

SAFETY UPGRADES FOR DRIVER PROTECTION

CIRCLE TRACK

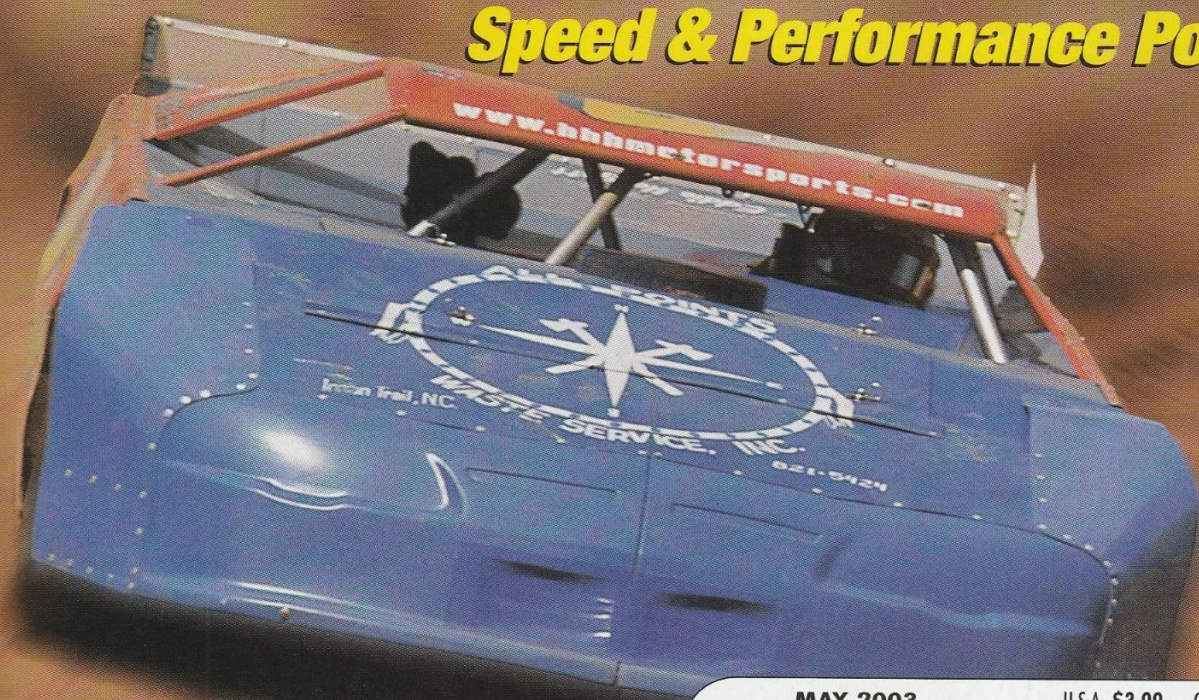
& RACING TECHNOLOGY

- *Understanding Bumpsteer*
- *Race Car Dynamics*

Tech Tips For

WEEKEND WARRIORS

Speed & Performance Pointers



MAY 2003

U.S.A. \$3.99 Canada \$4.99

MORE RACING TECH AT

www.circletrack.com

A PRIMEDIA Publication



*Second in a Two-Part Series
By Jeff Huneycutt*

Installing a Prefab Body

Last month in the first chapter of “Installing a Prefab Body” we covered everything from stripping an old body off a car, to reconfiguring the rollcage, to trimming the hood. When we left it, Mark Davis and his students at the Carolina Motorsports Tech Center in Conover, North Carolina, had the Chevrolet Late Model Stock body from Aluminum Racing Products (ARP) in place and ready for paint—which is where we will pick up for Part Two. The heavy lifting is done; now it's time for the detail work. This story will cover the final touches: installing the windshield, windows, grille, radiator and radiator box,

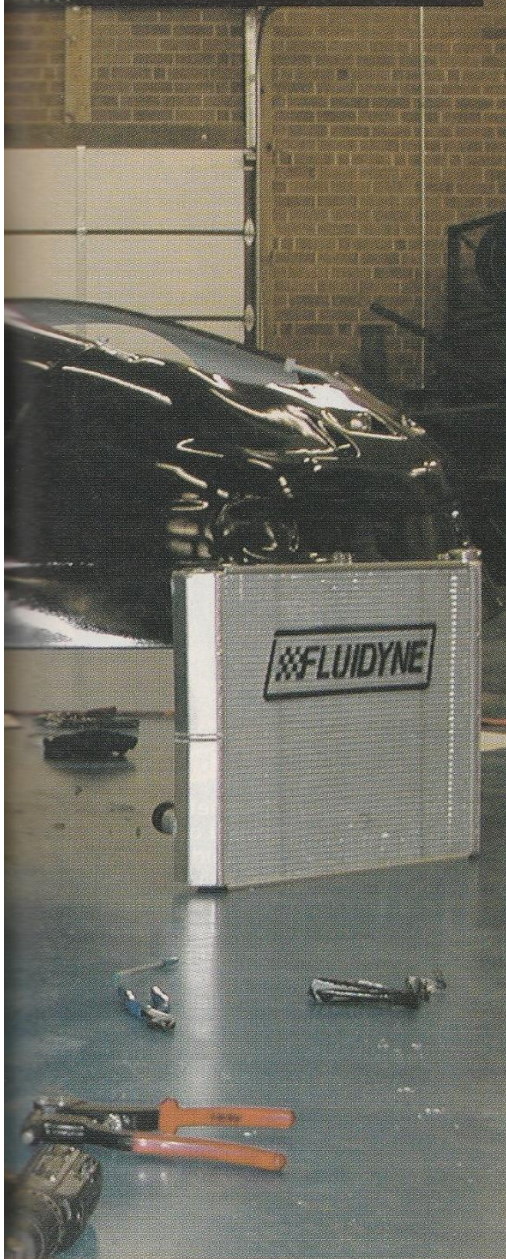
crush panels, and the rest of the body supports.

