

C Modified Quarterly **cm-q**

V2-I4 / Fall 2000

Moving Towards the Web

Since its inception, there have been calls to change the format of **cm-q** from a paper / US Mail based publication to an Adobe / E-mail or web page publication. It has been stated that an electronic version of the newsletter would offer significant advantages to the readers. The speed and cost of distribution are high on the list of benefits. From the beginning, I had planned on eventually taking this forum electronic. The question of when had not been resolved until recently when I gained access to the Adobe software that creates PDF files. If all goes according to plan, the overwhelming majority of the subscribers received this issue via E-mail. Please note that if you are reading a paper copy of the newsletter, you either have no E-mail address, or the E-mail address you have provided is invalid. The E-mail version of **cm-q** is the first step toward eventually setting up a web based version that I hope will further broaden the appeal of the newsletter.

So many tasks, so little time...

One of the primary reasons why it took two years to create an electronic version of the newsletter has been a lack of time. With family, work, and car preparation consuming most if not all of my time of late, it has been increasingly difficult to get this newsletter out in a "quarterly" manner let alone investigate / trial a new forum. Over the past two years, the number of weeks between issues has grown longer thus the calling into question "quarterly" aspect of this publication. I ask for your patience as I try to right this situation for 2001.

The Winter Project

Upon completion of my first season with the Swift SE3, I made the decision that it was time to tear down the car to its bare frame to clean up the effects of 12 hard years of racing. This is not to say that the car was in tatters as it had been through a mechanical frame up prior to the 1999 season at which point all systems were made right. I would characterize the state of the car at the end of the 2000 season as a bit "rough around the edges".

I hold this position after going through a similar frame up on my previous Reynard 85F. Those of you who saw the result of my first frame up will attest that the SE3 was nowhere close to the level of polish of the 85F. Knowing what the SE3 could look like after a frame up was far too tempting a thought to be left undone.

First task towards this goal was the creation of a work area in my unheated garage that would be somewhat bearable in the midst of a Michigan winter. My experience with the 85F frame up told me that a good three months would be wasted if I did not take such an effort. The best my "salamander" heater could provide was a 10-degree gain over the outside temperature. This doesn't cut it when it's anything below 40 degrees. After \$40 of material and a couple hours of work, I enclosed a 15'x15' section of the garage. To date, I have had no problem maintaining a 60 to 70 degree environment in the area even with outside temperatures in the low teens.

After getting the car into my work area and up on stands, I began the process of taking the car apart. I will say that this is part of the process I find the most disheartening. It seems each time I remove a part, I find something else that needs to be replaced or refurbished. I had hoped to just get away with cleaning / painting / polishing most items, but alas this is not the case.

As the car now sits, the drive train and suspension are completely disassembled leaving just those items contained in / on the frame to be removed. The attic of my garage has once again become the staging area for the majority of the components removed to date.

As I did during the 85F frame up, I find it helpful to create sort of an "anthropological dig" skeleton layout of the various car subsystems. In conjunction with photos and hand drawings, the process helps me keep track of how the numerous pieces all fit together.



Winter 1997. Laying out the 85F in the garage attic.

Although there is a lot of work still to go, it is my hope that by the next issue of **cm-q**, I will be in assembly portion of the SE3 frame up process. I have an odd feeling that this will not be the case, as my enthusiasm for this project seems to be 1/10 the level it was at the start of this effort!

-pru-

Details

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Subscriptions / Ads

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Personal For Sale and Wanted ads are free to **cm-q** subscribers. Simply forward your ad for inclusion.

Treasury

2000 cm-q Expense / Income*	
Publication Expenses	\$358
Ads / Donation Income	\$450
Surplus (Deficit)	\$92

*Through V2-I3

Disclaimers

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Books

Over the last 10 years, I have subscribed to variety of automotive periodicals ; AUTOWEEK, AUTOMOBILE, CAVALLINO, FORZA, NORTH AMERICAN PYLON, RACER, and RACECAR ENGINEERING.



Due to the amount of automotive related information now posted on the web, I found little need to continue my subscriptions to all these magazines. I have dropped all but RACER.

Since its early 90's inception, I have been a subscriber to RACER. The articles and photos contained within this periodical

are first class. The in-depth, behind the scene coverage of F1, CART, IRL, and NASCAR offer insights not available via the web. To subscribe, call (800) 999-9718.

