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Radio Control CAR ACTION

THE WORLD'S PREMIER R/C CAR MAGAZINE

June 1991

GIL LOSI
the Man Behind CAR of the YEAR!

MOTOR TIPS 20 hot

SMOOTH MOVE
RC10 TRANNY MAKEOVER

PROJECT KING CAB

TRC PRO 10

MEGAFET TEKIN 420F

MK'S TSUNAMI FLIER

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Radio Control CAR ACTION

VOLUME 6, NUMBER 6 JUNE 1991

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ON THE COVER: Top right—Team Losi's Junior Two. Center right—Tekin's TSC 420F speed controller. (Photos by Yamil Sued.) Lower right—MK Engineering's Magnum deep-vee. Center—a grinning Gil Losi Jr. (Photos by Steve Pond.)

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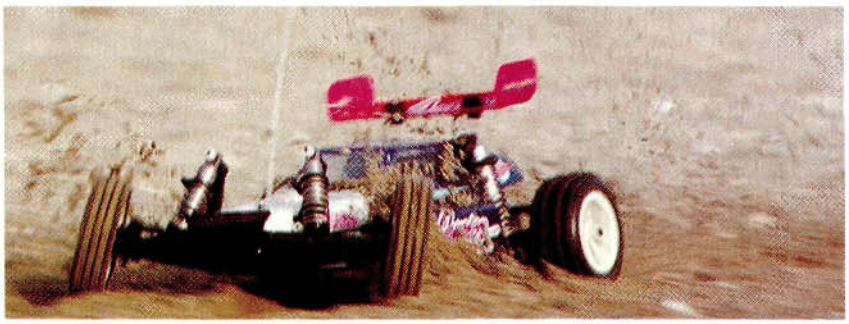
Gil Losi speaks up, page 52

EDITORIAL

by STEVE POND



RECENT DEVELOPMENTS in the R/C racing world have left our sanctioning organizations with the burden of making decisions that will dramatically affect the off-road racing fraternity.

During the last IFMAR World Championships in Sydney, Australia, new tires and wheels that were 2.2 inches in diameter were introduced. Although they were well within the boundaries of that organization's rules, the controversy that surrounded their use created a dark cloud that still remains almost two years later. At the time of the event, a variety of 2.1-inch tires and wheels was available to most of the racers there. The 2.2-inch goodies were still in the prototype stages; that obviously limited their availability, and those who weren't able to get their hands on them called "foul."

Since the World Championships, much of the tire technology in Europe and Japan has shifted toward the 2.2-inch configuration, which is legal under the rules of these countries' sanctioning organizations. This creates a problem in the U.S., because these foreign manufacturers are major tire suppliers here. Our sanctioning organizations, however, specify a maximum wheel diameter of 2.1 inches. So what's the solution?

A scale appearance advocate might argue that the larger 2.2-inch wheels and tires are too far out of scale and compromise the cars' appearance. On the other side of the argument, some racers say that the best tire technology is found in the 2.2-inch versions, so we'd be doing competitors a disservice if we ban them because of a .1-inch increase in diameter.

Another tire/wheel issue that surfaced recently concerns off-road racing trucks. At the 1991 Florida Winter Champs, Team Associated unveiled the first prototype of their soon-to-be-released racing truck, which features a narrow front tire that's approximately half the width of a standard racing-truck tire. Current truck racing rules specify only diameter and make no reference to minimum width, but many racers question whether an amendment should be adopted.

Again, there are two sides to the discussion: some say that, for the sake of performance, the narrow tires should be allowed; others say that these tires aren't consistent with the intention of the rules, and allowing their use would require everyone to buy new tires and wheels to be competitive.

There's no definitive answer to these questions—only opinions. When it's time for the racing organizations to make their decisions, it would help them to have substantial input from their members. If you feel strongly either way, drop them a letter! ROAR's address is 288 East Maple, Suite 266, Birmingham, MI 48011. NORRCA's is 331 Mariposa Court, Upland, CA 91786. ■

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ON JUNE 26, 1990, APPLICATION FOR ABC (AUDIT BUREAU OF CIRCULATION) MEMBERSHIP WAS FILED BY R/C CAR ACTION.

LETTERS

We welcome your comments and suggestions. Letters should be addressed to "Letters," *Radio Control Car Action*, 251 Danbury Road, Wilton, CT 06897. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous numbers of letters we receive, we cannot respond to every one.

JET BUSTER

I think you were confused when you wrote the report on the "jet-powered" monster truck (February '91, page 12). It would be difficult for the Clod Buster that's shown to be jet-propelled, because the flame comes out of the front. I'd like to see a jet-powered monster truck, but I guess I'll have to wait for one to hit the market. Also, can a Futaba MC112 speed controller handle a Clod Buster with two Monster Mash motors? If so, is there a limit to the kind of batteries I can use for just playing with my truck?

BRYAN MACDUGALL
Seattle, WA

Bryan, even jets backfire! It's a fact that the Soviets have a plane called the "Backfire Bomber" (the TU22M)! How do you think it got that name? Although the MC112 is a well-made controller, it was never designed to handle modified motors—especially two of them! Go with a PDI Turbo Zeta. CC

JET OR TURBINE?

On page 12 of the February '91 issue, one of the headlines says, "1/10-scale Jet Power to Come?" but the text says the vehicle is turbine-powered. There's a big difference between jet and turbine engines. Which is it?

KIRBY LUNN
Regina, Canada

Kirby, to be honest—neither. The truck you refer to is called the "Hot Head," and it's the brain child of Scott Branch of Hartsdale, NY. Butane gas is used to make the flames. I wish we could do a feature on this awesome vehicle, but the flame-thrower is just too dangerous. Scott has been working on this truck for the last few years, and he has spent a lot of time ensuring that the flame system is safe. For legal reasons, however, it's just

too dangerous for us to review it. I saw this beast in action, and let me tell you, it's HOT! JH

PURR LIKE A KITTEN

My RC10's tranny makes a lot of noise, but when I went racing for the first time, all the other cars purred like kittens. Should I get a new tranny? (My friend says it's messed up.) Also, when will you report on Freddy the Talking Speed Controller? I'd like to get one, so it will tell me what's wrong. How can I get *R/C Car Action* decals?

WILLIAM GARDNER
Austin, TX

William, the original RC10 tranny's molding was bad (flashing and burr on the gears). Clean the gears with the polishing wheel and the soft wire wheel on a Dremel tool. (See Steve Pond's article, "RC10 Torpedo" in the July '89 issue.) We had to put our review of Freddy on hold; he's fighting a "Nannite" infection, and his doctor gave him strict orders not to talk. For Car Action decals, see the order form on page 205. CC

YOU'RE CONFUSED

I've been an avid reader of your magazine for some time now and plan to continue—that is, if I can figure out which magazine to read! In the February '91 issue, I saw an advertisement for a *separate* monster/racing truck magazine. This distressed me in a major way! Like many R/C hobbyists, I have an interest in both cars and trucks, and I spend a lot of money on them. How do you expect me, as a younger enthusiast (I'm only 14 and hardly have the money to send this letter!), to be able to afford *two* magazines about the same thing!

Although you don't include aircraft in your publication, you don't separate boats from it. So why trucks? Not only have you distressed people interested in both cars and trucks, but you've made hypocrites of yourselves. As I recall, you once said that monster trucks and racing trucks should

(Continued on page 28)

PUBLISHER'S PAGE

by LOUIS DeFRANCESCO, JR.

Publisher Louis DeFrancesco holding the creative R/C effort of Steve Ibershof of Grand Rapids, MI. This project started life as a Monogram static plastic kit and was converted to R/C—another testament to the ingenuity of our readers!

I HOPE THAT, by the time you read this, the war in the Gulf will be in its twilight and our troops will have begun their homeward trek. Here at Air Age Publishing, our patriotic spirit is high, and we were able to ship 20,000 magazines to the Middle East on a military C-130 supply plane. We thank Major Jennifer Fletcher of the Defense Logistics Agency for helping to expedite the shipment. We've received many letters from Desert Storm soldiers who are readers of Air Age magazines, and we hope they'll soon be reading them on the trip home.

TWO-TIME WINNAH!

Well, Team Losi has done it again: for the second consecutive year, they've captured the coveted *R/C Car Action* "Car of the Year" award—this time, with their new Junior Two. The major criteria that convinced us this was "the car" are its race-bred features and affordable price, which greatly appeals to newcomers on budgets. By using less expensive, molded, composite materials and borrowing some of the JR-X2 and JRX-Pro's proven design features, Losi came up with a sure-fire winner. High tech with high price isn't necessarily the right combination for success—as this latest victor from the seminal minds of the Losi clan shows. Congratulations, boys!

RESOURCEFUL READERS

Our "Readers Rides" mail bin is overflowing, and we love it. We feature the hottest, most imaginative projects in our "Home-Built Series," and I urge you all to keep 'em coming, because *Car Action* is *your* magazine.

Once again, our belief in the overwhelming creativity of our readers has been confirmed. Steve Ibershof of Grand Rapids, MI, submitted a picture of a 1927, T-bucket, R/C hot rod that started as an old, 1/8-scale, static plastic model kit. How old? I built this model in the mid-'60s when it was introduced by Monogram Models! Most notable is the way in which Steve cleverly adapted the kit to R/C while hiding most of the components to give it that scale look. Way to go, Steve!

As for the rest of you R/Cers: don't be bashful. Let us see what you're doing! Hey—you might even start a whole new trend in R/C! ■

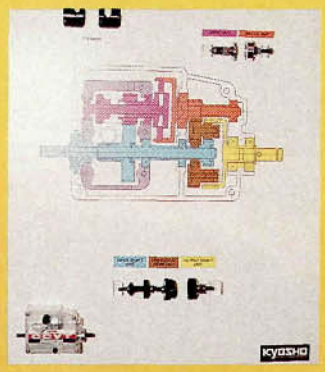
INSIDE SCOOP

by CHRIS CHIANELLI

As directed by the Ayatollah of Radio Controlla, Commander Crash Chianelli reporting back to the faithful followers of the Grand High Exalted with pertinent information! I'm back from my latest espionage excursion with microfilm, spy shots and stolen communiques that read as follows:

Chris Chianelli hobnobs with Mr. Suzuki at the Nuremberg show.

SUZUKI



Here's a spy shot of the CCVT schematic that Chris smuggled back to the U.S.

Table-top racer

This new 1/40-scale F40 Ferrari is one of the Marui 40PRO Series which will be offered by Imex. The vehicles in this series feature a 2-channel proportional radio, 3 to 4 minutes of driving at 1 minute of charge, and a front suspension with gear diff. Also in the Series is a Nissan Skyline GTR and a Porsche Carerra. Now all you have to do is map out a course on dad's pool table with a magic marker. (Caution: this may be hazardous to your health.)

2 FOOT TANKER

—actually, it's 27 inches long, but "27-inch Tanker" makes a lousy heading. Anyway, Robbe has added this new item to their Kenworth Aerodyne-Conventional. The kit features sprung axles (good for off-roading!), die-stamped scale parts, a steel-wire roof rail with brass-railing stanchions—and much more. As the Humungous from the movie "The Road Warrior" would say, "I want that fat tank of gas."

I don't know—and it isn't any of my business—where Mr. Suzuki (Mr. Kyosho) gets his energy or resources, but at this year's Nuremberg show, Kyosho's booth was crammed with more new car surprises than any other one.

POWER

Yeah, that's me with Mr. Suzuki—one of the most cheerful people I've ever met. Mr. Suzuki is holding the Ferrari F189, while I'm hanging on to the new ESPO Larrousse 90 (both powered by the muffled Cox .049 engine). These Formula 1 gassers will hit U.S. shores *soon.*

Also new from Kyosho is the revolutionary CCVT (compact, continuously variable transmission), which they developed with Bridgestone. The step-less "gear-shifting" adjusts automatically to a vehicle's needs while it keeps the motor running at optimum torque levels. That's all I can tell you now, but stay tuned to "the Scoop"; I'll be back with more on this interesting equipment.

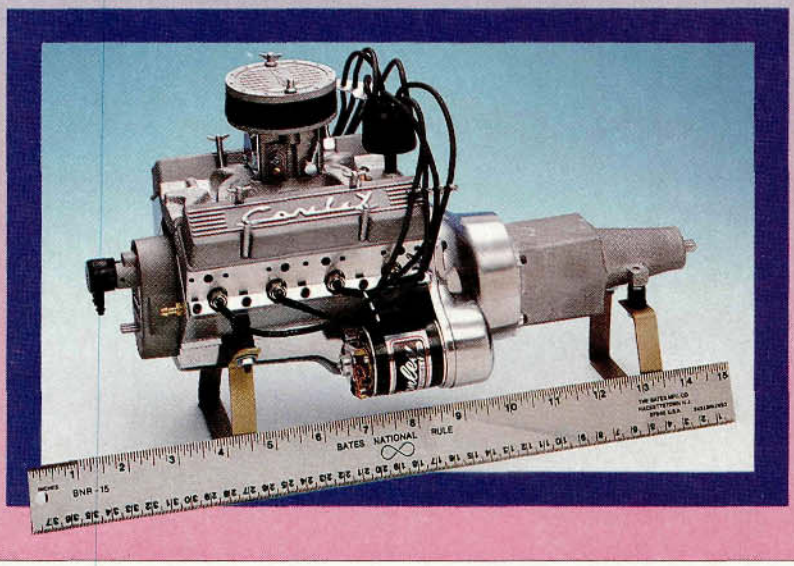
Travel Benefit

Most of the complaints voiced about the Clod Buster concern its suspension travel—or lack of it. Now, with the new Clod/Bullhead suspension kit from Production Design Inc., you can increase its travel from the stock 7/8 inch to 2 1/4 inches. The suspension kit comes in two versions (one for the stock plastic chassis and one for the aluminum chassis), and the four-bar suspension features torsion-bar augmentation. Coming this spring to a store near you!

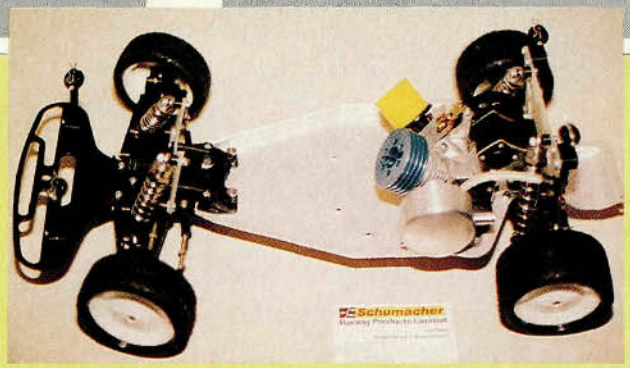
Conley Precision Engines Inc., of Glen Ellyn, IL, has developed this completely machined, ready-to-assemble, small-block V-8 engine. The major differences between this and earlier Conley V-8s, which needed additional machining by the modeler, are the addition of numerous die-cast parts, e.g., heads, valve covers, a bell housing, rods and much more. The engine's quality, appearance and detail surpass anything that has gone before.

small block

Like mastermind Gary, this is some piece of work!

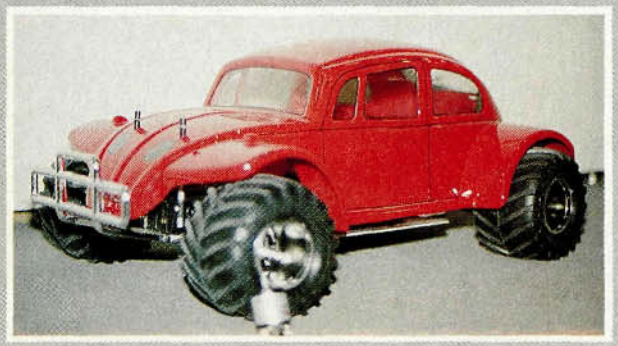


COUGAR GOT gas

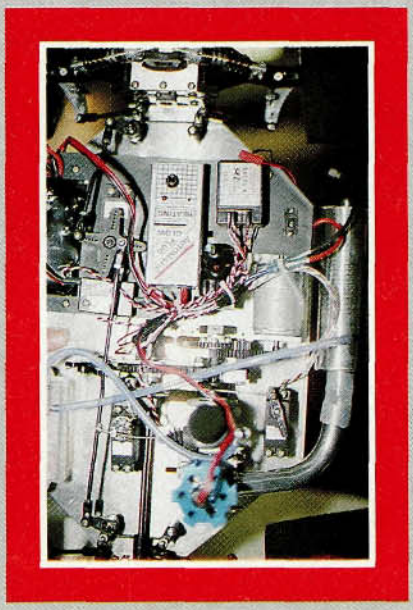


This is only a prototype, but it seems clear that Schumacher is moving ahead with .10 glow-engine versions of the Cougar and the Shotgun racing truck. After I'd taken this spy shot, I was politely escorted *out* of Schumacher's booth! Needless to say, they weren't willing to share any details with me.

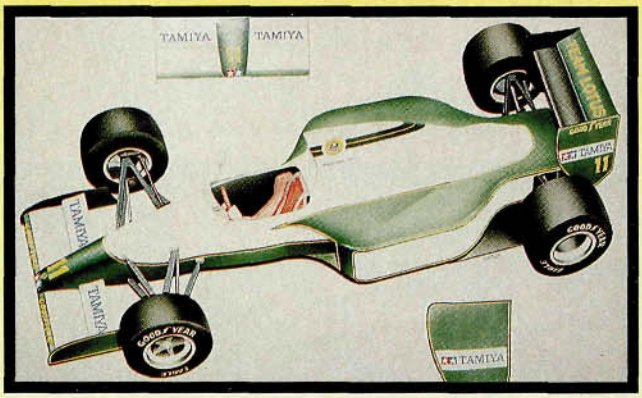
BEWARE OF BUGZILLA!



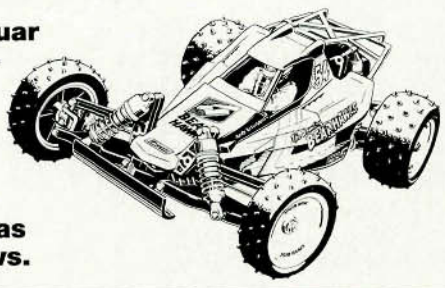
When I secretly met my spy—code name: Herr Titewaden—in Dusseldorf, Germany, he gave me this photo of the 1/6-scale 2WD BUGZILLA (for size comparison, that's an 05 motor resting by its front left wheel). This giant has a .46 pull-start glow engine, an aluminum frame, oil-filled aluminum shocks and a reasonable price tag (or so I'm told). It will soon be available from Altech Marketing, as will these options: 4WD upgrade, automatic glow lighter, reverse and onboard electric start. Altech has even more surprises in store, e.g., the Big Hammer 4WD truck—but that's another story, for another time.



TAMIYA enters FULL-SCALE formula 1

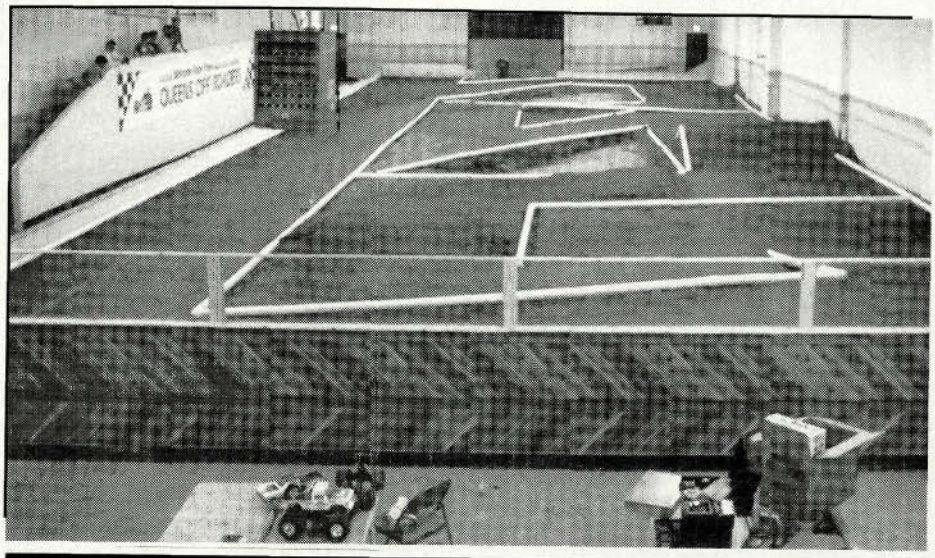


At the 1991 Nuremberg International Hobby Show, Tamiya Plastics Model Co. announced that the company will sponsor Team Lotus during the 1991 Formula 1 racing season. It seems appropriate that the maker of super-detailed, static, F-1 kits—including the Lotus—has decided to support an innovative, world-class team in full-size racing. Tamiya also has something for R/Cers: see the line drawings of the new GTP Jaguar for the C11 chassis and the all-new Bear Hawk—an econo 2WD buggy that can be extensively upgraded, as your budget allows.



HOT TRACKS

Here's another in our "Hot Tracks" series of outstanding R/C race courses. To see your favorite track featured here, send us good black-and-white photos and a description of its delights! (approximately 500 words). Send your entries to Hot Tracks, Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897.



QUEENS OFF-ROADERS RACEWAY, LONG ISLAND CITY, NY

WHEN THE WEATHER prevented us from completing our "Monster Truck Shootout" outside, the *Car Action* staff was very lucky to find the Queens Off-Roaders Raceway. Located just 15 minutes from the heart of New York City—at 42-12 13th Street, Long Island City, NY—this is one of the nation's largest, indoor, off-road racing facilities. Finally, there's an off-road track where you can race—rain or shine!

The track is 160 feet long and 57 feet wide, and it has 12-foot-wide lanes of the finest clay. Pit space is provided for 230 racers, and there are four A/C outlets for each. There's indoor parking across the street, so you needn't worry about your big car while you're racing your small one! There's an AMB computerized lap counter, and a large scoreboard tells the crowd the leaders' positions, the time left in each race and how long they have to wait for the next one. Spectators can watch the action from the snack bar/hobby shop that's above the track.

The track is open every day except Monday. On Tuesday, it's open from 10 a.m. to midnight, and the racing starts at 8 p.m. for 4WD modified and 2WD stock and modified. On Wednesday and Friday, the track is open for practice from 10 a.m. to 8 p.m. It opens at 10 a.m. on Thursday, and stock and modified trucks race from 8 to midnight. On weekends, the track is open for practice at 9 a.m., and racing starts at 11. Saturday is for 2WD stock, 2WD and 4WD modified and novice; Sunday is for 2WD stock and modified, stock and modified trucks and novice. ROAR rules apply.

For more information, call the Queens Off-Roaders Raceway at (718) 392-5766 (fax: 718-392-5982). Owners James and John Lee are very proud of their new track and are looking forward to many years of enjoyable racing. As John would say, "It's totally awesome, dude!" ■

JOLLY RODGER

You've seen red Ferrari F40s, but how about one painted in the Jolly Rodger F-14 colors? David Schleinkofer of Morrisville, PA, based his F40 on a JR-X2 chassis, but he made several suspension mods to lower the body. To improve the car's handling, he turned the tranny around for a mid-motor placement. For the electrics, he chose a Novak ESC, a Futaba Magnum Jr. and a Trinity Joel Johnson Modified motor.

MOPAR MAGIC

Scott Parkison of Selma, IN, whipped up this Dodge Daytona, and now he's ready to do battle with the best of IROC. With a race-proven Bolink Eliminator 10 under the hand-painted and detailed body (he made most of the stickers and numbers himself!), a Trinity Equalizer motor and a Futaba radio, Scott has the right stuff to go for the glory.

CRAZY CAMARO

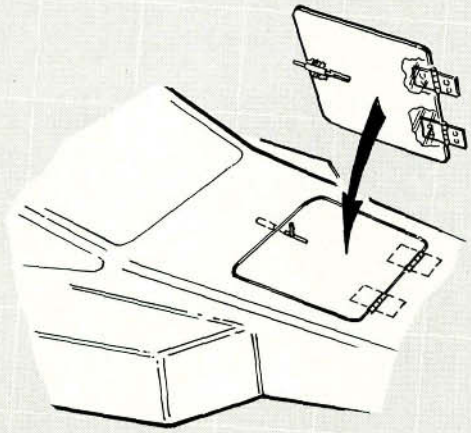
Luis Irizarry of Bronx, NY, created this 1/12-scale '68 Camaro Pro Stocker. He started with an old Tamiya chassis, to which he added a Monogram '68 Camaro Z/28 polystyrene, static-model body. To make the car look as realistic as possible, he added a few coats of red and white lacquer and installed working lights. (He even added a registration sticker to the windshield!) With a Kyosho Mega Motor under his car's hood, Luis is ready to cause a "K-Motion." Any challengers?

PERFECTION TAKES TIME

Here's a nicely finished Clod Buster from Jeff Smith of Dexter, MI. With a host of chromed parts, twin LeMans 480 Gold motors, an ESP Lift Kit and a trick splash-style paint job, this is one impressive machine. Jeff spent more than a year on this truck, and all his work definitely shows!

PIT TIPS

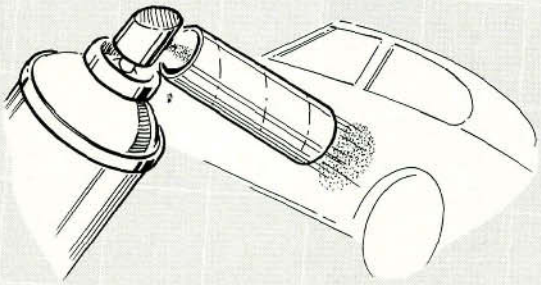
by JIM NEWMAN



RC10 CHARGE-PLUG HATCH

Avoid having to remove your car's body to reach the charge plugs: cut a small hatch over the battery plug. Glue model plane control hinges to the underside of the hatch and to the body. Make a latch with a piece of ball-point-pen tube and a paper clip, and glue a couple of tabs under the body shell to stop the hatch from falling inward.

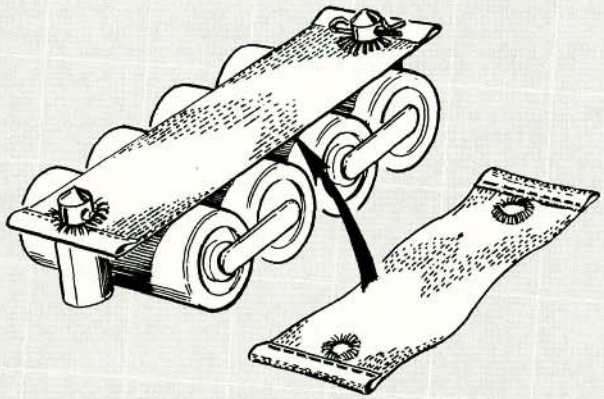
Philip Landowski, New Berlin, WI



TOUCH-UP MASKING

If you want to touch-up the paint on a small area, try spraying through a cardboard tube to reduce the chance of overspraying. Do experiment on a piece of cardboard first.

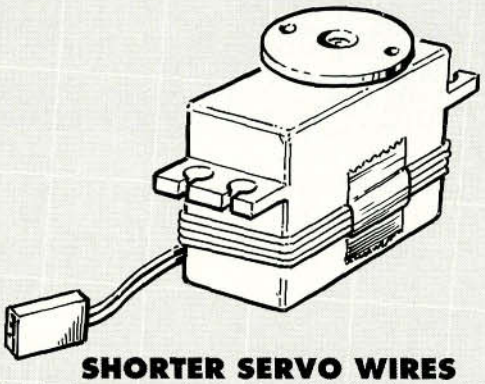
Danny Harrison, Fayetteville, GA



YZ-10 BATTERY STRAP

Instead of using a regular graphite battery clamp, you could cut and stitch a piece of wide elastic, make "buttonholes" in it (as shown), and stretch the elastic over your Ni-Cds to keep them in place. If you do this properly, you won't need clips at both ends, and this will really simplify battery removal.

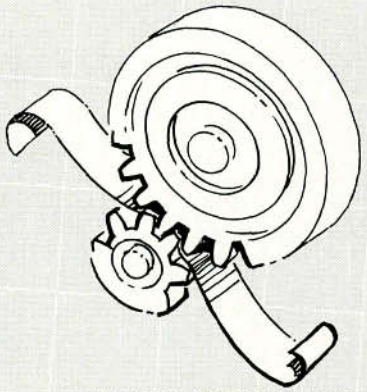
Chris Casey, Manhattan, KS



SHORTER SERVO WIRES

Instead of allowing your servo leads to clutter the inside of your car body, wrap them once or twice around the servo case, and secure them with a piece of tape.

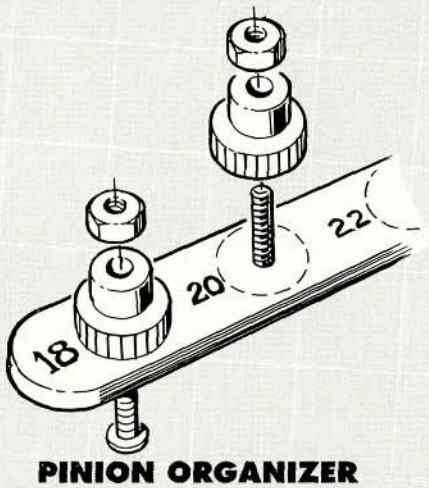
Paul Borg, Hammondville, Sydney, Australia.



PINION CLEARANCE

Feed a narrow strip of paper between the spur gear and the pinion before you tighten the screws. The paper will provide enough mesh and a proper clearance so that you can adjust the gears to run smoothly. Remove the paper after you've set the clearance, of course!

Peter Yang, Downey, CA

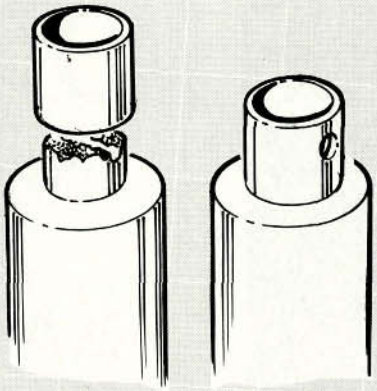


PINION ORGANIZER

Here's a simple, inexpensive way to organize pinions: drill holes in a Popsicle stick; glue machine screws into them; then hold the pinions on with nuts. Mark the stick to show each pinion's ID.

Lee Lossing, Brooklyn Park, MN

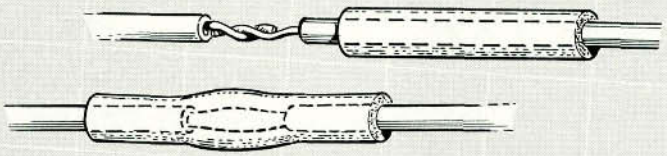
PIT TIPS



BODY-POST REPAIR

If you have enough of a nub left on your broken body post, glue a piece of aluminum tube over it. When the glue has hardened, drill new holes for the body clips.

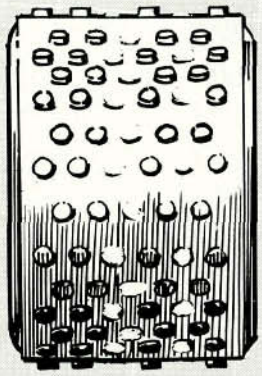
Dean Kyriannis, Astoria, NY



RUBBER-TUBE INSULATOR

When you've soldered wires together, slip a piece of model plane fuel line over the joint to insulate them. If you have to separate them for any reason, you can slide the tube along, instead of fighting to cut off a piece of shrink-sleeve.

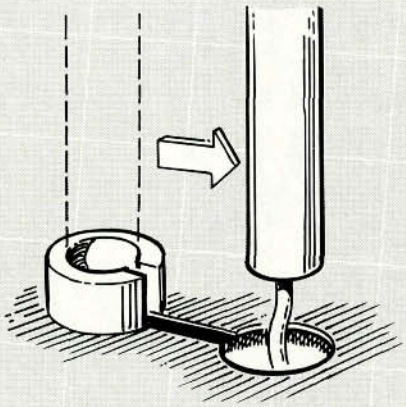
Brian Fick, Deansboro, NY



TIRE TUNING

With monster knobbies in front, you might notice that your R/C vehicle oversteers. By removing some of the knobs, you'll be able to tune the tires' grip and eliminate any tendency to oversteer. Just experiment until you get it right.

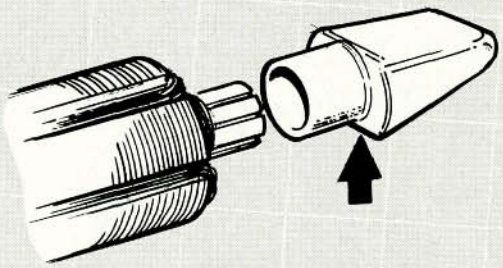
Jason Anderson, Grand Terrace, CA



EASY BLACKFOOT BODY REMOVAL

You don't have to remove the antenna each time you want to take the body off your Blackfoot. Cut a narrow opening in the antenna stub; drill a 1/4-inch hole in the body about 3/8 inch away from the stub; then cut a slot from the hole to the stub. To remove the body, just lift the antenna tube as shown, then feed it carefully through the hole as you raise the body shell.

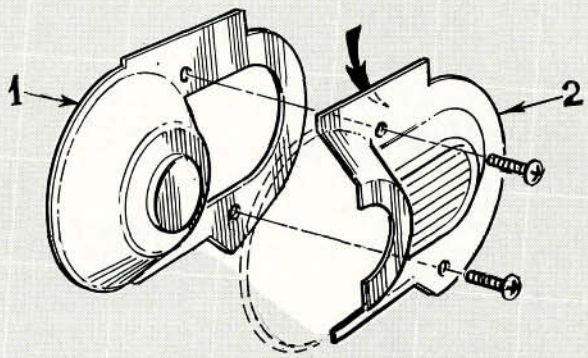
Chris Melfi, Mentor, OH



COMMUTATOR CLEANER

Stretch a pencil eraser over the commutator on your motor, spin the commutator, and you'll soon see that it's bright and shiny again.

Max Gundlach, Elroy, WI



RC10 DIFF COVER

In the drawing, no. 1 is a regular plastic diff cover that has been caulked to the diff case. (Note how the cover has been cut away.) No. 2 is a dust cover that has been partly cut away. A soft tape gasket has been stuck to the cover's face (see arrow) to prevent dirt from getting between the two covers. No. 2 is held by the usual screws, but it allows easy access to the pinion.

Ben Stitt, Kennewick, WA

Radio Control Car Action will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send rough sketch to Jim Newman, c/o **Radio Control Car Action,** 251 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.

LETTERS

(Continued from page 9)

be separated, not combined into one mag! Why do you insist on doing this?

STEVE BRENNAN
Decatur, IL

Steve, you're confused. We're not publishing a separate monthly magazine for trucks. We're simply offering a special truck issue! R/C Car Action will still cover all aspects of R/C cars and trucks. When we talk about separating monster trucks and racing trucks, we're talking about racing classes—not separate mags! CC

GRAPHITE WORSHIP! HERE WE GO AGAIN!

I've owned a Traxxas Sledgehammer since June '90. I wanted to buy a graphite chassis for it, but I haven't had much luck finding one. The people at my hobby shop say it isn't available yet, but I've seen the Traxxas ad (showing graphite parts) in your magazine for almost a year. I was able to order the front and rear graphite shock mounts from my shop, but not the chassis. I also called Tower Hobbies, but they didn't have one, either. Am I missing something here?

JASON KASSIS
Decatur, IL

Jason, your monster truck doesn't need a graphite chassis! Spend the money on an electronic speed controller, or ball bearings, or...I don't know—your girlfriend, maybe. Don't let people tell you what you need. Sometimes, this graphite stuff goes too far, so stop already! Besides, the Traxxas chassis is for the Radicator and the Bullet (which has been discontinued), not the Sledgehammer. CC

BEST MOTOR

I was given a Championship Edition RC10 recently, and I've been wondering which modified motor would be the best for it. Also, does this car need a bumper to race competitively?

JOSH CHAPPELL
Buellton, CA

Josh, it's hard to say that a particular motor is "the best." There are many factors to consider when you choose a motor. I hate to admit it, but something that a mechanic friend of mine used to say is true, "Speed is money. How fast do you want to go?" You have to decide whether you want to splurge and buy a hand-wound modified or just go for a "budget" modified (see the August '90 issue). As for the winds, find out what others at your track are running. At the moment, I use a 14 Quad in my RC10, but this might not be the right motor for your car.

Your RC10 doesn't need a bumper to race. If you're a beginner, it might be a good idea; otherwise, it will probably dig into jumps and slow the car down.

JH

RC10 TRUCK

I own a graphite RC10. Is it competitive against the Championship Edition RC10? If I modify my RC10 so that it has the same setup as the RC10 CE, will it be able to beat the CE? I know the graphite version is lighter than the CE, and this leads me to believe that it's faster, too.

Should I convert my graphite RC10 into a monster truck and use an RC10 CE for 2WD off-road racing, or would it be better to convert a CE into a monster truck and use the graphite version for 2WD off-road racing?

I was told that mounting an ESC on a car's chassis horizontally keeps the ESC cooler than mounting it on the rear shock tower. Is this true? If so, where do I mount an ESC on my graphite chassis so that it's completely on the chassis.

ERIC KANTERMAN
Marlboro, NJ

Eric, there are very few differences between the RC10 graphite and the RC10 CE. Their similarities include the new rear bulkhead, wider front arms, in-line steering blocks and increased rear toe-in. In fact, the only notable differences (aside from the chassis) are the CE's longer .71 shocks and three-piece rims

and the graphite's universals. And you're right, the graphite is slightly lighter, too. Don't worry about which one is better; they're both great!

As for truck conversions, hold on to your paycheck a little longer. Reliable sources tell me that Associated is working on a 2WD truck. I don't have all the details yet, but I've heard that it will have an aluminum chassis and new suspension components, tires and rims. I've also heard that it will be based on the Stealth transmission.

I'm not sure that mounting a speed controller on a chassis actually keeps the controller cooler. Although Masami Hirosaka and Cliff Lett both mount ESCs on their aluminum-tub chassis, graphite chassis are smaller. Mount your ESC on the shock tower, or try mounting the receiver on its side so that it won't hang off the edge of the chassis. I mount my ESC on the shock tower, and if it gets hot, I cut a small opening in the windshield to let air in. JH

WIDE LOAD

I have a tricked-out, supermodified JR-XT that uses a Triad 12-turn motor, pushed cells, a Tekin 411P and Sermos connectors—the whole enchilada! For the suspension, I use Robinson Racing's extended A-arms in the front (they work well!), but I want to increase the car's rear width. Which would work better: RPM's trailing-arm suspension or Robinson's H-arm type? What are the good points and bad points of each? Also, do Paragon Jump Jets really work?

JASON HERRON
Huntington Beach, CA

Jason, there's a lot of confusion about trailing arms and H-arms. When the JR-X2 was first introduced, the rear suspension was its most innovative feature. With the introduction of H-arms, everyone's ditching this setup. Why? I don't know. Losi designed the JR-XT to use a 5-link rear end for a good reason.

I think trailing-arm suspensions work well on rough tracks, and H- or A-arm suspensions work well on smooth tracks, but don't take my word for it—experiment! Try both types of rear suspension in the standard width and see what happens. Then try the wider version of whichever one worked best. Just don't forget that widening a car makes it squarer. This increases its turning ability and decreases its straight-line stability. Only you can decide if that's what you want.

