KYOSHO'S NEW THREAT: THE TRIUMPH

Radio Control
CAR ACTION

WORLD CHAMPS PREVIEW

POWER

ASSOCIATED'S NEW TRUCK

RC 10 ST

WORLD CHAMPS PREVIEW

DON'T

R/C FACTS FALLACIES &

HAMP'S SECRETS REVEALED:
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Radio Control Car Action (ISSN 0886-1609) is published monthly by Air Age, Inc., 251 Danbury Rd., Wilton, CT 06897. Beyond First Postage paid at Wilton, CT, and at additional mailing offices. Subscription rates are 1 year (12 issues), $29.95 (foreign $39.95); 2 years (24 issues), $54.95 (foreign $74.95). Send Form 3579 to Radio Control Car Action, P.O. Box 427, Mount Morris, IL 61054.
WHY'D IT BREAK?!

The most common complaint we receive is that many R/C cars break easily. The word "easily," however, is relative. To us, an "easily broken part" could be one that breaks in a minor collision or after a decent shot into a wall at the track, or one that fails prematurely under "normal" (another relative term) operating conditions. Some enthusiasts, however, expect their cars or trucks to withstand the abuse of driving off roof-tops, going over 6-foot-high jumps at full speed and hitting walls head-on at more than 45mph and still come up smelling like roses. To say that the expectations of reckless R/C enthusiasts are unrealistic is an understatement.

Like any other mechanical equipment, R/C cars must be treated with a certain amount of respect. To preserve a full-size auto for as long as possible, you have to change its oil and lube all its joints, and you must care for your R/C vehicle in the same manner. Without careful maintenance and a levelheaded operator, R/C cars are guaranteed a life of breakdowns and below-par performance.

Life is full of compromises. There can’t be an up without a down, a good without a bad, a black without a white—well, you get the picture. With R/C cars, you can’t have good performance without compromising durability. Bulletproof cars don’t go fast, so they must be made of lightweight materials in configurations that provide good strength-to-weight ratios.

Apart from a few poorly manufactured pieces, many of the available R/C products are capable of withstanding some fairly severe punishment. Don’t be too critical of the product you’re using. Most are designed to be a fair compromise between performance and reliability. You can’t have it all, so be happy with something in the middle. Most of all, keep having fun.
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**LETTERS**

**SHOCK STUMPED**

Recently, I bought a Blackfoot, but whenever I run it, its rear shocks get stuck, and they don’t come up unless I run it in reverse. Then, when the truck starts moving forward, they go down again. Do you have any solutions?

JOHN ARIEO
Greenbrook, NJ

John, it sounds as if something in your suspension is binding. Remove the shocks, and check that they operate smoothly (putting some lube on the shaft might help). If the shock doesn’t show any signs of binding, check that the rear arms move smoothly. If they do, then perhaps the shock-mounting screws are too tight. Stock shocks never work as well as oil-filled units, but if they don’t bind, they should be adequate.

JH

**SLIPLESS**

In the article on slipper clutches (April '91 issue), it said that some slipper clutches are compatible with the popular off-road cars, but there was nothing about using them in off-road trucks. Will any of the clutches mentioned fit my King Cab? If not, are there any companies planning to introduce one that will in the near future?

BILL KELLEY
Cape Cod, MA

Bill, slipper clutches are available for some trucks, but they’re primarily for trucks that are based on 2WD buggies (i.e., RC10 conversions, JR-XTs, etc.). Unfortunately, none of the clutches mentioned in the article will fit your truck. Slipper clutches are great for any vehicle, but I don’t know of any that are available for the King Cab now.

JH

**SUPERIOR SERVICE**

I’m writing to commend Twister Motors for its supreme service. I bought a Twister lathe, and its belt broke. I wrote to the company about the incident, and guess what? Yup! I received not only a replacement belt, but an extra one, too!—all in less than three days! Twister deserves the highest accolade for service, and I’d like to thank them.

COSMO MAO
Irvine, CA

Cosmo, I think it’s great that Twister helped you so quickly. The belt in my lathe broke soon after I bought it, too. (Actually, it was an O-ring, and they’ve been known to break!) I found a good selection of belts at an auto-parts store, and they sell for 50¢ each. Just make sure you get an O-ring of the same size.

JH

**LETHAL TRACTION**

Are you tired of your monster truck not having the traction it needs? Well, I sure was, so I devised this solution: puncture a hole in the tire with a nail, and then pass a bolt with a screw on it through the hole. Don’t worry, bolts cost less than $3, and they’ll really improve your truck’s traction. After a sore thumb or two, nothin’ will be able to stop your truck!

JARED THORNBURGH
APO, NY

Jared, although your idea shows the ingenuity that’s so prevalent in our hobby, I strongly recommend that you (or anyone who’s even considering modifying tires with sharp metal objects) refrain from this practice. The additional traction afforded by the metal spikes is outweighed by the danger. If anyone accidentally picked up the monster truck while you were running it, they could lose some digits! Besides, if you ever planned to race, I don’t know of any club that would let you use these modified tires.

FM
WHICH PITCH?
Hey! I have an RC10 with bearings, a Futaba speed controller and a fairly quick motor that I made out of spare parts. The only thing I dislike about my car is that its pinion/spur gear mesh is very loud! I’ve tried to adjust it, but this hasn’t helped. I use stock pinion and spur gears, but I want to use gears of a higher pitch to reduce the noise and provide smoother runs. Which pitch do you suggest? Also, in the B&R Motorworks ad, the motors’ brushes were soldered onto their endbell. Is this some sort of high-performance advantage that the rest of us don’t know about?!

JEFF KAMKE
New Berlin, WI

Jeff, the noise is probably caused by the fact that you’re using 32-pitch gears, and they’ve worn out. Try a set of 48-pitch gears. (I don’t recommend 64-pitch gears for off-road racing, because they’re delicate.)

As for the B&R motor ad, there’s a big advantage to soldering the brushes onto the endbell. Last year, I noticed that the color of the brushes in my motor was changing after one run, which is an indication of too much heat. Several of the brush springs snapped or were bent because of this heat. I realized that the brush spring probably didn’t create a very good connection, so I soldered them. Wow! What an improvement! Not only did the motor run at a lower temperature, but the brushes and springs lasted much longer. Also, the brush hood is attached to the endbell with the spring post and the same screw that’s used for the brushes. When you remove this screw, the brush hood can shift, so you risk altering its alignment. It’s important that the brushes are properly aligned with the armature, and soldering the screw ensures that they won’t shift.

JH

“SCE” mean? Also, how are cells rated? What’s the best battery for a stock setup? Your mag is great!

RICKY MASTERS
Austin, TX

Flattery will get you everywhere, Ricky. You’ve asked some very good questions, and I’ll answer them in order.

1. The cells in a “pushed” battery pack have been conditioned to produce more “punch.”
2. SCR is Sanyo’s designation for its fast-charge Ni-Cd battery. The 1200mAh sub-C cells were the first SCRs used in R/C. SCRs had a high discharge rate, however, so they were primarily used for stock-class racing. Recently, 1400mAh SCRs have been released, and they’re popularity has grown in the 2WD modified off-road classes.
3. The SCE—Sanyo’s 1700mAh battery—has made a huge impact on R/C racing because its increased current capacity allows for much longer run times.
4. Batteries are rated according to their discharge seconds, charging seconds, overall voltage, and recently, their internal resistance.
5. SCRs are the best for stock racing. I suggest that you buy 1400mAh packs, because if you ever decide to go modified, you won’t have to buy new batteries.

FM

THIS EAGLE EYE NEEDS GLASSES!
I’ve been reading your magazine for a while, so I’ve seen the coming and going of the “Eagle Eye of the Month Award.” In the article, “How To Make A Winning Concours Interior” (March ’91), I noticed something wrong. On page 68, it says that the driver is from a Tamiya car but, when

(Continued on page 24)
The Newest Way To Get Hitched

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Sturdy aluminum front and rear shock towers add strength and good looks to any 2WD Kyosho monster truck and allow for body and shock height adjustment.

NEW TREND?

To ensure our continued growth, much of our marketing effort here at Air Age Publishing is directed toward keeping readers enthusiastic about the hobby. This strategy should be adopted by R/C manufacturers and organizations, too, and this was a key topic of my recent meeting with Alan Green, the senior vice president of the Hobbico group (Tower Hobbies, Great Planes Model Distributors and Kyosho).

There was a lot of "brainstorming," and we plan to embark on some progressive programs and events that you'll see in the near future. Bringing "new blood" into the R/C fold is imperative; but exciting current R/C enthusiasts is just as important. Bill Jeric (Hobbico's senior product director) demonstrated new products, and the most impressive was the new Outlaw Rampage, which might really turn on active R/Cers. It's a 1/10-scale racing truck powered by a .12ci glow engine. If you aren't familiar with glow-powered R/C vehicles, let me tell you, this truck screamed, and Bill served up some wild sideways and rooster-tail action.

I thought, "What a great concept for a new class of racing."—and talk about speed and excitement! Many modelers shy away from glow engines because they can be very cantankerous and problematic; and then there's all that cumbersome starting and support equipment. The new glow vehicles are, however, much more user-friendly; they even have pull starters. Also, since this truck is in 1/10 scale, there's already a wealth of after-market goodies available from its electric brothers (i.e., wheels, tires, bodies, shocks, etc.).

This could very well be the start of something new. The industry is primed for a hot new trend, and I'd like to see more manufacturers getting involved. Global Hobbies is also offering a new glow-powered stadium truck, and Schumacher is about to introduce theirs. Remember: as industry members, it's our responsibility to keep exciting R/C consumers. Hey!—maybe a year from now, we'll be featuring the 1/10-scale glow-powered nationals!
As directed by the Ayatollah of Radio Controlla, Commander Crash Chianelli reports 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 communiqués that read as follows:

Here, Vladimir Pershin shows our Associate Editor, John-Boy "Walton" Huber, a Soviet 1/4-scale 4WD on-road gas car. The eastern bloc modeling scene has a lot of catching up to do. Most of this car's tooling was done by hand, and it was made of rough nylon. The car features four-wheel independent suspension with oil shocks and torsion springs; a black anodized-aluminum chassis; nylon suspension components; one-way front bearings; a belt drive; a two-speed tranny; steel drive gears; and quick-change rear wheels. We salute our Russian modeling friends for persevering in their country's industrially and economically troubled times. We figured that John-Boy's down-home, hospitable ways would quickly make the Russians feel at ease. Gosh darn, ma. They don't seem no different from us when you get right down to it!

After recent covert operations (including a break-in) at the Dan's RC Stuff facility were carried out in an attempt to expose Dan's high-tech government/business connections and dealings, this stolen document fell into our hands. Names and phone numbers have been deleted to protect the innocent. As you can see, Dan had clandestine meetings, and subsequently, a shipment (or possibly shipments!) of Dan's battery Gold Bars was sent to the NASA/Johnson Space Center for who knows what purpose! The only thing that my people have been able to uncover is that the bars were shipped to a high-security building with the words "Environmental Training Facility" printed on the door in small—but very official—letters. If Dan's bars are good enough for NASA, then they're good enough for us; don't you agree, Scotty?
This spy shot was taken at the .32-mile concrete tri-oval test track that's located 3 miles from the Traxxas headquarters in Dallas, TX. You can see what appears to be the 1/10-scale on-road prototype that Traxxas has been working on secretly. Our man in the Deep South (code name: Long-Lenz Leg-Horn) took this telephoto shot right before he was discovered and lassoed by J.R. Jenkins & Son. It's hard to see much because the photo is blurry, but the car looks as if it might be a Lynx-type, rear-pod design with an overhead-shock/bellcrank system; just don't hold me to that. Is Traxxas really developing an on-road threat? The respect for Traxxas in certain racing circles has grown recently, so if they're building one, we look forward to checking it out.

The fastest track in the land—the Velodrome in Encino, CA—will again be the site of the annual Thunderdrome and Radio Control Car Action Super Speedway Shootout. September 13 to 15, 1991, will go down in R/C history as the fastest days of the year. Be there, or be considered...slow!

From this photo taken recently at the Great Planes test track in Champaign, IL, it's evident that the 1/10-scale gas scene is gaining popularity. It's also quite obvious that the Kyosho Nitro USA-1 is catching some serious air and is a true American high-flier. Leave it to Car Action to bring you the first action shot of this new methanol monster.
No, I'm not talking about cars that race on slotted tracks. I'm talking about R/C cars that run using Trinity's new ROAR-legal Slot Machine (stock) and Tri Rotor (modified) motors. Trinity took material out of the center of the armature to produce a split or slot. The company says this makes up for the new 24-degree stock motor's reduced rpm (it's lower than old 37-degree stock motor). The

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slotted armatures are also cooler because air can now circulate to the inner part of the coil where heat build-up is the greatest. We haven't tested these motors yet, but I can tell you that this design worked in slot-car motors. There's one more thing I can say for sure: this development will stir up the pot...a lot!

My beautiful spy in the Far East has come through yet again! I hope to bring you more info about these Japanese “Mad Tune” cars soon (they're not available in the States yet), but for now, here's all I know. They're—get this!—1/70 scale (about HO size)! The single-cell car's Ni-Cd is charged by means of the transmitter. Will somebody please tell me why the Japanese call them Mad Tune cars?! Why not call them Table-Top Racers! Now that's a great name, if I do say so myself.

table-top formula-t?

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Hobby Dynamics
ESP's new, aluminum, monster-crusher Ladder Frame chassis borrows its technology from full-scale crushers. ESP claims that it's "lighter than any other aluminum chassis" and "perfect for racing and truck-pulling." It features a built-in chassis brace and a lift kit, and you can bolt it onto stock Clod/Bull components.

Schumacher—maker of the fearless feline force—has introduced a high-frequency electronic speed controller called the TRACO (traction-control system). Its ABS (advanced braking system) reduces wheel lock-up when you apply the brakes, and its fail-safe circuitry protects against interference and shuts off the power if you lose the signal. It also has low-voltage detection, which maintains the correct receiver voltage (i.e., the motor drive is reduced whenever the Ni-Cds drop below 4 volts). The controller's push-button programmable functions include acceleration rate and braking-rate options that can be either proportional, or switched between six values ranging from 25 to 87 percent. Its list price is approximately $220.

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"Readers' Rides" is our way of recognizing the unique, innovative—and sometimes bizarre!—vehicles that our readers have created. Send us a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, R/C Car Action, 251 Danbury Rd., Wilton, CT 06897. If the Ayatollah chooses your photo, you'll receive a one-year subscription to Car Action, or an extension to your existing subscription. You'll also be eligible for the third annual "Reader's Ride of the Year Contest" in the fall of 1991. Write your address and phone number on your letter and on the back of each photo you send, in case we need to contact you.

**HOLY TIME-CONSUMPTION, BATMAN!**

What started as a plastic model became a customized 1/8-scale Batmobile. Ewald started with a solid brass chassis and added an O.S. Max 25 FSR with a ducted fan that provides 4 pounds of thrust and keeps the engine cool. The Batmobile's power comes from thrust and a drive shaft that's connected to the spinner on the fan. Its parts are all handmade, and the all-balsa body alone took 850 hours to construct and finish! It's a stupendous job, and Ewald has the right to say his car is one of the best!

**CABIN FEVER**

It all began with a Monster Beetle kit... David Davis spent the rainy Portland, OR, winter modifying it until he got this cool truck. The mods include JG front and rear shock mounts, Trinity Power Plus Shocks, Sees Champ 500 wheels, a Sassy Chassis (which David has anodized black) and oh, so much more! Now that it's summer, David is psyched to drive it somewhere other than in his living room!

**TOUGH LYNX**

Garth Warner of Escondido, CA, modified this Lynx II Sport to get the most out of it on short tracks. This revamped machine has a Cheetah Racing Ultimate front end, a Kyosho Gold shock absorber and a TRC left-turn-only chassis. It's powered by a Peak Performance Psycho Stock motor, directed by a Futaba Magnum AM and controlled with a Tekin ESC. Garth decided to rework the Havoline Winston Cup stock-car body—a great body for a great car!
ODD COUPLE

Here's one of Tamiya's smallest trucks (we're talking about a Lunch Box) mounted on a full set of Tamiya's largest tires—yes, we mean Clod Busters! Anthony Mulcahy of Barnett, MO, is responsible for this cool combo. To make the big wheels turn with gusto, Anthony added a LeMans 240 ST motor with a Novak T-1X speed controller. Orange and black paint finish the project with a touch of class.

BAD BOY BIGFOOT

Geoffrey Kline Jr. of Trenton, NJ, sent in this photo of his modified Clod Buster. ESP quad shock mounts were added to the stock Clod suspension, and this allowed Geoffrey and his dad to mount eight extra shocks—for a total of 16 shocks! Its mods include a set of Trinity Matched Madness motors and CCP chrome wheels and bumpers. A Futaba Magnum JR radio controls it all.

MINI FUNNY

Taking a cue from full-scale funny trucks, Dave Semanik of Parma, OH, created his own 1/10-scale version. He started with a narrowed GP-10 chassis and added adjustable wheelie bars, a Novak ESC and a Black Magic VooDoo motor. Powering this potent package is a battery pack with 3/4 sub-C cells. The mods on this car enable it to run a 1/10-scale quarter-mile in 2 seconds!

THE WHEEL DEAL

Built by Harold Cambra of Wailuku, HI, this multi-wheel Clod tops our list of all-time greats. With more wheels than we've ever seen, this Clod Buster shakes the ground when it moves, and with six 7-cell battery packs powering a trio of Monster Mash motors, Harold can cart anything he wants! He has worked on this tractor/trailer for 8 months and is still thinking of ways to improve it. It really shows—check out the details! Just some of the highlights on this beauty are functional jack stands, a working fifth wheel and a geared lifting system for the bed.
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* Strong, lightweight.030 Lexan
* Aerodynamic styling
* Realistic detailing

you flip to page 71, the story changes, and
it says that driver is from an RC10. Is this
a typo or has the Eagle flown the coop and
returned to the pages of Car Action?

DANIEL WEISMAN
Jasper, IN

Danny, my friend, get some glasses! The
caption on page 68 says the driver is from
a Tamiya car; you got that much right. But
on page 71, it says—and I quote—"Finally,
I found an RC10 driver that had the
perfect dashboard attached to it. I trimmed
the dash away from the driver and put it
into my new car." Only the dash was
taken from the RC10.

JH

BRUTALIZED BIG BRUTE
My Big Brute has Clod Buster tires, a
Speedworks Monster Mash motor, ball
bearings and a problem with its stock diff!
I’m sure that the bevel gear is broken, but
I can’t buy the gear separately; I have to
buy a whole new diff I’m on a budget,
and I can’t decide if I should buy a Thorp
diff or a stock replacement diff. I don’t
want to buy the stock one only to have it
break again. The Thorp diff won’t break,
but it’s a little too expensive, so I’ll only
buy it if I have to. I’m unhappy because I
couldn’t drive my car for 6 months while
I waited for a plastic replacement part,
and then this happened. Please help!

JASON JUE
South Pasadena, CA

Jason, it sounds like your car is suffering
from drive-line failure—an affliction that
often occurs when monster-truck tires are
used on a car that wasn’t designed for
them. The big Clod tires and the Monster
Mash motor were too much for your
Brute’s stock tranny to handle. You’re
right about the situation, though; the stock
gears will continue to break. Believe me,
you aren’t the only R/Cer on a budget, but
it’s probably cheaper in the long run to
buy the Thorp diff.

FM

GRAPHITUS!

My Tamiya Vanquish is a fairly decent
car. Its manual lists an Avante carbon-
graphite chassis set (no. 3853038) as a
hop-up option, but I can’t find one any-
where! The people at my area hobby shops
said the Avante had been discontinued,
and the part wasn’t available. Say, it’s not
so! I’ve only been in the R/C world for
about nine months, and I don’t know what
to do next. Keep the great mags coming.

CORY MONTGOMERY
Carrollton, GA

Cory, you don’t need a graphite chassis to
have a good car. If the plastic chassis still
works, keep it. If it’s broken, then you can
upgrade it with fiberglass or graphite
chassis. Although the Avante has been
discontinued, you should still be able to
get parts for it and its relative, the Egress.
Call Tamiya directly to see if the parts are
still available.

JH

CAPTIVE AUDIENCE!

Until two weeks ago, I didn’t know how
serious people had become about R/C
cars, trucks and planes. I’m presently in-
carcerated in the Orange County Jail in
Goshen, NY, and when I asked the man
next to me for something to read, he
handed me the December ‘90 issue of Car
Action. It’s superior to anything I’ve ever
read, but I have one complaint. Your
magazine is very informative, but there’s
no information about how to get started,
or how to start your own club. Do you
have a magazine that could show me how,
I.e., what to do; statistics on different
motors, cars, etc.? I understand that the
Yokomo YZ-10 4WD is a decent car.

My release date is December 27, 1991.
Upon release, I’d like to subscribe to Car
Action, but right now, I have a money problem and can’t possibly afford it. My release is still 8 months away, but if you could find it in your heart to help a new fan, I’d greatly appreciate it.

JOHN CHANDLER
Goshen, NY

John, I guess it’s true that Car Action is everywhere. I’m pleased to inform you that Car Action also publishes special-interest books and quarterly special editions. Check out the Basics of R/C Cars, and our brand-new special issue, R/C Car Basics. Also, we’re working on an article about how to start your own club, and it should be printed soon. The Car Action 1991 Buyers’ Guide is a valuable information source for anyone interested in learning about the newest R/C products. Yes, the Yokomo is a good car, but it has a relatively sophisticated design, so it isn’t an entry-level car.

FM

FRED J. GOES BASIC!
I’m just starting out in R/C, and I like off-road cars. What’s a good car for beginners, and which motors would work well with it?

FREDERICK J. FLOYD
Orrum, NC

Welcome to R/C, Fred! I’m glad you chose the best magazine right off the bat. I like off-road cars, too, and I recommend any of the Tamiya entry-level cars, e.g., the Madcap or the Saint Dragon. Kyosho also offers some very high-quality kits (i.e., the Raider and the Ultima II to name a few) for novice off-roaders. It’s good that companies like Tamiya and Kyosho haven’t forgotten entry-level enthusiasts; after all, we were all beginners once (well, maybe not Masami!).

