

MARCH 1984 \$1.50

# Popular Mechanics

**'84 CARS:  
ALL THE IMPORTS  
With Features & Prices**

## MACHINES THAT HELP MAKE SUPER ATHLETES

**Next Target: Gold Medals At Los Angeles**

**PLANS INSIDE**

**Grow Lush Garden Crops:  
Make These 8 Simple Aids**

**GUIDE TO PLYWOOD:  
Be An Expert When You Buy**

**4 NO-FUEL, BACK-YARD  
GENERATORS: Make Your  
Own Energy, Sell The Rest**

**PM's CUSTOM PICKUP:  
Packed With Ideas  
For Sportsmen**



**How To Set Up Your  
Computer To Design  
And Print Just About  
Anything**



**Olympic Bobsled  
Streaks Through  
A Risky Curve**





# FORD BRONCO II

## LET IN THE GREAT OUTDOORS...



**MOST POWERFUL V-6 ENGINE.** More horsepower and torque than Chevy S-10 Blazer!

**PERFECT SIZE FOR 4-WHEELING.** Trim Bronco II turns in less space than S-10 Blazer or Jeep CJ. Seats 4 in comfort.

**LET THE SUN SHINE IN** with the new flip-out removable rear quarter



windows and sun roof options. It's a brand-new kick!

**FLIP TO 4-WHEEL DRIVE** from the driver's seat, with auto-lock hub option. Proven manual locking hubs standard.

### Quality is Job 1.

Ford's commitment to quality results in the best-built American trucks, based on a survey of owner reported problems during the first three

months of ownership of 1983 trucks. And the commitment continues in 1984.



**BEST-BUILT AMERICAN TRUCKS**



Get it together - Buckle up.

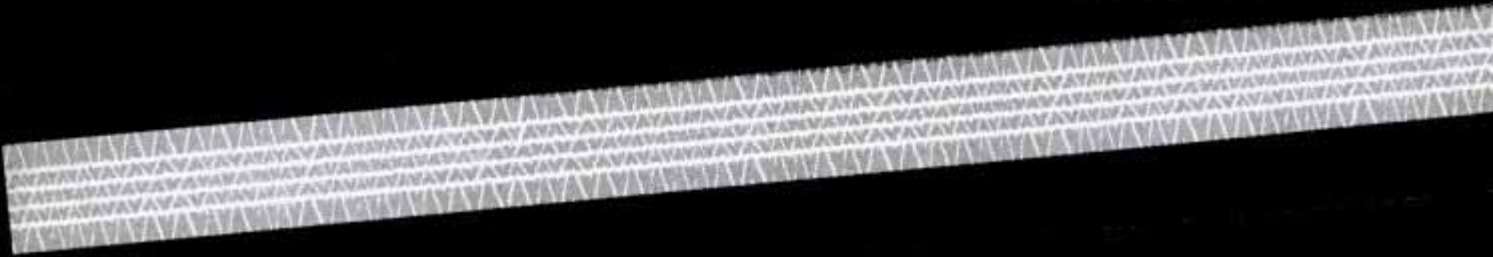


**IF YOUR CAR'S  
PERFORMANCE IS  
IMPORTANT TO YOU,  
TURN TO PAGE 17.**

This One



JX07-L9Z-RBK9





"Fifty situps.  
Twenty pushups.  
Ten laps.  
Shave.  
Shower.  
Speed Stick® protection.

That's how I give  
my business career  
an extra edge."



**THE  
WIDE  
STICK™  
GIVES  
YOU THE  
EDGE.**

by **MENNEN**

© 1984 THE MENNEN CO.

**speed  
stick®**  
DEODORANT

by **MENNEN**  
REGULAR

Материал, содержащий авторские права



# Popular Mechanics®



**ON THE COVER**  
What could be the world's fastest bobsled tunes up at a blazing 70 mph for the 1984 Winter Olympics at Sarajevo, Yugoslavia. Read how our experts are using new high-tech tricks to produce record-setting speeds. Story on page 92.  
—Photo courtesy of American Cyanamid Co.

VOLUME 161 NUMBER 3

MARCH 1984

INTERNATIONAL EDITIONS: CARIBBEAN, MEXICO, SOUTHERN HEMISPHERE

## AUTOMOBILES AND BIKES

- Imports and Motorsports 10
- Detroit Listening Post 14
- The PM Garage 29
- Car Clinic 40
- Saturday Mechanic:
- How to rebuild a carburetor 49
- PM Owners Report: Mazda 626 56
- Install a pass-through window in your pickup 60
- Germany's new engine 62
- PM's guide to the 1984 imports 94
- Customize your Fiero with bolt-on bodywork 108
- Ford racing through history 148
- PM's long-term car tests: VW Vanagon, Dodge Caravan, Honda Accord, Jeep Cherokee 170
- PM Owners Report: Volvo 760 GLE 180

## SHOP AND CRAFTS

- 30, 44, 144 Hints from readers
- 36 The PM Workbench
- 68 Sawing metal with a plywood blade
- 74 Build an heirloom stationery caddy
- 110 Make a custom cabinet for video games
- 115 6 accessories to build for your drill press
- 120 Workshop Minicourse: Working with levels
- 122 Rediscover your basement and add space

## ELECTRONICS, RADIO AND TV

- 58 PM Electronics Monitor
- 62 New technology for Olympic coverage
- 66 PM Software Monitor
- 104 Design and print almost anything on a word processor
- 154 Build PM's audio/video cable tester



## SCIENCE AND ENGINEERING

- Science Worldwide 38
- Quiet street-sweeping machines 63
- Submersible devices measure ocean currents 63
- Britain's mineproof mine sweeper 65
- Lead ring takes the place of biopsy 65
- Economical atom smasher 65
- Forging Gold at the Olympic Games 89
- Fire on ice: High-tech tricks for the Winter Olympics 92
- Mom and Pop power turns a profit 100
- Product Update 178

## AVIATION

- Unmanned "fighter planes" save pilots' lives 63
- New threat from a veteran jet 64

## BOATING AND OUTDOORS

- All Outdoors 8
- English sail folds like a Chinese junk 63
- PM's Forest Ranger lets you enjoy the great outdoors in style 98

## HOME AND YARD

- 32 Homeowners' Clinic
- 34 Appliance Clinic
- 54 New Now for home and shop
- 84 Make a concrete garden bench
- 112 8 garden aids for a bountiful harvest
- 118 Mark your belongings—and hold onto them
- 139 All about plywood
- 176 How to frame a basement window

## PHOTOGRAPHY

- 33 Photo Hints

## EVERY MONTH

- 5 Editor's Notes
- 6 Letters to the Editor
- 62 Technology Update
- 80 PM's Time Machine

## WORTH WRITING FOR

- 171 Looking for more ideas and information?

POPULAR MECHANICS (ISSN 0032-4558) is published monthly by The Hearst Corporation, 224 West 57th Street, New York, N.Y. 10019, U.S.A. Subscription prices: United States and possessions, \$11.97 for one year, \$21.97 for two years. Canada and all other countries, add \$16.00 for each year. Second-class postage paid at New York, N.Y., and additional mailing offices. Authorized second class mailing-in-Canada privileges by Canada Post, Windsor, Ont. Registered as second-class matter at the Post Office at Mexico D.F., Mexico, June 20, 1950. © 1984 by The Hearst Corporation. All rights reserved. Printed in U.S.A. POSTMASTER: Please send address changes to Popular Mechanics, P.O. Box 10064, Des Moines, Iowa 50350.

SUBSCRIPTION SERVICE: Popular Mechanics Magazine will, upon receipt from its reader of a complete 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 10064, Des Moines, Iowa 50350. • Should you have any problem with your subscription, please write Joan Harris, Customer Service Department, Popular Mechanics, P.O. Box 10064, Des Moines, Iowa 50350. To assure quickest service, please enclose your mailing label when writing to us or renewing your subscription. • Renewal orders must be received at least eight weeks prior to expiration to assure continued service.

Use this address for subscription orders & inquiries: POPULAR MECHANICS, P.O. Box 10064 Des Moines, Iowa 50350. POSTMASTER: Please send address changes to this address.



# HOME SWEET HOME IMPROVEMENT BOOKS FROM ORTHO.

If you want to build a great home improvement library, ORTHO has a great line of titles – 17 in all. And the line is growing all the time. Just look through the books. You'll find detailed information on most every do-it-yourself project you can think of. And every volume is generously illustrated in full color... with detailed diagrams and easy-to-follow directions written by ORTHO's staff of experts. Home improvement by the book? Look for these books at finer bookstores, home centers and lawn and garden outlets where ORTHO books are carried.

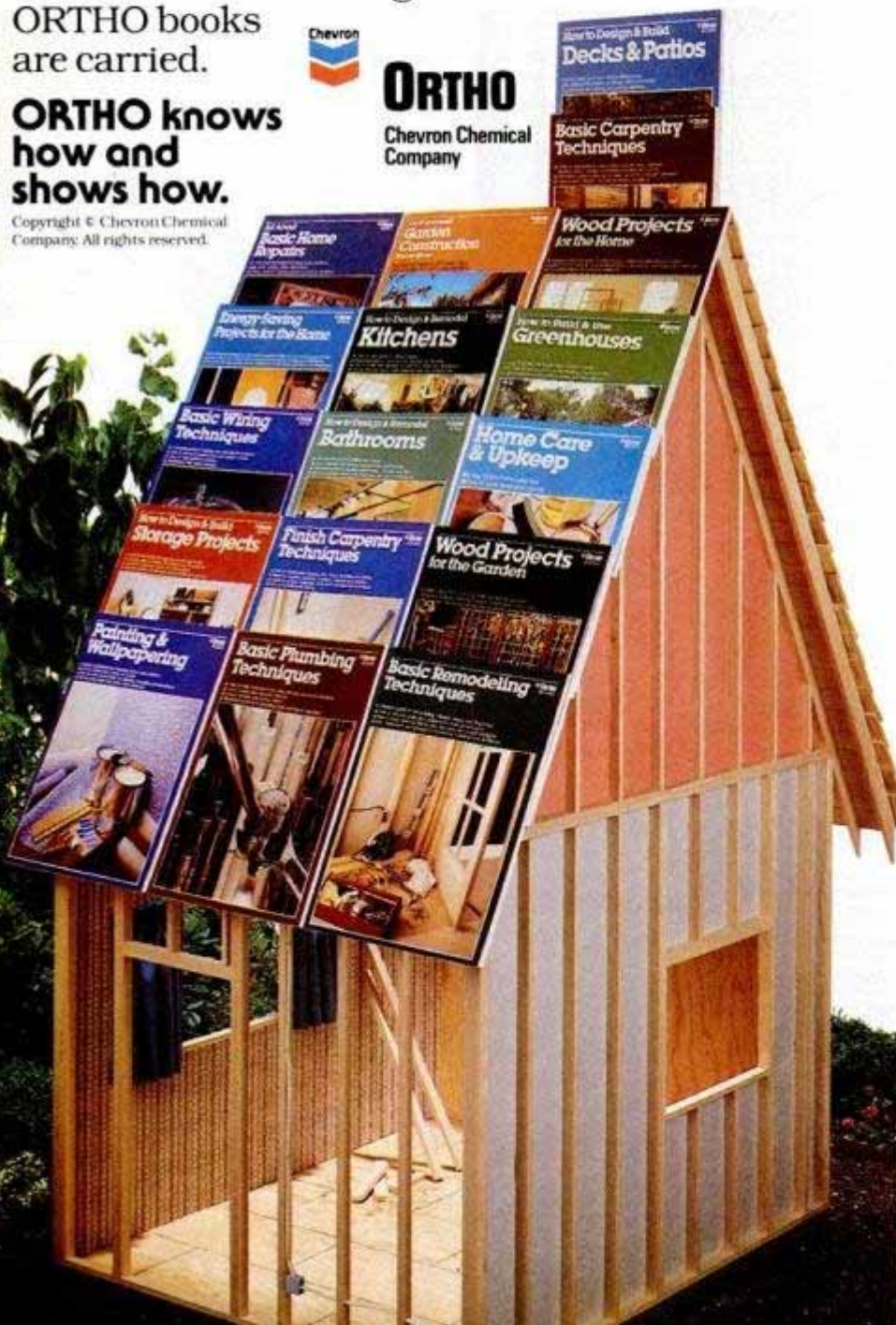


**ORTHO**

Chevron Chemical Company

**ORTHO knows  
how and  
shows how.**

Copyright © Chevron Chemical Company. All rights reserved.



## Popular Mechanics

**Editor-in-Chief:** John A. Linkletter  
**Executive Editor:** Joe Oldham  
**Managing Editor:** Bill Hartford  
**Graphics Director:** Bryan Canniff

**Special Editorial Features:** Sheldon M. Gallager, editor  
**Automotive:** Wade A. Hoyt, SAE, editor; Michael Lamm (West Coast); Daniel Charles Ross (Detroit)  
**Home and Shop:** Penelope Spangler, Joseph Truini, assistants  
**Boating, Outdoors and Travel:** Ray Hill, editor  
**Electronics:** Neil L. Shapiro, editor  
**Science:** Dennis Eskow, editor  
**Editorial Production:** Peter Easton, chief; John Bostonian Jr., art; Peter Francesconi, John Ginsberg, assistants  
**Design Director:** Ira Herrick  
**Art:** Alan Andresen, Ann Bennett, assistants

**Special Publications:** Clifford B. Hicks

**Editorial offices:** 224 West 57th St., New York, N.Y. 10019. We cannot be responsible for loss of unsolicited queries, manuscripts, or photos. For return, they must be accompanied by adequate postage.

**Reader Service Department:** Hilde vonThorak, director; 224 West 57th St., New York, N.Y. 10019; (212) 262-4292

**Advertising Director:** Gil Alfano

**Advertising Offices:**  
**New York:** 224 West 57th St., New York, N.Y. 10019; (212) 262-8824  
**Chicago:** 520 North Michigan Ave., Chicago, Ill. 60611; (312) 527-2400  
**Detroit:** 377 Fisher Rd., Grosse Pointe, Mich. 48230; (313) 881-3520  
**Cleveland:** PDC Building, 3659 Green Rd., Cleveland, Ohio 44122; (216) 292-7334  
**Los Angeles:** 460 East Carson Plaza Dr., Carson, Calif. 90746; (213) 532-8101

**Production Manager:** Alan Biederman  
**Advertising Production:** Patricia Woods; (212) 262-4800  
**Classified Sales Manager:** Sophie Gronowicz; (212) 262-4825

Published by The Hearst Corporation  
**President:** Frank A. Bennack Jr.  
**Chairman:** Randolph A. Hearst  
**President, Magazines Division:** Gilbert C. Maurer  
**Publisher, Popular Mechanics:** Daniel J. Coleman  
**Publishing Consultant:** Richard E. Deems

POPULAR MECHANICS IS PUBLISHED MONTHLY by the Hearst Corporation, 959 Eighth Avenue, New York, N.Y. 10019, U.S.A. Frank A. Bennack Jr., President; Randolph A. Hearst, Chairman; Harvey L. Lipton, Vice President and Secretary; Hearst Magazines Division: Gilbert C. Maurer, President; K. Robert Brink, Executive Vice President and General Manager; Raymond J. Petersen, Executive Vice President; Thomas J. Hughes, Vice President and Resident Controller; William S. Campbell, Vice President, Director of Circulation; Daniel J. Coleman, Vice President for Popular Mechanics.

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 plans published in this magazine.

POPULAR MECHANICS • MARCH 1984

Материал, защищенный авторским правом





# EDITOR'S NOTES

**M**ore than 30 different bobsleds were tested by the U.S. Olympic team before the athletes selected one for the current competition at Sarajevo. Each sled was the product of a skillful designer who used all his technological tricks to make it a gold medal contender.

Other U.S. teams have employed wind tunnels, computers, superspeed photography and other high-tech methods to prepare for the Games. And even now, the summer athletes are deep into scientific training and coaching techniques that they hope will produce winning performances in Los Angeles next August.

For a look at the fascinating new combination of science, technology and athletic skill, see *Forging Gold On Olympus* (page 89). Another ingredient in the mix may well be inventive genius. Among the foremost U.S. bobsled



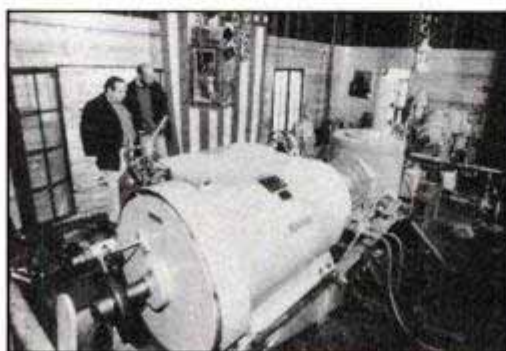
**Designer Tip Sempiner: From hair curlers to Olympic bobsleds.**

builders is New York designer Tip Sempiner, who holds an amazing total of 67 patents on everything from tape recording equipment to hair curlers. You can learn how he goes about building bobsleds in *Fire On Ice* (page 92). . . . **Photographer Steve Fay**, whose work you've seen in PM through the years, is now the envy of all commuters. He can work at home when he wants to, thanks to a new studio and entertainment room he put into his previously unfinished basement. Through the combined efforts of architect Ira Grandberg and the PM Home & Shop Dept. Steve has discovered new happiness in *The Rediscovered Basement: Lowest-Cost Space Maker* (page 122). . . . **Some people who started**



**Photographer Steve Fay savors the joy of working at home.**

**generating** energy as a hobby are finding their back-yard power plants put out a surplus they can sell. And others, like Paul Eckhoff (below, with Science Editor Dennis Eskow), have even launched new businesses selling energy-related equipment. Energy writer Dianne Driever tells you how to do it in *Mom & Pop Power Turns A Profit* (page 100).



**Eskow, Eckhoff and lots of home-grown power.**

*John A. Lillenton*

## Why the gas station attendant shouldn't wash your windshield.



Did you ever look at what he cleans it with? A squeegee that sits in water dirtied by a hundred other windshields. A rag that's been lying around collecting dust, oil, and who knows what else. A paper towel soaked by vapors from the gas pumps.

We know a better way to clean your windshield. Consider Wyp•shield windshield towels. Specially designed not to scratch, and won't give off lint like conventional towels. Most importantly, they come in a box dispenser, which keeps them clean and available.

So why not clean all your car windows and headlights with Wyp•shields. And let the gas station attendant stick to pumping gas.

Look for Wyp•shield windshield towels in auto and hardware departments.

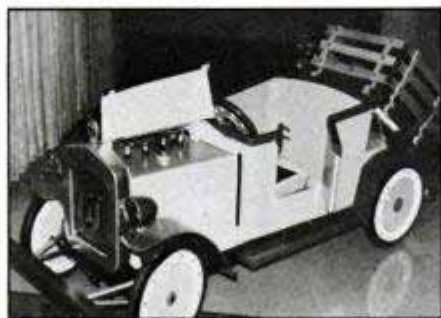
**Scott helps those who help themselves.**



# LETTERS TO THE EDITOR



## PM's pedal car in two body styles



Two versions of PM's convertible pedal car for kids: delivery van (left) built by reader Willson and pickup/dump truck (right) made by reader Wingert. It can also be a roadster.

Your readers might like to see a photo (above, left) of the pedal truck I made from your excellent plans (*Build PM's Delivery Wagon*, page 62, Aug. '82). I scaled it up 25 percent to accommodate large kids. I also added spring suspension.

LARRY R. WILLSON  
HIGHLAND, CALIF.

We built the pickup/dump truck version (above, right) for our grandson, adding automotive-type steering with ball joints and ball-bearing wheels. The hood also hinges up to reveal four real (discarded) sparkplugs. My wife and I have made many PM projects, but we think this is one of the most enjoyable we've ever undertaken.

WESLEY WINGERT  
BATESVILLE, ARK.

You both did a great job and added some nice touches. For others who may be interested, the plans, which show three different body styles, are \$9.95 postpaid from Stevenson Projects, Box 584, Del Mar, Calif. 92014.

## They're both a LARC

I enjoyed your article *Seafaring Fire Engine* (page 93, Oct. '83), but I think you erred in referring to LARC as a Light Amphibious Rescue Craft. When I was in the Army, LARC stood for Lighter Amphibious Resupply Cargo.

PHILIP H. CHASE  
CHARLESTON, S.C.

We're both right. The meaning you refer to was used prior to the Vietnam War. Ours is the current usage.

## Full of hot air?

We were pleased to see your coverage of hot-air sport balloons (*Now: Backpack Ballooning*, page 75, Dec. '83). It contained some misconceptions, however. In our Drifter, the pilot does not

land on his feet. He remains seated and allows the bottom of the fuel tank to absorb the landing shock.

Your writer was unnerved by the fear of the pilot light blowing out in flight. This can't happen while flying free, since you're moving at the same speed as the breeze. In any case, with the burner shut off, the balloon descends at 700 feet per minute—considerably slower than the 1,000 f.p.m. of a typical round-canopy parachute.

WILLIAM C. CHAMBERS JR.  
HOVERAIR LTD.  
SAN FRANCISCO

I really liked Ray Hill's story on backpack ballooning. The idea of exploring the wilderness while sailing over the treetops is fascinating.

SCOTT D. TEBOW  
LA HABRA, CALIF.

## Old idea, new twist

The French seem to be about 40 years late with their "new" low-level parachute bombs (*Technology Update*, page 145, Dec. '83). This technique was used with great effect during World War II in Burma. B-25s dropped 100-pound bombs at treetop level, using chutes on them to delay their fall and give the bombers time to get away.

COLUMBO S. CAPOGROSSI  
TRUMANSBURG, N.Y.

Yes, parachute bombs are not new in concept. However, the French system differs because they have rocket charges that will drive the bombs into heavily reinforced concrete after the chutes have been jettisoned. Otherwise, the bombs would lack sufficient impact to do serious damage.

## Chilling reminder

Your article *Through The Ice!* (page 88, Dec. '83) contained very useful information, but it overlooked one point. I agree it's easier to roll down a window rather than push open a door against water pressure, but suppose the car has power windows that short out and won't open? Also, many four-door sedans have nonopening rear windows.

I think the best advice is: Never venture out on ice unless you're in a convertible—with the top down!

C. R. BLYDENBURGH  
SAUNDERSTOWN, R.I.

## Exerciser update

Thank you for including our Vitamaster electronic exerciser in your article *It's A High Tech Christmas* (page 84, Dec. '83). I would like to point out, however, that the display shows not the time of day, but the elapsed time since the user started exercising. Also, the retail price should have been listed as \$599.95, not \$320.

P. JAY HARRIS  
VITAMASTER INDUSTRIES INC.  
BROOKLYN, N.Y.

The price that appeared on our test exerciser did not include shipping and handling charges or dealer profit. We regret the confusion. **PM**



It also has  
a new, more  
powerful engine.  
But what  
would you rather  
look at?



Any way you look at it, the Accord Hatchback is new. New engine. New tighter suspension. New lower hoodline. New sporty black trim. New contoured bucket seats. We could go on. But the best way to look at this new Honda isn't in a picture. It's out on the road. **HONDA** The Accord Hatchback

 ©1983 American Honda Motor Co., Inc.

Материал, защищенный авторским правом



# ALL OUTDOORS



## Camp-out sailboard takes you away

Most hot-dog sailboarders push their boards hard all the time—that's what sailboarding is about. But if a leisurely pace suits you, how about a cruising sailboard with dry storage and a sail that converts into a tent for two?

The Ten Cate Cruiser from England is molded from polyethylene plastic and has a polypropylene daggerboard. The Ten Cate measures 12 x 2½ feet, is 6 inches thick and weighs 46 pounds. The large three-batten sail mounts on a 14-foot fiberglass mast. Nothing special so far. But add the quick-release, watertight box plus the tent, and you come up with unique possibilities.

You can order the Ten Cate in the United States through British Information Services, 845 Third Ave., New York, N.Y. 10022. The cost is about \$560 including shipping. It's made by Ten Cate Ltd., Broadsailing Div., Unit 10, Stort Valley Industrial Park, Bishops Stortford, Hertfordshire CM23 2TU, England.



Sailboarders can take it with them on the Ten Cate Cruiser. Board has removable watertight box. Sail design allows the craft to be used as a tent for camping out.

## Cartridge doubles power

An all-new cartridge, not just a new loading of one that's been around for years, is an event. Now, on the heels of the Remington/Ruger .357 Maximum introduced a year ago, comes the Federal/Harrington & Richardson collaboration on the .32 Magnum.

With comparable power to the .38 Special +P 110-grain load, the semi-wad cutter .32 Magnum nearly doubles the energy of the standard loading for

the .32 S&W Long. Cartridge and case lengths are increased so the more powerful new cartridge cannot be chambered in older and weaker revolvers.

Muzzle velocity from a 4½-inch barrel jumps to 1,030 feet per second (f.p.s.) giving the 95-grain bullet 225 foot-pounds of energy at 50 yards and 190 at 100. This compares with a 98-grain bullet going 705 f.p.s. from the .32 S&W Long producing energies of 115 and 95 foot-pounds. Nearly doubling its power raises the .32 Magnum out of the pipsqueak class to make it really useful for sport and defense.

Four basic five-shot revolvers from Harrington & Richardson handle the new cartridge: the Model 686 Western Style, the 904 Swing-out with adjustable sights, the 732 Swing-out and the 632 Solid Frame. Each comes in various barrel lengths. Prices range from \$100 to \$195.

Many handgun shooters have long mourned the gradual decline of the .32 revolver for serious shooting. Now, this new cartridge, with guns to match, should bring it back stronger than ever.

## Motorcycle tank pack

Traveling by motorcycle has its drawbacks—like carrying capacity. The Eclipse Tank Trunk's six zipper compartments hold lots of stuff. It has a three-point attachment harness with quick-release buckles. Just unsnap the buckles and you can hook them to optional shoulder straps (\$9.95), turning the unit into a backpack. When the \$89.95 Tank Trunk is off the bike, its mounting harness straps stay behind, leaving the tank uncluttered. The Tank Trunk comes in black, gray or brown from Eclipse Inc., Box 7370, Ann Arbor, Mich. 48107. A catalog is available free of charge.

FM

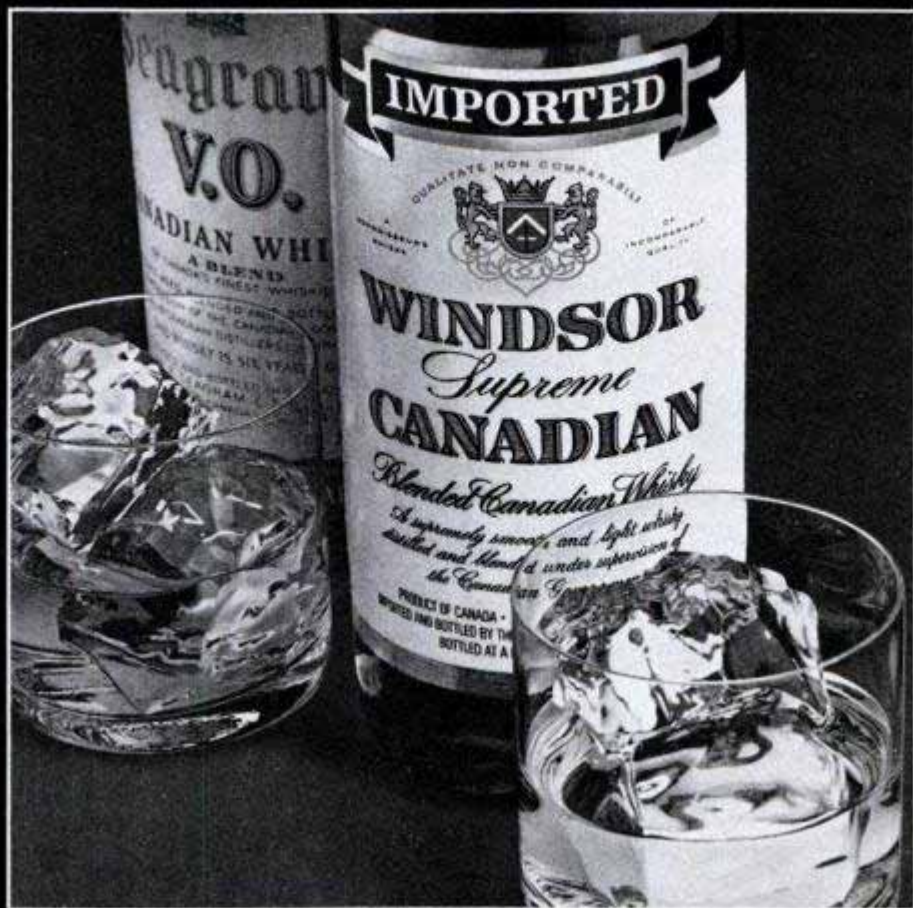


Tank Trunk can convert to a backpack.



New .32 Magnum round stands 1.35 in. tall, almost ¼ in. longer than the .32 S&W Long.





**NEW TASTE TESTS PROVE IT.**

# WINDSOR CANADIAN BEATS V.O.

Two separate broad-scale taste tests were conducted in late 1983 among Canadian whisky drinkers. The results: Windsor's mild, smooth taste was chosen over the new 80-proof V.O. both times.

Try the taste of Windsor and find out for yourself why you can't beat its taste. And you certainly can't beat Windsor's price.

**WINDSOR**   
ONE CANADIAN STANDS ALONE



# IMPORTS & MOTORSPORTS



**Versatile vehicle**



**Logicar as a van is converted to a pickup: First step is rolling the side glass into the roof (top, left). Roof is lowered (top), then rear window slides forward (above).**

Ah, versatility. Convertible owners can drop their tops on sunny days, hatchback drivers fold their rear seats to set up the canine corral and pickup truckers pop up the cap anytime they want to go camping. But no one I've seen can do a jiffy switch from van to pickup or vice versa the way you can with this versatile vehicle. The Logicar is a Danish creation from the drawing board of designer Jacob Jensen. His pickup/van is in the prototype stage now, with the fiberglass body on a galvanized tube-

type chassis and power from a VW air-cooled engine.

The first step in converting the van to a pickup is to slide the side windows into the roof as seen above. The roof is then lowered by a springloaded, telescoping system (that patent is pending) and it becomes the pickup bed. The rear window frame then slides forward to close up the cabin right behind the driver's seat, while a protective rubber mat rolls out to cover the pickup bed. In the pickup mode, Logicar carries driver

and passenger and about 900 pounds of payload. With seats, in the van configuration, it carries a driver and four passengers.

For production and licensing information, write to Logicar A/S, Hjulmagervej 5, DK 8800 Viborg, Denmark.

## Wagon gets a whine



**Just spotted: prototype of Audi Turbowagon.**

In case you hadn't noticed, Audi's on a roll—the 5000S station wagon is sure, smooth proof that a sedan can become a wagon model

without losing its looks or sacrificing sportiness. German drivers will, of course, want more power to go with the additional room, and for that a turbo will do the trick. This prototype Turbowagon was spotted in Germany, where it's been flashing every other wagon out of the fast lane as it closes at 148 mph. That's what 182 hp from the turbo Five nets as top speed. If four-wheel drive is the next thing to be added, we may see another Audi model here—the Quattro Turbowagon.

## Alfa Romeo renaissance

You can still buy an Alfa Spider, the design of which goes back to the '60s. It didn't get so old running on yogurt, you know, but because it's one of the all-time most beautiful roadsters. It'll probably still be available in 1985-86, when Alfa is planning to introduce two new sedans here, both in the BMW



**Arna (for Alfa Romeo Nissan Automobiles) has Alfa engine and Nissan sheet metal.**

class. Right now, the only closed car we get is the GTV-6, which was originally introduced as the Alfetta GT. When I visited Alfa and drove the GT in '75, I saw the potential of Alfa's production facilities at several locations in Italy. They are currently in full swing on projects that include the Alfa 33, Arna, Avio turbos and a 4x4. We'll be impressed with those '85-'86 sedans. That's my Alfa bet. **PM**



# Today's roads come with standard features most cars aren't equipped to handle.

Today too many cars are designed without enough regard for the way most roads were designed.

Without enough regard for the hazards of everyday driving. Without enough regard for the ever present threat of inclement weather.

---

## A car as tough as the roads it travels.

---

Fortunately, Subaru has designed a complete line of cars for these realities. And we started long before it was fashionable to do so.

We gave Subaru Front Wheel Drive for improved road holding. Rack and pinion steering for quicker response. Independent McPherson strut suspension for a

better ride over rough roads. And a dual diagonal braking system for extra safety.

As a result, Subaru has a proven record of durability and reliability. A record achieved on real streets and highways, not just on test tracks.

---

## You can't be sure of the road, so be sure of your car.

---

Since driving conditions can go from bad to worse in an instant, we've added the option of "On Demand"™ Four Wheel Drive to our Four Door Sedan and Two Door Hardtop. Making Subaru the only car company in America with a full line of front to "On Demand" Four Wheel Drive vehicles. Cars that give you more traction when the road gives you less.

This year the Two Door Hardtop incorporates our latest innovation. Turbo-Traction.™ It's our unique combination of Fuel-Injected Turbo Charging, "On Demand" Four Wheel Drive, and automatic transmission.

The result is unmatched versatility for exceptional handling under any conditions.

What's more, many dealers offer Subaru Added Security. It's the only extended service contract backed directly by Subaru.

So why settle for a car built for ideal roads, when you can have a car built for real ones.

**SUBARU.**  
Inexpensive. And  
built to stay that way.





EVINRUDE

# Catch it if

## EVINRUDE XP 150. THE FASTEST

If you want to be first to the fish, here's how to get there...the Evinrude XP 150. No ordinary 150-HP outboard can match its bass haulin' performance. That's because the XP 150 has many of the race-designed features of its big brother, the awesome

Evinrude®  
Formula One  
V-8 outboard.

In fact, in tests using a 16-foot bass boat, with OMC's SSTRX™ stainless steel prop, the fastest competition could chase the XP 150 was two miles per hour slower\*.

**HIGH-PERFORMANCE HEADS.** At the heart of this high-performance machine are totally redesigned cylinder heads...a "high squish" design that delivers

more power from every stroke. It's technology borrowed from the racing circuit, where every ounce of performance counts.

**HIGH-PERFORMANCE CARBS.** Three highly tuned dual carbs give the XP 150 its punch. These six recalibrated barrels of carburetion gather cool air scooped in through louvers in the hood, mix it with regular leaded fuel and then ram it into six of the most powerful cylinders on the water.

**TUNED EXHAUST.** For total performance you've got to dump exhaust as fast as you pack in fuel. That's why this XP sports the kind of tuned exhaust you'd expect to find on a racing engine. For more power, better engine efficiency. You'll know what tuned exhaust means when you hear this XP running.



A PRODUCT GROUP OF **OMC** OUTBOARD MARINE CORPORATION

© OUTBOARD MARINE CORPORATION 1984. ALL RIGHTS RESERVED. \*FOR COMPLETE TEST RESULTS, WRITE: EVINRUDE MOTORS, P.O. BOX 663, MILWAUKEE, WI 53201

История традиционного авторского права



# PERFORMANCE

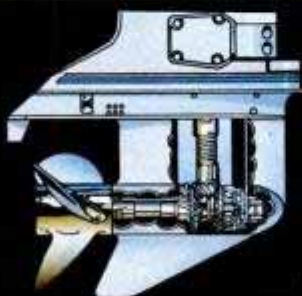
# you can!

## PRODUCTION 150-HP OUTBOARD.\*

### NITRO SERIES XP GEARCASE AND NEW RAKER PROP.

To handle a high-performance engine like this you need gears that can take it, and a lower unit shape that'll slip through the water at high speed. The Nitro Series™ XP gearcase gives you a superior hydrodynamic shape for maximum stability and performance at high speed, plus the kind of gears it takes to transfer the XP's power to a hot wheel like OMC's new SST Raker™ propeller.

**VRO AUTOMATIC OILING.** VRO™ is Variable Ratio Oiling, an automatic under-the-hood mechanical oiling system that continually adjusts the fuel/oil ratio, varying approximately 50:1 to approximately



150:1. And it delivers the fuel mix at the moment of throttle RPM change, so the correct fuel mix is flowing at all times, for better oil economy and engine efficiency.

### EVINRUDE DEALERS NATIONWIDE.

When you buy an XP150, you buy a little extra piece of mind, too. That's because nobody has more parts and service dealers coast to coast than Evinrude. See the hot new XP150 and the full line of exciting '84 Evinrude outboards now. We're the brand that gives you performance, not gimmicks. Call our toll-free number for the name of your nearest Evinrude dealer.



**FIRST  
IN PERFORMANCE  
OUTBOARDS**

**EVINRUDE** 





# DETROIT LISTENING POST



## 1986 Ford LTD

Here's our first good look at the Ford Taurus-series automobiles scheduled to debut in the fall of '85. The vehicle shown here demonstrates that Ford has a commitment to aerodynamics in its future. The car bears a striking "up-sized" resemblance to the Tempo/Topaz twins. More than one observer, however, has remarked on the similarity that the Taurus bears to the departed American Motors Concord.

The Taurus-series cars are intended to replace several of Ford's bigger Panther- and Fox-series vehicles—Lincoln Mark VII and Continental, Ford LTD and Mercury Marquis—but exactly which cars is still an open question. In 1982, Ford brought out its smaller Marquis and LTD, still rear-drive and built on the Fairmont (Fox) platform. Ford sources indicate that the company will sell the big sedans alongside the newer, smaller Taurus-series sedans and wagon, perhaps well into the late '80s.

The uncertainty, it appears, lies in Ford wanting to serve two masters—the fuel-efficient crowd, and those who buy



Spy photo of prototype Ford Taurus shows the slick lines of the 1986 LTD and Marquis.

big, rear-drive Detroit sedans regardless of the fuel situation. Taurus development was cut back significantly this year to carve costs from the program, and the Taurus-series replacement for the Mark VII, we're told, has been shelved until 1988 or beyond.

Taurus-series cars, sources indicate, will likely be motivated by a 2.5-liter version of the 2.3-liter Four now in the Tempo/Topaz. Also slated for the Taurus are a new 3.0-liter V6 and a four-speed automatic. Ford expects Taurus-series cars to achieve 26 mpg in the city with the 2.5.

## New Hurst transmission

George H. Hurst is a man who requires little introduction. Here it is: the Hurst Shifter and Hurst/Olds (before it was absorbed by Cars and Concepts).

George Hurst has always been an innovator. You've seen his magic at work on television and, perhaps, at race tracks, where the Hurst Jaws of Life help to safely extricate drivers from crashed vehicles.

Hurst's latest toy could revolutionize the auto industry. He's working on a transmission which, very loosely, works on the same principle as the impact wrench. Though promising in theory, prototypes have either failed to live up to expectations or simply failed to live. George Hurst, however, is unaccustomed to failure.

## Blowers from D.C.

Superchargers are making a comeback. After somewhat promising efforts put forth by Bendix a couple of years ago, the supercharger business withered away to little more than poorly funded research projects. Many outfits do build and successfully sell superchargers on a relatively small scale, but the equipment is not well distributed, generally speaking.

Chrysler's Direct Connection might turn that around soon. After intensive investigation of supercharger performance in Shelby Chargers at the West Coast development center, a blower manufacturer was chosen from four or five semifinalists. As this is written, Camden Superchargers of Austin, Tex., is in negotiation with Chrysler to supply blowers for "off-road use only" through Direct Connection parts dealers and catalogs.

Why not from the factory? A supercharged Shelby Charger sold through the factory would be subject to the scrutiny of EPA exhaust sniffers. The cost of certifying the blown engine would be prohibitive in view of the relatively small numbers of sales such a specialty car would generate. Though performance figures aren't known at this writing, the supercharged Shelby Charger will generate as much excitement as it will horsepower.

## The ad game Tempo

You've seen the Ford commercial in which the Tempo does a G-pulling loop-the-loop in the "O" of a giant Tempo logo? Pretty slick driving, or just trick camera work?

Neither, as it turns out. The Ford

folks were taking no chances that the neat trick would pay more attention to gravity than the shooting script. The Tempo is securely bolted to a moving track and pulled through the shot. The slot is nearly invisible on-screen, making the Ford Tempo the world's first full-sized slot car.

## The Firenza firecracker

Keeping pace with Oldsmobile will become more difficult in 1985.

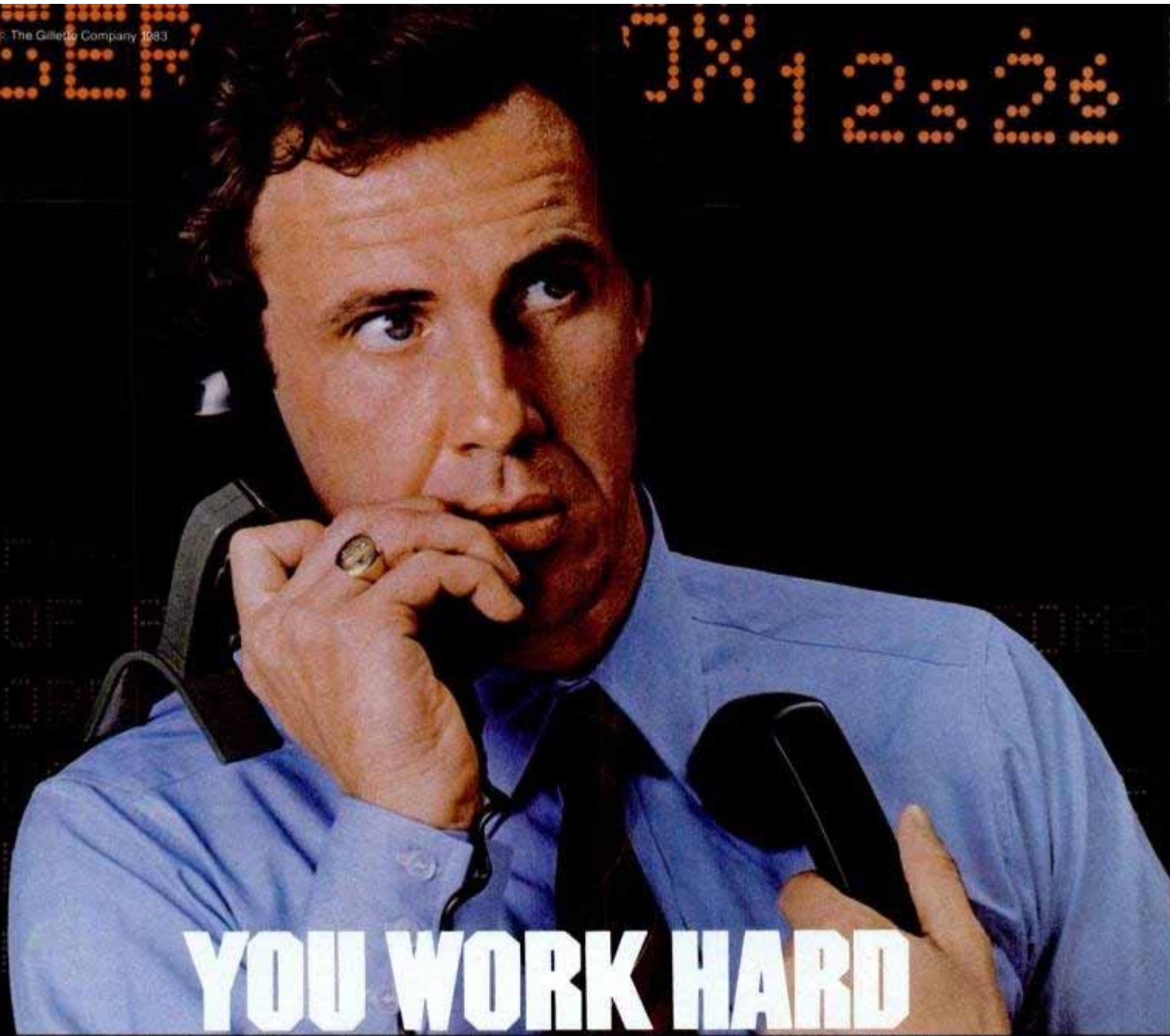
In a recent interview with Olds' general manager, Joe Sanchez, we tried to confirm his division's exciting prospects for the future. Joe Sanchez is a canny salesman, unwilling to do much more than allude to the following, so here's what Olds insiders themselves are excited about:

The Olds Firenza could get, as early as next fall for the '85 model year, Chevy's 2.8-liter HO Six. Olds will enhance the engine with direct port fuel injection and Oldsmobile heads, and the beast will pump out an honest 180 hp. Imagine that in a J-car, lightened up to 2,370 pounds!

In addition, Olds and GM's Hydramatic are working to adapt the electronically controlled 4+3 manual trans-

*(Please turn to page 16)*





# YOU WORK HARD YOU NEED RIGHT GUARD.<sup>®</sup>

New Improved Right Guard stick. Glides on smoother. Unbeatable at stopping perspiration odor. New twist-up container. Available in original scent, lime and new Island Spice.



Right Guard aerosol deodorant. Unsurpassed protection against perspiration odor. No deodorant spray works harder.



New Improved Right Guard aerosol anti-perspirant. Now more effective than any other spray at stopping the wetness that can cause odor.



Right Guard solid anti-perspirant. Goes on dry. New twist-up container. Easier to use. Its special formula works harder the harder you work.

New Right Guard roll-on. Improved formula goes on drier. Dries faster. Nothing stops wetness better.

## INTRODUCING THE NEW RIGHT GUARD LINE UP.

Proven protection against perspiration odor.



## DETROIT LISTENING POST

(Continued from page 14)

mission, currently offered in the Corvette, to that same HO-powered Firenza. Development centers around adapting the unique computer-shifted overdrive setup to a front-driver with transversely mounted engine.

The new Firenza will receive four-wheel disc brakes and a new suspension, enhanced for performance. The Firenzas will then be slotted just under the GM20/N-car for '85, which itself will include a sporting derivative. Will the sporty N-car offer Olds' pending

160-hp diesel? Or a 16-valve gasoline engine? Maybe both.

### Chrysler names H-cars

The Chrysler H-body cars, due in the fall of 1984 as '85 models, have been given names. The four-door hatchbacks will be sold as the Chrysler Commander and Dodge Lancer.

Lancer, one notes, is a Chrysler tag we've seen before. The Commander badge had originally been considered for an up-market version of the T-wagon Voyager minivan. Chrysler will build the sporty touring sedans in the

Sterling Heights, Mich., assembly plant it acquired from Volkswagen of America. VW never got the plant on-stream in the face of declining fortunes, and it has been extensively remodeled for Chrysler. According to sources, Chrysler expects to begin H-car assembly as early as September.

### Ear to the ground

**The IRS cometh:** April 15 isn't very far away, so file this where you can find it. The IRS has announced that the standard mileage deduction rate for cars used for business purposes has been raised from 20 cents per mile to 20.5 cents. This applies to the first 15,000 business miles on a car not fully depreciated. Check with the IRS for details.

**The big byte:** GM has purchased the hyperexotic CRAY-1 supercomputer for its research labs at the GM Tech Center in suburban Warren, Mich. The \$5.3 million number cruncher is to be used for research and development, high-speed storage-retrieval and computer modeling.

**More money matters:** The American Automobile Assn., in its most recent estimate, reports the average cost of operating a motor vehicle at 23.8 cents per mile.

**Heard it on the gripline:** Volkswagen of America, through association with the Better Business Bureau, has established a nationwide complaint-settlement program for owners of VW, Porsche and Audi vehicles. The "gripline" number, a toll-free hotline titled *Autoline*, will be supplied to buyers of new vehicles with their warranty information. The program also applies to those VoA products still under new-car warranty.

**Class action class:** Mercedes-Benz failed in an attempt to have a disgruntled 450 SLC owner's paint complaint thrown out of court, where the man had brought his gripe. The company wanted to set aside a San Francisco federal court ruling allowing the complaint to become a class action suit.

### Short drives

*Dodge Rampage 2.2* is the pickup version of the Charger. Baby, it's small inside, but you've never driven a Charger with this much trunk space. It could use more power for load-carrying, though it already carries the 2.2-liter HO Four.

*BMW 633CSi* is the car we'd all drive if it wasn't so expensive. There's a great ride, exciting, intelligent dashboard, straightforward instrumentation needing more gauges, poor seats. Best engine sound in the known universe. Will do 360s in fifth with very little road ice encouragement. **PM**

# Can WD-40 solve all your problems?



Dissolves tar, won't harm paint.



Lubricates and cleans tracks.



Cleans bike gears.



Loosens hard water deposits.



Frees sticky locks.



Dissolves crayon marks.

Just about. Because WD-40 helps clean and do repairs in the yard, the garage and all through the house.

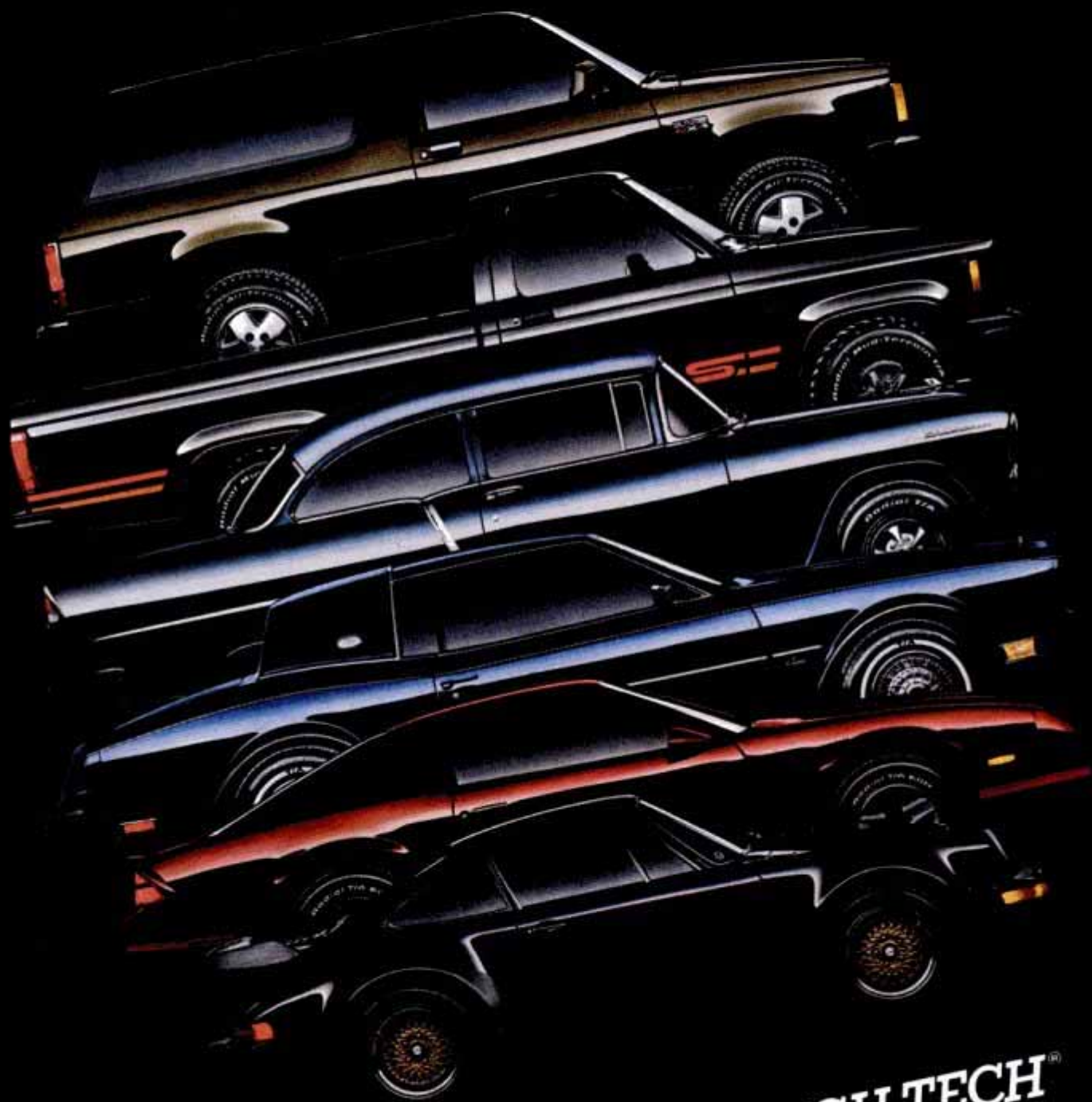
Got a problem with window cranks? WD-40 loosens corrosion and rust. Try it on chairs to keep them working quietly. Even unfreeze ski bindings with no problem.

And now your favorite use can win you an exciting prize like a Buick Riviera or a Caribbean cruise in the WD-40 Take Off Sweepstakes. Look for displays and entry blanks at participating stores.

WD-40 Company, San Diego, CA 92110



GOODRICH  
MAKES CARS  
AND TRUCKS  
PERFORM.



BF GOODRICH **T/A** HIGH TECH  
RADIALS



**HOW BF GOODRICH  
MAKES THE WORLD'S FINEST  
SPORTS CARS PERFORM:  
THE COMP T/A.**

*The Comp T/A\* was designed specifically with your car's performance in mind. In fact, when Car and Driver evaluated the Comp T/A, the overall results were unsurpassed. They called it "the best performing radial money can buy."*

**BF GOODRICH** **T/A** **HIGH TECH**  
**RADIALS**



The BFGoodrich Comp T/A is available in 50V, 55V, 60V, and 70V series sizes:

- A. Special belt configuration contributes to the tire's V speed-rating for performance at speeds in excess of 130 mph.\*
- B. Dual compound tread provides excellent dry traction.
- C. Computer-optimized tread offers outstanding handling and cornering.
- D. Transverse lateral grooves reduce hydroplaning for remarkable wet traction.
- E. High-modulus bead fillers impart quick steering response and high-speed handling.



\* Applies to Comp T/A tires only; must be maintained as specified on tire.



When the Comp T/A was tested on an unmodified foreign sports car, the vehicle generated as much as 0.855 g's during lateral acceleration under dry road conditions and as much as 0.849 g's in the wet. 60 to 0 mph dry stopping distance was as low as 152.2 feet. This outstanding performance was no surprise. After all it was the Comp T/A (raced at one-half tread depth) that became the first street tire ever to beat pure racing tires at LeMans.

**WE MAKE CARS PERFORM**

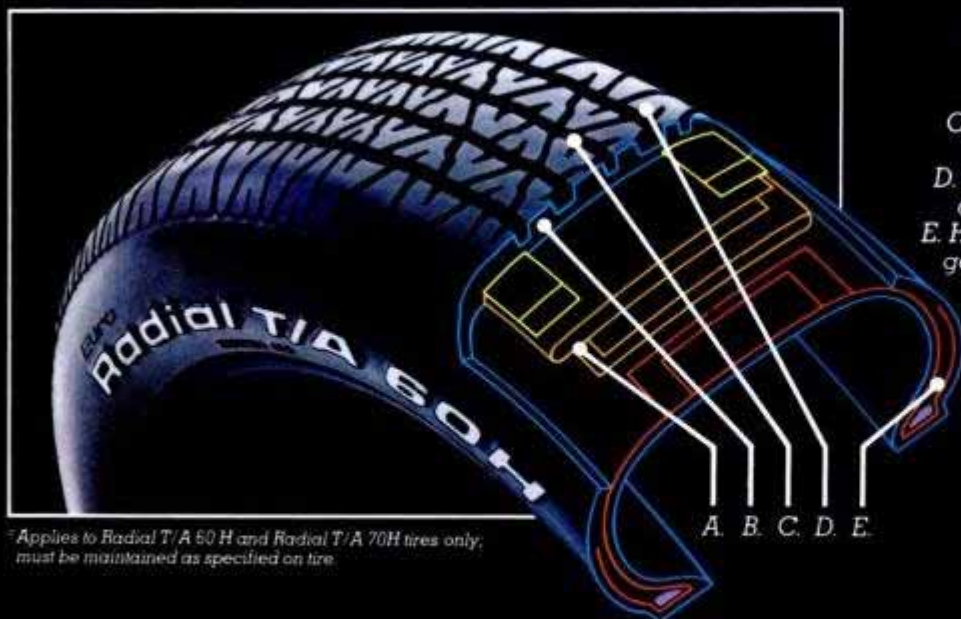


# HOW BF GOODRICH MAKES SPORTS COUPES PERFORM: THE NEW RADIAL T/A® 60H.

The new Radial T/A® 60H—and new Radial T/A® 70H—were designed specifically for outstanding car performance. Professional drivers recently tested the Radial T/A 60H on unmodified foreign and domestic sports coupes. The result: impressive performance. Test vehicles generated as much as 0.812 g's during lateral acceleration under dry road conditions and as much as 0.768 g's in the wet. Dry stopping distance from 60 mph was as low as 158.0 feet. Most importantly, in autocross and road course evaluations, the tire provided the car with a high level of predictability and control at the limit of adhesion.

The new speed-rated Radial T/A 60H and Radial T/A 70H are engineered with advanced materials and technology:

- A. Special belt configuration contributes to the tire's H speed-rating for performance at speeds up to 130 mph.\*
- B. Special tread rubber compound promotes outstanding traction and durability.
- C. High void-to-rubber ratio reduces hydroplaning for optimal wet traction.
- D. Computer-optimized tread design offers excellent handling.
- E. High-modulus bead fillers help generate quick steering response.



\* Applies to Radial T/A 60H and Radial T/A 70H tires only; must be maintained as specified on tire.

**BF GOODRICH** **T/A**® **HIGH TECH**  
**RADIALS**





The new BFGoodrich Radial T/A 60H and Radial T/A 70H—a combination of advanced handling characteristics derived from the world-recognized Comp T/A<sup>®</sup>, raised white letter styling, and the European H speed-rating. These tires are designed to make sports coupes perform.

**WE MAKE CARS PERFORM**



# HOW BF GOODRICH MAKES STREET MACHINES PERFORM THE RADIAL T/A.

The Radial T/A<sup>®</sup> was built to give your car great performance—as well as great looks. Its advanced construction was refined on the track, where the Radial T/A is known for making competition cars perform.

The history of the outstanding T/A<sup>®</sup> High Tech<sup>®</sup> Radial line began with the Radial T/A. It was the first street tire ever to race against pure racing tires. And win. Today, this winning tradition also continues off the track, where the Radial T/A is renowned for its outstanding dependability, excellent mileage, and predictable handling. The raised white letter design of the Radial T/A is understandably a symbol of tire excellence.

**BF GOODRICH** **T/A<sup>®</sup> HIGH TECH<sup>®</sup>**  
**RADIALS**





*The Radial T/A is recognized not only for its exceptional racing heritage but also for its winning good looks on the show car circuits. It is available in 50, 60, and 70 series sizes.*

*The Radial T/A is designed to make your car perform:*

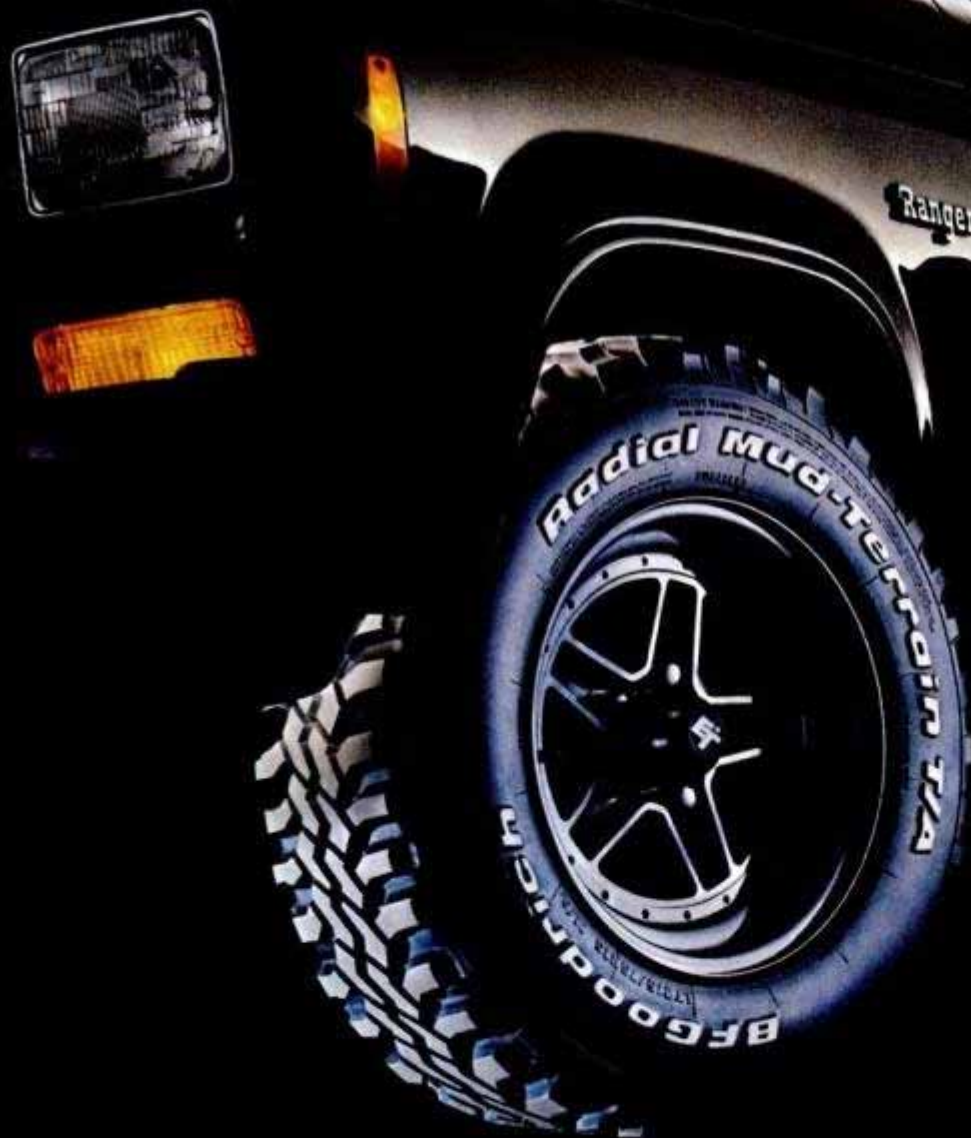
- A. Special tread rubber compound promotes outstanding traction.*
- B. Wide footprint provides remarkable roadholding abilities.*
- C. Computer-optimized tread design offers predictable handling.*
- D. High void-to-rubber ratio reduces hydroplaning for excellent wet traction.*



**WE MAKE CARS PERFORM**



**HOW BF GOODRICH  
MAKES TRUCKS PERFORM:  
THE RADIAL MUD-TERRAIN T/A<sup>®</sup>  
AND RADIAL ALL-TERRAIN T/A<sup>™</sup>**



*The Radial Mud-Terrain T/A<sup>®</sup> and Radial All-Terrain T/A<sup>™</sup> were designed with tough truck performance in mind. In fact, specially modified trucks equipped with these tires were recently evaluated by test drivers. The performance was outstanding.*

**BF GOODRICH T/A<sup>®</sup> HIGH TECH<sup>®</sup>  
RADIALS**





The BFGoodrich Radial Mud-Terrain T/A and Radial All-Terrain T/A are available in sizes for direct application on most original equipment wheels.

- A. Three carcass plies help resist sidewall bruising to optimize truck dependability.
- B. Folded belt system provides excellent handling plus strength.
- C. Tread pitch sequencing offers quiet ride.
- D. Dual compound tread ensures long wear for better mileage.

When equipped with the Radial Mud-Terrain T/A, the vehicle demonstrated remarkable traction—even through mud bogs with the viscosity of wet cement and under two feet of water. The truck with the Radial All-Terrain T/A exhibited rugged durability and traction—even while completing a 135-yard hill climb over deeply rutted terrain with up to a 45° slope.



**WE MAKE TRUCKS PERFORM**



# HOW BFGOODRICH MAKES LUXURY SEDANS PERFORM: THE SENSATIONAL NEW ADVANTAGE T/A RADIAL.

BFGoodrich introduces the advanced generation Advantage T/A<sup>®</sup> Radial. It combines outstanding all-season capabilities with the excellent ride characteristics of the previous Advantage T/A tires.

The Advantage T/A was first derived from the Radial T/A<sup>®</sup> — a tire regarded highly by experts for durability, mileage, and ride comfort. Now the Advantage T/A has been made even better. It achieves all-season capabilities, including 10% better wet and snow traction. And its exceptional treadwear has been further upgraded by 12%.

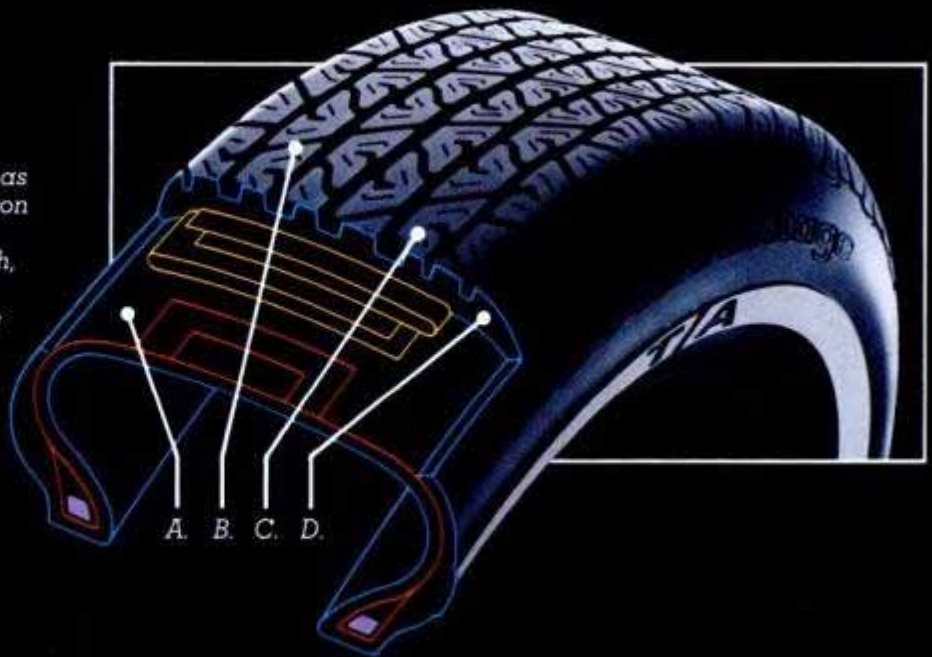
**BFGOODRICH** **T/A<sup>®</sup> HIGH TECH<sup>®</sup>**  
**RADIALS**





*The Advantage T/A offers all the benefits of the Radial T/A, as well as white sidewall styling and all-season tread.*

- A. Rayon carcass provides a smooth, comfortable ride.*
- B. Deep lateral grooves in tread give excellent wet traction.*
- C. Varied pitch ratio reduces noise levels to ensure a quiet ride.*
- D. New dual compound tread generates outstanding durability.*



***WE MAKE CARS PERFORM***



# THERE'S A BF GOODRICH T/A® HIGH TECH® RADIAL TIRE SPECIFICALLY DESIGNED TO MEET YOUR PERFORMANCE REQUIREMENTS.

## 50 SERIES

COMP T/A®	
TIRE SIZE	RECOMMENDED RIM WIDTH RANGE
195/50VR15	5.5- 7.5
205/50VR15	6.0- 8.0
225/50VR15	6.5- 9.0
P245/50VR15	7.0- 9.5
P265/50VR15	7.5-10.5
205/55VR16	6.0- 8.0
225/50VR15	6.5- 9.0

RADIAL T/A® 50	
TIRE SIZE	RECOMMENDED RIM WIDTH RANGE
P215/50R13	5.5- 8.5
P235/50R13	6.0- 9.0
P245/50R14	6.5- 9.5
P265/50R14	7.0-10.5
P265/50R15	7.0-10.5
P275/50R15	7.0-11.0
P295/50R15	7.5-12.0

## TRUCK TIRES

RADIAL ALL-TERRAIN T/A™ RADIAL MUD-TERRAIN T/A®	
TIRE SIZE	RECOMMENDED RIM WIDTH RANGE
P175/75R13	4.5- 6.0
LT195/75R14	5.0- 6.0
LT195/75R15	5.0- 6.0
LT215/75R15	5.5- 7.0
LT235/75R15	6.0- 7.5
LT255/85R16	6.0- 8.0
27x 8.50R14LT	5.5- 7.5
30x 9.50R15LT	6.5- 8.5
31x10.50R15LT	7.0- 9.0
33x12.50R15LT	8.0-10.0
31x10.50R16.5LT	8.25 only
33x12.50R16.5LT	8.25-9.75

## 60 SERIES

COMP T/A® 60V	
TIRE SIZE	RECOMMENDED RIM WIDTH RANGE
205/60VR13	5.5- 8.0
195/60VR14	5.0- 7.5
215/60VR14	5.5- 8.5
205/60VR15	5.5- 8.0
215/60VR15	5.5- 8.5
235/60VR15	6.0- 9.0
255/60VR15	6.5-10.0

RADIAL T/A® 60H	
TIRE SIZE	RECOMMENDED RIM WIDTH RANGE
205/60HR13	5.5- 8.0
195/60HR14	5.0- 7.5
215/60HR14	5.5- 8.5
235/60HR14	6.0- 9.0
205/60HR15	5.5- 8.0
235/60HR15	6.0- 9.0
255/60HR15	6.5-10.0

RADIAL T/A® 60	
TIRE SIZE	RECOMMENDED RIM WIDTH RANGE
P195/60R13	5.0- 7.5
P205/60R13	5.5- 8.0
P215/60R13	5.5- 8.5
P215/60R14	5.5- 8.5
P235/60R14	6.0- 9.0
P245/60R14	6.5- 9.5
P235/60R15	6.0- 9.0
P255/60R15	6.5-10.0
P275/60R15	7.0-11.0

## 70 SERIES

COMP T/A® 70V	
TIRE SIZE	RECOMMENDED RIM WIDTH RANGE
185/70VR13	5.0-7.0
195/70VR14	5.0-7.0
205/70VR14	5.5-7.5
185/70VR15	5.0-7.0

RADIAL T/A® 70H	
TIRE SIZE	RECOMMENDED RIM WIDTH RANGE
175/70HR13	4.5-6.5
185/70HR13	5.0-7.0
185/70HR14	5.0-7.0
195/70HR14	5.0-7.0
205/70HR14	5.5-7.5
225/70HR15	5.5-8.5

RADIAL T/A® 70	
TIRE SIZE	RECOMMENDED RIM WIDTH RANGE
175/70R13	4.5-6.5
185/70R13	4.5-7.0
P195/70R13	5.0-7.0
P205/70R13	5.0-7.5
185/70R14	4.5-7.0
195/70R14	5.0-7.0
P205/70R14	5.0-7.5
P215/70R14	5.5-8.0
P225/70R14	5.5-8.5
P235/70R14	6.0-8.5
P215/70R15	5.5-8.0
P225/70R15	5.5-8.5
P235/70R15	6.0-8.5
P255/70R15	6.0-9.5

THE ADVANTAGE T/A®	
TIRE SIZE	RECOMMENDED RIM WIDTH RANGE
P195/70R13	5.0-7.0
P195/70R14	5.0-7.0
P205/70R14	5.0-7.5
P215/70R14	5.5-8.0
P215/70R15	5.5-8.0
P225/70R15	5.5-8.5
P235/70R15	6.0-8.5
P255/70R15	6.0-9.5

© 1984 BFGoodrich

**BF GOODRICH** **T/A**® HIGH TECH®  
RADIALS



## NEWSCIENCE/UPDATE

## William H. Whyte observes the teeming tribes of urban jungles

**W**illiam Hollingsworth "Holly" Whyte has spent much of the past decade lurking in shadows, watching and filming total strangers. He's not an agent for the CIA, though; he's a self-taught urban sociologist, a student of street life. He has written several books on the subject and advised local governments on how to make public spaces attractive to the public.

"The most important thing we've learned in our studies," says Whyte, "is that what attracts people most is other people." Despite their protests that they hate crowds, city dwellers will mingle happily with others to buy food from a street vendor or to watch a performer. In New York City, says Whyte, a large crowd can form in 40 to 50 seconds. People even prefer crowds for conversation, he has learned. They will chat in the middle of a teeming department store or stop to talk by a busy intersection, while avoiding quieter, emptier spaces nearby.

Whyte is, at 66, the country's presiding expert on how people interact with urban landscapes. Sober-faced and three-piece-suited, he looks more like a banker than a sociologist—appropriate enough for a man who worked as an editor at *Fortune* from 1946 to 1959. His essays on corporate life were collected in his 1956 best-seller, *The Organization Man*. It was a first foray into amateur sociology, a hobby that was formalized when, in 1969, he was appointed distinguished professor of sociology by New York City's Hunter College.

While at Hunter, Whyte turned his attention to the study of New York City's planning ordinances, which require developers to provide miniparks and plazas in return for permission to erect taller buildings. Smoothly written proposals won him grants from more than a dozen foundations (including the National Geographic Society for a study that approached life in Manhattan as though its setting were a Sumatran jungle). Since 1971, Whyte's Street Life Project has been researching the habits of the urban human.

His techniques for studying sidewalks, parks and plazas consist mostly of making time-lapse films, measuring the space he's photographing, interviewing the people he watches and simply looking. "I've always been interested in direct observation," he says, admitting, however, "this is held in very low esteem as a technique in the social sciences.

"The really difficult part of observa-

tion is hypothesizing. People get out on the street and are swamped by it all, so you need a hypothesis to help focus. Then, if the hypothesis blows up in your face, you know that you're onto something."

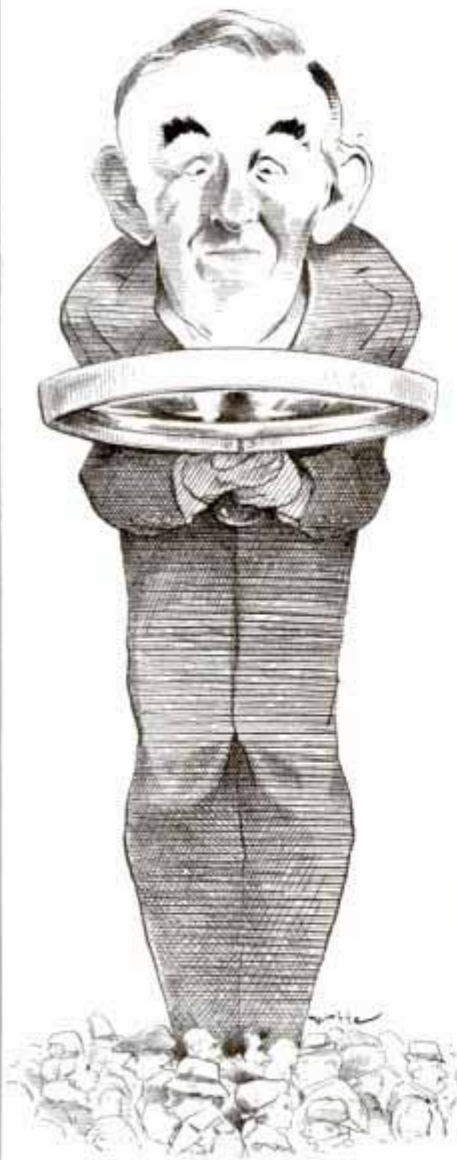
One example of a blown hypothesis is Whyte's finding that sunniness, esthetics and the size or shape of a plaza are often irrelevant to its success. Trees help—the bigger the better—as do food vendors and waterfalls, especially if the water is close enough to touch. But the most attractive factor is lots of space to sit, ideally with movable chairs. (Surprisingly, he discovered, loose chairs and tables are rarely stolen from public places.)

His studies have also disclosed a phenomenon he calls "triangulation": Two strangers are likely to start talking to each other if a third arrives and does something unusual, such as starting a political harangue or juggling or playing a flute.

Whyte judges the success of public spaces by the number of people they attract. Some notable successes are Boston's Quincy Market, the glassed-in Gallery in Philadelphia and the Auditorium Forecourt Fountain in Portland, Oregon; these are easily accessible from the streets and "user-friendly." Glaring failures include many so-called megastructures, such as Detroit's fortresslike Renaissance Center, the Peachtree complex in Atlanta and the Houston Center—all forbidding, deliberately shutting out the city.

**A**s unlikely as it seems, Whyte has found that battlements and barriers aren't necessary to keep out the "undesirables" so frightening to business owners. Amenities like chairs and fountains that attract people discourage vagrants and drug pushers, who are not fond of crowded places. He has also found that the "amiable crowding" of parks and plazas is self-limiting and that people start to drift away when the population density becomes too great. "People have some visceral sense of the rightness of it all," he says.

Whyte admits he has made no controlled experiments—deliberately manipulating trees, vendors, chairs or fountains. But he is convinced that successful parks cheer harried urbanites. He spent hours watching every New Yorker who passed Paley Park—a vest-pocket park with trees, vendors, movable chairs and a waterfall. Half of the passersby looked in, he reports. And half of them broke into a smile. ■





## NEWSCIENCE

## The lovebug's busy love life

"Men don't seduce; women choose," noted one shrewd observer. And in fact, in many species it is the female that selects the mate. But in the case of a fly native to Florida and Mexico, popularly known as the lovebug (*Plecia nearctica*), the male decides.

The male lovebug lives only two to five days, but it spends an average of 56 hours copulating (hence the name). Apart from its remarkable mating behavior, says Craig Hieber, a zoologist at the University of Florida in Gainesville, "it's an insect of not much consequence, really."

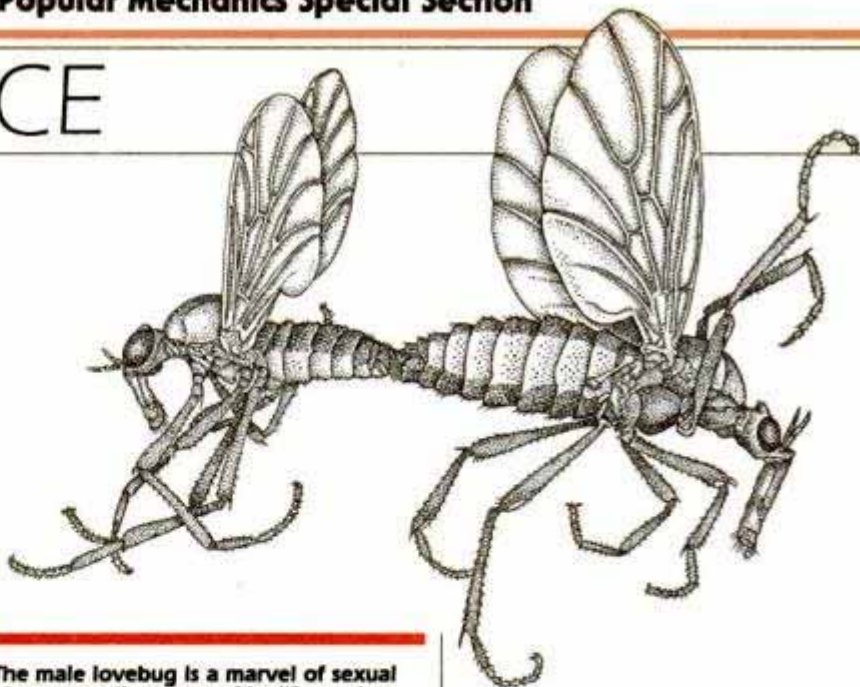
Hieber and colleague James Cohen report in *Evolution* that large female lovebugs are the most fertile and that males swarm over the nests of females emerging from their larval stage. The heaviest males are usually at the bottom of the swarm, and they compete for the fattest of the lady lovebugs. (Sometimes the eager winner begins copulating with his choice even before she has fully emerged.) The heaviest males are also likely to get the plumpiest mates—thin females usually die old maids. ■

## Shift of poles is overdue

Earth's magnetic poles may be reversing. The evidence, reported by University of Minnesota researchers, came from sediments laid down in a lake bottom.

Although this phenomenon has occurred every 200,000 to 1,000,000 years, it shouldn't be ignored; it would force us to reorient every guidance system that uses a compass. And animals that use Earth's magnetic field to navigate—everything from bacteria to birds—would either adjust or perish. Also, because cosmic rays from space are normally magnetically deflected toward the poles, a reversal could create climatic disturbances. Some theorists even suggest that prehistoric mass extinctions may have been caused by such changes in the weather.

Geologist Subir Banerjee and graduate student Donald Sprowl say their samples suggest that Earth's magnetic field has weakened by more than 50 percent over the last 4,000 years. Baner-



The male lovebug is a marvel of sexual vigor, spending most of its life mating.

The larva of the petroleum fly is found in natural petroleum pools in California. It floats completely surrounded by oil, with only a breathing tube connecting it to the air. The larva feeds on insects that become trapped in the oil.

—Submitted by Vatsala Muralidhara  
Fair Haven, NJ

jee says no conclusions can be drawn until data from other parts of the world are checked. A reversal can take very few years or up to 4,000, he says. No one knows why they happen, but Banerjee, noting that the last one took place 710,000 years ago, says, "we're overdue." ■

## "Lucky" turtle gets new flippers

Lucky, the sea turtle, was blissfully mating last April when a shark flashed from the deep and dined on her two front flippers.

A fisherman who saw it happen called the Coast Guard, which brought the 400-pound loggerhead turtle to the Theater of the Sea on Islamorada in the Florida Keys. This year, Lucky is to become the first sea turtle ever to receive anesthesia—and the first to get artificial flippers.

Lucky's replacement surgery has been worked out by Miami orthopedic surgeon Patrick Barry, who normally operates on humans. Metal implants that attach to the turtle's bones have been developed for Lucky by Howmedica, of Rutherford, New Jersey, a division of Pfizer. Artificial flippers molded of natural rubber by Goodyear and dyed to resemble the real thing, complete the package. Lucky's original flippers had small muscles that the replacements lack, but her strong, intact shoulder muscles should enable her to swim efficiently.

The cost of the operation, measured in materials and scientists' time, is far in excess of \$50,000—all donated in the name of "corporate goodwill" and basic research. ■



Prosthetic flippers, custom-made of steel and rubber, will provide a wounded sea turtle with a new means of locomotion.



## Tongue cleaning makes a comeback

Despite the popularity of brushing and flossing and the countless dollars we spend on mouthwash, billions of bacteria call our mouths home—and our tongues are the welcome mat.

According to Alan Drinnan, professor of oral medicine at the University of Buffalo School of Dentistry, we should add daily tongue cleaning to our oral hygiene routine. "People are always surprised at the amount of debris they remove this way," he says. The procedure cuts down on bacteria and leftover food particles, both implicated in tooth decay, periodontal disease and bad breath.

It is only in the past century that we have neglected our tongues. Throughout the 1700s and 1800s, Europeans used tongue scrapers, often elaborate silver ones. And archeologists have unearthed Roman tongue scrapers dating to A.D. 100.

While there are at least six different scrapers now on the market, Drinnan says it's just as easy to use the edge of a spoon, gently pulling it across the tongue. ■

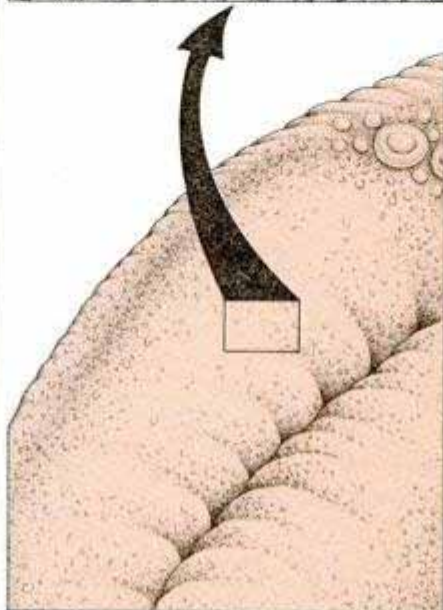
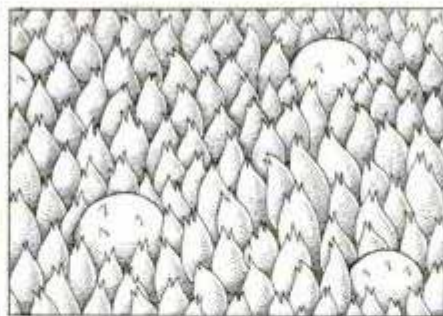
## Tumors feel radiation's touch

When cancer is treated with radiation, the procedure can destroy healthy tissue as well as tumors. So a group of physicians has come up with a way to deliver the radioactive dose exclusively where it's needed.

The technique, developed at the University of California, San Diego, Medical Center, has successfully shrunk tumors that were blocking the air passages of patients with terminal lung cancer.

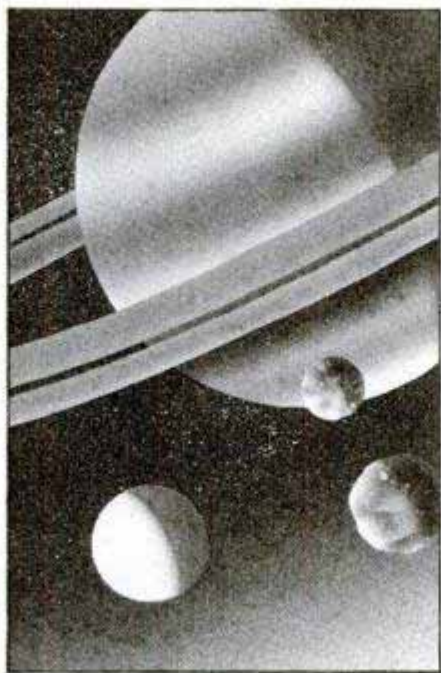
First, a tube is inserted through a patient's nostril and down the windpipe. Pellets of radioactive cobalt are then pushed through the tube until they touch the tumor.

James Harrell, a member of the team, says they've seen improvements anywhere from two days to six months after the procedure. More than a third of the treated patients survived another six months (they had originally been expected to live only three months). Harrell hopes this technique will soon be used along with traditional radiation therapy for all lung cancer patients. ■



The tongue's surface provides a myriad of hiding places for bacteria and old food.

Only one of Saturn's moons has a smooth surface. Old craters may have melted.



## The mystery of a melting moon

One of Saturn's moons is giving scientists a headache. The moon, Enceladus, appears to be crater-free. But it has no atmosphere to protect its icy surface from the meteors that have scarred exposed surfaces on Mercury, our moon and other airless bodies.

There is one other moon that resembles Enceladus—Jupiter's Io. But this only deepens the mystery: Io's orbit is elongated, toward Jupiter, then away from it. Gravitational stresses heat the interior, forcing molten material upward to repave the surface. But Enceladus' orbit is nearly circular, with no stresses to induce melting.

The answer may be Saturn's rings. In the (relatively) recent past, say scientists, Enceladus' orbit may have been elongated, like Io's. Volcanoes may have been spewing molten ice that refroze to hide all past imperfections. But gravitational pull from the rings tugged on another moon, Janus, which in turn pulled on Enceladus and eventually evened out its orbit. ■

An anteater searches for insects by flicking its 19-inch tongue more than 160 times a minute.

## New surgery cuts blood needs

According to the Jehovah's Witnesses, the Bible prohibits blood transfusions. In order to operate, doctors have had to develop "bloodless" surgical techniques.

One method dilutes and extends a patient's blood with water containing minerals and nutrients. Another involves cooling the body to slow metabolism. A patient's circulation can be safely stopped for approximately an hour if the body is chilled to 65 degrees Fahrenheit.

Now, a team of surgeons headed by Sambamurthy Subramanian at the Children's Hospital in Buffalo, New York, is employing both techniques in open-heart surgery on children. Bloodless procedures used on 48 patients, ranging from infants to eight-year-olds, reduced blood loss and strain on kidneys and lungs. There is also no risk of contaminated blood or a need to match blood types. ■

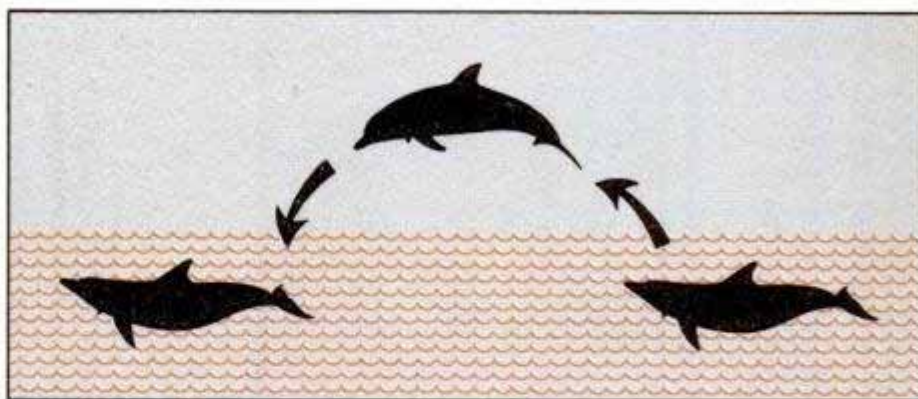


## RESEARCH ROUNDUP

## Porpoises: the logic of leaping

Everyone loves to see porpoises and dolphins leap into the air. But why do they do it? In the past, observers assumed that the graceful marine mammals leaped to breathe or possibly just for fun. Now a zoologist claims that "porpoising" makes it easier for these animals—and perhaps for some penguins and small whales as well—to swim at high speeds.

Working from mathematical models, zoologist Robert Blake of the University of British Columbia has found that, because of surface turbulence, a porpoise swimming faster than 10 feet per second saves some energy by leaping and even more by swimming at some depth. At speeds above 16 feet per second, though, leaping is the most efficient propulsion method. ■



Dolphins' graceful leaps help them avoid surface turbulence and reach high speeds.

Scorpions use two comblike "pectines" to sense the best surface on which to mate.

## Percussion pain

You've heard of tennis elbow and jogger's knee? Now get set for cymbal player's shoulder, a painful joint inflammation.

The first case, reported in the *New England Journal of Medicine*, turned up at Vanderbilt University Hospital, where doctors treated a woman who had put in a 22-hour rehearsal week with the marching band. ■

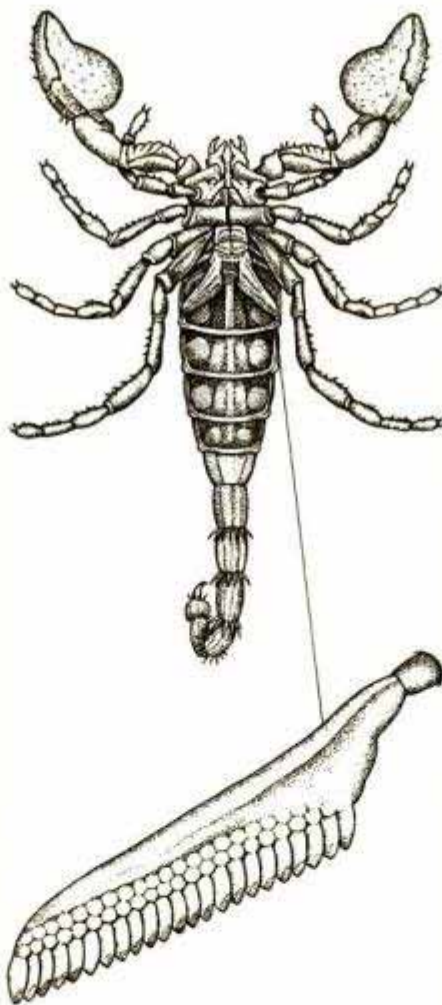
## Tattoo trouble

British doctors have noted a disturbing trend among teenagers: self-inflicted tattoos.

Described as a "craze" in the journal *The Lancet*, the practice involves pricking ink-covered skin with needles. Potential complications include simple infection, hepatitis, syphilis, leprosy and even cancer. Damage can also be psychological; plastic surgeons report waiting lists of people who want the tattoos removed. ■

## Touchy scorpions

As a scorpion walks, two tiny combs on its underside swing back and forth. These so-called pectines have mystified zoologists for years. Researchers Thomas Root and Colin Harrington, of Middlebury College, now believe the appendages'



function is to sense sand texture.

Using electrodes, they've found that nerves in the pectines fire in patterns that change according to the size of the sand grains contacted. Why so sensitive? Only if the sand is very fine will the male deposit a sac of sperm that the female can detect and collect. ■

## Birds' compass

Migratory birds always know where to head in the winter, but do they rely initially on the stars or on magnetic cues for their compass sense?

Two researchers at the University of Lund in Sweden argue for the latter. In a recent issue of *Nature*, they suggest that a bird develops its sense of direction very early in life, based on the Earth's magnetic field. It then charts the position of the stars against this internal magnetic map.

The biologists tested their theory by artificially shifting the magnetic field around pied flycatcher nestlings. Months later, they observed a corresponding shift in the birds' migration orientation—even after the artificial field was removed. ■

## Blood-bank bust

Although surgeons have mastered the intricate technique of transplanting a liver, hospitals are still hard-pressed to do the operation. Why? Because it heavily taxes their blood banks.

About 100 pints of blood are needed for just one liver transplant in an adult—up to 12 times the amount of blood in the body. Only a fourth as much blood is needed to transplant a heart. The reason for the hefty requirement? Since the "old" liver isn't working right, the blood doesn't clot and bleeding is often uncontrollable. ■



## NEWS/SCIENCE/INNOVATIONS

**The sea is  
Ian Koblick's  
workshop, home  
and playground.**



**W**hen Ian Koblick was 13, he used diving equipment he had built by himself to haul an outboard motor from a California lakebed. "It took me three minutes and I made ten dollars," he recalls. "In the 1950s, that was a lot of money to a kid." Having discovered diving's rewards, his devotion to underwater exploits became total.

Since that time, Koblick has developed a reputation as "America's Cousteau," and like his French counterpart, he has played a major role in a smorgasbord of marine projects.

In the 1960s, fresh out of college, he was a special assistant to the governor of the Virgin Islands, where he researched lobster management, sand-dredging and the construction of artificial reefs.

Soon afterward, he signed as an aquanaut for NASA's Tektite program, in which divers were subjected to extended periods of isolation in an underwater laboratory. As Koblick explains, "Tektite was a primitive space station. They wanted to know what happens when you're locked up and can't go home." Years later, NASA commissioned Koblick to verify data from satellites that were monitoring water quality and tracking fish migrations.

In 1970, he founded the Marine Resources Development Foundation, now based in Fort Lauderdale, Florida. One of the foundation's bigger projects was the deployment of an underwater laboratory for the government of Puerto Rico. Scientists lived for weeks at a time in the movable, 150-ton, three-room lab. There they measured pollution, studied coral reef ecology and cataloged plant and animal populations.

Perhaps Koblick's most significant contribution to marine science was his discovery that man can live for many days more than 100 feet down. All that's necessary, Koblick found, is a 36-hour "saturation" period during which a diver breathes a mixture of 95 percent nitrogen, 5 percent oxygen. This nearly eliminates the risk of developing nitrogen narcosis, a type of delirium that had previously hampered attempts to work at great depths. Much of this work is described in a book Koblick has written with James Miller, *Living and Working in the Sea*, to be published this May by Van Nostrand Reinhold.

Koblick has reaped a more tangible bounty from the sea than knowledge. In 1980, he acquired a 147-foot research vessel, the *Golden Venture*. Its most publicized exploit was the archeological exploration of two seventeenth-cen-

tury Spanish galleons, whose remains covered 10 acres of Caribbean seabed. Koblick laid out a grid and helped explore the site square foot by square foot. He also helped recover \$6 million in gold and silver from the wrecks—all of which went to the project's sponsor, treasure-hunter Mel Fisher.

Despite the breadth of his experience, Koblick, at 44, says he's frustrated. He dreams of other projects he fears will never come about. "There's no policy on underwater research in Washington," he says, "no organization to create one. We lack a precise definition of our needs. We need to put together the scientific expertise that exists now but that no one has ever coordinated, just like we did in space."

The oceans could solve countless urgent problems, he insists. Fish farmed in an acre of water could yield 10 times the protein raised in an acre of pasture. We could produce energy from ocean currents and methane from seaweed. We could use fast-growing kelp to help feed livestock and to make fertilizer. "And my pet project," says Koblick, "would be to develop hybrid plants that would grow in salty water, so we wouldn't have to depend on fresh water for agriculture."

**S**o far, Koblick hasn't had much of a problem finding funding. According to longtime friend and co-worker, Frank Milhoan, "Ian is one of the last of the great worldwide ocean con men. And that's not bad. It's the only way the oceans have been explored."

Koblick is currently concentrating on educational projects. He is sponsoring a movable, underwater laboratory that will be used for teaching and research by the Florida State University system. He wants to build a bus to be called the Sea Van, which will look like a submarine on wheels. Inside, it will simulate a submerged sub and offer educational exhibits. In June, Koblick hopes to open the world's first underwater resort near a Caribbean island (not yet chosen). For \$1,000, a guest will spend a week on the island, receive two days of diving instruction, and spend two nights in the submerged, four-guest "hotel"—which is being converted from Koblick's Puerto Rican sealab.

Koblick says these projects will help everyone understand the sea as he does. If that happens, he's convinced that ocean research will become a national priority—and the whole world will benefit. ■



# NEWS SCIENCE

## Self-sharpening blade has edge

Inspired by rats' teeth, two researchers at General Electric have invented a blade that sharpens itself.

The specialized cutting tool doesn't work like a knife. Resembling the edge of a cube or the lip of a cliff, its cutting edge is a 90-degree angle of metal that is placed against other metal revolving on a lathe. This edge shaves the surface of the spinning metal. As the blade is used, microscopic cone-shaped chips flake from its cutting edge, leaving a sharp, new edge behind. This is caused by the blade's shape, not the material it's made from (tungsten carbide powder that has been mixed with a binder, pressed and heated). Ranga Komanduri, who developed the blade with Minyoung Lee, says the idea came from rats' teeth because they are hard on one side and soft on the other, and thus always retain an edge.

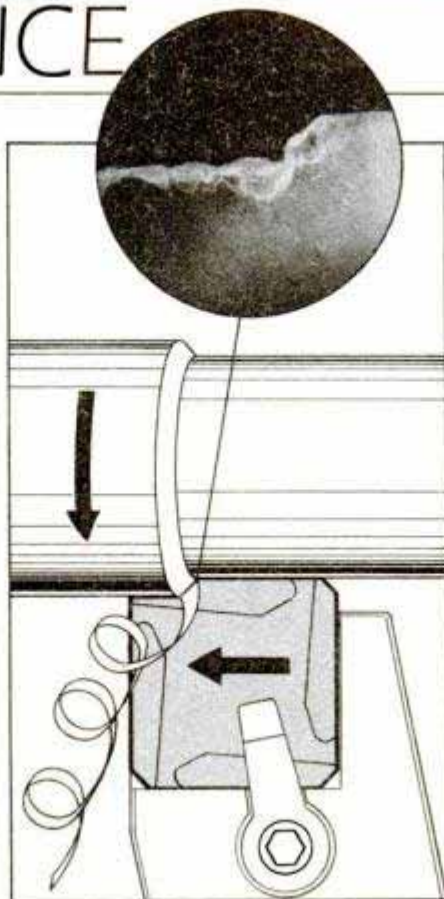
The blade's shape makes it impractical for knives or razors. But when cutting metal, it lasts up to six times longer than conventional tools. It even cuts tough titanium alloys, which react chemically with other blades, dulling them almost at once. Cutting titanium, GE's blade lasts about 30 minutes. ■

## Twin telescopes improve focus

Last year's biggest astronomical discoveries were made by IRAS, a satellite that carried sophisticated infrared sensors. But a device is in the works now that will have 10,000 times IRAS's resolving power. It will be carried aboard a trailer truck!

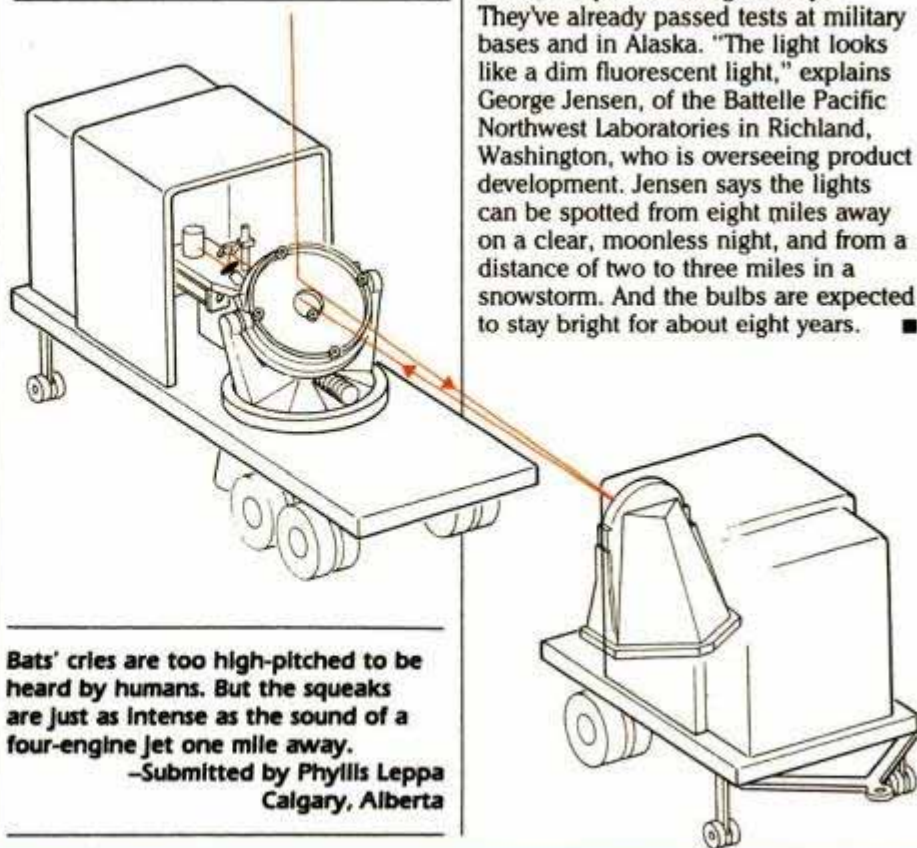
Two trucks, actually. Separated by as much as half a mile, the twin telescopes will work together, through a computer, to get a precise picture of the shape and size of infrared sources in the universe. The project, to be in operation in 18 months, is being supervised by Charles Townes, a Berkeley physicist and Nobel laureate (he won the prize in 1964 for the invention of the laser). "Our system won't be nearly as sensitive as IRAS," he says, "but it will be much better at pinpointing direction." In other words, he adds, IRAS magnifies well but focuses poorly; the new machines will have the opposite attributes.

Another advantage the paired



This new blade maintains a sharp cutting edge by constantly chipping away (inset).

A pair of truck-mounted telescopes will soon improve our view of the universe.



Bats' cries are too high-pitched to be heard by humans. But the squeaks are just as intense as the sound of a four-engine jet one mile away.

