CASE STUDY:

Firing Pin Alternation in Glock 17. ***June, 1997***

This example shows how the TriggerScan system can examine a gun's trigger action performance with two different firing pins. TriggerScan is used to examine the characteristics of the firing pin spring and also to determine the trigger profile and lock time before and after the firing pin alternation. The first striker is the original factory one, the other is a titanium striker marketed by Lightning Strike Products, Inc. - a Glock certified armorer.

Lock time obtained by the TriggerScan instrument is compared with results and also by two different methods of theoretical calculation. The lock time results are summarized in the following table:

	Original striker	Titanium striker
Lock Time Measured [ms]	3.1	2.2
Lock Time Calculated by Method 1 [ms]	3.2	2.2
Lock Time Calculated by Method 2 [ms]	3.0	2.0
Weight [grams]	7.45	3.05

Measured lock time is very close to the theoretical results. Calculation method 1 employs a simplified algorithm assuming uniform spring force and acceleration. Method 2 is a computer simulation of striker movement which counts for changing spring force and acceleration. Calculations are based on data which I obtained by measuring and weighing the actual gun parts.

The titanium striker is lighter than the original by 59%. The lock time with the new striker is reduced by 29%. This is because the lock time is proportional to square root of striker mass. The 1 millisecond difference in lock time basically means that if you actuate guns with the original and lightweight strikers simultaneously, the bullet is already out of the muzzle with the lightweight striker while the original striker is just coming in contact with the primer. This should mean improvement in accuracy.

The non-conductive parts in the Glock firing pin assembly pose a slight difficulty in obtaining a good reading repeatedly. About one out of ten readings is erroneous. This does not happen with other (all-metal) guns and I believe the problem could be eliminated by replacing the plastic striker bushings with metal ones.

The new striker impacts the primer with the same amount of energy as the original one, but it has a 49% higher velocity and 33% lower momentum of inertia. During test fire I noticed that the gun "wipes the primers" with the lightweight striker. Naturally, the low inertia striker does not oppose the primer flow as well as the heavier original. Nevertheless, ignition is reliable and probably even better *. During dry-firing I could feel the difference in recoil generated by the two different firing pins. The blow of the low inertia titanium pin does not jar the pistol as much as the heavier original, which should enhance accuracy. The sound of the low inertia striker blow is a very distinct "ding" rather than a traditional "click".

The trigger profile is practically unaffected by the striker alternation. It could be affected though, if the catch on the new pin had a different roughness, radius or angle. Competition shooters would probably like to improve the rough mating surface of the sear, which is as stamped. Any of these alternations would be pure guesswork without proper instrumentation.

