

Squire SS-100 Registry

CLBCOM 68
JULY 1996

SQUIRE SUNDAY III

is firmly set for Sunday August 18th at the Sand Castle in Lloyd's Neck, Long Island, NY from noon till ?? Lots of food and fun so feel free to bring the lady of your choice.

We are working on some Squire workshops for Saturday the 17th but the plans are not firm yet so we'll have to give you the schedule under separate cover or by telephone. In addition to the firm progress we've made in the resale value of our little roadsters I am also truly amazed at the technical progress we've made, like the report on the front end suspension detailed later in this letter. Time permitting Saturday, maybe we can yank one of these apart to demonstrate how simple and effective our torsion bars really are.

I'll be flying in from Phoenix on Thursday the 15th and Bob Murray will arrive the same day from Durham. All other non-New York Squire owners are welcome but Mark Offenbergs needs a head-count from both locals and out-of-towners to order food and make motel reservations so please give him a call with your confirmation at 516+271-4424 days and 516+424-8833 evenings. I came very close to not attending this years meet but now that I'm committed I'm really looking forward to the pleasure of your company.

THE SQUIRE SS-100 TORSION BAR SUSPENSION

research has been completed and Bill Lieske has labored diligently with his little drawing device to give you, in words and pictures, an easy to follow sketch on how-to-do-it-yourself or let your pet mechanic read it over before he adjusts it. You will note that we have recommended the use of lubricants between the Delrin bearing and it's carriage components and polymer purists may argue that the beauty of these plastic compounds is self-lubrication and we agree, up to a point. They have worked well for twenty five years but the ingress of water and road grit has formed an abrasive compound that introduces both wear and work embrittlement and causes the squeaks and groans that annoy us. So, we suggest that you take it apart and clean and lube it or squirt it up periodically with a teflon based spray. The other choice is to replace the Delrin bearings and we'll have more to say about that later.

MORE NEXT MONTH - BUT ALWAYS REMEMBER

If they can smile when things go wrong, they have someone in mind to take the blame.

MAINTAINING THE SQUIRE SS-100 FRONT END SUSPENSION SYSTEM

The Squire SS-100 torsion bar suspension system as designed and built by the Intermeccania factory has been cussed and discussed by many owners. Many feel that the suspension contributes to a rough or stiff ride characteristic. Others are disturbed by various squeaks and clicks that develop, particularly if the car has not been driven regularly. All Squire owners (except the two or three of us who have installed some form of power assisted steering) complain about how difficult it is to steer the car at low speeds. This write-up is intended to address the matter of torsion rod springing care and feeding. Power steering is a completely separate subject!

In past issues of the Squire Registry newsletters Art Stahl, the writer and others have touted the benefits of lubricating the Delrin bearings used in the torsion bar suspension system. Still, we have been worried as to the condition of those bearings particularly on Squires with 15,000 or more miles on the odometer. With the advent of Jim Dimond's Squire restoration project we have the second (that we know of) body off chassis to play with. On Saturday, June 22, 1996 Art Stahl, Sid Weaver, Ed Spielman, Terry Becker (our favorite automobile mechanical Guru) and I got together at Jim Dimond's place to visit, talk cars, tell a few jokes, insult each other and take a serious look at the Squire torsion rod front end suspension system.

Jim Dimond's Squire has between 12,500 and 13,000 miles on the odometer and is typical of the majority of running Squires. It was decided that we would dissect the suspension system to look at the Delrin bearings and to also explore the best way to adjust suspension height to level the car's front end, since it has been observed that many tend to sag on the driver's side. The methods of dis-assembling and re-assembling the suspension

system should be of value to all shade tree mechanic Squire SS-100 owners or could save some time for a professional front end or frame man who may be working on your Squire for you. Prior to this, Art and I had used suspension parts taken from my Squire when it was converted to a Mustang II front end for reference. This narrative was developed from the procedures that we used.

It is assumed that you will be working on a level or near level surface such as your garage floor or driveway. Equipment required includes a 2 ton or larger floor jack and a pair of sturdy adjustable jack stands. Tools include 1/2" drive socket wrenches having inch sockets up to 7/8" and metric sockets up to 25 mm. open end and/or box end wrenches up to the same sizes, a 10-12 oz. ball peen hammer and drift punches up to 5/16" diameter. A bench vise and a pair of *dial calipers* would be nice!