Letters

Thank You!

Included is our annual Thank-you check for cm-q. We haven't been able to drive this year (trying to figure out how to be parents and racers both – decided to take out "Pru" the Miata for ease of use), but we "CM" vicariously through your newsletter. Keep it coming!

Two corrections. One is the new number for our address. The other is your CM Numbers list. Just wanted to suggest you list "Driver 1" and "Driver 2" or "Driver" and "100 + Driver" with an asterisk if you want to designate "owner". I know there are others on the list where the owner is the higher number – and it's certainly true for us – the car's mine, Paul's the "co-driver".

Hope to see you out there again soon! And thanks for all your efforts in cm-q.

Kate Hughes

Kate,

Thanks for the donation!

Thanks also for the correction / idea. I will update your address accordingly. I'm planning on adopting your driver 1&2 idea for the CM numbers listing (it clears up a lot of ambiguity that exists with the current version!).

-pru-

p.s. Love the Miata nickname!

Pru revisited

The history of "Pru", now, whether you like it or not...

I had put a lift kit in my Explorer after getting stuck one night in deep ice (high centered on both diffs). After the lift kit, I didn't get stuck again (for a long time;-). Then, for Christmas my sister gave me some roll-bar padding for the new roll bar on the Miata. As she watched me install it, she remarked, "So. I hope you're going to drive this with a little more PRUDENCE than the Explorer?" And the Miata has been Prudence, or Pru, ever since!

Thanks again for your newsletter,

Kate Hughes

Letters continues on page 9...



Technical

After discussing SE3 front wing replacements, I asked John Goss of Pennon Composites if he had interest in contributing towards a technical article for **cm-q**. Although overwhelmed with requests from paying customers, John agreed. My thanks to John for parting with some of his precious time to answer the following composite bodywork questions.

-pru-

cm-q: What safety precautions should be undertaken when repairing composite bodywork?

JG: It's hard to understate the importance of disposal gloves whether working with polyester or epoxy type resins. This is especially true for epoxy as the body develops an allergic reaction after repeated exposure. Once you become allergic to epoxy you've got it for life. There are a number of people who have left the industry for this very reason.

It is also absolutely necessary to insure that you have adequate ventilation. I encourage the use of a respirator, as you quickly become accustomed to the smell of styrene and may not notice the build up of vapors.

Another thing to note, especially this time of year when people are working in closed shops, is that styrene is heavier than air. These flammable vapors tend to gather at the floor level. This also happens to be the location of most pilot lights and portable "salamander" type heaters. Besides being an explosive hazard, styrene vapors have nasty byproduct vapors when combusted by open flames.

Don't forget eye protection. Hardener is very caustic. If exposed to the eye, it can cause serious burns.

cm-q: What is the best material to use to repair a section of damaged bodywork? Mat and resin, "Tiger-Hair", etc.

JG: This depends on the type of repair that you are doing. If weight is not an issue, "Tiger-Hair" is fine. Actually, there's a new type of fast drying, lightweight Bondo called "Spilt Second" that we have been using.

Mat and resin is the most common material. An important thing to note is that when repairing a composite panel, you work from the outside towards the inside. This is the reverse of how a metal body panel is repaired. Use metal tape to section off your repair and then feather back in a "V" pattern the effect area. Build back in with mat and resin finishing off the repair with filler. Work hard to use as little filler as possible as it is heavy.

cm-q: When repairing bodywork, how crucial is ambient temperature? Does adding heat help / harm the curing process?

JG: It's critical. You cannot work below 60 degrees. You can mix / apply mat and resin at low temperatures and then place the given panel in some type of oven. I've seen some really creative ovens utilizing foam board and electric heaters. It has to be noted that there is some risk in using an oven with polyester resin as it should not be heated above 90 to 100 degrees.

The converse to low temperature is repairs done during the summer months. You use less hardener in the summer due to elevated temperatures.

While on the subject of hardener, it should be stated that most folks use way too much hardener. A manufacture typically provides 3x the amount of hardener needed for a container of resin. Besides being hard to work with due to accelerated drying times, using too much hardener is potentially dangerous. A high amount of hardener for a given amount of resin will generate a large amount of heat and even ignite. I've seen cups of resin with high amounts of hardener start to smoke! It's a good idea to keep pail of water around for just such an occasion.

cm-q: How important is clamping pressure / evacuation to the strength of bodywork repair?

