POWER

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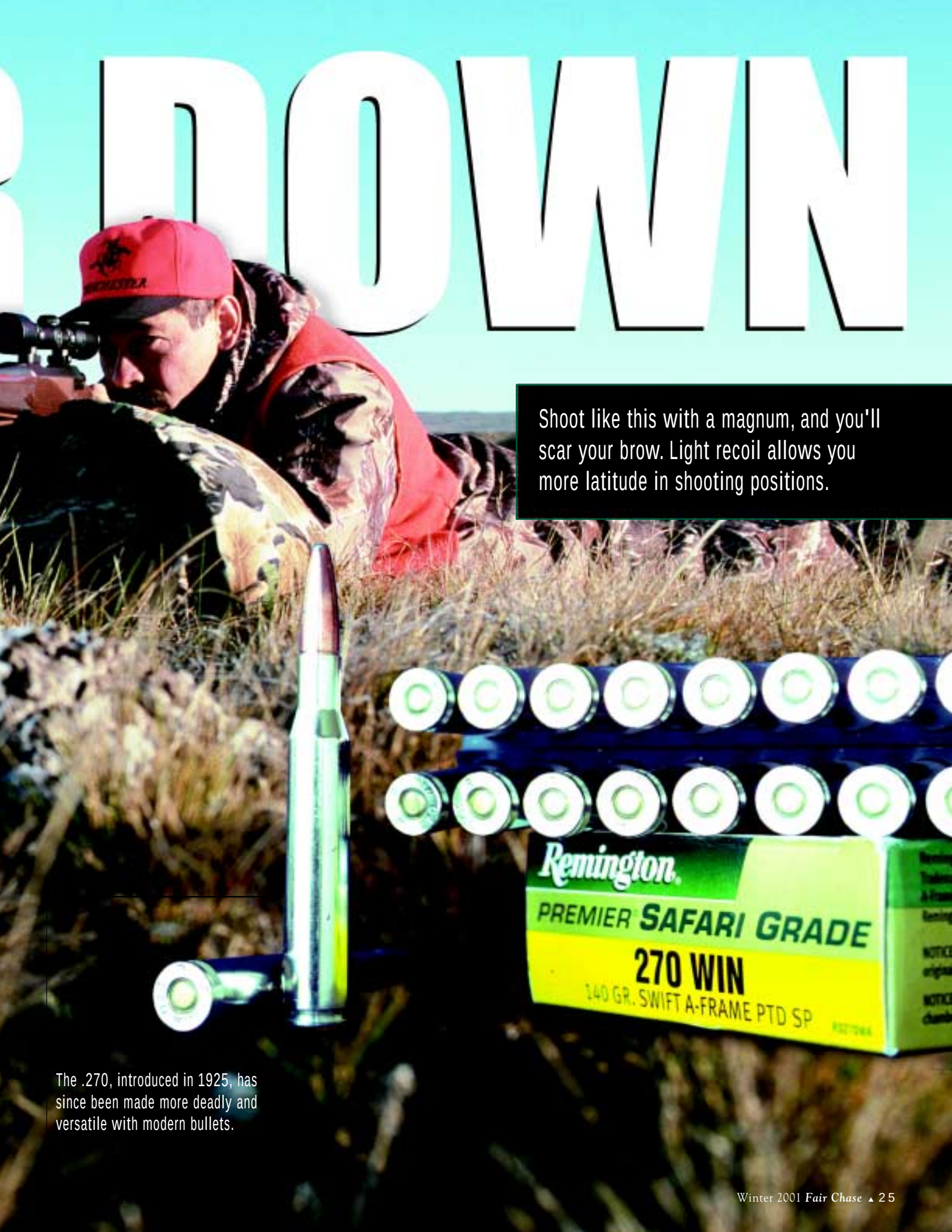
There were no elk on the mountain that he couldn't kill with his magnum. At least, that's what I got from our chat at the cabin. Because all the elk I've seen are indeed mortal, the implication was logical. But years ago I learned that hunters who made a point of their lethality were out to make sure you knew it just in case they didn't prove up. Anyone who talks much about himself doesn't think much of himself, and his opinion is generally on target.

When the trail is long and dark, I get downright philosophical.

This elk hunter would kill a bull, but not until he'd fired several shots, none of which went where an anatomical chart would suggest bullets go. There are indeed no elk on the mountain that can't be killed if you hit them often enough. On the other hand, chewing up the periphery of an elk with a powerful rifle seems a bit like gill-netting brook trout.

