



Section 3: Napoleonic Ordnance Weight and Range Tables

SOJ-07 (16)

Comparison of Horse Artillery Weights

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Tomas de Morla (1747-1812)¹⁹ considered the mobility of the artillery in terms of the weight pulled by each horse. It is accepted that this is a very crude measure but does show some interesting information.

It is well understood by the author

1. The first pair of horses give more traction than subsequent horses.
 2. The sizes of the wheels
 3. The efficiency of the drafting, angle of the load and the axle bearings.
- Etc....

It should also be noted that artillery would move as fast as its slowest element which was invariably the ammunition wagon (caisson) that could only sustain a slow trot.

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¹⁹ Short biography see Summerfield (2012) Smoothbore Ordnance Journal, SOJ-4(25), pp101

Weight per horse for Napoleonic Horse Artillery

Sustained Fast Trot

150-175 kg

- Russian M1805 10-pdr (HA)
- French M1765 4-pdr (HA)

176-200 kg

- Austrian M1780 Cavalry 6-pdr and M1780 Cavalry 7-pdr Howitzer (HA) without
- British M1790 Light 6-pdr and Light 5½-in Howitzer (RHA) without limber riders
- Danish Volante 3-pdr and 10-pdr howitzer
- Russian M1805 6-pdr (HA)
- Saxon M1810 8-pdr Howitzer (HA)

201-225 kg

- Austrian M1780 Cavalry 6-pdr and Cavalry 7-pdr Howitzer (HA) with 4 limber riders (assuming 90kg each)
- British M1790 Light 6-pdr and Light 5½-inch howitzer (RHA) with 2 limber riders – assuming 90kg each)
- French M1808 6-pdr (HA) and 24-pdr Howitzer (HA)
- Saxon M1810 6-pdr (HA)

Sustained Slow Trot

226-250 kg

- British M1790 Heavy 5.5in Howitzer (RHA) with two 90 kg limber riders
- British M1805 9-pdr (RHA) without limber riders.

251-275 kg

- British M1805 9-pdr (RHA) with two 90 kg limber riders
- French M1765 8-pdr (HA)
- Prussian M1816 6-pdr and 7-pdr howitzer (HA)

276-300kg

- British M1790 Medium 12-pdr (HA) and Light 12-pdr (HA) without limber riders

Walking Pace with some Trotting

301-325kg

- British M1805 Medium 12-pdr (HA) and Light 12-pdr (HA) with two 90kg limber riders.

Table 29: Comparison of Horse Artillery total weights.²⁰

The first weight does not include gunners riding on the limbers or trails of Austrian cavalry guns.
Each man is estimated to weigh 90 kg

	Calibre length	Piece Weight	Carriage & Limber Weight	Weight of guns and limbers	Limber Horses	Weight per horse
British (RHA) – two gunners on the limber						
M1790 Medium 12-pdr	16.8 cal	927 kg	1327 kg	2244 kg	8 horses	280.5 kg +22.5 kg
M1790 Light 12-pdr	13 cal	606 kg	1130 kg	1736 kg	6 horses	289 kg +30 kg
M1805 9-pdr	17.0 cal	685.6 kg	1235.2 kg	1920.8 kg	8 horses	240.1 kg +22.5 kg
M1790 Heavy 5.5in How	5.8 cal	507.9 kg	1204.9 kg	1712.7 kg	8 horses	214.1 kg +22.5 kg
M1790 Light 6-pdr	14.7 cal	229 kg	934 kg	1163 kg	6 horses	194 kg +30 kg
M1790 Light 5.5in How	4.8 cal	213 kg	975 kg	1188 kg	6 horses	198 kg +30 kg
Austrian (M1780 Cavalry Artillery) – 4 gunners on the Wurst						
M1780 Cavalry 6-pdr	15.3 cal	377.4 kg	679.8 kg	1057.2 kg	6 horses	176.2 kg +60 kg
M1780 Cavalry 7-pdr How	5.9 cal	275.0 kg	708.9 kg	979.4 kg	6 horses	163.2 kg +60 kg
Danish (Volante)						
Volante 3-pdr	16.0 cal	299.6 kg	833.9 kg	1133.4 kg	6 horses	188.9 kg
Volante 10-pdr How	7.8 cal	254.6 kg	863.8 kg	1118.5 kg	6 horses	186.4 kg
French HA (M1765)						
M1765 8-pdr	17.4 cal	580.5 kg	992.2 kg	1572.8 kg	6 horses	262.1 kg
M1765 4-pdr	17.4 cal	288.8 kg	731.8 kg	1020.6 kg	6 horses	170.1 kg
M1765 6.4in How	4.6 cal	318.2 kg	995.2 kg	1313.3 kg	6 horses	218.9 kg
French HA (M1808)						
M1808 6-pdr	17.3 cal	386.7 kg	963.6 kg	1350.3 kg	6 horses	225.0 kg
M1808 24-pdr How	6.7 cal	293.7 kg	959.9 kg	1253.6 kg	6 horses	208.9 kg
Prussian HA						
M1816 HA 6-pdr	18 cal	478 kg	1065kg	1556 kg	6 horses	259 kg
M1816 7-pdr How	6.4 cal	329.1 kg	1294.6 kg	1623.8 kg	6 horses	270.6 kg
Russian HA						
M1805 6-pdr	17.0 cal	363.9 kg	699.5 kg	1063.5 kg	6 horses	177.2 kg
M1805 10-pdr HA Unicorn	10.0 cal	321.0 kg	683.0 kg	1004.0 kg	6 horses	167.3 kg
Saxon HA						
M1810 6-pdr	17.5 cal	360.5 kg	894.6 kg	1255.1 kg	6 horses	209.2 kg
M1810 8-pdr How	6.9 cal	296.9 kg	846.1 kg	1143.0 kg	6 horses	190.5 kg

