

# Popular Mechanics

DECEMBER 1994

U.S. \$2.50  
Canada \$2.95

**SPECIAL**  
**O. J. SIMPSON'S HIGH-TECH TRIAL**

## WORLD'S MOST POWERFUL! KING KONG OF LOCOMOTIVES

At The Controls  
And Under The Skin  
Of Southern Pacific's  
New 5000-hp  
Freight Hauler

### UPGRADES AND ADD-ONS FOR YOUR PC

Make Your  
Computer  
Do More  
—Faster

### ROBOCOP CAR

Amazing  
Police Station  
On Wheels

### GREAT PINBALL MACHINES

Legends And  
Lore Of An  
American Classic



# FORD F-SERIES. THE BEST NEVER REST.



BUILT FORD TOUGH



Our available Convertible Console Seat has enclosed storage, plus flips up to seat three.



Using power wisely: F-Series has the most fuel-efficient gas V-8 with automatic transmission.<sup>†</sup>



Now you can get in and out in style with our available new cab step.

<sup>†</sup>5.0L V-8 EPA est. 15 city/20 hwy, mpg. <sup>\*\*</sup>Airbag on models under 8500 lbs. GVWR. Always wear your safety belt. <sup>†</sup>Based on 1977-1993 CY manufacturer's reported



Only F-Series has an available anti-theft system with remote keyless entry.



Our long list of safety features begins with a standard driver's airbag<sup>®</sup> and rear anti-lock brakes.



With F-Series, you get the confidence of knowing it's been America's #1 truck 17 years running.<sup>†</sup>

retail deliveries by Division.

This One



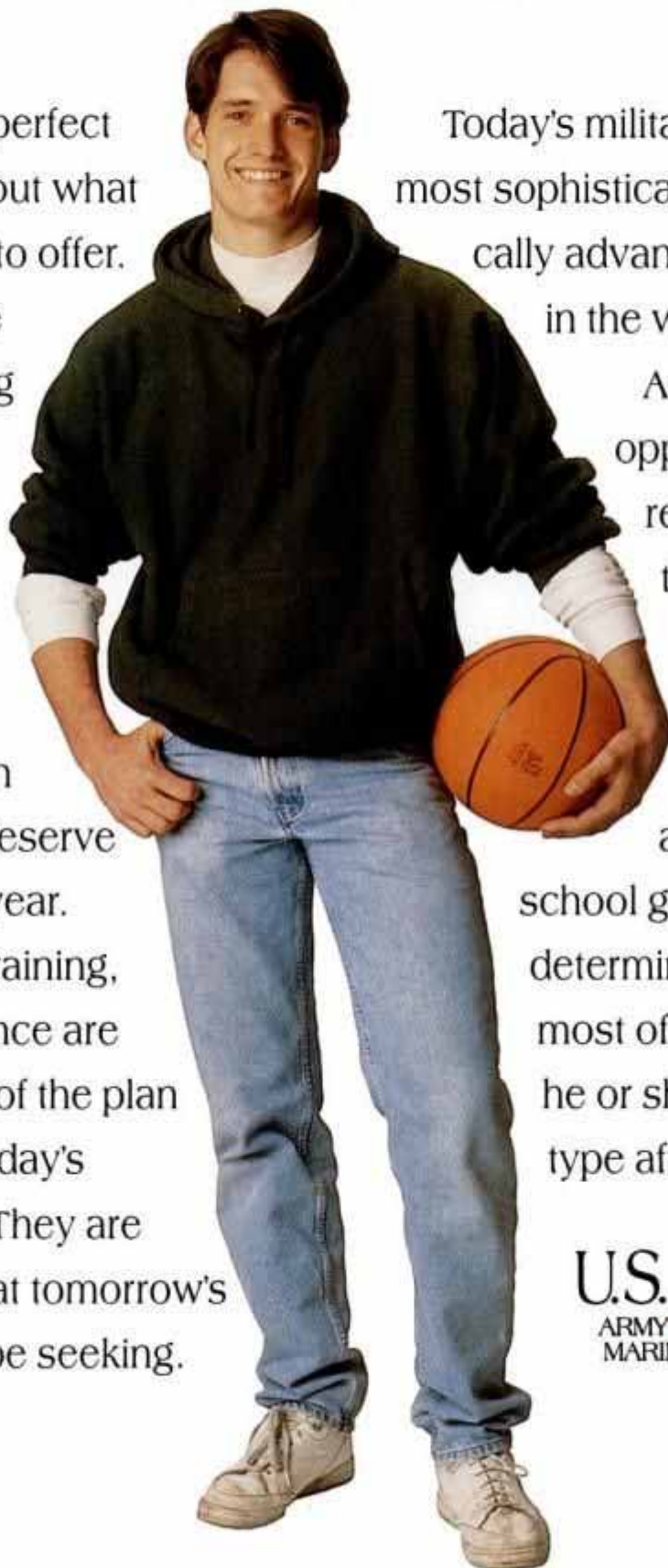
RNW5-YND-E53L

# 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 ★

# Popular Mechanics®

DECEMBER 1994  
VOLUME 171  
NO. 12



66



80



53

## AUTOMOBILES

### 38 Detroit Spy Report

A Ram Air Firebird, '96 Oldsmobile Eighty Eight and Ford Taurus SHO, '97 Ford F-Series pickup, Cadillac sport/utility, '98 front-wheel-drive Mercury Cougar and Buick Opel.

### 53 Imports '95

The tide is turning and, while domestics surge, imports fight for their place on the beach.

### 61 Engineering The '95 Imports

Inside the skin of the new overseas crop.

### 120 Corvette Museum

It's a mecca in Bowling Green, Kentucky, if you love America's sports car.

## TELECOMMUNICATIONS

### 77 On-TV Guides

You have one of the new 500-channel television systems? So what's on?

## BOATING/OUTDOORS

### 44 Boating

Shock treatment for personal watercraft.

### 70 Adventure: Cool Runnings

The Inside Passage from Seattle, Washington, to Juneau, Alaska, in a new Grady-White.

## AMERICAN CLASSICS

### 63 Pinball Machines

Manipulate a silver ball, hit it with a flipper, make the bells ring. It's an American phenomenon.

## HOME IMPROVEMENT

### 88 Home And Shop Journal

- **Shop Project:** A Morris chair and ottoman.
- **New Products:** 13 you'd like to have.
- **Shop Techniques:** Reinforced joints.
- **Home Improvement:** Install a water heater.

### 106 Homeowners Clinic: Home maintenance Q&A.

## SCIENCE/TECHNOLOGY

### 17 Tech Update

- Homebuilt spacecraft.
- Infrared sensors for the blind.
- Farnborough air show, and more.

### 40 Science When a comet hit Jupiter.

### 49 COVER STORY: 5000 Horsepower!

Driving the world's most powerful diesel locomotive.

## ELECTRONICS

### 42 Electronics Bose makes for a smooth ride.

### 66 O.J.'s High-Tech Courtroom

A harbinger of things to come in all courtrooms.

### 74 Police Station On Wheels The police cruiser of the future will be equipped like this one.

### 80 Computer Upgrades And Add-Ons

24 ways to make your PC better, plus the pick of the new CD-ROM titles.

### 116 Video Make your own photo prints from video.

## DEPARTMENTS

### 6 Editor's Notes

### 14 Letters

### 16 Time Machine

### 142 Coming Next Month



MERRY

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

16 mg "tar," 1.1 mg nicotine av. per cigarette by FTC method.

Материал, замененный историческим прототипом

*CHRISTMAS FROM MARLBORO COUNTRY*



© Philip Morris Inc. 1994

Материал защищен авторским правом

# EDITOR'S NOTES

● There's an ongoing debate among PM editors as to who has the best job on staff. What with signing my name to vouchers 500 times a day, meeting with vice presidents in charge of paper clips and other administrative duties I'm saddled with, it's agreed that I have the worst job (even though I get paid the most). For best job, a good case can be made for Boating/Outdoors Editor Joe

Skorupa. That is, if you have a daredevil soul and like to roam the world in search of adventure. It sounds like a Sunday evening TV show. In the past few years, Skorupa has driven a GMC truck from Tierra del Fuego at the tip of Argentina to Prudhoe Bay in Alaska, pounded a Ford Explorer from the depths of Death Valley to the spires of Pikes Peak, crashed through the Central American jungles in a Land Rover Discovery and piloted a boat up the Intracoastal Waterway. All in the name of testing the latest outdoor



Skorupa at the helm.

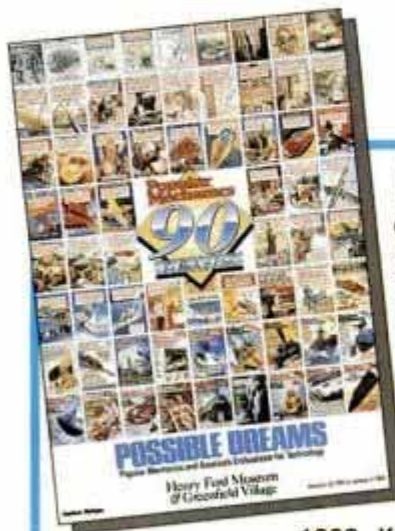
equipment and vehicles. Of course, all this is in addition to his regular duties testing boats in Florida and California, and supervising photo shoots with gorgeous models. See what I mean about the best job on staff? Now this month, Skorupa climbs into a Grady-White fishing boat and takes on the Inside Passage, a treacherous 1100-mile stretch of waterway between Seattle and Juneau. Check out "Cool Runnings" beginning on page 70. All wimps are advised to stay home and tend to their administrative duties. ... **Not far behind Skorupa** in the adventure department is Science/Technology Editor Greg Pope, who flew to Idaho to get behind the controls of the world's newest, most powerful diesel locomotive. It's this month's cover story starting on page 49. ... **And speaking of power**, Auto Editor Don Chaikin recently drove Lamborghinis, BMWs, Lexuses and a slew of other imported hot rods to bring you the second half of our New Cars '95 coverage. It begins on page 53. Enjoy. Now regarding who has the best job, I can't think about it now. I have to sign some vouchers. Till next time.

Joe Oldham

## Free Poster Offer

● We first printed this poster as part of our 90th Anniversary celebration. We produced several hundred thousand to give away to visitors at the "Possible Dreams" exhibit at the Henry Ford Museum in Dearborn, Michigan. We've just discovered a box of posters that somehow got lost and were never distributed. These are 15 x 21 (folded to 7½ x 10½) full-color posters depicting 66 past covers of POPULAR MECHANICS, including the first issue in January

1902. If you would like to have a free copy of this commemorative poster, send a self-addressed stamped envelope measuring 8½ x 11 to: Poster Offer, POPULAR MECHANICS, 224 W. 57th St., New York, NY 10019. When they're gone, they're gone.



# Popular Mechanics

Editor-In-Chief Joe Oldham

Managing Editor Deborah Frank  
Graphics Director Bryan Canniff

### Home Improvement

Editor Steven Willson  
Associate Editor Thomas Klenck  
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  
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

### Electronic Production

EP Administrator Sarah Deem  
EP Manager Robin LaSalle  
Art Editor John Bostonian Jr.  
Copy Editors Peter Burns  
Nancy Coggins

### Editorial Administration

Administrative Asst. Josephine Caronia  
Asst. to the Editor Barbara A. Novak

### Reader Service Department

Manager Norah I. Golad

### 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 Magazine 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 1-800-333-4848. 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 & 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.



# The Dirt Devil® Wet·Dry Vac.

## We put a lot into it. So can you.

The full 2½" accessory kit includes two wands, a floor/squeegee tool, a crevice tool, and a 7-foot hose.

The detachable blower is powerful enough to blow away dust, dirt, and leaves.

The extra-long hose and cord mean this vacuum can really go the distance.

The 8- or 16-gallon capacity tank can hold wet and dry messes together without removing the filter.

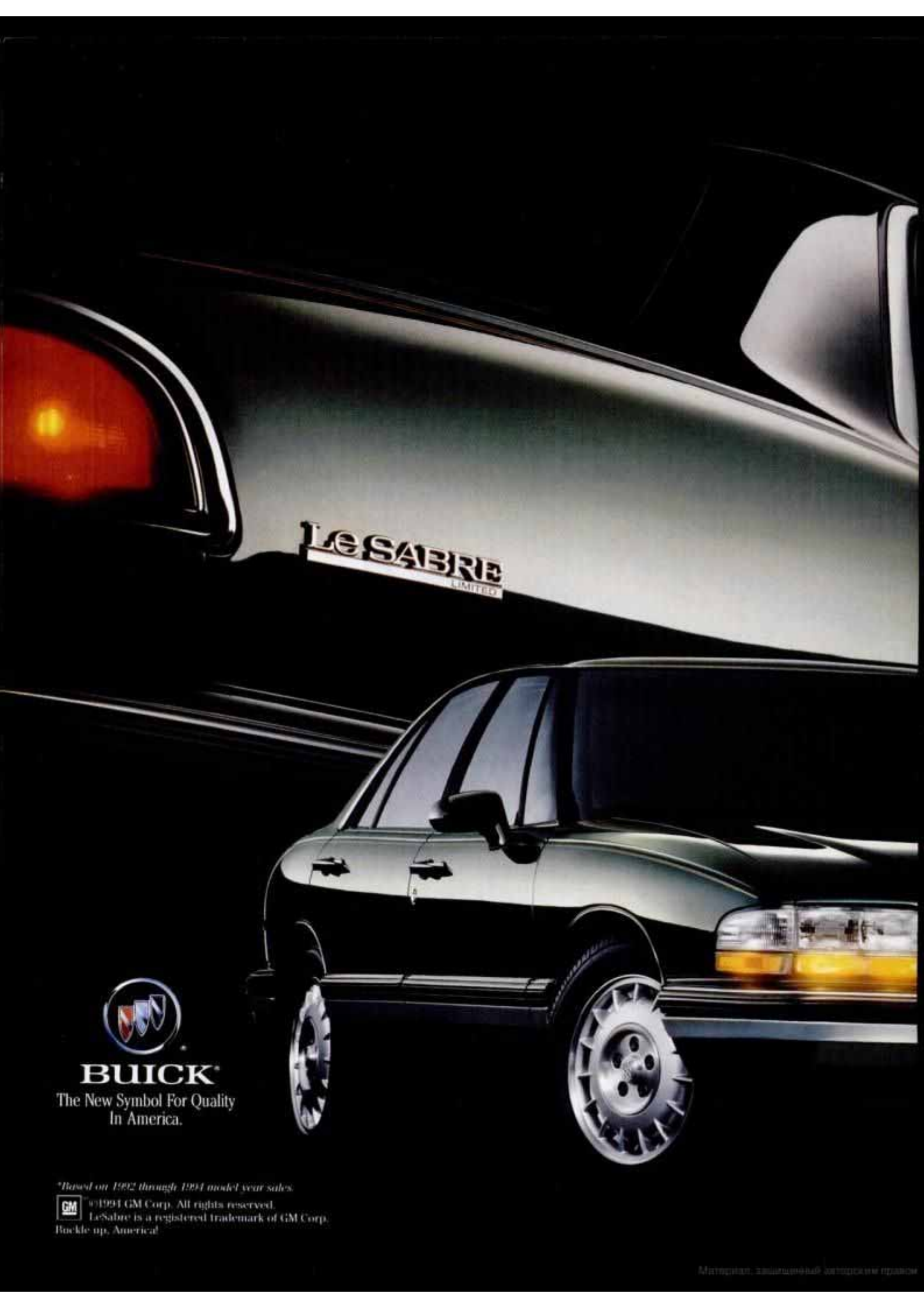
The convenient built-in tool caddy means you will spend less time looking for tools.

The low center of gravity and longer wheelbase mean enhanced stability and maximum tip resistance.



**Dirt Devil**  
by Royal

For a retailer near you, call 1-800-321-1134.




LeSABRE



**BUICK**

The New Symbol For Quality  
In America.

*\*Based on 1992 through 1994 model year sales.*

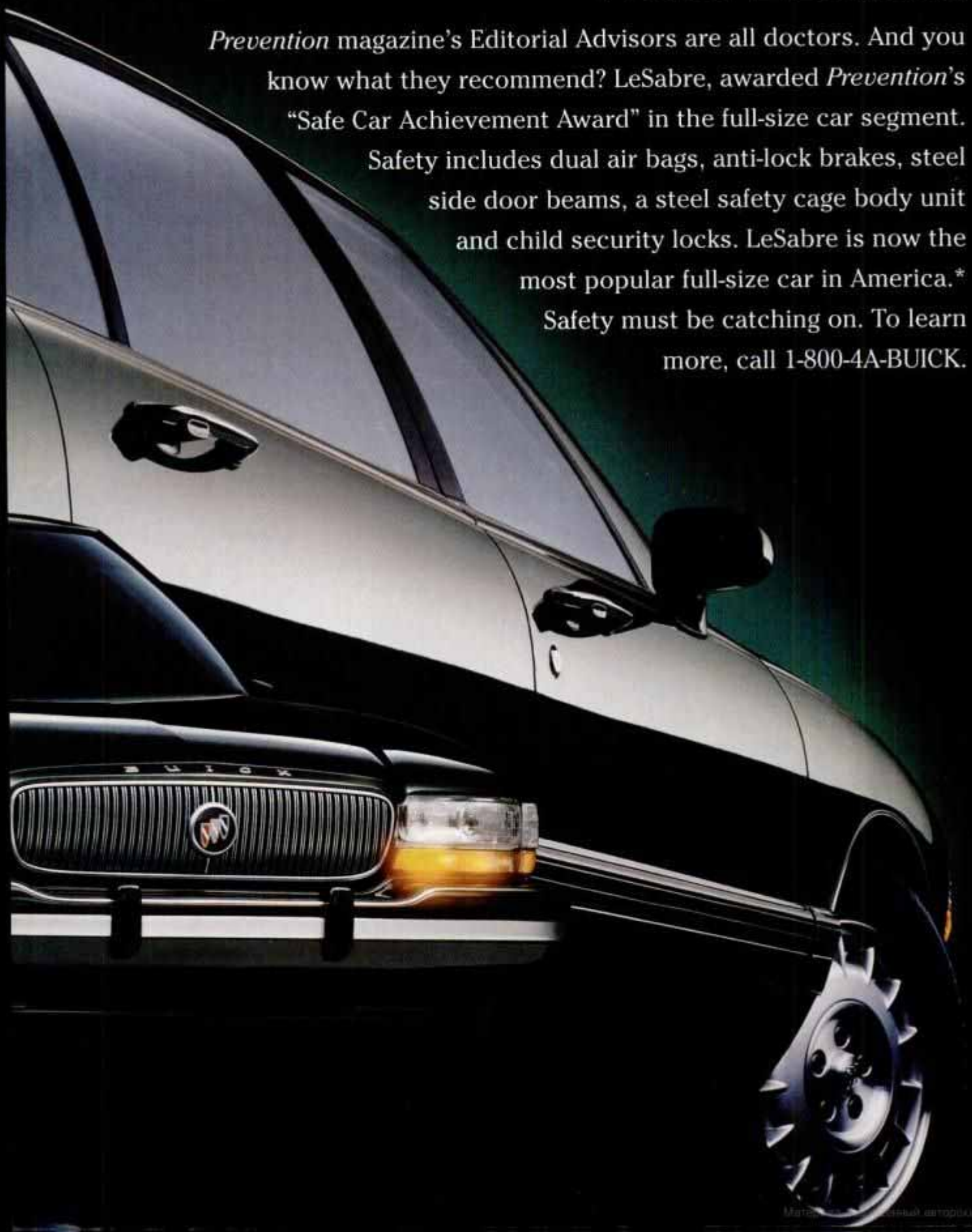
 ©1994 GM Corp. All rights reserved.  
LeSabre is a registered trademark of GM Corp.  
Buckle up, America!

# What do doctors recommend most? Buick LeSabre.

*Prevention* magazine's Editorial Advisors are all doctors. And you know what they recommend? LeSabre, awarded *Prevention's* "Safe Car Achievement Award" in the full-size car segment.

Safety includes dual air bags, anti-lock brakes, steel side door beams, a steel safety cage body unit and child security locks. LeSabre is now the most popular full-size car in America.\*

Safety must be catching on. To learn more, call 1-800-4A-BUICK.



I'll be home for Christmas...

Zippo commemorates the heroic spirit of World War II with two limited editions.

The Allied Heroes set—portraits of four generals engraved on high polish brass lighters with an etched brass key ring in a presentation tin. The D-Day Lighter—Zippo's historic black crackle finish with an antiqued brass medallion, displayed in a collector's tin.

Bring them home for Christmas.



**zippo**

Zippo Manufacturing Company • Bradford PA 16701  
Lifetime Guarantee—Made in the USA

**SEARS**

The D-Day Commemorative Lighter is available at the Gift Center of most larger Sears stores.

1-800-274-7367

The Allied Heroes Set is available through Things Remembered phone order only. To place an order or locate a Sears Gift Center or Things Remembered near you, call this toll-free number.

Things Remembered

Over 750 Things Remembered stores nationwide

# Popular Mechanics

**Publisher** Robert B. Dillingham

**Business Manager** Agnes P. Maillaro

## 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) 980-8883

**Manager** Daniel F. Kellner  
Dean Zeko

### Mail Order

**Manager** Barbara Jones  
(212) 649-3136

### Classified

**Manager** Dorothy Nolan  
(212) 649-3167

## MARKETING

**Director** William E. Congdon

## PROMOTION

**Manager** Kim A. Boknoski  
(212) 649-3085

## PRODUCTION

**Manager** Carole L. Hartman  
**Adv. Prod. Mgr.** Patricia A. Woods  
(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, 969 Eighth Avenue, New York, NY 10019, U.S.A. Frank A. Bennack Jr., President; Randolph A. Hearst, Chairman; Gilbert C. Maurer, Executive Vice President; Victor F. Ganz, Senior Vice President, Chief Financial and Legal Officer; Jolie 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.

POPULAR MECHANICS • DECEMBER 1994

Материал защищенный авторским правом

## PM HOTLINES

# COMMUNICATE WITH US

We're trying our best 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 printed 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 is available 24 hours a day.

### ELECTRONIC MAIL

You can call the PM computer any day between 6 pm and 8 am (only) Eastern time. 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. The department bulletin board also allows you to share your thoughts with other readers who call in.

New users get an identification number and password that allow them to access the system. Simply set your communications software to 8 bits, no parity and 1 stop bit (8-N-1), and set the baud at 300, 1200 or 2400. Please remember that we are not a professionally staffed, fully operational bulletin board. We're simply trying to make it easier for you to communicate with us. So please bear with us if it takes awhile to answer your message.

### READER SERVICE BUREAU

Our Reader Service Bureau is operational five days a week during regular business hours. The phone number is (212) 649-3127. Please call our Reader Service Bureau, *not our editors*, for information on back issues, reprints of articles, subscription inquiries and so on. It will save all of us time.

### HOTLINE PHONE NUMBERS

Unfortunately, our Hotline Phone Service is temporarily discontinued.

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

**Chef'sChoice®**  
professional  
**110**

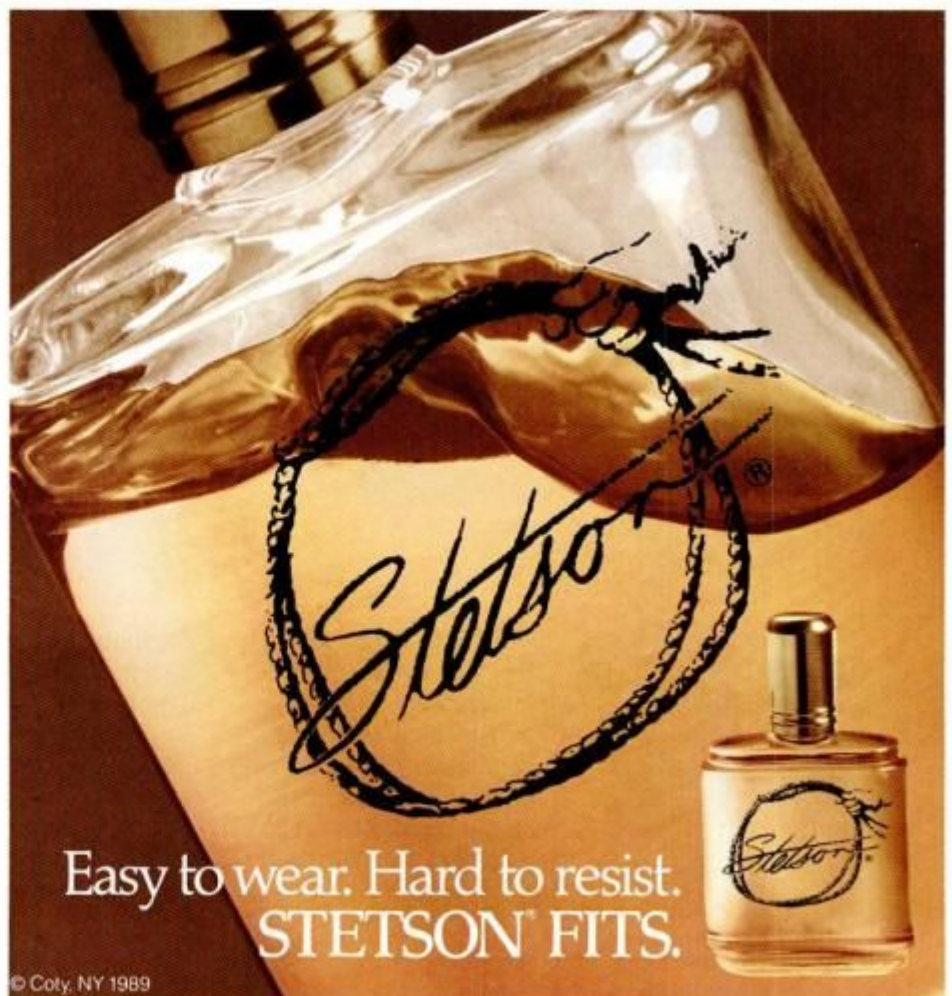


*Up to twice as sharp  
as a razor blade*

*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



Easy to wear. Hard to resist.  
**STETSON FITS.**

© Coty, NY 1989

# World's First.

WORLD'S FIRST 900 MHz DIGITAL SPREAD SPECTRUM CORDLESS PHONE



Escort 9020

\$299

*Escort introduced the world's first 900 MHz Digital Spread Spectrum cordless phone and Escort 9020 takes this innovative technology one step further. Escort 9020 continues our tradition of product excellence by offering greater range (up to eight times that of a conventional cordless phone) and improved talk time and stand-by time. With its superior range, clarity and security, Escort 9020 will change the way you think about cordless phones forever.*

- Superior technology provides up to *eight times* the range of a conventional cordless phone.
- Eliminates *all* of the poor range, clarity and security problems associated with ordinary cordless phones.
- Contains the same innovative technology that made *Popular Science* call our original 900 MHz Digital Spread Spectrum cordless phone one of the year's "greatest achievements in science and technology."
- Patented encryption hardware keeps scanners and other cordless phones from picking up your private conversations (ordinary cordless phones can't say the same).
- Digital technology ensures exceptional voice clarity.

*Escort 9010 is a 900 MHz Digital Spread Spectrum cordless phone with an internal handset antenna. It offers the same digital clarity and security as Escort 9020, plus superb range.*



\$299

**ESCORT**  
Always The  
Right Choice

#### Confidence

*When you give an Escort product, you're giving the very best. We've been designing innovative electronics for 16 years and have a tradition of excellence. Our quality and performance standards are second to none.*

#### Commitment

*We are committed to your complete satisfaction. If you're not completely delighted with your purchase, return it within 30 days for a refund. Buy now and the 30-day trial period won't even begin until December 25, 1994!*

#### Convenience

*Shop when you want to shop...from the safety and comfort of your own home. We're here to take orders all day, every day. And we're always glad to answer your questions – both before and after the sale.*

# World's Best.

WORLD'S FIRST DETECTOR WITH AN LCD MONITOR



Passport 5000

\$199

*Passport 5000 is the world's first detector with an LCD monitor. At a glance, you get the radar/laser information you need for quick decision-making.*

- DSP technology provides long range detection of every type of radar, plus you get full laser coverage.
- Patented DPR™ circuitry minimizes falsing.
- LCD monitor can be adjusted to four separate levels of brightness.
- World's first detector to incorporate the Emergency Vehicle Warning System for safer driving.

WORLD'S FIRST CORDLESS RADAR/LASER DETECTOR



Solo 4

\$249

*Solo 4 is the world's first cordless radar/laser detector. Its portable convenience makes it ideal for trips or when using rental cars.*

- DSP technology provides long range detection of every type of radar, plus you get full laser coverage.
- Patented DPR™ circuitry minimizes falsing.
- Four AA alkaline batteries provide most drivers with up to 60 hours of full-powered detection.
- To conserve battery life, Solo 4 will automatically shut itself off should you forget.

\$169



*Passport 4500 SuperWide detects all radar and laser bands. This full-featured SuperWide Ka detector offers long range warning, anti-falsing circuitry and a visual and audible alert system.*

## OUR HOLIDAY GUARANTEE!

*We want you to be absolutely delighted with your Escort purchase. That's why, during this time of holiday gift-giving, we won't start the 30-day trial until December 25, 1994 – even if you order right now!*



CALL TOLL-FREE:

**1-800-433-3487**

Open 24 hours a day, 7 days a week

**Overnight Shipping Available**

Shipping & handling is extra. OH res. add 6% sales tax.

ESCORT

► Department 5068D4  
5200 Fields-Ertel Road  
Cincinnati, Ohio 45249

**ESCORT.**  
The Innovative Edge.™

© 1994 CMI

# LETTERS

## Correction

A letter published in the September issue erroneously stated that *Popular Science* contributed to Handgun Control Inc. and had an antigun attitude. These statements are untrue. *Popular Science*, the nation's largest-circulation science and technology magazine, has never contributed to Handgun Control Inc. and does not have an antigun attitude.

FRED ABATEMARCO  
EDITOR-IN-CHIEF  
POPULAR SCIENCE  
NEW YORK, NY

*We should have done a better job of checking the facts before printing the letter. Our apologies.—Ed.*

## The Missing

I enjoyed your September cover story on POWs/MIAs very much. I'm looking forward to the day you can do the same for the "forgotten ones"—those who were downed over and around Russian airspace during the Cold War days.

MAJ. HARRY B. WOLFE  
USAF (RET.)  
SOUTH HADLEY, MA

As a former Special Forces officer, I would prefer to have read about technology that can help find those still living.

E.S. NIELSEN  
SAN JOSE, CA

Searching for the *surviving* POWs/MIAs should be of greater importance. As for skeletons, why not ask Hanoi about the warehouse storing hundreds of American skeletons? This was reported to the U.S. government by a former North Vietnamese colonel in the '80s. And what happened to the 86 men flown from

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

Haiphong and Hanoi to a military hospital in the Philippines in early 1986? Are sections of the POW/MIA Affairs Agency being



used to cover secret wars? Your search should start with the U.S. government.

CHRISTINA BURSKEY  
MT. AIRY, MD

The Joint Task Force-Full Accounting says no evidence exists that Americans are being held against their will in Southeast Asia. Well, if this is true, why is it that any information from Washington pertaining to POWs/MIAs is so heavily censored?

WALTER BRIGGS  
ALEXANDRIA, LA

What we need is more truth and less coverup from our government and the Vietnamese government. We have the technology to find the dead, but how much better it would be to bring back those still alive.

JOHN A. VINCENT  
CORRYTON, TN

I could not help but notice that your information looks just like government textbook information. But, as usual, all that was explained was how crash sites are dug up. Nothing was done to let the people know what happened to those

who were seen with open chutes, or seen captured. So how can anyone say that progress is being made when all we look for are remains? Why not look for live POWs? Is it so hard to realize that these men can be moved from one area to another long before we get the okay to investigate an area?

MAURICE O. BLISS  
SHAWNEE, KS

## The Fed Chip

In reference to your article on the Clipper chip, anyone who uses a cellular telephone, E-mail or any form of telecommunications must accept that the government may be listening. But is it realistic to fear that the government will listen to every E-mail conversation? The government's intentions are to introduce a new crime deterrent in the information age. With the unbridled

growth of the info superhighway, the government must find new techniques of surveillance to stop the high-tech crime wave of the 1990s. The Clipper chip, although not perfected yet, will allow the authorities to follow the recent trend of crime into the age of technology. It's time to quit worrying about the potential invasion of privacy by the "Big Brother Chip" and worry about the invasion of crime into our computer systems.

ZACHARY A. DAVIS  
SCOTTSDALE, AZ

Does anyone really believe that Janet "Gas-'Em-And-Burn-'Em" Reno will be restrained enough to follow laws that protect privacy? Waco should be warning enough that, to the Clintons and Reno, the ends justify the means.

JOHN A. VINCENT  
CORRYTON, TN

## Reader Project Of The Month



I'm getting pretty tired of reading about and seeing pictures of all those old cars and trucks that my fellow readers have restored. It's true that some really are works of art, but it's about time us "old iron" guys stood up to be counted. How about this 1954 Farmall Super C tractor I restored? It took about a year to complete. Everything is original—except the tires and fan belts—even the 6-volt ignition system. Oh, yeah, for you sporty car buffs: It does 0 to 10.5 mph in 6.1 seconds.

VICTOR MATHIS  
INDIAN RIVER, MI



# America's Most Popular Models Are Made In Italy



Burago of Italy creates the finest, most accurately detailed automotive replicas anywhere. Each fully assembled model is an exact replica of the original that

inspired it. Steering is operational and hinged doors, hoods and trunks open and close. Intricate workmanship includes complete dashboards and fully detailed engines. Metal body parts are finished with lead-free enamel. Exterior accents such as windshield wipers, door handles, accurate tire treads and spoked

wheels are standard equipment. Models are approximately 10" long, and weigh 16-22 ounces.

Burago's 1:18 scale Diamond Classic collection represents a full range of models—from the American dream cars like the '57 Chevy Corvette and the brand new Dodge Viper RT/10, to European racers and exotics such as the Porsche, Jaguar and Ferrari. Popularly priced, and with over 40 models to choose from, you'll assemble an impressive collection in no time!



**1:18 SCALE  
DIE-CAST METAL CARS**  
Available at better stores everywhere.



Above: Ferrari 456 GT, 1992



Porsche 356 B Cabriolet, 1961



Dodge Viper RT/10, 1992



Lamborghini Diablo, 1990



Chevrolet Corvette, 1957

Send \$1.00 for a color brochure showing Burago's full line of 1:18 scale die-cast metal models, plus a list of retailers nationwide.

**BURAGO BROCHURE**

Dept. PMC4, PO Box 1000, Mt. Pocono Industrial Park, Tobyhanna, PA 18466

Yes! I want more information on Burago die-cast models! \$1.00 is enclosed.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ Zip \_\_\_\_\_

© Model Expo 1994

# TIME MACHINE

90 YEARS AGO: DECEMBER 1904

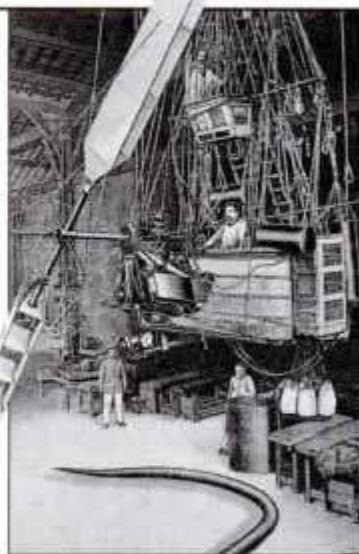


## Flying Blind

So meagerly was the Wright brothers' first flight reported that, a year later, analysts wrung their hands at the slow progress in conquering the air. The widely known wreck of Langley's *Aerodrome* had given airplanes a bad name, while the airship was perceived as "a most expensive and dangerous pleasure-craft." Although time, money and brains would likely solve technical problems, practical air travel remained a matter of speculation.

## Up, Up And Away

Meanwhile, the French continued their mastery of ballooning with an astonishing craft called the *Mediterranean II*. The undercarriage consisted of two wicker baskets, rigged together with rope and ladders. Two 23-ft. aluminum propeller blades jutted from the side of the larger basket. In addition, the basket trailed a long strip of fabric that acted as a rudder. The gas bag itself loomed 80 ft. high.



60 YEARS AGO: DECEMBER 1934



## Water Bugs

Speedboat racing lured crowds in the '30s, not only for the spills and thrills, but also for the chance that a dark-horse novice might snatch victory. East Coast racers favored single-seat hydroplanes, while in the West 2-man runabouts were popular, mechanics sprawling across their bows to flatten turns. Hull designers worked decks into teardrop shapes. But in the end, only pluck and luck on the part of the racer brought the boat to the finish line.



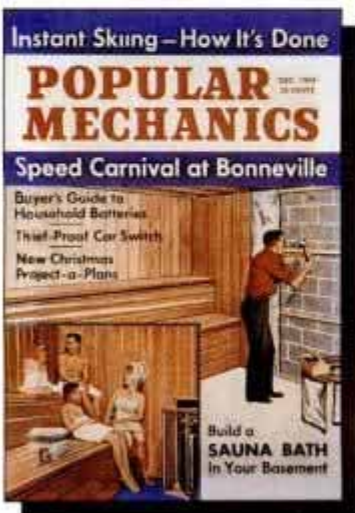
scanners. Instead, magnetic deflection coils zigzagged an electron beam across a fluorescent screen.

## Broadcast News

Television as we know it took shape as Philo T. Farnsworth demonstrated a system of sending and receiving images that dispensed with mechanical



30 YEARS AGO: DECEMBER 1964



## Hot House

The home sauna was America's newest status symbol, and we showed you how to put the finishing touches on this Finnish import. After investing in a sauna stove, you'd wall off a basement area with studs. These would sandwich fiberglass and an aluminum-foil vapor barrier. Redwood or red cedar, both poor heat conductors, lined the inner face and sauna benches.

## Speed Demons

Jet cars converged on Bonneville in racing's wildest month ever. First Tom Green shattered Craig Breedlove's 407-mph land-speed record in the *Wing-foot Express*. Three days later, Art Arfons did

434 mph in his *Green Monster*. Not to be outdone, Breedlove brought back his *Spirit of America* to smoke across the salt at 526 mph. Finally, Arfons upped the ante again, notching an average of 536.71 mph and experiencing history's first 600-mph tire blowout. **PM**



# TECH UPDATE

News Of Tomorrow's Technology Today



PAUL DIMARE

## Slip Gravity's Bonds In Your Homebuilt Rocket

AKRON, OH—Homebuilt aircraft have been flying since the dawn of aviation. Are we ready for homebuilt spacecraft? Space activist David L. Burkhead thinks so. He's proposing the Spacecub, a manned suborbital kit rocket that will roar to a 77-mile altitude, vaulting more than 600 miles.

Practical? Of course not. Spacecub is designed for 15 minutes of glory. Two minutes after launch, at an altitude of 12 miles, you will break the sound barrier. When your engines shut down, you'll be traveling at Mach 8. Weightless for several minutes, you'll see Earth's curvature and a jet-black sky. On your way down, the engines will reignite to cushion your tail-first landing. Any smooth, hard surface will serve as a pad.

To reach higher, you could ride Spacecub straight up to 194 miles. Of course, you'd clock 8 g's on re-entry.

If you can build and fly an aerobatic homebuilt, says Burkhead, you can

build and fly Spacecub. Although the kit would cost \$200,000, the technology is surprisingly uncomplicated.

Four vernier attitude-control rockets from Russia's RD-107 engine will deliver 20,000 pounds of thrust at launch. These rockets have amassed a superb reliability record since they first worked on *Sputnik 1*'s launch vehicle in 1957. Roughly \$600 worth of kerosene and liquid oxygen will deliver maximum performance. Although the vehicle will weigh 15,650 pounds fully loaded, at touchdown you will have burned off enough propellant mass to permit a safe landing

Clad in titanium, homebuilt Spacecub roars out of the atmosphere on four Russian vernier engines.

even with multiple engine failures.

But while tried-and-true propulsion will catapult Spacecub, up-to-date computers will control the ride. You can just press the start button and let the computer monitor the engines and dictate the vehicle's flight path, or you can fly the mission manually.

Spacecub's suborbital path and low aerodynamic loads eliminate the need for a heat shield. Its outer skin will be titanium, cut and shaped by the builder in the truest kit tradition.

### Highlights This Month

- **Bolt Cutters**—New devices to deter lightning.
- **Seeing Eyes**—Infrared sensors guide the blind.
- **Battle Of Britain**—Showdown at Farnborough.
- **Target: Sniper**—Sensors pinpoint hidden gunmen.
- **Water Power**—Engine to exploit "cold fusion."
- **Rocky Road**—Robot cars ply torture-test track.
- **Motor Rotor**—Electric wheel turns itself around.

Editor/Writer: Gregory T. Pope  
Reporters: Phillip Chien, Chris Chirnock,  
Jim Dunne, Scott Gourley, David Hughes,  
Kimberly Patch, Barry Rosenberg

## Skipper Pilots The Upper Atmosphere

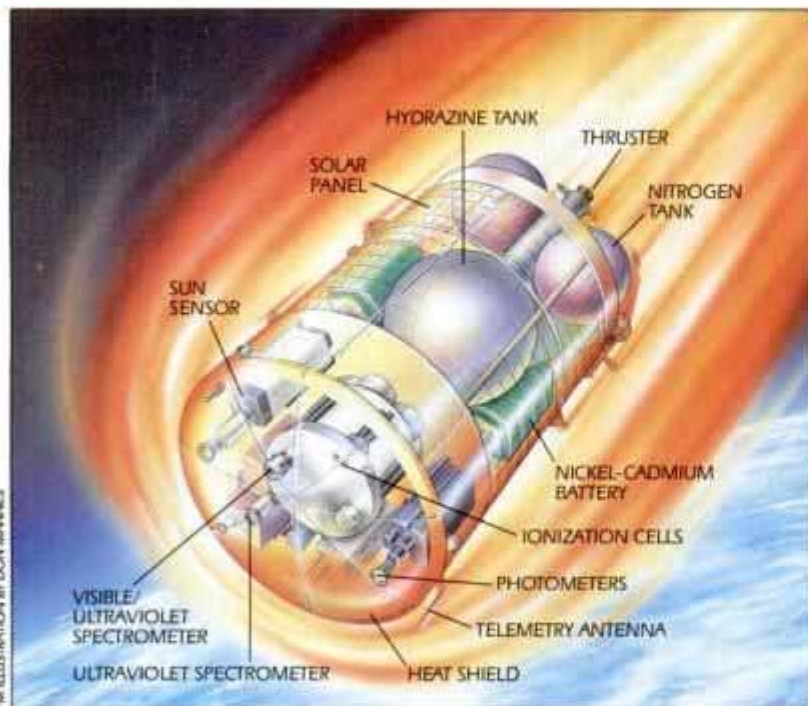
LOGAN, UT—Plowing headlong into Earth's atmosphere, a spacecraft or missile touches off a shock wave. How does this shock rattle the chemistry of air molecules? Thus asks the Ballistic Missile Defense Organization, which prizes data on missiles re-entering the atmosphere.

So BMDO has funded a unique spacecraft called *Skipper*, due for launch on a Russian Molniya-class rocket this spring. Built jointly by Utah State University and Moscow Aviation Institute, *Skipper* has been recently declassified.

*Skipper* will start looping in a 511-mile orbit and gradually fall. Controllers will usher the satellite over areas of the Pacific Ocean where they normally collect data from ICBMs on test flights. On-board instruments will look for atmospheric molecules that glow as *Skipper* hurtles by at 18,000 miles per hour. Once the spacecraft reaches a 50-mile height, it will disintegrate.

*Skipper* will monitor interaction between bow shock and upper atmosphere.

hurtles by at 18,000 miles per hour. Once the spacecraft reaches a 50-mile height, it will disintegrate.

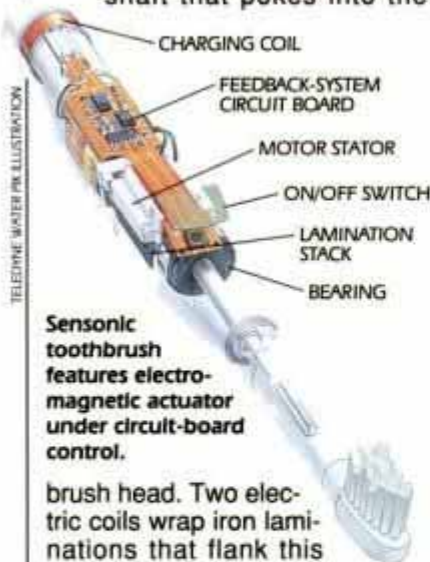


PM ILLUSTRATION BY DON MANNES

## New Sound Of Tooth Care

FORT COLLINS, CO—Electric toothbrushes have really picked up their game, as Teledyne Water Pik has introduced a model that operates at 30,000 brush strokes a minute. Rival Sonicare has a model clocked at 31,000.

Inside Water Pik's Sensonic, permanent magnets stud a shaft that pokes into the



TELEDYNE WATER PIK ILLUSTRATION

Sensonic toothbrush features electro-magnetic actuator under circuit-board control.

brush head. Two electric coils wrap iron laminations that flank this shaft. A circuit board charges alternate coils in quick succession, setting up a rapidly reversing electromagnetic field that wiggles the shaft back and forth. A feedback loop adjusts the circuit board's signals, keeping the brush's speed constant while it rubs against teeth.

## Pegasus Puts One In Van Allen Belts

EDWARDS AFB, CA—Good news for Pegasus fans. The winged rocket pulled off a picture-perfect launch this past August, six weeks after its bigger cousin Pegasus XL malfunctioned (see Tech Update, page 16, Sept. '94). Arcing from the wing of a B-52, the vehicle put a small satellite in a looping orbit.

The spacecraft is APEX, which stands for Advanced Photovoltaic and Electronic Experiments. Wheeling through the Van Allen radiation belts that cloak Earth, it is probing radiation's effects on satellite solar panels.

The next Pegasus mission will loft two ORBCOMM satellites (see "Letter To A Beeper," page 50, April '94).



ORBITAL SCIENCES CORP. PHOTO

APEX was the final Pegasus-carried satellite from a NASA B-52.

## Lightning Never Strikes Here

BOULDER, CO—The world's most dangerous phenomenon, lightning accounts for 6000 deaths and more than \$1 billion in damage every year. A company called Lightning Eliminators & Consultants has devised a way to prevent strikes in the first place. Called a dissipation array, the device resembles a skeletonized umbrella.

Here's how it works: A storm cloud has a negatively charged underbelly that induces a positive charge, called an electric shadow, on the ground directly below it. The dissipation array collects this charge and distributes it into the air overhead. The charged air molecules form a space charge that prevents lightning from leaping to the ground.



PM ILLUSTRATION BY ALBERT NOVAK



LIGHTNING ELIMINATORS &amp; CONSULTANTS PHOTO

Dissipation array shifts ground charge into the air, keeping lightning from striking area within collector wire.



## Cool cars shouldn't have frozen fuel lines.



No matter what kind of car you drive, STP Gas Treatment helps remove the water that leads to gas line freeze. And unlike gas line antifreeze, our unique gas treat-

ment formula works to reduce intake valve deposits and prevent clogged injectors. Just one bottle every time you fill up is the perfect antidote to winter. Whether your car is cool, not-so-cool, or just really cold.



DRIVE A BETTER CAR





**...Because You Can't Rush Smooth**



**SURGEON GENERAL'S WARNING: Smoking Causes Lung Cancer, Heart Disease, Emphysema, And May Complicate Pregnancy.**

19 mg. "tar", 1.4 mg. nicotine av. per cigarette by FTC method.



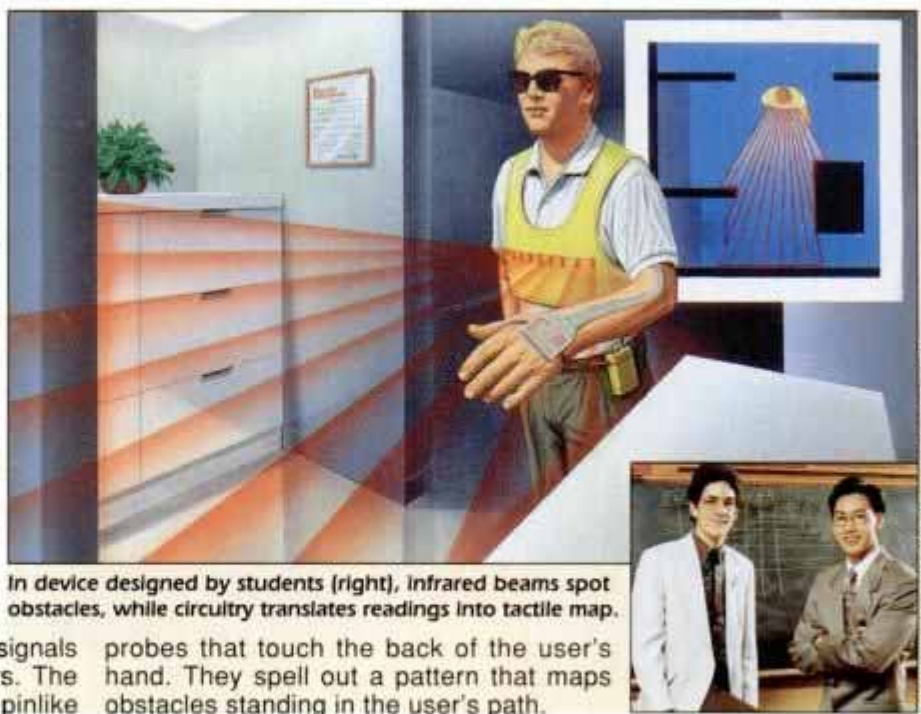
**Flavor.**

## Handy Map For The Blind

CHICAGO, IL—Two high-school students have parlayed cruise-missile technology into a system to help blind people navigate unfamiliar territory. The device works by translating infrared reflections into a map pressed like Braille into the user's hand. The design garnered top prize at a recent technical exhibit at the Museum of Science and Industry.

Built by Steven Daniels and Cuong Lai, the apparatus centers on a vest studded with Micro Switch infrared sensors. These connect via a ribbon cable to a unit strapped on the back of a hand.

Rangefinding data from the sensors goes to a small circuit board in the hand unit, which in turn sends signals to a matrix of electromagnetic relays. The relays then activate a group of 20 pinlike



In device designed by students (right), infrared beams spot obstacles, while circuitry translates readings into tactile map.

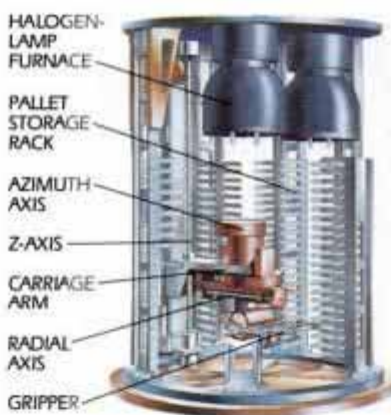
probes that touch the back of the user's hand. They spell out a pattern that maps obstacles standing in the user's path.

## Robot In A Can

GREENBELT, MD—Believe it or not, the first U.S.-built robot to ride the space shuttle flew only last September. ROMPS, the Robot Operated Materials Processing System, swapped semiconductor-crystal samples to and from small halogen-lamp furnaces.

The hardware fit into a 5-cu.-ft. canister that rode in *Discovery's* cargo bay. Like machinery in a jukebox, the 3-axis robot plucked small pallets from racks, hoisted them to the lamps and then replaced them. A newly developed proximity sensor, called a capaciflector, guided the ROMPS gripper.

Future adaptations of ROMPS could fly free on a satellite, relying on artificial intelligence rather than commands from ground controllers.



Robotic gripper brought pallets to furnaces, allowing semiconductor samples to melt and recrystallize.

## Robot Down A Hole

LIVERMORE, CA—Badgers, burrowing owls and kit foxes dig their dens beneath Site 300, a test range for non-nuclear explosives at Lawrence Livermore National Laboratory. Because environmental rules protect these animals, the lab must monitor the burrows to determine if special precautions are necessary during blasts.

The Miniature Optical Lair Explorer, or MOLE, does just that. The 5-in. vehicle carries a small camera that transmits images through an 18-ft. cable. Rolling on tracks lifted from a toy tank, MOLE illuminates the animals' tunnels with red light-emitting diodes.

So far the beasts haven't reacted aggressively against the robotic invader. In fact, they seem to be more inquisitive than anything else.



MOLE spies on badgers, foxes and owls with TV camera and red headlights.

## Robot Breaks New Ground

ALBUQUERQUE, NM—Long a hotbed of robotics research, Sandia National Laboratories is building a \$33-million robotic-manufacturing laboratory. To kick off construction, it was only fitting that a robot shoveled the first scoop of dirt at a groundbreaking ceremony this past summer.

The machine used sensors, automatic planning software and a GPS-



SANDIA PHOTO

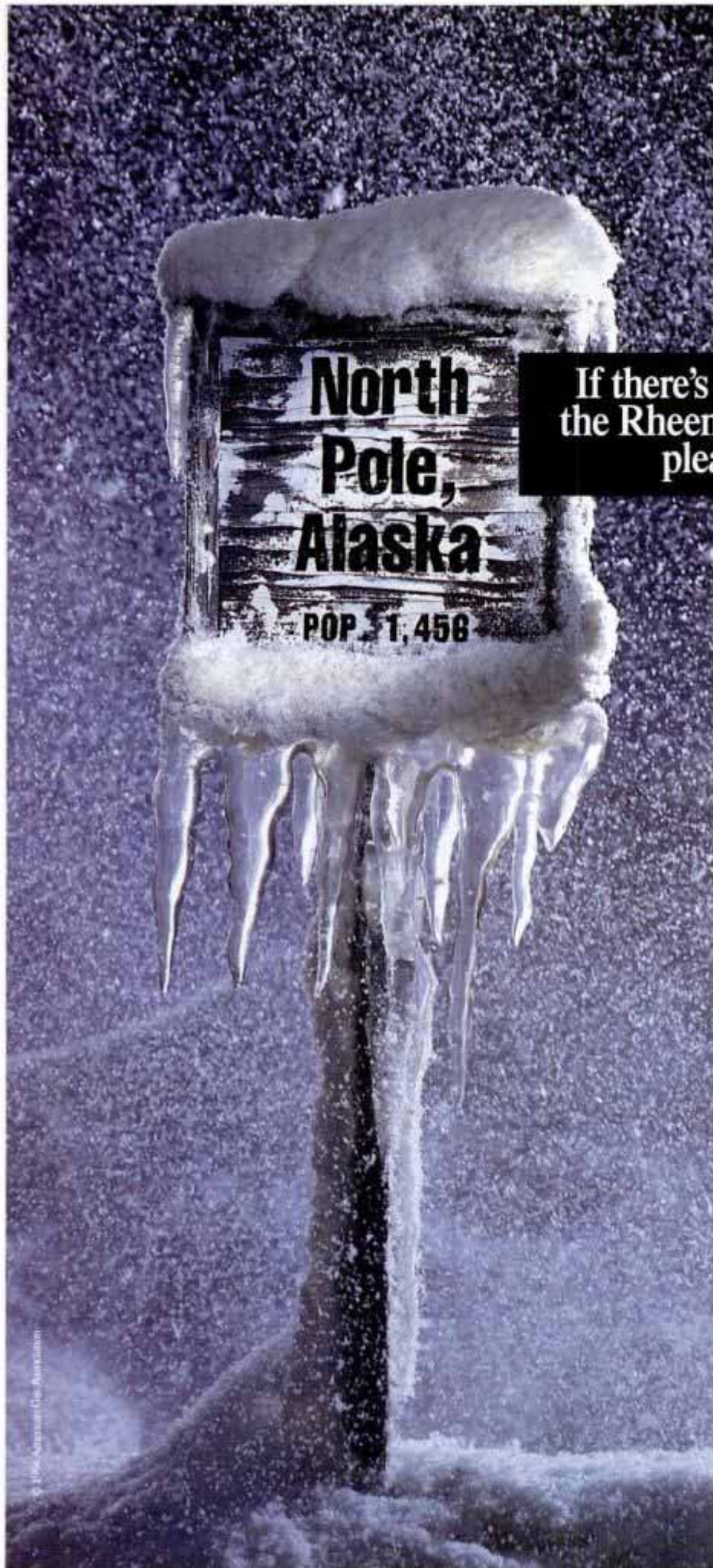
based location system to pick the right spot and then excavate.

Called the Remote TeleRobotic Vehicle for Intelligent Retrieval (RETRVIR), the robot was originally developed to aid in the cleanup of hazardous waste. But RETRVIR has proved a most versatile testbed. For example, it has built a small steel platform almost entirely under its own autonomous control.

Adapted from a Honda all-terrain vehicle, automated RETRVIR breaks ground for robotics laboratory.

(More Tech Update on page 26)





The Rheem 90 Plus passed rigorous field tests in the extreme cold of North Pole, Alaska.



It works like a Rheem

The high winter humidity of Chicago, Illinois. The lofty altitude of Leadville, Colorado. And the strong winds of Cheyenne, Wyoming.

**If there's a colder place to test the Rheem 90 Plus<sup>®</sup> gas furnace, please let us know.**

That's why you can count on the durability and reliability of this new high-efficiency gas furnace, either in a new home or when replacing your old furnace.

You can rely on savings, too. The 90 Plus gives you up to 94% Annual Fuel Utilization Efficiency (AFUE). With the added economy, comfort and reliability of clean natural gas.

You'll also appreciate its quiet operation and compact size. It's only 34 inches high, trim enough to fit in any replacement application and still leave room for an air cleaner and a humidifier.



For your nearest Rheem dealer, call (800) 548-RHEEM. Ask about the 90 Plus gas furnace, the one you can rely on — no matter how cold it gets.



**Clean natural gas.  
America's best energy value.**



MADE IN THE USA

65<sup>88</sup>  
Every Day

**Black & Decker® Quantum™  
7 1/4" 12.0 AMP Circular Saw**

For the serious worker. This 12 AMP, 5,300 RPM saw includes ball bearing motor, precision ground blade, combination square/wrench, spindle lock and dust collection system for a cleaner work environment. #BD3100.



MADE IN THE USA

46<sup>96</sup>  
Every Day

**Black & Decker® Quantum™  
3/8" 4.0 AMP Keyless Chuck Drill**

Powerful 4 AMP drilling capability for the serious do-it-yourselfer. Keyless chuck allows for quick, easy bit changes. Includes 2-way level, variable speeds, reverse and speed lock control. #BD1000.



58<sup>96</sup>  
Every Day

**Black & Decker® Quantum™  
4" Angle Sander/Grinder**

More power for bigger projects. Side handle moves in three positions. Includes 5.8 AMP AC/DC motor, ball bearing construction, spindle lock and sanding kit. #BD7000.



MADE IN THE USA



MADE IN THE USA

58<sup>84</sup>  
Every Day

**Black & Decker® Quantum™  
5" Random Orbit Sander**

Home improvements at your fingertips. Collects the dust while you sand. Sanding control feature protects work surface by maintaining optimum sanding speed. Includes adjustable side handle, dust collection bag and skirt, 5-inch hook and loop sanding pad and rear lock on switch. #BD5100.

Dale

Dale  
Sales Associate  
Hardware



“We carry a pretty wide selection of power tools. I know, because I do a lot of woodworking.”

MADE IN THE USA



**Skil® Circular Saw**

Powerful 10 AMP high torque motor goes right to work, delivering up to 2 1/8 HP. With 7 1/4" blade, die-cast aluminum blade guards and lock-off trigger switch. Hardened steel gearing for extra long life.

#5050.

**37<sup>97</sup>**  
Every Day



**74<sup>94</sup>**  
Every Day

**Skil® Plunge Router**

All ball bearing construction for smooth running and long life. With depth adjustment and easy-read depth scale, collet lock and powerful 9 AMP, 25,000 RPM motor. #1835.



MADE IN THE USA

MADE IN THE USA



**Vermont American® 3 Blade Bonus Pack**

Three 7 1/4" steel circular saw blades. Set includes popular cutoff/rip, plywood, and chisel tooth blades. Super sharp tips for long life and clean cuts. #27-26406.

**4<sup>97</sup>**  
Every Day

MADE IN THE USA



**13<sup>37</sup>**  
Every Day

**Vermont American® High Speed Steel Router Bit Set**

Five piece router bit set made from solid steel for long life and durability. These popular bit sizes fit all 1/4" routers. #27-23010.

Wal-Mart brings you power tools at powerful savings.

So, no matter what project you're ready to tackle, we make it affordable to do it yourself. Always.

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

*Always.*



ROCKWELL PHOTO

## Spectre Spectacular

HURLBURT FIELD, FL—One of the Air Force's most imposing weapons just got scarier. The 16th Special Operations Wing now has the first of 13 AC-130U Spectre gunships, which are joining the inventory of 130A and 130H models.

The 105mm howitzer and 40mm cannons are still on board. But a 25mm Gatling cannon has supplanted the original 20mm gun.

More important, the AC-130U's weapons suite will slave to a sensor package, which includes fire-control

Special Operations' AC-130U Spectre can pummel multiple ground targets thanks to new fire-control electronics.

radar, a forward-looking infrared and an all-light-level television. These will aid night and bad-weather operations.

A battle-management center inside the aircraft will integrate the electronics, permitting simultaneous attacks on two widely spaced targets.



FM ILLUSTRATION BY ED VALICOURSKY

As bullet crosses sensor's field of view, computer swings spotlight to illuminate sniper.

## Sensor Turns The Tables On Snipers

LIVERMORE, CA—They lurk on Balkan hills picking off distant civilians, or wait for their moment near political gatherings. Snipers have always enjoyed the unfair advantage of concealment. But Lawrence Livermore National Laboratory may have just evened the odds.

Engineers there have concocted a system called Lifeguard, which uses a unique sensor to track flying bullets back to their source. Although developers won't disclose the nature of the sensor, the device doesn't rely on sound. Once the sensor has scanned the bullet in flight, a computer pinpoints the origin of the shots within hundredths of a second.

Surrounding a potential target, the sensors could hook up to spotlights, cameras or—for military applications—a gun that answers in kind.

## Supersonic Teammates

HUNTINGTON BEACH, CA—In a move unprecedented for these rivals, Boeing and McDonnell Douglas have given up pushing different concepts for a supersonic airliner. They've now joined forces on NASA's High-Speed Civil Transport program.

Boeing's original plans called for a 311-ft. airplane with a 135-ft. wingspan. Meanwhile, McDonnell Douglas favored a longer aircraft of 334 ft. with a wingspan of 128 ft.

The new phase of the program will blend these designs. Engineers will also seek technologies to

minimize environmental impacts, including noise, of a Mach-2.4 airliner. These include a high-lift flap system to minimize engine thrust during climb-out and approach.



MCDONNELL DOUGLAS ILLUSTRATION

Boeing and McDonnell Douglas will co-develop future SST plans.

## Little Mirrors, Big Screen



TEXAS INSTRUMENTS ILLUSTRATION

DALLAS, TX—Years in development, Texas Instruments' digital micromirrors appear ready to hit the big time for projection TVs. The technology features a grid of microscopic mirrors on silicon posts. Signals from electrodes cause the mirrors to tilt. The result: Light projected on the mirrors is reflected either to the screen or out of the optical path. The tilting mirrors thus control the light intensity at each point on the screen.

Texas Instruments has explored two methods of adding color to the system: either a spinning filter or separate mirror arrays for red, green and blue. Now engineers are improving manufacturability.

Miniature mirrors reflect light at different intensities for bright picture.

(More Tech Update on page 30)



If you want to go to college, the Army can get you there. Qualify for the Montgomery GI Bill plus the Army College Fund, and you can earn \$20,000, \$25,000 or \$30,000 with a two, three or four year enlistment.

**We'll not only  
give you the money to get to college,  
we'll give you the drive.**

While you enlist, you can even apply for and gain admission to a

college through CONAP — the Army's Concurrent Admissions Program.

And remember, your education never stops while you serve. You'll learn things like teamwork, confidence and self-discipline, important tools that help you in college and all through life.

See your Army Recruiter. Or call [1-800-USA-ARMY](tel:1-800-USA-ARMY). **ARMY. BE ALL YOU CAN BE.**



Performance.  
Protection.  
Quality.®

AND



Solutions to Engine Problems.®

PRESENT

# THE NATIONAL AUTO QUIZ

1. The bodystyle designation of this 1947 Jaguar is a:



A) Convertible. B) Cabriolet. C) Drop-head Coupe. D) Landau.

2. What Indy champion was known as "The Professor?"

A) Mark Donohue. B) Rick Mears. C) Roger Ward. D) A.J. Foyt.

3. The world's largest museum dedicated to a single automotive nameplate honors the:

A) Ferrari Daytona. B) Mercedes-Benz SL. C) Duesenberg Model J. D) Chevrolet Corvette.

4. What track on the NASCAR Winston Cup circuit has the highest banking?

A) Dover. B) Talladega. C) Daytona. D) Indianapolis.

## WIN A FREE VIDEO

Send us your auto-related questions. If we use one of them in a future quiz, we'll send you a free car care video. In case of duplicate questions, the one with the earliest postmark will win.

Send your entries to:  
National Auto Quiz  
POPULAR MECHANICS  
224 W. 57th St.  
New York, NY 10019

5. What car did James Garner drive in the TV series, "The Rockford Files?"

A) Pontiac Firebird. B) Chevrolet Camaro. C) Pontiac Trans Am. D) Ford Mustang.

6. Who is the 1994 Indy Car Champion?

A) Michael Andretti. B) Al Unser, Jr. C) Nigel Mansell. D) Emerson Fittipaldi.

7. The world's fastest production car currently is built by:

A) Ferrari. B) Lamborghini. C) Bugatti. D) McLaren.

8. Which carmaker introduced a series of models that they called the "Forward Look?"

A) Chevrolet. B) Chrysler. C) Pontiac. D) Ford.

9. Before the timing chain can be inspected and removed, the following component(s) must be removed:

A) Rocker cover (valve cover). B) Cylinder head(s). C) Vibration damper. D) Intake manifold (V-type engines only).

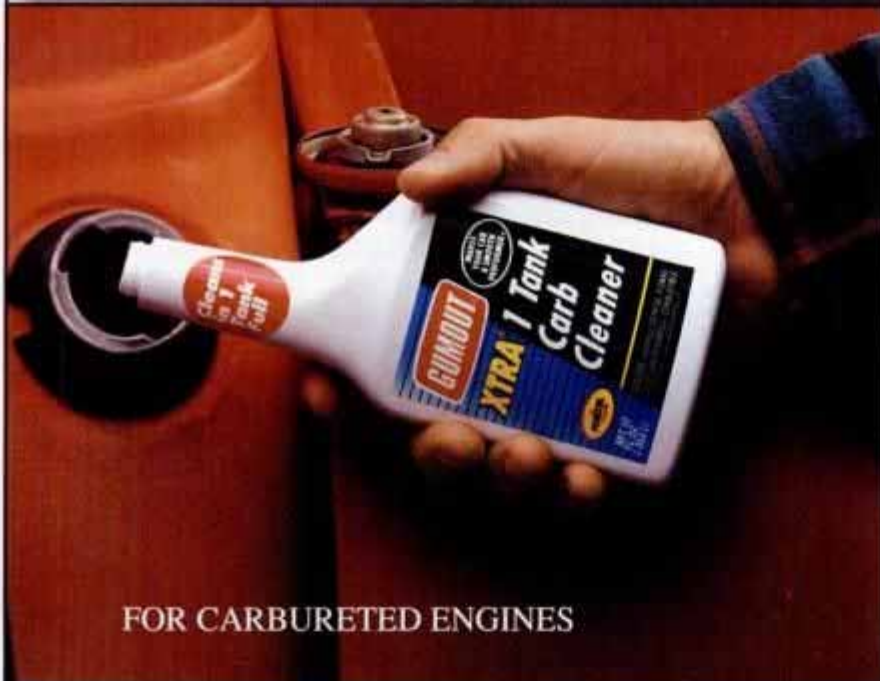
10. Which carmaker was the first to offer a "woody" station wagon that did not have boxy, truck-like styling, but followed the lines of a sedan?

