

Competitive Product Evaluation
Winchester Low-Priced Bolt Action
Center Fire Rifles

LIMITED DISTRIBUTION

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	<u>Remington 700ADL</u>	<u>Winchester 770</u>
lug dimensions*: (per lug)		
height	.095"	.093"
width	.445"	.394"
length	.445"	.519"
<u>Trigger Assembly</u>		
pull, average of five, as received, lbs.:	4.6	6.4
Remington design specs.	3.0 - 5.0	
extreme variation, lbs.	1/4	1/2
provision for customer adjustment:		
weight of pull	yes, screw adjustment; instructions appear in factory folder	yes, jam nut adjustment
over travel	yes, screw adjustment, instructions appear in factory folder	yes, screw adjustment
trigger-sear engagement	screw adjustment, The instruction folder cautions against altering the factory adjustment.	metal removal required to alter factory adjustment, The factory instruction folder does not make any reference to trigger adjustment.

*These dimensions do not reflect the material machined from the right (bottom)
Winchester lug to house the extractor mechanism.

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trigger material:	steel (powder metal)	steel (investment cast)
trigger face:	vertical serrations	vertical serrations
trigger-sear engagement face width:	.165"	.250"
number of parts comprising assembly (including bolt stop and, in the case of the Remington, the safety mechanism):	20	12

Firing Pin Assembly

indent, copper crusher, average of five:	.020"	.020"
Remington design specs.	.018 - .026	
extreme variation:	.001	.001
firing pin protrusion:	.047"	.046"
Remington design specs.	.045 - .075	
firing pin mass, grains:	924	836
firing pin spring mass, grains:	191	177
effective accelerated mass, grains (It is customary in such systems to add 1/3 the mass of the spring to the accelerated mass):	987	894
firing pin stroke:	both approximately 9/32"	

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Remington 700ADL

Winchester 770

striker fall time, average
of ten, rounded to nearest
.05 milliseconds:

3.45

3.75

This interval is not,
strictly speaking, lock
time. It does not include
the time required for
those events to occur
which necessarily precede
the beginning of firing pin
motion.

assembly:

There is an integral
shoulder toward the
front of the firing pin.
This functions as
both a firing pin
protrusion stop surface
and the spring seat.
The spring is assembled
from the rear; followed
by the bolt plug, and
firing pin head. The
firing pin head is then
pinned to the firing pin.

The surface of the
firing pin at the maximum
diameter appears to be
that of the original bar
stock. There is no
integral forward shoulder
on the pin to limit
protrusion and butt the
firing pin spring. The
spring is assembled
over the front of the pin
and retained by a slotted
collar. Firing pin
protrusion is limited by
the firing pin sleeve
contacting a step in
the bolt sleeve. The
firing pin sleeve is
permanently assembled
to the firing pin. They
are threaded together
and drive-loc pinned.

Safety

location:

housed on trigger
assembly; located
adjacent to right
rear tang of receiver

housed on bolt sleeve,
moves with bolt, lever
projects to right from
bolt sleeve

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	<u>Remington 700ADL</u>	<u>Winchester 770</u>
modes:	2-position, "safe" position blocks sear and locks bolt	3-position; "safe" position blocks firing pin and locks bolt, intermediate position blocks firing pin while bolt may be opened

Magazine

	both fixed staggered box	
type:		
fabrication:	folded	folded and spot welded
material:	sheet steel	sheet steel
retention:	screw-attached to receiver	friction fit in corresponding receiver cut
color:	black oxidized	black oxidized
follower:	nickel plated steel stamping	stainless steel casting, apparently tumble polished (not colored)
magazine spring constraints:	upper end of spring is well constrained in follower; lower end of spring constrained only by confines of magazine well in stock	upper end of spring is well constrained in follower; lower end of spring is retained transversely in stamped plate, plate outline same as magazine box - thus plate is constrained both longitudinally and transversely within magazine well in stock

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Remington 700ADL

Winchester 770

Trigger Guard

type:	both for blind magazine, no provision for floor plate	
material:	aluminum alloy	aluminum alloy
coloring process:	anodized	anodized (relatively soft) and black enameled
surface finish:	smooth and uniform, moderate gloss, sanding marks visible on interior of bow	somewhat coarse, very slight gloss, sanding marks visible on interior of bow
contour:	width varies on blending radii	width is a straight taper from top to bottom (die draft perhaps)

Sights

front:	cross-serrated face ramp, flat faced gold bead front sight, dovetail mounted to base; detachable	longitudinally-serrated face ramp, convex faced silver bead front sight, dovetail mounted to base; hooded; detachable
rear:	ramp-mounted, elevation governed by means of a sight step, discrete incremental changes; windage changes screw adjustable; U-notch, flat top leaf; detachable	Williams "guide" rear sight, windage and elevation on independent dovetails, no discrete adjustments, index scale provided; semi-buck horn U-notch leaf; detachable
elevation range, inches @ 100 yds.:	13.1"	20.7"
sight radius:	16-1/2"	14-3/4"

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INTRODUCTION

The 670 is the lowest priced bolt action rifle offered by Winchester. Many of the parts are the same as those used on the two higher priced models. The major differences involve the stock, bolt sleeve, and safety.

