

The Solid Scoop



**A Newsletter for
the Southern Calif.
Chapter of the
Solid Axle Corvette
Club**

Vol. 16 No. 2

June 2020

"We don't judge, we just keep them on the road"

See us on the web at www.socalsacc.com

On the cover: Alan Emslie's beautiful 1961 in Goleta, CA

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2020 SoCal Planned Events

<u>Date</u>	<u>Subject</u>	<u>Location</u>	<u>Organizer</u>
Nov 7 2020	Fall Tech Session	Auto Driving Museum El Segundo	Joe LeMay

SoCal SACC New Members – Welcome!

<u>Name</u>	<u>C1 owned</u>	<u>Location</u>
Jack Strong	1954	Long Beach, CA
Butch Rose	1957	Newbury Park, CA

Editor's Note:

I hope everyone is doing well during these trying times. With our events being cancelled due to the Covid-19 pandemic, this issue is mainly technical articles. I have received several articles from members– in fact, too many to fit in this issue! I will use them in the near future. I am always in need of content for future editions of The Solid Scoop. Please consider sending me photos of your car, photos from car shows, articles, etc., anything relating to Solid Axle Corvettes. And don't forget "For Sale" and "Wanted" ads are placed at no cost to members. Please contact me if you are not receiving the electronic newsletter via email. Fred Kokaska (fkokaska@yahoo.com), SCOOP Editor



Solid Axle Corvette Club
 A National Organization dedicated to
 keeping these Corvettes
 "on the road".

Club Features:

- Membership Chapter Clubs across the U.S.
- National Quarterly Magazine
- Annual National Convention
- Web Site: www.solidaxle.org (non-profit affiliation)

**Also visit the
 SACC National
 Web Site**

www.solidaxle.org

The Solid Scoop is a quarterly Newsletter published for the Southern California Chapter of the Solid Axle Corvette Club (SoCalSACC). The SoCalSACC Chapter is affiliated with the National Solid Axle Corvette Club (SACC). The SACC organization is a non-profit group with the intended purpose of bringing together owners and those interested in the early C-1 Corvettes (1953–1962) to help in appreciating these vehicles and “keep them on the road”.

C-1 Ownership is not a requirement for membership.

MEMBERSHIP: A prerequisite to become a SoCal SACC Chapter member, a person must belong to the National SACC. Applications for membership are available on our Chapter Web Site, www.socalsacc.com. Submitting an application along with the appropriate listed dues, is necessary for membership. The SoCal SACC Chapter will forward your National dues to assure your National membership. Once becoming a National member you will receive *On Solid Ground*, the National quarterly published magazine. Again, **MEMBERSHIP APPLICATIONS AVAILABLE: WWW.SOCALSACC.COM**

The Solid Scoop, is intended as a communication for Chapter members about chapter activities, technical articles, classified ads and past events to maintain in keeping our membership informed. The Editor and the Board of Directors of So Cal SACC have made every effort to ensure that the *Solid Scoop* contains no inaccuracies or errors, either in technical articles, tour information, listings regarding flyer and non-flyer events or in advertisements and is non-offensive and non-political and disclaim liability for any that may occur. Should you find any problem, please do not hesitate to contact the Editor. We will make every reasonable effort to rectify the situation.

Member submitted technical articles are encouraged. Many times these technical articles are based on personal experiences and preferences and as such are intended only as guidelines or helpful information for club members.

**Solid Axle Corvette Club
 Southern California Chapter Board
 2020 Club Officers**

ELECTED BOARD OFFICES

President	Phil Roche	pdr44@aol.com
Vice President	Nyma Ardalan	nyma@ardalan.org
Secretary	Larry Pearson	lpears1941@att.net
Treasurer	Barry Charles	bcharles@bcforensiccpa.com

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Interior	John Engelhardt	714-267-9996	littlejohns@sbcglobal.net



SoCal SACC Fall 2020 Tech Session

Saturday November 7th, 10am – 2pm

Location: Automobile Driving Museum, El Segundo

SAVE THE DATE – MORE INFO SOON

- We will have a series of presentations, 5-15 minutes each, covering maintenance or simple repairs on early Corvettes.
- We have reserved parking for all, with a special area for Solid Axle Corvettes that attend.
- Your entry fee includes coffee and snacks, full lunch, as well as entry to the Driving Museum. They have a nice collection for us to view; 130+ vintage, antique, and muscle cars.
- We will continue to monitor the Covid-19 health situation and will send email when a final decision is made. Until then, please save the date.