A) Ford. B) Nash. C) Chrysler. D) Packard.

ANSWERS  
1. C 2. A 3. D 4. A 5. A 6. B 7. D 8. B  
9. C 10. C (1941 Town and Country)



WORKS FOR 3,000 MILES



FOR CARBURETED ENGINES



FOR FUEL INJECTED ENGINES

# THINK OF THEM AS BOOSTER SHOTS FOR YOUR GASOLINE.

- These days, people are using detergent gasolines to keep fuel systems clean and running. But alone, these gasolines are just not strong enough to truly clean out your fuel system and help eliminate engine performance problems like poor acceleration, hard starts, hesitations and stalls. For that, you need Gumout® Fuel System Cleaners.
- These extraordinary cleaners add a boost of real power to detergent gasolines to clean fuel systems better and faster than gasolines alone. Gumout makes a fuel system cleaner just right for your car or truck -- whether it's fuel injected or carbureted. Pick up the one that's right for yours today. Then pour it into your gas tank during your next fill-up. And in just one tankful, you'll feel a real difference.



**Solutions to Engine Problems.®**



Performance and Quality from the People at Pennzoil.

# Lowdown On The Showdown At Farnborough



BRITISH AEROSPACE ILLUSTRATION



LOCKHEED PHOTO

Europe's Future Large Aircraft (left) and Lockheed's C-130J (above) seek contract.

FARNBOROUGH, ENGLAND—Overhead, the drizzly air shuddered from the roars of Harriers, Sukhois, F-16s and other international warbirds. But on the ground, the sound and fury was just as insistent. That's because the Farnborough '94 air show was the theater for a pair of hotly contested home-turf military-procurement awards.

Britain's Royal Air Force wants to retire its aging fleet of 60 C-130 Hercules airlifters. Seeking new planes as soon as 1996, British flyers have already voiced their preference for Lockheed's coming C-130J variant. The J will fly on scimitar-shaped Dowty propellers and Allison AE2100 turboprops, while two crew members, not four, man the highly automated flight deck.

But the UK must also consider Europe's Future Large Aircraft. The multinational project, which loomed as a huge plywood mockup near Farnborough's main entrance, can't be delivered before the century turns. It does promise a much bigger cargo bay that could engulf a Warrior fighting vehicle or even a Chinook helicopter. And local favorites British Aerospace and Rolls-Royce have stakes in the project. A decision from London could come as soon as this month.

At the same time, Britain's Army Air Corps is mulling a range of choices with which to replace its Westland Lynx attack helicopters. Again, although a decision won't happen until the spring, the flyers'

South Africa's Flowchart 2 is a target drone that mimics stealthy fighters.

choice is American: the AH-64D Apache with its Longbow radar and avionics. But Eurocopter's much newer Tiger has also drawn attention, as has Bell's night-fighting variant of

the veteran AH-1, the Cobra Venom.

A dark horse in this contest is South Africa's Rooivalk, a heavy-weight contender based on France's Puma helicopter. The South Africans, welcome again at Farnborough after years of disgrace, showed off their battle-proven chopper as well as a new stealth target drone called Flowchart 2.

Meanwhile, the air show featured the usual feast for aviation buffs. Among the highlights: a horizontal "cobra" maneuver from Sukhoi's canard-sporting Su-35, a dizzying blue-sky ballet from a Sukhoi Su-26 aerobatic aircraft, a drenching shower from an Ilyushin IL-76 outfitted for aerial firefighting, and a breakneck turn-on-a-dime performance by France's new Rafale fighter.



South Africa's Rooivalk (above), Bell's AH-1W Cobra Venom (below left) and Eurocopter's Tiger (below right).



GECC MANICORE PHOTO



BRITISH AEROSPACE PHOTO

FM PHOTO BY GREGORY T. POPE



**SURGEON GENERAL'S WARNING:** Smoking By Pregnant Women May Result in Fetal Injury, Premature Birth, And Low Birth Weight.

**Why?**



**At their price...**



**You  
got  
taste!**

© The American Tobacco Co. 1994

**New Pack**

\*Based on manufacturers' list prices.

15 mg. "tar",  
1.1 mg. nicotine av. per  
cigarette by FTC method.

Manufacturer's Coupon Expires 3/31/95  
**\$1 OFF 3 PACKS OR A CARTON**



To be placed on our mailing list complete the following (Please Print)

Mr.  Mrs.  Ms.

Street Address \_\_\_\_\_ Apt. # \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone \_\_\_\_\_

1) SEX:  Male  Female      2) Date of Birth: Mo \_\_\_\_ Day \_\_\_\_ Yr \_\_\_\_

3) MY REGULAR BRAND IS:

4) FLAVOR:  Menthol  Non-Menthol

5) LENGTH:  Regular or King  100 s/Long  120 s/Extra Long

6) TYPE:  Ultra Light  Light/Low Tar  Full Flavor  Non-Filter

Signature (required) X \_\_\_\_\_

By signing this I certify that I am at least 21 years of age, a smoker and that I wish to receive free cigarette samples, offers and/or other incentives in the mail subject to applicable laws and regulations.

Consumer Caution! This coupon is good only when brand (brands) specified is purchased. It cannot be copied, transferred, or assigned. Any other use constitutes fraud. OFFER VOID WHERE PROHIBITED. LICENSED, TAXED OR OTHERWISE RESTRICTED BY LAW. LIMIT ONE COUPON PER PURCHASE AND TO SMOKERS 21 YEARS OF AGE OR OLDER. CONSUMER PAYS SALES TAX. IF ANY Coupon offer expires 3/31/95. Retailers may rebate coupon at face value plus fee handling and actual postage costs required if coupon is redeemed in strict accordance with The American Tobacco Company coupon terms, incorporated herein by reference. Copy available upon request. Cash value 1/20th of 1¢. Mail to The American Tobacco Company, P.O. Box 12012, Nagles, AZ 85662-2012.

43300 13890

## Army's Missiles Go To Sea



Navy ATACMS could support amphibious assaults or strike at coastal defense sites.

DALLAS, TX—Although the Army and the Navy have long ruled separate domains, all that may be changing. For example, Army Black Hawk assault choppers whirled off the decks of Navy carriers during last fall's Haiti expedition, as the Pentagon tried new force-packaging concepts.

Now, in a separate effort, the Navy is testing a landlubber's weapon—ATACMS, the Army Tactical Missile System. While the firings will use a strap-down launcher, studies suggest the Navy's existing Vertical Launch System could also shoot the missiles.

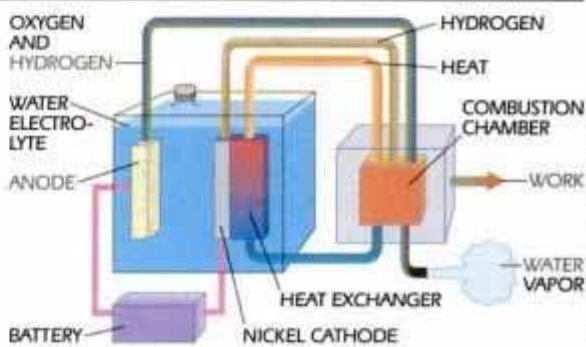
If the Navy variant passes muster, it will feature improvements planned for the Army's ATACMS. Because each missile will carry only half the number of bomblets in today's version, its top range will effectively double to roughly 150 miles. To make up for the drop in bang power, a GPS-based guidance system will provide exquisite precision.

## Engine To Burn Water

CAMBRIDGE, MA—Are hydrogen fuel tanks safe enough for use in a car? A Massachusetts Institute of Technology professor sidesteps this question by proposing water as the storage medium for hydrogen.

Keith Johnson has conceived an engine that exploits his explanation for controversial "cold fusion." Johnson attributes the excess heat in cold-fusion experiments not to a mysterious nuclear reaction but to an obscure but well-documented chemical reaction.

In this reaction, a charged nickel cathode draws and crushes together the hydrogen atoms in water. The reaction breaks water into hydrogen and oxygen and tickles the nickel into giving up latent heat. Johnson's water engine uses this heat to burn the hydrogen in oxygen.



Water engine uses nickel to liberate hydrogen fuel.

## Flarecraft For Five



Flarecraft L-325 cruises between 75 and 100 mph with 250-mile range.

WESTPORT, CT—The first production-line Flarecraft is now available. With a price tag of \$150,000 and seats for five, the L-325 is rolling out of a Midwestern factory.

The model sports a number of new features not seen in the prototype that debuted three years ago (see *Tech Update*, page 10, July '91). In addition to its Subaru V4 powerplant, the L-325 maneuvers on a Yamaha waterjet to back away from a dock. Kevlar shields its underbelly from punctures. And the pilot sits forward in the bow, making room for four passengers behind.

## Boats To Run With The Sun

PEWAUKEE LAKE, WI—While solar-powered auto races are familiar by now, the world's first intercollegiate solar-boat contest saw daylight last August.

The race, called Solar Splash, drew sponsorship from the American Society of Mechanical Engineers and Johnson Controls, which donated batteries. The big winner: Kanazawa Institute of Technology, which took both speed and endurance trophies. The



KIT and UA-Little Rock squared off in Solar Splash 200-meter sprint.

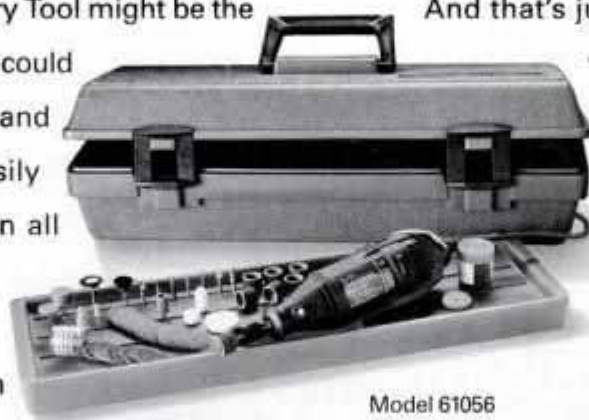
planing-hulled *Golden Eagle* left contestants from the University of Arkansas-Little Rock and the University of Puerto Rico in its wake. Solar racing happens to be a popular professional sport in Japan.

# DOES THE WORK OF ONE HUNDRED ELVES.



The Sears Craftsman Rotary Tool might be the most versatile power tool you could own. With up to 30,000 rpm and dozens of accessories, it easily handles all kinds of jobs, on all kinds of materials.

Carve wood, shape plastic, grind metal, cut pipes, polish silver, sharpen tools, etch glass.



Model 61056

**SEARS**  
**CRAFTSMAN®**

And that's just the beginning. As a special value, this model comes with a free 100-piece accessory kit, including sturdy carrying case with removable accessory tray.

Let all the elves at your house know the Sears Craftsman Rotary Tool would be the perfect Christmas gift.

**\$69.99**  
WHILE QUANTITIES LAST.

# You Need The Edge.

## TEKNA MICRO-KNIFE™

Fast action when you need it.

Five years ago Ray-O-Vac acquired Tekna. Then quickly decided the lightning-fast Micro-Knife™ was a bit too "switchblade" for their image. So they got rid of it, tooling and all. Just recently, a longtime Edge customer led us to an unknown stash! Now yours, while they last! Click the button and instantly reveal a scalpel-edged blade. The guard completely swallowed by the stainless case. Over 6" long. Made in the U.S. Call now!

- Tekna Micro-Knife™ #T6000 \$34.95
- Set of two, \$29.95 each! #2T6000 \$59.90

Who is listening to your private calls? Now talk with complete confidence and security.

The Scrambler™ converts your voice into unintelligible noise, then digitally re-converts it back. This is

the 21st century technology now used by government and high-powered executives. In one portable, carry anywhere unit. Protects against wire-taps, recorders, transmitters, linemen, and cellular scanners. Works on any phone - home, office, car, even pay phones. Best of all, no wires to connect, no complicated instructions. Just click The Scrambler onto any handset, and punch in one of 58,488 codes. Now you're clear to talk to any other Scrambler equipped phone - in total privacy. The Scrambler. Complete with a lifetime warranty.

- The Scrambler™ Privacy Protector #ACS-2 \$249.00 each
- Set of two Scrambler™ Units #ACS-SET \$229.00 each save \$40.00

*Super-efficient, powered by just one 9v battery.*



## Discover What It's Like To See In The Dark.

Push the trigger. The T3C-2 Scope powers up. Suddenly, in green-hued clarity, night is like day, magnified 3.2 times!

Designed for USSR Special Forces, powerful T3C-2 Night Vision Scope lets you see clearly in just starlight. Now switch on the Infrared Illuminator - and see in pitch black *total darkness*.

Optics focus smoothly from 3' to infinity. Complete with carrying case. Requires 6 AA batteries. Tripod mountable.

Nature study, law enforcement, boating, camping, or just plain spying, this once-secret Cold War technology is now yours. Lifetime warranty.

- T3C-2 Night Vision Scope, with Illuminator #T3C-2 \$479.00



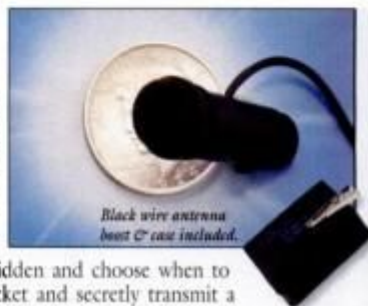
*Includes Illuminator!*

## Sit in Your Car and Hear Inside Your House - a Quarter 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 3-month 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. You won't believe your ears.

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



*Black wire antenna best case included.*

## Own the watch that kept Soviet spies on time.

Issued to first year KGB recruits, the 17 jewel KGB watch was a badge of honor. Emblazoned on its teal-green face is the dramatic red seal of the infamous intelligence network. Below, "KGB" in Cyrillic letters. Made in the original factory outside Moscow, with black leather band, moveable nickel-silver bezel, and accurate to ±5 seconds per month. Now own the last of a genuine cold-war relic, and get to your next party meeting on time, too!

- Original Soviet KGB Watch #KGB-W \$59.95



## 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 state-of-the-art optical diodes for a vivid, intense beam. Now, for business, work, or fun, own the personal laser of the 21st century.

- Ultra-Tech Laser Pointer, white #LR6000 \$79.95
- Ultra-Tech Laser Pointer, black #LR6001 \$79.95

## BLAZER MICRO-TORCH



The 1300° edge. At over 1/3 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.*



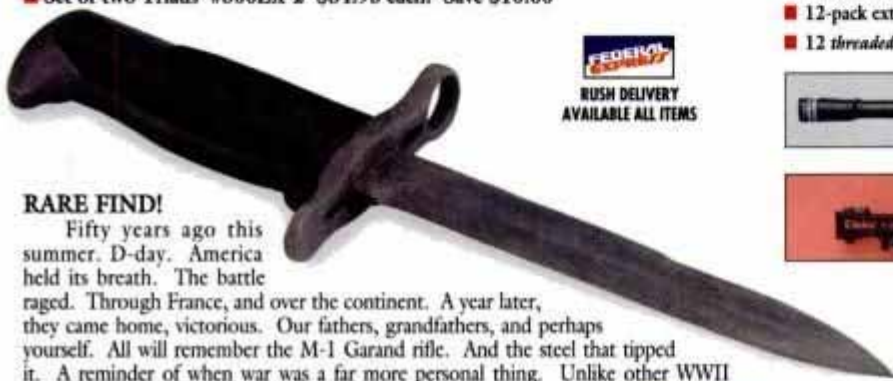
# We Deliver.

## TRIAD Personal Defense System

If the screaming 130db alarm or high-beam micro-light doesn't chase 'em away, just switch to *stun* and let 400 pulse-volts knock them down!

Finally, tri-level defense in one fist-sized concealable package. New Triad's *pulse-volt coils* pack a wallop nastier than stun-guns twice as large. Right through clothing! Yet effects wear off in just 2-3 minutes, plenty of time to get help or get away. Plus, a built in alarm sounds on your switch command, or if the wrist-pin is pulled. A micro-halogen light disconcerts assailants, giving you time to act. (Also an excellent emergency light) Keep the Triad on your keys, or give one to someone you care about. It's shockingly affordable.

- Triad™ Personal Defense System #300ZX \$39.95
- Set of two Triads #300ZX-2 \$34.95 each. Save \$10.00



### RARE FIND!

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 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 Korea. Over 11" long, with a parkerized 7" blade - ready to take a razors 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 M-1 Garand Bayonet #M1-GB \$26.95
- While supplies last only. Quantities limited.*



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

**FEDERAL EXPRESS**  
RUSH DELIVERY  
AVAILABLE ALL ITEMS



## EDGE NIGHTHAWK PISTOL CROSSBOW

Slide a steel-tipped bolt into the ready position, take aim, & fire. The legacy of medieval Europe streaks into the future. You command 40 pounds of awesome die-cast stopping power. The Nighthawk will rip a bolt through 1/4" plywood - with dead-eye accuracy. Swift, silent, and not a toy. Test fire one with the power of our 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



Cros-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

### Pineapple With a Twist.

Go ahead. Yank the firing pin. Now release the spring-loaded arm. Solid pewter "WWII Pineapple" Grenade lighter fires up *automatically*. Regulation 4" tall, complete with replaceable lighter cartridge. Next time someone asks for a light, toss 'em a flaming grenade instead.

- WWII Pineapple Grenade Lighter #730 \$19.95



## 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 1 1/2" Mini-Zippo Lighter - ready to use!



PM1294 Call Toll-Free 1-800-732-9976 or fill out order form and mail to:

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)

The Edge Company P.O. Box 826 • Brattleboro, VT 05302

Model #	Description	Qty	Price Each	Total

My order is over \$75.00 please send me my FREE Mini-Zippo Lighter.

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  
*see below*  
TOTAL

Add \$4.00 shipping and insurance per item, \$2.00 each additional item. All orders shipped within 48 hours.

**CALL TOLL-FREE 1-800-732-9976**

24 HOURS A DAY  
7 DAYS A WEEK



The Edge Catalog - over 60 full-color pages of the hottest knives, tools, tricks in the world. See it for yourself.



## Chrysler's Rough Road For Robots

CHELSEA, MI—Test drivers at Chrysler's proving grounds are in for a big relief. Starting next year, a new Automated Durability Road will save wear and tear on humans while putting cars and trucks through the most extreme tests of suspension, steering and whole-car life cycle.

The test vehicles will be retrofitted to respond to radio signals from a control center. An underground guide wire will direct the cars around the 1.3-mile oval. If the vehicles wander



CHRYSLER PHOTOS

Automated Durability Road will wale on Chryslers without hammering humans.

from the wire or sense humans nearby, they'll brake automatically.

The track has three lanes. One is laid with blocks of Wisconsin granite set at different heights, for a jolting ride. The middle lane is potted with

deep chuckholes, while the outer lane is a smoothly paved pull-off strip.

The driverless torture track will allow Chrysler to accelerate its test schedules, squeezing 100,000 miles of motoring into two weeks.

## Ford On A B-52 Chassis

IOWA CITY, IA—Taking a hairpin turn and hitting a patch of ice in the Iowa Driving Simulator feels like the real thing, thanks to a wide field of view and a motion base from a B-52 simulator on loan from the Air Force.

The motion base tilts with the computer-generated images to prevent queasiness. Motion also helps drivers evaluate car performance on rough surfaces by allowing them to feel the bumps.

The University of Iowa wants to know if a virtual-reality proving ground is feasible. If so, automakers could test different models by simply rewriting computer code.



Iowa facility has tested Taurus and Saturn, but researchers really want to try a Corvette.



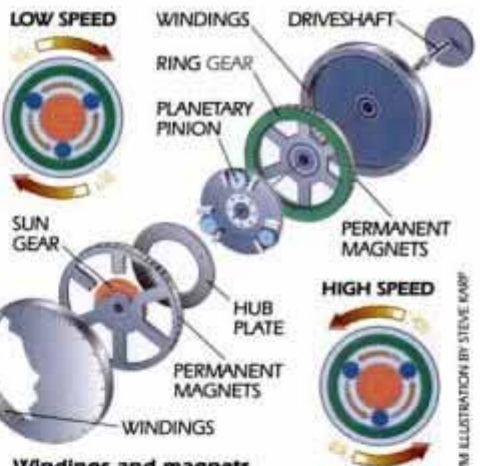
UNIVERSITY OF IOWA PHOTOS

## Electric Wheel Drives Itself

LEONARDSTOWN, MD—Town Creek Industries has put a new spin on an old idea. Tuck motors inside wheels, and you've eliminated 600 pounds of transmission, differentials and drivetrain.

In Town Creek's electric wheel, batteries power two pancake motors, one driving a ring gear, the other driving an inner sun gear. Between these gears lie three planetary pinions, which transmit torque to the wheel through a shaft.

At idle the ring gear and sun gear counterrotate so that the pinions don't move. To gain torque, one gear slows down until, at high speeds, the gears are running in the same direction. Advantage? Efficiency during both acceleration and cruise.



Windings and magnets make up motors to turn gears, which in turn spin pinions to drive electric wheel.

PH ILLUSTRATION BY STEVE KAMP



ART CENTER PHOTO

Exposed engine and fiberglass-shrouded people pod are hallmarks of Tu, a microsupercar.

## Tu, The Small Wonder

PASADENA, CA—Its father was a Kawasaki superbike. Its mother was a VW Rabbit. Tu, a mighty mite designed by two students at Art Center College of Design, takes components from each of these and wraps them in a fiberglass shell. The result: a 990-pound hot rod.

The open-top 2-seater—a street-legal working prototype—runs on an uncowed aluminum engine from a Kawasaki DX-11. The 140-horsepower powerplant turns the rear axle via a chain drive. The Rabbit supplied parts such as the steering column and modified differential components.



Hello, my name is Tom Lee, President of Bierhaus International, Inc.

If you're tired of paying \$12-\$18 a case for beer, I don't blame you.

That's why I'd like to show you an amazing new way to brew your own superb lager for as little as \$4.56 per case. You actually SAVE up to \$10 on EACH CASE OF BEER. And wait until you taste the beer! Compare it to the finest premium beers. Referring to this method of making beer, the *New York Times* stated, "...the quality of the beer may surprise many people... wait two to four weeks and friends may be placing orders."

The secret is in an anaerobic mini-brewery that lets YOU make up to 6 gallons of ALL NATURAL BEER, using only the finest barley malt and hops. No chemicals. No preservatives. You can brew several cases of beer in about 25-30 minutes. And everything you'll need (except the bottles and a little household sugar) comes with your mini-brewery.

I realize you're skeptical. I don't blame you. That's why we're offering our unheard of \$5.00 FREE GUARANTEE.

Try your mini-brewery. Keep it for up to 6 months. Make the beer at your leisure. If you don't agree that this is the best beer you've ever tasted in your life, we'll buy the kit back. What's more, we'll pay the return postage (by regular UPS or Parcel Post rates) and send you an extra \$5.00 for your time and trouble. No conditions. No excuses.

### IS IT DIFFICULT TO MAKE?

Using the Bierhaus Mini-Brewery, you can brew beer in just 25 minutes on a regular kitchen stove. Let it ferment for seven days, bottle it, and you're done.

- No more lugging empty beer cases to the carry out.
- No more chemistry set taste.
- No more paying \$12-\$18 per case of beer.

Just brew what you need once every month or two and that's it! For as little as 19 cents per bottle.

### CAN I MAKE DIFFERENT KINDS OF BEER?

Certainly. Just vary the ingredients and recipes according to the instructions supplied with each kit. You can make...

- **LIGHT LAGER.** Comparable to most Canadian premium beers and some light European lagers.

# I'll send you \$5.00 FREE if you don't agree my ALL NATURAL beer is better than any commercial beer you've ever tasted.

● **BAVARIAN DARK LAGER.** Full bodied, yet not bitter. The head is incomparable—rich and creamy.

● **STOUT.** Rich in body with a hearty, robust flavor. In the finest tradition of grand Irish Stouts.

● **ALE.** Popular with American home brewers. From England's favorite hoppy, dry "bitter" ales to the sweeter brown ales enjoyed in fine European pubs.

### CUSTOMER COMMENTS

*"My friends and I had tours of duty in Europe and were looking for that 'old country' flavor and body. Your Bavarian Dark has it all!"*

—Lt. Fred Frances, Texas

*"Your Continental Amber is as close to a perfect beer as I have ever consumed."*

—Dwayne Staner, Iowa

*"I no longer wonder whether I prefer the best commercial beer or your beer which I made. NO QUESTION. YOURS IS THE BEST!"*

—Ed Pearson, New York

### IS IT LEGAL?

You can make up to 200 gallons of beer per year — tax free — and you don't need a federal license of any kind.

### WHAT ABOUT ALCOHOLIC CONTENT?

You can make a super light beer (1.8%-2% alcohol), regular strength (4.5%-5%), or a European-style lager, ranging as high as 7.5% alcohol.

### MORE GOOD REASONS TO BREW YOUR OWN

If you truly love good beer, now is the ideal time to start brewing your own. "Sin" taxes are definitely coming. Bills before Congress could add \$5.00-\$6.00 to a case of beer or you could pay over \$1.00 a bottle for a six pack. But even more important is the quality of the beer you drink. "A well made home brew can stand on its own two feet against any premium brew the world over," says Tom Ayers, a home brew enthusiast.

Home brewing is growing at the rate of 25% a year and all the technology, ingredients, equipment and know-how is available to anyone who wants truly fine beer.

### WHERE DO I GET SUPPLIES ONCE I GET THE KIT?

Just call us to reorder. Bierhaus is among the largest mail order suppliers of equipment and ingredients in the country. You can choose from over 50 different malts from countries all over the world. We also carry a wide range of brewing supplies and accessories... everything you need to brew the best beer you ever tasted.

You can use your Mini-Brewery equipment over and over again for many years, and remember it's unconditionally guaranteed for one full year from date of purchase.

Your new Bierhaus Mini-Brewery contains an FDA foodgrade 7½ gallon fermentation tank with lid and airlock, complete syphon unit, bottle capper and caps, bottle brush, and brewing guide—plus ingredients to make 2+ cases of beer. The ingredients will be for a rich American lager—our best selling beer. Compare it to your favorite American commercial beer.



### \$5.00 FREE

Our guarantee is simple.

Order the kit and make the beer. Serve it to your family and friends and ask them to compare it to their favorite beer. If everyone doesn't agree it's far better than commercial beer—simply return the kit. I'll pay the return postage and send you a check for your kit purchase price. Plus I'll send you an EXTRA \$5.00 for your time and trouble.

©1994 Bierhaus International, Inc.

**Bierhaus International, Inc.**  
3723 West 12th Street, Dept. PM-1  
Erie, Pennsylvania 16505

Please send me the following mini-brewery:

**Basic Kit** (as described above)  
**\$39.95** plus \$7.50 S&H (UPS)  
continental USA only

**Super Kit-X** (includes Basic Kit items plus an additional complete fermentation tank, brewing spoon, hydrometer, thermometer & double ingredients for 10 gallons of beer.)  
**\$69.95** plus \$9.90 S&H (UPS)  
continental USA only

NAME \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_  
PHONE \_\_\_\_\_

Check enclosed  
 Charge to:  MasterCard  VISA  Discover  
Acct.# \_\_\_\_\_  
Exp. \_\_\_\_\_ (PA residents add 6% sales tax)

**FOR EXTRA FAST SERVICE** call us at (814) 833-7747  
from 8:30 a.m. - 5:00 p.m. EST weekdays and charge  
to MasterCard, VISA or Discover.

# Detroit Spy Report

BY JIM DUNNE, Detroit Editor



## Pontiac Ram Air

● Pontiac is planning a "Ram Air" theme for some of its sporty car lines for later this model year. These photos show a Trans Am model with a suggested Ram Air induction system. While much of the car's styling is identical to standard Trans Ams, the Ram Air hood and exhaust pipes are clearly different. The large hood scoops bring outside air directly to the intake manifold, while at the rear, large rectangular exhaust pipes help get rid of the exhaust in a hurry. But this project is more than just air scoops and exhaust pipes. It's a very serious attempt to get more horsepower out of the engine. And with this Ram Air setup, Pontiac engineers figure they can boost a Trans Am's horsepower by about 10%. The air intake is simplified by routing air in a straight line from the outside directly to the intake manifold, eliminating the right angle in the passageway on today's Trans Ams. With the larger exhaust pipe,



there's reduced backpressure. Yep, the age-old hot-rodders' tricks are still valid in the computer-controlled '90s.

## '98 Doesn't Go Into '97

Plans at Oldsmobile call for dropping the venerable Ninety Eight series as a separate model in 1997. Olds planners see the Aurora as the flagship sedan in the future lineup, and, with the growing popularity of the Eighty Eight, that leaves little room for the Ninety Eight. While the car may go away, its numerical name may not. Olds management is still thinking of offering the Ninety Eight as an upscale trim level in the Eighty Eight lineup.

## '96 Oldsmobile Eighty Eight

Oldsmobile will do a complete reskin of its Eighty Eight model for the 1996 model year. The car will have new surfaces on its sheetmetal, but will be essentially unchanged in chas-

sis layout and performance. This photo of a so-called "development car" shows the new grille and front-end styling. The remainder of this development car is unchanged from the current car. Reports from inside GM say the 1996 will have more rounded lines and will resemble the 1993 Hammer show car that Oldsmobile developed on the Eighty Eight chassis.

## Showing The SHO

Chrome wheels, specific styling for the front end and 16-in. wheels are some of the details of Ford's 1996 SHO model, caught here during some hot-weather testing. Nestled in the car's engine compartment is a new engine. The dohc V8 was designed by Yamaha, but will be built by Ford at its Cleveland engine plant. Ford expects that the smallish 3.4-liter displacement will put out an impressive 250 horsepower. Special SHO wheels and embossed bumpers will advertise the fact that this car is still the hottest



Taurus SHO is rounded, inside and out.

sedan on the road. A look inside reveals that the rounded lines of the car's exterior sheetmetal are echoed by round housings in the instrument panel—one for gauges, the other for radio and a/c controls. Note that the oval surfaces on the panel carry over the oval theme of the exterior styling. Look closely and you see a rounded pod that houses controls for heater and radio. That positioning has long



Smoother, rounded nose hints at future of Olds 88.

essentially unchanged in chas-





Soon at a Buick—and then Cadillac—dealer near you, a rebadged version of this Opel.

been a favorite in concept cars, but has never before been seen in a mainline sedan. Overall, the car will follow the styling of the standard Taurus, including round headlights and an oval grille opening.

### Déjà Vu All Over Again

Once again, it looks like Buick will be selling European-made Opels. The current plan has a version of the Opel Omega going into Buick showrooms for the 1998 model year. Buick currently has the Opel under test in the United States to check out necessary federal specifications for the car. This is the same car that Cadillac will introduce for 1997 as its lowest-price model. Buick will sell its version as a top-of-the-line sporty sedan. Specifications include a V6 engine, rear-wheel drive and 5-passenger seating.

### Front-Drive Cougar

You can pretty well expect that the next Mercury Cougar, due as a 1998 model, will be a front-driver, no longer a rear-wheel drive. This represents a revolutionary change for the sporty coupe. But for the first time Cougar will be completely separate from the Ford Thunderbird design. Reports indicate that Cougar will be based on the Mazda Millenia chassis. That means, besides front-wheel drive, a V6 engine and smaller dimensions. Though based on a Mazda design, Ford and Mazda will build the car in a U.S. assembly plant. Hopefully, there'll be a larger engine than the Millenia's 2.3-liter banger, in spite of the optional supercharger.

### Cadillac Goes To The Yukon

If Cadillac management gets its way, you may well find an upscale large sport/utility vehicle wearing the Cadillac crest. Executives at GM's luxury-car division want a sport/utility vehicle like the 4-door Yukon. GM

management hasn't given the green light to such a project, but Cadillac executives are already making plans. "We'll have leather seats, wood trim and the Northstar System—the works," says John Grettenberger, Cadillac's top man. There is a relatively major roadblock, though. Chevrolet and GMC plan to sell all the full-size sport/utilities GM can produce. Without any additional manufacturing capacity, there will be no vehicles left for Cadillac's customers.

### Ford's Pickups

Ford plans to offer two distinct pickup trucks in the coming years. Starting in 1996, there will be an F-150 replacement for small-pickup buyers. In 1997, Ford will introduce F-250 and F-350 replacements for big-pickup buyers. Look for the smaller trucks to be more carlike, while the larger vehicles will offer more heavy-duty features. The 1996 model F-150 will have all-new engines. Base is a 200-hp 4.2-liter V6. The first engine option is Ford's 215-hp 4.6-liter V8. At the top is a 225-hp 5.4-liter V8. As for cabs, a supercab is planned for the F-150, making it a 3-door vehicle.

### To Olds Or Not To Olds

The folks who are designing future Oldsmobiles are faced with a basic but critical question: Should they or should they not have the individual cars' names plastered all over the sheetmetal? Some folks at Oldsmobile want to emphasize the car names, like Delta Eighty Eight, Cutlass or Achieva. Others feel that—at most—only the Oldsmobile name should be embossed on the bumper fascias. "What we don't want is rockets painted all over the car," says Oldsmobile General Manager John Rock. What to do? The Aurora gives a hint. Look that car over and you'll find only one subtly placed "Oldsmobile" nameplate. See if you can spot it. **PM**

Racing's Best Kept

SECRET



**M**y Unser racing team

knows how to keep an engine running cooler and lasting longer...before every race we add a bottle of Bar's Leaks."

- Protects the engine from overheating.
- Conditions the cooling system and lubricates the water pump.
- Guards against cooling system leaks.
- Inhibits engine rust and corrosion.

*Bobby Unser Jr., World Famous Racing Driver*



"Don't trust your car to anything but BAR'S LEAKS because it's factory installed in 75% of all American cars and trucks."

NEW IMPROVED FORMULA

# Year Of The Comet

BY GREGORY T. POPE, Science/Technology Editor

● Remember the fizzle of comets Kohoutek and Halley? If you do, you had every reason to suspect last summer's anticipation of Shoemaker-Levy 9's assault on Jupiter (see *Science*, page 106, March '94). Wary of hype, even some scientists were beginning to downplay pyrotechnic predictions.

But the comet train ended with a bang, not a whimper. Forty million megatons of energy went up in a spectacular series of fireballs. While astronomers stopped short of tipping tubs of Gatorade over each other, they celebrated by inundating the Internet with images and interpretation.

Now, however, researchers are digging out from an avalanche of data gathered by earthly telescopes and spacecraft scattered about the solar system. In its wake Shoemaker-Levy 9 has left a trail of riddles, not the least of which is the true nature of the Shoemaker-Levy objects themselves. Were they comets after all, or miniature asteroids? And were they solid chunks, or swarms of loose material?

At the Space Telescope Science Institute in Baltimore, Maryland, astronomer Hal Weaver has weighed the evidence in the first question and found it inconclusive. "My bottom line slightly favors comets," he says, "but asteroids are by no means ruled out."

What has piqued the debate are the surprisingly scanty traces of water detected before, during and after the collisions. While asteroids comprise rock, comets are believed to be conglomerates of dirt and frozen gases, dominated by water ice. As a comet sweeps through the solar system, ultraviolet radiation from the Sun shatters water molecules into hydrogen and hydroxyl ions. The latter show up strongly on ultraviolet spectrographs, which analyze light from a celestial object to determine its chemistry. Yet the Hubble Space Telescope's spectrographs detected



"Black eye" (above) from impact of fragment G—the most energetic collision—spreads across area nearly as wide as Earth's diameter (left). Dark coloration comes from sulfur-bearing compounds.

no hydroxyl ions from Shoemaker-Levy 9 before the crash.

Scientists who favor a cometary identity for Shoemaker-Levy 9 can account for this. They argue that the fragments were so distant from the Sun's radiation that the water remained frozen in the comet's nucleus, where it might escape detection. On the other hand, the pro-asteroid faction notes that the objects were disintegrating as they flew toward Jupiter. As they broke up, they should have exposed so much surface area that plenty of water should have

sublimated directly into the comets' atmospheres.

One theory may satisfy both sides. It would explain the absence of water while rationalizing Shoemaker-Levy 9's more cometlike attributes, such as its tendency to come unglued. The objects may be skeletons of dead comets, their ices having evaporated to leave little more than crumbly cakes of silicon and carbon.

Infrared astronomy, which detects water directly, hasn't resolved the matter. The best data came from NASA's Kuiper Airborne Observa-

tory, a C-141A that carries an infrared telescope to 41,000 ft.—above 99% of the water vapor in Earth's atmosphere. Kuiper did glimpse brief flashes of water after two of the impacts. But no one is quite sure whether this water sloshed up from the aqueous clouds deep in Jupiter's atmosphere, or whether it came from Shoemaker-Levy 9 itself.

Meanwhile, the great black eyes that the impacts left on Jupiter's face have only added to the puzzlement. Ammonia and sulfurous chemicals abound in these dark bruises, but oxygen-bearing compounds—considered markers of water—are absent.

These observations suggest that the objects didn't penetrate farther than the topmost ammonia and ammonium-hydrosulfide levels of Jupiter's atmosphere. They evidently didn't reach the water layer thought to underlie these visible clouds.

And that opens another question: If the objects packed enough wallop to loft plumes 1000 miles above Jupiter's cloudtops, then why didn't they slam deeper into the planet? The mystery relates to the size of the individual fragments. Some astronomers believed the biggest fragments to be "traveling sandbags," loose agglomerations of cometary rubble, while others saw them as solid bodies.

"We were predicting moderate fragments—3 to 4 km—and fairly large impacts," says Paul Chodas of NASA's Jet Propulsion Laboratory in Pasadena, California. "And we were gratified by the actual events. Although the jury is still out, those who were saying these are 100-meter fragments appear to be wrong." Not so fast, say the agglomerationists: If they came in a tight pack, a swarm of small fragments could kick up fireballs yet still stop short in Jupiter's upper atmosphere.

### Galileo speaks

Adds Weaver, "Whether it's 100 meters or a few kilometers, I'm hoping the Galileo results will focus in on the correct number." Indeed, astronomers are eager for the data from the Jupiter-bound probe, which had a direct view of the impacts.

Whatever data returns to Earth from Galileo will be a tribute to the spacecraft's mission planners. Galileo wasn't designed to photograph Jupiter from 150 million miles away. At that range, the planet only spreads across 60 pixels of the Galileo camera's 800 × 800-pixel field of view. What's more, no one could pinpoint the timing of the impacts within an hour. Nor could physicists predict the brightness of the events.

All this is significant because Galileo data is crawling back to Earth at a mere 10 bits per second. The spacecraft must transmit through its low-gain antenna, since its high-gain antenna refuses to open (see Tech Update, page 18, Aug. '93). For that reason, mission planners sought to avoid lengthy transmissions of black-space footage, misexposed images or boring shots of Jupiter awaiting impact.

To get the most from Galileo, ground controllers programmed its camera to shoot on-chip mosaics—multiple Jupiter images on a single frame—which minimize empty black space. They also varied exposure time for all the spacecraft's instruments. In addition, on a few shots the camera was deliberately panned to smear Jupiter across the frame. Finally, mission controllers waited until the last minute before programming timing sequences into the spacecraft's 900-megabit tape recorder.

Based on data from telescopes, Galileo's controllers believe they have found the collision images and are now downloading surgically selected slices of data from the tape recorder. "We have the front end of the event, and then everyone else can put together the rest of the story," notes Jan Ludwinski, chief of mission planning for Galileo. **PM**

## No More Endless Pumping™ ...

U. S. Patented Speedy-Lift™ Pumping Lever • Available at All Major Retailers Nationwide

**Pro-Lift®**

**3 TON CAPACITY**  
SAFE, EASY TO USE

**MODEL G-493L**

**HEAVY DUTY HYDRAULIC SERVICE JACK**

**GATO HIDRÁULICO DE SERVICIO PESADO 3 TON**  
WILL LIFT 6000 LBS.

- U.S. Patented Speedy-Lift™ Pumping Lever for fast no load lifts.
- High lift 5 1/4" up to 19".
- U.S. patented by-pass device prevents over-pumping.
- Internal built-in safety valve for user safety.
- Swivel saddle and rear casters added for user safety.



**CAUTION:** Use only on a firm, level surface.

MEETS GUIDELINES OF AMERICAN NATIONAL STANDARD

Engineered in U.S.A. Exclusively for Shinn Fu Company of America, Inc. © Copyright 1994

10939 N. Pomona Avenue • Kansas City, Missouri 64153 • Call (816) 891-6390 or Fax (816) 891-6599

# Driving Bosemobiles

BY FRANK VIZARD, Electronics Editor



● Quietly, and without a great deal of fanfare, Bose Corp., a longtime maker of home audio speakers, is putting a lock on the car audio universe. Bose is supplying sound systems to 11 carmakers representing some 31 different vehicles. Bose has been amassing this playlist, so to speak, since the mid-1980s.

Two of Bose's most recent efforts can be heard in the new Oldsmobile Aurora and Mazda Millenia. Bose acoustically tailors its systems to match the interior of the car and neither the Aurora nor the Millenia is an exception, as their respective speaker arrays confirm. And at least one speaker configuration might raise an eyebrow among the more sonically sophisticated.

Of the two, speaker placement in the Millenia is the more traditional. Two 6 x 9-in. speakers are located in the rear deck. A pair of 4½-in. speakers are installed in the front door panels. And a pair of 2½-in. tweeters are installed in the instrument panel to deliver the more directional upper frequencies.

The Aurora features a more radical speaker array. The tweeters are located in the front kick panels, which, at first blush, seems to be an odd location for directional sounds generally aimed at your ears. Bose, however, does have to work with what the car allows physically.

Another novelty in the Olds Aurora is a bass module containing a single 6½-in. woofer that doubles as the rear package shelf. Complementing these

speakers are a pair of 6½-in. speakers in the front doors and a pair of 3½-in. speakers in the rear doors.

Another factor in the sound equation is the engine. The sound of a car engine is mostly a marketing decision, with the sound tailored to what the target buyer might like. In the Millenia, for instance, the Miller Cycle engine—designed to deliver big-engine performance in a small, fuel-efficient package—is whisper silent. This means the sound system doesn't compete as much with the sound of the car itself. Silence doesn't mean slow, either. The Millenia can hit a bird in flight. Trust me.

So how do the systems sound? Drivers of other Bose-equipped vehicles already know there is something that can be dubbed the "Bose sound."

Dr. Amar Bose, MIT professor and company founder, believes that excessive midbass- and midhigh-frequency sounds detract from a listener's long-term enjoyment of a sound system. At first, says Bose, excesses in the 80- to 200-hertz area are perceived as better bass and excesses in the 3000- to 10,000-hertz range result in superior

definition. In a few months, though, these effects become tiring and the listener lowers the volume and enjoys the system less.

Well, maybe. Personally, I tend to like sharp bass performance and superior definition. But this may be a function of musical taste since this is more critical with jazz, for example, than most rock. At the same time, I've listened to car audio systems that wear me out almost immediately. Certainly, sonic fatigue is not an issue with Bose systems. In any event, the Bose sound is something people tend to be judgmental about.

More interesting, though, and most noticeable in the Aurora, is the lack of a sound stage that is clearly in front of you, as it would be at a live concert. An audiophile might find it disturbing to hear a trumpet coming from the right rear door, as I did in the Aurora. On the other hand, many people like the feeling of immersion this system's configuration produces, and it's not exclusive to Bose systems. It's like being in a sonic carwash.

I suspect people expect different experiences from a live concert and a car audio system. While purists may argue—and I won't disagree—that both experiences should be the same, the latter perhaps gets used more as an immediate stress reducer, among other things. Music has its many uses. **FM**



The Aurora's speaker array (top) is more radical than the Millenia's configuration (above).

# FAST COMPANY...

1/18th SCALE DIE-CAST METAL MODEL CARS!

'53 CORVETTE



'59 ELDORADO



'96 BOXSTER



'52 BMW



'94 BMW



ORDER NOW FOR DECEMBER DELIVERY

'95 PORSCHE 993



'94 MACH III SHOWCAR



'92 AUDI AVUS



'94 MAZDA RX-7



'94 LAMBORGHINI DIABLO



'95 ASTON MARTIN DB-7



'94 JAGUAR XJ220



1/12th Scale

**A** 1953 CORVETTE. The car that started it all. The first Corvette! A must for all Corvette aficionados and 1/18th collections. From Mira; Ivory w/Red interior .....\$ 27.99

**B** 1959 CADILLAC ELDORADO in 1/18th Scale from Maisto; Pink, White, Black, Red or Blue Metallic.....\$ 24.99

**C** 1996 PORSCHE BOXSTER in 1/18th Scale from Maisto; Red, Black or Silver.....\$ 19.99

**D** 1952 BMW CABRIOLET in 1/18th Scale from Maisto; Black or Navy Blue both feature a Tan interior...\$ 24.99

**E** 1994 BMW 325i CABRIOLET in 1/18th Scale from Maisto, features working canvas top; Black, Red or White .....\$ 29.99

**F** 1995 PORSCHE 993 CABRIOLET in 1/18th Scale from Maisto; Red or Black.....\$ 19.99

**G** 1994 FORD MUSTANG MACH III SHOWCAR in 1/18th Scale by Maisto; Bright Yellow or Fluorescent Red Orange.....\$ 19.99

**H** 1992 AUDI AVUS SHOWCAR in 1/18th Scale by Revell; superdetailed, with highly polished chrome bodywork.....\$ 32.00

**I** 1994 MAZDA RX-7 in 1/18th Scale from Kyosho. Highly detailed, hand finished; Red, Black, Silver or Yellow.....\$ 79.00

**J** 1994 LAMBORGHINI "30th ANNIVERSARY" DIABLO VT in 1/18th Scale by Maisto; Purple Metallic.....\$ 19.99

**K** 1995 ASTON MARTIN DB-7 COUPE in 1/18th Scale from Guiloy; Burgundy Metallic.....\$ 34.95

**L** 1994 JAGUAR XJ-220 RACING in 1/12th Scale by Maisto, over 15" long. Only a limited number of these huge, super detailed models are available, order now to insure Christmas delivery....\$129.00  
 • XJ-220 STREET VERSION (not shown); Metallic Blue, Silver, Red, Green or Burgundy.....\$ 99.00



**EXOTICAR MODEL COMPANY**  
 2A New York Ave., Framingham, MA 01701

\*Shipping: \$4.95 first model, two or more 10% of order, maximum \$12.00 in the continental U.S. Orders over \$250. FREE Shipping.

CALL FOR OUR NEW 1995 CATALOG

OVERNIGHT SHIPPING ONLY \$2.00 ADDITIONAL PER CAR

ORDER TOLL FREE  
**1 800 348-9159**  
 ORDER TOLL FREE

FAX YOUR ORDER . . . 508 788-8088  
 FREE CATALOG . . . 508 620-6782

• MASTERCARD • VISA • AMEX • DISCOVER

©1994 Exoticar Model Company

Материал защищен авторским правом

# Future Shock At Sea-Doo

BY JOE SKORUPA, Boating/Outdoors Editor

● So, what's the definition of kick-butt performance: g-force cornering or raw speed? Given the opportunity, most of us would prefer both. But in the real world, engineers have a problem with this. The problem is that taut cornering and top-end speed are virtually opposing principles. This is especially true in boating, where the key to pinning tight turns is to carve into the water, and the key to top speed is to lightly skim over it. To do one well limits the ability to do the other, and this is as true for monster racing boats as it is for Sea-Doos.

Over the years, PWCs have concentrated on cornering instead of top-end speed (although '95 model intros indicate that this may be changing). Stock PWCs (with several exceptions) favor a playful image that emphasizes wet-and-wild fun—spin outs, wipe outs and wave-jumping thrills. Race-tuned PWCs don't stray far from this formula. They place a premium on lightning-quick response that's ideally suited to blazing around circular courses that are short and twisty.

But even though PWC engineers have limited their quest to cornering and handling, it hasn't necessarily simplified their jobs. For example, consider the debate that rages between two opposing schools of design: the riding-the-rails school and the nosing-in-the-bow school. The riding-the-rails school holds that cornering is best achieved by leaning the craft over on its side and carving water with such bottom elements as strakes, chines, side edges, rudderlike winglets, winglike sponsons and other appendages.



The bow-down school holds that a better way to carve turns is to dig in the nose and use bottom elements associated with a true modified V. (Note that the bow-down school may employ winglets and sponsons, too.)

Another debate raging among personal watercraft engineers centers on whether riders should lean into the turn or lean away from it. This debate continues to amaze me. Try making a full-throttle turn by moving your body high and outside. You fight uncomfortable forces all the way. It feels completely wrong.

Then try doing the opposite. Move your body low and inside. It feels natural. Control seems immediate and sure. There's virtually no learning curve. The low-and-inside school is easier and more comfortable. Fortu-



Shock treatment for the new Sea-Doo HX.

nately, several hold-out manufacturers have arrived at this conclusion, too. Virtually all new PWCs are designed to corner with a low-and-inside body position.

The engineers at Sea-Doo have been on the right side of both debates for years. Right from the start, Sea-Doo models have been noted for superior cornering, handling and overall performance. The reasons for this are based on solid engineering: low-and-inside body position, bow-down hull attitude through the corners and outstanding power derived from Bombardier-Rotax engines.

Sea-Doo's latest water rocket, dubbed the HX, features all of the above plus an interesting twist—it's equipped with a Direct Action Suspension (DAS) system. The HX is the first personal watercraft to be suspended, and it's not likely to be the last. The DAS system works by mounting a shock absorber beneath a pivoting, cantilevered seat. While the



Single-engine Sea-Doo Sportster sets a new pace for affordable minijet boats.

suspended seat softens bumps in rough water, its main purpose is to lower the rider's center of gravity during turns. The result is to transform the HX into a razor-sharp slasher.

Recently I had a chance to take out the HX for a hot ride on a chilly day in Montreal, and the innovative craft lived up to its billing. Cornering was mind boggling thanks to the DAS system and a multichine V-hull with sponsons. Speed was head-snapping, too, because of a torquey 85-hp 720-cc Bombardier-Rotax engine, which is fed by twin 38mm high-flow Mikuni carburetors.

To maximize the HX's market-leading agility, the craft's designers have given the hull a relatively narrow beam. This not only keeps weight and wetted surface to a minimum, but makes it more responsive to body English. The narrow footprint also makes the HX more tippy than the typical sit-down craft. In general, Sea-Doo sport models are considered to be relatively tippy, because of the company's uncompromising use of high-performance V-hulls. Flatter-hull craft are more stable, but they can't carve a turn as tautly as a knife-edge V.

The downside to the narrow beam is that only the most limber and balanced riders will be able to pull off a deep-water mount gracefully. I wasn't able to master the maneuver in the short time I tested the craft. After wiping out in the middle of the lake, the technique I used was to grab the handlebars and tweak the throttle. Forward acceleration stabilized the craft and helped me pull my body onto the seat.

Obviously, the HX (\$5899) isn't for everyone. It's a quirky, high-performance machine that rewards effort and hours of practice. For this reason, Sea-Doo considers it a one-of-a-kind, limited-production sport model. I must say that I disagree. Limited production? Possibly. But one-of-a-kind? I doubt it. The HX's suspension system is an idea whose time has come. We haven't seen the last of suspended water bikes by either Sea-Doo or the rest of the market.

In addition to the HX, I had a chance to test another of Sea-Doo's exciting '95 models, the new Sportster jet boat. Earlier this year, Sea-Doo entered the jet-boat market with the lightning-fast Speedster. This 50-mph screamer not only debuted as the market's fastest and most expensive jet, but also the only one with twin engines—dual 80-hp Bombardier-Rotax mills. In a class obsessed with weight reduction, fuel economy, low price tag and overall simplicity, the high-performance Speedster is clearly in a

niche by itself at more than \$11,000. The new single-engine, affordable Sportster, on the other hand, moves the Sea-Doo jet-boat division into the market's mainstream.

Powering the Sportster is a single 80-hp Bombardier-Rotax engine, which pushes the craft to speeds in the mid-40s. This level of performance proves to be a rebuke to those who questioned whether Bombardier's 80-hp engine could play in the same league as the bigger 120-hp Merc SportJet and the 115-hp OMC TurboJet. Top speeds I've come across so far with these big SportJet and Tur-

boJet engines are also in the mid-40s.

Another big difference between the Sea-Doo Speedster and the new Sportster (both of which run on the same 14-ft. 6-in. hull) is price. The Sportster comes in at \$7999 with trailer, among the lowest stickers on the market. Yet, as with all Sea-Doo models, the fit and finish and list of standard features (including a digitally controlled, keyless ignition theft-deterrent system) are top notch.

So, you want both top-speed performance and g-force cornering? So do the engineers at Sea-Doo, and they'll probably make it happen. **PM**

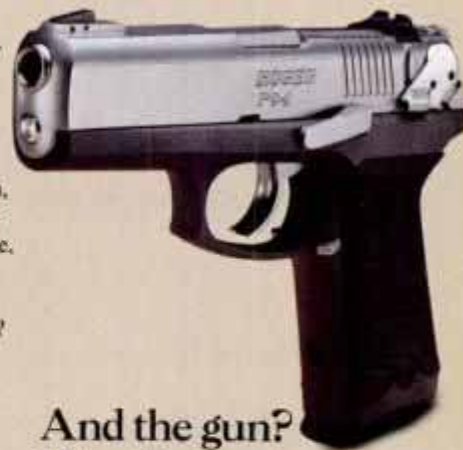
## IN 1969 RUGER DESIGNED AND BUILT THE 425 HP RUGER TOURER



With only 48 parts, the new P94 in 9mm and .40 Auto is considerably less complicated than the car but no less an engineering triumph. Compact, lightweight, and precision investment cast from aluminum alloy and specially formulated Terhune Anticorro stainless steel. The P94 represents the latest thinking in handgun design and construction, from the company that places no limit on its dedication to engineering. There is no better gun made, at any price. Available in three configurations: Double-Action-Only, Decock-Only, and Manual Safety. Suggested retail price: \$520. And the car? It's priceless.

Sturm, Ruger and Company, Inc.  
53 Lacey Place  
Southport, Connecticut 06490

Free instruction manuals for all Ruger firearms are available upon request.



And the gun?  
It's a Ruger, too.



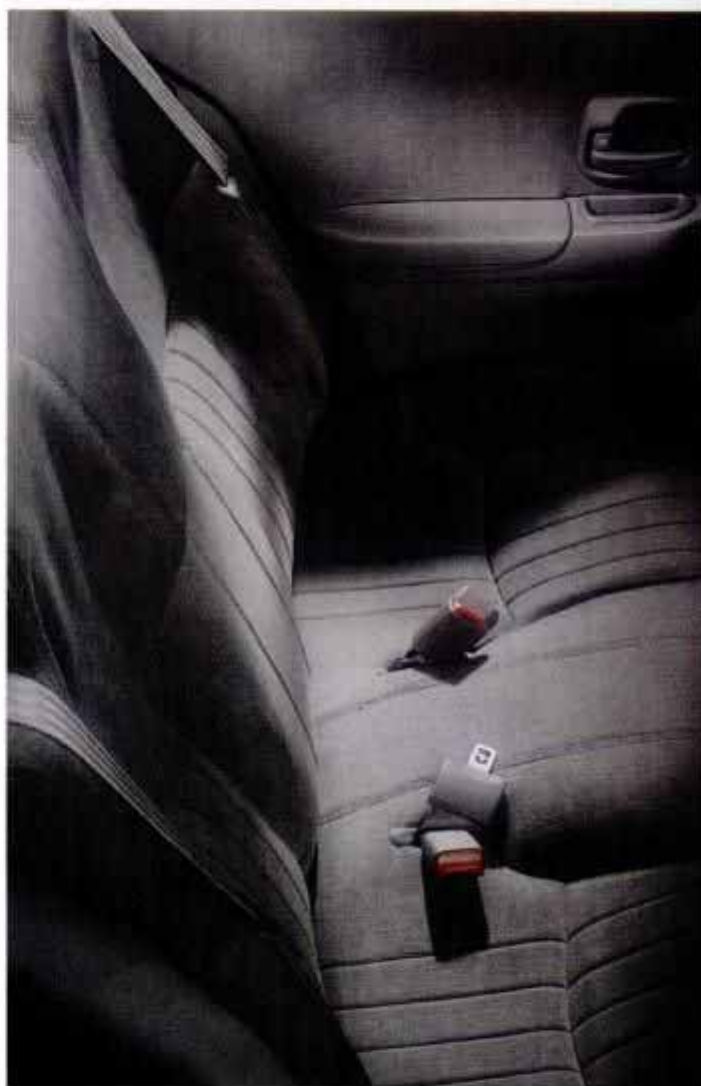
# RUGER

Arms Makers for Responsible Citizens

# With so many standard fe 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 there.



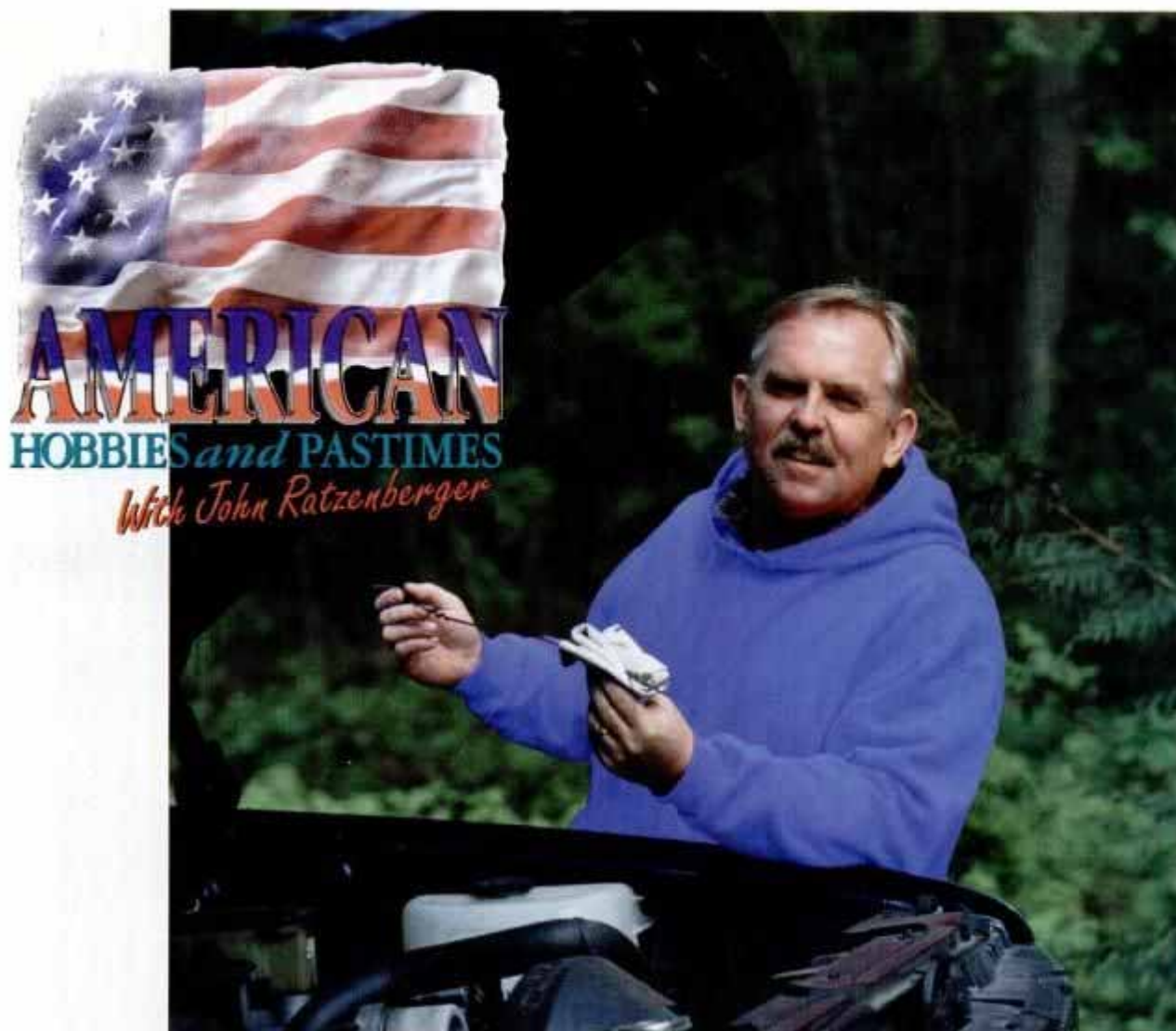
For a brochure call 1-800-950-2438. The Chevrolet Emblem and Lumina are registered trademarks and Chevy is a trademark of the GM Corp. ©1994 GM Corp. All Rights Reserved. Buckle up, America! 

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™



## It's all about home~life~family & making the best of it...

Join John, some Special Guest Stars and *Experts* each week, as they explore *America's Best*: home remodeling and gardening to woodworking and auto restoration.

Sponsored by...



Premieres December 30th on...



For more information call 1-800-892-6810



# 5000 HORSEPOWER!

We test drive the world's mightiest locomotive as America's freight haulers saddle up for a horsepower derby.

BY GREGORY T. POPE, Science/Technology Editor; PM Photos by Rich Cox

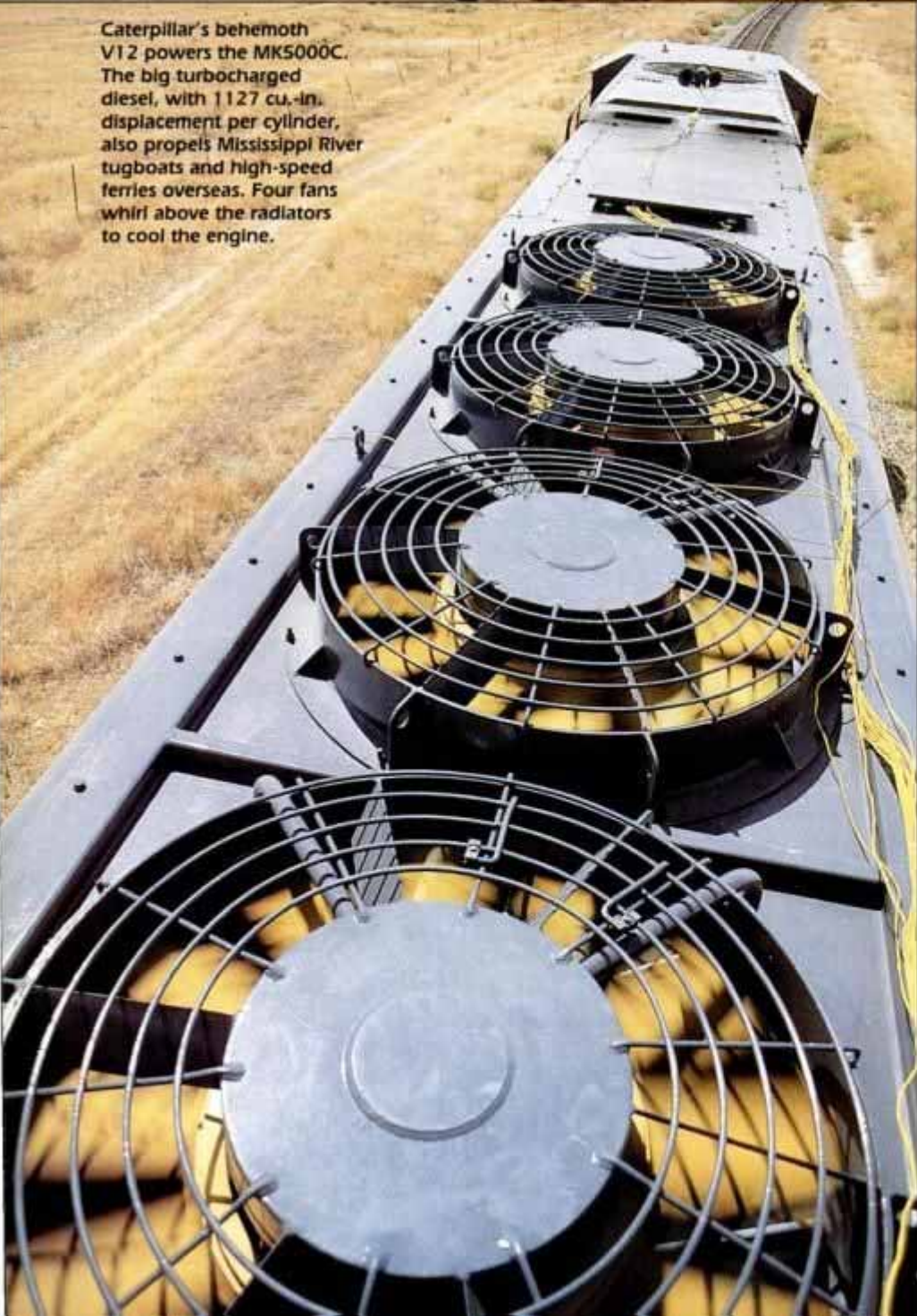
• Starting a locomotive has never been simpler, I'm assured. Reaching back to a panel behind the engineer's seat, I flip a black switch over to the PRELUBE setting. Instantly, batteries spark life into an oil pump, which cranks away until the start light winks on. Then I crane my neck out the window and below the time-honored "Watch the start!" With that, I simply throw the switch over to ENGINE START.

Twenty feet to my rear, a monster wakes. Even at idle, even in the insulated cab, a 25-ton Caterpillar 3612 diesel sounds

## 5000 HORSEPOWER!



Caterpillar's behemoth V12 powers the MK5000C. The big turbocharged diesel, with 1127 cu.-in. displacement per cylinder, also propels Mississippi River tugboats and high-speed ferries overseas. Four fans whirl above the radiators to cool the engine.



like hell on rails. The Death Star baritone puts to shame the earnest chug-a-lug of lesser engines. It's amazing how an extra 1000 horsepower will lend authority to a voice.

Awash in subwoofer rumble, I slip my brass reverser key into the gear slot and shift into forward. I set the bell ringing. I release the automatic parking brake. Then I push the throttle up to notch one. Rpm's gain in urgency. Slowly I pull back on the independent brake, unharnessing the locomotive. Digital numbers tumble on the cab's liquid-crystal display screen. As brake pressure eases, this juggernaut begins to roll.

The most horsepower I've ever had at my fingertips is 300, in a Chevy pickup that hurtled like a mad bull. Now I'm at the reins of a new breed of locomotive, propelled by the most powerful diesel engine ever to ride the rails. To beat the 5000-hp output of a single Cat 3612, you'd have to gang several engines together—as Union Pacific did in the 1960s with its huge DD40AX—or else hearken back to the glory days of the Niagara steam locomotives. To beat the sense of power, as my hands govern the transit of a titanic mass... well, you can't beat it.

