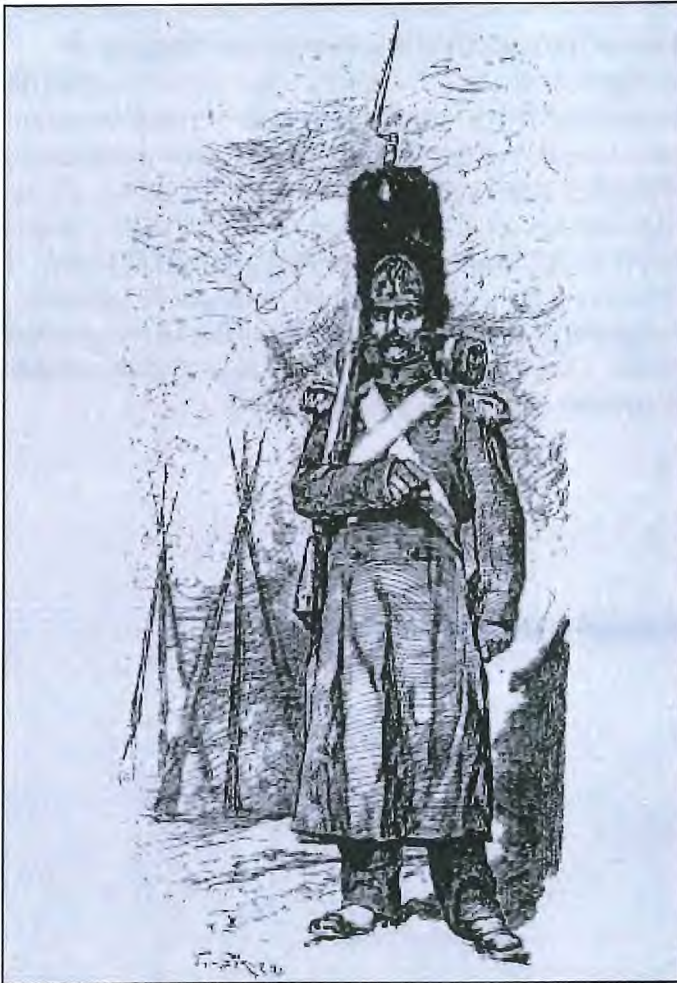


# ***THE GRUMBLER***

The Official Newsletter of G.N.H.W.S – July/August 2006



Welcome to the July/August Edition of the Grumbler – the official bimonthly newsletter of the Group North Historical Wargames Society.

As the new Editor, I would like to thank Dave for his time and effort he has put into the Grumbler over the past five years. Fortunately for us, in the past, Dave's community mindedness has been beneficial to the Club, but for the moment his other community involvements are entering a particularly demanding time. I look forward to when this work load decreases and we can once again benefit (exploit) his skills. In the mean time, much as any forlorn hope has done in the past, I have thrown myself into the breach hoping that I will be able to achieve some forward movement.

In my editorial role I hope to build on the high standard Dave has set. My primary aim is to meet the bimonthly publication schedule. This means six issues of the Grumbler out this year – July/August, September/October, November/December, January/February, March/April and May/June. For competition organizers the flexibility of the issue dates

will allow them to get the results or progress reports of the competitions, plus any narratives, into the Grumbler while they are still fresh in our minds.

The current layout and structure of the Grumbler will continue. Remembering that among the aims of our Society are:

“To advance the avocation of Historical Wargaming in the State of South Australia by means of research, ... exchange of information, promulgation of rules, systems ...”

and

“To widen public awareness of historical military heritage by ... publishing reports and manuscripts of military history...”

I hope that others will follow Marcus' lead and look at penning their thoughts or favourite theories and submitting them as articles. A consequence is that I would like to see a 'Letters to the Editor' section be needed to handle discussion of those ideas put forward. I would also like to see a new section introduced in which club members can boast to the world about their brilliant tactical successes over their opponents. If this takes off, I felt an apt name for the section would be 'Rimmer's War Diaries' - in honour of that great military genius Arnold (Ace) Rimmer of the mining ship 'Red Dwarf'. I am sure Martin would like to share his successes while Juan could bemoan the gallantry of his warband generals and tell of election of the many new such leaders in the post-battle drinking halls of his warband armies. I hope similar stories of valour, bravery and/or incredible luck will be shared by our non-historical gamers as well.