From the South

- From 405 North, exit El Segundo Blvd WEST
- RIGHT on Douglas Blvd
- LEFT on Mariposa Ave
- RIGHT on Lairport St

From the North

- From 405 South, exit to Hwy 105 WEST
- RIGHT on Nash St
- RIGHT on Maple Ave
- LEFT on Lairport St

Meet our newest members

Jack Strong



"I'm a semi-retired engineer and before the virus struck, was a part-time consultant to Rolls Royce. My work was on an on-call basis and involved investigating technical problems at their vendors here in Southern California. Well, now I have a lot more time to spend with my 1954 Corvette, until at least later this summer. I've always been a car guy and have had several classics including 1964 and 1968 Corvettes, and, two Jaguar XKE coupes. My '54 was purchased in June of 2018 (VIN E54S003432). It had approximately 130,000 miles and needed new paint and interior among other things. I had the car stripped down to the fiberglass and redone with modern paint and clear coat. I also purchased a complete new interior from Al Knoch. I was also able to purchase a hard top from Gary Hiltunen. The car now looks great (see photos) but, of course, still needs a few tweaks including heater and windshield wiper repairs, etc. The car received first place in the C1 class at the 2019 Huntington Beach Concourse d' Elegance. I found out about the Solid Axle Corvette Club through Gary and have already had some very informative conversations with Joe LeMay and Phil Roche. I live in Long Beach."

Butch Rose



"I am retired from the Los Angeles City Fire Department (35 years). I live in Newbury Park in Ventura County. I have a 2006 Z06, but that is not what gets me membership in the SACC. I also have a '57 that I have owned for a long long time, but I am just getting around to doing major work on it. I started out just going to do a few upgrades, and have gone crazy!!! I am a huge fan of the LS-7 motor so I ordered one with the T-56 6 speed from GM. I also bought coil over shocks & rack & pinion steering from Jim Meyer racing suspensions for the front end. I have a Currie 9" rear end with .430 gears. The front & rear have 11" Wilwood disc brakes. I have Kooks 1 3/4 headers. I pulled the body off the frame to do all of these upgrades and when i took the body to a Corvette specialty shop the guy there recommended I might look into the Concept 57 body from Corvette Central. I drove to Toledo Ohio (I always wanted to see Max Klinger's home town) picked up an entire new body. I had the entire frame and parts powder coated and am now just getting everything put back together. Got a long way to go, but starting to make some progress, I hope to be able to show it off when I get it finished (probably 2 years). When I get completely finished, I will have a ton of original parts for sale. "

2020 SACC National Convention Registration Form

August 26, 27, 28 & 29, 2020 - Carlisle & Boiling Springs, PA

Name _____ Family Member(s) _____
 Address _____ Non-SACC Guest of Member _____
 City _____ Home Phone# () _____
 State/Prov. _____ Zip _____ Cell Phone# () _____
 SACC Membership # _____ E-Mail _____
 Chapter _____ Arrival & Departure Dates _____

The convention's host hotel is: The Allenberry Resort, 1559 Boiling Springs Road, Boiling Springs, PA 17602. For reservations call (717) 258-3211, ask for "reservations" & say you are with the Solid Axle Corvette Club. Rooms in the Stone Lodge are \$219, while Pine Lodge rooms are \$172 to \$192 per night. Space is limited. Un-booked rooms will be released on July 25th.

If you plan to attend Corvettes at Carlisle, you must register separately. Suggest pre-registering for the "Fun Field" (\$75), which admits for your C1, the driver & one occupant, each day of the show. If you wait until you arrive in Carlisle to register, the price is higher and only those pre-registered for SACC will be able to park in our display area. **Make sure to list the Solid Axle Corvette Club on your pre-registration form.** You can pre-register on-line at: CarlisleEvents.com or call (717) 243-7055. If registering a non-C1 Corvette you can park on the showfield, but not in the SACC display area. If not driving a Corvette, you can park off-site (in a private lot) for \$10 to \$20 per day and pay the \$10 or \$20 daily admission rate (per person), at gate #3.

Please indicate all functions you plan to attend and the number of people attending each.

Convention registration, before 6/30/20. *Registration includes SACC member & one family member/guest.* \$ 100.00
 Please add \$50 for each additional family member/guest. _____ persons @ 50.00 each. \$ _____
 Please add \$25 for registrations submitted after July 1, 2020. _____ \$ _____
 Wednesday, 8/26 Reception Dinner at Allenberry Resort _____ persons @ \$25.00 each. \$ _____
 Thursday, continental breakfast at Allenberry Resort. _____ persons \$ *Included*
 Thursday, 8/27 Gettysburg tour, (includes: bus, tour guide, lunch & Cyclorama). _____ persons @ 75.00 each. \$ _____
 Thursday, 8/27 Awards Banquet & Reception. _____ persons @ \$50.00 each. \$ _____
 Friday, 8/28, Caravan, continental breakfast & tech sessions at Corvettes at Carlisle. _____ persons \$ *Included*
 Friday, 8/28, Chip Miller Amyloidosis Foundation Charity Dinner. *Call Jodi at Carlisle Events: 717 243-7055 (press 5) then ext. 113*
 Saturday, 8/29 Caravan, continental breakfast at Corvettes at Carlisle. _____ persons \$ *Included*
 Saturday, 8/29 Alternate event (for those not wishing to attend the events at the fairgrounds) _____ persons *TBA*
 Saturday, 8/29 Cook out and "drive-in" movie. _____ persons @ \$25.00 each. \$ _____
 T-Shirts. _____ SM MD LG XLG XXLG. _____ @ \$25.00 each. \$ _____
Convention T-shirts may be ordered, if unable to attend. If so, please add \$5.00 for shipping & handling. \$ _____
 Total enclosed \$ _____

Sorry, but due to our having to pay in advance for many events, no refunds will be made for cancellations occurring after 8/1/20.