²⁰ Converted into metric measures by Author from Morla (1827)

Weight per horse for Napoleonic Horse Artillery Ammunition Wagons

Sustained Slow Trot

226-250 kg

- British Desaguliers Caisson (RHA) without limber/caisson riders
- French 4-, 6-, 8-pdr & 24-pdr Howitzer Gribeauval Caisson (HA)
- Russian 6-pdr Horse Artillery Ammunition Cart

251-275 kg

- French 6.4in Howitzer Gribeauval Caisson (HA)
- Russian 10-pdr Horse Artillery Ammunition Cart

276-300kg

- Prussian Horse Artillery Caisson
- Saxon M1810 Caisson (HA)

Walking Pace with some Trotting

301-325kg

- British Desaguliers Caisson [assuming six gunners weighing 90kg each]

Walking Artillery

326-350kg

- M1780 Austrian Ammunition Wagons for the Cavalry Artillery (it should be noted that the Austrians employed ammunition mules for their horse artillery. Only the reserve ammunition was carried in Ammunition Wagons.)

Table 30: Caisson weights for horse artillery of various nations.

	Caisson Weight empty	Total Caisson Weight	Caisson Horses	Burden per horse
British Desaguliers Caisson <i>[not include the riding gunners]</i>				
M1805 9-pdr	863.4 kg	1396.5 kg	6 horses	232.8 kg +90kg
M1790 5.5in Howitzer	863.4 kg	1409.3 kg	6 horses	234.9 kg +90 kg
Austrian M1753 Ammunition Wagon				
M1780 6-pdr	520.8 kg	1363.7 kg	4 horses	340.9 kg
M1780 7-pdr How	520.8 kg	1363.7 kg	4 horses	340.9 kg
Danish Volante <i>[includes the 4 gunners riding on the Wurstwagon]</i>				
M1794 Volante 3-pdr	823.8 kg	1797.4 kg	6 horses	230.5 kg
M1794 Volante 10-pdr How	794.0 kg	1777.4 kg	6 horses	296.2 kg
French M1765 4-wheeled Gribeauval Caisson				
M1765 8-pdr	800.8 kg	1384.3 kg	6 horses	230.7 kg
M1765 4-pdr	800.8 kg	1349.6 kg	6 horses	224.9 kg
M1765 6.4in How	800.8 kg	1541.9 kg	6 horses	257.0 kg
M1808 6-pdr	800.8 kg	1433.3 kg	6 horses	238.9 kg
M1808 24-pdr How	800.8 kg	1441.6 kg	6 horses	240.3 kg
Prussian Ammunition Wagon				
M1816 6-pdr	898.0 kg	1814.6 kg	6 horses	302.4 kg
M1816 7-pdr How	898.0 kg	1658.4 kg	6 horses	276.4 kg
Russian M1805 2-Wheeled Ammunition Cart				
M1805 6-pdr	306.7 kg	723.0 kg	3 horses	241.0 kg
M1805 10-pdr Unicorn	306.7 kg	826.8 kg	3 horses	275.6 kg
Saxon M1810 Ammunition Wagon				
M1810 6-pdr	898.7 kg	1732.8 kg	6 horses	288.8 kg
M1810 8-pdr How	898.7 kg	1717.7 kg	6 horses	286.3 kg



SOJ-07 (17)

Comparison of Foot Artillery Weights

Dr. Stephen Summerfield of Loughborough University

Weight per horse for Napoleonic Foot Artillery

Sustained Fast Trot

201-225 kg

- Russian M1805 Light 12-pdr (FA)

Sustained Slow Trot

226-250 kg

- Prussian M1816 10-pdr (FA)

251-275 kg

- Austrian M1780 7-pdr Howitzer (FA)
- French M1765 4-pdr (FA)
- Prussian M1816 7-pdr (FA)
- Russian M1805 6-pdr (FA), M1805 10-pdr (FA) and M1805 20-pdr (FA)

276-300kg

- Austrian M1780 6-pdr (FA), M1780 12-pdr (FA)
- British M1790 Light 6-pdr, Light and heavy 5½-inch howitzer (RA)
- Prussian M1816 12-pdr (FA)
- Russian M1805 Medium 12-pdr (FA)
- Saxon M1810 12-pdr (FA) and M1810 8-pdr Howitzer (FA)

Walking Pace with some Trotting

301-325kg

- British M1805 9-pdr (RA)
- French AnXI 24-pdr howitzer (FA) and AnXI 12-pdr
- Prussian M1816 6-pdr (FA)
- Saxon M1810 6-pdr (FA)

Walking Artillery

326-350kg

- French AnXI 6-pdr (FA)
- French M1765 12-pdr (FA) and M1765 6.4in howitzer (FA)

351-375kg

- Russian M1805 3-pdr Unicorn (FA) – Mountain gun
- British M1790 Medium 12-pdr (FA)

376-400kg

- French M1765 8-pdr (FA with 4 horses)