Yes, Jump Jets work. I tried a set of them on my old RC10's rear shocks, and I was happy with the results. You can't use pressure gaskets with them, though, so it's not possible to have totally air-free shocks. They are, however, the closest thing to a variable-rate damper that I've seen so far. JH

WIMPY, WIMPY, WIMPY

The August '90 "Dirt Digest" column said that a truck the size of the USA-1 needs a steering servo with 50 to 75 ounce/inches of torque. In the November '90 USA-1 "Track Report," however, the author used a Futaba S132H servo, which only has a rating of 25. How could the USA-1 steer using a servo with such low torque? Your magazine rules!

SCOTT SULLIVAN
Bolingbrook, IL

Scott, just because this servo's power rating is low, it doesn't mean it won't work. Although it isn't the servo I'd choose for a truck like the USA-1, sometimes you have to use what's available, and that was all Joe Bruni had at the time. It worked well enough for the tests and the photo shoot, but for optimum performance, a more powerful servo would be better. JH

SHADOOBIE...SHATTERED

I've been into R/C for four years, and my first car was a Tamiya Super Champ. I managed to keep this relic in good running shape until a recent accident at my

(Continued on page 198)

R/C AND WARRANTIES

by DAVID BLEISCH

SO YOU'VE just installed the brand-new, state-of-the-art, electronic speed controller (SC) that will give your favorite buggy the winning edge at your local track. After adjusting it according to its manufacturer's instructions, you take your car out for a test run. After a couple of hot laps, things get even hotter as your buggy starts to pump out more smoke than Mount St. Helens. A close inspection and a few tests reveal that not only has your new SC suffered a total meltdown, but your dependable SCR matched battery pack no longer holds a charge, and the inside of your hot-wind modified motor looks like a new form of abstract art. After re-checking all the wiring and the instructions, you determine that the new SC must have been defective. Are you entitled to recover your loss? The answer lies in the law of warranties.

GET WARRANTY WISE

There are two types of warranty—express and implied.

- **An express warranty** is a promise of performance or quality expressly made by the seller of a product to the buyer.
- **An implied warranty** is created by state law and requires that the seller's product satisfy certain minimum levels of performance or quality, regardless of whether or not express warranties are made by the seller to the buyer at the time of sale.

EXPRESS WARRANTIES

An express warranty can be made verbally or in writing. Most electronic R/C products (e.g., radio transmitters and receivers, electronic speed controllers and peak battery chargers) come with written warranties from the manufacturer. Such warranties generally specify which parts and problems are covered, what you have to do to get repairs done (e.g., ship the product back to the manufacturer), what the manufacturer will do if the product is defective (repair it, replace it or return your money) and how long the warranty lasts.

The written warranty might also contain certain exclusions from coverage: labor costs, consequential damages and damages that result from using the product in a manner inconsistent with the manufacturer's instructions. (Consequential damages are losses caused indirectly by a defect in the product.) The best way to avoid being surprised by such exclusions is to *read the warranty before you buy*. By law, an express warranty must be available for the buyer to read before he buys any product that costs more than $15.

In addition to the standard written warranty, any printed description of the product creates an express warranty that the product will conform to the description. For example, if you buy a radio receiver that's described on the packaging as being compatible with a particular type of transmitter, the manufacturer has made an express warranty that the receiver really can be used with the specified type of transmitter—whether the accompanying written warranty says so or not.

A salesperson's oral promise (e.g., that the store will replace the product if it doesn't work properly with your equipment) is also an express warranty. Remember, however, that salespeople come and go, and memories fade, so don't rely on a spoken promise: get it in writing. If the salesperson refuses to promise in writing, there's a good chance that the promise won't be honored.

IMPLIED WARRANTIES

Most mechanical R/C products, including many car kits, don't come with written warranties. Even if a product has no written warranty, it's still covered by an implied warranty unless such a warranty is expressly disclaimed (by use of the words "as is," for example).

There are two basic types of implied warranty. The most common is the implied *warranty of merchantability*, which

(Continued on page 110)

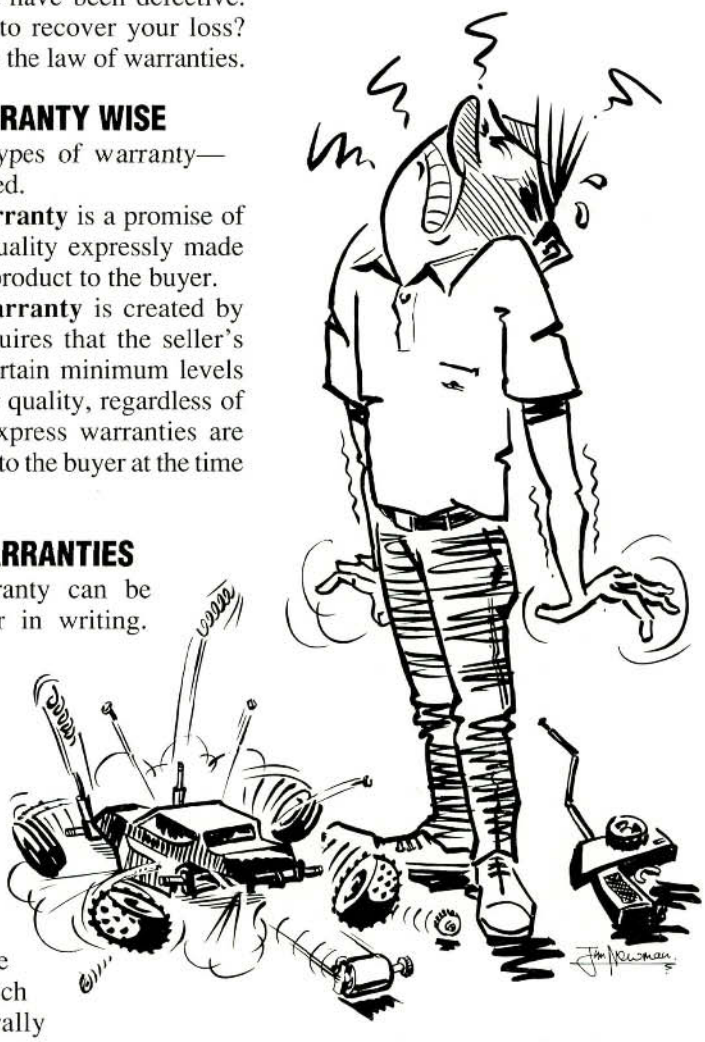
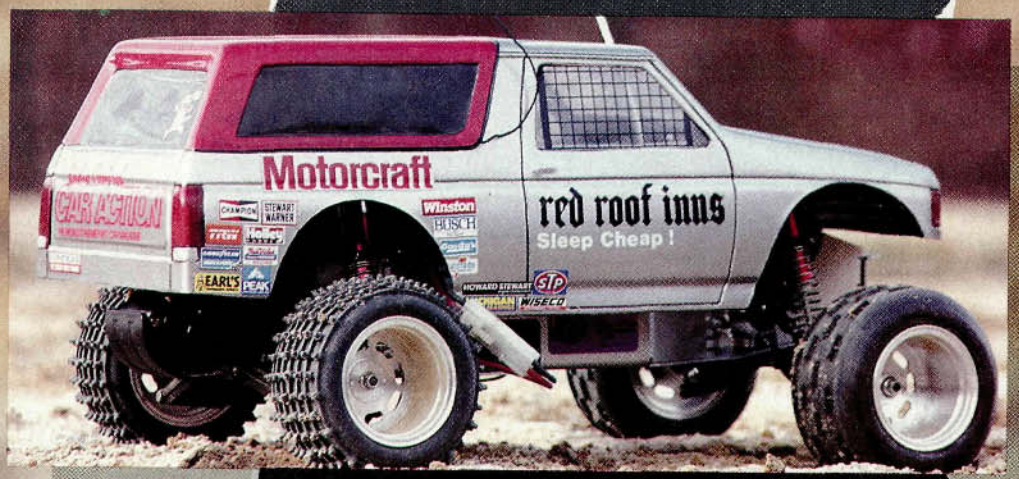


ILLUSTRATION BY JIM NEWMAN

KNOW YOUR RIGHTS

PROJECT KING CAB

THE GOOD NEWS IS THAT Tamiya's* King Cab is a much better truck than the Blackfoot. Out of the box, it has more potential and modification alternatives than any other Tamiya truck. The bad news is that it still isn't a racing truck.



by BILL O'BRIEN

Even at discount prices, one King Cab costs about the same as two Marui Big Bears or one-and-a-half Blackfoots. When you hand over your collection of dead presidents' portraits, you'll have a truck with a ball bearing differential and a full complement of sealed bearings for the gear and the drive shafts. Considering that, you're actually coming out ahead.

You get a truck that's more than a

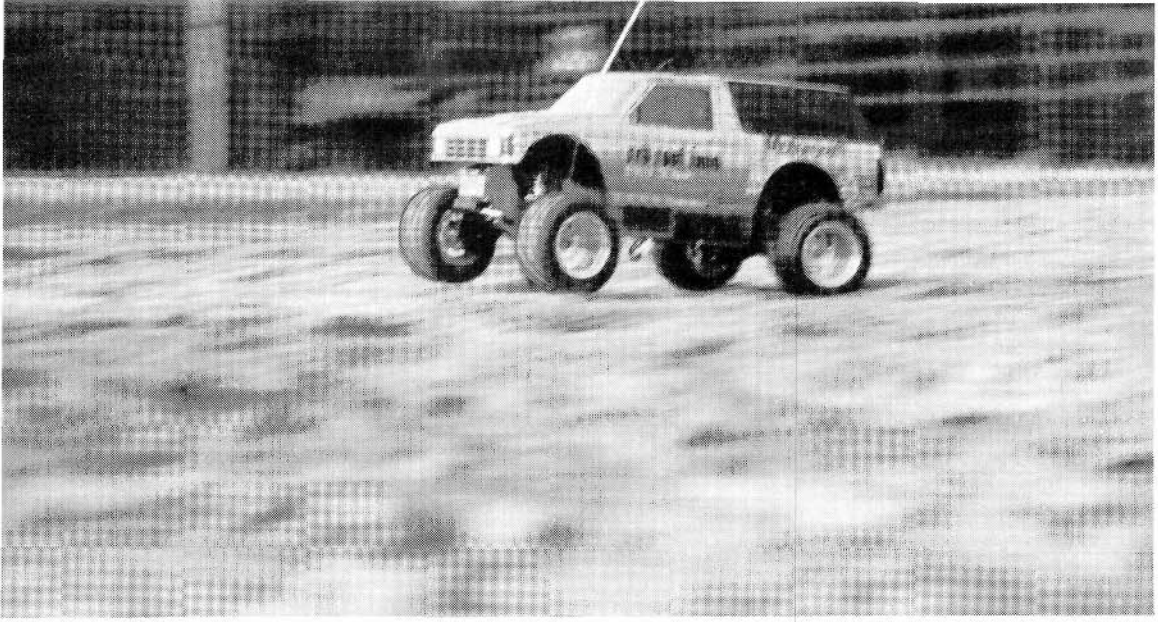
Blackfoot sport truck, but not quite a JR-XT racing truck. There are several reasons for this: of course, there's the perennial tub chassis that has become almost a Tamiya trademark in the last two years. You'll notice that the tub's shape resembles that of the one used on the Thundershot (Tamiya's 4WD off-road buggy), even though it's being used for a 2WD vehicle. (There's certainly enough room in the forward section for a second differential but, alas, there is none.)

HEAVY METAL CONVERSION

There's one other thing about this chassis: the King Cab is big; bigger, in fact, than any other I've seen, except for the Clod Buster. If you call the King Cab's chassis "a tub," then others are washbasins. With such a large chassis (and tall side walls), the King Cab sits high in the breeze. With the body mounted, it's taller than any other racing truck, except for the Traxxas Sledgehammer. In fact, the King Cab is just as high as the Blackfoot, and that high center of gravity isn't good for racing.

Then there's the differential. It's a ball differential, and it can be adjusted to permit a wide latitude in the amount of available slip—but it can't be adjusted ex-

(Continued on page 35)

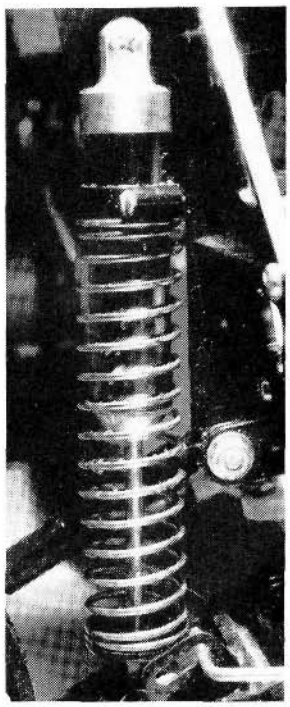


PROJECT KING CAB

"...there's nothing wrong with aluminum, but if you're a diehard competitor, stick with the original chassis..."

ternally. Diff stiffness is governed by the number of shims you install. The manual recommends one shim on each side (there are six in the kit) for normal diff action. Two shims on each side will synchronize the wheels for power takeoffs, but allow limited slip for bad road conditions. Three shims on each side side will practically lock the diff.

Unfortunately, the diff can't be adjusted from the outside. If you want to adjust the diff, you'll have to add or remove shims. To do this, you'll have to remove the diff from its housing and disassemble it. There's an access hatch in the top of the diff housing, but, to reach the housing, you still have to remove the diff sub-assembly (it's mounted on a fiberglass plate that's attached to the main chassis). The serious racer's only alternative is to keep several sub-assemblies at the ready, but that's costly at best.



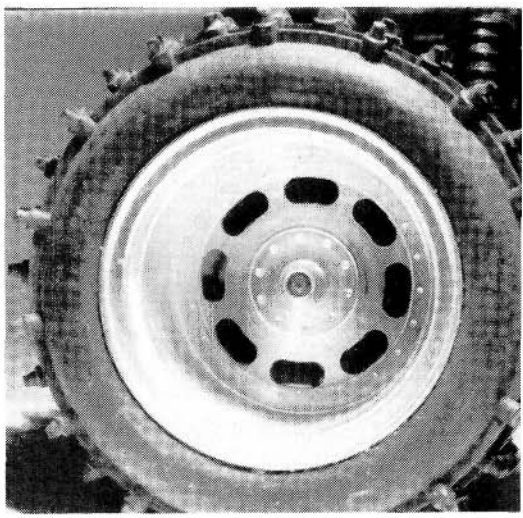
CHASSIS COME HOME

Looking around for a chassis for the King Cab is a waste of time. Nobody is working on a racing chassis (one that's lower than the Astute's or roughly the same size). I chose a Sassy Chassis* aluminum chassis because it brightened up the truck (and came with an aluminum bellcrank). You might not want to do the same, but not because it's a Sassy Chassis.

No aluminum chassis is for racing—it's for show. In all cases, it's just as heavy or even heavier than the stock setup (depending on how much extra stock stuff you can eliminate). Aluminum conducts electricity a hundred times more efficiently than graphite, so if you fray or strip a wire, the risk of electrical shorts (what a concept!) is increased. (If you're paranoid about graphite and short circuits, they haven't yet invented the word to describe how you should feel about aluminum!)

So, a word to the wise: if you're staying in a sport-type competition environment, there's nothing wrong with aluminum, but if you're a diehard competitor, stick with the original chassis, if you can't find fiberglass or graphite. (Now, if the folk at A&L had their eyes screwed on right, they'd introduce a graphite chassis with trailing arms for the King.)

My only complaint with Sassy's King Cab chassis is that the side slots used as the battery compartment are small, and they may not accommodate all types of stick packs (the red 1500mAh DuraTrax batteries are a particular pain). The problem is with the battery construction, but a slightly larger opening in the chassis (not more than a millimeter or two) would solve the problem.



These new Pro-Line tires are the closest thing to an all-terrain tire for 1/10 scale. JPS aluminium rims are beautifully machined, and they're available in a variety of different styles. 'Vette rims are shown here.

AND SPEAKING OF SHOCKS...

Tamiya's yellow shocks are the standard King Cab fare, and with

Although the red finish on the Trinity King Cab shocks looked great, some hardware was missing from the package, and three of the four shocks leaked after the test drive.

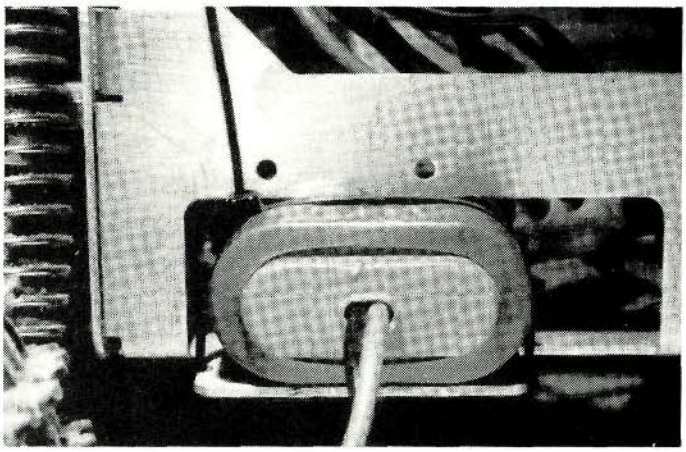
PROJECT KING CAB

the exception of a really ugly shock body, there's absolutely nothing wrong with them. Naturally, I replaced them because they weren't metal and anodized in some sleek color, but you don't have to. They work well, which is more than I can say for the replacements I chose.

Trinity has made so many high-quality products. It's surprising that everything they do comes out right all the time—well, almost all the time. I chose their new King Cab shocks, and they were a big disappointment.

It takes two packs of these long shocks to fit all four corners of the King Cab. They're red, so they look nice, but you give up a lot. Out went my nice brass shock bushing that came with the yellow shocks, and in went pieces of rubber tubing. Yechhh! I can't believe that Trinity would do that. The spring collars were all present and accounted for, but the small screws needed to secure the collars were missing from one pack of shocks. One of the shocks had a ball pressed into the metal cap hole, while the other three didn't—pretty poor quality control. After a few hard runs, three of the four shocks started to leak.

I would have been better off putting Trinity's* Clod Buster shocks on the King Cab. The quality is better; they come with brass bushings; and, of the 24 Clod shocks that I've installed on my two Clods, not one has leaked. They're also about $5 cheaper, because they're sold as a set of four, and they don't require additional packaging. (By the way: to keep the truck from bottoming-out against the A-arms, use 1/4 inch of tubing on the shock rod.)



There's only one problem with the Sassy chassis: unless you file the opening slightly, you might have trouble getting batteries in.

TIES THAT ADJUST

While you're working on the suspension, throw away the stock tie rods, and install a pair of Du-Bro* 4-40 adjustable rods. You'll need them. The suggested length for the tie rods brings the front wheels nearly parallel (perhaps 1/2 degree of toe-out), and you'll have to adjust the toe angle according to track conditions. Titanium turnbuckles might seem better from a weight perspective, but this truck will weigh more than 4 pounds no matter what you do, and the extra $3 a pair you would have spent on titanium turnbuckles can be saved for a round of Pepsi.

Toss out the stock 4mm rods that hold the drive-shaft carriers in place. Thorp* makes adjustable rods that let you set the wheel camber on all four wheels. They're labeled specifically for the King Cab, but I bet they'll also fit the Double Dare and the USA-1.

DIFFERENTIAL ANALYSIS

As I mentioned, the only problem with the King Cab's stock ball diff is its ornery disposition toward being adjusted. Curing it means replacing it, and I did so with a Thorp ball diff that can be tweaked without disassembling the truck's entire rear end.

Thorp also makes underdrive and overdrive counter gears for the King. I slipped in an underdrive unit—a good choice, if you're using a fast modified. Originally, I wanted to use one of Robinson's* 48-pitch replacement gears, but its gear assembly is a two-piece affair that's bolted together. The height of the bolt heads wasn't correct for my diff cover, and they ate a neat circle into the plastic in the short time it took to

PARTS LIST

- Sassy chassis with bellcrank
- Trinity power shocks
- Tecnacraft titanium turnbuckles
- Du-Bro turnbuckles
- Thorp adjustable upper control rods and underdrive gear
- JPS slotted wheels
- Pro-Line tires (7040 front, 7070 rear)
- JR NEA-900 speed controller, NER-822X receiver and NES-L501 servo
- Kimbrough servo-saver
- B&R 13-turn double motor

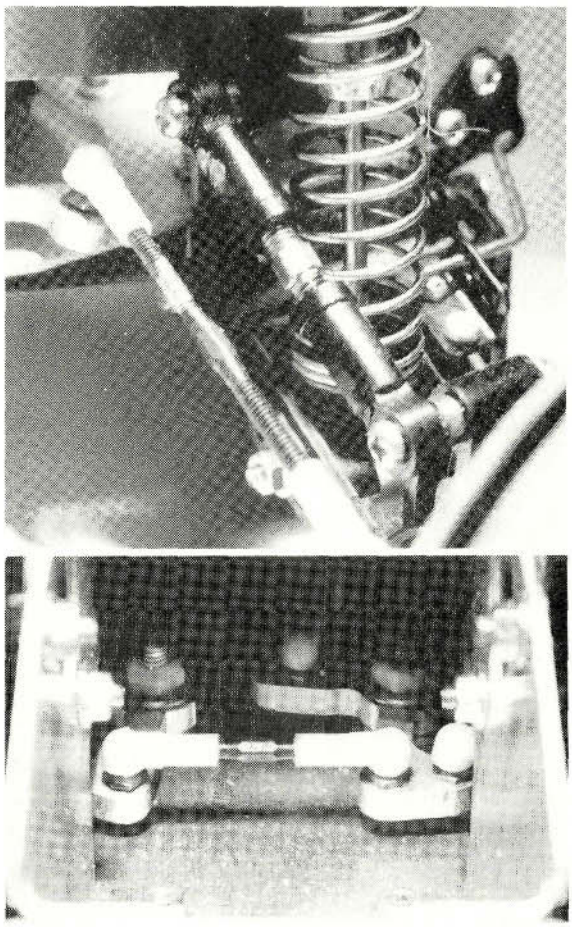
rev the motor and then brake when I heard that awful scraping sound.

As it was, the Thorp gear wasn't a picnic. It has a small bearing on both sides, while the stock setup uses a small bearing and a large one. I now have a beautifully sealed 5x11 bearing in my spare parts box. I had to make an extra trip to my hobby shop to buy a bearing of the correct size (for $6!). C'mon Thorp, get with the program!

WHEELY TIRED

About the only things (aside from the chassis) that didn't give me a problem were the wheels and tires. The wheel selection was simple: JPS* aluminum wheels with NASCAR-style cutouts. The bearing races in the front wheels were slightly oversize (it isn't good when you put a bearing in, turn the wheel over and the bearing falls out), but I've long since become accustomed to the inexactitude of CNC machining.

I use Pro-Line's* ribbed tires in the front and its new 7070s in the rear. The 7070 uses stepped mini-spikes and an alternating pair of mini cleats along the center line (Pro-Line calls this "the mini pin with staggered crossbars"). Each is mounted at the intersection of lines on a raised grid on the tire's surface (like a tennis net wrapped around the tire). It's probably the closest thing to an all-terrain tire for 1/10 scale. It doesn't look as if it would do well on either very low-traction or high-traction surfaces, but all those tracks that fall in the middle should be good testing grounds (including sand lots, backyards and baseball fields).



■ *Top: Du-Bro turnbuckles are used for the steering rods. Thorp's heavy-duty turnbuckles allow you to adjust the upper control links.* ■ *Bottom: The Sassy chassis kit includes a bellcrank steering system. Bushings work well, but ball bearings give you the ultimate in smoothness.*

MOTOR-VATED

Living up to my Bad Brain reputation, I selected a B&R* 13-turn double-wind motor for the King Cab. "Huh?" you say. Isn't that a 4WD motor? In most cases it is, but I figured as long as I was throwing large tires around on an under-driven diff—why not? The motor has enough Rs, and the increase in torque would be beneficial.

The electronics are a hodgepodge of anything I had around and, surprisingly, most of it matched. The radio is an Airtronics* XL-2P, but the receiver is a JR* NER-822X. A JR NES-L501 servo performs the steering chores, and a JR NEA-900 electronic speed controller adds momentum.

"I slipped in an underdrive unit—a good choice, if you're using a fast modified."

BODY BY FISHING

I didn't want to put the Nissan body back on the King Cab. It's a great body with good detail, and my paint job was superb, if I do say so myself, but I was tired of looking at it.

I started out with a nondescript Chevy stadium truck body, painted it red and added some Mears/Nissan decals. It looked OK, but it wasn't special enough. I bought a Toyota stadium truck body, but I didn't even take the time to paint it, be-

(Continued on page 118)

CAR OF THE YEAR

bred

of

champions

CAR OF THE YEAR

PHOTOS BY YAMIL SUED

team losi

junio

Choosing the "best" car was once reasonably easy. During the age of performance at all costs, fewer cars were recognized as dominant performers, and there was a much larger performance spread between the better and best.

Now, R/C racers are more discriminating. They not only want world-class performance, but they also want it at the best possible price.

r two

by STEVE POND

Although performance and economy can't usually be found together, there's a middle ground where you can obtain reasonable performance without surrendering your estate. This has changed the criteria we used to choose our Car of the Year; we noted consumer buying habits and the emphasis on more for less.

The new, low-budget cars have many of the features found on costly racing machines, but to keep their prices reasonable, some of the most expensive components have been omitted. The finest example of this trend is Team Losi's new Junior Two.

CAR

→ → →

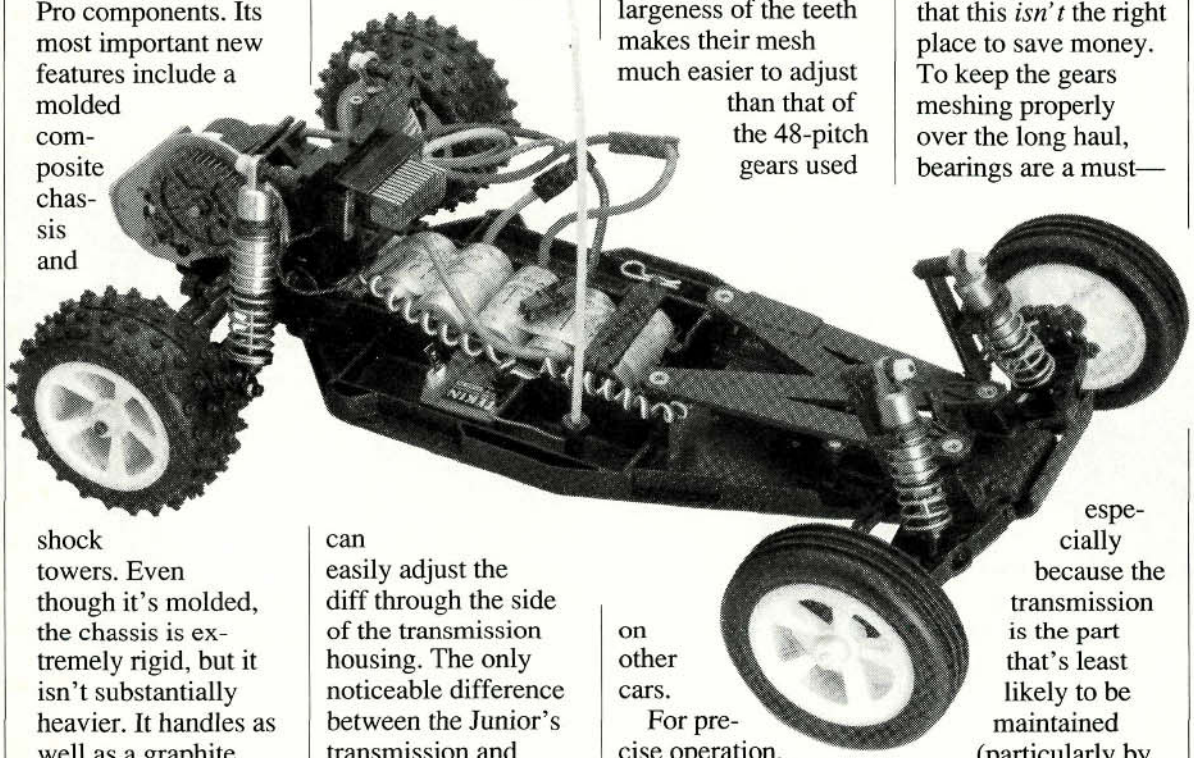
MORE FOR YOUR MONEY

The Junior Two's design is based on that of the JR-X2, but it also has some JRX-Pro components. Its most important new features include a molded composite chassis and shock towers. Even though it's molded, the chassis is extremely rigid, but it isn't substantially heavier. It handles as well as a graphite chassis plate, but production costs are kept to a minimum.

Losi didn't compromise when designing the transmission. The Junior has the same tranny as the JRX-Pro, and it's world-class. All the gears inside the tranny are very light and give strong acceleration, and the differential is considered to be one of the best in the business. The rings are hex-shaped on the inside, and they lock onto the outer hub for a slop-free fit. Using an Allen wrench, you can easily adjust the diff through the side of the transmission housing. The only noticeable difference between the Junior's transmission and those included with the full-blown racing machines is the addition of user-friendly 32-pitch gears. They aren't as flexible in terms of the number of available ratios, but the largeness of the teeth makes their mesh much easier to adjust than that of the 48-pitch gears used on other cars.

For precise operation, every piece that rotates in the tranny rides on ball bearings. Other companies include metal or plastic bushings to reduce the cost of their products, but Losi recognizes that this *isn't* the right place to save money. To keep the gears meshing properly over the long haul, bearings are a must—especially because the transmission is the part that's least likely to be maintained (particularly by beginners).

The Junior Two's



Left: The Junior Two might look very similar to the JR-X2, but it has a host of parts that were designed to keep its price at rock bottom.

Right: Although the Junior Two comes with an H-arm rear suspension, the five-link rear end can still be bolted to the chassis. The raised parts of the molded chassis increase its stiffness so much that even the team racers are using it.

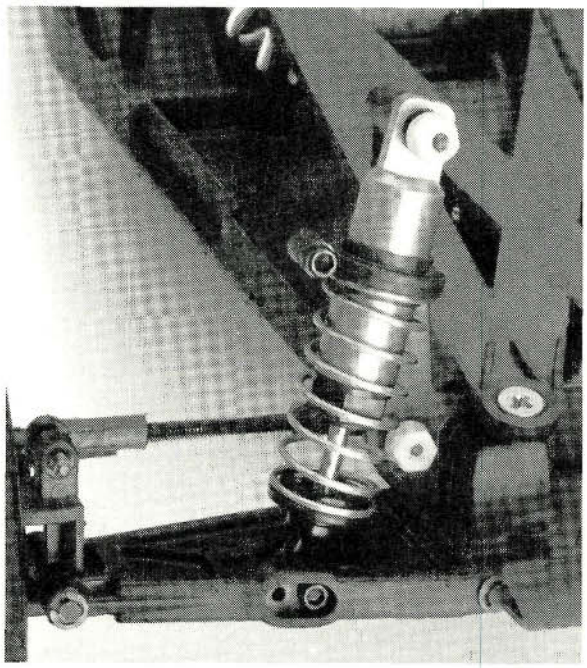
Only rarely does it happen—someone gifted throws a current idea to the wind in favor of a new one. Gil Losi Jr. did just that in 1986, and the result was a new standard in R/C—the JR-X2. Its out-of-the-box features were amazing at the time—all the neat, "trick" items were standard. Graphite chassis, graphite shock towers, slider-style drive shafts, turnbuckles and unique shocks were all there.

Worthy of special note was the tranny. With its low rotating mass to help with acceleration, a fully contained diff that could be adjusted in seconds

OF THE YEAR

junior two

suspension is the same as in earlier Losi designs, and it's as good as they get when it comes to competitiveness and durability. The rear suspension has H-arms. The five-link setup found on early versions of the X2 makes the car much more controllable, but H-arms make it much easier to assemble. The front end has the standard A-arms.



The front and rear suspension assemblies have adjustable upper links. These links are of the usual 4-40 threaded rod, so adjusting them is laborious, but they help limit the car's price. Turnbuckles make adjustment a snap, but they cost more, and I'd prefer to spend more time adjusting the linkages and have high-quality components elsewhere in the car—where they're *essential*.

Each corner has Team Losi's high-grade oil-filled shocks, which are identical to those on the original X2. They're a departure from the standard oil shock, which has a removable cap. The Losi shocks are sealed from the bottom with a

gil's a genius

and gears that needed no lubrication, the *Losi tranny was the best of the best.*

The JR-X2's five-link suspension was also a model of perfection and able to handle all tracks, from the roughest to the smoothest. The front suspension effortlessly took all the pounding that anyone could dish out.

Important reasons for the success of the JR-X2 are its high quality and ease of assembly. Losi is continually improving its design, and even beginners can assemble *it with little or no help.*

There's more! As time went on, we found that after-market support is also great. You'll find race-proven parts for this car at almost every track in the country, and the moderately priced team parts are available to all R/Cers.

Losi has shown its dedication to quality time and time again.

specifications

Type ..... Off-road
Scale 1/10
Sug. Retail Price $199.95

DIMENSIONS:
Overall Length ..... 15 inches
Width ..... 9.75 inches
Wheelbase ..... 11.25 inches
Front Track ..... 8.75 inches
Rear Track ..... 8.5 inches

WEIGHT:
Gross (w/ battery) ... 3 pounds, 5.48 ounces

BODY:
Type ..... Single-seat buggy
Material ..... Polycarbonate

CHASSIS:
Type ..... Tub
Material ..... Injection-molded composite

DRIVE TRAIN:
Primary ..... Gear
Transmission .... Gear
Differential ..... Ball
Bearings/Bushings ... . Bushings

SUSPENSION:
Front: Type ..... Single A-arm with upper control link
Damping ..... Oil-filled, coil-over shock
Rear: Type ..... Single H-Arm with upper control link
Damping ..... Oil-filled, coil-over shock

WHEELS:
Front: Type ..... One-piece nylon
Dimensions (DxW) ... . 2.1x.875 inches
Rear: Type ..... One-piece nylon
Dimensions (DxW) ... . 2x1.375 inches

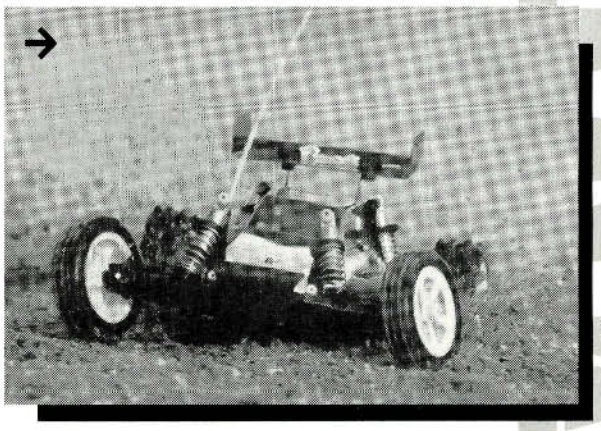
TIRES:
Front ..... Ribbed
Rear ..... 4-row spike

ELECTRICS:
Motor ..... None
Battery ..... None
Speed Controller ..... None

OPTIONS AS TESTED:
Trinity Equalizer stock motor; Tekin 411P electronic speed controller; Futaba Magnum Jr. with FP-132SH servo and Tekin micro-receiver.

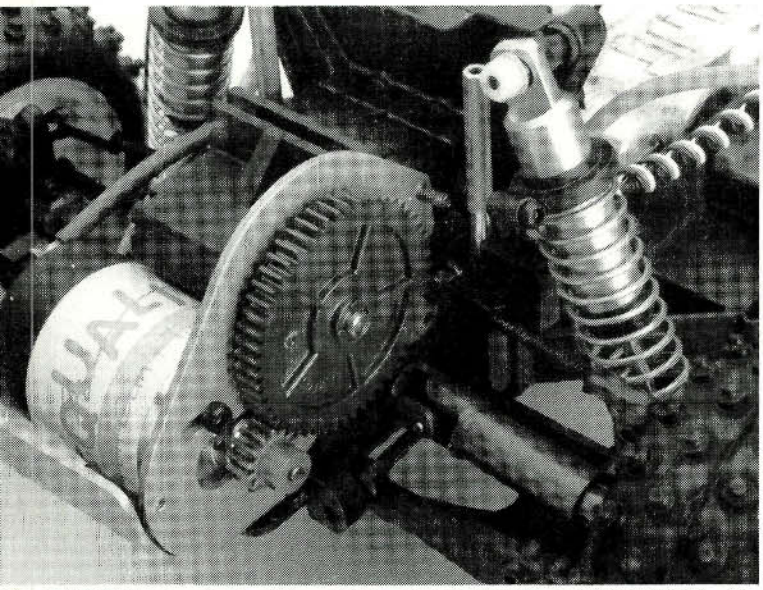
COMMENTS:
The Junior Two offers an impressive list of features, including a composite molded chassis, a front-end stiffener and, most important, a world-class transmission. It's a wise investment for entry-level racers, who can easily hop-up the car as their skills and budget allow. Although the kit doesn't include ball bearings for the axles, they can be added to increase speed and run times.

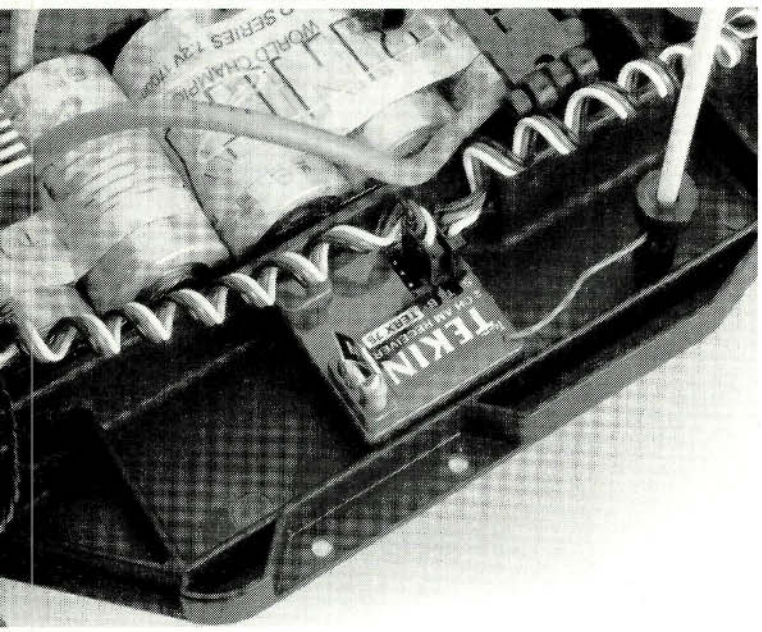
junior two



specially designed cartridge that contains rubber O-ring seals and a compression-compensating system. For reasons too elaborate to explain here, having a compensating system below the piston is more effective than having the standard bladder in the cap. Having the seals inside replaceable cartridges also makes shock assembly and maintenance substantially easier than is usual.

At the end of the suspension components, you'll find Losi's standard, five-spoke, nylon wheels with JR-X2 tires, which are suitable for most tracks. For the rear, there are four-row tires, and for the front, the standard ribbed tires. The racing-style, one-piece wheels make tire installation a snap; but because the tires have to be glued on, changing them is more of a chore.





■ ***Top: Oil-filled shocks are standard on all Losi cars. The upper plate increases the rigidity of the molded chassis' front end.*** ■ ***Bottom: The 32-pitch gears aren't as efficient as 48-pitch gears, but they're stronger and easier to adjust. The Junior Two has the same H-arm setup as the JRX-Pro.***

A KNOCKOUT COMBO

The combination of components found in the Junior Two has thrust it to the front of the pack of entry-level cars. It's not only based on the design of a proven top-notch racer, but if you select accessories wisely, it will also compete *against* it! All the parts designed for the JRX-Pro and the JR-X2 can be used on the Junior, and there are myriad high-performance parts available from Losi and other manufacturers. Take this car from the sandlot right to the Off-Road Nationals!

