

Anatomy 101: RCF-65 Seat Belt Buckles



THE LAP SEATBELTS ON MY 1967 Corvette Convertible were in terrible shape with rust stains on the buckle ends, and the inability to easily adjust the seat belts. With every new passenger (particularly my significant other), it became a long protracted affair to get the belt properly adjusted. When it came to my wife, the solution was usually "Oh, forget about it, Let's take my car."

So, I decided to put the seat belts on my list of Corvette projects. Rather than send them out for some expensive restoration job, and having the desire to tinker with things,

I took on the restoration myself. I asked a lot of questions on the NCRS Technical Discussion Board, researched the archives and the Restorer CD, and did some other research on the history of seat belts, and this particular model of seat belt buckle.

The RCF-65 Seat Belt Buckle was used on late 1966 and 1967 Corvettes, as well as 1966-67 GM passenger cars (Chevelles, Impalas, GTOs, Buicks, Cadillacs, and so on) as deluxe seat belts. They may have been used on passenger cars in 1968 and after, although seat belts in Corvettes I believe were changed in 1968. The RCF-65 was invented by Robert C. Fisher, thus RCF, and was patented in 1965. Robert C. Fisher was a GM employee, and holds numerous patents on seatbelts and parts of seatbelt assemblies up through 1977. There is an RCF-67 seatbelt buckle which was a smaller version of the RCF-65, used through the 1970's and which was probably the most plentiful seatbelt buckle used.

Taking the Thing Apart...

To commence the project, the first thing I had to figure out was how to get the buckle apart without breaking anything. I posted a question on the NCRS Board and had my answer by day's end. You insert a small flat blade screwdriver between the buckle top and back on the end opposite the tongue receiving end, and then pry up and out on both sides. The buckle top then pops off with the button insert.

To disassemble the other parts from the buckle back, it's easiest to unstitch the end of the belt. The belt retainer has a strap around it whereby a triple fold of the belt will not fit through. It is possible to remove the pawl plate and pawl spring without removing the belt from the retainer with a little work, but my belt retainer was rusted and you have to remove the belt to get to that part. Once the belt is removed, the belt retainer, pawl plate and pawl spring just slide out of the buckle back.

The Parts...

The second photo is of a disassembled RCF-65 Seat Belt Buckle showing the six refinished parts to it. The six parts are as follows (this, by the way, is my terminology):

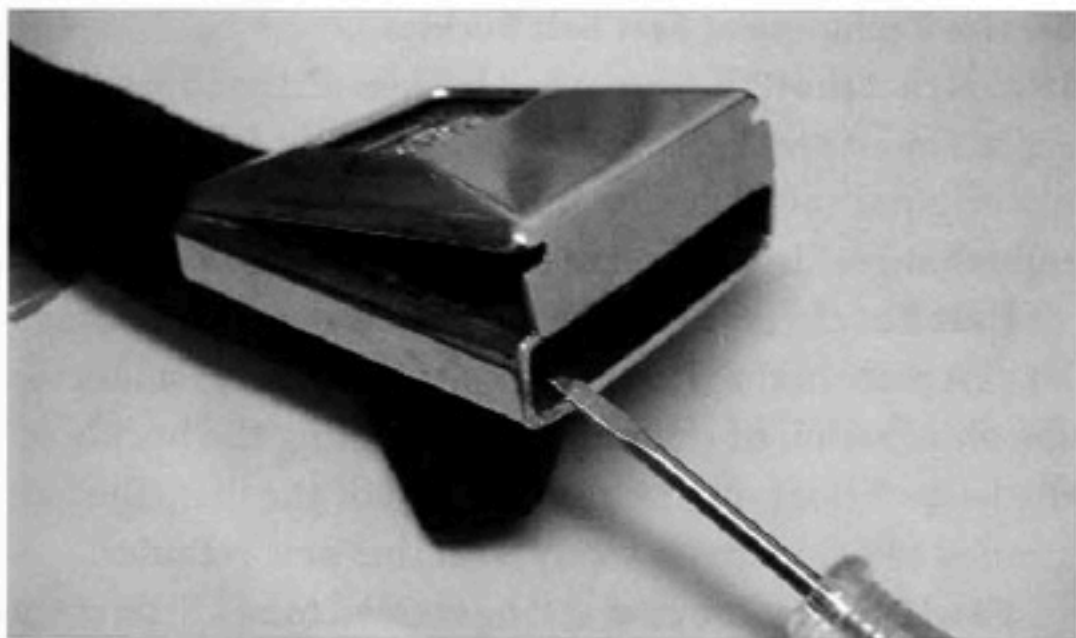
1. Upper left: the Buckle Back. This part is chrome steel and has "Hamill RCF-65" on the underside along with use instructions.