R DOWN



Shoot like this with a magnum, and you'll scar your brow. Light recoil allows you more latitude in shooting positions.

The .270, introduced in 1925, has since been made more deadly and versatile with modern bullets.

TABLE ONE

Here are a few factory loads that seem to be adequate for any North American big game out to 300 yards. That's far. (Drop is with a 200-yard zero.)

CARTRIDGE/BULLET WEIGHT, TYPE (SOURCE)	VELOCITY		ENERGY		DROP
	Muz.	300	Muz.	300	300
.25-06 115 Nosler Partition (Fed.)	2990	2300	2285	1350	7.0
.260 125 Nosler Partition (Rem.)	2875	2285	2294	1449	7.4
.270 140 Win. Fail Safe (Win.)	2920	2211	2651	1519	7.6
7x57 139 Hornady SP boat-tail (Hor.)	2700	2137	2251	1410	8.5
7mm-08 140 Nosler Partition (Fed.)	2800	2200	2435	1500	8.0
.280 150 Rem. PSP Core-Lokt (Rem.)	2890	2135	2781	1518	8.0
.308 165 Speer Grand Slam (Speer)	2700	2057	2670	1550	8.9
.30-06 180 CT Partition Gold (Win.)	2790	2192	3112	1920	8.0

It was 30 years ago at a camp in central Maine that Magnum Man came into my life. He was from Boston, I think. Every visiting bear hunter within rifleshot of the Patten highway was from Boston or New York, and the locals treated them both the same. With courtesy. No matter how abrasive, the clients got a welcome befitting their contribution to the rural economy. I didn't have much to contribute, but farmboy innocence must have counted for something, because in short order I was one of the family.

We checked the baits that night, bones with a scent still memorable. Woodsman's Fly Dope, our creosote-based cologne, kept the clouds of no-see-ums circling, landing gear down. Magnum Man and his pretty blonde companion got back first. Cradling a tumbler of something amber, he was telling their guide about his .44 Magnum. "It's got thump like you wouldn't believe. And I can shoot it. Can't I Sugar?" A dutiful nod from Blondie. "If a bear comes within 50 yards, it's one dead bear. She's seen me shoot." He sipped. "Not many people hunt with pistols. They're a tough gun to master. Took me a long time, didn't it, Sugar?" Another nod, and a smile that lit me up, though it didn't come my way. Magnum Man was as good-looking as the black convertible in the drive was expensive. I slunk off to avoid talk that might bring up my bear rifle, a war-surplus .303 SMLE.

A guide saw me and caught my arm.

"He'll miss."

"What?"

"He'll miss a bear."

"How do you know?"

He shrugged and flashed a gap-toothed grin from a field of black stubble. "They talk because they can't shoot. Ordinary rifles kill bears. You'll kill a bear."

As a matter of fact, I did, though the bear patiently hung around after it saw me, while I fought to get free of mosquito netting so I could make out the sights in the failing light. The handgunner missed one bear and crippled another. "We'll find it," he said, when they returned to the lodge that night. "Won't we, Sugar?" Blondie busied herself with lipstick. They didn't find the bear.

Magnum Man has since resurfaced with other artillery in other places. He's not always so good-looking or self-indulging. But he likes to flaunt firepower. Sometimes he can use it to good effect; mainly, though, it handicaps him. In lightweight rifles, powerful cartridges promise grenade-like violence. Before each shot, Magnum Man thinks about that. He can't help it. A flinch results.

Not all magnum cartridges are unpleasant to shoot, and heavy, long-barreled rifles mitigate blast and recoil from the most violent. Still, it's fair to say that if you insist on hunting with cartridges that can stop halftracks in their halftracks, you'll get beaten up by most rifles portable enough to be interesting.

Sir Isaac Newton described recoil when he figured out that for every action there's an equal and opposite reaction. You can calculate recoil's kinetic energy with this formula: KE = MV2 / GC, where M is the rifle's mass and V its velocity. GC is a gravitational constant for earth: 64.32.

Now, mass and weight aren't the same. Mass is really the measure of an object's inertia. The theory of relativity tells us that objects have equal mass if the same force gives them the same acceleration. Using gravity as the force, we equate mass with weight. That is, weight is one measure of the force with which an object is drawn to earth by gravity. Because rifles respond pretty much the same to gravity, rifles of the same weight have essentially the same mass. Enough of that!

