

**From: National Control Line Racing Association  
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**TO**

## **SPECIAL: PITMAN ISSUE**

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**Torque Roll Issue #132**  
**June 2017**



**Mike Greb shows his Pitting Prowess.**

## **PRESIDENT- Bill Bischoff**

Welcome back my friends, to the show that never ends. This month is the pitman issue. I am sincerely hoping some of them can form complete sentences, and have done so for the benefit of the rest of us. The August issue will be dedicated to the NATS and F2C team trials, and the December issue will feature Goodyear, both "real" and "sport". Be sure to stay tuned.

It appears that there is not much interest one way or the other when it comes to deleting events from, or adding events to, the AMA racing rules. The deadline for rule change proposals is not until December 31, 2017, but unless something drastically changes between now and then, I would say the racing community is in favor of leaving things as they are. Of course, comments are invited as always.

It is district rep election time. All the incumbents have agreed to run again, but write-in's are also welcome. If you write someone in, please make sure they are willing to take the job. A ballot is in the newsletter. Since we probably don't have the same level of voter fraud that is running rampant in the country in general, you may submit your ballot by mail, or simply send Melvin Schuette an email with your choice. Results will be announced at the NATS and in the August newsletter.

We have a couple of sponsors for NCLRA events at the NATS. MBS Model Supply is sponsoring Quickie Rat, and the Dallas Model Aircraft Association is sponsoring Sportsman Goodyear. We could still use sponsors for Clown and Super Slow Rat. Additionally, thanks to Ritch's Brew, who will once again be providing the fuel for racing.

### **SOUTH CENTRAL REPORT**

**Bill Bischoff**

Unfortunately, there's not a lot to report right now. The Dallas Spring Warm Up was almost totally weathered out (I still have T-shirts available for \$10.00), then we didn't go to Houston on Memorial Day weekend. It would have been just the Dallas racers, winds were forecast at 17 mph, and a heat index of 105. In fact, I would have probably driving back at the very moment I am writing this. Next up on the schedule is the Bob Gieseke Memorial contest on June 10/11 in Dallas, then we shift into NATS mode. Hope to see you there.

### **ABBREVIATED CONTEST REPORT: DALLAS, APRIL 28**

Friday was F2C day, and as it turns out, the only day we were able to fly because of high winds. The Biscuits and Gravy team and the Hempel/ Lee team both flew old reliable (Translation: slow and expendable) models, and completed three good races without incident. Biscuits and Gravy improved a bit on each time, with a 3:57, a 3:51, and a 3:47. Hempel and Lee were slightly faster, but experienced some unreliable initial starts to record a pair of 4:00 times. Their last race was a very close 3:48.

The real surprise was the third team, made up of Jeff Gitchel and Mike Giroir just for this contest. Although neither has much F2C

experience, their performance was not to be believed. Jeff was never in the wrong place in the circle. No problems with blocking or getting behind center, it was like Jeff wasn't even there. Mike had no wasted motion. He never had to move to catch an airplane, and there was no unnecessary prop flipping. Although they finished their races in no time, they were not able to record scores due to a minor technicality. I'd certainly like to see them have another go in October.



**B&G Team (center), Hempel & Lee (right) and Jeff Gitchel and Mike Giroir (left) A new F2C team that performed very well.**

## **SOUTHWEST – Ron Duly**

I built two new planes for the June 4 SCAR Contest. Super Glue seems to not agree with my nose so I rediscovered the sweet smell of Sigmant and Titebond. Great memories. I Can't remember how many amber-encased flies (Ambroid dropped on them if they landed nearby) were on the work bench many years ago. One of the planes just built is a Lil Quickie (which wasn't) from an old Kenn Smith kit. A lesson learned is NEVER carve a solid wing inside under fluorescent lights! The "flat" light does not reflect bumps, hollows and contours like real sunlight does. I almost tossed it when I realized what had happened. There wasn't enough time for a re-do so it is what it is. Should re-name it Lil 2 Slo. The other plane is a SSR. Mine should be named Emu 'cause it might not fly too well. Spent too much time on cutesy things like internal controls so I could be just like BB! Probably not. Two duds and no time to fix them. Oh, well, we'll have fun. Charlie Johnson and I are planning on attending the NATS this year. Two "pilots" should entertain you folks as we try to figure out the pilot/pitman functions. Attended a model engine Collectors show in Fresno a few weeks ago and ran into the NorCal racing contingent. Invited them down to SoCal for SCAR racing contests.

### **Racing results for June 4/2017 at Whittier Narrows**

Another race day with great weather in Southern California. The June 4th SCAR contest went well for most entrants. We had two entrants join us that usually can be found in the stunt circles: Pete Cunha and John Wright. One entrant managed to bring three new planes with two new engines. The bane of Pitmen to say the least! A new Super Slow Rat with the name "EMU" on it had possibly the tightest Enya 25 engine ever made. The owner (name withheld for obvious reasons) spent many, many minutes going thru the flip-pop-flip-pop-flip-pop routine without having any luck getting it to run. An electric starter wouldn't even turn it over. He finally took out the plug and used the electric starter to spin and spin and..... well you get the idea. Put the plug

back in and flip-pop-flip-pop..... OK, folks, time to step away before stepping on it! Charlie Johnson took up the challenge and shortly thereafter had it running. Things were looking up. That is until he tried to refuel it. Seems that the builder managed to solder shut the overflow vent so it all dumped out the venturi. Gee, it pressure tested just fine! The only way it could be refueled was for him to turn the plane in such a way that the end of the fuel pickup tube was "up". Needless to say, the time in the pits was a bit long. On to the SSR race. Dave Hull and Doug Mayer teamed up and flew Dave's beautiful Shyfox plane using an OS 25 FP. A new OS 25 FP. There seems to be a theme here! They did well, placing first with a time of 8:02.6 while Pete Cunha and Charlie Johnson placed second with Pete's equally beautiful plane powered by an OS 25 LA in a time of 9:31.24. The EMU plane just wasn't making it and withdrew after the axle snapped on landing. It sure made a quick stop! The wheel was too far forward anyway and it always bounced on landing. Time for a re-do!

In Jr. Mouse, Mason Mayer turned in a time of 3:55.96 for 50 laps. All went well for him and Dad was proud.