—Submitted by Phyllis Leppa  
Calgary, Alberta

scopes will have over other earthbound devices, according to Townes, is that they will be transportable to wherever viewing is best. "We may take them to the Southern Hemisphere for a year or two," he says. Among the objects to be examined are the center of our galaxy, still-forming stars and other puzzling infrared sources that have not yet been identified. ■

## Arctic night lit by "hot" bulbs

It can cost hundreds of thousands of dollars to light airplane landing strips in the Arctic, where in winter the sun shines only three hours a day. But new bulbs containing tritium (a radioactive isotope of hydrogen), which glow with no power source, are expected to cut lighting costs there by 80 percent.

The lights, developed by the Oak Ridge National Laboratory in Tennessee, are simply 10-inch glass tubes filled with tritium. The inside surface of each tube is coated with a zinc-sulfide-based phosphor. As the tritium decays, beta particles excite the phosphor, making it glow—and no radiation escapes from the tube.

Panels, each containing seven tubes, are placed along runways. They've already passed tests at military bases and in Alaska. "The light looks like a dim fluorescent light," explains George Jensen, of the Battelle Pacific Northwest Laboratories in Richland, Washington, who is overseeing product development. Jensen says the lights can be spotted from eight miles away on a clear, moonless night, and from a distance of two to three miles in a snowstorm. And the bulbs are expected to stay bright for about eight years. ■

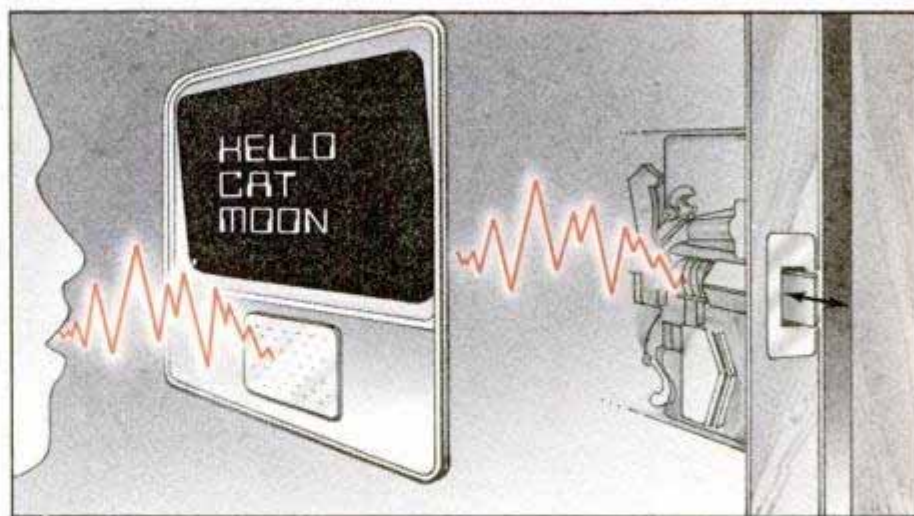


## Voice is key to new lock

**A**li Baba opened the Forty Thieves' cave by saying, "Open, Sesame." But a new voice-activated lock is more sophisticated: To open it, you must not only know the right words; the lock must recognize your voice as well.

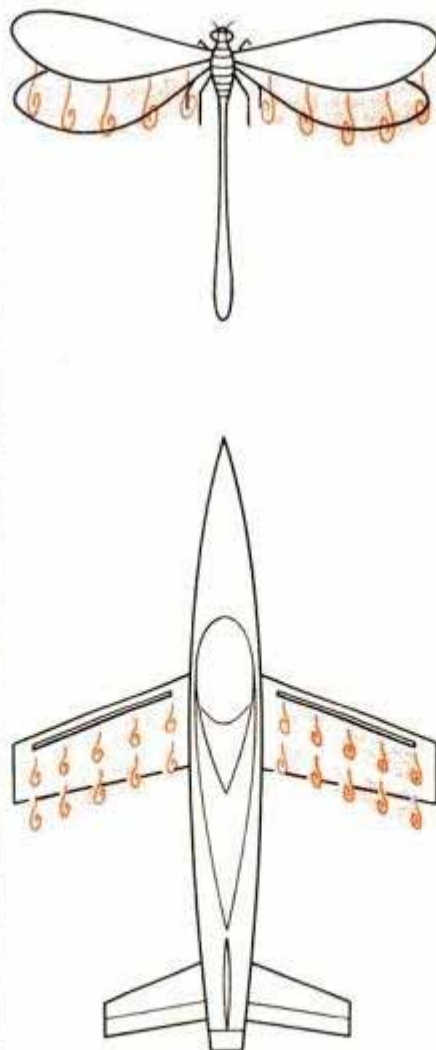
Designed by 1983 graduate Donald Crockett and engineering professor Lester Gerhardt of Rensselaer Polytechnic Institute (RPI), the lock combines an IBM Personal Computer, a Votan voice-recognition system and an electrically driven bolt.

To unlock it, you must push a button, wait for a beep and speak a code word. If the lock recognizes your voice, it flashes a pattern of words or numbers on a screen, which you must read back in an order known only to the computer and to those authorized to enter. If you get it right, the lock unbolts. If you make a mistake, you may try again—once. Currently, the sole prototype secures an RPI engineering lab.



**In order to open this computer-controlled lock, your voice has to match its memory.**

**The flow of air around a dragonfly's wings may help designers fashion future planes.**



## Subliminal cues from your TV?

**C**an't lose weight? Stop smoking? Hit a good golf shot? Now you may be able to talk yourself into it, subconsciously, while watching television.

A company called Stimutech, in East Lansing, Michigan, sells a system that makes a Commodore or Atari computer flash subliminal messages on a TV screen while you watch your favorite show. The messages appear for one-thirtieth of a second every two minutes or so—too fast to be read consciously, but not subconsciously, the manufacturer claims. The possibilities? Messages such as "I see myself as a non-smoker," or "Exercise is fun," or "Let's make love" indicate the range. There are eight cartridges, teaching stress control, good study habits, sexual confidence, and so on. The final message on each cartridge is "I am OK."

The system is called Expando-Vision. Says Wallace La Benne, professor of educational psychology at Eastern

Michigan University and chairman of Stimutech's advisory board, 20 years' worth of data support their claim. Most famously, in 1957 a New Jersey movie theater boosted popcorn sales 58 percent when "Buy popcorn" was flashed repeatedly on the screen. La Benne says the public fears being manipulated that way, but with Expando-Vision, the user does the manipulating himself.

## Dragonfly model for future wings

**W**hen a dragonfly darts past you, its wings are creating the kind of turbulence that, on a large scale, knocks airplanes out of control. Moreover, a dragonfly can lift as much as 15 times its own weight, while a high-performance aircraft can't lift a great deal more than itself.

That's why scientists under bioengineer Marvin Luttges at the University of Colorado, Boulder, are putting dragonflies into harnesses and blowing smoke at them in wind tunnels. "The dragonfly's wings," says Luttges, "create an airflow that looks like a little whirlwind. We're looking at ways that aircraft might generate similar little whirlwinds."

Luttges and his team are considering a number of modifications for airplanes. One is a second pair of wings that could pivot quickly to change their angle in the oncoming airflow; another, a strip of metal that would stretch the length of an airplane's wings and rise a fraction of an inch above them to create efficient swirls of air. The team also hopes to devise sensors that will allow these mechanisms to respond to changing airflows.

**Why is platinum so valuable? The total amount ever mined would make a cube only 14 feet on a side.**



## EVERYDAY SCIENCE

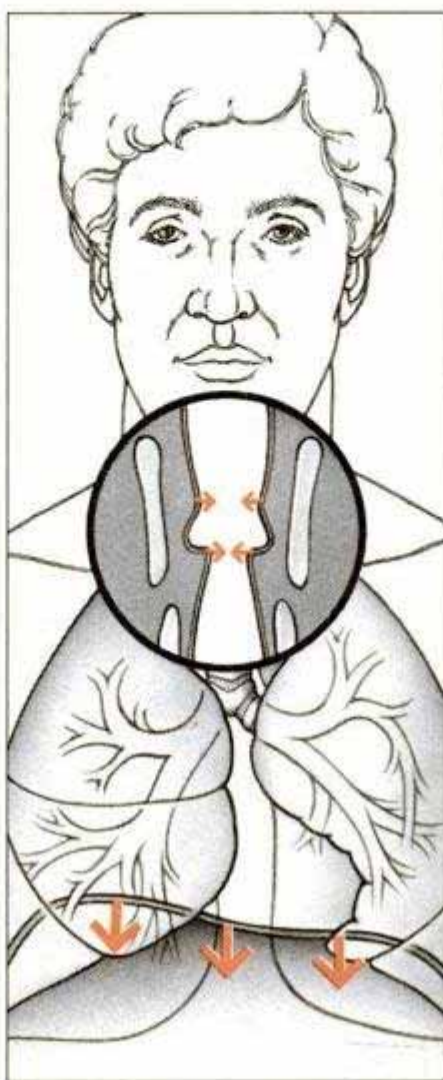
## What's a hiccup? What's the cure?

Medical texts propose so many different causes for hiccups that it is reasonable to conclude that nobody knows for sure. Various books tell you that hiccups come from swallowing hot or irritating substances (such as highly carbonated drinks), too much laughing, too much smoking, indigestion, hysteria, exercise too soon after a meal, swallowing air or nervousness. Hiccups are also attributed to irritated diaphragms—or to irritated nerves that control the diaphragm—and they are said to accompany stomach and bowel disorders, pregnancy, pleurisy, pneumonia, hepatitis, uremia, cerebral lesions, strokes, diabetes and even alcoholism.

In other words, whether you're sick or healthy, whatever you're doing, you're liable to start hiccuping. Fetuses even hiccup in the womb. Physically, a hiccup is a sudden, spasmodic contraction of the diaphragm, which produces a sharp intake of breath. The breath, however, is abruptly cut off when the vocal cords involuntarily pull together, producing the sound *Hic!* Some scientists believe hiccups are repeated but ineffective attempts to vomit. And some claim that men hiccup more often than women.

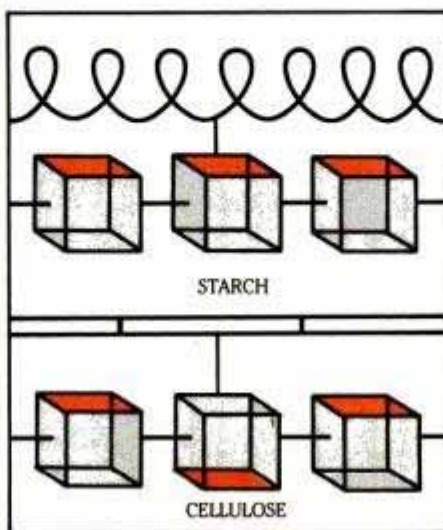
It is widely believed that a low level of carbon dioxide in the blood can predispose someone to hiccups, while a high level will inhibit them. Which is why popular cures involve holding your breath, breathing repeatedly into a paper bag or drinking a glass of water without taking a breath. Doctors sometimes prescribe sedatives or antispasmodic drugs for the afflicted, and medical texts frequently describe a treatment in which a soft rubber tube is inserted three or four inches into a hiccuper's nose and then pulled gently back and forth, "stimulating" the area behind the soft palate.

Another cure, noted by the Tuberculosis & Respiratory Disease Association of New York, is simply a teaspoonful of sugar. Repeated doses stopped hiccups in two-thirds of a sample of patients who had been hiccuping for as long as six weeks. Finally, a letter to the *New England Journal of Medicine* gives credence to a bartender's cure: eating a wedge of lemon soaked in Angostura bitters (don't eat the rind). This procedure stopped hiccups in 14 out of a sample of 16 hiccupers. ■



A hiccup occurs when the diaphragm muscle spasms, drawing air over the vocal chords.

Because the glucose molecules in cellulose alternate (bottom), it is hard to digest.



## Horses eat hay. Why can't we?

Cows chew their cud, horses chomp on hay, and termites destroy houses. But we humans would starve if our only food were cellulose, the principal component of grass and wood. Nevertheless, we digest starch daily—in foods such as bread, pasta and potatoes—even though it is made up of exactly the same chemical building blocks as cellulose. What makes the difference?

Starch and cellulose are both long chains of molecules of a sugar called glucose. But the molecules are arranged differently in each substance: Imagine a set of blocks that are red on the top and black on the bottom. Each block has a hook on one side and an eye on the opposite side. The blocks can be linked two different ways: with all the red sides on top and the black on the bottom or with the black and red sides alternating. The same patterns hold when glucose molecules hook up. In starch, all the molecules face the same way; in cellulose, they alternate. Also, the chains of starch are coiled and distinct, whereas those of cellulose are straight and occur in bundles.

Digestion depends on enzymes, special proteins that break the chains into individual molecules of sugar that cells use for fuel. Enzymes identify their target partially by shape. The enzyme that we use to digest starch does not recognize the cellulose shape and thus cannot digest it.

The same thing is true for cows, horses and termites. So how do they digest cellulose? The answer lies in microorganisms, such as bacteria, that live inside their digestive tracts. These tiny organisms produce an enzyme that can recognize cellulose and break it into molecules the host can use as food. In exchange for their services, the microbes are provided with free room and board. ■

Editor: Andy Revkin

Staff: Madeline Chinnici, Andrea Dorfman, Michael Lemonick, Nina Wallace.  
Contributors: Brian Feinberg, Susan Gilbert, Sibyl Golden, Ronald Landry, Richard Marini, Amy Mereson, Peggy Noonan, Steven Oppenheimer, Lawrence Prescott, Henry Weil.



# THE PM GARAGE



## Impact wrench for small jobs



New mini impact wrench operates with ordinary 1/2-in. sockets and reversible drill.

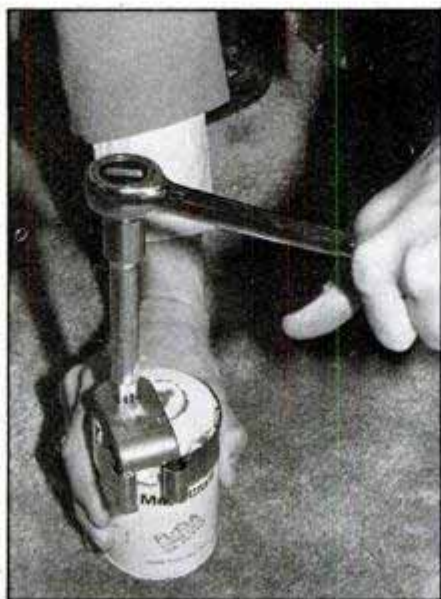
The U-Impact-It tool develops up to 120 lb.-ft. of torque, depending on the rpm of the electric drill that powers it. This is not as much as a professional unit, and you may have to snug up or break loose some fasteners manually (especially lug nuts). However, it does enable you to speed up the installation of exhaust parts and shocks, and is great on lagscrews and other nonautomotive jobs. It lists for \$28.95 and is made by Vermont American Hardware Tool Div., Box 340, Lincolnton, N.C. 28092.—*W.H.*

## Mini oil filter wrench

The new, smaller oil filters (about 3 in. in diameter) have spawned a new group of filter wrenches, typically using a stepped cap that fits over the end of the filter can. However, stepped-cap wrenches don't fit all the new filters. If you want something that does, you need a band wrench. A new one made for the smaller filters has some interesting design features.

The band has gripping teeth on the inside, so it won't slip. It works when you apply torque in either direction (no need to guess which way to install the wrench for loosening or tightening). It's made to be used with a 1/2-in. ratchet and extension, so it can fit into tight places.

The list price is \$5.50. The manufacturer, Lisle Corp., Clarinda, Iowa 51632, sells the wrench through auto parts stores.—*Paul Weissler*



This wrench for 3-in. filters fits all brands, including filters without faceted tops.

## Five-second monogram

Automotive elegance ends with the owner's monogram on the door. That touch of class is now available from Anderson's in California for \$9.50, postpaid (Calif. residents add 60¢ tax). These monograms come in either black, white or gold, in a choice of block



Gold block letters highlight a wood grain wagon panel. They also work on boats.

or script letters. In three-letter monograms, your family name initial is bold and centered. The monograms are guaranteed not to rub off, peel, crack, or chip. I put a set on the family wagon—an act that took about five seconds per door—and then tried to rub them off. No go; they're on there for good! Order yours from Anderson's, 2527-DPM, West 237th St., Torrance, Calif. 90505.—*M.L.*

## Tailgate protector



Tail-Gator protects tailgate from chips and scratches—the starting places for rust.

You can protect the vulnerable edge of your pickup truck's tailgate from becoming scratched and dinged with the Tail-Gator protective guard. The unit is made of anodized and brite-dipped aluminum, and will fit Ford, Chevy, Dodge Fleetside, Stepside and minipickups. Tail-Gator slips easily over the tailgate and is held in place with screws. The unit is \$27.75 from Deflecta-Shield Corp., Box 306, Corydon, Iowa 50060.—*Cliff Gromer*



# STIHL'S THE ONE!



The new Stihl® 024 AVEQ is tough enough for professional use, so you know it'll stand up to your biggest cutting jobs. It features superb balance, an excellent power to weight ratio, and at only 11.9 lbs., it's easy to handle. So if you're serious about cutting and need more than just a chain saw, Stihl's the One.

For sales and service, see the Yellow Pages under "saws." For your local dealer's name call toll-free 1-800-528-6050, Ext. 1430. In Arizona call 1-800-352-0458, Ext. 1430. In Canada: Stihl Ltd., P.O. Box 2364, London, Ontario N6A-4G3.

**STIHL**  
Number One Worldwide.

## HINTS FROM READERS

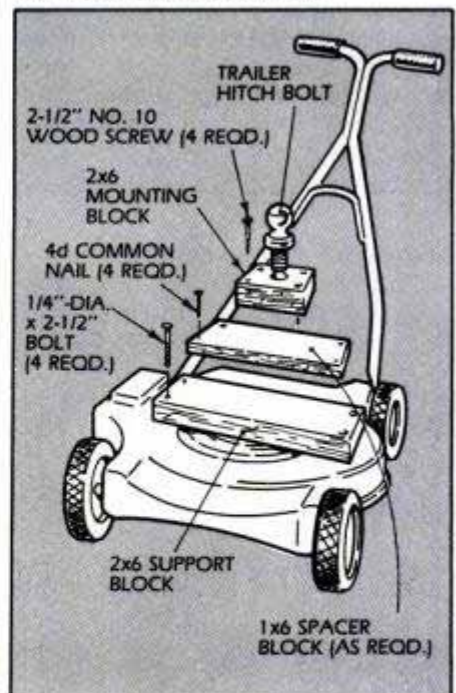
### Dry-cast concrete footing



To make a simple concrete footing for a post or pier, dig a hole to the needed dimensions and dampen it slightly. Fill the hole with mixed, ready-packaged concrete. Incorporate a tie-down strap with 16d galvanized nails going in opposite directions through two of the holes; use dry mix for fill. Tamp the ground level and then dampen it slightly with water from a garden hose until a top crust forms. Be sure to keep the footing wet for several days.

—Richard Day

### Mower moves boat



An old lawnmower chassis, scrap wood and a hitch ball bolt can help move a boat and trailer that are detached from the car. Fasten the wood to the mower platform and bore a hole for the hitch ball bolt.—Nelson I. Baxter



# Regency Hand Held Scanners

Bring you the excitement of Police, Fire, Emergency Radio, and more.

When you need to hear the action from wherever you are, Regency delivers. Our portable scanners keep you in touch with the local news. Whether it's bank hold ups, three alarm fires, weather, business, marine radio, or aircraft calls, Regency portables bring you the on the scene action. While it's happening from where it's happening . . . in your neighborhood.

## MAXIMUM VERSATILITY

The all new HX1000 keyboard programmable hand held scanner lets you cover your choice of

over 15,000 frequencies on 20 channels at the touch of your finger. No crystals are necessary. Six band coverage, search and scan, priority control, and a liquid crystal display with special programming messages and clock are all part of the package. And with the sealed rubber keyboard and die-cast aluminum chasis, the HX1000 is the most rugged and durable hand held on the market.

## WITH OR WITHOUT AIRCRAFT

If you don't need all the features of the HX1000, but you want the convenience of portability, we've got you

covered. Our two new crystal controlled hand held scanners, the HX650 and HX750, offer six channels, individual channel lock outs, LED channel indicators, step control, two antennas and an adaptor/charger. Both cover VHF high and low, UHF and "T" public service bands, with the HX750 offering the additional coverage of VHF aircraft band.

## DECIDE FOR YOURSELF

Your Regency Scanner dealer would be happy to give you a free demonstration of these and other new Regency Scanners. Stop in today. Or, write Regency Electronics, 7707 Records St., Indpls., IN 46226.

HX750



HX1000



HX650



**Regency**<sup>®</sup>

ELECTRONICS, INC.

7707 Records Street, Indianapolis, Indiana 46226



# HOMEOWNERS' CLINIC



## Woodpecker's song for spring

Every spring, you probably wonder who's knocking on your siding, gutters or TV antenna. The *rat-a-tat-tat* is not only annoying, but can cause damage to your house. For woodpeckers, drumming serves the same function as singing does for other birds. They're establishing a territory and attracting a mate.

Houses serve as a resonator and amplifier for the drumming sound, so they're more satisfactory than trees. Columns, downspouts and antennas may even resemble a tree to a woodpecker.

Of course, some insects may spend the winter months in the spaces found in siding and columns, while other insects bore into the wood. They're all food for woodpeckers.

My county extension agent stresses that you should combat Mr. Woodpecker as soon as he starts. Don't let him develop a habit.

In order to drum, the bird must be able to hold onto the structure. There-

fore, you should try to remove all ledges, cracks and crevices which might serve as footholds.

Although chemical repellents are sometimes effective, such as naphthalene (mothballs) hung in an open mesh bag (a silk stocking). I had success with a visual repellent. I tied foil pie tins and strips of aluminum foil by string from my soffit. The slightest breezes made the foil sway and twist enough to keep the birds away. Handheld reflective windmills, taped or tacked to the siding, will also keep the birds from riddling your house.

This information was obtained from my county extension agent in a booklet titled *Woodpeckers and Houses*. If your county extension agent doesn't have the booklet, write to Dekalb County Cooperative Extension Service, 101 Court Square, Decatur, Ga. 30030. Ask for leaflet No. 239.

There is a wealth of information available from your county extension agent.

## Sump pump goop

*I have a sump pump in my basement which takes the water from my wash tubs, clothes washing machine and floor drains, and pumps it up into the overhead sewer lines. I had no problems for 10 years, but about five years ago my pump began to run nonstop.*

*I removed the electrical connection, then found the pump and everything in the sump covered with about 1 in. of black goop. It's soft and slippery, and seems to be attached everywhere. It reminds me of a fungus or algae, and it sometimes has a slight odor. I scraped it off and washed everything thoroughly. Now the pump works perfectly.*

*I clean the system every three months now, but it's still such a mess it takes about 10 washes to get my hands clean. We've changed washing detergents about a dozen times, but that didn't help. I've even put bleach in the sump, to no avail. I'm afraid lime will eat the pipes.*

*Although we all have well water processed through water softeners, I'm the only one with this problem. How can I eliminate it?—Miles J. Mraz, Arlington Heights, Ill.*

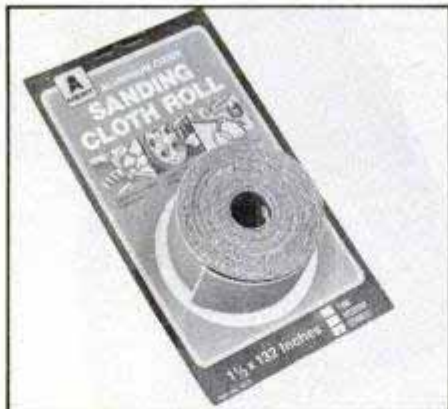
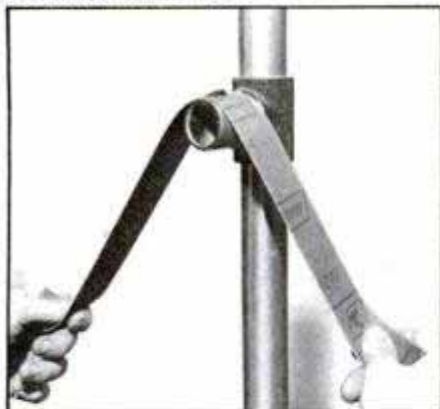
Read the caution on your bleach bottle for an insight as to what it may do to metal.

Both H.T. Adams, my local plumbing consultant, and Tom Harrison of Virginia Supply and Well Co., Atlanta, Ga., point the finger at your sump or tank. They both say that the coating on your tank has eroded.

Tom says that although it's a distasteful chore, and the length of the repair's holding out is unknown, the tank can be cleaned thoroughly, sanded and wire-brushed, then cleaned again and recoated with an epoxy paint. Both Tom and H.T. say you should replace the tank with one of the new plastic ones as the most permanent solution to your problem. **PM**

*Do you have a home-maintenance or repair problem? Send it to Homeowners' Clinic, Popular Mechanics, 224 West 57th St., New York, N.Y. 10019. Letters cannot be answered individually, but problems of wide interest will be discussed in the column. For more home-repair and maintenance help, get PM's Home Care Guide, \$4.95 postpaid. Send your order(s) to Popular Mechanics, Box 1014, Radio City Station, New York, N.Y. 10101.*

## Sander in a roll



The sanding cloth roll will help sand furniture spindles and plumbing fittings (left) before you assemble them. The 132-in.-long roll is available in a blister pack (right).

This aluminum oxide sanding cloth comes in a roll. It cleans, smooths and polishes in hard-to-reach places and on objects that are irregularly shaped. The cloth cleans rust and corrosion from tubular patio furniture, railings, tools, bikes and TV antennas. You can use it to sand wooden furniture legs, banister posts and spindles. In addition, the 1½×132-in. sanding roll will sharpen

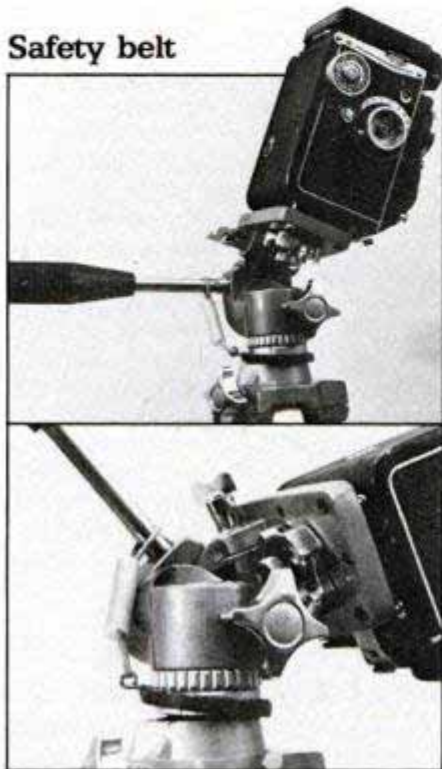
knives and tools, or smooth lathe work.

The cloth roll is available in fine, medium or coarse grits. It's manufactured by Merit Abrasive Products Inc., 201 West Manville, Compton, Calif. 90224. You can find it in hardware stores (\$3.10) or order from the maker. Postage is \$2 on orders under \$20 and \$2.75 on orders over \$20.



# PM PHOTO HINTS

## Safety belt



Have you ever forgotten to tighten your tripod's tilt handle, and then had your camera fall over? To prevent this type of damage, slip a ring made from ABS plastic pipe around the base of the tripod head and then set an eyescrew in the ring's rim. Pass a cord through the eyescrew and wind it around the tripod handle. Finally, cover the cord with plastic tubing (see details above).—A. Weber

## Unused space



Many amateur photographers set up a darkroom in the bathroom. A convenient spot for a processing data chart is on the back of the cabinet door. This location provides easy access to important information.—Robert Hertzberg

# POPULAR MECHANICS PLANS AND IDEAS CATALOG

Yes, we do have over 900 great ideas in our PLANS & IDEAS CATALOG. Projects for the homeowner — smart ideas in furniture. So many shop items you can build. We cover water sports, storage-play houses, double-duty campers for work and play. Recreational projects to build and enjoy—see it all in our catalog. \$1.00. Send your name and address with check or money order to, Popular Mechanics, Box 1014 Radio City Station, New York, NY 10101.



# FOUR OF THE BEST FROM OUR PM CATALOG

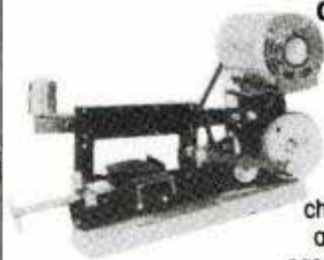
## FOR THE SHOP

**1 Classic European Workbench**—you can build this workbench for less than half of the cost of a factory-made version. You get detailed plans with instructions and material list. PL-1748, \$5.95.



## Cut Off Saw **2**

—Make hacksawing a lot easier and accurate. This cutoff saw cuts channels, angles and rounds with ease and precision even up to 3-in. size. Also, not too heavy to be portable. PL-1735, \$3.75.



**3 Tool Chest for a master craftsman.** Compact—made from cherry wood. For handling ease, it's actually two boxes. Well organized hand tool compartments allow easy access. Excellent construction absorbs moisture and protects tools from rust. Also, includes plan for a dolly. PL-1745. \$4.75



## FOR THE CAR

## Instant Car Repair **4** with Popular Mechanics Master Keys to Car Care.

In this handy packet that can be kept conveniently in your car, you can find your basic car repair instructions. If your car breaks down on an isolated road, how easy it will be to pull out these keys and tackle the problem yourself. PL-1750, \$4.95.



Order by number and send check or money order to  
**POPULAR MECHANICS Box 1014, Radio City Station, New York, NY 10101.**

For more on home and shop plans don't forget to enclose \$1.00 for our  
**PLANS & IDEAS CATALOG—just ask for B-1700.**

Popular Mechanics is a publication of Hearst Magazines, a Division of The Hearst Corporation.



# APPLIANCE CLINIC



## Dryer won't work in automatic

*I have a Canadian General Electric dryer, model No. TDA720A6W, serial No. WSI8313. The dryer had a problem with a disconnected wire and I replaced the timer with a new one. The unit has given excellent service until recently. The dryer functions well in the timed sequence but doesn't work in the automatic cycle (delicate, permanent press). It seems that the timer fails to advance. I removed and tested it with 110 volts. It worked in both the timer and automatic cycles. I checked the timer contacts. They don't appear to be stuck or pitted. How can I find the problem and correct it?—Frank H. Shipp, Hull, Quebec*

The problem may be that your 1960

vintage dryer is suffering from an open heat compensating resistor around the thermostat probe. To check and gain access to the resistor, first disconnect the power from the dryer. Next, open the dryer door and remove the four Phillips-head screws under the front lid of the top panel. Now loosen the two hexhead screws that are near the bottom of the front panel, one on each side, which hold the front panel to the cabinet.

Pull the top forward and lift it up and back away from the front. Now remove the 1/4-in. hexhead screws near the top inside of each side which hold the front panel to the cabinet. Lift the front up and away from the cabinet.

Once you remove the front panel, you will see a black box, which is the thermostat. From the box there will be a probe or thin wire which goes down into the lower part of the front panel. Around this probe is the resistor. It is in the shape of a hollow sleeve into which the thermostat probe fits. The resistor is held in place with a clamp and has two wires coming from it. Disconnect these two wires and check the resistor with a continuity meter. You should get about 400 ohms resistance. The replacement part is still available in Canada through a Camco Inc. service part store or in the United States through General Electric. The part number for the resistor is WE4X169. It costs approximately \$16.

## Leaking water

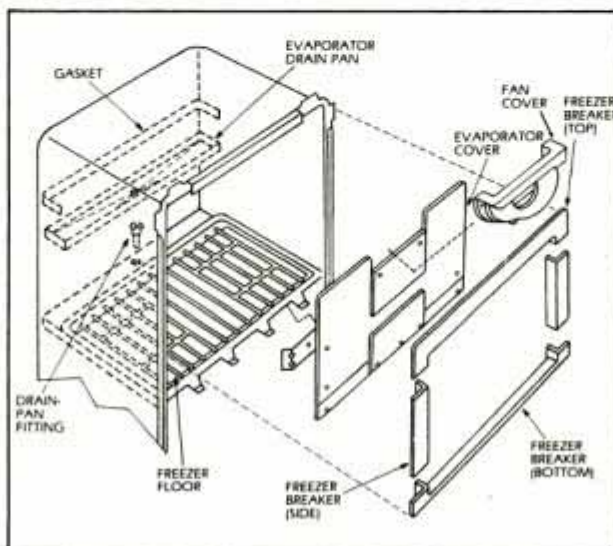
*We have a Sears 17.1-cu.-ft. frostless refrigerator/freezer that carries Model No. 10672627411, Serial E35016577. It has an automatic ice maker. For the last several years, water has run down the inside back panel of the refrigerator compartment, causing stains that need to be cleaned off every few months. Is there some way I can stop this?—D.A. Watkins, Jackson, Mich.*

It sounds as if the defrost water is getting behind the three-sided rubber gasket which is between the freezer liner and the evaporator drain pan. Apparently, the gasket is not sealing properly and some of the defrost water is leaking down the back wall instead of being directed into the drain pan.

To correct the problem, first unplug the refrigerator and defrost it thoroughly. Unplug and remove the ice maker. Remove the fan cover as well as the evaporator cover (rear wall) in the freezer compart-

ment. They are held in place with Phillips-head screws. Lift the covers up and out of the freezer. Next, remove the freezer floor, which is held in place with four Phillips-head screws. Lift up the floor at the rear and pull it out from under the front plastic breaker trim.

Wipe the rear wall and both side walls dry with a towel, then blow them dry with a hair dryer. Check the drain-pan fitting to be sure it's not restricted. Once the liner, drain-pan gasket and drain pan are dry and warm, apply a neat bead of RTV silicone rubber sealant between the top edge of the drain pan and the porcelain liner.



**To keep freezer defrost water from getting caught behind the drain-pan gasket, you should dry and seal the gasket.**

## Soap buildup in washer

*I have an 8- to 10-year-old, two-speed, heavy-duty Westinghouse washer. There's excessive soap buildup in the washer and on the clothes. How do I get rid of this?—Henry A. Reeves, Farmington Hill, Mich.*

First, remove the agitator by unscrewing the agitator cap. Lift the agitator up and out of the machine. Check the inside of the agitator and post in the machine for soap deposits or residue. Remove as much of the residue as possible, then replace the agitator and tighten the cap. Next, fill the washer with hot water (140-160° F.). Add one cup of a nonprecipitating water conditioner such as Calgon, Spring Rain or Miracle White, plus one cup of household ammonia. Do not add clothes, soap, detergent, bleach or any other washing ingredient. Run the washer through a complete cycle. You may have to repeat the process if you notice a soapy film on top of the water.

To get the soapy film out of the clothes, fill the washer with warm or hot water. Add one cup of the water conditioner and one cup of household ammonia plus the soiled clothes. Run the clothes through a cycle. **PM**

*If you have a problem with any appliance, send your question, along with the model and serial numbers, to Appliance Clinic, Popular Mechanics, 224 West 57th St., New York, N.Y. 10019. Sorry, but letters cannot be answered individually. Problems of wide interest will be discussed in this column.*



# Know your car inside and out.

Know how to fix it... to tune it... to service it... to keep it running right. The TOTAL SERVICE MANUAL for your car will show you how to do everything from a minor adjustment to a major repair.

**FREE CATALOG WITH EVERY ORDER**

## TOTAL SERVICE MANUALS

9481	CORVETTE 66-82 covers all models & engines	\$12.95
1756	CRICKET, PLYMOUTH 70-73 also covers Hillman Avenger	\$12.95
8188	DART & DEMON 68-76 covers all models	\$10.95
9592	DATSUN 200SX 80-81	\$12.95
8065	DATSUN 1200 & B210 71-78 covers all models	\$12.95
0783	DATSUN 210 79-82 covers all models imported	\$12.95
8127	DATSUN 240Z, 260Z, 280Z 70-78 covers all models	\$12.95
9152	DATSUN 280ZX 79-82 for all models incl turbo	\$12.95
1657	DATSUN 310 76-81 covers all models plus F10	\$12.95
9583	DATSUN 510, 610, 710 68-77 covers all models	\$12.95
1258	DATSUN 311 sports car 1600/2000 SPl, & SRl mids	\$20.95
9297	DATSUN PICK-UP 70-79 covers all 2-wheel drive models	\$12.95
0925	DATSUN PICK-UP 80-82 for all 720 mds. 2 & 4 whl drive	\$12.95
0871	DODGE 68-77 for all Monaco & Polara models	\$10.95
8066	DODGE ARIES 81-83 covers all models	\$12.95
1259	DODGE DASH 78-82 covers all models incl G174	\$12.95
8371	DODGE PICK-UP 65-82 covers all 4-wheel drive models	\$10.95
1298	DODGE PICK-UPS 71-82 all D100-350 mds; gas & diesel	\$12.95
2497	DODGE D-50 PICK-UP 79-81 all mds & Plymouth Arrow	\$10.95
8203	DODGE VANS 67-70 all 1/2, 1 & 1 ton mds incl Plymouth	\$10.95
6070	DODGE VANS 71-83 for all models to 1-ton plus Plymouth	\$12.95
8192	DUSTER 70-76 for all models incl. Scamp	\$10.95
9688	ESCORT 81-82 all models incl EXL plus Mercury Lynx/LN7	\$12.95
8189	FAIRLAIN, FORD 62-70 covers all models	\$10.95
8366	FAIRMONT, FORD 78-81 covers all models and engines	\$12.95
9874	FALCON, FORD 64-70 covers all 6-cyl models	\$10.95
9776	FIAT 124 67-82 all mds incl spyder, coupe, 2000 & turbo	\$12.95
8106	FIAT 131 75-80 for all models, 1.8 & 2.0 liter engines	\$12.95
0399	FIAT X1/9 71-82 covers all models	\$12.95
6022	FIAT STRADA 79-80	\$12.95
1073	FIESTA, FORD 78-80 covers all models	\$12.95
0675	FIREBIRD 67-69 covers all models	\$12.95
6309	FIREBIRD 70-81 covers all models incl Trans Am	\$12.95
1262	FIREBIRD 82-83 covers all 4-cyl V-6 & V-8 models	\$10.95
9611	FORD 71-82 covers E19c, LTD II, Ranchero, Thunderbird	\$10.95
0872	FORD 68-83 for Custom, Galaxie, LTD, XL & wagon mds	\$10.95
9369	FORD COURIER 72-82 covers all models imported	\$12.95
8205	FORD PICK-UP 65-68 all 2 & 4 whl dr mds, 1.7-1 ton	\$10.95
8458	FORD PICK-UP 73-75 all 2 & 4 whl dr F-100 to F-350's	\$12.95
8711	FORD RANGER 83 covers all pick-up models	\$10.95
0451	FORD PICK-UP 69-83 all 2 whl dr, F-Series & diesel	\$12.95
8204	FORD VANS 61-68 for all 1/2, 1 & 1 ton models	\$10.95
0453	FORD VANS 69-82 covers all 1/2, 1 & 1 ton models	\$12.95
9436	GRANADA, FORD 75-82 covers all models	\$10.95
8848	HONDA ACCORD CVCC 76-82 covers all models	\$12.95
9787	HONDA CIVILIC 79-81	\$12.95
8694	HONDA PRELUDE 73-81 covers all models incl CVCC	\$12.95
8206	INTERNATIONAL SCOUT 67-73 800, A, B, II mds	\$10.95
8565	INTERNATIONAL 62-80 line/maintain Scout, wagon, pick-up	\$10.95
1043	JAGUAR E-TYPE 61-72 covers all 6-cylinder models	\$12.95
9399	JAGUAR XJ6 68-79 covers all models	\$12.95
9617	JAGUAR XJ12 72-80 for all models incl XJS, Daimler	\$12.95
9769	JEEP, WILLEYS 46-65 all 4 & 6 cyl station wagons, pick-ups	\$19.95
8207	JEEP 66-75 for all Cherokee, Commands & Wagoneer mds	\$10.95
9805	JEEP WAGONEER J-series with 230 cdi eng	\$19.95

CREDIT CARD ORDERS & CUSTOMER SERVICE  
2 2 7 - 2 6 6 5  
**toll free 1-800-CAR-BOOK**  
IN NEW YORK 516-676-8043  
IF YOU DON'T SEE IT HERE, PLEASE ASK FOR IT

SATISFACTION GUARANTEED OR YOUR MONEY BACK



1713	ALFA ROMEO 62-78 for all Giulia, GT & Spider models	\$12.95
0441	ALFA ROMEO ALFETTA 73-80 all mds GT, GTV & sedan	\$12.95
9648	ALLIANCE 83 covers all AMC-Remault models	\$10.95
8677	AMC GREMLIN, HORNET, PACER 71-80 for all models	\$12.95
8194	AMC 75-82 covers AMC Concord, Eagle, Matador, Spirit plus	\$10.95
0991	ARROW, PLYMOUTH 76-80 covers all models	\$12.95
9404	ASPEN, OGDGE 76-79 covers all models	\$12.95
7127	AUDI 100 70-77 for all models incl 100L	\$12.95
1229	AUDI 4000 80-82 covers all sedan & coupe models	\$12.95
9699	AUDI 5000 77-83 reprint of factory manual all models	\$39.95
0726	AUDI FOX 73-75 covers all models	\$12.95
0379	BARRACUDA & CUDA 65-72 all 6 & V8 models	\$10.95
1042	BMW 2002 59-72 incl 1500, 1600, 1602, 2000 except CS	\$12.95
9813	BMW 320i 75-82 covers all models	\$12.95
8199	BMW 528i, 530i 75-80 covers all models	\$12.95
9760	BMW 2500, 2800, 3.0 all mds incl Bavaria & CS	\$12.95
0504	BRONCO 66-83 covers all full-size 2 & 4 whl dr models	\$10.95
8692	BRONCO II covers all down-sized 2 & 4 whl dr models	\$10.95
6308	BUICK 68-76 incl Electra, Le Sabre, Riviera, Wildcat	\$12.95
8473	BUICK 77-83 for all full size incl Electra & Le Sabre	\$10.95
8083	BUICK REGAL & CENTURY 74-80 for all mds incl turbo	\$12.95
8459	BUICK REGAL & CENTURY 81-83 for all rear whl dr models	\$10.95
9851	BUICK SKYHAWK 82 for all models & Cadillac Cimarron	\$12.95
0727	CADILLAC 68-74 all models except El Dorado	\$12.95
8678	CAMARO 67-81 covers all 4, 6 & 8 cylinder models	\$12.95
8460	CAMARO 82-83 covers all models	\$10.95
9557	CAPRI 70-76 for all 2000, 2600, 2800 mds	\$12.95
9386	CAPRI 79-82 covers all models and engines	\$12.95
9851	CAVALIER 82 covers all models plus Pontiac 12000	\$12.95
8465	CELEBRITY 82-83 covers all models & Ford Buick Century	\$10.95
0379	CHALLENGER 70-72 covers all 4, 6 & V8 mds	\$10.95
0462	CHALLENGER & SAPPHIRE 78-83 covers all models	\$12.95
8732	CHAMP & COLT 78-83 for all front wheel drive models	\$12.95
8321	CHARGER 67-70 for all models incl 500 & R T	\$10.95
8212	CHARGER 71-75 covers all models	\$10.95
0383	CHEVELLE 64-69 covers all Malibu models	\$10.95
8469	CHEVELLE 70-83 covers Malibu, Monte Carlo	\$12.95
0838	CHEVETTE 68-82 covers all models	\$12.95
1038	CHEVROLET 29-40 covers all 6-cyl models	\$18.00
0888	CHEVROLET 49-54 reprint of factory shop manual	\$20.00
1000	CHEVROLET 55-55 for all Bel Air, Biscayne, Impala mds	\$12.95
0919	CHEVROLET 69-81 for Bel Air, Biscayne, Caprice, Impala	\$12.95
8187	CHEVY II 62-68 covers all 4, 6 & V8 models	\$10.95
0779	CHEVY LUV 72-82 for all 2 & 4 whl dr mds & diesel	\$12.95
8464	CHEVY S 10, S 15 PICK-UP 82-83 for all mds plus GMC	\$10.95
8134	CHEVY PICK-UP 67-82 all incl Blazer, GMC, plus Suburban	\$12.95
8845	CHEVY S 10 & S 15 BLAZER 83 for all models plus Army	\$10.95
1662	CHEVY VANS 67-82 for all models plus GMC vans	\$12.95
0020	CHRYSLER 73-79 factory shop manual must give year	\$23.95
9218	CITATION 80-83 covers all models plus Buick Skylark	\$10.95
9580	CITROEN ID, DS 67-75 covers all DS19, 20, 21 mds	\$12.95
8111	COMET 70-77 covers all models	\$10.95
8212	CORONET, DODGE 71-75 covers all models	\$10.95
8032	CORVAIR 60-69 covers all models incl turbocharged	\$10.95
0479	CORVETTE 57-65 covers all 283 & 327 models	\$12.95

## GENERAL REPAIR MANUALS — TUNING GUIDES — HOME REPAIR — TECHNICAL BOOKS

9003	CHILTON AUTO REPAIR 77-84 for all American-built cars	\$19.95
7137	CHILTON AUTO REPAIR 64-71 for all American cars	\$19.95
1763	CHILTON AUTO REPAIR 54-63 for all American cars	\$19.95
1111	CHILTON TRUCK REPAIR 75-82 American & import makes	\$19.95
8561	CHILTON TRUCK REPAIR MAN 61-71 for all 1/2-2 1/2 ton mds	\$19.95
8091	CHILTON IMPORT CAR MANUAL 76-83 for all major makes	\$19.95
0492	AUTO REPAIRS & PRICES flat rate times 74-79 U.S. cars	\$7.95
9658	AUTO MECHANIC self teaching guide & study course	\$7.95
0406	AUTO MECHANIC certification tests, complete prep course	\$7.95
0653	AUTOMOTIVE OSCILLOSCOPE how-to-use manual for mechanics	\$9.95
1163	GM CARS Diagnosis & Repair 70-83 plus light trucks	\$14.95
8152	BOLT ON PERFORMANCE what to buy & what if? do you build	\$10.95
1766	ENGINE POWER basics of high performance engine building	\$8.95
9877	SMOKEY YUNKER'S POWER SECRETS the real, inside story	\$12.95
1146	PERFORMANCE WITH ECONOMY power from tuning & building	\$10.95
0654	AUTO AIR CONDITIONING technical school training manual	\$21.95
7129	AUTO AIR CONDITIONING service & repair all	\$8.95
8726	TRANSISTOR IGNITION SYSTEMS covers them all	\$8.95
1708	WEEKEND MECHANIC'S HANDBOOK ideal manual for beginner	\$12.95
9623	HOW TO TUNE YOUR CAR good for all cars	\$7.95
9170	BASIC MAINTENANCE & REPAIR keep your car running right	\$4.95
1712	BASIC AUTO REPAIR MANUAL a must for any car	\$5.95
1708	BASIC CHASSIS, SUSPENSION, BRAKES tune & service	\$6.95
0680	BASIC IGNITION & ELECTRICAL SYSTEMS	\$6.95
0680	BASIC AUTO TROUBLESHOOTING	\$6.95
3759	BOSCH ELECTRONIC FUEL INJECTION manual 70-79 imports	\$10.95
1711	BASIC CARBURETORS & FUEL SYSTEMS for all U.S. makes	\$6.95
9976	CARBURETOR BASICS troubleshoot/rebuild all U.S. makes	\$8.95
0882	CARTER carburetors rebuild, tune, modify all models	\$10.95
9411	HOLLEY carbs, all 2 & 4 cyl, tune & rebuild	\$9.95
9652	ROCHESTER CARBURETORS for all 1, 2 & 4 barrel models	\$9.95
1707	BASIC BODYWORK & PAINTING good overall information, pics	\$6.95
0827	AUTOMOTIVE REFINISHING best professional paint book	\$8.95
5104	AUTOBODY REPAIRING & REPAINTING the best	\$14.95
1659	AUTO BODY SHEET METAL REPAIR for professionals	\$14.95
5106	GLASS FIBER AUTO BODY construction & repair	\$6.00
8470	FIBERGLASS repair & construction for cars & boats	\$10.95
3726	ENGINE SWAPPING latest techniques with actual swaps	\$8.95
8491	PRACTICAL ENGINE SWAPPING how to do it right	\$7.95
6029	DIESEL GUIDE covers everything owner/buyer should know	\$8.95
7128	DIESEL, How to convert your car, van, pickup to	\$7.95
8432	DIESEL ENGINES, HOW TO REPAIR, complete training course	\$10.95
0667	DIESEL Fundamentals, Service, Repair covers all aspects	\$19.95
2526	ENGINE REBUILDING all U.S. & imports, gas & diesel	\$14.95
8174	CLUTCH & FLYWHEEL HANDBOOK, best on the subject	\$9.95
9320	AUTOMATIC TRANS SERVICE 68-79 all Ford & GM models	\$14.95
1749	AUTOMATIC TRANS REPAIR 74-80 AMC, Chrysler, Ford & GM	\$14.95
1223	BRAKES, STEERING SUSPENSION service all 76-83 cars	\$14.95
9780	AUTO RESTORATION GUIDE, best ever published, 291 pgs	\$17.95
0995	CAR INTERIOR RESTORATION useful for all cars	\$6.95
0906	OLD CAR VALUE GUIDE latest edition	\$9.95
0706	BYPASS EMISSION CONTROLS 73-77 all Ford-built cars	\$15.95
8474	BYPASS EMISSION CONTROLS 71-77 GM cars	\$14.95
0813	V-6 PERFORMANCE from Buick, Ford & Chevy V-6 engines	\$10.95
9534	BUICK POWER MANUAL performance tuning the V6 models	\$8.95
0830	CHEVY SUPER SPORT 61-76 everything about every model	\$14.95
9795	CHEVY PERFORMANCE getting the most from every block	\$10.95

8125	CHEVY SMALL BLOCK, how to rebuild	\$9.95
9409	CHEVY SMALL BLOCK, how to hotrod	\$7.95
0949	CORVETTE RESTORATION SOURCE BOOK 53-67 the bible	\$21.95
0946	FORD SMALL BLOCK, how to rebuild	\$9.95
8494	FORD BIG BLOCK, how to rebuild	\$9.95
9457	FORD V-8, how to rebuild 351, 351M, 400, 429, 460 engines	\$9.95
9498	PINTO, how to rebuild the 4-cyl	\$9.95
8195	FORD PERFORMANCE how to get it for street or track	\$10.95
8384	MOPAR SMALL BLOCK, REBUILD 273, 318, 340, 360 engines	\$9.95
0892	MUSTANG, HOW TO RESTORE YOUR complete how-to manual	\$14.95
8658	AIRCooled ENGINES manual for 1, 2 & 4-cyl over 15 cid	\$9.95
9419	SMALL ENGINE SERVICE MANUAL all 1-cyl under 15 cid	\$12.95
9770	LAWN MOWER fix all gas powered walking, push type	\$8.95
8755	REDWIN LAWYNER manual for all major makes and models	\$8.95
9651	SMALL TRACTOR manual 65-81 all makes/models 8-30 hp	\$19.95
8301	ALLIS CHALMERS tractor mds B, C, CA, G, RC, WC, WD, W50, WF	\$9.95
9822	FORD FARM TRACTOR manual covers all series 2N, 8N & 9N	\$9.95
8490	FORD TRACTORS mds 501, 600, 700, 800, 1, 800, 1, 801, 2000	\$9.95
1028	IH FARM TRACTORS for A, B, C, H, M, MTA 4.4 & W6TA 9 models	\$9.95
8158	JOHN DEERE farm tractor manual for mds A, B, D, G, H, M, MT	\$9.95
1020	MASSEY FERGUSON farm tractor models T20, T020 & T030	\$9.95
8231	WELDING GUIDELINES all gas & electric methods & metals	\$8.95
8180	SOLDERING the only book on the subject, very complete	\$7.95
9525	MACHINING FUNDAMENTALS to use all machine shop equip	\$25.95
8390	BASIC MACHINE TECHNOLOGY 622 pgs machine shop know-how	\$24.95
8397	CASTING SMALL METAL & RUBBER PARTS any material shape	\$6.95
0843	CONCRETE TECHNOLOGY most complete book on the subject	\$18.95
9147	EXCAVATOR OPERATION dozers, backhoes, loaders, cranes	\$9.95
0592	FORK LIFT TRUCKS service, overhaul all gas, prop, elec	\$19.95
9807	HEAVY EQUIP REPAIR dozers, backhoes, cranes, plus	\$19.95
0929	MOTORCYCLE MANUAL 68-81 all Japanese makes & H-D	\$24.95
0555	SNOWMOBILE 65-81 for all popular makes & models	\$11.95
8186	STERN DRIVE repair for OMC, Mercruiser, Volvo, Deyseidrive	\$9.95
8508	EVINRUDE O.B. 65-81 manual for all 1.5 to 35 hp models	\$9.95
8509	EVINRUDE O.B. 65-82 manual for all 40 to 140 hp models	\$9.95
8510	JOHNSON O.B. 65-81 manual for all 1.5 to 35 hp models	\$9.95
8511	JOHNSON O.B. 65-82 manual for all 40 to 140 hp models	\$9.95
8512	MERCURY O.B. 64-81 manual for all 4 to 40 hp models	\$9.95
1217	MERCURY O.B. 64-82 manual for all 50 to 200 hp models	\$9.95
0557	CHAIN SAW SERVICE MANUAL for top 34 makes	\$9.95
8002	OL BURNERS, How to install and service	\$9.95
8017	HOME PLUMBING & HEATING 672 pages cover every detail	\$8.95
7109	CLOTHES DRYERS fix all makes and models	\$5.95
1268	SEWING MACHINE REPAIR service, adjust, repair all makes	\$8.95
9804	TYPEWRITER REPAIR service and repair manual & electric	\$11.95
0530	HOME APPLIANCE REPAIR major wash, refrig, dishwasher, &	\$6.95
0809	VOCAL VIDEO RECORDERS service all cassette makes, models	\$12.95
0396	VIDE CASSETTE RECORDERS all about VHS & Beta machines	\$9.95
7133	35mm CAMERA REPAIR all SLR makes and models	\$9.95
8024	HOME SATELLITE TV on buying or building your own recvr	\$12.95
9959	TV REPAIR Beginners guide for any color, B/W problem	\$8.95
0533	TV Field & Bench Service's Handbook repair any TV	\$6.95
0450	TELEVISION ELECTRONICS: Theory and Servicing, 963 pages	\$24.95
9447	ELECTRICITY FROM WIND, WATER & SUN how to get it	\$7.95
8724	LOCKS & LOCKSMITHING complete, step-by-step course	\$14.95
3752	TELEPHONES, Master Handbook every type & installation	\$11.95

9806	JEEP UNIVERSAL CJ-2, CJ-3 reprint factory manual	\$19.95
8155	JEEP CJ 68-81 covers all CJ-5, CJ-6 and CJ-7 models	\$12.95
0596	LANCIA BETA 76-80 for sedan, coupe & HPE models	\$12.95
1254	LANDROVER 59-77 covers 2, 2A, 3 gas & diesel models	\$12.95
0481	MAVERICK 69-71	



# THE PM WORKBENCH



## Little vac tackles big jobs

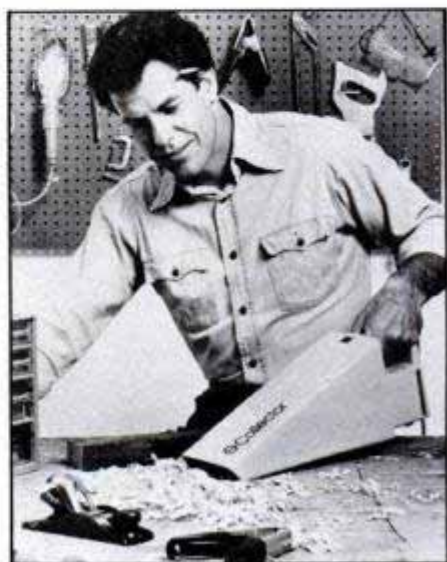
How do you keep your workshop clean? Until now, there were two basic ways: Simply brush sawdust and woodchips onto the floor to await an occasional sweep-up. Or use a large-capacity shop vacuum. Believing that a clean shop is a safe shop, I've always used a vacuum. That is, until I discovered the Collector by Black & Decker.

The Collector is a 120-v., 1.5-quart vac that's great for quick pickups around the home and shop. Unlike the cumbersome shop vacuum, the Collector transports easily and stores on a wall-mounted bracket. It has no bag to empty or replace; simply snap off the front housing and dump.

It's available at home centers and mass merchandisers for about \$50. For more information, contact Black & Decker, 515 Grebe Rd., Easton, Md. 21601.—J.T.



Handheld vac, with 18-ft. cord, wall-mount bracket and 3-ft. hose and adapter (above), is ideal for home and shop (right).

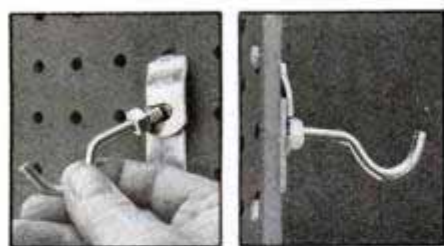


## Locking hooks

Hanging tools by hooks on perforated hardboard is a popular way to organize a workshop. But the major problem with this system is that the hooks aren't secure—they often wobble about and pop off the board. You can solve this with Perma-Hook. This "stay-put"

hook anchors to the board with a locknut to provide a stronger, safer and sturdier hanger. To remove a Perma-Hook, just give it a twist.

Perma-Hooks are made in 15 different configurations for use with 1/4- or 3/4-in.-thick board. They're available at hardware stores, home centers and from the manufacturer. For a price list and order form, you should contact Markson Manufacturing Co., 1430 Front Ave. N.W., Grand Rapids, Mich. 49504.—J.T.



Install the two clips so that they overlap, then screw in the Perma-Hook (left). Tighten the locknut to secure hook (right). Several hook models are shown below.



## Trickle trapper

Drip-Stop is a highly absorbent elastic band which you place on a paintbrush to catch messy drips when working overhead. Drip-Stop stretches to fit 2-



Position the absorbent, elasticized band around the brush to catch any messy drips.

to 4-in.-wide brushes. It's available at paint and hardware stores. A two-pack sells for \$1.48. For mail orders, contact Drip-Stop, Dept. PM, 4446 Ocean View Blvd., Montrose, Calif. 91020. Add 40 cents for postage.—Rosario Capotosto

## Consumer information

The latest edition of the Consumer Information Catalog is now available. The catalog offers over 200 booklets written by 30 federal agencies (some are free, others range in price from 50 cents to \$19) covering 11 general subjects. There are 28 booklets on housing listed under three subheads: Building, Buying and Financing; Heating and Energy Conservation; and Home Maintenance. For a free catalog, write to Consumer Information Center, Dept. PM, Pueblo, Colo. 81009.—J.T.



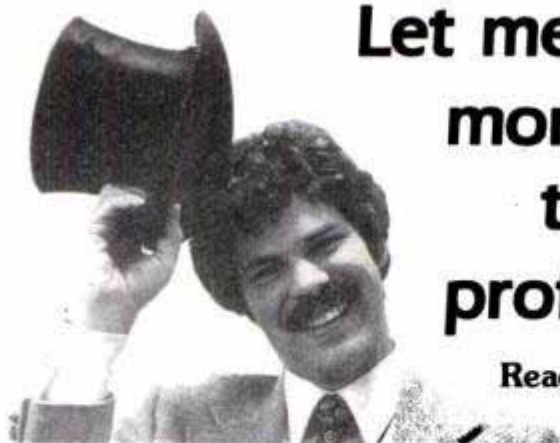
The federal government's free catalog offers over 200 informative booklets.

If you've come across a new product with some special features, let us know about it. Write to PM Workbench, Popular Mechanics, 224 West 57th St., New York, N.Y. 10019.



"This may be the best start-on-a-shoestring business that MOTHER has ever featured!"

# Let me show you how to make more money than you ever thought possible as a professional Chimney Sweep



Read my story, if you like the idea of earning \$150 per day part time, \$700 or more weekly in a business of your own . . .

My name is Tom Risch. I'm 28 years old, own my own home, a 22 ft. sailboat and an antique Morgan sports car. I suppose more than anyone, I'm the person responsible for "re-inventing" the chimney sweep business — as I'll shortly explain.

Don't get me wrong, I'm no genius. You could have stumbled into this as easily as I did. And my story is one you should know, if what you seriously want out of life is greater personal freedom, satisfying work — and a lot more money than you're earning now.

## A dead-end road

When I got out of school, I thought I had it made. I loafed around that first summer, then went to work for a house painter. But I didn't like the boss breathing down my neck, so I went out on my own.

For the next few years I tried to make it as a house painter and general fix-it man. I had plenty of independence but I was going nowhere fast.

One day in 1974 I found myself in a lady's attic fixing her chimney. An old top hat was lying on a trunk, so I put it on and started singing that great song from *Mary Poppins* — "*Chim-chimney, Chim-chimney, Chim-chim-cherie, a Sweep is as lucky as lucky can be.*"

Wondering what all the racket was about, the lady climbed the stairs and when I'd finished the chorus, asked me a fateful question: "Whatever happened to the old Chimney Sweeps?"

## No Sweep in town

I didn't have an answer, but the question aroused my curiosity. At that time the Arab Oil Embargo was on. The incredible boom in heating with wood was just getting underway. Folks everywhere were starting to use their fireplaces and new woodstoves around the clock.

And suddenly, dangerous chimney fires were breaking out all over town. I knew the reason: woodsmoke produces creosote, a highly flammable substance that condenses on chimney flues. Unless the chimney is cleaned regularly, a fire is almost inevitable.

## Starting over

My local fire chief convinced me my services as a Chimney Sweep were urgently needed. But I had a lot more to learn — most of it the hard way.

Everything that happened next is told in a booklet I want to send you, free. Just let me say here that I made plenty of costly mis-



Heart of the System

takes and wrong moves — mostly because nobody was around to help me get started right. I realized I needed better tools. It took many months of hard searching to find the right equipment. I designed and built my own vacuum system — the first ancestor of the amazing *SootSweeper*® we use today.

## \$45 for an hour's work

My System makes it possible to complete a typical chimney cleaning job in less than an hour. My standard fee was \$40 (most Sweeps now charge \$45 to \$50) — and people were glad to pay it. I found myself earning more money than I ever dreamed possible — \$150 to \$200 a day, \$700 or \$800 a week. And almost all of that was clear profit, for there's very little overhead in this business.

I realized there were more chimneys in my town than I could ever hope to clean, not to mention in my state and the whole U.S.A. I realized my success didn't have to be unique. I had friends all over the country who could profit from this wonderful opportunity. So I began sharing my experiences with them through AUGUST WEST SYSTEMS® — the first nationwide organization to provide training, equipment and start-up guidance for independent Chimney Sweeps.

## A wide-open field

Since then we've helped over 3,000 men and women begin new, highly profitable businesses of their own as professional Sweeps. Yet they've just begun to answer the need: there are over 25 million fireplaces in American homes. Since 1974 woodstove ownership has leaped from 200,000 to over 5 million, and the end's nowhere in sight. The more the economy worsens, the higher oil prices go, the greater the need for your services. . . . But what's it really like to be a Chimney Sweep?

Today it's a lot different than many folks imagine. First, with The August West System you clean most chimneys from below instead of on the roof. Your cleaning tools are brushes attached to our exclusive Flexi-Rods® that let you do a quick but thorough job. The dust from the chimney instantaneously disappears into the SootSweeper in-



"Last year with a helper for 5 months I did 1200 jobs, this year I'm trying for 1500. Needless to say I feel very good about what August West Systems has helped me do with my life." — Paul Sheehan, Sandwich, MA

stead of seeping into your lungs or all over your customer's rug.

If you're ambitious and a good planner, you can easily clear \$150 a day, maybe a lot more. You can work full-time, or start part time while you keep your current job until your new business is firmly established.

I want to be straight with you: chimney cleaning is no lazy way to quick riches. It's hard work, you do get dirty. But the rewards can be great. Paul Biskner, a real dynamo from Garden City, Mich. says: "I've already had plenty of \$1,000.00 weeks. Now I'm shooting for a \$1,000.00 day!"

## The perfect bootstrap business

You don't need special skills, business experience, a college degree or a big investment. The August West System gives you everything you need to start earning money almost right away — and we keep on helping you with advice and answers to your questions as your business grows.

But you are the boss. You can work as many or as few hours as you want. You'll enjoy wearing a top hat (and the response it inspires). You'll like the feeling of knowing you are performing a needed service. Here's what Isaac Watts of Madison, Va. recently wrote us:

"Every job is different — a new challenge. When I come through the door in my top hat I get first-class treatment — it's not like being a plumber or repairman. And I know my work is saving these folks from dangerous chimney fires. It's work you can take pride in."

## Ask for free proof

Find out more about the high earnings potential and other wonderful benefits you can enjoy as a professional Chimney Sweep. Just call me TOLL-FREE at 800-243-5166 and ask for extension 212A. I'll rush you a detailed INFORMATION KIT with the complete August West Story. Call or write today!

YES, send me your FREE INFORMATION KIT telling me how to make up to \$150 or more per day as a professional Chimney Sweep.

Name \_\_\_\_\_

Address \_\_\_\_\_

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



**August West Systems, Inc.**  
Dept. 2102  
187 Kings Highway Cutoff  
Fairfield, CT 06430

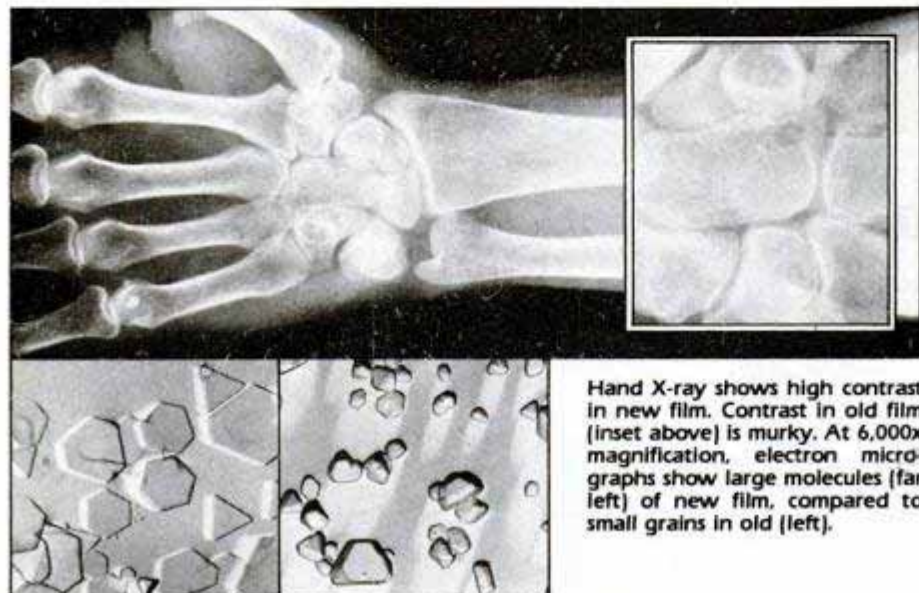
© 1983 August West Systems, Inc.



# SCIENCE WORLDWIDE



## Focusing in on X-ray film



Hand X-ray shows high contrast in new film. Contrast in old film (inset above) is murky. At 6,000x magnification, electron micrographs show large molecules (far left) of new film, compared to small grains in old (left).

New X-ray film introduced at a scientific meeting in Chicago has produced some of the sharpest, clearest radiography known to medicine. Radiologists say the new Kodak T-Mat G film will be of greatest importance in the emergency room, where rapid-serial—quick-fire—X-rays are taken. The secret of the film's contrast quality is in the molecular pattern of the silver halide grains used on its surface. The new film's molecules are flat, table-shaped and very large, compared with the pebble-like grains of silver-halide formulations used in previous films. Contrast in the old X-ray film is murky. The breakthrough should make X-rays more useful in discovering minor fractures, small tumors and other hard-to-detect subskin problems. It will also mean more accurate diagnoses.

## Where there's fire . . .



A man's finger is hit by a special laser pulse to demonstrate new heatless etching.

IBM scientists have etched circuitry onto submicroscopic chip material without causing any heat damage to the material. The revolutionary process uses a single laser pulse lasting 12 billionths of a second. Called "ablative photo-decomposition," it brings us one step closer to a true superchip.

## A-OK cancer therapy

University of Arizona researchers have found that a synthetic form of vitamin A fights tumors in a rare form of skin cancer, *mycosis fungoides*, which can spread to the lymph nodes and other organs. The vitamin, called "analog," has been tried on patients with advanced stages of the ailment. There is no indication that vitamin A itself would have a similar effect.

## Boning up on archaeology

Michael Waters was digging in the Sulphur Springs Valley of Arizona as part of his geology graduate work last year when he found a complete human skeleton. It has been dated to at least 9,000 years old. The find establishes the earliest known pre-Columbian settlement in the Southwest.

## New look at space station

Even as NASA was taking a fresh look at several proposed configurations for America's next space station late last year, the National Research Council tossed a little cold water on the discussion. The council's Space Science Board said few of the missions now envisioned for a 1990s space station would benefit especially by being in orbit. NASA is re-examining its space station plans so that they can include more experiments that can be done only in orbit.

## With this ring . . .



A decade ago, only Saturn was believed to have a ring around it. But recent discoveries have shown rings around Jupiter and Uranus. Now a Japanese infrared astronomy team has created a computer-enhanced image of a ring around the sun. Further observations are under way.

## How do you spell relief?

Physicians have to remember so many details in diagnosing a disease that it's easy to drop the ball. But now they can resort to *Mnemonics Rhetoric And Poetics For Medics*, a book by Robert Bloomfield and E. Ted Chandler (Harbinger Press, \$9.95). Delightfully humorous and filled with interesting ideas on how things are remembered, the book suggests word games as a help.

For instance, if a patient complains of pain when he tries to grasp something, it might be inflammatory arthritis. The mnemonic: GRASP. G is for gout, R for rheumatoid arthritis, AS for ankylosing spondylitis (spinal degeneration) and P for psoriasis. All are possible indications of inflammatory arthritis. How can anyone forget? **FM**



# INSTANT MEMORY®

## The New Natural Way to Remember!

- Now you can instantly remember everything you see, read, and hear.
- Guaranteed to save you time, money, and effort.
- Used by over 100,000 men and women in all walks of life.

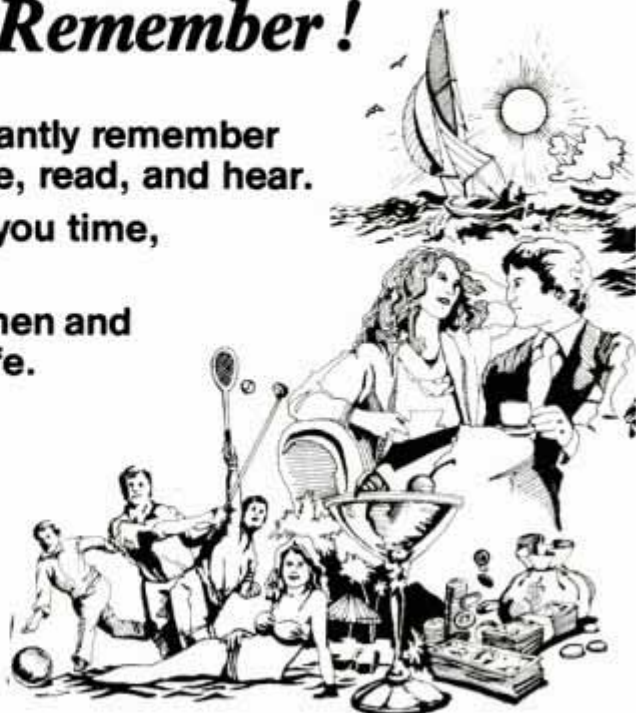
### Success depends on it . . .

**INSTANT MEMORY** is the fastest, surest, most enjoyable method ever devised to acquire a perfect memory *without even trying*.

No memorization, no word association.

It helps you solve problems *fast*. Reduces stress, fatigue. And even improves your tennis game!

Release your photographic memory. Nothing is forgotten! Learn "how" you remember, "why" you forget. Discover a natural ability of your mind to instantly recall everything you see, read, hear.



### You can have a photographic memory.

With **INSTANT MEMORY**, anyone can remember anything . . . *without even trying!* It unshackles your perfect memory from self-imposed exile instantly. This new way to remember is so simple, quick and usable, *everyone* can use it immediately.

### Age is no barrier.

Why? Because the results are automatic. It is the easiest way to remember names, faces, dates, speeches, formulas, music, phone numbers, and even entire books.

### Pass exams easily!

If you are in school, with **INSTANT MEMORY** you can *permanently* remember all you will ever study. Now you can *easily* pass every exam with less study, no worry and no "test trauma." Increases your vocabulary, improves spelling, masters foreign languages.

### Here's how it works . . .

Science has proven the accumulated experience of a lifetime is preserved perfectly in your mind. **INSTANT MEMORY** simply releases it! Without word associations. Just the natural powers of your mind. It's a spectacular way to put a lifetime of learning at your fingertips. And it's your birthright!

### About the INSTITUTE

For over 20 years, the Institute of Advanced Thinking has earned a reputation of proven reliability and integrity. It has gained international acclaim as the world's first and only instruction in Natural Memory.™ The Institute is a member of the American Association for the Advancement of Science, American Association for Adult and Continuing Education, and Pacific Palisades Chamber of Commerce.

### Play any sport better!

**INSTANT MEMORY** means your game just got better *without practice*. Why? Because the "perfect game" exists *inside you right now!* Simply learn how to "unleash" it.

### Learn any skill.

**INSTANT MEMORY** means learning new skills at a speed you didn't think possible. Because it's a natural state of mind. It comes built-in. So you don't have to work for it. *No repetition, no relearning!*

### Win at cards, give speeches, overcome stage fright.

This is far more than just a "memory" course . . . *it is a new way of living.* **INSTANT MEMORY** enables you to play any musical instrument, find lost articles, awaken the exact moment you desire, tell stories and jokes without nervousness, improve your typing, think faster, and much more!

There's no end to the things you can do with **INSTANT MEMORY**.

### MINDSTORMING® - your key to creativity.

With this amazing technique originated by the **INSTITUTE**, you can *instantly* liberate your inner creative abilities and *natural* intuitive powers. It floods your mind with a fortune of money-making ideas. There is no limit to what you can discover, invent or produce!

### Instant speed reading.

The first time you read something should be your last! Now you can *instantly* remember *all* you read. Because you will read a page like a photograph! With **INSTANT MEMORY**, there is *no limit* to the words you can read per minute.

© INSTITUTE OF ADVANCED THINKING 1981

### YOU WILL LEARN

- How to remember as fast as you think
- Poise and self-confidence in any situation
- Your mind has NO limits
- Hidden talents you didn't know you had
- Why all other memory courses are obsolete
- How to excel in everything you do
- Forgetting is antinatural and 'curable'
- Real ESP is using your mind correctly
- How to relax your entire body in seconds
- Why concentration improves automatically
- To express yourself persuasively
- There's a library already in your mind
- To advance your career by staying informed
- How to 'unlearn' psychological obstacles
- To recall even tough technical material
- Popularity, prestige, recognition is yours . . . and much, much more!

PLUS the added benefit of being able to quickly read all the magazines, newspapers and books you desire . . . and retaining all of it more clearly and accurately than ever before . . . at a surprisingly low cost.

### FULL MONEYBACK GUARANTEE

If you are not satisfied, simply return your book within 30 days for a complete refund. Absolutely no risk!

### Institute of Advanced Thinking

845 Via de la Paz, Dept. PM 384  
Pacific Palisades, California 90272

Yes, please send me your unique **INSTANT MEMORY** book for only \$10 complete by First Class Mail at no extra cost.

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
Or charge my  VISA  MasterCard  
Card No. \_\_\_\_\_ Exp. Date \_\_\_\_\_



# CAR CLINIC



## Shake-down cruise gives bad vibes

Since the day I took possession of my 1980 Buick Skylark, which has front-wheel drive and an automatic transmission, I've been plagued by a vibration while driving between 50 and 55 mph. I've haunted the Buick dealer, had the factory representative examine the car, had tires balanced four times, had wheels checked for runout and had wheel bearings inspected. Three new tires have been put on the car and balanced. The vibration is still there, and I'm disgusted. You're my last resort. Please help.—Arthur Engles, Queens Village, N.Y.

Tires are responsible for a large percentage of vibration complaints, but they're not the only cause. A loose engine-mounted accessory can cause

vibration. So can a problem with the transaxle or engine. I think what's needed is a more logical way of tracking down the trouble area. Here's what to do.

Drive the car on a smooth, level road, maintaining the speed at which vibration occurs. Shift into NEUTRAL while the car is moving and vibrating. If vibration disappears, the cause is a loose accessory or a problem with the transaxle or engine. Assuming that all accessory brackets are tight, tighten all supports holding the engine/transaxle to the frame before tearing into these assemblies.

If vibration should continue after the transmission has been shifted into NEUTRAL, then it becomes a somewhat more

complex troubleshooting problem.

The best way of telling whether vibration is caused by a tire/wheel assembly is to replace your four tires and wheels with assemblies that are known to be in good shape. Take them off another X-body car. If vibration is eliminated, then one or more of your tires or wheels is to blame. To find out which one is causing the problem, you must place your tires and wheels, one at a time, back on the car and then test drive it.

Don't overlook the fact that out-of-balance brake drums or discs can also cause vibration. See that wheels and tires are balanced; then use a wheel spinner to turn the assemblies. If shaking is noticed, you've found what you're looking for. Replace that disc or drum to rid the car of vibration.

## Cold-blooded Chevy

A perplexing problem has struck our 1980 Chevrolet Citation four-cylinder engine. The air conditioner and heavy-duty cooling system perform properly on hot summer days, even in heavy traffic. However, in cool weather, the temperature gauge barely rises for 25 miles, which suggests that the engine is failing to reach normal operating temperature. It doesn't matter whether the car is driven in town or on the highway. Several visits to our GM dealer have resulted in checking the cooling system and replacing the thermostat. Do you have any suggestions?—Dave Kutseker, Rich Creek, Va.

Yes. The electric cooling fan may be running when it shouldn't. The fan is supposed to come on when engine coolant temperature exceeds 230° F. When temperature falls below 214° F., the fan is supposed to turn off. A defective fan switch that senses coolant temperature or a bad cooling fan relay may be causing the fan to operate prematurely.

In hot weather, when ambient temperature is a factor, a cooling fan that runs prematurely may not affect coolant temperature all that much. This may be why the temperature gauge responds in hot weather.

Another possible reason for your problem with the Citation could be

an unresponsive temperature gauge transducer (sensor). If the part of the transducer that's in contact with coolant is coated, the transducer may not pick up lower coolant temperature. To check it out, remove the transducer. It's located in the rear of the right-hand cylinder head. Use a wire brush and a little brass polish to clean the part of the unit that comes in contact with coolant. Then, with an ohmmeter, check the transducer for resistance,

which should be zero. If it isn't, install a new transducer.

## History lesson

I've had the 1600 CVCC engine of my 1978 Honda Accord tuned more times than Liberace has had his piano tuned, and the EGR system inspected almost as many times. Still, no one has been able to rid the car of a significant power

*(Please turn to page 42)*

PM CAR CARE

**TIP**

↓

HOSES

SNORKEL

AIR FILTER HOUSING

**Look sharp**

When you have occasion to remove an air cleaner assembly from a carburetor, it's important to remember that one or more hoses are attached to fittings. If these hoses aren't reattached securely, or you accidentally break a fitting (many of which are plastic) without realizing it, your engine will develop a problem caused by a vacuum leak. This type of problem can be a bugger to track down.

Depending on the engine, hoses that are attached to air cleaners include the ones serving the thermostatic part of the air cleaner, the fuel-vapor canister and the positive crankcase ventilation (PCV) system.



# AT DODGE, WE ENGINEER THE PRICE AS CAREFULLY AS WE ENGINEER THE TRUCK.

**WE ARE DODGE. WITH THE LOWEST-PRICED FULL-SIZED TRUCK IN AMERICA. \$6,403.\***

Pay more and get less. Or pay less and get more.

Because you can buy a full-sized Dodge D100 at a list price that's hundreds of dollars less than a compact Ford Ranger or Chevy S-10, when comparably equipped with six cylinder engines.

**BACKED BY AMERICA'S LONGEST RUST-THRU PROTECTION TRUCK WARRANTY. AT NO EXTRA COST.**

There's more rust-fighting galvanized steel in a Dodge D100 than any Ford or Chevy pickup, compact or full-sized.

One reason why we can give you the longest rust-through protection warranty.

## 1984 STANDARD FEATURES DODGE D-100 PICKUP

- CHASSIS ITEMS**
- 225 CID SLANT SIX (3.7L) ENGINE
  - 95 NET HP @ 3600 RPM
  - 4-SPEED OVERDRIVE TRANSMISSION
  - 20-GALLON FUEL TANK
  - POWER BRAKES
  - 60-AMP ALTERNATOR
  - 370-AMP MAINTENANCE-FREE BATTERY
  - ELECTRONIC IGNITION

- APPEARANCE ITEMS**
- BRIGHT FRONT BUMPER
  - ALUMINUM GRILLE
  - DUAL BRIGHT EXTERIOR MIRRORS
  - "RAM" SIDE NAMEPLATES
  - "RAM'S HEAD" HOOD ORNAMENT
  - BODYSIDE TAPE STRIPES

- BRIGHT WHEEL COVERS
- WOODTONE INSTRUMENT PANEL WITH BRIGHT TRIM
- COLOR KEYS CARPETING
- 5-YEAR RUST PROTECTION WARRANTY

### SAFETY/CONVENIENCE ITEMS

- E-Z OFF TAILGATE
- 2-SPEED WINDSHIELD WIPERS
- WINDSHIELD WASHERS
- IN-CAB HOOD RELEASE
- DUAL HORNS
- R-61 HAND SIDE VISORS
- ROOMY GLOVE BOX WITH COIN HOLDER

### PAYLOAD

- 1395-LBS. PAYLOAD ALLOWANCE

**\$6,403.**  
TOTAL\*



THE ESTIMATED MILEAGE FOR THIS MODEL IS 18.0 CITY AND 26.0 HIGHWAY. COMPARE TRUCKS TO THIS MODEL WITH OTHER TRUCKS. YOUR OWN MILEAGE MAY BE POORER DEPENDING UPON DRIVING HABITS, AND YOUR TRUCKS OPERATING CONDITIONS.

FOR SIMILAR SIZED TRUCKS RANGE FROM 18.0 TO 26.0 MPG. CONSULT THE MILEAGE GUIDE.

**IT'S A BIG TRUCK TO DRIVE. A SMALL PRICE TO PAY.**

With a standard full-sized six cylinder engine. Standard full-sized hauling capacity. And room enough for three full-sized adults.

**SAVE \$200 TO \$400 WITH PROSPECTOR EQUIPMENT DISCOUNTS.**

Actual savings depend on model and package. And are based on the list prices of package items if purchased separately. So see your Dodge Truck dealer for details.

## 5/100 RUST-THRU PROTECTION

Limited warranty covering outer body rust-through on new '84 full-sized pickups and Ramchargers at no extra cost for five years or 100,000 miles, whichever comes first. Ask dealer for details.

**THE NEW CHRYSLER TECHNOLOGY. QUALITY BACKED BY 5/100 PROTECTION.**



EPA EST 18 MPG EST 26 HWY

Use EPA est. mpg to compare. Your info may vary with speed, distance, weather. Actual hwy. mpg & CR. Use 90. \* Base list price. Taxes and the dealer charges extra. Comparison. STANDARD EQUIPMENT LEVELS VARY.

BUCKLE UP FOR SAFETY

DODGE RAM D100





# WE GOT TO BE AMERICA'S BEST LANTERN THE HARD WAY.



The new Durabeam® lantern, with its brilliant 5" reflector, gives you a light that's 50% brighter than ordinary lanterns.

And Durabeam won't go to pieces when things get rough. It has a high impact resistant casing (which also floats).

a lens that's shatterproof, and a switch that's guaranteed for life.

Durabeam lights from Duracell, with the long-lasting Duracell® battery. They work when you need them.



**DURABEAM®**  
FROM DURACELL

It really works when you need it.

© 1983 Duracell, Inc.

## CAR CLINIC

(Continued from page 40)

loss, usually on acceleration but sometimes while cruising at highway speed. I realize this is a long shot, since you can't test the car, but is there anything in this car's history to explain the problem?—Ted Clark, Charleston, S.C.

About 20 years ago, some GM cars had a similar problem. Your Honda may be suffering the same ailment. My friends at Honda say that I could be right.

Accords (1976-78) and Civics (1975-78) with CVCC engines have an exhaust manifold with a liner that can loosen and partially block the exhaust system, causing loss of power. Drop the exhaust pipe and shine a flashlight into the manifold outlet. There should be nothing in the opening. If you see the liner, replace the manifold with a new one. For 1978 Accords and Civics, the part number is 80680; for 1977, 62898; and for 1976, 62690. The part number for the 1975 Civic CVCC engine exhaust manifold is 57569. If you do the job yourself, you'll need other parts that fit your particular exhaust manifold—a manifold gasket, heat riser gasket, two lower insulator gaskets, two O-ring seals and exhaust pipe nuts.

### PM CAR CARE

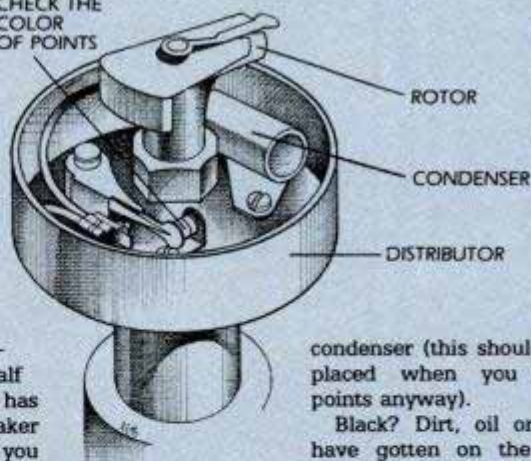


### Hey, look me over

According to the Champion Spark Plug Co., over half of the car population still has electromechanical (or breaker point) distributors. Did you know that the color of breaker points you remove can tell you much about what's going on?

Take blue. If points are this color, there's an electrical problem—probably excessive voltage (test the voltage regulator and primary resistance) or a defective

CHECK THE COLOR OF POINTS



condenser (this should be replaced when you replace points anyway).

Black? Dirt, oil or grease have gotten on the points. Maybe you used the wrong lubricant or too much lubricant on the distributor cam. Or maybe the PCV valve is plugged, which would force oil into the distributor housing.

Gray means that all is well. Replace the points if they're worn.

A second possibility is a plugged CVCC passage or valve. When this happens, the engine can behave just as a conventional engine would if it were excessively lean. In other words, it will stumble and hesitate on acceleration and will lack power and surge at cruise

ing speeds. The fix involves removal and cleaning of the auxiliary valve assemblies. You might be able to do this yourself if you have a Honda Service Manual. However, a special tool is sometimes needed to free the auxiliary valve assemblies.



## Flag waving

*The Oxygen (O<sub>2</sub>) sensor flag in our 1979 Buick Regal appeared, on schedule, at 15,000 miles. I installed a new sensor. It lasted only 5,000 miles before the flag again appeared. Why did this sensor fail so soon?—Robert Henning, no address.*

Whether the sensor has failed or hasn't failed is not a factor. The flag doesn't monitor sensor condition, it's merely a mechanical device that tells you when 15,000 miles have passed. The fact that the flag appeared after 5,000 miles suggests that it wasn't properly set, so reset it. Remove the instrument cluster lens and insert a pointed tool at an angle until it engages the flag wheel detent. Turn the flag wheel down until you feel three clicks. The flag is set to the correct position when a mark appears in the center of the window on the left of the odometer. If the flag flies again before the car goes 15,000 miles, there's a problem with the flag mechanism.

## Balky thermostat

*For two winters, I haven't gotten much heat from the heater of my 1981 Ford Escort. I replaced the thermostat after the first winter. It didn't help.—George Walters, Syracuse, N.Y.*

There are two types of thermostats that were used in these vehicles. Each is installed in an unusual fashion. If either type of thermostat was installed incorrectly, the symptoms you describe may result.

To check your thermostat, drain the cooling system to below the thermostat. Remove the thermostat housing and look at the 'stat. One type has a slotted hole in its side that must line up with a hole in the thermostat housing. The other type has tangs that must seat on the thermostat housing when the stat is turned to the right.

If your car is equipped with the slotted thermostat, make sure it's positioned correctly and reinstall the housing with a new gasket.

If your car is equipped with the thermostat that has locating tangs, turn it counterclockwise to remove it from the housing. If you find that the tangs were not engaged or that the thermostat was cocked, this was the likely source of the problem. Clean the thermostat and housing, then reinstall them. Use a new gasket (part no. E1FZ-8255-C). **PM**

## DO YOU HAVE A CAR PROBLEM?

*Just ask Mort about it. Send your question to the Car Clinic, Popular Mechanics, 224 West 57th St., New York, N.Y. 10019. While letters cannot be answered individually, problems that are of general interest will be discussed in the column.*

## SERVICE TIPS

■ You owners of VW and Audi cars may have heard there's a safety recall in progress. One involves brake line failure in 1975-80 Rabbits and Sciroccos built in Germany. German-built Rabbits have round headlights. Those built here, with square headlights, aren't involved. The other recall involves electrical failure in the fuel pump circuit of a fuel-injected engine. Vehicles to be repaired are 1976-82 Scirocco, 1976-80 Dasher, 1977-80 Rabbit, 1980-82 VW convertible and Jetta, 1980 VW pickup, 1976-79 Audi Fox and 1980-81 Audi 4000.

■ If your dealer determines that an oil leak from your 1983 GM two-liter L-4 engine is the result of a defective rear crankshaft oil seal, remind him that the two-piece seal he pulls from your car should be replaced with the one-piece seal that's being put into 1984 engines. There's a service bulletin in his files that pinpoints the correct way to install this seal. The bulletin number varies from one GM division to another, but it's dated October 1983.

■ An intermittent rough idle and/or stalling after cold startup with a 1984 Tempo or Topaz may be eliminated by installing a service diode harness assembly (part No. EOZY11A001-A) in series with the No. 32 start circuit at the starter relay. This fix applies to cars built before Sept. 15, 1983.

## The Dry Look holds today's look all day.



Available in pump or aerosol

Today's hair styles are neater, shorter and more natural. That's THE DRY LOOK® look. And THE DRY LOOK has a special 12-hour holding formula so you can keep that well-groomed look all day—even if you have fine or thinning hair. THE DRY LOOK hair spray. It keeps today's look looking good all day.

**The Dry Look.**  
12-hour holding power.



## "Catch of the Year" Sale!



### FREE \$400 BOAT with a new Coleman® Camping Trailer.

Here's an alluring offer worth over \$400 retail. A FREE Coleman Crawdad™ fishing boat.

- Made of tough RAM X® material—better than aluminum.
  - Stable enough for stand-up casting.
  - Weighs only 111 lbs.—transports on top of your car or camper.
  - Skims over water easily and quietly.
- Catch the Crawdad fishing boat and the new 1984 Coleman Camping Trailers at your local Coleman Dealer, today. He's in the Yellow Pages.

Coleman's "Catch of the Year" Sale only at participating dealers while promotional supplies last.

Send for your 1984 Coleman Trailer Brochure today. Include 50¢ for postage and handling. Mail to Dept. PM, The Coleman Company, Inc., Camping Trailer Division, Somerset, PA 15501.

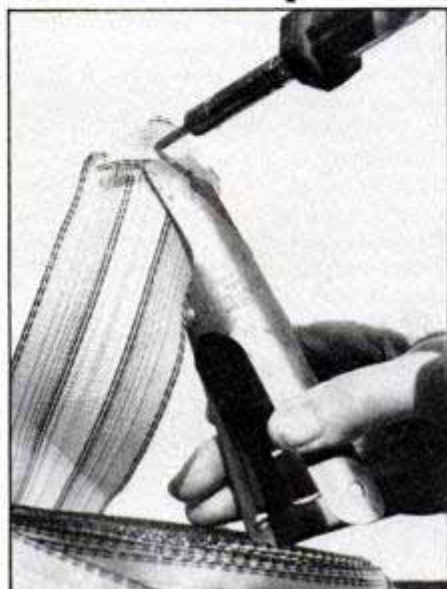
Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
Phone \_\_\_\_\_

Copyright 1984 The Coleman Company, Inc.



## HINTS FROM READERS

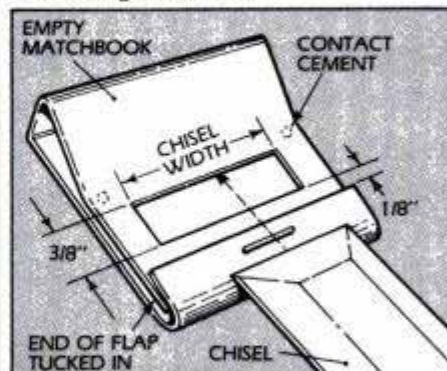
### Lawn furniture repair



When you're replacing the nylon webbing on an aluminum lawn chair, you can use this trick to prevent the screws from breaking the strands and causing them to unravel: Tuck over the corners of one end to form a triangle of three material thicknesses. Then, hold the end with a clamp and simply burn a hole through the three layers with a small soldering pencil.

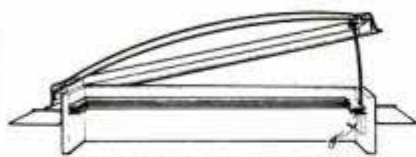
—Henry J. Fregly

### Chisel protector



Protect the cutting edges of wood chisels when they're out of their holders, or stored loosely in a toolbox: Cut a rectangular hole through the flap of a matchbook. Glue the flap with two spots of contact cement and tuck it into the book. Then insert the chisel all the way into the holder.—Gene Budd

## Skylighting with VENTARAMA®



Cutaway View of New LO-DOME™

#### FEATURES:

- Copper flashing
- Insulated dome, clear, bronze or white
- Manual, pole or motorized operator



attractive  
low silhouette

Give your home a light and airy atmosphere with VENTARAMA Skylights. VENTARAMA has 33 years' experience making skylit homes not only beautiful but problem-free.

Easy-to-use screen/storm panel system, silent motorization and pole or hand-crank operator will give years of easy carefree service.



**VENTARAMA® SKYLIGHT CORPORATION**

140 Cantiague Rock Road, Dept. PM34, Hicksville, N.Y. 11801 (516) 931-0202





Go on line in the world's fastest growing technology.

## NEW! DATA COMMUNICATIONS TRAINING FROM NRI

Practical training includes computer, modem, test instruments, and access to exclusive NRI communications network

Satellites... microwave... fiber optics... dedicated land lines. Suddenly the world is communicating in a new and different way, via digital data systems. People talking to computers... computers to computers... information is stored, retrieved, and relayed in nanoseconds. And an entirely new kind of communications is born.

### Industry, opportunities to triple

Data and telecommunications is already a \$150 billion industry and is expected to triple over the next five years. One typical company has grown from \$85 million to \$650 million... a 765% growth since 1978 alone. The need for qualified technicians to install, maintain, and service this enormous investment in high-tech equipment is tremendous even now. Opportunities and salaries can go nowhere but up and up.

### NRI will train you at home

You can learn at home in your spare time to become a data communications technician with NRI at-home training. NRI will start you with the basics, build upon your knowledge with easy-to-follow, bite size lessons to take you into the world of digital data communications. You'll learn what it takes to work on satellite, microwave, fiber optic, and telephone data links.

And you'll learn at your own comfortable pace, without classroom pressures or evenings away from your family. Over the past 70 years, NRI has taught the latest high-tech skills to almost 2 million students to become the world's largest and most successful school of its kind.

**Hands-on training includes computer, modem, breakout box and much more**

NRI takes you far beyond "book learning." As part of your course, you receive plenty of practical hands-on training that gives you real-world skills. You get the Radio Shack Color Computer, with 16K memory to teach you the systems and language of data communications plus you get an operating modem to let you tie in with world-wide communications networks.

You build your own RS-232C interface breakout box, an indispensable installation and trouble-shooting instrument you'll use throughout your career. You receive a professional digital multimeter and the NRI Discovery Lab, where

you construct solid-state circuits and demonstrate practical applications of the theory you've learned.

### Learn on-line with the exclusive NRI data network

You'll learn what data communications is all about by actually becoming part of an operating network. Using your computer, modem, and terminal software, you'll go on line to "talk" to your instructor, take your

exam by computer link, communicate with other NRI students and leave messages on the NRI "bulletin board."

As part of your course, you'll also receive membership in THE SOURCE<sup>SM</sup>, a regular \$100 value. A phone call ties you into computers loaded with instant news, stock quotes, electronic mail, educational programs, games, even discount shopping and travel reservations.

### Move into the future, send for Free Catalog

You can't find training like this anywhere else... only NRI trains you at home for an exciting and rewarding career in the brilliant new world of Data Communications. Mail the postage paid card right now for our big catalog of high-tech electronic careers showing all the equipment you get, detailed lesson descriptions, and career opportunities. Look it over and decide where you want your future to grow. Act now. There's a real need for trained data communications technicians.

Training includes all this equipment you keep... 16K computer, modem, breakout box, digital multimeter and the exclusive NRI Discovery Lab.



### NRI SCHOOLS

McGraw-Hill Continuing Education Center  
3939 Wisconsin Avenue  
Washington, D.C. 20016

**WE GIVE YOU TOMORROW.**

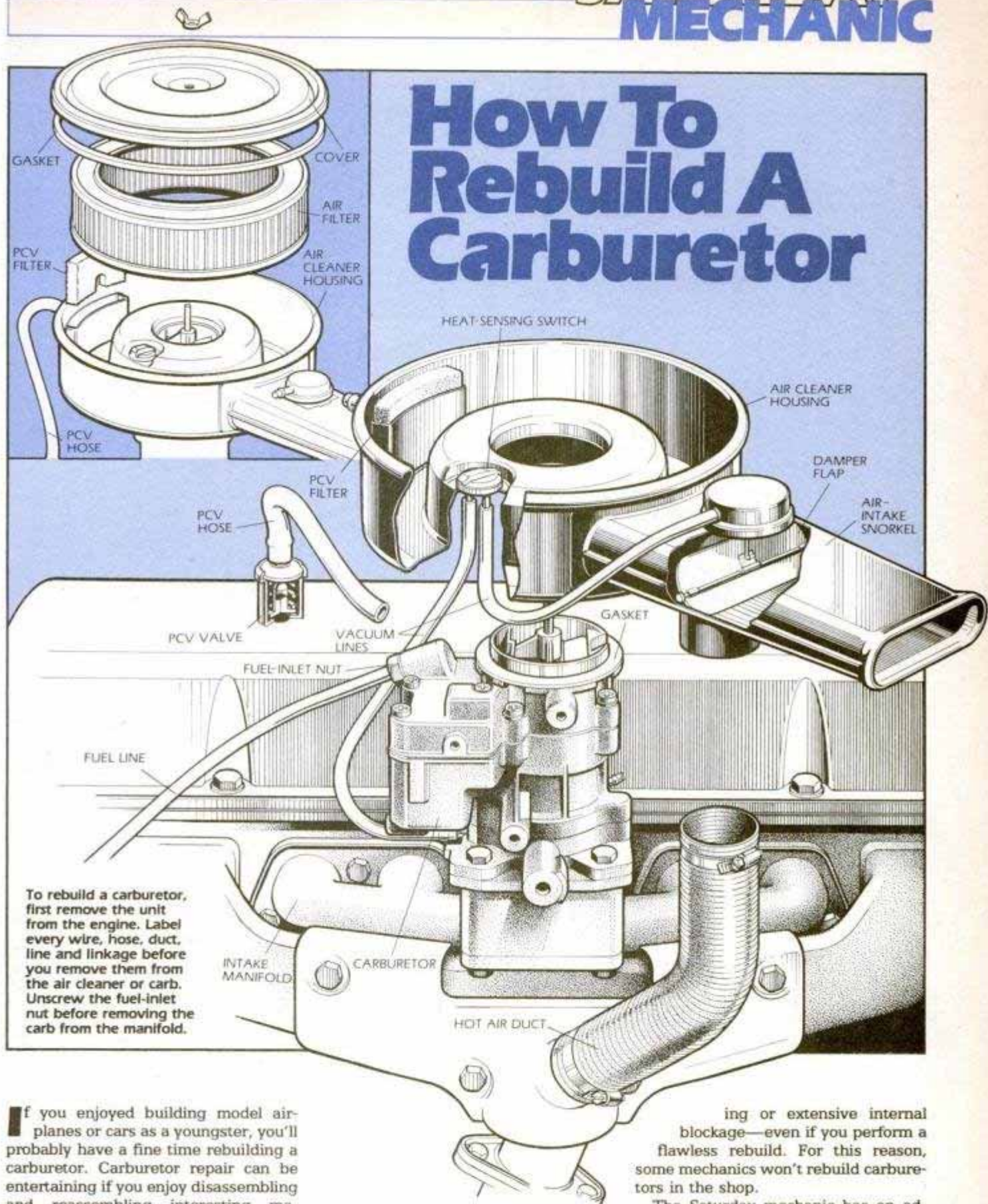
TRS-80 is a trademark of the Radio Shack division of Tandy Corp. SM a service mark of Source Telecomputing Corp., a subsidiary of the Reader's Digest Association, Inc.







## How To Rebuild A Carburetor



To rebuild a carburetor, first remove the unit from the engine. Label every wire, hose, duct, line and linkage before you remove them from the air cleaner or carb. Unscrew the fuel-inlet nut before removing the carb from the manifold.

If you enjoyed building model airplanes or cars as a youngster, you'll probably have a fine time rebuilding a carburetor. Carburetor repair can be entertaining if you enjoy disassembling and reassembling interesting machines. With the price of some rebuilt carburetors hitting the \$200 or \$300 mark, the idea of doing it yourself is considerably more appealing.