JG: Although vacuum bagging is the preferred method, most people do not have necessary equipment / materials to do it right. There is 5x the material most folks think is needed to properly vacuum bag a part; peel ply, bleed ply, bag, etc. You really need to insure that resin doesn't get into the vacuum pump.

As far as clamping pressure, I have to ask where the excess resin is going. If you end up with a puddle after applying pressure, you're using too much resin. We have found that the average person uses far too much resin. The ideal ratio is 50 / 50 mat to resin. To accomplish this you need to just wet the mat.

cm-q: What is the best way to reinforce a section of bodywork that has been damaged due to excessive load?

JG: You need to design a part to take the load. The thicker the section the stronger it will be. You can use balsa wood or honeycomb to create thicker section without sacrificing weight. This is the "I" beam concept where the bulk of the load it carried by the top and bottom surfaces of the beam. The middle section of the beam is simply there to join the top and bottom surfaces.



Pennon 1998 Kokopelli Sports Racer Bodywork
Photo courtesy of Pennon Composites

Technical Continued

cm-q: Engine covers / exhaust surrounds experience a tremendous amount of radiant heat. What heat load will sections of composite bodywork take before they fail?

JG: Resins have a transition temperature that is normally 10 degrees higher than the curing temperature. When a section of bodywork reaches this transition temperature it begins to move. Note that most cars were built in cooler British shops so transition temperatures can be fairly low. Dark colors (black is the worst) are especially susceptible to this problem. I've seen honeycomb pop through on side radiator covers.

Although the various reflective heat mats / tapes do provide some protection, it is minimal at best. The only real solution is to use the proper resin in the construction of the part. Polyester and vinyl based resins have a temperature curing limit of 100 to 120 degrees. As epoxy can safely be cured at up to 300 degrees, it is the material of choice when there are temperature concerns.

cm-q: At what point do you quit repairing a section of bodywork and just replace it? Weight of repairs? Cost of new?

JG: Everyone has different needs. You will find that after a certain number of repairs, your bodywork will fail to fit properly. Weight is also an issue. When a section of bodywork becomes too heavy to carry, then it's probably time to replace it!

cm-q: How hard is it to find original bodywork?

JG: Depends. Certain items are out of production. We have molds for highly used parts. Early Van Dieman or Reynard parts are fairly common.

cm-q: What if an original piece of bodywork cannot be found?

JG: Molds can be made, but they tend to be time consuming and thus expensive.

Pennon Swift DB-6/1600 Bodywork



Photo courtesy of Pennon Composites

cm-q: What is the best material to use to build a mold?

JG: Fiberglass that is at least 3x the thickness of the final part. The key to building a part is keeping the part and mold apart. Use a reasonable mold wax. You can never have enough wax. We recommend a minimum of 5 layers.

As an alternative to wax, you can try Polyvinyl-alcohol (PVA). It's like liquid Syran Wrap. It's amazing stuff. Just hit it with water and it disappears. The tough part of using PVA is getting a consistent layer across the mold.

A little forethought in your mold design will make the process of separating the part from the mold a bit easier. You need to insure that you have the proper amount of draft or undercut. Think of the bottom of a muffin tin. The angle of the side must be a minimum of 2 degrees. The greater the angle the better. People also find it hard to think in mirror images.

Contrary to common belief, your parts need to have thick, heavy edges. Part should be thicker on the edges than in the middle. Besides helping with structure, thick edges also help when it comes time to separate the part from the mold.

cm-q: What is the best material to use to build a new section of bodywork? Mat and resin, kevlar / etc.

JG: It depends on what purpose the part is going to serve. You can blend different materials to achieve the desired effect. Carbon fiber has very high compression strength but does not have good tensile properties. That is, it's stiff but brittle. Kevlar has poor compression properties, but has super tensile strength. It's a noodle that very tough to rip part. By combining the two materials, you can come up with a part that has the best properties of the two.

The drawback of carbon fiber and kevlar is cost. A part made with carbon fiber / kevlar can be up to 10x the price of the part made from fiberglass.

