

**Spring-Time Again:
An Examination of the 1963-1982 Heavy Duty Rear Spring
by
Gary Beaupre & Joe Lucia**

It's probably fair to say that many Corvette people believe that the primary visual difference between the C2/C3 standard suspension rear leaf spring and the heavy duty rear leaf spring is that the standard spring has 9 leaves and the heavy duty spring has 7 leaves. In a previous article on 1963-1977 standard leaf springs (The Corvette Restorer, Vol. 27, No. 2, Fall 2000), we learned that the standard spring actually had 9 leaves from 1963-1974, and 10 leaves from 1975-1977. In the present article we will take a look at the heavy duty rear springs that were used between 1963 and 1982.

In Table 1 we list by model year, the GM production part number and some of the design specifications for the heavy duty rear leaf springs used from 1963 through 1982. There were a total of 5 different production part numbers used over this time period. While all 5 springs have a similar spring rate or stiffness, the springs differ in several ways. One of the most obvious differences among the heavy duty springs is the number of leaves, which is either 6, 7 or 9. Thus, the old adage that all 63-82 heavy duty rear leaf springs have 7 leaves, does not apply to all years. In addition, from 1975-1977, GM added a plate that might appear as an extra leaf located on top of the smallest leaf, giving the appearance that 75-77 heavy duty springs had 8 leaves. This plate, however, should not be considered a leaf, but simply a top plate or spacer plate that is the same length as the spring mounting surface on the rear differential cover. As such, this top plate does not bend when the spring bends and this plate does not affect the spring rate or stiffness.

Table 1

Year	GM Production Part #	Spring Rate (lb/in) @ design load (lb) @ camber (in)	Width (in)	Assembled Thickness (in)	# of Leaves	Leaf Thickness (in)	# of Liners
63-74	3828811	305 @ 1325 @ -0.290	2.25	2.059	7	0.262	5
75	354130	305 @ 1325 @ -0.290	2.25	2.390	7+	0.262 0.306" top plate	5
76-77	362152	305 @ 1325 @ +0.060	2.25	2.390	7+	0.262 0.306" top plate	5
78-79	462598	307 @ 1325 @ +0.060	2.25	2.161	6+	1-2: 0.291 3-6: 0.276 0.225" top plate	5
80-82	14021604	294 (calculated)	2.50	2.301 (estimated)	9	0.229	8

The data listed in Table 1 were obtained primarily from GM engineering drawings, with the exception of 1980-1982 spring, for which we relied on information obtained by inspection of a 1980 car (courtesy of Dale Spencer) and a 1982 5-Star Bowtie car (courtesy of Bruce Fosdike), both documented FE-7 optioned cars. The measured 0.229" main leaf thickness is consistent with specification of 0.228" in the Spring Research Institute (SRI) database (information provided courtesy of Andy Deahl of Betts Spring Company in San Leandro, California). The SRI database says that all 9 leaves on the 80-82 spring were the same thickness, although we have not confirmed this by careful measurement since it is not feasible to do so without having access to a dismantled 80-82 spring. The calculation of the spring rate for the 1980-1982 spring was done using the SAE spring rate formula given in a previous article from *The Corvette Restorer* (Volume 26, No. 3, Winter 2000). The estimation of the assembled thickness for the 1980-1982 spring was based on the 0.229" leaf thickness and an assumed liner thickness of 0.030". Speaking of liners, we should note that the 1980-1982 heavy duty springs used metallic (zinc-based) liners, whereas the 1963-1979 springs used plastic (graphic-impregnated, polyethylene) liners.

In Table 2 we list by model year the GM service replacement part number and the year that each of these parts was discontinued. In some cases, the service replacement part number is the same as the production part number given in Table 1 and in some cases it is not. One reason for different service replacement part numbers from production part numbers is that sometimes the service part contained associated hardware such as bolts or nuts and the service part number then refers to this group of related parts sold together. For example, it's possible that service part # 3977578 might actually contain spring part # 3828811 in addition to associated mounting hardware. One other observation to make is that as of February of 1999, it was no longer possible to purchase any 1963-1982 heavy duty rear leaf spring from GM. For those people needing to replace a heavy duty rear spring for 1963-1982 cars the only remaining options are to purchase a reproduction spring, a used spring or an increasingly difficult to find NOS spring.