The Mabuchi 540 motor is standard in most of the cars I’ve mentioned, and it’s more than enough with which to start. You didn’t mention a radio system. When I first started in this hobby, the only affordable radios were the stick-type. Now, there (Continued on page 26)
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

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LETTERS

(Continued from page 25)

are inexpensive wheel-type transmitters, too. (Most drivers find wheel radios easier to use.) Do yourself a favor—decide which type of radio is best for you before you buy one.

FM

WILD BILL AND SPEEDY SPEAK OUT!!

My wife and I are R/C fans and racers, and we've found R/C Car Action very helpful and informative. I'm disabled and race an RC10. In the March and April issues, you showed how handicapped people can be involved R/C. I'd like to see more of this, and I hope you keep up the good work.

WILLIAM "WILD BILL" STEVENS
NANCY "SPEEDY" STEVENS
Baker City, Oregon

Thank's for writing to us, Wild Bill and Speedy. I'm glad that you find our magazine informative. One of the great aspects of R/C racing is that people of all ages and backgrounds can enjoy it! Most tracks don't have provisions for the handicapped unless one of their club members is disabled. Although there aren't any ROAR rules regarding handicapped facilities, it strongly recommends that its affiliated clubs make their drivers' stands accessible to the handicapped. Recently, my local off-road track built a separate drivers' stand with a ramp for one of its racers who's restricted to a wheelchair. If you're a handicapped racer and are frustrated by the lack of proper accommodations at your track, talk to the president of the club or the track owner. If you don't get satisfactory results, it's time to find another track.

FM
INEXPENSIVE FILTERS
For less than $2, you can make 18 sticky air filters that will attract motor-killing dirt. Wrap Johnson & Johnson self-sticking gauze bandage around your motor twice, cut it, then press it into place. It will stay secure until it's time to replace it.

Todd Fanciullo, Lake Zurich, IL

CLOD BUSTER MOTOR TERMINALS
This Radio Shack barrier strip (no. 274-656} mounted conveniently between the chassis and the steering servo makes it easy to disconnect the motor wires before removing the motor for service. It's also said to be a lot less expensive than connectors.

Rusty Carver, Jacksonville, FL

LOW-BUDGET CARPET TIRES
Slice a piece of 1½-inch-i.d. foam insulation tube as shown, then slip your new tires onto your rims. You can sand off the foam's outer "skin" on a grinding wheel, or use a wheel-truing jig, which would be more accurate. (See how to make one in February 1990 "Pit Tips.")

Wayne Beebe, Twin Falls, ID

SPRAY BOOTH
With one large cardboard box and a wire hook, you can make a simple spray booth. To keep the dust down, dampen the inside of the box before you spray. Cut out the area marked by the dotted line, tape an air-conditioner filter into the space, then stand an old window fan close behind the filter (sucking, not blowing!), you'll trap all the overspray inside the box and not on the piano!

Micah Cramer, Windsor, NY

BATTERY PACK

NO FLAT TRANSMITTER BATTERIES
Have you ever accidentally switched on your transmitter en route to the track? Why not flip the batteries over so that there's no chance of making a contact even when it's switched on? When you're ready to run, turn the batteries the right side up.

Klaus Burkhart, Corona, CA

SOLDERING-IRON REST
The humble coat hanger, yet again—this time, for this handy soldering-iron rest. Coil the wire around a large dowel, cut it to the correct length, then use CA to glue one end into a wooden base. Glue a foam sponge in the area shown by the dotted line. Kept moist, the sponge is ideal for wiping the iron's tip.

Steven Dong, Staten Island, NY
**Pit Tips**

**Transmitter Transportation**

Apply two large Velcro® patches to the sides of your toolbox, and apply the matching patches to the back of your transmitter. Now you won't need three hands to get to the track with your car, toolbox and transmitter.

Richard O'Neil, Cheekowaga, NY

**Blackfoot Axles for the Raider**

Cut the stock cup off the Blackfoot axles, grind flats (1) on them, then slip on the Ultima differential cups and tighten the setscrews. Ultima dogbones will fit the cups nicely—bore them out very slightly (2).

Michael Brocco, Saugerties, NY

**Ultima Chassis Update**

The Ultima's original aluminum chassis tended to bend easily, and this damaged the radio plate. The new Ultima Kelron chassis (no. KYOC4523) cost only a few dollars more. Use two long bolts and the corresponding nuts to make center standoffs (as shown). Your car has been updated for less than $20!

David Dodson, Wichita, KS

**Assault Screw Access**

The gearbox cover can only be removed after the wing has been removed, because one of the gearbox cover screws is directly underneath the wing. To make this job easier, just drill a hole in the wing (about the same size as the screw). This will allow you to reach the screw with a screwdriver without removing the wing.

Mike Cover, Amherst, Nova Scotia, Canada

**Dirt Filter for Tires**

Most wheels have a breather hole through which grit and dust can enter and unbalance the wheel. Attach a strip of used, foam, clothes-dryer sheet to the wheels with tape or a rubber band. Don't use a new one—it's clogged with softener. This filter keeps out the dirt.

Jim Zaborowski, Corona, CA

**Blackfoot Antenna Mount**

With this simple arrangement, you won't have to slip the antenna wire into and out of its tube each time you remove the body. The inexpensive nylon "P" clip (arrowed) is available at your hardware store. Just bolt it to the rear body-mount cross-beam.

Charles Cheng, Justin, CA

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.
KYOSHO® IS WELL-known for its off-road racing machines. As one of the top three manufacturers in the racing arena, it’s responsible for the Ultima (which grabbed the World Championship title in 1987), the very successful Optima series 4WD cars and, most recently, the Lazer 4WD. One of Kyosho’s latest efforts, however, strays from its racing lineage into what are called “Scale Series” cars.

With their emphasis on appearance rather than on all-out performance, Scale Series cars are designed for the large group of R/C enthusiasts who don’t participate in serious competition. Based on the car Rick Mears campaigned in the 1990 Cart Indy car race series, the Penske PC-19 is the latest in Kyosho’s line of scale cars.

by STEVE POND
The PC-19 is designed around Kyosho’s Scale Car chassis, which lends itself very well to Indy/Formula 1 applications. The 4W, independent, double-wishbone suspension has inboard coil-over shocks with cantilever actuating rods—identical to the design of the full-size car. Other PC-19 design features include a double-deck plastic resin chassis, one-piece chrome wheels, realistic rubber racing slicks, a breakaway front end, a three-step forward/one-step reverse mechanical speed controller, a Mega Outlaw stock motor and a bevel-gear differential.

The i/io-scale Penske PC-19 body included with the kit is about as good as it gets when it comes to scale realism. The kit includes all the parts you’ll need to build a complete rolling chassis, but you’ll have to pick up some additional components to guide and power the car.

The chassis is designed to fit most popular 2-channel radios, but if you’re new to R/C, it may be a good idea to avoid guesswork and use the Kyosho Pulsar system, the installation of which is fully detailed in the instructions. Other systems can be installed easily. In addition to the radio control, a 6-cell stick pack and an appropriate Ni-Cd charger will be required. The battery pack should include the male Tamiya-style connector that’s commonly used on Kyosho cars.

The PC-19’s assembly begins with the friction-type shock absorbers for each corner. Rather than using oil for damping, the shocks use a “friction sponge.” The shocks in the front seem to do the job rather well but, during testing, the rear of the car showed a tendency to “squat,” so add some heavy silicone lube to the rear damper. The heavy silicone lube slows shock compression and prevents the chassis from hitting the ground during acceleration. Once you’ve assembled the shocks, attach them to the front suspension components.

The front suspension is unique because the bulk-heads pivot at the rear and are held together in the front with a pair of rubber O-rings. The O-rings allow the suspension to pivot backwards so it won’t break if there’s a hard collision. When the front suspension has been completed, attach it to the chassis plate, and then move on to the rear differential and suspension.

The gear-type rear differential operates smoothly. It takes less time to assemble and is easier to maintain than the ball-type differentials usually found in all-out racing vehicles. The kit comes with a complete set of plastic bushings, but if you’re performance-minded (like me), you may prefer to install the comparatively frictionless ball bearings. By holding tighter tolerances than the bushings, ball bearings will also prevent wear of other components. Attach the rear suspension components to the assembled differential, and attach the entire unit to the chassis plate.

When you assemble the front and rear suspension, pay close attention to the length of the tension rods. Their length determines the ride height of the car, and if they’re of even slightly different lengths, the car will handle badly. A good eye and a metric ruler can get you the proper results.

The installation of the Kyosho Pulsar radio system is next, and could only be easier if it dropped in. Attach the tires and the wheels, and you’ve completed the assembly of the chassis.

The scale body included in the kit is more complicated than average, but it’s designed in a way that makes it easy to achieve fine details. The bright yellow paint seen
To avoid serious damage in a collision, the front suspension assemblies can pivot backward to absorb the impact. Two O-rings snap them forward again.

The PC-19’s suspension system is remarkably similar to that of a full-size race car. Notice the actuating rods that are connected to the shocks.

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Type</th>
<th>Penske PC-19 Replica</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale</td>
<td>1/10</td>
</tr>
<tr>
<td>Sug. Retail Price</td>
<td>$219.95</td>
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**DIMENSIONS:**

<table>
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<th>Dimension</th>
<th>Measurement</th>
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<tbody>
<tr>
<td>Overall Length</td>
<td>16.25 inches</td>
</tr>
<tr>
<td>Width</td>
<td>7.5 inches</td>
</tr>
<tr>
<td>Height</td>
<td>3.5 inches</td>
</tr>
<tr>
<td>Wheelbase</td>
<td>10 inches</td>
</tr>
<tr>
<td>Front Track</td>
<td>6.5 inches</td>
</tr>
<tr>
<td>Rear Track</td>
<td>5.75 inches</td>
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</tbody>
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**WEIGHT:**

<table>
<thead>
<tr>
<th>Type</th>
<th>Gross (with battery)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>44 ounces</td>
</tr>
</tbody>
</table>

**BODY:**

<table>
<thead>
<tr>
<th>Type</th>
<th>Indy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>Polycarbonate</td>
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</tbody>
</table>

**CHASSIS:**

<table>
<thead>
<tr>
<th>Type</th>
<th>Upper and lower plate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>Plastic</td>
</tr>
</tbody>
</table>

**DRIVE TRAIN:**

<table>
<thead>
<tr>
<th>Type</th>
<th>Pinion/spur</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission</td>
<td>Gear</td>
</tr>
<tr>
<td>Differential</td>
<td>Bevel gear</td>
</tr>
<tr>
<td>Bushings</td>
<td>Plastic</td>
</tr>
</tbody>
</table>

**SUSPENSION:**

<table>
<thead>
<tr>
<th>Type</th>
<th>Upper and lower wishbones</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damping</td>
<td>Pushrod-actuated inboard damper/spring units</td>
</tr>
<tr>
<td>Rear</td>
<td>Upper and lower wishbones</td>
</tr>
<tr>
<td>Damping</td>
<td>Upper-track control rod; pushrod-actuated inboard damper/spring units</td>
</tr>
</tbody>
</table>

**WHEELS:**

<table>
<thead>
<tr>
<th>Type</th>
<th>One-piece plastic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>(DxW)</td>
</tr>
<tr>
<td>Front</td>
<td>1.375 x 75 inches</td>
</tr>
<tr>
<td>Rear</td>
<td>1.375 x 10 inches</td>
</tr>
</tbody>
</table>

**TIRES:**

| Type                | Semi-pneumatic rubber |

**ELECTRICS:**

<table>
<thead>
<tr>
<th>Type</th>
<th>Mega Outlaw Stock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery</td>
<td>6-cell stick*</td>
</tr>
<tr>
<td>Speed Controller</td>
<td>Three-step mechanical</td>
</tr>
</tbody>
</table>

**OPTIONS AS TESTED:**

| Futaba Magnum Jr. 2-channel radio, 6-cell stick pack, Kyosho ball-bearing set. |

**COMMENTS:**

The PC-19 is Kyosho’s most realistic car to date: the suspension and bodywork are identical to those on the full-size PC-19. Though not designed for all-out competition, it has enough speed to satisfy scale enthusiasts. Getting all the radio and drive hardware under its Indy body is quite a task, but the result is a very sharp-looking car. To make installing the electronics easier and to improve the car’s performance, an electronic speed controller can be installed.

**PC-POSSIBLE CATCHES**

Owing to the soft rear suspension, the rear of the chassis plate smacked the ground when the car accelerated from a stop. (That’s why I suggested the use of a heavy silicone lube in the rear damper.) This isn’t ideal, but unless you race, it doesn’t compromise the car’s control. The addition of the heavy

(Continued on page 102)
INSIDE MASAMI'S

by STEVE POND

TO SAY THAT Masami Hirosaka has been "on a roll" would be a drastic understatement. Since the '87 IFMAR World Championships, Masami's winning streak has rivaled that of any driver in the history of R/C car racing.

In the November '90 issue, we featured the Yokomo* car that he used to win the 4WD Class at the '89 IFMAR World Championships in Sydney, Australia.

Masami has struck again! At the most recent Reedy* Race of Champions at the...
RCH Raceway in Costa Mesa, CA, he repeated his '89 World Champs performance and won the 4WD and 2WD classes by a substantial margin.

Although opinions vary about the correct ways to set up cars for different track conditions, top-level racers are the best sources of information on how to do it. They spend a lot of time learning about what makes their cars tick, and this makes them highly qualified. Here's a detailed look at how Masami set-up both of his cars for the hard-packed surface at the RCH Raceway.
WHAT "WORKS"?!
To race for the win, Masami drove a Yokomo 4WD car and a Team Associated® 2WD car (he’s sponsored by both companies). Instead of the 4WD machine screw runs through its end and rests against the center bulkhead. The holes in the chassis for the rear-bulkhead mounting screws are “slotted” so that the bulkhead can slide back and forth. This setup makes it possible to adjust the rear belt tension.

The front suspension on Masami’s car has improved geometry. Notice the new A-arms, steering blocks and special braces that were needed to control flex in the front hub carriers.

Super Dogfighter that he usually drives, however, he raced a prototype that will eventually be produced as the Yokomo ’91 Works machine. It’s based on the Super Dogfighter, but it incorporates many of the modifications that were made to Masami’s Super Dogfighter for the World Champs.

The car’s original front, center and rear bulkheads were kept, and only one modification was made to the rear bulkhead. A modified so that the batteries could be mounted toward the center of the car and, to increase the chassis’ overall strength, an upper support plate was attached to the tops of the bulkheads. On the front end, there’s also an unusual support bracket that’s attached to the top of each steering bellcrank. It supports two linkage rods that are connected to the front suspension’s upper links. Apparently, this was an effort to compensate for the prototype’s weak plastic-composite front hub carrier. (The carrier was too flexible, and this adapter with an 86-tooth spur gear. The adapter rides on the shaft that drives the front and rear differentials. Like the Super Dogfighter, the pulley that drives the front belt has a slipper assembly. All of the pulleys, including those in the differentials, are made of aluminum, but they might be prototypes for production nylon pulleys. The belts that drive the differentials are comparable to the optional fine-pitch belts that are available for the Super Dogfighter. This car also has universal-joint drive shafts that extend from the ball differentials at either end of the car.

SUCCESSFUL SUSPENSION
For improved stability, the prototype’s suspension arms are longer than those on the stock Super Dogfighter, and there’s more “toe-in” on the rear arms. They appear to be molded of black, fiberglass-impregnated nylon, and they look bulky. With this new design, the kingpins’ pivot points and the drive shaft’s universal joint are closer to the centers of the front tires, and this reduces the amount of tire scrub. (It’s rumored, however, that the arms are being redesigned to make them lighter and stronger.)

Attached to the front ends of the suspension arms are new injection-molded steering blocks that replace the Dogfighter’s fragile magnesium blocks. The rear hub carriers are attached to the suspension arms, and they’re also injection-molded. For consistent damping, the upright (Continued on page 46)
1. Associated's hard-anodized shocks (.71-inch up front and 1.02-inch in the rear)

2. Longer front A-arms move the steering’s pivot points closer to the centers of the tires to minimize tire scrub

3. Special linkage designed to strengthen the front caster blocks

4. Yokomo '91 Works chassis

5. Yokomo spur-gear adapter with dual one-way bearings

6. Rear-belt tension-adjustment screw

7. Longer rear A-arms provide more toe-in for better acceleration and stability out of the turns

8. Reedy Mr. H 12-turn triple-wind motor

9. Graphite upper chassis stiffener replaces the graphite backbone used on previous Yokomo cars

10. Fine-pitch belt drive coupled with machined-aluminum pulleys almost eliminates friction in the drive train

11. KO FET-boosted servo for the ultimate in speed and torque

12. RCPS titanium tie-rods

13. Custom-made fiber glass shock towers are used on the front and the rear
2WD TENSION
For the 2WD race, Masami used the new aluminum-tub version of the Associated RC10 Team Car. Many team drivers prefer this chassis because aluminum absorbs the hard bumps better than the very rigid graphite. This was especially helpful to Masami at the RCH Raceway.

To reduce weight, the chassis’ sides were machined and parts of the kick-up plate and the rear motor plate were removed. In addition, the holes in the bottom of the chassis (originally used to mount battery trays from side to side) were enlarged. The chassis plate’s bottom was covered with a clear, light-weight “tape” to prevent the track surface from gouging the aluminum and slowing down the car.

An ingenious battery-holding system replaced the stock battery cup. Two Yokomo battery-strap stand-offs were mounted to the chassis plate on both sides of the battery pack. These were held in place by a custom-made graphite battery brace that ran the length of the pack. This holds the saddle-style packs in place better than the stock battery holder.

SECOND SUSPENSION
The stock suspension arms were used at both ends of the chassis, but the stock adjustable upper links and steering links were replaced with lighter, more durable RCPS titanium turnbuckle rods. The front suspension’s upper linkage was attached in the usual place, but the rear upper links were attached to the top, inside hole on the bulkhead. In this location, the rod is shorter than the lower suspension arm, and this increases the camber angles when the suspension is compressed.

The car’s rear traction is slightly reduced, but when the car’s rear end breaks loose, it’s easier to control. Masami’s car has an innovative steering assembly that uses Yokomo steering bellcranks. A custom-made rack-type assembly is attached to the bellcranks. This minimizes the Ackerman effect and lessens the possibility that the steering will become locked during tight turns. The front suspension arms have 25-degree caster blocks (instead of the standard 15-degree blocks) that allow the car to turn more aggressively and exit the turns at higher speeds.

Associated front and rear wheels and Losi tires keep the car stuck to the ground. A pair of four-rib rubber tires handle the steering up front, while a pair of cut X-patterns put the power to the ground in the rear. Like the 4WD car, the X-pattern tires were padded to add support to the tread surface. For damping, Masami’s Team Car has the older Associated aluminum shocks, and they’ve been hard-anodized for a smooth performance. Each shock uses Associated soft green springs and Yokomo 30WT pure silicone oil. The RC10’s electronics package is similar to that used on Masami’s 4WD car (i.e., KO radio system, light Lexan receiver case and the shrink-wrapped CX-III speed controller). The KO prototype servo isn’t externally boosted, but if you look at the servo leads closely, you can see an extra wire entering the case. This is probably some type of booster. Although SCE batteries are pictured, Masami used (Continued on page 47)
1. Yokomo heavy-duty tie-rod ends replace the stock ball cups

2. Associated's hard-anodized shocks (.71 inch up front and 1.32 inch in the rear)

3. 25-degree caster blocks

4. Losi HT ribbed front tires

5. Yokomo steering linkage with a custom-made graphite rack and brace

6. Prototype KO servo with internal booster for quick response

7. Custom-made graphite battery brace

8. Lexan receiver cover replaces the heavier stock cover

9. Although SCE batteries are pictured, Masami used Reedy 1400 matched SCRs

10. Yokomo wing mounts

11. Reedy Mr. A's 14-turn triple-wind motor

12. Losi X-pattern (cut-down) rear tires

13. Shrink-wrap replaces the KO speed controller's casing

14. Graphite angle stock to stiffen chassis and help secure battery

15. Specially trimmed aluminum chassis

16. RCPS titanium tie-rods are used throughout to add strength and reduce weight
YOKOMO '91 WORKS

(Continued from page 42)

portion of each carrier limits flex. Masami used custom-made RCPS® titanium adjustable turnbuckle links on each corner of the suspension. He also used Yokomo's largest rod ends to provide as much strength as possible.

Associated hard-anodized shocks provide the damping on each corner of the Works car, and they're fitted with Associated's very soft green springs. (They're the older shock bodies with seals that are installed through the bottom. At the time, the new shocks weren't available in the proper length.) Masami also used Yokomo 25WT pure silicone damper oil in the front and rear. This grade was custom-blended using Yokomo's 200 and 300 grades. (By mixing them half-and-half, you can create a 25WT viscosity.)

The shocks are attached to the chassis using new shocks towers that are designed to prevent the bulkheads from being damaged during a crash. Both towers are made of fiberglass instead of graphite, so they're more flexible and less likely to break.

TERRIFIC TIRES

For the hard-packed slippery conditions at the RCH Raceway, Masami mounted a set of Losi® tires on Yokomo factory wheels. The front tires are four-row rears mounted on Yokomo wheels that were trimmed to the inside bead to reduce their width. The rears are cut X-pattern tires that are mounted on standard 2.1-inch wheels. Both the front and rear tires are filled with a lightweight packing material, which makes the tread area more rigid but still allows sidewall flex.

ELECTRONICS, ETC.

Masami used his favorite radio—a KO® two-stick type. To reduce weight, he replaced the standard receiver case with a Lexan case, and he used KO's FET-boosted servo to improve the steering.
response. Completing the electronics package is what looks like a KO CX-III speed controller that was removed from its original casing and covered with shrink-wrap (once again, to reduce weight). Reedy’s matched SCE cells and Mr H’s 12-turn triple-wind Ultra series modified motor powered the Works to the win. Topping it all off was a new, sleek shell.

**ASSOCIATED RC10**

(Continued from page 44)

Reedy Matched SCRs to power a Reedy Mr. A 14-turn triple-wind modified motor. The motor was mounted to a stock Stealth transmission that has an 81-tooth spur gear. He used an 18-tooth pinion, and this resulted in a 4.5:1 primary ratio and a 10,125:1 overall ratio.

Finally, Masami’s car had an Associated Viper body and wing, and it was painted with his trademark colors. The wing was mounted to the rear of the shock tower with Yokomo wing mounts and buttons.