First on the list, though, was a new coat of paint. If you have time, this is actually a good point to stop the progress on the body and put on a new coat of shine. The windshield (although it was cut to shape in Part One) and windows were not in place, so there was no chance of overspray getting on them. Likewise, the window straps, grille, and other assorted pieces were not yet on the car, so they did not have to be removed or taped over. Mark Kerttula of PitPaint.com drew up a really racy scheme and handled the spraying duties. Many racers remove the

body panels from the car before painting, but because Kerttula's design features several curving lines that run from the front bumper to the back, he felt it was easier to paint the body with it mounted in place on the car. This is the situation where not having a lot of pieces that require removal or taping off is a big plus.

After the Sherwin Williams paint was laid down, the car was loaded back up (very carefully, this time) and towed back to the Carolina Motorsports Tech Center. Davis says there is no specific order when it comes to the rest of the work required to get the car into racing shape. So, we began by installing the

Part One of our body hanging story involved just that: hanging the body. Part Two involves making everything right.



JEFF HUNEYCUTT

body brackets and fitting up the crush panels to seal the driver's cockpit from the underside of the car.

BRACKETS AND CRUSH PANELS There are many versions of brackets out there used to hold sheetmetal and fiberglass body panels in place, and they are all effective. In our case, we used lengths of $\frac{3}{8}$ -inch, 0.035-wall steel tubing. The chassis was built with attachment tabs welded in strategic locations, so we used them exclusively. Flatten the ends to create tabs and bend them to the angles you need. Davis prefers to put in no more brackets than necessary to hold the body in place. "If you have too many, especially on the



First we took the car to our painter, Mark Kerttula of PitPaint.com, for the full-shine treatment. Here, Kerttula puts the finishing touches on the design scheme with a few decals.

JEFF HUNEYCUTT



Roy Vaughn starts on the crush panel to separate the driver's compartment from the right-rear wheelwell. Building crush panels requires plenty of time and careful measurements, so go ahead and get the car up where you can be comfortable and it's easy to see what you are doing.

JEFF HUNEYCUTT

Safety First

superior products for the serious competitor

Starting at \$90



Stroud Safety 5-point restraint systems offer you the protection you need. Our certified belts come in many styles and colors featuring Latch and Link or Cam-lock releases. At Stroud Safety, our apparel and accessories are manufactured in the USA to the highest standards with the finest materials backed by our excellent customer service.

Contact us for more information on these and other quality racing equipment, and ask about our free catalog.

We always Re-Certify Stroud Safety Restraint Systems.

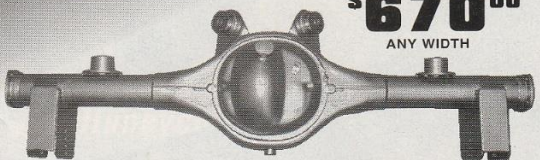
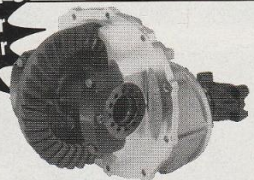
STROUD

4101 S. May Ave., Oklahoma City, OK 73119
405-632-2022 • www.stroudsafety.com
1-800-554-4648



REAR GEARS

Free T-shirt
with 3rd Member
or Housing Order
Offer Good to
Feb. 2003



\$670.00
ANY WIDTH

starting at **\$439.00**

THIRDMEMBER

Meticulously Assembled
and Ready to Install

- Choice of ratio: 3.00, 3.25, 3.50, 3.64, 3.70, 3.89, 4.11, 4.22, 4.30, 4.57, 4.71, 4.78, 4.86, 5.00, 5.14, 5.25, 5.29, 5.37, 5.43, 5.57, 5.67, 5.83, 6.00, 6.14, 6.20, 6.33, 6.50, 6.66, 6.83, 7.00, 7.16, 7.33
- Solid Pinion Spacer (not a crush sleeve)
- Stainless Steel Yoke Seal Surface
- Quality Timkin Bearings
- 28 or 31 Spline Forged Mini Spool with Chrome Moly Pin
- Shipped in a JAZ Storage Case

9" FORD HOUSING WITH AXLES

Includes Housings With Moser Axles, Bearings, Studs & Retainers.

