

JUNE 1995

U.S. \$2.50
Canada \$2.95

RACE FAN'S
GUIDE TO
THE INDY 500

Popular Mechanics

AMPHIBIOUS KITPLANES

Build The Ultimate
Personal Escape
Machine That
Lands
Anywhere

**BEWARE THE
DOOM VIRUS**
What To Do When
It Strikes Your PC

**BUILD OUR CUSTOM
STORAGE SHED**
For All Your Lawn
And Garden Tools

**SPORTS—ANY TIME,
ANYWHERE**
New Pages Provide
Instant Play-By-Play



There's nothing this truck won't go through
to find a child.

Dave Ashley,
San Bernardino County Sheriff's
Search & Rescue Volunteer.



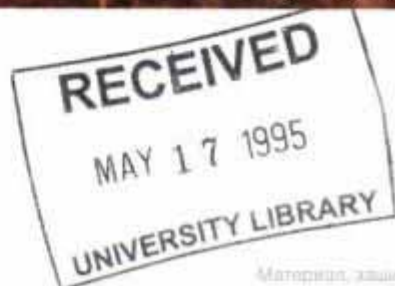
Ford F-Series.
The Best-Selling Trucks Are
Built Ford Tough.

Or a purse.

Dave Ashley.
Ford-Sponsored Rough Rider
Off-Road Racing Champion.



Closed course. Professional driver.



Материал, защищенный авторским правом



It never gives *less*
than 101 percent.



WILD TURKEY

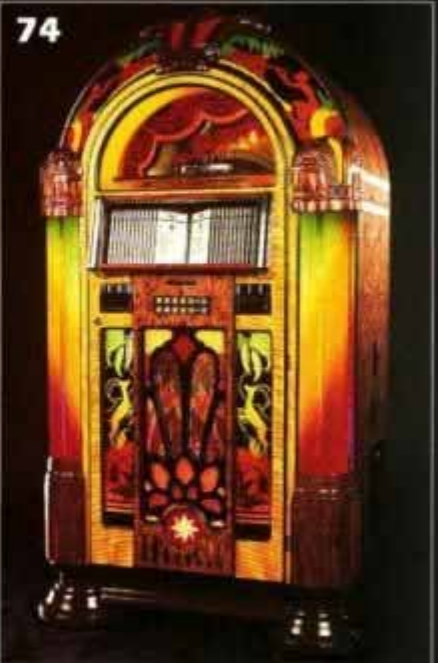
101 proof, real Kentucky.

Popular Mechanics®

JUNE 1995
VOLUME 172
NO. 6

DOOM VIRUS

51



74



62

AUTOMOBILES

- 42 Detroit Spy Report** The '96 Saturn wagon, Pontiac Bonneville and Olds Eighty Eight, plus the '97 Jeep Wrangler and Chrysler's coming V6.
- 45 Europe Spy Report**
First look at the Porsche Panorama, Mercedes-Benz S600 V12 convertible and sport/utility, and the '97 Jaguar XJS.
- 55 Owners Report: Chevy S-10 Pickup**
A truck that thinks it's a car.
- 62 The Brickyard Report** What's new and who's driving it in the Memorial Day classic.
- 86 Owners Report: Infiniti Q45**
A car that once defined its segment now has a lot of competition.
- 113 Car Care**
 - **Car Clinic:** Car Care Q&A.
 - **Saturday Mechanic:** Dashboard reminders.
 - **New Products:** Improve your car.
- 126 Motorsports** Our team experiences some early-season teething problems.

ELECTRONICS

- 40 Electronics** Cutting-edge computers do it all.
- 51 Doom Virus** Electronic diseases can be fatal to your computer.
- 82 What's The Score?** Can't get to the game? Get to your SportsTrax.

PHOTOGRAPHY

- 130 Photography** Solar-powered cameras.

HOME IMPROVEMENT

- 90 Home And Shop Journal**
 - **Home Improvement:** Build our storage shed.
 - **Shop Project:** A child's toy chest.
 - **Home Repair:** Window-glass replacement.
 - **New Products:** Paint and painting accessories.
- 98 Homeowners Clinic** Home maintenance Q&A.

SCIENCE/TECHNOLOGY

- 19 Tech Update**
 - Railcars that ride roads.
 - Japan's virtual-reality beer makers.
 - Army's electronic artillery zapper, and more!
- 38 Sports Science** Super sports machines.
- 46 Science** World's highest-flying kite.
- 58 COVER STORY: Amphibious Kitplanes**
A new generation that's cheaper to buy and easier to build.
- 68 Paper Reborn** Ever wonder what happens after you toss this magazine into the recycling bin?

TELECOMMUNICATIONS

- 78 Battle Of The Boxes** The top of your TV is about to become a war zone.

AMERICAN CLASSICS

- 74 The Jukebox** Without it, Saturday night just wouldn't have been the same.

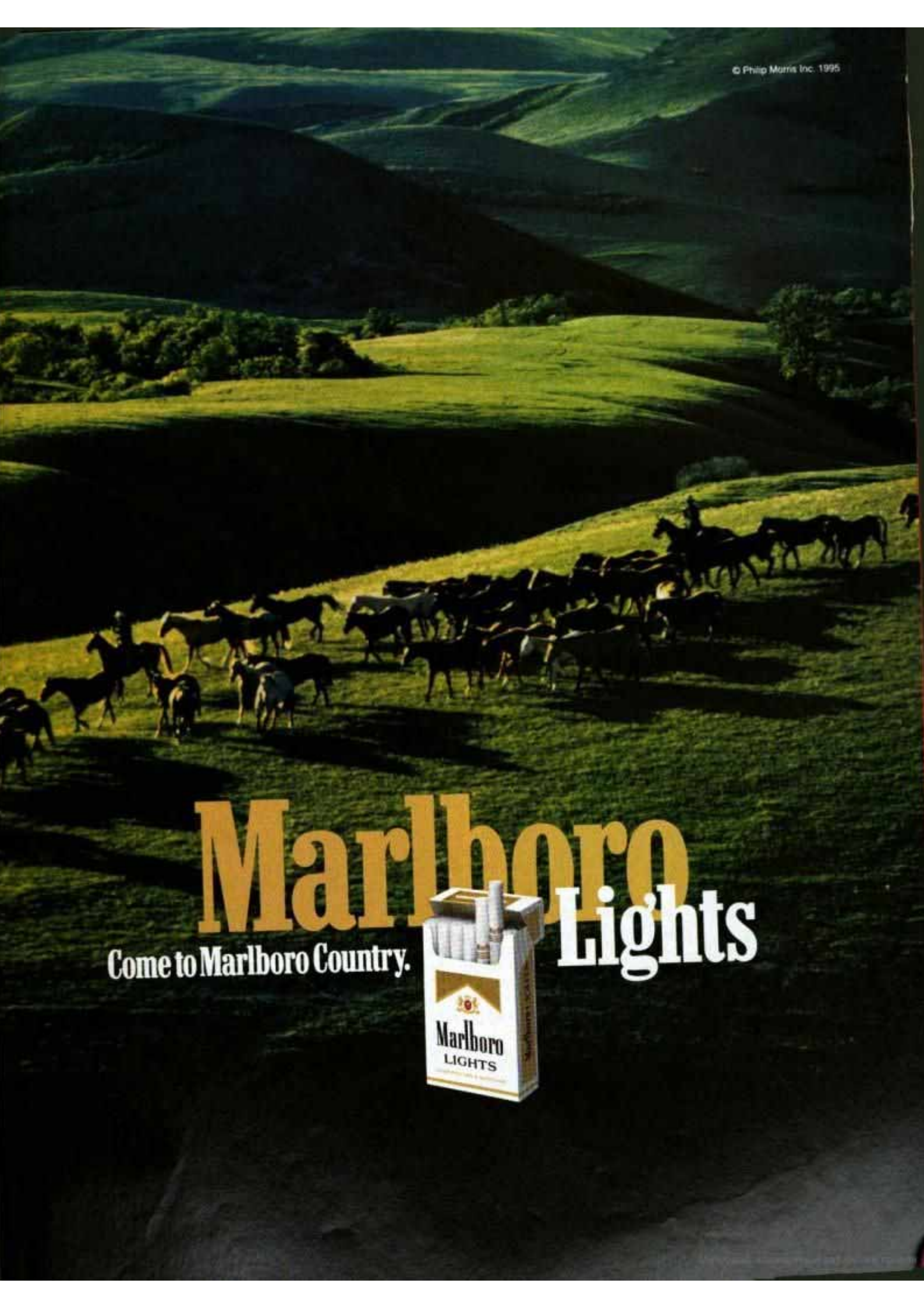
DEPARTMENTS

- 6 Editor's Notes**
- 12 Letters**
- 16 Time Machine**
- 150 Coming Up Soon**



**SURGEON GENERAL'S WARNING: Quitting Smoking
Now Greatly Reduces Serious Risks to Your Health.**

10 mg "tar," 0.8 mg nicotine av. per cigarette by FTC method. © 2008 R.J.R.T.C.



Marlboro

Come to Marlboro Country.



Lights

EDITOR'S NOTES

• There's something very romantic about the idea of piloting your own plane to some remote, otherwise inaccessible area in the bush and putting down on water. The setting sun is golden as you come in on final. The deep green pine along the shoreline turns purple as the water comes up to meet the pontoons. You're down. Perfect landing. Tomorrow promises three days of fantastic muskie fishing on this crystal-clear virgin lake. Wow. What an image. And it can be your reality if you'll only take the time to build your own amphibious plane. That's not so far out. Kits are better—and cheaper—than ever, thanks to more competition in the marketplace. Materials are much higher in quality than they were a few years ago. The parts go together more easily and less work is required to complete your dream. If it all sounds too good to be true, don't forget the several hundred hours of your labor that will be required. That and the purchase price of the kit. For the full story, check out Contributor Bill Garvey's cover story beginning on page 58. . . . It's Indy 500 time again. The Indycars have been screaming around the Brickyard all month in preparation for the 500 over Memorial Day weekend. Our annual look at what's new and who's driving it is in this issue. And can I help it if I had to spend considerable time at the track assisting in gathering the research that went into this report? Hey, I love this place! . . . I hope you'll be looking for the second issue of our new sister publication, CARSMART, which goes on sale just about the time you're reading this. CARSMART is a truly different approach to a car magazine. There's no technoid jargon, no puff pieces on how to lust after a Lamborghini—just solid information about which cars are good, how to get a great deal and how to save money on car ownership. Look for it on your newsstand now and let me know what you think. . . . Speaking of cars, you still have time to enter our Save The Wagons contest (in PM, page 74, Feb. '95) and win a brand-new 1995 Buick Roadmaster Estate wagon. All the details and rules are in the February issue. . . . Beware the doom virus about to strike your PC.



PHOTO BY BARBARA A. NOVAK

It's ugly, it's nasty and it's about to mess up your files. Stamp it dead on page 51. . . . Ever wonder what happens to this magazine once you finish reading it and heave it into the recycling bin? Find out on page 68. . . . Hey buddy, drop another nickel into the jukebox and punch up A12, "The Wanderer" by Dion. Ah, memories. Relive more of them in our American Classics feature beginning on page 74. Till next time.


Joe Oldham

Popular Mechanics

Editor-In-Chief Joe Oldham

Managing Editor Deborah Frank
Graphics Director Bryan Canniff

Home Improvement

Editor Steven Willson
Associate Editor Thomas Klencek
Assistant Editor Roy Berendsohn
Contributing Editors Norman Becker
Rosario Capotosto
Steve Toth

Boating/Outdoors

Editor Joe Skorupa

Electronics/Photography

Editor Frank Vizard
Contributing Editor Stephen A. Booth

Automotive

Editor Don Chaikin
Detroit Editor Jim Dunne
Associate Editor Mike Allen
West Coast Editor Scott Oldham
Contributing Editors Cliff Gromer
Michael Lamm
Rich Taylor

Science/Technology

Editor Gregory T. Pope
Senior Correspondent Abe Dane

Art Department

Sr. Assoc. Art Director Alan Andresen
Associate Art Directors Tom Kane
Kurt Novak

Editorial Production

Senior Editor Robin LaSalle
Copy Editors Nancy Cogrins
Dan Rosenbaum
Production Editors Joe Czerwinski
William G. Phillips

Electronic Production

EP Administrator Sarah Deem
Art Editor John Bostonian Jr.
EP Associate Louisa McFarland

Editorial Administration

Administrative Asst. Josephine Coronia
Asst. to Editor-In-Chief Barbara A. Novak

Reader Information Services

Manager Patricia A. Woods

Editorial Offices

224 W. 57th St., New York, NY 10019
(212) 649-2000

We cannot be responsible for loss of unsolicited queries, manuscripts or photos. For return, they must be accompanied by adequate postage.

SUBSCRIPTION SERVICE: Popular Mechanics will, upon receipt from its reader of a completely new or renewal subscription order, undertake fulfillment of that order so as to provide the first-copy delivery either to the Postal Service or alternate carriers within six to twelve weeks. If for some reason this cannot be done, you will be promptly notified of the issue date that will begin your subscription, with a request for any further instructions you may have concerning your order. Please address all such orders to us at Popular Mechanics, P.O. Box 7170, Red Oak, IA 51591. *Should you have any problem with your subscription, please write Joan Harris, Customer Service Department, Popular Mechanics, P.O. Box 7170, Red Oak, IA 51591 or call toll-free 1-800-353-4948. Please enclose your mailing label when writing to us or renewing your subscription. *Subscription prices: United States and possessions, \$15.94 for one year; \$29.94 for two years; Canada and all other countries add \$16.00 for each year.

Use this address for subscription orders and inquiries. **POPULAR MECHANICS**, P.O. Box 7170, Red Oak, IA 51591.

MAILING LISTS: From time to time we make our subscriber list available to companies who sell goods and services by mail that we believe would interest our readers. If you would rather not receive such mailings, please send your current mailing label or exact copy to: **POPULAR MECHANICS**, Mail Preference Service, P.O. Box 7024, Red Oak, IA 51591-0024.

AS A SERVICE TO READERS, Popular Mechanics publishes newsworthy products, techniques and scientific and technological developments. Due to possible variance in the quality and condition of materials and workmanship, Popular Mechanics cannot assume responsibility for proper application of techniques or proper and safe functioning of manufactured products or reader-built projects resulting from information published in this magazine.



CarSmart
Tests • Ratings • Cars • Trucks • Buying • Selling • Deals

THE ABSOLUTE BEST VALUES RIGHT NOW!

EXCITING! J.B. Power Rankings for 27 Cars and Trucks

Spooky Concept That Looks Good And Isn't

Latest Factory Cash-Back Incentives

Leasing's 11 Hidden Hazards

How to Pick a Car Cover

Homelite®

For Starters, It's Push-Button.

The New Push-Button Start Trimmer. Just squeeze the trigger, push the button, and trim. It's that fast! But there's more.

The tough new 2-cycle gasoline-powered model is an easier, quieter, slimmer trimmer. Not to mention, it's affordably priced.

So start making yard work easier with the push of a button.



1. Pull the trigger.



2. Push the button.

3. Trim.



Do it right. Do it Homelite.

Homelite®

Available at your Homelite dealer and other major retailers.
Or call 1-800-467-5150.

IF YOU ASK THE RIGHT QUESTIONS, YOU'LL FIND HUNTER IS THE ANSWER.

Why don't Hunter fans wobble?

Blade brackets are precisely measured to the perfect pitch.



Blade materials are properly sealed to keep out moisture and prevent warping.

Because we use the finest blade materials available. Because we manufacture our

rotors to stay in balance. Because all blade sets are precisely weighed

and measured for the same degree of pitch and balance. Because we simply refuse to allow wobbling in a Hunter fan.

Why do Hunter fans last so long?

Take a good look at a Hunter fan. Inside you'll find a powerful, rigorously tested motor with high quality, shielded bearings that keep out dust and dirt. And outside a gleaming, baked-on

durable finish that won't tarnish or fade over time.

The Hunter Original.®

Why are Hunter fans 81% quieter?



Every Hunter fan is built with a powerful, smooth-running motor engineered specifically for use in our ceiling fans, with precision ball bearings and special noise-reducing components between metal parts.

Why is Hunter the style leader?

The styles pictured are just a sampling. With over 350 styles to choose from, we have a Hunter fan for every room and decor.

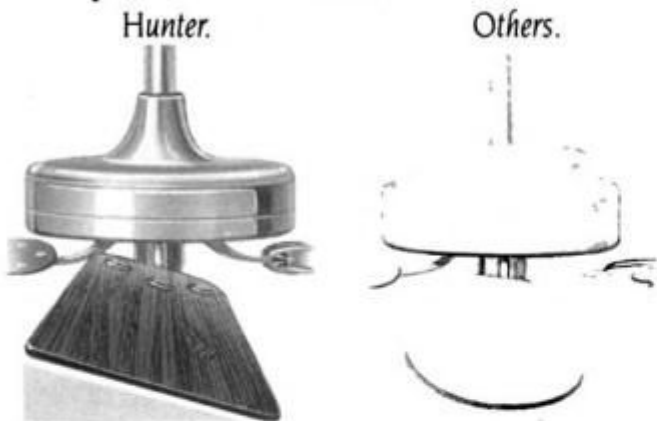
Why is the Hunter warranty the best warranty in the business?

Our fans have 20, 25 year and lifetime warranties. And are backed by a company that's spent 109 years building the world's best fan.



© 2000 Hunter Fan Company. All rights reserved. Hunter, The Hunter Original, and 81% Quieter are registered trademarks of Hunter Fan Company.

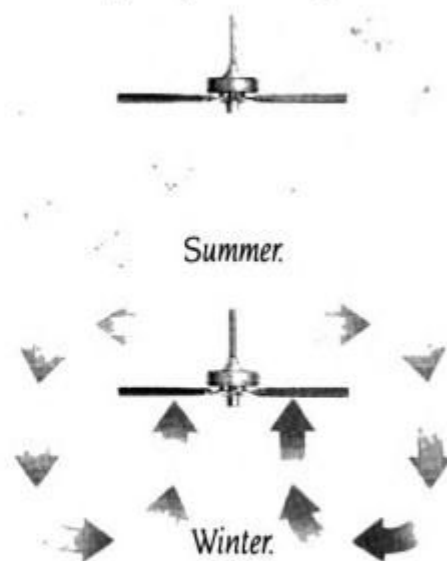
Why do Hunter fans move more air?



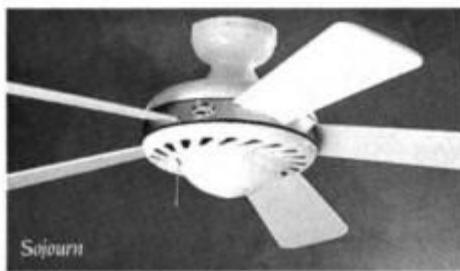
The greater the angle of the blade, the greater the air movement. And because we don't compromise on the motor or materials, we're able to set our blades at a more severe pitch for greater air movement. And greater comfort.

Why do Hunter fans save you money all year long?

Because we move more air more efficiently, a Hunter fan can save you up to 40%* on your air conditioning bills. In the winter, simply reverse the blade direction, to reclaim hot air trapped near the ceiling. Then enjoy even, comfortable heat.



1886 Series



Sojourn



The Berkshire Estate Collection



The Master Suite Collection



The Hunter Baseball Fan



1930's Original



The Original



Sea Island Outdoor Fan



Contour

Was there actually a man named Hunter?



Yes. Two of them, in fact. Over 100 years ago, John Hunter and his son, James invented the electrically powered ceiling fan. And from that point forward, we've made sure the name Hunter stood for quality and craftsmanship.

For a free brochure, write to us at Dept. PMM, P.O. Box 3900, Peoria, Illinois 61612. Or just give us a call today at 1-800-971-FANS.



Quiet For Life.

*Your savings may vary based on climate, building type and thermostat setting. On average at low speed settings.

When "razor sharp" isn't good enough
you need the **Diamond Hone™ Sharpener.**

Chef'sChoice®
professional
110



Up to twice as sharp
as a razor blade

Triple Bevel Trizor Edge
stays sharp up to 3 times
longer than professional edges.

For a store near you call Edgecraft Corp., 800-342-3255

from
EdgeCraft
World Leader in Cutting Edge Technology

Popular Mechanics

Publisher Robert B. Dillingham

ADVERTISING

Director John A. Pagliaro

New York

224 West 57 St., New York, NY 10019

Philip A. DeCarlo

(212) 649-3141

Paul M. Jowdy

(212) 649-3142

Erin M. Overend

(212) 649-3143

Chicago

1 South Wacker Dr., Chicago, IL 60606

(312) 984-5190

Manager Richard T. Weithas

Spencer J. Huffman

Detroit

Hearst Magazines Sales, Inc.

2301 West Big Beaver Rd., Troy, MI 48084

(810) 649-2981

Manager D. Craig Rebold

Los Angeles

3000 Ocean Park Blvd., Suite 2002

Santa Monica, CA 90405

(310) 450-8881

Manager Michael T. Campbell

Atlanta

Collinson and Company, Inc.

4315 Cowan Rd., Tucker, GA 30084

(404) 939-8391

Manager Newton B. Collinson, III

Jonathan M. Kiger

Florida Ron Saba

(813) 948-2088

Dallas

Ingersoll, Redding, Kellner & Zeko

14840 Landmark Blvd., Suite 230

Dallas, TX 75240

(214) 980-8983

Manager Daniel F. Kellner

Dean Zeko

Mail Order

Manager Barbara Jones

(212) 649-3136

Classified

Manager Dorothy Nolan

(212) 649-3167

Business Manager Jennifer D. Boyer

MARKETING

Director William E. Congdon

Promotion

Manager Kim A. Boknoski

(212) 649-3085

PRODUCTION

Director Carole L. Hartman

Manager Jean T. Block

(212) 649-3164

Published by The Hearst Corporation

FRANK A. BENNACK JR.

President & Chief Executive Officer

RANDOLPH A. HEARST

Chairman

GILBERT C. MAURER

Executive Vice President & Chief Operating Officer

Hearst Magazines Division

D. CLAEYS BAHRENBURG

President

K. ROBERT BRINK

MARK F. MILLER

Executive Vice Presidents

DANIEL E. ZUCCHI

Senior Vice President

ROBERT B. DILLINGHAM

Vice President for Popular Mechanics

RICHARD E. DEEMS

Publishing Consultant

POPULAR MECHANICS is published monthly by The Hearst Corporation, 369 Eighth Avenue, New York, NY 10018, U.S.A. Frank A. Bennack Jr., President; Randolph A. Hearst, Chairman; Gilbert C. Maurer, Executive Vice President; Victor F. Gann, Senior Vice President, Chief Financial and Legal Officer; Jodie W. King, Secretary; Edwin A. Lewis, Vice President and Treasurer; Hearst Magazines Division: D. Claeys Bahrenburg, President; K. Robert Brink, Executive Vice President; Mark F. Miller, Executive Vice President; Daniel E. Zucchi, Senior Vice President; George J. Green, Executive Vice President; Raymond J. Petersen, Executive Vice President; John A. Rohan Jr., Vice President & Resident Controller; Robert B. Dillingham, Vice President for Popular Mechanics.

LESS CAN BE MORE.

The *Super Tool™*
is 18 full-strength
tools with 10
locking blades
in a compact
9 ounce package.



Made in U.S.A.
25 Year Guarantee
100% Stainless Steel

The
Original

LEATHERMAN®

World's Finest Compact Multi-Purpose Tools

LEATHERMAN TOOL GROUP, INC. P.O. Box 20596 Portland, OR 97220 (503)253-7826



Escort Sale

World's First Cordless Radar/Laser Detector

Solo 4 offers portable convenience second to none. Four alkaline AA batteries provide most drivers with months of full-powered detection. And since there's no cord, Solo 4 is in detection mode as soon as you place it on your windshield and turn it on. Solo 4's cordless convenience is perfect for trips, when using rental cars...or just everyday driving.
Regular Price: ~~\$249~~ Sale Price: **\$229**



Our Most Popular Radar/Laser Detector

Passport 4500 SuperWide offers proven performance. A full-featured radar/laser detector, Passport 4500 SuperWide combines superior long-range detection with our patented anti-falsing system. As with our more expensive models, Passport 4500 SuperWide comes with mute and dark modes, audible and visual alerts, radar/laser band indicators and a signal strength meter.



Regular Price: ~~\$169~~ Sale Price: **\$149**

World's First LCD Radar/Laser Detector

Passport 5000 uses an LCD monitor to display a wider range of driving information than any conventional LED-style detector. At a glance, you'll see the radar or laser signal type, signal strength, selected operation modes and much more. It's also the first detector to incorporate the new Emergency Vehicle Warning System for safer driving.
Regular Price: ~~\$199~~ Sale Price: **\$179**



1-800-433-3487
Open 24 hours a day, 7 days a week

Shipping & handling is extra. Ohio residents add 6% sales tax.
(No other discounts apply; offer good on new orders only.)

ESCORT

► Department 506865
5200 Fields-Ertel Road
Cincinnati, Ohio 45249

ESCORT[®]

Материал, защищенный авторским правом

SATISFACTION GUARANTEED

If you're not 100% satisfied, return your purchase within 30 days for a refund - no questions asked.

LETTERS

Sky Giants



While reading "Titans Of Transport," I was struck by the fact that the current trend toward giant transport aircraft is a vindication of Howard Hughes and his Hercules flying boat of almost a half-century ago. His "Spruce Goose" (a moniker he detested) was scoffed at, but the craft proved to be ahead of its time. It's a shame that instead of being kept in flying condition, and fully flight tested to see what we could learn from this craft, the plane now serves as an oddity to be gawked at by tourists. ALLEN K. SMITH
NEW ORLEANS, LA

It's a shame that none of those designers ever heard of a guy named Bernelli. His designs were the ultimate in lifting power, using the body of the plane as well as the wings to provide lift. Too bad F.D.R. disliked Bernelli, and also Jack Northrup—there's just no telling where we'd be today in aircraft design.

WILLIS W. DONOVAN
TITUSVILLE, FL

UFRs (Unidentified Flying Readers) II

At the risk of seeming to be a member of some kooky

Letters are subject to editing for length, style and format.

flying-saucer club (of which I am not), I think that a serious study must be made of unusual objects seen in the skies over our Earth. And it must be made a top priority by the federal government, the private sector, the scientific community and even by religious leaders. Yes, many sightings of strange aircraft today probably are due to our government's testing of futuristic vehicles. But let's face it. This has been going on since time began—in ancient Rome, during the Middle Ages, in late 19th-century America, etc. We are not alone.

MARTIN A. DEPASQUALE
OZONE PARK, NY

I was fascinated by the flying-saucer article and quite pleased with the inclusion of the merits of the brainchild of Charles H. Zimmerman, the V-173/XF5U-1. I suspect that if the XF5U-1 had been allowed to fulfill its promise of vertical take-off and blistering top speed almost a half-century ago, the expensive and controversial V-22 might never have been. As a longtime student of the teachings of Mr. Zimmerman, I found an amazing relationship between the XF5U-1 and the VTO XV-15 prototype of the V-22 Osprey. They both weighed about 15,000 pounds. The XV-15 had the advantage of a light, powerful turbine engine—something Zimmerman predicted. At about the time the XF5U-1 was scrapped, Zimmerman designed what he called the Flying Wing Helicopter. Access to today's technology would allow the VTO capabilities of his designs to be proven.

DICK JOHNSON
DALLAS, TX

Sometime during the late '40s or early '50s, a letter-writer claimed to have been a guard at a top-secret Air Force base in a place called Rainbow, Antarctica. He said anyone caught in his area without a pink pass was shot. He also said the Air Force was developing flying-saucer aircraft at that location. Just thought I'd add a piece to thicken the pile.

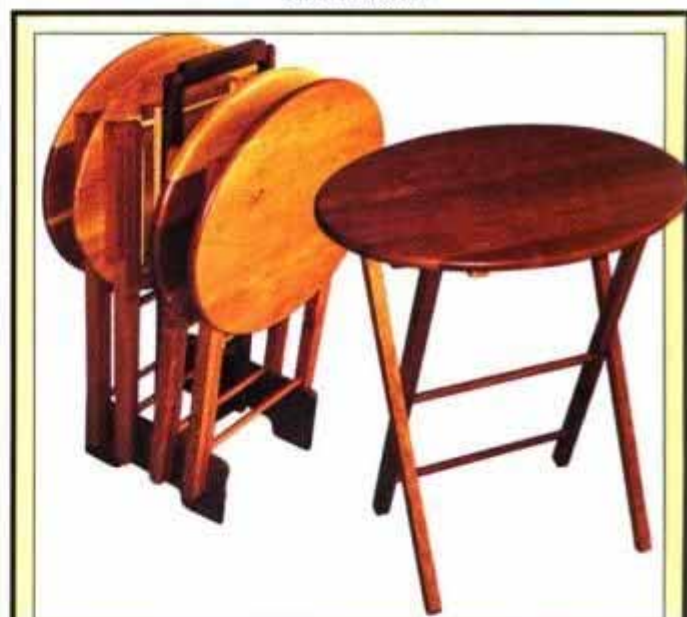
KEVIN P. MURPHY
CHICAGO, IL

By the way, Roswell is a nice town of about 40,000 people, and it's an interesting place to visit.

CLIFFORD MORGAN
PHOENIX, AZ

The fact is, the article's author, Abe Dane, didn't do his homework. He asked no questions, and offers no answers—not even as to why there are so many sightings. This article was nothing more than an ego exercise for Dane and an oc-

Advertisement



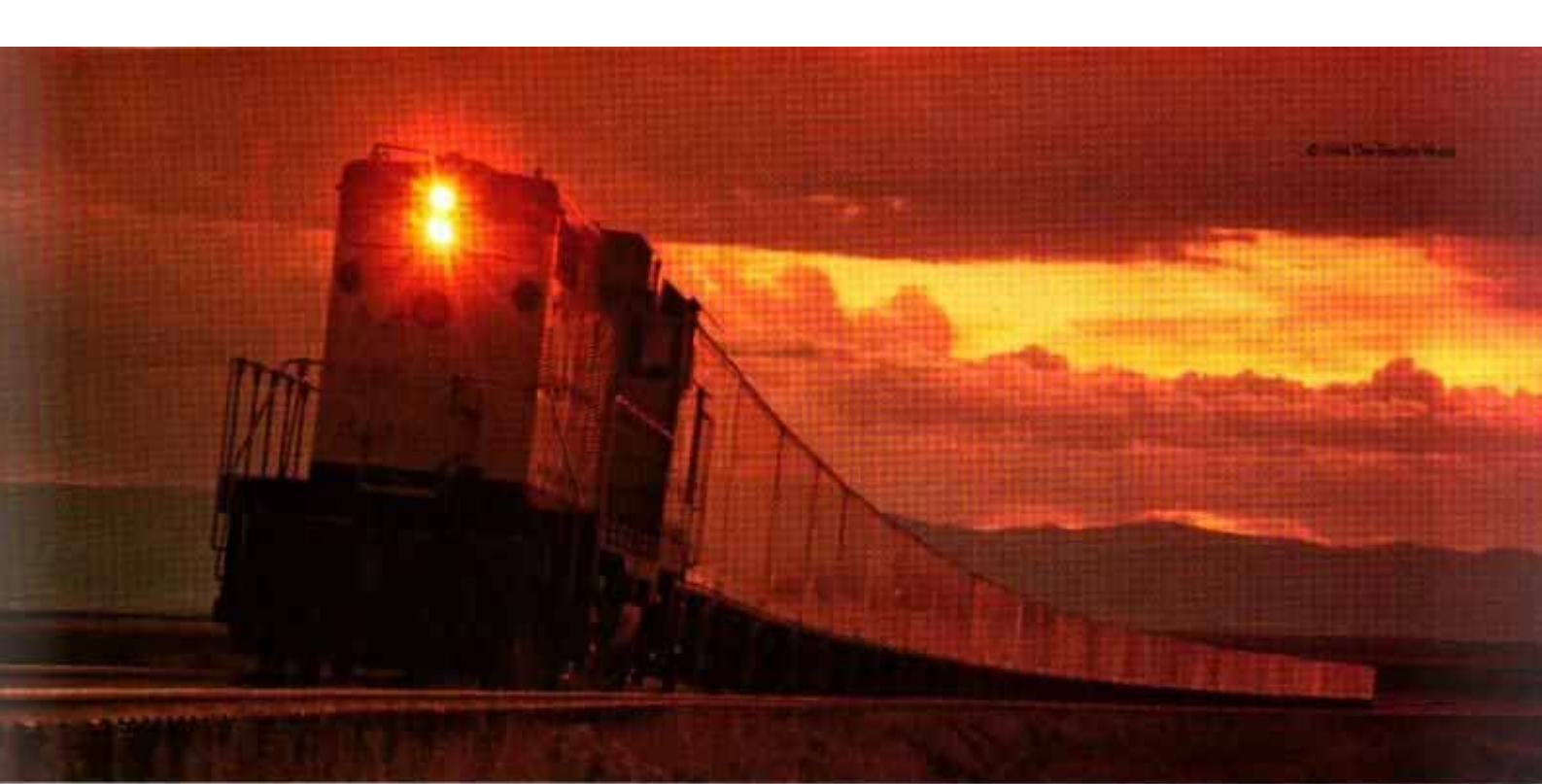
STANLEY

Reader Project Of The Month

When I looked at your plans for the folding tables in the January 1991 issue, I was immediately impressed. I decided to build the tables in my woodworking class at Pomona High School. Instead of mahogany, I used cherry for the trays and walnut for the stand. I also replaced your metal restrainer strips with wood to improve the appearance, and installed wood leg guides to enhance the stability. I then used Roto-Hinges to help the legs fold.

EVAN COULTER
ARVADA, CO

If your project is chosen as Reader Project of the Month, you will receive a Stanley Home Improvement Kit, complete with hand and decorating tools, and an electric stapler/nailer, valued at more than \$200. For your project to be considered, please send a clear, color photo and brief description to: Reader Project of the Month, Popular Mechanics, 224 W. 57th Street, New York, NY 10019.



If a 5,000 ton train can stay on its track, how come your closet door can't?

Right now, hundreds of trains are speeding across the country. Wheels holding firmly to their tracks. While at the same time, simple closet doors are falling off theirs. Ridiculous.

Enter the Stanley Accent Mirror Door. Designed with an anti-jump track to prevent slipping. Plus wheels that actually roll without jamming (What a concept). In short, this closet door actually stays put. And when you consider it's been opened and closed over 100,000 times in our testing facility (equivalent to 28 years of use), you can bet it's going to be around to see quite a number of fashion crises in your home.

Because at Stanley, our approach to building products has always been rather simple. We're not going to make something unless we make it better than anyone else. Now if that makes us sound demanding, so be it.

Because that's exactly what we are.

Here at Stanley, research always comes before design. Engineering always comes before aesthetics. Testing always comes before sales.

In our humble opinion, that's the only way there is to create the kind of products we strive for. Like our screwdrivers with ergonomically

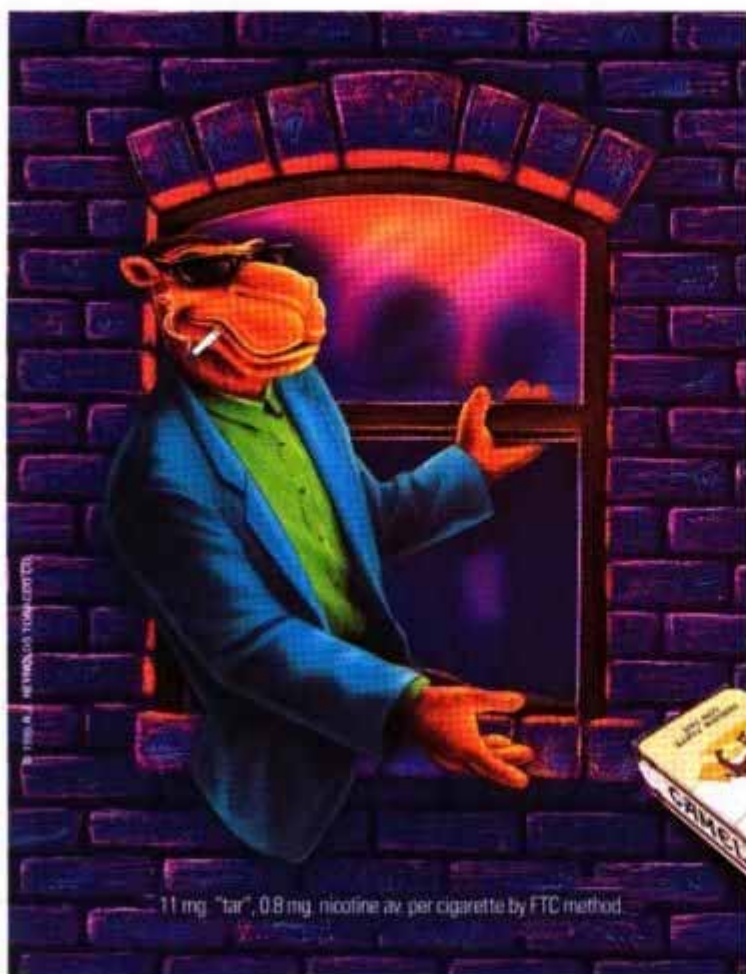
molded grips for increased torque. And exterior doors that can stand up to hundreds of pounds of pressure.

At Stanley, our goal has always been perfection. You can see that determination in everything we do. After all, why settle for inferiority, when you can settle for superiority?

STANLEY
helps you do things right.™



The Accent Mirror Door from Stanley
Designed with a special anti-jump track



know a man who has been contacted by government agents and asked what he knows about the dissection of alien bodies.
SCOTT SMITH
 HUNTINGTON BEACH, CA

So what did he know about it? And where did he learn it? —Ed.

Wheel Of Fortune

I have been a reader of POPULAR MECHANICS since 1939. I can remember when you published honest-to-goodness home projects so anyone with a little mechanical ability could build them—and not spend a lot of money. I was browsing through a recent issue, and I came across a shop project for a garden cart. Marine mahogany plywood? Wheels costing \$119 per pair? Ridiculous! I built my garden cart for \$37 using inflatable wheelbarrow tires that ride over grass much more easily, and the cart can be towed behind my lawnmower. Wake up and get real. I built an 8-in. table saw from POPULAR MECHANICS' Plan Service in 1944, and I used it until 1962.

ART RUTHERFORD
 CAMBRIDGE, IL

And you're complaining? —Ed.

Freedom Fighters

The response to J.M. Mansen, of

LETTERS (Continued from page 12)

casation for him to wear fatigues and play spy for a night or two with Glenn Campbell, which POPULAR MECHANICS was paying for. Maybe PM should stick to having its authors cover stories like how to change a water pump on a '57 Chevy and leave the more cerebral pieces to those who are a little more qualified to handle them.

GENE HUFF
 LAS VEGAS, NV

Coming up in POPULAR MECHANICS: "How To Make A Lamp Out Of A Lawnmower" and "How To Make A Christmas Tree Out Of Used Beer Cans." —Ed.

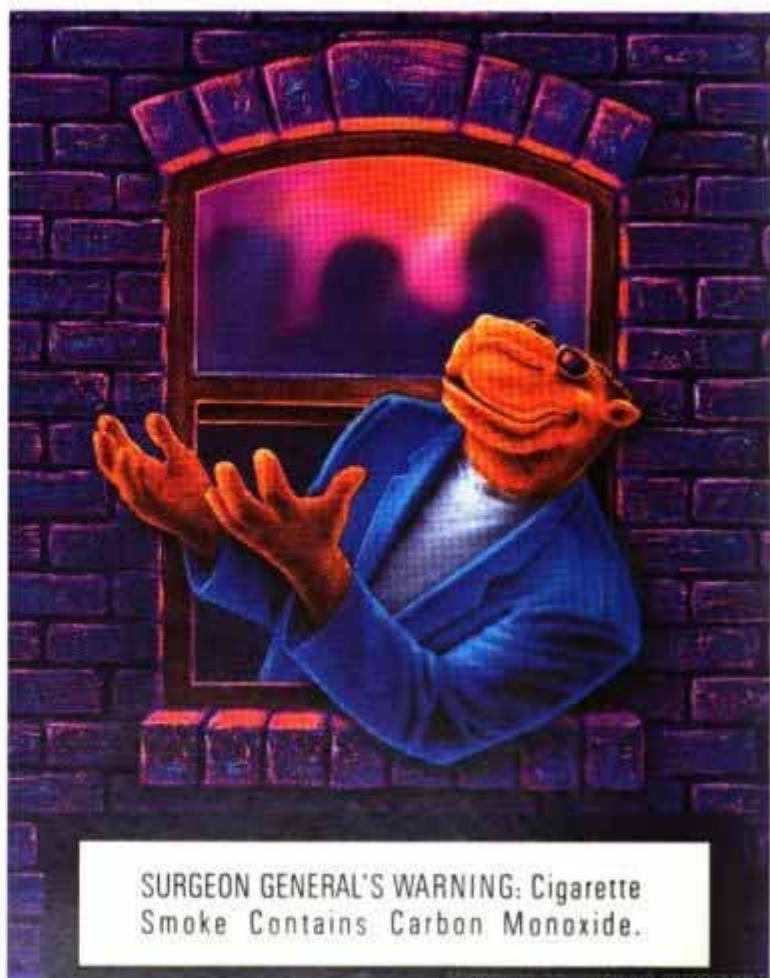
At 8:15 pm on April 22, 1983, on U.S. Route 8 in northern Wisconsin near Turtle Lake, was the last time I saw one. Unfortunately, no camera.

DOM CEILKY
 EAST LAKELAND, FL

Abe Dane ought to refund his travel expenses for the trip to Area 51. And PM editors ought to be ashamed of themselves.

JOHN G. LEYDEN
 DAVIDSONVILLE, MD

Your article was about what I would expect from the mainstream media. I



Austin, Texas, in your April issue was superb. "So much for the First and Second Amendments to the U.S. Constitution" pretty well nails it. It's right up there with the NRA's Wayne LaPierre's when he said: "It isn't about guns, it's about freedom." Finding a mainstream publication taking this kind of stance is refreshing and should be rewarded. Please send me the bill to renew my subscription for another year.

MICHAEL W. UGGEN
ANCHORAGE, AK

Leaving aside the question of whether your reference to the First Amendment was relevant at all, your rather abrupt response to the writer of this letter was completely in error in relying upon the Second Amendment with reference to handguns. As its language indicates, the purpose of the Second Amendment was to ensure the existence of "(a) well-regulated Militia . . ." as "necessary to the security of a free State . . ." It applies to a "well regulated" group of citizens, under the control of its senior officers, constituting a militia under the law of the government and armed accordingly. It does not apply to the purchase of a handgun by an individual. This is the law, as established in the courts of the country. You should stick to your areas of expertise and stay out of the constitutional law business.

JOHN W. EMMERLING
MILWAUKEE, WI

The U.S. Supreme Court has upheld many times an individual's right to own firearms.
—Ed.

I support your decision to allow gun advertisements and support you 100%. The last time I checked, we were living in a democratic society that allows free speech. If people don't like certain advertisements, they should skip over them. I don't smoke, but that doesn't mean I'm offended by cigarette ads. If these uneducated readers spent half their time learning the history of this nation instead of writing pointless letters about gun advertisements, maybe they would understand the positive contribution that guns have made. Yes, there have been abuses by some individuals. But you can't punish honest people for the actions of criminals. More people are killed by baseball bats than by assault weapons. Should we start banning batting cages and baseball bats? A gun is a tool, just like a hammer. Both have a purpose. Use them incorrectly and it's the user's fault, not the tool's.

KARL SMITH
(VIA INTERNET)

Copyrider

The article on the new Kawasaki Vulcan 800 was interesting. Besides being well detailed, it also proved that Harley-Davidson motorcycles are the best there is. Think about it. Why would other motorcycle companies so obviously imitate a design? Because it's the best. Kawasaki has copied Harley right down to the saddlebags and even the Harley-style single-pin crankshaft.

JAMES WALES
GUNTERSVILLE, AL

Car Careless

Your "technical" writer did it again—deceived millions of your readers with opinion instead of fact. Regarding changing your engine oil within 500 miles of purchase, new-vehicle manufacturers state that the engine oil and oil filter need not be changed until the first noted interval. Changing any sooner is a waste of time, oil and money. To the existing myths of the "dry-start" and "break-in," you can add the myth of the "break-in, early oil change." The establishment-controlled media has, for 40 years, been spreading mis/disinformation.

ANDREW'S ENGINES
COATESVILLE, PA

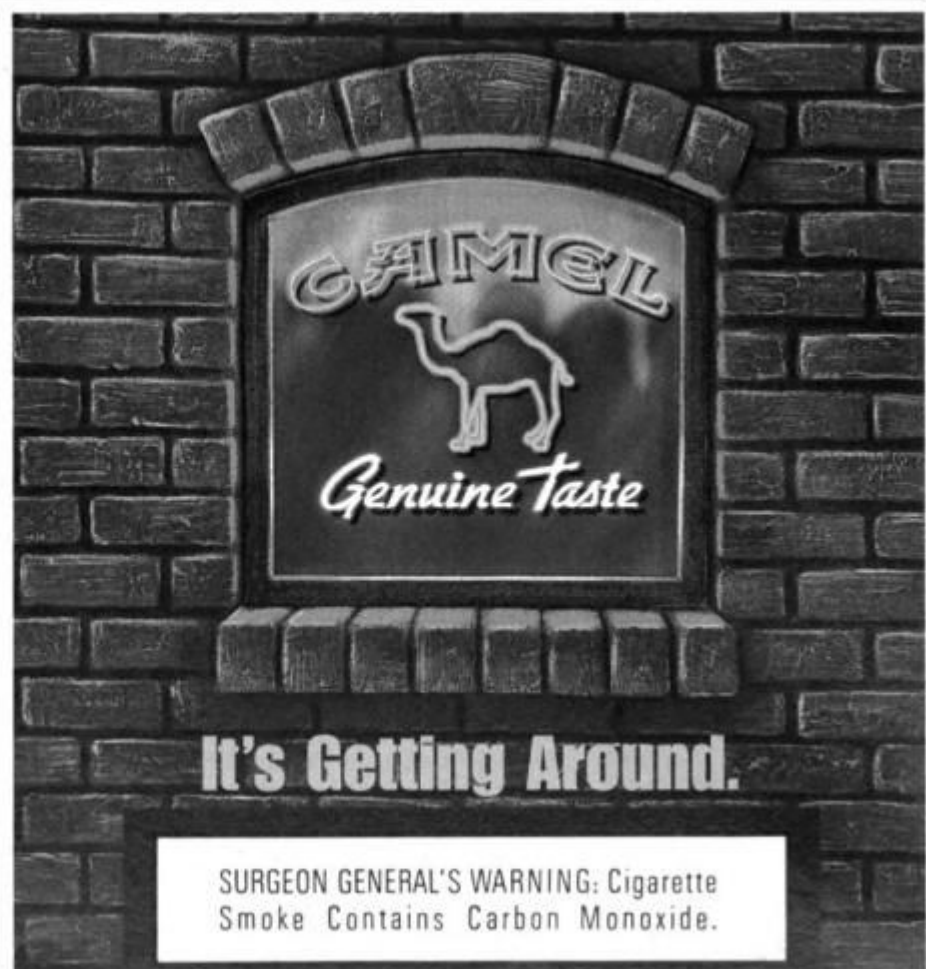
Yes, and there's a conspiracy between auto manufacturers and oil

companies to keep the 100-mpg carburetor off the market, too. —Ed.

Off T.A.R.G.E.T.

Jared Porter's letter states that every major city should have a T.A.R.G.E.T. Team equipped with night-vision cameras. Porter said that these night-vision cameras would help deter auto theft and drug dealing. I agree that the ability of the T.A.R.G.E.T. Team, with the help of the night-vision camera, will lower, if not control, the crime rate in the cities. But what about the basic right of a human being to his privacy? I really don't think the T.A.R.G.E.T. team with night-vision cameras will be able to do its job without disturbing the lives of ordinary citizens. Night-vision cameras will have to scan large areas to be effective. Law-abiding citizens who did not consent to being spied upon will be watched. Our forefathers gave us our rights as citizens of this country, and who has the right to change that? We, the youth of America, should hang onto the promises our forefathers made to future generations. Besides, there are many ways to control crime aside from the T.A.R.G.E.T. teams and their night-vision cameras.

DANNY FONG
AMES, IA



GAMTEL
Camel
Genuine Taste

It's Getting Around.

SURGEON GENERAL'S WARNING: Cigarette
Smoke Contains Carbon Monoxide.

TIME MACHINE

90 YEARS AGO: JUNE 1905



Hang Time

John Montgomery of Santa Clara College earned his 15 minutes of fame with a remarkable turn-of-the-century hang glider. Made of spruce, hickory and canvas, the aircraft had a 22-ft. wingspan. A balloon hoisted the 42-pound glider 4000 ft. into the air. Cut loose, it banked, swooped and dipped to a soft landing, the pilot controlling the four wings with guy wires. It was the closest man had come to achieving birdlike flight.

Steam Cleaner

While officials came to grips with the concept of sanitation, deadly contagious diseases continued to stalk cities.

Accordingly, the San Francisco Department of Public Health added a germ-killing vehicle to its fleet. The truck rolled up to disease-ridden houses, where bedding, clothes and other items were loaded into a large cylinder. A vacuum then drew out all the air from the chamber while high-pressure steam was piped in. For infected silk and fine fabrics, formalin replaced the steam.



60 YEARS AGO: JUNE 1935



Hog Heaven

Land-speed records were set, challenged and shattered throughout the 1930s. But motorcyclists wanted some of the power and glory, too. So Fred Luther assembled a monster 1500-pound 2-wheeler, driven by a 6-cylinder Plymouth automotive engine. The motorcycle—dubbed Hybrid X—stretched 115 in. long. Built to blow past 300 mph, the bike featured an unusual braking system: a pair of steel pads that dragged along the ground.

Heavy Duty

Three years out on the market, the diesel engine was revving up industry. From the wheat fields of California to the logging slopes of the Cascades, trac-

tors were taking advantage of the engine's tremendous fuel economy. Although the new powerplants came with big price tags, they worked hard enough to offset the extra cost.



30 YEARS AGO: JUNE 1965



Branch Offices

Treehouses climbed to new heights with a group of designs guaranteed to please sophisticated kids of the 1960s. Gone were the rickety, ramshackle perches of yesteryear. In their place, sleek A-frames and multi-gabled platforms offered high thrills without threatening spills. Since every treehouse is as unique as the tree it clings to, we provided a variety of rough attachment schemes. No trees? No problem. Our houses soared on stilts, too.

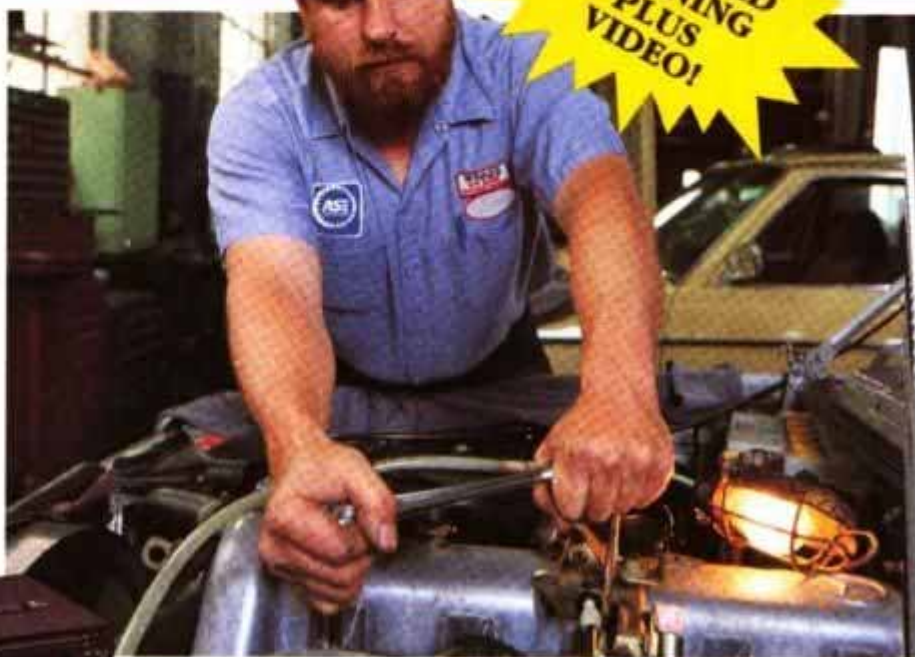
Green Machine

Guiding a missile up the tailpipe of a jet called for an expensive infrared detector, but two University of Wisconsin scientists invented one that even a farmer could afford. The \$30 radiometer, which measured infrared radiation from the Sun, was a big help in the pea patch, letting canneries predict harvests with uncanny accuracy.



NRI's new training gives you the hands-on skills and the professional equipment you need to make good money in automotive servicing

**NEW!
EXPANDED
TRAINING
PLUS
VIDEO!**



NRI's new, expanded training in Automotive Servicing fully prepares you to step into a high-paying new career or a successful auto servicing business of your own. With NRI, you get state-of-the-art skills, professional test equipment, plus live-action instruction on videotape—all you need to earn good money even while you learn.

There's no doubt about it: Automotive servicing is the kind of work you can take pride in. It's skilled work that commands good pay—as much as \$18,000 to \$50,000 a year according to the experts at the Automotive Service Association.

Plus recent breakthroughs in technology have propelled the automotive industry into the computer age. For you, that means more money-making opportunities than ever.

Now NRI shows you how to cash in on today's opportunities in automotive servicing. With NRI, you train for the big money, getting both the skills and the equipment you need to service just about any car on the road today.

Right from the start, NRI gives you in-demand auto servicing skills

With NRI training, you quickly master all-important under-the-hood services—including troubleshooting and tuning typical engine problems—so you can start earning good money even while you learn.

Then NRI's newly expanded training goes on to show you how to service the latest advanced technology systems and devices showing up on today's newest, most popular vehicles:

- Computerized engine controls
- Antilock braking systems
- Fuel-injection systems
- 4-wheel drive and 4-wheel steering
- Turbochargers, superchargers, and more!

Step by step, you cover today's cars from bumper to bumper, getting all the servicing know-how you need to earn ASE (Automotive Service Excellence) certification, the true mark of a highly trained automotive professional.



Hands-on training includes professional auto servicing equipment you keep

NRI training goes far beyond the books to give you quality equipment you can rely on throughout your auto servicing career.

Equipment like the OTC Monitor 2000 electronic diagnostic tester and an automotive digital multimeter, precision instruments you



can use to troubleshoot today's computer-controlled automotive systems.

Plus you train with and keep an inductive timing light,

vacuum gauge, compression tester, and remote starter... professional tools from Pentron designed for years of dependable service. You can even choose the optional Autocraft Ignition Analyzer Oscilloscope to make quick work of tuning and diagnosing older and newer cars alike.

See other side for tips from Richard Petty plus highlights of NRI's new live-action video instruction

SEND CARD TODAY FOR FREE NRI CATALOG

NRI Schools



McGraw-Hill Continuing Education Center
4401 Connecticut Avenue, NW, Washington, DC 20008

Check one free catalog only

- | | |
|--|--|
| <input type="checkbox"/> Automotive Servicing | <input type="checkbox"/> Microcomputer Servicing |
| <input type="checkbox"/> TV/Video/Audio Servicing | <input type="checkbox"/> Computer Programming |
| <input type="checkbox"/> Air Conditioning, Heating & Refrigeration | <input type="checkbox"/> Building Construction |
| <input type="checkbox"/> Home Inspection | <input type="checkbox"/> Home Remodeling |
| <input type="checkbox"/> Electrician | <input type="checkbox"/> Private Security Specialist |
| <input type="checkbox"/> Small Engine Repair | <input type="checkbox"/> Basic Electronics |
| <input type="checkbox"/> Locksmithing | <input type="checkbox"/> Appliance Servicing |
| <input type="checkbox"/> Gunsmithing | <input type="checkbox"/> Bookkeeping & Accounting |

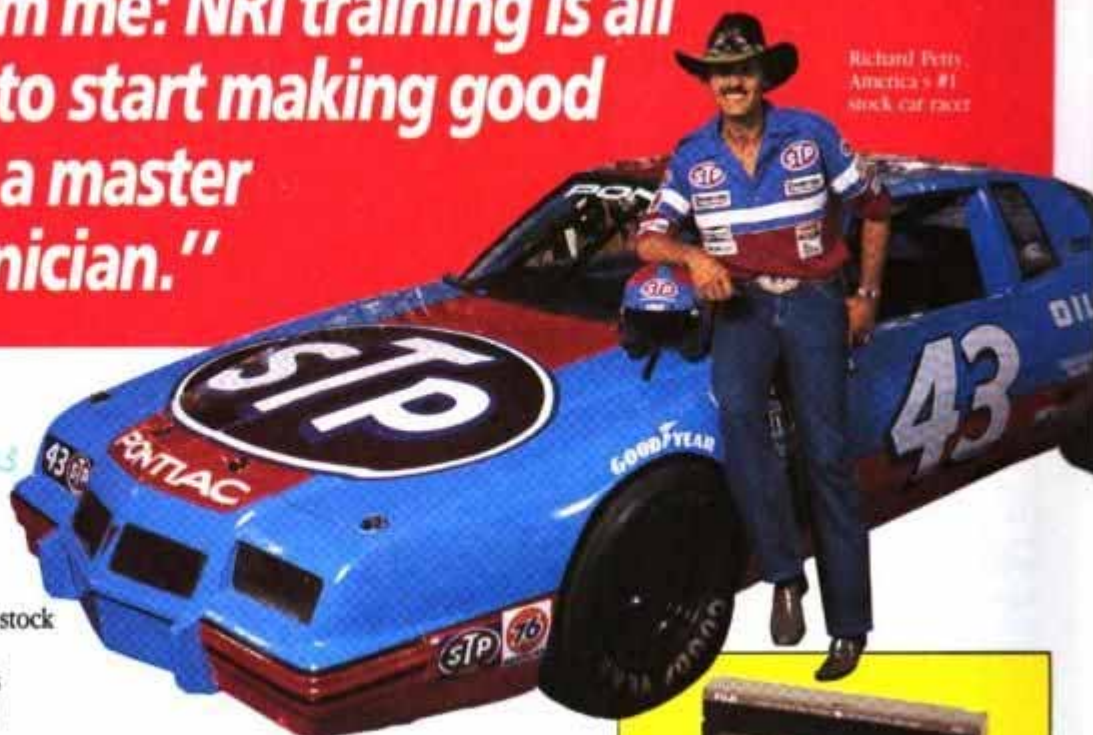


Name	(please print)	Age
Address		
City	State	Zip

For career courses approved under GI Bill, check for details.

"Take it from me: NRI training is all you need to start making good money as a master auto technician."

Richard Petty,
America's #1
stock car racer



Richard Petty

Richard Petty, America's winningest stock car racer, knows cars inside and out. That's why NRI turned to #43 for his evaluation of NRI's Master Course in Automotive Servicing.

"My dad made mechanics out of all of us, long before he let us enter a race," Richard says, "but very few people have that kind of teacher. That's why I'm sure glad to see home training like the NRI program come along. This is the most up-to-date, complete course in auto servicing I've ever seen.

"I looked over NRI's course from start to finish. So you can believe me when I say NRI gives you the best training in automotive servicing going. Check it out for yourself and you'll see what I mean."

Send today for FREE catalog

Find out more about NRI's newly expanded training that covers all the latest advances in automotive technology. See all the quality hands-on equipment you train with and keep. And learn more about NRI's exclusive new live-action video that adds a whole new dimension to your automotive training.

If the card is missing, write to NRI School of Automotive Servicing, 4401 Connecticut Avenue, NW, Washington, DC 20008.



New! Exclusive live-action video sharpens your tune-up skills

Now NRI's complete, up-to-the-minute training in automotive servicing even includes a custom-produced, live-demonstration 2-hour videotape on tune-ups and engine performance—yours to train with and keep.

Theory comes to life as NRI's on-camera team of professional automotive technicians shows you how to use the hands-on equipment included in your course to fully service any engine—from 4 to 8 cylinders, domestic or foreign, equipped with conventional or high-energy ignitions.

With the step-by-step instructions, photos, and diagrams in your NRI lessons—now reinforced by live demonstrations on videotape—you get the know-how and the hands-on expertise you need to cash in on today's growing demand for tune-ups. What's more, you'll have a sure skill that will allow you to make money doing tune-ups even before you finish the rest of your training.

NRI's exclusive live-action video is just one more way NRI ensures you get a fast start in a profitable auto servicing career.

SEND CARD TODAY FOR FREE NRI CATALOG



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 10008 WASHINGTON, D.C.

POSTAGE WILL BE PAID BY ADDRESSEE

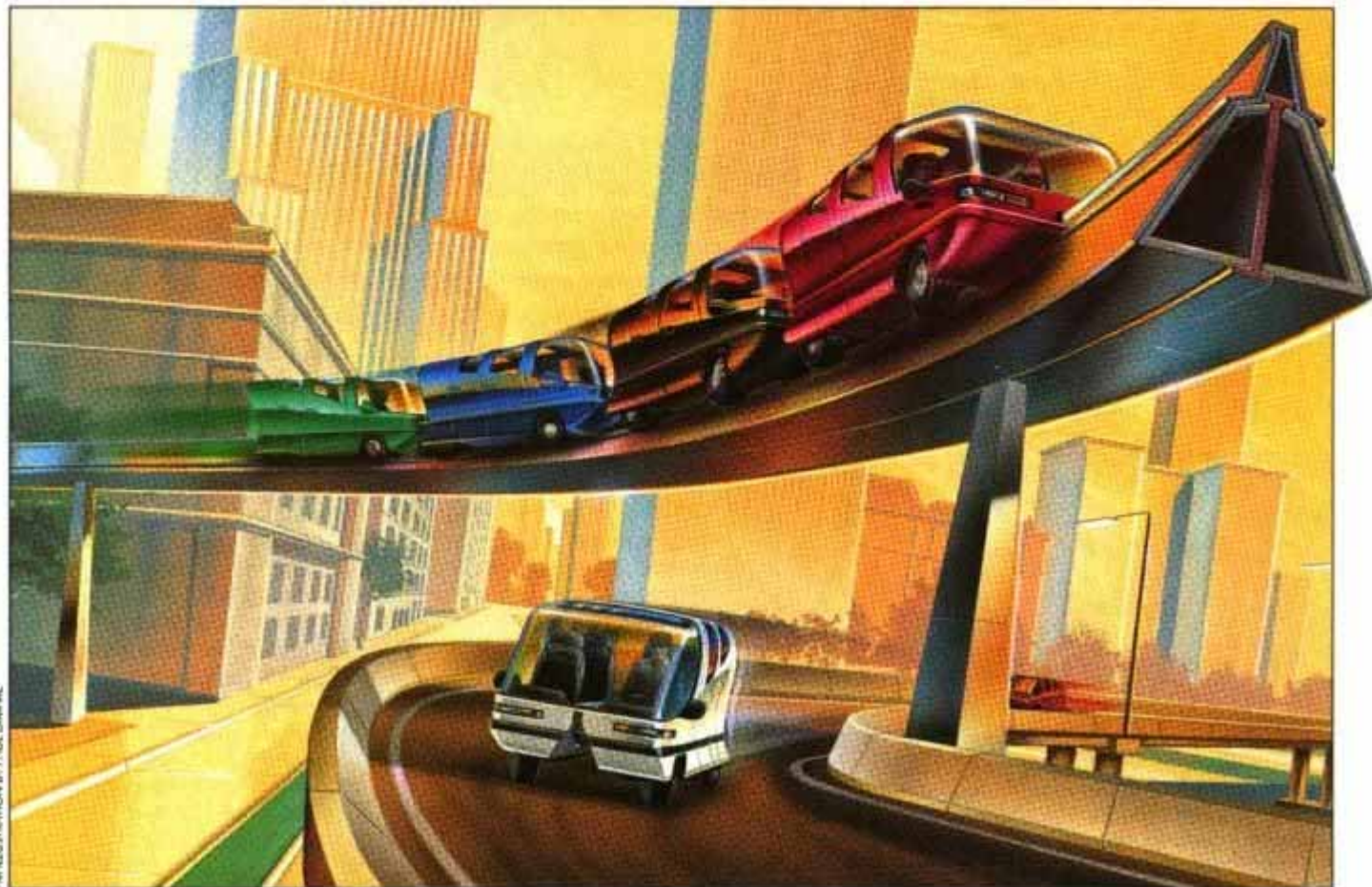
NRI Schools

McGraw-Hill Continuing Education Center
4401 Connecticut Avenue, NW
Washington, DC 20078-3543



TECH UPDATE

News Of Tomorrow's Technology Today



PM ILLUSTRATION BY PAUL DIMARIE

Rapid Transit Rides Rails, Then Roams Roads

RØDOVRE, DENMARK—There's your car. Then there's public transport. Few would argue that one can replace the other, even in the big city. But efficient as they are, subways and rail lines won't take you door to door. And cars, for all their convenience, clog urban arteries and cloud the air with their emissions.

Could one mode of transportation offer the best of both worlds? Danish inventor Palle R. Jensen thinks so. His proposed system, known as RUF, is an electric commuter vehicle, at home on rail and road alike.

On the streets, a RUF car could tap on-board batteries to travel for roughly 30 miles. This modest range should be enough to get the vehicle to an access ramp leading onto a network of monorails. At the ramp, the elevated rail dips to the ground so that vehicles can climb aboard.

A triangular slot in the belly of the car matches the cross section of the monorail. The slot houses four small support wheels and two drive wheels that press against the rail to scoot the vehicle along. Once on track, the car picks up power from the rail and returns it via regenerative braking. It enjoys unlimited range, speeds up to 125 mph and hands-off control.

Because the cars' front and rear ends fit together, multiple vehicles can platoon to form chains heading for a common destination. This serves

RUF slot cars can gang into trains while on the monorail, or wander the streets alone, powered by on-board batteries.

to minimize air resistance.

For trips out of town, the car's slot can be plugged with a small diesel generator and a fuel tank.

Jensen points out several cost advantages. The rail is a standard I-beam cloaked with steel plates and concrete. And automakers could mass-produce the vehicles to RUF standards, for purchase by both the public and private sectors.

Highlights This Month

- **Cyberbrew**—Japan's virtual-reality beer makers.
- **Happy Returns**—Introducing the reusable X-34 rocket.
- **Water Bearer**—Radical hybrid sealifter concept.
- **Shell Shocked**—Army's electronic artillery zapper.
- **MDTV**—Telemedicine network to debut in Georgia.
- **No Holds Barred**—Bionics revive paralyzed hand.
- **Rock Rollers**—Robotic vehicles wheel through mine.

Editor/Writer: Gregory T. Pope
Reporters: Philip Chien, Jim Dunne, Mike Dillon,
Kathleen Gleaves, Scott Gourley, Barry
Rosenberg, Fenella Saunders, Bob Scheier,
Herb Shuldiner, Andy Turnbull

Germs In The Oil Patch

JACKSON, MI—Energy researchers hope invisible allies—bacteria—can help them recover oil from underground fields.

Producers have long injected water into oil reservoirs to push black gold toward wells. Once the water has swept through the most permeable layers of sand, however, it continues to flow through only those layers, leaving oil trapped in less penetrable regions.

Hughes Eastern Corp. is enlisting germs to change all that. By dosing water with plant fertilizer, engineers hope to stimulate the growth of bacteria that will plug the spaces between sand grains in the water-swept layers. Water can then be forced through unswept layers.

Workers have already added nutrients to water pumped into four oilwells near Vernon, Alabama. In about six to eight months, Hughes Eastern expects to gain between 10% and 25% extra oil. This technique is cheaper than flooding a field with carbon dioxide or various polymers.



Fed nutrients, bacteria grow and divert water into low-permeability sand layers.



Sapporo's virtual brewery features 12 fixed and one mobile display to take visitors through the beer-making process.

Beer For The Head

TOKYO, JAPAN—Beer. Virtual reality. For some, the terms are synonymous. For others—visitors at Sapporo Beer's original brewery—virtual reality means actually becoming the beer.

Developed by Fakespace Inc. and Telepresence Research, the Sapporo installation sends visitors flying through the facility to experience brewing, fermentation,

filtering and bottling—all from the beer's perspective.

Peering through Fakespace BOOM displays, 13 viewers at a time are immersed at the molecular level of yeast, hops and other components. One viewer looks into a display mounted on a counterbalanced arm; the others watch fixed displays.

The virtual brewery accommodates 1000 visitors daily.

Warship Wheels

PANAMA CITY, FL—What more challenging environment for a robotic vehicle than the deck of a Navy ship? Space is tight, passages are steel-edged and the work-toting live missiles—is hazardous.

But the Omni-Directional Ordnance Handler, recently tested at the Naval Surface Warfare Center, appears to pass muster. Developed by a Swedish inventor in the 1970s, the vehicle moves on four unconventional 18-in. wheels. Elliptical rollers, offset by 45°, encircle each wheel hub. A computer controls the rotation speed of each of the wheels independently to turn the vehicle precisely or to change its fore/aft orientation while moving.



Omnidirectional robot pirouettes on wheels ringed with canted, keg-shaped rollers.

Comanche Dodges A Bullet

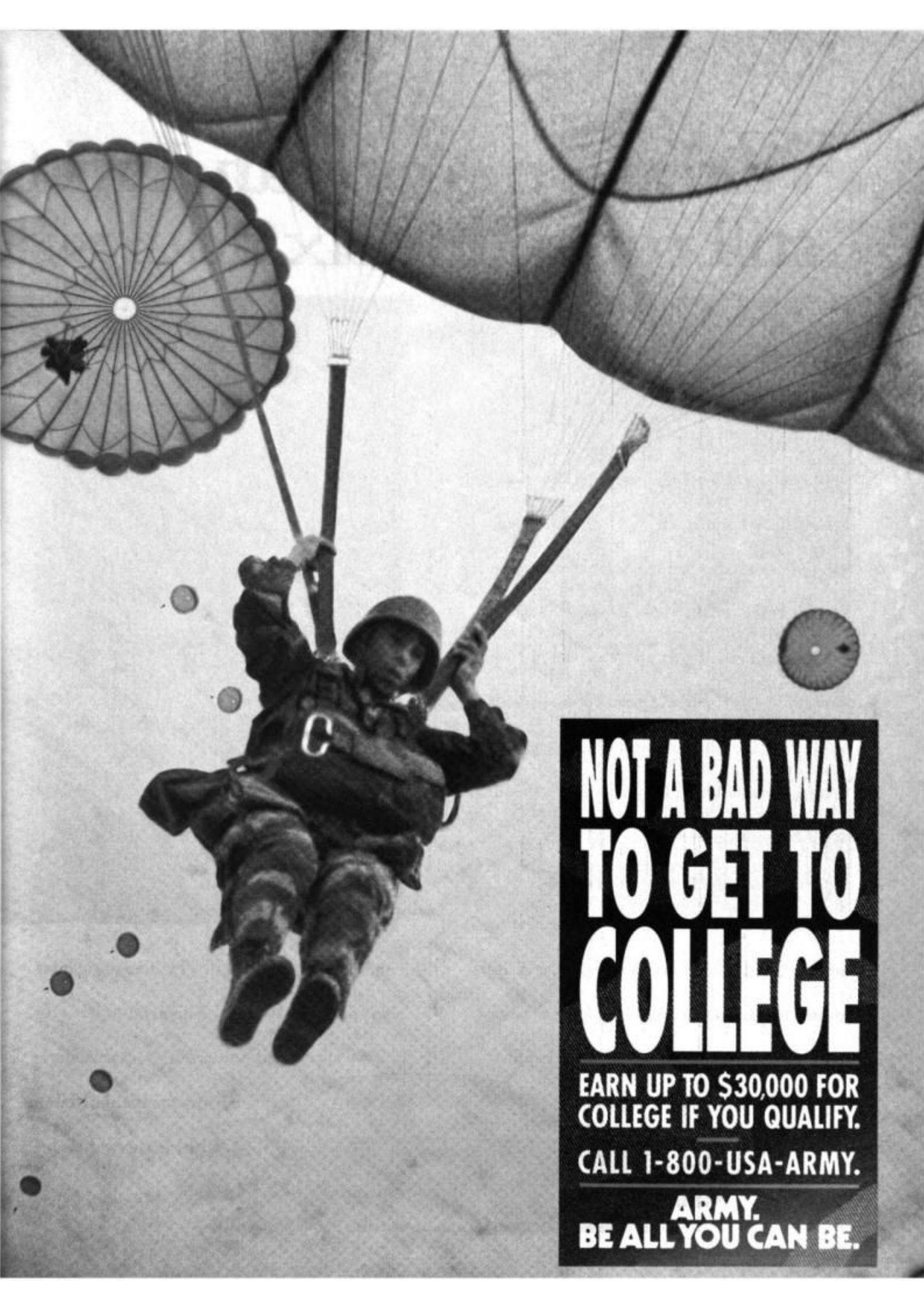
STRATFORD, CT—While the first RAH-66 Comanche helicopter is well on its way to completion (see Tech Update, page 30, March '94), the overall program is not. At the moment, two prototypes and six early-production models will certainly be built, but the future armed-reconnaissance helicopter has been a constant target for budget cutters.

The Pentagon, however, has already okayed a restructuring of the program, which should at least ensure that the prototype will fly this November.

At Sikorsky Aircraft's Connecticut plant, workers recently united the forward fuselage with its aft section, built at Boeing Helicopters in Philadelphia. Technicians are now testing the helicopter's unique 270-volt DC electrical system and fitting turboshaft engines to the airframe.



Mating of forward and aft fuselage sections means that the Comanche can accept engines and rotorblades.



**NOT A BAD WAY
TO GET TO
COLLEGE**

**EARN UP TO \$30,000 FOR
COLLEGE IF YOU QUALIFY.**

CALL 1-800-USA-ARMY.

**ARMY.
BE ALL YOU CAN BE.**

With so many standard features, there's still room for six adults in

Long before we began creating the all new 1995 Chevy Lumina, we asked thousands of people what they were really looking for in a new mid-size sedan. Turns out what they wanted more than anything was, well, everything. So the new Lumina comes with a range of standard equipment that, not too long ago, would have been thought impossible for a car in its price range.

At the top of the list is a sophisticated 4-speed automatic. Combined with a new fuel-injected, 160-horsepower V6 engine, it delivers power to the front wheels as quickly as your right foot can ask it to. So you'll be comfortable with all that power, a quick-cooling air



conditioning system with CFC-free refrigerant also comes as standard equipment.



We also added power door locks. Vanity mirrors for both driver and passenger (lighted

atures, it's surprising there's
here.




For a brochure call 1-800-950-2438. The Chevrolet Emblem and Lumina are registered trademarks and Chevy is a trademark of the GM Corp. ©1994 GM Corp. All Rights Reserved. Buckle up, America! 

on the passenger side). Theater lighting that slowly dims after you enter the car. Intermittent wipers, dual sport mirrors, and even an adjustable steering column are standard, too.

And the whole beautiful package is pro-

tected by a theft-deterrent system. Because as you've just learned, there's a lot of valuable stuff inside. See the new Lumina at your neighborhood Chevy dealer. Ask to take a test drive. And bring a friend. Or five.