We looked at many expensive, topnotch R/C performers before choosing the Junior Two as our *Car Action* 1991 Car of the Year. The Junior Two is just what consumers are looking for.

Thanks to Team Losi for producing such a spectacular car, and congratulations to them for the 1991 Car of the Year honors!

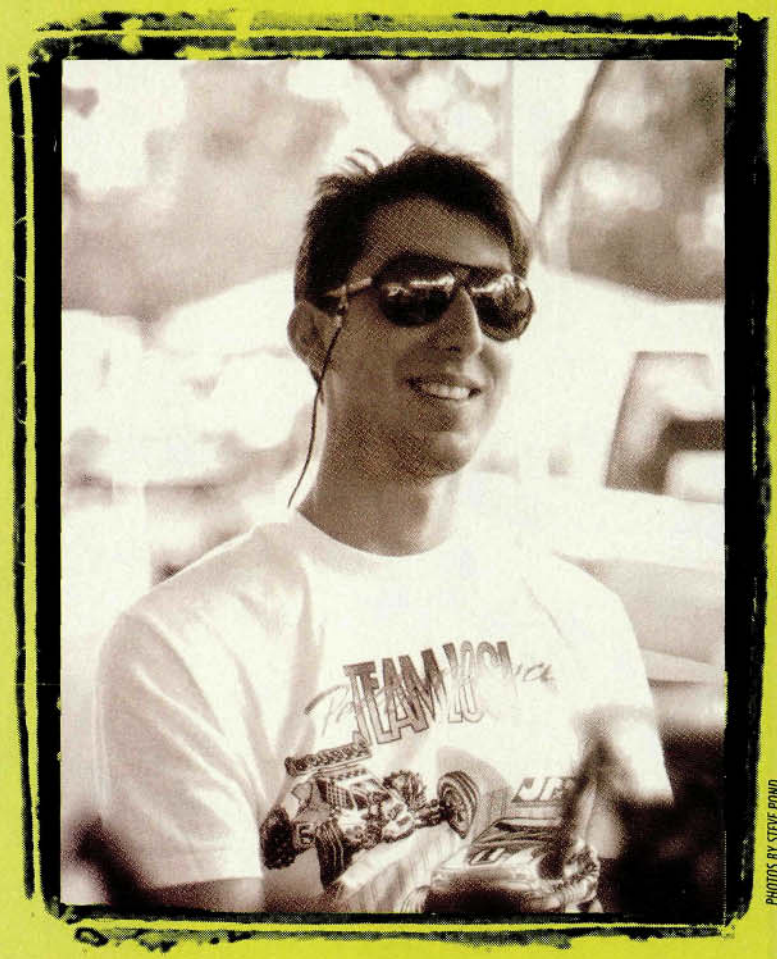
**Here's the address of the company featured in this article:*
Team Losi, *13848 Magnolia Ave., Chino, CA 91710.* ■

CAR OF THE YEAR

Interview:

by CHRIS CHIANELLI

GIL LOSI JR.



PHOTOS BY STEVE POND

CHRIS: *How old were you when you first started racing cars, and what was your first one?*

GIL: About 16, and the car was a Tamiya Rough Rider. It was the first R/C car ever made for racing—the predecessor of the Super Champ.

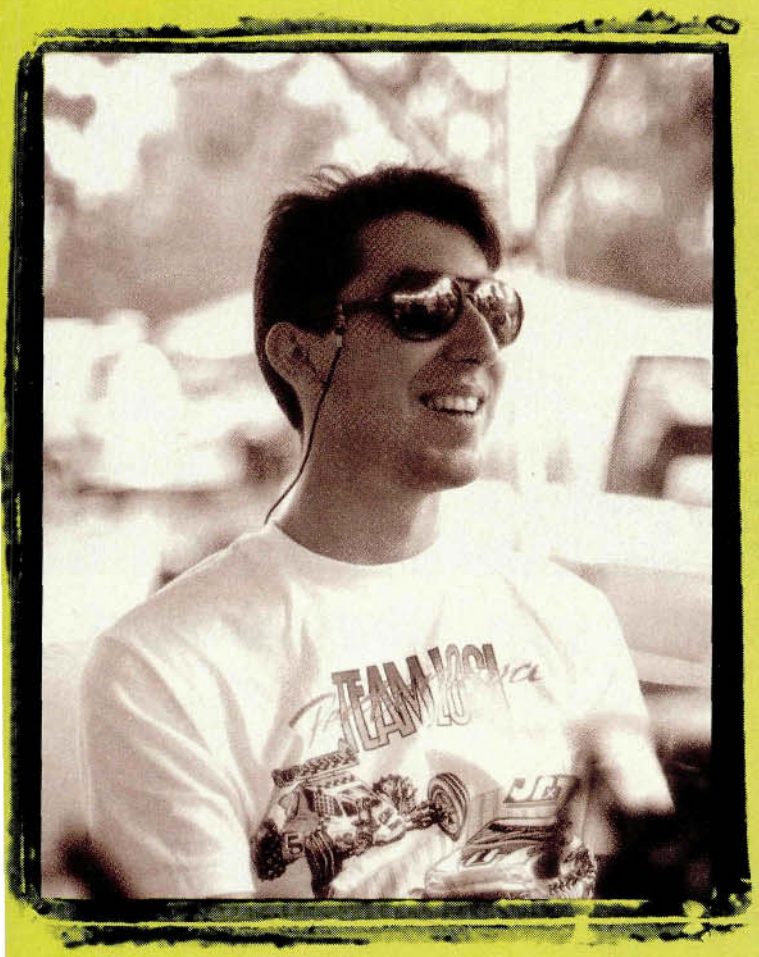
CC: *Were you the first in your family to get into R/C cars, and what motivated you?*

GL: My father was first! I just started doing it for fun. My dad got a car, we sat down together to build it, and I just went crazy. I thought it was the neatest thing in the world. Eventually, I got pretty good and entered races. Then we started the retail stores, so I ran for our store. Then I started doing well with Delta equipment, and I ran for Delta for a while, and then I did a lot of 1/8-scale racing. I wanted to go to the Worlds in France, and Associated offered me a ride, so that's when I started running for Associated.

CC: *Did you run any other cars after Delta—off-road cars?*

GL: I went from a Tamiya car directly to Cox cars—did

Gil decides to spill



well with those. Then I got involved with developing the Associated RC10.

CC: You're not only known as an extremely versatile racer, but also as a designer. You had a lot to do with designing the RC10, didn't you?

GL: Roger Curtis picked my brains as far as what the cars do—what's important. I just gave him the information an engineer needs to design something. I helped him set up guidelines so he could figure out what goals he wanted to achieve in designing the car.

CC: Isn't it true that you designed the first prototype of the 12L?

GL: Yes. That was totally mine. When I switched from Delta to Associated, they had a car (the RC12i) I didn't like at all, and I was very comfortable with my Delta cars. I sat down to build them an Associated/Delta car—one I had previously been racing, so I knew how to use it. I didn't like the T-bar design on the Delta, so I came up with my own. A lot of people didn't think it would work. I showed it to Roger, and he said, "Yeah, that's kind of cute," and left it at that. Then I built a car, ran it and sent it to Tony Przybylowicz [from Trinity]. He ran it and jumped through a hoop! I sent him all the parts to build a car, and he assembled one for Joel and me. Joel went to Cleveland that year and was very successful with the car. As soon as Associated saw it run well, they decided they wanted to make it, too, so I ended up with a problem with Trinity and Associated.

CC: And the rest is history. Was designing your own car just a hobby, or did you have production on your mind from the start?

GL: When I started to work on my own car, I had production in mind from the start. I had been working with so many people—Roger Curtis...and Bill Campbell at Delta. (I think he was the smartest engineer I ever worked with.) Curtis Hustings taught me a ton about building things as far as how important "fits" were. I just wanted

Interview: JR LOSI

to build my own stuff for him; the stuff that was being made—the Associated car was the best—was durable, but it didn't assemble well, and they weren't very interested in quality control at the time. We started out to build something better for the average person (as far as assembly goes)—and high quality.

CC: *Is that what made you decide to manufacture your own car?*
GL: Yeah. We got tired of selling stuff in our retail store that people couldn't make work. We knew we could make something that they could take out of the box and enjoy.

CC: *That's when you started work on the first JR-X2. When you went from prototypes to production, was it what you expected?*
GL: No, not at all. We built a couple of prototypes and got to where we were fairly happy with them, and then, when we sat down to try to look at how to make them, they couldn't be made that way. The materials didn't lend themselves to it. The only way we could make the car was if we machined everything out of billet aluminum, and it just wasn't feasible. I had to go out and get an education. I had to sit down with molders; poke around molding shops; talk with a lot of people and learn how things work and how to design within production limitations. That took me quite a while. I spent two to three years doing prototypes, and then I'd walk in and hand them to the guy who was going to do our molding and say, "Hey, what do you think of this part? And what changes would you like to see?"

CC: *In other words, if you want to build one car for yourself, you can do anything you want, but when you have to work within the constraints of mass production, that really confines what you can do.*
GL: Yeah. We had so many problems that I was lost! That was when we hired our engineer, Clarence, whose main specialty is injection molding. He's the one who has given me my education and helped me get through all that stuff.

CC: *Speaking of injection molding, I think you've all done an amazing job on the Junior Two chassis. That thing is stiff! I understand that some of your team racers are using it instead of the graphite. Is that really true?*
GL: Everybody is.

CC: *And it's cheaper. That's great.*
GL: I think that kind of stuff is good for the sport.

CC: *After the JR-X2 was released and became such a huge success, what happened?*
GL: When we first released the car, we had some problems that we didn't see in the prototypes. We had some failures—problems with the wheels. A bearing company started using a different oil, and it attacked the plastic in the wheels. We spent the first year reacting to problems like that, and we re-designed it a couple of times and changed vendors a bunch of times until we could get stuff right.

CC: *Do you plan a 4WD car, or any new 1/10-scale, on-road cars?*
GL: My next project will be an on-road car.

Interview: Gil Losi Jr.

CC: *Can you tell me anything about it?*

GL: Not yet, because I haven't done enough testing to know. I have about four different types of things I'm going to test. One I have a real strong hope for, but it will be really interesting to see what I end up with.

CC: *Any 4WD off-road cars in the works?*

GL: Not right now. We would love to, but it's such a big project.

CC: *Not nearly as big as 2WD.*

GL: I think it could be, though, if it wasn't expensive and the cars were decent.

CC: *You hit the nail on the head. If you could do with a 4WD car what you did with the Pro, everything you need would be there in the box.*

GL: Exactly. I think that if the right car was on the market, 4WD could be as big, or maybe even bigger, than 2WD. The "funnest" cars I've ever driven have been 4WD in any scale on any surface, but there's just the practical aspect, which nobody takes into consideration. A novice driver can pick up a 4WD car and drive it; with 2WD, that's not the case. I think that 4WD has some real benefits; it's just that from a manufacturing standpoint, it's really difficult, and I'd like to get another year of engineering under my belt before I tackle a project that big.

CC: *If anybody can do it, it's you guys. There's definitely a Junior T in the works, isn't there? Will that be out this spring?*

GL: Yes: April 15 is our release date.

CC: *You've won four world championships. What can you tell us about each one of them?*

GL: For the first, I wasn't really mature. I was fast and had good cars, but it took a lot of luck to win. The second year, I really matured as a driver. That was the SCORE Worlds. A few people tried Cox cars but were never successful; I took the car and just went out and did my own testing program and really got it to where it worked well.

CC: *Is that the Bandido or the Scorpion?*

GL: Scorpion. Just killed everybody with that one. At that time, most of the after-market companies would come up to our track and race on Wednesday nights. And the guys from CRP come up and just see whatever we were doing that week—whatever new part I was doing for my Cox cars—and they would manufacture the stuff. (We didn't want to be a manufacturer at that point.) We helped design a lot of after-market parts for many companies.

CC: *Do you have any insight for a novice who has his sights set on team racing?*

GL: I tell everybody that team racing isn't what they think. Buying lots of parts won't make you fast. The truly fast people will be fast whether they're sponsored or not, because they do it themselves. They don't rely on anybody else; they do what they need to do. Being a sponsored driver and part of a big team isn't always what it's cracked up to be. You have a lot of pressures and commitments, and you have to run things that you might not like. If you're a team driver, you're obligated to run cars in the way they want you to run them—use the parts and tires they want you to use. If you're independent,

you can do whatever you want. You have nobody to answer to. If I wasn't racing for a living, there's no way I'd want to be a sponsored driver, because I've always enjoyed doing it my way.

CC: *Worldwide, which drivers do you most admire?*
GL: My favorite is Joel Johnson—one of the most talented drivers I've ever worked with. Then there's Jack Johnson, who's probably one of the most underrated racers in the country. He's won lots of races over the last three years. You should watch him in 1/10 scale—he's fast! Jay Halsey is really fast, too, and Cliff Lett really deserves his success because he's very mature and really dedicated to his racing.

CC: *If you were getting ready to race right now, whom would you least like to come up against?*
GL: I don't know. Big names don't bother me. I'd much rather race the good guys; I like coming up against the hottest.

CC: *Whom would you most like to race against?*
GL: Masami. I've raced against him a couple of times, but the last few years, I don't count myself as being much of a racer.

CC: *You've been really busy with the business, but you're still known as a great driver.*
GL: I will be again, too. I fear the fast local who nobody knows—the one who will come up and surprise you. You shake your head and say, "What happened? Where did this guy come from? I wasn't prepared for him."

CC: *How can racers avoid being shaken in a race?*
GL: I get extremely nervous, but it makes no difference who I'm racing against. I probably shake more on a drivers' stand than any good racer you've ever seen. I shake when I practice. This is a total adrenaline rush for me.

CC: *It must be a positive rush, because it works.*
GL: I think people get nervous because they're worried about winning. I don't worry about winning. I've always loved the cars; I love how fast they go; I love trying to make them go faster; I love the racers.

CC: *You just love a good close race, whether you win or lose?*
GL: Sure, I love to win, but it isn't my priority. My priority is to go out and run well. I've lost races where I came off the stand extremely happy with my performance, and I've also come off the stand going, "Man, I was lucky to win that. I ran like *#@*!!

CC: *What's in the future for you and the Losi clan?*
GL: In the next two years, you'll see our company really maturing as far as our technology goes. We'll become more technical, more refined. Right now, the stuff we do does really well, but you'll find us with a much stronger direction. Things will come out right the first time. It took us a while to get the JR-X2 dialed-in. My goal is to come out with stuff that's as right as it can be for the time; to stay with the program and change our products to meet demand; and to keep getting faster.

"Buying lots of parts won't make you fast. The truly fast people will be fast whether they're sponsored or not, because they do it themselves."

CC: *In the past two years, you've met racers' needs more than any other company, with the Junior Two and other products that have interchangeable parts.*
GL: We see things from the retailers' standpoint. We understand what the shops need to survive and make a profit. We know what they need to make their customers happy—at least, we think we do!

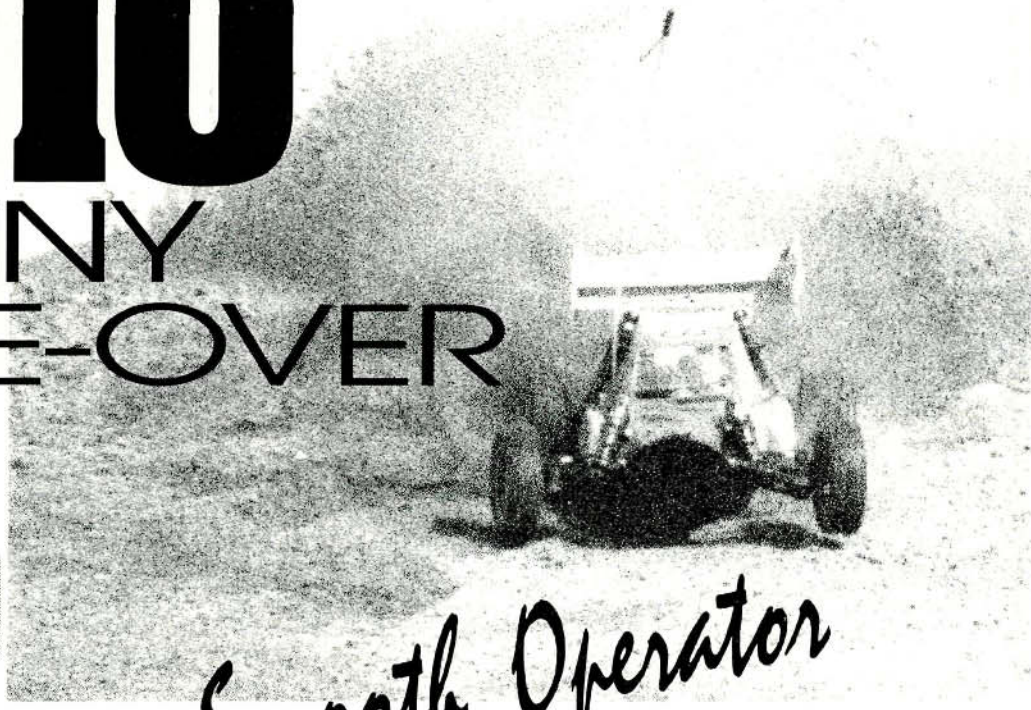
CC: *You'd like to be known as a great racer again?*
GL: Yeah. In another year, I'll be able to dedicate the time to winning again. I'd like to get back to where, when I pull up behind people, they shake in their boots again!

CC: *If the next two years are like the last two, the whole R/C industry has a lot to look forward to.*
GL: We're getting a lot better, and we've only scratched the surface of our potential. I know I've learned so much about manufacturing, but I'm looking forward to starting with a clean sheet: I got an on-road car and a 4WD car.

CC: *We're all looking forward to it, too. Thanks a lot, Gil.*
GL: You're welcome. ■

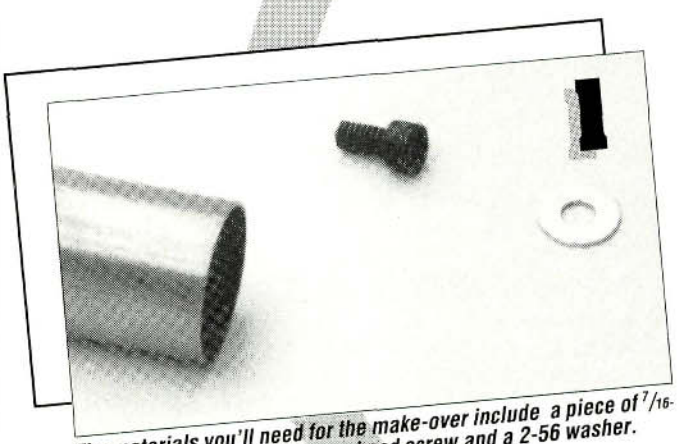
RC10 TRANNY MAKE-OVER

by BOB GAGNE



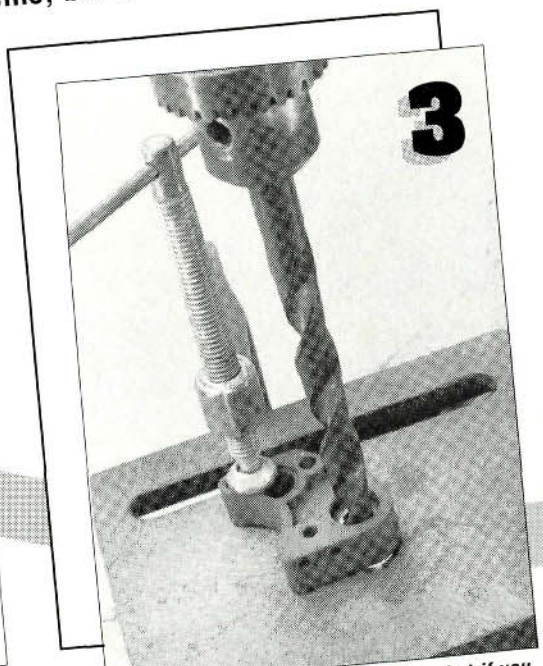
Smooth Operator

WHEN THE RC10 was first introduced, it was a major performance breakthrough. Most off-road buggies had geared differentials that were prone to wear, didn't run smoothly and soaked up a lot of power. The RC10 ball differential not only corrected these problems, but it was also adjustable.



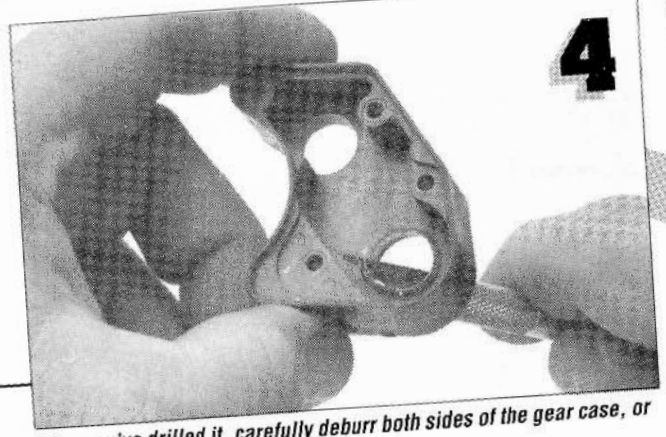
The materials you'll need for the make-over include a piece of 7/16-inch brass tube, a 2-56x1/8 hex-head screw and a 2-56 washer.

The necessary tools include a small tube cutter, a no. 47 drill bit, a 1/2-inch drill bit and a hobby knife.

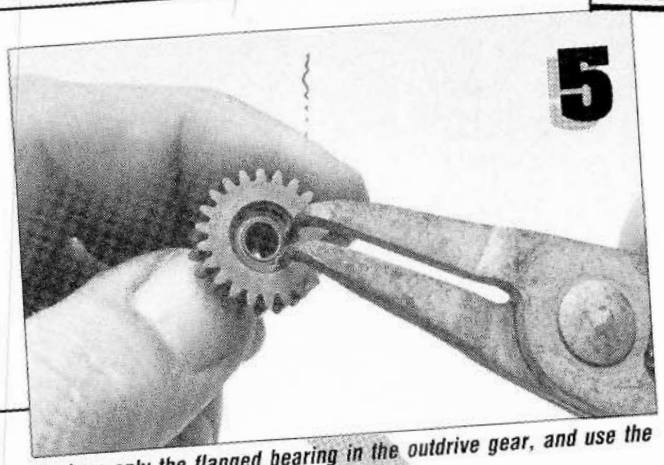


A drill press makes this job easier, but if you have a steady hand, a hand drill will do. Center the drill in the original outdrive hole, then clamp the gear case to the drill-press table.

PHOTOS BY BOB GAGNE



After you've drilled it, carefully deburr both sides of the gear case, or the bearings won't seat properly.



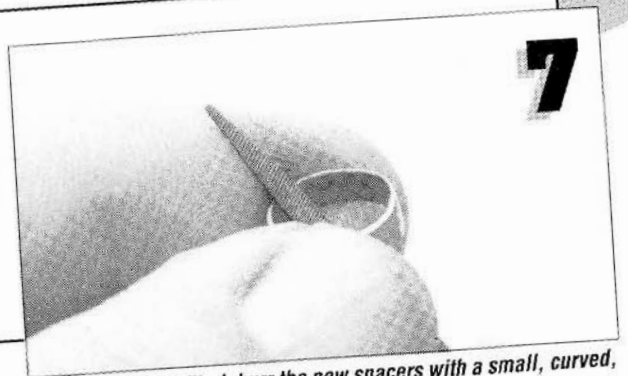
Replace only the flanged bearing in the outdrive gear, and use the retaining ring to keep it in place.

In the last few years, many third-party hop-up parts have been introduced to improve the performance of the stock Associated transmission. Most of these parts do what they were intended to do, but the improvement is marginal. I've tried most, if not all of these after-market parts, and I wouldn't be without the Delrin idler gears or the outdrive support bearings, but I've found that most other parts are more hype than real performance boosters. Companies, such as MIP*, Team Pit Stop*, Trackmaster*, A&L* and Associated offer direct replacement transmissions, and most do perform better than the stock transmission, but each has its own peculiarities. They're also expensive and range in price from $100 to $150.

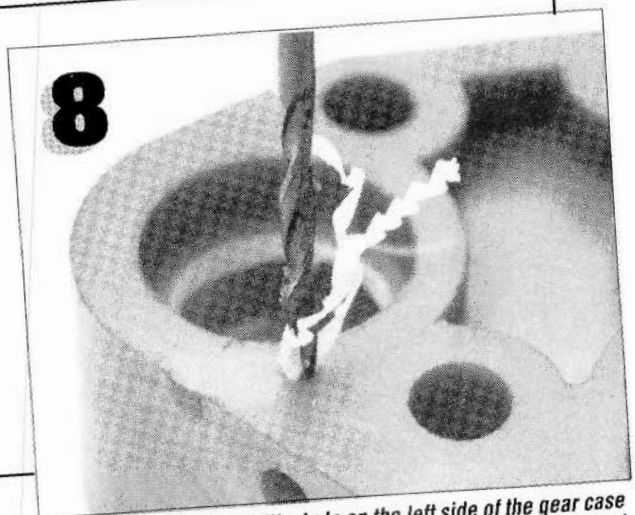
Even though its design has several weaknesses, the stock Associated transmission is still very competitive, and with a few improvements, it could be tops again. The Delrin idler gears make the gears mesh more smoothly, but the crude 32-pitch gears should be replaced with 48-pitch gears. (Thorp* offers a set for $35.)

There's also a problem with how the outdrives are supported. In the stock kit, two bearings are inserted into the outdrive body and held in place with a pan-head screw. Placed side by side, the bearings are set too far inboard to give the outdrives proper support. Hard acceleration unduly stresses the bearings and wears the outdrive cups. This makes the drive train bind and robs it of power. You can solve this problem by adding an optional outdrive support bearing. Unfortunately, this adds another set of moving parts to the transmission, and this increases friction and reduces the power go-

After temporarily reassembling the outdrives, the spine plate and the gear case, cut a spacer out of the brass tube. (Measure the distance from the outdrive gear to the outside edge of the gear case, and cut the tube to that length.) If you use a tube cutter, don't apply too much pressure, or you'll deform the thin tube.



To ensure a good fit, deburr the new spacers with a small, curved, fine-tooth file.



Before final assembly, drill a hole on the left side of the gear case for the 2-56 screw (no. 47) that will hold the outdrive support bearing in place. If you drill too close to the edge, the screw will make the case bulge and bind the bearing. Drill a little farther out.

RC10 TRANNY MAKE-OVER

ing to the wheels.

This overabundance of friction really bothered Bob Tourigny (our racing club's resident "gearhead"), so he took his tranny apart and studied its design thoroughly. He noticed that with the outdrive support bearing installed, there were three bearings on the same rotating shaft. It's practically impossible to align three bearings so that at least one doesn't bind when force is applied.

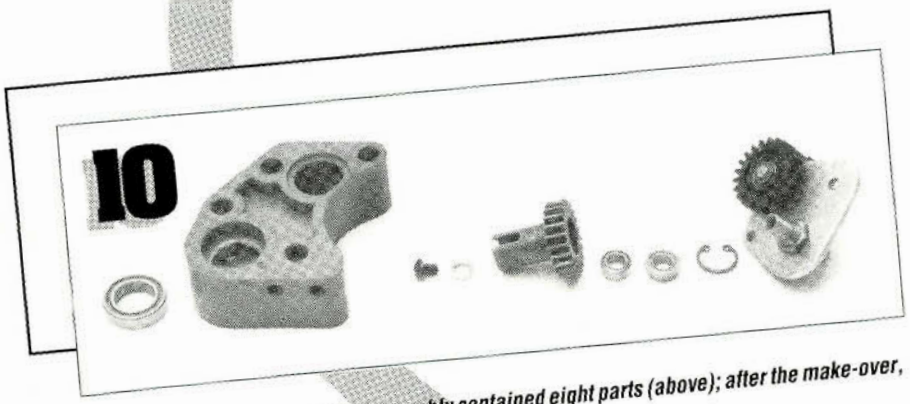
Bob found a way to eliminate the middle bearing, and this made a substantial difference to the resistance and friction. For weeks, we scrutinized Bob's motor, batteries and speed controller and tried to figure out how he was getting so much extra speed. Finally, he admitted to his experiments and allowed us to see the innards of his brain child. Recently, he decided to let *Car Action* readers in on his secret. Get ready to give your RC10 a real performance boost.

The complete transmission. Spin the spur gear—oh, what a feeling!

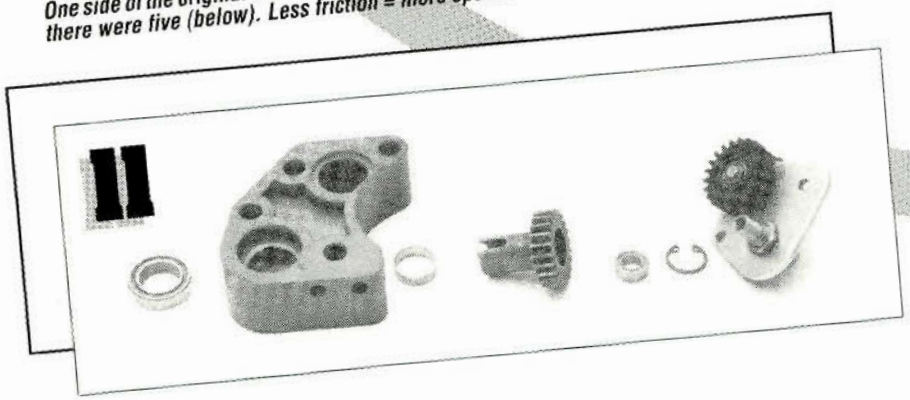
PARTS AND TOOLS

If you already have outdrive support bearings, this project will cost you less than $1.50 (that's right, *a buck and a half*, or less!). There's no need to search for exotic components—just go to your hobby shop, and pick up a short length of 7/16-inch brass tubing, a 2-56 hex-head screw and a washer. That's it!

The tools are expensive, but you probably have some, or can borrow some from a friend. You'll need a small tube cutter, a razor saw, or a fine-tooth hacksaw; a small, fine-tooth, curved file; a 1/2-inch drill bit; a no. 47 drill bit that measures .078 inch, and a hand drill, or a drill press.



One side of the original outdrive assembly contained eight parts (above); after the make-over, there were five (below). Less friction = more speed.



DOING THE WORK

You could build the transmission from scratch, but the cost of new parts would come close to the price of a new aftermarket tranny, so let's rebuild your old tranny.

As you take it apart, clean all the parts thoroughly, and inspect them for wear or damage. Remove the retaining ring from the inside of the outdrives, and remove all the bearings. Inspect and lube the flanged bearings before you use them again. (You won't use the smaller, non-flanged bearings again.)

When you've removed the

(Continued on page 120)

EXPLOSION

by TOM ATWOOD

ELECTRIC FLIGHT is catching on because it's exciting, as challenging as you want to make it and an easy hobby to start in. Unlike glow or gas model engines, electric power systems don't spew oil and grime, and they're relatively quiet. In fact, a lot of aeromodelers are switching to electric flight in a bid to hold on to flying sites where noise is an issue.

Newcomers often start with electric airplanes, and this is made easier by the variety of "almost-ready-to-fly" or "ARF" kits, which come almost completely built. Electric planes use power systems that are nearly identical to those used in R/C cars, and this gives R/C buffs a big advantage when getting started.

Ever think about driving a model not just around a track, but through the air—in all three dimensions?

■ *35 mm slide: Ed Schenk, Systems Manager, flies an electric trainer for the first time; Chris Chianelli stands by; author is in background.*

■ *Left: Model Airplane News Associate Editor, Gerry Yarrish, wears a leather glove for safety while launching this unusual "pusher" design—the electric Klingberg Wing.*

■ *Cover right: For more information about electric R/C planes, check out Model Airplane News—one of R/C Car Action's sister publications.*

It's EASY to FLY electric!

Electric-powered Klingberg Wing guides into the sky. A slight upward angle is maintained by gently pulling back on the right stick; a dive is achieved by pressing the stick forward; left and right turns (achieved through banking) are input by pulling the same stick to the left or right. The left stick is throttle control.

The Kyosho Zero is one of many almost-ready-to-fly fun-scale warbirds on the market (pilot is Chris Chianelli).

Flying an R/C model is a lot like playing a giant three-dimensional video game extending hundreds of feet into the sky. If you drive R/C cars, you've already overcome the single most difficult hurdle—being able to input right or left turns whether your model is coming or going.

Electric-powered planes range from highly stable, slow-flying trainers and gliders to fast pylon racers that race at more than 100mph. On a general level, planes can be categorized as trainers, sailplanes, sport planes and scale models. To get the hang of flying an R/C plane, the new flier usually begins with a trainer or a glider. Trainers are inherently stable and easy to manage (many electric-powered gliders also fall into this category).

FLYING AN R/C ELECTRIC TRAINER

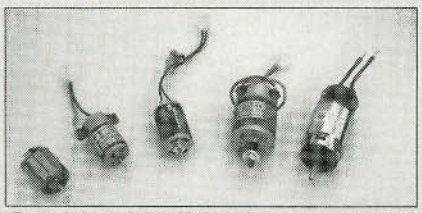
These planes typically have three control inputs. The motor is controlled by a simple servo-driven on/off switch or a speed controller. You turn on the power or increase throttle by pushing forward the left stick on the transmitter, and vice versa.

To dive the plane or bring the nose up to climb, the pilot

Keith Shaw brought these electric scale beauties to the September 1990 KRC Electric Fly (held annually in Quakertown, PA). From left to right, clockwise: Gee-Bee, 450 Stearman, Messerschmitt M-354 and "King Crimson" flying wing (powered by four Leisure ferrite 05 can motors and 28 Sanyo 1200mAh SCR cells).

ELECTRIC FLIGHT POWER SYSTEMS

Although I've seen several electric planes powered by Mabuchi* 540-size can motors, many of the commercially available kits come with Mabuchi 550-size motors, which have the same diameter but are a fraction of an inch longer. These are referred to as "05" size, by analogy to a glow engine with .05ci displacement.



From left to right: Mabuchi can motor for R/C cars can be used for many electric airplane trainers and gliders; Astro FAI 05 Cobalt Racing Motor and Carl Goldberg Turbo 550 ferrite motor (both used in model electric planes); and the Astro 60 FAI F3E and Plettenberg HP 355 motors. These 2000W motors are much more powerful than typical R/C car and airplane motors.

If you want to

provides control inputs to the elevator, which is the control surface at the rear of the horizontal stabilizer at the back of the plane. For example, if the elevator is deflected upward, the back of the plane pivots downward and the nose heads upward.

The rudder is used to turn the plane. Both the rudder and the elevator are controlled by the transmitter stick on the right. Like a stick in an early biplane, you push forward to dive, pull back to climb, and push left or right to turn the plane left or right. Only gentle inputs are needed when flying a trainer, and much of the time, none at all.

Trainers or beginner-level (2-meter wingspan) electric sailplanes usually have wings angled upward slightly in a shallow "V" shape; this is called "dihedral." Dihedral provides stability—a tendency for the plane to right itself when you take your hands off the stick. Rudder input on a plane with dihedral will cause the plane to roll slightly, and only then does it start to turn (i.e., if the plane rolls slightly and then stays at this angle, it effectively starts banking in a gentle curve). When the plane starts a turn, it starts diving just a tad, so a slight input of up-elevator is usually needed to keep it turning without losing altitude.

If you drive R/C cars, you've already overcome the single most difficult hurdle—

More advanced planes, which have no dihedral, don't have this degree of stability and require a more skillful pilot. These ships use ailerons for turning. Ailerons are the primary control surfaces at the trailing edge of the main wings. When flying with ailerons, the right-hand stick controls the elevator and ailerons, and rudder is moved over to the left stick. Ailerons roll the plane, and this is how a turn is entered. Just like with a trainer, most of the flying is done with the right-hand stick. A control input to the rudder in a ship without ailerons will push the tail to one side ("yawing" the plane), but it won't usually cause it to turn (dihedral is needed for rudder to turn the plane).

HOW FAST; HOW HIGH; HOW LONG?

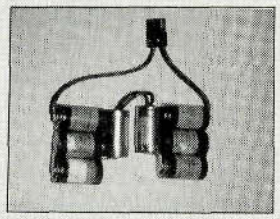
Electric flight systems will provide continuous motor runs ranging from a few minutes to more than 10 minutes. The flying wing shown in this article will fly for over 9 minutes, full throttle, using a pack of seven, 1700mAh, SCE cells, and for 12 minutes if the throttle is held back (and even longer if motor runs are interspersed with gliding flight). Using eight, pushed, Trinity, 1400mAh SCRs, the wing flies for only about five minutes in a continuous run, but it really cranks—its speed increases from about 40mph to well over 50mph (in a dive, the wing reaches speeds of more than 100mph).

A sailplane (highly recommended as a first plane or trainer) uses the electric power mainly to reach "thermaling altitude." Thermals are columns of rising air like those used by birds of prey to stay aloft, high in the sky. I've flown a sailplane very similar to the Kyosho* Stratus 2000 for over half an hour in soaring flight, without fully discharging the motor pack. I only brought it down because I was afraid the receiver battery might have been getting low. It's a lot of fun to watch a high-flying bird soar over to your glider to check it out and see whether you've found a better thermal than it has!

An electric for advanced R/C sailplane pilots, the Aeronaut Sunfly, is sold by Hobby Lobby* and patterned after the electric air-

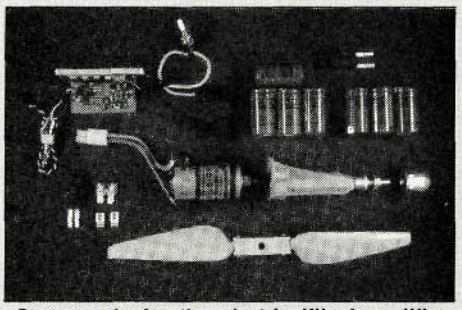
(Continued on page 130)

economize, any R/C electric car motor can be put into a "scratch-built" electric glider, and you'll be ready to fly without spending a lot. If you're willing to spend more for more power, cobalt motors are often the answer. AstroFlight* provides some of the best, ranging from 02 size (smaller than a typical R/C car motor) to the Astro FAI 60. Robbe Model Sport* offers Keller cobalt motors, and Graupner cobalt motors are available through Hobby Lobby.



Eight Trinity, pushed, 1400mAh SCR cells were used as a hop-up for the electric Klingberg Wing. Level flight speeds were well above 50mph.

I built the electric Klingberg Wing (see photo) because I wanted to build a "hot" electric that would fly on 7 to 9 cells. I picked the flying wing planform to minimize weight and drag, and chose the Astro FAI 05 cobalt racing motor. Sermos* connectors, an Astro 205 speed controller (replacing the Jomar controller shown in the photo), a Leisure* gearbox, Sonic-Tronics* folding prop and an airplane frequency radio round-out the flight system in the final version of this plane (for more information, see the March '90 issue of *Model Airplane News*). I could have used a car speed controller, and I did look at the Tekin* 411P, which offers great performance that's on a par with the Astro controller. Sounds like a system an R/C car enthusiast can relate to? The plane flies circles around many of the glow-powered airplane trainers.



Components for the electric Klingberg Wing power system—from left, top row: Jomar SC-4 speed controller (Jomar now provides a newer model); a high-frequency car speed controller would also work well); seven Sanyo 1200mAh Ni-Cd cells and Sermos connectors. Middle row: Sermos connectors for motor leads, 30A auto fuse and connectors, Astro FAI geared cobalt motor, Leisure 2.5:1 extended gearbox, Higley safety nut. Bottom row: Sonic-Tronics 11x7 folding prop.