To get velocity we have to crunch some numbers. We already know most of them. The formula: V = bullet weight (grs.) / 7000 x bullet velocity (fps) + powder weight (grs.) / 7000 x powder gas velocity (fps). Powder and its gas figure in because like the bullet they are "ejecta" and cause recoil. You can get powder weight from factory rounds by pulling bullets and weighing charges. Gas velocity varies, but Art Alphin, whose A-Square loading manual has an excellent ballistics section, insists that

With smaller cases and modest charges of relatively fast-burning powder, you'll get less blast and barrel jump — and a more efficient launch.

Inexpensive rifles like this Remington 710, chambered for ordinary rounds like the .30-06, give you all the help you need to shoot most North American big game. The scope is a Nikon Titan.

Winchester's .284, offering .270 performance in a short action, didn't set sales records. Ballistically, however, it's not far behind the 7mm Remington Magnum; and it kicks less.

From left, the .30-06, .300 Winchester, .300 Weatherby, and .30-378 Weatherby. Recoil can make you flinch with the big magnums. Better a .30-06 bullet accurately placed.

This British Columbia guide doesn't need more power than she gets from a .30-06. In general, women have a sensible disdain for hard-kicking rifles.

5200 fps is a useful average. The "7000" denominators simply convert grains to pounds so units make sense in the end.

For a 180-grain bullet launched at 3000 fps from an 8 1/2 pound .300 Winchester Magnum rifle, I'd calculate recoil this way: 180 / 7000 x 3000 + 70 / 7000 x 5200 = 8.5 x V. That simplifies to (77.143 + 52) / 8.5 = V = 15.19 fps. Then I can calculate recoil using the first formula: KE = MV2 / GC. My result looks like this: 8.5 (15.19)2 / 64.32 = 30.49 foot-pounds of recoil.

If I reduce rifle weight to 6-1/2 pounds, the numbers change. Skipping the preliminaries, I come up with a recoil velocity of (77.143 + 52) / 6.5, or 19.87 fps. KE then equals 6.5 (19.87)2 / 64.32, or 39.90. That's essentially a 33-percent jump in recoil energy. Hard to ignore. But the same rifle chambered in .30-06 recoils much less severely. In fact, in a 6 1/2-pound rifle it delivers less retina-plucking punch than the 8 1/2-pound .300 Magnum. Lighter bullets in smaller bores make shooting more pleasant still. In an 8-pound rifle, the .270 pats you with only 16.4 foot-pounds. Drop rifle weight to 7 pounds, and recoil climbs to 19.2 foot-pounds. A 6-pound .270 delivers 22.4 foot-pounds, or about 2 foot-pounds less than an 8-pound rifle in 7mm Remington Magnum with bullets of the same weight (150 grains).

Kinetic energy is not "kick." *Felt* recoil can vary significantly among rifles producing the same level of recoil in foot-pounds. There are a couple of reasons for this. One is that while bullet speed figures into the energy calculation, its contribution to rifle "slap" doesn't. Slap is what you get during quick recoil. A bullet that exits fast dumps all its energy fast too. The rifle seems to slap you instead of shoving you. For example, a Ruger Number One with a hot .45-70 Government load that launches a 405-grain bullet at 1800 fps recoils at about 17 fps. So does a .338 Winchester Magnum pushing a 225-grain spitzer along at 2800 fps from another Number One S. That means you absorb about the same-size bundle of energy from these two rifles. But the .338 will likely *feel* more punishing because the bullet leaves faster. The reactive motion peaks more sharply.

You likely wouldn't chamber a super-lightweight rifle for either the .45-70 or the .338 Magnum. But magnums like the 7mm Remington and .300 Winchester, and the new short rimless magnums, often pop up in rifles that weigh less than 7 pounds without scope. The owners commonly think that brutal recoil is the standard fee for using a nimble rifle with enough moxie to kill quartering elk or hit deer half a section away. Those willing to concede that their rifles hurt them can install muzzle brakes that transform kick to blast – a poor trade, in my view. Even if you disregard the danger of hearing loss, muzzle blast is nasty. It contributes to flinching, which is what you wanted to avoid by installing the brake.

With smaller cases and modest charges of relatively fast-burning powder, you'll get less blast and barrel jump – and a more efficient launch. Blast is energy lost to the atmosphere. Only in long barrels do small- and medium-bore bullets fired from magnum-size cases get proper acceleration. Cartridges like the .308 Winchester get their work done in short barrels. Result: tolerable blast and efficient launch in a rifle that doesn't handle like an irrigation pipe.