Sport Goodyear was next up. There were actually seven planes present but we only flew four of them. We decided to try the Dallas 80/160 lap schedule with the following results:

Duly/Johnson	Lil Quickie/Magnum	4:31.83	9:19.35
Hull/Wright	Buster/OS CVR	4:10.03	9:25.40
Johnson/Duly	Lil Rebel/Enya	5:36.17	
Wright/Hull	Nemesis/OSFP	6:20.19	

Pits for the Lil Rebel were slo-o-o-o due to yet another blocked overflow line. This time it would actually vent but very slowly. The Lil Quickie turned out nose heavy and landed like a kangaroo. It needs some work to get it right. The new Magnum started right up and ran fine. All in all, these planes look great in the air, handle well and are pilot friendly. Charlie Johnson and I are planning on attending the NATS this year. Two "pilots" should entertain you folks as we try to figure out the pilot/pitman functions. Attended a model engine Collectors show in Fresno a few weeks ago and ran into the NoCal racing contingent. Invited them down to SoCal for SCAR racing contests. Results from the upcoming contest to follow.

The next SCAR contest is September 10 at Whittier Narrows.

## MIDWEST – Bob Heywood

Get Your Race Face On – The Pit Stop

Races are won and lost in the Pits. That's a fact.

From my experience and observation two major factors contribute to losing a race in the pits; lack of organization and lack of practice.

Take a good look at how the top race teams in any major motorsports series handle a pit stop. Things happen quickly,

but in a very deliberate way. We are all human and sometimes things go south, but for the most part it goes right. These crews have everything they need right where it is needed, and nothing they don't.

For us the same thing needs to hold true. The pit crew needs everything they need and nothing else. A Sportsman Goodyear crew, for instance, needs fuel – only what is needed for the race with a small contingency reserve, battery & clip, a couple of spare props – reamed and ready to go on the engine, a couple of spare plugs, prop wrench and glow plug wrench. All of this needs to be in a pit box (small tote), neatly organized. The last thing you want is to run back to your main tool box for something simple.

The pit crew (man) should have the pit box in his hand at all times during the race. You have to be ready for the unexpected.

The practice part. The pit crew needs to work quickly but in a deliberate fashion. Set up a practice routine by running, say 7 or 8 laps, and then pitting. Do a bunch of these in a row. Work out the best way to fuel, hook up the plug and restart. Repeat.

Being well practiced will put you in the best shape to handle situations that don't quite work out.

*"Fly Low...Fly Fast..."*

Bob Heywood

## Successful pitting of race models: Part 1 By Paul Gibeault

As a pit man for all of my life I can tell you I've seen a few things... Many of you know me as a pilot (which I prefer because it's just so much less work).

However, I know of nobody who is as **fast & consistent** as I am with my **own equipment**. Over many years I have developed field equipment that assures me of good consistent results. It must be like rocket science as I continue to see these faults frequently occurring with other competitors. In order of importance:

1. A good battery (or battery system). For the most part, I use either a 2V regulated Glo-Bee Fireplug or a McDaniel **Heavy Duty** Ni-Starter with meter.

Non-metered glow drivers of any kind are useless for competition purposes. WE cannot "just hope" that the glow is OK. We must be certain.

(I mention McDaniel by name as I find their product is excellent, their service is outstanding & they're made in the USA. If your Ni-Starter fails for any reason, they make it right.)

Side note: I believe I own the fastest Ni-Starter award (100+ MPH) when my pit man released my NW Sport Racer with it still attached!!

There are other fancy R/C glow drivers available. And some of them even work well. Others don't work as well & you

must test these live with a glow plug connected and with fuel squirted onto the hot element and note how they respond. I have seen glow drivers that show green lights when the actual dry element glow is **really faint**. Such drivers cause a lot of cracking & popping but won't give you the instant hand flip start you're looking for. Beware of start units with an "auto-shut-off" function. Flipping a model with the driver in "shutoff" mode loses races every time!

2. Use a good glow clip. In the case of Cox clips used in mouse racing & speed. The thin wires should to be replaced with the heavier wire found on most other clips. Also, the internal connections can corrode causing very high resistance and poor glow. So, Cox clips must be pulled apart, re-wired, then reinstalled with silicone sealant. This allows for a lot of abuse without the clip failing. (photos in the previous "Mouse" issue).

The Sullivan "Kwik Clip" is a decent clip, but made from some sort of brittle nylon. I solder the bare wire ends on mine & install proper terminal ends when I'm able. I always have a spare clip assembly ready just in case it gets caught up in the odd prop accident on a sloppy pitstop. Sloppy clip accidents are mostly avoided by attaching the clip to your arm with various rubber bands so that only the minimum of clip is dangling. Long dangling clips seem to search out running props at the most inopportune time during frantic pitstops. Clip wires are naturally hungry and seek out needle valves, tank valves, uniflow pipes and most anything else they can get tangled in, so **beware!**

There are other clips available. The key is to make sure your wiring & connections are solid, and that you're comfortable with it. If you're not comfortable, then you need to search for a clip or hot-glove arrangement that is **comfortable** for you. Checking with what the winners are using is always a good bet.

I do not however, have a good solution when your own comfortable hot-glove or clip is very uncomfortable to your stand in pitman. With the bigger engines, I offer my Sullivan clip arrangement or a (slightly slower) Ni-Starter alternate. Neither were comfortable with one pitman who switched to his own battery (mid race) & fried my plug at the next pitstop. (turned out his was set up for a different kind of glow plug...Arg!)

Perhaps the lesson here is: Don't vary from the **supplied starting equipment** for the race, unless absolutely necessary.

The old "Texas Hot Thumb" is a very reasonable type of contact (hot touch) arrangement. The early one's were assembled with a brittle clear plastic that broke easily, but when that was changed to phenolic, that problem went away.

In as much as I've had great success with K&B std & HD plugs, there are other alternatives. The key here is if you change plug types, make absolutely sure you get in some testing before you enter the racing circle. "Go with what you know" and **practice** only with the new stuff until you have some history using it.

Mouse race pitting with Cox .049's: Some of you may have seen my nifty Cox clip soldered underneath a guitar pick. I

like it because it's so simple & adjusts for any kind of finger. In a pinch, I just rubber band the Cox clip to my index finger. Not as slick, but works essentially the same. Newer Cox mouse racers are best raced **for the first time** with the (more expensive) Cox TeeDee glow plug. This plug is indeed the **most forgiving** when all kinds of other things are set wrong. Afterwards, there are other plug types that can be used that also work very well. The Standard stock Cox **TeeDee p/n 1702 plug** was used to set the final AMA Mouse record 10 years ago & it still stands. The idea is to eliminate as many problem areas as you can when, especially when starting out.

3. Proper Priming: For most of my life this was hit & miss. Mostly hit & go, but the odd flood was a killer of the race time. So, some thoughts are:

- Mouse Race: Prime the Cox motor with the exhaust port **closed**. If it's open, you run the risk of flooding it.