TROUBLESHOOTING

by STEVE POND

ILLUSTRATIONS BY JIM NEWMAN

If you have a technical problem that your hobby shop or racing friends can't resolve, give us a shout at Radio Control Car Action, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to Troubleshooting, c/o Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897.

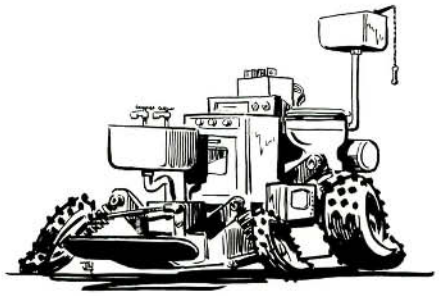
SERVO SEARCH

My Schumacher Pro Cat has a Trinity King Kong motor, a Tekin ESC 700 and a Futaba Magnum Jr. radio. Previously, I used a Futaba S148 servo for steering, but I recently bought a KO Propo 88Z FET-boosted servo for more responsive steering. To install it, I had to modify the receiver plug to fit the Futaba receiver. When I accelerate hard, my steering servo turns right, but if I accelerate slowly and then reach top speed, this doesn't happen. I had no problems before I installed the new servo. I run 1700 SCE batteries. Can you help me eliminate this annoying glitch?

KURT KOSCHNITZKE
Kobe, Japan

The FET-boosted servos from KO are designed to operate on a higher voltage than the standard Futaba servos, which typically operate on 4.5 to 5 volts. The KO servos run on the full 7.2 or 8.4 volts supplied by the car's battery. Because the Tekin's controller has a BEC that was designed for a Futaba 5V system, it's starving the KO servo and glitching under acceleration.

The KO servo can operate on the 5 volts (or more) supplied by the controller, but when accelerating, the voltage drops below that required to power the KO servo. To solve the problem, you must supply the servo with enough power, or you'll have to switch to a servo that can operate on the lower voltage supplied by the SC. You could also buy one of the newer Tekin or Novak ESCs that are equipped for FET-boosted servos, but that's an expensive solution.



WHICH CHASSIS CAN TAKE IT?

About a year ago, I bought a regular RC10, and I've been adding parts to it ever since. I've yet to add a Stealth transmission and a graphite chassis. Should I use a stock chassis or a graphite one? Which chassis would be best for racing on rough tracks?

ARMONDO DIAZ
Lancaster, CA

If you have to choose between the transmission and the chassis, go for the transmission. The Stealth is a tremendous improvement over the stock unit, and no chassis in the world can improve performance as much. As for which chassis you should use, I'd stick with the aluminum one.

Contrary to popular belief, aluminum chassis are still used by many team drivers who prefer them to graphite plate, especially on rough tracks. Aluminum seems to handle bumps a little better than the unforgiving graphite, and that makes a car easier to control.

IT'S YOURS!..."AS IS"

Some time ago I bought a Kyosho Nitro Brute, and I was very impressed with the speed and power of its O.S. gas engine. With the advantages came one major disadvantage, and I've decided it's caused by a design flaw in the engine.

I broke-in the engine properly, but after a week of moderate to heavy running, the connecting rod broke, damaging the piston and sleeve also. I replaced them, but the same thing happened again. This is a very costly, time-consuming repair, and I'd appreciate any suggestions (a new engine, a replacement part, or any kind of modification), because right now, the truck I paid $200 for is useless.

BEN COLE
Hamburg, NY

It's no secret that the engine in the Nitro Brute has a pretty soft connecting rod. For some time, we've been hearing complaints about it breaking. Having recognized this, you can take a few steps to prolong the rod's life. For starters, don't rev the engine with no load because it will rev beyond acceptable limits and the rod will snap. Also, be careful not to run the engine with a lean air/fuel mixture. Granted, the engine runs more strongly when it runs lean, but there's less oil going through it, and this will increase the likelihood of damage.

There's a chance that MK Engineering of Seymour, CT, will soon be making some high-performance connecting rods for these engines, but right now, there are no stronger rods available.

(Continued on page 70)

TROUBLESHOOTING

(Continued from page 68)

WONDERING ABOUT WIRES

In my quest to make my JR-XT the fastest truck, I'd like to swap the 16-gauge wire for some 13-gauge. I've seen speed controllers that have been modified to accept only three wires of the "monster" type. Which wire is removed, and how are the others are hooked up? The hole through which the wires enter my Tekin 300 speed controller only allows three of the 13-gauge type.

SIMON BRITTON
Chatham, Ontario, Canada

I'd never recommend that you open the case of an electronic speed controller to modify it. Although some talented racers who are well-versed in electronics doctor their SCs to suit their needs, I recommend that you don't.

Three-wire SCs are designed to minimize voltage drop. Typically, an SC with four wires has two positive leads: one for the motor positive and the other for the battery positive. Both are attached to the printed-circuit (pc) board that's inside the speed controller, and the points to which they're attached are electrically connected. We have the positive leads connected to the pc board only to supply the SC's components with power. By eliminating the two positive leads and running a separate lead directly from the battery to the motor, resistance is substantially reduced. By not passing the current through the controller's pc board, voltage loss is reduced to a minimum. The Tekin 300 is designed for four wires, so you should use them. It isn't worth voiding its warranty by changing its configuration just to gain a few millivolts. At some point, we'll cover such a conversion in Car Action, but for the moment, you should work on your driving skills. That's the best way to shave seconds off your lap times.

A GAS WASH?

I recently bought a .049 GTP Nissan gas-powered car. I've had it for about three months and have run it once. The ratchet on the starting mechanism just won't catch. The instructions tell me to "squirt" gas onto it; I did that, but it still didn't work. I called the 1-800 number, and a guy simply told me to buy a new one. I can't really buy a new one, because I already owe my brother a lot of money for buying all my other R/C cars. I'm open to suggestions!

CHAD HALL
Walton, NY

They recommend that fuel be squirted on the starting mechanism to wash away any debris that might prevent the ratchet from operating properly. The burned fuel and oil deposits in glow engines can also enter the starting assembly and prevent it from operating properly. The raw fuel very effectively washes away exhaust residue. You might have to take the ratchet off the car to check for a more serious problem, and if you need more than a "gas wash," check your warranty.

GEARING CHECKUP!

I have a Tamiya King Cab, which I built myself. I always hear the gears spinning before it starts to move, so I took it to my local hobby shop for a complete checkup. They rebuilt the gearbox, but the gears still spin. Everything else is still stock. What's the problem, and how can I fix it?

RAZA ALI
Farmingdale, NY

The noise you hear could be the differential slipping. The King Cab's ball diff can be adjusted by adding shims. The more you add, the tighter the diff will be, and the less it will slip. If it only slips a little before the truck gets moving, this is ideal! To ensure that the noise you hear isn't the grinding caused by missing teeth, you should check that all the gears—inside and outside the transmission—are in good shape.

A common trouble spot is the mesh between the the smaller gear on the spur and the outer part of the counter gear. The U-shaped bracket that supports the counter-gear shaft is prone to fracture. Under heavy loads, the fracture allows the bracket to flex, and this causes the gears to separate and skip.

Make my wake

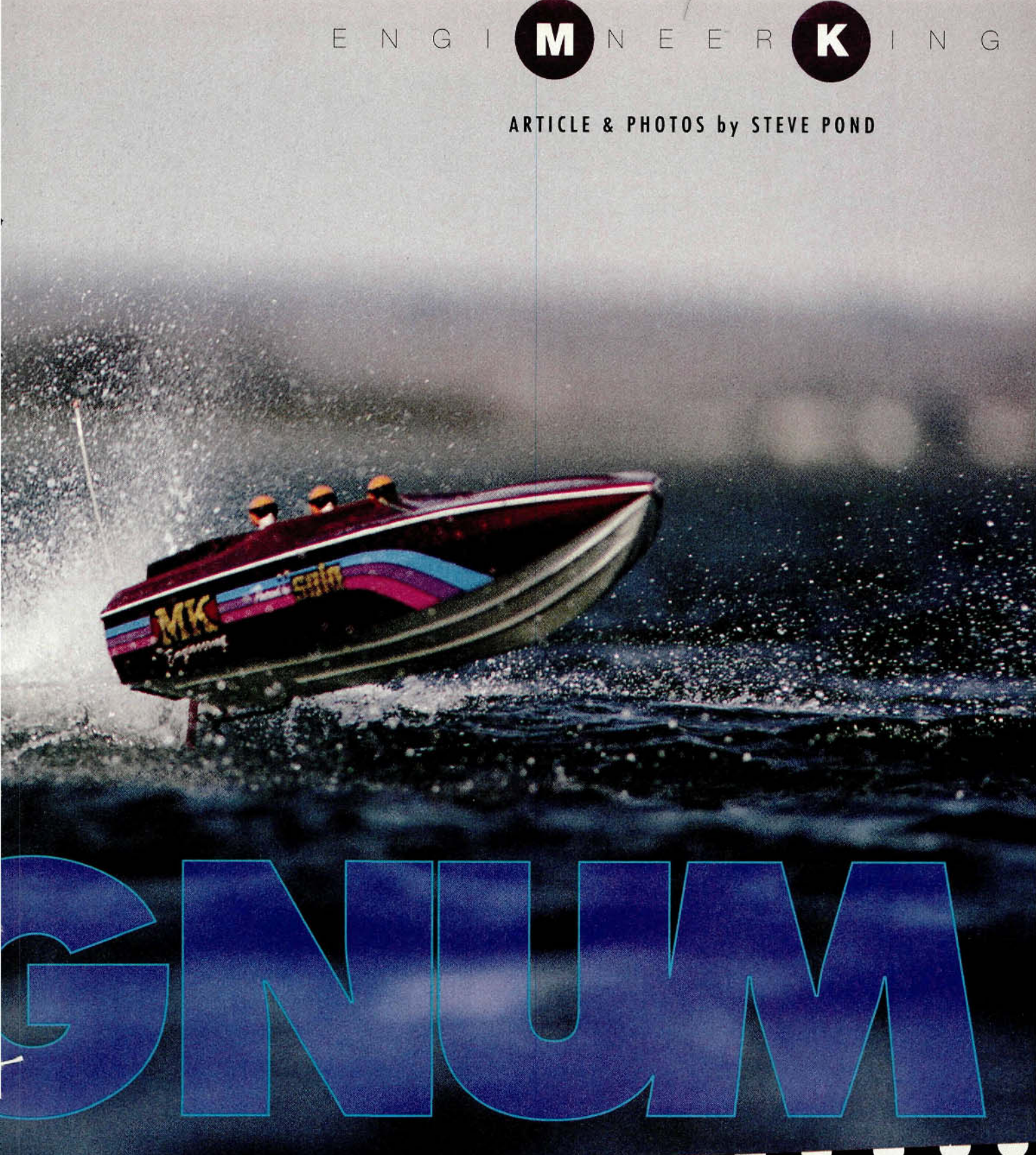
YOU PROBABLY think you need to know a lot about engines to run a gas-powered R/C car, boat, or plane successfully. Although it's true that glow engines have many frustrating quirks (e.g., their often delicate glow plugs can fail in the blink of an eye), they've been given a bad rap. One recent development—the user-friendly "chainsaw" or "weedeater" powerplant—has helped to dispel the myth that to have fun with a fuel-powered R/C vehicle, you have to be an engine guru. MK Engineering's* Magnum deep-vee offshore-class boat is a prime example.

Inset left: At 6'5", Car Action Executive Editor Steve Pond might be a head taller than the Magnum, but don't be fooled—this thing is huge!

MA

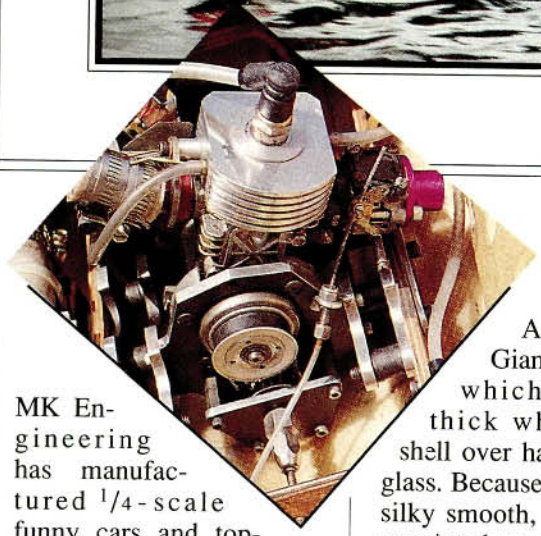
ENGINEERING

ARTICLE & PHOTOS by STEVE POND



GNUM

MAGNUM

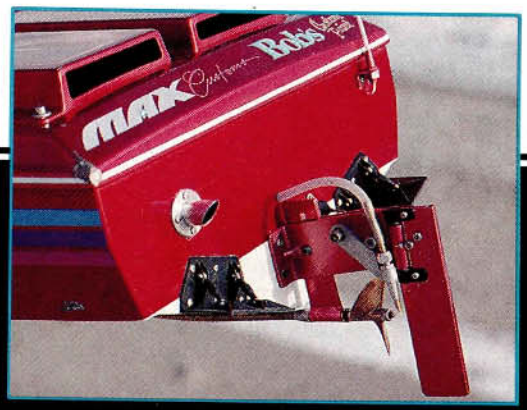


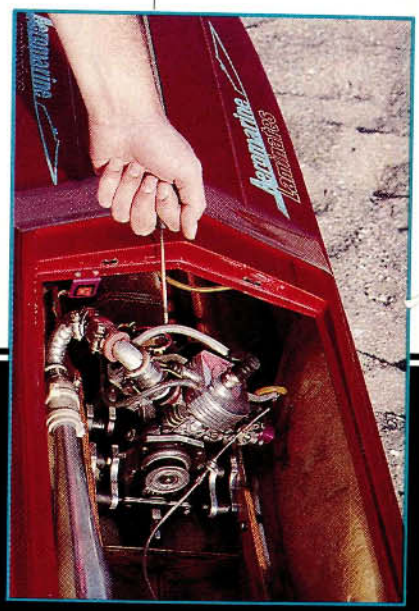
MK Engineering has manufactured 1/4-scale funny cars and top-fuelers for years. With the Magnum, the company has combined its powerplant prowess with Aeromarine Laminates'* flawless fiberglass to create a formidable big-bore boat.

FEATURES

The Magnum is based on Aeromarine's Giant Apache hull, which features a thick white gelcoat shell over hand-laid fiberglass. Because the gelcoat is silky smooth, it can be left unpainted or used as a prep-free base for a custom paint job. Also included is a large, detailed hatch with convenient Cam-Loc fasteners.

The Magnum's 23cc Solo engine features a one-piece cylinder-head/bore assembly for improved reliability, and removable transfer ports and a lower crankshaft housing to make maintenance and modifications easy. A pull-starter with a built-in cooling fan makes starting cheap





■ *Above: The optional water-cooled head and big-bore carburetor give the Magnum's performance a substantial boost.* ■ *Right: The transom has top-quality drive hardware, trim tabs and an aluminum exhaust outlet. Note the pick-up for the water-cooled head.* ■ *Far right: With a trouble-free pull starter, the Magnum is very "user-friendly."*

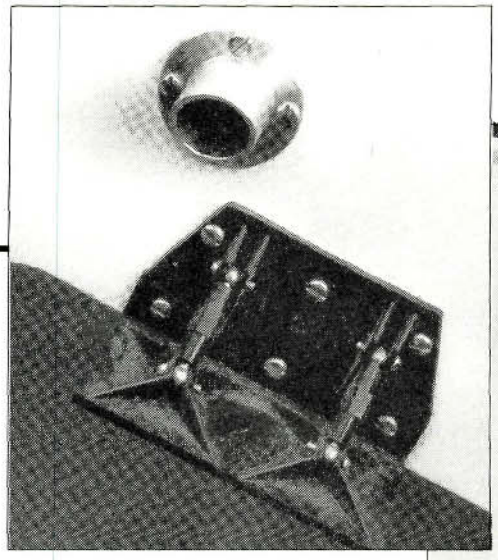
and easy and keeps the engine cool.

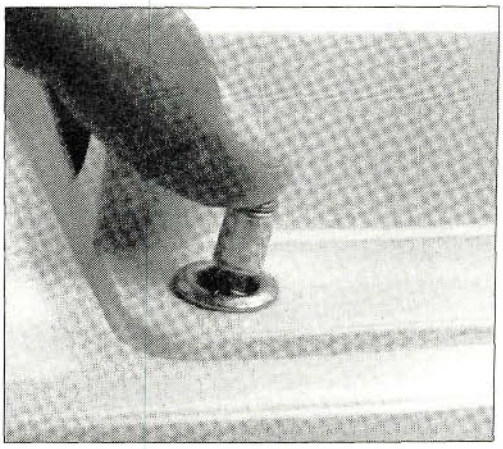
To reduce the effects of engine vibration, the Solo is fastened to rubber engine mounts. This also prevents the radio gear's microchips from being rattled around and avoids the hollow drone of an engine on a solid mount. Like many other nitro-powered boats, the MK's power is transferred to the water through the reliable ol' flex-cable surface drive. A flexible brass cable exits the hull through a brass stuffing box that runs from the inner hull to the strut assembly. This full-length assembly prevents the damage that's associated with shorter stuffing boxes and limits vibration caused by poorly supported cables.

At the end of the flex-cable drive is a Prather* X255 prop. Normally, a prop of this size wouldn't be appropriate for such a large engine, but owing to the Magnum's unique 1:2 belt overdrive, it's the most suitable. The transom hardware also includes a high-quality rudder assembly with a built-in water pickup and a set of large trim tabs for fine-tuning the boat's running attitude. There's also an aluminum exhaust outlet through which the burned fuel from the water-cooled straight pipe can pass.

For buoyancy, there's plenty of foam running along both sides of the hull's interior. The boat comes with all the necessary radio-mounting hardware, including a waterproof radio box with a quick-access plug, servo-mounting trays, linkages and clevises. There's even a can of 2-stroke engine oil! This is the most complete big-bore boat package available!

The stock Magnum is one of the fastest—if not the fastest!—boats in its class





Left: the rear of the boat's hatch is held in place with these push-button quick releases. Top: the trim tabs are fully adjustable so you can fine-tune the Magnum's running attitude. Above: the tabs on the front of the hatch cover ensure that it stays put even in the roughest conditions.

ASSEMBLY

The Magnum is appealing for many reasons, but the most important one is that it comes completely assembled. With the exception of radio-gear installation, there's no need to cut or drill through the hull to mount the hardware. The radio box is compatible with most popular 2-channel radios and Futaba* 9301 (or equivalent) servos.

Bob Schiffano gave the boat its brilliant paint scheme (candy-apple red over a metallic gold base), and its custom pinstriping and authentic gold-leaf lettering are by John Riccio of Max Customs*. To complete the boat's scale appearance, the three optional driver figures were added.

PERFORMANCE POWER

For the performance tests, I installed an early Magnum Sr. 3-channel transmitter with S9301 servos for steering and throttle. I tested stock and modified versions.

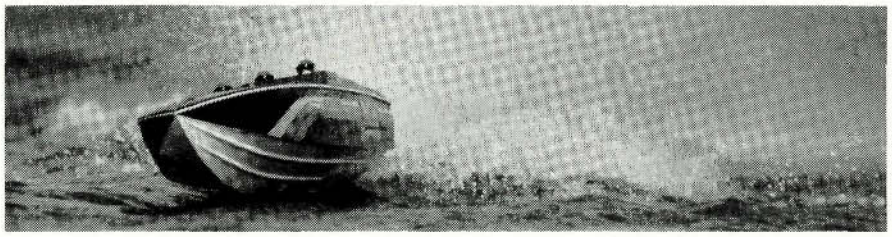
The stock Magnum performed flawlessly—beginning with a one-pull start and ending at sunset, after numerous tanks of fuel. The centrifugal clutch enabled me to start the boat and idle it out into the water while the engine warmed up. (For safety, this clutch also prevents the prop from spinning when the boat's engine runs at idle out of the water.) Although the Magnum's surface-drive setup caused noticeable cavitation, considering its size and displacement, it didn't take long to get this monster up on plane.

SPECIFICATIONS

Type: *Off-shore deep-vee*
Length: *57 inches*
Beam: *15.5 inches*
Weight: *17 pounds*
Hull Material: *Fiberglass*
Engine: *23cc Solo pull-start*
No. of Channels Req'd: *2*
Sug. Retail Price: *$1,175*
Features: *the MK Engineering Magnum comes fully assembled, and it includes all the hardware required for radio installation, a pull-starter for easy operation, flotation foam, a 24-ounce fuel tank, "through-hull" exhaust and a quick-release hatch.*
Options as tested: *Futaba FP-T3PG Magnum radio, water-cooled head, tuned pipe, big-bore carb, 1.5:1 and 1.7:1 overdrive ratios, painted drivers.*
Comments: *the MK Magnum is not only one of the most aesthetically pleasing big-bore boats, but it's also a great performer. It comes completely assembled, so it's easier to get into the water than most boats. It's very fast in its stock configuration, but for "cost is no object" performance, there are optional high-power goodies to make it faster.*

M K M A G N U M

When the Magnum is up on step, its speed is measurably greater than that of comparable boats. Its turning capabilities aren't as snappy as the lighter nitro-powered boats, but it's responsive enough to keep you out of trouble. In choppy conditions, the rudder might lift out of the water in a turn. This immediately whips the boat into an "about-face," but without the flameout that's usually associated with glow engines.



Unlike many glow-powered boats, the Magnum runs well in most conditions, but it excels in rough water. Turbulence breaks the bond between the water and the hull, so the boat can actually gain speed. I conducted these tests in waves of 2-feet and higher. Controlling it was difficult, but most boats would have been crippled by waves a quarter of that size.

The stock Magnum is one of the fastest—if not *the* fastest!—boats in its class. The trouble-free pull-start Solo is a welcome change from the labor-intensive glow engines. Although the Magnum's performance doesn't hold a candle to that of glow-powered boats, its user-friendly design should make it attractive to casual boaters. Depending on the running conditions, it consumes 24 ounces of fuel in 30 to 40 minutes.

The stock Magnum has a hefty price tag, but consider that it comes assembled with high-quality hardware before you decide whether it's in your price range or not. Compared with boats of a similar quality and size, it's a good deal!

MAGNUM MODIFIED

Although the stock Magnum is a performance leader among weedeater-style boats, the urge to install the optional accessories to get a few extra ponies was irresistible. I chose to add MK's water-cooled head, big-bore carb, tuned exhaust and 1:1.7 drive ratio kit, which includes a larger, X262 prop. (A 1:1.5 drive ratio kit is also available.) Although the water-cooled head has to be factory-installed in the Solo engine, modifying the drive ratio was a 10-minute operation; you simply change the pulleys. I made the other modifications in about an hour.

As expected, the modifications exaggerated the boat's performance characteristics. Its speed increased noticeably, but so did its fuel consumption. The increased power snapped the boat out of turns more quickly, and it gave me more of that all-important "hang time" when the boat crested the tips of the waves.

Were the modifications worth it? As the saying goes, "speed costs money...." In competitions that allow modified boats, the hop-ups are definitely advantageous. If your objective is not only to beat the Joneses, but also to embarrass them—go for it! For casual boaters, however, the increased power is overshadowed by expense. The box-stock version provides a good enough performance.

The Magnum is an aesthetically pleasing big-bore boat. Its engine is completely concealed beneath the hatch, and the hull's lines are sleek. Optional driver figures complete this sharp-looking package. As the "Enterprise" of R/C boats, the Magnum will boldly go where no boat has gone before. Though it has some of the usual gas-power problems, its inherent stability makes most water conditions fair game, and its reliability makes running the Magnum a joy, not a chore.

**Here are the addresses of the companies mentioned in this article:*
MK Engineering, *P.O. Box 216 Seymour, CT 06483.*
Aeromarine Laminates, *77 Cedar St., Babylon, NY 11702.*
Prather Products, *1660 Ravenna Ave., Wilmington, CA 90744.*
Futaba Corp. of America, *4 Studebaker, Irvine, CA 92718.*
Max Customs, *Hicksville, NY 11801.* ■

Hit the road!

PHOTOS BY JOHN RIST

TRC pro 10 SPORT

by JOHN RIST

IT WAS COLD AND WET in January in Huntsville, AL, and to help drive away the winter doldrums, I decided to build a new car. The logical choice for a winter project is, of course, a 1/10-scale pan car because you build and run it indoors. I chose the TRC* Pro 10 Sport. This entry-level car has two features that make it a great buy: it handles well right out of the box, and it accepts all the parts that fit the Pro 10 Elite, so it can "grow" along with your driving talents.

THE KIT

The fiberglass T-plate chassis has five cutouts on each side, and this makes it easy to tape-mount a 6-cell saddle pack. The front suspension consists of a pair of spring-damped axle blocks that ride on kingpins. The front axle beam is made of fiber-filled nylon, and it comes with a pair of 2-degree caster shims. These provide a sure-fire way for beginners to set the caster. You don't have to fiddle with lots of adjustments or even understand what caster is or how it works!

The instructions don't tell you which way to turn the shims, but the clever engineers at TRC mounted the front axle with two screws on each side—large screws in front and small ones at the back. The shims have corresponding large and small holes, so it's impossible to put them in backwards! Excellent engineering like this was evident throughout the kit: every part fit properly, and all of the instructions were clear. The kit doesn't include a mechanical speed controller or other electronics, but it does come with a Bolink T-Bird body.

ASSEMBLY

I'm fairly new to pan cars (most of my experience is with off-roaders), so I had to rely heavily on the instructions to figure out how to put this one together. The kit includes two books—one of instructions and the other of pictures. This is great because you can look at the pictures and read the words without having to flip pages. My only complaint is that some of the pictures lack detail. The Pro 10 Sport has many black parts that are mounted on a black chassis, so photographing it must have been like trying to take a picture of a black cat in a coal bin! If you examine the pictures closely, though, you can figure out the correct orientation of and place for each part.

Assembly takes approximately 4 to 6 hours. I took my time and followed every construction step, but I made three changes to the stock kit:

- I don't like Z-bend steering linkages because they're difficult to adjust, so I replaced them with two sets of Rocket City* ball links and Du-Bro* turnbuckle rods. I prefer Rocket City ball links to most other brands because they come tapped and color-coded for right- and left-hand threads. The left-hand threaded end is tapped clean and turns freely; the right-hand threaded end is tighter and acts as a locking mechanism to prevent the rod from "backing out" of the ball links. This setup is light; it costs only about $5; and it makes adjusting toe-in easy.
- I also replaced the stock E-clip front axles with threaded Bolink* axles. I hate E-clips when they're used in high-maintenance applications. If you've done much racing, you know that it's necessary to remove the front wheels often to clean out the carpet strands that get wrapped around the bearings. (I call E-clips "gee whiz" clips, because every time I install or remove one, I holler, "Gee whiz, I've lost another one!")
- Finally, I added a stick-style, 6-cell battery box, which accomplishes several things. It permits the use of reasonably priced, readily available stick packs. (Not all entry-level racers can handle the chore of building and maintaining a saddle pack.) It allows you to charge several packs and change them quickly between runs, and it means you can bias the weight to the left side of the car. This was great because both of the tracks in my town are left-turn-only.

Above: The Pro 10 Sport comes with a rear spring damper, but you can order an aluminum shock and a shock-mounting bracket from TRC. The addition of the battery box permits the use of a stick-style battery pack.

Left: Rocket City ball links and Du-Bro turnbuckles simplify toe-in adjustment.

I chose a Team Associated* RC10 battery box, which works very well. It's tough to get the halves mounted in the right location, but this problem is easy to solve. Cut a piece of 1x2-inch board to the same length as a 6-cell battery pack, and mount it between the battery-box halves with servo tape. Now slide this one-piece assembly around the chassis until you find the best mounting spot. Mark the location of one of the battery box's four holes, drill

T R C PRO 10 SPORT

Type	On-road
Scale	1/10
Sug. Retail Price	$109.95

DIMENSIONS:

Overall Length	18.25 inches
Width	9 inches
Wheelbase	10.50 inches
Front Track	7.38 inches
Rear Track	7.06 inches

WEIGHT:

Gross (with battery)	46 ounces

BODY:

Type	Stock car
Material	Polycarbonate

CHASSIS:

Type	Flat pan
Material	Fiberglass

DRIVE TRAIN:

Primary	Pinion/spur
Transmission	Direct-drive
Differential	Ball diff
Bearings/Bushings	Oilite bushings

SUSPENSION:

Front: Type	Fiber-filled nylon axle
Damping	Coil spring
Rear: Type	T-plate
Damping	Coil spring

WHEELS:

Front: Type	One-piece plastic
Dimensions (DxW)	2.5x1.125 inches
Rear: Type	One-piece plastic
Dimensions (DxW)	2.5x2 inches

TIRES:

Front/Rear	TRC green-dot foam

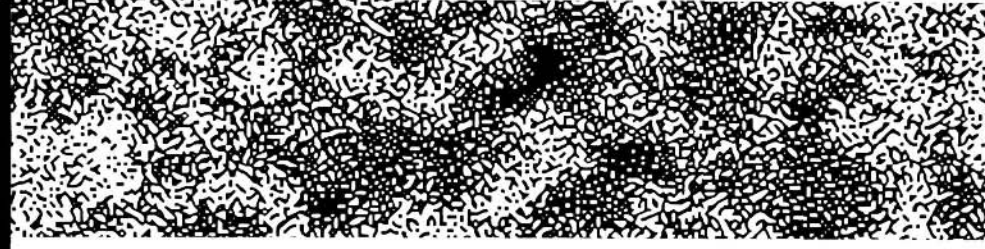
ELECTRICS:

Motor	05/540*
Battery	6-cell pack*
Speed Controller	Electronic*

OPTIONS AS TESTED:
Novak 410-MXc HF speed controller; Speedworks Joel Johnson stock motor; Futaba Magnum Jr. radio; steering links made up of Rocket City ball links and Du-Bro turnbuckles; Bolink threaded front axles.

COMMENTS:
The TRC Pro 10 Sport is an entry-level car, so it doesn't come with the weight-saving goodies (or ball bearings) that are found in the more expensive TRC Pro 10 Elite. Nevertheless, the Sport's heritage shines through: it's easy to set-up and drive, and all it needed to hook-up to the track was some tire dressing on the rear tires. As expected, the car responded well to the addition of ball bearings, and there are plenty of other "trick" parts you can use when you're ready to upgrade: all of the TRC Pro 10 Elite parts fit the Pro 10 Sport.

*** not included**



through the chassis, and mount the box with one screw.

Then, using the battery box as a template, drill the remaining three holes in the chassis using a 1/16-inch drill bit. (This bit is small enough not to remove any of the material from the holes in the battery box.) Remove the battery-box assembly and ream out the 1/16-inch holes in the chassis to accept 4-40 mounting screws. After you've removed the 1x2-inch board and cleaned the servo tape off the bottom of the box, it will be easy to mount the separate halves.

EQUIPMENT

I installed a Futaba* FP-R102GR receiver and FP-S148 servo—the standard components that came with my Futaba Magnum Jr. This radio is reasonably priced, yet it has adjustable steering and reverse on all channels, so it's great for both entry-level and advanced cars. (I've used my old Magnum Jr. to play in local parking lots as well as to compete in A-Mains!) I also used a Speedworks* Joel Johnson stock motor.

The speed controller I chose was a little exotic for an entry-level car, but I was reviewing Novak's* 410-MXc HF for "Scoping Out," and I couldn't pass up the opportunity to test a car and a speed controller at the same time! People often ask me which speed controller I recommend, and I tell them to buy the best racing-style controller they can afford. It's a wise investment, because a good controller is tougher and will last longer. Cars might come and go, but you can always move a good electronic speed controller from one to the next.

PAINTING

The chassis was a snap to assemble, and soon I was ready to paint the Bolink Thunderbird body. Back in the '60s, I watched the unlimited hydroplane races at Lake Guntersville, and the boat that always finished first was the Miss Budweiser. Since then, I've had a soft spot in my heart for any racing machine with the Budweiser logo on it. As you know, Budweiser sponsors Junior Johnson's Thunderbird on the NASCAR circuit, and that was the car I chose to base my model on.

I'm not into accurate scale paint jobs, but I enjoy building approximate representations. This way, people can identify your car with the real thing, but you don't put so much work into the body that you're afraid to race it. I started with a color picture of MRP's* Budweiser Stock Car. The blue Ford logos and the word "Thunderbird" are standard decals, as are the product decals on the fenders, the window netting, the hood clips and the windshield bars.

The difficulty came in finding the Budweiser symbols. The hobby shop didn't sell decals for the Budweiser Special, and even a search through supplier catalogues didn't turn up a

set. I'm stubborn, though, and I was determined to brew my own.

Fortunately, there are now sign shops that can supply custom, computer-generated, vinyl letters to go on the outside of a body, or mirror images to go on the inside. Mirror-image letters are great because, inside the body, they're protected from "wall rash." You can also spray over them with Coverite's* Body Shop paints, which are compatible with both Lexan and vinyl.

After looking at the picture of the Budweiser car and measuring my model, I came up with a pencil sketch of what I needed. I went to the sign shop and selected the type styles that most closely matched the lettering in the picture. The owner punched them up on a computer screen, and then he instructed the vinyl cutting rig to cut mirror-image letters. He even made some "Rist Racing" logos for me. I put them across the car's trunk lid, and they give it a nice personal touch. The whole process took about 30 minutes, and two sets of decals cost $20.

Some helpful hints: be sure to buy multiple sets of letters. It costs little or nothing for the extra sets, but it's really easy to ruin a letter. Make sure you rub the decals down around the edges, too, or paint might bleed under them.

I used masking film to keep the windows clear and put Carl Goldberg* red vinyl striping on the inside of the body. To finish the job, I applied the outside Ford logos and contingency decals. I'm proud of this body because it took more effort than just slapping on some decals. The bright red-and-white color scheme makes the car easy to photograph; just look at the color shots that accompany this article! Although the detailing isn't even close to scale, everyone who sees my car recognizes it as the Budweiser Special!

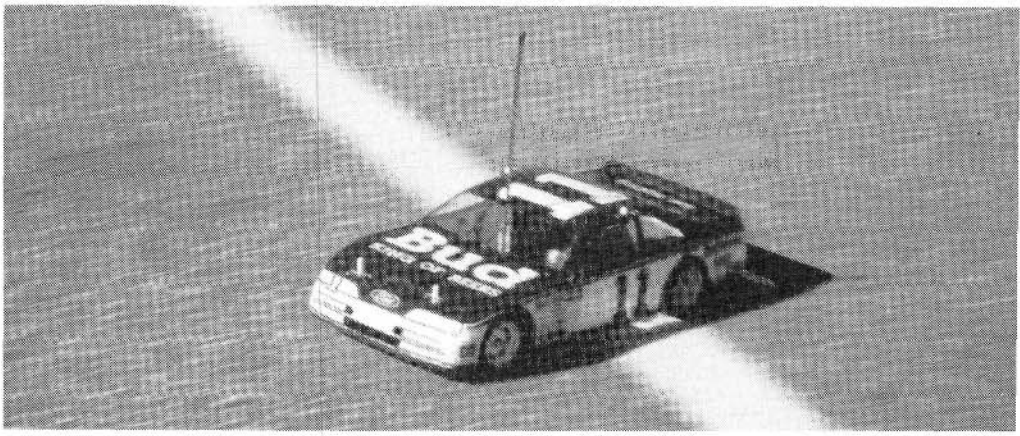
ROAD TESTS

The completion of my Budweiser pan car coincided with the opening of a new carpet track in Huntsville, AL, that's owned and operated by Rick Chambers of RC Hobby Shop. This large, flat track has 37-foot straight-aways, 35-foot-diameter turns and 12-foot-wide lanes.

For the initial test run, I used the kit-supplied green-dot front and rear tires. The car tended to oversteer, but a generous coating of tire compound on the rear tires solved the problem. With each successive run, the car ran faster and more smoothly. I'm sure that much of the improvement was the result of my getting used to the car and the track, but I was impressed by how easy the Pro 10 Sport was to set up. After just three runs, it was showing championship style.

When I returned home after the first test session, I tried some hop-up tricks on the car. I obtained TRC's no. 5330 Pro 10 Series Shock and Antenna Mount, the no. 5163 Aluminum Ball Joints and the no. 5450 Complete Shock Kit. No instructions come with any of the packages, nor is there any information in the stock kit's manual on how to install a shock, but I managed to figure out how it all went together. If you're new to the hobby, be sure to get help from your local hobby shop or a fellow racer.

I didn't really know how the springs fit into the shock or what to do with the supplied ball socket and link. The shock has two springs: the smaller one goes on the inside of the shock and forces it closed; the larger one goes on the outside of the shock and tries to push it open. By adjusting the outer spring's tension with the screw collar, you can balance the two spring pressures. This puts the shock in the center of its travel so it provides spring pressure in both directions much like the spring damper that it replaced.



I was impressed by how easy the Pro 10 Sport was to set-up. After just three runs, it was showing championship style.

The ball link goes into the small end of the shock body. To accomplish this, use an Allen wrench to screw the setscrew into the end of the ball link, and then screw this assembly into the shock's small threaded end. Screw the aluminum ball into the second hole from the back of the motor block's top plate. (The hole doesn't have any threads, but the ball will tap its own.) Now it's easy to bolt the shock/antenna mount bracket to the T-plate and install the shock between the ball socket and the shock bracket.

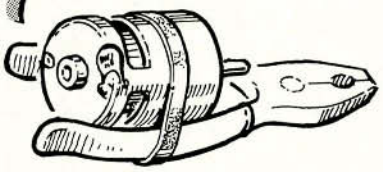
I had to try one more modification. I removed the ball bearings and the graphite diff axle from my Bolink car

(Continued on page 135)

20 MOTOR TIPS

ILLUSTRATIONS BY JIM NEWMAN

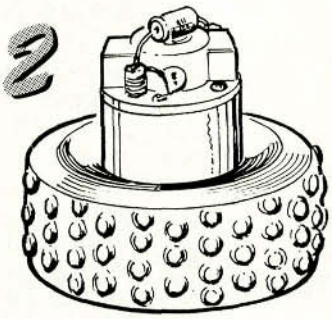
1



HOLD YOUR MOTORS

To stabilize your motors while you work on them, "nest" them between a pliers' plastic grips.

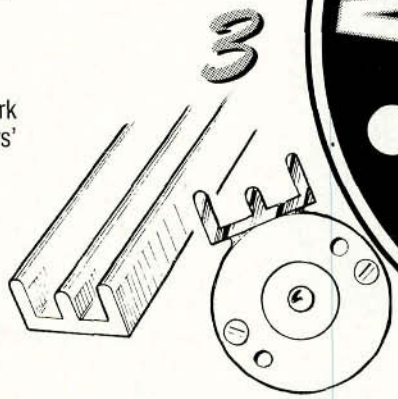
2



MOTOR HOLDER

Save an old tire or two, and use one to hold your motor vertical while you work on it.

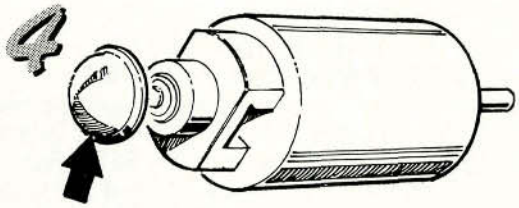
3



HOMEMADE HEAT SINK

The aluminum upper guides used on sliding doors make a fine heat sink when they're cut to length and glued to a motor. You could use CA to glue the rail to the motor case, but aluminum-filled epoxy might work better. You could also try curving the base of the sink so that it provides more contact with the motor case. Two or three sinks would get rid of the heat more efficiently than just one.

