

# Detailed Measurement of a Practice Rapier from the Berthold Collection in Hamburg

DI (FH) Florian Fortner, Dr. Julian Schrattenecker, Mag. Stefan Feichtinger  
www.rapier.at

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## Abstract

*In this article, a rare 17th century practice rapier from the Berthold Collection in Hamburg is presented in image and text, together with its measurements. An authentic reconstruction of the blade is made possible with this data.*

## I. INTRODUCTION

**D**ETAILED MEASUREMENTS OF period weapons are the most important source of information for manufacturing authentic reproductions. Furthermore, parameters of blade geometry and mass distribution are very illuminative for the interpretation of period fencing treatises.

## II. TERMINOLOGY

Most measurable parameters are common to all swords and quite clear, although some need a more detailed explanation, which follows. The measurement coordinate origin in all planes is the center of the front end of the grip.

- *Ricasso Length* – Ricasso length is measured from the front end of the grip to the start of the edge.
- *Blade Length* – Blade length is measured from the front end of the grip to the point.
- *Point of Balance (POB)* – The point of balance is usually considered the main parameter of handling and can be easily located by balancing the sword on an edge. However, it only determines little regarding handling characteristics. It is measured from the front end of the grip.
- *Blade dorsal length* – Length of the flat area on the back of a blade.
- *Pommel Neck Length* – The length of the pommel part that is the transition to the grip, which extends the actual grip length.
- *Crossguard Diameter* – The diameter of the crossguard at its thinnest point. This value is an indicator for the stability of the hilt.

Overall length	$l_o$
Blade length	$l_b$
Ricasso length	$l_r$
Ricasso block length	$l_q$
Grip length	$l_g$
Pommel length	$l_p$
Pommel neck length	$l_{pn}$
Point of balance	$l_{pob}$
Hilt height front of crossguard	$l_{hf}$
Hilt height rear of crossguard	$l_{hr}$
Blade dorsal length	$l_s$
Blade width	$w_b$
Ricasso width at front end	$w_{rf}$
Ricasso width at rear end	$w_{rr}$
Hilt width	$w_h$
Grip width at crossguard end	$w_{gf}$
Grip width at pommel end	$w_{gr}$
Grip width at distance X	$w_{gX}$
Blade dorsal width	$w_s$
Blade thickness	$d_b$
Ricasso thickness at the front end	$d_{rf}$
Ricasso thickness at the rear end	$d_{rr}$
Hilt depth outside	$d_{ho}$
Hilt depth inside	$d_{hi}$
Grip thickness at the crossguard end	$d_{gf}$
Grip thickness at the pommel end	$d_{gr}$
Grip thickness at distance X	$d_{gX}$
Edge thickness	$d_e$
Blade cross-section area	$A$
Overall mass	$m$

Table 1: Edged Weapon Parameter Overview

### III. BLADE CROSS SECTION CALCULATION

Blade cross sections can be calculated along a blade according to its shape. The formulae used are as follows:

#### III.1. OCTAGON CROSS SECTION

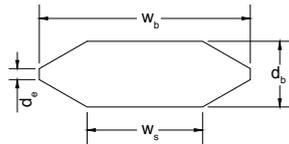


Figure 1: Octagon Cross Section

$$A = w_b d_b - (w_b - w_s) \frac{1}{4} (2d_b - d_{e1} - d_{e2}) \quad (1)$$

#### IV. DESCRIPTION AND MEASUREMENT OF A 17TH CENTURY PRACTICE RAPIER

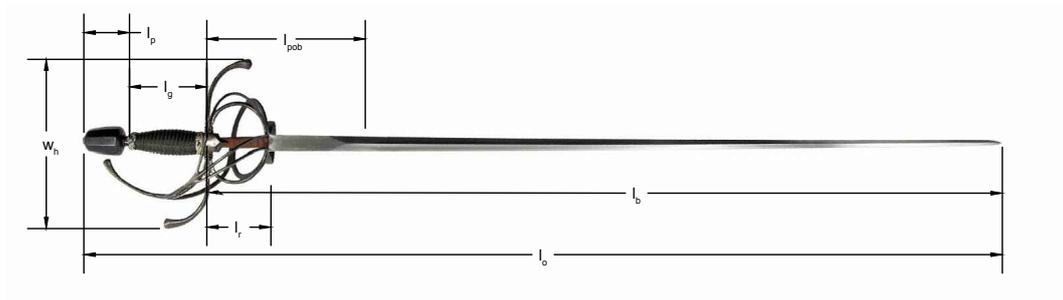


Figure 2: Sketch of a one-handed sword.

A sword with a sturdy, blunt, and octagonal blade without decoration and a rectangular ricasso. The hilt is symmetrical and consists of a crossguard, side rings and forward curved arms of round cross section. The latter are connected by a heart-shaped shell on each side. The pommel is cylindrical with a smooth surface. The grip has a double-concave shape and is made of wood wrapped in leather.

