From: National Control Line Racing Association
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TO

SPECIAL GOODYEAR ISSUE!

Torque Roll!!

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President's Column – April 2005- Bill Lee

Membership renewal: A reminder that if you have not already renewed your NCLRA membership, you should do it now. This issue of the TorqueRoll will be your last if you have not renewed your membership for 2005. Contact our Secretary/Treasurer, Tom Wilk, to renew. His address/phone number/e-mail address are on the back of this issue. Your membership expiration date is printed on the mailing label of this issue of the TorqueRoll.

NATs Planning: We still have a need for event directors for several events at the NATs. Here's the line-up so far:

Fox Race/SS Rat:	Jim and Jason Allen
F2C:	Jim Holland
F2CN: OPEN	
Scale Race:	Bob Whitney
B-TR:	Tim Stone
Slow Rat: OPEN	
NCLRA Clown Race	Tim Stone
Rat: OPEN	
NCLRA Quickie Rat: OPEN	
Mouse I: OPEN	
Mouse II: OPEN	

As you can see, we are not covered up with help! Come on, guys! It's time for each of us to step up and CONTRIBUTE instead of always being a "taker"!

And while we're on the subject, somebody needs to volunteer to be the overall NATs Racing Director for 2006.

Bylaws: An added section for the NCLRA bylaws has been proposed by Tom Wilk. It is inteneded to formalize the manner in which we set rules for competition events in the organization. The proposal follows, and the vote of the membership will be taken in June when we have a ballot for electing the District Representatives.

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Add the following section to the existing Bylaws:

NCLRA Event Rules

1. The Association shall on occasion define rules for CL Racing events.

2. The President shall appoint any necessary committees for the formulation or modification of any event rules.
   a. The committee will perform its duties and create a report to be returned to the NCLRA Board
   b. All rules shall be adopted only by majority vote of the Board.
   c. Committee members shall solicit input from the members in their area to aide in their deliberations.

3. Only NCLRA members may serve on a rule-making committee.

4. Only NCLRA members may make rule proposals for NCLRA events.
   a. A rule change must be submitted to the President who will then poll the Board to see if there is a desire to consider the change.
   b. If the Board deems it so, the President shall create a committee to consider the change and report back to the Board.
   c. Any rule change shall become official only upon majority acceptance by the Board.

5. When an event is advertised at a contest as an "NCLRA Event", the NCLRA rules must be followed.

6. The official NCLRA rules will be the version that is kept on the NCLRA web site.

7. As required, the President shall appoint committees to consider AMA CL Racing rules.
   a. Any such committee shall also make a report to the Board.
   b. Any report accepted by the board shall be taken to the AMA rule-making process by the President.

Elections: Just a reminder that elections this year are for the District Representatives. It is important that all nominations be made now. The dates for nominations are March 1-April 10, and nominations may be sent either to the Newsletter Editor, Tim Stone, or to me.

Reminder: All nominations for the NCLRA Hall of Fame must be submitted by the end of April. Our coordinator for the HoF is Dick Lambert, and all nominations must be submitted in writing to him.

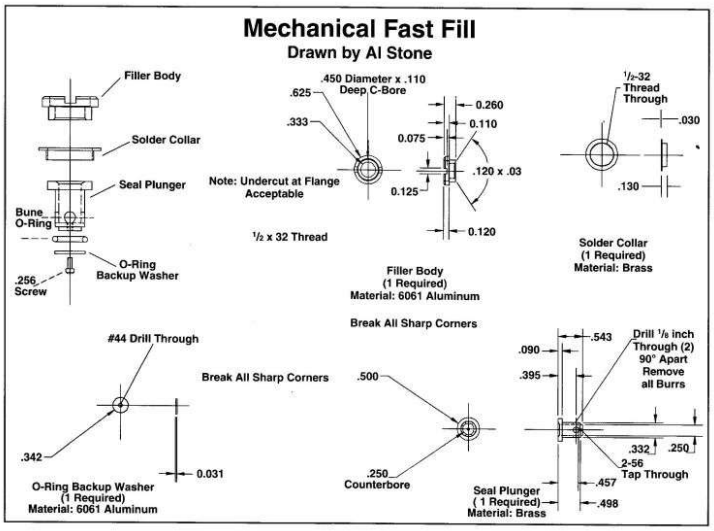
VICE PRESIDENTS' REPORT- STEVE WILK

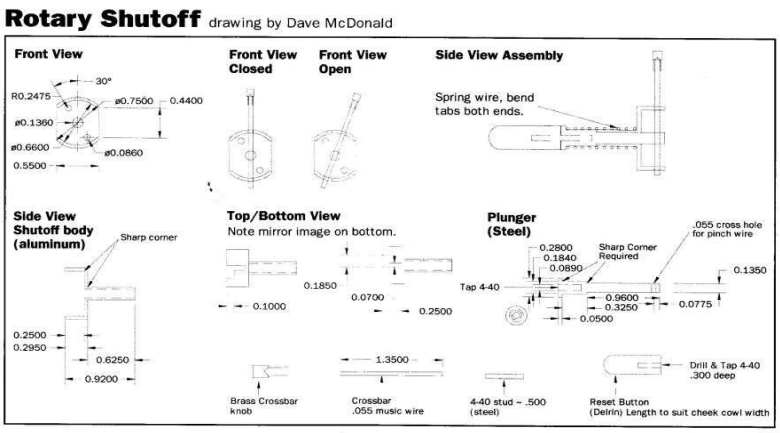
Are we there yet? is what you can hear up north. No we are not going anywhere, we are waiting for the snow to melt and the temps to warm up so we can do some practicing and get ready for our first contest of the season. For me that would be the St Louis, MO Contest, May 14 & 15. We (Dad and I) have been going to it for the last two years. They have a great site. It is located on the west side of St Louis, put on by the Lafayette Esquadrille. They have 3 paved areas for flying: one for Speed, one for Racing and the third they share for practice. This year they will be running Fox Race, Quickie Rat and Goodyear for the Racers. Last year they had a light attendance by the racers so I hope some of you might consider going this year. We don't have a lot of races in the Midwest and we cannot take any contest for granted. So contact John Moll jl172@sbcglobal.net if you are interest in going and looking for more information.

And now for something completely different.

I don't know if you noticed but there was a changing of the guard in the latest issue of Model Aviation (April 2005). Jim Holland has taken over the writing of the racing column from Dave McDonald. He is now the sixth columnist for the Racing section. The first columnist was Bill Lee from July '75 to Aug '82 followed by John Ballard Oct '82 to Dec '93, Ken Smith March '94 to Dec '95, Stew Willoughby March '96 to April '98 and Dave McDonald June '98 to April '05. Dave has been a strong voice for the racing community. He was one of the founders for the NCLRA and president for many years. He spent a lot of time at the AMA looking out for the best interests of the Racing community. Some of Dave's past articles in Model Aviation contained several articles with drawings. August '99: Mechanical Fast Fill, April '03: Adjustable Lead out Guide, August '03: Check Valve and February '04: Rotary Shut Off. I have referred back to these drawings many times and made these items for my own models. Thanks to Dave for sharing these with us and giving everyone the same advantage. Now that Dave has more time on his hands we expect to see him running even harder at the Racing circle. Thanks Dave.

Steve





SOUTHEAST REPORT-BOB WHITNEY

Well of course the big news is that the U.S. F2C Trials are going to be held in Palm Bay, Florida this year over the Labor Day weekend. Saturday will be practice, then 3 rounds on Sunday, 3 rounds on Monday. Anyone who would like to volunteer to help with timing, etc will be welcome.

We have found out that the recent loss of use of Whitehouse Field in Jacksonville was due to cost reductions by the Navy. Tampa Bay has also lost their field and are looking for a new one. The only real flying going on was a stunt clinic put on by World Champion Les McDonald at our Bayside field. I was one of the flyers judging. I flew Wayne Trivin's Moki .60 piped Intrepid, boy did I get cut up!..But it was fun…

Is everybody getting ready for the Nats?

Tim told me the focus of this issue of the newsletter would be Goodyear. I don't have much to add, but I notice that almost everyone has their landing gear too far forward, and they bounce. Set them up @ 15 degrees in front of C.G.and they will land nice. Sometimes a longer, or higher tailskid to make the model sit more level helps too.

SOUTH CENTRAL REPORT-RUSS GREEN

I recently sent an Email to the NCLRA officers to explore the possibility of an NCLRA sponsored contest in addition to what we do at the Nationals. Doug Mayer suggested that we get the word out to the members and publish it in the Torque Roll. I feel that is a good idea because there seems to be some interest. This is the contents of the Email:

"Hello NCLRA Officers,

Objective number four of the NCLRA bylaws talks about promoting racing events at the national level and recruiting officials for those events. I think this should include more than just the Nationals. I get the impression that; in general, participation at local contests is dropping off. And I think our greatest opportunity to promote racing (NCLRA objective 3) is to expand the scope of our national level contest activities (NCLRA objective 4). The bottom line is that we may need to support more than the Nationals to help keep control line racing healthy. I would like to propose that we seek to sponsor a racing contest in 2006. Here are some of my thoughts:

SCOPE OF NCLRA INVOLVEMENT

I think NCLRA's role would be organizational and manpower support. Possibly some financial support, but that could probably be offset with fundraisers. Our level of involvement would also depend on whether we sponsored racing at an existing contest or created a stand-alone NCLRA racing contest. This area would be our biggest challenge since most people would rather participate than run events and work.

EVENTS AND CONTEST DURATION
The racing events sponsored by the NCLRA should focus on AMA and NCLRA national level events if we are going to be consistent with bylaw objective 4. I think this would also include BTR even though it is not yet an NCLRA event. We could probably prioritize events to be scheduled based upon Nationals entry levels so that we include the most popular events. There will need to be enough events to draw people from all over the county. So, the contest may need to be three days especially if we piggyback on to an existing contest that traditionally has had local racing events.