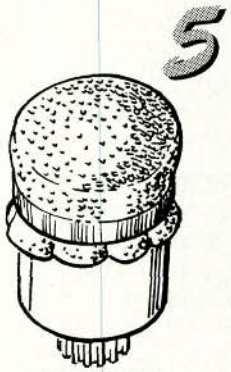
4



MOTOR-BEARING DIRT SEAL

The rubber shock gasket that usually fits over Tamiya's yellow shock units also snaps over the endbell bearing to keep dirt out and oil in. This simplifies maintenance and prolongs bearing life. Don't, however, use the gasket as an oil reservoir: too much oil passing through it will contaminate the commutator and damage the motor.

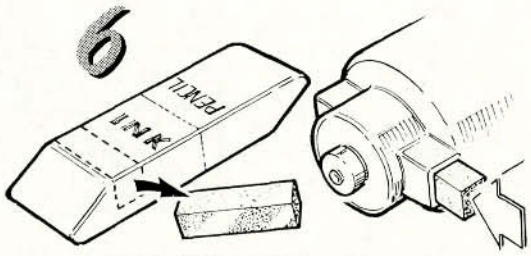
5



ENDBELL AIR FILTER

Here's another way of allowing cooling air to reach the commutator while keeping out grit. Hold a piece of thin, porous, foam plastic (of the bath-mat variety) in place with rubber bands or a piece of heat-shrink tube. It will completely cover the brush gear yet allow an air flow.

6



COMMUTATOR CLEANER

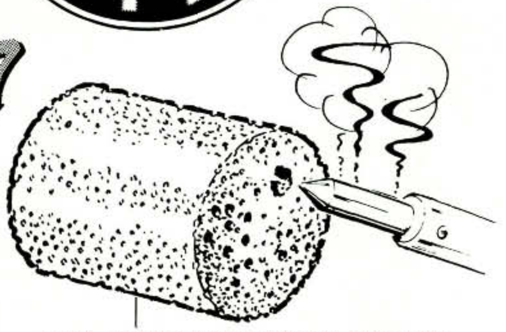
Measure your commutator brushes, then cut a piece of the same size from a regular ink eraser. Push this into the brush housing until it bears firmly against the commutator. Rotate the armature until the commutator is brightly polished. Cut a piece off the pencil end of the eraser, and use it for a final burnishing of the copper segments.

Tuning Tips for Maximum Revs

When you go to a racetrack, you're bound to see one!—you know, someone who's always playing around with motors: cleaning, filing, tuning, changing—all in the pursuit of power. When he bolts a motor into his car, it's always the fastest on the track. Just how did he learn to tune motors so well?—probably by reading R/C Car Action! Now you can be a motor maven with our 20 Hot Motor Tips. Read and learn!

MOTOR 20 hot TIPS

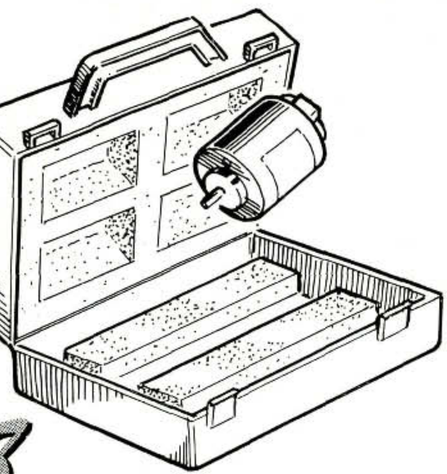
7



CUTTING HOLES IN FOAM

If you put foam dust covers over your motors, here's a way to cut neat holes for the motor wiring: simply use a pencil-type soldering iron to make a hole in the foam.

8



SPARE-MOTOR CARE

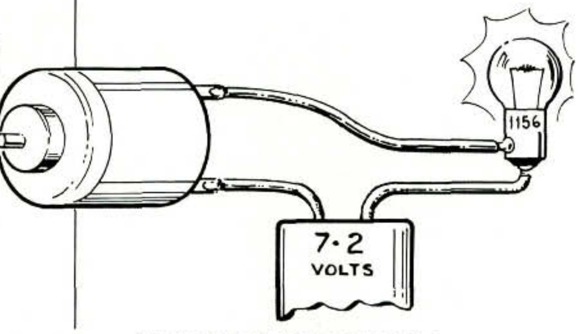
Spare motors should be treated kindly. Why not "nest" them in their own carrying case, e.g., an inexpensive plastic pencil box with snap latches. Line it with ordinary foam rubber, cut out nests for your motors, and glue foam retaining strips into the lid. The cost?—about $2.

9

ENDBELL ALIGNMENT

Here's a clever way to make sure your endbell isn't fitted back-to-front. Before you remove it, use a sharp, pointed tool and a straightedge to scratch a line across the edge of both the endbell and the motor can. When you reassemble the motor, simply align the marks!

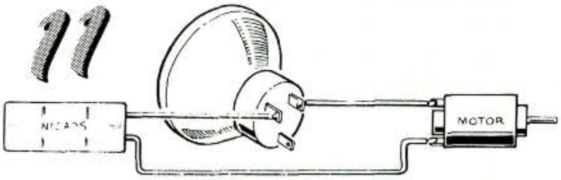
10



VOLTAGE DROPPER

Use the no. 1156 automobile light bulb that's often used for discharging battery packs. With a system of leads and crocodile clips or plugs, you can put this bulb in circuit (series) and use your stock 7.2V Ni-Cd pack to break-in your motor at a lower voltage: lower rpm without the expense of buying flashlight D-cells.

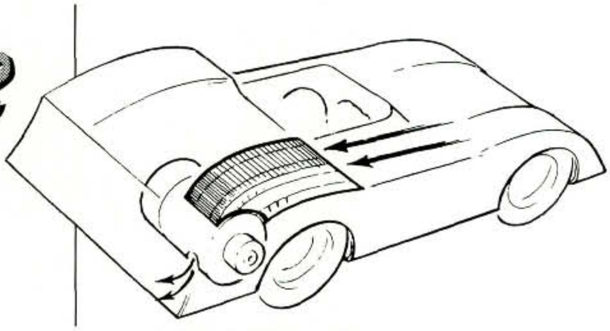
11



BREAKING-IN HIGH-POWERED MOTORS

No. 1156 bulbs only work on 540 motors, because they won't pass enough current to allow high-power motors even to turn over. A no. 6006 sealed-beam, 6V headlight is very reliable and costs about $5. Solder the wires straight to the two upper tabs (as shown), and you'll find that your motor runs at about the same speed as it would on two D-cells.

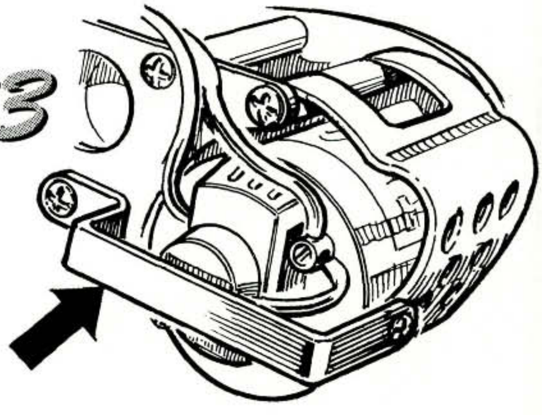
12



COOLING DUCT

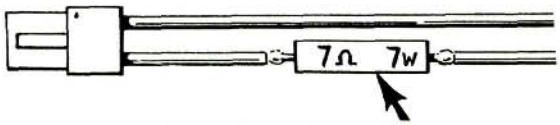
Here's something you can do to lengthen the life of your brushes and commutator—blast cold air directly onto them. The duct is easy to make with an index card and tape. Cut an intake in your car's body (preferably in the scale position), and hold the duct in with dabs of bathtub sealant. It works! You might also get longer runs.

13



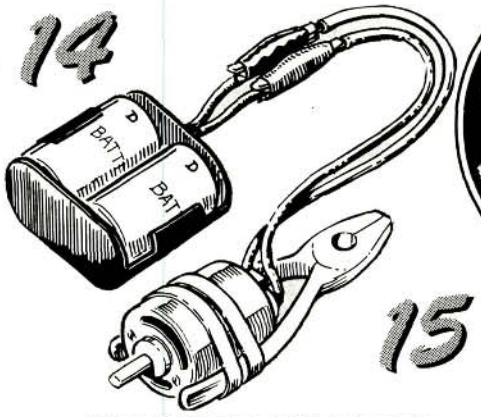
BRUSH-HOLDER GUARD

When the brush holder of this Optima took a solid hit that resulted in a "meltdown," its owner noticed that the regular motor guard hadn't protected that vital component. Make a protective extension with a strip of $1/8$x$1/4$x3-inch steel.



MOTOR BREAK-IN LEAD

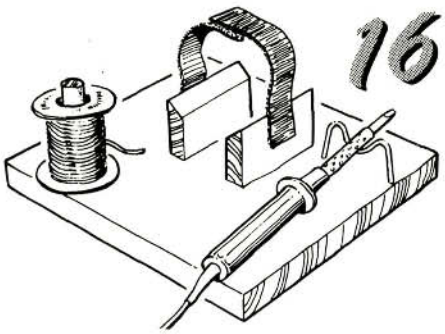
By using a resistor in this adapter lead, you can use an existing 6-cell battery pack to break-in your new motor. The resistor drops the voltage to a sufficiently low level and, for a 6-cell pack, use a 7-ohm, 7W resistor from Radio Shack. *Caution*: use silicone-covered wire because the resistor gets *hot* when it's discharging.



MOTOR 20 hot TIPS

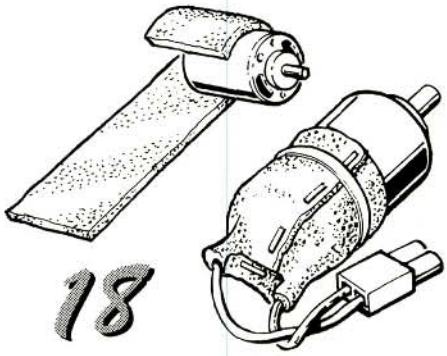
MOTOR BREAK-IN RIG

Here's a very inexpensive break-in rig: a Radio Shack D-cell battery holder (no. 270-386), two D-size batteries, two insulated battery clips. Total cost: approximately $3.85. The battery holder comes already wired, so just solder red and black alligator clips to the wires, rubber-band the motor between the handles of a pair of pliers, hook the leads to the motor wires, and away you go!



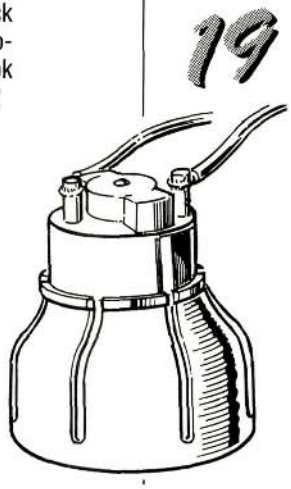
MOTOR SOLDERING JIG

This simple wooden jig not only holds the motor between the blocks with Velcro® while you're soldering, but it also holds the solder on a dowel spindle, and it has a simple wire rest for the iron. Drill holes in the wood so that the dowel and the wire rest can be glued into place. The device shown here measures 9x9 inches, and the spindle was made out of a 1/2-inch dowel.



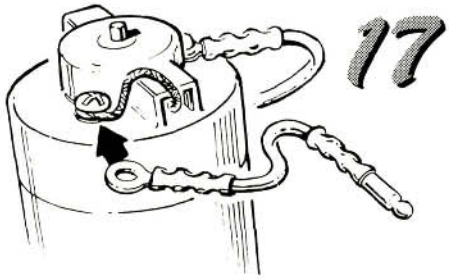
DUST FILTER

Need a filter? Take two used foam fabric-softener sheets, roll them around your motor, and staple them closed along the edge and across the ends, leaving the wires protruding. The sheets keep out dust and allow the engine to receive cooling air.



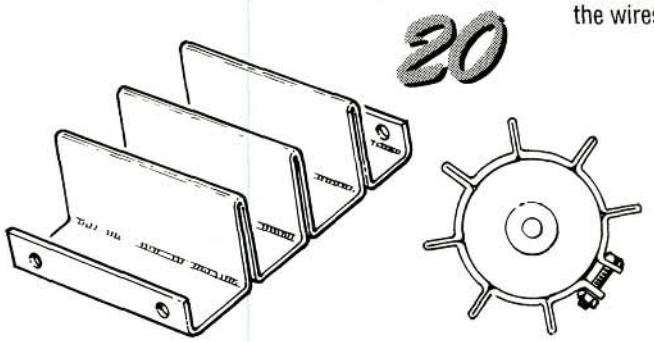
MOTOR-HOLDING JIG

This useful item can be found in almost any hardware store: a child-proof doorknob. Hot-glued to the end of your workbench or to a piece of wood, it holds a motor while you solder the wires into place.



SOLDERLESS CONNECTIONS

Instead of soldering leads to motors, why not use crimped, solderless connections everywhere on your cars? To a short piece of connecting wire, crimp an eye-type terminal lug with a male plug-in terminal at the opposite end. The eye-type goes under the screws holding the motor-brush leads. Naturally, the female connectors fit on the leads into which the motor leads plug. You might have to snip one edge off the eye lugs to make room next to the bearing housing. Caution! When you're using crimped connectors, you *must* put *female* connectors on all *live* leads, e.g., the battery leads and controller leads, so that the live connections will be inside the insulating plastic sleeve. Connectors for crimping pliers are inexpensive and are sold at hardware stores.



HOMEMADE HEAT SINKS

Fold thin aluminum sheet as shown. Using High-Temp Permatex, glue together the double layers that form the fins. When all has set, wrap the heat sink around your motor and secure it with two screws and nuts. (Put a tiny drop of thread-locking compound onto the threads.)

DIRT DIGEST

by BILL O'BRIEN & BOB KANE

Why don't we do it in the road?

WHAT A MONTH! Can anybody tell me why I bought a 1/4-scale car? It's OK; I don't know why I did, either. I *do* know why we answer letters, though; it's because we want you to keep writing. Here come some now....

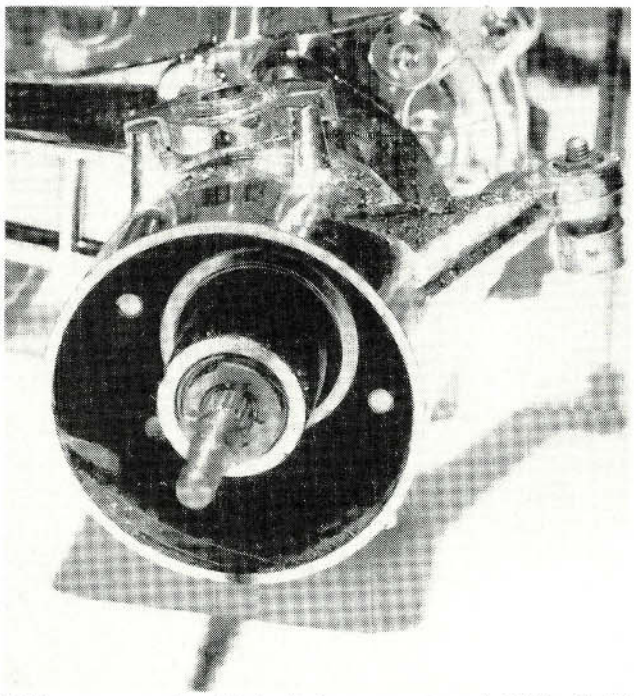
LETTERS, WE'VE GOT LETTERS

Ron in Ontario asks why Bob and I have never done the Madcap-upgrade article we promised. Obviously, Ron, you don't read *every* issue of *Car Action* (shame on you!). I wrote a Madcap truck conversion article for the December '90 issue, and everything I said about the truck's suspension holds true for the Madcap itself. You don't have to use the same Trinity Power Shocks as I did, but follow the general principles.

Cole from Kansas is upgrading to a Junior Two with a 411P (I wish I had his bankroll!), and he wants to know the correct way to solder connectors. Funny you should ask, Cole. Keep your eyes peeled, because somewhere in the next issue or two of *Car Action*, you'll get an answer to your question from the flux-and-flow experts. (Bob in Virginia, pay attention to that issue, too!)

Stephen in Washington State wrote to the "Bill and Bob Show" to see whether anyone is kitting the independent front end that Chris Dosek has on his Lynx II and asks whether it's available for the Delta Villain. He also asks whether anyone is really selling MK lightweight hubs. Then he has the gall to ask if the Exalted Editor Emperor Pond and his seeing-eye boy, John Huber, plan to write an update on the Delta Villain!

Stephen, booby, honey, sweety, thank you for reading "Dirt Digest" and writing to us, but you must work on that third "R" ('rithmetic, not rpm). If you add the word "Dirt" to the word "Digest," it must give you a clue you that we don't do on-road. Where's the fun?; where's the mud? We'll do this once, and only once: get a sheet of graphite (or fiberglass because it's easier to work with), and draw out the rear three-quarters of your Villain and the front quarter of a Lynx (get the picture?).



APM's new, one-piece Clod axle increases rear-end rigidity, but it sacrifices diff action for the increased strength needed for pulling.

If you haven't been enclosing an SASE with your letters, it's no wonder that MK hasn't answered you. Try calling MK; don't write. Most manufacturers would have to spend $2,000 to $3,000 a year on postage to answer every letter, but they're usually more than willing to spend a few minutes on the phone touting their products if you're footing the bill. That's the harsh world of sales. Finally, what the heck is a "Delta Villain"? Isn't Delta a faucet manufacturer?

Mike from the great state of New York (hooo-ray!) needs some hop-up tips for his Lunch Box. Just buy a Mud Blaster; at least, you'll be in the mainstream-scale size, but that's a facetious answer (Mike is almost 12 years old, so he knows what that word means). Why not write again and tell us what you want to do with your "truckette." A lot depends on how you want to run it, where you want to run it, and how much money you're willing to spend. There are about a dozen answers to your question. Also, if you like the people at your hobby shop and feel that they won't lead you on (most are great), ask them for help (and you won't have to wait three months for a reply!).

Finally there's Frank from Pennsylvania. He has access to 1/4-inch Lexan and a machine shop, and he wants to know whether there's a way to buy and adapt a Stealth transmission for his Traxxas Eagle on a $50 budget. Well, Frank, we have something in common. I'd like to replace my aging Dodge Daytona Turbo-Z CS with a new Dodge Stealth R/T that has an automatic transmission. Even though I'm working on a $5,000 budget to do that, I don't think either of us should hold our breath too long. The last time I looked, an Associated Stealth tranny was selling for about $80 (mail order), and a Stealth R/T cost about $22,000. We're both lacking in the finance department, so unless you plan to use the machine shop to cut some plates for $20 bills (not recommended!), you should get a replace-

(Continued on page 98)

(Continued from page 94)

ment Blue Eagle tranny for your truck—and I'll stick with my Daytona.

GRIPE OF THE MONTH

We haven't had one of these in a while, so I thought it was time to throw one in, and it isn't directed at any one manufacturer—almost *everyone* is guilty! Wouldn't it be nice if you could go home with some after-market equipment, install it in your vehicle and then run it? Did you ever notice how often that *doesn't* happen?

After-market shocks are the biggest bamboozlers of our bombastic buggies. If you're installing shocks to upgrade a car that doesn't already have them, you usually get everything you need; but woe to the one who wants to upgrade an existing shock system! Where are the shock bushings? Must we settle for little pieces of ugly tubing? How come the existing ball mounts are always too small or too large for the new shock's link ends? Why don't ball links of a suitable size come with the kit?

Nothing is more discouraging than taking a new part home, trying to install it in your buggy, and finding out that you need even *more* new parts to make it work.

AND THEN THERE ARE SHOCKS

We've noticed a headlong rush (the lemming principle, perhaps?) to mount long shocks on the fronts of buggies. Why are you doing that? Even more to the point: do you *know* why you're doing that? My guess is that you don't.

Basically, the longer a shock is, the more fluid it holds. The more fluid it holds, the more damping it exhibits (damping is a shock's ability to resist compression). Because the oil we use

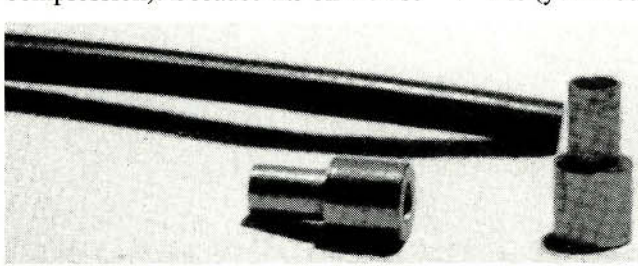
Having a good variety of shock oils is crucial. Simply by varying shock oil, you can markedly change your car's handling.

is viscous, the farther the valve travels in it, the slower that travel will be. Longer shocks will increase damping, but they're not the only way to go.

Whether long or short, all shocks have a valve. In its simplest form, the valve is usually a small disk on the shaft. You'll see a variety of holes in it; for any given thickness of oil, more holes means less damping, and fewer holes means more. Also, for any given valve with a certain number of venting holes, a thicker oil increases damping and a thinner oil decreases it. Perhaps, instead of spending $20 to $30 on long shocks, you should invest about $9 in a couple of shock oils of different grades.

If, however, you're hell-bent on long shocks no matter what, keep one other thing in mind. Mount the shock so that when the rod is fully compressed, it doesn't give you so much vertical wheel travel that your chassis bottoms-out. Press down on the chassis; it should be 1/4 inch off the ground when the shocks have reached their "full travel." If you don't check this (you modify shock travel by slipping some rubber tubing onto the rod), you risk breaking or warping your chassis or your A-arms. Of course, when you've put enough tubing on the shafts to limit shock travel, you might find out that your original short shocks were more than adequate.

Adjusting the valves and oil mix is much more tedious than just putting some longer shocks on your car or truck (the lazy approach), but by adjusting your vehicle, you'll win races. (Some kits include long shocks that are specifically designed to balance damping and travel, but check them anyway.)



Why don't they include these bushings with after-market shock kits? Nothing is more frustrating than finding you need more parts to complete your project.

LIFETIME AXLES

Late-breaking news from the pretty-much-very-odd folk at APM Custom Hobby* says that they're about to release a solid, one-piece axle for the Clod Buster and that they guarantee it for life (certain restrictions apply; void where prohibited, naturally).

The Clod already has a solid axle, but replacing its axle shafts with a solid rod increases rigidity—great for truck pullers. (Check out Pro-Line's* new Clod tires while you're at it). APM says the new axle will withstand four turns in a vise before it snaps.

Of course, because it's a single solid shaft, you reduce your vehicle's steering potential when you install it. (That's why you'd put the solid axle shaft in the rear diff only.) The shaft holds the diff and wheel assembly straight, so you don't have to bolt down the steering servo-saver. I've installed one in a project I'm working on, and it's pretty impressive. Though the assembly will work with the stock Clod gears, APM recommends that you spring for their metal gears, which are no slouches, either.

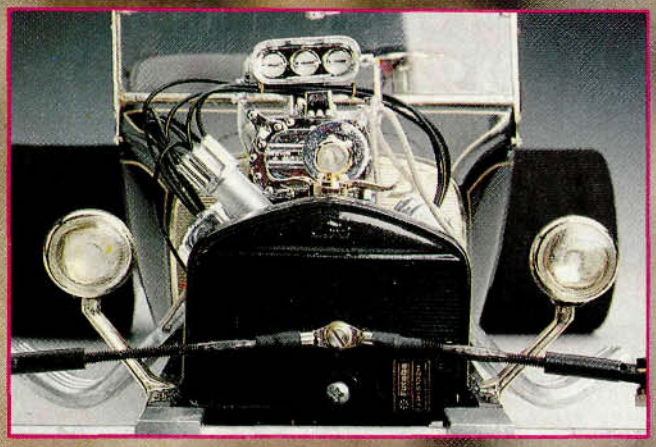
NEXT MONTH

Next month...? Right now, I'm in the middle of two projects: one involves a solid-axle Bullhead, and the other is something I've patched together with two Blizzards. I don't really know what it is yet, but it's about 30 inches long. So how can you expect me to know what's happening next month?

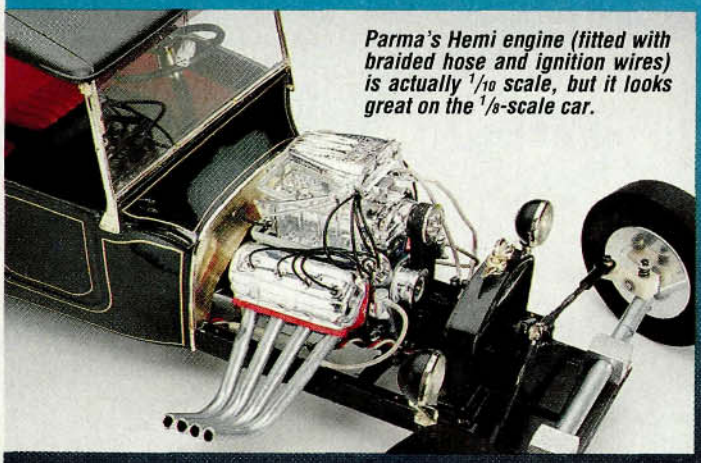
See you next month—same dirt time, same dirt channel.

**Here are the addresses that are pertinent to this article:*
APM Custom Hobby Inc., *810 31st St., Union City, NJ 07087.*
Pro-Line USA, *P.O. Box 456, Beaumont, CA 92223.* ■

by JOHN HUBER



A small opening was cut in the radiator for the steering servo. The center-point steering linkage is made out of a pair of electrical connectors.



Parma's Hemi engine (fitted with braided hose and ignition wires) is actually 1/10 scale, but it looks great on the 1/8-scale car.

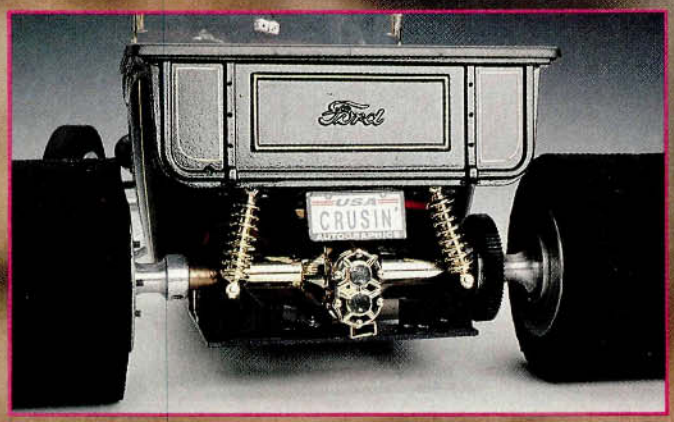
PHOTOS BY YAMIL SUED

FOR THE past two years, Steve Ibershof had been toying with the idea of transforming his static Monogram Golden T-Bucket into an R/C vehicle, but he wasn't sure how to do it. When he saw Eric Goldschrafe's T-Bucket in the December '90 issue of *Car Action*, "the gears" began to turn.

Steve cut the chassis plate out of a piece of fiberglass; then he epoxied the Golden T's chassis rails to the plate and drilled the holes needed for the rear pod parts. He cut an opening in the bottom of the chassis so that he can remove the motor whenever he needs to.

HOME-BUILT PROJECT

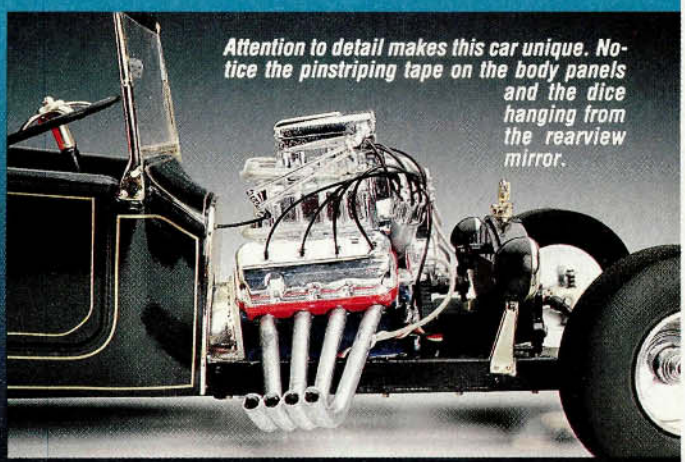
'27 T BUCKET



To achieve the ultimate in scale appearance, the Monogram kit's axle housing was built over the actual axle. The shocks aren't functional, but they add to the car's overall appearance.

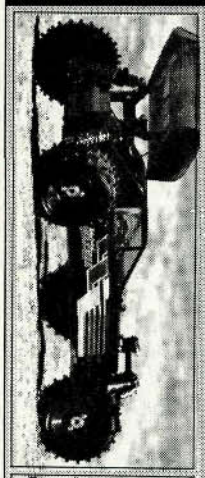
For realism, he cut another opening through which the oil-pan assembly protrudes from the bottom of the car.

Apart from a few minor modifications, Steve built the Golden T according to the instructions. He cut a hole in the radiator so that he could mount the steering servo there, and he made holes so that he could route all the wires underneath the car's interior (another realistic touch). The radio gear, which is underneath the seats, is mounted directly on the fiberglass chassis. Because space is limited, Steve uses a Futaba* micro receiver and a Novak* 4 ESC. A radio antenna



Attention to detail makes this car unique. Notice the pinstriping tape on the body panels and the dice hanging from the rearview mirror.

COMING NEXT MONTH!



YOKOMO PROJECT

FEATURES

Time Warp: Tamiya XR311
Fusion Speed RC10
Home-Built Flatbed Clod
Battery Building
Masking Basics

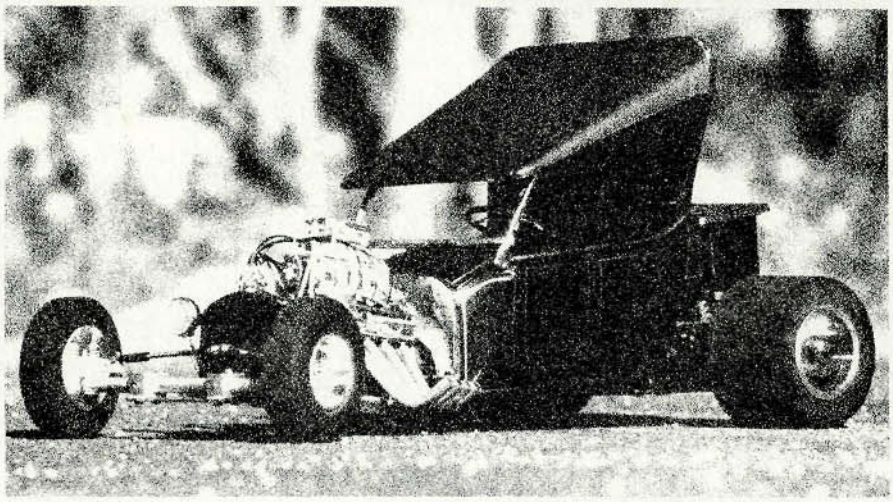
TRACK REPORTS

Kyosho Penske PC19
Corally SP-10
Kyosho Ferrari Testarossa

COLUMNS

Dirt Digest
Truck Stop
Scoping Out
Troubleshooting

HOME-BUILT PROJECT



would have ruined the T's scale appearance, so he mounted a Deans* mini loaded antenna on the chassis, and it runs from front to back.

The wheels came from one of Steve's old 1/8-scale gas cars, but they had to be modified to fit onto the axles. The front tires were narrowed, and the front and rear axle assemblies were taken from a 1/10-scale pan car. He put the rear axle through the kit's gold-colored rear-axle housing. This, along with the "Crusin' " license plate, makes the car look incredibly realistic.

A shiny metallic-gray paint job trimmed with Pactra's* gold striping tape finish off the body. Even though the Parma* Hemi engine is 1/10 scale, it looks great with the T-Bucket. For the final touch, Steve hung a pair of tiny dice from the rearview mirror. He found most of the items he needed for detailing at his local hobby shop. (Don't be afraid to ask for help; that's why they're there.)

Most of the parts on this model are made of fragile plastic, but that doesn't prevent Steve from having fun. He removes the interior, the roof, the trunk lid and the windshield, and off he goes. Basically, it's a show car, but he enjoys running it. It was on display at last year's ROAR 1/12-scale Nationals in Grand Rapids, MI, and many of the racers were surprised when he told them that it was an R/C car.

Steve is now working on another T-Bucket—this one will have working lights and a more detailed interior. Can't wait to see it, Steve.

Parts list

- Monogram Golden T-Bucket 1/8-scale kit
- Parma Hemi engine kit
- Blank fiberglass plate
- Novak 4 ESC
- Futaba FP-R2H micro receiver
- Futaba FP-S132H
- Trinity Monster stock motor
- Deans mini antenna
- Assorted 1/10- and 1/8-scale car parts

If you don't know the electronics are underneath, it's difficult to tell the T-Bucket is an R/C vehicle. Note the Deans antenna that lies flat on the chassis. It's considerably shorter than the stock antenna, yet it does the same job.

**Here are the addresses of the companies mentioned in this article:*
Futaba Corp. of America, *4 Studebaker, Irvine, CA 92718.*
Novak Electronics, Inc., *128-C E. Dyer Rd., Santa Ana, CA 92707.*
Deans Connectors, *distributed by Ace R/C Inc., 116 W. 19th St., Box 511C, Higginsville, MO 64037.*
Pactra Inc., *620 Buckbee St., Rockford, IL 61104.*
Parma International, *13927 Progress Pky., North Royalton, OH 44133.* ■

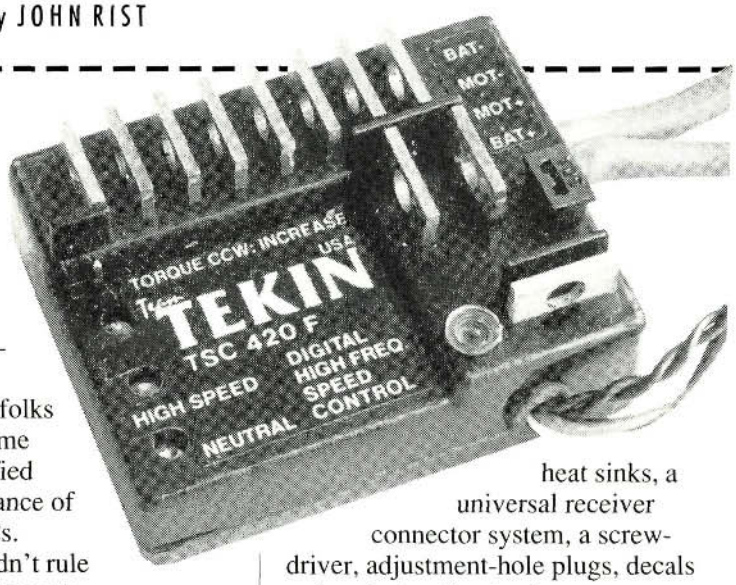
SCOPING OUT

by JOHN RIST

Tekin TSC 420F

DESIGN, UPDATE and improve. In today's world of electronic, computer-aided design, it's possible to go from the initial concept to the marketing of a new product in a matter of months. This rapid growth in the number of new products makes some modelers wonder whether they should buy the latest new speed controller (SC) today, or wait till tomorrow for the new, improved version. In the past year or so, Tekin has frequently updated its electronic SCs, and each improvement has resulted in a new model number on the market.

These product changes were driven by a couple of factors: improvements in Mosfet transistors (the parts in an ESC that control the amount of current that goes to the motor when you squeeze the trigger); and the need to meet competitors head-on with a "better mousetrap." The folks at Tekin assured me that they're satisfied with the performance of their current ESCs. Although they didn't rule out future improvements, they're confident that the established dynamite performance of their ESCs will help them to remain among the leaders in the industry.



Tekin's newest controller, the TSC 420F, seems to be a direct replacement for the Tekin ESC 700. This makes it Tekin's top-of-the-line controller. The TSC 420F and the ESC 700 are all-out racing models with eight FETs to handle the current. The big difference between the two is that the TSC 420F is a true high-frequency-switching controller. This high-frequency switching provides a very smooth throttle response, allows motor commutators to last two to five times longer, and increases the length of motor runs.

With all this in mind, I was eager to take a hard look at the TSC 420F—a racing-style ESC with these features:

- eight forward Mosfets; two brake Mosfets
- 4- to 20-cell capacity
- torque control (current limiting)
- high-frequency motor control
- regenerating battery recharging
- BEC
- built-in 50A fuse that protects against reverse voltage
- multilayered printed-circuit board

It's supplied with these accessories: tie-wraps, servo-mounting tape, motor-filter capacitors, brake FET heat sinks, a universal receiver connector system, a screwdriver, adjustment-hole plugs, decals and an instruction book.

As usual, I looked inside to see whether this ESC would be able to stand the rigors of racing. The TSC 420F is built on a multilayered circuit board that has "plated-through" holes. This type of pc board allowed Tekin to put several layers of etched copper under the FETs, and this increases current-handling capacity and lowers the "on" resistance. Most of the components are mounted on the surface. Surface-mounted parts have "metalized" pads or very short leads, and they're soldered flat on the pc board. These "lead-less" parts are small, and that's why the TSC 420F is the smallest, high-performance ESC on the market. Of course, its FETs are the standard size—it takes full-size parts to handle raw power. The TSC 420F is a well-built, truly high-tech speed controller.

To test the Tekin, I went to my "Scoping Out" lab. (See the sidebar for a description.) The detailed instruction manual made setting up the TSC 420F easy. My only difficulty was with the "interconnect" drawing, which shows both a three-wire setup and a four-wire setup. To further confuse the issue, the instructions talk about an "optional red wire" that's "only on the 410S"; in fact, the TSC 420F also has this wire (both the TSC 410S and the TSC 420F are four-

THE "SCOPING OUT" LAB

John Rist's lab consists of:

- **an oscilloscope**
- **a digital voltmeter**
- **a resistor load bank**
- **a 6V, 40A electricity supply**
- **a Pit Stop Radio servo/speed controller tester.**

The oscilloscope is used to monitor the controller's output and to guarantee that it's fully on.

The digital voltmeter takes all the voltage-drop readings and verifies the reading on the current meter.

The resistor load bank consists of 40, 12-ohm, 5W power resistors, which can be switched on and off one at a time to vary the load between .6 amp and 20 amps, but the standard 12 amps are usually used.

In series with the resistors is a 25A Simpson current meter and a 1-percent .01-ohm resistor. By measuring the voltage drop across this resistor, the current meter's reading can be double-checked. Of course, the lab power supply provides the test current.

wire controllers).

I figured out that one of the red wires and the black wire go to the battery; the other red wire and the blue wire go to the motor. The red wire that's shown running between the battery connector and the motor connector isn't needed with the four-wire TSC 420F setup. Don't forget to install the motor capacitors as shown in the connection diagram. I suspect that a high-frequency controller generates RF noise that could cause receiver glitching, but properly installed motor capacitors should eliminate this possibility.

TIME TO TEST THE TEKIN

With the controller connected and adjusted according to the instructions, I was ready to take some voltage-drop readings. I take the readings at two points: first, from one end of the wires to the other; second, 2 inches along the wires. The first reading establishes the performance of the controller as it comes out of the box; the second demonstrates the power-robbing effect of long wires and provides a figure with which I can compare the SC I'm testing with other controllers.

Pumping 12 amps through the TSC 420F, the end-to-end reading provided a voltage drop of 0.09 volt, which means a resistance of 0.0075 ohm. At the 2-inch point, with 12 amps still flowing, the resistance was 0.04 volt—0.0033 ohm. This is a *very low* resistance. The TSC 420F is one purebred racing controller!

