

THE STRENGTH OF MILITARY RIFLE ACTIONS

By Parker O. Ackley

After reading several articles in the various sporting magazines and after receiving hundreds of inquiries and comments from gun experts concerning these articles, which had to do with the strength of various types of military actions being brought into this country by our G.I.s returning from overseas, it was decided to make actual tests of the actions in question, in comparison with some of our well-known military actions, to find out exactly what the facts are.

The conclusion reached by many shooters who are interested in building rifles on these actions is that almost any action brought in from some foreign source is a booby-trap. Now, it is not reasonable to think that any nation is going to equip its troops with rifles which are dangerous. There is no reason to ridicule our enemies' weapons. In fact, some foreign developments are such that we should have a very healthy respect for them, regardless of the fact that they were developed by our foes. Any rifle can be dangerous when improperly handled. Statements have been made that certain foreign military rifles are unsafe with ammunition of calibers other than what they were made for. This is obvious. Any rifle is dangerous when the correct ammunition is not used. For instance there is no worse booby-trap than our own 1903 or 1917 rifle with the 8mm German military cartridge loaded into its chamber. This in no way reflects on our own actions or any other action which might be so used. Through long years of experience we have found that many things have been written about firearms which are based largely on personal prejudice or lack of the actual facts.

It was decided to use the .270 Ackley Magnum cartridge as the basis for our tests. This caliber was selected as one being rather hard on an action yet one for which the loading components are readily available. These experiments are still not completed. There are a number of actions yet to be tested. We are trying to work with a reasonable number of each type in order to get a representative idea of exactly what can be expected from the various ones. The .270 Magnum case and the 140-grain Barnes bullet has been used as far as possible. When a certain action could not be blown up using this bullet, it was necessary to go on to the heavier ones in order to build up pressures sufficient to wreck the action. The actions tested to date are as follows:

1. Jap 6.5 mm (.256) Number 459 Arisaka, M38
2. Jap 6.5mm (.256) Number 14316 Arisaka, M38
3. Jap 6mm (.256) Number 113113 Arisaka, M38
4. Mauser, standard Military 8mm with standard receiver ring, 1944 issue.

5. Mauser, marked ST MG, engraved, with large dovetail cut in top of receiver ring for German telescope mount.
6. Eddystone-Enfield Number 952302
7. Remington-Enfield Number 673777
8. Springfield, low number, reheat treated to Rockwell C40.
9. Sedgeley-Krag Number 254212, re-heat treated by Sedgeley.
10. Krag Number 38206, re-heat treated. Heat treater unknown.
11. Spandau Mauser, year 1916, Number 5120
12. Nickel Steel Springfield, Number 1484928
13. British Lee-Enfield, Mark III caliber .303, Number 41469
14. Jap 7.7 action, Number 43486, Model 99
15. Jap cast action, caliber 6.5 fitted with 7.7 bolt, Number D-26
16. Jap cast action, caliber 6.5, fitted 7.7 bolt, Number D-26
17. Krag action as issued, year 1899, Number 228577; safety lug .003 clearance
18. Krag action, year 1899, Number 254405; safety lug .003 clearance

ACTUAL TESTS

Jap 6.5mm action, Number 459, Arisaka Model 38, rebarreled with high tensile strength barrel, heat treated to about Rockwell C 35, chambered for the .270 Ackley Magnum. Action in very good condition.

Powder	Bullet	Comments
1. 60 gr. of 3031	140 gr. Barnes	Normal pressure
2. 60 gr. of 3031	140 gr. Barnes	Primer pierced.
3. 62 gr. of 3031	140 gr. Barnes	Primer pierced.
4. 63 gr. of 3031	140 gr. Barnes	Primer pierced.
5. 65 gr. of 3031	140 gr. Barnes	Primer blown.
Numbers 6-13, incl.:		
55 gr. of 4064	150 gr. Barnes	Normal; no headspace developed.
14. 65 gr. of 3031	150 gr. Barnes	Primer blown; .0005 headspace
15. 67 gr. of 3031	150 gr. Barnes	Primer blown; .001 headspace
16. 69 gr. of 3031	175 gr. Barnes	Extractor blown off; head of case ruptured.
17. 69 gr. of 3031	180 gr. Barnes	Case ruptured; chamber swollen barrel discarded; Graphitic tool steel barrel fitted. Several normal loads fired with normal pressures.
18. 69 gr. of 3031	180 gr. Barnes	Primer blown; case head very badly swollen.
19. 5 gr. of 2400 and 60 gr. 3031, duplex	180 gr. Barnes	Case head ruptured. Pressures tremendous.
20. 10 gr. of 2400 and 60 gr. 3031	180 gr. Barnes	Barrel blown off just ahead of receiver. Action still intact. Some set back in locking recesses indicated.