2. Lower left: Belt Retainer. This is a cast steel bar with rounded top and flat bottom. It has a bent steel strap around it that is peened in place at the ends of the cast steel bar. The Belt Retainer slides into the Buckle Back (after parts 3 and 4 are in place), The seat belt goes up through the slot in the buckle back, then between the strap and bar of the retainer, around the bar, and then back through the slot in the buckle back.

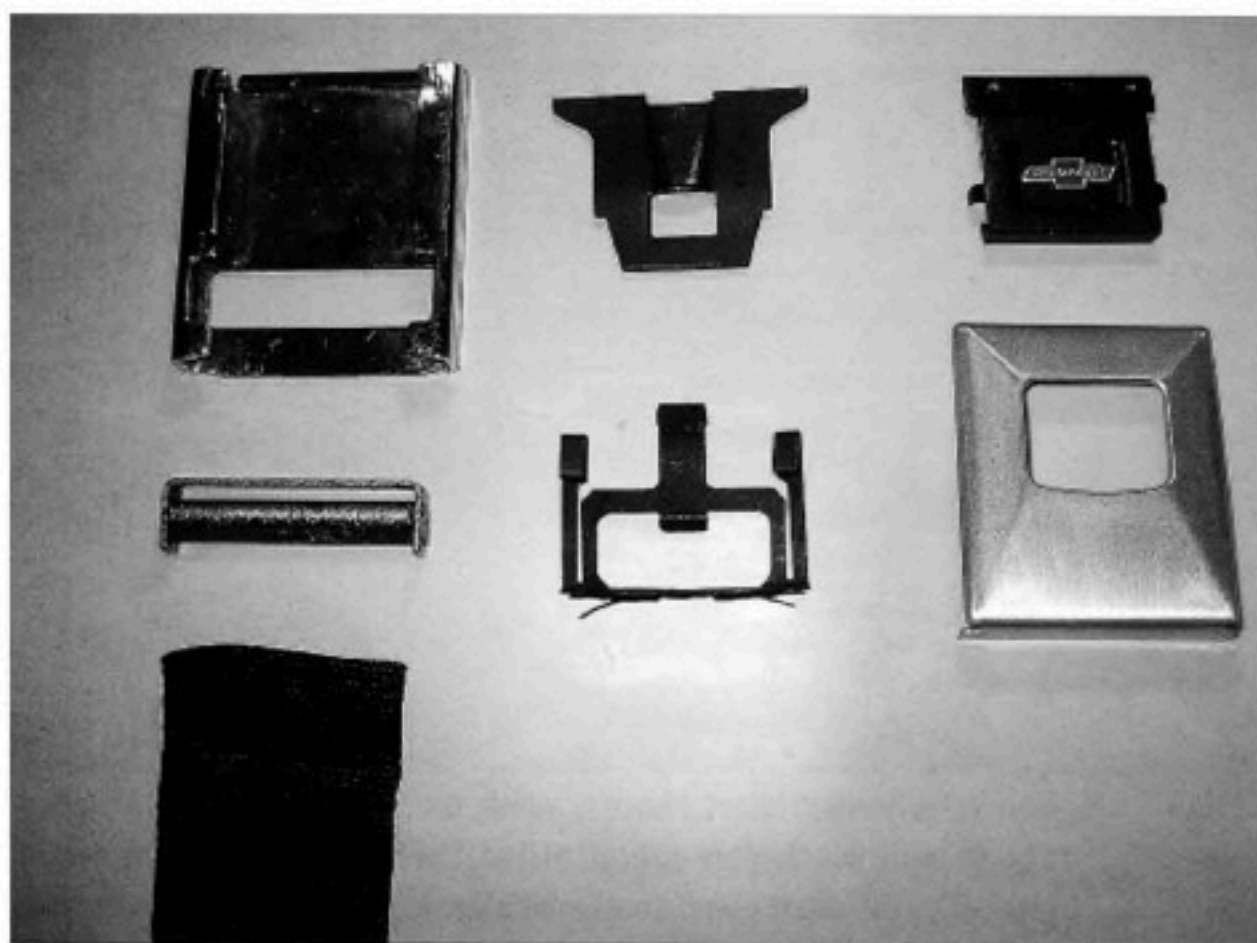
3. Upper middle: Pawl Plate. This is a pressed steel plate that wedges into and pivots along the tongue side of the buckle back. The raised edge along the rectangular hole in the Pawl Plate engages the tongue of the other side of the belt.