TIME AND LOCATION
I think spring or fall would be best so that we are not too close to the Nationals. It will be impossible to please everyone with the location. So, we might want to move the location from year to year or consider two contests in different locations if this thing is successful. Piggybacking onto an existing contest that has non-racing events may be a problem if non-racing events normally use the racing circle for part of the contest. A holiday weekend might be best if the contest is going be three days. Candidate locations must have someone fairly local that is willing to participate in the planning process. Not all the planning can be accomplished remotely, so I think we need a local person to champion the effort.

What is your opinion?

-Should we pursue sponsoring racing at a contest in 2006?
-If so, what contests might be candidates for a sponsorship? Cabin Fever 2006? Should we come up with our own contest? I would be willing to investigate Dallas as a candidate location.
-Can we count on NCLRA members to volunteer their time to organize / promote the contest and run the events?

If we decide to do this, I think the next step is to identify candidate locations and come up with criteria for selection."

Contact your district representative and let him know your thoughts. It is important to determine the level of interest among the membership. It is especially important that you contact your representative if you would be willing to volunteer your time to help organize and run things.

North Central Report - Les Akre

Not much happening here in the North Central District. There is still much snow on the ground in many locals. I was able to get some flying in about 2weeks ago, before the Lion of March roared in with more flurries and cold weather. Russ Green brought up a proposal for the possibility of the NCLRA sponsoring a contest with a full compliment of AMA and NCLRA events being offered. The other possibility is for the NCLRA to "sponsor" an existing contest, or a "roving" contest somewhere in the country.

I personally think this is a great idea. I'm sure that many members of the NCLRA would like to attend a "Major" contest other than the Nationals, but can't because of travel limitations. A centralized location (Wichita Kansas) would be ideal. But moving the location around would definitely have its merits as well. Ok North Central Members, what do you think of this proposal? I await your emails and phone calls.

That's all for now.

EDITOR'S COLUMN- TIM STONE

In this issue we are show casing the AMA Goodyear event. Goodyear has evolved from a simple form of Team Racing into the second fastest AMA event that is flown today. Only Slow Rat is faster than Goodyear; and only by a narrow margin! It is notable that the current .15 Rat record is held by a Goodyear, set in 2004 by Jim Holland using Bob Fogg's Ohm Special. Having good equipment, and knowing how to use it are two different things. In the articles that follow, written by several past National champions is a wealth of information on this subject. Les Akre goes into quite a bit of detail beyond building.

GOODYEAR CONSTRUCTION-WAYNE TRIVIN *(Reprinted from web archive @ NCLRA.Org)*

Since I've got crazy with this racing bit I figure I'd add a 'Scale Racer' to my growing fleet. I like being a little different in my approach to model subject and when I saw Tim Gillot's plans to the Shoestring I said to myself "this is the one". Although, when I first laid eyes on the them I thought to myself, man what a pain to build, there's got to be an easier way, I think there is and I've laid it out here.
Tim has some neat ways to install an aluminum engine crutch and gear pad, sandwiched between ply and balsa laminates, into the fus. It's a little complicated for my tastes so, I'm going with a somewhat old fashioned approach, hardwoods, ply and balsa.

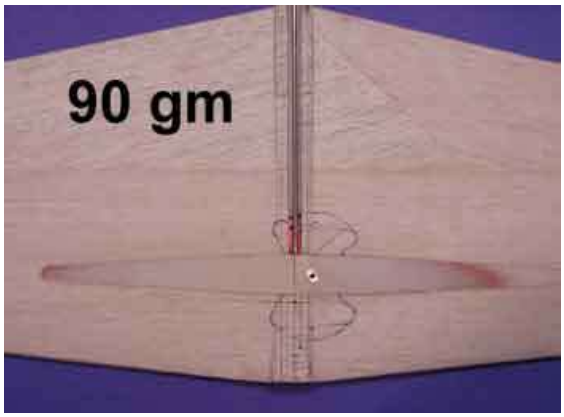
My first task was to redraw the outline and integrate a hollow fus with warren truss construction. A good way of transposing plan to balsa is sticking a copied section of the plans to the wood by, using 'Stik'N Post'. Take the cut copies and coat the backside with the product and fasten to your wood and then cut on your scroll saw, for the hardwoods, or use a knife on balsa.

I'm using a 1/4" oak crutch and 9 lb balsa for the back end. The oak can be had at 'Home Depots', in my area for a reasonable price and has worked well in several applications, in the past, such as 1/2A Proto and my Mouse planes. Once the crutch was done, as shown in the next photo, I then laminated 1/16" ply on the nose from the highpoint forward on both sides and 1/16" 4 lb. balsa on the back with epoxy. These are applied at a 45 degree from horizontal plane and in opposite directions. Then another lamination is applied, with . 03 oz carbon veil sandwiched between the smaller ply front section and balsa. The balsa is laid down at a 15 degree angle from the horizon this time, this will give a super stiff and lightweight structure. The troughs are then cut for the pushrod and fuel shutoff on a mill. The fus shown in the next picture weights in at 135.6 gm., not too bad I think.

The wing was constructed with 5 lb C-grain balsa and cross laminated the grain on the top and bottom. The total thickness is 3/8" with a 2/3rds, 1/3rd semi-semetrical airfoil, so I used 1/4" balsa on top and 1/8" on the bottom. I started with the grain on the top front straight and then run the grain in the same direction as the trailing edge like the FAI guys do on their team racers. Then using the 1/8" balsa I ran the grain straight across on the bottom on the trailing edge and matched the grain, even with the leading edge. The surfaces were doped with a coat of 50% thinned nitrate dope before the epoxy was applied, this will keep the glue from wicking into the grain and provide a stronger lamination.

After the structure has dried, I used a mill to slice a groove . 015" by 1/4" deep for plywood strips to protect the outside edges and routed the grooves for the flying wires, pushrod, and an area for the bellcrank .

I also cutout a pocket for 1/16" plywood top and bottom spars used to secure the bellcrank. I used a Fox 2" bellcrank and added some bottom extensions for attaching the wires to about 3" from the fus. The wires will be accessed through some slots cut into the bottom side of the wing. The finished, carved wing weighted in at 90 gm without tip weight which, I'll be adding in 10 gm which should be more than enough.



The tail feathers were constructed from 5 lb C-grain balsa and I used an old Midwest control-horn and I'm going to try those new, small Kavan hinges. The slits were also put in for the plywood protection strips around the outside. Weight for the stab and elevator is 10 gm and the rudder was 3.4 gm.

I assembled the pieces using epoxy and added a 8.6 gm 7lb balsa cowl, installed the blind-nuts for engine mounting and the 1/6" tail-skid. The total weight for the assembled structure came out to 267.5 gm as shown in the next picture.

Before any glassing is to take place I'll give the model a coat of 50% thinned nitrate dope to keep the epoxy from wicking into the balsa. I believe this process it critical because, epoxies tend to bleed vital chemicals, needed for a proper cure, into the capillaries of the balsa very easily, and this seems to help get a better bond and I tend to use less resin, keeping the weight down. I glassed the nose section and wing joints with . 5 oz cloth

I'm going to finish in a traditional 'stunt' style starting with three coats of nitrate then, attach 00 silkspan with thinner followed by two coats of nitrate. This is the point where I add the filets, and mixture of epoxy and micro-balloons, when

cured, sand with 100 grit to remove the shine and then another coat of nitrate. At this point I've added 25 gm.

Color is applied now, I've gone with the tradition Shoestring paint scheme and airbrushed on the details. The paint masks were laid out on a computer with Adobe Illustrator then taken to a sign shop for cutting out. One can save if you do the layout work yourself, the cost for the mask for three airplanes, of different types, cost $26 for 2 sq. ft. now put on some ink lines and a clear coat, and I guess the engine and stuff, it'll be

Success In Scale Racing By Les Akre

My interest in Scale Racing, or "Goodyear", developed from competing in a club event around 1975-76 called "Granny Goodyear". I never asked how this peculiar name came to be, I was only 14 years old at the time, and my main concern was learning how to restart my Super Tigre G-15 powered Falcon Special. The rules for this event were quite simple. You could build your model anyway you wanted (as long as it was legal). You could use any .15 size engine and the nitro content in the fuel was unlimited. The restrictions were placed on the fuel tank, which was limited to 1oz. This event was flown on . 012x52' lines and ran the usual 100 lap heats, and 200 lap finals that are common to the F2C event. The airspeeds were about 80-85 mph, and heats were flown 3-up.
This event was fun, and provided much excitement and experience for the competitors. It was a great event for a novice racer to cut his teeth on.

Fast forward to 1983.
I was hearing good things about this fellow in California named Tim Gillott, and his success with modified Rossi .15 engines. I decided that if I were to have any success using the Rossi engine, he would be the guy to make it happen. I received my reworked Rossi from Tim in April of 1984, which left me just enough time to build an airplane for my first appearance at the N.W. Regional control line competition. I built a Shoestring, and finished it just before leaving for the contest. Test flights would have to wait until I arrived. Shortly before "Goodyear" started, I got the test flights out of the way, and then waited nervously for my heat. I found that I had been paired with Vic Garner (who I'd only read about). My heat started off quite well; in fact I even passed Vic a couple times. Then, disaster struck on my first pit stop when I was introduced to a broken fuselage upon catching the model!
I had just learned to wing catch airplanes and was still very rusty (having done prop catches before). My day was done, but I had learned a valuable lesson…my models would have to be built stronger, and I would have to develop a better catching technique.

I kept in contact with Tim, and through many conversations with me asking a Billion questions, and Tim doing his best to run up my phone bill, I found that he was now doing 12mm shaft conversions on Rossi Mk 2's. I sent my engine back to Tim and set about thinking which airframe design and type of hardware I would use. Paul Gibeault and I made a last minute decision to go to an April contest at Whittier Narrows. I phoned Tim, and informed him I would be stopping by on the way to Whittier, and it would be nice if he had my engine ready. Tim put Paul And I up at his parent's house while he worked on getting my engine ready. While mulling around in Tim's shop, I spied his own "Goodyears" hanging on the wall. He had come back from a contest in Australia about 6 months prior, and the airplanes were set up for their unique rules. When I heard him say that he had no intention of flying the event anymore, it was simply a matter of price, and I found myself with 2 airplanes, and support equipment for both.
A few days later and we were back on the road to L.A. I entered "Goodyear", but didn't have any success with Tim's Shoestring at that contest. In fact, I was never to have any success with it, as afterwards when trying to refinish the model; I found that the paint stripper I used and Polyester resin do not get along very well!
The warped and softened airplane I was holding in my hands would never fly again! I will tell you later what happened to his other shoestring.

