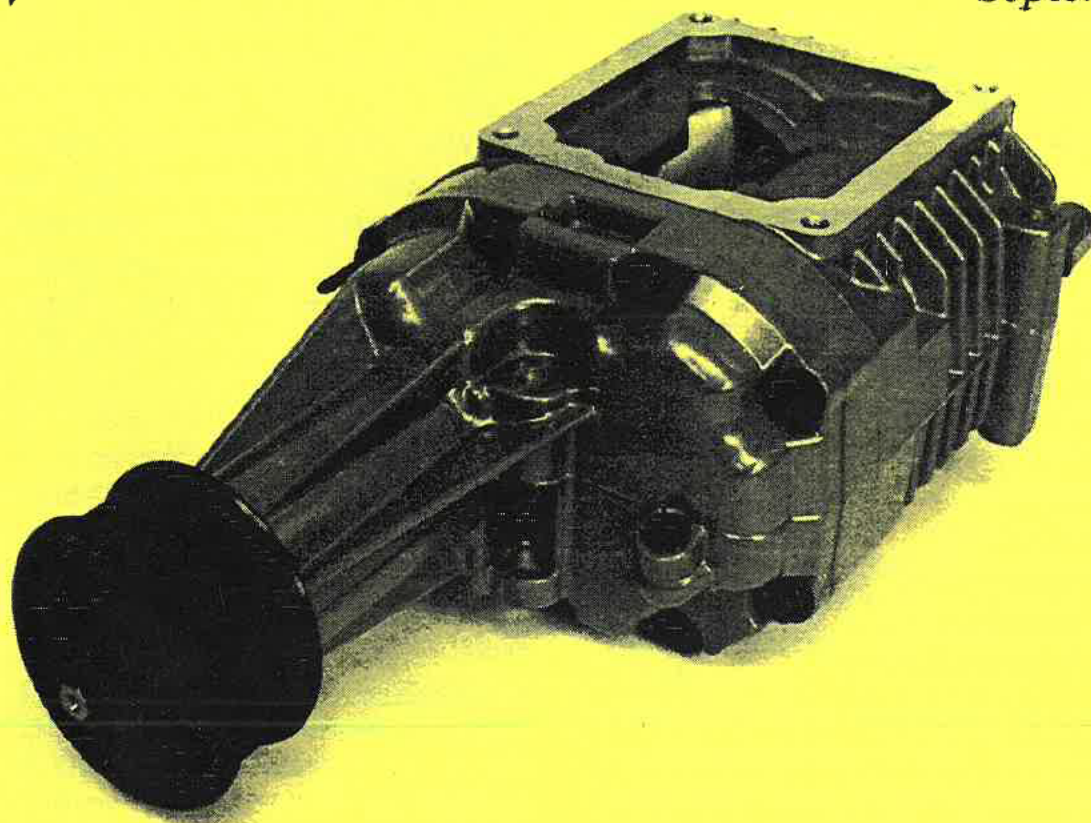


CHARGIN' THUNDER

Volume IV

September 1999



Super Coupe Club of America

Dedicated to the preservation and performance of the
Thunderbird Super Coupe – 1989 to 1995

President/Editor: Bill Evanoff

"For God sent not his Son into the world to condemn the world; but that the world through him might be saved" John 3:17

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From The Birds Nest

By Bill Evanoff

Corporate takeovers have become common place in this country and the buying and selling of companies seems to make the news practically every evening. One bank buys another, or a big manufacturing company buys a small one. **Well, I'm here to tell you that Dan Rather** and Peter Jennings passed recently on the opportunity to interview Bill Hull and myself when we agreed to a megadeal involving the transfer of the Super Coupe Club of **America. They felt this wasn't important** enough to the American public so they did not plan a trip to Charlottesville Virginia or Cincinnati Ohio to do an exclusive. We did have a few bites from Extra and Entertainment Tonight, but even they blew us off in the end. Well, I know that the members of the SCCoA care about such things so I am here to share the details of what went down recently between Bill Hull and the Evanoffs.

In all seriousness, Hull has simply been too busy selling Super Coupe performance parts to devote the proper time and energy to keep up with club business. He recruited **me to manage and edit the Chargin' Thunder** newsletter over a year ago and this issue represents the fifth I have had the pleasure of completing. Bill Hull has decided to dedicate his precious time and resources towards his successful Super Coupe performance parts business. He has offered the complete "Club" aspect of the SCCoA to my wife Patty and myself because he felt we could best handle it and were doing most of the necessary work already.

This changeover was official as of the beginning of September and therefore Patty and I will be responsible for all SCCoA club duties. This includes the club web site and

the quarterly Chargin' Thunder magazines. We are very excited about this opportunity and wish to thank Bill for this offer. We are honored that he felt we would be up to the task of heading up the SCCoA.

My wife Patty will be the new Vice President of the SCCoA and although I hate titles and don't know what else to call myself, I guess I will be the new President replacing the prior "Unimpeachable and President for Life", Mr. Hull. Bill had a lot of fun with his title and was always being facetious in regards to the "Presidential" label and I hope to do the same.

My wife will be the club's main daytime contact person as she will be home most days to take phone calls and answer any club-related questions. She will also be taking an active part in the editing, printing and distribution of the Chargin' Thunder magazine. She also hopes to be writing an **ongoing feature in this magazine called "The Ladies Corner"** which is devoted to the many women SC owners in our club and also the wives/girlfriends of the male SC owners. She brings a unique perspective to the **SC/XR7 ownership experience** and I'm sure even guys will find The Ladies Corner interesting and amusing. Although Patty is obviously not fluent in Super Coupe "speak", she is more than willing to learn and plans to come up to speed as soon as possible. Patty will sign up new members, address problems with existing members, answer any questions about club activities, and any other general questions. I will be available in the evenings after work and will have a club email account for any technical assistance.

The SCCoA is no longer going to be associated with Bill Hull's fine parts business and therefore it will not be a source of performance parts. Hull has already created a new company named Super Coupe



Performance Inc. and has retained his old phone number, which was 1-804-974-6659. He is currently working with Ron DiPaola to set himself up a new web site that will highlight his parts offerings. Most, if not all the parts that were previously available though the SCCoA will continue to be offered through Super Coupe Performance Inc. An easily found link to his new web site will be available on the SCCoA site when it is completed. **Until then the existing "SCCoA Parts" link will remain in its current position on the SCCoA site.**

I want to wish Bill Hull much success in his new business venture and I'm sure everyone appreciates all the work that he has put into our great club over the last three and a half years. Our lives have been forever changed because of his excitement and enthusiasm for these cars. **I've heard the statement "I'd have sold my SC by now if it were not for the SCCoA" too many times to realize that this club is something special. Its members greatly appreciate the Chargin' Thunder articles and also all the great parts that have become commercially available for the Super Coupe in recent years. Many of these parts can be directly traced to one source and one individual...That's Bill Hull! Bill Hull ... "WE ALL LOVE YOU, MAN!"**

350 HP Kit Update:

In the June issue of Chargin' Thunder I gave my impressions and dyno results from the 350 HP kit sold by Super Coupe Performance Inc. (SCPI). Based upon the actual rear wheel horsepower and torque values from the dyno run that was done on my '90 at the Carlisle Pennsylvania show I estimated the HP and torque values at the engine.

The math that I used to determine these values was incorrect and I want to thank SCCoA member Matt Boggs for showing me the error.

Here is the incorrect method:

HP Calculation

$$263 \text{ RWHP} \times 1.18 = 310 \text{ Engine HP}$$

Torque Calculation

$$345 \text{ RWT} \times 1.18 = 407 \text{ Engine Torque}$$

Here is the CORRECT method:

HP Calculation

$$263 \text{ RWHP} \div .82 = \mathbf{320 \text{ HP Engine HP}}$$

Torque Calculation

$$345 \text{ RWHP} \div .82 = \mathbf{421 \text{ Engine Torque}}$$

As you can see, the two methods give different results but let me explain why the second method is the correct one. The dyno operator at Carlisle estimated that my car had an 18% drivetrain loss. So I mistakenly thought I should multiply my rear wheel figures by 1.18 to get back to the engine figures. This is not correct because when one has an 18% loss, they only have 82% of their power left that actually goes to the rear wheels. Therefore, the proper calculation goes like this:

$$\text{Engine Power} \times \% \text{ of Power Remaining} = \text{RW Power}$$

Or in English, the engine power multiplied by the percentage of the power remaining (which is what is left after drivetrain losses) equals the rear wheel power. Manipulating this formula results in the following:

$$\text{Eng. Power} = \text{RW Power} \div \text{Power Remaining}$$

The corrected figures shown above further validate that the SCPI 350 HP kit indeed delivers the goods in a big way. Since the Carlisle show I have finally had the opportunity to actually wire up my intercooler fan to increase the temperature drop of the air as it passes through the intercooler. Once the fan was working, I



was shocked at how much air the little fan pulls across the intercooler. This item should surely be considered a necessity by all SC owners as it is relatively cheap and I believe it is highly effective. I have yet to **take my car to a track, but I'm optimistic it will actually break into the high 13's down the quarter mile.** I hope to get out on one of the upcoming cool fall days and I'll be sure to tell you the results in the **December Chargin' Thunder.**

Now that I have properly calculated my true horsepower and torque values and finished with all the items that make up the 350 HP kit I believe that anyone can reliably bolt on an additional 120 to 140 HP to their SC. Your **engine will still idle smooth as a baby's rear,** gas mileage will actually increase, emissions will be unaffected, and other than a more forceful exhaust note your SC will appear to most untrained eyes to be the same as it ever was. With this kit though, your car is **DEFINITELY not the same.** When you're ready to go fast, just make sure your front wheels are pointed straight in the direction you want to go, drop the hammer, and hang on tight for the ride of your life!

More Great Articles:

This issue is again jammed with terrific **articles from our members.** I'm so thankful that, when called upon, our membership will jump right in and tackle a subject and write up what they learned about it. We have **several "How To" articles in this issue** and just a ton of information about modifying and maintaining your SC in this issue. I should probably put Mike Puckett and Fred Holtzhauer on the SCCoA staff as they have faithfully contributed to just about every issue I've been part of. Also important is

the fact that this issue has many new contributors and I hope this motivates many others to write about a subject they have personal experience with or would like to share with others. Another exciting feature in this issue is from Joe Santillo who is methodically modifying his car to run in the **13's in the quarter.** This issue represents his first article in a series he will write tracking the effect of each of the modifications he plans to do to **his '95 SC.** This type of coverage is invaluable to others as they plan the futures for their own cars as their budget allows them to purchase aftermarket parts.

Top 25 List:

The Top 25 Fastest SC listing reappears in **this issue and I'm sure you will be please to see that nearly all the cars are now in the 14's.** I encourage everyone to continue to update us as your SC goes faster so we may keep the list current.

Mail copies of your time slips to:

Ron DiPaola
206 South Duane Ave
Endicott, NY 13760

Brock Banks '89 Cougar XR7



Brock Banks '89 Cougar XR7



THE LADIES CORNER

UNDER THE CANOPY

By Patty Evanoff

This year's car show at Columbus was as fun as ever. When I told my friends about it, they said "Fun? How can a car show be fun for a woman? That's like dragging your husband to a craft show and he tells you it was fun." But I insist that it was fun nevertheless. Even our five-year-old twin daughters had a great time. How can this be? The secret to our good times lies under the canopy!

As usual, my husband all but forgot us as soon as he found the coupe group and got out of the car. He did oblige us by putting up the canopy, getting out the lawn chairs and the cooler, but after that we rarely saw him the rest of the day. He was off looking at the cars, fiddling under the hoods, walking around the grounds, watching the racing, but most of all, chit-chatting with the guys. He even helped a couple of guys work on their cars. It is funny, all you have to do to draw a crowd at a car show is to pop the hood, get out some tools and start tinkering. It's a guy magnet! I had to laugh because when I listened to their conversations, it reminded me of someone speaking Chinese. I understood nothing of what they were talking about.

So, why do I enjoy these car shows so much? The camaraderie under the canopy! Yes, we ladies have a club of our own, the canopy club. Every year I look forward to talking with friends that I've met at the shows. How often do I get a chance to do nothing but chitchat all day? As a mother of twins, hardly ever. There are always lunches to make, laundry to do, bills to pay, toys to pick up, beds to make, etc., etc.,

etc.!! At the car show, I can relax. I look forward to seeing the ladies from previous shows and catching up on what's been happening in their lives this past year. We are getting to know each other quite well. I also enjoy meeting new folks. We Super Coupe chicks are such interesting people!

What do we talk about, you ask? Everything under the sun, or should I say canopy. While the guys talk about what they can do to make their cars go a millisecond faster, we talk about kids, families, health, jobs, vacations, movies, recipes, and current events, to name a few. We even talk about our men (watch out guys). We laughed so hard when one of the ladies talked about her husband's attempt to fix a leaky roof (he shall remain nameless). A common complaint among the SC ladies was that the guys' "TO DO" lists for getting things done around the house often get put aside, but they always seem to find the time to work on the car! With my husband, it is not that he is fixing something wrong with the SC, he just wants it to go faster. I will never understand this need for speed. Why can't he apply this need for speed and put up the mini-blinds that I bought three weeks ago?

After the shows, I always enjoy dining with the gang. I like to take advantage of any opportunity that I can get to not cook. This year was particularly fun in that the club members were invited to Tom and Julie's house for a cook-out. Not only did I get a great meal, but I also was able to see a beautifully decorated home. I always enjoy getting decorating ideas. When I got home,



I was motivated to add a few items to my own décor. Thanks to Tom and Julie for their hospitality. I asked my husband later if he noticed all the cool items in their home. **He said, "No, but I could tell you all about the car-related items in Tom's mega-garage."**

My children even enjoyed the show. At school the following week, Jessica painted a picture of the SC and her family at the car show with the caption **"I like to go to car shows"**. It was proudly displayed on the wall for kindergarten open house night. Why would children like going to a car show, you ask? Well, to tell you the truth, when we first got there they were bored. **"Where are the other kids?" they asked.** Julia gave up and decided to take a nap (she was tired after her first week of kindergarten). I wish I had taken a picture of her napping on a blanket under the canopy with her teddy bears, oblivious to the people talking around her. But the girls were not to be disappointed. Later in the afternoon, their friends finally showed up (their Daddy was late getting there because, you guessed it, he was up all night getting his supercharged Cougar XR7 perfected for

the show). The kids had a blast together playing ball, looking for rocks, eating French fries, and watching the drag races. They **really enjoyed playing "Simon Says" and "Leapfrog" with April, a girlfriend of one of the club members.** They also had a great time getting **"hay rides" in a wagon pulled by Tom's John Deere tractor.** Finally, the best part was going swimming at the indoor pool at the hotel.

So, ladies, do not hesitate to come to a car show. Bring your SC, your sunglasses, your kids, and your cooler. You can swap tales about your car, or share adventures about your life. Good times are to be had by all. I will leave you now with a song on behalf of my daughter:

Under the canopy
Down by the Super Coupes
On a blanket with my Teddy Bears
That's where I'll be

**** If you ladies have something interesting you wish to be considered for "The Ladies Corner", please send it by mail or email at pattyevanoff@usa.net.**

California Mini-Meet

By Bill Evanoff with info from John Zinn

California Super Coupe enthusiasts wanted in on some of the mini-meet action that other parts of the country have been enjoying so we held our first meet a few weeks ago. Attendance exceeded my wildest expectations as 21 Super Coupes and other performance MN12's showed up.