Dis-assembly can be accomplished as follows:

1. Carefully jack up the front end of the car until both wheels are free and place floor stands under the frame on both sides. Remove both front wheels. Do one side at a time so that you won't get the pieces mixed up! *Caution:* Look at the *torsion bar loaded arm* (see drawing) and assure yourself that the tension is released. You can check this by inserting a pry bar between the *lower arm* and the *spring arm*.
2. See the attached drawings for identifications of the various pieces and parts. Remove the shock absorber top and bottom mounting nuts and bolts. Set the shock absorber aside.
3. Locate and unbolt the *upper arm shackle*. It is held by two metric bolts with self locking nuts. Note: Before re-assembly, go to your favorite ACE Hardware store and buy four (4) 3/8" x 1" *grade 8* hex head bolts with aircraft type self locking nuts. For some reason the

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original bolts were somewhat larger than the holes in the "A" Arms and had damaged threads. The thrust column should now be free when a jack is placed under the brake drum rim. Using two wrenches, remove the *lower torsion arm thrust bearing* mounting bolt. Take the nut off first, then drive the bolt out. You should now be able to remove the whole *thrust column*. Now is a good time to place the lower thrust bearing in your bench vise and free up the *set nut*. Both of these were very tight and rusted in place on Jim's car, requiring heating of the nut with a torch to expand it enough to break it free. If you need to do this ***be careful not to overheat and wreck the rubber bushing.***

4 The rear of the *torsion rod* is attached to the frame by a special bracket held in place by two bolts. Remove both bolts and pull the torsion rod toward the rear of the car to remove it. Set it aside.

5. Using a center punch or small numbering punch set, mark the sleeve of the Delrin bearings at the bottom to identify their original positions. On re-assembly you should place each bearing in the same position, but rotated 90° from its original position to provide new weight bearing contact points. (See Step #7, below)

6. Loosen the small *set bolt* on the underside of the square *outer sleeve* that is welded to the two *spring arms*. Carefully tap the square tubing *torsion rod sleeve* out toward the rear of the car. You can now drop the *torsion arm assembly* out and remove the Delrin bearings along with the *torsion key nuts*.

7. Using mineral spirits or naphtha on a rag clean the *bearing races* on the chassis, the *Delrin bearings* and the *torsion key nuts*. Look at each surface under a strong light to observe their conditions. You should see a slight wear area at the lower side of the Delrin bearings as they were mounted. You might

also see some wear and rust accumulation at the opposite side of these bearings, in the bearing races and on the torsion key nuts. This rust and accumulation of dirt and grit was the cause of the squeaks and clicks that you might have heard! Clean everything up.

8. If you don't have a dial caliper or thickness guage, borrow one or take the bearings to a machinist for measuring the thickness of the Delrin bearing surface. It should be no less than 4.95 mm (.195 inches) at the narrowest part. If the wear is less than that, the bearings should be good for another 30,000 miles or more if they are kept properly lubricated! If the thinnest area is less than 4.80 mm (.189 inches) it is recommended that new bearings are installed.

Re-assembly is essentially the reverse of disassembly. Be sure to tighten all bolts properly. For the purists, we recommend 30# of torque on the upper shackle bolts and 40-45# on the lower shackle nut. As previously stated, it is best to do one side of the front end at a time so that parts are not mixed up.

The situation described here arises from the fact that no provision was made in this otherwise clever design to lubricate the bearings or to seal them from ingress of abrasive road dust between the moving surfaces. Although the movement isn't much road junk, even on paved highways, will be kicked up and will migrate into the bearing surfaces, causing wear. This can be severe if your Squire has been driven on dirt roads a lot and no lubrication has been applied.

We suggest that you do not squirt WD-40, *Liquid Wrench* or any other highly volatile thread loosener into these bearings. There are several high quality aerosol spray penetrating lubricants that carry Teflon or Silicone that will migrate into bearing surfaces and leave a lubricating film after the carrier liquid (usually alcohol or mineral spirits) has evaporated or dissipated. I recommend RONSON "Multi-

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Lube" penetrating spray. This particular lubricant had worked quite well to free up the suspension on my Squire.

Terry Becker has found a "magic" product that we used to lubricate Jim's bearings surfaces when re-assembled. It has the tweaky name of **DE-FRIC'N - TWIST**. It is also described as "*Slicker than snot!*" This stuff is a (patent pending) special lubricant used to "reduce wear on any plastic, rubber or teflon surfaces making frictional contact with each other or with metal." It is used by the MOTO-CROSS cycle crowd with considerable success and is manufactured by JAR Research, Phoenix, AZ, Telephone (602) 545-8400. We are trying to get a supply arrangement on this product. DE-FRIC'N TWIST comes in a tube applicator and is about the consistency of the stuff that it is slicker than, on a cold day! As far as we know at this time it isn't available as an aerosol spray applied lubricant.