After a few days of thinking about what I'd just done, I thought, "maybe this isn't a total waste", maybe I can learn something"! I set about carefully dismantling this airplane, so that I could learn how it was built. "Reverse engineering at its finest"!
I was able to dismantle the entire airplane down to all of its unique components, and decided that since all of the hardware was still in good shape, I would use it, (and my newfound construction technique) on my next airplane. I tested out this new construction technique by building a "Little Mike" which is a later version of the "Ginny" and is certainly one of the smallest legal "Goodyears" ever designed. By superimposing the various pieces of hardware over the drawing, I found that I was able to use everything from the dismantled model except the engine mount, which I had later found was cracked. The first flights were in June of 1985, with Paul flying. The bright yellow airplane flew great, and after 20 or so laps, I had him bring it in for a pit. I checked over the model and sent it up again for another 20 or so laps, then I signaled Paul to bring it down so I could change some parts. I installed a taper seat plug head that Tim supplied, and selected a 1L Glo-bee plug

to use with it. Unlimited Nitro fuel was still legal to use in Canada at this time, so in addition to the head change, came a prop change, and a tank full of 70% Nitro. After firing the Rossi and setting the needle, I released the model and set about to time it for airspeed again. The 7-lap time left me dumbfounded. I thought I missed a lap, so I timed the model again, and got the same result, a 13.37/7. 134.58 Mph.

At first, I didn't believe it, but the watch didn't lie! About 3 or 4 laps later, Paul noticed a control problem and was just able to hit the shutoff before the model hit the ground. The mylar elevator hinge had let go! I was very lucky not to lose the engine, as Paul had reacted to the problem immediately, and had just enough control to pancake the model and not drive it into the asphalt nose first. Treat your pilot to a nice dinner every time he demonstrates these "cat like" reflexes, it's cheaper than a new engine. I was not able to properly repair what was left of this model, so it was scavenged for the hardware that would go into the next one.

I sent word of my results to Tim, and a request for any parts and pieces for the "Goodyear" models he may have. About a month later I received a package containing a fuel tank, bellcrank, another shutoff, and one of his magnesium engine mounts. I now had enough hardware for 2 models.

Early in the spring of 1986, I made plans to attend another contest in Whittier, this one was in October, and is now known as the "Virgil Wilbur memorial" contest. I built 2 models to bring to this contest, a "Polecat", which was a version of a K-10 shoestring, and another "Little Mike".

The models were finished in late September, again leaving no time for maiden flights. Maiden flights at the contest site were becoming the norm!

Both models needed the addition of nose weight to fly stable enough to race. I decided that I would use the "Polecat" for this contest. My pilot for this adventure was none other than Tom Knoppi! After the dust and smoke from the heats had settled, I had a time of 3:23 next to my name, which was good enough to make the feature. The feature race was interesting to say the least. Tom had his hands full with my still somewhat tail heavy model, and managed to clip the prop on the ground several times during the flight. This combined with a few bouncy landings, made for a very nerve racking race. However, this day I would not be denied!

I finished first with a time of 6:26, and the only thing more frazzled than my nerves was the McCollum fiberglass prop on the front of my Gillott Rossi!

I went through one more model design, a "Wise Owl", (a very sleek version of the "Lil Quikie") before I was to find the model that fit my requirements perfectly. In the spring of 1989 I had my first look at the Hirsch drawings of the "Ohm Special. The second drawing was the one I was interested in; it was the later version, of which there were 2 variations. I settled on the version with the turtle deck, then took the drawing to work and enlarged it. I then set about figuring out where my hardware would be positioned, then drawing it in.

This model could not have been more perfect. The nose moment was long enough to suit my engine, tank, and fuel shutoff arrangement, as well as enough room for the "hot glove" contacts, plus it was a small airplane. Out of all of the models I have built, I have had the most success with the "Ohm Special" design. The second of the 2 models I have built is the one that took first place at the 2003 Nationals. The first model was retired after the nose delaminated causing severe vibration. It gave me 10 years of service, setting the Canadian 70 lap Heat, and 140 lap Final records, as well as numerous wins at Whittier Narrows and the N.W. Regionals where it set the N.W. Regionals record for Open Scale Race with a 5:47:01 in May of 1999.

For the remainder of this article, I will share with you what I have learned in my 30 years of Scale Racing. You may not agree with some, or any of my methods and choices, but the following information has helped me to develop a Scale Racing program that has provided a great deal of success.

The business end of Ohm #2.

The Model

Start by looking at as many drawings as you can. Better yet, buy Tom Wilk's excellent cd of racing planes. It has most, if not all of the popular "Goodyear" designs, as well as some of the newer airplanes. If you already have a full compliment of Hirsch "Goodyear" drawings, then have a look through them again, there may be a design that you overlooked.

Some designs look very sleek and aerodynamic, while others are "boxy" and plain looking, but the design you ultimately choose should be based on more than just "looks". For the hardware package I use, I need to use model with at least a 5-inch nose moment. The Ohm Special and Shoestring both have 5-inch nose moments, many other designs do as well. Some competitors prefer models with shorter nose moments. There is no right or wrong here. You need to pick a model with a nose moment that best suits your needs, so get out your drawings, grab a ruler and calculator and start crunching some numbers.

Some other items to consider in choosing a model are:

1. Wing position.
2. Wing aspect ratio and design.
3. Fuselage length and height.
4. Landing gear location.
5. Horizontal Stabilizer

Wing position:

Mid wing designs have shown themselves to be the best for Control line use. You want the model to fly parallel to the ground. You can check this by hanging your model by the lines, and checking to see if the wing is straight up and down. How the model hangs, will determine how the model flys, (ie. outboard wingtip down, or wingtip up).

Wing aspect ratio and design:

My personal preference here is for a leading edge without too much taper. I find that I can catch straight, or slightly tapered wings (Ohm Special) easier than models with highly tapered wings. Again this is a personal preference. Some of you may find that the low aspect ratio wings are to your liking. I prefer the medium to high aspect ratio wings, as I think they're faster, and with a greater span, there is more wing to grab onto during a pit stop.

Fuselage length and height:

Try and stay away from models with excessively long, and or tall fuselages. If the model doesn't track the circle properly, the resulting drag can scrub off lots of airspeed and the wind will affect it more as well. If you must use a design that has a long or tall fuselage, then be absolutely sure your models' lead out position is correct. Bob Fogg has an excellent computer program that calculates lead out position (which I use).

There is also a Line rake calculator on the NCLRA website.

Landing gear location:

If you used a Hirsch drawing as the basis for your models wing and fuselage profiles, then it will show the original landing gear location. The rules say that the landing gear MUST exit from the original location, but may be swept forward or backward. Here is where you must make a choice. Do you want your model to make 2-point, or 3-point landings. I prefer 2-point landings, and find that locating the gear legs straight down from the original drawings exit position accomplishes this nicely. With your gear properly positioned for 2-point landings, you will be able to land and have the model roll on the ground in a level position, tailskid in the air. To set up the model for 2-point landings without bouncing or "porpoising", set your model on a flat surface with the nose pointed down to a 15-degree angle. Your models balance point must be directly above the wheels axle centerline when held at this angle. Mark this point on the bottom of the wing. Then check your models balance point in the normal manner.

If your model balances on the spot you have marked, then you're good to go.

If your balance point is behind your mark, you'll have to add some nose weight, if in front of the mark, a bit of tail weight. It is better to balance slightly ahead of the mark than behind. Usually, I find I have to add a bit of nose weight.

If you wish to set up your model for a 3-point landing style, the Titanium gear legs once produced by Glenn Lee, or any type of gear with a lot of forward sweep is what you want. Try and get the gear legs to come out right underneath the engine cylinder. Any further back, and you risk the bounce or "porpoising" effect. When properly set up for a 3 point landing, your model will do exactly that, land on the gear and tailskid at the same time. The only downside to this set up is that you have to replace tailskids regularly when flying from Asphalt surfaces. The upside is that with the proper size wheels you can fly off of short grass fields as well.

Ohm #2 showing its landing gear location.

Horizontal Stabilizer:

This an important issue, so I'll address it. The rules say that you can increase its size up to 25%, but must retain the scale outline.

I use a 12-15% balance point on my "Goodyear" models, so the scale size stab works fine for me. If you find that you prefer a more rearward balance point on your model, then a larger stab may be to your liking. Some competitors like to "shake down" their models when coming in for a pit stop. The larger elevator surface combined with lots of elevator travel and a more rearward balance point helps in this regard.

I'll finish up the model section by addressing the 5% rule. The AMA rules allow for a 5% plus or minus value when scaling the model. What this means is that once you have scaled the full size dimensions of your drawing to the (1/8 inch = 1 foot) size required you could then subtract another 5% from these dimensions. I have seen this rule used in some very "creative" ways. Ideally, you want to retain the scale outline, and scale location of flying surfaces, etc. as much as possible. This is where matching your hardware to the design becomes very important. Fuel tanks are by far the biggest offender in this regard, often requiring the wing to be moved upward so that a long narrow fuel tank can be fitted. However, be realistic when doing this. I have seen some models where the wings have been moved upward from their original location more than what would be allowed by the 5% rule. While I'm on the "design abuse" soapbox, another area of concern is design profiles. What I find puzzling here is the elimination of carburetor air intake scoops, which appear on the original drawings, but are often omitted when the model is constructed. If its part of the design profile, it should be on the model.

After all, this is a "scale racing" event.