We met on August 28Th at the Off-Campus Pub in Fullerton, California. T-Bird and Cougar owners from San Diego, San Jose, Atascadero, and many locals came out. We

even had one enthusiast travel nearly 300 miles.

We had a great mix of cars with many Super Coupes, but also several unique V8 Birds and a supercharged early XR7 also. There were two Allen Engine Development supercharged 4.6L Birds and one 5.0L with a Kenne Bell Whipple-Charger

A great time was had by all and the highlight of the day was a raffle for either a Addco sway bar or a Kenny Brown strut tower brace. Mike Giagrande of Placentia, CA was the lucky winner.



Columbus Ohio Expo '99

By Bill Evanoff

A record number of Super Coupes descended upon the National Trails Raceway over the long Labor Day weekend this year in Columbus Ohio. The **Expo '99 event saw 26 SC's and one lonely LX Bird** under clear and hot skies. The Columbus show had a new sponsor this year and did not seem quite the same as in years past. The Performance Ford Club of America is no longer running it and overall attendance seemed to be off slightly due to this fact. The car show was probably half the size from previous years, but the racing action was still excellent and the staging and pit lanes were as full as ever.

Friday was a great day for test and tune, but Saturday was the major day for the show. I arrived before noon and pulled into a grassy area already bulging with beautiful Super Coupes. We were surrounded by old Comets and a few late model GT Mustangs. I had made previous arrangements with Ron DiPaola (our illustrious SCCoA Webmaster) that he and I **would install a new Magnuson Products "S" model on his '93. I knew Ron was anxious** to get started on his horsepower injection ASAP, as he was the first person who approached my car upon finding a good parking spot. I had just gotten the blower back from Magnuson a few days earlier and the installation started immediately. I was curious to see how long it would take us to do the installation and only three hours later Ron turned the key to fire up his new blower. The car ran perfectly and Ron was happy to see it was pulling 12 pounds of boost **with the '94/95 pulley on** his test drive. His old blower with 130K

miles was only making 8 pounds for some unknown reason. We believe he may have had a vacuum leak, but the results were what counted. The big pulley was chosen as a temporary measure to keep his head **gaskets in check until his new '95 engine is** implanted over the winter. Ron ran his SC the next day and turned a 14.6 in the quarter. His previous best with the old blower less than a month ago was a 15.1, **which shows how effective these "S" models really are.**

Five new SCCoA members were signed up over the weekend and the Columbus show was also the first place where the news was broken about the changeover in the SCCoA. I talked briefly with one of the new members and he claimed that he had eight Super Coupes currently. WOW, if I had that many, I would not get out of the driveway because I would never be able to decide which one to drive. That is definitely a record as I had previously heard of someone owning five SCs with some being used for parts, but eight is simply too cool.

Saturday went quickly and around 5 p.m., Tom Wilhelm and Julie Clemmons invited the whole group out to their new house for a cookout. I had to get gas for my car, so I left a few minutes early, but the group caught up to me at an extremely crowded truck stop where I was attempting to fill up. As I was topping off, over twenty SCs entered into the truck stop and proceeded **to wait for me. Yes, I'm sorry for causing** everyone to be delayed, but I really was almost out of gas! Getting out of the



station and onto the busy road caused our group to be split up as we all could not exit quickly. **I'm sure several minutes passed from the first car exiting to the last.** Tom and Julie had told a few of the members what exit to get off, but I didn't pay attention as I figured I'd follow the crowd. Well as it turned out, I was lucky enough to be about the fifth car out of the truck stop and I was leading over ten SCs down the road. **I said to my wife, "I hope they don't think I know where I am going, because I have NO CLUE!"** After about three miles on the highway, I pulled to the berm and proceeded at about 25 mph desperately hoping someone who knew the way would pass me and direct the group to the proper freeway exit. Well, as I pulled to the side of the road, so did everyone else. Monkey see, monkey do. After driving about a half-mile on the side of the road and causing a minor back up from all the other cars that did not know what to make of ten to fifteen Super Coupes along the berm going slowly. The only good thing this accomplished was it allowed the few stragglers who were last out of the station to catch the group. I got back on the freeway and accelerated quickly up to the speed limit and I guess that meant we were now racing, because I saw many of the SC drivers behind me start weaving in and out of the traffic playing cat/mouse with those around them. I am so thankful that Andy Erickson finally pulled out onto the fast lane and passed about five cars including myself. Within the next half-mile, Andy exited and we all followed him at the proper exit. Thankfully, Tom was waiting for us at the top of the ramp. From what I later heard, several of the cars last to exit the station had to drive over 115 mph in order to catch our group

while on the freeway because the traffic exiting the truck stop was so thick. One member's wife asked me, **"Is that what you guys call a cruise, because I'm not cruising with you anymore if it is?"** Her husband, who shall remain nameless, nearly pegged his speedo several times to catch the pack and his wife did not like that at all, especially with the kids in the car. I promise you now that I will definitely come to the show with a full tank of gas next year and maps to any excursions.

The group pulled onto the lawn at Tom and Julie's house and I am sure the neighbors were looking out the windows to see this wild sight. Can you imagine twenty SCs in your own yard? A John Deere tractor and trailer kept all the kids happy as several of us gave them rides around the property. The dogs, burgers, sausages, and chicken were quickly prepared and also quickly done away with by the hungry crowd. Our thanks go out to Tom and Julie for their tremendous hospitality.

Many came back to the track on Sunday after going out to breakfast together at the Cracker Barrel restaurant. Just as we had installed a raised/enlarged blower top on **Kurt Sunday's car at Carlisle, we did the same to Andy Erickson's car before we left** on Sunday. Four of us bested our previous installation time of thirty minutes with a new fastest time of only twenty minutes. I would have to say there is now an open invitation to anyone wanting this installation at shows as it goes so swiftly when you have the right tools and a few willing hands.



Those attending this year's event were:

Dick and Judy Adams	Ron DiPaola and Marisa Burns	Mark Sayers
Stan, Suzetta, Allicia, and baby Stan Wodzisz		Ken Seegers
John Filarski and Julie Castrodali	Keith King	Marc Haberman
Bill and Joanne Schlabach	Curtis Hungerford	George O'Neil
Fred and Karen Peckrul	Jimmy and Bev White	Roger Szczep
Tom Wilhelm and Julie Clemmons	Tim Hendelman	J.R. Carclay
Bob and Bob Jr. Moore	James Fernandes	Andy Erickson
Doug Williams and April Dantes	Wayne Ing	Machael Varrik
Chuck Carrol and Kit Duty	Robert, Carol, and Robert Jr. Grenkowitz	
Brian Fuller	Eddie Rahm	Reba Grogan
Bill, Patty, Jessica, and Julia Evanoff	Joe Baldazzi	Brad Birri

A Tale of –TWO Super Coupes

By Michael Taliercio

I have two Super Coupe stories for you. I've been driving a 1990 SC for about 6 years now. I own a repair shop in West Babylon, New York and the woman who sold me the car is a customer of mine. The car was stolen from her in 1992. The guys that stole it blew the motor and transmission, ripped out most of the dash, stole the radio, ripped off the body side moldings and knocked off the passenger side mirror. It was sitting at a Ford dealer on Long Island for more than a year when I bought it from her in 1993. She wanted \$3000 but there was so much damage that she accepted my offer of \$1000. There was \$1700 in storage charges on it, but the dealer is a friend so he let me take it for nothing. Pretty lucky!

It's even luckier that the first yard I called had a motor for the car. I got it for \$1000. I don't think he knew what he had. The motor had about 35,000 on it, so I put it in the car with very few repairs. I had a friend rebuild the transmission and he put a shift kit in it. I bought all the interior parts from the dealer and that took some time to complete. I drove it all the time while I was doing the interior. I put a Flowmaster exhaust system on it, put 3:73 gears in the

rear and a pulley on the supercharger. It goes like a rocket. It was quite a project, and it kept me busy for a long time. The **next things are a new hood and paint. It's a** good story but I think the next one is better.

I check the classifieds occasionally to see how much my '90 SC is worth. This ad caught my eye: "T-BIRD 1994 SC loaded, excellent, needs head gasket, \$4700" I figured I could fix the head gasket in my shop, so I called the guy and met him that afternoon. When I got to his house the car was in the driveway with the hood up. It was in front first so I could only see the rear. The color was a beautiful royal blue. As I walked up I could see the car was like new. No kidding, like just out of the showroom. Clean, shiny and blue! Is my excitement coming through?

Still the hood was up and I was worried what the guy was doing. We introduced ourselves and he started telling me that he bought the car for his wife. She hated it and he never even registered it. It was sitting in his driveway for three weeks and he wanted to get rid of it. He said the car seemed to be using water but he didn't see any on the ground or any white smoke from the exhaust. So he started looking around. He discovered that the original owner had installed an oversized intercooler and when he routed the hose that goes from the



radiator to the overflow tank it got pinched and rubbed through. That's where it was leaking. He had just finished replacing the hose as I got there.

I had hoped to get it for less than the asking price but since he had just fixed the hose and it didn't need a head gasket, he wanted the full amount. I tried to keep the smile off my face as I gave him the money. When I got to the DMV later the inspector told me there was a problem with the title. I got real nervous. Since this whole thing seemed to good to be true, I was expecting the worst. They wanted the registered owner, not the guy selling me the car, to sign the disclosure statement about the mileage and if the car was ever salvaged. I went back to the seller

and he said he would take the form to the owner. The worst hour of my life was waiting to see if he was going to return with the signed document.

At 3:55 PM, five minutes before the DMV closes, he drove up with the signed paper. I registered the car and it's in my driveway now. I finally have a good reason to straighten out my garage. I'm in love with my BLUE SC. By the way, the car has EVERY option and everything works! Yes Bill, I have two Super Coupes now. Again, thanks for the great web site, great technical information, and great general info too. I've just sent you a check to join the SCCoA.

Dear Bill:

You are doing an outstanding job. This club is great. In 1995 I bought a slightly used **T-bird Turbo Coupe. Ever since the "aerobird"** came out in 1983 (I was only seven), I dreamed about owning a T-bird. This was **the one I wanted ... a sleek**-looking, 5-speed Turbo. The only thing better would be the SC, but those were still out of my price range, being a freshman in college and all. The Turbo was fun, but I had to be in a Merkur club to get go fast parts, and the car was too heavy for that motor, except when it was flat-out to the floor, and then the vibrations could shake the doors off. But I managed to have serious fun it.

In the fall of 1997, I was looking to upgrade. After all, my Turbo had 194,00 miles on it, and was getting a tad unreliable. I found a 1993 black SC, with leather, CD, all the amenities I wanted, for a price I could manage. It had 54,000 miles on it, and it was a looker. It hauled too.

My brother had a 1994 Mustang GT, and we would always try to compare the two. I

personally thought the ride was much nicer in my T-bird, and it was nice knowing that my car was not one that everyone and his brother owned. The power delivery could not have been more different between my two Birds. No matter what gear, what rpm, I could nail the SC and it would just go. With the turbo I had to wait for spool-up, or drive it north of 3000 rpm all the time to get immediate response. Even then, the rush of the four banger was not as strong as the **low end grunt from the SC. The SC's** handling was a huge improvement over the Turbo-Fox platform also.

All in all, The SC is a much more sophisticated, refined, and powerful car over its predecessor. My SC now has 104,000 miles on it, has won 5th place at an all Ford show in Grand Rapids for T-birds, and has gotten me three tickets for speeding in **Ingham County. And I couldn't be happier.**

Keep up the great job,
Sincerely,
Jonathan L. Palmer, Member #575
(517) 676-6645



Dear Bill;
The SCCoA is looking good!

I think the change was a wonderful idea! I am working on a few articles for you too.

Our upcoming New Mexico Route 66 Meet could possibly attract about 13 SC nuts.

Here are some SC tips. Maybe you can put them in the next CT:

1. Have Mr. Hull ship your new Super Coupe Performance Inc. exhaust system to your work address.
2. When she notices the SC seems "a little louder" just say -"I think that stock exhaust has a leak, I better drive the SC daily now."
3. Have Bill Hull send two invoices. The real one, and the one you show the wife.
4. Never, never ever do a two-streetlight burnout with her in the SC.
5. Tell her you are testing the \$25 wax on the SC to make sure it won't mess-up her Taurus.
6. Pull off a spark plug wire before letting her drive the SC.
7. If you get a new raised/enlarged blower-top hide the old one to avoid questions like "how did this part go bad?"
8. Never ever pull over another SC with a blond babe driving to see if "she wants to join your club" when your wife is with you!
9. Trust me! Pay the extra money and have Bill Hull put a dozen roses in the box with your new downtubes and highflow cats.
10. Never ever have your SC Buddy do a tire smoking 180 in front of your house when he leaves.
11. Tell the cops that the white SC must have just followed you home thinking you were someone else.
12. Never, never, never have your buddy's SC on jack stands in your driveway three days in a row!
13. Never ask the wife to get your SC Buddy a sandwich and a beer because he's been here all day.
14. Yea honey... I know they are new 17" Cobra R rims, but those are the same tires from the stock rims.
15. And for you lucky guys... 101 Positions in a SC Backseat.

I have experience with every one except #15 (but that's on my Planned Modifications List).

The reason I wrote is, (if possible) could you **mention in the next Chargin' Thunder that Major Glenn Huber (Cofounder of the SCCoNM Chapter) did make it to Carlisle '99.** He flew (in an airplane, not an SC) there to meet Bill Hull and see all of the bad ass SC's. He has kids and that was too long of a drive for them.

(Consider it done Kurt.....Editor)

Thanks Buddy and keep up the great work! I'll put you down a big SC burnout at the next New Mexico red light I actually stop at!

Thanks again,
Kurt Sunday

To learn more about the New Mexico SCCoA chapter, contact Kurt at 915-877-7218 or email him at "ksunday@scgroupinc.com".
Editor



Love At First Sight

By Doug Williams

When I first saw a SC I had no idea what it was, but I knew I wanted one and my plans of getting a Camaro (GM family...) were history. I got my blue 89 5spd in 1992. For six years the car was my prize and I babied it like you wouldn't believe. Then about one year ago I almost sold it because I wanted something I could work with to make one of a kind, and fast too. But I decided to look up "Thunderbird SC" on the Internet and to my surprise I found some good things. (SCCoA, MN12 Performance, and TCCOA)

So last September I decided to take it out to the track and see what it would do stock.(exc. K&N and no silencer) It did a best of 15.3 @92mph, about what I expected. Then I started my first round of changes. MN12 Performance exhaust, 3.27 gears & Auburn Differential, and a 10% OD pulley for the SC. What a difference, Night and day! Those three changes are the basics for anyone who wants more performance out of their SC.

My second round of changes was suspension, wheels and tires. I decided on H&R springs & KONI shocks and as soon as I found out the 17X9 Cobra R style rims were available from MN12 I made the call! I was nervous about lowering my car but I think it turned out pretty well. It still has that nice ride, handles great, and looks great!

My third round of changes was for more power. Over the winter I found a '94 supercharger in a salvage yard, an irresistible deal! I sent it to Magnuson and had it "S"d! I added a SCCoA 3/4 top, 70mm TB, ProM 75mm MAF and a 5% pulley. My engine makes good power and pulls more at higher RPM's now. I have

done a few other changes along the way like drag radials for the track and my B&M ripper shifter. But it is not all about speed.