4. Lower middle: Pawl Spring. This is a complicated spring steel bent assembly which goes under the pawl plate and holds the Pawl Plate in an upward position to engage the tongue. Compressing the Pawl Plate and spring downward releases the tongue. The Pawl Spring also has a couple of spring ears on the lower vertical part that bear against the strap on the belt retainer and hold the belt to a locked position around the belt retainer and to the buckle back.

5. Upper right: Button Insert. The button insert is a decorative painted metal piece that includes a riveted-on logo. I believe that most Corvettes have the Chevrolet Bowtie although there are some reports of the Fisher Body logo in the Judging Manual. I believe that the Bowtie is probably unique to the Corvette, as all the other passenger car buckles I've seen with the same model buckle have either Fisher Body or GM logo on them. The Button Insert pivots along the edge of the Buckle Top and sits on top of the Pawl Plate.



In order to disassemble the buckle, insert a small flat blade screwdriver between the buckle top and back on the end opposite the tongue receiving end, and then pry up and out on both sides. The buckle top then pops off with the button insert.



This is a photo of a disassembled RCF-65 Seat Belt Buckle showing the six refinished parts. They include: Upper left- the Buckle Back; Lower left - Belt Retainer; Upper middle - Pawl Plate; Lower middle- Pawl Spring; Upper right - Button Insert; Lower right - Buckle Top. Detailed information is included in the text.

6. Lower right: Buckle Top. The Buckle Top, although it looks like solid stainless steel, is of plated steel with a brushed satin finish (try a magnet on them). The Buckle Top pivots around two tabs in the Buckle Back at the tongue end and then snaps over the opposite end with a pressure fit.

Putting It Back Together...

The parts go back together in reverse order of disassembly. The "Pawl Plate" is assembled to the top of the "Pawl Spring" first. This assembly is then slid into the "Buckle Back". The "Belt Retainer" is then slid into the back, with the strap against the "Pawl Spring", and the rounded surface to the top. The seat belt is then brought up through the slot in the "Buckle Back", between the strap and bar of the retainer, around the retainer bar, and then back through the slot in the "Buckle Back". The button insert is then inserted into the pivot groove in the "Buckle Top" at the tongue end. Hold the buckle vertical with the tongue end down, and align the groove on the top with the tabs on the back and get ready to snap the top (with the insert in place) over the upper end of "Buckle Back". Before you snap it shut, test the button to make sure it moves against the pawl plate and spring free and clear. If so, snap it shut by squeezing the buckle together.

Component Finishes...

Buckle Back: Luckily, the outside of the buckle back was in fairly good shape although I had some rust and corrosion on the inside from the Pawl Spring. I wire brushed the



Here's the finished insert. I have to admit, the insert was a little banged up to begin with, but they are difficult to find. The bowtie is cast metal, riveted or staked to the insert plate. Another NCRS member pointed out he removed it from the insert plate, sprayed all the parts, and JB welded it back on.