- Flying Clown: (using a Moki .15) This is a fabulous starting engine but can be miserable to start if you **over prime** or **overchoke** it. Learn what it needs & don't vary which is sometimes hard to do in a long 15-minute final race.

- Fox Race: These engines can use a prime on start, but again the exhaust port **must be closed**. There is **no need for exhaust prime on restarts**, but the engine must be **fully choked** during the refueling. You'll know it wasn't properly choked when the engine fires up and instantly dies from lack of fuel.

- TQR: A prime with exhaust port closed is good for both cold & hot starting. Again, the key is having the exhaust port closed otherwise you run the risk of either a flood or a fire. The mandatory use of 10% nitro fuels has increased the rate of pit fires dramatically. High nitro fuels were relatively immune to this in the old days. But, alcohol is immensely easier to ignite, and therefore more prone to pit fires which are **invisible** by the way. Often the pit man does not realize that he or his model is on fire until he starts seeing the **wing covering peeling away** or the nylon venturi **melting!** The one thing to take away from this is that over priming or priming with the engine's exh. port open, runs a **high risk for starting a pit fire**.

Note on K&B 40's: Some successful pit men like Bill Lee advocate batting the prop backwards for an instant start. Something you may want to consider, as it works great in this class. Les Akre has told me that he will vary his prop flipping technique depending on the engine (i.e. he will flip forward at first on every engine, but will knock the prop backwards, if the engine shows a propensity to start backwards during a cold start or pit).

#### **Misc observations:**

- If at all possible, have a fuel container / bulb large enough **not to have to need refuelling** during the race. A great pit man must be observing the progression of the race **at all times**. He cannot do this if he is away from his pit position, or otherwise occupied refuelling his bottle from the

main fuel can. This also allows the pitman to be uninterrupted in his lap count. Use two fuel bulbs if necessary, but do not be refueling during a race. The worst-case scenario is when the pit man is off refueling from the main can, and totally misses the model coming in for a stop. That of course loses you the race.

**Pitmen: Starting the model & instantly dropping it, is cause for pilot terror and most often a slack lined free flight launch into the circle.** Now I know us lowly pilots are "a dime a dozen" and "we don't get no respect", because we're just "boat anchors" etc, etc., but really!! If you want to win, or at least finish a race, proper launches are the order of the day. If you persist in dropping the model...well, then just you wait until we form a Pilot's Union & demand "qualified" pitmen, proper paid lunch breaks, coffee breaks, sun shades, and duty time limits. Then you'll be sorry you treated us with such insensitivity 😊.

So, Please **ENSURE** that you have **LINE TENSION** on the model and please **GUIDE IT** with your hand, as it lifts off into the blue. I've crashed too many otherwise decent models when this has been neglected, and it's not much fun, so don't let it be one of yours!

**To be continued...**

## Pitting-By Bill Lee

Three words: practice, practice, practice

Or as one sage would say: "proper preparation prevents poor performance".

No matter what you do or how you are set up with the model and the pilot, if you don't practice you will not be a good pitman and will only be lucky to get a good pit now and then.

The engine must be in good shape. A worn-out motor isn't going to start reliably.

Tank and filter must be clean and free of leaks.

You should be able to start the motor on the test block: if you can't reliably start it there, you can't expect it to be any better on a model in a race. Running the motor on the test block will tell you what the motor "likes" in order to be started reliably.

Fueling must be as rapid as possible.

For events which allow a quick fill, make sure the quick fill is serviceable, not rotten or torn, and that it seals under pressure. If you're using a mechanical quick fill, make sure all seals in it are working and that the movable parts are not frozen with old castor oil or dirt.

For events which don't allow a quick fill, such as requiring filling through tubing, position the tubing where it is easily accessed. Position it in a "natural" place so that you don't have to figure out how to access it in the heat of a pit stop. Put



**Note: Position of fuel inlet, easily accessed. Left hand stabilizing the model with index finger poised on shutoff. Fitting on fuel bottle to meet fuel inlet tubing. Not seen: QuickClip hanging in palm of left hand. Flipping glove omitted for pictures.**

a piece of large diameter silicone tubing on the fill line, cut flush with the end, and then use a funnel-shaped tip on your fuel bottle. Make the silicone tubing long enough so that when it is flush with the tip of the fuel inlet line, the silicone bottoms out and can't be pushed further onto the fill line.

If the event allows a shut-off, ALWAYS have one! For safety if for no other reason.

Position the shut-off in, again, a "natural" position. In other words: hold the model as if you were fueling it. Look at where your hands naturally fall. Build and mount the shut-off so that you can reset it from your "natural" hand position without a lot of extra motion. If you put it elsewhere and have to move our hands around, or pick up the model, to reset it, you are wasting time in the pit stop.

You will need some way to hold the fuel for refueling. There are several ways but the most common is some sort of polyethylene squeeze bottle. These can be purchased from some of the racing supply vendors (e.g., Bill Bischoff or Melvin Schuette). But you can make your own by first finding a suitable squeeze bottle and modifying the cap to have a large diameter tubing, typically 3/16"

or 1/4" diameter. Many also include a spring-loaded tip that is closed until the bottle is pushed into the quick fill or onto the fill line, but that is not essential. In any case, configure the tip of the tubing to suit either using it in a quick-fill, or funnel-shaped for use on a 1/8" tubing fill line.

Whatever you do, make sure the bottle is large enough to hold fuel for at least one complete race, perhaps with a bit of excess. You do NOT want to have to refill the fuel bottle in the middle of a race! Keep in mind that your model configuration may require the bottle to be held in some position other than up-down, and the bottle must be able to feed in the position required.

For events using a glow engine, you will need to have a starting battery. The battery must be charged, something you must do at home before the contest. Make sure all of the contacts in the battery system are clean and tight. The battery should be configured so that you can carry it to the circle and that it will remain close at hand during the start and pit stops.



**Battery strapped to arm, QuickClip readily available to attach to engine.**

For those events which allow "hot gloves" or "hot fingers", you must make a battery lead to your hand that will allow you to light the plug while holding the model. The model must be built so that the glove or hot thumb can then cause the plug to be lit. This means that there will have to be some sort of contact to the glow plug post and contact to the engine elsewhere. Typical arrangements include a glove with contacts sewn on the thumb and one or more fingers with leads to the battery. A hot thumb

will be arranged to allow gripping the engine with the thumb on the post of the plug, and the body of the hot thumb mechanism contacting the head.

