

HIGH-TECH BRAKING SYSTEMS FOR TODAY'S HOT RODS & MUSCLE CARS

Long gone are the days when performance meant straight-line speed alone. Today's hot rodders and muscle car enthusiasts are building increasingly sophisticated chassis, some nearing road-race capabilities, and they expect no less of their brakes. **BY JOHN F. KATZ**

BUILDING A PROPER BRAKE SYSTEM comes down to balancing a simple equation: Increased performance equals increased demand on the brakes, according to **Mark Campbell** of **MBM Brake Boosters** in Asheville, North Carolina.

This makes perfect sense; the faster your engine can wind up the speed, the faster your brakes need to be able to wind it back down. The last thing you want is the situation Campbell described as "all go and no 'Whoa!'"

Fortunately, the aftermarket offers a dazzling array of road anchors, from the economical-but-effective to the big-disc/big-performance variety. Some OEM-style electronics are even beginning to creep in, albeit slowly. But before we get into substance, let's take a look at style.

COLOR ME STOPPED

As much as go and whoa, hot rodding is about show. Those finned aluminum drums that started appearing on open-wheel roadsters circa 1960 not only stopped better but looked as cool as a leather jacket and blue jeans. Today's

fashion for big-diameter, forged-alloy wheels with lots of open space between the spokes has bared the brakes on every kind of car, from T-buckets to Buick Grand Nationals, and enthusiasts like to fill that space with big rotors and colorful calipers.

"Customers do value aesthetics in applications where the brakes are visible," said **Ron Duncan** of **Classic Performance Products Inc. (CPP)** in Anaheim, California. "This is not to say that they would sacrifice performance for aesthetics, but it's important to them that their ride looks good as well as performs well, and if it doesn't look sexy as heck, you're not going to put it on a \$100,000 show-stopper. Occasionally, you will find a customer whose vision is all about aesthetics and then it's good to understand what their vision is."

"Our experience indicates that appearance is critical for many of our customers who buy the larger street kits," said **Ken Hale** of **Wilwood Engineering** in Camarillo, California. "Red calipers comprise the majority of sales for those kits. Recently, we introduced our Quick

Silver nickel-plated calipers, which have rapidly become a favorite among our racing customers."

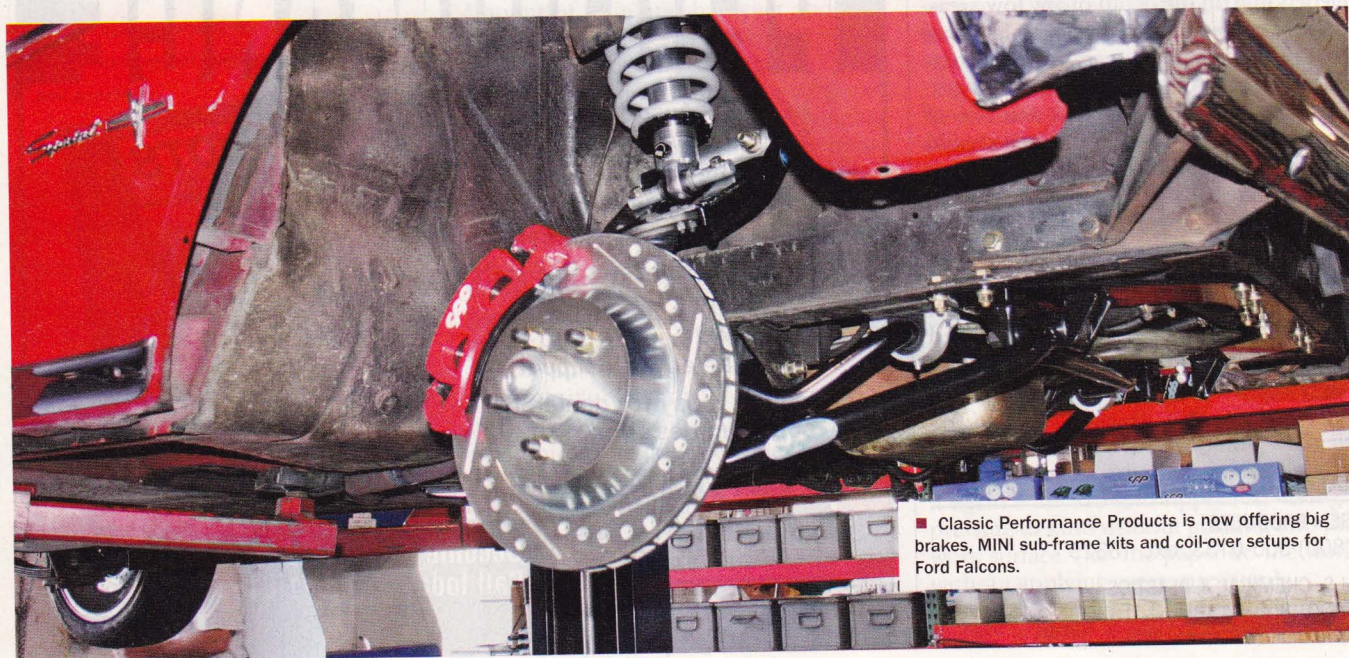
Hot rods, customs and muscle cars "take on the artful expression of the owner, so aesthetics are very important," said **Gabi Baer** of **Baer Inc.** in Phoenix. "When customers have already spent show-car money on the engine, paint and wheels, the brakes are just as important to complete the overall look. Most customers want a caliper color that will pop behind the wheel, and so we've introduced more powdercoat options. One of our more popular colors is a transparent candy red that we call Fire Red. It is unique and really draws attention to the brake behind an open wheel."