Classification according to [Norman, 1980]:

- *Outer Guard*: no match
- *Inner Guard*: no match
- *Pommel*: type 32



*Figure 3: Hilt oblique view*



*Figure 4: Hilt and forte side view*



*Figure 5: Hilt and forte top view*



*Figure 6: Pommel view*



*Figure 7: Hilt and forte oblique front view*



*Figure 8: Hilt inside view*



*Figure 9: Orthogonal total side view*



*Figure 10: Orthogonal total top view*

Object 1				
Overall length [mm]	1118			
Blade length [mm]	976			
Overall mass [g]	1150			
Point of balance [mm]	121			
Pommel length [mm]	63			
Pommel width [mm]	34.5			
Pommel thickness [mm]	34.5			
Pommel neck length [mm]	8			
Grip length [mm]	82			
Grip material	wood, wire			
Measurements Grip	Distance [mm]	0	28	82
	Width [mm]	25	25	20.5
	Thickness [mm]	19	21	17.5
Quillon block length [mm]	20.5			
Quillon block thickness [mm]	20			
Quillon block width [mm]	n/a			
Hilt width [mm]	87.5			
Hilt depth outside [mm]	67			
Hilt depth inside [mm]	67			
Crossguard length	215			
Crossguard shape	round			
Crossguard diameter [mm]	6.8			
Blade shape	rectangle to 64.5mm, hexagon to 900mm, diamond to point			

Table 2: Overview of the measurement parameters of object 1

$l_b$ [mm]	$w_b$ [mm]	$d_b$ [mm]	$ws$ [mm]	$d_{e1}$ [mm]	$d_{e2}$ [mm]	$A$ [mm <sup>2</sup> ]	Blade shape
20.5	16.0	7.3	-	-	-	116.80	Rectangle
64.5	17.5	8.3	-	-	-	145.25	Rectangle
100	14.7	8.1	5.1	1.4	1.9	88.11	Octagon
200	13.5	7.4	3.3	1.6	1.7	70.58	Octagon
300	12.9	7.5	4.3	1.6	2.0	72.24	Octagon
400	11.8	6.7	3.5	2.0	1.7	58.93	Octagon
500	10.9	6.4	3.5	2.0	1.8	53.11	Octagon
600	9.6	5.6	3.3	2.0	2.2	42.74	Octagon
700	9.1	5.6	3.1	2.4	1.9	40.61	Octagon
800	8.1	5.3	3.1	2.4	1.7	34.81	Octagon
900	7.6	5.0	3.0	2.4	1.4	30.87	Octagon
960	6.9	4.1	-	1.6	1.1	18.80	Hexagon

Table 3: Blade measurements of object 1, a one-handed sword. For the cross section calculation an average of both edge thicknesses has been used, due to strong variation from side to side.

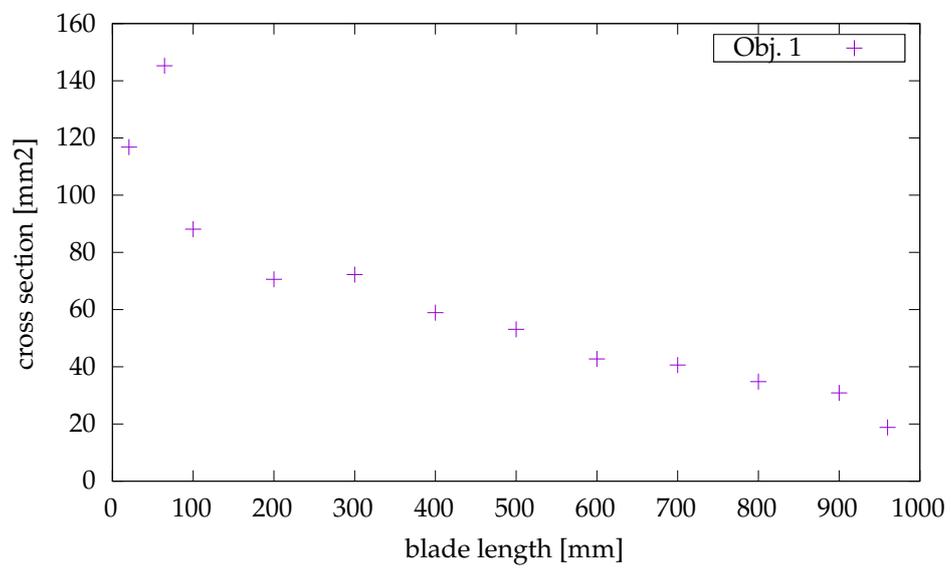


Figure 11: Cross Section of object 1

## V. ACKNOWLEDGEMENTS

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## REFERENCES

A.V.B. Norman. *The Rapier and Smallsword: 1460-1820*. Ayer Company Publishers, Inc., 1980.