Accurate shooting from hunting positions depends on perfect trigger control – much more so than does a tight group from a bench. In the field, you often have no artificial support. Only your bones and muscles keep the rifle on target. If you must shoot from an awkward position or at a steep angle, if you're breathing hard or shivering, if the wind is gusting or the target moving, you have your hands full controlling your hold. When you're down to the last ounce on the trigger and your brain screams "shoot!" you can't afford to jerk or even tense your shoulder in anticipation. A lightweight rifle will bob like a cork at the hint of a flinch. You'll miss.

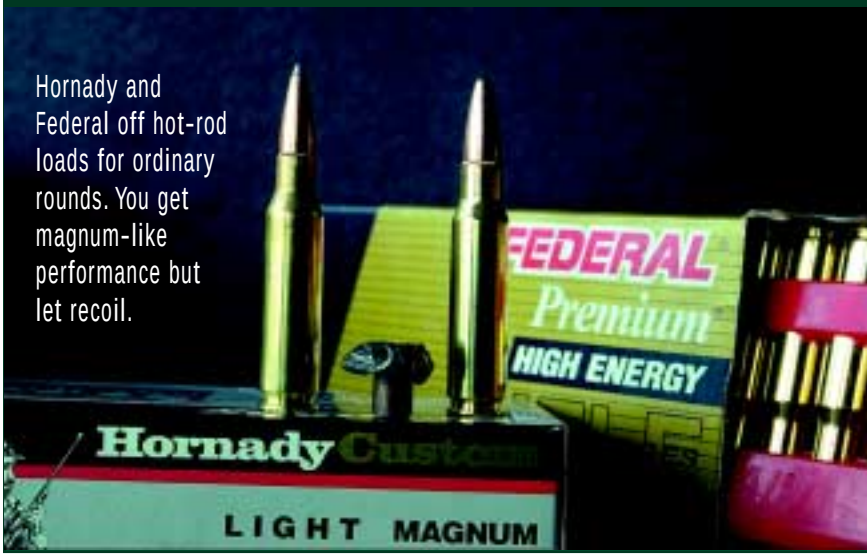
I know, because not long ago I missed an elk that way. It was a short shot, and the crosswire had no trouble staying on the ribs – until I fired. Then it dived, quicker than a ricochet. I'd horsed the trigger.

Such a blunder is less likely if you're used to shooting rifles that don't bite. The other day I was firing a Kifaru take-down rifle in .260. From the sit, I managed to keep three shots under 2 inches at 100

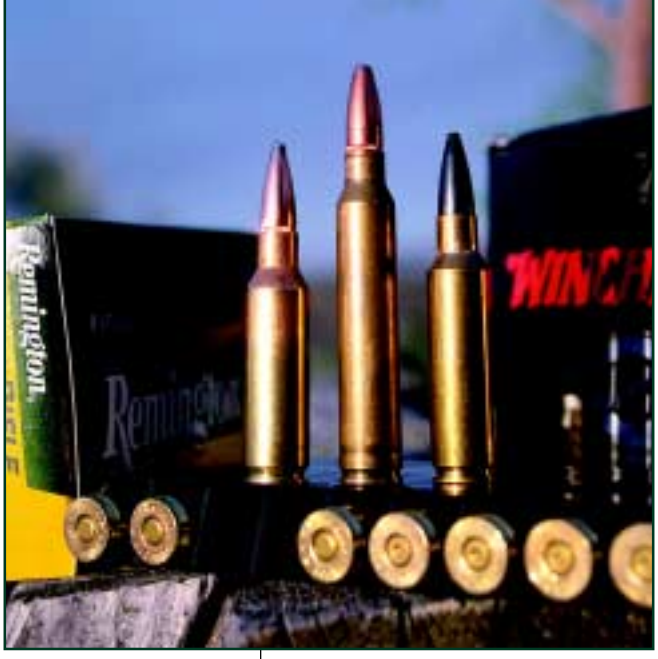
TABLE TWO

For higher velocity in some standard and magnum rounds, shop the Federal High Energy and Hornady Light and Heavy Magnum lines. This ammunition costs more but delivers a substantial boost in performance.

CARTRIDGE	BULLET WEIGHT	MUZZLE VELOCITY STD.	MUZZLE VELOCITY FEDERAL HIGH ENERGY	MUZZLE VELOCITY HORNADY LIGHT MAGNUM
6mm	100	3100	–––	3250
.25-06	117	2990	–––	3110
.270	140	2940	3100	3100
7mm-08	140	2800	2950	3000 (139-gr.)
.308	165	2700	2870	2870
.300 Wby Mag	180	3190	3330	–––
.303 British	180	2460	2590	–––
.338 Win Mag	225	2800	2940	2920



Hornady and Federal off hot-rod loads for ordinary rounds. You get magnum-like performance but let recoil.