401-425kg per horse

- Austrian M1780 3-pdr (FA) – Regimental Guns

Table 31: Comparison of Foot Artillery equipment weights.²¹

	Calibre length	Piece Weight	Weight of carriage, limber etc	Weight of guns and limbers	Limber Horses	Weight per horse
British [22]						
M1790 Medium 12-pdr	16.8 cal	927 kg	1327 kg	2244 kg	6 horses	374 kg
M1805 9-pdr	17.0 cal	685.6 kg	1235.2 kg	1920.8 kg	6 horses	320.1 kg
M1790 5.5in Howitzer	5.818 cal	507.9 kg	1204.9 kg	1712.7 kg	6 horses	285.5 kg
M1790 Light 6-pdr	14.7 cal	229 kg	934 kg	1163 kg	4 horses	291 kg
M1790 Light 5.5in How	4.8 cal	213 kg	975 kg	1188 kg	4 horses	297 kg
Austrian (M1780)						
M1780 12-pdr	15.3 cal	781.1 kg	962.6 kg	1743.7 kg	6 horses	290.6 kg
M1780 6-pdr	15.3 cal	383.0 kg	752.6 kg	1135.5 kg	4 horses	283.9 kg
M1780 3-pdr	15.3 cal	235.7 kg	679.8 kg	851.1 kg	2 horses	425.6 kg
M1780 7-pdr How	5.884 cal	275.0 kg	749.2 kg	1024.2 kg	4 horses	256.0 kg
Danish						
M1794 12-pdr	18.0 cal	818.9 kg	1218.3 kg	2037.2 kg	8 horses	254.7 kg
M1766 Heavy 6-pdr	22.0 cal	599.2 kg	1058.5 kg	1657.7 kg	6 horses	276.3 kg
M1794 Medium 6-pdr	20.0 cal	474.3 kg	1193.4 kg	1667.7 kg	6 horses	278.0 kg
M1766 Foot 3-pdr	16.0 cal	299.6 kg	694.1 kg	993.6 kg	4 horses	248.4 kg
M1766 36-pdr How	5.0 cal	689.1 kg	1158.4 kg	1847.5	8 horses	230.9 kg
M1766 20-pdr How	5.0 cal	384.5 kg	1268.2 kg	1652.7	6 horses	275.4 kg
French (M1765) [23]						
M1765 12-pdr	17.4 cal	885.0 kg	1091.6 kg	1976.6 kg	6 horses	329.4 kg
M1765 8-pdr	17.4 cal	580.5 kg	992.2 kg	1572.8 kg	6 horses 4 horses	262 kg 393 kg
M1765 4-pdr	17.4 cal	288.8 kg	731.8 kg	1020.6 kg	4 horses	255.2 kg
M1765 6.4in How	4.6 cal	318.2 kg	995.2 kg	1313.3 kg	6 horses 4 horses	219 kg 328.3 kg
French (AnXI mounted on M1808/AnXI carriages with M1765 limber)						
AnXI 12-pdr	18.0 cal	868 kg	999 kg	1867 kg	6 horses	311 kg
AnXI 6-pdr	17.3 cal	386.7 kg	963.6 kg	1350.3 kg	4 horses	337.6 kg
AnXI 24-pdr How	6.7 cal	293.7 kg	959.9 kg	1253.6 kg	4 horses	313.4 kg
Prussian						
M1816 12-pdr	17.2 cal	891.0 kg	1395.6 kg	2286.6 kg	8 horses	285.8 kg
M1816 6-pdr	17.2 cal	453.2 kg	1387.0 kg	1840.2 kg	6 horses	306.7 kg
M1816 10-pdr Howitzer	6.3 cal	563.6 kg	1340.4 kg	1904.0 kg	8 horses	238.0 kg
M1816 7-pdr How	6.4 cal	329.1 kg	1294.6 kg	1623.8 kg	6 horses	270.6 kg
Russian (M1805)						
Medium 12-pdr	16.5 cal	809.7 kg	850.6 kg	1660.3 kg	6 horses	276.7 kg
Light 12-pdr	13.0 cal	468.3 kg	768.8 kg	1286.0 kg	6 horses	214.3 kg
M1805 6-pdr	17.0 cal	363.9 kg	699.5 kg	1063.5 kg	4 horses	265.9 kg
M1805 20-pdr Unicorn	10.5 cal	685.0 kg	867.0 kg	1552.0 kg	6 horses	258.7 kg
M1805 10-pdr Unicorn	11.0 cal	353.8 kg	687.1 kg	1040.8 kg	4 horses	260.2 kg
M1805 3-pdr Unicorn [24]	11.0 cal	108.4 kg	602.3 kg	710.7 kg	2 horses	355.4 kg
Saxon (M1810) [25]						
M1810 12-pdr	17.6 cal	723.7 kg	1019.3 kg	1743.0 kg	6 horses	290.5 kg
M1810 6-pdr	17.5 cal	360.5 kg	894.6 kg	1255.1 kg	4 horse	313.8 kg
M1810 8-pdr How	6.9 cal	296.9 kg	846.1 kg	1143.0 kg	4 horse	285.7 kg

²¹ Converted into metric measures from Morla (1827)²² From Adye (1813)²³ Gassendi (1819)²⁴ Obsolete by 1810.²⁵ Rouvroy (1819)

Weight per horse for Napoleonic Foot Artillery Ammunition Wagons

Sustained Fast Trot

201-225 kg

Sustained Slow Trot

226-250 kg

- British Desaguliers Caisson without limber/caisson riders

251-275 kg

- Russian M1805 Ammunition Cart

276-300kg

Walking Pace with some Trotting

301-325kg

- British Desaguliers Caisson with six 90kg gunners
- Prussian Ammunition Wagon

Walking Only

326-350kg

- M1780 Austrian Ammunition Wagon
- French M1765 4- and 8-pdr Gribeauval Caisson

351-375kg

- French M1765 6- and 12-pdr Gribeauval Caisson

376-400kg

- French M1765 6.4in Howitzer Caisson

Slow Walking Only

401-425kg

426-450kg

- Saxon M1810 Caisson

451-475kg

- M1780 Austrian Ammunition Wagon [3-pdr] – *Not convinced this is correct by Morla (1827)*

Table 32: Caisson weights for foot artillery of various nations.