Mechanically, the Winchester 670 and 670 carbine are identical. Where it is necessary to distinguish various measurements between them, the carbine value is followed by the letter C.

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	<u>Remington 660</u>	<u>Winchester 670</u>	<u>Winchester 670C</u>
<u>Selection</u>			
calibers:			
standard ²	\$119.95	\$119.95	\$114.95
	222	---	---
	---	225	---
	243	243	243
	6mm	---	---
	---	270	270
	308	---	---
	---	30-06	30-06
magnum	\$149.95	\$134.95	magnum version not available
	6.5 Rem.	---	
	---	264 Win.	
	---	300 Win.	
	350 Rem.	---	
<u>features:</u>			
stock	walnut-beech laminate on magnum	-----	-----
sling	quick detachable sling and swivels are standard on magnum	not provided	not provided
recoil pad	standard on magnums	standard on magnums	-----
<u>Specifications (Catalog)</u>			
overall length:			
standard	38-3/4"	42-1/2"	39-1/2"
magnum	38-3/4"	44-1/2"	-----

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	<u>Remington 660</u>	<u>Winchester 670</u>	<u>Winchester 670C</u>
weight:			
standard	6-1/2#	7#	7#
magnum	6-1/2#	7-1/4#	----
barrel length:			
standard	20"	22"	19"
magnum	20"	24"	----
fixed magazine capacity:			
standard	4 (5 in 222)	4	4
magnum	3	4 (3 in 264)	---
stock dimensions:			
length of pull	14"	13-1/2"	13-1/2"
drop at comb	1-7/8"	1-3/4"	1-3/4"
drop at heel	2"	2-1/8"	2-1/8"

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Remington 660

Winchester 670

Stock

type:	Monte Carlo, no cheekpiece	
fluted comb:	yes, minimal	yes
grip:	full pistol grip, contouring behind grip	full pistol grip, no contouring behind grip
circumference at thinnest point	5.4"	5.1"
grip cap:	black plastic with white plastic diamond inlaid, as per R1100 shotgun	none
wood:	American walnut; walnut-beech laminate on magnums	birch
finish:	RK-W, over filler	lacquer
surface texture:	generally same as 700ADL	smooth to the touch, closed grain wood, cross-grain sanding marks visible
sheen:	very glossy	moderate gloss
barrel fit:	free floating	pressure bedded toward fore-arm tip

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	<u>Remington 560</u>	<u>Winchester 670</u>
checkering:		
type	pressed	pressed
sense	negative, points down	
fineness	20 lines/inch	15 lines/inch
panel	moderate variation in depth, no appreciable tears near edges, no border; individual diamonds considerably less distinct	much variation in depth of pattern at pistol grip, pronounced tears near edges, no borders; distinct diamonds
extent:	corresponding panels on the Remington are slightly more complex and considerably larger	limited coverage
reinforcing crossbolt:	dual brass crossbolts, second added below forward receiver ring	dual, as per W770
fore-end tip:	black plastic with white line spacer	none
bedding:	recoil lug area on magnums reinforced with bedding compound	
<u>Receiver</u>		
provision to accommodate various cartridge lengths:	one receiver length designed for "short" cartridges, both standard and magnum	variable length bolt stop on single long receiver, long magnum cartridges offered (except in carbine revision)

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	<u>Remington 650</u>	<u>Winchester 670</u>
ejection port length:	2.66"	3.11"
overall receiver length:	7.16"	9.25"

All other receiver characteristics on both guns are similar to those of the higher priced models discussed earlier.

Bolt

bolt body:	polished, not jeweled, black color left on front and rear portions	polished, not jeweled, color polished away from front and rear portions
bolt handle:	half spherical knob, flat on bottom, longitudinally serrated, black oxidized knob and handle, dog leg bolt handle bent forward to position knob over trigger	same shape as on W770, grit blasted and black oxidized, dull non-reflective color (see photographs)
(bolt plug, R; (bolt sleeve, W:	streamlined, no projections, extends beyond cocked firing pin head, black oxidized	very similar to Remington, tapped hole for bolt sleeve cross pin (retains firing pin in bolt sleeve); firing pin sleeve projects beyond end when cocked, colored to match bolt handle
bolt release:	toward left rear of receiver in bolt lug way	same as W770
utility	inferior ³	same as W770