Brackets Extra. Drum & Disk Brakes Available.
Bolt in 9" Housing for GM's & Mustangs also available.

- OPTIONS:**
- Daytona Pinion Support...add \$100
 - Ultra Lite Full Spool...add \$150
 - Posi-Traction & Black Gold Carriers Available
 - 3.25" U-joint Yoke...add \$35

Over 25 Years Experience
636-861-3900
Danny Miller's Rear Gears
923 St. Louis Ave. • Valley Park, MO 63088
We Have The Ford Parts You Need!

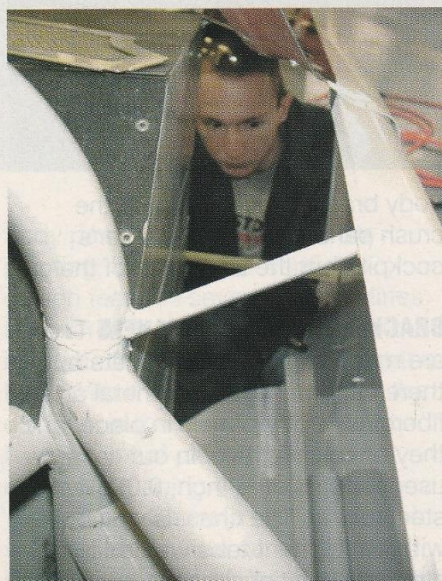
Installing a Prefab Body

corners, it can make the body too stiff," he explains. "When the action gets tight, there's going to be some bumping going on. Whether you are bumping somebody with your front bumper or getting hit from behind, you want a little give. If the corners of the car are too stiff, it can be too



Before cutting any sheetmetal, make a pattern out of cardboard or posterboard. It's a lot cheaper and easier to work with. And remember, unlike the final crush panel, getting the pattern right on the first cut is not your goal. Work your pattern until you get it perfect. Don't be afraid to use as much tape and as many patch pieces as you need. The finished product is the only thing that matters.

JEFF HUNEYCUTT



The crush panels needed to seal the driver's compartment from the engine bay are pretty large, but fortunately, it's a simple flat panel. As always, taking your time with your measurements makes the process faster overall and saves a lot of headaches.

JEFF HUNEYCUTT

Photographers:

Do you shoot great local track action?
Then CIRCLE TRACK can use you!
Please send samples to CIRCLE TRACK Action,
3816 Industry Blvd.,
Lakeland, FL 33811
(CIRCLE TRACK cannot return photos unless provided with a self-addressed, stamped envelope.)



You can see the final shape of the front crush panel as Chad Dale measures off where he wants to place the pop rivets to secure the panel. A raised bead 2 inches from the edge gives the panel additional rigidity without a weight penalty.

JEFF HUNEYCUTT

easy to get spun." From there it was on to what is universally accepted as the most hated part of race car building: crush panels.

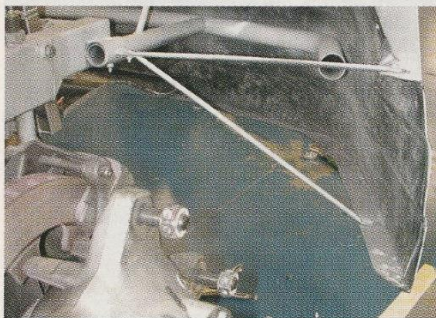
"Building crush panels really isn't all that hard, but for some reason most people hate doing it. It just takes patience," Davis says. "When you start, you have to visualize what you want the finished product to look like, and try to think about how you want the panel to attach to the rest of the car. Don't cut a panel just to fill a hole and not have any overlap where you can pop rivet it into place. The final panel doesn't have to produce an air-tight fit, you can seal it off with a bead of silicone, but I try to make sure I have no gaps any larger than 0.010 of an inch."

When cutting crush panels, make sure you have a good supply of cardboard or, better yet, thick poster paper, on hand. You can cut pieces away and tape them back on as much as you like until you get the shape that's a perfect fit, and it's a lot cheaper than going through several sheets of aluminum. Once you are happy with your cardboard pattern, use it to trace the shape onto a piece of aluminum (or steel if you prefer) sheetmetal and cut it out. If this is your first attempt at building crush panels, you may want to give yourself a margin for error and cut a little on the outside of your markings. Use a bead roller to run a bead approximately 2 inches from the edge all the way around the piece. This gives the panel additional strength at the



Here is a good look at the finished crush panel. There are no major gaps, and the whole thing can easily be sealed with a bead of silicone.

JEFF HUNEYCUTT

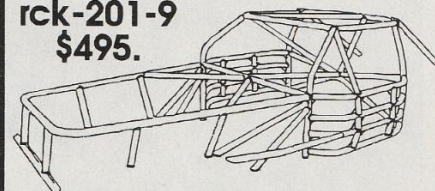


Braces for the body panels are constructed out of 3/8-inch tubing with the ends pressed flat to provide good mounting points. Mark Davis of Carolina Motorsports Tech Center prefers keeping brackets to a minimum so the body will give before traction does in the event of contact with another car.