With Masami’s track record, this probably won’t be the last time we congratulate him on his win at the Reedy International Race of Champions. We’re grateful to Yokomo and Team Associated for helping us obtain the cars for this article. Masami had to go without them for several weeks, and we also thank him for being such a trooper!

*Here are the addresses of the companies mentioned in this article:

Yokomo; distributed by Associated Electrics, 3585 Cadillac Ave., Costa Mesa, CA 92626.

Reedy Co.; distributed by Associated Electrics.

Team Associated, see above.

RPCS, 18312 Gifford St., Fountain Valley, CA 92708.

Team Losi, 13848 Magnolia Ave., Chino, CA 91710.

KO Propo; distributed by Global Hobby Distributors, 10725 Ellis Ave., Fountain Valley, CA 92728.

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Bad Brain Bonanza

Holy Fandango, Batman! It has been an incredibly busy month, but I've managed to get some things done here in the Bad Brain Laboratory of Doom and Pepsi-Cola. For those who were about to ask—no, I haven't assembled my YZ-10 yet (I'm only a year or so behind schedule). But I finally had the chance to look at some of the parts and product plugs that I've been stockpiling.

**ASSOCIATED STEALTH**

I bought an Associated* Stealth transmission, and all I can say is, "Wow"! This smooth operator only takes an hour to assemble, and it has about half the mass of the stock RC10 tranny. Overall, its manual is excellent, but some of the instructions were confusing. Right after the part about joining the two diff halves, I had questions like, "Do I grease the gears or not?" Luckily, this mental lapse occurred after I had finished the diff-gear assemblies (even assembling the thrust bearing was painless), so I figured out the remaining steps without dropping a bead of sweat.

The best news is that, after adding speed goodies to my stalwart RC10 for three years, I have enough spare parts (chassis included!) to build another stock version—right down to the dogbones. I admit that I'm missing some ball links, but this concept is still incredible. If I assemble the spare parts and then start modifying that stock version, I'll have yet another RC10...and so on!

**ASSOCIATED HARD-ANODIZED SHOCKS**

These shocks are easy to assemble, and the "tool" that comes with them makes installing the seals a snap. The piston operation is super-smooth, and these shocks are light, which is boon for your dieting buggy. The ones that I bought, however, didn't come with springs, spring caps, or spring clamps. (Spring Buyington wasn't included either, but most of you probably don't remember her.) If you buy these shocks, pick up the necessary hardware.

**LOS! JUNIOR**

I spent a weekend (actually, it only took me 5 hours) assembling my Losi* Junior (the car, not the person). Tamiya had better look out! The manual for this Losi car might not be as slick those included in Tamiya kits (which are written in 86 languages and have all those "pointing heads"), but it has scale pictures of the parts. In addition, when you finish with "Bag A," you've used all the parts that were in it (except for a spare C-clip). You can actually complete an entire sub-assembly without having to hunt for parts. What a novelty!

Be wary of the kingpin assembly, though. My manual showed pins of the wrong size. I knew they were the wrong ones, but I blindly followed the manual when I got to that step, and I spent 20 minutes detaching them and installing the correct ones. (That's also when I used the spare C-clip.)

**PARMA**

Parma* consistently introduces innovative products and high-quality buggy and truck bodies. So, there I was at Bruckner Hobbies, and what did my wondering eyes behold? A brand-new, one-piece (Continued on page 50)
Parma Kenworth body that's fairly thick. No, it's not a replacement for your favorite car stereo! It's an honest-to-goodness front end (cab) of a semi—and what detail! Granted, McAllister introduced its semi-truck body first, but joining its body halves is a painstaking operation (especially if you don't cut along the scribed lines accurately).

Persian rug makers deliberately flaw their rugs, because they believe that only Allah can create perfect things. Likewise, no matter how skilled and detailed a body is, there's usually some minor stuff that will drive you nuts. The upper sides of my Kenworth's sleeper are thinner than the rest of its body, and one of the Lexan vent windows has a small run. Like the rugs, however, the body's overall quality obscures the flaws.

Although the Kenworth would be great on a Bullhead, or even on a Clod conversion, it will fit almost any buggy chassis. (I'm using mine on a "gaserated" Kyosho RS-200).

PRO-LINE AT IT AGAIN

I have so many tires in my work room that it could qualify as a rubber room. So what did I do when I saw Pro-Line's* new Clod-size tires? Yup; I added them to the pile.

These odd tires (you'll see them in action in a future article on my Project USA-1) look as if someone started to develop a truck-pulling tire and then changed his mind. They have the horizontal bars that you'd see on a pulling tire, but the bars' centers have been carved out, so the tires almost look like all-terrain tires. My initial trials indicate that they work well, and they might reduce the amount you spend on monster-truck tires; you won't have to buy separate tires and wheels for street and strip running anymore!

LETTERS

I've asked you to write to me, and you have—thanks. Please keep the letters coming—it makes it easier to write this column. I have an idea for a letter-writing campaign.

I watch a lot of television, especially ESPN. (This is one of the reasons my brain went bad.) Lately, I've seen celebrity skeet shooting, cheerleading competitions, and a travelogue on the American quarter horse. Yawn! Now, there's nothing wrong with shooting skeet (as long as it's in season); quarter horses are beautiful animals; and a covey of screaming girls forming the letter "O" is great comic relief. But why doesn't ESPN cover some of the R/C nationals? It wouldn't have to be a whole Saturday Night Thunder segment—just a short program, once a month. Many of these races are more exciting than watching a clay plate escape from the sights of a celeb who's armed with a shotgun. And the tracks are small enough to need only two cameras.

Obviously, ESPN has overlooked the commercial possibilities of selling advertising time to the myriad R/C manufacturers such as Kyosho, Tamiya, Losi and Associated! This is where your letters come in. Money buys things (as you're well aware), and if ESPN thinks it can make a buck by running sponsored programs, here's a chance that it will. The more letters you write, the better the chance of this happening becomes. So finish reading this month's Car Action, and then write!

NEXT MONTH

My crystal ball is still being repaired, so it's hard to decipher what the future will bring (everything looks cracked—a familiar sight). Luckily, this hasn't stopped me in the past, so it's unlikely that you'll find a blank space where this column should be. I might even write about something "Septemberish." No matter what, I'll be here: same dirt time; same dirt channel.

*Here are the addresses of the companies mentioned in this article:
Associated Electrics Inc., 5855 Cadillac Ave., Costa Mesa, CA 92626.
Team Losi, 13848 Magnolia Ave., Chino, CA 91710.
Pro-Line USA, P.O. Box 456, Beaumont, CA 92223.
The popularity of R/C monster truck racing has been growing for the last couple of years. It started with a hobby grade kit and a few enthusiastic racers; it has developed into a tremendous sport. All of the major, competitive off-road race car manufacturers have hopped aboard the bandwagon and introduced their own racing trucks. The only holdout has been Team Associated*. Associated has been a leader in off-road racing technology for years, but it isn’t known to take the first step in new trends. It takes this company a little longer to introduce its vehicles into a popular class of racing, but Associated’s research has consistently provided consumers with some of the best racing-class vehicles money can buy. Where racing-trucks are concerned, Team Associated’s cautious yet calculated approach has again been worth the wait. Associated’s prototype racing truck, the RC10 ST, has arrived.

At this year’s Florida Winter Champs, a trio of Team Associated drivers debuted the prototypes in the Modified Truck Class. The drivers ran the trucks
with guarded optimism. Though they had a tough job getting through the qualifying rounds, two of the trucks managed to make the big feature. When push came to shove, the RC10 ST put the power down and came away with the 1st and 2nd positions!

Though the outcome of one race is hardly enough evidence with which to determine the overall worthiness of a particular design, the RC10 ST's performance in the hands of Cliff Lett was enough to mark it as a potential leader in R/C truck racing.

LETT'S GO!
The design of the winning RC10 ST is based on the timeless RC10 off-road racing car. At a glance, the RC10 ST looks like the car, but Associated reps caution that this vague resemblance is where the similarity ends. This was designed as a racing truck, not as a conversion for the car.

The RC10 ST has an aluminum tub chassis similar to the car's. A durable powder coating gives the chassis that vivid fluorescent color. Though the production versions of the truck will reportedly include a black-anodized version of the chassis, the powder-coated versions may be available as options. The RC10 ST's front kick-up plate, which is noticeably slimmer than that on the car, is designed to facilitate the use of longer suspension arms. The bottom of Lett's chassis was protected with a thick, adhesive-backed Teflon sheet that's available through Litespeed®.

The RC10 ST's suspension has been designed to withstand the rigors of truck racing. The suspension arms are noticeably bulkier than those used on the car, but they're molded in a way that provides tremendous strength and weighs less. The front arms are attached to the chassis by means of a new, ...
A beefed-up steering bellcrank with a built-in servo-saver was designed to withstand the rigors of truck racing.

Although the RC10 ST chassis is standard RC10 fare, the shock towers, A-arms and hub carriers are all new for the ST.

Long, hard-anodized Team shocks are fitted up front. Special body mounts, a new mini-bumper and a taller, strengthened front shock tower are standard equipment.

The RC10 ST features longer front A-arms and a narrow, one-piece bulkhead (shades of the World Champ Stealth car!) Cliff used 15 degree caster blocks.

narrow bulkhead design, and the rear arms are attached with the standard Associated mounts.

Supporting the wheels in the front are 15-degree caster blocks and standard steering blocks. The rear features a new hub carrier design that’s similar to the one used on the car, but with 3 degrees of toe-in built in. There are plans to offer three pairs of caster blocks with different degrees of toe-in, so that the truck can be tuned to a variety of track conditions. The advantage of altering the toe-in at the caster block (versus at the suspension-arm mounts on the chassis) is that it makes no appreciable difference to the wheelbase.

Each suspension arm features adjustable upper links to allow for changes in camber. The links used by Lett on the RC10 ST are from RCPS*. These titanium turnbuckle links, which are also used for steering, allow for easy adjustment and are substantially lighter and stronger than steel.

TURNING TRICKS

Lett’s RC10 ST has bellcrank steering. Owing to the truck’s larger, heavier tires, the truck’s bellcranks are much stronger than those found on the car, and they have an improved, built-in servo-saver. The servo saver has adjustable tension that allows the user to tailor it to the steering servo used.

The wheels used on Lett’s truck were designed specifically for the RC10 ST. Both the front and the rear wheels are of the three-piece variety that locks the tire on the rims without glue. The tires used on the RC10 ST at the Winter Champs were developed by Pro-Line. The four-row front tires are ribbed to improve the truck’s traction on hard-packed surfaces. The rear tires have a pin-spike tread made out of a soft rubber compound.

A noticeable difference between Lett’s RC10 ST and other racing trucks is the narrowness of its front tires, which were designed to improve turning ability. At one time, there were no rules concerning truck-tire widths, and Associated discovered that, in certain applications, the narrow tire worked better. Later, Associated and a group of other manufacturers decided, along with ROAR officials, that it would be in everyone’s best interests if the tires regarded as legal for ROAR-sanctioned events were limited to the wider versions. This was done to allay the fears of racers that they would have to buy narrower tires.
and wheels to remain competitive. The RC10 ST will include both versions of the front tires for racers to use in non-ROAR events.

**SHOCK TREATMENT**
Associated’s new Team shocks, which have a hard-anodized body for less operating friction and improved durability, provide the damping for the RC10 ST. The new shocks have seals that are loaded from the inside, not from the outside as with older shocks. This allows quick assembly and more suspension travel for the size of the shock. Associated pure silicone oil (30WT) was used in both the front and the rear.

The new Associated Stealth transmission is attached to the truck’s rear. The transmission itself wasn’t modified, but an optional factory graphite brace was used to fasten it to the rear bulkhead.

**THE GUTS OF GLORY**
Lett’s truck is powered by a 14-turn, triple-wind Reedy* Modifieds Mr. A Ultra Series motor. The A-Main gear ratio consists of an 87-tooth spur gear with a 16-tooth pinion, for an overall ratio of 12.23:1. The juice is provided by 7-cell Reedy matched 1400 SCR pack.

Other electronics in Lett’s RC10 ST include a Novak* 410-Mic speed controller and NER-3FM receiver, and an Airtronics* CS-2P radio with an ERG-XS steering servo. The Mic is one of Novak’s new line of high-frequency speed controllers. It’s designed to make the best use of your battery power by “recharging” as the truck runs. The NER-3FM receiver is also new to the Novak line, and it’s the first after-market receiver for use with FM radio systems.

The Airtronics ERG-XS steering servo has ultra-high speed and exceptional torque—of its size, it’s the fastest, most powerful servo available. The FET, which is attached to the chassis just behind the speed controller, was apparently required to use this new servo. Cliff explained that the demands of the ERG-XS were more than the circuitry in the speed controller was capable of delivering. The use of the FET was part of a test Novak conducted in an attempt to update the speed controllers to handle the demands of this servo and others with higher current requirements.

**MOOVE ON**
Topping off the winning RC10 ST is the Associated Toyota stadium-truck body that will be included in the production kits. The regalia on the nose of Lett’s truck is part of “Team Moo”—one of the current fads sweeping through California. It seems that everyone’s got “moo” on the brain, including Cliff (mooooovin’ that is).

Congratulations to Cliff and Team Associated for their win with the RC10 ST.

*Here are the addresses of the companies mentioned in this article:*
**Team Associated,** Associated Electronics, 3585 Cadillac Ave., Costa Mesa, CA 92626.
**Litespeed, P.O. Box 4765, Spokane, WA 99202.**
**RCPS, 18312 Gifford St., Fountain Valley, CA 92708.**
**Novak Electronics Inc., 128-C E. Dyer Rd., Santa Ana, CA 92707.**
**Airtronics Inc., 11 Antry, Irvine, CA 92718.**
properly lubricated. But what if you do all this and still get dusted by a driver with comparable skills and the same motor as you? Then perhaps you need to learn how to tune your motor for better performance on specific tracks and traction situations. I know what you’re thinking: “That’s all fine and dandy, but I don’t have the slightest idea how an electric motor works, let alone the know-how to make one run better.” Enter the Shinwa Motor Dresser (isn’t that a Bruce Lee movie?), which is the latest offering in Shinwa’s line of electric racing equipment.

GETTIN’ DRESSED!

The Motor Dresser is a fairly compact (approximately 12x4x3 inches) unit that’s designed to give you an idea of how well your motor performs and the changes you can make. Brushes, springs and timing all affect a motor’s characteristics. The Motor Dresser is not, I repeat, not a dynamometer. A true dyno measures torque and rpm under load, and the Shinwa uses a no-load method to determine rpm and amp draw ratings.

The Motor Dresser FET will perform the same three main functions as its predecessor; it has a tachometer that reads in the standard revolutions per minute (rpm), a DC current ammeter that shows the amp draw of the test motor as it relates to the speed at which it’s being run, and a motor-timing meter (Shinwa calls it a “timing-point meter”) to help you determine the right end-bell position for optimum efficiency. What separates this FET model from the previous Motor Dresser is its Mosfet motor-voltage control, which allows greater accuracy and smoother speed settings for testing and break-in, and the new Shinwa has a variable timer that automatically shuts off the unit.

To operate the Motor Dresser, you must first make your own lead wires and connectors—one for the power input and another for the motor-output terminal (two lead wires with alligator clips on their ends are more than sufficient for this). Although making my own leads was hardly a traumatic experience, I think that the least Shinwa could have done was include some wire for this purpose.

The instructions recommend that, to test and break-in your motor, you use a battery with the same voltage as the one you’ll eventually run it with, so use any spare 6- to 20-cell pack.

Once you’ve determined which battery is best for you, charge it as you would if you were going to run it in your car, and then hook it up to the power-input connectors, being sure to note the correct polarity. Now take the motor
you wish to test and attach the Shinwa’s magnetic pickup to the shaft on which you’d put a pinion gear, and put the motor—shaft down—into the Dresser’s “Christmas tree,” stand-like motor holder. The pickup magnet is what allows the Motor Dresser’s tachometer to determine rpm.

To protect your motor from being damaged, the instructions tell you to set the speed control to zero before you turn on the unit; if you don’t, the start-up amp draw may damage both the Motor Dresser and your expensive motor.

PRIMARY FUNCTIONS
Of the Motor Dresser’s three primary functions, I usually find myself consulting its tachometer first.

- **The tachometer** uses a dual scale that allows you to select either a low (0 to 20,000rpm) range, or a high (0 to 50,000rpm) range. The lower range is useful when you’re performing slower-rpm operations such as break-in and timing-point adjustment; and the higher setting gives an overall rpm rating for you speed-freaks.

I found the tachometer very useful when selecting brush and spring combinations (especially for stock motors), but always remember that the tach should be used with the unit’s ammeter, because the relationship between rpm and amp draw will determine a motor’s power curve. Trust me on this one; I tuned a stock motor to have a low amp draw and high rpm to see how it would work in my off-road car, and boy, what a dog this motor was out of the corners! So take my advice, and use the ammeter with the tachometer.

- **The ammeter.** It’s important to note that most motors, stock and modified, should be drawing around 2 to 3.5 amps at most. If a motor tests out at more than 3.5 amps, it should be adjusted to a lower rating. Any motor that pulls 4 amps or more on a no-load ammeter should be checked for shorts and other damage. The instruc-

(Continued on page 116)
If you could see all the letters I receive, you'd understand the need for this article. Far too many of you are wringing your hands, trying to decide which high-price item you "must" have next to make it to the winners' circle. Result number 1: you're rushing to relieve yourselves of hard-earned cash, only to find out the purchases don't instantly cut your lap times by 20 minutes. Result number 2: you're mad as hell! It's result number 2 we're trying to avoid. If you own an oil field, then please, indulge yourself in fruitless shopping sprees to your heart's content. If you're one of the unlucky few who doesn't, read on.
DON'T BE GREEDY FOR GRAPHITE

If aluminum is good enough for Team Associated’s Cliff Lett and “Master” Masami, I think it will do just fine for the rest of us. Let’s face it: these guys can have any equipment they want. Obviously, they don’t feel they need graphite, but the important question is, “Do you need it?” Yes, there are cases in which racers really think graphite helps them, e.g., in the high-speed oval scene. In most off-road situations, however, I doubt that any of us could tell the difference. Maybe Masami could, but the fact remains: his RC10 is aluminum!

By the time you read this, most (if not all) of the Team Losi racers will have thrown away their JR-X2 graphite chassis and be running the Junior Two chassis! The reason? Its high-pressure-molded, plastic-composite frame is incredibly light, rigid and, above all, much cheaper than graphite. Someone is watching over us racers!

It’s true that graphite won’t bend or break in high-speed crashes, but if you’re honing your driving skills, you’ve learned to keep these crashes to a minimum, right? I’m not putting down graphite—just its cost, which, more than ever, seems unjustified.

MATCHED SMATCHED!

Next fallacy: “To be competitive, I absolutely have to have matched cells.” WRONG! High-speed oval racing has become a battery/motor money game, but in off-road, they aren’t nearly as important, especially with the advent of high-frequency speed controllers and their recharging capabilities. With the heavy use of throttle-off and brakes in off-road, the charging circuitry in this new breed of controller can really increase run times. I’m sure a lot of you are saying, “Yeah, sure, the new breed of electronic speed controllers are expensive. Thanks for nothin’.” Electronics is the next subject, and speed controllers are a good place to start!

A good racing pack with unmatched cells will get the job done in off-road.
THE SPENDING SCAM

If it costs more, it has to be better, right? I'm not so sure. Of this I am sure; just because it costs more doesn't mean you need it. Here's proof: Team Novak has just introduced a new controller—the 410-M5. It not only has recharging circuitry, but it's also a high-frequency, 4- to 10-cell unit that uses Megafet transistors. Here's the best part—it lists for $119!

This represents a phenomenon that has occurred throughout the 1980s—prices of electronic products go down after the manufacturers have recouped their R&D money. Considering Novak's reputation for quality, I doubt that this affordable unit will turn out to be a dog; in fact, I'd bet on the opposite.

The "It's-more-expensive-means-I-need-it" load of garbage also applies to radios. Manufacturers are increasingly making their own components (e.g., integrated-circuit chips). This greatly reduces their costs, and the savings are then passed on to you. This doesn't make the radio "cheap"; it just makes it less expensive. I've had great results with inexpensive radios.

Will a super-equipped "bells-and-whistles" radio make you a better driver? Things like end-point adjustment definitely make it easier to set-up a car, but I don't think that an expensive radio will make you the track star—maybe a pit star, but not a "hot trigger." So, sorry, you can't buy talent; you can only fine-tune it with practice. Life is tough, young patriots.
WHY BAG THE BUSHINGS?!
I know a lot of you sit home watching TV on race day. Why? “I can’t race till I save money for a set of ball bearings. You can’t win without them, man; you just can’t.” FALSE! OK, ball bearings do make a difference, but more to run time than to top speed. I doubt that the difference in top-end speed would be noticeable or make a consistent difference to lap times. Bronze bushings that have been broken-in last a long time and run freely if properly lubricated and maintained. (Forget about plastic bushings altogether.)

When you first build a car, put ball bearings into the transmission. (If you can’t swing it, that’s OK; bronze bushings will do nicely.) If you can afford ball bearings for the tranny but not for the wheels, bronze bushings will suffice, and they’re easy to replace when you’re ready.

THE $80 MODIFIED
Many races have been won with machine-wound modified motors—especially in off-road. Unlike the high-bank oval game, in which nearly flat-out speed conditions are the norm, off-road racing takes the motor through a much greater rpm range. Acceleration is the most important factor, not top-end speed. In this case, a cheaper, machine-wound modified will quite often rise to the occasion. Simply put; the $80 hand-wind is not a must. If someone tries to tell you it is, don’t you believe it!

WISE UP!
OK, now I want different letters from you people. Instead of all the whining “I can’t,” “I want,” “I need” letters, I want some, “How I did with good, affordable, sensible equipment and lots of practice” letters. I’ll print them in Radio Control Car Action to prove it to the doubters out there.

On the other hand, if you want to be a pit star, go ahead, spend your money; I really don’t care. Maybe the transmitter with the most switches, lights and buzzers will help you get girls. Nah—truly great women love an underdog winner.
HOME-BUILT PROJECT

You’ve seen a lot of Tamiya Clod Busters in these pages, but never one like this! In the April ’90 issue of Car Action, Bill “Bad Brain” O’Brien showed us his Maximum Clod, and we knew the world would never be the same. It seems that a “Brain” infection has spread: Steve Levine of Flushing, NY, has gone beyond the Maximum Clod and created the Primadonna Clod. This is a Clod like no other. It has so many features, I hardly know where to begin.

