

# RcM



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# OFF-ROAD RACING

**Bill and Linda Pihl**

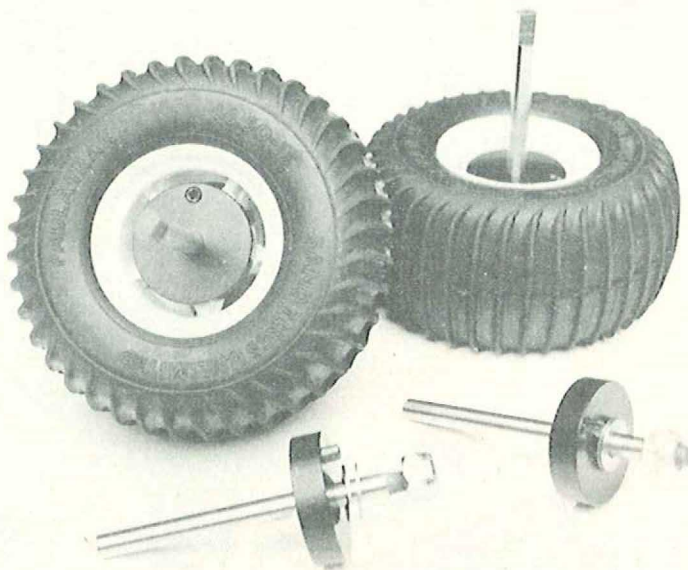


**I**n springs past, a man's fancy turned to love, this year a man's fantasy was to win the ORRCA Championship. With love and care, the cars were prepared for the eventful day. People awoke with anticipation over this, the day that would prove success or failure. After the dust had settled and hopes and dreams were broken, the top drivers for Stock, Modified and Open were . . .

This is being written in early summer and this year will be the first full season for ORRCA. The racing activity is off to a good start and growing like mad with many race courses being built and lots of races being scheduled. We will discuss this further in our next column.

Now for more information, ORCCA has a permanent address: P.O. Box #475, Westminster, California 92683. For information packets or any other correspondence, use the above address.

Ron Williams is the owner of Radio Controlled Hobbies and has a very complete shop, handling all



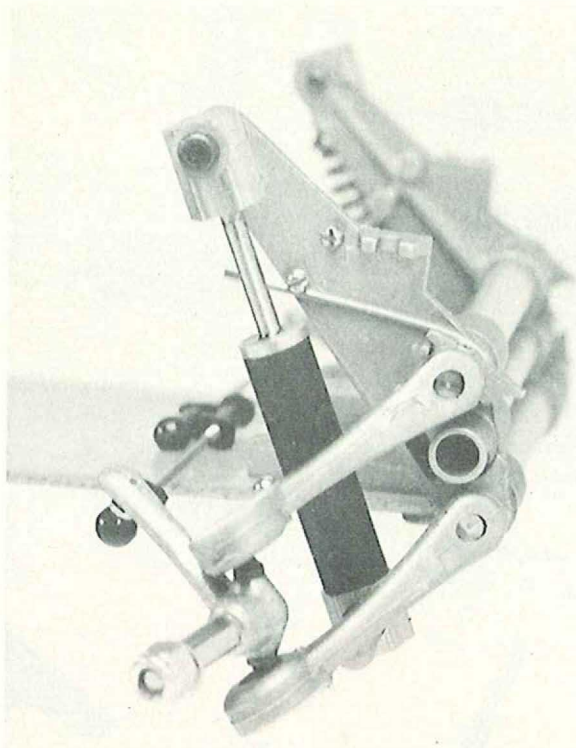
*Hardened steel axles from Moore's Ideal Products, see text.*

replacement and additional accessories for 2 and 4 wheel drive Tamiya off-road vehicles.

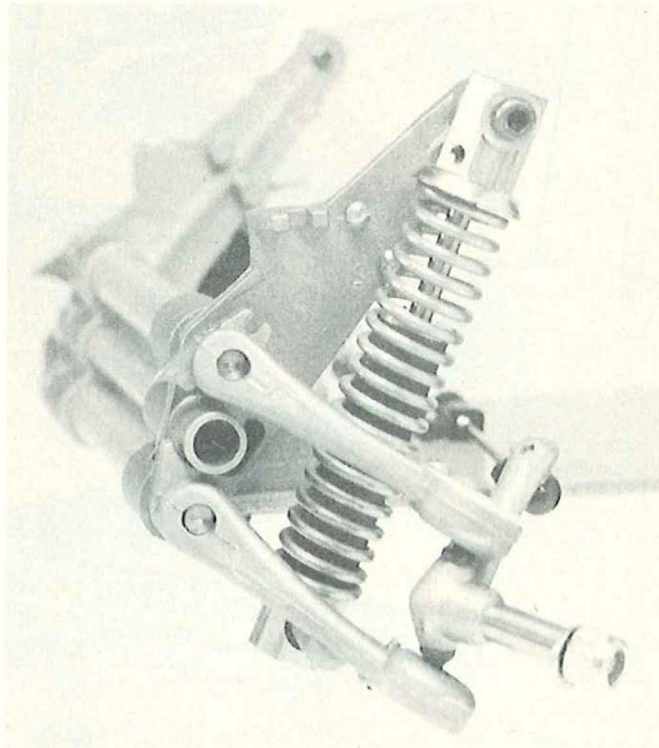
We will start off with the new brass

gear for the transmission of the Tamiya 4 wheel drive, Toyota and Blazer. This gear replaces the nylon

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*Oil dampening shock from Moore's Ideal Products, see text.*



*Oil Dampening shock with spring from Moore's Ideal Products, see text.*



# PIT STOP

## Gene Husting



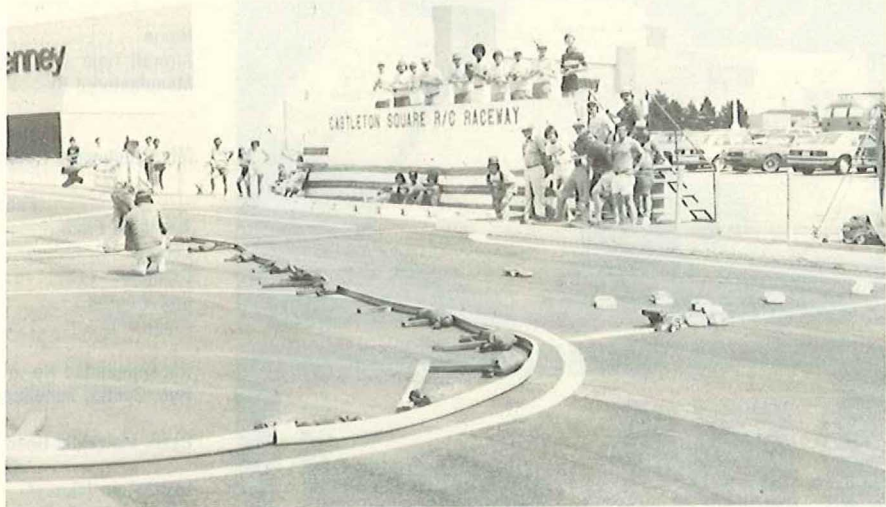
### 1982 ROAR Nationals Indianapolis, Indiana