So, if you are tired of squeaks, clicks and rough rides at the front end of your Squire, it is recommended that you or your favorite mechanic take the thing apart, clean up the bearing surfaces and grease up with the DE-FRIC'N stuff or some other lubricant designed to be compatible with Delrin. We are also working on the design of a suitable easily installed Delrin cover that will fit over the front of the bearing assemblies and clamp into the torsion bar carrier. This should prohibit most of the moisture and junk off the road from getting into these sensitive bearings.

Back in Step #3 we suggested loosening up the *thrust column set nut*. This is a good idea since you might at some future time wish to level the front end of your Squire or adjust both sides to compensate for torsion bar fatigue, making the fenders too close to the tires. To do this, you must go through steps 1, 2 and 3 to the point of having removed the *upper arm shackle bolts*.

To raise a given side of the car, you must shorten the *thrust column* by an amount

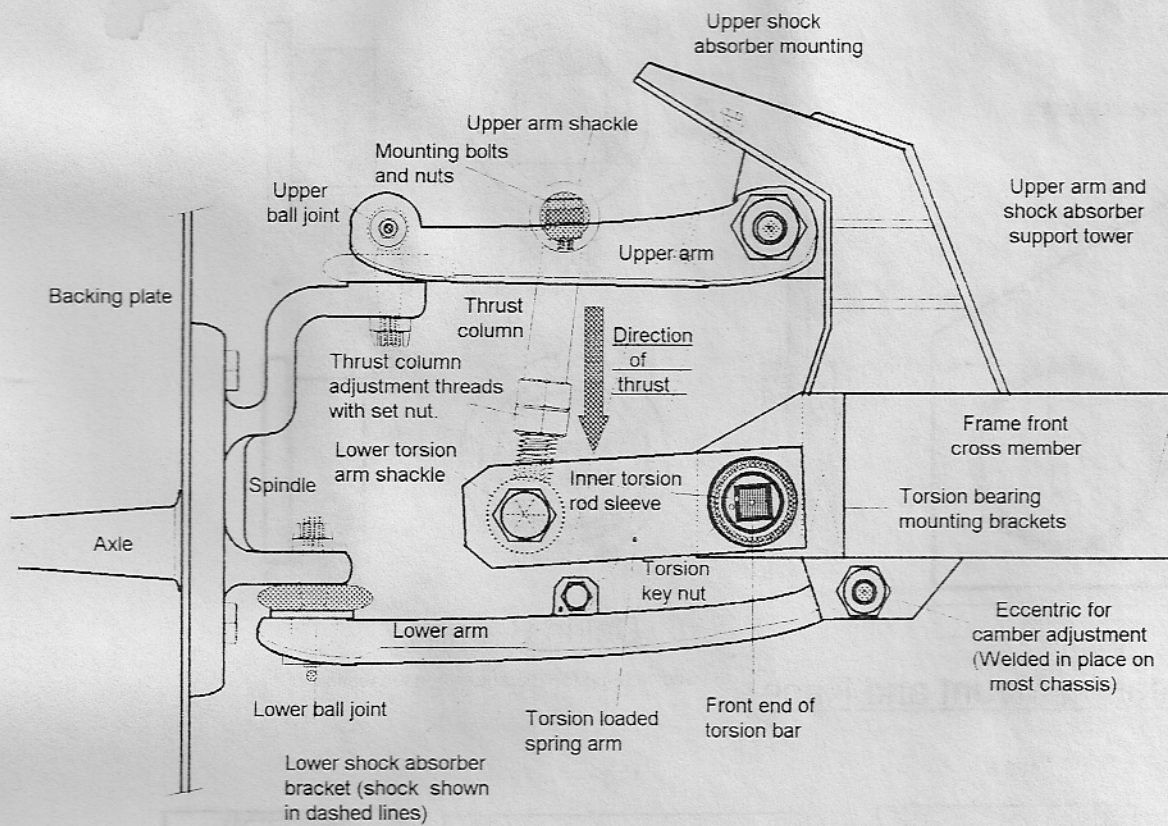
determined by the geometry of the design relative to the amount that you want the side of the car raised. The thread pitch of the adjustment rod is about 10 turns per inch, or one tenth of an inch per turn. If you want to raise say, the driver's side by $\frac{1}{2}$ inch, try shortening the arm by 2-1/2 turns. You will have to bolt the top of the column in place, replace the wheel and let the car down on the floor to check the effect of this change, then re-adjust if necessary.