Importantly, the model and the glove or hot thumb MUST be constructed so that using the glove/hot thumb is "natural"! If you have to think about where the contacts are, they are in the wrong place! Just as for the fuel inlet and shut-off, you should grab the model in the most natural way as if you are starting it, and then place the glove contacts where your hands "naturally" lie. No wasted motions!

If the event disallows a hot glove and requires a glow plug clip of some sort, you have a couple of things to consider. First to consider is a 2-man pit crew, one to fuel and start and the other to attach the battery and hold/launch the model. The advantage to a 2-man crew is that there are fewer things to do for each person, things that can be done in parallel by two people but which are done sequentially for only one. A 2-man pit crew is almost always faster than a 1-man crew when a glow plug clip is required. (This is not necessarily true if a hot glove is allowed!) The disadvantage of a 2-man crew is that it requires more people to be available for practice and for a contest, and often this is not possible.

If you are pitting by yourself using a plug clip, you should arrange the battery, battery leads and the clip so that they are immediately "where they belong" when fueling is complete. Many will have the battery strapped to their arm and the lead and clip held in the left hand during fueling. Many will have a battery and the lead laying on the ground right where the pitting will take place. Whatever is most convenient for you is the right way!

The pit stop actually starts when the pilot shuts the engine down with the shut-off (or the engine runs out of fuel). The pilot should get the model to the pit man as quickly as possible but not so fast as to make it hard for the pitman to retrieve. As the pitman, you should remember the rules! For AMA classes, there are circles painted on the ground, circles for the pilot and circles for the pitman. Each event defines the "Outer circle" and the "Inner Circle". The pitman can retrieve the model anywhere between the Inner and Outer circles! All pitting activity (as well as all pitting equipment) MUST be outside of the Outer Circle!

Obviously, it is much quicker for the pilot to bring the model to the pitman right inside of the Outer Circle. If the pitman must retrieve the model, he will waste time getting the model back outside the Outer Circle to actually do the pitting. But the pilot must be very careful to remain inside his "Pitting Circle" until the pitman has the model in his control or disqualification will result.

When the pitman catches the model, he must have the fuel bottle and battery connections readily available. The model is typically retrieved with the pitman using his right hand, while he carries the fuel bottle in his left.

After refueling and attaching the battery, the pitman must then flip the propeller to start the engine. And this is where earlier bench testing comes in! When running the engine on the bench, the pitman will become familiar with whatever a particular engine "likes" in order to start quickly and reliably. Some engines must be "dry" with no excess fuel while others prefer to be "wet".

Using the shutoff when refueling may be important here. If the engine must be “dry”. Keep the shutoff closed while refueling. If no shut off is on the model, roll the prop back against compression while refueling, then before flipping, tilt the nose of the model down to drain any excess fuel from the venturi. If the engine likes to be “wet”, open the shutoff during the refueling to allow fuel to be sent through the needle valve to the engine.

Some engines like to be flipped forward, others backward, some engines require a smooth forward flip, others need a “Bat the H...” flip! Whatever your engine “likes”, do it here!

In any case, propellers are usually quite sharp and the pitman should protect his hands. Some use a single finger sleeve, others use a leather glove, others use a soft leather glove with the flipping finger wrapped in duct tape. Whatever feels “natural” for you is the right thing!

Launching the model can be “interesting”! No matter how the pitman (or pit crew) holds the model to refuel and restart the engine, it is essential that the launch be done correctly without the model being pointed towards the pilot or with the glow plug clip still attached.

## **Pitting- Bob Whitney**

Why would anyone want to stick their finger in a prop time after time, just to get it hit time after time?

I used to think I was a good pitman, and then I met Dick Lambert, the GENERAL! Anyone can learn how to start an Engine; I will get back to that later. Dick knows how fast his plane goes and he knows how fast yours is going, he will ask you when you want to pit, and pit accordingly, 2/3 the way through the race he can tell you how many laps he has, and who is leading, his planes are always ready when he gets to the field, he knows what prop and glow plug [the old days] he is going to run because he spends time testing.

Starting an engine is a matter of practice. If you listen to an engine 99% of the time it will tell you what it wants to start. It will tell you if its flooded or dry. Two common things I see at almost every contest is number one, during the two min warm up, the pitman starts engine two or 3 times with no problem, then at 30 sec. completely changes his procedure. Why? He had just started it successfully 3 times!! The second thing, and this usually occurs in Fox racing, is where the pitman finger chokes engine when he flips the prop, the engine starts with a gurgle and dies. In this case, the engine is flooded, and the pitman again finger chokes the engine with the same results. A third problem is where the engine starts and dies as if the shut off is closed, is it? Better check now! In this case, the engine is dry and needs to be primed before it will start.

You must be comfortable when you are pitting. Some keep the plane on the ground others lift it up to start it. When using a hot glove you must find a way to hold the plane that feels good to you. I find that when using a quick clip, a second person makes for a faster pit. Again, practice so you don't bump into each other. He can put the clip on as you are filling the tank. When the engine starts the second person pops the

clip off with a flick of the wrist.

One trick I have found to work well in Clown racing, and in Fox racing, is when the tank is full, tip the nose down and give a short squeeze. The fuel will run out the venturi, then hit that Prop!

The battery is next, more than once I have had a nicad go dead in the middle of a race. I have found that a 12 volt power panel will stay charged for a month or more. Pick a panel with a dial to adjust the glow. The plug should glow a dull red.

For mouse 1&2. I use a battery from radio south strapped to my arm.

In order to be successful with the pitting sequence, you need to try to set up the plane so that you catch it with your right hand. When using a tank with a quick fill, it should be filled with the left hand as the shut off is reset with the right hand. If on suction have the bulb close to switch hands and fill with right hand. Every extra move you make is at least ½ lap lost!

When starting an engine on pressure, make sure you don't flood the engine through the pressure line. Find out if it needs to be turned over once or twice or just flipped, or hit.

You and your pilot need to practice together so he knows how fast he can safely bring the plane to you. You need a signal to tell the pilot when to pit. I use a horn to tell my pilot he has two laps to get the plane on the ground. I hope all this gibberish is of some help.

## **PITTING AMA RACERS-DON BURKE**

Pit stop technique is a subject that is generally taken for granted. This article pertains to rules and procedures for AMA racing (FAI (F2C) uses some different procedures). To be done right, pit stops have to be PRACTICED with your usual pilot. Although “teams” can be formed on the fly at a contest, the consistently successful teams practice together enough to know what each other is going to do when an abnormal situation occurs during a race. Even with practice dumb things happen (more about that later). Years back I was part of an FAI Team Race team. Even though we had practiced almost every weekend for a year, with contests at least once a month, when we got to the World Champs there were enough inexperienced teams flying unusual situations happened. For instance, we had never practiced what to do when someone else occupied our pit. At that time in FAI races you had to pit at specified unoccupied stations on the circle. I had to move just before a pit, but my pilot didn't know I had moved. He landed a little hot and I missed the catch. Things like that had never happened to us before because we flew with other experienced teams at home. Unusual things happen when inexperience is a factor. You must know what to do.