Let’s start with the chassis.

THE CHASSIS

The original plastic chassis was replaced with ESP’s* aluminum Clodzilla chassis. APM’s*
tubular bumper is bolted to the front of the chassis; it has been moved forward 2 inches to allow the front hood to tilt forward. Basically, all the stock plas-

Parma's Hemi engine, complete with ignition wires and braided pressure hose, rests under the hood. APM's hood tilt kit was modified to use an air cylinder instead of a servo.

The sunroof on the Primadonna Clod was cut out and hinged to allow it to open. The lights are fully functional.

John Riccio's paint job must be seen to be believed. The entire body was hand-painted, with very little use of an airbrush.

Just look at the detail inside the cab. The dashboard was originally from a Tamiya Bruiser, but all the other details were handmade.

Steve made his own bug shield and tinted headlight covers out of scrap plastic. As you can see from the yellow ribbon on the front bumper, Steve

The custom paint job wasn't cheap, but the results speak for themselves.

Primadonna

by JOHN HUBER

CLOD
tic parts have been replaced with a complete Custom Chrome® plastic parts kit. The gearboxes are protected by APM’s front and rear lower skids and ESP’s suspension stabilizers. A set of eight Parma® oil-filled shocks mounted on ESP shock motors are bolted to Stormer Racing® 4:1 gear-reduction units for awesome pulling power. Each motor is protected by an auto-reset thermal circuit breaker. (They’re used in the power systems of electric car seats and are rated for 35 amps.) All the wires are covered with braided pressure hose for the utmost realism. And have you ever seen chrome Tamiya or Sermos® connectors before? Steve couldn’t find them either, so he sent some connectors out to Chrome-Tech USA® in Wisconsin and had extensions provide the damping for this monster.

**POWER**
The motivational force behind the Primadonna is a pair of AstroFlight® cobalt truck-pulling motors with Litespeed® heat sinks. These blinking red LEDs were wired into the exhaust headers. They flash in the same sequence as those on a real Hemi engine, and go well with RAm’s VW engine sound board.

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**OPTIONS**

- APM double roll bar; front and rear lower skid bars; front and rear round bumpers; roll bar lights; diamond-plate bed liner; hood lift kit
- AstroFlight twin cobalt truck-pulling motors
- Chrome-Tech USA chrome Tamiya connectors
- Custom Chrome parts complete Clog package
- ESP shock extensions; suspension stabilizers; Clodzilla aluminum chassis
- Futaba Magnum Senior, MC111B ESC, 2 FP131s servos
- Kyosho windshield wipers, side-view mirrors
- Litespeed twin-motor heat sinks
- Max Customs custom paint
- Parma 426 Hemi; oil-filled shocks
- RAm VW engine sound
- Robart air retracts
- Sees aluminum rims
- Stormer Racing twin 4:1 gear-reduction units
- Misc.: emergency tire pump; 2-inch front-bumper nose extension; 1-inch body extension; two automotive automatic-reset thermal circuit breakers; interior; opening sunroof

To power the pneumatic system, a small onboard compressor pumps air into the tank on the bumper. A 540 motor, powered by 12 volts, cranks the compressor up to operating pressure.

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This pressure gauge reads the pounds-per-square-inch in the air-storage tank. Steve usually stops at 120psi, but it can hold more.

By flipping the switches mounted on the rear of the chassis, the rear bed can be tilted right, left, upward and downward. Steve custom-made the brackets and hinges after looking at a full-size truck with a similar setup.

---

Blinking red LEDs were wired into the exhaust headers. They flash in the same sequence as those on a real Hemi engine, and go well with RAm’s VW engine sound board.
straight, while the front wheels are controlled in the usual way. This is a very interesting idea, because 4WS is often too sensitive and makes the truck difficult to control. With Steve’s method, the rear wheels are turned only when necessary.

To control the power to the motors, Steve chose a Futaba MC111B. This is the MC112’s stronger brother, and it has adjustable reverse delay. It handles the power well, but Steve doesn’t use this truck for competition—pulling competition that is.

**000-LA-LA**

Steve entered his truck in the 1991 WRAM Show and the Toledo show, and he cleaned up both times: at WRAMS, the Primadonna was awarded “Best of Show”, and in Ohio it won both “Best Finish” and 1st Place among cars. After you see what else he’s done, you’ll know why. He started with a couple of old Clod bodies. With a little cutting here and a little cutting there, he removed the sunroof, doors, hood and rear bed. He attached small hinges to the doors and sunroof, and if the doors were to open, it made sense to make an entire interior. Steve cut and glued the dash from a Bruiser until it fit his truck properly, and then he added gauges and a stereo. He made his own seats (complete with seat belts), padded doors with armrests, window levers and even door locks! An interior lighting system makes all these details visible. To mount the interior, he had to raise the body by 1 inch. This also made it possible to mount a floorboard with a shift stick and plush carpeting.

When all the cutting and fitting had been done, it was time to put a few coats of paint on the body. After giving it its best shot, Steve decided to have a professional tackle the job. He gave the prepared body to Max Customs® of Hicksville, NY. Painter John Riccio spent many hours turning the dull plastic body into a colorful masterpiece. All the lettering and “dry brush” marks were hand-painted and protected by a super-glossy, clear coat. Such custom paint work doesn’t come cheap, but I’m sure you’ll agree that the results are stupendous.

Steve added APM’s double roll bar, light bar and diamond-plate bed liner, and windshield wipers and side-view mirrors from a Kyosho® kit. To complete the “show” look, he mounted stock tires on a set of Sees® aluminum rims.

**BODY IN MOTION**

Here’s the really interesting part: the pneumatics. Steve studied a full-size truck that had a hydraulic rear bed. By using Robart® air cylinders and valves, he can manipulate his truck’s bed into almost any position. Valves on the rear of the chassis control the bed’s tilting action in three directions: straight back, to the left and to the right. Steve had to make the brackets and mechanisms from scratch, using brass stock.

Using the APM tilt kit’s mounting brackets, a pneumatic cylinder tilts the front hood forward. A Parma Hemi engine looms under the hood with only the blower protruding from an opening. It’s incredibly realistic. When the hood is tilted forward, all the spark-plug wires, hoses and details are visible—there’s even a chrome firewall! On the end of each header pipe is a small red LED (light emitting diode). When turned on, they flash on and off in the same firing order as those on a real Hemi. This, along with the RAm® VW sound unit, makes the Primadonna look and sound very realistic.

(Continued on page 124)
AstroFlight 205

R/C CAR MODELERS owe a lot to R/C airplane modelers. It was the need for a light, reliable aircraft control system that prompted the design of the great, reliable radio systems we now take for granted. It was therefore no surprise to me when a company with its roots in the model aircraft world came up with a heavy-duty, pulling-truck speed controller.

The aircraft requirements that led to this design were the need for reliability, lightness, high voltage and high current. The result—the AstroFlight 205 speed controller. It seems to have been designed with trucks and cars in mind, because it has a massive braking system. It actually uses four FETs for braking instead of the usual one or two. You need the massive brake when you're trying to stop a 2hp Cobalt 60 with a 12-inch folding prop turning 13,000 rpm—in less than 7/10 second! Of course, truck pullers will find this brake handy, too. Its aircraft heritage becomes obvious when you read the instruction sheet, which describes the "built-in, soft-acceleration circuit" and explains that this soft acceleration might save your airplane from a deadly snap roll on takeoff. (Later, we also learn that this soft start will also save your gearbox and axles when you attempt a heavy pull.)

In the R/C Action Series special, Monster & Racing Trucks, there's a "Scoping Out" article in which I compare several high-voltage speed controllers that are commonly used in the truck-pulling world. The AstroFlight 205 did extremely well in my brutal lab tests, so this month, "Scoping Out" contains the results for all those who might have missed the special issue.

When I test a controller, I always take a look inside. The AstroFlight 205 controller has these features:

- brakes
- nine FETs: five for forward and four for braking
- Tamiya-style battery and motor connectors
- ability to handle 50 volts (40 cells)
- high-frequency motor control
- built-in heat sink

The AstroFlight 205 has very short leads and anti-glitching signal filtering (features that will be familiar to R/C airplane enthusiasts), but no BEC. It's housed in a narrow, fairly long box that's suitable for an airplane fuselage. This might sound grim, but a second look at these features reveals that the folks at AstroFlight are on the ball.

WIRE WORRY

Its short motor leads are perhaps its biggest handicap. You often need more than 6 inches of wire to reach the motor in a monster truck, but in an all-out, Open II-class pulling machine with several motors, you'll have wire splices anyway. For maximum efficiency, these splices should be as close to the speed controller as possible.

The controller is long and skinny with battery leads coming out of one end and motor leads coming out of the other. Point one end toward the batteries and the other end toward the motor, and you have a layout that needs the shortest possible wires.

The anti-glitch filtering is very useful. Fliers lose aircraft as a result of glitching, and truck pullers could lose a contest if a controller glitches and lets the sled bog down. Truckers might not think as much about reliability as fliers do, but if you ain't got it, you don't win.

Not having a BEC isn't such a bad deal. Most glitching results from the arcing of the motor brushes, and the AstroFlight 205 is a high-speed switching controller that generates noise of its
own. By not having a direct connection between the receiver and the controller, this noise has one less path along which to travel and destroy your run. Besides, when you run 28 cells, some of the high-voltage controllers with BEC require you to disconnect the BEC and run an external receiver battery.

With a 7-cell pack, I determined full throttle on the AstroFlight 205 by listening for maximum motor speed and measuring maximum voltage across the motor leads with a voltmeter. (The results of both methods proved to be right on the button when I checked them with an oscilloscope.)

At a glance, the AstroFlight 205 looks like a dynamite truck-pulling speed controller, but its instruction sheet leaves much to be desired. It contains a lot of information on the controller’s features, but few installation instructions. If you’re a newcomer to the R/C hobby, ask an experienced modeler for help before you tackle its installation.

LAB TESTS

The tests for this controller were designed to see whether it could stand up to the rigors of high-voltage truck-pulling. There were three stages: voltage-loss readings; my “let-it-cook” test and a 28-cell “dead-short” test.

The tests were conducted in the “Scoping Out” lab, but I added a few “torture” items, e.g., a 12V car battery for the voltage-drop test and the let-it-cook test. I also dedicated four 7-cell packs to my tests—with the intention of sacrificing them! I wanted to see whether the controller could stand 28 cells pumping at 100 amps.

Getting 100 amps out of a Ni-Cd battery just about requires a dead-short, and to provide this short, I used approximately 20 feet of monster wire. I used Sermos Powerpole connectors to tie the mess together. As far as I know, the Sermos connector is the only one that’s up to 100 amps. I measured the current with a 100W.01 1-percent resistor wired in series with the monster wire.

VOLTAGE-DROP TEST

In keeping with the high power-handling capability of this monster controller, I measured the voltage loss across it at 20 amps instead of the 12 amps I usually use for my tests. I used a digital voltmeter to take an input voltage reading and an output voltage reading. The difference between the two shows the voltage drop across the controller.

If you know the voltage drop at a fixed 20A current, you can calculate the controller’s resistance, i.e., voltage drop across the controller divided by 20 amps equals resistance. I take this measurement twice: first, along the full length of the battery and motor wires, including the connectors. This gives a voltage-drop reading for the controller as it comes out of the box.

I take a second reading at the 2-inch point along the battery and motor wires. This reading gives me figure with which I can compare a controller with the others

(Continued on page 70)
I've tested. The connector-to-connector voltage-drop test revealed a drop of .29 volt at 20 amps—a resistance of .0145 ohm. At the 2-inch point, the voltage drop was .15 volt—a resistance of .0075 ohm—not bad, considering that the controller has only five FETs.

A look inside the controller revealed how AstroFlight has managed this magic. The current doesn’t run through the pc board but is carried by heavy braid. As I’ve often pointed out, the quality of the solder joints, the length of the wires and the type of connectors used have as much effect on a rig’s performance as the quality of its speed controller’s FETs.

**LET-IT-COOK TEST**

With the car battery attached (and a 15-amp battery charger running full-bore), I readjusted the resistor load bank to consume 40 amps. My first attempt to “let it cook” soon had my load bank smoking—a lot! I discovered that, at higher voltages, I had to direct the blast from a 20-inch window fan across the load bank. But I also had to ensure that none of this cooling air reached the ESC being tested. After all, when a truck is pulling, its speed is almost zero, and there’s very little air cooling.

I let the test run for 15 minutes and then checked to see whether the 205 was hot. It was hot enough to burn your fingers, but it never missed a beat. Given its measured resistance, I expected it to get warm—perhaps even hot—but, once again, owing to its sound design, the 205 hung in there.

**PULLING TEST**

For my final test, I connected the AstroFlight 205 to the 28-cell pack to see whether it could hack Open II Class truck-pulling current levels. A few words of caution: it’s dangerous to try to obtain true 100A currents. I say this because I literally wrecked the battery packs; I had a smoky fire! The high current literally melted all the shrink-wrap off the cells. Some of the cell-to-cell straps shorted out across the now-exposed edges of the cells.

During the tests, I ruined five cells: four shorted and one opened. If you plan to abuse your Ni-Cds in the range of 100 amps, you must do two things:
- Use heavy braided wire between each cell. The extra metal will help to dissipate the heat by drawing it away from the cells, and the braid’s low resistance helps performance.
- Use a high-temperature sleeving on the cells. Plumbers’ Teflon sealing tape or cardboard sleeves might work, too. All the shrink-wrap on my cells was destroyed by a true 100 amps.

With the AstroFlight 205 connected to 28 cells, I jerked the throttle wide open. Smoke poured out of the batteries as they became dangerously hot. The initial current jumped to 108 amps, and after 30 seconds, it measured 65 amps. After 1 minute, the current had dropped to 51 amps and the AstroFlight 205 was still working normally; in fact, it wasn’t that hot. The rapid decrease in current was caused by the death of the batteries and not by any malfunction in the AstroFlight 205.

**TRUCK TEST**

We don’t have any truck-pulling where I live, so I wasn’t able to test this controller in a pulling truck. When my friends at R/C hobbies wanted to run a Tamiya Clod Buster in the Christmas parade, however, I suggested that the AstroFlight 205 would be up to the task.

The truck was fitted with Sanyo 4000mAh batteries to provide a run time that would be long enough to last for the whole parade. All went well, and the truck covered the entire route without a hitch. I’ve also tried the AstroFlight 205 in my Kyosho Sideways, and I found that it works very smoothly because of its high-frequency motor control. It also has very strong brakes.

The AstroFlight 205 probably isn’t the best choice for an average 1/10-scale car or buggy because it doesn’t have BEC. If you plan to run more than the usual 6- or 7-cell battery packs, though, this controller is one tough contender. It’s a true 28-cell (rated at 50 volts), 100A controller. Let the competition beware! If a truck-pulling competitor walks in with this controller under his truck’s hood, he has come to let the smoke roll—battery smoke, that is—because the AstroFlight 205 will still be around at the end of a 1-minute, true 100A run.

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*Here’s the address of the company featured in this article:
AstroFlight Inc., 13311 Beach Ave., Marina Del Rey, CA 90292.
In this, the second article in a four-part series on basic, start-to-finish painting, I’ll cover the ins and outs of body masking. I used an Associated® T-Bird body and a Viper body as examples of how to paint cars for the popular off-road and concrete-oval racing classes. The Viper’s paint scheme is a generic stars-and-stripes job, while the T-Bird is painted like the ’91 Bill Elliot Winston Cup car. (At least it was when I started this project; the full-size car’s paint scheme is different now.) Here’s how to “smooth out” the most difficult part of painting your R/C car.

Always mask the windows first unless you plan to highlight a window with chrome window trim or black weather stripping. If so, then apply it first. (See the T-Bird photo). Mask windows and details (i.e., grill openings, headlights, tail lights, etc.) with pieces of Dahm’s® or Coverite® window masking that are slightly larger than the areas you want to cover. Keep the masking as flat and as smooth as possible. Using the side of a sharp pencil point, gently rub the masking over the ridge that outlines the window or detail. This will leave an image on the masking’s surface.

Remove the masking from the body, and put it on something that it won’t stick to permanently, e.g., a carrier sheet/backing paper, plastic, or a sheet of Lexan. At Motion Graphics®, we use self-healing cutting mats. They’re available at hobby shops or art-supply stores. You can also use Plexiglas or a piece of glass, but cutting on these surfaces will dull the hobby-knife blade quickly.

Cut the masking to the proper shape, and then gently re-apply it in the appropriate place on the body’s interior. Be sure to rub down or burnish the edges after you apply each piece.

What you'll need

- Window mask
- Pinstriping tape
- Flexible ruler
- Burnishing tool
- Suitable cutting surface
- 3M masking tape (1/4-, 1/2-, 1- and 2-inch)
- Hobby knife
- Pencil
- Tack rag
- Fine-point permanent marker

Photos by Yamil Sued
Use a short, sharp pencil to mark the masking tape on the body's interior.

Gently rub the pencil back and forth over the tape on the window to highlight its raised border.

Remove the tape from the body, put it on a "non-stick" surface and cut along the pencil lines.

Re-apply the masking tape.

Rub down all the edges with a burnishing tool. Use the same method to mask the side window and the headlights.

Before applying pinstriping tape, draw guide lines on the body with a marker to help you position the tape properly.

Lay the tape on the body, then cut off any excess tape. Be careful not to score the Lexan when you trim the tape.

This white pinstriping that runs along the top of the red line separates areas that will be painted different colors and prevents the paint from bleeding.

INVINCIBLE VIPER

On the Associated Viper (no. 6121), I drew the design for the graphics on the body's exterior using a flexible ruler and a fine-point marker. You'll be able to remove these lines after you've masked the body. When you lay out a design, study the body's shape and determine where the color separations will look good and be easy to mask.

After I had laid out the design, I applied the silver pinstriping tape to separate the colors. With this "break" between different colors, I don't have to worry about the paints bleeding together. You can leave the pinstriping on the body or remove it later and paint these areas.

Try not to stretch the tape too much when you apply, because it tends to return to its original shape. Overlap the ends of the pinstriping, and trim them with a hobby knife (be careful not to apply too much pressure). Straight lines are the easiest to apply, so try to limit the number of curves in your design.

Using high-quality pinstriping will make this step much easier. Coverite Body Shop pinstriping is my favorite. One sheet has enough pinstriping to do several bodies, and the stripes come in five different sizes. There are, however, other
For curves, you might have to slice the pinstriping so that it lays flat.

Apply a small piece of tape over the cut to seal it.

Wide masking tape is used to cover the body's lower skirt. This area will be painted later.

brands that work well; just remember that the thinner and more flexible the material is, the better.

After you've applied the pinstriping, mask off the area at the rear of the roof with masking tape of different sizes. Next, apply 1/2-inch masking tape "stripes" across the hood and roof. Use a burnisher, a pen cap, or the back of your fingernail to smooth the edges of the pinstriping and the tape so that the paint won't be able to sneak under them. Now, mask off the rest of the hood and the roof. At this point, I applied the white stars (available from Coverite), and I prepared to paint the area that wasn't masked blue.

Before you start to paint, remove the black marker lines with a solution of three parts nail-polish remover and one part rubbing alcohol. Don't let this solution touch anything that's been painted or varnished (i.e., your mom's dining-room table), because it will remove the finish. Also, don't get any of it on the inside of the body, it will cause streaks and loosen the tape.

T-BIRD TRANSFORMATION

For the Bill Elliot T-Bird replica, I referred to a number of photos from full-scale racing magazines to determine where to put the car's stripes. The windows on most NASCAR racers are lined with black foam so that the glass has an airtight seal. To simulate this foam, I applied black pinstriping around all the windows except for the one on the drivers' side, which doesn't have glass in it on the full-size car. Then, I followed the procedure that I outlined earlier to mask the windows and the headlights.

When I had determined where the accent stripes should go, I drew guide lines on the body using a permanent marker and a ruler. These lines made it much easier to apply masking tape to the body's interior. Next, I applied red pinstriping of the proper width to make the red boot stripe. I put a white stripe just above the red one to separate it from the area that's painted blue. I kept the red and white stripes on the finished body as accent stripes. You can remove them and paint these areas later, but keeping

(Checked on page 146)
MOST PEOPLE in the U.S. are unaware of rally-cross racing, but it's very popular in Europe. It's a cross between full-blown rally racing and Mickey Thompson stadium racing. High-horsepower 4WD sedans (called “saloons” in Europe) and coupes battle it out on a short, enclosed rallycourse/racetrack.

Owing to the immense popularity of these races on the other side of the Atlantic, Schumacher of England has introduced an R/C version of the most popular rally-cross car: the Ford Sierra Cosworth RS 4x4, called simply the “RS 4x4”. Based on the European champion 4WD Pro Cat, the RS 4x4 is a potent package. Consider its mid-mounted motor, “quick-adjust” front and rear ball diffs, four-wheel independent suspension, full set of rubber-sealed ball bearings, Kevlar drive belts and some of the most original engineering in R/C, and you have a car that's begging to hit the racetrack with all wheels spinning.
THE KIT

The car’s large body took up most of the box’s space, and all the parts were neatly bagged and labeled. I completed the construction in about 5 hours. Although not for rank amateurs, it wasn’t difficult to assemble this kit.

ASSEMBLY

Assembly starts with the rear gearbox. It seems strange to call it that, because in this case there are no gears—only belts! A layshaft transfers power to the rear diff through two short Kevlar belts. This layshaft exits the gearcase and is driven by the motor in the standard spur-and-pinion fashion. The front and the rear diffs are ball-type units that include the new Schumacher hex diff rings. (Earlier Cat models had sandpaper glued to the diff rings to prevent slippage, but this didn’t work very well.) A long belt that runs between the front and rear diffs transfers power to the front end. An innovation that works: the diff pulleys in this kit are barrel-shaped, so there are no guides needed to keep the belts from sliding off the pulleys. This way, there’s no power loss caused by the friction of the belts rubbing against the guides. The drive train is simple, so maintenance should be easy.