**C**astleton, Indiana a suburb of Indianapolis, was the site of the 1982 USA ROAR Nationals. The track was located on the parking lot of the Castleton Square Mall, which was at the same location as the 1981 1/8 World Championships. The track surface was still excellent, but a different track layout was used. I must say that this ROAR Nationals was as well run as any Nationals I've been to. This is through the efforts of the Indy 500 R/C Car Club, headed by ROAR Vice-President Joe Werner, scorer Ralph Spencer, starter Mike Pierson and the other club members. Even though it rained 3 or 4 times during the Nationals, the lost time was made up and no alternate rain days had to be used and no racing was rained out. You guys and ladies did a super job. The first day we were there, Joe Werner showed up with the brightest green shoes you ever saw. The infield portion of the track had been painted a bright green, which exactly matched Joe's shoes. Joe took so much ribbing about those green shoes, they magically changed color the next day. But the track really looked super — for the 1/8 cars, that is. To set up the 1/12 track, the layout was changed by using white tape and white PVC pipe. The multitude of colors and the 1/12 layout made it one of the toughest 1/12 tracks I've ever run on. The Burch's, Johnson's and Lavacot's didn't seem to be having any problems with the layout, though. The track certainly separated the greats from the not-so-greats, very fast.

#### 1/12 Production Class

The Nationals started with the 1/12 Scale electric cars. The Indy club had erected a huge circus tent for the racers as a covered pit area. This was one of the greatest things the club did. When it rained it poured, and without the tent it would have been impossible. It was also very hot and very humid, and the 2nd best thing the club did, was having ice and cokes available in the tent. It was a lifesaver.

I've been wearing different yellow shirts and T-shirts to races for about 10 years now, but under this tent it looked like half the guys had yellow T-shirts. Last year there weren't too



*The 1982 ROAR Nationals was held in Indianapolis, Indiana, at the Castleton Square Shopping Mall. This was one of the best run Nationals we've had in a couple years.*

many 1/8 racers at the Nationals, because most 1/8 racers were using their vacation time for the 1/8 World's Championships in Indy. This year there were only 6 Associated team drivers and 4 MRP team drivers as well as BoLink and Parma drivers at the Nationals, because the rest of the drivers were going to be using their vacation time at the 1/12 Scale World's Championship next month in Anaheim, California. This was obviously much more important to them.

Someone counted 26 yellow T-shirts under the tent. The whole JoMac team was here! But why? The Nationals were important, but obviously not as important as the World's Championships. The answer to the question became apparent in a short time; as soon as we started racing. Apparently the JoMac team had learned something new about batteries and stock motors. Their stock motors were obviously much faster than the other team's motors, and they were eager to exploit this new found power, which was all fair and legal. However, it would seem the better thing to do would be to save this advantage for the World's Championships. We won't know till next month whether they made the correct decision or not. But they were certainly going fast here.

The Production Class cars consist of basically stock kit cars with ROAR legal stock motors which were issued to each racer by the Tech Inspector and using coupe bodies. As soon as

Ralphie Burch Jr., hit the track, it was apparent he was going to be the man to beat. Give him some power and he knows what to do with it. Ralphie led all 4 rounds of qualifying. But then Ralphie is always the fastest driver on the JoMac team. The extra power not only benefitted Ralphie, but the whole JoMac team which placed 7 cars in the "A" main. This only left 3 spots which went to Joel Johnson from MRP and Mike Lavacot and Jerry Case from Associated. Now it was easy to see why there were so many yellow shirts under the tent. It was apparent JoMac had come up with a different battery charging procedure. Every driver was using a different set of batteries for each run. I don't know exactly what the charging procedure consisted of, but it gave the batteries a stronger charge, resulting in more acceleration and longer running time. They did their homework well.

#### 1/12 "B" Production Main

Re-Pete Fusco missed the "A" Main by four tenths of a second, but the "B" Main was all his as he took 1st place by 3 seconds over John Huron in 2nd and Jim Aguirre in 3rd.

#### 1/12 "B" PRODUCTION MAIN

1. Re-Pete Fusco
2. John Huron
3. Jim Aguirre
4. Gary Kyes
5. Bill Jeric
6. Randy Tentschert
7. Terry Rott

#### 1/12 "A" Production Main

This class belonged to Ralphie from



day one and the Main was no exception. Ralphie took off in the lead with Joel Johnson following in 2nd. Lavacot got caught in the first corner traffic, and started next to last. Ralphie was flying but Joel was keeping him in sight. Lavacot moved up through the field and was closing on Johnson while Ralphie was getting closer to Lavacot. Ralphie won the race, lapping all the cars except Johnson in 2nd and Lavacot in 3rd.



Ralphie Burch Jr. (on the left) was Top Qualifier and won the 1/12 Scale electric Production class with Joel Johnson (center 2nd) and Mike Lavacot 3rd.

#### 1/12 "A" PRODUCTION MAIN

- |     |                   |            |
|-----|-------------------|------------|
| 1.  | Ralphie Burch Jr. | JoMac      |
| 2.  | Joel Johnson      | MRP        |
| 3.  | Mike Lavacot      | Associated |
| 4.  | Steve Koepp       | JoMac      |
| 5.  | Tom Miller        | JoMac      |
| 6.  | Tyree Phillips    | JoMac      |
| 7.  | Ron Schuur        | JoMac      |
| 8.  | Mike Hickman      | JoMac      |
| 9.  | Mike Hamilton     | JoMac      |
| 10. | Jerry Case        | Associated |

#### 1/12 Stock Class

Stock class consists of stock ROAR legal motors, which were distributed to the racers by the Race Director again. These cars are allowed to have ball bearings, a differential and to have modified chassis.

I was using my car to try to figure out how to make the stock motor run faster and with a team effort, including Roger Curtis' help back in California, we did manage to get the motors running better. However, we didn't have the time or the extra batteries to figure out the new battery charging method.

The added help from the motors did help though, as Associated did manage to get 4 of their 6 drivers in the Main. But the Top Qualifying honors went to Ralphie again, as he turned 33 laps in 8 min. The only other driver with 33 laps was Joel Johnson.

#### 1/12 Stock "B" Main

Gary Kyes, who hasn't missed an "A" Main in 92 years, or what seems like that long anyway, was also having problems solving the new battery charging method. Gary showed he's still got the magic touch with the steering wheel though as he won the "B" Main with Tyree Phillips 2nd and Bill Jeric 3rd.

#### 1/12 STOCK "B" MAIN

1. Gary Kyes
2. Tyree Phillips
3. Bill Jeric
4. Bud Bartos
5. Kevin Orton
6. Patrick Miller
7. Steven Koepp
8. John Huron

#### 1/12 Stock "A" Main

This race belonged to Joel Johnson. Joel got the lead at the start and there was no way anyone was going to catch him. Not Ralphie, not Lavacot, no one. When you talk of the great 1/12 racers, Joel's name has to be right there with the best. Of the best drivers, I think Joel hits fewer dots than any of them. He cuts the dots as close as anyone, but he hardly ever touches them. He had the lead in this race and if anyone wanted to beat him they'd have to drive around him, but it wasn't going to happen today. Joel took the win, with Mike Lavacot, who had gotten a little better start this time, taking 2nd and Ralphie Burch following in 3rd.