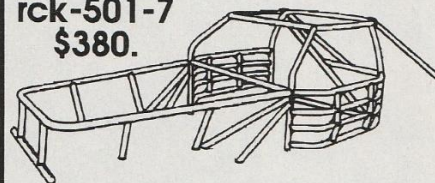
JEFF HUNEYCUTT



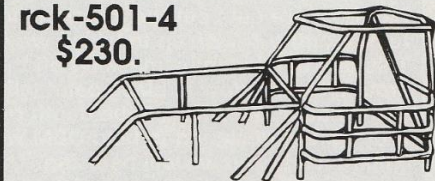
rck-201-9
\$495.



rck-501-7
\$380.



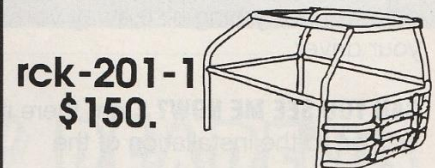
rck-501-4
\$230.



rck-201-3
\$215.



rck-201-1
\$150.



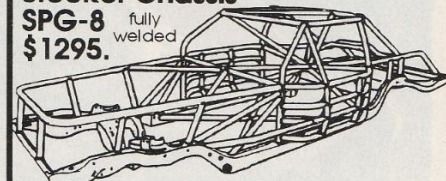
catalog \$3 or view online



basic cockpit tin kit \$195.

\$50. seat mount kit

Stocker Chassis
SPG-8 fully welded
\$1295.



Roll Cage Kits & some Chassis' ship the same day.

Tubing 1 3/4" x .095 CREW

Chassis' & Kits also available for Trucks & Mini-Stock

www.cscracing.com

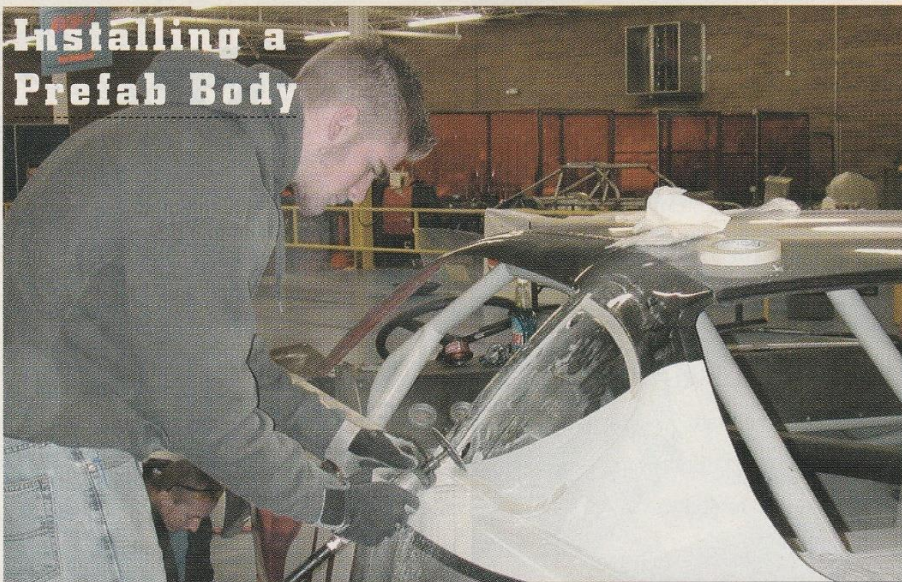
CSC Racing Products Inc.

125A H. Walker Pkwy., Newmarket, Ontario, Canada. L3Y 7B3

toll free ordering 1-866-954-0521
general inquiries 1-905-954-0521

all prices in US Funds effective April 1, 2003

Installing a Prefab Body



R.J. Beshore cuts out the locations for the side windows. Masking tape is used to mark off a $\frac{3}{4}$ -inch lip to which we can securely pop rivet the Lexan window. This can be hidden by masking off the Lexan and painting a 1-inch border around the window in black paint (eliminate scratches by painting the inside of the window). Also notice the depth of the lip where the rear window meets the roof. This is designed to hold OEM window glass and is much too deep for the 0.060-inch Lexan we will be using. This will have to be shimmed to make the rear glass flush with the top of the roof.

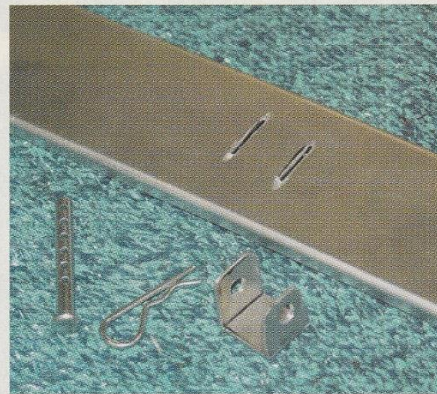
edges where it will have to attach to the car. Finally, a bead of silicone—especially on crush panels that separate the cockpit from the engine bay—helps keep carbon monoxide, dirt, and everything else away from your driver.