	Caisson Weight empty	Total Caisson Weight	Caisson Horses	Burden per horse
British Desaguliers Caisson <i>[not include the riding gunners]</i>				
M1805 9-pdr	863.4 kg	1396.5 kg	6 horses	232.8 kg
M1790 5.5in Howitzer	863.4 kg	1409.3 kg	6 horses	234.9 kg
Austrian M1753 Ammunition Wagon				
M1780 12-pdr	520.8 kg	1338.3 kg	4 horses	334.6 kg
M1780 6-pdr	520.8 kg	1363.7 kg	4 horses	340.9 kg
M1780 3-pdr	520.8 kg ^[26]	934.5 kg	2 horses	467.2 kg
M1780 7-pdr How	520.8 kg	1363.7	4 horses	340.9 kg
Danish Ammunition Wagons				
M1794 12-pdr	818.9 kg	2137.2 kg	8 horses	267.1 kg
M1766 Heavy 6-pdr	823.8 kg	1917.4 kg	6 horses	319.6 kg
M1794 Medium 6-pdr	823.8 kg	1917.4 kg	6 horses	319.6 kg
M1766 3-pdr	823.8 kg	1797.4 kg	6 horses	299.6 kg
M1766 36-pdr How	873.8 kg	1907.4 kg	6 horses	317.9 kg
M1766 20-pdr How	794.0 kg	1787.7 kg	6 horses	297.9 kg
French M1765 4-wheeled Gribeauval Caisson with M1808 caisson loadings				
M1765 12-pdr	800.8 kg	1463.1 kg	4 horses	365.8 kg
M1765 8-pdr	800.8 kg	1384.3 kg	4 horses	346.1 kg
M1765 4-pdr	800.8 kg	1349.6 kg	4 horses	337.4 kg
M1765 6.4in How	800.8 kg	1541.9 kg	4 horses	385.5 kg
M1808 6-pdr	800.8 kg	1433.3 kg	4 horses	358.3 kg
M1808 24-pdr How	800.8 kg	1441.6 kg	4 horses	360.4 kg
Prussian Ammunition Wagon				
M1816 12-pdr	898.0 kg	1773.0 kg	6 horses	295.5 kg
M1816 Foot 6-pdr	898.0 kg	1814.6 kg	6 horses	302.4 kg
M1816 10-pdr Howitzer	898.0 kg	1825.8 kg	6 horses	304.3 kg
M1816 7-pdr How	898.0 kg	1658.4 kg	6 horses	276.4 kg
Russian M1805 2-Wheeled Ammunition Cart				
M1805 Medium 12-pdr	306.7 kg	825.8 kg	3 horses	275.3 kg
M1805 Light 12-pdr	306.7 kg	825.8 kg	3 horses	275.3 kg
M1805 6-pdr	306.7 kg	723.0 kg	3 horses	241.0 kg
M1805 20-pdr Unicorn	306.7 kg	826.8 kg	3 horses	275.6 kg
M1805 10-pdr Unicorn	306.7 kg	826.8 kg	3 horses	275.6 kg
M1805 3-pdr Unicorn	306.7 kg	582.5 kg	2 horses	194.2 kg
Saxon M1810 Ammunition Wagon				
M1810 12-pdr	898.7 kg	1725.5 kg	4 horses	431.4 kg
M1810 6-pdr	898.7 kg	1732.8 kg	4 horses	433.2 kg
M1810 8-pdr How	898.7 kg	1717.7 kg	4 horses	429.4 kg

²⁶ Morla is mistaken with the weight of the ammunition wagon for the 3-pdr.



**SOJ-07(18):
Windage of Austrian and Prussian Ordnance**
Alexander Zhmodikov and Stephen Summerfield

Table 33: Comparison of windages in difference artillery manuals.

		Calibre	Windage	Calibre	Windage
		Austrian		Prussian	
12-pdr gun	Gassendi (1819)	119.1mm	5.1mm	118.6mm	4.7mm
	Markevich (1820)	119.3mm	5.3mm	118.6mm	4.7mm
	Morla (1827)	119.2mm	5.2mm	118.7mm	4.7mm
6-pdr gun	Gassendi (1819)	94.7mm	4.3mm	94.0mm	3.8mm
	Markevich (1820)	94.9mm	4.1mm	94.0mm	3.8mm
	Morla (1827)	94.6mm	4.1mm	94.2mm	3.7mm
3-pdr gun	Gassendi (1819)	75.7mm	3.8mm		
	Markevich (1820)	75.5mm	3.4mm		
	Morla (1827)	75.1mm	3.4mm		
10-pdr howitzer	Gassendi (1819)	170.7mm	4.3mm	170.1mm	3.8mm
	Markevich (1820)	170.9mm	7.7mm	172.4mm	6.2mm
	Morla (1827)	168.6mm	5.6mm	170.0mm	3.7mm
7-pdr howitzer	Gassendi (1819)	151.5mm	4.7mm	147.4mm	3.6mm
	Markevich (1820)	151.1mm	6.4mm	150.4mm	6.6mm
	Morla (1827)	149.1mm	4.4mm	147.5mm	3.7mm



SOJ-07(19): Russian Artillery 1812

Alexander Zhmodikov

- The Russian artillery pound is equal to the weight of a ball of artillery iron 2 Imperial inches (2.54cm) in its diameter. This Russian artillery pound was introduced by Jacob Bruce in the beginning of the 18th century.
- The artillery pound is equal to 1.1916800562 trade pounds.²⁷
- The Russian trade pound is 0.409512 kg.²⁸
- The artillery pound is 0.488 kg.
- 1 pud is equal to 40 trade pounds (16.38 kg).