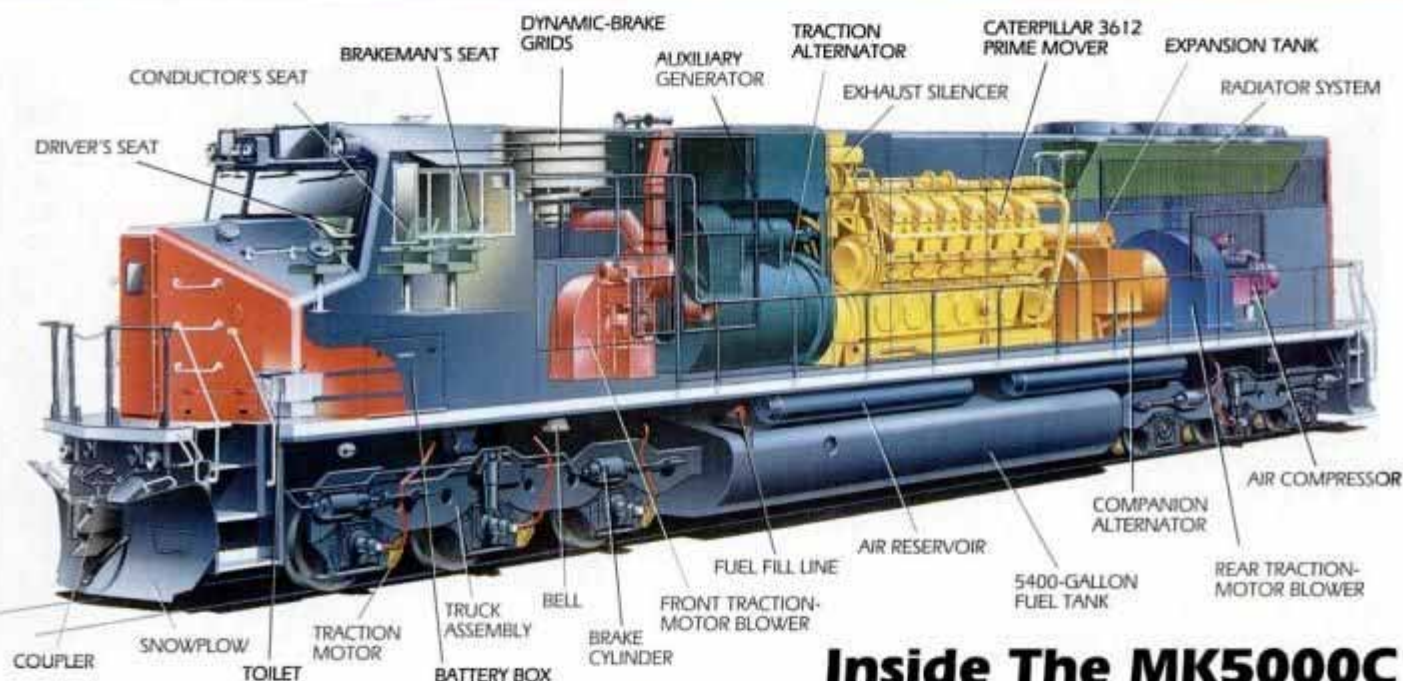
The MK5000C I'm driving throws a challenge to the big boys of diesel-electric locomotion: General Electric and General Motors' Electro-Motive Division (better known as EMD). This locomotive, built by upstart MK Rail Corp. (a subsidiary of Morrison Knudsen), heralds a showdown.

"I guess we're in a horsepower race," says Chris Anton, MK Rail's manager of new locomotive development, and he's right. Having spent the past decade trimming fat, the freight railways are now eager to add muscle to their fleets. When engines have more horsepower, fewer locomotives need pull each train, with attendant cost savings. MK Rail plans to give the railways all the horsepower they can handle. So, for that matter, do GE and EMD, who also have new high-horsepower locomotives in the wings.

### Easy does it

Of course, this kind of horsepower won't pin your ears back. A Fiat could outrace an MK5000C. The iron horse is a lesson in colossal momentum and weight and wheel-to-track adhesion, not lightness and speed.

While freight-train engineers might dream of flooring it—"wiping the throttle," in their words—none would dare on the job. Precious loads would shift and collide. Car couplers could strain beyond the breaking point. But the locomotive won't let this happen anyway. Microprocessor controls, on



## Inside The MK5000C

the Caterpillar 3612 prime mover and the traction alternator, prevent the power level from ratcheting up in a hurry. They keep such a tight rein on the 5000 horses that speed changes hardly even register in the gut.

Instead, driving a freight train demands finesse. Your brake hand does most of the work. I find this out as I take the train around a track loop at MK Rail's huge facility outside Boise, Idaho. Quickly I learn that even the slightest inclines cause a 180-ton locomotive to drop drastically in speed, and the merest downslopes lend surprising acceleration.

Yet, so subtle are the physical cues that I must keep an eye locked on the cab's multifunction display. Here, brake pressure and mph readouts seesaw against each other. As brake pressure falls and speed increases, there's a lag that seems unnatural to a car driver. Accomplished engineers think a few



MK5000C takes shape in Boise.

seconds ahead as they work the brakes to maintain an even velocity.

On downgrades, with a fully loaded train in tow, the traction motors themselves become the primary braking system. After all, brake shoes alone could scarcely cut into hundreds of tons of inertia without overheating.

Shifting the reverser key into neutral and pulling the throttle back toward me starts a process called dynamic braking, in which the traction motors turn into generators. The electricity they produce flows into resistance coils, where it dissipates as heat.

After wheeling around the track, we head out onto a spur of Union Pacific territory, where UP engineer Ruben Sangistevan takes over, in case Federal Railroad Administration enforcement agents are lurking in the sagebrush. We smoothly gain speed, leaving behind the gravel pits and timber yards of Boise.

"Rides like she was on rails!" deadpans Darin MacFarland. MacFarland, an MK Rail electrical engineer, and a cadre of other technicians are along this afternoon to check the electronic systems that riddle the MK5000C. The locomotive is hauling a converted

## 5000 HORSEPOWER!



Throttle lies at engineer's left, while automatic and independent brakes are at right. Dynamic braking occurs when reverser key and throttle handle are shifted back.

Southern Pacific Pullman packed with test equipment, caboose'd by an older SD40-2 locomotive that runs its dynamic brakes to simulate a load.

### Cat's meow

As Sangistevan mans the throttle, I can slip out the rear cab door and head aft along the external walkway. The train is now doing about 35 mph, and the big Cat roars. So deafening is the engine noise that it drowns out two Idaho Air National Guard F-4s that are overhead. As I walk past, sunlight dances on the shuddering hood that cowl the powerplant. I feel the engine heat cut through the midday 102° F temperature like a Pittsburgh blast furnace.

Caterpillar had locomotives in mind when it developed the mammoth diesel at the heart of this beast. Since its introduction in 1985, the 3612 has been shoehorned into a handful of existing locomotives. Like most car engines, the big 4-stroke V12 is a full-block design, permitting high firing pressures and good fuel economy.

I don't experience the full fury of the 3612 until we're back at the MK plant. There, engineers put the MK5000C into neutral and notch it up to full throttle for some onlookers from Burlington Northern. Anyone who's stood by as a P-51 Mustang revs up knows the basso profundo of a monster-block engine. Now imagine it

so loud and deep that it magic-fingers your rib cage from 200 ft. away.

While the MK5000C vents its battle cry, I get a chance to drive the SD40-2, an EMD workhorse that Morrison Knudsen remanufactured in 1990. The contrast with the MK5000C is stark. In the SD40-2, the control panel looks like something out of a German U-boat, with an industrial-black finish and analog dials, and a midjet fan struggling to sweep the air. The cab does little to dim the 3000-hp growl of the GM diesel engine. Oddly, I feel more attuned with the machinery here than with the high-tech interface on the MK5000C.

### Cradle of titans

Reborn locomotives like this SD40-2 put MK on the map during the 1980s, when cash-strapped railroads bought little factory-new motive power. MK's Boise facility reflects the continued success of its remanufacturing business. Inside, it's like a busy auto mechanic's shop scaled for a giant's proportions. The plant screeches with activity, with machine tools wailing and the hot air sharp with the smell of freshly cut metal. In every corner, men are stripping engines down to the block or bustling modern components into electrical cabinets.

Here, too, the MK5000Cs are being built. The Caterpillar engines arrive by train or truck from Lafayette,

Indiana. Some, shrink-wrapped and bright yellow, sit outside next to yesterday's faded 20-cylinder diesels. Meanwhile, on the shop floor, the second MK5000C looms nearly complete, as welders piece together frames for several more.

Southern Pacific has dibs on the first three MK5000Cs. Union Pacific will get the next three. A production run of 62 is scheduled through 1995. But MK Rail officials admit that the 5000C is merely a harbinger of the sea change in store for America's railroads—alternating-current traction, with its cooler-running, more efficient motors. Next year, MK will roll out an AC locomotive more powerful than the MK5000C. Not to be outdone, GE and EMD are also developing high-horsepower AC units, GE teaming with German engine-builder Deutz MWM while EMD develops its own. Caterpillar has a 16-cylinder 7000-hp cousin of the 3612 at MK's disposal.

Few in the trade believe horsepower ratings will climb above 7200, however. To channel any more rail-gripping tractive power through only six drive axles would tear up the wheels and track. And while railroads might welcome the efficiency of high horsepower, they are wary of concentrating power in too few locomotives. Should one puller conk out, a train would limp home grossly underpowered.

Nevertheless, the MK5000C and its rivals—new pinnacles of diesel-electric locomotion—continue to attract interest from railroads as the freight-hauling business surges. The coming horsepower race promises an interesting decade for engineers and enthusiasts alike. **PM**

NEW  
CARS 95



LEXUS LS 400

# THE TIDE TURNS

As the domestic industry surges, the imports fight for their place on the beach.

BY DON CHAIKIN, Automotive Editor

● While our domestic auto industry is rebounding from the pounding it took at the hands of the imports during the past decade, do not think for an instant that the import carmakers have tucked their collective tails between their legs and whimpered their way home. In fact, as we're halfway through the '90s, we find more foreign-based carmakers building vehicles

—and factories to build vehicles—here in the States. We also find, despite a relatively weak dollar that increases the price of foreign goods here, a very robust market for imported cars and trucks. And, like their domestic competition, those imported cars and trucks continue to get better and better.

Here, in alphabetical order, is a rundown on what you can expect to find at the various import dealerships this year.

## **Acura**

The first of the Japanese second-channels, Honda's luxury division has been taking its hits largely from its big cousins, Lexus and Infiniti. To regroup for the near



**FERRARI F355**

term, Acura is selling out its stock of '94 Vigors and not replacing it until the new car is ready, later in the year. Also due later this year is an all-new NSX *vundercar*, which promises to eclipse the original in terms of technology and performance.

**Alfa Romeo**

First the good news for those who appreciate these true drivers' cars from Italy: Alfa Romeo will be selling '95 models here. Now for the confusing news: No one's quite sure how many or for how long. There will be '95 versions of the front-drive 164 sedan—both LS and 230-hp Quadrifoglio. Other than different alloy wheels, the cars are unchanged from the few hundred cars Alfa sold last year.

**Audi**

With a new hood, grille, headlights, wheels and bumpers, the former Audi 100 is now the A6. Like the 90, the A6 now can be equipped with the com-

**FERRARI 456 GT**



pany's Quattro all-wheel-drive system as a free-standing option, regardless of trim level, sedan or wagon. With either front-drive or awd, the A6 is powered by the same 2.8-liter V6 as was the 100. With the demise of the awesome Audi V8 sedan, the high-performer of the marque is the S6.

**BMW**

The big news from the Munich-based carmaker is the redesign of its big car, the 7-series. While visual

differences between the new and old may be subtle, there are strong differentiations beneath the skin, including a much stiffer chassis and new multilink rear suspension. Drivetrain remains the same as the old. For more details, see the First Drive report below.

**Bugatti**

The rebirth of this near-legendary name is major news all by itself. Add to it that the company—now the owner of Lotus—

**FIRST DRIVE**

**BMW 7-SERIES**

● For '95, BMW has revamped its top-of-the-line sedan, the 7-series. Though the new car bears a very strong resemblance to the older one, BMW's tradition-minded customers will like the alterations in the kidney-shaped grille openings, and the slightly altered greenhouse. Close examination will reveal that all external surfaces are new for 1995.

Inside the cabin, the familiar BMW cues dominate the instrument panel. Black, white and red gauges peek out through the steering-wheel rim, while radio and heater controls are set in a driver-tilted center console. The shift lever for the 5-speed automatic transmission is wood-capped to match the wood strip that surrounds the front compartment.

Not surprisingly, performance is up



to BMW standards. The European-spec 740 that I drove felt like it would have no problem covering the factory's claim of 0 to 60 in 7.4 seconds. Because of conditions, I cannot attest to the 150 mph or so claimed top speed. Handling feels crisper—believe it or not—than the previous car. Expect prices for the new 7-series to be about the same as the former.

—Jim Dunne





LAMBORGHINI DIABLO VT

intends to sell about 40 EB110 supercars here this year. The EB110 is a V12-powered 2-seater that will carry a sticker of more than \$350,000 with gas-guzzler and luxury taxes. See the First Drive report on this page for more details.

### Ferrari

After quite a drought, there are suddenly two new cars with the prancing horse on their hoods sitting at your local dealer: the F355 and the 456 GT. The new F355 replaces the 348 coupe. (The 348 Spider soldiers on, at least for now.) Using the same 3.5-liter V8 as the 348 but weighing less than the old car, the F355 uses its 380 hp to get to 60 mph in 4.5 seconds and to blast past 180 mph.

The 456 GT is Ferrari's latest 2+2. To gain some room for those in the back seat, Ferrari has departed from its usual midengine configuration with the 456 GT. The new V12 engine is up front, under the hood. That V12 is 5.5

liters and has 48 valves driven by four camshafts. That's all worth 436 hp. The power goes through a 6-speed transaxle (the transmission's at the rear axle) to get the 456 GT from 0 to 60 mph in a tick over 5 seconds and ultimately to 186 mph. Your roughly quarter of a million bucks also gets you air conditioning and power windows, mirrors and door locks.

### Honda

Taking a major step toward being a full-line vehicle maker, Honda has finally entered the minivan market. And unlike its half-hearted attempt to invade the sport/utility field, with the Isuzu-built Rodeo clone, the Passport, Honda has designed and is manufacturing its own minivan, the Odyssey.

Typically for Honda, the Odyssey differs from the norm in its design—there are four hinged doors. No sliding door, and passengers egress on both the right and left sides of the vehicle. The interior is equally innova-

tive in its approach to versatile use of space for both cargo and people. To see how it works, see the First Drive report (page 56).

The other big news from Honda is that its best-selling sedan, the Accord, will finally be available with a V6 engine. To see how the extra cylinders and attendant chassis tuning have affected the Accord, see the First Drive report (page 56).

### Hyundai

After giving us an all-new Sonata last year, the big Korean carmaker has an all-new car coming very soon after the new year. Called the Accent, the front-drive subcompact replaces the original Hyundai, the Excel. While details are not yet firm, we do know that the Accent will be available as both sedan and hatchback, powered by an sohc 1.5-liter Four good for 92 hp and 96 ft.-lb. of torque. A 5-speed manual will be standard and a 4-speed automatic will be available as well.

## FIRST DRIVE

### BUGATTI EB110

● Odds are you'll never see one of these cars except here in the pages of this magazine. Or maybe on television, driven by some leggy starlet, or an actor playing a Beverly Hills lawyer.

One of the privileges and delights of this job is the occasional opportunity to drive exceptionally neat cars. And the Bugatti is indeed neat. Here's the list: V12, four turbochargers, four camshafts and 500 horsepower (well, okay, the EB110S has 550 hp—I drove both and couldn't tell!).

No surprise, but the acceleration is fierce at any speed—even at 100-plus mph. The rated top speed

of the lightweight S version is 220 mph. Yes, the brakes are staggeringly powerful—much too good to use in traffic to their fullest or you will be rear-ended by something far less glamorous than the Bugatti.

Cornering on the car's Michelin run-flat tires is harder than in most racing cars. And, unlike most exotics I've driven, worked on and, yes, lusted over, the interior level of fit and finish is perfect. Don't worry about scuffing up the interior of the trunk with your golf clubs—there's no trunk.

—Mike Allen



PHOTO BY RON SELICKS

Other options will include antilock brakes. You can bet that the Accent will hit the showrooms with the accent on price, so expect it to cost less than \$9000.

**Infiniti**

The big news at Nissan's luxury line won't happen until this coming spring. Then Infiniti will introduce a new model, the I30, slotted between its G20 and J30 sedans. The I30 is based, essentially, on a Japanese-market version of the current Maxima. When it arrives here, expect the front-drive luxury sedan to be much in character like the big Infiniti, the Q45. It will also share some styling cues with the Q. Power will be from a 220-hp dohc 24-valve 3.0-liter V6 and an automatic.

**Jaguar**

This year brings us the first new Jaguar since Ford purchased the Coventry-based carmaker in 1989. The new car, the XJ-Series sedan, represents 60 years of Jaguar sedans. (The company itself actually dates back to 1922.) And the current XJ also represents the first time that Jaguar has offered a supercharged model, the XJR. See the First Drive report (page 58).

The new Jaguar sedans also boast four round headlights, a more curved look than before and an available trac-



**FIRST DRIVE**

**HONDA ACCORD EX V6**

● This is the one for all the experts who kept saying that Honda needed a V6 in the Accord to remain competitive with the Ford Taurus, Toyota Camry, Chevrolet Lumina, Buick LeSabre and all the other models in that mainstream American family-sedan category. All of the above have V6 engines as standard equipment or options, and now the Accord does, too.

Honda's new V6 is essentially based on the old Acura Legend 2.7-liter V6, but just about every part has been upgraded and improved. All the '90s bells and whistles are there. It all adds up to 170 horsepower at 5600 rpm and 165 ft.-lb. of torque at 4500 rpm. To fit it all under the hood, the hood grew 20mm higher and 70mm longer.

The extra two cylinders do not a hot rod make. So don't think the V6 Accord is going to burn rubber all the way to the mall. Instead, think smooth. This new engine, teamed only with Honda's 4-speed automatic, is definitely a smoothie. Slamming a dark-red-with-gray-leather EX up the Pacific Coast Highway from Torrance to San Luis Obispo quickly dispelled any thoughts we had of boy racer. Instead, we started to feel like we were in, perhaps, an entry-level Acura Legend. There's a real feeling of luxury car here. The car just rolled, with extremely smooth power flow any time we needed it. There was no sudden burst of anything here, just the feeling of strength emanating from under the hood.

The suspension works well with the powertrain. We can attest to 110 mph. If you're a 4-cylinder Accord fan, then you're definitely going to love the V6. —Joe Oldham

**FIRST DRIVE**

**HONDA ODYSSEY**

● True to Honda's passenger-car heritage, the Odyssey is very carlike, especially when you look at it side-by-side in the parking lot next to the minivan standard: Dodge Caravan.

There are two seating options: 6- or 7-passenger. The 6-passenger seating has two captain's chairs amidships that remove easily, but requires rear-seat passengers to squeeze between them for ingress or egress. The 7-passenger center bench seat has two halves that fold against the front seats, leaving a large floor space in the center cargo area. In either case, the rear bench seat folds down completely into a well at the very back, leaving a flat floor perfect for luggage or cargo.

Derived from the Accord platform, the Odyssey shares the Accord's 2.2-liter 4-cylinder engine and automatic. However, the minivan's engine is retuned for an extra 5 ft.-lb. of torque—which still isn't really enough for a van full of people and stuff. So coming sometime during this year is



a 3.0-liter V6, a different engine than that used in the V6 Accord.

The base Odyssey LX is well-equipped with dual airbags, antilock brakes, air conditioning, power mirrors and locks, and six beverage holders. The EX adds a power sunroof, alloy wheels, remote entry and makes the 6-passenger captain's chairs standard. Expect to pay about \$18,000 to \$24,000 for one. —M.A.

PHOTOS BY BILL DELANEY

## MERCEDES-BENZ S-CLASS



tion-control system. Naturally the cars have 4-wheel disc ABS and dual airbags. And, at long last, the factory has returned the classic leaping cat to the front of the hood—as an option.

### Kia

Having survived its first year in the States with only the Sephia subcompact sedan, the small Korean manufacturer, Kia, is doubling its offering. Right about now you should be able to kick the tires of the Sportage sport/

utility. That is if there's a Kia dealer anywhere near you. The Sportage is about 6-in. shorter than a Jeep Cherokee, though its wheelbase is longer, and it's powered by an sohc 2.0-liter Four based on an older Mazda design and a 5-speed manual. Later on, there will be a dohc version of the engine and a 4-speed automatic. The dual cam engine should increase horsepower by about 40% over the base model. The 4-door Sportage is a 4-wheel drive, with a 2-speed transfer

case, and is built with a separate ladder-type steel frame beneath its body.

### Lamborghini

Besides last year's 30th anniversary special-edition Diablo SE, the Sant'Agata Lamborghini factory has also created the Diablo VT. Of the 150 anniversary models only 25 have been spec'd for the United States. Given those numbers, you might have a better chance of coming across a Diablo VT than one of the anniversary models.

## FIRST DRIVE

### LEXUS LS 400

● When those Lexus ads claim the company is engaged in the "relentless pursuit of perfection," believe it. One stint at the wheel is all that's needed to realize that the new LS 400 is smoother and—honest!—even quieter than the original.

In fact, by comparison, the vault-like original LS seems downright noisy and buzzy. This improvement in NVH was attained through attention to detail via small tweaks throughout the car—from the drivetrain through the chassis to the body. The new body carries a remarkably low Cd of 0.28. However, the new sheet-metal looks very much like the old. Toyota is a company that's steeped in tradition, and the car's designers are attempting to build a traditional Lexus look, based on the LS 400.

Despite the similarity of appearance with the previous car, the new car is 200 pounds lighter than its predecessor. The wheelbase has been increased and the suspension and steering systems refined. The total

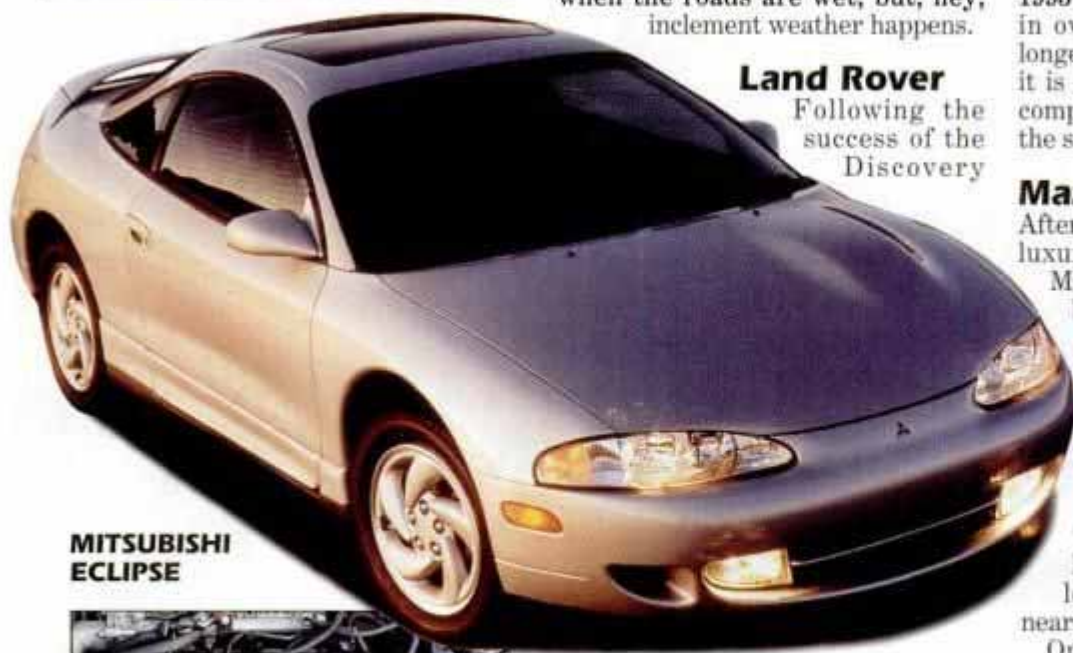


result is a slightly firmer ride with somewhat crisper handling than before. Changes to the gearing and the weight loss improve performance. Power is from a refined version of the same dohc 4.0-liter V8 as before.

Along with the elevated sense of serenity in the lavish passenger cabin, there is now more room for rear-seat occupants thanks to the longer wheelbase. There's also a dual-zone climate-control system, dual airbags and the industry's first in-dash CD changer.

—Don Chaikin

course, not too many people knowingly take their Diablo out for a cruise when the roads are wet, but, hey, inclement weather happens.



**MITSUBISHI ECLIPSE**



The VT stands for Viscous Traction, Lamborghini's designation for its all-wheel-drive system. Spreading some of the 492 hp and 428 ft.-lb. of torque to the front wheels when the rears begin to slip is not such a bad idea. Besides increased stability during hard cornering, there's more stability when the road is wet, too. Of

**Land Rover**

Following the success of the Discovery

sport/utility vehicle earlier this year, the boutique off-road vehicle maker from England has a new Range Rover in the wings. Due here early in 1995, we'll have the details—including a First Drive report—then.

**Lexus**

After redefining the luxury automobile market with the LS 400 five years ago, Toyota's elite division has done it again. For '95, there is a substantially redone LS 400 atop the Lexus fleet. The dohc V8 has more power and torque, and handling is crisper than before. For specifics, see the First Drive report (page 57).

**Lotus**

The really big news from Lotus for 1995 is that through various changes in ownership—the company is no longer owned by GM but by Bugatti—it is still in business. Otherwise, the company's low-slung Esprit remains the same as it was last year.

**Mazda**

After launching its nonluxury-division luxury car, the Millenia, last year, Mazda has gotten back to the bread-and-butter end of the market and has finally replaced its best-selling model, the Protegé.

The Protegé's wheelbase has been stretched out to 102.6 in., leaving room for a 95.5-cu.-ft. interior that's larger than the interior of the BMW 5-series. There's even a 13-cu.-ft. trunk. But the Protegé is only 174.8 in. long, which, for comparison, is nearly 2 in. shorter than a Saturn.

On the interior, Mazda designers have done a fine job on controls and accommodations. A split 60/40 folding rear seat, dual cup holders and dual airbags are now standard, too.

The Protegé's unibody is nearly twice as rigid as that of the previous model. Extensive use of urethane foam and a steel sandwich firewall contribute to low interior noise levels. The Protegé is available only as a 4-door sedan, in three trim levels. The DX and LX versions are powered by a new 92-hp dohc 1.5-liter 4-cylinder engine. The top-line ES uses a refined version of the dohc 1.8-liter 16-valve Four from the Miata rated at 122 hp. Base price for the DX is \$11,995, a fully loaded ES is \$16,145.

**FIRST DRIVE**

**JAGUAR XJ**

• When Ford bought Jaguar, some were concerned that the prestigious motorcar might become a Lincoln from the radiator back. Well, Jaguar fans can breathe easier. The restyled and re-engineered '95 XJ-Series are true to the marque.

Performance and handling reach new levels for Jaguar, as power output is increased across the board. The 4.0-liter XJ6 now puts out 245 hp, while the XJR uses a supercharged version of the engine—a first for Jaguar—for 322 hp.

The engineers even found a few extra horses for the 6.0-liter V12, which is now rated at 313 hp. Suspensions are more taut but still retain that supple Jaguar ride. The V12 still has that subtle erotic rumble, and you enjoy a refined whistle from the



Eaton positive displacement blower when you put your foot into the XJR.

Add to this the 4-speed automatic transmission, speed-sensitive steering, upgraded antilock brakes, traction control and real-wood trim interior, and you just know this could never be a Lincoln. —Cliff Gromer

PHOTOS BY CLIFF GROMER



MITSUBISHI 3000GT SPYDER



ment. That means the Spyder is available as a plain-vanilla 3000GT with a 222-hp dohc 3.0-liter V6 or a VR-4 twin-turbo 320-hp version.

### Nissan

After the introduction of its 240SX and Maxima earlier this year, Nissan is gearing for its next model, the replacement for the venerable Sentra.

### Porsche

Amazingly, the news from Porsche is the same old 911. Well, it's not really the same old 911, but the '95 911 Carrera shares much beneath the skin as well as much about its skin itself with the original 911 of three decades ago. The body is smoother, more modern and the air-cooled 3.6-liter Six now develops 270 hp and 243 ft.-lb. of torque. Maybe the most startling difference is what holds up that rear engine: the new multilink rear suspension. The result is a Porsche that

### Mercedes-Benz

Mercedes is the world's oldest carmaker. It is the original. And it may be the most methodical and purposeful. So after introducing its compact C-Class sedan last year, it finally eased the 10-year-old 190 out to pasture. As the company girds itself to replace its rapidly aging E-Class cars next year and works to build a factory in Alabama, which will produce sport/utility vehicles, there's not much new for '95. Unless you call a price reduction to the top-of-the-line S-Class models news. By taking some of the factory incentives away from the dealers, Mercedes-Benz has been able to

lower the price of these engineering marvels. For '95, the S-Class cars have also received a minor facelift.

### Mitsubishi

It seems most carmakers can take the roof off a sport coupe and make it a convertible. Mitsubishi, as has been its wont, opted to do things a little differently than everyone else. It has contracted with ASC Inc. of Southgate, Michigan, to take the roof off its 3000GT and in its place install a folding, retractable hardtop. *Voilà*—the 3000GT Spyder, available with the same drivetrains as in the 3000GT coupe and the same levels of equip-

### FIRST DRIVE

## TOYOTA AVALON

● Avalon replaces the Cressida at the top of Toyota's lineup. Cressida was smaller and rear-wheel drive, and was really intended to serve the needs of the Japanese domestic market. The Avalon is designed and built here, to serve our market. Built on a 4-in. lengthened version of the Camry chassis, Toyota managed to add only 22 pounds to the Camry's overall weight in building the Avalon. The new car also retains the Camry's 24-valve dohc 3.0-liter V6 drivetrain, although the engine develops slightly better (192 versus 188) horsepower and torque (210 versus 203 ft.-lb.). Transmission is the Camry's 4-speed automatic. Also retained but retuned are the suspension and steering. While hardly intended as a sporty car, Avalon will carve up your favorite



section of twisty road with aplomb.

Styling can also be criticized for being conservative, but with Toyota expecting to deliver 50% of Avalons with the optional split-bench front seat, it's obvious that its intended buyer probably isn't one known for his or her way-out tastes.

There are two trim levels of Avalon. The base XL includes such niceties as tilt wheel, power door locks and mirrors, and stereo. The upscale XLS includes all this as well as automatic temperature control, outside thermometer, theft control and leather-wrapped wheel. —M.A.

**TOYOTA TERCEL**



is as lightning-fast as its predecessors, but one that lacks the ferocious bite of sudden oversteer for the unwary driver. The other big news from Porsche involves the price of the 911 Carrera. In both coupe and cabriolet versions, price is down—by several

and turbocharged V8 engine of the Bentley Turbo R beneath the body of the Rolls Corniche. The new entity is given another grand old name from British motorcar history, the Flying Spur. There is also a new "entry-level" Rolls, the \$149,900 Silver Dawn.

V6 engine and automatic transmission under its hood. The 3.0-liter V6 is based on an Opel design that boasts a relatively narrow 54" V and 210 hp. The 9000 CDE comes in one equipment level—take it or leave it—for just under \$39,000.



**SUBARU LEGACY OUTBACK**

thousand dollars—over that of the past generation of 911s.

**Rolls-Royce And Bentley**

For '95, you'll be able to find—albeit in all of about 35 cars—the chassis

**Saab**

After the reborn 900 series last year, Saab continues to refine its 9000 models. The latest is the 9000 CDE, which puts wood trim in the passenger compartment of this 4-door sedan and a

**Subaru**

With the introduction earlier this year of the '95 Legacy—sedan and station wagon—this Japanese niche marketer has gotten a jump on the model year. The new Legacy is improved and refined over the old. Like the old car, the new Legacy is powered by Subaru's horizontally opposed 4-cylinder engine, now up to 135 hp and 140 ft.-lb. of torque. Also like the old car, the '95 Legacy is available either as a front-driver or with all-wheel drive. If you really shop around, you may be able to find a fwd model equipped with Subaru's traction-control system, which will cost about the same price as the superior awd version.

**Toyota**

This juggernaut continues to crank out new and improved cars. For '95, *(Please turn to page 123)*

**FIRST DRIVE**

**VOLKSWAGEN PASSAT GLX**

● This car has always been a dark horse in the midsize sedan field. It's a driver's car—distinctively Teutonic in character. In fact, one of its strong points has always been a strong dose of character in a market segment filled with cars that deliberately have as little character as possible. But there's always been a fatal flaw, be it the lack of a 6-cylinder engine, or a simple lack of price competitiveness, or a reputation for a certain lack of mechanical reliability. Well, VW may have seen the light at the end of the tunnel and has introduced the latest Passat. There's always been a huge back seat in



this buggy, and now there's a dashboard and interior that can be described as other than minimalist, if not quite luxurious. The exterior freshening is welcome, too.

The 172-hp V6 engine is wonderful and works well with the electroni-

cally controlled 4-speed. Works even better with the 5-speed manual.

Here's the best part—they have dropped the price 3 grand, making it competitive with the best from Japan and the United States. I'll take one. —M.A.

# ENGINEERING THE IMPORTS

The quest for the perfect car.

BY PAUL WEISSLER

● As all of the world's automakers are vying to develop the car of the future now, none has given us the earth-shattering breakthrough of antigravity drive or infinite miles per gallon or the pocketable station wagon. Nor is any about to. Like the domestic auto industry, foreign automakers are still expanding rather than shattering the current technology envelope. That envelope, however, is already stretched well beyond what anyone would have thought imaginable only a few years ago.

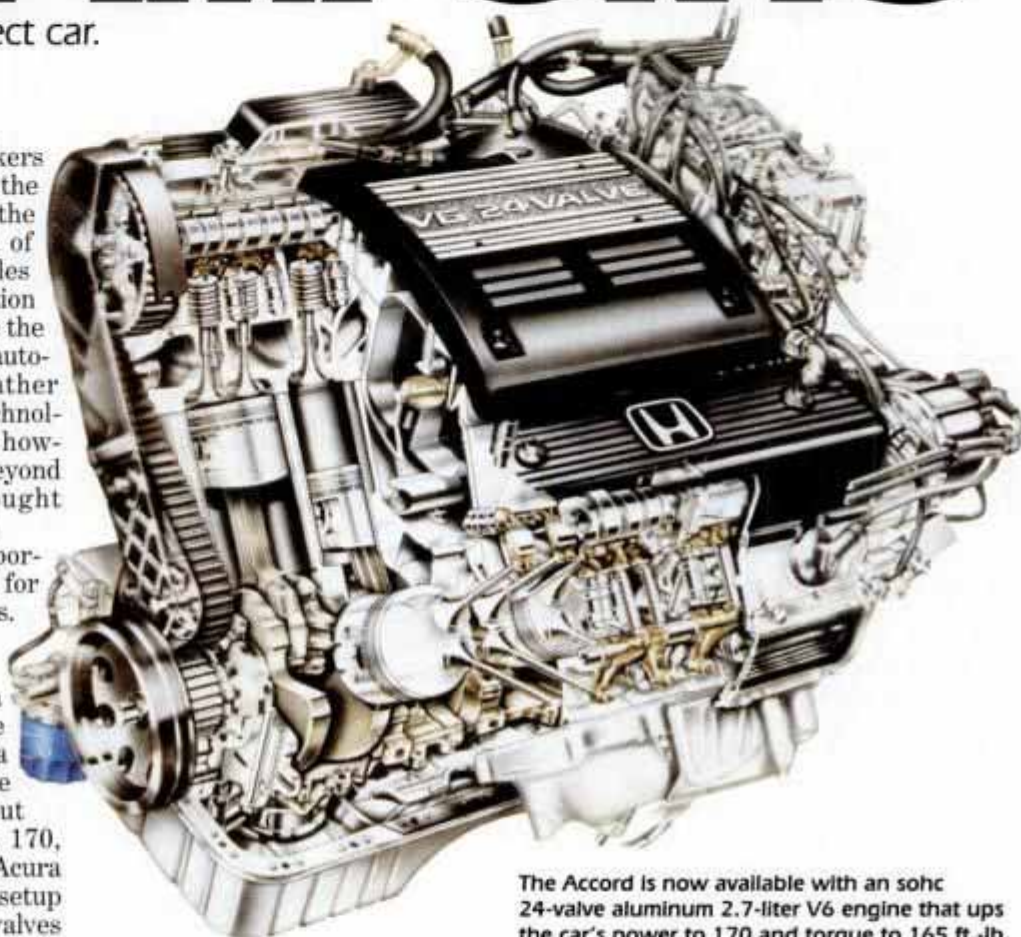
Here's a rundown of the important engineering developments for the coming year's crop of imports.

## Honda

The Honda Accord finally gets a V6 engine, and it looks much like the second-generation Acura Legend powerplant. The intake manifold is a simpler design, but horsepower from 2.7 liters is 170, compared with 160 from the old Acura version. The engine has an sohc setup with direct action on the intake valves and horizontal pushrods to rockers for the exhausts, as with the Legend. Of course, Honda also beefed up the block with strengthening ribs, and reworked the Accord's chassis for the greater engine weight.

## Lexus

The new Lexus LS 400 shows where Toyota "refinement" technology is going, and the new Heater/Ventilation/Air-Conditioner case is just one example. It's an ingenious design that is a major advance over the flap doors typically used to regulate airflow. Instead, the airflow is controlled by what resembles a roll of film, with horizontal slots in one section. The roll is exposed or rewound by a computer-controlled stepper motor. The "roll of film" takes less room than a flap door, isn't prone to binding and leaking, and because air doesn't have to flow around a flap, is quieter and less restrictive. The new ventilation system uses four rolls and is so com-

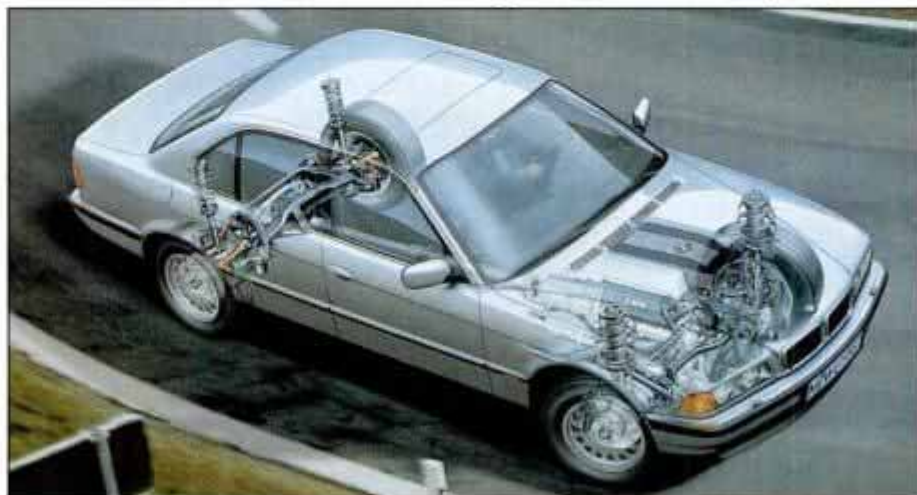


The Accord is now available with an sohc 24-valve aluminum 2.7-liter V6 engine that ups the car's power to 170 and torque to 165 ft.-lb.

compact that it allowed Lexus engineers to also incorporate separate driver and passenger controls without a major increase in the size of the case, and there was still room left over in the

dashboard for a passenger's-side airbag, a glove compartment and an optional in-dash 6-disc CD changer.

The LS 400 has some innovative approaches to a handling suspension,



Stiffer structure, and refined subframe-mounted front and rear suspensions, increase the high-speed cornering ability and steering accuracy of the '95 BMW 7-series models.

and one of them is in the front seats. The seat pan (and pad atop it) doesn't rest on just a bunch of springs, but on a combination of a coil spring and torsion bar, with the coil spring connected to a bellcrank attached to the seat pan. It looks a lot like a front suspension design, and the seat deforms much less on lateral acceleration, so the driver's body doesn't tend to shift in hard cornering.

### Mitsubishi

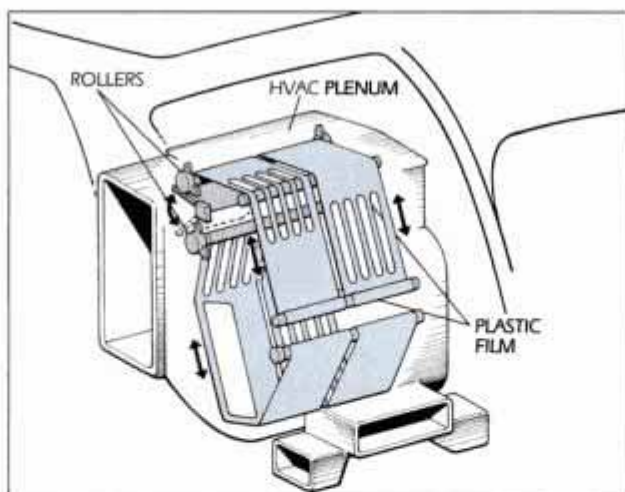
The retractable hardtop convertible dates back to the 1930s and Peugeot, then to 1957 and the Ford Skyliner that had the first fully automatic retractable in volume production. For '95 there's a new entry, the Mitsubishi 3000GT Spyder, which combines an import with styling by Mitsubishi's California studio and domestic technology and hardware from American Sunroof Corp. Inc. (ASC) of Southgate, Michigan.

The top is a high-tech lightweight plastic, the backlight is glass. Two electric/hydraulic pumps operate hydraulic cylinders to raise and lower the top in 35 seconds. There are no limit switches or relays, just sensors wired (with the pumps) to an 8-bit microprocessor. The ASC computer incorporates on-board diagnostics and has permanent memory of readings from the sensors. If the top stops in midposition and is manually moved and then the automatic switch is pushed, the electronics determine the new position and pick up from there.

### Assorted techbids

- BMW's high-performance M3 sport sedan has an inline 6-cylinder for the first time. The 240-hp engine is a bored-and-stroked version of the 2.5-liter Six. The engine has BMW's latest application of variable peak rpm. It's computer controlled to 6800 rpm in First and Second gears for maximum acceleration, only 6300 in the other three. BMW's new 7-series sedan has a refined suspension and a stiffer-than-before structure—now a world-class 29 Hertz torsionally. The multilink rear suspension provides for controlled toe-out during hard cornering.

- The new dohc 3.0-liter V6 in the '95 Nissan Maxima features a split cooling system that reduces temperatures in the cylinder heads by pumping



Slotted film on rollers directs airflow through the LS 400's ventilation system. More compact, precise and quiet than conventional flap doors, the film is electronically controlled.

coolant directly from the radiator to the heads. This not only provides more balanced cooling overall, but permits a 10:1 compression ratio with reduced chance of knock. Half the coolant from the radiator is pumped to the block, half to the cylinder heads. Horsepower is 190, compared with the 160 hp of the old sohc 3.0-liter V6, which only had a 9:1 compression ratio.

- Mercedes-Benz has a 3.0-liter naturally aspirated diesel engine in its E300D E-Class sedan that meets the '95 exhaust emissions standards of all 50 states. The inline Six capitalizes on a lot of current gas-engine technology including four valves per cylinder, dohc design, computer-controlled variable-intake tuning, EGR and an oxidation catalyst. The combustion

prechamber is centrally located, like the spark plugs in most 4-valve dohc gas engines.

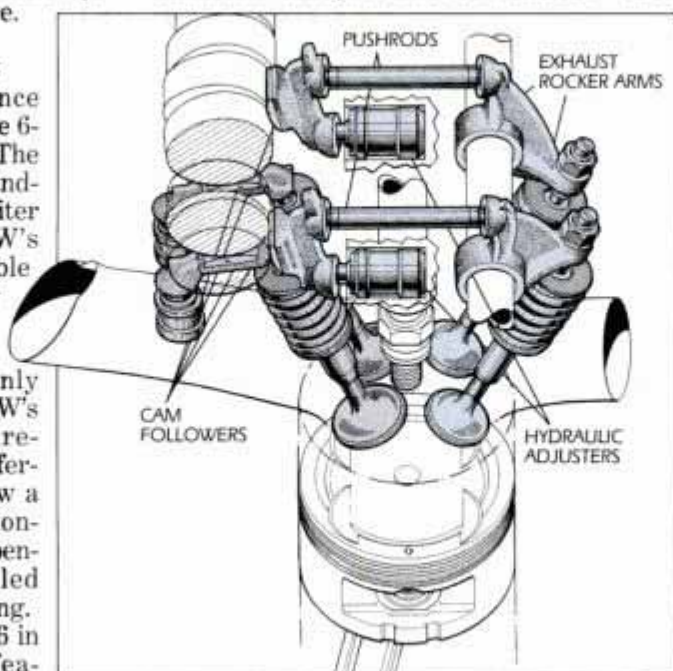
- The '95 Toyota Tercel's 1.5-liter Four has a split ignition system, with a coil module atop each of two plugs, just like the direct ignition in some premium cars. However, the Tercel's are double-end coils, and the opposite end has a wire to another plug.

- The 1.5-liter Four in Mazda's new Protegé looks as strong as a block of granite. The block is split at the crankshaft, so the aluminum lower half provides a super-stiff, vibration-resistant design, and because it holds the main bearings, the overall package is extremely rigid and comparatively smooth: I-ribs and X-ribs, box sections, and a load-spreading conical design from the rear of the cast-iron and aluminum-block halves to the bellhousing—it's all there. For increased smoothness, one key engine mount is a hydraulic on manuals, an additional one is hydraulic on automatics.

Although much of the attention to the new Porsche 911 Carrera is focused on the old air-cooled horizontally opposed 3.6-liter Six (up from 247 to 270 horsepower), the classic body also reflects some not-so-obvious high tech. Example: the front airflow pattern. Air goes through the condenser and engine oil cooler and exits just ahead of the front wheels through downward-facing vents. This lowers aerodynamic drag, and despite the body's classic look, Cd is only 0.33.

- The Discovery, Land Rover's new sport/utility, is the first of its type with dual airbags, and it all was done with a conventional spring-and-roller sensor wired to a computer. However, Rover was able to tailor the sensor so it would recognize a crash, compared with hard off-road use, to keep the airbags from inflating at the wrong times. This is the same basic design that will go into the new Range Rover coming later in the model year.

- While others still are installing a second airbag, for the front passenger, Volvo introduced a third and a fourth, built into the front seatbacks, so they're always in position, whether the seat is moved fore or aft. When triggered (it deploys in 12 milliseconds), the bag comes out through a special seam in the seatback, to become a 12 x 5-in. safety cushion. **PM**

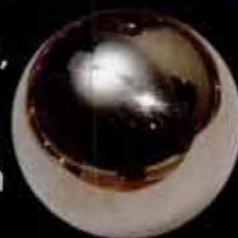


One camshaft operates both intake and exhaust valves in the Honda Accord's optional V6. Transversely mounted pushrods span the cylinder head and act on the exhaust valves.



# PINBALL!

Out of the Great Depression they came, fantasies under glass that captivated young boys and turned them into wizards with a silver ball.



BY ROGER SHARPE; PM Photos by Bill Ashe

• Three Balls For A Quarter. Special When Lit. Extra Ball. Replay. Tilt. Game Over. Remember these terms? They're phrases from youth. Phrases from a time when spare change was the gateway to an exciting universe of fabulous art, bumpers, flashing lights, bells, flippers and the exasperating movements of a 2.8-ounce 1<sup>1</sup>/<sub>16</sub>-in. steel ball. Phrases inspired by one of America's unique inventions—pinball. Now, six decades old, pinball is more popular today than ever, a fact that is true not only for collectible machines built during pinball's golden age—the late 1940s to the mid-1950s—but also for such modern

The eye-pleasing art and ingenious action of Coronation (1952) is based on the Miss America Pageant.



# PINBALL!

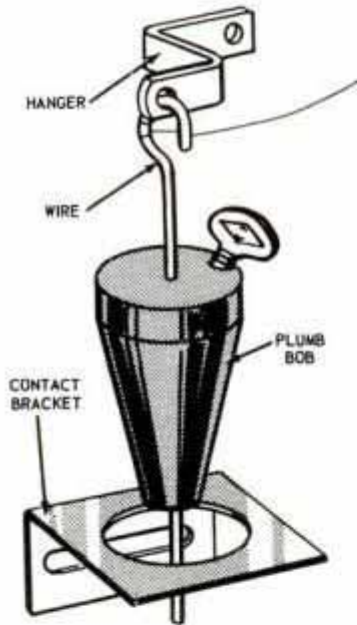


machines as Indiana Jones, Star Trek: The Next Generation and The Addams Family.

The reasons for pinball's enduring popularity are not very hard to understand. The game, a thrilling combination of luck and skill, has universal appeal. Equally important, the game's builders and designers have maintained a lightning-quick pace of technological innovation. Today's painstakingly crafted pinball machines incorporate CD-quality sound systems, fully orchestrated musical scores, special visual and interactive effects, and a dazzling array of mechanical toys, elevated ramps and multiball excitement.

The story of modern

## Tilt Mechanism



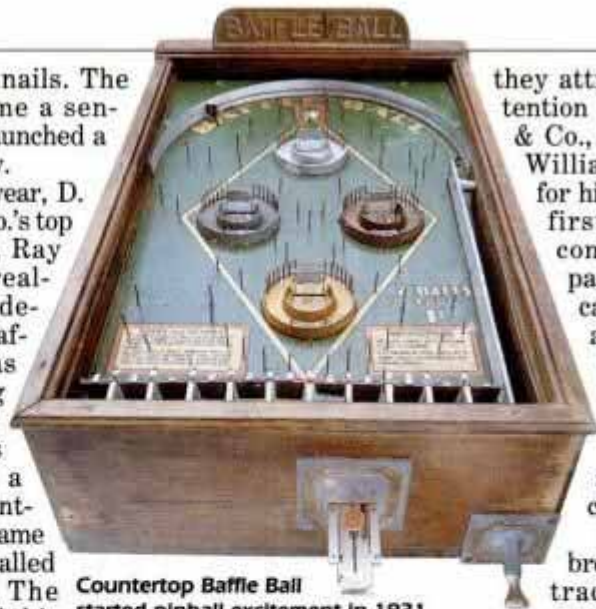
pinball, forerunners of which date to a bagatelle game of the mid-1800s, really begins in the Chicago garage of David Gottlieb in 1931. There, with the help of his family, Gottlieb created the first commercially successful coin-operated, countertop pin game—Baffle Ball. For a penny, a player pulled a plunger and propelled seven marbles onto a numbered playing field covered with holes and pin obstructions

made from nails. The game became a sensation and launched a new industry.

Within a year, D. Gottlieb & Co.'s top distributor, Ray Moloney, realized that demand for Baffle Ball was outstripping supply. His solution was to produce a brightly painted new pin game of his own called Ballyhoo. The success of this

game ultimately inspired Moloney to change the name of his company to Bally Manufacturing.

In the same year, a young pin-game distributor from California, Harry Williams, began experimenting with game ideas. His modifications were so successful that



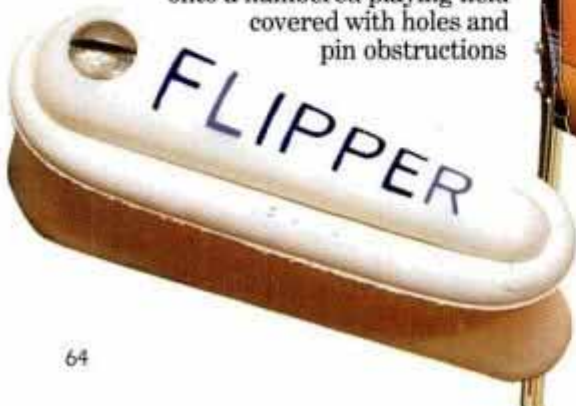
Countertop Baffle Ball started pinball excitement in 1931.

they attracted the attention of D. Gottlieb & Co., which offered Williams a royalty for his designs. The first machine to come out of this partnership was called Advance, and it incorporated such now-familiar concepts as metal arches and mechanical gates.

One of the breakthrough attractions of Advance was its delicately counterbalanced gates, which were vulnerable to jabs and nudges from players. One day, in 1932, Williams went to a drugstore and saw a player hit the bottom of Advance to score points without having to aim.

This so enraged Williams that he took the game off location and hammered fine nails through the bottom of the machine. In Williams' words, "Anybody who tried to affect the play of the game by slapping the flat of his hand against the game's under-surface, would now think twice before trying it again."

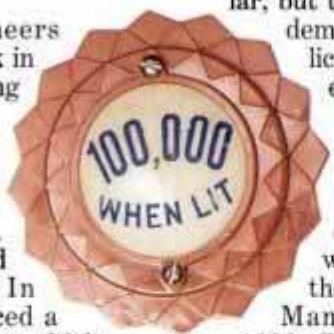
However, Williams knew this was a cruel and temporary solution. So, he developed a simple, effective device that stopped play if the machine was handled roughly. The device consisted of a small ball balanced on a pedestal. If the game was shaken or pounded, the ball fell from the pedestal and struck a metal ring that immediately stopped play. This device became known as the tilt mechanism, and a new word was added to the pinball lexicon. A few years later, when the age of electricity finally came to pin-



CORONATION, 1952. (ON OPENING PAGE) AND BAFFLE BALL, 1931. (TOP) ARE COURTESY OF THE STEVE YOUNG AND JOHN FETTERMAN COLLECTION

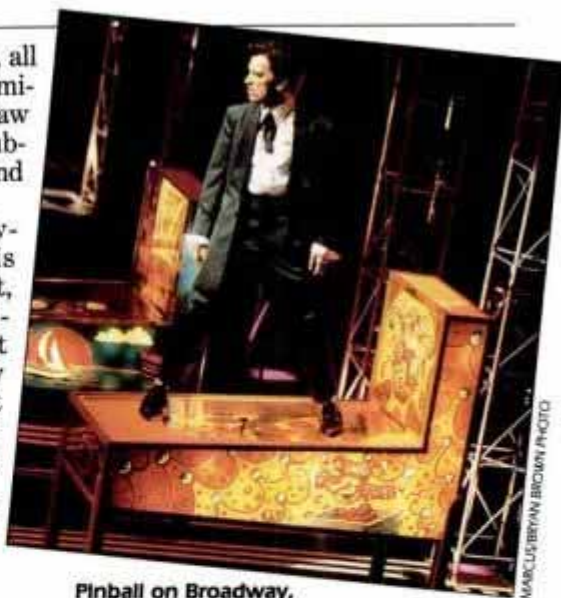
ball, Williams invented the pendulum tilt, which is still used on machines to this day.

Other pinball pioneers were making their mark in the early 1930s, including David Rockola, who in later years became a major force in jukeboxes. However, before he switched allegiances, Rockola had a profound influence on pinball. In 1933, Rockola introduced a landmark game, Jigsaw, which not only enabled players to score points, but also to complete a puzzle by hitting certain



targets and holes. Up to this time, all the pin games were strikingly similar, but the popularity of Jigsaw demonstrated that the public was looking for new and exciting possibilities.

No machine delivered more on this promise than Contact, a Harry Williams-designed machine that was introduced by the Pacific Amusement Manufacturing Co. in 1933. Contact was the first pinball game to use electricity, battery-powered solenoid action and a new dimension in



Pinball on Broadway, one of the stars of The Who's Tommy.

sensory feedback—sound.

Electricity opened a whole new world of possibility, and pinball would never be the same. Such new features that were quickly incorporated into electrical pinball include automated action, automatic scoring and lighted back glasses.

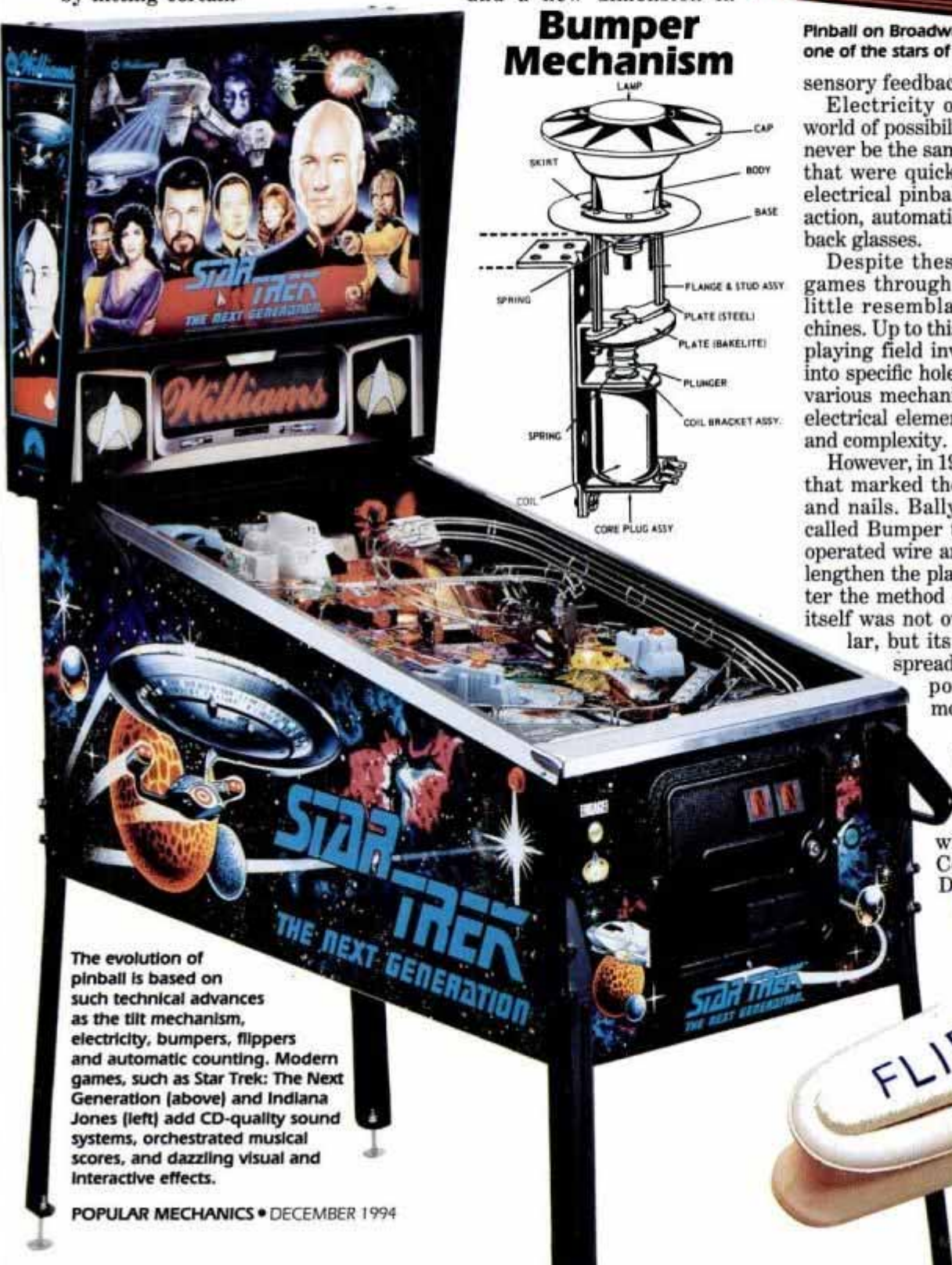
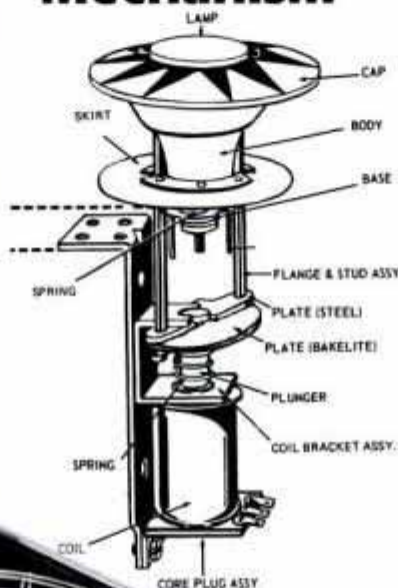
Despite these advances, pinball games through the mid-1930s bore little resemblance to modern machines. Up to this point, scoring on the playing field involved shooting balls into specific holes. Pin placement and various mechanical and rudimentary electrical elements added excitement and complexity.

However, in 1937, a feature emerged that marked the death knell of pins and nails. Bally introduced a game called Bumper that used electrically operated wire and spring bumpers to lengthen the play of the game and alter the method of scoring. The game itself was not overwhelmingly popular, but its influence was widespread and an integral component was added to modern pinball.

The next major development, one of the most radical innovations of all, was introduced in 1947 when D. Gottlieb & Co. unveiled Humpty Dumpty. This machine

*(Please turn to page 123)*

## Bumper Mechanism



The evolution of pinball is based on such technical advances as the tilt mechanism, electricity, bumpers, flippers and automatic counting. Modern games, such as Star Trek: The Next Generation (above) and Indiana Jones (left) add CD-quality sound systems, orchestrated musical scores, and dazzling visual and interactive effects.





# HIGH TECH

The O.J. Simpson computerized courtroom is a harbinger of things to come in all courts of law.

● *“Doctor, would you please indicate for the jury the approximate angle and direction of the instrument that inflicted the wounds labeled R, S and T?”*

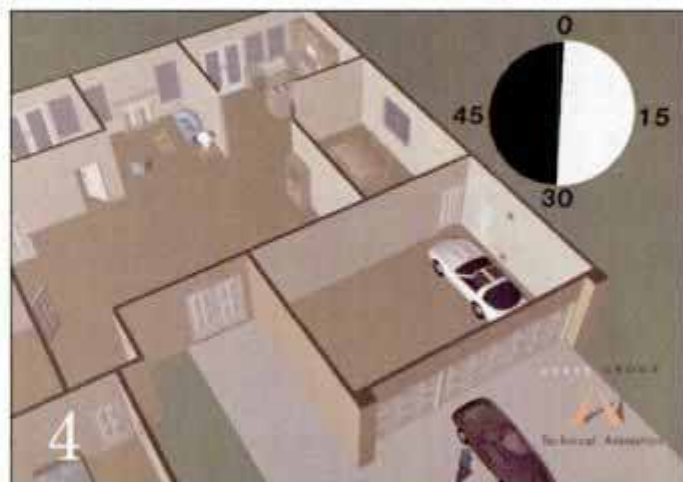
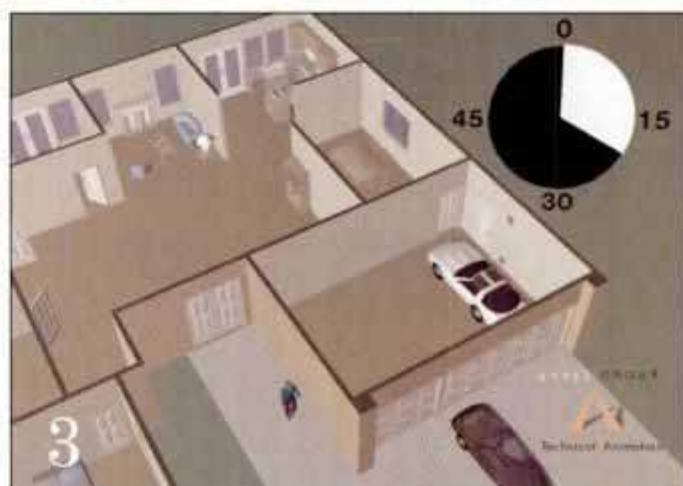
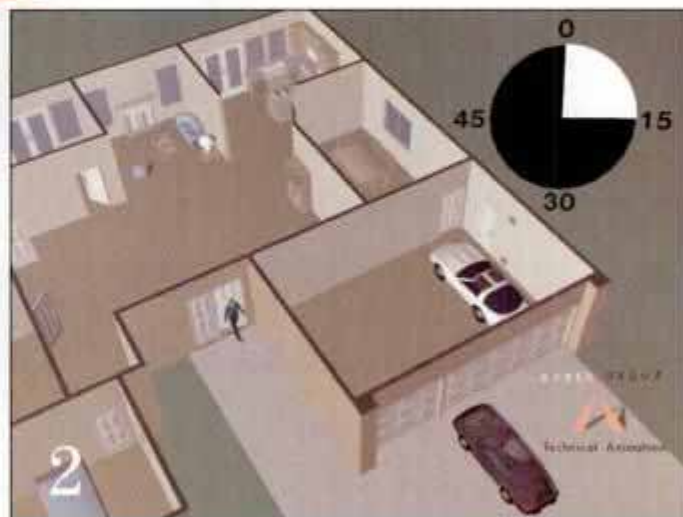
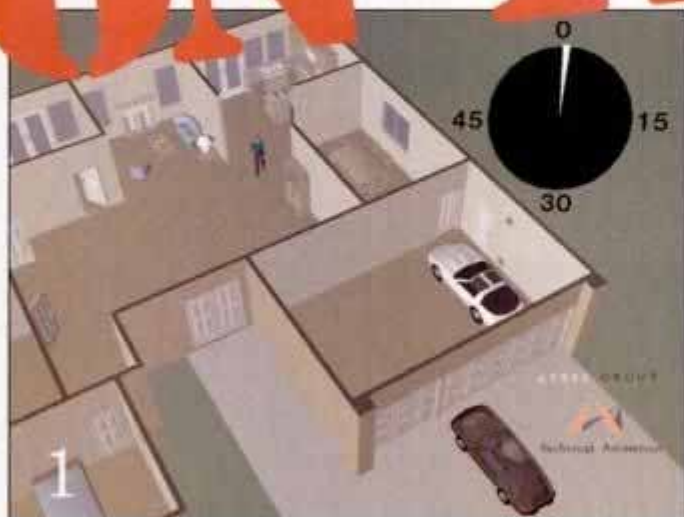
*The witness is Dr. Michael Baden, who as former chief medical examiner of the City of New York performed hundreds of autopsies on victims of violent crimes. He accepts a small pointer from defense attorney Johnnie Cochran and with it touches the screen of the laptop computer in front of him.*

BY GEORGE KOPP

*“This wound, labeled R, was made by a cut from above at about a 45° angle,” says Baden, as the pointer traces a line on the computer screen.*

*The members of the jury are not watching the witness. They’re transfixed by the image on a 67-in. projection monitor. It’s a 3-dimensional male human figure—resembling an artist’s mannequin, without facial or anatomical features—floating against a blue background.*

# ON TRIAL



The Los Angeles County coroner has stipulated that this computerized diagram accurately depicts the pattern of wounds on the body of Ronald Goldman, murdered along with Nicole Brown Simpson outside her Brentwood condo.

"This wound, labeled S, was made from below, at a much sharper angle." As Baden continues his testimony, the image on the screen seems to rotate a quarter-turn in space. An arm on the figure is raised, revealing the location of wound S, and the witness indicates with his light pen the angle of entry of the murder weapon.

"Wound T, here," the image rotates yet again, "was also made from above, at about a 30° angle." Attorney Cochran, standing at his podium and looking at his own laptop computer, interrupts. "So this victim was attacked from the front, from the back and from the side?" the lawyer asks, rotating the computer image for emphasis as he speaks.

"That is correct," Baden answers.

"Dr. Baden, in your experience as a medical examiner, is this pattern of victims' wounds consistent with an attack by multiple assailants?" Cochran asks.

"Yes, completely consistent," answers Baden, raising a serious doubt as to the prosecution's version of the crime.

The above scenario is, of course, fiction. But it could become fact as the murder trial of O.J. Simpson gets under way. One indisputable fact, however, is that Judge Lance A. Ito's Los Angeles courtroom will be one of only about two dozen in the United States fitted with an array of computer, CD-ROM, laserdisc, videotape and Photo CD presentation gear—hooked into separate projection TV sets for the jury and spectators—and controlled by some highly specialized software developed for the legal profession.