To quote Field Marshall Blucher:

**“Vorwärts”**

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## A Message from the President Of the Group North Historical Wargames Society

Anybody who has spent any time with me at all will know that I'm not keen on formality. However, I understand that I have a new responsibility to carry on the good work of the previous Club office holders and contribute positively to promote and strengthen our hobby. As the President of the GNHWS I have three key goals I would like to "formally" achieve over the next 12 months:

- The first of these goals is to see our hobby, in all its forms (including Fantasy!) become better known and understood in the broader community. I believe we can achieve this by asking our non-wargaming friends from work or school to come along to a Club night and see what we do. We must continue to hold our Club competitions and Open Days and these events must be well advertised – with posters in local schools, papers, libraries and shopping centres. These are a few simple ways to raise the levels of interest in our hobby.
- My second goal involves the GNHWS Website. I would like to acknowledge the on-going efforts of Mike Allen and contributors to the Website and ask all of the members to consider providing additional material to the Website. I'm very keen to raise the quantity and quality of the material available. Please submit your articles, scenarios, rule commentaries and photos to Mike so we can better use this excellent resource.
- My final goal concerns the Grumbler itself. Thanks to Dave Knowles the Grumbler has been maintained but, like the Website I think with a little effort we can raise the level of material in the Grumbler. Many of you will have written notes for games, quick reference charts and even essays or papers for school or uni with a military/historical focus that could easily be reformatted for inclusion in the Grumbler. Please consider submitting material, as I believe we can generate an active and interesting Club magazine with much to offer our members. I asked Rowland Dickinson to become the new editor and I fully endorse his enthusiastic approach to his new role and hope you will help us to achieve our vision for the Grumbler.

Finally I would like to say (though most of you will know this anyway) that my main aim in being a member of the Club is to push lead soldiers around the battlefield. My main responsibility as President is to support all of the members to push their lead (or plastic) soldiers around the battlefield! That said, we are a "self-help" club – if you want something done ... you generally have to do it yourself. If you want to be in a competition – then you'll need to get some friends together to help you run it. If you don't like the state of the damaged terrain or the condition of the Clubrooms – then come along to the working bees and give us a hand to fix things up. Most of all if you like wargaming and want to keep playing in a great Club then please keep coming along on Wednesdays, Fridays and Sundays – your attendance is our greatest asset.

Thanks  
Marcus

## Notices/Announcements:

### Gaming Nights:

A reminder to everybody gaming nights are:

- every Weds and Fri evenings and
- every 2<sup>nd</sup>, 4<sup>th</sup> and 5<sup>th</sup> Sunday afternoon.

Weds and Fri the hours are: Doors officially open at 7:00 pm and close at 11:00 pm.

- On Weds people often start arriving from 6:30 pm and a key holder might be there to open up. But it has been known to open just after 7:00 pm so if you plan to be early please speak to a committee member (beforehand) to get access.
- Closing time is 11:00 pm. Please schedule your game to finish with enough packing up time to be out of the doors by 11:00 pm.

Sundays (2<sup>nd</sup>, 4<sup>th</sup> and 5<sup>th</sup>): Noon to 6pm. Attendance fluctuates at the moment so if you plan to come along it may pay to ensure someone has a key to get. Otherwise email the Society on : <mailto:groupnor@groupnorth.asn.au> or check the Society's website at [www.groupnorth.asn.au](http://www.groupnorth.asn.au)

### Committee:

Congratulations to our new committee of management voted in at our Annual General Meeting. The positions are:

Marcus Tregenza	- President
Heinz Schroeder	- Vice President
Owen Bartsch	- Secretary
Harry Dunn	- Treasurer
Mike Allen	- Committee Member
James Dekort	- Committee Member
Martin Foreman	- Committee Member
Darryl Lademan	- Committee Member
John Hawkins	- Committee Member
David Waldergrave	- Committee Member

### Fees

Annual membership fees are now due by the end of **August**. After much debate at the AGM they are now:

**\$70** for a senior and

**\$30** for junior.

This is due to the increasing costs of maintaining our own (aging) facilities and an increase in fees we must pay to the Penfield Sports Association. Longer serving members will remember the days when fees were \$100/\$50 before we moved to Penfield.

### Tidiness

It is time for reminder on this issue. Please tidy up around your gaming area after you have finished your game and place terrain neatly back in the correct shelf in the terrain room. We are all forgetful at times so please be generous by doing a little bit extra when you do tidy up.

Also please remember to check before your game (with a committee member) about whether or not you need to put tables/chairs away in case there are other activities in the hall before the next club event.

