Springs

[the most important parts]

Glen Zediker

Changing your tune from music wire to chrome silicon means you won't be changing springs again (probably ever). They cost more, but hard users call it a value. This material has greater resistance to change under heat and stress than does music wire.

ORIGIN: This is a jist of an article I did for another magazine. I added a few things that I don't send to magazines due to space concerns.

Whoa. This has to be boring. With all the uber-cool things to talk about, like magazine loaders and flashlight holders, why spend time on springs? Fair question, and, of course, I have an answer. AR15s, like all semi-automatics, run on springs. Without springs your AR15 won't work at all. It couldn't even make that cool chunka-chunka noise that tells us it's alive. There are springs galore. Some don't do much more work than a paperclip, but others control systems functions, which means function quality. The most stressed and important springs (related) include the trigger return, hammer, ejector, extractor, and, of course, buffer. Not many firearms have a spring bigger than that last one. It makes the gun run, so chunka-chunka first, along with essential preamble —

Plain Old Springs

OEM (factory provided and GI contract) coil springs in AR15s are made of music wire. There are alternatives, which we'll talk about, but the next comments refer to stock items. Many folks believe that a coil spring can live forever. It won't. A percentage of these same folks may tell you that a spring will "take a set" and then settle that way forever. It won't. What they are saying is that a coil spring shortens (the "set"). They are right if they say that the initial shortening happens relatively quickly. In its first 100-300 cycles a spring will, indeed, shorten a noticeable (easily measurable) amount. Progress will be slower from that point, but it never ends. Coil springs get shorter and shorter (also weaker and weaker) with each operational cycle. A spring will also lose some "spring" just sitting compressed (magazine springs show this). Some springs also work harden, making them more susceptible to breakage as they bounce along through their lives. Sort of like geologic time, it's hard to see the teeny amount of spring breakdown that occurs each time the bolt carrier cycles, but it adds up. At a tic or two per whack, there's about 5000 rounds paramount life from a music wire buffer spring. That doesn't mean the rifle won't run further, just that it won't be running like it was when the spring was new. Many of the "mystery malfunctions" that turn up around this point in an AR15's life can be traced to the buffer spring sacking out (because a new spring very often cures them). All other "working" coil springs in the rifle also have functionally proper lives that vary, but all will last longer than they can perform up to spec.

Complete spring failures aren't common, unless you're a full-auto sadist. One optics company I know of does torture tests on its sights by mounting one on a rifle and then subjecting it to virtually continuous full-

Here's a flat wire chrome silicon buffer spring. The idea is to make a spring that can't be even close to fully compressed in an AR15 or AR10, and the reason is more consistent operation. I don't like having to get so technical, but springs work better when they're springier. This flat wire spring increases load against the carrier about 25-percent but isn't unduly stiff in operation.

auto fire. They run magazine after magazine after magazine through their M4-style carbines (up to 100 30-round mags without a break). Company name doesn't matter here because they're known for testing optics, not springs, so haven't collected data they'd want to back up. However! After hundreds of thousands of rounds experience torturing springs, they say that buffer spring breakage is absolute (usually between two and four coils from the front). The fewest rounds before a failure so far 12,000 and the most has been 22,000. Failure factors at work under the circumstances these rifles are fired under compound, but heat transfer has to play its part. Music wire is adversely affected by heat as low as 175 degrees F. Work hardening is another, and, related, the impulses that travel through a spring exist well beyond the expected back and forth compression and rebound stresses. Under high volume cyclic operation, the spring is enduring at least double the stresses per cycle as it would in slow-paced semi-auto fire.

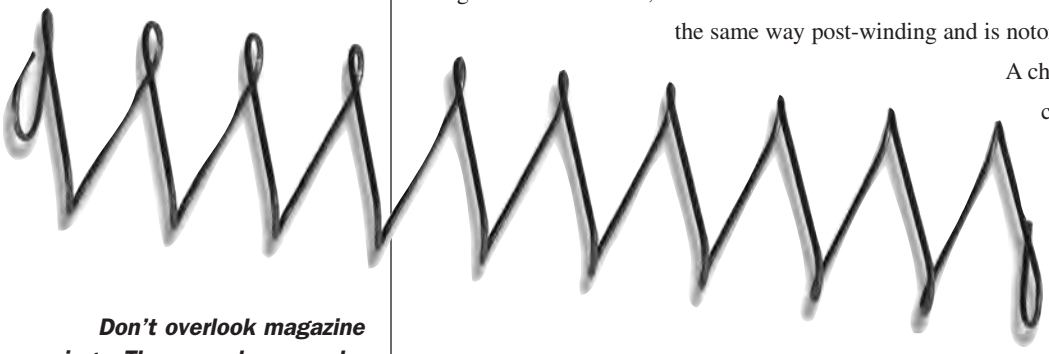
This same outfit goes through a whopping lot more ejector and extractor springs than buffer springs. Ejector springs usually break in the middle, and usually at about 8000-9000 rounds, frequently requiring a small drill to remove (it kind of welds itself to the bolt body). Extractor springs fail fastest; 3000 rounds is about tops in continuous full-auto fire. Breakage usually occurs just out of the recess of the extractor itself.