The Hardware:

Everyone has there own ideas here. What type of hardware you use will depend on the models design parameters, personal preference, and your building style. Here, I will cover the control system, fuel tank, fuel shutoff, engine mount, and landing gear.

I use Gillott hardware on all my Scale Racers, having decided not to re-invent the wheel when you can buy it. Several years ago, Tim finished the Shoestring plan that he'd been working on, and has it ready for sale. It shows his hardware, and the dimensions for building it, all except for the bellcrank. Tim has a good selection of bellcranks for sale, and will make the fuel cutoffs, and the engine mounts on an order to order basis if you find making these items too intimidating. The fuel tank is made from a single piece of sheet stock, which makes for some careful bending, but nothing too complicated for the average modeler.

Although some types of hardware will work on a great number of models with dissimilar features, some designs will require a more individual touch. You should approach this with an open mind. As I said before, the number 1 culprit is the fuel tank. If the design you pick requires you to move the wing too far up to be able to use your existing fuel tank design and be legal, then consider building your tank into the model. This requires you to cut out a portion of the wing (so the tank will sit high enough) and the fuselage as well (so you can hide some of the tanks width).

I've been building my fuel tanks into my models for quite some time now, and can recommend it highly. The only areas where I have had my tanks leak, are the areas where they are exposed, and that is easy to fix. You start by cutting out the area where your tank will be positioned, coat this cavity with a good grade of laminating epoxy, and then position the fuel tank into the cavity. Some of the epoxy will be forced out around the tank, so scrape it flush with the fuselage with a scrap piece of balsa. You want the gaps around the tank to be filled in with epoxy. I then build a balsa box around the exposed tank, effectively creating a tank fairing, and to also create a lower fuselage to wing joint. Glass this area very well; it strengthens the outboard fuselage to wing joint tremendously.

If your model has a short nose moment, or if you don't like the idea of gluing the tank in permanently, you can cut a cavity into the fuselage just ahead of the wing and fit some mounting tabs onto your tank for easy removal. Remember to fuel proof this cavity with really well with a good laminating epoxy.

In order to have enough fuel capacity, you will have to use a short, wide tank for this application. You should still try and make the tank as long as you can, as it will keep the width to a minimum. There is no longer a cheek cowl width rule for the Scale Race event, so you should have no problems designing a cowl to cover the part of the fuel tank that protrudes through the inboard side of the fuselage. However, in the interests of aerodynamics, try and keep the cowl as slim as possible.

Control system:

Whatever bellcrank system you end up using, try and use one that does not promote wear on the control lines. Make sure that the controls are slop free and that the elevator drops under its own weight. Sticky controls can make a good flying model hunt like a dog! How you attach the lines to the bellcrank is largely a matter of preference, but I prefer to use a pulley system, so that the control wire doesn't rub and wear on a solid button. My system uses a post on each end of the bellcrank. Each control wire has a brass pulley permanently attached to it.

This pulley then slips over the post, and is covered by a thin aluminum plate preventing the brass pulley from coming off. I oil the pulley before installation, to keep the wear to a minimum. Use, a good quality silver solder on your control system, and clean all of the solder joints with lacquer thinner making sure all traces of flux are gone. Apply some light preservative oil to the solder joints at this time. Most "Goodyears" with internal controls do not have easy access to the pushrod, bellcrank, or elevator horn, so check over your solder joints very carefully, making sure they are good and solid before closing in the control system forever.

Fuel Tank:

By this time you should know where you plan to position the fuel tank in your model, and how you will retain it. Where the fuel tank is located will also determine its shape. Wedge shaped tanks are popular, as are the straight walled type, but which ever type you use, make sure that your "fastfill" tube, (if still using the rubber "duckbill" type) is positioned at the tanks widest point. The fuel feed pipe should also be positioned at the tanks widest point, with the pressure feed line located directly above (I position mine on the outboard inside wall of the fastfill tube near the top). I use a 1/8" O.D. feed pipe, and a 3/32" O.D. pressure feed line.

If you use a mechanical "fastfill" you will have to decide at this time whether or not you want to use a wet (uniflow), or dry pressure system. With the mechanical "fastfill" and a wet (uniflow) pressure system, the pressure feed line can be located height wise anywhere from just above the feed pipe, right up to the roof of the tank, but should be directly above the feed pipe when viewed from the front of the tank. You almost always have to use a ball check valve with a wet pressure system, for if you can't get the engine started on the first or second flip, you will have a badly flooded engine. If a mechanical "fastfill" dry pressure set up is desired, then a small chamber or (bubble) must be made to fit on the roof of the tank, directly above the feed pipe. First you drill a hole into the top of the tank, where the "bubble' will be located, then install the pressure feed line into this "bubble". Now solder the "bubble" directly over the hole you just drilled. This "pressure bubble" as its sometimes known, will keep the fuel from entering the pressure feed line and flooding the engine due to its being located higher than the fuel level.

Gillott Products 3oz. fuel tank

Now that we have the internals of the tank figured out, we have to position it properly in relation to the spray bar assembly on the engine you intend to use. Measure from the bottom of the engine mounting lugs, to the center of the spray bar assembly. This dimension is the maximum; the widest part of your tank (where your feed pipe is) should be from the outboard side of the fuselage (providing your models engine mount is flush with the fuselage). You can be inboard slightly, but try not to outboard of this dimension. Positioning the tank slightly inboard will allow your engine to run a bit richer in flight, while holding a strong ground setting. I find this beneficial for my set up, as I use the dry pressure system, and my tanks lean out slightly as the flight progresses.

The amount of the pressure your tank receives has a direct effect on how well your engine restarts. The variables involved here are:

1.The size of the pressure feed line in the fuel tank.
2.The size of the hole in your engines pressure fitting.
3.The size of the hole in your ball check valve (if you use one).
4. The overall volume of your pressure system.

If everything is proper, your engine should restart in 1 or 2 flips, and be on full rpm immediately. If there is too much restriction, the engine will start on the lean side, and slowly build up to maximum rpm. If there is too much pressure, then the engine will start on the rich side, and be very sensitive to needle adjustments. I use a 3/32" O.D. pressure feed pipe in the tank, and regulate the pressure by selecting the proper size pressure fitting for my engine. Make sure that the silicone tubing you use is of good quality, and kept as short as possible. Rethink your plumbing if you find your tubing has to loop around things, just to go through your shutoff.

I'll address tank capacity at this time. My experience has shown that a 2.5~2.75 oz. tank capacity works very well. I would rather have a bit of reserve capacity in case I need it, than run short. Sometimes strange things happen during a race, and if you have to stop and make an early pit, its nice to know you can run the rest of the way without running out of fuel. My criteria, is to have enough tank capacity to run a full 70 laps. I'll accept a DQ on the off chance I overrun because of a broken shutoff, or have a shutoff malfunction, but to pit twice in a heat because I ran dry really sucks.

Shutoffs:
Here again is where I've seen a great number of designs. The shutoff must work reliably, and be easily replaced if it breaks or malfunctions. Pick a design that will allow for easy replacement, and the shortest possible fuel, and pressure lines. The shutoff must also have enough pressure to reliably kill the fuel and pressure flow at the same time. When using a pressure tank for racing, you MUST pinch both lines to effectively kill the engine.

Gillott Products Goodyear shutoff.

Motor mount:
Try and use a metal mount plate of some type. It will provide the best mounting base for your engine, and is also a good place to mount the shutoff. I have seen mount plates made from magnesium, and aluminum. The magnesium mount plates are lighter, but the threads for the engine mount bolts wear out quicker. 6061-T6 is a good aluminum for engine mount plates. So is 7075-T6, but it is harder to tap. You can make the plate removable from the model by using at least a 3/16" thick plate, and by drilling and tapping the engine mount holes in the plate, then bolt the plate to the fuselage. If you want to fit the model with more than one brand of engine, or one with different mounting dimensions, you just make another plate that bolts to the fuselage, but fits the other engine. Keep in mind that if you decide to do this you will have to make the crankcase cavity in the model the size of the engine with the largest mounting dimensions. You can also build the mount into the airplane as I do. Either way works great, so use the method that best suits your needs, just make sure it is solid.

Landing gear:
Titanium, Aluminum, steel wire, and now Carbon Fibre, are all materials that have been used for landing gears. I prefer Titanium as it provides the lightest strongest gear for me at present. Steve Wilk Manufactures a Carbon landing gear for "Goodyear" that looks very promising, and 6061-T6 Aluminum has been a used successfully for years. Steel wire can be used, but without a fairing, it isn't as aerodynamic as the others. For wheels, I prefer those that are made from a soft compound. They wear a bit faster than the harder materials,

but they also stick better on landings, with less shock transmitted through the gear legs to the model. The old Dons Black rubber type in 1.25" diameter are my favourite. These are quite old and were superseded by the tan colored units sometime later. I used the set that came off of one of Tim Gillott's Models, and had used them continuously for almost 20 years until last years Nats, when one of the hubs came loose and I lost one.

If you happen to find it somewhere out on the racing circle contact me, I'd like it back…or if you have a set of the black ones that you really want to sell to me, let me know, I'm interested!

Stuart Robinson in England makes some really nice wheels with polyurethane tires, and Aluminum centers in sizes from 1" to 2 1/4", in ¼" increments, as well as other racing components, such as shutoffs, circular bellcranks, and filler valves for both fuel tanks, and filler bottles.
To contact Stuart write:

Stuart Robinson
2 Brooklyn Street
Utley, Keighley
West Yorkshire
BD20-6DU

If anyone else has a source for wheels, let us all know.