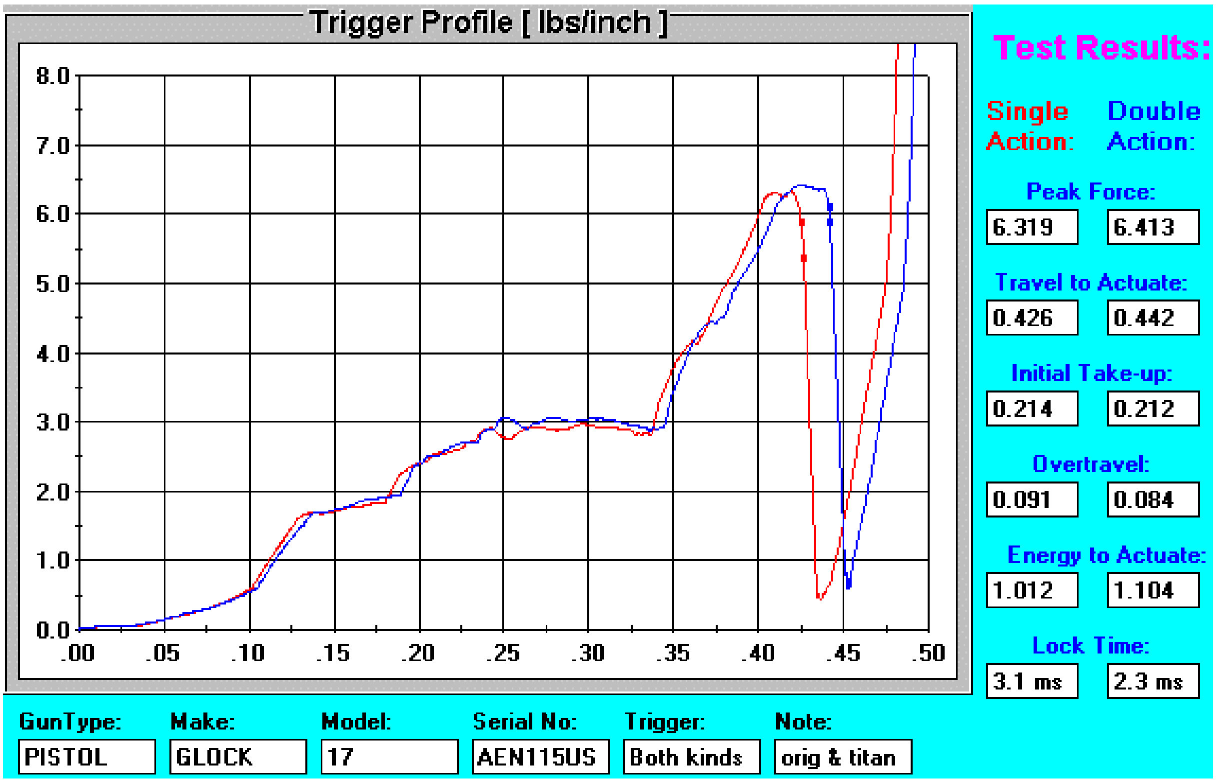
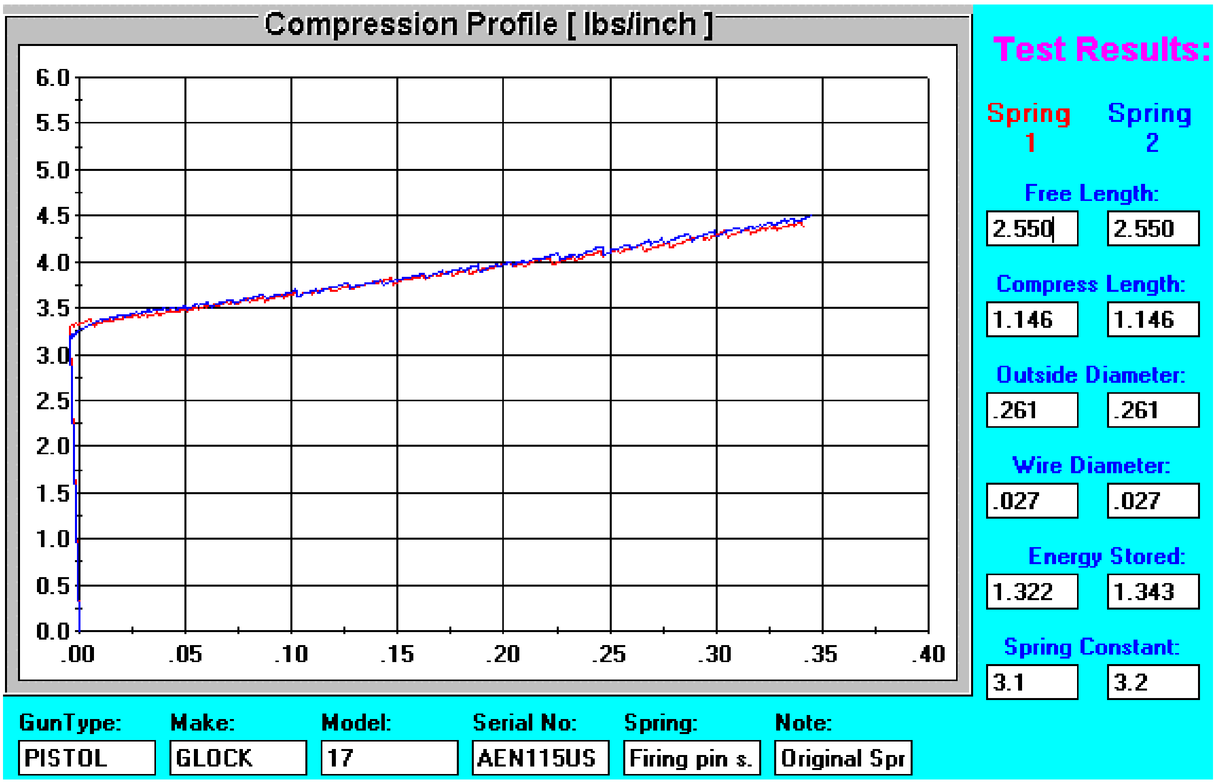


Chart above shows the trigger profile with the original pin (red) and with the titanium pin (blue). The variation could be a result of my experimenting with the shape of the new striker. Test results, automatically generated by the software, are also shown above. In both cases the trigger breaks at little over 6 pounds and has a travel of almost .45 inch. There is a fair amount of initial take-up and modest overtravel. Energy to actuate the trigger is the amount of work needed in order to cause the gun to fire and can also be thought of as a measure of safety against an unintended shot. It is graphically represented by the area under the curve. The trigger profile is relatively smooth with little roughness. The shape of the trigger profile curve is typical to a Glock pistol.



The chart above, also generated by the TriggerScan instrument shows the compression profile of the striker spring. The same test is repeated twice here in order to get a more accurate result. The spring energy and spring constant are calculated automatically. The spring stores 1.33 inch*pounds, or 0.15 Joules of energy. This energy is delivered by the striker to the primer, neglecting friction losses. The spring constant, or stiffness, of 3.15 pounds/inch, or 552 N/m is used in theoretical lock time calculations.

The study shows, that TriggerScan system can assist you in fine tuning the trigger action in many different ways.

* It might intuitively seem that if two strikers have the same energy, the heavier of the two will be more effective in detonating the primer. The opposite is true. Studies done by others (SAAMI, U.S.Army, Olin Corporation) show, that at a given energy level a high-velocity/low-inertia impact is more desirable for reliable detonation of the primer than a low-velocity/high-inertia impact.

Calculations for both method 1 and method 2 are not shown here. There are several pages. We can provide them to you upon request.