CAN YOU SEE ME NOW? From there it was on to the installation of the

windshield and windows. Up front, the safety Lexan is $\frac{1}{8}$ -inch thick; for the rear window and side windows behind the C-pillars 0.060 Lexan is used to reduce weight. As mentioned in the first installment, NASCAR requires a stock roof for Late Model Stock racing, and the lip is recessed to fit OEM windshield glass, which is too deep for the

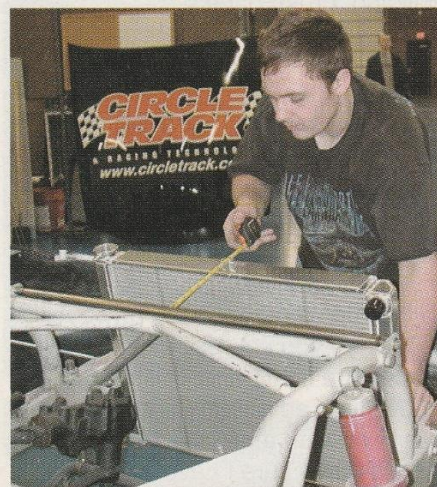


Our rules say the rear glass has to be held in place by two straps that must be bolted to the car. Our back glass has been cut to fit the rear window opening and is ready to be pop riveted into place. Because the lip at the top had to be shimmed to get the Lexan to sit flush with the roof, Mike Evans has to use button-head bolts where the Lexan connects to the roof. Notice also how a small break at the bottom of the window straps—made from 0.060 aluminum—helps them follow the window better and still sit flat against the rear deck.



Davis has his own method for securing the radiator in the race car in a way that is also easy to remove. It is simply a $\frac{1}{4}$ -inch hitch pin, clip, and a homemade aluminum bracket that slides through two slots in the radiator's top plate. Once the bracket is TIG-welded in place, it makes a secure attachment point.

CYNTHIA DAVIS



The top of the radiator is held in place with a single bar that fits into the aluminum horseshoe bracket and is locked in with the hitch pin. Here, Evans measures the length of tubing he will need to fabricate the top bar.

JEFF HUNEYCUTT

Lexan we are using. So, for the tops of the front windshield and back glass, spacers had to first be pop riveted into place so the Lexan would sit flush where it meets the roof. This is not necessary on the side windows because they fit into ARP's fiberglass panels. Everything is then pop riveted into place (Davis uses only steel-shank rivets, available from Fastway Racing Products, throughout the car because of its higher shear strength).

The front and back "glass" must also be secured in place by two exterior straps. Our rules say they

JEFF HUNEYCUTT

Installing a Prefab Body

Davis creates the floor of the radiator box. The sheet of aluminum is cut to the width he needs but is left slightly too long. The break is actually the rear of the box where it will attach to tabs on the frame holding the radiator. A piece of 6-inch PVC pipe mounted on a frame makes the perfect apparatus for creating large-radius bends.



JEFF HUNEYCUTT



The Service You Need, the Quality You Demand!

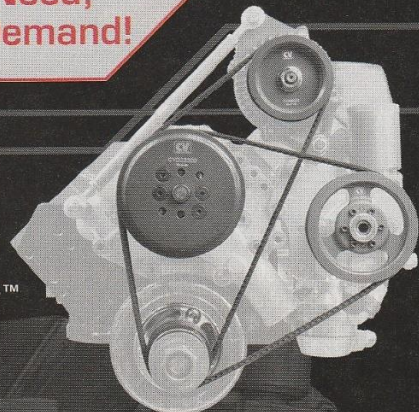
©2003 CV Products Inc.



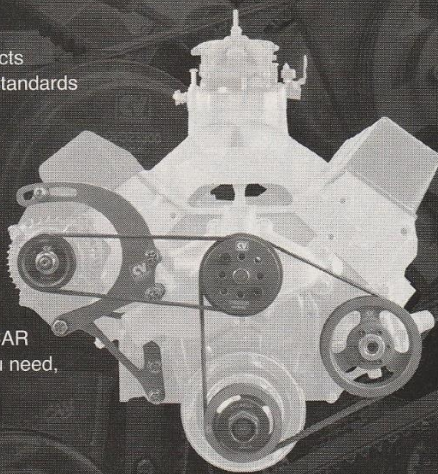
Developed with input from engine builders at all levels of racing, from the grassroots to NASCAR Winston Cup, the drive components of the future are here today with the new S-Drive™ and V-Drive™ systems and components.

- CNC-machined from premium 6061-T6 billet aluminum for maximum strength and minimum weight
- Designed to precisely match the rib design of Goodyear's Gatorback Poly-V™ serpentine belt
- Unique hard anodizing procedure provides longer life and minimum wear
- TIR (total indicated run-out) on all CV Products pulleys far exceeds industry quality control standards
- Custom machining services available upon request

Through our in-house engineering department along with strategic partnerships with other industry-leading manufacturers, we are able to provide anyone with the same technology used by the top race teams. With a huge available inventory of Drive System configurations from Late Model Stock to NASCAR Winston Cup, CV Products has the service you need, the quality you demand!