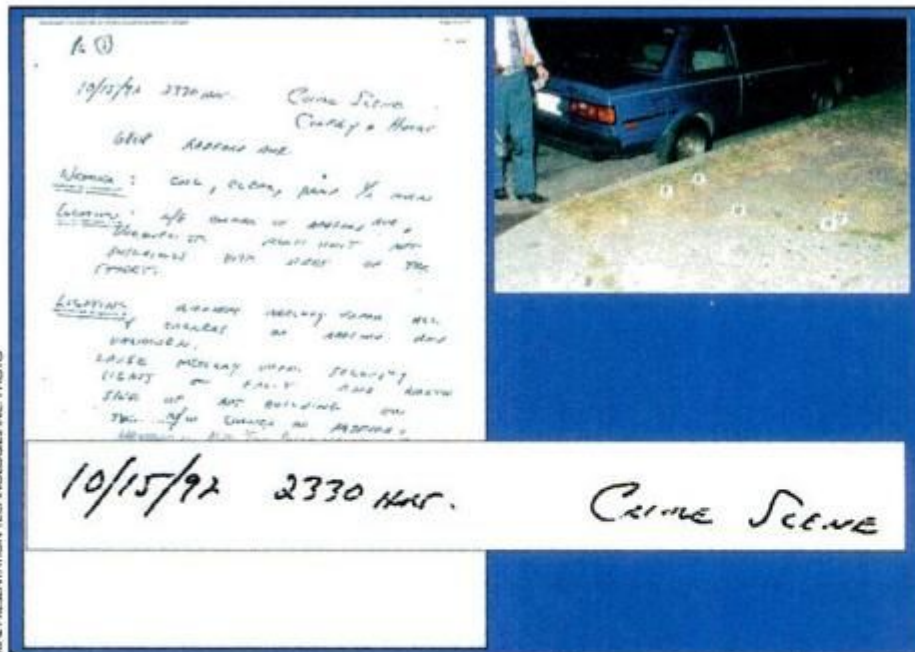
The high-tech trial equipment is expected to accomplish two primary goals. One is to make for a speedier trial, allowing attorneys for both sides to organize and

Computer animation visually shows a jury how long it would take, for example, for a person to get from Point A to Point B—testimony that can be critical in a courtroom trial.

present their cases more efficiently. The other is to help the jury understand the complex evidence that's presented—especially the evidence given by expert witnesses—on such arcane subjects as DNA testing.

# HIGH TECH ON TRIAL

TRIAL PRESENTATION TECHNOLOGIES INC. PHOTO



Computers display pictures and the officer's notes from the crime scene simultaneously.

But once this, the highest-profile criminal case in a generation, has come to a close, lawyers, journalists and ordinary citizens will surely ask the question: Did the computers convict—or acquit—O.J.?

The Simpson trial will have not one but two totally separate computer systems. The first, which is widely used in many courtrooms today, including Ito's, is Computer Integrated Reporting (CIR). Often called "the real-time" by the lawyers and judges, CIR makes a real-time transcript of the trial immediately accessible to the trial participants. The laptop computer on Ito's bench, visible to TV viewers of the Simpson preliminary hearings, is his CIR monitor, displaying the written proceedings as they happen, recorded by the court reporter.

But CIR isn't confined to the written record. In Los Angeles, the CIR transcript is encoded with the SMPTE time code developed for film that allows computerized synchronization between the official written trial transcript and an unofficial video

recording of the proceedings. This is a big time- and money-saver, according to Judge George W. Trammell III, Ito's colleague on the L.A. criminal bench and the man largely credited with moving L.A.'s courts into the computer age.

With a video record, a jury requesting a readback of testimony can watch it on tape in the jury room (provided the defendant has waived his right to be present at readback sessions). "There's a lot in the official written transcript that took place out of the jury's presence," Trammell says, "which we have to edit out of a readback. The videotape allows us to replay only those portions which the jury is allowed to hear." It also lets the judge move on to the next case in his crowded calendar without clearing the court for a readback session, and gives the jury more information on the witness, like body language.

While CIR is fast becoming a courtroom fixture around the country (although not necessarily with video), what will really make the Simpson

trial unique from a high-tech standpoint is the Interactive Presentation System (IPS). This system gives lawyers access to the full array of computer wizardry, including animation and slick graphics, with which to impress the jury. IPS has also spawned a new legal specialist, the evidence consultant, to help attorneys use those tools effectively.

And thanks to one such consulting firm, Trial Presentation Technologies Inc. (TPT) of Los Angeles, the Simpson trial will have IPS. The company is installing the needed equipment, about \$125,000 to \$150,000 worth, as well as providing the technical expertise to keep it running smoothly, for no charge.

The heart of the hardware setup is an ordinary 486DX2 66-MHz computer, equipped with a video board and enough hard-drive capacity to handle digital full-motion video, should it be needed. With proprietary software, the PC can also integrate a variety of peripherals, including laserdisc player, Photo CD, CD-ROM and VCR. All of these input devices can be used to display evidence to the jury over a high-grade 67-in. projection data monitor. Courtroom spectators will watch on a 54-in. projection TV. The judge and the lawyers are equipped with PCs, and they can toggle between the CIR and IPS display.

A key component of IPS is the judge's "kill switch." This allows him to immediately shut off the display to the jurors to prevent them from seeing something by mistake. Notes TPT principal Tom Reiter, "In a case such as this, any unapproved display of evidence to the jury could result in a mistrial. The judge has to make sure he has control over the system."

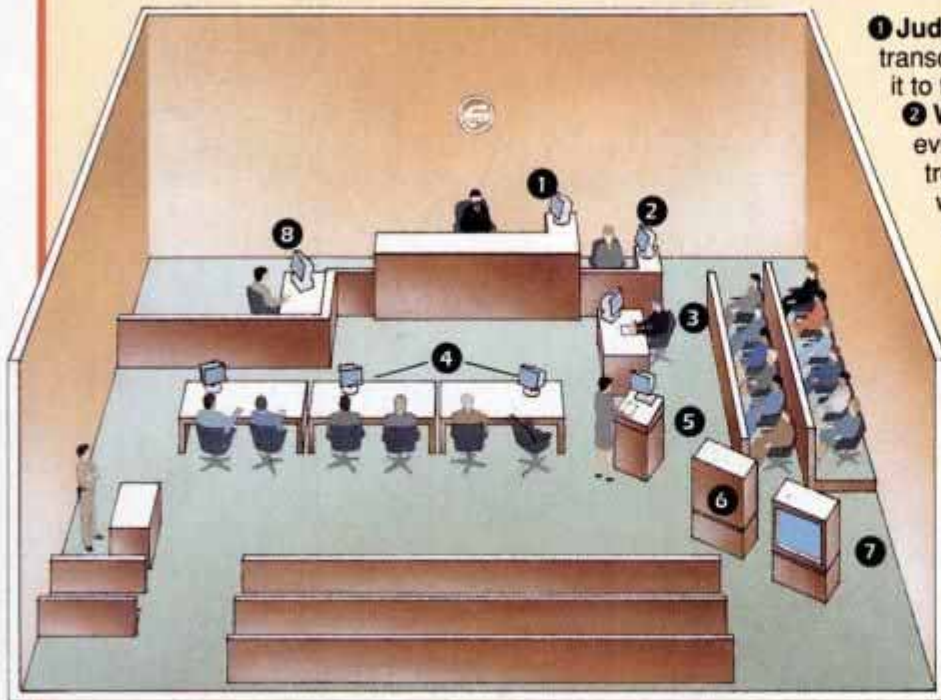
What will the jury see over those monitors? "You can mix documents and photos, documents and video, photos and video," says Reiter. "You can annotate on the fly with a light pen. Anything on screen can be cap-

## Computers Re-Create The Scene



Instead of presenting photos and documents for this theoretical ATV accident, a computer animates the sequence of events in question.

# O.J.'s Courtroom Layout



**1 Judge's Monitor**—Allows judge to review transcript or view evidence before displaying it to the jury and spectators.

**2 Witness Monitor**—Witness can view evidence and draw or write using an electronic light pen. Everything drawn by the witness is displayed on all of the monitors in the courtroom.

**3 Court Reporter**—Will be using Stenograph CIR software to electronically translate reporter's notes to English, which is displayed on monitors for the judge and attorneys during the course of the trial.

**4 Attorney Monitors**—Allows attorneys to review transcript, search previous testimony, or switch to evidence display during live testimony.

**5 Podium Monitor**—Equipped with light pen, which allows attorney to annotate documents and other evidence. These annotations can be saved and printed for review by jury during deliberations.

**6 Jury Display**—67-in. rear-screen projection system, custom designed by American Video Communications, displays photos, text and other evidence on a high-resolution wide-angle screen for the jury.

**7 Spectator Display**—Courtroom spectators can view the same evidence that is presented to the jury on a 54-in. rear-screen projection system.

**8 Presentation Control**—High-speed computer holds electronic images of documents, charts, diagrams and photographs. Video laserdiscs are used to show animations and other video.

IPS system, developed by OMIC, controls the display on all evidence to the jury. The system technician displays each piece of evidence as it is requested by the attorney and admitted by the judge.



LOS ANGELES TIMES PHOTO: PHIL ILLUSTRATION BY ANDRÉ L. BROUSSON

tured and saved and printed out."

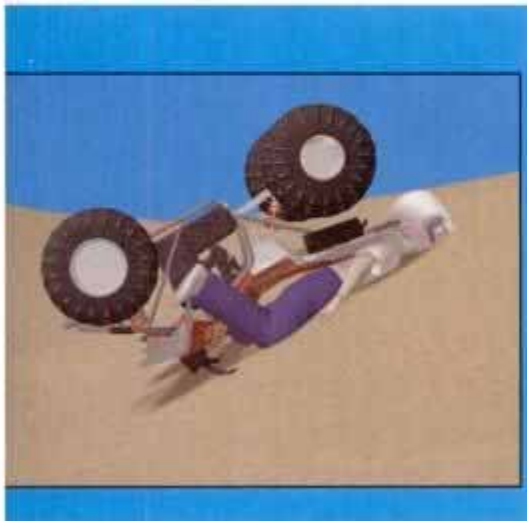
According to Judge Trammell, "This system allows the jury to follow along in a more meaningful manner. In the traditional trial, the jurors kind of get an idea what the witnesses are talking about, but they really only see the evidence close up during deliberations. So many times, the evidence lawyers use is small—like photos. They'll post it on a board, and maybe the first juror will be able to see the details, but the people down the line won't see anything."

But IPS is like an iceberg. The courtroom equipment and presentations the jury sees are only the tip. For the legal profession, the real impact of technology is in pre-trial

preparation—organizing documents, researching case law and, very likely in the Simpson case, preparing those all-important computer animations and presentations.

Here, specialization takes over yet again. The Simpson defense team, led by attorney Robert Shapiro, has turned to its own evidence consultants, with its own proprietary CD-ROM-based software, to develop its IPS presentations. Gilbert, Arizona-based inVzn Development Corp. (pronounced "in-vision") is the developer of a Windows-based document management application for lawyers called *WinVision*, and a courtroom presentation package called *TriaLink*,

*(Please turn to page 118)*



# COOL RUNNINGS

We tackle the frigid and foggy 1100-mile Inside Passage from Seattle to Juneau in a rock-solid Grady-White with a helm full of electronics.

BY JOE SKORUPA, Boating/Outdoors Editor

• With visibility at zero, boating is similar to flying by instruments. It requires complete trust between the navigator and the captain. It requires supreme concentration and attention to detail. And finally, it requires a certain amount of guts, which is especially true when groping blindly through the fog in unfamiliar Alaskan waters with two GPS units and a compass suddenly out of sync by more than 30°.

"Joe, I think we need to head north by 17°," co-pilot and navigator Charlie Plueddeman calmly states.

"Which way is north, Charlie?"

"I think it's that way."

"Well, I think it's that way." We point in two different directions. Clearly, it's time to shut down the engines. The boat, a Grady-White Islander 268, comes to rest in dead-calm waters. The only sound is of falling rain. There's nothing to do but stare into

the dark-as-night fog, even though all we see is our chances of reaching Juneau before nightfall rapidly slipping away. It's well beyond noon, and we still have 120 miles to go.

Then, we hear the faint sound of an outboard engine. Out of the gloom, the shape of a little runabout emerges and heads our way. A local lad, wearing neither coat nor hat despite the chilly rain, zips over and says, "Hey, you know where we are?"

"Not exactly."

"Well, I guess I won't make it to Petersburg today. Damn. Which way's Wrangell?"

"We just fueled up in Wrangell. It's over there," I say, pointing off the transom.

"Thanks. I just circled Five Mile a couple of times and couldn't figure out which way to go. Be seeing you." With that, he hammers the throttle. Charlie and I look at each other and figure the guy must be a few







ice cubes short of an igloo. However, the encounter is not without significance. The mysterious sportboater provided us with a key piece of information. Namely, that Five Mile Island is dead ahead. Knowing this, we find the entrance to Wrangell Narrows, and recalibrate our instruments. Several minutes later, back on course and heading into the Narrows, a small boat pops up on the radar screen. It's our phantom friend, far from Wrangell and circling aimlessly. Or is he? With a wave, he heads into the mist and drops off the radar.

### True north

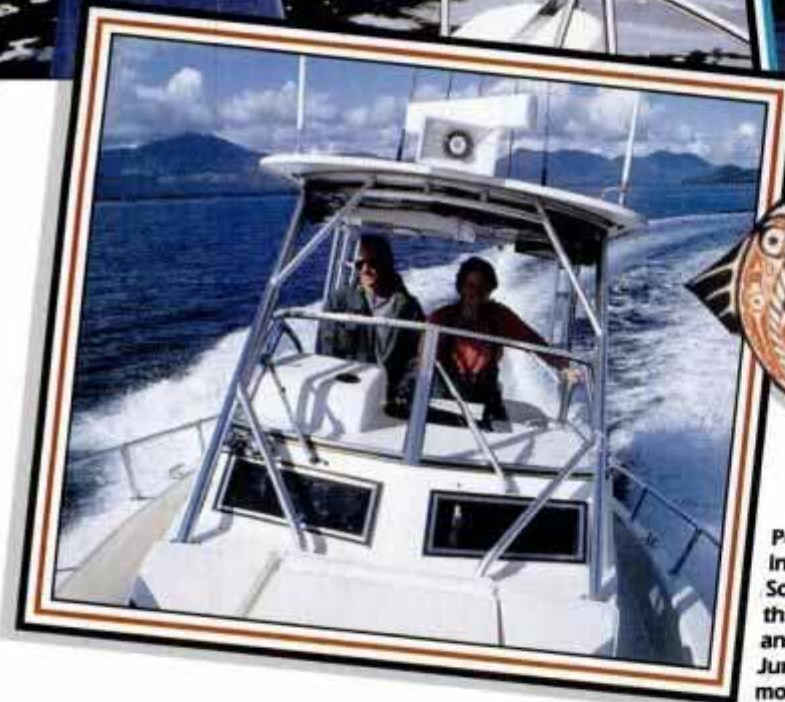
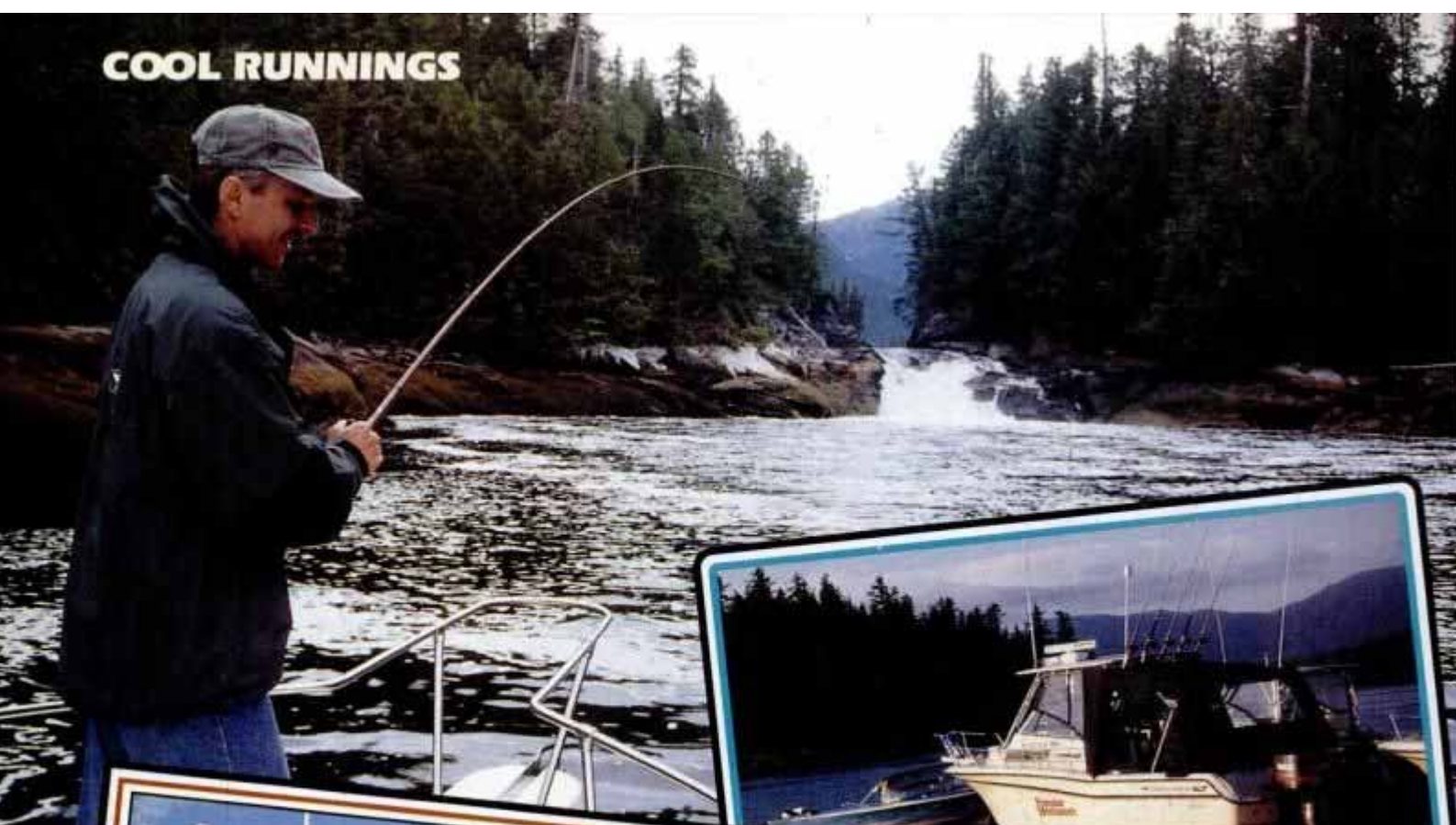
You can't get there from here. This is a roadside joke in Maine, but in coastal Alaska it means what it says. Check out the map. Ketchikan, Petersburg, Wrangell and Juneau are isolated outposts surrounded by spectacular wilderness—vertical shoreline, jutting peninsulas, fiords, snowcapped peaks, glaciers, forest-clad islands and arguably the best fishing grounds on the

planet. Sure, you can fly in here (mostly by float plane) or go by boat, but either way this forbidding realm makes it clear that powerful forces are its true inhabitants and travelers are subject to their whim.

I came to this realization many times during the 1100-mile run from Seattle to Juneau. (Plus another 250 miles backtracking to Ketchikan.) Isolated patches of fog forced Charlie and me to slow down on several occasions, most significantly in Queen Charlotte Sound, an open stretch of ocean known to produce 90-ft. seas, and in the curtain of fog that began outside of Wrangell and lasted two days, a time frame in which Charlie and I were scheduled to cover 490 miles. That we made it is a tribute to the exceptional performance of the Grady-White and its helm full of electronics.

"So, you guys are from POPULAR MECHANICS," says a dock attendant in Juneau looking at the decals on our hull. "What are you doing, field testing a new boat?"

Charlie and I exchange looks. Yeah. That's right.



Postcards from the Inside Passage, clockwise from top: Fishing in the salmon heaven of Lowe Inlet; water camping in Greenway Sound; greetings from Ketchikan; and the intrepid field testers at full throttle. Opposite page, clockwise from top: Taking leave of Seattle and the Space Needle; waterfalls off Victoria Island; greetings from Juneau; the Inside Passage route; a humpback whale in a leaping mood; and traditional totem poles south of Ketchikan.

We're field testers, and we're field testing a new boat, a 1995 Grady-White Islander 268. Few people have grasped this concept as easily as the distinguished gentleman from Juneau.

For some reason, most people seem puzzled by our boat. I suppose it's because Grady-Whites are thought of as East Coast boats that define offshore fishing from the Carolinas to Florida and beyond. As a result, it's a shock for many people to see a Grady-White in Alaska, although I can't imagine why.

I made the Islander 268 my boat of choice not only because it's new, but because it's well suited to the unique demands of a long-range expedition to Alaska. I wanted a boat that could run with 40-plus-mph speed (it topped out at 45 mph with full fuel and water

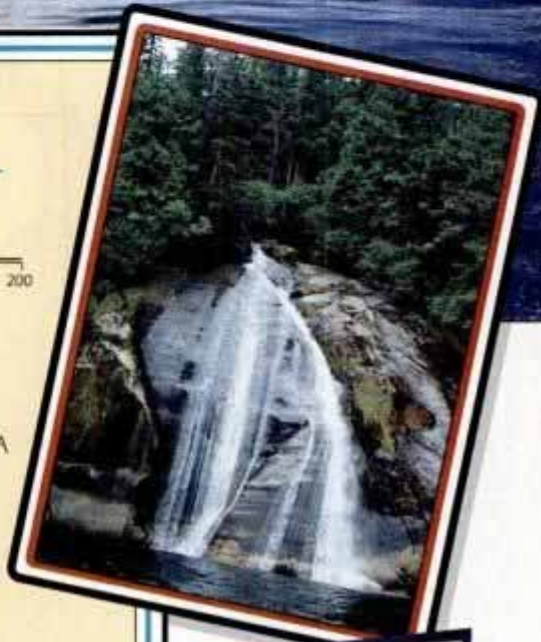
tanks, complete gear and a 2-man crew) and achieve decent fuel economy (it averaged about 2.3 mpg). On the other hand, it had to be big enough to sleep two, hold a week's worth of food and gear, and handle large chop and open-ocean swells.

Beyond this, the boat had to be a superb fishing craft and an excellent cruiser. I not only planned to fish whenever possible, but to sleep several nights on board.

The Islander 268 admirably filled this bill. Weighing just 4200 pounds (without engines) and measuring 26 ft. 11 in. long and 8 ft. 6 in. abeam, the midsize Grady is small by Alaskan cruising standards. But it easily proved itself worthy to hang out with the big boys on the Inside Passage. Condi-

tions were outstanding for five of our seven days, but during the roughest episodes, especially the 4-hour run from Petersburg to Juneau in fog and whitecaps, the Grady kept us dry from spray, refrained from pounding us senseless, and maintained an impressive running speed of 30 knots.

While I came to appreciate many features on the Islander 268—the sturdy and protective hardtop, the camper enclosure that kept out the elements, the unfailing windshield wipers, the beautifully balanced 18" variable-V hull (called SeaV2 and designed by Ray Hunt), the performance-enhancing outboard bracket and the overall aft layout with bench seat and transom door—there's a larger point to be made. The point is that,



like other Grady-White models, the Islander 268 is as fully loaded and impeccably detailed as a BMW.

Admittedly, Gradys are top-dollar rigs. Base price for the Islander 268 is \$40,900. Add the cost of twin 150-hp Yamahas, a hardtop and top-of-the-line Raytheon electronics (notably the Echostar 790 GPS Navigator Echo Sounder, Raychart 600XX Electronic Charting System and R11XX Raster Scan Radar), and the price of the test boat comes in at about \$85,000. Is it worth that kind of money? That depends on what you want. If you want a boat that's rock solid (thanks to a layer of flotation foam between the hull and inner liner that makes the boat unsinkable), does everything asked of it with aplomb and maintains market-

leading value in resale, then it's probably worth the price. If you don't want these things, then it's probably not.

### Pod of humpies

"Hey, Joe, look. Whales!" Charlie yells.

"Where?"

"Over there!" he points.

"I don't see anything. Now I see them. They're over there," I yell, and point in a different direction. We're out of sync again, but to our surprise, the whales are everywhere. It's a pod of 50 humpbacks swimming down Stephens Passage. We're on our way south to Ketchikan and a date with a barge to ship the Grady back to Seattle. It's the second day of enveloping fog, but we're veteran radar readers

now and nothing slows us down.

Except the whales. At times, the humpies are only 30 yards away, rolling on the surface and cruising gracefully in an over-and-under pattern similar to dolphins. On several occasions, they jump magnificently out of the water. It takes an hour to travel just 5 miles with the pod, but it's the most thrilling hour of the trip.

Not much later, the fog slowly begins to lift, and by the time we reach Ketchikan, the Sun reappears after a 2-day absence. Going over notes before flying home, the field testers agree that the Grady-White Islander 268 and the Raytheon electronics passed the field test with flying colors. And so, as a matter of fact, did the field testers.

FM

ELECTRONICS

# CYBER COP

A new patrol car uses advanced electronics to help police make real-world arrests.

BY JAMES M. BARRY; PM Photos by Jim Frenak





● The police car desperately needs an overhaul. At least that's what Dick Chrysler, president of a specialty vehicle outfit called Cruiser and no relation to the big car company, thinks. If Chrysler has his way, future smokeys won't be pursuing tomorrow's bandits in plain old police cars. Officers will be cruising in mobile police stations that combine innovative design, advanced electronics and state-of-the-art communications. These police vehicles will be so plugged into cyberspace you might as well start calling the officers driving them cyber cops.

Picture this: A highway patrol car in hot pursuit of a speeding vehicle radios the car's license number into headquarters. Sure enough, the car has been reported stolen and it's thought that the driver is a felon on the run. Headquarters transmits a rap sheet and mug shot of the suspect that appear to hover in front of the Cruiser. The officer has up-to-the-minute information and never has to take his hands off the wheel or eyes from the road while he is in hot pursuit.

Once he has the suspect securely in custody in the vehicle's protected fiberglass rear-seat



"containment area," the officer can pinpoint his location with the Cruiser's on-board navigation system, activate the video system to record the suspect and evidence, and use the vehicle's laptop computer, printer and fax to forward a report.

Some of the 320,000 or so police cars in service in the United States include elements of the advanced capabilities mentioned here. And since about 25% of the fleet is replaced annually, chances are if you get pulled over to the side of the road, your officer may have some of this technology available. Chances are even better that he or she will be driving a Ford or a Chevy. Since the early '80s—when the Chrysler Corp. stopped making rear-wheel-drive 8-cylinder cars—the vast majority (85%) of new police cruisers are either Ford Crown Victorias or Chevrolet Caprices.

According to Chrysler, who heads what is a division of RCI—a Brighton, Michigan, specialty vehicle company that supplies police vehicle



From the outside, Cruiser looks like it's got just a few extra emergency lights. But inside, the center console is loaded with electronic devices, including a computer, which make the car a rolling station house.



components—"The traditional piecemeal method of outfitting patrol vehicles leads to potentially unsafe environments, redundant systems and an overall product that is out of date technologically."

Chrysler says that many police departments spend as much as \$50,000 for a fully outfitted police vehicle that is not nearly as sophisticated or effective as the concept car he expects to sell for about \$30,000 when full production begins in 1998.

For the most part, the exterior looks like a standard police car. The most notable differences are a retractable lightbar that folds into the rooftop when not in use, a rear spoiler of emergency lights and a front bumper brush bar for off-road situations. A skidplate under the front bumper also offers off-road protection.

It's inside the Cruiser that most of the differences lie. The new car will eliminate the traditional instrument panel gauges and LED readouts in favor of a 9½-in. reconfigurable LCD screen and heads-up display (HUD) connected to all the vehicle's information systems. The HUD uses the same technology as that developed by GM Hughes Electronics for fighter planes to display speed, altitude, target location and other information seemingly out in front of the pilot's windshield during aerial combat. In the Cruiser, night-vision images could appear on either the HUD or the LCD screen on the dashboard console.

In this instance, Delco Electronics (another GM division), in conjunction with RCI, is developing a variation of the "Datavision" HUD that is already being used in some police vehicles. The technology, which is also beginning to crop up as an option in civilian cars from GM's Oldsmobile and Pontiac divisions, is expected to become more prevalent as the population ages and drivers are less able to change focus quickly from dashboard displays to the road.

The HUD can display information



Fiberglass seats for prisoners make for easy scrub-downs. Overhead console houses electronic systems, doubles as a gun rack. The nightstick, of course, is in easy reach.

from a variety of sources including mobile data terminals (MDTs), radar speed sensors, video surveillance equipment and vehicle operational systems. The system consists of a 2.5-pound cigar-box-size projection unit that mounts on the car's headliner, a smaller windshield-mounted optical combiner assembly and a 2.3-pound electronics box that's stored in the trunk. The HUD electronically replicates the LCD displays as a virtual image that appears suspended 10 to 12 ft. in front of the driver.

Inside the Cruiser, the center console can be equipped with radio, scanner, radar, a 3-in. black-and-white video monitor and an 8mm VCR, computer, fax and MDT. The overhead console is designed to incorporate a siren, switching center, a miniature black-and-white 8mm video camera, 2-way radio speaker, night-vision sensor and dome light.

The rear-seat Personnel Containment Module (PCM) is designed to address health issues that law enforcement personnel deal with every day—the danger of infectious diseases, especially those transmitted by blood-borne pathogens. The PCM is made of form-fitting textured fiber-

glass that extends down into the vehicle footwell, where floor drains make for easier sterilization and washing.

Cruiser has already shown a Chevrolet Caprice prototype of the mobile substation to police at a variety of law enforcement conferences. Next year, Chrysler plans a series of "rolling labs" in which he and his staff will bring prototype cars to municipalities for real-world field testing for several weeks at a time.

RCI also installs components of its advanced Cruiser package as aftermarket products and plans to retrofit existing vehicles with many of the advanced capabilities that the police car of the future will incorporate.

The new cars are intended to be equally valuable for rural and urban police forces. "The two real purposes of the Cruisers are the pursuit mode, which is more likely in a rural area," Chrysler says, "and as a mobile substation, detention unit and full working command post—which of course has inner-city applications. You can really increase law enforcement presence when you can quickly deploy a full working police substation, complete with fax, phone, video and computer anywhere in a city." **PM**

# CHANNEL SURFING'S NEW WAVE

New on-screen program guides make it easier to navigate through an ocean of choices.

STARSIGHT							
SEP	MON	TUE	WED	THU	FRI	SAT	SUN
7	9:00P			9:30P			
NICK	Dragnet			Bob Newhart			
SHOW	City Slickers						
MTV	Jams			Janet World Tour			
CNN	Larry King Live						
20	Math ... Who Needs It?!						
DISC	Wild Australia						
26	In the Best Interest of:						
HBO	The Bodyguard						
4	Prime Suspect			Gaslight			
ESPN	NFL Prime Monday						
10	Cheers			U.S. Senate			
SHOW	SHOWTIME						7:30P

BY GEORGE MANNES

• Once it was easy to see what was on TV. You walked over to the set, flipped through a few channels, and there you were.

On today's cable systems, it's harder. By the time you flip through 35 channels or wait for a slow-paced program guide to scroll down a list of choices, you've forgotten what they are.

In this light, seeing what's on the tube in a 200-channel universe is enough to make your eyes glaze over. Figuring out what to watch in this endless sea of video would be as hard as sailing across the Pacific without a compass.

That's why several companies are racing to bring a new type of program guide to satellite and cable subscribers. Instead of being printed on paper, they're right on your television screen. But unlike the channel guides on many cable television systems, you can control the content yourself. Instead of waiting 2 minutes for the guide to scroll around and tell you what's up next on Nick at Nite,

## CHANNEL SURFING'S NEW WAVE



you just push a button or two and find out whether it's "Bob Newhart" or "The Dick Van Dyke Show." But that's not all. These electronic program guides—or interactive program guides (IPGs), as they're alternatively known—do a whole lot more. Here are some of the things they can do:

- Display a capsule description of an upcoming show, so you can find out if it's something you haven't seen yet.
- Sort TV programming by genre. That way, you can see a list of all the horror movies on each week, or a lineup of all the football matches, coach's shows and post-game roundups on a holiday weekend.
- Show you whether there's anything better on TV without having to take your eyes off the current channel. A minimized text display at the top or bottom of the picture describes what's on each of the other channels. You can switch once you read a title that looks appealing.
- Tune directly into any broadcast that's listed in the IPG. You don't have to know the right channel name or number.
- Program your VCR to record a show with the push of just a single button. Worrying about a start time, stop time, channel number and recording date is a thing of the past.

IPGs have actually been around since 1986, when a company called SuperGuide Corp. of Shelby, North Carolina, started selling an IPG service that lets home satellite-dish owners sort through the hundreds of channels they can receive. But now SuperGuide is being joined by newer guides funded by big names in entertainment. StarSight Telecast, owned in part by the cable TV giant Viacom, is targeting not only dish owners, but cable subscribers and people who watch just broadcast TV. Another IPG for cable customers, TV Guide On Screen, is a joint venture of the magazine's parent and Liberty Media, a company linked to Tele-Communications Inc., the nation's largest operator of cable systems. Other IPGs are being developed by Prevue Networks,

the country's biggest supplier of program-listing channels to cable systems. And DirecTV and USSB, two program providers for the DSS satellite reception gear now sold by RCA, have a special IPG.

Providing an IPG to TV watchers nationwide requires a complex network of program data, computer software and special hardware. A look

to 27 megabytes of data. It takes about a half-hour for TVDT to transmit all this information.

Once it has the database, StarSight eliminates redundancies so it can speed up subsequent transmission times. The company also encrypts the program data and adds conditional access information so that only authorized subscribers can use StarSight.

From Fremont, the data is sent back east via phone line to two different organizations: the Public Broadcasting Service, based in Virginia, and a Viacom satellite communications facility in New York. At PBS, the StarSight data is inserted into the TV sig-



at the operations of StarSight Telecast gives you some idea of the effort required to make IPGs work.

The starting point is a database of television program schedules: a listing of all the TV shows scheduled to air on all the channels over all of the United States. That could be as many as 20,000 different shows aired on roughly 400 cable and satellite services and 2000 local broadcast stations. StarSight Telecast's database comes from TV Data Technologies (TVDT), a company in Glens Falls, New York, that supplies program data to more than 2700 customers.

Linked by a special telephone line to a computer at StarSight's headquarters in Fremont, California, a computer at TVDT transmits its latest national schedule once a day. TVDT also sends what are called channel maps for the 11,000 different cable systems across the U.S.—lists of the network or station that appears on each numbered channel in the local cable system. At other times during the day, TVDT sends isolated programming changes as they occur.

"Essentially our computer is always asking them if there's anything new," says John Roop, StarSight's senior vice president of technology and development. "And as soon as there is some new data, then that comes down the line." A full national schedule covering 12 days of programming and including all the channel maps amounts

### TV Guide On Screen

Lockout options to restrict access, simple-to-use menus, and easy point-and-click access to special programming are among the on-screen features available.



nal that PBS beams via satellite to all the local public-television stations in its national network. Specifically, the data goes into the signal's vertical blanking interval (VBI)—that black horizontal bar you see when your TV picture starts rolling like a slot machine. At more than 200 of these local PBS stations, StarSight has installed what it calls "smart data bridges," which collect program information and channel maps relevant to what's on broadcast and cable in that area and ignores the rest. This information is then re-inserted into the VBI of the local station's signal and fed to local subscribers' TV sets, using a slower data rate equivalent to the speed with which closed captions for the hearing impaired are transmitted to the home. It's through the VBI of local PBS stations that StarSight data will reach most homes.

The data stream that's sent to Viacom is used to reach satellite-dish owners who subscribe to StarSight. It's also used as a backup for cable systems that don't carry a PBS station with the primary data feed. It's sent in the VBI of the satellite



STARSIGHT						
SEP	MON	TUE	WED	THU	FRI	SAT SUN
7	8:00P		8:30P			9:00P
CNN	Primenews			Larry King		
SHOW	City Slickers					
HBO	Primenews 1 hour long					
DISC	ONCE Press RECORD again to confirm recording.					
ESP	DAILY (M-F) WEEKLY					
FAM	4 Fresh Prince Blossom In the Best					
DISN	Avonlea			Casablanca		
REQ	The Prince of Tides			Juice		
HBO	HOME					

STARSIGHT						
SEP	MON	TUE	WED	THU	FRI	SAT SUN
7	9:00P		9:30P			10:00P
CNN	Larry King Live!			World News		
SHOW	City Slickers					
HBO	Bingo		Home Alone			
DISC	All In a Day's Work			All In a Da		
26	Math ... Who Needs It?!					
26	Math ... Who Needs It?!					
MON	9:00P 1 hour					
A large number of people with exciting jobs use math every day in their work. Education. (CC)						
TIME BOX CBL 8 7:25P MON SEP 7						



### StarSight

Part of the appeal is the linkage to VCRs for easy taping and quick program summaries. StarSight is also available as a stand-alone device.

feeds for Viacom's MTV and Nickelodeon networks.

The last link in the chain is to get the programming information into a piece of hardware in the home. Zenith is already selling StarSight-equipped TVs. Mitsubishi TVs and Samsung VCRs are expected to follow, along with TVs from Thomson Consumer Electronics (in its RCA and ProScan models) and Philips. Satellite TV subscribers will be able to buy a StarSight-equipped integrated receiver/descrambler from Uniden. Cable subscribers who don't buy a StarSight TV or VCR would have a StarSight-capable cable box if their local operator offered the service.

But StarSight—along with other cable-marketed IPGs from Prevue Networks and TV Guide On Screen—generally won't be available through cable systems until box manufacturers start selling large numbers of a new generation of smarter cable boxes. And those boxes are just becoming available. StarSight also plans to sell the necessary reception hardware in a stand-alone box priced under \$200.

However the guide reaches the home, developers of TV Guide On Screen, StarSight and other IPGs have spent a lot of time trying to make them easy to use.

Simple remote controls and intuitive operation are important. Indeed, existing remote controls may prove inadequate, concludes a study by AT&T Bell Labs, as they are too complicated. A simple wandlike device that would be a cross between an existing remote and

a computer light pen may be the answer. Meanwhile, at Thomson, one approach under consideration would employ a "mother" remote with numerous offspring that could



### RCA

A mother remote control would have offspring tailored for individual viewing choices.

be customized for the viewing preferences of individual family members.

"If you're at a screen, you shouldn't have to ask yourself, 'Now which key would I use to do this function?' It should just be real obvious," says Barb Mason, director of access control and interactive products in General Instrument's satellite business unit. "Even if they do press an incorrect key, but you kind of knew what they wanted to do, you do it anyway. So that's one of the things you need to do, is evaluate all the possible things a consumer would do wrong and make a guess at what they really wanted to do."

As StarSight was starting its national rollout at press time, one of the big unanswered questions facing the company was how much of a demand there will be for the product. Beyond the cost that StarSight hardware might add to a TV or VCR, subscribers will have to pay anywhere from about \$3.55 to \$4.30 a month for the service, depending on how many months they prepay. That's \$42.60 to \$51.60 a year.

But the biggest technical challenge, says Roop, is reliability. "You can run a Windows spreadsheet for a couple of hours and then if you get a general protection fault, you go, 'Aw, heck,' and you restart Windows," Roop says. But with a TV-based computer program like StarSight, it's a different story. "People aren't used to having to reset their TV sets," he says. "So it has to be absolutely, utterly 100% reliable. It has to be able to go in the field with tens of millions of units out there and have zero failures." **PM**

# COMPUTER UPGRADES AND ADD-ONS

These performance-enhancing accessories will help you get the max out of your PC.

BY STEPHEN A. BOOTH, Contributing Editor  
and FRANK VIZARD, Electronics Editor

• A modest bankroll buys a lot of computer these days. To eat the spare change, there's no lack of accessory items to upgrade or enhance your PC's usefulness. What follows is a selection of add-ons—some practical, some just for fun, but all worth taking note of.



## Twist And Turn

Can you make a better keyboard? Here's one thought from Studio Red, a California design house. This keyboard twists, tilts and lifts so you can type at a more comfortable angle. It's \$99 from Lite-On Peripherals Inc.

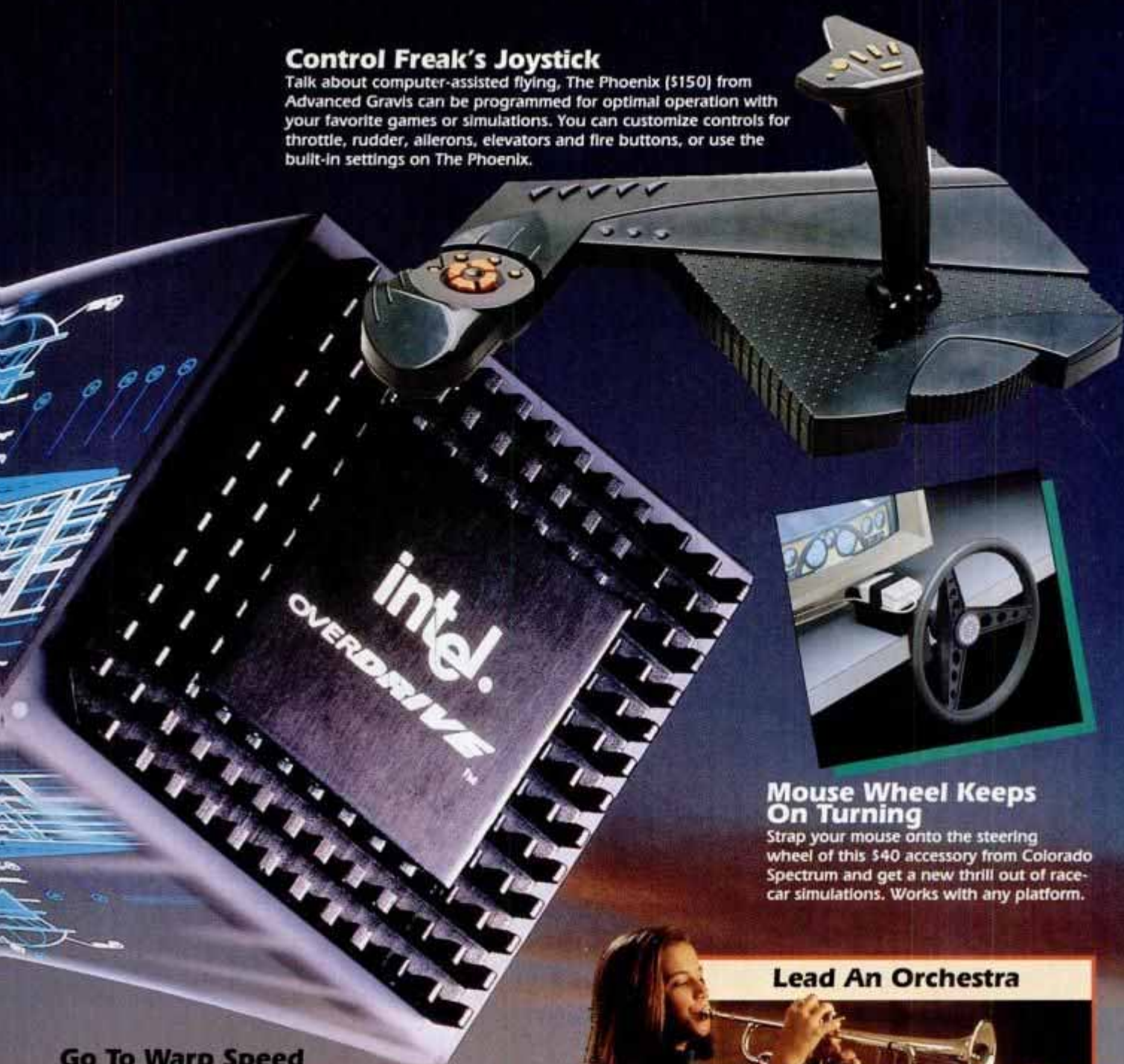


## Send From Anywhere

When you're nowhere near a wired phone and have to communicate data from your portable PC, PocketPlus from Sierra Wireless lets you transmit wirelessly via Cellular Digital Packet Data (CDPD) service. The battery-powered modem (\$1195) can transmit faxes via cellular radiotelephone, too. It handles either job at superhigh speeds, to conserve power. Yes—it'll send data or fax on wired phone lines, too.

## Control Freak's Joystick

Talk about computer-assisted flying, The Phoenix (\$150) from Advanced Gravis can be programmed for optimal operation with your favorite games or simulations. You can customize controls for throttle, rudder, ailerons, elevators and fire buttons, or use the built-in settings on The Phoenix.



## Mouse Wheel Keeps On Turning

Strap your mouse onto the steering wheel of this \$40 accessory from Colorado Spectrum and get a new thrill out of race-car simulations. Works with any platform.

## Go To Warp Speed

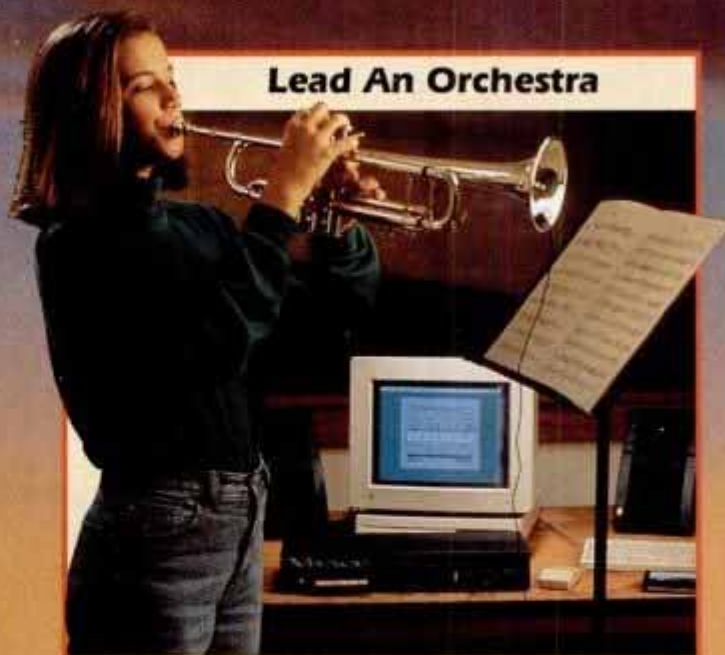
Why trade in when you can upgrade a PC to warp speed with one of Intel's OverDrive processors? Applications, including multimedia, will run 40% to 70% faster with the simple plug-in chips. An SX2 OverDrive chip (\$249) doubles the clock speed of 486SX-based PCs from 20 or 25 MHz to 40/50 MHz. The DX2 OverDrives (50 MHz, \$299; 66 MHz, \$349) improve performance on 486SX/33 MHz and 486DX/25-MHz or 33-MHz computers.



## Drive A Mouse

Trade in that plain-vanilla economouse for Motor Mouse Products' exact mini-replica of the '85 Corvette (\$66). The classic Chevy replaces the cursor on-screen—even revs and honks its horn.

## Lead An Orchestra

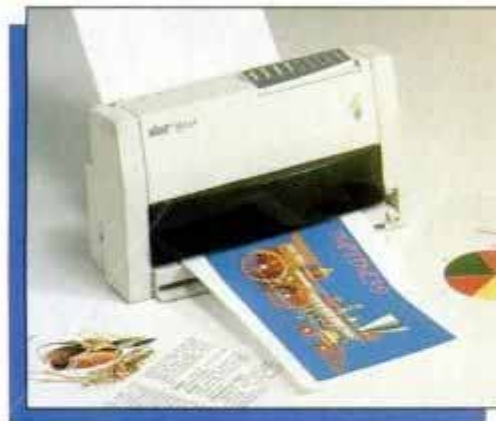


The orchestra follows the soloist in this hardware and software package from Coda Music Technology. Called Vivace, the \$2295 system instantly analyzes what the soloist is playing and follows tempo changes with no perceptible delay. Music cartridges are priced at \$30 each and the repertoire includes classical and jazz standards.

# COMPUTER UPGRADES AND ADD-ONS

## T-Shirt Printer

Here's functionality and fun. Star Micronics SJ-144 color printer (\$499) uses heat-fusion to bind multicolor inks to any kind of paper—even

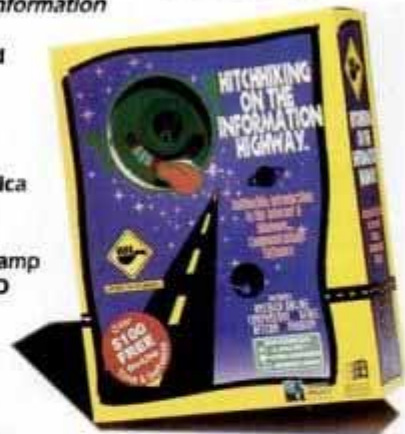


iron-on transfer sheets for creating T-shirts from your custom multimedia designs. Color ribbons go three for \$45, and are good for eight pages each. Sheets and ribbon for 10 iron-on transfers cost \$20. You can use it for economical monochrome printing, too: Three ribbons cost \$30 and yield 540 pages.

## Info-Highway Roadmap

When is a CD-ROM an accessory? When it's the \$100 *Hitchhiking On The Information Highway*

*Highway*—a flight-simulator to the world of online computing produced by Moon Valley. Besides free software and trial subscriptions to America Online, CompuServe, GEnie, Prodigy and Netcom's Netcruiser ramp to the Internet, the CD provides practice simulations for navigating these services and a travel atlas of user bulletin boards and info services.



# Software Upgrade: We Pick The Top CD-ROM Titles

● These days, nearly every new personal computer comes equipped with a CD-ROM drive, a significant upgrade in itself over older machines. It's a short leap to the realization that encyclopedic discs like Microsoft's *Encarta* and games like "Myst" make good use of the multimedia capabilities offered by CD-ROMs. But what if you want more than just reference works and games? Those titles are a little harder to find. Here's our short list of some discs that we think the PM reader might find of particular interest.



*The Way Things Work*: superior animation.

● **The Way Things Work** (Dorling Kindersley Publishing, Windows PC, \$100). Based on David Macaulay's popular book, this disc is among the best ever produced for the CD-ROM format. The use of animation is superior and nearly all-pervasive. The descriptions of how everyday machines work are accurate, enlightening, clever and humorous, as are the discussions of the principles behind the technology. —F.V.

● **Star Trek: The Next Generation Interactive Technical Manual** (Simon & Schuster Interactive, developed by The Imergists Inc., \$70). This one isn't just for "trekkers." It's also for techies who might want a look at a cool new technology called Apple Quicktime VR that puts the Starship Enterprise in a very photorealistic environment. Commander Riker offers a guided tour, but you can explore the 12 main areas of the ship at any time. —Bill Cook

● **Complete Baseball** (Microsoft, Windows PC, \$60). If



*POPULAR MECHANICS Car Buyers Guide 1995*: a shopper's tool.

major league baseball never resumes, the '94 edition can be the national pastime's ultimate time capsule. The disc is encyclopedic on historical stats for players, teams and performance categories. Photos accompany the 1000-plus bios. Audio and video clips replay thrilling moments of the game. Take notes—some 900 trivia questions will separate the bushers from the all-stars. —S.A.B.

● **J.F.K. Assassination: A Visual Investigation** (Medio, Windows PC, \$60). There's nothing ghoulish about a preoccupation with the killing of President John F. Kennedy. A generation later, there still are too many unanswered questions. This disc puts most of the major investigative reports at your fingertips. Besides a digitally enhanced Zapruder film, there are clips from four other amateur movies filmed in Dallas's Dealy Plaza that day. Computer animations display the conflicting bullet angles often cited in contradictory reports. —S.A.B.

● **Jets!** (Medio, Windows PC, \$60). This disc offers an excellent history of jet aviation. Photos and specifications for more than 140 jets are included, with many of these having videos and controllable 3D models. This disc also contains the complete text of *Test Pilots* by Richard Hallion and *The X Planes* by Jay Miller. The information is thoroughly hyperlinked so it's easy to jump around the data. —B.C.



*Leonardo The Inventor*: ahead of his time.



### Faster Modem

If you're a regular on the info-tollway and upload or download data by the ton, a high-speed modem might make financial sense. The \$249 CalCom 2842EX is an external model that ships 28,800 bits per second, over conventional phone lines, and also sends or receives faxes at 14,400 baud.



### Breaking The Color Barrier

With a street price of less than \$500, Canon's BJC-4000 printer is a low-cost solution to color printing. The BJC-4000 uses bubble-jet printing technology and new water- and fade-resistant dyes. Interchangeable cartridges let you switch easily between color and monochrome.

● **POPULAR MECHANICS New Car And Truck Buyers Guide 1995** (Hearst New Media & Technology/Books That Work, Windows PC, \$30). Here's our entry into the CD-ROM universe. This disc contains information on more than 800 car and truck makes, including invoice and retail prices, safety and complaint ratings, and mechanical specifications. You can create a customized comparison chart of the statistics of the vehicles in which you are most interested. —B.C.

● **Cinemanía '95** (Microsoft, Windows PC/Macintosh, \$60). Forget the 20 motion videos, 900 movie stills, hundreds of music themes or lines of dialogue, 2000 star photos and 4000 bios. Forget the hot air of Roger Ebert or Pauline Kael's snooty bile. Their 3800 movie reviews join 19,000 from regular guy Leonard Maltin—plus book-length references such as *The Film Encyclopedia* by Ephraim Katz. This is probably the most comprehensive cinematic database you'll ever need. —S.A.B.

● **Leonardo The Inventor** (Future Vision Multimedia, Windows PC/Macintosh, \$40). Leonardo da Vinci's 15th-century vision of the future, as seen in his notebooks, is surprisingly prescient.



#### Cinemanía '95: the best cinematic database.

This disc animates Leonardo's sketches and compares them to modern-day machines. Leonardo was also a great artist but the full complement of his work isn't reproduced—the emphasis here is on machines. Eight simulations can be seen in 3D and the special glasses are included. This is probably an interesting disc but it's not as rich and deep as it might have been. —F.V.

● **Exploring Ancient Architecture** (Medio, Windows PC, \$60). There are four periods that you can study: Neolithic, Egyptian, Greek and Roman. The real fun is taking one of the two building tours available within each period. Thanks to sparkling computer animation, you actually feel like you're walking through Stonehenge, for example. —F.V.

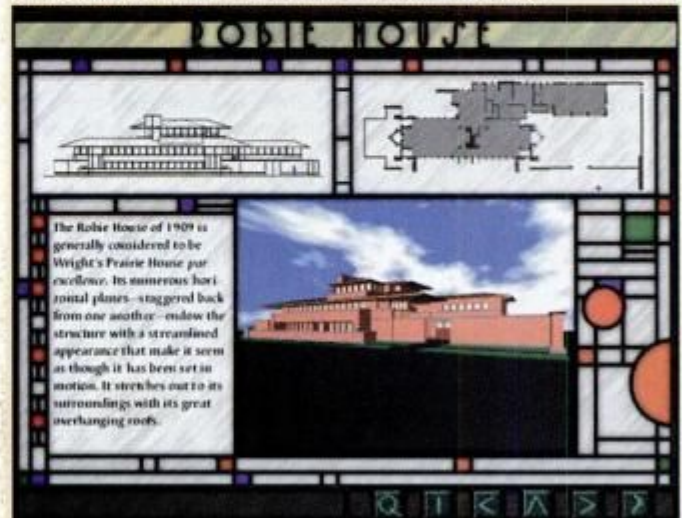
● **The Ultimate Frank Lloyd Wright** (Microsoft, Windows PC/Macintosh, \$60). Frank Lloyd Wright is the architectural genius whom architects study. Now you can too with this CD. You'll



#### Star Trek: The Next Generation Interactive Technical Manual.

get walk-through tours of Wright's coolest residential designs, detailed plans for his furniture and fixtures, and explanations of his use of materials. Better yet, *Wright Modeler* helps you create your own dream designs for projects as small as a chair or as grand as your imagination. —S.A.B.

● **World Beat** (Medio, Windows PC, \$60). This guide to the world's music—everything from Irish folk to Madagascar pop—is terrific because it offers so many ways to explore the subject. You can view documentary-style overviews, search by music styles, click on maps at random, read articles or study sheet music. Most of the material has a music video or audio sampling. —F.V.



#### The Ultimate Frank Lloyd Wright: our best architect.

# COMPUTER UPGRADES AND ADD-ONS



## Extreme Joystick

The Logitech Wingman Extreme (\$70) has a heavy, weighted base engineered for the hard g's of "Thrustmaster"-compatible flight simulators. Extra palm support will keep you at the controls longer, while a 4-way switch on the handle gives an around-the-clock view from anywhere in the cockpit. Three thumb buttons control weapons and target acquisition.



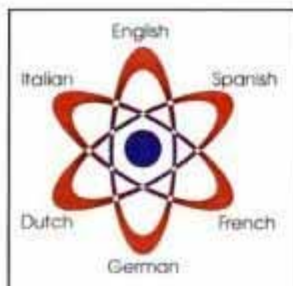
## Power Management

Here's a neat solution to both power-cord tangles and electrical surges that might reach those cords. American Power Conversion's SurgeArrest (\$135) protects five components and a telephone device. Cords stow out of sight within the device, which can sit under your monitor. A lifetime warranty covers connected equipment up to \$25,000. When the juice stops flowing APC's Back-UPS 450 Power Supply (\$279) comes into play. UPS here means uninterruptible power supply. If the AC stops flowing or even dips in a brownout, these battery backups power your PC long enough for you to save whatever you're working on. This APC model will keep a Pentium-class PC and peripheral running for about 8 minutes. With optional software (\$69) it can be programmed to shut down your system automatically. It's a surge suppressor/noise filter, too.



## Foot Pedals For Flyers

Here's a PC accessory that gives your feet something useful to do—at least while you're playing simulations. Pro Pedals (\$140) from CH Products work in conjunction with CH Products' joysticks to add rudder control, toe-brakes and independent throttle for flight simulators, or pivot movement for driving games.



## Translator

Windi instantly translates your work into another language with the touch of a hot key. Produced by TWI Helios Editions, the software package is available from Thomas West Inc. for \$450. Call (212) 684-4102.



## Tape Backup

With large-capacity hard-disk storage drives built into most new PCs, it takes a long time and dozens of floppy diskettes to make backup copies of data files. A magnetic-tape backup such as this 250-megabyte Core TD-P250 model (\$399) performs the chore in minutes. It uses standard QIC-format tape cartridges, connects to a PC's parallel printer port and provides a pass-through connector for the printer.

## Traffic Cop

The ComShare 750 from Command Communication (\$179) directs incoming calls to the appropriate device whether it be a telephone, fax machine, answering machine or computer. Or you can assign four numbers to one line. It's handy if you don't want the expense of installing a second telephone line.



## Bigger Hard Drives

Hard up for data storage, what with applications and multimedia programs that hog up memory? Identity Systems offers five hard-disk upgrades in 210- through 525-megabyte capacities for between \$299 and \$599. A how-to video makes installation easy.



### Big-Screen Computing

Multimedia computing is more fun on a big screen that can exploit its motion video and graphics images. The 17-in. PanaSync from Panasonic (\$999) fits on a desktop, and has preset controls to adjust to all the various graphics standards. The antiglare monitor meets tough Swedish guidelines for electromagnetic radiation—and U.S. specs for energy efficiency.

### Flat Plug

It's little things that make life simpler—like this computer cord that lets you plug into tight spaces. Designed by Paige Manufacturing of King City, Ontario, this cord may be showing up in computer boxes soon.



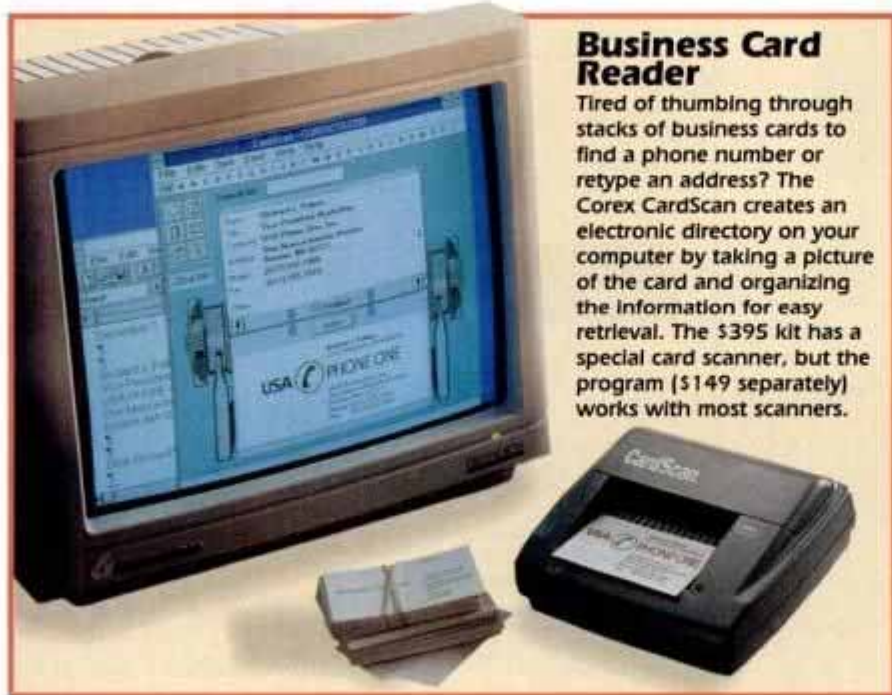
### No Fear Of Java

You know what hits the fan when liquids hit the computer keyboard. Not with Identity Systems' IDKB101-SR spill-resistant model (\$40)—a membrane beneath the keypad seals out moisture and debris.



### Video Producer

The Studio Magic Personal Video Studio (\$499) is an add-on board and software package that converts your PC to a production studio for enhancing video recordings. You can edit and reassemble your camcorder movies, and embellish them with multiple special effects, titles, animation and computer graphics, music or voice-overs. It connects two video components, say, a camcorder and a VCR. The optional Studio Magic Controls board (\$200) gives you remote control over both devices through your PC.



### Business Card Reader

Tired of thumbing through stacks of business cards to find a phone number or retype an address? The Corex CardScan creates an electronic directory on your computer by taking a picture of the card and organizing the information for easy retrieval. The \$395 kit has a special card scanner, but the program (\$149 separately) works with most scanners.



### CD-ROM Drive

You can upgrade your PC to multimedia status with Sony's CDU-55S internal double-speed CD drive (\$259). It has a motorized disc-loading tray and fits in the standard bay for 5¼-in. floppy drives found in desktop or mini-tower PCs. **PM**

# 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.<sup>1</sup> In recognition of their "need-to-know" about computer-related products, the marketing department of Popular Mechanics introduces this new 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, contact Barbara Jones at 1-800-669-1251.

<sup>1</sup>Source: PM Reader Panel Study, 1993

## Hot Product: Free IBM CAD Trial

Computer Assisted Drawing software is finally within range of home computer users. With a 60-day free trial offer (just pay \$9.95 S&H,) you owe it to yourself to discover all the amazingly useful features of IBM's new, full featured CAD3X program. Usable by DOS or OS/2 computers, this program is a terrific bargain at \$99. Easy-to-understand menus guide you through the sketch and design process for projects such as landscaping, redesigning kitchens, woodworking projects, furniture arrangements and mechanical designs. CAD3X prints out blueprints, schematics, materials lists and much more. Order direct from IBM with credit card: 1-800-426-2231 ext. 77.

## Hot Tip: Blacker Laser Prints

**Q:** My older laser printer has a problem printing large solid type or thick lines with a dense black. It looks more like dark gray, with some scratches. What can I do?

**A:** Try turning up your laser's print density dial, if it has one. Otherwise, you can sometimes achieve a very rich black effect by spraying your laser printout (outdoors) with artist's acrylic matte spray. It causes the tiny toner clumps to bleed together making a more uniform black image. This may also cause some small type or fine lines to bleed together, so try spraying a test print first.

Reaching 9.8 Million PM Readers Each Month!



## Earn \$4,000 Per Month From Your Home With A Computer!



FREE CBSI 486 Computer

Quit spending money on your computer and let it earn money for you. This is a proven turnkey business an individual or couple can run. If you purchase our software and business program, we will give you the computer and printer. If you already own a computer, you may receive a discount. Begin part-time and still retain the security of your present position. We will provide free, home office training. Financing available.

To receive free cassettes and color literature, call toll-free:

**1-800-343-8014, ext. 1670**

Or Write: Computer Business Services, Inc.

CBSI Plaza, Ste. 1670, Sheridan, IN 46069



## Turn your ideas into reality 3 times faster.

Mechanical Design  
 Cabinetry/Woodworking  
 Furniture Arrangements  
 Electrical Schematics  
 Form/Letterhead Design  
 Construction Plans  
 Home/Office Remodeling  
 Landscape Design  
 Bill of Materials  
 Graphic Illustrations

So easy to use .... yet more 2D features than any CAD under \$1000

- Full featured to quickly make any 2D drawing
- Lines, Arcs, Curves, Symbols, Export to WP, Analyze, Associative Dimensioning, 2D Booleans, and more
- Parametric parts, Programless macros
- Patented - Dynamic highlighting, Smart redraw reduces learning time AND slashes drawing time!
- Online graphical hyper help, Online Demos
- Outstanding DNF compatibility
- DOS and OS/2 versions available

Limited time offer ...  
**\$99** 30 day money back guarantee

System requirements: IBM compatible PC with math coprocessor, 8 MB free on hard disk, mouse.  
 DOS: 1 MB RAM minimum (4 MB recommended).  
 DOS 3.3 or higher. OS/2: 4 MB RAM minimum.  
 OS/2 1.3 or higher.

**IBM CAD**  
 800-426-2231 ext. 31



# Mind Power Breakthrough!

Plug Your Mind into the Amazing Learning Machine™ To Boost Mental Powers, Program Your Mind for Success & Launch Virtual Reality-Like Fantasies. 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 basic 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 \$12 shipping & handling to the address below. (Item #4501). Please allow 4-6 weeks for delivery.

## \$600 Super CD Bonus Pak

Hundreds of dollars worth of valuable Learning Disc 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 Discs that will be bundled FREE as part of this special introductory offer.

**The Teacher™ (\$59 Value)** Start-up demonstration disc 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 language training 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 Discs 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 6-6) 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 Disc programs. Plus info on future programs including ESL, Japanese, Chinese, and Russian. The Photographic Mind Series, Transcendental Mind Series, 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 formats.



For Fastest Service Call Toll Free  
**1-800-925-3263**

**ZYGON**

18368 Redmond Way, Redmond, WA 98052  
Fax Orders To (206) 882-1454



# Craftsman's Chair

*An Arts-and-Crafts chair and ottoman.*

BY NEAL BARRETT

● The elegant ottoman and chair we present here are examples of the American Arts-and-Crafts furniture style, also sometimes called the Mission or Morris style. This type of furniture evolved from a movement in England in the late 19th century, in which craftsmen rejected the heavy ornamentation and shoddy construction of mass-produced Victorian furniture. Gustav Stickley, an American furniture designer and manufacturer, went to England in the late 1890s and returned home with great enthusiasm for the new design trends.

Characteristic of Stickley's work are heavy, unornamented rectilinear forms with through-tenon construction. Most of his pieces were built from quarter-sawn white oak and upholstered in leather. Our pieces are faithful to the originals, including the chair's adjustable back with five different positions. Whether reading, watching TV or taking a well-earned Sunday nap, you're sure to find a comfortable spot.

If you can't find quartersawn white oak, write Talarico Hardwoods, RD 3, P.O. Box 3268, Mohnton, PA 19540.