I started going to some of the car shows with other SC people. My first one was Mobil 1 Challenge. Very cool. Lots of racing, and mostly Mustangs. Then in July I went to the Ford Superfest in Milan, MI. Andy Ericson, Chuck Carrol, Jimmy White, Bill Schlabach and myself were there. Andy won the car show and Jimmy and I ran our cars. That is when I ran my 14.1 @ 99.4mph. It was fun running 2 SC's down the track! Chuck Carroll and I went to the FUN Ford weekend in Norwalk, OH. That is a top-notch track facility and would be a good place for a future SC meet. I won the show there in a strange category of all Thunderbirds, Fairlanes, Galaxies, basically any large 2-door Ford. The last event I went to was the Columbus Ford Expo. I took my girlfriend and we met the most SC people there and had a great time! I wish I had been going to these events and meets all along! There are some great people and some really nice cars out there!

So this is what I have been doing with myself and car in the last year! I really look forward to seeing all the SC people again and meeting more SC enthusiasts in the future.

P.S. I hope to see all the Midwest Chapter SC's **at Milan on OCT 9Th.**

Anyone wishing info. on the Milan Michigan show can contact Doug at (313)562-3004.....Editor

Doug Williams '89 SC





What About Those Anniversary Seats?

By: Chuck Carroll

After reading Chuck Coryell's article in the last Charging Thunder, I have decided to add my two cents on the rare thirty-fifth Anniversary SC. Our cars are almost a decade old and the suede/leather seats are too. This means that more than likely they are in desperate need of recovering. In the past two months I have received countless e-mails on my newly recovered seats and how I went about getting them redone, so I decided to write it down on paper so all you anniversary owners have it for your future reference.

I am a college student and I spent a semester at Jacksonville University in Jacksonville Florida. While I was down there I researched auto trim shops and found Bill's Custom Auto Trim. When I went to the shop I noticed a set of Corvette seats and an antique Jaguar in the garage, so I knew that he knew what he was doing. Bill and I sat down and talked over what I wanted and what the prices would be. He told me that authentic suede is next to impossible to get and if you can get it you will have to sell some of your organs to pay for it. So he introduced the idea of Ultrasuede, an exact substitute for the real thing, and I was sold. If you inspect the seats you will notice that the side bolsters and all the material that you sit on is leather, while all the sides and back are

vinyl. I was able to get the seats done during the week I was gone for spring break so it worked out well for me. After he receives the material it will only take him a week to finish the seats.

I called Bill about doing more of these seats in the future and he said he would be more than willing to work with anyone to get the seats there and send them back out. If you have a trim shop that you want to recover your seats Bill will also just order the material for you and have it perforated as well. If you have him do the seats it will cost in the neighborhood of \$650-\$750 (plus shipping) for the front seats, and the same for the backseat.

Here is a list of the Ultrasuede that you will need.

Grey: #5566 Pewter

Blue: #2328 True Blue

Contact: Bill's Custom Auto Trim

3161 St. Johns Bluff Rd. S.

Jax, FL 32246

Phone: 904-565-1543



My Quest for the 13's

by Joe Santillo

I would like to start this article by telling a little about myself and how I ended up with a Super Coupe:

In 1989, I was about to go back college to get my degree **and I was driving a '83 Oldsmobile Firenza station wagon..** This was a very different ride than I was used to. The car I had been driving for the past 7 years was a modified 440 Plymouth Fury. This was a fast car but had some serious reliability problems. **That's where the wagon fit in.** It would start every time and use about ¼ the gas of the Plymouth. It was down on power though as the 2.0l GM 4-cylinder produced about 60 HP.

Prior to returning to college, the Olds wagon finally broke down. It was on the way home from a trip to Florida. Around the DC beltway, the tranny let go. This sounds familiar right? Anyway, I had to spend a couple of days in the DC area without a car. So, I found a ford dealer and was looking at the mustangs when I saw the new red SC. It looked so modern and I was really impressed that Ford took the risk of putting a supercharger on one of their cars.

Since I was going to school soon, I knew there was no way I could afford the Super Coupe. A few months later, I bought my friends 85 Mustang GT. I could probably write an article about this car but this is not the place. I will say that Ford had one fast mustang that year as the car ran 14.5 stock and 14.0 with slicks, and underdrive pulleys.

Advancing several years forward (1993), I was finished with school and working in Maryland with a decent job. The mustang was still running good but was starting to show signs of rust. I decided that I wanted

a V8 (5.0) thunderbird as my next car and started looking for a used model. After several months with no luck, I decided to **buy a 91 with a V6.** The power wasn't too bad and once I put on a set of good tires, that car could handle as well as the mustang.

Now, let's move forward a couple more years. It was the beginning of 1995 when I decided to buy a used Super Coupe. I had a budget of \$15,000 and two requirements. It had to be a 5 speed and it could not be **silver.** **I also couldn't get one with a moonroof** because my head would hit the roof.

One month of searching the local papers turned up zero 5-speed cars. I got to drive a used automatic 1994 model at a dealer and I was really impressed. The price was too high though. I made the decision to buy a new Super Coupe. For a couple thousand more than the price of the used 94, I was able to order my car with what I wanted.

Unfortunately, I ordered the automatic. I wimped out at the last moment because of the bad traffic and icy winters around here. If I only knew then what I know now. Other than the tranny, I got the floor mats and that was it. The car was already loaded with everything I wanted and then some. From the start, I was very impressed with the power and handling of the SC. The only modification I made in the first 4 years was the installation of the alarm system. I made a couple of disappointing trips to the dealer for warranty work but this could be an article too. During these 4 years, I began thinking that the engine made good power in the mid-range but really fell flat at higher



rpms. I also thought that Ford somehow programmed the computer to prevent the engine from making enough power to spin the tire(s) from the start. The SC would not spin the tires on a warm day. Was it a plan devised by the lawyers at Ford to prevent lawsuits from the widows of reckless SC drivers?

I spent some time looking in magazines and calling manufacturers of performance parts to see what could be done to improve the performance of my car. I had no luck but I had a plan. I knew the exhaust could be opened up to help the top end but I figured a chip would be needed to help the power off the line. I found nobody who made a chip for the 95 and Borla was the only one making an exhaust. I decided that I was not going to pay \$800 for an exhaust that did not include the cats!

A short time later, I found the SCCoA web site along with MN12 Performance and Bird Cats. The amount of information and parts I found was amazing. Also amazing, were the prices of everything. I realize that mass production reduces the cost for Mustang performance parts, but now, I know how lucky those guys have it.

It took about 6 months, but finally I was convinced to 'do' the exhaust. Back in May, I installed the "other guy's" full exhaust on my SC. I would like to say that it helped, but I have no hard numbers to compare to.

After the exhaust, I ran 14.94 at 92 mph in the ¼ mile. Since I never ran the car before that, I will have to trust Motor Trend's 15.2 at 88mph as the baseline.

So now that I did the exhaust, I'm hooked. I have decided to set a goal of reaching the 13.99 second mark in the ¼ mile. I know there has been a lot of talk about this recently on the BBS, but I will try to do it for less than \$2000 in performance parts.

In the upcoming issues of Chargin' Thunder, I will discuss the modifications made since the last issue and the effect. I will also try to visit the track between all mods to determine the effectiveness of each. The exhaust is the only mod that was used for the 14.94 second run. I replaced the tranny/converter, but that might be a future article. The performance gain of the new tranny is small compared to the exhaust.

In future articles, I plan on discussing the results of the SCCoA blower top and an OD pulley. I will use an 89 – 93 pulley as a starting point since it gives 3.8% over a '94 – 95 blower pulley. I also plan on installing 3.73:1 gears, K&N panel filter, remove the air silencer, and a couple of other things. **As long as the track is open, I will also 'test'** the gains of the mods. If I hit 13.99 before I spend \$2000, I'll be happy. If I don't, I think I'll be really close and will start to focus on the handling/braking. Look for my article in the next issue to see my progress.

IMPORTANT NOTE: SCCoA member George Clarke (George.Clarke@prodigy.net) passes this news along to our members regarding a great place to buy original Ford/Motorcraft parts for your SC. Please help spread the word that Dan Dellamarine, Manager of Tom Gogel Ford in Bridgeton, NJ wants our business. He is offering generous discounts and sometimes-free mailing. He can be reached via email at (partmandan@aol.com) or 1-800-624-4302



Computer Code Reading the Paperclip Way

By Matt Boggs (mboggs@evansville.net)

Computer error code reading has become an essential for the home mechanic trying to diagnosis and repair troubles affecting their favorite vehicles. There are multiple posts per day on the club BBS pertaining to error codes and what they might mean or how one goes about obtaining such a thing as a computer error code. Many stores sell devices that will aid you in checking computer codes, although they are often sold at deterring prices. It is simply unnecessary to buy these expensive units. In this article, I hope to provide you with a simple and cost effective manner for checking the computer codes on your Super Coupe and many other Ford EEC-IV vehicles. As a side note, Ford switched the Thunderbird to the EEC-V starting in 1995. To my knowledge the EEC-IV was used on the majority, if not all, Thunderbird/Cougar models prior to 1995.

What is a computer error code and what do I need to get one?

The computer error code is a two or three digit number (depending on version of EEC-IV) representing a specific fault, which was detected by the on-board computer during a regular diagnostic sweep of various electrical systems and components on your car. There are some various flavors of error codes available to you. A KOEO (key ON engine OFF) Self-Test code provides a check that the control module memory and processing capabilities are in tact. It also checks that sensors and actuators are functioning properly in and among themselves. These are called HARD faults or On-Demand codes. These are errors that the computer sees at the instant that you are running this type of test. You also have KOEO Continuous Memory codes. These are the result of the computer running its continual on-board diagnostic program while

you drive your car. If a fault is found while the car is running, the error code will be stored in KAM (Keep Alive Memory) for you to later retrieve. These are called SOFT codes and can indicate a chronic or intermittent problem. SOFT codes are errors that have occurred in the past but may not be present the moment you administer the KOEO test. If the computer does not detect a SOFT code stored in KAM within 80 (sometimes 40) key starts, it will erase that code from memory. You can also perform the ER (engine running) Self-Test. This is similar to the KOEO Self-Test but will check sensors and actuators in closed loop running condition.

How do I recognize an error code?

To my knowledge the fault codes can be read off the Check Engine light for most Thunderbirds, if this does not seem to be the case for you contact me for an alternative method. A single flash has a duration of about ½ second on and ½ second off. Digits will be separated by about one second and entire codes will be separated by about 4 seconds. For example, a car with a 2-digit code having an error code of 23 would have two quick flashes then about a one-second pause then three quick flashes and a pause of roughly 4 seconds before displaying additional errors. A single flash will separate the HARD and SOFT codes. All HARD codes will be given first followed by a single separator then all SOFT codes will be given.

What do I need to get an error code?

All you need to perform the KOEO and ER test described above is a simple metal paperclip. You might also want to bring a pencil, notepad and a copy of this article along with you just in case.



Okay, now how do I really make this thing happen?

Setting up the error code checking tests is really not that difficult and can be done in the course of a few minutes, once you become familiar with the procedure. Both tests are generally more effective once the car has been driven to obtain proper operating temperature, but the KOEO can be administered to a cold engine with decent results. I will provide the steps in a checklist type format for ease of usage.

KOEO Test

1. Locate the test connectors. They are **found on the passenger's side of the engine** compartment back near the firewall behind the shock actuator. They are sometimes housed in a plastic casing, which is attached to the body by a plastic push clip. They are usually made of black, gray, or red plastic. You should find a trapezoidal connector with 6 slots and a small separate pigtail connector with one slot.

2. Now that you have found the connectors, it is time to hook up your paperclip. Fashion the paperclip in to a **large "U" shape**. Hold the trapezoidal connector with the slots facing you. Insert one end of the paper clip into the slot (signal return) located on the right of the top row (has two slots, chose the one on the right). Insert the other end of the paperclip into the single slot of the pigtail (self-test input).

3. **Sit in the driver's seat and turn the** ignition switch to the ON position (do not start the engine for this test). You will hear a series of clicks and whirrs. This is normal. The ECA is taking readings while checking the operation of various sensors and actuators.

4. Watch the yellow/orange Check Engine (Malfunction Indicator) light for a series of

flashes indicating the error codes. Remember HARD codes are given first then a single separator flash then the SOFT codes. HARD codes will usually be repeated twice in sequence before the single flash.

5. Write down any codes you received and reference an error code list to aid in diagnosing your problem.

6. You can clear the codes in order to determine a fixed problem, by simply removing the paperclip from the test connectors while the check engine light is flashing codes.

7. Remember to remove you paperclip when done and store it in a safe place.

ER Test

1. Engine temperature is critical for this test, so make sure that your car has been driven or idled long enough to allow the O2 and Coolant temperature sensors to reach operating temperatures.

2. With the engine off, connect the paperclip to the test connectors as described in the KOEO test.

3. Get in the car and start the engine. Almost immediately after the engine starts a series of flashes will occur on the Check Engine light as well as a very high idle. 2, 3, or 4 flashes should appear. This should represent half the number of cylinders your engine has. For the SC you should see 3 quick flashes. If you flashes are not correct for the engine you have, then the wrong ECA may have been installed on your car.

4. Immediately after the cylinder ID the ECA activate different actuators and modify the idle speed. It does this to get a response from various sensors. It is normal for the RPM to rise and fall as well as



misfire. During this time you need to do a BOOP (brake on-off, power steering) procedure. I usually do this about 2 seconds after the last flash in the cylinder ID sequence. You need to turn the wheel about one-half turn and touch the brake pedal momentarily to perform the BOOP. This allows the ECA to check the operation of the power steering switch and brakes.

5. After several seconds the engine should smooth out. The ECA will advance timing to about 20 degrees at this time.

6. Watch for a single flash about this time. Approximately 1 – 3 seconds following this single flash you need to snap the throttle to Wide Open Throttle (just goose the gas and make sure the RPM exceeds at least 2,000). As soon as you exceed this target RPM the throttle should be closed again (just pull **your foot off the gas**). This "goose test" helps the computer monitor changes from the TP and MAP sensors as well as correct idle speed seeking.

7. Briefly after the goose test, you should see error codes flashed on the Check Engine (Malfunction Indicator) light similar to the routine as described in the KOEO test. Only HARD codes will be given and there will be no single separator pulse. These will be codes that the ECA detected during the cycling of the engine at the time you

performed the test.

8. End the test by turning off the engine then disconnecting the paperclip from the test connectors.

What do all these codes mean?

I have included a list of codes for the 2-digit and 3-digit EEC-IV systems. Error codes are provided to aid in troubleshooting. Sometimes a given code does not mean the part referenced with that code is bad. It could represent that something related to that part is bad. For example, an out of range O2 sensor code could indicate that your MAF is not calibrated correctly. I know this because I installed a 70mm ported MAF on my 1990 and had an O2 code come up after my battery was disconnected. The car ran good before disconnecting the battery cleared the adaptive memory variables. I had a feeling the re-calibrated MAF had changed the fuel scheduling thus causing a persistent rich condition. I changed the MAF back and the problem was solved. So the moral of this story is error codes will get you very close to your problem and sometimes hit is on the head the first time, **but use them as a tool for troubleshooting...** not the final word. I would suggest keeping a few metal paperclips, a pencil, some paper, and a copy of this article in your car in case a check engine or check gauges light threatens to ruin your plans for a nice cruise about town.