Fiberglass has an undeserved bad reputation. Recall that fiberglass, as with carbon fiber and kevlar, is a binary substance of mat and resin.

The resin is as important as the mat. In a composite part, the resin fails first. There are a lot of people making carbon fiber parts that offer very little strength as they use cheap resin. That said, an epoxy resin is better in every way when compared to polyester and vinyl resins.

cm-q: How should a repaired section of bodywork be prepared for final finishing?

JG: As thin a coat of filler as possible. Body filler has no strength and increases weight.

cm-q: How hard is it to match the original gel-coats? Is it better to gel-coat match or paint a repair?

JG: Matching gel-coats is a nightmare due to UV effects. Other than adding weight, paint is the way to go.

Technical Continued

cm-q: How many layers of paint can be effectively applied on a section of bodywork?

JG: As we do not do paint work, I don't have the experience to answer that question. It's amazing how much paint is on some of the parts that I have seen. A gallon of paint is heavy, so each time you paint a car you're adding weight.

cm-q: What's the best way to remove paint from composite bodywork? Sanding, Soda blasting, Chemical Stripping, etc.

JG: Having tried a number of different methods, I have to say that the only real way to get this done is a DA sander. This is especially true with Urethane based paints.

cm-q: What type of services does Pennon offer?

JG: We offer a full line of composite services from concept to molded finished product. We will do some structural repair, but not bodywork in the strict sense of the word.

cm-q: What's the best / worst time to have work done?

JG: The off season that we had 10 to 15 years ago no longer exists. We are busy year round. The week after the Runoffs seems to be the only break we get!

cm-q: What kind of lead-time should plan?

JG: We are really receptive to the demands of racers. If you need something turned around quickly, we will do everything possible to accommodate you. If possible, we like 1 to 2 weeks lead-time.

cm-q: What the best way to ship bodywork? Size / weight considerations.

JG: This is huge issue at the moment. We generally use UPS, but the oversize limits sometimes force us to a common carrier (Yellow Freight / etc.). Shipping a part by common carrier will cost a minimum of \$100.

cm-q: Where are you located? How can you be reached?

JG: Our address is 4245 Coye Rd. Jamesville, NY 13078.

Contact us via phone / fax at (315) 498-4401. My E-mail address is jgoss@pennon.com. You can access our web site address at www.pennon.com

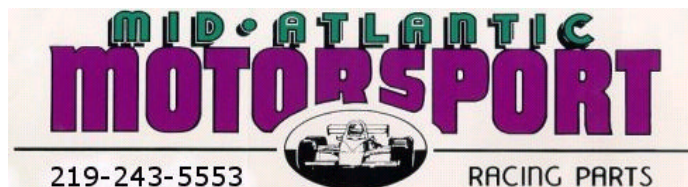


Technical Contributors

Without the following contributors, the **cm-q** Technical columns would not be possible. Please make the effort to contact these businesses the next time you are in the market for a given product or service.

-pru-

Engine Development



Tires, Wheels, & Racing Parts

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Products

Maintaining / charging a battery in-between events and in the off season can be accomplished by a wide variety of different products. For the cost, size, and simplicity, I have found it hard to beat the MRC Battery Saver / Charger sold by Harbor Freight Tools. I have over 4 seasons of experience with this unit and found it stone reliable. In the 85F, I ran a separate set of wires from the nose mounted battery to a quick connector the terminated in the cockpit. This type of installation is on my list for the SE3, as I currently have to remove bodywork to get to hook up the positive lead off the hot side of the starter!

www.harborfreight.com ITEM 41160-0VGA \$14.99

MRC BATTERY SAVER/CHARGER



Driver / Car

During my quest last summer to profile a former CM National Champion, I was informed that the whereabouts of '91 Champion Jeff Watson was unknown. The last time anyone could recall running into Jeff was at the '92 Solo2 Nationals.

When I purchased the SE3 late last year, I was told that one of the previous owners was none other than Jeff Watson. The seller of the SE3 was a friend of Jeff's and agreed to put me in touch.

A call to Jeff for SE3 Solo2 set up information eventually led to the following interview. My thanks to Jeff for dusting off his memories!

-pru-

cm-q: What is your full name?

JW: Jeff Watson.

cm-q: Do you have any nicknames?

JW: None that I'm aware of.

cm-q: What is your age?