Hold Harmless Agreement: I agree to insure my vehicle(s) and property against loss, damage and liability and to provide proof of insurance to SACC. I assume the risk of any and all damages or acts or omissions which may result in the theft, damage or destruction of my property or injury to me or to others occurring during or as a consequence of this convention. I agree to send proof of vehicle insurance covering the convention dates.

Year _____ Vin # _____ License tag # _____ State _____
 Exterior color(s) _____ Interior color _____ Trailer: Yes _____ No _____
 Insurance Company _____ Policy # _____ Expires _____

Signature _____ Date _____ Please mail completed form with check (payable to SACC) to:

Jack & Cheryl Jarvis - SACC
 3305 Pennsylvania Avenue
 Charleston, WV 25302

**Convention contacts: Jack Jarvis (304) 543-6021
 or Brad Bean (850) 499-4736**



Joe's Garage

SoCal SACC Technical Manager Joe LeMay (jlemay5@aol.com) shares tips and information on common C1 maintenance and restoration projects.

U-Joint Guide

I recently had to change transmission yokes when switching from the Muncie 318 3-speed (yes that is what it is) to a Muncie M-20. The two transmissions have different output shaft splines. Let me first say something about yokes. If you have a transmission that has been used a bit, and want to change yokes, a new or another yoke may not fit. The splines on the output shaft may be worn/ twisted and the new yoke will not slide into the transmission. Check the fit prior to installing the transmission and final assembly. My new yoke had to be pounded in. That was not going to work and I had to continue with the old yoke. It slid on easily and smoothly. Note: the base transmission make/ model was a Muncie 318 that was cast in Saginaw, not in Tonawanda. Saginaw date cast transmissions have single digit year; i.e. 6=1956, 7=1957; Tonawanda cast transmissions were not used in Corvettes, have a two digit year; i.e. 56=1956, 57=1957 and have a "T" on the main case close to the cast number.

The driveshaft in your car connects the transmission to the rear differential. The driveline consists of a slip yoke, the shaft, a bolt-in yoke, and two U-joints. The purpose of the U-joint is to adjust for the working angles of the suspension. They are the weak link in the driveline and replacing the U-joint is easy.

U-Joint Sizes and Styles

U-joints are noted in terms of series. Each series has a specific cap diameter and overall joint width. The most common type uses Outside Snap Ring Style locks, where a snap ring secures the outside of the caps. This is what your older Corvette has. There are also Inside "C" Clip Style locks that use snap rings on the inside.



OUTSIDE SNAP RING STYLE: The outside snap ring style is easily identified by the obvious snap ring that is located in a groove in the yoke at the outside edge of the universal joint bearing cap. Hence the term "Outside" Snap Ring style. This snap ring requires pliers to squeeze the snap ring to install or remove it from the yoke. This snap ring centers the U-joint within the yoke ears. These are typically found on 1310, 1330, 1350 universal joints.

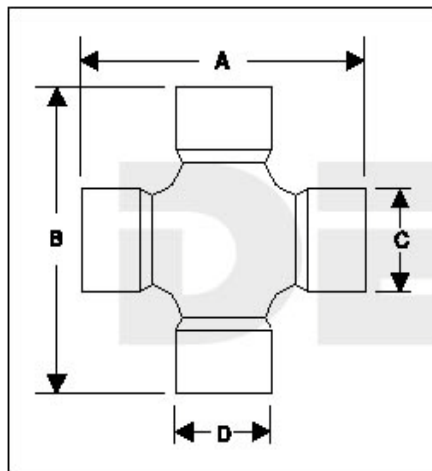


INSIDE "C" CLIP STYLE: You can easily identify the INSIDE style GM 3R series because when you look at the yoke you see the end of the U-joint bearing cap and no squeezable snap ring is visible.