The 1/12 Stock class winner was Joel Johnson (left) with Mike Lavacot (right) 2nd, and Ralphie Burch Jr. 3rd.

#### 1/12 STOCK "A" MAIN

- |     |                   |            |
|-----|-------------------|------------|
| 1.  | Joel Johnson      | MRP        |
| 2.  | Mike Lavacot      | Associated |
| 3.  | Ralphie Burch Jr. | JoMac      |
| 4.  | Art Carbonell     | Delta      |
| 5.  | Jerry Case        | Associated |
| 6.  | Tim Morton        | JoMac      |
| 7.  | Re-Pete Fusco     | Associated |
| 8.  | Terry Roth        | Associated |
| 9.  | Tom Miller        | JoMac      |
| 10. | Mike Hickman      | JoMac      |

#### 1/12 Modified Class

This class is the same as Stock class except modified motors are allowed. The cars are obviously faster and the drains on the batteries can obviously be higher, depending on the motors. Mike Lavacot had the fastest time after the first round with 33 laps in 484.2 seconds but Joel Johnson was just a whisker away at 33 laps in 484.3. But someone that made the biggest surprise was young Terry Rott. Remember that name. You'll be hearing it a lot in the future. Terry was the only other driver to turn 33 laps in the first round. Terry has the ability to become one of the super

drivers. He only needs a little more experience, then look out!

Lavacot was the only one to turn 33 laps in the 2nd round, but in the 3rd round Ralphie took Top Qualifier honors by beating Lavacot's time by 1½ seconds with 33 in 482.8.

Rain had interrupted the racing, so after qualifying was over, Joe Werner announced there would be at least a 1 hour break, then the "A" Main would be run first, before it started to rain again. It was actually 1½ hours before the "A" Main started.

The "A" Main had Ralphie's name written all over it. Ralphie and Lavacot made a race for first place in the beginning, which was very exciting, but then Ralphie started pulling away. Mike Hickman and Terry Rott were literally fighting it out for 3rd place, but they were so intent racing each other, they didn't notice Arturo Carbonell going on by to take over 3rd place. Ralphie had about 1/2 a lap lead now, and had lapped everyone except Lavacot. Lavacot's batteries started to dump with about 1 minute to go and Ralphie pulled up right behind Lavacot. Lavacot moved over and let Ralphie go right on by. Joel Johnson had been running up front but his batteries also couldn't handle the load and he DNF'd. Ralphie took the win with Lavacot 2nd and Arturo taking 3rd.



Ralphie adds another win taking the Modified class with Lavacot 2nd and another familiar face, Arturo Carbonell 3rd.

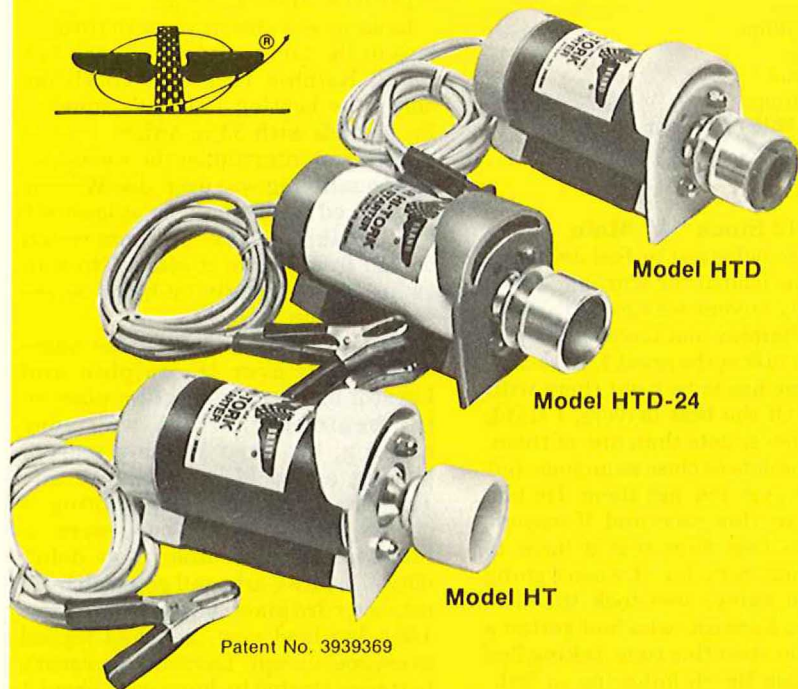
#### 1/12 MODIFIED "A" MAIN

- |     |                   |            |         |
|-----|-------------------|------------|---------|
| 1.  | Ralphie Burch Jr. | JoMac      | Trinity |
| 2.  | Mike Lavacot      | Associated | Reedy   |
| 3.  | Arturo Carbonell  | Delta      | Reedy   |
| 4.  | Mike Hickman      | JoMac      | BRM     |
| 5.  | Terry Rott        | Associated | Reedy   |
| 6.  | Re-Pete Fusco     | Associated | Reedy   |
| 7.  | Jerry Case        | Associated | Reedy   |
| 8.  | Gary Kyes         | MRP        | BRM     |
| 9.  | Bob Light         | JoMac      | Trinity |
| 10. | Joel Johnson      | MRP        | Trinity |

#### 1/12 MODIFIED "B" MAIN

- |    |                |                     |
|----|----------------|---------------------|
| 1. | Kevin Orton    | 6. Ken Peckham      |
| 2. | Larry Stevens  | 7. Ron Schuur       |
| 3. | Tim Morton     | 8. Steve Koepp      |
| 4. | Tyree Phillips | 9. Randy Tentschert |
| 5. | Tom Miller     | 10. Bill Jeric      |





Model HTD

Model HTD-24

Model HT

Patent No. 3939369

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### 1/8 Gas Racing

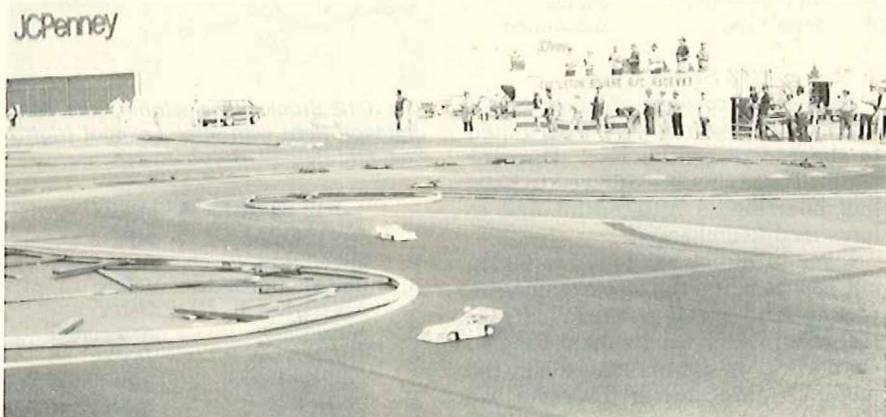
The 1/12 barriers were removed from the track, and now there was the 1/8 track with green infield. This was a beautiful 1/8 track. Easy to see and fun to drive. There was one day of open practice. It would be interesting to see the battle between the suspension cars and the pan cars on this track. The track appeared good enough that both cars should be at their best.