We trust that this will give Squire SS-100 owners some additional insight into the front end suspension, how it works and how it should be maintained. Our considered opinion is that trying to drill holes in to the bearing area to force in grease or oil will *probably not do any good*. A good lubrication with a high quality lubricant will loosen up the springing action and irrigate some of the dirt out of the bearings. Application of a suitable lubricant every 1,000 to 1,500 miles will keep things moving free and easy. If your bearings are bad, let Art or me know. We have the capability of machining new bearings. The cost of a set of Delrin bearings is expected to run about \$60.00 (for a set of four).

Incidentally, during the tech session proceedings, Art, Sid and Jim did all the real work on this project. Ed, Terry and Bill kibitzed and provided various (highly intelligent) suggestions along with suitable sardonic comments throughout the day. The profanity and flatulence was spontaneous, mostly provided by Art and Sid. Jim's wife, Rita, provided refreshments and generally kept out of ear shot!

Bill Lieske

July 17, 1996



Typical Squire SS-100 front end suspension elements

View from front of chassis, looking at right side front suspension.

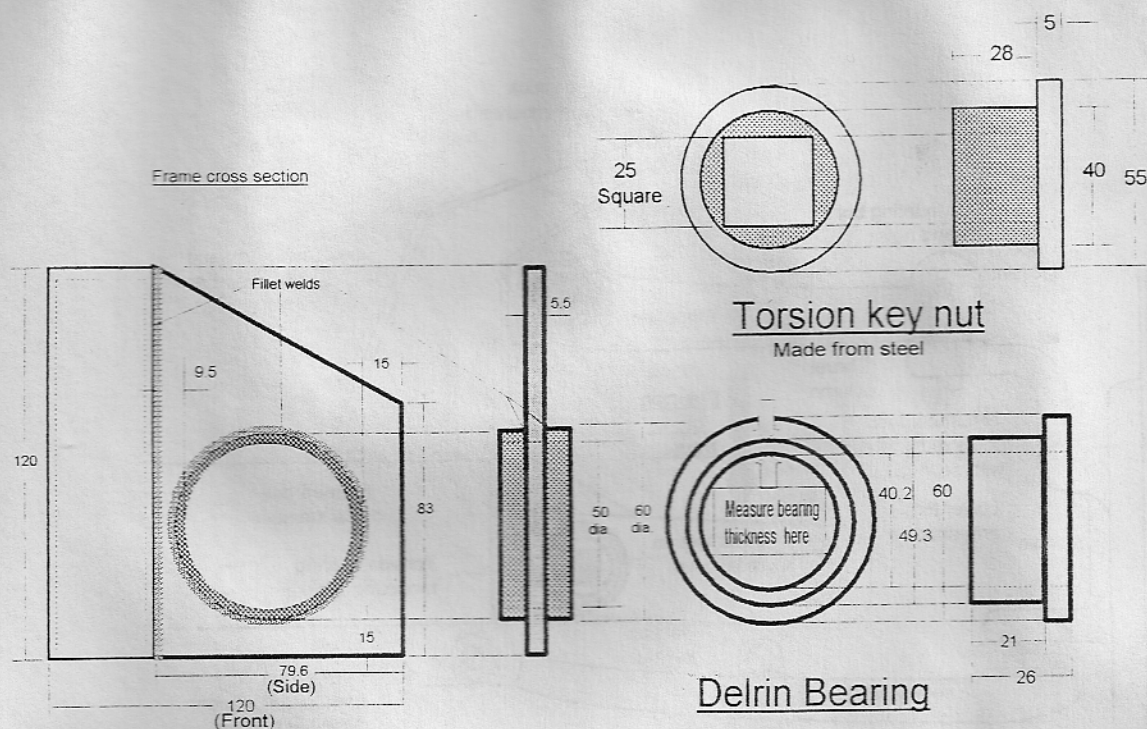
How it works:

The torsion rod has one end fastened to the side of the frame. It is made from specially selected tempered steel. The torsion effect results from the rod's resistance to twisting when a twisting moment is applied to the opposite end from the fixed mounting. An arm is arranged such that when it is subjected to rotation a twisting moment is applied to the torsion rod. This provides the basis of this type of torsion rod (or torsion bar) springing.