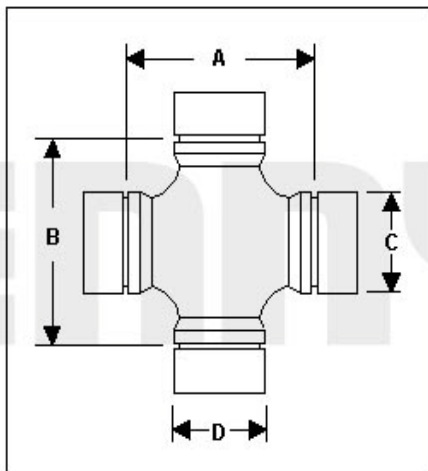
Nearly all U-joints have one side that is pressed into a welded-in yoke while the other side bolts into the other yoke (the yoke on the pinion shaft). There are outside and inside locks, and in most cases they are not interchangeable. Measuring inside locks is a little different than outside locks. You measure from the outer side of the lock ring groove side to side. This gives you the width of the joint lock. You still need to measure the overall width of the joint to make sure it is compatible with the bolt-on yoke.



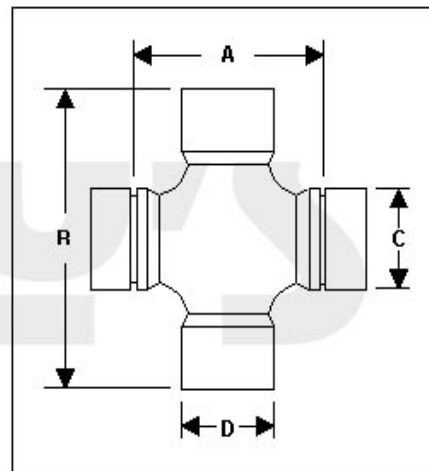
Joe's Garage



OUTSIDE SNAP RINGS



INSIDE "C" CLIPS



OUTSIDE / INSIDE COMBINATION

Greasable vs Non-Greasable

There are two types of joint body: solid-body and greasable. The Spicer-style, solid-body U-joint comes "lubed for life," and does not have grease Zerk fittings. This makes them a little stronger because they do not have the stress risers created by the opening for the Zerk fitting in a greasable U-joint. Greasable joints should be greased every 5,000 miles, something that most people don't ever do. Greasable joints will also 'spin-off' a little grease onto the underbody.

Listed here are the most common U-joint series.

Outside lock U-joints (measured cap to cap)

<u>Series</u>	<u>Width</u>	<u>Cap Diameter</u>
1210	2.438"	1.062"
1310	3.219"	1.062"
1330	3.622"	1.062"
1310 Big cap	3.219"	Two 1.062", Two 1.125"
1330 Big cap	3.622"	Two 1.062", Two 1.125"
1350	3.622"	1.188"
1410	4.188"	1.188"
1415	4.178"	1.187"
1480	4.187"	1.375"
1485	4.178"	1.375"
1555	4.965"	1.375"

Inside lock U-joints (measured lock to lock edge)

<u>Series</u>	<u>Width</u>	<u>Cap Diameter</u>
3RL or S44	2.556	1.125"
7260	2.125	1.078"
7290	2.622	1.126"



Joe's Garage

The sizes listed here are the most commonly used for street cars and trucks. The 1310 and 1330 "big cap" joints are unique to Ford vehicles, and they feature one pair of caps that are 1/16" larger than the other side of the joint. Torsional forces are exerted on the U-joint in a twisting motion. For most cars, 1310-series U-joints are typical choice, but for performance applications, the rugged 1350-series joints are the better choice. The larger the series number, the larger the trunnion. Trunnions are the protruding shafts that the caps ride over. Larger trunnions equate to more torsional strength.

Changing to a larger series U-joint is not a simple task, you can't just buy bigger joints. All yokes (slip, bolt-on, and weld-in) must match the desired joint size. There are special U-joints just for that, they are called combination U-joints and designed to fit a wide variety of applications. This allows you to mate a larger (or smaller) U-joint to the other. For example, you buy a new driveshaft that comes with 1350 weld-in yokes, but your car has 1310-sized yokes for the transmission and rear differential. A 1350-to-1310 joint has a 1350 on one side and a 1310 on the other, allowing you to install the driveshaft. While it can be done, using crossover U-joints is not suggested as a long-term solution. The smaller trunnion size basically becomes a fuse, and will break eventually before the larger trunnion. A special note to remember...When choosing a universal joint to connect to a Locating TAB Style Rear End Pinion or Transfer Case Yoke, you need the OUTSIDE Snap Ring Style. However, if connecting to a Rear End Pinion or Transfer Case Yoke that DOES NOT have the Locating tabs, you need the INSIDE "C" Clip Style

UNIVERSAL JOINTS for CHEVROLET CARS

Over the years Chevrolet U-joints have been of two basic designs. One is the outside snap ring style and the second is the inside "C" clip style. The choices below are the series numbers for those originally used on Chevrolet Cars except Corvette. For Corvette, see section below.

Outside Snap Rings. If you have a Chevy Car driveshaft with Outside Snap Rings, the U-joint dimensions should be 3.219 inches wide cap to cap - 1.062 bearing cap diameter.

Inside "C" Clips. If you have a Chevy Car driveshaft with Inside "C" Clips, the U-joint dimensions should be 2.556 inches wide between inside shoulders of yoke - 1.125 bearing cap diameter.