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Jap 6.5 mm action, Number 14316. Action in good condition.

Powder	Bullet	Comments
Numbers 1-5, inclusive		
58 gr. of 3031	140 gr. Barnes	Normal pressure
6. 56 gr. of 3031	170 gr. Barnes	Primer pierced
7. 61-1/2 gr. of 3031	170 gr. Barnes	Primer blown
8. 65 gr. of 3031	170 gr. Barnes	Primer blown
9. 65 gr. of 3031	180 gr. Barnes	Primer blown; .002 headspace.

Powder	Bullet	Comments
Numbers 10-11, Normal Loads		Pressure normal
12. 68 gr. of 3031	180 gr. Barnes	Primer blown; .007 headspace developed
13. Normal load		Pressure normal; action showed no weakness. Fitted with Ackley tool steel barrel about Rockwell C34.

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Jap 6.5mm action, Number 11313; Action in very poor condition. Firing pin, .067; firing pin hole in bolt, .120. High tensile strength (chrome-moly) barrel, Rockwell C 35.

Powder	Bullet	Comments
1. 62 gr. of 3031	140 gr. Barnes	Everything normal
2. 63 gr. of 3031	140 gr. Barnes	Primer pierced
3. 65 gr. of 3031	140 gr. Barnes	Primer pierced; bolt plug blown out; extraction very easy. Firing pin hole in bolt bushed at this time to fit firing pin closely.
4. 10 gr. of 2400	140 gr. Barnes	Primer blown; chamber OK .002 headspace developed.
Numbers 5-6 55 gr. Hi-vel #2	140 gr. Barnes	Normal pressure
7. 10 gr. of 2400 60 gr. of 3031	140 gr. Barnes	Barrel split from breech to a point about 6" from muzzle. Receiver threads ruptured from split barrel. Locking lugs OK. Very little apparent setback in action, exclusive of ruptured threads due to ruptured barrel. Action still serviceable.

Eddystone-Enfield, No. 952392, fitted with Graphitic tool steel barrel, caliber .270, Magnum, Rockwell 47 C.

Powder	Bullet	Comments
1. 58 gr. of 3031	100 gr. Barnes	Normal pressure
2. 62 gr. of 3031	100 gr. Barnes	Some pressure indicated, but extraction OK.
3. 60 gr. of 3031	120 gr. Barnes	High pressure; primer not blown but extreme top load indicated.
4. 58 gr. of 3031	140 gr. Barnes	Normal pressure
5. 62 gr. of 3031	140 gr. Barnes	Action completed wrecked; receiver ring blown off; Bolt still in action.

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Remington-Enfield Number 637777 fitted with high tensile strength (chrome-moly) barrel, chambered for .270 Magnum, Rockwell 38 C.

Powder	Bullet	Comments
Numbers 1-6		
56 gr. of 3031	130 gr. Barnes	Normal pressure
7. 60 gr. of 3031	130 gr. Barnes	High pressure; case stuck
8. 61 gr. of 3031	130 gr. Barnes	High pressure; case stuck
9. 61 gr. of 3031	150 gr. Barnes	High pressure; case stuck
10. 61 gr. of 3031	170 gr. Barnes	Primer blown
11. 63 gr. of 3031	170 gr. Barnes	Primer blown; .994 headspace developed.
12. 65 gr. of 3031	170 gr. Barnes	Bolt frozen; barrel had to be unscrewed to get case out of chamber.
13. 66 gr. of 3031	180 gr. Barnes	Same as No. 12 but had .025 headspace. Cocking lugs very badly swollen. Locking recesses in receiver set back very badly. Chamber swollen.
14. 68 gr. of 3031	180 gr. Barnes	Case ruptured; escaping gas bulged side rails of action very badly. Lugs and recesses upset badly. Action unserviceable.