Engine and Props:
Lately, there have been only two real choices for AMA Scale Race; the Rossi .15 mk2 and mk3 engines, as modified by Tim Gillott, or the Nelson .15. I personally use the Gillott Rossi Mk2's, and find them to be very tractable. I don't have any experience with the latest Nelson .15 engine, so I can't comment on its characteristics. The Timmy Rossi's were until recently, set up with heads for his version of the taper seat plugs. These were 2 piece units, with the plugs being re machined Glo-Bee 1/2A plugs. The 1L was the best of the heat ranges to use with the 10% fuel. His supply of these plugs is now exhausted, and if you order an engine now, you have a choice between a head made to fit the Nelson plugs, or a head made to fit the Nova Rossi Turbo plugs, which come in a dizzying array of heat ranges. Tim's engines run best if you prop them for 29~29.5k on the ground. That equates to about a 6"x4.75~5" prop. I do not modify any of my engines; I use them exactly as I receive them from Tim (except for head clearance). I have not found that his engines lack anything, except maybe a quicker delivery time. I hear there may be some performance to be had in a 1-piece head, so I will look into that. No racing engine will be at its best without the correct size propeller. "Goodyear" engines are no different. The best time I ever turned was with a 5.75X5 carbon prop. I run right on about 5" of pitch, so I can't use over a 6" diameter without loading the engine excessively. I have not done a lot of prop testing, so there may be better combination to try, time will tell. The important thing is to keep the engine in its power band. If you use Gillott Rossi's, ask Tim what size prop to start with, he will gladly tell you. If you use the Nelson .15, ask Henry for his suggestion. Once you have a prop that works well, you can fine-tune it later. One rule I always abide by; is never over prop.

Odds And Ends:

Most everyone who has built control line racing models has a preference for airfoil shapes and wing thickness. After looking at the airfoil on the Shoestring as I was dismantling it, I noticed that the thickness at the root was fully 9/16" thick, tapering out to about 1/8" at the tips. I decided to give this a try as well. My first "Ohm" was built with a semi-symmetrical 9/16" thick airfoil at the root, and a tapered out to a 3/16" thick symmetrical airfoil at the tip. This made for a beautiful flying model, that handled very well on takeoff and landing. I now use this same type of airfoil package on all of my racers with solid wings. Many guys have said, "you'll go faster with a thinner wing", but I have never lost a race because my airfoil was too thick. The point here is never be afraid to try something different, and when you find something that works for you, stick with it. Try and look at as many of your competitors models as you can, sometimes you can pickup a few ideas that you may want to try later. Never be afraid to make changes to your model if it can be improved. It may not look pretty afterwards, but you can always incorporate the changes into your next model.

No one succeeds alone; and I have many people to thank for my success over the years. Here is a list of the people that have helped me the most at one time or another with my Scale Race program.

Peter Tilley	Todd Ryan
Paul Gibeault	Bob Fogg
Tim Gillott	Bob Kerr
John McCollum	Vic Garner
Tom Knoppi	Bill Lee

Each one of these people have been instrumental to my efforts, be it piloting, technical information, or simply some good advice at the right time. I thank you all it was much appreciated.

Oh! I almost forgot. I said I would tell you the fate of Tim's second model. The other Shoestring model is alive and well and residing in Paul Gibeault's basement awaiting a new finish. This model was built in 1969, and is still in flying condition. Will Naemura now owns it. It was converted to use a pressure refueling system, much the same as the F2C's use.

If you have any comments, or questions, please feel free to contact me at: scaleracer@hotmail.com. Or, contact me using the information on the back page of this issue under North Central Representative.

Best regards, Les Akre

Building a Scale Racer – Dave McDonald

I will attempt to do a construction article dedicated to the building of a Goodyear (Scale Race) aircraft. I decided to write this article after the `97 Nationals, and seeing so many airplanes that were not competitive, either being too heavy, aerodynamically dirty, or structurally weak.

I would first like to mention three airplanes in this event I consider to be among the finest. First from a technology standpoint the airplane campaigned by Bob Fogg. This features a vacuum formed wing and fuselage, giving extreme accuracy and light weight, yet providing strength through a crutch style airframe.

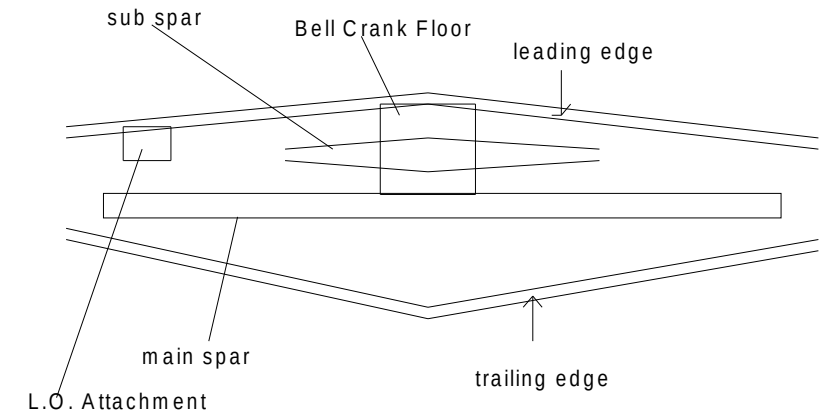
Second, and probably the best overall airplane belongs to Stew Willoughby. Stew's airplane scores extremely high marks in aerodynamically cleanliness, being strong, and built straight, and is without a doubt the best finished of any Goodyear Racer being campaigned today.

Another airplane, that has not seen active competition for the past couple of years is the Ohm by Dick Lambert. This airplane combines both wood construction, with its laminated fuselage, and its vacuum formed wing, and composite tail.

Let me start by saying that the method of construction described in this article is not the only way to build one, but, is a tried and true method.

WING CONSTRUCTION

I start all of my Goodyear racers by building the wing first. This is built on a piece of 1/8" glass to attempt to keep the wing straight during, and after construction. First select a piece of 1/16x6x36 in. balsa, keeping in mind you want a piece that is straight, yet medium firm. This will be the bottom of the wing. Next draw your wing outline on this and cut. I additionally draw where the leading edge, trailing edge, bellcrank, leadout, centerline, is located. I like to place my bellcrank at about 30-33% of the root cord. Next using a NEW SHARP knife I cut out a section of balsa that just reaches the leading edge, and approx. 2 inches each side of the span centerline. This should cover where the bellcrank mounts.



Next I cut out the door where line to leadout attachment will take place. (note you should cut just into the leading edge area. this will provide a built-in floor for the front of the door to rest on.) Using the pieces as a guide cut a 1/16 piece of ply for the door, and for the center section. Make sure the center section is a good fit, no big gaps when you are ready to assemble. I then glue this in place.

Next we are ready to make the leading edge. I use a piece of .040 carbon fiber 1/2" wide, then capped by a piece of 1/16 bass to make the leading edge. After this install the trailing edge, this is constructed from a piece of .007 carbon fiber 3/4 inch wide. (See drawing #1)

After installing the leading and trailing edge using epoxy and allowing to dry, redraw the appropriate lines on the plywood center section.

Next we cut a piece of ply for a sub-spar. This is 1/16 thick, 1" wide at the center, and tapered to 1/2" at the ends. This piece is 12 inches long. I like to buy large pieces of ply thus allowing me to cut this spar cross grain for the 12" length. I then get ready to install this and the main spar at the same time. The main spar is made from 1/8x1x20" spruce. After all this is dry you are ready to locate your bellcrank position. (remember we want the pushrod running down the centerline of the wing) Drill a hole through the ply for the bellcrank attachment. I like to use a 2" perfect bellcrank, by using these, you can take the bushing and tap it for a 8-32, this will double as the nut to hold it all together. It is helpful to have the leadouts made on the bellcrank before final installation. This allows you to clean the solder joint prior to installing the bellcrank. Next you will need to make an attachment point for the leadout door. I take two 2-56 blind nuts, and place them in a piece of ply. This is glued across the leadout opening allowing the leadout door to be screwed into place.

We are now ready to cut and install ribs. I usually start with the outboard wing, additionally the two ribs located on each side of center are cut from 1/2" stock, with the others in the wing being cut from 3/8". I like to use a piece of balsa approx. 2" wide as a tip block, additionally I install 1/2oz. of weight in the outboard wing.

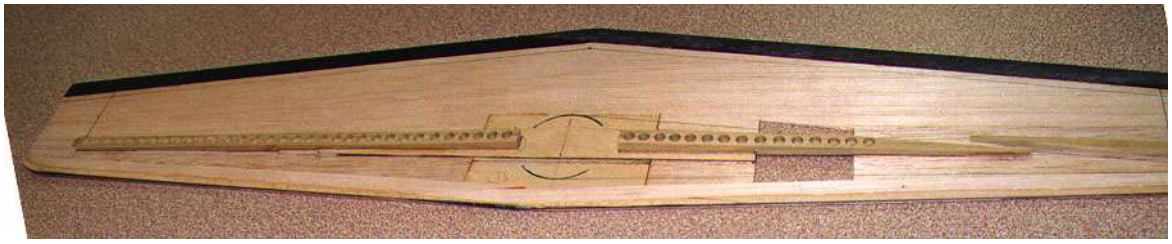
Build the inboard side of the wing in the same manner. However, you have to notch the bottom of the ribs to allow the leadouts to operate freely.

After all ribs are in place I then sand the appropriate airfoil in the wing. Make sure the bellcrank has free movement, if it's not free now, it won't be later.

The final step in wing construction is to put the top sheeting in place. After installing the sheeting, sand the edges, top and bottom to give the wing its final airfoil. Keep the wing on the glass with weight to keep it as straight as possible.

Tail Construction

The entire tail section is made from one piece of 3/16 bass. I use bass one for its strength, and for its ease in finish. Most people use balsa here with glass. I believe that the finished product weighs about the same, yet you do not have to go through the trouble of glassing the assembly. Sand the tail



section to airfoil shape, and draw the elevator section. I usually sew the hinges on, so you will need to drill the appropriate holes, and then cut out the elevator section. Round the edges of the hinge line, cut the individual elevators out and install your control horn. I make an elevator horn with 1/4 attachment point above the elevator hinge line, this gives ample movement of the elevator. This will provide ample movement to allow you to flutter the airplane. This will help with that 1/2 lap shut down.

Rudder

Additionally I like to make the rudder approximately 1/8" longer on the bottom, this allows the rudder to be placed in a notch in the fuselage, and not simply glued on top.