Campbell of MBM noted the practical advantages of powdercoated calipers.

"Powdercoating provides extra protection from the elements with a great-looking durable finish," he said. "We offer MBM calipers by Wilwood in black and red, which seem to be the leading, trendy colors."

Also popular is color-matching the calipers to the paintwork on the car, "but

» STORY CONTINUED ON PAGE 28



■ Classic Performance Products is now offering big brakes, MINI sub-frame kits and coil-over setups for Ford Falcons.

« STORY CONTINUED FROM PAGE 26

if you decide to do this, have the calipers professionally powdercoated, or at least use a high-temperature caliper paint," Campbell recommended. Brake calipers get hot, so "leave it to the pros, or buy stock colors out of the box," he advised.

"Aesthetics will always be one of the prevailing factors in the hot rod market," said **Brian Shephard of Currie Enterprises** in Corona, California. "We don't see a clear preference for any particular color or style, but we do see that brake manufacturers are providing many more color and styling options."

ADVENT OF ABS?

The technology of aftermarket brakes is also evolving. Anti-lock (ABS) electronics are now nearly universal on OEM vehicles. Other computer-controlled features such as electronic brake-force distribution (EBD) and brake assist (BA) are expanding rapidly, and some high-end cars even incorporate radar braking into smart cruise control. How soon should we expect the hot rod and muscle car market to start demanding these features as well?

The answer depends heavily on which segment of the market.

"These technologies will and are finding their way into the hot rod and muscle car industry," Duncan said. "Many people are already using LS engines with computer controls, so it certainly follows that sophisticated electronics will show up in braking systems as well. Plus, there are always pioneers in our industry who will push the limits of performance by using the latest technology."

Hale of Wilwood agreed.

"Market-based evolutionary forces will bring technology such as ABS and traction control," he said, also pointing to the widespread acceptance of LS and other newer engines with modern computers and wiring harnesses.

Shephard, on the other hand, has seen little interest in electronically

controlled braking outside of the autocross segment.

"Most of our customers love their old cars for their simplicity," he said. "Not many of them want to make their hot rods as complicated as their new cars. They want to be able to work on their old cars themselves."

Keeping things simple is probably a wise choice for the DIY rodder.

"Installing the most modern brake systems in older cars is an attractive option, however many modern systems are very complex and require a high degree of training to install," said Campbell. Shade tree installers "should not underestimate the level of difficulty," he said, adding that even hot rod professionals shouldn't attempt to build a computer-controlled braking system without some kind of formal training.

"After all, you want safe, effective, reliable brakes, whether or not they use cutting-edge technology," said Campbell.

"Brake systems are pretty basic when you get down to the nuts and bolts," said Duncan. "They get complicated when you want to put together a system that will out-perform someone else's."

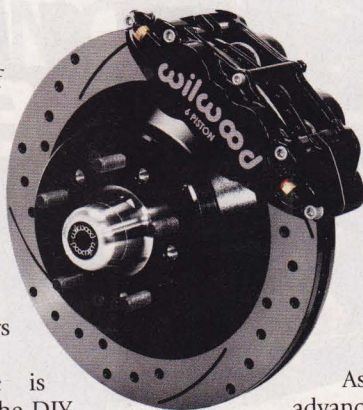
Baer believes it's not a question of if these technologies will reach the hot rod hobby, but when.