There is one principal disadvantage to rebuilding your own carb: It may not work when you're finished! As me-

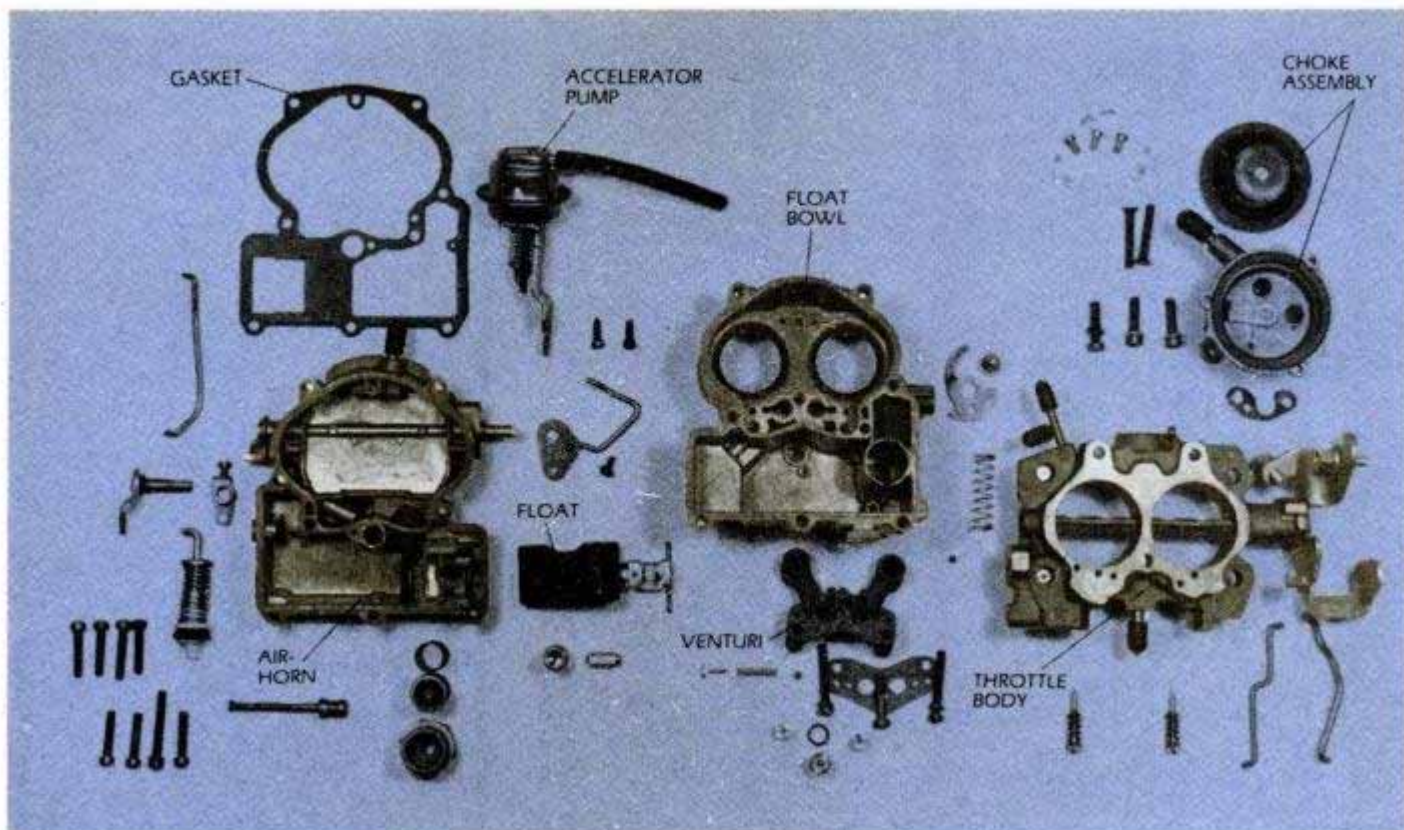
chanics well know, there's no guarantee of success when you rebuild a carb without testing it on a flow bench as major rebuilders do. The carb could fail to work properly due to a porous cast-

ing or extensive internal blockage—even if you perform a flawless rebuild. For this reason, some mechanics won't rebuild carburetors in the shop.

The Saturday mechanic has an advantage here. You know the pitfalls going in, and if you're willing to take a chance, you can save a lot of money by rebuilding your own carb.

Another factor to consider before you decide to do it yourself is the complexity of the carburetor in question. The



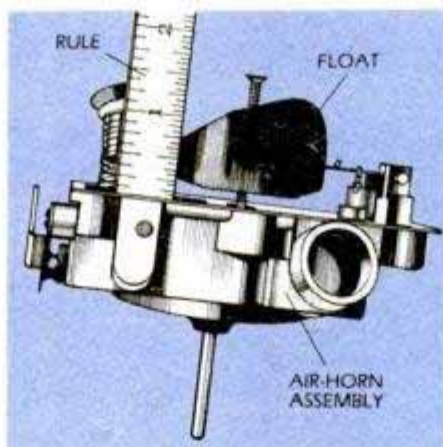


This photo of a disassembled Rochester 2GC shows three main body components (air horn, float bowl and throttle body) surrounded by removable subassemblies, gaskets, jets, check balls, screws and linkages. Replace old parts with new ones in kit.

novice carburetor mechanic should avoid some of the more complex designs, such as the Rochester Quadrajets or the Ford Variable Venturi carbs, which require special tools for accurate setup.

Some of the most commonly used carburetors, however, are also the most simple. Included among them are the popular Rochester 2GC and 2GE, which are found on millions of GM cars produced in the last quarter century; the various one-barrel Carter, Rochester and Holley designs; the newer GM 2SE and E2SE Rochester two-barrels; the Autolite four-barrels found on many mid-'70s Ford and Mercury V8s; the Carter Thermoquad and AFB four-barrels found on some Chrysler V8s and virtually any other carb that doesn't have a tremendous number of components or special systems.

Before you even consider taking your carburetor off the intake manifold, you should have carefully diagnosed your engine performance problem. Fuel system troubles are sometimes easily confused with other types of engine performance problems. The best mechanics never try to repair an engine by throwing new parts at it until they get lucky.

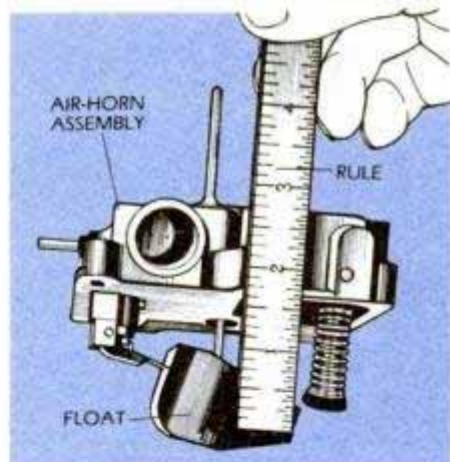


Float level is usually checked with the air horn inverted. Use steel rule or gauge in the kit to measure and adjust the float level.

Instead, they logically and systematically attempt to eliminate possibilities until they locate the true culprit. Our November 1982 *Saturday Mechanic* outlined a plan for fuel system diagnosis.

Remember, too, that all fuel system problems are not carburetor problems. Incorrect fuel mixture—both rich and lean—can be caused by a malfunction somewhere else in the fuel system, so a test of fuel pump pressure and output (as described in that November issue), should precede any attempt to repair your carburetor.

If your fuel tank is contaminated to the point where you must change fuel



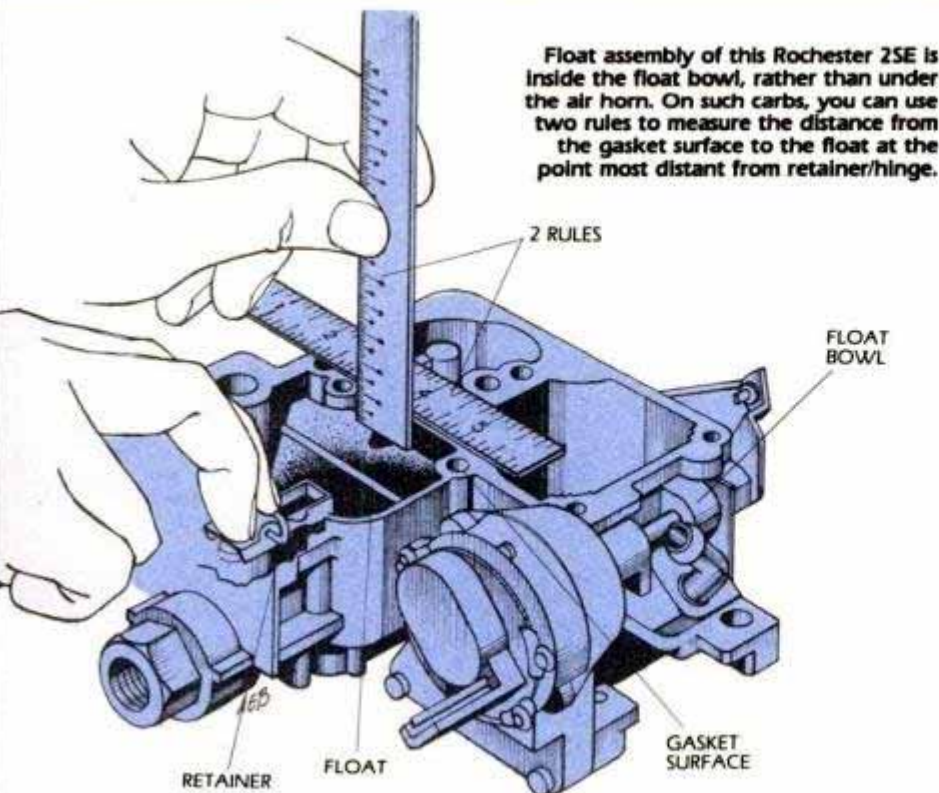
Float drop is checked with air horn upright. On most carbs, drop can exceed specs if needle doesn't wedge against float.

filters frequently, have your tank professionally removed and cleaned before beginning other repairs.

### Carburetor removal

The first step in the repair procedure is the removal of the carburetor from the car. Begin by removing the air cleaner. Most air cleaners have a vacuum line for control of the hot air system. This line connects to a manifold vacuum source. Disconnect the line from the air cleaner's thermal valve. Mark it with a color-coded or number-coded piece of tape, so you won't confuse it with other vacuum lines that will have to be disconnected. Disconnect the hot





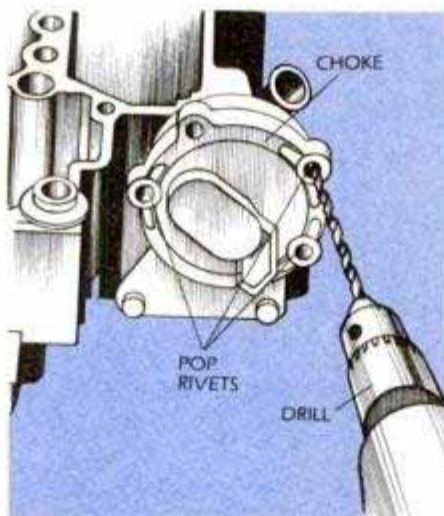
Float assembly of this Rochester 2SE is inside the float bowl, rather than under the air horn. On such carbs, you can use two rules to measure the distance from the gasket surface to the float at the point most distant from retainer/hinge.

air duct that runs from the exhaust manifold to the air cleaner and remove the entire air cleaner assembly from the engine compartment.

With the air cleaner removed, study the carburetor and note any linkage, wire or hose attachments that will have to be disconnected before the carb can be lifted from the engine. Mark the vacuum lines—you'll find at least one more in addition to the one you've already removed—remove them and lay them aside. If there's more than one wiring connection, mark them as well before you disconnect. The throttle linkage and transmission shift valve linkage (on cars with automatic transmission) are usually secured by circlips or ball-and-socket connectors. Remove these, taking care not to lose any clips. If the carburetor has a manifold-mounted choke heater, you must disengage the choke linkage, as well.

The next step is disconnecting the fuel line. Place a rag under the fuel line connection to catch spilled fuel. Then, using a tubing wrench that provides a secure grip, loosen the fuel-line nut. Use an open-end wrench to hold the fuel-inlet retainer nut, which is part of the carburetor. If you don't, you might twist the fuel line. If you don't have a tubing wrench, you can try loosening the fuel-line nut with an open-end wrench, but you might round it off. If you do that, use locking pliers to remove it, and then replace it.

Once the fuel line has been discon-



Cover is attached to the choke housing with rivets, rather than screws, on late-model carbs. Drill out rivets to remove the cover.

nected, loosen the fuel-inlet retainer nut while the carb is still on the engine. This will save you having to wrestle with it on the bench. Then, loosen and remove the four bolts securing the carburetor to the intake manifold. You'll probably have to use a box wrench on most of them. Don't use an open-end wrench unless you have to because of limited access.

With the carburetor off the car, examine it until you find a model number. It might be stamped or printed on the float bowl, or it might be on a small metal tag secured by one of the float bowl screws. Determine the make and

model of the carb, such as Rochester 2GC or Carter BBD.

Armed with this information, head for your local parts store. (If you have trouble finding the model and ID number, take the whole carburetor with you.) Ask the counterperson for a rebuilding kit. Make sure the kit comes with instructions before you purchase it. The instructions should include an exploded view of the carb, which demonstrates how the parts fit together, plus instructions for making the various adjustments, and a list of specs for the different cars on which the carb is used. It may not include specific step-by-step assembly and disassembly procedures, but it should, at least, include a list of the various components that indicates the order of removal and reassembly.

While you're at the parts store, buy a new fuel filter and—unless you have access to a carb-dip cleaning tank—a can of engine degreaser spray.

Find a large, well-lighted work area before you even open your carb kit. Kitchen tables are great, but the rest of the family will undoubtedly object to the gasoline odors that will permeate the house if you do the job indoors. A basement or garage workbench is best.

Open the carb kit, examine the instruction sheet and familiarize yourself with the parts included in the kit. You'll find a variety of gaskets, some new clips, some little steel balls, a new needle and seat assembly, a new accelerator pump (in most cases) and a gauge for measuring float height adjustments.

## Carb disassembly

Begin the disassembly procedure in the order prescribed in the instruction sheet. You'll probably begin with the fuel-inlet retainer nut (which you've already loosened) and proceed to disconnect the various linkages (accelerator pump, choke, fast idle) that join the bottom half of the carb to the top half, or air-horn assembly.

Many carburetors are equipped with a choke housing that contains a thermostatic coil. On most late-model carbs, the cover of this housing is secured with rivets to prevent tampering with the choke adjustment.

To remove a choke cover that has been riveted to its housing, drill the head of each rivet until it falls off. GM specifies a No. 21 drill bit for removal of the cover on many of its Rochester carbs. Once the head has fallen off the rivet, drive out the shank of the rivet with a small drift.

After you've completed all the pre-



liminary disassemblies, the instructions will probably direct you to remove the air-horn screws and air-horn assembly. Next will be the float assembly and accelerator pump. These parts are frequently attached to the underside of the air horn, although they are located in the bottom, or float bowl, half of the carb in some designs.

The float bowl will contain the metering jets, some check balls and, in many cases, a power valve assembly. All of them will be removed. In many cases, the float bowl can be disassembled from the throttle plate beneath it.

The idle adjustment screws are located in the throttle plate. On many late-model carbs, they're tamper-proof. You may have to remove a plug to gain access to the idle mixture screws.

Once the carb has been completely disassembled, examine the float. If it's made of brass, shake it to see if there's fuel inside. If there is, the float has a leak and must be replaced. If the float is plastic, you should replace it as a precaution. Some plastic floats absorb gas with time and become too heavy. This can affect performance. If you have a float scale and a list of specs, check it. Otherwise, it's best just to replace it. Most parts stores carry a wide range of replacement floats.

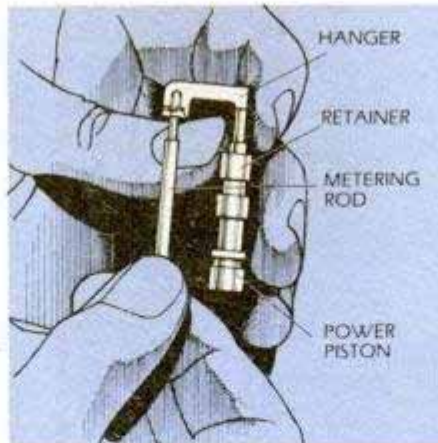
## Cleanup and reassembly

The cleanup procedure is the worst part of the rebuilding job. Mechanics immerse the metal parts in a chemical cleaner, known as carb dip, for an hour or so. Then they rinse the parts in water and dry them with compressed air. This cleaner can be used for other part-washing jobs, so it might not be a bad idea to purchase a small container.

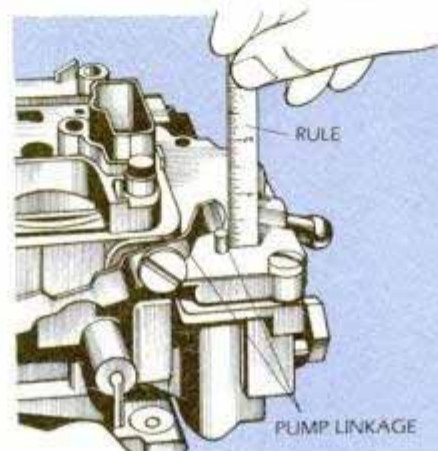
You can also use a drain pan and a spray can of carb cleaner. Simply lay the parts in the pan, spray them and let them soak for 10 or 20 minutes. Renew the spray if it starts to evaporate. Then rinse the parts in hot running water and blow them dry if possible with an air compressor, not a hair dryer. Blow drying is important because you can direct the air into the various passages, insuring that they're not blocked. If you don't have an air compressor, buy a can of the compressed air sold in camera stores for cleaning photo equipment.

If the parts aren't clean after one treatment, repeat the procedure. Cleaning is probably the most important part of a rebuild. Many carb failures are the result of dirt.

Once cleanup is complete, examine all parts for cracks or porosity. If the carb is equipped with a power valve



Scored or corroded power piston on ZSE can be polished lightly with crocus cloth. Replace any damaged metering rods.



Kit will contain instructions for adjustments that must be made after reassembly. Here, pump linkage of a ZSE is set to specs.

piston or metering rod piston (see your parts list), examine it for scoring or galling. You can polish it lightly with crocus cloth. Don't attempt to polish the metering rod itself or to straighten a bent metering rod. Damaged metering rods must be replaced. This is usually not a parts store item, but many new car dealers' parts departments do stock individual carb components.

Reassembly usually begins with the installation of the needle valves in the throttle plate assembly. Screw them in only until they are finger-tight, then back them out two to four turns as an initial idle adjustment (or as indicated in your carb kit instructions).

Before you're very far into the reassembly, you'll be installing the float and needle seat assembly in the air horn. At this point, you must make the float adjustments. You'll find specs and instructions for this job in the adjustment section of the instruction sheet.

Generally there are two adjustments: Float level is adjusted with the air horn inverted and the needle seat in a closed position. (This is probably the most crit-

ical carb adjustment of all.) The other float adjustment is usually called float drop, and it's made with the air horn in an upright position. In this case, you may not have to be quite as cautious, as an amount in excess of the spec is okay, as long as the float will retain the needle without binding at maximum drop.

When you reinstall the air horn on the float bowl assembly, make sure you don't knock the float out of adjustment. If the carb has a piston-type accelerator pump that hangs from the air horn, make sure it fits properly into the pumping chamber in the float bowl.

## Adjustments

Once you have completed the reassembly procedure, you'll have several adjustments to make, most of which can be done with the carb off the car. These will include a choke adjustment, fast idle adjustment, vacuum break adjustment and a choke unloader adjustment. (On carbs that are more than 10 years old, you may have fewer adjustments to complete.)

Perform each adjustment in exactly the manner described on the instruction sheet. This will make a tremendous difference in driveability.

On some late-model GM carbs, like the ZSE and E2SE, you will need a choke angle gauge to make certain adjustments. However, you can complete enough of the adjustments without this tool to get the car running. Then, if you'd rather not invest in this specialized but inexpensive tool, you can take the car to a mechanic for the adjustment.

Even if you can complete all the adjustments yourself, you may want to take the car to a competent engine mechanic for final adjustment of the idle mixture—particularly if your state has an annual inspection program. A few degrees of adjustment on an idle-mixture screw can make or break the emission inspection.

When you have reassembled the carburetor, reinstall it on the intake manifold and properly reconnect all the wires, hoses, ducts, lines and linkages that you labelled and disconnected in the beginning. Then reinstall the air cleaner and its vacuum lines.

Unless your car has an electric fuel pump, it will not restart until the engine has turned over enough for the mechanical pump to fill the float bowl. Prime the carburetor by dumping a few spoonfuls of gasoline (one at a time) down the carburetor throat until the engine will start and run without stalling. **PM**





## The longer you drive your car... The more you'll like Exxon motor oil.

Today, your car's engine not only has to work harder, it may also have to last longer. So make sure your motor oil can go the distance. Exxon offers a full line of high-quality motor oils, like Exxon Extra™ with special anti-wear additives for engine protection and special friction-modifiers to improve gas mileage.

And every one of these oils measures up to API SF, the oil industry's toughest protection

standard for gasoline engines.

Choose from these four quality Exxon oils: Exxon Extra 10W-40 and super-premium Uniflo® 10W-40 for gasoline engines; Exxon Extra 10W-30 and straight-grade Exxon Plus™ for both gasoline and diesel engines.

Help keep your engine in the prime of life with Exxon motor oil.



Look for Exxon oils in new, easy-to-use, 1 quart side-pour bottles and easy-to-carry shrinkwrapped cases of twelve 1-quart cans.



Quality you can count on.



### Benchtop milling

Now there's a portable precision milling machine that's designed for benchtop use. It's the Model 850 by Electro-Mechano, 241 East Erie St., Milwaukee, Wis. 53202. The compact unit can be used by modelmakers, metalworkers and electronics hobbyists to produce small parts with critical tolerances. The 32-in.-high machine is powered by a 1,725-rpm, 1/8-hp motor and has five spindle speeds from 380 to 5,200 rpm. It mills a variety of materials, including aluminum, iron, steel, bronze and sheet acrylic. The Model 850 is available from the maker for about \$1,485.



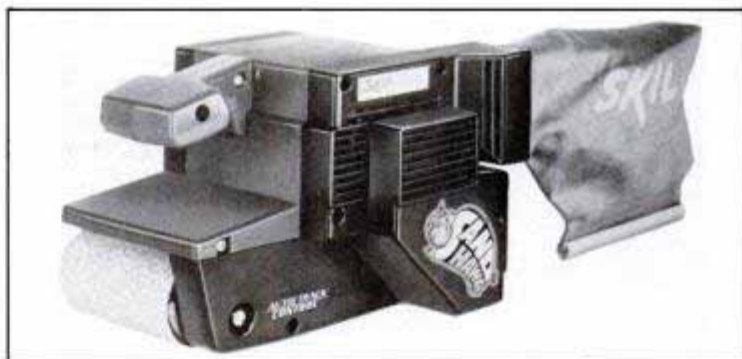
### Super stapler

The unique shape of this electric stapler permits stapling to within 1/8 in. of walls and corners. Other features include a power knob to control staple driving force and a trigger lock to prevent accidental discharge. It's sold at hardware stores and home centers for about \$35. Contact Parker Manufacturing Co., 149 Washington St., Worcester, Mass. 01613.



### This beast is a beauty

A powerful 4 x 21 3/4-in. belt sander has been introduced by Skil. The 1 1/2-hp sander features a patented Auto-Track system which Skil claims will keep the sanding belt aligned to eliminate adjustments during operation. The flat-top design allows the tool to be inverted and clamped to a workbench so that it can be used as a stationary sander. A bench clamp accessory kit (No. 14008) is available from Skil. The Sand Hawg sells for approximately \$225. For more information, you should contact Skil Corp., 4801 West Peterson Ave., Chicago, Ill. 60646.



### Surface preparation



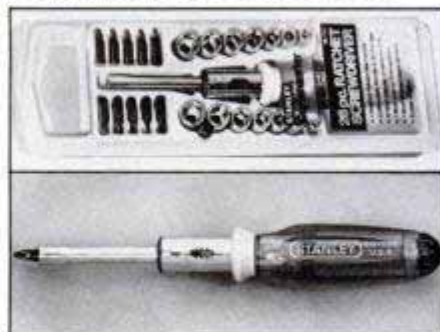
Three stripping and finishing pads made of nonwoven synthetic material are offered by 3M. The stripping pad is used with chemical paint and varnish removers. Clean and brighten metal surfaces with the metal finishing pad. The wood finishing pad is used to apply furniture oil, stain and varnish. Each is about \$1. Contact 3M, Building 223-4S, St. Paul, Minn. 55144.

### Portable power



GTO Electronics, 430 Ritt St., St. Peter, Minn. 56082, introduces the PACS-1500 (\$1,495) portable a.c. power inverter which provides 1,500 watts of continuous power from a 12-v. battery. The solid-state inverter is claimed to be lighter, quieter and more reliable than gas generators. It's for boats, recreational vehicles and homes. Write to the maker for more information.

### Ratchet screwdriver



The Stanley Workmaster ratchet screwdriver comes with 24 interchangeable tips: 10 screwdriver bits, seven inch sockets and seven metric sockets. A three-position switch allows you to turn screws using a ratchet action, or it locks for use as a standard screwdriver. It's about \$30. Write to William Shanahan, Stanley Works, Box 1800, New Britain, Conn. 06050. **PM**



# SEARS ANNOUNCES HEAVY-DUTY SAVINGS FOR YOUR LAWN AND GARDEN.

## SAVE \$400

**THIS SEARS CRAFTSMAN®  
GARDEN TRACTOR IS  
NOW ONLY \$1699.99.**

This tough 18-HP tractor does it all! Its six speed trans-axle lets you pick the right power and speed for the job. And it hooks up to our full line of sleeve hitch attachments—so you can do everything from plowing to mowing to snow blowing.

## SAVE \$100

**THIS SEARS CRAFTSMAN  
3½-HP REAR-TINE TILLER  
IS NOW ONLY \$499.99.**

It's the lightweight tiller with the heavy-duty power. The secret is in its efficient chain driven Counter Rotating Tines. And with its self-propelled wheels, handle-mounted controls, and eight-position depth stake, you get easy handling in most soil conditions.

## SAVE 15%

When you buy Sears Tractor or Tiller Attachments.

15% off regular price of any Sears Tractor or Tiller Attachment when you bring this coupon to a Sears retail store (this offer is also available through the Sears Catalog).

Hurry! Offer ends March 24, 1984. Only one coupon valid per purchase. Cash value 1/20¢.



**ON SALE MARCH 1-24, 1984.**

Mower attachment not included with tractor.  
Prices and dates apply only to the continental United States except Alaska.  
Available in most Sears retail stores.  
© Sears, Roebuck and Co. 1984

*There's more for your life at*  
**Sears**



# PM OWNERS REPORT:

BY MICHAEL LAMM, West Coast Editor

## MAZDA 626

"A fun car to drive. Handles very well."  
—IDAHO AUTO JOBBER

"Especially impressed by all the features that were standard equipment."  
—MISSOURI MINER



"Hubcaps fall off because the 'keeper' clips don't hold."  
—CALIFORNIA ACCOUNTANT

"The car has been magnificent. I recommend it to everyone."  
—MARYLAND SALESMAN

"Roof is very low."  
—NEW YORK OPERATIONS MANAGER

Buyers love its looks and economy, but report some mechanical glitches.

No doubt about it. Owners *do* like the way the new Mazda 626 looks—the sloping hood, rakish windshield, low roofline, clean proportioning and the car's overall sportiness.

"The 626 succeeds in appearance where most others fail," a Wisconsin retailer wrote at the bottom of his questionnaire. "It doesn't look like an econobox. The only compact sedan that comes close in terms of sleekness and distinctive, contemporary styling is the new Audi 5000."

A Maryland printer was among the many who agreed: "It's as beautiful on the inside as it is on the outside. In my

### A NATIONWIDE SURVEY BASED ON 2,186,865 OWNER-DRIVEN MILES

opinion, the 626 is the best-looking car on the road today."



The interior is packed with standard items, such as power steering and a tilt wheel.



Five-door Touring Sedan is a head-turner. Owners we surveyed raved about its looks.

Most buyers mentioned appearance as the 626's strongest selling point, but they were also well aware that there's more to this car than meets the eye. For one thing, the 626 comes as a handsomely loaded automobile, particularly in the Luxury series (there's a 626 Deluxe—the base model—and an up-market Luxury 626, both available in all three body styles). The full list of stan-

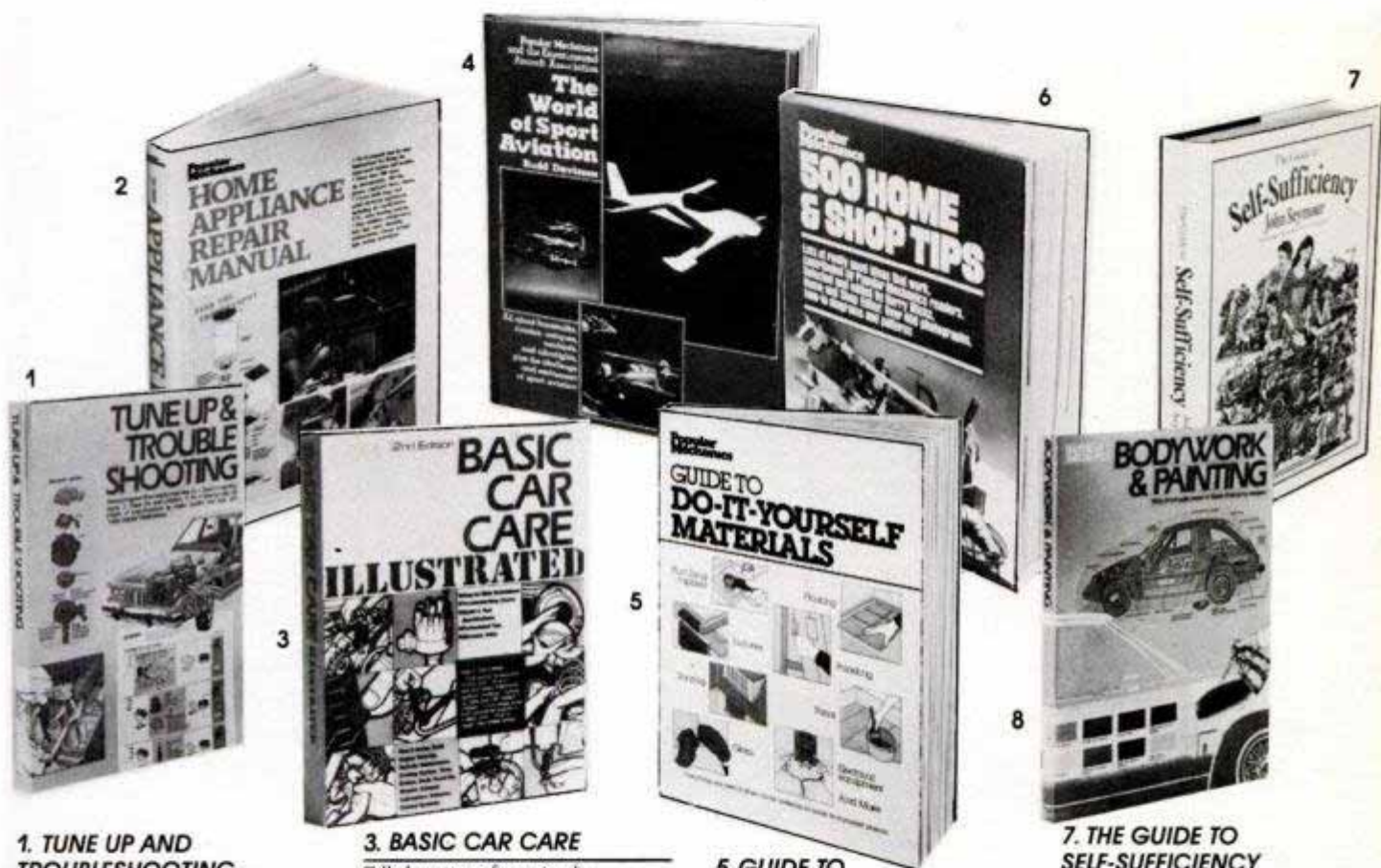
*(Please turn to page 157)*



# Build your own library with Popular Mechanics Books

**PRACTICAL TIPS AND INSTRUCTION  
FROM THE EDITORS OF POPULAR MECHANICS**

Step-by-step, fully-illustrated POPULAR MECHANICS' BOOKS are complete manuals of information and practical advice.



## 1. TUNE UP AND TROUBLESHOOTING

Over 50 pages of charts, showing how to trace and solve most common problems. Covers all modern U.S. cars and four most popular imports including pickups, vans, four-wheelers, and diesels. Over 90 pages of tune-up specifications for U.S. models from 1974-1979 plus Datsun, Toyota, Rabbit and Beetle. (B-1757, \$19.95 - B-1757A, paper \$11.50)

## 2. HOME APPLIANCE REPAIR MANUAL

Provides step-by-step repairs for more than 50 different kinds of appliances. More than 800 photographs, 200 diagrams and charts. Lists appliance part suppliers. Gives a basic introduction to electricity and instructions for operating electrical testing equipment. Illus. (B-1752, \$23.50)

## 3. BASIC CAR CARE

Tells how to perform simple maintenance checks, prevent or delay breakdowns, do tune-ups, handle basic repair jobs. Highly illustrated with clear-as-crystal photos, diagrams, and drawings. Covers electronic ignition, diesels and front-wheel drives. (B-1756, \$19.95 - B-1756A, paper \$13.00)

## 4. THE WORLD OF SPORT AVIATION

The focus is on four basic types of sport aircraft - homebuilts, antiques and classics, warbirds, and ultra-lights - explaining the state of the art in each category. Discusses the types of materials used, space requirements, engines, certification and safety. Lists various organizations one can join. This book brings to life the thrilling world of sport aviation. 32 pages of color illustrations. (B-1755, \$24.00)

## 5. GUIDE TO DO-IT-YOURSELF MATERIALS

Provides answers to every do-it-yourselfer's questions about materials and supplies used for home improvement projects. Discusses lumber, millwork, plywood, hardboard, siding, plumbing, and electrical supplies. The only up-to-date reference work that furnishes complete information on the thousands of standard building products available today. (B-1759, \$8.95)

## 6. 500 HOME AND SHOP TIPS

Here's a ready reference for solving all home, shop and craftsman problems. Eight chapters cover areas where most of us need help: improving workshop techniques, painting, yard care, metalwork, home emergency plumbing and electrical problems. (B-1754, paper \$12.95)

## 7. THE GUIDE TO SELF-SUFFICIENCY

Practical advice on being totally or partially self-sufficient in every way. Over 600 2-color illustrations show step-by-step how to do it. Learn to brew beer, bake bread, pickle onions, design a diary, convert to solar energy, build a slaughterhouse or spin yarn. (B-1753, \$18.95 - B-1753A, paper \$10.00)

## 8. BODYWORK AND PAINTING

This is the first book whose table of contents was designed to match the needs of rapidly growing do-it-yourself market. It shows how to save time and money by doing your own work. Step-by-step illustrations, 16 pages of photographs, including color matching, pinstripping techniques and custom designs. (B-1758, \$19.95 - B-1758A, paper \$12.95)

**TO ORDER**, use the "B" numbers and send check or money order to POPULAR MECHANICS, Box 1014 Radio City Station, New York, NY 10101.

Popular Mechanics is a publication of Hearst Magazines, a division of THE HEARST CORPORATION.



# PM ELECTRONICS MONITOR



## New circuit to foil thieves

Your new car stereo keeps you rocking all the way to the shopping center. You park your car and duck into the store to buy a few new tapes. When you come out again, your car's dashboard is mangled, your new car stereo is just a memory and the tapes you've just bought won't be played until the insurance company comes through with a replacement stereo.

If you've ever had expensive electronic equipment stolen, you know the aggravation. But a new device called the "Kaish Circuit Lockout" may end theft of such items by making components such as car radios, even telephones and TVs, useless to all but their original owner.

The Kaish circuit involves encoding a computer chip within the appliance's microprocessor innards. The owner of the device enters his own code into the circuit and that code vanishes when the power to the unit is even temporarily cut off. Without the enabling code, the

appliance cannot be made to work again other than with strictly controlled equipment at the factory.

Here's a rundown on how the proposed system could work to help save some of the millions of dollars lost each year.

A radio is manufactured and a factory code is inserted into the circuit. This factory code is inserted by automated equipment rather than by humans who might "spill the beans." Then an access code is placed into the Kaish circuit. This code is supplied to the consumer, who takes the unit home and installs it in his car.

The user enters his personal code after deleting the factory's access code. This personal code is entered by using the controls already on the unit—pressing, pulling and turning them in various ways.

At this point, if power is cut by a thief stealing the radio, the personal code is wiped out. And there are millions of

possible code combinations. If the consumer, on the other hand, forgets his code and breaks the power connection, he would have some recourse. The factory code could be enabled if the unit were sent back to its point of manufacture. Obviously, the one weak link in this chain is assuring that the manufacturer is able to keep the factory code secret.

According to International Electronic Technology Corp. (the maker of the Kaish circuit), it should add only about \$5 to the expense of manufacturing a radio.

In order for this to work, the majority of radios would have to have the circuit installed. After all, even if you know the thief will not be enjoying your radio, you still don't want to be left without a radio yourself, and with a damaged car. The idea must be for this circuit to become so widespread that thieves *know* they will not be able to enjoy or sell their ill-gotten goods. Only then will the Kaish circuit be a real lockout.

## Phone FORTH

If you've ever wanted to experience the FORTH programming language, but didn't want to spend the cash before knowing if you'd like it, get on your computer and modem and call (415) 538-3500. You'll reach an electronic bulletin-board system called the FIG-Tree run by the Forth Interest Group. There, you'll meet—electronically—with Forthites of every persuasion. Or, if you don't have a modem, call (415) 962-8653 to talk to an actual human.

## Hands-off mouse

Mice are big in computers these days—not the furry kind, but devices that are rolled about on the desktop or atop a special pad. These rolling devices enable the computer user to point at various spots on the screen, or to enter commands without touching the computer's keyboard.

But mice, like all of us, have a problem in that overwork might make them sickly. Moving parts and the accuracy of the rolling surface's circumference all join to contribute to the latest dread

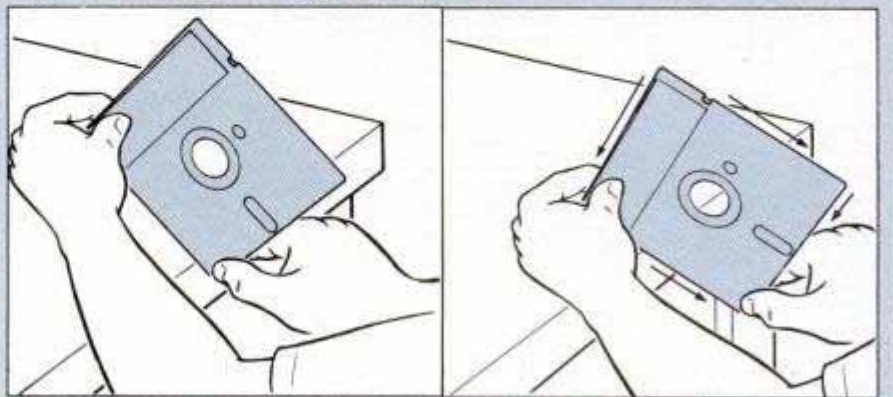
of the computerist: mouse failure.

Now comes the solid-state mouse. Announced by Volks Communications of Long Lake, Minn., this new mouse is only a flat pad of transducers. Just by moving your fingertip on top of the pad

you achieve the same results as you would using an old mouse.

Of course, a flat pad does not have quite the cuteness ratio of a mechanical rodent. Things could still roll either way. **PM**

## First Aid For Computer Disks



If a floppy disk won't boot (start up), it may not be moving within its jacket. Carefully grasp the disk by two corners and hold it upright on the edge of a desk

(above, left). Press lightly and draw the edges of disk along desktop (right). This will flatten edges back into shape long enough for you to recopy data.



# Yamaha oil injection. When we say it's better, we're not blowing smoke.

Blue smoke and outboard motors have long been associated. It's unsightly, for sure, but an oil-rich mixture also diminishes performance and increases operating expenses.

That's why Yamaha has introduced Precision Blend™ oil injection on new outboards from the 40-horsepower electric-start model on up. That's the widest range of oil-injected outboards you'll find. And our system has proven itself for more than 20 years on our other 2-cycle engine products.

Precision Blend varies the fuel/oil ratio from 200:1 to 50:1 based on engine rpm and throttle position. Oil is injected behind the carburetors

directly into the manifold. That means the system can instantly respond to a change in engine speed or load.

Other manufacturers are playing catch up with systems that premix the fuel and oil in front of the carburetors, which means there's a lag time before the correct mixture reaches the combustion chamber.

Check into the new Yamaha line, from 2 to 220-plus horsepower. Our advantages will become clearer when you don't see your money going up in smoke.



Oil is injected directly into the manifold so there's no lag time in achieving the correct mixture. This method also insures that oil won't gum up the carburetor.



The crankshaft-driven pump delivers the correct amount of oil based on throttle position and rpm.

# YAMAHA

PRECISION BLEND

For your nearest dealer, call  
1-800-447-2882

OUTBOARDS by  
**YAMAHA**  
EXPECT A LOT.



# Install A Pass- Through Window In Your Pickup

BY WADE HOYT, Auto Editor



Pass-through window has sliding panes that allow access between pickup bed and cab.



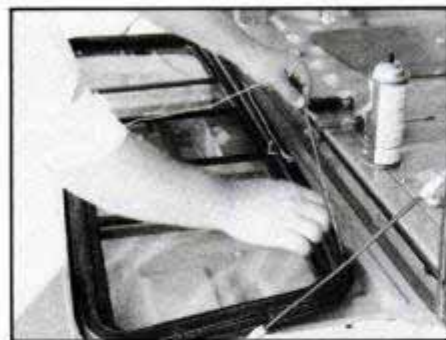
**1** The tools you will need to remove the standard, flat window on the pickup truck and install a new one include an ice pick with a bent tip, a screwdriver, silicone spray and about 15 feet of nylon cord.



**2** Use the screwdriver to pry the rubber molding away from the inside of the window glass. Be careful not to damage the molding. A good push from inside the cab will then pop out the stock glass.



**3** Carefully remove the rubber molding from the stock window and fit it onto the replacement pass-through window. The next step in the process is to spray the rubber molding with silicone lubricant.



**4** Now you should insert the nylon cord into the groove that surrounds the rubber molding. Make certain that the ends of the cord cross at the top center of the window. Tie a loop at one end of the cord.



**5** Install the replacement window in the cab opening and carefully pry the inner lip of the molding over the sheet metal. Use the ice pick to fish out one end of the cord. Pull out the cord to seat molding.



**6** A flexible vent window is installed in a pickup truck in the same manner. This window has flexible glazing in a rigid frame. The push latches hold the outer edges of the window open for ventilation.

If your pickup truck came from the factory with a solid rear window, you may be developing claustrophobia. But you don't have to: There are replacement windows on the market that open and are easy to install. Most of them are called pass-through, or slider, windows. They have four glass panels. The center two slide to the sides.

They're popular on pickups with camper shells because you can pass items between the pickup bed and cab.

Installation is relatively simple. You must be careful not to damage the original rubber molding when you remove it because it must be reused with most replacement windows. The trick to installing the window is to use a length

of nylon cord to seat the molding (step 4). Use the bent ice pick to fish out one end of the cord once the window is in place (step 5).

In addition to a Pass-Thru model, one manufacturer, LeVan Specialty Co. of Industry, Calif., makes a Flex-Thru model with a tinted panel that opens at the edges for ventilation only. **PM**



# #1 TOUGH TRUCK

## '84 FORD PICKUPS



### BEST-BUILT AMERICAN TRUCKS

**#1 SELLING PICKUP  
7 STRAIGHT YEARS.\*  
OFFERS BIGGEST SIX,  
V-8 & DIESEL!**

The best-selling Ford offers a powerful advantage for '84—the husky 4.9L I-6, most torque in any pickup. Plus the 7.5L, biggest V-8. And 6.9L diesel with 26 more horsepower than Chevy. Choice of roomy

*Get it together—Buckle up!*



Regular Cab, Crew Cab or big exclusive

SuperCab, too.  
\*Based on registrations through May, 1983.

#### Quality is Job 1.

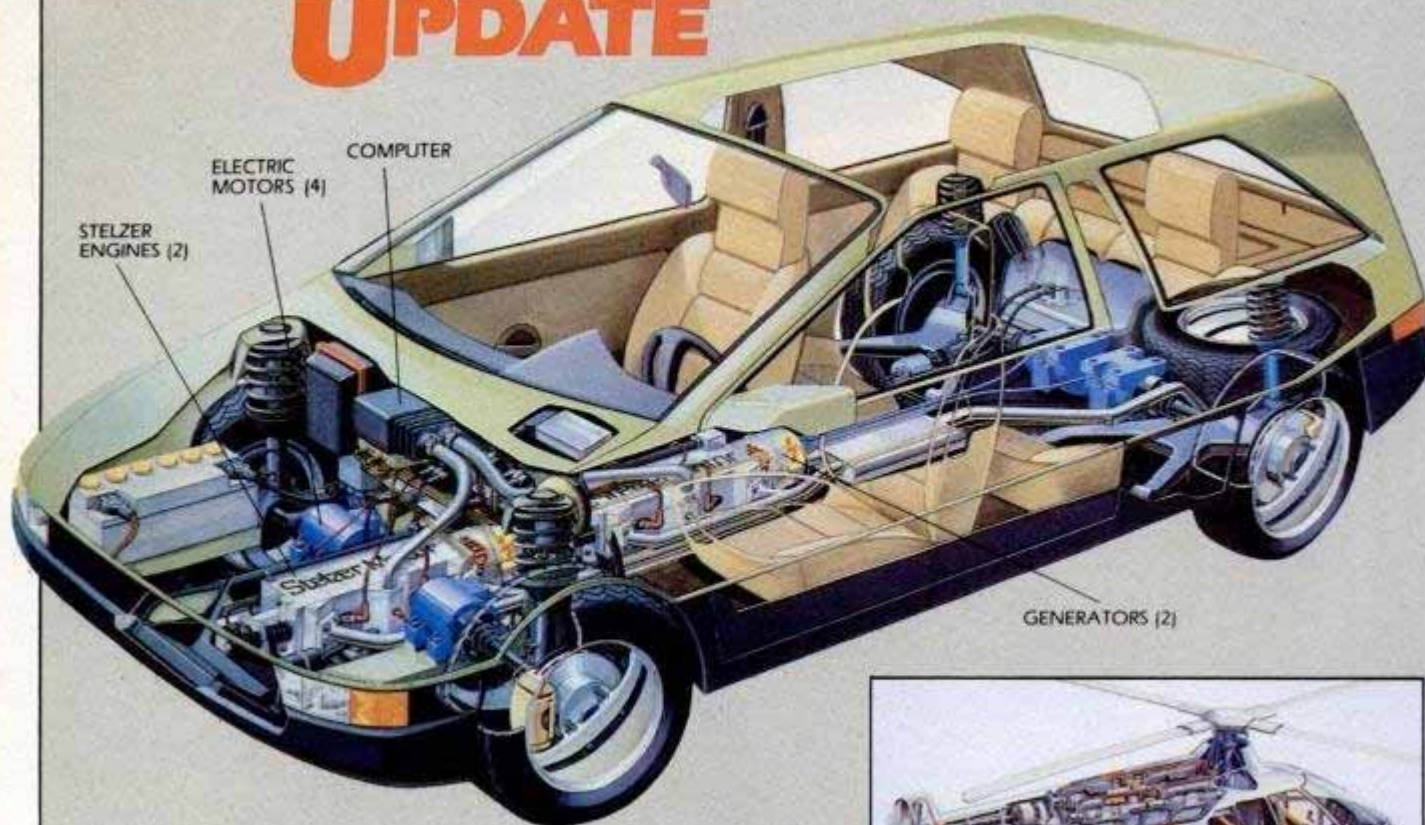
Ford's commitment to quality results in the best-built American trucks, based on a survey of owner reported problems during the first three months of ownership of 1983 trucks. And the commitment continues in 1984.

**BUILT FORD TOUGH.**





## UPDATE



### TRANSPORTATION

## Germany's new engine

**W**hen Frank Stelzer introduced his prototype car at a West German auto show last year, he may have opened a new chapter in the ever-evolving book on automotive engines. Under the hood—in fact, under the whole body of the car—purred a strange motor system that can run on

any known fuel with little buildup of engine heat and with a purported fuel efficiency at least equal to the best economy cars on the market today. The Stelzer motor is a reciprocating piston system that runs horizontally inside its housing.

Gone are the connecting rods, crank-

shafts and scores of moving parts associated with a standard auto engine. The Stelzer motor consists of eight parts, and only one—the reciprocating piston—moves. With a displacement of 400 cc, it delivers 75 hp and could be made even more compact. At present, its being sold as a pump, but Stelzer

### ELECTRONICS

## ABCs of Olympic TV

**B**roadcasting the Winter Olympics takes advanced electronics. In a pre-Olympic demonstration, ABC used an image of decathlon champ Bruce Jenner to demonstrate its "real-time paint box," a computer graphics system that lets an artist turn a freeze-frame into a posterlike work of art within 15 seconds. Using a light stylus on a glass plate, the artist mixes colors on an electronic palette and then paints in a background. ABC spent two years constructing two control rooms, a graphics room and a master control center.

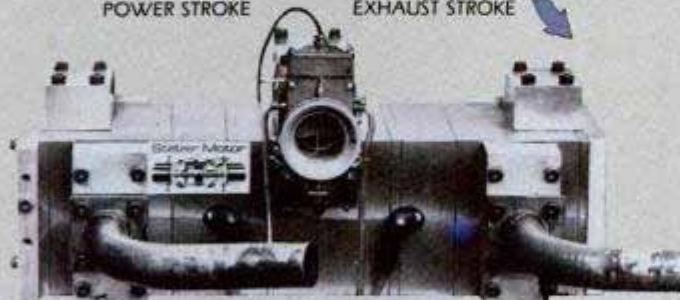
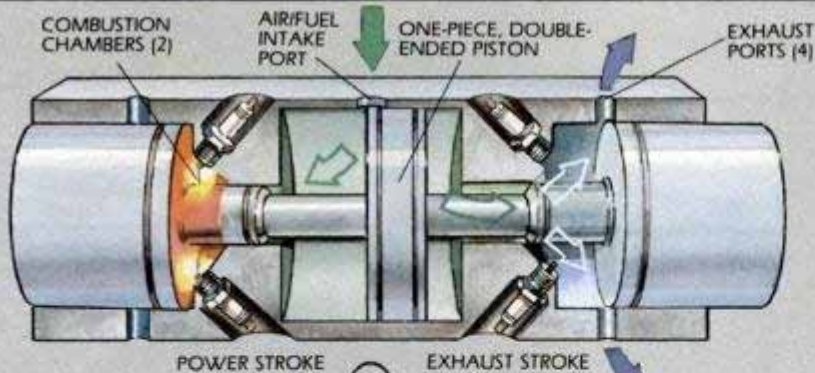


Artist at ABC's "real-time paint box" uses palette and light stylus. She dubs color into the freeze-frame photo of Bruce Jenner (far right, top) to get the posterlike finish shown behind her. One of the control rooms is at far right, below.

Editor: Dennis Eskow

Contributors: Sheldon M. Gallager, Jack Hammond, John Dornberg, Gene D. Sprouse, Harry Zegel, M.D.





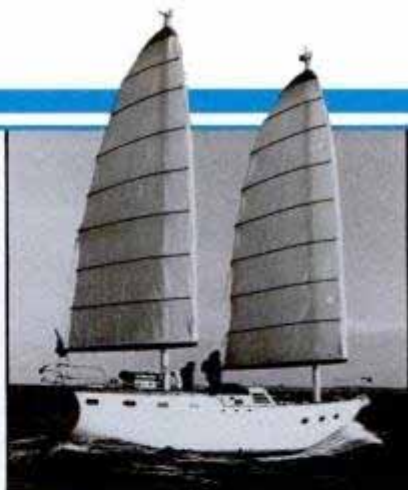
Stelzer car (facing page) would use electric motors and computer for regulated four-wheel drive. The Stelzer engine configuration could also be used in a helicopter. The reciprocating piston (drawing above) has only one moving part. As the piston rocks back and forth, it compresses air-fuel mixture for combustion. A prototype Stelzer motor is shown in the photo above.

sees uses for it as the driving part of an auto, helicopter or marine system.

The two-stroke piston sits inside a cast-iron block formed by three cylindrical chambers. The middle chamber contains the inlet for the air-fuel mixture from either a carburetor or an injection pump. As the piston oscillates,

it alternately compresses the mixture in the left and right combustion chamber. Stelzer claims his engine runs 25 percent cooler than the better auto engines on the market today.

Stelzer's prototype converts power from the push-pull piston to electrical energy. The engine drives two generators that power two motors in the front and two in the rear.



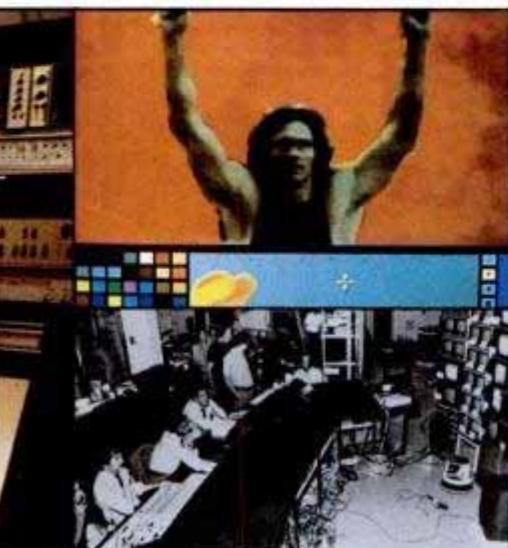
### BETTER THAN JUNK

England's newest production sailboat has a "concertina rig" that folds into a neat bundle like the sail on a Chinese junk. And the sail can be hoisted quickly. The English model can withstand a 70-knot wind. The sail design makes for smoother handling in open seas.



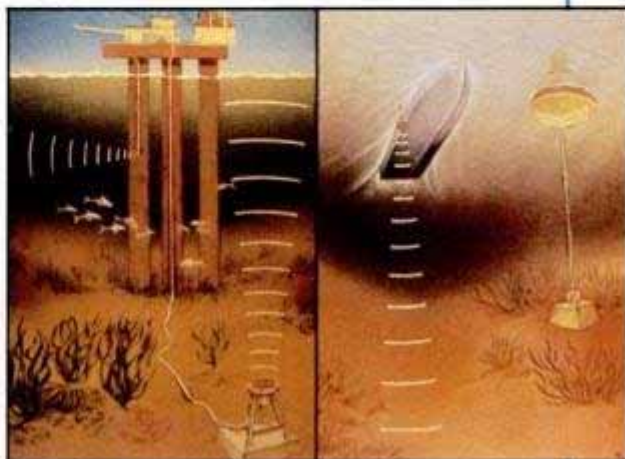
### SWEEPING AWAY NOISE

If you're traveling to West Berlin this year, one noise you'll hear less of is that coming from street-sweeping machines. American and German scientists at the University of Houston have developed a noise suppressor for street sweepers. It is an air-blowing "resonator" that produces sound waves which actually neutralize much of the sound coming from the sweeper motor.

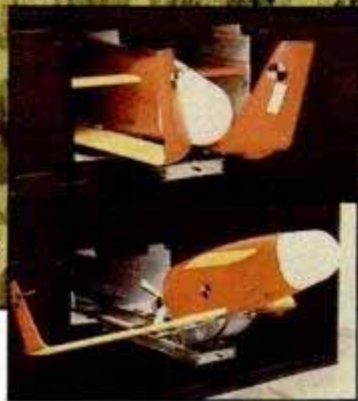
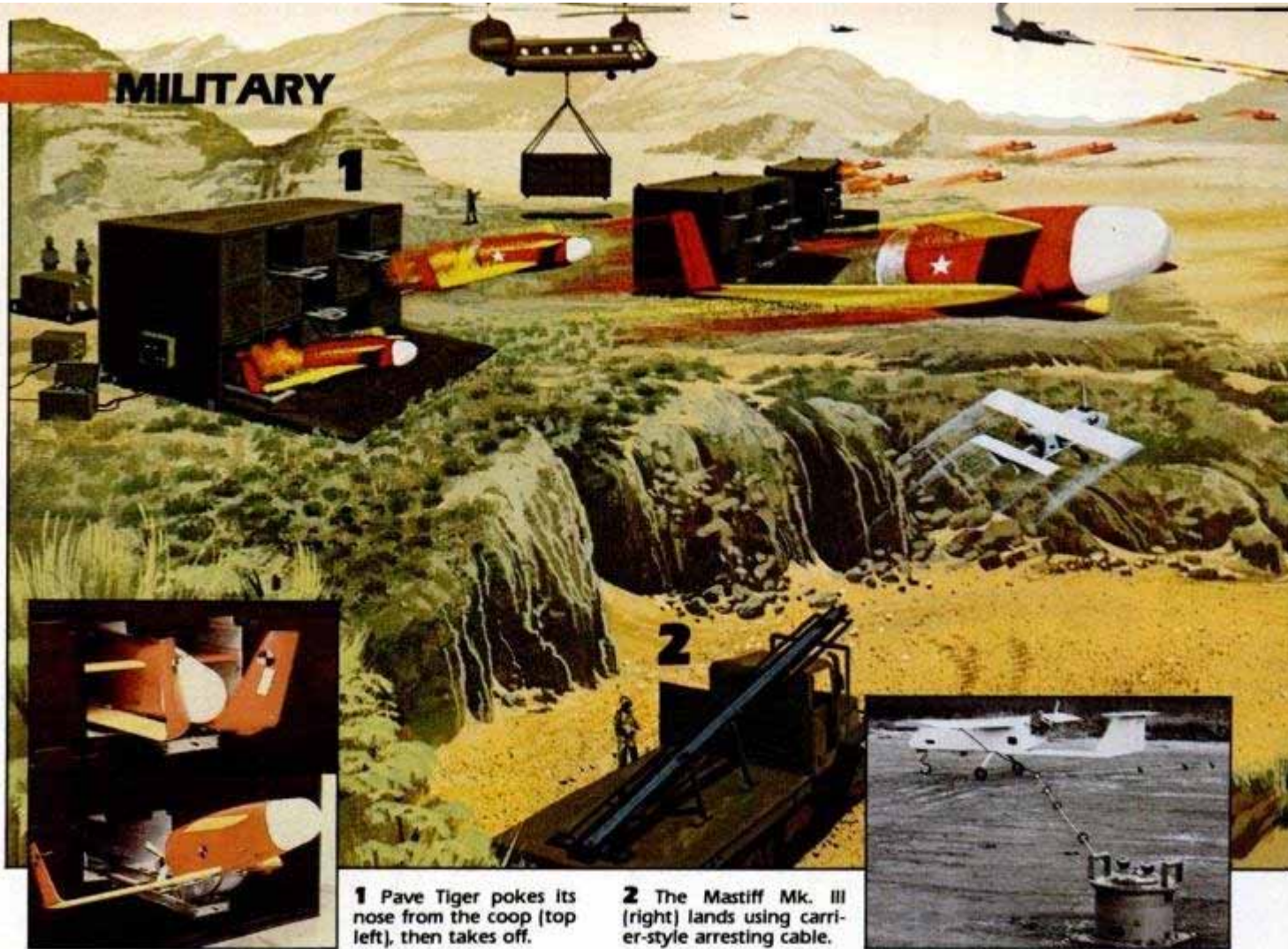


### THE NOISY WORLD BELOW

The oil industry needs highly accurate measurements of river and ocean currents to plan ocean rigs and determine maximum load for tankers going upriver. Two new devices from Ametek—submersible "current profilers"—have been introduced to create accurate current profiles. Using operating radio frequencies of 300 kHz, and 115 kHz, the devices can float at any depth or can be installed at the bottom of a boat or oil platform. The Ametek submersible current profilers will give oil company marine engineers a new tool for planning.







**1** Pave Tiger pokes its nose from the coop (top left), then takes off.



**2** The Mastiff Mk. III (right) lands using carrier-style arresting cable.

## New unmanned 'fighter planes' save pilots' lives

**W**hen the Israelis sought to destroy hidden missile sites in Lebanon's Bekaa Valley, they first sent in small, unmanned reconnaissance drones called RPVs (Remotely Piloted Vehicles). Cheap and expendable, the little winged drones provided electronic eyes to help following pilots spot their targets. They also acted as sacrificial decoys, deliberately drawing enemy fire to flush out its position—all at no risk to human life or multimillion-dollar fighter jets.

Encouraged by their uncanny success, the U.S. Air Force, in conjunction with Boeing, is now studying an even more advanced RPV system known as Pave Tiger. Unlike the Israeli version, used only for surveillance, Pave Tiger RPVs carry explosive warheads and are actually remotely guided,

flying bombs. Up to 15 at a time can be unleashed in flocks from a multiple launcher that looks like an overgrown pigeon coop. Each RPV stores, with wings folded, in a separate compartment. At the push of a button, out it pops, its wings unfold, and off it sails, powered by a tiny prop.

Known as a "harassment drone," the Pave Tiger can bedevil an enemy in several ways: It can attack a target directly if its location is known; it can attract enemy fire, then home in on the enemy's own missile-guidance signals; or it can merely "loiter" overhead for as long as 10 hours, forcing the enemy into inaction just by the threat of its presence. Its engine noise, intentionally loud, can also mask the approach of friendly helicopter gunships.

## New threat from a battle-tested jet in the Mideast



Still deadly after 10 years: A Super Étendard on a French carrier.

**I**t's a 10-year-old aircraft that's barely supersonic, but it could mean big trouble for us and our NATO allies. It's the French-built Super Étendard, a carrier-based fighter-bomber that first made news at the Falklands in 1982 when Argentine Super Étendards equipped with deadly Exocet missiles played havoc with British warships.

The latest shocker is that France has leased five of the aging jets to Iraq, known to have her own supply of Exocets. Now Iran is threatening to blockade the Strait of Hormuz, shutting off Persian Gulf oil to the rest of the world, if Iraq attempts to use the planes against Iranian oil facilities. What makes the veteran Super Étendard so devastating is not its speed (less than Mach 1 at sea level), but the fact that it carries advanced all-weather navigation and target-seeking avionics. Thus, it could touch off new tensions in the already turbulent Middle East.



# TECHNOLOGY UPDATE

## MEDICINE



**3** The Peanut flies like a helicopter and makes frightening noises.

Meanwhile, two other new RPVs are also making news. The Mastiff Mk. III, Israel's latest eye in the sky, is an improved version of the type used in Lebanon. Looking like a radio-controlled model airplane, it carries sophisticated surveillance gear, has a range of 60 miles and can remain aloft for seven hours. It's catapulted from a mobile launcher and retrieved by an arresting cable like a carrier jet.

From Canada comes the Peanut, named after its unusual double-ball-shaped body. Under test by the U.S. Army, it combines surveillance with a sneaky harassment twist. Large contrarotating blades, turning around its midsection, enable it to take off and land like a helicopter and also make a lot of noise to let the enemy know it's coming. The bad guys either shoot it down, revealing their position, or they scurry for cover. Either way, the good guys win.



### MINEPROOF MINE SWEEPER

Most ships fear to venture into mine-infested waters, but not this new British BH.7 hovercraft. Its soft skirt and air-supported hull are virtually immune to underwater blasts, making it ideal for both mine-sweeping and mine-laying operations. The vehicle is built by Westland's British Hovercraft Div. It can also carry troops safely through minefields.

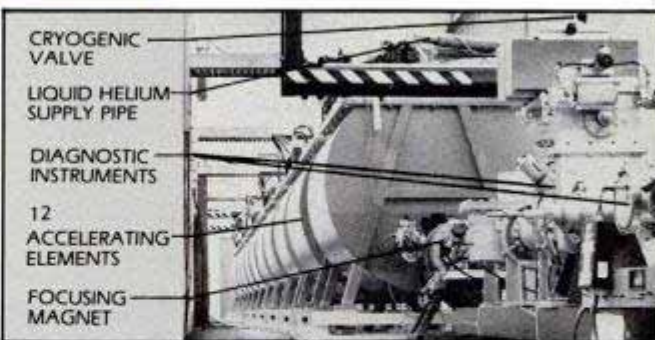


Doctor takes bone tissue (left) in nonsurgical biopsy. Procedure uses gamma picture (top, right) made through lead ring (bottom).

### Bagel biopsy

A plain lead ring is keeping patients with bone ailments from having to undergo some types of exploratory surgery at St. Agnes Medical Center in Philadelphia and at several other institutions. A small amount of "marker" chemical is injected into the patient's vein. A special "gamma" camera then scans the patient, giving a radiological picture of his bones. The ring is placed on the skin, blocking out gamma rays and pinpointing a spot where there is an infection or tumor. The doctor inserts a needle in the center of the ring and draws out a sample of bone tissue. The procedure takes the place of a biopsy.

## ENERGY



Cryogenic valve adjusts helium, which supercools the accelerator.

### Economical atom smasher

The Superconducting Linear Accelerator at New York's State University at Stony Brook cuts the cost of accelerating atomic nuclei by 30 percent. Normally, the costs run to thousands of dollars per experiment. The secret is a superconducting mechanism in the ring. The Stony Brook accelerator is cooled to minus 450° F. with liquid helium. That reduces electrical resistance to near zero. The accelerator is modular in construction, with 12 elements that can be individually repaired. That eliminates the need to warm up the whole unit to diagnose a problem in one section. **TU**



# PM SOFTWARE MONITOR



## A fantasy world comes to life

Have you ever journeyed through J.R.R. Tolkien's Middle Earth? Or have you partaken of the antics in a place such as James Branch Cabell's Land of Poictesme? For that matter, when's the last time you went over L. Frank Baum's rainbow?

Now, with the game of *Ultima III*, computers have become the new frontier of fantasy literature. Written and programmed by Rich Garriott under the *nom de plume* of Lord British, this is less a game than it is a whole new world to explore.

The reason that this game is so successful is in what author and scholar J.R.R. Tolkien once referred to as a "subcreation." If a fantasy world seems to be as complex and as rich in detail, while still being as internally consistent, as our own world, then it becomes easy to believe in and enter that world—to "live" there. Other games are simply unbelievable.

The world of *Ultima III* can only be compared to a living tapestry—complex and beautiful.

The game begins even before you put the disk in your computer. Included in the box is a cloth map of the Land of Sosaria as well as detailed explanations of various spells, charms and gaming rules.

Once the disk begins to spin, prepare to forget everything else as you create the first of the characters you will both control and identify with. Four characters may journey to find "Exodus." The first part of the quest is to discover what or who Exodus is. These charac-

ters—whether they are wizards, clerics, fighters, rangers, elves or many others—will become the main players in a fantasy "novel" that you'll live through at the keyboard.

Once the characters are set, you will find yourself journeying across an animated map of the Land of Sosaria. The oceans move in liquid rhythm, the flags atop the castles wave in the wind, and mystery surrounds you. You must explore areas the map does not show in order to find the land's many towns, castles and the dark, hidden passageways which open onto a subterranean land of dungeons and despoilers.

As you move, various creatures will accost you. During combat, the on-screen map clears and you see all of your advancing enemies as well as all four members of your party—all animated in real time. Each character you control must choose a weapon, throw a spell or reposition himself as per your orders.

Following combat, and the awarding of gold to the victor, you will want to stop at a town to outfit your party. Each town is a multiscreen affair with shops and taverns, as well as numerous townspeople. You will want to stop and talk with the townsfolk because some will have clues to impart.

Once you've purchased swords, axes, torches and such, it will be off to a dungeon. There, in just about perfect 3-D, you'll venture through mapless



When you start *Ultima III*, you're treated to a "movie" of some of the game's features. The screen above is one of the introductory scenes.

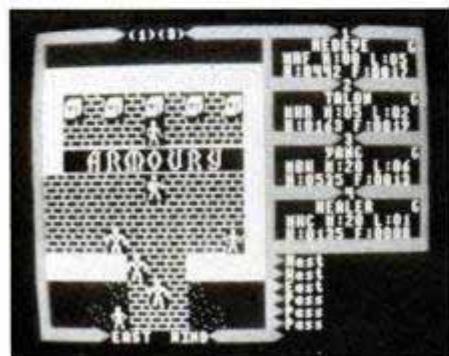
realms searching for... ah, but that would be telling.

As you can see, the fine points of the game call for a strict attention to detail. Many of the things that you do in one part of the game will affect what you can do later. What you purchase in the towns will affect your combat results, as will your ability to control your characters via the keyboard. It is this interweaving of possibilities which makes the game particularly challenging.

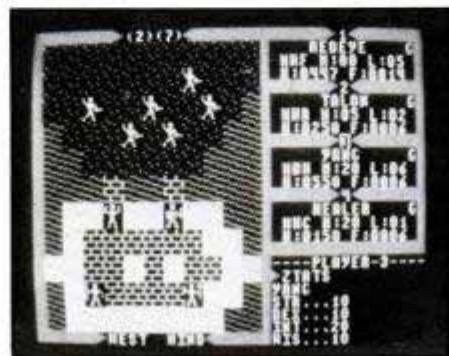
Although *Ultima I* and *Ultima II* are fine games, with *Ultima III* the technique has been perfected. This is the best fantasy game in computing. Indeed, it is one of the best fantasy worlds in which to live. Lord British is a veritable J.R.R. Tolkien of the keyboard.

*Ultima III*, from Origins Systems, is now available for the Apple II and will soon appear for other computers. But you had best put aside a year or so to play it.—N.S.

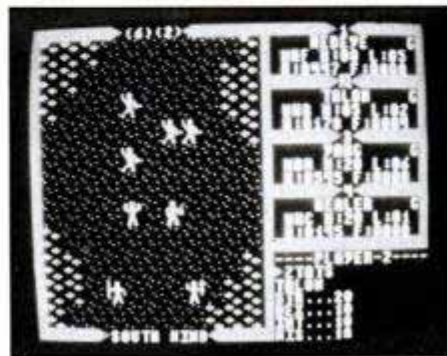
PM



Visiting an armory is a chance to buy new armor. You can also buy a new sword at a weapons shop or just drink at the pub.



Fighting from aboard a ship presents a number of tactical considerations as your enemies advance toward you from the land.



Unique combat routines allow you to control each of your characters in real time as various creatures try to do you in.





# PLAYERS GO PLACES

## Low Tar Players.

Regular and Menthol  
Kings and 100's

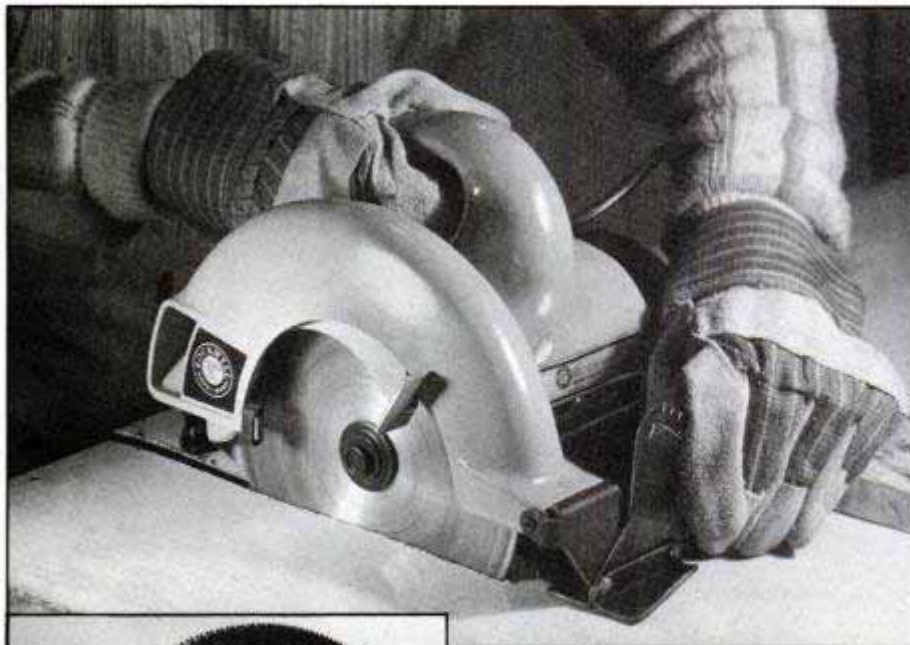


Kings: 12 mg "tar," 1.0 mg nicotine—100's: 14 mg "tar,"  
1.1 mg nicotine av. per cigarette, by FTC method.

Warning: The Surgeon General Has Determined  
That Cigarette Smoking Is Dangerous to Your Health.



# Saw Metal With A Plywood Blade



Ferrous material can be cut easily with a circular or a table saw, using dull plywood-cutting blades, like the ones at the left.

Here's an inexpensive, quick way to cut light-gauge iron and steel.

BY DAVID W. CARNELL; Photos by Walter E. Burton

For over 20 years I have been using my circular saw to cut mild, stainless and even hardened steel almost as fast as I cut wood. The blades I use are not made of some costly metal alloy—far from it. They are standard plywood-cutting blades with slightly worn teeth. The reason they work so well is that I am not cutting by abrasion, I am friction sawing.

Friction sawing is not a new idea. The basic process has been used in industry for years. Some research revealed that the principle was apparently discovered during World War II when someone ran a dull band saw blade through sheet steel—at a high speed, without coolant—and found that it cut faster than a sharp blade operated at normal speed with coolant.

Here's how it works. Instead of relying on the saw blade to actually cut the material, friction sawing requires the blade to simply rub against the material and, in the process, generate a great deal of heat at the point of the cut. Because of the high blade speed, the heat is created faster than the workpiece can absorb and diffuse it. As the

temperature at blade contact nears the melting point, the cohesion of the molecules in the workpiece drops rapidly. The softened metal can no longer resist even the slightest abrasion of the teeth and is just swept away.

Once the cut has begun, the blade continues to heat the back edge of the cut and moves progressively through the balance of the material. In this respect, the action is much like a cutting torch that heats an edge until it is red and then hits it with a stream of oxygen and blows away the metal.

The blade, on the other hand, does not melt because any given point on its circumference is in contact with the workpiece for such a short time, compared to how long it is free of the material, that it cools before it hits the workpiece again. Of course, this all happens in a fraction of a second.

For home shop work, ferrous materials (iron and steel) are the only ones that

can be cut with friction sawing. However, some sophisticated industrial equipment can friction saw other metals and alloys. Ferrous materials cut so well because they are relatively poor heat conductors. Therefore, the friction heat builds up much more rapidly at the point of the cut. Also, very little heat is absorbed by the material on either side of the cut, so the basic metallurgical structure of the metal is not significantly changed.

Aluminum, brass, copper and other materials conduct heat much better and also melt at lower temperatures. The loosened material will cool before being cast away by the blade and some will end up adhering to the blade body. This not only fouls the blade, but can also leave an extremely ragged cut.

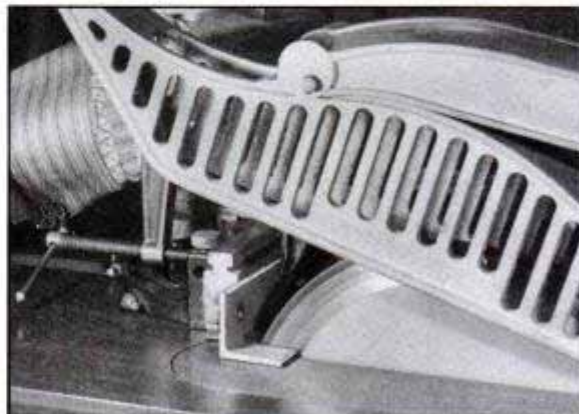
There was a time when friction-sawing blades were readily available to consumers. In the late 1950s, Sears, Vermont-American and other manufacturers sold 6- to 10-in.-dia. blades for circular saws and table saws. Sears called its blades "steel slicers," which were plain steel discs with radial slots cut around the circumference. But about 10 years ago the larger-diameter blades dropped from view and the smaller blades became scarce.

Faced with a growing shortage, I decided to modify a standard plywood-cutting blade—by grinding off the teeth—to match the old design. Further experimentation showed that a dull plywood blade with teeth intact worked better in nearly every case. The slight abrasive action of the teeth helped remove the heat-softened steel more quickly.

## How to do it

The first step is proper preparation. Clean out any sawdust from the dust chute on a circular saw and from the table and stand of a radial-arm or table saw. Also, sweep any dust from the

*(Please turn to page 70)*



When using a table saw to friction cut angle iron, always be sure to clamp stock securely to the miter gauge.

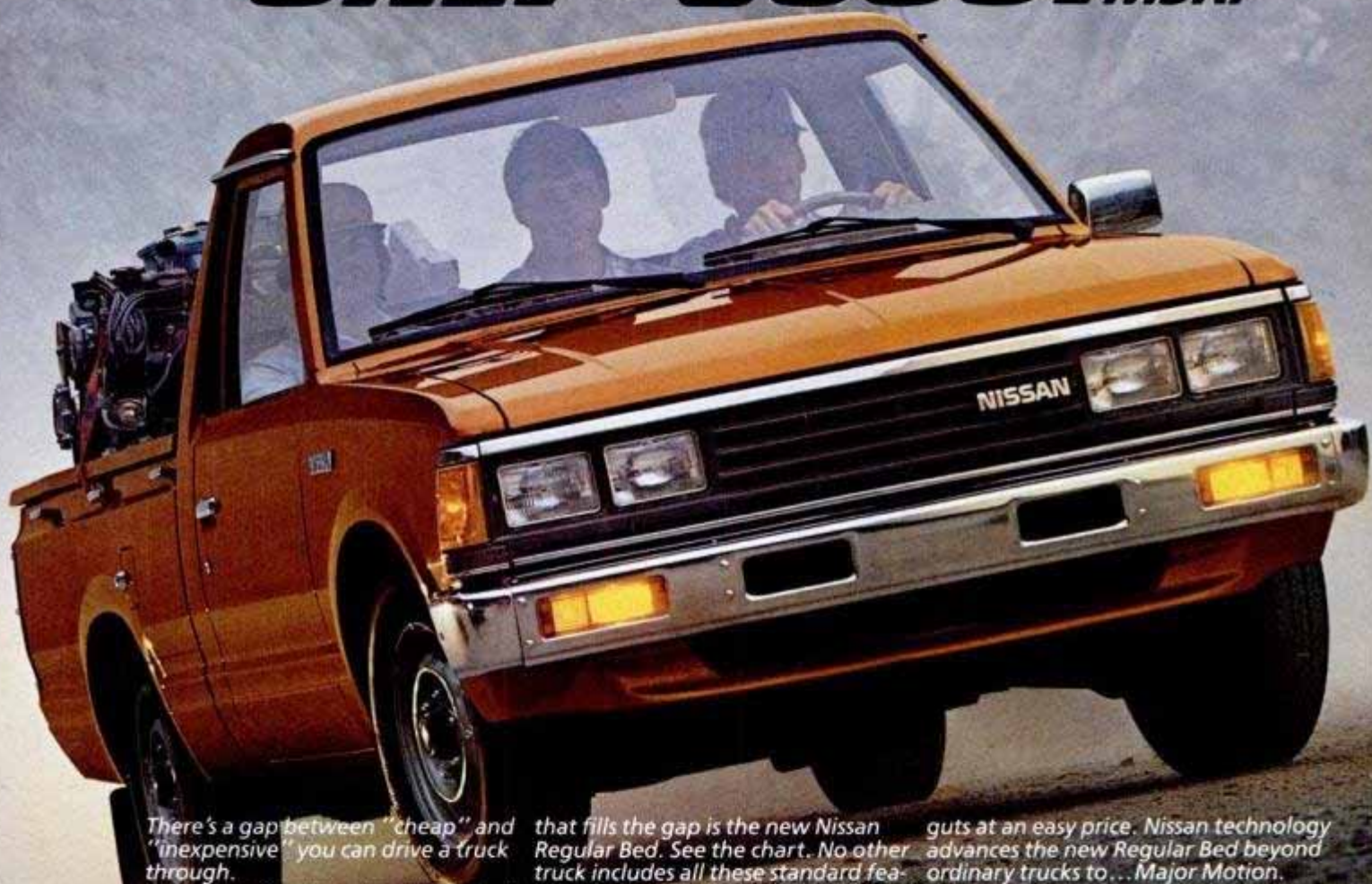




Nissan is proud to sponsor  
ABC TV's telecast of the  
1984 Summer Olympic Games

© 1981 AMC, Inc.  
"Star in Motion"  
© 1980 L.A. Olympic Committee

# ONLY NISSAN, ONLY \$5999\* MSRP\*



There's a gap between "cheap" and "inexpensive" you can drive a truck through.

That gap is value—how much truck you get for your buck. And the truck

that fills the gap is the new Nissan Regular Bed. See the chart. No other truck includes all these standard fea-

tures for a sticker price of only \$5999\*  
Muscle, hustle, economy and tough

guts at an easy price. Nissan technology advances the new Regular Bed beyond ordinary trucks to... Major Motion.

**AT YOUR DATSUN DEALER.**

Base models	Engine size (cc)	Horsepower/rpm (std)	Torque/rpm	Payload (lbs.)	Transmission (base)	Mfr.'s sug. retail price (base)	Turning circle (ft., curb to curb)	Ground clearance (in.)	Ventilated power front disc brakes	Double wall bed
NISSAN	2389	103/4800	134/2800	1460	5 spd./w overdrive	\$5999*	34.1	7.9	STD.	STD.
TOYOTA	2366	100/4800	130/2800	1400	4 speed	\$5998*	34.1	6.5	STD.	N/A
FORD RANGER	1995	73/4000	107/2400	1235	4 speed	\$5993*	36.7	6.6	STD.	STD.
CHEVY 5-10	1940	82/4600	101/3000	1000	4 speed	\$6408*	36.8	6.4	STD.	STD.

COME ALIVE, COME AND DRIVE

# TRUCKS MAJOR MOTION FROM NISSAN

\* Mfr.'s sug. retail price excluding title, tax, license and destination charges.





# Deluxe Camera \$5

**NOT a  
misprint**

**You Must Complete and Return  
the Survey Below By April 15**

This special offer is being made in preparation for a national television campaign. The survey will be used as a significant part of our future promotion efforts. To show our appreciation we'll send you our quality camera for only \$5.00 ... but you must return the attached survey.

The camera comes complete with the following features:

- Shoots color or black and white
- Adjustable lens
- Makes prints or slides
- Has protective lens cover
- Contains carrying strap
- Simple to operate

These quality cameras will not be sold at this price by the company in any store.

Each camera carries a full money-back guarantee and will be repaired or replaced by the company FREE of charge.

There is a limit of 3 cameras per address at this special price. But, if you order within the next 5 days you will be permitted to request up to five (5) cameras at this low price.

**Survey form MUST be returned with your order.**

## Survey Form

1. Do you currently own a camera  
 Yes  No
2. If yes, how much did you pay? -  
 Under \$50  Over \$50
3. Do you intend to give a camera as a gift?  
 Yes  No
4. Do you mostly take prints or Slides?  
 Prints  Slides
5. When do you mostly watch T.V.?  
Morning  Afternoon  Evening
6. Do you have cable T.V.?  
 Yes  No

Camera Survey No. TV-1  
Techni-Science Corp. of America  
P.O. Box 7038  
Wilton, CT 06897

Please rush me the following cameras as indicated:

- One  Two  Three  Four  Five  
\$5 \$10 \$15 \$20 \$25

Add \$2 per unit for shipping & handling.

TOTAL ENCLOSED \$ \_\_\_\_\_

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_

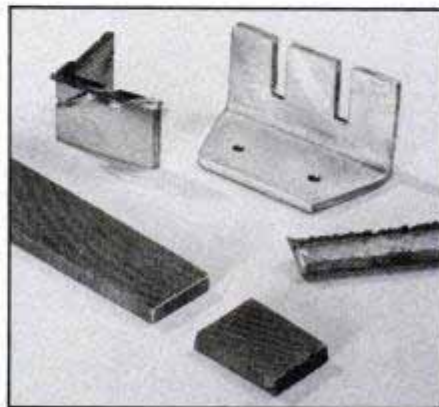
STATE \_\_\_\_\_ ZIP \_\_\_\_\_

## PLYWOOD BLADE

(Continued from page 68)

floor around these tools and remove any cans of volatile solvents from the area. This cutting method can create quite a shower of sparks, which could easily ignite flammable substances. Make sure to wear a long-sleeved shirt, gloves, a face shield, cap and ear protection—the noise level can be extreme. It's also a good idea to keep an eye on the shop for a while after sawing to be certain nothing is smoldering.

Inspect your dull plywood blade to



Angle iron, stainless steel angle, sheet steel and hardened steel file (clockwise from top left) were all friction sawed.

make sure there are no hairline cracks in the edge, then mount it in the saw and set it for maximum cutting depth. Remember, the plywood blade cuts faster when less of its circumference is in contact with the workpiece.

Sheet steel, up to 1/4 in. thick, will cut almost as fast as you feed it into the blade. A 12-in. cut can take less than 10 seconds. Stock that is 1/4 in. thick cuts just as well. But thicker material represents some slow going. You can cut up to 1/2-in.-dia. steel rod with friction sawing and up to 2-in.-dia. iron pipe, but the latter will be especially slow work because the blade will be in contact with two sides of the pipe at the same time. For cutting such thick pipe, a hacksaw or pipe cutter is probably a better choice.

Always clamp the workpiece securely in place before starting a cut. Clamp it either to the workbench if you're using a circular saw or to the miter gauge if you're using a table saw. This will prevent the work from "chattering" when cut, which would put extra stress on the blade.

Feed the material into the blade as forcefully as possible without significantly slowing the saw. The extra pressure increases the friction and speeds the cut. Also keep in mind that the blade will form sharp burrs on either side of the cut that should be handled with care. In most cases, these can be easily filed or ground away. **PM**



# Energy crunch creates new jobs for trained technicians.

## Learn at Home in Your Spare Time as NRI Trains You for Heating, Air Conditioning, Refrigeration, and Solar Technology

As energy requirements increase and supplies tighten, as demands on established technologies increase and new ones are developed, the need for skilled technicians will continue to grow. And you can get a head start in this booming career field with NRI home training. You learn in your spare time, develop the professional know-how and skills that help you move ahead.

## Practical Training Includes Professional Vacuum Pump

Along with the basic theory you need, you get the practical servicing tips and actual "hands-on" experience with NRI demonstration kits. You get necessary working tools like a system analyzer, leak detector, tubing and joint tools, and more. You even get a top quality



vacuum pump, a professional "must" for evacuating and recharging refrigeration systems properly.

card today and take advantage of your opportunities. If card has been removed, write to the address below.

## Includes Optional Postgraduate Training at York Institute

Graduates of NRI's Master Course are eligible for a week of resident training at the world-famous York Institute. You'll get concentrated training on advanced industrial equipment under the guidance of expert instructors. There's no extra charge for tuition or training materials...an opportunity only offered by NRI.

## Send for Free Catalog...No Salesman Will Call

Get all the details in NRI's free catalog. It shows lessons, equipment, and more about this exciting, big field. NRI home training works, as over a million students can tell you. Mail the postage-paid

## Or check out these other growing fields

### Small Engine Repair

There's plenty of opportunity for the man who can service power mowers, garden tractors, chain saws, outboards, mopeds and other small engines. Training includes professional tools and an actual 5 HP engine you keep, plus optional residence training at the Tecumseh Factory Service School at no extra charge.

### Electrical Appliance Servicing

Good appliance people are hard to find. NRI trains you for your own full- or part-time business fixing everything from refrigerators to toasters. Includes professional tools and instruments.

### Auto Repair and Servicing

A good mechanic can work just about anyplace he wants. NRI trains you at home from headlight to taillight with pro tools

included. Approved by Richard Petty, NRI automotive consultant.

### Building Construction

Save up to 50% building your own home, get a better job, or even start your own contracting business. Covers everything from foundations to rafters with practical projects emphasizing energy-efficient construction.



**NRI Schools**  
McGraw-Hill Continuing  
Education Center  
3939 Wisconsin Avenue  
Washington, D.C. 20016

**We'll give you tomorrow.**





# Build An Heirloom Stationery Caddy

This cherry storage cabinet will organize your paperwork.



The cabinet interior contains six tiers for storing all your stationery supplies. A convenient drawer hides behind the lower front panel. With the doors closed (top, left), the unit makes an attractive tabletop piece.

BY RALPH WILKES

**T**his reproduction of a 1750 English stationery caddy stores pens, paper and your personal correspondence. The cherry hardwood cabinet features overlapping doors that lock to secure the upper storage tiers and the bottom drawer.

Begin work by cutting the cabinet sides (A, see materials list on page 78) from  $\frac{5}{8}$ -in.-thick cherry. Then cut the dadoes and rabbet in each side for accepting the dividers (F-K) and the cabinet back (C). Cut and attach the bottom support cleats (E) to the sides. Now, cut  $\frac{3}{16}$ -in.-thick mahogany wall paneling for the dividers and back.

Cut and assemble the cabinet base members (P,Q). Secure the base frame with dowels and glue as

shown. Rout a  $\frac{1}{4} \times \frac{1}{4}$ -in. rabbet in the inside bottom edge of the base for installing the base panel (R). Then, use a  $\frac{1}{4}$ -in. rounding-over bit to shape the frame's outside edge and corners.

Assemble the cabinet by first screwing the base to the sides (don't use glue). Then glue and nail the back to the rabbets cut in the sides. Install the divider bottom (B) and the pencil tray step (N) as shown. Now, make the pencil trays (M,O) using a  $\frac{3}{4}$ -in. core box cutter in a shaper or router table. Cut and assemble the calendar tray compartment using mahogany wall paneling. Attach two cleats (WW) to the cabinet sides to support the tray. Next, shape the calendar tray cov-

*(Please turn to page 76)*



# CAMEL

## LIGHTS and FILTERS



Experience the Camel taste in Lights and Filters.

LIGHTS: 9 mg. "tar", 0.8 mg. nicotine av. per cigarette by FTC method.  
FILTERS: 15 mg. "tar", 1.0 mg. nicotine av. per cigarette, FTC Report MAR. '83.

Warning: The Surgeon General Has Determined That Cigarette Smoking Is Dangerous to Your Health.



# STATIONERY CADDY

(Continued from page 74)

er (S) with a 3/4-in. core box cutter. Attach the cover with two brass butt hinges (JJ). Now, make the drawer (parts AA-DD) to fit into the area below

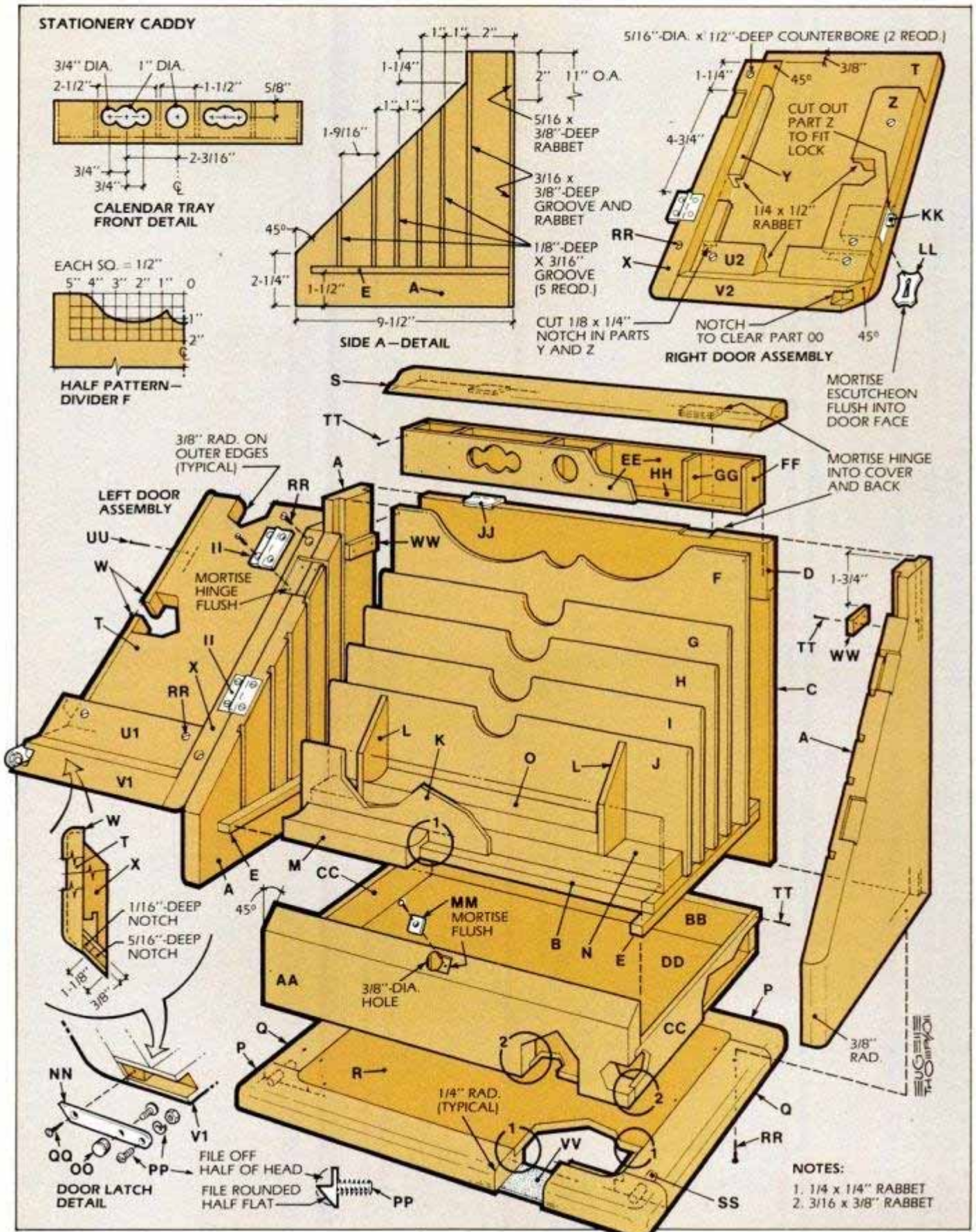
the dividers. Dry-fit the drawer.

Cut the two cabinet doors (T) from 3/8-in.-thick cherry and attach the hinge support (X) to each door. Note that the doors are an assemblage of parts (U1, U2, V1, V2, W, X, Y and Z). Attach all door parts except part Z. Install the lock

(KK) and the escutcheon (LL). Notch and install part Z to hide the lock.

Mortise the door hinges (II) into the cabinet sides and the hinge supports. Install the doors to the cabinet so that they swing and close properly. Assemble

(Please turn to page 78)





---

# WANT A GOOD REASON TO BUY A NEW MARINER? TAKE A LOOK AT AN OLD ONE.

---

Almost any outboard motor can look good in the showroom.

But a Mariner outboard still shines after the gloss wears off.

Mariners are built to run better, run longer and more efficiently than other outboards. And judging from the letters we get from owners each year, that's exactly what they do.

Our outboards have earned a reputation for reliability in some of the world's toughest waters. They've navigated ice flows along the bleak coast of Greenland and powered an expedition down the Amazon, Parana and Orinoco rivers.

In short, you can't buy a more reliable outboard.

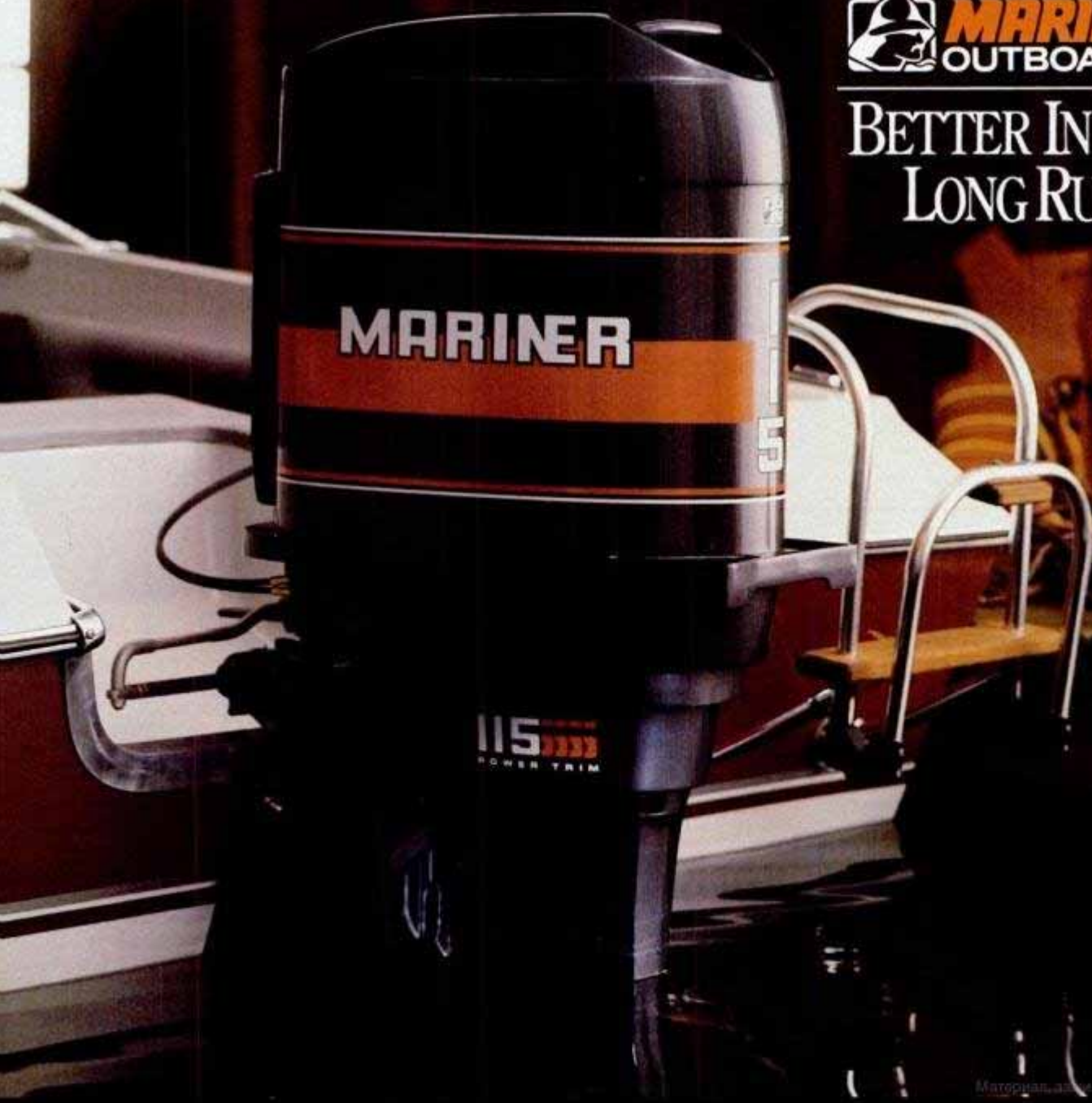
Which is why every year you see more and more old Mariners still running strong. And more and more new ones being sold.

For a free catalog of Mariner Outboards from 2 to 200 horsepower, write Mariner, Dept. 84, 1939 Pioneer Road, Fond du Lac, WI 54935.



---

## BETTER IN THE LONG RUN.



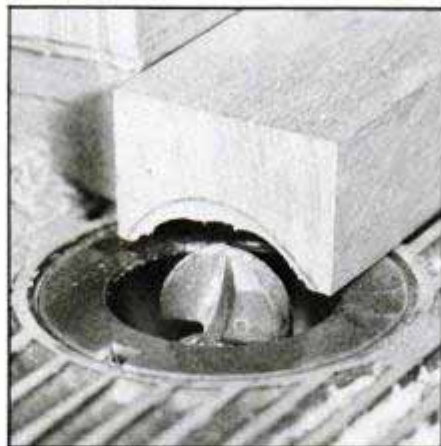


## BUILD AN HEIRLOOM STATIONERY CADDY

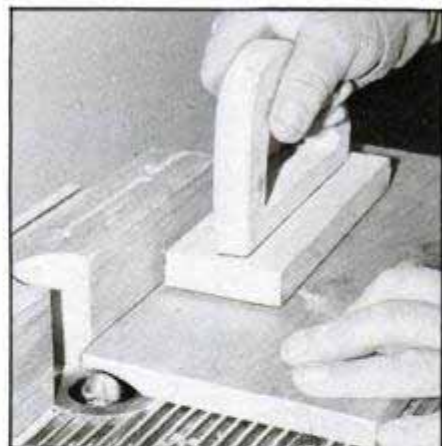
(Continued from page 76)



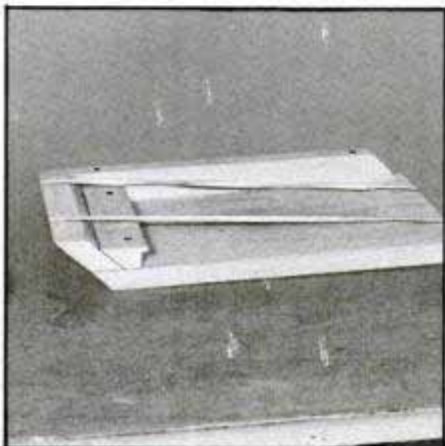
Cut 1/8-in.-deep dadoes into the cabinet sides to hold the dividers. Note that the wood grain runs horizontally.



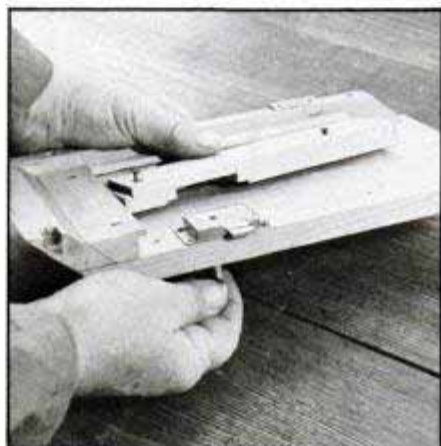
Use a 3/4-in. core box bit in a router table or shaper to form the pencil trays. Adjust the depth-of-cut gradually.



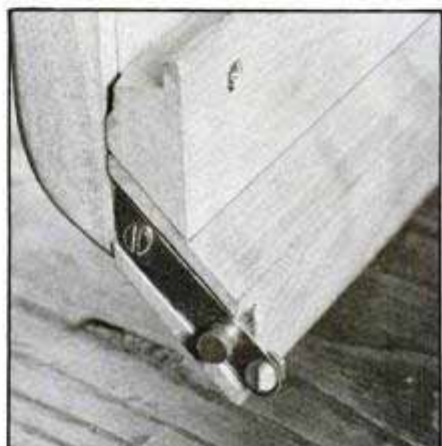
A safe way to form the narrow calendar tray cover on the shaper is to use a wide board. Then rip the cover from it.



An easy way to hold the bottom door member until the glue dries is to stretch two heavy-duty rubber bands around door.



Attach the lock to the inside of the right-hand door. Then notch part Z so that it will fit right over the lock mechanism.



Mortise the bottom of the left-hand door to accept the door latch. Then, attach the latch using a 1/2-in. No. 6 fh screw.

ble and install the door latch (parts NN-QQ). Notch the bottoms of both doors and the drawer front to accept the latch. Make sure that part PP catches the latch plate (MM).

Remove the doors, drawer, dividers

and base for final contour sanding and finishing. Slowly sand the bottom front edges of the cabinet and the doors on a stationary sander.