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	<u>Remington 660</u>	<u>Winchester 670</u>
operating smoothness:	good, magazine follower bears on bottom of bolt when operating with magazine empty, left receiver wall extends to center line of receiver toward front to minimize vertical bolt play	very good, no "anti-bind device" on this model, receiver-bolt interference can occur as with R700ADL, magazine follower bears much less on bottom of bolt
bolt disassembly:	same as R700ADL	with action closed and cocked, a small punch is inserted through hole in left side of bolt sleeve, this permits firing pin assembly to be unscrewed readily from bolt, further disassembly requires twisting spring stop collar 90°, tools required
bolt stroke, similar length cartridges:	3.84"	3.81" carbine
bolt body length:	4.88"	6.15"
bolt-bolt plug alignment toward rear of stroke:	same as R700ADL	very similar to Remington system
All other bolt characteristics on both guns are similar to those of the higher priced models discussed earlier.		

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Remington 660

Winchester 670

Trigger Assembly

pull, average of five, as received, lbs.:	5.15	5.4*
Remington design specs.	4.0 - 6.0	
extreme variation, lbs.:	1-3/4	1/2*
provision for customer adjustment:	instruction folder states, "Trigger adjustment sealed at the factory."	all comments same as for W770

Firing Pin Assembly

indent, copper crushed, average of five*:	.019	.020
Remington design specs.	.018 - .026	
extreme variation*:	.001	.002
firing pin protrusion:	.058	.057, .062 C
Remington design specs.	.045 - .075	
firing pin mass, grains:	763	874
firing pin spring mass, grains:	135	188
effective accelerated mass, grains:	807	936
firing pin stroke:	9/32"	9/32"
striker fall time, average of ten, milliseconds:	3.25	3.90, 3.70 C
extreme variation:	.3	.5, .4 C

*No significant differences noted between W670 and W670 C.

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	<u>Remington 660</u>	<u>Winchester 670</u>
assembly:	same as R700 ADL	The firing pin spring is assembled onto the firing pin from the front. It is followed by a collar which rotates 90° into a notch in the firing pin body to retain the assembly. The firing pin sleeve is permanently assembled to the firing pin. They are threaded together and drive-loc pinned.
<u>Safety</u>		
location:	same as R700 ADL	lever located similarly to Remington
modes:	similar to R700 ADL	safety lever reciprocates longitudinally, 2-position "safe" position blocks trigger and locks bolt
operation:	comfortable, large thumbpiece on safety lever	uncomfortable, inadequate thumbpiece on safety lever, moving from "fire" to "safe" was difficult
<u>Magazine</u>		
retention:	friction fit in corresponding receiver cut out	
follower:	nickel plated steel stamping	aluminum, possibly forged, same as used on immediate post-1964 Winchester Model 70

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Remington 660

Winchester 670

magazine spring constraints: upper end of spring is well constrained in follower; lower end constrained vertically by tabs folded inward from sides of magazine, may pivot or move horizontally within confines of magazine box inner walls

upper end of spring riveted to follower, cannot move or twist; lower end constrained as per W770

Trigger Guard

type: one piece, forward portion extends to cover bottom of blind magazine and support front take-down screw

It appears to be the same part as that used on the W770.

material: nylon

coloring process: none, black nylon

surface finish: fire abrasive blasted, mold joint line visible entire length of trigger guard

contour: unorthodox, bow is reminiscent of Remington shotgun-type fire control

W.A. Warren:gb
November 1969

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FOOTNOTES

1. It was felt by some that the W770 stock was too massive around the grip near the front of the comb. There was insufficient clearance for the heel of the hand.
2. The Model 670 is not available in .308 Winchester. Winchester introduced this cartridge.
3. The R660 bolt release cannot be operated without the aid of an external object. A slender object must be inserted into the receiver to depress the bolt stop while the bolt is then withdrawn over it.

APPENDIX LIMITED DISTRIBUTION

Specific Guns Evaluated

Remington 700ADL, 30-06, #6257769, withdrawn from warehouse, 8-69.

Winchester 770, 30-06, #G940546, received by test laboratory, 3-69.

Winchester 670, 30-06, #113251, received by Custom Shop, 8-69.

Remington 660 standard, .308, #6269046, borrowed for evaluation from process engineering, 10-69.

Winchester 670 carbine, .243, #105617, received by Custom Shop, 9-69.

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Barrel Groove Dimensions As Determined By Air Gage

	<u>breech</u>	<u>middle</u>	<u>muzzle</u>	<u>Remington Specs.</u>
Remington 700 ADL 30-06 #6257769 6 groove, R.H.	.3088	.3087	.3087	.308 to .309
Winchester 770 30-06, #6940546 4 groove, R.H.	.3075	.3075	.3075	
Winchester 570 30-06, #113251 4 groove, R.H.	.3074	.3073	.3072	
Remington 660 .308, #6269046 6 groove, R.H.	.3083	.3084	.3083	.308 to .309
Winchester 570 Carbine, .243, #105617, 6 groove, R.H.	.2429	.2429	.2428	.243 to .244

ACCURACY LIMITED DISTRIBUTION

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Groups fired from bench rest, indoors, 100 yards, 9X scope. Each measurement below is the average of five 5-shot groups, inches.