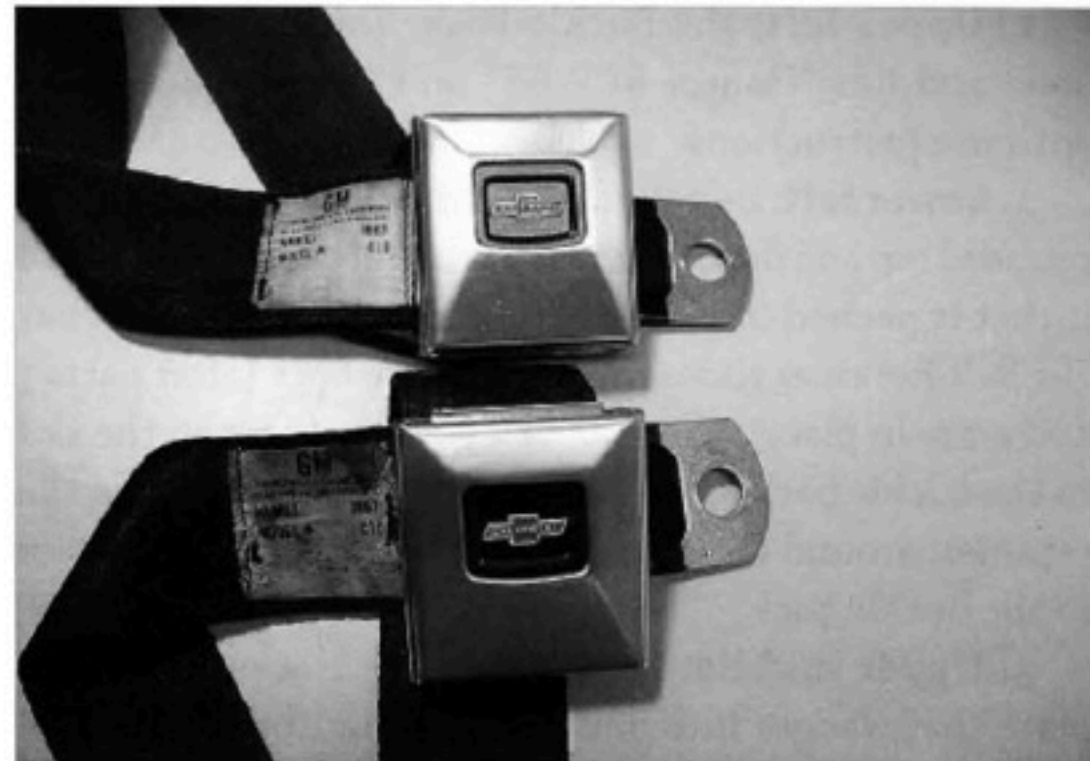
corrosion off with a Dremel wire brush, and then applied a Simichrome Polish to the inside and outside.

Belt Retainer: On the first belt, this part was so rusted I couldn't tell what the original finish was so I assumed bare metal. On the passenger side buckle, I found remnants of a gold dichromate or anodizing. I soaked these parts in Naval Jelly and Jasco Metal Etch. I wire brushed them with a wheel on a drill, and then with a Dremel wire brush, to bare shiny metal. Next, I then sprayed them with Eastwood gold dichromate base. The proper finish here would be zinc or cad plating with a dip in yellow dichromate.

Pawl Plate and Pawl Spring: The Pawl Plate and Pawl Spring had a flat black finish, probably black phosphate on the plate and enamel on the spring. I soaked these in lacquer thinner, followed by metal etch, cleaned them up, and spray painted them with flat black Rustoleum.

Button Insert: I spent the most time with the Button inserts mainly trying to find the right color blue for the bowtie. Working from a pictures of original buckles and restored ones, as well as my original buckles, I experimented with no less than six shades of nail polish and Ford and Chrysler touchup paint (OPI Aruba Blue was close, but with no cigars). Finally, I went to the local hardware store for the spray paint color charts. I found that Denim Blue was about the right color although too light, and Royal Blue was too dark, so I bought a can of each and decided to mix them.

After stripping all of the paint from the inserts by soaking in lacquer thinner, I then mixed the two spray paint colors by spraying into jar, first the lighter color and then the dark, and thinning with lacquer thinner. At about 50-50 I finally got what I thought was the right shade of blue.



The finished product. I left my original tattered labels on as they were original, and only one was stamped 7E67, which is the 7th week of 1967. This is quite a lag to the June 29th 1967 assembly date of the car. If I ever change the webbing, I'll get reproduction labels, but these belts washed in Simple Green looked pretty good to me.