### Open Day

The Open Day Co-Ordinator is still to come forward and identify themselves. If you are unable to co-ordinate but are willing to take responsibility for running a particular game/event/table/catering/thing, please put your name and the game/event/etc you would like to do and how long you can do it for on the sheet provided on the noticeboard.

### Tattoo

Our Annual Tattoo saw 51 entries overall and while some categories were a bit light on in numbers there was some stiff competition in the popular Historical sections and the 25mm or more non-Historical section. Congratulations to those who entered in the tattoo. The results do not necessarily reflect the skill of the winners (not wishing to detract from their efforts) but there were some categories not heavily contested. We hope everyone can enter something next year.

Best 25mm or more Historical:	Marcus Tregenza
Best 25mm or more non-Historical:	Darryl Lademan
Best 25mm or more Terrain/Model:	Marcus Tregenza
Best less than 25mm Historical:	Mike Allen
Best less than 25mm non-Historical:	David Waldergrave
Best less than 25mm Terrain/Model	David Waldergrave
Best overall:	Darryl Lademan

Thanks,  
Marcus

### Hordes Of The Things!

Ross Dawe will be running a tournament of "**Hordes Of The Things**" over two Wednesday nights in late July or early August. The dates are still to be finalised so check the club notice board. The 'Hordes Of The Things (HOTT)' rules are a variant of DBA that is easy to learn and play. Entry is free! There will be games of HOTT on the Wednesday beforehand so players can learn and practice the rules.

Matched pairs of 25mm scale armies will be provided with tables matching the army themes. Your usual fantasy favourites will be there, along with a few unusual ones!

## Companion 06 DBM

Ross Dawe will be running the annual "**Companion**" DBM tournament in a round robin format from late August until Christmas. Details are still to be finalised so check the club notice board. The theme is "Any Army BC" and is 380 points, one list.

## Diary

Very Soon:

**"Spanish Armada"** campaign - contact Ross Dawe

Soon:

**"Hordes of the Things"** 25mm – 2 night tournament with armies supplied, see announcement above - contact Ross Dawe

22-23/07/06 plus a weekend in Oct

**"Imperial Games"** - Warhammer 40K Tournament - Organiser is Owen Bartsch  
The October weekend is not yet set due to a tournament run by Southern Wargammers in October.

August – December 2006

**"Companion 06"** - 15mm DBM Ancients see announcement above – contact: Ross Dawe

20/8/06

**"Flames of War"** - Some armies will be supplied to play with on the event for those interested. Organisers are Alun Gallie, Chris Such, Mike Allen & Scott Elaurant.

27/08/06

**CONFLICT** event held by the Games Workshop Society, Group North Historical Wargames Society co-ordinator Mike Baker

30/10/06 –

**Open Day** - Group North Historical Society Open Day – contact TBA

21/12/06 -

**"Circus Maximus"** 'A day at the Chariot Races' – Ross Dawe

## Tournament Results

### Berserker 06 Big Battle DBA Tournament Results

After several months of games our 'Berserker' Big Battle DBA tournament has ended. The placings for prizes are based on the best 7 games, each game having a maximum score of 18 points. Score in brackets is the total from all the games played using our round robin format.

Marcus Tregenza	126 (152) - 10 games, 6 unlucky points : 1st + trophy
Martin Foreman	121 (150) - 11 games, 9 unlucky points : 2nd + trophy
Chris Young	118 (139) - 10 games, 5 unlucky points : 3rd + trophy
Ross Dawe	116 (137) - 11 games, 6 unlucky points
Rowland Dickinson	104 (127) - 11 games, 11 unlucky points : Unluckiest Player
John Hawkins	103 (119) - 10 games, 7 unlucky points
Harry Dunn	90 ( 99) - 10 games, 8 unlucky points
Juan Trinidad	80 ( 98) - 11 games, 4 unlucky points
Kevin Burns	76 ( 76) - 7 games, 2 unlucky points
Michael Grant	55 ( 59) - 9 games, 5 unlucky points
Mike Baker	55 ( 55) - 6 games, 7 unlucky points
Nigel Douglas	54 ( 58) - 10 games, 6 unlucky points
David Knowles	36 ( 36) - 2 games, 1 unlucky point

We also had a prize for the 'Unluckiest Player'. Points for this were earned by having generals killed, the army camp sacked, a garrisoned built up area sacked or rolling triple one for movement. Rowland with his Mycenaean army leaped out of the blocks for the unluckiest player prize by having an Iliad's worth of generals slaughtered in his early games and his town sacked, with Martin coming a close second for his generals dying quickly as well. Harry Dunn accidentally made a big effort to catch up in his last few games with some unlucky streaks that saw his Carthaginian commanders dropping like flies, but in the end Rowland had his camp torched one time too many and wins the prize.