"These things take time to make their way into the aftermarket, but if the OEMs come up with a better way of doing something, it is just a matter of time," Baer said. "This is usually due to the initial cost, and the time it takes to figure out the correct way to adapt parts or ideas, but we are already starting to see ABS adapted to early muscle cars."

FULL FLOATERS & COMPLETE KITS

A simple mechanical concept that has migrated from racing to the OEMs and from there to the hot rod aftermarket is the full-floating caliper.

"Full floaters are not a new idea, but the OEMs have now adapted them to street cars, making them easy to package with parking brakes and ABS," Baer said. "The floater that we introduced last year is also available with an ABS option for customers who want to add anti-lock capability to their projects."



■ Wilwood Engineering has released its new Challenge Series big brake kits for 1960-1970s GM and Mopar muscle car spindles, as well as the OEM Mustang II and Wilwood Mustang II replacement Pro-Spindles.

As for other technical advances, Hale cited Wilwood's Carbon Ceramic rotors and new Spec 37 iron rotors.

"Both materials raise the bar for performance, but in different ways," he said. Spec 37 is "a proprietary iron alloy developed to withstand extreme temperatures with the highest possible resistance to distortion, warping, cracking and wear." It has been race-proven on both short ovals and road courses, according to Hale. Carbon ceramic rotors, originally developed for military applications, cut weight by half compared to an iron rotor of the same diameter.

Also new from Wilwood is the Challenge Series of big brake kits.

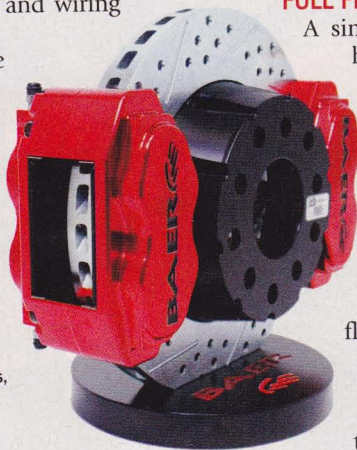
"New kits are now available for the popular 1960s and 1970s GM and Mopar muscle car spindles, as well as OEM Mustang II and Wilwood Mustang II Replacement Pro-Spindles," said **Jacquelyn Hernandez**, the company's marketing assistant. Wilwood Challenge Series kits features 12.88-inch one-piece carbon iron rotors, slotted in the basic GT series and drilled-and-slotted in the optional SRP line.

"Clamping power is delivered via forged Superlite 6R radial-mount six-piston calipers—powdercoated in black or high-gloss red," she said. Optional custom colors are also available, and BP-10 compound low-dust Smart Pads round out the friction package, Hernandez said. Each kit also includes radial-caliper mounting brackets, wheel bearings, hub seals, half-inch -20 wheel studs, alignment shims and premium-grade fasteners.

"We've acquired a second state-of-the-art brake dyno that allows us to test and evaluate rotors and friction materials in all performance modalities," said Hale. "This is how Wilwood develops new materials and brings them to market quickly. We now offer three complete lines of brake pads, comprising over 15 different formulas."

Currie's signature products are its complete rearends, which can be supplied

■ When a customer invests in his engine, paint and wheels, the brakes are as important to complete the overall look, according to Baer Inc. To meet this need, Baer has introduced more powdercoat options, including the transparent candy red "Fire Red" shown here.



with a variety of brakes.

"We usually set a customer up with our drum brakes or Explorer disc brakes for most standard street and street-and-strip applications," Shephard said. The Explorer kit features 11-inch solid rotors, single-piston calipers with pads and backing plates/caliper mounting bracket plates with the drum-style parking brake assembly installed. "If they plan more heavy usage, such as autocross or racing, we refer them to one of the high-end brake manufacturers," he said.

KNOWLEDGE IS (BRAKING) POWER

Still, for all the new hardware on the market, CPP's Duncan credited education as the single greatest advance in braking systems.

"More people [are] understanding how to build a system correctly," he said. "Those in the pro-touring scene seem to be especially aware of the capabilities of their vehicles."