CVD93310 – SVO Ford Serpentine (Twin 5-Rib)



CVD93221 – SBC Serpentine (Low mount power steering)
Shown with Optional Alternator Kit
CV22225 / CVD93225



Custom machining services available

NEW CV Products Drive System Catalog now available!

Pick up your free copy of the New CV Products' 2003 Drive System Catalog. An indispensable resource for everything you need to know about CV's S-Drive™ and V-Drive™ Systems and components including pulleys, gears, brackets and belts.



800.448.1223
cvproducts.com



42 High Tech Boulevard Thomasville, NC 27360 336.472.2242 336.472.2204 Fax

THE CURVES HAVE IT

ILLUSTRATION A

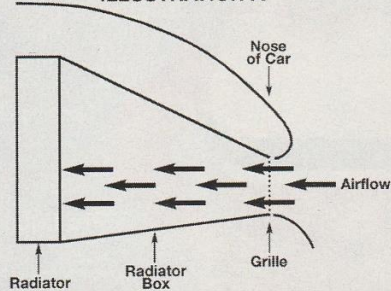
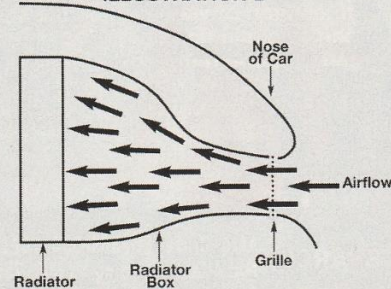


ILLUSTRATION B



Flowing air has mass and reacts in predictable ways. Aerodynamicists take advantage of air's properties with the help of multi-million dollar wind tunnels and advanced computer modeling, but to get more flow to your radiator all you need is to understand a few simple concepts. Air will cling to most surfaces just like water (stick your finger under a faucet of running water for a good illustration). It will follow a curve but separate from the surface if it hits an angle. A radiator box with a flat top that angles down from the top of the radiator to the top of the grille does little good at getting air to cool the top of the radiator—incoming air simply breaks away at the angle where the grille and radiator box meet and keeps moving straight ahead (see Illustration A). But air will follow a top panel that meets the incoming air at the same angle it is traveling and then gently slopes up to the level of the top of the radiator. Additionally, you can create even more flow by using the top and bottom panels to create a venturi and increase airspeed in the radiator box. It's the same principle as what's going on in the carburetor throat (see Illustration B).



Davis test-fits the first section of the radiator box to make sure he is getting the curve he wants. This photo gives you a good idea of how the floor of the radiator box is shaped as well as how the top bracket holding the radiator in place is built.

JEFF HUNEYCUTT

must also be bolted into place. We used thin aluminum strapping bolted into place with button-head screws to meet regulations and keep the exterior profile as smooth as possible. On the inside of the rear window, aluminum brackets were fabricated to hold the bottom of the rear window in the desired location. At speed, low pressure air rushing past the rear window will try to pull the thin Lexan out and cause it to almost bubble out. The brackets simply help the 0.060 Lexan maintain the desired shape.

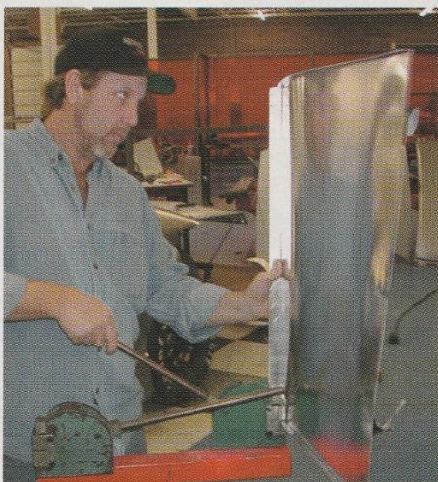
THE COOL FACTOR The most complex part of this install was the radiator, grille, and radiator box. The grille itself was easy: ARP makes an inexpensive grille insert that simply rivets into place once you have cut the marked opening out of the bumper cover. Davis likes ARP's grille design because it does not sit flush against the exterior of the bumper cover, but is recessed about an inch with a radius leading to the opening. That helps direct air into the opening instead of allowing it to slide off the sides. Davis says this design is effective enough that you can actually see a difference in engine coolant temperatures with no other changes.

"That radius leading to the recessed grille, from my experience, will lower the coolant temperature an additional 20 degrees under race conditions," Davis says. "That's a big deal to me, because now I have a



To provide strength and a place for the box's sides to be attached to the bottom, a lip is turned up on both sides with the help of a sheetmetal brake. This, of course, flattens the curves that have just been put in the sheetmetal.

JEFF HUNEYCUTT



You can still slightly see where the curves have been in the sheetmetal, so Davis works the edges on the shrinker/stretcher until he gets the shape into the panel he had before.

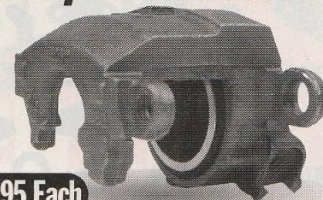
JEFF HUNEYCUTT

LEADING BRAKE PERFORMANCE

- Billet Calipers • Racing Rotors
- Master Cylinders • Brake Pads
- Fluids



New Brake Technology for Steel Caliper Classes!