Combination U-Joints may have been used at the rear end of some INSIDE "C" clip style OEM driveshafts. These were used to connect the inside "C" clip style 3R series driveshaft to a 1330 series rear end pinion yoke that has the locating tabs. They are usually found on vehicles with a 1330 series pinion yoke on a 12 Bolt rear end.

Corvette Universal Joints

The typical Corvette driveshaft U-joint is either 1310 or 1330 series. The typical rear axle half shaft U-joint is 1350 series but 1330 series can be found on early 80's Corvettes. The 1310 U-joint will measure 3.219 wide and the 1330 will measure 3.625 wide. Both will have a 1.062 bearing cap diameter. The 1350 series is always 3.625 wide and 1.187 bearing cap diameter.

- Spicer 1310 series U-joints fit Corvette Driveshaft from 1953 to 1962, and 1963 to 1970.
- Spicer 1330 series U-joints fit Corvette Driveshaft from 1971 to 1982
- Spicer 1350 series U-joints fit Corvette half shafts from 1963 to 1982

Other than for C1's, there are variations in these requirements. Use this as a guide and check the part numbers. I will cover installation in a future article.



Joe's Garage

Spark Plugs

Spark plugs are perhaps one of those mysterious items where you look for the specification for your engine and order that plug. There is a lot more to it than that. This is especially true when there have been engine modifications. I am going to present what spark plugs are all about and how to adjust your selection of plugs based on engine operations and conditions.

Spark plugs have been around as long as internal combustion engines have and are often a misunderstood component. Spark plugs are a "window" into the engine and can be a valuable diagnostic tool. Spark plugs display the condition inside the combustion chambers of the engine. The experienced tuner can use spark plugs to find the root cause of problems, determine air-fuel ratios and increase vehicle performance.

Spark Plug Basics

The primary function of the spark plug is to ignite the air-fuel mixture within the combustion chamber under any operating condition. Spark plugs must provide a path and a location for electrical energy from the ignition coil to create a spark used to ignite the air-fuel mixture. The ignition system voltage must be sufficient to spark across the spark plug gap. This is called "electrical performance."

The spark plug firing end temperature must be kept low enough to prevent pre-ignition, but high enough to prevent fouling. This is called "thermal performance," and is determined by the spark plug heat range. We will discuss spark plug heat range later.

There are temperatures within an auto that we are familiar with. The engine temperature can be identified by the temperature of the coolant and oil. The engine temperature is related to the actual temperature within the combustion chamber and will be lower than the combustion chamber temperature. Then there is the temperature of the spark plug exposed to the combustion chamber that we need to examine more closely.

The operating temperature of a spark plug is the actual physical temperature at the tip of the spark plug within the running engine. The temperature is determined by a number of factors, but primarily the actual temperature within the combustion chamber. The level of torque being produced by the engine will strongly influence spark plug operating temperature because the maximum temperature and pressure occurs when the engine is operating near peak torque output (torque and RPM directly determine the power output).

Spark Plug Appearance

When the engine is operated in a particular manner, the combustion chamber and the spark plug tip temperature will be a related temperature. If the engine is operated at stop and go traffic conditions, the combustion chamber and spark plug will be at a cooler temperature. At 110 mph and full throttle for ½ hour, the combustion and spark plug will be at a relatively hot temperature. Let's look at what the spark plug possibly looks like after operating at a continuous load from light to heavy (cool to hot).

Wet fouling with non-evaporated fuel - At light loads and cooler temperatures the plug may appear wet, smell like fuel, or have oil. This is the zone of the highest degree of fouling for spark plugs. The mixing ratio of fuel and air is very low in this case (rich mixture). Atomization of fuel is low and the fuel burns in its liquid state. The level of creation of combustion deposits is significant. In addition, the insulator tip is wet from the non-evaporated fuel. It may also be oily indicating something is wrong with the engine or valves. The decreasing insulation resistance of the insulator tip results in an occasional failure of a cylinder to ignite. Frequent cold starts and moving from rest in cold weather will accelerate the fouling of the insulator tip.



Dry fouling with soft deposits - Perhaps at a somewhat warmer temperature, the plug may appear with a sooty black build-up, but it is still on the cooler side. The engine running at idling speed or at low load can result in the setting of soft (dry) combustion deposits on the insulator tip, even if the fuel does not burn in liquid state. The fouling zone is below 450°C.



Inert zone - Running the engine harder will produce a higher temperature at the spark plug tip. No further combustion deposits are formed, but those already existing will not be burnt. In this zone, there does not occur any setting of combustion deposits on the insulator tip. The new spark plug does not feature any fouling and if a spark plug is fouled, it does not get cleaned. The inert zone is 450-475°C.