## Making Chair Parts

Begin by making the legs. The best way to display the oak's unusual grain is to construct the legs so the grain is visible from all sides. We assembled the leg from four beveled pieces glued to a solid square core.

Begin by ripping slightly oversize slats from  $\frac{3}{4}$ -in.-thick stock. Set the table saw blade at  $45^\circ$ , and carefully rip the slat edges so that the piece has a width of  $2\frac{1}{4}$  in. across its face. Do not cut the slats to finished length yet. Rip the core pieces slightly oversize, then joint their surfaces. Dry assemble each leg to check the joints.

Lay out the four facing pieces and the core piece for a leg and apply a thin film of glue to all the joint surfaces (Photo 1). Apply the glue sparingly. Too much glue will result in a sloppy fit and make the parts hard to clamp. Assemble the leg with masking tape, and clamp the assembly until the glue sets (Photo 2).

Next, use dado blades in the table saw to cut the tenons at the top of the front legs. Use a stopblock on the miter gauge to guarantee accuracy in the cuts. Butt the workpiece against the block. Cut the tenon slightly oversize and then pare it smooth using a



**1** Each leg is an assembly of four beveled pieces glued to a core. Spread a thin film of glue on each bevel and each core.



**2** Tape the leg assembly together, then position closely spaced clamps around the assembly and let the glue set.



**3** Using a miter gauge, cut the tenon on the leg with a dado blade in the table saw. Bevel the tenon end with a chisel.



**4** Cut the leg mortises with a plunge router. To provide adequate support for the router, clamp two legs together.

Lead photo: J.R. Rost  
Step-by-step photos: Neal Barrett  
Technical art: Eugene Thompson  
Photo stylist: Gabe Herrick

sharp chisel (Photo 3). Accuracy is important here because the tenon end is exposed, so don't remove more than the thickness of a light shaving.

The tenons on the rear legs have a shoulder that is not 90° to the tenon, so it is simpler to cut these joints by hand. Clamp a leg blank in a vise and make the vertical cheek cuts using a dovetail saw. Then, holding the legs flat to the benchtop, saw the tenon shoulders. Finish the tenons by shaving them smooth with a chisel.

Lay out the mortises on the chair legs. Note that the only leg mortises that are not through mortises are for the top side rails. For the through mortises, cut half the mortise depth from one side of the leg using a plunge router. Then, turn over the workpiece and complete the cut. This requires that the top and bottom limits of the mortises be accurately marked. Also, the router edge guide must be placed on the same leg face when cutting both sides of the joint.

Clamp two legs together on the workbench to provide a stable support for the plunge router. Make a series of increasingly deep passes with the router until you have cut slightly more than half the mortise depth. Do not cut the mortise in a single pass. White oak is too tough a material to do this. Turn over the legs and complete the cut (Photo 4). Cut the ends of the mortise square with a chisel.

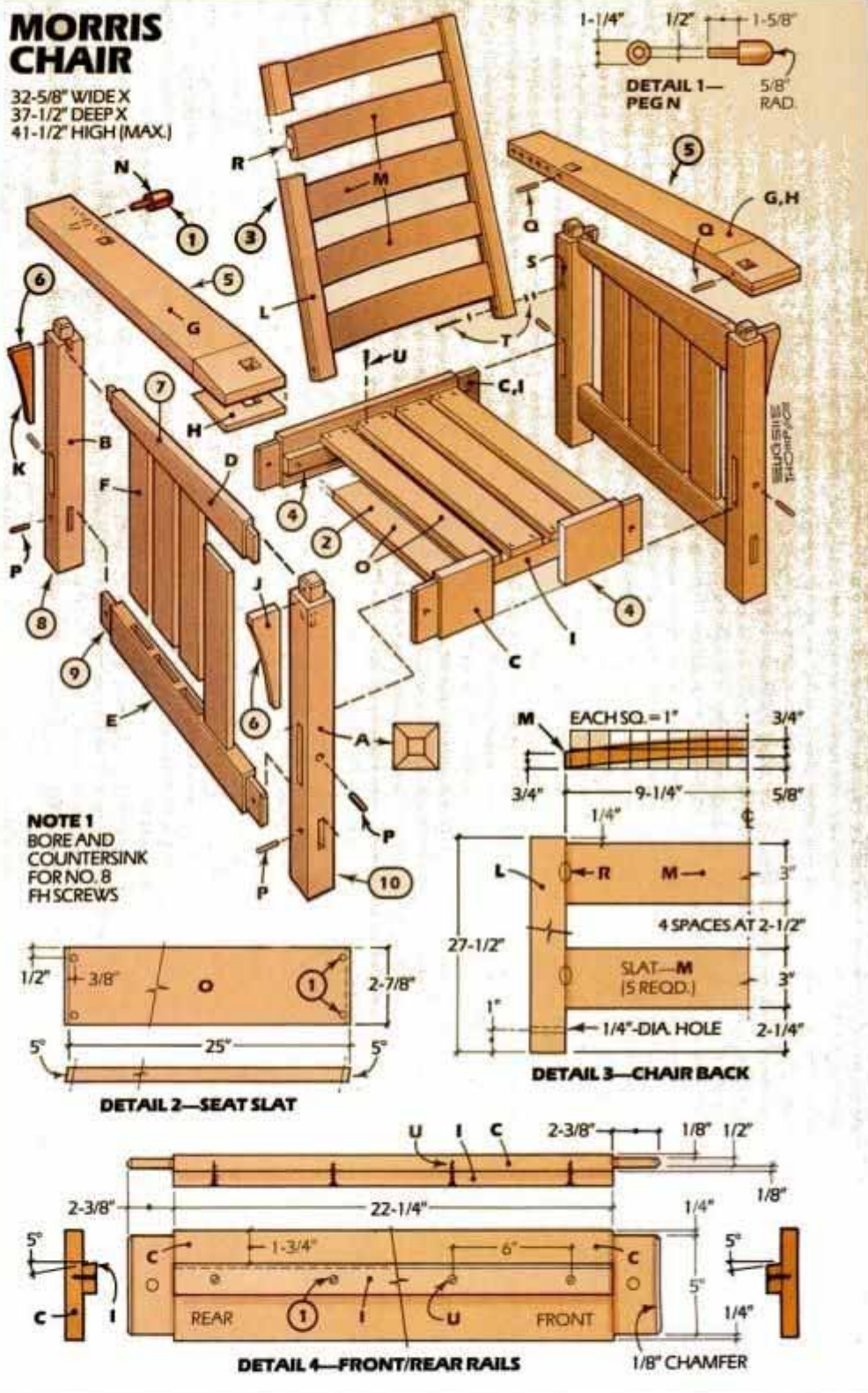
Next, rip and crosscut the front, back and side rails and side slats to finished dimension. Lay out the tenons on the end of each rail. Begin cutting each joint by making the shoulder cuts using the table saw and miter gauge (Photo 5). Attach an auxiliary fence to the miter gauge to do this, and attach a clamp on the fence to act as a stop. Butt each workpiece securely to the fence and stop to make the shoulder cut. Next, cut the tenon cheeks using a shopmade tenoning jig on the table saw (Photo 6).

Mark the slat mortises on the side rails, and cut the mortises in a series of shallow passes until you have arrived at the depth shown in the plans. As was done with the legs, provide a stable base for the router by clamping two rails to the bench (Photo 7). Again, use the edge-guide attachment on the plunge router, and square the cuts with a chisel when you're done.

Mark the taper on each side top rail, and cut the taper on the band saw. Cut just to the waste side of the line. Remove the saw marks from the surface and work down to the taper line using a hand plane.

## MORRIS CHAIR

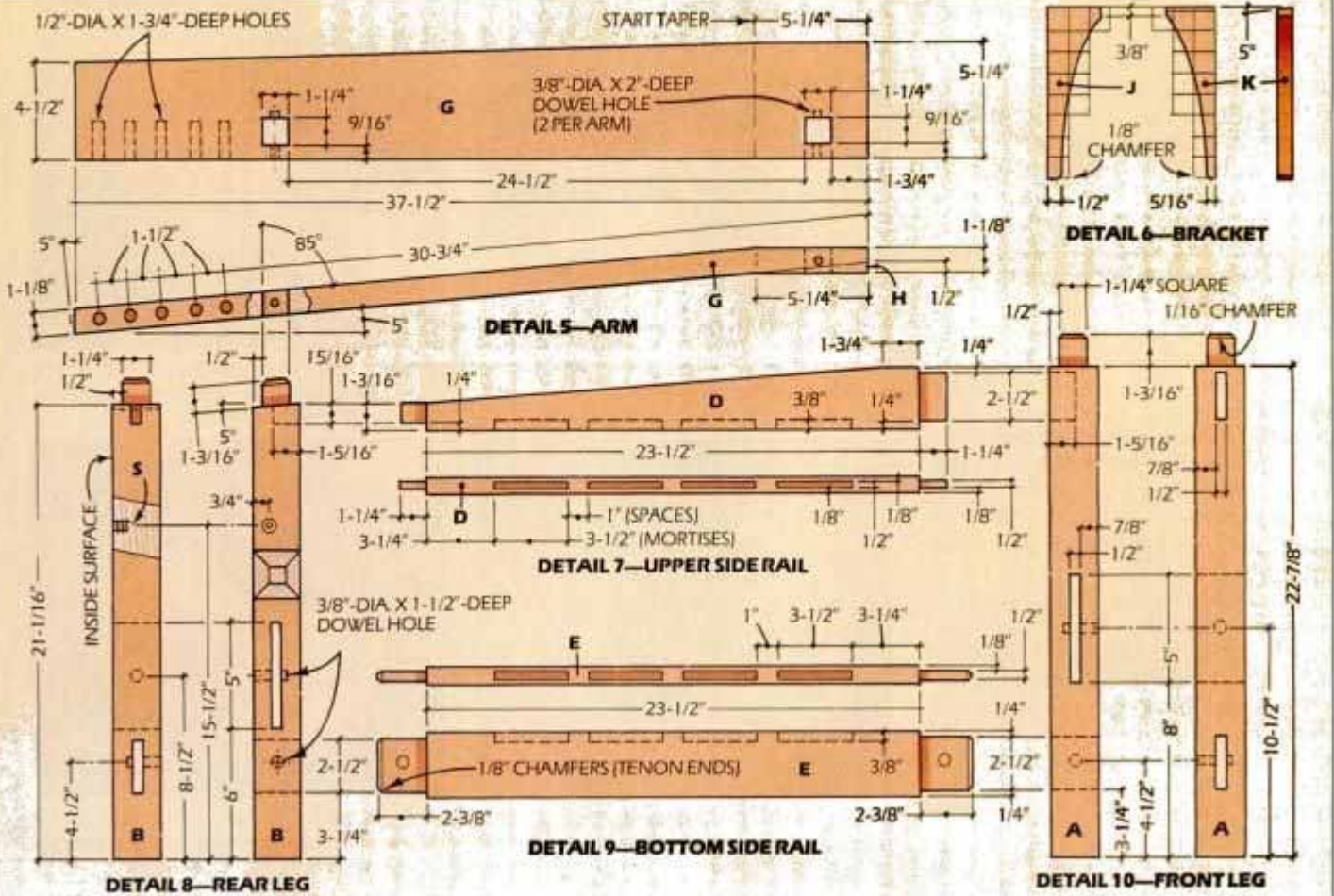
32-5/8" WIDE X  
37-1/2" DEEP X  
41-1/2" HIGH (MAX.)



Select two pieces of 5/4 stock for the arm blanks and cut them to rough size. Lay out the wedge shapes on a piece of 5/4 stock and cut out the wedges using the band saw. Feed the workpiece into the blade slowly to avoid burning it. To disguise the wedge, and make it appear that the arm is made from one piece of wood, it's important to get a good glue joint

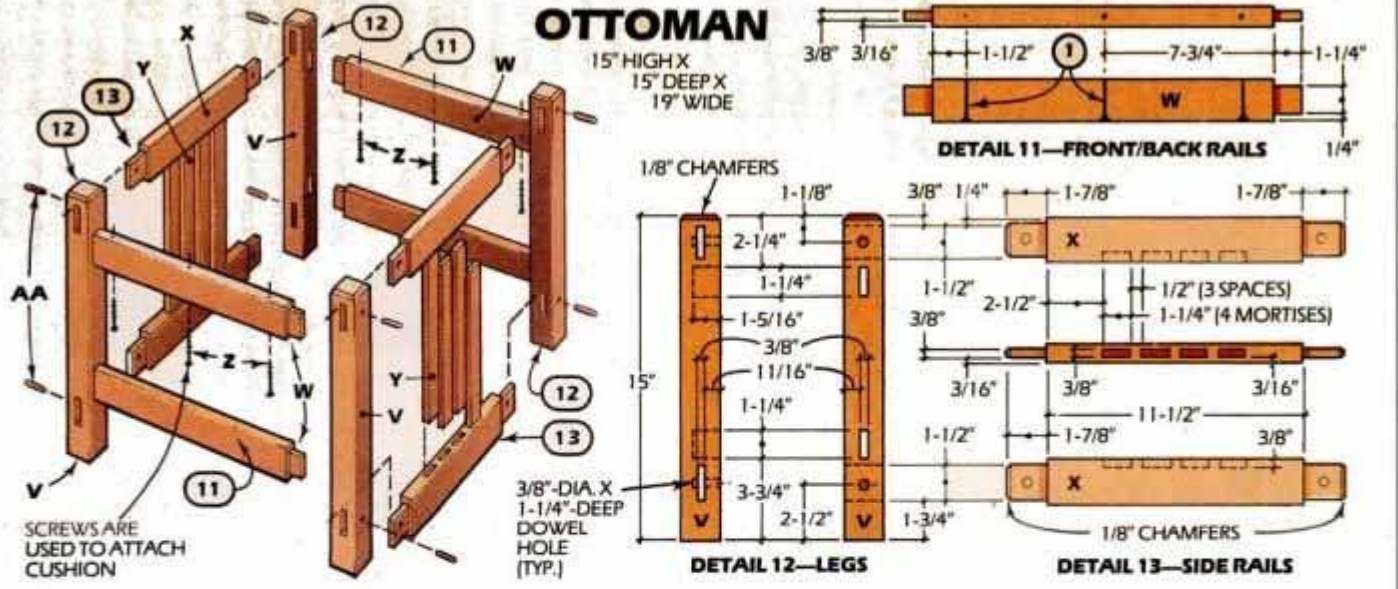
here. To ensure this, plane or sand the cut surface of the wedge so it is smooth and flat. Glue and clamp the wedge to the arm. After the glue has set, cut the flat on the top of the arm using the band saw (Photo 8). Proceed slowly to minimize burning. Clean off the saw marks by sanding or using a hand plane.

Mark the location of the through



## OTTOMAN

15" HIGH X  
 15" DEEP X  
 19" WIDE



### MATERIALS LIST—CHAIR AND OTTOMAN

Key No.	Size and description (use)	Quantity	Material
A	2 1/4 x 2 1/4 x 24 1/16" white oak (front leg)	2	White oak
B	2 1/4 x 2 1/4 x 22 1/4" white oak (rear leg)	2	White oak
C	3/4 x 5 1/2 x 27" white oak (rail)	2	White oak
D	3/4 x 3 x 26" white oak (rail)	2	White oak
E	3/4 x 3 x 28 1/2" white oak (rail)	2	White oak
F	1/2 x 3 1/2 x 14" white oak (slat)	8	White oak
G	1 1/2 x 5 1/4 x 38" white oak (armrest)	2	White oak
H	1/2 x 5 1/4 x 5 1/4" white oak (wedge)	2	White oak
I	3/4 x 1 1/2 x 22 1/4" white oak (ledger)	2	White oak
J	3/8" x 2 1/4 x 8" white oak (front arm bracket)	2	White oak
K	3/8" x 2 3/8 x 8" white oak (rear arm bracket)	2	White oak
L	1 1/2 x 1 1/4 x 27 1/2" white oak (backrest side)	2	White oak
M	1 1/2 x 3 x 18 1/2" white oak (backrest slat)	5	White oak
N	1 1/4-dia. x 3 3/8" white oak (backrest peg)	2	White oak
O	3/4 x 2 1/4 x 25 1/2" white oak (seat slat)	6	White oak
P	3/8"-dia. x 1 1/2" white oak (dowel peg)	8	White oak
Q	3/8"-dia. x 2" white oak (dowel peg)	4	White oak
R	No. 20 joining plates	10	Hardware
S	1/4-20 threaded insert	10	Hardware
T	1/4-20 x 2 3/4" brass rh machine screw and six brass washers	2	Hardware
U	1 1/4" No. 8 fl screws	28	Hardware
V	1 1/2 x 1 1/2 x 15" white oak (legs)	4	White oak
W	3/4 x 1 3/4 x 18" white oak (rails)	4	White oak
X	3/4 x 2 x 15 1/4" white oak (rails)	4	White oak
Y	3/4 x 1 1/4 x 10 1/4" white oak (slats)	8	White oak
Z	2 1/4" No. 8 fl screws	6	Hardware
AA	3/8"-dia. x 1 1/4" white oak (dowel peg)	8	White oak

mortises in each arm. Note that the angle of the rear leg mortises is not perpendicular to the adjacent arm surfaces. Bore a 1-in.-dia. hole in the center of each mortise to remove most of the waste. Clamp an arm to the workbench with support blocks under the workpiece to hold it at a slope. Cut the mortises to shape using a sharp chisel and work from both sides of the arm to prevent splintering where the mortise exits (Photo 9).

Sand all parts before assembling the chair because it will be impossible to sand them afterward. Use 120-grit and 220-grit sandpaper, and dust off thoroughly between each grit. This should leave only minor touchup sanding after the chair is assembled. Also, ease all sharp corners with a finely set block plane or sandpaper before assembling the pieces.

Cut the backrest sides and backrest slats to dimension. Make a plywood template for the slat's curved shape, and trace the shape onto each blank.

Place the backrest sides and slat blanks flat on the worktable. Place the parts together in their appropriate positions, and mark the location of the joining plate slots on each part. Hold the plate joiner and the workpiece firmly against the table. With the plate joiner held on the mark, make the plunge cut (Photo 10).

Cut the inside curve on each slat using the band saw, then clamp each piece between bench dogs and use a cabinet scraper to remove the saw marks. Cut the outside curve on the slats, and use either the scraper or belt sander to remove the saw marks.

Locate and bore the holes in the backrest sides for the screws that mount the backrest to the chair base. Sand the backrest parts with 120- and 220-grit sandpaper, carefully easing all sharp edges. Dust off the parts and test fit them. Glue and clamp them together using biscuits at each joint.

## Assembly

Begin assembly by gluing and clamping the side slats to the top and bottom side rails. Then, glue and clamp each of these subassemblies to the front and back leg posts (Photo 11). The bottom side rails have through tenons. To prevent glue from getting on the tenon end, apply glue sparingly on the tenon cheeks only.

Next, glue and clamp an armrest to the side assembly (Photo 12). Again, the top tenons on the legs go through the armrests. Therefore, apply glue only on the tenon cheeks. Before you move on to the next assembly, bore



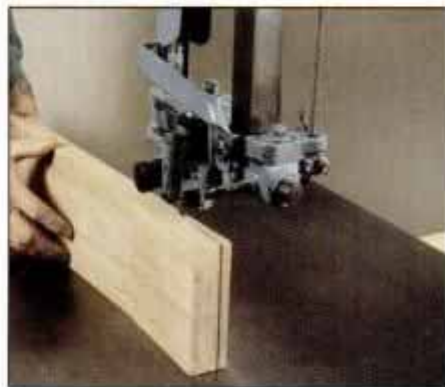
**5** Attach an extension fence with a stop to the miter gauge, and cut the tenon shoulders on the front and back rails.



**6** Next, attach an auxiliary fence to the table saw's rip fence, and use a tenoning jig to cut the tenon cheeks.



**7** Cut the slat mortises in the side rails using a plunge router. Again, clamp two rails together to support the plunge router.



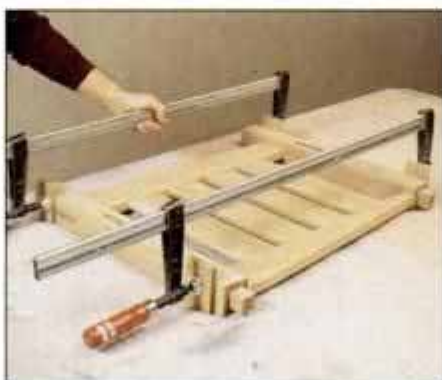
**8** Cut a wedge for each arm, and glue it to the arm. After the glue has set, saw the top of the arm to produce the flat.



**9** Fasten an arm to the workbench, and support it at a slope. Cut the through mortise for the leg tenon using a chisel.



**10** Mark the curve on the backrest slats, and mark the biscuit location. Cut the biscuit slots using a plate joiner.



**11** Glue and clamp the side slats to the side rails. Then, glue and clamp this subassembly to the front and back legs.



**12** Glue and clamp armrests to the side assemblies. Use blocks to prevent marring and to spread clamp pressure.

holes in the armrest for the backrest pegs (Photo 13), and bore the hole for the dowel peg that is driven through the arm into the leg tenon.

Join the side assemblies by gluing and clamping them together with the front and back rails (Photo 14).

Now cut the seat slats and ledger strips, and bore and counterbore pilot holes in the ledger strips and slats. Install the ledgers and slats.

Using the doweling jig, bore holes in the rear legs and the backrest for the threaded inserts (in each rear leg) and the machine screw (through the sides of the backrest).

Bore the peg holes at each of the remaining joint locations that have an exposed tenon. Using just a little glue, install an overlength peg at each joint. After the glue has set, pare the peg flush with a sharp chisel.

Lubricate the threaded inserts with a little paste wax and drive an insert into each back leg (Photo 15). Hardware stores may sell these inserts, or you can buy No. 33183 threaded inserts from The Woodworkers' Store, 21801 Industrial Blvd., Rogers, MN 55374.

Complete the assembly by installing the backrest. Separate the backrest sides from the legs with three brass washers (Photo 16).



**13** After the side-arm assembly is complete, use a doweling jig to bore holes for the backrest peg in each arm.



**14** Glue and clamp the side assemblies with the front and back rails. Use two clamps at the front and back.



**15** Bore holes, and install the threaded inserts in the rear legs. Lubricate the inserts with wax before installing them.



**16** Drive a machine screw through the backrest side and into the insert. Use three washers between the leg and side.

## Ottoman

The construction of the ottoman uses the same techniques as the chair, but the legs are cut from solid 8/4 stock.

Cut the parts to dimension, then mark and cut the mortises and tenons.

Before proceeding to assembly, remember to bore and counterbore pilot holes through the top side rails (Photo 17). The ottoman's seat is attached to the rails by screws driven through these holes.

Begin assembling the ottoman by gluing and clamping the slats to the front and back rails, then glue and clamp this subassembly to a pair of legs (Photo 18). Bore and install pegs at the joints, then glue and clamp these subassemblies spanned by the remaining rails (Photo 19).

You can now proceed to finish the two pieces. To achieve an authentic Arts-and-Crafts appearance, we used Solar-Lux American Walnut stain No. 847-536, available from Woodworker's Supply Inc., 1108 N. Glenn Rd., Casper, WY 82601; (800) 645-9292. We also used Solar-Lux retarder to prevent lap marks.

Next, we applied three coats of Watco Natural Danish Oil Finish. Apply the oil generously with a rag or brush, let it sit for about an hour,



**17** Bore and counterbore pilot holes for attaching the ottoman's slip seat. Use the drill press or a doweling guide to do this.



**18** Begin the ottoman assembly by gluing and clamping the side rails to the slats. Then glue and clamp this to the legs.

then wipe it off. Allow the oil to dry overnight between coats. After the last coat was thoroughly dry, we buffed the finish with 4/0 steel wool and polished it with a soft cloth.

To complete the chair and ottoman in the most authentic manner, as well as to impart a luxurious touch, we had the cushions upholstered in leather. Leather is expensive, and special techniques are required to work it. For this reason, we went to a professional upholsterer to have the cushions made. To do this, it's best to bring the pieces to the shop so that everything can be made to fit properly. **FM**



**19** Join the ottoman side assemblies by gluing and clamping them with rails. One clamp should provide sufficient pressure.

**NEW PRODUCTS**

# Hardware Heaven

*The best new products from this year's National Hardware Show.*

BY ROY BERENDSOHN, Assistant Home Improvement Editor

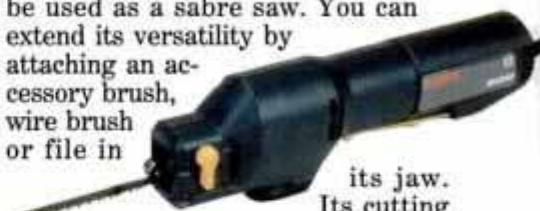


### Big Enough

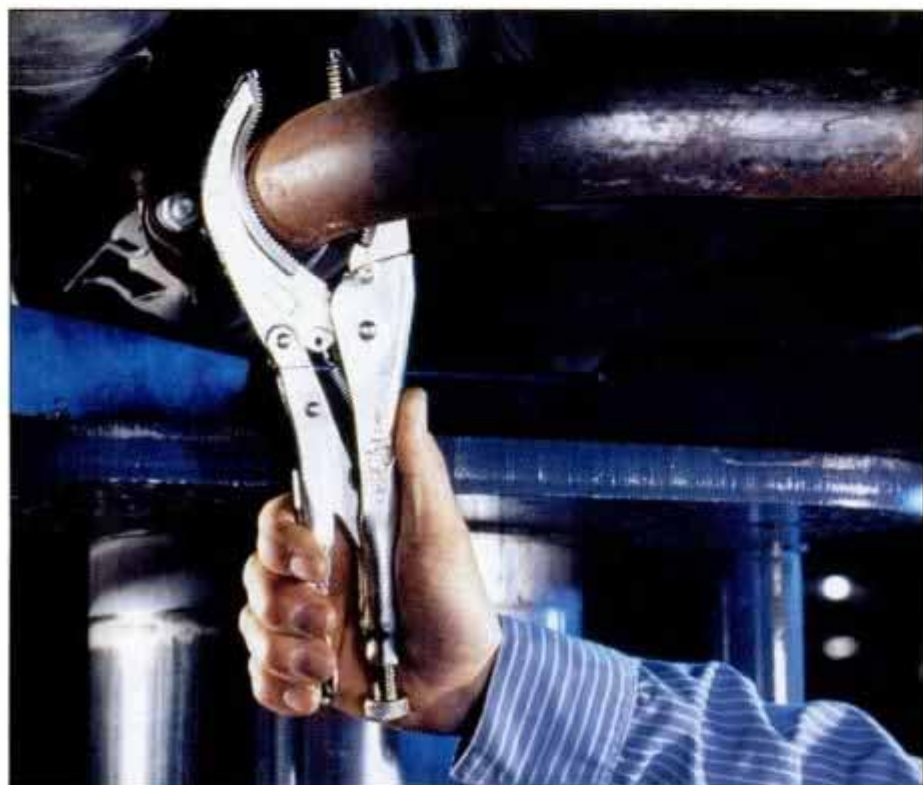
Unlike other cordless circular saws, this 14.4-volt model has a blade big enough to cut through a 2 x 4. Cutting framing lumber isn't exactly what these trim saws are designed for, but DeWalt tells us that trim carpenters and kitchen installers need it. The company says the tool will crosscut 75 2 x 4s on a charge and will rip 85 ft. of 1/2-in. plywood. The saw has a 24-tooth 5 3/8-in.-dia. thin-kerf blade and a fan-cooled motor with replaceable brushes. Its battery recharges in 1 hour, and fits DeWalt's 14-volt drills. The saw, steel carrying case and recharger come as a kit. Although its suggested retail price is about \$440, DeWalt says the tool can be found for about \$300 at hardware stores and home centers. Write DeWalt Industrial Tool Co., P.O. Box 158, 626 Hanover Pike, Hampstead, MD 21074.

### Versatile Venue

The Bosch B4050 is like a reciprocating saw, but it is light enough to be used as a sabre saw. You can extend its versatility by attaching an accessory brush, wire brush or file in



its jaw. Its cutting speed is adjustable between 300 and 3800 strokes per minute, and its orbital action is adjustable through three positions. The saw takes standard 6-in. sabre saw blades, and its blade changes without tools. Bosch says it cuts through 2 3/8-in.-thick wood and 5/16-in. steel. It costs about \$115 at hardware stores and home centers. Write S-B Power Tool Co., 4300 W. Peterson Ave., Chicago, IL 60646.



### Big Mouth

Suppose you could own just one pair of pliers. In that case, these would be a good choice. The curved jaws on the Vise-Grip 12LC open to 3 1/8 in., so you can clamp onto an oil filter or a piece of pipe. The jaw tips are parallel, so you can still lock on flat surfaces. With 1/16-in.-deep serrations on the jaws, the tool grips surfaces with the tenacity that we expect of Vise-Grips. Finally, although times may change, the pliers are still built using the same rugged steel construction associated with these tools. The 12LC costs about \$20 at hardware stores. Write American Tool Cos., 8400 Lake View Pkwy., Suite 400, Kenosha, WI 53142.

### Sentimental Journey

Stanley has broadened its line of cabinetmaking tools and modified other long-standing tools to create a new, high-quality tool collection, known as the Fine Woodworking and Specialty line. These tools are available at hardware stores, lumberyards and home centers. We had a chance to try the yellow and black chisels shown and found them well balanced and capable of holding a keen edge. A 4-piece set costs about \$44. You can visually inspect all the tools in this new collection by getting Stanley's free catalog. Some of the tools are new, and, in some cases, unique to Stanley, and others are ones that the company has sold for years. We were glad to find some sentimental favorites in it. For instance, the company still makes cast-iron duplex rabbit planes and three sizes of Yankee screwdrivers. To order a free catalog, write Stanley Tools, Advertising Services, 600 Myrtle St., New Britain, CT 06050.







## Simply Amazing

We saw a demonstration of the Power Center at the National Hardware Show and came away thinking it was an amazingly versatile machine, especially given its compact size. At its heart is a 110-volt 1800-rpm induction motor with power takeoffs at both ends. To this motor you can



hook up any one of the following: a blade-grinding module that moves a plane iron or a chisel across a 3-in.-dia. grinding wheel automatically, a sanding disc, a

drill-sharpening module that handles regular and split-point bits, and a flexible driveshaft and chuck. The tool, which becomes available in January 1995, costs about \$200 to \$250. The price includes an instructional video that comes packaged with the tool. It's sold at home centers and hardware stores. For more information, write Plasplugs Inc., 780 Vassar Ave., Lakewood, NJ 08701.



## Back To Basics

It's not every day you see innovation in products this basic, but here's one: spring-loaded center punches, nailsets and cold chisels. The ones we tried worked well, and they don't pinch your fingers. The tools cost \$8 to \$9 each and can be used in wood- and metalworking. They are sold individually or in kits through hardware stores, home centers and catalogs. Write Noxon Inc., 2921 N. University, Spokane, WA 99206.

## Better By Design

This well-designed adjustable wrench has features that mechanics and homeowners alike can appreciate.

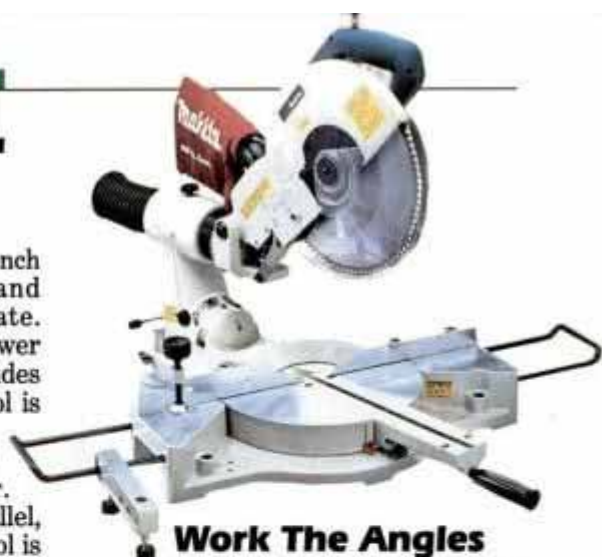
First, it has a nonprotruding lower jaw—the shank hardly protrudes beyond the jaws when the tool is open or closed. The jaw face is marked in 1/16ths on one side, and millimeters on the other.

Also, its jaws are precisely parallel, and they move smoothly. The tool is forged out of a chrome vanadium steel bar, making it strong, says Channellock, despite its thin section and light weight. It comes with jaw capacity from 1/16 to 1 3/4 in., and it costs from \$15 to \$52 at hardware stores and home centers. For more information, write Channellock Inc., 1306 S. Main St., Meadville, PA 16335.



## Take A Look

Ryobi developed its model ML618 lathe at a size (18 in. between centers) and a price (\$230 to \$250) that make it worth considering. The 29-pound machine has features such as electronic variable-speed control and the capacity to turn bowls and plates up to 10 in. in diameter by turning the twin steel rails perpendicular to the headstock. Like larger lathes, the toolrest is a machined casting, and both headstock and tailstock centers are No. 1 Morse taper. The machine is sold at hardware stores, home centers and through tool catalogs. Write Ryobi America Corp., 5201 Pearman Dairy Rd., Suite 1, Anderson, SC 29625.



## Work The Angles

Radical best describes the new Makita sliding-dual-compound miter saw. It not only bevel cuts 45° to the right as well as the left, it cuts miters up to 60° in both directions. Also, it can crosscut a 12 1/16-in.-wide board. Makita says its thin-kerf 12-in.-dia. carbide-tipped blade has received multistage heat treatment so it stays flat and will not distort under cutting load, even when cutting shallow compound angles. A blade that stays flat has less tendency to follow the grain. Other features on the 15-amp saw are its on-board socket-wrench storage for blade changes and a built-in vise. The saw has a suggested retail of about \$1500 at hardware stores, home centers and woodworking supply catalogs, but Makita says it sells in the \$900 to \$1000 range. Write Makita USA, 14930 Northam St., La Mirada, CA 90638.





## Dust-Free Drywall

Okay, so this drywall sanding system is not exactly a homeowner's tool. On the other hand, Porter-Cable thinks it will be a big hit with contractors and rental companies. It consists of a wet/dry vac and a rotary disc sanding tool. Plug the sanding tool (or any power tool) into the vacuum, and when you turn on the tool, the vacuum starts. When you turn off the tool, the vacuum runs 15 seconds to pull dust out of the system. The sander weighs 8 pounds. Its rotary-driven disc has foam-backed abrasive pads that, Porter-Cable says, leave a paint-ready surface. The pads come in 100-, 120- and 150-grit. One pad is enough to sand the interior of an 1800-sq.-ft. home, the company says. The pad turns inside an articulating head, so it follows surface contours. The vacuum has a suggested retail price of about \$450, and the sander \$575, but they can be found for about \$300 and \$400 at hardware stores and home centers, Porter-Cable says. Write the company at: 4825 Hwy. 45 N., P.O. Box 2468, Jackson, TN 38302.



## Room For One More

If your toolbox is crowded, this is the file for you. It consists of a plastic handle with a powerful magnetic strip. Thin steel plates, covered with diamond grit, attach to the magnetic handle. We tried one and found it worked well. As a bonus, the tool hardly takes up any space in a toolbox. Because diamond grit is an abrasive, you can

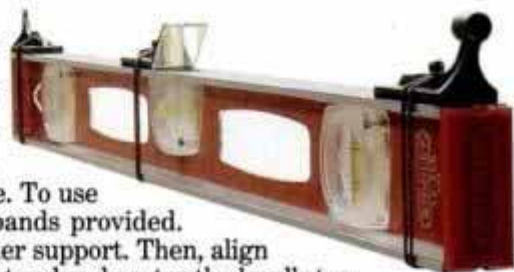


use the file by moving it in any direction, and it works on materials from wood to hardened steel and glass. It costs about \$40 and replacement diamond pads cost about \$10 each. It's sold through mail-order catalogs and hardware stores. Write EdgeCraft, Limestone and Southwood Rds., P.O. Box 3000, Avondale, PA 19311.

## It's Fun Work

We tried this unusual retrofit tool and found it worked well and is fun to use. It's really the best way we know for a homeowner to shoot grade inexpensively. It's also a clever way to teach youngsters about topography and grade. To use it, snap it on a level with the elastic bands provided.

Hold the device up on a sawhorse or other support. Then, align its peep sight on a distant object or target rod and center the level's top



bubble between its lines—you do this with the small mirror that's part of the kit (adapters allow the tool to work on side-reading levels). The whole process takes just minutes. It costs about \$25 at hardware stores and home centers, or it can be bought directly from EWC/Tool Division, 11750 Sutton St., Petaluma, CA 94952; (800) 723-4404.

## Double Duty

Jorgensen pulls a double header with this clamp, because it squeezes parts together and it pushes them apart. Here's how the clever device works: With the jaw in the position shown, the clamp is a fast-action type. To use it as a spreader, slide the handgrip to the end of the bar so its jaw is facing outward, then pop off the nylon end pins, and reverse the sliding head. The clamps come in 10-, 16-, 22- and 28-in. sizes, and they cost from \$16 to \$20 at hardware stores, home centers and through tool catalogs. Write Adjustable Clamp Co., Sales Dept., 417 N. Ashland Ave., Chicago, IL 60622. **FM**

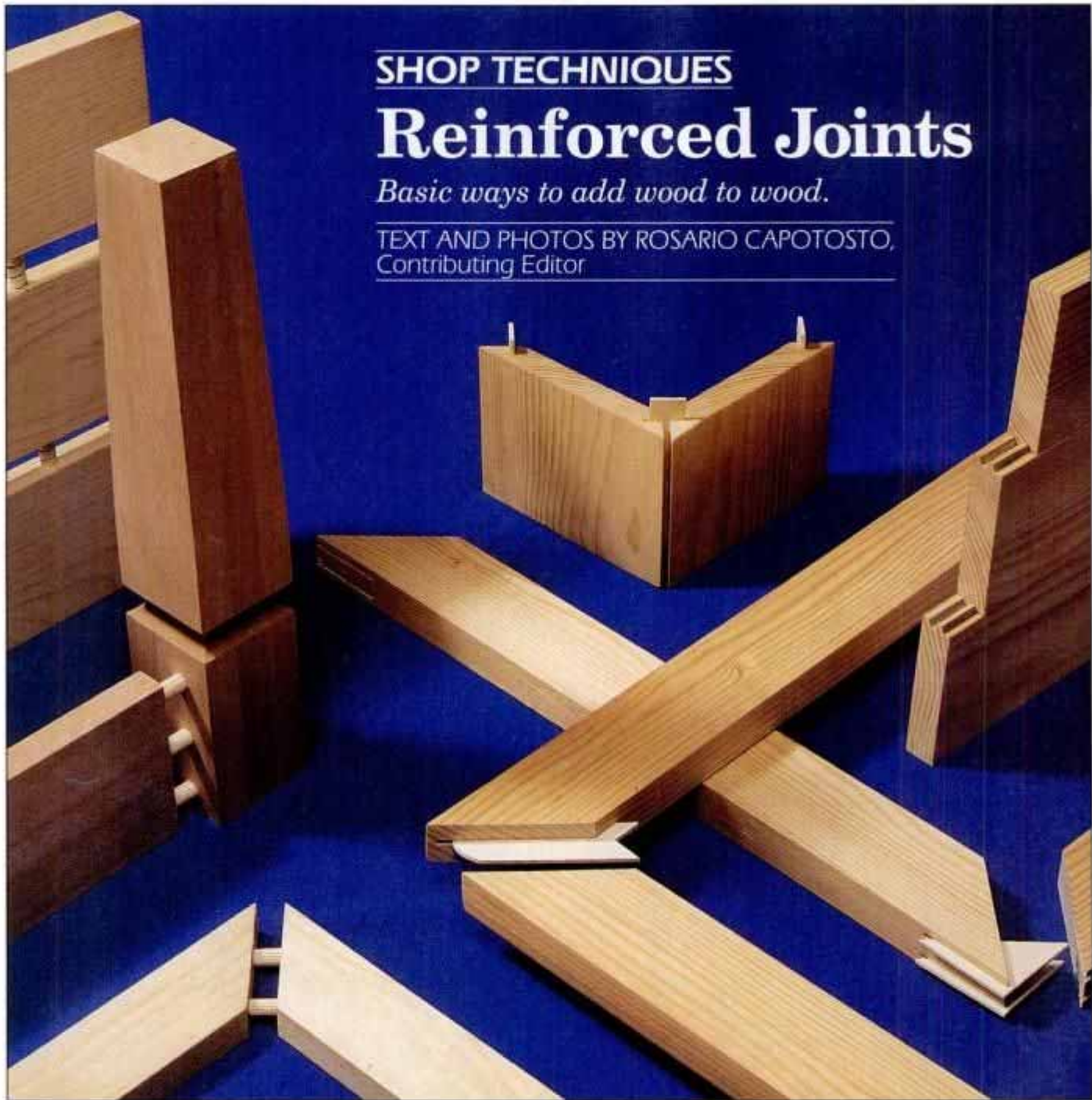


SHOP TECHNIQUES

# Reinforced Joints

*Basic ways to add wood to wood.*

TEXT AND PHOTOS BY ROSARIO CAPOTOSTO,  
Contributing Editor



● Have you noticed that once a woodworker learns how to make tight-fitting dovetail joints, they begin to appear on everything? And mortise-and-tenon joints, once mastered, multiply like rabbits—usually pinned and in full view. Woodworkers aren't immune to the "if you've got it, flaunt it" syndrome. However, the real pro will tell you to choose your joint to suit the job. And in many cases, the direct approach is not only faster and easier, but just as strong as the fancier, more skill-intensive solutions.

The simplest way to join two pieces of wood is to cut them to size, apply a little glue to the mating surfaces and

put the assembly in clamps until the glue sets. Unfortunately, this method doesn't work well if there's any end grain involved. End-grain joints require reinforcing, usually with dowels or splines, so the glue joins the pieces through adequate long-grain contact.

As it turns out, dowels and splines are also handy for aligning and reinforcing ordinary edge-to-edge joints. In combination with milled joints such as tongue-and-groove joints and glue joints, you're prepared to solve a wide range of joinery problems. Best of all, you can make most of these joints quickly and accurately, using ordinary hand and power tools.

## Basic Butt Joints

When used correctly, today's glues are stronger than the wood itself. Therefore, when laminating stock to produce wide panels, there's a good argument for leaving out any type of reinforcing. The secret to a successful edge-to-edge glue joint is perfect contact along the entire mating surface.

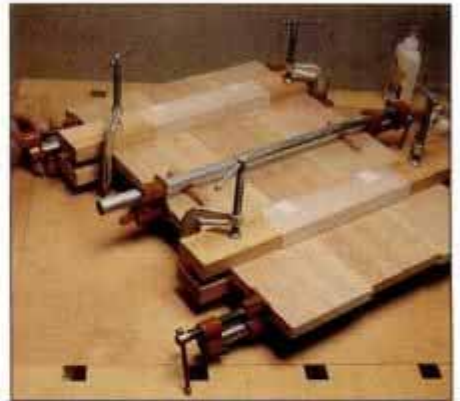
Begin by laying out the boards and marking them as they're to be assembled. If you have a jointer, joint each edge. Check for fit by placing the mating surfaces together and looking for any light that passes through the seam. To fine-tune a joint, or do the job entirely by hand, fold two adja-

cent boards together and hold them in your vise so both mating surfaces can be planed at once. Then, true the edges with the longest plane you have (Photo 1). Because both edges are planed together, slightly out of square planing is negated when the boards are unfolded and joined.

To keep the boards aligned and flat when gluing them together, sandwich straight boards across the assembly and clamp. Then, apply bar or pipe clamps across the assembly. Alternate these clamps above and below the panel to equalize the pressure and reduce any tendency the assembly has to cup (Photo 2).



**1** Fold workfaces together and plane the edges. Planing angle doesn't affect parallel alignment of faces when boards are joined.



**2** Apply glue to both mating surfaces of each joint. Use boards to keep assembly flat. Alternate clamps above and below.

## Doweled Joints

Using dowels in a butt joint increases the mechanical resistance to lateral stresses and maintains alignment when gluing the boards together. While it's a popular alternative to simple butt joints, keep in mind that it often creates a crossgrain assembly. In edge joints, avoid using dowels longer than about 1½ in. Otherwise, the dowels may actually force the joint open if the wood dries and shrinks. Always make the dowel holes slightly deeper than necessary and either buy or make grooved dowel pins so excess glue can escape.

To add dowels to an edge-to-edge joint, first place adjacent boards together and use a square to mark centerlines on both edges (Photo 3). Use a doweling jig to ensure that the holes will be square to the edges and at a uniform distance from the workfaces. Some doweling jigs are self centering. If you're using a noncentering type, be sure to reference one side of the jig with designated workfaces on your stock to ensure that adjacent faces will be aligned. Use a depth stop or piece of tape wrapped around the drill bit to gauge hole depth (Photo 4).

To do the job with a drill press, first clamp a fence to the drill-press table and place your work against it. Then, adjust the fence so the bit is centered over the stock edge. Mark an index line on the fence that corresponds to the bit center. Align hole centerlines on the work with the index mark, and bore each hole (Photo 5). Always reference the same working face of each piece against the fence to ensure good alignment even though there may be slight variations in stock thickness.

Doweling is an excellent way to reinforce mitered-frame joints. After cutting the miters, lay each joint together and mark the hole locations on the faces. Then transfer these cen-



**3** Place adjoining boards face to face, and use a square to mark dowel hole centerlines across both edges at once.



**4** Align index mark on doweling jig with centerlines on stock edge and bore holes. Self-centering jig aligns hole across edge.



**5** To bore dowel holes on a drill press, set up fence and position for centered hole. Align holes with index mark on fence.



**6** Use a doweling jig to bore holes for miter joints. Use a depth stop or masking tape around bit to gauge hole depth.

terlines across the mating edges.

Align your doweling jig with the hole centers and bore the holes (Photo 6). To assemble the frame, apply glue and join two L-shaped sections first. Then, join the assembled sections and clamp with bar clamps or a band clamp to bring the joints tight.

A dowel center is a small steel plug with a centered point on one face. Use dowel centers for transferring hole locations in leg-to-rail joints or other joints with unaligned faces. First, bore dowel holes in one piece and

insert the centers (Photo 7). Then, press the two mating surfaces together to transfer the centers. Use flat shims clamped to the work to gauge the appropriate face offset (Photo 8).

When dry assembling dowel-joined components to check for fit, it's a good idea to cut slots along each dowel so the project can be assembled and disassembled easily. Use a small block of wood to hold each pin and cut the slot on a band saw (Photo 9). Use unslotted grooved dowel pins for the final glued assembly.

*Say something  
smooth.*

Black Velvet® Blended Canadian Whisky, 40% Alc. by Vol. (80 Proof) © 1994, Heublein, Inc., Hartford, CT



**Black Velvet**  
SMOOTH. PREMIUM. IMPORTED.

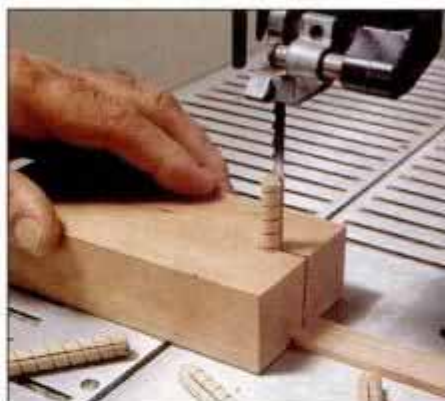
Материал, защищенный авторским правом



**7** For unaligned dowel joints, place dowel centers in dowel holes in preparation for marking adjoining hole positions.



**8** Press mating pieces together to mark holes with dowel centers. Shims clamped to work sides control alignment offset.



**9** To add slots to dowels for dry fitting assemblies, install dowel in scrap block. Then, cut slot on band saw.

## Milled Joints

Milled joints, such as the tongue-and-groove and shaped glue joint, make stock alignment and assembly easy while increasing the surface area for a stronger glue joint. These joints can be made on a table saw or shaper.

To make a tongue-and-groove joint on a table saw, first install a dado blade and set the width for the width of the groove—usually one third of the stock thickness. Set the fence for a centered cut, and cut the groove (Photo 10). Making the tongue requires two cuts—one on each side of the edge of the mating piece.

You can also use a molding head with tongue-and-groove cutters. These specially shaped cutters enable you to complete the joint in two passes (Photo 11).

The shaped glue joint is made with a single glue-joint cutter that produces both mating pieces (Photo 12). To use the cutter, first shape the edge of the first piece (Photo 13). Then, shape the edge of the second piece, flip the piece over and join the two. Because of the reversible profile, the faces will be aligned.

When making any of the above milled joints on a table saw, always secure a wooden board to the metal table saw fence so the fence can be adjusted up to the cutter.



**10** Use a dado blade for tongue-and-groove joints. First cut makes groove. Making the tongue requires two cuts.



**11** To make tongue-and-groove joints in two passes on a table saw, use a molding head with tongue-and-groove cutters.



**12** Glue-joint cutter in molding head shapes both sides of joint. Shaped glue joint increases glue surface area.



**13** Use a featherboard to hold workpiece against wooden auxiliary fence when using molding head. Glue-joint cutter shown.

## Spline Joints

A spline is a thin strip of wood that is inserted into grooves cut in adjoining stock faces. Like dowels or milled joints, splines add mechanical strength to the joint and aid in alignment during assembly. Thin plywood, 1/8-in.-thick hardboard and hardwood are the usual spline materials. If you use solid wood, orient the grain at a right angle to the grain direction of the work to provide greater strength. Like dowels, hardboard, plywood or

crossgrain hardwood splines should not be too wide or they may force the joint open if the wood shrinks. For average work, make the spline width about the same as the stock thickness. A spline joint doesn't require a single, continuous spline. For long joints, simply use short lengths placed end to end in the slot.

To cut a spline groove with a router for an edge-to-edge joint, first install a winged slot cutter of the appropriate size. Center the cutter on the

stock and make the slot (Photo 14). This method is best for making blind spline joints that require stopped slots. Cut the splines for a slip fit that is slightly less in width than double the slot depth (Photo 15).

You can also use a table saw to quickly cut spline slots that match the saw kerf thickness. When cutting slots in edge miters, place the slot closer to the inside miter corner to provide adequate depth for the slot (Photo 16). When assembling a box

"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**

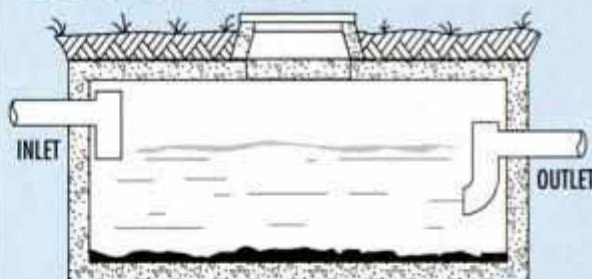
OR Fill Out Coupon

**Keep your septic tank and  
cesspool in great shape.  
Use SEPTIC HELPER!**

#### SEPTIC TANK BEFORE



#### SEPTIC TANK AFTER



#### DRAIN LINES BEFORE/AFTER



A drain pipe loses part of its diameter in 5 years due to organic build-up.



SEPTIC HELPER helps to restore the pipe to original after a few months of treatment.

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

PM



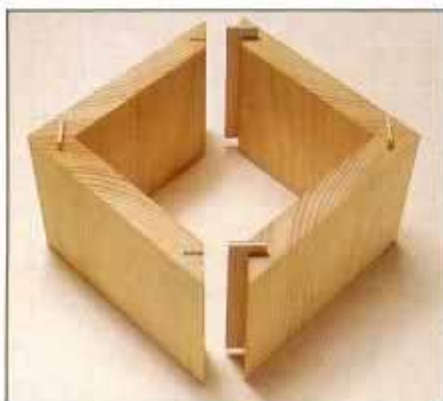
**14** Use a router equipped with a winged slot cutter to make spline slots. Stop cut short of end for blind spline joints.



**15** Referencing slot with same face of each board ensures alignment. Cut splines slightly narrower than double slot depth.



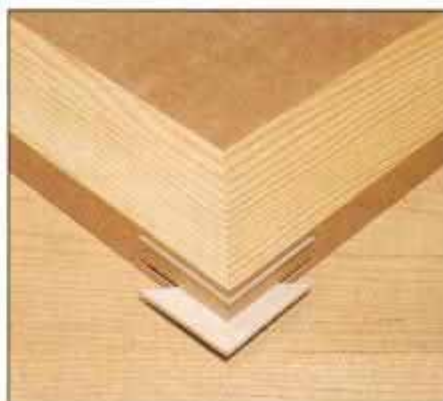
**16** Use a table saw to cut kerf-width slots. Cut slots in miters with blade tilted to miter angle and slightly below center.



**17** Assemble splined-miter-joint boxes in two stages. First join adjacent L sections. Then, join subassemblies and clamp.



**18** Use a jig to support workpiece when cutting spline slots parallel to face in end of miter joint. Use two splines per joint.



**19** Apply glue and fit splines in miter. Clamp across frame to tighten miters. Clamp across joints to hold splines.

joined with splined miters, join the two L-shaped sections first. Then, join the two sections and clamp (Photo 17).

Splines can also be used to join mitered frames. The advantage here over doweling is that there's some room for adjustment during assem-

bly. To cut the slots on the table saw, first build a jig that supports the work vertically and at the miter angle (Photo 18). Then adjust the fence and depth of cut and make the slot. It's best to use two slots in each joint for maximum strength. After the slots

and oversize splines are cut, apply glue and assemble the frame. Clamp across the frame to bring the miters together and install clamps face to face across the spline joints to hold the splines in place until the glue sets (Photo 19).

## Plate Joints

The fastest way to reinforce a simple butt joint is with a plate joiner. The oval-shaped plates, or biscuits, have the advantages of both splines and dowels. In addition to being quick to make, plate joints are easy to adjust during assembly and provide good strength. Plate joinery is suitable for laminating boards into a larger panel, for using on mitered work and for joining rails to legs. It greatly speeds producing strong end-to-face-grain joints in shelf construction.

To join shelves to a side panel, first lay out the shelf positions by marking the top of each shelf on the side panel. Then, lay a shelf above its shelf position so the end is aligned on the mark and lay out slot index marks on the shelf. With the plate joiner held vertically, place the front faceplate on the side panel and butt the base of the joiner against the end of the shelf.



**20** Use a plate joiner for fast assembly of shelves and side panels. First cut slots in sides, then matching slots in shelf ends.

Align the index mark on the joiner base with the slot marks on the shelf, and cut the slots down into the side panel (Photo 20).

To cut the corresponding slots on a shelf, rest the joiner base on the side



**21** Apply glue to plate joint slots and install plates in shelf ends. Then, assemble components, adjust alignment and clamp.

panel and butt the faceplate against the shelf end. Then, align the index marks and make the slots. When the slots have been cut, apply glue, insert the plates, assemble the components and clamp (Photo 21).



# BE "THE BOSS" OF YOUR OWN NEW BUSINESS!

Send now for your free opportunity kit;  
get "hands on" training in one of seven  
profitable fields!

## Learn to Earn!

The Federal Government projects the service sector of the economy will show tremendous growth over the next several decades. You can get your share of the profits when you become a "pro" in one of 7 high income professions. Professions that could easily earn you \$18 to \$30 per hour. Foley-Belsaw's unique training programs can make those dreams come true. The key to your success lies in providing a service that is in great demand. Foley-Belsaw training programs focus on seven fields where the demand is growing and will continue to grow through the twenty-first century! And with Foley-Belsaw's unique approach, you gain skills quickly in your spare time at home; you can even earn cash while you learn. There's no "classroom pressure" ... no fierce competition ... you set your own pace, your own study style. Foley-Belsaw also provides "extras" other courses don't offer: a 100% money-back guarantee; along with all the professional tools and equipment you need.



**1 Locksmithing.** As millions of Americans demand greater protection, this becomes a high demand field. We provide the training to make you a professional locksmith who commands \$25 per hour.

**2 Professional Saw & Tool Sharpening.** Imagine a business where 90 cents out of every dollar you take in is cash profit! You'll earn \$18 to \$25 per hour running machines that do the work for you.

**3 VCR Cleaning, Maintenance & Repair.** The VCR has become a basic part of nearly every American household. You can make up to \$50 per hour in this fast growing field.

**4 Upholstery.** As furniture prices rise and quality noticeably decreases, it makes good sense to pursue a career in upholstery. You'll learn to make big profits in both commercial and consumer markets.

**5 Small Engine Service & Repair.** There are more than 65 million small engines in use today (a number growing at a rate of 1,000 each month). You can make \$45 in just 1/2 hour for a simple tune-up, and even more for many of the simple repairs you'll learn on everything from snow blowers to bass boats.

**6 Professional Woodworking.** Build over \$3,000 worth of valuable furniture while you learn! You'll start the Foley-Belsaw course with the simplest of projects then move on to creating heirloom-quality furniture! You'll save thousands on your own home repairs alone.

**7 Computer Repair, Maintenance & Upgrade.** There's no doubt about it, the computerization of America is taking place! Get a jump on a high paying occupation or business of your own in a field with an unlimited future.

CALL TOLL FREE

# 800-487-2100

FOR FREE INFORMATION PACKET!

COMPLETE AND RETURN THIS COUPON TO:

Foley-Belsaw Institute, 6301 Equitable Road, Kansas City, MO 64120

(Please check only one of the following.)

- Locksmithing, Dept. 12575
- Saw & Tool Sharpening, Dept. 21420
- VCR Repair, Dept. 62240
- Upholstery, Dept. 81032
- Small Engine Repair, Dept. 52472
- Woodworking, Dept. 43367
- Computer Repair, Dept. 64140



NAME \_\_\_\_\_

STREET \_\_\_\_\_

CITY/STATE/ZIP \_\_\_\_\_

**YES!**  
SEND ME  
THE FOLLOWING  
**FREE**  
OPPORTUNITY KIT

## Homeowners Clinic

BY NORMAN BECKER, P.E.,  
Contributing Editor

### Wood Stove Clearances

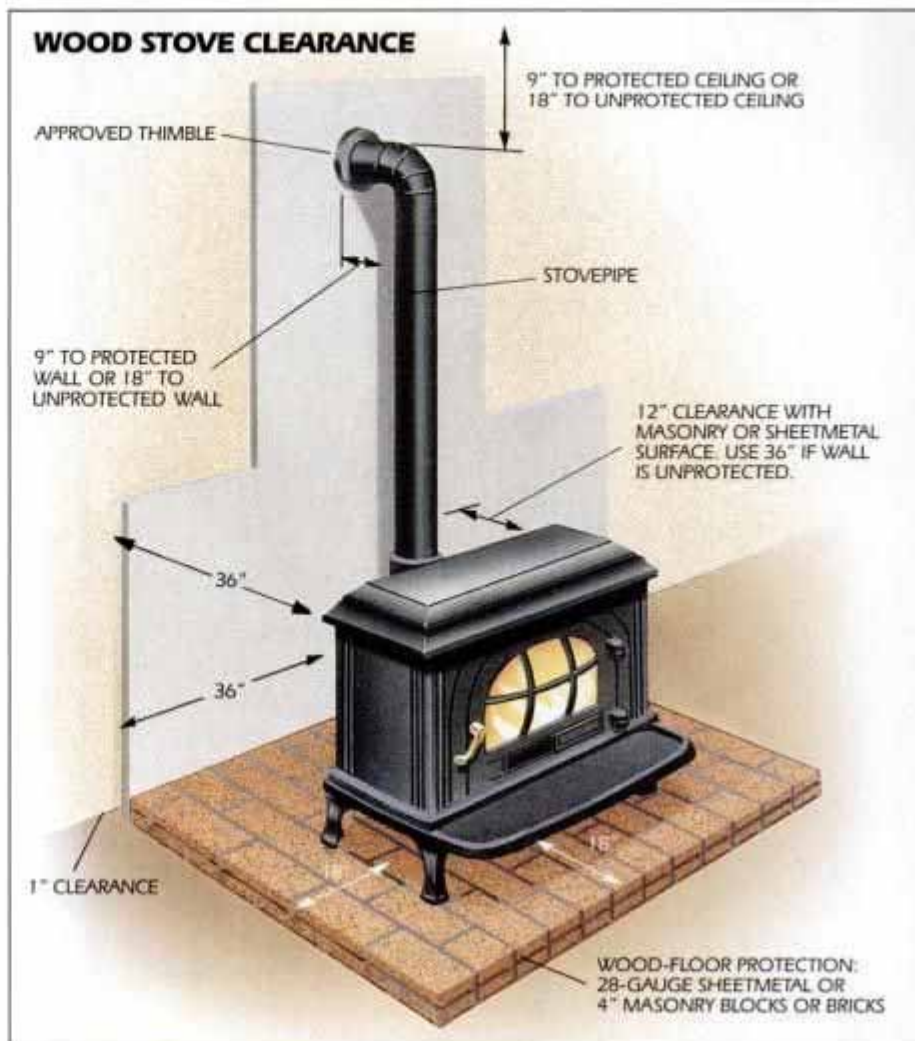
It is important that proper clearances be maintained between wood stoves and combustibles, such as walls and furniture, to prevent a fire. Wood undergoes a physical change when continually exposed to elevated temperatures, and this reduces its ignition temperature. Wood normally begins to burn at 400° F to 600° F. However, when it is continually exposed to temperatures between 150° F and 250° F, its ignition temperature can be lowered to 200° F.

It can take years for wood's ignition temperature to be lowered, so homeowners can acquire a false sense of security. But when the wood's temperature coincides with the lowered ignition temperature, it will ignite and burn spontaneously.

With that in mind, there are basically two sets of standards for clearances around wood stoves—clearances for stoves that have been tested and listed to UL Standard No. 1482, and clearances for stoves that have not been listed to this standard.

A new stove will have a label attached to it telling you if it has been tested and listed to this standard. The label will also tell you what clearances to use around the appliance (generally these are in the 12-in. to 36-in. range).

For stoves that have not been tested and listed to the UL standard, the minimum clearances are often



To safely install a wood stove, follow the manufacturer's directions and observe adequate clearances on all sides of the appliance. Generalized clearances are shown above.

defined by local building codes, so you should check with your building department before installing a stove. Some generally accepted clearances are shown in the drawing. Also, you may need a building permit for the installation, and some municipal-

ities require that a stove meet current EPA emissions guidelines.

### Frosted Attic

The roof sheathing in our attic last winter was either heavily frosted or wet with large patches of mildew. The attic floor is covered with loose cellulose insulation but no vapor barrier. The gables are vented, and one end has a fan that kicks in at 80° F. Do we need a plastic vapor barrier under the insulation and vents along the ridge? Our basement is damp, too. Does this contribute to the problem?

STEPHEN HOLTROP  
HUNTINGTON, IN

The problem in your attic is a reflection of the problem in your basement. A vapor barrier under the insulation will help reduce the frost and mildew buildup—however, it will not eliminate it because you have an excessive moisture condition in your house. Even with a vapor barrier, moisture will migrate up to the attic through plumbing and

### Free Info

● If you're like most people, you spend more time inside in the winter, which allows you more time to notice every spot and stain on your carpet. If you want to do something about them, or if it's time to replace the carpet, contact The Carpet and Rug Institute. The CRI has two outstanding free pamphlets. One is about cleaning and maintenance, and the other is about carpet types, should you want to replace your carpet or have some installed for the first time. Write The Carpet and Rug Institute, P.O. Box 2048, Dalton, GA 30722, or call (800) 882-8846.

—Roy Berendsohn

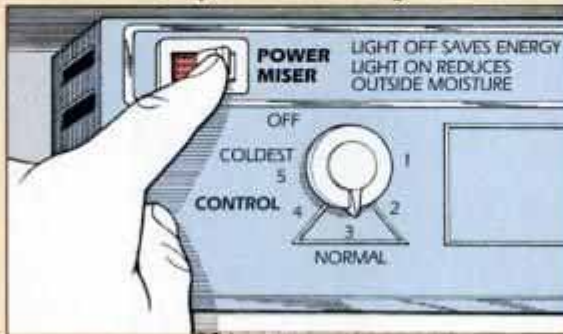


**Saving Energy**

● The winter months mean increased utility bills, so you should take advantage of an easy energy saving when you can. How? Remember to use the energy saver switch on your refrigerator. Many modern refrigerators have this switch. It controls current flow to a heater coil that runs around the front of the freezer cabinet and extends to the mullion between the fresh food cabinet and the freezer. During the high-humidity months of summer, you want to energize the heater. By keeping the cabinet surfaces warm, the heater prevents condensation from forming. During the winter, however, indoor humidity is usually quite low, so there is no need to activate the heater. The surfaces can be cool without condensation forming on them. Most energy saver switches have instructions. —R.B.



**APPLIANCE CARE TIP**



vent pipe chases and other openings.

To control the attic problem, you will have to control the dampness in the basement. Make sure to clean your gutters and downspouts so that water can flow to and then down the downspout. Also, the ground should slope away from the house, or surface water during a rain or snow melt will flow toward the house and accumulate around the foundation.

If after doing the above there is still a moisture problem, you should coat the interior portions of the foundation wall with a cement-based

sealer such as Thoroseal, from Thoro System Products, Suite 101, 8570 Phillips Hwy., Jacksonville, FL 32256; (800) 227-8410. I'm assuming you have a concrete floor in your basement, not a dirt floor. If not, install a concrete floor or cover the dirt floor with overlapped polyethylene sheets with the joints taped.

**Banging Drainpipes**

I have drain lines made of ABS plastic in my home, and the lines are run inside wood frame/drywall partitions. Whenever I run hot water through the line, it makes noise, like someone

**Christmas Tree Tips**

● If you buy one of the 35.4 million Christmas trees used annually in the United States, you might appreciate these tips from the National Christmas Tree Association:

**Cut Trees:**

A tree should smell and look fresh. To test it, lightly grip a branch about 6 in. from its end and draw your hand to the branch tip, letting the needles slip through your fingers. Few needles should fall off. If the tree is small enough, you can pick it up and drop it on its cut end. This should dislodge only a few needles.

Cut off a section of the tree's stem before placing it in water. Place the tree in water immediately after it is cut. It may require a gallon of water in the first 24 hours.

**Live Trees:**

1. Keep the tree in a sheltered, unheated location away from freezing temperatures, direct sun and wind.

2. Keep the root ball moist, not wet.

3. To plant the tree, move it from the house to a sheltered location to help it adjust to colder temperatures. Dig the planting hole during the fall, and plant the tree only if the ground is unfrozen. If the ground is frozen, put the tree in a sheltered spot until spring or until a thaw.

4. Do not remove burlap wrapping from the tree ball when planting. When the root ball is wrapped in plastic, cut the cord securing the wrapping and unravel the plastic exposing at least half the ball. If the tree is in a plastic pot, tap around the pot to loosen it, then slide it off.

5. Backfill around the root ball with soil removed from the hole, and mulch thoroughly around the base of the tree.

6. Stake the tree during the first year of growth to prevent it from being tipped over in the wind. —R.B.

**Winner and Steel Champion**



With a sturdier handle and new, rugged finish, America's most popular steel bottle is now tougher than ever. Made in the USA and guaranteed for life, it makes a winning gift, too. Available in quart, half-gallon, and widemouth styles, plus a Stanley Lunch Cooler.