Glossary of Terms

PIP	Profile Ignition Pickup	Provides crankshaft or camshaft position information for ignition synchronization	MAF	Mass Air Flow	A system which provides information on the mass flow rate of the intake air to the engine
ECU	Powertrain Control Module	The module that controls the EEC system	PFE	Pressure Feedback EGR	An EGR system that monitors EGR pressure across a remote orifice to control EGR flow
CID	Cylinder Identification	Hall sensor or dual hall sensor, Indicates camshaft position	EGR	Exhaust Gas Recirculation	Reducing NOx emissions levels by adding exhaust gas to the incoming air/fuel mixture
ECT	Engine Coolant Temperature	The temperature of the engine coolant	EGO	Oxygen Sensor (O2s)	A sensor which detects oxygen (O2) content in the exhaust gases
BP	Barometric Pressure (BARO)	The pressure of the surrounding air at any given temperature and altitude	HEGO	Heated Oxygen Sensor (HO2s)	An oxygen sensor (O2s) that is electrically heated
TP	Throttle Position	Indicates the position of the throttle plate	DIS	Distributorless Ignition System	A system in which the ignition coil secondary circuit is dedicated to specific spark plugs without the use of a distributor
ACT	Intake Air Temperature	The temperature of the intake air	EGT	Exhaust Gas Temperature	A sensor which detects exhaust gas temperatures
KS	Knock Sensor	Detects engine knock	PSPS	Power Steering Pressure	Indicates the pressure in the power steering system
			BTDC	Before Top Dead Center	A setting in degrees before the point in which the piston reaches the top of its travel on the compression stroke



1989-1990 3.8L SC ENGINE SERVICE CODES

2-Digit Service Code Chart

Code	Test Condition	Explanation	Code	Test Condition	Explanation
11	O/R/C	System pass	52	O	PSPS circuit open
12	R	RPM unable to reach upper test limit	52	R	PSPS always open or always closed
13	R	RPM unable to reach lower test limit	53	O/C	TP sensor input exceeds test maximum
14	C	PIP circuit failure	54	O/C	ACT sensor input exceeds test maximum
15	O	ROM test failure	56	O/C	MAF sensor input exceeds test maximum
15	C	Power interrupted to keep alive me	61	O/C	ECT test sensor input below test minimum
18	C	Loss of tach input to ECU, spout grounded	63	O/C	TP sensor below test minimum
18	R	Spout circuit open	64	O/C	ACT sensor input below test minimum
19	C	CID sensor input failed	66	C	MAF sensor input below test minimum
21	O/R	ECT sensor input out of test range	67	O	Neutral drive switch open. A/C input high
22	O/R/C	BP sensor input out of test range	67	C	Clutch switch circuit failure
23	O/R	TP sensor input out of test range	72	R	Insufficient BP change during test
24	O/R	ACT sensor input out of test range	73	R	Insufficient TP output change during test
25	R	KS sensor not detected during test	74	R	Brake on/off circuit open, not on during test
26	O/R	MAF sensor input out of self-test range	77	R	Wide open throttle not sensed during test
29	C	Insufficient input from vehicle speed sensor	79	O	A/C on during self-test
31	O/R/C	PFE circuit below minimum voltage	82	O	Supercharger bypass circuit failure
32	R/C	EGR valve not seated	83	O	High speed electro drive fan circuit failure
33	R/C	EGR valve not opening	84	O	EGR VAC regulator circuit failure
34	O	Defective PFE sensor	85	O	Canister purge circuit failure
34	R/C	Excess exhaust back pressure	87	O/C	Fuel pump primary circuit failure
35	O/R/C	PFE circuit above maximum voltage	88	O	Electro drive fan circuit failure
41	R	EGO/HEGO circuit shows system lean (right side HEGO)	91	R	HEGO sensor circuit shows system lean (left side HEGO)
41	C	No EGO/HEGO switching detected, system lean (right side HEGO)	91	C	No HEGO switching sensed (left side HEGO)
42	R	EGO/HEGO shows system rich (right side HEGO)	92	R	HEGO sensor circuit shows system rich (left side HEGO)
45	C	DIS coil Pack 3 circuit failure	96	O/C	Fuel pump secondary circuit failure
46	C	DIS coil Pack 1 circuit failure	98	R	Hard fault is present
48	C	DIS coil Pack 2 circuit failure	No Code		Unable to run self-test or output codes ¹
49	C	Spout signal defaulted to 10 degrees BTDC	not listed		Does not apply to vehicle being tested ¹
51	O/C	EGT sensor input exceeds test maximum			
O-Key On, Engine Off			C-Continuous Memory		
R-Engine Running			1-Refer to system diagnostics		



Super Coupe Club of America
1991-1995 3.8L SC ENGINE SERVICE CODES
3-Digit Service Code Chart

Service Code	Test Condition	Service Code Definition	Service Code	Test Condition	Service Code Definition
111	O/R/C	System PASS	187	C	Injector pulse width lower than expected
112	O/C	Air Charge Temp (ACT) sensor circuit below minimum voltage/ 254°F indicated	188	C	Fuel system at lean adaptive limit at part throttle, system rich (LEFT SIDE)
113	O/C	Air Charge Temp (ACT) sensor circuit above maximum voltage/-40°F indicated	189	C	Fuel system at rich adaptive limit at part throttle, -system lean (LEFT SIDE)
114	O/R	Air Charge Temp (ACT) higher or lower than expected during KOEO, KOER	191	C	Fuel system at lean adaptive limit at idle, system rich (LEFT SIDE)
116	O/R	Engine Coolant Temp (ECT) higher or lower than expected during KOEO, KOER	192	C	Fuel system at rich adaptive limit at idle, system lean (LEFT SIDE)
117	O/C	Engine Coolant Temp (ECT) sensor circuit below minimum voltage/ 254°F indicated	211	C	Profile Ignition Pickup (PIP) circuit fault
118	O/C	Engine Coolant Temp (ECT) sensor circuit above maximum voltage/- 40°F indicated	212	C	Loss of Ignition Diagnostic Monitor (IDM) input to EEC processor/SPOUT circuit grounded
121	O/R/C	Closed throttle voltage higher or lower than expected	213	R	SPOUT circuit open
122	O/C	Throttle Position (TP) Sensor circuit below minimum voltage	214	C	Cylinder Identification (CID) circuit failure
123	O/C	Throttle Position (TP) Sensor circuit above maximum voltage	215	C	EEC processor detected coil 1 primary circuit failure
124	C	Throttle Position (TP) Sensor voltage higher than expected	216	C	EEC processor detected coil 2 primary circuit failure
125	C	Throttle Position (TP) Sensor voltage lower than expected	217	C	EEC processor detected coil 3 primary circuit failure
126	O/R/C	BP sensor higher or lower than expected	219	C	Spark timing defaulted to 10 deg's-SPOUT circuit open
129	R	Insufficient Mass Air Flow (MAF) change. during Dynamic Response Test	225	R	Knock not sensed during Dynamic Response Test
136	R	Lack of Oxygen Sensor (HEGO) switches, indicates lean (LEFT SIDE)	341	O	Octane adjust service pin in use
137	R	Lack of Oxygen Sensor (HEGO) switches, indicates rich (LEFT SIDE)	411	R	Cannot control rpm during KOER low rpm check
139	C	No Oxygen Sensor (HEGO) switches detected (LEFT SIDE)	412	R	Cannot control rpm during KOER high rpm check
144	C	No Oxygen Sensor (HEGO) switches detected (RIGHT SIDE)	452	C	Insufficient input from Vehicle Speed Sensor (VSS)
157	C	Mass Air Flow (MAF) sensor circuit below minimum voltage	511	O	EEC Processor Read Only Memory (ROM) test failure
158	O/C	Mass Air Flow (MAF) sensor circuit above maximum voltage	512	C	EEC Processor Keep Alive Memory (KAM) test failure
159	O/R	Mass Air Flow (MAF) higher or lower than expected during KOEO, KOER	522	O	Vehicle not in PARK or NEUTRAL during KOEO
167	R	Insufficient throttle position change during Dynamic Response Test	525	O	Indicates vehicle in gear / AC ON
171	C	Fuel system at adaptive limits, Oxygen Sensor (HEGO) unable to switch (RIGHT SIDE)	528	C	Clutch switch circuit failure
172	R/C	Lack of Oxygen Sensor (HEGO) switches, indicates lean (RIGHT SIDE)	536	R/C	Brake On/Off (BOO) circuit failure / not actuated during KOER
173	R/C	Lack of Oxygen Sensor (HEGO) switches, indicates rich (RIGHT SIDE)	538	R	Insufficient rpm change during KOER Dynamic Response Test
175	C	Fuel system at adaptive limits, Oxygen Sensor (HEGO) unable to switch (LEFT SIDE)	539	O	AC On/Defrost On during KOEO
176	C	Lack of Oxygen Sensor (HEGO) switches, indicates lean (LEFT SIDE)	542	O/C	Fuel pump secondary circuit failure
177	C	Lack of Oxygen Sensor (HEGO), switches, indicates rich- (LEFT SIDE)	543	O/C	Fuel pump secondary circuit failure
179	C	Fuel system at lean adaptive limit at part throttle, system rich (RIGHT SIDE)	556	O/C	Fuel pump relay primary circuit failure
181	C	Fuel system at rich adaptive limit at part throttle, system lean (RIGHT SIDE)	558	O	EGR Vacuum Regulator (EVR) circuit failure
182	C	Fuel system at lean adaptive limit at idle, system rich (RIGHT SIDE)	563	O	High Speed-Electro Drive Fan (HEDF) circuit failure
183	C	Fuel system at rich adaptive limit at idle, system lean (RIGHT SIDE)	564	O	Electro-Drive Fan (EDF) circuit failure
184	C	Mass Air Flow (MAF) higher than expected	565	O	Canister Purge (CANP) circuit failure
185	C	Mass Air Flow (MAF) lower than expected	998	R	Hard fault present****FMEM mode****
186	C	Injector pulse width higher than expected			



XR3.8iSC

3.8 Super Coupe motor swap into a XR4Ti

By David Godfrey

The thought to swap an 89 Super Coupe motor originated while visiting my "junkyard bud's" place in the fall of 1997. He had just bought a wrecked 89 Super Coupe from the insurance lot and had parked it in one of his "protected" places. I looked the motor over closely & liked what I could see (which isn't much on a Super Coupe!). One thing I didn't like was that the Super Coupe had a hydraulic clutch where the XR clutch was cable operated. I was in the process of rebuilding the 2.3T in my 1987 Merkur XR4Ti and already had money committed to that project so I couldn't seriously entertain a swap at that point.

A few weeks later I was back at the junkyard & saw a base 3.8 sitting in the motor pile. In the barn was a 5.0 bell housing, flywheel & T-5. I pulled them outside, put them on the 3.8 & they fit. Next I got one of the wrecker operators to drag the engine over to a wrecked XR and lower it in place. With the transmission removed the motor & bell housing easily went in. In fact it fits between the XR strut towers better than the T-birds. I put the T-5 transmission in place & it lined up OK with the shifter hole, but the shifter was a bit forward from where it needed to be. At this point I forgot about the swap & worked on completing my 2.3T rebuild.

While at Carlisle in 1998 I looked at the Super Coupes closely and spent some time talking to Bill Evanoff. I had researched some magazine articles on the Super Coupe and liked the performance, which is amazing considering what a SC weighs. I enjoyed

talking to Bill and others at Carlisle & learned a bit more about the motors.

I guess the turning point was when a guy put his extensively modified XR on the Dynojet and came up with 220 hp at the wheels. A slightly modified Super Coupe went on later in the day and came up with the same HP & more torque. Torque was what I was after and the Super Coupe motor seemed like the way to go. I could not help but wonder how this motor would perform in a lighter car.

Two weeks after Carlisle I listed my newly rebuilt 2.3T (less than 2K miles) and everything else under the hood of my XR for sale. Much to my surprise all was spoken for within a week! After stripping all the 2.3 related parts from my car I was left with a nice hulk of a car and there was no turning back.

My junkyard bud sold me the motor and everything under the hood of the Super Coupe (and anything else I wanted) for \$800. I pulled the Super Coupe motor from the donor car myself to insure I got what I needed and that everything was in good shape. I already had collected a couple of Ford spec T-5 cores for a swap behind the 2.3T. The main ingredients were in place, now I just had to make it all fit!

The motor supports were actually pretty simple. I designed & fabricated some steel supports that bolted to the XR front cross member. The stock motor mounts bolted to these pieces. The transmission cross member is a typical XR T-5 conversion item.



I was able to use the stock XR clutch cable with the 5.0 bell housing. One of my design goals was to have a reversible modification so I could change back to the 2.3T if desired. This goal was achieved, but after driving the car I cannot imagine going back to a four-cylinder turbo. Components are bolt in with no cutting or welding of chassis components required.

I had looked at using early model base 3.8 exhaust manifolds instead of the Super Coupe manifolds. The base 3.8 items looked like they would flow a lot better. A friend of mine told me about the headers as used in a 3.8 in a late model Mustang. I checked in a Mustang salvage yard and bought a set for \$45! With the motor on its mounts the headers fit in from the top.

With the motor installed I then mocked up pieces for the intercooler. I sold the air to water unit that was on the 2.3T, but had planned on using something similar. Once the intercooler mockup was complete I made a drawing of it and faxed it to Eric Odenweller at British American Transfer. Eric is the US distributor for **Pace intercooler's, Mocal oil coolers and other European products.** Eric faxed my drawing to Pace who replied with a price of an intercooler based on the nearest core size they offered to my drawing requirements. I tweaked my mockup to fit, saw that all would work well, and ordered the IC. With all the fabrication out of the way I removed the motor and went through it. I also stripped and repainted under the hood and detailed countless parts.

I had intended on doing a valve job and replacing the rings. When I pulled the pistons out and checked the bores the cylinder to wall clearance was 75% of the spec. I went ahead and ordered some new **Ford pistons and had the block bored .03".** The guy that does my automotive machine

work is probably one of the best small block Chevy builders in the south. I have known him for years and in times past he did all the machine work on my national record holding 2L Pinto drag car. He looked at the heads and gave me some suggestions as how to modify the combustion chambers. I reworked them and ported the heads per his directions as well as porting all the intake manifold sections. The intake port openings were squared up (had to make allowances for the injector opening) and the center intake port was extensively reworked to eliminate as much of the dogleg as possible. The main intake was port matched to the heads. The blower inlet was port matched to the 70mm BBK throttle body.

The crankshaft was in beautiful shape and only needed polishing. The 5.0 flywheel was modified by removing most of the counterweight and the entire rotating assemble was balanced. If I had to do it all over again I would have used an aftermarket neutral balance billet 5.0 flywheel. This would have been easier than machining off the stock flywheels counterweight.

The transmission ended up being an odd mix of Borg Warner world class and non-world class T-5 parts. A GM spec Camaro T-5 extension housing and main shaft were integrated to the Ford spec case. This **moved the shifter back 2" and put it in the middle of the shifter opening in the floor.** The GM T-5 as mounted in a Camaro is rotated 15 degrees so a wedge shaped adapter was made to allow for a flat mounting surface for the Mustang transmission mount to bolt to. The gear set is a 2.951st **gear close ratio "Z" setup.** This has the highest torque rating for a T-5. 5th gear is a .63 non-world class over drive. A custom spacer had to be made to provide the correct endplay for the 5th driven gear. A non-world class 5th was used because the



would class ratio available for the GM spec main shaft is .67 and I wanted the tallest possible gear for highway cruising. I did have a problem with this set up which I will explain later. When all was done the only used items on the transmission were the case, top cover and extension housing.

I removed the XR's wiring harness and hung it in the garage next to the SC harness waiting for inspiration on how to merge the two together. One of the problems with the XR is its flaky engine management so I was glad to get rid of it. I already had a service manual and wiring diagram for the XR and ordered the ones for the Super Coupe. Using any info I could get (sometimes contradictory!) I made a spreadsheet listing the 2.3T and 3.8SC EEC-IV and sensor pin outs. I then deleted what was not needed from the 2.3T harness and added the 3.8SC items. This gave me a from-to wiring list. I then removed the deleted wires from the 2.3T and 3.8SC harnesses and merged them together. It sounds simple, looks tough, but was not really all that hard to do. It just takes a lot of time and tape!