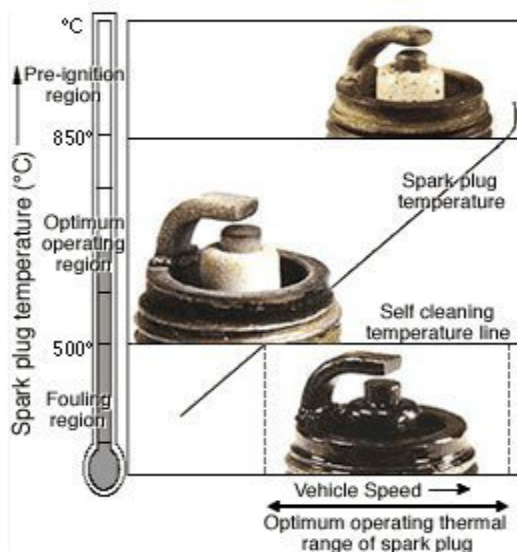
Self-cleaning zone - Run the engine still harder where the plug tip temperature rises above 475 °C, into the so-called self-cleaning zone. In this temperature range, no new deposits are formed and those existing deposits will be burnt. The spark plug operates in an optimum manner. The insulation quality of the ceramic insulator will return to a common value. The shift into the self-cleaning zone generally takes place during acceleration and at higher vehicle speeds. A light tan/gray or brownish color, along with very little electrode erosion, indicates optimal operation conditions, including a healthy engine and correct spark plug temperature. The self-cleaning zone is above 475°C to 800°C.



Overheating zone – With higher loads and running at full torque for extended periods, the plug tip temperature rises above 850°C. A very high insulator tip temperature is undesirable. High temperature results in pre-ignition of the air-fuel mixture and further compression of the mixture already ignited leads to still higher temperature, which can cause serious damage to the engine. The insulator will have a glazed white appearance and may have small black deposits. There may also be abnormal electrode wear, and you will likely notice a loss of power at high speeds or under high engine load.



These Spark plug conditions can be seen in the illustration that follows with vehicle speed and temperature plotted.



Heat Flow Path and Heat Rating of Spark Plugs

We saw from the photos that it is important to have the combustion chamber, the spark plug, and most importantly the spark plug tip operate at the desired temperature. It is necessary, to keep the insulator tip (the part of the insulator projecting into the engine area) within an optimum temperature range. "Insulator" used in the context of a spark plug's ceramic material refers to electrical insulation of the center electrode. It does not refer to thermal insulation. The ceramic insulator material conducts heat.

In order to achieve the correct temperature of the insulator tip for a given engine, the spark plugs are produced in various thermal values or heat ranges. Spark plug heat range is the measure of how much heat the spark plug absorbs and how fast the spark plug dissipates heat from the spark plug tip. It must do this in a precise and controlled manner so the spark plug will:

Stay cool enough to avoid pre-ignition and/or electrode destruction due to detonation.

Run hot enough to burn off combustion deposits that would otherwise collect on the sparkplug insulator tip and cause fouling that leads to misfire.

Adapt to specific engine characteristics and widely varying driving/load conditions.

The heat range of a spark plug is the temperature range in which the plug works well thermally; its "thermal performance." The heat range (i.e. in scientific terms its thermal conductivity characteristics) is determined by the insulator nose length and its ability to absorb and transfer combustion heat, the gas volume around the insulator nose, and the materials/construction of the center electrode and porcelain insulator.

"Hot" spark plugs remove heat from the combustion area relatively slowly. They have a longer insulator and they achieve a tip temperature higher than the fouling temperature zone relatively fast. "Cold" spark plugs feature a relatively short insulator and they remove heat from the tip quite fast, in order to avoid pre-ignition. The heat rating of a spark plug is indicated by a number, with some manufacturers using ascending numbers for hotter plugs and others doing the opposite, using ascending numbers for colder plugs. As a general guideline, among identical spark plug types, the difference in tip temperature from one heat range to the next is approximately 70°C to 100°C.

By examining "hotter" and "cooler" spark plugs of the same manufacturer side by side, the principle involved can be very clearly seen: A hotter spark plug has a longer distance between the firing tip and the point where insulator meets the metal shell. Therefore, the path for the dissipation of heat from the tip to the cylinder head is longer and the firing tip stays hotter. The insulator nose of a hotter spark plug also has a greater surface area that is exposed to more of the ignited gases and is easily heated to higher temperatures. A cooler spark plug is configured in an opposite manner and there is more substantial ceramic material filling the gap between the center electrode and the shell, effectively carrying off the heat.

For normal use, the selection of a spark plug heat range is a balance between keeping the tip hot enough at idle to prevent fouling and cold enough at maximum power to prevent pre-ignition leading to engine knocking. The heat range must be carefully selected for proper spark plug thermal performance. The optimal firing end temperature is approximately 500°C (932°F) to 800°C (1472°F). If the heat range is not optimal, then serious trouble can be the result. The two most common causes of spark plug problems are carbon fouling (< 450°C) and overheating (> 850°C).