Table 2

Year	GM Service Replacement Part #	Date Discontinued
1963-1970	3828811	note (1)
1971-1974	3977578	10/76
1975	354130	2/99
1976-1978	370387	7/79
1979	471821	12/80
1980	14022104	8/80
1981-1982	14021604	2/91

Note (1) The GM part # 3828811 “disappeared” from the GM SERVICE parts system approximately 12/70 but we can find no official record of date of discontinuation.

In Table 3 we list by model year the GM RPO codes and associated ordering requirements imposed by GM to order a car with the heavy duty rear spring. We also list the number of cars equipped each year with the heavy duty spring. It is interesting to note that the percentage of cars equipped with the heavy duty rear spring varied greatly among model years. For example, for the 1971 and 1972 model years fewer than

1 car out of every thousand had the heavy duty spring. This is in sharp contrast to model year 1978 when more than 1 out of every 4 cars had the heavy duty spring. The reason for these differences is easy to figure out. The only way to get the heavy duty suspension for some years was to purchase an expensive engine option, such as the ZR-1 option that cost the buyer of a 1972 model more than \$1,000 above the base price. Whereas in 1974 it cost a mere \$7 extra to get the gymkhana suspension package that included the heavy duty rear spring.

Table 3

Year	GM RPO	Ordering Requirements	Number of cars with HD spring
1963	Z-06	Z-06 package only	199
1964	F-40	L-84, G-81	82
1965	F-40	L-84 or L-78 and G-81	975
1966	F-41	L-72	2,705
1967	F-41	L-71 or L-88 (note 1)	2,198
1968	F-41	L-71 or L-88 (note 1)	1,758
1969	F-41	L-71 or L-88 (note 1)	1,661
1970	ZR-1	ZR-1 package only	25
1971	ZR-1, ZR-2	ZR-1 or ZR-2 package only	20
1972	ZR-1	ZR-1 package only	20
1973	Z-07	Z-07 package only with L-82 or LS-4	45
1974	FE-7 or Z-07	no engine ordering requirement with FE-7	1,952
1975	FE-7 or Z-07	no engine ordering requirement with FE-7	3,338
1976	FE-7	no ordering requirements	5,368
1977	FE-7	no ordering requirements	7,269
1978	FE-7	no ordering requirements	12,590
1979	FE-7	no ordering requirements	12,321
1980	FE-7	no ordering requirements	9,907
1981	FE-7	no ordering requirements	7,803
1982	FE-7	no ordering requirements	5,457

Note (1) Although Chevrolet ordering requirements specified that F-41 was available with these engines only, a small number of cars with other engines MAY have been originally equipped with F-41.

During the course of this research project we became aware of several other interesting spring-related items. One observation that was pointed out to us by several NCRS members is the presence of embossed (raised) letters on the edges of some spring leaves. The observed letters are either GMU or GM-U. Examples of these embossings are shown in Figs. 1 & 2. The GMU embossing shown in Fig. 1 has been observed on both standard and heavy duty springs.



Fig. 1 Photo of "GMU" embossing on a 7-leaf, heavy duty spring (photo by Craig Schultz). This embossing has also been observed on 9-leaf, standard springs.