The SC engine management harness is **much neater than the XR's**, The biggest decision was which cars air conditioning control system to use. The SC has an integrated relay control module controlling the AC, cooling fans and other stuff. The XR has individual relays located throughout the car for these functions. I decided to remove the integrated relay control module part of the SC harness and integrate the XR AC and fans controls to it.

Prior to trying to start the car I did a weeks worth of key on power check with the computer removed to verify power and grounds in the engine compartment. I found a few problems but nothing serious. I checked spark and all the vehicle systems I

could before putting the computer in and all was well.

I started the project two weeks after Carlisle 1998. The motor was installed for the last time during the Thanksgiving weekend. After all the pieces were bolted up I took a **few days and made me a "do list" of what** was necessary to complete the swap. The list had over 60 items! I worked it down steadily one day figuring that I would go out in the garage one evening and realize that the only thing left to do was start the car. This day arrived towards the end of February 1999.

I went out in the garage, plugged the computer in, held my breath and turned the key to the run position. I had hoped to hear the fuel pump run for a second or two then shut off as its suppose to. No fuel pump, but no smoke from the computer either! After checking the wiring I found that the vehicle fuel pump wire was connected to the EEC fuel pump monitor terminal Vs the fuel pump terminal. I made the change, turned the key back on, and heard the pump run the shut off as its suppose to. I knew I had the wiring correct at that point. I turned the key to the start position and the motor cranked right up like it had been in the car all its life! In the end I only had one pin out to correct.

After running the motor a few minutes I shut it down and checked for leaks and all was well. Ran it for 20 minutes at a fast idle with the cooling fans on, shut it down again and checked everything again. All was still looking great. The next day I drove it around the block for the first time. When **taking off I thought, "wow, that 2.95 first gear seams *really* tall"**. I drove around the block in what I thought was 1st and 2nd gear. After checking everything over one more time I took it down the road for a longer drive. I then realized I had started



out earlier in 3rd gear! The car easily takes off in 2nd gear. When slowing down for 90 degree turns I rarely have to down shift past 4th. Man, does this thing have some torque!

The car runs fantastic. Imagine a hot Super Coupe with a fresh motor and the car loosing 900 pounds and you get the idea. The nature of the car is completely changed. The motor pulls hard up all through the power band have had no problems at all with the swap. The only thing I have done to the motor is change the oil.

I had to go through the transmission before Carlisle to correct a problem with the 5th gear syncro. There is approximately a 2200-RPM drop when shifting from 4th to 5th gear at 6K rpm. After doing this a few times 5th gear started crunching a bit when being engaged. I disassembled the trans and noticed that the syncro ring was burnt for 1/3 of its circumference. The 5th gear syncro is really small for the work it has to do and shifting to it at 6K does not help any. I replaced the syncro assembly, changed to synthetic gear lube and lowered the shift point out of 4th and have not had any further problems. Of course the real answer is to swap in a dual over drive T-56, but **that's a project for another day.**

The XR is "blessed" with rather small wheel openings and only two readily available differential ratios. Because of this there is not a lot of choices on tire size or flexibility on speed Vs RPM. I changed the rear end ratio from the 5 speeds 3.64 to the automatics 3.36. Based on the current tire size the computed results of the close ratio T-5 and 3.36 rear end gearing provide the following speeds:

Gear	Ratio	RPM	Speed	Comments
1 st	2.95	6200	43.25	BTDT
2 nd	1.94	6200	65.78	BTDT
3rd	1.34	6200	95.23	BTDT

4 th	1.00	6000	123.49	BTDT
5 th	.63	5500	179.69	Chickened out!!

(BTDT = Been There, Done That)

I have been in the 150+ range once and the **car was still pulling hard. I don't know if it will pull 5500 rpm in 5th and don't plan on finding out.** I do believe it is an easy 160-mph car and that is fast enough for me.

I live at the base of a mountain in Alabama. There is a switch back road that I use to compare tuning changes. When I first got the XR with the stock (somewhat) 2.3T there was a place on the mountain where I had to down shift to third and leave it there for a fairly long distance. With the 2.3T modified it would pull the mountain in 4th easily. There was one place where it felt like I could shift to 5th, but when I did so the power fell off and it would not pull the gear. With the SC motor the car easily climbs the mountain in a .63 overdrive 5th gear (Vs the **XR's .84) and the 3.36 rear end gear. This** is really an awesome car to drive. It does everything I could have hoped for really well.

I could not have done this swap without assistance from many people. My junkyard bud, Robert Walker of Walkers Auto Salvage has been most generous with assistance in parts and technical information. Being able to look around and scrounge parts is absolutely necessary in a project like this. Also, my kids looked forward to going "junkin" on Saturday morning and being able to explore the wonderful world of wrecked cars. Jim DeBerry of Merkwerke has developed a swap kit to put a 5.0 in the XR and he too is a wonderful source of information. I doubt that there is anyone in the country who knows the XR electrical system better than Jim. Both the Merkurbahn and SCCoA web sites were also valuable sources of info.



I will be happy to answer any questions or comments. You can reach me via e-mail at Dgodfrey@PEImail.com.

Super Coupe Motor Swap Spec.

Motor

Rebuilt 1989 3.8 SC consisting of the following: Block bored .030 with Ford .030 pistons, rotating assembly balanced with 5.0 flywheel & pressure plate, level cut block & heads, competition 3 angle valve job, resized rods, ARP rod bolts & head studs, ported heads & intake manifolds, combustion chambers extensively modified, remote mounted coil pack with custom length Magnecor wires, Mocal oil cooler with thermostatic oil filter adapter.

Induction & Intercooler

70mm BBK throttle body, 7" K&N cone filter, air inlet plenum, 3" diameter HPC coated mandrel bent mass air to throttle body tube, **1" raised blower top, 10% overdrive** supercharger pulley, Walbro 190lph in tank fuel pump, Pace air to water intercooler based on 4.5 x 4.5 x 12 core, dedicated 26 x 7 x 1.5 IC water loop radiator, 12v direct drive gear type water pump, 1 gallon aluminum reservoir, HPC coated mandrel bend I/C ducting, -10 braided hoses & fittings on the water loop.

Driveline

2.95 first gear close ratio "Z" gear set T-5 with GM spec T-5 mainshaft & 5th gear assy, uprated input bearing retainer,

Mustang shifter integrated to GM shifter mounting plate, Broward 450 ft LB pressure plate, **Ford Motorsports 10.5" diameter** clutch disc, balanced one piece drive shaft.

Exhaust

95 Mustang 3.8 stainless steel headers with **HPC coating, stainless steel Bassani "Quiet Thunder" series custom muffler with dual 2 1/2 inlets & outlets, Dr. Gass X-pipe, two 4" diameter Pace resonated exhaust tips. 2 1/2" mandrel bent down pipes with dual** tubing out the back.

Cooling

Dual Spal 10" electric fans, stock XR radiator, modified T-stat housing with XR fan control switch.

Instrument cluster & gauges

2" diameter Autometer Phantom series fuel level & water temp gauges & stock Super Coupe tach integrated into the cluster. 240KPH/150mph speedometer face installed on stock XR speedometer. 2 5/8" Autometer Phantom series oil pressure & vacuum/boost gauges installed on the center console.

Miscellaneous

Rear mounted Morroso battery box, custom A/C hoses & transmission cable adapter, MAP sensor, purge solenoid, & vacuum canister relocated behind upper firewall. Super Coupe alternator, power steering pump, & EEC-IV.

AC Conversion

By Marc Zimmerman

If you own an older-89~93 SC sooner or later you will probably be faced with the prospect of converting your air conditioning system to R-134a refrigerant.

While there has been much discussion about the benefits and shortcomings of R-134a, the fact is that now it is the refrigerant of choice for all domestic carmakers. New federal regulations mandate a conversion when major service is performed on a R-12 system. The following article represents a



manufacturer recommended conversion process.

1. Inspect the system and determine what repairs are needed to bring the system back to peak operating condition.
 - Connect gauges and record high and low side reading if possible.
 - Check hoses for wear and oily residue. Use a dye in the system to track down leaks.
 - Remove the high-pressure line from condenser to evaporator. (It has to be replaced anyway). Remove and inspect the orifice tube for contaminants, note that this requires cutting the metal line at the orifice tube.
 - Check the compressor clutch for signs of slipping. If there are signs of slipping, check voltage at the clutch and all the switches.
 - Verify that the engine cooling fan comes on when the compressor clutch is engaged.
2. Recover the R-12
3. Disconnect the hoses from the system.
4. Replace the accumulator only:
 - If contaminants are found in the system
 - If replacing a major component.
 - If the accumulator is over 5 years old
5. Remove all defective components and hoses that are to be replaced.
6. Flush the system to remove old oil and trash in the system.
7. Drain the oil out of the new or existing compressor.
8. Add the specified amount of ester oil distributed evenly throughout the components as follows. (for a FX-15 like **our SC's have**)
 - Accumulator-2 oz.
 - Condensor-1 oz
 - Evaporator-2 oz
 - Compressor-4 oz
9. Replace the high-pressure line from the condenser to the evaporator. This line has the orifice inside it from the factory.
10. Replace any bad hoses or parts you found inspecting the system.
 - Replace all O-rings with "Green" HNBR O-rings.
 - Lubricate seals and gaskets with ester oil.
 - Reconnect all components.
11. Install R-134a service port adapters.
12. Install the retrofit decal. THIS IS VERY IMPORTANT!! You must communicate the retrofit information to the next technician who may work on the car.
 - Type and amount of oil (9 oz of ester for us)
 - Pounds and ounces of R-134a used
 - Name and address of dealer servicing system.
 - Date retrofit
13. Pull vacuum on system for 30 min or more.
14. Charge the system to the manufacturers recommended level. Use a scale to **measure quantity...do not guess.**
15. Adjust the pressure switch.
 - Turn the screw in the top of the switch counterclockwise until the compressor cuts off at 21 psi on the low side.
16. Leak check the system using an electronic detector or fluorescent dye.
17. Road test the system. You may find that the system takes longer to cool down than with R-12.

The condenser will run hotter with R-134a, some people have found that a pusher fan will help cool the car after the conversion.

On a personal note:

Both of my cars (90 Taurus, 89 XR-7) have been converted for over two years and are cooling very well even today.



Replacing the Supercharger Nose Cone

By Mike Puckett

I have noticed a lot of posts on the SCCoA BBS about leaking supercharger nose cones. So, I thought that I would respond with a how-to article as I have now performed this operation four times. It is a 3-6 hour job depending upon experience and expertise. The last time that I did this I started just before the end of the Indy 500 when Arie Luyendyk crashed and finished just before the green flag dropped for the Coca Cola 600, about 3 hours.

The nose cones are available from Magnuson Products for around \$285 exchange. It can be ordered by calling 805-642-8833. Since I have neither replaced the seal itself or the bearings I won't cover that aspect of repairing a supercharger. But, I have heard, but not confirmed, that a usable seal is available from Chicago Rawhide, part #7966. Also, changing out the nose cone won't do anything for roaring or noisy bearings. Sometimes that noise is normal but if it is excessive then the entire sc will need to be exchanged in which case only the R&R portion here need be followed. Magnuson is kind enough to supply all gaskets, seals, sealing compounds, and synthetic lubricant so no other parts are needed. They will even put whatever size pulley that you want on it.

The tools I use are a stubby 1/4" ratchet, 3/8" ratchet, torque wrench, an 8, 10, 12, 13, and 18mm sockets, screwdrivers, some extensions and a few miscellaneous tools. The only other requirement is some proficiency in working on cars. Although it is not a difficult job it can result in the usual busted knuckles and tendency to use foul language.

To get started let's pop the hood and take a look at what we're going to be doing. We will remove the belt, remove the MAF and inlet tube, disconnect the throttle linkage, remove the EGR if we have one, disconnect all attached wires and hoses, remove the upper IC tube, and finally, remove the supercharger. With the supercharger off of the engine we will change the nose cone and then reassemble the system in the reverse order.

Using an 18mm socket wrench on the idler pulley nut with as long a ratchet as you can get, relieve the tension on the sc belt and slip it off of the sc drive pulley. If you want to reuse your own pulley break loose the retainer nut with the belt still on and use a 3 jaw puller to remove the pulley from the shaft when the belt is off. Unplug the MAF sensor connector and place it out of the way. Next, pop the two clamps loose on the side of the air filter box. Loosen the clamp that holds the inlet tube to the throttle body and carefully lift the whole assembly out of the way keeping in mind that there's a small rubber hose connected to an underside fitting. At this point I also remove the rubber weather strip from the top edge of the firewall to give more room. There are two 10mm bolts that hold the throttle linkage to the side of the throttle body. Before removing these two bolts pop the throttle linkage off of the ball joint on the linkage. If you lift the cable up and slide it over the top of the inlet plenum it will be out of the way. If you still have the stock throttle body you'll need to disconnect the coolant hoses at the bottom. Some coolant will leak from the hoses unless you drain some from the system. I inserted a copper



tube into the hoses to bypass the throttle body since I have a BBK unit.

Here is the fun part if you have an EGR system. If not, rejoice and pick us up on the flip side of this procedure. Everything with regards to the EGR components is difficult to get to. We have two pieces to remove: the EGR valve and canister, and a small gray plastic box sitting in a metal clip with a small rubber hose attached to the bottom. Here is where I use a stubby handle, preferably a flex handle, 1/4" ratchet with a long but not deep well 10mm socket. Remove the two bolts holding the EGR valve and riser tube to the inlet plenum. Be careful not to split or break the metal bellows below the EGR valve on the tube. This bellows allows some flex between the exhaust and the valve but if it is old it may split. Discard the gasket, as there is a new one in the gasket kit. Removing the rubber hose from the canister is tricky due to restraints on access to it. I broke the fitting off of mine the first time. To repair it I super glued the fitting back on and then coated the area with epoxy except right where the hose mounts.

Remove the canister from the spring bracket after the whole assembly is removed, as it is a very tight fit. In fact I removed that spring bracket from mine since it is such a pain to deal with and now I just lay the canister in the open space. There are two rubber vacuum hoses attached to the inlet plenum and one more over on the right rear attached to the gate actuator. Remove all these and loosen both clamps on the rubber interconnect tube as well as the two electrical connectors to the idle air bypass valve and the throttle position sensor. Remove the spark plug wires over the nose cone from the coil pack and slide the looms off of the posts on the sc bolts. Using a spanner wrench loosen and unscrew the large collar nut on the supercharger outlet

adapter (or sc top as it is commonly called). Using a 13mm socket, loosen and remove the two nuts holding the upper intercooler tube to the intercooler and remove the upper IC tube. If you have already installed a raised/enlarged outlet adapter top then you have previously removed the bolt hole on the upper IC tube to bracket anchor point. If not, remove the bolt. Peel the teflon tape from the connection surfaces and clean them with a solvent.

There are three bolts holding the supercharger in place. The front one is a 17mm and the two back ones are 10mm. Remove all three and the supercharger and plenum assembly is loose. It's a good idea to check over everything here to make sure that everything is disconnected. If you had trouble getting access to the right side coolant line to the throttle body, now is the time to remove this hose. Lift the entire assembly up and forward to remove it from the engine. The rubber interconnect tube will tug as you lift out but it will let go. Do not separate the inlet plenum from the supercharger body, as it is not necessary.