Other notable events included Rowland having a dice roll come to rest propped on a corner without anything to support it, Juan being on the wrong end of a string of 6-1 results that routed a command in one turn and Martin's scythed chariots that were almost unkillable. A crowd pleaser game was Harry's Carthaginians fighting an extremely bloody battle with Nigel's Romans.

The final placings were still undecided going into the last few games, with both Martin and Marcus going head-to-head for wins with Chris close behind. In the last game Martin needed an 18 point win with his Seleucids to edge out Marcus on the tie-break provision, but fell short when his army melted against John's Macedonians. Congratulations to Marcus on his tournament win.

The tournament organiser, Ross Dawe, would like to thank the players for making the whole thing run smoothly. The round robin format allowed players to take breaks for

holidays or work commitments and also made it easy to accommodate two late starters, so we will use it again next year.

More detail is on the Web Page

## Rimmer's War Diaries

Rimmer's War diaries are composed so that, for future generations of tabletop commanders, the experiences and insights of successful (and not so successful) commanders can be made available to them. Through such magnanimous generosity of their predecessors, the future commanders can be suitably informed and over-awed by the brilliance of those who have gone before.

In this Edition's study<sup>1</sup> is by Martin Foreman and is of his first game in the recent Adeladium 06 competition. The following is Martin's narrative of the battle

My Army during Adeladium was 4/13 Medieval German Imperial 1456 AD Cold Ag 1. 425 points. Just the meaty stuff is given below, all three commands had 32 Elements, Filler was extra (Ps and Hd). The Army Breaks on 44.5

C-in-C's Command- designed to take the rough, skirmish and punch with the Knights.	#2 Comd - Designed to move straight ahead and kill something.	Allied Comd - Designed to support the flank with punch.
1 Reg Kn(S) C-in-C 2 Irr Kn(O) dismount as Bd(S) 2 Reg Kn(I) dble 4 LH(F) 18 Ax(X)	1 Reg Kn(I) dble S-Gen 16 Reg Pk(O)	1 Reg Kn(I) dble A-Gen 1 Reg Kn(I) 2 Reg Cv(S) 16 Reg Pk(I)
Break 10	Break 9.5	Break 10.5

Game 1 was against John Hawkins, who fielded 4/84 Burgundian Ordonance 1471 AD – giving a reasonably historical match-up. I was the defender and John placed his Baggage in the far left hand corner.