Fuselage

This is probably the most difficult and time consuming area outside of finish. Before I ever start on the fuselage, I have the aluminum engine plate made, the shutoff, landing gear, and tanks, (yes tanks you should never leave home without a backup tank ready to mount).

After all these items are ready, I start the fuselage. The reason for this sequence, is its much easier to lay out the geometry of the equipment as you are building. There are several ways in which to build a fuselage. I like to start with 4x36x1/4 sheet. You probably will have to splice a piece where the high point of the canopy is, but that is no problem. After you have drawn the outline of the fuse, draw your thrust line, wing and tail location lines. Next you will locate the trailing edge of the wing on the fuselage, and glue a piece of 1/16 balsa from the trailing edge to the nose of the plane. I strongly recommend you epoxy these pieces into position. Do this on both sides. Now you have the standard 3/8" thick fuselage. Redraw your thrust line, and then locate your motor mount area. I use 3/8x1/2 maple motor mounts, making sure the mount goes to the high point of the wing. Additionally great care should be taken to insure that the mounts are parallel with the thrust and wing lines. Cut out the location for the mounts and epoxy in place.

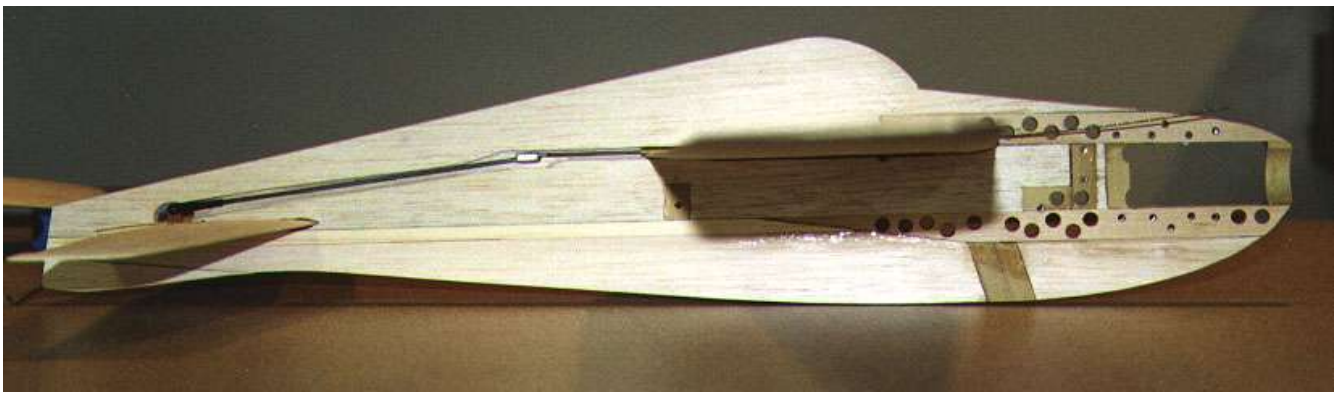
After this has dried, the next step is to cut out the location for the wing. This is extremely important. It is much better to cut the opening small and then sand, rather than cut the opening too large to start with. Great care should be taken on cutting the area for the bottom of the wing, and all sanding should be done on the top, keeping the bottom parallel with the thrust line. After the slot for the wing is made you should draw around the pushrod.

Next locate where the tank is to mount, on the Quickie that is below the wing. There I cut a rectangular area out for the tank to recess into. Check your tanks, make sure they both fit in this area without difficulty, slide the wing in the airplane, and check them both again. If they do not fit, now is the time to remedy the problem, not after the wing in installed.

After this I return to the engine area, and locate my attachment points for my engine plate. The better job you did on installing the maple motor mounts, the easier it is to install the engine with zero incidence. After the location for the aluminum plate is determined, I insert a piece of maple for the shutoff, and front of the tank to attach to, as well as a piece of maple for the back of the tank also. Now, if you are using a rotary shutoff is the time to drill the attachment hole, along with the holes for the tie downs. After this stage is complete you should be able to install the engine, tank, shutoff, I suggest you do so just to make sure everything fits. While I have all of these items temporarily installed, I slide the wing in again to make sure every thing fits and fits properly.

Next you are ready to install doublers, I use 1/16 ply doublers on each side, remember we have mounting locations in the fuse, so I install the outboard doubler first.

You will need something to locate your mounting holes with. I have taken a piece of 1/16 music wire, and made a point on one end, allowing me to insert this through the holes, while making a mark on the ply. Some would say this is too much trouble, but the reason for this, if for some unknown reason your inserts come loose that the shutoff, tank, etc. are mounted to, they will not pull through the ply if you follow these steps. After you have located all of the attachment holes, drill these out with a 1/8" drill bit.

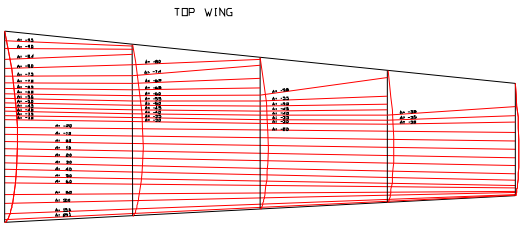


Ohm Contruction
Bob Fogg

(Photos courtesy of Jim Holland)

The Shahan and Fogg Team (FAST) built two Ohm Special Goodyears. They were originally designed and built in 1990. The planes were of composite construction throughout. Basic features were, epoxy/glass skins over end grain balsa cores for the wing, stab and fuselage. The second Ohm utilized a foam core instead of balsa core in the stab. The tank was a uniflow design, and used a mechanical quick fill. Engines were Gillott-Rossi MK-IIIs. The engine was mounted to an aluminum crutch which was bolted into a close fitting pocket in the fuselage.

Fuselage, Wing and Stab patterns for the Ohms were milled from sugar pine, using a special home made 3 axis rotation fixture mounted to a small Clausing Knee Mill. A computer program was written that took the design airfoil, added camber, and provided 3-axis rotation data for the fixture. The airfoils were then cut using the provided coordinates. It took approx 80-100 cuts for each half of the top and bottom. There were top and bottom patterns for the wing and stab.



The wooden pattern blanks were spliced together from 2" wide and 0.3" thick sugar pine. The bottom face was vacuum bagged to smooth metal table with a thin piece of glass fabric to help hold the fine details on the edges. The wooden blanks were held to the 3-axis fixture using a vacuum and locating dowels during machining. Once the pattern pieces were completed and sanded, they were epoxy bonded to a MDF board that had been pre-sealed with epoxy. The MDF board had 3-4" of material beyond the pattern, to allow for vacuum bagging. Once this was completed, the patterns were cleaned up and sanded, were painted with Epoxy, sealed with several coats of paste wax, and coated with PVA release agent.

Molds were then made from the patterns with a gel coat and epoxy/glass to form 1/8-3/16" thick molds, also using vacuum bags. A second pattern was made for each part, for the sole purpose of being a sanding fixture. This sanding fixture was ported with channels to distribute the vacuum around the part.

Skins were made using 'E' glass, which I now consider 'old' technology. I would build differently today.
Wing was 3/4 layers: each top.bottom skin weighed 31g, finished wing with core, bell crank hardware, etc 116 g
1. style 106 on 45 degree bias
2. style 1557 uni - span wise
3. style 106 on 45 degree bias
4. style 106 on 0 degree outboard forward 2" L.E.

Tail 2 layers:
1. style 120, 0 degree
2. style 120 on 45 degree bias

Fuselage: 23 separate glass plies, but basics:
nose to tail....joined, approx. 130 g
1. style 120 on 45 degree bias
2. style 1557 uni
3. style 120 0 degree
the rest of the plies were motor mount, wing joint, and Landing gear reinforcements.

A completed skin was placed into the vacuum fixture, retained by the vacuum, and sanded until all the flash was gone. Tape was applied to the sanding fixture to help protect it from the sanding blocks.

After a skin was completed, end grain balsa cores were placed into the skins. Only a central strip of core (like a spar) was used, along with thinner rib-core pieces to keep the airfoil shape. These core pieces were pre-sealed on the skin side

with epoxy to prevent them from absorbing too much resin during bonding. They were then bonded to the skins in the original mold to keep their shape. After bonding, whey were sanded to the mid plane using the vacuum sanding fixture, and the surfaces of the end grain was sealed. Once the two halves were made, control and or hinges were added, and the pieces bonded together in the mold. A third mold piece was used to cover the skins during bonding, as the vacuum would have crushed them in the unsupported areas between the balsa ribs.

The wing, stab and fuselage were all made in a similar fashion. All parts were carefully made and documented as work progressed, especially component weights. Numerous test laminate and core pieces and samples were made to fine tune all the processes before actual components were made.

FINISHING-TIM STONE

Back in my youth I had someone tell me that the difference between a good airplane and a GREAT airplane was well, sanding. A slick, light airplane will be faster, so you'll have to add finishing skills to your resume to be a Champion! There are no appearance points in racing, but a good finish definitely helps. Today you have a myriad of choices for surface preparation and paints that can be used. Everyone has a favorite method of finishing. Over the years I have tried many different methods and materials, looking for one that satisfies our needs as racers, and is the easy to apply.

For C/L racing, finishes have to be light, durable, and hopefully repairable; racing planes take quite a beating. By far my favorite paint for racing planes has been 2 part epoxy paint such as HobbyPoxy or K&B Super Poxy; however these are no longer available. K&B Ultrapoxy is still available in a limited color selection, and according to their web site, they will not be producing any more of the unlisted colors.

Klasskote paint is a 2 part epoxy currently being produced that is interchangeable with K&B Superpoxy (but not Ultrapoxy). I have tried this paint, and it works well for our purposes. I have pretty much settled on 2 part epoxy after having tried almost all of the other urethane or 'spray epoxy' products that are marketed for use on model aircraft.

When I want to do a quick finish, I'll use dope; good quality dope is fuel proof up to 10% nitro but not much more than that. A dope finish will wind up lighter than an epoxy finish so it works well on larger airplanes where weight is an issue. Since the drying time of dope is very quick, you can easily finish an airplane in a weekend; a resin/epoxy finish takes much more time to cure properly.