Now we are going to remove the nose cone from the body. I do this with it in my lap while sitting in a comfortable spot. It may be easier on a workbench or in a large vise for someone else. Drain the fluid into a bucket first after removing the plug. It will take a few minutes to empty. All ten of the bolts holding the nose cone to the body are 10mm but you will need a deep well for the two with plug wire loom posts. I break each bolt loose before removing any of them. It is very important not to break any of the seals apart at this point. The seal between the main body and the center plate must not be broken as it will then have to be removed and resealed. We only want to break the seal from the nose cone to the center plate. To do this find the indentation on the top side and put a 9/16 nut or similar

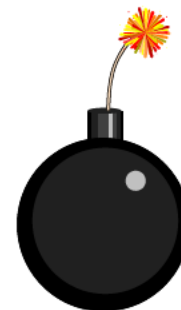


into the hole. Place a chisel into the hole and brace it between the nut and center plate. Twist the chisel. I use a crescent wrench on it, and pop the front nose cone seal only. Wiggle the nose cone and lift it off of the body and centerplate assembly. Remove the torsional isolator from the input shaft from whichever side it stays on. You get a new one with installation kit. Wipe off the excess lubricant and clean the sealer residue from the centerplate mating surface. I use a single edge razor blade and #600 grit gray paper. Carefully and lightly scrape and sand off the residue without scratching or misshaping the surface.

Now we start the reassembly. Apply an extremely light coating of the red #518 or 510 sealer supplied in the kit to both mating surfaces on the new nose cone and the centerplate that was just cleaned. Slide the new torsional isolator onto the three pronged coupling on the centerplate input shaft. Line up the three prongs on the nose cone shaft coupling with the torsional isolator and push the two pieces together. Drop the bolts into the holes and snug them up before torquing to 20 lb/ft following the sequence in the supplied documentation. Reassembling is basically the reverse order with a couple of exceptions. Place the completed sc and plenum assembly in place guiding it into the short piece of black rubber tubing on the upper return plenum. Lube the inside of the rubber tube with a bit of silicone to make for an easier insertion. Do not tighten and torque the sc bolts until the EGR valve is bolted in place with the new gasket. It won't line up otherwise and it is so much easier to get it aligned this way. Torque them enough to seal the EGR after the sc retaining bolts are torqued. Torque the 12mm bolt to 52-70 lb-ft and the 8mm bolts to 15-22 lb-ft. Measure and cut just enough of the teflon sealing tape to completely encircle the tube fitting plus about a 1/4 inch. Put it on the convex ends

about 2mm from the inner edge by peeling the backing as you go. The kit supplies enough tape to redo the whole system. The collar nut is supposed to be torqued to 148 lb-ft., but don't torque it until the upper sc tube is connected to the intercooler. I go back and forth between the two until it's tight making sure the ends seat together and don't separate. Retorque the collar nut after the engine has run for about 15 minutes or so. Torque the 13mm IC tube retaining nuts to 20 lb-ft. All of the torque settings are supplied in the documentation. I also use the supplied anti-seize compound on all bolts going into aluminum.

From here we simply put things back together the way they came apart. When the reassembly is completed and double-checked add the new synthetic sc lubricant using the entire contents of 8 oz. It will fill the supercharger to the bottom of the lowest thread on the case. Put the plug back in and we are ready to smoke test it. A lot of device secretly run on smoke, you know. That is why when they break down, all the smoke comes out and there's none left to run the machine. This is especially true in electronics! This should complete the procedure. If any difficulties arise when running the engine, stop and check your work again.



If after checking your work again and it still doesn't work, then try one of these!.....Editor



Snake Oil!

Is That Additive Really A Negative?

Originally printed in *Road Rider* magazine, now known as *Motorcycle Consumer News*, August 1992

Information for this article was compiled from reports and studies by the University of Nevada Desert Research Center, DuPont Chemical Company, Avco Lycoming (aircraft engine manufacturers), North Dakota State University, Briggs and Stratton (engine manufacturers), the University of Utah Engineering Experiment Station, California State Polytechnic College and the National Aeronautics and Space Administration's Lewis Research Center.

Road Rider does not claim to have all the answers. Nor do we care to presume to tell you what to do. We have simply tried to provide you with all the information we were able to dredge up on this subject, in hopes it will help you in making your own, informed decision.

You Can't Tell The Players Without A Program

On starting this project, we set out to find as many different oil additives as we could buy. That turned out to be a mistake. There were simply too many available! At the very first auto parts store we visited, there were over two dozen different brand names available. By the end of the day, we had identified over 40 different oil additives for sale and realized we needed to rethink our strategy.

First of all, we found that if we checked the fine print on the packages, quite a number of the additives came from the same manufacturer. Also, we began to notice that the additives could be separated into basic "groups" that seemed to carry approximately the same ingredients and the same promises.

In the end, we divided our additives into four basic groups and purchased at least three brands from three different manufacturers for each group. We defined our four groups this way:

1. Products that seemed to be nothing more than regular 50-rated engine oil (including standard additives) with PTFE (Teflon TM) added.
2. Products that seemed to be nothing more than regular 50-rated engine oil (including standard additives) with zinc dialkyldithiophosphate added.
3. Products containing (as near as we could determine) much the same additives as are already found in most major brands of engine oil, though in different quantities and combinations.
4. Products made up primarily of solvents and/or detergents.

There may be some differences in chemical makeup within groups, but that is impossible to tell since the additive manufacturers refuse to list the specific ingredients of their products. We will discuss each group individually.

The PTFE Mystery

Currently, the most common and popular oil additives on the market are those that contain PTFE powders suspended in a regular, over-the-counter type, 50-rated petroleum or synthetic engine oil. PTFE is the common abbreviation used for Polytetrafluoroethylene, more commonly known by the tradename "Teflon," which is a registered trademark of the DuPont Chemical Corporation. Among those oil additives we have identified as containing PTFE are: Slick 50, Liquid Ring, Lubrilon, Microlon, Matrix, Petrolon (same company as Slick 50), QMI, and T-Plus (K-Mart). There are probably many more names in use on many more products using PTFE. We have found that oil additive makers like to market their products under a multitude of "private brand" names.

While some of these products may contain other additives in addition to PTFE, all seem to rely on the PTFE as their primary active ingredient and all, without exception, do not list what other ingredients they may contain.

Though they have gained rather wide acceptance among the motoring public, oil additives containing PTFE have also garnered their share of critics among experts in the field of lubrication. By far the most damning testimonial against these products originally came from the DuPont Chemical Corporation, inventor of PTFE and holder of the patents and trademarks for Teflon. In a statement issued about ten years ago, DuPont's Fluoropolymers Division Product Specialist, J.F. Imbalzano said, "Teflon is not useful as an ingredient in oil additives or oils used for internal combustion engines."

At the time, DuPont threatened legal action against anyone who used the name "Teflon" on any oil product destined for use in an internal combustion engine, and refused to sell its PTFE powders to any one who intended to use them for such purposes.

After a flurry of lawsuits from oil additive makers, claiming DuPont could not prove that PTFE was harmful to engines, DuPont was forced to once again begin selling their PTFE to the additive producers. The additive makers like to claim this is some kind of "proof" that their products work, when in fact it is nothing more than proof that the American legal ethic of "innocent until proven guilty" is still alive and well. The decision against Dupont involved what is called "restraint of trade." You can't refuse to sell a product to someone just because there is a possibility they might use it for a purpose other than what you intended it for.

It should be noted that DuPont's official position on the use of PTFE in engine oils remains carefully aloof and non-committal, for obvious legal reasons. DuPont states that though they sell PTFE to oil additive producers, they have "no proof of the validity of the additive makers' claims." They further state that they have "no knowledge of any advantage gained through the use of PTFE in engine oil."

Fear of potential lawsuits for possible misrepresentation of a product seem to run much higher among those with the most to lose.



After DuPont's decision and attempt to halt the use of PTFE in engine oils, several of the oil additive companies simply went elsewhere for their PTFE powders, such as purchasing them in other countries. In some cases, they disguise or hype their PTFE as being something different or special by listing it under one of their own tradenames. That doesn't change the fact that it is still PTFE.

In addition, there is some evidence that certain supplies of PTFE powders (from manufacturers other than DuPont) are of a cruder version than the original, made with larger sized flakes that are more likely to "settle out" in your oil or clog up your filters. One fairly good indication that a product contains this kind of PTFE is if the instructions for its use advise you to "shake well before using." It only stands to reason that if the manufacturer knows the solids in his product will settle to the bottom of a container while sitting on a shelf, the same thing is going to happen inside your engine when it is left idle for any period of time.

The problem with putting PTFE in your oil, as explained to us by several industry experts, is that PTFE is a solid. The additive makers claim this solid "coats" the moving parts in an engine (though that is far from being scientifically proven). Slick 50 is currently both the most aggressive advertiser and the most popular seller, with claims of over 14 million treatments sold. However, such solids seem even more inclined to coat non-moving parts, like oil passages and filters. After all, if it can build up under the pressures and friction exerted on a cylinder wall, then it stands to reason it should build up even better in places with low pressures and virtually no friction.

This conclusion seems to be borne out by tests on oil additives containing PTFE conducted by the NASA Lewis Research Center, which said in their report, "In the types of bearing surface contact we have looked at, we have seen no benefit. In some cases we have seen detrimental effect. The solids in the oil tend to accumulate at inlets and act as a dam, which simply blocks the oil from entering. Instead of helping, it is actually depriving parts of lubricant."

Remember, PTFE in oil additives is a suspended solid. Now think about why you have an oil filter on your engine. To remove suspended solids, right? Right. Therefore it would seem to follow that if your oil filter is doing its job, it will collect as much of the PTFE as possible, as quickly as possible. This can result in a clogged oil filter and decreased oil pressure throughout your engine.

In response to our inquiries about this sort of problem, several of the PTFE pushers responded that their particulates were of a sub-micron size, capable of passing through an ordinary oil filter unrestricted. This certainly sounds good, and may in some cases actually be true, but it makes little difference when you know the rest of the story. You see, PTFE has other qualities besides being a friction reducer: It expands radically when exposed to heat. So even if those particles are small enough to pass through your filter when you purchase them, they very well may not be when your engine reaches normal operating temperature.

Here again, the scientific evidence seems to support this, as in tests conducted by researchers at the University of Utah Engineering Experiment Station involving Petrolon additive with PTFE.

The Petrolon test report states, "There was a pressure drop across the oil filter resulting from possible clogging of small passageways." In addition, oil analysis showed that iron contamination doubled after using the treatment, indicating that engine wear didn't go down - it appeared to shoot up.

This particular report was paid for by Petrolon (marketers of Slick 50), and was not all bad news for their products. The tests, conducted on a Chevrolet six-cylinder automobile engine, showed that after treatment with the PTFE additive the test engine's friction was reduced by 13.1 per cent. Also, output horsepower increased from 5.3 percent to 8.1 percent, and fuel economy improved from 11.8 percent under light load to 3.8 percent under heavy load.

These are the kind of results an aggressive marketing company like Petrolon can really sink their teeth into. If we only reported the results in the last paragraph to you, you'd be inclined to think Slick 50 was indeed a magic engine elixir. What you have to keep in mind is that often times the benefits (like increased horse power and fuel economy) may be out weighed by some serious drawbacks (like the indications of reduced oil pressure and increased wear rate).

The Plot Thickens

Just as we were about to go to press with this article, we were contacted by the public relations firm of Trent and Company, an outfit with a prestigious address in the Empire State Building, New York. They advised us they were working for a company called QMI out of Lakeland, Florida, that was marketing a "technological breakthrough" product in oil additives. Naturally, we asked them to send us all pertinent information, including any testing and research data.

What we got was pretty much what we expected. QMI's oil additive, according to their press release, uses "ten times more PTFE resins than its closest competitor." Using the "unique SX-6000 formula," they say they are the only company to use "aqueous dispersion resin which means the microns (particle sizes) are extensively smaller and can penetrate tight areas." This, they claim, "completely eliminates the problem of clogged filters and oil passages." Intrigued by their press release, we set up a telephone interview with their Vice- President of Technical Services, Mr. Owen Heatwole. Mr. Heatwole's name was immediately recognized by us as one that had popped in earlier research of this subject as a former employee of Petrolon, a company whose name seems inextricably linked in some fashion or another with virtually every PTFE-related additive maker in the country.

Mr. Heatwole was a charming and persuasive talker with a knack for avoiding direct answers as good as any seasoned politician. His glib pitch for his product was the best we've



ever heard, but when dissected and pared down to the verifiable facts, it actually said very little.

When we asked about the ingredients in QMI's treatments, we got almost exactly the response we expected. Mr. Heatwole said he would "have to avoid discussing specifics about the formula, for proprietary reasons."

After telling us that QMI was being used by "a major oil company," a "nuclear plant owned by a major corporation" and a "major engine manufacturer," Mr. Heatwole followed up with, "Naturally, I can't reveal their names- for proprietary reasons."

He further claimed to have extensive testing and research data available from a "major laboratory," proving conclusively how effective QMI was. When we asked for the name of the lab, can you guess? Yup, "We can't give out that information, for proprietary reasons."

What QMI did give us was the typical "testimonials," though we must admit theirs came from more recognizable sources than usual. They seem to have won over the likes of both Team Kawasaki and Bobby Unser, who evidently endorse and use QMI in their racing engines. Mr. Heatwole was very proud of the fact that their product was being used in engines that he himself admitted are "torn down and completely inspected on a weekly basis." Of course, what he left out is that those same engines are almost totally rebuilt every time they're torn down. So what does that prove in terms of his product reducing wear and promoting engine longevity? Virtually nothing.

Mr. Heatwole declined to name the source of QMI's PTFE supply "for proprietary reasons." He bragged that their product is sold under many different private labels, but refused to identify those labels "for proprietary reasons." When asked about the actual size of the PTFE particles used in QMI, he claimed they were measured as "sub-micron in size" by a "major motor laboratory" which he couldn't identify - you guessed it - for "proprietary reasons."

After about an hour of listening to "don't quote me on this," "I'll have to deny that if you print it," and "I can't reveal that," we asked Mr. Heatwole if there was something we could print. "Certainly," he said, "Here's a good quote for you: 'The radical growth in technology has overcome the problem areas associated with PTFE in the 1980s'"

"Not bad," we said. Then we asked to whom we might attribute this gem of wisdom. DuPont Chemical, perhaps?

"Me," said Mr. Heatwole. "I said that."

QMI's press releases like to quote the Guinness Book Of Records in saying that PTFE is "The slickest substance known to man." Far be it from us to take exception to the Guinness Book, but we doubt that PTFE is much slicker than some of the people marketing it.

The Zinc Question

The latest "miracle ingredient" in oil additives, attempting to usurp PTFE's cure-all throne, is zinc dialkyldithiophosphate, which we will refer to here after as simply "zinc."

Purveyors of the new zinc-related products claim they can prove absolute superiority over the PTFE-related products. Naturally, the PTFE crowd claim exactly the same, in reverse.

Zinc is contained as part of the standard additive package in virtually every major brand of engine oil sold today, varying from a low volume of 0.10 per cent in brands such as Valvoline All Climate and Chevron 15W-50, to a high volume of 0.20 percent in brands such as Valvoline Race and Pennzoil GT Performance.

Organic zinc compounds are used as extreme pressure, anti-wear additives, and are therefore found in larger amounts in oils specifically blended for high-revving, turbocharged or racing applications. The zinc in your oil comes into play only when there is actual metal-to-metal contact within your engine, which should never occur under normal operating conditions. However, if you race your bike, or occasionally play tag with the redline on the tach, the zinc is your last line of defense. Under extreme conditions, the zinc compounds react with the metal to prevent scuffing, particularly between cylinder bores and piston rings.