Russian Artillery organisation.

Position Battery company

- Four Medium 12-pdr s, four Light 12-pdr, and four ½-pud unicorns.
- 7 officers 250 gunners and 50 drivers.
- 36 caissons (three to each gun), six spare carriages, twelve artillery carts, one field forge, and fifteen food carts.
- The crew is 13 men to each cannon or unicorn.

Light Artillery Company

- Eight 6pdr cannons, and four ¼-pud “foot” unicorns,
- 24 caissons (two to each gun), four spare carriages, eight artillery carts, one field forge, eleven food carts.
- 7 officers, 170 gunners and 36 non-combatants.
- The crew is 10 men to each cannon or unicorn.]

Horse artillery company

- Six 6pdr cannons and six ¼-pud “horse” unicorns.
- 24 caissons (two to each gun), four spare carriages, eight artillery carts, one field forge, and fifteen food carts.
- One senior officer, six junior officers, two trumpeters, 24 NCOs, 206 privates (72 “bombardiers”, 134 “cannoniers”, no “Handlangers”), 45 non-combatants.
- 14 men to each cannon or unicorn.

²⁷ Markevich (1820) *Rukovodstvo k Artilleriiskomu Iskusstvu*. [A Manual to the Art of Artillery.] Vol.1, p.86-88 is the same as Markevich (1808) “ *Artilleriiskii Zhurnal* [Artillery Journal], No.1, p.37.

²⁸ Gassendi (1819) give the Russian trade pound (funt) as 408.9786g,

Table 34: Artillery company composition.

Personnel	Battery Coy	Light Coy	Horse Coy
Senior officer	1	1	1
Junior Officer	6	6	6
NCOs	24	24	24
Drummers	2	2	-
Trumpeters	-	-	2
Bombardiers	50	35	72
Cannoniers	50	35	134
Handlanger	150	100	None
Non-Combatants	50	36	45
TOTAL MEN			

Table 35: Manning the guns

	Battery Coy	Light Coy	Horse Coy
Medium 12-pdrs	13 crew		
Light 12-pdrs	13 crew		
½-pud Unicorns	13 crew		
6-pdrs		10 crew	14 crew
¼-pud “foot” unicorns		10 crew	
¼-pud “horse” unicorns			14 crew

Horse teams:

6 horses to each 12-pdr gun or ½-pud unicorn.

4 horses to each 6-pdr gun or ¼-pud unicorn.

3 horses to each caisson.

Table 36: Russian horses and number of vehicles per company.

Equipment	Position Battery Coy	Light Coy	Horse Coy
Medium 12-pdrs	4 (6 horses)		
Light 12-pdrs	4 (6 horses)		
½-pud Unicorns	4 (6 horses)		
6-pdrs		8 (4 horses)	6 (4 horses)
¼-pud “foot” unicorns		4 (horses)	
¼-pud “horse” unicorns			6 (4 horses)
3-horse caissons	36 (3 horses)	24 (3 horses)	24 (3 horses)
Spare gun-carriages	6	4	4
Artillery carts ²⁹	12	8	8
Field forge	1	1	1
Food carts	15	11	15
TOTAL VEHICLES			

²⁹ The artillery carts contained various tools and spare parts

**SOJ-07(20)****Russian M1805 projectiles and powder charge**

Alexander Zhmodikov

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Markevich, A.I. and Plotto, V.K. (1805), *Tchertezhi Vsem Polkovym i Batareinyam Orudiyam, Ikh Lafetam, Zaryadnym Yashchikam s Gnezdami Vsekh Kalibrov i Vsei Prinadlezhnosti Onykh Orudii. (Drawings of All Regimental and Battery Pieces, Their Carriages, Caissons with Cells for Ammunition of All Calibers, and All Tools of These Pieces.)* St.Petersburg.

A.I. Markevich (1808) "Ob artilleriiskoi shkale ili ob artileriskom razmere v Rossii upotrebyaemom." (On the artillery scale, or on artillery measure that is in use in Russia.), *Artilleriiskii Zhurnal [Artillery Journal]*, No.1, p.37.

Markevich, A.I. (1820), *Rukovodstvo k Artilleriiskomu Iskusstvu. [A Manual to the Art of Artillery]*, St.Petersburg, Volume 1

The Russian gunpowder is 30 parts (75%) of saltpetre, 4 parts (10%) of sulphur, and 6 parts (15%) of charcoal.

Calibre and ammunition dimensions.**Table 37: Calibre of Russian M1805 Cannon and Unicorns [Gogel (1816)].³⁰**

	Calibre, inches (mm)	Projectile diameter, inches (mm)	Windage, inches (mm)
12-pdr cannon	4.739 (120.4mm)	4.579 (116.3mm)	0.160 (4.1mm)
6-pdr cannon	3.762 (95.6mm)	3.634 (92.3mm)	0.128 (3.3mm)
½-pud unicorn	6.102 (155.0mm)	5.927 (150.6mm)	0.175 (4.4mm)
¼-pud unicorn	4.843 (123.0mm)	4.668 (118.6mm)	0.175 (4.4mm)

³⁰ I.G.Gogel, I.I.Fitzum, and K.K.Gebgard, *Osnovaniya Artilleriiskoi i Pontonnoi Nauki. (The Basics of the Artillery and Pontoon Science.)* St.Petersburg, 1816, vol.1, pp 125-126, table. The same data in A.I.Markevich, *Rukovodstvo k Artilleriiskomu Iskusstvu. (A Manual to the Art of Artillery.)* St.Petersburg, vol.1, 1820, p.154.