A big concern for me is longevity of the finish. I recently dug up a 30+ year old speed plane that had been finished with polyester resin and Hobbypoxy. Even though the finish was dull, just a few minutes of waxing brought the finish to near new looking, and the finish showed no sign of cracking. This was amazing, especially considering that the plane was stored in an attic that varied between –30 degrees to probably 160 degrees!

A polyester resin base preparation will work with a variety of topcoat paints; lacquers, enamels, dope, epoxy, urethanes, I have yet to find a paint that will not cure properly over resin. One big problem though can be getting the polyester resin to cure properly, especially over epoxy joints and sometimes plywood glue laminations or certain softwoods. There is a solution to this problem that I will describe.

Here are the basic steps for finishing that I use;
-3 coats thinned nitrate dope
-Sand & 1 more coat thinned nitrate dope (unsanded)
-Fiberglass cloth & resin (or silkspan/CF Veil covering)
-add fillets, sand fillets & overall airframe
-1 Final coat resin
-Color coat
-Trim & clear coat

STEP #1 –SEAL THE WOOD

Nitrate dope is the first coat applied to bare wood. Many racers are unfamiliar with using this, but there are good reasons for it. Nitrate dope is primarily a sealing/prep coat. It adheres to bare wood far better than Butyrate dope. It also has a higher % of solids than does Butyrate dope. Nitrate dope is very lightweight, sands easily and dries quickly. Nitrate dope is sold in well stocked hobby stores, or get it directly from Sig.

Start on the bare wood & brush on 3 coats Nitrate dope thinned 50/50. The purpose of this is twofold; it seals the wood & prevents resin from wicking into the wood, keeping weight down, and it also provides a layer that resin will cure properly over. Nitrate dope is NOT fuel proof, so don't make an attempt to use it excessively in engine bay, etc. Don't try to fill the grain with nitrate dope, this will be done later. When the initial 3 coats are dry, sand the model with 100 grit paper. Apply 1 more coat 50/50 Nitrate dope, but do NOT sand it. The reason for this is make sure that you have a good layer to seal the wood from any spots you might have sanded through.

STEP #2-COVER/FILL THE GRAIN

At this point you'll have to decide on what type of cloth covering you want to use to add strength & fill the grain. There are 3 main types of cloth marketed to modelers for this purpose; silkspan, fiberglass cloth, and carbon fiber cloth/veil.

Silkspan is available through Sig Manufacturing in 3 weights, the weight generally used for covering bare wood is '00' weight. 'GM' weight is heavier, and 'SGM' is the heaviest grade. At around a buck for a 24 x 36" sheet, it is by far the cheapest cloth covering. Silkspan covers the grain pretty well, but is not as strong as 'glass cloth or cf cloth. With a silkspan base, you can finish off painting with dope, urethane, epoxy or lacquer topcoats.

Fiberglass cloth comes in a variety of weights; they are identified by how much a square yard weighs. Fiberglass cloth also comes in 2 grades; "E" and "S" "E" cloth is most commonly used and generally marketed to modelers."S" cloth is about 1/3 stronger and is twice as expensive. "E" cloth is a borosilicate glass while "S" is a magnesia-alumina-silicate glass.

.56 and .75 OZ 'glass cloth are very light weights and are used on wings, tails, any area that you want to cover grain but not add too much weight. Using this weight of 'glass cloth on a wing will strengthen it considerably. Heavier standard weights are 1.5 and 6 OZ that are generally used to reinforce high stress areas such as nose/ cheek cowl & tail areas around the tail skid. I generally cover nose area with 1 layer of 6 OZ 'glass cloth. Polyester resin is used to bond the 'glass cloth to sheeting.

Carbon fiber Veil cloth is becoming popular with the stunt crowd for finishing sheeted surfaces. It looks like black silkspan and comes in 2 weights; .35 OZ and .6 OZ At around $ 12.00 a square yard it is pretty expensive stuff. It is available from Art's Hobbies LLC on the web. Art's also sells Kevlar unidirectional cloth which may interest racers for the same purpose. Polyester resin is used to bond CF veil; epoxy must be used to bond Kevlar cloth to the sheet balsa.

Silkspan covering method

After 3 coats of thinned 50/50 Nitrate dope, sand and apply 1 more coat thinned Nitrate dope. Do not sand this. This seals the wood and prevents the wet silkspan from raising the grain. Wet the silkspan with water in a squirt bottle. Lay the silkspan over the area to be covered, and work out any wrinkles, pull it taught. While still wet, sand off any excess silkspan at edges with 220 grit wet/dry sandpaper, being careful not to tear the silkspan. While still damp, brush on a coat of thinned Nitrate dope to adhere the silkspan to the structure & let it dry.

Now is the stage to add fillets; I like either Sig Epoxylite or polyester resin & micro balloons. Sand the fillets. Apply 2 more coats 50/50 dope. Next, apply a coat of sanding sealer; this is available from Sig, or you can make your own by mixing nitrate dope with a bit of corn starch & thinner. My recipe is 1/3 each of thinner, Nitrate dope and cornstarch. Sand the sanding sealer coat with 320 grit paper. Apply 2 or 3 more coats thinned nitrate dope, sand with 400 grit and you should be ready for paint. Although this sounds like a lot of coats it results in a very lightweight preparation, suitable to paint with dope, epoxy, or urethane.

Fiberglass Cloth Covering method

Polyester resin is generally available in 2 viscosities; usually labeled as 'Resin' or 'Finishing Resin'. Finishing resin is about one third the thickness of plain 'Resin'. While you can get resin from any number of retail outlets I prefer to order directly from the manufacturer to insure it is fresh. Resin has a definite shelf life and it will not cure well if it is too old. I would NOT recommend using any Automotive resins; I have had some very poor results with what I have tried. I have had some very good results using Sig resin.

When covering with 'glass cloth & resin use the heavier weight resin as opposed to finishing resin to first apply the cloth. Cut the 'glass cloth at least 1" larger than the surface being covered, this prevents unraveled edges of cloth from getting in the way. Brush on a fairly thick coat of resin, lay down the cloth and go over it with a dry brush to work out any wrinkles. While the resin is still wet, blot it very firmly with either flat paper towels or a roll of heavy weight toilet paper, throw tissue out as it gets saturated. The idea is to soak up as much resin as possible while still getting the cloth to adhere. If you soak up too much resin and the cloth begins to lift, brush on more. You can do only one side of a wing or body at a time. Leave any cloth overhanging at edges alone until the resin cures.

When 'glassing up the nose using 6 OZ cloth, do NOT blot up the excess resin; it needs to be heavy to fill up the weave & add strength.

Temperature is especially important for proper curing of resin. The slower that resin cures, the harder it will be to sand. If you add too little hardener, or temperature is too cold, you'll have a real mess on your hands! With any new batch of resin I always mix a test batch to be sure of how much hardener to use. You can force curing by adding more hardener than recommended or raising temperature of where the airplane sits to cure. A large cardboard box with an incandescent light bulb
set in it has worked well for me. You do NOT want the temperature to go much above 120 degrees… Epoxy fails when subjected to sustained temps around 170 degrees or so.

After the resin/cloth cures, it is time to add fillets. When using a resin base and resin top coat I prefer to use micro balloons & resin for fillets; this insures 100% compatibility. I have learned a couple of tricks over time with micro balloons to make them easier to do. Mix micro balloons as thick as possible; this makes them easier to sand. When the fillets are just starting to harden, you can go over them with your finger and 'feather' them quite nicely if you work quickly. First go over them dry to 'ball up' any excess, then dip your finger in acetone to smooth out. This can save you a bunch of sanding later. When cured, sand the fillets only; with 220 grit paper.

At this point you have a couple of different ways to go before color coating. Now the weave of the 'glass cloth must be filled in.

If your goal is a lighter finish, then give the plane a coat of sanding sealer, sand it using 320 grit, then a coat of Finshing resin. (a second coat of Finishing resin might be needed) Any areas that were covered with 6 OZ 'glass cloth will probably need a spot coat of thicker resin to fill the weave. Sand this with 400 grit, and you should be ready for paint.

If you desire more strength, then brush on a coat of regular resin, keep it thick enough to fill in the weave. When resin is applied thickly, you usually have to block sand it with 220 grit to level out the ridges. Using a good quality brush helps minimize this problem. Final coat with 1 coat of Finishing resin, sand with 400 grit and you should be ready to paint.

Painting

If you don't already own an airbrush or a small spray gun it is well worth the cost to get one. Even a bottom of the line Badger airbrush gives excellent results. Paint in spray cans is formulated to keep the nozzle from clogging, and the amount of pigment/solids in spray cans is reduced. This leads to an opacity problem that requires multiple coats in most cases to get decent coverage. The results you'll get from using a spray gun are simply superior to aerosol cans.

Read the manufacturers' instructions and follow them carefully; especially the application information. Some paints require a 'mist' coat first before wet topcoats; some paints prefer a single, wet coat.

Solvent Wash (On resin prepared surfaces only…NOT OVER DOPE!) just prior to painting, to remove any oil or greases that may be hiding that will ruin your paint job. Some manufacturers will recommend a solvent wash, and what solvent to use. This is generally the same thinner that is used to thin the paint. If no solvent wash is recommended by the manufacturer, you can use lacquer thinner, or "Prep-Sol" that is sold in any Automotive paint store.

Room lighting is important to getting a good paint job. I usually set up 2 500 watt halogen lights at one end of the spray area to help see the coverage I am getting. I always use a good respirator when painting; it helps me concentrate on the job. Start by spraying around the edges of all surfaces; then the sides of body, and finally the wing and tail feathers.

I like to finish up the job with a clear coat after applying trim. This is not necessary, but for the slight weight penalty I feel it is worth it. A clear coat adds durability to the finish, and depth to the color coats. If you are using a clear coat, sand the color coat with 600 grit prior to clear topcoat. Of course use the same product line for color coat and clear coat!