Stain all parts with a cherry stain, then apply three coats of polyurethane

varnish. Sand lightly between coats with 220-grit abrasive paper. Finally, reassemble the cabinet. Cut out day, date and month displays from a wall calendar and paste them on cardboard for the calendar tray. **PM**

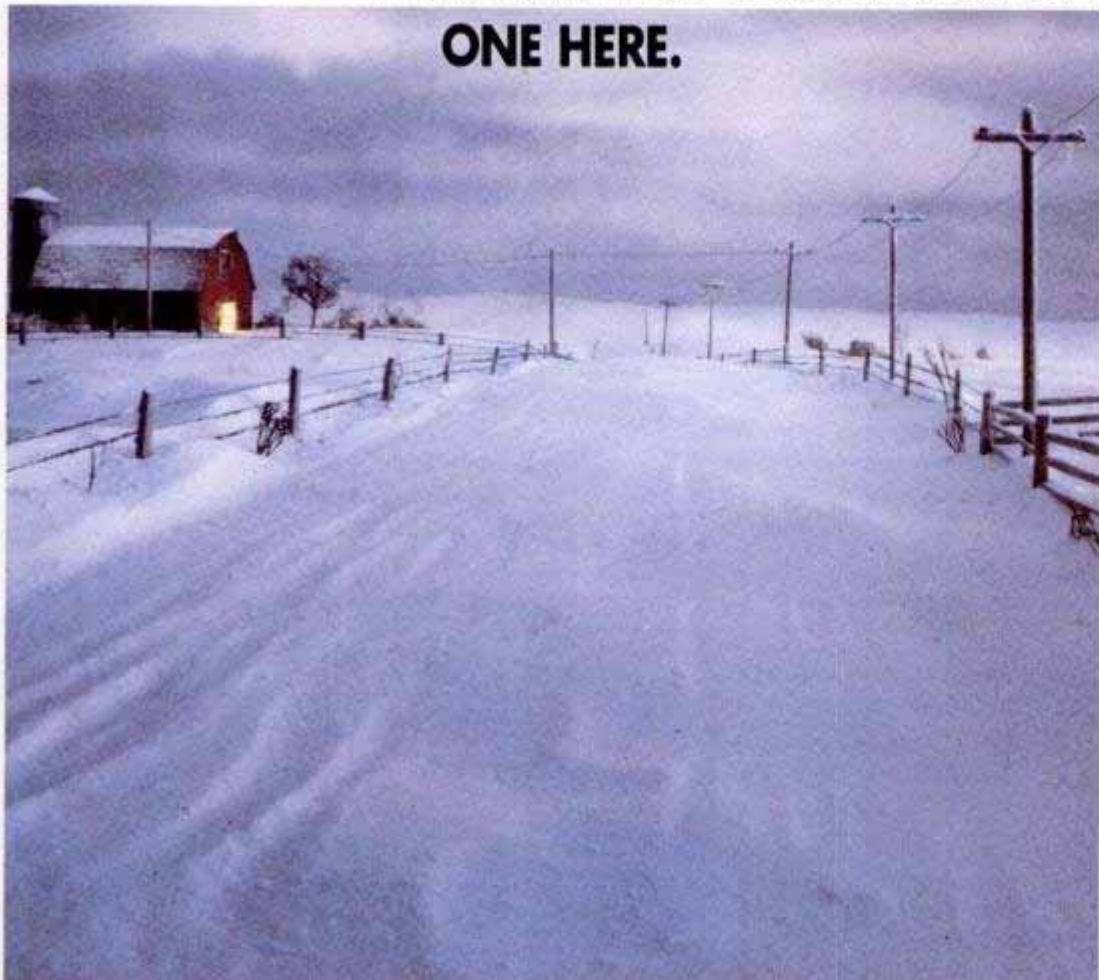
### MATERIALS LIST—STATIONERY CADDY

Key	No.	Size and description (use)
A	2	5/8 x 9 1/2 x 11" cherry (side)
B	1	1/4 x 7 13/16 x 10 3/4" plywood (divider bottom)
C	1	3/16 x 9 1/2 x 11 1/2" mahogany paneling (back)
D	1	5/16 x 2 x 11 1/2" cherry (upper back)
E	2	1/4 x 3/8 x 8 11/16" cherry (cleat)
F	1	3/16 x 9 x 11 1/2" mahogany paneling (rear divider)
G	1	3/16 x 6 1/2 x 11" mahogany paneling (divider)
H	1	3/16 x 5 1/2 x 11" mahogany paneling (divider)
I	1	3/16 x 4 1/2 x 11" mahogany paneling (divider)
J	1	3/16 x 3 1/2 x 11" mahogany paneling (divider)
K	1	3/16 x 2 x 11" mahogany paneling (divider)
L	2	3/16 x 1 3/8 x 2 3/4" mahogany plywood (tray end)
M	1	1 3/16 x 1 1/8 x 10 3/4" cherry (pencil tray)
N	1	1 3/16 x 1 3/8 x 10 3/4" cherry (step)
O	1	1 3/16 x 1 3/8 x 7" cherry (pencil tray)
P	2	5/8 x 1 1/2 x 7 1/4" cherry (base front and back)
Q	2	5/8 x 1 1/2 x 12 5/8" cherry (base end)
R	1	1/4 x 7 3/4 x 10 1/8" plywood (base panel)
S	1	5/8 x 2 x 12" cherry (cover)
T	2	5/8 x 5 13/16 x 11" cherry (door)
U1	1	5/8 x 1 3/8 x 5 1/2" cherry (left door support)
U2	1	5/8 x 1 3/8 x 5 3/16" cherry (right door support)
V1	1	5/8 x 2 x 5 1/2" cherry (left door bottom)
V2	1	5/8 x 2 x 5 3/16" cherry (right door bottom)
W	1	3/8 x 3/4 x 11 1/8" cherry (left door trim)
X	2	5/8 x 1 x 11 5/8" cherry (door hinge support)
Y	1	5/8 x 1/2 x 7 1/2" cherry (card and envelope holder)
Z	1	5/8 x 1 3/8 x 7 1/2" cherry (lock cover)
AA	1	5/8 x 2 3/4 x 10 3/4" cherry (drawer front)
BB	1	5/16 x 1 1/4 x 10 3/8" pine (drawer back)
CC	2	3/16 x 1 1/2 x 8 7/8" mahogany paneling (drawer side)
DD	1	3/16 x 8 7/8 x 10 3/8" mahogany paneling (drawer bottom)
EE	2	3/16 x 1 3/4 x 10 11/16" mahogany paneling (calendar tray front and back)
FF	2	3/16 x 1 x 1 3/4" mahogany paneling (calendar tray end)
GG	4	3/16 x 1 x 1 1/2" mahogany plywood (calendar tray dividers)
HH	1	1/4 x 1 x 10 3/16" mahogany plywood (calendar tray bottom)
II	4	3/8 x 1 1/4" brass butt hinge
JJ	2	3/4 x 1" brass butt hinge
KK	1	5/16 x 1 x 2" brass full mortise lock
LL	1	1 x 1 1/4" 26-ga. soft brass (escutcheon)
MM	1	3/8 x 1/2" brass latch plate, No. 4 fh screw
NN	1	5/16 x 1 7/8" spring steel (door latch)
OO	1	1/8"-dia. x 1/4" brass bolt, knurled nut (release button)
PP	1	1/8"-dia. x 1/4" brass bolt, hexnut (latch)
QQ	1	1/2" No. 6 fh screw
RR	14	1" No. 6 fh screw
SS	4	1/4"-dia. x 1" hardwood dowel
TT		1/2" brads
UU		1" brads
VV		Heavyweight felt (padding)
WW	2	1/4 x 1/2 x 1 1/2" plywood (cleat)
Misc.		Carpenter's glue, cherry stain, polyurethane varnish.



# UNTIL MICHELIN'S XA4, WHEN YOU BOUGHT ALL-SEASON TIRES YOU MADE TWO COMPROMISES.

ONE HERE.



ONE HERE.



All-season tires made their first appearance five years ago. They weren't Michelins.

Because while we had long been intrigued by the concept, we weren't satisfied with the state of the art.

True, all-season tires outperformed most regular highway tires in snow. But they were no match for most snow tires. An unacceptable compromise.

On dry pavement, they usually outperformed snow tires, but fell short of the average highway tire. Another unacceptable compromise.

So we set about developing a way to turn a good idea into a great tire. The result: the Michelin XA4 all-season tire.

It took four years to develop. And twenty million miles to test. But we think you'll agree, it was worth it.

In snow it performs as effectively as a snow tire.

On dry pavement, it handles with the aplomb of a highway tire.

There are other major advantages. We reduced rolling resistance to save gas.

And we increased tread life. With proper care, you can get up to 60,000 miles. And that's 60,000 miles through just about anything that Mother Nature can

throw at your car.

You see, at Michelin, we do more than just talk about the weather.

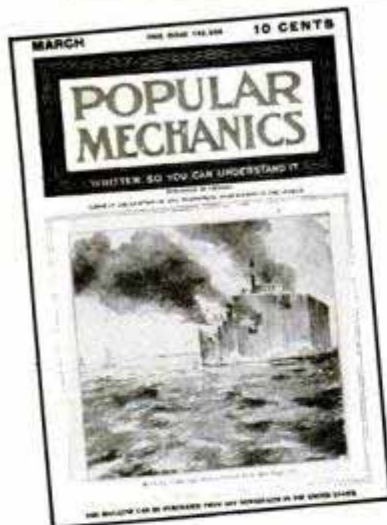


**MICHELIN.**  
**BECAUSE SO MUCH**  
**IS RIDING**  
**ON YOUR TIRES.**



# PM'S TIME MACHINE

75 YEARS AGO: March 1909



Chicago's water tunnel burns.

## Fire kills 70

On the morning of Jan. 20, a fire broke out in the intermediate crib of the great tunnel at Seventy-third street (Chicago), which extended four miles out into the lake. When the cry of fire echoed through the huge upper floor of the wooden structure, most of the men were at breakfast. All was confusion, and 70 men died. As near as could be determined . . . the fire started in the powder room, which had 1,000 lb. of explosive . . . fire was not attended by an explosion.



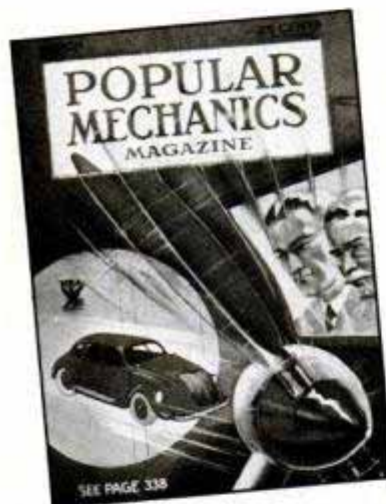
## New mail boxes

The new U.S. mail boxes in California tell when the next collection will be made. The opening of the box by a mail carrier turns a cylinder on which letters and figures are arranged.

## Fingerprints

In the investigation made by the Paris police and M. Bertillon following the Steinheil murder, the excitement of which shook France, fingerprints were found on a cognac bottle and on a glass cover of a small clock that played a part in the murder. Bertillon easily identified the imprints made by the finger of M. Steinheil, the murdered man. The method of identifying finger prints is quite complicated . . . but it is possible to determine who made them.

50 YEARS AGO: March 1934



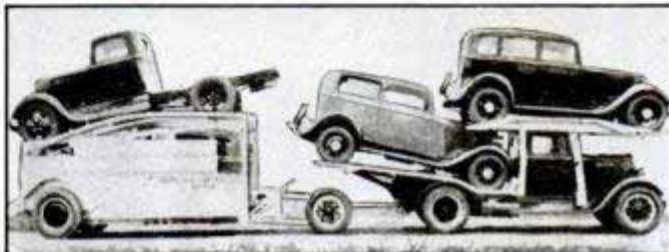
We seek superspeed.

## Streamlined cars

W.E. "Willi" Ley, professor of mechanical engineering at the University of Michigan, where air resistance and related problems have been studied, concludes that "streamlined cars with variable-gear transmissions may travel three times as far on a gallon as the conventional sedan can at normal touring speeds."

## Radio control

A model sailboat made by Robert H. Packard is controlled by radio signals from equipment on shore.

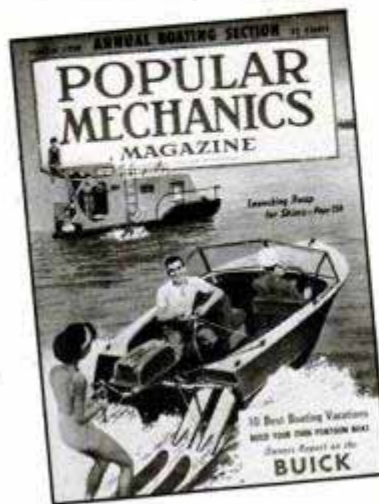


## New car-carrying truck

Four of the largest automobiles in the industry may be stored on an odd-looking tractor-trailer carrier that is only thirty-nine feet long. This is made possible by an ingenious method of top-loading and overlapping. The laws of many states,

especially those on trans-continental routes, specify that such carriers shall not exceed a length of forty feet. The new vehicle was specifically created in order to carry the same number of cars without violating these laws.

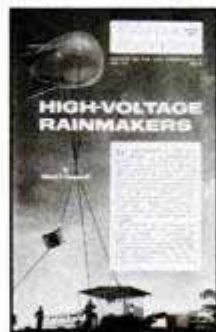
25 YEARS AGO: March 1959



Launch ramp aids water skier.

## Ski boat

The water-ski boat has special built-ins to aid the skier. A launcher eases the skier into the water after the boat has attained skiing speed, eliminating beach or dock starts. Skis are parallel with the surface until the skier trips a hydraulic mechanism which lowers the skis into the water. The launcher mounts on any boat over 16 feet and is easily removed for storage. A tow bar around the motor has an electronic eye that "watches." A buzzer sounds an alarm if the skier falls from the rope.



## Smoke sniffer

Prevention of fire and explosion disasters was given an assist by development of an ultraviolet-sensitive tube that responds simultaneously to flame, smoke and

## Making it rain

Do raindrops and other precipitation in a thunderstorm generate the tremendous electrical charges? Or do vast electrical fields generated by other forces growing in a thunderhead create the raindrops? If electricity comes first, small generating plants may be able to "broadcast" an electrical charge into the free air and possibly stimulate rainfall.

combustible vapors. The four-inch black tube that was developed by Minneapolis-Honeywell illuminates an indicator whenever any fire or smoke is present in the beaker. **PM**



# How to Tow With Today's Car

and save up to \$15 at Hitch World



New cars and trucks have lighter bodies, transmissions and suspensions to save you gas. But if you plan to tow, you need added protection for these areas of your vehicle.

Here are a few basic tips to follow.

## 1. GET THE RIGHT HITCH.

All hitches are not alike. The wrong one can cause body damage. Or tear out.

Hitch World selects and installs the hitch that is designed to meet your towing needs. They carry top-brand names like Draw-Tite and Reese. Every hitch is backed by an exclusive nationwide warranty that is good for as long as you own your tow vehicle.

## 2. GET A TRANSMISSION COOLER.

When towing with a downsized car, heat builds up inside of your transmission. This added stress

can burn its fluid and shorten the transmission's life.

Hitch World experts select and install the transmission cooler,



such as Hayden, that can extend the life of your transmission by releasing the added heat caused by towing.

## 3. GET A TOWING SUSPENSION.

A standard suspension is basically made to carry passengers. By adding a trailer, you can overload your suspension.

Hitch World installs air lifts or air shocks, such as Monroe and Hellwig, that give your tow vehicle added frame support, and reduce rear-sagging and tire wear caused by a weak suspension.

## NOW SAVE UP TO \$15

Take this ad to your nearest Hitch World. It is good for \$5 off the price of a hitch, a transmission cooler, and a suspension system (\$15 maximum discount, offer expires 12/31/84).

Look in the White Pages under U-Haul Centers for the location nearest you.

Write for a FREE HITCH GUIDE:  
HITCH WORLD, Dept. PM,  
P.O. Box 21503  
Phoenix, AZ 85306



at your **U-HAUL** Center



# DREAM MACH

A large, dark blue Mercury outboard motor is the central focus. The motor's cowling features a large, oval-shaped window that reflects a serene sunset scene. In this reflection, two people are seen in a small boat on a body of water, with a forested shoreline in the background. The word "MERCURY" is printed in large, white, bold letters across the middle of the reflection. Below the reflection, on the motor's cowling, the number "35" is displayed in white. The overall lighting is dramatic, with the warm colors of the sunset contrasting against the dark blue of the motor.

**MERCURY**

**35**



# LINE!

*That deep, deep black. That lean, swift shape. That recognized symbol of boating excitement.*

*A Merc. The machine that's made for your dreams. The machine that runs like a dream.*

*In 1984, the Mercury® dream machines offer you more than ever before, including new smaller, lighter and tougher models.*

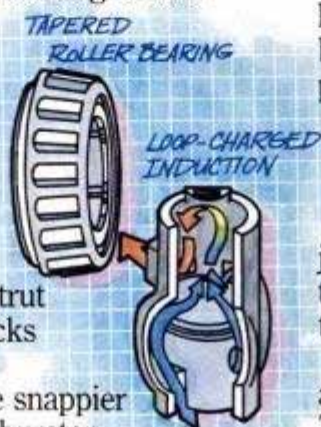
## AS TOUGH AS THEY COME: THE NEW 18XD AND 25XD.

Outboards don't come any tougher—or more dependable—than the new 18XD and 25XD.

Work 'em. Load 'em. Push 'em. They're built to take it all. Chromed cylinder bores extend engine life.

Tapered roller bearings resist wear from heavy engine loads. A stainless-steel water pump housing fights corrosion. And a tough gearcase strut absorbs hard knocks and bumps.

You'll like the snappier starts the new carburetor and fuel injection primer give you, too. And the better performance and fuel economy loop-charged induction makes possible: the fuel/air mixture enters through *three* intake ports, "looping" through the cylinder and efficiently forcing waste gases out.



## A TOUGH NEW COMPETITOR IN THE 27 LB. CLASS.



The new 2.2 Mercury is tough, light and powerful for its size.

It weighs a mere 27.5 pounds, light enough to hand-carry to hard-to-reach areas.

Yet, the 2.2 is packed with features. It has a built-in gas tank. Water cooling like the big Mercs. Loop-charged induction for top fuel efficiency. An adjustable tilt pin to easily position the engine

for efficient running. 360° steering. And a zinc anode tab for corrosion protection. All in 27.5 pounds.

## THRUSTERS. MODELS OF EFFICIENCY.

Mercury Thruster™ electric motors can supply you hour after hour of fishing power on just one battery charge. The secret: a patented planetary gear system. The large prop turns at optimum speed to get the most thrust from the least battery drain. This design is so efficient a Thruster needs just one 12-volt battery to give you the thrust other electrics need two to manage.

And now Thruster efficiency is available in three models. Thruster. Thruster Plus™ for extra power. And new Thruster II, lower-priced than Thruster but just as efficient.

## YOU CAN'T BEAT THE SYSTEM.

The Mercury Outboards System is the marine industry's strongest manufacturer-to-dealer-to-customer



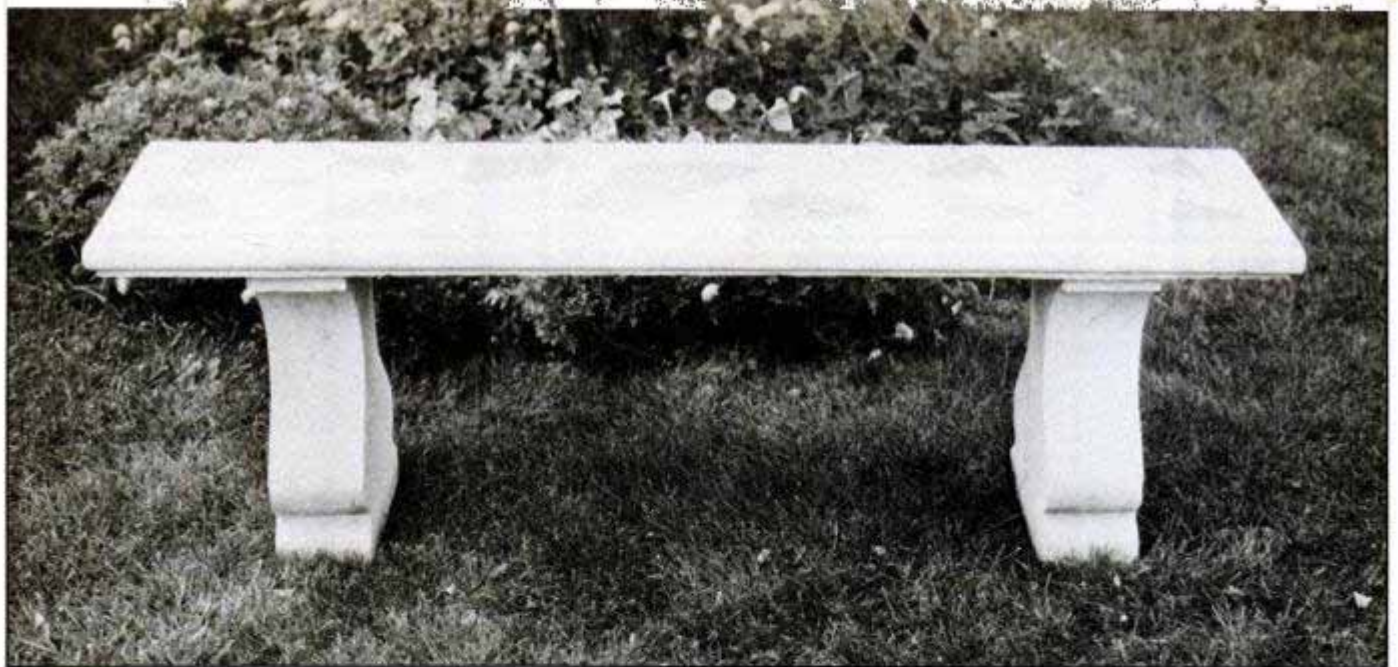
network ever. It's your assurance of satisfaction from your investment and of pride in your outboard.

Over 6000 Mercury dealers worldwide belong to The System. And they have the most dependable Mercs they've ever had to offer: The 1984 Mercury dream machines, including Thrusters, the 2.2, 3.5, 4.5, 7.5, 9.8, 18XD and 25XD. See your Mercury dealer soon, he'll help you select the Merc that's made for *your* dream.



The possible dream.





# Make Your Own Concrete Bench

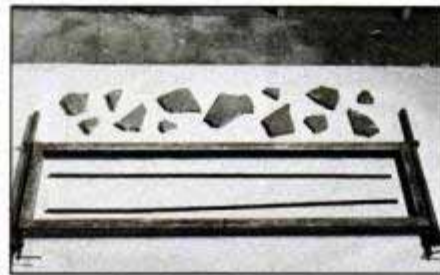
Combine your carpentry skills with the casting craft to make this bench.

BY DR. GEORGE F. LUTER

**Y**ou've probably seen these handsome benches in beautiful gardens. You may have seen them also in garden supply centers, where they cost \$70 or more. For a fraction of that amount, you can make your own bench that will last a lifetime.

The base form is made of 1×6 pine. You need a total of 20 ft. The top form is ripped from 16 ft. of 2×4. To assemble the base-form side pieces, use 2-in., 6d common nails and resorcinol glue. The endpieces of the base form are assembled with finishing nails and glue. Eight 6d dual-head (form) nails hold the base form together while casting.

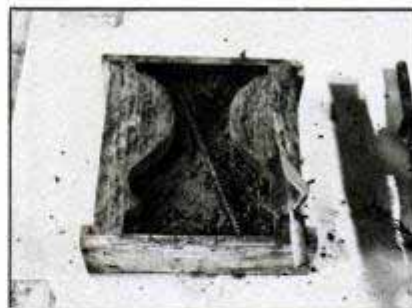
For one bench, you need three 80-lb. bags of commercially prepared sand mix (a mix of silica sand and Portland cement) and 19 ft. of 3/8-in.-dia. or 1/2-in.-dia. reinforcing bar, called rebar. If you can't find rebar at the store where you buy the cement, check at a building supply center or your local hardware store. Rebar is easily cut with a hacksaw. Other tools that will come in handy are a coping saw, table saw or circular saw, band saw, drum sander attachment for an electric drill, router with 1/2-in. straight bit and 1/2-in. cove bit, and a concrete finishing stone or small sharpening stone.



Assemble top form with clamps. Reinforcing bars are shown where they'll be imbedded. Have inlay pieces in approximate pattern.



Fill the top form about half full. Carefully trowel mix into the cove of the form and place the rebars in position.



Fill base form about one-third and place one rebar as shown. Add another third, place other rebar crosswise to first.

Two pipe clamps aid in casting the top. You also need some motor oil and naphtha for treating the wood and some old rags, as well as cement mixing tools for small batches.

Cut the 1×6 stock for the base forms into 12 16-in. lengths and stack them, alternating the grain direction with each piece. This step minimizes warping in the finished form. Now transfer the grid pattern in the drawing on page 86 to a template of stiff paper or 1/8-in.

hardboard. Mark the pattern on each piece in the stack. Use a jigsaw or band saw to make the cuts.

Separate the stack into two and begin gluing the side pieces. Run a bead of glue around the adjoining faces of three pieces and nail them together with five or six evenly spaced 2-in., 6d common nails. As you join, keep the curved edges aligned rather than the straight edges. Apply glue to the top piece of this stack and the adjoining

face of the next piece and nail again. Repeat this step for the last piece, and repeat the process for the other stack. After the glue is dry, sand out any unevenness in the curved surfaces with a drill-mounted drum sander.

Rip the endpieces for the base form from 1×6 stock with a total length of 40 in. This is enough for

the two ends and the four 1-in. square tabs. Glue and nail the tabs to the endpieces with 4d finishing nails.

Rip the pieces for the top form from straight and clear 2×4 stock. A table saw is best, but a circular saw does the job, too. Follow the steps in the drawing for cutting the cove in the top form pieces. Use a 1/2-in. straight bit in your router to make the initial groove about 3/8-in. deep. Then use a 1/2-in. cove bit

*(Please turn to page 86)*



**SOMETHING  
NEW**

# Popular Mechanics FILE BOXES & SEPARATE INDEXES

**No more untidy shelves or magazines stacked on top of each other.**

POPULAR MECHANICS FILE BOXES will help you keep your magazines and bookshelves trim and orderly. PM is now offering a sturdy glossy lacquered File Box to keep a year's supply of PM issues neatly together. The FILE BOX stands alone with all twelve issues intact! Line them up by year on your bookshelf and always have a wealth of do-it-yourself information at your fingertips.

With every order you will receive FREE self-adhesive labels covering the years 1975 through 1984. Peel off the year required and place on appropriate PM File Box. Turn the File Box any way you choose. Place the year on the side that's convenient for you. Expose all the magazines on the shelf, or keep the solid side in view. It's your choice! Either way you'll have a valuable, convenient and very attractive reference library.

Price for 1 File Box,  
\$2.95

Price for 2 File Boxes,  
\$2.75 each

Price for 3 or more  
File Boxes, \$2.50 each



**PM Indexes  
for the years  
1975-1982  
are here!**

Find the answers to your shop, home and car problems faster than ever. Thousands of entries cross-reference the articles that have appeared in PM over these years.

Broad category listings help you locate articles on home remodeling, boats, car maintenance, shop projects and many other subjects.

**ORDER BY YEAR! PRICE  
for each index is \$2.25.**



**SEND YOUR ORDER TODAY!**

**Make Check or Money Order Payable to Popular Mechanics**

Please allow three to four weeks for delivery

**POPULAR MECHANICS**

**Box 1014, Radio City Station, New York, NY 10101**



## CONCRETE BENCH

(Continued from page 84)

without a pilot for the next four steps.

Cut the top form sides square and to 59½ in. long. Cut the ends square to 14 in. and then cut knobs on the ends with a coping saw. These knobs should fit snugly into the cove of the side pieces.

To make the forms water repellent, apply a half-and-half mixture of ordinary motor oil and naphtha. Coat the forms liberally and let the mixture soak in for a day or two.

Before mixing the sand and cement, set up the top form with pipe clamps. Tack the base form together with dual-head nails. Be sure the forms are square. Now, once again, apply the oil mixture to all surfaces that will come into contact with the cement. A little oil on the pipe clamps makes them easier to clean.

One base requires about 40 lbs. of dry sand mix cement. Add water a half quart at a time, mixing thoroughly until it's stiff (like Jell-O). Don't add more water, as this will reduce the strength of the bench.

Fill the base form about a third, carefully troweling mix into all areas. Throughout the filling process, vibrate the forms by tapping lightly around the edges with a hammer. Add a length of rebar as shown. Be sure there is a clearance of at least 1 in. from any edge or surface. Add another third of mix and another rebar crossing the direction of the first rebar. Then fill the form and level off with a straightedge.

At this point, your tapping should cause a few bubbles and some water to come to the surface. Add more cement, level again and trowel to a smooth surface. Check again for square and allow it to set.

The top form requires about 160 lbs. of dry sand mix. Mix with water as before and trowel in a bed of cement about 1 in. thick. Add the two pieces of rebar and the rest of the mix. Level, vibrate, then level again and trowel smooth. Check for square and allow it to set.

After the base has set for one hour, vibrate the form and lightly trowel the surface. Then brush lightly with an old paintbrush to produce a slightly rough surface, but without brush marks. If you do get brush marks or drag out

small globs of cement, wait another hour before continuing with this step. When you're satisfied with the surface, let it set undisturbed for 24 hours.

Repeat this process for the top unless you are adding an inlay. To add the inlay, place the pieces on the top. With the point of your trowel, scribe a line around each piece. Then dig out a hole for each piece so that the stone can rest level with the surface. When all stones are in place, work across the top with a straightedge to get each stone level with the surface. Fill around each piece.



Dig out holes for the inlay pieces, then place pieces in holes and level them with a straightedge. Fill in around the pieces as you work across the top.



Remove endpieces from base form, then lightly tap curved pieces with a hammer for a clean separation. Pull curved form straight back away from base.



Rub the surfaces with a concrete finishing stone or sharpening stone to work up a paste that fills small voids. Brush remaining paste lightly for a smooth finish.

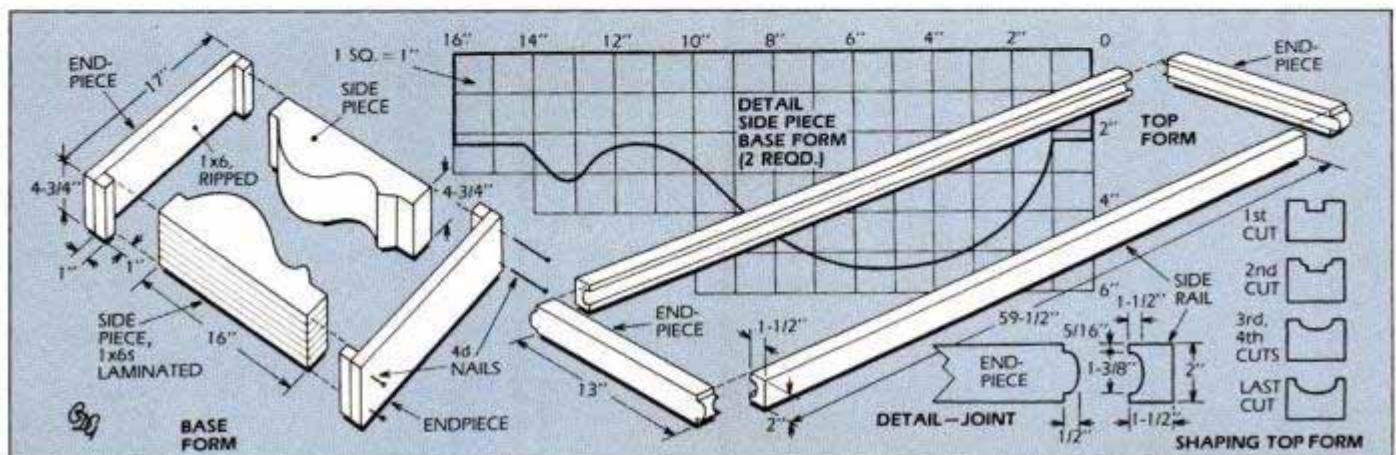
After one hour, vibrate the top form. Check to see that the stones have remained level and lightly trowel the surface. Now brush and trowel until you are satisfied with the surface. Let the top set for 24 hours so the sand mix can harden. It will have a drab greenish tint and is said to be "green." Now it has less than 20 percent

of its final strength.

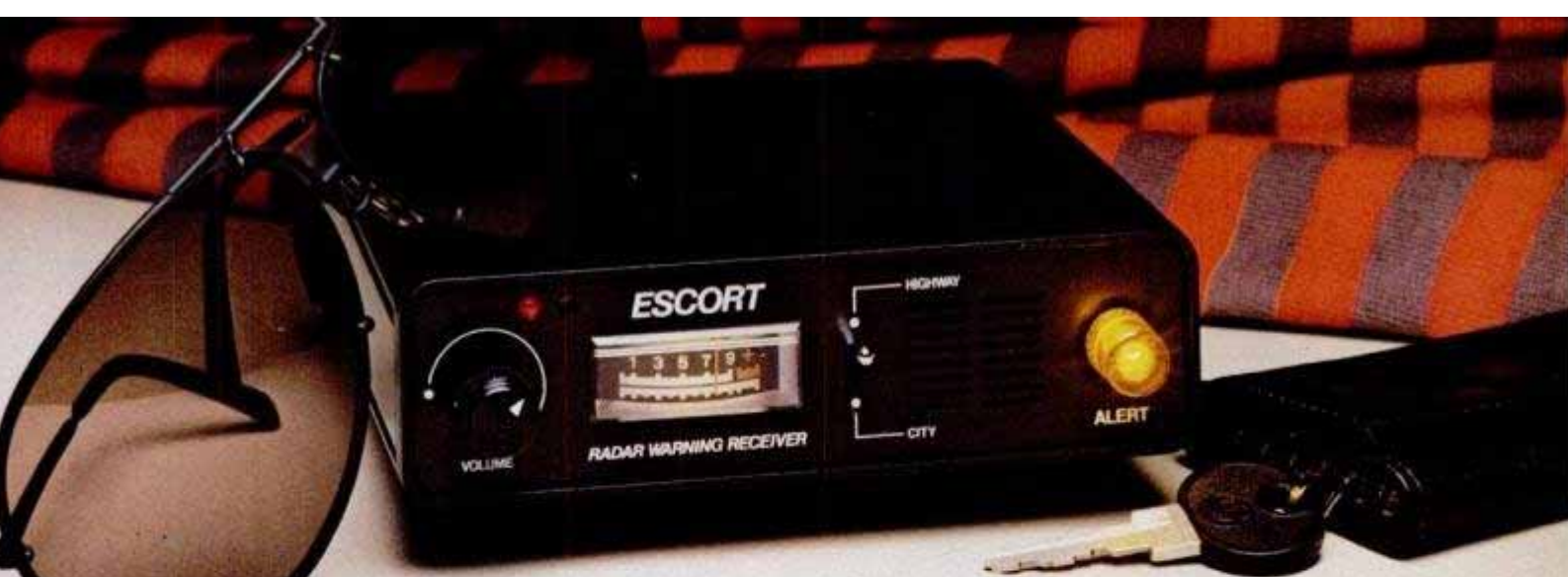
Tap off the endpieces of the base form. Loosen the curved side pieces by tapping lightly with a hammer. To remove the top form, remove clamps and loosen the side pieces by tapping on their ends so that they slide an inch or two first. Then remove the endpieces. You'll need two bases.

Cover the green concrete forms with wet rags and keep them wet. After 24 hours, carefully lift the top and slide some wood blocks underneath. Make a paste of leftover sand mix and fill the voids. Then, using a concrete finishing stone or sharpening stone, grind edges and surfaces with a back-and-forth motion. Clean the stone inlay.

Re-cover with wet rags. I wet cure benches 14 days, then hose them down for another week. If the finished bench wobbles, adjust the bases, or add small shims under the top. **FM**







# THE RADAR CONNECTION

You've probably noticed that every time the magazines test radar detectors, ESCORT comes out on top. Its performance has become something of a legend, because we believed the only way we could have the best detector possible was to make it ourselves.

### Credentials

Our success is a matter of record. In ESCORT's first magazine test, *Car and Driver* rated it highest by a wide margin. Recently, the same magazine tested a new ESCORT with ST/O/P™ (Statistical Operations Processor) and concluded that it "is clearly the leader in the field in value, customer service, and performance..."

**STOP** Digital Processor Circuitry

We're particularly proud of that quote because it credits ESCORT with *more* than just industry-leading performance. Just as we designed ESCORT to be the best detector possible, we knew there had to be a way to take better care of customers than the usual retail distribution system. That's why we have no dealers. From the beginning, we've sold all ESCORT's direct from the factory.

### No Middlemen

You see, we know how difficult it is to buy a camera or stereo component, or any precision gear. Every store has different prices so you feel obligated to shop around. Then you have to wait for a salesman. He may not know much about the products or may try to get you to choose another brand. And the week after you buy, they go on sale.

We don't want any middlemen speaking for us. The ESCORT is a precision microwave receiver made to warn you of police radar. On that sort of purchase, we think you'd prefer to deal with experts. When you dial our toll-free number, you're talking to the factory: **One Microwave Plaza**. All of our engineering, manufacturing, sales and service happen under this one roof. The buck stops here, you might say. And you always know where to find us.

### No Respect

If you've ever taken any high-tech equipment back for service, you may have noticed another problem with retail distribution. Once in a great while, the dealer can fix the equipment. But sometimes they fix it wrong, or say they can't get parts and try to sell you a replacement.

Or you find they "don't carry that brand anymore." Then you're stuck with the task of tracking down another dealer, or trying to deal direct with a factory that isn't set up to serve consumers. And if the manufacturer happens to be in another country, well, you get the picture.



**THE RADAR DEFENSE KIT**

### No Runaround

At Cincinnati Microwave, we treat customer service differently, and for a very good reason. We don't have a network of hungry dealers, we've got something far more persuasive: *Hundreds of thousands* of satisfied owners. In fact, the chances are pretty good someone you know owns an ESCORT. We try our best to please our customers after the sale, because they are the biggest source of new sales. It's that simple.

You should also know that we'll fix any ESCORT, no matter how old. We don't believe in planned obsolescence. While our competitors are proliferating models, we're working to make ESCORT better. When we find an improvement, it goes straight into production. So ESCORT is always state-of-the-art.

### No Waiting

Keeping up with the latest technology is only one advantage of dealing direct. You don't have to wait in line; you don't even have to go to the store. Just reach for your phone—we're only a parcel delivery away. Take the first 30 days with ESCORT as a test. If you're not absolutely satisfied, we'll refund your purchase and pay for the postage to return it. *You can't lose.* We also back ESCORT with a full one year limited warranty on both parts and labor. Life under the radar gun is a lot easier with ESCORT.

### Do It Today

**By Phone:** Call us toll free. A member of our sales staff will be glad to answer any questions and take your order. (Please have your Visa or MasterCard at hand when you call).

CALL TOLL FREE . . . 800-543-1608  
IN OHIO CALL . . . . . 800-582-2696

**By Mail:** We'll need to know your name and street address, daytime phone number, and how many ESCORTs you want. Please enclose a check, money order, or the card number and expiration date from your Visa or MasterCard.



ESCORT . . . . . \$245.00  
Ohio residents add \$13.48 sales tax.

### Speedy Delivery

If you order with a bank check, money order, credit card, or wire transfer, your order is processed for shipment immediately. Personal or company checks require an additional 18 days.

**ESCORT**  
RADAR WARNING RECEIVER

Cincinnati Microwave  
Department 368  
One Microwave Plaza  
Cincinnati, Ohio 45242-9502

Tune in "Talkback with Jerry Galvin," America's new weekly satellite call-in comedy talk show. Sunday evenings on public radio stations. Check local listings.

Материал, защищенный авторским правом





**Come to where  
the flavor is:**



**Marlboro Red or Longhorn 100's—  
you get a lot to like.**

17 mg "tar," 1.1 mg nicotine av.  
per cigarette, FTC Report Mar '83

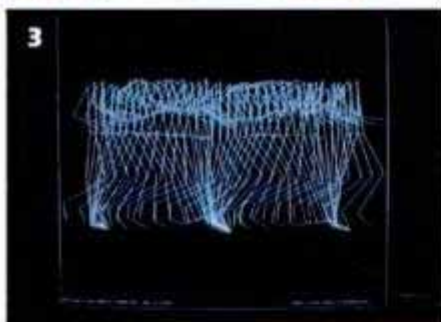
**Warning: The Surgeon General Has Determined  
That Cigarette Smoking Is Dangerous to Your Health.**

© Philip Morris Inc. 1983

Marlboro and Longhorn are registered trademarks of Philip Morris Inc.



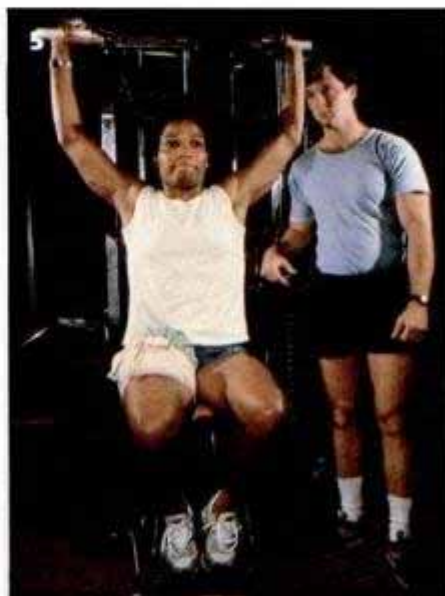
# FORGING GOLD ON OLYMPUS



Monitoring equipment (1) records athlete's carbon dioxide output on a computer (2). With other data, computer generates an image (3) so coaches can help adjust the athlete's movement for a winning edge.



Distance runner Joan Benoit (4) was among the athletes who used the Olympic Training Center in Colorado to improve her stride. Just exposing athletes to high-tech devices may be enough to boost performance.



Equipment also includes advanced weight-training devices (5) and high-speed cameras and other visual detecting equipment. Light-beam guns (6) are used to determine timing improvements to split seconds.

Superaccurate monitoring techniques are helping our best athletes find the winning edge for the Summer Olympics.

BY ROBIN NELSON; Photos by Bruce McAllister and Deborah Beamer

**A**s many 2.5 billion people—roughly half the population of the world—will watch the major televised events of the summer Olympic Games which begin in July in Los Angeles. As always, a lot of *minor* events—medals contested in sports in which Americans have had little spectator interest, and almost no participation—will determine the ultimate Olympic competition of this now superpolitical spectacle: the final medal count. For a lot of people around the

world, including the 7 million expected as spectators at the Los Angeles sites, that medal count will provide at least a preliminary answer to some key questions:

- Will the "get-serious" posture of the reorganized U.S. Olympic Committee, backed by millions of dollars in corporate support, put America back on top in the Games?
- Will illegal drugs and chemicals continue to be a



dominant fact of life in world-class competition?

■ Has the United States closed the "sports science gap" between it and the major Soviet bloc competitors?

Many close observers of the U.S. effort believe the answer to the first two questions depends on the degree to which Committee officials and our athletes respond positively to the third. With millions of dollars already invested in new facilities and projects, including our first national Olympic Training Center (in Colorado Springs, Colo.), the U.S.O.C. has promised its contributors that "the best U.S. team ever" will be competing at Los Angeles.

Yet a visit with Training Center experts, coaches and athletes produced, on the average, more cautious—while still hopeful—estimates of the potential of the American team. Often, the feeling reflected is that it may be 1988 or even 1992 before a U.S. Olympic contingent fully reflects the new emphasis on scientific training and coaching techniques.

"There is no knowledge gap between us and the Russians or East Germans," says Dr. Kenneth "Casey" Clarke, director of Sports Medicine for

the U.S.O.C. "What we have is a *distribution* gap. We know as much, maybe more, about what makes great athletic performances, about biomechanics and the physiology of sport. But as far as getting that knowledge into the hands of coaches and athletes, we may be as much as 15 years behind. Look at East Germany, a country of only 17 million people, which outscored us in Montreal—they may have something like 10,000 coaches with Ph.D. degrees."

Clarke says there may be two dozen facilities in the Soviet Union which are better equipped than the U.S.O.C.'s Colorado Springs Training Center. The former Air Force base may be "state of the art" in terms of some of its analytical methods and laboratories, but it offers nothing special in its overall physical plant, including training equipment which, like the computers and videotape machines, was donated

by manufacturers. (Possibly the best bicycling velodrome in the hemisphere, however, is a few blocks away.)

But the site and its staff—both volunteers and paid professionals—play a major role in the U.S.O.C.'s goal of identifying and advancing the nation's elite athletes. At the same time, as many developmental athletes as possible are given time at the Center to absorb training methods. In addition, new knowledge is pursued both at the Center and through the many projects that it farms out to universities and researchers.

Yet, almost to a man, the scientists at Colorado Springs admit that what they actually know about the science of sport in relation to our leading competitors isn't nearly as important as what our athletes believe. What has emerged in recent years—as efforts have been focused on sports medicine principles and scientific analysis of athletic performance in this country—is that our athletes tend to enter any arena in a badly "psyched-out" condition when there are Soviet bloc competitors who will be prominent challengers. Chuck Dillman, assistant director of Biomechanics and Computer Services at the OTC,

tells this story about a U.S. ski jumping team practicing in Europe before a major competition:

"We unpacked some new high-speed filming equipment before their practice jumps. 'Wow,' one of the jumpers said, 'just like the East Germans' stuff.' That day the whole team jumped farther, by an average of about 4 meters per man, than they had before. It wasn't the film—which we didn't even look at until later—but just the idea that now we've got nifty technology, too."

Though no one is willing to come out and actually say it, just exposing athletes to the exotic analytical treadmills, digitizing equipment, force platforms and so forth at U.S.O.C.-sponsored research facilities may be as effective in boosting performances at Los Angeles as any knowledge gained from the process. This "faith factor" is particularly

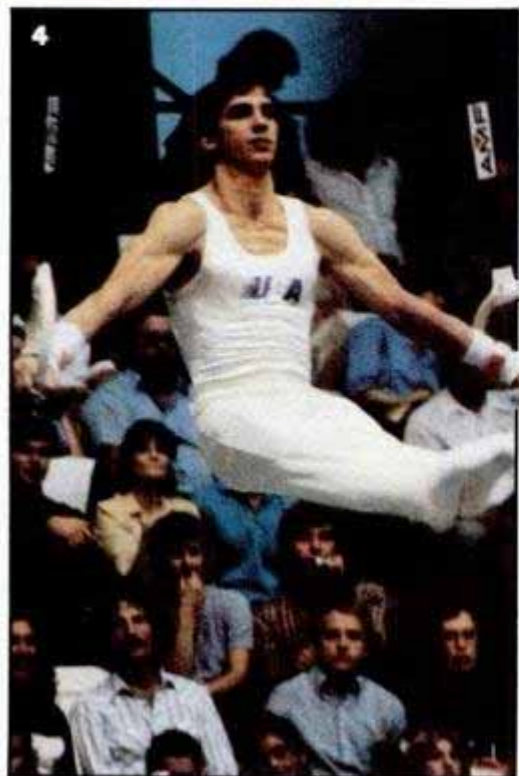
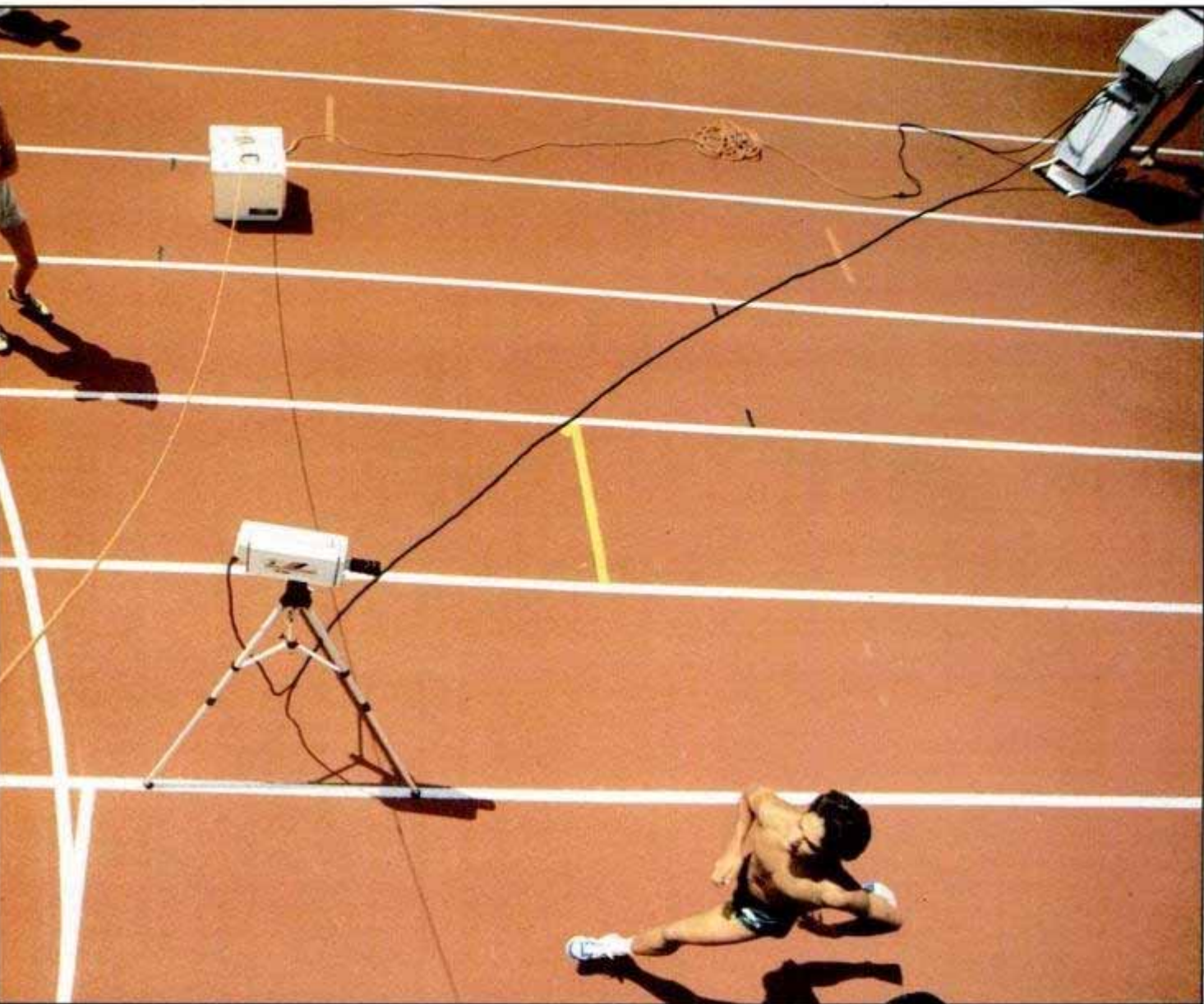
*(Please turn to page 134)*



Long jumpers were among the athletes to test the "faith factor." By monitoring athletes, some officials think performance will improve.







**1** Overhead fisheye photo shows high-speed camera setup used to analyze a runner's technique. Cameras at different angles yield a precise computer image.

**2** Cyclists test gear, from helmet to the bike itself, on a motorcycle-assisted run around the track at the Olympic Training Center in Colorado Springs.

**3** Electronic lane-watching device helps swimmers cut time when touching wall.

**4** Olympic gymnasts compete at Colorado trials to test the "faith factor."

**5** Hurdlers reportedly improved their performances after they were diagnosed with the aid of high-speed camera equipment and light-beam setups.



# FIRE ON ICE

America's winter Olympians reached into a high-tech bag of tricks to prepare for the Sarajevo Games.

BY MARK MEINERO; Illustrations by Hank Iken

The Olympic motto, *Citius, Altius, Fortius*, translates to "Swifter, Higher, Stronger." For the Winter Olympics at Sarajevo, Yugoslavia, it's appropriate that swifter is mentioned first—a majority of the events rely on speed for victory. In the Summer Games, the men running the 100-meter dash are called "the world's fastest humans." But at best, their bodies move along the stadium track at about 23 mph, to which a downhill skier—or most any other winter participant—can justifiably say, "Ho hum."

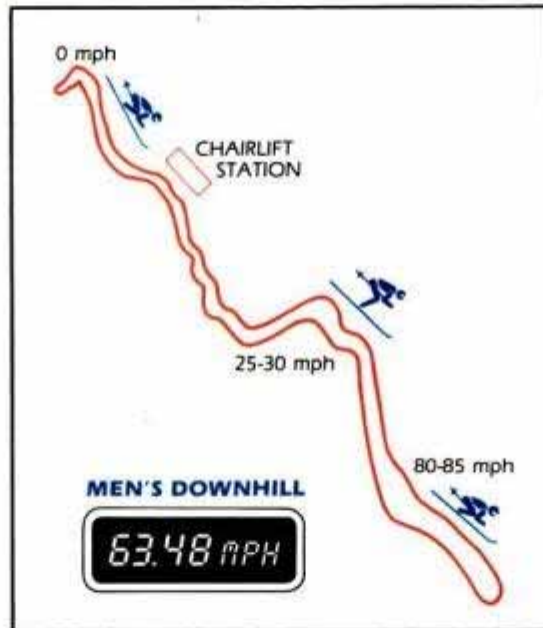
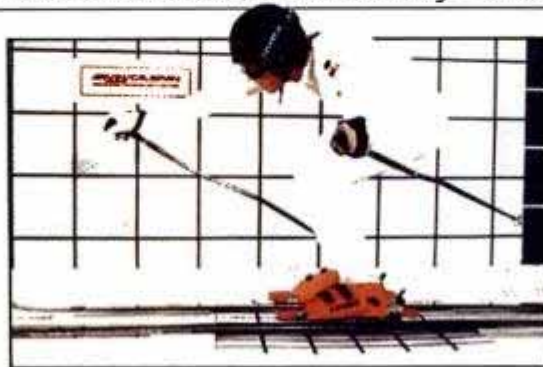
The men's downhill Gold Medal winner at Sarajevo will have to exceed 60 mph down the slope. In pre-Olympic downhill races along the Yugoslavian course, the average speed was 63.48 mph. Fast, yes—but if the Games were held at Kitzbühel, Austria, the average would be just over 70 mph. There are stretches where the downhill slope drops at angles of as much as 60°. At those points, the best skiers will exceed 80 mph.

And then there's bobsledding, which quickly hits speeds approaching—sometimes exceeding—80 mph. In two- and four-man sleds made of graphite, Kevlar and other aviation materials, the sleds skim the ice at such high speeds and steep angles that crew members are subjected to forces more than five times the Earth's gravity.

Even in ski jumping, where style, not speed, is the important factor, competitors approach 60 mph on the jump and run that follows.

To make the American competitors faster for this year's Winter Games, backers have resorted to every conceivable technology—from the wind tunnels used to give skiers explicit instruction on body movement to the design studios where superbobsleds are assembled to rival the best Europe has to offer.

For a downhill skier, aerodynamics is regarded as the key to a successful run. Experts say the trick is to stay as long as possible in a low tuck—a deep crouch with the upper body parallel to the ground. Harald Schoenhaar, the alpine technical director for the U.S. ski coaches, says a skier will try to get into the low tuck about two or three pole placements after leaving the starting gate.



Skier in low-tuck position (top) adjusts his angle of attack during wind tunnel tests at Calspan Corp. Diagram (above) shows downhill course at Sarajevo. Readout indicates average speed for Olympic trials.

But the skier can't always do that. There may be a quick turn on the course, or a patch of undulating terrain. Then the skier must slow down to about 25 or 30 mph by coming out of the low tuck and moving into the more erect high tuck—the knees remaining bent, but the upper body now just slightly hunched over. Schoenhaar says the change in body position allows the skier to maintain his balance against the centrifugal force of the turns.

Occasionally, the course becomes easy. The angle is not so steep and the turns are gradual. That's when speeds average 50 to 60 mph.

To maximize the aerodynamics, downhillers have been working with Dr. Michael Holden, the chief aeronautical engineer for Calspan Corp. in Buffalo, N.Y. Using wind tunnel tests, Holden has trained the skiers to position themselves properly. Holden says just a few moments in the wrong position can mean the difference between victory and defeat.

The bobsled event starts with a push from the two or four men who launch the approximately 500-pound sled, then jump in. Before the ride ends, gravitational pull in the final curves can hit 5.5 gs, as it did at the last Olympics in Lake Placid, N.Y. That gravity can either help push the driver to a faster finish or slow him with a buffeting

side force—it all depends on how well the driver handles the turn and how well-designed his sled is.

The winning average speed at Lake Placid for the East German four-man sled was 57.77 mph. At the bottom of that run, according to former U.S. Olympic Coach Gary Sheffield, the sleds were doing between 75 and 80 mph.

Tip Sempliner, who designed one of the two-man bobsleds entered in the pre-Olympic trials, says a sled that gets a 1-second head start on a competitor will—with all other things being equal—finish 2½ seconds ahead. The vehicle he designed under sponsorship of American Cyanamid proved to be so fast in Olympic trials that team officials told PM they weren't sure a crew could handle it.

With a Kevlar body and attenuated frame, the vehicle is light enough and has enough give to attain 90 mph. Attenuation allows the aerodynamic body to spread apart on





sharp turns. The rounded bottom of the Sempliner bobsled reduces drag to near zero, which in turn causes the sled to leave the ground at very high speeds.

In time trials at Lake Placid, the average sled moved at 25 to 30 mph early in the run, hit about 40 at a big curve called Shady, then reached 60 and beyond as the finish line approached. At one point, where the run dropped 60 feet over a 130-foot length, the G-forces reached 4.5. Bobsleds that lost time on Shady found themselves in a fight against G-forces. Until this year, only the Italian-made sleds were designed to work with the G-forces rather than fight them. Now, several American-made vehicles are pliable and bottom-round, and take advantage of the gravity forces.

Other design changes made by Sempliner in his Douglaston, N.Y., workshop include runners made out of a secret alloy. Using machinery provided by Sears, he was able to construct runners rough enough to bite into the ice without being sharp. Olympic runners must be rounded.

If U.S. competitors fare better in this year's competition than in years gone by, the athletes will receive much of the credit—but they'll know that technology was the power behind the throne in 1984.



Sempliner's bobsled (top) has a rounded belly and attenuated body so it can take advantage of the G-forces. The chart above details the speeds and gravitational forces on the bobsled run at '84 Winter Games. Readout shows average course speed.





Toyota's 1984 lineup is headed by new front-wheel-drive, transverse-engine Corollas.



All-new 318i has an unmistakable BMW look.



Nissan's 300ZX is all-new for '84, but like former Z-cars, it features a pleasing mix of tried-and-true styling themes. A fuel-injected V6 with optional turbo provides the push.





Mercedes 190 "baby Benz" competes with smaller BMWs.

# PM's DOLLARWISE GUIDE TO 1984 IMPORTS

Turbochargers, aerodynamic styling and high-tech electronics mark the new crop.

BY DANIEL CHARLES ROSS, Detroit Editor

**H**ow much off sticker? was the question you used to ask when you got serious about a new car. But if you're shopping for a 1984 import, be forewarned: The bottom line might be *more* than the figure on the "suggested list price" label. Many heavily optioned Japanese imports go out the showroom door at well over the sticker price. The dealer is an independent businessman and the law of supply and demand—and horse trading—definitely applies.

The model lineup this year is quite varied, with turbocharging gaining popularity even in previously low-dollar family sedans. Shop carefully before you spend, compare critically, but most important of all, *drive the cars*. There is no substitute for getting behind the wheel.

## JAPAN

### Honda

**Civic**—The undisputed leader of the four-car Civic line is the CRX. Honda believes it will be the best mileage-getter ever with a frugal 1.3-liter Four that has an EPA rating of 67 mpg! This year's 1.5-liter Four features three valves per cylinder, and both engines are all-aluminum. The sexy aero CRX seats two for all practical purposes, and never looked better doing it.

**Prelude**—The aggressive-looking Prelude enters 1984 like a dragon. The standard equipment list adds four-wheel disc brakes, power steering and an adjustable steering column. A three-valve-per-cylinder, 1.8-liter Four merrily performs up to its usual high standard unchanged.

**Accord**—This is a nice piece, made better by the implant of the Prelude's engine for a 100-cc increase in displacement. A single carb, unlike the Prelude's





# ALL THE IMPORTS—FROM \$4,900 TO \$156,000

## ALFA ROMEO

Spider Veloce 2000	\$16,000
GTV-6	\$19,000

## ASTON MARTIN

Vantage/Volante	\$110,000
Lagonda	\$150,000

## AUDI

4000	\$12,390
5000S	\$16,480
4000 Quattro	\$16,500
5000S wagon	\$17,480
5000S Turbo	\$22,250
Quattro coupe	\$35,000

## BENTLEY

Mulsanne	\$97,950
----------	----------

## BERTONE

X1/9	\$16,000
------	----------

## BMW

318i	\$17,000
528e	\$25,500
533i	\$30,000
733i	\$36,500
633CSi	\$42,000

## DODGE/PLYMOUTH (MITSUBISHI)

Colt	\$4,900
Vista Van wagon	\$9,000
Conquest	\$13,000

## FERRARI

308GTBi/GTSi	\$59,500
Mondial 2 + 2	\$59,500

## HONDA

Civic	\$5,250
Civic CRX	\$6,150
Civic wagon	\$7,000
Accord sedan	\$8,550
Accord two-door hatch	\$7,700
Prelude	\$10,000

## ISUZU

I-Mark coupe	\$6,900
I-Mark Deluxe	\$6,950
Impulse	\$10,200

## JAGUAR

XJ-6	\$32,500
XJ-S	\$35,500

## LAMBORGHINI

Countach 5000S	\$99,500
----------------	----------

## LOTUS

Esprit Turbo	\$48,000
--------------	----------

## MASERATI

Biturbo	\$26,500
Quattroporte	\$65,000

## MAZDA

GLC	\$5,500
626 four-door sedan/hatch	\$7,900
626 coupe	\$8,050
RX-7	\$9,900
RX-7 GSL-SE	\$13,800

## MERCEDES-BENZ

190E/190D	\$23,300
300D/300CD	\$31,950
300TD	\$35,300
300SD	\$39,500
380SE	\$42,000
380S L	\$42,800
500SEL	\$52,000
500SEC	\$56,000

## MITSUBISHI

Tredia	\$6,600
Cordia	\$7,000
Tredia Turbo	\$9,000
Cordia Turbo	\$9,500
Starion Turbo	\$12,500

Prices effective December '83

## NISSAN

Sentra	\$5,200
Sentra MPG	\$5,700
Sentra wagon	\$7,100
Pulsar NX	\$7,800
Pulsar NX Turbo	\$8,800
200SX	\$8,900
Maxima sedan	\$11,400
Maxima wagon	\$12,800
300ZX	\$16,000
300ZX Turbo	\$19,000

## PEUGEOT

505 GL/S	\$11,300
505 wagon	\$12,000
505 STI	\$15,800
604	\$18,500

## PININFARINA

Spider 2000	\$16,000
-------------	----------

## PORSCHE

944	\$21,400
911 Carrera	\$32,000
928S	\$44,000

## RENAULT

Fuego	\$8,900
Sport wagon	\$9,000
Fuego Turbo	\$11,600

## ROLLS-ROYCE

Silver Spirit	\$98,500
Silver Spur	\$109,000
Camargue	\$150,600
Corniche	\$156,000

## SAAB

900	\$11,100
900 Turbo	\$16,900

two, restricts its output to 86 hp. LX is the new luxury version for '84.

### Isuzu

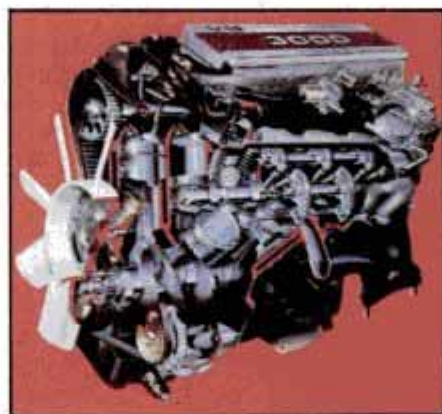
**I-Mark**—The LS and Deluxe coupe I-Marks are dropped, leaving the Deluxe four-door to soldier on with upgraded standard equipment. Engines are gasoline or diesel. The I-Mark Diesel Coupe is retained as a separate model.

**Impulse**—This beautiful sport coupe from the pen of Giugiaro's Ital Design is essentially unchanged for '84. Isuzu could barely wedge any more standard equipment into this car; it's already an embarrassment of riches. Performance, however, still lags behind its looks. A turbo model is rumored.

### Mazda

**GLC**—Fwd hatches and sedans are available for '84, with the GLC Sport replaced by the GLC Luxury. To bolster the market's low-yen end, a bare-bones hatchback has been added to the line.

**626**—How to improve on a winner?



The three-liter, 60° V6 engine in the 300ZX is a lightweight, compact design that will fit transversely in the upcoming front-drive Maxima sedan. In Japan, this engine is also available in two-liter form.

This 1982-83 Japanese Car of the Year carries over essentially unchanged.

**RX-7**—S, GS and GSL versions are joined by a GSL-SE model that replaces the four-barrel carb with fuel injection and adds some displacement, pushing power from 101 hp to 135. Neat new

"speed-sensing" variable-assist power steering option gives maximum boost for parking, minimum at highway speeds. Dash controls, better interior airflow and an air dam that directs cooling air to brakes are new.

### Mitsubishi

**Colt**—GTS Turbo version runs off like a rocket, a result of 102 fuel-injected hp. This minimissile is sold here at both Plymouth and Dodge dealers. It continues to carry the unique Twin-Stick gearbox, offering four speeds hot or four speeds hotter. Every Mitsubishi car line now has a turbo-charged model.

**Dodge Challenger**—Cancelled.

**Plymouth Sapporo**—Ditto.

**Starion/Conquest**—The Mitsubishi and Dodge/Plymouth sporty models differ from one another only in minor detail. Best new version available: the ES (for EuroSport), with a turbo-boosted, 2.6-liter, 145-hp Four and standard antilock rear brakes. Cruise control joins standard equipment, and the exte-



## SUBARU

GL/DL two-door hatch and sedan	\$5,100
GL/DL wagon	\$6,600
GL/DL hardtop	\$6,700
GL 4wd	\$7,300
GL/DL wagon 4wd	\$7,300

## TOYOTA

Tercel	\$5,100
Starlet	\$5,900
Corolla four-door hatch and sedan	\$6,500
Tercel wagon	\$6,600
Tercel wagon 4wd	\$7,500
Corolla Sport	\$7,600
Celica S/GT	\$7,700
Camry	\$8,100
Van	\$9,000
Celica GTS	\$10,600
Cressida	\$13,800
Cressida wagon	\$14,400
Celica Supra	\$16,000

## VOLKSWAGEN

Rabbit Diesel	\$6,400
Jetta	\$7,400
Jetta GL	\$8,200
Rabbit GTI	\$8,350
Jetta GLI	\$8,700
Scirocco	\$10,900
Vanagon	\$11,700
Quantum GL	\$13,000
Quantum wagon	\$13,800

## VOLVO

DL	\$11,300
GL	\$15,000
GL wagon	\$15,550
Turbo	\$16,500
Turbo wagon	\$17,400
760 GLE	\$21,200

rior receives a cleanup, deleting the fake hood scoop. Two other models are the LS and LE.

**Cordia**—Base, L and LS versions get better torque and 88 hp from a new standard, two-liter Four. The turbocar gets the 1.8-liter Four boosted to 116 hp (up 41 percent!), and ventilated front discs, usual suspension beef, power accessories and appearance items. The five-speed gearbox becomes standard in all cars, replacing Twin-Stick in L and LS models.

**Tredia**—See Cordia. Same mechanicals, different bodies. Models include a turbocar, featuring the blackout - is - beautiful theme, bigger tires, new alloy wheels, extended air dam. Road warriors will appreciate Tredia's "soft-feel gun grip" shifter knob.

## Nissan (Datsun)

**Sentra**—One of our favorites, the Sentra comes in four body styles

and three trim levels. Its engine is bumped from 1.5 liters to 1.6, with a new electronically controlled carburetor.

**Stanza**—A peppy 97-hp, two-liter Four motivates the Stanza, with electronic fuel injection new this year. A five-speed manual is the standard transmission. New grille, fenders and hood design contribute to a fresh-faced look. The notchback model gets new taillights and a new trunk lid, and the interior gains two inches of front-seat legroom.

**200SX**—The old model just retired. The new 200SX is a sporty, wedge-shaped coupe and hatchback that debuted at the Frankfurt Auto Show last year. First look at the U.S. version is on a following page. There will be a choice of a 102-hp, two-liter, normally aspirated engine with a solid rear axle or a 120-hp, 1.8-liter turbo motor with independent rear suspension.

**Pulsar NX**—Unchanged, Pulsar NX still carries 1.6-liter Four with 69 hp. It comes with either a five-speed manual or three-speed auto with lockup torque converter. The fun turbo version has been cancelled. The two- and four-door Pulsars also will bite the dust for 1984.

**Maxima**—Nissan press guys term this car one with "dateless" styling. That means the warhorse is getting on, though its popularity remains up. It will remain essentially unchanged until, in late-year, a new front-drive sedan with V6 power, using a version of the 300ZX engine, comes along.

**300ZX**—Call it a refinement of a theme already pretty well executed. The new Z-car boasts a V6 pumping out 160 hp normally, 200 hp under turbocharging. New bells and whistles for the electronic dashboard, plus new fuel injection and an electronically con-



Rolls-Royce has cut the price of its Silver Spirit by \$12,500 (enough to buy a fully loaded Chevy).

trolled, four-speed automatic. Most notable on the completely new but familiar exterior are the semilidded headlamps.

## Subaru

**GL/DL/HL**—A High Luxury series joins companion GL and DL versions of the Subaru hardtop, sedan and station wagon models. HL cars have standard a/c, power windows-mirrors-steering, and electro goodies such as a trip computer and digital dash. "Turbo-Traction" in the cars and wagon combines a turbocharged, fuel-injected, 1.8-liter Four with Subaru's On-Demand 4wd.

**Brat**—Unchanged.

## Toyota

**Starlet**—Unchanged.

**Tercel**—Last year's Tercel 4wd station wagon had cult status from the beginning. All seven—count 'em—seven Tercel models get the same low-torque, 1.5-liter, ohc, in-line Four, offering a modest 62 hp. New model: front-driven, two-wheel-drive version of the 4wd wagon.

**Corolla**—Toyota covers the waterfront here, with Corollas in fwd and rwd configurations. Super SR5 Sport comes in slick new two-door coupe or liftback models with rear drive; four- and five-door grocery-getter sedans are

*(Please turn to page 160)*



Honda CRX combines cute styling and amazing performance in a two-seat package.



# PM's Forest Ranger

It's not a camper, but the features designed into our Ford Ranger pickup will certainly make you a lot more comfortable in the great outdoors.

**W**here do you get an inexpensive, compact vehicle that can take you and a buddy as far into the outback as you want to go, shelter you for a week or two and bring you back out none the worse for wear? And it has to be street legal, of course.

A motorhome can't take you off-road. A utility vehicle doesn't have the room of a pickup, and a pickup fitted with a typical slide-in camper can barely get out of the driveway, let alone off the beaten path. A trail bike and pup tent probably isn't your idea of shelter, and besides, where do you put all your gear?

By now, you realize that you can't buy such a vehicle. That's why we decided to design one ourselves.

When Ford came out with its new V6, four-wheel-drive version of the Ranger minipickup, things started to come together. The short-wheelbase Ranger is only 175 in. long—no bigger than a Honda Accord sedan. More important, it's only 65 in. wide—12 in. narrower than a full-size Bronco. When you're trying to thread your way down a narrow trail, that could be the difference between go and no-go.

The Ranger box is a full 6 ft. long on the inside and 4½ ft. wide. That's more than enough space in which to camp out and store hunting and fishing gear under a lightweight and inexpensive cap. So, after a lot of planning and figuring, we ordered up a Ranger 4×4, with the luxurious XLT interior, four-speed manual transmission and a bunch of what they call comfort and convenience options.

We got power steering, power brakes, air conditioning, rear step bumper, sliding rear window, vent windows, tilt wheel, AM/FM/cassette deck, the exterior protection group, the convenience group and the light group. We checked just about every box on the order blank except kitchen sink. We figured we'd add that ourselves.

So as not to end up with a whimpering cream puff of a truck, we added every muscle-building option



The twin custom-built platform units (top) open up to reveal storage for every camping accessory. The storage units are covered with laminate (above, left) and slide out easily. With foam mattresses (above, right), the units can serve as occasional bunks.



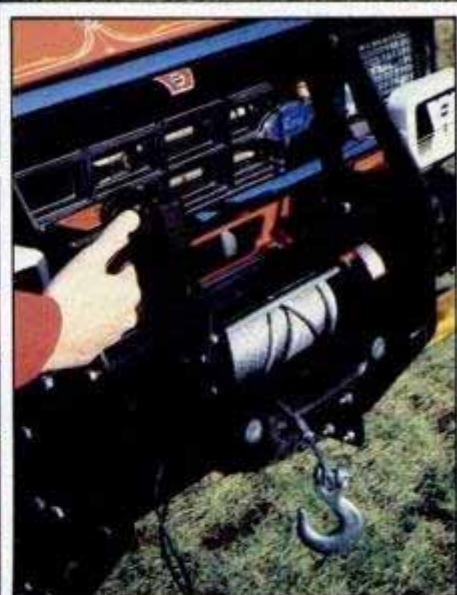


Designed by the PM Outdoors Dept.  
 Editor: Ray Hill  
 Text: Rich Taylor  
 Photos: George Ancona  
 Fabrication: Sand & Hill Inc., South Brunswick, N.J.

Ford has. We got the 13-gal. auxiliary fuel tank, heavy-duty alternator and battery, camper package with 1,600-pound payload and western-style trucker mirrors. We skipped the optional off-road tires and wheels because we wanted to add those ourselves.

The result of all this was a peppy, comfortable, fun-to-drive minitruck. As it came from Ford, it was just right for an afternoon's fire road bashing or everyday commuting. It was also perfect for rounding up a load of firewood, lumber or auto

*(Please turn to page 166)*



PM's Forest Ranger (top) can carry all of the gear that's necessary to get us to the out-back and back in style and comfort.

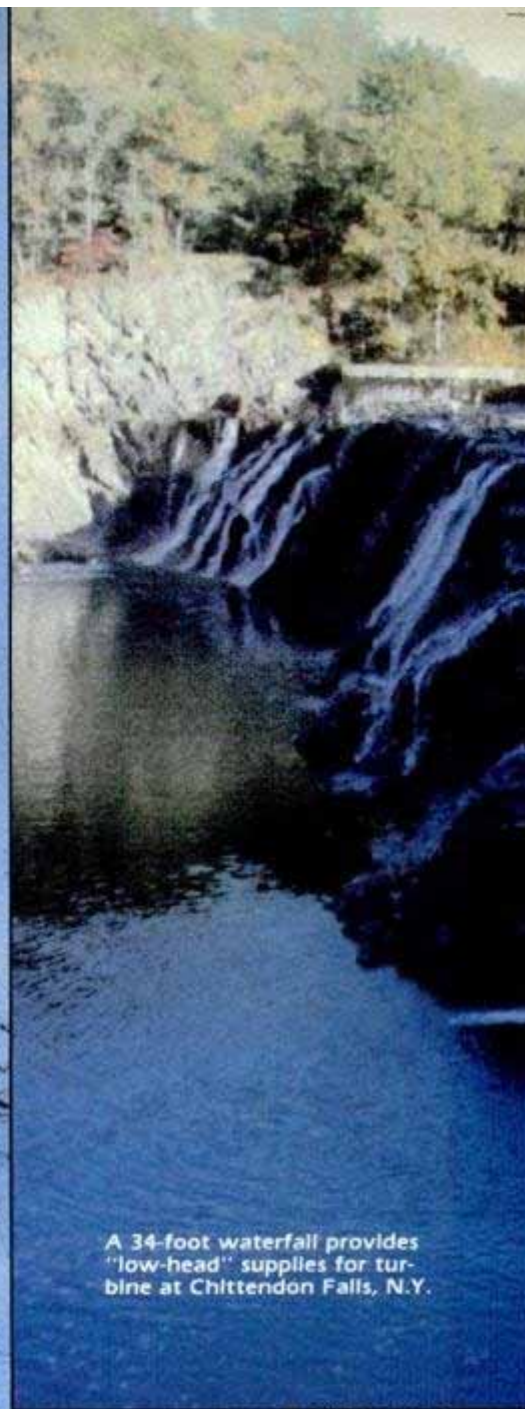
Warn winch setup on front bumper (above) can pull us out if we get too far into the wilderness. The one-handed CB radio and super-duty flashlight (left) are conveniently located in the cab of the Forest Ranger.



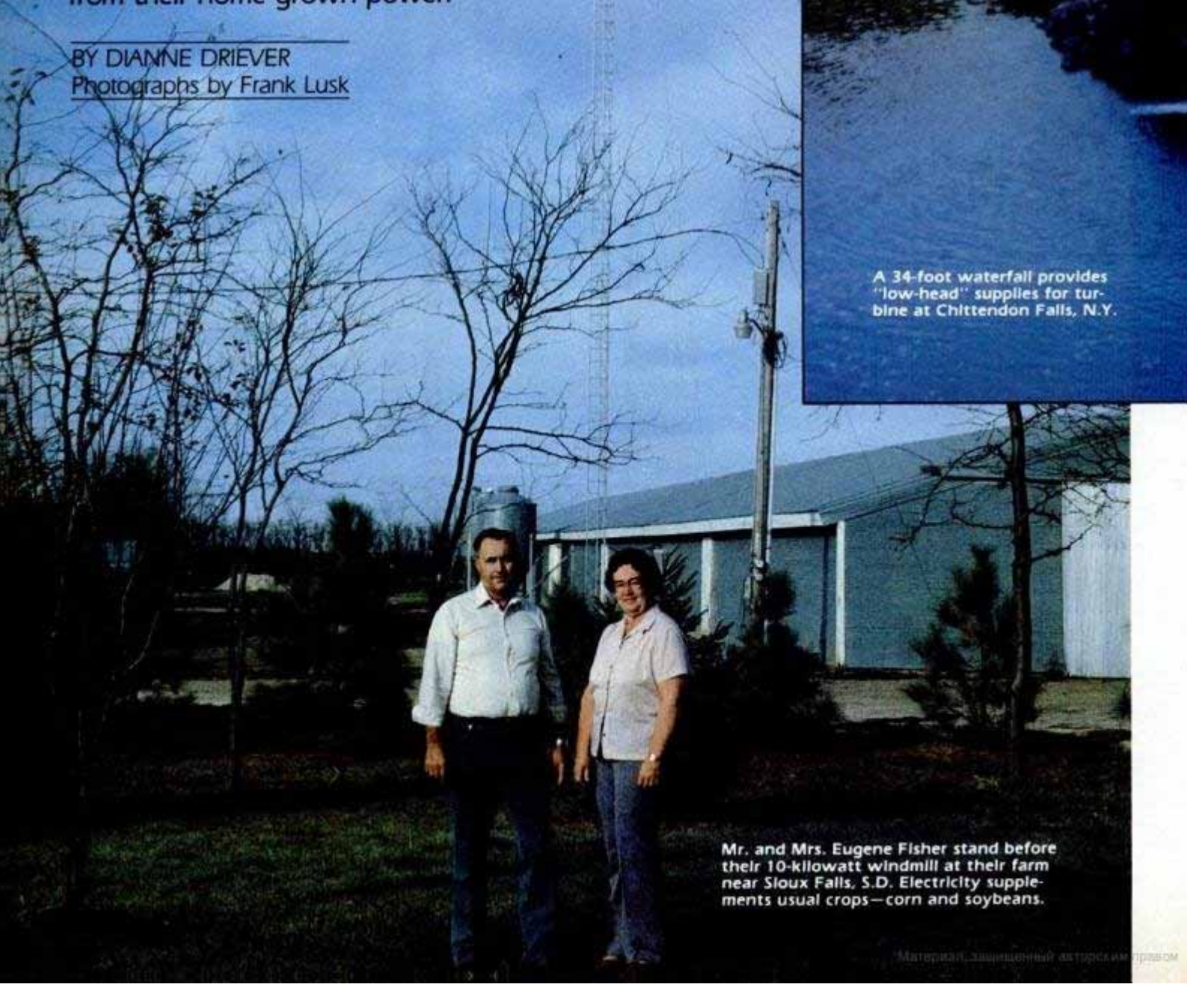
# Mom & Pop Power Turns A Profit

Farmers and homeowners are starting to reap big profits from their home-grown power.

BY DIANNE DRIEVER  
Photographs by Frank Lusk

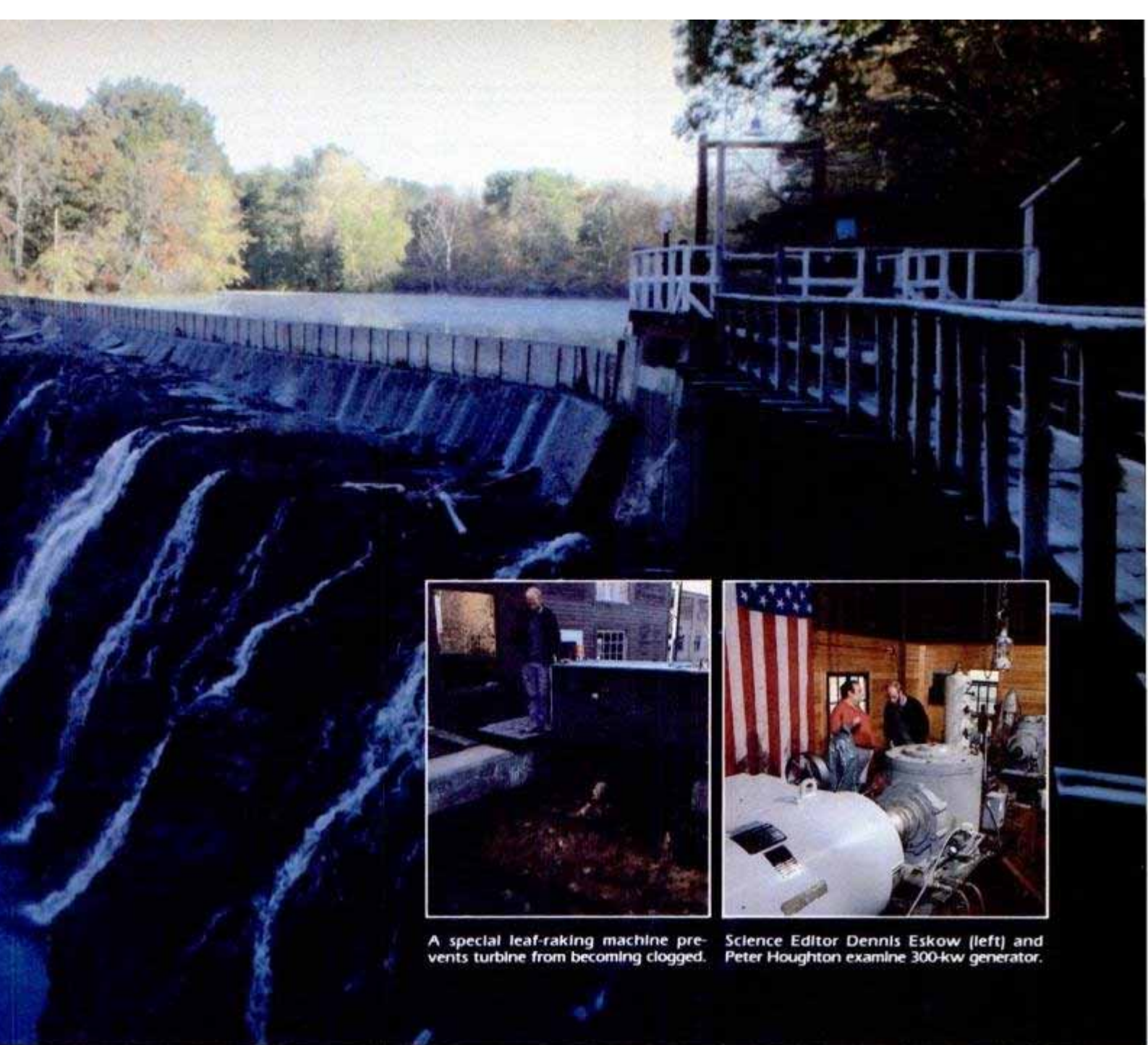


A 34-foot waterfall provides "low-head" supplies for turbine at Chittendon Falls, N.Y.



Mr. and Mrs. Eugene Fisher stand before their 10-kilowatt windmill at their farm near Sloux Falls, S.D. Electricity supplements usual crops—corn and soybeans.





A special leaf-raking machine prevents turbine from becoming clogged.

Science Editor Dennis Eskow (left) and Peter Houghton examine 300-kw generator.

**S**ell home-grown electricity? Just 12 years ago, Barbara and George Mallett couldn't have imagined it. Instead, they dreamed of a country life style, so they bought a 100-year-old ranch in northern California's Trinity Alps, where they hoped to make ends meet by growing hay and apples and raising cattle. Electricity for irrigation was provided by an old hydro plant on Trinity Creek, where their six children enjoyed playing in the sun.

Little did they realize that their vintage 75-kw Pelton turbine would lead to the creation of the "Mom & Pop Power Co.," a public utility providing enough electricity to serve 600 homes and bring the Malletts a yearly income of about \$100,000.

And it's happened on a cattle farm in Connecticut and on a wind farm in the Midwest. When the National Energy Act was written in 1978, even its strongest backers couldn't foresee the success it would have in rural America. The act forces utilities to buy energy from any private source at the rate per kilowatt hour it would cost them to produce the additional power

themselves, called the "avoided cost." In the six years since the act was created, rates paid to small producers have risen from ½ cent per kwh to as much as 8 cents per kwh. Using falling water, wind, cow manure and sunlight, over 5,500 small-scale power plants (with a capacity under 10 megawatts) are in place and producing electricity.

The U.S. Department of Energy, which licenses the small utilities, doesn't know how many are turning a profit. But PM, in interviews conducted with mom and pop power-plant owners around the country, has found that a growing number are making money.

In the eastern United States, the Francis turbine—a chambered Nautilus spinning on a vertical axis under a flow of low-pressure water—has made back-yard power more desirable than ever. When Paul Eckhoff, his daughter Mary and her friend Peter Houghton were scouring rural upstate New York in search of abandoned powerhouses, they found a rusted Francis turbine in the ruins of an old cardboard box factory. They also found—in what seemed a hopeless state of



decay—a 6-foot concrete weir creating a lovely 34-foot waterfall, rotted wooden headgates, a debris-ridden sluiceway, a rusted penstock and a powerhouse slipping off its foundation. To Eckhoff and his family corporation—including his wife and five daughters—it was the ideal location for a hydroelectric facility and a retirement home. He calls it Chittendon Falls Hydro Power Inc., which sells excess power to the New York Power Authority.

More recently, corn and soybean farmer Eugene Fisher has added a new crop to his farm near Sioux Falls, S.D. Fisher's 90-foot-high wind vane supplies all the electricity required by his farm and home, and he sells the monthly excess back to the Rural Electrification Administration. His windmill cost \$27,000 to set up, so it won't turn a profit until later in the decade. But Fisher says the self-reliance is a great payoff and will keep him happy until the profit starts to flow.

### Manure-based system

At the Sunny Valley Farm near Danbury, Conn., the profits started soon after the generator began running off its manure-based biomass system.

Under funding from a private foundation, the farm has a system that turns manure from 200 dairy cows into methane gas that powers a generator. The remaining slurry is used as fertilizer (no nitrogen is lost in the gasification process) or as bedding.

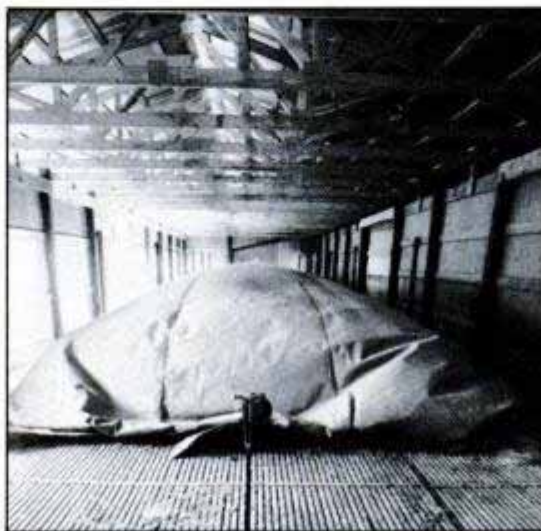
Filtration machinery picks pieces of straw out of the slurry and cleans and dries it. Until recently, the farm had to depend on costly used newsprint to provide bedding for the cows. The manure-based system has eliminated Sunny Valley's \$1,000 per month electric bill, providing about \$400 per month in excess electricity that is sold back to Northeast Utilities.

To make a profit, you need a fair understanding of how

---

A 90-foot-high wind vane supplies all the electricity at Eugene Fisher's farm and home. The excess is sold back to the power company.

---



Kevlar blanket covers slurry as manure digester at Sunny Valley makes methane, fertilizer and straw.

energy is produced, a good measure of workshop know-how, plenty of good tools and about a half-dozen extra hands.

In California, the Malletts ordered a brand-new Pelton turbine, generators and switching gears. The turbine, developed during the California gold rush, makes use of the "high-head" conditions of the Sierra. High-pressure, low-volume waterfalls move the Pelton turbine like a traditional water wheel.

### East Coast rivers

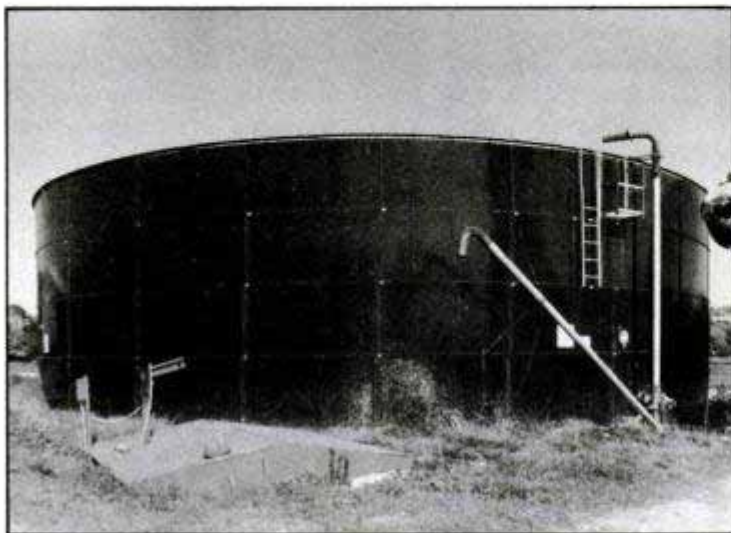
East Coast rivers tend to be more docile, so the Eckhoff concern and others have opted for the Francis turbine. Submerged beneath the creek surface, the turbine takes advantage of low-head supplies and turns its multiple chambers around a vertical axis.

Restoring the old site has given the Eckhoffs and Houghton an education in the running of vertical generators, gearboxes and the importance of keeping penstocks clear of dried leaves, which can clog up a turbine. The New Yorkers devised their own motorized rake to clear leaves from the trough that feeds water directly to the wheel. It works off a small automotive engine. In addition to restoring the turbine and inventing

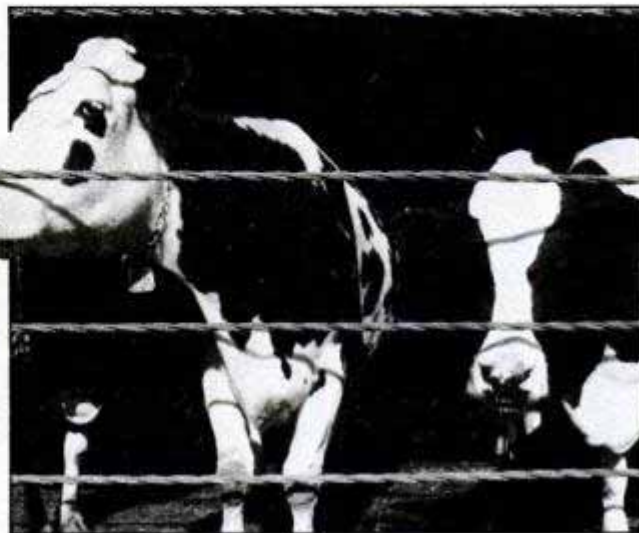
the rake, they've built two generators from spare parts: one a 300-kw and the other a 150-kw. They also made their own hydroelectric control equipment, which they now market to other small utilities.

In the Great Plains, Fisher and other farmers who harness the wind must buy a synchronous inverter so that they can get on line with the Rural Electrification Administration.

The inverter converts direct current from the generator to alternating current, which can then flow either into the normal household wiring or into the public utility lines on windy days when excess power is produced. If a power failure occurs in the lines, the inverter immediately shuts



After methane is removed, slurry is pumped into this vat. Straw is strained out of liquid and remaining fertilizer is used on fields.



Sunny Valley's 200 cows produce 18 tons of manure a year. That pays for the farm's electricity and leaves a monthly profit.



down the wind system, protecting linemen from power surges.

The system being used at Sunny Valley Farms is home-grown. The Sunny Valley cows produce 18 tons of manure a year, an amount that used to be called a waste disposal problem. But last year, Sunny Valley installed a digester to collect, process and distribute cow manure for electricity, fertilizer and straw.

The cow barn is hosed down and mechanically swept each day. The resulting slurry is collected in a concrete trough through which hot-water pipes run, bringing the biomass temperature to about 100° F. The trough is covered with a Kevlar blanket. As the slurry ferments, it gives off methane and carbon dioxide gas. The methane fuels a four-cylinder engine, which powers the farm's 27-kw generator. Heat from the engine warms the water pipes that ferment the biomass, so the entire system is self-energizing. The carbon dioxide gas flows out with the fertilizer in gravity tubes and is run off outside the building.

#### Slurry used in fields

The slurry, including the fertilizer, left after the methane is extracted is shunted to a giant vat, where it stands until transferred to pump trucks for use in the farm's cornfields. As the fertilizer is piped out of the vat, the liquid is filtered to remove bits of straw. That filter, when cleaned out, will yield enough straw each year for cow bedding to cut the use of newsprint in half.

The system is fully operational and making a profit already. Digester operator John Schaeffer says that if all the retrievable manure, slaughterhouse waste and whey from dairy farms across the nation were fed through digesters, the resulting energy would meet 2 percent of America's needs. Digesters may some day remove and convert waste from septic tanks and water treatment plants.

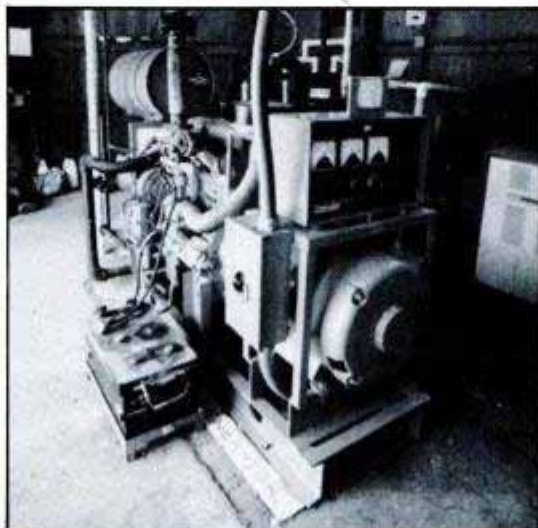
Even the mom and pop operations not turning a profit

---

At the Sunny Valley Farm, 200 dairy cows provide the fuel.

Profits started soon after the generator began running off the manure-based system.

---



Methane produced at Sunny Valley fuels an engine which powers this 27-kw generator for electricity.

have something to offer a homeowner. U.S. Department of Energy official Bill Meade says the systems often provide backup electricity for homeowners living in areas frequently affected by blackouts. And he notes, "Given the federal, state and even municipal tax advantages available for many mom and pop operations, there's also the tax break angle."

If you think you might want to get into the energy-producing business, contact your state utilities commission energy office or agricultural extension service. If you have a hydroelectric site, they'll refer you to consulting engineers who specialize in site feasibility studies. Such engineers will recommend the proper equipment and, for a fee, even supervise the installation of the plant. For more information, write to: National Hydropower Assn., 1516 King St., Alexandria, Va. 22314.

For a complete list of wind energy systems manufacturers, write to American Wind Energy Assn., 1609 Connecticut Ave. NW., Washington, D.C. 20009. A *Guide To Commercially Available Wind Machines* can be ordered free from the National Technical Information Service, 5285 Port Royal Rd., Springfield, Va. 22161.

Another excellent publication is *Wind Energy Conversion Systems*. To order, send \$2 to the South Dakota Office of Energy Policy, Capitol Lake Plaza, Pierre, S.D. 57501.

Other home-grown energy systems require more specialized equipment and study. Information on biomass and other systems is available from the Cogeneration Coalition Inc., 1828 L St. NW, Washington, D.C. 20036.

Mom and pop power does seem to be a growing concern, especially in rural America. But there are many pitfalls, not the least of which is the question of payback. Not every system will pay for itself. If you plan to get involved, ask your state energy agency to introduce you to someone already in the business on property similar to yours. **PM**

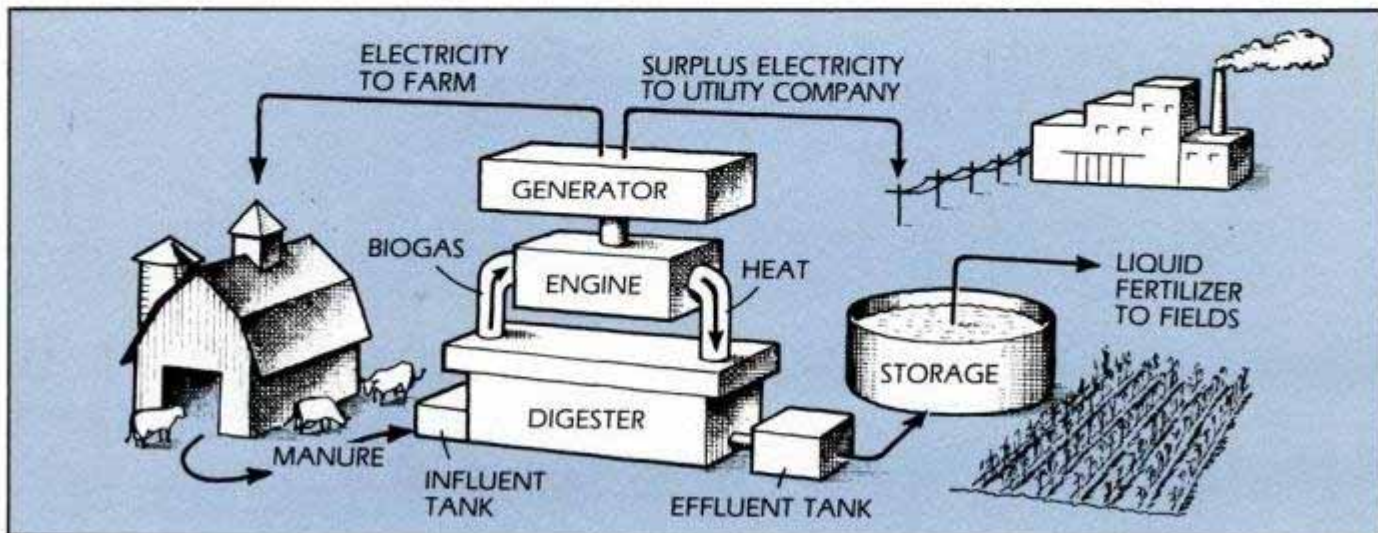


Diagram shows system for turning manure into fuel and fertilizer. Manure and water are piped into the digester, where methane gas is warmed out of slurry. Gas powers the generator, and heat goes back into the slurry. Remaining liquid is gravity-piped to fertilizer tank.





THE SMITH FAMILY PROBLE



SHE'S A BEAUTY!!

MOTHER AND DAUGHTER

KINDA GREAT

THE SMITH FAMILY PROBLE



SHE'S A BEAUTY!!

MOTHER AND DAUGHTER

KINDA GREAT

PETER WINS  
FIRST PRIZE

MINDA SEX



EPSON





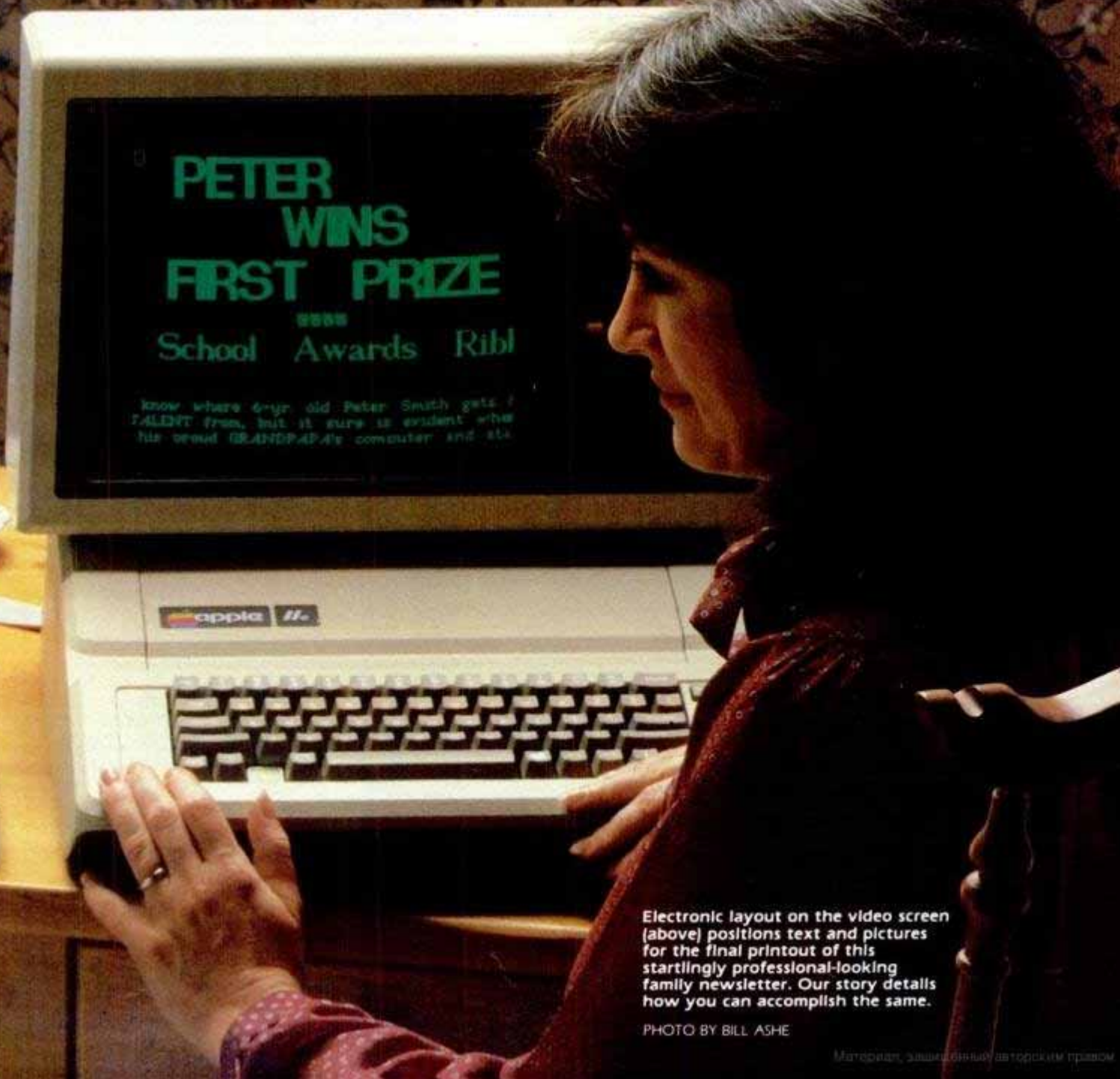
# FORGET TYPEWRITERS: Now Design And Print Almost Anything!