ALL NEW LUMINA  GENUINE CHEVROLET™

X-Rocket Aims High

DULLES, VA—It looks like a cross between the space shuttle and the Pegasus winged rocket, with a little X-15 thrown in for style. Meet the X-34, a radical little rocket with a big ambition: to become the first reusable commercial launch vehicle (see Tech Update, page 17, Feb. '95).

American Space Lines, a new company formed by Orbital Sciences and Rockwell, will build the X-34, with support from NASA. Right now, engineers are weighing



ORBITAL SCIENCES PHOTO AND ILLUSTRATION

two options: a 72-ft. X-34A, sized to carry 1200 pounds, or an 88-ft. X-34B, which would launch 2500-pound payloads.

In either case, the X-34 will ride beneath the wing of an L-1011 or Boeing 747. At 35,000 ft., the aircraft will release the vehicle, which will fall away before igniting its rocket engine and ascending. As it blasts out of the atmosphere, the X-34 will roll over on its back. At 350,000 ft., a door will pop open and the payload, with an orbital rocket booster, will fly out. The X-34 will continue on a ballistic trajectory, re-entering the atmosphere and rolling over once again. Guided by GPS, it will glide to a landing at a conventional runway.

X-34 will release its payload through an electromechanical door, then plunge through atmosphere to land on runway.

To keep costs down, the rocket engine will burn regular jet fuel in liquid oxygen. American Space Lines believes an X-34 mission won't run more than \$4 million. First orbital flight: 1998.



Fuel-Cell Fleet

WEST PALM BEACH, FL—With a top speed of 15 mph, the Genesis ZEV isn't about to pin anyone's ears back. But it is the first vehicle powered by a fuel cell to enter the marketplace. Five are heading for Palm Springs, California, and the first



Genesis ZEV runs for 3 hours on a tank of oxygen/hydrogen and has a range of 45 miles. will begin tooling around this summer.

The Genesis will show off its potential as an airport cargo-hauler, grounds-maintenance vehicle or amusement-park people mover. Inside, tanks hold compressed oxygen and hydrogen to feed a 7.5-kw fuel cell. Energy Partners Inc., Western Golf Car and Telesis Cogeneration collaborated on the vehicles and associated fueling stations, which can refill the ZEV's tanks in 15 minutes.

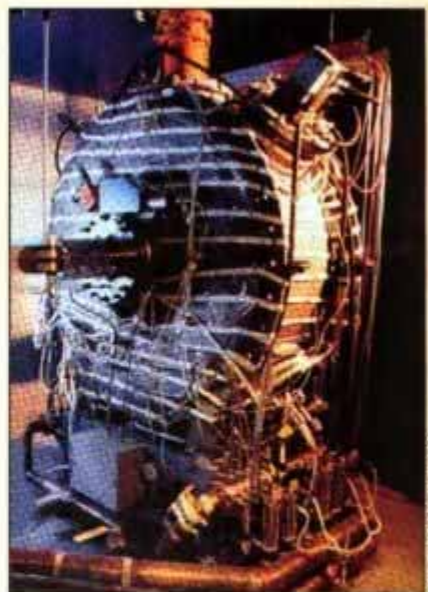
ENERGY PARTNERS PHOTO

Blue Devils' Super Laser

DURHAM, NC—Once the pride of the Strategic Defense Initiative, the free-electron laser (FEL) may become the darling of the scientific world. Ironically, the newest of these exotic devices—a huge FEL at Duke University—features components from the country whose missiles inspired the laser's development: Russia.

FELs boast two advantages: They can be tuned to produce laser beams at many wavelengths, and there's no fundamental limit to the amount of power they can produce.

Tuned to X-ray wavelengths, the Duke FEL can probe living cells. At



Duke's free-electron laser includes components such as a booster cavity (above) from a Russian laboratory.

infrared wavelengths, it could perform delicate surgery without scarring tissue or damaging nerves. The FEL can also etch small-scale chips and micromachines with unprecedented precision.

DUKE UNIVERSITY PHOTO





Sound this big from a radio?



© 1995 Bose Corporation. Covered by patent rights issued and/or pending.

Not just big, but full, rich, and incredibly lifelike. You literally have to hear the Bose® Wave® radio to believe it. Very simply, it's like no other radio made. The key is our patented acoustic waveguide speaker technology, which enables the Wave® radio to fill the room with big, natural stereo sound. Yet it's small enough to fit almost anywhere.

The Wave® radio is designed for convenience as well as great sound. There's a handy remote control, pre-set buttons for your favorite stations, and many other features. You can even connect it to a CD or cassette player to enjoy your favorite music.

The Wave® radio is available directly from Bose. Simply call the toll-free number, or send the coupon to receive a complete information kit or to try out the Wave® radio in your home for fourteen days, satisfaction guaranteed. Otherwise, just return it for a refund of the purchase price.

Only Bose offers all this advanced technology. And for just \$349. Call 1-800-845-BOSE, ext. RP274, or send the coupon today. And learn all about a small wonder.

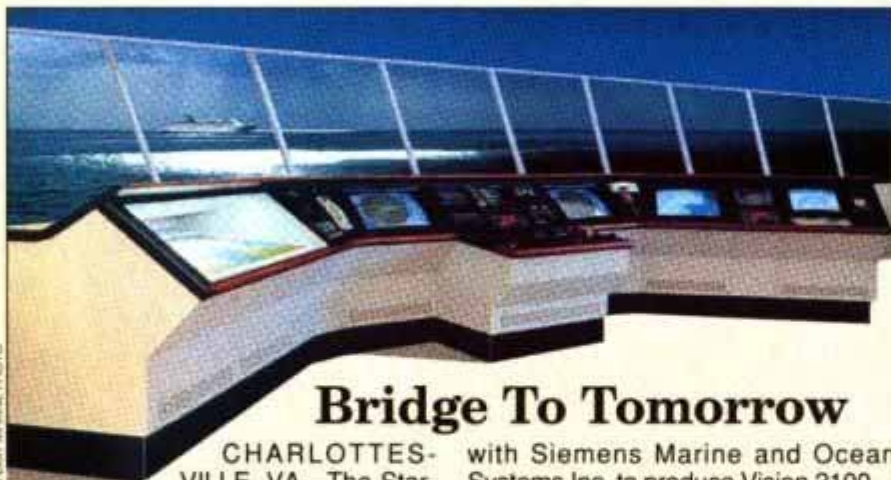
BOSE®
Better sound through research®

MR./MRS./MS. NAME (PLEASE PRINT) _____ () DAYTIME TELEPHONE () EVENING TELEPHONE
 ADDRESS _____
 CITY _____ STATE _____ ZIP _____

Call 1-800-845-BOSE, ext. RP274

Or mail to: Bose Corporation, Dept. CDD-RP274, The Mountain, Framingham, MA 01701-9168. Price is subject to change without notice.

Материал, защищенный авторским правом



SPERRY MARINE PHOTO

Bridge To Tomorrow

CHARLOTTESVILLE, VA—The Starship *Enterprise* had one. So do the Navy's new warships. But until recently, a fully integrated bridge wasn't economically viable for container ships, oceanliners and other commercial vessels. Even the most modern civilian bridge remains a hodgepodge of electronic systems, few of which can access the others' data.

But Sperry Marine has teamed Vision 2100 integrated bridge replaces disparate clutter with organized console.

with Siemens Marine and Ocean Systems Inc. to produce Vision 2100—and streamline the skipper's workplace. The console integrates navigation planning, electronic chart display, engine-room monitoring, radar and other functions. The highly automated configuration features the Microsoft Windows NT operating system.

While it aids the captain in plotting a course, Vision 2100 can also boost a ship's performance by harnessing sea-state and navigational data to optimize propulsion.

Gift-Wrapped Horsepower

STE. THERESE, QUEBEC—When you buy a Camaro or Firebird, it's like giving yourself a present. Now these cars come gift-wrapped in a plastic coating called Transseal.

At the assembly plant, the auto bodies move into the Transseal sprayer right after they pass through the color-paint ovens. Masks cover window openings and door hinges. The bodies then travel through another oven to cure the coating.

Transseal protects the car's finish until the new owner takes delivery. The coating is then either peeled off by hand or lifted with a water spray.

Transseal plastic wrap shields car's finish from damage during transportation.



GENTHER MICROPHOTO

Watch It, Buster



BOFORS AB ILLUSTRATION

Buster can fire tungsten-carbide kinetic-energy darts in rapid volleys.

Rocket motors will boost the laser-guided projectiles to speeds above 4400 mph. Effective range: 13,000 ft. Sweden aims to deploy Buster by 2010.

KARLSKOGA, SWEDEN—The Swedes are respected as masters of anti-armor weaponry, and this latest design should enhance their reputation. Conceived by Bofors AB,

Buster will fire a volley of dartlike projectiles at lightning speeds.

Eight launch tubes will ride aboard a tank chassis. Via a remote fire-control system, a gunner could unleash darts toward four separate targets—at intervals of only 2½ seconds.

Rocket motors will boost the laser-guided projectiles to speeds above 4400 mph. Effective range: 13,000 ft. Sweden aims to deploy Buster by 2010.

Bob Hope Joins Army

BALTIMORE, MD—The Army has drafted two veteran freighters—renamed the *M/V LTC Calvin P. Titus* and *M/V SP5 Eric G. Gibson*—as the first ships to beef up its pre-positioning force. Owned by the Maersk Line Ltd., the roll-on/roll-off vessels will operate under the Navy's Military Sealift Command. Bethlehem Steel's Sparrow Point shipyard added cranes and cargo-space a/c to the vessels.

Also, the lead ship in a new class of sealifters is under construction at Avondale Industries in New Orleans. The USNS *Bob Hope* will be the first of 19 vessels dedicated to surge shipping and pre-positioning.



Converted vessel (above) will haul materiel such as rations, while heavy equipment will arrive aboard *Bob Hope*.

Hydraulic Pipeline For Coal



SANGSUI PHOTO

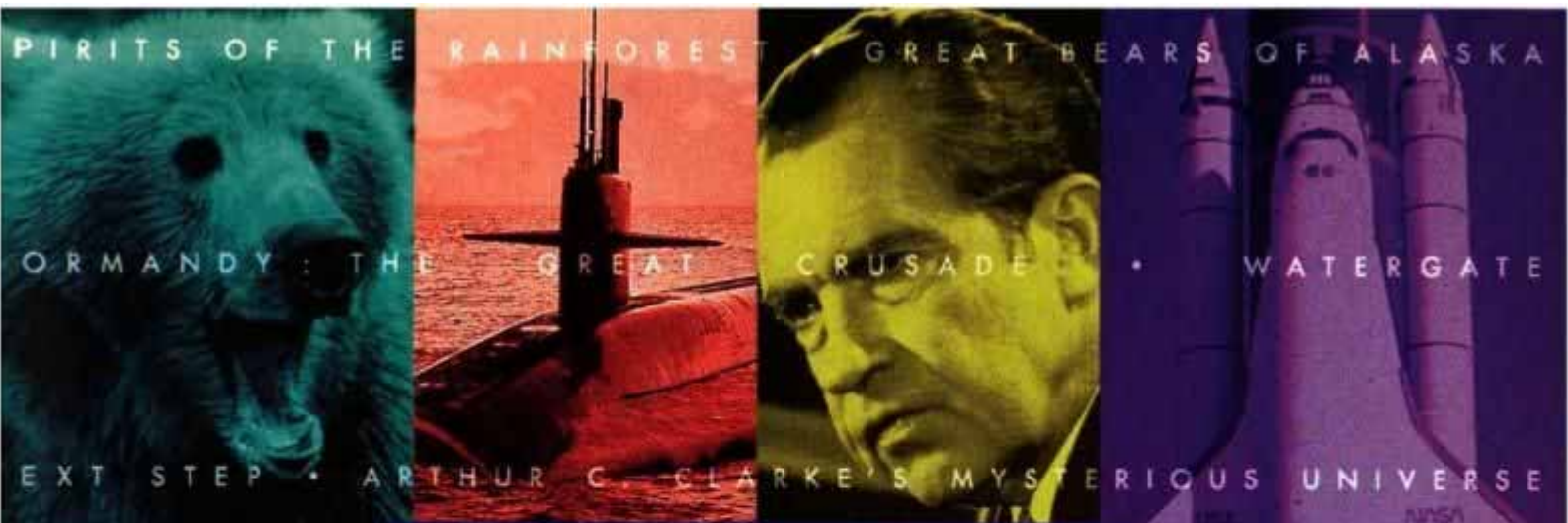
COLUMBIA, MO—Pipelines shunt oil around the nation. Why not coal? At the University of Missouri, engineers are developing a coal-log pipeline that could give trucks and trains a run for their money.

Unlike a slurry, the Missouri pipeline keeps coal and water separate. A die compacts the coal into capsules, which are then injected into the tube and flushed to their destination. The engineers have proposed building a pilot plant in an abandoned mine.

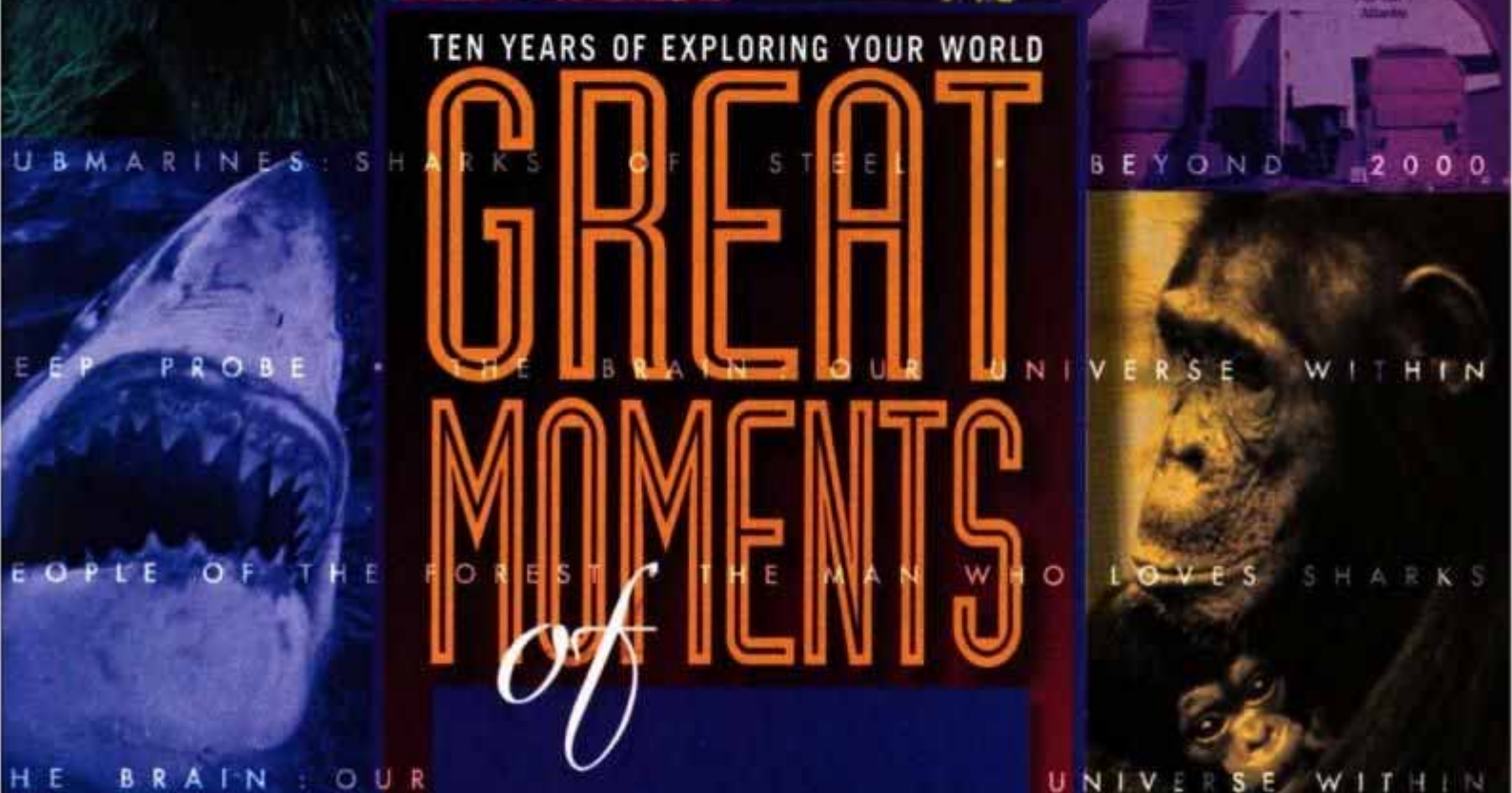
Coal-log pipeline could transport clean Western coal to Eastern states.



U.S. NAVY ILLUSTRATION (MCM PHOTO)



PIRITS OF THE RAINFOREST • GREAT BEARS OF ALASKA
ORMANDY: THE GREAT CRUSADE • WATERGATE
EXT STEP • ARTHUR C. CLARKE'S MYSTERIOUS UNIVERSE



UBMARINES: SHARKS OF STEEL • BEYOND 2000
EEP PROBE • THE BRAIN: OUR UNIVERSE WITHIN
EOPLE OF THE FOREST • THE MAN WHO LOVES SHARKS
HE BRAIN: OUR UNIVERSE WITHIN

TEN YEARS OF EXPLORING YOUR WORLD

GREAT MOMENTS

of

THE **Discovery** CHANNEL®

A TWO-HOUR SPECIAL • HOSTED BY BOB COSTAS



BEYOND 2000 • A TIME OF AIDS
HE SPACE SHUTTLE • IN THE COMPANY OF WHALES
SUNDAY, JUNE 11 • 9 PM ET/PT
ARRIER: FORTRESS AT SEA • HOW THE WEST WAS LOST

By now you've heard what full synthetic oils can do for your car's engine. You've also heard what they cost.

Advanced protection, without the price

But Valvoline DuraBlend is a revolutionary new breed of motor oil: a state-of-the-art blend of technically advanced synthetic oil and the highest quality conventional

motor oil. Yet it costs 40 percent less than a full synthetic oil.

No regular oil protects like DuraBlend

The synthetic component of DuraBlend forms a lubricating film on critical metal-to-metal surfaces, even when most of the oil is still cold in the pan. And the conventional oil component helps suspend and neutralize harmful

acids that can promote engine wear. It's truly the best of both worlds.

Enhanced performance, reduced wear

Right out of the bottle, you'll get significantly reduced engine wear on cold starts. Better fuel economy. More horsepower. Improved engine deposit control. In general, a smoother running engine than

**What do you get
when you cross
a high quality
conventional
motor oil with
an advanced
formula synthetic?**

you've ever experienced with conventional motor oils. And DuraBlend can be used in any car or truck, at any time.

**VALVOLINE.
THE #1 CHOICE OF
AMERICA'S TOP MECHANICS.**

Valvoline pioneered the use of synthetic oil technology in the high-performance world of racing. We created DuraBlend with



© 1995 The Valvoline Company, Marketers of **VALVOLINE** and **PIROL**

the same race-proven expertise that helps make Valvoline the number-one choice of top mechanics for use in their own cars and trucks. Now we bring that advanced engineering home to the family car. At a price that finally makes sense.

**PEOPLE WHO KNOW
USE VALVOLINE®**

Valvoline DuraBlend.™

**A revolutionary
oil that protects
better than
regular oils but
costs 40% less
than full synthetics.**

High-Stepping Heavy Haulers

FORT WALTON BEACH, FL—Tired of the endless debate that pits airlift versus sealift? A retired aeronautic engineer has patented a cargo-transport concept that blurs the distinction.

Much like a conventional hovercraft, the vehicle uses powered lift to reduce hydrodynamic drag during takeoff. Fans blow air into a below-hull space flanked by pontoons and retractable doors fore and aft. When the vehicle reaches liftoff speed, the aft door retracts and the hovercraft fans cut off. The effect is to nose the machine skyward like a seaplane.

Once airborne, the craft's lifting-body fuselage and stubby



Hybrid ground-effect transporter is based on inventor's homebuilt craft (left).



CHUCK BIXEL PHOTO

wings put its aerodynamic center of lift at the same point as its center of gravity. This coincidence makes for stable water-to-air transitions and—combined with the flat, low-aspect-ratio wings—allows

the vehicle to travel efficiently in ground effect.

Inventor Chuck Bixel says he has demonstrated the concept with small radio models. These have flown on higher cushions of air than equivalent models of other ground-effect vehicles.

AN ILLUSTRATION BY ED VALIGURSKY

Containers For People

VALDEZ, AK—A lesson from the *Exxon Valdez* disaster: Have trained personnel available for immediate and extended deployment. But where to house them? In emergencies, crew populations can double or triple quickly, outstripping the berthing facilities aboard spill-response vessels.

In the past, that has meant expensive renovations to a ship's superstructure. But now there's

Bubble Your Troubles Away



Flow boiling whisks heat from avionics modules recently designed at Purdue University.

WEST LAFAYETTE, IN—What do nuclear reactors and computers have in common? Both must stay cool, because meltdown means disaster. Now a single technology, developed at Purdue University, could chill machines big and small—from microchips to megawatt lasers.

Called flow boiling, the technique forces liquid through microchannels carved into heat-producing devices. The heat boils the liquid, causing tiny bubbles to form on the microchannel walls. The heat boils the liquid, causing tiny bubbles to form on the microchannel walls. The flowing liquid flushes away these bubbles—along with the hot vapor they contain—and leaves room for new bubbles to form. The process dissipates far more heat than simple air or liquid cooling. Boilermaker engineers have proved the concept on lab-built avionics modules.



PURDUE PHOTOS



MARINE INDUSTRIES N.W. PHOTO



TEC/ARTIST LARRY PHOTO

Oil-spill contingency barge can house expanded crews in portable modules.

a simpler solution: portable crew quarters, developed by Marine Industries N.W. Inc. The modules, which match the dimensions of intermodal containers, lock to a vessel's deck with standard corner fittings.

A berthing module sleeps six and contains a shower and mudroom. A galley/utility module can double as a recreation area during slack time—or as a planning center during emergencies. Meanwhile, a command and communications module features four windows.



**[LIKE MANY GREAT VEHICLES CHERISHED BY THEIR OWNERS,
OURS IS DESTINED TO COLLECT DUST.]**

Unlike most classic vehicles, the Sonoma Highrider wasn't meant to sit around in some millionaire's warehouse. It is, after all, a GMC Truck. So while it looks great in any parking space, Highrider is at its best in gear, whether it's cruising down the open highway or kicking up dust on the meanest dirt road. Just climb behind the wheel, and Highrider's appeal becomes immediately apparent. Its available 191 HP Enhanced 4.3 liter V6 is the most powerful engine in its class. And there are other niceties as well. Things like massive stabilizer bars. Huge 31-inch tires. Special heavy duty axles. And a suspension anchored by 46 mm Bilstein® shocks, built to absorb punishment. Even the frame was specifically designed for Highrider. It's a truck for truck fanatics, brought to you by the experts at GMC Truck. And although it has all the right qualities to inspire immense devotion in its owners, Highrider has one other distinct advantage: you won't be afraid to take it out of the garage. For more information, call 1-800-GMC-TRUCK.



©1995 General Motors Corporation. All rights reserved. GM, GMC, GMC Truck, Sonoma, Highrider and the GMC Truck logo are registered



Official Truck of the National Hot Rod Association.

More **SONOMA** 1-800-4-A-GMC

Drones Of The Ocean Blue

COLLEGE PARK, MD—Free-wing tilt-bodies (see Tech Update, page 15, Aug. '93) will see action at sea. Under a contract from the French navy, Matra and Freewing Aerial Robotics are putting one of the unmanned air vehicles aboard a frigate.

The free-wing concept suits ship-board operations. In flight, the vehicle can tilt its body—and hence its propeller— independently of its wings. The result: vectored thrust that permits near-vertical takeoffs and landings without the need for nets.



A free-wing tilt-body can cock its fuselage to vector thrust from the propeller.

The Bert Rutan-designed Scorpion free-wing (renamed Marvel for the French experiments) will work with a Matra-designed command and control system. Reconnaissance is the drone's

forte—it can vector its thrust to pass slowly over a target of interest. If the vehicle proves shipshape, it could also find work in the commercial world: spotting fish for ocean trawlers.



Army's Shot Blockers

FORT MONMOUTH, NJ—Artillery has long been the big killer on the battlefield. But thanks to a partly classified system called Shortstop, the U.S. military may soon be able to reach out and touch hostile artillery rounds, detonating them before they ravage friendly forces. Whittaker Electronics of Simi Valley, California, will deliver nine such systems to the Army next year.

Conceived but unfielded during Desert Storm, Shortstop consists of a receiver/transmitter, amplifier, antenna and battery pack. Army sources say the system requires "user knowledge to set the correct electronic-countermeasures technique." Once set, however, Shortstop operates autonomously, broadcasting signals to trigger artillery fuses prematurely.

Shortstop apparatus will come in three varieties: a 25-pound portable system, a vehicle-mounted model and a stand-alone package.

Shortstop broadcasts signals to trigger incoming rounds at a safe distance.

eties: a 25-pound portable system, a vehicle-mounted model and a stand-alone package.

Tails For Trucks

LUBBOCK, TX—Long-distance trucks and buses may one day sail along the highway, thanks to a fairing invented by Herb Carper, a mechanical-engineering professor at Texas Technological College.

Called an aerodynamic inflatable boattail, the device unfurls like a giant windsock when the vehicle gains speed. The tail streamlines the airflow around the vehicle, eliminating the low-pressure zone that acts like an anchor to slow it down.

In wind-tunnel tests, the boattail reduced drag on a tractor-trailer by 13%. Carper is modifying the device to shorten its dimensions to a practical length.



Inflatable truck boattail reduces aerodynamic drag.

TV To Put On A Clinic

AUGUSTA, GA—Being "on call" will soon have a whole new meaning for doctors in Georgia. An unprecedented telemedicine network will link 59 hospitals and correctional facilities.

In the works at the Medical College of Georgia are two key technologies.

One, the Electronic House Call, will put a live doctor on a patient's TV or computer screen. Not only will patient and physician be able to converse, but the pa-



tient will have digital examination devices—such as a stethoscope—to plug into the TV or computer.

Meanwhile, a sensor glove will allow a patient to supply the doctor with tactile information—by palpating a cyst, for example. Right now, the doctor sees the data in the form of a topographical map. Ultimately, the physician will wear a glove fitted with actuators that replicate the patient's motions and sensations.



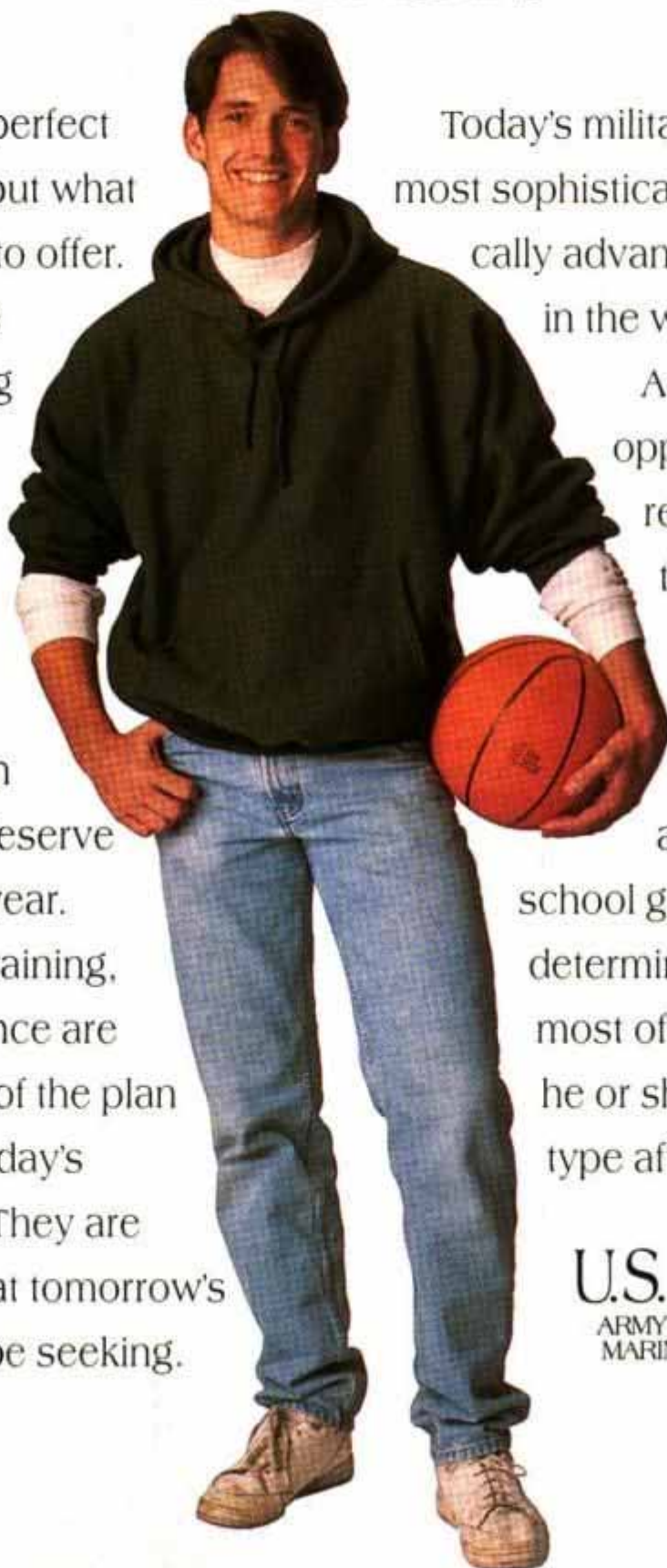
Sensor gloves are part of effort to update the old "radio doctor" concept.

IF YOU NEVER THOUGHT OF YOUR CHILD AS THE MILITARY TYPE, THINK AGAIN.

Now is the perfect time to think about what the military has to offer.

Although the military is getting smaller, the Armed Forces still need to recruit almost 400,000 young men and women for Active and Reserve positions each year.

Education, training, and job experience are important parts of the plan to restructure today's Armed Forces. They are also exactly what tomorrow's employers will be seeking.



Today's military is one of the most sophisticated and technologically advanced organizations in the world.

As in the past, the opportunities and rewards for joining the military will continue.

So, if you know a smart, ambitious high school graduate who's determined to make the most of the future, maybe he or she is the military type after all.

U.S. ARMED FORCES
ARMY ★ NAVY ★ AIR FORCE ★
MARINES ★ COAST GUARD ★

You Need The Edge.



Own the laser pointer of the future.
Project a brilliant red dot up to 100 yards. In the open, or clandestinely. Great for conferences, training programs, construction sites, driving your neighbors crazy, or making your dog run around in circles. We had a great time projecting a dot onto the computer monitors of the office across the street. They never did figure it out. New 5mw optical diodes for a vivid, intense beam. Now, for business, work, or fun, own the personal laser of the 21st century. On sale now!



■ **Ultra-Tech Laser Pointer #LR6001 \$69.95**

Sit in your car and hear inside your house – an eighth of a mile away!

The same technology used by surveillance teams and undercover police: Sub-miniature electronics amplify and transmit even whispers, right to your portable or car FM radio!

Internally powered by a tiny micro-battery. Leave hidden and choose when to "listen in". Or hide in your pocket and secretly transmit a conversation to a friend's car or walkman! Secure and monitor offices, your home, or anywhere. We tested ours at 700 feet line of sight! You won't believe your ears.



■ **Micro-Tech Transmitter Bug #K277 \$34.95**
Check your local laws before using.



Own the last of Russia's restricted issue spy glasses.

Designed for the KGB. All steel micro-binoculars fold away to disappear into palm or shirt pocket. Yet super advanced coatings and huge 2.5 x 17.5 power yields crystal-clarity, even in low-light conditions.

Hunting, sports events, concerts, nature study, or surveillance. Now get the powerful 1 1/2" long cold-war edge.

■ **Dual Focus KGB Micro-Binoculars #R-215 \$29.95**

With case and Russian documentation, and can be used reversed as low power microscope. Hurry comrade, supplies limited.

BLAZER MICRO-TORCH



The 1300° edge.

At over 1/6 the surface temperature of the sun, 3" Micro-Torch will ignite a wet campfire, harden metals, fuse plastics, cut rope like a laser beam, and thaw a frozen lock in about half a second.

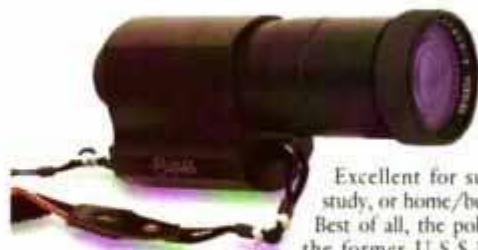
Press the electronic ignition lever. The blue-hot flame is windproof, rainproof, and completely adjustable. Indoors, even solder jewelry, copper and electronic components. Detachable safety-stand for hands-free operation. Outdoors, Blazer is the ultimate survival tool – guaranteed fire.

Get two – keep one at home and one in your pack or glove compartment. You'll be amazed how often you fire it up.

■ **Blazer Micro-Torch #PB207 \$39.95**

■ **Blazer Fuel, 3 year supply #RF300 \$9.95**

Complete with full instructions and a lifetime warranty.



See in the dark.

The White Night™ One of the best night vision scopes ever available. Its famous compact size and wide-optic power turns night into green-hued day instantly. Measures just 7x3x2", with magnification of 3.2x.

Excellent for surveillance, nature study, or home/business protection.

Best of all, the political changes in the former U.S.S.R. have driven exchange rates to an all-time low. Check out this price! Complete with carrying case, straps, and a lifetime warranty.

■ **White Night™ Scope #WN-37 \$495.00**

Super efficient, requires just 2 AA batteries - not included.



Pay your next speeding ticket, or for a bit more don't get one at all. Ever.

Switch on the cloaking device for your car, and become nearly invisible to police radar. And it's completely legal! The Mirage 2001™ employs radar masking circuitry, rocketing out silent, un-seen waves that almost "zero-out" police clocking guns. Even works against pulsed-radar, the newest "instant-on" device in speed-traps. Do not confuse with "active" scramblers or weak and ineffective "Spirit" brand jammers. Mirage's passive circuitry operates within all FCC guidelines and its big jamming antenna wipes out the competition. To be used with your radar detector for powerful protection. Spot the traps, then jam them. Worth every penny if you travel at all. Measures app. 4"x 3", and includes a full lifetime warranty.



■ **Mirage Radar Scrambler #M2001 \$249.95**

The Edge recommends you obey all posted speed limits. Mirage is intended only as protection against improperly calibrated police radar or unscrupulous law enforcement - both rare occurrences. Check your laws before ordering.

Take back control of your telephone.

Tele-Screen™ Phone Protector eliminates unwanted calls. Harassing calls, sales calls, any call you wish. Incoming calls are greeted by a voice prompt: "Thank you for calling. Please enter the four-digit pass-code." Your phone rings only if the caller enters the correct code. Voice prompt repeats and if no code is entered, the caller is automatically disconnected! Use the key-pad to change the code, or de-activate the unit. It's like having an un-listed phone number when you want it unlisted. Like during study, meal-time, romantic evenings, or when you only want calls from those you gave your password to. Also secures fax and modem lines!

■ **Tele-Screen™ #TS-300 \$44.95**

Installs easier than an answering machine, with its own AC power pack. Rings once to let you know its working. Un-Tele-screened extensions will regular ring.



We Deliver.

REMEMBER
FATHER'S DAY
JUNE 18!



The Highway Zapper!

Activate any radar detector within 3/4 of a mile. Point it down the road, and watch brake-lights light-up the sky! Back off those 18 wheelers eating your back bumper. Slow down that maniac who just passed you at 110 mph. The size of a cigarette pack, the Zapper works on just one 9v battery. Have a blast next vacation, or amuse yourself on your cruise to work. Complete with the rules for the new Road Warrior game "Trolling for Tail Lights."

■ The Zapper Radar Activator #AXT-10 \$49.95



EDGE
NIGHTHAWK
PISTOL CROSSBOW

Have you ever gone target shooting with a crossbow? Slide a steel-tipped bolt into position, take aim, and pull the trigger! A 100 mph thrill - especially when you hit the target dead on. Swift, silent, and on sale now! \$29.95 includes the die-cast alloy 40lb. Nighthawk, bow string, and five bolt-arrows. Test fire yours with the power of the Edge no-risk guarantee.

- Nighthawk Pistol Crossbow #1066 \$29.95
- 12-pack extra bolt-arrows. #1066-12 \$4.95
- 12 threaded steel-tip aluminum shaft bolts in anodized gold. #1066-A \$9.95



Cross-hair™ 4x15 Target Scope, enlarges your view 4 times, simple to mount.
#C410 \$29.95



Electronic Point Sight, projects brilliant red dot onto your field of view, never misses, cinch to mount. #7809DZ \$18.95



RARE FIND!

FedEx
DELIVERY ALL ITEMS



Fifty years ago this summer, D-day. America held its breath. The battle raged. Through France, and over the continent. A year later, they came home, victorious. Our fathers, grandfathers, and perhaps yourself. All will remember the M-1 Garand rifle. And the steel that tipped it. A reminder of when war was a far more personal thing. Unlike other WWII & Korea Bayonets you may have seen, these are the originals. Complete with scabbard, and a certificate of authenticity. They have seen action from the Ardennes to the Chosin Reservoir to early 'Nam. Over 11" long, with a 6 5/8" blade, ready to take a razor's edge. Camping, survival, chores at home and on the road, or under display glass in your den, room, or office. Own the steel that helped keep freedom alive.

■ Authentic M5-A1 Garand/Carbine Bayonet #M5-A1-GB \$39.95

While supplies last. Quantities limited. Complete with its correct matching M5A1 original scabbard.



U.S. Marine (left) on N.E. slope, Seoul, 1950

Pocket size Voice-Changer instantly hooks to any phone.

Advanced voice-disguise technology as used by detectives and witness protection programs - in a compact 6 x 4 x 2" unit. Press a button and alter your voice in 16 distinct and totally different masking levels. Sound like a woman, a woman like a man, or a child like a grandfather. Be your own secretary and say you're not in! Best of all, it clicks right to any phone - home or business. No extra wires or complicated hook-ups, and nothing to learn. Try one on a friend - they won't believe it's you!



■ Transition 2001 Pocket Voice Changer #Q2001 \$74.95 Meets all FCC regulations. Requires 4 AA batteries. Will realistically voice disguise at mid-range settings, sound hilarious at extreme settings.

Each genuine Garand Bayonet is complete with scabbard and Certificate of Authenticity. Each Bayonet is rated NRA "very good to excellent" condition.



THE EDGE COMPANY
KNIVES, TOOLS, & GIFTS

P.O. Box 826, Brattleboro, VT 05302 • 1-800-732-9976



Free!

With any order over \$75.00. The lightweight, pocket Micro-Telescope

PM0605 Call Toll-Free 1-800-732-9976 or fill out order form and mail to: The Edge Company P.O. Box 826 • Brattleboro, VT 05302

Name _____
Address _____
City _____ State _____ Zip _____
Telephone (____) _____

Method of Payment: Check or Money Order enclosed
 VISA MasterCard Amex Discover

Credit Card #: _____

Exp Date: ____/____ Issuing Bank of Card _____

I certify that I am over eighteen years of age and assume liability for laws in my area concerning products I have ordered:

X _____
(Signature)

Model #	Description	Qty	Price Each	Total

My order is over \$75.00 please send me my FREE Micro-Telescope.

Also send me a special 2 year Edge Catalog subscription. \$3.00

The Edge Ironclad Guarantee: Every item we sell will give you complete satisfaction or you may return it within 30 days for a full refund, credit, or exchange. Your choice. Plus - every Edge product is covered by our famous lifetime warranty.

Shipping
we bill
TOTAL

Add \$5.00 shipping and insurance per item, \$3.00 each additional item. All orders shipped within 48 hours.

CALL TOLL-FREE 1-800-732-9976

24 HOURS A DAY
7 DAYS A WEEK



www.edgecompany.com

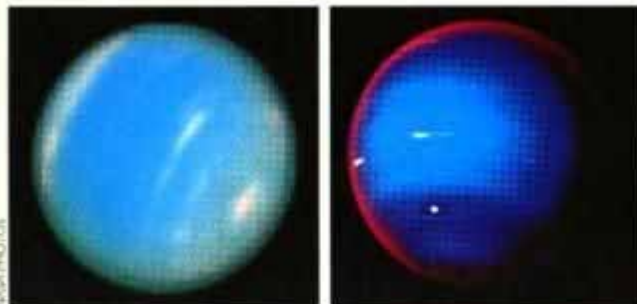
Hubble Sees The Future



Astronauts will swap in HACE camera during a future servicing mission.

BALTIMORE, MD—While astronomers are sky-high over the new and improved Hubble Space Telescope, they're now eyeing even better upgrades. After all, many of the Hubble instruments were designed some 25 years ago, and the telescope's original components will have spent more than a decade in space by the year 2000.

To keep Hubble sharp, NASA has just okayed the construction of HACE—Hubble Advanced Camera for Exploration—for installation after the turn of the century. Like other replacement instruments, HACE will have optics to compensate for the Hubble mirror's spherical aberration. Up to 10 times more sensitive than the current Wide-Field Planetary Camera-2, HACE will permit exploration of the faintest objects at the edge of the universe. It will accomplish this with extremely long exposures of a small part of the sky. Its detectors—electronic "film"—will be able to digitally block out bright objects to reveal their dim companions, such as planets.



Compared with current Hubble capability (left), HACE photos will approach resolution of Voyager's closeup shots (right).

Robot Miners Hit Pay Dirt

COPPER CLIFF, ONTARIO—The most dangerous job in America? It might be underground mining. But in five years, Automated Mining Systems (AMS) Inc., of Toronto, hopes to have the technology to run a mine from the surface.

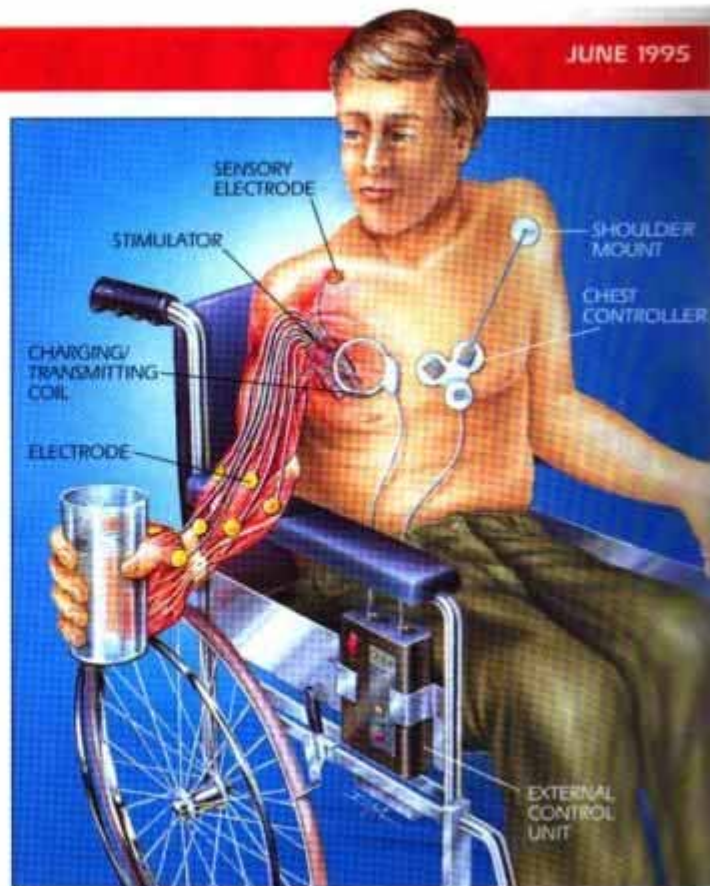
Right now, at an Inco nickel mine near Sudbury, Ontario, one man maneuvers two vehicles with an AMS



radio-control system. The machines are front-end loaders called scoop trams. They shuttle rock from the working face to a shaft that leads to a crusher.

Each tram runs autonomously for three-fourths of the time, with the operator taking control only when it loads and dumps. Inco believes that a single worker could ultimately run four vehicles at once via remote control.

Pierced coaxial cables riddle the mine, carrying signals from



Controlled by left shoulder, electrodes stimulate righthand grips.

Restoring The Grip

ST. LOUIS, MO—For the first time in 10 years, a paralyzed man can eat, watch TV and even write a letter with minimal assistance. The 47-year-old was one of 20 patients fitted with a "bionic hand" developed at Stanford University and implanted at the Palo Alto Veterans Hospital in California.

An auto accident left the man immobile from the chest down but still able to flex his shoulders and elbows. Now, platinum electrodes cling to seven arm and hand muscles, and wires snake through his arm to a stimulator buried in

his chest. An additional, sensory electrode delivers a faint buzz to his right shoulder as a system check.

Fastened to the skin above this box is an insulated wire coil through which the stimulator is both charged and triggered.

On the other side of his chest is a control system based on motion sensors. By shrugging his left shoulder, the patient indicates which grip he wants his right hand to assume. He can select a pinch grip for pencils or forks and a palmer grip for drinking glasses.



A semiautonomous robotic scoop tram ferries 12-ton loads of rock between the mine face and a crusher.

the surface and broadcasting them to the trams. In autonomous mode, though, the vehicles simply follow strings of lights.

PHOTO: JAMES H. HARRIS

TV

HOTTER!

LOUDER!

FASTER!



Zippo's new NASCAR products are hotter, louder, and faster than ever. Zippo's exceptional Technigraphic™ photo transfer process gives a hot look to these NASCAR lighters. Bold new designs shout out your favorite cars, tracks and logos loud and clear. Keep track with the '95 schedule lighter, cut loose with a Zippo knife, or make your mark with a Zippo pen. But race on down to the track, or to your favorite Zippo retailer, because racing gear this great is going faster than ever.

Rusty Wallace licensed by Penske Racing South and Rusty Wallace, Inc.
 Mark Martin Valvoline® registered trademark used with permission from Valvoline, Inc.
 Jeff Gordon, DuPont, Kyle Petty, Bobby Hamilton, Kendall and Winston Cup are granted under the authority of Motorsports Traditions, © 1994.

No.

han ever. L...
 transfer proces...
 lighters. Boldblo8 .zi...
 it the '95 schtaz 28' adt 4...
 s pihitaz. Bolblo8. sritihgij 8 iij...
 auzei. bioces:seonord jentnraunzei n...
 man elee. Zibppqiz. jela uqhman elee. Zib...
 han ever. Zippqiz. jela uqhman ever. Zippqiz...
 fer proces:seonord jentnraunzei proces:seonord jent...



Lifetime Guarantee
 Made in U.S.A.

SPORTS SCIENCE

Super Sports

BY JOE SKORUPA, Outdoors/Boating Editor



● The Super Show makes a mighty effort to live up to its name. Held in Atlanta each year, this mother of all trade shows has super attendance, super size, super new products (sporting goods)—and super security at the gate. Super may not be a strong enough word to describe the measures employed to keep unwanted individuals (the general public) out. To Super Show management, gawking at stars like Nancy Kerrigan and Michael Jordan makes sense only if the gawkers are large-volume purchasers of sporting goods.

As a result, obtaining media credentials on opening day is a pain in the butt. It requires preregistering weeks before the show, then waiting in line at the show for more than an hour while your paperwork is processed. Ironically, the lines for exhibitors and regular attendees (sporting goods retailers) are twice as long.

Experienced attendees (myself included) arrive the day before the show opens to avoid the lines. Sometimes it gets ugly in the press room. Over the years, I've seen video cameramen and TV reporters on the verge of rioting as they stand impa-

tiently in line. For one thing, they're not used to receiving less than preferential treatment, and secondly, their producers won't understand why they missed the big interview with Troy Aikman or Bonnie Blair or Nolan Ryan.

Last year, to smooth out any rough edges, the show attempted to move security into the realm of high technology. In addition to issuing entry badges, it also issued photo IDs and swipe cards with magnetic strips that digitized the card holder's name, address and phone number. The idea was for exhibitors to use the swipe cards to create databanks of contacts for future use.

Unfortunately, few bought into this scenario. In fact, no one I came across took the least

bit of interest in my photo ID or swipe card, even though both were hanging around my neck on chains. Old-fashioned entry badges (also on chains) and business cards were the primary currency of the show. Despite the failure of the new high-tech systems, the attempt succeeded in producing a new fashion statement—the multi-layered neck-chain look.

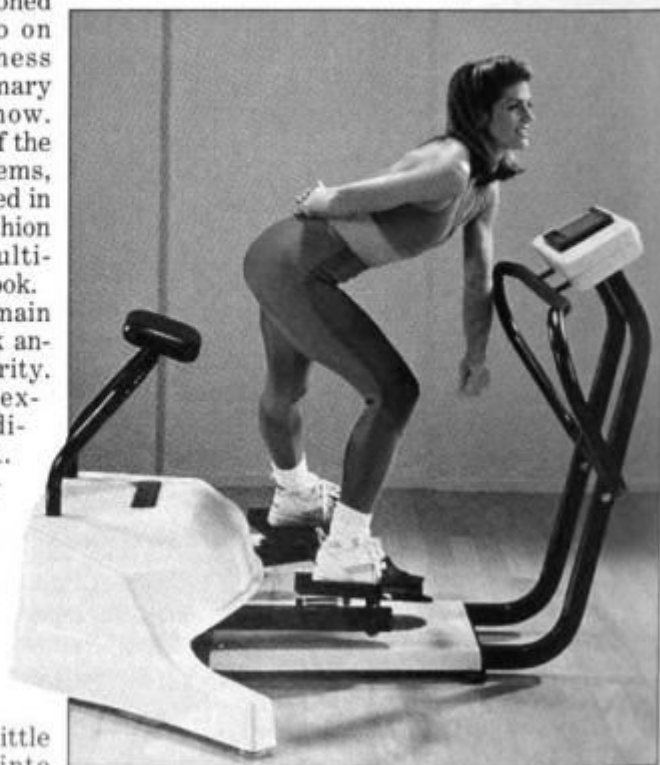
Once inside the main gates, I had to crack another layer of security. Each of the main exhibitors—Nike, Adidas, Reebok, L.A. Gear and Starter—erected multistory booths with guarded entrances and sealed perimeters. If your name wasn't on a list or you didn't know a corporate functionary, you stood little chance of getting into one of these fortresses.

Being a veteran show attendee and a pushy staffer on a large-circulation magazine, I was able to crack the security of most of the top exhibitors. Inside, I discovered a number of interesting new products:

● Resistance machines that simulate popular sports have been a developing trend for years, but at this show it entered a new phase. Take the Reebok Sky Walker (shown at left), for example. This hydraulic-resistance machine simulates walking. Well, not walking, exactly. More like walking on the moon or vertical swimming.

Instead of striding on a surface (such as the ground or a treadmill belt), the Sky Walker positions your feet on suspended footpads connected to mechanical arms. As you move your legs, the mechanical arms swing and offer positive and negative resistance. To work the upper body, the unit has handgrips attached to belts. Resistance for all motions is hydraulically actuated and adjustable.

Although aerobic (cardiovascular) exercise on the Sky Walker looks and feels something like walking, it's really more like a repetitive scissors kick that's similar to swimming. The bene-



Nautilus Skate Machine is a no-impact aerobic simulator.

fit of the motion is that it completely eliminates pounding on vulnerable areas such as knees, ankles, hips and lower back. The commercial model that debuted at the Super Show retails for about \$3500. Two home units to be introduced this month will cost from \$1000 to \$1500. Contact Reebok Sky Walker, 2707 Satsuma, Dallas, TX 75229; (800) 405-9255.

● Fitness walking shoes have always puzzled me. How much technology do you really need for walking? Well, the new Reebok Leader DMX model answers the question by taking walking-shoe technology to the max—the DynaMax.

The Leader DMX is the first of Reebok's walking shoes to feature a system that not only places air chambers in the heel and forefoot of the sole, but also connects them with an airflow channel. This system, called DynaMax, enables the chambers to actively adjust cushioning pressure throughout the stride, so Leader DMX shoes reduce pounding during exercise. Price is \$69.99. Contact Reebok International Ltd., 100 Technology Center Dr., Stoughton, MA 02072; (617) 341-5000.

● The Nautilus Skate Machine (shown on opposite page) is another aerobic-resistance fitness unit that simulates a popular sport. In this case, inline skating. Like the Sky Walker, the Skate Machine offers a no-impact cardiovascular workout.

For those unfamiliar with impact terminology as it applies to exercise, high impact and low impact refer to the amount of shock measured in body weight that an exercise places on the ankles, knees, hips and lower back. Running, for example, is a high-impact exercise that applies substantially more than one body weight to the vulnerable joints. Fitness walking, on the other hand, is a low-impact exercise that applies only a fraction more body weight to the joints during a workout. A shorthand way to re-

member the difference between high and low impact is that if both feet come off the ground at the same time, it's usually a high-impact exercise. If only one foot comes off the ground at a time, it's usually low impact.

The Skate Machine and Sky Walker are no-impact exercisers because both feet stay planted. No more than one body weight is applied to the joints while exercising.

The Skate Machine, with its emphasis on lateral (side-to-side) movement, enables exercisers to work out inner and outer thighs, legs and buttocks. The unit includes interactive computer graphics that permit users to take advantage of 12 routes at nine fitness

Inline skaters know their sport is too potentially dangerous to use flimsy skates. Fortunately, the new Mojo bootless skates are surprisingly well made. In fact, when worn with dark boots or high-top sneakers, they look exactly like conventional inline skates. But quality doesn't come cheap, and, even without the boots, these skates aren't inexpensive. The high-performance Street Lord lists for about \$250 and the recreational Hijacker goes for about \$200. The skates come in two sizes (small and large) and feature ankle padding and either three or four adjustment belts (depending on the model). Contact MOJO USA, 8335 Nieman Rd., Lenexa, KS 66214; (913) 438-6656.

● Impact reduction, another major trend at the show, was on the mind of Roland Sommer, a German aeronautical engineer who came up with the ProKennex Kinetic tennis racket. It seems Sommer has a friend with a bad case of tennis elbow who was forced to give up the sport. Sommer thought he could help his buddy return to the court by designing a racket that actively absorbed the energy of the ball striking the racket, thus reducing shock to the elbow.

To do this, he hollowed out 100 chambers in the head of the racket and filled them with microbearings. The result is a racket that not

only sounds like a salt shaker when rattled, but also has a bigger sweet spot, reduced vibration in the hand and increased stability for off-center shots. The price is about \$250. Contact ProKennex, 9606 Kearny Villa Rd., San Diego, CA 92126; (619) 271-8390.

So why do Super Show exhibitors have such tight security? One manufacturer told me that the sporting-goods industry is a copycat business. Knockoffs appear within weeks of the intro of a hot new product. This explains Nike's fortresslike booth. I wonder if we'll soon see dozens of copycat swipe cards replacing business cards? In a word, nah.

The last thing you want to worry about is jock itch...
Cure it with Cruex.

Count on the brand that has effectively cured more cases of jock itch than any other.

Cruex.
 The #1 cure for jock itch.

Cruex
 antifungal spray powder

kills jock itch fungus

Cruex
 antifungal cream

kills jock itch fungus

© 1995 Gillette Health Medication, Inc.

levels. The computer also monitors calorie-burn per hour, total calories burned, miles skated, speed, time elapsed and strides per minute. Considered a commercial unit, the Skate Machine costs \$3200. Contact Nautilus International Inc., 9800 W. Kinsey Ave., Suite 105, Huntersville, NC 28078; (704) 875-1798.

● For skating without a machine, new Mojo Street Lord and Hijacker skates offer something unique to in-lining—bootless skates. Just put on comfortable shoes, step into the monocoque polypropylene shells, tighten the belts, snap the quick-release buckles and skate away.

Cutting-Edge Computers

BY FRANK VIZARD, Electronics Editor

● If you had to think of a sporting metaphor for the computer industry, pole-vaulting might be it. A month doesn't go by, it seems, without someone raising the bar to a higher level.

Unless you're in the thick of the business, it's hard to keep abreast of new developments. Yet, given the ever-increasing importance of computers, this is one piece of hardware worth keeping even a distant eye on. Here are some notes and observations on the field:

● **Bet on black.** A cosmetic change for sure, but new black computers, like those from Acer, signal that the PC is moving into the living room right next to all of the other electronic entertainment gear. Chalk this one up to the fans of TV shows like "The X-Files," who chat online during commercials.

● **Double-barreled multimedia.** If you use one CD-ROM drive a lot, you'll probably use two. That's the thinking behind Packard Bell's twin CD-ROM-drive computers. Having two drives makes it easier to switch applications, easily beating loading and unloading from a single bay. This idea has even shown up in laptops, specifically Panasonic's CF-41 model (\$4900), which also sports an MPEG-1 full-motion video pack.

Speaking of CD-ROMs, new quad-speed drives are the rage among multimedia mavens. As opposed to their double-speed predecessors, quad-speed drives play video clips more



smoothly, synchronize video and sound more precisely, install disks faster and are more responsive—something game players will appreciate.

● **More memory.** Lots of software firms claim their products run fine on computers with 4MB of RAM (random-access memory), but don't you believe it. A minimum standard these days is 8MB, and if you want to stay ahead of the curve, opt for a 16MB Pentium machine like AT&T's Globallyst 630 minitower (\$2499 list).

● **Bigger hard drives.** Forget megabytes. Give me a gigabyte. Hard drives are where all the data gets stored, but as big as they are, space can run out. A 1GB hard drive, such as the one in Compaq's new Presario CDC 992 (\$3000), is like having a whale inside your computer, able to consume all those digital bits like so much plankton.

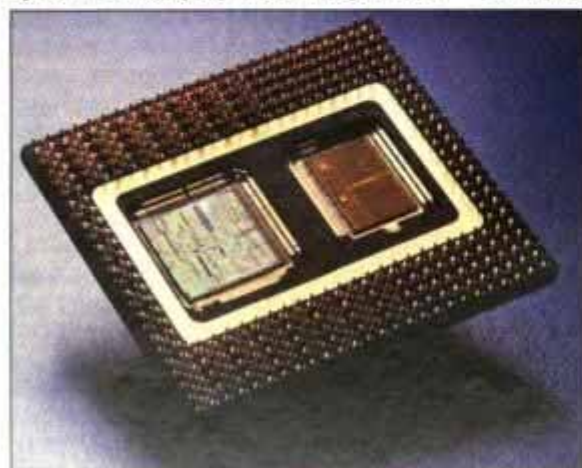
All these bits of data, incidentally, are harder to get rid of than it might appear. Clicking on the delete bar of a Windows Program Manager eliminates only the application icon, not the program itself. Due to the linkage system employed by DOS on PCs, newly installed programs spread into a variety of directories

and subdirectories. Load enough software and your computer will slow to a crawl. Ditching unwanted data can be time-consuming—and a misstep can cause the system to crash. If you want to rid yourself of the "fatware" that came with the computer, invest in a software program like Uninstaller (\$49). It guides you through the cleansing process, suggesting which far-flung files can be deleted without disabling the machine.

● **Cross-platform.** To Apple devotees, the Macintosh 6100/66 might seem like a cross-dresser. But for those who regularly move between Apple and IBM-compatible computers, this machine is suitably attired. Buried inside the \$2759 Mac is an Intel 486 microprocessor, DOS 6.22 and Windows 3.1. To switch between the two platforms, you hit a 2-key sequence. This is a great machine if you like the ease of a Mac but have noticed that much of the cool software is released on DOS long before it's available for Macs.

● **Intel inside—not?** The floating-point math problem with Intel's Pentium chip has been fixed and the story has passed into computer folklore. But Intel's stranglehold on microprocessors is weakening. All the microprocessors inside Compaq's 486 Presarios are made by rival AMD. Compaq is using a 586 designation for its new Pentium-equipped computers, a semantic move that opens the door for other suppliers to provide performance wrinkles not offered by Intel.

Intel, of course, is hardly asleep at the keyboard. The company recently introduced a very fast 120-MHz microprocessor—its internal clock clicks 120 million times per second—that's 25% smaller than its predecessors. And later this year, Intel will launch the P6, a microprocessor twice as complex as the Pentium chip. Sporting 5.5 million transistors, the P6 is expected to reach speeds of 200 MHz. Look for the P6 to reach mainstream computing in mid-1996. **FM**



Intel's new P6 chip is super fast.

PM HOTLINES

COMMUNICATE WITH US

We're trying to make it easier for you to communicate with us. Here are four ways you can do it.

LETTERS

Your written letters are always welcome. If we think your letter would be interesting to other readers, we might even print it in our Letters column (unless you request that it not be printed). Our editors are listed by department on the masthead in the front of the magazine next to Editor's Notes. Our address is: Popular Mechanics, 224 W. 57th St., New York, NY 10019.

FAX MACHINE

You can fax written mail to us if you have access to a fax machine. Our fax number is (212) 586-5562, and it's available 24 hours a day.

ONLINE ACCESS

World Wide Web

Computer users with a connection to the World Wide Web can log into our Web site, *The PM Zone*. You can exchange messages with other users, and with the Webmaster who maintains the site. There are also more than 1000 text, graphics, software and digital movie files to browse through. To log in, simply launch your browser software and open the following URL: <http://popularmechanics.com>.

Internet E-mail

If you subscribe to America Online, CompuServe, Prodigy or any other online service offering Internet mail capabilities, you can reach us at: popularmechanics@hearst.com.

Dial-up Bulletin Board

Even without Internet access, you can use your modem to dial our computer 24 hours a day. The number is (212) 582-8369. Once you're online, you can leave messages for specific editors, or direct inquiries and comments to a specific department. You can also share your thoughts with other readers who call in.

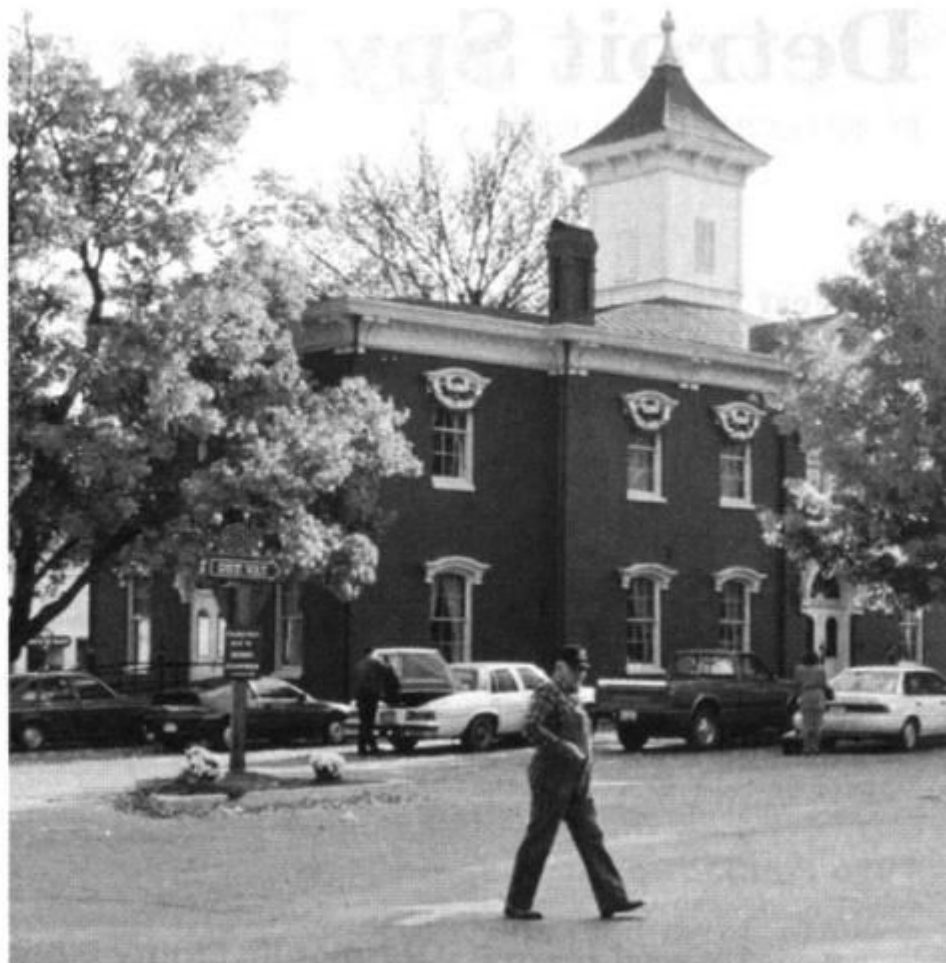
Simply set your communications software to 8 bits, no parity and 1 stop bit (8-N-1) and set the baud at 1200, 2400 or 14,400. *Please remember that we are not a full-time bulletin board. So please bear with us if it takes awhile to answer your message.*

READER INFORMATION SERVICES

Our Reader Information Services Department is operational five days a week from 9 am to 5 pm Eastern time. The phone number is (212) 649-3127. Please call our Reader Information Services Department, *not our editors*, for information on back issues, reprints of articles, etc.

Subscription Inquiries

Call (800) 333-4948.



If you'd like to visit our distillery, we're open every day but Thanksgiving, Christmas and New Year's.

LYNCHBURG, TENNESSEE, is a quiet little town where things have a habit of staying the same.

There's a red brick courthouse that looks like it did in 1895. A boarding house that dates to the era of the Civil War. And a distillery where Jack Daniel's Whiskey is made by a method perfected in 1866. We can't explain why things haven't changed much around here. They just never have. And after a sip of Jack Daniel's, most folks are glad they haven't.

SMOOTH SIPPIN'
TENNESSEE WHISKEY

Tennessee Whiskey • 40-43% alcohol by volume (80-86 proof) • Distilled and Bottled by Jack Daniel Distillery, Lem Motlow, Proprietor, Route 1, Lynchburg (Pop 361), Tennessee 37352
Placed in the National Register of Historic Places by the United States Government.



Detroit Spy Report

BY JIM DUNNE, Detroit Editor

The Next Saturn Wagon

● It seems like only yesterday that GM launched its "new kind of car company." But the truth is, Saturn has been around for five years and, while the cars have been continually refined and improved, they still look like they always did. With Saturn's plastic body panel on steel-frame construction, it's interesting to note that GM hasn't yet made any real alterations to the line's styling. But that changes with the '96 sedans and station wagons, which will undergo their first major redesign. A look at this '96 wagon prototype shows more rounded lines, especially in the roof.



1996 Pontiac Bonneville

Saturn isn't the only GM car with a new look for next year. In fact, all the big front-drive GM sedans are getting refreshed. A close look at the Pontiac Bonneville reveals a narrowing of the air intake in the center of the grille and larger, repositioned running lamps. These details aren't unique to the Bonneville—all Pontiacs make them part of their brand identity, which boasts the most aggressive styling among GM's large cars.

Tiny V6

Chrysler plans to build its smallest-ever V6 for its 1998 lineup of small cars and trucks. With a 2.7-liter (165-cu.-in.) displacement, the engine rates almost as small as some of Chrysler's 4-cylinder motors. While details about the engine are scarce, Chrysler insiders indicate that it will have a horsepower rating close to 200. Both single- and double-overhead-camshaft versions are in the works.



Among the styling changes on the '96 Bonneville is a sleeker snout.



Oldsmobile Eighty Eight

Like the Bonneville, this 1996 Oldsmobile Eighty Eight sedan prototype is very close to showroom ready. This car reveals a cleaner look overall,



Smoother and cleaner looking, this '96 Olds is the real thing.

even though there are few additional sheetmetal differences. Note the smoother front fascia, including the bumper surface. At the sides, a smooth cladding strip on the lower doors adds a new dimension to the plain steel surface. Improvements are more than skin deep, too, as there's a refined 3.8-liter V6 that delivers more horsepower and has OBD II self-diagnosis capabilities.

Shortstar

It looks like Ford badly underestimated the demand for small vans. That's clear from recent decisions coming out of Dearborn. Now, the company is considering building a smaller version of Windstar in order to compete with Chrysler's short-wheelbase vans—a switch from Ford's earlier decision to build Windstar only in the larger long-wheelbase version. Note also that Ford backtracked on its plan to quit making Aerostar vans.

Chrysler Coup

Chrysler is preparing the Jeep Wrangler for a complete makeover within 12 months. That's just in time to meet the growing demand for an inexpensive 4-wheel-drive sport/utility vehicle. Priced below the Cherokee in Chrysler's lineup, the 1997 Wrangler will offer a new suspension, an enclosed steel body and sedanlike doors and interior.

From Rear To Front

General Motors is getting closer to building front-drive automobiles exclusively. It will drop full-size rear-drive sedans and wagons from the model lineup at the end of 1996: the Fleetwood Brougham, Roadmaster and Caprice will be gone. Only Corvette, Firebird, Camaro and the imported-from-Europe Cadillac Catera will remain for the foreseeable future. GM started manufacturing front-drive cars in the United States in 1965, when it introduced the Toronado. Now, 30 years later, the company is nearing a complete turnaround. **PM**

Материал, защищенный авторским правом

AUTOMOBILES

Europe Spy Report

BY MIKE ALLEN, Associate Automotive Editor



Porsche Panorama

● Porsche has traditionally offered a Targa-top version of the 911, and for the past few years, a true convertible. Based on the 911 convertible chassis rather than the coupe, this unique vehicle uses a sliding sunroof-type arrangement that's engineered and built for Porsche by aftermarket sunroof manufacturer Webasto. Rather than a simple Targa-style removable roof panel, the entire panel, probably made of glass, runs back along the rear window. There's also a motorized cloth sunscreen to keep the back of occupants' necks from baking at high noon. Constructed of aluminum, the roof panel might also be completely removable. We've captured one here, held together by most of a roll of duct tape, while testing in Europe. The inset is an artist's impression of the production car, sans tape.

Riches To Ragtops

As if Mercedes' S-Class cars weren't already among the most expensive in



Panorama has a huge roll-back sunroof.

the world, here's the new S600 coupe in convertible format. With M-B supplying the chopped-down coupe body, and coachbuilder Karmann the convertible top and mechanism, spe-



Limited-edition S600 ragtop will be assembled by AMG.

cialty builder AMG is handling the final assembly. Look for a limited production run of 500 cars, and a window sticker quite a bit higher than that on

the already stratospherically priced Rolls-Royce Corniche.

Big Cat On The Prowl

Ford's purchase of this on-the-ropes British carmaker has permitted Jaguar to bring out new models by drawing from the corporate parts bin. This replacement for the XJS is slated to be one of the first. Look for a 4.0-liter V8 (related to the 4.6 modular in the Crown Vic and upcoming Mustang) to be assembled in England. The convertibles will have a one-button electrical convertible top. Like the XJS, there will also be a coupe variant.

Stump-Jumping In Style

Serious off-road geeks probably won't be mopping their chins over the new Mercedes AAV (All-Area Vehicle, get it?). It has no separate frame, but uses automobile-style unit-body construction. With only modest ground clearance, and with more attention being paid to interior appointments, the AAV is aimed dead-on at the country-club set, who insist on driving something more expensive than a \$30,000 American truck. That's Range Rover territory, folks. The AAV is based on C-Class mechanical parts, and our disguised test vehicle is wearing a false grille that looks very similar to the C-Class cars. Production of all AAVs is scheduled for the German carmaker's new plant in Alabama. **FM**



PHOTO BY JIM DUNN

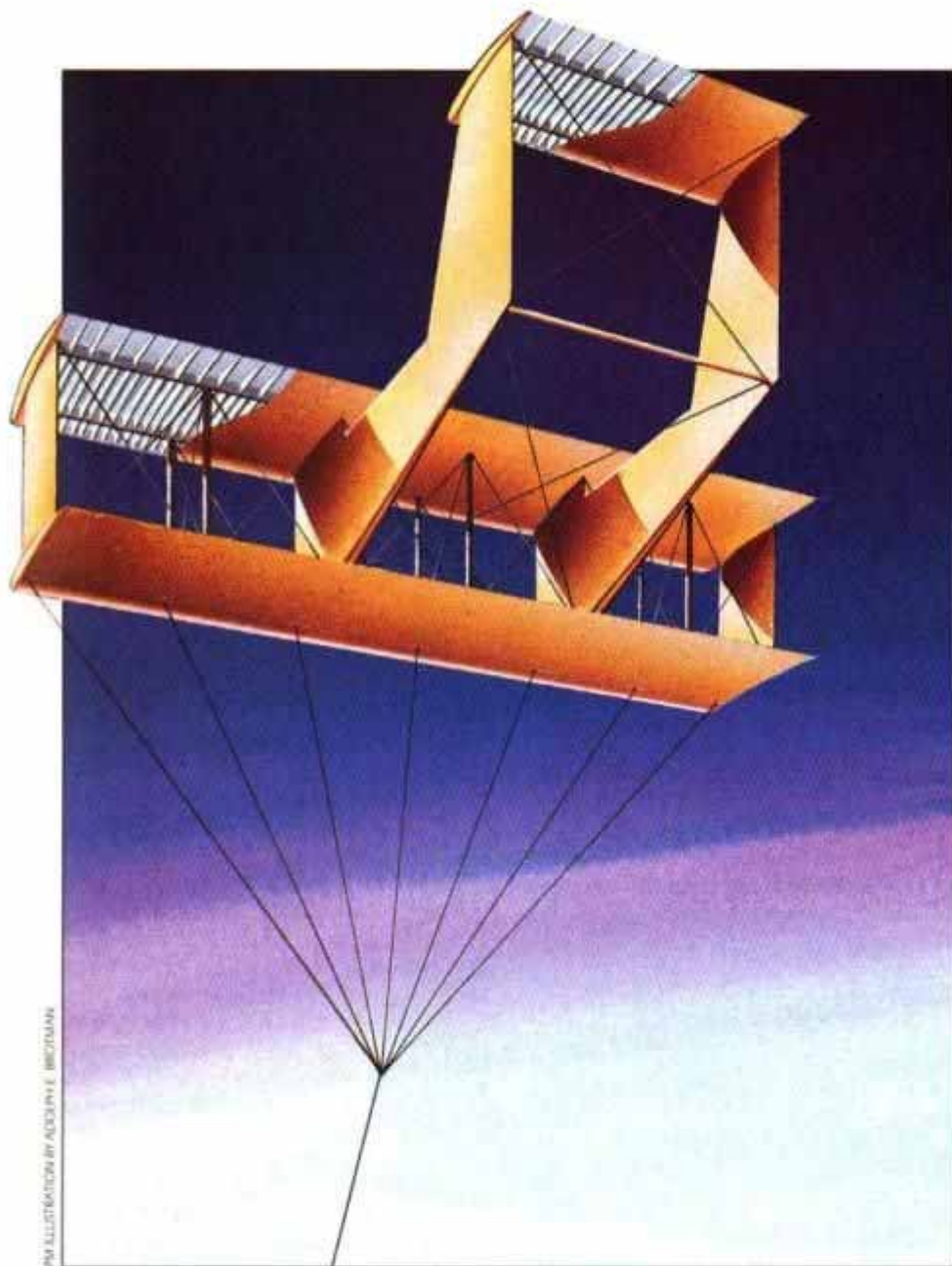
It's not a panel truck—just a disguised Jaguar sport coupe.



Mercedes-Benz to enter the truck market with AAV sport/utility. сроким правом

World's Highest-Flying Kite

BY GREGORY T. POPE, Science/Technology Editor



AN ILLUSTRATION BY ANDREW E. BICKMAN

● On a crisp autumn day, the wind sweeps out of British Columbia and collides with the Canadian Rockies. There, in western Alberta, the air rushes skyward in a phenomenon known as a mountain wave.