The setup with long wires performs 2.25 times worse than the setup with 2-inch wire. The only way to realize an ECS's maximum potential is to pay attention to wire length and connectors.

THE "LET-IT-COOK" TEST

I let 20 amps flow through the controller for 15 minutes—no cooling air or

(Continued on page 108)

Team Astro Sweeps The NATS

In Truck Pulling and Drag Racing Astro Motors are almost unbeatable. Astro motors have powered more trophy winners than all other makes combined.

IEDA Drag Racing Fall Nationals
Colton, Ca. Nov. 3, 1990

National Speed Records

Top Speed Unlimited Rail 71.02 Mph Roger Rose, Astro Top Fuel II Motor
Low E.T. Top Fuel Rail 1.981 Sec. Mike Ogle, Astro Top Fuel I Motor

Track Record Oct. 28,1990

Low E.T. Unlimited Rail 1.820 Sec. Roger Rose, Astro Top Fuel II Motor

IEDA Nationals Winners

1st Place.....Pro Comp .....Eric Wiems .....Astro Top Fuel I Motor
2nd Place....Pro Comp .....Roger Rose .....Astro Top Fuel I Motor
1st Place ....Top Alcohol Rail.....Brian Reeter....Astro Top Fuel I Motor
1st Place ....Top Fuel Funny Car...Eric Wiems .....Astro Top Fuel I Motor
2nd Place ...Top Fuel Funny Car...Calvin Grant ...Astro Top Fuel I Motor
1st Place.....Top Fuel Dragster .....Mike Ogle .....Astro Top Fuel I Motor
2nd Place....Top Fuel Dragster .....Mike Russo .....Astro Top Fuel I Motor
2nd Place....Unlimited Dragster ....Roger Rose .....Astro Top Fuel II Motor

NR/CTPA World Championships
Champaign, Il. Sept. 30, 1990

1st Place..... 2WD Modified.....A. Janicki .....Astro Pullmaster I Motor
2nd Place ... 2WD Modified .....Dutch Esgro ....Astro Pullmaster I Motor
3rd Place.... 2WD Modified.....David Hester ...Astro Pullmaster I Motor
1st Place.....2WD Open I .....Kyle Haynes.....Astro Pullmaster I Motor
3rd Place....2WD Open I .....Marcia Arman Astro Pullmaster I Motor
1st Place.....2WD Open II.....Jim Bee.....Astro Pullmaster II Motor
2nd Place....2WD Open II.....Scott Weigel.....Astro Pullmaster III Motor
3rd Place ... 2WD Open II..... G. Kinsey .....Astro Pullmaster II Motor
1st Place..... 4WD Open I .....Sean Cullen .....Astro Pullmaster I Motor
2nd Place.... 4WD Open I .....Don Fisher.....Astro Pullmaster I Motor
2nd Place ... 4WD Open II.....Dale Arman .....Astro Pullmaster II Motor

Team Astro 13311 Beach Ave. Marina Del Rey, Ca. 90292 (213) 821-6242

(Continued from page 107)

heat sinks! I didn't expect that my leaving off the large heat sink would cause a problem, because Tekin claims the controller's eight Megafets can handle the current without it. They do, however, recommend that you use the small heat sinks on the braking FETs.

With the current flowing, I sat back and enjoyed a cup of coffee. After 15 minutes, the heat sinks were barely warmer than room temperature, so Tekin's claim that the TSC 420F can operate safely without a heat sink is valid.

THE "DEAD-SHORT" TEST

For this, I put a short across the controller and subjected it to all the current that my lab supply can deliver—about 40 amps. After 5 minutes, the TSC 420F was too hot to touch, but it was still operating normally.

This controller has built-in thermal shutdown, but with its incredibly low "on" resistance, it would be scary to pump enough current through it to force it into shutdown. I'm convinced that the TSC 420F can stand a lot of abuse and keep on trucking.

As with any setup, a little common sense is required when you have trouble. The average Ni-Cd battery pack can deliver more than 100 amps, and a true dead short should be obvious from the smoke coming out of your car. At that point, it's time to shut down and find the cause of the problem.

AND NOW FOR SOMETHING COMPLETELY DIFFERENT...!

It goes against my nature to deliberately wire-in a controller backwards, but Tekin says that the TSC 420F has reverse-voltage protection with a 50A fuse. I gritted my teeth and wired it in backwards. The fuse let loose with a snap and a spark. After reconnecting the battery correctly, I found the TSC 420F was alive, but working erratically. I replaced the fuse, and the TSC 420F was operating properly again. The presence of a fuse usually means you should expect a poor performance, but the TSC 420F has a very low "on" resistance. I examined the pc board and found that the TSC 420F has two power buses: one feeds the forward FETs, and the other feeds the brakes and the BEC voltage regulator. The fuse is in the brake/BEC voltage bus.

When you reverse the voltage, the braking FETs blow the fuse and remove power from the BEC voltage regulator. With the BEC dead and power removed from the brakes, all is safe—usually. I don't recommend that you try this, but it did work for me. The fuse is a special "funny shaped" one, so make sure you have a spare in your toolbox.

TAKE IT TO THE TRACK

We're fortunate in Huntsville, AL, to have a brand-new indoor track—a huge flat oval that demands speed and skill. My son Joe was home from college, and we decided to try the new track and the TSC 420F at the same time.

The 6-cell stock class attracts the most cars. I fitted my Bolink Eliminator Gold with a B&R Bullet stock motor, a new 1400mAh 6-cell Sanyo SCR pack, and the Tekin TSC 420F speed controller. Anyone who has used a B&R Bullet stock knows that it has very advanced timing that draws a heavy current and runs a car very fast; in fact, this setup was so fast that we had oversteer that kept us flirting with the outside wall. The super "drivability" of the TSC 420F allowed Joe to keep the car under control most of the time, and we managed to put in a reasonable showing for our first time out.

We set the gearing to give us a 4-minute, 10-second dump. With this high gearing and the power-hungry B&R Bullet, the battery and motor were soon hot enough to cook eggs, but the TSC 420F was still quite cool.

You don't need brakes on a high-

TEKIN TSC 420F

DIMENSIONS:

Height	0.75 inch
Width	1.5 inches
Length	2.0 inches
Weight with wires	2.1 ounces

TUNING:

Access to controls	Excellent
Ease of adjustment	Very good

PRICE:

Suggested retail	$200
Warranty	120 days

ELECTRICAL:
(Manufacturer's specs)

Max. voltage	20 cells
Min. voltage	4 cells
Current rating	400 amps
Resistance	0.0018 ohm

TEST PARAMETERS:

Voltage	6 volts
Current	12 amps
Voltage drop to end of wires	0.09 volt
Voltage drop at 2-inch point	0.04 volt
Resistance* to end of wires	0.007 ohm
Resistance* at 2-inch point	0.003 ohm
BEC output, 6-cell battery	5.80 volts
Motor switching frequency**	2127Hz

***Resistance = Voltage Drop ÷ Current**
****Frequency is measured from rising edge to rising edge of the switching wave form.**

COMMENTS:
If your competitors show up at the track with a TSC 420F speed controller in their cars, *beware:* it's a killer. The TSC 420F is Tekin's top-of-the-line speed controller and, with its high-frequency motor switching, 20-cell capacity, cool operation and low "on" resistance, it's destined for the winners' circle. There's some minor confusion in the instruction manual: the hook-up diagram shows three- and four-wire setups in the same picture. Experienced modelers won't have any trouble connecting the TSC 420F, but beginners should seek help. When you combine smallness, lightness and low "on" resistance with high-frequency motor drive, the results are impressive. The TSC 420F is sure to be a winner!

speed oval track, so we tested them at a local parking lot, where I found that the TSC 420F has *very strong*, yet controllable brakes. This controller has all the qualities it takes to be a champion: low "on" resistance, smooth throttle response and cool operation.

A KILLER CONTROLLER!

Beware if your competitors show up at track with this controller! It will be a killer. Tekin designed it to be a top-of-the-line unit, and it seems to be second to none. It has a lower "on" resistance than any controller I've ever tested, but it's small and light enough to fit any 1/10- or 1/12-scale car or truck.

My attempts to make it so hot that it would trip the automatic thermal shutdown failed; it has such a low "on" resistance that it simply doesn't heat up much. As if all this weren't enough good news, the TSC 420F is one of the *hottest* new, high-frequency-switching ESCs. I'm sold on this feature because it provides longer run times; it reduces commutator-brush wear; and it provides incredibly smooth throttle response.

The TSC 420F will handle 20 cells, so it's the logical choice for heavy-duty truck pulling and large electric boats. A few words of caution, though: if you run more than nine cells, you'll need a receiver battery pack. It's important, however, to turn off the controller's power switch if you run it this way. Consider taping the TSC 420F's switch in the "off" position, or remove it; the receiver battery pack's switch will turn off both the receiver and the speed controller.

One of my few problems concerned Tekin's instructions—a multipurpose book that encompasses several Tekin controllers. The connection diagram is confusing. If you're hooking-up a controller for the first time, ask an experienced modeler for help.

The bottom line? Tekin's TSC 420F speed controller will win races!—lots of races!

**Here's the address of the company featured in this article:*
***Tekin Electronics,** 970 Calle Negocio, San Clemente, CA 92672* ■

& WARRANTIES

(Continued from page 30)

requires that a product must be fit for the ordinary purpose for which it was produced; in other words, that the product will work and do what it's supposed to.™

The other is an implied *warranty of fitness* for a particular purpose. This warrants that a product will suit the buyer's particular needs rather than just conform to the ordinary purpose for which it was produced. This implied warranty arises if a seller sells you a product when he or she is aware of your particular needs. For example, in the scene described at the beginning, if you had taken your buggy to a hobby shop and showed your setup to a salesperson who then sold you the electronic speed controller, the controller would have come with an implied warranty that it was fit to be used with your buggy's setup, even if the salesperson didn't expressly say so.

HOW TO HELP YOURSELF

Now that you know which warranty coverages are available, what should you do when a problem arises? First, be prepared. Be sure to use your R/C equipment only in accordance with the manufacturer's instructions and to perform any required maintenance. Failure to do so may void your warranty. Also be sure to keep your sales receipts with your warranties. In addition to providing *proof* of purchase, your sales receipt will show the *date* of purchase. Proof of the date of purchase is important because most warranties expire after a specified time.

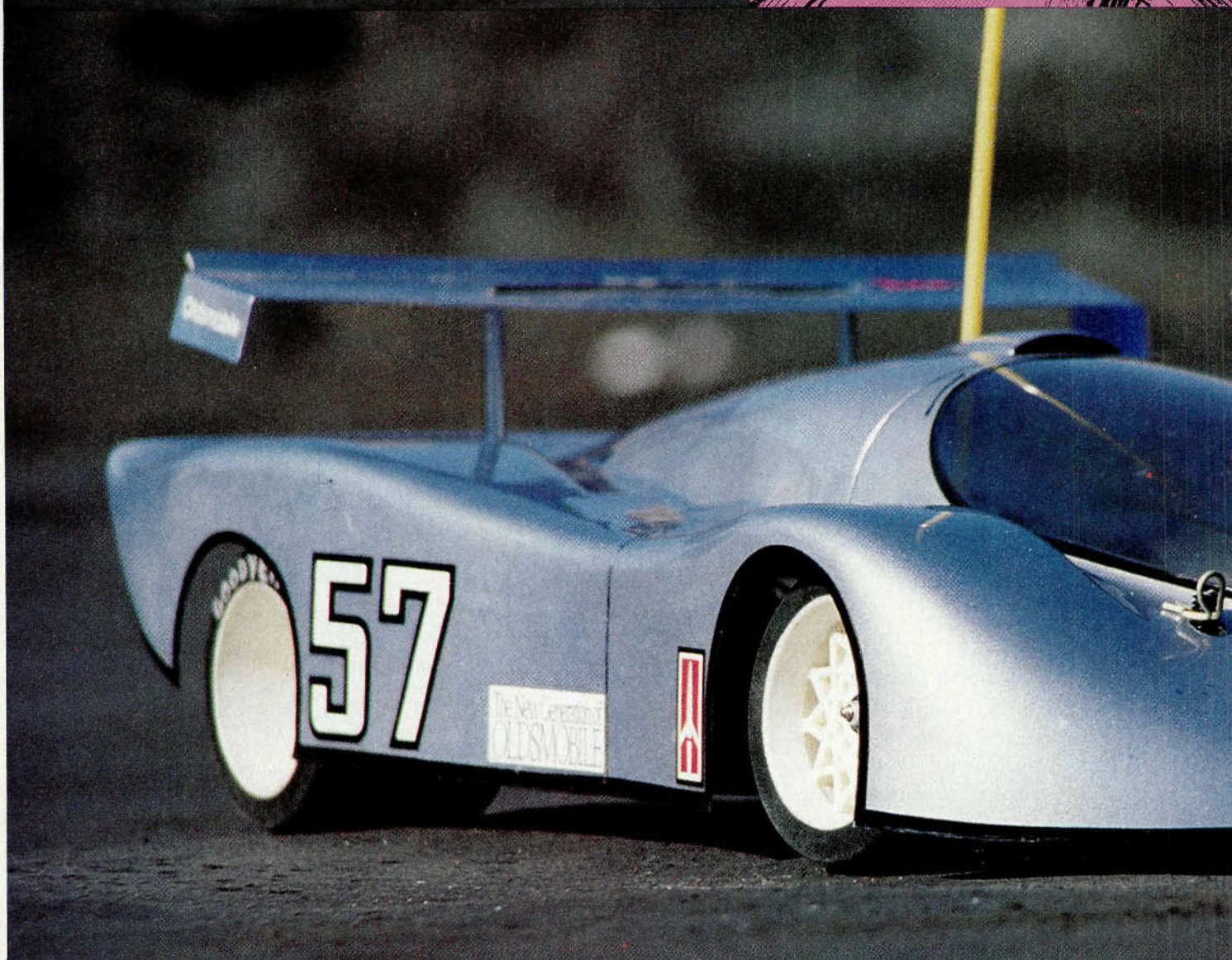
When you have a problem, there are several steps that you can take.

- First, if your product comes with a written warranty, read it carefully to see whether the warranty covers your particular problem.
- Remember, if your problem isn't expressly covered by your written warranty, it may still be covered by an *unwritten implied* warranty. Some states prohibit or limit a seller's ability to disclaim implied warranties.
- Additionally, if a product comes with a written warranty, federal law prohibits the product's supplier from disclaiming any implied warranties that cover the product. (Even though many written warranties attempt to do so anyway, such disclaimers are invalid.) You can contact your local consumer protection office for more information about the extent of coverage provided by implied warranties in your state.
- Many written warranties also state that they're limited only to the repair or replacement of the product covered by the warranty and do not cover consequential damages. Some written warranties state that they're limited in amount to the purchase price of the product covered. In our example, the damage to the battery pack and the motor that resulted from the defect in the speed controller might not be covered by the written warranty if it expressly excludes such damages. A few states, however, prohibit the exclusion or limitation of consequential damage warranty coverage. Your local consumer protection office can tell you what your state's laws are.
- Next, discuss your problem with the retailer who sold you the product to find out whether he or she can solve your problem, or whether you'll have to deal with the manufacturer.

When I bought a popular off-road buggy kit that mistakenly came with two right front A-arms but no left front A-arm. I could have sent one of the A-arms back to the manufacturer for a replace-

(Continued on page 118)

M



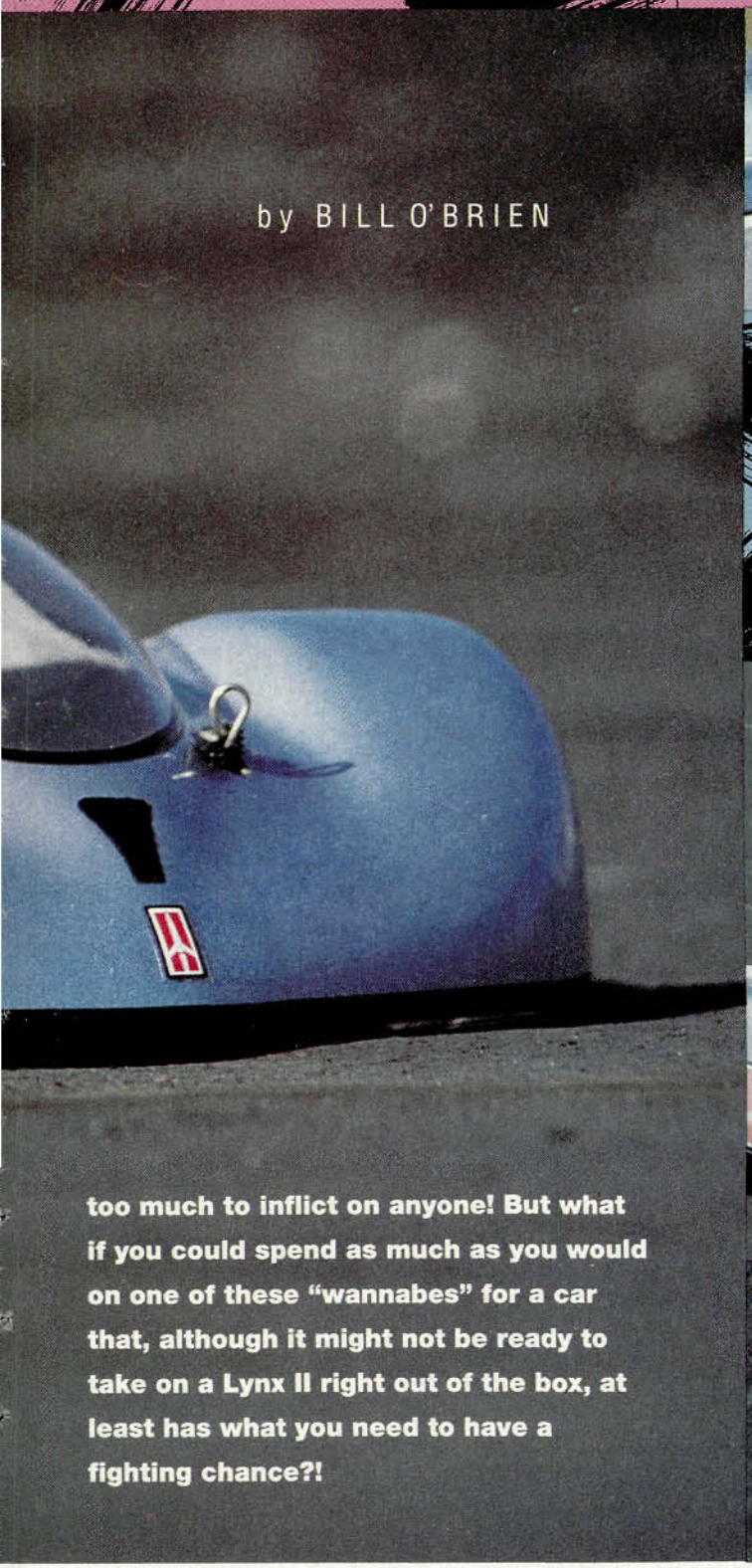
WHETHER YOU'RE an off-roader who wants to find out how the other half lives, or you're just getting started in on-roading, the odds are good that you don't want to spend a fortune to find out what it's like. Surprise!—you don't have to. McAllister* recently introduced the Hyundai of R/C on-road cars!

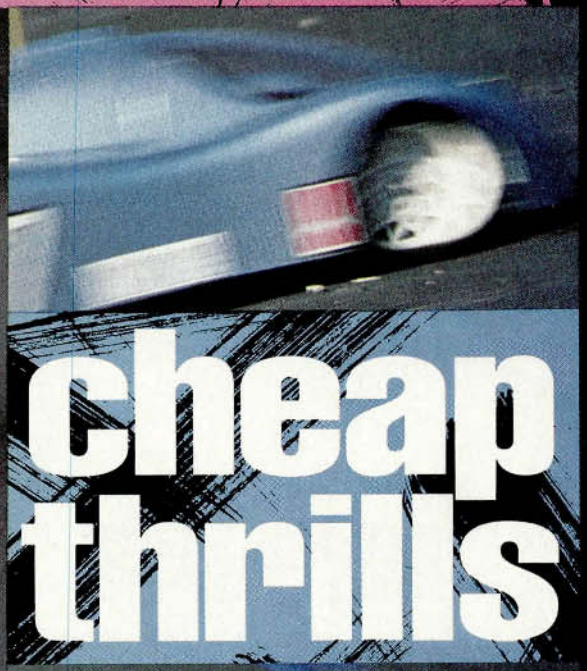
I know that there are already plenty of inexpensive on-road cars on the market and that the last thing anyone should be subjected to is another in a long line of listless little Yugos. Their fiberglass chassis and flanged bronze bushings are

K-PRO

by BILL O'BRIEN

cheap thrills





too much to inflict on anyone! But what if you could spend as much as you would on one of these "wannabes" for a car that, although it might not be ready to take on a Lynx II right out of the box, at least has what you need to have a fighting chance?!

PHOTOS BY BILL O'BRIEN

MX-PRO

Even with the dual rate dialed down to almost nothing, I could still power through turns without a problem.

THE SEMI-KIT

Let's look at the MX-Pro's features. Its lightweight graphite chassis has a conventional bat-wing design, and it's slotted to hold four individual cells on either side. This means that you can distribute the weight of the batteries to suit the type of track you're running on. You can also use a standard stick pack, and that's an immense boon to off-roaders who want to get into on-roading without spending more money on new batteries.

McAllister includes an aluminum front beam and beam carriers as well as an aluminum engine pod—and a strange pod it is. That it's aluminum isn't unusual, but it has been drilled out to allow you to set-up the motor on either side of the pod, and this gives you another way to control weight distribution. (To prevent the rear end from spinning out on oval tracks, some on-roaders like to put all the weight on the left side of their cars.)

The motor pod is attached to a standard graphite T-bar which, in turn, is bolted to the main chassis. Not as traditional on a budget racer is the aluminum-tipped graphite rear axle. Most inexpensive car kits use a heavy steel axle that racers quickly replace with a graphite unit—or a titanium one, if they have big bucks to spend. A 48-pitch spur gear (not 32) is also part of the package.

Perhaps the MX-Pro's crowning glory is that there isn't a bushing to be found; flanged bearings are included for the front wheels, the rear axle and the differential.

You don't get tires or a body, but you do get wheels. That's part of the reason why the MX-Pro is less expensive than some model cars. Given the wide choice of tires—from straight foams to rubber-capped radials—and the many available tire compounds (and staggers), you'll be able to find just the right tire traction for your track. Likewise, with such a wide choice of IMSA, NASCAR, CART, F1 and plain old scale bodies, you're sure to find a look you like.

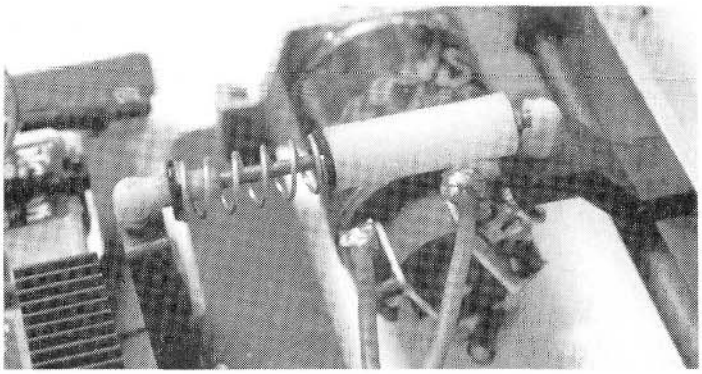
CONSTRUCTION

Don't look too hard for an assembly manual; all you'll find is a 11x17 sheet of paper folded in half. It's a good thing that the instructions are well-written!

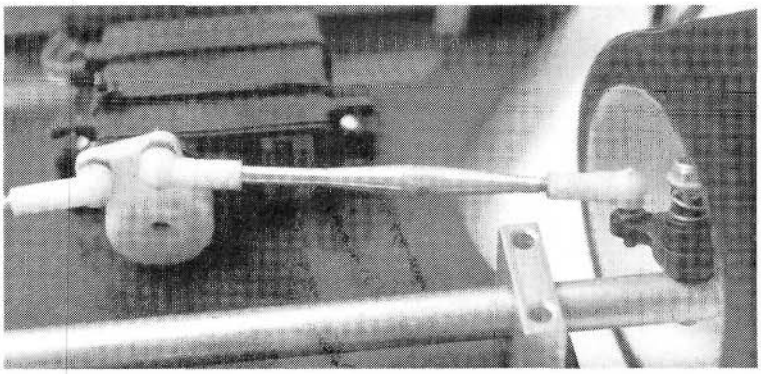
There are only two difficult stages in the assembly—putting the differential together and assembling the rear damper—and everything else is smooth sailing. The diff is difficult to handle in the way all diffs are: it isn't easy to keep the aluminum-tipped graphite axle level while you're filling the spur gear with the diff balls.

Because the MX-Pro's price is so reasonable, you might want to make some changes as you complete the assembly. Switching to Hyperballs* for the diff will add about $10 to the cost, and you'll shell out a sawbuck or so for Robinson Racing's* gold-anodized diff rings. (Ceramic diff rings are another possibility. They're incredibly smooth, but they cost a lot. I recommend that you keep it cheap until you've decided whether or not you like on-road racing.)

The rear spring damper is connected to the T-pod, and it prevents the pod from flexing too far forward and snapping.



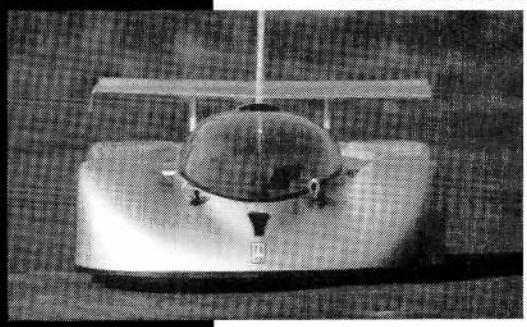
This simple rear damper is nothing more than a rod, a tube and a spring. CRP's Frog shocks should work well as replacements.



It's easy to make adjustments with TRC's aluminum turnbuckles. The stock McCallister rods are threaded so that one end of the rod must be removed before you can adjust its length.

...it tracked as straight as an arrow!

McALLISTER MX-PRO



Type ..... 2WD on-road
Scale 1/10
Retail Price $215

DIMENSIONS:
Overall Length ..... 13.5 inches
Width (f/r) ..... 8.5 inches
Wheelbase ..... 10.25 inches
Track (f/r) ..... 7 inches

WEIGHT:
Gross (w/battery) ..... 3.48 pounds

BODY:
Type ..... not included

CHASSIS:
Type ..... Pan
Material ..... Graphite

DRIVE TRAIN:
Primary ..... Direct-drive
Differential ..... Ball
Bearings/Bushings ..... Ball bearings

SUSPENSION:
Front: Type ..... Solid axle
Damping ..... Independent front springs
Rear: Type ..... Stressed T-pod
Damping ..... Spring damper

WHEELS:
Front: Type ..... BBS
Dimensions (DxW) ... 2x1 inches
Rear: Type ..... BBS
Dimensions (DxW) ... 2x2 inches

TIRES:
Front/Rear ..... not included

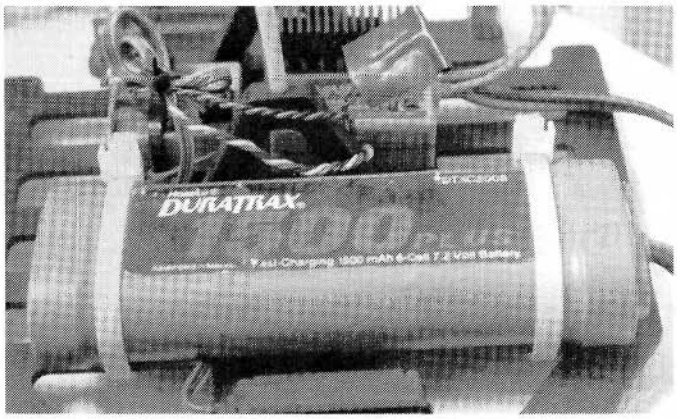
ELECTRICS:
Motor ..... not included
Battery ..... not included
Speed Controller ..... not included

OPTIONS AS TESTED:
Novak 2-channel receiver and T-4 speed controller; JR 507 servo; Duratrax 1500mAh battery; TRC green-dot tires; Tecnacraft titanium turnbuckles; Revtech stock motor.

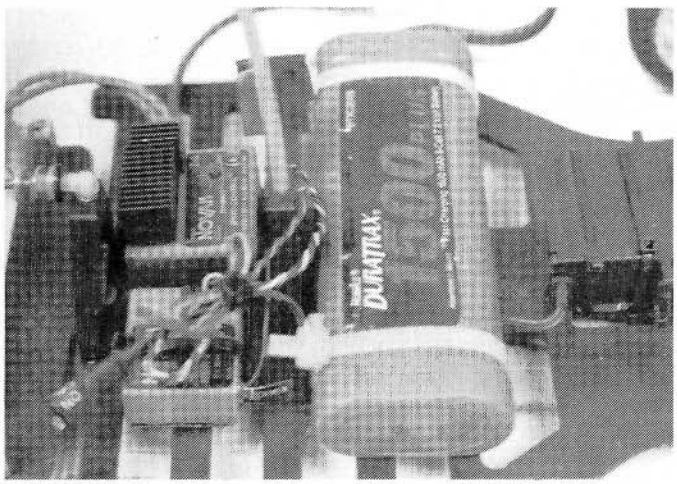
COMMENTS:
The MX-Pro is an excellent entry-level car that can "grow" with you through at least your first year of on-road racing.

McAllister says this design is very effective, but I've seen spring dampers on Frogs that worked better! Basically, the damper is a shaft with a tube and a spring. Golly! There's really no way to vary the resistance or the T-pod's response (in shock terminology, these are called damping and rebound), so keep CRP's* Frog front shocks in mind as possible replacements.

You might also want to change the tie rods. You can't adjust the stock rods without removing the ball links from the ball pivots, and that's a no-no. There are several solutions to this problem: the cheapest is to use Du-Bro* adjustable turnbuckles. They're a little heavy, but they work. A second alternative is Tecnacraft* titanium turnbuckles. Now we're talking high-tech and relatively high bucks, as these are about $8 a pair. If you *really* want to make an investment in the car right away, spend the $10 to $15 it takes to get a center-point steering kit. That's the ultimate no-slop setup.



If you do a lot of off-roading, you can use your stick packs in this car. CRP makes tie-wraps that can be used over and over again.



The Novak electronics worked well, but a torque-limiting speed controller would help eliminate wheel spinning. The rear-pod brace prevents you from mounting the battery any farther back than it is, so this is a good place for the radio gear.

ELEC-TRICKS

For radio gear, I chose a Novak* receiver and speed controller and a small JR* 507 servo. Adding to the hodge-podge, I use a Hi-Tec* 3-channel pistol-grip radio (I put the third channel on unemployment). As you might suspect, these are all things I had lying around. If I were going to buy all new stuff for the car, I'd make some changes.

First, I'd go with one of the tiny receivers from RCD*, Tekin* or Novak. Because weight reduction is one of the keys to successful on-roading, I'd also use a Futaba* S-129 microservo. Most important of all is the speed controller. If you use a hot motor wind, a torque-limiting SC is a *must* for good off-road control, especially when your car comes off the line.

Don't let the "torque-limiting" part of the name frighten you: these speed controllers are actually current limiters that clamp down any time the controller exceeds the current limit you've set. This usually happens when your car comes off the line, or at any other time when you accelerate hard (you know, those times when you're trying to go straight quickly, and

(Continued on page 150)

R/C & WARRANTIES

(Continued from page 110)

ment, but that would have taken a lot of time and energy. Instead, I took one of the A-arms back to the shop where I had bought the kit, and a salesperson cheerfully replaced the part. If you do have to deal directly with the manufacturer, however, send all correspondence by certified mail, and keep copies in case you need proof later of what has taken place.

• If the seller refuses to fix your problem, or asks you to pay for repairs when you think that your problem is covered by applicable warranties, make the seller aware that you know your legal rights.

Some time ago, I bought a radio receiver that the manufacturer claimed was compatible with my particular brand of radio transmitter. After installing the receiver in my car, I was disappointed to discover that it glitched excessively, and this made it impossible to control my car. I sent the receiver back to the manufacturer, demanding a refund, but I instead received a form letter stating that the problem lay in the specific tuning requirements of my brand of transmitter and that I should send them my transmitter (along with a small fee) so that they could adjust it. I wrote to inform them that the description on the package stated that the receiver would be compatible with my brand of transmitter and that this was an express warranty and that I was willing to assert my legal rights! The president of the company called me, and we soon reached a satisfactory resolution. ■

PROJECT KING CAB

(Continued from page 37)

cause after I had cut it out for a trial-fit it looked just like the Toyota version of the King Cab. On my third trip to the hobby shop, I found a Ford Bronco body. It had wheel wells, which were a major problem, but I had scissors that would cut Lexan.

When I had finished, the combination of paint and decals was unique. The only problem was that the Bronco's high roof line looked out of proportion with the pickup's low bed. I trashed the stock body posts and made a Velcro® and plastic mounting system. The rear body posts stick up about 100 feet (actually, it just seems as if they do), but they fit the Bronco's roof line.

RUNNING

The 7070 tires were a good choice for the frozen February ground. They provided excellent traction and literally tore up the loose silt that lay on top of the hard dirt. This isn't to say that the revamped King Cab worked perfectly—it didn't.

The truck was plagued by humungous understeer and an exaggerated tendency to run on its rear wheels only. The front end spent so much time in the air that I considered removing the front wheels and tires to reduce the weight—after all, they weren't being used.

Fortunately, everything I had changed—all the turnbuckles and even the Trinity Power shocks—made adjustments possible. I lightened the pre-load on the front springs and went down to a 10WT oil. I added 90WT oil to the rear shocks and used about 1/2 inch of pre-load on the springs. I adjusted the front to about 1 degree of toe-in (will somebody please make a toe-in gauge!); and I added about 1/2 degree of camber to the right rear wheel.

If that sounds simple, it wasn't that easy to do. I had to run the truck for about a half hour to work it all out that far, and

(Continued on page 120)

PROJECT KING CAB

(Continued from page 118)

it's still not perfect. The truck runs with all wheels on the ground, and the steering is mostly neutral at this point. That's about a 90-percent improvement and right where I ran out of batteries.

WHAT'S NEXT?

Let's state some cold, hard facts. If you want a racing truck, buy a JR-XT. In the long run, it will cost you a lot less (I'm a diehard Tamiya fan, but I'm also a realist). If you must have a Tamiya racing truck and can't wait until they finally decide to build one, buy an Astute and a truck conversion kit. On the other hand, if you want a modern version of the Blackfoot that's reliable, has few easily broken parts and still gets around faster than the average sport truck, the King Cab is great. The upgrades are reasonable—they won't put you into the A-Main in a Nationals—but they'll keep you ahead of most of the other trucks out there.

**Here are the addresses of the companies mentioned in this article:*
MRC/Tamiya, *200 Carter Dr., Edison, NJ 08817.*
Sassy Chassis, *204 South Oak St., Itasca, IL 60143.*
Trinity, *1901 E. Linden Ave., Linden NJ 07036.*
Du-Bro Products, *480 Bonner Rd., Wauconda, IL 60084.*
Thorp Mfg., *4054 E. Mission Blvd., Pomona, CA 91766.*
Robinson Racing Products, *165 N. Malena Dr., Orange, CA 92669.*
JPS, *P.O. Box 3014, Fullerton, CA 92634.*
Pro-Line USA, *P.O. Box 456, Beaumont, CA 92223.*
B & R Mfg., *28000 Tothill Dr., Santa Clarita, CA 91350.*
Airtronics Inc., *11 Autry, Irvine, CA 92718.*
JR Propo, *distributed by Hobby Dynamics, P.O. Box 3726, Champaign, IL 61826.* ■

TRANNY MAKEOVER

(Continued from page 62)

parts from the gear case, carefully drill out the inside of the outdrive hole to 1/2 inch. If you use a drill press, center the drill in the hole, and clamp the gear case to the drill-press table before you start to drill it. If you drill the hole off center, you might have to remove some material with an X-Acto knife to prevent binding. Be sure to deburr the inside and outside edges of the enlarged hole so that the ridge left by the drill bit is completely removed. Reassemble the outdrives using only the flanged bearings and the retaining ring. Slide the outdrive assemblies onto their shafts on the spine plate, but don't secure them with the pan-head screws and washers that originally held them. (The pan-head screws held the assembly on the shaft by seating against the middle bearing that was eliminated in this makeover.)

Temporarily assemble the spine plate and the transmission-case halves, and measure the distance from the outdrive gear to the outside of the transmission-case bearing flange. Using the tube cutter (or whatever tool you have), cut a spacer from the brass tubing stock. Cut it wide enough to match the distance between the outdrive gear and the gear-case bearing flange. Deburr the tube, and slip it over the outdrive cup. Be sure it seats flush against the outdrive gear.

Next, carefully install the outdrive support bearing, and make sure that the brass spacer doesn't prevent the bearing from seating all the way in or allow excessive end play between the outdrive support bearing and the spine plate. If the fit is good, spin the outdrive cups, and listen and feel for signs of the brass spacer rubbing against the gear case.

Disassemble the left side of the gear case, and drill a hole that's slightly smaller than the 2-56x1/8 hex-head screw as close as possible to the support bearing hole. (If it's too close, the screw will create a bulge

(Continued on page 130)

paris/palace can-am chal

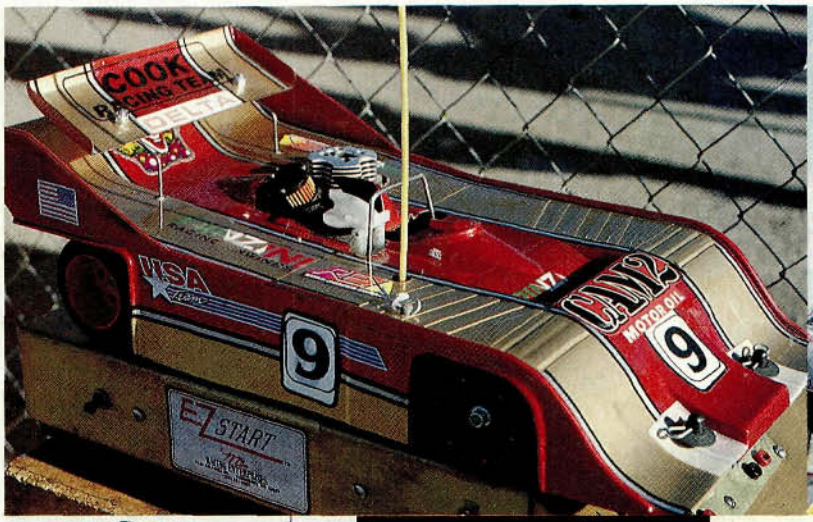
by JEFF BRONSTEIN

crank-shaft blast!

MANY CONSIDER 1/8-SCALE, gas, on-road racing to be the ultimate R/C experience. The speed, the acceleration, the smell of nitro and alcohol—all make for thrills that are second-to-none. Even though this kind of fun can be slightly more expensive than racing electric cars, many hard-core R/Cers can't resist the urge to try it, and just about everyone agrees that it's worth it. The result?—1/8 scale is growing like never before.

lenge

PHOTOS BY JEFF BRONSTEIN



Left: Cliff Lett (right) chills out before the race. He has been equally threatening in 1/8-scale gas and 1/10-scale electric races.