BY NEIL SHAPIRO  
Electronics Editor

Advances let compute-  
it-yourselfers format  
attractive documents.

If you think this is just another article about using your computer as a word processor, think again. The personal computer revolution has moved beyond word processing to electronic typesetting, type design, layout and even graphics. With a relatively inexpensive home system, you now can have many of the same capabilities as publishing houses that use professional systems selling for upwards of a million dollars.

The trick is in knowing how to bring hardware and software together to



Electronic layout on the video screen (above) positions text and pictures for the final printout of this startlingly professional-looking family newsletter. Our story details how you can accomplish the same.

PHOTO BY BILL ASHE



achieve a goal. It's a lot like building any sort of project. All the tools are in the toolbox, but only the knowledgeable do-it-yourselfer can pick the right tool to do the job properly.

Now, an accomplished *compute-it-yourselfer* can do everything from designing a family newsletter to formatting a professional report, or just impressing friends with absolutely gorgeous correspondence.

Here's the toolkit—and here's how to go about making use of all the "tools of the trade."

## Beyond graphics

Many computer systems, such as the Apple IIe and the IBM PC, are capable of graphic output as well as words and numbers. But programs that take advantage of a machine's graphic ability—and apply that ability to electronic design of the printed page—have only recently appeared.

Such a program for the Apple is *Fontrix* by Data Transforms. The *Fontrix* program allows you both to draw and set "type" on the Apple's high-resolution graphics screen. A similar program

called *Pyxel*, from Pyxel Applications, is available for the IBM PC.

Programs like *Fontrix* take advantage of printers, such as the line of popular printers from Epson, which can print graphics as well as text. These are often called "dot-matrix" printers because each letter they print is made up on a matrix of dots. A "dot-matrix" printer can also print pictures using a series of tiny dots.

*Fontrix's* secret lies in its ability to fool the printer into thinking that everything you are printing is a picture—

## Getting The Big Picture

One of the most annoying limitations of using a personal computer for professional-style printing is the difficulty of envisioning what the printed page will look like based on its video representation. Using the proper combination of software and hardware can help in this visualizing process.

First, you will want a word processor that formats onscreen in much the same way that the printed page will look. This is called, not surprisingly, a "what you see is what you get" word processor. Many word processor programs claim this capability, but often to see what it is you will be getting requires you to stop editing and wait while the screen reformats in a "preview" mode. No good. Every time this happens you have lost your train of thought.

In the CP/M world, the *Wordstar* program from MicroPro formats as you type. Center a line, and it centers on the

screen. We think *Wordstar* is the all-around best CP/M word processor. Available for the IBM PC and Apple II (it comes with a free circuit card to convert the Apple to CP/M), it is a very good buy. If you don't want to add CP/M to the Apple, then *Format II* from Kensington Microware is just about the best word processor which runs in the Apple's native "AppleDOS" operating system. And, for the IBM PC'er a new program called *The Word* from Microsoft looks to be a whole new step forward in this field.

But, once you have the word processor picked out, you may still have screen problems. After all, even a full-size screen width of 80 columns will have some problem showing you how a page of 100 columns of type will really look.

The "Ultraterm" from Videx, for the Apple II, is a revolutionary development

in hardware. Plugged into the main circuit board of an Apple, the Ultraterm will convert the Apple's video to up to 132 columns across. We have had much success in using the Ultraterm to do such things as lay out and design three-column newspaper pages right on the screen of the Apple II. (Note that a column on the computer is one letter or character; in newspapers it's the width of one line of type.)

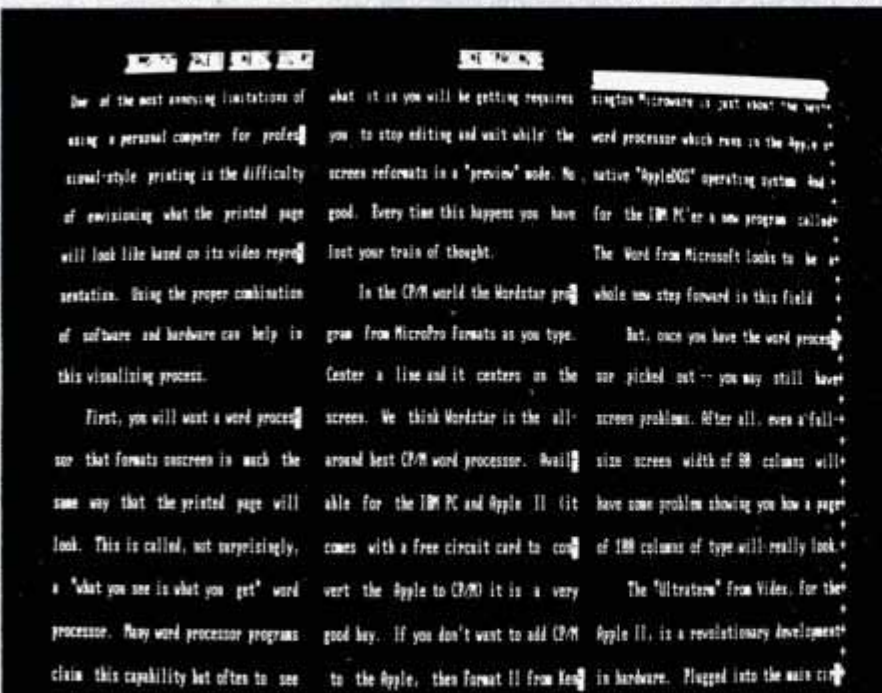
The Ultraterm, when in an 80-column mode, supplies the Apple display with what Videx calls a "high-quality" character set. Instead of normal computer-looking type on the screen, the Ultraterm produces very attractive "Roman-style" type which is easy on the eyes.

We have tested the Ultraterm extensively in conjunction with the *Wordstar* word processing program.

In doing so, we have found that configuring *Wordstar* to operate at 132 columns onscreen by 24 lines deep is simply a matter of following *Wordstar* 3.3's excellent installation instructions (it would be much more complex on earlier versions of the program). We have had no problem in operating in this extended viewing mode, but it must be pointed out that when you configure *Wordstar* 3.3 to this wide width, a special message alerts you the program has not been "debugged" for line lengths greater than 80 columns. We cannot guarantee that you won't have problems, but in over 100 hours of operation and hundreds of thousands of words of text the program has yet to fail in this mode for us. As always, back up your documents to a second disk!

If you have the Apple II and are doing any sort of serious word processing, the Ultraterm is the way to go for display.

But no matter which computer you are using, the hints given here should help you see what you get *before* the final printout. And, once you know that, it will be easier to design and use type fonts and other graphics such as those that are mentioned in the rest of the article.—N.S.



Ultraterm display of a specially set-up *Wordstar* program shows how a three-column format may be designed and previewed onscreen. Ultraterm is by Videx for the Apple II.



bypassing the printer's built-in type styles and allowing you to design and choose your own.

Let's say you want to place a large headline above a typeset story. This would call for two type styles. Programs such as *Fontrix* let you type from the keyboard in any type style you want, directly onto the computer's screen.

First, you look at the available type fonts in the *Fontrix* manual (a font is one size and style of a typeface). You can probably find two that you like from the wide selection. If not, *Fontrix* lets you design your own fonts.

Once you have the fonts you like, using them is very simple. First, load the font from the computer disk. Then, when you type at the keyboard, the letters that you enter appear on the screen in the font design you've chosen.

A block, called a cursor, shows you onscreen where the next letter you type will appear. Using various keyboard commands, you can move the cursor to any position on the screen—and beyond the screen. That's because *Fontrix* allows you to link together many screens as one printed page. In this manner, your page design can be very complex, but the screen won't be too crowded. Your computer's screen becomes a window onto a much larger page, and you can move the window to look at one part of the page and then another. (In the picture at the beginning of this story, note how the headline about Peter winning a blue ribbon takes up more than one screen, even though it is only a part of the final printed page.)

### Adding graphics

The *Fontrix* program will also let you draw pictures onscreen using a joystick or a graphics tablet. Or you can place pictures done by other programs onto your video page to be printed.

While the graphics routines included are adequate for many situations, if you'll be doing a lot of picture drawing, we recommend a special graphics package to use separately. The very best graphics-only software we have seen for the Apple is Penguin Software's *The Complete Graphics System*. This program allows you to design many pictures quickly while the computer worries about keeping the lines straight and drawing perfect circles. (By the time you read this, the program should also be available for the IBM PC.)

It's even possible, using *Fontrix*, to place photography onto the video screen and then onto your page. But to do this requires special hardware. The "Photocaster" is a circuit board from Adwar Inc. which plugs into an Apple II and allows you to attach a video camera to the computer. What the camera sees

*(Please turn to page 136)*

## FANCY FONTS

OLD ENGLISH, 18-PT.

A B C D E F G H I J K L M N O P  
Q R S T U V W X Y Z a b c d e f g h i j  
k l m n o p q r s t u v w x y z 1 2 3 4 5

ROMAN-STYLE, 40-PT.

A B C D E F G  
H I J K L M N O P  
Q R S T U V W X Y Z  
a b c d e f g h i j k l m n o p q r s t u v

ROMAN-STYLE ITALIC, 12-PT.

A B C D E F G H I J K L M N O P  
Q R S T U V W X Y Z a b c d e f g h i j k l m  
n o p q r s t u v w x y z 1 2 3 4 5 6 7 8 9

ROMAN-STYLE BOLD, 18-PT.

A B C D E F G H I J K L M  
N O P Q R S T U V W X Y Z a b c d e f g h i j  
k l m n o p q r s t u v w x y z 1 2 3 4 5

SCRIPT, 14-PT.

A B C D E F G H I J K L M N O P  
Q R S T U V W X Y Z a b c d e f g h i j k l m n  
o p q r s t u v w x y z 1 2 3 4 5 6 7 8 9

SANS SERIF-STYLE, 18-PT.

A B C D E F G H I J K L M N O  
P Q R S T U V W X Y Z a b c d e f g h i j k l

## FONTRIX

ROMAN HEADLINE

A B C D E F G H I J K L M N O  
P Q R S T U V W X Y Z 1 2 3 4

ASCII BOLD

A B C D E F G H I J K L M N O P  
Q R S T U V W X Y Z 1 2

ROMAN HEADLINE

A B C D E F G H I J K L M N O  
P Q R S T U V W X Y Z

OLD ENGLISH

A B C D E F G H I J K L M N O P  
Q R S T U V W X Y Z a b c d e f g h i j k l m n o p

ITALICS

A B C D E F G H I J K L M N O P  
Q R S T U V W X Y Z a b c d e f g h i j k l m n o p

SCRIPTS

A B C D E F G H I J K L M N O  
P Q R S T U V W X Y Z a b c d e f g h i j k l m n o p q r s

## Printing Your Own Typefaces

The two programs that we describe in the story—*Fontrix* and *Fancy Fonts*—are capable of producing a wide assortment of type styles.

The *Fancy Font* program will work in conjunction with any CP/M word processing program, while the *Fontrix* program requires that text be typed in manually.

Typefaces in *Fancy Fonts* are sized in much the same way usual type is—height is measured in points (there are 72 points to the inch). *Fontrix* typefaces, on the other hand, are all relative in

size. As the illustration below shows, various *Fontrix* sizes may be produced from one typeface design.—N.S.

Size  
Size  
Size  
Size  
Size

The type sizes in the *Fontrix* program can be changed by the user as needed.



# Bolt-On Bodywork

Pontiac's new Fiero makes customizing a nuts-and-bolts operation.

BY MICHAEL LAMM, West Coast Editor, AND HARRY BRADLEY



Doorless roadster, reminiscent of a dune buggy, would make a nice weekend project for the Fiero owner. This is the most complex project shown. It requires sawing through roof supports and removing the doors.

**W**ill Pontiac's mid-engined Fiero become America's newest cult car? We think there's a good chance of it, and here's why:

Consider the cult status of the Volkswagen Beetle. The Beetle became cultish partly because it was so easy to rebody. Unbolt the original body and you still had a drivable floorpan. Thus, the Beetle could reappear from the brink of disaster and take on nearly any shape the owner could dream about—from a replica Pantera to a 1937 Ford nose-job to a dune buggy or Baja Bug.

The Beetle's customizing versatility plus its sheer numbers, its mechanical stamina and all those inexpensive aftermarket parts—everything conspired to make the VeeDub a natural cult car. Back-yard fiberglassers couldn't keep their hands off it. In fact, the cult still flourishes.

## Along comes Fiero

So now here comes the Fiero, which has most of the same basics as the Beetle—all but the numbers at this point. Just wait until enough Fieros get sold so they become inexpensive and accessible to teen-agers as used cars. If Pontiac can keep the price in line, you're going to see another cult car within a few short years.

And when that happens—perhaps even before it hits full cult status—you'll see customizers turning out all sorts of body skins for this two-seater.

That's partly because Pontiac has made the factory skins so easy to replace. To replace an outer door, for example, all you have to do is remove the Phillips screws around the outer edges, then reach in and release the door handle. And you can remove and replace the front fenders, both decks, the rear quarter, and even roof in the same simple way.

The only tools needed are a set of Torx-head wrenches, metric sockets, Phillips and normal screwdrivers, and a pop riveter. You do have to buy some replacement molding clips. A Pontiac engineer told me recently that a total skin transplant shouldn't take more than five hours, tops, and with experi-

ence, you can probably do the job in three.

This means the Fiero becomes the first mass-produced American automobile that doesn't need a lot of specialized knowledge or equipment to customize. You don't have to know how to weld—you don't even have to be a wizard with Bondo, lead or fiberglass. All you need are a few tools and enough money to buy a new set of skins.

## Selling 'in the white'

Pontiac has been asked by several aftermarket companies to sell them Fieros "in the white." That means minus skins—just the rolling space frame. Diversified Glass Products in Pontiac,

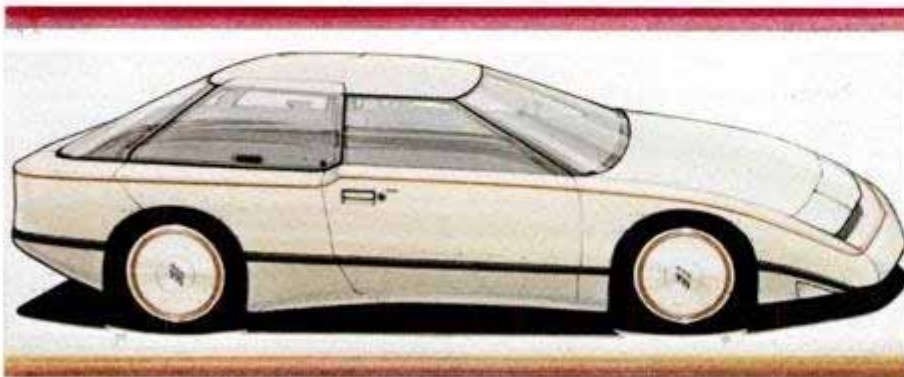
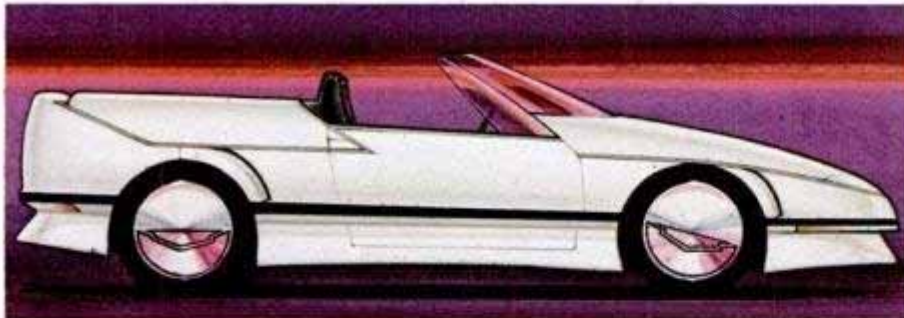


Underneath the Fiero's plastic body shell is a drivable skeleton called a "space frame." The body panels are attached to this frame with 39 bolts and other screw-type fasteners. Replacing all the body panels would take a beginner about five hours. Firms that now sell add-on spoilers could make completely new fenders, decks, nose sections and tail sections for the Fiero. And Pontiac is wholeheartedly encouraging such customizing.





Another bolt-on customizing tack would be to convert the Fiero into an aerodynamic coupe that cleverly disguises the car's midship engine location. This rendering, in fact, is very close to the shape that Pontiac is planning for the '86 Fiero.



Other GM divisions are vying for the Fiero space frame so that they can create their own spinoffs. Cadillac has considered a convertible version (top) with a turbo V6. A wagon version (above) is also under study. Although limited in cargo-carrying ability, its capacity isn't bad for a small car—a sort of maxi hatchback. Easily engineered outside skins will let General Motors introduce new cars quickly on the Fiero space frame.

Mich., which builds fiberglass racing bodies for SCCA and IMSA cars, will probably be among the first to offer modified panels for the Fiero.

What will these new skins be like? Diversified's will likely turn the Fiero into an all-out racing machine. On the West Coast, rumor has it that at least one company is working on a traditional doorless roadster—like the dune buggies of 20 years ago. And another West Coaster has a convertible version in the prototype stage, complete with a removable hardtop.

#### Station wagons and hatchbacks

Perhaps there'll be something along the lines of a mini station wagon. Also hatchbacks. The hatchback seems a natural, since Pontiac considered that body type even as they developed the production notchback coupe. Some customizers might want to extend the rear fenders out beyond the back bumper for a less stubby look. Or at least cant the rear profile more in the direction of the number 7 rather than the inverted 7 that now exists. Tailored hatchbacks can make the Fiero look a lot more like a Ferrari than a Fiat X1/9.

But you might also see some configurations and panel modifications that no one's aware of yet. For example, there could be a modernistic version of the jeep, complete with four-wheel steering. A customized Fiero could easily use the front steering mechanism inherent in the Fiero's rear suspension, which is carried over intact from GM's fwd X-cars. Relatively minor modifications would be needed to make the rear wheels steer.

#### A new industry

As Pontiac adds Fiero powerplant options like a High Output four-cylinder Iron Duke (135 hp) in '85 and a Super Duty 2.7-liter version in '86 or '87 (190 hp) plus over-the-counter parts for even more, all hooked up to a five-speed transaxle, you'll see an entire industry that will spring up around this power-

*(Please turn to page 165)*



# Custom Cabinet For Video Games

This cabinet stores all your video game needs and holds the TV at the right playing height.



Our video game cabinet is built of mahogany plywood. The top drawer stores the game console, paddle and joystick controllers. The lower drawer holds game cartridges.

BY PENELOPE SPANGLER  
Asst. Home And Shop Editor

Our custom-built cabinet holds everything you need for your video games. And it rolls easily into place, ready for action, or against a wall when it's not in use. The top drawer of the cabinet was designed to hold an Atari 2600 console and controls. However, you can adapt it to suit another unit.

Construction: The Woodsmith's Studio  
Color photo: Layman and Newman

The bottom drawer stores game cartridges.

The cabinet and drawer fronts are of mahogany veneer plywood, edged with  $\frac{1}{16}$ -in. strips of solid mahogany. We used  $\frac{1}{2}$ -in. birch plywood for the remaining drawer parts, except the bottoms and the top-drawer divider. These and the cabinet back are  $\frac{1}{4}$ -in. lauan mahogany. The parts are joined with carpenter's glue and clamped until the glue is dry.

Begin work on the cabinet by laying out and cutting the top (A, see materials list), bottom (C) and sides (D). Cut the stretcher (B) to size. Cut

rabbets in both ends on a table saw or with a router. Also rout notches in which the sides of the top drawer slide (see stretcher detail).

Cut dadoes in the sides for the top and bottom. Rabbet the sides and top to accept the back.

Measure  $8\frac{7}{16}$  in. from the top and bottom of each side to position the stretcher. It is recessed  $\frac{3}{4}$  in. from the front. Rout a mortise (see note 5) for the stretcher in each cabinet side.

Test-fit the parts. Clear the rabbets and mortises with a chisel if needed. Cut the cabinet back (E), then cut the

(Please turn to page 146)



## MATERIALS LIST— VIDEO-GAME CABINET

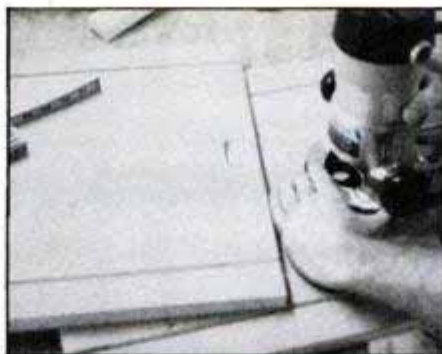
Key	No.	Size and description (use)
A	1	3/4" x 15 7/8" x 23 1/4" mahogany plywood (top)
B	1	3/4" x 1 1/2" x 23 1/4" mahogany plywood (stretcher)
C	1	3/4" x 15 7/8" x 23 1/4" mahogany plywood (bottom)
D	2	3/4" x 15 7/8" x 18 3/4" mahogany plywood (sides)
E	1	3/4" x 15" x 23 1/4" lauan mahogany (back)
F	2	3/4" x 1 1/4" x 15 7/8" mahogany plywood (leg cleats)
G	2	3/4" x 6 1/16" x 22 1/4" mahogany plywood (drawer fronts)
H	1	1/2" x 3/4" x 22 1/4" mahogany (finger grip)
I	2	1/2" x 5 1/16" x 14 5/8" birch plywood (side, top drawer)
J	2	1/2" x 6" x 14 5/8" birch plywood (side, bottom drawer)
K	2	1/4" x 14 5/8" x 21" lauan mahogany (drawer bottoms)
L	2	1/2" x 5 1/4" x 21" birch plywood (drawer back)
M	12'	1/16" x 3/4" to suit mahogany (trim)
N	2 pr.	14" No. 300 Grant drawer slides*
O	4	1 1/2" Shepherd ST2BB ball casters**
P	2	3" zip clips***
Q	1	1/4" x 5" x 13 1/4" lauan mahogany (drawer partition)

Misc.: Carpenter's glue; boiled linseed oil.

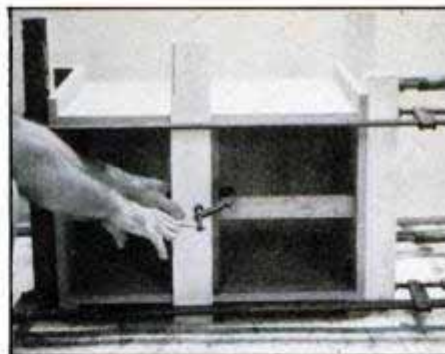
\*Grant Hardware Co., Div. of Buildex Inc., West Nyack, N.Y. 10994.

\*\*Shepherd Products U.S. Inc., 203 Kerth, St. Joseph, Mich. 49085.

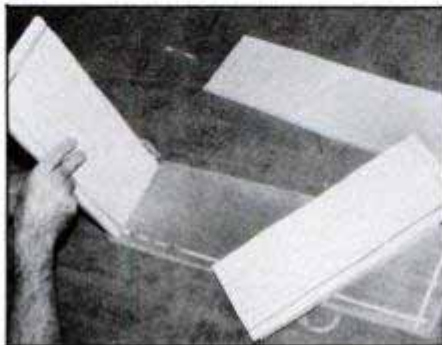
\*\*\*Constantine, 2050 Eastchester Rd., Bronx, N.Y. 10461.



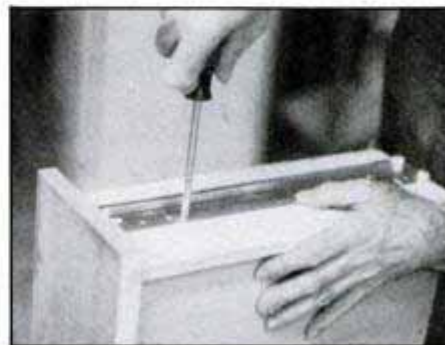
Route 3/8 x 3/8-in. mortises for the stretcher centered on the cabinet sides. Stretcher is recessed 1/4 in. from front. Adjust the router and test on some scrap before routing.



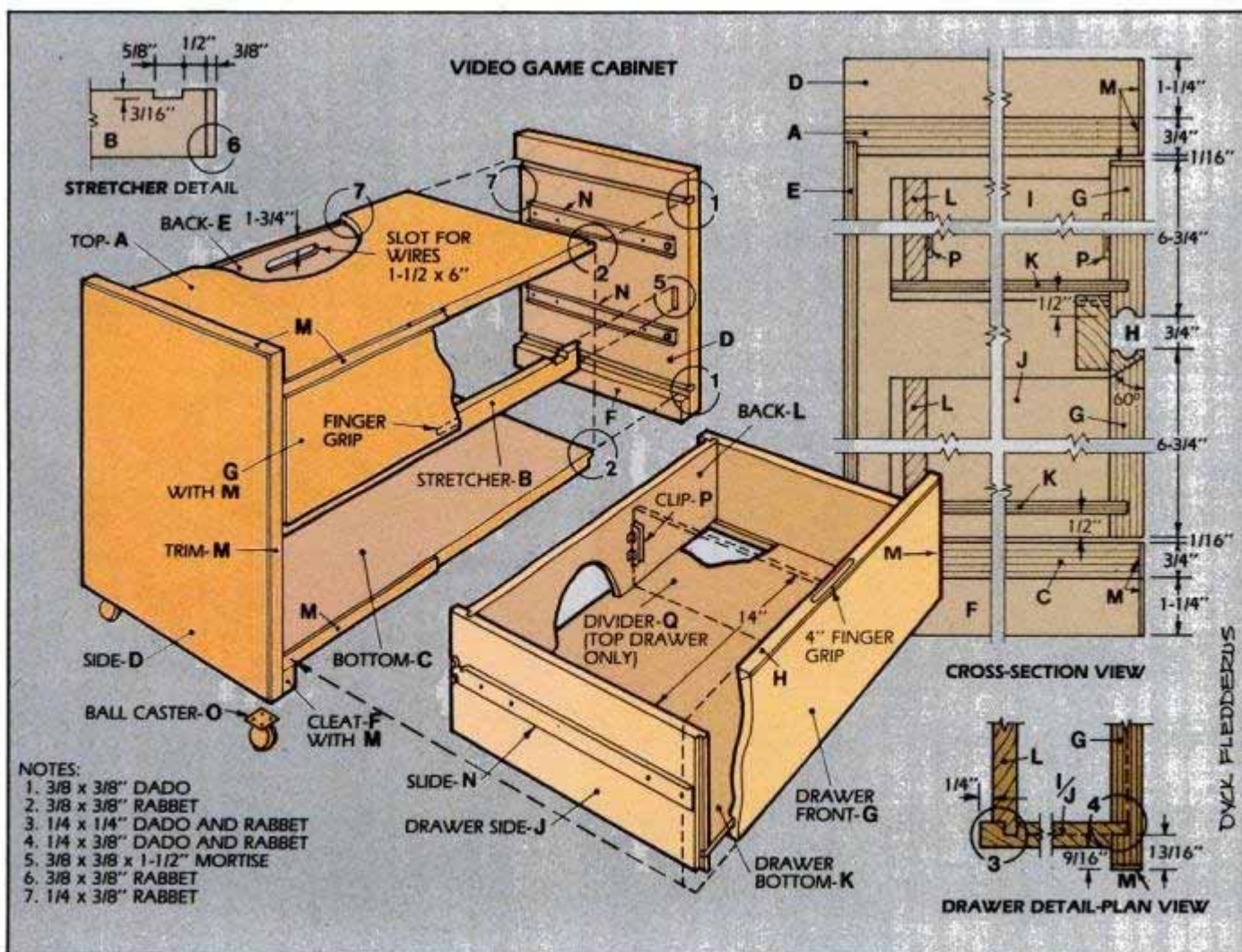
Glue on solid mahogany trim to cover the plywood edges of the cabinet. Apply clamping blocks and clamp until dry. The glue should be dry in about three hours.



Cut the drawer fronts, sides and backs. Cut dados and grooves in the fronts; rabbets, dados and grooves in the sides; and rabbets in the back before fitting [see drawing].



Temporarily install drawer slides with only two screws. Install the remaining screws after the cabinet hardware is in place and you are certain of the slide position.





# 8 Garden Aids For A Bountiful Harvest

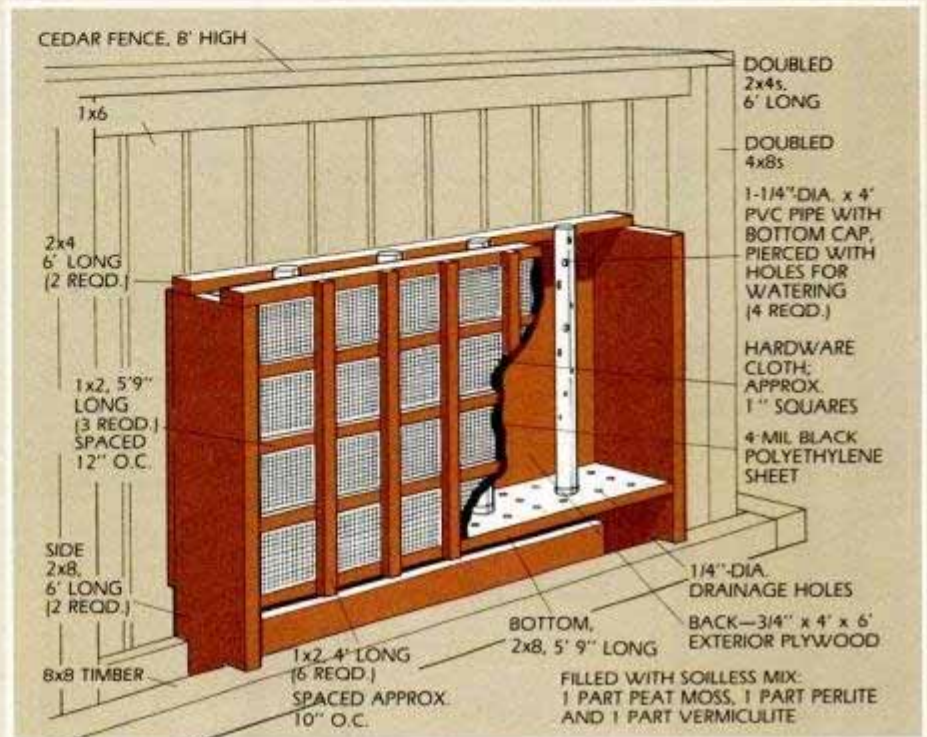
These garden structures can help you grow blue-ribbon winners.

## 1 Vertical fence planter

You can build this vertical redwood planter on any well-supported fence that's at least 4 ft. high. It makes the most of a small space and eliminates bending over to garden. Its back is  $\frac{3}{4}$ -in. exterior plywood. The back, sides, top 2x4s and bottom are assembled with 10d galvanized nails.

Black polyethylene plastic, 4-mil thick, is tacked across the front to the sides, top and bottom. Hardware cloth covering the plastic is held in place by a grid of 1x2s. The grid members are joined with resorcinol glue and 4d nails; the vertical members are fastened to the planter with 10d nails. Position the watering pipes as the planting mix is added. The top of the tubes should be above the soil. To plant, cut a small X into the plastic.

Our planter (below) contains spinach and leaf lettuce.





NARROW-LEAF HINGE  
SUCH AS NO. B38, 2-1/2"-  
LONG HINGE, STANLEY HARDWARE;  
(PAIR REOD.)  
SECURE WITH 3/4" NO. 6 FH SCREWS

FULL  
STORM SASH  
FOR DOUBLE-HUNG  
WINDOW (3 x 5')

1x4, 2'-6-1/2" LONG  
(2 REOD.) SOLAR  
DEHYDRATOR TRAY

SHADE  
SCREEN  
2'-8" x 4'-8";  
SECURE WITH  
HEAVY-DUTY STAPLES

1x4, 4'-8" LONG  
(2 REOD.)

3/4 x 1-1/2  
x 12" PINE  
(4 REOD.)

3/4 x 12" x 5'  
EXTERIOR PLYWOOD  
(2 REOD.)

SCREEN  
DOOR PULL  
(2 REOD.)

3/4 x 12 x 34-1/2"  
EXTERIOR  
PLYWOOD  
(2 REOD.)

ASSEMBLE PARTS WITH  
RESORCINOL AND HOT-DIPPED,  
GALVANIZED 4d AND 8d NAILS



## 2 Cold frame/ solar dryer

This cold frame lets you start growing flowers and vegetables as much as eight weeks earlier than if you were planting in your garden. And after harvest, slip in the dehydrator tray to dry fruits for snacks, or herbs and vegetables for later use in soups or as seasonings. You can also use the cold frame to grow winter salad greens.

The top is a standard storm sash. It is hinged to a bottomless frame with

members butt-joined together. To fit onto the storm sash, the hinges should have narrow leaves. For durability, make the frame of redwood or pressure-treated wood and join with 8d hot-dipped, galvanized nails. Screen door pulls make it easy to carry.

The slip-in dehydrator tray is a 1x4 frame with mitered joints assembled with resorcinol and 8d nails. A section of shade screen is stapled on top of it. The sides are 1x4s glued and nailed together and reinforced with corner blocks, secured in place with resorcinol and 4d nails.



2x6 CEDAR CAP  
MITERCUT, SECURE  
WITH 2" MASONRY  
NAILS

22"

2" MASONRY  
NAIL

BRICK

1x4 CEDAR

SOIL

GRAVEL

4" CONCRETE SLAB;  
POUR WITHIN  
TEMPORARY 2x4 FORM;  
SLOPE AWAY FROM  
DRAIN

2"  
GRAVEL

1/2"-DIA. x 5" PVC PIPE  
DRAIN, CENTER ON CONCRETE SLAB

1-1/4"-DIA.  
WEEP HOLES,  
12" SPACES

## 3 Raised-brick planting bed

Besides being decorative, this raised-brick planting bed is at a convenient height. It's laid over a 4-in. concrete slab that rests on 2 in. of gravel.

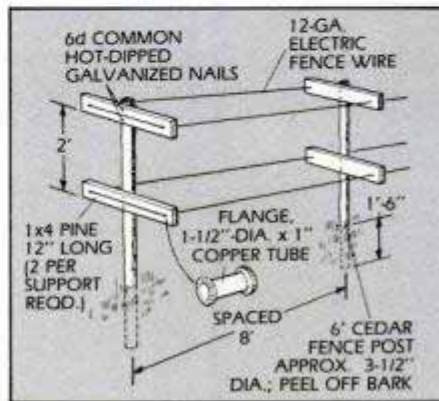
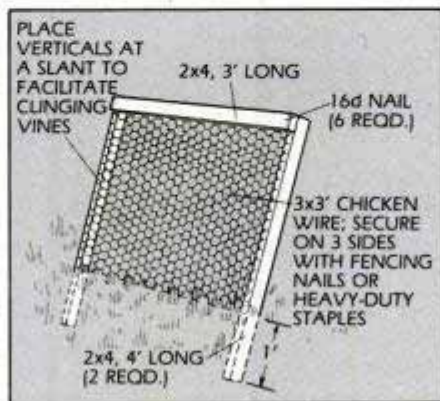
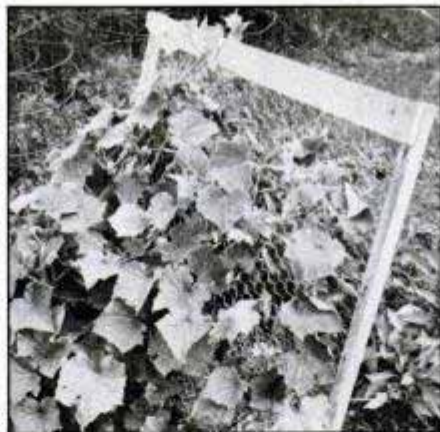
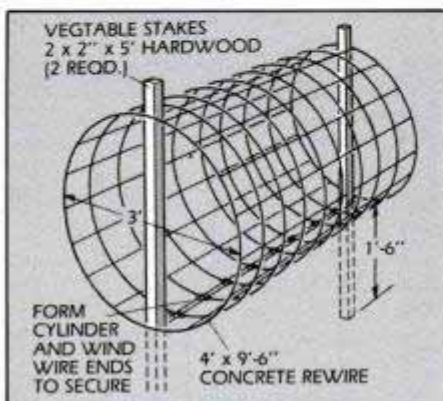
Position 2x4s on edge to define the slab's perimeter. Place a PVC pipe drain in the center, embedded 1 in. into the gravel. Hose the 2x4s then pour premixed concrete. Tamp the concrete with a spade. Run a 2x4 across to level it, then slope the slab toward the drain with a trowel. To cure the cement, spray it with water and let stand three to seven days, under polyethylene.

Mix only as much mortar as you can use in 1 1/2 hours. Mark off the lines which the first course of bricks should follow, then spread mortar along the course. Spread mortar on one end of the brick to be laid and place it in the bed. Cut excess mortar; smooth joints.

Before laying the second course, make weep holes with 1/4-in.-dia. dowel temporarily spaced 12 in. apart. Check each course with a spirit level.

Project No. 1: Chicago Botanic Garden, adapted from  
Ortho books; Nos. 2, 4-8: Garden Way Gardens;  
No. 3: Chicago Botanic Garden





## 4 Horizontal tomato cage

This horizontal wire tomato cage keeps the tomatoes off the ground and reduces damage from slugs, cracking and decay. The cage is a 9½-ft. length of concrete reinforcing wire bent into a cylinder. Wind the cut wire ends around the mating edge.

Set the cage over a pair of hardwood vegetable stakes. Space the stakes about 4 ft. apart and plant them 18 in. into the ground. As the plants grow, loosely tie or support them on the next higher section of wire. Make sure they don't bind. A pair of these cages should satisfy the needs of most home gardens.

## 5 Cucumber trellis

Cucumber vines on a trellis are usually less susceptible to damage, produce straighter cucumbers and take up less space than those grown on the ground. This is especially true of the larger cucumber varieties.

This trellis is made of 2x4s, a crossbar and two legs joined by 16d hot-dipped, galvanized common nails. Use redwood or pressure-treated wood. Fencing nails or heavy-duty staples fasten a 3x3-ft. section of chicken wire to the frame. Plant the structure a foot into the ground, so it slants backward slightly. Guide the vines upward by hand, or tie them loosely to the wire.

## 6 Raspberry supports

Although raspberries are expensive to buy, the plants can be grown with great success in Northern climates, if you are willing to spend the time. The supports are of cedar fence posts—a stock item in garden centers. Crosspieces that hold training wires are 1x4s cut in 1-ft. sections and nailed to the post with 6d common hot-dipped, galvanized nails. Bore ½-in.-dia. holes for the training wires. Install copper flanges before setting posts into the ground. Space the posts 8 ft. apart and string the wire.

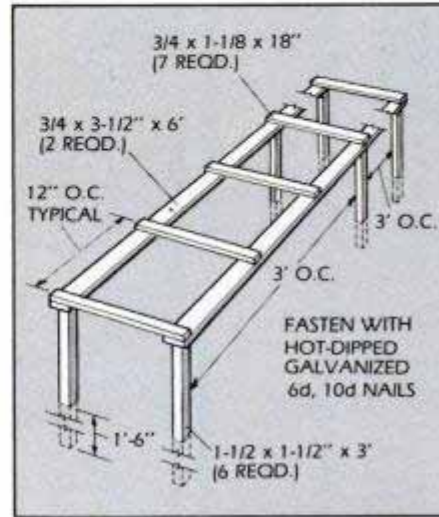
Raspberries blossom on canes that developed the previous year. Cut out old canes and lift and train the new ones.

## 7 Tomato ladder

This tomato ladder helps keep the fruit of bushy, low-growing plants off the ground. For durability use garden-grade redwood.

The ladder rails are 1x4s, 6 ft. long. Rip a 1x4 into three equal widths. Then cut it into 18-in. sections for the crosspieces. Fasten the crosspieces to the rails with 6d nails. Fasten the ladder to the legs with 10d nails. Plant the legs about 18 in. into the ground. Or adjust the height to accommodate the type of tomatoes you are growing.

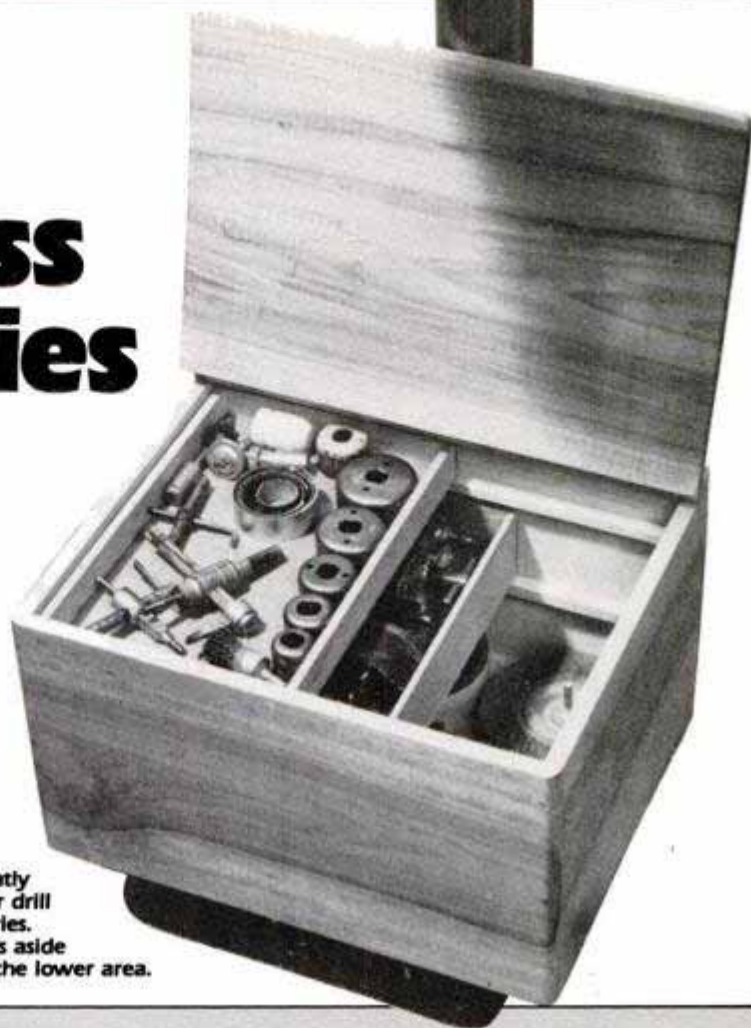
*(Please turn to page 130)*





# 6 Drill Press Accessories You Can Build

TEXT AND PHOTOS  
BY ROSARIO CAPOTOSTO



This chest neatly stores all your drill press accessories. Slide the trays aside for access to the lower area.

Build these six aids and turn your drill press into a superorganized, efficient workcenter.

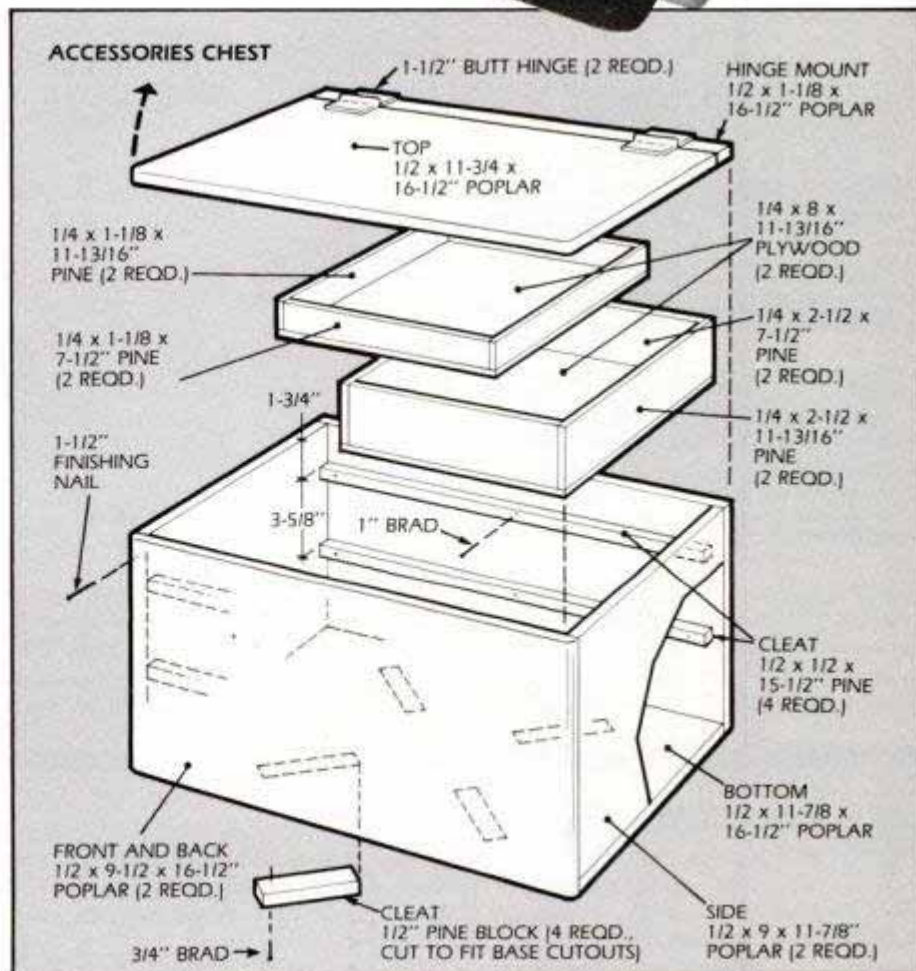
## 1 Accessories chest

This spacious chest uses the area under the drill press worktable for storing larger accessories such as hole saws, vises, buffing wheels, spare chucks, clamps, circle cutters and drum sanders.

The chest is constructed of 1/2-in. poplar, but 1/2-in. birch plywood or A/C plywood would work just as well.

Note that the two tool trays inside the chest slide from side to side. This allows easy access to the larger bottom compartment without removing the trays. Be certain to install the bottom tray *before* nailing the upper cleats into position.

Next, attach four small cleats to the





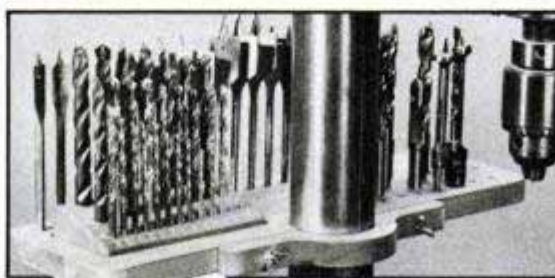
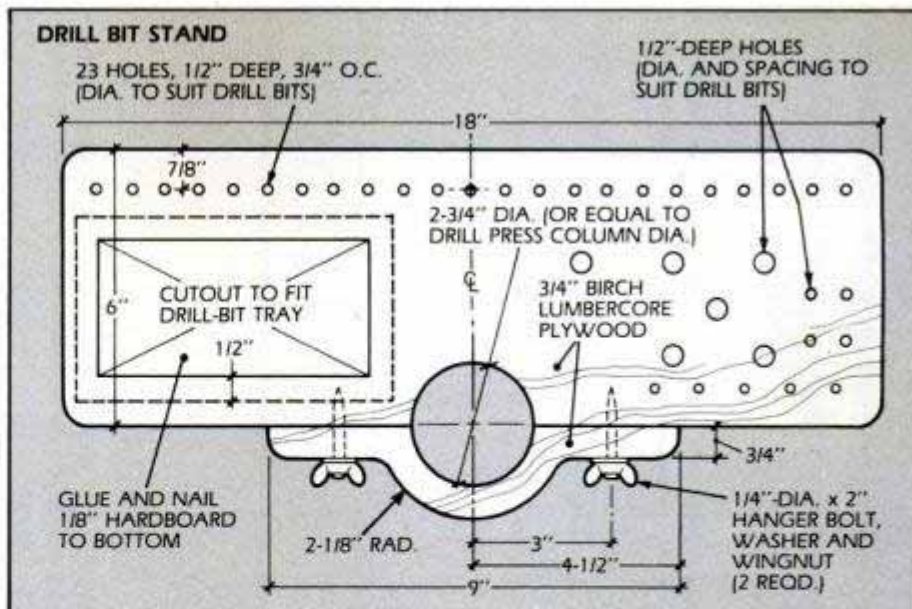
chest bottom. Cut the cleats to fit into the cutouts in the drill press base. The cleats lock the chest in place and prevent it from vibrating off or being knocked from the base. If you wish, you can install a hasp and lock to the top.

Finish the chest, inside and out, with two coats of polyurethane varnish.

## 2 Drill bit stand

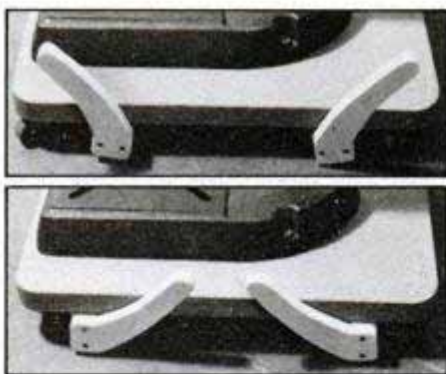
Here's an easy-to-make drill bit stand that's conveniently located for quick bit selection. The stand clamps to the drill press column using two hanger bolts with wingnuts. The stand shown here is of lumbercore plywood, but 3/4-in. solid birch or pine could also be used.

Cut a hole into the board that is equal to the diameter of the column. Then, cut through the hole's center on a table or radial-arm saw. The stock removed by the saw blade reduces the hole diameter enough to permit tightening. The stand holds a store-bought drill bit tray, but you can also bore holes.

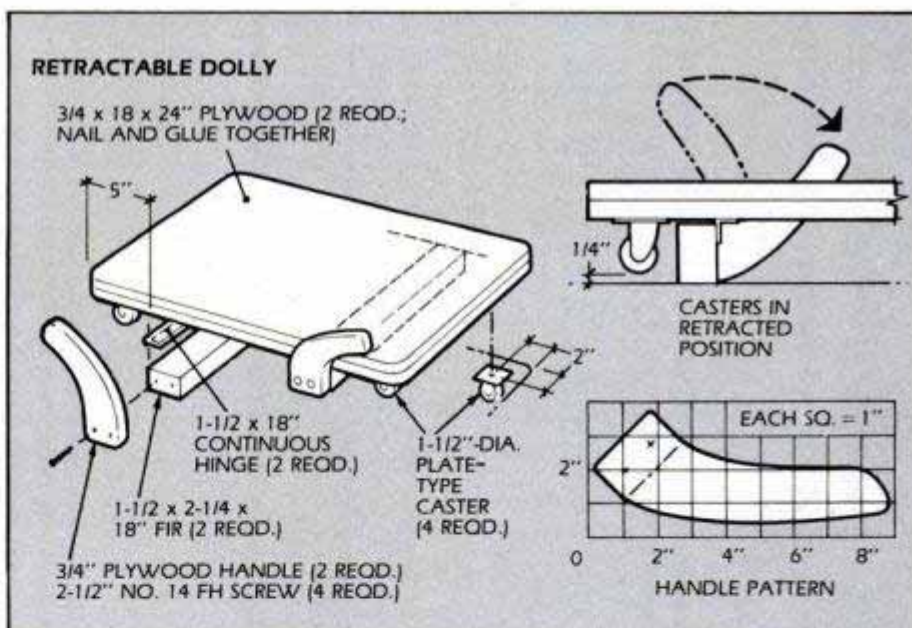


Handy drill bit stand clamps to the drill press column to keep all your bits in order.

## 3 Retractable dolly



By spreading the levers apart, the dolly is lowered onto the casters (top). You just have to push the levers inward (above) to raise the wheels off the floor.



The drill press is essentially a stationary tool. But there are times when it's necessary to move it about, especially in smaller home workshops.

This dolly allows you to move the

machine safely without straining your back. Simply spread the levers apart to lower the dolly onto casters. Pull the levers inward to lift the dolly onto wood blocks. Glue and nail together two

pieces of 3/4-in.-thick plywood to form the dolly's 1 1/2-in.-thick platform. Cut the platform large enough to locate the casters outside the perimeter of the machine's base.

## 4 Tool tray

An extra tray on a drill press (see top photo, facing page) can hold spare bits, tools and other items used frequently.

Our plywood tray is designed to attach to the threaded hole located in the worktable's back edge. The hole's original function is to accept an accessory tilting worktable.

The tray can be adapted to any drill

press by simply boring and tapping a 1/2-in.-dia. hole in the worktable. Then, screw the tray in place with a 1/2-in.-dia. x 1 1/2-in. hexhead bolt. Note that 1/2 x 1 1/2-in. pine trim is added to prevent items from rolling off the tray.

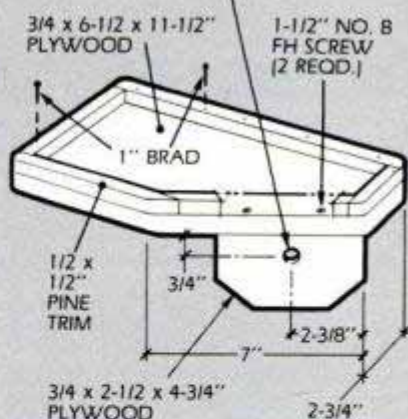




This conveniently positioned tray is great for holding your extra drill bits and tools.

#### TOOL TRAY

1/2"-DIA. HOLE—FASTEN TRAY TO DRILL PRESS TABLE EDGE WITH 1/2"-DIA. x 1-1/2" HEXHEAD BOLT AND WASHER

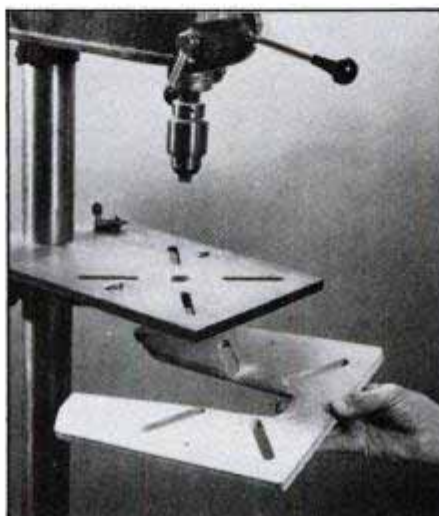


## 5 Clamping panel

The ribbed underside of the drill press worktable sometimes makes it difficult to position C-clamps precisely where you need them. A simple solution is to make a filler panel out of 1/2-in. hardwood plywood.

Cut the panel to fit around the worktable's ribbed underside. It may be easier to first make a cardboard template of the panel. Then, after making certain that the template fits flat along the table's underside, trace the template onto the plywood and cut along the outline.

Now, bore and tap two holes in the worktable and attach the panel with flathead machine screws.

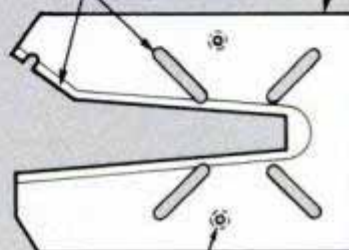


Clamping-panel cutouts fit around the irregularly shaped worktable bottom. Screw the panel in place from the underside.

#### CLAMPING PANEL

1/2" HARDWOOD PLYWOOD

CUT OUT AND SHAPE TO FIT BOTTOM OF WORKTABLE



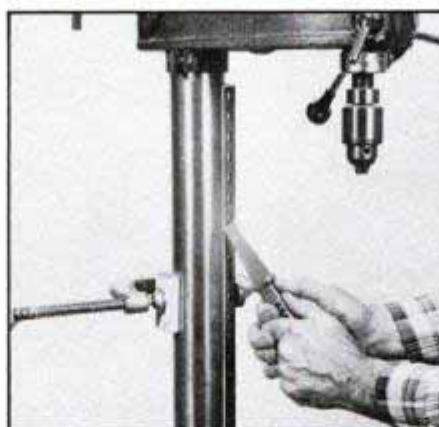
BORE AND COUNTERSINK HOLES FOR 1/8"-DIA. x 1" FH MACHINE SCREW; BORE AND TAP MATCHING HOLES IN WORKTABLE (2 REQD.)

## 6 Centering guide

After raising or lowering the drill press worktable, you must visually realign the drill chuck with the worktable's clearance hole. If the two are misaligned, the drill bit will strike the table, resulting in a pockmarked table or a ruined bit. This is especially harmful to wood-boring bits.

A simple solution is to mark a clearly visible centerline down the drill press column and a matching mark on the worktable. Then simply keep the two marks aligned to ensure that the chuck is centered over the worktable's clearance hole.

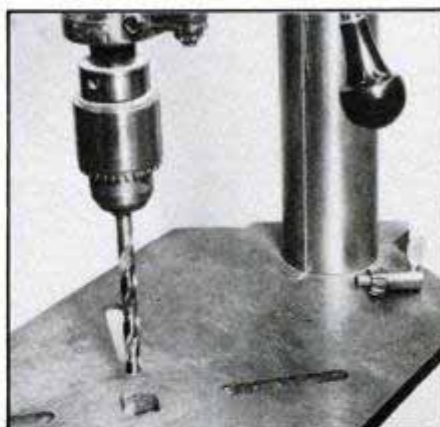
Mark both centerlines into the steel using a carbide-tipped scribing tool (the type used for cutting plastic laminate and sheet plastic). A diamond-pointed scriber would work as well. Clamp a length of angle iron to the front of the column directly behind the chuck to act as a straightedge guide for



Use an angle iron as a straightedge to guide the scribing tool. Start at the top of the column and pull the tool downward.

the scribing tool. Then score the column several times starting at the top and pulling the tool downward.

Next, with the chuck centered over the clearance hole, scribe a 1/2-in.-long line on the back center of the worktable in line with the scribe on the column. File the scribed lines using a smooth



Line up the two scribed marks so that you can make sure the drill's chuck aligns with the worktable's clearance hole.

cut mill file to remove any burrs. Then, to make the lines more visible, apply white paint to the lines with a small brush. Wipe off the excess paint with a cloth dampened with the appropriate solvent. Some paint will remain in the crevice of the scribed lines, making them easy to see.



# MAKE YOUR MARK— And Keep What's Yours

Putting your personal identification on the tools you own serves as a reminder and encourages neighbors to return a tool they've borrowed. Likewise, putting your mark on valuables—although possibly not a deterrent to theft—can hasten the return of items that are recovered by law enforcement agencies.

The mark you use for identifying first-classification objects—those of relatively low value—should be quick and inexpensive to apply. You should mark all hand tools, portable power tools and similar household items with simple identification. It may be bands of tape around the han-

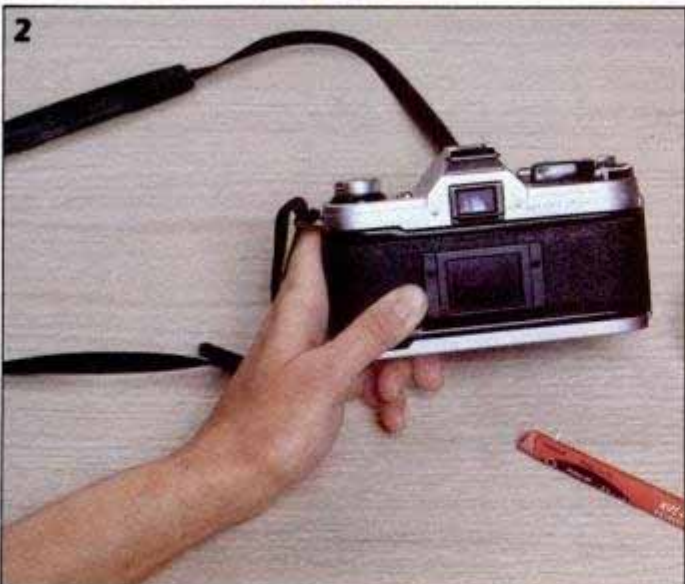
Labeling tools or valuables reminds borrowers and aids return of stolen items.

dles, your first name burnished in wood, or your initials scratched in metal with a scribe.

Consistent taping of all your tool handles, if you select this method, helps reinforce your mark to borrowers. Use a combination of tape colors, or multiple bands, so your mark doesn't look as if it's part of the manufacturer's design.

The second classification of items—those of greater value—needs a permanent mark of identification that can be traced to you if the item is lost or stolen. According to crime prevention authorities, the best identification to use is your

*(Please turn to page 132)*



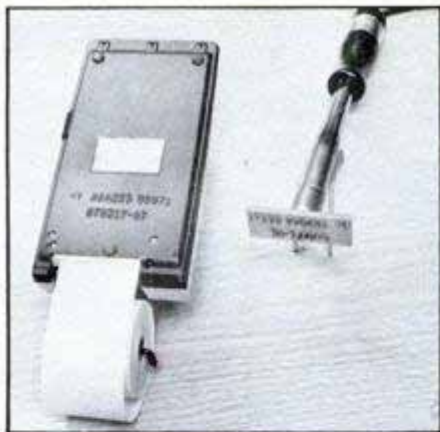
**1** Several bands of incandescent tape wrapped around the handles of yard tools are a simple, nondefacing means of marking them. The glowing bands serve as a reminder to borrowers, and are visible across the street for easy identification.

**2** Engraving your driver's license number on a camera can help the police identify you as the owner of a stolen and recovered item. Going over the engraving with a colored lacquer stick (foreground) highlights the number.

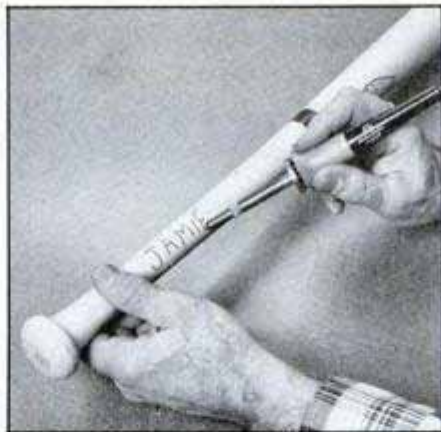
**3** When you engrave permanent identification in valuable decorative items, you needn't deface them. The bottoms of such objects are often flat and easy to mark, as well as being out of view. The engraver shown is a Weller tool.

**4** Bands of plastic tape in your own personal color combination identify your portable tools to borrowers. Your own "designer stripes" are especially helpful if friends or colleagues also mark their portable tools with tape.

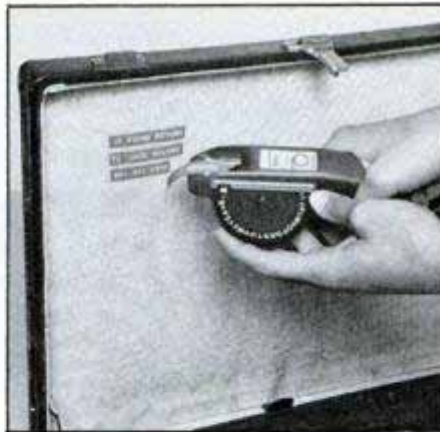




A 125-w. branding iron with your license number or other identification can mark plastic, hard and soft woods. Maker's Mark (\$36.45 postpaid) is by Craftmark.



Burnishing pencil such as this one sold in hardware and craft stores marks identification in wood. With a burnisher, you write as much or as little as you wish.



A neat identification on fabric and other materials is supplied by a Dymo lettering wheel. Print needed information, letter by letter, on self-adhesive plastic strips.

## HOW TO MARK IN METAL

**M**etal is harder, smoother and less porous than many other materials. Therefore, marking on metal poses its own problems. However, there are special markers that can make permanent or long-lasting and legible marks in metal.

For making durable, weatherproof identification marks, ball cap paints are helpful. They are available in colors from welding and industrial supply houses. Remember when using these markers not to press down hard. With use you will start to feel the ball as it becomes depressed enough for the paint to flow.

A scribe makes clear marks for identifying valuables and for layout work on metal. The small-size ones found in the handle of some combination squares work fine.

For marking identification on personal tools, designating machined parts or making lineup marks on metal, an etching pen that looks like a ball-point pen is excellent. Keep these pens in a safe place away from children, as they contain an acid which does the marking.

Number stamps can make permanent marks. Although they have a large initial cost, they last for many years with mini-

mum care. It requires practice to get a good mark with a stamp. Hold the stamp perfectly vertical with the number in complete contact with the surface to be marked. Strike the stamp squarely and fairly hard with a small ball-peen hammer. A disadvantage of stamps is that you are limited to the letters or numbers in your set.

Electric engravers are good choices for marking identification on tools, jewelry and appliances. If you hesitate to engrave without a guide, see technique photos at bottom of page.—Ronald E. Thomas



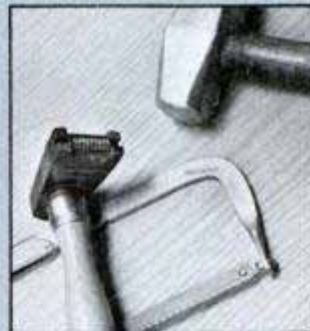
The Markal ball point marker leaves long-lasting, weather- and water-resistant mark that dries in 20 minutes.



A scribe leaves a lasting mark in metal. You can produce a neat identification by using a stencil as a guide.



This metal etching pen by Fowler works on steel, brass, aluminum and copper. It has replaceable cartridges.



The metal stamp holds 10 letters or numbers. It makes an imprint on metal when positioned and hammered.

## A SIMPLE TECHNIQUE FOR NEAT ENGRAVINGS



Position Scotch transparent tape on area of proposed engraving. Draw guidelines; pencil in the engraving.



Go over the identification markings with an engraving tool, such as the Dremel electric engraver shown.



When you're satisfied with the engraving, you can easily remove the tape to reveal the permanent identification.



Rub the engraving with a colored lacquer stick to fill the indentations with color. Take time to wipe off the excess.



# WORKSHOP MINICOURSE



## Working with levels

Even the most basic toolkit should contain a level. This simple, easy-to-use tool is a necessity for accurately setting or checking work in a true horizontal plane (called level) and a true vertical plane (called plumb). It is also indispensable for adjusting things such as record players, pendulum clocks and washing machines that must be level or plumb to operate properly.

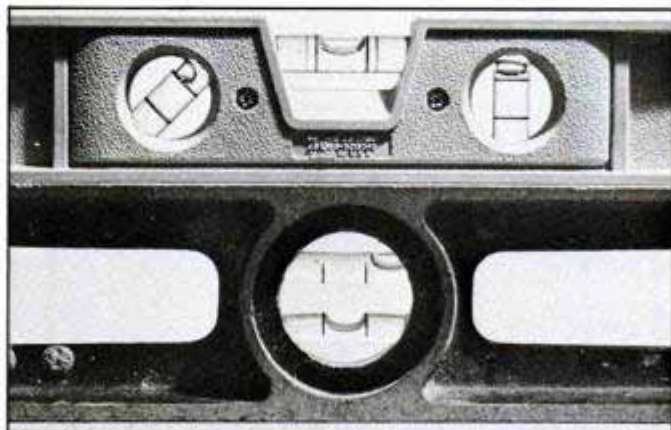
Levels come in a variety of types, as shown in the photos here. The most widely used are the carpenter's, torpedo and line levels.

Carpenter's levels range in length from 18 to 48 in. and are even longer for specialized mason's levels, but the 24-in. size is probably best for overall work. Most come with three bubble vials: a lengthwise center vial for horizontal surfaces, one end vial aligned perpendicular to the edges for checking plumb, and a 45° vial at the other end for checking that angle accurately.

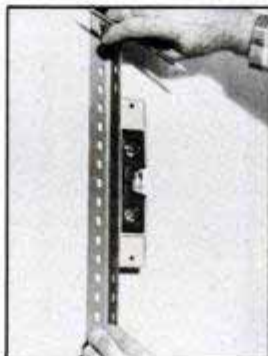
The torpedo level is much shorter, usually 9 in. long, and is handy for working in tight spots where a long carpenter's level won't fit. Newer models have three vials like the carpenter's levels and some have a magnetic edge (shown at right) that will hold the tool on steel or iron workpieces, thus freeing your hands to hold the project and mark its proper position.

The line level is shorter still, about 3 in. long, and has two hooks on top so the instrument can hang on a string stretched tightly across a wide span. It's a good reference tool when doing grading or foundation layout and for checking long-span masonry and carpentry work.

Using a level requires no special skill. Just hold it firmly on the surface and make sure that both the base of the level and the work surface are absolutely free of debris. You should also get in the habit of checking a level for accuracy periodically. One way to do this is to place the level on a surface and observe the position of the bubble. Then flip the level end-over-end and see if the bubble is in the same place. If it's not, adjust the vial—if it's possible with your model—or get a new level. **PM**



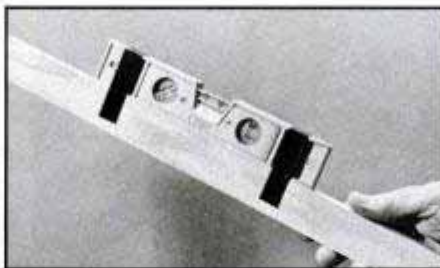
Older-type level (left below) with bent-glass vials must be placed on top or bottom edge to read level properly. Newer design (top) has a single straight vial with barrel-shaped inside so that level can be used on edges and sides. Newer vials are also 20 percent larger in volume in order to provide better visibility.



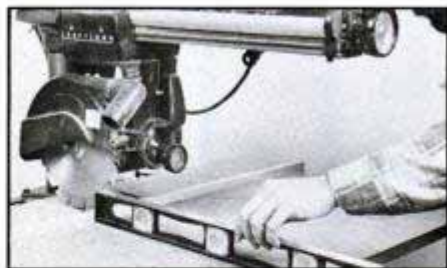
Torpedo level with magnetic edge frees hands when you're working.



Aluminum line level hooks onto taut line for leveling over long spans. It weighs under 1 oz. so it will not sag the line. Flat bottom allows for its use as a surface level.



Short level can substitute for a longer level by taping it securely to longer board. Board must be straight and have uniform width.



Use level to true up all tables and beds on stationary shop equipment. Level across table (as shown) and along table's length.



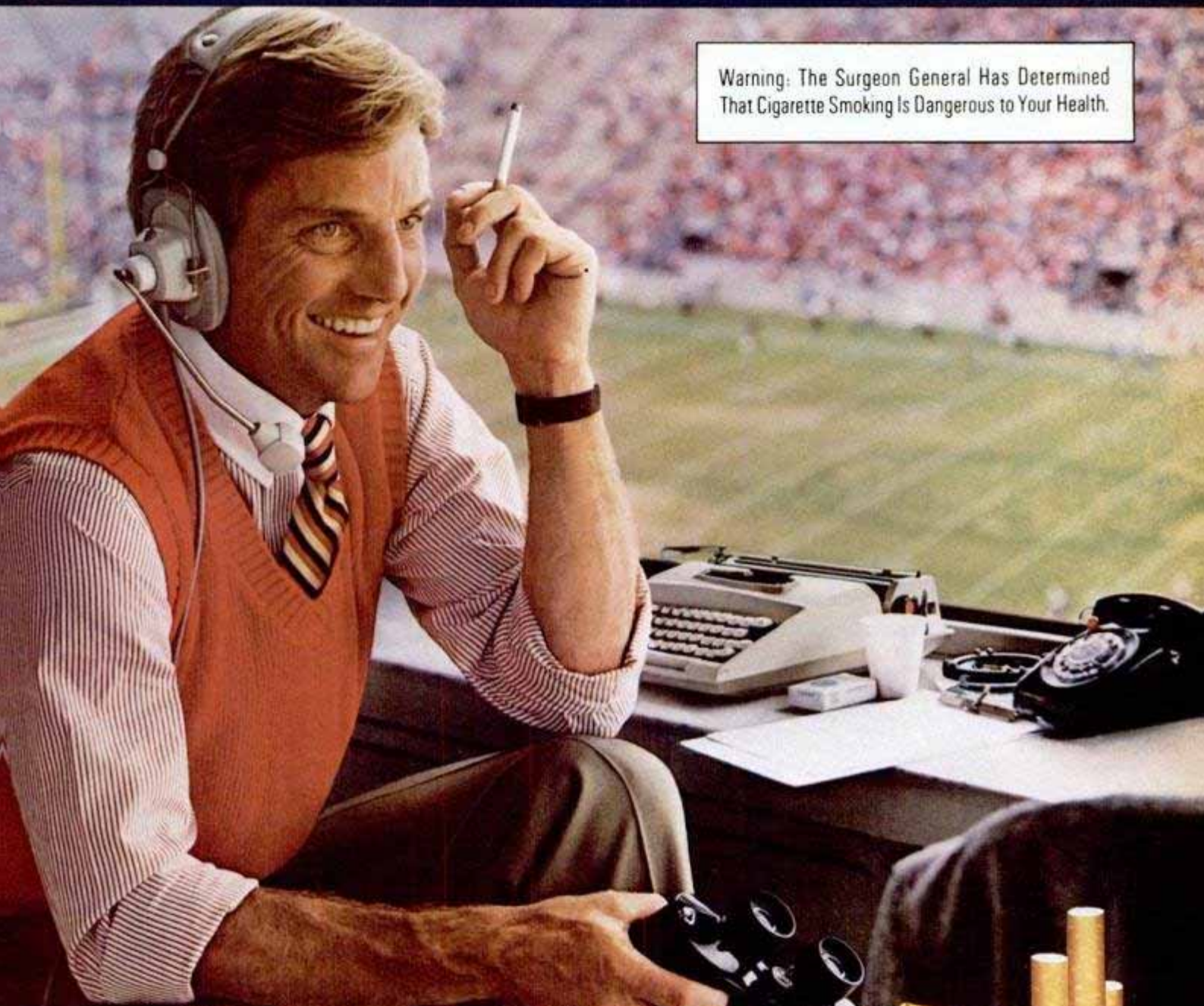
Bull's-eye level, on post above, shows plumb in both directions at once, as long as post top is perfectly square to post sides.



Inclinometer (level and angle finder) gives needle readings from 0 to 90° in any quadrant. Tool back has angle and grade chart.



Warning: The Surgeon General Has Determined  
That Cigarette Smoking Is Dangerous to Your Health.



ULTRA LIGHTS: 5 mg. "tar", 0.5 mg. nicotine av. per cigarette by FTC method;  
FILTER: 9 mg. "tar", 0.7 mg. nicotine av. per cigarette, FTC Report MAR. '83.

# VANTAGE. THE TASTE OF SUCCESS.

Great Taste  
with Low Tar.  
That's Success!



© 1983 R. J. REYNOLDS TOBACCO CO.

Материал, защищенный авторским правом





This conference room-entertainment center was created from an unfinished basement in a hillside home. Full window on downhill side brightens the room.

## The Rediscovered Basement Lowest-Cost Space Maker

Dollar for dollar, the best way to add lots of living space to your home is by remodeling the basement.

BY STEVEN WILLSON  
AND STEVE FAY

**W**ith the cost of building materials and new housing going up regularly, the search is on for economical ways to increase living space.

A full basement provides extra room at a fraction of what home additions cost. With your imagination, and the



A long entrance hallway separates the basement work areas and provides space for the builder's photo gallery. The curved wall hides an oversized chimney.

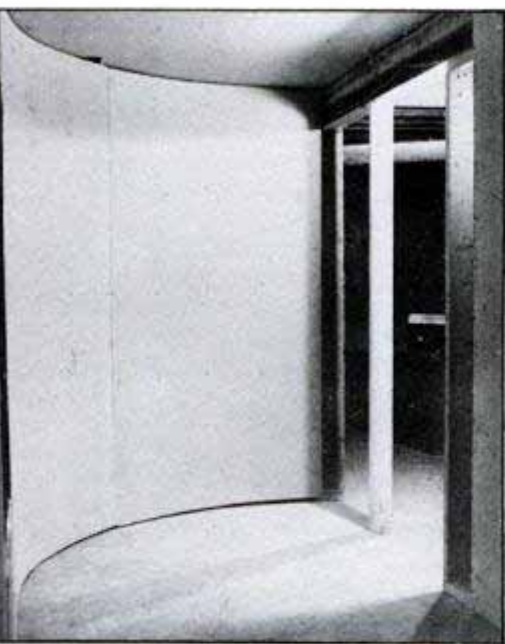
PHOTOGRAPHS BY STEVE FAY

ideas presented here, you can transform your basement into a spacious family room, a first-rate home office, or even a photo-studio-conference room like the one above.

We show you how to build a curved wall that can add excitement to any room and how to install fabric-covered wall panels that soften a room's appearance while they deaden sound transmission. We show you how to frame around low-hanging pipes and then how to cover them, and the rest of the ceiling, with drywall. We also supply plans for making some clever sliding light fixtures. The built-in bookcase and cabinet wall—a major project—will get a full how-to treatment next month.



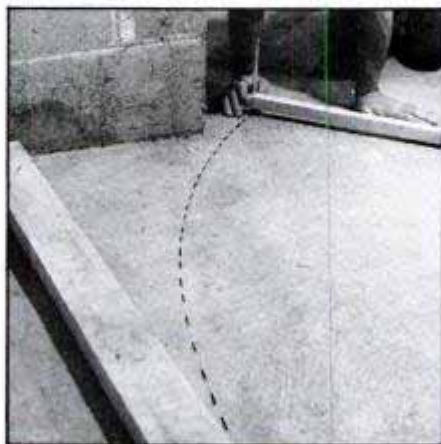
## Curved wall



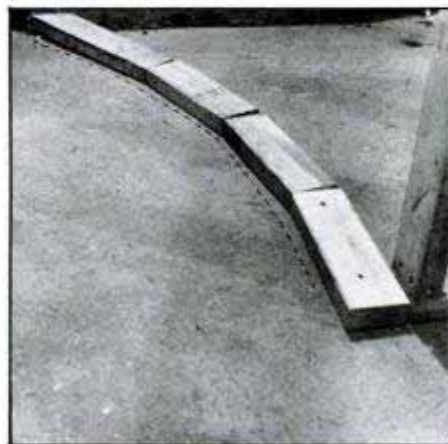
This curved wall, ready for taping, requires no special skills to build. Wood framing underneath forms arc which is covered by two separate layers of 1/4-in. drywall.

**A**lthough the finished side of this curved wall is concave, the same basic construction applies to a convex curve; just turn the plates around. To begin, install the floor blocking and plate as shown. From this plate, plumb up to the floor joist to position the top of the wall. Install enough blocking between the joists to provide nailing back-up for the upper plate assembly. Then

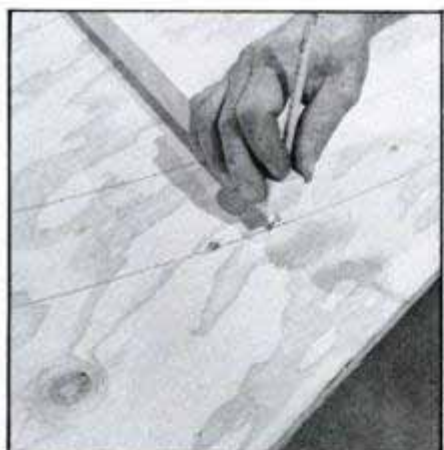
cover the joist with drywall, and nail in the upper blocking. Attach the plate so it's plumb in both directions with the lower one. Lay out stud positions, then measure each stud individually to accommodate any difference in length caused by an uneven floor. Install the studs plumb and attach the drywall. Most professionals dampen the back of the panels to aid in bending.



Begin building curved wall by laying out proper arc on floor, using board with pivot nail in one end and pencil at other end. Board length should match hall width.



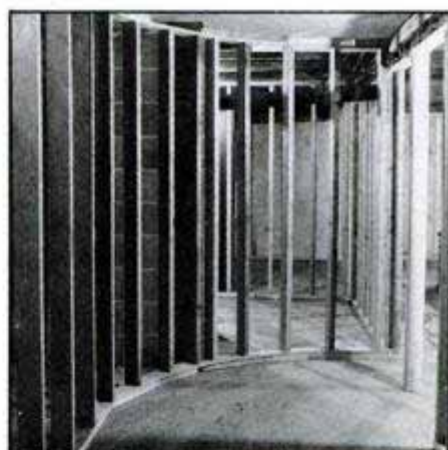
Cut 2x4 stock into 12-in. lengths and nail to floor, using masonry nails. Keep boards back from the arc line at least 1/8 in. at the closest points. Wear eye protection.



Using same marking jig, transfer wall arc onto 1/4-in. plywood. Extend jig 3 1/2 in. and then mark plywood again. Cut out stock between the lines with a sabre saw.



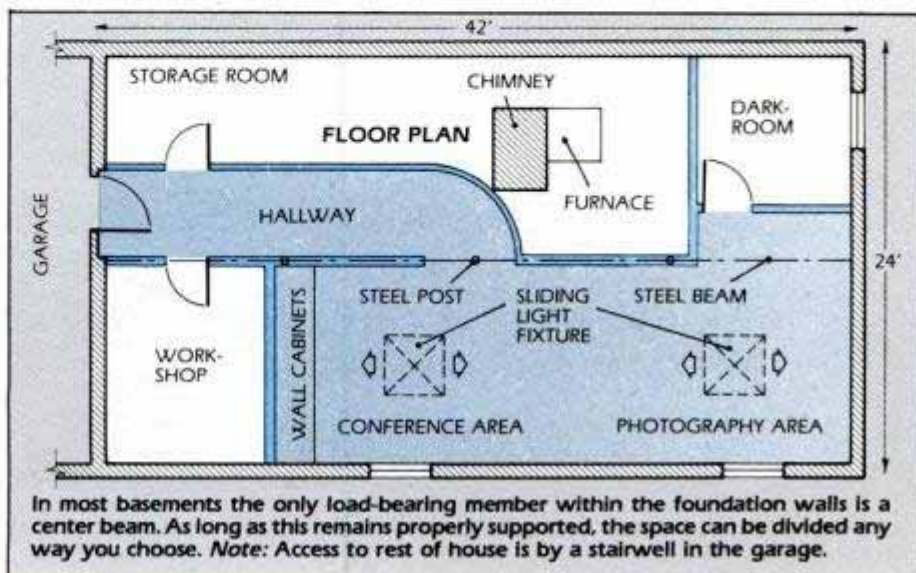
Test-fit bottom plywood plate to make sure arcs align. Then cut plate to length and use it to trace matching plywood plate for wall top. Nail plate to 2x4 floor blocks.



Nail 2x4 blocks to ceiling and install upper plywood plate. Then measure each stud length individually, cut each to length, and toenail along arc on 12-in. centers.



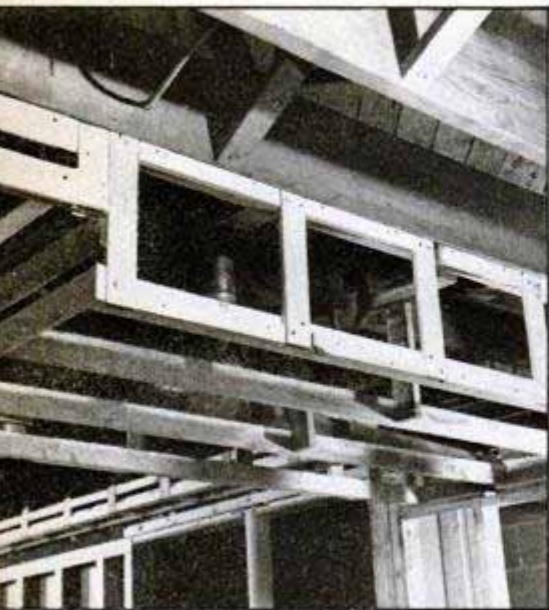
Mark stud position on face of drywall panel and nail one edge to the wall. Slowly push in until middle of the sheet hits remaining studs. Maintain pressure as you nail.



In most basements the only load-bearing member within the foundation walls is a center beam. As long as this remains properly supported, the space can be divided any way you choose. Note: Access to rest of house is by a stairwell in the garage.



## Hiding pipes



Framing around pipes, steel beams, heat ducts and other obstructions is time-consuming but necessary to support drywall, which gives the room a finished look.

Probably the most basic problem to be faced when remodeling a basement is related to its original design. Most of these rooms were never meant to be finished living spaces—at least not in the builder's mind—and because of this, construction practices that would never pass muster in the rest of the house go unchecked.

Certainly the most annoying of these is the reduced headroom that results from shorter foundation walls. This problem is compounded by low-hanging plumbing pipes, heat ducts and, in some older homes, electrical wiring conduit—all of which should be hidden to give the room a finished look. Even though many of these components could be moved up between the joists, that could cost thousands of dollars. The more sensible approach is to construct wood frames around these obstructions and then cover the framing with drywall.

One method for constructing these frames—called "soffits" in the building trades—is shown below. Plan the work carefully, keeping in mind how the room will look when it's done. You

have two primary goals: First, try to keep the number of soffits to a minimum, even if this means increasing some in size to accommodate another obstruction close by. Second, construct a soffit level, plumb and square to the basement partitions and foundation walls—even if the obstruction is not installed that way. This will give the job a clean look that lessens the impact of an uneven ceiling.

Once you've determined where you want your soffits, begin constructing them as shown. The floor joists are your most important points of attachment because they will be carrying nearly all the weight. The partitions and foundation walls basically serve to stabilize the framework and to keep it square.

Another good tip: Always try to "anchor" the soffit to a wall instead of building it so it is isolated in the middle of the room. Do this even if it requires making the soffit longer or wider than it has to be. Also, be sure to construct the framework so that all inside and outside corners have solid blocking on both sides to receive the nails used to hang the ceiling drywall.



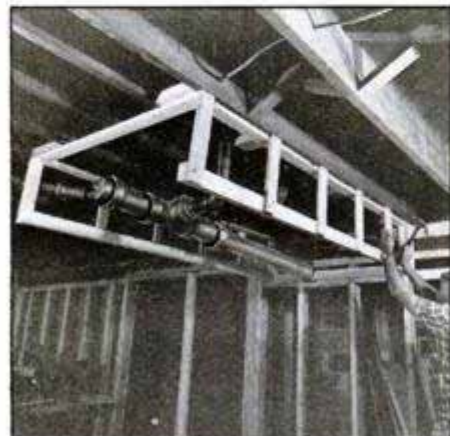
Begin framing by finding lowest point of obstruction (waste line above) and positioning a level furring strip at that point. Draw a line across studs at top of strip.



Tack-nail board to wall stud just under marked line and another board to floor joist, as shown. Clamp together, adjust for level and plumb, then mark for cutting.



Install blocking between joists to provide sound nailing for frame boards. Then nail boards in place, making sure they're installed square to wall, even if pipe is not.



Install framework side by side by suspending it from edge of joist-mounted boards. Make sure side is plumb, level and square to wall before nailing all boards in place.



Last step in building framework is to nail filler blocks between vertical suspension boards. This provides necessary support for installing drywall corner bead later.



Don't cover up pipes or other obstructions that require servicing, such as the waste line cleanout plug above. Instead, scribe and cut framework so plug is accessible.



# THE LOOK AND FEEL OF A COLT. THE KICK OF AN AIRGUN.



## THE CROSMAN 357s.

Leave it to Crosman to match the realism of a Python with the backyard fun of an airgun.

Our new 357 not only looks and feels like the real thing, it has almost the same weight and trigger pull.

Of course it's a CO<sub>2</sub> airgun, so it costs a lot less to buy and to shoot. But perhaps the biggest kick of all is how often you can use it.

For target shooting, tin can plinking, or just plain fun, our .177 cal. pellet 357 gives you true 6-shot convenience. With authentic single- and double-action firing.

And it's available with 4" and 6" interchangeable barrels—an airgun first. These unique break-open barrels and six-shot Speed Loaders make our 357 the fastest, easiest-loading airgun ever.

Equally impressive is our muzzle velocity of up to 430 fps. And it's superaccurate, too; from 25 feet out, it can put round after round into a 1" bull's-eye!

See your Crosman dealer. He has the first airgun that could pass for a Python. With the "kick" of a Crosman.



#1 IN AMERICAN AIR POWER

**Crosman**  
AirGuns

980 Turk Hill Road, Fairport, NY 14450  
(716) 223-6000

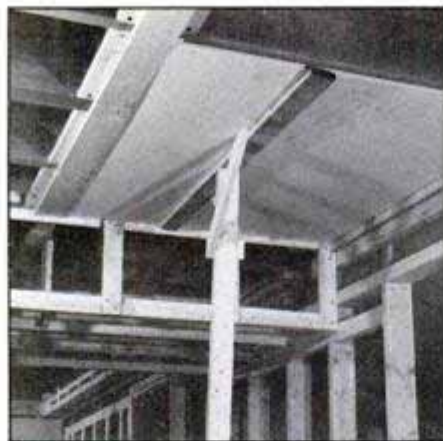


## Ceiling



Installing drywall on a ceiling with many different surfaces requires careful preparation. Be sure you have solid nailing behind the perimeter of all sheets.

**G**ypsum board, usually called drywall in the trades, is an excellent building material for finishing basement ceilings. It's inexpensive, easy to work with, and yields the same finished look as the other ceilings in most houses. Hanging it, however, is strenuous work. The photo above shows a

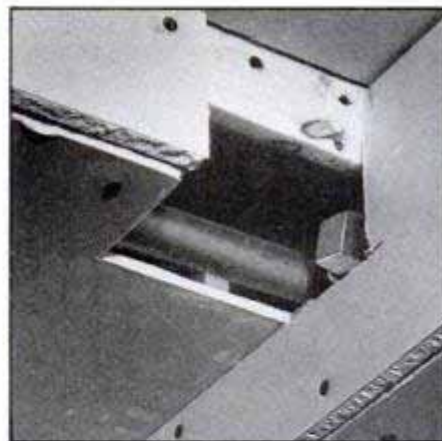


A T-brace made of 1x4 and 2x4 stock is a great help when drywalling a ceiling. Cut stud 1/2 in. longer than room height; lift panel into place; wedge brace underneath.

handy T-brace that helps. To use it, just lift a panel into place and wedge the brace underneath. Nail the sheet to the bottom edge of the floor joists.

Although drywall is available in various lengths, the shortest panels, 4 ft. wide by 8 ft. long, are the best for non-professional use because they are the lightest. Drywall also comes in different thicknesses. We used the 5/8-in.-thick type, but 1/2-in.-thick panels will work if you maintain 16 in. or less between framing supports.

When hanging the panels always keep the tapered edges on the panel sides next to each other. These slight depressions are designed to accommodate the tape and joint compound used



Leave adequate drywall clearance around areas that require servicing, like the cleanout plug above. When ceiling is finished, make wood plate to cover hole.

to finish the surface later. (In the photo at far left, the boards running across the ceiling are cleats to support light fixture tracks. Normally, these are not present and the drywall spans the entire surface unbroken.) For added holding power, apply a bead of panel adhesive to the framing members before you lift a panel into place.

Any components that require servicing, such as cleanout plugs and wiring junction boxes, must remain accessible. Don't cover these with drywall. Once the ceiling is done, fashion wood plates to cover the holes, then screw them into the framing. When the taping is complete, paint the ceiling flat white to blend the many surfaces.

## Wall panels



Once ceiling was taped, sanded, primed and painted, we installed burlap-covered fiberboard panels directly to wall studs and furring strips to reduce sound transmission.

**T**hese burlap-covered, fiberboard wall panels have one great advantage over drywall panels: Once they are installed, there's no more work to do because their outside surface is already finished. This factor is also the source of their biggest drawback: They can easily become soiled during the cutting and installation process. For this rea-

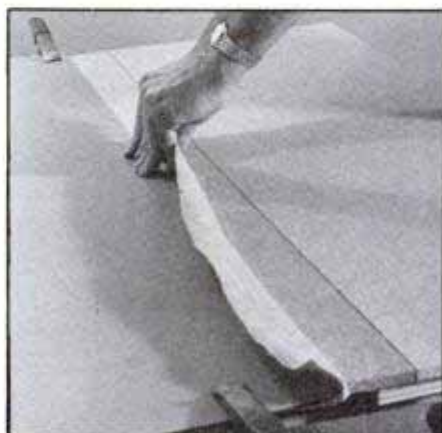


To cut panels, mark overall length required, then move metal straightedge 3 in. above mark. Clamp straightedge in place and cut burlap with a sharp utility knife.

son, take extreme care when working with them.

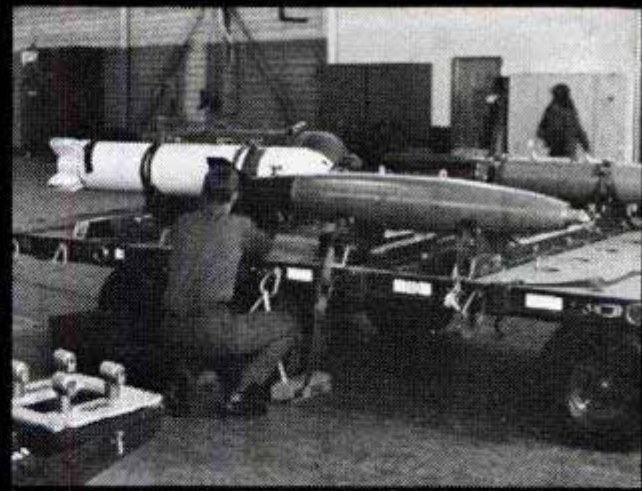
The photos here show the proper method of cutting the panels to length. Accurate measurements are a must because it's impossible to make a satisfactory horizontal joint if the panels have been cut too short.

Begin installation in a room corner



Peel burlap 1 in. past the mark for finished length, then clamp straightedge in place and make final cut. Replace blades in utility knife frequently to obtain smoothest cut.





# WE'RE LOOKING FOR PEOPLE WHO LIKE TO WIN.

The Air Force Reserve has immediate openings for people who can work well as part of a team. The weapons field includes regular competitions, so a winning attitude is important.

In addition to a good paycheck, you'll earn retirement credits and other benefits. So if you think you're enough of a competitor to qualify, call today.

**CALL:**  
**1-800-257-1212 Toll Free**

*Or fill out the coupon and mail today.*  
**MAIL TO:**  
Air Force Reserve Opportunities  
P.O. Box 3008, Warner Robins, GA 31099

Name \_\_\_\_\_

Address \_\_\_\_\_

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

Prior Service? Yes \_\_\_\_\_ No \_\_\_\_\_

**AIR FORCE RESERVE** 26-411-3008

A GREAT WAY TO SERVE







# THE FASTEST, EASIEST \$100,000

## You'll Ever Make in Your Life, Yours Now

- WITHOUT A PENNY OF INVESTMENT
- WITHOUT LEAVING YOUR HOME
- WITHIN 90 DAYS
- "WORKING" ABOUT ONE HOUR A DAY (OR EVENING)

There are all kinds of ways to make money. Good golly, Molly — if anyone knows that, I do! For the past 20+ years I've concentrated on finding, investigating, creating and specifically singling out only the very finest legal and ethical methods for carving out a mass of wealth in a hurry. But believe me, in all those years never have I experienced anything remotely as exciting as this one!

Recently, I came across a fairly new way to make big bucks, but after a thorough study I discarded it because it required too much investment of time, money and personal effort. But my study did serve as inspiration to develop yet another fantastic and unusual wallet-fattener — **something that until now has never been done** — yet fully complies with the tough set of standards I'm noted for demanding of any potential wealth-producing concept:

- Must be able to be started with **minimum investment**
- Must be possible to **start at home** and not interfere with family life.
- Must be able to be started and run **initially by one man or woman**
- Must require only a **few hours of spare time per week**
- Must have realistic annual profit potential of **\$40,000 or more**

Well, this one goes way beyond my usual rigorous test. Get this: This extra-ordinary money-maker® allows you to:

- Start at once — **within 30 seconds** of studying my report
- Invest **not a single cent**
- Accomplish everything **without leaving your home** — heck, you can do it from your favorite easy chair whilst eating pizza or petting the dog (or vice versa!)
- Have a potential **net profit** (not gross ... net!) of **\$100,000.00** by the end of 90 days — tops. And that's **cash**, not theoretical or paper profits.

Naturally, you're wondering what all this is — but I'm not going to tell you here. No, it's going to cost you ten

For the past two decades Du Vall has captured the imagination of men and women the world over by providing solid, unique direction for their quest for financial freedom. His firm is headquartered in Michigan with international marketing offices in Hong Kong (known as DAX International, John W. Lane, President). In addition to producing some three dozen publications on money-making/self-improvement themes, DuVall is also the creator of the popular Derek Dax adventure/mystery/romance series and the author of the political intrigue novel, "The Big Dream" (published by Lyle Stuart, Inc., New York). Unlike most, he has never had to resort to outlandish money-back guarantees to attract only the finest DAX-DOERS worldwide and no such policy is expressed or implied.

His writings have been used in numerous style and content workshops and accredited courses at such institutions as California State University, UCLA, Fordham, University of Illinois and Worcester Polytechnic Institute.

smackers to find out. But I will tell you what it *isn't* so you'll not be off on some wild goose chase:

- ★ No sex or off-color stuff
- ★ No chain letter, pyramid or multi-level scam
- ★ No mail order, envelope stuffing or drop-shipping
- ★ No writing or self-publishing how-to stuff
- ★ No loan brokerage scheme
- ★ No stocks, commodities, real estate, etc.
- ★ No gambling, betting or wagering
- ★ No arts, crafts or special skills
- ★ No party-plan, door-to-door or phone selling
- ★ No catalogs, mailing lists, postage, etc.
- ★ No equipment to buy or rent
- ★ No bothering friends, relatives, etc.
- ★ Not anything you have ever seen advertised anywhere

### WHO CAN DO IT

Anyone with even a smidgen of ambition.

### WHAT IS REQUIRED

Other than my step-by-step detailed report ... nothing. I have thought long and hard about it; A person virtually without a shirt on their back or a pot to plant petunias in could do it. You will of course, have to put my plan into motion — but that's both fun and easy and totally accomplished from the comfort of your own home. (By the way, no one will be coming to your home, either.)

Finally, let me make this clear: Once you have my report, **that is all you need to get going!** I have nothing else to sell you for this deal. Your purchase of this extraordinary report is NOT a "foot in the door" to get you to buy some extra or expensive "course" or whatever ... this is all you need from me!

### WANT PROOF?

We have over 10,000 'tasty testimonials' from housewives, doctors, lawyers, layed-off factory workers—all sorts of good people. These excerpts sum up their feelings:

*"Thanks a million times ... you have proved 100% accurate in what you said in your advertisement. Doing this work is so easy! I sometimes work while in bed. Should you come up with another ingenious thing, please let me know."*

Mohidin Mohammed, Sweden

*"We are so impressed ... have our 13 and 16 year olds involved ... thanks for giving our family new hope."*

MacClear Family, Indiana

*"... man in economically depressed area left \$35,000 secure job to put this method to work ... made \$120,000. First man I've ever met who really made money on idea purchased through mail."*

David Roman, Editor, ROMAN REPORTS, Ohio

### WHAT TO DO NOW

You've got two choices:

1. Put this ad aside, wait 90 days or so and perhaps lose your chance at \$100,000.



### Nifty Bonus!

A few months back in our DAX MONEY-MAKER® CONFIDENTIAL NEWSLETTER, we reported on another business that can easily net \$1,000 a week for life. It's a bit more involved and does require getting out and about, but our readers were so delighted with it that I'm including it as an extra **free bonus** when you order our new special DAX report, "\$100,000 in 90 Days."

2. Do the only sensible thing. Send me the ten bucks and get started on wearing in that path to the bank.

P.S. One more thing (say, this Du Vall is a windy so and so, isn't he!). There are lots of people right now in bad financial straits. I hope you're not one of them, but if you are, having read this ad you now have absolutely no excuse for being broke, because as the saying goes, "This is it!" This could truly be the once-and-for-all solution to any money miseries you have, I guess you'll have to take my word for it until you receive these fabulous reports — but if it eases your mind any, over 1,000,000 men and women worldwide have been, over the years **repeat buyers** of my books, courses, reports, cassette tape programs and newsletters. There must be a reason ...

— Dean F. V. Du Vall

Du Vall Press Financial Publications  
920 W. Grand River, Williamston, Michigan 48895

For same day DAX processing mail to: BOX 14-AA53 WILLIAMSTON, MI 48895

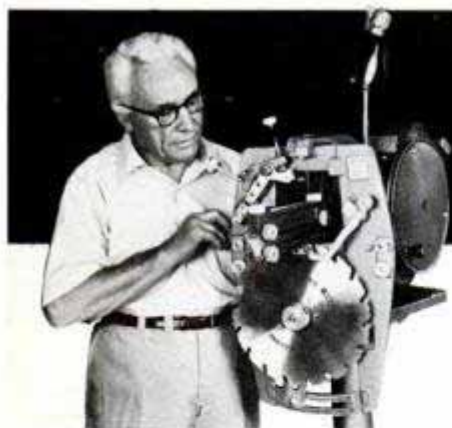
Dean — this sounds like just what I'm looking for — a chance to make mega-bucks without any investment or having to leave the house. The same day you receive my order rush me your new DAX Special Report, "\$100,000 in 90 Days" plus the Free Bonus Report, "\$1,000 A Week for Life." Enclosed is ten dollars.



For Personal Success

Zip \_\_\_\_\_  
Optional:  Add \$2 for individual handling/first class postage. ©1983





## Be Your Own Boss and Make \$12.00 to \$18.00 AN HOUR!

Find out how by calling...  
**1 (800) 845-3000**  
*(In Utah Call 1 (800) 662-8666)*  
... now for your **FREE**  
**Lifetime Security Fact Kit!**

Your Free Lifetime Security Fact Kit tells you how to make \$12.00 to \$18.00 an hour in your own Foley Full-Service Saw and Tool Sharpening Business. Your FREE Fact Kit explains how you can:

- be your own **BOSS!**
- work full time or part time, right at home.
- do work you enjoy and take pride in.
- operate a **CASH** business where 90¢ of every dollar you take in is clear **CASH** profit.

And it is so easy to learn. Foley gives you all the facts and instructions. No experience or special training is necessary. Foley tells you everything you need to know to be successful.

And there's plenty of business available in your area. You will be able to sharpen all types of saws, garden and shop tools for home, farm and industry.