Overheating

The most serious result of selecting a heat range that is too hot is overheating. Overheating will cause the electrodes to wear quickly and lead to pre-ignition. Pre-ignition occurs when the air-fuel mixture is ignited by a hot object/area in the combustion chamber before the timed spark event occurs. When the spark plug firing end (tip) temperature exceeds 850°C, pre-ignition originating from the overheated insulator ceramic can occur. Pre-ignition will dramatically raise the cylinder temperature and pressure, which can cause serious and expensive engine damage. When inspecting a spark plug that has experienced overheating or pre-ignition, blistering on the ceramic insulator and/or melted electrodes can sometimes be found.



Joe's Garage

Causes of Overheating:

- Spark plug heat range too hot. If the engine is to be operated at high RPM, under a heavy load or at high temperatures for long periods, a colder heat range may be needed.
- Insufficient tightening torque and/or no plug gasket.
- Over-advanced ignition timing. Advancing ignition timing by 10° will cause the spark plug tip temperature to increase by approximately 70° to 100°C. Higher cylinder temperatures near the knock level will bring the spark plug tip temperature closer to the pre-ignition range. A colder heat range spark plug may be necessary if the ignition timing has been advanced to near the knock level.
- Fuel octane rating too low (knock is present). Knock will elevate the temperature of the combustion chamber components (spark plug, valves, piston, etc.), and will lead to pre-ignition.
- Excessively lean air-fuel mixture. Excessive leanness will cause the cylinder and plug temperatures to increase, possibly resulting in knock and/or pre-ignition. This may cause damage to the spark plug and/or seriously damage the engine.
- Excessive combustion chamber deposits
- Continuous driving under excessively heavy load
- Insufficient engine cooling or lubrication

Types of Abnormal Combustion

Pre-ignition: Pre-ignition occurs when the air-fuel mixture is ignited by a hot object/area in the combustion chamber before the timed spark event occurs. When the spark plug firing end (tip) temperature exceeds 850°C, pre-ignition originating from the overheated insulator ceramic can begin to occur. It is most often caused by the wrong (too hot) heat range spark plug, and/or over-advanced ignition timing. An improperly installed (insufficient torque) spark plug can also result in pre-ignition due to inadequate heat transfer. Pre-ignition will dramatically raise the cylinder temperature and pressure, which can melt and hole pistons, burn valves, etc.

Knock: Occurs when part of the air-fuel mixture in the combustion chamber, away from the spark plug, is spontaneously ignited by the pressure from a flame front originating from the spark plug. The two colliding flame fronts contribute to the “knocking” sound. Knock is sometimes referred to as “ping” or “detonation.” Knock occurs more frequently when using low octane fuel. Low octane fuel has a low resistance to knock (low resistance to ignition). Knock is related to ignition timing. (Knock is sometimes referred to as “spark knock.”) Retarding the ignition timing will reduce knock. Heavy knock often leads to pre-ignition. Heavy knock can cause breakage and/or erosion of combustion chamber components.

Selecting Spark Plugs

It was common before the modern era of computerized fuel injection to specify at least a couple of different heat ranges for plugs for an automobile engine; a hotter plug for cars which were mostly driven mildly around the city, and a colder plug for sustained high speed highway use. This practice has, however, largely become obsolete now that cars' fuel/air mixtures and cylinder temperatures are maintained within a narrow range, for purposes of limiting emissions. Vintage engines used in racing benefit from picking a proper plug heat range. Very old racing engines will sometimes have two sets of plugs, one just for starting and another to be installed once the engine is warmed up, for driving the car. C1's benefit from selecting the correct spark plug based on driving conditions. If we were all racing, it would be easy to specify the heat range. The factory recommendations changed significantly. Spark plugs were installed in 1956-7 from AC 43-5 to 46. In Nov. 1956, AC 44 were provided. In May 1957, AC 46 were provided. ST-12 has the following information:

55-57	AC 43	AC-43-5			
58-62	AC 42-1, Ext. HD	AC 43, HD	AC 44, FI	AC 45, 4 BBL	AC 46, City



Joe's Garage

Here is a recommendation for spark plugs. An AC 45 equivalent may be a good starting point. If you are looking for a specific spark plug, NOS or eBay may be your choice.

Stock Spec	AC	Champion	NGK	Denso
Heat Range	(X)0-(X)9	(1-25)	(9-1)	(35-16)
AC 42-1 com	C42-1	J4C, J6C	B6S	W24S-U
AC 43	R43, R43S	J10, J6, J6C	B6S	W20S-U
AC 43 com		J6C		
AC 43-5				
AC 44		J7, J8C	B5S, B6S	W16S-U
AC 45	R45, R45S	RJ14YC, J14Y J11C, J12C, J8, J8C	B4	W14-U
AC 46		RJ14YC, J14Y J11, J11C, J12C	B4, B2	W9-U
	R- resistor, 4(X)- 14mm X 13/16, XL- extralong reach S- extended tip	R- resistor, J- 14mm X 13/16, Y- projected nose, C- copper plus	B- 14mm X 13/16 (none)- 3/8 reach S- standard electrode	W- 14X20.6 (none) 3/8 reach S- regular type U- U groove
14mm 13/16" 3/8 reach	R45XLS: w/ extended tip. NO NOT USE			