Instead of using dogbones or universals to transfer the power from the diffs to the wheels, the car uses slider-style drive shafts similar to those found on Losi and Traxxas cars. (Contrary to popular belief, Schumacher, not Losi, was the first to use sliding-style drive shafts.) The sliders are connected to a splined rear axle that rides in the hub carrier.
The hub carrier has a disk molded onto it that helps prevent the accumulation of dirt inside the wheel. (This would slow your car.)

The front diff is similar to its rear counterpart, but only one belt rides on it instead of three. Again, the pulley is barrel-shaped, but I think there should be guides on the front, because the front belt is considerably longer and there's a greater chance of it sliding off the pulley.

Put the assembled diff into the housing and screw the housing to the chassis. When I did this, I noticed that the diff moved side to side about 1/8 inch in the housing. This didn't seem right, but there was no mention of spacers anywhere in the manual. (I later found out that this was an oversight in the instructions.) I thought that the play might be intentional, so I left the spacing alone.

Mount the front A-arms to the up-right bulkhead/shock tower and connect this to the diff housing. The entire upright assembly can pivot backward (or “crashback”) to absorb some of the shock of a crash. O-rings on the front of the uprights provide enough tension to keep the uprights in place while the engine is running.

As the suspension is compressed, the camber increases. The only disadvantage is that camber isn’t adjustable. A rather beefy rollbar on the rear helps handling (unlike many others, this one makes a difference). I did have one small problem with this: the ball ends have to be soldered to the rollbar and for the life of me, I just couldn’t heat the bar enough to melt the solder! I heated the bar for about 15 minutes with no effect; eventually, I managed it, but it was a real job.

Later I found a product called, “Solder-It” from Kool-It*. This solder paste can fuse parts with only the heat from a match. It’s incredibly convenient compared with the conventional silver solder required for this type of job.

**SHOCKING SHOCKS**

Anyone who’s ever raced a Schumacher car knows that the weakest parts of the suspension are the stock shocks. Under serious racing conditions, they quickly wear out. To improve on the old design, Schumacher has nickel-plated the shock bodies to increase durability. I built the shocks and filled them with 20WT Team Losi* shock oil, and they didn’t leak a drop!

Next, connect the front and rear hardware to the fiberglass chassis.

**OPTIONS AS TESTED:**
Tekin 411P ESC; KO Propo EX-5 radio and PS-701 steering servo; Novak NER-2S mini-receiver; Trinity Torkzilla motor and Pushed SCRs; Kimbrough small servo-saver; JG threaded rod and ball ends.

**COMMENTS:**
Although its assembly might leave beginners frustrated, the car’s performance is worth the effort. Out of the box, the car can be raced on or off-road. This car is based on the highly successful Pro Cat, and with the right body and a new set of tires, it can be converted into one. Schumacher’s new nickel-plated shocks and hex diff rings are great improvements over the original Pro Cat design.

* not included

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*Later found a product called, “Solder-It” from Kool-It*. This solder paste can fuse parts with only the heat from a match. It’s incredibly convenient compared with the conventional silver solder required for this type of job.
with the chassis stiffener, also made of fiberglass. Make sure that you bevel the edges of the battery slots on the chassis so that you don’t cut the shrink-wrap on the cells when you strap them in.

This car’s main drive belt rides under the chassis, so you have plenty of room in which to mount your radio gear. I mounted a Tekin* 411P electronic speed-controller, a Novak* NER-2S mini-receiver and a KO Propo* PS-701 servo under the upper chassis brace. I chose to use the Trinity* Torkzilla 13-turn single motor that I used in my other 4WD car for part of last year—it’s a killer! After I had installed the equipment, I mounted the supplied pinion (nice touch!) and was ready to go...almost.

Next, I painted the body, which is fairly thick and should last through many beatings. I covered the body with three coats of liquid masking, and then I proceeded to cut and paint. The result wasn’t bad, if I do say so myself. Mounting the body was the last step, and when I had done that, I peaked a battery and was ready to go.

"...this is one of the most versatile cars I’ve ever seen...by changing the tires and the body, you can have an off-road Pro Cat—but one with new, improved shocks and diffs!"

The first thing that I noticed as I ran the car down my street was how real it looked! Despite the oversteer (probably the result of a lack of rear traction), running this car was a real blast! After a day here at Car Action, John Huber and I took the RS 4x4 out for few more test runs. The deserted street in front of the office was the perfect site to “wind this baby out.” The car’s speed was phenomenal!

We quickly learned that going full speed into a slightly sandy area, hitting the brakes and then punching the throttle could produce multiple 360s and great laughs. With the rather soft suspension setup, the car leaned a lot on hard corners, but it never lifted its inside tires.

Unfortunately, there’s no racing class for the RS 4x4 under the rules of current racing organizations. For the on-road classes, independent rear suspension isn’t allowed, so the car can’t qualify for those sanctioned events. There are a number of local carpet and concrete tracks, however, that run off-road classes, for which the RS would be suited.

Against its own kind, this is one of the most versatile cars I’ve ever seen. As a bonus, by changing the tires and the body, you can have an off-road Pro Cat—but one with new, improved shocks and diffs! I’m impressed with the quality of the parts, and everything that was supposed to be in the box was there. If you break something, all the Pro Cat parts fit the RS 4x4; if your hobby shop doesn’t carry them, Schumacher does. If Siskel and Ebert reviewed R/C cars, I think they’d give this one an enthusiastic “thumbs up!”

*Here are the addresses of the companies mentioned in this article:
Schumacher, 6302 Benjamin Rd., Suite 404, Tampa, FL 33634.
Kool-It; Unival, 498E Nepperhan Ave., Yonkers, NY 10701
Team Losi, 13848 Magnolia Ave., Chino, CA 91710.
Tekin Electronics, 970 Calle Negocio, San Clemente, CA 92672.
KO Propo distributed by Global Hobby Distributors, 10725 Ellis Ave., Fountain Valley, CA 92728.
Trinity, 1901 E. Linden Ave. #8, Linden, NJ 07036.
HERE'S A NEW bird of prey soaring in the R/C skies. The Traxxas® Hawk is an entry-level racing truck that's based on the Traxxas Radicador's fiber-reinforced ABS tub chassis. Its wheels are of brushed chrome over nylon; its tires are low-profile spikes; and its tranny has a planetary diff with 48-pitch, metal internal gears. (For durability, all the other gears are 32 pitch.) To reduce
stress on the drive train and increase gearbox reliability with extremely hot motors, a ball diff kit is also available. (Unlike a gear diff, a ball diff allows slippage.)

The Hawk kit comes with a stock 540 Mabuchi motor, a Lexan truck body and a three-step forward/reverse mechanical speed controller that's identical to the one used in the Traxxas Cat. Oilite bushings are also standard, but a ball-bearing kit is available.
**Type**: Racing truck  
**Scale**: 1/10  
**Sug. Retail Price**: $180  

**DIMENSIONS:**  
Overall Length: 16.5 inches  
Width: 7 inches  
Wheelbase: 11 inches  
Front Track: 10 inches  
Rear Track: 10.25 inches  

**WEIGHT:**  
Gross (w/bat.): 4 pounds, 4 ounces  

**BODY:**  
Type: Pickup  
Material: Lexan  

**CHASSIS:**  
Type: Tub  
Material: Nylon  

**DRIVE TRAIN:**  
Primary: Gear  
Transmission: Gear  
Differential: Gear  
Bearings/Bushings: Oilite bushings  

**SUSPENSION:**  
Type (f/r): Single A-arm  
Damping (f/r): Oil-filled, coil-over shock  

**WHEELS:**  
Type (f/r): One-piece nylon  
Dimensions (DxW) (f/r): 2.2x2 inches  

**TIRES:**  
Front and rear: Pin spikes  

**ELECTRICS:**  
Motor: 540 Mabuchi  
Battery: 6-cell stick pack*  
Speed Controller: Three-step mechanical  

**OPTIONS AS TESTED:**  
Futaba 2PBAK Magnum Junior transmitter and S-148 servos; Tekin mini-receiver; ball bearings; Trinity SCE stick pack.  

**COMMENTS:**  
The Hawk offers most of the reliable features of the more expensive Eagle at a low price. It's a wise investment for entry-level racers because it performs well out of the box and can be upgraded as their skills improve and their budgets allow.  

**CONSTRUCTION**  
I was apprehensive about building my first R/C vehicle, but I was pleasantly surprised by both the kit and the instruction manual, which is very well-illustrated and easy to follow. All the parts are separated into well-marked bags, and there are plenty of spare screws, nuts and washers.  

Most of the construction went smoothly. You begin by building the tranny and installing the rear suspension arms. My only trouble was with the shocks: without C-ring pliers, it took me forever to install the C-rings on the bottoms!  

Later, the shocks were binding. I thought that I might have bent the shaft, but I had over-tightened the shock collars. This compressed the shock body, which, in turn, caused the piston to bind. The problem was easy to correct, and otherwise, the shocks worked perfectly.  

After you've built the shocks, install the rear ones, build and adjust the front end, and then install the front shocks. Next, install the body mounts in both the front and the rear ends.  

At this point, the instruction manual tells you to cut off the tail end of the chassis, but if you want to upgrade the Hawk with the Pro Tranny, you shouldn't do any cutting until you get the tranny kit. The next step is to mount the tranny, the front end and the front bumper onto the chassis. The servo, radio system and speed controller are installed next, and finally, you install the tires on the finished chassis.  

The turnbuckles included with the Hawk kit have a nifty feature. Each has a little adjustment nut that's cone-shaped on the side with the reverse thread. This makes it very easy to adjust the turnbuckles properly once they've been installed in the truck.  

I chose a Futaba* 2PBAK Magnum Junior transmitter, but I use a Tekin* mini-receiver to save space and minimize weight. To control the steering and speed controller, I use Futaba S-148 servos. I also use a Trinity* SCE stick pack, which I charge with a Tekin BC 100 L charger.  

I found one minor error in the instruc-
For increased durability, the Hawk’s external gears are 32 pitch. The internal gears are 48 pitch, and they run much more smoothly.

The standard three-speed controller worked properly, but when it was dirty, “dead spots” developed. A quick stroke with a wire brush brought it back up to snuff.

The Hawk’s front arms are shorter than those on the Blue Eagle, but because the rims are offset, the width of their front tracks is very similar.

I tested the Hawk on indoor and outdoor off-road tracks, as well as on an open dirt road, and it handled like a pro on all three surfaces.

Without a bellcrank system, some bump-steer is noticeable, but it doesn’t hamper the Hawk’s performance. Tekin’s mini-receiver fits nicely behind the steering servo.

The Hawk is built to take minute of it. The bottom line?—the Hawk is built to take it and take it big time.

SUGGESTED UPGRADES

Once you’ve mastered your Hawk, you’ll never outgrow it. There are several upgrades that will make it meaner and better. First, you can install the Pro (Blue Eagle) Tranny kit (part no. 1920); then you can add aluminum shocks, long rear suspension arms (which actually reduce stress on the rear axles), the graphite rear shock tower and an electronic speed controller, e.g., the brand-new Traxxas 3009.

You can also replace the ABS tub with the graphite chassis used in the Eagle and then install long aluminum shocks, a graphite front shock tower, offset wheels and long front suspension arms. When you’ve finished upgrading your Hawk, it will look just like its big brother—the Eagle.

This is definitely the truck to start with and grow with. Face it, you’ll want to keep this Hawk in your R/C rookery for a good long time!

*Here are the addresses of the companies mentioned in this article:

Traxxas Corp., 12150 Shiloh Rd., #120, Dallas, TX 75228.
Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.
Tekin Electronics, Inc., 970 Calle Negocio, San Clemente, CA 92672.
Trinity, 1901 E. Linden Ave., #8, Linden, NJ 07036.
Motion Graphics, 2645 Robert Arthur Rd., Westminster, MD 21157.
TAMIYA

TAMIYA'S Manta Ray is a 1/10-scale, ready-to-assemble, full-time, 4WD off-road racer. It's easy to build, and beginners will be pleased with its performance. Many of its features are the standards that have made Tamiya products industry mainstays.

The Manta Ray's tub chassis is made of high-impact, injection-molded, ABS resin with a specially designed honeycomb pattern molded into the base of the tub to increase strength. The suspension features a four-wheel, independent, double-wishbone design with upper and lower arms, which were designed to be light, but strong. Large-volume, oil-filled, coil-over shocks are also...
The drive system consists of an easy-to-assemble, low-maintenance shaft drive. The main drive shaft is connected to the front and rear gearboxes, which house bevel-gear-type differentials. This design is one that Tamiya has used successfully over the years. Each gearbox has an access hatch to allow quick gear changes or any maintenance that may be needed.
MANTARAY

"The speed controller is Tamiya's dependable, three-step forward-and-reverse mechanical unit..."

THE KIT
The kit includes a basic 540-type, sealed-endbell motor and a 21-tooth pinion gear, which will provide a good starting ratio. Many people will want to upgrade their motors, or at least change the gear ratios, so Tamiya has included an adjustable motor mount. You can use 16- to 21-tooth pinion gears with ratios that range from 8.59:1 to 11.27:1. This should cover most of the track conditions when you use a hotter motor setup.

The speed controller is Tamiya's dependable, three-step forward-and-reverse mechanical unit that's been around for years. The kit includes a set of four 5x8mm and four 5x11mm ball bearings.

The well-illustrated, vacu-formed polycarbonate body and rear wing that are ready to paint.

The steering arms are heavier than the usual ones, and they have a 5mm ball end instead of the smaller 3mm ball end. The plastic bushings will wear out with extended use. For optimum performance, buy a set of four 5x8mm and four 5x11mm ball bearings.

The standard Tamiya three-step speed controller delivers the power to the motor—it's not too fancy, but it's reliable.

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The standard Tamiya three-step speed controller delivers the power to the motor—it's not too fancy, but it's reliable.
MANTA RAY

PERFORMANCE

The Manta Ray ran smoothly through the turns and over the jumps. The suspension functioned smoothly, but it should be upgraded for racing. The Manta's weight distribution is interesting: about 60 percent of the overall weight is in the rear, and the rest is in the front. This makes handling jumps easier, which is uncharacteristic of most 4WD cars. The 540 motor performed as expected—flawlessly—but with the 21-tooth pinion, top-end speed was fine, although the Manta Ray had a hard time pulling out of the turns with any authority. A smaller pinion gear would help the car accelerate out of turns, but for those who'd like to see a drastic improvement in performance, a motor change may be in order.

The Manta Ray is easy to assemble, and the instructions are well-written. This rugged vehicle is perfect for the entry-level modeler. Once again, Tamiya has proven that it's the beginner's best friend.

Tamiya's yellow, oil-filled shocks provide consistent damping on all four corners. Extra-long dogbones deliver power to the front wheels.

*Here's the address of the company featured in this article:
MRC/Tamiya,
200 Carter Dr.,
Edison, NJ
08818.

Like many other 4WD Tamiya cars, the Manta Ray is shaft-driven. A nicely designed rack-type steering system virtually eliminates bump steer.
KYOSHO PENSKE

Continued from page 36

silicone lube in the rear shocks improved the ride, but because the shocks have no seals, the lube must be replenished regularly.

The car’s soft suspension also affects its turning ability. Under power, the PC-19 has a tendency to push. The lack of steering under power, however, reduces steering sensitivity, and this makes the car more controllable (good for the inexperienced drivers). When you want the car to turn more tightly, simply let go of the throttle and the weight will be transferred to the front end.

This car’s chassis is very close to the ground, and that makes it tough to clear small rocks and other debris. Take a broom along with you if you plan to run this car in an area that hasn’t been well-maintained.

PC=PRETTY COOL!

After running through a few packs, I analyzed the chassis further to see if there was anything I could do to improve the car’s performance. I couldn’t change the shocks, as they aren’t adjustable. I did, however, find a way to get a substantial jump in speed. The pinion gear included in the kit rides on a reduction/counter gear. In its stock configuration, the pinion rides on the larger part of the two-step gear, and the smaller part drives the transmission. This results in a gear reduction and reduced speed overall. If you take the pinion gear off and turn it around, it rides on the same part of the counter gear as the transmission does. This produces the same effect as the installation of a larger pinion, at no extra cost. The downside to this is that it reduces run time by about 1 minute.

Overall, the PC-19 was a blast. As an (Continued on page 116)

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MASAMI SWEPT UP IN '89... WILL HE REPEAT IN '91?

by JOHN HUBER

IF YOU'VE EVER wanted to attend the IFMAR Off-Road World Championships, but knew that spending thousands of dollars to travel to some far-away place like Australia or England just to watch a race was out of the question, then hold on to your hat: the Worlds is coming to the United States—Detroit, MI, specifically—this year! Held biennially, and boasting the attendance of 140 drivers from 20 countries, the IFMAR Worlds is the premier R/C racing event. The last time the Worlds was held in this country, it was the event's premiere in 1985 at the Ranch Pit Shop in Del Mar, CA. At this rate, the next time the U.S. hosts the Worlds (after '91) it could be 1997!
THE TRACK

The 170x70-foot track has a clay base covered with 4 inches of sand for drainage; the racing surface is 8 inches of sifted and processed topsoil. Grass grows around the track, which is fully equipped with electrical lines and water. The width of the lanes varies between 8 and 14 feet, and the track’s elevation changes as much as 7 feet—a very enjoyable drive. To give the drivers an unobstructed view, the 32x8-foot drivers’ stand is 10 feet away from and 8 feet above the track. Covered pit space will be located trackside. To make it easier for the racers to get their radios, the radio-impound area will be in the pit area. Tables and AC will, of course, be provided.

So what is there to look forward to this year? Well, if the '91 Worlds is anything like the last one, there should be a lot.

This is the place for factory teams to bring out all the prototype cars and parts to see how they’ll hold up in world-class competition. The last Worlds was full of (Continued on page 111)
KYOSHO’S NEW CONTENDER—
TRIUMPH!

by FRANK MASI

If there's one task in the world that could drive any R/C car manufacturer bonkers, it would be designing a 2WD off-road race car that could loosen the stranglehold that Team Associated and Team Losi have put on this class. Kyosho has done an admirable job, even winning the 2WD class at the 1987 World Championships with Joel Johnson at the helm of one of its new Ultimas. Every time it releases a new car, Kyosho seems to set the industry on its ear, as it did with its Lazer ZX. With the 1991 Worlds fast approaching, Kyosho has unveiled its all-new factory-works 2WD car, the Triumph.

The Triumph is a completely new design—no Ultima parts here! One of the solutions uses twin 4mm belts instead of the gears found in the Ultima. Attached to one end of these belts is a slipper clutch that's similar to the A&L Powerclutch, except that the unit must be disassembled to remove the spur gear. This may be changed so that slipper settings can be retained when the spur is taken off. The pleasant surprise here is that Kyosho has included a standard 48-pitch, 100-tooth spur gear, not a metric 48-pitch! Though

Ultima's problems were its transmission, and—boy!—has Kyosho taken care of it. With an output ratio of 2.21:1 (to compare: Associated's Stealth is 2.25:1 and Losi's LRM is 2.18:1), the Triumph's transmiss-

The front bulkhead was narrowed to accommodate the extra-long A-arms. Rake is adjustable between 20 and 30 degrees. The new front shocks are 3 1/2 inches long.

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ball diffs may soon receive this treatment. The transmission sits so low in the car that the diff pulley is actually partially below the chassis plate.

Want to talk about easy maintenance? The entire tranny can be removed by taking out just five screws! The Triumph has an extremely rigid double-plate chassis. Just to show that Kyosho is aiming for the gold with this baby, all the major chassis parts—including shock towers—are made of graphite.

Perhaps the most significant difference between the Triumph and previous Kyosho cars is its front-end design. Its features include: 20- to 30-degree adjustable rake; new 3.5-inch front shocks with machined pistons that will be available separately (to upgrade Kyosho's Gold shocks); a super-narrow front bulkhead with extra-long front A-arms; and in-line steering blocks. On the rear, the Triumph has an extremely rigid graphite chassis and upper plate. Note the 2.2-inch wheels and tires.

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Most parts of the standard Kyosho ball diff remain unchanged, engineers felt the ball pressure plates could be improved. The plates now incorporate separate, hardened drive rings. All Kyosho

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end of the Triumph, there's a unique toe-in adjustment that's similar to the one used on the Ultima Pro XL. By attaching the rear hub carriers to the A-arms with tie-rod ends, toe-in/out becomes infinitely adjustable. Rounding out the Triumph's list of features are: a set of four 2.2-inch rims and tires (this car is designed for IFMAR competition); a bellcrank steering system similar to that found on the Lazer; and a quick-release battery-hold-down system.

With the Triumph, Kyosho has proven that it doesn't rest on its laurels. If the U.S. production version is anything like the prototype shown here, Team Associated and Team Losi's lives just got harder!
new and controversial products like Associated’s top-secret “Stealth” car and Yokomo’s coveted 2.2-inch tires and rims. So much secrecy shrouded the Stealth that no one was permitted to photograph it without its body. Even two years later, no one outside Associated has ever had a close look at it.

**2WD**

The 2WD Open Class should be the fiercest competition yet, at any race, anywhere. At the 1989 Worlds in Australia, Eustace Moore said, “If one of these guys thought he could win by slitting his opponent’s throat, he would!” I’m sure the competition will be just as tough this year; after all, everyone wants to be the world champion. Each of the major manufacturers has been working its research and development teams overtime in an attempt to put its car on top.

The Losi JR-X2 has gone through some changes over the past two years. Two years after the ’89 Worlds, Associated’s Stealth car is still under wraps. Expect to see more of it this year.

What worked to the Stealth’s benefit there may not work here.

**4WD**

At the 1987 Worlds, in Romsey, England, Kyosho placed five of its then-prototype Optima Mids in the 4WD A-Main; Yokomo placed only one car. In 1989, things changed: there were five Yokomos and one Kyosho. The track conditions strongly affected these performances, so it will be interesting to see what happens this year.

Schumacher, with its Pro Cats and Cougars that are so well suited to high-bite surfaces, will also be tough competition in Detroit. An interesting new “face” in this year’s Worlds will be Tomy. (Yes, that’s right, the toy company.) It recently developed a highly sophisticated belt-drive 4WD car called the “Intruder,” and it could definitely be a contender.