The trend to short-action cartridges that perform like longer belted magnums is gaining steam. It's the sensible direction

yards, following with a 4-inch offhand group. Almost certainly, a more powerful cartridge would have had me flinching, because the rifle was very light. And the result would have been all the more embarrassing because, again, lightweight rifles respond most violently to a flinch.

By some standards, cartridges like the .260 and even the 30-06 seem just shy of anemic. But those standards could use some tweaking. They're skewed by platoons of super-powerful cartridges that deliver more energy and flatter flight than most hunters can use. When the .30-06 appeared a century ago, it was the second most potent infantry cartridge in the world (behind, believe it or not, the 8x57 Mauser!). It also outperformed hunting rounds like the brawny .33 Winchester. At 2700 fps, 150-grain bullets from the .30-06 sped downrange 800 fps faster than 160-grain bullets from the .30-30, by contemporary measure itself a "high-velocity" cartridge. By the time World War II thundered to our door, only a few new hunting rounds had challenged the '06. One was the .250 Savage, developed around 1912 by Charles Newton (whose own line of rifles and rimless high-performance cartridges, designed with Fred Adolph, failed at market). The .300 Savage, circa 1920, was an attempt to bottle .30-06 performance in a case suitable for short-action lever guns. That proved too lofty a goal, but the cartridge prospered. In 1925 Winchester announced the .270, essentially a small-bore '06 that shoved a 130-grain bullet downrange at a blistering 3100 fps. And Western Cartridge Company started loading the .300 Holland & Holland Magnum.

The .300 H&H, or Super .30, was the first of many cartridges on the belted .375 H&H case. And the first cartridge to put the .30-06 in the backfield. The .270 had gained its speed by taking a cut in bullet weight. The .300 Magnum sent a 180-grain bullet out the muzzle 200 fps faster than the .30-06. Its case capacity (86 grains of water) was 28 percent greater, and it generated about 40 percent more recoil. Roy Weatherby boosted its performance by reducing its significant taper. From it Weatherby, then Winchester, then Remington fashioned the first short magnum cartridges – so called because they would fit in 30-06-size actions. The 2.85-inch hull of the .300 Holland needed a longer breech.

Beginning in 1994 Don Allen assembled a line of cartridges based on the rimless .404 Jeffery case shortened to match 2.50-inch magnums. John Lazzeroni followed with cartridges designed from scratch but close in dimensions to the full-length .404. Remington's Ultra Mags came next, long rimless rounds that didn't match the Lazzeroni's or Weatherby's new .30-378 and .338-378 for capacity but beat the short magnums over the chronograph. Meanwhile, John Lazzeroni was fielding a series of rounds that would redefine "short." They fit in actions designed for the .308 Winchester's 2.0-inch case. But their .580 head and scant taper gave them the capacity of longer belted magnums. Though Remington had failed to market super-short magnums (the 6.5 and .350) in the mid-1960s, Lazzeroni's effort interested shooters. The .300 Winchester Short Magnum resulted. Next, Remington announced 7mm and .300 Short Ultra Mags.

By my total, we now have 17 domestic rimless and belted magnum cartridges – in 7mm and .300 alone! That's counting only rounds that equal or exceed the performance of the 7mm Remington Magnum and the .300 H&H Magnum.

But the deer that we're shooting are the same as when the .25-35 was popular. Elk don't grow any tougher now than in 1939, when a survey of 2300 Washington hunters showed the .30-06 to be most potent by far of the six most popular elk rounds – which also included the .30-30, .30 Remington, .30-40 Krag, .35 Remington and .300 Savage. The British Columbia trapper who years earlier bought a brand-new rifle in .303 Savage and managed 18 kills (two grizzlies!) with his first box of cartridges might gape at the size of big game rounds now. He might also stick with the .303.

It makes sense to choose a cartridge that will shoot to the ability of your sight. Scopes now help us hit well beyond the effective range of .303 Savage. On the other hand, it's not necessary to hit animals harder than a .303 did at close range, with its 190-grain bullet loafing along at 1940 fps. Ballistics tables show that a 180-grain .30-06 bullet delivers that much speed at 400 yards! Few riflemen can keep bullets in the vitals at greater range under field conditions, no matter the rifle or scope. In fact, 250 yards is a long shot for many hunters – not only because the target looks small, but because you can often get closer than 250 yards. At 200 yards, a 180-grain Nosler factory-loaded by Federal and fired from a .30-06 dumps about 2150 foot-pounds of energy, or 15 percent more than a .30-30 generates at the muzzle.