The first thing to know is all the rules. “Ignorance of the rules is never an excuse!” Go online and download the CL Racing Rules from the AMA web site. They're in PDF format, downloadable with the free ADOBE “ACROBAT READER”. This can take a while on basic internet service but is essential for everyone to be aware of.

The field layout consists of four concentric circles. The

smallest is the Pilot's Circle and is the one where all pilots are supposed to be while racing. The next one, the "Pitting Circle", is the limit of where the pilot can maneuver while the airplane is moving. The next, the "Safety Circle" is the limit where a pitman can enter the racing zone without the Event Director's OK. The "Outer Circle" defines where an airplane can be serviced.

Know for sure ahead of time where the Safety Circle and Outer Circle are and your pilot should know that he can't cross the Pitting Circle while the airplane is moving. With the multiple layouts on our circles it's easy to get confused. Some pilots use a small colored sandbag on the ground just outside the Pitting Circle so they have a visual reference of where they should be when the airplane is being serviced. Make sure that when you pit at least the airplane centerline is on or outside the Outer Circle. Don't succumb to what I've heard after DQing a team, "Aw, today's only a practice race, not the NATS!" If you get used to doing things at a "practice race" you'll do it at the NATS too!

Know what to do for unusual happenings. For instance, the pilot doesn't quite get the airplane to you or you miss a catch. With your battery and fuel bottle in hand, you run around the circle to outside where the airplane stops. Never, ever, cut across the circle to get there! If you're lucky and it's close enough to reach without crossing the Outer Circle just grab it and do your thing. If it is not inside the Safety Circle, you don't need the event director's OK to pick it up, just be aware of what's going on. Move on a circle radius and pull it out to the Outer Circle and get to work. If it's in the "Racing Zone" (inside the Safety Circle), inside the inner circle, wait for the event director to give you a signal before entering the racing zone to pick it up. NEVER, NEVER, NEVER, move the airplane around the circle. I have been pitting and had an inexperienced pitman jump over me and my airplane because he thought he could save time by taking the airplane back to the fuel and battery he left behind. He jumped over just when I started the engine. My pilot used the shutoff and prevented what could have been a really nasty occurrence. That was one time we were fortunate to have had a "safety-only" shutoff on the airplane.

Practice starting your engine, even on a test stand, and remember an engine on its side will start differently from an upright or inverted one. A lot can be learned when there's no "pressure of the moment." If you MUST pick up your airplane to get a good whack on the prop two things are required. First, be sure that your lines off the ground are not a hazard to other teams. I've seen one pitman who had his airplane so far off the ground while flipping that the next airplane taking off behind his location went UNDER his lines. Needless to say, it was a preventable error. Secondly, a much better thing to do is find a prop position on the engine that allows you to give the proper flip while the airplane is on the ground. Make sure the prop is in the right position to be flipped. Some need a more upright location so they can be firmly whacked.

All racing rules that I know about require "Rise Off Ground" (ROG) takeoffs. So, if you've picked your airplane up to start it place it back down on the ground again for

release. Hand launching is a no-no. Some events specify "Unassisted ROG" which is defined as no part of the pitman moving in the same direction as the airplane.

### **Pay attention to the little details!**

At the NATS and all local races, the pitmen must wear Protective headgear. If your local rules don't require them, get them changed! In any case ALWAYS wear a hard hat. I've been bonked by an FAI TR taking off, tain't no fun. I use a baseball type because that kind of helmet has ear/temple protection.

The bicycle types don't have this feature. Always keep the chinstrap in use, leaning over and dropping your hat onto the airplane can be a real bummer! That also applies to things in a shirt pocket!

Do you have adequate protection for the hand you use for starting? One of the best things I've been introduced to is a "fillet glove" inserted into a leather glove. Check with your local fishing supply store. You don't have to worry about cut fingers with one of these! Or you can use a "chicken stick."

Some other items to think about are:

-Is the needle valve sticking out enough to be hit by you when flipping the prop?

-Is the needle valve accessible without sticking your finger into the prop? OUCH!

-Do you have access to the venturi to choke it if necessary without hitting the prop? If not what do you do to get the proper prime, in the exhaust, in the venturi, or by forcing fuel into the engine with fuel bottle pressure?

-Where's the tank filler? Can you reach it when the glo-plug connector is on, or when the hot glove is on the contacts? About to give it a drink! The tank filler is easy to get at.

-Where does the tank overflow go? Inboard or directed at the ground outboard is safest. Some classes have engines that run a little hot. For those I direct the overflow at the cylinder head to help the restarts. I haven't had a fire yet, but that possibility exists!

If you have a pinch off on the tank overflow vent put it where you can easily get to it while filling the tank.

Knowing how much "prime" a particular engine needs is essential; they all seem to be different. Some need the feed line to the engine to be filled all the way to the needle valve, while some flood immediately if you don't stop filling when the fuel appears in the overflow. If a shutoff is allowed it can be used to either help a prime or prevent a flood by knowing when it needs to be reset.

How much fuel do you need in the bottle for a race? I generally, use an 8oz. squish bottle as they're easier to handle. I keep at least one spare filled with race fuel so I can swap the filler neck between pits. I like to keep the bottle at least half full so I don't have to worry about whether fuel is going into the tank or not.

Does your fuel bottle match up to the tank effortlessly or do you have to plug something into something else?

What kind of battery do you use and where is it located? A wrist mount gives me the best results.



I have two setups, a "Radio-South" glo-driver and a normal metered glo-driver from Hobby People. One has an LED string and the other a meter to show glo-plug condition. I have modified both with a connector at the unit. I have a variety of interchangeable leads depending whether a hot glove can be used. Also each is mounted on a "wrist brace" that I got at a bowling alley.

They're very easy to take on and off.

How easy is it for your glo-plug clip to come off the engine when it starts? For classes that do not allow hot gloves, I work on the clip with a small diameter DREMEL bit to make sure they won't hang up and cause a wingover on takeoff. Some think that having two pitmen is quicker. One fills the tank and flips the prop; the other puts the clip on the plug. To me, though successful, it introduces another human into the process and would take more practice to get it right.

### Hot glove contacts

I have used fuselage contacts, as well as the wing leading and trailing edge contacts. I prefer the fuselage types.