Table 38: Russian M1805 projectile weights [Gogel (1816)].³¹

Projectile weight trade pound (kg)	
12-pdr cannonball	14¼ (5.836 kg)
6-pdr cannonball	7¼ (2.918 kg)
½-pud shell	empty: 21¼ (8.702 kg) charged: 22½ (9.214kg)
¼-pud shell	empty: 10½ (4.300 kg) charged: 11¼ (4.607 kg)

Charge weights

Fitzum (1811)³² shows the same charge weight for cannons. He shows the charge weight for ½-pud unicorn as equal to that for Medium 12-pdr (4 trade pounds/1.638kg), and the charge weight for ¼-pud unicorn is shown as equal to that for 6-pdr cannon (2 trade pounds). This gives the “charge weight/projectile weight” ratio as 1:5 for unicorns of both calibres.

Table 39: Calibre, projectile diameter, and windage, project weight and charge weight of Russian M1805 field ordnance. [Fitzum]³³

	Projectile Weight	Charge weight	Charge ratio
Medium 12-pdr	5.857kg	1.638kg	1:3.6
Light 12-pdr	5.857kg	1.024kg	1:5.7
6-pdr	2.918kg	0.819kg	1:3.6
½-pud unicorn	8.233kg	1.638kg	1:5
¼-pud “foot” unicorn	4.018kg	0.819kg	1:5
¼-pud “horse” unicorn	4.018kg	0.819kg	1:5

However, Markevich (1820, p.455) shows the “charge weight/projectile weight” ratio for unicorns as 0.1882352, which gives the charge weight for ½-pud unicorn 1.550 kg, that for ¼-pud unicorn – 0.756 kg. It quite probable that by 1820, the charges for the unicorns had been slightly reduced from experience gained during the Napoleonic Wars.

Table 40: Russian canonballs and shells weight (in trade pounds): pp 455 and 500 tables [Markevitch (1820)].³⁴

	Projectile weight trade pound (kg)	Charge weight, trade pound (kg)	Charge/projectile weight ratio
Medium 12-pdr	14 and 29/96 (5.857kg)	4.0 (1.638 kg)	1:3.6
Short 12-pdr	14 and 29/96 (5.857kg)	2.5 (1.024 kg)	1:5.7
6-pdr cannon	7 and 1/8 (2.918kg)	2.0 (0.819 kg)	1:3.6
½-pud unicorn	20 and 10/96 (8.233kg)	3.78 (1.550 kg)	1:5.3
¼-pud unicorn	9 and 78/96 (4.018kg)	1.85 (0.756 kg)	1:5.3

³¹ I.G.Gogel, I.I.Fitzum, and K.K.Gebgard, *Osnovaniya Artilleriiskoi i Pontonnoi Nauki. (The Basics of the Artillery and Pontoon Science.)* St.Petersburg, 1816, vol.1. Canonballs and shells weight (in trade pounds): p.179, table.

³² I.I.Fitzum (1811) *Artilleriiskii Zhurnal (Artillery Journal)*, No.3, p.56.

³³ I.I.Fitzum (1811) *Artilleriiskii Zhurnal (Artillery Journal)*, No.3, p.56.

³⁴ A.I.Markevich, *Rukovodstvo k Artilleriiskomu Iskusstvu. (A Manual to the Art of Artillery.)* St.Petersburg, vol.1, 1820.

Russian Canister of 1807

Old Russian canister shot (case shot) was made of iron and not as some references have it as canister. The old canister design of the tin cylinder with a tin base which when the powder charge deflagrated usually broke completely broken together with the wooden “sabot”, so the powder gas would leak through the gaps between the balls before they had left the barrel. As a result, some balls were broken, while the others had a relatively low initial velocity.

The new M1807 canister had an iron disk at bottom of the cylinder. The iron disk of the new round was usually not broken by the detonation of the gunpowder charge, so it pushed the iron balls forward with almost all the possible impulse of the explosion. In 1807-08 new canister rounds were filled with iron balls produced for old canister, later balls of other sizes were produced as shown in Table 43.

Table 41: Canister ball dimensions designed in 1807.

	1	2	3	4	5	6	7	8	9
Ball diameter	21.6mm	22.9mm	23.5mm	26.0mm	30.5mm	34.3mm	37.5mm	38.6mm	49.5mm
Ball weight	37.3g	44.4g	48.0g	65.4g	105.4g	150.0g	195.4g	214.1g	451.3g

Table 42: Composition of Russian M1807 close range canister.

			Total Wt
Medium 12-pdr	151 x No.3 balls	151 x 48g	7.25kg
Light 12-pdr	132 x No.3 balls	132 x 48g	6.34kg
6-pdr	72 x No.2 balls 27 x No.1 balls	72 x 44.4g 27 x 37.3g	
½-pud unicorn	48 x No.7 balls	48 x 195.4g	9.38kg
¼-pud “foot” unicorn	151 x No.3 balls	151 x 48g	
¼-pud “horse” unicorn	132 x No.3 balls	132 x 48g	

Table 43: Composition of Russian M1807 long range canister.