\$79.95 Each

GM Metric Caliper With Oversized 2 3/4" Piston Provides As Much As 20% More Caliper Clamping Force.

U.S. BRAKE is now offering steel GM Metric Calipers to improve your braking performance where rules require factory steel brakes. These steel metric calipers feature a 2 3/4" oversized (stock is 2 1/2") piston for increased clamping force. This allows for more brake system tune ability for pavement or dirt track racing. These are a direct replacement fit.

GM Metric Caliper in stock at:

AFCO Racing Products	800-417-7441
Bernheisel Race Components	800-426-2570
Dirt Works	417-465-2410
Ellis Race Cars	317-485-6497
Harris Auto Racing	800-833-5174
Hole Shot Engineering	727-546-3541
J.C. Dubil Race Car Parts	563-359-3434
J & J Motorsports	800-223-2496
JR Motorsports	888-771-5574
Lane Automotive	800-772-5266
Lou Fegers Racing Equipment	800-328-3618
Race Mart	660-465-2069
Total Race Supply	613-938-6027
Townsend Racing Products	804-798-8168



P.O. Box 626 • 975 Hyrock Blvd.
Boonville, IN 47601

Toll Free: 1-866-369-2643 • Fax: 1-812-897-7656
email: sales@usbrake.com

CHASSIS COMPONENTS FOR ALL RACING NEEDS



CALL TODAY FOR YOUR CATALOG
1-800-473-1730



19033 174TH AVENUE • SPRING LAKE, MI 49456

616-846-1730

1-800-473-1730

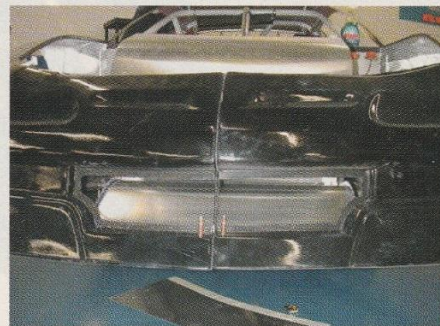
Find us on the Web!

www.aa-mfg.com racing@aa-mfg.com

Installing a Prefab Body



Once the floor and roof of the radiator box have been fabricated, it is easy to see how the curves will create a venturi effect and lead the incoming air across the entire surface of the radiator. All that's left to do is trace the curves on a piece of cardboard to create a pattern and cut out the side panels.



Up front the grille opening has been cut out. The recessed opening for the grille and the radius that surrounds it help guide air into the radiator box and increase flow to the radiator. Notice the center ribs of the front bumper cover have been left in place to keep from weakening the cover too much.

JEFF HUNEYCUTT

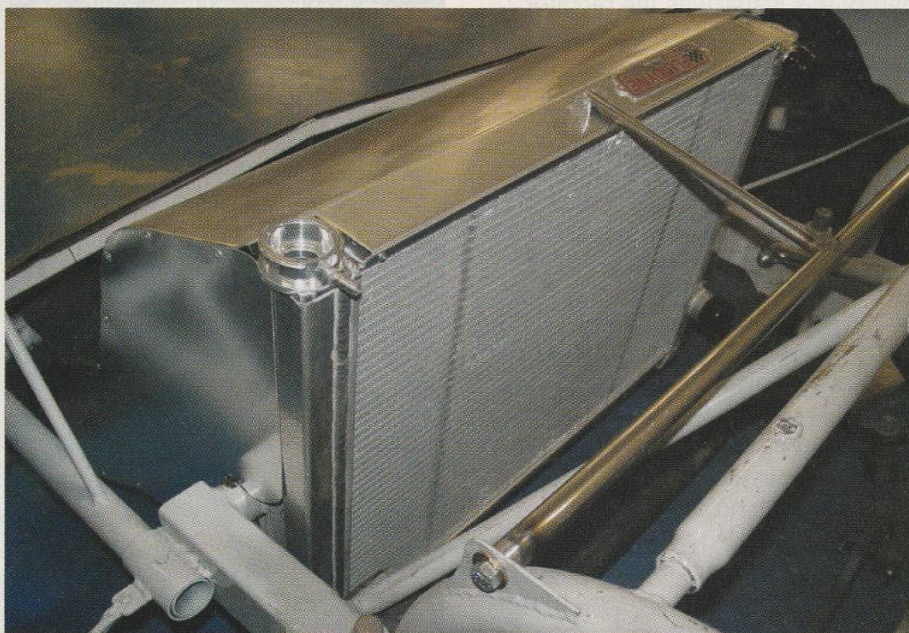
JEFF HUNEYCUTT

cushion. To get the water temperature back to 220, I can put more tape on the car, which will give my driver more downforce. It's pretty simple: The more efficient you can make your cooling system the more you can close off the radiator opening. That gives you more downforce, which makes for a better-handling race car."