Sailplane aficionados have long gathered at a town called Pincher Creek, about 150 miles south of Calgary, to take advantage of this up-draft and soar to record altitudes. It's also the perfect spot to fly a kite, and this fall a trio of Canadians plans to do just that. In fact, they aim to loft one thousands of feet higher than any kite has ever ventured before.

Kite builder Richard Synergy, meteorologist David Hudak and electronics engineer Mubarak Baksh hope to break records that were set when men and women flew kites for a living. Until the early 1920s, weather bureaus relied on kites to hoist wind gauges, thermometers and other instruments. German weathermen sent a string of eight kites to an unchallenged 31,955 ft. in 1919. The single-kite mark stands at 12,471 ft., established at Milton, Massachusetts, in 1898.

Back then, nothing flew higher. But these meteorological kites soon ceded air superiority to balloons, airplanes

and, ultimately, satellites. For their day, though, the kites represented leading-edge technology. Wood-framers known as Hargrave box kites, they sported cloth skins of silk soaked with varnish—a material very similar to ripstop nylon. Some stretched as long as 9 ft. Lofted in groups, they could exert 900 pounds of tension on a tether as they climbed. Such force, applied as the kite line is wound in, could crush a reel like a beer can. To withstand this pull, rugged steam-powered winches—machines used on trans-Atlantic cable-laying ships—paid out and hauled in the lines.

Today, Synergy and company can exploit a century's worth of aeronautic engineering to top the weather kites' records. They want to raise a single kite to 15,000 ft. and put a gaggle of kites at 35,000 ft. The kites themselves, now being built in Toronto, will be enormous. The biggest—32 ft. across—rivals a single-engine aircraft. "As you go up in the air, the ability to create lift diminishes considerably," notes Synergy. "If your kite doesn't have a couple hundred square feet of wing area, it just won't generate enough lift to get to record heights."

Although this sky monster will possess enough strength to resist 100-mph winds, the kite itself will weigh less than 60 pounds. It's built much like a biplane of the Wright brothers' era, but updated with space-age materials. Each of the kite's wings encloses a skeleton of spars and ribs. These structural members are cut from Styrofoam and coated with a thin veneer of fiberglass. In addition, carbon-fiber compression struts and crossbracing lines reinforce the wings. Carbon arrow shafts, anchored in balsa-plywood sockets, join the upper and lower wing. Guy wires crisscross between the anchor points.

Behind the wings rides a tail, its twin booms constructed of a carbon-fiber lattice and sheathed in nylon. Acting like the elevator of an airplane, the tail can tilt to change the front wings' angle of attack. This ensures that the vertical lift from the wings never overcomes the strength of the kite line. An on-board strain gauge will keep track of the line tension. Although mountain waves are said to

flow as smoothly as wind-tunnel air, the kite flyers want to be ready for unexpected gusts that could jerk the kite skyward.

Meanwhile, the inboard vertical panels—to which the articulating tail booms attach—will house the kite's electronics suite. Hudak, who works for the Canadian weather bureau, is filling the panels with instrumentation to measure air pressure, temperature, wind speed and other variables. These sensors will glean new information on mountain waves, thus providing a better scientific picture of the phenomena.

In addition, a Global Positioning System (GPS) receiver will verify the altitude reached. Miniature television cameras will gaze at the ground and monitor the kite, checking for hazards such as icing on the wings. A pair of transmitters, their broadcasts choreographed by an on-board computer, will beam all this information to the mission-control ground team.

On land, four or five ham-radio operators will track the kite by way of its radio transmissions. They'll aim parabolic antennas at the sky from different locations and triangulate to get a continuous, if rough, fix on the kite. The more accurate GPS receiver, by contrast, provides information only every 5 minutes. True, the radio-signal technique can be off by as much

as 1000 ft. in altitude. "But that's plenty good enough to track that sucker if it breaks a string and you have to report it to air-traffic control," says Synergy.

Getting all this equipment into the sky will pose as much of a challenge as building the kite itself. The team plans to load an electrohydraulic winch—as big as a VW Beetle—on the back of a flatbed truck. First, launch personnel will pull out 2000 ft. of line and attach the kite. They'll run with the kite, while the computer-controlled winch reels the line back in, until the kite is airborne. The winch will then reverse to begin paying the line back out. After that, because a mountain wave can incorporate down-drafts as well as updrafts, the truck must be maneuvered to keep the kite in a rising airflow.

As the winch releases the line at 7 or 8 ft. per second, the kite will ascend for 5 or 6 hours in its attempt to reach a record altitude. Synergy hopes to have spotting aircraft available to view the kite at its zenith. "Getting it down again may be another thing entirely," he warns. "The wave may not disappear at night—it may blow continuously for four or five days. We may not be able to bring in the line faster than 1 or 2 ft. per second. Although we expect to handle 100-

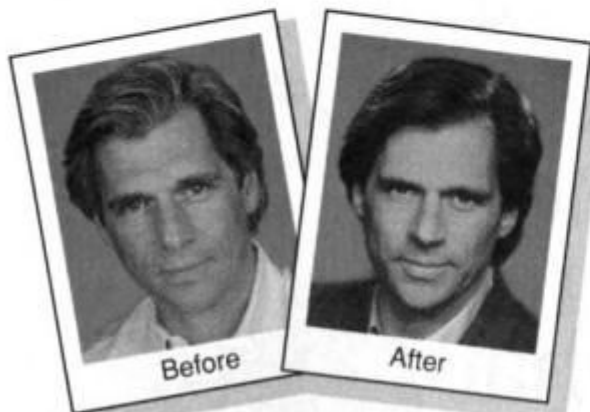
mph winds, you don't fool around and force the issue."

At the mercy of capricious winds, Synergy's team is preparing options. A rotating ground crew will stand by for a month, ready to loft a kite if conditions favor flight. Ideally, they'll assemble 15 kites of three different sizes and between 10 and 15 reels of kite line in various weights. When the wind is blowing lightly, a thick line of lightweight Spectra fiber will suffice. But in stronger winds, thin but heavy piano wire will tether the kite. Surprisingly, the limiting factor in gaining altitude isn't the weight of the kite line, which can add up to 800 pounds at 35,000-ft. heights. Instead, it's the aerodynamic drag that the string's thickness can cause.

Synergy, a longtime kite enthusiast, has high hopes for this endeavor. He believes the effort will inspire university engineering departments to take their own shots at his record, thereby reviving the development of kites as meteorological tools (see "Science On A Kite String," page 114, May '92). His timing is good: The popularity of kite flying has soared in the '90s, with competitions drawing thousands annually. If Synergy and his colleagues can rewrite the record books, the sky's the limit for the sport and science of kite flying. **FM**

Now blend away gray with the sure thing for a natural look.

You just can't miss with the 5-minute haircoloring called **JUST FOR MEN**... proven over 35 million times.



Free booklet: A Man's Grooming Guide for the '90s. Plus valuable coupons. Call 1-800-353-1347.

It looks too natural to be haircoloring. Even you won't be able to tell what was gray and what wasn't. So you look naturally younger. It's easy to see why men who try Just For Men® keep using it again and again. Just For Men has been successfully used over 35 million times. No wonder it's the leader in men's haircoloring.

Fast and easy. You simply apply Just For Men and in 5 minutes, rinse. Its scientifically-timed action blends away gray... assures you of a totally natural look.

Effective yet gentle. This remarkable formula is perfectly balanced: So effective, it brings back the look of your own natural color and won't fade or wash out. So gentle, its rich conditioning action leaves your hair looking healthier and fuller.

Unique formula. Just For Men is revolutionary, backed by 34 years of specialized research in men's haircoloring. That's experience no one else can match.

So why settle for less than the sure thing for a natural look? You just can't miss with Just For Men.



JUST FOR MEN...the leader in men's haircoloring

In 7 natural shades видов, защищенный авторским правом



MADE IN THE USA

11⁹⁴
Every Day



House Beautiful™ Flat Exterior House Paint

Premium quality acrylic latex covers in one coat and dries to a flat sheen. Mildew, blister, fade and chalk resistant. Mercury and lead free. With 20 year warranty. **Sold exclusively at Wal-Mart.**



MADE IN THE USA

11⁹⁴
Every Day



House Beautiful™ Exterior Primer Sealer

Premium quality acrylic latex primer seals exterior surfaces, protects against the elements and enhances topcoat performance. Resists mildew, peeling and blistering. Blocks wood stains. Mercury and lead free. With 20 year warranty. **Sold exclusively at Wal-Mart.**



MADE IN THE USA

12⁹⁴
Every Day

House Beautiful™ Gloss Exterior House Paint

Protects against the elements so well, it comes with a 20 year warranty. Premium quality acrylic latex covers in one coat and dries to a medium gloss. Mildew, blister, fade and chalk resistant. Mercury and lead free. **Sold exclusively at Wal-Mart.**



MADE IN THE USA

2⁹⁷
Each Every Day

Premium Rust-Oleum Spray Enamel

Stops rust while providing superior coverage and protection. Dries in 2 to 4 hours. Comes in a variety of colors.



MADE IN THE USA

2⁴⁷
Each Every Day

House Beautiful™ Premium Acrylic Sealant

Superior flexibility (meets C920 specs) seals both inside and out. Available in white or clear, both in 10.3 oz sizes. **Sold exclusively at Wal-Mart.** #HB920WHT/HB920CLR



“Painting and home improvements are my hobby, and I use what I know to help you.”



Kurt
Kurt
Sales Associate



MADE IN THE USA

11⁹⁴
Every Day

**House Beautiful™ Interior Latex
Kitchen & Bath Semi-Gloss**

Provides beautiful one coat coverage. Self-priming, stain and mildew resistant. Super Scrub Formula is extremely washable. With 20 year warranty.
Sold exclusively at Wal-Mart.



MADE IN THE USA

11⁹⁴
Every Day



**House Beautiful™ Interior
Latex Satin Wall & Trim**

Goes on in one coat. Superior washability. And so fade resistant, it comes with a 20 year warranty!
Sold exclusively at Wal-Mart.



MADE IN THE USA

9⁹⁷
Every Day



**House Beautiful™ Interior
Latex Ceiling White**

One coat coverage dries to a washable flat finish. A breeze to paint with as it's spatter resistant and cleans up easily. With 20 year warranty.
Sold exclusively at Wal-Mart.



MADE IN THE USA

8⁹⁷
Every Day

**House Beautiful™
7 Piece Painting Set**

Guaranteed one coat coverage for all paints, enamels, sealers and stains. 3/8" nap for all semi-smooth surfaces. Kit includes plastic tray, paint saver lid, roller frame, two roller covers, extension pole and baseboard trimmer. **Sold exclusively at Wal-Mart.** #53250.

Wagner® Power Painter® 220 Kit

A fast and simple way to paint, for any size project! Applies most latexes and unthinned oil-based paints in a steady, even spray pattern. Clean-up only takes seconds. And the Wagner suction draws paint right from the can. #280002.

79⁹⁷
Every Day

MADE IN THE USA



At Wal-Mart, we've got what it takes to do it right. A complete line of painting supplies and accessories, available at low prices every day. And friendly, helpful associates to mix paint for you, or help you match colors. Remember, when it's time to start that home improvement project, it's time to head to Wal-Mart.

WAL★MART®
ALWAYS LOW PRICES. ALWAYS WAL-MART.

Always.



For around \$12,200, no compact delivers more.

At about \$12,200, including destination, Dakota Sport V-6 gives you more power for the money than any compact pickup.¹ Plus, you get more hip room, more shoulder room and more cargo room than with a comparable Ford Ranger or Chevy S-10.

That's just for starters. Dakota also has more standard towing than those compacts.

Want even more? With Dakota, you get

standard rear-wheel anti-lock brakes plus a standard driver's airbag. And Dakota provides the security of the new Customer One Care™ 3-year or 36,000-mile bumper-to-bumper warranty and 3/36 Roadside Assistance.²

So if you're looking to get more truck for your money, look here. Dakota Sport. It's a little bigger. A lot better.

	BASE V-6 ENGINE/HORSEPOWER	TOWING	SWB BED VOLUME	HIP/SHOULDER ROOM
DAKOTA SPORT V-6 4x2	3.9L V-6 MPI/ 175 HP	4,300 LBS	47.1 CU FT	56.1 IN/58.0 IN
SUPERIORITIES	MORE POWER	MORE TOWING ³	MORE CARGO ROOM	MORE HIP & SHOULDER ROOM
FORD RANGER 4x2	3.0L V-6 MPI/ 147 HP	1,800 LBS	37.4 CU FT	52.8 IN/54.6 IN
CHEVY S-10 4x2	4.3L V-6 EFI/ 156 HP	4,000 LBS	39.4 CU FT	52.0 IN/57.2 IN

All data based on information available at time of printing. ¹Dakota Sport V-6 \$12,189 MSRP comparison vs. compacts. Tax extra. ²See limited warranty & restrictions at dealer. Excludes normal maintenance & wear items. ³Standard towing with manual transmission and engine shown. For still more information, call 1-800-4-A-DODGE. **TREAD LIGHTLY!**™ Always wear your seat belt.

America's Truck Stop



The New Dodge

A DIVISION OF THE CHRYSLER CORPORATION

DOOM VIRUS

As easy to catch as the common cold, an electronic disease can be fatal to a computer. Here's how to keep your PC healthy.

BY STEPHEN A. BOOTH, Contributing Editor; PM Photo by Brian Kosoff

● Pogue, Monkey, Form and Kaos4, Michelangelo, Anthrax and Doom. The names can sound amusing, or downright menacing. They are some of the thousands of computer viruses, and the infections they spread may be merely annoying or maliciously destructive. Either way, every personal computer is vulnerable. And until a vaccine is developed, the only way to ward off a bug is by rigorous computer hygiene.

These electronic germs don't discriminate between corporate computer networks and stand-alone machines in the den back home. They can spread inside

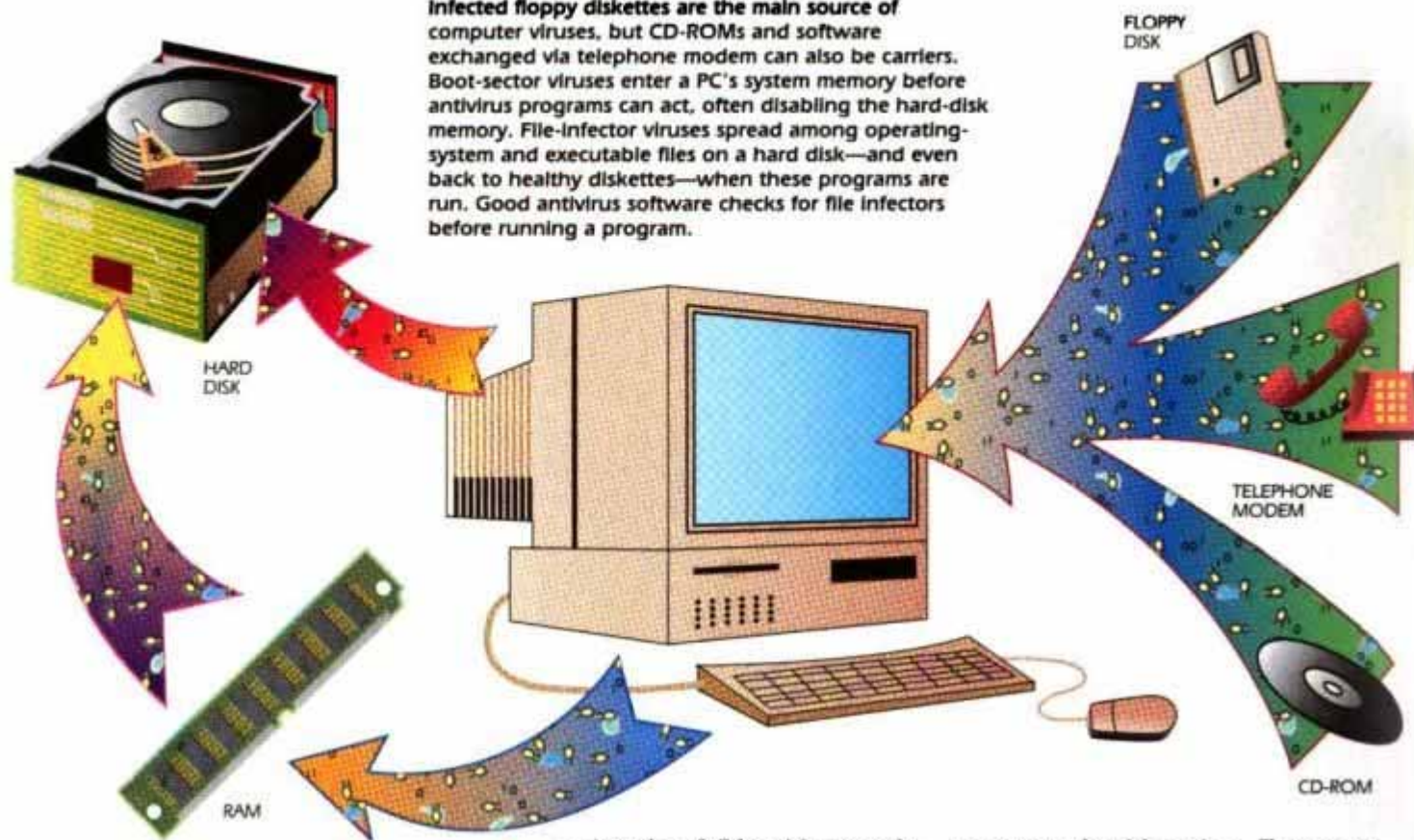
any computer in the time it takes to boot a diskette. And there are plenty to go around.

Computer viruses have existed for a decade, but they only achieved widespread notoriety when the great Michelangelo scare of March 6, 1992, threatened an amnesia epidemic among hard-disk memories around the world. According to the National Computer Security Association (NCSA) in Carlisle, Pennsylvania, nearly 6000 known viruses exist worldwide, and as many as 200 new ones pop up each month.

Meanwhile, virus attacks grow as the computer pop-

How A PC Virus Spreads

Infected floppy diskettes are the main source of computer viruses, but CD-ROMs and software exchanged via telephone modem can also be carriers. Boot-sector viruses enter a PC's system memory before antivirus programs can act, often disabling the hard-disk memory. File-infector viruses spread among operating-system and executable files on a hard disk—and even back to healthy diskettes—when these programs are run. Good antivirus software checks for file infectors before running a program.



ulation does, and infections can travel anywhere that a phone line goes. Michelangelo bopped only several hundred machines in South America during its debut. Yet even though it's easily detectable, the virus, triggered once per year on Michelangelo's birthday, continues to claim new victims.

It's hard to tally the financial toll of virus damage—let alone the costs in time and anxiety. One estimate for 1994 from antivirus software maker Symantec put the expense of restoring data at \$3 billion for corporate America. That's probably just the tip of the iceberg.

Computer viruses are strictly software-borne. There's nothing inherently viral in the microprocessors, storage devices or other hardware of a PC. Nor is there any hazard from the process of telecommunications—using a modem to exchange data with other computers. In every case, it's the content exchanged—by phone or diskette—that might harbor a virus. No kind of computer is immune. Strains are more numerous and infections are more prevalent among IBM-compatible PCs, by virtue of their numbers, but Apple's Macintosh has its own barrel of germs.

Unlike biological viruses, the computer variety is always man-made, basically a software program written to perform aberrant deeds. Who

writes them? Often it's a prankster. Sometimes it's an individual with a point to prove or an axe to grind.

Once a virus is launched, it's usually spread innocently and inadvertently—but always by direct contact. Computer viruses aren't airborne—they have to be loaded into the PC, either from software on a floppy diskette, from a program downloaded via telephone modem or one distributed on a network of linked PCs.

After it takes up residence in the computer, the virus can spread to other pieces of software and, potentially, other PCs. For example, a parent brings work home to complete, and, from a diskette infected at the office, inadvertently spreads the crud to the family PC.

Alternately, and more likely, one of the kids borrows a floppy from a pal—a copy of the hot new game that's been making the rounds at school like midterm flu. Somewhere along the way it picked up the Wild Man of Borneo virus, which got into another family's PC when mom or sis downloaded a free coconut bread recipe from the Internet. Wild Man finds a comfortable tree directory in the same family PC on which the parent completes the office work.

At the stroke of noon the next day, the parent's office workstation belches "Yum-yum! Eat 'em up!" as Wild Man gobbles up a month's worth of

corporate bookkeeping. Everyone scrambles to alert clients or colleagues who might have been sent infected files or electronic mail, but in the panic, one employee forgets he used the company PC to modem the Rotisserie Baseball stats to the other guys in his league. Some, no doubt, are eagerly digesting the dope over lunch at their desks, as Wild Man chows down on their companies' data. Others might have copied the stats to a floppy, to check them out on their home PCs that night.

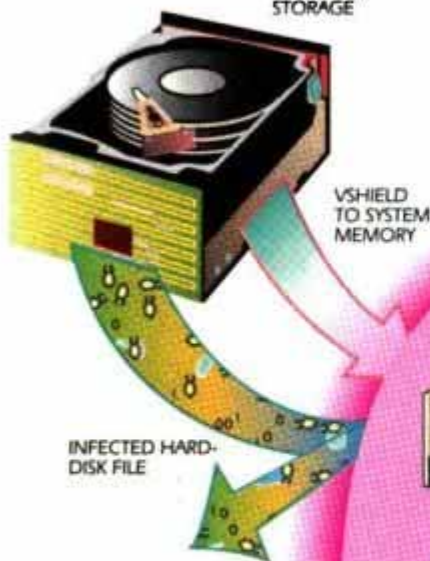
Such is the nature of virus transmission. But this scenario might have been averted or at least controlled at any point—home or office—had the proper safeguards been in place. This entails not just installing antivirus software, but using it religiously, and establishing routines for checking out all new programs.

There's plenty of software available to detect computer viruses, possibly disinfect or repair a contaminated file, and even set up barriers against incoming infections. The software is either free or inexpensive, and considering what's at risk, it's relatively fast and easy to use.

Experts define a virus as a computer program that attaches itself to other programs, along with instructions to reproduce. By replicating itself, the virus multiplies, spreading to new programs and other computers.

VShield Protection

HARD-DISK STORAGE



VShield, part of McAfee's VirusScan, is a resident program that loads into a computer's system memory when you turn on the PC. Here, it checks files from a hard disk or floppy diskette automatically as they enter system memory, but before they are run.

VSHIELD TO SYSTEM MEMORY



INFECTED DISKETTE



no policing on the Internet. So beware of geeks bearing gifts—either via modem or in person.

A worm or a horse does its damage once, but it is the ability of a virus to reproduce and spread that makes it such a fearsome adversary. There are different kinds and combinations of viruses. They include:

- **Boot-sector viruses.** These are the toughest to detect and to protect against, since they infiltrate a computer system immediately upon its being booted, or started, with an infected diskette. Because of the way IBM-compatible PCs operate, antivirus software doesn't come on duty until after the boot-up procedure. By this time, a boot-sector virus is already in the door and setting up shop in the computer's memory.

A boot-sector virus removes the original boot-sector information of a floppy diskette or a hard disk and replaces it with a different, perverted code. This way, upon subsequent boot-ups, the virus enters the computer's memory first. Once in memory, the virus can spread to other disks.

This accounts for the virulence of the Michelangelo virus—a boot-sector infection that impairs your ability to access information from the com-

This power to clone itself makes a virus different from a computer worm—a rogue program that infiltrates a PC but lacks any instructions to reproduce. Ditto for a Trojan Horse, an innocent-looking software program that conceals a troublesome one, perhaps a virus.

Programs that can be downloaded for free directly from the Internet might be Trojan Horses. Unlike commercial online services (such as CompuServe, Prodigy, America Online) that scan uploads for viruses before downloading to subscribers, there's

Case Study: Crisis In The PM Zone

● We admit it. Here at PM, we'd lulled ourselves into thinking computer viruses were something that happened to other people. We learned the hard way what a mistake that was.

The story unfolds like something out of the movie "Outbreak." My brother Mike and I were putting in long hours working on the POPULAR MECHANICS World Wide Web site, The PM Zone. And as often seems to happen when deadlines loom, one of the Macintoshes we were using started acting flaky.

The initial problem was innocuous enough. A piece of Web-browsing software we'd downloaded from the Internet exhibited a very subtle flaw in the way it formatted text. We shrugged it off.

But later the same day, our word processor keeled over. When we tried to start it up, a box popped onto the screen, displaying an ominously worded message: "An error of type 3 has occurred." No amount of mouse-clicking could get the word processor to launch. As it happened, the program was a new release, reputed to be buggy, so we immediately dialed the maker's tech-support line.

Unless you like what the music-on-hold jockeys are playing, that's always an aggravating experience. The company's

representative at first suspected a font problem, so we deleted all the word-processor fonts. That got our program back on its feet, but only haltingly, and the fix lasted only a few hours. Next, we tried replacing the system file and the Macintosh Finder—the basic software resources the computer needs to run any application program.

We spent days barking up one wrong tree after another. Driven by frustration, we completely wiped the hard drive clean a number of times, then laboriously re-installed all the software. Eventually, the tech representative gently suggested that we might have a virus. We were skeptical. We'd heard that one before, and we didn't see how anything could survive having the hard drive reformatted.

We found out we were wrong when I installed the Web-browser software on another computer on PM's editorial network. This one was equipped with more up-to-date antivirus software, and a virus warning immediately popped up on the screen.

With that, the previous week's bafflement snapped into focus. We realized there was now something nasty on at least two of the magazine's computers. Both were connected to a network of

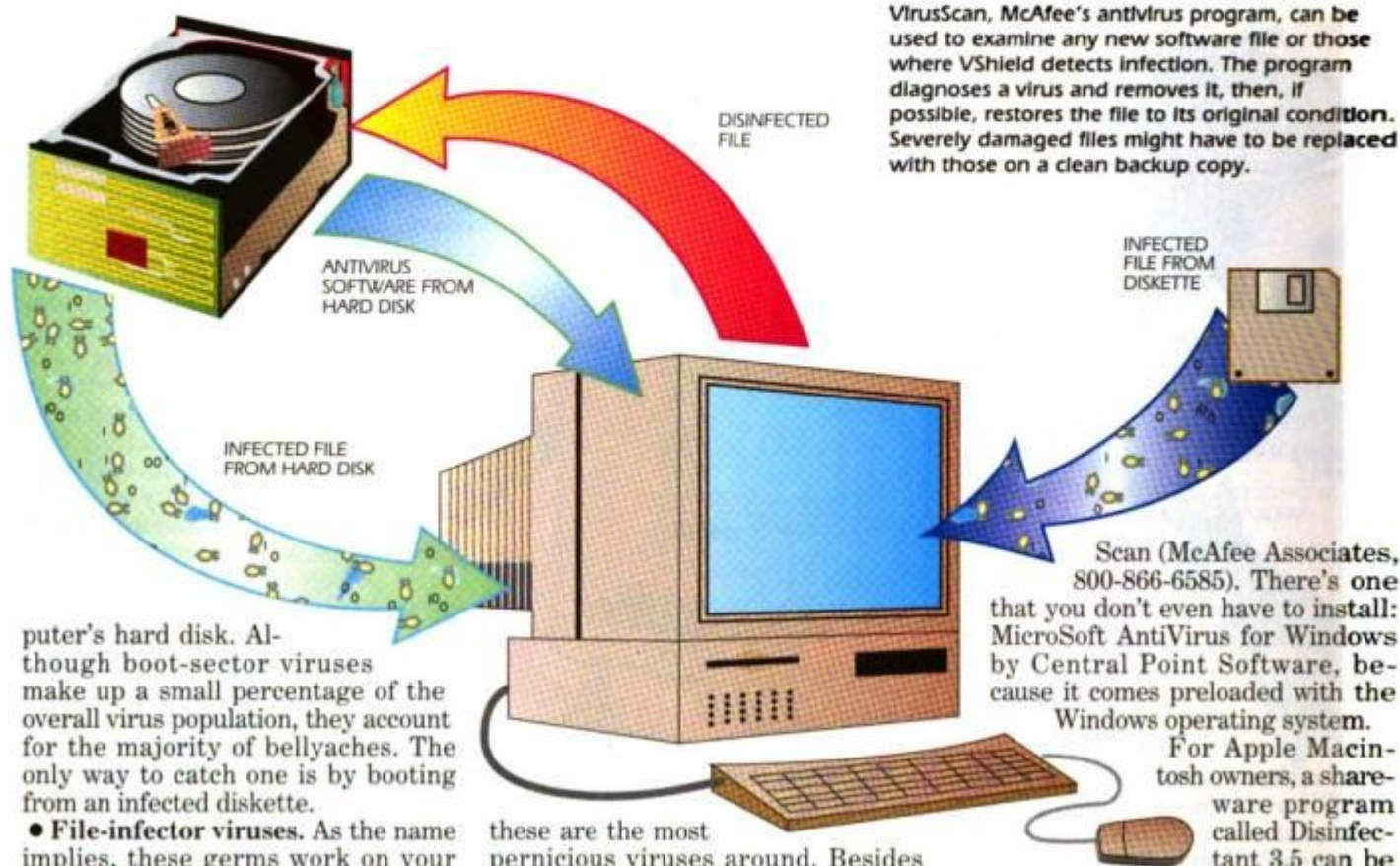
more than 25 machines that we rely on to get our work done, and we had no idea how far it had spread. It was a weekend, and none of our electronic production people were on hand, so I rushed out and bought the first piece of antivirus software I could lay my hands on.

We scanned all the network drives with it, and those on the two machines we'd installed the Web browser on. We discovered that no less than four applications on our Mac were affected by something called MBDF A/B, a relatively mild but fast-spreading strain that has been roaming the world's computers since 1993. It had attached itself to our computer's basic-operating-system software, and from there jumped onto applications as we ran them. It had survived the drive reformatting because the applications were on an external drive. Once infected, the system software was reinfected every time they ran.

In the end, the whole episode was probably for the best. We lost the use of one computer for a week, but it could have been a lot worse. And now you can bet that every new piece of computer software is scanned first, and our anti-virus database is updated regularly to ward off new bugs.

—Abe Dane

Detection And Removal Of A File-Infecter Virus



VirusScan, McAfee's antivirus program, can be used to examine any new software file or those where VShield detects infection. The program diagnoses a virus and removes it, then, if possible, restores the file to its original condition. Severely damaged files might have to be replaced with those on a clean backup copy.

puter's hard disk. Although boot-sector viruses make up a small percentage of the overall virus population, they account for the majority of bellyaches. The only way to catch one is by booting from an infected diskette.

• **File-infecter viruses.** As the name implies, these germs work on your computer's files—usually executable files (those with suffixes such as .COM, .EXE, .SYS and .BIN). Typically, these viruses hide the program's original loading instructions and add their own code, so that the virus loads first. Once an infected file is executed, the virus spreads to other executable files.

A file infecter that caused red faces last summer was Kaos4. This cutie gave a bad dose to those cruising an X-rated bulletin board on the Internet—at least those who downloaded some of the erotic shareware and failed to run a virus scan before scoping the goodies. Kaos4 wasn't very destructive—it was more of an embarrassing nuisance that added a 697-byte suffix with the author's pen name to the files it infected. But it got around like a hot phone number.

Like most file infecters, the addition of the viral code increased the size of the files—a telltale sign that antivirus programs look for. But viruses are now getting trickier, using encryption and other means to cover their tracks or hide their presence.

• **Polymorphic viruses.** Encrypted viruses can hide, but polymorphic viruses can run. Their encryption changes with each infection, requiring more sophisticated antivirus scanning techniques. They're also called mutation-engine viruses.

• **Stealth viruses.** Experts say that

these are the most pernicious viruses around. Besides their other tricks, stealth viruses make their work invisible by hiding in the computer's memory. From there, they can deceive users and antivirus software by recognizing and intercepting checkup messages, then returning an all's-well sign. Pogue, a file infecter that ironically means "kiss" in Gaelic, is such a pain. Effective antivirus programs will detect their activity in system memory.

Some viruses are maliciously destructive, designed to wipe out files, corrupt them beyond use or make them inaccessible. Others might not be intentionally damaging, simply playful. Form, for example, is a boot-sector virus that on the 18th of each month causes a PC's speakers to make a clicking sound with each keystroke.

Still, annoyance aside, even silly viruses can become problematic. The additional code of a file infecter (such as the 697-byte string that Kaos4 added to files) could, over time, deplete available memory or become a cumbersome parasite that, like barnacles on a boat's hull, causes a computer to work less efficiently.

Your best chance of avoiding a virus or minimizing an infection is to install an antivirus program. Some popular titles for IBM-type PCs include Norton AntiVirus (Symantec Corp., 800-441-7234), IBM's own IBM AntiVirus (800-551-3579) and Virus-

Scan (McAfee Associates, 800-866-6585). There's one that you don't even have to install: MicroSoft AntiVirus for Windows by Central Point Software, because it comes preloaded with the Windows operating system.

For Apple Macintosh owners, a shareware program called Disinfectant 3.5 can be downloaded for free from commercial online services or obtained by mail from its developer (send a self-addressed stamped envelope and a blank 800KB or 1440KB diskette to: John Norstad, Academic Computing and Network Services, Northwestern University, 2129 N. Campus Dr., Evanston, IL 60208).

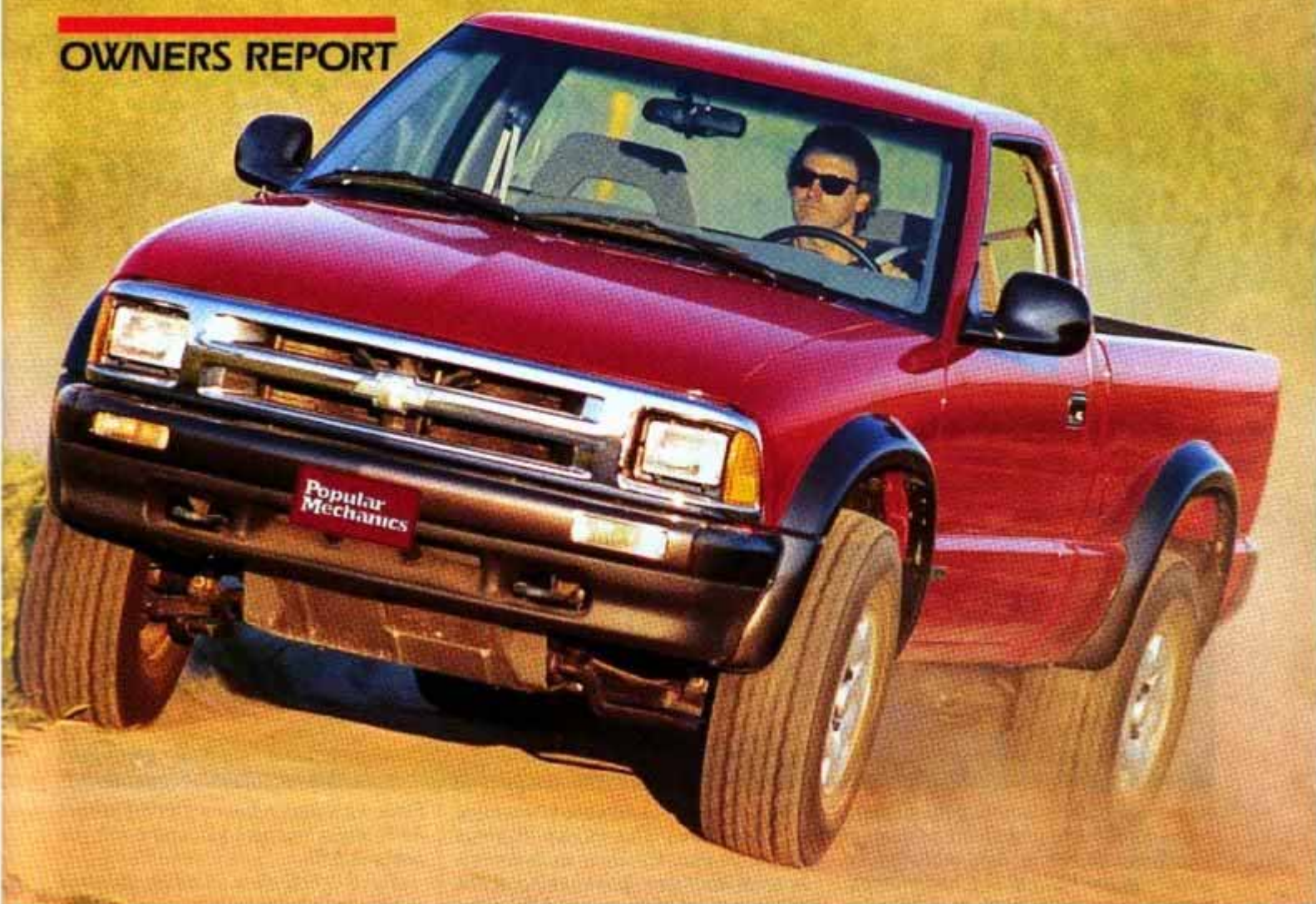
McAfee's VirusScan 2.1 provides a good example of how an antivirus program works. It's actually a 2-part process that begins by establishing a sterile environment.

First, the VirusScan detection portion of the program checks all parts of the computer, including multimedia CD-ROMs, to see if any virus is present. If so, the program removes the infection, and either restores the contaminated files or instructs you how to restore or replace them. Next, when a virus-free condition is ascertained, McAfee's software installs a monitoring program called VShield, a buffer zone that resides in the computer's memory and immediately alerts you to any subsequent infection. If you see a red flag, you can run the software through VirusScan.

The key to making VirusScan or any such program effective is to use it regularly—and to keep it current. The latter part is easy. At least once a month, McAfee releases updated de-

(Please turn to page 128)

OWNERS REPORT



CHEVROLET S-10 PICKUP

A second "car" that really hauls.

BY MICHAEL LAMM, Contributing Editor; PM Photos by Scott Dahlquist

● Pickups have come a long way since the Reo Speedwagon, and millions of urban Americans who 10 years ago wouldn't have dreamed of owning a truck now do—with pride. Anesthesiologists and archeologists, hunters and housewives bought pickups for all sorts of reasons. Utility did enter the equation, but if pickups weren't fun to drive, most of these workhorses would still be down on the farm.

The Chevy S-10, originally a 1982 model, didn't change much until 1994. That year, Chevrolet restyled the compact S-10 bumper to bumper, stretching overall length 10 in., widening the vehicle 3 in. and adding nearly 2 in. to the height. The regular and extended cabs got bigger, seats and instrument panel grew more comfortable and harmonious, designers pushed the windshield forward and raked it more, and a lot of work went into sealing, insulating and tightening. What the Bowtie Boys and everyone else in the industry recognized was

that buyers craved as much comfort and performance in a pickup as in a car, *and* truck utility and toughness. So those were some of the attributes the 1994 S-10 took on.

(Though we only surveyed Chevy owners, the GMC Sonoma shares the S-10's DNA and all of its attributes.)

Our Owners Report covers the 1994 S-10, but it could just as easily apply to the 1995 model. Important changes for '95 include a driver's-side airbag—something our '94 owners asked for—and a drop in price. The base 1994 S-10 carried a \$10,125 sticker, while its '95 counterpart lists for \$9655, even with the airbag, side-impact door beams and high-mounted stoplight. However, not many people we talked to bought stripped S-10s. They paid an average of \$14,211.

The most popular engine in our survey was the 165-hp iteration of GM's 4.3-liter Vortec V6. There's also an "Enhanced" version of this same engine that delivers 195 horses. The high-output V6 attracted 22.5% of our

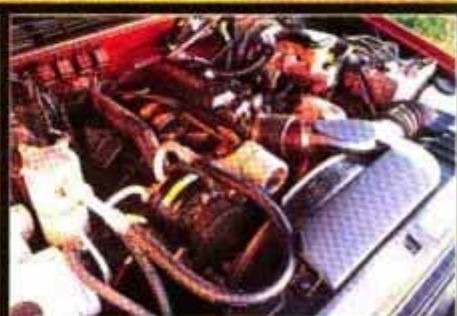
CHEVROLET S-10 PICKUP



Redesigned dashboard is easily legible.



Comfort is good really for only two.



Most owners chose the standard V6.

respondents. The base 2.2-liter Four, rated at 118 hp, ended up powering 30.6% of our S-10s. And while most owners of the Four said it had enough muscle to meet their needs, 7.3% told

us they wished they'd opted for one of the V6s instead. The 165-hp V6 costs \$850 more than the Four in 2wd models and includes 4-wheel antilock brakes instead of rear-only ABS. (The

Four with 2wd comes with rear-wheel ABS, while V6s and 4wds all now have 4-wheel ABS.)

The S-10 offers a daunting menu of equipment choices. Basics include the

SUMMARY OF CHEVROLET S-10 PICKUP OWNERS REPORTS*

Total miles driven	1,515,520	Avg. mpg, city/hwy:					
Average miles driven	6827	2.2-liter Four	22.4/26.9	Poor	1.8	What type of trouble?	
Purchase price:		165-hp 4.3-liter V6	18.7/22.7	Excellent	51.6%	Misc. electrical	13.4%
Average	\$14,211	195-hp 4.3-liter V6	18.7/22.9	Good	44.4	Automatic transmission	13.4
Range	\$9810-\$21,154	5-speed manual	21.3/25.5	Average	3.1	Alternator	10.4
4-speed automatic		4-speed automatic	18.8/23.0	Poor	0.9	Brakes	10.4
Series and drivetrain choices:		Specific likes:		Control layout:		Manual shifter	9.0
S-10 LS 2x4	55.7%	Styling	58.7%	Excellent	53.5%	Vacuum hoses	6.0
Base S-10 2x2	28.3	Ride quality	29.6	Good	44.2	Windshield wipers	6.0
S-10 LS 2x2	13.9	Comfort	28.0	Average	2.2	Repair it yourself?	
Base S-10 2x4	2.2	Handling	24.9	Poor	0.0	No	98.5%
Engine choices:		Powerful engine	24.9	Instrumentation:		Yes	1.5
4.3-liter 165-hp V6	46.8%	Economy	20.1	Excellent	54.9%	Dealer repairs satisfactory?	
2.2-liter 118-hp Four	30.6	Roominess	14.3	Good	42.9	Yes	66.1%
4.3-liter 195-hp V6	22.5	Specific dislikes:		Average	1.8	No	33.9
Transmission choices:		No complaints	16.2%	Poor	0.4	Dealer service opinion:	
4-speed automatic	62.8%	Not enough power	12.2	Driver sightlines:		Excellent	47.4%
5-speed manual	37.2	Mpg lower than expected	10.1	Excellent	60.9%	Good	40.7
Cab type:		Brakes grab, spongy pedal	8.1	Good	36.0	Average	9.1
Regular	55.4%	Paint chips easily	6.1	Average	2.7	Poor	2.9
Extended	44.6	Road and wind noise	4.7	Poor	0.4	Dealer sales policy:	
Bed type:		Seating comfort	4.7	Overall convenience:		Excellent	43.9%
Standard 6.05 ft.	91.7%	Suggested changes:		Excellent	57.2%	Good	39.5
Longbed 7.38 ft.	8.3	No changes	15.6%	Good	40.5	Average	13.6
Why did you choose the S-10 pickup?		Make airbags available	8.3	Average	2.3	Poor	3.1
Styling	50.5%	More powerful engine	7.3	Poor	0.0	Number of vehicles owned:	
Price/value	21.6	More comfortable seats	6.4	Workmanship opinion:		This vehicle only	22.6%
Previous ownership	18.6	Greater interior space	6.4	Excellent	61.0%	Two vehicles	47.3
Power/performance	9.3	Fix wet brake performance	4.6	Good	33.6	Three vehicles	15.0
Economy of operation	8.3	Offer more options	4.6	Average	4.9	Four or more	15.1
For hauling	8.3	Engine power:		Poor	0.4	Principal driver:	
Roominess	8.3	Excellent	48.4%	Comfort opinion, front seats:		Male	87.6%
Options/Accessories:		Good	39.6	Excellent	64.0%	Female	11.0
Air conditioning	84.1%	Average	9.8	Good	32.0	Equal	1.4
YC5 Appearance package	65.6	Poor	2.2	Average	3.1	Age distribution of owners:	
Premium sound system	62.7	Handling:		Poor	0.9	Under 29	22.0%
Alloy wheels	57.7	Excellent	52.4%	Comfort opinion, rear seats:		30-49	38.1
Sliding rear window	23.8	Good	43.6	Excellent	22.3%	50-plus	39.9
Locking differential	22.1	Average	3.6	Good	33.9	Based on your experiences, would you buy a Chevrolet S-10 pickup if you had it to do over again?	
Cold-climate package	20.0	Poor	0.4	Average	25.0	Yes	71.0%
Electronic-shift transfer case	16.4	Braking:		Poor	18.8	Maybe	23.7
SS performance/trim package	16.4	Excellent	50.4%	Any mechanical trouble?		No	5.4
Towing equipment	12.9	Good	39.3	No	71.0%		
Z12 on/off-road package	8.3	Average	8.5	Yes	29.0		
ZM6 off-road package	4.6						

* Percentages might not equal 100% due to rounding up or insufficient data.

two cab types, extended and regular boxes, two engines in three power ratings, 5-speed manual or 4-speed automatic transmissions, 2- and 4-wheel drive with manual or electronic shift, plus nine different suspension packages. And that's not all—you still have to decide about the LS appearance and trim group: the 195-horse 2wd SS performance/trim package, the ZR2 on/off-road package or the cold-climate package plus trailering equipment, premium sound system, air conditioning, bucket or bench seats, sliding rear window and on and on.

The main reason most owners put themselves behind the wheel of an S-10 was its very bold, sporty new look. More than half listed styling as the reason they bought this pickup.

What they liked, after styling, was the S-10's ride and seating comfort. "There's a lot of room to get comfortable," commented a Massachusetts financial planner. A West Virginia contractor noted, "Interior size is great. I'm 6-4 and weigh 300 pounds and I'm comfortable driving this S-10."

A few owners pointed out, though, that the fold-up side seat in the extended cab was strictly for one kid on a short hop.

The truck's comfort goes beyond interior room. "It's quieter than most cars I've driven," wrote a Texas engineer. That's because there's more than the usual amount of weatherstripping on the double-walled doors. There's also semiflush glass and wind-tunnel-silenced outside mirrors, as well as lots of sound deadener throughout the cab and under the hood.

Workmanship was rated excellent by 61%, and only 29% of our respondents reported any type of mechanical problem. Brakes, however, tended to grab after the pickup had been outside overnight in cold, wet weather. A few drivers also reported sponginess in the brake pedal. Dealers were judged good but not great.

One thing that surprised us was the "Yes, I'd buy it again" statistic. Even acknowledging that most S-10 owners felt deeply about their trucks, we didn't expect 71% to tell us they'd go for an S-10 the next time around. The S-10 is, after all, a 2+1 seater at best, and lots of owners have growing families. So where did they plan to put future offspring? And then we looked at the responses to how many cars and trucks they owned in total. All but 22.6% already listed two or more vehicles in the family. So the S-10 became a "second car" of sorts. In some cases, a third or fourth car. And that's why these guys (87.6% male ownership) could be so cavalier. It seems like the passion that put them in trucks will keep them in trucks.

FM



Many of our respondents bought this truck based on the appeal of its sporty, brutish looks. The rest of the package—not to mention its low price—kept them happy.

EDITORS REPORT

Everyman's Practical Sportabout

• While nobody was really looking, something very interesting happened in the fun-to-drive auto market. The compact pickup truck has become the inexpensive sportster of the '90s. A passenger compartment that's equipped (typically) with a couple of bucket seats, a potent engine, maybe a 5-speed and rear-wheel drive that lets you break out the rear end, all in a package that's priced under most passenger cars, is just hard to resist.

In reality, though, the pickup has actually transcended all sporty cars to date. The pickup offers something no sports car ever could. Just add up the practicality of the whole thing—not only is a compact pickup less expensive than just about any sporty car, but it's also less expensive to insure and maintain than a sporty car. And there's all of that utility available—compliments of the cargo bed sitting above the rear wheels.

Then, in the case of the Chevy S-10 and its kissing cousin, the GMC Sonoma, you add the undeniable sex appeal of sporty sheetmetal and the allure of a modern interior. That interior, of course, can be adorned with such amenities as a/c, a respectable sound system and power windows. Hey, this is a very hard-to-pass-up have-fun driving package.

Naturally, to have even more fun, Chevy (and GMC) offers more for some more green—additional power with a stronger V6, off-road capability

and on-road seriousness with various suspension and tire packages. And regardless of which option boxes you check off when ordering one of these—extended cab or regular, hot motor or cool, AM/FM with or without cassette—you automatically get the cargo box in back. No matter what your pals at the club may say, no matter how crazy your mom or your wife may think you are, this thing is practical. There are just a myriad number of uses for that cargo box. Or leave it empty all the time and just enjoy the drivetrain and the cab.

If you don't want to leave the cargo bed barren—like when someone calls your "practical" bluff—Chevy has added a clever touch. Notches in the sidewalls accommodate 2 x 6s upon which you can lay a sheet of plywood to create a second floor in the cargo bed.

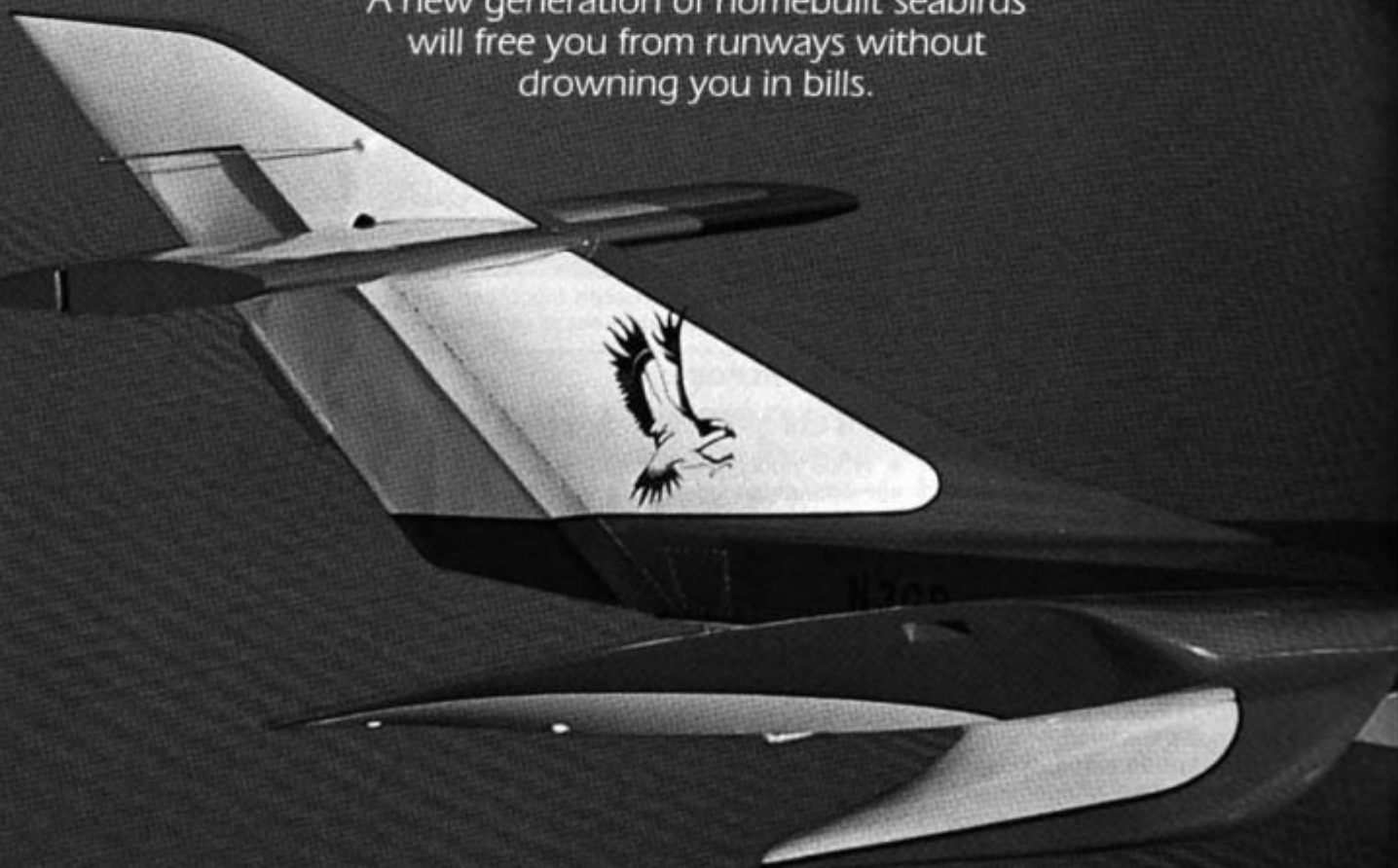
The compact pickup is definitely the sportster of our time, and Chevrolet (and GMC) has absolutely figured out the formula. The S-10 is fun, responsive and sporty. Oh sure, it's still a truck, so the steering is slower than you might like, and the ride—especially when the cargo bed is empty and the road is rough—can be harsh. But the fun of driving, and even riding in, this well-designed, well-executed small truck more than compensates for those complaints. And don't forget—there's all that potential utility sitting there behind you.

—Don Chaikin

COVER STORY

WATER WINGS

A new generation of homebuilt seabirds will free you from runways without drowning you in bills.



● One “first” that lives with every pilot is the day the instructor steps out onto the tarmac and says, “You’re ready. Take ’er up by yourself.” The apprehension, determination and exhilaration of that first solo flight gets seared into your psyche.

For me, an event nearly as memorable occurred the first time I alighted, quite intentionally, on a river and shut off the engine. I went from land to air to water in the course of one 15-minute flight. And there I was, surrounded by water, watching the world glide by in silence. The scene and sensations were a jumble of juxtaposition—and utterly delightful.

Suddenly, the boundaries of flying seemed to vanish. While runways are rare, water is everywhere. But even more satisfying was the outrageousness of putting an airplane on water without dire consequences.

Machines designed to function in multiple environments are invariably more complex and costly than their single-world counterparts. The lumbering sea-

BY WILLIAM GARVEY

planes of yesteryear, such as the Grumman Albatross and Boeing 234 flying boats, are good examples. But for today’s aquarian airmen, there’s a new generation of light amphibious kit-planes. This group ranges from aluminum-and-fabric rigs to a high-performance 4-place machine.

And in case you’ve got the urge to wander the ocean skies but lack the patience to build your own water-bird, we’ve included a slick factory-made amphib as well. No matter which you pick, you’ll never think of “going to the beach” in quite the same way again.

Buccaneers

Open-cockpit tube-and-fabric ultralights, the Buccaneer SX and Buccaneer II kits arrive with the hard work—welding, stitching and such—already done.

Water-friendly planes that come in a kit include (top to bottom) an all-composite biplane, a sleek wooden 2-seater and a steel-tube-on-fiberglass amphibian.



GLASS GOOSE



OSPREY 2



CATALINA

WATER WINGS

Assembly takes a mere 170 to 200 hours. To date, Keuthan Aviation has delivered some 500 Buccaneers.

The single-place SX comes with a Rotax 503 standard, which lifts the 800-pound bird skyward after a mere 175-ft. run. Cruise is 65 mph. The beefier side-by-side II uses a 582 to loft its maximum 1150 pounds off the water after a measly 275-ft. run. Cruise is 76 mph. The standard SX kit lists for \$15,990, and the II comes in at \$19,990.

For more information, contact Keuthan Aviation Inc., 910 Airport Rd., Merritt Island, FL 32952, or call (407) 459-3200.

SeaRey

First flown in 1992, the SeaRey takes 350 to 400 hours to build, using basic hand tools and a pop rivet gun. Once assembled, the SeaRey can be trailered because its wings detach.

Sliding canopies and a 44-in.-wide cabin mark this 1200-pound aircraft. A Rotax 582 gets the bird off land or water in 300 ft. Cruise is 85 mph.

The SeaRey costs \$22,900. Some 60 kits have been delivered to date, and two-thirds of those are already flying.

For details, contact Progressive Aerodyne Inc., 520 Clifton St., Orlando, FL 32808, or call (407) 292-3700.

Osprey 2

One of the most handsome amphibians, the rakish Osprey 2 is distinctive in its construction as well. Composites be damned—this is a wood airplane (with fiberglass and metal parts where necessary, of course).

Pushed by a 150-hp Lycoming 4-banger, the 2-place 1560-pound Osprey comes off the water in 530 ft. It's off concrete in 400 ft. Cruise at 70% power is 126 mph.

Unveiled in the 1970s as a plans-only design, the Osprey 2 has proven immensely popular, with 1500 sets of plans sold and 500 airplanes flying. Working strictly from plans (\$195 per set), you'll finish in 2000 to 3000 hours.



ROBERT GORTER PHOTO

Ready-made parts shorten that timetable by 500 hours. All totaled, you'll probably invest \$15,000 to \$18,000 before you can get the Osprey airborne.

For information, contact Osprey Aircraft, 3741 El Ricon Way, Sacramento, CA 95864, or call (916) 483-3004.

Catalina

The Catalina boasts a true 3-place cabin, flaperons and folding wings. The sleek amphib features a steel-tube fuselage on a one-piece fiberglass hull.

Powered by a Rotax 582, the 1200-pound Catalina can leave the waves in 756 ft. and cruise at 75 mph. With optional wing tanks installed, the bird can migrate for 10 hours aloft.

Some 160 Avid Aircraft amphibian kits have been delivered, and some 70 are airborne. Average build time is 700 to 800 hours. The Catalina is priced at \$21,995, including engine.

For further details, contact Avid

The all-fiberglass Seawind (above) seats four, and the ultralight Buccaneer II (below left) comes to life in less than 200 hours. Below right, Lake's amphibian arrives fully built, and the homebuilt SeaRey has wings that detach in about 40 minutes.

Aircraft Inc., P.O. Box 728, Caldwell, ID 83606, or call (208) 454-2600.

Glass Goose

Among all kitplanes, this amphibious biplane is one of the most intriguing. The double wing gives the Glass Goose 151 sq. ft. of wing area within a relatively short 27-ft. wingspan.

Despite the extra wing drag, the Goose runs fast—135 mph cruise—and far—1100 miles with standard 70-gallon tanks. Powered by a 160-hp Lycoming, the 1750-pound bipe will depart whitecaps after an 800-ft. run.

At press time, kit shipments had just begun, and assembly of the first two aircraft was proceeding rapidly.



BUCCANEER II

KEUTHAN AVIATION PHOTO



SEAWIND

Build time is estimated at 1000 hours.

The Glass Goose kit—less engine, instruments and radios—is \$18,000. Figure on investing \$32,000 to \$35,000.

For more information, contact Quikkit Inc., 9002 Summer Glen, Dallas, TX 75243, or call (214) 349-0462.

Seawind

If you want a kit amphibian that goes fast and far—and carries four—look no further. This is the one and only.

An all-fiberglass design, driven by a 300-hp Lycoming, the Seawind boasts a 191-mph cruise (at 75% power), 980-mile range and 1100-pounds useful load. This 3400-pound beast takes off after an 820-ft. run on the ground or 1100 ft. on water. Once airborne, it claws skyward at better than 1250 feet per minute.

Having delivered 75 kits, S.N.A. estimates build time at 2000 hours for first-timers. You can shave off 400 to

500 hours by taking the Kwick Kit option, but that ups the ante by \$9800.

A standard kit—less engine, prop, electrical wiring and upholstery—is \$43,980. For a completed plane, outfitted for instrument flight, the investment will run upward of \$100,000.

For more about Seawind, contact S.N.A., Inc., P.O. Box 607, Kimberton, PA 19442, or call (610) 983-3377.

Lake Renegades

No interest in investing countless hours sawing, sanding and painting? No problem. Your seaplane is waiting.

Lake Aircraft has been making amphibians for more than 40 years and has delivered 1300 worldwide. Today, Lakes are the only FAA-certified single-engine amphibians being built.

Aluminum skinned, the Lakes feature a midwing pusher engine and tricycle gear. The Renegade 250 is a 6-place machine with a 250-hp Lycoming, while the Turbo Renegade, powered by a turbocharged 270-hp Lycoming, carries four.

At its fully loaded weight of 3140 pounds, the standard Renegade has a water takeoff of 1250 ft. Cruise at 6000 ft. is 150 mph (75% power), and range is 912 miles. Turbocharging pays off at altitude—the Turbo Renegade 270 boasts a 177-mph cruise at 20,000 ft.

Base price for the 250 is \$386,800, and for the Turbo, it's \$425,200.

For more particulars, contact Lake Aircraft Inc., 50 Airport Rd., Laconia Municipal Airport, Gilford, NH 03246, or call (603) 524-5868. **PM**



LAKE RENEGADE

LAKE AIRCRAFT PHOTO



SEAREY

INCUBATIVE AIRCRAFT PHOTO

МАШИНЫ, ЗАКАЗЫВАЕМЫЕ АВТОРСКИМ СПОСОБОМ



THE BRICKYARD

● It's the biggest single-day sporting event on Earth and the oldest race on the U.S. calendar. It's 33 cars wheel to wheel at 245 mph for 200 laps. The Indy 500 is also the best-paying and most expensive race there is. The total purse in 1994 was nearly \$8 million, with the winner getting nearly \$1.4 million.

However, given the price of competing, the prize money must be bodacious. Consider that a 1995 Lola or Reynard Indycar goes for about \$500,000, and each team has to have one or two spare cars per driver. Then the Ford-Cosworth, Honda and Mercedes-Ilmor racing engines are leased, not sold, to the teams, with the deal usually including a half dozen or so complete engines plus a specified number of engine rebuilds during the season for about \$1.5 million per lease program. Throw in the sophisticated telemetry systems for an additional \$50,000 per car.

It's expensive, all right, but alluring.

BY JIM McCRAW

The players

Gone are Mario Andretti and Al Unser Sr., who have retired; Nigel Mansell, who has returned to Formula One; John Andretti, who's driving in NASCAR; and Jeff Andretti, who's recuperating from injuries.

Present on the program will be five former winners: defending champ Al Unser Jr. (1994, 1992), Emerson Fittipaldi (1993, 1989), Danny Sullivan (1985), Arie Luyendyk (1990) and Bobby Rahal (1986).

Here, in alphabetical order, are the teams:

- Arciero Racing has Hiro Matsushita—with his Panasonic sponsorship—in a new Lola/Ford.
- Tony Bettenhausen has a car for Swedish speedster Stefan Johansson, and maybe one for himself. The cars are last year's Penske cars, with new Mercedes engines.
- The CompTech team has Honda power for Parker Johnstone's Reynard.
- Forsythe Racing, formerly half of Forsythe-Green,



REPORT

What's new and who's driving it at this year's Memorial Day Classic.

will be putting the veteran Teo Fabi in a Reynard/Ford-Cosworth combination.

- A.J. Foyt will be backing veteran driver Eddie Cheever's Lola/Ford.

- Rick Galles will run a Lola/Mercedes-Illmor this year. The driver is Adrian Fernandez and sponsors are the Mexican beer Tecate and Quaker State.

- Chip Ganassi will have Ford-Cosworth-powered Reynards for Bryan Herta and Jimmy Vasser.

- Barry Green has a Reynard with a Ford-Cosworth for Jacques Villeneuve.

The team to beat at Indy is the juggernaut Marlboro Team Penske. First, there's AJ Unser Jr., shown at the top of the page winning last year's race. Second, there's teammate Emerson Fittipaldi, shown at right at Phoenix in this year's improved car.



PHOTO BY SCHLEMAN

THE BRICKYARD REPORT

- Jim Hall, under the Pennzoil banner, will field former Reynard test driver Gil de Ferran in a Mercedes-Ilmor-powered Reynard.

- The Indy Regency entry of Sal Incandela has a Lola/Mercedes-Ilmor. As of this writing, there's no driver.

- John Menard will self-sponsor his team again this year, along with Glidden Paints and Quaker State, for car driver Scott Brayton. The stock-block Buick V6 engine, now campaigned as a Menard, will be in a new Lola chassis designed specifically for it. This is the last year at Indy for the stock-block V6.

- Paul Newman and Lola importer Carl Haas have former series champ Michael Andretti and Paul Tracy on the Kmart/Havoline team.

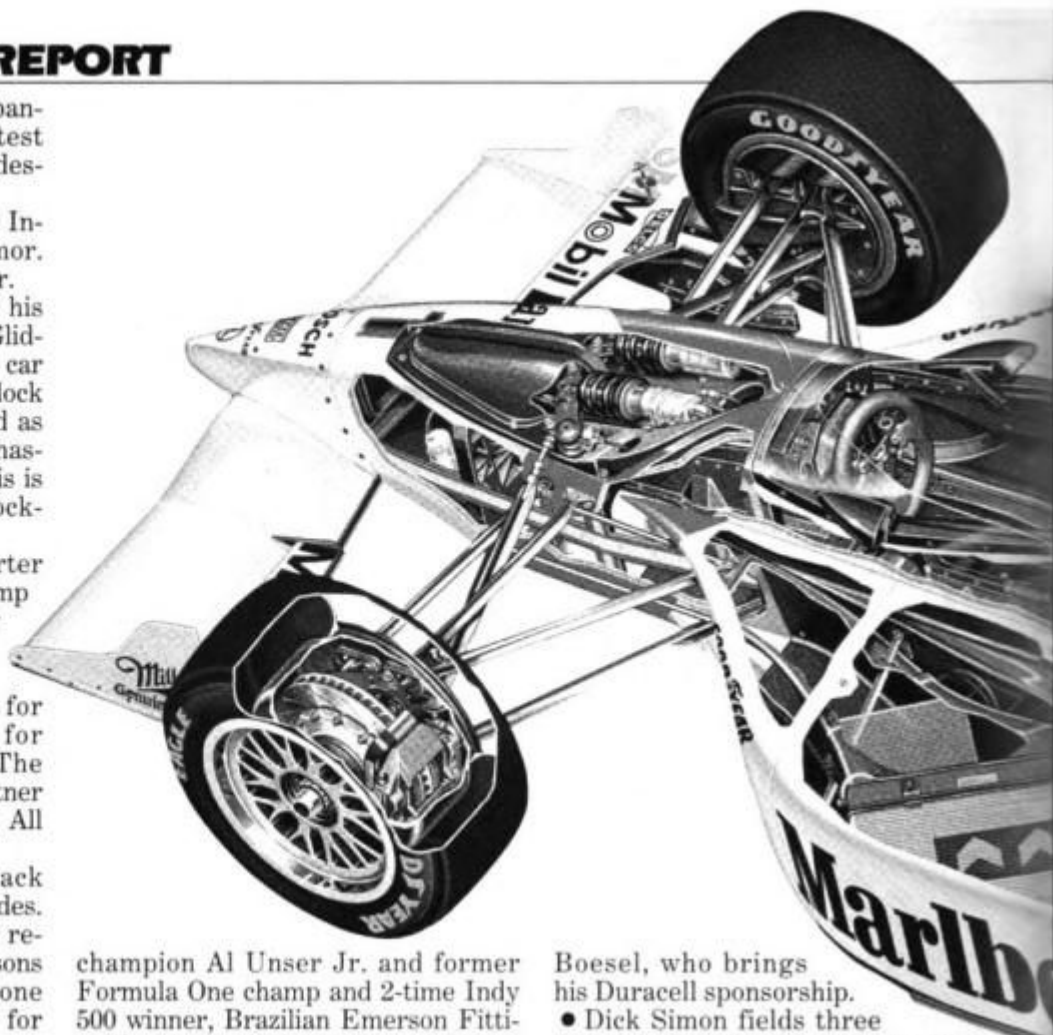
- PacWest, owned by Bruce McCaw, has three entries. One is for Danny Sullivan and another for Brazilian Mauricio Gugelmin. The third is for Dominic Dobson, a partner in and vice president of the team. All are Reynard/Fords.

- Jack and Allan Pagan will back Dennis Vitolo in a Reynard/Mercedes.

- U.E. "Pat" Patrick makes his return to Indy after a couple of seasons with a Lola T95 chassis, Firestone tires and Ford-Cosworth power for driver Scott Pruett.

- Payton/Coyne Racing has former NFL-star Walter Payton in partnership with veteran car owner Dale Coyne fielding Ford-Cosworth-powered Lolas for Belgian Eric Bachelart and Italian Alessandro Zampedri under Agfa Film and Mi-Jack sponsorship.

- The awesome 1995 Marlboro-Penske/Mercedes team, with seven wins in the past 10 Indy 500s and 10 wins in 25 years, will have defending



champion Al Unser Jr. and former Formula One champ and 2-time Indy 500 winner, Brazilian Emerson Fittipaldi. Both will drive Penske PC-24 cars powered by the new Mercedes-Ilmor IC-108 racing engines.

- Project Indy, a team co-owned by driver Christian Danner and German racing veteran Andreas Leberle, will field a Reynard with Cosworth power. The driver is still unnamed.

- The newly reconstituted Bobby Rahal/Carl Hogan team will have Bobby Rahal in the Miller Genuine Draft Lola with Mercedes-Ilmor power, joined this year by Brazilian Raul

Boesel, who brings his Duracell sponsorship.

- Dick Simon fields three Lola/Ford-Cosworth combinations for drivers Dean Hall (Subway) and Chilean Eliseo Salazar (Cristal Bottling), and in partnership with restaurateur Jonathan Byrd for Davy Jones.

- Tasman Motorsports, under Steve Horne, will run a new Honda-powered Reynard on Firestones, with Brazilian Andre Ribeiro driving.

- Derrick Walker will field two cars—one with Robby Gordon driving for Valvoline and one for Christian Fittipaldi, Emerson's nephew, driving

A Corvette Sets The Pace Again

- Chevrolet General Manager Jim Perkins will drive the Indy Pace Car. That's because this year's Pace Car will once again be a Corvette, the third time in the past 17 years. The 1995 version will carry custom paint—a dark purple metallic accent panel over an arctic-white bottom half—and a white convertible top. It will be powered by a stock 300-horsepower LT1 V8, and an automatic transmission.

The tires and wheels have been upgraded to the P275/40ZR-17 Goodyear GSC and 5-spoke alloy wheels from the now-departed ZR1.

In addition to the tire and wheel changes and the paint scheme, the fleet of three Pace Cars will include a rollbar behind the cockpit, a set of



An LT1 Corvette with ZR1 wheels and tires, trick paint and lights paces the race.

360° strobe lamps, two sets of competition-style 5-point safety harnesses, a complete set of radios, microphones and headphones, and an on-board fire-extinguisher system.

While you probably won't be able to drive any of the three original Pace Cars, Chevrolet will be offering 500 road-going Indy Pace Car replicas.

The replicas will all be automatic LT1 convertibles with purple metallic over white paint, air conditioning, Delco Bose sound system with cassette and CD player, 3.07:1 rear axle, 9½-in. ZR1 front and rear wheels with ZR1 275/40ZR-17 tires and ZR1 brake rotors, black leather sport-bucket power seats embroidered with the 79th Indianapolis 500 logo, plus special Indy Pace Car exterior graphics.

—J.M.

the Marlboro Brazil entry in his first Indy 500. Both will be in a Ford-Cosworth-powered Reynard chassis.

1995 engines: more rpm

The Indy 500 rules, set by the United States Auto Club (USAC), will be identical in

bank angle, compression ratio or bore and stroke combination.

With displacement, boost, methanol fuel and steel-spring valvetrains dictated by the rules, about the only way to make more power is to spin the engine faster, which all three engine builders will do in 1995. These engines develop about 800 hp at 13,500 rpm.

agement. The 80° XB engine is, in effect, designed to operate as two 4-cylinder engines connected by a flat 180° crankshaft.

The Mercedes-Ilmor IC-108 engine has new cylinder heads, a new and larger plenum, a new ignition system and a new engine-management system for this year. Like the Cosworth



most respects to the 1992-94 regulations. This will be the last year for the 2.65-liter (161-cu.-in.) engine size. Next year, the Speedway management will launch its own series, the Indy Racing League, with a 2.2-liter dohc 4-valve V8 engine formula, and USAC and IndyCar are expected to use the same size engines in order to keep costs down.

The rule book still allows the use of the 209-cu.-in. engines at 55 in. of boost, so John Menard, who built such engines for last year's race based on the original Buick V6 design, will be back with them.

The Ford-Cosworth XB engine, the Mercedes-Ilmor IC-108 and the Honda Indy V8 engine are similar in concept: dohc 32-valve V8 engines with single turbochargers. The 48 in. of boost is limited by pop-off valves supplied by USAC.

There are differences in the engines' cylinder heads, intake plenums, electronic ignitions, engine-management systems and physical size. While USAC sets the limits on total displacement, designers can use any cylinder-

Last year, Indy newcomer Honda raced its HRX engine with Bobby Rahal, using aluminum heads and accessories bolted to a steel block—about a 50-pound weight penalty versus the competition. That engine will be replaced for Indy by the HRH engine, a completely new design with all-aluminum construction, much higher rpm capability and a larger intake plenum. While the cylinder-bank angle is classified, we'd bet on an 80° layout and a flat, 180° crankshaft like the Cosworth and Ilmor engines.

The Ford-Cosworth XB Series II engine, to be put on the track first by Newman/Haas and Ganassi Racing, features new cylinder heads and valvetrain, a new plenum design and new electronic ignition and engine man-

The '95 Marlboro-Penske PC24, shown here in short-wheelbase road-course variety, has aero refinements, cooling and durability improvements over last year's winning car, and a totally redesigned dohc 32-valve Mercedes-Ilmor engine.

agement. The 80° XB engine is essentially designed to operate as two 4-cylinders.

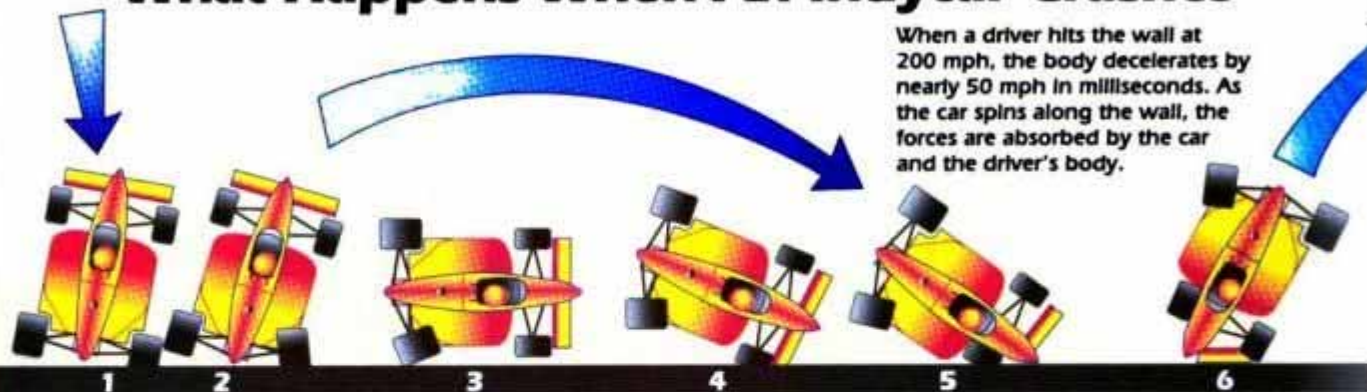
Chassis evolution

A typical Indycar weighs a minimum of 1550 pounds empty, about 2000 pounds with driver, 40 gallons of methanol fuel and lubricants. Wheelbases average 115 in., with an overall length of about 190 in. and a width of about 80 in. Front tread width is about 68 in., with the rear tires tucked in slightly, at about 64 in. Ground clearance under the flat-bottomed Indycar is about 1 in., and overall height is about 36 in. at the roll hoop.