The schedule called for Super Stock class first. This class is restricted to pan cars weighing a minimum 5½ lbs. with a .200 bore carb and no nitro fuel, racing Formula bodies. Jerry Snow dominated qualifying, turning 15 laps in 289.4 seconds on his first round and then lowering that to 279.5. The closet driver to him was Bob Leckron with 284.7.

### Super Stock "A" Main

Mark Miranda took the early lead, but within 10 laps Jerry Snow passed Mark for the lead. Jerry opened up a one lap lead, and after his first pit stop he had an 8 second lead. Then it rained and the race was stopped.

After the rain stopped and the track dried, which was the following morning at 9 a.m., the race was restarted. Snow was to be given an 8 second lead, then the next car would be flagged off. With that kind of a lead, how could Snow lose? But something



The 1/8 Scale road course was one of the best in the country, and the type that should be used on a National level.

happened. As the cars were lined up for the restart, a pitman stepped on Snow's car accidentally, bending the bumper down and breaking the wing. When the green flag was raised, Snow's car would only turn in one direction! He couldn't even make it back to the pits. By the time he got the car fixed, he was now 8 laps down.

Meanwhile Dale Smith, Bob Leckron and Mark Miranda were having a great battle for 1st place. But now Snow was back on the track and he was flying. Soon he was only 7 laps down, now 6, now 5, 4, 3, 2, 1, now he was on the same lap with the leaders, but time was running out. Soon he



Super Stock action was supplied by winner Mark Miranda (left), 2nd place finisher Jerry Snow (center) and 3rd place Dale Smith.

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passed the 3rd place car, now the 2nd place car and now Snow had the leader, Mark Miranda in sight. He was getting closer and closer to Mark, but time ran out. Mark won the race with Snow 2nd, just 3 seconds back. Snow had made up 7 laps, but he needed 3 more seconds. Dale Smith finished in 3rd.

#### SUPER STOCK "A" MAIN

1.	Mark Miranda	100 laps
2.	Jerry Snow	100
3.	Dale Smith	100
4.	Don Reger	98
5.	Rich Potempa	97
6.	Louis Przybyla	90
7.	Arlyn Simon	89
8.	Jim Delancey	72
9.	Bob Leckron	60

#### Can Am Class

As you'll remember, last year the ROAR membership voted in 2 car classes. The Open class, which includes the independent suspension cars and the Pan class which prohibits the independent suspension cars. Yet, to make the racing more interesting, both classes actually qualify together on the track, but then are placed in the main they qualify for. It's something like the real Can Am racing where they have over 2 liter and under 2 liter Can Am cars that race together, but in separate classes.

The traction on the track now was pretty good, thanks to the Super Stock cars. The 2 days of Can Am racing consisted of 1 practice round, 4 qualifying rounds of 15 laps and then the 100 lap "A" Main, "B," "C" Mains, etc.

Ralphie Burch Jr., started going fast right away with his pan car turning 15 laps in 269.4 seconds, to lead the 1st round. Jack Mueller was next with 275.8, followed by Chuck Phelps at 277.1, Rich Lee at 282.1, and Curtis Husting at 282.3.

The next round Ralphie turned 276.8, followed by Curtis Husting at 279.1, then Jack Mueller 281.4, Rick Davis 283.7 and Arturo Carbonell 284.5.

The track was then opened up for practice at night and a lot of testing was going on. I had decided to let Re-Pete Fusco run my RC500, which was the first car Curtis built. Re-Pete got to run 5 minutes practice that night before going into the last 2 rounds of qualifying the next day.

The practice the night before had obviously helped someone. Arturo Carbonell found the combination he liked turning 264.1. Ralphie was next with 271.0, then Rich Lee 272.3 and Rick Davis 274.5 and surprising Kevin Orton 276.0 and Curtis with another 279.3.

The last round was really quite interesting. Art, Ralphie and Re-Pete

were all in the same heat. Art took off in the lead with Ralphie right behind in 2nd. Re-Pete sat on the line and let the rest of the field take off first. He said later, he didn't want to hurt my car! Art was flying around the track at a very fast pace. Ralphie in 2nd. Re-Pete was passing cars at a fast rate. At the finish it was Arturo with a Top Qualifier time of 255.1, Ralphie next at 262.0 and Re-Pete closing in at 267.2.

Art had qualified first in the Open class and Ralphie was first in the Pan class. But 2 of the most unexpected "A" main spots came from Butch Kloeber and Kevin Yelle, who qualified for the "A" Main with pan cars. You 2 guys did super!

#### Can Am "B" Main

The "B" Main is normally always a close race, because all the cars have qualified with similar times. However, I think Joe Sullivan belonged in the "A" Main. When the race started, Joe was long gone. By the 28th lap he had lapped the whole field, but then he ran out of fuel and lost 2 laps. When Joe got back on the track again, he was making up for lost time, but now Bill Campbell had the lead and it turned into a 4 car dash to the finish line. Bill held on for the win with Curtis Husting 3 seconds back in 2nd, Dana Smeltzer 4 more seconds back in 3rd, with Joe taking 4th.

#### CAN AM "B" MAIN

	Open Class	Pan Class
1.	Bill Campbell	1
2.	Curtis Husting	2
3.	Dana Smeltzer	3
4.	Joe Sullivan	
5.	Georgia Campbell	1
6.	David Campbell	2
7.	Tony Markunas	5
8.	Chuck Phelps	6
9.	Tom Miller	7
10.	Jim Delancey	3

#### Can Am "A" Main

It was time for the "A" main. Because all the other Mains were run before the "A" Main, it was about 5 hours since these drivers were on the track, the traction would be better. The Main was 100 laps long. Had everyone picked the right tires? We'd soon know.

The green flag went up and Ralphie immediately jumped into the lead with Arturo right behind. Re-Pete waited for all the cars to take off then he started. Ralphie was flying, but so was Art. Ralphie had about a 100 foot lead, but that's about all he could open it up. After the first pit stops, he still had the lead, with Art in 2nd. Ralphie was now lapping cars. One of the cars he was about to lap, apparently did not want to be lapped. Ralphie got nudged in the boards, and by the time a turn marshal got him out, Art had taken

over the lead. Art now had about a 100 foot lead and Ralphie couldn't catch him, and Art wasn't making any mistakes.

I had put harder rear tires on Re-Pete's car to make sure they lasted 100 laps, but it made the rear end too loose. Nevertheless, by the halfway mark, Re-Pete was running 3rd. Rick Davis was starting to run now and moved into 4th. Art was still leading, Ralphie in 2nd. Rick was getting closer and closer to Re-Pete, on the 98th lap Re-Pete touched the only dot in the whole race, but it was enough to let Rick shoot by and take over 3rd.

Art went on to take the win with Ralphie in 2nd, 7 seconds back, Rick 3rd and Re-Pete 4th.