### Deployment:

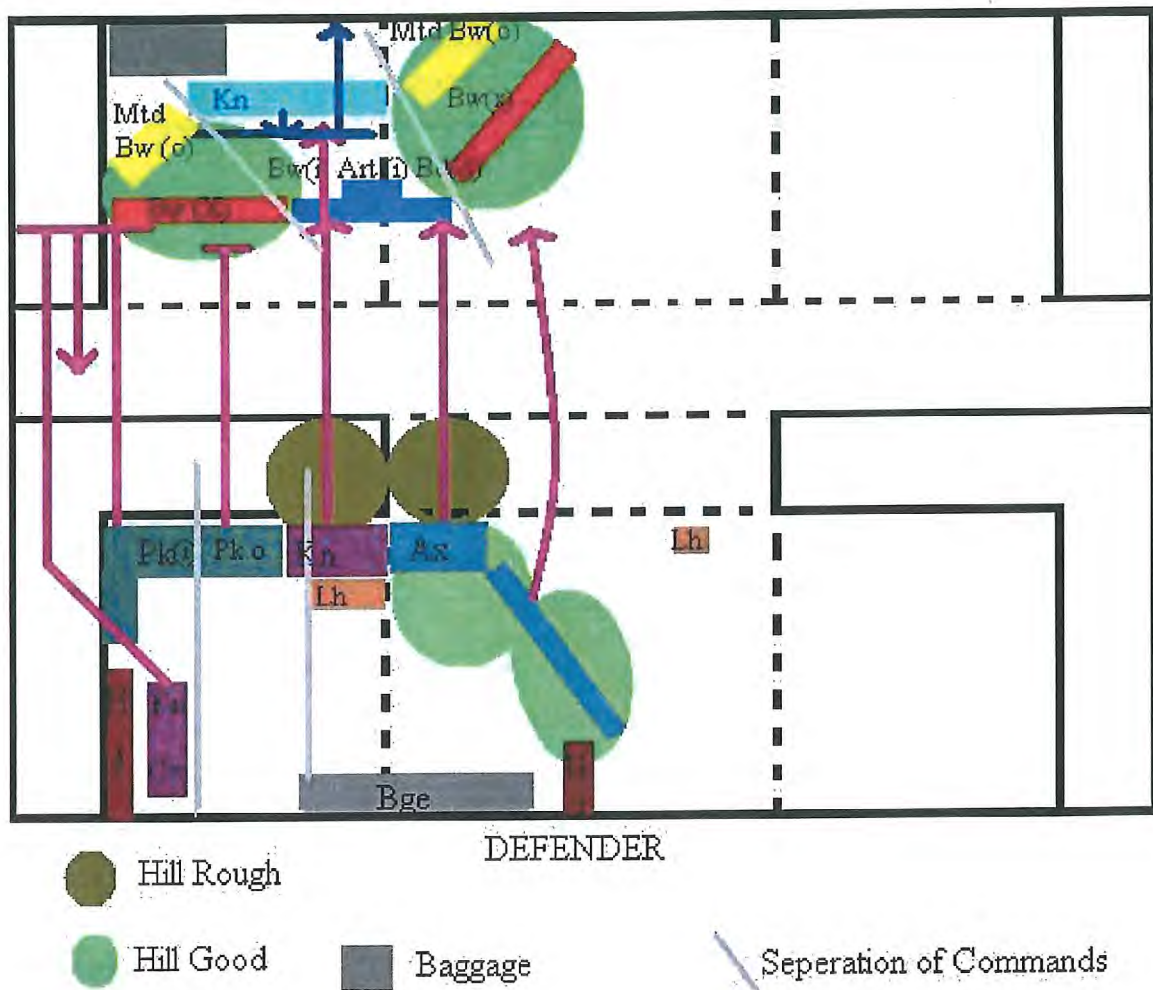
As John's army is so small it was an easy choice to setup to skirmish the right hand side of the table.

My plan from the start was to push the pike and knights straight forward in the centre and just cover my flanks with the Ax(X) and LH(F) on the right hand side. To the left hand side of the table there was a weakness of Johns Mtd Bow(O) (single ranked with 1 Bd(O) in support; facing dble Kn(I) and Cv(S). That weakness or should I say trap lead to my Allies downfall, (more on that later).

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<sup>1</sup> Article received 26 June 2006





What happened:

On my left my Allied comd Pk(I) expanded to the left and linked up with the dble Kn(I) and Cv(S) to proceed forward.

The centre with the Sub general dble Kn(I) marched forward with 16Pk(O).

The C-in-Cs comd on the right, the 2 dble Kn (I), 2 Kn(O) and Kn(S) C-in-C, with supporting Ax(X) to their right, marched towards the Bw(I)/Art(I) and single ranked Bd(O) on John's left, totally ignoring the Bw(X) on the hill anchoring John's left flank..

My allied command got to within 1 base depth when their general decided to tackle a single ranked Bd(O) supported to its left by dismounted Bw(O). His dble Kn(I) and Cv(S) supported him by taking on the Bw(O). The General is at 4 and John's Bd(O) is 3 up 1 as its uphill (4) - Only one result here; yep 1 dead General The (I) kills him. However his troops all kill the dismounted bow. Next minute panic sets in as my Allied command is running away as they score a 2 on the next pip die.... DOH.



Shot just prior to getting my whole line into contact. Spot the missing General on the left at the top of the photo... Doh. However take note of the artillery, blade and bow line in the centre of the picture.

In the centre John stayed still to receive the charge of my Kn and Pk(O). All over in 2 bounds as the Bw/Art and Bd explode in front of my Pk and Kn. John moved his Kn up to cover the hole but as they are now facing Pk(O) losses soon mount up. I only need 1 or 2 knights to put that command to route - done.



As expected the single ranked blade bow and artillery evaporated. John's Knights rolled forwards to plug the gap (in some cases into 4 deep pike).

### The End.

All of this has only taken 1.5 hours of play. At this stage John's Kn have dissolved and the centre is devoid of opponents. My Kn are 3 bounds from contacting the Baggage or 2 bounds away from catching the Mtd Bow facing the wrong way. My Ax(X) are happy to watch the Bw(X) on the hill from a safe distance ie not getting shot at. John decides he wants an early lunch and retires. I point out that there is still hope but he concedes. 9-1 for the Medieval Germans.