Using the wing contacts is in my opinion the primary cause of takeoff crashes. I think that by holding the airplane by the wing it's easy to impart an inboard yaw when releasing.

Pilots get a little irate when staring down a crankshaft!

Do you have a spare plug, plug wrench, prop and prop wrench handy? In most cases, if you have to change a prop or plug the race is over for you. But I have won a final race (including a plug change) when the other teams had more trouble than we did!

If you're competing in a class with shutoffs, know when to make a pit stop. There is a small advantage to staying up if the others in the race are pitting. And if you pit while they are flying you don't have to worry about avoiding them on the ground. Even though the rules put the safety responsibility on the airplane on the ground, it's a lot easier to finish a race than possibly have to make repairs and start over.

When the engine cuts off, by shutoff or runs out of fuel, get ready for the landing. You will normally have your battery on your left arm (right-handed pitmen), and your fuel bottle in your left hand.

A good glove on your right (catching) hand helps take some of the blow, especially for a prop catch. The major disadvantage of a prop catch is the possibility of breaking the prop. Your pilot should know whether he/she should land fast for a wing catch or a little gentler for a prop catch. Both have their advantages. The wing catch is faster, the prop catch better for airplanes with built-up wings. In either case I have found that if the pilot is having trouble getting the airplane on the ground, arrange ahead of time with him/her to have the airplane moving flat & level, even if it's off the ground. If it's bouncing around it's a much worse target to catch. Most rules permit mid-air catches, some specify that the airplane must have contacted the ground at least once before the pitman can touch it.

During the race, know what lap you're on or how many laps you've gone since the last pit. You should have practiced enough to know how many laps you can get per tank with a particular setup. That way you can signal your pilot to

shutoff, or be ready for the next stop when you can't use a shutoff. Don't do what I recently did. I started watching how another team's pit stop was going and missed the engine cutoff on ours. My pilot made a really good landing, but I wasn't looking at him or it. My first clue was an airplane coasting to a stop an 1/8th of a circle away. Just plain dumb on my part. Lesson learned, "Watch your airplane and pilot, know what's going on all the time. Don't become a spectator!"

One last comment. This article discussed pitting techniques, there are some piloting issues that need to be addressed. The least of which being the pilot needs to know where he should be when he's not flying and others are. Sitting or lying down is required by the rules. Most important he needs to be outside the Pitting Circle so he won't interfere with other pilots taking off or landing.

And to repeat PRACTICE, PRACTICE, PRACTICE.

There's nothing better than having a "motor reflex" response. If you have to think about what to do next, you're burning daylight!

## PITTING - BY BOB OGE

Almost everything I learned from pitting was self taught with the help & guidance from my Father. Back when I was a kid I used to cut lawns. My Dad gave me an old 2 cycle mower with an exposed rope-wound starter on top. Having seen my Dad start it by hand with no rope, I decided I could too! I would grab the bare pulley and flick it quickly to start it. Many years later people are amazed to see me hand start a .65 speed engine, but they are much smaller than what I learned on!

My first models were 1/2 A's like many people. OK Cubs and Wen Macs were the first motors I started out with. My Dad designed a plane that looked like a bird, and I flew the heck out of it! I still have that plane minus the tail feathers.

Well enough of this other stuff. So you would like to know my opinion about how to pit model airplanes. The first thing that should be done is to take the engine and put it on a test stand and give it a proper fuel supply. Next, take off the glow plug and check it to see if the element is in the correct shape and in working order by lighting it up in your hand. If the plug glows real bright you need to cut down the power a little. If the plug does not glow at all you need to turn up the power until you can see the red glow a little. Or if necessary replace the glow plug making sure the new plug is good. Then reinstall the glow plug. According to its displacement, you have to put in a prime. I have found out over the years that on a cold start you need to put in four drops of fuel into an .049s intake and one drop in the exhaust. Make sure that the fuel is up to the needle valve. Flip the prop through several times to get this small amount of fuel sloshed throughout the insides of the engine. Put the power supply to the glow plug and then flip the prop hard, fast, and completely through compression. When you flip the prop you need to flip it from the area near the hub. This will make the prop go through the compression faster than if you flip it from the outer parameters of the prop. If the engine does not start with this, put in one more drop of fuel into the exhaust, and try to start it again. If it does not

start this time it is obviously a bad engine and you should just throw it away! No, just kidding. You have to remember that the smaller the displacement an engine is, the easier that it is to flood. If it is flooded the only thing to do is keep flipping until it starts.

When you get the engine running you need to let it get completely warmed up. Then pinch the fuel line if it has one to stop the engine. Then after it is stopped for about 30 seconds put the battery on it again and try to start it again. If it won't start right back up you need to figure out just what you need to do to get started again. Does it need a small prime? Does it have too much fuel to start? Is the plug still good? These are the most important things to have to remember. You need to start and stop the engine as many times as it takes to see just what the engine needs to start on one flip. Then when you transfer the engine to a plane you will have a better idea as to what you need to do to have the engine cooperate for you. You might have to go through the same process when the engine is on your plane several times to see if the starting procedures are the same as when it is on the bench for the restarting process. Then you need to put in the air and see if the starting procedures change again. Remember that these engines are made to run. They almost all can be made to start in one or two flips if you work with them. It is important to remember that each engine is different. What works on one engine may not work with another engine. Practice on how much fuel to prime with for each different engine you use and your pitting should go smoother.

Another thing, when pitting a plane in competition or in practice, try to be consistent in what methods you use for each engine and plane. Sometimes an engine will act differently when on the plane than how it started on the test stand. Subtle nuances will make a difference. Once you find out what method you used on a good start stay with it. If you have several engines, you may want to keep a log of how you started each different engine.

The best thing is practice, practice, practice until it comes naturally without thinking.

I have found that some engines like the K&B 40s start best when you bring the prop up to forward compression and hit it backwards hard. This engine will usually start best this way if it has the right prime.

Sometimes when pitting an airplane, it works out best to either bump the shutoff on a pressure system just for a moment to let the prime get to the engine first before filling the tank. You can flood the engine very easily if you do this too long. Sometimes you can fill the tank and open the shutoff on the last little squirt of fuel going in the tank. This also can help get good pits. But again, this can flood the engine if not done correctly. That is where the practice practice practice comes in. Knowing your engine and how it starts before competition is a big factor.

In regard to safety...Whether you are a beginner or an old pro, remember to think safety and protect your fingers. A good fitting leather glove really helps to avoid those nasty cuts and scars and even worse a trip to the emergency room. Good luck with your pitting. I hope this helps. Now go out and hit it hard.