These are the fast guys. Can Am Main event winner Arturo Carbonell (left) Rick Davis 2nd place, Open Class (center) and Re-Pete Fusco 3rd place Open Class.



The Can Am Pan class was dominated by Ralphie Burch Jr. (left) with Butch Kloeber 2nd (center) and Kevin Yelle 3rd.

#### 1/8 CAN AM "A" MAIN

	Open Class	Pan Class
1.	Arturo Carbonell	1
2.	Ralphie Burch Jr	1
3.	Rick Davis	2
4.	Re-Pete Fusco	3
5.	Jack Mueller	4
6.	Butch Kloeber	2
7.	Kevin Orton	5
8.	Kevin Yelle	3
9.	Rich Lee	6
10.	Bruce Oakley	7

#### Oval Race

The Oval race was the last race of the Nationals. Thank goodness it was last, because I don't think there was enough cars left for any more racing. This was a very fast oval, with cars hitting speeds well over 60 mph.

Top Qualifying honors went to Ralphie Burch with 30 laps in 279.7 seconds and this was the first time he'd ever ran an oval. Rick Davis was

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# DELTA PRESSURIZED SHOCK ABSORBER

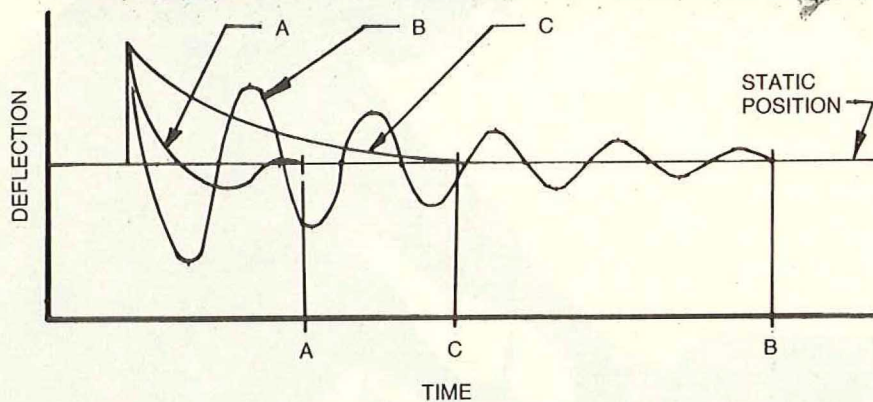


FIGURE 1

A revolutionary concept for R/C racing cars, off-road buggie and airplane landing gears

**A**lthough our first production R/C racing car 14 years ago was a full 4-wheel independent suspension chassis with many advanced features, it did not have shock absorbers. It relied strictly on joint friction to dampen the suspension. While the car handled quite well it was soon shelved in favor of the lighter, simpler flat pan type chassis which for the next 13 years we strived to improve and perfect.

In the back of our minds was the ever present knowledge that some day

we would no doubt be developing, once again, an independent suspension race car. Sure enough in 1981 suspension cars were successfully introduced in Europe, thus triggering latent suspension concepts we had been accumulating for years. The result of this latest design effort is the 1982 Delta Eagle 4-wheel independent suspension race car. Perhaps the most challenging part of the design was to come up with a shock absorber that would function 100% like the full sized counterpart, and yet be practical and economical to produce.

**What does a shock absorber do?** Since it is necessary that the tires must be in contact with the ground in order to have control of the race car, it

is best to think of the shock absorber as a device which helps the spring return the tire to the ground as quickly as possible. Another way to state this is that they help the spring keep the tires in contact with the ground the greatest amount of time.

Technically speaking, we are dealing with a mass, spring and damping system. The chassis, wheels, and suspension members are the mass, the springs are obviously the spring, and the shocks are the damping. Figure 1 shows the effects of the shock absorber on this kind of system.

**Condition A.** The shock has just the right amount of damping (shock oil correct). The tire will return to normal position in the least amount of time.

**Condition B.** The shock has not enough damping and now the tires will overshoot and continue to bounce for several cycles before returning to normal.

**Condition C.** The shock has too much damping and now the tires will not overshoot at all but will take a long time in returning to normal.

**How does a shock absorber work?** It pumps oil through a restrictor (orifice) during both compression and extension movements. Pumping oil requires energy, which comes from the motion of the suspension members.

**What is the biggest problem in designing an R/C car shock absorber?** After studying full sized shock absorbers it was apparent that they could not simply be scaled down without the price escalating out of sight. To take the check valves, O-rings, and orifices found in 1¼" full size shocks and squeeze them into a package of 5/16" diameter simply did not appear practical. A real breakthrough was required which would operate in this subminiature size. The biggest problem came from trying to solve a very basic characteristic of the hydraulic shock cylinder, oil and rod. **It is necessary to understand this fact:** As a piston rod enters a hydraulic cylinder, a certain volume of oil must go somewhere to make room for the rod itself. Additionally, as the rod leaves the cylinder, it will leave behind a volume that must now be filled with oil. Refer to Figure 2 for illustrations of this problem.