John's central command has now broken. The pike can move left towards the baggage or The Ax(X), which have suffered no casualties, can move frontally into the Bw(X) on the right while the Knights hit the Bw from the flank and rear

### Conclusions;

The match ups were mostly all in my favour and John did not have the room or pips to alter it. His pip die were at times woeful. this allowed me to race forwards into contact. My Generals like leading from the front, and at times they do pay for this.

Many thanks to Martin for his report and tolerance of the Ed introductory comments. Martin went on to win Adeladium 06. The Group North Historical Wargames Society Website has more detail on Adeladium, battle descriptions and photo's.

## Articles

This Edition's article was submitted by me before any thought of becoming editor had crossed my mind. Though publishing it, I do not expect to set a precedent that the only contributor to this Section is the Editor. The article has been reviewed but mainly to correct my poor English and spelling – all interpretation, arithmetic or measurement errors are entirely my own.

### **The Death Zone in the Horse and Musket Period** **By Rowland E Dickinson<sup>1</sup>**

During the horse and musket period we have frequent reports of bodies of troops firing volleys away at each other with minimal casualties occurring beyond a certain, very short, distance. Conversely, there are references to a distance within which hits are almost certain – often referred to as the death zone.

While the following do not include the term 'death zone' they have whetted my curiosity as to why they should have occurred. Those that come to mind are:

- The current military drill of 'Advance in Review Order' (Australian Army based on British Military Drill) involves a march forward of fifteen paces and halting.
- The death zone referred to by Ambrose in his writings on the American Civil War as being 15 paces (see [1] pp446 & 447).
- Waiting to fire until "you see the whites of their eyes".
- One of the functions of sergeants in the horse and musket period was to use their halberds or equivalent to level the muskets.(see [4] p66 and [5] p84).
- The inaccuracy of the musket due to windage.
- The lack of a rear sight on the musket (and possible a foresight as well)
- The lack of firing range practice by musket toting armies. (See [2])

These lead me to look into the geometry of the firing of the smoothbore musket and to share my observations for discussion.

The firing mechanism of the musket involves the escaping of gases around area of the touch hole. This precludes the firer effectively sighting along the barrel. This led to the conventional wisdom that the musket was kept level (the function of the sergeants with their halberds) so that the ball went directly towards the target (not allowing for windage

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<sup>1</sup> Article received 1 June 2006

or the parabolic trajectory due gravity). However, human tendency is to try to take aim and so the firer would tend to try and sight onto the target along the fore sight, but keeping the gases escaping through the touch hole away from his face. This would be particularly prevalent in the stress of combat. (Training breaks down, for example the repeat loading of a musket without firing it). The infrequency of firing the musket when 'in barracks' or 'on campaign' would preclude the development of the marksmanship and the ability to compensate for the inherent inaccuracies of such a method that were developed by professional hunters, foresters and frontiersmen. Also when taking aim it would be the instinct to aim at the centre of the largest portion of the target, in the case of an opposing line of soldiers – the centre of the chest region.

An exaggerated representation of this is shown in Figure 1

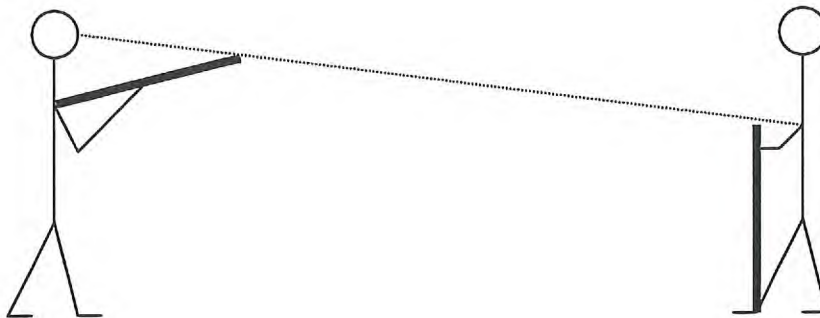


Figure 1

A natural question is what is the maximum distance apart at which a ball so sighted will go over the head of the target? Or an alternate statement of this problem is: what is the distance of the region in which a hit is guaranteed – how wide is the death zone? To examine this we look at the geometry of the firing which is shown in Figure 2.