			Total Wt
Medium 12-pdr	41 x No.8 balls	41 x 214.1g	
Light 12-pdr	34 x No.8 balls	34 x 214.1g	
6-pdr	41 x No. 5 balls	41 x 105.4g	
½-pud unicorn	94 No. 5 balls	94 x 105.4g	
¼-pud “foot” unicorn	50 x No. 5 balls 10 x No 4 balls	50 x 105.4g 10 x 65.4g	
¼-pud “horse” unicorn	40 x No. 5 balls 8 x No. 4 balls	40 x 105.4g 8 x 65.4g	

Table 44: Canister ranges and number of hits at a Target measuring 8 ft high (2.44m) and 18 sazhen wide (38.4m) wide for M1805 field guns.³⁵

Range	M1805 Medium 12-pdr		M1805 Light 12-pdr		M1805 6-pdr	
	Short range canister, 112 balls	Long range canister, 41 ball	Short range canister, 98 balls	Long range canister, 34 balls	Short range canister, 96 balls	Long range canister, 41 ball
100 sazhen	51		65		40	
200 sazhen 426.8m	37		50		38	
250 sazhen 533.5m	30		32	19	30	
300 sazhen 640.2m		18	18	13	12	20
350 sazhen 746.9m		12		11		13
400 sazhen 853.6m		6		8		3

Table 45: Canister ranges and number of hits at a Target measuring 8 ft high (2.44m) and 18 sazhen wide (38.4m) wide for M1805 field artillery unicorns.³⁶

	½-pud Unicorn		¼-pud Foot Unicorn		¼-pud Horse Unicorn.	
	Short range canister, 113 balls	Long range canister, 56 balls	Short range canister, 113 balls	Long range canister, 60 balls	Short range canister, 94 balls	Long range canister, 48 balls
100 sazhen 213.4m	59	-	52	-	57	-
150 sazhen 320.1m	56	-	33	-	48	-
200 sazhen 426.8m	43	-	25	-	41	-
250 sazhen 533.5m	34	22	-	14	18	12
300 sazhen 640.2m	-	18	-	11	-	10
350 sazhen 746.9m	-	12	-	5	-	6
400 sazhen 853.6m	-	10				

³⁵ A.I.Markevich, *Rukovodstvo k Artilleriiskomu Iskusstvu. (A Manual to the Art of Artillery.)* St.Petersburg, vol.1, 1820, p.761 (results obtained in 1807).

³⁶ A.I.Markevich, *Rukovodstvo k Artilleriiskomu Iskusstvu. (A Manual to the Art of Artillery.)* St.Petersburg, vol.1, 1820, p.761 (results obtained in 1807).

Russian M1805 Ranges

Table 46: First graze and extreme range shot for the M1805 Medium 12-pdr, Light 12-pdr and 6-pdr.³⁷

Elevation	First graze M1805 Medium 12-pdr	Extreme Medium 12-pdr	First graze M1805 Light 12-pdr	Extreme Light 12-pdr	First graze M1805 6-pdr	Extreme 6-pdr
0 degrees	186 sazhen 397m	780 sazhen 1665m	137 sazhen 292m	843 sazhen 1799m	133 sazhen 284m	787 sazhen 1679m
2 degrees	397 sazhen 847m	819 sazhen 1748m	347 sazhen 740m	781 sazhen 1667m	378 sazhen 807m	665 sazhen 1419m
4 degrees	630 sazhen 1344m	845 sazhen 1803m	528 sazhen 1127m	874 sazhen 1865m	689 sazhen 1470m	779 sazhen 1662m
6 degrees	708 sazhen 1511m	724 sazhen 1545m	742 sazhen 1543m	750 sazhen 1601m	786 sazhen 1677m	928 sazhen 1980m
8 degrees	869 sazhen 1854m	-	750 sazhen 1601m sazhen	775 sazhen 1654m	901 sazhen 1923m	950 sazhen 2027m
9,5 degree*					965 sazhen 2059m	
10 degrees	1032 sazhen 2202m	-	916 sazhen 1955m	-		-
13,5 degrees*	1097 sazhen 2341m	-		-		-
16,5 degrees*			1074 sazhen 2292m	-		
19,5 degree**					1209 sazhen 2580m	
23 degrees**	1318 sazhen 2813m	-				
28 degrees**			1264 sazhen 2697m			

* – the elevating mechanism is in lowest position.

** – the elevating mechanism is removed, the breech is on the transom.

Table 47: First graze and extreme shell range for the ¼- and ½ Pud unicorn.³⁸

Elevation	First graze M1805 ½-pud unicorn	Extreme ½-pud unicorn	First graze M1805 ¼-pud Foot Unicorn	Extreme ¼-pud Foot Unicorn	First graze M1805 ¼-pud Horse Unicorn	Extreme ¼-pud Horse Unicorn
0 degrees	144 sazhen 307	712 sazhen 1519m	179 sazhen 382m	627 sazhen 1338m	133 sazhen 284m	698 sazhen 1490m
2 degrees	425 sazhen 907m	755 sazhen 1611m	397 sazhen 847m	708 sazhen 1511m	354 sazhen 755m	664 sazhen 1417m
4 degrees	529 sazhen 1129m	910 sazhen 1942m	437 sazhen 933m	593 sazhen 1265m	502 sazhen 1071m	650 sazhen 1387m
6 degrees	652 sazhen 1391m	808 sazhen 1724m	541 sazhen 1154m	605 sazhen 1291m	532 sazhen 1135m	657 sazhen 1402m
8 degrees	750 sazhen 1601m	849 sazhen 1812m	664 sazhen 1417m	674 sazhen 1438m	657 sazhen 1402m	-
10 degrees	806 sazhen 1720m	880 sazhen 1878m	690 sazhen 1472m	706 sazhen 1507m	755 sazhen 1611m	-
11,5 degrees *			962 sazhen 2053m		766 sazhen 1635m	-
12 degrees	906 sazhen 1933m	936 sazhen 1997m				
16 degrees*	875 sazhen 1867m					
25.5 degrees **			1067 sazhen 2277m			
27.5 degrees **					1155 sazhen 2465m	
29 degrees**	1190 sazhen 2539m					

* – the elevating mechanism is in lowest position.