This event will be covered extensively by Car Action’s Steve Pond, yours truly and maybe more. If you enjoyed Car Action’s coverage of the ’89 Worlds as much as I did, just wait till this issue hits the stands. Steve and I will see who can shoot the most film at a single event!
TROUBLESHOOTING
by STEVE POND

GROUND GRASSHOPPER
Recently, another car ran over my modified Grasshopper (I was able to fix it). This happened because, whenever I give my car full power and let go of the throttle, it gets stuck on full speed and goes crazy. Then, when it stops, it won’t move. I need help!!! (I use a Team Associated RC10 stock motor and a Magnum Sport radio.)

Matthew Bourland
Fort Worth, TX

You have to adjust the mechanical-wiper speed controller that’s used on many Tamiya cars precisely to prevent them from running away. The Magnum Sport radio doesn’t have any throttle-trim or end-point adjustments, so the servo travels as far as it can every time. To compensate for not being able to adjust the radio, you’ll have to adjust the linkage. When the wiper goes too far past the full-throttle point, it’s likely to bind and become stuck in the full-throttle position. To limit the wiper’s travel, move the servo end of the linkage rod inward, closer to the servo. If your radio has a BEC system, be sure that it’s installed without modifications. For systems without BEC, check the four AA cells that power the receiver.

Matthew Bourland
Fort Worth, TX

BACKSIDE BOUNCE?
The rear shocks (red) on my Turbo Scorpion bounce as if there’s no oil in them. They worked well when they were new, but now they don’t. I’ve checked the oil level, and it’s fine. I’ve tried putting new oil in them, but this hasn’t solved the problem. Also, the shocks are slightly scratched on the inside.

Nathan B. Colorado

The shocks on the original Cox Turbo Scorpios shocks were well known for losing their oil, but since you insist that there’s plenty of oil in them, the problem must lie elsewhere. When you use a shock for a long time, its cylinder bore and its piston become worn. This creates a larger gap through which the shock oil must pass, and the shock’s damping ability deteriorates. There must be extensive wear for this to happen, though.

The only other possible cause is that when you replaced the shock oil, you used an oil with a lighter weight. Oil is graded by viscosity—the thicker it is, the higher the viscosity number. If the kit came with 30WT oil and you replaced it with 5WT oil, then the car will bounce all over the place. Try refilling the shocks with heavier oil; this should eliminate bouncing.

A CLOD MOD?
I’ve talked to many hobby dealers and racers about putting my Novak T-4 speed controller into a Clod Buster. Some say I can use this controller in a stock Clod; some say it’s OK to use it in a modified Clod; and others say don’t use it at all. Who’s right?

Carl Bloom
Hermantown, MN

According to Novak Electronics, the T-4 should work well in the Clod Buster. Be sure to use the proper capacitors on both motors, and use the heat sinks that come with the controller. The controller’s most vulnerable component is its 50A brake FET. It’s the same as those used in the 410 MXc and M1c units. As long your packs have ratings that are within the controller’s acceptable voltage specifications, you shouldn’t have any problems.
REACHING THE PEAK

I have a problem with the batteries that I use in my Clod Buster. I climb hills at a local quarry just for fun. I've connected a Sassy Chassis, a Tekin 700 speed controller and Trinity Matched Madness motors using 13-gauge wire and Sermos PowerPole connectors. I have two Trinity matched 1700 SCE packs that I assembled with Dan's Gold Bars, and three other packs that consist of bulk, unmatched cells. The matched packs are "false-peaking." One of them is only 8 seconds behind my number-one pack when I discharge it with a 12-bulb discharger, so I don't think the problem is caused by a dead cell. I use a Tekin BC210 Reflex charger and Cobra Super Battery Bugs. I let my packs trickle-charge for half an hour, and then I fast-charge them. To prevent voltage spikes, I use a 12V deep-cycle marine battery as a power source. I "Super Bugged" the problem pack down to .5 volt by reversing the Bug for a week. Then I trickle- charged it for 16 hours at 1700mAh. I peak-charged the pack according to Tekin's instructions, and it didn't false-peak. Then I dumped the pack with a 12-bulb discharger that I built from an article in Car Action. I brought it down to 6 volts and let it sit for a week on a Super Bug at 1.5 volts. When I recharged it, however, it false-peak again! I have to hit the 4-minute timer six or seven times and monitor the pack with a digital voltmeter to charge it. It's very frustrating. There isn't an R/C hobby shop within a 200-mile radius, so you're my only link with the R/C world. I hope you can help.

Jim Huntley
Cranbrook, BC,
Canada

Without question there's a bad cell in your pack. Although its discharge time is only 8 seconds less than your other packs, a partially deteriorated cell will "vent" slightly and cause the false-peaking you've described. You'll be able to use the pack for a while, but every time you charge it, the safety vent in the bad cell will release a little gas. This causes a momentary voltage drop that the peak charger interprets as a peaked pack. When you trickle-charged the pack, you alleviated the false-peak problem. With 16 hours of trickle at the rate you mentioned, the pack was probably completely charged, so when you attached it to the fast charger, you just topped it off. Find the bad cell by checking each cell with a digital voltmeter. The bad cell will have substantially lower voltage than the rest. Simply replace it, and the pack should work well.

As for your charging technique, I think you're overdoing it. Abandon the complicated trickle, quick-charge, dump, cycle method. Just charge your packs, run them until they're out of juice, let them sit for a day or two (SCEs only), and then use them again. You should only use the bulb discharger when you can't use a pack's entire charge. Every now and then, you can use a simple 5-ohm or 10-ohm resistor to completely erase any residual charge.

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TROUBLESHOOTING

BRITISH LIGHTWEIGHT

Recently, I decided to try on-road racing (I've been racing a monster truck at a local track, but I've always enjoyed watching the lightning-fast on-road cars), and I bought a well-designed, lightweight car—a PB Racing (it's an English company) Sizzler. How tight should the ball diff be? I read the article on this in your Stock Car Special, but I prefer the roadcourse scene to the Superspeedway. Do the same diff-setup rules apply to road-racing and stock cars? Also, how tight should the spring tension on the rear shock be?

Michael Lopez
New York, NY

Regardless of the application, you should tighten the diff until there's little or no slip under full acceleration when starting from a dead stop. The correct tension will vary according to the type of motor you use and the track conditions, but the result should be the same. The amount of spring tension on the rear shock is also determined by the track conditions. When you're sure that you're using the correct oil/spring combination, you can increase or decrease the spring's tension to fine-tune the suspension. If you increase the tension, you'll improve the steering response, but you'll have to sacrifice a little rear traction. Reducing the tension produces the opposite effect. This adjustment also depends on what kind of tires you use, the chassis tweak, the weight distribution, etc. After you've sorted out these variables, adjusting the spring will be a piece of cake.

STICKY SITUATION

My RC10's E-clips pop off the front pivot pins. Ever since I installed Andy's front A-arms, the pins have worked their way out. The people at my hobby shop told me to use titanium pins, but they haven't made a difference. Also, I use Pro-Line 2-inch rear tires on my car, and they fall off the wheels when I drive in dirt. I've tried different tires (e.g., Pro-Line, Team Losi, Duratrax). The people at my hobby shop suggested that I glue the tires onto the wheels, but I don't want to replace the wheels when the tires wear out.

Jeff Corsaro
Pomona, CA

I'll assume that the E-clips you refer to are those on the rear of the inner front pivot pin. (They're the closest to the ground and the most likely to be knocked loose.) When you use Andy's A-arms, the beveled edge on the arm where the clip is attached to the pin increases the chances of losing these clips. The E-clips' edges are exposed, so it's more likely that they'll be caught on something and come loose. To prevent this, put shims (e.g., washers) on the pivot pin before you install the E-clip. This will keep the E-clip on the rear of the pin and snug against the arm, so it's less likely to be caught on something.

If you use one-piece rims, the only solution is to glue the tires to the rims. When the tires wear out, loosen them by boiling them for a few hours; then it should be easy to remove them. Also, Associated offers three-piece wheels that lock the tires to the rims without the use of glue.
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<td>Sanyo 1400 SCR Cells</td>
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<td>640 - 649 - $3.75 each</td>
<td>280+ 6 Cell Pk $30.00</td>
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<tr>
<td>660 - 669 - $4.50 each</td>
<td>290+ 6 Cell Pk $42.00</td>
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<tr>
<td>670 - 679 - $5.50 each</td>
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<td>680 - 689 - $7.00 each</td>
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<td>Sanyo 1200 SCR Cells</td>
<td>New Killer Bushing Mods.</td>
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<td>500+ 6 Cell Pk $25.00</td>
<td>By Phoenix 13D 14D 15D</td>
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<td>515+ 6 Cell Pk $35.00</td>
<td>Also 1500 Max Tork Stock</td>
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**MOTOR DRESSER**

(Continued from page 57)

The break-in timer belongs exclusively to the new Motor Dresser FET. Consisting of an illuminated on/off switch and adjustment pot (which can be set anywhere between 30 minutes to an hour), the timer will automatically cut off the power to the test motor. Unfortunately, if you plan to run your motors for 30 to 60 minutes to break them in, then...
MOTOR DRESSER
(Continued from page 116)
plan to have your commutator cut afterwards, as most motor manufacturers recommend short break-in periods—around 5 minutes (with a shot of motor spray every minute or so while it’s running) at 3 or 4 volts. The purpose of this is to allow the removal of surface irregularities on the brush, between it and the commutator. Actual break-in occurs when the motor is run in the car under load after just a few minutes. Running without load won’t accomplish this.

GETTIN’ CHARGED!
Just to show you that the Shinwa engineers are always thinking of ways to improve their products, the Motor Dresser can actually be used as a battery charger and discharger.

To charge batteries on the Shinwa, you must first replace the battery you were using to test your motors with a 12V power source (a car battery or a regulated power supply). Next, in place of the motor, hook-up the battery you want to charge; set the FET motor speed control so that the built-in ammeter reads 1.5, and charge away. (Remember to use the break-in timer or an auxiliary timer.)

Finally, to discharge a battery with the Motor Dresser, hook your pack up as if you were going to test a motor, but instead of a motor, connect a 0.1-ohm 10W resistor. While the battery is discharging, use a voltmeter to monitor the voltage to prevent cell reversal.

So there you have it. I found some of the new Shinwa Motor Dresser FET’s features quite useful, but others fell short of my expectations. The bottom line is that only you can decide whether its benefits are worth the investment.

*Here’s the address of the company featured in this article:
Shinwa; distributed by Pacific Trading Co., P.O. Box 3593, Mission Viejo, CA 92690.*

PRIMADONNA CLOD
(Continued from page 67)
A pneumatic system depends on air pressure to function. Steve could have simply mounted an air-storage tank on the truck, (Continued on page 134)
WHILE MOST OF the nation was still digging out from under the winter snow and dealing with the cold, R/C off-road racing was alive and hot in the sunny Southwest. The scene was Tempe, AZ (a suburb of Phoenix); the event was the Pro-Line/Car Action 5th Annual Cactus Classic Off-Road Race, which was held on March 15 to 17.
Hosted by the Scale Racing Sports (SRS) Raceway, this race is one of the hottest off-road events in the Southwest. It not only draws crowds of drivers from Arizona, but it also attracts the heavyweights from California, Texas, New Mexico and Nevada.

THE TRACK
The SRS Raceway track is truly unusual. (The only other track of this type that I've seen is at Hobby Haven in Livermore, CA, which was the site of the 1990 ROAR National Championship Race.) In addition to the rough-and-tumble jumps and the twisting turns of a regular off-road track, the elevation of this course varies.

There's a huge stadium jump on the straight in front of the drivers' stand. On the back side of this jump there's a lower jump that your car can easily clear if it has sufficient speed. A mere 15 feet down the track, there's a set of large doubles that end in a downhill slope into turn 1.

The first turn is a 150-degree, left-hand, downhill dogleg. This is immediately followed by turn 2, which is right-hand dogleg that runs uphill to turn 3. There, you hit a 180-degree hairpin, head downhill and over a light jump (hit the brakes!), and run into turn 4, which is a right-hand dogleg at ground level. Next, you head down a short straight with two jumps that are just far enough apart to cause your car's front bumper to scrape the deck. When you've cleared these, it's uphill to turn 5, which takes you onto a fast sweeper at the far end of the track to a rocket ride straight downhill. Turn 6 is right before the main straight. It's a deceiving, hairy, banked hairpin that has a little inside "hook."

Next, it's back uphill onto another long straight, in the middle of which is a mild
Although this jump is broad, it doesn’t go clear across the track. There’s one open lane that you can take to dodge the jump, and it puts you on the wide end of the seventh turn. Turn 7 is a fairly fast 180-degree sweeper. Taking the wide line slingshots you down the last straight, which has at least three slight elevation drops. There’s a small lip on the entrance of turn 8, and this causes your car to drop into a small dip. If you hit it hard, you’ll slide away. Hit it with just a touch of power, however, and you’ll move on to the main straight and back to the awesome jumps. This track is fun and intense.

### QUALIFYING

Most of the drivers loved this track, and the challenge of the different elevations only added to the thrills. The traction was decent, and the tires of the day were mini pin-spikes with ribbed fronts.

<table>
<thead>
<tr>
<th>Fin.</th>
<th>Qual.</th>
<th>Name</th>
<th>Laps</th>
<th>Time</th>
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<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>Matt Francis</td>
<td>12</td>
<td>4:22:68</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>Robert Gillispie</td>
<td>11</td>
<td>4:04:00</td>
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<tr>
<td>3</td>
<td>10</td>
<td>Todd Bullis</td>
<td>11</td>
<td>4:05:46</td>
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<td>4</td>
<td>6</td>
<td>Darryl Reich</td>
<td>11</td>
<td>4:05:85</td>
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<tr>
<td>5</td>
<td>8</td>
<td>Brent White</td>
<td>11</td>
<td>4:08:93</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>Quincy Hughes</td>
<td>11</td>
<td>4:09:42</td>
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<td>7</td>
<td>5</td>
<td>Chris Walrod</td>
<td>11</td>
<td>4:13:43</td>
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<td>8</td>
<td>9</td>
<td>Bill Siler</td>
<td>11</td>
<td>4:17:91</td>
</tr>
<tr>
<td>9</td>
<td>2</td>
<td>Rick Wood</td>
<td>11</td>
<td>4:20:24</td>
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<td>10</td>
<td>7</td>
<td>Jammer</td>
<td>11</td>
<td>4:21:69</td>
</tr>
</tbody>
</table>

Practice runs were held on Friday, and it was also supposed to be the first day of qualifying. This was spoiled, however, by a vicious rain storm that hit during the thick of practice. The next morning, the scene was one of despair. The storm had left up to 12 inches of water in the low areas of the track. Not to be defeated, the SRS crew labored hard to prepare the track by 10 a.m. on Saturday. It was an incredible feat, and I congratulate them. The opening qualifiers began at 10:30 a.m.

During the Monster Truck qualifying, it became apparent that Team Associated was there to win. The team’s qualifying times proved that their new RC10 truck was handling the track well. Mark Pavidis, Cliff Lett and Butch Kloeber all placed their factory-works trucks into the A-Main, and Derek Furutani placed a similar vehicle in the A-Main, too. The Associated trucks'
mods included narrow, front, ribbed tires; very long A-arms; and long shocks all around. All of them were equipped with Stealth transmissions.

In the 4WD Classes, it was a classic battle between YZ-10s and Lazers. Although there were a few other cars in the group, these were the dominant cars. In the 2WD Stock Class, Matt Francis held the TQ position with Rick Wood only 2 seconds behind, and Quincy Hughes just a second behind him. The 2WD Modified Class saw Brian Kinwald in the lead by 3 seconds over local driver Scott Anfinson. He was followed by Lett, who was only .31 second behind.

Bill Christiansen held the TQ by a full lap over Ryan Hicks and Jason Christensen in the 4WD Stock Class. The 4WD Modified group was led by Mark Francis, followed by Kinwald and Rick Hohwart. They were separated by less than 3 seconds. The Truck Class for stockers had Todd Bullis leading David Wilson by only \( \frac{1}{4} \) second, while Chuck Erickson was 2 seconds down in the 3rd spot. In the Modified Truck Class, Pavidis put a works Associated truck up front, while teammate Lett finished in 2nd. Privateer Bryan Peterson was less than \( \frac{1}{4} \) second behind him.

The final qualifier was held on Sunday morning. Then, the track was groomed and marked with chalk to prepare it for the Mains, which started at 2 p.m. The weather was perfect, with sunny skies and "T-shirt" temperatures.

THE MAIN EVENTS

2WD STOCK

At the start of this race, Matt Francis took the holeshot with Chris Walrod in tow, making Francis sweat. Robert Gillespie was within striking range while the leaders battled, and he actually captured 2nd when they hit a corner and stalled. At the halfway mark, Walrod stole the lead for a while, but he lost it later when he bungled a jump. This allowed Bullis to jump into 3rd with Darryl Reich hot on his trail. Matt Francis took the win with Gillespie in 2nd and Bullis in 3rd.

By the way, all of the Stock Class drivers were "tech checked" using Com-

(Continued on page 146)
PRIMADONNA CLOD
(Continued from page 124)

but that would have needed frequent pumping. Instead, he dismantled a 12V roadside air pump and mounted it on the front. The pump is powered by a standard 540 motor and is capable of pumping over 120psi! A 12V battery jack is mounted to the side of the chassis, and the compressor fills the air tank in approximately 30 seconds.

I thank Steve Levine for letting us get a good look at the Primadonna Clod. It's not every day we see a vehicle like this one. I hope this “Brain” infection doesn’t affect too many more of you, but I think it’s contagious!

*Here are the addresses of the companies mentioned in this article:
Tamiya, 200 Carter Dr., Edison, NJ 08817.
ESP Mfg., 30 Crystal Lake Plaza, Crystal Lake, IL 60014.
APM Custom Hobby Inc., P.O. Box 357, Dumont, NJ 07624.
Custom Chrome, 56175 Plymouth Rd., Livonia, MI 48150.
AstroFlight Inc., 13311 Beach Ave., Marina Del Ray, CA 90292.
Litespeed, P.O. Box 4765, Spokane, WA 99202.
Stormer Racing, P.O. Box 126, 23 High Speed Rd., Glasgow, MT 59230.
Sermos R/C Snap Connectors, Cedar Corner Stn.,

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13. T&A Titanium Lynx II axle,

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OATS WITH large, gas-guzzling, 2-stroke engines are now very popular, and during the last few years, the variety from which to choose has continued to grow. Called “weedeaters,” these large boats are easy to start and have excellent gas mileage (at least 30 minutes run time on a full tank), and their size and power are more than enough for blasting through the waves.

Their only drawback—until now—has been price. Most weedeater boats cost more than $800, and some have price tags nearer to $1,500; a special few approach $3,000! But bear in mind that these well-engineered boats have been thoroughly tested, and their top-quality gelcoat-and-fiberglass hulls are often painted at the factory—good value! You only have to open the shipping crate, pour in the gas, flip on the radio and go.

Distributed by Hobby Dynamics*, the Hustler isn’t in the same league as the high-price monsters. It was designed for more average budgets, but it’s still a monster boat; there’s just a little assembling left for you to do before it can hit the water. At half the price of the other weedeaters, it’s a good deal.
The kit contains a white, plastic, modified deep-vee hull with a McCulloch 22cc engine already installed, a plastic radio box, a bag of running hardware and a wooden boat stand. I assembled the boat in about 3 hours. The hardware went together exactly as described in the instructions, and the parts fit easily.

Any problems?—yes; one. In my pre-production review model, the engine wasn't mounted at the correct angle. It was mounted so that the output shaft and the stuffing box weren't perfectly aligned. The difference between them was only about \( \frac{3}{16} \) inch, but this was too much to expect the flexible drive cable to compensate for. It took me about 20 minutes to remove the rear motor-mount bolts, reposition the engine, drill new mounting holes and reinstall the bolts. I called Hobby Dynamics, and they confirmed that there were alignment problems with the first few models produced, but also said this is no longer the case. On the new Hustlers, the flex shafts and engines are supposed to be aligned at the factory.

**ASSEMBLY**

Before you do anything else, you must spend 30 seconds on assembling the wooden boat stand, which holds the hull securely while you work on it and attach the other assemblies.

Next, assemble the strut-drive components—just a shaft, a pin and a locking collar. Slide the strut drive into the strut blade, and then attach the assembly to the drive-cable ferrule. Slide the prop onto the strut-drive assembly, key the prop to the drive pin, and hold the prop in place on the shaft with another locking collar. To ensure everything stays put, apply thread-locking compound to all the set-screws.

Attach this assembly and the rudder to the strut bracket, which you then attach to the hull with four 8-32 bolts. (The holes have already been drilled for you, so there's no problem deciding where the bolts go.) Secure the bolts with blind nuts that come in the hardware package. What wasn't included?—only the thread-locking compound.

**RADIO BOX**

The plastic radio box (it looks like a typical Tupperware®-type freezer box) is sealed tightly with a lid, so your electrical stuff will stay dry when the box doesn't. The box fits perfectly between the factory-installed, plywood, motor-mounting rails in the far-aft section of the Hustler.
hull. When you’ve drilled the holes for the throttle and rudder pushrods, slide the box into place behind the fuel tank and hold it there with rubber bands, which also ensure that the lid stays put.

Screw the servos onto the two wooden servo-mounting rails, and slip the entire assembly into the radio box. Glue doesn’t adhere well to this type of plastic, so the two servo rails are secured with self-tapping screws. (These go through the box and into the ends of the rails.)

Use double-sided tape to hold the radio gear on the sides of the radio box, and then install the on/off switch through the lid (use the supplied Du-Bro Kwik-Switch mount). So far, this radio box has kept my radio safe and dry, and there’s no sign of “freezer burn” on my servos!

**THE ENGINE**

To complete the installation of the McCulloch 22cc, 2-stroke, gas engine, you only have to connect the gas lines and the throttle cable—a straightforward procedure that takes only seconds to complete. The fuel tank fits right behind the engine and is held in place with rubber bands.

I installed the tank before installing the throttle cable because I didn’t want the cable to get in the way while I was trying to position the tank between the plywood mounting rails. With the tank and cable installed, you only have to hook the throttle cable to the servo with the hardware that’s supplied for the job. Make sure that the radio box’s lid doesn’t bind the servo or the cable when it’s attached to the box.