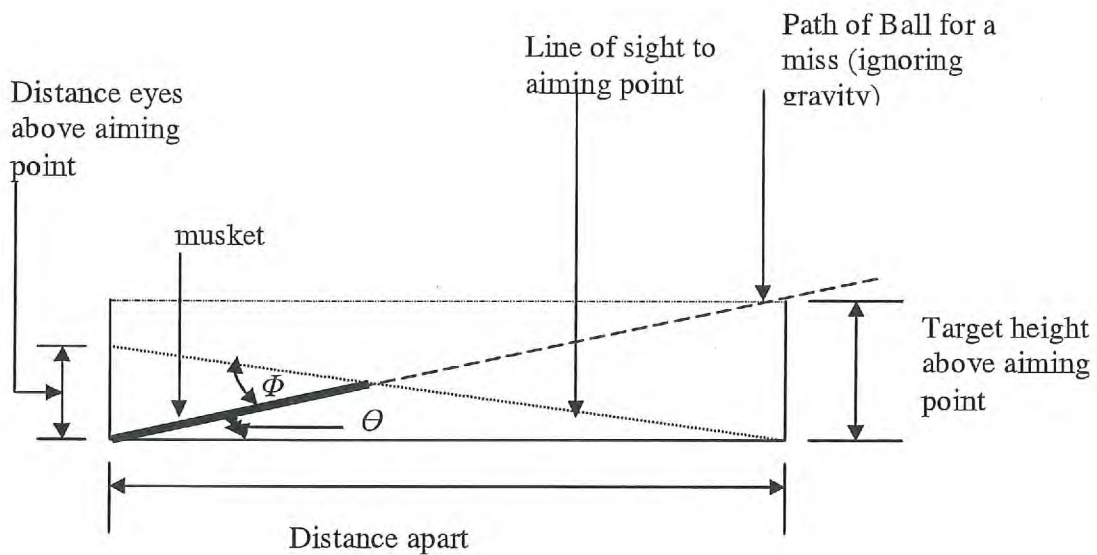


Figure 2  
Geometry of Sighting the Musket

Some algebra (apologies to all):

- Let the distance of the firer's eyes above the aiming point be 'e'.
- Let the height of the target above the aiming point be 'h' (for each firer this is also the height above the same spot at the rear of the musket).
- Let the distance apart be 'd'
- Let the length of the musket<sup>2</sup> be 'm'
- Let the distance from the end of the musket to the top of the targets head be 'm''

Now since we have constructed two isosceles triangles, from the basic geometry these values are related by the following equations:

$$(m + m')^2 = d^2 + h^2$$

$$\frac{e}{h} = \frac{m}{m + m'}$$

Hence we derive 'm+m'' in terms of 'm', 'e' and 'h'.

$$(m + m') = \frac{mh}{e}$$

And so we have:

<sup>2</sup> One must also allow for the distance from a vertical line dropped from the eyes to the level of the musket. For simplicity I use the term musket to represent the distance from the foresight of the musket (or end of the barrel if there was no foresight) to where this imaginary drop line meets the line of the real musket.

$$\left(\frac{mh}{e}\right)^2 = d^2 + h^2$$

We can use this equation to isolate any one term and express it as the result of the other terms. For example we can isolate 'd'.

$$d = \sqrt{(m + m')^2 - h^2}$$

$$d = \sqrt{m^2 \left(\frac{h}{e}\right)^2 - h^2}$$

$$d = h \sqrt{\left(\frac{m}{e}\right)^2 - 1}$$

Noting that  $e < m$ , i.e. the musket is longer than the distance the firer's eye is above the rear of the musket, should 'e' increase in value then 'd' gets smaller. So for firers who kept their eyes well above the rear of the musket but tried to aim using the foresight nevertheless, the death zone reduces dramatically – hence the need for the sergeants to 'level the muskets'.

Consider now what we 'know'.

- The variable 'd' is the length of the death zone. We are told the death zone was 15 paces. While a pace is an imprecise measure, presume a pace length of 75 cm. This gives the death zone distance, d, as 1125 cm.
- The variable 'm' is the musket length. A musket was approximately 5 feet long and this converts to 150 cm.

This still leaves two variables 'h' and 'e' which we need to know but have no way of measuring directly.

- The value for 'h' can be roughly estimated by comparing the distance from the centre of a typical male's chest to the top of his head, to his height. Using this ratio, and taking a typical soldier's height for the period, a rough estimate of 'h' can be found.
- Finding a value for 'e' is more problematic. Remembering that this value represents how the firer takes aim and how close the firer's eye gets to the line of the musket barrel. The escape of hot gases from the touch hole would disincline many to get too close. However, by using the equation above, we can express 'e' in terms of the other variables.

$$e = \frac{mh}{\sqrt{d^2 + h^2}}$$

For example an individual 175 cm tall, with 40 cm<sup>3</sup> from the aiming mark to the top of the target's head, gives the result that the eye level above the musket – 'e' – is 5.33 cm. This does not seem an unreasonable distance. As for 'h' we can presume that the ratio of 'e' to the height of the soldier is a constant value.