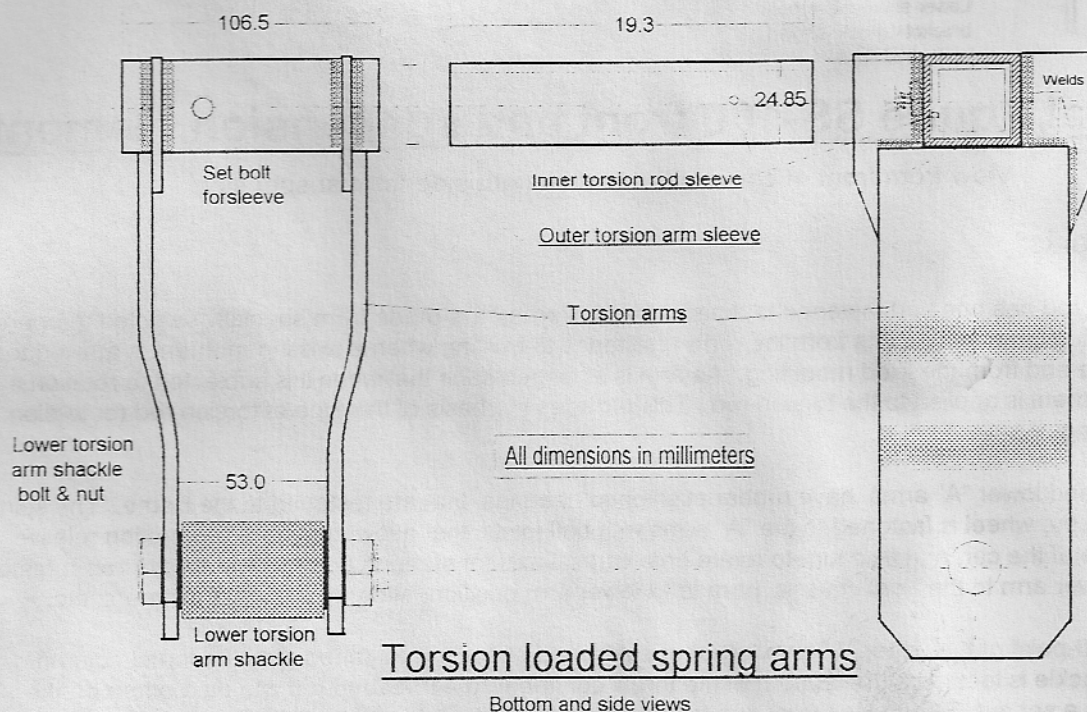
The upper and lower "A" arms have rubber cushioned bearings that are fastened to the frame. The spindle which holds the wheel is fastened to the "A" arms with ball joints, that allow up and down motion relative to the frame of the car, and freedom to rotate on a vertical axis for steering control. A stabilizer rod is fastened from the lower arm to the front chassis horn to fix lower arm position, allowing caster adjustment, etc.

At about mid-point of the upper "A" arm a rubber cushioned shackle is fastened atop the thrust column. Another shackle is located at the bottom of the thrust column with a threaded rod into the bottom of the column with a set nut. The down thrust due to chassis weight is transferred from the upper arm downward to the spring arm to apply the weight to the wheel. To raise the stance of the car, the column must be shortened. The delrin bearings are the only sleeve type bearings in the system that are not rubber mounted.

As far as we know, this particular style of torsion springing is exclusive to the Squire SS-100 chassis.