Corvette C1 Classified Ads

WANTED: *Distributor for 1954 Corvette. Must include mechanical tachometer port and cap. jackhstrong@yahoo.com*

FOR SALE: *1962 Corvette, white, fawn beige, 2 tops, complete body-on restoration, 350hp rebuild, new heads and internals, 4 bolt main and balanced crank, 4-speed trans, new 330 camshaft and rear end gears,. Have all paperwork. Lee Barry 949-310-2129*

FOR SALE: *C-1 parts: 58-62 Fan Shroud, splash pan, kick panels bare, heater, front license bracket and related parts, front bumper brackets, front motor mount. 61-62 grill bar, trunk lid. 56-58 hubcaps. 56-62 3.36 ping and pinion. 60 bell housing. nice original 61 windshield dated Dec 60. 58-59 male hood latches new reproduction. 56-62 misc hood hinges, latches, pop ups, supports. 56-62 misc emblems, cove trim, other body trim. Chip Werstein 818-554-6560 or chipsgarage@aol.com.*

FOR SALE: *Cast iron bell housing for 1959 corvette cast # C159 \$75. 1960 short block never been bored cast April 7,1960 , build date July 12,1960 passenger car power glide four barrel. \$ 250. may pick up here. David Freedman 864 Avenida Acapulco San Clemente Ca 92672 949-230-0750*

FOR SALE: *61 Corvette, maroon, black interior, white coves and top. 245 hp 4 speed 3.36 rear. I found this car for a friend several years ago and he is now ready to sell. It is a very nice good running driver quality car with original matching number running gear. Comes with original 4.11 posi. If I had space, I'd buy it. Price is \$45,000 firm. This is a great price for a very good car. Chip Werstein 818-554-6560. chipsgarage@aol.com.*

WANTED: *Pictures, movies, or programs of any 1957 Corvettes at the racetracks, streets, or dealerships in Fresno, Madera, Hanford, Merced, Stockton. Mid Valley California. Ray 570-656-3420 rcdfirst@mail.com.*

WANTED: *Chevy heads 3748770 or 3755550 with staggered valve cover holes. Eric May 805-208-9342*

-- NON-Solid Axle Member Ads --

FOR SALE: *2014 Z51 3LT Convertible, 7000 miles. CA \$44K OBO, 7 Speed Manual, Black with Adrenaline Red interior, Magnetic Ride Control, Exhaust Multi-Mode, Carbon Fiber Interior, Custom Red Calipers, Suede Microfiber Wrapped Upper Trim, Premium Carpets and Battery Protection Package. russell.bergen@yahoo.com, (858)-610-3749*

FOR SALE: *1972 Corvette 2 top convertible. Ontario Orange. Fully optioned. P/S, P/W, P/B, air, tilt & tele, 4 spd., posi, leather, tinted windows. New correct tires. 3 year restoration. \$39,500. Mike, 661-373-0617*

For Sale/Wanted ads are FREE for current SoCal SACC Chapter members. Email your ad text to the editor (fkokaska@yahoo) for inclusion in the next edition.

SoCal SACC FREE COMMERCIAL VENDOR LIST

C-1 Services by SoCalSACC Chapter Members. Support those in our Chapter.

NOTE: Only those active SoCal SACC Chapter members with a C1 related business/products are eligible to be listed for FREE!

Product or Service	Member Name	Contact Information	Details
Interior Concepts & Design	John Engelhardt	Fountain Valley, CA (714) 435-9448 Shop (714) 267-9996 Cell littlejohns@sbcglobal.net	Complete Interior Restoration Convertible Tops
Vette Garage 53 thru 67 Restorations From Drivers to Concourse	Ron Lefler	(760) 983-5944 Cell (909) 519-7977 rdlef@aol.com	C-1 Hardtop Restoration
American Motoring Memories C-1 Corvette Repairs	Jeff Reade	11375 Playa St., Culver City, (310) 397-3800 FAX (310) 397-6969	All type repairs, Total & Partial Restoration, Engine Overhaul, Consulting, Sales & Service
Corvette Frame Straightening Corvette Restoration 1953 – 1962 Specialist	Walden Dahl	(760) 949-6653 Victorville	Chassis straightening for C1's. We have the attachments to correct any frame problems.
Corvette Mike	Mike Vietro	1133 N. Tustin Av, Anaheim, (714) 630-0700 corvettemike.com	We sell the best..... And service the rest!

Member Photos

Back in April, members Bob Brown ('59) and Fred Kokaska ('61) went to see the Joor Muffler Man wearing his mask in Escondido, CA. We remained 6' away from him at all times!