*Maddin.*  
**STANLEY**  
 America's No. 1 Brand

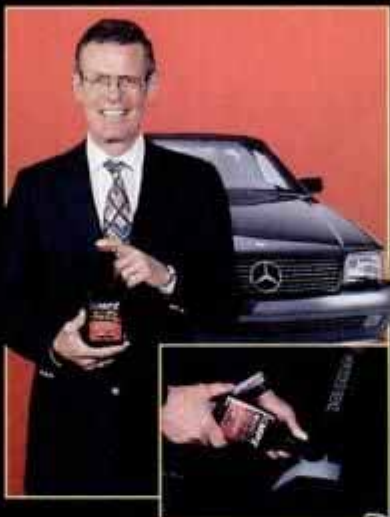
# "NEVER CHANGE OIL AGAIN..."

## BOBBY UNSER SAYS:

"Oil is just oil without MPZ...but with it you get more horsepower, more torque, and more wear protection. MPZ has proven these benefits with Torco's Racing Oil in the world's most powerful and fastest racing cars, boats and motorcycles...including 300 MPH race cars on pavement and 400 MPH race cars on the Bonneville Salt Flats.

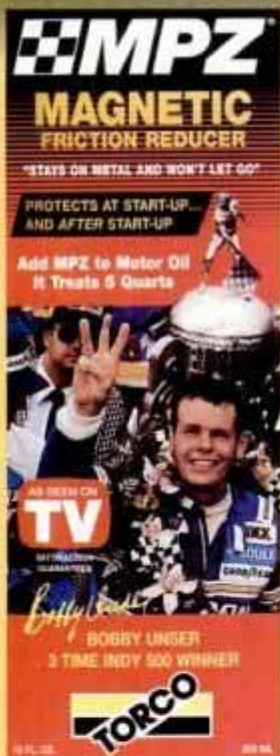
Now this racing secret is available to all engine owners in Torco's MPZ Magnetic Friction Reducer...that stays on metal and won't let go. It protects at start-up...and after start-up. Just pour in MPZ. It only takes a minute...and it will save money every mile you drive.

So order MPZ now! You'll save money on gasoline, oil, filters and engine repairs. You'll help protect the environment and save energy resources. There's no risk. It's guaranteed."



...WITHOUT **MPZ**™ MPZ Reduces Friction Here...Where 97% of Friction Occurs.

MPZ's Formula Of Active Ingredients Is Rated As The **SLIPPERIEST FRICTION REDUCER** By The World's Top Car Manufacturers.



"We all know there are a lot of oil and engine treatments. I've seen them all...and I've tried most of them myself. Believe me, there's nothing like MPZ. Here's why!

MPZ adheres to iron and steel engine parts magnetically where it is chemically absorbed into the surface. Therefore, MPZ won't wash off, burn off or rub off. It stays put and won't let go of cylinders, piston rings and valvetrain parts where energy is lost due to friction.



**NASA FACILITY TESTS**  
Government grant proves MPZ in Energy Saving Research.

MPZ recovers energy lost to friction. This saves money on gasoline. It protects the oil from oxidation and heat breakdown into residual carbon. So your oil and filter will last longer...saving money. MPZ protects your engine from wear...saving even more money.

Order now! There's nothing like MPZ for saving money on gasoline, oil, filters and engine repairs. It's guaranteed. Only \$19.95 per bottle plus \$4.00 shipping and handling. Call now! Order desk open 24 hours...1-800-879-3800."

**SAVE 20 GALLONS OF GAS**

Highway Driving	8.5%
City Driving	6.3%

MPZ more than pays for itself by saving gasoline.



**CALL NOW! 1-800-879-3800**

**TORCO INTERNATIONAL CORP.**

9916 Pioneer Blvd. • Santa Fe Springs, CA 90670 • (310) 942-8480 • FAX (310) 949-4211

© 1994 TORCO International Corp.

banging on the walls with a hammer. Can you tell me how to correct it?

ROY HIGA  
AIEA, HI

Since the noise only occurs when hot water is flowing through the drain-pipe, it is probably caused by the expansion of the pipe. Apparently, the pipe is constrained by an inadequately sized opening in the top or sole plate in the wood stud wall. As the pipe expands, it rubs on the sides of the opening, creating the noise. If this is the case, open the section of wall by the pipe, and wedge a piece of polyethylene sheet or plastic milk jug in the opening. This will reduce the friction generated by the rubbing action.

## Heating System Leakage

I acquired a hot water radiator from a building prior to its demolition. After a cold-water pressure test revealed no leaks, we installed the radiator. Shortly thereafter, we discovered that it leaks about a pint of water a day. Does a slow drip from a hot water radiator pose any threat to the heating system?

VICTOR ZUPANCIC  
KIRKLAND LAKE, ONTARIO

It could. It depends on the hardness of the water and how long the leak exists. In a hot water heating system, the radiator, distribution pipes and boiler are filled with water. In a properly functioning system, correct pressure is maintained by the pressure-reducing valve, which lets in water when some water leaks out.

However, the introduction of this water leads to mineral deposits on the boiler bottom. Here's how it happens: Calcium carbonate and magnesium carbonate (commonly called lime) are in solution to various degrees in most water supplies, and are responsible for the condition known as hard water. These minerals precipitate out of the water when it is heated to more than 140° F. Therefore, the harder the water and the longer the leak exists, the more minerals that are introduced into the system and the greater the amount of deposits on the boiler bottom.

The deposits can insulate the boiler water from the boiler wall. When the water cannot cool the wall, the wall can overheat and crack.

PM

## 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**

**How To  
Install An  
Electric  
Water Heater**

BY STEVEN WILLSON,  
Home Improvement Editor  
PM Illustrations by  
George Retseck

● A water heater, especially an electric model, is a very simple device. Unheated water enters one side of the tank. The water is heated by a couple of electric resistance elements that extend from the side of the tank into the middle of the water. And then on demand the water exits from the other side of the tank. Unfortunately, such simplicity doesn't really extend to its installation. While far from difficult, installing an electric water heater does involve plumbing and electrical work, which may be enough to put off quite a few people. It shouldn't. The skills required for a job like this are not nearly as demanding as they are for other common homeowner pursuits like refinishing furniture or growing a successful vegetable or flower garden.

**Getting started**

Plan your installation on paper first. This is a great way to minimize the number of fittings you need and the number of trips to the hardware store to buy the things you forgot.

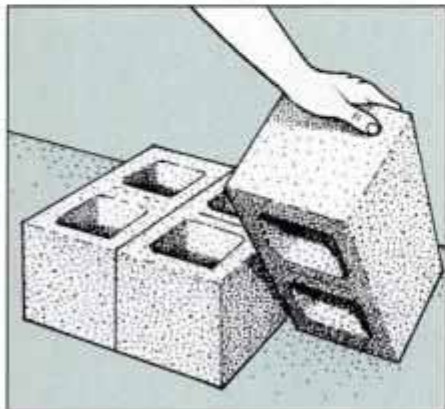
For this job, we were replacing a tank and moving its location as part of a larger remodeling job. If you're just



putting a new tank in the same place, you'll have even less work to do. Begin by removing the tank from its box and reading all the product literature that comes with it. Make sure to incorporate any specific manufacturer instructions into your plans, especially if not doing so voids the product warranty. Select a convenient spot for the tank and place two or three concrete blocks on the floor (Fig. 1).

These blocks help prevent damage from minor floods and make getting at the drain much easier.

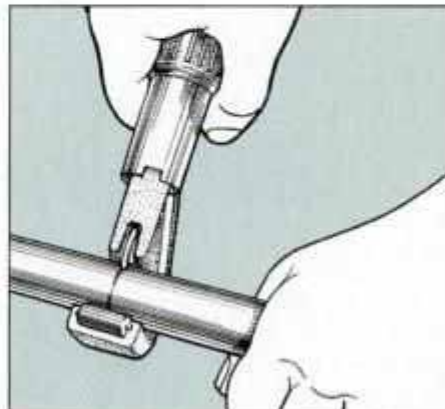
Next, slide the tank on top of the blocks making sure to keep the drain faucet to the front (Fig. 2). Rock the tank back and forth slightly to make sure the blocks don't move. If the blocks do move, or the tank rocks on top of the blocks, reposition everything until the tank is stable.



**1** Create a platform for the tank on the floor using concrete blocks. This platform protects the tank from water damage.



**2** Slide the tank onto the blocks and center it. Align the drain toward the front and make sure the tank doesn't rock.



**3** Begin installing the cold water copper tubing by cutting a piece to length. Use a standard tubing cutter for the cut.

## Soldering basics

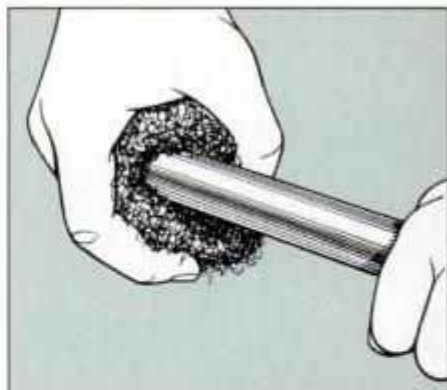
Soldering copper tubing and fittings is really one of the easiest building skills to acquire. All you need (besides the tubing and fittings) are a propane or Mapp gas torch (we prefer Mapp gas because it burns hotter and melts lead-free solder better), a tubing cutter, some paste soldering flux, several pads of steel wool, a wire brush to clean the ends of the fittings and some lead-free solder. All of these items are commonly available at local

hardware stores and home centers.

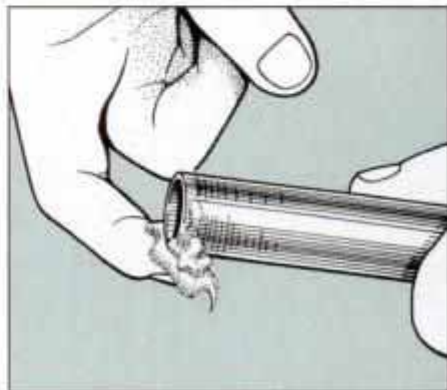
The rules are simple: The mating surfaces must be cleaned thoroughly and covered with flux, the tubing cuts have to be absolutely square and the fittings can't be bent or distorted.

The place to begin is by cutting a 6- to 8-in.-long piece of 1/4-in.-dia. tubing for the cold water entrance line on the tank. Use a tubing cutter, not a saw, and keep the wheel square to the pipe as you work (Fig. 3).

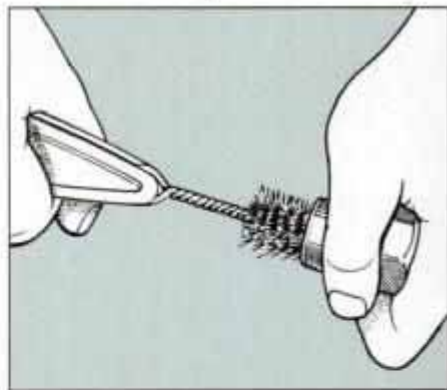
Next, clean the end of the tubing



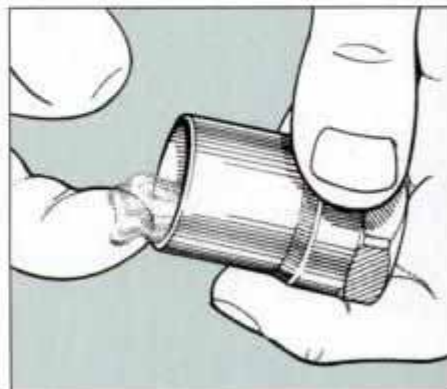
**4** Once the tubing is cut, clean the end with a steel-wool pad. Make sure to clean at least a 1-in.-long section of tubing.



**5** Apply paste flux to the polished end of the tubing with your fingertip. Make sure to cover the entire perimeter.



**6** Clean the inside of a female pipe adapter using a wire brush. Make sure the entire inside surface is clean.



**7** Add flux to the inside of the adapter fitting. Spread it liberally and then slide the fitting onto the end of the tubing.

## IT'S LIKE OWNING MY OWN MACHINE SHOP!



Guaranteed  
to pay its  
own way!

Now, you can Mill, Turn  
or Drill metal, wood, and  
plastic with one quality  
and precision tool!

Build your own projects,  
make your own repairs



Lathe

Businesses make repairs, build prototypes,  
do light manufacturing. The possibilities  
are endless.

Pays for itself in six months

Want to save time and money?  
Do work in your own shop!  
No more waiting for high-priced  
machinists or repair profes-  
sionals. Down-time is expensive  
--don't wait for expensive parts--  
do it yourself! Models start as  
low as \$1,095.00

You don't have to  
be a machinist!

Do quality work right away.  
The Smithy is simple and  
functional, and with it



Mill



Basic Tool Pak - FREE with Smithy purchase!



Drill

you'll receive a great  
operations manual, a one-  
hour instructional video,  
and a tool pak to get you  
started. On top of that, call  
our toll-free technical  
assistance line any time you have a question.

Imagine what you can do with  
your own personal machine shop.

We're so confident you'll be satisfied, we'll  
give you 30 days to try it out.

Call or write Today for a  
FREE 64 page Catalog.

**1-800-4SMITHY**

(1-800-476-4849) Dept. PMAA

Name \_\_\_\_\_

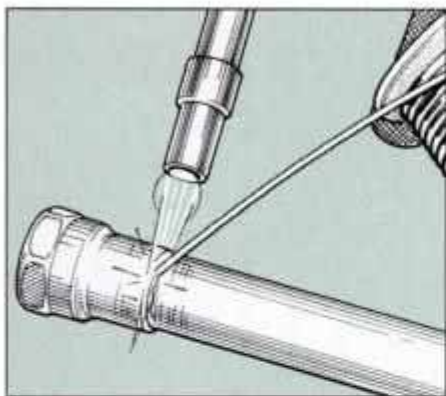
Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ Zip \_\_\_\_\_

**Smithy**

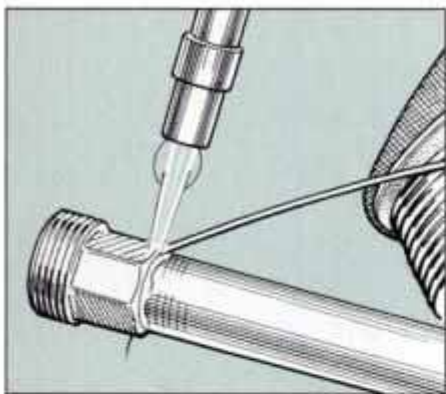
3023 East 2nd Street  
The Dalles, Oregon 97058



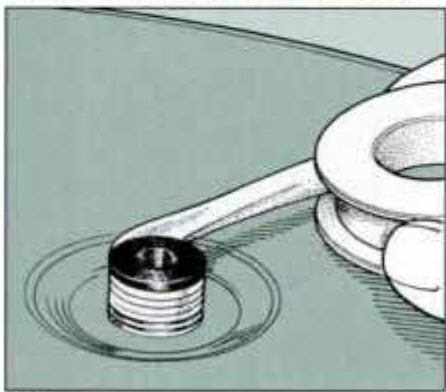
**8** Heat the joint until the flux burns. Then add solder and keep heating until it melts and runs out the bottom of the joint.



**9** Once the joint is full, remove the torch. Then wipe the joint clean with a soft rag to remove any excess solder before it dries.



**10** Solder the male side of a union to the other end of the tubing after you've cleaned the mating surfaces thoroughly.



**11** Use Teflon tape to seal the pipe threads on the tank nipple. Imbed the tape in a clockwise direction.

with a piece of steel wool (Fig. 4). Rub clean an area at least 1 in. long and make sure that only a bright copper color can be seen when you're done. Then cover the cleaned area with some soldering flux (Fig. 5) and put the piece aside.

You can also use steel wool to clean the inside of all your fittings, but it's much more convenient to use a simple wire brush designed for the purpose. Just insert the brush into the end of the fitting and turn until the sur-

face is clean (Fig. 6). Add flux to the inside of the fitting (Fig. 7), and then slide the fitting over the end of the tubing piece.

Begin heating the joint by turning on the torch and adjusting the flame so the inner blue flame is about 3/4 in. long. Bring the tip of the flame to bear directly on the top of the joint and heat this area until the flux melts and burns out. You don't have to move the torch around the joint. Copper is a great conductor of heat and keeping

# Sleep Better On Air!

## 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 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.

to your body's shape and 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.

## Sleep Better On Air

A Select Comfort Air Sleep System doesn't rely on springs or water. Air is better because it gently contours



The Only Mattress with Push Button Firmness Control.

## HURRY!

Call for special offer now in effect.

For FREE Video and Brochure, Call  
**1-800-831-1211**



Please send me a FREE Video and Brochure.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

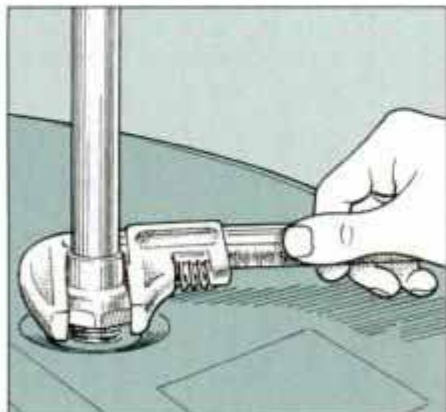
Zip \_\_\_\_\_ Phone \_\_\_\_\_

Mail to: Select Comfort Corporation  
 6105 Trenton Lane N., Minneapolis, MN 55442

© Select Comfort Corp., 1994 Dept. 3350

the flame in one position is all that's required to heat the entire joint.

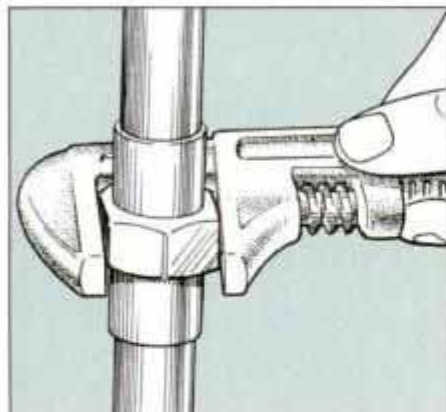
As soon as the flux disappears, touch the top of the joint with some solder (Fig. 8). If the tubing is hot enough, the solder will melt right away. If not, simply lift off the solder, keep heating the joint and try again. Once the solder starts to melt, keep pushing the solder into the joint until



**12** Thread the tubing and adapter assembly onto the tank and then tighten firmly in place with an adjustable wrench.

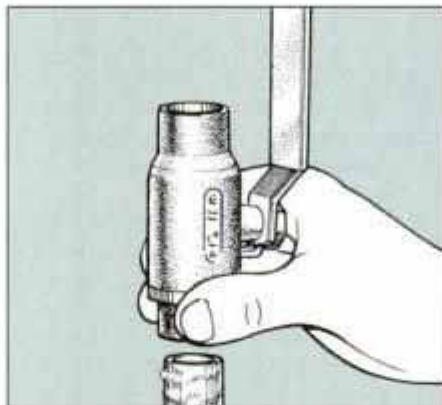
it drips out the bottom. This means the joint is full. Immediately remove the flame and wipe off any excess solder with a soft rag (Fig. 9). Be sure to wear heavy gloves to prevent burns.

Because we wanted to be able to easily move the tank for servicing or repair we decided to put a union fitting on both the cold and hot lines as they left the tank. To install these



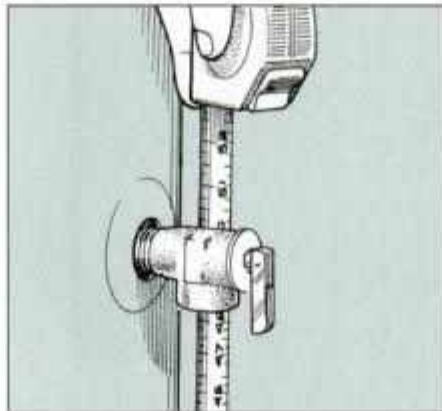
**13** Solder a short length of tubing onto the nut side of a union. Then join the two halves with the nut. Tighten it firmly.

unions, simply clean all the tubing ends and fittings as before, add some flux and solder the parts together (Fig. 10). Once this assembly is complete and cool to the touch, put some Teflon thread-sealing tape onto the tank nipple threads (Fig. 11) and tighten the adapter in place (Fig. 12). Then join the two halves of the union together (Fig. 13) and tighten the nut firmly.



**14** Clean the tubing and the ball valve, and apply flux to them both. Slide the valve over the tubing and solder together.

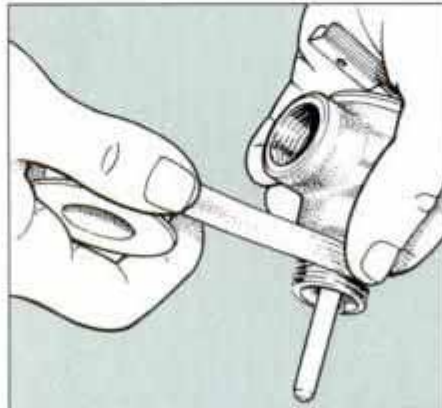
Next, clean and flux a shutoff valve for the cold side and slide it over the tubing end (Fig. 14) and solder it in place. We used a ball valve for this purpose but a gate valve with sweat fittings on both ends can also be used.



**15** Temporarily install a temperature and pressure relief valve and measure from the bottom of the valve to the floor.

### T&P valve

The T&P valve (temperature and pressure relief valve) is a safety device that creates a pathway for the water to escape if the pressure inside the tank builds to a dangerous level for any reason. It's important



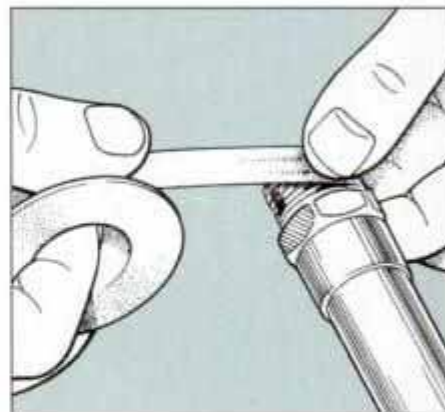
**16** Remove the temperature and pressure relief valve. Then cover the threads with Teflon tape, stretching it into place.

that the valve you buy is rated the same as your water heater. The product literature for both will describe what's required. In our case, we simply matched the ANSI (American National Standards Institute) rating numbers of both.



**17** Reinstall the valve in the tank using an adjustable wrench. Make sure that the open end of the valve points down.

To begin the installation, temporarily thread the valve into the tank and take a measurement between the bottom of the valve and the floor (Fig. 15). Deduct 4 in. from this measurement and cut a length of tubing to match. Once your measurement is taken, remove the valve and coat the threads with Teflon tape (Fig. 16) and reinstall it in the tank (Fig. 17). Then solder a male adapter onto the tubing, let it cool and cover the threads with Teflon tape (Fig. 18). Finish up by threading the drain assembly into place and tightening securely with a wrench (Fig. 19).



**18** Cut the relief valve tube to length and solder a male adapter to one end. Cover the adapter threads with Teflon tape.

### Electrical power

A water heater always requires a separate 220-volt circuit and in our case a 30-amp circuit breaker and 10/2 (with ground) circuit cable. These were already in place on our job, but the cable ended nearly 20 ft.

(Please turn to page 114)



# SHOP OUTFITTERS

a division of Lockdown Securities, Inc.

Manufacturer of Compact Metalworking Tools

605 South Adams St. • Laramie, WY 82070 USA

(307) 745-5999 • FAX (307) 742-5999



MADE IN USA

**\$298.00**  
**Christmas**  
**New Years**  
**Special**

Shipping included lower 48  
(Save \$71.00 off Regular \$369.00 Price.)

Ask for special when you call.

**Note:** All items shown except bent tubing and scrollwork, were formed on the standard tooling that comes with each bender. Optional tooling may be added at any time.

We are continuing to develop and patent new attachments for the benefit of our customers to expand their capability well into the future.

Over 10,000 Benders in use today in USA.

© 1994

## 2516-H Compact Bender (Shown with optional tubing dies)

### Specifications:

**Capacity:** Bends up to 5/16" x 2" flat, 5/8" solid round or solid square hot rolled mild steel. Sharp Right Angle Bend Attachment bends up to 3/16" x 2" or 1/4" x 1-1/4".

**Tooling:** Each machine includes (7) 1"-3" heat treated steel dies, die rack, square stock block, heat treated pins, stand, sharp right angle bend attachment, and instruction manual.

**Weight:** Approximately 60 pounds.  
**Height:** 38-1/2"



New! Baked on Powder coated finish.



### Optional Scroll Attachment

Bends up to 3/16" x 1" Hot Rolled Flat Stock (Add \$98.00)  
Includes 112 Page Idea and Design Book.

### High Quality Precision Ring Roller

Rolls Rings out of up to 3/16" x 1" & up to 5/16" Round

**\$269.00**  
Includes Shipping Lower 48

Approximate weight 15 lbs



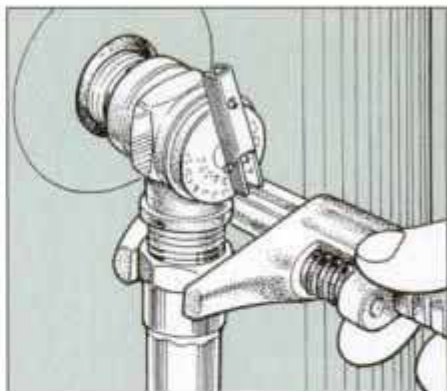
away from our new tank location.

We brought new cable, from a joist-mounted junction box, to the new tank location by boring holes through the middle of the overhead joists and running the cable along the side of the joists where convenient. Be sure to staple the cable in place every 2 ft.

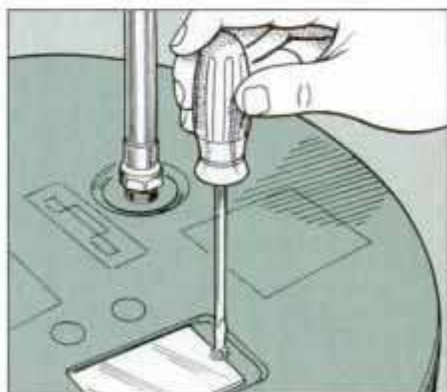
To gain access to the electrical wires in your tank, remove the covering plate on the top (Fig. 20) and pull out the black and white wires that you

find there. Then remove the knockout plug from one cable hole using a screwdriver and hammer (Fig. 21) and slide a conduit connector into the hole (Fig. 22). Firmly attach the connector by threading its nut in place from inside the tank opening.

Next, measure the distance from the top of the tank up to the joists above and add about 4 in. so the conduit can be attached to the side of a joist or a piece of blocking nailed between two joists. Once the conduit is



**19** Thread the drain tube into the relief valve and tighten. The open end of the tube should be 3 to 4 in. above the floor.



**20** Remove the cover plate that protects the electrical wires. Usually just one screw holds the plate in place.



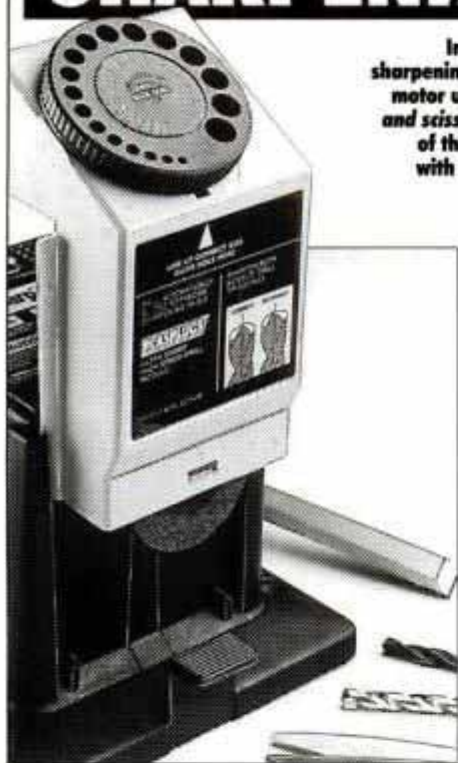
**21** Locate a knockout on the top of the tank and force it down with a screwdriver and hammer. Break it off with pliers.



**22** Slide the threaded end of a conduit connector into the knockout hole and tighten it in place with the connector nut.

## THE ULTIMATE 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" aluminum 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 7/16" to 3/4"
- Even sharpens broken drills



Dial up the size of drill bit

Unique double action backs off the drill faces for a perfect finish

### 4 FOR MASONRY DRILL BITS

- Resharpenes tungsten carbide masonry drills
- For regular or hammer-action
- 80 grit Silicon carbide grinding wheel included



Takes masonry drill bits up to 3/8" diameter

Flip-over bridge used for finishing off hammer-action bits

## 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.



**PLASPLUGS** 780 Vassar Avenue, Lakewood, N.J. 08701. Tel: (800) 966-6400

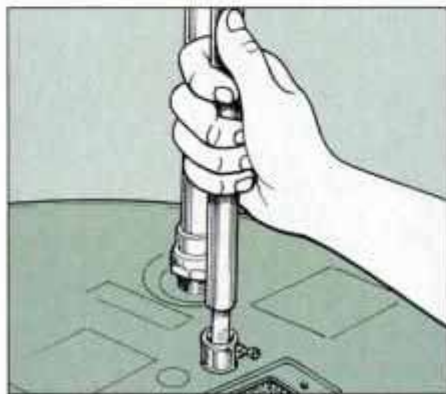
## UltraSharp™

### AN EXPERT IN EVERY BOX

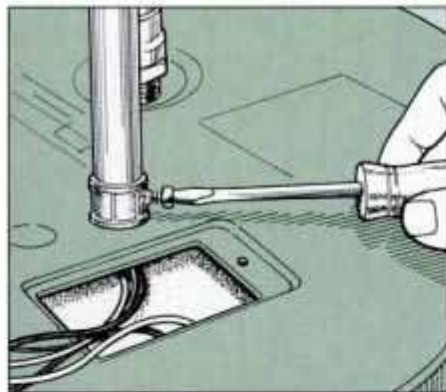
The UltraSharp 4-Module starter pack is available from Home Centers, Department Stores and good Hardware outlets. Made in the USA by Plasplugs. 4-Module Starter Pack includes modules 1-4, motor unit, two grinding wheels, and comprehensive instructional videotape.



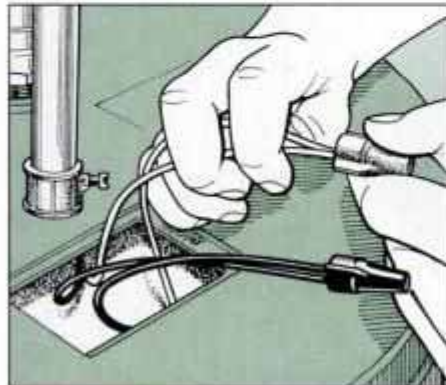
**23** Cut a piece of conduit to length and slide it over one end of the electrical circuit cable. Avoid damaging the insulation.



**24** Feed the cable through the connector and into the tank opening. Then slide the conduit completely into the connector.



**25** Fasten the top of the conduit to the floor framing above. Then attach it to the connector with a setscrew.



**26** Attach the cable ground wire to the ground screw. Then join the white wires and the black wires with wire connectors.

cut, slide the free end of the cable into the top of the pipe (Fig. 23) and pull the cable out the bottom. Then fish the cable end through the connector and into the tank opening and slide the conduit into the connector (Fig. 24). Tighten it in place with the connector screw (Fig. 25) and attach the ground wire from the cable to the grounding screw inside the tank opening. Join the two white wires together with connectors and the two black wires together with connectors

(Fig. 26). Replace the covering plate and your installation is done.

Check your work by first filling the tank with water and making sure that there are no leaks in your plumbing job. Remember to close the drain valve before turning on the water. Only when the tank is full should you turn on the circuit breaker and send power to the heating elements. If you turn on the elements before the tank is full of water, they will be ruined and will have to be replaced. **FM**

## Double Your Exercise Results

**Meet TRIMAX ... Designed for Twice the Workout in Half the Time**

Dive right in, and you'll be immediately impressed by the workout. Hydraulic cylinders and two-way isokinetic resistance — that's the power of TRIMAX. You don't have to worry about adjustments, changing weights or how many pounds to lift. There's no wasted motion — no wasted effort.

**Unique to TRIMAX ... Combined Strength and Cardiovascular Training**

Dual resistance, pushing and pulling, works two separate muscle groups, cutting your workout time in half. This intense two-way action elevates your heart rate into your target zone, giving you a thorough cardiovascular workout. In less than 30 minutes, you've achieved total body conditioning.

**22 exercise positions**



**44 total exercises**

You're tired, but not sore, because there's no harmful negative resistance or load bearing on your joints. You feel exhausted but exhilarated. You definitely want to do this again.

**Dramatic Results — Quickly ...**

From the very beginning, you're encouraged and motivated. Within 30 days you'll be stronger and leaner. Plus, you'll have a lowered heart rate, greater endurance, and increased flexibility. With this success come some pretty healthy doses of self-esteem.

**Tested, Compared, and Rated The Best ...**

**Popular Mechanics**

featured TRIMAX in its March '93 issue. "In addition to rock solid construction and superb overall ergonomics, the

TRIMAX is notable for an innovative weight-resistance system that uses smoothly articulating hydraulic shocks." In the same article,

which compared TRIMAX to NORDICFLEX GOLD and SOLOFLEX, they continued ...

"Of all the test units, TRIMAX is the one that most closely resembles the kind of state-of-the-art equipment found in health clubs."

**You Must Be Satisfied ...**

We believe the more knowledgeable you are about exercise, the more likely you'll purchase a TRIMAX. Call our 800 # for a comprehensive information kit, including a free brochure, video, and an envelope brimming with information you will use. Try out a TRIMAX for a full month — no obligations, and find out just how good this machine really is. We guarantee that you'll be satisfied.

# TRIMAX®

**Free TRIMAX information kit, including Video and Brochure.** Call toll-free or send this coupon.

**1-800-866-5676**

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone ( ) \_\_\_\_\_

Mail to: 20 S. Main St., Janesville, WI 53545 Dept. PM1294

# Making Snapshots

BY JAMES M. BARRY



● There is good news for those of us who are growing shoulder weary juggling and juggling a still camera and a camcorder simultaneously at family events to get snapshots and videos. A new generation of video printers, machines that produce snapshots from your home videos (or any video source), is coming on the market with prices much lower than before.

You get a very different type of snapshot when you're grabbing it stop-action style from a home video. There's a sense of spontaneity that comes through that's more difficult to realize in all but the rarest instances with a still camera. Since video is made up of 30 frames per second, you have an enormous selection to choose from before making prints. You simply hook up the video printer to your VCR or camcorder and television, roll the tape and you're ready to turn select video frames into snapshots.

And people are finding more uses for creating prints from video. The proliferation of multimedia players that combine graphics, video and sound dramatically increases the potential for pulling a stop-action shot

from a video screen. Kids need a picture of a lion for a homework assignment on African wildlife? Pull it right off your television screen. Want to rub it in or prove it to your pals that you really did get to the highest level of your favorite videogame? Prove it with a picture of your triumph.

This winter, Casio and Sansui introduce two



Casio's new video printer produces 2 × 3½-in. snapshots.

new video printers that use very different technology to accomplish the same effect—fast, low-cost prints taken straight from your television or video camera.

Video printers are not new, of course. Professionals have used units costing several thousands of dollars for many years, and sophisticated consumer models costing \$1000 or more have been on the market since the late '80s. These can be found in many electronics stores from familiar brands like Sony, Panasonic, Hitachi and Mitsubishi.

These machines use a thermal-dye transfer process that converts video signals into heat for printouts. A thermal head heats the ink and applies it to the printing paper using three primary colors: yellow, magenta and cyan. Information from thermal sensors and temperature records in the thermal head memory are fed to the microprocessor for temperature calculations, resulting in sharp, well-defined image outlines. Since the ink evaporates into tiny particles, very delicate color adjustments are possible.

The Sony CVP-M3 color video printer is a compact, portable model that weighs less than 10 pounds and carries a suggested retail price of \$1200. It's simple to use, with just two main operation buttons: CAPTURE and PRINT. As you review a videotape, choose a scene, press the CAPTURE button, then hit PRINT and a 4 × 5 full-color print is ready in less than a minute. The unit has lots of other features, too, such as the ability to print picture-in-picture, multiple images on a single sheet and multisequence printing for motion analysis of a golf swing, for example.

The Panasonic PV-VP1 is a table model with a list price of \$1300 that uses the same type of thermal transfer process and includes digital effects. Since the quality of the prints depends in large part on the quality of the video signal, the best snapshots will come from the best video sources. With that in mind, both units feature S-Video inputs for higher resolution

from S-VHS or Hi-8 source material.

The news this winter, however, is about the two new low-priced printers from Casio and Sansui. Casio uses a new formulation of the heat transfer process while Sansui uses a Polaroid photographic process to achieve the same results.

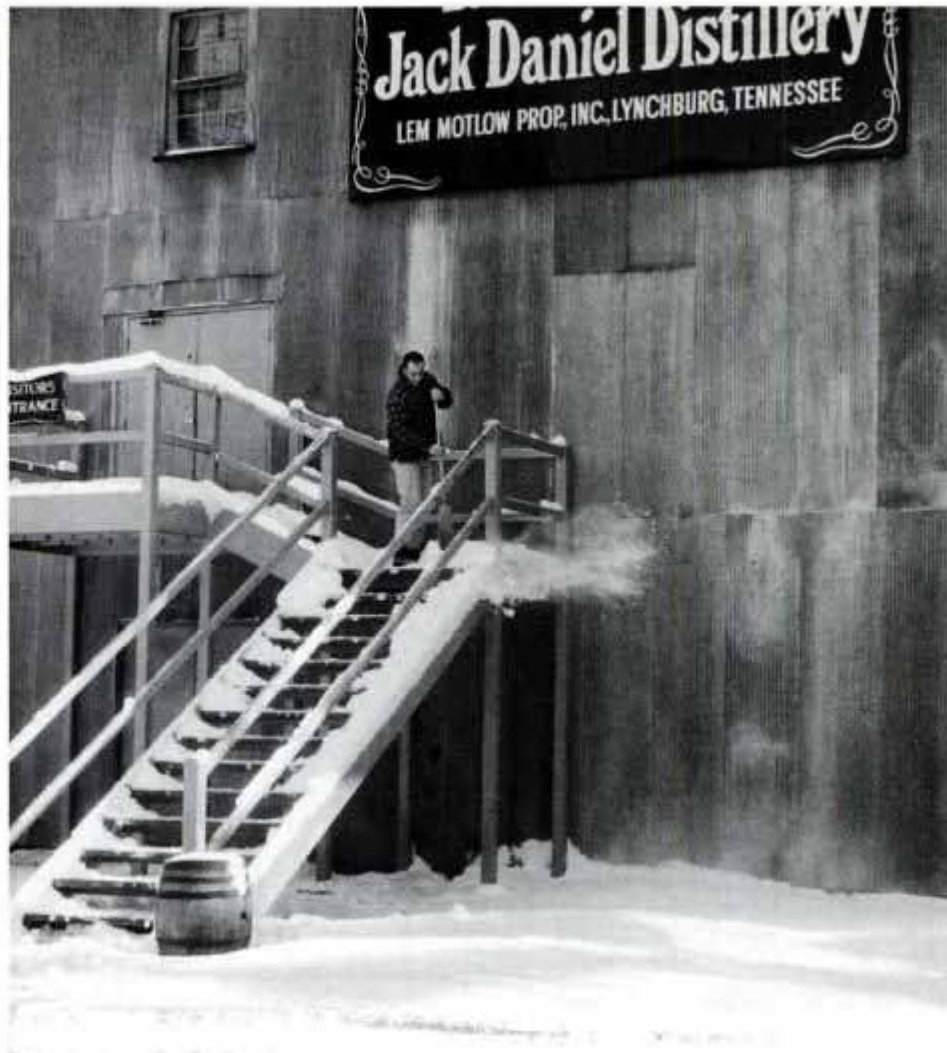
Casio's new VG-100 personal video printer, listing for less than \$600, uses a heat transfer system but it employs a new technology called Point Diffusion (PD) transfer.

The Point Diffusion method uses a reduced amount of energy, according to the company, making it possible to simplify the design of the print mechanism. The newly developed system works in conjunction with an original chip-integration technology to allow the price breakthrough. A newly developed high-precision point diffusion head is equipped with fine heating points for each dot, providing exact control over heat diffusion to the thermal-ink ribbon. The PD system solves many of the problems experienced when controlling dot color gradations by providing control over the size of each dot, thus enabling smooth changes in color shading and higher-definition color images.

This is a compact unit, just about 8 x 10 in. and about 3½ in. high, weighing about 5½ pounds. It produces a color print about 2 x 3½ in. in size. It can produce 128 color gradations, which translates into more than 2 million colors. The resolution is 499 dots x 682, or the equivalent of 210 dots per square inch. The paper comes in standard or sticker packages of 50, priced at \$19.99 and \$24.99.

The Sansui VideoSnap is another snapshot model that uses Polaroid Spectra film and an instant photographic process to recover stills from any video source. The shoebox-size VideoSnap weighs 6 pounds and contains a tiny LCD display that is photographed to deliver the Polaroid print. The VideoSnap, which is also expected to sell for less than \$600, is easy to use. Once you've hooked it to your video source and a monitor, simply press the FREEZE button to stop the action, and if what you see is what you want to print, press PRINT and a Polaroid pops out and develops before your eyes in the familiar way. Sansui executives point out that their unit gives the user the advantage of purchasing Polaroid Spectra film, which typically sells for \$8 to \$10 for a pack of 10 prints at thousands of retail outlets.

The more conventional video printers use standard video print packs that carry a "VP" symbol and also cost about 80 cents to \$1 per print and are available at electronics stores. **PM**



Jack Daniel Distillery is open every day but Thanksgiving, Christmas and New Year's - regardless of the weather.

IF YOU LIKE JACK DANIEL'S, won't you visit us someday in Lynchburg, Tennessee?

We'd like to take you around and show you how we make our Tennessee Whiskey. (We use an old, old method our founder perfected in 1866.) Of course, if you can't join us this year, don't worry. Our distillery has survived two world wars, 25 presidents and one Depression here in Lynchburg. Not to mention a serious fire and the blizzard of '93. So, whenever you decide to come, we'll be here.

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 3611), Tennessee 37352  
Placed in the National Register of Historic Places by the United States Government.



both of which will be used by the defense team.

"When I first met Robert Shapiro he was pulling a dolly loaded with documents," says Terri Tobey-Smith, vice president of inVzn, and a promoter of the "paperless trial" concept. "Our main mission in life is to change the way the legal profession uses paper. We make it simple for them. I'll ask, 'Do you want that paper in a box, or on a CD-ROM?'"

Putting legal documents on CD-ROM involves more than scanning them into a computer. Complex security procedures must be maintained to ensure that the digital documents

are identical to the printed versions. In addition, they must be indexed for quick access. In many cases, each page of a document running over hundreds of pages must be indexed.

The WinVision software uses a proprietary system inVzn wishfully calls ISII, for International Standard for Image Identification—wishfully, because it is not yet an international standard, or even a national one. ISII has, however, been tested in the courts and upheld as providing a verifiable audit trail for official documents. Simply put, ISII assigns each page of a document a unique number, like a PIN, of which inVzn maintains

a record through the corporation's nationwide system of service bureaus.

As for the indexing part, as each document is scanned into a computer at an average rate of about 6000 pages per hour, the WinVision software keeps track of pages and allows the lawyers to flag important points—for referral, for printing or for any use.

"Only 3% of all cases ever go to trial," says Tobey-Smith. "This kind of preparation can really impress an opposing counsel and encourage an out-of-court settlement."

If the case does go to court, like the Simpson case, the next step is to "burn the trial CD," says Tobey-Smith. The trial CD will take all the relevant documents or portions of them, any photos, videos or other evidence, and key them with bar codes. Using *TriaLink*, the lawyers can print out bar-code labels, stick them on 3 x 5 cards or a legal pad along with their trial notes, and retrieve them instantly from the trial CD-ROM using a wireless bar-code reader.

What is the effect on the jury? Imagine a traditional trial. The lawyer is questioning a police officer. "I hand you this photo of a blood-stained glove. Do you recognize it? I hand you this page of notes. Are these the notes you took at the crime scene?" The jury sees no photo, no notes. The lawyer may as well be showing the officer his new baby.

With IPS, when the lawyer presents the witness with the photo, the jury sees it, too. When the lawyer shows the witness the notes, the page appears on the screen right next to the photo. If the lawyer asks the witness to indicate a blood stain, he circles it with an electronic marker like football announcer John Madden analyzing a hole in a team's defense—and the jury has a ringside seat.

"We don't want to take the place of the facts of the case," says Tobey-Smith. "The technology allows the attorneys to present the facts of the case in a way the jury can understand."

Nonetheless, computer animation that goes beyond the presentation of fact may become a factor. With no eyewitnesses to the crime, the circumstantial evidence is open to interpretation. Will the defense introduce a computer animation explaining the known facts of the case, showing how O.J. could have been at home as they have maintained?

Says evidence consultant Tom Reiter, "I don't know how much will get in, quite frankly. You can use animations if they're explanatory in nature. If you do an animation that's a scenario of a murder, you have a tough time getting it in."

The lawyers for the police officers



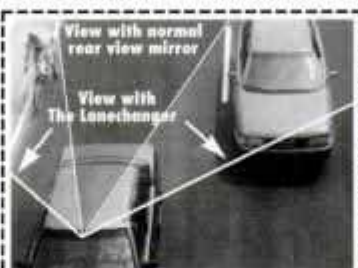
## Avoid Blind Spots With THE LANECHANGER

The Lanechanger is a unique, easy to install, wide angle mirror that helps eliminate dangerous blind spots, greatly improving your overall field of vision.

- Increases visibility for safer lane changes and while backing up
- Provides better view of rear seat occupants
- Works great as a Child Watcher
- Available in two models: **Universal Fit**

**THE LANECHANGER I** is an add-on wide angle auxiliary rear view mirror that attaches to your existing rear view mirror. Available at Canadian Tire, Pep Boys, G.I. Joe's, Fred Meyer, Western Auto, K-Mart, Rose Auto, Trak Auto & other retail outlets.

**THE LANECHANGER II** replacement combination wide angle and conventional universal fit rear view mirror. Lanechanger II available in a variety of retail stores or order Factory Direct. Send \$29.95 plus \$4.00 Shipping & Handling to:



Look how much more you'll see with the Lanechanger rear view mirrors!



The Lanechanger I (above) and II (top photo) can be installed in any vehicle!

**THE LANECHANGER INC. 601 Auguste Mondoux, Aylmer, Quebec, Canada J9H 5E1**

**CALL TOLL FREE 1-800-667-0363.**

(819) 595-3054



involved in the Rodney King beating know that well. They prepared a computer-generated animation purporting to show that the notorious videotape was misleading—that its false perspective showed King being beaten on the head, when in fact those blows were to the shoulder and arms. The judge ruled it inadmissible.

Reiter cautions that it's a mistake for lawyers to let the system "devolve into an entertainment package." For one thing, he says, "No matter how good your technology, it's never going to be as good as what the jury sees on TV." However, consultants and lawyers alike believe that IPS will be used extensively to help the jury understand the testimony of expert witnesses. Barry Levin, a lawyer who's defending two police officers in another Los Angeles case, and who plans to use IPS extensively, says the technology is most effective when used to drive home the "irrefutable facts."

"It's a beautiful tool in a murder case," he says. "It takes away the gory photos and makes the medical evidence interesting to the jury. I expect the Simpson defense may explain every possible medical possibility, and use computerized animation to show a 3D image of the body—anything to raise questions about the prosecution's theory of the case." **PM**

## THE BEST BUYS IN SPIRAL STAIRS!

METAL

OAK

VICTORIAN



Only \$425\*  
For 3'6" Diameter  
(Hts. 8'0" to 8'8 1/2")



Only \$1575\*  
For 4' Diameter  
(Hts. 8'0" to 8'8 1/2")



Only \$3300\*  
For 4' Diameter  
(Hts. 8'0" to 8'8 1/2")

Shown 5' diam. with optional Brass Handrail, 16-Balloon Spindles and Solid Wood Ends.

\*F.O.B. Broomall, PA Other Diameters, floor-to-floor heights, and Welded Units available. Made in the U.S.A.

**EASY-TO-ASSEMBLE-KITS** (Metal Kits in stock for immediate shipping or pick-up)

**NOW! SHOWROOM/WAREHOUSE LOCATIONS IN:**

Broomall, PA (610) 544-7100  
Pomona, CA (909) 598-5766  
Sarasota, FL (813) 923-1479  
Houston, TX (713) 789-0648  
Chicago, IL (708) 952-9010  
Stamford, CT (203) 325-8466

**Call or Write for Free Color Brochure:**

Toll Free: 800-523-7427 Ext. PM124, The Iron Shop, Dept. PM124, Box 547, 400 Reed Rd., Broomall, PA 19008

Specify: Metal  Oak  Victorian

Name

Address

City  State  Zip

MasterCard • Visa • Amex • Discover

From the Leading Manufacturer of Spiral Stairs

**THE IRON SHOP**

©The Iron Shop 1993

## FROM FRONT...



**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.

Typical car mats can cost a small fortune at a car dealer, but **WeatherTech** mats are anything but typical!

**PRICED TO BE THE WORLD'S BEST MAT VALUE:**

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:**  
**\$79.95**  
complete,  
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 • Colt • 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!



**CARGO LINER APPLICATIONS:**  
Blazer-Jimmy S10 & S15 (4 dr. only)  
Blazer, Yukon, Jimmy full size 1992-1994 • Suburban • Bronco 1980-1994 full size • Explorer-Navajo 2 & 4 door • Isuzu Trooper • Rodeo/Passport • Cherokee 1984-1994 • Grand Cherokee 1992-1994 • Pathfinder 1989-1994 • 4Runner 1990-1994 • Landcruiser 1991-1994 • Olds Bravada • Grand Voyager/Caravan, T&C • Montero • Windstar

**FROM \$69.95**  
plus  
**\$8 shipping\***

**ANY COMBINATION, AND WE SHIP FREE!**

**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, Ltd  
5161 THATCHER ROAD  
DOWNERS GROVE, IL 60515  
708-769-1500 fax 708-769-0300

**We've Got You Covered**

Cannon is a trademark of Cannon Rubber Ltd. of England. WeatherTech is a trademark of MacNeil Automotive Products Ltd.



# CORVETTE MECCA IN KENTUCKY



The National Corvette Museum is now open and available for religious experiences.

• After 41 years, the Corvette has a national shrine. America's only production sports car, the Chevrolet Corvette, finally has its own museum, located in Bowling Green, Kentucky, directly across the road from the Cor-

TEXT AND PHOTOS BY JIM McCRAW

dedicated to a single automobile.

The spanking new 68,000-sq.-ft. National Corvette Museum is the brainchild of Corvette fancier/re-

with 26 board members representing the legions of Corvette owners around the world.

Total cost of the project to date is \$15 million, and the museum reflects that expenditure in its avant-garde architectural design, interior decor and contents. The building's curved stone walls lead down to a bright yellow display rotunda, which is topped by the 11-story red Mobil 1 spire.

The grand opening ceremonies were presided over by Chevrolet General Manager Jim Perkins, along with the

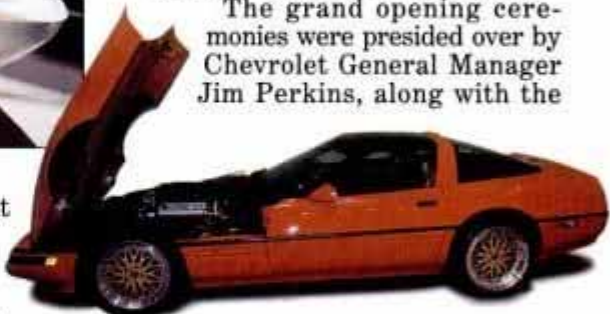


This is the original '59 Stingray concept car that previewed the midyear Vettes.

vette assembly plant, just off Interstate 65 at exit 28. Opened this past Labor Day, it is the largest and most comprehensive museum in the world

storer and museum president Dan Gale of Boston, a rotund dynamo with a walrus mustache. The museum was built

with donations from Corvette owners and Corvette clubs as well as corporate sponsors like Mobil, General Motors, Mid America Designs and others. It will be operated by the National Corvette Museum Foundation, a nonprofit foundation



There are even customized late-models.

three Corvette chief engineers—Zora Arkus-Duntov, who started the original Corvette project, Dave McLellan, who retired in 1993, and current chief David Hill—and featured such Corvette luminaries as Stingray designer Larry Shinoda, racer and Corvette specialist Dick Guldstrand,

*(Please turn to page 122)*



Manta Ray show car was the '69 iteration of the Mako Shark.





## The world's 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 introduce *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 **American Dental Association** as an effective cleansing device, UltraSonex emits 1.6 million cycles per second of incredibly effective ultrasonic waves that penetrate gingival tissue and disrupt bacterial growth, which helps reduce inflammation. No other product available for home use has this capability. UltraSonex is completely silent and extremely gentle.

Yet in just 2 weeks, you'll 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! UltraSonex Toothbrush **\$99.95** (\$10.95) #3100. 6 Replacement Heads (Year's Supply) **\$29.95** (\$5.95) #3200. UltraSonex and 6 Replacement Heads (Year's Supply) **\$129.95** (\$11.95) #3300



## No more back pain!

In 21 days, you can be feeling better than you have in years! No drugs. No surgery. No repeat doctor visits. No gimmicks. *No More Back Pain* is a powerful 21-day self-care program from D. Robert Swezey, a recognized leader in the nonsurgical treatment of back pain and founder of the renowned Arthritis and Back Pain Center at Swezey Institute in Santa Monica CA. Awarded The Film Advisory Board's "Award Of Excellence," this unique interactive video helps you quickly



diagnose your level of back pain, then coaches you to recovery. This progressive program uses simple, easy-to-do, therapeutic exercises that help your back heal quickly, safely and naturally. Dr. Swezey takes you through a series of "Feel Good" movements that relieve pain and tension, "Do Good" exercises that strengthen and recondition, and "Life Skills" — terrific tips that keep your back in top shape. Includes a handy 26-page pocket guide with a daily prescription of exercises and Life Skills for relief at your fingertips. Join the 10,000+ people Dr. Swezey has helped to lead normal, active, pain-free lives. Also available: "Drive Away Back Pain" audiocassettes — proven techniques for pain relief as you drive. Video **\$39.95** (\$5.95) #4000. Video and Audio **\$59.95** (\$6.95) #4010.



## Comfort, warmth, quiet and safety... a remarkable HEATER!



The *Vornado EVH* (Electronic Vortex Heat) is the discriminating buyer's space heater of choice. It automatically responds to your every need with C<sup>3</sup>— Constant Comfort Control — continuously delivering the precise amount of heat you require. Simply set the desired temperature on the calibrated, easy-access, temperature control panel, and EVH goes to work to raise the room temperature to the exact setting.

*The Vortex Air Circulation System creates a whirling beam of air that circulates quickly and quietly throughout the entire room, keeping it at a constant, pre-set temperature.*



Once the temperature is reached, EVH "throttles back" both fan speed and heat output to maintain the temperature efficiently and effectively. No annoying hot blasts or cold spots typical of other heaters controlled by an on/off thermostat. Just set it and forget it! The EVH features a nonglowing heating element, maximum 120° exit air temperature and a cool-touch cabinet, making it completely safe — even around kids and pets. Two energy-saving power settings, essential overheat and tip-over protection make the EVH virtually foolproof. No other heater warms the air more evenly or more safely. Its compact size, flat back and angled air inlets allow you to tuck it close to a wall or under a desk and out of the way. Lighted power switch. **\$109.95** (\$11.95) #3800.

### "The Magellan Ultimate Guarantee"™

Judge for yourself if the product is right for you. 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 S & H) or credit card number and expiration date.



The Magellan Group  
Dept. PMM621  
2515 East 43rd St.  
P.O. Box 18223  
Chattanooga, TN 37422

MB2 ©1994 The Magellan Group, Inc.



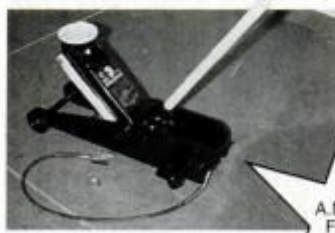
INTRODUCING



# AIR/MANUAL DUAL OPERATED JACKS

a complete line to lift vehicles FAST and SAFE!

for professional shops, mechanics, hobbyists and more...



- Built-in safety valve for safe lift
- Excellent for trucks, busses, agricultural and industrial uses
- Engineered in U.S.A.

Meets Guidelines of American National Standard

For More Information, Please Contact  
 Shinn Fu Company of America, Inc. © Copyright 1994  
 10939 N. Pomona Avenue • Kansas City, Missouri 64153  
 Call (816) 891-6390 or Fax (816) 891-6599

CORVETTE (Continued from page 120)



Schoolboy's dream: a mid-'60s 427 roadster.

as well as noted current Corvette engineer/racer John Heinricy.

A caravan of more than 4000 Corvettes from virtually every state, Canada and several Western European countries poured into Bowling Green under Kentucky State Police and National Guard direction, all morning and into the afternoon. Fifty of the caravan Corvettes (with at least one car from each year of production) and the caravans that came in from 10 American cities formed a circle directly in front of the museum. The first of 42 trees (representing each year of the Corvette so far), a 20-ft. sugar maple, was planted on the museum grounds, and a 4-ft. aluminum time capsule containing Corvette memorabilia was buried on the grounds, to be opened in 2053 on the Corvette's 100th anniversary. Musical accompaniment to the grand opening weekend was provided by the Beach Boys, naturally. An estimated 100,000 people attended the Labor Day weekend bash, which was covered by the big TV networks and CNN.

### Something for everyone

The museum currently features 52 Corvettes with examples from every era, starting with the original 1953s. The collection, which Dan Gale promises will grow and change over time, includes significant production cars, prototypes that were never produced, and racing Corvettes such as the SS, the Sebring and the ZR-1 that holds the world record for 24 hours, 5000 kilometers and 5000 miles.

In addition to the cars, there's the Chevrolet Theatre, which continuously shows the history of the Corvette, and a number of dioramas featuring a vintage Mobil gas station, a vintage Chevrolet dealership, a slice of the Corvette production line and a pit scene from the 24 Hours of Daytona. Within three of the dioramas, Corvette personalities including Shinoda, McLellan and Heinricy are immortalized in statuary. There's a Corvette model collection, a historic dealer-literature display, a pinball and video arcade, and a large gift shop containing Corvette items of every imaginable kind. For further information on this Corvette-lover's paradise, contact the museum directly at (502) 781-7973, or fax your inquiry to (502) 781-5286.

PM

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.

Popular Mechanics  
 Reader Service Department  
 224 West 57th Street  
 New York, NY 10019

(Please make check or money order payable to Popular Mechanics.)



incorporated a feature that its inventor, Harry Mabs, called flipper bumpers, which were activated by buttons on the side of the cabinet. For the first time, a pinball machine offered players some control over the flow of the game on the playing field. The success of flippers was immediate, and the game as we know it was born.

With these advancements in place, pinball entered a booming golden age of popularity. New machines were designed, built and shipped every three weeks. Classics of the era include such favorites as Triple Action, Coronation, Lady Luck, Queen Of Hearts, Dragonette, Manhattan, Marble Queen, Diamond Lil and many others.

These games and others from the late 1940s to the mid-1950s are now highly collectible items that can command prices upward of \$1000 for completely refurbished machines. Those in less than pristine condition can fetch about \$200 to \$300, although a great deal of work and money will be required to get them into operating condition.

Machines from a second golden age (from about the late 1960s through the 1970s) run a bit higher than older games because of their greater technical complexity. Machines of this era include a number of the most successful games of all time, such as Fireball, Captain Fantastic and Wizard, the last two inspired by The Who's *Tommy*, currently a hit musical on Broadway. An interesting footnote about *Tommy*, which has surfaced as a hit album, movie and Broadway musical over the years, is that each incarnation has sparked a boom in pinball, a key element in the plot.

Despite competition from videogames and other modern electronic marvels, pinball has maintained its widespread allure, and in some ways is more popular now than ever. Pinball accounts for 35% of all revenue taken in by the coin-game market, an \$8-billion-a-year industry. That's a lot of quarters to pump into such modern classics as Terminator 2: Judgment Day, Super Mario Brothers, Elvira and Black Knight 2000, among others. But then, you get a lot for your money. After all, where else can you enter a high-action realm of dazzling, mystical universes for only the cost of spare change and a few brief moments of time? **PM**

#### SOURCE LIST

For more information:

- **The Pinball Resource**, Steve Young, 37 Velie Rd., Lagrangeville, NY 12540; (914) 223-5613.
- **The Pingame Journal**, James S. Schelberg, 31937 Olde Franklin Dr., Farmington Hills, MI 48334.

there is a totally redone Tercel at the bottom of the Toyota lineup and a brand-new model, the Avalon, at the top. There are also refinements—such as more power for T100 pickup trucks—all across the board.

The new Tercel is larger, roomier, peppier and simply better all-around than the car it replaces. Power is up some 13% over the last car, to 93 horsepower, thanks to the dohc 1.6-liter Four that's been used successfully by Toyota in its low-cost sporty coupe, the Paseo. The '95 Tercel is available in both coupe and sedan trim, in three model series.

At the other end of the Toyota scale is the large 4-door 6-passenger—that's what we said, 6-passenger—Avalon. The Avalon is the very first Japanese sedan to offer such commodious accommodations, and it's based on the very successful Camry formula, and platform. For specifics, see the First Drive report (page 59).

### Volkswagen

Quietly but undauntedly, the little old carmakers from Wolfsburg continue to deliver new and improved products. For '95, there's an updated version of the can't-help-but-make-you-smile Cabrio and a new Passat family car.

The new convertible is priced at under \$20,000, and, like the original VW convertible, is built for Volkswagen by Karmann Coachworks. It has dual airbags, antilock brakes, seating for four (the Cabrio has about as much interior volume as an Acura Integra sedan) and a 115-hp sohc 2.0-liter Four mated to a 5-speed manual or 4-speed automatic.

Also for '95, Volkswagen has introduced its latest iteration of its large (in VW terms) passenger car, the Passat, in sedan and station wagon forms. See the First Drive report (page 60).

### Volvo

The folks from Göteborg have reshuffled and tweaked the model lineup again. The result is that '95 finds no more 7-series cars, two distinctly different 9-series cars and the potentially very potent 850 front-drive models. And what's new about these cars for '95 is the top-of-the-line 960. With a new appearance—from the A-pillars forward—and a new interior, the 960 has been distanced from its former 4-cylinder sibling, the 940. Still rear-wheel drive and still available as a sedan or a wagon with dual airbags and 4-wheel disc antilock brakes, the 960 also boasts a new suspension.

Also new for '95 will be the first ever side-impact airbags, mounted in the front seats of the 850 models. The airbags are standard in the 850 Turbo, optional in the others. **PM**

**"BLASTER"**  
**CONCENTRATED  
 TO WORK WHERE  
 OTHERS FAIL!**

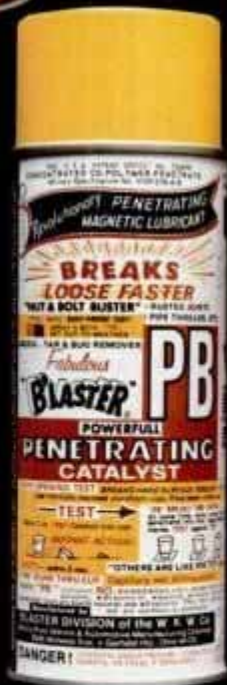


**B'laster  
 Fuel Injector  
 Cleaner**

Boosts performance and power. Improves mileage. One can treats two cars. Cleans system to 100% efficiency.

**B'laster PB  
 Penetrating  
 Catalyst**

Powerful, concentrated penetrant frees rusted or immobilized parts by releasing the surface tension that causes them to stick. Protects against rust and corrosion.



Available at your nearest auto parts store.

**"BLASTER"**

For the store nearest you, call 1-800-858-6605

# 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 **ProstsafE** from Whitewing Labs. **ProstsafE** 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  
ProstsafE 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 "ProstsafE 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 **ProstsafE** are clear. If you are looking for relief, order **ProstsafE** today.

**Whitewing Labs, Dept 107**  
17939 Chatsworth St., Suite 408, Granada Hills, CA 91344

PS1 1 month supply of ProstsafE 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. 107

*"Now I get a good night's sleep without getting up every two hours to urinate."*

-- Mr. C. Hussy  
Cleburne, TX

*"ProstsafE 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

**STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION**

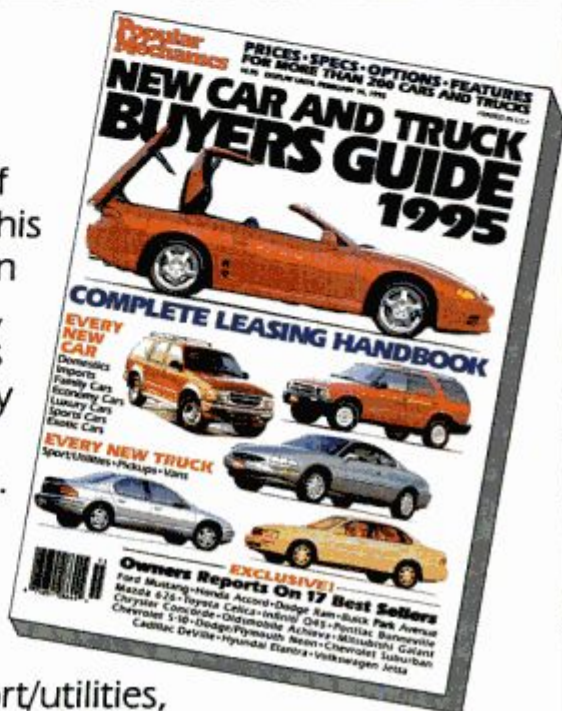
- 1a. Title of publication: Popular Mechanics
  - 1b. Publication No. 530-390
  2. Date of filing: October 1, 1994
  3. Frequency of issue: Monthly
  - 3a. No. of issues published annually: 12
  - 3b. Annual subscription price: \$15.94
  4. Complete mailing address of known office of publication: 224 West 57th Street, New York, NY 10019
  5. Complete mailing address of the headquarters of general business offices of the publisher: 959 Eighth Avenue, New York, NY 10019
  6. Full names and complete mailing address of publisher, editor and managing editor: Publisher: The Hearst Corporation, 959 Eighth Avenue, New York, NY 10019; Editor: Joe Oldham, 224 West 57th Street, New York, NY 10019; Publisher: Robert B. Dillingham, 224 West 57th Street, New York, NY 10019
  7. Owner: The Hearst Corporation, registered office, 1209 Orange Street, Wilmington, Delaware 19801, mailing address, 959 Eighth Avenue, New York, New York 10019 - Stockholders owning or holding one percent or more of total amount of stock of The Hearst Corporation are: Trustees of Trust created under the Will of William Randolph Hearst, Deceased, namely: Frank A. Bennack, Jr., Millicent Hearst Boudjakdji, John G. Conomikes, Richard E. Deems, George R. Hearst, Jr., John R. Hearst, Jr., Randolph A. Hearst, William R. Hearst, III, Joseph Kingsbury-Smith, Harvey L. Lipton, Frank Massi, Gilbert C. Maurer and Raymond J. Petersen, the address for all of the foregoing being 959 Eighth Avenue, New York, New York 10019. Those having a beneficial interest in the Trust mentioned above are: Millicent Hearst Boudjakdji, Phoebe Hearst Cooke, Deborah Hearst Gay, Austin Hearst, David Whitmire Hearst, Jr., George R. Hearst, Jr., John Randolph Hearst, Jr., Randolph Apperson Hearst, William Randolph Hearst, II, William R. Hearst, III and Joanne Hearst Castro.
  8. Known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages or other securities: None
  9. Not applicable
  10. Extent and nature of circulation: Average no. of copies each issue during preceding 12 months
- |  |           |
|--|-----------|
| A. Total no. of copies printed (net press run):                          | 2,041,089 |
| B. Paid circulation  |           |
| 1. Sales through dealers and carriers, street vendors and counter sales: | 232,173   |
| 2. Mail subscriptions:   | 1,401,121 |
| C. Total paid circulation:   | 1,633,294 |
| D. Free distribution by mail, carrier or other means:                    |           |
| Samples, complimentary and other free copies:                            | 40,633    |
| E. Total distribution:   | 1,673,927 |
| F. Copies not distributed  |           |
| 1. Office use, left over, unaccounted, spoiled after printing:           | 9,320     |
| 2. Returns from news agents:   | 357,842   |
| G. Total:  | 2,041,089 |
- Actual no. of copies of single issue published nearest to filing date
- |  |           |
|--|-----------|
| A. Total no. of copies printed (net press run):                          | 2,039,385 |
| B. Paid circulation  |           |
| 1. Sales through dealers and carriers, street vendors and counter sales: | 221,357   |
| 2. Mail subscriptions:   | 1,399,000 |
| C. Total paid circulation:   | 1,620,357 |
| D. Free distribution by mail, carrier or other means:                    |           |
| Samples, complimentary and other free copies:                            | 40,000    |
| E. Total distribution:   | 1,660,357 |
| F. Copies not distributed  |           |
| 1. Office use, left over, unaccounted, spoiled after printing:           | 10,100    |
| 2. Returns from news agents:   | 368,928   |
| G. Total:  | 2,039,385 |

I certify that the statements made by me above are correct and complete.  
 Robert B. Dillingham  
 Publisher

# Popular Mechanics

## NEW CAR AND TRUCK BUYERS GUIDE 1995

Written by the automotive editors of Popular Mechanics, this is the only publication that contains photos, prices, specs, options and features for every 1995 car and light truck sold in America. Every new car—domestics, imports, economy, family and sports. Every new truck—minivans, sport/utilities, pickups and vans.