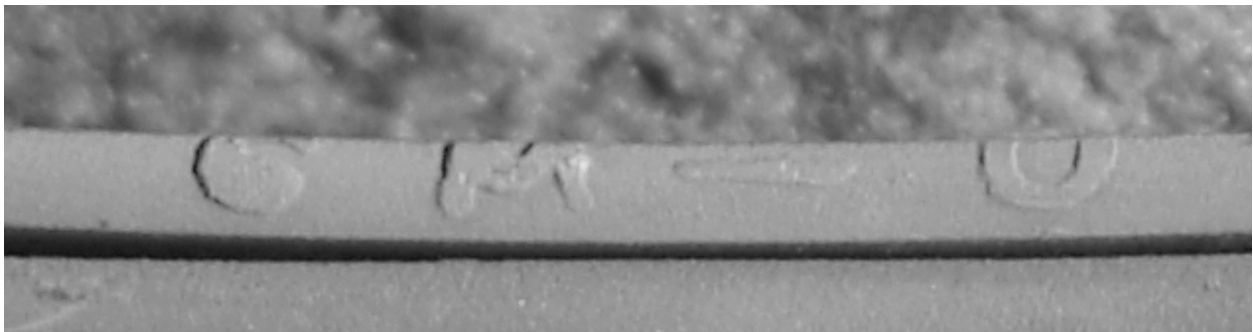


Fig. 2 Photo of "GM - U" embossing on a 9-leaf, standard spring (photo by Craig Schultz).

Based on observations, some springs have one of these embossings and some don't. Those springs that have the embossing typically do not have an embossing on all leaves and sometimes the embossings appear more than once on a given leaf. While we know of no GM engineering drawing that specifies the use of such embossings, it is our belief that springs both with and without these embossings are original GM springs. We would very much like to hear from anyone who has additional information about these embossings.

Another spring related item of particular interest to owners of mid-year cars is a change made by GM in the retainers that insert into holes in each end of the spring main leaf. These retainers serve to constrain a large rubber bushing. During the 1963-1967 model years, these retainers were GM part # 3831588. This part was discontinued from service in 1967 and superseded by part 3910701, which remains available today. The earlier part number was used on all mid-year cars, while the later part number was used from 1968-1982. People restoring the leaf spring (or the trailing arms, which also use 2 identical retainers) for 63-67 cars have to choose between restoring original 3831588 retainers or buying new 3910701 retainers. Unfortunately, these retainers are made from steel, that was neither plated nor painted. As would be expected, original 3831588 retainers are often rusty and pitted, making restoration difficult. Typically, restorers opt for using the 3910701 retainers. The 3831588 and 3910701 retainers are, however, noticeably different in terms of the geometry of the peripheral lip that constrains the rubber bushing. On the currently available 3910701 part, the peripheral lip is 0.325" tall and oriented at approximately 80 degrees from the base plane. On the earlier 3831588 part, the lip is noticeably shorter and is oriented at approximately 45 degrees from the base plane. This difference in lip height and angle is easily detectable by a knowledgeable and observant chassis judge and can lead to a points deduction during judging. However, it is possible to modify the 3910701 retainer to mimic the 3831588 retainer. In Fig. 3 we show the 3910701 retainer on the left, an original (badly rusted) retainer at the center and a modified retainer on the right.



Fig. 3 Photo showing the currently available GM retainer (left), an original retainer (minus a portion of the bottom section that was destroyed during removal) from an original 1966 leaf spring, and the modified retainer (right) that more closely approximates the lip height and angle of the original mid-year retainers.

Figure 4 is a top view looking down on the original retainer that has been placed face-to-face against a modified retainer. The effects of the modification process can be seen as a slight increase (approximately 85 thousandths of an inch, or slightly less than the thickness of two dimes stacked together) in the outer radius of the peripheral lip.



Fig. 4 Top view looking down onto a rusty original retainer placed face to face against a newly modified retainer showing a slight increase in the radius of the peripheral lip on the modified part.

The modified retainer shown in Figs. 3 and 4 gives 63-67 restorers a third option in addition to the previous ones of trying to restore an old and typically damaged part or using a new, but obviously incorrect part.

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Questions and comments can be sent to:

Gary Beaupre
NCRS Northern California Chapter
(408) 733-2845
E-mail: beaupre@rrdmail.stanford.edu
NCRS # 28818

Joe Lucia
E-mail: joelucia@comcast.net
NCRS #12484