There are only three chassis builders. Penske doesn't sell current chassis to customers, but does sell its year-old cars. The other two are British-based builders, Lola and Reynard, and they are in the business of selling customer chassis.

To keep cost and complexity down,

What Happens When An Indycar Crashes



When a driver hits the wall at 200 mph, the body decelerates by nearly 50 mph in milliseconds. As the car spins along the wall, the forces are absorbed by the car and the driver's body.

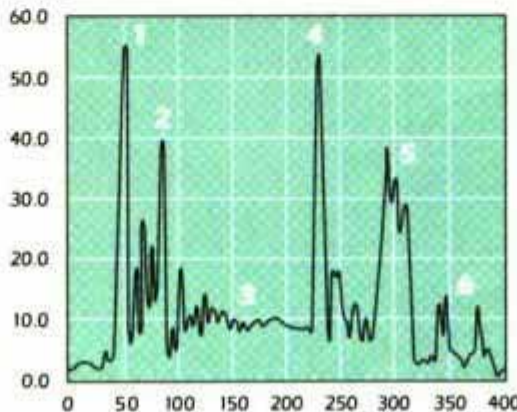
● What do we know about the tremendous forces at work when a 2000-pound car going 200 mph is stopped instantaneously by an unforgiving concrete wall?

Thanks to the IndyCar organization, the GM Motorsports Technology Group (MTG), GM Research and the GM Biomedical Science group, we know much more about crash forces and crash dynamics than ever before.

The MTG staff, working with GM safety experts, developed the Instrumented Sensor Technology (IST) black box. This can measure acceleration/deceleration up to a maximum of 200 g's, in longitudinal, lateral and vertical axes, sampling the forces up to 2000 times per second.

A 7-g threshold is built into the box so that normal race conditions don't trigger the recorder. Duration settings are set to preclude the recording of spikes caused by engine vibrations at 13,000 rpm. Each box has about 500K of memory, which continuously overwrites itself if no incident takes place.

The recorder data is combined with physical measurements of the crash site and videotape to provide scientists with a millisecond-by-millisecond record of the crash. GM MTG crews put fresh batteries into the black boxes and supervise the installation of the black boxes into each car, on Thursday or Friday before



The forces of the crash shown above are plotted by the IST. Peaks correlate with numbers above.

each race, and collect the boxes from each crew after every race—crash or no crash.

In one recent IndyCar crash monitored by MTG, the car spun at 190 mph, and after the spin went into the wall head-on, resulting in a 38-mph velocity change in about 70 milliseconds and a 60-g impact. Instruments recorded that the car hit the wall at 179 mph and was sliding along the wall at 63 mph. The composite nose cone of the race car absorbed 120,000 pounds of force (60 g's x the 2000-pound weight of the car) in 50 milliseconds, with no damage whatsoever to the chassis, tires or front suspension. The driver got out and walked away.

Dr. Terry Trammell, the IndyCar

medical director and a surgeon at Methodist Hospital of Indianapolis, has said that, mile for mile, you're 30 times more likely to crash at Indy than on a highway, but that you're only 1.2 times more likely to be injured in that crash, even at very high speeds.

But crashes do happen, and a human body so tightly restrained in the cockpit distorts under the very high negative-g loadings. GM crash-sled studies using the GM Hybrid III anthropomorphic dummy, helmeted and strapped into a simulated Indycar cockpit, displayed significant data.

A 40-g deceleration from 45 mph showed the dummy elongating the neck, torso and arms into contact with the cockpit interior or windshield. The heavy-duty full-face helmet worn by a racing driver makes the driver's head heavier and adds to the neck distortion. In a very close simulation to a racing crash, the instruments showed an average head acceleration of 77 g's, lumbar compression of almost 2200 pounds of force and an average neck tension of more than 1200 pounds of force.

Armed with this new information, safety experts are working with IndyCar designers to eliminate sharp composite edges in cockpits and to add padding—wherever possible—to reduce life-threatening head and neck injuries and disabling injuries to the lower extremities. —J.M.



GM did crash testing, using a helmeted dummy in a mock race-car cockpit, to determine driver stress loads in a race crash.



the manufacturers use a single all-carbon-fiber chassis design and alter its characteristics for street, road, oval and speedway courses by changing front and rear wings for more or less downforce, and by changing front- and rear-suspension arms to provide long wheelbases for high-speed tracks like Indy and Michigan, and shorter wheelbases for the rest of the series.

Penske's all-conquering PC23 design from last year has been mildly updated for 1995. Designer Nigel Bennett changed the engine bay in order to accommodate the new engine. There's a longer nose section and a relocated driver's seat, farther back than before, which alters weight distribution and helps the car change direction more easily. The transverse transaxle and the engine's bellhousing have been lightened and made more compact. The Penske PC24's cockpit sides have been raised slightly for driver protection, and Kevlar material has been added to the sides of the car.

The 1995 Reynard has been changed significantly from last year to make it less pitch-sensitive and easier to drive. The side pods are taller, the air intakes and ducting for engine cooling are changed and the air handling in the under tray is all new. The Reynard uses a normal 5-speed longitudinal transaxle behind the engine, while the Penske and Lola use new transverse transaxles, though the 1995 Reynard reflects a 35-pound weight reduction in the transaxle. Ford-powered Reynards use a smaller engine cover than the Mercedes-

Ilmor and Honda-powered Reynards.

The Lola chassis, which teams found difficult to balance last year, has been tamed for 1995. The Lola design team has raised the side pods, and the cooling duct intakes are reshaped to provide the same cross section in a narrower shape—all in search of better aerodynamics.

The tire war

This year's Indianapolis 500 marks the return of Firestone after 21 years. To prepare, the company

Contenders include: Michael Andretti's Kmart/Texaco Ford-Lola (top), Bobby Rahal's Miller Genuine Draft Mercedes-Lola (right) and Robby Gordon's Valvoline/Cummins Ford-powered Reynard (bottom).



spent 1994 testing with Patrick Racing team driver Scott Pruett. Pruett logged some 9000 test miles on 13 different tracks to develop a set of Firestone Firehawk racing tire compounds for Indy, as well as for the other IndyCar venues.

Tire suppliers committing to the Indy 500 must be able to supply complete sets of tires to half the number of cars that show up for qualifying (nearly 50 last year), making the Fire-

stone investment of time, money and personnel far greater than just supplying the Patrick and Tasman teams it has already signed. Goodyear and Firestone should have three compounds available.

Telemetry: more is better

Pi Research, of Cambridge, England, supplies telemetry and data-acquisition hardware and software to virtually all of the Indy 500 race teams. Pi supplies "black box" data loggers, programmable liquid-crystal-display dashboards and software that allows the teams to gather, display and ana-

lyze telemetry data and make changes to the cars' suspension, shock absorbers, aerodynamics, engine and tires.

Pi also supplies sensors for engines, tires, suspension positions and strain gauges mounted on the suspension tubes to sense load, as well as steering angle, throttle angle and brake line-pressure sensors. Infrared tire-surface temperature sensors and wheel-mounted tire-pressure sensors are used in testing and qualifying, but not during the race itself.

Pi will add a laser-based ride-height telemetry system to continuously monitor front and rear ride heights, which will lead to valuable information on load, pitch and roll in the suspension.

This year, the analysis software will allow multiple y-axis parameters to be plotted against a single x-axis parameter such as time, speed, distance, temperature or pressure. Another new wrinkle from Pi is a separate fuel-management software program that will enable teams to continuously alter pit-stop strategy based on their fuel consumption.



TECHNOLOGY

PAPER REBORN

How does recycling turn yesterday's magazines into tomorrow's notepads? We follow the paper trail.

BY NANCY KISSER; PM Photos by Robert Brown





● What happens to this copy of **POPULAR MECHANICS** once you've finished reading it? If you don't add it to your permanent library, do you toss it in the trash or bundle it for recycling?

If you recycle, you may have been told to keep magazines and catalogs out of the newspaper stack. Until recently, the glossy paper in magazines and catalogs tripped up recycling mills. The clay-based coatings that create the sheen were difficult to remove, and inks tended to cling to the clay. The traditional method of de-inking—washing with large amounts of water—proved ineffective with coated paper.

But all that's changing, and the paper world is better for it. "Glossy magazine paper has bright, strong fiber that's valuable for recycling efforts, whether you're making recycled newsprint, copier paper or paper towels," says Sandra Foley, manager of International Paper's Lock Haven, Pennsylvania, mill. There, fiber from old magazines and newspapers is salvaged and turned into 100% recycled copier and commercial printing paper.

The key to obtaining that fiber? New flotation de-inking systems that American paper mills are adopting and refining—technology that European and Japanese mills have exploited for nearly 30 years. At Lock Haven, for example, International Paper is using a process licensed from a German firm. With the de-inking barrier removed, old magazines can now complete the long journey from curbside disposal to reincarnation. This process of renewal is detailed to few outside of the highly competitive paper industry.

Road to recovery

The paper trail begins when collection trucks deliver magazines and catalogs to a materials-processing facility. Besides de-inking, magazine paper must undergo a series of steps to remove other contaminants—everything from wax to staples to lost TV remote controls. At the processing plant, the magazines ride a forklift to a conveyor belt that carries them across an elevated sorting



Conveyor carries magazines to pulper.

area. There, on both sides of the line, workers pluck off obvious contaminants, such as plastic grocery bags.

The conveyor moves the magazines to a baler, a large compactor whose one or two rams create a tight bundle before binding it with wire. Alternatively, some plants channel the loose magazines into sturdy boxes called gaylords.

Bales or gaylords travel by truck or railcar to the de-inking facility. The transport of old magazines has surprised facilities accustomed to working with old newspapers. Because coated magazine paper is slippery, it tends to slither free of the baling wire. At one new de-inking plant, workers opened railcar doors and found magazines flying all over the place. The bales had disintegrated during the trip. With experience, processors have learned to avoid slippage by tearing or shredding the magazines to form rough edges, or by using gaylords.

Pulp friction

When the magazines first arrive at the de-inking plant, they move through a wire cutter, where a blade slips under the baling wire, cuts it and releases loose magazines onto a conveyor. Just before the magazines move up the conveyor and toward the pulper, workers seize any remaining visible contaminants that may have gotten past earlier checkpoints.

The pulper acts like a giant kitchen blender, stirring the paper with water

Gross contaminants are culled.



PAPER REBORN



In flotation de-inking vat, vacuum tubes remove bubbles coated with ink and clay.

until a thin porridge-like pulp is formed. Caustic chemicals also may be mixed in, causing the paper fibers to swell. As the fibers expand, ink bursts free, ready for later removal.

Although blender-like blades at the base of the pulper mix the pulp efficiently, they do have drawbacks. The mechanical assault may break up contaminants and ink particles into smaller pieces, making them more difficult to cull. What's more, the shearing action tends to shred paper fibers, which resemble threads with clinging hairs. The hairs help the fibers lock together to form paper. And longer fibers lend paper strength, to keep it from tearing as it dries or races through a printing press. To preserve fiber intact, some plants are turning to pulpers that abrade paper with rotating drums.

Many facilities employ double conveyors to carry the recyclable

material to the pulper, thereby widening the choices available for managing and mixing the recovered paper. Along with magazines, for example, old newspapers can be sent to the pulper in controlled proportions. Or the conveyors may go to separate pulpers that operate in parallel.

White sheets

From the pulper, the liquid—pulp is roughly 95% water—will run through a series of purifying steps. The order and number of these steps depend on how clean the pulp must become for the final product. The inside of a cereal box, for example, needn't be pristine white. Newsprint, by contrast, requires clean pulp. Most mills consider the sequence of these cleansing processes a proprietary secret.

Ink removal, of course, was the step on which glossy-paper recyclers stumbled—until the recent introduc-

tion of flotation de-inking. Simply put, the process floats the ink away on bubbles. Inside a flotation de-inking vat, nozzles inject air into the pulp, touching off bubbles that rise to the top. As they ascend, the bubbles pick up ink from the fibers, forming a grey foam on the surface.

"The flotation process is very similar to the bubbles that are formed when you wash dishes, do laundry or give your child a bubble bath," notes Foley. Like soap, the clay that coats glossy paper strengthens the bubbles so that they can surface without bursting and dropping ink particles back onto the fibers. In some vats, the ink-laden bubbles float away from the pulp. In others, industrial-scale vacuum arms sweep up the foam.

Mills may repeat the flotation process several times, brightening the pulp as ink is removed. The foam itself is sometimes reprocessed to salvage as much of the fiber as possible.

Sticky problem

While flotation takes care of the ink and clay, different processes remove other contaminants, such as glues, nonpaper inserts and staple wire. Plastics, adhesives and hot melts are particularly characteristic of magazines and catalogs. Collectively known as "stickies," they're difficult to capture and remove—and can wreak havoc on machines, especially printing presses.

To purge the pulp of these and other contaminants, plants use centrifugal cleaners to separate fiber from materials that are either lighter or heavier. Forward cleaners reject things like staples, dirt and sand, which outweigh fiber. Reverse cleaners spin out lighter substances, such as plastics and wax. A through-flow cleaner combines both processes.

In addition, mills pass pulp through pressure screens—surfaces punctured with either holes or slots. The size and shape of these perforations and the spaces between them are chosen based on the length of the fibers and the amount of water in the pulp. Plants do their best to avoid



Screens capture small-scale contaminants.



Ink stains pulp before flotation process.



Clean pulp is ready for paper machine.



matting the screens with fiber and blocking the flow.

Round holes tend to capture flat, flaky materials and thin debris such as wires and hair. Slots, on the other hand, are more effective in eliminating chunkier waste, like plastic fragments and stray ink balls.

Final paper

After the magazine pulp has been thoroughly cleaned, it's piped to the final step—the paper machine. Alternatively, if this machine stands in another facility, the pulp is dried into rough mats that are stacked and bound for shipment. Once the pulp arrives at the remote location, water is added to bring it to the right consistency.

Carried on a mesh screen, the pulp then races through the paper machine at speeds up to 50 mph. Through a series of drainage stages, pressure rolls and dryer rolls, the pulp is turned into paper, emerging at the end of the machine to be wound onto huge rolls. Later, it is cut to size.

Today, mills throughout North America use flotation de-inking on old magazines and catalogs to make new paper products: newsprint, copy paper and paper towels. These include Manistique Paper in Michigan, which collects from six Midwestern states, and Jefferson Smurfit in Oregon, which draws from West Coast sources. Newer on the scene, Tennessee-based Bowater and Texas-based Champion International mills are recovering Southern magazines. Canadian companies, with de-inking plants scattered along the border, use magazines collected mainly in the United States.

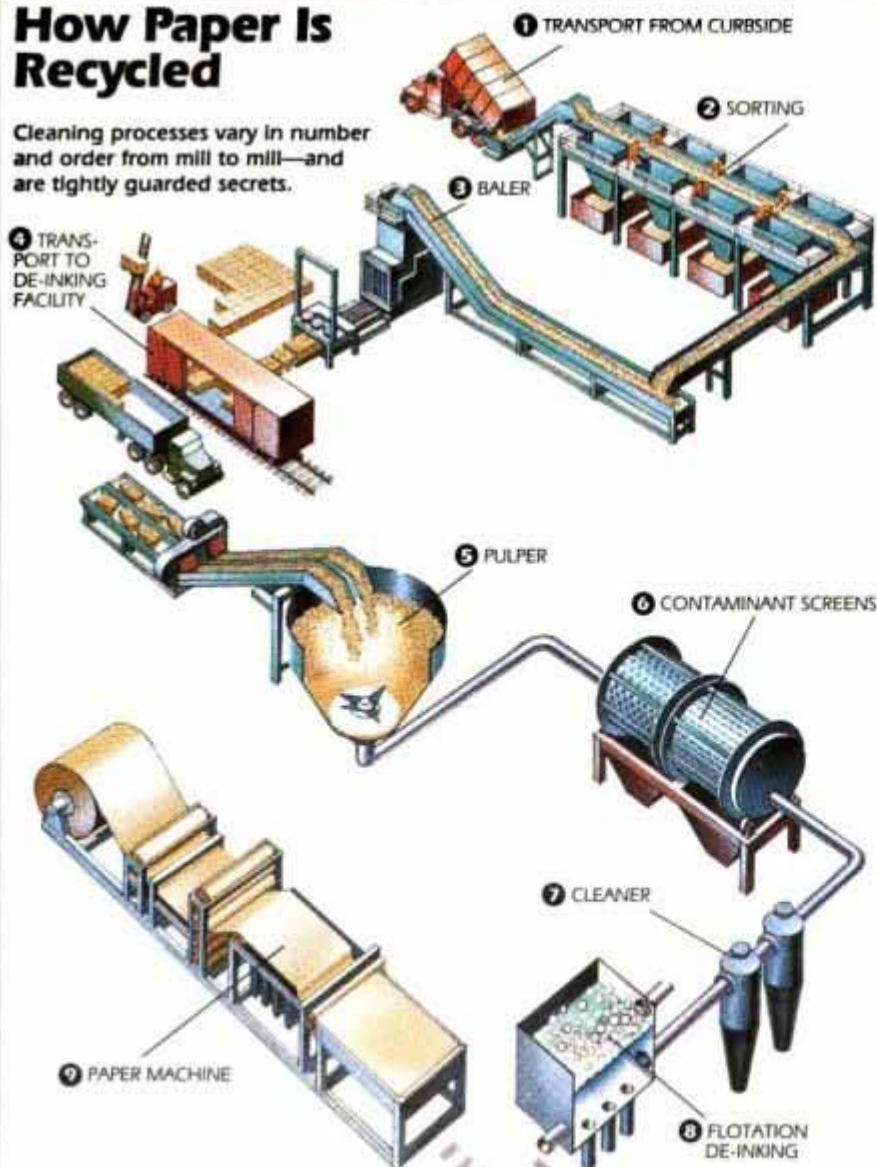
As these and other mills compete for old magazines, communities benefit because trash-disposal problems dwindle. More than 15 states have passed legislation requiring newspaper publishers to use recycled fiber. The amount of recycled content in newsprint is expected to reach an average of 40% by the end of this decade. Thanks to flotation de-inking, tomorrow's news will feature yesterday's magazines. **FM**

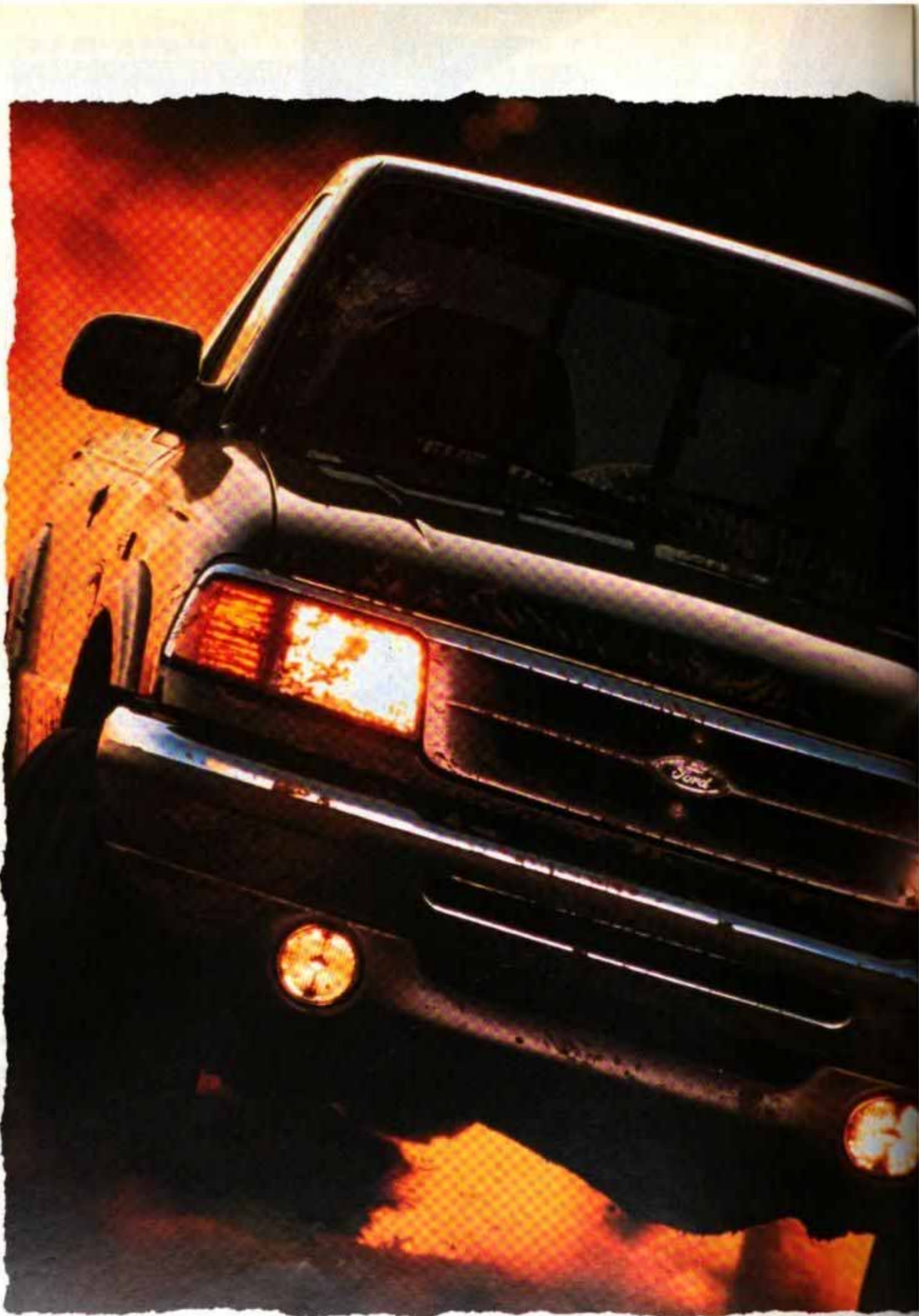
Finished product is cut to size.



How Paper Is Recycled

Cleaning processes vary in number and order from mill to mill—and are tightly guarded secrets.





The best ideas don't
always start with a
clean sheet of paper.



When we take on a project,
we like to get our hands dirty.
That's business as usual when
we send a Ford Ranger 4x4 into
the weekend battle of off-road
racing. It's the meanest, most
punishing proving ground to
test our newest technology,
from suspensions to engines to
brakes. And when these ideas
are fully developed, we use
them in the Ford you can drive.
Now that's hitting paydirt.

BUILT FORD TOUGH



Ford Ranger 4x4

AMERICAN CLASSICS



THE JUKEBOX

From the jitterbug to rock-and-roll, the jukebox launched thousands of tunes and romances. Without it, Saturday night wouldn't have been the same.

BY RICK BOTTS; PM Photo by Spencer Jones

• Technicolor lights catch your eye. Gleaming bubbles draw you close. Title strips of popular songs beckon your fingers. Irresistibly, you reach into your pocket, pull out a coin, drop it into the slot and select a number. The machine whirs to life. A chrome arm swings a record to the turntable, which begins to spin and rises to meet the tonearm. Suddenly, a speaker crackles

with a familiar sound—Bing Crosby, Glenn Miller, Frank Sinatra, Hank Williams, Patsy Cline, Elvis. Technically speaking, it's the sound of a coin-operated electric phonograph of the 1930s, '40s and '50s. But to those who came of age during those years, it's much more than that. It's the sound of good times, romance and Saturday night. It's the sound of the jukebox.



This eye-catching trio of vintage Wurlitzers from the golden age of the 1940s includes the highly collectible Model 750 and Model 1015, opposite page (left to right), and Model 800, above.



THE JUKEBOX

The beginning of the jukebox dates to 1877 and a converted barn in Menlo Park, New Jersey, where a former telegraph clerk named Thomas Edison was attempting to invent a new type of telegraph. In the process, Edison stumbled upon a technique for recording sound, but the sound was so weak that it required a listening tube to be heard. Still, the machine caused a national sensation.

In 1889, Louis Glass (an investor in the new machines, now called phonographs) fitted one with a coin slot and four listening tubes. He installed it in

But the technology that made radio feasible also made it possible to pack a new generation of jukeboxes with vacuum tubes that amplified sound through ground-shaking 15-in. speakers. In 1927, AMI, of Grand Rapids, Michigan, came out with the first amplified jukebox. By 1935, AMI was joined by Rock-Ola and Seeburg, both of Chicago, and Wurlitzer, of North Tonawanda, New York.

Jukeboxes at the start of this era were made to resemble the floor-model radios of the day, but manufacturers soon realized that a key to success was eye appeal. And no one capitalized on this concept more than Wurl-

itzer, which till then had been known for its player pianos and pipe organs.

Wurlitzer became the "King of the Jukeboxes" in the late 1930s and '40s, thanks to a series of beautifully styled cabinets that featured spellbinding use of lighting and animation. The company revealed the inner workings of the record selector by installing a glass window, and people were fascinated by the robot-like action. They were equally mesmerized by shimmering rainbow-colored revolving lights and the most distinctive feature of all—bubble tubes.

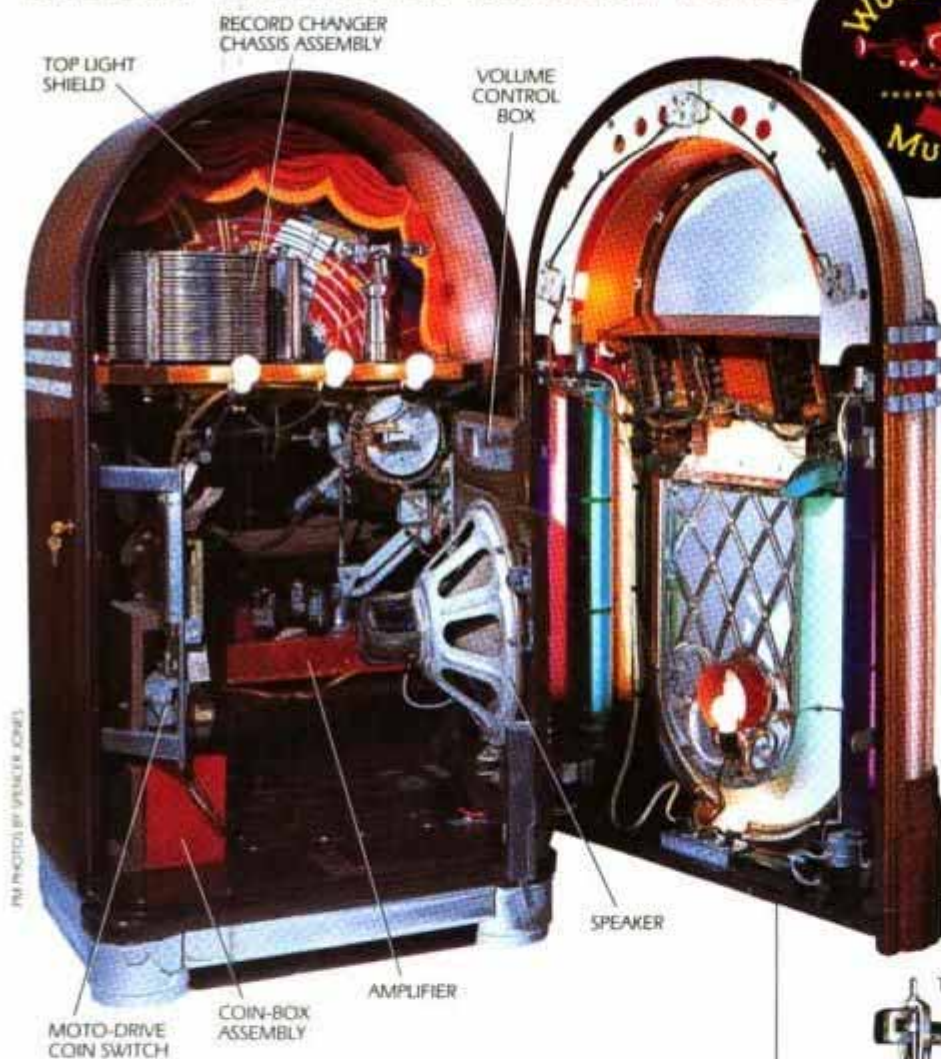
With these familiar features (rotating lights, bubble tube and distinctive round top) in place, the landmark 1946 Wurlitzer Model 1015 became the biggest-selling jukebox of all time with a production run of 56,246 units.

The next milestone arrived in 1948 with the Seeburg Model M100A, a 100-selection jukebox. (Other models at the time offered only 20 to 40 selections per unit.) This gave Seeburg a decisive edge in the late 1940s, and it rode the wave of success throughout the '50s. Seeburg was also responsible for the first hi-fi jukebox (Model HF100G) in 1953 and the first 200-selection jukebox (Model V200) in 1955.

Although no longer the force it was in the '40s, Wurlitzer continued to innovate, introducing the first stereo jukebox (Model 2200) in 1958.

Overall, the '50s was a decade of major change for jukeboxes, not only in the area of mechanical workings, but in exterior styling, too. Instead of being built to resemble floor-model radios, the new generation looked as if it were designed at General Motors. Typical features included chrome grilles, fins and glass windows large enough to double as windshields—all of which were perfectly in tune with the times.

Inside Wurlitzer Model 1015

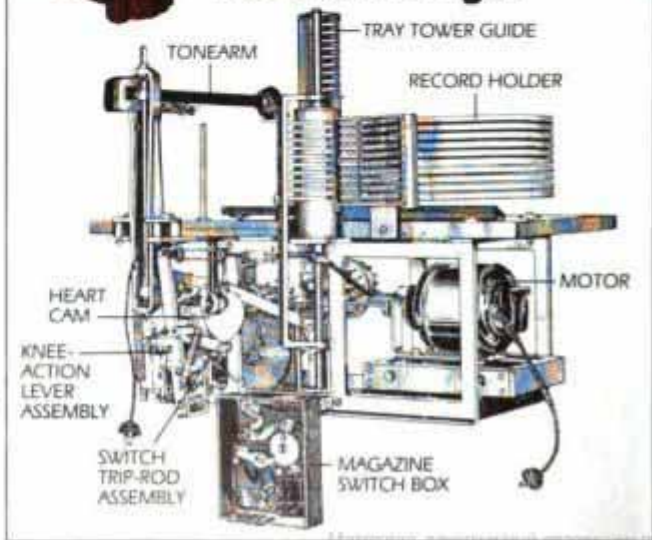


the Palais Royale Saloon in San Francisco, and it was an immediate success. By 1897, cities across the country had phonograph parlors where you could sit, pick up earphones, drop in a nickel and hear music.

After the turn of the century, a new generation of coin-operated phonographs, such as Gabel's Automatic Entertainer, was born. After several years, however, the public lost interest in these machines and turned to player pianos and the latest sensation—radio,

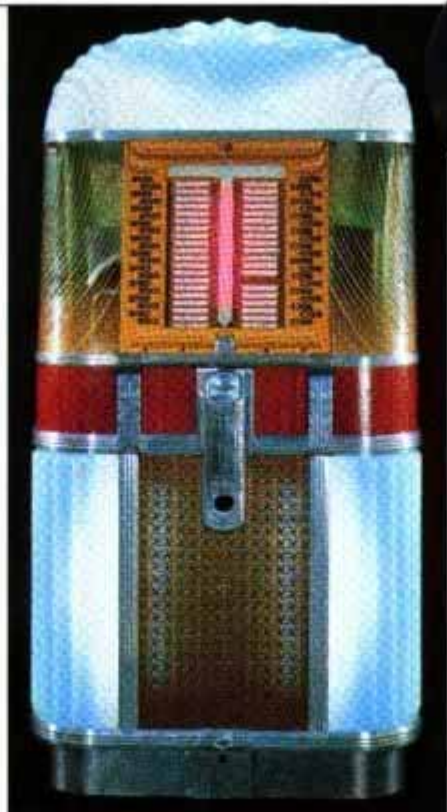
Lighting and coin-operation assemblies fill the interior space of the artistic jukeboxes that came of age in the 1940s. The record changer was inside, too, but it was made visible through a glass window. The '34 Wurlitzer Model P10 Simplex, which is illustrated at right, predated the huge multirecord trays.

Record Changer





The vintage Seeburg Model 147 from 1947.



From 1948, the translucent AMI Model B.



come from? With the popularization of radio in the 1920s, coin-operated phonographs temporarily fell out of favor. But they never

lost their appeal to fans of music that wasn't played in mainstream dance halls, movies and on the radio. One of the strongest markets at this time was among African Americans, who supported coin-operated phonographs by playing them in Southern roadside bars or cafes called juke joints. In essence, the term juke came out of the same body of slang that gave birth to the name jazz. The slang term originally referred to dancing, having a good time, and probably, sex.

The jukebox eventually moved back into mainstream popularity, but it also continued to play hard-to-find music: country music, during the years when Hank Williams was given scant airplay, and rock-and-roll when Elvis was considered subversive.

Is it the artistry of the cabinet, the lights, bubbles, clever animation or the songs that maintain the keen interest in jukeboxes long after the arrival of more sophisticated forms of entertainment? Perhaps it's none of these things. It may be something as simple as fond memories of good times, romance and long ago Saturday nights.



By the mid-1950s, jukeboxes had reached their peak of popularity. At that time there were more than 500,000 units on location in America—in other words, about one jukebox for every 330 people.

During the mid-1960s, jukeboxes started a long, slow decline. The development of the transistor radio, the blossoming of Top-40 radio and increasing popularity of TV all contributed to a shift toward other forms of entertainment.

The downward spiral continued throughout the 1970s and '80s, but in 1986, Seeburg breathed new life into the jukebox industry by introducing the first CD model. This innovation not only halted the decline, but it sparked a period of modest growth. Today, there are actually more jukeboxes on location than there were 10 years ago.

However, the largest segment of jukebox activity isn't in building new machines, but in collecting and restoring classic models of the late 1930s through the early '60s. The most sought-after jukeboxes are the artistic masterpieces of the '40s and '50s, which, in showroom condition, command from \$5000 to \$10,000. Later models from the '70s and '80s, however, can still be bought for \$300 to \$700.

Naturally, collectible Wurlitzers, Rock-Olas, Seeburgs and AMIs play vintage records—old 78s and 45s. And while these can be purchased from collectors or ordered new from companies that supply the jukebox market, many people long for a combination of classic styling and modern high-quality sound. In response, several manufacturers (including Wurlitzer) now make reproductions of classic models that are equipped to play CDs. Many resemble the famed Wurlitzer Model 1015 (or other models of the era) and retail for about \$6000.

So where did the name jukebox



The LaserStar Diamante, above, is a new CD model. The Rock-Ola Gazelle, right, is new, too, but looks like a '41 Wurlitzer.



SOURCE LIST

- Back Pages Antiques, 125 Greene St., New York, NY 10012; (212) 460-5998.
- Jukebox Collector Magazine, 2545 SE 60th Ct. No. 201, Des Moines, IA 50317; (515) 265-8324.

TELECOMMUNICATIONS



BATTLE OF THE BOXES

The top of your TV is becoming a war zone.
At stake is control of the interactive gateway.

BY GEORGE MANNES; PM Illustration by Alan Gutierrez

• Professional magician Dana Law does a neat trick on his computer. He subscribes to the Prodigy online service but, unlike virtually every other subscriber in America, he doesn't need a phone line to sign on. More impressively, he can download information at speeds that leave today's 14.4-kilobits-per-second modems in the dust. It makes a big difference, Law says, when he uses his computer to download large files containing graphics, sound or video: "I've seen it smoke," he says. The secret to this magic? Instead of accessing

Prodigy through his phone line, Law connects to the service via his television. More precisely, Law's computer is hooked into the same wire that brings him his MTV, CNN and Comedy Central. He's one of about 150 customers of Cox Cable Communications in the San Diego area enjoying this experimental high-speed Prodigy connection without tying up a phone line (or disrupting the television picture, either).

One of the first cable customers to sign up for this type of service, Law definitely won't be the last. As the



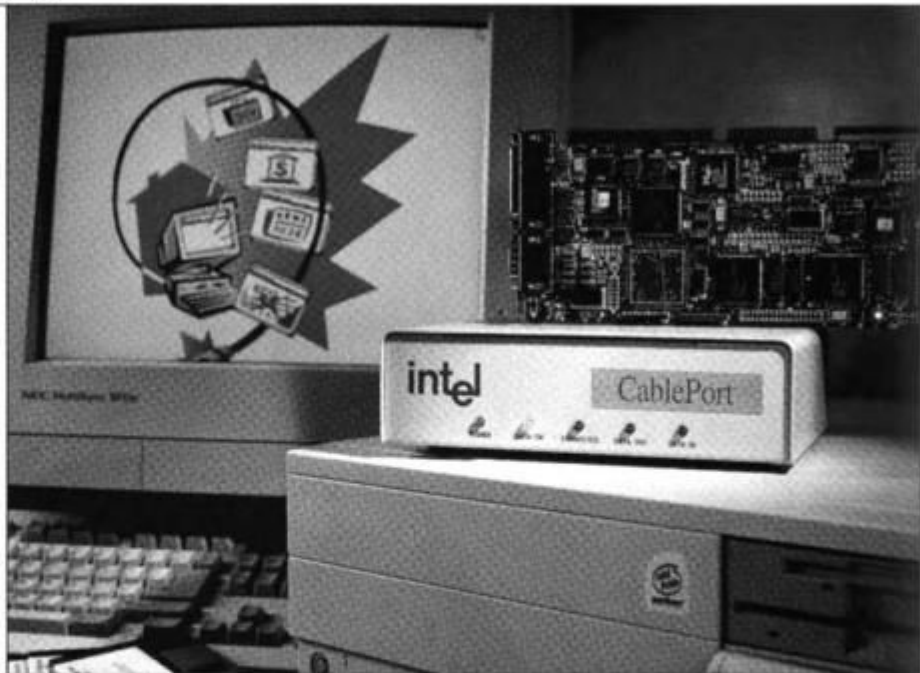
BATTLE OF THE BOXES

cable industry looks for new ways to increase its revenues, many system operators are planning to offer an alternative to phone lines for accessing the Internet and online services such as Prodigy. If a cable operator is upgrading its complete system, enabling online access requires a "relatively modest investment," says Joe Waz, vice president of external affairs for Comcast Corp., another cable company experimenting with online access. "We can be first to the market with a bigger pipe to the PC, so why not do it?"

Connecting a TV cable wire to a computer is only one among numerous scenarios for how Americans may start interacting with their television sets and television service. In the works are systems for offering movies-on-demand and other commercial transactions through high-capacity interactive networks. Another alternative is a videoconferencing system that connects the television to a telephone wire. Yet another is a new type of telephone that merges an answering machine with a television screen. Almost all of these applications require a box that connects to your television, like a current-day cable box. Until one of these ideas triumphs—or several of them do—get ready for a battle of the boxes atop your television set.

Across the country, cable operators and local telephone companies envision systems that will cross the 2-way communication of telephone networks with the one-way delivery of video over today's cable networks. Using these intelligent systems, subscribers will be able to start watching a movie they select from a menu at any time of day. While sitting on their couch, they'll be able to shop and access news and sports-information services with the push of a button.

But what type of box will sit on top of their TV sets is still unclear. The biggest splash so far has been made by the Full Service Network (FSN)



Intel's new modem connects your computer to a high-capacity coaxial cable TV system.

built by Time Warner in Orlando, Florida. Though it doesn't yet serve a large population, FSN is the first publicly demonstrated system in the United States that offers computer-based video-on-demand. Whenever they choose, subscribers can watch their choice of movies stored on a central computer, and they even have the ability to pause and scan forward or backward at any time. AT&T and Silicon Graphics, two pivotal contributors to the system, have teamed up to offer the same type of sophisti-

cated interactivity to other cable operators and telephone companies. So far, their joint venture, called Interactive Digital Solutions (IDS), has announced one other customer in the United States: Cablevision Systems Corp., a large cable operator based in Long Island, New York.

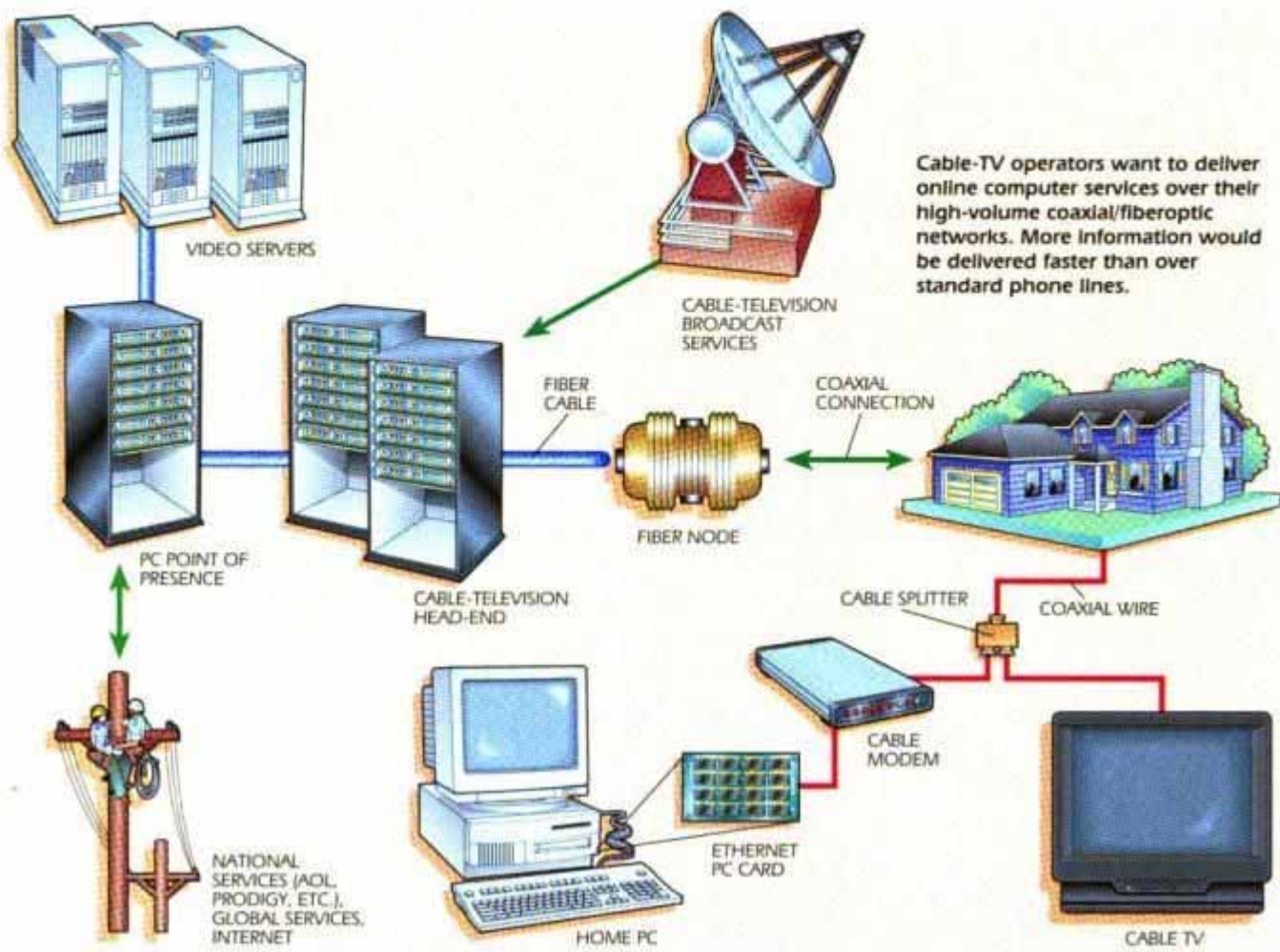
But the AT&T-Silicon Graphics team has its competitors. One alternative is ICTV, a Los Gatos, California, company working closely with—and partly owned by—IBM. ICTV is the system integrator for an interactive television



AT&T's Home Information Center lets your TV receive text messages and a variety of sports, weather and news services as well.



Wiring Computers For Cable



system being built by Cox Cable—the nation's fourth-largest operator of cable television systems—in Omaha, Nebraska. ICTV is designing a system it says will be more practical and less expensive than Time Warner's Orlando operation—where, it's believed, the first-generation set-top boxes are costing several thousand dollars apiece to build. In Orlando, digitally encoded movies are retrieved from a computer and travel in digital form all the way to a subscriber's house, where they are then converted into conventional analog signals for viewing on the living-room television. In Omaha, though, movies will be converted from digital to analog at a central signal distribution center before they travel on the network to viewers.

This system design, according to ICTV and IBM, makes for a less expensive network because in-home set-top boxes can be simpler, and expensive equipment can be shared between homes. So far, says a Cox spokesman, the system has sent video streams to fewer than five employee homes, and the company refuses to say when it will start large-scale testing.

Another alliance plugging itself as a simpler alternative to the Time Warner model is a joint venture of computer manufacturer Sun Microsystems and Thomson Consumer Electronics, maker of RCA and GE home-electronics equipment. Since



Open TV features on-screen prompts.

last fall, the companies have been promoting a standard they call Open TV—an interactive system they say could work over any telephone, cable or satellite network. At the Consumer Electronics Show in Las Vegas in January, the partners demonstrated their streamlined vision of how consumers might watch or rewind a movie they had ordered and how they could request further information

about products in the commercials they saw on television. "It's practical and affordable now," says Elliot Broadwin, vice president of marketing and sales for the Thomson-Sun alliance. For full interactivity, he says, "You don't have to wait five years."

But AT&T and Silicon Graphics don't subscribe to the idea that the interactivity they're selling is overpriced or slow to arrive. For example, IDS is working with cable products manufacturer Scientific-Atlanta to develop a less-expensive subscriber box for the Orlando system that they expect to be ready next year.

While these companies battle over the connections between televisions and high-capacity interactive networks, a different division of AT&T is introducing a product that connects people's TVs to their telephone lines.

The AT&T Home Information Center takes textual information received by telephone and displays it on a television screen. Priced at \$329 and scheduled to go on sale by midyear, the HomeCenter starts out as a digital telephone-answering machine. But it's also a data receiver. Users who

(Please turn to page 136)

ELECTRONICS



WHAT'S THE SCORE?

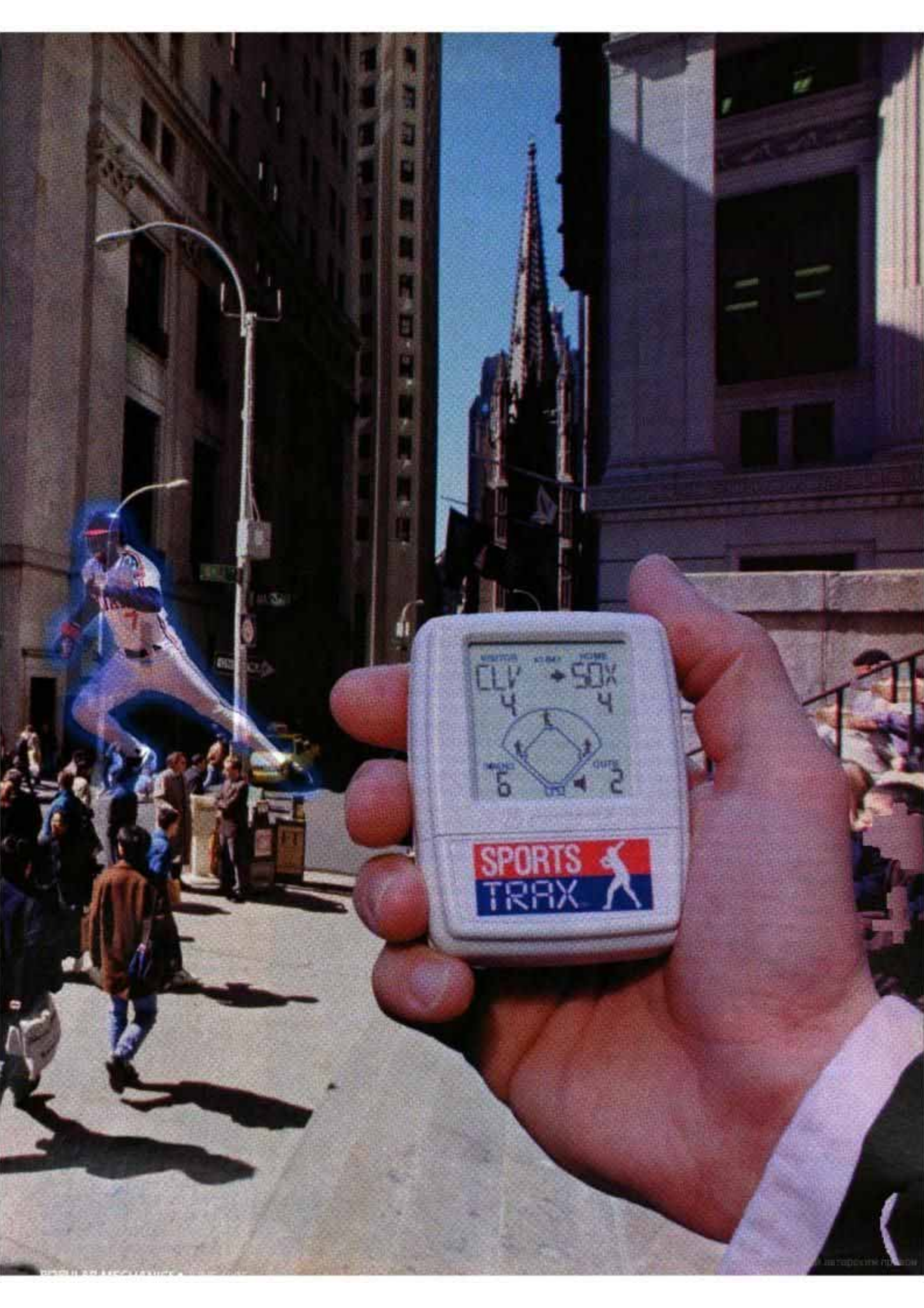
Can't get to the game? Sports pagers give you all the play-by-play action.

BY REBECCA DAY. PM Photo by Michel Tcherevkoff

● You're in Los Angeles on business, but your hometown baseball team, the Chicago White Sox, is playing in Toronto. There's little chance you'll flip on the television or radio and pick up anyone but the Dodgers or the Angels. So you settle for infrequent news updates and wait for tomorrow's newspaper box score. Or maybe you're just one of the millions of Americans who now lives far from his birthplace but still has a fondness for the old local team. But how do you keep

up with your favorite team if you're beyond the range of even the team's radio announcers?

There are a couple of ways, thanks to the pack of satellites that orbit the Earth some 22,000 miles above the equator. With satellite TV you can pick up games from all over—if you're willing to pay the premium and sit glued to your couch. Online services also provide sports summaries, but they tie you to a modem and require dialing in, signing on and searching



VISITOR AT HOME
CLV → SOX
4 4
IN OUT
6 2

SPORTS
TRAX



SportsTrax

Dedicated to baseball, the SportsTrax system works like existing pager services. Game updates are transmitted to a central processing center. The information is then formatted for SportsTrax and relayed to local areas for radio transmission. An audible alert advises you that an update is available. Elapsed time from game to pager is about 2 minutes.

PH ILLUSTRATION BY PAUL DRUMF

for information. You may be on the go, but if you're a true sports fan, you want to follow the game, the spread and the field or track conditions from the beach, the park or your desk. It's the information age, and you want it all now—wherever you are.

Motorola is banking on the idea that sports fans want round-the-clock updates on any and every game, who scored and how, injury reports and probable lineups. Employing the same satellite and paging technology used to keep you on a pocket pager, the company is now offering several ways to satisfy sports cravings in more than 230 metropolitan areas.

Motorola's EMBARC division is using what it calls the Wireless Broadcast Network (WBN) to deliver sports information either to a cassette-size pocket receiver or to a receiver that attaches to a DOS-based computer's RS-232 serial port. The pager service, called Sports-To-Go, features an abbreviated version of what's available on the more comprehensive Non-Stop Sports Service for PCs.

The sports data is generated by the same wire services that also supply game information to the broadcast industry. On-site reporters call in the action to integrators at Scorequest Inc., who type in the data, write the software code for the PC-based service and then send it by satellite to Motorola's EMBARC switching station. Here, the latest sports news is formatted for wireless

transmission. Two separate feeds are sent from the EMBARC station back to the satellite and then beamed to the pager distribution system for delivery to either the handheld pagers or the PC receivers.

The pager-like receiver offers a 4-line \times 20-character display, whose directional buttons enable you to navigate through the 6400 characters of information. According to Garry Glover, marketing manager for Motorola's EMBARC division, it takes 5 to 7 minutes to scroll through all the data, which is updated round the clock every 5 minutes.

Two services are available: the basic service called Contender and the enhanced service called MVP. Basic service includes sports headlines and news for major league baseball, NBA basketball, NFL football and NHL hockey. The Top-25 college football and basketball teams are also covered, and golf updates will be added later this year as well.

Pricing for the hardware and service is similar to standard cellular and pager service. However, the sports service is only available directly from Motorola and not through an agent, such as Cellular One. You pay \$99 for the pager, \$25 for activation and \$10 shipping and handling. If you purchase a one-year contract in advance, you pay the monthly equivalent of \$11.99 for Contender and \$39.99 for MVP. Paying by the month costs \$14.99 and \$44.99, respectively.

The DOS computer version of the service uses GameView software to present information in a full-screen easy-to-read format. By navigating through the text using PAGE UP and PAGE DOWN keys, you can quickly glance at scoreboards or upcoming schedules. Called Non-Stop Sports for PCs, the service expands what's offered with Sports-To-Go by adding pregame analysis and post-game wrapup. The three versions available—Player, Star and Legend—are basic, expanded and full-blown feature packages. Pricing ranges from \$35.97 for the basic service—with hardware, activation, three months' service, software, cable and shipping—to \$164.97 for the Legend package.

A different kind of sports pager is available from Motorola's Pan American Paging Subscriber division. Called SportsTrax, the $2\frac{1}{2} \times 3 \times 1$ -in. pager follows a baseball game batter by batter and displays game information on a small LCD. The screen shows a baseball diamond with runners, if any, on base. Teams, scores, inning and number of outs are also given, and an arrow points to the team at bat.

SportsTrax has an audible alert that keeps you in touch as the game progresses. A half-astral tone progression signals the start of the game, for example, and a chirp indicates when a side is retired. A pleasing tone announces that your team has scored,



Sports-To-Go

Designed for all-sports coverage, Sports-To-Go is actually two services—one for pagers and one for computers—that use the same infrastructure. Sports data is transmitted to a switching station and then fed via satellite for local radio transmission.

and a boo-hoo inverted-fourth tone indicates that the other team has scored. A home run sets off a siren, and a rally (your team has runners in scoring position and is less than six runs ahead) is pointed out by an electronic "Charge!" The information is updated after each batter.

Data comes from the press box via two wire services and is sent by a phone link to the newsroom. It is then relayed by satellite or phone line to Motorola's Computer Control Center in Boynton Beach, Florida, where information is extracted for individual games, formatted for the SportsTrax device and beamed by satellite to the

national paging network. The elapsed time from action to delivery of the data is about 2 minutes.

Motorola is marketing the device as a way to follow your favorite team, but you can follow every team if you want to—provided you live within the national paging network, which covers approximately 85% of the country. Once one game ends, you can reprogram the device to follow another in about 30 seconds.

SportsTrax's suggested retail price of \$199 includes three seasons of programming. After the 3-year period, you can either trade in the unit for a more advanced model, throw it away,

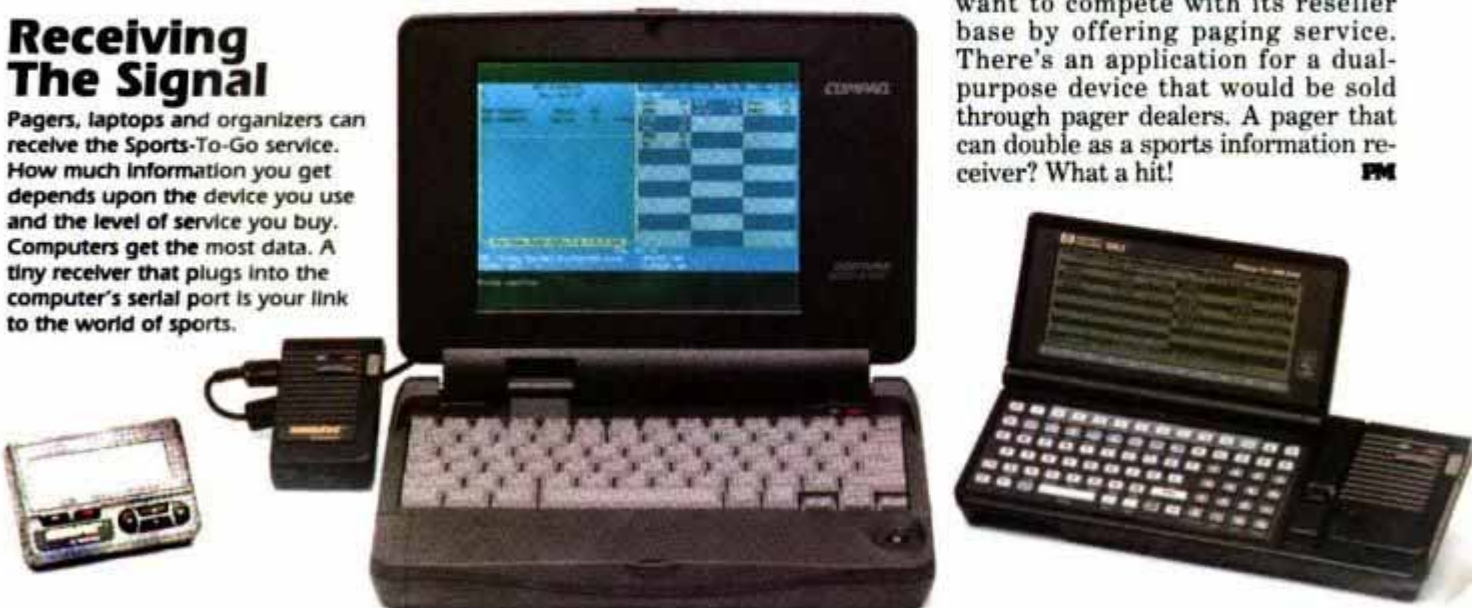
recycle it or add it to your shelf of baseball memorabilia. Motorola decided to give term limits to the pagers as an alternative to monthly or seasonal charges or activation fees. Additionally, technological improvements will make current models obsolete in a few years. Next-generation products will offer more memory, more processing power and more features.

Given Motorola's abilities, it would behoove the company to double up both paging and sports services in these new pocket sports receivers. Motorola executives say that the technology is there to do both. For now, the EMBARC division doesn't want to compete with its reseller base by offering paging service. There's an application for a dual-purpose device that would be sold through pager dealers. A pager that can double as a sports information receiver? What a hit!

FM

Receiving The Signal

Pagers, laptops and organizers can receive the Sports-To-Go service. How much information you get depends upon the device you use and the level of service you buy. Computers get the most data. A tiny receiver that plugs into the computer's serial port is your link to the world of sports.



OWNERS REPORT

INFINITI Q45

An understated but powerful statement.

BY MICHAEL LAMM, Contributing Editor; PM Photos by Bill Delaney



● When Nissan launched its Infiniti division, it dropped its big gun, the Q45 sedan, right into the heart of the fray. In its baptism by fire, the Q45 instantly squared off against such luxury stalwarts as the Cadillac STS, the BMW 5-series and the Mercedes-Benz 300-Class (now called E-Class) models and the Jaguar XJ6. And let's not forget that the new Q was also immediately compared to its equally new competitor, the Lexus LS 400.

However, based on the comments of our respondents, the upstart from Infiniti has all the mettle it needs to do just fine, thank you very much.

Potency

The typical owner in our owners survey (a male over the age of 50) paid \$46,819 for his Infiniti Q45. And the feature that this established, mature citizen liked best about his Q45 was its smooth but bodacious power.

Engine strength was voted the Q45's most-valued feature by 52.6% of our respondents. "Performance is excellent," enthused a Maryland entrepreneur, "and the overall automobile makes a quiet statement of taste and achievement." Performance generated an additional 19% of the best-liked ballots.

We at POPULAR MECHANICS magazine interpret

"power" as acceleration plus top speed, and we define "performance" as the use of power in everyday driving. Bearing that in mind, the Infiniti's No. 1 selling point—power from its 278-hp dohc V8—also caused what drivers liked least, namely the Q45's skittish behavior on wet, snowy and icy roads. Almost 18% made mention of that problem. Even with the \$1600 optional traction-control system, which 72.3% of our respondents had, there seemed to be too much power for secure handling on slippery surfaces.

But despite the Q's tendency to slip-slide through Snow Belt winters, most survey respondents thoroughly enjoyed all that acceleration. The automobile's power was judged to be excellent by 90.6% of our owners—a record in recent memory.



Agility

In 1991, the Infiniti Q45 became the first car in this country to offer an active suspension system. Though this feature is being phased out, you may still find a so-called Q45a at your dealership. The active suspension amounts to a \$6600 package on the base car. The Q45a, ordered by 35% of our respondents, also comes with a CD changer, rear antisway bar, traction control, all-



Instruments have been revised.



Interior comfort ranks high on the list.



Owners love the potent 4-cam V8.



season tires on special wheels and heated front seats.

In very basic terms, the Q45a's active suspension senses a bump electronically with little accelerometers at each of the car's four corners. A computer processes this information and then opens or closes valves in hydraulic suspension actuators at those same four corners. The active suspension's sensors, computer and valve system are able to sense and counteract body roll, yaw and pitch during cornering, braking and hard acceleration.

Infiniti now offers another interesting optional model—the Q45t or Touring package, which includes a 4-wheel steering system. Only 12.1% of our surveyees had ordered the \$3100 Touring alternatives, and there were no comments either way

SUMMARY OF INFINITI Q45 OWNERS REPORTS*

Total miles driven	873,686	Interior space	5.6	Good	30.7	Brakes	8.6
Average miles driven	7221	Suggested changes:		Average	7.1	Repair it yourself?	
Purchase price:		Brighter instrument lighting	10.0%	Poor	3.1	No	94.3%
Average	\$46,819	Greater range in power seat	8.9	Driver sightlines:		Yes	5.7
Range	\$38,500-\$54,000	Larger cup holders	8.9	Excellent	69.8%	Dealer repairs satisfactory?	
Why did you choose the Infiniti Q45?		Better handling for winter	7.8	Good	24.6	Yes	79.3%
Previous ownership	31.7%	More interior room	7.8	Average	4.8	No	20.0
Styling	28.5	More trunk space	6.7	Poor	0.8	Dealer service opinion:	
Performance	19.5	Engine power:		Excellent	64.8%	Excellent	77.1%
Price/value	14.6	Excellent	90.6%	Good	31.1	Good	15.2
Quality	14.6	Good	8.7	Average	3.3	Average	7.6
Options/Accessories:		Average	0.8	Poor	0.8	Poor	0.0
Traction control	72.3%	Poor	0.0	Workmanship opinion:		Dealer sales policy:	
Cellular telephone	53.3	Handling:		Excellent	82.7%	Excellent	72.2%
Active suspension (Q45a)	35.0	Excellent	81.1%	Good	15.7	Good	23.0
Four-wheel steering (Q45t)	12.1	Good	15.0	Average	1.6	Average	1.6
Avg. mpg:		Average	3.1	Poor	0.0	Poor	3.2
In town	20.9	Poor	0.8	Comfort opinion, front seats:		Number of vehicles owned:	
On the highway	17.0	Braking:		Excellent	79.7%	This vehicle only	13.3%
Specific likes:		Excellent	82.7%	Good	14.8	Two vehicles	42.2
Power	52.6%	Good	13.4	Average	5.5	Three vehicles	23.4
Handling	42.2	Average	2.4	Poor	0.0	Four or more	21.1
Styling	38.8	Poor	1.6	Comfort opinion, rear seats:		Principal driver:	
Comfort	32.8	Overall performance:		Excellent	62.1%	Male	70.2%
Ride quality	26.7	Excellent	86.4%	Good	29.0	Female	25.8
Quietness	19.0	Good	12.8	Average	8.1	Equal	4.0
Overall performance	19.0	Average	0.8	Poor	0.8	Age distribution of owners:	
Specific dislikes:		Poor	0.0	Mechanical trouble?		Under 29	0.8%
Handling on ice/snow	17.8%	Control layout:		No	72.9%	30-49	41.6
No complaints	13.1	Excellent	64.3%	Yes	27.1	50-plus	57.6
Trunk too small	7.5	Good	28.6	What type of trouble?		Based on your experiences, would you buy an Infiniti Q45 if you had it to do over again?	
Fuel mileage less than expected	6.5	Average	5.6	Power windows	20.0%	Yes	64.8%
Power seat height range	5.6	Poor	1.6	Misc. electrical	17.1	Maybe	26.6
Instrument lighting	5.6	Instrumentation:		Air conditioner	8.6	No	8.6
		Excellent	59.1%	Battery	8.6		

* Percentages might not equal 100% due to rounding up or insufficient data.

INFINITI Q45



Q45's styling is conservative, and strongly reminiscent of a number of other cars, from Oldsmobile to BMW. Redesign brought the chrome grille in place of a large hood badge.

EDITORS REPORT

The Other Japanese Luxury Car

● The Infiniti Q45's greatest handicap is that it was born at the same time as the Lexus LS 400. While Toyota launched its Lexus division with deliberate efficiency, Nissan seemed to flounder. The Q45 was preceded by an esoteric advertising campaign showing rocks and flowers, whereas the LS 400 hit the public's consciousness with impressive hardware. The result has been that, through no fault of the car, the Q45 has been lost in the LS 400's shadow. And that's really a shame.

As the overwhelming bulk of our survey respondents have discovered, the Infiniti Q45 is one nifty ride.

Engineered in the traditional front-engine/rear-drive configuration of European sport/luxury sedans, the Q45 is a no-nonsense road car. The V8 is strong and sweet, with nearly 300 ft.-lb. of torque available to the driver's right foot. The tautly tuned suspension pays homage to the serious chassis tuners in Munich who have elevated the BMW's suspension to an art form. The Q45's drivetrain and chassis complement each other superbly—this car simply begs to be driven. The harder you drive it, the more it rewards you and then begs for more. Unless, of course, it's wet and sloppy outside. Then, the big Infiniti—in no uncertain terms—lets you know to back off. (A problem, interestingly, that used to plague the highly regarded sedans from BMW.)

But more than the serious drivetrain and chassis, the Q45 offers an elegant and luxurious interior. The re-

cent redesign even added a touch of wood to the otherwise Teutonic passenger compartment. The seats are firm, the driver's environment efficiently and thoughtfully designed and executed. For the remainder of the car's occupants, there are all the necessary requisites—concert-hall stereo, leather upholstery, deep-freeze air conditioning—all wrapped in a solidly quiet body.

It's true that the rear seat is a bit crowded and the trunk fills pretty quickly once you start loading luggage, but these are minor warts on an otherwise impressive complexion—one that comes complete with 4-wheel disc ABS, a sunroof, a Bose stereo, memory 10-way power leather seats and a remote keyless-entry system. And you can throw in the optional active suspension, 4-wheel steering and traction control, just for kicks.

And, as our respondents noted, the dealership experience is as good as it should be. So what's wrong here?

Not much, really, except for the inevitable comparisons to the Lexus LS 400. And those comparisons are not really of equals. The Q45 was born of a different mindset than was the LS 400. And the big Infiniti accomplishes its designers' goals with the same success that the LS 400 accomplishes its different ones.

Now that Nissan has settled down into quietly marketing the Q45 to an obviously receptive public, it's finally emerging from the Lexus's admittedly long shadow.

—Don Chaikin

about the effect of 4ws on handling. Handling, however, did rank as the Q45's second-best-liked attribute, with ride quality coming in fifth, behind styling and comfort. A Vermont store manager observed, "Great road feel and response. You're really in total control." Again, 81.1% of the owners gave the Q45 a handling rating of excellent.

Just over a fourth of these Q45 owners told us they'd experienced some sort of mechanical problem, but they quickly added that their Infiniti dealers took marvelous care of them.

The Q45's main mechanical problem? The power windows. These were so tightly fitted that they moved very slowly, sometimes making squealing noises going up and down. A number of drivers commented on the Q45's extreme silence at speed, thanks partly to good body insulation and sealing. This quiet prompted a North Carolina homemaker to observe, "We don't hear air rushing past the windows and doors—an annoyance that was so common in our former cars." Overall workmanship—including paint quality, the smoothness of the exterior and interior bodies, and mechanical reliability—was judged excellent by 82.7% of our respondents.

When we asked for suggestions on how to improve the Q45, we really didn't get many. However, 10% of our surveyees said they'd appreciate brighter instrument-panel lighting. At night, the analog gauges are too dimly lit for older drivers to see comfortably—a problem that was addressed with the car's recent facelift. A few also mentioned that last year's additional seat padding cuts into headroom. On previous models, flatter seats gave greater vertical clearance—often a critical factor for taller drivers.

We also noticed a little grouching about the Q45's styling. "Design needs to be more distinctive for luxury identity, like the Mercedes or Rolls-Royce," commented a Florida doctor. And the Q45's trunk was judged by some to be a little too small. At 14.8 cu. ft., its cargo capacity is just over 1 cu. ft. smaller than the comparably sized Chevy Lumina's.

But the majority response, by far, was one of satisfaction and driving pleasure. "Powerful, fun, handles great but also rides smoothly. I don't know how they do it," exuded a South Carolina structural designer. Added a North Carolina retiree, "I've owned six BMWs and three Mercedes, but the Q45 is the best car I've ever had." And a Florida attorney may have summed up the majority opinion by saying, "You can pay more for a BMW 740i or a Mercedes S-Class, but I can't conceive of a better car. This one's just super-super!"

RM

The first and only toothbrush that fights plaque... **ULTRASONICALLY!**

Now remove plaque and fight gingivitis and gum disease the same way your dentist does - ultrasonically! Through an exclusive arrangement, The Magellan Group is pleased to bring you, *UltraSonex*®, the first and only toothbrush that uses the advanced ultrasonic technology previously available only to your dentist.



Clinical studies show that using *UltraSonex* can reduce bacterial plaque by 97%, bleeding gums by 60% and gingivitis by 28% - in just 4 weeks - and *UltraSonex* can reverse the progression of gingivitis, which can lead to periodontal disease.

Accepted by the ADA and recommended by dentists, the *UltraSonex* is not an electric toothbrush. It has no moving parts, does not vibrate and is absolutely silent. It works by emitting 1.6 million cycles per second of incredibly effective ultrasonic waves that penetrate the gum tissue to disrupt bacterial growth, which helps reduce gingivitis. No other product available for home use does this. The *UltraSonex* can also reverse the progression of gingivitis and gum disease. It is extremely gentle, yet you'll quickly notice dramatic results. Just brush normally. Shuts off automatically after 3 minutes. Recharges in its own base. Try *UltraSonex*. Then check with your dentist. You'll both be amazed at the results. \$99.95 (\$10.95) #3100. *UltraSonex* and 6 Replacement Heads (Year's Supply) \$129.95 (\$12.95) #3325.



Ultrasound penetrates deep into gum tissue.

Fresher, Healthier Air in minutes!



The *HEPA-CLEAR*™ Air Purifier with ionizer from Slant/Fin® has what it takes to be a true HEPA (High Efficiency Particulate Air) filtration system and it operates at an astonishing 99.97% efficiency, ridding the air you breathe of billions of pollutants and allergens. Literally scrubbing it clean of pollen, dust, dangerous bacteria, mold spores, animal dander, even tobacco smoke. And a system that operates at 99.97% efficiency is 166 times more effective than purifiers that claim to operate at 95% efficiency. Other systems blow purified air out of the bottom

or sides of the machine, re-contaminating it with dirt and dust, but Slant/Fin's unique patented air passageway design allows vertical discharge of the filtered air. The *HEPA-CLEAR* can significantly reduce respiratory ailments and is the only true HEPA that is compact (12" diameter x 14" high) and lightweight enough to be placed virtually anywhere - on the floor, on a table, even a file cabinet. And, it can be tucked away in a corner and still do its job. The Filter Replacement Indicator System lets you know when it's time to service the filter. Healthful negative ions (like those that super charge the air after a rain storm) enrich the air, making it fresh, pure, invigorating and odor-free. *HEPA-CLEAR* is less than half the price of larger more cumbersome models. In fact, in its price range, only Slant/Fin offers this complete HEPA filtration system. We're so sure you won't want to breathe without it that we offer a 100% money-back guarantee. Manufacturer's 2-year limited warranty. \$129.95 (\$12.95) #4280.



PATENTED AIR PASSAGWAY DESIGN

This is one powerful vacuum!



You'll be amazed with the performance of the *Oreck Power Broom*. It picks up anything and everything in its path. Dust, crumbs, broken glass, — you name it. In fact, it's got more power than any other electric broom you can buy. The *Power Broom* features a two-speed motor for customized cleaning control, a large capacity dust cup with a washable, re-usable filter and an extra-long 25-foot cord. With a self-adjusting floor tool that quickly and easily glides from floors to carpets, it goes places most regular vacuums can't, like under beds, up and down stairs and up-against walls. It makes quick pick-ups a breeze. Hangs flat and out-of-the-way in a minimal amount of space. The *Power Broom* is so well-built, it's backed by a Mfr.'s 2-yr. ltd warranty. \$69.95 (\$9.95) #3900.



Easy Open Dust Cup



Self Adjusting Floor Tool

"The Magellan Ultimate Guarantee"™ If you're not completely satisfied with your purchase, simply return it for a full refund.

ORDER TOLL-FREE 24 HOURS A DAY
800-644-8100

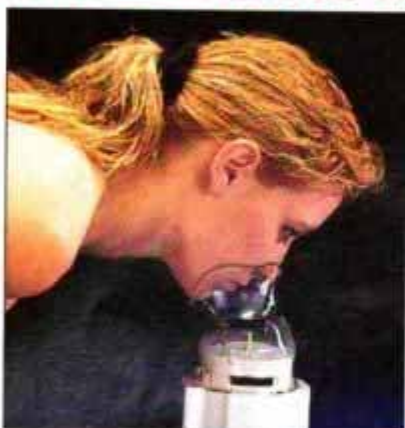
TO ORDER BY MAIL: Send check or money order for the total amount (including \$ 4 H) or credit card number and expiration date to:



The Magellan Group
Dept. PMF05
2515 East 43rd St.
P.O. Box 182236
Chattanooga, TN 37422

G55 © 1995 The Magellan Group, Inc.

Get relief from the misery!



Steam inhalation therapy has long been recommended by doctors for the relief of congestion from allergies, sinus infections, colds, asthma, bronchitis and throat irritation. Prepare yourself for the onslaught of the allergy season with the new *Steam Inhaler*. Unlike old fashioned vaporizers, this *Steam Inhaler* won't injure delicate membranes adding to your discomfort. Its unique design creates a controlled, gentle stream of steam. And the sci-

entifically designed soft hood allows air to mix with the steam allowing comfortable, natural breathing. The patented grille design lets you control the flow of steam precisely, making it safe for both adults and children. Compact and lightweight, it's easy to use at home, the office or when traveling. Fill it with only 1.5 oz. of tap water and get up to 30 minutes of steam therapy. Add your favorite over-the-counter medications if you like. Automatic dual-voltage capability for use in the U.S.A. or abroad. Comes with soft travel case. \$49.95 (\$7.95) #4040.