Above right: Gene Hustings (left) and Mike Swauger give the car the once-over before the race. Mike's was one of seven 4WD racers that were powered by a Paris/Rex engine.

Right: Ralph Burch Jr. and Mike Swauger's cars ready to go the 30 minutes.

Combine the excitement of 1/8-scale racing with the glitter and lights of Las Vegas, and you have the Paris Racing/Palace Station Casino Can-Am Challenge. In 1990, the first Can-Am race attracted most of the sport's top drivers as well as many newcomers.

The Vegas R/C Racers provided what might just be the perfect racing site. The Las Vegas Silver Bowl is a 1/4- and 1/8-scale racing complex complete with a first-rate drivers' stand, spectators' bleachers, lights and an officials' tower. The infield's maze of switchbacks is integrated into the large 1/4-scale oval. Eight right turns and six lefts make this track a real game of acceleration. During the first day of practice, the drivers discovered that the surface had plenty of traction but that hitting one of the pinned boards could do *a lot* of damage.

WHO WILL QUALIFY?

In the first round of pan-class qualifying, B.J. Tanniehill set the pace with a 10-lap run in 4:10.65. Not far behind was Boo

Ron Paris

Competitive racing has always been in Ron Paris's blood. When he was six, he and his brother, Ed Jr., raced their electric trains down a straight track, and even then, Ron's ingenuity kept him out front. When his train couldn't handle two power supplies, Ron glued rubber bands to its wheels to improve traction.

As a kid, Ron spent most of his time at his father's garage reading model magazines and those about full-size racing, or at the L.A. County fairgrounds watching drag and sports car races. He began to rewind motors and race slot cars, and he even drove an entire 10-hour, slot-car enduro event himself—and won!

At age 17, after working in the machine shop at ET Autoparts, Ron opened his own P&M Automotive & Marine Performance Engines shop. To supplement his income, he played the drums in a rock 'n' roll band. The next year, he worked as a pit crew member for the drivers of a top fuel dragster and other modified and funny cars. Although he was only a teenager, he was already establishing himself as a master mechanic.

At age 25, Ron went to work for a local Budweiser distributor. He maintained the diesel delivery trucks and even worked on the Ferraris, the Porsches, the Mercedes gull-wing and the GT40 that his boss raced at vintage car races. Today, Ron is general manager in charge of the whole fleet, and he has dozens of delivery trucks to maintain.

Ron soon branched out into U-control airplanes. He tinkered with their small engines, but he quit when one that he had equipped with nitrous oxide came apart and the prop nearly cut off his arm. After that, Ron decided to try a different hobby, so he bought a Leisure 1/12-scale electric

Flat Pan A-Main

Fin.	Qual.	Name	Car	Engine
1	2	Boo Scarpati	Associated	O.S.
2	3	Rene Romero	Associated	Paris
3	4	Bryan Farmer	Associated	Rossi
4	5	Bud Seiler	Associated	O.S.
5	1	B.J. Tanniehill	Associated	Paris
6	7	Carlo Bruno	Associated	O.S.
7	6	Richard Heisel	Associated	O.S.
8	8	Ron Nunamaker	Associated	n/a
9	9	James Oldiges	Associated	n/a

2WD Suspension

Fin.	Qual.	Name	Car	Engine
1	1	David Campbell	P-2	Paris
2	5	Rick Templin	RC500	Paris
3	3	Bob Marino	RC500	Paris
4	4	Mike Gagen	RC500	Paris
5	7	Mark Maranda	RC500	Paris
6	9	Phil Cotter	Cam-2/Cobra	Pinzini
7	6	Tym Wells	RC500	Paris
8	2	Rich Lee	RC500	O'Donnell
9	10	Barry Schultz	RC500	Paris
10	8	Auto Rosa	RC500	Paris

4WD Suspension

Fin.	Qual.	Name	Chassis	Engine
1	1	Ralph Burch Jr.	RC500	Paris/Rex
2	5	Butch Kloeber	RC500	O'Donnell
3	2	Mike Swauger	RC500	Paris/Rex
4	9	Mark Blackketter	RC500	Paris/Rex
5	7	Akihisa Hashimoto	P-4	Pro-1/Rex
6	4	Cliff Lett	RC500	Paris/Rex
7	6	Chuck Moon	RC500	Paris/Rex
8	8	Sal Difazio	RC500	Paris/Rex
9	10	Jay Kanemoto	BMT	Nova Pinzini
10	3	Barry Grossenbache	RC500	Paris/Rex

winners

can-am challenge

Scarpati, who completed 10 laps in 4:22.42.

Reigning National Champion and Delta team driver David Campbell dominated the 2WD qualifying. He drove a nearly flawless first round and completed 12 laps in 4:16.09. That won him TQ honors and proved that his national rank was no fluke. Conspicuously absent from 2WD was Terry Ballard, who's one of the top drivers in this class. After dominating 2WD for the past year, he has decided to try 4WD.

In the first 4WD qualifier, Associated's Cliff Lett and Butch Kloeber looked like the two to beat. Cliff set a new track record (now, there's something new!) with a staggeringly fast 13 laps in 4:10.92. That record stood for only 40 minutes, though! In the second qualifier, his teammate Ralph Burch Jr.—Associated/Paris Racing's "top gun" and National Champion—beat Cliff's time by almost 4 seconds (13 laps in 4:07.06). In the final qualifier, Burch beat his own time: 13 laps in 4:03.16 was the TQ run of the day and a new track record!

LEARNING FROM THE BEST

With nearly 100 entrants from all over the U.S., there were lots of heats and plenty of time in between them for competitors and spectators to talk to the pros and the manufacturers. Newcomers are always welcome to ask questions, and the Delta, Associated and Cam-2 team drivers spent some of their time helping out the many rookies.

Ron Paris of Paris Racing is probably the best-known individual in 1/8-scale. He's a co-sponsor of and mechanic for several of the top Associated drivers, and he's one of the main sponsors of the Paris/Palace race. He brings an army of workers and racers to many of the big events; without them, he couldn't possibly achieve such incredible success. Of the 10 cars that qualified for the 4WD A-Main, eight were powered

Born to Race

car. He ran it once and then scratch-built his own, which had a mid-mounted engine. With Mike Lavacot, who was just beginning his R/C career, Ron began to race at Hobby John's Raceway. As you might expect, he modified electric motors, too.

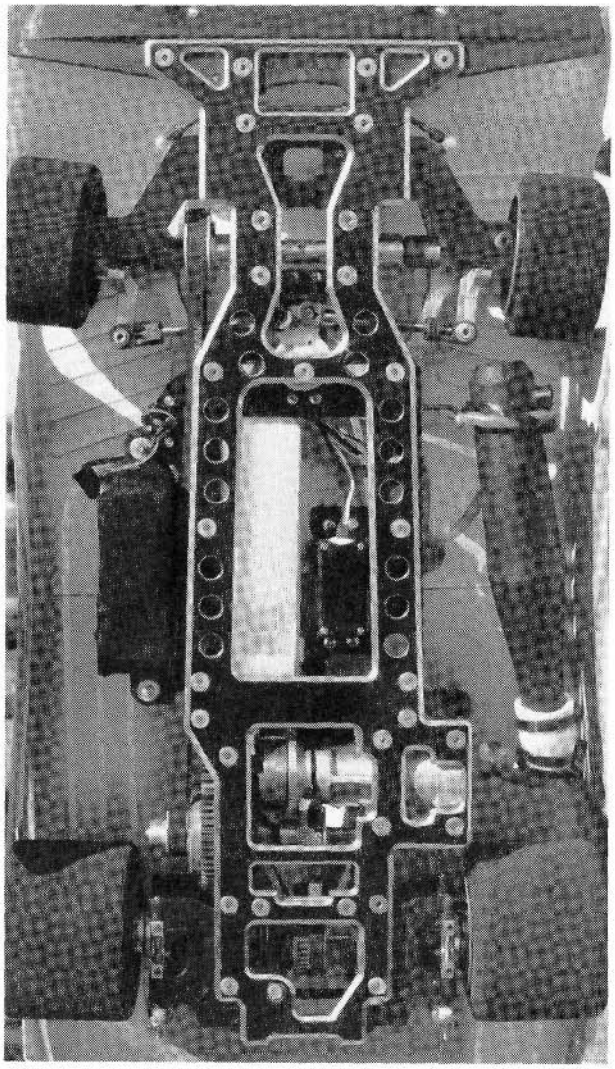
Ron must have liked being "behind the wheel," because he soon bought a Tamiya Rough Rider 1/10-scale, off-roader. He custom-made a set of shocks for it, and they vastly improved the car's handling and helped him to win many races. He then bought a Cox car equipped with a Reedy motor and was the TQ at the CRP Challenge at the Ranch Pit Shop. Ron watched gas-car racing at the Ranch and decided to give *it* a try, too. He bought a Thorp car and, using McCoy parts, began to modify K&B engines. Thanks to Gary Kyes, MRP picked up Ron as a driver, and this helped him make the G-Main at the McCoy race.

When he was 35, Ron bought a Delta car kit, built it in one day and made the A-Main at a Southern California race the next day! (Luckily, Ron's wife, Linda, understands his love of cars and has always been supportive of his career.) Ron asked Delta whether they would sponsor him, but they were only interested in Arturo Carbonell. Ron then asked Associated for sponsorship, but they weren't looking for another driver, either. Gene Hustings was impressed by Ron's engine and suspension skills, though, and he invited him to join the Associated team. What a lethal combination!

Over the past seven years, Paris-powered RC500s have won 95 percent of the major gas races. With a record like that, it's no wonder that Ron has become the world's number-one engine builder.

by Paris/Rex motors, and Ron personally maintains four of the seven Associated team cars—which, coincidentally, were the top four qualifiers!

It's always interesting to see what Paris Racing is up to and how Ron squeezes every ounce of power out of his cars. During qualifying at the Paris/Palace Challenge, Ron and Associated owner Gene Hustings tested new fuels. (Because some Paris/Rex motors turn at more than 38,000rpm, heat and friction are major considerations in the development of fuel lubricants and wetting agents.) The old adage, "To finish first, first you have to finish," is even truer of 30-minute Mains.



The business side of the Cam-2 Cobra.

THE MAINS

Although the first two days of racing were marred by wind and cold, the final day was picture perfect. It looked as if top qualifier B.J. Tanniehill would lead in the Pan A-Main, but mechanical problems put him out. After about 15 minutes, Boo Scarpati took over the top spot, and he led until the end. Some say that the pan-car class is history, but the drivers who competed in Las Vegas will tell you it's as much fun now as it has ever been.

R/C cars have come a long way. Two-wheel drive is a racing purist's dream because it most closely resembles the "real thing." The cars are slightly slower than their 4WD counterparts, but they're much less expensive, and the competition between sponsored and unsponsored drivers is very close.

Team Delta and Cam-2 have dominated 2WD since the "Biggie" (the Nationals) in Dallas, but several other drivers are coming on strong. The top five qualifiers in the 2WD A-Main were all within 5 seconds of the TQ position. After 15 minutes of the 30-minute race, half the cars were still on the lead lap.

Dave Campbell, Rick Templin and Bob Marino battled for the top position for nearly the entire race. With less than 2 minutes left, Templin and Marino tangled, and this put Campbell in the lead. Then, with less than 1 minute to go, Campbell's car lost its two-speed transmission, and the motor screamed down the back straight. With Templin closing fast, Campbell limped across the finish line—just seconds before his motor let go!—to take the honors for Team Delta.

We thought the 4WD A-Main would be a showdown between the best of the best—a world-class lineup in a world-class race—and it was. To no one's surprise, Ralph Burch Jr. took the lead off the line, followed by team members Mike Swauger and Cliff Lett. Butch Kloeber and Akihisa "Hatch" Hashimoto rounded out the top five.

Lett and Kloeber decided to put the heat on Burch early. Only 5 minutes into the race, Lett drove a perfect line and squeezed into the lead, followed by Kloeber in 2nd. Soon afterward, Burch—the obvious favorite to win this race—hit one of those big "dots" (the ones as large as a manhole cover!), which launched his RC500 over the lane and sent it cartwheeling into the infield. He hit the same dot on the next lap—with equally bad results.

Many spectators counted Burch out because of the time he had lost and the possible damage sustained by his finely tuned race car. To everyone's surprise, the car seemed undamaged; even more miraculous was that Burch started to gain on Lett and Kloeber!

In front of the pits, Cliff Lett's car flamed-out, and this put Butch Kloeber's O'Donnell-powered car out in front. Kloeber made some amazingly fast pit stops, which delayed the inevitable challenge from Burch's Paris/Rex-powered car. Slowly but surely, though, Burch reeled Kloeber in. Soon, the two "kings of 2-stroke" were bumper to bumper, and the battle was very exciting.

Kloeber tried to tighten his line to fend off the National Champ, but Burch recaptured the lead with a clean pass. He went on to win the A-Main with 93 laps in 30:13.89—one lap ahead of Kloeber. That's proof that some racers have serious natural talent and you should never count them out! When combined with the mechanical genius of Ron Paris, Ralph and the Associated team seem unstoppable.

THE START OF SOMETHING BIG?!

The Paris/Palace Can-Am Challenge could become one of the great 1/8-scale R/C races (like the McCoy, "the Biggie" and the Gas Blast), and it might even turn out to be *the* big race of the '90s! There's already talk of adding another day to the event, and race officials expect more than 170 entrants next year. Congratulations to this year's winners, and to *all* the competitors for some of the best racing we've seen. ■

TRANNY MAKEOVER

(Continued from page 120)

around the support bearing hole.) This screw will keep the support bearing in place on the left side. The motor-mounting plate will hold in the right side bearing. You can always use a washer if you drill too far away, but if you're too close, you might throw off the bearing alignment.

The transmission is now ready for reassembly. With the exception of the modified outdrive assemblies, do this as you usually would. To seal the hole in the center of the outdrive assembly, insert the nylon washer that comes with the kit, and use a dab of silicone sealant. When you put the tranny back together, spin the spur gear. Oh, what a difference!

Bob Tourigny's make-over reduces weight slightly: two screws, two washers and two bearings are removed. Bearing alignment problems that cause unnecessary friction and binding are solved, and the binding that's caused by stress and premature wear is eliminated (if you aren't using outdrive support bearings).

Now for the real test. Mount the tranny in your car, and go destroy the guys with the fancy replacement transmissions—just like Bob Tourigny has been doing to me for the past six months!

**Here are the addresses of the companies mentioned in this article:*
Associated Electrics, *3585 Cadillac Ave., Costa Mesa, CA 92626.*
MIP, *838 Edna Place, Covina, CA 91723.*
Team Pit Stop, *12233 SW 132 Court, Miami, FL 33186.*
Track Master Mfg., *1466 Pioneerway, Ste. 10, El Cajon, CA 92020.*
A&L Mfg., *P.O. Box 2115, Corona, CA 91718.*
Thorp Mfg., *4054 E. Mission Blvd., Pomona, CA 91766.* ■

ELECTRIC FLIGHT

(Continued from page 67)

planes used in the world electric flight championships, which are held every two years. The Sunfly uses an Ultra 1600, which is a 512W Graupner* motor running on 16 cells. The Sunfly is an awesome performer that's capable of large powered loops, rolls and other aerobatic maneuvers, yet it's also a soaring plane. Able to handle fast dives and very high-speed flybys, it's no beginner's ship! Although the motor only runs for about 2 1/2 minutes, you don't run it for more than 30 or 40 seconds at a time (unless you have awfully good eyes) and 1-minute flights are common, even in "dead air."

BUILDING YOUR PLANE

ARFs are largely pre-built and take only a few hours to assemble. These kits are usually made of a combination of plastic, foam and wood, and they come covered with a plastic covering. The Kyosho Stratus 2000 and Zero are examples. Other "build-it-yourself" kits might come with a lot of balsa sticks and sheeting, and you first have to glue the entire structure together and then cover it with a heat-shrink plastic film. If you build from plans using your own supply of wood, or entirely from your own design, it's called "scratch-building."

You can pick a model to suit your building preferences. Follow the instructions carefully, because proper alignment is necessary for good flying characteristics. What do you need to build one of these planes?—many of the same tools you use to build R/C cars: CA glue, 5-minute epoxy, screwdrivers, pliers, a soldering iron, a razor knife, sandpaper.

GETTING STARTED

First, join the Academy of Model Aeronautics (AMA)*. Membership gives you

(Continued on page 132)

ELECTRIC FLIGHT

(Continued from page 130)

half-a-million dollars' worth of personal liability insurance, and half a million for property damage, as well as $25,000 of "no fault" medical insurance, in case you're injured while participating in the hobby (contact the AMA for details). Flying clubs require AMA membership before you can use their flying fields. Note also that, under FCC regulations, R/C airplanes use a different frequency band than ground R/C models.

It's helpful to find someone who can serve as a flight instructor. There's no faster way to get flying than with the help of a teacher who can launch and land for you as your flying skills improve. Some people take only a few flights before they can solo, e.g., with a slow trainer, such as an electric glider. Some need 10 or 15 flights before they get the hang of it. Your instructor will fly your trainer a few hundred feet up ("two mistakes high"), and if you have difficulty, he can take over the radio and put the ship back to where you can take over. If a "buddy-box" system is available, two transmitters can be electronically connected, and there will be no need to use the time-honored "toss and grab."

If you don't have an instructor, you can easily find one by contacting your local flying club (your hobby shop can help you find clubs). Also note that Air Age sells a variety of books for beginners in R/C aeromodeling, and *Model Airplane News*, one of *R/C Car Action's* sister publications, offers an exciting glimpse of R/C aeromodeling each month, and it includes reviews the best of the electric airplanes.

Almost any modeler can easily get airborne using essentially the same motors, battery packs, fuses, wire and chargers already used in many R/C cars and trucks. Be forewarned, though, that R/C aeromodeling is fun! Once you've experienced the thrill of flying your own model, you may never be the same!

**Here are the addresses that are pertinent to this article:*

Kyosho/Great Planes Model Distributors, *P.O. Box 4021, Champaign, IL 61824.*

Hobby Lobby International, *5614 Franklin Pike Cr., Brentwood, TN 37027.*

Graupner; *distributed by Hobby Lobby.*

AMA, *1810 Samuel Morse Drive, Reston, VA 22090. Tel: (703) 435-0750.*

Mabuchi Motor America Corp., *475 Park Ave. South, New York, NY 11706.*

AstroFlight, *13311 Beach Ave., Marina Del Rey, CA 90292.*

Robbe Model Sport, *180 Township Line Rd., Belle Mead, NJ 08502.*

(Continued on page 135)

ELECTRIC FLIGHT

(Continued from page 132)

Sermos R/C Snap Connectors, *Cedar Corners Stn., P.O. Box 16787, Stamford, CT 06905.*
Leisure Electronics, *22971 B, Triton Way, Laguna Hills, CA 92653*
Sonic-Tronics, *7865 Mill Rd., Elkins Park, PA 19117.*
Tekin Electronics, *970 Calle Negocio, San Clemente, CA 92672.* ■

PRO 10 SPORT

(Continued from page 89)

and installed them in the Pro 10 Sport. They fit as if they were custom-made!

The following day, I returned to the track to test the modifications. I spent the first few runs adjusting the gear ratios and getting used to the track. The car still tracked beautifully, but its speed had increased dramatically owing to the lower drag of the ball bearings and the higher gearing. By the end of this session, I was convinced: the TRC Pro 10 sport is fast, well-designed and handles beautifully.

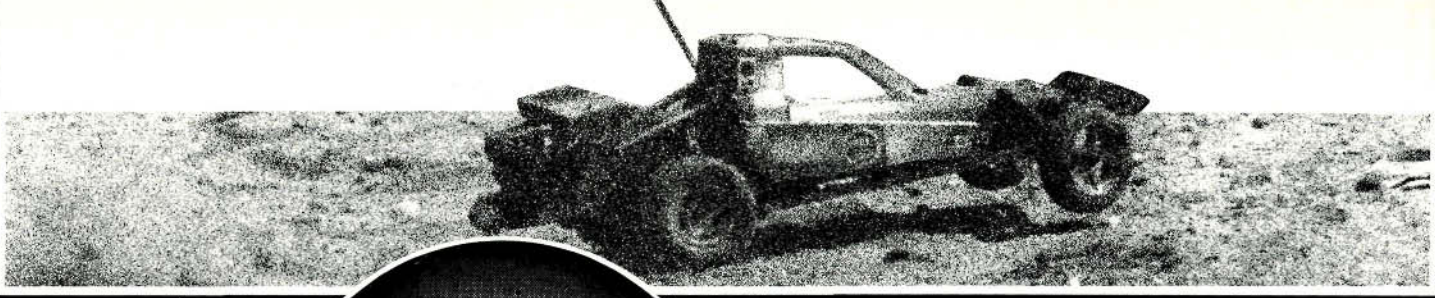
CONCLUSION

This car is easy to assemble, and I really enjoyed working with it. The rear body posts were too short for the Bolink body that's included in the kit, but I simply used longer screws and put a 1/2-inch stack of nylon washers under the posts.

I converted my car to use stick battery packs instead of saddle packs. I think that a stick pack with a connector is a lot easier for entry-level drivers to handle. To dial-in the car properly, I simply applied tire compound on the rear tires to prevent the oversteer. (I might have been able to achieve the same results by using harder front tires.)

The TRC Pro 10 Sport is an excellent entry-level R/C car. It's reasonably priced; it performs well in its stock configuration; and with a little advice from fellow modelers, you shouldn't have any trouble getting it to hook-up. Then, as a need for speed sets in, you can add Pro 10 Elite hop-up parts (they all fit the Pro 10 Sport). I'm not sure that the shock improved the car's performance, but the ball bearings were definitely worth the effort it took to install them.

(Continued on page 150)

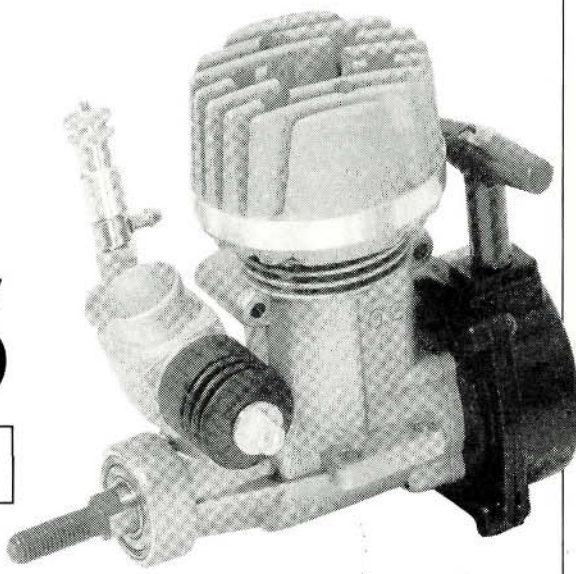


PHOTOS BY STEVE POND

Basics Of GLOW ENGINES

NITRO INTRO

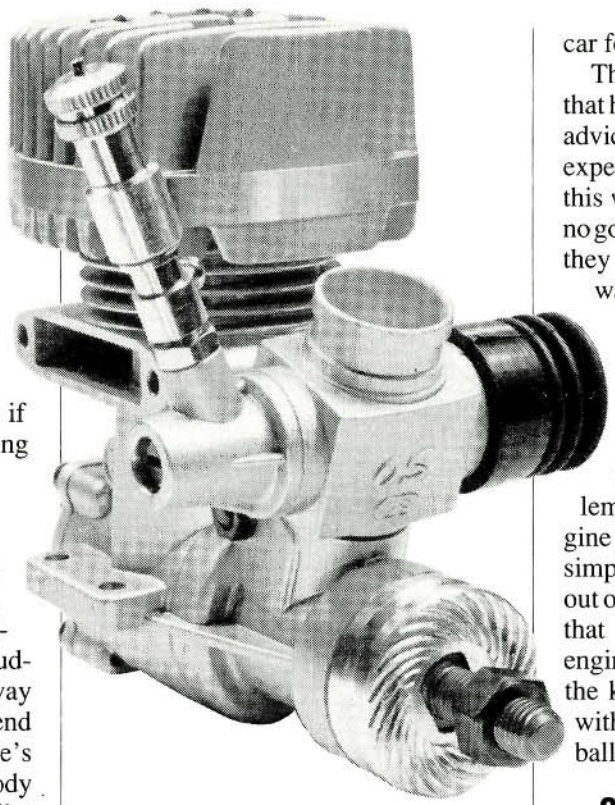
by CHRIS CHIANELLI



THE MODERN 2-STROKE glow engine is a highly developed study in simplicity. Sound like a contradiction in terms?—well, it isn't. Two-stroke engines have evolved into superlight, dependable powerhouses, and if you keep certain basics in mind when operating and caring for them, there's nothing to be scared of. Running piston-powered cars is not only a new speed experience, but it can also be a lot of frustration-free fun if you invest a little time in understanding the basics.

CHOOSING AN ENGINE

When choosing an engine, gather as much information as possible from people who run glow engines successfully. Be sure to lose your loudmouthed, know-it-all friend on the way to the hobby shop. You know the friend I'm taking about; we all have one. He's the one who always drives somebody else's model. He claims he's got a killer car that's so fast only he can handle it, but he's never been spotted with it at the track. It's at home: "The paint isn't dry." He says he's saving this superior car for "the mother of all races."



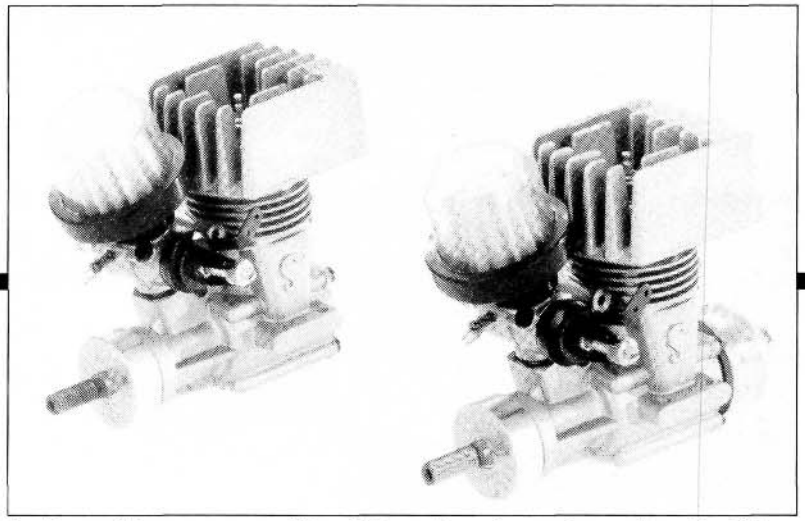
Modern glow engines deliver high power reliably—if you follow some simple rules. Above right: many of the newer types come with a recoil pull-start, which greatly simplifies starting.

The dangerous thing about this guy is that his pontifications sound like expert advice, but he has little information or experience to back them up. People like this will tell you, "Those engines ain't no good. Mine always stalled out." What they forget to mention is that the fuel was a year old and had sand in it!

Find out the facts, and make your own educated decisions. There are a lot of good brands out there, but stick with a make that's sold and used a lot in your area so that you don't run into a parts problem. I don't care how "killer" an engine is—if it takes four months to get a simple part like a needle valve, you're out of the race. Don't let anyone tell you that you "need" the most expensive engine to win, either. Driving ability is the key to winning races, just as it is with electric cars. Less expensive, non-ball-bearing engines do a great job.

GET OFF TO A GOOD START

After buying a new engine, remove the backplate and check for filings left by the machining process. These are rare, but it does happen, and just one can



Foreign particles can cause problems if they enter a glow engine, so air and fuel filters must be kept clean. Right: note the electric starter cone at rear of engine.

score the delicate piston/cylinder surfaces. Before you start the engine for the first time, apply some Pacer* After Run oil to the crank area and the piston and sleeve.

Don't turn the crankshaft a lot. The factory fit of ABC (aluminum, brass and chrome) pistons and cylinders is sometimes very tight. The engine might have been lying around for a year in some warehouse, and the oil put there by the factory might have dried up. Turning a tight, dry engine by hand can scratch that important smooth piston/cylinder finish.

Make sure that you understand the terms "rich" and "lean" as they apply to the air/fuel mixture of the carburetor. "Rich" means heavy on the fuel, light on air; to "lean the mixture" means to reduce the fuel and increase the air. This concept is important to successful glow-engine running, but it's often not fully understood by newcomers.

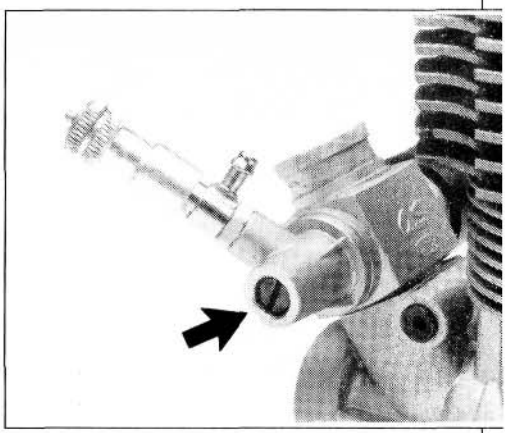
You see, fuel has oil in it to lubricate the engine parts, but that's only half the story. Oil has another job that's just as important as lubrication: it also takes heat out of the engine. More oil (a richer mixture) keeps the engine running more coolly and more reliably. Understanding oil's dual role will make you more aware of how to set the mixture and make your glow experience much more rewarding.

THE FIRST RUN

Many guys break-in a new engine by running it in a car; I mount mine on a test stand with a propeller, but this isn't necessary. When breaking-in an engine in a car, I recommend that you run it quite rich for the first few tanks of fuel. I can hear guys saying, "An ABC engine won't seat with an overly rich mixture." That's true, but not all engines are ABC. Besides, other things in the engine (e.g., bushings, bearings, wristpins and crankpins) have to seat as well, so a few rich runs can't hurt.

OK; the engine is in the car, and you're ready to start it. Stop! Re-read the instructions on carburetor adjustments. The high-rpm needle is the one you'll be fooling with the most. (It's the long needle with a knurled end.) It adjusts the mixture when you're using "high-speed" throttle positions. Screwing it out (counterclockwise) richens the mixture; screwing it in (clockwise) leans the mixture. Learning how to set this needle will make or break your glow-engine career.

Beginners often turn the needle in too much because they love the sound of the engine pitch getting higher and higher. "It's screamin', man!" Yeah, because the poor engine is being tortured! As you screw in the needle to lean the mixture, engine rpm increase, but the amount of oil that takes away the heat decreases,



The high-end needle valve is adjusted when the throttle is wide open; the low/mid-range adjustment screw (arrowed) is for idle and throttle transition mixture. Read the engine instructions carefully for fine-tuning these adjustments.

ENGINE TROUBLESHOOTING

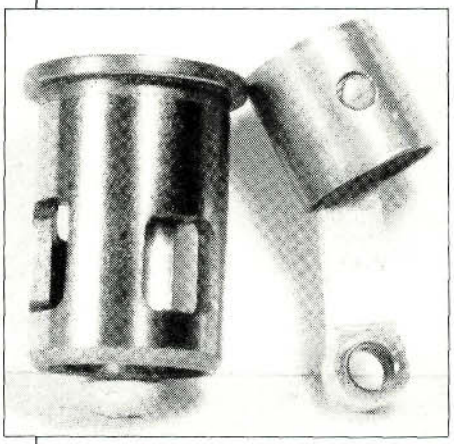
RUNS ERRATICALLY, OR HOT		RUNS LEAN, WILL NOT RICHEN	WON'T START	WON'T IDLE	RUNS A SHORT TIME AND QUITS
Fuel foaming	Bad plug gasket	Fuel vent blocked	No fuel	Bad plug	Pick-up off in tank
Fuel line too small	Leaking glow-plug stem	Improper lubricant	Flooded	Bad fuel	Clunk off-line
Glow plug shorted	Blocked fuel vent	Defective plug	Dead battery	Loose carb	Defective plug
Glow plug blown	Pick-up off in tank	Improper carb setting	Defective plug	Wrong carb setting	Clogged filter
Bad fuel	Crack in crankcase	Fuel line too small	Bad fuel	Case screws loose	Clogged carb
Air leak in tank	Varnish in engine	Fuel line clogged	Defective leads	Head screws loose	Loose carb
Air leak in line	Bearings worn out	Air leak in tank	Loose plug	Loose plug	Loose needle
Kinked fuel line	Bearings defective	Air leak in line	Loose head	Fuel line too large	Bad plug
Debris in fuel line	Split tubing inside tank	Air leak in carb	Improper connection	Leak at carb base	Fuel line too large
Carb leaking air	Carb set too lean	Head screws loose	Wrong carb setting		Blocked vent
Debris in filter	Loose case screws	Case screws loose			
Clogged needle valve	Loose plug				
Loose head					

Basics Of GLOW ENGINES

and things start to get hot. You have to learn to strike a happy medium between a good rpm level and a mixture that's rich enough to protect the engine.

Use the exhaust as a guide. There should always be a certain amount of oil—clean oil—coming out of the exhaust stack. If the exhaust oil is dark (which means that there are aluminum particles in it), the engine is either not broken-in or too lean and hot, and you're ruining it. Try bringing the engine to top rpm—the point before it runs lean, rpm sag and it dies—and screw the needle out a half to a whole turn. Experience will give you an "ear" for a properly adjusted glow engine, but this is a good starting point.

If you know someone who has been running glow engines for a long time, ask him to walk you through the process. If no one is available, just remember the importance of oil and its relationship to heat, and you'll be fine.



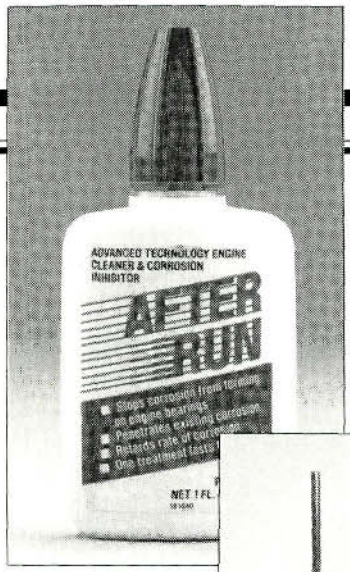
The fit between the piston and the sleeve is crucial. Good fuel with a castor-oil lubricant not only supplies a protective film between the two, but it also reduces excessive heat.

IT REALLY IS SIMPLE!

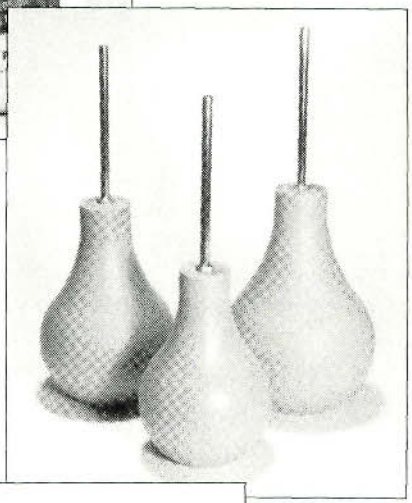
If you learn the basics—and stick to them!—you'll have fun with glow engines. Nevertheless, there are those who don't, so we continue to hear things like, "Why won't it start?" "Why did it quit?" "I hate these things" "I'M LIVING IN HOBBY HELL!" Take the cotton out of your ears and put it in your mouth! Make sure that you have a good starting battery, fresh fuel and a filtering system to get the fuel into the tank.

Ninety percent of starting problems are the result of a weak glow-plug battery. Many people go to their local department store, buy a dry-cell "hobby battery"

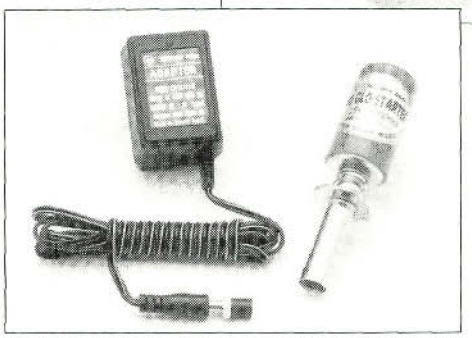
(Continued on page 191)



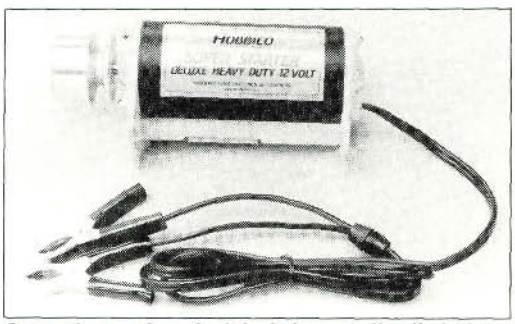
Pacer's After Run oil is an extremely effective guard against corrosion. Apply a little to the carb and exhaust stack after each run, and use a lot for storage.



These bulbs are a cheap way to get the fuel into your tank. After the fuel has been sucked into the bulb, add a piece of tube that has a filter on it before you squirt the fuel into the tank.

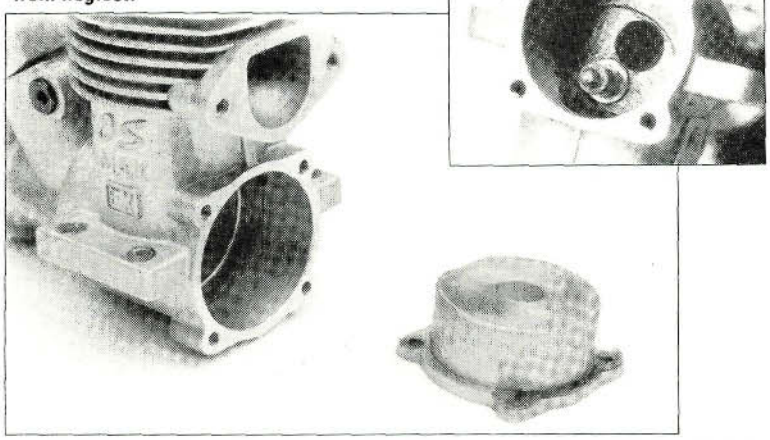


A strong battery = a "fun" day of racing! The most common cause of starting problems is a weak glow-plug battery, so buy a good rechargeable one. Forget dry-cell "hobby batteries"; they stink.



Some glow engines don't include a recoil pull-start, so you might need to use a 12V electric starter. My recommendation, though, is to buy a pull-start engine for your first one!

Before storing an engine, remove the backplate and apply After Run to the moving parts. Inset: here's an example of the corrosion that results from neglect.



TURBO KYOSHO ULTIMA II

by BOB GAGNE

THIS IS MY third article on the Kyosho* Ultima series of off-road buggies. By now, I'm familiar with the logic behind the design and with the strengths, weaknesses and evolution of the Ultima. Although the Ultimas all have the same body as the original Turbo Ultima, that's where the similar-

PHOTOS BY BOB GAGNE

PURE PERFORMANCE!