However - and this is the important part to remember - available research shows that more zinc does not give you more protection, it merely prolongs the protection if the rate of metal-to-metal contact is abnormally high or extended. So unless you plan on spending a couple of hours dragging your knee at Laguna Seca, adding extra zinc compounds to your oil is usually a waste. Also, keep in mind that high zinc content can lead to deposit formation on your valves, and spark plug fouling.

Among the products we found containing zinc dialkyldithiophosphate were Mechanics Brand Engine Tune Up, K Mart Super Oil Treatment, and STP Engine Treatment With XEP2. The only reason we can easily identify the additives with the new zinc compounds is that they are required to carry a Federally mandated warning label indicating they contain a hazardous substance. The zinc phosphate they contain is a known eye irritant, capable of inflicting severe harm if it comes in contact with your eyes. If you insist on using one of these products, please wear protective goggles and exercise extreme caution.

As we mentioned, organic zinc compounds are already found in virtually every major brand of oil, both automotive and motorcycle. However, in recent years the oil companies voluntarily reduced the amount of zinc content in most of their products after research indicated the zinc was responsible for premature deterioration and damage to catalytic converters. Obviously this situation would not affect 99 percent of all the motorcycles on the road - however, it could have been a factor with the newer BMW converter - equipped bikes.

Since the reduction in zinc content was implemented solely for the protection of catalytic converters, it is possible that some motorcycles might benefit from a slight increase in zinc content in their oils. This has been taken into account by at least one oil company, Spectro, which



offers 0.02 to 0.03 percent more zinc compounds in its motorcycle oils than in its automotive oils.

Since Spectro (Golden 4 brand, in this case) is a synthetic blend lubricant designed for extended drain intervals, this increase seems to be wholly justified. Also, available research indicates that Spectro has, in this case, achieved a sensible balance for extended application without increasing the zinc content to the point that it is likely to cause spark plug fouling or present a threat to converter-equipped BMW models.

It would appear that someone at Spectro did their homework.

Increased Standard Additives, (More Is Not Necessarily Better)

Though some additives may not contain anything harmful to your engine, and even some things that could be beneficial, most experts still recommend that you avoid their use. The reason for this is that your oil, as purchased from one of the major oil companies, already contains a very extensive additive package.

This package is made up of numerous, specific additive components, blended to achieve a specific formula that will meet the requirements of your engine. Usually, at least several of these additives will be synergistic. That is, they react mutually, in groups of two or more, to create an effect that none of them could attain individually. Changing or adding to this formula can upset the balance and negate the protective effect the formula was meant to achieve, even if you are only adding more of something that was already included in the initial package.

If it helps, try to think of your oil like a cake recipe. Just because the original recipe calls for two eggs (which makes for a very moist and tasty cake), do you think adding four more eggs is going to make the cake better? Of course not. You're going to upset the carefully calculated balance of ingredients and magnify the effect the eggs have on the recipe to the point that it ruins the entire cake. Adding more of a specific additive already contained in your oil is likely to produce similar results.

This information should also be taken into account when adding to the oil already in your bike or when mixing oils for any reason, such as synthetic with petroleum. In these cases, always make sure the oils you are putting together have the same rating (SA, SE, SC, etc.). This tells you their additive packages are basically the same, or at least compatible, and are less likely to upset the balance or counteract each other.

Detergents And Solvents

Many of the older, better-known oil treatments on the market do not make claims nearly so lavish as the new upstarts. Old standbys like Bardahl, Rislone and Marvel Mystery Oil, instead offer things like "quieter lifters," "reduced oil burning" and a "cleaner engine."

Most of these products are made up of solvents and detergents designed to dissolve sludge and carbon deposits inside your engine so they can be flushed or burned out. Wynn's Friction Proofing Oil, for example, is 83 percent

kerosene. Other brands use naphthalene, xylene, acetone and isopropanol. Usually, these ingredients will be found in a base of standard mineral oil.

In general, these products are designed to do just the opposite of what the PTFE and zinc phosphate additives claim to do. Instead of leaving behind a "coating" or a "plating" on your engine surfaces, they are designed to strip away such things.

All of these products will strip sludge and deposits out and clean up your engine, particularly if it is an older, abused one. The problem is, unless you have some way of determining just how much is needed to remove your deposits without going any further, such solvents also can strip away the boundary lubrication layer provided by your oil. Overuse of solvents is an easy trap to fall into, and one which can promote harmful metal-to-metal contact within your engine.

As a general rule of thumb these products had their place and were at least moderately useful on older automobile and motorcycle engines of the Fifties and Sixties, but are basically unneeded on the more efficient engine designs of the past two decades.

The Infamous "No Oil" Demo

At at least three major motorcycle rallies this past year, we have witnessed live demonstrations put on to demonstrate the effectiveness of certain oil additives. The demonstrators would have a bench-mounted engine which they would fill with oil and a prescribed dose of their "miracle additive." After running the engine for a while they would stop it, drain out the oil and start it up again. Instant magic! The engine would run perfectly well for hours on end, seemingly proving the effectiveness of the additive which had supposedly "coated" the inside of the engine so well it didn't even need the oil to run. In one case, we saw this done with an actual motorcycle, which would be rid den around the parking lot after having its oil drained. A pretty convincing demonstration - until you know the facts.

Since some of these demonstrations were conducted using Briggs and Stratton engines, the Briggs and Stratton Company itself decided to run a similar, but somewhat more scientific, experiment. Taking two brand-new, identical engines straight off their assembly line, they set them up for bench-testing. The only difference was that one had the special additive included with its oil and the other did not. Both were operated for 20 hours before being shut down and having the oil drained from them. Then both were started up again and allowed to run for another 20 straight hours. Neither engine seemed to have any problem performing this "minor miracle."

After the second 20-hour run, both engines were completely torn down and inspected by the company's engineers. What they found was that both engines suffered from scored crankpin bearings, but the engine treated with the additive also suffered from heavy cylinder bore damage that was not evident on the untreated engine.

This points out once again the inherent problem with particulate oil additives: They can cause oil starvation.



This is particularly true in the area of piston rings, where there is a critical need for adequate oil flow. In practically all of the reports and studies on oil additives, and particularly those involving suspended solids like PTFE, this has been reported as a major area of engine damage.

The Racing Perspective

Among the most convincing testimonials in favor of oil additives are those that come from professional racers or racing teams. As noted previously, some of the oil additive products actually are capable of producing less engine friction, better gas mileage and higher horsepower out put. In the world of professional racing, the split-second advantage that might be gained from using such a product could be the difference between victory and defeat.

Virtually all of the downside or detrimental effects attached to these products are related to extended, long-term usage. For short-life, high-revving, ultra-high performance engines designed to last no longer than one racing season (or in some cases, one single race), the long-term effects of oil additives need not even be considered.

Racers also use special high-adhesion tires that give much better traction and control than our normal street tires, but you certainly wouldn't want to go touring on them, since they're designed to wear out in several hundred (or less) miles. Just because certain oil additives may be beneficial in a competitive context is no reason to believe they would be equally beneficial in a touring context.

The Best of The Worst

Not all engine oil additives are as potentially harmful as some of those we have described here. However, the best that can be said of those that have not proved to be harmful is that they haven't been proved to offer any real benefits, either. In some cases, introducing an additive with a compatible package of components to your oil in the right proportion and at the right time can conceivably extend the life of your oil. However, in every case we have studied it proves out that it would actually have been cheaper to simply change the engine oil instead.

In addition, recent new evidence has come to light that makes using almost any additive a game of Russian Roulette. Since the additive distributors do not list the ingredients contained within their products, you never know for sure just what you are putting in your engine.

Recent tests have shown that even some of the most inoffensive additives contain products which, though harmless in their initial state, convert to hydrofluoric acid when exposed to the temperatures inside a firing cylinder. This acid is formed as part of the exhaust gases, and though it is instantly expelled from your engine and seems to do it no harm, the gases collect inside your exhaust system and eat away at your mufflers from the inside out.

Whatever The Market Will Bear

The pricing of oil additives seems to follow no particular pattern whatsoever. Even among those products that seem to be almost identical, chemically, retail prices covered an extremely wide range. For example:

One 32-ounce bottle of Slick 50 (with PTFE) cost us \$29.95 at a discount house that listed the retail price as \$59.95, while a 32-ounce bottle of T-Plus (which claims to carry twice as much PTFE as the Slick 50) cost us only \$15.88.

A 32-ounce bottle of STP Engine Treatment (containing what they call XEP2), which they claim they can prove "outperforms leading PTFE engine treatments," cost us \$17.97. Yet a can of K Mart Super Oil Treatment, which listed the same zinc-derivative ingredient as that listed for the XEP2, cost us a paltry \$2.67.

Industry experts estimate that the actual cost of producing most oil additives is from one-tenth to one-twentieth of the asking retail price. Certainly no additive manufacturer has come forward with any exotic, high-cost ingredient or list of ingredients to dispute this claim. As an interesting note along with this, back before there was so much competition in the field to drive prices down, Petrolon (Slick 50) was selling their PTFE products for as much as \$400 per treatment! The words "buyer beware" seem to take on very real significance when talking about oil additives.

The Psychological Placebo

You have to wonder, with the volume of evidence accumulating against oil additives, why so many of us still buy them. That's the million-dollar question, and it's just as difficult to answer as why so many of us smoke cigarettes, drink hard liquor or engage in any other number of questionable activities. We know they aren't good for us - but we go ahead and do them anyway.

Part of the answer may lie in what some psychiatrists call the "psychological placebo effect." Simply put, that means that many of us hunger for that peace of mind that comes with believing we have purchased the absolute best or most protection we can possibly get.

Even better, there's that wonderfully smug feeling that comes with thinking we might be a step ahead of the pack, possessing knowledge of something just a bit better than everyone else.

Then again, perhaps it comes from an ancient, deep-seated need we all seem to have to believe in magic. There has never been any shortage of unscrupulous types ready to cash in on our willingness to believe that there's some magical mystery potion we can buy to help us lose weight, grow hair, attract the opposite sex or make our engines run longer and better. I doubt that there's a one of us who hasn't fallen for one of these at least once in our lifetimes. We just want it to be true so bad that we can't help ourselves.

Testimonial Hype vs. Scientific Analysis

In general, most producers of oil additives rely on personal "testimonials" to advertise and promote their products. A typical print advertisement will be one or more letters from a satisfied customer stating something like, "I have used Brand X in my engine for 2 years and 50,000 miles and it runs smoother and gets better gas mileage than ever



before. I love this product and would recommend it to anyone."

Such evidence is referred to as "anecdotal" and is most commonly used to promote such things as miracle weight loss diets and astrology.

Whenever I see one of these ads I am reminded of a stunt played out several years ago by Allen Funt of "Candid Camera" that clearly demonstrated the side of human nature that makes such advertising possible.

With cameras in full view, fake "product demonstrators" would offer people passing through a grocery store the opportunity to taste-test a "new soft drink." What the victims didn't know was that they were being given a horrendous concoction of castor oil, garlic juice, tabasco sauce and several other foul-tasting ingredients. After taking a nice, big swallow, as instructed by the demonstrators, the unwitting victims provided huge laughs for the audience by desperately trying to conceal their anguish and disgust. Some literally turned away from the cameras and spit the offending potion on the floor.

The fascinating part came when about one out of four of the victims would actually turn back to the cameras and proclaim the new drink was "Great" or "Unique" or, in several cases, "One of the best things I've ever tasted!" Go figure.

The point is, compiling "personal testimonials" for a product is one of the easiest things an advertising company can do - and one of the safest, too. You see, as long as they are only expressing some one else's personal opinion, they don't have to prove a thing! It's just an opinion, and needs no basis in fact whatsoever.

On the other hand, there has been documented, careful scientific analysis done on numerous oil additives by accredited institutions and researchers.

For example:

Avco Lycoming, a major manufacturer of aircraft engines, states, "We have tried every additive we could find on the market, and they are all worthless."

Briggs and Stratton, renowned builders of some of the most durable engines in the world, says in their report on engine oil additives, "They do not appear to offer any benefits."

North Dakota State University conducted tests on oil additives and said in their report, "The theory sounds good- the only problem is that the products simply don't work."

And finally, Ed Hackett, chemist at the University of Nevada Desert Research Center, says, "Oil additives should not be used. The oil companies have gone to great lengths to develop an additive package that meets the vehicle's requirements. If you add anything to this oil you may upset the balance and prevent the oil from performing to specification."

Petrolon, Inc., of Houston, Texas, makers of Petrolon and producers of at least a dozen other lubrication products containing PTFE, including Slick 50 and Slick 30 Motorcycle Formula, claim that, "Multiple tests by independent laboratories have shown that when properly applied to an automotive engine, Slick 50 Engine

Formula reduces wear on engine parts. Test results have shown that Slick 50 treated engines sustained 50 percent less wear than test engines run with premium motor oil alone."

Sounds pretty convincing, doesn't it?

The problem is, Petrolon and the other oil additive companies that claim "scientific evidence" from "independent laboratories," all refuse to identify the laboratories that conducted the tests or the criteria under which the tests were conducted. They claim they are "contractually bound" by the laboratories to not reveal their identities.

In addition, the claim of "50 percent less wear" has never been proven on anything approaching a long-term basis. Typical examples used to support the additive makers' claims involve engines run from 100 to 200 hours after treatment, during which time the amount of wear particles in the oil decreased. While this has proven to be true in some cases, it has also been proven that after 400 to 500 hours of running the test engines invariably reverted to producing just as many wear particles as before treatment, and in some cases, even more.

No matter what the additive makers would like you to believe, nothing has been proven to stop normal engine wear.

You will note that all of the research facilities quoted in this article are clearly identified. They have no problem with making their findings public. You will also note that virtually all of their findings about oil additives are negative. That's not because we wanted to give a biased report against oil additives - it's because we couldn't find a single laboratory, engine manufacturer or independent research facility who would make a public claim, with their name attached to it, that any of the additives were actually beneficial to an engine. The conclusion seems inescapable.

As a final note on advertising hype versus the real world, we saw a television ad the other night for Slick 50 oil additive. The ad encouraged people to buy their product on the basis of the fact that, "Over 14 million Americans have tried Slick 50!" Great. We're sure you could just as easily say, "Over 14 million Americans have smoked cigarettes!"-but is that really any reason for you to try it? Of course not, because you've seen the scientific evidence of the harm it can do. The exact same principle applies here.

In Conclusion

The major oil companies are some of the richest, most powerful and aggressive corporations in world. They own multi- million dollar research facilities manned by some of the best chemical engineers money can hire. It is probably safe to say that any one of them has the capabilities and resources at hand in marketing, distribution, advertising, research and product development equal to 20 times that of any of the independent additive companies. It therefore stands to reason that if any of these additive products were actually capable of improving the capabilities of engine



lubricants, the major oil companies would have been able to determine that and to find some way to cash in on it. Yet of all the oil additives we found, none carried the name or endorsement of any of the major oil producers. In addition, all of the major vehicle and engine manufacturers spend millions of dollars each year trying to increase the longevity of their products, and millions more paying off warranty claims when their products fail. Again, it only stands to reason that if they thought any of these additives would increase the life or improve the performance of their engines, they would be actively using and selling them - or at least endorsing their use. Instead, many of them advise against the use of these additives and, in some cases, threaten to void their warranty coverage if such things are found to be used in their products. In any story of this nature, absolute "facts" are virtually impossible to come by. Opinions abound. Evidence that points one direction or the other is available, but has to be carefully ferreted out, and is not always totally reliable or completely verifiable.