Yet he, and the other experts, still see some of the same mistakes being made over and over again. The most common error, Duncan reported, is when DIY builders "try to piecemeal a system together on a budget and wind up with a hodgepodge of parts that, at best, were never meant to work together and, at worst, actually conflict with each other," he said. "CPP offers budget systems, so if you don't want to spend a lot of money we can at least sell you a complete system that will work with your application."

Hale also emphasized the complete-system approach.

"Each component in the brake system needs to complement every other component, and that can't be done in a

shotgun fashion," he said. "Most people really don't understand the physics that goes into designing a brake system. Choosing the wrong master cylinder is one of the biggest mistakes we see, yet it is only one of several. Remember that bigger is not always better. If your primary concern is weight, then you want the smallest and lightest system that will meet your performance requirements, so always consult a professional when considering a brake upgrade."

Shephard agreed that it's common to see customers attempt to choose a master cylinder that's too large for the application.

"There is so much misinformation out there about master cylinders," he

said, adding that it's nearly as bad with proportioning valves. Most hot rodders, Shephard continued, are sufficiently aware of the consequences of getting it wrong, and know better than to guess, "but they call a manufacturer for recommendations and get it wrong anyway," he said.

"We talk to people who have been through three different manufacturers for master cylinders and proportioning valves, and they're at their wits' end because their cars still won't brake properly," he said.

"There's a lot to be said for buying a complete system from one company," Shephard continued. "That doesn't guarantee that it will work, but it makes one manufacturer responsible for it. If you piece your system together part by part, trying to save a buck, and it doesn't work, shame on you, [but] if you buy a complete system from someone else and it still doesn't work, shame on them."

Vacuum servos or boosters present their own specific challenges.

"Clearance issues are the most common," said Bud Riser of Tuff Stuff Performance Accessories in Cleveland, especially when "a big-block engine, tall valve covers, and/or headers" are also part of the project, "but a simple cardboard template solves the clearance question easily."

Adequate vacuum can become an issue if the customer also wants a radical cam. "Low vacuum can result in a hard pedal and slow stopping," Riser said, adding that if the customer insists on a racy cam, then they may also need a vacuum canister or vacuum pump for better braking.

Tuff Stuff boosters range from 7-inch, single-diaphragm models for under-floor mounting on traditional hot rods to 11-inch dual-diaphragm "truck" units. The company also offers chrome



■ SSBC Caliper Kits are designed for OEM disc brake vehicles with single-piston calipers. The kits, a direct bolt-on replacement for OEM calipers, are made from forged or billet aluminum, are coated with a clear anodize and come with Grade 8 hardware.



■ While colored rotors are appealing, powdercoating gives extra protection from the elements with a great-looking durable finish, according to MBM Brake Boosters. The company offers MBM calipers by Wilwood in black and red.

Web Exclusive

Tuff Stuff Performance Accessories provided us with a detailed guide to sizing the master cylinder and other critical components of a custom braking system that you can read at

www.hotrodandrestoration.com/brakes/web-exclusive-master-cylinder-sizing.



proportioning valves as an option with its master cylinders.

"The problems we see most often are insufficient engine vacuum, boosters that are too small, incorrect master cylinders and incorrect brake valves," Campbell said. He also reminded us that if you're installing vacuum-assisted brakes, then you need a camshaft that makes vacuum.

TRAIL BRAKING

All of our experts agreed on the need to plan the brake system as an integral part of the build.

"The first step in selecting brakes for a particular build is to find out what size wheel the vehicle will have and what are the customer's goals for the project," Duncan said. "When you listen to customers' wants and needs, you can ultimately provide them with a braking system that will look good, perform great and fit their application."

"Usually we would start out with the intended use of the vehicle and what size wheel the customer is planning on using," Baer said. "Then we go over details

such as suspension, spindles, etc., to get a better feel for what the customer is trying to accomplish. The brakes are just one part of the package, but everything has to work together, so we try to not only make sure that customers get what they want, but that they also get what fits with all their other components.

"All brakes are not created equal," Baer emphasized. "Many customers will purchase brakes based on size and price alone, but there are many other factors and important details that go into engineering a complete braking system. Compare all options before you purchase. Don't be afraid to ask questions; that's why we're here."

Remember, also, that "safety is the goal of braking and proper brake function is key to enjoying your car," Campbell said. "Give the braking system the thoughtful consideration, evaluation and planning it deserves." **HRR**