JW: 44.

cm-q: Where do you live?

JW: Albuquerque, NM.

cm-q: What is your occupation?

JW: Business Consultant.

cm-q: What is your SCCA Region / Division?

JW: I'm not an active SCCA member at this time.

cm-q: How long were you a SCCA member?

JW: The mid-70's until '97.

cm-q: How long did you autocross?

JW: I stated after high school in 1974, but I didn't get real serious until after I graduated from college. I last ran in '97.

cm-q: What were some of your autocross cars?

JW: I started in C Production with a 390 AMX. After that, I ran a DMod 914. In the mid-80's, I competed in CSP with an Omni O24. In the late 80's, I had an S2. For the '91 season, ran in CM with the T-540. In '92, I ran the Swift FC in BM. After '92, I owned S2 until I quit racing SCCA.

cm-q: How many Solo2 Nationals did you attend?

JW: '91 and '92.

cm-q: What were your best Solo2 Nationals results?

JW: I won CM in '91 and finished 5th in BM in '92.

cm-q: Have you ever Solo1 or Club Raced?

JW: I've done hill climbs as well as Regional, National and Professional road racing.

cm-q: What were your best Solo1 / Club Racing results?

JW: I set a class record with the AMX at the Freeze Out Mountain, ID hill climb. I took a regional championship with the Omni in ITB. I was running 9th in a USCA FF2000 race at Firebird before the throttle cable broke on the SE3. I've won races in S2.

cm-q: How many years did you run in CM?

JW: 1991 was the only full season. I only did a few events with the S2 back in '96 and '97.

cm-q: Why did you pick CM?

JW: It was where the Lola was classed.

cm-q: What CM number did you run?

JW: I don't quite remember, but I think it was 21. I know it was a low number as I recall a lot of people wanting to run a high number. Most thought running toward the end of the heat was an advantage, and I surprised them when I won with a low number.

cm-q: Why did you pick that number?

JW: It was on the car when I bought it.

cm-q: How did you acquire the Lola?

JW: A friend of mine called in late '89 / early '90 to let me know that he had a CF taking up space in his garage. I knew it was a well-maintained car with a good motor so I decided to buy it. I really just fell into the car.

cm-q: How long did you own the Lola?

JW: Not quite a year. I recall selling the car just after the Nationals. As you can imagine, it was fairly easy to sell.

cm-q: What was year was the Lola?

JW: I think it was a '79 or '80.

cm-q: Who prepared the car?

JW: I did all the work on the car.



The ex-Watson T-540 as campaigned by Bill Martin
Photo courtesy of Sportscar

Driver / Car Continued

cm-q: What tires did you run?

JW: Hoosier.

cm-q: What type of rain tires did you run?

JW: Didn't own a set. It never rains here!

cm-q: What type / number of wheels came with the car?

JW: I recall only having the wheels that were mounted on the car.

cm-q: Who built the Lola engine?

JW: It was a no name engine built by someone in CO. It did have a Farley head and custom Farley exhaust. The guy at Farley that made the exhaust was an musician. He determined the correct length of the pipes by listening to the sound produced when blowing air through them!

cm-q: Who built / maintained the gearbox?

JW: I never had to do did anything to the Hewland.

cm-q: What gears did you run?

JW: I ran an integral first with the remainder stacked on top. I don't recall the exact ratios.

cm-q: What shocks did you run?

JW: Fox double adjustable. It was what I was used to after a year as a race engineer for Farley in the Canadian Pro FF2000 series.

cm-q: What brake pads did you run?

JW: The softest Ferodo I could find.

cm-q: Did you use an external "jump" battery?

JW: I recall the Lola being wired for a external battery, but I never used one.

cm-q: What clutch did you run?

JW: I don't even know, as I never touched the clutch.

cm-q: What type of oil did you run?

JW: Redline.

cm-q: What type of coolant did you run?

JW: Water with Water-Wetter.

cm-q: What type of fuel did you run?

JW: Straight pump-premium.

cm-q: Did the Lola have any special modifications?

JW: I added Ackerman. Originally the car was parallel steer. This was a fairly intricate procedure, as it required some serious modifications to the uprights. To get the right geometry, I had to remove a portion of upright. This involved some serious cutting and welding.

cm-q: Did you ever have a co-driver?