**NO-HASSLE HUSTLER**

When all the parts are in the hull, route the throttle and rudder cables to the radio box, mark their positions, and drill the box to accept the outer guide tubes. There’s already a hole in the transom for the rudder control, but it’s bigger than it has to be. I didn’t seal the space around the outer guide tube because I wanted a route through which the bilge water that accumulates during runs could be poured out. It isn’t logical to seal this 1/8-inch space when the deck is open to water.

Before you’re ready for action, you have to dress up the Hustler with the supplied Mylar decals. They come in a large sheet, but it takes only a few minutes to trim them to size and press them into place. Be sure to clean the hull before you apply the decals so that you

(Continued on page 174)
BODY MASKING
(Continued from page 74)

the tape in place makes the paint job cleaner. I used computer-cut vinyl graphics, but if you decide to paint on your graphics, this is the time to apply the masking for them.

Most bodies have bends and compound curves around which you have to stretch the pinstriping tape. Taping the insides of corners seems to be difficult for most painters, because the tape tends to lift off the body. To prevent this, gently slice the tape in these areas with a hobby knife. This will relieve the stretching that's needed to get the tape into the corner. Pressing the tape down firmly will create a small gap in the sliced area. Apply a smaller piece of the tape over the slice so that paint won't get under the tape and cause unsightly blemishes.

I masked off the areas that I'd later paint white before I applied the car's main color—royal blue. Wide masking tape sufficiently covered the skirting on the car's nose and sides, but the large area in the rear needed more than that. You can apply additional pieces of tape, but this is more work than is necessary. Attach masking tape to the edge of a piece of paper that's slightly larger than the area you want to cover. Apply the taped edge along the accent stripe, pull the paper over the body's edges, and tape it in place.

Next month, I'll discuss how to paint both bodies using spray paint and airbrushes.

*Here are the addresses of the companies mentioned in this article:
Associated Electrics Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626.
Dahm's, P.O. Box 360, Cotati, CA 94931.
Coverite, 420 Babylon Rd., Horsham, PA 19044.
Motion Graphics, 2645 Robert Arthur Rd., Westminster, MD 21157.

CACTUS CLASSIC
(Continued from page 132)

petition Electronics' new “StockCop” motor checker (see the sidebar). This device positively identifies stock motors by measuring their internal resistance. It's a clever idea—one you can't fool with.

STOCK TRUCKS
This event was a slug fest! In the first corner, seven of the 10 trucks were piled high. Bullis managed to come out ahead with a huge lead in the opening lap. Hicks was in 2nd and Billy Bradford brought up the rear, in 3rd. Within the first

(Continued on page 158)
MOSTLY OVER
looked—and defi-
nitely undervalued
by most R/Cers—Marui’s* 1/12-
scale Big Bear has a lot more to
offer than you might think.

Years and years ago, when I was
young and didn't know much better, in the
heartland of New Jersey, I found a store that was
selling Marui's CJ-7 for a paltry $49 as a close-out
special. I bought it, assembled it and had more
fun with that bouncy, under-suspended Jeep than
with any other vehicle I owned (the only possible
exception being my Blackfoot). Eventually, the
pounding I gave it broke enough pieces to war-
rant a final bounce to the trash bin, but I saved
the body—it had great detail
and, thanks to the solid,
high, roll bar, it
hadn't been really
destroyed.

(Continued on page 151)
A bunch of years went by, during which Marui products sort of disappeared for a while and then reappeared—sold by Phoenix Models. I occasionally looked at the Big Bear, but because it’s 1/12 scale, I really wasn’t interested until I saw one up close. Someone had forgotten to tell me that the Big Bear and the CJ-7 use the same chassis. The CJ-7 was 1/10 scale essentially because of its small (buggy-size) tires, and Jeeps fit that scale well.

So, if the CJ-7 body was 1/10 scale, and the chassis could fit either scale, by putting 1/10-scale tires on the Big Bear, I’d be able to turn the Big Bear into a CJ-7 monster truck—sort of!

BODY WORKS

Made of hard, injected, ABS plastic, the CJ-7 body is incredibly detailed—inlaid hinges, grills and wipers. A driver, a six-point roll bar, a fire extinguisher, a gas can and a spare tire are standard accessories, but it needs a little work to make into a monster truck—but it’s easy work.

To clear the large tires (Clod Buster size), I enlarged and rounded the wheel wells. To do this, I had to remove the body’s nice front and rear fender wells. That’s no great loss at the rear, but the front wells have a molded-in side shield, and it was a shame to sacrifice it. (Oh well...cut we must!)

Likewise, I trimmed 1/4 inch off the fenders in the areas behind each front wheel well, but that’s all there was to it! The Big Bear and CJ-7 body mounts are identical, so everything else stayed the same.

CHASSIS SURGERY

The chassis offered more of a challenge. To make the Clod tires fit correctly, I had to remove most of the forward section of the battery compartment, and that’s an important part of the chassis. Its box shape increases front-to-rear rigidity, so when you take out that forward section, you actually weaken the chassis, and that isn’t a good thing to do.

To make up for this, I epoxied some 1/8-inch-square brass-tube stock into the grooves at the bottom of the chassis. Don’t use CA; it’s too brittle. Get some 5- or

(Continued on page 152)
BIG BEAR

(Continued from page 151)

10-minute epoxy, but read the label before you buy it. Some epoxies (mostly the instant ones) don’t do too well if you get them wet, and the bottom of a monster truck will definitely get wet.

DIFFERENTIAL OF OPINION

The stock Big Bear diff is quite good (I used its CJ-7 counterpart in a dragster, and it didn’t break), but the giant tires subject it to new loads, so protecting it is more than a safety precaution; it’s a necessity. For the Big Bear, there’s only one way to go—MIP’s* ball differential kit. There are only two gears in the package, and they’re metal, so they can’t break (all right, anything can break, but they don’t break easily).

SO-O TIRED

Now the hard part—choosing the wheels and tires. For wheels, I turned to Bru-Line®; its Super System Wheels include a Clod wheel and a hub intended for the Big Bear. The sad part is that while the wheels are chrome, the hubs are white. Oh well...can’t have everything.

The tires were easy to find. I wanted “big,” and I wanted “menacing,” and the only ones that fit that description are CRP’s® monster Clod Buster spikes. Of course, they weren’t meant for a Big Bear (or a CJ-7, for that matter), so I had to trim them a bit. I cut the two inside rows of spikes off the front tires, and the innermost row off the rears. Then, everything fit, and nothing rubs where it shouldn’t.

SPRING ARRIVES!

The weakest part of CJ-7 and Big Bear kits is the suspension. For all practical purposes, they have none—just some really loose springs. The CJ-7 was designed to do wheelies, and for that, the suspension works well—but that’s all it works well for. Unfortunately, there’s really nothing you can do about it. With the weight of large tires up front, it won’t be reaching for the sky, but the tires will have to do most of the work usually done by the suspension.

This doesn’t mean that you can’t help the suspension along a little, (especially at the rear)—so it doesn’t bottom-out. You just have to add a spacer to the 7/2-inch spring to compress it enough to make wheelies an impossibility.

Up front, you have to do something else entirely. With the large tires mounted, the front wheels will splay out when the truck runs, because the suspension geometry wasn’t designed to carry that much load. To counteract that, you need to beef up the steering assembly.

The top of the steering assembly is strengthened with new linkage. Thread Du-Bro® adjustable 4-40 ball links onto the ends of Du-Bro 4-40 rods. They act as steering rods between the servo and the spindles. To improve steering-linkage geometry, install 7/4-inch spacers between the ball links and the spindles. When linked, Du-Bro rod ends give the closest thing to center-point steering on a monster truck that you’ll ever find. Tie the whole thing together with a large Kimbrough® or CRP servo saver, and mount it on a servo with at least 42 ounce/inches of torque. That’s half the battle.

The bottom of the front-suspension assembly is strengthened with a custom-made tie-rod. Mount an adjustable 4-40 rod with adjustable 4-40 ball links across the bottom of the car by drilling a hole in each of the spindles; then adjust this rod to minimize play between the spindles.

Together, these two additions will stop a lot of the wheel splaying, but it won’t eliminate it—nothing will, but the truck will be controllable, and that’s what you’re looking for.

MONSTER MOTIVATION

Because I’m basically a mild-mannered

(Continued on page 179)
WHAT DO YOU get when you combine a Kyosho* Turbo Ultima II with a Pro-Line* monster-truck conversion kit? The answer is, a bodacious track burner! With the tremendous growth of the monster truck/racing truck segment of the R/C hobby, everyone seems to be getting into the buggy-to-truck conversion business. Now Pro-Line, one of the most respected names in tires and wheels, has decided to jump in and offer a well designed, rugged truck conversion kit at a very reasonable price ($79.95).

Before I discuss this conversion kit, I think that a warning is necessary. Few, if any, conversion kits are as economical as an out-of-the-box truck kit. Consider the conversion that I'm reviewing: the Ultima II Turbo kit costs $279.95, and the Pro-Line conversion kit costs $79.95. This totals $359.90 compared with $229.95 for the Outlaw Ultima Racing Truck kit.

Inset: Kyosho’s Turbo Ultima II “before.” Left: the completed truck with sharp-looking directional spoke wheels and the Ford stadium-racer pick-up body.
On the other hand, conversion kits enable you to turn a car that’s collecting dust on your shelf into something that will get you truckin’. Many of the Pro-Line parts are better than those found in some truck kits! (e.g., extremely well-detailed five-blade directional wheels, “Speed-Paw” competition tires, a versatile body mounting system). The Pro-Line conversion of the Ultima II Turbo gives you a good, basic, very competitive racing truck for use on a tame-to-moderate track—and you don’t have to modify the suspension.

THE KIT
The Pro-Line kit gives you a lot for the money, including: a polycarbonate, Ford stadium-racer pickup body; heavy-duty body mounts; unique body posts; high quality wheels and tires; front spindles; front-wheel bushings (too bad they don’t include bearings!), black polycarbonate for side dams; a killer fluorescent orange decal sheet; and line-drawing instructions. The only things not included that would really make a difference are long front shocks and long front shock towers. These parts would probably push the kit’s cost to over $100, which might be too expensive for many prospective truckers.

ASSEMBLY
The Pro-Line conversion starts with the Kyosho Ultima II Turbo that I reviewed in the June, 1991 *RC Car Action*. Except for a Tekin* 411P electronic speed controller and a Parma* 18-turn Cyclone II, it’s stock. I thought it was the ideal choice for a conversion because it would be similar to the Kyosho Outlaw truck when it was completed. It also has some interesting built-in refinements, such as a ball diff, ball bearings and gold shocks.

When the Ultima’s body has been stripped off, the metamorphosis begins. The kit’s instructions are good, but they might be a little sketchy for first-time builders. First, you replace the front spindle. Simply remove the steering blocks from the uprights, pull out the old spindle and press in the new, extended spindle. Next, assemble the body posts and mount them on the chassis. They’re about 1\frac{1}{2}-inch thick, rugged and well-made, and they have molded-in saw guides that make it easier to cut them evenly. These

---

"Cornering was just the way I like it: sure and predictable with a little push."
posts will probably never break, but they aren't perfect. Because of the way they fit on the brackets, the shortest they can be is about \( \frac{3}{4} \) inch. I like to keep the body as low as possible, but that's as low as this system will allow.

Attach the mounting-bracket assembly to the shock towers with the long shock-mounting screws. Remove the stock screws, put washers on the new screws, and slip them through the mounting bracket and the shock towers. Install the shock-mounting spacers and replace the retaining nuts. Now the hard part is over, and you've almost finished! Mount the tires on the rims, and install the bushings in the front hubs. I bought and installed a set of Tamiya\textsuperscript{*} ball bearings—they make a big difference in the truck's performance. Install the hub nuts, and check that the wheels turn freely. I hate white wheels, so I dyed mine blue with LiteSpeed\textsuperscript{*} nylon dye to match the paint.

So far, the conversion has taken about half an hour. If you're a perfectionist, the rest of the work will be more time consuming. To protect your electronic compounds from dirt and moisture, you can make side dams out of the black polycarbonate sheets included in the kit. Few other kits include anything like it to help you preserve your electronics, and it's easy to work with—all you need are scissors and a straightedge. I made a template out of thin cardboard and I used it as a pattern on the black polycarbonate. You can mount the side dams to the chassis with servo tape or with CA if you're brave. I cut out a section in the middle of each side of the dams for easier access to the battery.

Finally, you can fit and finish the body. Generally, I trim the body at the trim line and fit it before I paint it. This way, I can see where the body posts come into contact with the body. I used Pactra\textsuperscript{*} metalflake and candy colors in the red-white-and-blue combination for which I'm well known. It just plain sparkles!

(Continued on page 182)
minute, Jade Kurtchi made his way from the back of the pack to 4th place, and then, while Hicks and Bradford battled, he made a bid for 3rd. With just over a minute left, Bullis was gone, and Kurtchi and Bradford fought for 3rd. With 25 seconds left, Kurtchi and Bradford closed within striking distance of 2nd-place Hicks, and then all three of them tangled. Bradford shot to 2nd, while Kurtchi and Hicks duked it out in the last lap. Kurtchi got the best of the fight and finished in 3rd.

2WD MODIFIED
At the start of this race, Kinwald held the lead, with Lett in 2nd and Matt Francis in 3rd. Lett played his pressure game, but Kinwald held up well. Then, Lett missed the tabletop and "endo'd" his car. That put him back with the pack, while Kinwald left the scene. Rick Vehlow, Hohwart and Francis were on Lett's tail, and they put the pressure on him. Lett nailed the triple and then a track marshall, which put him way down while the pack drifted away. With a minute left, the pack was a mess, and there were five cars vying for 2nd place. Kinwald was so far gone that he was forgotten. At this point, Francis was in 2nd, and Anfinson was in 3rd. Francis clipped a corner, letting Anfinson by, and this sealed up the race. J.D. Beckwith made a late charge, but it wasn't enough. He plowed his car on the final lap and sank to 9th place. At the finish, Kinwald was in the winners' circle by almost a full lap, Anfinson in 2nd and Matt Francis in 3rd.

4WD STOCK CLASS
The start of this race was clean, with Bill Christiansen in the lead followed by Hicks, Troy Messina and Jim Freeman. They formed a little train that lasted for most of the race, but Jason Christensen spoiled it. As the race continued, the cars spread out almost perfectly, and no one hit any major traffic. Hicks fell into 3rd about 3 minutes down. Bill was out front doing his thing—nothing but clean driving! He finished in 1st place, with Jason Christensen in 2nd and Hicks in 3rd.

MODIFIED TRUCKS
This was the most exciting race of the day. Although there was still plenty of daylight, the track lights started to come on. Pavidis got a nice start from the pole, with Peterson in 2nd and Lett in 3rd. As I mentioned earlier, Lett likes to play a pressure game. It goes like this: he knows he has the power, but he stays on the tail of the guy in front of him until that guy gets nervous and takes himself out. This time, Lett's game backfired! He tried to go around the table-top jump, but he missed, and his truck rolled. He retained 3rd and eventually caught up with Peterson. Cliff Montgomery held 4th over Furutani and Kloeber, and all of them were in a tight little bunch. Meanwhile, Pavidis was out front, just tooling along. At the halfway mark, Lett was up on Peterson again. They began a "seesaw" battle, but this time, neither one played any games. Down the main straight, Lett had the inside edge, but Peterson had a lot of punch, and he took back 2nd. Through the back straights, Lett had the speed. He regained 2nd, and began running as fast as he could. Peterson wouldn't be denied, however. The final laps were down to the wire. Pavidis was out front and almost gone. Lett opened up on Peterson, but they...
CACTUS CLASSIC
(Continued from page 158)
headed into traffic. This was costly for
the leaders. Then Pavidis made his only
mistake of the day. He was heading for
the final turn, and it looked as if the win
would be his. He looked backward to see
if his teammate Lett was in the clear for
2nd place, and he lost sight of his truck.
By the time he found it again, it had
overshot the final turn and spun out. Then
Lett and Peterson were on him, with an­
other truck just ahead. At the stadium
jump, Pavidis stalled. Lett took the lead
in midair, only to find the slower truck in
front of him. There was nowhere for Lett
to go, and he tangled with the slower
truck. From out of nowhere, Peterson
shot forward and seized the win. The
crowd went absolutely wild, as Lett
crossed the finish line in 2nd and Pavidis
in 3rd. This was quite a topper for
Peterson, because he was also celebrat­
ing his birthday at the race.

4WD MODIFIED
At the drop of the start, Mark Francis had
the lead with Kinwald in 2nd and
Beckwith in 3rd. This group left the rest
of the pack behind. At the 1-minute mark,
Francis hit a corner, and Kinwald took
the lead. Beckwith made a really good run
at Francis, cutting most of the corners
tightly and cleanly. Although he hit some
a little too closely, he had lots of ponies
and made up the time very quickly.
Beckwith made a great midair pass over
the jumps, but to no avail. He planted his
car in the wrong place, and Francis drove
right through him. With only half a lap
remaining, Francis must have angered the
gods of Sanyo, because his battery went
south. Beckwith never even blinked as he
shot past Francis and took 2nd behind
Kinwald. Mark Francis barely held off
Hohwart as he crawled to the line in 3rd.

Thanks to SRS Raceway, Pro-Line and
Car Action, the Cactus Classic was, in­
deed, a great race. It was even rumored
that it was a qualifier for the World
Championship team, but this proved un­
true. From the fierce competition, how­
ever, you never would have known that it
was anything but a bloody shot for a team
slot. Sunny Tempe, AZ, has warm
weather and hot off-road racing. You
should be there next year!

HUSTLER
(Continued from page 144)
don't trap dirt or fingerprint smudges un­
der the decals' clear edges. Dirt and
smudges are very unsightly and will de­
tract from an otherwise nice-looking
model. (I cleaned my boat with window
cleaner.)

IN A HURRY TO "HUSTLE"
The first run with any new model always
stirs a few butterflies in my stomach; on
this day, the Hustler had them doing
double-time! At the water's edge, I in­
stalled new radio batteries and filled
the fuel tank with a fresh batch of 40:1 gas/
oil fuel. (I always use freshly mixed
fuels.) I tugged the McCulloch's starter
cord sharply. Three pulls, and the engine
barked, sputtered, and then settled into a
nice, comfortable idle. Weedeater boats
have a centrifugal clutch, and the prop
doesn't turn until you advance the
throttle. This is a nice feature, because it's
safer: you don't have to be concerned
about losing a finger while you handle
and launch the model.

When the engine had warmed up a tad,
I slowly applied the throttle while moni­
(Continued on page 179)
toring the engine’s response. The engine is air-cooled, so I didn’t hurry to put the boat in the water. I put the Hustler in the water and pushed it out to clear the mud and rocks.

The Hustler’s prop cavitated for a moment, but after running approximately 20 feet, the hull got up on step and accelerated nicely. The water was calm, and the model ran rather “flat.” The boat felt balanced, but when I applied left rudder, it seemed to skid in turns. I attribute this to the hull’s shape—a modified vee—and its rather smooth strakes. The Hustler didn’t spin out; it just seemed “soft” when it edged around corners. (The hull seems to have been vacu-formed over a mold, and this has produced the strakes’ smoothed-over shape.)

The Hustler doesn’t come with turn fins or trim tabs, and adding them would be the first logical step toward improving its performance in turns. As is, it’s a fine, powerful sport model. Needing little trim, it runs straight and hard right off the workbench.

The Hustler doesn’t pretend to compete with models that cost two or three times as much. Given its reasonable price and the little assembly required to put it together, I rate the Hustler as good value, and its performance can satisfy sport mariners. I like my Tupperware® boat!

Here’s the address of the company featured in this article:
Hobby Dynamics Distributors, P.O. Box 3726, Champaign, IL 61826.
JR Propo; distributed by Hobby Dynamics.

BIG BEAR
(Continued from page 152)

sort of “Bad Brain,” I really didn’t get outrageous in the motor department; in fact, I chose the Big Bear’s stock 540SH motor. It has enough torque to move the beast, and it’s free—and that meets all my requirements!

I matched this tame motor with a Futaba® MC-112B speed controller, which I’ve had for nearly three years. It has never “burned up” on me; it works whenever I want it to; and I didn’t have to buy it—once again, a product that meets all my major criteria.

I came across a 2-channel 27MHz Futaba receiver in my spares box and already had a KO Propo* EX-5 radio for it. (Continued on page 182)
Big Bear

(Continued from page 179)

Blackfoot; and it isn’t a racing truck. It’s my very own CJ—the Big Bear Clod. No one else has one and, unless you all build one of your own, there won’t be a bazillion of them around. And that makes it the fastest, biggest, bestest 1/10-scale monster Jeep that there is!—and there’s nothing at all wrong with that.

*Here are the addresses of the companies mentioned in this article:
Marui; distributed by Imex Model Co., 53 Trade Zone Ct., Ronkonkoma, NY 11779.
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CRP, P.O. Box 2350, Atascadero, CA 93423.
Du-Bro Products, 480 Bonner Rd., Wauconda, IL 60084.
Kimbrough Products, 1420 East St. Andrews Place/Unit F, Santa Ana, CA 92705.
Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.
KO Propo; distributed by Global Hobby Distributors, 10725 Ellis Ave., Fountain Valley, CA 92728.

Ultima II

(Continued from page 157)

Performance

Here’s the fun part! Although it was January in New England, there was just enough warm weather for me to find a thawed spot where I could take some pictures. The racing action, however, was all inside. Its first run confirmed my suspicion that the Ultima conversion would be a very forgiving truck. I drove like a turkey, but the truck easily recovered from every blunder I made. Cornering was just the way I like it: sure and predictable with a little push. The truck didn’t have much power out of the turns, though, and it didn’t make it to 4 minutes. The culprit was the transmission gearing. After gearing down as low as I could, I decided that the transmission’s drive ratio was just too high for the monster tires. I installed a Trinity* Ultima under-drive cluster-gear assembly, and it brought the ratio down so that I had plenty of gear-selection latitude with the Parma 18-turn motor. Sometimes, when you install this assembly, you have to modify the motor plate where the spur-gear spindle passes through it to create the proper clearance. This time, I found that it fit perfectly and didn’t need any modifications.

Back on the track, the Ultima exploded out of the turns as if it were fired from a cannon. It also achieved a 4-minute run time with about 30 seconds to spare. Although I raced this truck on an indoor track, I think that when the weather breaks and the dirt tracks open, it will be admired and feared by the local competition. I’d better make room on the trophy shelf right away—running this truck in serious competition will make things crowded in a big hurry!