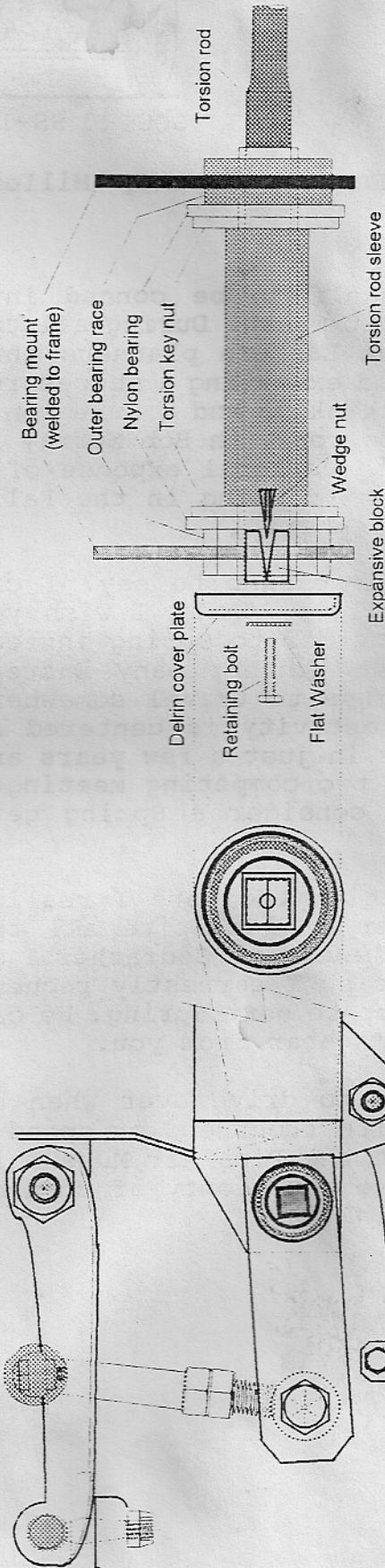
Bearing Mount and Race



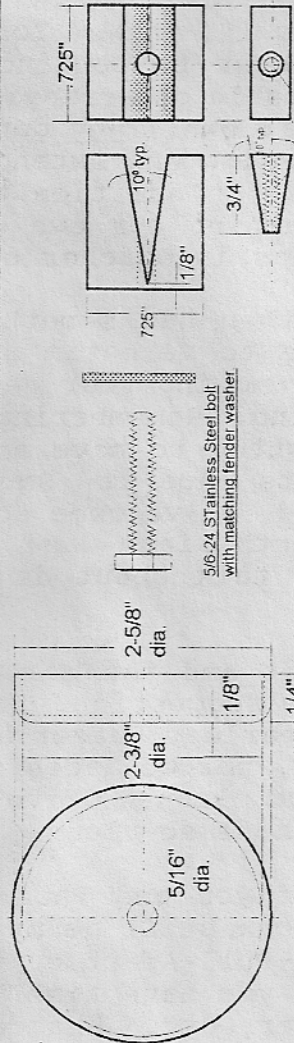
Squire SS-100 Torsion Bar Bearing and Mount Details

See associated write-up for discussions of maintenance of this assembly and bearing replacement procedures.

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Phantom view of bearing assembly

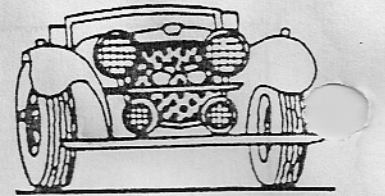


Expansive block and wedge block details

Make from steel unless otherwise noted

Bearing cover plate for Squire SS-100 front suspension

This idea sets forth a cover plate that will attach into the front of each bearing assembly to reduce or eliminate the ingress of dirt and moisture into the Delrin bearings. When installed, the application of non water soluble, non seizing grease at the inside of this cover plate should greatly expand the bearing life.



SQUIRE SS-100 CLUB

Attachment to Clbcom 68

To The Western Group: Botto, Dimond, Fulton, Lieske, Miller, Spielman & Weaver

By now you know that I have allowed myself to be conned into attending Squire Sunday III in New York next month. During all the phone calls I did my best to convince the Eastern planners that they were perfectly capable of arranging and executing a successful two day meeting on their own. They don't think so and I sure won't debate that here but during one extended telcon with Bob Murray in Durham I mentioned that in addition to the personal expense of a trip East, we were planning our own Western meeting in the Fall, most likely in Las Vegas in October or November.

Bob thought a moment then had something important to say. I can quote him pretty close to verbatim as follows; "Art, I wish you fellows would consider moving your get-together to Spring instead of another Fall meeting. Remembering last Winter, many Eastern members would be delighted to have an excuse to travel somewhere warm in March. And lets face it, Squire activity is centered in Phoenix and Long Island. We've come so far in just a few years and I'd hate to see that enthusiasm wane with two competing meetings. Why don't you fellows talk about it and consider a Spring get-together".

I have thought about it and the more I think the more I realize that it's a damn good suggestion. However, and despite all the kidding around about Fearless Leader and The Squire Godfather I am not running this group, nor do I desire to so I earnestly request your input on moving our planned drive-in up to next Spring. We can vote by post card or phone so please, let's hear from you.

Note to Sid Weaver: If you and Paul want to drive over when it cools off a little we can still do my Squire front end or spend a day or two at American-Pull-Apart or visit the Pima Air Museum in Tucson or all three if you have time. We've got plenty of room to park your truck, trailer, etc. Wha'da think?