** – the elevating mechanism is removed, the breech is on the transom.

³⁷ I.G.Gogel, I.I.Fitzum, and K.K.Gebgard, (1816), vol.2, p.47 table.

³⁸ I.G.Gogel, I.I.Fitzum, and K.K.Gebgard (1816) vol.2, p.47 table.



SOJ-07(21) Russian M1805 Guns, Limbers and Caissons

Alexander Zhmodikov

Dimensions of guns and carriages

Table 48: Dimensions of gun tubes.

	Bore length (chamber)	Chamber length	Tube length	Barrel weight	Barrel weight	Difference
Literature				Markevich 1805³⁹	Gogel 1816⁴⁰	
Medium 12-pdr	15.75 cal	none	16.5 cal	803kg	819kg	+16kg
½-pud unicorn	10.2 cal	1.94 cal	10.5 cal	672kg	680kg	+8kg
Light 12-pdr	12.25 cal	none	13.0 cal	459kg	467kg	+8kg
6-pdr	16.25 cal	none	17.0 cal	360kg	360kg	0
¼-pud “foot” unicorn	10.7 cal	1.94 cal	11.0 cal	352kg	360kg	+8kg
¼-pud “horse” unicorn	9.7 cal	1.94 cal	10.0 cal	311kg	315kg	+4kg

Table 49: Gun Carriage Dimensions

	Carriage bracket length	Carriage wheel diameter	Carriage Weight	Carriage weight	Carriage weight
Literature			Markevich (1805)⁴¹	Gogel (1816)⁴²	Markevich (1820)⁴³
Medium 12-pdr	304.8cm	140.2cm	not shown	606.1kg	577.4kg
Light 12-pdr	280.7cm	140.2cm	not shown	516.0kg	495.5kg
½-pud unicorn	335.3cm	140.2cm	not shown	622.5kg	593.3kg
6-pdr gun	243.8cm	121.9cm	327.6kg	337.4kg	331.7kg
¼-pud “foot” unicorn	257.8cm	121.9cm	331.7kg	344.0kg	335.8kg
¼-pud “horse” unicorn	257.8cm	121.9cm	344.0kg	360.4kg	not shown

³⁹ Markevich and Plotto (1805)

⁴⁰ Gogel, Fitzum, and Gebgard (1816) Vol.1, p.53

⁴¹ Markevich and Plotto (1805) the table at the last page.

⁴² Gogel, Fitzum, and Gebgard (1816), Vol.1, p.69 [the weight includes the handspikes.]

⁴³ Markevich (1820), Vol.1, p.500

Limbers and Caissons

Diameter of the wheel for limbers and caissons is equal to diameter of the light artillery carriage wheel (121.9cm).

Total amount of ready ammunition in the artillery companies:

- Each 12-pdr gun: 80 balls, 30 canister (10 close range and 20 long range), and 10 incendiary shells,
- Each 6-pdr gun: 90 balls and 30 canister (10 close range and 20 long range),
- Each unicorn: 80 shells, 30 canister (10 close range and 20 long range), and 10 incendiary shells.

There were ammunition boxes on the limbers of the 6-pdr gun and ¼-pud unicorn, which could contain, correspondingly, 18 and 12 rounds of ready ammunition.

In 1810, flare shells were introduced (two flare shells instead of two incendiary shells for each unicorn).

Table 50: Limber weight (without ammunition)

Literature	Wheel diameter	Weight of Limber (cells for ammunition) Markevich (1805)⁴⁴	Limber weight (cells for ammunition) Gogel (1816)⁴⁵
Medium 12-pdr	121.9cm	262.1kg (no cells)	278.5kg (no cells)
Light 12-pdr	121.9cm	262.1kg (no cells)	278.5kg (no cells)
½-pud unicorn	121.9cm	262.1kg (no cells)	278.5kg (no cells)
6-pdr gun	121.9cm	270.3kg (+10.2kg)	274.4kg (not shown)
¼-pud “foot” unicorn	121.9cm	270.3kg (+12.3kg)	274.4kg (not shown)
¼-pud “horse” unicorn	121.9cm	270.3kg (+12.3kg)	274.4kg (not shown)

Table 51: Caissons weight.⁴⁶

	Wheel diameter	Weight of Caisson	Weight of ammunition cells	Weight of caisson empty
Medium 12-pdr	121.9cm	307.1kg	28.7kg	335.8kg
Light 12-pdr	121.9cm	307.1kg	28.7kg	335.8kg
6-pdr gun	121.9cm	307.1kg	43.0kg	350.1kg
½-pud unicorn	121.9cm	307.1kg	30.7kg	337.8kg
¼-pud “foot” unicorn	121.9cm	307.1kg	34.8kg	341.9kg
¼-pud “horse” unicorn	121.9cm	307.1kg	34.8kg	341.9kg

⁴⁴ Markevich and Plotto (1805) (the table at the last page).

⁴⁵ Gogel, Fitzum, and Gebgard (1816) Vol.1, p.89

⁴⁶ Markevich and Plotto (1805) (the table at the last page).