*Here are the addresses of the companies mentioned in this article:
Kyosho; Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61824.
Pro-Line USA, P.O. Box 456, Beaumont, CA 92223.
Tamiya; Model Rectifier Corp., 200 Carrier Dr., Edison, NJ 08817.
LiteSpeed, P.O. Box 4765, Spokane, WA 99202.
Pactra Inc., 620 Buckbee St., Rockford, IL 61104.
Trinity, 1901 E. Linden Ave., Linden, NJ 07036.
In keeping with our constant efforts to help foster the growth of the radio-control car hobby, we print this track directory intermittently to inform modelers where they can race and exchange ideas. If you'd like your track listed, please fill out this coupon and return it to R/C Car Action Track Directory, 251 Danbury Road, Wilton, CT 06897. We list as many clubs as space allows.

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<tr>
<td>Richard Baker (912) 437-4015</td>
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<tr>
<td><strong>ARCAR NORTH</strong></td>
</tr>
<tr>
<td>6071-A Buford Hwy., Daraville, 30340</td>
</tr>
<tr>
<td>(404) 448-4533</td>
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<tr>
<td><strong>ARCAR SOUTH</strong></td>
</tr>
<tr>
<td>5281 Germain Industrial Crt., Ellenville, 30049</td>
</tr>
<tr>
<td>(404) 366-4922</td>
</tr>
<tr>
<td><strong>MACON AREA R/C AUTO RACING</strong></td>
</tr>
<tr>
<td>Mercer University Drive, Macon</td>
</tr>
<tr>
<td>George Joyner (912) 477-1709</td>
</tr>
<tr>
<td>Brantley Wima (912) 742-5301</td>
</tr>
<tr>
<td><strong>CHECKERED FLAG RACEWAY</strong></td>
</tr>
<tr>
<td>U.S. Hwy. 129, 3 miles north of Fitzgerald</td>
</tr>
<tr>
<td>Leo Roberts (912) 423-9917</td>
</tr>
<tr>
<td><strong>R/C RACEWAY &amp; HOBBY SHOP</strong></td>
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<tr>
<td>U.S. Hwy. 441, 5 miles south of McRae</td>
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<tr>
<td>Ralstin Horton (912) 868-2705</td>
</tr>
<tr>
<td><strong>ABS RACEWAY &amp; HOBBY SHOP</strong></td>
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<tr>
<td>U.S. Hwy. 280, Milan</td>
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<tr>
<td>Eddie Altawy (912) 362-4536</td>
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<tr>
<td><strong>R/C HOBBIES</strong></td>
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<tr>
<td>2305 Westside Dr., Snellville, 30278</td>
</tr>
<tr>
<td>(404) 985-1448</td>
</tr>
<tr>
<td><strong>CHAMPION R/C SPEEDWAY</strong></td>
</tr>
<tr>
<td>421 Reynolds Rd., Lawrenceville, 30246</td>
</tr>
<tr>
<td>(404) 962-8049</td>
</tr>
<tr>
<td><strong>RACEWAY HOBBIES</strong></td>
</tr>
<tr>
<td>1205 Johnson Ferry Rd., Woodlawn Square, Marietta, 30068</td>
</tr>
<tr>
<td>(404) 565-2190</td>
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<tr>
<td><strong>DIXIE RACING CLUB</strong></td>
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<tr>
<td>2519 Old Norcross Rd., Tucker, 30084</td>
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<tr>
<td>Tim McNeil (404) 934-9199</td>
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<tr>
<td>E.T. David (404) 971-2859</td>
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<tr>
<td><strong>DALTON RACEWAY</strong></td>
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<tr>
<td>2300 Chatanooga Rd., Dalton, 30720</td>
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<tr>
<td>Danny Sane (404) 226-6665</td>
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<tr>
<td><strong>SCORE</strong></td>
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<tr>
<td>Lake Mayer Park, Savannah</td>
</tr>
<tr>
<td>Contact Phil Hurd, 1 Melinda Cir.,</td>
</tr>
<tr>
<td>Savannah, 31406</td>
</tr>
<tr>
<td>(912) 355-6033</td>
</tr>
<tr>
<td><strong>BOLINK RACEWAY PARK</strong></td>
</tr>
<tr>
<td>420 Hess Rd., Lawrenceville, 30245</td>
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<tr>
<td>Bob Rule (404) 963-0252</td>
</tr>
<tr>
<td><strong>PDQ RACEWAY</strong></td>
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<tr>
<td>429 Bankhead Hwy., Mableton, 33059</td>
</tr>
<tr>
<td>Richard Burdett (404) 941-2626</td>
</tr>
<tr>
<td><strong>SILVER WINGS SPEEDWAY</strong></td>
</tr>
<tr>
<td>5611 Riverdale Rd., College Park 30349</td>
</tr>
<tr>
<td>(404) 991-2225</td>
</tr>
<tr>
<td><strong>GEORGIA HOBBY CENTER</strong></td>
</tr>
<tr>
<td>112 Kenwood Rd., Fayetteville 30214</td>
</tr>
<tr>
<td>(404) 460-1753</td>
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(Continued on page 212)
CLODBUSTER • USA - 1 • BULLHEAD
NEW! CLODBUSTER-BULLHEAD Aluminum Ladder Frame Chassis $59.95
ESP MFG. - YOUR MONSTER TRUCK PARTS HEADQUARTERS
CLODBUSTER/BULLHEAD PARTS USA - 1 PARTS
Aluminum Ladder Frame Chassis...$59.95
Aluminum Chassis Brace $12.95
Suspension Lift Kit $10.95
Racing Suspension Kit $21.95
Quad Shock Mount Kit $24.95
Front Bumper W/Brushguard $26.95
Rear Twin-Tube Bumper $16.95
Roll Bar Lights $21.95 pr
Snow Plow Kit $69.95
Wheelie Bar $24.95
Aluminum Body Mounts $19.95
Aluminum Skid Plate $10.95
H.D. Steering Rod Kit $19.95
 Aluminum Wheels $74.95 pr
Chrome Wheels $14.95 pr
Stainless Bearing Kit $59.95
40,000 RPM Racing Motors $99.95 pr
4:1 Gear Reduction $29.95
Front Bumper $26.95
Rear Bumper $16.95
Front/Lwr Bumper $27.95
Rear/Lwr Bumper $27.95
Body Mounts $19.95
Twin-Tube Roll Bar $36.95
Light Mtng. Bar (Holds 4 Lights) $4.95
Roll Bar Lights $21.95 pr
Snow Plow Kit $69.95
Work/Display Stand $29.95
SEND CHECK OR MONEY ORDER + $4.00 S&H OUTSIDE CONTINENTAL US $10.00 S&H
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CRYSTAL LAKE, IL 6001
(815) 455-5440
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TRACK DIRECTORY
(Continued from page 204)

HAWAII
HAWAII R/C ELECTRIC CAR CLUB
1423-10th Ave., Honolulu, 96816
(808) 737-9582

COBRA
P.O. Box 27908, Honolulu, 96827
(808) 538-7255

IDAHO
VAROOM-VENTURE RACEWAY
4th & Bryden, Lewiston, 83501
(208) 743-4114

HAINAN
HAINAN BUMPER RACEWAY
1423-10th Ave., Honolulu, 96816
(808) 737-9582

ILLINOIS
AMERI-TRAC SUPERSPEEDWAY
Rte. 3, Box 242
Mattoon, 61938
(217) 234-8754

RECTOR'S R/C RACEWAY
Rte. 3, Albion, 62806
(618) 447-3282

REDLINE RACEWAY
921 Harding, Calumet City
(708) 862-8181

V.R.C.A.R.
RG's R/C, 418 W. Gallatin
Vandalia, 62461
Ron Gould (618) 283-2913

THE HOBBY HUT
1825 W. Main St., Murdale Shopping Center
Carbondale, 62901
(618) 529-4456

FAIRFIELD HOBBIES & R/C
1305 Fairfield Rd., Round Lake Beach, 60073
(708) 740-1300

C&C HOBBIES & RACEWAY
2811 W. Station St., Kankakee, 60901
Chris Robins, (815) 935-2660

CARPETBURNERS R/C CLUB
436 E. Main St. (rear), Danville, 61832
(217) 442-7466

METRO FAST RACEWAY
950 W. Irving Park Rd., Hanover Park, 60133
(217) 234-8754

WEP ELECTRONICS & HOBBIES
Box #2, 50, Lawrenceville, 62459
Bill Poe (618) 884-9048

LANE HOBBY MODELS
Rt #2, Box 50, Lawrenceville, 62459
(312) 477-3050

RACEWAY HOBBIES, LTD.
80 E. Main St., Rt. 22, Lake Zurich, 60047
Bill Palermo (312) 438-0460

HOBBYTOWN
4915 W. Rte. 120, McHenry, 60050
Luke Herring (815) 344-1777

(Continued on page 222)

Introducing the
"PULL"VERIZER
1/10th Scale Pulling Truck
Standard Features:
• Commercial-Grade Bearings Front & Rear
• Hitch
• Aluminum Chassis
• Adjustable Wheelbase
• Sealed Gearbox w/550 Motor
• Std. 90:1 Gear Ratio • 3/8-in. Rear Axle • Aluminum Rear Mounting Hubs • Tires and Wheels
NR/CTPA-Legal in 2WD Sportsman & 2WD Open I
PRICE: $249.00
Dealer Inquiries Invited
DESIGNED BY DARANCI DESIGNS, BOHEMIA, NY

COME RACE WITH US!
Our high-banked, concrete oval track is now ready for racing! 1/12th carpet track also ready. Let's go racing!!

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516-254-6229

Exclusive distributor of "Pull"verizer. Kit does not include linkages, radio, antenna, body, or mounts.

“"PULL"VERIZER..."
"I don't see any reason why the "PULL"verizer would not be competitive..."
— President, NR/CTPA

"COME RACE WITH US!"
PRO-LINE
Jet Wheels
Pro-Line USA introduced its direct-fit "Jet" racing truck wheels for the RC10 and the JR-XT at the 1991 Chicago Show. These 2.2-inch jet-black wheels will always look new, and they have a cone-dish design that keeps the dirt out. They contain a high-grade, lightweight, black nylon compound for high-impact resiliency and fracture resistance in races and heavy-use conditions.
Part nos. 2568 (front, RC10); 2569 (rear, RC10); 2570 (front, JR-X2/XT); 2571 (rear, JR-X2/XT).
Price: $7.95/pair
For more information, contact Pro-Line, P.O. Box 849, 40490 RCR 186, West Acres Professional Bldg., Steamboat Springs, CO 80477.

DARANCI DESIGN
The Pull Verizer
Daranci Design introduces the Pull Verizer 1/10-scale truck. Its Mabuchi RS550 motor has a brass, 10-tooth, 32-pitch pinion gear and is mounted to a heavy-duty sealed gearbox that has a 90:1 output ratio. The gearbox and gears are of heavy-duty nylon. The Pull Verizer's solid-aluminum gearbox adapter is designed to fit tightly onto the gearbox hub, and it will accept a 3/8-inch-diameter rear axle. It's drilled and tapped with a 9/32-inch thread for a mounting screw (to secure it to the gearbox) and for a 10/32x5/8 setscrew (to secure it the axle). Also included is a 3/8x1/2-inch steel axle that's drilled and tapped to accept 1/8x1/4 cap screws, which secure the rear wheels to the hubs. The 4x20-inch chassis is of .90-thick (approximately 1/16-inch) aluminum, and on each side, it has six countersunk front mounting holes for adjusting the wheelbase.
For more information, contact Daranci Design Inc., P.O. Box 410, Bohemia, NY 11716.

TOTAL RACING CONNECTION
Titanium Axle
Total Racing Connection's durable titanium axle replaces the stock Lynx II or Pro 10 axles.
Part no. 5661T
Price: $27.95
For more information, contact Total Racing Connection Inc., P.O. Box 1058, 2211 Charter St., Albemarle, NC 28001.

BOLINK
Pro Springs
Bolink's new front suspension Pro Springs are here! They're available individually or as a set in four different tensions: blue is light, green is medium, red is heavy and purple is extra-heavy.
Part nos. 5131-B (blue); 5131-G (green); 5131-R (red); 5131-P (purple).
Price: $2 each; $7 (four pairs).
For more information, contact Bolink R/C Cars Inc., 420 Hosea Rd., Lawrenceville, GA 30245.

UNIVAL
Solder It
Unival's Solder It silver-bearing solder paste comes in an easy-to-use 7gm syringe, and it can be activated with the heat from a lighter or a match. Designed to solder all ferrous and non-ferrous metals, Solder It is ideal for making electrical connections, joining copper pipes and repairing car radiators. It's five times stronger than ordinary solder and has a tensile strength that ranges from 10,000 to 25,000psi. Solder It is electrically conductive, and it resists stress and vibration.
Part no. SP7.
For more information, contact Unival Corp., 498E Nepperhan Ave., Yonkers, NY 10701.

LITESPEED
Tuff-Stuff Chassis Protector
Litespeed's Tuff-Stuff Chassis Protector adhesive sheets prevent the drag and wear that's caused when the chassis bottoms-out against the track. They also reduce drag at high-speeds. The 8x14-inch sheets are .010 inch thick.
Part no. 0175
Price: $6.95.
Yokomo YZ-10 Litesink
Litespeed introduces its improved Litesink motor heat sink for Yokomo C-4/YZ-10 cars. Designed for use with an upper-chassis stiffener plate, this lightweight black model has over 17 square inches of heat-exchange surface area. Litesink substantially reduces a motor’s temperature, and this provides 20 to 40 percent longer run times.

Part no. 1035  
Price: $24.95

For more information, contact Litespeed Inc. R/C Performance Products, P.O. Box 4765, Spokane, WA 99202.

ALTECH PK170 ESC
Altech Marketing’s new PK170 proportional forward-and-reverse electronic speed controller is rugged and powerful. To satisfy the demands of many stock and mildly modified motors, it delivers 120A continuous current (320A peak) in forward and 60A continuous (160A peak) in reverse. It has BEC, which eliminates the need for a receiver battery and a speed-controller servo, and it uses a Tamiya-style battery connector and 6V to 8.4V Ni-Cd battery packs. Only two adjustments are necessary to set it up for use with MRC or Futaba radio systems, so beginners will find it easy to use. Its aluminum case has metal mounting lugs that serve as heat sinks for the Mosfet output circuit.

For more information, contact Altech Marketing, P.O. Box 391, Edison, NJ 08818.

ASSOCIATED ELECTRICS New Mr. Series Modified Motors
Reedy has added new motors to its Mr. Series of modifieds, and each one includes an on-road conversion kit. The versatile kit has extra on-road springs and brushes so you can run off-road and on-road. For a broader power-band and increased efficiency, all the motors use the heat-resistant Ultra Torque Magnets, which excel under heavy loads and provide consistent power. The motors are available in a variety of double, triple and quad winds and from 11 to 19 turns for on-road and off-road applications.

Part nos. 508 (Mr. A’s 14-turn triple); 509 (Mr. L’s 14-turn double); 510 (Mr. T’s 11-turn triple); 511 (Mr. N’s 19-turn double); 512 (Mr. M’s 13-turn double).

Price: $80

For more information, contact Associated Electrics Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626.

TOTAL RACING CONNECTION Graphite Nerf Wings
These new Graphite Nerf Wings enable you to protect your car’s rear tires and axle with an offset hub. The package includes a pair of nerf wings and all the hardware that’s necessary to install them on a Lynx II.

Part no. 5206  
Price: $6.95

For more information, contact Total Racing Connection Inc., P.O. Box 1058, 2211 Charter St., Albemarle, NC 28001.
**PARMA**  
**Losi Chassis Dust Cover**  
Parma's Losi Chassis Dust Cover protects the electronics on your JR-XT or JR-X2 from dirt and grime. Made of durable .030 Lexan, the cover is clear, so it's easy to look inside. You can also paint it to match your car's body!  
Part no. 10417  
Price: $7

---

**MIP**  
**Shock Kit**  
MIP's shock kit for 1/10-scale Losi buggies has hard-coated shocks that are smooth and durable! They have less friction, and there's no leakage between the cartridge and the shock body!  
Part no. LS-20  
Price: $26.95/pair

---

**DAHM'S RACING BODIES**  
**1991 Chevrolet Lumina-NASCAR**  
Dahm's new super-aerodynamic 1991 Chevrolet Lumina NASCAR racing body (shown here on Associated's RC10L) fits 1/10-scale on-road cars. This lightweight .030 GE Lexan body has an authentic, bolt-on, adjustable rear spoiler (including mounting bolts), screened vents, hood pins, trunk pins, windshield clips, rear-window straps and 3-D intake vents on the side windows.  
Part no. D133  
Price: $19.98

For more information, contact Dahm's Racing Bodies, P.O. Box 360, Cota, CA 94931.

---

**Mylar Decals**  
With Parma's three new 6x8-inch Mylar decals for 1/10-scale cars you can win in style! Finish your Pontiacs with the Heinz Ketchup or Country Time sponsor sheets and your NASCAR "stackers" with the Winston fender decal. Just cut along the dotted lines, and cover the entire fender with all the decals at once!  
Part nos. 10684 (Heinz); 10687 (Winston fender); 10689 (Country Time).  
Price: $4

For more information, contact Parma International, 13927-PR Progress Pky., N. Royalton, OH 44133.

---

**MRC**  
**Nissan 300ZX IMSA GTO Racer**  
MRC/Tamiya's 1/10-scale Nissan 300ZX IMSA GTO Racer will astound you. Its chassis is made of a new, engineering plastic, and it's FRP T-plate provides stiffness where it's needed, but it flexes to give optimum handling. You can control the Nissan's new Sport Tuned 540 motor with its three-step forward-and-reverse mechanical speed controller or an optional electronic speed controller. It has a spring front suspension and an oil-filled, coil-over shock damper in the rear. The rear-axle brace is mounted on an FRP T-bar plate that flexes with the track's surface, and you can adjust the shock-damper plate for track conditions, too. The new transmission is a ball differential, so you can adjust the amount of "slip" that occurs. Ball bearings are used on the rear axle, and oilless metal bushings are used on the front axles. The Nissan's polycarbonate body is detailed and aerodynamic, but the car's new three-point adjustable wheelbase can also accommodate other Tamiya on-road bodies (optional).  
For more information, contact MRC, 200 Carter Dr., P.O. Box 267, Edison, NJ 08818.
NEW PACE CAR
10 LIGHT SET

Add the excitement of a Pace Car to your collection of car bodies. This set includes:
- #RED 19 Headlights with aluminum reflectors.
- 2 tail lights with red lenses, 4 flashing hazard lights with amber lenses, and a #RED 07 Light Bar with 2 flashing bulbs and an adjustable rate flasher all wired into one system.
- 8 RED 19 Headlights with aluminum wheels.
- 4 Cell Pack for power.
- Battery or a 6 or 7 cell car nicad pack for power.

$49.95

1/2 PRICE OFFER

RAM wants to encourage all races and events to begin with pace laps to set an air of excitement! Club presidents and track operators are invited to order ONE Pace Car Set directly from RAM at 1/2 price, $25.00, plus $3.00 U.P.S. Use club or business stationary for all orders.

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800 River Dr., Byron
Jim Haynes (815) 334-5055
or Bob Falk (815) 334-5163

M/C

(Continued from page 212)

TEEN TOWN
105 N. 13th, Herrin

MARTY'S R.C. HOBBIES
1335 E. Broadway, Bradley, 60915
(618) 933-8441

CHICAGOLAND HOBBY
6017 Northwest Hwy., Chicago, 60631
Greg (312) 775-4868

Hobby Hut
22 Naiman V., Granite City, 62040
Roy Koberna (618) 451-7330

THUNDER ROAD 31 RACEWAY
MACHESNEY PARK RACEWAY
BYRON AREA RADIO RACERS

INDIANA
BLAZEN' RACEN' RACEWAY
Old U.S. 30, P.O. Box 6
Hamlet, 46032
(219) 897-1324

MOORESVILLE R/C HOBBY
9201 S. St. Rd. 57
Camby, 46113
(317) 831-8877

Hobby Barn Raceway
1930 Springfield Road
Terre Haute, 47802
(812) 299-5773

RACE STREET RACEWAY & HOBBY
1126 W. Race St., New Castle, 47362
John & Dick (317) 521-4888

SOUTHERN INDIANA MODEL RACING ASSOCIATION
413 Conlon Rd., Bedford, 47421
(812) 275-1958

CC HOBBY & SPEEDWAY
R.R. 1, Box 68, Francesville, 47946
(219) 567-2447

WILDWOOD ACRES CAMPGROUND
50520, 300N, Hartford City, 47348
Don Bole (317) 348-2100

BREMEMAN BANDITS R/C RACING CLUB
BREMEM HOBBIES
308 N. Bowen, Bremen, 46506

GONZOE RACEWAY
Chesterfield, Jeff (219) 326-4341
Ruben (219) 348-5409

GOSSEN R/C OFF-ROAD RACING
Tim's Hobby Shop, 1922 Elkhart Rd.,
Goshen, 46526
(219) 534-1992

MIDDLEBURY R/C CLUB
Flying High Hobbies Ina,
304-N. Main, Middlebury
Steve or Sharon Mattern
(219) 825-2128

TRI-COUNTY RACEWAY & HOBBIES
RL 4 Hwy 50E, Washington, 47501

EAGLE HOBBIES
24968-A C.R. 6, Elkhart, 46514
Pat/Kathy Sapikowski (219) 262-2066

KOKOMO HOBBY & RADIO RACETRACK
1704 E. Sycamore, Kokomo, 46901
(317) 457-5050

RUSHEL OUTLAW DIRT DOLL
Rt. 4, Rustville
Steve Shoppe (317) 329-3407

(Continued on page 226)
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(813) 786-7135

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IOWA

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805 South Jerome, Algona, 50511
Mike Beisch (515) 295-9052

JAM RACEWAY
Osceola County Fairgrounds
Sibley, 51249
Joe Schilling (712) 754-2017

IOWA OFF-ROAD RACING CLUB
P.O. Box 22052, Des Moines, 50322
Ron Boone (515) 987-1184

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421-26th St., Marion, 52302
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P.O. Box 1213, Storm Lake, 50588
Rick Fix (712) 732-4555

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MORE TRACK DIRECTORY