KYOSHO TURBO ULTIMA II

Type ..... 2WD off-road
Scale 1/10
Sug. Retail Price $279.95

DIMENSIONS:
Overall Length ..... 14.5 inches
Width ..... 9.5 inches
Wheelbase ..... 11.1 inches
Front Track ..... 7.8 inches
Rear Track ..... 8.2 inches

WEIGHT:
Gross (w/battery) ..... 54 ounces

BODY:
Type ..... Aerodynamic off-road buggy
Material ..... Polycarbonate

CHASSIS:
Type ..... Flat pan
Material ..... Kelron

DRIVE TRAIN:
Primary ..... Spur/pinion
Transmission ..... Gear
Differential ..... Ball
Bearings/Bushings ..... Ball bearings

SUSPENSION:
Type (f/r) ..... Wishbone/control arm
Damping (f/r) ..... Aluminum, oil-filled, coil-over shocks

WHEELS:
Front: Type ..... Two-piece plastic
Dimensions (DxW) ..... 2.1x.815 inches
Rear: Type ..... One-piece plastic
Dimensions (DxW) ..... 2.1x1.355 inches

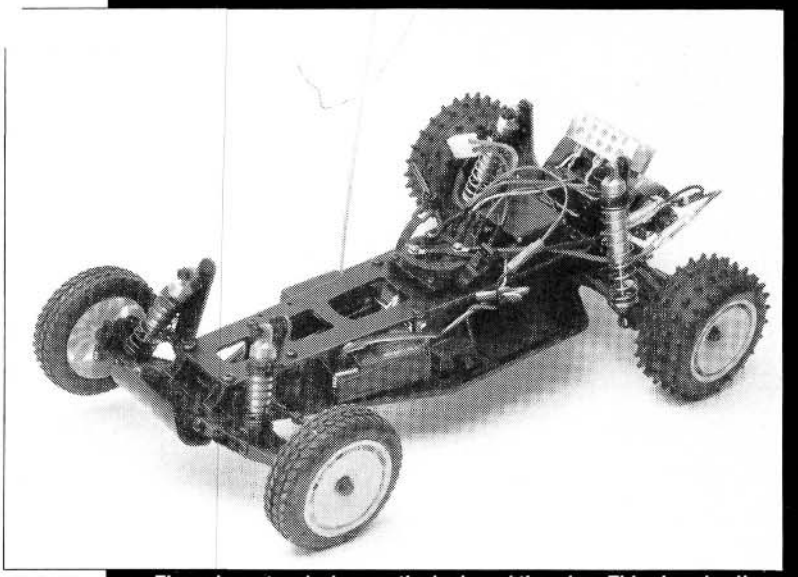
TIRES:
Front ..... Low-profile "gator"-back
Rear ..... Low-profile spike

ELECTRICS:
Motor ..... Kyosho Outlaw Stock LeMans 22-turn
Battery ..... 6-cell stick or 6- or 7-cell saddle pack*
Speed Controller ..... Kyosho heavy-duty mechanical rotary

OPTIONS AS TESTED:
Futaba Magnum Jr. radio system; 6-cell SCR battery pack

COMMENTS:
The Turbo Ultima II is a real contender. Its Kelron chassis and Kyosho Gold shocks soak up the bumps and jumps. Most of the usual "trick" mods are included in this kit, but the 22-turn motor is a little underpowered for modified competition, and it's illegal for true stock competition. The ball diff and ball bearings make the car competitive against the RC10, the JR-X2 and other "all-out" cars.

* not included



The only parts missing are the body and the wing. This chassis allows you to make most adjustments—all except rear toe-in. My fears about inflexibility were unfounded. Adjusted just as you see here, the Ultima II hooked-up well on the track.

ity ends. Each new Ultima is an improvement—not just a copy of a previous design with some frills added to stimulate sales. Each model also seems to be aimed at a particular group of racers.

The Ultima II seems to fit between the Raider and the Ultima Pro XL; and the Turbo Ultima II seems to fill the gap between the Ultima II and the Pro XL. This indicates that the kit is aimed at intermediate racers, but it's more expensive than the Pro XL. It has many of the Pro XL's upgraded features (a ball diff and Gold shocks), but it still has the less expensive, more flexible Kelron chassis of the Turbo Ultima II.

Unfortunately, the Ultima II kit includes a mechanical speed controller (SC) and an Outlaw Stock 22-turn motor. These components make the Turbo more expensive than the Ultima Pro XL ($269.95 for the XL, $279.95 for the Turbo). This is a waste, because they're the first parts modelers will replace, and they're the parts that increase a kit's price. If Kyosho had left out the mechanical SC and included a ROAR-legal stock motor like the LeMans Super Stock 34, or omitted the motor and included the mechanical SC, or left out both, the kit would have been more reasonably priced.

Kyosho must think that Kelron is the material of the future for R/C car and truck chassis. Its last three or four kits all have Kelron chassis and/or shock absorbers. Only the Pro XL has graphite parts, but that's aimed at very serious competitors and not at the majority of racers.

THE KIT

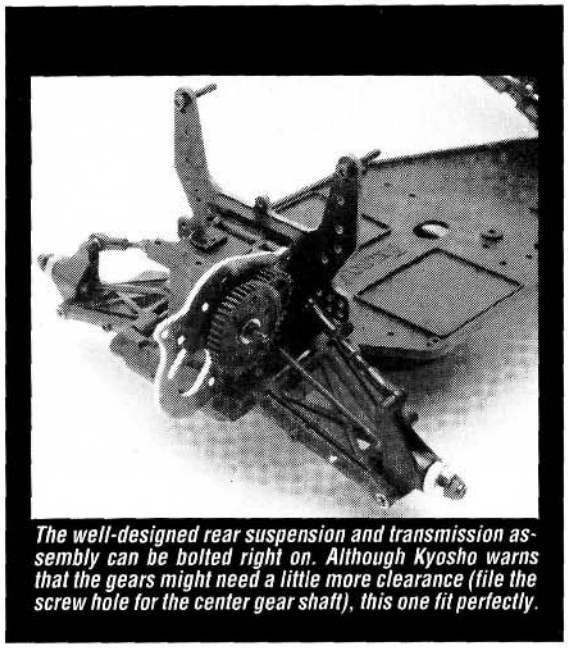
As with most Kyosho products, the box is attractively decorated with several color photos of the completed car. Inside, you'll find a body, a chassis, a wing, a decal sheet, an instruction book and a smaller box that contains all the other parts.

I was delighted to find that this kit included many of the most important hop-up parts and improvements: a ball-bearing set, a ball differential (assembled), gold-anodized aluminum shocks (assembled), turnbuckle control rods and fiberglass shock towers—all performance boosters of the first magnitude.

ULTIMA II

No R/C car should have nylon bushings, and the bronze or steel bushings, although more durable than the nylon ones, hurt performance. The ball diff is far superior to the geared diff, and it's also adjustable. Kyosho's Gold shocks are the choice of the Team Kyosho drivers because they're smooth and durable. The turnbuckle control rods make suspension adjustments fast, easy and accurate, and the fiberglass shock towers are surpassed in stiffness and strength only by the more expensive graphite units. These parts will truly enhance the performance of the Turbo Ultima II.

I was disappointed with some of the parts. Like most other manufacturers, Kyosho still includes the crude, power-robbing 32-pitch gears in its kits. Considering the volume manufacturers work with, I doubt that there's a meaningful difference between the cost of 32-pitch and 48-pitch gears. The 48-pitch gears work much better, so why not put them into a kit that's obviously designed for competitions.



The well-designed rear suspension and transmission assembly can be bolted right on. Although Kyosho warns that the gears might need a little more clearance (file the screw hole for the center gear shaft), this one fit perfectly.

The Z-bend steering and throttle control rods are also disappointing. If Kyosho goes to the trouble of putting a durable ball link on one end of these parts, why not put it on the other end? Such a link would avoid the problem of the Z-bend wearing and making the steering and throttle linkage sloppy. (This always seems to happen after a few races.) The "snap-on" motor connectors eventually cause problems: to ensure a good connection, simply solder the connectors to the tabs on the motor.

Finally, why supply a 22-turn, single, economy modified motor with a kit that seems to be aimed at intermediate racers who will probably race in stock-class events? The Outlaw Stock Mega Motor is *not* a stock motor! ROAR hasn't approved it for stock competitions, and it's underpowered for most modified races. What's more, it has no removable endbell to facilitate cleaning and timing adjustments. I suppose its inclusion in the kit is a selling point, but most modelers will be disappointed when they find they have to spend another $28 on a ROAR stock motor.

ASSEMBLY

Kyosho assembly instructions are always very good. The Ultima II's instruction book includes clear line drawings and scale drawings of the parts needed for each step, two parts lists, an exploded view of the car, and an excellent section on suspension adjustments.

I did find one area that could be improved. Some of the parts are difficult to find because there are no numbers given to tell which bags they're in. To find them, you have to go to the parts list, find the part's number and cross-reference it to the parts bag. This could be a major headache, but keep this criticism in perspective; the instructions are still very good.

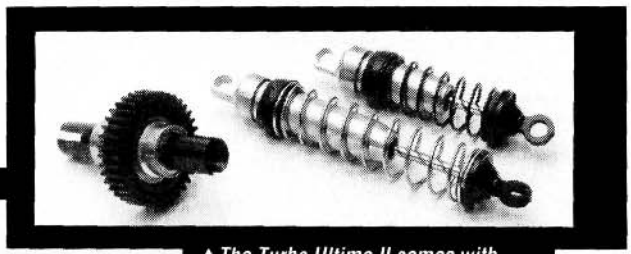
First, construct the subassemblies, e.g., the control rods, shock absorbers and transmission. The shocks and the ball diff (two of the trickiest and most important parts for your car's performance) arrive assembled.

The intermediate steps include the construction of the suspension system, the R/C gear, the power train and the wheels.

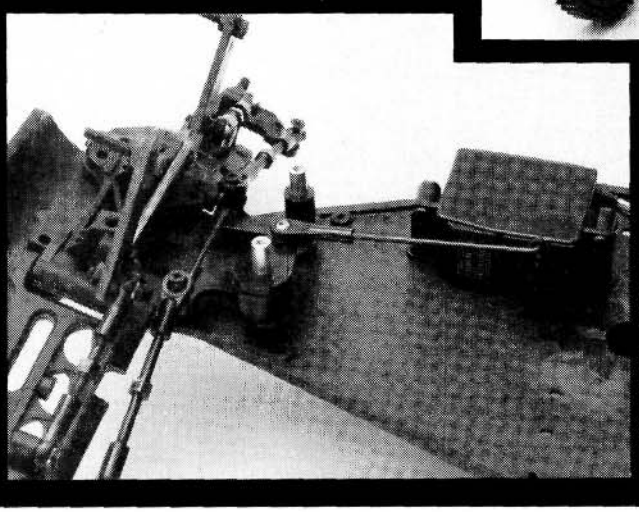
Finally, you finish the body. I'm always amazed at how well Kyosho parts fit together: every hole lines up; every screw is exactly the right length; and few, if any, parts have to be adjusted to work smoothly. Kyosho should be given a prize for accuracy.

I won't describe each part, but some are interesting enough to examine closely. The Kelron chassis is light

(Continued on page 171)



▲*The Turbo Ultima II comes with assembled ball diff and Kyosho Gold shocks. In case you have to disassemble and reassemble them, e.g., for maintenance, the instruction manual tells you how.*



◀ *The Ultima has a rack-type steering system that helps to eliminate bump-steer and makes steering more precise. It isn't precise after the Z-bend wire has started to wear on the steering control rod and center rod. The same system is used on the throttle control rod.*

PRO 10 SPORT

(Continued from page 135)

Just remember: this car is intended to be an inexpensive "fun" car that runs well—and it is. If you started upgrading *major* components, it would be cheaper to buy an Elite model.

**Here are the addresses of the companies mentioned in this article:*
***TRC,** P.O. Box 1058, 2211 Charter St., Albemarle, NC 28002.*
***Rocket City R/C Specialties,** 103 Wholesale Ave. NE, Huntsville, AL 35811.*
***Du-Bro Products,** 480 Bonner Rd., Wauconda, IL 60084.*
***Bolink R/C Cars,** 420 Hosea Rd., Lawrenceville, GA 30245.*
***Team Associated,** 3585 Cadillac Ave., Costa Mesa, CA 92626.*
***Futaba Corp. of America,** 4 Studebaker, Irvine, CA 92718.*
***Speedworks; distributed by Trinity,** 1901 E. Linden Ave., #8, Linden, NJ 07036.*
***Novak Electronics, Inc.,** 128-C E. Dyer Rd., Santa Ana, CA 92707.*
***MRP,** 18676 142 Ave. NE, Woodinville, WA 98072.*
***Coverite,** 420 Babylon Rd., Horsham, PA 19044.*
***Carl Goldberg Models Inc.,** 4734 W. Chicago Ave., Chicago, IL 60651.* ■

MX-PRO

(Continued from page 116)

you wind up going left instead!). A torque-limiting speed controller can even help make up for poor traction. The downside is that unless you take the time to set-up the controller correctly for the track you run on, you can murder your acceleration.

I chose a Revtech* Super Stock motor, but any motor will do for the first few times you run. Just don't go insane and buy some radical wind until you've had some practice.

TIRING TRIALS

Rather than buy foam donuts and go

(Continued on page 152)

MX-PRO

(Continued from page 150)

through the hassles of mounting and truing them (why I own a tire-truing machine when I've never had an on-road car, I don't know), I bought TRC mounted, trued and glued front and rear wheels and tires.

Tires are coded with colored dots that indicate their hardness or softness. Although the most basic reason for having a variety of tire compounds has to do with track surfaces, part of the traction equation relates to how you have your car set up. If you've never tried on-roading before (let alone run this car before), you can't possibly know which are the correct tires to buy.

I started with green dots because the color looked better than any of the others (yup, that was my reasoning!), but I hope to make more informed decisions about the tire compound as I get more practice. Don't rely on traction compounds to do the work your tire should be doing. If you lose traction, get a softer tire. If you have too much traction, use a tire that's a little harder. Traction compound lets you fine-tune the tire, not make up for its deficiencies.

BODY WORKS

Deluged with a nearly overwhelming choice of bodies (far more than I've ever found for off-road!), I retreated into a small corner of my local hobby shop and bumped into a Lexan version of Oldsmobile's Aerotech body. In size and style, the Aerotech body is remarkably similar to an IMSA Camel Light body. On the full-size car, the body was designed to provide the utmost in aerodynamic efficiency. The scale body is a faithful reproduction.

(Continued on page 159)

MX-PRO

(Continued from page 152)

To increase downforce, a small upturned airfoil is built into the rear of the Aerotech body, but that wasn't enough for me. On the other hand, I didn't want to overpower the petite body with a mega-wing. Fortunately, I found a 1/12-scale stabilizer wing gathering dust in a bin. I took everything home (all right, I paid for it first!) and set it all down next to the chassis.

The MX-Pro uses aluminum body posts up front and aluminum support tubes rising up from the T-bar engine pod. The front body posts had to go because they were too long and looked too good for me to hack away at them. The Bolink* replacements work well.

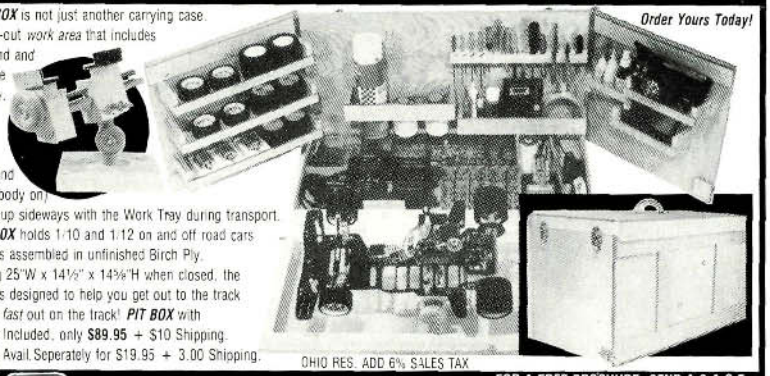
To my simple mind, it didn't make sense to use tubes on the T-bar pod, which is supposed to flex as the car moves, and believe it or not, I was right. The rear tubes are actually wing-mounting tubes, and they're simply a place on which to anchor the body loosely at the rear of the car. Cut two elongated holes in the rear of the body for the body mounts/wing tubes; this will keep the body stable but still give the chassis room to flex. If you use large body clips on the tubes, you can prevent the body from flopping around.

PRO-FORMANCE

I figured that having a dry day to test the car would be as unlikely as getting it set up right the first time, but the weather was nice, and when I tried out the car, it tracked as straight as an arrow! Did you ever get the feeling that you can't lose? (Since I don't race, I always have that feeling!)

All right—I admit it. I made a mistake. I mounted the rear of the body about 3/8 inch too high, but to fix the problem, I simply moved the stops down the tubes. Other than that, everything was fine. I'd

(Continued on page 162)



MX-PRO

(Continued from page 159)

like to take all the credit, but I'm sure that the MX-Pro's easy setup had as much, if not more, to do with it as I did!

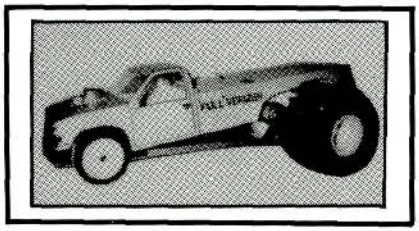
The car turns on a nickel (I tried a dime, but it kept giving me change), but I had to dial the dual rate way down to prevent the car from spinning out on turns. (Someone said I should slow down, but the whine of the MX-Pro at speed just sounded too good.) Even with the dual rate dialed down to almost nothing, I could still power through turns without a problem. I like that!

When my Duratrax* batteries eventually dumped after 4 minutes, 28 seconds and I retrieved the MX-Pro from the center of the grid (duck, dodge, jump to avoid oncoming traffic), it was obvious that I was pleased. (Of course, repeating "Yes" in an ever-increasing volume was probably a dead give-away.) One drawback: although there isn't any dirt to clean off, there's an awful lot of tire dust all over the place, and it's much harder to remove.

WHAT'S NEXT

I don't know what to tell you about improving this car. I'd certainly like to do something about that rear damper (it wasn't a problem, but I just don't like it). Camber adjustments should be possible, but not with the stock, solid, front-axle setup. There are kits that remedy the deficiencies, but they increase the car's cost, and I'm not sure I want to do that. I guess I'll just have to be satisfied with driving the MX-Pro and enjoying it the way it is. What a shame!

**Here are the addresses of the companies mentioned in this article:*
***McAllister Racing,** 2245 First St., Unit 105, Simi Valley, CA 93065.*
***Hyperballs/Hyperdrive Racing Systems, Inc.,** 3210 Howard Nickell Rd., Fayetteville, AR 72703.*
***Robinson Racing Products,** 165 N. Malena Dr., Orange, CA 92669.*
***Custom Racing Products (CRP),** 8784 Plata Ln., Atascadero, CA 93422.* *(Continued on page 171)*



MX-PRO

(Continued from page 162)

Du-Bro Products, *480 Bonner Rd., Wauconda, IL 60084.*
Tecnacraft, *1335B Dayton St., Salinas, CA 93901.*
Novak Electronics, Inc., *128-C E. Dyer Rd., Santa Ana, CA 92707.*
JR Propo Remote Control/Hobby Dynamics Distributors, *P.O. Box 3726, Champaign, IL 61826.*
Hi-Tec/Radio Control Development (RCD), *9419 Abraham Way, Santee, CA 92071.*
Tekin Electronics, *970 Calle Negocio, San Clemente, CA 92672.*
Futaba Corp. of America, *4 Studebaker, Irvine, CA.*
Revtech R/C Products, *7401 White Ln., #19, Bakersfield, CA 93309.*
Bolink R/C Cars, Inc., *420 Hosea Rd., Lawrenceville, GA 30245.*
Duratrax/Great Planes Model Distributors, *1608 Interstate Dr., P.O. Box 4021, Champaign, IL 61824.* ■

TURBO ULTIMA II

(Continued from page 148)

and tough, but quite flexible. When you install the suspension on the chassis, you think that the assembly will never work (you could almost bend the chassis into a letter "C"); then you get to the radio plate, which seems to be made of an even lighter, more flexible material. I firmly believe that a stiffer chassis is better, so I'm a graphite fan, and the Ultima II's

(Continued on page 186)

TURBO ULTIMA II

(Continued from page 171)

space-age, bendy, plastic stuff had me worried. When I put the chassis and radio plate together, though, I had an assembly that seemed to be as rigid as I could want.

Kyosho's shocks set the industry's standard. They work smoothly and reliably with the nylon A-arms and hub carriers that are common to Ultimas. The turbo tranny is almost the same as that on the Pro XL, but it uses 32-pitch gears instead of 48-pitch. The ball diff comes completely assembled, but there's a section in the instructions that shows you how it was put together so that you can confidently disassemble and reassemble it for cleaning. I still can't understand why Kyosho uses 32-pitch gears when 48-pitch work so much more smoothly.

The adjustable wing support is also interesting. It's made of strong nylon and is very stiff. The large, Lexan wing is screwed onto the rear shock towers where it puts the maximum downforce on the rear bulkhead. In most kits, bent wire supports the wing, and the wire's flexibility absorbs some of the downforce. Kyosho's wing support doesn't have this weakness.

THE ULTIMATE ULTIMA?

Are we having fun yet? No, but we will! There are always doubts mixed with our optimism about a new car. Even though I respect the Ultima Series cars as some of the best in their class, I still had some doubts about how the Ultima II's Kelron chassis would perform.

At the track, the battery packs were peaked while my able assistant, Dave Tarantelli, and I took static shots. Dave, who trades A-Main wins with me at Ray's Hobby's off-road track, had

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TURBO ULTIMA II

(Continued on page 186)

brought along his superfast, super-hooked-up JR-X2 so that we'd have something with which to compare the Turbo's performance. His car had been racing on the test track for a season and had been set up with a stock Race Prep off-road motor and an electronic speed controller. Even with the 22x1 Mega Motor, the stock Turbo Ultima II (supplied pinion gear, tires and all), shouldn't have been able to come close to Dave's JR-X2.

Surprise, surprise! The Ultima traded places with the JR, lap after lap. The JR seemed to have an advantage in turns, but the Ultima had the straights. The only handling problem was a considerable amount of understeer as it came out of the corners, and this can be attributed to the "gatorback"-type front tires, which were clogged after the first lap and never cleared.

For the second run, Dave was ready with a 7-cell SCR pack. As you'd expect, the JR was faster, but in a 4-minute race, the cars were still on the same lap at the finish. The Kelron chassis didn't seem to hamper handling or acceleration; in fact,

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TURBO ULTIMA II

(Continued from page 189)

the car seemed to be a little more forgiving than most of the Ultimas I've owned.

For the last run, Dave and I traded cars, and he soon felt the same about the Ultima's performance. With a change of tires, a good stock motor and an electronic speed controller, this car could definitely be a strong competitor in the stock division. Dave is already thinking about next season. Now we're having fun!

**Here's the address of the company featured in this article:*
***Kyosho/Great Planes Model Distributors,** P.O. Box 4021, Champaign, IL 61824.* ■

BASICS OF GLOW

(Continued from page 138)

(yeah, sure) that's been on the shelf for nine years, and expect good performance. The engine will often die while you're putting a few drops of fuel into the carb to prime it! Go to a hobby shop and invest in a rechargeable glow starter; it's worth it. If the glow plug is good, the battery is good and the engine has been primed with a few drops of clean fuel in the carb, the thing has to start! There's no way it can't, sports fan!

The next consideration is fuel. Fuel, my good buddies, isn't at all like wine: it doesn't improve with age! You can drink wine that's cloudy, but cloudy glow fuel will make your engine cough, burp and sputter. Buy a good commercial blend, preferably one with castor oil in it (because of its heat-dissipating qualities), and buy only a month's supply. (Why not split a gallon with buddy?) Also, don't use a turkey baster to get the fuel into the tank. There are many inexpensive manual pumps that work well. Buy two filters—one to go at the end of the pick-up line in the fuel can, and the other to go in the delivery line to act as a final filter before the fuel enters the tank.

ONE LAST THING

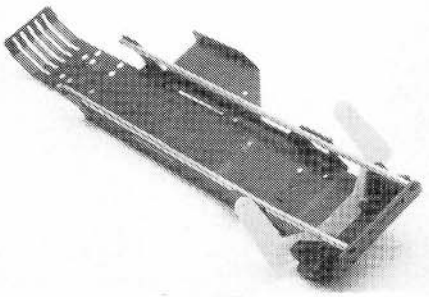
Good extended performance requires aftercare. At the end of a day's racing, don't just throw your car in the closet and expect to have a happy little purring engine when the mood strikes you to return to the track. Make sure the fuel tank is empty, and run the engine as dry as you can before you put it away. Alcohol is hygroscopic (i.e., it attracts water), so leaving unburned fuel in the crankcase is like asking for corrosion. *(Continued on page 196)*

WHAT'S NEW

MRC/TAMIYA
Sport Tuned Electric Motor

Using MRC/Tamiya's new Sport Tuned Electric Motor is one of the easiest ways to hop-up your Super G or "speed up" your King Cab Nissan R/C truck. The durable, well-engineered powerplant can be bolted in wherever a 540-size motor goes. It can handle 5- to 7-cell batteries (6 to 8.4 volts), and it's set at the factory for a timing of 15 degrees. At maximum efficiency, it produces 350 grams per centimeter of torque, uses 12 amps and delivers 18,300rpm. No-load rpm is 21,500 at 2.2 amps. The Sport Tuned Motor has a fixed metal endbell with rugged Oilite bushings, internal motor-noise filters and a metal case with a matte black finish.

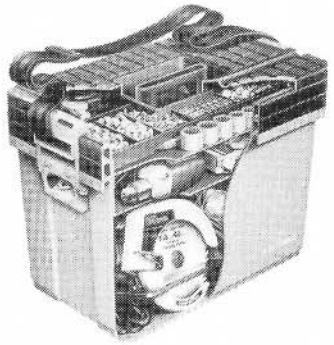
For more information, contact Model Rectifier Corp., 200 Carter Dr., Edison, NJ 08817.



BME
RC10 Aluminum Chassis

Check it out, RC10 lovers! This aluminum chassis comes anodized in red, blue, black or gold, and it works well in dirt and on paved ovals. Also available is a matching LTO front clip that fits other RC10-style chassis, too.

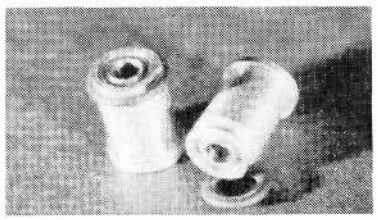
For more information, contact BME, P.O. Box 2066, Bricktown, NJ 08723.



SEARS, ROEBUCK
Craftsman SST

Sears, Roebuck and Co. introduces a portable tool-storage unit that bridges the gap between small toolboxes and bulky tool chests. The versatile Craftsman Sit, Stand, Tote (SST) has 4,816 cubic inches of storage space and can double as a seat and step stool. It's 21 1/4 inches long, 13 5/8 inches wide and 17 7/8 inches tall, and it can support 250 pounds.

Made of durable polypropylene olefin, the Craftsman SST's unique molded design includes a 9-inch bottom tub, a 5-inch tote tray and a 3-inch tool organizer tray. The V-groove in the lid can be used to hold pipes or dowels for cutting. The Craftsman SST is available at Sears stores and through the Sears Catalogue for less than $50.

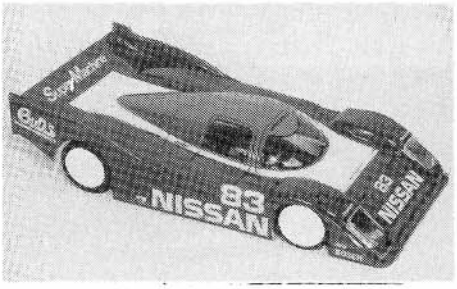


PROMPTON DESIGN
1/12 Left Wheel Hub

You can mount Prompton's 1/12-scale left wheel hub without making a flat spot on your graphite axle. Simply adjust it to the proper spacing and clamp it on.

Price: $15.95

For more information, contact Prompton Design Inc., 636 N. Hill Pl. #402B, Los Angeles, CA 90012.



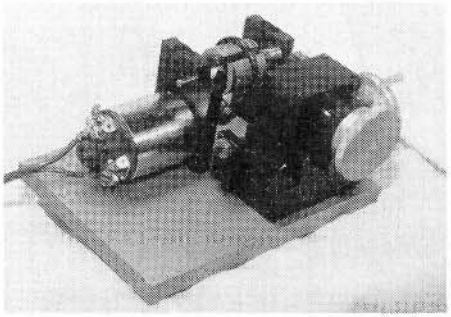
BUD'S RACING PRODUCTS
Nissan NPT-90 Body

This Nissan NPT-90 Racing Body is new from Bud's Racing Products. A champion in full scale and soon to be one in R/C at the 1991 U.S. Indoor Champs, this body is functional and realistic.

Part nos. 1000 (1/12-scale NPT-90 Standard Weight); 1000SL (1/12-scale NPT-90 Super Light Weight); 5000 (1/10-scale NPT-90 Light Weight).

Price: $11.95; $11.95; $18.95.

For more information, contact Bud's Racing Products, 1575 Lowell St., Elyria, OH 44035.



SPEED CRAFT RACING
Pro Motor Lathe

Speed Craft Racing Products proudly introduces its Pro Motor Lathe. This unique, black-and-gold-anodized motor lathe is the professional way to recut your commutator. It's accurate to within .0002 inch, easy to control and portable. It has a safety lock and comes with its own toolbox; an optional diamond cutter is available.

Part no. 9001

Price: $249.95

For more information, contact Hobby Etc., 295 D.W. Hwy., Nashua, NH 03060.

Descriptions of new products appearing on these pages were derived from press releases supplied by the manufacturers and/or their advertising agencies. The information given here does not constitute endorsement by **Radio Control Car Action,** nor guarantee product performance or safety. When writing to the manufacturer about any product described here, be sure to mention that you read about it in **Radio Control Car Action.**

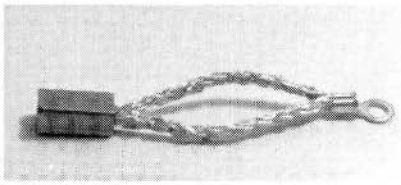
DAHM'S
Tuff-E-Nuff

Dahm's 1991 custom Ford Ranger Lexan body—Tuff-E-Nuff—is designed to fit most 1/10-scale cars and trucks. It's perfect for monster trucks, pullers, mud boggers, pro-stock drag trucks and street trucks. Tuff-E-Nuff has aerodynamic styling, a supercharger with scoop, flared wheel wells, side vents, a cab extension, a narrow racing profile and fine detailing. It comes with finishing instructions, decals and a sample of one of Dahm's exciting graphic films.

Part no. D190

Price: $19.98

For more information, contact Dahm's Racing Bodies, P.O. Box 360, Cotati, CA 49431.

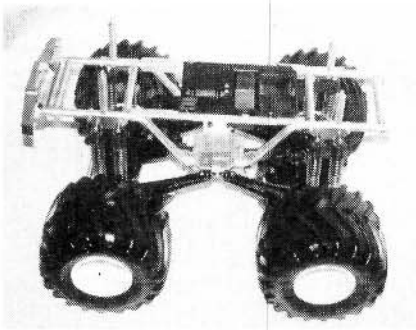


TRINITY
Hard Brushes

Trinity proudly announces its new, improved hard brushes. These full-size, uncut motor brushes have dual shunts for lower resistance.

Part no. 4038

For more information, contact Trinity Products, 1901 E. Linden Ave. #8, Linden, NJ 07036.



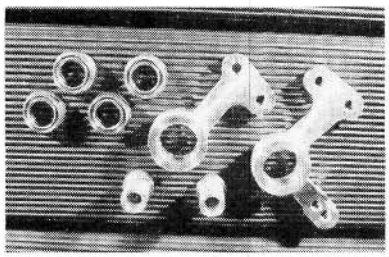
ESP
Twin-Tube Aluminum Chassis

ESP's Tamiya Clod Buster chassis has an all-new, twin-tube ladder frame that's very similar to that of full-scale monster trucks! This lightweight design is much stronger than the stock plastic chassis, and it even has a built-in chassis brace.

Part no. ESP028

Price: $49.95

For more information, contact ESP Mfg., 7105 Virginia Rd., Crystal Lake, IL 60014.

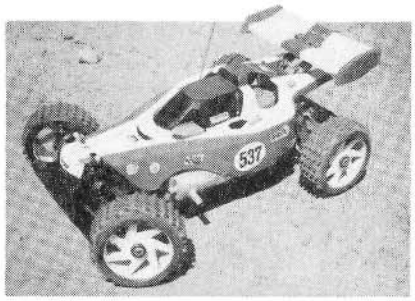


PROMPTON DESIGN
RC10 Ball-Bearing Bellcrank

Prompton's new RC10 Ball-Bearing Bellcrank is made of a strong aluminum alloy to maximize steering response and ensure minimum vibration. The kit comes with four, high-precision ball bearings; it's easy to install and doesn't require any modification.

Price: $35.95

For more information, contact Prompton Design Inc., 636 N. Hill Pl. #402B, Los Angeles, CA 90012.

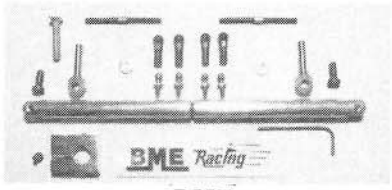


OFNA RACING
Pirate M1

The Pirate M1 is a 4WD, 1/8-scale, gas buggy with many standard features that aren't found on other cars in this class or price range. It comes ready to accept a bolt-on O.S. 21RF-B or EX-B engine, or it can be ordered with special mounting accessories for Italian engines. The Pirate kit is a complete rolling chassis with fully sealed bearings, a sturdy nylon suspension, an exhaust system, composite disk brake and a flywheel unit. You only have to add an engine and R/C electronics. With its large-volume shocks, the Pirate is perfect for dirt tracks.

Price: $389.95

For more information, contact OFNA Racing Division, 779 West 19th St., Suite E, Costa Mesa, CA 92627.

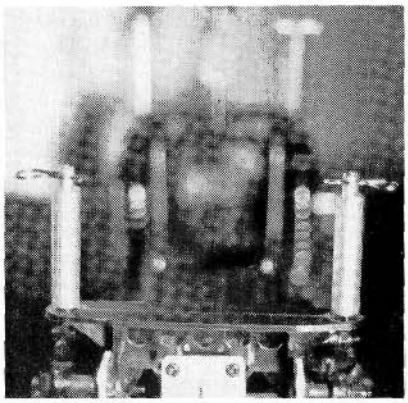


BME
Lynx/10L Front End

BME announces a new front end for the Lynx II and the 10L that allows independent caster/camber adjustment. This light, high-quality design has magnesium cross-bar sections, ground and polished tooled-steel kingpins, steel turnbuckles, 2024 aluminum cinch blocks, hex wrenches and molded rod ends.

For more information, contact BME, P.O. Box 2066, Bricktown, NJ 08723.

WHAT'S NEW



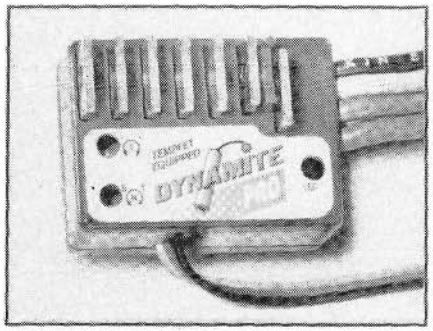
QUANTUM MECHANICS Gear-Case Brackets

Use Quantum Mechanic's machined-aluminum, gear-case brackets on your Clod Buster or Bullhead, and you'll never have to buy another pair of plastic brackets again!

Part no. 1302

Price $14.95/pair

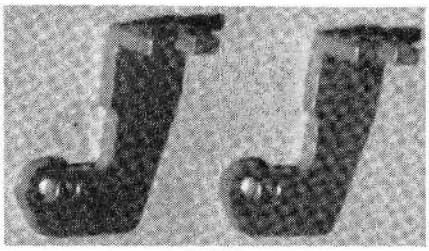
For more information, contact Quantum Mechanics, 63 S. Capitol Ave., San Jose, CA 95127.



HORIZON HOBBY DISTRIBUTORS Dynamite Pro ESC

Designed for sport driving or entry-level racing, the Dynamite Pro controller's smallness and lightness make it perfect for all types of cars or trucks. It has fully proportional forward and adjustable brakes, which are necessary for precise driving or competition racing; it also has a Tempfet transistor that protects it from current overloads. The unit comes complete with heat sinks, a pot-adjustment tool, capacitors, instructions and a universal plug system that fits Futaba, Airtronics and KO radios. The Dynamite Pro comes with a 120-day warrantee.

More more information, contact Horizon Hobby Distributors, 3102 Clark Rd., P.O. Box 6029, Champaign, IL 61821.



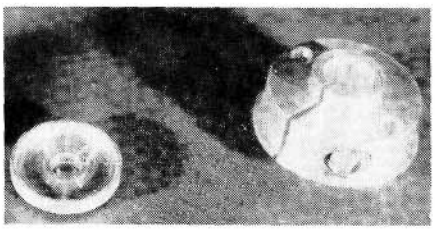
ESP USA-1 Body Mounts

Constructed of solid aluminum tubes, ESP's new body mounts for the Kyosho USA-1 are much stronger than the stock units, and they give the truck body an extra inch of lift.

Part no. ESP020

Price: $19.95

For more information, contact ESP Manufacturing, 7105 Virginia Rd., Crystal Lake, IL 60014.



PROMPTON DESIGN 1/12 Front Wheel Quick-Change Adapter

Prompton's newest wheel adapter allows you to change 1/12-scale front wheels in seconds without removing the front ball bearings. Simply take off an O-ring and pull out the wheel. The adapter will also save you the trouble of changing the number of washers on the front axle. Once you've installed it, you'll never again have to change the washers when you change a front wheel. The kit comes with four high-speed ball bearings and two extra O-rings.

Price: $29.95

For more information, contact Prompton Design Inc., 636 N. Hill Pl. #402B, Los Angeles, CA 90012.

AIN PLASTICS '91 Catalogue

AIN Plastics announces its '91 Catalogue. This comprehensive, 208-page source book offers a full line of mechanical plastics, sheet, rod, film, tube and accessory items. There are many new products from AIN—including large cast-acrylic tube, rod and block, and polycarbonate shelving systems—as well as recent offerings from Fiberglass Evercoat, 3-M, Devcon, Dremel, Loctite and more. This easy-to-use catalogue contains extensive product information (e.g., sizes, thicknesses, specifications and tolerances), government and AMS specifications, properties of adhesives and engineering plastics, and even a table of decimal/fraction/metric equivalents.

For more information, contact AIN Plastics, Inc., Dept 91 BAC, P.O. Box 151, Mt. Vernon, NY 10550.

BASICS OF GLOW

(Continued from page 191)

Put some Pacer's After Run into the carb; then remove the glow plug, put some in the cylinder and turn the engine over a few times. This will protect the parts well while the engine is in storage. Replace the plug, and put a piece of clean tissue paper into the carb to keep out dust.

There are a lot of frightening rumors about glow engines, but most of them are unfounded. The manufacturers are constantly working to make running glow engines even easier (witness the growth in the number of pull-start engines that make expensive 12V starter gears unnecessary). Remember the basics; talk to people you know who run glow engines successfully; make your own informed decisions—and tell your loudmouthed friends to shut the @#%* up!

**Here's the address of the company mentioned in this article:*
Pacer Technology and Research, *9420 Santa Anita Ave., Rancho Cucamonga, CA 91730* ■

LETTERS

(Continued from page 29)

local track. (The car's rear end was literally shattered.) Now I'm having a terrible time finding replacement parts to fix it. I called MRC, but they only offer one or two of the parts I need. I knew that finding parts would be tough, but I didn't think it would be impossible. My car is just gathering dust.

IAN MONTGOMERY
Denver, CO

Ian, I started out with a Rough Rider (which preceded the Super Champ), and I had the same problems finding parts. When I did find them, I bought whatever I could. After a while, though, I gave up. I'll tell you what I'm gonna do...I'll put all the Rough Rider/Sand Scorcher/Super Champ parts I can find into a big box and send them to you. They're not doing me any good, and you might find what you're looking for! JH

618-08

ADVERTISER INDEX