## MAKE A SPRING-VALVE FUEL BOTTLE

### Bill Bischoff

What's a spring valve fuel bottle, and why would I want to make one? A spring valve fuel bottle, like the name suggests, incorporates a spring loaded valve. When fuel is being dispensed, the filler tube is pushed, opening the valve. When released, the spring closes the bottle so fuel doesn't spill out. In use, it is very much like a team race finger valve, only on a squeeze bottle. Because you can squeeze the bottle with the valve closed, you can deliver fuel to the tank under higher pressure. This may speed up your pit stops slightly.



Let me begin by saying that if you've never been to the McMaster-Carr web site, you HAVE TO check it out ([mcmaster.com](http://mcmaster.com)). They've got tons of useful hardware and little widgets. I've been buying from them for years, and I'm still discovering stuff I can use or repurpose. I have listed part numbers for the items I used in this project. However, if you don't want to buy in quantity, suitable items should also be available at Lowe's, Home Depot, or other home centers and hardware stores. The spring I used is 1/4" OD, .020 wire, and has a compressed length of about 1/2". It is a bit stiffer than a ball point pen spring, but should be fairly soft. The parts from the hobby shop are self explanatory.



Start by drilling a #11 hole through the center of a 5/16-18 x 1/2" brass bolt. (Fine thread 5/16-24 hardware will work just as well.) Use a lathe if you have access to one, or at least a drill press. The idea is to get the hole straight and centered.



**Filler Valve in closed position.**



**Filler Valve in open position.**

Install the 5/16 x 1/2" brass bolt through the lid of your fuel bottle, with the head of the bolt inside the bottle. Secure with a 5/16" washer and nut. A standard hex nut will work, but I used a thin jam nut to eliminate a bit of weight and bulk.



**Complete Assembly shown with Filler Valve in open position.**

Next, cut a piece of 3/16" OD brass tubing approximately 2 1/2" to 3" long. Also cut a 3/8" long piece of 5/32" brass rod. This will be the plug for the end of the brass tubing. Insert it flush with one end of the brass tubing and solder it in place. Drill a 1/8" hole crosswise through the brass tube, 1/2" from the (plugged) end. Drill another 1/8" hole through the brass tube at a 90-degree orientation to the other hole, 11/16" from the end. Carefully deburr/ file/ sand the tube so that it is a smooth, sliding fit through the hole in the bolt. also, file a flat spot for the wheel collar set screw.

Cut a piece of 5/32" ID silicone fuel line, 1/4" long. Use a new blade, and make clean, square cuts. Slide the piece of fuel tubing onto the end of the brass tube to where it almost touches the 1/8" cross-holes, then install a 3/16" wheel collar on the end of the brass tube. Insert the 3/16" brass tube assembly into the 5/16" brass bolt from the inside of the bottle.

Slide the spring over the brass tube from the outside end, followed by a wheel collar. Adjust the position of the wheel collar so that when the spring is fully compressed, both 1/8" holes are visible beyond the head of the bolt.

Without disturbing the wheel collar next to the spring, remove the wheel collar and fuel tubing seal from the other end and disassemble. Solder the "spring stopper" wheel collar in place. Don't rely on the setscrew, as it merely crimps the brass tube instead of tightening firmly.

Reassemble the valve. Put the lid on the bottle and give it a gentle squeeze. If it seems to be leaking, try cutting the fuel tubing seal a tiny bit shorter, or stretching the spring slightly. A good seal should not be hard to achieve. The last step is installing whatever type of filler fitting meets your needs. I usually cut the end of the tube about 1/4" beyond the soldered wheel collar, and push the fitting up firmly against the collar. This may vary, depending on the fitting. My fitting is made from a 1/2" OD nylon spacer which is countersunk on the end to form a funnel shape.

#### **MATERIALS McMASTER-CARR PART #**

**8-16 oz bottle 8 oz: 4218T44 / 16 oz: 4218T45**

**5/16-18 x 1/2 brass (or stainless steel) bolt, with thin jam nut and washer bolt: 92941A578**

**washer: 96659A107**

**nut: 92174A030**

**approx 1/4 OD compression spring 9657K41**

#### **HOBBY SHOP PART #**

**3/16 OD brass tubing (min 2 1/2" long) K+S8129**

**5/32 brass rod (3/8" long) K+S8165**

**3/16 wheel collars (2) DUB141**

**XL (5/32 ID) silicone fuel line (1/4" long) DUB553**



**Topside View of Filler Valve.**

## ***MBS Model Supply Special Notice.***

Due to reasons beyond our control, we will not be able to have the business setup at the 2017 Nationals. However, if you contact us in advance we will bring your order with us and you can pick it up there.

Contact us at [mbschuette@cox.net](mailto:mbschuette@cox.net) or by phone at 785-221-7042. If calling please call after 6pm central time or anytime on the weekends.

Melvin

### **CONTEST CALENDAR**

**NOTE! Confirm all contest details with Contest Director!**

**NCLRA cannot be held responsible for errors or omissions!** This calendar is compiled from data collected at the NCLRA website [nclra.org](http://nclra.org). and other published sources. Members can log in to [NCLRA.org](http://NCLRA.org) and submit contest details.

### **NORTHEAST DISTRICT**

2017 RACING SCHEDULE

South Jersey Aero Modelers

Contest Site: Mountain View Park, Middlesex, NJ

Come out and enjoy Control Line Racing.

Inquiries...call Phil Valente-610-692-6469

15-Oct.

CD Al Ferraro

NCLRA Clown, Sportsman Clown, Perky Speed, Fox 35 Speed

5-Nov

1 OZ GOODYEAR, FOXBERG, CLOWN RACING-SPORTSMAN,

CLOWN SPEED, FOX 35 SPEED, PERKY SPEED

PHIL VALENTE AMA#16155

1523 ULSTER WAY

"WEST CHESTER, PA 19380"

(610) 692-6469

19-Nov

1 OZ GOODYEAR, FOXBERG, CLOWN RACING-SPORTSMAN,

CLOWN SPEED, FOX 35 SPEED, PERKY SPEED

PHIL VALENTE AMA#16155

1523 ULSTER WAY

"WEST CHESTER, PA 19380"

(610) 692-6469

### **NORTH CENTRAL DISTRICT**

None

### **NORTHWEST DISTRICT**

None

### **MIDWEST DISTRICT**

July 16-22

91st Annual National Aeromodeling Championships

AMA Contest site, Muncie In.