With a very fine brush, I flooded the Bowtie with the mix on a horizontal surface. Once that dried, I then rubbed off the paint on the edges of the Bowtie and on the Chevrolet lettering, first with a flat piece of wood and then with an Exacto knife. The next step was to mask the Bowtie with blue painters take, and cutting around the Bowtie with an Exacto knife. Once masked, I spray painted the insert with semi-flat black dash paint.

Buckle Tops: My buckle tops were badly pitted with the lower plating showing through, and one was even bent and cracked. If they are pitted or heavily scratched, there is not much you can do with them, except send them out for re-plating or look for replacements from Corvettes or passenger cars at junkyards. Since one of mine was bent and cracked I opted for the latter. As I was scheduling a junkyard expedition, another NCRS member seeing my post of the insert, offered me a pair of 1976 service replacement belts with buckles in good shape, and I took it.

Service Replacement Seat Belt Buckles...

I found that the RCF-65 seat belt buckles on the 1976 service replacement seat belt buckles were slightly different than my original 1967 buckles although all parts were readily interchangeable. They were different as follows:

Belt Retainer: The belt retainer was now one rectangular cast piece in the shape of a capital "I" with no side strap. The elimination of the strap allows taking the buckle off the belt without unstitching the end of the belt. The belt seemed to adjust more freely with this new retainer.

Pawl Spring: The pawl spring seemed to be a little stronger and higher, and the pawl plate had a slightly broader ridge where the tongue engages the pawl plate. The little

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Photos can either be color or black and white. With today's photo manipulation software, it's relatively easy for me to change a digital image from color to black and white. If you send prints, 5x7-inch (or larger) size is the best and if sending prints, I need the negatives (they're scanned here, and turned into digital images). The bottom line with any sort of photo is, the better the original quality, the better the end result.

- **Your Projects:** If you flip to the back of the magazine, you can see we're featuring projects on the back page. I'd truly appreciate if you could consider forwarding photos and a few details of any in-progress Corvette restorations you have. I'd like to see what you're working on, and I think the rest of the membership would like to see it too. These in-progress articles are very important. Please send them!
- **Payback Time:** Remember the old days when you could earn a special "Restorer" shirt in return for sending in articles? The board of directors has voted to reinstitute the Corvette Restorer writer recognition program (but with a bit of a twist). The program will recognize members who submit

articles to the Corvette Restorer Editor. Articles do not have to be published but require approval of the Editor. Article recognition will be during any 3-year period beginning January 1, 2004 (that's retroactive folks, so some of you now have a pretty big head start). A submission and approval of three articles with recognition of a hat, five articles with recognition of a shirt and seven articles with recognition of the windbreaker/jacket. Once I make the tallies, I'll send in the request, and you'll receive your reward.

For your reference, here's my address:

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Thanks! And don't be shy. Grab me at the next NCRS event and say Hi! 🍷🍷



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ears on the pawl spring that would bear against the strap on the old belt retainer were also eliminated, as they would now bear against the belt itself with the new retainer. I believe that the design changes to the pawl spring and pawl plate were probably a correction of a problem with the RCF-65, known as "inertial unlatching". Inertial unlatching is the tendency of the seat belt to unlatch due to a sudden shock, and can be demonstrated by latching the belt, holding the belts tight, and then slapping the back of the buckle against a hard surface. The momentum of the pawl plate compresses the spring, and the belt buckle unlatches. I tried this with my original belts a number of times against a piece of wood and they unlatched every time. With the service replacement buckles on the same test they stayed latched every time.

So, if you have a soft belly, there's probably no worry about inertial unlatching. But if you have a six-pack down

there, or want the ultimate in safety as far as lap belts go, then you should go to the newer pawl spring and pawl plate. I put the service replacement spring, plate, top and insert button (after refinishing), on my original belts.

The Numbers...

On each of the buckle parts except the pawl spring, there are these three or four digit numbers which I could not make any sense of as to whether they were a date code or some kind of serial number. My original buckles had an equivalent number on each part between the two. Others I have seen have different numbers on the backs between pairs. I surmise that the numbers are production run numbers, although somewhere there is likely a book of production numbers with corresponding dates. 🍷🍷

Sew Fine

Some racecar sanctioning bodies (for example, the National Hot Rod Association) mandate belts and harnesses be serviced by the manufacturer on a regular basis (typically, replace the complete belt assembly or have the hardware tested and re-webbed by the manufacturer every two years).