Mauser, Standard military 8mm with standard receiver ring, 1944 issue.

Powder	Bullet	Comments
1. 58 gr. of 3031	100 gr. Barnes	Normal pressure
2. 62 gr. of 3031	100 gr. Barnes	Some pressure indicated; extraction a all right.
4. 58 gr. of 3031	140 gr. Barnes	Normal pressure; .002 headspace developed.
5. 62 gr. of 3031	140 gr. Barnes	Top locking lug broken. Locking recesses set back badly, indicating about .015 headspace. Receiver still serviceable. Bolt wrecked.

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Sedgley-Krag Number 254212, Model 98, re-heat treated by Sedgley. Original Krag barrel rechambered for Improved .30-40 cartridge.

Powder	Bullet	Comments
Numbers 1-5, factory loads		Everything normal
6. 45 gr. Hi-Vel #2	150 gr. Service	Normal pressure
7. 48 gr. Hi-Vel #2	150 gr. Service	Normal pressure
8. 50 gr. Hi-Vel #2	150 gr. Service	Some pressure indicated; extraction hard.
9. 53 gr. Hi-Vel #2	150 gr. Service	Some pressure indicated; extraction hard.
10. 55 gr. Hi-Vel #2	150 gr. Service	Some pressure indicated; extraction hard.
11. 57 gr. Hi-Vel #2	150 gr. Service	Case very tight; primer OK.
12. 58 gr. Hi-Vel #2	150 gr. Service	Pressure very high; primer still tight; chamber badly swollen; barrel wrecked; new barrel fitted at this point of high tensile strength (chrome-moly) steel; Rockell C35.
13. 59 gr. Hi-Vel #2	150 gr. Service	Case tight; hard pressure indicated; primer still tight.
14. 60 gr. Hi-Vel #2 compressed charge	150 gr. Service	Primer blown: chamber slightly swollen; action OK; headspace .004 which was sufficient to allow safety lug to come in contact.
15. 45 gr. 4198	150 gr. Service	Everything normal
16. 50 gr. of 4198 compressed charge	150 gr. Service	Primer loose; action OK; no additional headspace indicated.

Powder	Bullet	Comments
17. 10 gr. of 2400 50 gr. Hi-Vel #2 compressed charge	150 gr. Service	Primer blown; action OK.
18. 50 gr. of 2400	150 gr. Service	Receiver ring blown off; rear portion of receiver wrecked; bolt lugs OK.

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Nickel-steel Springfield action, Number 1484928. Brand new; had never been fitted to a barrel, as issued. Fitted with high tensile strength .20 Magnum barrel.

Powder	Bullet	Comments
Numbers 1-5 55 gr. of 4064	140 gr. Barnes	Forming loads normal.
6. 50 gr. of 3031	140 gr. Barnes	High pressure. Primer OK.
7. 62 gr. of 3031	140 gr. Barnes	Blown primer. Pressure high.
8. 64 gr. of 3031	140 gr. Barnes	Blown primer. Case head badly deformed.
9. 65 gr. of 3031	140 gr. Barnes	Left locking lug half-sheared away. Rim of bolt broken off. Lower locking recesses set back .025. Sear snapped in two.
	140 gr. Barnes	Cocking piece blown out. Action wrecked.

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Mauser, marked ST MG, engraved. Receiver apparently annealed for engraving purposes. Extremely soft inside and out. Top of receiver ring cut away for German dovetail telescope mount base. Dovetail extended all the way through receiver ring. Fitted with high tensile strength (chrome-moly) barrel; Rockwell C 35.

Powder	Bullet	Comments
1. 55 gr. of 3031	140 gr. Barnes	Pressure OK, no headspace developed.
2. 55 gr. of 3031	140 gr. Barnes	Pressure OK, no headspace developed.
3. 55 gr. of 3031	140 gr. Barnes	Top of receiver ring blown off due to the cut-away condition of the action.