HOME&SHOP JOURNAL

HOME IMPROVEMENT

Storage Shed

*When there's no more room in the garage,
build this simple backyard structure.*

TEXT AND PHOTOS BY MERLE HENKENIUS

● Consider the items we now store in garden sheds. In addition to the requisite lawnmower, the selection may include a snowblower, leafblower, tiller, wheelbarrow and, of course, the usual miscellany of lawn-and-garden hand tools. The total value can easily run to several thousand dollars. With this in mind, the quality of the shed itself becomes a priority.

You do have a few options to choose from, of course. Metal shed kits have long been offered at the retail level, and site-built wood sheds are available at lumberyards and from weekend entrepreneurs.

We opted for a third alternative—constructing a shed from scratch, using conventional house-building materials and methods. With this plan, it's possible to accommodate the shed's size to your collection of tools and machinery, and even tailor the trim and siding to match your home.

Our shed is based on a 7 × 9-ft. floor frame with lapped siding.

Frankly, the do-it-yourself option will cost more than purchasing a shed—for the materials alone. But in the end, you'll have an attractive, secure building that will outlast just about everything you put in it.

Because garden sheds are considered temporary structures, they're usually not constrained by building codes. Lacking code directives, we chose a treated lumber framework for our base, set over shallow trenches filled with gravel. The gravel provides drainage away from the wood and better accommodates the pitch and heave of the seasons.

We also built our own roof trusses. Trusses are easy to build, even if you've never used a framing square or haven't mastered roof geometry. And the small ones seen here are a breeze to install, even when working alone.

Setting The Base



1 Place pressure-treated floor frame on gravel-filled 4-in.-deep trenches. Then, level the frame in both directions.

Build the shed base frame using three pressure-treated 4 × 4s and two pressure-treated 2 × 4s. For a 7 × 9-ft. shed like ours, cut the 4 × 4s to 9 ft. less 3 in. for the 2 × 4s at each end. Cut the 2 × 4s to 7 ft. long. Nail the boards to the ends of two 4 × 4s using 16d galvanized common nails to make



2 Nail 3/4-in. tongue-and-groove plywood to the floor frame. After this is completed, coat with an enamel porch paint.

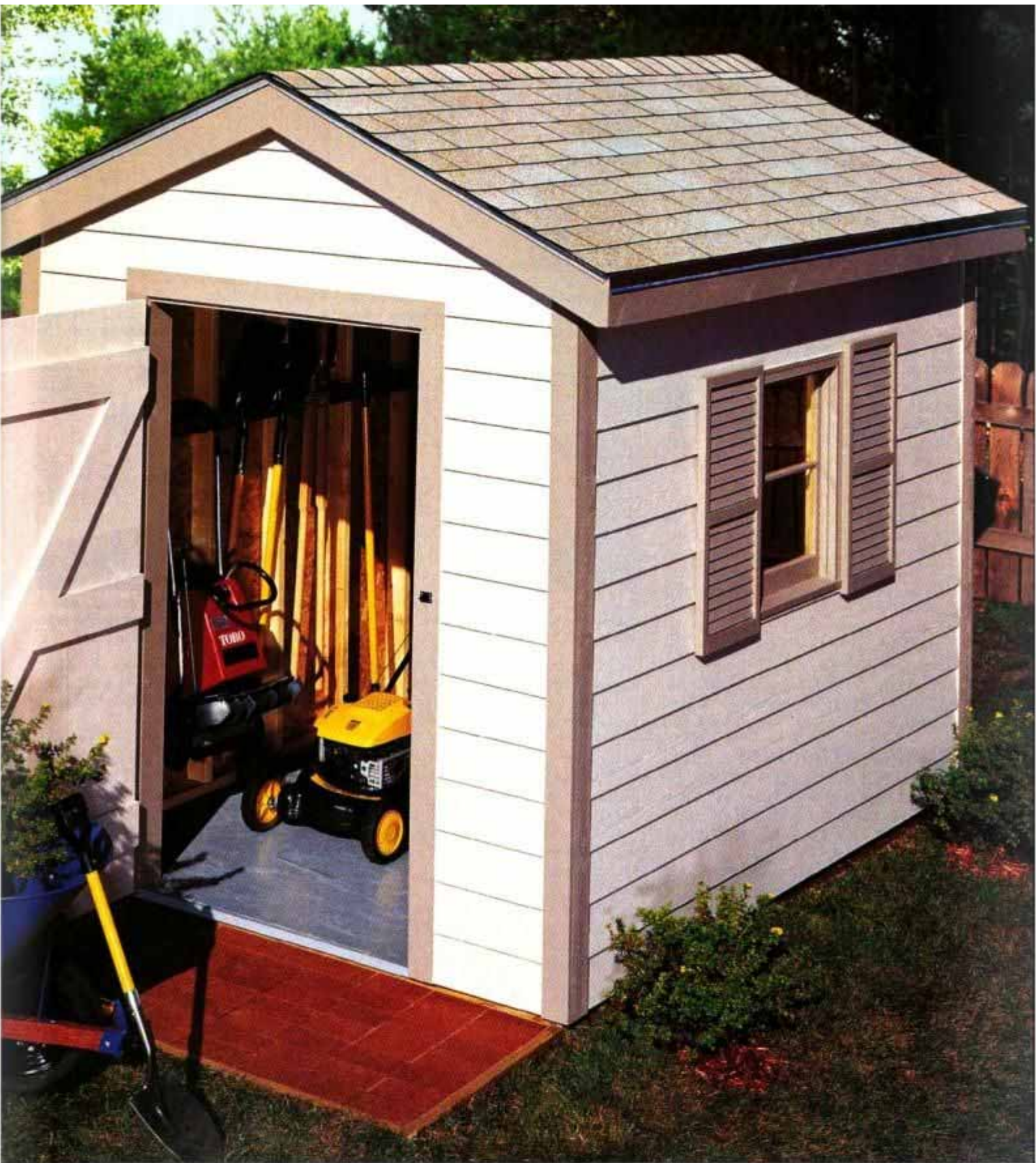
a rectangular frame. To provide extra floor support, nail the third 4 × 4 to the 2 × 4s along the frame centerline, as shown in the drawing on page 93.

With the base frame assembled, level the ground at the shed site and dig a continuous 4-in.-deep trench to match the base frame perimeter and an addi-



tional trench that's aligned with the center 4 × 4 support. Fill the trenches with gravel, set the frame in place and level it in both directions (Photo 1).

To make the floor, nail pieces of 3/4-in. tongue-and-groove plywood onto the frame. Begin by trimming the groove from the starting sheet



and nail that piece in place with 8d screw-shank galvanized nails. Using the two factory edges of the plywood, check that the framework beneath it is square, and adjust if necessary. Then, set the second piece in place, engage the tongue in the groove and nail it down (Photo 2).

Wall Construction

Cut the four 2 × 4 long-wall plates to the length of the floor. Then, mark the stud positions on the plates. Position the first stud 15¼ in. from the leading end of each plate, and each subsequent stud at 16-in. centers.

To frame a utility-sash window,

measure the width of the window, position a full-length stud on each side of the opening and cut a sill plate—to span between them—for the window to rest on. Leave the area above the window open. Cut the wall studs to 78½ in. and build the corners by nailing three studs side by side. Lay each

stud in position and nail to the plates with 16d nails (Photo 3).

Build the back wall in a similar fashion, but omit the triple studs. Place the second stud 12½ in. from the leading end of the top and bottom plates. Then, place the remaining studs on 16-in. centers.

The door opening on the front wall should be at least 36 in. wide—wider if you have a riding mower. For a 36-in.-wide opening, laminate the door header by sandwiching 39-in. 2 × 4s around a piece of ½-in. plywood. To support the header, cut two jack studs 3½ in. less than the normal stud length and nail these to full-length studs. Then frame the front wall with a centered opening, as shown. Finally, slide the header between the jack studs and the top plate and nail it from the top and sides.

Nail ½-in. plywood or waferboard sheathing over the studs, using 8d galvanized nails. On the end walls, extend the sheathing 3½ in. beyond the framing on both sides. This overhang will eventually cover the ends of the long walls.

At the window wall, cut out the sheathing over the opening and set the window in place. Nail through the trim with 10d galvanized casing nails (Photo 4). Tip up a long wall and align it with the floor. Secure it with 16d



3 Nail each stud through the plates with two 16d nails per stud. Place triple studs at the ends of both long walls.



5 Set the first wall up and nail it through the soleplate. Then, level and brace the wall with a 2 × 4 nailed to the floor.

nails. Then, plumb the wall and nail a diagonal brace to the floor (Photo 5). With the side walls up, raise the end walls between them. Nail them to the



4 After sheathing, cut window opening and use 10d galvanized casing nails to secure the window to the wall.



6 After the end walls are set up, add a second top wall plate. Overlap the wall plates at the corners and nail in place.

floor and to the side walls. Finally, nail second top plates to the existing plates, overlapping the side walls at the corners (Photo 6).

Building The Roof

First, build a jig for assembling the trusses. Cut a sheet of plywood and a 2 × 4 to match the width of the shed and nail the 2 × 4 to the plywood flush with an edge.

Measure 24 in. from each end and mark the 2 × 4. To establish a 5-in. pitch, lay a framing square on the plywood and against the edge of the 2 × 4 at the 24-in. mark. Then, mark the plywood 10 in. above the 2 × 4. Next, lay a straight 2 × 4 against the corner of the jig 2 × 4 and angle it to intersect the 10-in. mark. Butt a second 2 × 4 edge to edge against the angled 2 × 4

and nail the second piece to the plywood. Repeat from the opposite end of the jig and mark the vertical centerline on the plywood and 2 × 4s.

Cut all the pieces for the first truss to fit the space on the jig. Use the first set as a pattern for the rest. Lay the members in place, and nail the joints together with gussets that are made of ½-in. plywood (Photo 7). Use 7d nails and construction adhesive on the gussets. Place gussets on both sides of each truss, except the two end trusses.

Mark the wall top plates every 24 in. Lay the trusses upside down on the walls, and then tip up the end trusses

and align them with the top plates. Toenail these trusses in place (Photo 8).

Run a string between the rafter ends of the two end trusses, and align the remaining trusses with this string. When all are toenailed to the walls, plumb the first truss and position the rest of the trusses to match.

To create an overhang on the ends, nail doubled 2 × 4 rafters to each end truss rafter (Photo 9). Then, rip ¼-in. plywood to fit underneath the rafter ends to create a closed soffit. Finally, sheath the end walls as well as the roof and add the 1 × 6 fascia, as shown in the drawing.



7 Build a roof truss jig on a plywood platform. Then, nail and glue ½-in.-plywood gussets to the truss components.



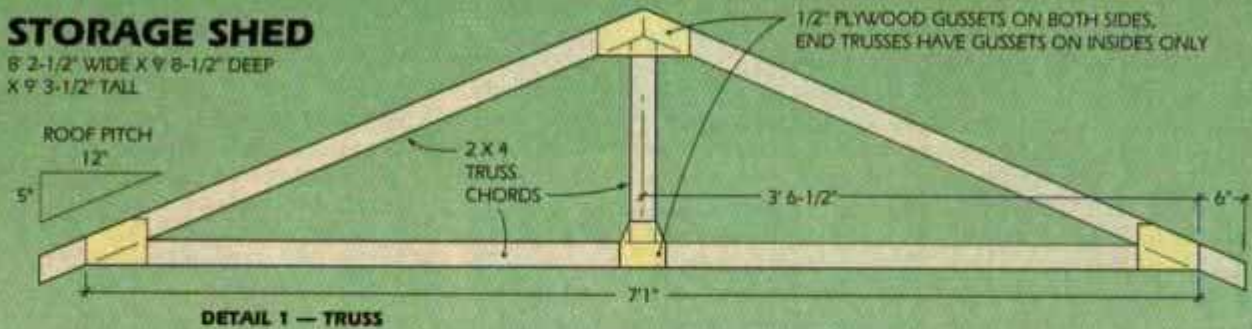
8 Lay the trusses between the walls and then tip up the end trusses. Center and toenail them to the wall top plates.



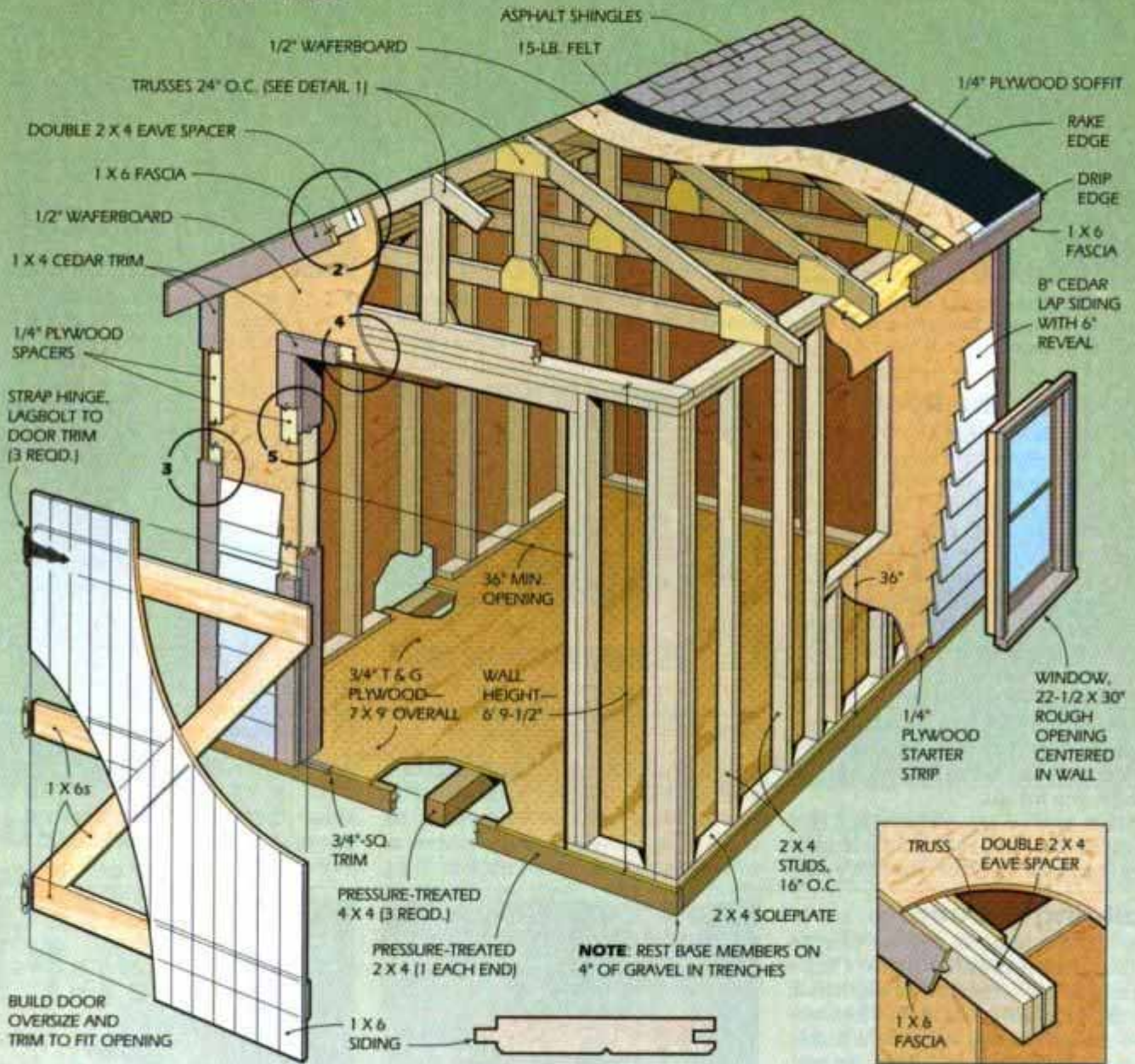
9 Create a 3-in. roof overhang at the gable ends by adding double 2 × 4 rafters to the truss rafters already in place.

STORAGE SHED

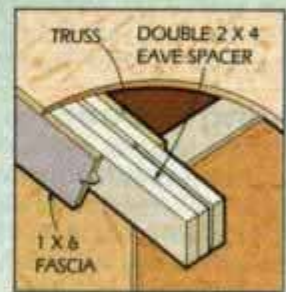
8'-2-1/2" WIDE X 9'-8-1/2" DEEP
X 9'-3-1/2" TALL



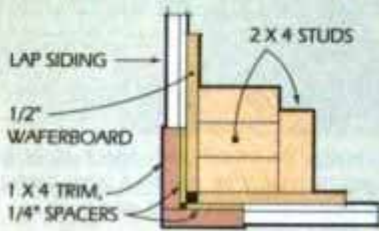
DETAIL 1 — TRUSS



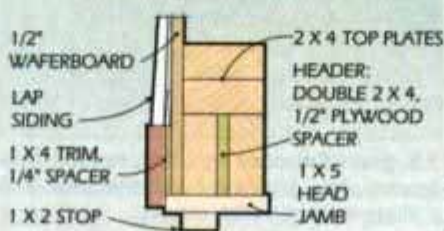
NOTE: REST BASE MEMBERS ON 4" OF GRAVEL IN TRENCHES



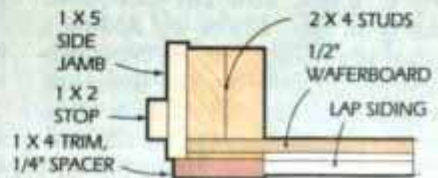
DETAIL 2 — EAVE



DETAIL 3 — CORNER



DETAIL 4 — HEAD DOORJAMB



DETAIL 5 — SIDE DOORJAMB

Siding And Trimwork

Install 1/4-in.-plywood trim spacers around the door opening and at the corners of the shed so that the 3/4-in. trim will cover the ends of the lap siding. Then, install the 1 x 5 doorjamb with the 1 x 5 doorjamb (Photo 10). Add the door face trim over the plywood, and follow with the 1 x 4 corner trim. Use 8d casing or galvanized screw-shank nails.

Nail 1/4- or 1/2-in. plywood spacer



10 Use 1 x 5 pine for the doorjamb. Align with 1/4-in. plywood face-trim shims. Place shims under the corner trim as well.

strips to the bottom of the sheathing and install the first siding row around the shed. Leave a 1/16-in. gap from where the siding abuts any trim and start the first row about 1/4 in. below the sheathing. Measure up from the starter row and mark the trim every 6 in. (Photo 11). Install the siding against these marks with 8d galvanized siding nails.

On the long walls, bring the siding



11 To keep the siding lapped uniformly, measure up from starter row and mark the spacing on the trim in 6-in. increments.

up against the eave soffit. You'll need to finish the gable ends by trimming the final rows with angle cuts to match the roof pitch. Use a framing square or the roof truss jig to lay out the angle for the gable cuts. When you've completed the siding, caulk all joints between trim and siding and between soffit and siding (Photo 12). When the caulk skins over, prime and paint the shed.



12 Caulk all siding-to-trim joints and soffit joints. Always apply sparingly and avoid smoothing it with a finger.

Shingling The Roof

Cover the sheathing with roofing felt. Then, nail galvanized rake edge along the gable ends and drip edge along the eave edges of the roof. This will prevent rainwater from seeping between the shingles and the roof sheathing.

Install a starter row by trimming the tabs from a few shingles and nail what remains over the drip edge, with the grit facing up and the factory edge down. Allow the shingle edge to extend over the drip edge by about 1/4 in. (Photo 13). Offset the starter row from the first full row of shingles by trimming 3 in. from the first starter shingle you install.

After you've put the starter row down, lay the first row of full shingles over it and nail in place. On every sub-



13 After nailing the drip edges in place, trim the tabs from the shingles and then install a starter row along the eaves.

sequent row, cut 6 in. from the first shingle. Align shingles so that the bottom of the latest row lies across the top of the tab slots of the previous row. Nail each shingle with four 3/4-in.



14 Cut the shingles into three tab-size pieces and use the tabs to cap the peak. Be sure to space each piece 5 in. apart.

galvanized roofing nails.

To cap the ridge, cut shingles into three pieces along the tabs. Then, nail the tabs along the peak at 5-in. intervals (Photo 14).

Building A Door

Assemble tongue-in-groove pine to create a rectangular panel that's slightly larger in height and width than the trimmed door opening. Then, secure two horizontal 1 x 6 battens across the boards with 1 3/4-in. coated screws. Use four screws at each junction.

Next, mark and cut the door squarely to size. Finish by adding a diagonal brace between the crossbattens to further stiffen the door and help prevent sagging. Add an additional short crossmember at the center of the hinge side to support a third hinge (Photo 15).

Attach gate hinges to the door over the battens. Position the door in the



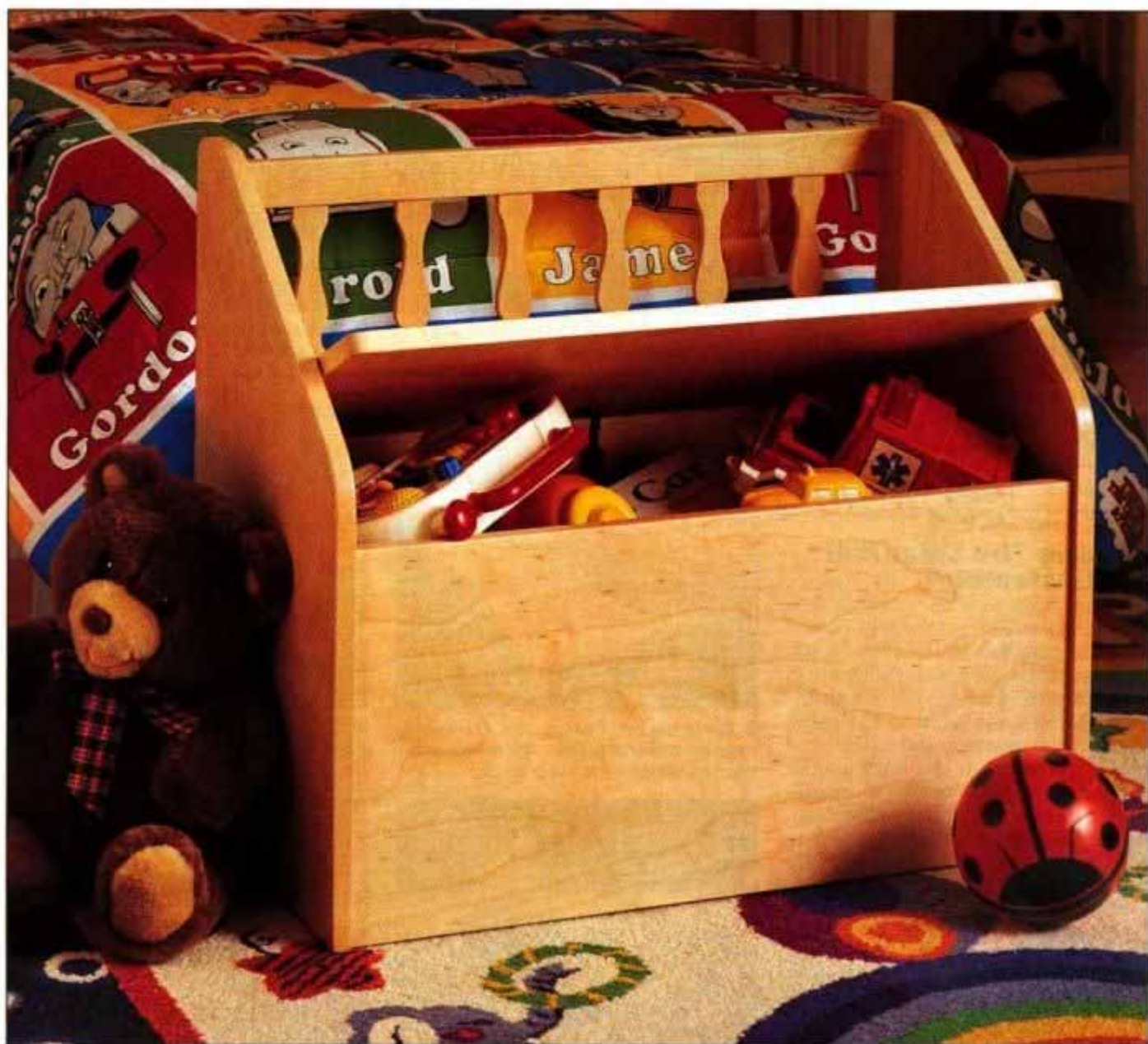
15 Build the door by using tongue-and-groove pine. Attach the crossmembers and a diagonal brace with screws.

opening and lagbolt the hinges to the door trim (Photo 16). Then, install a handle, bolt and hasp. Finally, when



16 Hang the door with three steel gate hinges. Secure it to the trim with lagbolts, then add the handle, bolt and hasp.

the door swings easily and closes squarely, nail a 1 x 2 stop to the hasp side of the doorjamb.



SHOP PROJECT

Child's Play

A toy chest for boys and girls.

BY ROSARIO CAPOTOSTO,
 Contributing Editor

● One of the great joys in life is watching a child play, especially with some of his or her favorite toys. And, one of the most persistent parent-child confrontations centers around what to do with all these toys when

playtime is over. Here's a solution—or at least part of one.

This little chest, which can hold a bunch of easily accessible toys, turns into a convenient bench when the top is closed. And the lid is controlled by a spring-tensioned support that prevents accidental slamming on little fingers.

Making The Panels

Begin construction using a smooth cutting blade. A simple way to handle the large crosscuts is to tack a strip of wood to each panel's back. The strip is sized to slide easily in the miter gauge slot (Photo 1). To make the strip slide smoothly, rub some wax on its edges.

Next, rip and crosscut maple edge banding and glue it to the panels (Photo 2). We used 3-way clamps, but you can try bar clamps or even masking tape. Note that the top edge bands

Lead photo: J.R. Rost
Step-by-step photos: Rosario Capotosto
Technical art: Eugene Thompson
Photo stylist: Gabe Herrick

of the end panels are slightly long, so they'll be sawn at an angle when the ends are cut to shape. Also, use three 19-gauge brads partially driven into each edge band to keep it from sliding. Band all the panels in this fashion—except the lid, which gets its edge bands after the chest is assembled.

After the glue dries, scrape off glue beads and plane edge bands flush to the panel surfaces.

Next, set the table saw miter gauge to 35° and



Материал: элитарный авторский проект

make the angled cuts on the end panels (Photo 3). Glue and clamp the edge bands onto the sawn surface.

We cut the panel dados and grooves with a router and a 1/2-in.-dia. straight bit. A rectangular frame is used to guide the router to make these cuts (Photo 4). Be sure that the side rails are parallel and are spaced to fit the diameter of your router base, plus the difference between the diameter of the router bit and the width of the required dado or groove. You must precisely measure the thickness of the plywood before setting the distance between the rails. (Hardwood plywood is always slightly thinner than its stated dimension.) Tack nail a movable stop across the rails to control the length of the cut, and cut each groove or dado in two passes. Then, using a chisel, cut the ends of the grooves square.

Making The Splat Rail And Assembly

Cut the splats to shape, then smooth their edges. The pieces will be too small to clamp to a bench. Instead, use a 1/16-in.-radius corner-rounding bit in the router table for the job (Photo 5).

With the dado head in the table saw, cut the groove in the top rail and the edge band on the back panel. Then cut the filler blocks to length, leaving the four end blocks 1/2 in. longer than the others. Remember to round off the rail edges before assembling the workpieces.

Use glue sparingly as you fit the splats and filler blocks in the top rail (Photo 6). When they're all in place, briefly insert the subassembly into the groove in the back panel—without glue. After the glue in the top rail has set, repeat the procedure, applying glue and spacing each block to secure the splats in the back panel. During both subassembly stages, temporarily test fit the back to the side panels to ensure later realignment.

When the back assembly is dry, complete the project in the following sequence: Insert the back panel into the groove (Photo 7). Join the bottom and front to this subassembly, then add the second end and lay the chest on its back. Next, glue and clamp the entire assembly together (Photo 8) and check it for square.

Cut the lid panel to size, glue and clamp the side bands to it and then add the front and back bands. Install the hinge and lid support, attach the standoffs and relieve any sharp corners with fine sandpaper. Finally, apply several coats of polyurethane to finish off the project. **PH**



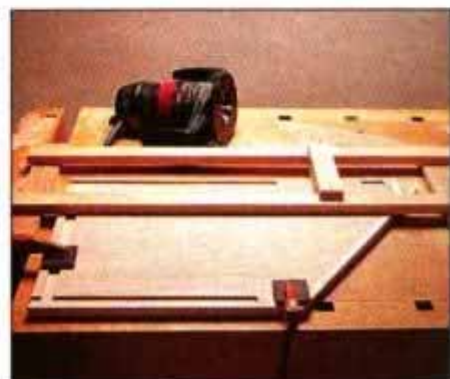
1 Tack nail a strip to the back of each panel. The strip should ride in the miter gauge groove as the panel is being cut.



2 Glue and clamp each of the edge bands to the panels. Note that the top edge band of the end panel is just slightly long.



3 Using the miter gauge, cut the sloping edge on the end panels. Afterward, apply edge banding to the sawn surface.



4 Cut grooves and dados in the end panels with a router. Then tack nail a block across the rails to stop the cut.



5 Since the splats are so small, it's best to round over their edges on a router table. A ball-bearing bit usually works best.



6 Insert the splats and spacer blocks in the top rail. After the glue has dried, repeat the procedure on the back panel.



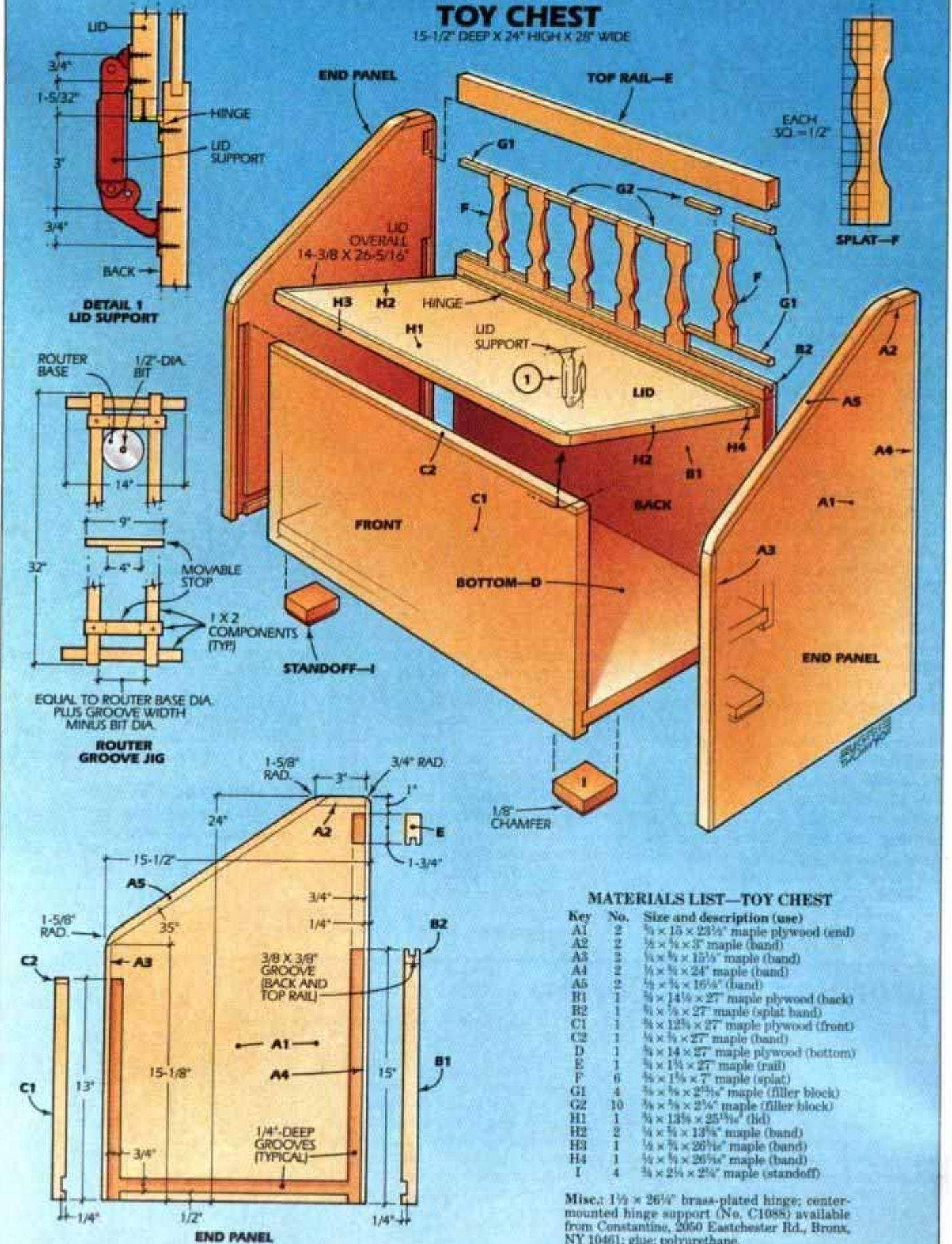
7 Begin the assembly by inserting the back into an end panel. Next, add the bottom and front, then the other end.



8 Clamp the chest using five bar or pipe clamps. Be sure to check the assembly for square before allowing the glue to set.

TOY CHEST

15-1/2" DEEP X 24" HIGH X 28" WIDE



Homeowners Clinic

BY NORMAN BECKER, P.E.
Contributing Editor

Cellar Leakage

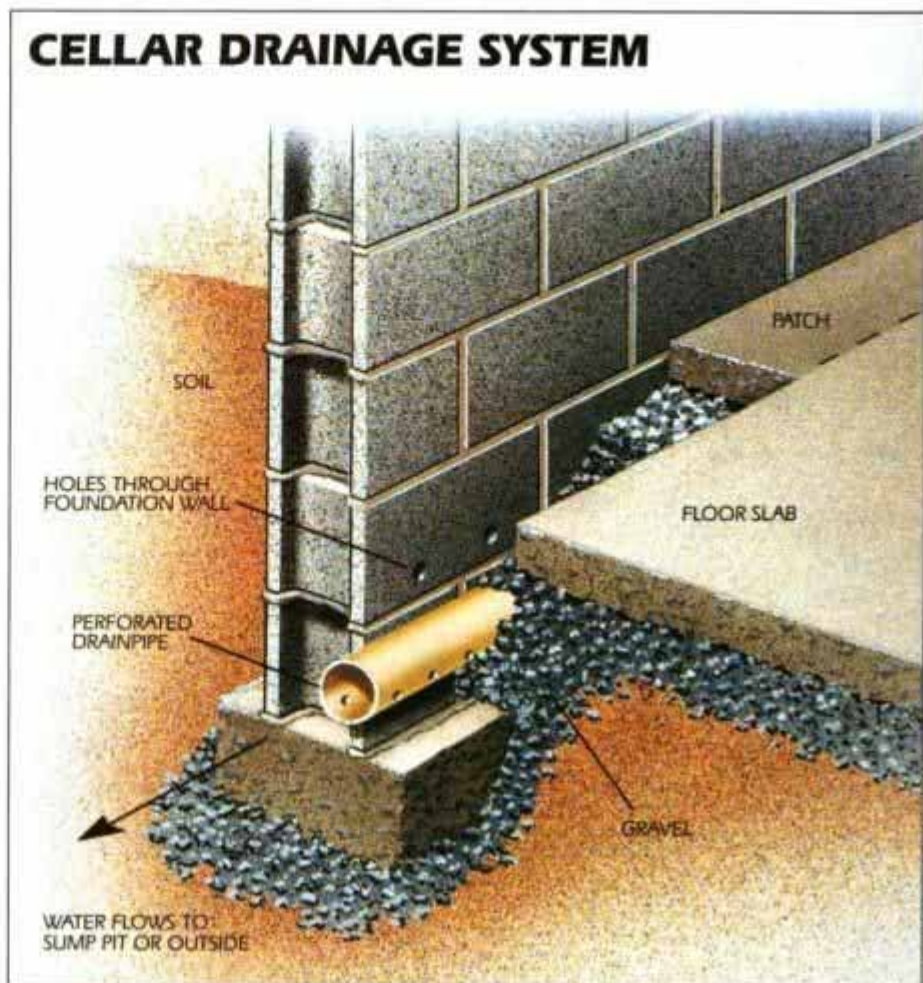
I have leakage in my cellar where the concrete-block walls meet the cellar floor. Occasionally, water will seep through the cellar floor near the block walls. I've received several quotes on waterproofing, and they all use clay or bentonite injected into the ground around the exterior of the house. Some of these companies will guarantee the work they do. Is this a good procedure to follow? I hope to avoid excavating outside the foundation. Thank you for any information you can give me.

GEORGE SCHIECK
WYOMISSING, PA

I wouldn't recommend soil injection with a "waterproofing" material as a means of coating the foundation walls to control a water-seepage condition. To the best of my knowledge, it rarely works over the long term. Unless the foundation is exposed, you wouldn't know if there's anything in the ground preventing full coverage of the wall. For instance, there may be wood debris that was buried by the builder that's now covering a portion of the wall. This debris would keep the waterproofing material from reaching the exterior foundation surface. Over the years, the wood will rot, exposing a part of the foundation wall through which water can flow. Also, if water is seeping into the house through the floor, waterproofing the walls will not correct the condition.

Since you don't want to resolve this problem by excavating on the outside, adjacent to the foundation,

CELLAR DRAINAGE SYSTEM



A cellar drainage system often consists of perforated pipe and gravel. Water drains through the foundation wall into the pipe and is then directed to a sump pit or an outside drain.

you can do it from within your cellar—provided the floor slab isn't integral with the foundation footings. It'll involve cutting 1-ft.-deep openings within the floor slab adjacent to the problem walls, puncturing holes in the bottom blocks, installing 4-in.-dia. perforated drainpipes and gravel and then pouring concrete to match the existing floor.

The drainpipe can discharge into the sump pit and be pumped out or, if the topography around the house

is sloped, the drainpipe can be pitched and run under the foundation to a low point on the exterior, which provides a free-flowing outlet.

Crawlspace Water

The crawlspace under my 6-year-old home is covered with pea gravel that has a plastic vapor barrier on top of it. Throughout most of the year, the pea gravel is damp. At other times, small areas of gravel are covered by at least an inch of

Working With Corian

● DuPont's Corian is a rocklike material made with acrylic polymer and minerals. It's sold in sheets and can substitute for ivory, granite or other substances in craft and furniture projects.

If you're interested in working with this versatile material, DuPont offers a free brochure that has concise and specific information on how to cut, shape, sand, drill and fasten Corian. And we do mean specific information. Approximately 1 1/4 pages of the 12-page guide are devoted to using adhesive. Also, you learn that although you don't need diamond-tipped tools to

cut this stuff, it's tough enough to require carbide blades and power tools with sufficient amperage. For example, the company recommends using circular saws of 10-amp or more power.

Corian is available in 1/4- and 1/2-in. thicknesses and in a variety of sizes. Since the material is available in a wide range of sizes, colors and patterns, it's difficult to give an accurate cost per square foot. For instance, one retailer said that the material costs from \$12 to \$24 per sq. ft., depending on thickness and pattern, plus \$5 shipping.

To get your brochure, write DuPont Corian, P.O. Box 80702, Wilmington, DE 19880, or call (800) 426-7426.

You can order, as well as get additional product information, by calling either of two toll-free numbers: (800) 724-4008 or (800) 321-6840.

—Roy Berendsohn

How to
work with
Corian[®]
in the home workshop

CORIAN[®]
in the home workshop



water on top of the vapor barrier.

A certified home inspector has assured me that this is not unusual for a crawlspace and that I need do nothing about it because there are no water marks on the foundation walls and the floor framing shows no signs of decay. However, several waterproofing firms insist that I need to dry up my crawlspace by installing a perimeter drain and a sump-pump system: The cost ranges from \$2500 to \$8000. What would you advise? CHARLES MASSEY INDIANAPOLIS, IN

A crawlspace should be kept relatively dry. Why? Because continuously wet conditions are conducive to decay fungi, which will cause rot. The dampness also promotes mold and mildew and is very inviting to carpenter ants and termites.

Certainly, installing a sump pump with perimeter drains will control the water condition. However, make sure that the plastic vapor barrier is properly installed before going through the expense of having a drainage system put in. The plastic ought to completely cover the gravel, even along the perimeter of the foundation. Its edges need to be sealed to the foundation and its joints should be taped. If all this is done, the vapor barrier should prevent excessive moisture in the crawlspace.

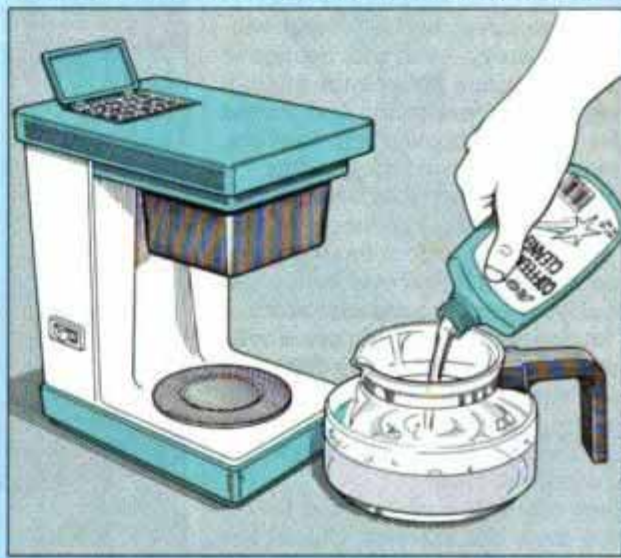
In those areas where water accumulates on top of the vapor barrier, check to see if the water is seeping through open or loose vapor-barrier joints or through the foundation wall. If water is coming through the walls, check the grade of the ground adjacent to the house, which should slope away from all sides of the foundation. Also monitor the effectiveness of gutters and downspouts. Furthermore, if the ponded water is the result of condensation dripping from the overhead cold-water pipes,

Cleaning Your Coffeemaker

● Many an automatic-drip coffeemaker has been discarded when its water flow slowed to a trickle because of calcium and mineral deposits in its plumbing. Running vinegar through the machine may help, but vinegar stinks, works slowly and isn't effective on many combinations of lime and minerals. You might want to consider regular use of a coffeemaker cleaner to remove scale. We tried Whink coffeemaker cleaner and found it effective. It contains two scale-fighters: sulfamic acid and hydroxyacetic acid. Chemist Moe Taravati, Whink's director of technical services, says the combination acts synergistically, though scientists aren't sure why the two acids are more effective together than separately. Furthermore, sulfamic acid has a higher ionization constant than the acetic acid found in vinegar. Taravati explains that the higher the constant, the more complete the formation of ions in the chemical reaction. Acids with a high constant attack scale more vigorously than those with a lower constant, even if the lower-constant acid is more concentrated (more acidic). He adds that sulfamic acid doesn't produce harmful fumes and is safe to use in appliances. A 10-ounce bottle costs about \$3 at grocery stores and at appliance-repair shops. Contact Whink, P.O. Box 230, Eldora, IA 50627, or call (800) 247-5102. —R.B.



APPLIANCE CARE TIP



you can control this problem with a dehumidifier.

If you can't maintain a tight seal in all the vapor-barrier joints and control water seepage through the foundation, you will need to install perimeter drains and a sump pump.

Tube Skylight

A while ago, I read about a new type of skylight that resembles a pipe vent

on the roof. The fixture looks a lot like recessed ceiling lights, and I recall that it acts like a periscope. Even though small, it gives more light than the conventional skylight, according to product claims. Might you tell me where I can get this item?

JANICE CAFFARY
LAKELAND, FL

The item you're referring to is called the Sola Tube. It has a curved roof-mounted reflector, a 10-in.-dia. mirrored transfer tube and a prismatic light diffuser at the bottom of the tube to spread the light evenly. Sola Tubes are available in lengths up to 10 ft. and cost about \$315 installed. To find a dealer in your area, contact Sola Tube Co., 5825 Avenida Encinas, Suite 101, Carlsbad, CA 92008; (800) 773-7652. PM

BUZZWORD ● ● ● Smart Hole

● Smart Hole is an example of a humorous term replacing a less colorful one. In this case, ventilation designers and architects sometimes say smart hole instead of fresh-air inlet or makeup-air inlet. A smart hole is a vent that allows a controlled amount of fresh air to enter a tightly sealed energy-efficient building. Why not just open a window? That's not precise enough. Structures that are very energy efficient exhaust stale

indoor air at a controlled rate and balance this with fresh outdoor air. Exhausting indoor air creates a negative pressure in a building, and a smart hole opens when it senses a pressure differential between the inside and outside. Some smart holes open in response to indoor humidity. The smart hole itself is box- or pipe-shaped, requires no electrical power to operate and has few moving parts. —R.B.

DO YOU HAVE A HOME-MAINTENANCE OR REPAIR PROBLEM?

Just ask Norman about it. Send your question to Homeowners Clinic, Popular Mechanics, 224 W. 57th St., New York, NY 10019. While letters cannot be answered individually, problems of general interest will be discussed in the column.

**HOME
 IMPROVEMENT**

**Glass
 Replacement**

*Step-by-step tips for
 painless window repair.*

BY ROSARIO CAPOTOSTO,
 Contributing Editor
 PM Illustrations by
 George Retseck

● If you've never had a broken window, don't worry—you will. Sooner or later, this minor household mishap strikes every homeowner. And, unless you've replaced broken glass before, the chore might seem intimidating.

Like many other jobs, though, repairing broken glass is simply a matter of following a few basic procedures. And, you'll find everything you need at your corner hardware store.

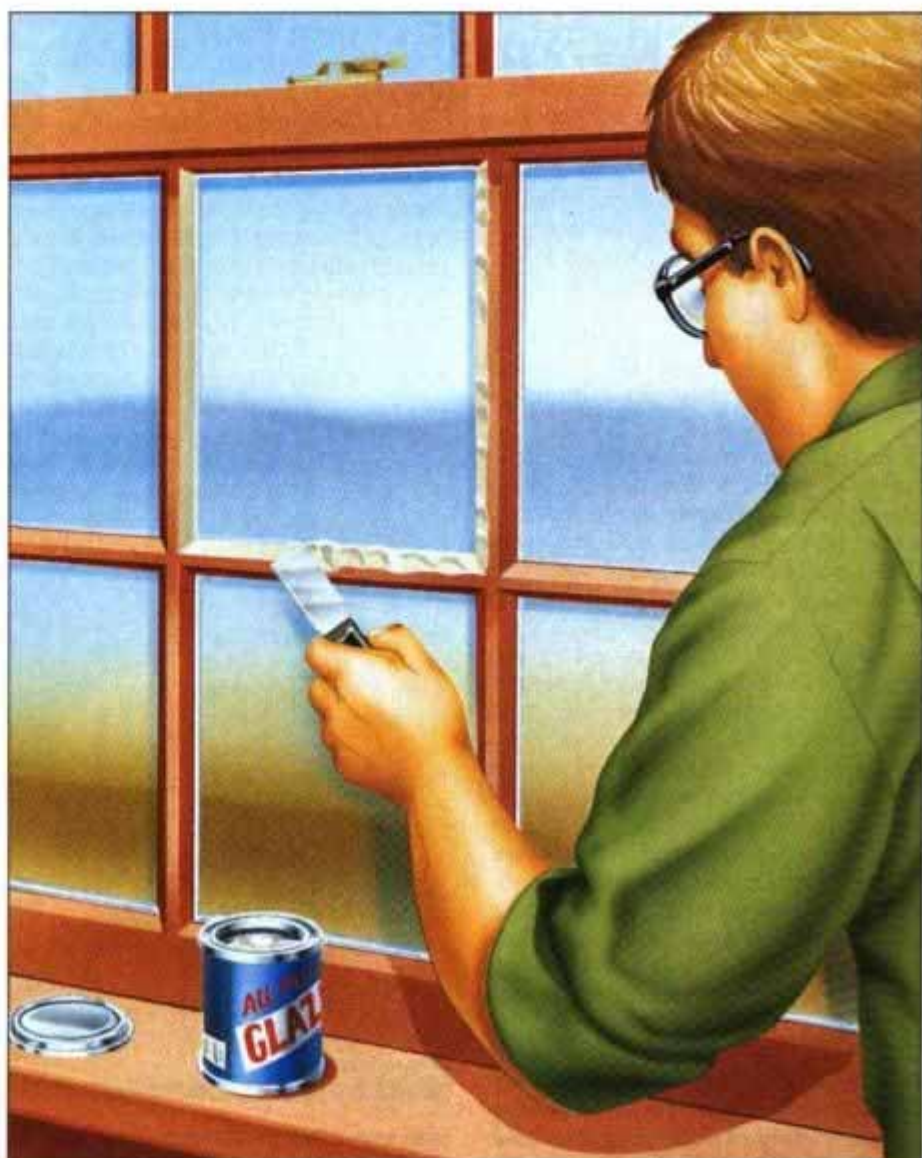
The following techniques cover most of the window types found in homes: single-glazed wood sash, insulated double-glazed wood sash and steel-casement and sliding aluminum sash windows.

Very often, the glass must be replaced from the exterior side of the window. If your job is within easy reach, you can replace the glass with the window in place. However, for hard-to-reach windows, it's safer to remove the entire sash.

**Single-Glazed
 Wood Sash**

For this, the standard window in most homes, the glass must be replaced on the exterior side.

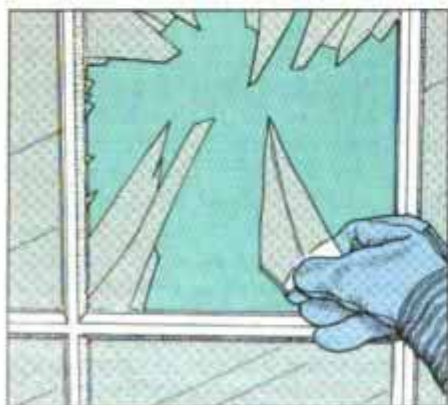
If the pane is merely cracked, start



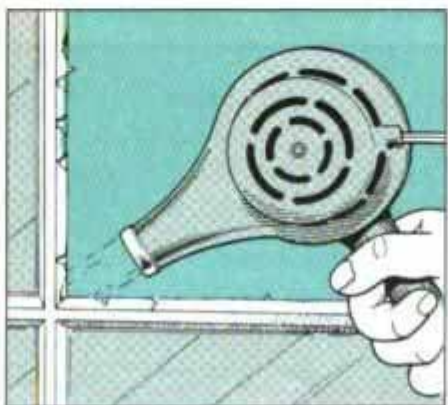
the job by removing the putty or glazing compound. But if the pane is broken, be sure to wear goggles and heavy-duty gloves and remove the shards carefully (Fig. 1). If standard putty was used, it'll probably be rock hard. Soften the putty with a heat gun set at a low temperature. Keep the

gun moving to avoid scorching the wood or cracking any of the adjacent panes (Fig. 2).

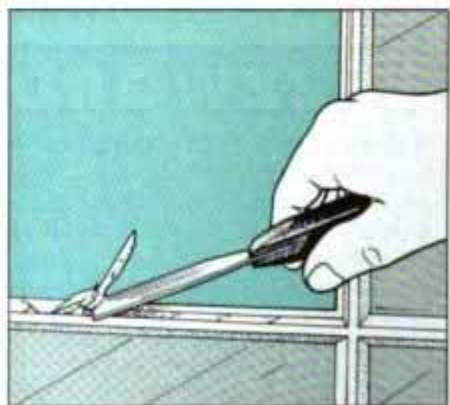
Then, remove the softened putty with a putty knife (Fig. 3). When the wood frame is relatively clean, use needle-nose pliers to pull out the old glazier's points.



1 First, remove all broken glass from the sash. Note: Wear heavy-duty work gloves and safety goggles for protection.



2 If the old putty is hard and thus difficult to remove, you can soften it by gentle heating with a hair dryer or heat gun.



3 Use a putty knife to clean out the old putty or glazing compound. Be careful to avoid cutting into the wood frame.

After the putty, points and remaining chips of glass have been removed, scrape the sash down to bare wood with a chisel held perpendicularly to the wood surface (Fig. 4).

Next, seal the bare wood with linseed oil, thinned exterior house paint or primer (Fig. 5). Allow this coat to dry completely. Then, to determine the exact size of the replacement pane, measure the opening and subtract $\frac{1}{8}$ in. from each dimension.

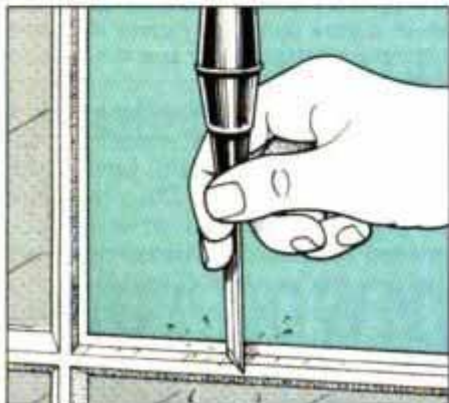
While hardware stores will usually cut glass to size, you can also do the

job yourself. First, place the glass on a firm surface padded with cardboard or newspaper. Use a felt-tipped pen to make the cutting-line marks on the glass. Then, lubricate the cutting wheel of the glasscutter with kerosene or a light spray lubricant. Align a straightedge with the cutting line. Hold the cutter between your index and middle fingers, backed by your thumb. Place the cutter wheel about $\frac{1}{8}$ in. from the far edge of the glass and draw the cutter toward you in a single, firm stroke (Fig. 6). Place a

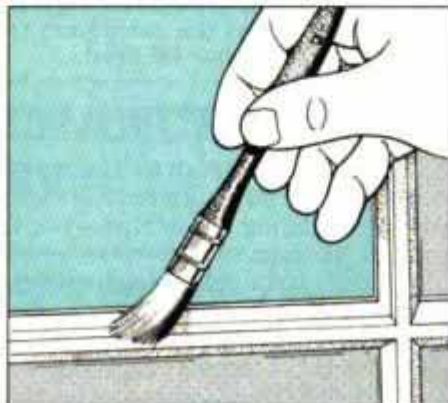
dowel under the score line and press down on the glass in order to make a clean break (Fig. 7).

Once the glass has been cut, apply a thin bead of glazing compound along the inside face of the sash rabbet to provide a cushion and seal for the glass (Fig. 8). Smooth the compound with a putty knife and press the glass firmly into the opening (Fig. 9).

Next, install glazier's points against the glass. Use two of them per side for a small window and every 6 in. for a large pane. Press the points into



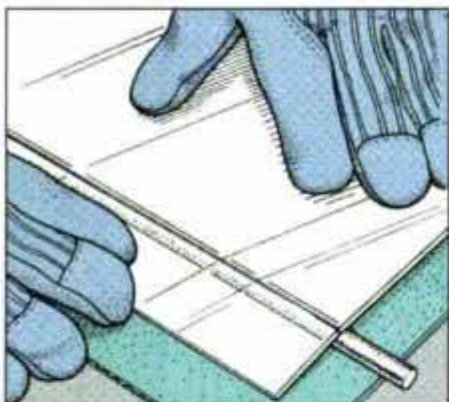
4 After the glazier's points have been removed, scrape the sash down to bare wood by using a vertically held chisel.



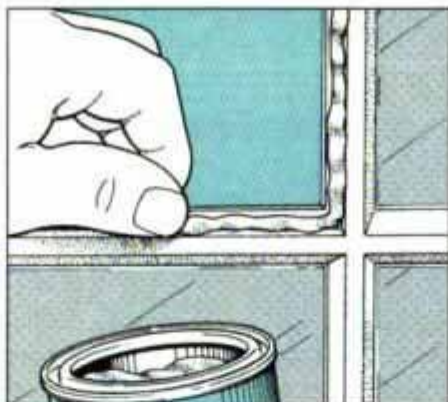
5 Coat the bare wood with linseed oil, thinned exterior house paint or primer to seal it. Then, let the sealer coat dry.



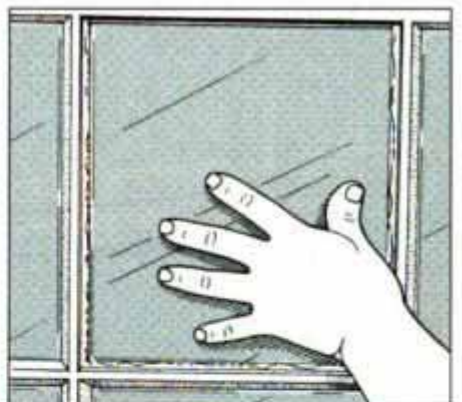
6 Use a straightedge and glasscutter to cut the glass. Lubricate the cutter wheel and score the glass with only one pass.



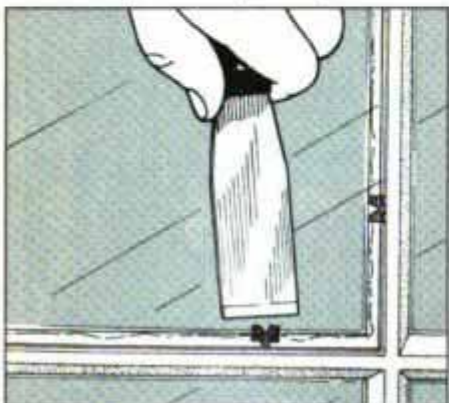
7 Place the score line over a dowel and apply pressure on both sides of the glass. This will snap the two pieces apart.



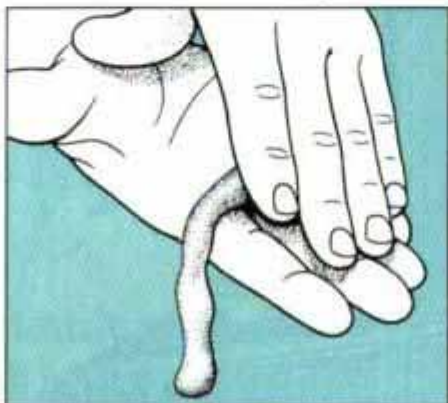
8 Lay a small bead of glazing compound around the inside face of the sash rabbet to both cushion and seal the glass.



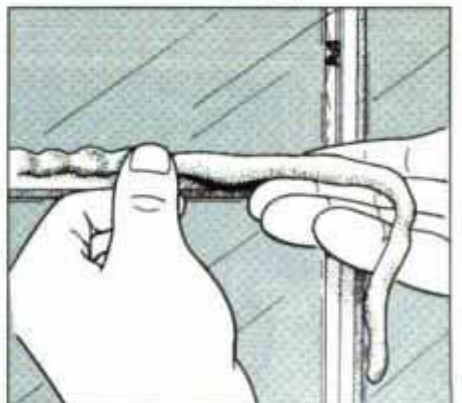
9 Place the new pane of glass in position and then press it evenly all around in order to achieve a tight, gap-free seal.



10 Using the tip of a putty knife, position the glazier's points against the glass and then press them into the wood.



11 Glazing compound is much easier to work with than putty. Shape it into a rope by rolling it between your palms.



12 Apply the rolled-out glazing compound over the glazier's points and press it firmly against both the glass and sash.

the wood with a putty knife (Fig. 10).

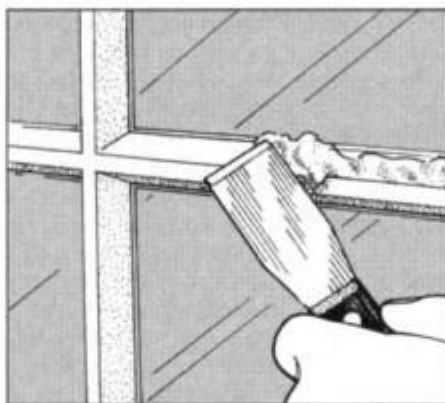
Roll some of the compound between your palms to form a rope shape approximately $\frac{3}{8}$ in. in diameter (Fig. 11). Lay the compound along the edges of the pane and press it firmly in place with your thumb (Fig. 12). Smooth the compound with a putty knife. Hold the knife at an angle and draw it along the compound to form a neat, triangular bead (Fig. 13).

Let the compound cure for about one week before painting it. Allow the paint to overlap the glass pane by about $\frac{1}{8}$ in.—this will provide a good seal between the compound and the glass (Fig. 14).

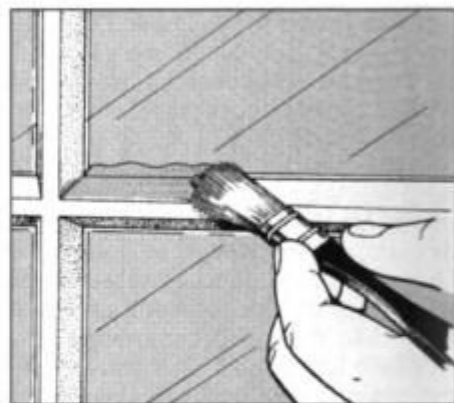
Double-Glazed Wood Sash

A double-glazed pane is typically a factory-sealed unit that consists of two panes separated by a metal spacer. If the pane is installed with compound, replace it by using the techniques described for single-glazed windows. However, the replacement double-glazed pane must be obtained from the window manufacturer.

If your window panes aren't bedded with compound, chances are they're held in place with wood strips



13 Hold the putty knife at an angle as you draw it across the compound to create a neat, triangular 45° bevel.



14 Let the compound cure for about one week before painting. Extend the paint onto the glass to further seal the joint.

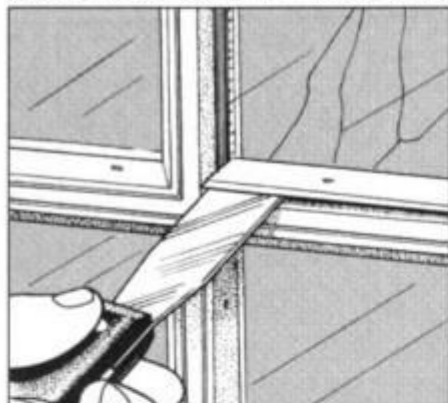
that are nailed or stapled to the inside of the sash.

Begin by prying away the wood strips with a putty knife (Fig. 15). Avoid damaging the strips—you'll want to use them again.

After the strips have been removed, use a utility knife to cut between the glass and the silicone caulk that seals the glass on the outside of the window. Have a helper stand inside to catch the glass as it falls from the sash (Fig. 16). Then, with a utility knife or chisel, scrape away the old silicone (Fig. 17).

To install a new pane, first place a $\frac{1}{4}$ -in. bead of nonlatex, nonacrylic silicone sealant around the face of the sash rabbet (Fig. 18). Push the glass in place with equal pressure all around so that the silicone squeezes out around the edges (Fig. 19).

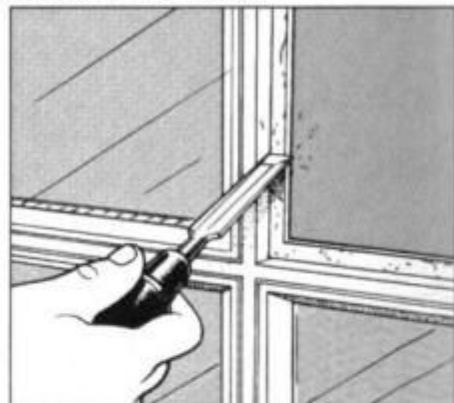
Install and nail the wood retaining strips, making sure not to nail too close to the glass. Use a piece of cardboard to protect the glass (Fig. 20). Next, trim any excess silicone with a utility knife, leaving a $\frac{1}{8}$ -in. bead around the perimeter.



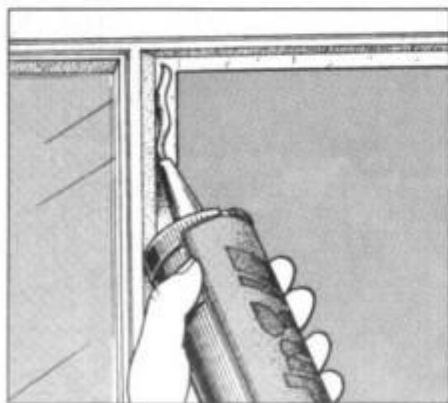
15 Use a putty knife to pry out the wood strips that hold the double pane. Be careful not to damage the wood.



16 After cutting the seal between pane and wood, press glass away from the frame. Helper inside catches the pane.



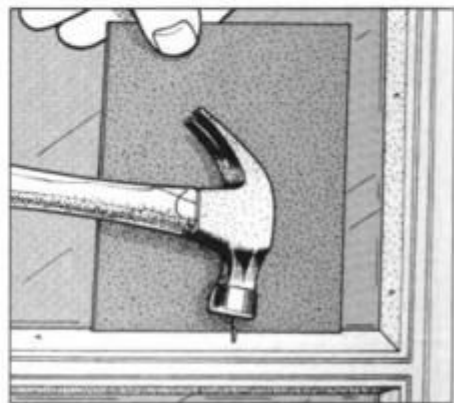
17 With a chisel, scrape any remaining sealant from the frame. Hold the tool so that it's perpendicular to the surface.



18 Begin installing the new double-glazed pane by applying a fresh bead of silicone sealant around the wood frame.



19 Press the new pane into the sash. Apply even pressure to seat it firmly and allow excess silicone to squeeze out.



20 To renail the wood strips, place cardboard against the glass for protection and then slide the hammer along.

"An ounce of prevention is worth a pound of cure"

FACT: Septic Helper works to prevent septic tank and cesspool problems and saves you \$\$\$\$!

FINALLY... SEPTIC MAINTENANCE MADE EASY

CUT DOWN: re-doing drain fields • pumpouts • wet spots • costly expenses • clogged drains • offensive odors

100%
GUARANTEED

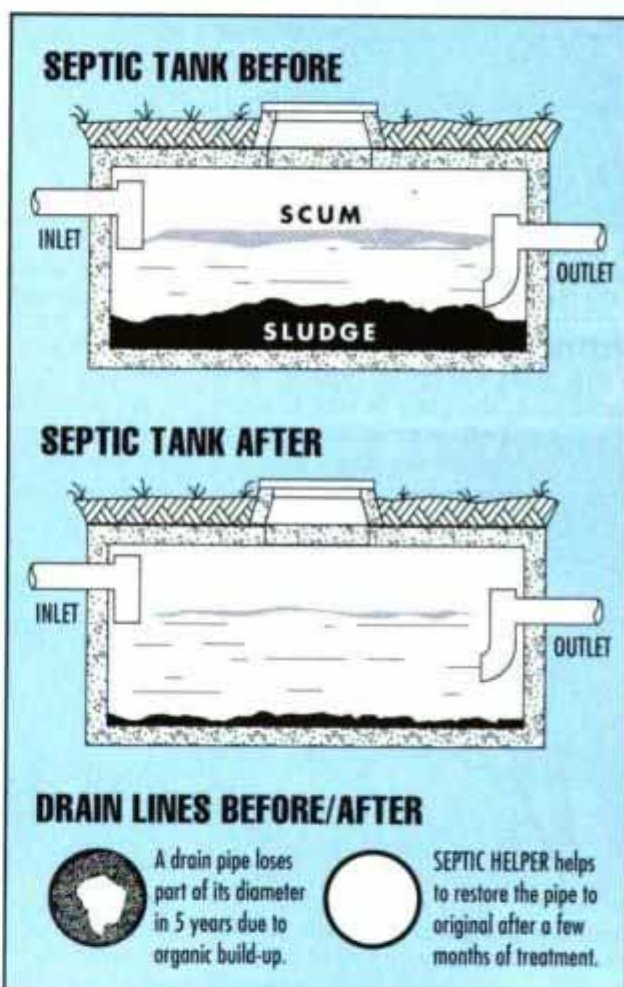
Septic Tanks/Cesspools can eventually clog up, back up and become malodorous. Slow drainage can set in and become a constant problem. Now there is a product available that will help maintain your system and also help it reach maximum efficiency. SEPTIC-HELPER goes to work in your system, activates the bacteria and begins to change organic solids into liquids. Let SEPTIC-HELPER work to keep your septic system trouble free.

A beneficial bacteria additive that is safe and easy to use

For More Information Call Toll Free
1-800-544-4074

OR Fill Out Coupon

Keep your septic tank and cesspool in great shape. Use SEPTIC HELPER!



I am interested in more information on **SEPTIC HELPER**

Name _____

Address _____

Town _____ State _____

Zip _____ Tel. (____) _____

How many septic tanks/cesspools? _____

Mail in coupon to:
Krane Products
P.O. Box 521 Larchmont, NY 10538

Steel-Case Window

If you're replacing glass of a vintage metal sash in which the pane is set in compound or putty, the procedure is the same as the one described for the single-glazed wood sash. However, instead of glazier's points, you'll find spring clips holding the pane in place.

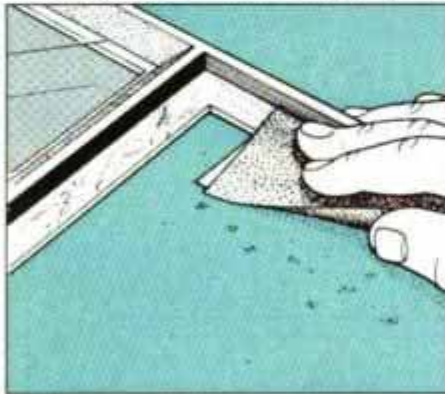
First, remove all broken glass, chip

out the putty or compound, and then carefully pull out the spring clips with a screwdriver or pliers. Use sandpaper to clean away any rust or loose paint on the frame (Fig. 21).

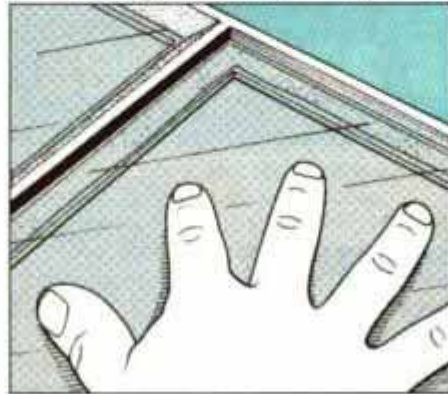
Cover bare spots with metal primer, followed by a coat of paint. When the paint is dry, lay a cushion bed of compound along the frame, then position

the new pane in place. Press the pane gently and uniformly until the compound squeezes out evenly to the edge of the frame (Fig. 22).

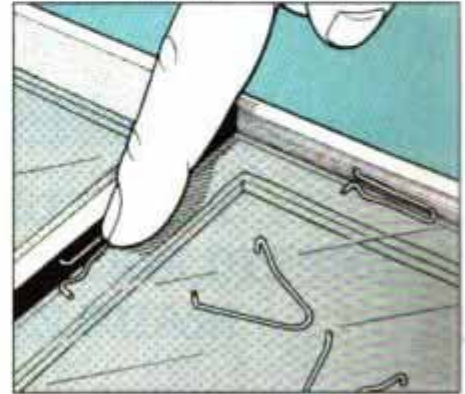
Insert spring clips into the holes in the sash to secure the glass (Fig. 23). Then, pack compound evenly around the frame and bevel it to a triangular bead with a putty knife.



21 After removing broken glass, putty and clips, use sandpaper to remove rust on the metal frame. Prime bare spots.



22 Lay a thin bead of compound around the frame and insert the glass. Press the glass firmly into the compound.



23 Insert the spring clips into holes in the sash. Then, apply and trim the compound as described for wood sashes.

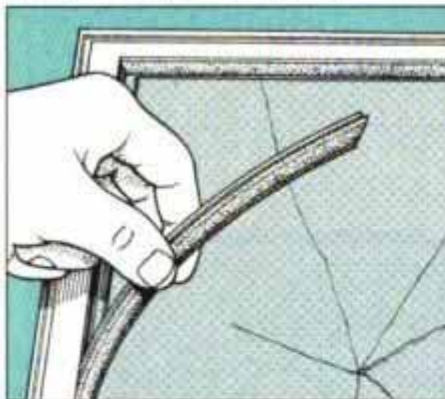
Sliding Aluminum Sash

In the most common type of aluminum sash, the glass is held in place with a bead of cement and a vinyl spline. To replace the pane, first lift

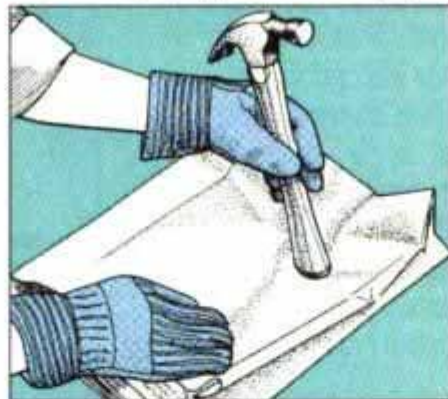
the sash out of the window frame, then pry out the spline using a knife to get a start at the corner (Fig. 24).

If the pane remains cemented to the frame, wrap some newspaper

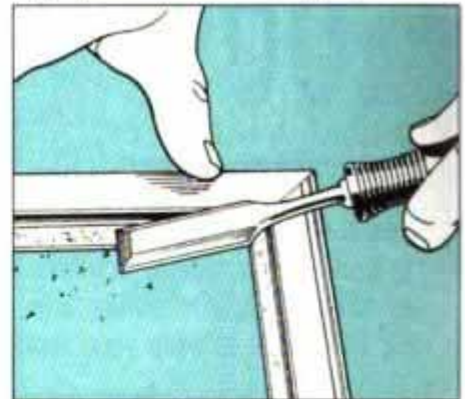
around the sash and gently tap to break the glass free (Fig. 25). Use a sharp chisel and an abrasive pad to remove all traces of cement and thoroughly clean the sash (Fig. 26).



24 Pull the vinyl sealing spline from aluminum sash. Insert a knife at one corner in order to pry up end of spline.



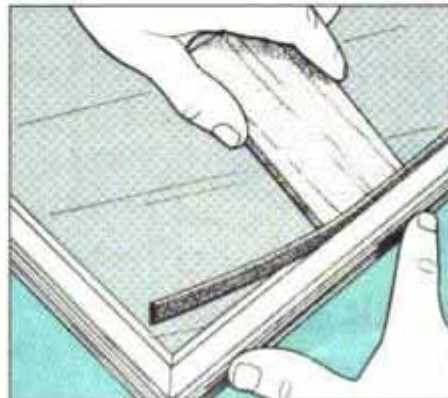
25 If the glass isn't free, wrap the sash with newspaper and gently tap around the perimeter to break the cement seal.



26 Use a chisel to scrape off any traces of the old cement. Then, finish cleaning the surface with an abrasive pad.



27 Apply a thin bead of cement around the ledge of the window frame. Then, lay the glass in place and press to seat.



28 Replace the vinyl spline by pressing with a small block of wood. Be sure to miter ends of new spline to fit corners.

Buy or cut a piece of glass that's the same thickness as the original. Cut the glass about $\frac{1}{16}$ in. less than the opening. If you need to replace brittle or damaged spline, bring a sample of it to the hardware store so that you can match the size and cross section of the new spline with the original that you removed.

Apply a thin bead of Duco household cement to the frame, then lay in the glass (Fig. 27). To replace the four spline pieces, start at one corner and press the spline in with your thumb. Then, use a $\frac{1}{4} \times 2 \times 8$ -in. strip of plywood to work the spline under the lip of the frame (Fig. 28).