You will be able to set your own hours and not have to worry about layoffs and strikes. And there are no franchise fees. Any age person can succeed.

But you've got to get the **FACTS** before you can get started. So **CALL NOW** for your **FREE** Lifetime Security Fact Kit. It's yours to keep with **NO OBLIGATION** and **NO SALESMAN WILL CALL ON YOU.**

If you prefer, you can mail us the coupon below to receive your **FREE** Fact Kit, but you'll get it sooner if

you call NOW. The number is 1 (800) 845-3000. Call any time of day or night. **WE PAY FOR THE CALL.** Utah residents please call 1 (800) 662-8666.

**FREE**  
LIFETIME  
SECURITY  
FACT KIT

**The Foley Company**  
20140, Field Bldg.  
Kansas City, MO 64111

**YES**, I want to know more! Please rush my **FREE** Lifetime Security Fact Kit. No obligation and no salesman will call.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_

STATE \_\_\_\_\_ ZIP \_\_\_\_\_

## 8 GARDEN AIDS

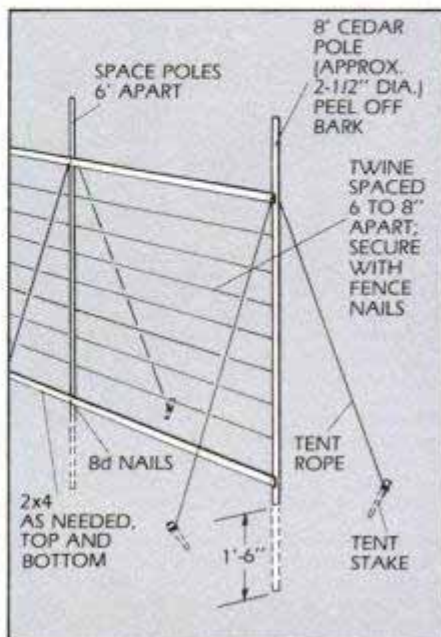
*(Continued from page 114)*

### 8 Pole bean trellis

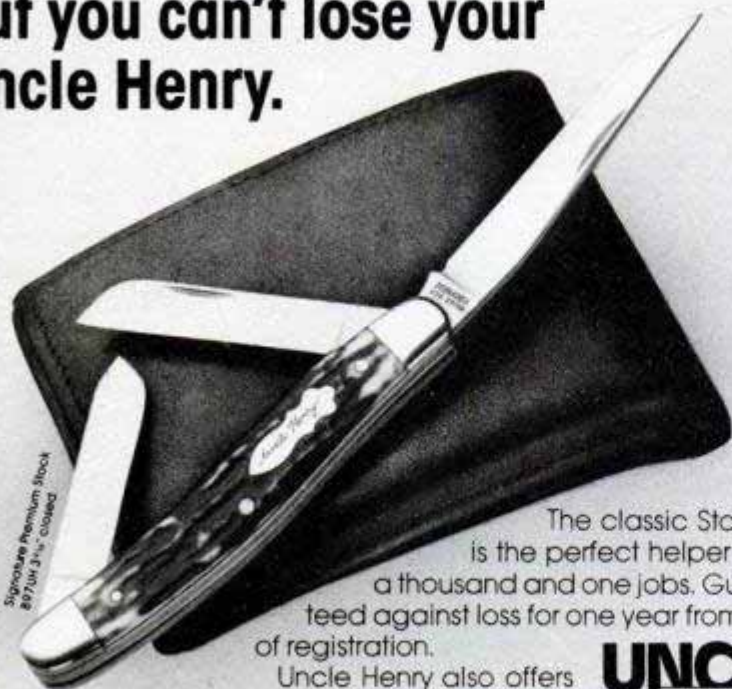
If your garden space is limited, you can greatly increase its production per square foot if you train plants to grow upward. These trellises let your pole beans climb.

Set 8-ft. cedar poles about 18 in. into the ground and spaced approximately 6 ft. apart. Provide top and bottom rail supports with 2x4s fastened with 8d nails. Lace strong twine horizontally from pole to pole, spaced 6 to 8 in. apart. If desired, secure it with fence nails. Support the poles with tent rope on opposite sides. Stake the rope into the ground.

Familiar pole lima bean varieties include Carolina and King of the Garden. Favorite pole snap beans include Blue Lake and Roman. Any of these would do well on the trellis. **PM**



## You can lose your wallet, But you can't lose your Uncle Henry.



The classic Stockman is the perfect helper for a thousand and one jobs. Guaranteed against loss for one year from date of registration.

Uncle Henry also offers a selection of pocket knives with one and two blades.

**UNCLE HENRY**  
SCHRADE

Write for your free Schrade Almanac to Schrade Cutlery Corp., Ellenville, N.Y. 12428-0590.



# HOW-TO BOOK CLUB

The Best Source for Quality, Service, and Value!

Practical Projects . . . Exciting Ideas . . . and Time- and Money-Saving Tools for Homeowners, Hobbyists, and Do-It-Yourselfers!

## Select 5 Books for Only \$2<sup>95</sup>

Values to \$105.75

Join Now, Get a Work Apron FREE!



1409  
List \$15.95



1244  
List \$19.95



1508  
List \$19.95



1602  
List \$15.95



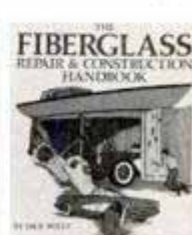
1424  
List \$19.95



1601  
List \$19.95



1547  
List \$17.95



1297  
List \$17.95



1460  
List \$18.95



1484  
List \$21.95



1563  
List \$18.95



1365  
List \$16.95



1160  
List \$14.95



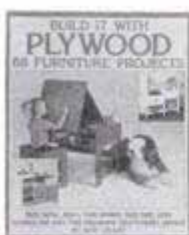
1597  
List \$19.95



1587  
List \$19.95



1562  
List \$16.95



1430  
List \$18.95



1546  
List \$18.95



1504  
List \$21.95



1537  
List \$16.95



1458  
List \$17.95



1321  
List \$12.95



FREE Work Apron

## 7 very good reasons to join the How-To Book Club

- **Big Savings.** Save 20% to 75% on books sure to increase your how-to know-how
- **No-Risk Guarantee.** All books returnable within 10 days without obligation at Club expense
- **Club News Bulletins.** All about current selections—mains, alternates, extras—plus bonus offers. Comes 13 times a year with hundreds of up-to-the-minute titles you can pick from
- **"Automatic Order."** Do nothing, and the Main selection will be shipped automatically! But . . . if you want an Alternate selection—or no books at all—we'll follow the instructions you give on the reply form provided with every News Bulletin
- **Bonus Books.** Immediately get a Dividend Certificate with every book purchased and qualify for big discounts of 60% to 80%
- **Extra Bonuses.** Take advantage of added-value promotions, plus special discounts
- **Exceptional Quality.** All books are first-rate publisher's editions selected by our Editorial Board and filled with useful, up-to-the-minute information

## HOW-TO BOOK CLUB

P.O. Box 8 Blue Ridge Summit, PA 17214

Please accept my membership in the How-To Book Club and send the 5 volumes circled below, plus, my FREE work apron, billing me \$2.95 plus shipping and handling charges. If not satisfied, I may return the books within ten days without obligation and have my membership canceled. I agree to purchase 3 or more books at reduced Club prices (plus shipping/handling) during the next 12 months, and may resign any time thereafter.

- 1128 1160 1244 1287 1297 1321 1365 1409 1424  
1430 1458 1460 1463 1484 1504 1508 1520 1537 1546  
1547 1562 1563 1573 1587 1597 1601 1602 1629

Name \_\_\_\_\_ Phone \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_ Zip \_\_\_\_\_

Valid for new members only. Foreign customers must pay in advance in U.S. currency. This order subject to acceptance by the How-To Book Club. PM-384



# ATTENTION LOT OWNERS: More Home for Your Money!



Over 45 Models  
to Choose From!

Have more space, more luxury features for less money. Complete it yourself. Reduce costs by \$1,000's. Curtis does the heavy, difficult framing, then supplies finishing materials with step-by-step instructions.

Don't settle for less... you can get more home the Curtis complete-it-yourself way.

Send Coupon or  
Call for a FREE Catalog.

There's a representative near you!  
Call Toll Free: 1-800-228-2323  
or 612-542-4300

**Curtis Homes**   
(612) 542-4300  
Custom built on your lot.

- Special credit arrangements for lot owners.
- Quality materials and features.
- Use our plans, your plans, or best of both.
- Discounts for cash buyers.

Send me your FREE Homes Catalog  
CURTIS HOMES, DEPT. PM-1  
2201 Florida Ave. So., Minneapolis, MN 55426  
(Please Print)

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
Phone( ) \_\_\_\_\_  
 We own land.  
 Enclosed is \$2.00 for priority handling.

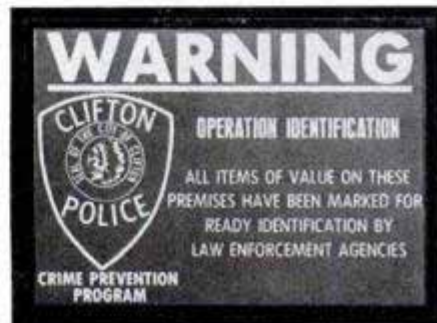
## MAKE YOUR MARK

(Continued from page 118)

driver's license number with the state abbreviation. It is easier to track you through this number than through your social security number.

Try to put identification on all theft-prone items. For example, mark art and collectibles, electronic equipment, jewelry, power tools, items made of precious metal, sports gear and cars. This makes it harder for burglars to fence stolen goods. Also, if a burglar is apprehended with goods that are marked, it is easier for law enforcers to prove the items are not his. Don't mark removable parts such as bike fenders or outboard motor propellers.

As you mark your valuables, keep an inventory of them—one copy at home or the office, a second copy in a safe deposit box or other secure place.



Stickers such as this one from the Clifton, N.J., Crime Prevention Office can be placed conspicuously to discourage burglars.

Beside each item the inventory should include: the brand, year of purchase, serial number and estimated value.

As further security, take photos of your valuables. Clearly identify each photo, telling the date it was taken and the objects shown.

Many municipalities have a crime prevention program which encourages homeowners to place identification on their valuables. Stickers indicating that the homeowners are part of this operation-identification program are available, for use on windows and doors. Marking valuables combined with this type of organized effort may well deter burglars.—P.S.

## SUPPLIERS

Ball point marker: Markal Co., 250 North Washtenaw Ave., Chicago, Ill. 60612.

Branding iron: Craftmark Products Inc., Box 6308, Marietta, Ga. 30065.

Engravers: Dremel Manufacturing Div., Emerson Electric Co., 4915 21st St., Racine, Wis. 53406; Weller Mini-Shop Kit, The Cooper Group, Box 728, Apex, N.C. 27502; Wen Products Inc., 5810 Northwest Highway, Chicago, Ill. 60631.

Etching pen: Fred V. Fowler Co., 66 Rowe St., Newton, Mass. 02166.

Lacquer stick: Lacquer-Stik, Lake Chemical Co., 250 North Washtenaw Ave., Chicago, Ill. 60612.

Lettering wheel: Dymo label makers, Esselte Pendaflex Corp., Clinton Rd., Garden City, N.Y. 11530.

Metal stamp: Pannier Corp., 207 Sandusky St., Pittsburgh, Pa. 15212.

## A space age polish that removes and prevents pitting!



### MONEY BACK GUARANTEE!

**MET-ALL** aluminum polish. Cleans, polishes, waxes and protects in one application. Safe, fast, easy to use.

**MET-ALL** shines aluminum and all other metals to a mirror-like finish. Great for home, auto, marine and aviation use. Tested and approved by the three largest producers of aluminum.

**MET-ALL**. Removes the dullness, not the metal.

Ask your retailer or write to:  
**DARS MET-ALL INDUSTRIES, INC.**  
29-00 Review Ave., Long Island City,  
NY 11101 (212) 937-3535

## The American Clock Builder

**NEW!**  
100 PAGE  
CATALOG  
\$2.00 ppd.  
(Refunded with  
your first order)

**LOWEST  
PRICES  
IN THE  
U.S.A.**

### LARGEST SELECTION!

- Do-It-Yourself Clock Kits
- Imported Brass Movements
- Quartz Movements
- Music Box Movements
- Finishing Supplies and Tools

**Solid Walnut  
Bracket Clock  
ONLY \$22<sup>95</sup>**

- Complete Kit Includes:
- Quartz Movement
  - Solid Oak Wood Parts — All Pre-Cut
  - Brass Finish Dial
  - Dial Glass
  - Serpentine Hands
  - Solid Brass Bail Handle



7-1/2" H x 7-5/8" W

Compares to finished clocks that retail at \$100.00 and up!

CALL TODAY! 312-584-9600

**Craft Products Co.**

CLOCK BUILDERS SUPPLIES  
Dept. PM4M, 2200 Dean Street, St. Charles, IL 60114  
Serving America's Craftsman Since 1940



# Once you've decided to mow with the best, it's only a question of how fast you want to finish.



No matter what kind of lawn you have, or how much time you want to spend on it, there's a dependable, top-quality John Deere mower that's designed to do the job.

If, for example, you have a lawn of a quarter-acre or less, and time isn't really an issue, your best bet is probably a walk-behind mower. There are several models available, including the 21-inch self-propelled version pictured above. It comes with a dependable 4-hp engine, a deep die-cast aluminum deck, and rear-wheel gear drive that provides excellent traction, even on hillsides. An optional rear grass bag enables you to trim on either side.

If you have a larger lawn and you'd rather spend less time mowing it and more time enjoying it, you may prefer one of the five new John Deere riding mowers. Even the 8-hp R70, the lowest-cost model, will mow a half-acre in just 30 to 45 minutes, depending on the amount of trimming to be done. In fact, when you consider the high-quality features and solid construction of the R70, you probably can't find a better rider for the money. It has a 30-inch mower, a full-length welded steel frame, a 5-speed shift-on-the-go gear-drive transmission, and an optional 6½-bushel rear grass bag.

Or, if you own an acre or more, and mowing's become a big production, a John Deere lawn tractor may be in order. The 116, for instance, with a 46-inch mower and 16-hp engine, will mow an acre of lawn in about 45 minutes. All seven John Deere lawn tractors provide added versatility with an optional front blade, snow thrower, dumpcart, lawn thatcher, and rear-mounted grass bagger (for 30- or 38-inch mowers).

So the choice is yours. From 4-hp walk-behind mowers to 16-hp lawn tractors. But regardless of how long it takes to do the job, you'll be doing it with the best.

*For more information or the name of the dealer nearest you, call 800-447-9126 toll free (Illinois, call 800-322-6796) or write John Deere, Dept. 62/59, Moline, IL 61265.*



**Nothing Runs Like a Deere®**



## FORGING GOLD

(Continued from page 90)

large in view of a major component of the East European psych-out: the drug problem.

U.S. athletes were seriously shaken by the steroid scandal at last July's Pan American Games and the U.S.O.C.'s announcement that a full series of drug tests would be performed on competitors in the Olympic Trials. It seemed that the advantage of the East European athletes—whose governments are believed to encourage the use of performance-enhancing as well as strength-building drugs—would be intensified.

"We are not in a position to condone the use of steroids," says Clarke. "But I don't hesitate to say I sympathize with any world-class American athlete who wants to take them just to stay even. I'm not talking about average performers or even good ones—there have been tests with placebos versus steroids that show no appreciable difference in performance. But we don't know how world-class performers are affected because we haven't experimented with them, and the other side has."

### Beating the system

Last summer, Clarke told PM the Soviets had quietly managed to purchase every component of the urine-testing system that will be set up at UCLA to check for the more than two dozen banned substances, from antihistamines to steroids. Would the Soviets use a replica to figure ways to beat the system? "Probably," said Clarke. (There is no way the United States can openly do the same thing, although elements of a "chronobiology" study now being done on the training methods and performance variations of world-class American athletes by the Harvard Medical School include a request, for the first time, that athletes anonymously submit data concerning their use of steroids.)

Dr. Irving Dardik, the chairman of the U.S.O.C.'s Sports Medicine Council, an advisory group, acknowledges that most athletes perceive drugs to be effective. He says that's an attitude that can be countered only by offering a *more effective* alternative in scientific training and techniques.

At Colorado Springs, this "stronger medicine" has taken the form of an impressive array of analytical apparatus, coupled with imaginative ways of putting it to use. Among the major components are:

■ A treadmill in the physiology laboratory that not only provides readouts of an athlete's heart and respiratory rates, but projects a "VO<sub>2</sub>" (maximum oxygen uptake), the critical measure for any endurance event. It also tells

researchers whether a subject's efforts are being fueled by stored carbohydrates or body fat consumption.

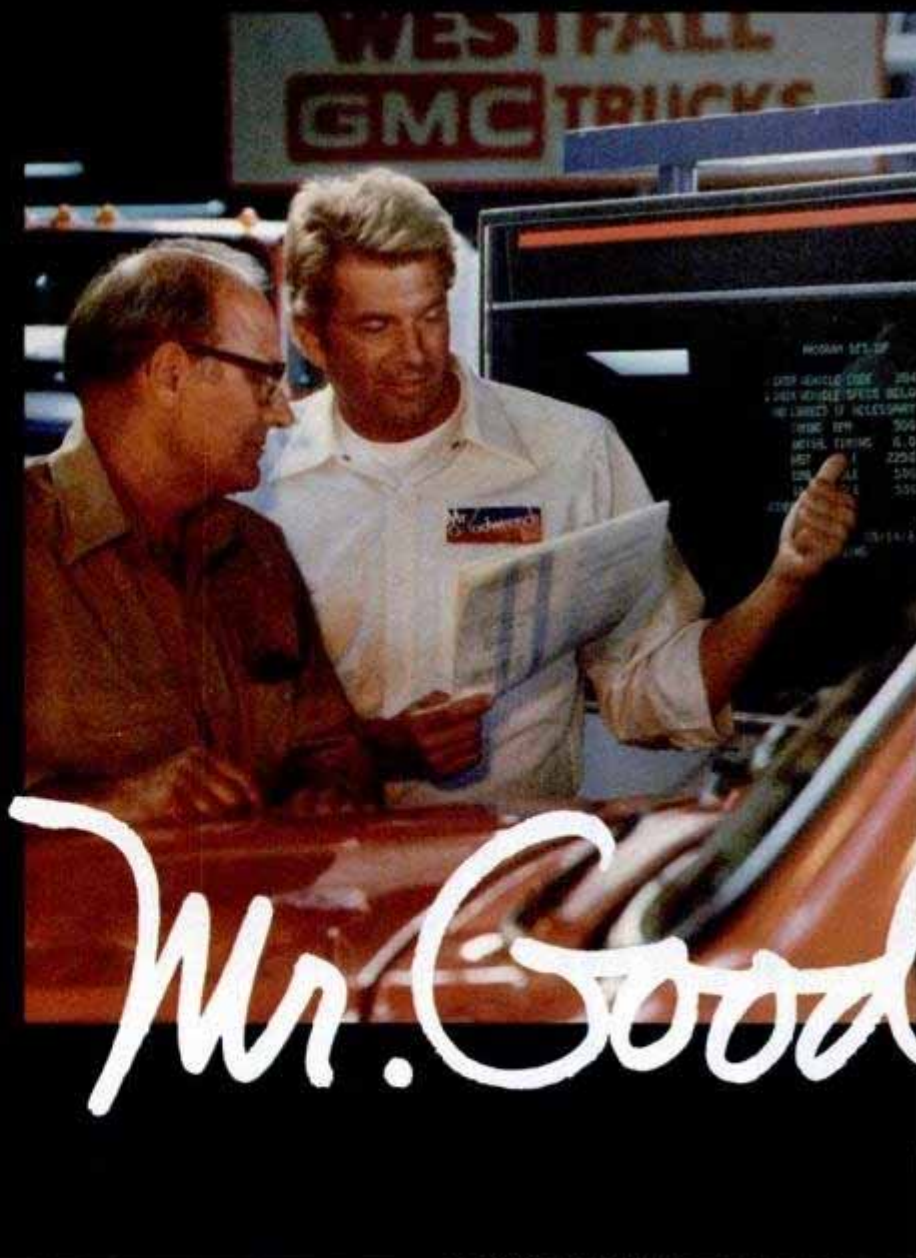
Last year, an aspiring marathon runner was tested on this treadmill and advised that he should change his event to middle distances. This is an element of "Big Brotherism" no U.S. Olympic Committee would have condoned in the past—at least not openly.

■ A tank for underwater weighing to determine a subject's percentage of body fat. The percentage is compared to optimums recorded for champion athletes in specific events. It's also a prime indicator of conditioning.

In one case, a Soviet women's gymnastics coach working with American women gymnasts under an exchange program last year told one of her charges to lose five pounds after visually sizing her up. The girl was later tested and found to have a lower percentage of body fat than some gymnasts the Russian coach had found exemplary in body build. A Colorado Springs physiology lab volunteer said, "The girl she picked had a large bust."

Another athlete-volunteer at the Center managed to reduce her percentage of body fat by four points—a remarkable amount for someone al-

Your engine makes 8,000 explosions a minute.





ready in training—through intensive workouts. But she found that added performance was negligible due to fatigue. "We've found that there is a very fine line between undertraining and overtraining," Clarke said. "A lot of coaches in this country don't believe in alternating light and heavy workouts, and they could be doing their athletes more harm than good."

■ Two types of force platforms in the Center's Biomechanics Lab section. One is made by Advanced Mechanical Technology Inc., the other by Kistler Instrumente, a Swiss firm that uses piezo-electric technology. Force platforms

can determine the directional qualities of forces applied in various athletic movements, and therefore indicate if an athlete can change something in his technique to gain efficiency.

■ Visual motion analysis equipment systems. These include a Locam II high-speed motion picture camera that has a variable shutter and can operate at up to 500 frames per second; Lafayette Instrument photocell sensors which beep when a light beam is broken; a Selspot system using LEDs to provide spot coordinates in a computer-interfaced method that calculates position, velocity and acceleration during

athletic movements; a Talos digitizing tablet that uses a sonic pen or cursor to provide digital analysis of anything on film through the lab's Apple or Data General computers; and several video camera systems. The last includes a high-speed video unit capable of 200 fields per second (as opposed to 25 for standard TV), which gives instant superslow-motion replay. Also, a Sony camera can track the brightest point in any field and give X,Y coordinate data—used with Selspot LEDs—to its own peripheral plotter.

Meanwhile, the U.S.O.C. is funding a number of projects at similarly equipped facilities all over the country, such as: cycling biomechanics at Penn State, diving techniques at the University of Washington, fencing at the University of Delaware and analysis of "horizontal jumps" at Iowa.

It's the Committee's intention that we're not going to be swamped in the sports which Americans don't consider "glamour" events. In the Munich Games in 1972, according to a compilation in a recent *New York Times* article, the minor sports of canoeing, cycling, fencing, field hockey, judo, modern pentathlon, team handball, volleyball, weightlifting and Greco-Roman wrestling offered a total of 174 medals. Of these, the United States took a single bronze medal—in canoeing.

#### Equipment-oriented sports

The fact that so many of these sports in which the United States does only marginally well are equipment-oriented is another challenge seized on by the Biomechanics Lab at Colorado Springs. Our cyclists' equipment, from spokes to helmets, will look radically different—even though their \$7,000 Raleigh bikes won't. Our fencers will sport new shoes—a different type on each foot.

But some critics of the new Committee insist that more effort should have been put into the sports Americans care about—to ensure that Carl Lewis and Mary Decker, for instance, aren't embarrassed in Los Angeles, not that John Beckman (cyclist) or Christine Penick (judo) and others emerge briefly as medal contenders only to fade into the oblivion of an unpopular sport.

The Committee obviously doesn't agree and thinks that by applying the best science and technology we have, we'll produce our best effort. "We're not trying to be Big Brother," says former decathlon champion Bob Mathias, director of the Colorado Springs Training Center. "We're trying to be competitive, but in the American way, without direct government control." Mathias, who still looks fit enough to back up the line for the Rams, never touched a weight when he trained for

(Please turn to page 146)

## A tune-up helps make sure they're split-second right.

As Mr. Goodwrench explains, "At 55 miles per hour, an 8 cylinder car or truck makes about 8,000 explosions per minute. And the more precise they are, the better performance you get.

"That's what a tune-up is about. Perfect timing. You see, for 8,000 explosions,

your engine needs 8,000 perfect gulps of air, 8,000 perfect sips of gas, and 8,000 perfect sparks of electricity less than a tenth of an inch long. One of each—per cylinder—per six-hundredths of a second. That splits it pretty fine. And everything has to happen at the exact split second it's needed.

No wonder a tune-up is so important. After many



thousand miles, a natural process of wear can throw these precise adjustments way out of whack!

So see Mr. Goodwrench whenever a tune-up is recommended in your GM car or truck maintenance schedule. And ask him to check your filters, too, for better engine performance. He has quality GM parts, the right tools, equipment and training available. And he's at participating independent GM dealers who sell Chevrolets, Pontiacs, Oldsmobiles, Buicks, Cadillacs, GMC and Chevy trucks



LET'S GET IT TOGETHER...BUCKLE UP.

# Goodwrench

KEEP THAT GREAT GM FEELING WITH GENUINE GM PARTS



## PRINT ALMOST ANYTHING

(Continued from page 107)

can be processed and saved on a disk, and *Fontrix* will be able to take the resulting image from that disk. Of course, the resolution of the computer's graphics is far less than that of even the grainiest film. But if a picture is worth a thousand words, then even these pictures must be worth a few hundred. And, in many cases, just a recognizable image is all that's needed.

Although a program like *Fontrix* will do many things, it may not be the answer for those who wish to produce a

printed page where there is a lot of text and very few graphics. This is especially the case if the text must be justified (aligned along the column edge), centered or arranged differently. Simply typing at the keyboard and trying to align everything manually would drive even the most exacting perfectionist nuts in a very short time.

A top-of-the-line word processing program will, of course, take care of just about every kind of formatting. With one of the more powerful programs, you can both write and format text. You can set text to various measures (the length of the line of type),

justify edges of columns, do specialized indents—just about anything up to the width of your screen (see *Getting The Big Picture* on page 106 to learn how to go beyond that limitation).

But printing out text that you have processed in various type fonts has always been a problem. In the past, the only way to achieve this was with a "daisy-wheel" printer. This printer has a type element where the type characters are arranged on a flat, circular wheel, with the characters themselves making the wheel look a little like a daisy. To change fonts, you stop the printer and change the wheel.

However, this has two drawbacks. First, a daisy-wheel printer is far more expensive than the dot-matrix style. Even the wheels themselves, if you get a wide assortment, can cost more than an entire dot-matrix printer. Second, daisy-wheels cannot produce very large type sizes. So, while various typefaces are available, the sizes of these fonts are limited.

### Program makes it easy

But another ingenious program, *Fancy Fonts* from SoftCraft, allows anyone with a computer using the standard CP/M operating system to set his word-processed type in any number of type styles and sizes. And it makes this possible using an inexpensive dot-matrix printer. (In this case, the Epson brand of printer is required due to specialized control codes.)

Rather than typing onto the screen, this program requires that you already have your document prepared on disk using a CP/M-based word processing program. While you were preparing the document, you would have had to insert the specialized codes that *Fancy Fonts* needs in order to do such things as change from one type font to another, set spacing between lines, center and justify lines, change the measure of a line—just about anything you might want to do in formatting a page.

Using a special but easy-to-learn command language, you tell the program certain things, such as which of the included (or design-your-own) fonts are to be used and when the document is in the disk drive. Then all else is automatic. The *Fancy Fonts* program will turn your word processed document into type that looks just about professionally set. Again, this *Fancy Fonts* program fools the printer into thinking it's really printing graphics.

At-home print shops helped to begin the American Revolution. Now, the Computer Revolution brings printing back home again. No matter what your printing needs, the combinations of hardware and software should turn you into a computerized version of Benjamin Franklin.

FM



## GREAT SPRING HARDWARE SALE

Spring Months 29 April 21 1984

### CHANNEL LOCK

For You Who Want The Best

## Two Of The Best At Best Ever Prices

Super savings on two of the world's most popular pliers. Ask for these CHANNELLOCK specials at your hardware store. Mar. 29 - Apr. 21, 1984

- No. 430GH Tongue and Groove Plier
- 10 Inch, 7 Positions, 2 Inch Capacity



- No. 317GH Long Nose Plier
- 7 Inch with Side Cutter

CHANNELLOCK, INC. • Meadville, PA 16335

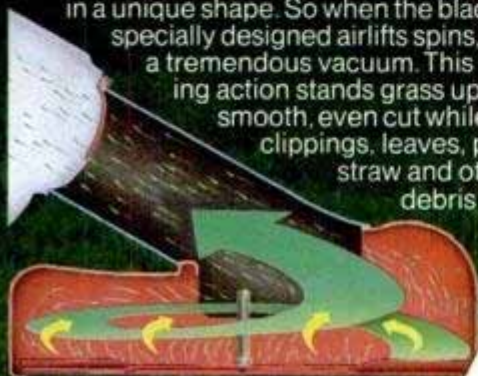
**CHANNELLOCK Pliers Are American Made**



# THIS AD IS FOR PEOPLE WHO THINK ALL MOWERS ARE THE SAME

Most lawn mowers have a blade, engine and four wheels. So you think they're all the same. But other mowers don't have the engineering that makes SNAPPER Hi-Vacs® the ultimate in lawn performers.

**NO OTHER MOWER HAS HI-VAC:** SNAPPER's exclusive design revolutionizes lawn work. The 360° bottom edge of the mowing deck is formed in a unique shape. So when the blade with its specially designed airflits spins, it creates a tremendous vacuum. This vacuuming action stands grass up for a smooth, even cut while forcing clippings, leaves, pine straw and other debris into



the catcher. This vacuuming system works even in tall, damp grass. That's quite an advantage since it allows you to mow in the cool of the morning while others have to wait for the lawn to dry.

**ELECTRIC START:** Lawn work is easier thanks to SNAPPER's electric start mowers. They even have

an alternator to charge the battery while you mow and a back-up recoil starter. Just turn the key and your 21" push or self-propelled mower is ready to go.

**REVOLVING CREDIT PLAN:**

SNAPPER's convenient credit plan makes it a snap to own a Hi-Vac today. So see the yellow pages for your local SNAPPER dealer. You'll be yards and yards ahead.

It's a snap with **SNAPPER**



Visit your participating SNAPPER dealer for Sensational Spring Savings.  
**SNAPPER POWER EQUIPMENT** McDonough, Georgia 30253



**IT'S TIME YOU TRIED SLEEPING ON AIR.** There's

much more to it than you can see from these pictures. Your back and joints don't ache in the morning because of less pressure. You don't toss and turn as much and you generally sleep deeper and more restfully because of less body movement. It really is logical—flexible, air-cushioned comfort provides a better night's sleep as opposed to lying on a conventional mattress of rigid metal springs and stuffing.

**GENUINE AIR COIL CONSTRUCTION**... Herein lies the "magic." These "Controlled Air Chambers" are what support you when lying, sitting, or just lounging. You (and your

**FACTORY DIRECT PRICES**

**FROM \$19.95!**

**AIR BEDS**

sleeping partner) don't sink down in the middle.

Instead you are both securely supported at all times in maximum comfort and stability. Also, a Perfect

Portable Spare Bed for guests, camping, traveling, sunbathing, floating or fun! It comes in 5 standard bed sizes including our new "singles" size (slightly smaller

than twin) inflating in minutes with an air pump or cannister vacuum cleaner (adapter is incl.) Heavy gauge, fade resistant, poly vinyl, cleans with soap and water. Rich Camel color comes in Vinyl or Velveteen suede-like finish (shown). Starshine Airbeds are the finest quality available with a 90 day limited over-the-counter replacement warranty.



**PORTABLE SPARE BEDROOM**  
The AIR BED turns any room into a comfortable spare bedroom.



Imagine spending a relaxing sunny afternoon floating in the sun. Both vinyl & velveteen air bed finishes are waterproof and dry quickly.



**AIR COIL CONSTRUCTION**



**VELVETEEN**

**VINYL**

Original Suede-like camel finish is attractive and comfortable without any bed sheets.

Our NEW economical version for use as traditional mattress with sheets and bedding.



The AIR BED is a versatile alternative to your current mattress. Inflate to your own desired firmness and sleep better than ever.

**SHOP FASTER BY PHONE**  
**1-805-966-7187**

Or send a check, or credit card # (Diner's Club, VISA, MasterCard, Am. Express) for Air Bed specified. Add \$5.95 shipping & insurance per bed. CA res. 6% tax. Canadian shipping \$15.00 ea. Sorry no C.O.D.

MAIL THIS COUPON WITH YOUR ORDER

Bed Size	Vinyl	Velveteen
■ Singles (29" x 72")	■ \$19.95 (#600)	■ \$29.95 (#605)
■ Twin (59" x 74")	■ 29.95 (#601)	■ 39.95 (#606)
■ Full (54" x 74")	■ 39.95 (#602)	■ 49.95 (#607)
■ Queen (60" x 80")	■ 49.95 (#603)	■ 59.95 (#608)
■ King (74" x 80")	■ 59.95 (#604)	■ 69.95 (#609)

Dealer Inquiries Welcome

**AIR PUMP (#669)**—Inflates Air Beds quickly.  
\$14.95 plus \$2.00 shipping ea. 145-81

**STARSHINE GROUP**  
816 B STATE STREET, DEPT. BD91  
SANTA BARBARA, CA 93101



# ALL ABOUT PLYWOOD And Other Building Panels

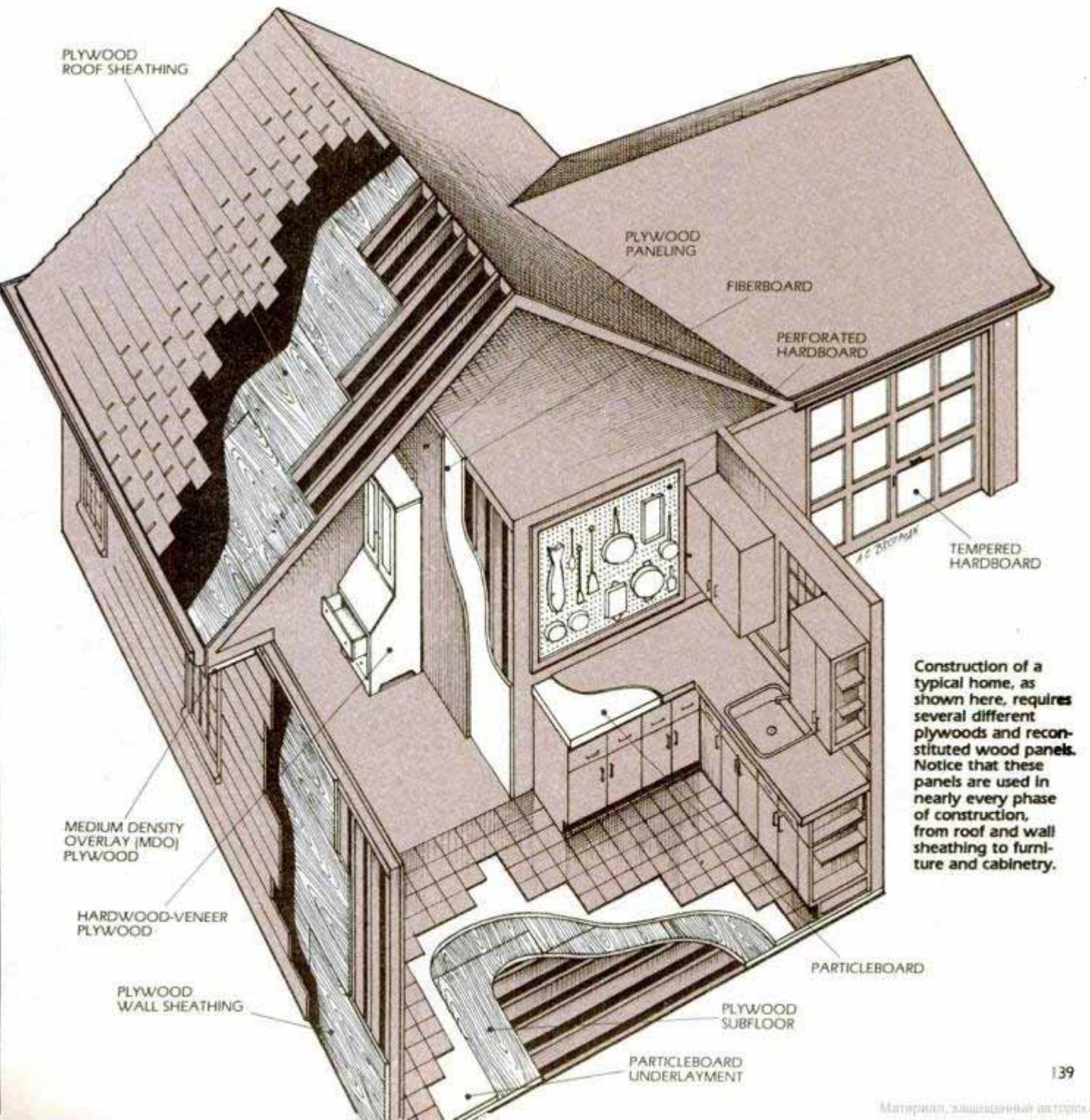
We examine the broad range of building panels so you can select the right type for your needs.

BY JOSEPH TRUINI, Asst. Home And Shop Editor, AND JOHN H. INGERSOLL

**T**he original plywood design of cross-laminated wood veneers (plies) has changed little since 1905, when plywood was created in St. John, Ore. But the plywood industry itself has grown into a large, diversified family of specialty building products,

including reconstituted wood panels made from wood chips, wafers and strands.

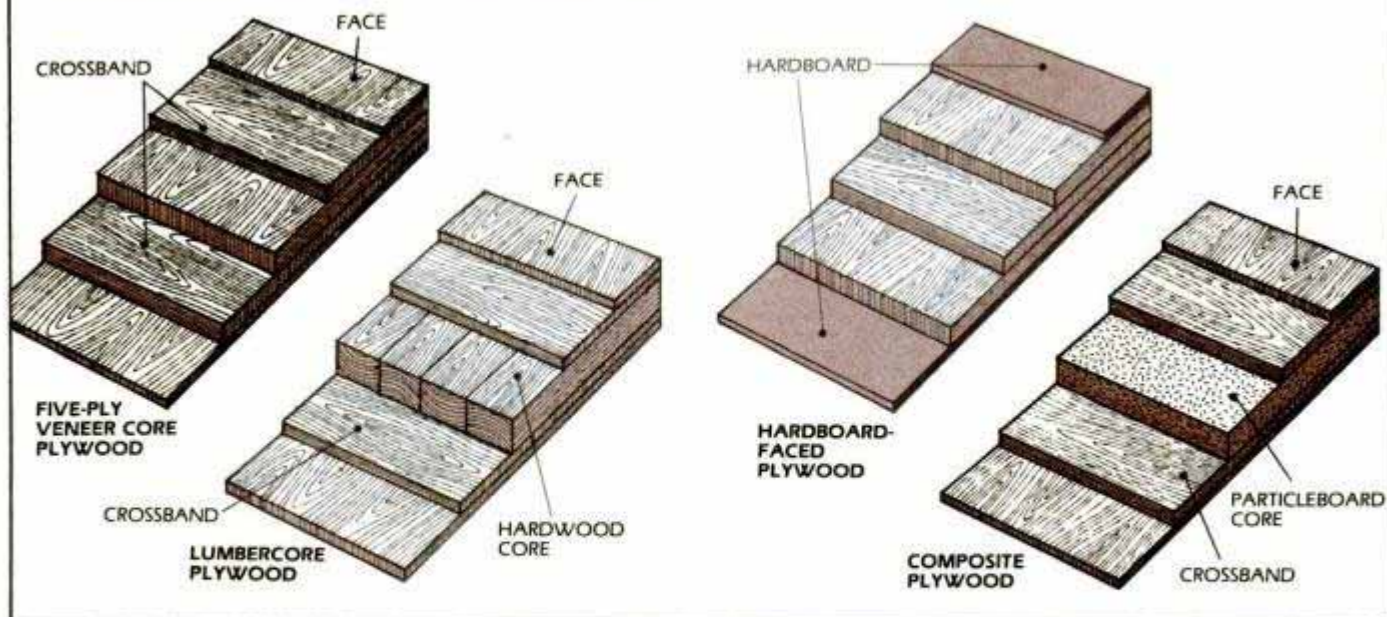
Here, we discuss a wide variety of building panels and explain their uses. Because of the many panels, it's important to select the right one for the job. In



Construction of a typical home, as shown here, requires several different plywoods and reconstituted wood panels. Notice that these panels are used in nearly every phase of construction, from roof and wall sheathing to furniture and cabinetry.



## TYPICAL PLYWOOD CONSTRUCTION



Cross lamination of veneers gives plywood its strength. Note that the grain of the crossband runs perpendicular to the adjacent plies.

In addition to using the information here, contact the manufacturers in the source list at the end of the story for product specifications.

### Plywoods

**Softwood-veneer plywood** is the panel most widely used for construction and industrial applications. It's made with an odd number of cross-laminated softwood veneers such as pine, fir, spruce and hemlock. The cross-lamination of veneers—wood grains running perpendicular to each other—gives plywood its strength.

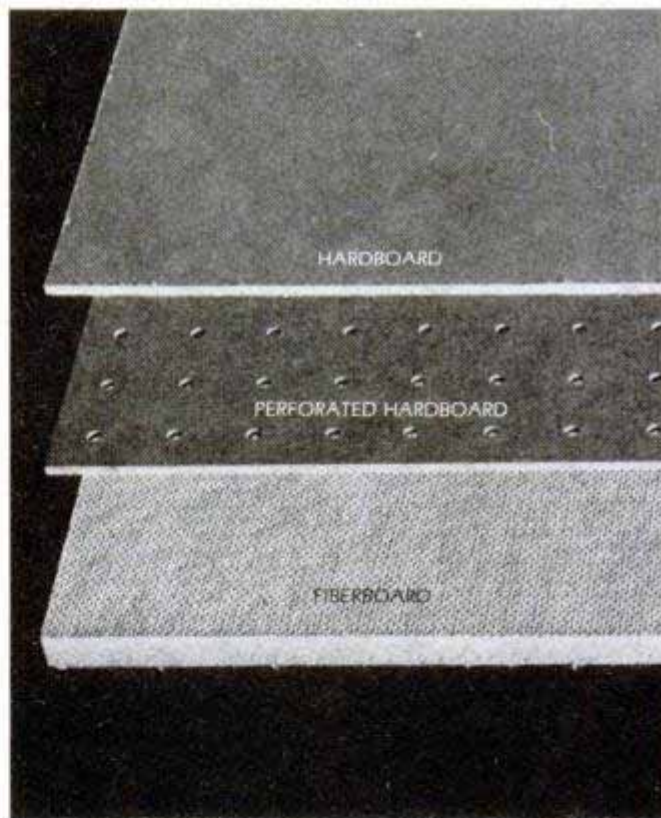
Plywood is graded by the quality of the veneer used for the face and back surfaces, and by the type of adhesive used to bond the veneers into panels. The highest quality veneer grades are N and A. These veneers provide smooth, defect-free surfaces. The minimum grade veneers are C and D (see veneer grade marking chart).

During manufacture, wood veneers are bonded together with an adhesive under a hot press. Depending on the adhesive used, the plywood is graded either interior or exterior. Interior-grade plywood is made with moisture-resistant glue for use indoors. Exterior plywood is manufactured with a 100 percent waterproof glue.

Certain structural plywoods (and reconstituted panels) are categorized by the American Plywood Assn. (APA) as performance-rated panels. Such panels carry a stamp indicating the maximum center-to-center spacing of supports, such as wall studs or floor joists, over which the panel should be placed. For example, a panel rated 24/16 can be used as roof or wall sheathing over rafters or studs which are spaced 24-in. apart. The same panel can also be used for floor decking over 16-in. o.c. joists.

Standard size for softwood-veneer plywood is 4×8 ft., as are most building panels. Common thicknesses are 1/4, 3/8, 1/2, 5/8 and 3/4 in.

**Hardwood-veneer plywood** is a high-quality interi-



Here are three nonveneered, reconstituted wood panels. The two hardboards have smooth, hard faces. Fiberboard has a soft, screened face, but is strong enough for wall sheathing.

or panel used typically in furniture and cabinet construction. The face and back plies are made of hardwood veneer. The inner plies, or core, are softwood. The most popular hardwood-veneer plywoods are birch, oak, lauan mahogany, walnut and ash. Standard thicknesses are the same as softwood-veneer plywood.

**Lumbercore plywood** is the highest-quality panel. Its face and back are hardwood veneers laminated to a core of solid hardwood strips. It's used in furniture

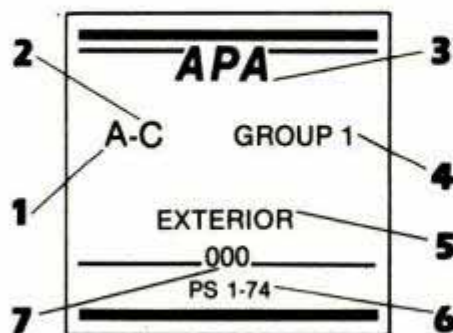


## PLYWOOD GRADE GUIDE

### Veneer Grade

Grade Marking	Face	Inner plies	Back	Typical Uses
A-A Interior	A	D	A	Interior cabinet and furniture construction. Applications where both sides are visible.
A-B Interior	A	D	B	Same uses as A-A except that the back side is somewhat less attractive.
A-D Interior	A	D	D	Interior furniture construction and paneling where one side is not visible.
Underlayment	C plugged	D	D	Often called PTS (plugged and touch-sanded). Used as an underlayment for carpet, tile and other finished flooring.
A-A Exterior	A	C	A	Top quality exterior panel for storage sheds, patio furniture and boat interiors.
A-C Exterior	A	C	C	Good quality exterior panel for cabinets and shelters when one side is not visible.
B-C Exterior	B	C	C	Moderately priced rough work panel. Used for storage racks and pet shelters.
C-D Plugged/ exterior	C plugged	D	D	Commonly known as CDX. Rough exterior panel used for roof and wall sheathing.
Marine	A or B	B	A or B	High quality panel used for boats and fine crafted exterior shelters and cabinets.

## TYPICAL GRADE MARKING



1 Veneer grade of panel face. 2 Veneer grade of panel back. 3 American Plywood Assn. trademark. 4 Group number signifying strength and stiffness of wood species used. Plywood is manufactured from over 70 wood species, which are divided into five groups. Group 1 woods are the strongest; group 5 woods are the weakest. 5 Panel laminated with exterior glue for permanent exposure to weather or moisture. 6 Product standard governing the manufacture. 7 APA mill number.

and cabinet construction, mostly for desks and table-tops. Lumbercore plywood is available in standard and 4×10-ft. panels. Common thicknesses are 1/2, 3/4 and 1 in.

**Medium-density overlay (MDO)** is an exterior plywood veneered with an opaque resin-treated fiber overlay. The tough, supersmooth overlay surface is highly suited for painting. MDO is generally used for exterior signs and soffits. In addition, because of the smooth overlay surface and the high-quality veneer core, MDO is a popular choice for building both interior and exterior cabinets. An MDO exterior plywood siding is also available.

**High-density overlay (HDO)** is an exterior plywood manufactured with an abrasion-resistant, resin-impregnated fiber overlay which provides an extremely hard, smooth surface. HDO is similar to MDO in uses, but it's tougher.

HDO is most commonly used for concrete forms. The overlay allows HDO panels to strip from hardened concrete surfaces without delaminating. It's also an excellent panel for exterior signs, countertops and workbenches. Both HDO and MDO plywood are available in common thicknesses: 3/8, 1/2, 5/8 and 3/4 in.

**Plyron** is a trade name for plywood panels manufactured with a hardboard face and back. The tough hardboard surface permits Plyron to be used as a workbench top and for utility cabinets, doors and underlayment. It's available in interior and exterior grade in common thicknesses: 1/2, 5/8 and 3/4 in.

**Plywood siding** is used when the natural beauty of wood is desired. Siding is available in a broad range of veneer face grades and in several surface patterns and texture combinations.

Many plywood sidings are rated as structural panels and can be applied directly over studs. But check the local building code before using plywood siding as wall sheathing. Plywood siding comes in 1 1/32, 3/8, 1/2, 19/32 and 5/8-in. thicknesses.

## Reconstituted wood panels

**Particleboard** is the most widely used reconstituted wood product. This nonveneered panel is made from wood chips bonded with resins under heat and pressure.

The two most common types of particleboard are industrial grade and underlayment. Industrial particleboard is a high-quality, fine-finish panel used in furniture and cabinets and as countertops under plastic laminate.

Use underlayment particleboard over a subfloor and under carpet or tile. It comes in 1/2, 5/8 and 3/4-in. thicknesses.

**Waferboard** is a nonveneered structural panel made from wood wafers, as opposed to particles or strands. Common uses include wall and roof sheathing, subflooring and underlayment. The distinctive wafer pattern has made waferboard a popular choice for cabinets, storage bins, paneling and craft projects. Waferboard sheets are available in 7/16, 1/2, 5/8 and 3/4-in. thicknesses.

**Oriented strand board (OSB)** is similar to waferboard, with two exceptions: OSB is made from thin wood strands instead of wide wafers, and the strands are mechanically arranged, or oriented, in perpendic-



ular layers. The strands are then bonded with a phenolic resin.

Use OSB in the same applications as waferboard. But, because of the oriented strands, OSB is considered to be one of the strongest reconstituted panel products. OSB is available in standard 4×8-ft. sheets; larger panels up to 8×24-ft. can be specially ordered. Common thicknesses are 1/4, 3/8, 7/16, 1/2, 19/32, 5/8, 23/32 and 3/4 in.

**Hardboard** is a stiff, high-impact panel manufactured from refined wood fibers. The fibers are interlocked into a mat and compressed by heavy rollers into thin, hard sheets.

Hardboard (a well-known brand is Masonite) is available in three basic types: service, standard and tempered. Service hardboard is an interior panel which is used where low-weight is important and high strength is not necessary, such as for cabinet backs. Select standard hardboard when high-strength and good finishing qualities are required. Use it in furniture and as interior paneling and door skins.

Tempered hardboard is standard hardboard in which chemicals and heat-treating processes have been added to improve stiffness, hardness and finishing properties. Use tempered hardboard for exterior applications such as soffits, shutters and garage door panels.

Perforated hardboard, such as Pegboard, is available with closely spaced holes punched through the panel for accepting small hooks and brackets.

Hardboard is commonly available in 1/16, 1/8 and 1/4-in. thicknesses.

**Fiberboard** is a nonveneered structural panel made of individual wood fibers molded into durable sheets. This versatile product, also known as grayboard, is used as carpet underlayment, sound deadening panel, exterior siding, wall sheathing and as a protective floor cover-up.

Standard fiberboard panels measure 4×8 ft. But the Homasote Co. also offers fiberboard in 4×10, 4×12 and 8×12-ft. sheets. Panel thicknesses are 1/2 and 5/8 in.

**Composite plywood** is a softwood-veneer-faced panel with a reconstituted wood core made of either particleboard or oriented strand board. Composite plywood, known by the trade name Comply, is used virtually anywhere softwood-veneer plywood is used. Standard panel size for composite plywood is the same as softwood-veneer plywood.

The plywood and building panels discussed here are the products you're most likely to find at local lumberyards and home centers. These are the most common products for typical home construction and furniture-making. **PM**

#### SOURCE LIST—

##### PLYWOOD AND BUILDING PANELS

- American Hardboard Assn., 887-B Wilmette Rd., Palatine, Ill. 60067.
- American Plywood Assn., Box 11700, Tacoma, Wash. 98411.
- Elmendorf Board Corp., RFD 2, River Rd., Claremont, N.H. 03743.
- Georgia-Pacific Corp., 133 Peach Tree St. N.E., Atlanta, Ga. 30303.
- Hardwood Plywood Manufacturers Assn., Box 2789, 1825 Michael Faraday Dr., Reston, Va. 22090.
- Homasote Co., Box 7240, West Trenton, N.J. 08628.
- Louisiana-Pacific Corp., 1300 Southwest Fifth Ave., Portland, Ore. 97201.
- National Particleboard Assn., 2306 Perkins Pl., Silver Spring, Md. 20910.
- Potlatch Corp., 1 Maritime Plaza, Alcoa Building, Clay and Front Sts., San Francisco, Calif. 94111; Attention: Mr. Hutchins.
- Weyerhaeuser Co., Box B, Tacoma, Wash. 98477.

### VENEER GRADES

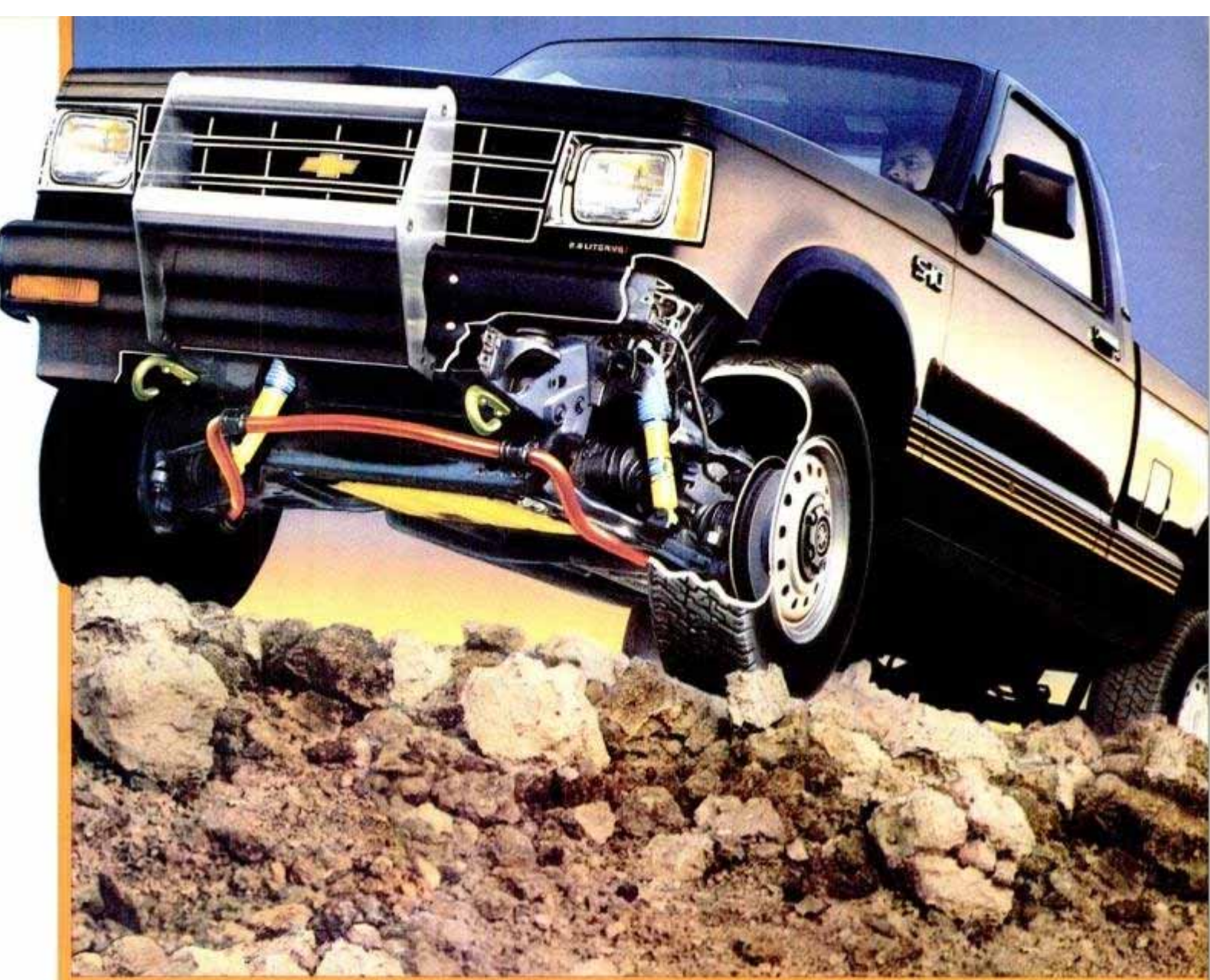
<b>N</b>	"Natural finish," smooth surface veneer of all heartwood or all sapwood. Free of open defects and no more than six wood repairs allowed. Repairs must be made parallel to grain and well matched.
<b>A</b>	Solid, smooth surface with no more than 18 neatly made wood repairs set parallel to the grain.
<b>B</b>	Solid surface with circular repair plugs and tight knots permitted to 1 in. diameter. Minor splits allowed.
<b>C</b> Plugged	Improved C veneer with splits up to 1/4-in. wide and knotholes limited to 1/4×1/2 in. Synthetic repairs permitted.
<b>C</b>	Tight knots and knotholes allowed up to 1 1/2-in. diameter. Synthetic repairs, defects and splits that don't impair strength permitted.
<b>D</b>	Knots and knotholes permitted up to 2 1/2 in. wide. Synthetic repairs, splits and stitching repairs are allowed.

(Adapted from American Plywood Assn. specifications)



Here are five methods of constructing wood panels (from the top): all veneer plywood, veneer with particleboard core, compressed wafers, compressed oriented strands, and small wood particles formed into large, flat sheets.





## NOTHING LIKE IT. ON THE ROAD OR OFF.

The amazing ride of Delco/Bilstein gas shocks.

Now available on Chevy S-10 4x4 Pickups. Imagine.

A shock designed for outstanding performance in the rough  
*and* uncanny smoothness on the road.

**Smooth and tough.** S-10's optional off-road package has new gas shocks that are designed to fine-tune themselves to provide a highway ride so smooth you may forget you're driving a truck, and amazing agility and control over brutal terrain.

**Revolutionary 4-wheel drive.** When you team these technologically advanced shocks with the revolutionary Insta-Trac 4-wheel-drive system, you've got yourself one tough off-roader. Chevy S-10 4x4.

Grille guard shown above is available through your Chevy dealer.  
Let's get it together...buckle up.

OFFICIAL U.S.  
CARS AND TRUCKS  
OF THE XIV  
OLYMPIC WINTER  
GAMES



Sarajevo '84  
© 1983 GM Corp. Sarajevo '84



# CHEVY TOUGH IS TAKING CHARGE



# MUST LIQUIDATE

Limited Supply of MITSUBISHI

# BIKE ENGINES

AT FAR BELOW DEALER COST

**FACTORY NEW! FACTORY PERFECT!**

**Pedal as far as you like for the exercise. Then cool off as you "motor" home!**

## PUBLIC NOTICE!

**Finder's Fee Paid For Liquidation Inventories!**

We are authorized liquidators of consumer products that must be quickly sold at drastic price reductions for reasons such as:

Overproduction. Last year's models. Economic recession. Out-of-season products. Bankruptcy or other financial problems. Order cancellations. Plant closings, etc.

If you know of any company with surplus inventories that must be quickly liquidated for cash, phone us Toll-Free: 1-800-328-0609. Only products in perfect operating condition will be considered. We'll pay you a finder's fee based on a percentage of the total value of the sales contract. (Officers and sales reps of mfr. are ineligible for fee.)

Lever quickly engages or disengages drive mechanism when you want to switch from muscle power to motor power.

Centrifugal clutch for smooth operation when you speed up, slow down or idle the engine.

Lightweight. Just 15 lbs.

Rugged, yet lightweight polyurethane fuel tank.

Compartment to carry pre-measured oil container.

Bike engine mounts easily, using ordinary hand tools.

Handy compartment for tools.

Spring tension on friction drive roller provides go-power to rear wheel.

**Enjoy the ease and convenience of motorized power for assistance on steep hills or long distance bicycle trips. This 15 lb. "powerhouse" cruises at 20 mph. Has a top speed of 25 mph. Travels up to 130 miles per gallon. It adds new distance, new adventure, new fun to bicycle riding!**



"A bicycle engine that retails for over \$269? You're kidding!" That's exactly what we said when we first heard of this surplus inventory. Then we checked the leading mail order catalogs. To our surprise, an engine with LESS horsepower than THIS one is \$199.95 in the Sears '83 Fall & Winter catalog. But we were STILL skeptical! Until a sample arrived. It was finely crafted. Obviously high quality. AND the 1 1/2 hp. engine was a product of world-renowned MITSUBISHI.

We were thoroughly impressed! Especially when we saw the manufacturer's confidential price list. It showed a WHOLESALE price of \$190.95 . . . to DISTRIBUTORS!

Of course, we know you ride your bike mainly for the exercise. But why limit the distance you can travel by how long your leg muscles and lung power can hold out? With this lightweight engine, you can go across town or across the state. Pedal as far as you like for the exercise. When you get tired, rely on the engine to power you up hills or cross-country. Zip along in breezy comfort at speeds up to 25 mph. Travel up to 40 miles on just a stingy 1/3 gallon tankful of fuel (gas/oil mixture).

For mom, dad, sis and brother, here's a nifty, thrifty engine that attaches securely with simple tools. The rear-mounted engine provides perfect balance. There's efficient transfer of power to the rear wheel by spring tension on the friction drive roller. Fingertip throttle control on handlebar gives quick, easy control of speed. A centrifugal clutch automatically engages as you increase speed; automatically disengages as you slow down and idle the engine at traffic lights.

Handy compartment holds tools for tuneups and routine maintenance. (4 tools are included.)



Convenient fingertip control of throttle lever on handlebar. Quickly speed up, slow down or just idle . . . easily.

**Manufacturer's Suggested Retail**  
**\$269.95**

**OUT THEY GO AT ONLY:**

**\$88**

Price subject to change after 60 days. Offer void outside original 48 states.

**A wonderful gift for bicyclists! Supply is limited. Order promptly!**



VISA  
MasterCard  
AMERICAN EXPRESS  
DINERS CLUB

Credit card members can order by phone, 24 hours a day, 7 days a week.

**Toll-Free: 1-800-328-0609**

If busy signal, or if no answer, call:

**Toll-Free: 1-800-328-5727**

In Minnesota, call: **1-800-742-5685**

**C.O.M.B. Co.**

THE NATION'S LARGEST AUTHORIZED MAIL ORDER LIQUIDATOR OF CONSUMER PRODUCTS  
14605 28th AVE. N. • MINNEAPOLIS, MINN. 55441

C.O.M.B. Co. / Liquidators Dept. F-382-1751  
14605 28th Avenue North / Minneapolis, Minn. 55441

Send      Bike Engine(s) at \$88 each plus \$12 each for shipping and handling. (Allow 3-4 weeks for delivery. Add 2-3 weeks extra if paid by check. Minnesota residents add 6% state sales tax. Sorry, no C.O.D.)

My check or money order is enclosed.

Charge to my:  MasterCard  VISA  
 American Express  Diners Club

Acct. No. \_\_\_\_\_ Exp. \_\_\_\_\_

PLEASE PRINT CLEARLY

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

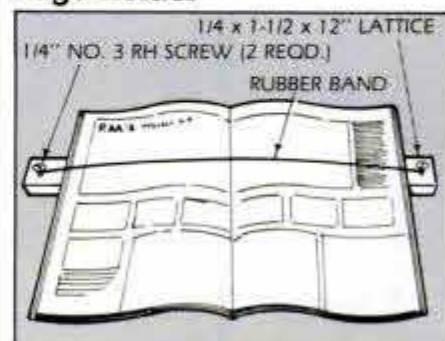
State \_\_\_\_\_ ZIP \_\_\_\_\_

Phone (Area Code \_\_\_\_\_) \_\_\_\_\_

Sign here \_\_\_\_\_

# HINTS FROM READERS

## Page holder

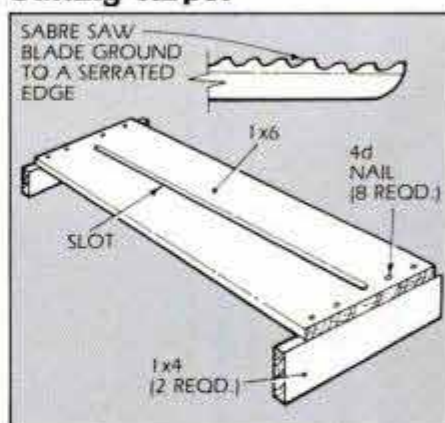


When you are working from plans, following a recipe or doing homework, it isn't always convenient to hold open a book or magazine. This holder keeps the pages that you want right in front of you.

Cut a small, flat piece of wood (1/4 x 1 1/2-in. lattice) about a foot long or as needed to hold the book or magazine. Install a 1/4-in. No. 3 roundhead screw at each end.

Center the open magazine on the strip of wood, stretch a heavy-duty rubber band and hook it on the two screws. Your hands will be free to work on the project.—*William Slamer*

## Cutting carpet



To cut carpet or thick rubber with a sabre saw, grind the saw blade to a knife edge, but be sure not to grind away all of the teeth. You'll fashion a blade with a serrated edge, similar to a bread knife. You can make a handy cutting board out of a 1x6 with a center kerf cut to within 1 in. of both ends. Nail a foot to each end to give blade clearance.—*Harry Louden*



**THE FIRST STEP  
IN INSTALLING  
A DUVINAGE  
SPIRAL STAIR KIT:  
SEND FOR OUR  
FREE BROCHURE.**

DUVINAGE



**FREE**

Find out how easy and economical it is to install the best spiral stair kit. Mail the coupon today. Duvinage, Box 828, Hagerstown, Md. 21740.

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_  
Zip \_\_\_\_\_ Phone (\_\_\_\_) \_\_\_\_\_  
area code

**The Quality  
Alternative to  
High-Cost  
Inflatable  
Boats!**



11'  
SE 9  
holds 5 adults

Why pay \$600, \$1000 or more for an inflatable boat? Sea Eagle inflatable boats last for years, go almost anywhere and cost as little as \$110. Fishing platform, motor runabout, river raft, camp boat, yacht tender and now a true speedboat! Lakes, rivers, ponds, bays and oceans. Sea Eagles give you real value for your money!

For your FREE 32-page color catalog write:

Sea Eagle, Dept. PM43B,  
St. James, NY 11780

**FREE 32-page color catalog!**

Or telephone: 516-724-8900  
8:30 AM-4:30 PM, Mon.-Fri., EST



**WONDER  
TILLER**

**At Just 20 lbs,  
What It Will Do  
Will Amaze You!**



**Don't let its small size fool you!**

If your garden is less than an acre, you need a big, expensive tiller like you need rabbits. What you need is *one* small, precision machine that can do a *variety* of jobs in the garden and around the yard... quickly, easily, neatly and economically.

The exciting Mantis Tiller/Cultivator is changing the way Americans garden. It weighs just 20 pounds so *anyone* can use it. It starts with a flick of the wrist... cuts through tough soils... turns on a dime... weeds in and around plants, between narrow rows and along fence lines... and runs *all day* on a gallon of gas! What's more, with its inexpensive attachments, it quickly becomes a *furrower, lawn aerator or de-thatcher, a power edger, or a hedge trimmer!*

**3-Week In-Your-Garden Trial**

*Best of all, you can try the Mantis — risk-free!* If you don't love it, simply return it for a full refund, including shipping!

Mantis' tines are warranted *for life* against *ever* breaking and its engine has a *lifetime* Replacement Agreement!

Why spend another season without the little tiller that's changing the way Americans garden?

©1984 MMC



Mantis Manufacturing Co.  
1458 County Line Rd., Dept. 379  
Huntingdon Valley, PA 19006

Please send me information on the revolutionary Mantis Tiller/Cultivator.

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_ Zip \_\_\_\_\_

**HOT WINDSHIELD  
WASHER FLUID!!**



The ONE  
and ONLY  
LPL  
HOTSHOT!  
**\$19.95**

N.J. Res. add  
6% sales tax

plus \$2.00 postage US  
\$3.00 postage Canada  
(U.S. Funds Please)

or send Visa or Master Card number  
and exp. date to:

**HAPI 200 Nursery Road  
Titusville, NJ 08560**

Inserted into the car's heater hose, this unit heats the washer fluid, permitting wipers to remove frost and light snow while driving. Only tools needed to install are a knife and screwdriver.

VISA  MASTER CARD

Card # \_\_\_\_\_  
Exp. Date \_\_\_\_\_  
Signature \_\_\_\_\_



**TWENTY TWO SOCKETS IN ONE**

A single socket that fits 90% of the most common inch and metric size nuts, bolts and machine screws. A rugged, adjustable socket that can be changed with one hand to any size, from 5/16" to 5/8" or 8mm to 16mm, in less time than it takes to remove a conventional socket. You always have the right socket in your hand as you need it.

The Ultra-Socket works like a compact, three-jaw chuck for a lathe. Turn the knurled ring at the top of the socket and the jaws move to the exact size for the nut or bolt. And they hold the setting until you change it.

The three-jaw design gives a better, more solid grip than the conventional 12-point socket. The Ultra-Socket will even work on nuts and bolts that have been rounded-off or are a non-standard size. It is about the same size as a conventional socket: a little over 1" diameter, 2 1/4" long, and over 100ft/lbs strong.

To get your Ultra-Socket with your credit card, call number below or mail your check or money order for just \$24.95 plus \$3.00 shipping for item 5709. NY residents add sales tax.

**ORDER TOLL FREE 1-800-227-2665**  
IN NEW YORK 516-676-8043

**CARBOOK, Sea Cliff, NY 11579**  
Satisfaction Guaranteed or Money Back



# NOW! Get in on the PROFITS in

# SMALL ENGINE REPAIR!



Start your own money making business!

Work part time, full time—right at home—we help you every step of the way.

No doubt about it...as a small engine pro, you can cash in on the huge demand for qualified men in one of America's fastest growing industries. You'll be able to command top hourly rates of from \$10.00 to \$15.00 per hour—and that's just for labor. A simple tune-up earns as much as \$17.50 for less than an hours work, and parts, engines and accessories will add even more to the profits.

Plenty of business waiting for qualified men.

65,000,000 Small Engines Are In Use Today!

That's the official count from the Engine Service Assn., and one-million new engines are being built each month. With fully accredited Foley-Belsaw training, you can soon have the skills and knowledge to make top money servicing these engines. People will seek you out and pay you well to service their lawnmowers, tillers, edgers, power rakes, garden tractors, chain saws, minibikes, snowmobiles, generators, go-carts, paint sprayers, snowblowers... the list is almost endless.



Professional Tools and Equipment, PLUS 4 H.P. Engine ALL YOURS TO KEEP... All at No Extra Cost.

### NO EXPERIENCE NECESSARY!

You don't need to be a "born mechanic" or have any prior experience. You can master this profitable trade right at home in your sparetime. Lessons are fully illustrated...so clear you can't go wrong, and with our famous "learn-by-doing" method you get practical "hands-on" experience. We also show you how to get business, what to charge, where to get supplies wholesale...all the inside tricks of the trade you need to assure success right from the start.

Send for FREE Facts—Do It TODAY!

NO Obligation—NO Salesman Calls!

You risk nothing by accepting this offer to see how easily you can learn the skills you need to increase your income in a high-profit business of your own. Just fill in and mail coupon below (or send postcard with name and address) to receive full information by return mail.

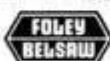
RUSH COUPON TODAY  
Foley-Belsaw Institute  
50431, Field Building  
Kansas City, Mo. 64111



FREE BOOKLET!

Send for your copy today!

FOLEY-BELSAW INSTITUTE  
50431, FIELD BUILDING  
KANSAS CITY, MO 64111



YES, please send me the FREE booklet that gives full details about starting my own business in Small Engine Repair. I understand there is No Obligation and that No Salesman will call on me.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_

STATE \_\_\_\_\_

ZIP \_\_\_\_\_

## FORGING GOLD

(Continued from page 135)

the 1948 Games. "It was supposed to make you muscle-bound," he recalls. "Today, we know how to apply strength training. We've come a long way and we have a long way to go."

Like other members of the U.S.O.C. hierarchy, Mathias has to keep himself visible in a fund-raising capacity. The Colorado Springs facility's current operations are underwritten by a \$3 million grant from the Miller Brewing Co. But the dollars necessary to continue the Olympic effort on the expensive frontiers of science and technology will depend on the results of the Los Angeles Games. And the Games may depend as much on whether we can win the psych-out war as on the exact percentage of body fat that full-figured female gymnasts should carry. **PM**

## VIDEO-GAME CABINET

(Continued from page 110)

cleats (F). Join the parts with carpenter's glue, clamping the cabinet until the glue sets. Check that the cabinet is square.

Begin work on the drawers by cutting the drawer fronts (G). Remember to allow space for the trim, top and side edges. Bevel the top edge of the bottom drawer front 30°.

Cut trim H and trim M. Before applying the trim, plane as needed and sand with 80-grit abrasive paper. Dust and wipe with a tack cloth after all sanding procedures. Apply the trim as needed with carpenter's glue. Clamp the unit. The glue will be dry in about three hours.

Cut the remaining drawer parts: the sides (I, J), bottoms (K), backs (L) and top-drawer divider (Q). In the drawer fronts, cut dadoes for the sides and grooves for the bottoms. The sides are set in 1/8 in. to accommodate the slides. Rabbet the sides to accept the drawer front. Also, cut grooves for the bottoms and dadoes for the backs. Rabbet the back to accept the side. Test fit the drawers, then assemble with glue, checking for square. Clamp until the glue is dry.

Cut a slot in the back for wires. Rout finger grips in the drawer fronts. Then sand all surfaces with 120-grit abrasive paper. Install the divider (Q), then install the drawer slides (N). Finish with boiled linseed oil before installing the casters (O).

Wipe on two coats of boiled linseed oil, one coat per day. Leave each coat on a maximum of two hours before wiping it off. Finally, apply butcher's wax and buff immediately. **PM**



THE LESS YOU USE  
YOUR CAR . . . . .  
THE MORE YOUR  
ENGINE NEEDS RISLONE!

Engines used for stop and go trips, or run for less than half an hour at a time, form crankcase sludge! Sludge plugs oil filters and oil passages. It can block the oil pump screen so that working parts may starve for oil!

RISLONE cleans up on sludge. Dissolves it. Keeps it from fouling up your engine's lubrication system. And that's good. A clean engine starts easier, runs better, lasts longer and gives you more gasoline mileage.

So, if you run your car less today, take better care of it with RISLONE. RISLONE has been used for over 50 years by millions of motorists in big cars, small cars, foreign cars, trucks, boats and diesels too. Use it with every oil change.

Get RISLONE at your local auto merchandise store. It comes in a big quart yellow, red and black can . . . enough product to keep your engine clean and efficient.



FREE: 32 page LUBE TIPS Booklet. Information, ideas and discussion about lubrication, problems and performance. Send self-addressed stamped envelope 4 1/2 x 6 1/2 or larger.

THE SHALER CO.

Waupun, Wisconsin 53963

In Canada: Warren Packaging Co. Ltd.  
Scarborough, Ontario







# FORD

## Racing Through History

Henry's legacy: 82 years of noisy enthusiasm.



1983



1909

1962

**1909:** There were many private Model T racers. This rare factory entry won the New York-Seattle race, then was disqualified.

**1962:** Texan Carroll Shelby's Cobra roadsters had body and chassis built in England and 289- or 427-cu.-in. Ford V8s.



1902

**1902:** Ford's 999 racer was named after a locomotive that went 112 mph in 1893. **1983:** Flames belch from Ford's latest world-beater, the high-tech Mustang GTP.

**H**enry Ford realized early in the game that it took two kinds of machines to make an auto company. One was the product itself—the car. The second, perhaps more important, had to be the vehicle of publicity. Without publicity, even a good carmaker would wither and die. Ford learned that the hard way while trying to launch two automaking ventures before his third succeeded. Not only did he recognize the importance of getting known, but he knew by 1901 how he'd go about it: racing.

Although Ford had never raced a car in his life, he decided to race against the toughest competitor he could find: Alexander Winton. Winton was the A.J. Foyt of his day. He had won more major races and set more speed records than any American then living.

Ford beat Winton, became the instant hero he'd planned to become, and

BY MICHAEL LAMM AND WADE HOYT



Photos by Vic Huber

got so caught up with the success that, first thing next summer, he began building two race cars—twins.

These two leviathans turned out to be 1,155-cu.-in., 80-hp fire-breathers—wooden-framed, with no rear suspensions, U-joints, differentials, bodies or hoods. Henry dubbed them "The Arrow" and "999." Ford's partner knew a bicycle racer named Bernd Eli Old-

field, a daredevil who'd never driven a car before but figured it might be fun.

On Oct. 25, 1902, after a little coaching from Ford, Barney Oldfield strapped on his goggles, took a firm grip on 999's handlebar and won his first automobile race: the five-mile Manufacturers' Challenge Cup at Grosse Pointe, Mich. Oldfield went on to become one of the best-known racers in America.

In January 1904, Ford drove The

*(Please turn to page 150)*





**1923**



**1935**



**1954**



**1964**



**1967**



**1968**

**1923:** Koukol Special had Model T block, overhead cam and Winfield carbs. It raced on dirt and board tracks and at Indy.

**1964:** Special Cobra Daytona coupes with 289 engines challenged Ferrari for the World GT Championship in the mid-'60s.

**1935:** One of eight Miller-Ford front-drive Indy cars. Exhaust pipes passed too close to the steering box and boiled the lubricant.

**1967:** Hulking 427 coupe was driven 3,250 miles in 24 hours by A.J. Foyt and Dan Gurney to win LeMans one of four times.

**1954:** Lincoln Capri built by Bill Stroppe was driven to victory in 1,900-mile Carrera Pan America-Mexico by Ray Crawford.

**1968:** Lotus-Ford 498 used by Graham Hill and Pete Lovely is one of many powered by the most successful racing engine ever.



## FORD RACING

(Continued from page 148)

Arrow over a three-mile stretch of frozen lake sprinkled with cinders. During the run, Henry's riding mechanic, Spider Huff, clung to one frame rail alongside the engine. When the bouncing and shaking got so bad that Henry could no longer hold open the throttle, Spider did it for him, right at the carburetor. The car leaped and bounded over the ice. Ford and Huff managed to hang on and covered a mile in 39.4 seconds, or 91.4 mph. That world land speed record for automobiles was the first set by an American car or driver.

It wasn't until 1909, the first full year of Model T production, that Henry Ford re-entered competition, this time in a combined speed and endurance contest from New York to Seattle.

In all, 14 auto manufacturers entered this highly publicized event, but only five actually made the race, which became a comedy of errors as drivers got lost, did things against the rules or simply dropped out exhausted. Both Model Ts managed to finish, one taking 22 days to win the race and the other coming in third behind a Shawmut.

Five months later, the race judges learned that the winning Ford had cheated—its mechanic had changed

engines illegally. Ford was disqualified, and the judges declared the second-place Shawmut the winner. By then, though, the entire world had celebrated the winning Ford.

As the Model T came down in price and went up in popularity, a speed cult grew up around it. So did an aftermarket high-performance industry. Ford had nothing to do with this movement, but the firm benefited tremendously.

T-era hot rodders developed amazingly sophisticated equipment, like pent-roof dohc heads with four valves per cylinder, domed alloy racing pistons, radical cams, multiple carburetion, five-main counterweighted crankshafts, pressure lubrication, oil coolers, plus all sorts of gearbox, frame, wheel, tire and suspension mods. Except for all-out racing cars, Ford had no real competition from any other American automaker in the field of speed.

The Model T's victories and records grew. Hottest Fords of the T era were the sleek competition Frontys, engineered and often prepared by, of all people, Louis and Arthur Chevrolet!

The Ford V8, which stayed basically unchanged from 1932 through 1948, remained the engine of choice for hot rodders until the ohv Chevrolet V8 arrived in 1955. Stock Ford V8s could outrun all but the most expensive heav-

ies of the early Depression—everything but V12 Pierces and Packards, V16 Cadillacs, Stutz Super Bearcats and supercharged Duesenbergs. The well-publicized Elgin Road Races of 1934 were dominated by Ford V8s, as were stock-car events, hillclimbs, rallies and beach runs.

The Ford Motor Co. didn't get back into formal competition until the 1935 Indy 500, when Preston Tucker talked Edsel Ford into fielding 10 Ford V8-powered fwd race cars designed and built by Harry Miller. Miller cars and engines had won six Indy 500s, including those of the past three years, so it seemed a safe bet that Miller could make a Ford win the 1935 race.

Beautiful as they were, time didn't permit proper testing and development of the eight Indy Fords that were finally built. Only four managed to qualify, and they all dropped out within 145 laps due to steering problems.

The years before and after WWII were filled with the frenzied performance activity of hot rodders who couldn't and wouldn't leave the Ford V8 alone. One was Zora Arkus Duntov, who went on to design the Corvette. The hot rod kept Ford's mechanical and performance reputation alive long after the elder Ford had put the company's

(Please turn to page 152)

## HOW MUCH CAN A SALES CLERK KNOW ABOUT HARDWARE WHEN HE ALSO SELLS RECORDS?



When you shop at a Sentry store, you get help from people who work with hardware every day.

Our sales clerks may not know Country & Western from Rhythm & Blues. Or Tony Orlando from Toni Tennille.

But they know hardware very well.

Our people can save you time finding what you want. And save you trouble by suggesting what you might need.

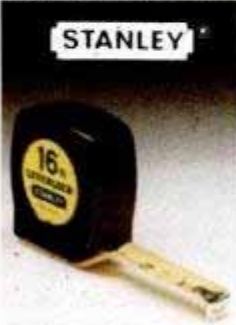

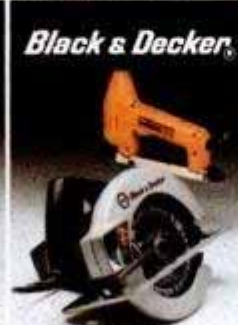

So next time you need hardware, come to Sentry.

Where fast, helpful service isn't just a

song and dance. Where hardware isn't a sideline.



Check the Yellow Pages under Hardware for the Sentry store nearest you. Sentry Hardware Corporation, Cleveland, Ohio 44113. Merchandise shown in this advertisement is available from participating dealers only. Offer expires March 31, 1984. All Sentry dealers own their own stores. They select their merchandise and set their own prices. There may be variations in products, available quantities and prices in individual stores.

 <p><b>STANLEY</b> 3/4" x 16' Leverlock® Tape Rule (30-516W) \$5.88</p>	 <p><b>ARROW</b> Heavy Duty Tacker (T50) \$12.99</p>	 <p><b>Black &amp; Decker</b> Circular Saw w/Free Electric Staple Gun (7392) (9700) \$56.88</p>	 <p><b>Weller</b> Soldering Iron (SP23) \$5.99</p>	 <p><b>SKIL</b> 3/8" Variable Speed/ Reversible Drill (457) \$31.88</p>	 <p><b>VERMONT AMERICAN</b> 7 1/4" Carbide Tip Saw Blade (M73714) \$3.99</p>
--	---	--	--	--	--



LIQUIDATION BUREAU, INC. 3602 N. 35th AVE., PHOENIX, AZ 85017

# MUST LIQUIDATE REMAINING INVENTORY at far below dealer cost!

**NOW YOU CAN BUY THE COUNTRY'S BEST SELLING  
5 H.P. COMPRESSOR AT A LIQUIDATION PRICE!**

This **HEAVY DUTY** workhorse of a compressor is perfect for running **PAINT SPRAY GUNS, GREASE GUNS, POLISHERS, STAPLERS, SANDERS, IMPACT WRENCHES, AIR HAMMERS, DRILLS, TIRE CHANGERS** or almost any labor saving pneumatic tool! Priced **BELOW DEALER COST** and at a savings of up to **\$600.00**, this is truly a rare bargain. **Be sure and call or mail your order right away.**

5 H.P. MOTOR  
HOSE OUTLET  
CERTIFIED  
STEEL TANK

**Perfect for:**

- HOME WORKSHOPS
- FARM or RANCH
- GAS STATIONS
- BODY SHOPS
- SMALL FACTORIES
- MAINTENANCE OPERATIONS
- GARAGES

**ASME  
RATED TANK**

**SPECIFICATIONS:**

5 HP  
230 VOLT, 15 AMP  
TWIN CYLINDER  
932 RPM  
AIR DELIVERY  
AFPM @ 40/90  
PSI—11.8/9.4  
125 # MAX  
PRESSURE

Comes with  
1 YEAR  
WARRANTY

ASME RATED 60  
GALLON TANK (vert.)  
REGULATOR  
WITH GAUGE  
15' HOSE  
METAL TIRE CHUCK  
LENGTH 28 1/2" WIDTH  
23 1/2" HEIGHT 7 1/4"  
SHIPPING WT. 340 lbs

Compare up to \$1200.00

**OUT THEY GO FOR ONLY**

**\$599.** Plus \$40.00 for Shipping & Handling

## AIR TOOLS AT LIQUIDATION PRICES!

**AIR IMPACT WRENCH**  
1/2" SQ. DR.  
Reversible  
**\$39.** Compare at \$69

**AIR DRILL/ SANDER**  
1/2" 3 PRDS  
3" 4 1/2" & 5 1/2"  
**\$34.** Compare at \$100

**BUTTERFLY RATCHET**  
Reversible  
1/2"  
**\$39.** Compare at \$69

**HIGH IMPACT HAMMER SET**  
100 to 3000 RPM  
1/2" 3/8" 1/2" 3/4"  
1000 1/4" 3/8" 1/2"  
**\$24.** Compare at \$69

**AIR RATCHET (Reversible)**  
1/2" Square drive—75 ft. lb. torque  
**\$39.** Compare at \$69

**UP TO 3/16" AIR RIVETER**  
85 TO 110 PSI  
**\$59.** Compare at \$100

**Pneumatic GREASE GUN**  
90 PSI  
**\$39.** Compare at \$69

**"Jitterbug" ORBITAL SANDER**  
Constant 1/2" Orbit  
Paper 3 1/4" x 9"  
**\$39.** Compare at \$69

## WOOD, PLASTIC, ALUMINUM CUTTING 1/2 H.P. - 14" BAND SAW

Here is a sturdy band saw that's ideal for your general purpose straight and intricate sawing. It easily cuts through material up to 6" high and 1 1/2" wide. Its powerful 1/2 H.P. motor will meet most cutting needs.

• Cutting Angle Range 45° L, 45° R • Table Size 14" x 14" • Table Tipping 10° L, 40° R • Blade Speed Range 3000FPM • Blade Size 3/4" x 60" x 92 1/2" • 5 teeth per inch • Motor, 1/2 H.P., 1750 RPM • 110/220V • Overall Height 65 1/2" • Height (floor to table) 43" • Height (table to guide) 6" • Blade to Frame 14" • Floor Space 19" x 30 1/2"  
**Compare at \$599.00**  
**OUT THEY GO FOR ONLY \$278.**

## 1/2 H.P. METAL CUTTING BAND SAW

• 3 Blade speeds—65-120-220FPM • Table allows for counter cut, sitting & notching • 0-9" Height (floor to table) • Vert. 54" • Ht. floor to table 34" • Floor space 20 1/2" x 42" • D.A. Bed 26 1/2" x 14 1/2" x 16" • Angular cuts 90° to 45° • Motor 110/220V, 60 Hz, 1725 RPM • Capacity 4 1/2" round 4" x 6", rectangular • Blade size 1/2" x 64 1/2" x 62 1/2"  
**Compare at \$495.00**  
**OUT THEY GO FOR ONLY \$188.**

## 10" TABLE SAW

• Shipped unassembled • Capacitor-start 9450 RPM 1/2 H.P. motor 110V-12 AMP AC 220V-5 AMP AC • Table measurements: 20 1/8" W x 27" D • Overall: 47 1/2" x 36" D • 42" H • Capacities: Depth of cut 3 1/8" and 2 1/8" at 45° • Rip 2 1/2" RAL at blade • Distance to front of blade 12 1/2" • Blade up to 10" • 3/8" Arbor • Speed 4500 RPM (60 Hz)  
**Compare at \$695.00**  
**OUT THEY GO FOR ONLY \$299.**

**LIQUIDATION BUREAU, INC.**  
Authorized liquidator of Consumer Products  
3602 N. 35th AVE. PHOENIX, AZ 85017

**All machines come with 1 YEAR PARTS WARRANTY and include motors. SATISFACTION GUARANTEED**

## 16 SPEED DRILL PRESS

Perfect for home workshop or industrial use!

These **FLOOR or BENCH** model drill presses are really **HEAVY DUTY** and built to withstand years of rugged use. They drill fast into **PLASTIC, WOOD, BRASS, ALUMINUM, CAST IRON and STEEL.** The base and head are made of fine-grained cast iron and the column is extremely heavy for rigid and smooth drilling. The table swings 360° and tilts 0° to 45°. The powerful 1/4 H.P. motor and variable 16 speeds deliver maximum drilling efficiency.

**SPECIFICATIONS:**  
• 11 1/4" dia. table with "T" grooves  
• 6 1/2" from spindle center to stand base  
• Spindle to base (max.) 1 25/8"  
• Spindle to table (max.) 15 1/8" • Chuck is 1 1/8" • No. 3 J.T. Arbor • Morse 2 taper • Capacitor start 110V motor, 10 Amps • Weight (bench) 160 lbs. (floor) 180 lbs.

**Compare at up to \$695.00**  
**OUT THEY GO AT ONLY \$158.**

ADD \$30.00 FOR FLOOR MODEL  
**Compare at up to \$695.00**  
**OUT THEY GO AT ONLY \$158.**



MADE BY Famous CAMPBELL HAUSEHLD  
TWIN CYLINDER COMPRESSOR  
PRESSURE SWITCH  
ASME SAFETY VALVE  
INSPECTION PORT  
MODEL VT-5587  
**HEAVY DUTY COMMERCIAL 5 H.P. 60 GAL.**  
Made in U.S.A.  
INSPECTION PORT  
MOISTURE DRAIN

## MUST LIQUIDATE at below dealer cost NEW 4250 watt Electric Start Power Generator

**GASOLINE POWERED** or can be factory converted to **GAS & NATURAL GAS or GAS & PROPANE!**

**8 H.P. BRIGGS & STRATTON 4-CYCLE ENGINE**



**2-240V & 2-120V RECEPTACLES**  
35 4-1/7 1/2 AMPS

**4250 WATT SURGE POWER** or Run all day at **3800 WATT** continuous power

**Comparable Models priced at \$1200.00**  
**OUT THEY GO AT ONLY \$499.**

Factory conversion to **GAS & NATURAL GAS \$50.00 ADDITIONAL**  
**GAS & PROPANE \$150.00 ADDITIONAL**

**CREDIT CARD CUSTOMERS**  
VISA/MASTERCARD  
**ORDER TOLL-FREE 1-800-992-0887**  
(24 HOURS - 7 DAYS A WEEK) IN AZ, CALL 602-233-9999 COLLECT  
**LARGE QUANTITY BUYERS, CALL FOR DISCOUNTS!**

LIQUIDATION BUREAU, INC. Dept. A230-3  
3602 N. 35th AVE., PHOENIX, AZ 85017

Send \_\_\_\_\_ 5 H.P. 60 GAL. COMPRESSOR(S) @ \$599 ea. plus \$40 ea. shipping & handling

\_\_\_\_\_ AIR IMPACT WRENCH(S) @ \$39 ea.

\_\_\_\_\_ AIR DRILL/SANDER(S) @ \$34 ea.

\_\_\_\_\_ BUTTERFLY RATCHET @ \$39 ea.

\_\_\_\_\_ HIGH IMPACT HAMMER SET(S) @ \$24 ea.

\_\_\_\_\_ AIR RATCHET(S) @ \$39 ea.

\_\_\_\_\_ AIR RIVETER(S) @ \$59 ea.

\_\_\_\_\_ GREASE GUN(S) @ \$39.00 ea.

\_\_\_\_\_ "JITTERBUG" ORBITAL SANDER(S) @ \$39 ea.

Add \$3 for each air tool ordered for ship. & handl.

\_\_\_\_\_ BENCH DRILL PRESS @ \$158 ea.

\_\_\_\_\_ FLOOR DRILL PRESS @ \$188 ea.

\_\_\_\_\_ 14" BAND SAW @ \$278 ea.

\_\_\_\_\_ Metal cutting BAND SAW @ \$188 ea.

\_\_\_\_\_ 10" TABLE SAW @ \$299 ea.

\_\_\_\_\_ 4250 WATT electric start GENERATOR(S) @ \$499 ea. Convert to  GAS & NATURAL GAS  GAS & PROPANE (Add \$150 ea. conversion)

I will pay truck driver the freight charges upon delivery.

\_\_\_\_\_ 419-SPRAY-RYTE PAINTER(S) @ \$59 ea.  
Add \$5 ea. for shipping & handling

Find check or money order enclosed. (AZ Res. Add 6% Tax)

Charge my  VISA  MASTERCARD

Acct. # \_\_\_\_\_ Exp. \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ St \_\_\_\_\_ Zip \_\_\_\_\_

Phone # ( ) \_\_\_\_\_ Sign Here \_\_\_\_\_

Please no C.O.D.'s • Orders accepted in Continental U.S. ONLY • Allow 3 to 4 weeks for delivery. If paid by personal check add 2 to 3 weeks.



# YOU DON'T NEED CASTRO'S PERMISSION TO SMOKE CUBAN-SEED HANDMADE CIGARS!

HANDMADES FOR THE MAN WHO THOUGHT HE COULDN'T AFFORD THEM!

I'll send them to you from Tampa, the fine cigar capital of the world. Sample the cigars in my new Master Maker's Sampler and enjoy a wonderful new smoking sensation. I'll include a generous sampling of Honduras handmades plus a nice selection of vintage-leaf long-filler and cut filler cigars, all perfectly blended for mildness and flavor.

These superb smokes are made with expertly blended Cuban-seed-leaf tobaccos grown and cured the old Cuban way in Honduras from seed smuggled out of Cuba. They're mild, flavorful and extremely satisfying to the cigar smoker who's looking for something new, something better, something exceptionally tasty. Experts can't tell them from Havana. You won't be able to, either, when you try them. Natural, Maduro and Candela wrappers. If you're ready for a luxuriously enjoyable smoking experience try them now.



## MY OFFER TO CIGAR LOVERS

I'll send you postpaid a selection of 42 factory-fresh cigars—a special selection of Honduras handmades, vintage-leaf long-filler and cut filler smokes. If these cigars aren't all you expected, return the unsmoked ones by United Parcel or Parcel Post within 30 days and I'll refund your money. No questions asked. Your delivered cost is only \$10.90 for 42 factory-fresh, Cuban-seed-leaf cigars.

To order, fill in and mail coupon to **B166**

## THOMPSON CIGAR CO.

5401 Hangar Ct., Dept. B166, Box 30303, Tampa, FL 33630

O.K., TOM! Ship me the Master Makers Sampler under your money-back guarantee for only \$10.90.

- Check for \$10.90 enclosed (Fla. residents add 5% sales tax.)  
 Charge \$10.90 to my  VISA  American Express  
 MasterCard  Diners Club

Credit Card No. (Print all digits)

EXP. DATE

name

street

city

state

zip

OFFER GOOD IN U.S. ONLY  
 CREDIT CARD USERS  
 SPEED DELIVERY BY CALLING

**TOLL-FREE 1-800-237-2559**  
**IN FLORIDA CALL: 800-282-0646**

## COMPACT CARL HEALD HAULERS SQUEEZE THROUGH TIGHT SPOTS WITH EASE!

**NEW TOLL FREE NUMBER!**  
**1-800-253-1030.**  
 (In Michigan call 616/849-3400.)

3 or 4 WHEELS  
 FOR WORK OR FUN!

11 or 16 H.P. available  
 in all models.

SPEND LESS NOW  
 ON EASY-TO-BUILD KIT.

SAVE LATER ON MAINTENANCE.



Hauler Mark 4 Model HH-411 shown with optional cab, lights, emergency amber flasher, windshield washer and wiper  
 Optional bolt-on steel cab with vinyl canvas doors protect driver and rider from foul weather. Optional windshield wiper and washer for clear view.



Hauler Mark 4 Model HH-416 shown with optional lights and knob tires

Up & down hills, across rough terrain and around sharp corners, hauler keeps a steady course. Forward, reverse and automatic torque converter. Totes over 800 lbs. Rear hydraulic disc brake gives a sure stop every time.

Other options available.

For more information, write or call today for FREE COLOR BROCHURE:

1-800-253-1030;

in Michigan call 616/849-3400.

**CARL HEALD, INC.** Dept. NSX  
 P.O. Box 1148, Benton Harbor, MI 49022



Hauler Mark 3, Model HH-311 shown with optional lights and knob tires

Choice of engine available in all models. 11 H.P. Briggs & Stratton engine is Synchro-Balanced for less vibration. Speeds up to 20 mph. 16 H.P., opposed twin cylinder Briggs & Stratton for more lugging power, less vibration and greater low end torque. Speeds up to 25 mph.

## FORD RACING

(Continued from page 150)

engineering program on hold.

By 1952, the company was riding a crest of new-found solvency under Henry Ford II, the grandson of the founder, who decided to get Ford back into racing.

Two California speed merchants, Clay Smith and Bill Stroppe, talked Lincoln-Mercury into letting them prepare several Lincolns for the Pan American road races. Stroppe's garage in Long Beach rebuilt each car to withstand the unpredictable 1,908-mile dash up the Mexican republic along the then-new Pan American highway. Lincolns won 1-2-3-4 in 1952 and '53, then 1-2 in 1954 in the stock-car category.

The late 1950s saw Fords and Mercurys thriving in NHRA and NASCAR competition. In the 1960s, Ford launched its Total Performance program, an ambitious campaign to dominate every major form of auto racing. By the end of the decade, Ford-pow-



MG hot rod is powered by a "flathead" Ford V8 with double overhead cam Ardun heads—designed by Zora Arkus Duntov.

ered cars had been victorious from the high-banked NASCAR ovals to the Indianapolis Motor Speedway and from Formula One grand prix racing to the 24 hours of LeMans.

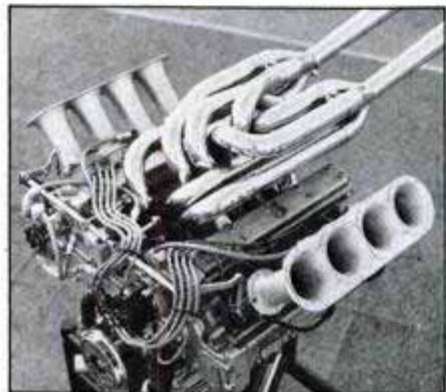
Perhaps the best-remembered facet of Total Performance was Carroll Shelby and his Cobra sports cars: Anglo-American hot rods powered by 289-cu.-in. Fairlane V8s. The old-fashioned roadsters quickly dominated American road racing and snatched the International GT Championship from Ferrari in 1965. To compete on the long, fast European racetracks, Shelby constructed six aerodynamic Cobra Daytona coupes.

To win LeMans, Englishman Eric Broadley helped Ford design a neat, mid-engined coupe called the GT-40, which also used modified Fairlane V8s. After an unsuccessful attempt on the 24-Hour race in 1964, a bigger version was built to hold the 427-cu.-in. NASCAR V8. These cars won LeMans in 1966 and '67. Then the big engines were banned, but GT-40s with 302-cu.-in. engines won in '68 and '69. Ford of



England bankrolled the construction of a three-liter (183-cu.in.) V8 for F1 Grand Prix racing in 1967. This Cosworth-Ford won the first race it entered (the '67 Dutch GP, in Jim Clark's Lotus). It went on to win 155 GPs, which is still a record. By the time it was no longer competitive—which was only last year—turbocharged versions of the Cosworth-Ford had won the Indy 500 six years in a row, making this one of the most successful engines in the history of auto racing.

Ford's second official visit to Indianapolis was in '63. By '65, the inevitable happened: Jim Clark won Indy in a Lotus-Ford, ending the long reign of the four-cylinder Offenhauser engines. Ford's special four-cam V8s dominated the Brickyard for six of the next seven years, then were eclipsed by turbocharged Offies before the Cosworth turbos took over.



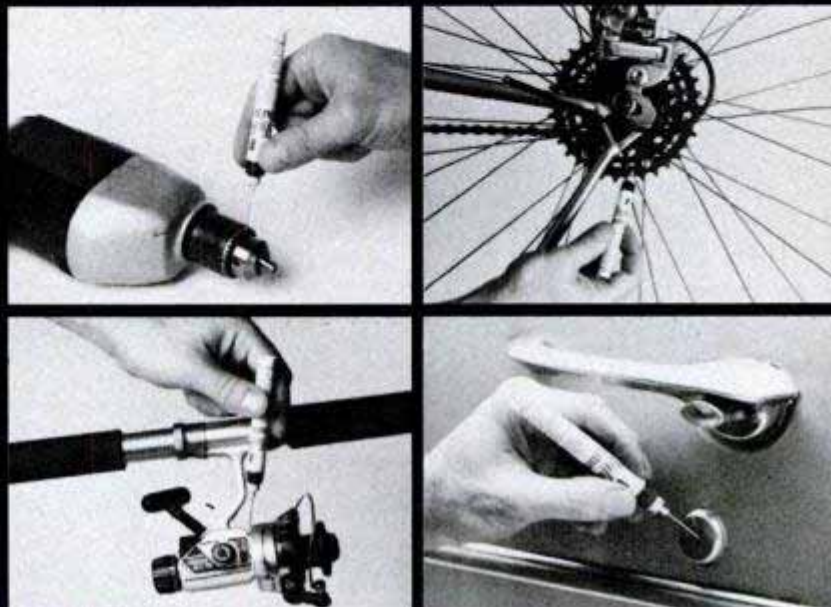
Four-cam Ford V8s won the Indy 500 in 1965-'67 and again (turbocharged) in 1969-'71. Power ranged from 425 to 725 hp.

During the '60s, Ford 427 V8s (some rare overhead-cam "shotgun" engines) made an impressive showing in drag racers and NASCAR stockers.

Growing concern with pollution control, safety legislation and fuel economy kept Ford engineers away from racing for a good part of the '70s. Those concerns still exist, but just to keep its hand in, Ford unleashed a radical Mustang GTP on American road racing last year. In a class dominated by mid-engined Chevy V8 specials and turbocharged Porsches, the GTP looks odd. Its front-mounted, four-cylinder engine displaces only 1.7 liters, but it's turbocharged to produce a staggering 590 hp. The GTP won its first race last year, and remains a serious challenger in '84 with a new 2.2-liter turbo engine.

So, the next time someone asks you about the greatest names in racing, before you blurt out Ferrari or Offenhauser (or even Chrysler or Chevy), don't forget Ford. It's been doing it longer and better than anyone else. **FM**

# LUBIT-8<sup>®</sup> THE SUPER OIL WITH TEFLON<sup>®</sup> THE WORLD'S SLIPPERIEST LUBRICANT IN A PEN-OILER FOR \$2.99.



With its needle tip applicator super slippery Lubit-8 is the ideal lubricant for power tools, bicycles, fishing reels, automobiles and hundreds of other items.

Special patented\* process permanently disperses micro-miniature particles of Teflon<sup>®</sup> and Fluon<sup>®</sup> in Lubit-8.