British Enfield action, Number 41469, rechambered for the Improved .30-40.

Powder	Bullet	Comments
Numbers 1 and 2	150 gr. Gov.	Normal
factory loads	150 gr. Gov.	Normal
3. 55 gr. of Hi-Vel #2	150 gr. Gov.	Normal
4. 57 gr. of Hi-Vel #2		High pressure, Primer OK.
5. 60 gr. of Hi-Vel #2	150 gr. Gov.	
6. 52 gr. of 4198	150 gr. Gov.	Leaky primer
compressed charge		Bolt wrecked. Receiver bent.
7. 50 gr. of 2400		

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Jap 7.7 action, Number 43486, rebarreled with Graphitic tool steel barrel, chambered for .270 Magnum.

Powder	Bullet	Comments
Numbers 1 to 10		
55 gr. of 4064	140 gr. Barnes	Forming loads normal
11. 60 gr. of 3031	140 gr. Barnes	Blown primer. Case tight. .005 hdsp.
12. 62 gr. of 3031	140 gr. Barnes	Case not as tight as preceding shot. Primer blown. No increase in hdsp.
13. 64 gr of 3031	140 gr. Barnes	Case not as tight as preceding shot. Primer blown. No increase in hdsp.
14. 66 gr. of 3031	140 gr. Barnes	Case very tight. Blown primer. Very high pressure. No visible effects on action. .004 increase in headspace. Chamber swollen.
Numbers 15 and 16		
55 gr. of 4064	140 gr. Barnes	Normal
17. 68 gr. of 3031	140 gr. Barnes	Case very badly deformed. Head-space increased to .004, making total at this point of .012. Pressure tremendous.
18. 55 gr. of 4064	140 gr. Barnes	Action OK. Normal.
19. 10 gr. of 2400 and 60 gr. of 3031	140 gr. Barnes	Case badly deformed. Bolt tight due to upset in lower locking recesses. Locking lugs OK.
20. 60 gr. of 2400	140 gr. Barnes	Both lugs broken off. Receiver ruptured on right side. Bolt stayed in. Firing mechanism OK.

Spandau Mauser action, year 1916, number of receiver 5120 and bolt number 2634, rebarreled with high tensile strength .270 Magnum. Action unaltered.

Powder	Bullet	Comments
Numbers 1-8, 55 gr. of 4064	140 gr. Barnes	Forming loads normal
9. 60 gr. of 3031	140 gr. Barnes	High pressure. Primer OK.
10. 62 gr. of 3031	140 gr. Barnes	Pressure high. Blown primer.
11. 64 gr. of 3031	140 gr. Barnes	Results same as preceding shot. No gain in headspace.
12. 66 gr. of 3031	140 gr. Barnes	Primer blown. Small hole blown thru receiver ring at right side where receiver is cut away. .012 headspace. Action normal otherwise.
Numbers 13-17, 55 gr. of 4064	140 gr. Barnes	Normal
18. 65 gr. of 3031	140 gr. Barnes	Receiver ring ruptured. Bolt lugs still intact. Bolt remained in action. Firing mechanism OK.

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Krag action, Number 254405, fitted with high tensile strength barrel, chambered for Improved Zipper, Action as issued, unaltered. Safety lug .003 clearance.

Powder	Bullet	Comments
Numbers 1-10, factory loads		Forming loads; extraction very easy.
11. 34 gr. of 3031	56 gr. Factory	Normal
12. 37 gr. Hi-Vel #2 compressed	54 gr. Sisk	Loose primer. Action OK.
Numbers 13-15 Factory loads	54 gr. Sisk	Normal
16. 33 gr. of 4198 compressed	56 gr. Factory	Loose primer. Action OK.
17. Factory load	54 gr. Sisk	Normal; no headspace
18. 30 gr. of 2400		Case very tight. No gain in headspace.
19. Factory load	54 gr. Sisk	Normal

Powder	Bullet	Comments
20. 33 gr. of 2400	54 gr. Sisk	Action wrecked. Bolt remained in receiver, but cracked through the middle. Forward locking lug intact but bolt badly bent at that point. Receiver ring blown off into two pieces. Bolt stayed in; cocking piece, spring, etc. stayed in.