### PLUS THIS EXCLUSIVE!

#### Owners Reports On 17 Popular Cars And Trucks From The People Who Own Them!

**ORDER NOW FOR JUST \$5.95 BY CALLING 1-800-333-4948 OR BY MAIL FOR \$4.95 USING THE COUPON BELOW (Prices include all shipping, handling and postage.)**

Send check or money order for \$4.95 to: PM194

Popular Mechanics Buyers Guide  
 P.O. Box 10577  
 Des Moines, IA 50340

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

## EURO-BURNER

- Improved alternative to conventional coil burners
- Flat, round cast-iron surface heats evenly.
- Clean-up is a breeze.
- No unsightly burner bowls and open wire coils.
- Built-in high limit safety, reduces heat if pot boils dry or burner is left on without a pot.
- Vastly reduces chances of a grease fire.
- Improved durability and service life.
- Cost effective way to up-grade your existing range to the state of the art.
- Simple plug-out your old, plug-in the EURO-BURNER installation
- Featured in the March 1991 POPULAR SCIENCE "What's New" section.



Call 1-800-360-5357

for more information or to place an order. Visa & MC accepted.

Or Write to SMC Mail Marketing

PO Box 101 Slatedale, PA 18079-0101

## 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

## WOOD HEAT

WOOD FURNACES HEAT YOUR ENTIRE HOME

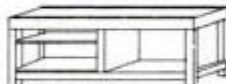
Call 1-218-326-6786 or Write

**Charmaster®**  
2307A HWY 2 W.  
GRAND RAPIDS, MN 55744

## BUILD THIS 8 FT WORKBENCH

If you can use a circular saw and a drill, you can build this general purpose workbench designed for the do-it-yourself handyman.

PLANS \$14.95 includes shipping & handling



Features:

- Sliding shelves
- Pegboard tool storage
- Lockable front doors

Complete Plans:

- Step by step instructions
- Materials list
- Building tips



1-800-323-0347



R. Scott Edgar Enterprises  
P.O. Box 345  
Red Hook N.Y. 12571-0345

**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

**FREE!!!**

WITH EVERY ORDER

FULL COLOR CATALOG & MINIATURE BOOTKNIFE W/KEYRING SHEATH



STAINLESS STEEL BLADE!



**THE ULTIMATE COMBAT/SURVIVAL KNIFE!**

**GIANT 15 1/4" OVERALL**

10" 420 J2 stainless steel blade. Handle & sheath hold a complete survival kit. Hurry! Limited Supply!

Super Low Price at \$39.95

1-800-385-4103 CREDIT CARDS AND C.O.D.

OR RUSH CHECK OR MONEY ORDER FOR \$44.95 TO:  
**HURRICANE INTERNATIONAL**  
PO Box 109, Cold Spring Harbor, New York 11724

\$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



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!

## MULTI-VISION ELECTRONICS

**CABLE TV CONVERTERS & DE-SCRAMBLERS**

- Jerrold • Zenith • Pioneer
- Scientific Atlanta • Remotes
- VIDEO STABILIZERS
- Accessories



**FREE CATALOG**

Quantity Discounts!  
\$25 For Each Referral!  
Buy Where the Dealers Buy!  
**G U A R A N T E E D !**

**800-835-2330**

Please have Make & Model # of equipment used in your area

DEALERS AND EXPORTERS WELCOME

CALL NOW Toll Free 1 800 932-9344

TUBE & CONDUIT



Ext. (203) 781-8000 } 202

FAX# (203) 781-8005

# RADAR JAMMERS

"EVERY DRIVER SHOULD HAVE ONE"

NO MORE TICKETS!!!

WITH THE ALL NEW: **MIRAGE 2001**

(PASSIVE RADAR SCRAMBLER)

**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!



**FREE!**  
100 pg. book on BEATING RADAR TRAPS with *Mirage!*

**\$249**  
plus S&H

- 30 month warranty
- Movable vacuum attachment
- 2-year RF jamming circuit
- 100% FCC legal

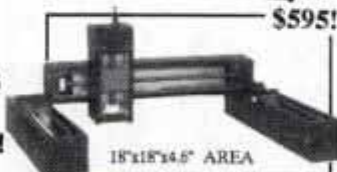
ORDER TOLL FREE:  
**1-800-732-0044**

TEL. 802-861-0000  
P.O. BOX 33287 • FRIEDLEY, MA 02432

## MACHINE YOUR DREAM!

DESKTOP MANUFACTURING only

TURN YOUR IDEAS INTO CASH! **\$595!**



**THIS IS THE MACHINE YOU'VE BEEN WAITING FOR!**

Now you can put your PC computer to work prototyping and manufacturing actual 3-D products out of wood, plastic or light metal! The NEURACTOR turns a Dream(tm) tool or router into a digitally controlled CNC milling, drilling & routing machine. This breakthrough kit comes complete with easy-to-assemble electronics, 4 digital motors, hardware & pre-machined metal parts. PLUS FREE 3D CAD/CAM SOFTWARE! Act now! Put your technical skills to work in your own at-home business! Free info (501) 839-8293 or send \$595 + \$24.95 S&H. Allow 4-8 wks. del. U.S. CYBERLAB, 14786 State Gap Rd., West Fork, AR 72774

## 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.

Call 407-725-1000 or send \$19.95 + \$1.00 shipping per item to: USI Corp., PO Box #12362, Melbourne, FL 32902. COD's OK.

**\$19.95 EACH** By Del. Add.

### 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 9V battery (not incl.) For catalog of Transmitters, Voice Scramblers and other specialty items, enclose \$2.00 to USI Corp.

## SOVIET SUBMARINE CLOCK



### A COLD WAR TESTAMENT

This clock was standard issue on soviet nuclear attack subs. The twelve jewel movement & six pound weight are proof of the Russian mania for rugged top quality. Gasket sealed & housed in a waterproof aluminum alloy case with fine chrome trim. Good looking large dial displays a double fluke anchor, silhouette of a sub conning tower, large red star, & Cyrillic script. The spring wind mechanism & ingenious hatch cover utilize the same key. After nearly fifty years- Here is LIVING PROOF that times have changed. A bona fide showpiece. Case diameter: 8", dial: 6", eight day twelve-jewel movement. Unused, never commissioned Soviet sub clock in top working condition comes with: easy wall mounting plate, certificate, warranty. Be advised-this is a real find. We don't have many to sell. Order R-SUB \$80.00 add \$7.50 shipping. Satisfaction guaranteed.

Order by mail from: DutchGuard, Dept PM11, PO Box 411687, Kansas City, MO 64141  
MC/Visa Order Toll Free 1-800-821-5157

# Northern

Where the Pros and Handymen Shop

## WINTER Warm-Up Sale!



### Portable Kerosene Heater Helps Keep Several Rooms Warm

Multi-room omni-directional kerosene heater delivers up to 23,000 BTUs per hour. Big 2 gallon fuel tank. #17340

sale **\$129<sup>99</sup>**

### 5 HP Snowblower Opens a 24" Path

Powerful 2-stage blower has 6 forward, 2 reverse speeds. #2605

sale **\$569<sup>99</sup>**



### Pressure Washer Saves You Cleaning Time!

1250 PSI, 115 Volt motor draws 14.5 Amps. 10-foot grounded cord, 24" hose, 0/60" spray tip, gun, and 2-piece lance. #157193

sale **\$219<sup>99</sup>**

### Ceiling-Mount Automatic Electric Heater

240 Volts, 5000 Watts at 17,065 BTU/hour. #17303

sale **\$184<sup>99</sup>**



### Heavy Duty Tarps

1000 denier nylon threads between two layers of reflective silver polyethylene. Water resistant and ultra violet.

Item	Cut Size	Sale
18497	8' x 8'	\$4.99
18498	8' x 10'	\$7.99
18499	10' x 12'	\$10.99
18500	12' x 16'	\$16.99
18501	12' x 20'	\$19.99
18502	16' x 20'	\$29.99
18503	20' x 30'	\$54.99
18504	30' x 40'	\$89.99
18505	30' x 50'	\$119.99
18506	30' x 50'	\$139.99

### The Original Leatherman® Tool

A complete tool set to carry in your pocket! #19915

sale **\$36<sup>99</sup>**

### 4,400 Watt Extended Run Generator

Runs up to 7.8 hours on one tank! Long-life, 8 HP Briggs & Stratton engine has a cast iron sleeve... lasts up to 3 times longer than conventional engines! Low oil shut-off. Protective roll cage frame. #164593

sale **\$499<sup>99</sup>**



HOMELITE

Shipping not included.

## FREE CATALOG!

Send or call for your FREE Discount Catalog. ORDER TOLL FREE

**1-800-533-5545**

Fax: 1-612-894-0083

Sale Prices Good Thru 11/30/94 Key #07052

Name \_\_\_\_\_  
Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Key #07052 SEND TO: NORTHERN,  
P.O. Box 1219, Burnsville, MN 55337-0219

## HOVER... ..Over All Terrains in the Air Commander!



Fastest, quietest, & lowest price available! From \$5,200! Dealerships available!

CALL GPI at 800-541-7228

## 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

NYS/OPTIKLEER DEPT. PM  
P.O. BOX 8095, LYNN, MA 01904-2535 (617) 955-6224

## Steel Homes FOR LASTING VALUE

Our Steel Framed Homes offer:

- 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

## DISTRIBUTORS WANTED

JOIN THE 18-YEAR INDUSTRY LEADER

- Homes in 50 States and 26 Countries
- Simple, Bolt-Together Frame Construction
- Refundable Investment • Hands-on Training
- Distributor Support • No Experience Necessary

Call today for a FREE Info Packet with a Seminar Schedule. Or order a VIDEO for only \$9.95!

**1-800-TRI-STEEL**

1-800-674-7833

(817) 497-7070 Fax: (817) 497-7497

5400 S. Stemmons Fwy., Denton, TX 76205



Tri-Steel Structural, Inc.

## SPACE - AGE OPTICS SEE THOSE BLIND SPOTS YOU COULDN'T SEE BEFORE!

Finally - Now Available. Eliminate blind spots Completely and Permanently. Successfully tested on the Autobahns of Europe. The all new advanced Multi-View™ Adjustable Blind Spot Mirror provides expanded **distortion free vision** - doubling the limited visibility one sees in regular side mirrors. Multi-View™ attaches easily and in seconds to any vehicle's side mirrors. It's unique ball swivel allows it to be adjusted to suit any driver's viewing position - maximizing the view from both side mirrors. Forgotten are old fashioned "fish-eye" mirrors that distort, cloud up and won't adjust. Once you've driven with them you'll wonder how you ever drove without them!

See All Around Your Vehicle!  
Avoid Car Jackers and Blind Spots!



SEE WHAT YOUR REGULAR MIRROR CAN'T!

360° ADJUSTABLE!  
FOG FREE  
CUSTOM LOOK

Makes Driving Safer For You & Your Family.

ONE Small: 2 1/4" x 1 1/4" (Cars, Minivans & Pickups)  
PRICE Large: 2 1/2" x 2 1/2" (Trucks, RVs and Campers)

Introductory Offer

Only \$14.95 per pair  
(Single Mirror \$9.95 ea.)

Order Today - Toll-Free  
**1-800-757-7571**

\*Visa \*MasterCard \*Discover \*Amex

**30-DAY MONEY-BACK GUARANTEE**

Or send check / money order / Credit Card # to:  
**MULTI-PRODUCTS**

17981 SKYPARK CIRCLE #G, IRVINE, CA 92714

Add \$2.50 shipping/Handling • CA residents add sales tax

## POWERCENTER™

POWERFUL SHARPENING SYSTEM FOR SHOP AND HOME

'Inaugural' edition now released!

- Heavy duty 110 volt AC motor unit with two power take-offs.
- Unique AutoSharp module automatically and accurately sharpens chisels and planes without losing the temper of the blade.
- Builds into a complete sharpening and grinding system with more modules available soon.

Call toll-free for more details or to place order. Allow 4-6 weeks for delivery. NJ residents add 6% sales tax.

Plasplugs Inc, 780 Vassar Ave, Lakewood, NJ 08701.

**(800) 966 6400**



BY **PLASPLUGS®**

\$149.95  
+S & H

## Revolutionary Cable Descrambler

# NOVAVISION COMMUNICATION TERMINAL



With Year 2000 Technology!

Replaces Jerold, Pioneer and Scientific Atlanta

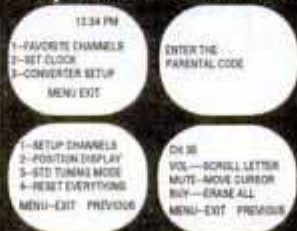
### Features...

- Built in Descrambler
- Computer Interface
- 750 MHz
- Infra-Red Wireless Remote Control
- Integrated Volume and Mute Control
- On Screen Menu Displays For All User Functions
- Clock

- Favorite Channel Memory Bank
- Programmable Parental Lockout
- Channel 3/4 Switchable
- Last Channel Recall
- Sequential or Direct Channel Access
- HRC / STD / IRC Programmable
- Auto Frequency Control Tuning
- Sleep Timer
- Audio and Video Ports
- Switched Electrical Outlet
- Inview Video Pass-Thru Technology

Call Us

Easy to use On Screen Menus



FROM **JP VIDEO**

DESCRAMBLERS / CONVERTERS

**1-800-950-9145**

SAVE HUNDREDS OR MORE

Call Today!

and receive a FREE CATALOG

**1-800-682-9968**

Credit Cards Accepted  
Be Independent and Get Your Own Personal Cable Equipment



We offer the Zenith PZ-111  
Converters • Descramblers • Filters

ELITE ELECTRONICS • 2927 So. 120th Street  
Omaha, NE 68144 • 402-334-5152

100% MONEY BACK GUARANTEE 30 Day Free Trial

## GO ANYWHERE!

**max** 6 wheel drive **ATV**  
Amphibious 2 and 4 passenger models



(21-years-old and over, Please)

No Money Down. As low as \$115 mo.

Call Toll-Free 1-800-255-2511

(From anywhere in the U.S. or Canada)

Recreatives Industries, Inc.

60 Depot Street, Buffalo, NY 14206

## Cable TV Equipment

Your #1 Source for Descramblers,  
Converters & Combinations

Zenith  
Tocom  
Jerrold  
Pioneer  
Century  
Panasonic  
Oak Sigma  
Scientific Atlanta  
...and more!

Save \$\$\$  
Don't Rent

Call for Free  
Catalog!

WE WILL MATCH OR BEAT  
ANY ADVERTISED OR WHOLESALE PRICE!

**AAElectronics**

Credit Cards Accepted

Call Today! 1-800-258-9512

## U.S. GO KARTS

Best Selection! Lowest Prices!

• Fun Karts • Racing Karts • Minibikes • Kits

• All-Terrain Karts • Accessories • Tools & More!

Full Color Catalog Only \$2 plus you receive a

coupon worth \$5 off your first order. Order your catalog

by phone on VISA or MasterCard or mail to address shown

U.S. GO KARTS

501 ESPANADE DR #1400

OXNARD, CA 93030

805-981-1248

## TIP Turbine Paint Sprayer

HVLP-High Volume, Low Pressure

TP-77 pumps out 60cfm @ 4-5psi. Eliminates up to 80% overspray. Heated air reduces moisture. Eliminates runs. Has 1qt. cup, gun, nozzle, cart, 30ft. hose, turbine. U.S. Made. Requires no compressor. 1yr. warranty. Wt. 45Lb. Call for Free Catalog. Or see PM Nov. '92

**\$599** PPD, UPS US 48 issue, pg 128.

TIP Tools & Sandblast Equipment, Dept. PM,  
7075 Rt. 446, P.O. Box 649, Canfield, OH 44406 1  
800 321-9260 Fax 216-533-2876 VISA/MC



# 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

1-800-772-6244 M-F 9-6 EST

U.S. Cable TV, Inc. Dept.: KPM124 4100 N. Powerline Rd. Bldg. F-4 Pompano Beach FL 33073

## 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 18016

★★ Call 1-800-987-BANG (2264) ★★

## Train for exciting career opportunities!

Get on a fast track to a new money-making career. ICS can train you at home for a better job in any of these fast-growing, good-paying fields! You can even get a Specialized Associate Degree at home through ICS.

Get FREE Facts

ICS International Correspondence Schools Dept. AP85845, 925 Oak Street, Scranton, PA 18515

Send free facts and color brochure on how I can study at home for the career I have chosen. No obligation. Check One Box Only!

### ASSOCIATE IN SPECIALIZED BUSINESS DEGREE PROGRAMS

- Business Management
- Accounting
- Bus. Mgmt.—Finance Option
- Bus. Mgmt.—Marketing Option
- Applied Computer Science

### ASSOCIATE IN SPECIALIZED TECHNOLOGY DEGREE PROGRAMS

- Civil Engineering Technology
- Mechanical Engineering Tech.
- Electrical Engineering Tech.
- Industrial Engineering Tech.
- Electronics Technology

### CAREER DIPLOMA COURSES

- High School
- Auto Mechanics
- Surveying & Mapping
- Drafting
- Air Conditioning & Refrig.
- Wildlife/Forestry Conservation
- Medical Office Assistant
- Diesel Mechanics
- Electrician
- Small Business Management
- Gun Repair
- Electronics
- Bookkeeping
- Child Day Care
- Legal Assistant
- Computer-Assisted Bookkeeping
- Motorcycle Repair
- Hotel/Restaurant Management
- Catering/Gourmet Cooking
- Computer Programming
- Personal Computer Specialist
- PC Repair
- Desktop Publishing & Design
- Secretary with Computer
- Fitness & Nutrition
- TV/VCR Repair
- Photography
- Animal Care Specialist
- Journalism/Short Story Writing
- Interior Decorating
- Florist
- Fashion Merchandising
- Teacher Aide
- Medical Transcriptionist
- Professional Locksmithing
- Appliance Repair

Name \_\_\_\_\_ Age \_\_\_\_\_

Address \_\_\_\_\_ Apt. # \_\_\_\_\_

City/State \_\_\_\_\_ Zip \_\_\_\_\_

Phone ( ) \_\_\_\_\_

Call toll free! 1-800-595-5505 Ext. 5161

Call anytime—24 hours a day, 7 days a week. OR MAIL COUPON TODAY!

# METAL WORKING BOOKS

Discover hundreds of unusual, high-quality technical books that you'll NEVER see in any book store! Both newly written & reprints of rare old books! Your satisfaction guaranteed! Here are just a few—

### CHARCOAL FOUNDRY

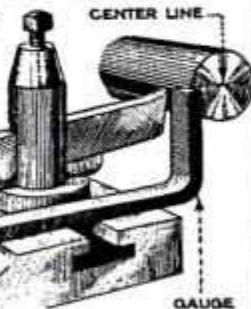
Build a furnace from a five gallon pail that can melt aluminum, pot metal and brass using grocery-store charcoal. Cast machine parts, ingots, art objects. All the secrets!

Book 163 \$6.95

### BUILD A METAL LATHE

Build a precision 7" metal cutting lathe without the need of precision tools! Cuts to 1/1000". It's true! Prototype cost about \$50! Definitely not a toy! Detailed paperback! Best seller! Order a copy!

Book 177



\$8.95

### BLACKSMITH SHOP & IRON FORGING

From 1906! Complete text on forging of iron with hammer and anvil. Make bolts, tools, even steam engine repairs! Details on all tools and procedures. Great illustrations. Order a copy!

Book 4074

\$7.50

### CARE & OPERATION OF A LATHE

Reprint of the 112 page handbook shipped with every new Sheldon lathe in 1942. Heavily illustrated detailed how-to. Applies to all lathes.

Book 21052

\$7.50

### HASLUCK'S METALWORKING

Huge hardcover 1907 handbook. Over 2000 illustrations. Build a lathe, steam engine, clock, boiler, telescope, dynamo, gas engine, more. Covers repousse, vise work, blacksmithing, foundry, polishing, spinning, lathe work, much more. 760 pages.

Booklet 21265

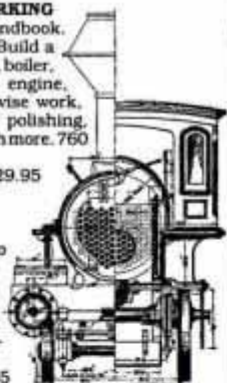
\$29.95

### LOCOMOTIVE CONSTRUCTION

Massive industrial how-to for building an "American" locomotive. Over a thousand "blueprints". Huge hardcover reprint from 1892. Complete details in catalog.

Book 21443

\$44.95



### PLATERS' GUIDEBOOK

Professional electroplaters' mini-handbook from 1930's. Formulas, tanks, hints, tips, etc

Book 21451

\$7.95



and many others...

## BIG CATALOG!

Write for your copy of Lindsay's 72 page Metal Working Books catalog and see what you've been missing! Send \$1.00 (US & Canada) or \$4.00 foreign airmail. Write today!

## Lindsay's METAL BOOKS

Box 538-FMJ, Bradley IL 60915

Send the books I've marked. A check, money order, or my Mastercard/Visa card numbers are enclosed in payment. Send free catalog.

Send just a copy of your latest jam-packed catalog. A dollar is enclosed.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ St \_\_\_\_\_ Zip \_\_\_\_\_

## AMAZING ELECTRONIC PRODUCTS & DEVICES

### Infinity Transmitter++

Listen-in to premise, or access

"ongoing" phone conversations with emergency call

"break-in"! #TELGRAB - Plans...\$10.00, Kit/Plans...\$99.50

Long Range FM Voice and Telephone Transmitters

Easy to assemble kits: #XFM/XLT300 (2 unit combo) ...\$34.50

Laser Window Bounce Listener System

#LLIST1 - Plans...\$20.00, Kit/Plans...\$199.50

Blastor/Intimidator 100,000 watts of explosive

power, #BLS3 Plans...\$10.00

Ready to Use...\$99.50

FREE CATALOG! With Order - Or Send \$1.00

MC/VISA-Checks welcome - add \$4.00 P&H. COD's add \$4.50 extra.

## INFORMATION UNLIMITED

PO BOX 716 DEPT PM1294 AMHERST, NH 03031

Orders 800-221-1705 • Inq's 603-673-4730 • Fax 603-673-5406

## Video Spy Camera

See What's Happening When You're Away! Only \$299 \$199

This tiny high quality, B/W video camera with built in microphone transmits through standard cable to your TV or VCR. Easily concealed. Thirty (30) day money back guarantee. Optional wireless feature available.

To Order Call: 1-800-222-0274

Or Send Check/Money order to: Brittany Group Inc. 444 N. Fredrick Ave. # L-275, Gaithersburg MD. 20877-2432

VISA or MASTERCARD 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

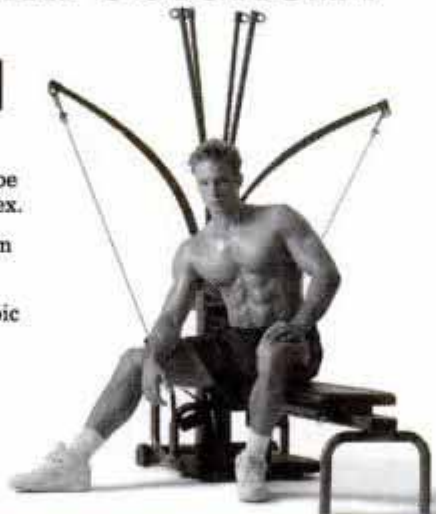
## FREE VIDEO

**Shows You How BOWFLEX® Lets You Outperform Nordicflex® and Soloflex®.**

**Compare Before You Buy!**

**You Will See:**

- How workouts with Bowflex can be faster than Nordicflex and Soloflex.
- Why Bowflex's cable pulley system can give you better results.
- Why Bowflex can offer both aerobic and strength conditioning.
- Why only Bowflex is backed by a lifetime warranty.



**For Your Free Video Call 1-800-BOWFLEX (269-3539)**

Or Write: Bowflex, Inc.  
2200 N.E. 68th Ave.  
Vancouver, WA 98661

© 1994 Bowflex, Inc. Bowflex® is a registered trademark of Bowflex, Inc. Soloflex® is a registered trademark of Soloflex, Inc. Nordicflex® is a registered trademark of Nordic Track, Inc.

BUY FACTORY DIRECT & SAVE!



Starting At Under \$200

UNIVERSAL SHELTERS of AMERICA

2 YEAR WARRANTY 30 DAY Money Back Guarantee

- All weather protection for all types of vehicles, materials, property and more
- Super-strong, waterproof, ripstop Dupont® material with zippered enclosure
- Shipped directly to you
- Easily assembled
- Each shelter custom made to your specifications



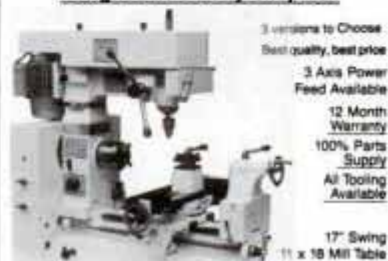
CALL TOLL FREE 1-800-822-9658

VISA MC FAX 1-203-756-8898  
Dealership Inquiries Welcome

## 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 591, MONTESANO, WA 98663  
SINCE 1981

## HERNIA APPLIANCES FOR COMFORT!

You can enjoy heavenly comfort night and day at work or at play! Send for FREE illustrated booklet.



BROOKS APPLIANCE COMPANY

777 State Street, Marshall, Mich. 49068

## CABLE TV CHANNELS EQUIPMENT GUARANTEED

Direct! → The nationwide source for cable TV equipment. **FREE 30 DAY TRIAL!**

"BUY WHERE THE DEALERS BUY."

**FREE** TV Cable Descramblers and Converters Catalog. Open Every Day!

YOUR VCR TAPES CAN PLAY AS CLEAR AS DAY! Why put up with Inconsistent Color, Flashes and Streaking and Interference!

UNJAM NOW WITH Video Decoder

- Easy Connections
- Eliminates "jumbling"
- Copy any tape
- RC Plugs Included
- 2 Year Warranty
- 30 Day Money Back Guarantee

VISA • MC C.O.D. **MEGA ELECTRONICS** 1-800-676-6342 SAVE 1000's

21 S. Main St., Winter Garden, FL 34787

POPULAR MECHANICS • DECEMBER 1994

## CABLE DESCRAMBLERS

No 800#  
No Catalog  
Just low, low prices.

Call the rest  
Then call us for the  
best price.

**305-425-0751**

NO FLORIDA SALES!

## Our Ramps Won't Let You Down.

**STRONG**—12,000 pound GVW capacity exceeds strength and safety ratings of all other ramps, regardless of price.

**VERSATILE**—Seventeen degree incline raises low-profile vehicles—even Corvettes—nearly seven inches. 40" long, 12" wide.

**LABORATORY AND FIELD TESTED**

**EASY TO USE**—No sharp edges, won't damage driveways. Fits in trunk, hangs on wall, stands on end.

**STABLE—DURABLE—RUSTPROOF**

Patented polymer support system offers excellent weight distribution for extra margin of safety. Made in U.S.A.



**RhinoRamps**  
STRONGER THAN STEEL

Only **\$49.95** + \$3.00 S & H  
(PA residents add sales tax)  
**MONEY BACK GUARANTEE**  
VISA, MasterCard 24 hours/7 days  
**ORDERS 1-800-283-6188**  
FAX ORDERS: 1-717-652-8010  
INQUIRES: 1-800-430-6642

If ordering by mail, make checks payable to **RhinoRamps** and send to:  
RhinoRamps, 39 South Cameron St.,  
Harrisburg, PA 17101

## Now you can do something about the weather

Our **ULTIMETER® II** Weather Station helps you plan your day, safeguard your family and property by alerting you to local conditions that often vary from distant forecasts.

Tells you to: Warn loved ones when wind chill threatens frostbite, secure outside belongings against sudden gusts, protect plants against weather extremes. Over 20 weather functions:



ACTUAL SIZE: 2 1/2" x 6 1/2"

• Wind Speed and Direction (40 ft. cable) • Temperature (25 ft. cable) • Chill Factor • Alarms • Highs/lows/times/dates • Metric/English • Optional self-emptying rain gauge • 30-day money back guarantee • One-year warranty

**HOME WEATHER STATION ..... Only \$179.00**

Add a Second Keyboard/Display Unit...Only \$69.00

**NEW! Add our PC DATA LOGGER ..... Only \$69.00**

Del. in US, add \$8.25 shipping & insurance. NJ res. add 6% tax.

For information or to order with VISA/MC:

**TOLL-FREE 1-800-USA-PEET (872-7338)**

FAX orders: 908-517-0669

Or send check, m.o. or credit card no. and exp. date to:

**PEET BROS. COMPANY** 601-412M Woodland Rd.,  
W. Allenhurst NJ 07711  
Free Brochure Our 18th Year ©1993 Peet Bros. Co.

Build a **SHOP OF YOUR OWN**  
for prices you could only  
dream about

LIMITED OFFER



**EASY DO-IT-YOURSELF CONSTRUCTION**  
PACKAGES INCLUDE STEEL, FRAMES,  
SHEETING AND HARDWARE

**30X36**  
Value \$7,751  
**NOW \$3,975**

**36x48**  
Value \$12,145  
**NOW \$6,220**

**40x60**  
Value \$17,250  
**NOW \$8,846**

**46x72**  
Value \$25,143  
**NOW \$12,894**

Other Sizes Available

**MIRACLETRUSS®**

**1-800-843-8275**

FAX 612-544-1835

Made in America

PM

## ENVIROLET™ Composting Toilet Systems



### Advanced Waterless & Low Water Models

The environmental, sanitary, odor-free answer for cottages, cabins, homes & industry. Call for free information

**SANCOR™**  
140-30 Milner Ave., Scarborough, Ontario, Canada M1S 3R3

**1-800-387-5126**

CANADA 1-800-387-5245

## CABLE TV BLOWOUT

NEW!!!

**NOVAVISION \$195.00**

Revolutionary new universal one-piece converter and descrambler. Fully activates all Jerrold, Scientific Atlanta, and Pioneer systems except baseband.

- Picture in Picture
- Computer interface
- Dual tuners
- Volume/Mute
- Parental control
- On-screen display
- Stereo
- Last channel recall
- Favorite channel memory
- Ch 3/4 switch

- Quantity Orders Only
- 30 Day Free Trial
- Call for Pricing of Smaller Quantities
- All Other Models Available
- 1 Year Warranty

Jerrold, Scientific Atlanta, Pioneer are registered trademarks and all references are for identification purposes only.

"The Originals"

**JERROLD® TvT \$29.95**

**JERROLD® TnT \$50.00**

**SCIENTIFIC ATLANTA® M80 \$50.00**

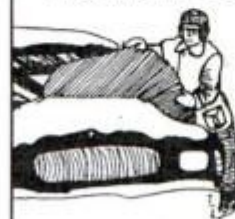
NEW IMPROVED!!!  
**PIONEER® PIO-III \$50.00**  
WORKS ALL PIONEER SYSTEMS

NEW!!! INTERCHANGABLE  
**TnT-M80-3 \$50.00**  
WORKS ALL JERROLD AND SCIENTIFIC ATLANTA EXCEPT BASEBAND

**MicroCom Inc.** Mastercard VISA  
**800-665-2002** AMEX COD

## FROST-BLANKET™ WINDSHIELD COVER\*

NO MORE SCRAPING — CLEARS SNOW & ICE EASILY!



**GOES ON QUICKLY.** Just lay FROST-BLANKET on your windshield. That's all you do. Nothing to attach. No tools.

**SELF-ADHERING.** FROST-BLANKET, a flexible, special rubber formula, automatically conforms to windshield, stays until you remove it. No adhesives, no tapes.

**SNOW & ICE SLIDE OFF.** To remove snow and ice just lift FROST-BLANKET off — and snow and ice with it.

**LONG LASTING, EASY TO STORE.** After each use, just shake snow and ice off, roll up, and store in your trunk.

Call **1-800-FROSTED (1-800-376-7833)** or send \$19.95 plus \$4.95† S&H to:

**AME CONSUMER PRODUCTS CORP.** • P.O. Box 67, Towaco, NJ 07082

\* U.S. Pat. # 5,211,438. Canada, Pats. Pend. †Canada S&H, add \$8.45 (U.S.) NJ residents add 6% sales tax.

**OWN YOUR OWN**

## 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**

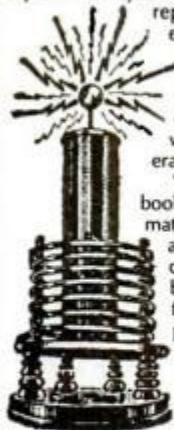
# HIGH VOLTAGE!

## LIGHTNING BOLT GENERATORS!

**BUILD** Monstrous Tesla coils! Terrifying induction coils! Powerful Wimshurst machines! Mysterious Jacobs ladders! Much more!

**DISCOVER** one of the very best down-to-earth collections of high voltage books anywhere. Let Tesla explain his mysterious inventions to you. **STUDY** reprints of rare textbooks and experimenter's notebooks. Learn secrets from today's mad scientists. **USE** their formulas and their computer programs to build your own devilish laboratory filled with strange lightning bolt generators. *The secrets are here!*

You'll also find detailed how-to books on chemistry, lasers, practical math, unusual scientific apparatus, ancient radio apparatus, magnets, crystal sets, windpower, electric bicycles, neon signs, vacuum forming, rare formulas and recipes and much more.



## STRANGE CATALOG!

SEND \$1.00 for your personal copy of Lindsay's Technical Books catalog! Hundreds of guaranteed quality books! You'll be amazed! Write for a complete catalog TODAY! Do it NOW!

**Lindsay's TECHNICAL BOOKS**  
Box 538-WN3, Bradley IL 60915

Send a Technical Books Catalog! \$1.00 is enclosed!

Name \_\_\_\_\_  
Street \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

## CHRISTMAS SALE!

Save on cable rental fees!

# CABLE TV DESCRAMBLERS WE'LL BEAT ANY PRICE

**JERROLD-TOCOM-ZENITH  
HAMLIN-OAK-PIONEER  
SCIENTIFIC ATLANTA**

- 24 HOUR SHIPMENTS!
- 30 DAY MONEY BACK GUARANTEE!
- QUANTITY DISCOUNTS!

**MASTER CARD / AMEX / VISA / C.O.D.**

Have make and model number of equipment used in you area ready.

## CALL TOLL-FREE 1-800-284-8432 CABLE WAREHOUSE

10117 West Oakland Park Blvd., Suite 315, Sunrise, FL 33351  
**NO FLORIDA SALES**

Anyone implying theft of service will be denied assistance.  
**FREE\* FEDEX SECOND DAY  
SHIPPING ON ALL ORDERS**  
\*Same charge as our normal UPS ground.  
Offer good until 12/31/94.

## WINTER CLEARANCE!

**STEEL BLDGS**
**SAVE UP TO 45%**

Buy Factory Direct. 20 x 36 • 25 x 40  
Build it yourself! 30 x 42 • 40 x 180

## 800-888-4606

**STEELMASTER**

## ABSOLUTELY AWESOME VIDEOS

Only **99¢**

**20 FREE VIDEOS**

- 10 VIDEOS \$9.90
- Buy 20 Get 20 FREE
- 40 VIDEOS \$19.90
- DISCOUNT CATALOG with 3 FREE VIDEOS bonus offer \$3 Shipping

**BARGAIN DISCOUNTS Dept. MCA**  
Box 85311 Los Angeles, CA 90072

You Won't Believe Your Eyes!!!

## TALKING WATCHES \$11.99 EA.

Postage Paid

- PRESS THE TALK BUTTON TO HEAR THE TIME
- COCK-A-DOODLE-DOO ALARM
- DIGITAL DISPLAY
- HOURLY TIME ANNOUNCEMENT OPTION

Call! Residents add 8.25% Sales Tax

**K.R. PRODUCTS**  
4351 Sepulveda Blvd., Dept. 426-pm, Culver City, CA 90230

## Satellite-TV FREE

100% Satisfaction Guarantee

**Systems from \$479**

56 Page Catalog/Buyer's Guide

- All Major Brands
- Complete Systems
- Accessories
- Huge Savings
- Easy Installation
- Complete Instruct.

**Let Us Help You Select Your New Satellite TV Entertainment System**

**Over 40,000 Satisfied Customers**

**YOU CAN**

**1-800-334-6455**  
Int'l 218-730-8251 Fax 218-730-4879  
**SKYVISION INC.®**  
1020 FRONTIER DRIVE  
FERGUS FALLS, MN 56537

**INSTALL OR UPDATE YOURSELF!**

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, rescue, or dealership purposes, send \$11 (refundable) for our comprehensive info pack. Discover how affordable it can be to fly. Visa or Mastercard. Foreign orders add \$4.50).

**Nectaric Hovercraft Inc.**  
1049 Tippecanoe Street, Terre Haute, Indiana USA 47807-8394  
Fax: 812-834-3217 Phone: 812-834-1120

## "Tankless Gas Hot Water Heater"

Energy Savings • Continuous Supply of Hot Water • Compact Wall Mounted Design • LP/Natural Gas Direct-Vent or Conventional Flue

Call 800/456-3761 for Free Brochure

MYSONB McNeely-Yull Corp.  
9911 Horn Rd., Suite 100-A  
Sacramento, California 95827

At Myson...We're always in Hot Water!

## CORVAIR

Over 10,000 new, used & performance parts in our 500 pg. illustrated catalog: **Rushed - \$4.00** (in U.S.A.)

**CLARK'S CORVAIR PARTS, INC.**  
Rt 2, Box PS, Shelburne, Ma. 01370  
(413)625-9776

## Yes! You can own your own home.

*It's easier than you think!*

Just being your own general contractor and doing some of the simpler work yourself may be enough participation to provide the equity (down payment) you need for a mortgage on your very own home! Call today!

**1-800-343-2884**  
Ext. 1

**MILES HOMES**

*No down payment on Miles materials or money lent for subcontracted work*

## MILLENNIUM<sup>3</sup>

**Converter w/options including:**

- volume control
- remote A/B switch
- parental lockout
- infra-red remote
- restores picture-in-picture
- favorite channel memory
- watch 1 chan. record another

**\$55!** 10-lot price for dealers only!

**800-644-6682**

**NOVAPLEX**

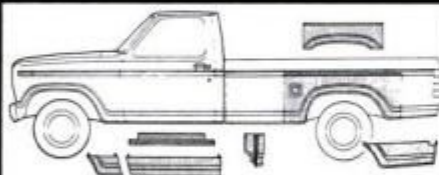
8818 Bradley Ave., Sun Valley, CA, 91352

## VOICE CHANGER TELEPHONE



SIXTEEN DIGITAL VOICE CHANGING MODES are built into this standard desktop telephone. Change your voice from male to female, female to male, adult to child, child to adult & "cartoon" voices. Use as regular voice phone or switch to

Voice Change Mode (lighted mode indicator). Tone/pulse, last number redial, hearing aid compatible, FCC registered, UL listed, warranty. Precise & realistic voice masking is ideal security for women & children home alone, as a home/business "screening" device, and discourage annoying callers. Money back guarantee, \$89.00 + \$5.00 shipping. DutchGuard, Dept. PMV, P.O. Box 411687 Kansas City, MO 64141. Send checks/money orders or MC/Visa orders call TOLL FREE (800) 821-5157



## STEEL RUST REPAIR PARTS

Restore your car, van or truck to showroom condition with TABCO parts. Over 100,000 domestic and foreign parts, available for immediate delivery.

Send \$5 for illustrated, 150-page catalog with instructions to install TABCO parts. Refundable with order. Shipped 1st Class. Dealer inquiries invited.

**TABCO** (216) 248-5151  
FAX (216) 248-8979  
30500 Solon Industrial Pkwy. Dept. PM Cleveland, OH 44139

## CHEAP HEAT

INEXPENSIVE • ENERGY EFFICIENT  
MAINTENANCE FREE

USING YOUR  
WATER HEATER

Don't waste money on another space heater. Let your gas or electric water heater give you continuous 90 degree heat AND hot water. Do it yourself in an afternoon with easily obtained parts. Don't delay! Order today!  
Complete Illustrated Plans • \$12.95 postpaid  
ROPERSEN ENTERPRISES  
P.O. BOX 1112, DEBOTO, TEXAS 75123-1112

# 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

**NCCA**

Member of  
National Consumer  
Cable Association

**MD Electronics**

875 S. 72nd St. • Omaha, NE 68114

VISA MasterCard

DISCOVER

**FREE  
Catalog!**

# Now It Takes Only 12 Weeks To Get From "Before" To "After."



Don W. — Age 27

**Before**  
Body weight: 194 lbs.  
% Body fat: 11.5%  
Waist: 33 inches  
Arms: 12.5 inches  
Chest: 40.5 inches



**After\***  
Body weight: 175 lbs.  
% Body fat: 6%  
Waist: 31 inches  
Arms: 15.5 inches  
Chest: 44.5 inches

## YOU GET RESULTS FAST.

Now you can see impressive results like Don's in only 12 weeks!\* Research shows that the patented isokinetic resistance mechanism of a NordicFlex Gold® strength trainer works your muscles more efficiently than other, ordinary strength trainers.

up to  
**38**  
total-body  
exercises

**30-DAY IN-HOME TRIAL!**

## YOU GET A FASTER WORKOUT.

NordicFlex Gold automatically adjusts to your strength level for a fast, effective workout. Since you waste no time adjusting resistance, your changeover time between exercises is faster than with other systems!

Get a leaner, firmer body in only 12 weeks! Call now for your free video and brochure.

\*Individual results may vary.

**FREE Video and Brochure, CALL 1-800-441-7890 Ext. 0K1L4**

or write: NordicTrack, Dept. 0K1L4, 104 Peavey Road, Chaska, MN 55318-2355  
 YES, I want to learn about the industry leader. Send me a FREE brochure and VHS videotape.

Name \_\_\_\_\_ Street \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_ Phone ( ) \_\_\_\_\_

**NORDIC FLEX Gold**

Best of all...it's from NordicTrack, a CML Company!

©1994 NordicTrack, Inc., A CML Company • All rights reserved.



**CABLE TV**

Jerrold®  
Zenith  
Tocom  
Oak

**B&B**

Hamline  
Pioneer  
Scientific  
Atlanta

**1-800-826-7623**

3584 Kennebec, Eagan, MN 55122  
30 DAY TRIAL 1 YR. WARRANTY

VISA MC AMEX DISC COD

**Steam Models**

"FASCINATING WORKING STEAM MODELS!"

Complete "WILD & WAXIE" line. Over 100 different models. Trains, Marine, Cars, Trucks, Stationary Fire Engines & Accessories. Stunning, large 34 page colored Catalog \$6.95 Refundable.

SALES • PARTS • SERVICE  
LARGE DISCOUNTS

PHONE: (800) 475-1771

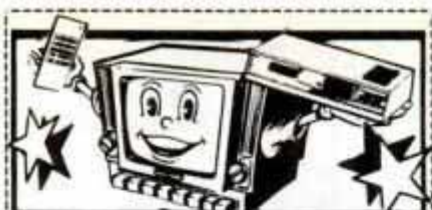
YESTERYEAR TOYS & BOOKS, INC.  
Dept. Pk Box 537, Alexandria Bay, NY 13607

**CABLE TV  
DESCRAMBLERS  
Converters & Accessories**

**SAVE MONEY! OWN YOUR EQUIPMENT**

You now have a choice to own your cable equipment to 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...

**CALL FOR YOUR FREE CATALOG TODAY.**  
Add-on Cable Company  
**800/334-8475**



## CABLE T.V. CONVERTERS

WHY PAY A HIGH MONTHLY RENTAL FEE?

All Jerrold, Oak, Hamlin, Zenith, Scientific Atlanta, Pioneer and all specialized cable equipment available for shipment within 24 hours. For fast service MC/VISA or C.O.D. telephone orders accepted. 30 Day Guarantee (Quantity Discounts) 8 A.M. to 5 P.M. C.S.T. Monday through Friday.

Send self-addressed stamped envelope (60c postage) for FREE CATALOG.

**MIDWEST ELECTRONICS INC.**  
P.O. Box 5000  
Suite 311 (PM)  
Carpentersville  
Illinois 60110

INFORMATION/ORDERS (800) 472-1110

Note: Decoders and Descramblers must not be used without authorization by your local cable operator. No Illinois Orders Accepted.

**World's Finest** **HOME BUILT HELICOPTER**  
Super-easy, low-cost construction!

- Carries one person • Store it anywhere
- Powered by Go-Kart engines • License free

Complete G-1 Construction Plans: **Only \$24.95**  
(Add \$3 post. Foreign add \$5)

Four color inserts • Helicopter assembly instructions • A helicopter helicopter catalog  
Catalog only: \$10

**VORTECH, Inc.**  
PO Box 511 • Fallston, MD 21047  
72 HOUR ORDERING (1-410-583-6366)

**GO KARTS** LARGEST SELECTION DISCOUNT PRICES

FUN KARTS • MINIBIKES  
ALL-TERRAIN KARTS  
ENGINES • KITS • PARTS

88 PAGE CATALOG \$39!  
Order the catalog to show or VISA or MasterCard for just \$2.00 to address.  
Some Catalog sent by 1st Class Mail.

**KW KART WORLD** DEPT M PHONE  
1488 MENTOR AVE., PAINESVILLE, OHIO 44077 (216) 337-5509

WORLD'S MOST EFFECTIVE AUTO ANTI-THEFT DEVICE

• Works on Automatic or Manual  
• Made of One-Piece Hardened Steel  
• Dismounts  
• Works on 2000 Ford

**MUL-T-LOCK**

Call Today! 1-800-308-LOCK

**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

**NU-TEK ELECTRONICS** NCCA  
3250 Hatch Cedar Park TX 78613

**CABLE TV CONVERTERS & DESCRAMBLERS**

**1-800-228-7404**

FEDERAL EXPRESS, UPS, VISA, M/C, DISCOVER

**FREE Catalog** VCR PRO  
The Only Remote You Will Ever Need Again  
Guaranteed To Work On Any Infrared Product  
Replaces Any 8 Remotes  
Makes Programming A VCR Simple

**PICTURE IN PICTURE**

- Works on ALL TVs
- 4 Source Inputs
- 181 Channel Capability
- Video Command Center
- Remote Control

**CABLE TV MULTI-MEDIA EQUIPMENT**

- **DESCRAMBLERS/CONVERTERS**
- BULLET PROTECTORS & IMMUNIZERS
- DIGITAL ON-HOLD ANNOUNCERS
- LAZER PENS & VOICE-MAIL SYSTEMS

**1-800-833-2915**

BUY WHERE THE DEALERS BUY - GUARANTEED!  
BUY 2 SAVE 10% ON A SECOND UNIT!  
FRIENDLY, COURTEOUS SERVICE

**GENUINE ELECTRONICS INC.**

**CABLE TV DESCRAMBLERS** 9-5 CST DEALERS WANTED  
LOWEST PRICES MON-FRI EARN EXTRA \$\$\$  
SAT 10-2  
**BIG SALE**

Please have MODEL used in your area when calling  
CNC Concepts Inc  
PO Box 49503-PM  
MPLS MN 55449

**1-800-535-1843**

**SMALL COMPANY • BIG DISCOUNTS!**  
CABLE TV DESCRAMBLERS AND CONVERTERS

Discover MasterCard Visa Top Brands Available SATISFACTION GUARANTEED! 1-800-775-0444 American Express COD Check by Phone

**T.C. ELECTRONICS**  
Decoders and Descramblers must be not used without authorization by your local cable operator. No Tennessee sales.

**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. SSAE 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

**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)

**NEW HYDRO MAGNATAC.**  
No Belts...All-Hydraulic Drive!  
SAVE MONEY...MAKE MONEY!

Buy factory-direct. Use for landscaping, gardening, excavating, logging... Earn Extra CASH!

- CATALOG ... \$2.00
- VIDEO ... \$9.50
- Technical Manual... \$8.50

STRUCK-KIT • Box 307 • Dept. PM124  
CEDARBURG, WISCONSIN 53012

**SURVEILLANCE**  
& COUNTERSURVEILLANCE Electronic Devices

Covert Video Cameras • Transmitter Kits • Voice Changers  
Bug and Phone Tap Detectors • Shotgun Mics • Micro Recorders  
Vehicle Tracking • Locksmithing • AND MORE!

IMPROVED! 7-Hour Telephone Recorder  
Tapes incoming/outgoing phone calls automatically. \$125.00

FOR CATALOG SEND \$5.00 TO... **SPY OUTLET**  
P.O. Box 337, Buffalo, NY 14226 (716) 691-3476

**HELICOPTER** Revolution  
Affordable, Personal Revolution  
Mini 500

Revolution Package Catalog... \$15  
10 Hour Action Video... \$30  
Intro Pack & Video... \$40  
PAL (Standard Format) Video... \$50  
Intro Pack & PAL Video Combo... \$85  
(Package prices add \$10 for S/H)

Credit Card Orders Only: 1-800-43-ROTOR

**BUILDING A NEW HOME OR REMODELING**

WHAT DO I DO... WHO DO I TALK TO... HOW DO I START?  
If you are starting these questions, let us give you the answers. We have years of experience in consulting & remodeling homes. We can help you through the complex job building process with the help of our experienced professionals.

- ANSWER ALL YOUR QUESTIONS
- EASY TO FOLLOW
- BUILDING NEW OR REMODELING
- YOU ARE IN CONTROL
- SAVE MONEY! See HOW! HANDBOOK \$29
- IT ONLY COSTS REMODELING & ADDITION HANDBOOK \$24

SEND CHECK PLUS \$2.00 S&H PER HANDBOOK • PA RESIDENTS ADD 6% TAX  
TO: RICHARD KAPUSTA, INC. • 535 LAKEVIEW ROAD • TELFORD • PA • 18988

**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

**SINGERS! REMOVE VOCALS**  
Unlimited Backgrounds™  
From Standard Tapes, Records, & CDs with the Thompson Vocal Eliminator™ Call Now for Free Catalog & Demo Tape.  
Phone (404)482-4189-Est 61  
LT Sound • Dept. PM-15  
7968 LT Parkway  
Lithonia, GA 30038  
24 Hour Demo/Info Request  
Line (404)482-2485 • Ext 61  
The Thompson Vocal Eliminator™ - Better Than Karaoke!

**CABLE DIRECT**  
100% MONEY BACK GUARANTEE! • 30 DAY FREE TRIAL!

Now you can tune-in to your favorite cable TV programming and SAVE 100's—EVEN \$1000's on premium

**CABLE TV EQUIPMENT**  
Converters • Descramblers • Filters


FREE Cable TV Catalog

**MODERN ELECTRONICS**  
**1-800-906-6664**  
2125 S. 156th CIRCLE • OMAHA, NE 68130

Don't have unprotected

# DIVORCE!

Get extensive help. Save \$\$\$  
Local lawyers & referrals, newsletter  
**MEN'S DEFENSE ASSOCIATION**  
17854 Lyons Forest Lake, MN 55025  
>> 2 bucks brings info <<



## FLUSH UP TOILET

To Above Floor Drain  
Install It Yourself - Anywhere  
No Digging Up Floors

New Mod. E 1.6

Write McPherson, Inc., Dept. 16  
Box 15133, Tampa, Florida 33684



## 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

## Concrete Dome Kit

1(800)608-0001

Monolithic Constructors, Inc.  
PO Box 479-M - Italy, TX 76651

Free Brochure  
or Video \$19.95

Build your own super strong  
concrete Monolithic  
Dome™. As an office,  
home, shed, cabin,  
rental unit, anything!  
Cost / Energy Efficient.



## CABLE TV DESCRAMBLERS

1-800-233-9388

FREE CATALOG  
GUARANTEED BEST PRICES - IMMEDIATE SHIPPING

**APPLE ELECTRONICS**  
3389 Sheridan St. - Suite 257  
Hollywood, FL 33021

## THE DIGGER

Build It Yourself  
Backhoe - Send For  
Free Brochure

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

**CAD** plans available

P.O. Box 506, Dept. P • Daleville, VA 24083 • 1-800-81-PLANS



### ADVERTISEMENT

# WORTH WRITING FOR

#### 920 CUB CADET SERIES 2000 TRACTORS

Full-color guide to America's only complete line of shaft drive lawn tractors. Seven models, 12.5 to 18 HP available with either six speed AutoGear™ or AutoHydro™ transmissions. This brochure not only details the unique Cub Cadet construction, operations and attachments, it also provides complete technical specifications. Free Brochure

#### 921 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

#### 922 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.

#### 923 RUBBERMAID

Rubbermaid Commercial Products offers a 6-page, 4-color, full-line products brochure featuring complete information on transport, storage, feeding/watering products for home, business or farm use. Free Brochure

#### 924 NEW! AUTOMATIC BATTERY MANAGEMENT SYSTEM

Automatic and "hands off" operation describes Wells Marine Technology's line of automatic battery systems. These units will replace manual battery selector switches whenever more than one battery is needed. Patented sensing system puts battery in parallel whenever engine is running and automatically isolates each battery when engine is shut down. Perfect for boats, RVs, Commercial Vehicles. 40 to 400 plus AMPS. Emergency start feature included. Free Brochure

#### 925 KEEP YOUR HOME ENERGY EFFICIENT

If you're thinking about remodeling or adding a room in your home, a free brochure called "Need More Space" offers tips on insulating and helping to keep your new living space energy efficient. From CertainTeed Corporation. Free Brochure

#### 926 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

#### 927 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

#### 928 SCIENCE RESOURCE CATALOG

Edmund Scientific's 120 page catalog contains over 4,000 products for the budding scientist, student and educator - featuring microscopes, telescopes, weather instruments, fiber optics, solar equipment, magnifiers, high-tech science toys, plus many items designed for science fair projects. Free Catalog

#### 929 THE WOODWORKER'S STORE CATALOG

New! The Woodworker's Store 1994/95 catalog with hundreds of new items features 112 full color pages of domestic and exotic hardwoods, veneers, wood parts, specialty hardware, kitchen accessories, finishing supplies, tools, books, and plans..... Many exclusive items and hard to find specialties. Orders shipped in 24 to 48 hours. Toll free ordering. Over 40 years in business! Satisfaction guaranteed. Catalog \$2.00.

#### 930 INFORMATION FOR THE DIVORCED

DIVORCE: Attorney and local group referrals, literature on finances, law citations, top writers, common sense on all gender issues. Membership information from national organization. \$2.00

#### 931 TRIMAX

TRIMAX Inc. offers the most advanced in-home fitness equipment for total body conditioning available on the market today. Utilizing bi-directional hydraulic cylinders which provide isokinetic resistance. TRIMAX delivers an

extraordinary muscular and cardiovascular workout. Achieve and maintain your personal fitness goals quickly, safely and dependably in the comfort of your home. FREE Video and Brochure

#### 932 FREE STUFF FROM UNCLE SAM

Get your copy of this valuable book. Every year our government hands out billions of dollars worth of free stuff, loans, subsidies, scholarships, grants, etc. This 64 page book tells you exactly where to write or call to get your share. It also tells you where to buy government surplus items (such as cars, boats, cameras, etc.) for "peanuts." \$3.00

#### 933 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™

#### 934 "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). Free Catalog

Popular Mechanics 12/94  
Box 1718, Sandusky, Ohio 44871-1718

This Coupon Expires March 31, 1995

Please see that I receive the items checked below

- |                              |                              |                                     |                                     |
|------------------------------|------------------------------|-------------------------------------|-------------------------------------|
| <input type="checkbox"/> 920 | <input type="checkbox"/> 924 | <input type="checkbox"/> 928        | <input type="checkbox"/> 932 \$3.00 |
| <input type="checkbox"/> 921 | <input type="checkbox"/> 925 | <input type="checkbox"/> 929 \$2.00 | <input type="checkbox"/> 933        |
| <input type="checkbox"/> 922 | <input type="checkbox"/> 926 | <input type="checkbox"/> 930 \$2.00 | <input type="checkbox"/> 934        |
| <input type="checkbox"/> 923 | <input type="checkbox"/> 927 | <input type="checkbox"/> 931        |                                     |

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.

# CLASSIFIED ADVERTISEMENTS

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 **FEBRUARY** issue closes on **DECEMBER 5TH**. (On sale date is **JANUARY 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, 224 West 57th Street, New York, NY 10019. Be sure to indicate classification under which advertisement is to appear. For additional advertising information call 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 can take your order over the phone. For speedy placement of your advertisement contact Dorothy at 1-212-649-3167. Please have credit card information handy. Thank you.

## PUBLISHER'S MART BOOKS & PUBLICATIONS

**CAJUN CRAFTS/DELICACIES DIRECTORY.** Contact creators personally \$5.95: DirectLink, Box 47A, Cecilia, Louisiana 70521

**MATH** aid. New booklet: "Ways To Make College Mathematics Easier". Great For all Students! \$2.50. Palms Publishing, P.O. Box 12912, Santa Barbara, CA 93107

**"ANARCHIST COOKBOOK"** Available again! \$25. delivered. Barricade Books, Box 1401-X, Secaucus, NJ 07096

**"SHARPENERS REPORT"** Monthly Newsletter. Valuable Tips—Sources—Buy/Sell Used Equipment. Free Brochure. Skog Company, Dept. PM12, P.O. Box 22187, Minneapolis, MN 55422

**FREE BOOKLETS:** Life, Death, Soul, Resurrection, Pollution Crisis, Hell, Judgment Day, Restitution, Bible Standard(PM), P.O. Box 67, Chester Springs, PA 19425.

**HOW** to buy a good used car book. Details send SASE: P.O. Box 172, Lemon Grove, CA 91946

**RENEGADES** Sourcebook Of Forbidden Devices/Knowledge. Write: #365-X12, Penfield, NY 14526-0365

**ENLIGHTENING!! EMPOWERING!! SELF-IMPROVEMENT BOOKS. FINANCIAL SUCCESS. GREATER ENJOYMENT. FREE CATALOG. STARLIGHT, P.O. BOX 598, HURLEY, VA 24620.**

**MEN** Great Gift Idea "The Busy Woman's Guide To The Stock Market". Written by A Woman For Women. Send \$8.95 includes P/H To: The Busy Woman, P.O. Box 250043, Atlanta, GA 30325

**PERFECT GIFTS!** Jones' Complete BarGuide, \$18.95. Stan Jones Cooking With Spirits, \$14.95. Publisher Pays Delivery! Jones, Box 7318, Nogales, AZ 85628-7318

**THE FUNERAL ALTERNATIVE.**—What Is The Funeral Alternative? Send \$5.00 For Information. TFA, 2148 Sadler Road Ste 2115, Amelia Island, Florida 32034

**WARMAN'S ANTIQUE GUIDE** 1000 Photographs, 50,000 Items. Most Complete Price Guide Published. \$15.95. Fairfield Gifts, 43 Wyndover Ln., Stamford, CT 06902

**DROP SHIP MAILORDER - EASY PROFITS.** Starlight, POB 598, Hurley, VA 24620

**BURGLARS BEWARE!** Protective alarms. For home and away. Free brochure. KLM, 3612 Rosewood Avenue, Dept. M1201, Los Angeles, CA 90066-3030.

**HOME INSPECTION.** Easy to read manual guides you through a house. Learn what the professionals know. \$6.95. Newhall Publishing, Dept. 1110, 4230 N. Oakland, Suite 204, Shorewood, WI 53211

**WELDING** - Certified Instructors Reports: How To Become A Certified Welder, How To Repair Cast Iron, many others. Write for free list. Marshall, 29430 Mabel Street, Millbury, Ohio 43447

**COMPUTERS IN PLAIN ENGLISH,** take the mystery out of buying a PC. A concise 28 page booklet of valuable information. \$4.00. Next Step, P.O. Box 6041, Camillus, N.Y. 13031-6041

**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.**

## CATALOGS

**DISTINCTIVE GIFTS** for Every Family Member. Shop By Mail, Enjoy The Convenience. Catalog \$5.00 Refundable. Impex Direct, 9020 Marcel Gelinus, Dept. C1612, Montreal, Quebec, Canada H1E 5V8

**MAKE WOODED TOYS!** Whirligigs! Door Harps! Doll-houses! Banks! Music Boxes! Dozens of fun Wooden toys from easy to use plans, parts and kits. All Skill Levels! Catalog \$1.00. Cherry Tree Toys, Box 369-310, Belmont, OH 43718. Phone Free: (800) 848-4363. Ext. 310.

**CANVAS BAGS AND APRONS, S.A.S.E.** For Free Info. **CANVAS UNIVERSITY,** 10734 Jefferson Suite 216-PM, Culver City, CA 90230

## KIT CARS

**KIT CAR BUYERS GUIDE ON VIDEO.** Twenty manufacturers featured \$19.95. Call (804) 743-2118 Ext. 25

## CHRISTMAS GIFT SHOPPING

**CHRISTMAS COLLECTION** Holiday Decorations. TG Conlon, 82 Wall St., Suite 1105, New York, NY 10005

**LETTER FROM SANTA.** \$3 With Child's Name, Address. By Dec. 15th. Kinco, Box 2058, Chester, SC 29706.

**PERSONALIZED PENS.** Set of 12 only \$3.95 (plus \$1.95 per set shipping & handling). Sensational stocking stuffer! National Pen, Dept. PM1, San Diego, CA 92181

## AUTOMOBILES

**\$225 DAILY "CHROME PLATING"** Auto Parts, Motorcycles, inexpensive, easy. (Free) information. Chrome Finish, Box 5748, Deltona, FL 32728

**CLASSIC CAR VIDEOS!** Catalog \$1.00 (deductible). Route 66 Videos, P.O. Box 8461, Albuquerque, NM 87198-8461

**GOVERNMENT SEIZED** Vehicles from \$100. Fords, Mercedes, Corvettes, Chevys. Surplus. Buyers Guide. (1) 805-962-8000 Ext. S-20024.

**VAPOR CARBURETOR TRIPLES MPG.** Free information. H&A, R2E35P Bowling Green, MO 63334-9350

**DRUG RAID SEIZURES:** Buy Dirt Cheap! Cars, Trucks, Boats, Computers. Seizures, Box 51488-AT, Ontario, CA 91761

**\$250 DAILY ELECTROPLATING** Details. Communications Engineering, 76 Boulevard M, Hudson Falls, NY 12839

**NEW** used car inspection guide **OVER 200 MONEY SAVING TIPS** \$3. Bluetree, 1010 Somerset Drive, Johnson City, TN 37604

**\$250 DAILY REBUILDING** Alternators-Starters. Details. Mechanical Engineering, 76 Boulevard K, Hudson Falls, NY 12839

**FUEL ATOMIZER 2000.** Famous, small and doubling gas mileage for many. Save gas and earn money. Costs less than \$150.00. Guaranteed. Free Information, 800-647-1771. 24hr recorded message. Wyoming Instruments - A Name To Be Trusted.

**VEHICLES** Under \$200! Cars Auctioned By DEA, FBI Nationwide. Trucks, Boats, Motorhomes, Computers, And More! Call Toll Free! 1 (800) 436-6867 EXT. A-1922

**TIRES** more for your money send \$3.95 and SASE To: FC Enterprises, Box 498, Mosier, OR 97040

**FREE** electroplating catalog. Books, Kits. University Pubs., Box 1071, Provo, UT 84603. (801) 377-5367

**WORLD'S BEST CAR POLISH!** Dazzling shine. Ultimate paint protection. Free brochure. KLM, 3612 Rosewood Avenue, Dept. M1202, Los Angeles, CA 90066-3030.

**94 MPG** On My Car With \$20 In Supplies! Free Details. Send SASE. NIFI, Box 1465M, Seneca, SC 29679

## ELECTRIC VEHICLES

**1-800-KAYLOR-K. COMPONENTS, PUBLICATIONS, INSTRUCTIONS, VIDEOS.** (KITBOOK \$22.95) KAYLORKIT. POB1550PM, BOULDER CREEK, CALIFORNIA 95006-1550

## AUTO SUPPLIES & EQUIPMENT

**DC INVERTERS** 12VDC/115VAC Ideal for Mobile Service Businesses 125-1200W. 1-800-742-5148

**ALTERNATOR** Generator Rebuilding Book. Details: HV Technologies, 7505 Barkentine, Las Vegas, NV 89128

**HEADLIGHT MINDER,** Headlights automatically on & off with wipers. Easy installation. \$15. Hayden, Box 4123, North Myrtle Beach, S.C. 29597-4123

**THE** Original "Slim Jim" Car Door Opener Tool. Only \$19.95. Danton, 2815A Longmire, College Station, Texas 77845

## BICYCLES, SUPPLIES

**BICYCLE SAFETY LIGHTING SYSTEM** High Intensity Bicycle Halogen Headlight! "Much Brighter Than Ordinary" Modern Aerodynamic Design Satisfaction Guaranteed, \$24.95. Postpaid. Ashland Bicycle Center, 2126 Winchester Ave., Ashland, KY 41101.

## GO-KARTS, MOTORCYCLES, & MOTORSCOOTERS

**GO KARTS,** Minibikes & ATVs. 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

## CONVERTING BUSES TO MOTOR HOMES

**FREE INFORMATION** - Bill Lowman, 306M Riverbay, Tampa, FL 33619. 813-621-5296.

## AVIATION, HANG GLIDING

**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, 617-M Anderson, Talent, OR 97540

**HOMEBUILT AIRCRAFT - ILLUSTRATED SOURCEBOOK:** New Second Edition. 300+ pages. Photos, Drawings, Specs for Every type aircraft plus hardware, accessories, etc. \$20.00 plus \$4.50 S/H (U.S.) to: Aerocrafter, 940 Adams #G(9) Benicia, CA 94510

**AIRBOATS.** Hovercraft Supplies. Plans, Propellers, Engines. Catalog \$5.00. Arrowprop, Box 610M, Meeker, Oklahoma 74855

**SPORTPLAN** Resource Guide! The ultimate "How-To" consumer guide to over 500 sport aircraft kits, evaluated and written by USAviator magazine test-pilots. Over 500 pages with illustration/photos covering kits, supplies and services, \$39.95. 1-800-356-7767 (Visa/MC Only). USAviator, POB 9131, Winter Haven, FL 33883-9131.