Continuing that quest for an efficient cooling system, we installed a 28-inch radiator from Fluidyne. This unit is made for Sportsman-level racing, so it is compact but very efficient. Of course, to get the most air to the radiator it has to be in the front of the car, which also

makes it a prime candidate for wreck damage, so it needs to be mounted in such a way to make removal and replacement as easy as possible. Our radiator sits in a pair of brackets welded to the frame and is held in place at the top by a single bracket. In the event it gets damaged during a race, all that has to be done to replace it is remove the hoses, unplug the electric fan, remove the single hitch pin holding it in place at the top of the radiator, and yank it out. All the race team needs to get back on the track is a new radiator and a jug of clean water.

With the radiator in place and the



The completed radiator box seals the area from the grille to the radiator nicely, yet is not physically attached to the radiator.

CYNTHIA DAVIS

grille opening cut, it was time to connect the dots with a radiator box. Throughout this buildup, Davis has reminded us that "air is the only thing you get for free, so you had better take advantage of it." When it comes to the radiator box, it's no different than the body. A box with straight walls does not direct the air where you want it to go or otherwise try to take advantage of how the incoming air strikes the radiator. For example, compare the size and location of your grille opening to the size and location of the radiator. After a tough race in traffic you should notice tire-rubber buildup on your radiator. That rubber gets to the radiator through the grille just like the cooling air; if it is concentrated in one area and not evenly distributed across the radiator, then you also aren't getting even cooling across the radiator fins. In other words, you aren't getting the most cooling power your radiator can produce.

An easy solution is to create a venturi in your radiator box. Davis does this by curving the floor and roof of the radiator box inward and then out—much like a carburetor throat. This not only increases airflow to the radiator, but it also causes the incoming air to follow the roof and floor of the box, increasing flow to the top and bottom of the radiator that normally do not see enough air. The sidewalls are flat since the width of our grille matches the width of the radiator. The box is attached to the bumper cover as close to the grille as possible with pop rivets. To allow easy removal of the radiator, the big end of the box is not attached directly to the radiator but to two tabs on the frame that the radiator

sits in. This setup also minimizes the connections between the front bumper and the rest of the car. If the front end gets crushed, the radiator box probably will too. Simply rip off the front bumper cover and the radiator box should come with it.

Once the radiator system was installed, our bodywork was nearly

complete. There's still a lot to be done on the car before it will be ready to race again—like a new engine, suspension components, and a driver's compartment upgrade—so keep an eye out in future issues of CIRCLE TRACK for the continuing evolution of our NASCAR Late Model Stock. **CT**

SOURCES

Aluminum Racing Products (ARP) •
888/245-1468 • www.arpbodies.com

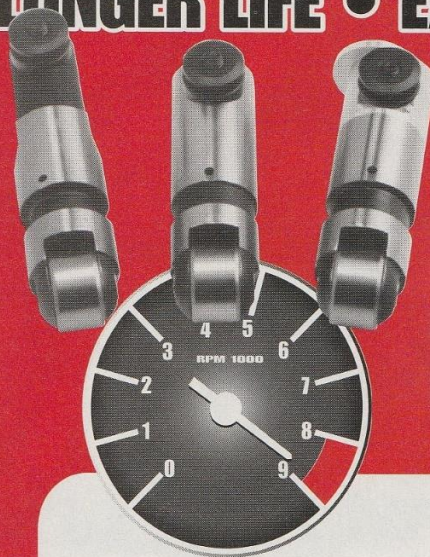
Carolina Motorsports Tech Center •
866/459-2758 • www.carolinateteamconcept.com

Fastway Racing Products • 800/447-9353 •
www.fastwayracingproducts.com

Fluidyne • 888/358-4396 • www.fluidyne.com

PitPaint.com • 704/907-8101 •
www.pitpaint.com

LONGER LIFE • EXTENDED RANGE



NEW!

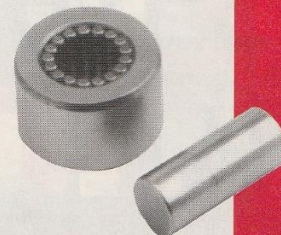
RED ZONE™

Maximum Endurance Roller Lifters

From ISKY

RED ZONE™ Roller Lifters feature the new **Marathon™** Roller Bearing—the bearing that keeps on rolling longer!

Marathon™ Bearings utilize a larger diameter pin and a shock absorbing thicker outer race for higher fracture toughness!



← Smoother finish, **Alloy steel body** repels scuffing. **Fully Rebuildable!**

← Exclusive **Full Spectrum 3 Point Oiling System** features continuous dual action pressurized lubrication!

Test Proven RED ZONE™ Safe! Tested via the most rigorous real world test standard, **Spintron Test II.**

Available for most popular oval track and drag race applications.

"Do It Right ... Race with the Legend"

ISKY

RACING CAMS

16020 S. Broadway • Gardena, CA 90247
fax 310-515-5730 • www.iskycams.com

323-770-0930

Call or write today for our **FREE Cam Brochure**. Send \$5 for our giant 200 page master catalog. Our products are available factory direct or through your local dealer.