = 100 \frac{(L/2 - B)}{L} \quad (2)$$

where:

B = distance from balance point to designated point (see 2.1.2), and

L = ATA arrow length (see 2.1.2).

4. Keywords

4.1 ATA arrow length; balance point; front of center; insert; nock slot

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