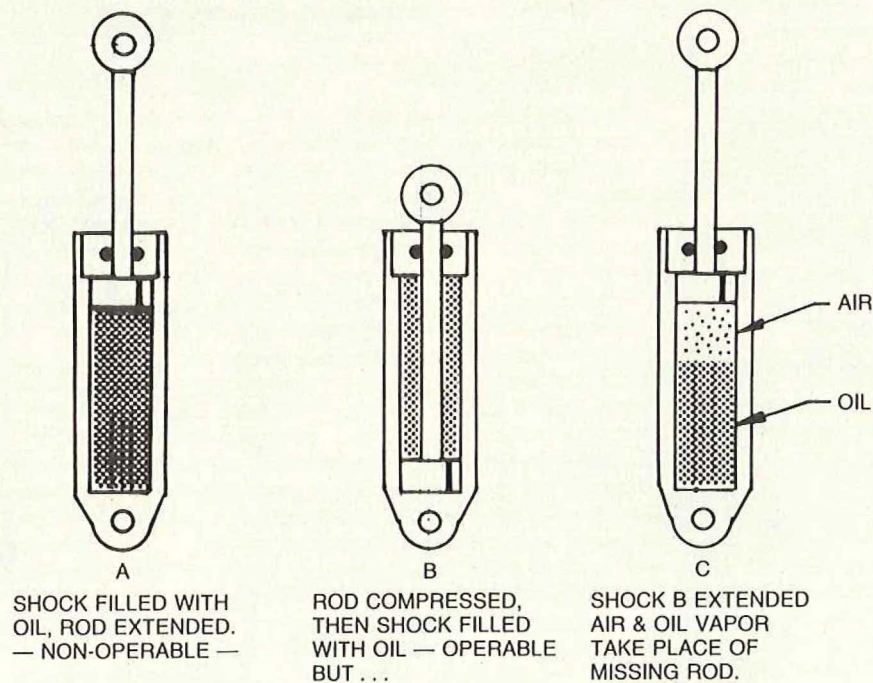


FIGURE 2



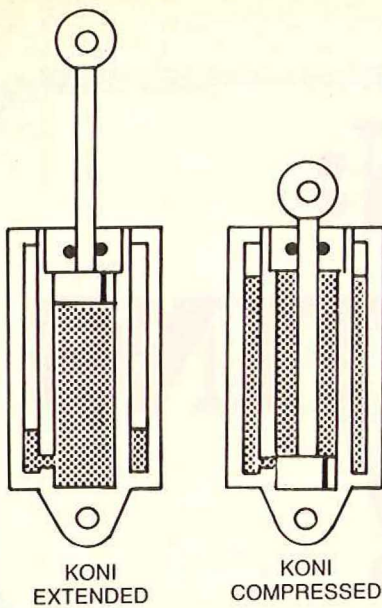
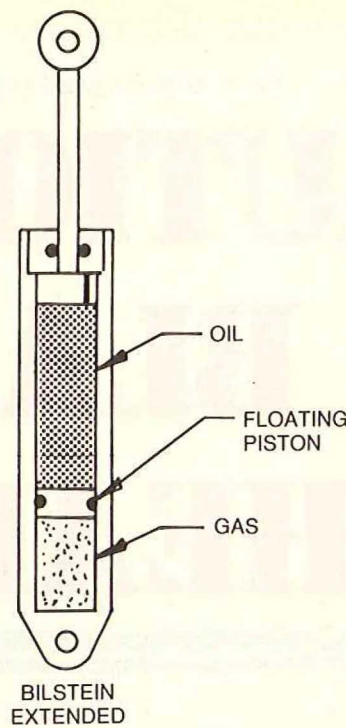
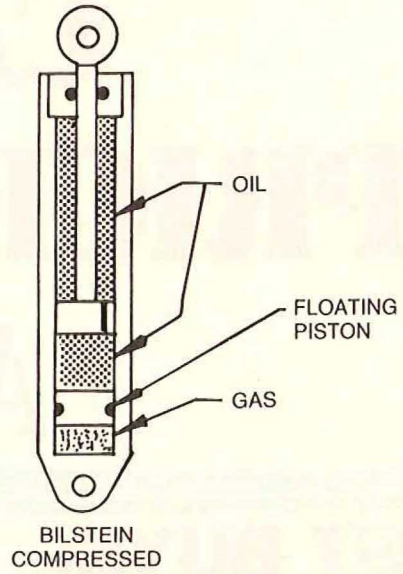


FIGURE 3A

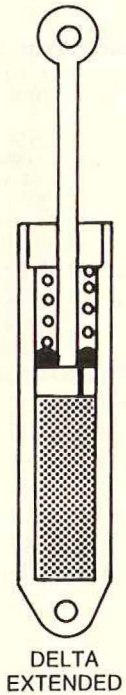


BILSTEIN EXTENDED

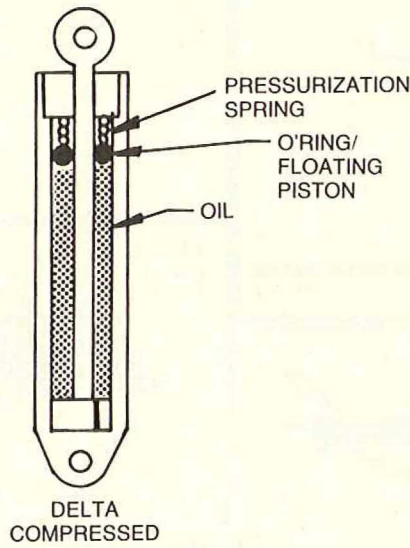


BILSTEIN COMPRESSED

FIGURE 3B



DELTA EXTENDED



DELTA COMPRESSED

FIGURE 4

**Shock 2A:** This shock was filled with oil before the rod and seal were installed. It will be impossible to compress this shock because there is no place for the incompressible oil to go. This shock is unusable.

**Shock 2B:** This shock was filled with oil after the rod was pushed all the way to the bottom of the cylinder. Then the seal was installed. Notice that there is less oil in Shock B than in Shock A. Can this shock be extended? See answer in Shock C.

**Shock C:** This is what Shock B looks like after the rod has been extended. So far so good, right? Wrong. Notice that no oil was available to fill the volume left behind by the rod. Where did that air come from? Well, as the rod was pulled out, the oil pressure was greatly reduced allowing minute air particles and oil vapor to flash out of the oil, thus allowing the rod to be fully extended. This is called cavitation, a condition not

acceptable in our R/C racing cars.

All R/C shock absorbers we have examined to date are of the Figure 2B and 2C type, and have the inherent weakness in that they pump not a pure stream of oil through the orifice but a varying mixture of air and oil. This means that the shock absorber sees a varying oil viscosity through the orifice and thus for any given part of the shock absorber stroke provides a varying and unpredictable amount of damping.

**How do full sized racing shock absorbers solve the rod/oil displacement problem?** Good question, let's take a look at the two most popular types and see how they work and why they are difficult to scale down.

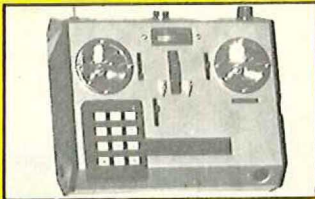
**The Koni Shock — Figure 3A:** This is of a twin wall construction wherein an external concentric reservoir is connected to the main cylinder through a combination check valve/orifice. Oil enters or leaves the reservoir as needed to maintain the oil/rod volume relationship. The check valves and orifices act at the proper time to provide low or high resistance to the oil flow thus providing damping and yet not allowing cavitation. Problems with adapting this concept are not only the minute check valves and orifices but also the larger diameter required for this type reservoir forces the enlargement of the suspension springs which will be mounted on the outside of the shock

to page 128



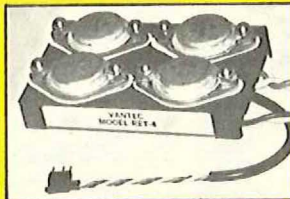
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### SHOWCASE '82

from page 126/106

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### FIBERGLASS MOLDS & PARTS

from page 104/102

acid brush and gravity. Let dry. Cover the top seam with tape and resin. Let

dry. Remove the masking tape and lightly sand seam. Be careful not to sand through the two thin layers of resin down to the fiberglass cloth. Wash off all the mold release agent. Running water over the fiberglass resin makes sanding with waterproof sandpaper ten times easier than dry sanding. Plus, the water carries the glass fibers down the drain instead of letting them float about in the air for you to inhale. That is the last thing that we should have in our lungs. Further, your sandpaper won't clog and wear out anywhere nearly as soon. Apply primer and paint. If the finished color is to be light, I recommend a coat of white over the primer; this really helps especially if the color is to be yellow.

Good luck, your perserverance will be rewarded.

### DELTA SHOCK ABSORBER

from page 95/94

absorber. Both space and weight are at a premium on the R/C competition racing car. In addition, this type shock requires nearly vertical installation to keep the reservoir orifice/check valve ports covered with oil.