NEW PRODUCTS

Fresh Paint

The latest paint and painting products.

BY ROY BERENDSOHN,
 Assistant Home Improvement Editor

Nice And Clean

Accolade interior flat enamel is an acrylic wall paint so tough and nonporous that you can completely clean any household



stain from it, claims manufacturer Pratt & Lambert. The product is suitable for painting walls, trim and doors. It provides the substance and smoothness of an enamel but without the sheen. How is this possible? Because Accolade is formulated with a high percentage of both pigment and 100% acrylic binder. It's available in 1000 colors. A gallon costs about \$32 at paint and hardware stores. For more information, write Customer Service, Pratt & Lambert Architectural Finishes, P.O. Box 22, Buffalo, NY 14240, or call (800) 289-7728.

Good Match

Geocel's Stain Match sealant is available in 24 shades to match Olympic's most popular stain colors. Not only does it stick to wood, aluminum, vinyl and masonry, but paint and stain will also adhere to it, the company says. When you're done caulking, it comes off your hands and tools with water. A 10-ounce tube costs about \$3 at hardware stores and home centers. Write Geocel Corp., P.O. Box 398, Elkhart, IN 46515.



PHOTO BY RICARDO CANO/ISTOCK

Better All The Time

Polyurethane is valued because it resists wear and water, and Minwax goes one step further by introducing one that you can wipe on with a soft cloth, thus eliminating brush marks and sags. The finish dries in 3 hours and can be applied in a single, thin coat or multiple coats to provide greater depth and protection. It's available as a gloss or satin finish in pints or quarts (about \$8 and \$11, respectively) at hardware stores and home centers. Write Minwax, 50 Chestnut Ridge Rd., Suite 201, Montvale, NJ 07645.



Scraping By

Anybody who has ever painted a house with divided-lite windows can appreciate this heavy-duty glass scraper. The sample we tested is comfortably shaped, and it has a precise smooth-sliding thumb-latch. Another feature that makes it easy to use is its offset blade, which tilts down 5°. Tipping the blade at an angle helps it lift paint better, the manufacturer says. The Delta heavy-duty glass scraper costs about \$2.50 at most hardware and paint stores and at home centers. Write Hyde Tools, 54 Eastford Rd., Southbridge, MA 01550.



Illustration: эдвардский авторский проект



Best Of Both

For years, water-borne polyurethane paints were specialty industrial products. Now, Red Devil says homeowners can have both the gloss and wear-resistance of oil-based paints in a water-based coating when they buy Duratex enamel, a water-borne polyurethane. This interior/exterior product offers high cleanability and weather resistance because it contains 20% more binder than comparable products on the market, says the company. It's available in a wide range of colors in half-pint and quart sizes. Scarlet, white and black can be purchased in gallon sizes. A half pint costs about \$4.50, a quart costs about \$11 and a gallon, \$35. It's sold at home centers and hardware stores. Write Thompson & Formby, 825 Crossover Rd., Bldg. C, Suite 240, Memphis, TN 38117, or call (800) 367-6297.



STEEL HOMES

Our Steel Framed Homes offer Lasting Value with:

- ◆ 9" (R-30) Insulation for BIG Energy Savings
- ◆ Unmatched Protection from High Wind, Fire, Termites, Heavy Snows and Earthquakes
- ◆ American-Made Steel (over 66% Recycled)
- ◆ 100 Standard Models or Custom Designs
- ◆ Straight Walls, Framing that won't Warp, Rot or Creep, Floors that won't Creak or Groan
- ◆ Open, Clearspan Interiors and much more



DISTRIBUTORS WANTED

- ◆ Join the 19-Year Industry Leader
- ◆ Homes in 50 States, 29 Countries
- ◆ Simple, Bolt-Together Construction
- ◆ Low, Refundable Investment
- ◆ No Experience Necessary with Hands-on Construction Training



Call Today to Order a **FREE Info Packet** or a **\$9.95 VIDEO**:

Call **1-800-TRI-STEEL**
1-800-874-7833 (817) 497-7070 Fax: (817) 497-7497
5402 S. STEMMONS FRWY. DENTON, TX 76205



Friend Or Faux?

Recent years have seen an explosion of interest in faux finishing methods that make painted surfaces look like marble, wood burl or other exotic materials. Zinsser introduces a glazing liquid that, it says, should help even novices achieve impressive results. The coating comes in a latex or alkyd variety. It's either mixed with latex or alkyd paint or applied by itself with a brush, sponge or rag. The material is heavy bodied and can be used on vertical surfaces because it won't run. And it sets slowly, which provides enough time to work the finish, the manufacturer says. A quart of Blend & Glaze costs about \$7. Blend & Glaze Extender, its companion product, increases the versatility and working time even further. A 22-ounce bottle costs \$5. Both are sold at paint and hardware stores as well as home centers. Write William Zinsser, 173 Belmont Dr., Somerset, NJ 08875.



An Abrasive Nature

Paint- and varnish-covered surfaces are notoriously difficult to sand because these finishes clog the sandpaper. To solve this problem, Norton offers a product consisting of aluminum oxide abrasive material bonded to a commercial-weight paper. The abrasive is specially coated to help it resist clogging,



Norton says, adding that the paper will last twice as long as conventional sandpaper in this application. A pack of five 9 x 11-in. sheets costs about \$4. To sand curved surfaces, consider Norton's hand-sanding tool. It consists of a flexible 5-in.-dia. pad on which you mount an adhesive-backed sandpaper disc. The pad and one disc cost about \$7. Both the sandpaper and disc are sold separately at home centers and hardware stores. Write to the Norton Co., 1 New Bond St., P.O. Box 15008, Worcester, MA 01615.

Hit The Deck

Okay, you've just washed and scrubbed your deck, now what? Thompson's says your next step should be to seal it with a deck finish. Its Wood Protector Deck Finish has a mildewcide, ultraviolet absorption agents and fade-resistant pigments. Apply it with a brush or roller and then clean up the tools with soap and water. The company says that by the time you've got your tools washed and put away, the finish should be dry (about 2 hours). One gallon will cover about 250 sq. ft. of smooth deck lumber or about 100 ft. of rough-sawn lumber. It can also be used on new pressure-treated lumber, redwood and cedar. One coat should provide sufficient protection, the company says, though you can use two if you think it's necessary. A gallon costs about \$17 and is sold at home centers and hardware stores. Write Thompson & Formby Inc., 825 Crossover Ln., Bldg. C, No. 240, Memphis, TN 38117, or call (800) 367-6297.



**THIS OPENER REQUIRES
VERY LITTLE MAINTENANCE.**



DITTO.

Introducing the Stanley Workhorse™ Screw Drive Garage Door Opener.

It requires no maintenance for a minimum of ten years.* Yet it's so durable and dependable that you can count on it all that time for smooth, quiet operation even in the most extreme temperatures. On top of that, we designed the Workhorse with six built-in safety features to provide you with greater peace of mind. (Which is something the opener on the left doesn't even come close to offering).

For more information, call
anytime. 1-800-Y-STANLEY

STANLEY
helps you do things right.™

*Additional lubrication may be required based on an average of 2.5 open and close cycles per day.

Carpet Insurance

Carpet and paint splatters don't mix well. You can cover your carpet with this 21-in.-wide plastic runner. It comes in a 50-ft. roll and adheres with a self-stick backing. According to 3M, it won't leave adhesive residue on the carpet. It costs \$15 at home centers.

The company expands its paint-stripper line with an extra-strength product that doesn't contain methylene chloride, yet removes tough coatings like polyurethane. The Premium Paint Stripper has low amounts of methylene chloride and is fast acting. A gallon of Extra-Strength Paint and Varnish Remover costs \$16 and the Premium Paint Stripper is \$22 at home centers. For more information, write 3M DIY, 515-3N-02, St. Paul, MN 55144, or call (800) 854-4266.



PRECISION TARGET RIFLES

Pictured here, left to right:
 Ruger No. 1-V,
 Ruger KM77 Mark II Target,
 Ruger K77/22VH 22 Hornet*,
 Ruger K77/22VMBZ
 22 Magnum, and Ruger
 K77/22VBZ Long Rifle.



Ruger's rich selection of precision rifles is unparalleled in design, quality and materials. These Ruger KM77 Mark II bolt-action rifles feature an ideal mating of dependable stainless steel actions with heavy hammer-forged stainless steel barrels precisely inletted into sturdy resin-filled laminated hardwood stocks.

The Ruger No. 1 features the time-proven falling-block action with a heavy chrome-molybdenum hammer-forged steel barrel fitted to a select, satin finish American walnut stock.

Ruger precision shooting rifles — beautiful to behold, a joy to handle, superbly accurate for all long-range target shooting.

Ruger Precision rifles are available in the following calibers: 22LR, 22 Magnum, 22 Hornet, 223, 22 PPC, 22-250, 220 Swift, 6mm Rem, 6mm PPC, 243 Win, 25-06, 308.

Suggested retail prices from \$499 to \$665. *Scope not included.

Instruction manuals for all Ruger firearms are available free upon request. Please specify model.

Sturm, Ruger, & Company, Inc.
 53 Lacey Place
 Southport, Connecticut 06490

RUGER
 Arms Makers for Responsible Sportsmen

Mighty Interesting

This is one of the most interesting paint products we've seen recently. It's a multicolored paint system that's designed to be as easy to apply as any paint. It's available in 18 multicolored blends. You take one of these blends and mix it with a clearcoat. The blended paint is suspended and dispersed in the clearcoat. Apply the coating with special rollers. The clearcoat costs about \$24 a gallon, the multicolored blends cost about \$20 each and the rollers, from \$1 to \$3. The blends and clearcoat are water based, low odor and durable enough to withstand repeated cleanings, the manufacturer says. Called the Spectura line, it's sold at paint stores. Write SPI, 400 Charter Way, North Billerica, MA 01862, or call (800) 729-7656.



Make Hanging Wallpaper Easy

Custom Building Product's idea is to take the mess out of hanging prepaste wall coverings. To accomplish this, it introduced the Wallpaper Pal, a \$25 device sold at home centers. Step one: Insert the roll of wallpaper in the device. Step two: Feed the covering through the dispenser. As the paper is pulled through, a cartridge in the dispenser spreads an activator adhesive in a side-to-side motion, eliminating dry spots or adhesive globs. Step three: Cut the covering to length, and apply it. Each Wallpaper Pal can apply adhesive to four to five bolts of wall covering. A smaller version, the Border Buddy (\$15), is also available for hanging wallpaper border. Replacement cartridges cost \$5. For more information, write Custom Building Products, 13001 Seal Beach Blvd., Seal Beach, CA 90740.



Multiple Use

This unusual tool snaps to the rim of a paint can and serves as a wipe-off edge as well as a brush rest. But its versatility doesn't stop there. Take it off the can and use it to scrape excess paint from a roller or to press masking tape against wood trim. Called the Brush Buddy, it costs about \$2.50 through home-product catalogs or from Sugrue Products, 4401 Ravenswood, Third Floor, Chicago, IL 60640.



PHOTO BY ROSARIO CAROTI/STO



Black Out

Before you get out the squeegee and coal tar to seal your driveway, consider this product—an acrylic latex asphalt sealer that cleans up with soap and water and is thin enough to be applied with a garden sprayer, says its manufacturer. The company claims that 1 gallon will cover 300 sq. ft. of asphalt in good condition and somewhat less if the pavement is in poor shape. A 1-gallon container costs about \$14 and a 2½-gallon container, \$29. It's sold at hardware stores and home centers. Write Bossworks, 4510 W. 77th St., Suite 329, Minneapolis, MN 55435, or call (800) 933-8043.

Is Your Water Safe?

FACT: 43% of all public water systems violate federal health standards. (Natural Resources Defense Council)

FACT: 560,000 American children suffer learning disabilities due to lead in drinking water. (U.S. E.P.A.)

FACT: 680,000 adult males have high blood pressure due to excessive levels of lead in drinking water. (U.S. E.P.A.)

FACT: Drinking chlorinated water may as much as double the risk of certain cancers. (National Cancer Institute)

Safe drinking water is essential to your family's health.



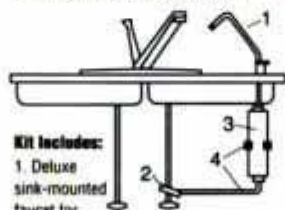
Water



Doc+or



Complete Kit for easy do-it-yourself installation



Kit includes:

1. Deluxe sink-mounted faucet for filtered water.
2. Self-tapping connector to cold water line.
3. 1 yr. guaranteed filter cartridge.
4. Mounting bracket and water line.

The Water Doctor In-Home Treatment System gives you bottled water quality at a fraction of the cost.

- Reduces unhealthy contaminants like lead and chlorine.
- Laboratory tested and certified*
- Easy Installation
- 1 Year Warranty on filter cartridge

* Leading Independent Laboratory tested effective for over 2000 gallons.

Thousands sold retail for \$119.⁹⁵
Buy Factory Direct and Save!

Complete Kit \$69.⁹⁵ + \$6.⁵⁵ shipping and handling
7 Day Delivery Guaranteed

Unconditional Money Back Guarantee

Mention this ad and receive **50% off coupons for first 3 replacement cartridges.** (Regularly 40" each, only 20" with coupon)



To order call 1-800-360-7417 or send check or Money Order to:
American Health Solutions, 801 West Freeway, Suite 715, Grand Prairie, TX 75051



A Rapid Clip

The next time you have to repair a big hole in a drywall surface, consider these clips. Here's how they work: Cut the hole into a square and place one clip on each side. Drive a drywall screw into each clip and cut a piece of drywall to fit the cavity. Screw the drywall to the clips, then snap off the piece of the clips that projects on the outside. Apply tape and taping compound. A package of six clips costs \$3 at home centers and other building-supply houses. For more information, write USG Corp., P.O. Box 6721, Chicago, IL 60680.

THE ULTIMATE HOME SHARPENING SYSTEM

Introducing Ultrasharp™ by Plasplugs. The modular sharpening system. Simply slide modules onto the powerful motor unit and sharpen chisels and plane blades - knives and scissors - high speed and masonry drill bits. The heart of the UltraSharp is the powerful motor unit. Complete with 1 3/4" aluminium oxide grinding wheel, its smooth-running induction motor runs at 2400 rpm.



1 FOR CHISELS AND PLANES

- Regrinds chisels and plane blades up to 2" wide
- Adjustable grinding angle



Powerful integral magnet helps keep blade secured

Adjustable angle from 20° - 70°

Positive latching action secures module on motor unit

2 FOR KNIVES AND SCISSORS

- Sharpens straight-edged knives
- Sharpens straight-edged scissors



Unique top guide for sharpening knives

Precisely angled slot for sharpening scissors

3 FOR HIGH SPEED STEEL DRILL BITS

- Sharpens drill bits from 1/16" to 3/16"
- Even sharpens broken drills



Dial up the size of drill bit

Unique double action "backs off" the drill flutes for a perfect finish

4 FOR MASONRY DRILL BITS

- Resharpen tungsten carbide masonry drills
- For regular or hammer action
- 80 grit Silicon carbide grinding wheel included



Takes masonry drill bits up to 1/2" diameter

Flip over bridge used for finishing off hammer-action bits



Drop Zone

Has this ever happened to you? The dropcloth moves away from the wall or trim and, oops, there goes your nice clean paint job. Daubert's solution is a 5-mil-thick poly dropcloth with a pretaped edge that comes wrapped around a cardboard core. Simply unwrap it and press it in place. The company says it's sticky enough to hold securely but, if necessary, can be peeled back and reapplied to position it just right. It comes in four sizes. A medium-size 24-in.-wide x 100-ft.-long dropcloth costs \$6.25 at paint stores, home centers and hardware stores. Write Daubert Coated Products, 1 Westbrook Corporate Center, Westchester, IL 60154.

Wipe Out

This waterless hand-cleaning towel is said to wipe oil and latex paint from your hands without leaving a residue. After you're done with the wiper, use it to wipe paint off tool handles. It consists of a perforated plastic-fiber sheet with abrasive fibers bonded to it. It's impregnated with liquid hand cleaner that contains an antibacterial agent. The towels also remove asphalt, grease, ink, wax and grass stains, according to the manufacturer. A bucket of 30 towels costs \$13 at automotive supply stores. To locate a distributor in your area, write Dymon, 3401 Kansas Ave., Kansas City, KS 66106.



PLASPLUGS 780 Vassar Avenue, Lakewood, NJ, 08701. Tel: (800) 966 6400

Ultra Sharp™

AN EXPERT IN EVERY BOX

The UltraSharp 4-Module starter pack is available from Home Centers, Department Stores and good Hardware outlets. Made in the USA by Plasplugs

FREE!



Included in every 4-Module starter pack. This comprehensive videotape shows you exactly how to get the best from your UltraSharp system. Covering setting up, safe operation and the correct use of every UltraSharp module. It's an invaluable guide for the novice and experienced do-it-yourselfer alike.

CALL NOW FOR YOUR FREE ULTRASHARP PREVIEW VIDEO

(800) 966 6400

A Place For Everything

Keeping tools accessible as you work on a ladder can be a problem, especially when you try to do repair and paint work at the same time. The Tool/Paint Docker gives you plenty of space to put your tools so you won't get worn out going up and down the ladder. The 12½-in.-wide x 16-in.-long tray is molded of rigid plastic and will hold up to 24 pounds of gear and paint. It is easily installed on the side of a folding step or extension ladder, using the bolt-on wingnut bracket that's included. It costs about \$11 at hardware stores and home centers. Write Better Tools Inc., 206 River Ridge Circle, Burnsville, MN 55337, or call (800) 798-6657.



Construction Ahead

If this summer finds you with a big construction or remodeling job, maybe you should consider contractor-size tools. Powered by four C batteries, the Wagner PowRCaulk 720 can apply caulk or construction adhesive at a rate of 25 ft. per minute at high speed and 12 fpm at low speed. The gun has an automatic reverse feature to prevent excess flow when you stop caulking. The gun will pump 30 10½-ounce tubes of caulk before it needs new batteries, the company says. It costs about \$50. If you've got a paint job on the same scale, you might consider Wagner's ¾-hp airless sprayer, which can apply ½ gallon of paint per minute. The \$700 tool comes with 25 ft. of ¼-in.-dia. hose. Both are sold at home centers. Contact Wagner Spray Tech Corp., P.O. Box 9362, Minneapolis, MN 55440, or call (800) 328-8251. **FM**

NOW AVAILABLE!

**Popular Mechanics
Editorial Indexes
from 1976 to 1994**



Are you searching for a particular Popular Mechanics article? Let our yearly indexes make it easier to find. Every article published in the magazine is referenced here—automotive, boating, electronics, home improvement, outdoors, photography, science and more. Thousands of entries cross-referenced. All years available from 1976 on. Price for each index is \$4.95, plus \$1.95 for postage and handling. Order by year.

The following years are available:

1976	1983	1990
1977	1984	1991
1978	1985	1992
1979	1986	1993
1980	1987	1994
1981	1988	
1982	1989	

Send to:
Popular Mechanics
Reader Information Services Dept.
224 West 57th Street
New York, NY 10019

Please make check or money order payable to Popular Mechanics. Be sure to include your name and address.

**Turn your
PC into a
powerful
labeling tool.**

Expand the usefulness of your PC for the home office and for the whole family!

Now you can easily create and output great-looking labels for every purpose: To organize things around the kitchen, the shop, the playroom and the office. DOS and Windows compatibility means you can print from stored lists and POSTNET barcoded addresses and create custom labels using all the fonts and graphics your PC can hold! Come and learn more about Smith Corona's remarkable "label enablers" today!



The Smith Corona PC Label Printers

Available in 1.0 & 2.0 models

**SMITH
CORONA®**

Now Available at
**Office Depot.
and OfficeMax®**

For more information write to:
Smith Corona, Dept. PM, 65 Locust Ave., New Canaan CT 06840

HOW TO PROTECT YOUR FOUNDATION



Working on construction sites or simply puttering around the house, your feet are your foundation. If they hurt, your work suffers. So protect your feet with Georgia Workboots, the only footwear with our exclusive combination of Suspension System® and patent-pending Comfort Core® technologies. The Suspension System outsole works like dozens



of tiny shock-absorbing pads, moving independently to reduce bruises while you work.

The Comfort Core insole cushions your feet with air-circulating inserts that make staying on your feet a breeze. The story about how we spent years developing the most comfortable workboots is now in a free brochure. Send for your copy. **Just call 1-800-251-3388, ask for Advertising and get the name of the Georgia Boot retailer nearest you.**



Georgia Boot®

Available this summer wherever you buy workboots. Материал, защищенный авторским правом

CAR CARE

CAR CLINIC

BY MIKE ALLEN,
Associate Automotive Editor

Double Reverse

How do I find a brake line that will fit on a dune buggy I bought? I need one that has a different fitting on one end than the other, and the guys at the auto parts store all look at me like I'm from Neptune. They've never seen one. They tried to sell me an adapter, but it means using two separate brake lines connected by the adapter.

JOHN THOMAS
TOLTEC, AZ

Your dune buggy probably uses an American-style reverse flare on the master cylinder end to match an aftermarket master cylinder. The other end is undoubtedly a metric bubble flare to match the stock VW brakes.

The first step is to rent or buy a flaring tool. Also get a metric brake line more than twice the length you'll need—you'll cut it in half and have a spare. I recommend practicing a couple of times on short pieces of scrap before trying this on the real thing. You'll also need to salvage the old American line's steel fitting, or you could buy a short American line and use one of the new fittings.

Cut the new metric line to length. A tubing cutter is preferred, but a hacksaw will work if you leave a clean cut. First, slide the fitting over the line (making sure you slide it on the right way). Now, clamp the line into the flaring tool. Carefully flare the end of the line.

Loosen the line in the tool and push it up. Using the extra reverse-flare die, invert the flare on the end of the line so the metal flares back in. Now, remove the extra die and flare again, doubling the thickness of the metal at the end of the line.

Feeling Flush

I just bought a used motorhome. As I was tuning it up last weekend, I inadvertently added about 2 ounces of brake fluid to what I thought was

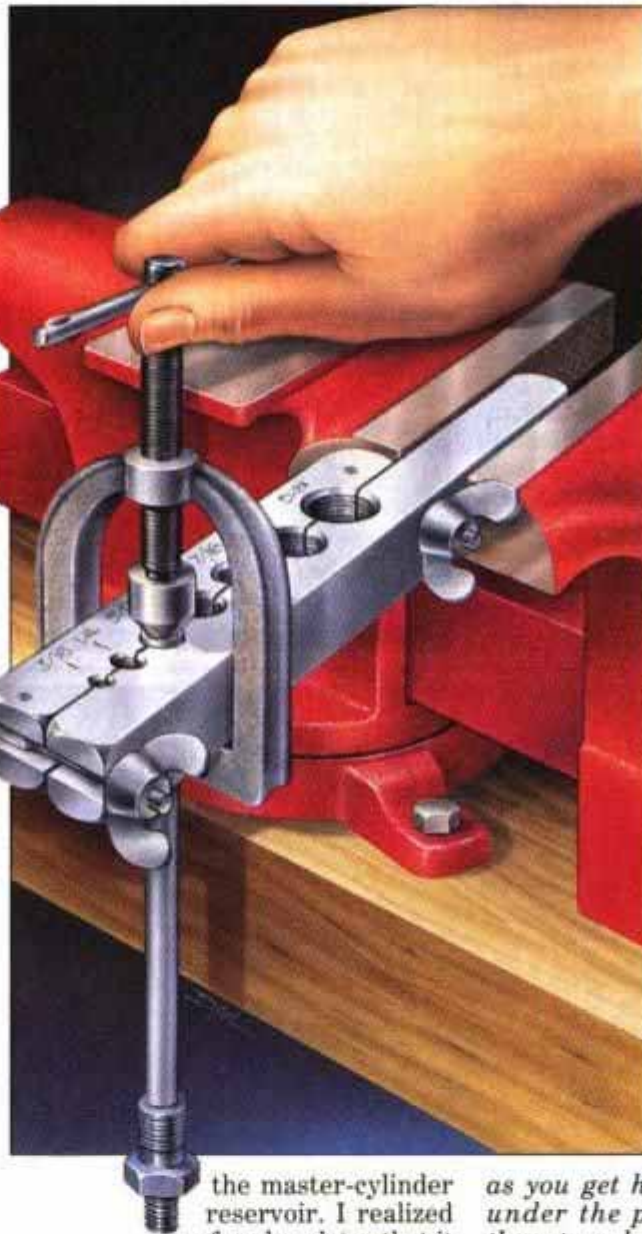


PHOTO ILLUSTRATION BY JOHN BARNES

the master-cylinder reservoir. I realized a few days later that it was really the power-steering fluid pump reservoir. What should I do now?

R. GERARDI
OCEANSIDE, CA

Power-steering fluid is mineral-based. Brake fluid is a mixture of several alcohols, mostly glycols. They most assuredly are not compatible. The alcohols will degrade the rubber seals and hoses—in a hurry.

Go to the discount store's auto parts department and buy a gallon of the correct power-steering fluid for your motorhome—today. As soon

as you get home, put a drain pan under the pump and disconnect the return hose—it's the one with a hose clamp (the high-pressure side uses a hydraulic fitting). When the fluid stops draining, start the engine and let it run for a few seconds in order to pump the rest of the fluid from the steering box.

Next, reconnect the hose and fill the reservoir with power-steering fluid. Jack up the front until the wheels clear the ground. Start the engine, and turn the steering wheel back and forth from lock to lock 20 times to clear the air out of the system. Repeat this drain, fill and turn procedure three times.

CAR CARE

Whining Over Nothing

Several years ago, I replaced the auto transmission in my Grand Am after finding evidence of water in the transmission fluid. The water came from a failed transmission cooler in the radiator, so after replacing the tranny I hooked up an aftermarket cooler, bypassing the stock cooler in the radiator altogether.

Now, after taking the car into my mechanic because of a whine in the transmission, I find evidence of water in the ATF again. He changed the fluid in the tranny, but the remaining fluid in the torque converter is still contaminated. What should I do?

G.N.
NEW YORK, NY

The first transmission problem wasn't caused by water in the ATF—it was caused by coolant in the ATF that was leaking into the transmission cooler lines where they flow through the car's radiator.

When you bypassed the stock cooler, you also bypassed an important part of its purpose: to warm up the transmission in cold weather. The warm coolant flowing around the

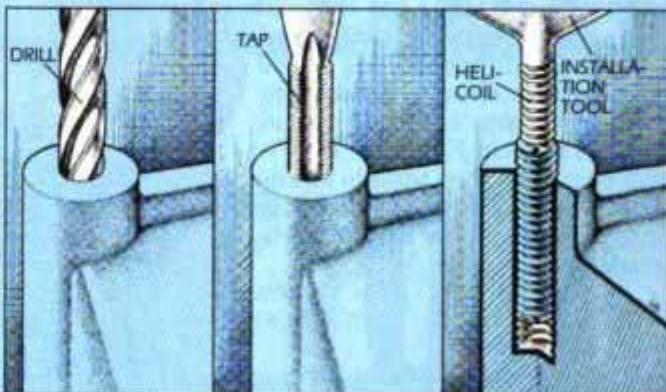
A Sticky Situation

• There are few things more annoying than bolting something together late at night and having that last fastener go soft as you take up the final bit of torque. There you are with stripped threads, and no room to tap the hole for the next larger bolt.

Don't panic. Next time you're in the auto parts store, pick up a Heli-Coil kit for the more common sizes of fasteners on your car.

Start by running the correct size drill bit down the stripped hole—carefully. I usually use a manual tap handle rather than a power drill—you're not really removing more than the tops of the stripped threads. Now run the special Heli-Coil tap into the hole. This tap is exactly the right size for the stainless-steel coil. Don't substitute. Blow out the chips.

Now thread a Heli-Coil over the installation tool. The coil has a tab at its bottom that the tool picks up. This draws the coil into the tapped threads from the bottom. It expands as the tool is removed, and you can break off the tab with a small screwdriver. The new threads should be stronger than the originals.



**ANYONE CAN PROMISE
NEVER TO LEAVE YOU FLAT.
WE GUARANTEE IT.**

A flat tire can happen to you or someone you love at anytime. On the way to an appointment. In the middle of the night. On a dark, lonely road.

At times like these, you need Puncture Seal™: The only instant tire repair with a Roadside Guarantee*. The only instant tire repair that won't leave you flat.

Puncture Seal inflates a flat in seconds. So you're back on the road in seconds. It's safe and easy to use.

Keep a can of Puncture Seal in the trunk of all your cars. When it comes to keeping you and your loved ones safe and secure, you have our guarantee on it.

DON'T LET SOMEONE YOU LOVE DRIVE WITHOUT IT.



*See can for details and restrictions information.

CAR CARE

cooler in the radiator will quickly raise the ATF temperature to its normal range.

The water you're seeing in the tranny now is condensation, which normally will boil out of the transmission every time it's warmed up and driven around for a half-hour or so. Replace your radiator—or repair the trans cooler in it—and your condensation problems will go away.

Others who suspect problems with water or coolant in their transmission should send some of the ATF to an engine-analysis lab, which typically costs \$15 to \$20. Leaking coolant will be spotted easily by the oil analysis.

Gone Fishin'

I tow a small boat that has an electric trolling motor. Can I recharge the battery with a cigarette-lighter plug connected to my car's dashboard-lighter socket? Will this damage the electrical system or the battery?

TOM SCOTT
VALLEY STREAM, NY

Yes, you can charge the battery that way. But I don't recommend it. If the battery is really dead, you stand

the chance of blowing the (probably 10-amp) fuse that protects the cigarette lighter. You may need to put some resistance into the wire to the battery to limit current. Unless you live a long way from the fishing hole, you won't get much charging done.

Better: Go to the marina or auto parts store and get a dual battery adapter—the kind for RVs. This is to let you run down the light/accessory battery all night and not drain the starting battery. Then, when the car is started in the morning, the alternator will charge the accessory battery as fast as it can. Install one of these near your battery and run a pair of 10-gauge wires back to the trailer. One goes between the RV charging adapter's auxiliary battery terminal and the boat's POS terminal. The other goes to the boat battery's NEG terminal and a good ground on the vehicle's frame. If you want to use some sort of connector, be sure it's rated for 30 amps or so. **PM**

DO YOU HAVE A CAR PROBLEM?

Just ask Mike about it. Mail your question to Car Clinic, Popular Mechanics, 224 W. 57th St., New York, NY 10019. While letters, faxes or phone calls cannot be answered individually, problems of general interest will be discussed in the column.

SERVICE TIPS

● If you have a 1993 Dodge Intrepid (or Chrysler Concorde/Eagle Vision) built before 8/20/92 with an a/c unit that works well for a few days, then suddenly stops blowing cold air, the problem is likely a clogged expansion valve. Your dealer has the updated parts.

● Assembly plant tire damage has been a problem on certain 1991-93 GM models. If you see a bulge on an outboard sidewall and/or notice a slow air leak, it's possible the tire has a torn inner bead. This condition—and missing chunks of tread—should be covered under GM's New Vehicle Warranty. If a tire is bad but doesn't have either of these visual cues, the tire company warranty should apply.

● Ford has designed a rubber bumper (PN F3SZ-18198-A) to be installed on the threaded end of each control-arm tension strut of 1993 Thunderbird/Cougars and 1993-94 Lincoln Mark Vllls that make a grunt noise after the steering wheel is released from either full-lock position.



YOUR OLD FLAME HAS MET ITS MATCH.

If you're still using WD-40®, here's something new to try. Liquid Wrench® Super Lubricant with Teflon®.

It protects and lubricates thousands of things all around your home, workshop and garage. Squeaky hinges. Rusted bolts. Hand tools. Power tools. Lawn and garden equipment. Cars. Boats. And machinery.

But, unlike that WD-40 of yours, Liquid Wrench Super Lubricant with Teflon is non-flammable.

So, drop your old flame like a hot potato and pick up a can of Liquid Wrench. It'll do everything your old flame used to do. With one very obvious exception.

THE ONLY NON-FLAMMABLE AEROSOL LUBRICANT WITH TEFLON®



SATURDAY MECHANIC

RESETTING YOUR EMISSIONS MAINTENANCE REMINDER

BY KEN JURAN

● Your late-model minivan has been a trusted member of the family for the past two years and 36,000 miles. It has helped you move your sister across town, kept your kid's Little League van pool rolling and faithfully transported the dog to the vet. But it sure caused havoc last weekend. Leaving at 5 am with your buddies and a week's worth of fishing gear, it sputtered, spewed black smoke from the exhaust and

wouldn't even idle. Walleye washout!

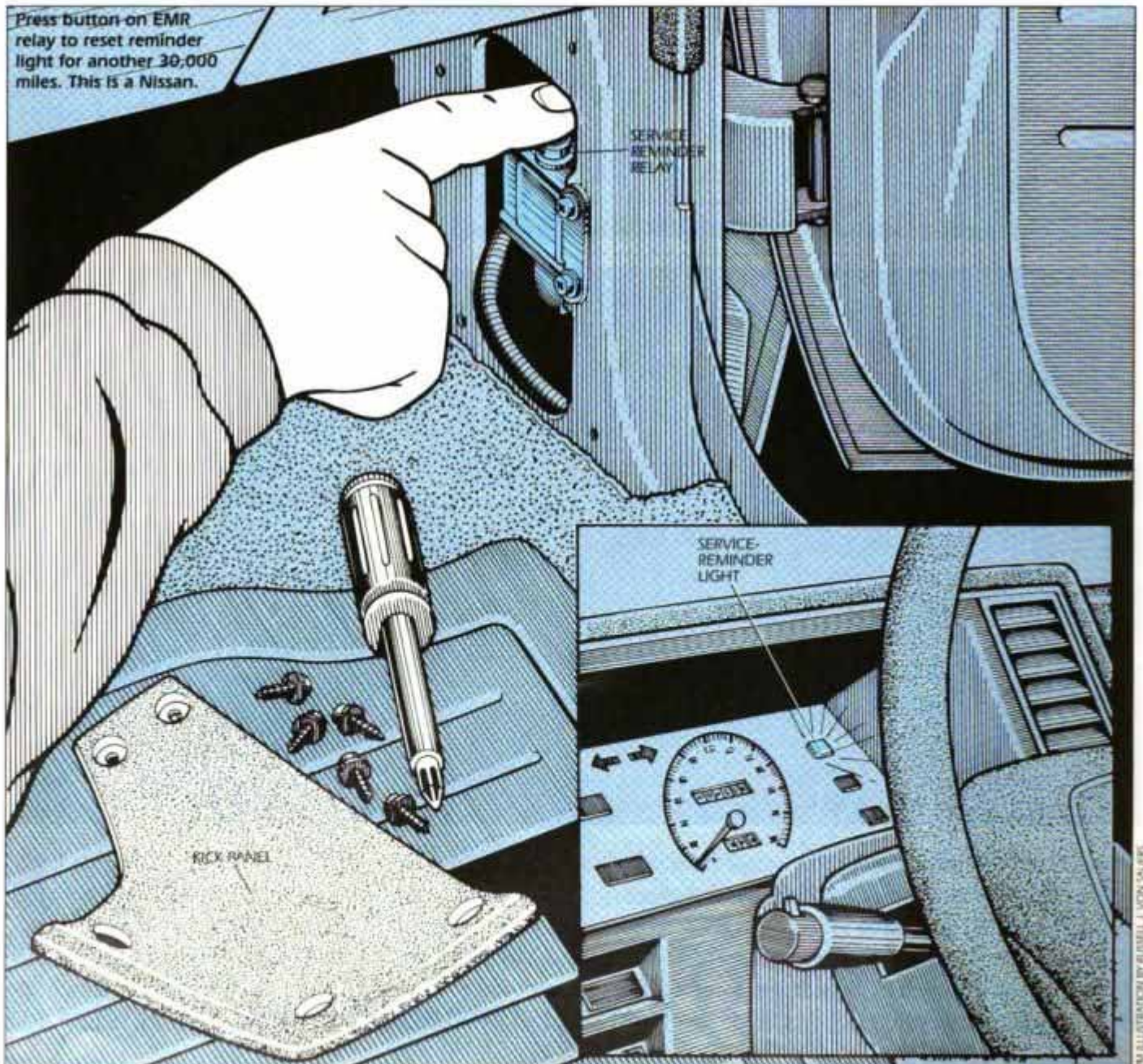
It's bad enough your pals won't talk to you, but now the truck's got to go in for service. And the only way to get to work is by bus because your wife needs the Bimmer to make all of her sales calls. Peachy.

Your dash is talking to you

Hold on. Have you been ignoring that warning light on the dash because

your "car guy" brother-in-law said it's not important? Well, maybe it is. You see, that warning light is designed to come on at about 30,000-mile intervals, depending on the vehicle. (Check your owner's manual for the specifics.) It's called an emissions maintenance reminder, or EMR, and it definitely shouldn't be ignored.

When the EMR indicator glows, it doesn't necessarily mean there's a



Natural Prostate Relief

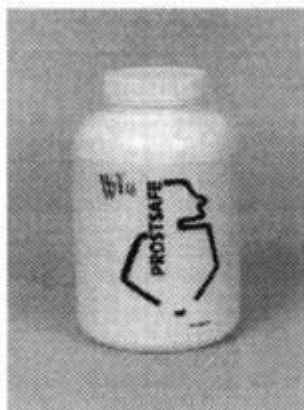
It's a natural fact. If you are a male over 40 and don't already suffer from a prostate gland disorder, the odds are 2 to 1 that you will before you are 59. By the age of 65, most American men have enlarged prostates.

As the years pass, mild discomforts can become disabling. Today, prostate surgery is the second most commonly performed surgery in men over age 65! Surgical complications can include total loss of bladder control and sexual dysfunction.

Prescription drugs may halt the swelling, but rarely ends the suffering. Like many prescription drugs, they have side-effects, like weak erections and low sex drive.

Many doctors feel that prostate disorders can be treated or prevented by giving the prostate gland the nutrition it lacks.

Recent scientific research has shown how to remedy the underlying problems associated with prostate disorders--safely and effectively. These results have been published in the *British Journal of Clinical Pharmacology*, the *American Journal of Gerontology* and papers from the *National Cancer Institute*. They reveal that several vitamins, minerals and natural herbs can dramatically shrink the prostate and improve urinary performance in older men.



The most modern application of these healthy ingredients is found in **Prostsafeproduct** from Whitewing Labs. **Prostsafeproduct** is the nutritional "tool kit" for men with prostate problems, and those who wish to prevent them. It is a mixture of zinc, serenoa serrulata, ginseng, certain amino acids, bee pollen and vitamins A, B-6 and E. Working as a team, these ingredients have been scientifically proven to shrink a swollen prostate.

Our customers have said
Prostsafeproduct helps to:

Halt the endless trips to the bathroom during the night!

Stop that burning sensation during or after urination!

Prevent uncontrollable wetting!

Improve bladder control!

Empty bladder completely!

Sustain erections and enhance virility!

Please a concerned wife!



Dr. Michael Rosenbaum, M.D. says "Prostsafeproduct supplies essential vitamins, minerals and herbs needed to nourish and maintain a healthy prostate."

For as little as a dollar a day, that seems like inexpensive insurance against deadly prostate disorders. If for some reason you are not satisfied, just return the unused portion within 30 days for a full refund.

The reasons why men over 40 use **Prostsafeproduct** are clear. If you are looking for relief, order **Prostsafeproduct** today.

"Now I get a good night's sleep without getting up every two hours to urinate."

-- Mr. C. Hussy
Cleburne, TX

"Prostsafeproduct has stopped the burning after urination."

-- Mr. C.E. Black
Barboursville, WV

"I empty my bladder and have a good stream of urine with no strain."

-- Mr. S.J. Hymel
Houma, LA

"I previously encountered discomforts such as bladder urgency. These problems are now completely absent."

-- Mr. B. Doser
Holland, MI

"This is a little personal but, how can I say, I am more virile."

-- Mr. G. Howard
Cleveland, OH

"...and in the sex department, my wife thanks you."

-- Mr. G. Sawin
Lynwood, WA

Whitewing Labs, Dept. 128
17939 Chatsworth St., Suite 408, Granada Hills, CA 91344

PS1 1 month supply of Prostsafeproduct only \$34.95 plus \$4.50 S&H

PS2 2 month supply only \$59.95 (Save \$9.95) plus \$4.50 S&H

PS6 6 month supply only \$119.95 (Save \$89.75) plus \$4.50 S&H

Check enclosed \$ _____ CA res. add 8.25% & AZ res. add 5.50%

Visa/Mastercard # _____ Exp. date _____

Name _____

Address _____

City _____ State _____ Zip _____

or call **1-800-950-3030** Dept. 128

FROM FRONT...



EXPLORER MAT SHOWN

MATS IN RICH MATTE BLACK WITH A RED PINSTRIPE

HERE'S PROOF. Only **WeatherTech** mats give you all-season protection like this: up to 13 lbs. of pliable virgin rubber that's channeled so deep it can trap and hold up to 1 1/2 quarts of water, slush or sand! It doesn't curl, crack or harden, even in sub-zero temperatures. **WeatherTech** mats are attractive, with a high-tech design manufactured to fit what you drive. **MORE PROOF.** You may not know it, but Cannon[™] of England, the manufacturer of **WeatherTech**, is an original equipment supplier to Ford, GM, Honda, Toyota, Lexus, Mercedes, Nissan, Audi and others.

PRICED TO BE THE WORLD'S BEST MAT VALUE: Typical car mats can cost a small fortune at a car dealer, but **WeatherTech** mats are anything but typical!

Deep grooves trap and hold snow, mud or sand



Anti-skid ridges prevent slipping

FRONT SET:
per set
\$44.95
plus
\$7 shipping*

FRONT AND REAR SET:
complete.
\$79.95
Free shipping*

MATS TO FIT MOST DOMESTIC AND IMPORTED CARS, TRUCKS, VANS, AND SPORT UTILITY VEHICLES:

Acura • Alfa Romeo • Audi • BMW • Buick • Cadillac Chevrolet Chrysler • Daihatsu • Dodge • Eagle • Fiat Ford • GEO • GMC Honda • Hyundai • Infiniti • Isuzu • Jaguar • Jeep • Lexus Lincoln Mazda • Mercedes • Mercury • Mitsubishi • Nissan Oldsmobile Peugeot • Plymouth • Pontiac • Porsche Range Rover • Renault • Rolls Royce • Saab • Saturn Sterling • Subaru • Suzuki • Toyota • VW • Volvo

WE GUARANTEE YOUR SATISFACTION.

If you are not happy with your order, return your unused mats or cargo liner within 30 days for a complete refund, less shipping.

*We pay shipping within the 48 contiguous states on orders of a front & back set, two or more sets, or a combination of mats and cargo liner. Extra shipping charge may apply outside the 48 states. If paying by check send checks payable to MacNeil Automotive Products Ltd. IL residents add 6 3/4% sales tax.

TO REAR...

WeatherTech liners take a back seat to no one when it comes to cargo area protection. Our tough, durable liners are molded to your specific vehicle... exactly! The **WeatherTech** liner is engineered to grip your cargo and minimize load shift plus a 3 inch high lip to contain spills. So now for the first time, **WeatherTech** protection can be yours from front to rear!



GRAND CHEROKEE LINER SHOWN

FROM \$69.95
plus
\$8 shipping*

ANY COMBINATION, AND WE SHIP FREE!

SPORT UTILITY LINER APPLICATIONS:
Blazer • Bravada • Bronco • Cherokee • Grand Cherokee Explorer • Navajo • Jimmy • Land Cruiser • Montero • Rodeo/Passport Range Rover-Discovery, County, 4.0 SE • Pathfinder Suburban • Tahoe • Trooper • Wrangler • Yukon • 4Runner

MINIVAN LINER APPLICATIONS:
Aerostar (Ext.) • Astro/Safari (Ext.) • Gr. Caravan Gr. Voyager • MPV • Odyssey • Previa • T & C • Villager/Quest • Windstar

AUTOMOBILE TRUNK LINER APPLICATIONS:
Accord • BMW 3, 5 Series • Camry • Concorde Intrepid • Lexus ES300, LS400 • Maxima Mercedes "C," "E," "S" Class • Taurus/Sable • Vision

Order Today:
1(800) 441-6287

Call 8 AM -10PM (Central Time) 7 days

Major credit cards accepted.

We usually ship within 48 hours. Simply tell us the make, year and model, and we'll send you the **WeatherTech** mat or liner engineered to fit. Express shipping available.

MacNeil

Automotive Products Limited
2435 WISCONSIN AVENUE
DOWNERS GROVE, IL 60515
708-769-1500 fax 708-769-0300

WeatherTech is a registered trademark of MacNeil Automotive Products Limited

CAR CARE

problem. But each time the light comes on, the emissions system should be inspected. The idea is to work on the engine before the engine works you over. After giving your okay, the light has to be reset so the system starts counting down for the next EMR cycle.

There's a different reset procedure for just about every EMR system.

Some indicators, such as those on 1989 and newer Chrysler light trucks, can be reset only by tapping a scan tool into the on-board computer controls. If you don't have a scanner, it's off to the repair shop or the dealer for assistance. Some setups are reset by replacing a module. After a certain number of miles, the module is simply left disconnected.

There's no resetting provision at all on some vehicles. Just disconnect a plug or connector to shut off the light.

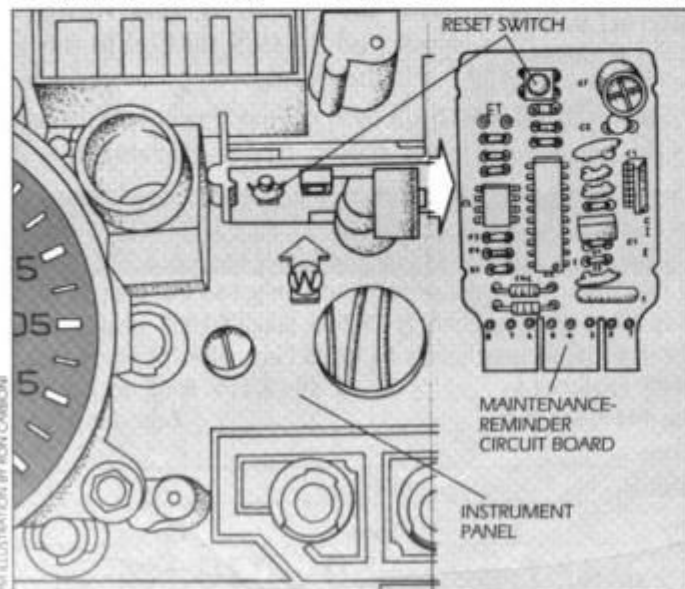
Still other EMR lights, such as the **SENSOR** warning on most Nissans, require nothing more than a screwdriver and about 5 minutes of your time to either push a button on a relay or pull apart a connector—that is, after you've given the emissions controls a once-over.

Only under the following three conditions should you consider resetting the EMR light without inspecting the emissions system: 1. You've had no driveability trouble and no **CHECK ENGINE** light, 2. You've noticed no appreciable change in fuel economy, and 3. Your vehicle always passes the state emissions test with flying colors.

Checking emissions system

The key element in your emissions system is the oxygen sensor that's mounted in the exhaust manifold. It senses if the engine is running too rich or too lean. When the O₂ sensor gets lazy and stops reporting accurate information to the electronic engine controls, driveability trouble can begin—and fishing trips can be ruined. So check out the O₂ operation first.

Next on the list is the exhaust gas recirculation (EGR) valve, if your engine has one. Apply a vacuum to the valve's nipple and make sure the valve seat opens and closes smoothly. On late-model computer-controlled EGR systems, there may be no way to check the solenoid/valve mechanism without special tools. If you haven't heard any engine ping or knock lately, idle quality is okay, and if the **CHECK**



On Chrysler minivans, you must remove the fuel gauge or tachometer to get to the emissions-maintenance-reminder reset switch.

CAR CARE

ENGINE light hasn't come on, the EGR system is probably fine.

Other operations you can check include the smog pump (or pulse-air system) on engines that use them. Examine the pump belt for cracks, wear and proper tension. Follow the tubes from the pump to the diverter valve and down to the exhaust manifold and catalytic converter. Make sure the rubber hoses are intact and the metal pipes and check valves aren't rusted out. You might even be able to reach under the vehicle and rap the catalytic converter with a mallet or hammer. A rattling noise means the cat has broken down internally—and its better days are behind it.

If you can see the fuel-system charcoal-vapor canister (sometimes it's buried in a front fender), inspect the integrity of its rubber lines and fittings. And while you're at it, look at the air filter, air-box breather element and the engine's vacuum lines. Make sure the positive crankcase ventilation valve still rattles when you shake it. Check the spark plugs and wires and the distributor cap and rotor (if applicable) for wear. Ultimately, all powertrain components make up the emissions system, so check whatever you can get to.

Finding the reset location

Although it varies, reset-switch locations can generally be broken down into three areas: the speedometer cable/firewall area, the kick panel/under-dash area and the instrument panel area. The positions often change from model year to model year across the same vehicle make, so always approach your search with an open mind. And check your owner's manual.

The speedo cable resets are usually the easiest because the cable sticks out like a sore thumb, and there's usually plenty of room to work. Vehicles in this category include: some Audis and Volkswagens, 1980 Cadillacs, some 1980 Chrysler and 1980-81

AMC cars, 1980-85 280-Class Mercedes-Benz cars, Peugeots, Porsche 924s, Renaults, Toyota Land Cruisers, Triumph/MG cars and Volvos.

Audis and VWs are a breeze. You'll find the mileage counter in the cowl tray at the base of the windshield (the speedo cable leads right to it). There's a hole on the back of the counter. Stick a pen or pencil in the hole and press in the reset button. You'll feel the button lock in place. That's it. On Volvos, the mileage counter is also in line with the speedo cable. Once

you've found the counter, press its reset button with your finger. Same thing with Mercedes, except you pull the plug and leave it disconnected.

Caddies are done from the inside. Drop the lower steering-column cover. Feel for the sensor reset cable to the left of the speedo cluster. Yank on the cable until you see the flag reset itself on the left side of the odometer. On AMCs, Chryslers and Renaults, locate the reset switch between the upper and lower speedo cables at the firewall. Slide the rubber boot out of

Let's Focus On Why WIX® Air Filters Work Better.

When you take a close look at WIX Air Filters' superior media, it's no wonder other filters don't match up. The non-phenolic pleated cellulose traps particles so small, filtering efficiency is nearly 100%.

Add the sturdy construction shown below, and you'll see why you can't buy better protection for your engine.

But quality this high isn't available just anywhere. So call us toll-free for the WIX Filters dealer nearest you.

1-800-NEED-WIX
WIX® FILTERS

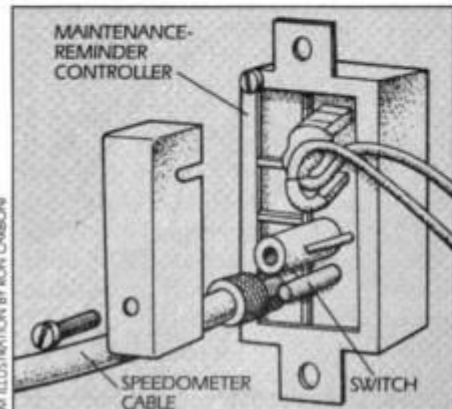
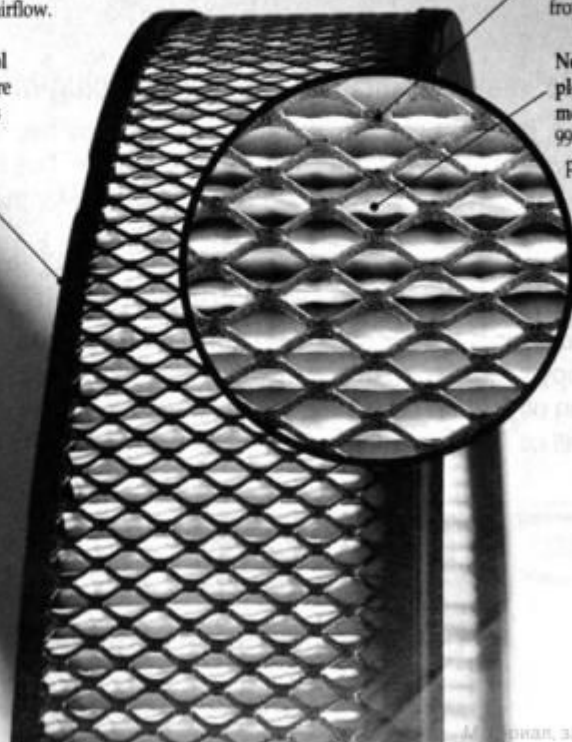
Galvanized wire-screen inner body supports filter media and allows maximum airflow.

Leakproof plastisol end seals make sure dirt doesn't bypass the filter.



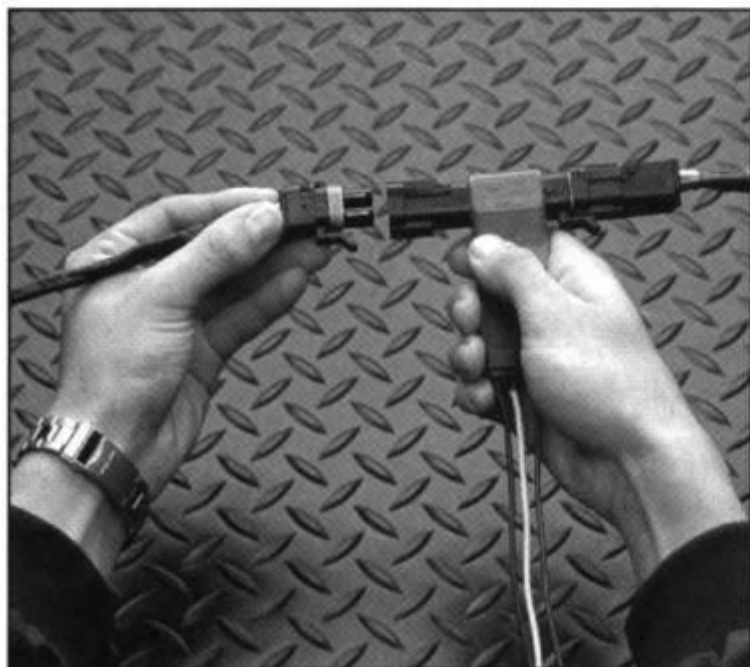
Strong plated-steel outer casing protects filter media from crushing.

Non-phenolic pleated cellulose media removes 99.6% of all airborne particulates.



You'll find Volvo's mileage counter under dash. Press reset switch to turn off light.

WIRE YOU WAITING?



LiteMate® makes vehicle-to-trailer wiring plug-in simple.

No cutting, splicing or taping. If your vehicle already has factory connectors, you'll have trailer lights in just minutes. The Hoppy LiteMate System. The easy way to get going. Look for the Hoppy display at fine automotive retailers nationwide.

Do you have amber or separate turn signals?

Then you need a special safeguard from trailer light malfunction. Use Hoppy's new breed of power converters for complete protection of your on-board computers, anti-lock brakes and air bags. Call us today for more information.



428 Peyton • Emporia, KS • 66801 • (316) 342-7320

CAR CARE

the way and turn the reset screw one-quarter turn clockwise until you feel the detent.

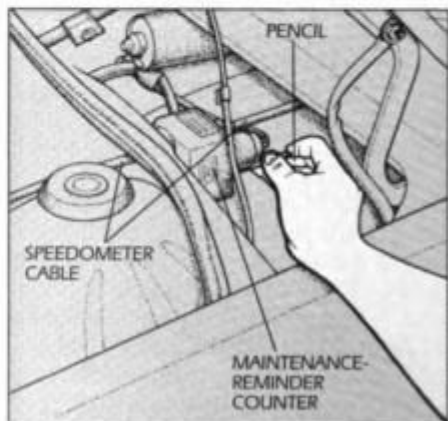
Peugeot is a little weird. First, unbolt the mileage counter from inside the left front wheel well, pull the assembly down and turn the reset button counterclockwise until you reach a stop. You'll find the mileage counter on the left engine mount or strut tower of the Porsche 924. On Toyota's Land Cruiser, the reset switch is located in the engine bay near the firewall—just slide it to the opposite position. Triumph/MGs require two pins that fit into the reset holes on the mileage counter in line with the speedo cable on the left inner fender. Turn the switch to the opposite position.

Hunting for switches

Vehicles that fall into the second category number too many to call out separately, but they all have some sort of EMR module, relay, connector or pair of connectors. Examples include the 1984-86 Chevy Sprint, Ford trucks since 1985, Jaguars, Jeeps and Saabs, to name just a few.

On the Sprint, you'll find a cancellation switch on the right side of the fuse panel. Press the switch to the OFF position. Ford hides EMR modules behind the passenger kick panel on its trucks. Stick a small rod in the hole marked RESET. While holding the button down with the rod, turn the key to RUN and continue to depress the button for 5 seconds. On Jaguar XJ6 and XJS cars dating back to 1983, the mileage counter is behind the trim in the trunk. Press the white button with the key on to reset the light.

Jeep's EMR light comes on at 82,500 miles. Once you find the EMR timer, either on the brake pedal bracket or under the dash on the passenger side, install a new one or just leave the system defunct. There's no reset button. On some models, Saab mounts a mileage counter under the



Stick a pen or pencil in the back of the mileage counter in the cowl tray on Audis and Volkswagens to reset EMR system.

dash to the left of the steering column, next to the flasher relay. Push the reset button on the counter.

Pulling the instrument panel

This third category can get complicated because you usually have to dismantle part of the dash to remove the instrument cluster or a gauge to get in behind the cluster, as on Chrysler's minivans. According to a diagnostic hotline we're friendly with, these vans are the cause of the most EMR reset calls. The circuit-board-mounted switch is tricky to find if you don't know what to look for. It's mounted behind the fuel gauge on the standard cluster or behind the tachometer on the optional cluster. Sometimes you'll find a 9-volt battery in there, too. It must be replaced with an alkaline battery. Some Chrysler captive import light trucks have a reset switch on the back of the cluster near the speedo junction or on the lower righthand corner of the cluster, behind the face panel.

On 1980 GM vehicles, pull the instrument cluster lens and use a small tool to push on the stem of the orange plastic flag that pops up near the odometer. An alignment mark should appear in the left center of the odometer window when the flag is properly reset. Late-model GMs use no specific EMR indicator. The CHECK ENGINE light illuminates if there's a problem.

Audi's 1984-88 4000s and nonturbo 5000s have a cancel switch labeled OXS on the back of the instrument cluster that must be removed from the pod to gain access. Late-model turbos hide a mileage counter with a reset button under the rear seat. Some BMWs use a resettable mileage counter, but 1980-83 528e and 633 CSi cars and other late models require that the oxygen sensor light be removed from the instrument cluster. Daihatsu turns on the light at 80,000 and simply wants the bulb removed from the cluster. On 1989-93 Geo Trackers, locate the 3-wire cancellation switch in the main wiring harness behind the instrument cluster or in the steering-column lower-access panel.

You'll find the reset on the back of the speedo on Isuzu Troopers. Pull the tape from Hole B and swap the screw from Hole A to Hole B. Tape over Hole A. Mazda MPVs are similar. Swap the screw from Hole NO to Hole NC. Late-model Mercedes-Benz cars use no EMR indicator. However, 1980-85s, other than the 280, require bulb removal. On VW Rabbits and Pickups, remove the instrument panel cover trim plate to get to the mileage counter release arms at the top left of

CONCENTRATED. WORKS WHERE OTHERS FAIL. GUARANTEED!



B'laster PB Penetrating Catalyst

Powerful, concentrated penetrant frees rusted or frozen parts by releasing the surface tension that causes them to stick. Protects against rust and corrosion.

B'laster Fuel Injector Cleaner

Boosts performance and power. Improves mileage. One bottle has enough concentrated lubricating power to protect for 6,000 miles. Cleans system to 100% efficiency.



Available at your nearest auto parts store.

For the store nearest you, call

1-800-858-6605



734-015

SO EASY, YOU COULD DO IT BLINDFOLDED.

(GRANTED YOU MIGHT
NEED SOMEONE TO LEAD
YOU TO THE TIRE.)

CLEANING YOUR TIRES DOESN'T HAVE TO BE TRICKY. WITH NO TOUCH TIRE CARE, ALL YOU HAVE TO DO IS SPRAY IT ON AND WALK AWAY. THERE'S NO SCRUBBING, NO WIPING, NO ELBOW GREASE AT ALL. YOU'LL BE ABLE TO ADMIRE THEM FOR WEEKS AND WEEKS. UNLESS, OF COURSE, YOU'RE STILL WEARING A BLINDFOLD.



CAR CARE

NEW PRODUCTS

IMPROVE YOUR CAR

Oil Recycler

Changing your own oil—draining it—is usually not a problem. The sticky part is pouring the used oil from a drain pan into a container without spilling it all over your shoes or having the container tip over. Recoil offers an environmentally friendly solution to oil recycling. You hang the Recoil unit in your garage or on a fence, and then plug into the empty oil containers. The unit holds up to 12 quarts of oil and flows it back into your empty quart-size motor-oil containers. The bottles attach to special valves in the Recoil unit so the oil stops draining when they're full, and the valves self-seal to prevent spillage when you remove them. Recoil also accepts a gallon container. The filled receptacles can then be hauled to your local used-oil collection center. Recoil sells for \$19.95 and is available from Recoil Recycling Products Inc., 22916 Ocean Ave., Torrance, CA 90505; (310) 375-6086.



Custom Wheels

If clothes make the man, then wheels make a car. Dressy and functional, American Racing Equipment's AR-24 one-piece 9-spoke alloy wheel fits most domestic and import front-wheel-drive cars. Available in 15 x 5½-in. and 14 x 6-in. sizes, the sporty wheel comes clear-coated to prolong its finish. Available at

most major auto parts outlets, the wheel costs \$85 and up. Contact: American Racing Equipment Inc., 19067 S. Reyes Ave., Rancho Dominguez, CA 90221; (310) 635-7806.

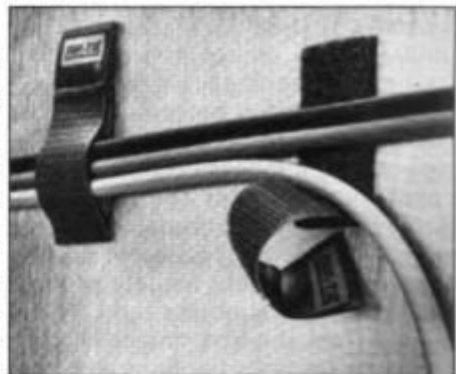


Security System

When the first steering-wheel cane lock appeared, it triggered a sort of security-lock war—with all kinds of variations. The latest player is Security-Pal's model 100. Aside from immobilizing your wheel, the welded steel unit incorporates a built-in alarm, which plugs into your cigarette-lighter socket. The siren, using an internal battery, shrieks a 100-decibel warning and flashes a bright light if the plug is removed from the socket or when any of the vehicle's lights come on. A motion sensor also triggers the alarm. Security-Pal costs about \$99.95 and is available at major auto parts stores. Contact Wolo Manufacturing Corp., 1 Saxwood St., Deer Park, NY 11729; (800) 991-9656.

Wire Router

If randomly run wires and cables make your engine compartment look like a school science project, here's a new holder to keep them neat. Cable Catch is a Velcro fastening system that lets you route the circuits along any flat surface. One side of the system permanently adheres to the wall. The other side secures the wires, using Velcro to reduce possible crimping damage that can result when nylon ties are used. A quick pull releases the wires. Cable Catch, which costs \$14 to \$16 for a pack of five (depending on size), is available from The Rip-Tie Co., P.O. Box 77394, San Francisco, CA 94107; (800) 348-7600.



Electronic Mirror

Forget that "Mirror, mirror on the wall..." stuff. Prince's oversize electronic rearview mirror for your vehicle tells you much more. It shows those flashing lights coming up on your rear bumper, and a built-in digital compass displays your heading, compensating for magnetic irregularities. Want to know the outside temperature? Just check the mirror. There are also map-lights for driver and passenger. And the lights automatically shut down if left on for 15 minutes after the ignition is turned off. The mirror sells for \$199 from Mitco Corp., 54847 CR 17, Elkhart, IN 46515; (800) 433-6486. **FM**



Mind Power Breakthrough!

Plug Your Mind into the Amazing Learning Machine™ To Boost Mental Powers, Program Your Mind for Success & Launch Fantastic Mind Journeys. Plus Get \$600 of Free Learning CDs!

By Dane Spotts



Absolutely mind blowing!!! I popped a French Learning CD into the Learning Machine™. Immediately I was sucked into a deep, dream-like trance. Weird colors and patterns

were created on the insides of my closed eyelids. While in this super-relaxed but hyper-aware state, the special Learning CD began unfolding its magic programming.

A Vacation in 22 Minutes

It was as if a movie were playing inside my head. I could see myself in France having lunch at the Eiffel Tower. The music, the sounds, even the fragrance of summer in Paris. A beautiful woman spoke to me. "Bonjour, mon ami," she said. In an almost unconscious way I began following the dialogue. The mental imagery was so intense I not only understood what was going on, it was like I was there.

Learning at Light Speed

The Learning Machine is more than virtual reality. More than just a cool way to relax after a hard day at work. According to one college professor, "It may be the most powerful learning tool since the invention of the book."

Here's why. When you do a Learning Machine session your mind is cut off from outside distractions. Your attention becomes focused inward as the powerful sensory stimulation (light-sound matrix) bombards your imagination. Ideas and mental images float in and out of your consciousness. It feels like the best

dream you've ever had. Then while in this highly euphoric mental space, the Learning CD opens your learning centers to peak receptivity and pours in new knowledge and skills. It's the ultimate mind trip. But it's not just for fun.

Let's say you want to learn a foreign language, improve your reading and comprehension, or increase your math skills. Or just give your kids a powerful edge in school, learning many times faster than their peers. It's simple.

You select a specially programmed Learning CD in the area you want to study. Plug it into any ordinary CD player. Then attach your Learning Machine digital headset into the headphone jack. Push play and a few moments later your mind is launched into a pre-programmed learning session. In a fun, almost effortless way, the Learning CD unfolds its program and literally forces you to learn. It's the most amazing thing you've ever experienced.

Speak French, Spanish, German & Italian

Learning foreign languages, or anything for that matter, at rocket speed can be very empowering. And I'm going to include a ton of valuable Learning CD software with your Learning Machine so you can get immediate results from this new technology.

You'll receive 4 introductory language courses — French, Spanish, German, and Italian. Plus a Super Vocabulary course, a Super Memory course, and a Super Speed Reading course. And for your kids, a SuperPhonics™ reading program. Over \$200 worth of Learning CDs make this the deal of the century. But I also



Beyond virtual reality, the light-sound matrix stimulates your mind and opens your learning centers. Like magic it pours in new information, skills, mental programming, and launches your imagination.

want to show off its other incredible mind expanding powers.

10 Fantastic Mind Journeys

So I'll include the 3-D Mind Sync™ Library, with 10 mind launching programs on 3 CDs. Turn your Learning Machine into a meditation, self-hypnosis, and virtual fantasy computer. You'll get the following titles: *Creativity Booster, Quick Energy, Stress Zapper, Mental Tune-Up, Virtual Visualization, Imagination Stimulator, Learning Accelerator, Super Intuition, Lucid Dreaming, and Super Zen States.*

A \$150 value, this extensive collection is a super added bonus. But even more exciting is how it can be used for habit control, success conditioning, and eliminating self-sabotaging behavior.

Super Motivation Library

Let's say you want to transform a loser mind-set into a winning one. Or you'd like to quit smoking or lose weight. Pop in an InnerMind™ Programming Disc. The sensory stimulation matrix opens a window into your unconscious mind. Then by infusing your "inner mind" with positive programming, you can rescript negative, self-defeating attitudes. I'm including an awesome 18-title InnerMind Programming Library. From success conditioning to weight control this is another \$150 value.

30-Day Risk Free Trial

Plus in addition to the Language Learning Library, the SuperPhonics, Super Speed Reading, Super Memory, and Super Vocabulary programs, the 3-D Mind Sync Library, and the InnerMind Programming Library (a \$600 combined value), I'm including coupons worth a thousand dollars. These coupons are for hundreds of future Learning CD applications, including software that links your mind directly to a multi-media computer. It's something you absolutely must experience.

Try the Learning Machine for 30 days risk free. Take your mind on an incredible journey. If for any reason you're not totally blown away by the experience, send your kit back to me for a full refund.

To order, credit card holders call toll free. Or send your check or money order for \$299.95 plus \$16 shipping & handling to the address below (Item #4501). Please allow 4-6 weeks for delivery.

FOR FASTEST SERVICE CALL TOLL FREE

1-800-925-3263

ZYGON

18368 Redmond Way, Redmond, WA 98052

Fax Orders to (206) 882-1454

\$600 Super CD Bonus Pak

Hundreds of dollars worth of valuable Learning CD Libraries are bundled with your Learning Machine™ to make this an incredible deal. Here is just a sample of the mind-boggling benefits of your Learning CDs that will be bundled FREE as part of this special introductory offer.

The Teacher™ (\$59 Value) Start-up demonstration CD will take you on a journey and prep your mind with all the incredible things you can do with your Learning Machine.

Accelerated Interactive Language Learning™ Library (\$200 Value) 4 introductory courses teach you basic French, German, Spanish, and Italian using the same course materials taught to international diplomats.

3-D Mind Sync™ Library (\$150 Value) 10 mind journeys: Creativity Booster, Quick Energy, Stress Zapper, Mental Tune-Up, Virtual Visualization, Imagination Stimulator, Learning Accelerator, Super Intuition, Lucid Dreaming, and Super Zen States. Launch your mind into fantastic mind journeys from deep meditation to extreme alertness.

InnerMind™ Programming Library (\$150 Value) 18 programs on 3 Learning CDs program success behaviors into your subconscious. Titles: Building Self-Esteem, Eliminate Fear & Anxiety, Projecting a Winner's Image, Attracting Love Relationships, Health & Healing, Expanding Psychic Powers, Attracting Prosperity & Wealth, Time Management & Organization.



Creativity & Problem Solving, Effective Public Speaking, Increase Focus & Concentration, Super Memory & Learning, Stay Fit/Exercise Motivation, Permanent Weight Loss, Eliminate Procrastination, Quit Smoking Now, Meet Your Deadlines, Always on Time.

Super Speed Learning™ Beginner's Pak (\$59 Value) 4 accelerated learning programs, Super Speed Reading, Super Memory, Super Vocabulary, and SuperPhonics (for kids K-6) teach you learning skills you'll use for life.

Plus \$1,000 Worth of Coupons for More Software

Included in your kit are coupons for additional Learning CD programs such as Japanese, The Photographic Mind Series, and Transcendental Mind Series. Plus info on future programs including ESL, Chinese, and Russian. Fantastic Journeys that launch your consciousness into incredible new worlds. The Time Traveler Series, World History, Science & Space, World's Greatest Mind Series, Study Habits Discs, Self-Esteem For Kids, Children's Classic Literature Series, Corporate Training Programs and more. Future multi-media titles include the Civil War series, Everything I Ever Wanted To Know, plus existing CD-ROM software converted into Learning Machine format.



INFO HIGHWAY SHOPPING MART

Computers • Software • CD ROM • Peripherals & Accessories

Nearly two out of three readers of Popular Mechanics now have personal computers at home.¹ In recognition of their "need-to-know" about computer-related products, the marketing department of Popular Mechanics presents this advertising section especially for these readers. You'll find useful computer tips, product previews and advertising for innovative products. Information in this section is not provided by the editors of Popular Mechanics. For more information about products featured in this section, please contact the advertisers directly. For information about placing advertising in this section in the August issue (closing June 1), contact Barbara Jones at 1-800-669-1251.

¹Source: PM Reader Panel Study, 1993

Hot Product: Parsons Drug Encyclopedia

The *Encyclopedia of Drugs* is an easy-to-use database of the latest information on more than 6,000 prescription and non-prescription drugs. In addition to a general description of each drug, this \$39 list price software for DOS, Windows or Macintosh provides details on side effects, drug interactions, precautions, storage, notes and more for each drug. Search by brand, generic name. Prints info for ready reference. For info or to order, call Parsons Technology at 1-800-223-6925.

Hot Tip: Tracing Scans in CAD

When using computer aided drawing software like IBM's CAD/3X, you can save drawing time by taking any existing paper drawings that you need to reproduce on your computer to a computer service bureau to be scanned at 1200 dpi (dots per inch). The computer service will give you back a high-resolution TIFF file on disk(s) which you can load into your CAD program as an image you will then trace over, creating your new drawing. CAD/3X's Selective Dynamic Highlighting feature then gives you "smart" menu selections depending on your task — a real time saver.

Reaching 10 Million PM Readers Each Month!



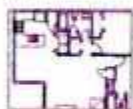
Turn your ideas into reality 3 times faster.



**Cabinetry/
Woodworking**



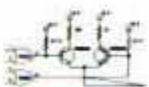
**Mechanical
Design**



**Home/Office
Layouts**



**Construction
Plans**



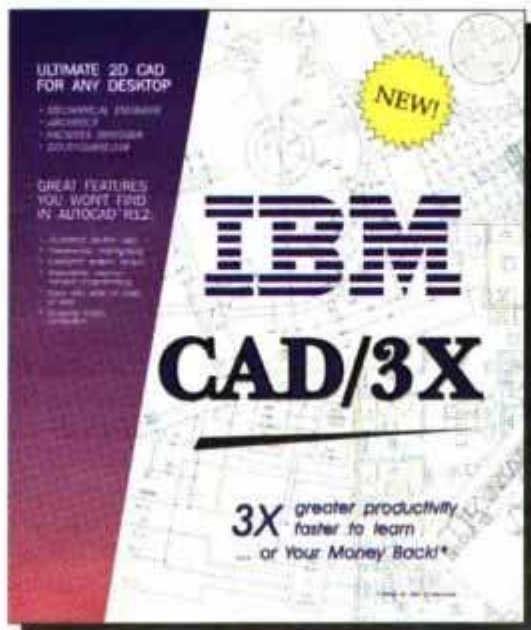
**Electrical
Schematics**



**Landscape
Design**



**Graphic
Illustrations**



System requirements: IBM compatible PC with math co-processor, 8 MB free on hard disk, mouse. DOS: 1 MB RAM minimum (4 MB recommended), DOS 3.3 or higher.

- Full featured to quickly make any 2D drawing
- Patented technology reduces drawing time
- Outstanding DXF compatibility
- Lines, Arcs, Curves, Symbols, Export to WP; Analyze
- Online graphical HELP, Complete online Demos
- Dynamic Highlighting, Smart Redraw slashes learning time
- Parametric parts, Programless macros
- Associative Dimensioning, 2D Booleans, and more

Limited time offer ...
\$99 30 day money back guarantee

IBM CAD

800-426-2231 ext. 30

PLEASE:

BEFORE YOU TAKE ANOTHER PILL, READ THIS.



Get critical information on side effects, interactions and more with **Encyclopedia of Drugs—FREE!**

Do you know if it's OK to take that cold tablet with your other medication? If you miss a dose of Prinivil should you double your next?

If you're uncertain, relax—*Encyclopedia of Drugs™* can tell you.

Best of all, it's FREE!

That's right. This easy-to-use software puts up-to-date information on more than 7,000 prescription and non-prescription drugs at your fingertips—FREE!

Pharmacies and hospitals across the country rely on the same source for their information—First DataBank!