Super slippery Lubit-8 surface resists dust, does not coagulate, and leaves no oily residue.

Can be used just about anywhere since Lubit-8 is unaffected by temperature extremes (-60°F to +500°F).

Penetrating action frees "frozen" nuts, bolts, locks, and bearings. And the pen-oiler is refillable!

**PENETRATES. LUBRICATES. CLEANS. POLISHES.  
AND PRESERVES. A LITTLE GOES A LONG WAY!**



\*US Pat. Nos. 3,932,656 & 4,127,491.  
LUBIT-8 is reg. TM of Fluoromatics, Inc.  
TEFLON is reg. TM of Du Pont.  
FLUON is reg. TM of ICI America.

## LUBIT-8<sup>®</sup>

Please ship \_\_\_\_\_ pen-oilers of Lubit-8 at a special price of \$2.99 per unit, 2 for \$5.50, 4 or more, \$2.50 apiece, \_\_\_\_\_ four time refill at \$3.49 each. (Shipping included in Continental United States. Mass. residents add 5% sales tax.) Visa or Mastercard accepted on orders of 2 or more. Call 1-800-852-7800 for easy ordering through Mastercard or Visa. In Mass., call 1-617-823-5995.

Enclosed is my  Check for \$ \_\_\_\_\_  Money order for \$ \_\_\_\_\_

Charge to my  Mastercard  Visa Amount \$ \_\_\_\_\_

Account No. \_\_\_\_\_ Exp. date \_\_\_\_\_

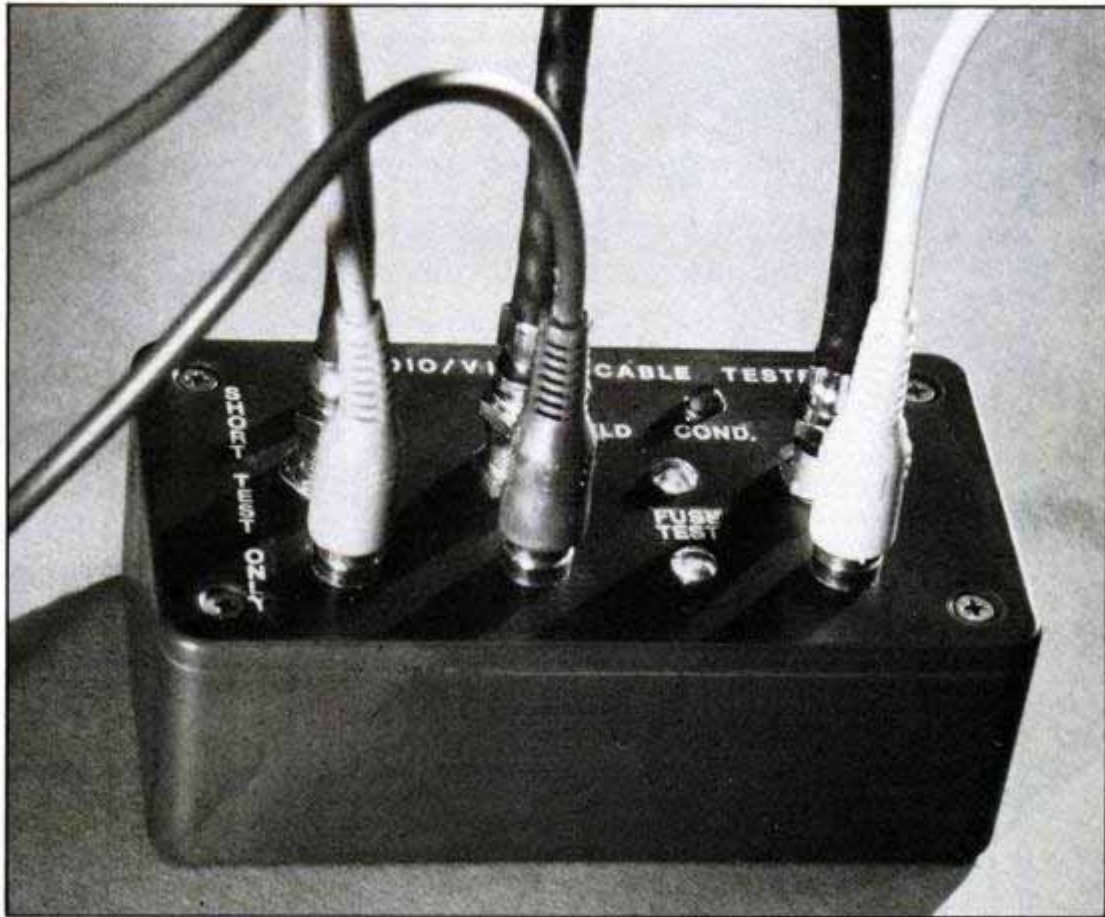
CRC TECHNOLOGY, INC. 80 Paul Revere Terrace, Taunton MA 02780

Name \_\_\_\_\_ Tel: \_\_\_\_\_

Address \_\_\_\_\_

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





Test both RCA-style phono plugs and F-type connectors. They're found on most popular audio/video cables.

## Build PM's Audio/Video Cable Tester

When your stereo or TV center begins to act funny, the connecting cables may be causing the problem. Here's a quick and useful project.

BY LARRY KLEIN

**R**emember the last time you spent an hour trying to track down the shielded cable that was causing the intermittent hum or signal loss? The only sure way to test for an intermittent cable is to plug it in, put a signal through it and try to provoke the problem. A standard ohmmeter won't be very helpful unless the cable is permanently shorted or open-circuited.

Let PM's Audio/Video Cable Tester come to the rescue. It tests cables in the same way they are used: plugged in and with voltage going through them. PM's battery-powered, inexpensive and easy-to-build cable tester will make a welcome addition to any electronics toolbox or test bench.

The parts layout is not critical, and the tester can be built into any box. However, you should use a plastic case, since the normally grounded sections of the six test jacks do *not* all connect to a common ground. If you use a metal box, insulate jacks J2 and J5 and the

fuse-test terminal connecting to the center conductor of J1. If you do want to use the chassis box as a common ground, the negative terminal of B1 and the associated wiring connect to it. The 3/4-inch spacing between the fuse-test screw heads will accommodate both type 3AG and the smaller glass fuses.

Unlike the phono jacks (J1, J2, J3), the F-connector jacks (J4, J5, J6) do not come with grounding lugs, so before tightening, a loop of thin, bare wire must be placed under each mounting nut to serve as a soldering point. Each pair of phono and F-connecting jacks is wired parallel. Proper polarity must be observed in wiring the LEDs: the positive (anode) leads of all three LEDs are connected together and led through resistor R1 to the positive terminal of battery B1.

An optional continuity test probe can be made up of an 18-inch phono cable with a defective plug. The

[\(Please turn to page 156\)](#)



# Tufoil®

## Makes Oil Alone Obsolete!

### A Revolution in Engine Lubrication

TUFOIL®, the super lubricant concentrate, introduces a new and highly advanced standard in engine lubrication. A technological breakthrough, TUFOIL® (pronounced tough-oil) is the *only* patented\* and proven successful combination of oil and microminiature particles of PTFE. Commonly known as Teflon®, or Fluon®, PTFE is the slipperiest substance known.

Just a few *ounces* of TUFOIL® added to your favorite motor oil is better at reducing wear, increasing power, improving fuel economy and enhancing overall performance than *any* engine lubricant you can buy. Much better!

### Satisfaction Guaranteed or Your Money Back

At a manufacturers suggested list price of \$12.95, a little TUFOIL® goes a long way and pays for itself many times over.

Used as directed, with TUFOIL® your car will *run better and last longer on less fuel!*

Next time you change your oil, really change it! Add TUFOIL®.

### Users everywhere praise TUFOIL — you will, too!

"In our real world experience with two different LeCars, TUFOIL works. It didn't clog the oil filter, didn't leak out all the gaskets and didn't thin out at high speeds. It stayed in dispersion and cut the fuel bill 10 percent."

POPULAR MECHANICS MAGAZINE, JANUARY 1982

"When I first heard of TUFOIL I was skeptical. So many products promise much more than they deliver. However, after running my own tests and analyzing them myself, I was surprised at the results. TUFOIL does all it promises!"

Robert Peppin, 1982 NAPA/NIASE MECHANIC OF THE YEAR

"With 3200 miles on the odometer since TUFOIL was added, the average fuel economy increase has been 21.65 percent."

OFF-ROAD MAGAZINE

"We used TUFOIL on four vehicles in extreme cold weather. All four vehicles started very quickly. In addition, we experienced gas savings of 7-35% using TUFOIL."

Col. A.F. Cugno, STATE MAINTENANCE OFFICER, MASSACHUSETTS ARMY NATIONAL GUARD

"Our dynamometer tests on a 427 Ford racing engine indicated a 17% horsepower increase after the TUFOIL application."

Andy Rutherford, Owner, STAYWELL DYNO-TUNE

"Lubrication engineer Franklin Reick succeeded where everyone else had failed... DuPont conceded that TUFOIL was in fact entirely different from the harmful kinds of oil additives they had publicly condemned... The bottom line is 1) you shouldn't use shade-tree Teflon/oil concoctions, 2) TUFOIL is a unique, different, but safe kind of Teflon/oil additive."

MOTOR AGE MAGAZINE, APRIL, 1982



Ideal for standard transmissions and differentials too!

Tufoil® One of a Complete Line of Revolutionary Lubricants For Every Consumer and Industrial Need.

Teflon is Reg. TM of DuPont  
Fluon is Reg. TM of ICI Americas, Inc.  
TUFOIL is Reg. TM of Fluoramics Inc.  
\*U.S. Patents No. 3,933,656; 4,127,491 & 4,224,173  
Other U.S. and International Patents Pending

Get new Tufoil® at a special price of only \$9.99 per 8 oz. bottle (shipping included in Continental United States.) Call 1-800-222-8011 for easy ordering through your MasterCard or Visa. In Massachusetts call (617) 877-3060. Or just complete the coupon below and forward with payment. Please allow 3 weeks for delivery.

Please ship \_\_\_\_\_ bottles of Tufoil® at the special price of \$9.99 per 8 oz. bottle. (Mass. residents add 5% sales tax). Case and gallon quantities available on request.

Enclosed is my:  Check for \$ \_\_\_\_\_  Money order for \$ \_\_\_\_\_

Charge to my  Master Card  Visa Amount \$ \_\_\_\_\_

Account No. \_\_\_\_\_ Expiration date \_\_\_\_\_

Please send more information. My self-addressed stamped envelope is enclosed.

MV TECHNOLOGY, INC. 770 Water Street (Rear), Framingham, MA 01701



Name \_\_\_\_\_ Tel: \_\_\_\_\_

Address \_\_\_\_\_

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



**NEW! 4 IN 1**  
POWER-FEED  
**PLANER/MOLDER**  
**JOINTER/SANDER**

The first affordable shop of its kind!

Now turn low cost rough lumber into valuable finished stock for grandfather clocks, furniture, house-trim, picture frames... sell to others. Molds all popular patterns & custom designs. Planes and joints without change-over. Quickly converts to power-feed drum sander! Comes complete... ready to use. **30-DAY FREE TRIAL!** Easy terms.

**FREE INFORMATION KIT**

CALL TOLL-FREE 1(800) 824-7888, Oper. 642  
OR WRITE TO:  
**WOODMASTER TOOLS, INC.**  
2849 Terrace, Dept. PP31, Kansas City, MO 64108

**ADD STEREO SOUND TO YOUR TV!**

**TELEADAPTER®**  
Model TE-200 easily connects between any TV or VCR and your stereo systems' aux. or tape inputs. Teleadapters matrix stereo circuitry takes a mono signal from the TV or VCR, and synthetically produces two stereo channels, so exciting and dimensional, you will think you're at the theatre. The TE-200 also matches the impedances and serves as an isolation interface. Order yours today, complete with all instructions, cables, and prompt 30 day refund guarantee if you're not satisfied. Only \$39.95 plus \$3.00 ship. Mail check, MO, Visa, MC or DC # or call 24 hours, ask for our free catalog and the name of your nearest dealer.

**TOLL FREE**  
1-800-251-8608  
DEPT. 125, P.O. BOX 1316  
COLUMBIA, TENN. 38402-1316

**RHOADES**

**SWISS ARMY TYPE KNIFE**

All purpose wonder knife. Red handle. Sturdy survival knife with 12 Stainless Steel Blades perfect for fishing, camping, work and play. Guaranteed 4.50 ea. Add 50¢ Post & Handl.

Westbury Sales P.O. Box 434, 373 Maple Ave. Westbury, N.Y. 11590 Dept. E-3-PM

**Gas to Electric Conversion Kit**

**GAS LAMP BURNS \$72 TO \$120 OF GAS PER YEAR. OUR CONVERSION KIT OPERATES ON 1/10 THE COST OF GAS.** Easy to install 2-bulb fixture duplicates the charm and increases the light output of any gas light. Includes automatic On At Dusk—Off At Dawn photo electric control. Available in 12 volt or 115 volt.

FOR MORE INFO WRITE:  
**Gaslight Conversions, Inc.**  
1039 CHARLES AVE. ST., PAUL, MN 55104

**HYDRAULIC JACK REPAIRS**

A Business of your own. Earn while you learn at home. Millions of jacks in gas stations, trucking firms, etc. need servicing. We show you HOW. Start spare time in your basement or garage. Big opportunity for mechanics.

Write for folder No. PM3 and free bonus offer.

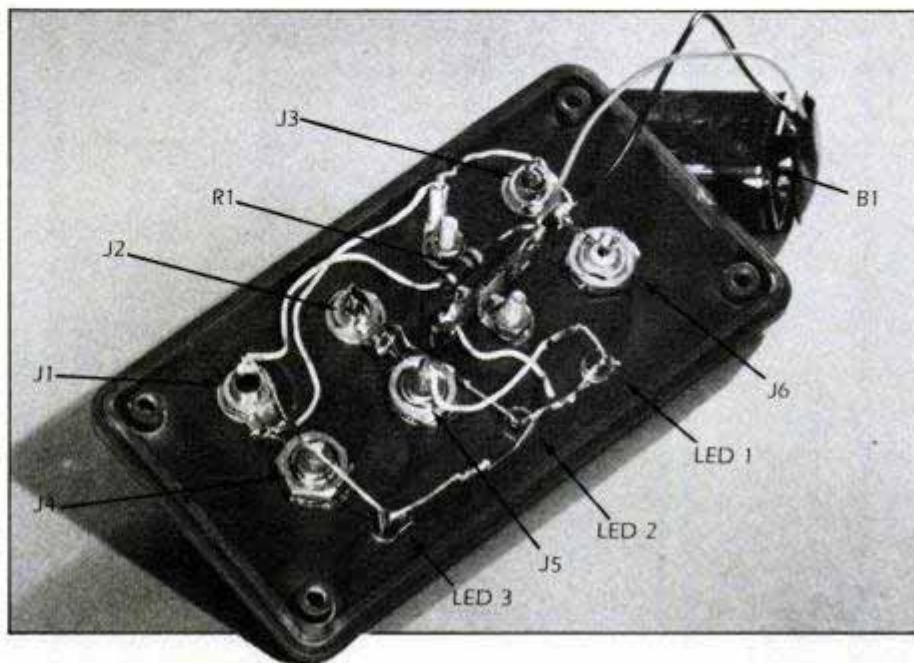
**HYDRAULIC JACK INC.**  
P.O. BOX 18, ACCORD, NY 12404

## BUILD PM'S CABLE TESTER

(Continued from page 154)

plug is cut off and the shielding of the wire stripped back several inches. The inner conductor is soldered to the probe tip and the shielded wire is twisted, brought out through the insulation at

bridged across the fuse test terminals will cause the red LED to light; a bad fuse won't. Most diodes can also be tested using the fuse test terminals. The red LED will light when a good diode is bridged across the terminals in one direction, but not in the other. A shorted diode will cause the LED to



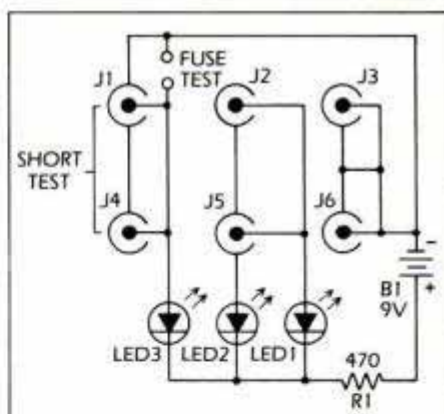
LED 1 should be labeled "COND." or other abbreviation for center conductor. LED 2 is the "SHIELD" light during conductivity tests. LED 3, the "SHORT" light, will indicate if cable's wires are shorted together.

the rear of the probe, and soldered to a foot or so of flexible lead with an insulated alligator tip installed on its end.

The short test should always be made first. Plug either end of the cable under test into the appropriate phono or F-connector Short Test Only jack. Only one end of the cable needs to be plugged in for a complete short test; the other end is left free. If the red LED (LED 3) lights, there is a short circuit in the cable. If the red LED doesn't light, test for a short circuit by flexing the cable several times.

The continuity test will indicate any open connections in either the inner signal-carrying conductor or the shielding wire. Both ends of the cable must be plugged into the appropriate jacks flanking the Fuse Test terminals. As the second plug on the cable is inserted into its jack, the green LED labeled "COND." (LED 1) will light first. This shows that the inner conductor is completing the tester circuit. When the plug is fully inserted, both green LEDs (1 and 2) will be lighted, showing that both the shield and inner conductor are okay. Flex the cable several times. Watch the green LEDs. If they flicker or go out when the cable is bent, the cable has an intermittent open circuit.

The fuse test is easy. A good fuse



lights in both directions; an open diode will cause no indication at all.

The continuity test probe can be plugged into either short test jack. When the circuit under test has continuity, the red LED lights. The lower the resistance, the brighter the light. The LED will light dimly for resistances up to about 90,000 ohms (90 K). **PM**

### PARTS LIST—CABLE TESTER

- J1, J2, J3—Shielded phono jacks (Radio Shack part No. 274-346 or equivalent).
- J4, J5, J6—Type F61-A female chassis-mount connectors (No. 278-212).
- LED 1, LED 2—Green LEDs (2.1-v. forward voltage; No. 276-022).
- LED 3—Red LED (1.75-v. forward voltage; No. 276-041).
- R1—470- $\Omega$ , 1/2-w. resistor (No. 271-19).
- Misc.—Standard 9-v. transistor battery (B1), battery snaps (No. 270-325), battery holder clips (No. 270-326), terminal strip with two insulated lugs and a grounded center post, soldering lug, three 6-32  $\times$  3/8" nuts and bolts, 4 3/4  $\times$  2 1/2  $\times$  1 1/2" case (No. 270-239).



# Handcrafted Excitement

Style and engineering join together to create the best, most authentic component car money can buy. Complete, affordable, and easy to build, the 1937 Jaguar\* SS 100 reproduction by Antique & Classic Automotive, Inc.



For the full story  
write or call TOLL FREE 800-245-1310.  
PA residents call (412) 898-3551.

ANTIQUE & CLASSIC AUTOMOTIVE, INC.

100 SONWIL DR  
BUFFALO, NY 14225

- \$3.00 enclosed for complete full-color brochure.  
 \$30.00 enclosed for assembly manual (VW version).  
 \$30.00 enclosed for assembly manual (front engine version).  
 I am interested in a fully assembled model.

NAME \_\_\_\_\_  
 ADDRESS \_\_\_\_\_  
 CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_  
 HOME PHONE \_\_\_\_\_ BUSINESS PHONE \_\_\_\_\_  
 CHARGE MY:  MASTER CHARGE  VISA  DINERS CLUB  AMERICAN EXPRESS Account # \_\_\_\_\_  
 Expiration Date \_\_\_\_\_

## OWNERS REPORT: MAZDA

(Continued from page 56)

standard equipment runs on for paragraphs, but to hit just the high points of the L series: adjustable MacPherson struts, split folding rear seats, 10-way adjustable driver's seat (six-way for

Deluxe), electric side mirrors, tach, tilt wheel, variable-ratio power steering, power brakes, power windows, power door locks, headlights-on reminder chime, digital clock, remote deck and fuel releases, carpeted trunk, and storage bins in all doors.

And that's just for starters. There's

no doubt that the full list of standard features swayed a good many customers, especially those who compared the 626 with some of its rivals, notably the Honda Accord, Pontiac J-2000, Nissan Stanza, Audi 4000 and VW Jetta.

But to see the 626 completely, some

(Please turn to page 158)

## SUMMARY OF 1983 MAZDA 626 OWNERS REPORTS\*

Total miles driven	2,186,865	Economy	20.8	Average	2.4	Dealer service opinion:	
Average miles per gallon		Performance	17.6	Poor	0.0	Excellent	24.1%
Five-speed manual		Specific likes:		Comfort opinion:		Good	51.5
In town	29.0	Styling	52.9%	Front seats		Average	19.1
On the highway	36.2	Handling	52.5	Excellent	73.4%	Poor	5.5
Three-speed automatic		Economy	42.6	Good	24.7	Number of vehicles owned:	
In town	25.4	Comfort	32.8	Average	0.8	This car only	35.0%
On the highway	34.8	Ride	23.4	Poor	1.2	Two cars	46.1
Engine/transmission choices:		Specific dislikes:		Rear seats		Three cars	12.2
Five-speed manual	66.9%	Not enough headroom	12.2%	Excellent	39.4	Four or more cars	6.7
Three-speed automatic	33.1	No complaints	10.8	Good	53.5	Makes of other cars owned:	
Body type choices:		Five-speed hard to get	8.0	Average	6.3	Chevrolet	20.7%
Four-door notchback		into reverse	8.0	Poor	0.8	Ford	18.3
sedan	48.6%	Air conditioner problems	7.0	Had any mechanical trouble?		Mazda	10.4
Two-door sport coupe	39.3	Not enough horsepower	7.0	Yes	60.9%	Buick	9.1
Five-door hatchback		What changes would you like?		No	39.1	Toyota	9.1
sedan	12.1	No changes	20.4%	What type of trouble?		Would you buy another 626?	
Series choices:		More powerful engine	14.5	Air conditioner	33.1%	Yes	70.0%
Mazda 626-SC	24.0%	Better air conditioner	5.9	Broken speedo cable	20.4	No	2.0
Mazda 626-SS	18.9	Reposition power		Power door locks don't		Maybe	28.1
Mazda 626-LSC	13.3	window switches	4.5	release	12.7	Would you buy another Mazda?	
Mazda 626-LSS	17.3	More headroom	4.1	Power steering leaks	7.0	Yes	80.7%
Mazda 626-LST	11.2	How much did you pay?		Electrical	7.0	No	2.0
Mazda 626-LX	15.3	Average	\$10,257	Dealer repairs satisfactory?		Maybe	17.3
Why did you choose this car?		Range	\$8,000-\$13,000	Yes	73.4%	Age distribution of owners:	
Styling	48.2%	Workmanship opinion:		No	26.6	15-29 years	32.7%
Reputation	28.6	Excellent	67.6%			30-49 years	48.6
Price	22.4	Good	29.9			50-plus	18.8

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



## OWNERS REPORT: MAZDA

(Continued from page 157)

not-so-random comments might give the best overall picture.

"I like the variable-rate suspension that comes standard in the 626-SC coupe," noted a Georgia attorney. "Actually, the 'automatic' setting seems a little smoother on the highway than the very soft 'normal' setting, but I really appreciate the firmer 'sporty' shock position when driving over the many miles of road construction we have here in Georgia."

All 626s except four-door sedans come with what Mazda calls its EVSA suspension system. EVSA stands for Electronic Variable Shock Absorbers and makes all four MacPherson struts adjustable from the instrument panel. There are three ride settings: normal for soft, sporty for firm, and automatic, which automatically switches the front struts to sporty above 50 mph.

"It's a fun car to drive," said an Idaho jobber, "because it handles so very well." A Tennessee manager added, "The very nice ride and handling are among the most pleasing aspects of this car."

A New York student: "I find the 626 sedan to be great for ski trips. The front-wheel drive gives excellent traction in snow, and the 40/60 split rear seats let me carry one passenger in back along with all our skis. We don't need a rack."

Sedans and coupes have the forward-folding 40/60 split back seat, which gives access to the trunk. The five-door liftback, meanwhile, comes with a 50/50 split. The liftback's rear seatbacks fold totally flat to create a station-wagon-like 21.0 cubic feet of cargo capacity. The sedan's trunk can stow up to 13.7 cubic feet even with the rear seats occupied.

### Front and rear legroom

Speaking of spaciousness, we heard nothing but praise for the 626's front and rear legroom. Yet 12.2 percent of our respondents did note a certain lack of headroom, especially in sunroof-equipped cars. The headliners of 626s without sunroofs have a little kickup molded in just above the front seats. A Texas serviceman said, "I'm 5-feet-11, and while my 626 seems a little short on headroom, it's okay if I keep my hair combed!" The low sunroof affects rear riders more than those up front.

Surprisingly, nearly 61 percent of the owners we interviewed reported early mechanical problems. Most were minor but, even so, 61 percent is a higher figure than we normally get. For example, only 28 percent of all 1983 Thunderbirds needed early repairs, 33 percent of Pulsars and about 40 percent of all

Chevrolet Celebrities. Chalk up this aspect of the 626 as a mild shocker.

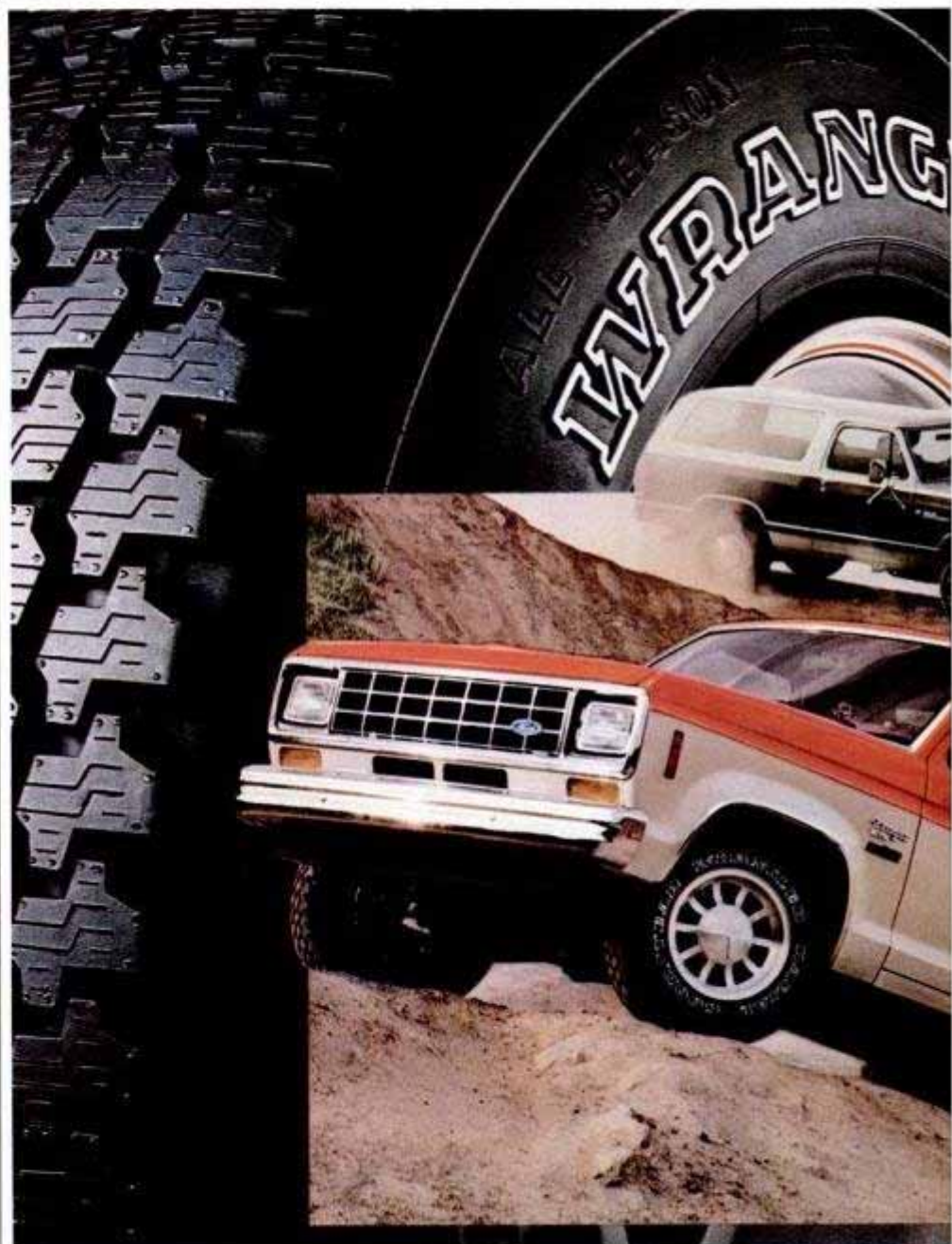
Specifically, the 626 suffered from: 1, air conditioner leaks, overloaded a/c circuit breakers, and compressor rumble; 2, frayed and noisy speedometer cables; and 3, power door locks that wouldn't release on demand. A few power-steering pumps also tended to leak, and some factory radios transmitted ignition noises. A number of owners griped about wheel covers flying off, and this problem persisted even after dealers replaced lost covers.

We also logged the usual grumbles about brake squeal, minor dashboard

rattles and engine vibration (despite liquid-silicon-filled motor mounts).

Not that the Mazda 626 is a poorly engineered or constructed automobile. Far from it. Workmanship scored a 97.6 percent good to excellent rating, and that's about as high as we've ever recorded. "Everything fits and works flawlessly," said an Idaho instructor, "and by all the evidence, factory quality control is excellent."

A few owners (14.5 percent) said the 626 could use a bit more horsepower. A Tennessee jewelry wholesaler claimed, "BMW drivers already fear my Mazda. What if the engine were turbocharged



**WRANGLER RULES THE ROAD.**



to the tune of 145-plus ponies? I think Mazda will have to get serious about power, because the rest of the car is a benchmark by which *all* automobiles have to be measured."

As it is, the 626's 1,970-cc ohc Four puts out 84 hp at 4,800 rpm and 112 lb.-ft. of torque at 2,500 rpm. This is with an electronically controlled, twin-barrel, feedback carburetor. Overseas versions of this same engine use port fuel injection and deliver 8 to 10 more horses. It's conceivable that Mazda will bring fuel-injected versions here.

They won't have to rush, though, because, as this is written, customers

are still waiting in many parts of the country. Dealers get sticker price or better, and we noted several reports of price packing with unasked-for goodies like undercoating (on top of factory undercoating), \$100 floor mats, "lifetime" glazes and so on.

A California management analyst put it this way. "The 626 sells itself; what you shop for is the dealer. If Mazda Motor Corp. had a more controlled U.S. dealer organization and could bring in all the cars they wanted, without quotas, Detroit would really be in deep trouble!"

As with most makes that we survey,

Mazda dealers got mixed reviews. Over 75 percent of our sample rated their dealers good to excellent, but 5½ percent were absolutely livid over the treatment they had gotten. As a 22-year-old student in North Carolina complained: "It does an excellent car like the 626 no justice to be sold by a dealership like this one. Management is very rude and unhelpful. I'll buy a Mazda in the future, but not from this dealer."

A young Arizona software engineer adds: "I was unhappy with the service department at the dealership where I purchased the car. They treated me like I didn't know what I was talking about. They didn't notify me when parts were in. I had to make return visits for the same problem. But I have since switched to a different Mazda dealership and have been very satisfied."

Frustration with dealer service is not unique to Mazda—we see it often. It usually arises out of slow or slipshod warranty work. As a Missouri executive put it: "Best quality auto I have ever owned. It is also very dependable if you can keep it away from auto dealers and find a good mechanic. As with every car I have owned, when you return a car for warranty work, it is always returned with a defect."

But a fellow Missourian expressed the majority view of Mazda 626 owners when he wrote: "There is only one mechanic at the dealership, but they are very good at trying to set up appointments as soon as possible and at your best convenience."

#### Satisfied with mileage

Our owners were more than satisfied with fuel mileage. Those with manual transaxles reported 29/36 mpg, which isn't too far from the EPA estimate of 29/41. The automatic delivered 25/32 according to our respondents versus the EPA's 27/36. An Arizona software engineer said, "Fantastic mileage with little compromise in performance."

There's a great deal to appreciate in the 626 and, as much as they genuinely like and admire their cars, many owners never become aware of some of Mazda's subtler engineering touches: the unequal front A-arms that compensate for engine offset, the axle carrier bearing that allows both front halfshafts to be the same length to prevent torque steer, the predrilled holes for mudflaps, the fact that the radiator doubles as a vibration damper, the thicker-than-normal oil pan that muffles engine drumming, the 15-inch optional alloy wheels, the fact that the automatic transmission weighs a bare 90 pounds. Mazda Motor Corp. (formerly Toyo Kogyo) took great pains engineering the 626 and, in the opinion of owners, the engineers definitely succeeded.

PM

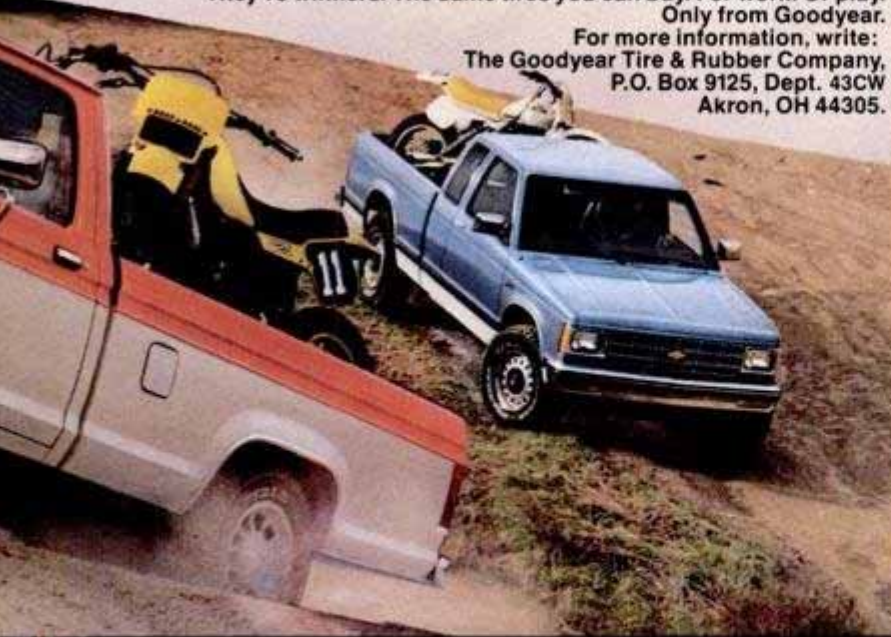
# WRANGLER RADIALS. ALL-SEASON. ALL-TERRAIN. ALL-POSITION.

For a winning combination of on-road performance and off-road grit, put your light truck or van on Wrangler All-Season Radials. From Goodyear, #1 in radials. Wrangler Radial truck tires are all-terrain tough, year-round ready. Designed for surefooted traction and a smooth ride. With larger beads and stronger sidewalls than our passenger-car tires, for more stability and resistance to damage. And 63% deeper tread than our Custom Polysteel Radials — for longer wear. We've tested Wranglers at off-road races from Baja to Riverside. They're winners. The same tires you can buy. For work. Or play.

Only from Goodyear.

For more information, write:

The Goodyear Tire & Rubber Company,  
P.O. Box 9125, Dept. 43CW  
Akron, OH 44305.



## GOODYEAR



## GUIDE TO '84 IMPORTS

(Continued from page 97)

fwd. All are attractive. A 70-hp, 1.6-liter, ohc, in-line Four is standard; optional is a 1.8-liter diesel estimated to get 60 mpg.

**Corona**—Its option wasn't picked up for 1984.

**Camry**—Few changes here, in that Camry was introduced in mid-'83. Primary notation: addition of the optional 1.8-liter turbodiesel with 73 hp at 4,500 rpm.

**Celica**—GT-S model gets four-wheel vented discs, and all models get the 2.4-liter, fuel-injected Four of 105 hp, previously offered only in GT and GT-S. All Celicas now get nicely done hidden headlamp treatment.

**Celica Supra**—A compression ratio increase and larger-diameter intake manifold cause 10 more hp, up to 160, in fuel-injected, twin-cam, 2.8-liter Six. Front and rear are slightly tweaked for appearance's sake.

**Cressida**—The ECT electronically controlled, four-speed automatic gets an overdrive lockout switch. A sinful amount of standard equipment is joined by optional digital instruments and a trip computer on some models.

**Van**—Originally called the Van Wagon, the second name has been dropped, perhaps to avoid confusion with VW's Vanagon. With its optional refrigerator and automatic icemaker, it's a tailgate *partier par excellence!* A two-liter injected Four powers Deluxe and LE versions with 2-2-3 seating plans. This revolutionary vehicle needs only the usual garage space, yet has a 149.8-cu.-ft. cargo area.

## ITALY

### Alfa Romeo

**Spider Veloce**—Unchanged from '83. All the good accessories are standard; a/c is optional. Except for some '80s-style spoilers, this is the car Dustin Hoffman drove in *The Graduate*.

**GTV-6**—There's new accent paint in gray and the radio antenna moves to the windshield. Final drive is changed to 4.10:1.

All-new, turbocharged V6 coupes, expected to challenge BMW, will not appear in '84. Maybe '85.

### Bertone and Pininfarina

Fiat has officially ceased doing business here, but auto entrepreneur Malcolm Bricklin formed International Auto Importers (IAI) to bring in, directly from their makers, rejuvenated forms of the Fiat X1/9 and Spider 2000. Rumored: A twin-turbo Bertone X1/9, joining a Spider 2000 that is already single-turbocharged. In Italy, Pininfarina sells supercharged Spiders.

### Ferrari

**308GTB/308GTSi**—Is there anyone who doesn't know Thomas Magnum's car when he sees it? The sexy shape is supplemented by a three-liter, mid-engine V8. Power is up with the advent of the *Quattrovalvole* four-valve-per-cylinder Eight.

**Mondial 2+2**—This vehicle packs the same power as the two-seaters, but in a more civilized and equally good-looking package.

### Lamborghini

**Countach 5000S**—The exotica from Italy. Injected V12 pumps out 348 hp. How exotic is it, you ask? The Countach's optional rear spoiler costs more than a Chevette (\$5,500)!

### Maserati

**Biturbo**—It's supposed to debut at the Boston Auto Show October 15. We hope it does. The Biturbo is a two-door, four-place, twin-turbo (thus the name) heir to the Maserati brothers' name. A 24-valve, 90° V6 displacing 2.5 liters claims 192 hp at 5,500 rpm, with 233 lb.-ft. of torque at 3,000 rpm. An esti-



Stylish Nissan 200SX coupes and hatchbacks will go on sale at Datsun dealers in March.

mated 3,500 Biturbos will be shipped here in '84.

**Quattroporte**—This is a modern-day classic that can hit 130 mph, thanks to an all-aluminum, 4.9-liter, four-cam V8, pumping 288 hp. All independent suspension, rack and pinion steering, four-wheel vented discs. A lot of car with a price to match.

## GREAT BRITAIN

### Aston Martin

**Lagonda**—This is a superexotic if ever one was built. Very few, very fascinating, very expensive. A four-door sedan, three-speed automatic only, using the corporate V8.

**Volante/Vantage**—Vantage is the successor to James Bond's original Aston coupe; Volante is the convertible version. A hand-built, 5.4-liter, four-cam, aluminum V8 powers both.

### Bentley

**Mulsanne**—The inexpensive Rolls-Royce. The twin-turbo version is only for Europe.

### Jaguar

**XJ6**—Unchanged. Slightly upscale Vanden Plas model XJ6 continues as well. A new slant-six engine (half the V12) is coming, plus new bodywork and—egad—a T-roof.

**XJ-S**—Sleek two-seat V12 adds trip computer and new colors.

### Lotus

**Esprit Turbo**—A consortium of right-thinking businessmen each put up \$50,000 to bring Lotus back to us. They've done a good job. Best news: a potent 205 hp for this tenacious, wedge-shaped low-rider.

### Rolls-Royce

**Silver Spur/Silver Spirit**—As long as there's an England, there'll be 6.75-liter, V8 Rolls-Royces. Due to the favorable dollar-pound exchange rate, Rolls has dropped its prices: Bottom-of-the-line Spirit is down from \$111,000 to only \$92,000 and change.

**Corniche**—The classic Rolls convertible. Unchanged except for new low price.

**Camargue**—A Rolls-Royce from the Pininfarina pen. It's extraordinarily rare here.

## GERMANY

### Audi

**4000**—The basic 80-hp, four-cylinder model is essentially unchanged. Big news is the 115-hp, five-cylinder 4×4 4000S Quattro version, the second step in Audi's plan to offer 4wd across the board.

**Coupe GT/Quattro**—The \$14,500 Coupe GT is driven by a 2.2-liter Five, producing a peppy 115 hp. The Quattro is the full-blown 4wd, turbocharged, 160-hp road version of Audi's potent rally car.

**5000S**—Slick aero bodywork holds down wind noise, increases top speed and reduces fuel consumption. The 140-hp Turbo bowed in January, along with the wagon version. Turbowagon prototype exists (see *Imports and Motorsports*), but production is unscheduled for the United States. Slow-selling diesel engines are suspended until further notice.

### BMW

**318i**—Successor to the 320i with chassis upgrades and cleaner sheet metal execution. A 1.8-liter Four replaces the previous 2.0-liter, with crisp performance.

**528e**—Adds heated mirrors, and retains its frustrating rev limiter. A good buy for those unlikely to drive too vigorously.

**533i**—The five-series car with heart, the 533i has good ride quality motivat-

(Please turn to page 162)



## NEXT MONTH IN PM

- **Airline pilots whose skillful flying prevented disaster.**
- **Amazing homebuilt robots.**
- **New minivans: PM rates them.**
- **45-page Home Ideas Guide.**
- **Dangerous roads: You can avoid routes that kill.**
- **Plus: Great shop ideas, best motor oil, and more!**

**SUBSCRIPTION SERVICE:** Popular Mechanics Magazine will, upon receipt from its reader of a complete new or renewal subscription order, undertake fulfillment of that order so as to provide the first-copy delivery to the Postal Service 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 10064, Des Moines, Iowa 50350, or call toll-free 1-800-247-5470; Iowa residents call 1-800-532-1272. Should you have any problem with your subscription, please write Joan Harris, Customer Service Department, Popular Mechanics, P.O. Box 10064, Des Moines, Iowa 50350. To assure quickest service, please enclose your mailing label when writing to us or when renewing your subscription. Renewal orders must be received at least eight weeks prior to expiration to assure continued service.

## Popular Mechanics

P.O. Box 10060, Des Moines, Iowa 50350

**YES!** Please enter **WZPM**  
my subscription to  
POPULAR MECHANICS for:

- 1 year \$11.97  
 2 years \$21.97

Payment of \$ \_\_\_\_\_ is enclosed.

Bill Me \_\_\_\_\_  
Initial here

Name \_\_\_\_\_ (please print)

Address \_\_\_\_\_

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

Your first copy will be on its way to you in six to twelve weeks. Watch for it!

A publication of the Hearst Corporation.

Charge orders subject to publisher's acceptance.  
(Above prices apply in U.S. & Possessions only. Canadian and foreign prices upon request.)

## CHANGING ADDRESS?

If you're planning to move, please let us know at least eight weeks before changing your address. Attach current address label and fill in your name and your new address. This will serve to insure prompt service on your subscription.

Send old label with your name  
and new address to:

**POPULAR MECHANICS**  
P.O. Box 10064, Des Moines, Iowa 50350  
or call toll-free: 1-800-247-5470  
State of Iowa residents call: 1-800-532-1272

NAME \_\_\_\_\_ (Please print)

NEW ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP CODE \_\_\_\_\_

## WATER WELL DRILL KIT



Now you can drill a water well or a free-flowing spring in your backyard. Have all the pure, fresh water you want **FREE!**

**OVER 35,000 SOLD!**

Easy to operate as your power lawn mower!

FOR FREE BROCHURE

CALL TOLL-FREE

**1-800-821-7700**

(Ask for Extension 413)

Or clip coupon and mail TODAY!



413 Anderson Road  
Opelika, Alabama 36802

Please mail your **FREE** brochure.

Print Name \_\_\_\_\_

Address \_\_\_\_\_

City-State \_\_\_\_\_

Zip \_\_\_\_\_

© 1984 DeepRock Mfg. Co.

## FREE COLOR CATALOG

Build Your Own Grandfather Clock  
Prices Starting Under

**\$300**

(including movement and dial)

- Do-it-yourself case kit, parts pre-cut
- Finished clocks
- Solid 3/4" hardwoods: black walnut, cherry, oak
- Heirloom quality
- Factory direct prices
- Solid brass West German chiming movements
- Money back guarantee
- Prompt shipment



MASTERCARD, VISA and DINERS CLUB ACCEPTED



**EMPEROR®**  
CLOCK COMPANY

WORLD'S LARGEST MANUFACTURER OF GRANDFATHER CLOCKS

Dept. 1034, Emperor Industrial Park

Fairhope, Alabama 36552

IN CANADA: Emperor Clock Corporation, Dept. 1034  
7-1081 Meyerside Dr. Mississauga Ontario L5T 1M4

## WHAT A DEAL!

only  
**\$12.95**  
but read  
the ad for an  
even better  
deal.



**Pocket Fluorescent Lamp**  
outshines them all!

This incredible invention was not possible until recently. Technology did not exist to develop a super small fluorescent light. Only incandescent flashlights existed that gave poor light and used up batteries fast. Transistorized circuitry made it possible to produce this pocket size fluorescent lamp (6").

Not only do you get superior light, but the 4AA batteries (not included) will last five times longer than in a standard flashlight. The 4 inch fluorescent tube is available everywhere.

You would expect to pay over \$20 for this incredible light invention, but our price is a fantastic low \$12.95. But buy two for \$25.90 and you get a third one absolutely free. You probably think we are crazy to do this, but we want you to get to know our unique quality products and how well we treat our customers. One Year Guarantee, 30-day Return Privilege.

For fast service major credit card holders ask for Extension 37 and order BC4, or send a check for the total amount plus \$1.50 delivery per lamp. (\$2.50 for 3 lamps.) California delivery add 6% sales tax.

ORDER TOLL FREE  
**1-800-227-3800**  
**Ext. 37**

24 hours 7 days a week

**BENTLEY'S**  
FOR BETTER LIVING™

735 Burnett Ave.,  
Box 31445, San Francisco, CA 94131  
© 1983 Bentley's



# FAMILY OF SEVEN CUTS HOT WATER BILLS IN HALF!\*

Tankless Heater Provides Endless Hot Water



The Hughson family of Pennsylvania

The Hughson family just took 7 showers in a row — the 7th was as hot as the first — and they're saving hundreds on their hot water bills too.

## Sound, Simple, Money-Saving Idea

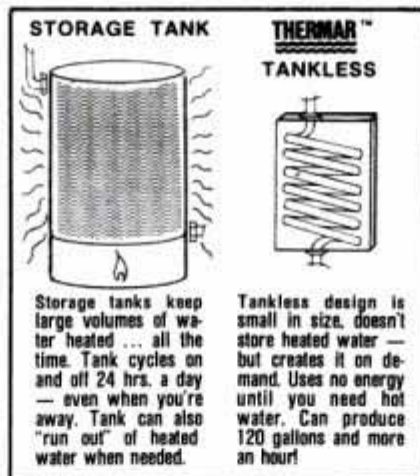
Did you know that much of the energy used to heat your basement tank of water is dissipated right through the walls of the tank itself and into your storage or crawl space area?

### The Perfect Answer—New Thermar™ Tankless Instant Hot Water Heaters

If heat losses are created by the need to keep large volumes of water standing in a tank, why not eliminate the tank? And, that's just what Thermar™ has done. In its place we have developed a tiny, super powerful instantaneous heating unit which **ACTUALLY CREATES HOT WATER AS YOU USE IT**. A microswitch on the unit automatically turns on the moment hot water is needed. Then a continuous stream of delightful, sparkling hot water flows from the tap for shower or wash basin. **IMAGINE** — as much hot water as you want — produced in a never-ending stream as long as you need it.

The ordinary Tank-Type Hot Water Heater is the most "Energy Costly" appliance in your home. In this day of rising

costs and energy consciousness, a new THERMAR™ TANKLESS INSTANT HEATER should be considered by everyone interested in saving money and saving energy.



Storage tanks keep large volumes of water heated ... all the time. Tank cycles on and off 24 hrs. a day — even when you're away. Tank can also "run out" of heated water when needed.

Tankless design is small in size, doesn't store heated water — but creates it on demand. Uses no energy until you need hot water. Can produce 120 gallons and more an hour!

U.L. Listed Electric and AGA Certified Gas Models  
Thousands in Use Around the World

You'll recover the initial costs many times over in fuel savings as the years pass. And, you'll enjoy a lifetime of hot water — shower after shower after shower!

\* Savings will depend upon local cost of fuel, type of fuel used, condition, age and type of present heater equipment.

**THERMAR™**

- America's Leader in Tankless Heaters
- Featured in *Popular Science Magazine*
- Seen on Television!
- Member — Gas Appliance Manufacturer's Association Inc.

FOR RUSH DELIVERY OF FREE ENERGY CATALOG AND FULL DETAILS  
USE COUPON BELOW OR CALL 1-800-228-6505  
Nebraska Residents Call 1-800-642-9606

**THERMAR™**

Johnson Power Tech  
Melrose Square  
Greenwich, CT 06830

I would like to cut my hot water heating bills in half! Please RUSH your FREE catalog of THERMAR™ INSTANT, TANKLESS HEATERS. Include details of the absolutely unique 10 year guarantee and lifetime rebuilding option. I understand that I am under no obligation to buy.

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
Canadian Residents send to: 56 Bramsteele Rd., Suite 8, Brampton, Ontario L6W3N4

PM0384

## GUIDE TO '84 IMPORTS

(Continued from page 160)

ed by the 3.2-liter Six from the 633CSI. A five-seat hotrod.

**633CSI**—The perennial Bimmer high-winder, the 633CSI provides high style and head-turning ability for those who can afford it. At its peak, one of the best-sounding engines ever! A timeless value.

**733i**—A "full-sized" BMW with the guts of the 633CSI. On-board computer, four doors, five speeds or a three-speed automatic.

### Mercedes-Benz

**240D**—Discontinued.

**190E/190D**—This is the exciting new entry-level "baby Benz" rumored for so long. Up close, inside and outside, it's a full-sized M-B in smaller scale. 190E is the gasoline-powered 2.3-liter Four; the 190D is the 2.2-liter diesel version. Drives superbly.

**380SEL/380SEC**—Discontinued.

**300D/TD/CD/SD**—Power is from M-B's 123-hp, turbodiesel Five, with four-speed automatic. The D is a five-passenger sedan, TD the wagon, CD the coupe and SD the luxury sedan.

**380SE/380SL**—The SE is the sedan, while the SL, as any Californian knows, is the Coupe/Roadster. Both are powered by 3.8-liter, gas-fed V8s.

**500SEC/500SEL**—Gasoline V8s return to the big Benz models at last. Both the SEL five-seater and SEC four-seater "sports coupe" get five-liter, injected, light-alloy V8s.

Mercedes estimates about 5,000 buyers will opt for this country's first air-bag option. M-B will offer the Supplemental Restraint System (SRS) in six models, including the 190 Series. The option's suggested price is \$880.

### Porsche

**944**—Quite honestly, one of the best-ever, most cost-effective methods of obtaining genuine sports car thrills. The European turbo model is being withheld here until the current edition's popularity wanes a bit.

**911 Carrera**—Contentious handling, but still inspires awe. Coupe, Targa and Cabriolet versions. New fuel injection and a 3.2-liter engine (up from 3.0) make a breathtaking 200 hp. Also fresh: ignition system and bigger, better disc brakes.

**928**—Ride. Handling. Acceleration. Quality. Unchanged for '84.

### Volkswagen

**Quantum**—The VW standard bearer is a front-driver powered by 2.1-liter gas Four. A 1.6-liter, ohc, turbodiesel Four is optional, while a/c is now standard.

Most VW prices are reduced across



# \$1000 A Month With Just A Hack Saw!

© Philip E. Brancato Sr. 1982

Yes, you can make \$1000 a month and more with just a hack saw in your spare time.

## Will I Get Rich?

No, you will not get rich, but you can make over \$1000 a month in your spare time and have a ball doing it.

I tried all those "Get Rich" gimmicks that are advertised, that never tell you anything until you've sent them your \$25, and then you find out their gimmicks were not for you. Well, I've tried them all and I'm still not rich.

All I ever wanted was something I could do in my spare time with my hands, make a little money and enjoy myself and not have to buy \$3000 worth of tools or merchandise to do it.

## Believe It Or Not

I found the most enjoyable and profitable business working with my hands and the only tools I use are a hack saw and measuring tape. The really nice thing about it is any man, woman or ten-year-old can do it.

## What Do I Do?

I make beautiful indoor/outdoor P.V.C. pipe furniture. Such as chairs, lounges, tables, swings, and all kinds of baby furniture out of P.V.C. pipe; even birdhouses and feeders. P.V.C. pipe furniture is the hottest selling furniture on the market today, because it is unique and beautiful and will not rot or rust and it will virtually last a life time.

## Profit Unbelievable!

The fantastic part of this business is the profit.



Just go look at some of this furniture in the stores and see some of the unbelievable prices it is selling for.

A chaise lounge that costs \$62.25 in material and three

hours of work is selling for over \$228 in the stores. I can sell my chaise lounge for anything I think my labor is worth. For once, the big manufacturing companies cannot compete with me or you on prices. You will find you will have more orders than you want!

## Where can you buy the P.V.C. Pipe?

You can buy the P.V.C. pipe from any local hardware store to start. Plus I will supply you with the names and addresses of cushions and pipe manufacturers who will sell to you wholesale, plus I will supply you with my shop manual and six detailed shop drawings with pictures and measurements of six different designs.

## Do you need my shop drawings?

No, you don't need my shop drawings unless you want to save hundreds of hours of trial and error work and thousands of dollars that I had to spend before I finally

found the right design and measurements and tricks to the manufacturing of P.V.C. pipe furniture. I only wish that when I started, I could have bought these shop drawings and I would have gladly paid \$100 for just one of them.

## I will pay you!

Yes, I will pay you \$25 for any unique design shop drawing that I can use in my collection and workshop manual.

## How do you start?

1) Decide if you like to work with your hands to create things and want to make money.

2) Can you afford \$12.00 for my shop manual and six drawings.

3) Send me your name and address along with your check for \$12.00 to:

Philip E. Brancato Sr.  
P. O. Box 237 P7  
Riverview, Florida 33569  
(813) 677-6948

Please allow about two weeks for delivery.

the board, either in real dollars or through additional equipment at no extra cost.

**Scirocco**—Sexy sport coupe powered by a 1.8-liter Four. New: revised front strut and rear shock valving and the 90-hp GTI package. Features vented discs to stop from a 110-mph top end. Headroom is a sore spot for tall people, and the seats could use more lumbar support.

**Rabbit**—LS is cancelled, with lower prices for base L and higher-trim GL. Diesel engine is now standard, with the gasoline version the higher-priced option! Fewer power-train combinations this year, too. GTI 90-hp, five-speed package is now available on the convertible, built by Karmann in Germany. All of the U.S.-built Rabbits can still be readily identified by their square headlights.

**Jetta**—If by now you've guessed that Jetta gets the GTI package, you're correct. It's dubbed the GLI in the Jetta, however. A 68-hp turbodiesel powerplant is optional on this upscale Rabbit with a trunk.

## FRANCE

### Peugeot

**505/505STI**—Getting around in style is the travel mode here. No

ground-shaking performance to write home about, but five-speed and STI package are well-suited for wringing the 97 hp from the two-liter gas engine. The 2.3-liter turbodiesel is optional. GL, S and new station wagon are the configurations.

**604**—Only the 80-hp, 2.3-liter turbodiesel can be had here. This is Peugeot's upscale roller, more luxurious all around, but it could use the gas V6 that originally powered it.

### Renault

**Le Car**—Discontinued.

**18i**—The 18i sedan was cancelled for being too close to the market segment coveted by the U.S.-built Alliance. The 18i wagon continues as the Sportwagon, with a future promise of four-wheel drive.

**Fuego**—A two-door hatch, now up-gunned to a 2.2-liter ohc Four in normally aspirated trim. The turbo version still throbs to the buzz of Renault's 1.6-liter ohv Four.

## SWEDEN

### Saab

**900/900S**—The no-longer-eccentric Swede is available in three-door hatch or four-door sedan models, with commendable performance and handling.

A two-liter, in-line Four provides 110 hp at 5,250 rpm.

**Turbo**—Truly as different from the basic cars as night and day. Performance is thrilling with the five-speed, merely terrific with the three-speed automatic, where power comes on in shotgun bursts. APC System controls knock and monitors boost to achieve the best performance possible from differing grades of unleaded fuel. Higher octane fuel, however, gives more horsepower.

### Volvo

**760GLE**—This is the wedge-shaped limo that resulted from a 10-year development project. Power train choices include a 130-hp V6 with automatic or a 106-hp, 2.4-liter turbodiesel Six with the automatic or a four-speed plus overdrive. By spring, the 162-hp, inter-cooled gas Turbo Four should be available with either trans.

**DL/GL/Turbo**—There are only insignificant modifications to Volvo's Swedish strongboxes. Turbocars, including the sinister turbo station wagon, will soon be offered with factory intercooling, boosting output to 162 hp. Intercooling is currently available over the parts counter as a kit. All models come standard with exceptional quality and built-in safety. **PM**



# Sale on quality woodworking tools

## BLACK & DECKER INDUSTRIAL PALM SANDER

Black & Decker industrial tools are a favorite of contractors and cabinet shops. Rectangular design lets you flush sand tight corners. 12,000 RPM for smooth sanding. Dust bag keeps work area clean.

Model 4010  
List **\$73.00**  
Our Price **47.95** ppd  
Mfg. Rebate **10.00**  
Your Cost **37.95** ppd



## FREUD COMBINATION BLADE

This carbide tipped industrial blade has been rated as the best all-around blade. Rip or cross cut hard or soft wood, plywood, composition materials, etc. Specially designed teeth cut clean and leave a smooth finish. 10" diameter, 50 teeth.

Model LU84M11 List **\$74.50**  
Also — Freud teflon coated super cut-off blade 10", 80 teeth, Model LU85M10 List **\$110.88** Sale **\$78.95** ppd



Sale  
**\$49.90**  
ppd

## Professional Tools at Discount Prices!

### BLACK & DECKER CUT SAW

This heavy duty 2 speed saw uses universal 1/2" shank blades. Scroll cuts down to 1/2" radius. Free carrying case.

Model 3103-09

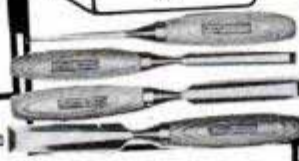
List **\$145.00**  
Our Price **99.95** ppd  
Mfg. Rebate **20.00**  
Your Cost **\$79.95** ppd



### MARPLES 4 PC. CHISEL SET

These famous bevel edge English chisels are made of tough Sheffield steel. Versatile enough for light handwork as well as roughing with a light mallet. A heavy steel ferrule mates the blade to an ash handle. Set contains 1/4", 1/2", 3/4" and 1".

Sale  
**\$18.95**  
ppd



### MIRACLE SANDING BELTS

So good that many of our customers tell us they outlast regular belts 2 to 1. Hard to believe at these low prices? Buy a pack (or more) and try a belt in your own shop. If you don't feel as we do that these belts are a terrific value, return the balance for a full refund. Prices are for a pack of 10.

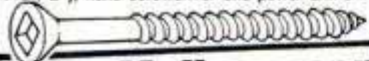
Size	Grit	Pack of 10	Size	Grit	Pack of 10
3"x21"	100 or 120	<b>\$ 9.80</b>	3"x24"	100 or 120	<b>\$12.00</b>
	80	<b>10.00</b>		80	<b>12.20</b>
	60	<b>10.50</b>		60	<b>12.60</b>
	50	<b>10.70</b>		50	<b>13.10</b>
	40	<b>11.00</b>		40	<b>13.40</b>



**30 day money back guarantee**  
Examine any item in your home or shop. If it's not what you expected, return it in original condition for a full refund.

### PROFESSIONAL WOODSCREW KIT

These screws are widely used in furniture manufacturing and cabinet making. The square recess in the head helps prevent slippage (and damage) and lets you sock screws down tight. Extruded thread (#8) cuts clean. Thin shank eliminates the need for oversized pre-boring. Kit contains 400 flathead screws (100 each 1", 1 1/4", 1 1/2", 2"), hand screwdriver and power drill bit.



Super Value  
**\$13.95**  
ppd



List **\$100.00**  
Our Price **\$69.95** ppd  
Mfg. Rebate **\$10.00**  
Your Cost **\$59.95** ppd

### BLACK & DECKER VARIABLE SPEED REVERSIBLE DRILL

Black & Decker's most popular industrial drill is designed for long life and lots of power. 0-12,000 RPM. Reversible with a flip of a switch. Model 1172-10

### Mail coupon or call toll free:

**800-343-3248,**  
**800-322-6100 (Mass.)**  
**TREND-LINES, INC.**  
**170P Commercial St. Box 189 PF**  
**Malden, Ma. 02148**

Black & Decker manufacturer's rebates expire April 25, 1984

Quantity \_\_\_\_\_ Item \_\_\_\_\_ Price \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Name \_\_\_\_\_ Mass. Residents Add 5% \_\_\_\_\_

Signature \_\_\_\_\_ Total \$ \_\_\_\_\_

Address \_\_\_\_\_ City \_\_\_\_\_

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

Check or Money Order Enclosed Phone \_\_\_\_\_

VISA  MasterCard \_\_\_\_\_

Expiration date \_\_\_\_\_

C.O.D. \$5.00 deposit each item.

\$2.50 per item extra for C.O.D. shipments.

### MAKITA 3"x21" BELT SANDER

This best selling industrial tool is a favorite of contractors everywhere. Makes quick work of tough jobs whether sanding new wood or old. 12 1/2" length is ideal for rough or finish sanding. Free dust bag.

Model 9900B

List **\$191.00**  
Our Price  
**\$126.50** ppd



### MAKITA 3/8" CORDLESS DRILL With Free Light

This drill goes where you go — out in the back yard, on the roof or out to the boat. With this reversible battery powered drill, you're not tied down by electrical cords. Recharges in one hour. Rechargeable light included along with industrial drill, one hour charger and carrying case.

Model 6010DL List **\$154.00**

Sale  
**\$99.95**  
ppd



Sorry, no catalogs by phone except with order.  
**Catalog \$1.00 Free with any order.**

**We Pay The Freight!** (Freight prepaid in Continental USA on orders over \$35.00. On order under \$35.00, add \$2.00 per order.)



## BOLT-ON BODYWORK

(Continued from page 109)

plant. That's just what happened to the small-block Chevy V8 25 years ago.

And along with engine goodies galore, watch the aftermarket companies offer the special superwide wheels and tires, gas pressurized shock absorbers, all sorts of suspension equipment, seats and an unlimited assort-

ment of bodies, spoilers and separate panels.

By then Pontiac will find itself with the ultimate American cult car—but only *if* the division can keep the P-car away from Chevrolet long enough, and *if* Pontiac can hold the base price within reason. **PM**

## Custom Cars from Studio II



Indy pace car version of the Fiero features an add-on nose, air snorkel and rear wing.

Pontiac's design center, Studio II, has already produced two customized Fieros. One is the Indy 500 pace car (see *Detroit Listening Post*, page 14, Feb. '84). Bolt-on parts for the pace car include a cleaned-up nose piece, rear wing and an intake air snorkel for the engine cover/rear deck.

Most of the hot-rod pieces for the modified 232-hp, four-cylinder engine come from Pontiac's "Super Duty" catalog and are available from dealer parts departments. Because these engine pieces do not meet EPA antipollution requirements, they are meant for "off-road" (racing) use only. However, that does not stop many hot-rodders in states without periodic emissions inspections.

The roadster below was also designed by Studio II, using bolt-on parts. A nice touch is the outside mirrors, which are attached to the windshield pillars. The

doors open under the mirrors. Of course, this design has no windows or top—you couldn't get a door with its windows up to swing under the mirrors.

Pontiac's general manager, Bill Hoglund, went to the recent Specialty Equipment Manufacturers convention to make sure no one overlooked the opportunity to produce add-on custom parts for the Fiero. He was also shopping for a company that could build 2,000 Fiero convertibles to GM quality standards. These would be sold, ready-built, by Pontiac dealers. Hoglund is hoping to build a hot-rodding cult for the Fiero.

Since GM officials are dragging their feet on the issue of making the Fiero into a real sports car (they've already nixed an aluminum version of the V6 and a turbo), Hoglund is taking his case to the people, who often do a more inventive job, anyway.—W.H.



One-of-a-kind Fiero roadster has top chop, new rear deck and enlarged side air scoops.

These 2 books—at less than half price—can start you on the most challenging engrossing, relaxing hobby you'll ever experience.



## EXPLORE THE WORLD'S OLDEST HOBBY!

Now, re-discover the new-old hobby of building historic wooden model ships. It really isn't hard. Not when you can choose a kit with pre-cut parts that make assembly easy. And clear, large-scale plans and instructions that virtually take you by the hand and guide you every step of the way.

**It may not be for everybody, but this "less than half-price" offer will help you decide if it's for you!**

You can learn all about this fascinating hobby by mailing the coupon below, along with your check or money order for \$5. Here's what you'll get in return:

■ Richard Mansir's "How to Build Ship Models," a 64-page beginner's guide that regularly sells for \$7.95.

■ Our own 80-page, full-color catalog illustrating the widest selection anywhere of historic wooden ship model kits, cannon kits, and miniature hobby tools. Regularly sells for \$3.

**That's a \$10.95 value for just \$5. What's more, we'll also include a certificate worth \$3 on your first ship kit order!**

When you receive your catalog, see for yourself the many ship model kits you can build. And how easy it can be to build one. You can climb aboard the world's oldest hobby by filling out and mailing the coupon below.

### MODEL EXPO, INC.

23 Just Road, Fairfield, N.J. 07007

**Mail this coupon today!**

Model Expo, Inc. Dept. PM-34  
23 Just Road, Fairfield, N.J. 07007

**YES!** Please send me your catalog and Beginner's Guide (\$10.95 combination value) for just \$5. My check or money order is enclosed.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

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



# Train at Home for One of These 32 Career Opportunities

SEND FOR FREE CAREER FACTS ABOUT DIPLOMAS OR DEGREES

If you want more money, more security and a better way of life, the decision to train for a better career could be the most important one you will ever make. And now you can train at home in your spare time for a diploma or even a degree to help you get a better job. This is the same kind of training program that has been used by nearly 2,000 American Corporations to train their employees... Union Carbide, Ford, DuPont and many others.



## Or... Get Your Degree Without Attending College

Now without attending class, you can get your degree in business with a major in Marketing, Business Management, Accounting and Finance. Or get a technical degree in Civil, Mechanical or Electrical Engineering Technology or Electronics Technology. If you already have some college or if you have worked in the field, you may be entitled to advanced standing toward your degree.

1072C

### Could a Career Diploma or a Degree Be Worth Thousands of Dollars to You?

Compare your present salary with the amount of money you could be making in any of the careers shown below. Training in a trade or earning an Associate Degree in Specialized Business or in Specialized Technology could make a giant difference in your lifetime earnings. But it's not the money alone... think of the security, satisfaction and the fun of working in a job you like. Get more information at no cost! Check the career you're most interested in and mail the coupon today. There's no obligation and no salesman will call.

### An Ideal Way to Learn

No need to change your daily routine or take time from your job or family. Learning is easy because everything is explained step by step with plenty of drawings, diagrams and photos. And like many colleges—all these courses use "open book" exams that let you refer to your texts and apply what you have learned. If you do have a question, your instructor is as close as your telephone. And all courses include necessary tools, instruments and materials... whatever you need for your training.

Mail coupon today for free facts and color brochure.



**International Correspondence Schools, Dept. PBS24**  
ICS CENTER, Scranton, Pennsylvania 18515

Please send me free facts, color brochure and full information on how I can study at home for the career I have chosen. I understand I am under no obligation and no salesman will call. **CHECK ONE BOX ONLY!**

#### BUSINESS ASSOCIATE DEGREE PROGRAMS

- Business Management
- Marketing
- Finance
- Accounting

#### TECHNICAL ASSOCIATE DEGREE PROGRAMS

- Civil Engineering Technology
- Mechanical Engineering Tech.
- Electrical Engineering Tech.
- Electronics Technology

#### CAREER DIPLOMA PROGRAMS

- High School
- Auto Mechanics
- Hotel/Restaurant Management
- Surveying & Mapping
- Drafting
- Air Conditioning & Refrigeration
- Travel Agent\*
- Wildlife/Forestry Conservation\*

- Art
- Police Sciences\*
- Veterinary Asst.\*
- Diesel Mechanics
- Electrician
- Small Business Management
- Electronics
- Bookkeeping\*
- Microcomputer Repair

- Computer Programming
- Computer-Assisted Bookkeeping\*
- Gun Repair\*
- Motorcycle Repair\*
- Catering/Gourmet Cooking
- Small Engine Repair
- Computer-Assisted Sm. Business Mgmt.

\*These courses are offered by North American Correspondence Schools, ICS, North American Correspondence Schools and the Center for Degree Studies are divisions of National Education Corporation. They are Accredited Members of the National Home Study Council in Washington, D.C.

NAME \_\_\_\_\_ AGE \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY/STATE/ZIP \_\_\_\_\_

## FOREST RANGER

(Continued from page 99)

parts. But this stock Ranger was merely the blank canvas upon which we proposed to let our imaginations run riot.

In our pursuit of off-road excellence, we asked Sam Cicero of Sand & Hill Performance Engineering (1504 Route 130, South Brunswick, N.J. 08852) to help us convert our Ford Ranger into PM's Forest Ranger. Our first step was to add an additional 3 in. of ground clearance by raising the chassis off the axles with a lift kit. To control our now sky-high chassis, we fitted heavy-duty, off-road Monroe shock absorbers.

Alloy wheels have no place in the woods, where one ill-timed blow can shatter your hopes and dreams. American Racing supplied 15x8 all-steel wheels with chrome rims and gold-chrome centers. American Racing calls them Gold Nugget wheels, and they look just right on our Ranger—tough, but not ugly. To make sure they stay ours, we used McGard locking lug nuts, which require a special wrench.

For tires, we went to B.F. Goodrich, which has earned an unparalleled reputation in off-road truck racing and Pro Rallying. BFG's Radial All-Terrain T/A is the off-roader's tire of choice. It works on dry pavement as well as every

consistency of off-road slipperiness. For our Forest Ranger, Goodrich engineers recommended we use P235/70R15s—hefty tires, but not so large that they cause premature wear on suspension and steering parts.

Because we expect to be heading far off-road, we fitted a Warn M6000 electric winch to the front bumper. This has a capacity of 6,000 lbs., and comes with a combo mount kit which combines a winch mount, brush guard and driving light mount all in one tough, tubular steel bracket.

Warn also supplied Model 410 driving lights and Model 330 fog lights, which bolt to the combo mount. At the same time, we replaced the stock headlights with Cibie quartz-halogen units. Switches for the auxiliary lights are under the dash. The winch has a remote switch on a cable which can be used from inside or outside the Ranger. With 100 ft. of .25-in. wire rope, the M6000 can pull our fully loaded Ranger at 11 feet per minute.

Our final dressup item at the front was a translucent sun visor from Saturn Corp. Called the Supervisor, it's made from ABS and acrylic and gives the little Ranger some of the brawny panache of big over-the-road rigs. The only additions we made to the cab were a Cobra 66 LTD CB radio with all controls on

the microphone and a Mag-Lite super-duty flashlight mounted on the tunnel in front of the shift lever. The Mag-Lite is unique in that you can focus the beam of light or flood it out to a wider area, all at the twist of a wrist. And the case can withstand a drop and even a stomp or two.

The heart of our Ranger is the pickup bed. We needed to turn it into a multi-use space, which could be used simultaneously for storage and sleeping, but be convertible to pure pickup space when needed.

Our first addition was a sturdy rollbar, built by Range 1 Steel. This isn't a decorative bed protector or driving light mounting bar like many pickups wear to get that macho appearance, but a real rollbar designed to support an upside-down truck if our off-road adventures get too frisky.

A critical concern of our rollbar design was that it had to fit under a cap. After looking at a lot of camper tops, we finally selected a sleek piece from Glasstite. It features genuine fiberglass construction, a vista window for increased headroom and light, a chrome luggage rack, waterproof top to cab boot and double-locking, wraparound rear liftgate. We painted it to match the orange and black color scheme of the Ranger, with a tan interior to match the



truck interior. After adding a DeeZee tailgate protector, we were ready for the main event.

The one thing we couldn't just go out and buy was our custom-built bed platform/storage compartment. This is actually built as two mirror-image units, which slide into the pickup bed from the rear. On top are twin bunks, with high-density foam mattresses covered in a rust-colored fabric.

Under the bed platform are custom-designed storage areas for two backpacks, fishing gear, camping gear, two Coleman 501-960 cook kits, a Coleman 52-40 cooler, a Coleman 54-10A700 propane stove and two Coleman 200A195 lanterns. There are also two long, thin spaces—one for fishing rods and one for hunting guns.

The top of each storage unit is piano-hinged so you can lift up each half of the bed platform separately for access to the compartments underneath. There are also two drop-down, piano-hinged access doors at the rear. The entire unit is built from exterior-grade plywood, 1/2-in. for the bed platform and doors, 3/4-in. for the frames and vertical walls. All surfaces, inside and out, are covered with Formica laminate in a burlled walnut finish.

### Bed platform/storage unit

There is nothing at all tricky about the construction of this bed platform/storage unit. The least experienced carpenter can knock it together in an afternoon, and a few coats of hard-gloss enamel would be a durable time- and money-saving substitute for the laminate we used. The most time-consuming part of the project is screwing down those long piano hinges. And, obviously, the dimensions can be altered to fit virtually any pickup truck.

We've met the goals we originally set. Our Forest Ranger is capable of going anywhere a four-wheel vehicle will fit, no matter what the weather or surface. Not only will it carry all the gear two people require to live off the land indefinitely, but it will also keep them dry, warm, rested and organized.

### Comfortable transportation

Even better, between trips to the outback, our Forest Ranger serves as comfortable and economical transportation. For serious hauling, the two storage units can slide out. Each weighs very little and can be handled easily by one person. With two people, you could lift the storage units out fully loaded and store them in the garage on top of one another, ready to go on the next camping trip. And, of course, the cap can also be unbolted for maximum loading ease. What more could you want in the way of versatility? **PM**

# NRI can show you how to make money repairing small engines!

**There's plenty of opportunity for the man who can service mowers, garden tractors, chain saws, outboards, mopeds, motorcycles, snowmobiles, etc.**



There are 50 million small engines out there, and many are waiting for qualified servicemen to fix them. NRI can give you the training you need to cash in on this opportunity, and you learn at home in your spare time, at your convenience.

### Includes 5 HP Engine

You learn by doing with NRI "hands-on" training. As part of the NRI Master Course, you get a brand-new 5 HP Tecumseh commercial engine to work on. You learn to diagnose problems, tuneup and adjust, even tear down for valve and ring jobs. And your training includes professional tools like an inductive tachometer, volt-ohm meter, torque wrench, valve spring and ring compressors, complete wrench set, and more... all to equip you for learning and earning.

### Choice of Two Courses

NRI's Basic Course puts special emphasis on lawn and garden equipment, teaches you the theory and practice of ignition, lubrications, cooling, and starting



systems. Its 30 "bite-size" lessons concentrate on one subject at a time to let you move at your own pace, give you greater clarity and faster learning.

The same teaching techniques give you advanced training on the 45-lesson master course... training in the repair and servicing of a wide range of other motors including generators, industrial equipment, even motorcycles. You learn to service electrical systems, transmissions, clutches, power take-offs, and more.

### Exclusive Factory Training

Although not required for graduation, your Master Course includes five intensive days of optional training at the Tecumseh Factory Service School. Here, you'll work with master technicians and instructors, getting first-hand experience in subjects like solid-state testing, transmissions and transaxles, engine teardown, two and four cycle carburetors, magneto theory, troubleshooting, and more. All designed to prepare you for success.

### Send for Free Catalog

Find out for yourself how much NRI training can do for you. Send for the free catalog with all the facts, descriptions of each lesson, and factory training curriculum. No salesman will call. Get started on your future today! If coupon has been removed, write to NRI Schools, 3939 Wisconsin Ave., Washington, D.C. 20016.



**NRI Schools**  
McGraw-Hill Continuing  
Education Center  
3939 Wisconsin Ave.,  
Washington, D.C. 20016

We'll give you tomorrow.



Please rush me the one free catalog I have checked. I understand that there is no obligation and no salesman will call.

### SMALL ENGINE SERVICE & REPAIR

- Automotive Servicing
- Air Conditioning, Refrigeration & Heating including Solar Technology
- Electrical Appliance Servicing
- Building Construction
- TV/Audio/Video Servicing, Communications Electronics with CB, Microcomputers, Electronic Design Technology, Electronics

All career courses approved under GI bill  
 Check for details.

1102-034

Name \_\_\_\_\_ (Please Print) Age \_\_\_\_\_

Street \_\_\_\_\_

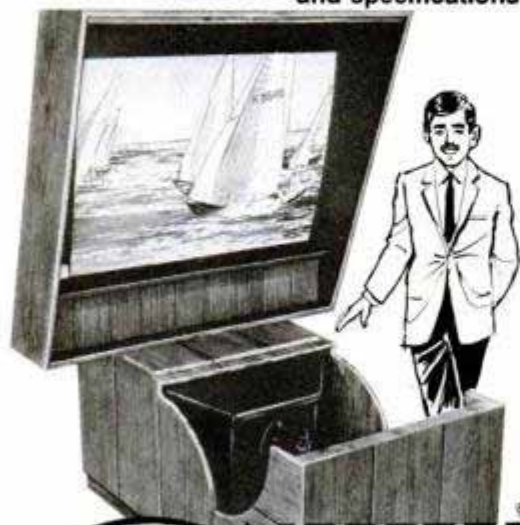
City/State/Zip \_\_\_\_\_

Accredited by the Accrediting Commission of the National Home Study Council



# Get Amazing New Tube Mounted Lens BUILD YOUR OWN BIG SCREEN PROJECTION TV!

Special Offer  
**\$49<sup>95</sup>** **NOW only \$29<sup>95</sup>**  
VALUE including tube mounted lens, cabinet plans and specifications



- Put small portable TV inside cabinet—lens enlarges picture to giant 5-foot diagonal picture.
- Thrill to sports; just like being at the game! See your favorite movies as if you were in the theater!
- Easy to build—Construct this cabinet model 5-foot BIG SCREEN TV with about \$40 worth of common particle board, screws, nails, hinges, corner braces. Finish to your choice of antique, paint, stain or varnish.
- Save \$2,000 or more! Why pay the store price for projection TV? Build in your home workshop or have cabinet shop do it for you.

### MONEY-BACK GUARANTEE

If you are not satisfied for any reason, return kit within 30 days after receipt for full refund.

© 1983, Mega-Projector Co.

MEGA-PROJECTOR CO., DEPT. PM34  
11610 Seminole Blvd., Largo, FL 33540

Yes, please rush me Big Screen TV system which includes Tube Mounted Lens Assembly and Cabinet Model design plans (\$49.95 value). Enclosed find \$29.95 plus \$3.00 shipping & handling... Total \$32.95. (Florida residents please add 5% for state tax.)

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_ Zip \_\_\_\_\_

### FREE BONUS!

Easy-to-follow, simple A-B-C design plans for cabinet—nationally advertised and sold at \$15.00—included FREE with your tube mounted lens kit. ORDER NOW!

Save Time! Save Money!  
Mill Supply Sells Over  
1,000 Different Die-Formed

## STEEL REPLACEMENT PANELS

To Repair Rust or Collision Damage  
on Many American Cars, Pick-up  
Trucks and Vans and Most Imports



Sheet Metal Info on Pick-ups and Vans **\$100**

Lists sheet metal parts and accessories available for Chevy, GMC, Plymouth Dodge vans and pick-ups, and Ford Econolines and Club Wagons. (\$2 Canada)

36-Page TABCO Import Car & Truck Catalog **\$200**

Lists over 1,000 steel replacement panels, fenders, hoods, grills, rockers, rear quarters, etc. (\$3 Canada)

Send check or money order; allow about 3 weeks for delivery. VISA and Mastercard accepted ON PARTS ORDERS ONLY.

Send self-addressed stamped long envelope for FREE information on any ONE American or import car or truck.



Dept. PM-403 **Mill Supply**  
3241 Superior Avenue • Cleveland, OH 44114  
Phone (216) 241-5072

## NOW! MAKE UP TO \$12.00 AN HOUR IN YOUR OWN BUSINESS!

Now you can quickly turn spare time into CASH profits! No selling or previous training needed. With this Complete Shop, you can be your own boss, set your own hours! Customers come to you... pay you cash to sharpen saws, knives, chisels, scissors, garden tools... all cutting edges.

Phone Toll Free 1-800-824-7888 Oper. 642  
Woodmaster, Dept. 45J,  
2849 Terrace, Kansas City, Mo. 64108

YES  please send me the FREE BOOK that gives full details.

Name \_\_\_\_\_ Please Print \_\_\_\_\_  
Address \_\_\_\_\_  
City/State \_\_\_\_\_ Zip \_\_\_\_\_



### How to make 60¢ worth \$20

Through a new, improved process you can repair windshields on location in only six minutes. Your cost—about sixty cents. Your price—twenty dollars or more. Repair is a welcome alternative to replacement costs of \$120-\$600... and offers 90% of original visibility.

#### OWN YOUR OWN BUSINESS—

This process including equipment to repair, instruction and training, optically matched resins are available on a franchise basis for only \$2,500.00. The business is typically 80% wholesale to dealerships, agencies & fleet owners. You go to them so overhead is low. For more information call Tom at (801) 254-0731 or write to:  
**UNIVERSAL Windshield Repair**  
9737 South 1600 West • South Jordan, Utah 84065

## FUN & FUNCTION

The  
**Skoot  
"Cub"**

Revolutionary  
U.S. made off-  
road motor  
vehicle anyone  
can ride



- Weighs only 50 lbs. Tough tubular steel frame quickly separates into two components for transporting.
- Dependable 50cc Tecumseh engine delivers approx. 125 MPG at 20 MPH. Factory warranted at over 16,000 Tecumseh Service Centers in the U.S. and Canada.
- Steel basket carries light loads.

Only \$395 plus UPS (Basket optional).

To order or for free color brochure call:  
Toll-free 1-800-228-0167  
In Nebraska: (402) 423-2776

Or write: **SUMMIT PRODUCTS, DEPT. I**  
P.O. Box 2555  
Lincoln, Nebraska 68502

Check, Money Order, VISA, MASTERCARD  
or AMERICAN EXPRESS.

## SANDING BELTS



	Per Doz.		Per Doz.
1x42 Mead, etc.	\$ 7.95	3x27 Porter Cable	\$11.00
2x17 1/2 Burgess	8.25	4x21 3/4 Skil	12.90
2x21 Porter Cable	8.50	4x24 Misc	13.50
2 1/4 x 21 1/2 Skil	8.95	4x27 Porter Cable	14.50
2 1/2 x 16	9.25	4 1/2 x 26 Skil	15.50
3x18 Wen, etc.	9.50	4x36 Hammond	17.75
3x21 Porter Cable	10.00	4x37 1/2 Atlas	18.25
3x23 3/4 Skil, Thor.	10.85	4x52 1/2 Walker	20.95
3x24 Porter Cable	10.90	4x54	21.75
		6x48 Delta-Sears	39.75

1. All belts cloth backed. 2. Specify for wood or metal.
3. Will Ship Assorted — Or Specify Grit
4. MONEY BACK GUARANTEE 5—Other sizes available at lowest prices—Please Inquire.

Include \$2.75 for postage and handling. Send check or money order. NYS Res. Add Tax.  
**JACKSON TOOL CORP., DEPT. SBR**  
27-55 Jackson Ave., Long Island City, N.Y. 11101

## GIANT 80 Page PERSONAL SURVIVAL CATALOG

Survival books - Self defense books -  
Knives - Silent arms - Exotic weapons  
-FREE survival tips: Send \$1.00 to  
SURVIVAL SYSTEMS  
BOX 30308, DEPT PM-3  
PHOENIX, AZ 85048



# EMCO REX 2000

**COMBINED JOINTER-THICKNESS  
PLANER with a 5-year FREE warranty  
you probably will never need**

The REX 2000 is one of the finest combination woodworking machines made today and it's priced below competition. With over 40 years of "Old-World" manufacturing excellence you are assured a machine that is inspected and tested then re-inspected and retested to ensure balance, smooth operation and unexcelled accuracy. The EMCO REX 2000 will stand up to years of cabinet making, remodeling or any woodworking and we stand behind each unit with the most comprehensive buyer protection plan available in shop tools today!

**The ONLY combined Jointer-Thickness Planer with:**

- 30-day Free Trial • 5-year Warranty
- Lifetime Maintenance Program

Call: **1-800-521-8289**  
In Ohio 614/445-8382

## emco USA™

Dept. PM-34R • 2080 Fairwood Avenue  
P.O. Box 07795 • Columbus, Ohio 43207

**FREE**  
*brochure and price list*



**5  
YEAR  
WARRANTY**

# Your home workshop can PAY-OFF

## BIG...

**START  
YOUR OWN  
MONEY  
MAKING  
BUSINESS!**

**Earn Extra Income  
Right At  
Home.**



**FOLEY  
BELSAW**

**3-IN-1  
Power Feed  
Power Tool.**

**SEND FOR  
FACTS TODAY!**

## Planer Molder Saw

**Three power tools in one—  
a real money-maker for you!**

The Planer/Molder/Saw is a versatile piece of machinery. It turns out profitable precision molding, trim, flooring, furniture... in all popular patterns. Rips, planes, molds separately... or all at once. Used by individual home craftsman, cabinet and picture framing shops, lumber yards, contractors and carpenters.

Never before has there been a three-way, heavy-duty woodworker that does so many jobs for so little cost. Saws to width, planes to desired thickness, and molds to any choice of patterns. Cuts any molding pattern you desire. Provides trouble-free performance. And is so simple to operate even beginners can use it!

**30-Day FREE Trial!** SEND FOR  
EXCITING FACTS  
**NO OBLIGATION—NO SALESMAN WILL CALL**

**RUSH COUPON  
TODAY!**

FOLEY-BELSAW CO.  
90443 FIELD BLDG.  
KANSAS CITY, MO. 64111

**FOLEY  
BELSAW**

Foley-Belsaw Co.  
90443 Field Bldg.  
Kansas City, Mo. 64111

**FREE  
BOOK**

**YES, please send me the FREE Booklet that gives me complete facts about your Planer-Molder-Saw and full details on how I can qualify for a 30-Day Free Trial right in my own shop. I understand there is No Obligation and that No Salesman will call.**

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

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

# CUSTOM

**WE CUSTOM-MAKE GLASS SCREENS  
TO FIT ANY ARCHED, ODD-SIZE  
OR STANDARD DIMENSION  
FIREPLACE OPENING.**

© The Iron Shop 1979, '82



We build our custom glass fireplace screens without compromise in materials or workmanship. The frames are crafted from heavy gauge steel. Hinges, latches and mesh curtains are all extra heavy duty. We'll not only build you a glass screen to fit, it could last as long as your fireplace.

Now on display at our new locations:

<b>Pomona, CA</b> (714) 598-5766	<b>Sarasota, FL</b> (813) 923-1479
<b>Houston, TX</b> (713) 789-0648	<b>Chicago, IL</b> (Opening April '84)

CALL OR WRITE FOR FREE BROCHURE

To: The Iron Shop, Dept. 117C, Box 128, 400 Reed Road,  
Broomall, Pa. 19008 Our Tel: (215) 544-7100

Name \_\_\_\_\_  
Street \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
We accept MasterCard, VISA and AMEX.

## THE IRON SHOP®

MANUFACTURERS

## GARDENING?

**NEW  
TIGER  
TILLER**

**WEIGHS 22 LBS. . . DOES 4 HOURS WORK  
IN ONE . . . BUSTS SOD . . . TILLS DEEP  
WEEDS FAST WITHOUT HARD WORK!**

**RUNS SINGLE HANDED . . . WON'T JUMP OR BOUNCE LIKE  
OTHER TILLERS . . . IMPROVES YOUR SOIL . . . MAKES  
YOUR GARDEN BETTER THAN OTHERS.**



Tills 18 in. wide, runs  
single handed.

Weeds between rows  
and plants, 12-9-6 and  
2 in. wide.

Gasoline powered, runs 8 hrs.  
on 1 gal., tills knee deep.

**One month money back trial period, send for  
free gardening guide . . . you might win a tiller.**

Not sold in stores . . . write for literature.

Write to Allentown Tiller Co. Dept. D  
c/o Allentown Feed Co. Main St. Allentown,  
N.J. 08501. For rush delivery of literature Call  
201-530-9380 Ask for Betty Allen



**New Ritchie Vertical Log  
Splitter. Designed for easy  
one man operation. 12 and  
15 ton models built to last.  
Information, send \$1.00.**

**RITCHIE ENTERPRISES,  
Rt. 1, Box 2246, Lopez, WA 98261**



# PM LONG-TERM CAR TESTS

## VW VANAGON

Big As A Truck; Useful, Too

## HONDA ACCORD

Japanese Virtue From Ohio

## DODGE CARAVAN

First Car-Sized Van

## JEEP CHEROKEE

Traditional 4wd In A  
Downsized Box



Volkswagen Vanagon (left) dwarfs the front-drive Dodge Caravan minivan. These two vans possess widely different appeals.



Downsized Jeep Cherokee was delivered in "perfect" weather.



We wanted a "Buy American" bumper sticker for our Honda.

What with new car introductions coming later and later in the year, there was a considerable gap between the time we turned in our last batch of long-term test cars and the time the new ones arrived. In fact, we've just barely broken in a few of them. Before we get to these new cars, we have some old business to attend to:

Our aerodynamic Audi 5000S has gone back, none the worse for wear, and we're still unable to be any more critical of this fine driver's car than in our initial long-term report (page 64, Nov. '83). The Chrysler New Yorker, too, an example of the domestic approach to luxury-car design and one of which Chrysler can be extremely

proud, has been returned. It never let us down despite our heavy-handed—and footed—treatment. In almost 5,000 miles of rushing from one assignment to another, we never did drive any distance with the cruise control on, and wound up with overall fuel economy between 20 and 21 mpg. Anyone who applies the tender loving care that comes with ownership can top that, we're sure.

### Dodge Caravan SE

First, they downsized pickup trucks. Then it was cars, 4x4s, and now it's vans. Chrysler is the first of the car manufacturers to bring out a domestically made minivan. Its so-called T-van

is probably the worst-kept secret in the auto industry. They have been leaking information and photos of it for over a year now. You may remember our initial report on the vehicle (*The Garage-able Van*, page 66, June '83).

The Dodge Caravan and Plymouth Voyager officially went on sale in January, and you can already see many of them on the road. I attended the official press preview at Pine Mountain, Ga., early last December and drove a Dodge Caravan back to New York City. They should have given me an order book, because I could have sold a dozen of them on the 900-mile trip.

I got a chance to sample a wide variety. [\(Please turn to page 172\)](#)



# WORTH WRITING FOR

LOOKING FOR IDEAS ON CAR CARE, TOOLS, BOATING, HOME IMPROVEMENTS & MORE? CHECK THESE LISTINGS. THEN USE THE COUPON BELOW.

## 808 UNFOILABLE OIL

Quaker State offers an information booklet to help you select the right automotive motor oil. Explains how different operating conditions and driving situations require different motor oils. Free

## 809 BETTER BOATING

30-page, full-color brochure from Mariner, illustrates and describes their entire line of outboard motors. Models to fit every boater's needs . . . motors from 200 to 2 horsepower as well as trolling motors and accessories. Free

## 810 THE PERFECT MATE

Locker Mate, a new product from Sioux Technology promotes neatness, organization and expands the utility of lockers wherever they are found. All metal . . . adjustable in width from 8" to 12". 25" high. Polymer coated for added strength and durability. Brochure free.

## 811 CRAFTSMAN'S CATALOG

Trend-Lines, a discount mail-order house, has just about everything a woodworker needs - books, plans, hand and power tools, sanding belts, saw blades, finishes and many other unique and useful items. Catalog \$1.00.

## 812 FIGHT ENGINE FRICTION

New formula lubricant can help improve mileage, performance and starting. Tufoil oil lubricant from Fluoramics explains how patented process can produce energy savings and reduce engine friction and wear. Brochure free.

## 813 WHALE OF A TIME

Brochure from Boston Whaler describes 26 of their boat models, ranging from 9 to 27 feet. Information includes testimony from owners on Whaler construction, safety and maintenance. Free

## 814 WORDS ON WINDOWS

24-page, full-color booklet from Andersen answers frequently asked questions about windows and gliding doors. Covers new construction, remodeling or replacement and also includes special sections on window planning. Free

## 815 YOU WOULD WOOD FINISH

Minwax offers a 22-page wood finishing booklet including tips that save time and trouble for do-it-yourselfers. Information on how to apply preservative stain to house exterior to restoring priceless antiques. The name of your nearest dealer provided. Free

## 816 SPRING IN BLOOM

32-pages of plants and trees, flowers and fruit in full-color. Spring sale catalog from House of Wesley will assist you in planting a complete garden, landscape and beautify your home. Free

## 817 PLENTY OF PLANS

POPULAR MECHANICS all new 1984 "Plans and Ideas" catalog . . . Over 900 ideas on workshop projects, plans for shop tools, storage houses, boats, furniture, toys—just about everything! \$1.00

## 818 THE HARDWARE STORE IN YOUR MAILBOX

96-page, colorfully illustrated catalog from DRI Industries. Shop from your home or office for all your do-it-yourself repair and building needs. Over 1,500 items . . . select from fasteners, tools and organizers. Free

## 819 SKI INDOORS & STAY FIT

Duplicate cross country skiing motion with a jarless total body, cardiovascular exerciser. 8-page, full-color brochure from NordicTrack discusses equipment specifications, as well as exercise and caloric information. Free

## 820 DO-IT-YOURSELF LIBRARY

Carbook's 32-page catalog of do-it-yourself books covers virtually everything of interest to people who enjoy working with their hands. Over 1,000 titles, ranging from cars and trucks to aircraft and boats . . . wood-working and metalworking to electronics and computers. \$1.00

## 821 OUTDOOR OUTFITS FOR ALL SEASONS

Cabela's presents thousands of quality items for fishing, hunting and outdoor recreation in seasonal catalogs. Five catalogs per year. Free

## 822 PUT A NEW WOOD FACE ON

Here's a new 1984 catalog featuring a broad choice of veneers, inlays, pre-joined veneer faces and supplies for the veneer crafter. Also includes embossed wood moldings, chair cane and hardwood lumber. From Bob Morgan Woodworking Supplies. 50¢

## 823 DO-IT-YOURSELF DREAM HOUSE

The new factory-made houses offer you top-notch construction at savings up to 50%! Many manufacturers will also make all the parts for a custom house from *your* plans. Build the house yourself or have it built. Brochure lists 150 name and addresses of manufacturers of houses. The Building Institute. 50¢

## 824 KNIFE KNOW-HOW

16-page, informative booklet from Buck Knives shows how to sharpen a knife, field-dress a deer, skin/fillet fish. Also includes safety techniques and much more. Free

## 825 SAWING SAFELY

A full-color, 16-page guide to safe and efficient chain saw use. Also includes maintenance tips. From Husqvarna. 25¢

## 826 WONDERFUL WOOD FINISHES

8-page, 4-color booklet from Watco-Dennis shows how to create professional finishes the first time with all types of wood. Watco Danish Oil seals, primes, finishes, hardens, protects, beautifies and penetrates . . . in one application. No pre-staining needed. Free

## 827 FUN-FILLED CATALOG

Things you never knew existed. New, 1984 80-page catalog of 1600 hard to get novelties, jokes, tricks, outdoor items, hobbies, sports, science, electronics, models, gadgets and more. From Johnson Smith Co. 10¢

## 828 DISCOUNT CATALOG

100-pages . . . from air compressors to winches . . . with log splitters and parts to build your own. Trailer parts, gas engines, generators, chain saws and accessories. From Northern Hydraulics. Free

## 829 GET HITCHED

15 page, full-color Hitch Guide from U-Haul tells you how to choose the right hitch for your make and model car, safety towing tips and a complete description of towing accessories. Free

## 830 GENTLEMEN FARMERS AND WEEKEND GARDENERS

16-page, full-color brochure from Gilson illustrates their lawn and garden tractors, mowers and tillers. Information on specifications, accessories, safety and warranties also included. Free

## 831 NEW WAY TO REMEMBER

A unique approach to memory improvement is provided by easy-to-read, easy-to-apply book entitled INSTANT MEMORY. Uses natural ability of your mind to recall . . . no word association. Introductory information. Free

## 832 CAR CARE . . . AT YOUR FINGERTIPS

If you drive a car, you need POPULAR MECHANICS' Master Keys to Car Care. This information-packed series of illustrated brochures contains step-by-step instructions to help you maintain your car and keep it looking like new. Convenient-size makes this valuable guide the handiest tool in your car care kit. \$5.45

Popular Mechanics 3/84  
Box 1718, Sandusky, Ohio 44870

Please see that I receive the items checked below

- |                                     |                              |                                     |                                  |
|-------------------------------------|------------------------------|-------------------------------------|----------------------------------|
| <input type="checkbox"/> 808        | <input type="checkbox"/> 813 | <input type="checkbox"/> 818        | <input type="checkbox"/> 823 50¢ |
| <input type="checkbox"/> 809        | <input type="checkbox"/> 814 | <input type="checkbox"/> 819        | <input type="checkbox"/> 824     |
| <input type="checkbox"/> 810        | <input type="checkbox"/> 815 | <input type="checkbox"/> 820 \$1.00 | <input type="checkbox"/> 825 25¢ |
| <input type="checkbox"/> 811 \$1.00 | <input type="checkbox"/> 816 | <input type="checkbox"/> 821        | <input type="checkbox"/> 826     |
| <input type="checkbox"/> 812        | <input type="checkbox"/> 817 | <input type="checkbox"/> 822 50¢    | <input type="checkbox"/> 827 10¢ |

- |                                     |                                       |
|-------------------------------------|---------------------------------------|
| <input type="checkbox"/> 828        | Total money for priced items \$ _____ |
| <input type="checkbox"/> 829        | Service Charge \$ _____50             |
| <input type="checkbox"/> 830        | Total money enclosed \$ _____         |
| <input type="checkbox"/> 831        | Total items requested _____           |
| <input type="checkbox"/> 832 \$5.45 |                                       |

This Coupon Expires May 31, 1984

Name (Please Print) \_\_\_\_\_

Address \_\_\_\_\_

Town \_\_\_\_\_ State \_\_\_\_\_ Zip Code \_\_\_\_\_

(Please send cash, 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.



# FREE 80 PAGE CATALOG



80 pages packed with products at super savings for clock building and woodworking. **American made** quartz movements, woodworking tools at discount prices, clockbuilding plans, and new pre-cut hardwood clock kits. Hundreds and hundreds of unique and interesting items at the lowest prices you can find. Great for the hobbyist, essential for the craftsman. Mail coupon today, or call:



(414) 248-1150



**KLOCKIT**  
DEPT. PM34  
P.O. BOX 542  
LAKE GENEVA, WI 53147

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

For faster delivery include \$1 for 1st class mailing.

## THE INCREDIBLE NEW PROFIT MACHINE!!

### Versa-Fry



Makes: Regular-size donuts, mini-donuts, rosettes, funnel cakes (2 sizes) plus any fried foods.

Delicious taste, exciting aroma attracts customers. They watch, they buy, you make big money.

Ideal for fairs, public events, fund raising, specialty restaurants.

- Designed for quality, safety
- Stainless steel and aluminum
- Plugs into standard 110-volt outlet
- Easy to operate—complete instructions
- Financing available

Call TOLL FREE 1-800-328-8213  
or write (including phone number)

### AMERICAN FOOD LINES, INC.

A Quantum Group Company  
9651 13th Ave. No., Dept 73B  
Minneapolis, Minnesota 55441

## LONG-TERM TESTS

(Continued from page 170)

ety of T-vans with various options at the press preview. The front-drive T-van is available with a five-speed manual transmission or a three-speed automatic and Chrysler's 2.2-liter, four-cylinder engine, or with the automatic and Mitsubishi's 2.6-liter Four. While the 2.2 might be fine in the Great Plains, it doesn't have enough power with either transmission to handle hills. The 2.6 is no dragster either, but at least it can get uphill, merge with highway traffic and generally get out of its own way.

Chrysler has promised to introduce a wide-ratio five-speed early in the year, and this should give the 2.2 better acceleration through the gears. If you want a five-speed, insist on the wide-ratio unit, and test-drive it to see if it will do the job.

I found the stick shift lever a bit short. It felt like I was groping for change on the floor every time I had to change gears.

### Carl-like emphasis

During the preview, the Chrysler public relations people constantly referred to the vehicle as a car, not a truck or van. And it *is* more carlike than trucklike, despite its van silhouette. The T-van is built on Chrysler's K-car platform, so it is no longer than an Aries or Reliant, although it's 4 inches wider. The T-van takes up less space and handles better than a full-size wagon. It's much easier to park, maneuver, drive and garage than a full-size van, and will no doubt appeal to people who want seven seats, but don't want to drive a truck.

With this in mind, I selected the most carlike version for our long-term test—a loaded SE with automatic, 2.6 engine, velour upholstery, seven seats (you have a choice of one, two, five or seven seats in the T-van), cruise control, power steering, seats and door locks, Goodyear's new Vector all-season tires, a roof rack, rear washer/wiper, plus a four-speaker stereo system. Sticker price was \$12,935. The base model starts at \$8,678. The single-seat commercial van base price is \$7,595.

PM's van does not have power windows, the handling suspension or two-tone paint, so its price could have been even higher.

Options cost about the same as a K-car (the 2.6 engine, for example, is \$259). Chrysler has certified the T-van as a truck, so you must register it as a multipurpose vehicle in most states, and this could affect license and insurance fees.

There are many thoughtful touches in the T-van. Instead of a tiny glove compartment, there is a big dresser

drawer under the passenger seat. Both buckets and the two-place bench have fold-down arm rests. Six of the seven seatbelts have inertia reel retractors (the exception is the center position on the three-place bench). Seatbelts are anchored to the sturdy benches, so the benches can be quickly and easily installed, swapped, or removed. There are two lights under the rear liftgate that illuminate the ground as well as the small cargo bin. The spare tire is stored under the cargo floor and is lowered to the ground (or stowed) by a cable and winch system when you use the lug wrench to turn a nut under the carpeting. One option we would have liked is the remote-control rear vent windows. Twisting knobs on the ceiling near the driver opens or closes the pivoting rear side windows via cables.