**The Bilstein Shock — Figure 3B:** This type shock uses a floating piston and gas pressure to compensate for the oil volume change. An initial charge on the gas provides positive pressure on the oil. As the piston rod is compressed into the shock cylinder, the floating piston is forced to move to make room for the rod volume. The **to page 130**

# 1/4



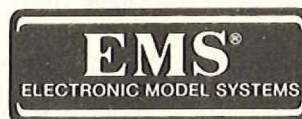
- A. 1200 MAH (1.2 AH) Square (fast charge)**  
**WEIGHT:** 7.4 oz. (207g)  
**SIZE:** 1.89" x 1.89" x 1.80"
- B. 1200 MAH (1.2 AH) Flat (fast charge)**  
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**WEIGHT:** 10 oz. (280g)  
**SIZE:** 4.7" x 2.37" x 1.37"
- C. EMS Eagle Servo**  
 Ball Bearing - Watertight Case  
**THRUST:** 156 oz.-in. (2.5 ohm motor)  
**WEIGHT:** 3.6 oz. (102g)  
**SIZE:** 1.70" H x 1.14" W x 2.60" L  
**MECHANICS:** World Engines S-16
- D. EMS - 20H Servo**  
 Ball Bearing - Watertight Case  
**THRUST:** 56 oz.-in. (6 ohm motor)  
**WEIGHT:** 2.0 oz. (57g)  
**SIZE:** 1.68" H x 0.92" W x 1.79" L  
**MECHANICS:** Kraft KPS - 20H

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# Scaler's

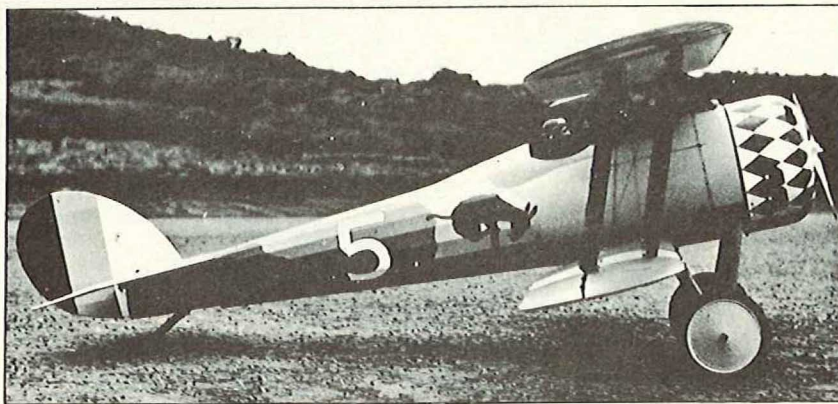
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piston moves toward the compressed gas compressing the gas even further. This is the type of shock used on many light aircraft as shock absorbing landing gear, the gas pressure providing the force to extend the gear. The problems in adapting the Bilstein type shock to the R/C car are not as overwhelming as the Koni type. The cylinder does have to be a bit longer than the Figure 2 type shocks, and an O-ring sealed floating piston with its additional friction is not too attractive. The real killer is coming up with a gas valve with which to pressurize the shock. Let's now take a look at the Delta pressurized shock and see how the problems above were solved.

Now that you have a basic understanding of the principles and problems of shock absorbers, the following will explain the Delta Pressurized Shock Absorber.

**Operating Principles:** This shock is more of the Bilstein type but with many simplifications. Instead of gas, a spring is used to provide the pressure. The spring is very simple and light and eliminates the need for a pressurization valve. Secondly, we found that a single O-ring could be used not only as the floating piston but would also act to seal the oil into the cylinder at both the rod and the cylinder. This was the big breakthrough we had been looking for. With the single O-ring, overall shock friction is very low and parts count and construction techniques very simple. As the piston rod moves in and out of the cylinder, the floating O-ring moves up and down inside the cylinder to keep the oil under continuous pressure and thus compensates for the change in volume discussed previously. This Delta pressurized design then provides for a pure oil (no air) moving through the orifice and thus fully predictable and controlled damping characteristics throughout its full stroke. This design is also self-compensating for oil leakage and temperature effects.

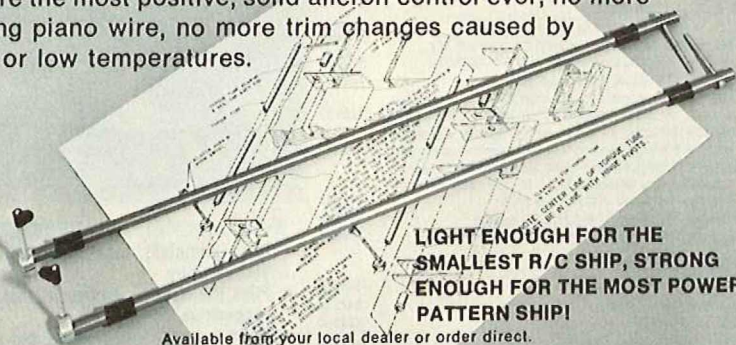
We are publicly disclosing this design here so as to establish the origin of this simple but truly effective shock absorber. If you have an application for this shock design, please contact Bill Campbell at Delta Manufacturing, 27 Racecar Court, Lorimor, Iowa 50149 USA (515) 763-2220. We have several configurations of this shock absorber and would be willing to help match or design one for special applications. □



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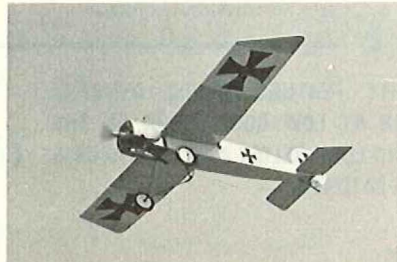
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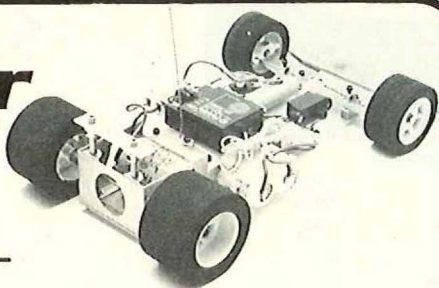
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## PIT STOP

from page 90/86

next with 283.4. Arturo was 3rd with an identical 283.4, but no backup times. Chuck Phelps was next with 285.0 and Bruce Oakley 287.4.

### Oval "A" Main

The Oval "A" Main was full of suspense. Art took the lead with Ralphie in 2nd. About the 20 lap mark, Art got tangled in traffic and the wing got bent. He pitted to fix the wing and Ralphie took the lead with Art 2nd.

Ralphie kept the lead till 60 laps when he got hit in traffic and it chunked the right rear tire. It took him a couple laps to get back to speed, then he got hit in the muffler and was out of the race.

Arturo then took over the lead and he had about a 1 lap cushion. All he had to do was stay out of trouble. But that wasn't easy. On the 92nd lap Art hit a car that had spun out in front of him and he lost his steering servo.

Rick Davis now had the lead and he also had a full 1 lap lead. Then on the 98th lap Rick hit a parked car which broke the front of the body loose. Every time he gave the car some power the front of the body came up, and if he gave it too much power the whole car pulled a wheelie. He now had to limp around the track about 20 mph while cars were flying on by at 60 mph. Kevin Orton was in 2nd place and was closing in on Rick fast. On the last lap Rick had about a 50 foot lead going in to turn 3, but by turn 4 Kevin was right behind. Rick punched it, the car pulled a wheelie, Kevin closed too fast, and ended up hitting Rick's car and it actually pushed Rick's car across the finish line in 1st place. Kevin was a split second behind in 2nd place with Greg Zielenski finishing one lap behind in 3rd.