Encyclopedia of Drugs gives you a general description of each drug, plus vital details like side effects, drug interactions, precautions, storage, notes and more!

Why is Encyclopedia of Drugs free?

It's simple. We want you to take your medications safely. And we want to count you among our more than 2 million loyal, satisfied customers. They enjoy many of our more than 50 affordable software titles—we're certain you will, too!

Hurry! Order your FREE copy today!

Encyclopedia of Drugs has a retail value of \$39. But for a limited time, you can have it FREE. All you pay is \$8.95 for shipping and handling.

So take the risk and uncertainty out of your medications—with FREE *Encyclopedia of Drugs!*

Call now to order:

1-800-223-6925

24 hours a day, 7 days a week! Or fax your order to 1-319-395-7449, shop the CompuServe * Mail (Go PA) or clip and send the coupon. For fastest service when ordering by phone, please have this ad and your credit card handy.

System Requirements: *The Encyclopedia of Drugs for Windows* requires an IBM® or compatible PC, 2MB RAM, Microsoft® Windows 3.1 or later running in standard or enhanced mode, and approximately 5MB hard drive space. *Encyclopedia of Drugs for DOS* requires 640K RAM and 4.5MB hard drive space. *Encyclopedia of Drugs for Macintosh* requires 4MB RAM (2MB free), system 7.0 or later and 9MB hard drive space. Copyright © 1995 Parsons Technology, Inc.

~~\$39~~
FREE SOFTWARE!

Learn how to make your medications the most effective.



Understand the side effects any medication may cause.



Know which drugs you can take together—and which you should never mix.



If you miss a dose, should you skip it or double the next dose? Find out instantly.



Yes! Rush me Encyclopedia of Drugs for \$39 FREE!*



Includes User's Guide and expert technical support. *For shipping and handling please add \$8.95 or C\$11.95 for Canadian orders. No purchase orders please.

Name _____

Address _____

City _____ State _____ Zip _____

Day Phone () _____

Evening phone () _____

Disk Size: 3.5" 5.25" (choose one)

Format: DOS Windows Macintosh

Disk Density: High Low (DOS only)

We will ship HD 3.5" Windows disks if boxes are unmarked

Payment: Check or Money Order enclosed

Visa American Express

Discover MasterCard

Card # _____

Exp. Date _____

No, I don't want to order now, but please send me your FREE catalog!

PARSONS TECHNOLOGY
An **Intuit** Company

Product Development Center, One Parsons Drive,
PO Box 100 Hurwatha, IA 52231-0100

Your priority code is 302605E

Available
for Windows,
DOS or Mac



Waltrip leads Jeff Gordon, Terry Labonte and Ricky Rudd down from the banking at the Atlanta Motor Speedway before breaking a valve in lap 187 of the Purolator 500.

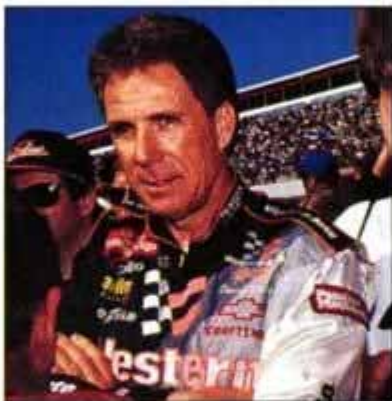
Waltrip said. "I thought I was going to wreck two or three times during my qualifying lap."

Race day was warmer and less damp, and Waltrip quickly improved his position throughout the afternoon. He finished a lead-lap seventh—one of five Monte Carlo drivers to score in the top seven. Even though Ford star Rusty Wallace led 348 of the 400 laps, his car faded toward the end and he finished third behind Chevy drivers Terry Labonte and Dale Earnhardt.

The Purolator 500

The Atlanta Motor Speedway, located near Hampton, Georgia, hosted Round 4 of the series. By now, Ford owners, drivers and crewmen were carping that the Monte Carlo had an unfair advantage because of its superior aerodynamics. They claimed that Ford teams needed a rules concession to close the gap. As things turned out, the Purolator 500 added fuel to those fires.

Waltrip opened up a solid fourth, his best qualifying effort since winning the pole position at Martinsville, Virginia, during the spring of 1992. Chevrolet started the weekend off right by taking the top-5 spots on a track where Fords had won seven of the last 10 races and six of the last 10 poles.



An optimistic Darrell Waltrip is looking toward a brighter future.

Except for one lap, Chevy drivers Gordon, Earnhardt, Bobby and Terry Labonte, Ken Schrader and Waltrip combined to lead all 328 laps. Unfortunately, Waltrip wasn't running at the finish for the third time this year. He led two laps (122-123) during an exchange of pitstops before his engine failed again, this time at lap 187.

"Something fairly serious—it was a valve—broke in the engine," he said. "It was similar to the problem we had at Rockingham a couple of weeks ago. It's really disappointing because we had a 5th- or 6th-place car."

But things promise to only get better later on in the spring. Among Waltrip's 84 career victories (the most among active drivers) are 38 at the tour's next four racing stops: Darlington, South Carolina; Bristol, Tennessee; North Wilkesboro, North Carolina; and Martinsville, Virginia.

Ever the optimists, Waltrip and his crew expect good things before Memorial Day weekend. "Except for Rockingham, we've run good at every race this year," he said. "Some nagging little problems have kept us from finishing races, but we'll get them straightened out."

"This is a winning team, and we intend to win races this year." **PM**



HOW GLENNA GOODACRE LOOKS AT THE WORLD.

Glenna Goodacre is one of this country's most renowned sculptors. In 1991, she was chosen to create the Vietnam Women's Memorial in Washington, D. C. And when it was completed, she began work on another masterpiece: the new home she was building in Santa Fe. Glenna Goodacre could have had any brand of windows she wanted. She chose Marvin. To learn more about the windows that satisfied the critical eye of an artist, call 1-800-346-5128 (1-800-263-6161 in Canada) or mail the coupon for a free brochure.

Complete and mail to:
Marvin Windows & Doors
Warroad, MN 56762
4179506A

Name _____

Address _____

City _____ State _____

Zip _____ Phone (____) _____

MARVIN
WINDOWS & DOORS

Made to order. Made for you.

A true statement by Paul B² of San Pedro, California



"I earned \$1,000 on just 12 VCR repairs in one week!"

**Last name withheld by request.*

How to cash in on the skyrocketing field of VCR repair!

You too can earn up to \$85 an hour, pocket \$200 a day in the high profit field of VCR repair—part-time or full time. There are over 77 million VCR's currently in use in America today. Here is a once-in-a-lifetime opportunity to go into a booming business of your own, be your own boss and enjoy financial freedom and security.

It's easy to learn VCR cleaning, maintenance and repair at home in just a few short weeks through Foley-Belsaw's unique method which emphasizes the mechanics involved in 90% of all repairs, without dwelling on all the unnecessary basic electronics. This exclusive practical hands-on course was developed and proven over a long period of time in an actual VCR repair shop. It combines simple step-by-step lessons with easy-to-follow video cassette guidance. No special experience or electronics background is necessary. And when you

complete the course you will receive the School's official diploma attesting to your expertise.

Send coupon today for FREE Fact Kit. No obligation.

Don't miss out! Send in the coupon NOW. There's absolutely no obligation and no salesmen will call on you.

© Foley-Belsaw Institute 6301 Equitable Road
Kansas City, MO 64120-1395

MAIL TODAY FOR FREE INFORMATION PACKAGE.

**Foley-Belsaw Institute,
6301 Equitable Road,
Kansas City, MO 64120-1395**



Please Check Only ONE of the Following:

- | | |
|---|---|
| <input type="checkbox"/> VCR Repair- 62336 | <input type="checkbox"/> Computer Repair- 64234 |
| <input type="checkbox"/> Locksmith- 12666 | <input type="checkbox"/> TV/Satellite Repair- 31118 |
| <input type="checkbox"/> Small Engine- 52562 | <input type="checkbox"/> Gunsmithing- 92147 |
| <input type="checkbox"/> Upholstery- 81104 | <input type="checkbox"/> PC Programming- 35067 |
| <input type="checkbox"/> Woodworking- 43437 | <input type="checkbox"/> Vinyl Repair- 71044 |
| <input type="checkbox"/> Saw & Tool Sharpening- 21467 | |

Name _____

Address _____

City _____

State _____ Zip _____

Call toll-free 1-800-487-2100

"I started 3 months ago, now earn over \$900 a week."
D.K., New York, NY

"Took in over \$3,200 in the past 10 days!"
H.H., Denver, CO

"Doubled my income within 6 weeks."
R.B., Bakersfield, CA

DOOM VIRUS (Continued from page 54)

tection files for new viruses. These can be downloaded by modem or obtained by mail, and they're free for two years after you've purchased VirusScan (\$129).

The first part is easy too—but you have to do it. VirusScan can be programmed to run in a variety of ways, including automatically every time you turn on the computer. This might not seem necessary if you seldom load new software—you might run a scan only then. Automatic scanning is a fast and painless ounce of prevention

that can spare potential anxiety. When PM ran VirusScan on a PC with some 1200 files, the scan took just over 3 minutes.

One infection no antivirus program can prevent is the boot-virus kind, contracted when booting up an IBM-compatible PC with an infected diskette. In truth, people seldom boot from a floppy these days—startup usually comes directly from the hard-disk drive, assuming the operating system is installed there.

If you must boot from a floppy, it should be only with an original version of the operating system (or

a virus-free copy) from a diskette that has been write-protected. There's a little tab on each diskette that prevents any further recording—that is, it protects it from any software codes that might be subsequently written. If the tab is locked, there's no way an infected computer can spread a virus to the diskette. (Besides having a clean diskette of your system, it's a good idea to make backup copies of your most important files regularly. Sometimes, virus-infected files can be damaged beyond repair, and the only way to restore them is from a healthy copy.)

Some people do boot from floppies. The only way to block a boot-sector virus infection is through hardware that alters the PC's boot-up process in such a way as to permit virus-checking at this early stage.

One such product is McAfee's ROMShield, a read-only-memory chip that can be installed on the Ethernet cards used for networked corporate computers. This technology will eventually come to stand-alone PCs. In fact, Compaq Computer recently introduced its SafeStart Virus Detection. It, too, uses a dedicated microprocessor as front-line defense during the boot-up process. At this writing, SafeStart is available only in Compaq's Deskpro XL computers, sold mostly to corporate users. It's a good bet, though, that the knowhow will migrate to Compaq's Presario line of PCs—and that other computer makers will offer similar products.

Until there's a silver bullet—hardware as well as software—computer users should practice prophylaxis in all software exchanges.

Scan any new program before executing it, no matter how innocent the source seems. Avoid pirated software on pragmatic, if not ethical, grounds. Besides being a popular Trojan Horse, pirated programs sometimes attract their own viruses. Recently, a file-infector virus called Doom II Death delivered fatal blows to computers running illegal copies of the popular game "Doom II." As for shareware, whether via telecommunications or floppy disks, ascertain if the bulletin board or the physical disk has been duly certified by the Association of Shareware Professionals.

By keeping records of programs borrowed or loaned, you can trace a virus you contracted or might have spread. If you do get a dose, report it—either to your antivirus vendor or to the National Computer Security Association (717-258-1816). As with other illnesses, early detection and treatment can prevent the damage from spreading.

PM

TECHNOLOGY UPDATE

500 miles from nowhere, it'll give you a cold drink or a warm burger...

NASA space flights inspired this portable fridge that outperforms conventional fridges, replaces the ice chest and alternates as a food warmer.

By Charles Anton

Recognize the ice cooler in this picture? Surprisingly enough, there isn't one. What you see instead is a Koolatron, an invention that replaces the traditional ice cooler, and its many limitations, with a technology even more sophisticated than your home fridge. And far better suited to travel.

What's more, the innocent looking box before you is not only a refrigerator, it's also a food warmer.

NASA inspired portable refrigerator.

Because of space travel's tough demands, scientists had to find something more dependable and less bulky than traditional refrigeration coils and compressors. Their research led them to discover a miraculous solid state component called the thermo-electric module.

Aside from a small fan, this electronic fridge has no moving parts to wear out or break down. It's not affected by tilting, jarring or vibration (situations that cause home fridges to fail). The governing module, no bigger than a matchbook, actually delivers the cooling power of a 10 pound block of ice.

From satellites to station wagons. Thermo-electric temperature control has now been proven with more than 25 years of use in some of the most rigorous space and laboratory applications. And Koolatron is the first manufacturer to make this technology available to families, fishermen, boaters, campers and hunters—in fact anyone on the move.

Home refrigeration has come a long way since the days of the ice box and the block of ice. But when we travel, we go back to the sloppy ice cooler with its soggy and sometimes

spoiled food. No more! Now for the price of a good cooler and one or two seasons of buying ice, (or about five family restaurant meals), all the advantages of home cooling are available for you electronically and conveniently.

Think about your last trip. You just got away nicely on your long-awaited vacation.

You're cruising comfortably in your car along a busy interstate with only a few rest stops or restaurants. You guessed it... the kids want to stop for a snack. But your Koolatron is stocked with fruit, sandwiches, cold drinks, fried chicken... fresh and cold. Everybody helps themselves and you have saved valuable vacation time and another expensive restaurant bill.

Hot or cold. With the switch of a plug, the Koolatron becomes a food warmer for a casserole, burger or baby's bottle. It can go up to 125 degrees.

And because there are no temperamental compressors or gasses, the Koolatron works perfectly under all circumstances, even

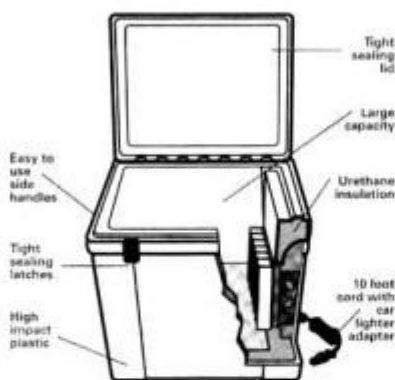
upside down. Empty, the large model weighs only 12 pounds and the smaller one weighs just seven. Full, the large model holds up to 40 12-oz. cans and the smaller one holds six.

Just load it up and plug it in. On motor trips, plug your Koolatron into your cigarette lighter; it will use less power than a tail light. If you decide to carry it to a picnic place or a fishing hole, the Koolatron will hold its cooling capacity for 24 hours. If you leave it plugged into your battery with the engine off, it consumes only three amps of power.



The refrigerator from outer space.

The secret of the Koolatron Cooler/Warmer is a miniature thermo-electric module that effectively replaces bulky piping coils, loud motors and compressors used in conventional refrigeration units. In the cool mode, the Koolatron reduces the outside temperature by 40 degrees F. At the switch of a plug, it becomes a food warmer, going up to 125 degrees.



Limited time offer.

Because Comtrad is bringing this offer to you directly, you save the cost of middlemen and retail mark-ups. For a limited time only, you can get this advanced, portable Koolatron refrigerator at the introductory price of \$99. Call today to take advantage of this special promotional pricing. Most orders are processed within 72 hours.

Try it risk free.

We guarantee your satisfaction with any product from Comtrad Industries. With the Koolatron you get our complete "No Questions Asked" 30 day money-back guarantee. Plus you get a full one year manufacturer's limited warranty. If you are not satisfied for any reason, just return the product for a complete refund.

Koolatron (P24A) holds 30 quarts.....\$99 \$12 S&H
Koolatron (P9) holds 7 quarts.....\$79 \$8 S&H
Optional AC Adapter (AC 10).....\$39 \$6 S&H

Please mention promotional code 022-PO6410.

For fastest service call toll-free 24 hours a day

800-992-2966



To order by mail send check or money order for the total amount including S&H (VA residents add 4.5% sales tax). Or charge it to your credit card by enclosing your account number and expiration date.

COMTRAD INDUSTRIES

2820 Waterford Lake Drive Suite 106
Midlothian, Virginia 23113

SUN POWER!

A new solar-powered camera lets you forget about the batteries.

BY GEORGE SCHAUB

● You're 4-wheeling it on a long back-road journey when the red-rock formations in the distance inspire you to take a photo. You grab your camera from the back seat, aim, press the shutter release and...nothing happens. Another lost shot due to battery failure—and that's the last thing you thought to pack. Being 10 miles from the nearest country store means losing a whole day's worth of pictures. And upon arriving there, the owner can only scratch his 2-day-old beard when you ask him for a 6-volt lithium.

Today's cameras are totally battery dependent—no power means no pictures. While rechargeables can be powered via the cigarette lighter, a special adapter in your car or in the hotel room at night, there are no recharging units for the specialized batteries found in many cameras. (Those that use AAs are okay.)

Now, Canon has come up with an alternative energy source for a camera—solar power. Its Sure Shot del Sol (list price: \$285) has tandem, amorphous silicon cells arrayed on the front of a unique camera body. When they're exposed to sunlight, these cells convert photons to electrons, sending power to a nonremovable lithium ion battery, which in turn powers the camera's autofocus, autoexposure, shutter, flash, film advance and rewind. Canon has made significant advances in micromotors that offer low-power efficiencies and has applied them to this camera's automated functions.

Right out of the box, the Sure Shot del Sol has sufficient stored power to run through four rolls of 24-exposure film, with half of those pictures being exposed with flash. When fully charged, the del Sol can handle six to eight rolls of 24-exposure film. A battery-check button cues you in on battery level during charge or use.



Canon Sure Shot del Sol Features

- A LENS
- B FLASH
- C VIEWFINDER
- D SOLAR PANEL
- E SHUTTER BUTTON
- F SELF-TIMER BUTTON
- G BATTERY-POWER DISPLAY
- H BATTERY-CHECK BUTTON
- I RED-EYE REDUCTION LAMP

Solar energy can charge batteries that run everything from refrigerators in RVs to submersible pumps in the middle of the desert. The panels are the key to efficient power gathering, as the angle at which the rays enter affects the amount of energy collected. New technology has made

the gathering more efficient through the construction of angled, or super-gathering, arrays.

It is photon energy, not heat, that creates the action. But the heat that sometimes accompanies solar charging, particularly in summer

(Please turn to page 132)

MIRAGE™ 7000
NEWEST RADAR TECHNOLOGY:



**Powerful Electronic Shield Cloaks Your Car
 To Make It "Invisible" To Police Radar!**

**SPACE AGE ELECTRONIC RADAR SCRAMBLER PROTECTS YOU FROM POLICE RADAR
 UP TO 15 SECONDS SOONER THAN THE MOST EXPENSIVE RADAR DETECTORS!**



**USE THIS DEVICE TO PREVENT POLICE RADAR FROM
 "LOCKING - ON" TO YOUR CAR. AND, IT'S 100% LEGAL!**

The **MIRAGE 7000** advanced circuitry intercepts all Police Radar, including pulsed radar and the newest "instant-on" guns used in "speed traps." It zaps out Police Radar readings with its powerful signals. And it operates within FCC guidelines, making it 100% legal.*

OUR GUARANTEE !

Try the **MIRAGE 7000** in your car for thirty days. It will defeat all types of Police Radar. If you are not absolutely satisfied with its unique capabilities, and the increased protection that you receive from it, return it for a full refund.

Drivers are urged to abide by posted speed limits and local laws. The **MIRAGE 7000** is recommended for protection against improperly calibrated radar guns and unscrupulous law enforcement only. Both occur in rare instances.

*Some localities interpret the law differently. Be sure to check laws where you drive.

Introducing the **MIRAGE 7000**, a State-Of-The-Art device that uses Electronic "Cloaking Technology" similar to technology used by the U.S. Military in the Gulf War that made our fighter planes "invisible." It is easy to install and it will protect you if you unwittingly exceed posted speed limits.

The unique design of the **MIRAGE 7000** enables it to outperform previous scrambler technology. In controlled tests, the **MIRAGE 7000** proved an average of **400% more powerful than older models** and **900% better against Ka radar** that requires the fastest response time. The **MIRAGE 7000** is built with **24 Carat Gold Plated component circuitry** to provide you with the most sensitive "radar receive signal" obtainable.

Simply plug the **MIRAGE 7000** and your radar detector into the "Duo-Connector"™ (included) and insert the connector into your car's cigarette lighter. Its that easy. The **MIRAGE 7000** will go to work for you instantly. It will jam Police Radar and give you up to 15 crucial seconds of additional protection, ample time to slow down.

MIRAGE 7000 Complete with windshield mounting bracket, power cords, "Duo-Connector"™ and a 30-month extended factory warranty. **Only — \$249** (\$9 S&H)

**ORDER TOLL-FREE
 1-800-688-1200**

Please mention Special Offer # X908
 Or send a check or money order to —

Advanced Radar Technologies

3355 Lenox Road, Suite 750
 Special Offer # X908





That's funny. It doesn't look like a piece of cake.

NO TOUCH WHEEL CLEAN - SPRAY ON - HOSE OFF - ADMIRE WHEELS - ADMIRE FREE TIME

S I M P L E . R E A L L Y S I M P L E .

A TV TURNTABLE

VCR CABINET IN ONE!

We've got the perfect unit for housing your home entertainment system! This space-saving TV/VCR Holder has a convenient 360° swivel base to make TV viewing comfortable from any corner of the room. The unit fits over the top of your VCR, and the casing keeps your VCR protected from dust, scratches and damage.

Where can you put it? Any sturdy surface will do (i.e., countertop, desktop, dresser or chest of drawers). Its anti-scratch rubber base prevents damage to your furniture. Made of durable high-impact ABS plastic, the TV/VCR



Holder houses VCRs measuring as large as 4" h. x 17 1/2" w. x 15" d., and TVs up to 26" in screen size.

869696.....\$49.95

ORDER TODAY!

Call **1-800-223-3073**



Or send check or money order to:

Popular Mechanics
Dept. PMP651
P.O. Box 400821
Des Moines, IA 50347-0821

Be sure to add your state and local sales tax. Please add \$5.95 for shipping, handling & insurance.

months, can damage film and, with the del Sol, may harm the secondary battery. Usually, we're told to keep our cameras out of the sun.

The del Sol keeps the damaging effects of heat to a minimum through an ingenious self-regulating pop-up front panel, which automatically elevates to provide shade when charging in direct sunlight. This happens at temperatures of 80° or above. Yes, you can charge the camera on the dashboard of your car. But even though the inner workings will be protected by the heatshield, the film inside the camera may still bake due to the high ambient temperatures, especially in a closed car during the summer months. And baked film can cause color shifts and odd image effects.

Will the camera charge properly under anything but bright cloudless skies? The lux, a unit of illumination, tells the tale. Direct sunlight yields about 100,000 lux. In shade, it drops to about 30,000. Indoors, near a window, you pick up about 8000 lux on a clear day, and about 4000 on a cloudy day. Indoors, under ambient light conditions, you drop to 1000 lux.

In direct sunlight, the del Sol gets a full charge in about 6 1/2 hours. In shade, it takes about 16 hours. Indoors, near a window on a cloudless day, it can take 67 hours, and if you leave the camera in a room away from a window, it can be as long as 2000 hours. The camera comes with a lux indicator, which may prompt you to move the camera to a more conducive spot for charging. It is also equipped with a battery-power indicator to allow you to judge how many rolls you can expose (with 50% flash shots) at the camera's state of charge.

Since lithium batteries for today's cameras can cost as much as \$15 a pop, the renewable energy provided by the del Sol's solar-power system sure makes economical sense.

And, while solar power is what makes this camera unique, it also has a very usable lens and shutter. The 32mm (moderately wide angle) lens lets you shoot as close as 1 1/2 ft. It has four flash-operating modes, ranging from auto-flash to red-eye reduction to what's called a slow-synchro mode, where the subject and background light level both get considered in the exposure so that you can get natural nighttime shots. It has a slow-shutter-speed warning, which tells you when to steady the camera to avoid shaky-looking pictures, and all the auto-everything features one expects.

The camera is small enough for casual carrying, and attractive with its pearl-white paint job. But the grid of solar cells covering the front is what will cause the most conversation. **PM**

HOME GARDENING BREAKTHROUGH!

AT LAST... A REAR-TINE TILLER ESPECIALLY FOR SMALL GARDENS!

The 4HP JUNIOR® Model

- **SAVES YOU MONEY!** Half the price of larger rear-tine tillers.
- **SAVES YOUR BACK!** Forget spading and raking! The 4HP JUNIOR® Model prepares your garden in a fraction of the time with none of the backache!
- **SAVES HAND WEEDING!** Instant, accurate DEPTH REGULATOR adjusts for shallow cultivation to uproot, chop and bury weeds seeds while you simply guide it up and down between rows.
- **SAVES GARDEN SPACE!** Narrow, 14" tilling width allows you to plant your rows closer together. Grow more in less space!
- **EASY TO USE!** With its tines in the rear and engine out front, the 4HP JUNIOR® Model is so well balanced you can handle it with **JUST ONE HAND®**. It won't shake you to pieces like front-end tillers do!
- **EASY TO TURN AND MANEUVER!** Because the Junior is light and compact (but strong!), you can turn it and maneuver it in tight places with wonderful ease!
- **BUILT TO LAST!** Like our larger models, the 4HP JUNIOR® Model is covered by a Full, No-Time-Limit Warranty — the best in the business!

(For a free copy of the warranty, please write to the address in the coupon.)



There's so much more to know about this wonderfully different and better idea in small garden tillers...like how you can use it to build super-rich soil, no matter what your soil conditions, for a more successful garden!

Why, for heaven's sake, suffer any longer with a FRONT-END tiller like the one shown here - the type with its revolving TINES IN FRONT and NO POWER to the tiny wheels? They shake the living daylights



out of you and make you leave footprints and wheelmarks in the soil. They make gardening **TOO HARD!** But the TROY-BILT® JUNIOR® Model makes it easier and more enjoyable than ever! Send for full details today!

SPECIAL OFFER
Now in Effect!



No more hand weeding!



Turns on a dime!

Please mail the coupon today, or
call Toll Free

1-800-645-8787 Dept. 4793

TROY-BILT®

Dept. A4793

102nd Street & 9th Avenue
Troy, New York 12180

YES! Please send me my FREE Great Gardens Catalog with details on the complete line-up of TROY-BILT® Tillers, plus information on the TROY-BILT® Easy Pay Plan with no-money-down financing for qualified customers.

Please Print

Name _____

Address _____

City _____

State _____ Zip _____

Материал, защищенный авторским правом

Relieve Back Pain!

Frustrated With Your Sleep?

Do you toss and turn at night? Can't seem to find a comfortable position? Does your back ache when you awake? These are signs that your mattress doesn't support you properly.



Select Comfort's patented air cushion design has no springs or coils that can create pressure points and uneven support.



Metal coil mattresses support only the firm parts of your body, creating pressure points, and uneven spinal support.



With Select Comfort, you each get exactly the firmness you need.

Also it keeps your spine in its *natural alignment*. And that lowers the tension in the surrounding muscles. So you can sleep comfortably in any position and wake feeling great.



Select Comfort contours to your body.

Call For More Information

You owe it to yourself to learn more about this revolutionary way to a better night's sleep.

For FREE Video and Brochure, Call
1-800-831-1211

Yes! Please rush me a
FREE Video and Brochure.

Name _____
Address _____
City _____ State _____
Zip _____ Phone _____


SELECT COMFORT™

Mail to: Select Comfort Corporation
6105 Trenton Lane N., Minneapolis, MN 55442
© Select Comfort Corp., 1995 Dept. 4129

Sleep Better On Air

A Select Comfort adjustable firmness mattress doesn't rely on springs or water. Air is better because it gently contours to your body's shape.



The Only
Mattress with
Push Button
Firmness Control.

BATTLE OF THE BOXES

(Continued from page 81)

pay a monthly fee—expected to be less than \$10—will receive a bundle of data services, probably including weather and local traffic reports, news summaries, sports and stock-portfolio updates and a television guide. AT&T will be marketing the HomeCenter in conjunction with banks offering home-banking services through the device. The first institution that AT&T said it would be working with is the New England-based Shawmut Bank.

The HomeCenter could revolution-

ize the way people listen to phone messages. If someone subscribes to Caller ID, he could use the HomeCenter to list messages by phone number or by the name of the caller, if that information were listed in the HomeCenter directory. Armed with this data, the user could listen to his messages in order of importance, not in the order in which they were left.

Another product due out this year literally turns a television into a telephone. The LT-70P, marketed by Casio-PhoneMate, is a video phone, complete with miniature camera, that sits on top of a TV set. Unlike other

videoconferencing systems, it transmits pictures over conventional phone lines. But unlike AT&T and MCI telephones that do the same thing, the LT-70P displays pictures on a conventional television set instead of a 4-in. LCD monitor. One shortcoming of the LT-70P is that it sends only still pictures, updating its portrait of a caller about once every 3½ seconds.

"If you're really looking at someone for body language, you're not going to be able to do that," admits Jim Oblak, vice president of marketing at Casio-PhoneMate. But the LT-70P transmits audio simultaneously with video, and it has a higher-resolution mode (512 x 224 pixels) for sending more critical images. The device also has an input for transmitting an image from a source other than the camera, such as a VCR. The LT-70P is due in June at \$1280 per unit.

Meanwhile, manufacturers are developing cable modems and other hardware necessary to put subscribers like Dana Law online through their cable wire. The modem that Law is using comes from Zenith. Other companies developing modems include Intel and LANCity.

But getting a cable modem up to speed involves more than putting it into a subscriber's home. Though Law's modem is rated at 500 kilobits per second—more than 30 times as fast as a 14.4-kbps telephone modem—Law says that it's running a lot slower than that, closer to only two or three times faster than a 14.4 modem.

Putting modems onto a cable system requires fine-tuning the cable network, says Steve Gautereaux, vice president of technical development for Cox Cable Communications. For example, a problem with outside cable wiring—or even faulty wiring in a neighbor's home—can enable noise to leak into the system and lower the speed of a cable modem.

Aside from ironing out technical problems, another factor that may slow the spread of cable modems is their current cost. List prices now start at about \$500, and Gautereaux says, "They need to get to around \$100 to make it a business."

But for Law—who doesn't have to pay extra to Prodigy or Cox for this high-speed access—the appeal of the new, speedy modem is obvious, especially when he uses Prodigy to surf the graphics-intensive portion of the Internet known as the World Wide Web. A slow modem makes downloading files time-consuming. Law, of course, is already somewhat jaded. "It's a graphics nightmare," he says of the Web. "I don't even bother using the World Wide Web at 14.4."

Speed rules.

PHOTO BY [unreadable]

PM Buyer's Guide

For advertising rates please call or write: Barbara Jones, Mail Order Manager, 224 W. 57th Street, New York, NY 10019.
Phone: 1-800-669-1251 or 212-649-3136; Fax: 212-586-5562

Concrete Dome Kit **1(800)608-0001**
Monolithic Constructors, Inc. Free Brochure or Video \$19.95
PO Box 479-M • Italy, TX 76651

Build your own super strong concrete Monolithic Dome™! As an office, home, shed, cabin, rental unit, anything! Cost / Energy Efficient.



Cycle-Flyer MAN POWERED SAILPLANE
Kits from \$499
Glide Ratio of 35:1 @ 250 lb
Lightweight, Low Cost and Easy to Build

Complete Blue Prints & PLANS \$ 14.95 add \$ 3 postage (foreign add \$ 5)

Cycle-Flyer, Inc.
19672 Stevens Creek #264-A, Cupertino, CA 95014

European Award Winning Design



An Affordable, Personal Helicopter

The **Mini 500**

Performance Above and Beyond Your Expectations!

110 MPH
One Week Assembly, Unique Patented Control System

Info Package Catalog \$115
Action Video \$30
Info Pack & Video Combo \$40
PAL (European Format) Video \$45
Info Pack & PAL Video Combo \$55
(Foreign orders add \$10 for S&H)

Revolution Helicopter Corp.
1905 W. Jesse James #19J
Excelsior Springs, MO 64024
Customer Service or Questions Call (816) 637-2800

MasterCard VISA

1-800-637-4867



Celebrate July 4th & All Events
CARBIDE CANNON
BIG BANG! **\$119.95**

Mammoth Cannons shoot with terrific BANG! Have a bang-up time at special events. Uses powdered carbide ammo. Hundreds of shots for few cents. All metal construction with large, rugged cast-iron wheels. Machined brass mechanism for easy loading and firing. Authentic turn-of-century design. Handsome decor when not in use. Made in USA to last a lifetime. Available in 3 sizes: 9" cannon, \$49.95 postpaid; 17" cannon, \$89.95 postpaid; 25" cannon (shown here) with rapid firing and automatic loading, \$119.95 postpaid. The larger the cannon the louder the bang! Carbide ammo, about 100 shots, \$6.00; 3 packs for \$15.00. Send check, money order or call. Visa, MasterCard accepted by mail or phone. Give card number & expiration. Money-back guarantee. Send for FREE CATALOG!

The Conestoga Co., Inc., Dept PM, PO Box 405, Bethlehem, PA 18014
★★ Call 1-800-987-BANG (2264) ★★



NEW! Revolutionary File Makes Steel Files Obsolete!

- 3 Powerful Files in One: Coarse, Medium & Ultrafine!
- 100% Diamond Abrasives File & Shape Anything!
- Unique Magnalok™ Magnetic Holder
- Also the Ultimate Sharpening Stone!

EdgeCraft™
Diamond File Set 420



Available at most Sears, participating ACE®, TrueValue®, and other fine hardware stores.

For a store near you:
(800) 342-3255

Patents pending © EdgeCraft 1993

FINALLY!

FULL-COLOR 3-D VIDEO WITHOUT HASSLES

Virtual Videos™ compatible 3-D video

- No double images
- No smearing
- No attachments
- No eyestrain

The premiere "scenic wonders" triple feature:

1. "The Grand Canyon in Depth"—gorgeous!
2. "The Sculptures of Bryce Canyon"—beautiful!
3. "Zion Video Venture"—magnificent Utah!

Two pairs of Virtual Videos 3-D glasses included.



All three Virtual Videos in 3-D on VHS — \$29.95

Call toll-free now: 1-800-VIDEO-3-D
VISA and MC accepted

\$489 12 x 20 x 8 **INSTANT WORKSHOP** **22 x 20 x 8**

PATENT PENDING

COVER IT™ INSTANT GARAGES ALL WEATHER SHELTERS

30 Day Money Back Guarantee!

2 YEAR WARRANTY

FREE DOOR!

BUY FACTORY DIRECT AND SAVE!

PROTECT BOATS! **STARTING AT \$199**

INSTANT PROTECTION FOR: Cars, Trucks, Boats, RV's, Motorcycles, Paint booths, Docks, Pools, Workshops, Gov't. and Industrial Contracts, Sandblasting, Camp or Temporary Shelter, Walkways, Hot Tubs, and More! **HEAVY DUTY** Galvanized Steel Frame. Durable Dupont® Cover with Zipper Door. Sizes available from 5' to 60' Wide, up to 30' High, Any Length. Withstands Rain, High Winds, Sun, Sap & Heavy Snow. Assembles and Anchors Quickly & Easily. No Property tax or permit required. Survived Hurricane Andrew! Canadian Weather Tested!

COVERS LAST UP TO 20 YEARS. WE SHIP TO YOUR DOOR.

GREENHOUSES!

SOLAR ELECTRIC PANELS

POWERGLASS \$79.95

360 mA at 14.5 VDC
17.5" x 16.0" x 1.25"
3.8 lbs.

POWERGLASS PLUS \$99.95

700 mA at 14.5 VDC
39.0" x 15.0" x 1.25"
9 lbs.

Meet your small power needs without noise, pollution, fuel costs, or electric bills with **POWERGLASS** and **POWERGLASS PLUS** Solar Electric Panels from SECO.

To order call 1-800-700-1867

Cable TV Descramblers *Converters & Accessories*

For the amount of money you spend each year on cable rental, you could own your equipment.



YOU NOW HAVE A CHOICE...

save money by purchasing your cable equipment. Access all premium and basic channels. We offer the lowest prices on all major brand names including Zenith, Jerrold, Scientific Atlanta, Tocom, and Pioneer. **FREE 30 day trial period and 1 year warranty.** So, if you are tired of the rising cost of cable TV...

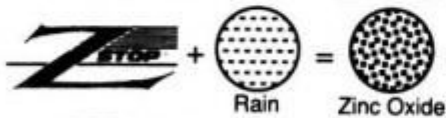
800/334-8475

MasterCard • VISA • AMX • COD

Call for your free catalog today
Add-on Cable Company

Life Insurance For Roofs

Information & Price * 1-800-845-5863 * Fax 206-745-9529



Moss, Mildew & Fungus Inhibitor
100% Natural Fungistat
E.P.A. Registered 55500-1
Safe for Pets & Plants
Easily Installed on Old & New -
Wood or Composition Roofs



Only
\$32.99 each
50 ft. Roll W/Nails



Easy to Install
Avg. Roof - 3 Coils

Mfg. by:
Wespac
P.O. Box 46337 - Seattle, WA 98146
(Dealer Inquiries Invited)

Visa & Master Card
Accepted

CABLE TV DESCRAMBLERS

JERROLD, SCIENTIFIC ATLANTA, ZENITH, TOCOM, PIONEER, HAMLIN, PANASONIC

- * **ONE YEAR WARRANTY ON ALL PRODUCTS IN WRITING!**
- * **BUY 2 SAVE 10% ON SECOND UNIT.**
- * **EASY TO INSTALL INSTRUCTIONS WITH EVERY ORDER.**
- * **FRIENDLY, COURTEOUS SERVICE.**

WE GUARANTEE YOUR COMPLETE SATISFACTION WITH A 30-DAY NO-RISK TRIAL PERIOD.

TKA ELECTRONICS
7914 W. Dodge Rd. #334
Omaha, NE 68114



FOR A FREE CATALOG OR TO PLACE AN ORDER CALL:

1-800-729-1776

MAKE \$90/HOUR **FREE INFO**
SAVE BROKEN, SCRATCHED OR CRACKED WINDSHIELDS & PLATE GLASS
Our Hi-Tech Optikleer system repairs most glass breaks in seconds without removal at 3500% profit. Easy to learn. Low investment.
CALL NOW - TOLL FREE **800-695-6224**
NVS/OPTIKLEER DEPT. PM
P.O. BOX 8065, LYNN, MA 01904-2535 (617) 595-6224

Make and Sell Your Own Ornamental Concrete Items!



Book about Aluminum Molds including over 425 designs, prices and production trade secrets from the world's largest mold manufacturer.

Book only \$10

CONCRETE MACHINERY CO., INC.
P.O. Box A99, Hickory, NC 28603

Satellite-TV **FREE**
100% Satisfaction Guarantee
64 Page Catalog/Buyer's Guide
Systems from \$499
Let Us Help You Select Your New Satellite TV Entertainment System
Over 1 Million Depend on Skyvision®
1-800-334-6455
Int'l 218-738-5231 Fax 218-738-4879
Skyvision, Inc.®
1020 FRONTIER DRIVE
FERGUS FALLS, MN 56537
INSTALL OR UPDATE YOURSELF!

FLY...
For \$5,495, Now it's possible to buy the best for less! Capitalize on the engineering expertise of the world's oldest light hovercraft manufacturer. Whether your interest is in hovercraft for recreational, commercial, tourist, or disaster-relief purposes, send \$11 (refundable) for our comprehensive info pack. Discover how affordable it can be to fly! Visa or Mastercard. Foreign orders add \$4 S/H.
Neoteric Hovercraft Inc.
1649 Topcorcoran Street, Terre Haute, Indiana USA 47807-2304
Fax: 812-834-3817 Phone: 812-834-1100 140

The TSI Power Bike Kit is driven by a tough 21cc, two-cycle gasoline engine. Unit comes with an over the center lever to engage drive wheel. Throttle control that you route to handle bars, centrifugal clutch, recoil starter, operators manual, installation instructions and 90 day warranty. Top speed is 15 mph. \$329.99
*Shipping \$22.99
Call or Write: TSI P.O. Box 4121
San Luis Obispo, CA 95408 800-833-7112

Wet basement? Here's the solution
Simple to Understand - Step by Step VIDEO
Solves Leaking Basement Problems
Viordi Corp. \$29.95
Flushing, NY + 4" Shipping & Handling
1-800-430-0118

Descramblers
3 Year Warranty with Trade-Up option!
Elite Electronics HUGG Savings! 30 Day Money Back Guarantee!
Free Catalog
1-800-682-9968

LIGHT ACTIVATED SOCKET



Never enter a dark house, apartment or garage again. No complicated timer to set. Turns off manually with a slide switch or by itself within 55 minutes of daybreak.

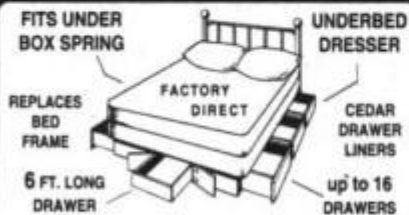
**EASY TO INSTALL!
JUST SCREWS INTO
ANY EXISTING SOCKET**

The Light comes on when it gets dark. Indoors or Out!

No. 455 Set of 2 Safety Sockets—**\$21.95** plus \$4.80 Shipping and Handling

HAMPSHIRE ELITE PRODUCTS
146 MAIN STREET, SUITE 165 • SALEM, NH 03079

Anderson™ BEDROOM ORGANIZER



PUT A DRESSER UNDER ANY BED - FROM \$159

FREE CATALOG 1-800-782-4825

BEST DEALER PRICING!

30 DAY FREE TRIAL! CABLE DIRECT

**DESCRAMBLERS
CONVERTERS • FILTERS**

**COPY RENTAL TAPES WITH OUR
VIDEO STABILIZERS**

Now you can tune-in to your favorite cable TV programming and **SAVE \$100'S - EVEN \$1000'S** on premium CALBE TV EQUIPMENT.

FREE Cable TV Catalog. 1 YEAR WARRANTY

**100%
MONEY BACK
GUARANTEE!**

MODERN ELECTRONICS
1-800-906-6664

2125 S. 156TH CIRCLE • OMAHA, NE 68130

LASTS A LIFETIME



**STEEL
BLDG'S**

SAVE UP TO 45%

Buy factory Direct: 20 x 36 • 25 x 42
Build it yourself! 35 x 56 • 50 x 124

800-888-4606



KEYLESS ENTRY LOCKS

**HIGH SECURITY DOOR LOCKS
NO KEY CONVENIENCE**

ALL MECHANICAL 1" DEADBOLTS DEFY FORCIBLE ENTRY OR AUTOMATIC LOCKING DEADLATCH
4 OR 7 DIGIT COMBINATIONS

EASY INSTALLATION

1-800-288-4234 or FAX 407-328-9877

MOD. LT 8102

PRESO-MATIC Keyless Locks

OWN A MACHINE SHOP

Do your own machining and shop work with a Smithy 3-in-1 Lathe • Mill • Drill



**FIX IT
YOURSELF!**

- Easy to use!
- Save Money!
- Save Time!
- As low as \$1095

For **FREE** Catalog Call:
1-800-4SMITHY

1-800-476-4849
(Ask for operator PM)

Smithy

or write:
Smithy Dept. PM
3025 E. 2nd Street
The Dalles, OR 97058

RADAR JAMMERS

"EVERY DRIVER SHOULD HAVE ONE"

NO MORE TICKETS!!!

WITH THE ALL NEW: **MIRAGE 2001**

HOW IT WORKS

The Mirage uses electronically generated white noise interference to scramble target radar-signals. Radar guns cannot compute a signal that has been affected by white noise interference and will not display any speed. The Mirage 2001 installs like a detector and comes complete with adj. mount and auxiliary power cords. Also the Mirage uses the latest advances in passive jamming technology which are 100% FCC legal!

- 30 month warranty
- Movable vacuum attachment
- Zaps RF jamming circuit
- 100% FCC legal



FREE!
80 pg. book on
BEATING
RADAR
TRAPS
(with Mirage)
\$249
plus S&P

ORDER TOLL FREE:
1-800-732-0044

T.E.R. DISTRIBUTORS
PO BOX 22287 • PROLEY, WA 98422

ROLL-TOP-COVER™



For a free brochure, call or write:
PACE-EDWARDS CO., Dept. F
2400 Commercial Blvd. • Centralia, WA 98531
1-800-338-3697

**Just the thing for people
who want to get weather
information first hand!**



Over 20
Features

THE WEATHER WIZARD III!
With Wind Speed and Direction,
Temperature, Wind Chill, Highs
and Lows, Alarms, Optional
IBM and Mac Interface

Plus Compass Rose

\$75 Rainfall Option

ONLY \$195.00!

(Plus \$8.00 Shipping & Handling)

Actual
Size:
5 1/4" x 5 1/4"

For more information or a free catalog, call

1-800-678-3869

PM25U

TRIMMER USERS!



WHY do it
the HARD
WAY?

You'll LOVE

this totally new kind of TRIMMER ON WHEELS compared to the hassle of using a hand-held trimmer like the one above! The DR® TRIMMER/MOWER rolls "light as a feather" on two BIG WHEELS! TRIMS better, far more precisely than hand-held trimmers. Plus, MOWS everything from whole lawns (even wet!) to tough, waist-high growth with incredible ease! Rocks, roots, stumps, etc.

do it no harm, because the DR® has no steel blade to bend, break or dull! Perfect for use with riding mowers: takes the place of both your hand-held trimmer & small-wheels walk-behind mower for finish-up trimming and mowing. A delight for anyone to use!

**Please mail
coupon below
TODAY for
FREE
DETAILS!**



**TOLL
FREE
1(800)**

231-4466

YES! Please rush complete **FREE** DETAILS of the Revolutionary **DR® TRIMMER/MOWER** including prices of models with and without Electric-Start and "Off-Season" Savings now in effect.

Name _____ PM
Address _____
City _____
State _____ ZIP _____

To: **COUNTRY HOME PRODUCTS®**, Dept. 391
Ferry Road, Box 89, Charlotte, VT 05445

WATER WELL DRILL KIT



Thousands of happy gardeners and homeowners have discovered the Hydra-Drill secret. They drilled their own wells and their gardens prove it! You can, too. Call or write us today and we'll send you a big, free package of information about drilling your own well with the Hydra-Drill.

Call Toll Free
1-800-333-7762

(Ask for Operator 7718)

Also, ask about our "How To..." videotape!
Or Clip Coupon and Mail Today!

DeepRock

7718 Anderson Road
Opelika, AL 36802

YES! Send the FREE INFORMATION PACKAGE, and the illustrated guide **HOW TO DRILL YOUR OWN WATER WELL.**

Print Name _____

Address _____

City/State/Zip _____

Phone (must have) _____

© 1995 DeepRock

World's **Tiniest** **HOMEBUILT HELICOPTER**

Super-easy, low-cost construction!

This tiny marvel flies like the big ones, yet is the smallest and simplest piston-engine helicopter ever developed!

• Carries one person • Can be stored anywhere • Powered by Go-Kart engines • License free

Complete G-1 Plans:

Only \$24.95

(Add \$2 post. Foreign add \$1)

YOUR ORDER INCLUDES A

HELICOPTER EXPERIMENTER BOOK &

A HOMEBUILT HELICOPTER CATALOG

Catalog only \$10

Order from **VORTECH, Inc.**

PO Box 511-P • Fallston, MD 21047

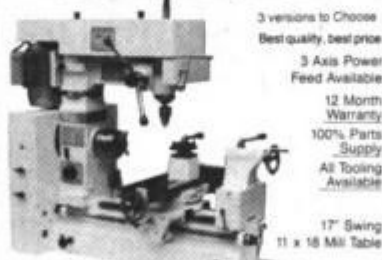
24-HOUR ORDERLINE: **1-410-583-6366**



SHOP-TASK

MILL - LATHE - DRILL

The Original Home Machine Shop
Designed in USA by Shoptask



3 versions to Choose

Best quality, best price

3 Axis Power

Feed Available

12 Month

Warranty

100% Parts

Supply

All Tooling

Available

17" Swing

11 x 18 Mill Table

1-800-343-5775

FREE BROCHURE

DEMAND THE BEST

SHOPTASK P.O. BOX 186, ABERDEEN, WA 98520

SINCE 1981

TELEPHONE LISTENING DEVICE



Record telephone conversations in your office or home. Connects between any cassette or tape recorder and your telephone line. Starts automatically when phone is answered. Records both sides of conversation. Stops recorder when phone is hung up.

\$19.95 EACH (By Our Mail)



Super Powerful
FM TRANSMITTER

Many times more powerful than other transmitters. Transmits up to 1/2 mile to any FM radio. Easy to Assemble Kit - up to 5V battery (not incl.) For catalog of Transmitters, Voice Scramblers and other specialty items, enclose \$2.00 to USI Corp.

Call 807-725-1000 or mail \$19.95 + \$1.00 shipping per item to: USI Corp., PO Box #M-2052, Melbourne, FL 32902 CDDY, OK.

CABLE TV CHANNELS

EQUIPMENT **GUARANTEED**

Direct! **FREE 30 DAY TRIAL**

The nationwide source for cable TV equipment.

"BUY WHERE THE DEALERS BUY."

FREE TV Cable Descramblers and Converters Catalog. Open Every Day!

YOUR VCR TAPES CAN PLAY AS CLEAR AS DAY!

UNJAM NOW WITH Video Decoder

• Easy Connections • Eliminates "jamming" • Copy any tape • RC Plugs Included

• 2 Year Warranty • 30 Day Money Back Guarantee

MEGA ELECTRONICS

VISA • MC C.O.D. **1-800-676-6342** SAVE 1000's

21 S. Main St., Winter Garden, FL 34787

OWN YOUR CABLE TV CONVERTERS

FULLY GUARANTEED **FREE GIFT** On First Order

BEST PRICES for... Panasonic, Pioneer, Jerrold, Zenith and More Brands...

CALL FOR FREE CATALOGUE

CABLEZONE

1-800-909-4333

GO KARTS

FUN KARTS • MINIBIKES
ALL TERRAIN KARTS
ENGINES • KITS • PARTS



LARGEST SELECTION DISCOUNT PRICES

88 PAGE CATALOG \$3.99
Order the catalog by phone on VISA or MasterCard or mail \$3.99 to address below. Catalog sent by 1st Class Mail.

KW KART WORLD DEPT. M

1488 MENTOR AVE., PAINESVILLE, OHIO 44077

PHONE (216) 357-9998

CABLE T.V. EQUIPMENT

Why Pay High Rental Fees?

Replacements for all models. 60 day unconditional money back guarantee. Low Prices. Ship within 24 hours. S.S.A.E. for free catalog. Visa, MC, COD. Let our experience work for you.

1-800-243-3967

SKYLINE SYSTEMS INC.
114 S. Euclid Ave.
Park Ridge, IL 60068

NU-TEK ELECTRONICS

Leading the way to excellence

Cable TV Converters and Descramblers

BEST SELLER

SUMMER SPECIAL
ONLY \$279.00



STARGATE SST

Features include:

- Upgradeable card slot
- Volume control
- Parental control
- Audio/Video ports
- Sleep timer

OFFER EXPIRES ON JUNE 30, 1995

1-800-228-7404

FREE CATALOG

UPS Express Mail

Never Suffer the Aggravation of bump Feed Heads again

Get a **WEED HOG™**

"Simple is better" Weed Hog keeps it simple, keeps you trimming

Fits All Gas Trimmers

- Designed for heavy duty trimming
- Four (1.30ga.) star-shaped cutting line — Extra tough for trimming chain link fences, trees, brick or stone
- Never wrap line spools again

\$26.95
S/H 3.50
30.45

CHECK or MONEY ORDER
EXTRA LINE
(S/P) ADD 3.99

Note: Send Trimmer Name & Model No. To: Department PM-6
E & L Products • 6261 27 Avenue Forest Blvd
Jax, Fla 32244

TAN AT HOME!



Home and Commercial

SunQuest

WOLFF TANNING BEDS

Buy Direct and Save Up To 50%
New and Used Units

Call for a FREE Color Catalog!

1-800-462-9197

COMPUTER ERASE BAD CREDIT FREE

INSTANTLY!

Add tens of years of AAA credit in your credit file

"OVERNIGHT" 100% Legal **FREE DETAILS:**

FBI, DMV (DUI) Gold (PM)
Files too .. P.O. Box 15574
Beverly Hills, CA 90209

NOVELTY SKELETON KEY
Amaze Your Friends

You Get 3 Sized Tension Keys, Precise Instructions, & MORE.
Note: This device is to be used for demonstration purposes only!
Satisfaction Guaranteed or Full Refund; 2 weeks delivery. To get this exciting device, Send Now ONLY \$8.95 + \$2 S&H to: Safe Marketing, 90 W. Montgomery Av No.366F, Rockville Md 20850

FREE P.H.D!
ACCREDITED DEGREES
MINISTERIAL LICENSE
PROFESSIONAL DIPLOMAS
Psychic • Hypnosis • Counseling • & More!
Rush Name & Address To:
P.U.L.C. • BOX 276265-PM • SACRAMENTO, CA 95827

Cable TV Descramblers
Converters • Filters • Accessories

30 day Free Trial - NO RISK!
Unbeatable wholesale prices!
Affordable extended warranty
1 Year Warranty on all products

Free Catalog

Call the cable professionals!
Credit Cards Welcome!

1-800-379-3976

Prices starting as low as \$99!

CABLE T.V. EQUIPMENT
10 Years Experience
Zenith, Jerrold, Scientific Atlanta
Pioneer, Tocom
Test Aids Available
30 day money back guarantee
Visa / MC / COD

Call for a price

NEWTRONICS
800-256-2880

Incredible 20 PROJECTS of PVC PIPE
GO-KART / BAJA / FORMULA ONE / HOVERCRAFT / SNOWMOBILE / SAILBOAT
LANDSAILER / GREENHOUSE / GAZEBO / SWIMMING POOL / & MORE.

PVC PIPES ARE EASY TO CUT/FIT/ALIGN / JOIN
LOW-COST, DURABLE & GOOD-LOOKING !!

Collection of detailed plans for all 20 projects
BOOK \$ 13.95
plus \$ 6 postage

To: PVC DESIGNS P.O. BOX 36674-A, HOUSTON, TX 77238

SUBMARINE Dry type, air supplied by a scuba tank. Powered by a 12-volt electric motor. Experience the thrill of under-water flying !! Kits available from \$500.

Homebuilt Submarine Guidebook FREE with your order

Complete construction prints BOTH 2 AND 4-MAN VERSIONS
PLANS \$ 15 + \$ 3 postage

PowerSub Corp.
P.O. Box 741196, Houston, TX 77274

SPYVIEWER \$5.00 EACH (POSTAGE PAID)

- 200° WIDE-ANGLE DOOR VIEWER
- CRYSTAL CLEAR, NO MORE BLIND SPOTS
- EASY TO INSTALL, 9/16" HOLE SIZE
- FIT 1 3/8" TO 2 3/16" DOOR THICKNESS
- HIGHEST QUALITY BRASS MATERIAL
- CHOOSE FROM THREE FINISHES: POLISHED BRASS, ANTIQUE COPPER, OR BRIGHT CHROME (PLEASE SPECIFY)

POLING & COMPANY, INC. 3688 GRAVEL DRIVE, FT. WORTH, TX 76118

CABLE TV DESCRAMBLERS
• Quantity Discounts • 24 Hour Shipping
• Save Money, Don't Rent
NOBODY BEATS OUR PRICE
Call Us Last For Best Price
1-800-677-0321
Anyone implying theft of service will be denied service
VIDEO CONNECTIONS, INC. - NO FLORIDA SALES



Put It Up With Nothing Down!

No down payment and attractive construction financing when you purchase a Miles home.

When you build with Miles Homes, you can build the home of your dreams with no down payment on our materials or the money for subcontracted work. Because at Miles Homes, we believe attractive financing should be a standard feature with every new home.

MILES HOMES

Call 1-800-343-2884, Ext. 1 for a free consultation
Miles Homes Services, Inc. 150

The amazing walk-behind brush cutter!
The DR® FIELD and BRUSH MOWER

CLEAR & MAINTAINS meadows, pastures woodlots, wooded and rough non-lawn areas with ease. CUTS tall grass, weeds, brambles, tough brush and saplings up to 1" thick.

CHOPS/MULCHES most everything it cuts. Leaves NO TANGLE of brush to pick up like hand-held brushcutters and sicklebar mowers. Perfect for low-maintenance wildflower meadows, European-style woodlots, walking paths, or any area you only want to mow once a month or once a season!



TRY FOR 30 DAYS RISK FREE

Please mail this coupon TODAY for complete FREE DETAILS of the DR® FIELD and BRUSH MOWER including prices, specifications of Manual and ELECTRIC-STARTING Models, and "Of Season" Savings now in effect. There is no obligation

Name _____
Address _____
City _____ State _____ ZIP _____
To: COUNTRY HOME PRODUCTS*, Dept. 391
Ferry Road, Box 89, Charlotte, VT 05445

Don't Lose Your Head Over High Cable TV Bills!



Owning your cable equipment saves you the high cost of monthly rental charges and gives you complete control of your TV.

We have the Best in

CONVERTERS and DESCRAMBLERS

Everquest • Panasonic • Jerrold • Zenith • Pioneer
Scientific Atlanta • Oak • Eagle • Hamlin • Tocom

1 800 624-1150



875 S. 72nd St. • Omaha, NE 68114



LET US OFFER YOU A WORLD OF SAVINGS..

NEW



INTELESTAR
ACCEPT NO
SUBSTITUTIONS

UNIVERSAL CABLE TV CONVERTER & DESCRAMBLER

- DEALER INQUIRIES WELCOME
- FULL WARRANTY
- NEW INTELESTAR®
- PICTURE IMPROVING ENERGIZER CABLES
- BULLET PROTECTORS & IMMUNIZERS
- WE CARRY ALL MAKES AND MODELS

MEMBER OF THE NATIONAL CONSUMER CABLE ASSOCIATION



Order Toll Free:

800-835-2330

Order by C.O.D., Check-Via-Phone or VISA / MC
Please have the make and model # of the equipment used in your area.

MULTI-VISION ELECTRONICS INC.

Multi-Vision
Cable TV & Video Equipment

FREE CATALOG

1-800-835-2330

INTELESTAR, JERROLD, STARGATE, PANASONIC, ZENITH, PIONEER, SCIENTIFIC ATLANTA, TOCOM, & PICTURE-IN-A-PICTURE are all registered trademarks. All references to the above mentioned equipment is for identification purposes only, we are in no way implying that any of the products in our ad originate equipment. Multi-Vision Electronics is in no way affiliated with the above mentioned companies or corporations.

Jet Power up to 37 lbs. of thrust!

BUILD THIS AMAZING JET ENGINE IN YOUR OWN HOME SHOP!

Jet power for • 1-PERSON HELICOPTERS • AIRPLANES • JET PACKS • GO-KARTS • BIKES • ROCKETRY

Complete Pulsejet Plans **ONLY \$20.95** plus \$3 p/h — \$6 foreign

FREE with your order! (A \$15.00 Value)

24-hour Creditcard line

Order from: **Windsprite • PO Box 145-P Long Green, MD 21092** (410)836-8824

WE DARE YOU...

to find a more intense experience than a SportsSub dive. This is not a "wet suit". No breathing or dive gear is worn. Take your friends for rides, 2 & 3 person models. In production since 1987. Now build your own from a kit for half the price! Into pkg \$89.95, 20 min. action video \$24.95, or both for \$29.95. Outside N.A. add \$15.00. U.S. dollar money order or Visa only. International VentureCraft Corp. 1225 E. Sunset Dr. Suite 500 Bellingham, WA 98226-3529 Order line or Fax: (804) 436-5657

MAJOR APPLIANCE REPAIR MADE EASY!

- Refrigerator Repair Under \$40
- Washing Machine Repair Under \$40
- Clothes Dryer Repair Under \$40
- Dishwasher Repair Under \$40

Easy-to-Follow • Quick Diagnosis Method Learn Insider Secrets That Save You \$\$\$!

1-800-251-8090

OR SEND CHECK/MONEY ORDER TO:
New Century Publishing, P.O. Box 988 • 14000 E. 1st Ave. • Denver, CO 80231, USA

KARTING CLUTCHES

#35 or # 40/41 Chain Needle Bearing 5/8", 3/4" or 1" Bore

Finally, a dependable fun karting clutch that lasts!

NORAM, P.O. Box 09338, Milwaukee, WI 53209

Phone Orders: 1-800-996-6726

Storage • Shop • Office • Etc.

Factory-Direct • Pre-Packaged **STEEL-FRAME Buildings**

PRICE SLASH

Limited Offer Save THOUSANDS



- 100% Usable Space
- Build it yourself & save



You get: #1 Grade steel Frames & Endwalls; high-strength Sheeting, deluxe Trim package; simple, step-by- step Assembly Directions!

LIMITED-TIME BARGAINS (Call for others)

27 x 36' - Value \$8,061 - NOW \$4,134
34 x 48' - Value \$12,630 - NOW \$6,468
42 x 60' - Value \$17,940 - NOW \$9,198
48 x 72' - Value \$26,150 - NOW \$13,398

CALL FREE **1-800-843-8275**
(FAX 612-544-1835)

MIRACLETRUSS™ PM

Call or Write for full color literature showing tools for making Ornamental Iron



SHOP OUTFITTERS
Manufacturer of Compact Metalworking Tools You Can't Buy Just Anywhere

605 South Adams St. (307) 745-5999
Laramie, WY 82070 FAX (307) 742-5999

VERY UNIQUE VIDEOS

ONE DOLLAR ANY SUBJECT State Your Preference

FREE Videos Under A Buck CATALOG with 3 FREE VIDEOS bonus offer for all new customers \$3 Shipping

10 VIDEOS \$10
EXTRA SPECIAL 40 VIDEOS Only \$29

MOVIE LIQUIDATORS Dept. PM65 Box 85311 Los Angeles, CA 90072

SURVEILLANCE & COUNTERSURVEILLANCE Electronic Devices

Hidden Video Cameras • Electronic Kits • Voice Changers
Bug and Phone Tap Detectors • Shotgun Mics • Micro Recorders
Vehicle Tracking • Locksmithing • AND MORE!

Extra Long Play Telephone Recorders - Silently Tapes \$125.00
Incoming Outgoing Phone calls automatically...

SDY OUTLET FOR CATALOG SEND \$5.00 TO...P.O. Box 337 Buffalo, NY 14226 (716) 891-3478 - (716) 895-8860

CABLE TV BLOWOUT

NOVAVISION & MILLENNIUM 3G
Revolutionary new universal one-piece converters and descramblers. Fully activates all Jerrold, Scientific Atlanta, and Pioneer systems except baseband.

Options include:

- Picture in Picture
- Simultaneous watch/record
- Channel ID
- Volume/Mute
- Parental control
- On-screen display
- Stereo
- Last channel recall
- Favorite channel
- Ch 3/4 switch

All Other Models Available
30 Day Free Trial • 1 Year Warranty
Best Dealer Prices Available Anywhere!

Jerrold, Scientific Atlanta, Pioneer are registered trademarks and all references are for identification purposes only.

"The Originals"
JERROLD® TvT & TNT
ACTIVATES ALL JERROLD EXCEPT BASEBAND

SCIENTIFIC ATLANTA® M80
ACTIVATES ALL SCIENTIFIC ATLANTA EXCEPT BASEBAND

NEW IMPROVED!!!
PIONEER® PIO-III
WORKS ALL PIONEER SYSTEMS

Call for your FREE brochure today!

MicroCom Inc.
800-665-2002
MasterCard • VISA • AMX • COD

CABLE TV DESCRAMBLERS

Best Prices in the U.S.A. We Will Beat Any Price!



Jerrold, Scientific Atlanta, Panasonic
Pioneer Green, FTB3, SA3, Super-Pio

Jerrold Impulse & Starcom series (Stealth)
Sci. Atlanta inc. 8536/+ 8580, Drop-field (M80)
FAST SHIPMENTS FREE CATALOG
30 DAY MONEY BACK GUARANTEE
1-800-818-9688 M-F 9-5 EST
U.S. Cable TV, Inc., Dept.: KPM065
4100 N. Powerline Rd. Bldg. F-4 Pompano Beach FL 33073

MICRO HELICOPTER

Designed by NASA Engineers
Complete unit, parts available
Fully assembled
under \$900

MOST INNOVATIVE DESIGN

Powered by two
opposed gas engines.
Eliminate tailrotor, clutch,
reduction gears & assoc.
linkages.....



Take off & land
everywhere!!

No license needed
easy & safe to fly
Max. 941 ft. min.

B-EZ Engineering
P.O. Box 1675,
Stafford, TX 77497

Fully Illustrated & Detailed
PLAN \$ 15 - \$ 2 postage

Low Budget HOMEBUILT Ultralite

Experience the freedom of open sky



AEROTEK
Engineering, Inc.

Anti-Stall & Spin Design
Easily built in one week!!
No license needed

Build this simple plane from plans
using urethane foam and wood.
Propulsion options range from
go-cart engine to Rotax power.

Complete & Fully Illustrated
PLANS \$15 + \$ 2 postage
Includes a Ultralight Guidebook
& Homebuilt Ultralight Catalogue.

Empty Weight: 150 lb
Max. Speed: 80 mph
14019 S.W. Fwy. #301-250E, Sugar Land, TX 77478

WOOD HEAT

Forced air or
hot water furnaces
Charmaster®

218/326-6786 2307 HWY 2 W
GRAND RAPIDS, MN 55744

THE DIGGER

Plans to build and use in
your own backyard • Self propelled
• No machining • Car towable
• Under \$1,000 to build • Design in
use over 8 years • 3-point hitch
plans available



Build It Yourself
Backhoe • Send For
Free Brochure

P.O. Box 606, Dept. P • Delleville, VA 24083 • 1-800-81-PLANS

VISA **CABLE TV
DESCRAMBLERS** MasterCard
LOWEST PRICES 9-5 CST DEALERS WANTED
SAT 10-2 EARN EXTRA \$\$\$
BIG SALE
Please have MODEL used in your area when calling
CNC Concepts Inc
1-800-535-1843 P.O. Box 49503-PM
MPLS, MN 55449

SAWMILL \$3795.
FREE INFORMATION
Silvacraft Sawmills
90 Curtwright Dr.
Unit 3
Amherst N.Y. 14221
1-800-661-7746

**NEW HYDRO
MAGNATAC®**
No Belts...All-Hydraulic Drive!
Use for excavating, clearing,
landscaping, gardening,
logging...or work for
others for Extra CASH!
• CATALOG \$2.00
• VIDEO \$9.50
• BROCHURE .. Free
• Technical Manual - \$8.50
STRUCK-KIT • Box 307 • Dept. PM0695
CEDARBURG, WISCONSIN 53012

**BUILD A BETTER BUILDING
LARGE SAVINGS**
• Easy to Assemble
• Quick Delivery
• Built to Last
• Straight Sides
• Trussless
• All Steel
• 20 Year Guarantee
GUARANTEED LOWEST PRICES
FACTORY DIRECT 1-800-668-5422
• Sizes 500-20,000 sq. ft.
• Strongest for Wind & Snow
• Heavy 22, 20 & 18 ga. steel
• Maintenance Free
Call Now and Save
up to **45%**
Limited Time Offer
PIONEER PIONEER STEEL BUILDINGS - since 1980

**** CABLE T.V. ****
DESCRAMBLERS
LOWEST PRICES!!!!
CPS ELECTRONICS
1-800-995-1749

**Gerstner® Master
Tool Chests**
Finest American Made
Wood Chests & Cases
Since 1906
For Free Catalog Call
(513) 228-1662

PLAZAC SALES INC.
Cable TV Converters Plus Panasonic, Scientific
Atlanta, Jerrold, Pioneer and more. Professional
Service, Good Prices. One Year Warranty - Ship
C.O.D. Any one implying theft of service will be
declined sales. Sorry, no New Jersey sales. Dealers
Wanted. PLAZAC SALES INC.
1-800-A-WIRE-4-U (1-800-294-7348)

**SINGERS! REMOVE
VOCALS**
Unlimited, Low Cost, Instantly Available
Background Music from Original Standard
Recordings! Does Everything Karaoke
does... Better and gives you the
Thompson Vocal Eliminator™
Free Brochure & Demo Tape...
LT Sound Dept PM-1
7988 LT Parkway
Lithonia, GA 30058
24 Hour Demo/Info Request Line (404)482-2485-Ext 61
When You Want Something Better Than Karaoke!

**Build Your
Own Cobra.**
It's fast, it's mean and
its almost as much fun
to build as it is to drive.
Order factory direct from CARS Inc.,
free color brochure, call (800)-252-7742 ext.1113

Make \$25 to \$100 per hour
with **Badge-A-Mint™**
Yes, it's really possible by making and
selling bright colorful Badge-A-Mint
2 1/4" buttons. Buttons are proven
money-makers at fairs, flea mar-
kets, conventions, or anywhere
people congregate. They're
fast and easy to make with
Badge-A-Mint and inexpensive!
Send for a FREE full color
catalog or send for a
Starter Kit, only \$29.95
plus \$4.25 shipping (IL
residents add \$1.87 tax).
Badge-A-Mint, Dept. PM095, Box 800, LaSalle, IL 61301,
Phone 1-800-223-4103

SALE!
**CABLE TV
DESCRAMBLERS**
**WE'LL BEAT
ANY PRICE!**
CALL TOLL-FREE
1-800-284-8432
• JERROLD • TOCOM • ZENITH •
• OAK • PIONEER • HAMLIN •
• SCIENTIFIC ATLANTA •
24 HOUR SHIPMENTS!
QUANTITY DISCOUNTS!
30 DAY MONEY BACK GUARANTEE!
FREE CATALOG & INFORMATION
MasterCard American Express Visa C.O.D.
HAVE MAKE AND MODEL NUMBER OF EQUIPMENT USED IN YOUR AREA
1-800-284-8432
FOR ORDERS ONLY
For technical & customer service: 305-749-3122
ALL SHIPPING & HANDLING FEES AT CUSTOMER'S EXPENSE
Anyone implying theft of service will be denied assistance.
CABLE WAREHOUSE
10117 WEST OAKLAND PARK BLVD., SUITE 315, SUNRISE, FL 33351
NO FLORIDA SALES

Use
Zip
Codes
When
Answering
Ads

Classified Ads

Dorothy Nolan, Classified Manager

Rates: \$12.60 per word. 10 word minimum.

Bold Face Type—\$1.00 extra per word. (First word automatically set in Bold Face Type). Gray Background—Additional \$54.00 per advertisement. Centered Headlines (5 words or less)—\$65.00 per line. Our AUGUST issue closes on JUNE 5TH. (On sale date is JULY 15TH). All advertising is payable in advance by check, money order or credit card. Advertisers wishing to charge their MasterCard, American Express or Visa accounts, please be sure to include number and expiration date. Send order and remittance payable to: Popular Mechanics, Classified Advertising, P.O. Box 33578, Charlotte, NC 28233-9920. Be sure to indicate classification under which advertisement is to appear. For additional advertising information call 1-800-367-5452/1-212-649-3167 or FAX: 1-212-977-5415/1-212-586-5562.

Advertisers using a P.O. Box number must furnish complete name and street address for our records. To avoid delay in the publication of your advertisement, please send samples and descriptive materials with your request if your advertisement does not state clearly what is being offered.

YES!!! We do take advertisements over the phone. Contact Dorothy at 1-800-367-5452. Please have credit card information handy.

ADVERTISING AGENCIES, ADV. SERV., MAILING LISTS

MAILING LISTS. U.S./CDN. Fresh, guaranteed. Opportunities, moneymaking. Irwin Hertzsprung, Suite 565, 1706 Front St., Lynden, WA 98264.

AIR CONDITIONING & HEATING

LEARN AIR CONDITIONING FUNDAMENTALS At Home! Save Today On Utility And Repair Bills. \$2.00. Catalog D.T.I., 8170 South Eastern Avenue, Suite 4-274, Las Vegas, Nevada 89123.

ANTIQUES, RELICS, ETC.

FREE List to Serious Collectors. 300,000 Indian Artifacts, Spears, Pots. 50,000 Minerals And Fossils. Caddo Trading, Box 669, Murfreesboro, Arkansas 71958.

ARTS, CRAFTS, SUPPLIES

"GETTING Started in Stained Glass." \$1.00. Whittemore, Box 2065T, Hanover, Mass 02339.

CLOCK WORKS, Beading supplies, rockhound supplies, belt buckles, cut stones. Wholesale catalog \$1.00. Eloxite, Box 729, Wheatland, Wyoming 82201.

AUTOMOBILES

\$225 DAILY "CHROME PLATING" Auto parts. Motorcycles, inexpensive, easy. (Free) information. Chrome Finish, Box 5748, Deltona, FL 32728.

DRUG RAID SEIZURES: Buy Dirt Cheap! Cars, Trucks, Boats, Computers. Seizures, Box 51488-AT, Ontario, CA 91761.

VAPOR CARBURETOR TRIPLES MPG. Free information. H&A, R2E35P Bowling Green, MO 63334-9350.

SUMMER Carlisle, July 28-30, Carlisle PA Fairgrounds. Collector Car FleaMarket, Car Corral. Space Available. Sunday GTO Display Plus The Giveaway Of A 1965 GTO At 4PM. 717-243-7855.

FUEL ATOMIZER 2000. Famous, small and doubling gas mileage for many. Save gas and earn m1-oney. Costs less than \$150.00. Guaranteed. Free Information. 1 800-647-1771. 24hr recorded message. Wyoming Instruments - A Name To Be Trusted.

CARS FOR \$100 Trucks, boats, 4-wheelers, motorhomes, furniture, electronics, computers etc. by FBI, IRS, DEA. Available your area now. Call 1-805-962-8000 Ext S-20024.

\$250 DAILY REBUILDING Alternators & Starters. Details. Mechanical Engineering, 76 Blvd K, Hudson Falls, NY 12839.

FOOL those thieves, simulate an expensive car alarm. Small blinking light package. Send \$12.00 to: DHAMIS, 1185 Moody Blvd., C.P. 77090, Terrebonne, Quebec, J6W 5S5.

FREE Electroplating Catalog. Kits. University Pubns., Box 1071, Provo, UT 84601.

MAKE YOUR OWN HEAVYDUTY TRUCK BEDLINER FROM FREE DISCARDED RACECAR TIRES. Plans \$3.75. Byerly, 434 3rd Street, Northumberland, PA 17857.

CHRYSLERS At Carlisle, July 14-16, Carlisle PA Fairgrounds, All Chrysler FleaMarket, Car Corral and Showfield. Space Available. Win A 1972 Challenger Sunday at 4PM. 717-243-7855.

HOW TO SAVE Hundreds, Even Thousands On Your Next Car, Easy To Follow. \$10.00. BKM Enterprises, P.O. Box 1111, Eatontown, NJ 07724.

I Got A Professional Looking Paint Job For Just \$51.28. I'll Show You How. Send \$8.00 To: S. Austin, Box 296, North Salt Lake, Utah 84054.

KIT CARS & COBRA REPLICAS—Giant 8th Ed. Buyer's Guide—104 glossy pages, 300 photos showcasing today's entire crop of full-sized fiberglass replicas. \$19.95 ppd. (800) 995-8373 order line.

AUTO SUPPLIES & EQUIPMENT

TURBOS - Auto - Industrial - Agricultural Direct Replacement All Makes And Models. Call Ray, (518) 437-1300, D&W Diesel And Electric.

UNIQUE & Easy Way To Drain Your Radiator & Protect The Environment. \$6.95 + \$2.05 S/H. S&P, P.O. Box 26, Andover, KS 67002.