Having said all this it is important that you have not created a "Hanger Queen" if you are serious about racing! If you baby your plane because of all the work you put into a finish, then the effort was not worth the results.

RACE RESULTS- JIM HOLLAND

SCAR Race #1 March 19-20

I'm sure all of us who showed up to race are flattered by the interest! Anyway, here they are:

Mouse I	Heat 1	Heat 2	Final
Dawson	04:40.35	03:46.69	06:44.50
Holland	03:39.22	02:56.06	07:04.62
Hull DNF	DNF		08:18.81
Patwell	02:52.60	DNS	DNS

LA Fox Final

1 Burke	06:08.19
2 Kusik	45 laps

NCLRA Clown Race

	Heat	Final
Holland	93	309
Dawson	131	186
Kusik	88	dq
Turnberg	dq	

NCLRA Quickie Rat

	Heat 1	Heat 2	Final
Holland	dnf	03:28.53	06:50.73
Hull	5:46	3:56	8:46

Worthy of note here is the return of Jed Kusik who has been absent for the last couple of years. Notable performances were turned in by newcomers John Patwell and Dave Hull in Mouse I, beating my sorry qualifying effort.

Don Burke and I teamed up for the day and turned in our best performance in Flying Clown where everything seemed to work. Our low heat lappage is due to my falling over a pilot who was sitting inside the pitting circle while I was bringing the plane in for its second stop. We didn't bother to refly the heat after finding out that we had already qualified for the final! The engine, plane and prop combo used was the same as I used at the 2004 Nats.

We were pretty casual in Quickie Rat and our posted times reflect this. Finally, the weather was near ideal for racing, light clouds, moderate temperature and a moderate breeze.

2005 Contest Calendar

NOTE!! *Confirm dates, locations & events with the CD or contact listed below. NCLRA cannot be held responsible for changes, errors, omissions, etc.*

DALLAS TX Speed/Racing Spring Warm-up April 16-17,
2005 Racing events will be held on Sunday the 17th.
Site: Hobby Park Patrick Hemple CD, 3005 Bayport Cir. Rowlett TX 75088 214-607-1561 Events: Slow Rat, Goldberg, TQR, Sport Goodyear and Mouse I

Portland, Oregon, April 23/24 Fireballs Spring Meet, racing will include NW Sport & Clown Race.

SCAR Race # 2: Spring Fling
April 24, Whittier Narrows, CA
Events: AMA Mouse I, LA Fox Race, NCLRA Clown Race, NCLRA Quickie Rat
Event Director: Jim Holland (209) 726-0357
E-Mail: jgmholland1959@yahoo.com

ST LOUIS, MO- BUDER PARK MAY 14 & 15
SPEED & RACING
NCLRA FOX, Goodyear, TQR. CD John Moll
jl172@sbcglobal.net

Albany, Oregon, May 27 - 29, Northwest Regionals
Events include Mouse I, Mouse II, NCLRA .15 Rat, AMA Goodyear, NW Goodyear, NW Sport, NW Super Sport, Clown, Quickie Rat.

TOPEKA, KS MAY 28 & 29 TOP CLASSIC MEET
Site- Gage Park.
Mouse 1, Class 2 Goodyear, Goodyear, Big Goodyear,Texas Quickie Rat. CD James Lee 785-266-7714

Dallas Aero Summer Heat June 18 Racing events will be held on Saturday the 18th. Site: Hobby Park Dale Gleason CD, 6003 E. Lone Oak Rd. Valley View TX 76272 940-637-2169 Events: Goldberg, TQR, Sport Goodyear and Mouse I

SCAR Race #3: Pre Nats Warmup
June 19, Merced or Stockton, CA
Events: AMA Scale Race, NCLRA B Team Race, NCLRA Clown Race, NCLRA Quickie Rat, LA Fox Race (Time Permitting)
Event Director: Jim Holland (209) 726-0357
E-Mail: jgmholland1959@yahoo.com

AMA National Championships
July 10 – 15, Muncie Indiana
Events: See NCLRA web site for details

SCAR Race #4: 'Marianas Turkey Shoot'
August 6-7, Location NAS Alameda, CA
Events: Sportsman 15 Carrier, LA Fox Race, NCLRA Clown Race, SCAR Goodyear, NCLRA Quickie Rat
Contact: Jim Persson
Event Coordinator: Jim Holland (209) 726-0357
E-Mail: jgmholland1959@yahoo.com

DALLAS TX Charles Ash Memorial September 3
Racing events will be held on Saturday the 3rd.
Site: Hobby Park Bill Bischoff CD, 2609 Harris Dr. Garland TX 75041 972-840-2135 Events: Slow Rat, Goldberg, TQR, Sport Goodyear and Mouse I

Rocky Mtn. Aeromodelers Sept 3-4
All Speed, Mouse 1, NCLRA Fox.

F2C TEAM TRIALS SEPT 3-5 PALM BAY FLA.
Practice Sat, Trials Sun & Mon.Contact Bob Whitney

SCAR Race #5: September Bash (Provisional)
September 18, Whittier Narrows, CA
Events: SCAR Formula Unlimited, SCAR Goodyear, NCLRA B Team Race, NCLRA Quickie Rat
Event Director: Jim Holland (209) 726-0357
E-Mail: jgmholland1959@yahoo.com

Salem, Oregon, October 8 & 9, Fall Follies
racing event(s) to be announced

SCAR Race #6: Virgil Wilbur Memorial
October, Whittier Narrows, CA
Saturday Events: AMA Scale Race, SCAR Formula Unlimited, NCLRA .15 Rat, NCLRA Clown Race, NCLRA B Team Race
Sunday: AMA Mouse I, LA Fox Race, SCAR Goodyear, NCLRA Quickie Rat
Event Director: Jim Holland (209) 726-0357
E-Mail: jgmholland1959@yahoo.com

SCAR Race #7: Toys for Tots
December 4, Whittier Narrows, CA
Events: NCLRA Clown Race, SCAR Goodyear, SCAR Formula Unlimited, NCLRA Quickie Rat
Event Director: Jim Holland (209) 726-0357
E-Mail: jgmholland1959@yahoo.com

NATIONAL RECORDS

SLOW RAT

JR	(70 LAP)	5:16.20	SCOTT MATSON	7/10/00
	(140 LAP)	6:47.37	SCOTT MATSON	7/10/00
SR	(70 LAP)	4:29.63	HOWELL PUGH	7/20/94
	(140 LAP)	10:58.47	DOUG SHORT	7/10/00
OP	(70 LAP)	2:36.31	BOB OGE	7/18/91
	(140 LAP)	5:24.94	MIKE GREB	7/19/90

½ A MOUSE 1

JR	(50 LAP)	2:37.57	SCOTT MATSON	7/15/99
	(100 LAP)	5:17.68	SCOTT MATSON	7/17/99
SR	(50 LAP)	2:44.68	DAVE ROLLEY JR	7/15/99
	(100 LAP)	5:20.11	D.J. PARR	7/16/98
OP	(50 LAP)	2:12.3	JIM HOLLAND	7/16/04
	(100 LAP)	4:22	RYAN/GIBEAULT	7/15/99

½ A MOUSE 2

OP	(70 LAPS)	3:01.24	MACCARTHY/KERR	7/11/03
	(140 LAP)	7:16.03	WHITNEY/HALLAS	7/11/03

SCALE RACING

JR	(70 LAP)	2:50.65 BOB FOGG III	7/16/91
	(140 LAP)	6:08.55 BOB FOGG III	6/23/92
SR	(70 LAP)	3:15.12 DOUG SHORT	7/11/00
	(140 LAP)	5:40.05 BOB FOGG III	7/11/95
OP	(70 LAP)	2:39.38 WILLOUGHBY/OGE	7/15/97
	(140 LAP)	5:33.04 BOB FOGG II	7/16/91

F2C TEAM RACING

OP	(100 LAP)	3:15.5 BRODHEAD (GBR)	7/12/04
	(200 LAP)	6:45.2 ROB FITZGERALD (AUS)	7/12/04

'B" TEAM RACING

OP	(35 LAPS)	1:29.3 WAYNE TRIVIN	7/13/04
	(70 LAPS)	3:15.2 LES AKRE	7/13/04
	(35+70 LAPS)	4:49.1 VIC GARNER	7/13/04
	(140 LAPS)	6:45.1 DON BURKE	7/13/04

RAT RACING (.15 RULE)

OP	(70 LAP)	2:44.6 JIM HOLLAND	7/15/04
	(140 LAP)	5:33.1 JIM HOLLAND	7/15/04

JR-SR NO RECORD ESTABLISHED

NCLRA FOX

JR	(100 LAP)	5:57.11 SCOTT MATSON	7/11/99
SR	(100 LAP)	5:28.09 SCOTT MATSON	7/16/02
OP	(100 LAP)	5:37.41 MCDONALD/MATSON	7/11/99

NCLRA CLOWN

OP	(15 MINUTES)	300 LAPS	RON DULY	7/14/04
OP	(7 ½ MINUTES)	158 LAPS	RON DULY	7/14/04

NCLRA TEXAS QUICKIE RAT

SR	(70 LAPS)	3:04.22	SCOTT MATSON	7/12/01
SR	(140 LAPS)	6:20.20	SCOTT MATSON	7/12/01
OP	(70 LAPS)	2:56.4	BILL CAVE	7/15/04
	(140 LAPS)	6:03.8	BOB MURPHY	7/15/04

TQR MOTORS FOR SALE-BOB OGE

I would like to let people know that I have six of the K&B 8011 engines to be available immediately. I have finally got most of the parts finished and the only thing that I have left to do on these is get the bearings that I have ordered and assemble them. All of these engines are new and or have new stock parts except the bearings. I will have High-speed bearings installed in all of these engines. I have a couple of them done and I think that these engines will be real good.

The cost of these engines will be $175.00 each. I can provide the .292 venturis for another $20.00 each. There will be a $5.00 postage charge for the engine. I have several hours invested in each of these engines and each engine will be warranted by me for 1 year from the date of purchase.

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