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Jap cast action, caliber 6.5 Number 151 barreled with .270 Magnum Graphitic tool steel barrel.

Powder	Bullet	Comments
1. 55 gr. of 4064	140 gr. Barnes	Normal load. Blown primer. Safety lug blown out of bolt. Gained .005 head space.
2. 55 gr. of 4064	140 gr. Barnes	Same as above. Action wrecked.

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Krag Number 383206, fitted with high tensile strength (chrome-moly) barrel, Rockwell C 35 chambered for Improved Zipper. Both safety lug and front locking lug contacting. Action re-heat treated, but soft.

Powder	Bullet	Comments
1. 31 gr. Hi-Vel #2	54 gr. Sisk	Pressure normal
2. 34 gr. Hi-Vel #2	54 gr. Sisk	Pressure normal
3. 36 gr. Hi-Vel #2 compressed charge	54 gr. Sisk	Pressure indicated; case slightly tight.
4. 37 gr. Hi-Vel #2	54 gr. Sisk	Pressure indicated; case slightly tight.
5. 30 gr. of 4198	54 gr. Sisk	Pressure normal
5. 33 gr. of 4198	54 gr. Sisk	Primer still tight; excessive pressure.
7. 25 gr. of 2400	54 gr. Sisk	No headspace developed at this point.
8. 28 gr. of 2400	54 gr. Sisk	Excessive pressure; sticky case.

Powder	Bullet	Comments
9. 30 gr. of 2400	54 gr. Sisk	Receiver ring ruptured to the extent that a small piece was blown out directly above extractor cut. Locking lugs upset, with front end of Bolt bent but not cracked. Rear lug OK. Receiver not cracked, except at ring.

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Krag action, Number 228577 rebarreled with high tensile strength barrel and chambered for Improved .30-40 Krag.

Powder	Bullet	Comments
Numbers 1-10 50 gr. Hi-Vel #2	150 gr. Gov.	Cases fell out without use of extractor.
11. 55 gr. Hi-Vel #2	150 gr. Gov.	Normal
12. 58 gr. Hi-Vel #2	150 gr. Gov.	Showed primer pressure, extraction all right.
13. 60 gr. Hi-Vel #2	150 gr. Gov.	Blown primer, small piece broken out of flange on face of bolt.
Numbers 14-17 50 gr. Hi-Vel #2	150 gr. Gov.	Normal. Extraction exceptionally easy.
18. 50 gr. of 4198	150 gr. Gov.	Tight case. High pressure. Primer tight.
19. 10 gr. of 2400 and 50 gr. Hi-Vel #2	150 gr. Gov.	Blown primer. Slight crack at base of forward locking lug; .003 gain in headspace. Both lugs bearing.
Numbers 20-21 factory loads		Extraction perfect. No enlargement of crack.
22. 50 gr. of 2400	150 gr. Gov.	Action wrecked. Receiver ring blown off. Left side of action blown off. Bolt broken in the middle. Bolt stayed in; cocking piece, firing pin, spring, etc. all stayed in.

Springfield, low number, re-heat treated to Rockwell C 40, fitted with high tensile strength (chrome-moly) barrel; Rockwell C 35.

Powder	Bullet	Comments
Numbers 1 to 3		
55 gr. of 3031	130 gr. Barnes	Normal pressure
4. 60 gr. of 3031	140 gr. Barnes	Primer blown; extraction very hard.
5. 61 gr. of 3031	140 gr. Barnes	High pressure; hard extraction.
6. 62 gr. of 3031	140 gr. Barnes	Action completely wrecked; receiver ring blown off; chamber swollen.

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Jap cast action, caliber 6.5 fitted with 7.7 bolt, Number D-26; barreled with .270 Magnum Graphitic tool steel barrel.

Powder	Bullet	Comments
1. 55 gr. of 4064	140 gr. Barnes	Receiver gave way on first shot.