## HOVERCRAFT

**HOVERCRAFT** Parts. Catalog \$5.00. GPL, 1220 Tangelo #A13, Delray, FL 33444-1258.

**SIX-PASSENGER HOVERCRAFT KIT**, Fiberglass Hull, Brochure \$3.00. Air Craft Corporation, 4112 Victoria Blvd., Hampton, VA 23689

**HOVERCRAFT** Plans, Kits, Information \$8.00 (Refundable). SevTec, Box 846, Monroe, WA 98272

## CB'S, RADIO & HAM EQUIPMENT

**SECRET** Scanner Frequencies! Federal Agencies, Surveillance, Police, More! Free Catalog! CRB, Box 56, Commack, NY 11725

**POLICE-FIRE SCANNERS**. CB's. **MARINE 2WAY**. **ANTENNAS**. HPR, BOX 19224PM, DENVER, CO 80219

**CB MODIFICATIONS!** Frequencies, sliders, FM, amplifiers, books, kits, repairs, high-performance accessories. Catalog \$3. **CBCI**, Box 31500M, Phoenix, AZ 85046

**21 BAND SHORTWAVE WORLD RECEIVER** Black - 18oz. - Dim: 7" x 4.5" x 1.5" \$29.95 + \$6.00. S/H Money Back Guarantee! Checks, M/O, Credit Cards. Flying Dragon Corp., Box 18017, Knoxville, TN 37928

## ELECTRONICS

**NIGHT VISION EQUIPMENT** You Can afford. Call Right Now For Free Catalog HITEK (800) 54-NIGHT.

**BUGGED? PHONETAPPED?** Free Catalog Counter-Surveillance equipment tells you Fast! 1-800-732-5000

**SURVEILLANCE/COUNTERSPY, PROTECTION!** Guaranteed Lowest Prices! Catalog's \$5.00. Protector, Box 520294-M, Salt Lake City, UT 84152 (801) 487-3823.

**SURVEILLANCE - COUNTERSURVEILLANCE - WE HAVE EVERYTHING!** Catalogs \$5.00. PEP, Box 930024-M, Norcross, GA 30093

## COMPUTERS & SOFTWARE

**DES:** File Security Software. ASE, P.O. Box 96, Plentywood, MT 59254.

**FREE CATALOG.** IBM Compatible Shareware. CIL, Box 18477, Raytown, MO 64133. (816) 478-6185.

**FREE CATALOG-ON-DISK.** IBM Compatible ShareWare. ASP Approved Vendor. Buster Software 1-800-598-7238

**WARNING!** Don't buy a PC or MAC for yourself or your child until you've read this **FREE!** Write: Tsunami, 216 F Suite 153C, Davis, CA 95616. (916) 757-7867.

**BOOMERANGS ... HIGH-TECH DESIGNS!** Incredible Returns Amazing Fun. **FREE CATALOGS.** BoomerangMan, 1806-1 N 3rd, Monroe, LA 71201-4222

**FREE CATALOG-ON-DISK!!!!** IBM-compatible shareware. RJM Technologies 1-800-756-8810.

**SAVE MORTGAGE \$\$\$** Windows program analyzes accelerated payments, audits ARMs. \$15. Stiles, 3270 Jeffrey-Lori, Finksburg, MD 21048

**PRINT THOUSANDS OF 'PERSONALIZED' LETTERS W/ MAILING LABELS EACH DAY** using any IBM PC/Clone! Diskette of simple proven software & clear practical instructions. Contact: BDB, Dept. M, Box 80, Carle Place, NY 11514

**SNES/GENESIS**, cartridge backup systems, security tools, more. Free information. VCRX Video, P.O. Box 151011, Lufkin, TX 75915

## SATELLITE - TV

**FREE Catalog** - Lowest prices world wide. **SKYVISION**, 1022 Frontier, Fergus Falls, MN 56537. 1-800-334-6455.

**SUPER LOW PRICES. FREE U.S.-INTERNATIONAL CATALOG.** SATMAN 800-472-8626.

**FREE DETAILS!** Satellite systems, upgrades, programming. **ORBITEK**, Box 264-M12, Bohemia, New York 11716-0264. 1-800-669-4728. 1-516-589-1292.

**LEARN** How **VIDEOPYPER-II** owners get sound without codes. \$19.95. Nassirian, Box 382M, Rio Linda, CA 95673.

**FREE Catalog** - Nobody Beats Our Prices! Satellite Express 1-800-552-3666

## TV, VIDEOS & VIDEO EQUIPMENT

**NOTICE: USE OF CERTAIN ITEMS IN THIS CLASSIFICATION REQUIRES STATION AUTHORIZATION.**

**HOW-TO VIDEOS.** All your interests, huge selection. **NOT AVAILABLE IN STORES.** Big Catalog \$1. Spur, Box 871-F, Colorado Springs, CO 80901

**HARD** To Find Training Videos 138 Pg. Catalog. \$12.95 Order Now With Our Checks By Phone. 800-488-4330.

## CABLE TV EQUIPMENT

**CABLE** Test Chips. Puts cable box into full service mode! \$29.95 to \$59.95. 1-800-452-7090. (310) 902-0841.

**REVOLUTIONARY** Technology: Universal Box Works On Jerrold-Pioneer Systems. 1-800-676-6342

**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 TV DESCRABLERS NOBODY BEATS OUR PRICE!** Quantity Discounts 24 Hour Shipping - All Brands Call V.C.I. 1-800-677-0321

**CABLE TV DESCRABLERS, CONVERTERS, COMBO'S, DEALERS DISCOUNT CALL NOW WE'LL BEAT THE COMPETITION - UNIVERSAL SALES - 800-647-2371**

**CABLE CONVERTERS, ACCESSORIES BELOW WHOLESALE!** Immediate delivery from giant stock! COD orders only. No California sales. 1-800-995-1749.

**(CABLE TV) De-scrambling Turn-On Chips!** (Videos), Easy To Install In Your Converter! **NEW**, No Soldering Injector Kits. In Stock Now All Major Brands. Money Back Guarantee. Call The Professionals (1-800-800-8532). TAZ Electronics.

**CABLE/SATELLITE DESCRABLERS** for all systems guaranteed! Send SASE for information. Mystical Electronics, P.O. Box 481 Cooper Station, New York, NY 10276

**"CABLE T.V. CONVERTERS"** Jerrold®, Zenith, Pioneer, Oak, Scientific Atlanta, And Many More. 12 Years Experience gives Us The **ADVANTAGE.** VISA/MC, AMEX, COD. Advantage Electronics, Inc. 1-800-952-3916, 1125 Riverwood Dr., Burnsville, MN 55337

**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 S&H. VISA/MC. Electroman, (504) 482-3017.

**DESCRAMBLE CABLE**, add simple circuit to Radio Shack RF modulator, instructions \$10.00. TELCOM, Box 832-M12, Brusly, LA 70719

**CABLE TV CONVERTERS, DESCRABLERS.** 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 Raihead Blvd., Naples, FL 33963

**CABLE TV CONVERTERS & ACCESSORIES** Wholesalers Welcome! 30 Day Moneyback Guarantee! Free Catalog! **PERFORMANCE ELECTRONICS, INC.** 1-800-815-1512.

**SECRET CABLE DESCRABLERS!** Build your own De-scrambler for **LESS** than \$12.00 in **SEVEN EASY STEPS!** **RADIO SHACK** Parts List and **FREE** De-scrambling Methods that **COST NOTHING** To Try, Included. Send \$10.00 to: **INFORMATION FACTORY**, P.O. Box 669, Seabrook, Texas 77586. For C.O.D.'s 1-713-922-3512 Any Time!

## CAMPERS & TRAILERS - KITS, PLANS

**TILT W/360° ROTATION** Snowmobile, 4-Wheeler, and Trailer Plans. Send \$19.95: MW Consulting, P.O. Box 2834, Rocksprings, WY 82902

**172 TRAILER PLANS** Motorcycle, Utility Car, Construction—Strong, Streamlined, Easily Built. Catalog \$4.00. (Refundable). Tag-Along, Box 15107, Salem, OR 97309

**BUILD YOUR OWN CAMPER** - Travel Trailer - Fifth Wheeler - Motorhome - Pickup Cover. Plans - Patterns - Kits - Catalog \$1. Glen-L, 9152 Rosecrans, Box 1804/RV4, Bellflower, CA 90706.

## BOATS, OUTBOARDS, TRAILERS, & KITS

**BOAT KITS - PLANS - PATTERNS - AMERICA'S LARGEST SELECTION - 6/70°** - Powerboats - Sailboats - Trimarans - Dinghies - Houseboats - Hydroplanes - Tunnelhulls - 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** Direct from designers. Assistance Available. 7/55°. Over 240: Canoes - Kayaks - Hydroplanes - FUNboats - Powerboats - Sailboats. Quick! simple Stitchenglu. Save! 166-page **DESIGN BOOK - \$4.00** (Sent Airmail) Includes Free "Boatbuilding Supplies" catalog. "Epoxy Manual" \$2. **GLEN-L**, 9152 Rosecrans, Box 1804/PM4, Bellflower, CA 90706. 310/630-8158.

## SWIMMING POOL, SPA & POND EQUIPMENT

**SAVE BIG ON UTILITY BILLS!** **THERMAL** Dome Replacement Spa Covers 1-800-433-3153.

## CAMPING EQUIPMENT & TENTS

**8' CANVAS TEEPEE** - Easy no-sew kit, \$155.00, or build from available hardware, plans \$10.00, great camping, playhouse, classroom, clubs. M&M, Box 5951, Orange, CA 92613 (714) 997-1828

## KNIVES, CUTLERY, ETC.

**KNIVES - SWORDS - NINJA ITEM** Color Catalog Big Savings. Send \$5.00. 1084 Monet #28, Baton Rouge, LA 70806

## GUNS, DECOYS, HUNTING

**BUYING A GUN?** Call us first. Save money. Save your life. 1-900-446-7294. \$1.98 min 18+

## ENGINES, MOTORS

**ENGINES** - Briggs, Kohler, Others - **HUGE DISCOUNTS!** Catalog \$2. Engine Mart, 2642 Newfound, Merritt Island, FL 32952

## TOOLS FOR SALE

**TOOLBOX**, Award-Winning. Efficient. Call Tech-Pack 1-800-295-9292 For Free Brochure.

**BOLTS, SCREWS, TOOLS, WHOLESALE, DIRECT.** Guaranteed. Catalog \$2.00 (Refundable). Camelot, Dept. 44, Box 65, Bristol, Wisconsin 53104

## MACHINERY, TOOLS & SUPPLIES

**LATHES** Milling Machines, Machine Shop Supplies. Free Catalog. Blue Ridge, Box 536-V, Hurricane, WV 25526-0536. (304) 562-3538.

**HOBBYISTS** Improve your **LATHE** with the ultimate tool-post system; KRF, Box 783C, St. Joseph, MI 49085. 616-429-7050

**NEW** Catalog-HUNDREDS of plans-FREE tap drill chart - Steel - Brass - Aluminum - Shop Supplies. Computer Control your machines. Send \$2.00 - CEI, RFR#1, Box 163 PM, Cameron, IL 61423

**FOUNDRY SETS** Supplies, Brochure \$1.00. Pyramid Products, 85357 American Canal Rd., Niland, CA 92257. (619) 354-4265.

**LATHES - INDUSTRIAL/HOBBY FROM \$390.00, METALS, SUPPLIES. CATALOG \$2.00.** CAMPBELL TOOLS CO., 2100-D SELMA RD., SPRINGFIELD, OHIO 45505. 1-513-322-8562.

**4" METAL** Cutting Lathe \$129.15. Taig, 12419 Nightingale, Chandler, AZ 85249

**STAINLESS** High Pressure Steam Cleaners. To 4000psi Factory Direct. 1-800-324-2822

**LUMBERJACK** chain saw sawmills - power-feed. Brochure \$2.00. Brown Engineering, Box 40, West Point, CA 95255

**SSAVES 6" ELECTRONIC DIGITAL CALIPER** **MAKES GREAT GIFT, ONLY \$59.95. DISPLAYS SAE & METRIC.** Accurate to .001 or .01mm, Hardened Stainless Steel, Auto On/Off, Zero Button, Measures Inside, Outside, Depth & Step. Includes battery & case. Check/Money Order To: Shawn Products Co., Inc., P.O. Box 7227, High Point, NC 27264-7227. Include \$5.00 Shipping & Handling. NC residents + 8% Sales Tax. Mastercard, Visa Orders, 800-672-1595. COD's ok + \$4.50

## ENERGY SAVING

**POWER** Planner Cut Utility Bills 50%. International Trade, 155W. 162nd Street, Bronx, NY 10452

## SOLAR & ALTERNATE ENERGY

**NEW! BUILD AMAZING LIQUID PISTON ENGINE** from pipe fittings. Easy plans. Free information. ABCO, Box 306-M12, Seminary, MS 39479

**FREE ENERGY!** Fuel-less motors and generators. H&A, 2REPM, Bowling Green, MO 63334-9350

**SENSATIONAL** Untapped Energy System. Free Information. RR2 Box 106, Sherborne, NY 13460

**HOW** To Convert Bar-B-Q Grill To Solar Cooker. Masters, 6532 S. Van Buren, Tucson, AZ. 85706. Send \$12.95.

**SOLAR POWERED**, 50 Products. Catalog \$5. 1-800-80SUNIX. **SUNIX CO., POB 3889-PM, SAN RAFAEL, CA 94912**

**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.**

## HEATING, FUEL SAVERS

**HEAT** With Fuel? Millions Of B.T.U. Saved! How? \$6.95 to: W. Allen, 10152 Pollard Creek Rd, Mechanicsville, VA 23111 **92%+** High Efficiency Gas Furnaces. Lifetime Heat Exchanger Warranty. \$995.00 Free Installation Video & Shipping. 1-800-265-9389.

## PLANS, BLUEPRINTS, PROJECTS

**SANDBLASTER** Build Quality Unit Cheap. Send \$5.00 For Blueprints And Parts List. P.O. Box 1491, Manhattan Beach, CA 90266

(Continued on next page)

## PLANS, BLUEPRINTS, PROJECTS

(Continued from preceding page)

**MAKE** Your Own Low-Cost Christmas Lawn Ornaments. Send \$2. SASE. Phillip Johnston, 2798 SE Teresa Dr., Madras, OR 97741

**CLOTH** Shopping Bags. Three Sizes. Easy Instructions \$4.00. D&M Enterprises, P.O. Box 180131, Utica, MI 48318

**SAVE MONEY**, build your own airtight storm windows. Booklet, \$7.95. Storm Windows, 618 Hickory, POB 1457, Anaconda, MT 59711.

**HITECH** Plans & Kits - Flying Cars Electric Vehicles. Weapons. Custom Bicycles. Tomorrows Products Now! Catalog \$4.00 M.O. - Mark Quinn, P.O. Box 9395, Fort Lauderdale, FL 33310

**STRAW - BALE** Design and Utility Free Living Can Save You Thousands. Booklet \$10.00. Hidden Exposure Architects, 8500 Madrid Canyon Road, Trinidad, CO 81082

**GAZEBO**, Playhouse, Porch Swing. Plans \$10.00 Each. Free Gift. Shutt, 2120 Dexter, Dansville, MI 48819.

**GREENHOUSE** - Build Your Own. Simple, Cheap. \$8.50. For Detailed Plans. Marshall Miller, Hansen St., Box 31, Bawlf, Alberta, Canada T0B 050

## ROOFING

**FLAT ROOFS - SAVE 70%**. Solve any problem. Any size roof. Revolutionary reinforced acrylic system. Easy, safe, foolproof. Proven 25 years. We manufacture, consult, instruct. Free information: PMK Roofing, P.O. Box 20784, Lehigh Valley, PA 18002-0784

**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.

## PLASTICS

**RUBBER**, plastic compounds, techniques, sources. Free information: Castcrafter, Box 16586 (A12), Memphis, TN 38186-0586

**CASTOLITE** Liquid Plastics. Crystal clear, colors. For casting, embedding, coating, fiberglassing, repairing and reproducing with our Mold Making Supplies. Catalog \$3.00 refundable. **CASTOLITE**, 940/PM, 4915 Dean, Woodstock, IL 60098.

## DO IT YOURSELF

**ATTENTION** Woodstove Fireplace Users. Kindling Wood Galore. Build Your **SPLITTER** For Less Than \$20.00. Unique. Proven. SASE \$1.00 For Information To: Robber, Dept. P, Box 6088, Wallingford, CT. 06492.

**ELECTROPLATING** Textbook. Metallics/Nonmetallics. \$14.95. Details Free. Tropic, Palm Bay, FL 32906-0095

**LEARN** Modern Arrowhead Making. VHS \$29.95, S/H \$3.50. Commons, Box 5012-M, Central Point, OR 97502

**ALARM** Your Vehicle For Under \$100.00. Details \$15.00. Box 48025, Ft. Worth, TX 76148-9998

**BELT BUCKLES** for coins, stones, jewelry mountings, cut stones, clock works. Wholesale catalog \$1.00. Eloxite, Box 729, Wheatland, Wyoming 82201

**BOTTLE** Cutting Sample Ring Brochure \$1.00. Box 210, Cataract, WI 54620

**HEATING** - Step By Step Video Shows You How To Install A High Efficiency Gas Hot Air Furnace & Ductwork, \$15.95 1-800-265-9369.

## 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

## MODELS, MODELS SUPPLIES

**INTERNATIONALLY** Recognized Medical Inventor With Over 30 Patents Associate Professor USC has PCT Patent for Safer Bone Marrow Biopsy Needle: Will Share Royalties With Company Who Will Make Model. Contact: 310-247-8517.

**STEAM ENGINE KITS** power models at savings to you! Send \$2.00 for catalog. PM Research, Inc. Dept. 7, 4110 Niles Hill Road, Wellsville, NY 14895

## TOYS, GAMES, KITES, PUZZLES, NOVELTIES

**POKER PLAYERS ALERT** New Game **BASEBALL POKER** Fast Playing With Scorebook, US \$19.95. P.P. Guaranteed. RMU Productions, P.O. Box 490295, Leesburg, FL 34749-0295

## MAGIC TRICKS, JOKES, VENTRILOQUISM

**FREE!** World's Leading Novelty Catalog. 1600 Jokes, Tricks, Science, Sports, Hobbies. Johnson-Smith, F-01, Bradenton, FL 34206-5500

**VENTRILOQUIST** Supplies, Instruction. Information **FREE!** Dummy Catalog \$2.00. Maher, Box 420-PM, Littleton, Colorado 80160.

**FUN 'N** Magic Catalog \$1.50. Elbee Co., 520 Broadway-PM, San Antonio, TX 78215

**PROFESSIONAL MAGIC CATALOG** \$3.00. Windsor, Box 46067, Dept PM11, Chicago, IL 60646

## HOBBIES & COLLECTIONS

**PINBALL** Machines - Books, Parts, Supplies. Catalog \$1.00. Marco, 2401-PM Sunset, West Columbia, SC 29169-4717

**MICKEY** Mantle 5c to \$30,000.00 learn the secrets of investing. \$2.00 LSASE. HAMCO, Box 653, Glenside, PA 19038

## 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

## STAMP COLLECTING

**FREE** sample plus catalog. Jefferies, 3480 Middlebelt, West Bloomfield, MI 48323

**50 DIFFERENT** Old U.S. between 1861 and 1939 - \$1.00. Ed Roush, Box 3734, Mansfield, Ohio 44907.

**OLD** U.S. stamps on approval. Sherman, Box 15355E, Philadelphia, PA 19111

**101 MINT PAIRS \$15.91. KING**, 330 Alexander, Kamloops, B.C. Canada V2B3R3

**10 OLD** Mint U.S. Commemoratives, 25c! Approvals, Global, Box 7429-P10, Olympia, WA 98507.

## RE-UPHOLSTERING VIDEO TAPES

**LEARN** to re-upholster! with videos, Tomien, P.O. Box 93M, Mayo, MD 21106 (410) 956-4225.

## MUSIC INSTRUCTIONS & INSTRUMENTS

**ACCORDION** Top Brands, Cordovox. Buy Direct Tremendous Discounts. Trades accepted. Free brochure PM, Accordion-O-Rama, Inc., 307 7th Ave., New York, NY 10001. Phone 212-675-9089.

**ACCORDIONS, CONCERTINAS**, Button boxes, new, used, repairs, trades, credit cards. Castiglione, Box 40S, Warren, MI 48090. Catalogs 313-755-6050-800-325-1832

**JOHNNY B** - Sensational Country Music Artist. New CD Album \$14.99. Free Single Cassette. Sunshine, P.O. Box 10286, Oakland, CA 94610

## EDUCATION & INSTRUCTIONS

**GAIN INDEPENDENCE AS A LOCKSMITH &** be your own boss, 584 page comprehensive manual of locksmithing \$32.50 + \$3.50 S&H. Shankle, 1001A Brazos, Marble Falls, TX 78654

**BECOME A HOME INSPECTOR** Start Your Own Business. Approved Home Study. Free Career Literature. P.C.D.I., Atlanta, Georgia. 800-962-7070 Dept. PPP127.

**FREE VIDEO** External BA/BS, MS/MBA, PhD/LAW/Ac-credited. financial aid. (800) 431-3775. La Salle University, Dept #775, Mandeville, LA 70470-4000

**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

**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).

**LOCKSMITHING**, Universal School of Master, Correspondence and Shop Training. Box 214652PM, Sacramento, CA 95821

**LOCKSMITH VIDEO** - Basic Locksmithing - Free Details - NLT, P.O. Box 620204, Littleton, CO 80123

**LEARN** to finish drywall professionally, big profits. \$3.00. HAMCO, POB 653, Glenside, PA 19038

**"YOU CAN FIX YOUR MICROWAVE OVEN"** Plus, "VCR Know-How"! Instructional Videotapes. **FREE** Brochure. Call **MICROTECH 1-800-700-UFIX**

**THREE R's FOR THE NINETIES** SASE To: System One, P.O. Box 451, Fairless Hills, PA 19030

**NONRESIDENT UNIVERSITY DEGREES**. Bachelor's, Master's, Doctorates. Accredited, inexpensive, fast. Credit for life experience. **FREE BROCHURE**. Bears Guide-C&B, PO Box 826PM, Benicia, CA 94510. (800) 835-8535.

**REPENT:** Acts 2; Heb. 10; Heb. 12; IS 66, 1709 Fredricksburg Ave., Lakeland, FL. 33803-2561

**ELECTRICAL & Plumbing Repair Videos**, 1 hour each \$22.50. Ed Wright, 102 Sunset Island Trail, Gallatin, TN 37066

**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. (212) 649-3167. FAX: (212) 977-5415.

## 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**

## EMPLOYMENT INFORMATION

**BE** A Merchant Seaman - Travel, Good Pay, Male/Female Details. 415-487-5478.

## HELP WANTED

**ASSEMBLE** Easy Products At Home. Top Pay! Program Guaranteed! 1-800-377-6000 Ext. 7030

**EASY** Work! Excellent Pay! Assemble Products At Home. Toll Free 1-800-467-5566 Ext. 5038.

**HOME** Typists, PC users needed. \$35,000 potential. Details. Call (1) 805 962-8000 Ext. B-20024.

**\$329.84** Weekly. Assembling Our Products At Home. Toll Free 1-(800) 333-3294

## NEW PRODUCTS

**NOVERFLOW™** Ever Had A Washing Machine That Overflowed During The Rinse Cycle? New Electronic Device Called Noverflow™ Will Save A Costly Cleanup. Many Models Including Dishwasher. Free Brochure. Rantek, Dept-PM, Box 189, Dearborn, MI 48127.

**GENERATOR FLASHLIGHT USES NO BATTERIES;** squeeze lever to light, \$9.95. Foster Gifts, 527 Rogers Avenue, #3, Brooklyn, New York 11225.

## FOR INVENTORS

### WORK DIRECTLY WITH REGISTERED PATENT ATTORNEY AND GRADUATE ENGINEER

WITH thirty-six years combined engineering and patent experience. U.S. and international patent applications. **PATENT** and **DEVELOP** your idea with the experience of an expert. Call or write for free **CONFIDENTIAL DISCLOSURE, RECORD OF INVENTION** and **148 PAGE BROCHURE**, Introduction to Industry, Marketing Plans, Overseas Production, Prototypes and Research Ready Available. Also specializing in Copyrights and Trademarks - **LESS THAN 45 MIN. FLIGHT TIME TO U.S. PATENT OFFICE - TOLL FREE FROM U.S. AND CANADA** Phone 800-367-7774; FAX 800-367-7773 or write: **MICHAEL I. KROLL**, Registered Patent Attorney, U.S. Patent registration #26,755; 171 Stillwell Lane, Syosset, New York 11791. Outside USA (516) - 367-7777 - FAX: (516) - 892-2787.

**PATENT IT ECONOMICALLY!** Free details. Licensed since 1958. Raner Associates, 2008 Fondulac, Richmond, VA 23229.

**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**, Your First Step is Important. We Have a Database Of 7+ Million Companies To **CREATE OPPORTUNITIES FOR OUR CLIENTS**. APSI, Washington, DC 800-458-0352

**INVENTORS!** Can you patent and profit from your idea? Call **AMERICAN INVENTORS CORP.** for free information. Serving Inventors since 1975. 1-800-338-5656.

(Continued on next page)

## FOR INVENTORS

(Continued from preceding page)

**PROTECT** your patent(s) against infringement with Patent Infringement Abatement Insurance. Call 1-800-537-7863 for free information package.

**STOP PAYING FOR UNMARKETABLE DESIGN PATENTS! PATENTALS INCORPORATED: SEARCHES, OBTAINS UTILITY PATENTS, MARKETS AND LICENSES INVENTIONS FOR A PERCENTAGE. 800/261-7497**

**PATENT, Market, Your Inventions Latest Methods, Forms, Illustrations \$25. M.O. Creative Research, Box 103, St. Augustine, FL 32085**

**INVENTIONS, ideas, new products. We submit to industry. Call 1-800-288-IDEA.**

**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 24 HOURS: 1-800-846-3226.**

**BORSARI & ASSOCIATES** provides PROFESSIONAL patent searches & applications. Registered patent attorney guarantees CONFIDENTIALITY and SUPERIOR SERVICE. Located next to Patent Office. Call 800-225-2462 for free information packet.

**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.

**FREE INVENTION PACKAGE** Davison & Associates offers customized Development, Patenting, and Licensing. Proven Results. 1-800-677-6382.

**FREE help for inventors!** No charge for protection forms and information kit. Affiliated Inventors Foundation. 1-800-525-5885

**INVENTORS DREAM TOOL. IDEAFISHER™** software guarantees you'll never get stuck for an idea again! 1-800-269-4332. Under \$100.

**LEARN** how to offer your invention for sale or license. Free booklet outlines procedures, royalty rates, requirements. Kessler Sales Corporation, C-5-FI-4, Fremont, Ohio 43420.

**THE ABC's Of Getting A Patent, The Book For The Inventor** Send \$23.95 + \$2.00 S&H To, D. Sharp, P.O. Box 1802, Pasadena, MD 21122.

**FREE Invention Cassette \$5.00 S&H: KIMTEK, P.O.B. 126, Orleans, Vermont 05860**

**INVENTORS Don't be Fooled - Call Our Inventors Club 1-800-466-1793.**

**HAVE AN IDEA?** Free information package/free consultation - Freedom Marketing 800-932-4298

## INVENTIONS WANTED

**TOY IDEAS WANTED.** Nation's #1 Toy Design/Development Firm. We Pay All Expenses. Complete Legitimate, Providing Genuine Opportunities. 1-800-574-4599.

**FREE Information Packet!** Professional Patenting and Marketing services. New product ideas with prototype or Schematics Preferred. But Not Required. Concept Network: (800) 835-2246 Extension 197.

**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

**WE INVEST** Cash in Unique Ideas That May Be Marketable. And We Have A Program To Assist Inventors. Send only Name & Address, Not Your Idea, For Our Free No - Obligation Literature. Investment Discovery Group, Suite 222, 401 Fayette, Springfield, IL 62704. 217-753-2505.

**QUEENSBURY** Gifts Seeks Unique Products Ready For Distribution, 412-922-8997.

## REAL ESTATE

**COUNTRY REAL ESTATE CATALOG**—United National's NEW catalog features over 200 pages of the best country real estate bargains across America! Wilderness lands & retreats, farms, ranches, historic homes, waterfront properties & more. Send \$4.95 to: UNITED NATIONAL REAL ESTATE, 4700-PM Bellevue, Kansas City, MO 64112. Or call 1-800-999-1020, Visa/MC accepted.

**GOVERNMENT HOMES** from \$1 (U repair). Delinquent tax property. Repossessions. Your area (1) 805-962-8000 Ext. GH-20024 for current repo list.

**REDUCE** Mortgage, Save Thousands of \$\$\$ without refinancing. Free Details SASE To: Phenix, 850 South Rancho, Ste. 2308, Las Vegas, NV 89106

**FORECLOSED** Government Homes And Properties! HUD, VA, RTC, Etc. Listings For Your Area. Financing Available. Call Toll Free! 1 (800) 436-6867 Ext. R-2071.

## GOVERNMENT LANDS

**GOVERNMENT** land now available for claim. Up to 160 acres/person. Free recorded message: (707) 448-1887. (4K23)

## BUY IT WHOLESALE

**BELTS, Buckles, Hat Tacs, Jewelry, More.** Complete line fast sellers. Big Profits. Complete dealer set up. Color catalog \$1.00. Anchor, Box 3968-PMR, North Providence, RI 02911

**CLOSEOUTS, Wholesale Sources... BUY CHEAP...** Write: CNP, 1344 Madonna, #286-PM, San Luis Obispo, CA 93405-6504

## 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

## TREASURE FINDERS

**BURIED TREASURE** - Sensitive equipment allows locating from distance. Brochure free. Simmons, Box 10057-MA, Wilmington, NC 28405

## PROFITABLE OCCUPATIONS

**FREE** information Starter & Alternator Rebuilding. Box 422, Seymour, TN 37865

**GET** Started in Realty Valuation Right Away, Great Rewards, Not A School. Free Information. Val-Serv, Box 171, Big Bend, WI 53103

**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. (212) 649-3167. FAX: (212) 977-5415.**

## 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. C270C, Woodland Hills, California 91367

**\$225 DAILY "CHROME PLATING"** Auto Parts, Motorcycles, inexpensive, easy. (Free) information. Chrome Plating, Box 5748, Deltona, FL 32728

**AMAZING INCOME POSSIBLE** - Hot Business, Free Information Call Now 1-800-365-7550 Ext. 4839.

**VENDING INDUSTRY FACTS** you need to know. CALL for FREE newsletter. 800-221-6066

**LET** the government finance your small business. Grants/loans to \$500,000.00. Free recorded message: (707) 449-8600. (K23)

**START YOUR OWN JANITORIAL BUSINESS.** \$20,000-\$100,000/year. Manuals, Box 6350-PM, Portland, OR 97228-6350.

**FREE** Two Page Business Information. Diversified, 940 Oneida, El Paso, Texas 79912

**PROFITUNITIES** - 25 odd, unusual enterprises. Free details. P.O. Box 6985-PM, Mesa, AZ 85216

**"MANUFACTURE GIANT PROJECTION TVs"**—Huge profits!!! Simple!!! "Sony quality"!!! Catalog \$1.00. POLIVISION, 187-PM Cypress, Throop, PA 18512-1429

**\$100,000 A Week!** Without going to work! Free details. Atwood Co., 12762 Brookhurst St. 508-E, Garden Grove, Calif. 92640

**\$32,607 IN BACKYARD!** Growing new specialty plants. Free booklet. Growers, Box 1058-PM, Bellingham, WA 98227-1058

**\$500.00 FROM ONE SACK CEMENT!** Picture Proof \$1.00! BRINCO, Box 401092-K, Hesperia, CA 92340

**PLASTERCRAFT** . . . Profitable Home Business 3000 Molds Available. Details. Lynnette, 6251C Mentpark, Mentor, Ohio 44060

**\$40,000 ON 1/2 ACRE!** New Hydroponics - inexpensive, pleasant, practical! Free information. Robin's, Box 681804, Franklin, TN 37068-1804

**WHOLESALE BARGAINS.** Freebies, Giveaways by mail. Write: Wholesale, Box 51488-A, Ontario, CA 91761.

**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**

**HYDRAULIC JACK REPAIR MANUAL, CATALOG \$10.00. HYDRAULIC PARTS SUPPLY, BOX 4157, BROWNSVILLE, TEXAS 78520-4157**

**LEARN** Sewing Machine Repairing. Men, Women. Lucrative Profits. Gresslin Correspondence School, Box 905, Alexandria, Ohio 43001.

**NEW! GROW EXPENSIVE PLANTS. SELL FOR 2,000% PROFIT.** Free information. Growbiz, Box 306-M12, Seminary, MS 39479

**MAILORDER** Books. 1,000% Profit. Selectco, Box 1140, Clearwater, FL 34617

**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 Teller Drive, Morgan Hill, Calif. 95037.

**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. 20-72, Chatsworth, CA 91311-4991. (800) 345-45MC

**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

**\$10,000.00 Monthly** Taking Easy Snapshots! No Experience. Film Specially. Photopro, 1611 Crenshaw #235M, Torrance, CA 90501. (909) 659-9757. Extension M5

**DISTRIBUTE** Unique Electronic Product. Manufacturer, Box 28307, Kenneth City, FL 33709

**INSPECT HOUSES \$225+ APIECE!** Easy, Inexpensive! Free details. UNI-FORM, Box 27025, Pittsburgh, PA 15235-7025

**MAKE** homemade "How-to/opportunity" booklets. Mine have earned \$436,097. Money never stops. Free information, Booklets, 507J Oak Drive, Friendswood, TX 77546

**\$1,000 WEEKLY AIR TOOL REPAIRING.** Free Details. Box 4172, Wichita Falls, TX 76308-0172

**JOIN HOME-WORKER'S ASSOCIATION** — Get "Guaranteed Legitimate" home-employment offers! (Many Choices!) Write: Association - PM1294, Alexandria Bay, New York 13607-0250

**INFORMATION** Highway Get On! Get Rich! No Computer Needed! Complete Course Only \$470! Free Details! (716) 265-4275. 24 hours.

**\$25.00/POUND PAID** For Aluminum Scrap? (YES...Free Report!) Write: Ameriscrap - PM1294, Alexandria Bay, New York 13607-0127

**BIG MONEY IN YOUR MAIL BOX!** Easy, Ready Made Mail Order Opportunity. Free Details. Order Number P12100, 1985 West Henderson, Suite 577, Columbus, Ohio 43220-2401

**\$392.00** From Square Foot Plywood. (Huge Demand) \$1.00 (Refundable). Woodwin-PM, POB 859, Bridgewater, Mass. 02324-0859

**\$1804 MONTHLY** Buy/sell used cars (spare-time) FREE Details. Autonet, 507 Oak Drive, Friendswood, TX 77546

**EARN \$250 Per Hour** in The Fabric Protection Business. Free Details. 1-800-948-4294.

**NEW! 2000% PROFITS** - in Moldmaking/Casting. Free information. Castcrafter, Box 16586 (M12), Memphis, TN 38186-0586

**\$1204 WEEKLY! START PAYPHONE ROUTE** under \$1000.00 as I did. Free Information! QPM, 7309 Cobia Lane, Hudson, FL 34667.

(Continued on next page)

## BUSINESS OPPORTUNITIES

(Continued from preceding page)

**ENTREPRENEURS.** Start Homemade Booklet, Newsletter Self-publishing On Shoestring. \$35,000, \$100,000 Income. Details. Stahka, 60 Westchester, Williamsville, N.Y. 14221

**EASY BUSINESS! EARN \$1,000 weekly.** Free details. Write or send stamped, addressed envelope. TODCO, BOX 12306, Merrillville, IN 46411-2036.

**WORK FROM HOME.** Financial Independence! Quetzal Co., Box 537, Walla Walla, WA 99082

**HIGH Earning Potential/Low Investment.** Operate A Human Gyro For Fun And Profit! 1-800-433-3153.

**HOME-BASED BUSINESSES** + Real homework! Earn \$1800 Part-time. **FREE DETAILS** reveals how! QPC, Box 5248-PM, Hudson, FL 34674

**RECORD Videotapes.** At Home \$5,000 Monthly Possible. No Pornography. Free Details. Write: CMS Video Company, Dept. 17, 210 Lorna Square - #163, Birmingham, AL 35216

**INCOME AT HOME!** 250 Profitable Ideas. Free Details. InfoNetwork, 145 Laurel Ave., Millbrae, CA 94030

**FREE Information Process Mail At Home.** Send SASE: Money Express Mailers, Box 201652, Denver, Colorado 80220.

**FIND OUT THE TRUTH/SECRETS** Behind Making \$1000's/Week Mailing Letters, Answering Machines, Mail Order, ... etc. For Info On How It Works And Can Work For You! Send \$5 + Long SASE To: P.B.P., 9630 SW 35th #33, Portland, OR 97219

**\$400 DAILY "TINTING WINDOWS".** Automobiles, Boats, Residential, Commercial, Inexpensive, Easy, Free Information. **MOBILE-TINT**, 92a Main, Hampton, CT 06247

**MAILORDER BOOKS.** Excellent profits. Mascor-PM, Box 8308, Silver Spring, MD 20907.

**FREE electroplating catalog.** Books, kits. University Pubns., Box 1071, Provo, UT 84603. (801) 377-5367

**FREE Home Business Startup.** Choices, Box 6864, Bellevue, Wash, 98008.

**\$6,000 Monthly Assembling Computers!** (Easy Home Business Opportunity.) Free Report: Computers, 9629P Ripplecreek, Moreno Valley, California 92557-1821

**FREE!** 1001 Fast, Easy ways to make money. Send name/address. Money Making, Dept. PM, Box Z, Studio City, CA 91614

**WRITE,** Publish, Prosperous Booklets. Free info. 306Z Riverbay, Tampa, FL 33619

**PROFITABLE HOME BUSINESSES** You Can Start On A Shoestring Budget \$8.00. KANDOIT Company, P.O. Box 1304, Lafayette, LA 70598-1304

**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. PN, Minneapolis, MN 55435.

**EARN \$5,000 per month** from home with your own direct mail business. Free report, 1-(800)-820-2536 Ext. 322PK

**\$1,000.00 Weekly** Recoloring Faded Carpets. **COLORMASTERS**, POB 76, Herndon, KY 42236

**\$100 000 GUARANTEED** In First Year Making How-To Opportunity Booklets. Non-Stop Money! Free Information. Falcon's Nest Publishing, 2829 Gratiot Blvd., Suite A, Marysville, MI 48040

**SEND NO MONEY** for any business opportunity until you get this Free Report. Don't get ripped off! Write to: Bulkley Education Technologies, 32M Cross Highway, Westport, CT 06880

**BIG MONEY REPAIRING AUTO WINDSHIELDS.** Supplies and information. Grubbs Glass Patch, P.O. Box 243, Monticello, AR 71655. 1-800-243-2213

**\$320,000 Yearly Selling Books** by Mail. Recruiting Business Associates. TPCF, Box 4113, Torrance, CA 90510

**#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-PMC SW 5th Street, Grants Pass, Or 97526

**1,000 WORKATHOME Manuals!** Wholesale catalog. IRCINC., Box 14107-PM, Jackson, MS 39236-4107.

**PRIVATE INVESTIGATION TRAINING!** BIG INCOME! OWN BOSS! FREE INFORMATION. PROBE, BOX (PM) 2133, BEVERLY HILLS, CALIFORNIA 90213-2133.

## 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**—1-212-649-3167. FAX: (212) 977-5415/(212) 586-5562.

## MONEYMAKING OPPORTUNITIES

**EARN BIG MONEY** With Little Known Stock Purchasing Techniques. Learn How \$10.00 To: #21, 305-4625 Varsity Dr. NW, Calgary, Alberta, T3A 0Z9

**WIN ANY LOTTERY, PROVEN METHOD!** Send \$5.00. Scott, 1690 Glacier Lane, Plymouth, MN 55447

**CRAPS.** Win big money consistently. **GUARANTEED!** Free Details. 1-800-217-7711

**FREE 24 PAGE REPORT.** Super Profits On Information Super Highway. No Computer Required! (619) 492-8493

**WORLDWIDE WHOLESALE SOURCES!** Unlimited Products! Unlimited Earnings! **FREE** Report. Infomax, Box 4078-PM, Ft. Lauderdale, Florida, 33338

**\$80,000 From One Acre!** **GROW GINGSENG.** Lee's, Box 68276-PM, New Augusta, Indiana 46268

**PERFECT HOME BUSINESS - \$7000.00 MONTH.** Information \$3.00. Box 104, Springfield, KY 40069.

**WE PAY \$100!** Send SASE, Two Stamps: Information, Drawer 1077, Deming, NM 88031-1077

**42 MONEYMAKING** Successful Reports \$5.50 SASE. Resource, Box 401, Bryn Mawr, CA 92318.

**ANNOUNCING!!!** Important Message Tells Which Opportunity Offers Can Make You Rich! Details. Specialty Publications, 155-L Handsome Avenue, Sayville, New York 11782

**CRAPS-THE PRO METHOD** Guaranteed Free Info. AVA, P.O. 742434, Dallas, TX 75374

## MAILORDER OPPORTUNITIES

**MILLIONAIRE** Money Making Secrets For Information. Business Consultants, 18228 Woodhaven, Tequesta, Florida 33469

**MAILORDER** Millionaire Reveals Money Making Secrets. Free, exciting cassette. Mel Powers, 12015 Sherman Road, No. Hollywood, California 91605

**FREE 900'S** - Outstanding Opportunity. Unlimited Income - Free Information Call: (914) 573-2067.

## ANIMALS, BIRDS

**FLYING SQUIRRELS** Make Wonderful Pets. Small, Cute, Fun, Easy Inexpensive Care. Young And Breeders. 210-826-5664

## DOGS-PETS

**FISH** Tank, 10 Gal; Complete Set-up. Just Add Gravel, Water, Fish. \$29.99 + \$5.00 Ship./Handling. O.M.P., 1018 East 72 St., Tacoma, WA. 98404

## BALDING

**HAIR** Replacement - Free Details. Suite 121, 2441A, Jericho Turnpike, Garden City Park, NY 11070

## OF INTEREST TO ALL

**SECRETS** of Dream Interpretation! Empower Yourself!!! Free Info. Package: 1-800-878-0951

**FREE PRIVACY CATALOG.** Cash income opportunities. Secret loans. New identity. Eden, Box 8410-PC, Fountain Valley, CA 92728. 1-800-338-8484

**"MEN'S SEXUAL PERFORMANCE AFTER 40:** What Happens, Why It Happens and What You Can Do About It" by Dr. Laubach. Send \$15.95 To: Leadership-L, 1221 Cottonwood Val. Drive, Irving, TX 75038. 800-443-6912.

**DON'T DIE** Of Carbon Monoxide Poisoning - Protect Your Family! For Info Write: Dreamweaver Ent., P.O. Box 1048, Mundelein, IL 60060

**CLASSIC RAILROAD POCKET WATCH.** Embossed Eagle, Antique Gold Tone Finish, #3980; **PORCELAIN NATIVE AMERICAN,** Head Statue, Cloaked, Bear, Wolf Head, #24771. **PORCELAIN BABY ELEPHANT** With Master, #22596, **40 PIECE SOCKET, BIT TOOL SET,** Ratchet Screw Driver, Metric, Inches, #21858; \$19.95 Each Item Or 4 for \$60.00. Money Orders, Checks, Money Back Guarantee. **INTERNATIONAL GIFTS,** Dept. Ig008, 3007 Rucker Ave., M343, Everett, WA 98201-3931.

**SLOT** Player's Hotline. Free How To Win Advice. Recorded Message, 416/499-8698, Anytime.

**ACHIEVE!** Retain **ERECTION,** Free Info. 1971 Lumsden 320M, Brandon, FL 33511

**PROTECT** Yourself & Loved Ones With **ALARM LIGHT.** Pocketsize! Bright Flashlight; Blasting "Scream" When Activated Demands Attention. \$12.95 each. WRN, Box 1106, Burnsville, MN 55337.

**TERMINATOR** Little-known proven methods kill Cockroaches - Guaranteed. Send \$5.95 to: Deadbug, 2210 Wilshire Blvd., Suite 243, Santa Monica, CA 90403.

## OF INTEREST TO MEN

**SEXUAL FITNESS FOR MEN - FREE INFORMATION.** Halo, 5942 Edinger, Ste. 113A, Huntington Beach, CA 92649

## GOVERNMENT SURPLUS

**DRUG RAID SEIZURES:** Buy Dirt Cheap! Cars, houses, boats, computers. Seizures, Box 51488-A, Ontario, CA 91761

**USA GOVERNMENT AUCTIONS!** Complete Guide to Riches! **FREE** Report. Infomax, Box 4078-PM, Ft. Lauderdale, Florida 33338

**GOVERNMENT SURPLUS.** Jeeps \$60, Typewriters \$4. Send \$5 For Report to: **DISTINCTIVE CHOICE,** 11214 Pines Blvd., Dept. 188, Pembroke Pines, FL 33026

## LOANS BY MAIL

**IMMEDIATE CASH LOANS!** Borrow \$1,000-\$75,000. Regardless of credit or income-No Collateral Required. **SAME DAY PROCESSING.** Call Toll Free 1-(800)-452-9869.

**NEED-A-Loan** \$500-\$100,000.00 Bad Credit No Problem 1-800-441-3012

**SIGNATURE** Loans Must Have Checking Account & Steady Job. 1-800-445-0680.

**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.

**BORROW \$100 - \$100,000!** No Collateral. Personal. Debt Consolidation, Business, Residential - 1-800-444-6599

**QUICK** Cash. No Collateral, No Credit Check, No Front Fees. (213) 882-4269.

**GOVT** Grants, Loans, Report \$3.00. Dean, Box 5072, S. Lake Tahoe, CA, 96157

## PERSONAL

**COLLEGE DEGREES,** High School Diplomas. Authentic looking. Free Catalog. Dept. PM-158, National Certificate, 126 13th St., Brooklyn, NY 11215. (718) 768-6803 (24 Hours) FAX 718-965-3400

## REMAILING SERVICE

**FREE! REMAILERS LIST. AGENTS NEEDED.** PS, Box 29656, San Antonio, TX 78229

**CONFIDENTIAL** Address. Forwarding Worldwide. Voicemail. Mailpost, 2421M Pratt, Chicago, 60645. (312) 764-0100 (800) 890-3199.

## EYEGLASSES

**READING GLASSES** - Free Catalog. Debbie Burk, P.O. Box 519, Dept PM, Plainview, NY 11803

**WHOLESALE** Prescription Eyeglasses from \$39.00. Catalog \$1.00 Refundable with Order. Benchmark Optical, Inc., Dept. M, Box 262433, Tampa, FL 33685-2433

## MISCELLANEOUS

**REPLICA** Swiss Watches 18KT Goldplated! Lowest Prices! 2Y Warranty! (404) 682-0609.

**FREE DEGREES! COUNSELING, SPIRITUAL, HYPNOTHERAPY! MINISTERIAL LICENSE!** P.U.L.C., Box 276265-M, Sacramento, CA 95827.

## 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.

## FINANCIAL

**NEW** Valid Credit File Guar. Free Info: Call 213-368-8114.

**SECRETS** Of Protecting Your Wealth From Lawsuits And Unnecessary Taxes Now Revealed. Free Information. Wealth Builders, Box 1665, Nederland, TX 77627

**CONTROL** Your Financial Future Catalog \$4.00 Refundable With Purchase. Software Available. R&N Merchandise and Publications. P.O. Box 840, Newman Lake, Wash. 99025-0840

(Continued on next page)

**FINANCIAL**

(Continued from preceding page)

**YOU NEED ONE!** Prepare your own will and save \$\$\$. Free Details. Allied Products, 1511 East Commercial Blvd., (#147), Ft. Lauderdale, FL 33334

**BILLIONS Available!** Free Government Grants! Call (24 hrs): 1-(619) 599-3502.

**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.

**DONT GET RIPPED OFF!** Call SCI Hearing. Free Catalog 1-800-414-1551

**FREE Hearing Aid Catalog.** All Models. Huge savings! No salesman will call. Rhodes, Dept. 31L, Brookport, IL 62910. 1-800-468-3100.

**CONTACT LENSES**

**WHOLESALE Contact Lenses.** All Brands. Example: Disposables-\$17.00. Bausch & Lomb Softlens-\$11.00. 1-800-521-3511.

**TOBACCO**

**CIGARS, Tobacco, Pipes, Chew.** Free Catalog. Erie Tobacco Co., 1828 Euclid, Cleveland, Ohio 44115

**SCIENCE & CHEMISTRY**

**'EXPERIMENTER' LABORATORY CHEMICALS GLASSWARE,** Catalogue \$2.00. Established 1953. **HAGENOW LABORATORIES,** 1302 Washington, **MANITOWOC, WISCONSIN 54220**

**TELEPHONE & SERVICE**

**VERIFY TELEPHONE NUMBERS** and more. David, 9105 Myron Street, Pico Rivera, CA 90660

**SPECIAL SERVICES**

**INFORMATION.** On anything. Ferguson Research Specialists, 60-15 Woodside, Woodside, New York 11377.

**HEALTH, NUTRITION, VITAMINS**

**BREAST Cancer 5-Year Diary.** \$4.00. Grant Enterprises, P.O. Box 6444, Albany, NY 12206

**GROW SPROUTS INDOORS.** Delicious, Nutritious, inexpensive. Easy kit w/seeds. Send \$4.00 SASE. Danielle Linsky, POB 252M, Jefferson, WI 53549-0252.

**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.**

**STOP SMOKING**

**GUARANTEED!!!** Unique Patented System. **FREE INFORMATION:** Get-A-Grip Enterprises, 11925 Pearl Road, Cleveland, Ohio 44136

**TREE REMOVALS**

**TREE KILLING NAIL.** \$10.00 Each. 5 for \$25.00. Trees, Box 3064, Maple Glen, PA 19002

**GARDENING & LAWN CARE**

**ROTARY Mowers Riding/Walking Sharpen Without Detaching Blades.** Modification Hand Grinder, Plans \$9.00. TW Enterprises, P.O. Box 86, Liebon, MD 21765-0086

**RECIPES, COOKING, ETC.**

**RECIPE Research,** I'll Find The Ones You Want \$6.00. Jackie, P.O. Box 494983, Garland, Texas 75049

**SAUSAGE-MAKING,** Smoking. Free catalog of equipment, ingredients. Sempex, Box 11476P, Minneapolis, MN 55411. 800-488-5444.

**CAFE EXPRESS** Offers 5 soup recipes. Send \$5.00. P.O. Box 1163, Provincetown, MA 02657

**7 EASY** Child tested & Approved Dinner Recipes \$3.00. JC Discount Sales, Dept. 201, 3100 Independence Pkwy #311-286, Plano, TX 75075.

**JESUS' MEALS.** Authentic, easy recipes from Christ's time! Six pages. SASE \$6.50. JM, 150 S. Glenoaks Blvd. #9135, Burbank, CA 91510.

**HEAVENLY Chocolate** \$5.00/SASE. Recipes, 9463 Singing Quail, Austin, TX 78758-6134

**EXOTIC Curry Chicken!** \$1.00/SASE. Tiffany, #812-250 Webb Drive, Mississauga, Ont, Canada L5B 3Z4

**"25 TROPICAL DRINK RECIPES"** Send \$5.00 To: W. Clarke, 1 Soho, Nepean, Ontario, K2J 2W4

**HOMESTEAD Salami Recipe.** Delicious, Satisfying. \$5.00. Box 192, Great Falls, Montana 59401-0192

**WINEMAKING, BEERMAKING, ETC.**

**BEERMAKING-Winemakers** Free Catalog. Fast Service. Free Recipes. Cellar-M, Box 33525, Seattle, WA 98133. 800-342-1871

**THE 90's Hot/Best Drinks** including X-Rated. Send \$4.95 To: Art Of Bartending, P.O. Box 1452, Piscataway, NJ 08855-1452

**FREE BEERMAKING BOOK-Catalog.** Finest Equipment, Ingredients. Fast Service! 1-800-852-9545.

**WINEMAKERS - BEERMAKERS** Free Illustrated Catalog - Fast Service. Large Selection - VISA/Mastercard - (816) 254-0242 - Kraus, Box 7850-L, Independence, Missouri 64054

**BEGINNERS SPECIAL.** Free Catalog and **GREAT PRICES.** Call **U-BREW** 1-800-845-4441, North Myrtle Beach, SC 29582.

**FREE CATALOG** Brew quality beer yourself. Call WindRiver Brewing 1-800-266-HOPS.

**FREE Catalog.** Sebastian Brewers, 7710 91 Avenue, Vero Beach, Florida 32967. 1-800-780-SUDS.

**LIQUEURS - industry Quality - Made at Home.** Irish Cream, Amaretto, Crème de: Menthe; Cacao; Banana - More! 40 pg. Book. Satisfaction Guaranteed. Send \$10.00 to: Recipes Research™, PO102, Box 10475, Fargo, ND 58106-0475

**BURGLAR ALARMS & HOME PROTECTION**

**WIRELESS Home, Auto Security Systems.** SASE. R&B, Box 356, Eastchester, NY 10709

**DETER BURGLARS!** High quality/visibility aluminum security system yard warning signs work. **STOP THEM AT THE ROAD!** 4/38.95. Fortress Security, Box 968, Dacula, GA 30211.

**GUARD your doorways** with **DOOR STOP ALARMS.** They resist and alert forced entry. Great for homes, stores, offices. Free brochure. Vintech, 2 Kelly Ridge Road, Carmel, NY 10512

**PERSONAL ALARM** clips to belt, purse, door, ear-splitting wail activated by switch/pull-pin, battery not included. Red or grey \$16.95 Ck/Mo. Unlimited Opportunities, 53853 Oakview, Shelby Township, MI 48315

**Popular Mechanics**

224 West 57th Street, New York, N.Y. 10019  
Classified Advertising Dept. (212) 649-3167

**DEADLINE FOR ADS:** Copy and payment must be received by the 5th day of the 2nd preceding month for the issue in which the ad is to appear. See Head of Classified Section.

**HOW TO COUNT WORDS:** Name and address must be included in counting the number of words in your ad. Each initial or number used counts as 1 word: J.J. Smith, 224 West 57th Street, New York, New York 10019: 9 WORDS. Zip codes are not counted. Phone #: 2 WORDS, Symbols used as keys are charged for. City or state count as 1 word each: New Brunswick, New Jersey: 2 WORDS. Abbreviations such as C.O.D., F.O.B., R.P.M., U.S.A., P.O., 5x7, 16mm are counted as 1 word. (P.O. Box 392 counted as 3 words) Webster's International Unabridged Dictionary will be used as our authority for spelling, compound words, hyphenations, abbreviations, etc. Send remittance payable and order to Popular Mechanics, Classified Department, 224 West 57th Street, New York, New York 10019. Please indicate Heading under which ad is to appear.

Remittance of \$ \_\_\_\_\_ is enclosed to cover \_\_\_\_\_ insertion(s) in the \_\_\_\_\_ issue(s). \_\_\_\_\_ Classification

<b>NO CHARGE FOR CAPS</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
<b>8</b>	<b>9</b>	<b>10-\$126.00</b>	<b>11-\$138.60</b>	<b>12-\$151.20</b>	<b>13-\$163.80</b>	<b>14-\$176.40</b>
<b>15-\$189.00</b>	<b>16-\$201.60</b>	<b>17-\$214.20</b>	<b>18-\$226.80</b>	<b>19-\$239.40</b>	<b>20-\$252.00</b>	<b>21-\$264.60</b>
<b>22-\$277.20</b>	<b>23-\$289.80</b>	<b>24-\$302.40</b>	<b>25-\$315.00</b>	<b>26-\$327.60</b>	<b>27-\$340.20</b>	<b>28-\$352.80</b>
<b>29-\$365.40</b>	<b>30-\$378.00</b>	<b>31-\$390.60</b>	<b>32-\$403.20</b>	<b>33-\$415.80</b>	<b>34-\$428.40</b>	<b>35-\$441.00</b>
<b>36-\$453.60</b>	<b>37-\$466.20</b>	<b>38-\$478.80</b>	<b>39-\$491.40</b>	<b>40-\$504.00</b>	<b>41-\$516.60</b>	<b>42-\$529.20</b>
<b>43-\$541.60</b>	<b>44-\$554.40</b>	<b>45-\$567.00</b>	<b>46-\$579.60</b>	<b>47-\$592.20</b>	<b>48-\$604.80</b>	<b>49-\$617.40</b>

**YOUR NAME** \_\_\_\_\_ **PHONE:** \_\_\_\_\_  
(PLEASE PRINT)

**FIRM (NAME IN AD)** \_\_\_\_\_

**YOUR ADDRESS** \_\_\_\_\_

**CITY** \_\_\_\_\_ **STATE** \_\_\_\_\_ **ZIP** \_\_\_\_\_

**DATE:** \_\_\_\_\_ **YOUR SIGNATURE** \_\_\_\_\_

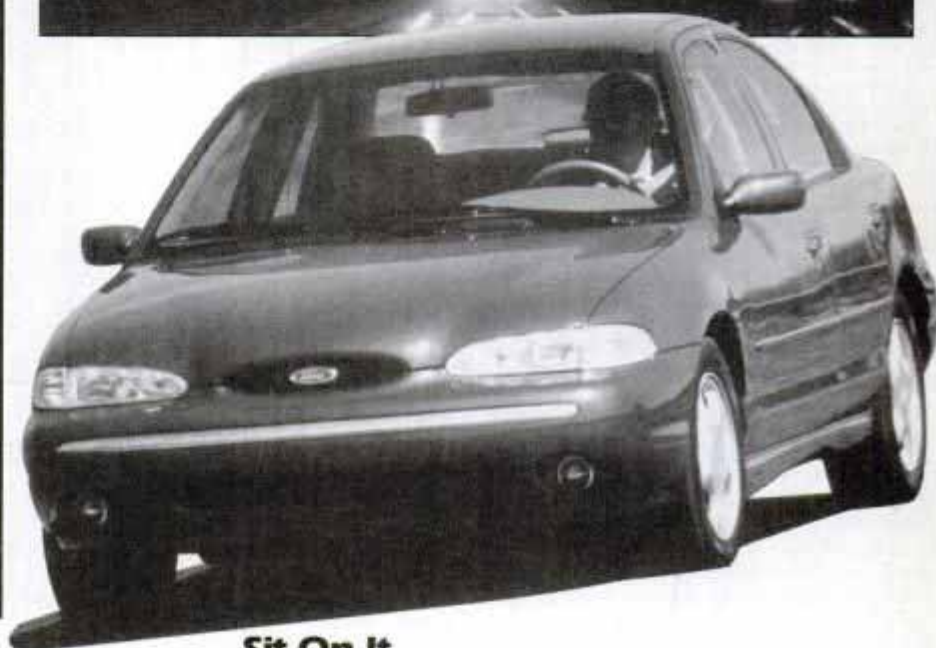
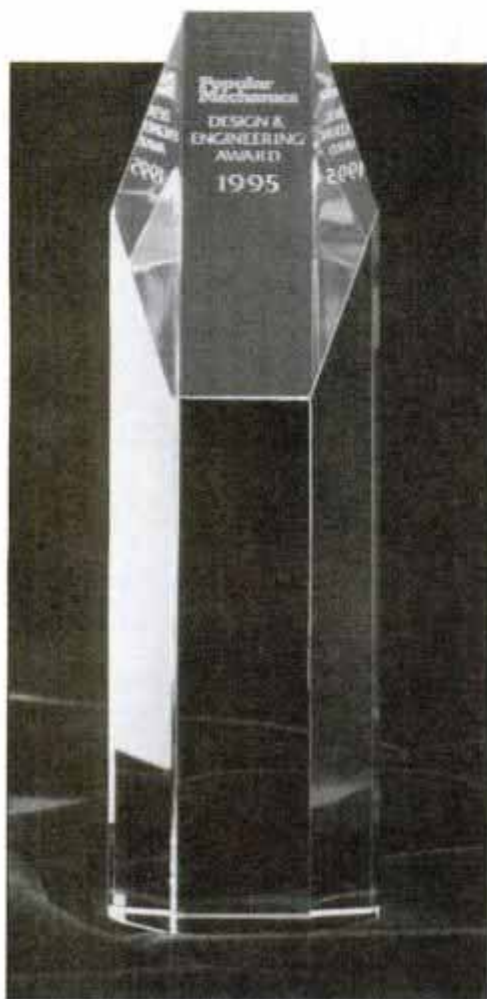
(PLEASE PRINT OR TYPE COPY • FOR ADDITIONAL WORDS ATTACH SEPARATE SHEET)

Order Form D94

**FAX: (212) 977-5415 (212) 586-5562**

**\$12.60 per word—10 Word Minimum**  
**BOLD FACE CAPS—\$1.00 Per word**  
**(First Word: No charge for Bold Face)**  
**\$65.00—B/F CENTERED HEADLINE**  
**(5 Words or Less)**  
**\$54.00—Screening**

# COMING NEXT MONTH



## Flying Saucers Are Real!

Secret military aircraft, alien spacecraft or what? Our firsthand investigative report cuts through the coverups to reveal the truth about flying saucers. Don't miss this exclusive—our cover story in the January issue.

## Design & Engineering Awards

We honor the best designs and hottest new ideas in science, technology, automotive, boating, outdoors, home improvement, home electronics and photography with PM's prestigious annual Design & Engineering Awards.

## Compact Confrontation

You'll find plenty of zip in the new V6-powered family sedans. But which one should you buy? We run six popular models through our full battery of tests to give you the answer.

## Sit On It

Build our turn-of-the-century Mission-style couch. Our step-by-step instructions walk you through each phase of the job to craft this fine piece of furniture.

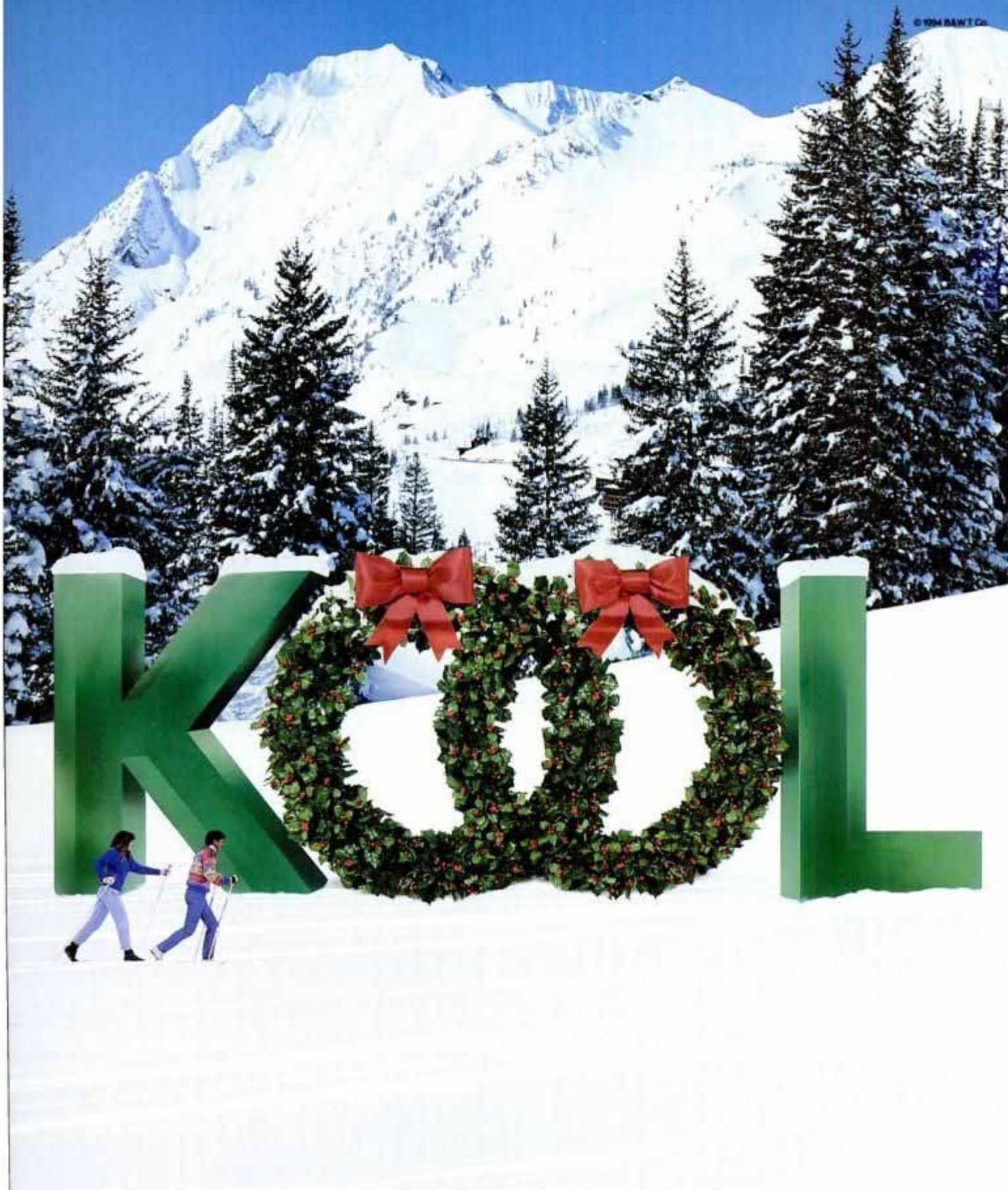
## Hot Shots

The newest point-and-shoot cameras are smaller and lighter, offer underwater operation and take better pictures. We sort through the models and features—so you won't have to.

## CB Comeback

Remember "10-4, good buddy"? Motorists are finding CB radio a cheap alternative to cellular phones, and are relying on CBs in emergencies.

*Editor's Note—Due to changes in production schedules, an article may not appear when originally planned. We apologize for any inconvenience this may cause.*



**SURGEON GENERAL'S WARNING: Smoking Causes Lung Cancer, Heart Disease, Emphysema, And May Complicate Pregnancy.**

100's, 16 mg. "tar", 1.2 mg. nicotine av. per cigarette by FTC method.



# Now You Won't Have To Sit So Close To The Screen.



**Chevy S-Series.** *Hang on to your popcorn. Now you can watch your favorite action and adventure show without getting a cramp in your leg or a crick in your neck. The roomy new Chevy S-Series is here. Designed from the inside out, the S-Series Extended-Cab*

*gives you an extra notch of seat travel for more leg room than almost any full-size extended-cab pickup made. How's that for good measure? And the S-Series is exceptionally quiet. Foam plugs, triple-sealed doors and a great deal of sound insulation keep outside noise outside.*

*So get with the program. Sit back, relax*

*and test drive the new*

*Chevy S-Series.*



**Chevy S-Series  
LIKE A ROCK**



For a free product brochure call 1-800-950-2438.

The Chevrolet Emblem and S-10 are registered trademarks and Chevy is a trademark of the GM Corp. ©1994 GM Corp. All Rights Reserved. Buckle up, America!