WHOLESALE Auto Parts—Top Brands—Unbelievable prices—All US/Foreign Vehicles. 1-800-435-6460.

INTERESTED IN CLASSIFIED ADVERTISING?

READ POPULAR MECHANICS Latest Edition of "TIPS ON HOW TO MAKE MONEY THROUGH CLASSIFIED ADVERTISING". This informative 24-Page Booklet Will Show You The Do's And Don'ts of Classified Advertising And How You Can Make It Work For You. So Order Today, Only \$1.00 (no cash) Plus You'll Receive A \$2.00 Coupon Refundable With Your First Order. Send To: POPULAR MECHANICS CLASSIFIED, P.O. BOX 33578, CHARLOTTE, NC 28233-9920.

AVIATION, HANG GLIDING

HOMEBUILT AIRCRAFT - ILLUSTRATED SOURCE-BOOK: New Second Edition. 304 pages. Kits, Supplies, Services - Everything to select, build, fly and maintain your own airplane. \$20.00 plus \$4.50 S/H (USA). 1-800-557-2376 in USA or (707) 747-1509, 8-4 PST or Check/MO to: Aero-crafter, 940 Adams #G(9), Benicia, CA 94510.

ULTRALIGHTS - Sample issue \$3.00. Ultralight Magazine, 12545 70th Street, Largo, Florida 34643-3025.

BUILD/FLY Your own **BACKPACK POWERED PARACHUTE** for fun/profit. Takes off from level ground unassisted. Safe, Simple, Inexpensive. Detailed book with sources Now only \$19.95. Easyup, 1089 Medford Center #244M, Medford, OR 97504.

BOOMERANGS ... HIGH TECH DESIGNS!! Incredible Returns Amazing Fun. **FREE CATALOGS.** BoomerangMan, 1806-1 N 3rd, Monroe, LA 71201-4222.

AIRBOATS, Hovercraft Supplies. Plans, Propellers, Engines. Catalog \$5.00. Arrowprop, Box 610M, Meeker, Okla-

BUILDING/RESTORING AN AIRCRAFT? JOIN EAA! Since 1953, EAA has helped people realize their dream of flying. Membership is \$35.00 per year. Call 1-800-843-3612, mention code "PM". EAA, P.O. Box 3086, Oshkosh, WI 54903-3086.

BUILD YOUR OWN AIRPLANE? YOU CAN DO IT! Our nationwide workshops teach you how. Call for free information. Alexander Aeroplane Company, 1-800-831-2949. Department PM.

PISTON Powered Rocket Belt, Skateboard Hovercraft, Plans \$39.95. Technico, Box 2463, Mission, KS 66201.

WANT to pilot a helicopter or a airplane, no license required, guaranteed, no gimmicks or risk involved and in compliance with FAA, earn top dollar pr/hr \$500.00 and up, info pack for \$19.95 includes data photos, specs on how its done, never before offered. Great Lakes Aviation Inc., PO Box 907, Daytona Beach, FL 32115-0907.

BALDING

DON'T LOOSE YOUR HAIR SAVE IT! \$9.95 No extra cost. For information send check or money order. M.D., P.O. Box 1034, Franklin Park, IL 60131.

GROW Hair 4 Months. New Discovery! Box 1012-C, Makati 1250, Philippines. Brochure \$1.00.

BOATS, OUTBOARDS, TRAILERS, & KITS

BOAT KITS - PLANS - PATTERNS - AMERICA'S LARGEST SELECTION - 6'70" - Powerboats - Sailboats - Trimarans - Dinghies - Houseboats - Hydroplanes - Tunnel-hulls - Duckboats - Canoes/Strippers - Kayaks - Dories - **DISCOVER** No dryrot epoxy boatbuilding - **HUGE ILLUSTRATED CATALOG \$3.00** (Airmail \$5.00), Book "Amateur Boatbuilding", \$6.00. - Free Epoxy/Fiberglass/Supplies Catalog - **CLARKCRAFT**, 16-6 Aqualane, Tonawanda, NY 14150.

MERCURY - FORCE - EVINRUDE-NEW 1993 Bargains...All Sizes...\$2.00 handling...Scott McCulloch parts...Electra Marine, 610 Merrick Road, Lynbrook, New York 11563. **INFLATABLES.**

BOAT PLANS - PATTERNS - KITS - Over 240: Canoes - Kayaks - Hydroplanes - Sea Fleas - Powerboats - Sailboats. Quick/simple Stitchengue. Save! **168-PAGE DESIGN BOOK - \$5.00.** (Sent Airmail). Includes Free "Boatbuilding Supplies" catalog. "Epoxy Manual" \$2.00. **GLEN-L**, 9152 Rosecrans, Box 1804/PM5, Bellflower, CA 90706-2138. **310/630-6258.**

\$32.00 TAKES ALL. 12ft Hydrojet boat molds. 4", 6" & 8" Twin Impeller Jet Pump patterns & molds. 12 assembled 8" pumps. Hastings, 17 W. Main, Herington, KS 67449. 913/258-3151.

BOOKS & PUBLICATIONS

AFRICA! Spectacular affordable safaris! Secrets revealed! 'Safari', 2190 Melaleuca Drive, Merritt Island, Florida 32952.

BORROW \$97,000. - Make No Payment For 50 Years. Free Info - 1018 Tuolumne, Modesto, CA 95351.

"ANARCHIST COOKBOOK" Available again! \$25.00, de-

BOOKS & PUBLICATIONS

"SHARPENERS REPORT" Monthly Newsletter. Valuable Tips—Sources—Buy/Sell Used Equipment. Free Brochure. Skog Company, Dept. PM8, P.O. Box 22187, Minneapolis, MN 55422.

FREE BOOKLETS: Life, Death, Soul, Resurrection, Pollution Crisis, Hell, Judgement Day, Restitution. Bible Standard(PM), P.O. Box 67, Chester Springs, PA 19425.

RENEGADES Sourcebook Of Forbidden Devices/Knowledge. Write: #365-X6, Penfield, NY 14526-0365.

EINSTEIN'S INCREDIBLE SECRET OF THE HUMAN MIND. Send \$10.00 U.S. Fully Refundable To: Brooks Bartholow, 1154 Serrano Drive, Colton, CA 92324.

BOOKS, TAPES, COMPUTER DISKS. All subjects. Write for free catalog. Emerald, P.O. Box 7144, Columbia, MO 65205.

FREE CATALOG — 300 How-To And Self-Improvement Books: Sports, Health, Gambling, Cooking, Humor, More. Pinewood Products, 140 West 69 Street, #99A, New York, NY 10023.

MEN PROTECT MONEY, property, emotions in breakup with wife or live-in without paying professional prices. Instruction book by attorney for all income levels. \$9.95. 1-800-555-3633.

BACK PAIN? Proven video guarantees relief or your money back! Free information (800) 765 2502.

1908 SEARS CATALOG-Authentic Reproduction \$14.95. P.P., Midwest Distributors, 10103 NW 86th Terr., Kansas City, MO 64153.

10 BIGGEST MISTAKES BUYING (REFINANCING) HOUSE! \$10.00 Refundable. Money Strategies, 7604 Main Street 107-MP6, Flushing, NY 11367.

BUMPER STICKERS

EXPAND your business by advertising your product in this space for only \$12.50 a word. zip-code free; \$65.00 will give you a bold centered headline. Your offer will reach 8,000,000 readers a month! 50% of our advertisers that you see on these pages are repeaters; so the magazine must be working for them. In addition our readers are do-it-yourselfers, self-confident self-starters willing to commit themselves in any worthwhile endeavors. Reach out to these groups with your franchise opportunities and services. Send your ad to: Popular Mechanics Classified, P.O. Box 33578, Charlotte, NC 28233-9920.

BURGLAR ALARMS & HOME PROTECTION

SAVE Money - Purchase My Security Company Yard Signs And Window Decals. **PROVEN CRIME DETERRENT.** AT EEZ Security, 502 Washington Avenue, Towson, Maryland 21204.

SECURITY Catalog - Home/Personal/Auto \$2.00. Box 236, South Bend, IN 46624.

BUSINESS OPPORTUNITIES

IMPORT-EXPORT opportunity, profitable world-wide, mail order business from home, without capital. We ship plan for no risk examination. Experience unnecessary. Free Report. Mellinger, Dept. J2706, Woodland Hills, California 91367.

MAILORDER Opportunity. Start profitable home business without experience or capital. Information free. Mail Order Associates, Dept. 478, Montvale, NJ 07645.

\$400 DAILY "TINTING AUTOMOBILE WINDOWS" DETAILS \$1.00. MOBILE-TINT; 92A Main, Hampton, CT 06247.

\$225 DAILY "CHROME PLATING" Auto Parts. Motorcycles, inexpensive, easy. (Free) information. Chrome Plating, Box 5748, Deltona, FL 32728.

\$75.00 PER HOUR Improving Home Owner Security. Do It. So Can You! Free Details. Dick's, P.O. Box 2546, Costa Mesa, CA 92628-2546.

FREE Copy Network Marketing Millions. 18 Oneida, Centereach, New York 11720.

\$2000 Weekly! Assemble Products At Home. Free Info-pack. Universal-PM, Box 360378, Brooklyn, NY 11236.

\$750.00 DAILY "GOLDPLATING" Auto Emblems, Jewelry, Inexpensive Home Setup. Send \$4.00. Gold, P424 Hill, Houston, Texas 77037.

WE BUY newspaper clippings. \$781.23 weekly. Send stamped envelope. Edwards, Box 467159GH, Atlanta, GA 31146.

EARN \$1,000'S WEEKLY Working At Home. Start immediately. Free Supplies/Postage. Free Information. Send SASE to: WWPS, Box 32, Neenah, WI 54956.

BIG MONEY REPAIRING AUTO WINDSHIELDS. Supplies and information. Grubbs Glass Patch, P.O. Box 243, Monticello, AR 71655. 1-800-243-2213.

\$802,844 from homemade "how-to/opportunity" booklets. Free report. Booklets, 507J Oak, Friendswood, TX 77546.

\$40,000 ON 1/2 ACRE! New Hydroponics - inexpensive, pleasant, practical! Free information. Robin's, Box 681804, Franklin, TN 37068-1804.

LET the government finance your small business. Grants/loans to \$500,000.00. Free recorded message: (707) 449-8600. (KZ3).

PLASTERCRAFT . . . Profitable Home Business 3000 Molds Available. Details. Lynnette, 6251C Mentpark, Mentor, Ohio 44060.

MAKE YOUR DREAM COME TRUE, EARN \$75,000 YEARLY REPAIRING CRACKS IN WINDSHIELDS AND PLATE GLASS, NOT REPLACING THEM. CALL 1-800-826-8523 (US/CANADA): THE GLASS MECHANIX, 4555 N.W. 103RD AVENUE, FT. LAUDERDALE, FL 33351.

LEARN Sewing Machine Repairing. Men, Women. Lucrative Profits. Gresslin Correspondence School, Box 905, Alexandria, Ohio 43001.

NEW! GROW EXPENSIVE PLANTS. 2,000% PROFIT. Free information. Growbiz, Box 306-M8, Seminary, MS 39479.

RECYCLE METALS. NO, NOT BEER CANS! Easy \$458 weekly! Free information. Recycler, Box 681804, Franklin, TN 37068-1804.

\$2,000 DAILY From Your Telephone Answering Machine! I've made over \$1,000,000 using mine! (303) 637-1492. Recorded Details.

RECYCLE! (AMAZING PROFITS MADE) Reconditioning Automobile Batteries! (Free) Information! Battery Outlet, Box 3300PM, Hickory, NC 28603-3300.

PIANO Tuning quickly learned with home study courses. Diploma granted. American Tuning School, 17050 Telfer Drive, Morgan Hill, Calif. 95037.

BE YOUR OWN BOSS. REPAIR CRACKED WINDSHIELDS. It's easy. We'll teach you how to start and run your own business. Keep all the money you earn. Patented Equipment, FREE valuable report. Call 1-800-321-2597. Glas Weld Systems, Inc., Box 5755-D, Bend, OR 97708.

HOMEWORKERS DESPERATELY NEEDED! But don't get caught in the homework fraud trap! Hundreds of legitimate companies want to employ you now! Free report! Long SASE To: Consumer Network, Dept. P2, Box 8138, St. Paul, MN 55108.

DISTRIBUTE Unique Electronic Product. Manufacturer, Box 26307, Kenneth City, FL 33709.

JOIN HOME-WORKER'S ASSOCIATION - Get "Guaranteed Legitimate" home-employment offers! (Many Choices!) Write: Association - PM 695, Alexandria Bay, New York 13607-0250.

START A-Million Dollar mail order business. We drop-ship 2955 best selling products. Lowest below wholesale prices. Immediate delivery. Spectacular home business opportunity. Free Book. SMC, 9401 De Soto Avenue, Dept. 20-78, Chatsworth, CA 91311-4991. (800) 345-4SMC.

\$1,000 WEEKLY AIR TOOL REPAIRING. Free Details. Box 4172, Wichita Falls, TX 76308-0172.

\$320,000 Yearly Selling Books by Mail. Recruiting Business Associates, TPCF, Box 4113, Torrance, CA 90510.

\$50,000/year. Selling, wholesaling or exporting cars. Free report. Autonet, 507 Oak, Friendswood, TX 77546.

FREE information: America's Most Profitable Home Business Opportunity! 1-800-644-4133.

WATER WELL DRILL—Economical—Simple—Sturdy. Start PROFITABLE Niche Business. 1-800-656-6766.

MAKE \$15,000 monthly! The Perfect Business. No investment. Easy. Free Booklet. MPM, Box 57, Lenore, ID 83541.

MAKE \$25.00 / POUND From Free Aluminum Scrap? YES! Free Report! Americrap - PM695, Alexandria Bay, New York 13607-0127.

RECORD Videotapes . . . At Home \$5,000 Monthly Possible. No Pornography. Free Details. Write: CMS Video Company, Dept. 17, 210 Loma Square-#163, Birmingham, AL 35216.

NEW 2000% PROFITS - in Moldmaking/Casting. Free in-

YOU HIT A GOLD MINE Earn \$60,000.00 a year Gold Plating Emblems on Automobiles. For free information call US/Canada-1-800-877-0066. Write: The Gold Mine, 1304 S.W. 160th Avenue, Suite 230A, Ft. Lauderdale, FL 33326.

\$250 DAILY ELECTROPLATING. Details. Communications Engineering, 76 Blvd., Hudson Falls, NY 12839.

BUY NEW 1995 VEHICLES: \$800 Down/\$75 Monthly. No Credit, Loans, or Leases. Send SASE To: Hearn, Box 300, Norfolk, AR 72658.

\$1,000'S WEEKLY MAILING LETTERS Free Postage/Supplies. Rush SASE. COLOSSAL, Box 040215-PM, Brooklyn, NY 11204.

SIX Home Business Opportunities. \$1.00 SASE. C&S Merchandise, 4913 W. Earle, Phoenix, Arizona 85031.

\$6,000 Monthly Assembling Computers! (Easy Home Business Opportunity.) Free Report: Computers, 9629P Ripplecreek, Moreno Valley, California 92557-1821.

FREE! WEALTH-BUILDING, mail-order software. \$9.95 processing. Dynamic Publishing, Box 231, Granbury, Texas 76048.

GET PAID \$268! Roll Taking Easy Snapshots At Home! Free Report: Phototek, Box 2457-PM, Pinecove, CA 92549. 909-659-4737.

FREE Electroplating Catalog. Books, Kits. University Pubs., Box 1071, Provo, UT 84601.

#1 MONEY Maker Spare Time! No selling! No inventory! Publicly documented seven week \$19,919 income! Free audio cassette and Report reveal everything. Real Money, 333-PM65, SW 5th Street, Grants Pass, OR 97526.

HELP OTHERS IMPROVE THEIR HEALTH. BIG MONEY! 1-800-270-6929—ANYTIME.

EASY BUSINESS! EARN \$1,000 weekly. Free details. Write or send stamped, addressed envelope. TOOCO, Box 12036, Merrillville, IN 46411-2036.

FREE Details! Steps To Own Home Business. Info. 1801 "H" Suite B5, 315, Modesto, CA 95354.

600 HOME BASED BUSINESSES REVEALED. FULL INFORMATION ONLY \$29.95. MOON, BOX 501, FRIENDSWOOD, TX 77549.

FREE 900#S Get Your 900# for absolutely free!! Recorded free information 213-964-4534 Ext: 9.

ACHIEVE financial freedom and personal power guaranteed! Write: Navaar, Box 1714, New York, NY 10013.

SELL CARS TO GERMANY, SAUDI ARABIA, ETC. Directory, \$7.00. Italian Trade Directory, \$5.00. Magnum, P.O. Box 23922, Alexandria, Virginia 22304.

MAILORDER PROFITS. Sell Books, Tapes, Shareware, Mailing Lists! Over 600 Titles. Free Distributorship Information. Mascor-PM, Box 8308, Silver Spring, MD 20907.

HOW TO CLAIM YOUR FORTUNE at U.S. Government Auctions. New manual shows how. \$22.95. Foster Gifts, 527 Rogers Avenue, #3, Brooklyn, New York 11225.

SOLAR'S BACK! SOLID OPPORTUNITY. Build/market pool or spa heaters. Easy, inexpensive. Write: InfoWorks, Box 551, Palo Cedro, CA 96073-0551.

HOW TO...MAKE MONEY DISTRIBUTING SOFTWARE! \$2.00 (Refundable). Details. LFB, Box 338, Hopedale, MA 01747-0338.

START A SUPER PROFITABLE BUSINESS AT HOME. PROVEN SUCCESSFUL. FREE INFORMATION. SEND SASE. THE HOMEWORKS, 7 ANDREWS RD., BIDDEFORD, ME 04005.

FREE BROCHURE. MAKE PROFITABLE BOOKLETS, NEWSLETTERS. Stahlkas, 60 Westchester, Williamsville, NY 14221.

\$100,000 YEARLY. FASHION WATCH BUSINESS. FREE DETAILS. 619-558-0300 24/HR.

12 MOST PROFITABLE HOME BUSINESSES, Guaranteed. Free Information Anytime. 1-800-626-3262.

FREE Report! Get Cash In Your Mailbox Everyday. JG, Box 2111, Middletown, CT 06457.

MONEY In Your Mail! With Easiest Business On Earth! Free Details! Mountain Marketing-PM, 42 Perkins Valley Rd., Bryant Pond, ME 04219.

REALISTIC Home Businesses/Longevity Research - 30-pages. Send 2 stamps. Odessa Factsheet, 3062-B Emerson, Palo Alto, CA 94306.

BUILD your own golf clubs! Free full-line catalog: heads, shafts, grips, tools, supplies and more. Call 1-800-423-2968.

TOWABLE HOTDOG Cart! Station Wagon Unit! Plans! (Wooden). Manual \$12.00. Tackmann, 205 E78, NY 10021.

HOW-TO VIDEOTAPES, 3500 TITLES, BIG PROFITS WITHOUT INVENTORY. FREE INFORMATION. SBM, Dept-MG, Box 48613, Atlanta, GA 30362.

BUSINESS OPPORTUNITIES

DOUBLE your income with World's Easiest Business. New Report reveals how to own it Free. Write: OwenCorp/PM, Battle Ground, Washington 98604-0010.

PRIVATE INVESTIGATION TRAINING! BIG INCOME! OWN BOSS! FREE INFORMATION. PROBE, BOX (PM) 2133, BEVERLY HILLS, CALIFORNIA 90213-2133.

AMAZING money weekly at home guaranteed. Best home business. Free Exciting Details. Permnanand Publications. 919 Spoonbill-PM, Ft. Lauderdale, FL 33326.

CRIME Busters! 1000% Profit How To Guard Against Crime Reports; Reproduction Rights. Rush \$1.00 Refundable With Order. D&M Connections, 527 N. Azusa Ave., Dept. 386VP, Covina, CA 91722.

BUNKBEDS. Clear \$300 per day making bunk beds. Start at home in spare-time and expand the business at your own pace. Bunks, 7800 Computer Ave, Dept. PB, Minneapolis, MN 55435.

START your own business demonstrating and supplying much needed, problem solving products to the construction industry. Essentially no investment required besides time. Our training turns your time into money. Income opportunity limited only by time invested and demonstration proficiency. Kinsmans Corporation, 1444 S. 20th St., Omaha, NE 68108. 1-800-NOX-CRETE.

INTERESTED

IN CLASSIFIED ADVERTISING?

READ POPULAR MECHANICS Latest Edition of "TIPS ON HOW TO MAKE MONEY THROUGH CLASSIFIED ADVERTISING". This informative 24-Page Booklet Will Show You The Do's And Don'ts of Classified Advertising And How You Can Make It Work For You. So Order Today. Only \$1.00 (no cash) Plus You'll Receive A \$2.00 Coupon Refundable With Your First Order. Send To: **POPULAR MECHANICS CLASSIFIED, P.O. BOX 33578, CHARLOTTE, NC 28233-9920.**

BUY IT WHOLESALE

BELTS, Buckles, Jewelry, Wallets. Complete line fast sellers. Big Profits. Color catalog \$1.00. Anchor, Box 3958-PMR, North Providence, RI 02911.

FAMOUS NAME REPLICA WATCHES. Excellent Quality. Wholesale Brochure. 1-800-553-4334.

BUSINESS CARDS, Rubber Stamps 50% Off. Fast-Free Delivery! 1-800-526-2348.

CABLE TV EQUIPMENT

PIONEER PROGRAMMING SOFTWARE Does 51XX Thru 63XX. No More E2-E4-E5. Don't Miss Out. 1-800-484-1780. Ext. 4705.

CABLE Test Chips. Puts cable box into full service model \$29.95 to \$59.95. 1-800-452-7090, (310) 902-0841.

CABLE TV DESCRAMBLING

TURN-ON CHIPS - Easy To Install Jerrold, Pioneer, Scientific Atlanta, Zenith. Quantity Pricing Available. All Orders Shipped Within Twenty-four Hours. (1-800-800-8532) **TAZ ELECTRONICS GUARANTEED.**

REVOLUTIONARY Technology: Universal Box Works On Jerrold-Pioneer Systems. 1-800-676-6342.

CABLE T.V. CONVERTERS AND ACCESSORIES. Fair Prices, Quality Service, and 14 years Experience Gives Us The **ADVANTAGE.** CALL 1-800-952-3916 V / MC / AMEX / DIS/ COD. Advantage Electronics, Inc. 1125 Riverwood Dr., Burnsville, MN 55337. **MEMBER OF NCCA.**

CABLE TV CONVERTERS/DESCRAMBLERS. 2 year warranties on Jerrold, Zenith, Tocom, Scientific Atlanta. We service most converters. Money back guarantee. **NATIONAL CABLE SERVICES (219) 935-4128.**

CABLE/SATELLITE DESCRAMBLERS for all systems guaranteed! Send SASE for information. Mystical Electronics, P.O. Box 481 Cooper Station, New York, NY 10276.

CABLE Test Aids, Cubes, RFT1's and Traps. Jerrold, Pioneer, Sigma Boxes. 1-800-671-1110.

"BULLET" BUSTER. Electronically shield your cable box. \$19.95 + \$3.00. S/H. VISA/MC. Electroman, (504) 482-3017.

CABLE DESCRAMBLERS. BARGAIN HEADQUARTERS, WHOLESALE PRICES. ABSOLUTELY THE LOWEST PRICES! MONEY BACK GUARANTEE. NOBODY BEATS US! RP ELECTRONICS 1-800-304-3604.

CABLE TV EQUIPMENT & ACCESSORIES. Wholesalers Welcome! 30 Day Moneyback Guarantee! Free Catalog! **PERFORMANCE ELECTRONICS, INC. 1-(800) 815-1512.**

PROTECT YOUR INVESTMENT. The BULLET STOPPER Electronically Neutralizes ANY Harmful "Surges." **SUNSTATE ENGINEERING 1-800-717-1575.**

SECRET CABLE DESCRAMBLERS! Build your own Descrambler for LESS than \$12.00 in SEVEN EASY STEPS! **RADIO SHACK** Parts List and FREE Descrambling Methods that **COST NOTHING** To Try, Included. Send \$10.00 to: **INFORMATION FACTORY, P.O. Box 669, Seabrook, Texas 77588.** for C.O.D.'s 1-713-922-0512 Any Time!

CABLE TV Descramblers—Excellent Prices. Immediate Shipping. VISA/MC/COD. Wing Wholesale 800-304-4408.

CABLE TV, ORIGINAL EQUIPMENT, DESCRAMBLERS, CONVERTERS, COMBOS, QUANTITY DISCOUNT, CALL NOW WE'LL MEET OR BEAT THE COMPETITION. UNIVERSAL SALES 1-800-647-2371.

CABLE TV CONVERTERS/DESCRAMBLERS Don't Pay Retail Buy From The Wholesaler. 30 Day Money Back Guarantee. No PA Sales. **DIRECT CABLE SUPPLY INC. 1-800-808-3356.**

LINK YOURSELF TO THE FUTURE WITH OUR EXPERIENCE! Cable TV Converters And Descramblers. Quality Service and Satisfaction Guaranteed! Visa/MC/AMEX/COD Accepted. Quantity Discounts. **CABLE-LINX, INC. Minneapolis, MN 1-800-501-0095.**

CABLE TV DESCRAMBLERS/CONVERTERS. Jerrolds, Scientific Atlanta, Tocom, Zeniths, Pioneers. **BEST PRICES!** Free Catalog! **ALLSTAR 1-800-782-7214.**

TOCOMS Starting \$179.00, **DESCRAMBLERS** For **JERROLD, SCIENTIFIC, PIONEER** Starting \$69.00. Lots More. **BLOWOUT SALE. 800-903-3727 Ext. 100PM.**

CABLE TV CONVERTERS, DESCRAMBLERS, Scientific Atlanta, Zenith, Jerrold, Pioneer, Oak, Replacement For Most Models. Quality, Price & Service. Visa/MC - dealer inquiries invited. **EAGLE Electronics, Inc. 1-800-259-1187, 1301 Railroad Blvd., Naples, FL 33963.**

DESCRAMBLER. Anyone can build with seven parts from Radio Shack. Plans \$8.00. 1-800-818-9103

CABLE TV Why rent? When you can own. Low prices, quality products. Call **TONITE 6 pm-11 pm EST 1-800-865-7493** free catalog. True Value Electronics, P.O. Box 591, Lincoln, NH 03251.

CAMERAS & EQUIPMENT

CAMCORDER BATTERY WOES? Easy "how to" instructions to recover full battery charge! \$6.00. **LSASE: Torque Testing, Bldg. 223B, 704 Stonyhill Road, Yardley, PA 19067.**

CAMPERS & TRAILERS—KITS, PLANS

CAMPERS - TRAVEL TRAILERS: Plans/Kits Catalog \$1.00. Glen-L, 9152 Rosecrans, Box 1804/RV5, Bellflower, CA 90708-2138.

FREE RV Accessory Catalog. Frank's RV, 13861 Seaboard Circle, Garden Grove, CA 92643.

YOU Can Build A Utility Trailer. Easy, No Welding. Complete Plans \$12.00. Weimer, Box 1554, Loxahatchee, Florida 33470.

THIS IS A SCREENED AD!

LET Your Advertisement Achieve The Same Effect! For An Additional \$54.00 Per Advertisement You Can Order Our Screening Process. Same Price Applies To All Advertisements No Matter What Size, Small Or Large. For More Information Call **POPULAR MECHANICS CLASSIFIED—1 (800) 367-5452/(212) 649-3167, FAX: (212) 977-5415/(212) 586-5562.**

CATALOGS

LIST of free parts, software, videos, catalogs \$5.00. Rayel, 7067 E. Viewpoint, Anaheim, CA 92807.

210 Page Gift Catalog. \$5.00. V/M Accepted. Call 805-736-2970 Ext. 621 For Information. **GIFTS GALORE, 1212 North D., Lompoc, CA 93436.**

"SMALL ENGINE PARTS" catalog \$2.00. Smith's, 513W Spring, Weatherford, TX 76086.

CB'S, RADIO & HAM EQUIPMENT

PRO CB ANTENNAS/ACCESSORIES! Free catalog. Firestick Labs, 2614 Adams, Phoenix, AZ 85034.

SECRET Scanner Frequencies! Federal Agencies, Surveillance, Police, More! Catalog \$1.00! **CRB, Box 56, Commack, NY 11725.**

CB MODIFICATIONS! Frequencies, sliders, FM, amplifiers, books, kits, repairs, high-performance accessories. Catalog \$3.00. **CBCL, Box 31500M, Phoenix, AZ 85046.**

POLICE-FIRE SCANNERS, CB'S, MARINE 2WAY, ANTENNAS, HPR, BOX 621136PM, LITTLETON, CO 80162.

CONTACT LENSES

WHOLESALE Contact Lenses. All Brands. Example: Disposables-\$17.00. Bausch & Lomb Softlens-\$11.00. 1-800-521-3511.

CONVERTING BUSES TO MOTOR HOMES

FREE INFORMATION - Bill Lowman, 306M Riverbay, Tampa, FL 33619. 1-800-621-5325.

DO IT YOURSELF

PLANS: Inexpensive Electric Water Heater, \$3.00: Heater, 1713 Spratley St., Portsmouth, VA 23704.

INSTRUCTIONAL VIDEO - "Do It Yourself Home Repair" Shows 35 Common Household Repairs. Send \$23.95 To: Value Best Merchandise, 2304 Eleuthera Pl., Seffner, FL 33584.

LEARN Modern Arrowhead Making. VHS \$29.95, S/H \$3.50. Commons, Box 5012-M, Central Point, OR 97502.

BELT BUCKLES for coins, stones, jewelry mountings, cut stones, clock works. Wholesale catalog \$1.00. Eloxite, Box 729, Wheatland, Wyoming 82201.

ATTENTION Woodstove Fireplace Users. Kindling Wood Galore. Build Your **SPLITTER** For Less Than \$20.00. Unique, Proven. SASE For Information To: Robiber, Dept. P, Box 6088, Wallingford, CT 06492.

1-800-NEW-FOAM. Repair Speaker Foam Rot. D.I.Y. Kits Or We Do The Work. 1-800-639-3626 **VISA, MC.**

HOMEOWNERS. Save hundreds on residential roof leak repairs and maintenance. Write or call today for detailed step by step video. \$29.00. Bret Lyon, 1972 Chiquapin Grove Road, Bluff City, TN 37618. **VISA / MC / AMEX / COD. 1-800-892-2028.**

EARN MORE MONEY! Learn electronics from videos. Guaranteed. 1-800-678-6113.

WET YARD? Simple, Unique System To Lower Overall Water Level. Send \$12.95 For Plans To: P.O. Box 0506, Buffalo, NY 14223.

UPHOLSTERY TRAINING VIDEOS. Free Brochure, VUE, Box 1218PM, El Verano, CA 95433. 800-635-3493.

"BUFFER, heavy duty 30" mandrel, Plans, Components, inexpensive. Write: HEM, P.O. Box 64100, Tacoma, WA 98464-0100.

WOODEN Wagon Kits \$23.95 To \$142.95. No Tip Steering. 814 238-7508.

DRINKING WATER PURIFIERS

WATER, All Natural. How To. \$2.00 Per Minute. Average Call 3 Minutes. Maximum Call 5 Minutes. 18 Years-Touchtone Required. 1-900-988-2220.

EDUCATION & INSTRUCTIONS

TERMPAPER ASSISTANCE. 19,278 PAPERS AVAILABLE! 306-PAGE CATALOG—RUSH \$2.00. Research, 11322 Idaho. #206MK, Los Angeles 90025. Toll-Free Hotline: 800-351-0222 (or 310-477-8226).

PARALEGAL GRADED CURRICULUM. APPROVED home study. Affordable. 100 years experience. Free catalog 800-826-9228. **BLACKSTONE SCHOOL OF LAW, P.O. Box 871449, Dept. PM, Dallas, TX 75287.**

INVESTIGATION CAREER. Quick home study. Become a professional. (800) 272-6680.

NONRESIDENT UNIVERSITY DEGREES. Bachelor's, Master's, Doctorates. Accredited, inexpensive, fast. Credit for life experience. **FREE BROCHURE.** Bears Guide, P.O. Box 7070, Berkeley, CA 94707. 1 (800) 835-8535.

FREE VIDEO External BA/BS, MS/MBA, PhD/LAW-Accredited, financial aid, (800) 431-3775. La Salle University, Dept #775, Mandeville, LA 70470-4000.

BECOME AN ELECTRICIAN, Approved Home Study. Electronic Tools Included in course. Free Career Literature. P.C.D.I., Atlanta, Georgia. 800-362-7070 Dept. TEG127.

CALLED: Acts 2; John 9, 1 Cor. 1; Rom. 10. 1709 Fredricksburg Ave., Lakeland, FL 33803-2561.

AT POPULAR MECHANICS WE LIKE TO MAKE IT EASY FOR YOU. YOU CAN CALL OR FAX IN YOUR ADVERTISEMENT AT ANY TIME. ALL WE NEED IS A CREDIT CARD TO CHARGE IT TO. ASK FOR DOROTHY NOLAN, 1 (800) 367-5452/(212) 649-3167. FAX: (212) 977-5415.

ELECTRONICS

SURVEILLANCE - COUNTERSURVEILLANCE - WE HAVE EVERYTHING! Catalogs \$5.00. PEP, Box 930024-M, Norcross, GA 30093.

BUGGED? PHONETAPPED? Free Catalog Counter-Surveillance equipment tells you Fast! 1-800-732-5000.

BLOWN AWAY! Build inexpensive speakers that sound like TOP QUALITY components. Complete Plans \$25.00. P.O. Box 302, Ambridge, PA 15003.

EMPLOYMENT INFORMATION

\$\$\$ At Home Packet Gives All Information. \$2.00 To: Dibel Enterprises, Box 453, Glenmont, NY 12077.

ASSEMBLE easy products at home! Excellent pay! Guaranteed! 1-800-377-6000 ex7035.

ENGINES, MOTORS

ENGINES - Briggs, Kohler, Others - **HUGE DISCOUNTS!** Catalog \$2. Engine Mart, 2642 Newfound, Merritt Island, FL 32952.

FINANCIAL

SMALL BUSINESS "Government" Loans Available Nationwide! It's easy when you know how - Call NIC: 1-800-226-3601, BF7030.

BAD/NO CREDIT? Get MasterCard!! Proven Top-Rated Program. No Application Fees. 1-800-799-2242.

NEW Valid Credit File Free Information 24HRS. 213-368-8114.

FREE GOVERNMENT GRANTS! Billions Available! Never Repay! Call (24 Hours): 1-(619) 599-3502.

VISA/MASTERCARD. Bad, No Credit, OK. Call Now! 1-800-846-4992.

CAN'T WORK? Denied Social Security? Get Benefits! Free Tape. 1-800-404-1391.

"HOW to build your financial path", Novice's guide to investing money. Eliminate the middleman. \$7.95 Money back guaranteed. Jean Dupuis, 3941 SW 60 Ter., Davie, FL 33314.

AVOID FINANCIAL DEATH TRAPS. \$3.00 (refundable). 15 Drew Avenue, Lexington, MA 02173-3013.

CREDIT PROBLEMS? Do It Yourself Credit Repair. Proven Methods. \$5.00. FMPA, 6441 North Monalisa, Tucson, AZ 85741.

BUY STOCKS WITHOUT A BROKER. SAVE HUNDREDS In brokers commissions by purchasing your shares directly from these top companies. Guide provides complete, little-known information on the **EASY**, do-it-yourself investing. Send \$9.95 to: CONQUEST, P.O. Box 102, Dallas, PA 18612-0102.

MONEY Troubles? Reduce Interest, Cut Payments, Save Thousands. 1-800-SAVE-ME-2.

AVOID PROBATE. Save Attorney's Fees: Protect Your Family. FREE information. Wildwood, 195 E. Main, #466C, Milford, MA 01757.

FOR THE HOME

LIGHT BULB SAVER! SPECIAL INSERTS GIVE 75,000 HOUR LIFE! SET 6 \$9.95; \$1 SHIPPING. GUARANTEED. LARRY B. STAUFFER, DEPT. PM, 559 MCNARY RD., BAINBRIDGE, OH 45612.

ULTRASONIC Unit drives mice, roaches, fleas, vermin away forever. Harmless to pets. Unit protects 2500 sq./ft. \$34.95. USI, 13345 Belfield, Dallas, TX 75234-5103. 214/406-1176.

GIFT SHOPPING

GERMAN HANDMADE CRAFTS! Perfect for unique GIFTS! DISTRIBUTORSHIPS also available. \$2.00 for complete info. Max Shadle, 71 Pond Drive East, Rheinbeck, New York 12572.

GO-KARTS, MOTORCYCLES

GO-KARTS, Minibikes & ATV's. Assembled, Kits, Parts, Engines. Discount Prices, Large Selection. 88 Page Catalog \$3.00. 216-357-5569. Kart World, Dept. C., 1488 Mentor Ave., Painesville, Ohio 44077.

KARTING Industry Buyer's Guide - \$12.00. KMI, Box 101, Wheaton, IL 60189.

GOVERNMENT LANDS

GOVERNMENT land now available for claim. Up to 160 acres/person. Free recorded message: (707) 448-1887. (4KZ3).

SEE HOW THIS SCREENED ADVERTISEMENT CAUGHT YOUR EYE—FOR AN ADDITIONAL \$54.00 YOUR ADVERTISEMENT CAN ALSO LOOK LIKE THIS. REMEMBER TO REQUEST A SCREEN WHEN ORDERING YOUR ADVERTISEMENT.

GOVERNMENT SURPLUS

DRUG RAID SEIZURES: Buy Dirt Cheap! Cars, houses, boats, computers. Seizures, Box 51488-A, Ontario, CA 91761.

GOVERNMENT AUCTIONS - Your Area! Cars, trucks, computers, more! Must sell! Call Now: 1-800-601-2212 exSP7030.

SEIZED VEHICLES & ASSETS! 400 Source Directory. Free Details: Box 543033-M, Dallas, TX 75354.

PURCHASE Government Surplus \$3.00. SG 414 West

HEALTH & NUTRITION

WELD OR SOLDER? Natural Products Helps Detoxify Heavy Metals From Your Body. 1-800-206-1863.

HEARING AIDS

HEARING AIDS - GUARANTEED LOWEST PRICES! No huge commissions. Home trial, terms. All makes. We're the oldest, biggest, best. Custom instrument specialists. Free information, 1-800-323-1212. Lloyds-PMC.

FREE Hearing Aid Catalog. All Models. Huge savings! No salesman will call. Rhodes, Dept. 31F, Brookport, IL 62910. 1-800-468-3100.

HELP WANTED

ASSEMBLE Easy Products At Home. Top Pay! Guaranteed. 1-800-377-6000 Ext. 7030.

HOME TYPISTS, PC users needed. \$35,000 potential. Details. Call (1) 805-962-8000 Ext. B-20024.

EASY Work! Excellent Pay! Assemble Products At Home. Toll Free 1-(800) 467-5566 Ext. 5038.

\$329.84 Weekly. Assembling Our Products At Home. Toll Free 1-(800) 333-3294.

HERBS

\$80,000 From One Acre. Grow GINSENG. Lee's, Box 68276-PM6, New Augusta, Indiana 46268.

HOBBIES & COLLECTIONS

PINBALL MACHINES! - Books, Parts, Catalog \$2.00. MARCO, 5290 Platt Springs, Lexington, SC 29073-9252.

RAILROAD Lamp Collectors Free Information On New Book. Write: Hiram Press, P.O. Box 1926, Hiram, Ohio 44234.

BUILD Your Own Mechanical Slot Machine. Free Brochure. Hobbicraft, P.O. Box 8123, Paramus, NJ 07653-8123.

HOUSE PLANS

CUSTOM HOME PLANS. Construction-Proven Builder's Portfolio. Reproducible Vellums \$99.00. Catalog \$1.00. Refundable. Master Plans, Box 1452, Bolingbrook, IL 60440.

HOVERCRAFT

HOVERCRAFT Parts. Catalog \$5.00. GPL, 1220 Tangelo #A13, Delray, FL 33444-1258.

HOVERCRAFT Plans, Kits. Information \$8.00 (Refundable). SevTec, Box 846, Monroe, WA 98272.

HOVERCRAFT Plans Publications Catalog. \$2.00. L.A.M., Box 27655, Lansing, MI 48909. 800-213-2088.

INSURANCE

DEEP Pocket Insurance Companies Have Money. Get Your 10%, Send \$9.95. NASEEM, Box 190, 3840 East Robinson, Amherst, N YH 14228.

INVENTIONS WANTED

INVENTIONS DEVELOPED & MARKETED - FREE - PROTECTION CERTIFICATES U.S. Patent Office Former Examiner, Licensed Patent Engineer, Manufacturers Representative. Patmart, Suite 702PM, 233 Broadway, New York, NY 10279.

INVENTORS

WORK DIRECTLY WITH REGISTERED PATENT ATTORNEY & GRADUATE ENGINEER with 36 combined engineering & patent experience. U.S. & international patent applications. **PATENT & DEVELOP** ideas with the experience of an expert. Call or write for free **CONFIDENTIAL DISCLOSURE RECORD OF INVENTION & FREE 228 PAGE BROCHURE**. Introduction to industry, Marketing Plans, Offshore Production, Prototypes & Research Ready Available. Also specializing in Copyrights & Trademarks. **ASSOCIATES LOCATED AT PATENT OFFICE, CREDIT CARDS ACCEPTED. SATURDAY & SUNDAY HOURS.** Michael I. Kroil Registered Patent Attorney, Registration #26,755, 171 Stillwell La., Syosset, NY 11791 TOLL FREE US & CANADA 800-367-7774, Toll Free FAX US & Canada 800-367-7773. International Phone/FAX 516-892-2795.

PATENT IT ECONOMICALLY! Free details. Licensed since 1958. Raner Associates, 2008 Fondulac, Richmond, VA

INVENTORS! Can you patent and profit from your idea? Call **AMERICAN INVENTORS CORP.** for free information. Serving Inventors since 1975. 1-800-338-5656.

PATENT AND DEVELOP Your Invention. Registered Patent Agent and Licensed Professional Engineer. Send for **FREE PATENT INFORMATION** Every Inventor Should Have. Richard L. Miller, 12 Parkside Drive, Suite-M, Dix Hills, NY 11746-4879. (516) 499-4343.

INVENTORS: Utilize The Logical Process™ TO PROTECTION and Potential PROFITS. **FREE ADVICE** APSI, Washington, DC 800-458-0352.

INVENTION PATENT DEVELOPMENT MARKETING. FREE PROTECTION CERTIFICATES U.S. Patent Office Examiner George Spector, Suite 702PM, 233 Broadway, New York, NY 10279.

FREE INVENTION PACKAGE Davison & Associates offers customized Development, Patenting, and Licensing. Proven Results: 1-800-677-6382.

REGISTERED PATENT ATTORNEY. D.A. Kettlestrings. Free Information. 1-800-966-7577.

INVENTORS-NEVER SEND IDEAS TO STRANGERS! AVOID RIPOFFS - SAVE THOUSANDS! REVOLUTIONARY PROTECTION/MARKETING METHOD! NONPROFIT ORGANIZATION. FREE INFORMATION: 1-800-846-3228.

INVENT SOMETHING? ESI Inc. links unconnected individuals with decision-makers. Free brochure supplied. 1-800-547-7885.

ACCUSEARCH Specializes in Thorough, Prompt, Inexpensive Patent Searches. 1-800-999-5498.

INVENTIONS. New products. We submit to industry. Patent services. 1-800-288-IDEA.

STOP PAYING FOR UNMARKETABLE DESIGN PATENTS! PATENTALS INCORPORATED: SEARCHES, PROCURES UTILITY PATENTS, MARKETS AND LICENSES INVENTIONS FOR A PERCENTAGE. 800/261-7467.

PATENT SEARCHES, W/O REPORT \$195
UTILITY PATENT APPLICATION \$1750

INFOTECH Design and Patent Professionals. Call for information, 800-301-6036.

INVENTION Help Firm Seeking Ideas To Market. No Fee For Approved Ideas Until Sold. 800-564-2034.

FREE help for inventors! No charge for protection forms and information kit. Affiliated Inventors Foundation. 1-800-525-5885.

LEARN how to offer your invention for sale or license. Free booklet outlines procedures, royalty rates, requirements. Kessler Sales Corporation, C-5-FI-5, Fremont, Ohio 43420.

NATIONAL REGISTRY. Protect ideas BEFORE showing anywhere. P.O. Box 945, Narberth, PA 19072.

PATENT OPINION IN ONE WEEK
WITH MONEY-BACK GUARANTEE

EXPERIENCED patent attorneys with engineering degrees and with search offices next to Patent Office can rapidly report on patentability of your invention as quickly as one week. Money-back guarantee if your report not processed as promised. Free information about all the ways to protect your invention. Call 1-800-847-4949.

ATTENTION INVENTORS Get Smart. Not Scammed! Know What To Watch For 1-900-234-7575 Ext. 7280. \$1.99/Minute. 18+Only.

SECRET CABLE DECRYPTERS! Build your own Decrypter for LESS than \$12.00 in SEVEN EASY STEPS! **RADIO SHACK** Parts List and FREE Decryption Methods that COST NOTHING To Try. Included. Send \$10.00 to: **INFORMATION FACTORY**, Dept. 10, P.O. Box 669, Seabrook, Texas 77586. For CDO'S 1-713-922-3512 Any Time!

INVENTORS Don't Be Fooled - Call Our Inventors Club 1-800-466-1793.

INVENTOR'S HELPER Have a bright idea? Protected Ideas Have Profit Potential! Patent Search \$95.00/2 Days. **FREE BROCHURE** (800) 633-9729 - (516) 757-2573.

LOANS BY MAIL

BORROW \$500-\$40,000! "Overnight" on Signature. Keep indefinitely! Action, Box 5499-A, Diamond Bar, CA 91765.

FEDERAL LOANS for small business now available. 1-800-777-6342 for free details.

SIGNATURE Loans Must Have Checking Account and Steady Job. 1-800-445-0680.

BORROW \$500-\$100,000. 98% Eligible Overnight Service. (910) 379-9162.

BORROW \$100 - \$100,000! No Collateral. Personal. Debt Consolidation, Business, Residential - 1-800-444-6599.

IMMEDIATE CASH LOANS! Borrow \$1,000-\$75,000. Regardless of credit or income-No Collateral Required. **SAME DAY PROCESSING.** Call Toll Free 1-(800)-452-9969.

MACHINERY, TOOLS & SUPPLIES

HOBBYISTS improve your **LATHE** with the ultimate tool-post system: KRF, Box 783C, St. Joseph, MI 49085. 616-429-7050.

FOUNDRY SETS Supplies. Brochure \$1.00. Pyramid Products, 85357 American Canal Rd. Niland, CA 92257. (619) 354-4265.

CNC 3D Milling Machine From \$3,495. PC-Controlled. Prototyping, Modeling. Industry or Hobbyist. Bobcad-Controls, 310-606-9340.

LATHES - INDUSTRIAL/HOBBY FROM \$410.00. METALS, SUPPLIES, CATALOG \$1.00. CAMPBELL TOOLS CO., 2100-D SELMA RD., SPRINGFIELD, OH 45505. 1-513-322-8562.

4" METAL Cutting Lathe \$129.15. Taig, 12419 Nightingale, Chandler, AZ 85249.

EMCO Maier Compact 5 Lathe Package. Free Catalog. Blue Ridge, Box 536-V, Hurricane, WV 25526-0536. (304) 562-3538.

OXYACETYLENE WELDING EQUIPMENT Sheet metal, tools, AL & 4130 tubing and sheet. Catalog \$3.00. Call 1-800-831-2949, Alexander Aeroplane Company, P.O. Box 909, Griffin, GA 30224.

MAGIC TRICKS, JOKES, VENTRILOQUISM

VENTRILOQUIST Supplies. Instruction. Information FREE! Dummy Catalog \$2.00. Maher, Box 420-PM, Littleton, Colorado 80160.

FREE! World's Leading Novelty Catalog. 1600 Jokes, Tricks, Science, Sports, Hobbies. Johnson-Smith, F-01, Bradenton, FL 34206-5500.

MAILORDER OPPORTUNITIES

FREE 900#S - Outstanding Opportunity. Unlimited Income - Free information. Call: (914) 573-2067.

MISCELLANEOUS

REPLICA Swiss Watches Goldplated! Lowest! Warranty! (404) 682-0609, FX (404) 682-1710.

FREE DEGREES! COUNSELING, SPIRITUAL, HYPNOTHERAPY! MINISTERIAL LICENSE! P.U.L.C., Box 276265-M, Sacramento, CA 95827.

MONEYMAKING OPPORTUNITIES

CRAPS SYSTEM. Wins consistently. **GUARANTEED!** Free recorded information: 1-800-217-7711.

WIN Video Poker playing by the rules. Information 1-408-274-2534 ext888.

MANAGE/Broker 900# Free 900# Provided \$10,000 Monthly potential - 1-800-870-3292.

EARN Cash With Your Computer. Free Details. 1-604-473-4155 (24HRS).

WIN AT BLACKJACK, NEW, EASY

FREE details. Upton, Box 815P, Sonoma, CA 95476.

HOW To Collect Sports cards for profit. Learn how. Details \$6.00. Henderson Associates, 1724 Seminary Road, Quincy, IL 62301.

MUSIC INSTRUCTIONS & INSTRUMENTS

ACCORDIONS, CONCERTINAS, Button Boxes. new, used, repairs, trades, credit cards. Castiglione, Box 405, Warren, MI 48090. Catalogs 800-325-1832.

ACCORDION Top Brands, Cordovax. Buy Direct Tremendous Discounts. Trades accepted. Free brochure PM, Accordion-O-Rama, Inc., 307 7th Ave., New York, NY 10001. Phone 212-675-9089.

INSTRUMENT Kits! Build Appalachian and hammered dulcimers, banjos, mandolins, even harps, harpsicords. Free Catalog. PM Hughes, 4419 West Colfax, Denver, CO 80204.

OF INTEREST TO ALL

FREE PRIVACY CATALOG. Cash income opportunities. Secret loans. New identity. Eden, Box 8410-PC, Fountain Valley, CA 92728. 1-800-338-8484.

FREE PRESCRIPTION DRUGS. May Be Able To Get Medication Free. For Info. Send \$20.00 To: NS Products, P.O. Box 201, Granger, IN 46530.

DESPAISED? For spiritual help, write: Irwin Hertzprung, Suite 565-S, 1706 Front Street, Lynden, WA 98264.

FREE INFORMATION! Avoid probate. Save attorney's fees. Protect your family. Write: Book Gallery, 13681 Newport Avenue-#8-179M, Tustin, CA 92680.

WORLD'S SMALLEST FM RADIO. Ultralite 2000. Great Companion For Most Activities. Free Brochure. Argent Specialties, 1920 Monument Blvd - Suite 543PM, Concord, CA 94520.

OF INTEREST TO MEN

FREE FOR FATHERS. Two-color bumper sticker--"Good Dads Are Good Men." News release to come about a dad/son book. Man Redefined, Dept. B, P.O. Box 3142, East Hampton, NY 11937.

PERSONAL

FRIENDLY Psychic Talks Personally To You. Learn The Secrets Of Your Life. Have Your Destiny Revealed. 1-900-478-7700 EX451 18+ \$2.99/Min.

PSYCHIC NETWORK: Your Personal 12-Page Life Analysis & Guide. Send Birthdate, Birthplace, Birthtime & \$9.95 to STARGAZER, P.O. Box 325, Gulf Breeze, Florida 32562-0325.

COLLEGE DEGREES. High School Diplomas. Authentic looking. Free Catalog. Dept. PM-161, National Certificate, 126 13th St, Brooklyn, NY 11215. (718) 768-6803 (24 Hours) FAX 718-965-3400.

PLANS, BLUEPRINTS, PROJECTS

DECK SEATING Comfortable Elegant Bench Rail For Deck's. Easily Followed Plans \$8.00. SASE. DHR, P.O. Box 14319, Tulsa, OK 94159.

WOODEN Geared Clock plans. Easy, unique! Details, Riggs, Box 2983, Gardnerville, NV 89410.

HEAVY Duty Clothes Drying Rack Portable & Collapsible Holds Full Laundry Load Eliminates Energy Costs. Complete Drawings \$5.95. Big Time Sales, Box 651, Broadalbin, NY 12025. Also Available In Kit Form \$82.50 includes Freight.

CARROT CANNON Shoots carrots. loud, plans \$10.00, RB Assoc., PO 11075, Raleigh, NC 27604.

ROCK Tumbler From Scraps. Send \$7.50 To: Egeness, P.O. Box 4663, Wenatchee, WA 98807.

FREE WORKBENCH PLANS with Purchase of Woodshed Plans. Send \$19.95. Plans, Box 381, Rockaway, NJ 07866.

LIGHT YOUR BARBECUE FAST, Unique Charcoal Starter Plans \$5.00. Hayes Enterprises, 9155 Vineyard Lake Drive, Plantation, Florida 33324.

PLANS for Shop Equipment, Tools, Home and Garden Projects, Green-Houses, Alternative Energy, Trailers. Send SASE For Free Description List. TDS, P.O. Box 736, Sparks, NV 89432.

PLASTICS

CASTOLITE Liquid Plastics. Crystal clear, colors. For casting, embedding, coating, fiberglassing, repairing and reproducing with our mold making supplies. Catalog \$3.00 refundable. **CASTOLITE**, 95G/PM, 4915 Dean, Woodstock, IL 60098.

RUBBER, plastic compounds, techniques, sources. Free information: Castcraft, Box 17000 (A6), Memphis, TN 38187-0000.

PRINTING PRESSES, RUBBER STAMP OUTFITS

TYPE for printing and stamps. Catalog \$2.00 deductible. Quaker City Type, R.D. 3, Box 134, Honeybrook, PA 19344.

PRINTING Presses. Type Supplies. List \$1.00. Turnbaugh Supply, Mechanicsburg, PA 17055.

REAL ESTATE

EXPERIENCED Broker Saves You \$\$\$, Knowledge Pays. Satisfaction Guaranteed. All States OK, Butler Realty, 1732 NE 1st Ave., Crystal River, Florida 34428.

BARGAIN HOMES—Foreclosed, HUD, VA, S&L Bailout properties. Low Down. Fantastic Savings. Call 1-805-962-8000 Ext. H-20024 for list.

RECIPES, COOKING, ETC.

SAUSAGE MAKING. Smoking. Free catalog of equipment, ingredients. Semplex, Box 11476PS, Minneapolis, MN 55411. 1 800-488-5444.

EASY DEER MEAT CHILI. \$3.00 SASE. P.O. Box 36, White Plains, MD 20695.

5 GENERATIONS Of 75 Tested, Delicious Old Home Recipes, \$6.95. S. Poe, Box 474, New Martinsville, WV 26155.

DEER, DUCK, RABBIT- 15 RECIPES \$4.00. NANCY'S, BOX 1318-A, FLORENCE, SC 29503.

HOT Dog Meat Sauce. It's Great \$3.00 SASE. Robert, P.O. Box 2576, Largo, FL 34649.

REMAILING SERVICE

FREE! REMAILERS LIST, AGENTS FNEEDED. PS, Box 29656, San Antonio, TX 78229.

CONFIDENTIAL Address. Forwarding Worldwide. Voice-mail. Mailpost, 2421M Pratt, Chicago, 60645. (312) 764-0100 (800) 890-3199.

RE-UPHOLSTERING VIDEO TAPES

LEARN to Re-upholster! with videos. Tomien, P.O. Box 93M, Mayo, MD 21106 (410) 956-4225.

ROOFING

SINCE 1978 Contractors, Homeowners Have Installed **POLAR SEAL®** Liquid Acrylics And Fiberglass Mat To Build **WHITE, SEAMLESS, WATERPROOF ROOFS** On **WAFERBOARD, ASPHALT, CONCRETE, STYROFOAM, RUSTED METAL** For ANY SIZE, SHAPE Or SLOPE, INCLUDING **GEODOMES, DEALERS INQUIRE.** 1-800-343-7663. Video Available.

SATELLITE - TV

SUPER LOW PRICES. FREE U.S.-INTERNATIONAL CATALOG. SATMAN 800-472-8626.

FREE Catalog - Lowest prices world wide. **SKYVISION**, 1022 Frontier, Fergus Falls, MN 56537. 1-800-334-6455.

LEARN How **VIDEOCYPER-II** Owners Get Sound Without Codes. \$19.95. Nassirian, Box 382M, Rio Linda, CA 95673.

SERIOUS BUYERS: LOWEST PRICES ANYWHERE. Shop around, call us last. Free price list. 43 years in business. Antenna King. 1-800-814-5377.

REPAIR Your Own Dish. Save \$\$\$, Free Catalog With Video. \$19.95 + \$4.95 S.H. C-Satellite, Box 926, Belchertown, MA 01007. 1-800-618-6742.

SCHOOLS

HIGH SCHOOL AT HOME, NO CLASSES. LOW MONTHLY PAYMENTS. INFORMATION FREE. EST 1897. CALL 1-800-228-5600 OR WRITE AMERICAN SCHOOL, DEPT. #345, 850 E. 58TH ST., CHICAGO, IL 60637.

SCIENCE & CHEMISTRY

'EXPERIMENTER' LABORATORY CHEMICALS GLASSWARE, Catalogue \$2.00. Established 1953, **HAGENOW LABORATORIES**, 1302 Washington, MANITOWOC, WISCONSIN 54220.

THIS IS A SCREENED AD!

LET Your Advertisement Achieve The Same Effect! For An Additional \$54.00 Per Advertisement You Can Order Our Screening Process. Same Price Applies To All Advertisements No Matter What Size, Small Or Large. For More Information Call **POPULAR MECHANICS CLASSIFIED—1 (800) 367-5452(212) 649-3167, FAX: (212) 977-5415 (212) 566-5562.**

SOLAR & ALTERNATE ENERGY

SOLAR Hot Air Collector. Simple, Efficient, Ingenious Home Heat. Build Your Own. 50 Minute Video \$24.95. DPT Designs, 88 South Street, West Newbury, MA 01985.

NEW! BUILD AMAZING LIQUID PISTON ENGINE from pipe fittings. Free information. ABCO, Box 306-M6, Seminary, MS 39479.

FREE ENERGY! Fuel-less motors and generators. **H&A**, 2REPM, Bowling Green, MO 63334-9350.

SOLAR POWERED PRODUCTS CATALOG \$3.00. Sun Products, 656C North Wellwood Ave., Suite 140PM, Linderhurst, NY 11757.

FREE HEAT FOR YOUR POOL Warm a Pool that is Always too Cold or Extend the Usable Season. A Low Cost Do-It-Yourself book shows how. Send \$8.00 + \$2.00 S&H to: DIGPUB, P.O. Box 298, Goshen, KY 40026.

NEW! Built Solar Heaters, Heat Air Or Water. Manual and plans, send \$12.00U.S. **OMICRON**, C.P. 41048, Centre Duvernay, Laval (QC), H7E 5H1, Canada

SAVE UP TO 80% ON HEATING BILLS. Wood/oil, Wood/gas multi-fuel whole house warm air furnace. UL Listed. Eagle Mfg., 1000 Ag. Science Drive, Palisade, MN 56469 or 1 (800) 358-0060.

SPECIAL SERVICES

INFORMATION. On anything. Ferguson Research Specialists, 60-15 Woodside, Woodside, New York 11377.

STAMP COLLECTING

FREE sample plus catalog. Jeffries, 3480 Middlebelt, West Bloomfield, MI 48323.

OLD U.S. stamps on approval. Sherman, Box 15355E, Philadelphia, PA 19111.

45 DIFFERENT US AIRMAILS, USED \$2.00, MINT \$15.00. EBERLING, Box 2216, Neptune City, NJ 07754.

DISCOUNT, Stamps, Packets, Free List. Iva, Box 197-C, Hanford, CA 93232.

10 OLD Mint U.S. Commemoratives, 25¢! Approvals, Global, Box 7429-P15, Olympia, WA 98507.

STOP SMOKING

SMOKEFREE Conquered Guaranteed Interesting Money-makers \$5.00. JEP, P.O. Box 28035, Moncton, NB E1C 9N4 Canada.

TELEPHONE & SERVICE

DISCOUNT Calling Cards! Personal 800#s 18¢/min; 5% travel rebate card. Free to get! No monthly fee! SASE. Rainbow Services, 216 Rhoda, St. James, MO 65559.

"TELEPHONES, TELEPHONES, TELEPHONES". (FREE CATALOG), AMAZING ACCESSORIES! "Payless", 6102 Manor Rd., Austin, TX 78723.

AT POPULAR MECHANICS WE LIKE TO MAKE IT EASY FOR YOU. YOU CAN CALL OR FAX IN YOUR ADVERTISEMENT AT ANY TIME. ALL WE NEED IS A CREDIT CARD TO CHARGE IT TO. ASK FOR DOROTHY NOLAN, 1 (800) 367-5482 (212) 549-3187. FAX: (212) 977-5415.

TOBACCO

CIGARS, Tobacco, Pipes, Chew. Free Catalog. Erie Tobacco Co., 1828 Euclid, Cleveland, Ohio 44115.

TOOLS FOR SALE

BOLTS, SCREWS, TOOLS, WHOLESALE, DIRECT. Guaranteed. Catalog \$2.00 (Refundable). Camelot, Dept. 44, Box 65, Bristol, Wisconsin 53104.

AMAZING NEW TOOL, Makes Your Projects 100's Of Times Easier, Low Cost, Inexpensive, Buy Direct and Save, Free Brochure. T.G. Products, 95B Emjay Blvd., Brentwood, NY 11717-3384.

TRAVEL & RECREATION

IMPRESS friends. Half off hotels, cruises, condos and more. Guaranteed. Box 50457-A, Tulsa, Oklahoma 74150-0457. (918) 591-0994.

TREASURE FINDERS

BURIED TREASURE - Sensitive equipment allows locating from distance. Brochure free. Simmons, Box 10057-MA, Wilmington, NC 28405.

TV, VIDEOS & VIDEO EQUIPMENT

NOTICE: USE OF CERTAIN ITEMS IN THIS CLASSIFICATION REQUIRES STATION AUTHORIZATION.

VCR REPAIR KIT, Works On All Makes & Models. Free information. 1-800-944-VCRS.

WANTED MISCELLANEOUS

GOLD, Silver, Platinum in any form (jewelry-dental, industrial). Assaying service. Free price quotes. Top payment. 1-800-932-1010/617-326-3442.

BUYING Tungsten Carbide, Moly, Tantalum, Gold, Silver, Platinum 1-800-321-6914.

WELDING, SOLDERING, PLATING

"TINY TORCH", Pinpoint Welding With Total PRECISION Standard Regulator Connections. \$109.00. ABC, 6529 Patal, Houston, TX 77041 or \$2.00 info.

WINEMAKING, BEERMAKING, ETC.

BEERMAKING-Winemakers Free Catalog. Fast Service. Free Recipes. Cellar-M, Box 33525, Seattle, WA 98133. 800-342-1871.

FREE BEERMAKING BOOK-Catalog. Finest Equipment, Ingredients. Fast Service! 1-800-852-9545.

BEGINNERS SPECIAL. Free Catalog and GREAT PRICES. Call U-BREW 1-800-845-4441, North Myrtle Beach, SC 29582.

GOURMET Kits. Free Catalog. 7710 91 Avenue, Vero Beach, Florida 32967. 1-800-780-SUDS.

WISHNIAK Liqueur Recipe, \$3.00. "Sapear", P.O. Box 8604, Haifa, Israel.

IDIOT-PROOF BEERMAKING. MAKES 400OZS (IN THE BAG). 4 GREAT EUROPEAN STYLES. RE-USABLE. SALEPRICE \$29.95. 800-636-6779.

WINEMAKERS-BEERMAKERS. Free illustrated Catalog - (800) 841-7404 - Kraus, Box 7850-L, Independence, Missouri 64054.

BEER! BEER! BEER! Build your own MICRO BREWERY with Household Items for LESS than \$30.00 with my BREWERS HANDBOOK. FREE Recipes Included! Send \$10.00 INFORMATION FACTORY, P.O. Box 811, Seabrook, Texas 77586.

WOOD, WOODWORKING

FOLDING ADIRONDACK CHAIR. With Pull-Out Footrest. Plans \$15.00. Foxbat Design Services, Box 67, Smith Falls, Ontario K7A 4S9.

USE YOUR ROUTER LIKE A PRO! 3 unique, innovative accessories. Complete plans, details, pictures, \$10.00. Surprise bonus gift with your order! Or more information \$2.00 refundable. C. Reed, 610-A Amigos, Ramona, CA 92065.

ADVERTISEMENT

Worth Writing For

957 MADE TO ORDER FROM MARVIN

Beautifully demonstrates how made-to-order wood windows and doors can enhance your home. Helps you determine your needs for design, energy efficiency and maintenance, then choose the products and options to match. Free Brochure

958 1995 POLARIS MAGNUM ATV'S

Introducing the 1995 Polaris Magnum 4x4 and 2x4—both have the largest four-stroke engines in the industry. A full 425cc's of liquid cooled four stroke power. Polaris now has the most powerful four stroke around, with its four valve head and a sophisticated 34mm CV carburetor. The engine is unique with its dry sump lubrication which provides easier cold starting and increased performance. Write for more information on Polaris all terrain vehicles.

959 LITEMATE - THE ORIGINAL VEHICLE-TO-TRAILER WIRING SYSTEM

The Litemate Advantage makes installation of vehicle-to-trailer wiring weather-tight, plug in simple and professional with no cutting of wires! All connectors are Made-in-the U.S.A. Free Brochure

960 ZIPPO LIGHTER COLLECTORS GUIDE

Zippo windproof lighters enjoy a widespread and enviable reputation as valuable collectibles. The Zippo Lighter Collectors Guide is a 28 page historical reference guide to Zippo collectible lighters since 1932. It contains illustrations and descriptions of popular lighters and lighter series and explains the date code found on the bottom of every Zippo lighter. Free Booklet

961 ANDERSEN® WINDOW & PATIO DOOR FACTBOOK

Andersen Windows® & Patio Door Factbook offers ideas for creating distinctive light-filled environments using Feature Windows, Patio Doors and Roof Windows. Includes tips for planning a project, choosing a contractor, energy facts and more. ANDERSEN WINDOWS, INC. For free factbook, call 1-800-426-4261.

962 FOR THE LIFE OF YOUR ENGINE

Free WIX Filters' brochure for passenger car and light truck

filters. Contains information on WIX oil, air, fuel, and transmission filters, including filter wraps, our magnetic in-line transmission filter and oil filters for imported cars. Free Brochure

DIAMOND FILE™

Revolutionary EdgeCraft™ Diamond File™ Set 420 makes steel files obsolete! High-Strength polymer holder with powerful magnet holds 3 easily interchangeable 100% diamond abrasive steel pads: coarse, medium or ultrafine. For stores near you, call 1-800-342-3255.

"OUTDOOR LIVING...INDOORS" - PLANNING AND DESIGN GUIDE

Let this brand-new 32 page color catalog inspire you with ideas for your home. A complete guide to America's most

popular sunrooms, solariums, patio rooms and patio doors. Plus, additional 6-page brochure, "Affordable Outdoor Living Space from Four Seasons", featuring the full range of our patio room products. FOUR SEASONS SUNROOMS. Free. Call 1-800-FOUR SEASONS (1-800-368-7732)

NEED TO GET A SPECIAL GIFT TO A SPECIAL PERSON, FAST?

RadioShack Gift Express™ is the easy way to shop for and send electronic gifts. Choose from thousands of items in the Radio Shack catalog. Then, Radio Shack Gift Express service will wrap, pack, enclose a card and send your purchase anywhere in the U.S. - all for a nominal charge. You can even call toll-free and order by phone. For Radio Shack Gift Express or the location of stores near you, call 1-800-THE-SHACK™

Popular Mechanics 6/95
Box 1718, Sandusky, Ohio 44871-1718

This Coupon Expires August 31, 1995

Please see that I receive the items checked below

- 957 959 961
 958 960 962

Total money for priced items \$ _____

Service Charge \$ 1.50

Total money enclosed \$ _____

Total items requested _____

Name (Please Print) _____

Address _____

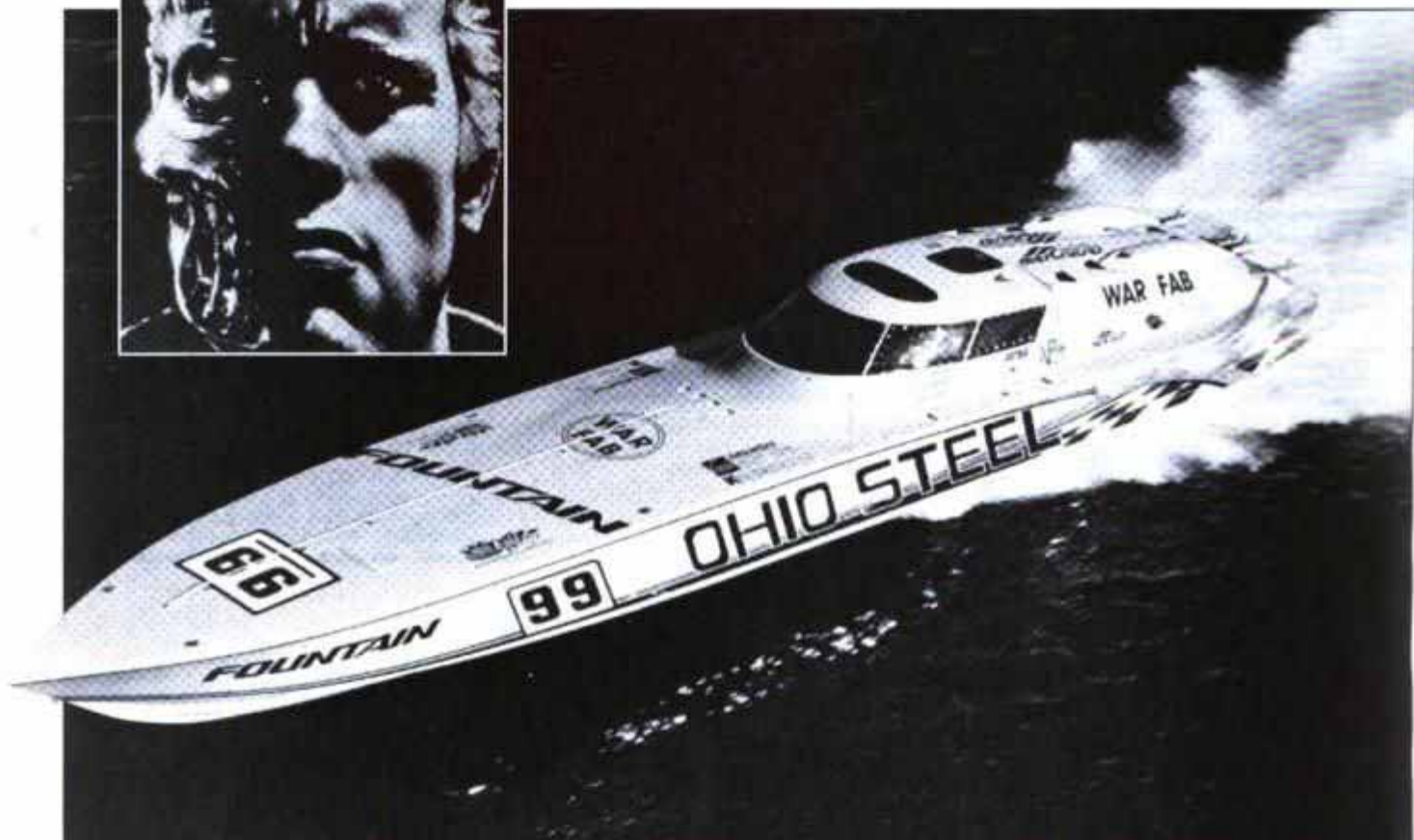
Town _____ State _____ Zip Code _____

(Please send check or money order made out to POPULAR MECHANICS. No stamps, please)

Note: Popular Mechanics processes your requests for the above information and forwards these inquiries to the organization making the offer. Each company mails the material directly. Your order will be on its way to you within 90 days.

PREVIEW

Coming Up In Popular Mechanics



Humanoid Robots

State-of-the-art robots learn like people and even have an awareness of themselves. But will they take over, just like in the movies? Find out in an upcoming cover story.

Cruise Missile

Ever wonder what it's like to blast over the water at 125 mph, powered by three 1000-hp engines at full song? Come with us for a ride in the world's fastest offshore boat.

Mission To Pluto

The mysteries of Pluto will no longer be a riddle as we journey to our solar system's final frontier. We take a detailed look at how a joint U.S./Russian project will work—and what we may learn by studying the last unexplored planet.

'Oh, Computer...'

"Star Trek" moves closer to reality with new-generation voice-recognition computers. Here's how you'll be able to talk directly to your computer instead of using a mouse or a keyboard to communicate your commands.

Hang Tight

If you ever wanted to hang something on a masonry wall or hollow wood wall, or needed to join two pieces of metal, our complete guide to specialty fasteners is just the ticket. It's all here, including the names of product manufacturers and their prices.

Drywall Basics

Installing drywall is a fundamental home-improvement project. Our step-by-step guide shows you how to get professional results.

POPULAR MECHANICS (ISSN 0032-4558) is published by The Hearst Corporation, 959 8th Avenue, New York, NY 10019, U.S.A. Subscription prices: United States and possessions, \$15.94 for one year, \$29.94 for two years. Canada and all other countries, add \$16.00 for each year. Second-class postage paid at New York, NY, and additional mailing offices. Canada Post International Publications Mail Product (Canadian Distribution) Sales Agreement No. 259179. CANADA GST NBR. R105218291 Send returns to Canadian Direct Mailing Sys. Ltd., 920 Mercer St., Windsor, Ontario N9A 7C2. Registered as second-class matter at the Post Office at Mexico D.F., Mexico, June 20, 1960. © 1996 by The Hearst Corporation. All rights reserved. Printed in U.S.A. POSTMASTER: Send address changes to Popular Mechanics, P.O. Box 7170, Red Oak, IA 51591.



YOUR BASIC® FRONT PAGE NEWS



SURGEON GENERAL'S WARNING: Smoking By Pregnant Women May Result in Fetal Injury, Premature Birth, And Low Birth Weight.

© Philip Morris Inc. 1995

Kings: 16 mg "tar," 1.1 mg nicotine av. per cigarette by FTC method. ©1995 PHILIP MORRIS INC.

07055223044



b89055223044a

WHEN YOU'VE *outgrown* YOUR TONKA.

Now THAT THE WORLD IS YOUR SANDBOX,
YOUR TRUCK NEEDS TO BE A WHOLE LOT BIGGER
AND MUCH MORE POWERFUL. WITH ITS 195 HORSEPOWER
AND EXCLUSIVE DRIVER CONTROL SYSTEM,*
THE ALL NEW CHEVY BLAZER IS ONE
TOY YOU'LL NEVER GET TIRED OF PLAYING WITH.

ALL NEW BLAZER
LIKE A ROCK



For a free brochure or video call 1-800-950-0540. *Excludes other GM products. The Chevrolet Emblem and Blazer are registered trademarks and Chevy is a trademark of GM Corp. ©1995 GM Corp. All Rights Reserved. Buckle up, America! Tonka is a registered trademark and is used with permission of the Tonka Corporation. All Rights Reserved.