Why the big fuss about changing belts regularly? Simple. Webbing wears out and in many situations, it wears out much quicker than you might guess. But before going any further, give the following some consideration:

In a typical fatal MVA (Motor Vehicle Accident for the uninitiated), the leading cause of death is head injury. Head injuries are almost always caused by the person's head striking a portion of the vehicle. Certainly, the mandated use of seat belts (coupled with the use of air bags) has slowed the rate of head injuries in passenger vehicle accidents, but how does this relate to racecars?

If any vehicle—racecar, street driven Corvette or otherwise—is decelerated, a specific amount of gravitational force is exerted which in turn requires an opposite effort to keep the driver planted in the seat. This gravitational force is commonly referred to as a "G" force. Every human being has one "G" force holding his or her feet on Mother Earth. Basically, a single "G" force is equal to your respective weight. If you weigh 170 pounds, that's the weight of the "G" force that you exert. If you weigh 250 pounds, that's the corresponding weight of your specific "G" force. Given the laws of gravity, there are additional "G" forces acting upon your body as you accelerate and decelerate a vehicle. As an example, if your particular car is accelerating forward at one "G", there is a one "G" force (equal to your weight) pushing you rearward in the seat. Now, if that same car decelerates at the rate of two "G's", then there will be a two "G" force attempting to push you forward. Right out of the seat. Remembering what we said earlier about the weight of your own "G" force, the two "G" deceleration will be twice that of your personal scale weight.

Pretty simple stuff. But when you start factoring in the typical "G" forces present in a quick car accelerating or decelerating, it becomes apparent that you cannot remain positioned in a seat without support. For example, many years ago, the NHTSA (National Highway Traffic Safety Administration) released a set of figures for passenger cars involved in a 35 mile per hour head on crash into a solid object. These figures have been obtained by way of instrumented "dummies" seated in production vehicles propelled into a concrete barrier. The dummy decelerates at a force equal to between twenty and forty "G's" for a pe-

riod of time equaling fifty to one hundred milliseconds. Although the time frame is critical (for various reasons we will not involve ourselves with in this publication), it is the massive "G" loading, even in a 35 mile per hour crash that quickly becomes apparent. Just look at the following simple mathematical calculations—using both a 170-pound driver and a 250-pound driver as examples:

"G" Force Figure @ Deceleration	(A) 170-Pound Driver	(B) 250-Pound Driver
20 G's	20 x 170 = 3,400 pounds	20 x 250 = 5,000 pounds
30 G's	30 x 170 = 5,100 pounds	30 x 250 = 7,500 pounds
40 G's	40 x 170 = 6,800 pounds	40 x 250 = 10,000 pounds

Now, it doesn't take a rocket scientist to figure out that the forces present in an accident at a relatively slow overall speed are incredible. G-force numbers ranging anywhere from 3,400 pounds to over five tons are trying to pull you out of the seat belt and at the same

time, trying to stretch the belt, bend the belt hardware and pull the mounts free from the vehicle. And remember, this is from an instrumented crash at 35 miles per hour.

There's more to the belt situation. Consider how a seat belt is constructed. Typically, the belt webbing is sewn in place with an incredibly strong nylon thread (of a type approved by the Government for such applications), but even the strongest thread or webbing will begin to break down with age, exposure to the elements, misuse, exposure to chemicals, exposure to perspiration along with a host of other factors. And these factors add up. A conservative estimate in regard to belt condition shows that belts can lose as much as 30% of their webbing strength in two short

years. It is because of these factors that sanctioning bodies such as the NHRA mandate the replacement of belt webbing at very regular intervals.

Bottom line? There is more than one-way to restore seat belts and associated belt hardware. As a magazine, we're not advocating you copy the buckle restoration process shown in the main body of this article nor are we rejecting the process. We're simply showing you how one man restored the seat belt mechanisms on his personal Corvette. By no means take seat belts, belt hardware, belt webbing or even the thread that sews them together lightly, even in a Corvette that never sees competition. WS