In this environment, conclusions reached by known, knowledgeable experts in the field must be given a certain amount of weight. Conclusions reached by unknown, unidentifiable sources must be discounted almost totally. That which is left must be weighed, one side against the other, in an attempt to reach a "reasonable" conclusion. In the case of oil additives, there is a considerable volume of evidence against their effectiveness. This evidence comes from well-known and identifiable expert sources, including independent research laboratories, state universities, major engine manufacturers, and even NASA. Against this rather formidable barrage of scientific research, additive makers offer not much more than their own claims of effectiveness, plus questionable and totally unscientific personal testimonials. Though the purveyors of these products state they have studies from other independent laboratories supporting their claims, they refuse to identify the labs or provide copies of the research. The only test results they will share are those from their own testing departments, which must, by their very nature, be taken with a rather large grain of salt.

Transmission Math for T-bird SC's

by Fred Holzhauser, fredholz@concentric.net

The formula for rpms to speed is:

$$\frac{\text{rpm} \times 3.14159 \times \text{tire diameter (inches)} \times (1 \text{ ft} / 12 \text{ inches}) \times (1 \text{ mile} / 5280 \text{ ft}) \times (60 \text{ min} / \text{hour})}{(\text{axle ratio}) \times (\text{overdrive ratio})} = \text{mph}$$

Simplified, it's:

$$\frac{\text{rpm} \times .002975 \times \text{tire size (inches)}}{(\text{axle ratio}) \times (\text{overdrive ratio})} = \text{mph}$$

Here's some help figuring out your ratios. On the rearend housing, there's usually a tag that shows the ratio. Also, on the driver's door is a manufacturer's number. In the spot where it says axle is a code that tells you the ratio and type of axle, either traction lock or standard. Here's a table where you can look up the result. Usually, the 5 speeds came with 2.73 axles and the automatics had either 3.08 or 3.27 axles, depending on year or options.

Tire Size	Inches	Ratio	Code locker	Code std
225 60 16	26.63	3.27	E	5
235 60 16	27.10	2.73	M	8
245 60 16	27.57	3.08	Z	Y
245 55 16	26.61	3.27	E	5
255 55 16	27.04	3.55	K	2
245 50 17	26.65	3.73	W	6
265 50 17	27.43	4.10	(n/a)	(n/a)

The 5 speeds have an 0.75 overdrive. The AOD's have an 0.67 overdrive. 0.68 works for the wide ratio automatic (4R70W). If your tire size doesn't appear here, look up the tire size calculator, by George Davenport, in the FAQ section of <http://www.scco.com>. That's where these values came from (Thanks, George!).

Sample Calculation:

My car has an AOD with 3.73 gears installed. I have 225 60 16 tires. How fast can it go if it has peak power at 5500 rpm, and enough grunt to actually get there?

$$\frac{5500 \text{ rpm} \times .002975 \times 26.63 \text{ inches}}{3.73 \times 0.67} = 174 \text{ mph !!}$$



TOP 25 Fastest Super Coupes

Rank	Name	Year of Car	Date of Run	Time/mph
#1	Neil Frisbee	1990	08/31/1997	12.40 @ 114 MPH
#2	Wayne Ing	1992	04/04/1998	13.0 @ 102.6 MPH
#3	Stan Wodzisz	1990 Cougar XR7	09/18/1999	13.123 @ 104.1 MPH
#4	Bill Hull	1991		13.500 @ 100 MPH
#5	Brad Fielder	1995	08/15/1999	13.900 @ 98.90 MPH
#6	Mike Puckett	1990	04/17/1999	14.135 @ 98.26 MPH
#7	Doug Williams	1989	07/11/1999	14.142 @ 99.40 MPH
#8	Bill Schlabach	1989	06/30/1999	14.201 @ 97.42 MPH
#9	Rich Thomson	1995	06/18/1999	14.226 @ 94.34 MPH
#10	Frank Joseph	1989		14.301 @ 96.03 MPH
#11	Steve Griffith	1993	02/1999	14.368 @ 96.63 MPH
#12	Kurt Kreis	1992	05/09/1997	14.590 @ 94.34 MPH
#13	Dan Welch	1989	11/11/1998	14.591 @ 92.51 MPH
#14	Brett Allender	1995	10/16/1998	14.636 @ 92.93 MPH
#15	Ron DiPaola	1993	09/05/1999	14.646 @ 93.17 MPH
#16	Micah Miller	1989	05/07/1999	14.667 @ 94.78 MPH
#17	Jimmy White	1995	10/17/1997	14.737 @ 92.24 MPH
#18	Charles Markman	1992	10/03/1998	14.81 @ 92.16 MPH
#19	Andy Erickson	1992	08/08/1999	14.831 @ 93.92 MPH
#20	Aaron Pedroza	1992	09/01/1999	14.860 @ 92.33 MPH
#21	Ken Seegers	1992	08/30/1997	14.916 @ 92.78 MPH
#22	Bill Evanoff	1990	09/05/1998	14.92 @ 92.5 MPH
#23	Joe Santillo	1995	07/16/1999	14.940 @ 92.01 MPH
#24	Brad Klein	1995		14.993 @ 90.35 MPH
#25	Jimmy White	1994	2/17/1999	15.050 @ 93.94 MPH

Anyone who remembers the last "Top 25" list can surely see that the list is maturing and people are finally sending in their time slips to be counted. I would like to see this list with more 13-second cars and have every car on the list being quicker than 14.50 seconds in the near future.

The fall of the year is a GREAT time to take your SC out and run down the track as the cool weather helps our cars more than you can imagine. The intake is sucking in cool air and the intercooler creates a substantially greater temperature drop in the compressed air traveling through it. The lower temperatures result in a "Double Improvement"! A prime example of what cool air can do for your SC can be shown by Brad Fielders time above. Brad lives in Alaska and the last time he raced his car the air was in the 30's and the humidity was also very low. While the continental US is sweltering in the August heat, Alaska is closing up shop and getting ready for winter it appears. The results of cool air and low humidity speak for themselves with his 13.90 second run from his moderately modified SC.

I encourage everyone to keep mailing in your time slips to Ron DiPaola to keep the list edging downward. I KNOW there are a few of you running nitrous who have stated your times on the SCCoA BBS, but have not sent in your slips yet, so SEND EM' IN and be counted! Editor



Fast Car Comparison Chart – Know Your Competition

All data is from *Car and Driver* Magazine (except '95 SC auto which is from *Motor Trend*)

	Data from Car and Driver Magazine (except for SS data which is from Motor Trend)				ACCELERATION			BRAKING	LATERAL
YEAR	MAKE	MODEL	TRIM	COST	0-60	1/4 MI	TOP SPD	70-0	
THUNDERBIRDS				\$k	(sec)	(sec)	MPH	(ft)	g
92	FORD	THUNDERBIRD	KB SWB SC	47.8	6.2	14.6	149.0	189.0	0.88
93	FORD	THUNDERBIRD	SC (MANUAL)	26.0	6.8	15.4	139.0	177.0	0.8
95	FORD	THUNDERBIRD	SC (AUTO)	26.0	7.0	15.2			0.82
89	FORD	THUNDERBIRD	SC (MANUAL)	21.9	7.1	15.5	146.0	181.0	0.82
89	FORD	THUNDERBIRD	SC (AUTO)	24.2	7.1	15.5	137.0	192.0	0.82
94	FORD	THUNDERBIRD	LX	19.0	8.1	16.3	106.0	201.0	0.79
96	FORD	THUNDERBIRD	LX	19.5	8.7	16.7	105.0	191.0	0.73
OTHER MN 12 BASED CARS									
96	LINCOLN	MARK VIII	LSC	43.3	6.6	15.1	122.0	178.0	0.81
94	LINCOLN	MARK VIII		41.3	6.8	15.3	131.0	186.0	0.8
98	LINCOLN	MARK VIII	LSC	43.0	7.0	15.3	124.0	175.0	0.80
92	MERCURY	COUGAR	XR-7 5.0	24.0	8.5	16.5	109.0	190.0	0.83
THE COMPETITION									
99	CHEVY	CAMARO	Z-28	24.5	5.2	13.8	158.0	182.0	0.84
99	Cadillac	Eldorado	ETC	45.6	6.8	15.2	145.0	196.0	0.79
99	Cadillac	Seville	STS	51.4	6.8	15.3	141.0	192.0	0.79
99	Audi	TT	Coupe	32.9	6.9	15.6	132.0	174.0	0.87
99	FORD	CONTOUR	SVT	23.2	6.9	15.4	141.0	180.0	0.86
99	FORD	LIGHTNING	SVT	30.7	5.8	14.4	139.0	197.0	0.81
99	FORD	MUSTANG	GT	23.0	5.5	14.2	138.0	170.0	0.85
99	FORD	MUSTANG	COBRA	28.2	5.5	14.1	149.0	185.0	0.88
99	MERCURY	COUGAR		20.2	8.0	16.4	133.0	198.0	0.79
97	ACURA	INTERGA	TYPE R	24.0	6.6	15.2	143.0	164.0	0.88
97	CHEVY	CORVETTE		43.4	4.8	13.3	175.0	158.0	0.90
97	CHEVY	MONTE	Z34	23.0	7.9	16.1	108.0	197.0	0.81
97	EAGLE	TALON	ESI	17.0	8.3	16.4	128.0	206.0	0.75
97	FORD	TAURUS	SHO	30.5	7.7	15.9	139.0	177.0	0.80
97	MITSUB	3000 GT	VR4	47.5	5.1	13.8	157.0	169.0	0.88
97	PONTIAC	FIREBIRD	TRANS-AM	26.5	5.3	13.9	159.0	163.0	0.87
97	PONTIAC	GRAND PRIX	GTP	24.5	6.8	15.2	127.0	189.0	0.79
96	CHEVY	CAMARO	Z-28	28.7	4.9	13.6	162.0	163.0	0.89
96	FORD	MUSTANG	COBRA	29.5	5.9	14.6	150.0	163.0	0.86
96	FORD	MUSTANG	GT	22.5	6.6	15.1	140.0	171.0	0.81
96	FORD	MUSTANG	KENNY BRN.	42.6	5.4	14.1	152.0	164.0	0.89
96	FORD	MUSTANG	GT40	22.2	5.5	14.2	151.0	170.0	0.85
96	FORD	MUSTANG	COBRA 4.6	26.6	5.4	14.0	153.0	175.0	0.85
96	FORD	MUSTANG	COBRA R 351	37.0	5.4	14.0	151.0	165.0	0.89
96	FORD	MUSTANG	STEEDA	30.1	5.0	13.8	14.5	158.0	0.95
96	SALEEN	MUSTANG	S351	37.3	5.1	13.9	147.0	171.0	0.87
95	CHEVY	IMPALA	SS	23.4	6.5	15.0	142.0	179.0	0.86
95	EAGLE	TALON	AWD	22.0	6.6	15.3	137.0	169.0	0.85
95	NISSAN	MAXIMA	SE	25.6	7.3	15.9	123.0	187.0	0.75
94	CHEVY	454 SS		22.1	7.1	15.7	120.0	217.0	0.79



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94	CHEVY	CAMARO	Z-28	20.6	5.5	14.1	156.0	167.0	0.86
94	CHEVY	CAMARO	Z-28	21.0	5.3	14.0	154.0	165.0	0.92
94	CHEVY	CORVETTE	ZR-1	70.5	4.7	13.1	179.0	161.0	0.92
94	FORD	LIGHTNING		21.7	7.2	15.8	110.0	184.0	0.88
94	FORD	MUSTANG	GT	19.2	6.1	14.9	137.0	179.0	0.85
94	FORD	MUSTANG	COBRA	20.5	5.6	14.3	137.0	181.0	0.9
94	LEXUS	SC 300		38.6	6.6	15.3	140.0	173.0	0.82
94	MITSUB	ECLIPSE	GS-T	22.0	6.5	15.3	130.0	178.0	0.8
94	PONTIAC	FIREBIRD	FORMULA	18.6	5.5	14.2	154.0	172.0	0.89
94	TOYOTA	SUPRA	TURBO	42.0	4.6	13.1	160.0	160.0	0.95
93	FORD	PROBE	GT	20.1	7.1	15.4	133.0	182.0	0.86
93	FORD	TAURUS	SHO AUTO	26.8	7.6	15.7	139.0	197.0	0.80
93	TOYOTA	MR-2	TURBO	25.5	6.3	14.8	142.0	157.0	0.88
92	EAGLE	TALON	TSI	21.0	6.5	15.1	137.0	184.0	0.81
92	GMC	TYPHOON		29.8	5.3	14.1	124.0	185.0	0.79
91	CHEVY	CAMARO	Z-28	19.3	6.4	14.6	143.0	199.0	0.88
91	FORD	TAURUS	SHO	22.6	6.6	15.2	140.0	183.0	0.77
91	GMC	SYCLONE		26.1	5.3	14.1	126.0	183.0	0.80
90	FORD	MUSTANG	LX	13.7	6.2	14.8	141.0	177.0	0.84
89	FORD	MUSTANG	GT		6.3	14.7	137.0	200.0	0.82
89	FORD	MUSTANG	LX		6.2	14.8	141.0	177.0	
89	FORD	TAURUS	SHO	21.8	6.9	15.3	137.0	206.0	0.82
88	FORD	MUSTANG	GT		6.3	14.7	137.0	200.0	0.82
88	TOYOTA	MR-2	SUPERCHG.	19.8	6.5	15.0	130.0	199.0	0.78
87	BUICK	REGAL	GRAND NAT.	17.0	4.9	13.9	129.0	197.0	0.80
87	BUICK	REGAL	GNX	27.0	4.7	13.5	124.0	186.0	0.80
87	CHEVY	CAMARO	IROC	18.0	7.1	15.2	135.0	196.0	0.85
87	FORD	THUNDERBIRD	TURBO CPE	17.0	8.0	16.0	137.0	194.0	
87	PONTIAC	FIREBIRD	FORMULA	13.5	7.4	15.3	134.0	204.0	0.86
86	BUICK	REGAL	GRAND NAT.		7.5	15.7	121.0	198.0	0.80
86	CHEVY	MONTE	SS	14.4	7.8	15.9	117.0	204.0	0.80
86	DODGE	OMNI	GLHS	10.8	6.5	14.9	130.0	183.0	
86	FORD	MUSTANG	SVO	15.0	6.8	15.1	128.0	197.0	
86	FORD	MUSTANG	LX	10.0	6.2	14.2	132.0	222.0	0.83
86	MAZDA	RX-7	TURBO	19.5	6.5	14.9	145.0	193.0	
86	MITSUB	STARION		17.4	7.8	15.9	125.0	186.0	
86	PONTIAC	FIERO	GT	14.8	7.5	15.9	123.0	200.0	0.80
85	FORD	MUSTANG	GT	11.4	6.4	14.9	135.0	206.0	
84	FORD	MUSTANG	SVO	16.2	7.5	15.5	128.0	217.0	
82	CHEVY	CAMARO	Z-28	13.2	8.6	16.4	116.0	201.0	0.81
82	FORD	MUSTANG	GT		8.1	16.2	125.0	213.0	0.75
82	PONTIAC	FIREBIRD	TRANS-AM	12.8	10.6	17.5	116.0	186.0	0.81

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If there were ever a
valid reason to CRASH
your Super Coupe,
this may qualify



Thanks to Kurt Sunday for this contribution and I hope he keeps his eyes on the road in the future.
NOTE: No actual Super Coupes were hurt during the creation of this photograph!