In a race of seemingly who could finish could win, Rick Davis (left) kept it together to cross the finish line first, to win the Oval Main. Rick also won the concours event with his Williams paint job by Erich Kugler. 2nd In the Oval was Kevin Orton (center) with Greg Zielenski 3rd.

to page 134



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## PIT STOP

from page 132/86

### OVAL "A" MAIN

1.	Rick Davis	Associated
2.	Kevin Orton	Delta
3.	Greg Zielenski	Delta
4.	Art Carbonell	Delta
5.	Dave Hechler	Associated
6.	Bruce Oakely	Delta
7.	Chuck Phelps	Associated
8.	Jerry Snow	Associated
9.	Ralphie Burch	Associated
10.	Rich Lee	Associated

### OVAL "B" MAIN

1. Ross Kloeber
2. Jack Mueller
3. John Thorp
4. Gary Campbell
5. Dana Smeltzer
6. Rich Potempa
7. Bill Jeric
8. Jim Lehman

### LTA-61 BLIMP

from page 85

..... written instructions are very complete and take you through all phases including flying and, if necessary, repairing.

First crack out of the barrel, the plastic blimp bag is inflated by using the exhaust end of a vacuum cleaner. The manual suggested making a tapered cone out of an 8½" x 11" sheet of paper, fitting the small end inside the bag filler tube and the large end over the aforementioned exhaust port of the vacuum cleaner. We, instead, borrowed a plastic funnel from the wife's kitchen and found it couldn't have been better! (Little did she realize that all this time she had a "blimp bag filler funnel" in the kitchen drawer.) The purpose of filling the blimp's envelope was, of course, to

to page 138

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**BIG IS BEAUTIFUL**

from page 199/7

quantities of the engine. He tells me he expects to build perhaps five or ten a year and this would make it a real collector's item. He anticipates cost to be "about \$3000.00 US" and would be interested in finding out how many might be interested in such an engine at such a price. Those of you whose ears pricked up at the mention of a working rotary engine should drop Guy a line at the above address for additional details and possible delivery schedule. The engine has been built (not yet by Guy) and has the reputation of being an easy-starting, tractable engine. The picture I have of the engine was clipped from a magazine and is, unfortunately, not of a quality to permit reproduction here. It looks rather nice, to say the least. Can you imagine a Quarter Scale WW I fighter with a real rotary up front? Can you imagine the torque? It'd be the next best thing to flying the real thing!

See you next month.

**OFF-ROAD RACING**

from page 4

gear, for those hard bumps and knocks that are imposed on the transmission during operation. Retail price is \$24.95, at the time of this writing.

There are two more new items from R.C.H. Products. One is a set of trailing arms made from tough nylon that retains the shape. They are 40% lighter than a set of stock trailing arms, cost less and last a lot longer. Retail price is \$11.95 for a set of four.

Also, there is a new brass gear for the transfer case that is very nearly the same weight as the original nylon gear.

All of the above items, and more, are available at Radio Controlled Hobbies, 657 W. 19th St., Costa Mesa, California 92627, or R/C Race Prep, 7137 Owensmouth #26C, Canoga Park, California 91303.

Mike Reedy has a new electric motor especially wound for off-road. The Reedy Modified motor that we have run for two months has been strong running and is one of the fastest to date. Retail price on the motor is \$60.00 and worth every penny. You can buy a Reedy motor at your hobby shop who can get them from Associated.

Fun Racing Products has released



the Mono-Shock suspension for the Tamiya car. It is a new concept for R/C racing. Using the Kyosho shock and F.R.P. coil-over spring, the Mono-Shock is made to bolt on to the F.R.P. Products rear cage, but it can be adapted to other roll cages. Retail price for the Mono-Shock system (excluding shock and coil-over) is \$49.95. Available from R.C.H. Products, 657 W. 19th St., Costa Mesa, California 92627.

From Moore's Ideal Products, there is a set of replacement hardened steel axles with anodized aluminum drive for the rear wheels of the Tamiya buggies. Retail price for the set is \$12.00

Also, there is your choice of oil dampening shocks with or without coil spring, both bolt right to the stock front and rear end. Retail price for shocks is \$19.95 a pair; coil spring shocks are \$24.95 a pair. Moore's Ideal Products are available from hobby shops.

The new off-road car from World R/C Imports is the A.Y.K. car. The one we have been running is very impressive in its handling. The suspension is very much like the I.R.S. suspension used in the full sized cars, which makes turns easier. Even when using a lot of power, the car does not want to overturn. The fit of the machined parts is very precise and we had no problem in assembly.

Another new item from World is the A.Y.K. peak detector charger. Just plug in batteries, set voltage, push start button, and walk away. The charger does it all — charges the batteries to peak charge and shuts down to a trickle — no more overheated batteries. The charger is only \$39.95. You can believe it.

Also available is a complete line of accessories, bearings for the motor case and wheels, brass gears for the transmission, replacement bodies, and a complete stock of replacement parts.

The A.Y.K. cars, accessories and replacement parts are available through hobby shops. □

#### FROM THE SHOP

from page 2

..... is that which produces a square or cube of the number. The drain on the numbers and the extreme rush which is required to hurry so many numbers out of the battery often brings about premature failure.

Experts recommend avoiding problems which require large numbers or which contain 8's and 9's  
to page 205

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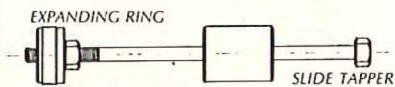


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% Nitro	One Gal	4 Gal case or 5 Gal can Per Gal	24 Gal Per Gal	126 Gal Per Gal	30 Gal drum Ea	54 Gal drum Ea
0%	10.50	6.60	5.75	5.35	103.00	140.00
5%	11.50	7.80	6.95	5.85	152.00	235.00
10%	14.00	9.10	8.25	7.79	205.00	330.00
12%	15.00	9.70	9.00	8.67	227.00	368.00
15%	16.00	10.10	9.25	9.00	258.00	425.00
25%	23.00	17.50	16.00	14.47	363.00	614.00
40%	30.00	25.00	23.00	21.00	520.00	897.00
60%	38.00	33.00	31.00	29.00	705.00	1230.00

#### NEW! Economy fuel with castor oil lubricant.

10% 11.00 7.80 7.00 6.60 170.00 280.00

Prices are subject to change without notice. Free delivery on 1, 4, 5, 24 & 126 gal deals in USA. 30 & 54 gal drums are freight collect. FOB Clover, S.C. Gallon price is determined by nitro content & total qty. ordered. S.C. orders add 4% sales tax. Use charge card on any order. C.O.D. limited to UPS shipments only. Deduct 3% for prepayment by money order or certified check.

#### FOR 1/4 SCALE ENGINES

"NEW" Power Booster — \$12.00 qt. 38.00 gal. Frt. included. Use 3 oz/gal in gas mix.

"NEW" Oil — \$10.00 qt., \$30.00 gal.

Order from:

FHS Supply, Inc. Route 5 Box 68

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