**Control Line Racing July 17-20**

Monday- AMA Scale Race, DMAA Sportsman Goodyear

Tuesday- 1/2A Mouse 1, NCLRA Quickie Rat

Wednesday- AMA Slow Rat, NCLRA Super Slow Rat

Thursday- F2C Team Race, NCLRA Clown Race

### **SOUTHEAST DISTRICT**

None

### **SOUTH CENTRAL DISTRICT**

Sept 2 same events as June 10

Sep 29- Oct 1 DMAA Fall Finale same events as April 28-30

### **SOUTHWEST DISTRICT**

#### **2017 Whittier Narrows Speed, Combat, & Racing Contest Calendar**

Whittier Narrows Park, S. El Monte, Ca., **34.042737, -**

**118.070392**

**PRELIMINARY-rev A**

**Sept 9-10**

**Wayne Trivin Memorial Speed and Racing**

All speed events including electric, 301-310 & 334,335 + perky & NASS Sport Jet & C Speed.

Racing Sunday only: SCAR Goodyear, NCLRA Clown, Super Slow Rat/Fox Race and Quickie Rat

**CD & Racing ED: Ron Duly h: 818-843-1748**

Speed ED:

**Oct 21-22**

**Virgil Wilbur Memorial Speed, Combat, and Racing**, sanction #17-284

All speed events including electric, 301-310 & 334,335 + perky & NASS Sport Jet & C Speed.

Combat: 75mph slow, F2D fast

Racing Sunday only: SCAR Goodyear, NCLRA Clown, Super Slow Rat/Fox Race and Quickie Rat

**CD & Speed ED: Howard Doering h.714-638-4937**

**c.714-394-5304**

Racing ED:

Combat ED:

**Dec 2-3**

**TOYS FOR TOTS Speed, Combat and Racing**

All speed events including electric, 301-310 & 334,335 + perky & NASS Sport Jet & C Speed, Torquette Speed, Hollow Log Speed.

Combat: 75mph slow, F2D fast

Racing Sunday only: SCAR Goodyear, NCLRA Clown & Super Slow Rat/Fox Race and Quickie Rat, Musciano Log Racing

Entry fee: 1 new unwrapped toy, approx value \$10-\$20.

**CD & Racing ED: Charlie Johnson**

Speed ED:

Combat ED:

NOTES:

1. **Contact CD or ED to confirm contest dates before traveling long distances.**
2. All Racing events Sunday only
3. Same four Racing events each contest
4. Clown will be flown on 60\2019 lines per NCLRA NATS rules
5. Other Racing events may be flown if two entrants show up ready to race
6. Combat and/or Navy Carrier events may be added to some contests.



Various pitting pictures from the 2013 Nat's

## NATIONAL RECORDS

### SLOW RAT (.25 engine)

Op (70 laps) 3:01.52 Jim Gall/ Les Akre 7/04/11  
 (140 laps) 6:17.59 Russ Green/ Bill Lee 7/07/09  
 (no Jr or Sr record)

### ½ A MOUSE 1

Jr (50 Laps) 2:37.57 Scott Matson 7/15/99  
 (100 Laps) 5:17.68 Scott Matson 7/17/99  
 Sr (50 Laps) 2:44.68 Dave Rolley Jr 7/15/99  
 (100 Laps) 5:20.11 D.J. Parr 7/16/98  
 Op (50 Laps) 2:12.3 Jim Holland 7/16/04  
 (100 Laps) 4:22 Ryan & Gibeault 7/15/99

### ½ A MOUSE 2

Op (70 Laps) 3:01.24 MacCarthy/Kerr 7/11/03  
 (140 Laps) 6:18.13 Whitney/Hallas 7/10/09

### SCALE RACING

Jr (70 Laps) 2:50.65 Bob Fogg III 7/16/91  
 (140 Laps) 6:08.55 Bob Fogg III 6/23/92  
 Sr (70 Laps) 3:15.12 Doug Short 7/11/00  
 (140 Laps) 5:40.05 Bob Fogg III 7/11/95  
 Op (70 Laps) 2:39.38 Willoughby/Oge 7/15/97  
 (140 Laps) 5:33.04 Bob Fogg Sr 7/16/91

### F2C TEAM RACING

Op (100 Laps) 3:42 Fisher/Wilk 7/13/15  
 (200 Laps) 6:43.32 Fisher/Wilk 7/16/12

### F2CN (NCLRA RULES)

100 Laps 4:14.84 Bill Lee/ Russ Green 7/07/11  
 200 Laps 8:37:10 Wallick/Brozo 7/15/13

### NCLRA 'B' TEAM RACING

Op (35 Laps) 1:24.34 Burke/Duly 7/12/05  
 (70 Laps) 3:05.73 Green/Lee 7/10/09  
 (35+70 Laps) 4:33.91 Green/Lee 7/10/09  
 (140 Laps) 6:08.80 Green/Lee 7/10/09

### RAT RACING (.15 RULE)

Op (70 Laps) 2:44.6 Jim Holland 7/15/04  
 (140 Laps) 5:33.1 Jim Holland 7/15/04  
 Jr-Sr No record established

### NCLRA FOX RACE

Jr (100 Laps) 5:57.11 Scott Matson 7/11/99  
 Sr (100 Laps) 5:28.09 Scott Matson 7/16/02  
 Op (100 Laps) 5:32.55 Tim Stone/Bob Oge 7/10/05

### NCLRA CLOWN RACE

Op (7 ½ Min.) 150 Laps Bischoff/ Lee 7/15/15  
 Op (15 Min.) 284 Laps Bischoff/Lee 7/15/15

### NCLRA TEXAS QUICKIE RAT

Op (70 Laps) 2:58:72 Bill Lee/Bill Bischoff 7/18/13  
 (140 Laps) 6:07.01 John McCollum/Bill Lee 7/14/05

### NCLRA SUPER SLOW RAT

(100 Laps) 5:14.30 Bill Lee/Russ Green 7/05/09

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724-966-2726 email [flyin@brodak.com](mailto:flyin@brodak.com)

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e-mail: [Barry@Petrockfarm.com](mailto:Barry@Petrockfarm.com) 906-337-4533  
[www.Petrockfarm.com](http://www.Petrockfarm.com)

### **JIM DUNKIN**

Engine reference books 816-229-9671  
[dunkin@discovernet.com](mailto:dunkin@discovernet.com)

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### **NELSON COMPETITION ENGINES**

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Manufacturer of NELSON Racing Engines and parts, FAI Pans  
for F2A & FIC Custom Button Heads, Nelson Glow Plugs, many  
other specialty engine items. (Henry Nelson) Phone: (724) 538-  
5282 e-mail: [nelcomp@fyi.net](mailto:nelcomp@fyi.net)

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