Table 1 below shows how the death zone increases slightly for taller soldiers. The difference in the death zone for soldiers 145 cm tall (4 ft 10 in) to 200 cm (6 ft 8 ins) is negligible, hence while the Russian Guards of the late 1700's and early 1800's looked impressive, 15 paces was still the death zone.

Soldiers height (cm)	h	Musket Length M (cm)	e	m/e	Death Zone d (cm)	d paces English
	(cm)		(cm)			
145	33.14	150	4.42	33.97	1125.22	15.003
150	34.29	150	4.57	32.83	1125.18	15.002
155	35.43	150	4.72	31.77	1125.15	15.002
160	36.57	150	4.87	30.78	1125.11	15.001
165	37.71	150	5.03	29.85	1125.07	15.001
170	38.86	150	5.18	28.97	1125.03	15.000
175	40.00	150	5.33	28.14	1124.99	15.000
180	41.14	150	5.48	27.36	1124.95	14.999
185	42.29	150	5.63	26.62	1124.91	14.999
190	43.43	150	5.79	25.92	1124.87	14.998
195	44.57	150	5.94	25.26	1124.82	14.998
200	45.71	150	6.09	24.62	1124.77	14.997

Table 1 – Death Zone Variation with Soldier's Height

Musket length, including cavalry carbines, was quite variable<sup>4</sup>. Table 2 illustrates the affect of varying the musket length for a soldier 160 cm (5 ft 4 ins).

<sup>3</sup> These are measurements done on the authour.

<sup>4</sup> Frequently, muskets are described by barrel length or overall length. Interestingly the Textbook of Small Arms (see [3]) gives both the barrel length and overall length of the Baker rifle. This allows the deduction of the length of the butt as 38.75 cm (15.5 ins), which would seem reasonable to use as a standard value for line infantry muskets. Hence those who wish to redo my calculations could add this figure to listings of barrel lengths. The Land Service Musket with a barrel length of 1.05 m (42 ins) would have and overall length of 1.44 m (57.5 ins) and the light infantry musket barrel was three inches shorter giving a length of 1.37 m. (see [2] p76 and [3] pp3 & 5)



Soldiers height	h	Musket Length	e	m/e	Death Zone	d
(cm)	(cm)	m	(cm)		d	paces
		(cm)			(cm)	English
160	36.57	100	4.87	20.52	749.58	9.994
160	36.57	110	4.87	22.57	824.71	10.996
160	36.57	120	4.87	24.62	899.82	11.998
160	36.57	130	4.87	26.68	974.92	12.999
160	36.57	140	4.87	28.73	1050.02	14.000
160	36.57	150	4.87	30.78	1125.11	15.001
160	36.57	160	4.87	32.83	1200.19	16.003
160	36.57	170	4.87	34.89	1275.27	17.004
160	36.57	180	4.87	36.94	1350.35	18.005
160	36.57	190	4.87	38.99	1425.42	19.006
160	36.57	200	4.87	41.04	1500.49	20.007
160	36.57	210	4.87	43.09	1575.56	21.007

Table 2 – Death Zone Variation with Musket Length

In this case we see that a longer musket is more effective. The limitation is the ability of the soldier to effectively reload his weapon. So with longer muskets and the ability to load them more easily, the taller Russian Guards should have had a distinct advantage.

Acknowledging the variations that can occur due to the muskets used by different nations, the inherent inaccuracies of windage, the degree of training and the differences in soldier's heights; this article provides an interesting explanation for the phenomenon during the battles of the horse and musket period where bodies of troops could fire volleys away at each other with minimal casualties occurring beyond a certain, very short, distance.

[1] 'Ambrose Bierce's Civil War', Ambrose Bierce, Edited with An introduction by William McCann 1956, Regnery Gateway Limited 1996 edition, Random House, New York

[2] 'The Napoleonic SourceBook', Philip J Haithwaite, Guild Publishing, London, 1990

[3] 'The Textbook of Small Arms 1929', HM Stationery Office, Holland Press, London, 1961.

[4] 'Soldiers - A History of Men in Battle', John Keegan and Richard Holmes, Guild Publishing, London, 1985

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