JW: I never had a co-driver mainly due to the fact that I'm not a pleasant person to be around when I compete.

cm-q: What was the name of your team / sponsors?

JW: Ascent Racing / Hooiser / Car Crafter Body Shop.

cm-q: What's the "ideal" CM car?

JW: The T-540! It won! How much more ideal can it get?

cm-q: What's the "coolest" CM car?

JW: I always liked the Swift DB-1. Anybody won with one of those?

cm-q: Tommy Saunders used a DB-1 to take his '98 and '00 CM National Championships.

JW: Interesting. I always thought the DB-1 would do well.

cm-q: What did you like the most about CM?

JW: The level of competition. Everyone had equal equipment. Everyone was extremely friendly.

cm-q: What would you do to improve CM?

JW: I wouldn't screw with it at all. It's great the way it is.

cm-q: Any other interesting CM stories?

JW: At the '91 Nationals, I really shocked a bunch of people as I basically came out of nowhere to take the win!

cm-q: Have you raced at all since you left the SCCA?

JW: In '99, I ran an Aprilia Challenge class motorcycle racing team. Our best finish was a 5th at Laguna Seca.

I recently tried a 125cc shifter kart owned by a friend of mine. It was a lot of fun.

cm-q: Did you know that the SCCA now has Solo2 class for F125?

JW: Really. I might just have to get one.



Letters Continued

Donation and Data

Chris, sorry for the long overdue response. I think your cm-q publication is great and just mailed a donation. Hopefully, this will cover this year, next, and a few expenses for other current and past deadbeats... like me. Since you are now in BM, don't be afraid to open the publication up to other "mod" classes. We all can learn from each other. Also, a web-based newsletter might be less work and allow more reader input. Just a thought.

CM Numbers List Data:

Make: Tiga
Type: S2
Year: '85
Model: SC85
Number: 28
Color: TBD (currently sanding and sanding and sanding... has made me very envious of open wheel cars.)
Tires: Hoosier

BTW, I was working course in '92 Salina when you co-drove Mal Kooiman's Vega. Small world. Also, Guy Ankeny informed me Dave Johnson sold his Tiga S2 back in '98.

Keep up the great work.

Craig Henry

Craig,

Received your check. Thanks for the donation as well as the input!

In regards to your Salina comment (you're freaking me out here), that Vega was the worst car as far as handling goes that I've ever had the displeasure to drive!

Thanks for the flash back,

-pru-



-pru- in Mal Kooiman's HS 1975 Cosworth Vega
Salina, KS, 1992

For Sale

1985 Winnabago-Itasca

Big engine, small motorhome. 454 Chevy powered. 23'. 32K actual miles. New exhaust system, new Bilsteins, new A/C. 55 hours on 4000 watt aux. generator. New mattresses, newly upholstered dinette couches, all new window blinds, new privacy curtains. Sleeps 4 to 6 depending on size of people. \$14,500. We are too busy to use it. Located on the west coast of FL.

Bill Hiatt
941-475-5367
billy8910@aol.com

1979 Dulon

This car is in great condition. Ready for autocross. Former Joyce Looman 5 time CML National Champion car. Also successfully campaigned nationally by Tamara McDaniel and Gary Godula up to 1998. Open trailer is included along with some spares. Car is located in Louisville KY. Pictures and specs available. \$6,900

Geoff Hale
502-561-1480 7-3 EST
Down21@aol.com

Reynard FF88

Former Bert Swift car. Taylor box, light rotors, cv's, diff. 3 sets of wheels, stainless exhaust, good assortment of Suspension spares (rockers, toe links, a-arms, etc.), 10 gears, Single Koni's or Triple Penske's. The most developed Reynard in the country. Surely the fastest! 11,000 w/Koni's, 13,500 w Triple's! This car can beat DB-1's. Check out pictures at bryancohnracing.com. Located in St. Louis.

Bryan Cohn
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V3-I1 Preview

I'm planning a Technical column on brake systems for **cm-q** V3-I1.

I hope to connect with the recently relocated couple of Gary Godula and Tamara McDaniel for the **cm-q** V3-I1 Driver / Car column.

If all goes according to plan, **cm-q** V3-I1 to be in your E-mail / US mailbox the final week of March.

As always, I welcome any and all of your submissions.

-pru-