A .300 Winchester delivers more, of course – though less than some shooters suppose. Its payload at 200 amounts to 2395 foot-pounds. At 400 yards, the difference is dramatically less: 1550 for the .30-06 and 1585 for the .300 Winchester Magnum. How come? Well, the faster a bullet is launched, the greater the air resistance. Stick your hand out a car window at 30 mph, then at 70, and you'll notice the difference. Drag levels the playing field early in the game. As bullets decelerate, drag eases up. The faster bullet will always have an edge, at least over normal hunting ranges. But a .300 Winchester dumps about 35 percent more recoil than a .30-06 of the same weight, and you get precious little more killing energy.

Similar disparities show up in bullet arcs. Zeroed at 200 yards, a

.30-06 plants a 180-grain Nosler 8.6 inches low at 300 and 24.6 inches low at 400. The same bullet booted nearly 300 fps faster from a .300 Winchester Magnum strikes 7.5 and 22.1 inches low. Not much difference. In fact, the .308 Winchester, a much smaller cartridge, hits within 2 inches of the Magnum at 300 yards. At 400 you'd have to shade just a little over 4 inches high. Incidentally, that .308 bullet delivers more than a ton of energy to 200 yards and hits harder at 300 than the .300 Winchester at 400.

You can play the same games comparing the .270 with the 7mm Remington Magnum. It's easy to find wider performance gaps between magnums and ordinary cartridges. But at some level, it makes sense to think about how much impact speed you need to open the bullet, how much energy you must drain inside the animal to make a quickly-lethal wound and how flat the bullet must fly to give you a reasonable point-blank range. Table 1 (page 26) shows a few factory loads that seem to me adequate for any North American big game out to 300 yards. That's far. (Drop is with a 200-yard zero.)

You might include other cartridges; certainly there are other loads. In fact, you can choose from nearly 80 factory loads for the .30-06 alone! Many feature bullets once available only to handloaders. For higher velocity in some standard and magnum rounds, shop the Federal High Energy and Hornady Light and Heavy Magnum lines. This ammunition costs more but delivers a substantial boost in performance. A two-stage powder-charging process, and propellants not sold on the component market, yield the higher speeds without exceeding SAAMI pressure limits (see Table 2 on page 29).

Not that you need more punch or a flatter flight than you get with ordinary loads in cartridges like the .308. Roy Chapman Andrews shot all manner of game with the .250 Savage, whose 100-grain bullet carries only 1000 foot-pounds to 200 yards – less than a .270, 7mm-08 or .308 brings to 400. Settlers in East Africa used the .303 British to good effect, mainly with the old 215-grain round-nose bullet that flew slightly flatter than a cinder block. Its high sectional density aided penetration in tough game at the modest ranges tough game was shot. Surplused in Canada, SMLEs have also accounted for thousands of moose.

As we take for granted power steering in automobiles, and telephones that travel, our expectations of rifle cartridges are as much influenced by what's available as by what's needed.

"I don't like recoil at all." The fellow outweighed me but apparently didn't think big men needed to shoot big cartridges. He preferred a .243 for elk and killed them neatly with it. Another amigo has used a .25-06 to take more than 20 elk. The last shot spanned over 400 yards. A single 100-grain Hornady was enough. "I don't like to shoot that far, but there was no doubt that if the bullet went through the front slats it would kill the bull. I've shot enough elk to know." More to the point, he's shot that Remington 700 year round at enough 'chucks, coyotes and paper targets to shoot it well. Deer are no challenge when you've hit marmots at 350 yards. Elk may be tough, but if you can confidently thread a bullet through the aorta, there really isn't any option for the bull but to die.

My gun racks hold several magnum rifles. Some are accurate, but none seem as easy to shoot as rifles chambered for cartridges now considered ordinary. It's useful sometimes to read about the exploits of hunters using rounds like the .300 Savage when *they* were the titans. And to let a friend load your rifle only sometimes while you shoot from hunting positions, just to see if the rifle jumps when the chamber is empty. It's a good idea to decide whether you need the mayhem that caves your clavicle and mashes your molars each time you pull the trigger. Before you start flinching in your sleep. ▲▲▲

Remington's titanium rifle weighs a mere 5-1/2 pounds. It's properly chambered for cartridges that develop less than 25 foot-pounds of recoil in rifles of that weight.