Gun	Ammunition Lot	Make	Bullet Weight	Group Size	Horizontal	Vertical
R700ADL #6257769						
30-06	L1SRD	R	150 P.S.P.	2.78	2.14	2.30
W770 #G940546						
30-06	L1SRD	R	150 P.S.P.	1.58	1.17	1.11
R700ADL #6257769						
30-06	N11E	R	220 P.S.P.	2.08	1.62	1.82
W770 #6940546						
30-06	N11E	R	220 P.S.P.	1.95	1.72	1.11

Another Remington 700ADL 30-06 (#6287837) was withdrawn from the gallery as it was being processed (10-30-69). This gun was subjected to the same accuracy test as those above.

R700ADL #6287837						
30-06	L1SRD	R	150 P.S.P.	3.69*	3.31	2.21
	N11E	R	220 P.S.P.	1.97	1.69	1.62

*Remington specifications call for a maximum 5-shot group of 3-1/2" with 220 grain bullets.

APPENDIX LIMITED DISTRIBUTION

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Fabrication Methods

	<u>Remington</u>	<u>Winchester</u>
investment cast:		receiver 770, 670 trigger 770, 670 sear 770, 670 safety lever 770 magazine follower 770 bolt handle 770, 670 bolt sleeve 770, 670 firing pin sleeve 770, 670
	bolt handle 700	
machined:	receiver 700, 660	bolt body with integral locking lugs, apparently 770, 670
turned:	bolt body 700, 660 bolt head 700, 660 bolt plug 700, 660 firing pin 700, 660	firing pin 770, 670
stamped:	magazine follower 700, 660 safety lever 700 bolt handle 660	safety lever 670 safety linkage 670
die cast:	trigger guard 700	trigger guard 770, 670
extruded:	firing pin head 700, 660	
powder metal:	sear 700, 660 trigger 700, 660 safety thumbpiece 700, 660 front and rear sight bases 700, 660	
forged:		magazine follower, aluminum 670
swaged:	barrel 700, 660	barrel 770, 670
commercial:		front and rear sights (Williams) and bases 770, 670
injection molded:	trigger guard 660	

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Assembly Methods

	<u>Remington</u>	<u>Winchester</u>
copper braze:	bolt handle to bolt body 700, 660	bolt handle to bolt body 770, 670
	bolt head to bolt body 700, 660	
spot welded:		folded magazine box assembly
threaded permanent:	barrel to receiver, 700, 660	barrel to receiver, 770, 670
		firing pin sleeve to firing pin (also drive-loc pinned)
threaded removable:	front and rear sights to barrel	front and rear sights to barrel
	bolt plug to bolt body	bolt sleeve to bolt body
	receiver assembly to stock	receiver assembly to stock
pinned:	firing pin tip to firing pin	

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FIELD TEST NOTES

All five guns were briefly field tested. One experienced bolt action shooter and one inexperienced bolt action shooter participated.

Testing consisted of firing the heaviest and lightest bullet weights available in factory loaded ammunition, with both fast and slow bolt operation. Leather gloves were worn during magazine loading and shooting.

No noticeable differences were detected in ease of magazine load and unloading between the rifles tested.

Remington 700ADL 30-06

Bolt operation and feeding were very smooth. The safety can be applied (moved to "on safe") with the bolt open.

Winchester 770 30-06

Bolt operation and feeding were very smooth. The safety (bolt sleeve mounted) cannot be applied while the bolt is open.

Winchester 670 30-06

Bolt operation and feeding were smooth. The safety can be applied with the bolt open (safe position does not lock bolt closed). It is difficult to move the safety from "fire" to "safe" position.

Winchester 670 C 243

The first shell out of the magazine jammed frequently when fed slowly. The shell wedged between feed lips and chamber when the bullet was approximately 1/4" into the chamber. The safety was difficult to move from "fire" to "safe" position. Closing the bolt over a loaded magazine (4) to chamber a fifth shell was very difficult. There was insufficient room to depress the shells to allow the bolt to pass over them.

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Photographs

I. R700ADL and W770

1. Full view right side
2. Full view left side
3. Silhouette right side
4. Pistol grip area left side
5. Fore-end checkering and rear sight
6. Top of comb - Monte Carlo
7. Bolt head
8. Rear of bolt
9. Pistol grip bottom view
10. Butt plate

II. R660 and W670 and W670C

1. Full view right side
2. Silhouette right side
3. Pistol grip area left side
4. Rear of bolt

WAWarren:gb