Now, in my brand of shooting, which is NRA High Power, I have not had a spring failure. I have seen the effects of worn springs, and that is manifested in changes in rifle function. For instance, an extractor stops extracting or a buffer spring becomes a poorer buffer. At the least, I would suggest that any AR15 owner change springs (all the "main" ones already mentioned) at a minimum of 5000 round intervals, half that if you're a competitive shooter. There are alternatives; keep reading.

Zoot-Capri Springs

Beyond meeting blueprint specs, performance enhancements can be found through aftermarket spring replacements. I'm a big believer in stouter buffer springs. Such a spring keeps the bolt locked a little longer after firing. Increasing the capacity of ejector, extractor, and hammer springs won't hurt either. Many semi-auto shooters will be familiar with aftermarket "extra-power" springs for various applications, and these (usually) improve overall function. From a certain perspective, life can increase through installation of an extra-power spring, but only because it starts off a little stouter. If it's made from music wire, use will still show the same effect and similar rate of breakdown. If you're looking to maintain new spring performance, replacement intervals will

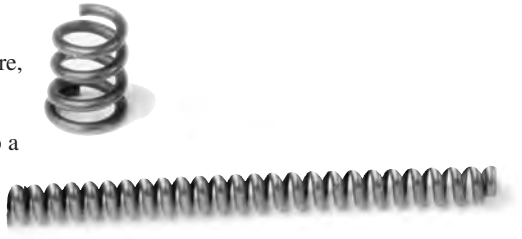
Ejector and extractor springs endure a lot of stress, and use and time affect these system's function. A better spring is a better solution to extraction problems than the little "D-ring" inserts. Preloading a spring to make it "stronger" isn't as good as redesigning the part for higher capacity operation. The extractor spring offered by SSS Inc. is about 80-percent harder working than stock.



Don't overlook magazine springs. They are always under pressure, even when the magazine is empty. Fill it and leave it and there's more breakdown likely over time. Some aftermarket springs, such as those from Superior Shooting Systems and Brownell's Inc. also have redesigned follower angles for better operation. If you have an AR15 magazine that won't work, it's often the spring. The main symptom of spring sack here is the bolt overriding a round. Brownell's has very effective spring and follower packages that will bring most any magazine back to life.

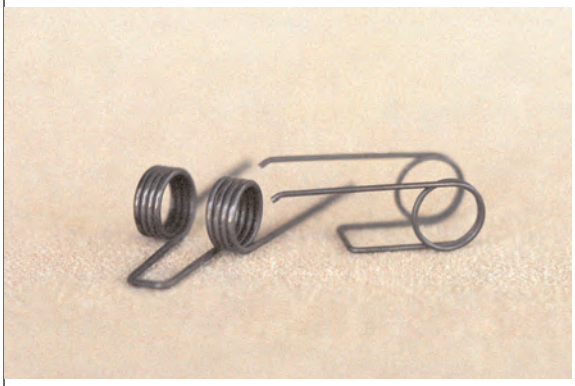
There is a comprehensive article on spring materials and design on this web site for those interested in learning more. The article is written by David Tubb.

remain unchanged.



As said, most AR15 springs are made of music wire, which is what almost all gun springs are made of. That material is relatively cheap and fairly easy to make into a spring. A better material is chrome silicon alloy. It's what goes into race car valve springs and the like (used when resistance to breakdown and heat is important). It's available to the firearms industry almost exclusively through the aftermarket. Chrome silicon springs cost more and take more effort to make, or at least by those who make them for all they're worth. A well-executed chrome silicon spring is heat-treated and shot-peened after being wound. These steps help ensure that the spring is what it should be. They are also made using certified materials, which means that lot-to-lot variances aren't an issue. Music wire can't be improved in the same way post-winding and is notorious for lot-to-lot inconsistencies.

A chrome silicon spring will still take a set and continue to degrade, but the difference is that a chrome silicon buffer spring, for instance, will last about 500,000 rounds at optimum performance instead of 5,000 rounds. That's big. Other chrome silicon springs demonstrate the same sort of comparative life increase. I sho hain't no engineer but do understand that the operational characteristics of chrome silicon further enhance spring performance. A buffer spring, for instance, exhibits the same (or improved) bolt unlocking delay and increased rebound strength as an extra-power music wire spring, but the chrome silicon spring may not be technically "extra-power."



I've spend beacoup time messing with trigger springs. The idea is to get faster locktime and, of course, a lighter break weight. That means more spring on the hammer and less on the trigger return spring, usually. For a two-stage trigger, upping trigger return spring resistance can allow for a lighter break weight and still maintain a higher total weight, as is necessary in NRA Service Rifle competition. Here is where I've seen the most help from chrome silicon springs. As the trigger group is used, lock time is getting slower and trigger pull is changing. I've been using chrome silicon trigger return and hammer springs for a few years now, and haven't had the pull change. Caution: too much hammer spring accelerates wear on trigger engagement surfaces.

SUPPLIERS

Superior Shooting Systems Inc.
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Brownell's Inc.
641-623-5401
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