So far, we've driven the Caravan 1,600 miles, and we do have a few complaints. The sliding side door is difficult for kids to close properly. If it's not slammed tight, it hangs up half-latched and is hard to unstuck. The rear seatback and the sliding door track began to rattle as soon as we hit New York City's infamous potholes. And the engine stumbles a bit on cold mornings. We'll see if the dealer can fix this.

The compact size, while it is handy and cute, does have one drawback—you have to make a choice between people or cargo. Unlike a full-size van, you can't fit seven people plus their vacation luggage into a T-van. And the bench seats are a squeeze for seven adults. But it's easy to get in and out of. The seats are only an inch or two higher than a car's.

To date, it's been a ball to drive. Everyone loves it and asks us a million questions about it. I got 19 mpg on the highway and 18.2 in commuting. The aerodynamic shape, with its flush windshield, nearly eliminates wind noise, making this a comfortable van to drive long distances. And my son's entire Boy Scout troop now thinks I'm pretty cool.—W.H.

### Volkswagen Vanagon

Everyone still thinks of the VW as the original minivan. However, the Vanagon has grown considerably from the original VW Microbus—in sophistication, power and size. It's almost as big as a conventional Ford, Chevy, or Dodge van, with 201 cu. ft. of cargo space. The seven seats are upright and roomy enough for adults. Even with seven passengers aboard, there's room for 49.7 cu. ft. of luggage behind the rear bench.

The new water-cooled rear engine is a big improvement over the old air-cooled unit, both in power output and noise. You can still hear the familiar VW flat-Four bleat, but it seems far



away now, not upside your head. Although the new *Wasserboxer* engine produces only 82 hp, the very wide-ratio four-speed manual transmission gives the Vanagon brisk acceleration—up to 20 mph in *FIRST*, 40 mph in *SECOND* and 65 mph in *THIRD*. You get quite a bit of engine roar if you wind it up this high, and there's no tachometer. However, the shift points are indicated on the speedometer dial and there is an ignition cutout that prevents over-revving.

Jumping back and forth between the Vanagon and T-van, as I have done, I was very aware of the trucklike qualities of the VW. It's big and square. You have to climb up into it and remember not to fall out! There is a loud wind roar at highway speeds. The 3-foot-long shift lever is awkward to use, and forced me to lean forward to reach *THIRD*. All very trucky.

The Vanagon gives its driver a new appreciation of the phrase "forward control position." You literally sit on top of the front wheel, with your arms and legs out in front of it. Although forward visibility is great, it takes a few tries before you learn not to cut corners too tight.



Forward control position of the Vanagon puts you off until you get used to it.

The compensation for this rather bizarre way to drive is room—tons of it. When the five of us went shopping for a Christmas tree, we took the Vanagon, not the T-van, and we didn't have to put the tree on the roof, either. For a rig this big, we've been getting an excellent 19.3 mpg in daily commuting and around-town shopping.

There have been a few disappointments in the 650 miles I've driven it so far. With 3,700 miles on the clock, I discovered a coolant puddle under the engine. It was running along an exhaust header and may have come from the block or a hose. It was impos-

sible to tell. I refilled the reservoir tank and made a note to have a dealer check it out.

I never tried to remove the bench seats because it requires a lot of wrench work and it never was necessary. All the bench seatbelts are old-fashioned, nonretractable types. They are difficult to adjust, especially for children, which discourages their use. It is almost impossible to secure an infant seat with such belts.

#### Awkward filler

The filler for the windshield reservoir is under the carpeting in the driver's

footwell. It's awkward to fill without a funnel and you can't tell it's full until it overflows. The job was made a good deal more difficult on our Vanagon because some overzealous assembly line worker had glued the carpet over the cap.

Although a rear window wiper/washer is available, our Vanagon was not equipped with this option. Foul weather convinced me that it is absolutely necessary on any van for decent rearward vision. Actually, for a base price of \$11,700, the rear wiper/washer should be standard.—*W.H.*

(Please turn to page 174)

## WITHOUT OIL ANALYSIS, CAR LEASING COMPANIES, TRUCK FLEETS AND AIRLINES WON'T MOVE. NEITHER SHOULD YOUR VEHICLE.

\*\*\*\* IMPORTANT REPORT \*\*\*\* IMPORTANT REPORT \*\*\*\* IMPORTANT REPORT \*\*\*\*

### ENGINE REPORT

CRITICAL WEAR CONDITIONS  
PISTON, RING & LINER WEAR  
DRAIN OIL  
CHANGE OIL FILTERS  
INSPECT TURBOCHARGER OR BLOWER FOR WEAR  
CHECK AIR TO FUEL RATIO  
CHECK AIR INDUCTION/FILTRATION SYSTEM FOR LEAKS  
CHECK CRANKCASE BREATHER FOR RESTRICTIONS  
CHECK BLOW BY/COMPRESSION

\*\*\*\* IMPORTANT REPORT \*\*\*\* IMPORTANT REPORT \*\*\*\* IMPORTANT REPORT \*\*\*\*

### TRANSMISSION REPORT

TESTS INDICATE ABNORMAL UNIT WEAR  
CLUTCH WEAR  
OIL COOLER LEAKING  
DRAIN OIL  
INSPECT CLUTCHES  
CHECK OIL COOLER  
FLUSH THE SYSTEM  
RESAMPLE AFTER INSPECTION CORRECTIVE ACTION  
FEEDBACK LAB#756-INSPECTION REVEALED FAULTY OIL COOLER

"IF YOU WANT YOUR CAR IN TOP CONDITION. IF YOU PLAN TO GET MAXIMUM USE OUT OF YOUR CAR BEFORE YOU TRADE IT IN, OIL ANALYSIS CAN BE A USEFUL TOOL."... *Popular Science Magazine.*

You take care of your car, change oil regularly, and have routine maintenance performed. You treat your vehicle like the fine machine it is. Whether you do the repairs or pay for the work done, you need the least expensive and most efficient methods used by large corporations and governmental agencies — having engine oil and transmission oil undergo spectroscopic analysis. Then you will know what should be done and can tell your mechanic what is needed. No more unnecessary, costly work!

**What is oil analysis?** Just as a blood test tells the physician what is going on in the human body, spectroscopic analysis provides information for a computerized report on an engine or transmission. Oil is analyzed for metal content providing information on unit wear, coolant dilution, dirt, as well as fuel dilution and total solids. This information is translated into recommended maintenance.

Precision Diagnostics, Inc., specializing in top quality, accurate, scientific oil analysis makes **TWO** tests available to you — engine oil analysis and transmission oil analysis. Computer printouts provide information on needed work and explain the meaning of the spectroscopic findings. These are the same tests that have been provided to industry and government for twenty three years and are available to consumers for the first time.

#### WHO USES OIL ANALYSIS?

Car Leasing Companies  
Agriculture & Farming  
U.S. Army Corp.  
of Engineers

Airlines  
City of Chicago  
Amtrak

Truck Fleets  
City of Los Angeles  
Insurance Companies  
So. Calif. Rapid Transit District

#### WHEN TO USE OIL ANALYSIS

- Every 15,000 miles or sooner if your engine or transmission loses efficiency or sounds bad.
- Before you sell a car, to command a top price.
- Before you buy a used car.
- Before your new car warranty expires.

Order spectroscopic oil analysis kits **now** for your car, truck, boat and airplane — for their engines and transmissions. This small expenditure provides information that could save hundreds of maintenance dollars!

Mail to: Precision Diagnostics, Inc., 777 Silver Spur Rd., Suite 132  
Rolling Hills Estates, CA 90274, Attn: Department 301

Ship to:  
Your name (print) \_\_\_\_\_  
Street address & apt. no. \_\_\_\_\_  
City, state, zip code \_\_\_\_\_  
Enclosed is check or money order only for \$ \_\_\_\_\_  
Charge my  Master Charge  Visa Card \_\_\_\_\_ (Charge card No.) \_\_\_\_\_  
Expiration Date \_\_\_\_\_ (Signature charge orders)

Check No. of Kits Ordered	Price	Sub-total
<input type="checkbox"/> 1	\$18.95	\$ _____
<input type="checkbox"/> 2	\$35.00	\$ _____
<input type="checkbox"/> 3	\$51.00	\$ _____
<input type="checkbox"/> 4	\$67.00	\$ _____

Add \$2<sup>00</sup> per kit for shipping & handling

Total \$ \_\_\_\_\_

How many of the tests ordered are for aircraft? \_\_\_\_\_



## LONG-TERM TESTS

(Continued from page 173)

### Jeep Cherokee Chief

I took delivery on our long-term Jeep Cherokee Chief on the best day of the year—the worst day. Detroit experienced its first major snowstorm of the season that day, turning a short 12-mile trip from downtown out to AMC into a 70-minute nightmare. It took me only 20 minutes to get home, in traffic.

The downsized Cherokee XJ is a likely key to profitability for struggling American Motors. About 20,000 1984 Cherokees have already been sold. Ini-

tial planning for the entire year had been only 40,000, so sales are far ahead of expectations. Price, apparently, is no object to Jeep buyers. Base price for the Cherokee is \$9,995, and the sticker for our Jeep, which is typical of the optioning process, inflated that to \$15,376. That's \$5,015 worth of options, plus a \$368 transportation charge.

Our long-term test vehicle was equipped as we think most people would want it. The Cherokee Chief package over a red exterior is the most striking visual combination, and the fat Goodyear all-terrain tires on AMC's

optional aluminum wheels enhance this rugged appeal.

This Jeep just *laughs* at snow. Command-Trac 4wd can be engaged on the fly, and the five-speed gearbox coupled to AMC's new 2.5-liter Four provide a good combination of power and economy for this type of vehicle. The very first tankful of unleaded regular gave a 15.3-mpg return on the investment, despite our youthful exuberance and the resulting four-wheel spin when accelerating away from stoplights in the snow.

We'll put a lot of miles on this Jeep in the next three months or so, including trips down to Florida and up into the wilderness of Michigan's snowbound Upper Peninsula. Stay tuned.—D.C.R.

### Honda Accord

"Starting now. Made over here." That's the way Honda announced its 1983 four-door Accord when "the first Japanese car built in the United States" rolled off the production line in Marysville, Ohio.

The car we tested for half a year showed little evidence that it came from a brand-new manufacturing plant in a country foreign to its origin.

Typically Honda, with all the nice little touches one expects, it was well put together and performed flawlessly up to the time we returned it with 14,220 miles on the odometer. (We did suffer through one fuel-line freeze-up in 2° F. weather, but I'm blaming the gas for that problem.)

Sure, with an automatic transmission, its 1,751-cc engine doesn't rocket you away from stoplights, but it's amply powered for family transportation.

The '83 Accord's transmission is another first, according to Honda: The first four-speed automatic in a front-wheel-drive car in the United States. It features a lockup torque converter which "significantly closes the gap between five-speed and automatic mileage figures." Its EPA estimated mpg is 29 city, 40 highway. We calculated overall mileage at 31 mpg during our test driving. (That included some stationary engine running just to keep warm during this past, frigid winter.)

The lockup torque converter gave me a bit of concern early on. As the car approached highway speed, I thought the engine was surging, but was assured it was normal. After that, no problem.

The Accord's bunch of standard equipment includes cruise control and power-assisted front disc brakes, to name just two. Handsome inside and out, the dark gray model we drove is, for my taste, one of the best-looking cars on the road—and even nicer with its facelift for '84.—J.A.L.

There is only ONE leader... Wheel Horse. We invite you to compare. This Work Horse LT-1100 3-speed lawn tractor is backed by the same Wheel Horse engineering and design excellence, and is available at a price you can afford. This spring, you won't find a better "quality value" in a lawn tractor anywhere!

**WORK HORSE**

by  **Wheel Horse**

Quality. At an affordable price.



\*Base price for tractor only. Mowers and other attachments optional — available at participating Wheel Horse dealers only. Freight, dealer prep, delivery, state and local tax not included.

Manufactured by Wheel Horse Products, Inc., South Bend, Indiana. 1-800-348-2424. In Indiana, call 1-800-552-3333.



Get these professional advantages at no extra cost  
when you take Locksmithing Institute training.

# BE A LOCKSMITH!



Learn the money-making art of Locksmithing! Home study with the famous Locksmithing Institute is like an actual apprenticeship...in your OWN well-equipped lock shop. You work under a Master Locksmith instructor, receive your own electric

key machine, locks, keys, parts, picks—all at a price many graduates say would be fair for just the instruction!

### START NOW!

In mere weeks you can be ready to make money copying keys or installing locks. Later, you can get into even *more* profitable areas of locksmithing. Our course also includes a special unit on Fire and Burglar Alarm Systems—another field with new earning potential

due to rising crime. The Institute, of course, can't guarantee you a job or income, but we have successfully trained thousands of men and women with basic mechanical aptitude in this most essential profession. If you can study at least 1 hour a week, we can do the same for you. Write us. It *could* be the key to a new future!



Approved by N.J. Commissioner of Education. State Approved Diploma. Approved for Veterans.

## LOCKSMITHING INSTITUTE

Established 1948 • Division of Technical Home Study Schools  
Little Falls, New Jersey 07424



### SEND TODAY FOR FREE BOOKLET

TO: Locksmithing Institute, Dept. 110-034 Little Falls, New Jersey 07424

Please send FREE Opportunity Booklet and sample lesson materials. No obligation. No salesman will call.

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

Check here if Veteran



"I have already master keyed my Elks Lodge and 38 apartments...so you see my locksmith course is practically paid for! I was never so enthused with lessons in my entire life!"

Adelindo Orsi, Jr.,  
Azusa, Calif.



"The lessons, materials and instructors were EXCELLENT... I really enjoyed the Locksmithing course. Am telling my friends about the course, as it is well worth the tuition."

Frank R. Bishop,  
Holt, Mich.

## NEW! FROG PHONE

FREE GIFT!  
Key Ring/Digital  
Clock/Tape  
Measure.  
\$9.95  
value.



Special Offer \$24.95 (Reg. \$38.95)

Frog Phones are uniquely designed, touch tone telephones that make great gifts. The eyes light up when receiving a call. Comes in green with beige base. Size: 5" H x 3 1/2" W x 2 3/4" D. Also available in Panda and FireFly designs.

SAVE \$14 by buying direct from the importer plus get a FREE gift valued at \$9.95.

**NO RISK OFFER** Satisfaction Guaranteed. Return the Frog Phone within 30 days for a prompt and full refund. Keep the Key Ring/Clock as a gift. **Guaranteed Delivery:** Send money order for last one week delivery. Tel: 201/641-1185.

P.B.I., Inc., 11 Moonachie Road, Dept. M-2, Moonachie, N.J. 07074.

Frog Phone  Panda  Firefly @ \$24.95 ea. plus \$2.95 for p. & h.

\$\_\_\_\_\_ Check or Money Order enclosed. N.J. residents add sales tax.

Name \_\_\_\_\_

Street Address \_\_\_\_\_

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

## NEW HOME OWNERSHIP

Do You Have What It Takes?



### TAKE THE TEST

- |  | YES                      | NO                       |
|--|--------------------------|--------------------------|
| 1. Do you want a beautiful new home?<br>(Select from over 50 plans.)   | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Do you own land?<br>Do you have the means to acquire land?<br>(Your lot may not have to be fully paid for.)                     | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Are you willing to do some of the work yourself?<br>(Save thousands of dollars — build it yourself with our pre-cut materials.) | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Do you have a combined income of \$18,000 or more?<br>(No down payment required — 100% construction financing available.)       | <input type="checkbox"/> | <input type="checkbox"/> |

Get started on your new home today. Fill out the information below and mail the above test results at once!

Please send me (check one):  Free color brochure  
 80 page, full color catalog.  
(Please enclose \$3 check or money order.)

PHONE NUMBER ( ) \_\_\_\_\_

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_

ZIP \_\_\_\_\_

MPM5-0384

## Miles Homes

4700 Nathan Lane, P.O. Box 9495  
Mpls., MN 55440

You're Miles ahead with  
no down payment.



# How To Frame And Finish A Basement Window

**A** common problem is encountered by many homeowners when remodeling a basement: how to frame and finish a window that is recessed back from the foundation wall. The answer: Install an extension window jamb made of 1×6 or 1×8 No. 2 pine ripped to the appropriate width.

First, frame out a rough opening around each window with 2×3s. Cut the header and sill 2 in. longer than the window width. Nail the header 1 in. above the window opening and the sill 1 in. below the window.

Next, determine the width of the jamb. Measure the distance from the window frame to the *finished* wall, then rip the pine stock accordingly.

Here's an easy-to-build extension jamb for covering basement utility windows.

BY GENE and KATIE HAMILTON  
Photographs by Gene Hamilton

Cut and assemble the jamb so that its inside dimensions clear the window opening by at least ¼ in. on all sides. Assemble the jamb using 2-in. finishing nails and butt-joined corners. Next, hold the jamb in the rough window opening and use cedar shingles to shim it into position. Be certain that the

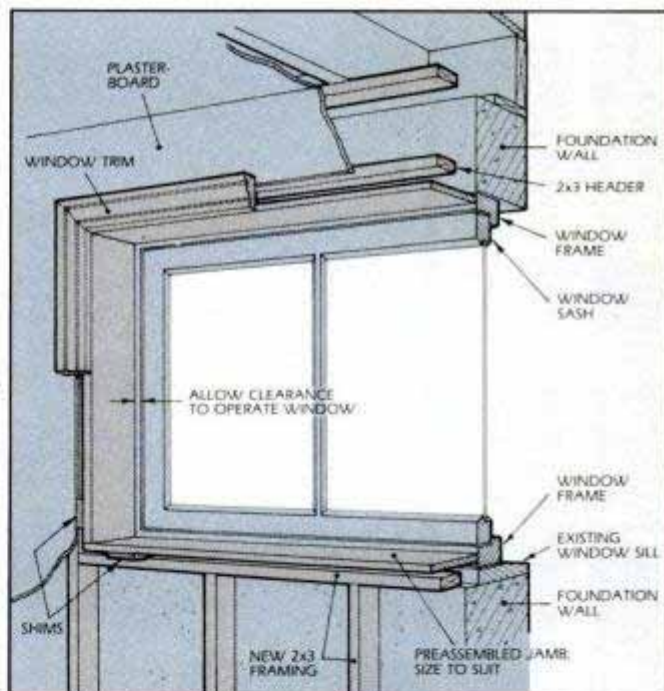
bottom of the jamb is level with the window opening and that the jamb sides align with the window frame.

Check the jamb for square and then drive 2½-in. casing nails through the jamb and shims and partially into the 2×3 framing. Once again, check the jamb for square before driving the nails all the way in. Then, toenail the back of the jamb into the window frame using 1½-in. finishing nails. Apply caulking where the jamb meets the frame.

Finish the wall with plasterboard or paneling. The finished wall should be flush with the jamb. Finally, trim the window opening with casing molding. Paint or stain the jamb and trim as desired. **PM**



While framing out the basement walls, build a rough opening around the window that is at least 2 in. larger on all sides.



Preassemble the jamb before you nail it into the rough opening. You should use 2-in. finishing nails and simple butt joints.



Use shims to hold the jamb in position for nailing. Be sure to check the jamb for square before you drive in the nails.



The finishing touches include casing molding around the window opening and slim blinds for privacy when needed.



# Build Yourself the Simple Life. For Less.



For many, log home living means a simpler, more economical way of life. If that's what you want, look to Lincoln Logs Ltd. We feature a lower total erected cost than comparable models from other major manufacturers.

Why? Because Lincoln Log homes are pre-engineered—not pre-cut or numbered, which adds to the cost of log homes and restricts freedom to customize or correct errors on-the-job.

Lincoln Log home packages are complete (you even get roof system, hardware and nails). And a wide range of options is available for you to add later, if you desire.

Write for your Lincoln Logs plans kit. Send the

coupon with check or money order for \$6.00. Or call 800-833-2461 (in New York State call 518-494-2426). MasterCard and Visa accepted. Exclusive Dealership Territories Available

**Simple Log Home Living.  
For Less.**



The Original  
**Lincoln Logs Ltd.**

© 1982, Lincoln Logs Ltd.

Lincoln Logs Ltd.  
16034 Riverside Drive, Chestertown, NY 12817

Enclosed is my \$6.00. Please rush me my full color plans kit.

Name \_\_\_\_\_

Address \_\_\_\_\_

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

County \_\_\_\_\_

Phone (\_\_\_\_) \_\_\_\_\_

## INTRODUCING...



**THE QUICKER UNSTICKER,  
THE BETTER PROTECTOR.**

Developed by

**RONSON**  
CORPORATION

**EARN UP TO  
\$12 AN HOUR**

**IN YOUR OWN  
SPARE  
TIME or  
FULL TIME  
SHARPENING BUSINESS!**



**ON OUR  
30-DAY  
FREE  
TRIAL  
OFFER**

You risk nothing by accepting this offer to see how easily you can turn your spare time into big Cash Profits with your own Complete Sharpening Shop. No selling... no previous experience needed. Our famous Sharp-All and show-how instruction set you up to make \$200, \$500, \$700 a month CASH sharpening Saws, Knives, Scissors, Lawnmowers, Shop and Garden Tools... all cutting edges.



Send for all the facts! Our free Book tells how to start a profitable, lifetime home sharpening business, how we help you grow, how we'll finance you.

Send for FREE details — mail coupon below or postcard TODAY!  
Foley Belsaw Co. 80320 Field Building, Kansas City, Mo. 64111

**No Obligation... No Salesman Will Call**

• YES,  FOLEY BELSAW CO. 80320 FIELD BLDG., KANSAS CITY, MO. 64111  
please send me the **FREE BOOK** that gives full details.

Name \_\_\_\_\_ Phone/Fax \_\_\_\_\_

Address \_\_\_\_\_

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

**Free Vigor® Tool Catalog**  
244 Pages of  
**Hard to Find Precision Tools.**

**With Purchase of: PK-35—Set of 5  
VIGOR® HOBBYCRAFT PLIERS AND NIP-  
PERS with CUSHION GRIP HANDLES**

Fine quality, well made lap joint, polished heads.

**Flat Nose** for holding flat or square objects to make angular bends.

**Chain Nose** for twisting, gripping, or for loops.

**Round Nose** for making bends, loops, coils or for twisting wire.

**Side Cutter**—Pointed nose.

**End Cutter** for heavy duty cutting.



Smooth Jaws 4 1/2" Long

Set of 5 pliers Plus FREE 244 page \$15.95 Post Paid in Continental U.S.A.

Catalog Only \$2.50 —refunded on first catalog order.

**CHECK OR MONEY ORDER  
PLEASE PRINT CLEARLY**

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

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

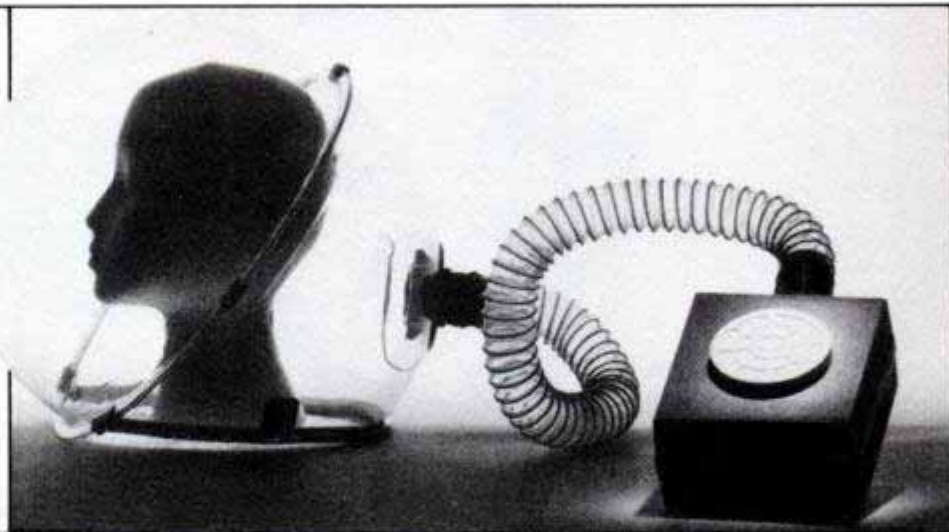
**GOLDMANS**  
P.O. Box 2160 Dept. 184  
Hempstead, N.Y. 11550



# PRODUCT UPDATE

## Breathing easily

Many allergy sufferers don't develop symptoms unless exposed to dust or pollen for hours. They inhale tiny particles until a threshold is reached and their eyes tear or they begin to cough. Now comes the Hincherton Hayfever Helmet, a space-age plastic bubble attached to a battery-powered, fan-driven filter you wear on your belt. Use it for an hour, and you can be exposed to dust or pollen for several hours without developing symptoms. For more information, consult your physician and write: Level Seven, 1924 Arlington, Charlottesville, Va. 22903.



## Ruler/Calculator/Clock

The RC-258 from PM Industries (no

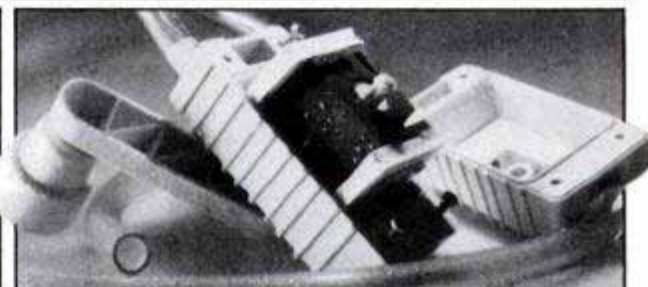
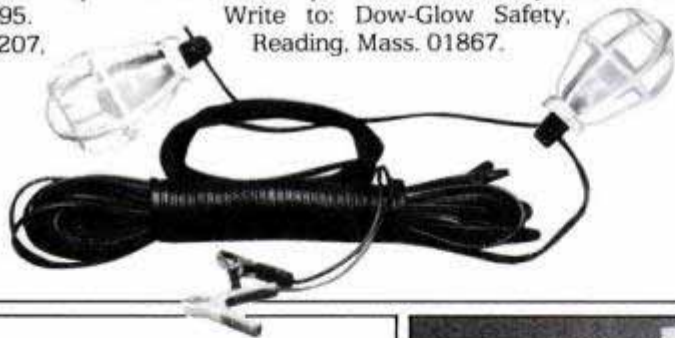


relation to us) is a 12-inch ruler with English and metric numbers. It has a digital clock and a removable calcula-

tor. The package costs \$19.95 through PM Industries, 5946 Kester Ave., Van Nuys, Calif. 91411.

## Newer lights

The Emergency Lighting System consists of a pair of caged bulbs. Alligator clips hook them to any 12-volt car battery. A set costs \$19.95. Write to: Dow-Glow Safety, Box 207, Reading, Mass. 01867.

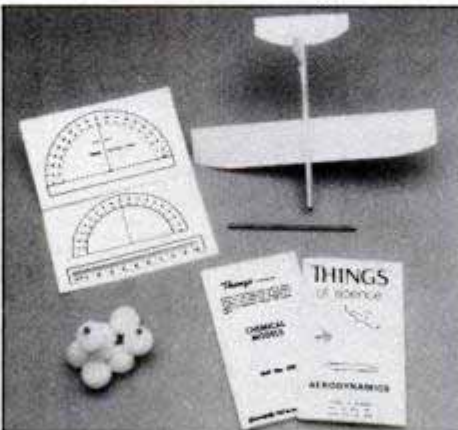


## Pump by hand

The PalmPump costs \$30. Write to Stanfill Associates, 2759 South Raleigh, Denver, Colo. 80236.

## Better view

Gor-Vue's \$125 arc-welding helmet's lens gets darker or lighter depending on the intensity of the welding light. Write to: Gor-Vue 29085 Sollin Rd., Cleveland, Ohio 44139.



## Things of science

A variety of interesting do-it-yourself experiments. From \$2. Write to: Things of Science, RD1, Box 130, Newtown, Pa. 18940.



## Energy snoop

The heat sensor in the E/One snoop picks up heat loss through any wall or window. It operates on a 9-volt battery. Follow the instruction manual and you can conduct your own home energy audit. It costs \$47 from Environment One, 2773 Balltown Rd., Schenectady, N.Y. 12301.

PM





# NORTHERN HYDRAULICS

## DISCOUNT PARTS AND EQUIPMENT!

Prices Good Thru April 1, 1984

### HEAVY DUTY LOG SPLITTERS

#### 12 1/2 ton Homeowner Special -



Heavy Duty Slide, 5 HP engine combined with 11 GPM 2 stage pump. Auto detent valve. 8" wedge. 3 Gallon Tank with Filter & Strainer. Large Pneumatic Low or High Speed wheels. 1 1/2" Hitch

Low Speed #1128 **\$729**  
High Speed #1125 **\$739**  
Will Ship 48 States for \$60.

#### 15 1/2 ton



Heavy Duty 4" x 24" cylinder, 5 gal Reservoir, 11 gal 2 Stage pump. 5 Hp Motor, 8" Hydraulic Wedge, Suction Strainer, Filter, 480 x 8" High Speed Tires, 1 1/2" Hitch, Heavy Duty Frame. These will split the toughest trees. High and Low Profile only **\$869**

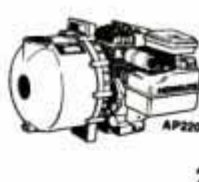
Will Ship 48 States \$80.

#### A 24 1/2 ton Block Buster

12" Wedge, 5" Bore x 24" Stroke cylinder, 7 gal Tank, 15 gal 2 Stage pump, 10 Hp. Motor. Auto detent valve.

Low Profile #1142 **\$1399**  
High Profile #1140 **\$1599**

Will Ship 48 States \$100.  
(Must include Frt at time of order or we will ship Frt Collect.)  
Toughest frame in the industry.



#### 1. Gas Engines (Horiz. and Vert.)

Horiz. 5 Hp. Briggs 3/4" Shaft #6052

5 Hp. Tecumseh 3/4" Shaft #6051

8 Hp. Tecumseh cast iron sleeve #6081

10 Hp. Tecumseh cast iron sleeve #6010

Vert. 8 Hp. Tecumseh 1" shaft #7082

8 Hp. Briggs 1" shaft #7080

10 Hp. Tecumseh 1" shaft #7010

Other 3-20 Hp. models at savings up to 50%.

**\$137**

**\$132**

**\$186**

**\$224**

**\$199**

**\$212**

**\$214**

#### 2. Homelite Water Pump

Corrosion resistant construction, ideal for water and chemical transfer. EPDM seal 2" suction, 28' lift 120' head. Will pump 8400 GPH - 3 hp Briggs. Will ship 48 states for \$6.00

Item #10966

**\$183**

#### 3. 5 hp Air Compressor

5hp 60 gal. vert. - Campbell-Hausfeld Model #VT5587 two cylinder, pressure gauge with safety relief valve. 230 volts 11.8 CFM at 40 PSI and 9.4 CFM at 90 PSI, 25"x22"x65" Item #15954 Ship weight 415 lbs Sale **\$598.00**

Will ship 48 states for \$40.00

#### 5 hp 2 stage

5hp - Campbell-Hausfeld Model 2 stage twin cylinder 60 gal 230 volts, 23.4 CFM at 125 PSI 21.5 CFM at 175 PSI to 200 PSI

Item #15957 Ship weight 495 lbs

Sale **\$1179.00**

Will ship 48 states for \$70.00

Other air compressors available

**NH** Northern  
Hydraulics  
INC.

P.O. Box 1219, Burnsville, MN 55337 Dept. #

Hours 8-6 M-F 9-1 Sat.



### LOG SPLITTER PARTS



11 gal 2 Stage pump Use with 5 Hp Motor #1011 **\$109**

13 gal pump Use with 5 + Hp. Motor #1013 **\$137**

16 gal 2 Stage pump use with 8 Hp or Larger Motor #1015 **\$157**

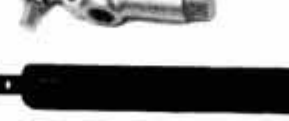
22 gal pump use with 10 Hp. or Larger Motor #1017 **\$279**



Standard Control Valve Built in Relief Valve. #2010 **\$43.75**

Detent Valve, Pressure Sensitive detent. You don't have to Hold Handle on return stroke #2020 **\$58.50**

8" High 6" Deep Wedge #3060 **\$23.00**



Hydraulic Filter to 20 gal/min #4020 **\$12.95**

4 x 24 x 2" Cylinder (Can go UPS) #902424 **\$112**



5 x 24 x 2" Tie Rod Ship wt. 100 lbs. #909524 **\$210**



#### 4. Trailer Parts

We have the largest stock of trailer parts to repair or build your own at discount prices including Hubs, fenders, wheels and tires, Axles, Brakes, Hitches etc. 4 hole Hubs + Spindles **\$37.50/Set**

Item #1251 Trailer springs 2000 LB capacity **\$24/PR**

#### 5. Item Wheel and Tire Sets

Item	Wheel and Tire Sets	ea.	Tire Only
1211	480x8 (4 Hole)	<b>\$22.00</b>	<b>\$15.50</b>
1216	480x12 (4 Hole)	<b>\$34.00</b>	<b>\$22.00</b>
12131	570x8	<b>\$31.00</b>	<b>\$26.00</b>

#### 6. ATV Tires—Save up to 50%! 3 ply Belted Construction (U.S. Made)

ITEM #	Size	Price
#12510	21 x 12 x 8 Knobby	<b>\$39.95</b>
12511	21 x 11 x 8 Trail Pro	<b>\$47.00</b>
12512	25 x 12 x 9 Turf buster	<b>\$57.00</b>

#### 7. Honda Generators

Quiet and reliable. Static noise suppresser for reduced TV and Radio interference. Oil Alert system automatically shuts off engine if oil level below safe limit. Chrome plated frame for protection. Ideal for camping accessories, small tools and appliances or emergency Power.

ITEM #	Model	Watts	Price
1660	EM-500	500 Watts	<b>\$299.</b>
1662	EM-600	600 Watts	<b>\$327.</b>
1663	EX-800A	800 Watts	<b>\$383.</b>

Will ship generator to 48 States for \$10

Send for Free 100 page Discount Catalog.

Discount prices on Generators, Log Splitters, Gas Engines, Hydraulic Parts, Winches, Trailer Parts, Air Tools, Truck accessories, ATV Tires, Go-Kart Parts

**MENTION THIS AD FOR SALE PRICES!**

**TOLL FREE 1-800-533-5545 (ORDERS ONLY)**

Northern Hydraulics  
P.O. Box 1219, Dept. #  
Burnsville, MN. 55337



SEND COUPON FOR FREE DISCOUNT CATALOG!

Use Your Mastercard or Visa

Name \_\_\_\_\_

Address \_\_\_\_\_

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

Material, защищенный авторскими правами



# PM OWNERS REPORT: VOLVO 760 GLE

BY MICHAEL LAMM WEST COAST EDITOR

"I love the looks and reaction its styling gets."  
—MISSISSIPPI FACTORY REP

"As good as the big  
Mercedes at half the price."  
—NEW YORK DOCTOR

"Car has been off the road over  
20 days to correct problems."  
—TEXAS REAL ESTATE BROKER



"Turbodiesel performance is so  
good I tend to 'punch' it. This  
causes me to lose fuel economy."  
—CALIFORNIA CIVIL SERVANT

"Dealer network not as good as the car." —NEW HAMPSHIRE SALESMAN

Owners like styling and  
comfort, but reliability  
receives mixed reviews.

**T**he 760 GLE marks the first totally new Volvo to arrive in America in 15 years. In price (\$21,362 for 1984), it stands just below the Cadillac Seville and Mercedes 190E. And most buyers are former Cadillac, Buick and Oldsmobile owners.

Volvo's new flagship preserves what used to be considered conventional engineering before transverse powerplants and fwd became the norm. Its up-front engine drives the rear wheels. The 760 GLE comes with two engine/transmission choices: an aluminum V6 and a cast-iron, Straight Six turbodiesel. Oddly enough, the V6 is larger than the diesel, displacing 163 cu. in. (2,849 cc) against the kerosene burner's 145 cu. in. (2,383 cc).

Volvo sells the V6 with an automatic transmission only and the diesel with a four-speed manual or the automatic. The manual comes with the Laycock de Normanville electric overdrive, and the



Big, fully carpeted trunk is one of the many luxurious but practical aspects of the 760.

automatic transmission has four speeds, the top one being an overdrive ratio.

The GLE's unitized body is also conventional, with ample space for five along with luggage. Volvo prides itself on corrosion prevention and crashworthiness. The GLE makes extensive use of nonrusting materials, and its front and rear sheet metal is designed to crush in a controlled fashion.

Front and rear suspensions are also straightforward: MacPherson struts fore and a live axle aft. The rear suspension uses Volvo's Constant Track system, which places a central longitu-

## A NATIONWIDE SURVEY BASED ON 1,705,838 OWNER-DRIVEN MILES

dinal control arm above the differential, along with a self-leveling system that incorporates gas-filled shock absorbers.

Nearly every conceivable extra comes standard in the GLE, including automatic air conditioning, heated driver's seat that turns on at 57° F., multi-adjustable seats, cruise control, electric windows, power door locks, tools, storage compartments everywhere and, on '84 models, a four-speaker AM/FM stereo system.

So much for the sales pitch. The question now becomes, "Do those people who've already bought the GLE feel it's a good car, bad car, good deal, bad deal, or something in between?"

We asked GLE owners and, frankly, their collective bottom line surprised us. Nearly a quarter said they *might not* buy the GLE again. They were unde-



**MAKE EXTRA \$\$\$ EVERY DAY!**  
 Get into the big, year-round  
**EXTRA MONEY BUSINESS**  
 that's EASY to learn—EASY to do—  
 and EASY ON YOU!

# Be a LOCKSMITH!

You Can Make Up to \$12.50 an Hour  
 — even while learning! Train FAST at Home!

Never before have money-making opportunities been so great for qualified Locksmiths. Now lucrative regular lock and key business has multiplied a thousandfold as millions seek more protection against zooming crime. Yet there's only one Locksmith for every 17,000 people!

### Start Collecting CASH PROFITS Right Away

You're "in business" ready to earn \$5 to \$12.50 an hour a few days after you begin Foley-Belsaw's shortcut training. Take advantage of today's unprecedented opportunities in locksmithing for year-round EXTRA INCOME in spare time — or fulltime in a high-profit business of your own. Hundreds we've trained have done

### THIS PRO KEY MACHINE YOURS TO KEEP

can add \$25 to \$40 a week to your income...and it won't cost you a cent with your training!

**ALL TOOLS, MATERIALS AND PRACTICE EQUIPMENT COME TO YOU WITH YOUR COURSE.**



Tells how to make money in Locksmithing almost from the start!



it. So can YOU! All tools plus professional Key Machine given you with course. These plus practice materials and equipment, plus simple, illustrated lessons, plus expert supervision, plus business-building guidance will enable you to KEEP THE MONEY COMING IN! Ideal for retirement — good jobs, too.

### SEND FOR EXCITING FACTS—No Obligation

Discover what's in Locksmithing for you — how Foley-Belsaw's master-locksmith-approved training can give you the skill you can depend on to EARN MORE — ENJOY LIFE MORE. Just fill in and mail the coupon below to receive full information by return mail. Do it TODAY!

FOLEY-BELSAW INSTITUTE, 10425 Field Bldg., Kansas City, Mo. 64111

### MAIL THIS COUPON—NO SALESMAN WILL CALL

FOLEY-BELSAW INSTITUTE, 10425 Field Bldg.  
 Kansas City, Missouri 64111



Please send me free of cost or obligation your publication "Keys to Your Future" on how Foley-Belsaw can quickly train me to make money in Locksmithing and how all tools and Key Machine are given me to keep.

Name \_\_\_\_\_  
 Address \_\_\_\_\_  
 City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

cided. Only 67.9 percent were sure enough of their choice to say, "Yes, I would do it again."

That's not a very high "yes" figure. In fact, more owners of Corvettes, Mustangs, LeBarons and Ford Ranger pickups told us they'd choose those same vehicles again next time.

Nearly 60 percent of the owners we questioned had experienced mechani-

cal difficulties of some sort. Nor did dealers always remedy these ills, because 41.3 percent of our respondents reported that their dealers hadn't solved the problem the first time. In fact, a surprisingly high 12.8 percent of owners repaired their own cars (which means that, in many cases, the troubles weren't major).

Commenting on the GLE's sorest

point, an Illinois retiree told us, "Frost melts off the air conditioner cooling coils, and water runs down onto the carpets. The unit wasn't sealed properly. I had to take it back to the dealer twice for that." In all, 16.4 percent of the cars we surveyed had similar A/C experiences.

Stranger, though, was the case of the  
*(Please turn to page 182)*

## SUMMARY OF 1983-84 VOLVO 760 GLE OWNERS REPORTS\*

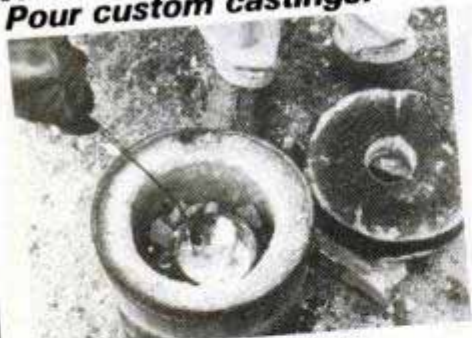
Total miles driven	1,705,838	Poor dealer service	9.4	Good	16.0	Number of vehicles owned:	
Average miles per gallon		Fuel mileage below expectation	7.8	Average	3.4	This car only	23.8%
Gasoline 2.8 aluminum V6		Poor rear vision	6.8	Poor	0.4	Two cars	45.8
In town	18.8	Not enough seat adjustability	6.8	Rear seats		Three cars	20.0
On the highway	23.6	What changes would you like?		Excellent	68.6	Four or more cars	10.4
Turbodiesel 2.4 in-line Six		No changes	20.0%	Good	27.5	Makes of other cars owned:	
In town	29.0	More adjustable seats	8.0	Average	3.1	Volvo	14.8%
On the highway	35.3	Different upholstery materials	5.5	Poor	0.9	Chevrolet	13.1
Engine/transmission choices:		Better fuel mileage	5.0	Had any mechanical trouble?		Ford	10.4
Gasoline V6 with automatic	77.4%	More convenient ashtrays	5.0	Yes	59.7%	Honda	10.4
Turbodiesel Six with o.d. manual	22.6	Move emergency brake	5.0	No	40.3	Nissan	9.3
Why did you choose this car?		How much did you pay?		What type of trouble?		Volkswagen	9.3
Styling	41.7%	Average	\$19,828	Air conditioner	16.4%	Would you buy another Volvo GLE?	
Reputation	25.0	Range	\$17,500-\$22,250	Shattered side glass	15.0	Yes	67.9%
Performance	23.7	Workmanship opinion:		Electrical	13.6	No	7.6
Safety features	18.0	Excellent	66.7%	Fuel injection	12.9	Maybe	24.5
Owned Volvos before	15.4	Good	27.8	Cruise control	8.6	Would you buy another Volvo?	
Specific likes:		Average	3.4	Dealer repairs satisfactory?		Yes	77.5%
Comfort	54.2%	Poor	2.1	Yes	58.7%	No	6.4
Handling	48.1	Comfort opinion:		No	41.3	Maybe	16.1
Styling	40.7	Front seats		Dealer service opinion:		Age distribution of owners:	
Ride	32.4	Excellent	80.3%	Excellent	27.6%	15-29 years	5.1%
Performance	21.8	Specific dislikes:		Good	40.4	30-49 years	50.4
No complaints	11.5%			Average	11.1	50-plus	44.4
				Poor	4.3		

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



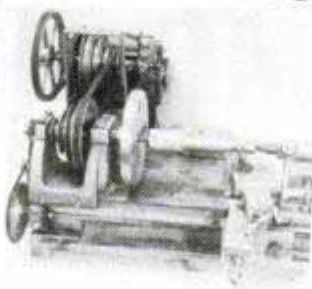
# Rare Technical Books

## Melt Metal! Pour custom castings!



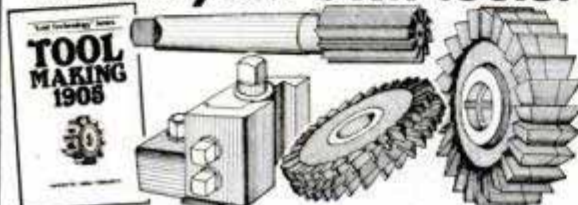
**CHARCOAL FOUNDRY** by Dave Gingery  
Learn how you can turn an old pail and a blower into a powerful furnace that can melt aluminum cans and scrap, pot metal and even brass. We built one for less than \$25! Uses grocery store charcoal! Build a complete foundry. Pour the castings that you need to build a lathe, shaper, milling machine, drill press, indexing head and more. Small book jam packed with valuable how-to! 72 page paperback. **\$6.95**  
Cat no. 163

## Build a lathe!



**BUILD A LATHE**  
by Dave Gingery  
Use the charcoal foundry to make the castings to build a precision lathe with 7" swing, 12" between centers. Two prototypes cost less than \$50 each to build, and both turned steel to within .001"! No precision equipment needed. It's true! This precision lathe was used to build a drill press, shaper, and milling machine. You can do it too! Order a copy today. 128 page paperback. **\$7.95**  
Cat no. 177

## Make your own tools!



**TOOLMAKING 1905**  
Yes, you can make drill bits, milling cutters, taps, reamers, jigs and fixtures, dies, punches, gauges and much more. Learn how in this reprint of a 1905 technical school textbook. Heavily illustrated. Impress your friends when you pull a precision end mill off the shelf and tell them you made it yourself! You can! Rare information! Order a copy today. 208 page paperback. **\$9.95**  
Cat no. 4040

## Rare information!



**RUN THREE PHASE MOTORS ON SINGLE PHASE POWER!**  
Learn three proven methods in use since turn-of-the-century! Two are easily installed! No motor rewinding! Booklet **\$3.00**  
Cat no. 81

**ALTERNATOR SECRETS**  
Get thousands of watts from common auto alternator! Run tools, lights, AC-DC appliances, charge batteries, light arc welding, and more. Tips for building custom regulator! Great info! Low price. Booklet **\$3.00**  
Cat no. 80

**POWER INVERTER TECHNOLOGY**  
Convert low voltage DC into 110 AC! Learn how they work, why some won't, why some will. Covers smallest up to large industrial models. Sources of plans supplied. Rare info... Large booklet. **\$5.00**  
Cat no. 83

## Write for a catalog!

Learn about rare books on building woodstoves, sundials, wooden boats, electric autos, lathe accessories! Make glass, paper, kilns, knives, soap, cheese, explosives, heat treat furnace! Learn calculus, steam engine design, chess, electronics, shortwave radio, crystal set construction, more! Homestead! Build a fish farm! Build a complete foundry for aluminum, brass, cast iron, more! Repair small engines and diesels! Learn to electroplate! You'll find this and much, much more in your copy of Lindsay's latest Technical Books catalog!

## Yours is waiting!

Send \$1.00 US & CAN (\$4.00 foreign airmail). If you order books from this ad, request a free copy. You'll see in a minute why everyone is talking about this incredible mailorder bookstore! You've already missed some incredible books that are no longer printed. Don't wait! Write for your copy today!

## How to order...

Send your name and address, the name, number and price of the books you want along with check or money order. Or send your VISA or MASTERCARD numbers and your signature. Include 75¢ shipping for the first book and 25¢ for each additional book. Satisfaction guaranteed. You may return any book within 7 days for refund.

## Lindsay Publications

PO Box 12-XC, Bradley IL 60915-0012

- Send a catalog! I've enclosed \$1.00 (\$4.00 foreign airmail)  
 Send me the books listed, and a free catalog. I've enclosed 75¢ shipping for the first book and 25¢ for each additional

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

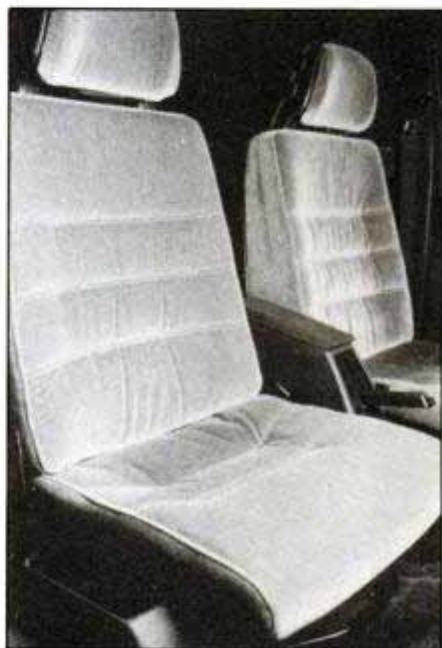
**Write Today!**

## OWNERS REPORT: VOLVO

(Continued from page 181)

shattering side windows. No fewer than 15 percent of our owners mentioned this. A retired North Carolinian's experience proved typical. "I shut the driver's door, walked away from the car, and the glass shattered. I didn't slam the door either; just shut it."

A Volvo spokesman told me that the problem stems from mistempering the glass on early 760s—those built before March 1983. Dealers have been instructed to replace the glass in all GLEs up to a certain VIN number, and they do this automatically. There's no charge, of course, and the fix is usually



Volvo's multiadjustable seats received one complaint: There's no height adjustment.

caught the first time an early car is brought in for routine servicing. Once the repair has been made, the dealer puts a little tag on the driver's door so the glass doesn't have to be replaced twice.

Then, too, we noticed reports of lots of minor mechanical annoyances. These ranged from cold-natured engines to rough idle, squeaky brakes, staticky radios and window leaks. They were not, however, seen as a reflection of the car's total quality. Owners mentioned them almost in passing, as if to say, "... this shouldn't happen in a \$20,000 luxury automobile."

While virtually all repairs came under warranty (12 months and unlimited mileage), Volvo owners still weren't overjoyed with their dealers' parts and service practices. A California corporate controller said, "Four weeks is too long to wait for a new seat-adjustment assembly." And a New Mexico salesman grumbled, "Service people don't seem well trained, and parts are slow to



arrive or are often the wrong ones."

However, not all Volvo dealers are held in low esteem. "The dealer lent me a car while he was repairing mine," said a Florida retiree, "and he even filled my tank upon completing the repair."

Another factor that might contribute to keeping down yes votes in the would-you-buy-it-again column could be the diesel engine.

Keep in mind that 22.6 percent of our respondents chose the turbodiesel. Not only have diesels fallen out of favor recently, but the GLE diesel came only with a manual transmission before 1984. Several drivers said they'd opt for the automatic next time. Even without an automatic, the GLE diesel cost \$673 more than its gasoline-powered twin.

In its favor, however, is the fact that it's one of the better performing diesels sold in this country. In the 760 GLE, it delivers 50 to 60 percent better fuel mileage than the V6.

Performance fans should enjoy the 160-hp intercooled turbo Four that will be offered in the 760 GLE this spring. It has about 30 more horses than the V6, will do 0 to 60 mph in 8 seconds and will be available with both transmissions.

### Workmanship praised

Overall workmanship received extremely high marks, with 94.5 percent in our survey rating it good to excellent. A self-employed Floridian said, "I wash and wax my car myself. I enjoy doing it and have since I was a kid. You notice the details when you've polished cars for over 25 years and, in all that time, I've never seen an automobile as finely put together and finished as the GLE."

Both the gasoline V6 (made in France by Peugeot) and the diesel engine (designed by Volkswagen) give excellent performance, and owners had very complimentary things to say about handling and comfort as well.

Talking about his turbodiesel, an Indiana sales manager told us, "This car drives like no other. It's very quiet and has amazing acceleration in any gear at any speed. The diesel engine is a dandy!"

A New Mexico salesman said, "This sedan drives like a small sports car, especially in heavy traffic. Yet it rides like a cloud. The automatic transmission changes gears subtly. Shifts are hardly noticeable." A Nebraska banker: "The V6 is responsive; a delight to drive." And a retired North Carolinian: "Hugs the road, excellent for mountain driving, excellent ride."

A Georgia personnel manager: "The comfort of this car is like resting in my private den at home. Seats are so comfortable that, upon completing a long

trip, I have to remind myself that it was a long trip." An Illinois CPA echoed, "Ride and handling are excellent, and the seats adjust to the moods of our tushes."

However, as adjustable as the GLE's seats are—and this includes lumbar support—a few tall drivers felt that the seats should have a height adjustment so they could be positioned nearer the floor. A New York doctor observed, "Volvo should seat people lower in the car. In my Mercedes, I have 3-4 inches of headroom; in the Volvo, my head nearly touches the ceiling."

Viewed as a whole, most owners

seemed quite pleased and satisfied with their purchases. A Texas dairyman wrote across his questionnaire, "Perfect in every way." And a West Virginia supermarket owner said, "This is one superb automobile!"

"Obviously," concluded a California mortgage banker, "Volvo has finally put some style in its top-line model. It's definitely a head turner and has prompted many compliments. I foresee no major mechanical problems for at least 10 years, and I believe Volvo makes the safest car on the road today. This Volvo is an understatement of quality." **PM**


## FREE TRIAL

BEFORE YOU BUY

# HEARING AIDS

## UP TO 50% OFF COMPARABLE AIDS


SPECIAL OFFER TO READERS OF POPULAR MECHANICS



**BODY AIDS  
MODEL 59B**

- Small and Slender
- Most Modern Styling
- Inexpensive to Operate
- Lightweight Aluminum Case

\$99<sup>90</sup>



**BEHIND THE  
EAR AIDS  
MODEL 270**

- Fits Comfortably, Inconspicuously
- Separate Telephone Coil for Clarity
- High/Low Range on Volume Control
- Separate ON and OFF Switch

\$199<sup>90</sup>

GET QUALITY HEARING AIDS AT AMAZINGLY LOW PRICES BECAUSE WE SELL DIRECT BY MAIL • YOU PAY NO DEALER MARK-UPS OR COMMISSIONS.

HUGE SAVINGS

Buy direct—Eliminate dealer markups and commissions.

30 DAY FREE TRIAL

We send you the Aid of your choice—FREE TRIAL—no obligation.

TIME PAYMENTS

Time payments arranged after you are satisfied with the Aid of your choice.

1 YEAR WARRANTY

One year warranty on all Hearing Aids from LLOYD'S.

NO SALESMAN WILL CALL

We promise no salesman will ever call on you.

FOR FREE INFORMATION AND HEARING LOSS QUESTIONNAIRE, CALL

# 1/800/323-1212\*

## TOLL FREE

\*Illinois Residents please use coupon.

LLOYD HEARING AID CORP. • 128 Kishwaukee St. • P.O. Box 1645  
Rockford, IL 61110 Dept. PM8

Please send me FREE Literature and Low Prices on all types of Hearing Aids.

NAME \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP CODE \_\_\_\_\_

WE EVEN PAY THE POSTAGE... Just tape or paste this Postage-Paid label to the front of any envelope. No further postage or addressing is needed.

LLOYD'S TRUST THE CUSTOMER PLAN

Our Trust the Customer Plan has been a resounding success for over 90 years. We've sent thousands of Hearing Aids to customers in all 50 states. Over 250,000 Hearing Aids sold altogether. We have never asked for a deposit. Our files have thousands of letters from satisfied customers... and from medical clinics, hospitals, veterans organizations and institutions. Want us to prove it? Just write us or send the coupon on this page.

Dept. PM8

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

## BUSINESS REPLY LABEL

FIRST CLASS PERMIT No. 1891, ROCKFORD, ILLINOIS

POSTAGE WILL BE PAID BY ADDRESSEE

**LLOYD Hearing Aid Corporation**  
128 Kishwaukee St.  
P.O. Box 1645  
Rockford, IL 61110



# Got a Minit? Make a Button!

It only takes a "minit" to enter the fast and easy, fun and profitable world of button-making with Badge-A-Minit. These 2 1/4" plastic coated buttons are fun to wear, fun to make and easy to sell at flea markets, fairs, conventions, sporting events, or anywhere people congregate. Supply buttons for community events, school clubs or churches. Button parts cost only pennies each. Finished buttons sell for much more.

Only \$24.95 gets you started with everything you need to make buttons.

Send today for our FREE colorful 48 page catalog PLUS a FREE 24 page book full of button-making ideas from Badge-A-Minit.



Badge-A-Minit, Ltd. Dept. PM384  
Box 800, Civic Industrial Park, LaSalle, IL 61301

- SEND ME FREE the catalog and idea book!  
 YES, SEND ME the Badge-A-Minit starter kit for only \$24.95 plus \$1.75 shipping (IL residents add \$1.25 tax)

Visa  MasterCard  American Express

Credit Card No. \_\_\_\_\_

Exp. Date \_\_\_\_\_ Signature \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

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

Your purchase is always covered by our unconditional money-back guarantee

## "I Made \$1500 In Two Weekends Selling Mini Donuts" J.S. Illinois

Set up at Flea Markets, Sports events, County Fairs, Bazaars or other weekend events. Lil' Orbit equipment makes up to 1250 mini donuts an hour. "We earned \$350 for 3 1/2 hours our first booking," says A. & J. Wade of Texas



### A Family Business

An ideal family business because any person age 10 or 80 can operate it.

Portable Stand

### Ideal Business Of Your Own

Small investment. Operate sparetime or fulltime. A complete merchandising unit based on 6 years of experience. All the features you need to make big money with mini donuts. Completely self-contained.

### Or Go Anywhere With Mini Donut Factory

Lightweight, yet sturdy. Take your Mini Donut Factory to different events every week-end.



Financing Available

As little as 1/3 down and up to 12 months to pay based on credit acceptance



**The DONUT MAN**

A Quantum Group Company  
9851-13th Ave. No., Dept. 72B  
Minneapolis, Minnesota 55441



## ONE-MAN Sawmill

The Only ONE-MAN PORTABLE SAWMILL

Of Its Kind In The World

Don't let inflated lumber prices stop your important building projects. The Sawmill goes right to the trees and turns out smooth, true-cut lumber... even beginners get excellent results. Just one man (no crew needed) can easily cut enough on weekends to save hundreds of dollars over high lumberyard prices. Use as little as 25 horsepower. Factory-direct selling keeps price low, and convenient time payments may be arranged.

Rush coupon today for Free Booklet "How To Saw Lumber."

FREE BOOK Foley-Belsaw Co., 30335 Field Bldg., Kansas City, MO 64111  
Please send Free Booklet with full details. No obligation, and no salesman is to call. ~~\$\$\$~~

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City-State \_\_\_\_\_ Zip \_\_\_\_\_

Your Ticket to a Great Career!

## LEARN BASIC ELECTRONICS

TRAIN AT HOME IN SPARE TIME... Because the Electronics Field is growing so fast, it offers excellent career opportunities... even at the entry level. A knowledge of BASIC ELECTRONICS can help you get your foot in the door, qualify for good jobs like Technical Rep., Sales Rep., Junior Technician/Tester and more. Easy-to-follow home-study course starts you at the very beginning... explains everything step by step with plenty of photos, charts, diagrams. Multimeter, parts kits, calculator, digital VOM included. Hands-on training lets you learn by doing. **Get FREE FACTS. No salesman will call. MAIL COUPON TODAY!**



ICS BASIC ELECTRONICS, Dept. PB024  
Scranton, PA 18515

Name \_\_\_\_\_ Age \_\_\_\_\_  
Address \_\_\_\_\_  
City/State/Zip \_\_\_\_\_

## WHAT'S HE DOING!

Making a Concrete Flower Pot! ... and SO CAN YOU!

Make and sell your own Ornamental Concrete items. Rush \$5.00 for Book about Aluminum Molds with prices and production trade secrets direct from world's largest mold manufacturer. Over 350 designs to select from.



Send \$5.00 CONCRETE MACHINERY COMPANY  
Today To ➔ P. O. BOX A99 - HICKORY, N. C. 28601



GARAGE DOOR OPENERS

- Buy Factory Direct and Save
  - Thousands In Use
  - Easy Homeowner Installation
  - Immediate Shipment by UPS or PP
  - Radio Controlled
  - Free Brochure
- HELPMATE Equipment Co. Dept. PM-384, Baroda, MI 49101

## LEARN CLOCK REPAIR

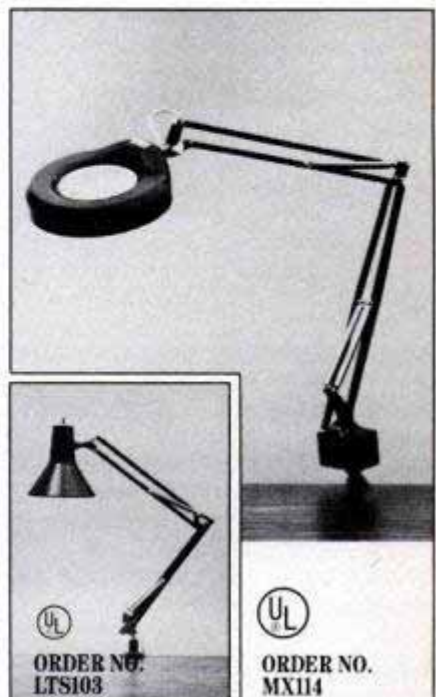
1 EARN BIG MONEY & WORK AT HOME & BE YOUR OWN BOSS FOR DETAILS SEND \$1.00 TO

**NATIONAL CLOCKMAKERS INSTITUTE**

P. O. BOX 448, LEWISTOWN, PA, 17044



## STUDIO SPEC™ MAGNIFIER LAMP AT \$59.95 YOU CAN'T AFFORD TO BE WITHOUT IT.



This quality all-metal construction UL recognized lamp uses a standard 22W fluorescent circline bulb (the bulb is included!). Features of this great buy include a polished, distortion-free glass magnifier (X3); a 4-way, all metal clamp bracket; a full 45" reach. The lamp is available in two colors; Ivory and chocolate brown.

You must agree, it's a steal at only \$59.95 each (plus shipping). If you buy 5 or more, it's only \$54.95 each (plus shipping). Order No. MX114.

Shipping is only \$5.00 each in the continental USA.

**SPECIAL BONUS!** If you buy one or more of the magnifier lamps, you can get our LTS103 bench lamp for only \$10.95 each (plus \$2.80 each shipping). The LTS103 is UL listed to 100 W, utilizes a porcelain socket, and includes mounting brackets.



To order call toll free

(800) 423-5336

Calif. toll free

(800) 382-3663

Local

(818) 701-5848

18215 Parthenia Street  
Northridge, CA 91325

MasterCard and Visa accepted

EXCLUSIVE ONE HOUR SHIPPING

QTY	ORDER NO.	COLOR	PRICE	SHPG	EXT
—	88-MX114	—	\$59.95*	\$5.00	—
—	88-LTS103	—	\$10.95	\$2.80	—
—	88-MX115-FL	—	\$ 5.95	\$2.00	—
			*Only \$54.95 for 5 or more		
			TOTAL		

Credit Card # \_\_\_\_\_ Exp. Date \_\_\_\_\_

Name (please print) \_\_\_\_\_

Signature \_\_\_\_\_



# CATCH ON

MASTER COMPUTERS  
IN YOUR OWN HOME!

## LEARN PROGRAMMING AND APPLICATIONS

Now you can learn about computers, operations, programming, applications, software. Everything you always wanted to know. Write your own programs. Or customize pre-written programs. Make a computer do exactly what you want it to do. Benefit from becoming "computer-wise" today. It's all in this one educational package!

## A COURSE IN COMPUTERS AND BASIC PROGRAMMING

NO PREVIOUS COMPUTER EXPERIENCE NEEDED. The entire course is "user friendly", written in simple language, that's easy for a beginner to understand. You will LEARN BY DOING - programming from the very first lesson using any computer, IBM, APPLE, ATARI, COMMODORE, TRS, TI.

## A CONVENIENT WAY TO LEARN

Progress at your own speed, in your spare time, in your own home. Take the mystery out of word processing, computerized accounting, maintaining data files and much, much more.

Get started now in the fast-growing field of computers, and CATCH ON to the technology of the future... **COMPUTERS!**

Send today for your free information package. Or call toll-free (800) 824-7788, in California call toll-free (800) 824-8848. No obligation.

HALIX INSTITUTE  
1743 South Vermont Ave., Los Angeles, CA 90006

... if you don't have a computer yet, don't buy one until you receive this free information.

**halix**  
INSTITUTE

An affiliate of Hemphill Schools and IPHS.

THE INTERNATIONAL CHOICE SINCE 1980

HALIX INSTITUTE, CENTER FOR COMPUTER EDUCATION  
DEPT. 88H-A0503  
1743-SO. VERMONT AVE.  
LOS ANGELES, CA 90006

YES! Send me information on how I can learn about computers and programming at home!

Name \_\_\_\_\_ Age \_\_\_\_\_

Address \_\_\_\_\_

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

I already have a computer available.

Make \_\_\_\_\_ Model \_\_\_\_\_

# Own Your Own Towing Business For UNDER \$3,500

With A GULF EASTERN MF-69, 4-Ton ELECTRIC WRECKER — Complete And Ready To Install On Your ¾-Ton Pick-Up Truck



**One Full-Year Warranty!**  
Comes Complete, Ready For Immediate Use!  
Look What You Get!

Standard Features — Model MF-69 Electric Wrecker/6' Extendible Boom.

- Painted, pre-wired and complete in every detail with top of the line equipment for unequaled value
- Four-bulb, stainless steel, heavy-duty revolving beacon
- Adjustable work light, cluster lights, stop & turn indicators
- Mast mounted light controls
- Self-locking winch to raise and lower boom
- Quality tow sling
- Two 10' galvanized chains with J-hooks, T-hooks and grab hooks
- Four-ton heavy duty commercial electric winch
- 75' x ¾" stainless power winch cable with hook
- Mast mounted heavy duty on/off switch
- Remote control handle with 15' cable
- Finger-tip controls
- Mounting kit plus installation instructions

## Convert Your Pick-Up Into A Profitable Business

Hundreds are in use daily and earning thousands of dollars. Start your own towing business or substantially increase your firm's earning capabilities if you own:

- Service Station
- Car Dealership
- Car Rental
- Body Shop
- Garage
- Towing Company

**ORDER NOW AND SAVE \$200\*\* FREIGHT ALLOWANCE \$3,495\*\* LESS \$200\*\* = \$3,295\*\***

**GULF EASTERN MFG. CO., 5000 Gandy Blvd., Tampa, Fla. 33611, Toll-Free 1-800-237-9668 - Fla. 1-800-282-6979**

Enclosed:  
 Check  
 Money Order

Charge My:  
 American Express  
 Master Charge  
 Visa  
 Please send information on MF-69 Wrecker

Please Ship \_\_\_\_\_ MF-69 Wreckers @ \$3,295\*\* Each = \$ \_\_\_\_\_  
 I will pay the Shipping Charges to driver upon delivery. Allow 4-5 weeks for delivery. Add 2-5 weeks extra if paying by check. Sorry, no C.O.D. orders.

Acct. No. \_\_\_\_\_ Expiration Date \_\_\_\_\_  
 Name \_\_\_\_\_ Phone ( ) \_\_\_\_\_  
 City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Sign Here \_\_\_\_\_

State Distributorships Available

Manufactured in U.S.A.

# WOODWORKERS Do-it-Yourself CATALOG

with **20**  
**WOOD**  
**SAMPLES**



104 giant pages  
—14 kinds cabinet and furniture woods,  
79 veneers in 3-ft. lengths,  
19 flexible veneers to 36" wide x 8 ft., 11 fancy burl & crotch, 54 sizes, kinds carving blocks, 76 assembled inlays, 72 lamp parts, 39 clamps, 118 carving tools & chisels, 73 wood picture kits, 500 plans, 96 how-to books. Pic. framing, carved molding, period hardware, sliding, revolving hdwe. Cane, reed, wood finishes, coffee mill kit, clock parts, etc. Over 2,000 hard-to-find products in new Woodworker Catalog!

TEAR OUT AD. MAIL TODAY.  
**CONSTANTINE Est. 1812**  
2051 Eastchester Road, Bronx N.Y. 10461

- Enclosed \$1 for Catalog without samples.
- I prefer Catalog with 20 Wood Samples. \$2 enclosed. Send 20 wood veneers from around the world. Identified. Useful when matching, naming & ordering fine woods. Educational. \$1.50 refunded on first catalog order.

Name \_\_\_\_\_

Address \_\_\_\_\_

Zip \_\_\_\_\_



**Only**

**\$212<sup>65</sup>**

72" x 30" top, legs and stringers (with all accessories as shown)

**\$135<sup>00</sup>**

72" x 30" top, legs and stringers only

**An industrial workbench for the home handyman.**

It's rugged. It's convenient. It's dependable. It's our Stackbin Maple Top Workbench and the only one you're ever going to want for those "do-it-yourself" home projects. The Stackbin Maple Top Workbench features durable 14 gauge channel formed steel legs and can be bolted to the floor for extra stability. A variety of optional metal accessories and six different sizes available. (Choice of three other bench-top surfaces as well.) The Stackbin Maple Top Workbench is sold direct-from-the-manufacturer only, so you

enjoy substantial cost savings, too. (No wonder it's an industry favorite.) To find out how you can order, simply fill out, and mail in the coupon below.

Name \_\_\_\_\_

Address \_\_\_\_\_

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

Sounds like the Stackbin Maple Top Workbench could be right for me. Please forward ordering information.

**STACKBIN CORPORATION**

Albion Road, Lincoln, RI 02865.



# SAVE as much as 80% with **AMT** Quality Power Tools

American Machine & Tool Co. Dept. PM34, 4th Ave. & Spring St., Royersford, PA 19468

Please send me the units checked.

Payment in full enclosed \$  
 \$5.00 deposit each item enclosed, balance C.O.D.; or charge my



Card No. \_\_\_\_\_

Expiration Date \_\_\_\_\_

Signature \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

Zip \_\_\_\_\_

- |   |   |
|---|---|
| <input type="checkbox"/> 12" Swing, 4 Ft. Lathe \$67.75                   | <input type="checkbox"/> 8" Tilt Arbor Saw \$52.50      |
| <input type="checkbox"/> Ball-bearing Model \$79.50                       | <input type="checkbox"/> Standard Rip Fence \$6.50      |
| <input type="checkbox"/> 4-Jaw Lathe Chuck \$46.80                        | <input type="checkbox"/> Long Cabinet Rip Fence \$7.50  |
| <input type="checkbox"/> Face Plate \$4.50                                | <input type="checkbox"/> Ball-bearing Spindle \$12.50   |
| <input type="checkbox"/> Set of 3 Chisels \$11.00 (not shown)             | <input type="checkbox"/> 5 1/8" Jointer-Planer \$195.00 |
| <input type="checkbox"/> Set of 8 Chisels \$29.00 (not shown)             | <input type="checkbox"/> Belt Sander \$52.00            |
| <input type="checkbox"/> Master Set of Turning Chisels \$44.95            | <input type="checkbox"/> Disc Sander Attachment \$17.00 |
| <input type="checkbox"/> Spindle Shaper Kit \$44.00                       | <input type="checkbox"/> Mitre Gauge for Sander \$3.50  |
| <input type="checkbox"/> General Electric Motor \$49.50 (with other item) | <input type="checkbox"/> \$54.55 (purchased separately) |

## FANTASTIC VALUES WITH THIS COUPON!

**DIRECT FACTORY OFFER AND REVOLUTIONARY PATENTS** decrease costs, increase efficiency. Full scale power tools of heavy duty 100% cast iron and steel. Streamlined design reduces weight, cuts material and production costs. Special patents provide added efficiency, accuracy, savings. Parts made, assembled, tested, packed in our own factories, shipped direct.

**ENDORSED BY AMERICA'S TOP MAGAZINES . . . OVER 2 MILLION USERS** confirm their precision, versatility and rugged performance.

**\*10-YEAR LIMITED WARRANTY.** Any part or parts of any AMT power tool which become inoperative for any reason within 10 years of the purchase date will be repaired or replaced by the factory. Your only cost: for return postage.

\*\* Except motors to which the same terms for one year warranty will apply.



**8" TILT ARBOR POWER SAW** DOES WORK OF \$150.00 BENCH SAW as is. Converts easily to equal any \$300.00 floor model cabinet units! Crosscuts, rips, mitres, cuts compound angles, dados, makes coves and moldings.

**\$52.50** f.o.b. factory. Wt. 22 lbs. including completely assembled cast iron and steel 8" saw with ground cast iron table, blade guard, mitre gauge. Less blade. **RIP FENCE**, if desired, for easier work alignment, \$6.50 add'l.

**PRECISION BALL BEARING SPINDLE** for commercial service, \$12.50 add'l.

**SAW BLADE TILTS . . . TABLE STAYS LEVEL.** Lock securely at any angle up to 50°. Raises, lowers, 0° to 2-1/4". Takes standard blade, saw insert removes to take dado heads, cutters, etc. (not included). Takes 1.3 HP motor or larger (not included). **RIP FENCE**, if desired for easier work alignment; Standard size (for bench saw) \$6.50; long rip fence for cabinet base (as shown), \$7.50.

**FREE CABINET BASE PLANS** Use bench saw as received (inset photo) . . . or transform easily and inexpensively into floor model (as shown) guaranteed to do work of floor models costing \$300. **FREE plans** . . . all you'll need are a sheet of 3-4" plywood and 3-4 hours. Use your AMT saw for cutting. Plans provide 27" x 24" work surface, 33" height.

**10-YEAR LIMITED WARRANTY\***

**10-DAY MONEY BACK GUARANTEE**

Try any AMT power tool for 10 days. If not fully satisfied, return for full refund of purchase price. We will pay return freight.

### INDUSTRIAL SIZE 12" SWING 4 FT. WOOD LATHE



DOES WORK OF \$200 UNITS.

**\$67.75** Complete as shown.

**10-YEAR LIMITED WARRANTY\***

Comparable in speed, precision and durability to units selling for \$200 and more. 36" between centers. For wood and plastics. Tubular steel bed rails with dual point suspension increase accuracy, ease of operation. Precision ball thrust cup center, heavy spur center, graduated T-rest, 3-Speed pulley for different work diameters. Heavy-duty ball-bearing model \$79.50.

f.o.b. factory. Shipping Wt. 30 lbs. Faceplate (optional) for turning bowls, lamp bases, etc. \$4.50. Set of 3 high speed turning chisels, \$11.00 add'l; Set of 8, \$29.00.

PRECISION 4" x 36"

### BELT SANDER

f.o.b. factory Wt. 18 lbs.

**\$52.00** Disc Sander attachment including disc, bracket, ground cast table (tilts 0-45°); \$17.00 add'l.

The world's most talented belt sander. Heavy cast iron sander has belt track and tension control; includes 4" x 36" standard sanding belt. Changes from horizontal to vertical sanding in seconds. Uses 1.3 HP or larger motor.

**10-YEAR LIMITED WARRANTY\***

### NEW! 5 1/8" JOINTER-PLANER

**\$195.00**

f.o.b. Factory Wt. 60 lbs.



Larger and heavier than our popular 4 1/4" model to handle bigger stock. Three blade cutter head has micrometric adjustment so that individual blades can be set easily. Fence fully adjustable 45° to 0° to 45°.

**10-YEAR LIMITED WARRANTY\***

### SPINDLE SHAPER KIT with holddown

**\$44.40**

f.o.b. factory. Shipping Wt. 6 lbs. Complete less wood parts, motor.



Makes beads, coves, moldings, tongue-and-groove joints, etc. Easy assembly plans. Has sealed greased-for-life ball bearings, adjustable height control, fence assembly. Takes 1-4 HP or larger motor. Standard 1/2" bore cutters available.

**10-YEAR LIMITED WARRANTY\***



### MASTER SET WOOD TURNING CHISELS

High quality turning chisels handcrafted to exacting metallurgical standards. Set of 10 includes two skewers, three gouges, parting tool, round nose, spear point, plus two inside turning tools—all in a wooden storage case.

**\$44.95** f.o.b. factory Wt. 7 lbs.

**10-YEAR LIMITED WARRANTY\***

### 4-JAW LATHE CHUCK

Holds workpiece firmly without screws

Cast iron and steel chuck with 4 independent, reversible, stepped, black steel jaws. Outside diameter chucking 7/16" to 5"; inside diameter chucking 7/8" to 6". Fits all AMT wood lathes and others with headstock spindle threaded 3/4" x 16". Chuck key included.

**\$46.00** f.o.b. factory Wt. 6 lbs.

**10-YEAR LIMITED WARRANTY\***

BRAND NEW

### MOTOR

Develops a full 1 HP. New General Electric Motor for use with any power tool in this ad. Features 1-2" shaft, 1725 RPM. \$49.50 if purchased with any AMT tool (\$54.55 if purchased separately). 17 lbs. f.o.b. factory. Covered by a one year limited warranty.



**AMERICAN MACHINE & TOOL CO., INC., 4th Ave. & Spring St., Royersford, PA 19468**

Visit our Royersford FACTORY SHOWROOM for these same low prices. 4th and Spring Sts. From 9 to 4:30 on weekdays and 9 to 12 on Sat.

## A SINGER'S DREAM!



### REMOVES VOCALS FROM RECORDS!

Our VOCAL ELIMINATOR can remove most or virtually all of a lead vocal from a standard stereo record and leave most of the background untouched! Record with your voice or perform live with the backgrounds. Used in Professional Performance yet connects easily to a home component stereo system. Not an equalizer! We can prove it works over the phone. Write or call for a free brochure and demo record.

Write to: **LT Sound, Dept. PM, PO Box 338 Stone Mountain, GA 30086**  
 In Georgia Call (404)493-1258

**TOLL FREE: 1-800-241-3005 - Ext. 52**

## BEAUTIFUL WOOD FINISHES

Watco Danish Oils provide an elegant, extremely durable penetrating finish IN the wood, not ON it! Primes, seals, hardens, protects and beautifies in one fast, easy application.



Natural and seven attractive Danish Oil colors. No pre-staining needed. Write Watco-Dennis Corp., 1756-22nd St., Santa Monica, Calif. 90404, Dept. PM-34.

## Roll Top Desk Plan



**FULL-SIZE PLAN** includes instructions for pedestal base & upper tambour roll top with bookshelf. Desk has 2 pull-out manuscript boards & 7 drawers, two with suspension files. Full size template for tambour is included. Size is 21" x 55" x 48" high. Price is \$12.50.

**ARMOR PRODUCTS**  
 P.O. Box 290, Dept. C, Deer Park, NY 11729



Available for first time in U.S!  
**NEW! WALL-A-BIKE**  
 only \$24.99 ea

Introducing a revolutionary idea in bicycle storage that:

- eliminates clutter!
- provides more floor space!
- makes more room for car!
- fits any size bicycle!
- is made of galvanized steel!
- is easy-to-use!

Order yours now by sending check or money order today! VISA or MasterCard accepted (please include acct.#, expiration date and signature). NJ residents add 6% sales tax.

Star Enterprises, P.O. Box 87, Dept. PMS, Fanwood, NJ 07023  
 Allow 4 - 6 weeks for delivery.



**SAVE MONEY!**

**BUY SURPLUS**



1/4-HP, 1725-RPM,  
REVERSIBLE, 115-VAC MOTOR

Shop  
Wt. 18 lbs.

**124-Page Catalog**

NORMAL RETAIL OVER \$49.00 **\$19.95** ADD \$4.00 POSTAGE AND HANDLING

- ITEM 10-1049 -- G. E. motor. Split phase, rated cont. duty, 5-amps., reversible, thermally protected. Removable cast iron pulley for 3/8" V-belt. Shaft diam. 1/2"
- Use for moderate torque applications such as fans, blowers, speed reducers, tools, pumps, etc. Size 9" x 6" x 5-1/2"

Send \$1

**SURPLUS CENTER**

Telephone Orders 402-474-4366

Dept. PM-034 Lincoln, NE 68501

**APPROVED FOR VETERANS**

**GET INTO DRAFTING**

Train at home in spare time. No previous experience needed. Tools and materials included with course. No special talent required. We show you what to do, how to do it. **LEARN DRAFTING AT HOME!**

NAME \_\_\_\_\_ AGE \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

Accredited National Home Study Council

**NORTH AMERICAN SCHOOL OF DRAFTING,**  
4400 Campus Dr., Dept. P8824, Newport Beach, CA 92660

**SUN CONTROL FILM**

- Pioneers in the sun film industry
- Distributors of fine Sun-X products since 1956



**SUN-X**

Up to 78% turned away with Sun-X Fog Silver Reel Film


CHECK WITH BERT THE SUN-XPERT

**NO INVESTMENT! INSTANT INCOME!**

Run your own profitable "shoe store" business from home in spare or full time. We give you—FREE—complete Starting Kit that makes you \$217.00 EXTRA each month for just 2 easy orders a day. You feature 350 fast-selling dress, sport, work shoe styles for men and women. Air-cushioned insoles, and 75 years of shoemaking craftsmanship! Sizes 4-16—widths AA-EEEE. Draw on 500,000 pair stock. Earn prizes, bonuses, shoes for yourself. Rush postcard for your FREE Starting Kit today... Now!

Or Call Toll Free  
1-800-826-7030, Ext. 184  
In WI 1-800-472-7003, Ext. 184

**MASON SHOE MFG.**  
CO. Dept. F-409  
Chippewa Falls, WI 54774



**For Our Dealers**

- No DIY Sales
- A complete line of film for your needs to include sputter films
- Dealer support and training
- Complete Advertising Program
- International Dealerships/Protected Areas
- Preinspected Films/Top Quality

For more information concerning existing dealerships or the establishment of your own dealership, call today 1-800-231-6623. Texas call collect (713) 869-8331 or write to: Sun-X International, Inc. P.O. Box 7764 Houston, TX 77270

**BLAUPUNKT CAR AUDIO**

at Prices that are unbeatable



PLUS the Richmond

- Hirschman Antennas, Isophon Loudspeakers
- Becker, Sanyo & Mitsubishi Car Radios
- Ungo & Theft Guard Alarm Systems

Everything in Car Stereo & Mobile Sound Systems  
Also—Marantz & UHER Tape Recorders

Call Toll Free  
outside CALIF. 800-423-2075  
in CALIF. 800-227-9511

**WALTER ODEMER CO., INC.**  
1516 W. MAGNOLIA BLVD., BURBANK, CA 91506

**SAMPLE IMPORT FREE!**

...and I'll tell you exactly how to turn it into big money!



**How to start your own big profit HOME IMPORT BUSINESS**

**MY PLAN STARTS YOU FAST... Shows you how to Buy Below Wholesale**

**24,221 IMPORTS**

MEN—WOMEN... Turn Spare Hours or Full Time into INCOME!

- Moped \$220
- Tiger Eye Ring \$3.75
- South American Orlon Poncho \$6.38
- Diamond & Sapphire Low, low prices from Bangkok
- Lock Blade Knife 75¢

**CLIP COUPON, MAIL TODAY, PUT AD IN WALLET AS REMINDER OF BIG PROFITS AHEAD!**

**DISCOVER PROFITS OF IMPORT!** My Home Mail Order Import Business Plan guides your every step... it is based totally on my personal success. Shows how to deal direct and cut out costly middlemen... so you keep all the profits! I do the "hard work" for you... by traveling the world to find dazzling "first time offered" new imports. The actual sample I will send you Free is typical of my import discoveries. You can pick and choose from more than 24,000 products. Deal in one product or 1000's. Buy below wholesale.

**YOU CAN START IMMEDIATELY.** I arrange free membership in exclusive International Traders organization... instantly puts you in direct contact with suppliers abroad. I show how to operate anywhere. Age no barrier. Ideal for spare time husband/wife or retirement business. My report, "How to Import and Export" tells how to do it. No obligation. No salesman will call. Certificate brings your free gift sample import and everything else.

**B.L. MELLINGER, Famous World Trader**  
Internationally-known Mail Order Expert, President, Mellinger Co. "I started only a few years ago, part time, in my garage with less than \$100. Today my business empire spans the globe. I will help you succeed using my personal experience. Mail coupon for FREE REPORT!"

**DISCOVER PROFITS OF IMPORT!** My Home Mail Order Import Business Plan guides your every step... it is based totally on my personal success. Shows how to deal direct and cut out costly middlemen... so you keep all the profits! I do the "hard work" for you... by traveling the world to find dazzling "first time offered" new imports. The actual sample I will send you Free is typical of my import discoveries. You can pick and choose from more than 24,000 products. Deal in one product or 1000's. Buy below wholesale.

**YOU CAN START IMMEDIATELY.** I arrange free membership in exclusive International Traders organization... instantly puts you in direct contact with suppliers abroad. I show how to operate anywhere. Age no barrier. Ideal for spare time husband/wife or retirement business. My report, "How to Import and Export" tells how to do it. No obligation. No salesman will call. Certificate brings your free gift sample import and everything else.

- START WITH 24,221 PRODUCTS!**
- Many you can buy one at a time or order in quantity. Example: one 35 mm camera with hot shoe and carry case \$13.00 per or 12 for \$7.41 per. Price drops to only \$5.80 in larger quantities. New government ruling makes thousands of imports free of any duty whatsoever. You deal direct my International Traders way. Cut out greedy U.S. specialty merchandise middlemen. Really deal direct.
  - 35 mm Camera \$5.80
  - Quality Spinning Reel Only \$1.22
  - With hot shoe and carrying case.
  - Stereo Cassette Recorder Player AM/FM \$27.00
  - Clear and powerful 7 x 35. Beautifully balanced.
  - Field Glasses \$3.55
  - Fantastic Radio Watch \$4.80
  - Comes with headphones.
  - From Orient Genuine JADE NECKLACE
  - Swiss Electric Razor \$3.70
  - Cassette Recorder \$11.45
  - Sterling Silver Cubic Zirconia Diamond Like Ring \$4.40
  - Video Game Cartridges Below Wholesale

**FREE CATALOGS!**

**Now! Quick Double Profits!** As a Member of International Traders you also get free catalogs of specialty merchandise to order at rock-bottom prices from big U.S. Warehouse. Products subject availability, price fluctuation.

**This Certificate Good for ONE SAMPLE IMPORT - FREE**

**PERSONAL GUIDANCE!**

I believe in giving you my personal help! Regularly I meet I.T. members at regional closed door Seminars across the country. You will be invited to these meetings.

**1000's more dazzling products you can buy DIRECT!**

- 2 Way FM Radios
- Diamonds
- Telescopes
- Video Games
- Sapphire Rings
- Fishing Tackle
- Cameras
- Telephones
- Paintings
- Auto Accessories
- Computers
- Stereos
- Fashion Clothing
- Cigarette Lighters

The Mellinger Co., 6100 Variel Ave., Dept. K2253  
Woodland Hills, CA 91367-3779

**IMPORTANT!**

Your initials must appear below to qualify for Free Sample Import. Because of high cost and limited supply, I hereby agree to limit my request to one, and one ONLY, Free Sample Import. I have not previously requested this Free sample. I am over 18 years of age.

Initial here \_\_\_\_\_

Name \_\_\_\_\_ Age \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

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

**WOODWORKING MACHINES**

**5 in 1 Combination**

WITH ELECTRIC MOTOR WHICH DEVELOPS 3 HP.

- 34" LATHE
- 10" TABLE SAW
- 11 1/2" DISC SANDER
- 16 1/2" VERTICAL DRILL PRESS
- HORIZONTAL DRILL PRESS

REGULAR PRICE \$1,200  
Now only \$795.  
During this special tax clearance sale



**VERY IMPORTANT**

The only machine built with:

- ALL CAST IRON TABLES
- HEAVY DUTY DESIGN
- DEVELOPS 3 HP MOTOR
- BUILT AS AN INDUSTRIAL MACHINE

**ONE PLACE FOR ALL YOUR NEEDS.**

**CALL NOW!!! FOR FREE GIFT**  
Toll Free (1-800) 421-2467

IN CALIFORNIA CALL COLLECT (213) 549-0781

□ VISA □ MASTERCARD □ MONEY ORDER

PLANT:

**MASTER WOODCRAFT CO.**  
800 SPRUCE LAKE DRIVE • P.O. BOX 669  
HARBOR CITY, CA 90710  
(A Republic-Lagun Group)

Dealership Available



## AMAZING

### SCIENTIFIC and ELECTRONIC DEVICES

PHASER shockwave and invisible FORCE FIELD generators. LASERS for weapons, cutting, burning, cloud writing, holography and special effects. NUCLEAR particle accelerators and detectors. PLASMA, ION, HIGH VOLTAGE, HIGH FREQUENCY TESLA COILS and LIGHTNING generators. TRANSMITTERS and CONTROL devices for security, telephones, intrusion detection, nature listening. PLUS PLUS INFRASONICS, ULTRASONICS, ENERGY, CHEMICAL and PERSONAL PROTECTION and SAFETY DEVICES. SEND \$1 for catalog of plans, kits and completed items to:

**INFORMATION UNLIMITED, INC.**  
P.O. Box 716, Dept. M8  
Amherst, N. H. 03031

## SPARE TIME or FULL TIME

# START Your OWN HOME Wholesaling BUSINESS—Make... Fabulous Profits Your First Day

21 Marketing Plans help you sell products like these...just look at the profits you make—3, 5, even 7 times your cost!

**Over 2670 Items**  
Warehoused For Immediate Delivery!

- GENIE PORCELAIN CROWN**  
Sells For—\$7.95  
Your Cost—\$2.55  
PROFIT—\$5.30
- GENIE DIAMOND RING**  
Sells For—\$19.95  
Your Cost—\$4.95  
PROFIT—\$15.00
- MAGNETIC PADLOCK SET**  
Sells For—\$4.95  
Your Cost—\$1.55  
PROFIT—\$3.30
- Men's, Ladies' LCD QUARTZ WATCHES**  
Sells For—\$9.95  
Your Cost—\$2.90  
PROFIT—\$7.95
- NO BIG INVESTMENT**  
No Previous Experience
- Easy Clip-On FLEXIBLE FLASHLIGHT**  
Sells For—\$3.95  
Your Cost—\$1.35  
PROFIT—\$2.60
- "Boonie" KNIFE & LEATHER SHEATH**  
Sells For—\$14.95  
Your Cost—\$4.80  
PROFIT—\$10.15

Here are just a few of the 21 Ways we show you how to operate:

- MAIL ORDER
- SWAP MEETS
- WAGON JOBBING
- PARTY PLAN
- CATALOG DISTRIBUTION
- DROP SHIP WHOLESALING

We Supply Full Color Catalogs, Circulars, Step-By-Step Marketing Plan Instructions—EVERYTHING!

**CUT THIS COUPON**  
**FREE Facts AND MAIL TODAY!**

**SMC** Specialty Merchandise Corp. Dept. 308-39  
9401 De Soto Ave., Chatsworth, CA 91311-4991  
Yes Send me the FREE FACTS on how I can start my own home wholesaling business. No obligation. No salesman will call.

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

## USE HOT AIR

Don't pay high replacement prices for broken or damaged plastics, from radiators to sailboards. You can repair plastic auto and cycle parts, skis, sailboards, recreational and household products.



CALL OR WRITE FOR BROCHURE NO. 38 PM

**BW brian r. white co., inc.**  
313 henry station road  
ukiah, california 95482  
(707) 462-9795

**LEISTER**

# BE INDEPENDENT...

## With Your Own MAGNATRAC!



Do your own work, do it your own way, ...and SAVE!

- Build your own road or landscape your home ● Dig a pond or swimming pool ● Clear brush and haul firewood ● Excavate for a patio, basement or solar addition... Do it all yourself and SAVE with a Magnatrac Bulldozer Kit! Do work for others in your spare time for extra cash. 1000's of Magnatracs in use. SAVE MORE, buy Kit factory-direct; assemble it in a weekend...Send Now For:

- CATALOG showing construction & uses of "factory-built" Magnatrac Kit.....\$1.00
- PLANS for building a Magnatrac from "locally made" components.....\$7.00

**STRUCK KIT, Dept. PM34 Cedarburg, Wis. 53012**

## Merry Christmas and Happy Treasure Hunting

This season White's Electronics again offers special gifts with their finest metal detectors: 6000/DI Series 3, 6000/D, 5000/D, 4000/D and PI 1000 Series 2. Metal detectors make fantastic outdoor hobbies - fun and profitable - for the whole family.



Models from \$79.95

**CALL TOLL FREE 1-800-847-6911**

**WHITE'S ELECTRONICS, INC. Sweet Home, OR 97586**

## Scamp



### SCAMP TRAVEL TRAILER


All Fiberglass - Lightweight  
Scamp 13' & 16' & 19'; 5th Wheel  
Toll Free 1-800-346-4962  
Minn. Only 1-800-432-3749  
or write for free color brochure  
Box 2, Backus, Mn 56435

## Independence...

with a MINI-BEEP®  
Electric Scooter \$798.95

- Light weight ● Portable (fits in car) ● Battery operated ● Medicare approved!

Ride with confidence everywhere; home, store, park, church etc. 30 day No-risk guarantee! Write: Struck Corp, Dept: PM34S Cedarburg, WI 53012



## FOR ORDERS ONLY TOLL-FREE 1-800-223-3411

**Sony WM-8**  
Walkman® Stereo Cassette Player

• Featherweight headphones for private, dynamic stereo sound

**\$39.95**

# FOCUS

For information and all N.Y. State orders, please dial (212) 871-7800. All items subject to availability and price changes. Mail and phone orders C.O.D. Master Charge, Visa, Discover handling extra. Everything Factory Fresh, 10 day Money Back Guarantee (less shipping). Not responsible for typographical errors!

**Focus Electronics,**  
4523 - 13th Ave., Brooklyn, NY 11219

**COMPUTER OUTFIT**  
16K Ram w/3 pc. of software all for only

**\$39.95**

Times printer.....\$79.90  
Times 2688 - Color w/72K.....only \$149.95

**Sony SL-2400**



**\$419.95**

Front loading low profile 3 day/night timer. Elect. Vex. precise tuning. Wireless remote control.

**"Stadium For One"**



**\$119.95**

Miniature 3.7" black and white picture, with high-contrast, high-resolution... plus special zoom control.

car cord.....10.99  
rechargeable battery.....18.95

**SONY**

**Deluxe Full Range Cordless Telephone System**



**\$139.95**

"Clear Channel" 256 Codes One year warranty

**COBRA AN-3200**  
Tel Answering Machine w/remote



**\$89.95**

NEW ONLY

- Disconnect Director - will not Record No Message Calls
- 2 Cassette Systems for Better Performance
- 2 Min. Income Messages

**Panasonic SGV300**



**\$139.95**

STEREO

AM/FM Receiver  
Built in cassette player/recorder  
Self driven turntable  
Bass-treble speakers

**3-5000**  
Portable "Help" CB



**\$49.95**

40 channel car adapter  
magnetic antenna  
travel case  
LED readout

**CFS-300**



**\$79.95**

STEREO

AM/FM cassette recording  
Automatic Music Sensor  
Four-inch speakers

**REPLACEMENT TELEPHONE**



**\$9.95**

Re-dial feature  
Hook switch  
Mute Button

was 14.95  
**Now only \$9.95**

**1-800-223-3411**



**IS YOUR ENGLISH HOLDING YOU BACK?**

I have helped thousands of men and women to become effective speakers, writers, and conversationalists. With the new C.I. METHOD you can stop making mistakes in English, build up your vocabulary, speed your reading, develop writing skill, learn the "secrets" of conversation. Takes only 15 minutes a day at home. Costs little. 32-page booklet mailed FREE. Write TODAY!

Don Bolander, Career Institute, Dept. 110-034, 1500 Cardinal Drive, Little Falls, N.J. 07424.

**WEIGHT LIFTING EQUIPMENT**

Complete catalog of over 90 items used by strong men, body builders and athletes to develop strength and muscles.

SEND 35¢ TODAY FOR YOUR COPY WEIGHT LIFTING EQUIPMENT

P.O. Box 662 Holyoke, MA 01040

**TRAILER FOR THE BUS!** Burro Travel Trailer kit sleeps four. Under 1000 lbs. Fiberglass. Ready to tow. Finish interior only. Write: Burro PM-3 14143, 21st Avenue North, Plymouth, MN 55441. For full color catalog send \$2.00 to cover postage and handling. Dealers Wanted.

**WORLD'S FINEST FLASHLIGHT**

Flashlight to Touchup with just a hand of the wrist.

Just 1/4 Turn

Lifetime Guarantee

**MAKE TOYS** Plans, Kits Hardwood Wheels, Parts Catalog \$1.00

Cherry Tree Toys, Belmont, OH 43718 (614) 484-1746

**SAVE up to 90% GOVT. SURPLUS**

Surplus and other bargains galore! Industrial, mfg., marine, aircraft, auto, hardware. A must for hobbyist, mechanic, handyman, outdoorsman. Our 39th Annual Catalog. Send \$1 today (deductible from first order of \$10 or more).

**AIRBORNE SALES CO.**  
8501 Steller Dr., Dept. PM384  
P.O. Box 2727, Culver City, CA 90230

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_ Zip \_\_\_\_\_

**Learn how to Program and Use PERSONAL COMPUTERS**

Now at Home in Spare Time, you can learn everything you always wanted to know about personal computers. How to program in BASIC. How to understand and use BASIC commands. How to write and run your own programs. How to adapt existing software to your needs.

**Complete Course Includes Your Own Computer**

More than just another programming manual, this is a comprehensive home-study course written by experts. No need to quit your job or school. You learn everything right in your own home, without attending a single class! And to give you hands-on experience, we include your own computer—the Timex Sinclair 1500 with built in 16K memory—plus cassette recorder so you can save your programs on tape.

**Mail Coupon Today! Send for Free Facts.**

**ICS** COMPUTER TRAINING, Dept. P8024  
Scranton, PA 18515

Name \_\_\_\_\_ Age \_\_\_\_\_  
Address \_\_\_\_\_  
City/State/Zip \_\_\_\_\_

**RUPTURE APPLIANCES**

**FOR COMFORT!**

When you slip into a genuine BROOKS Appliance you can enjoy heavenly comfort night and day at work or at play! Thirteen million sold, since 1880. You buy direct from the factory - never sold in stores - beware of imitations. Only the highest quality materials and workmanship. (Especially for older people who wish to avoid unnecessary operations for reducible rupture). Send for our FREE illustrated booklet with no obligation.

**BROOKS APPLIANCE COMPANY** (Medicare Dept. 821, Marshall, Mich. 49068 Pays 80%)

A FAMILY TRADITION SINCE 1916

**KUEMPEL CHIME**

Our Experience... Your Craftsmanship

**Build the Finest**

- Save 50% on easy to assemble Red-1-Kut Grandfather Clock Kits
- 3/4" cherry, oak or walnut
- 1" beveled glass included
- Handcrafted by grandfathers
- Tubular bell movements
- Or start from scratch 3 plans for \$5.00

Write for Free Literature or Call  
**1-800-328-6445**  
Between 8 a.m. & 4 p.m.

**KUEMPEL CHIME Clockworks**  
Dept. 516, 21195 Minnetonka Blvd. Excelsior, MN 55331

Get Big Manual Free!

**Build Your Own High-Mileage "Super Carb!"**

**SuperTube Cutaway Vaporizer**

**C.N. Pogue Family Reveals High MPG Secret. Inventor Claims 79.8 MPG, 400 cid Chrysler!**

Rebirth of the legendary "200 MPG" Carburetor? Possibly. Pogue got reported MPG with light car, small engine, "clean" fuel of 1930s. Famed inventor's grandnephew, Floyd Stafford, just installed Covey vaporizer in '71 Pontiac (big V8), reports 71 MPG, 1600 mile trip!

**VAPORIZES FUEL BEFORE CARB INDUCTION**

New easy-to-build vaporizer is incredibly simple, amazingly efficient. Fits under hood. Only 14" to 18" long, 3" in diam. It's heated by exhaust gases, precisely-controlled for 100% fuel vaporization! Gasoline enters tubular spiral, instantly vaporizes; travels to small surge tank for full power under load; enters optional propane carb, or present carb through low-cost stock or simple hand-made adaptor. Dual system, instant change-over. Runs on high as 100 to 1 air/fuel ratio with no power loss!

**YOU'RE INVITED TO JOIN ROAD TEST TEAM!**

Build your own or have it built, at any metal shop. Discover how you may vastly-increase mileage of your car, truck, or RV! We furnish specs, construction details. Parts Kits planned, but pre-production data needed. Install unit, provide test info requested, and big Covey Manual (2nd Edition) costs you nothing. Free Road Test Application, full details. Write!

**CRS Carb Research Center, Dept. PM-3**  
PO Box 1 Foyil, OK 74031

**GOVERNMENT JOB OPENINGS**

**\$8,000 To \$50,000 Per Year**

**Immediate Opportunities**

Thousands of Federal, State, & Local career positions are now available for skilled and unskilled workers. Vacancies exist nationwide at all levels. Exceptional benefits and security. Anyone interested in applying send for free report. Please include birth date and enclose \$1.00 for immediate first class shipment.

**GRS Dept. X44, 4620 Wisconsin Ave. NW, Washington, D.C. 20016**

**BUILD A BIKECAR**

The Amazing Mini Car Built with Bicycle Parts! Electric-Pedal Powered! Fun to Drive! Easy to Build!

**PLANS \$7.95**

Postage and Mailed First Class

Send To: **SPORTRAN INC.**  
Box 732R, Indian Rocks, FL 33535

**GREAT SAUSAGE RECIPES**

227 page illustrated book explains sausage making plus home curing and smoking of meat, fowl and fish. Over 100 recipes. We now have Low Salt Seasonings. Free equipment and supply catalog has more information.

**The SAUSAGEMAKER**  
177-6 Military Road Buffalo, N.Y. 14207

**Rocking Horse Plan**

Build this all-time favorite. Size 25 x 36. Full-size plan & accessories kit available. Kit contains vinyl & foam for padded seat, fur fabric for mane & tail, rings & vinyl for bridle.

PLAN-245 ... \$6.00 ppd. Catalog ... \$1.00.  
HA KIT (accessories only) ..... \$9.00 ppd.

**ARMOR PRODUCTS**  
P.O.Box 290, Dept. C, Deer Park, NY 11729

**So easy to handle you guide it with Just ONE HAND!**

**No Footprints! No Wheelmarks! No Struggle!**

Tiller users, for heaven's sake, please don't buy nor put up any longer with any other make of Tiller without giving yourself a chance to find out about our wonderfully different and better kind of Tillers — with **POWER DRIVEN WHEELS** and with tines in the **REAR** instead of the **FRONT!** Please let us send you complete details, prices, "OFF-SEASON" SAVINGS, etc. Mail coupon below now to **TROY-BILT® Roto Tillers, 102nd St. & 9th Ave., Troy, N.Y. 12180**

© 1983 GARDEN WAY, INC.

**TROY-BILT® Roto Tillers, Dept. A2048**  
102nd St. & 9th Ave., Troy, N.Y. 12180

Please send the whole wonderful story of TROY-BILT® Roto Tillers including prices and "OFF-SEASON" SAVINGS now in effect for a limited time.  
(Please Print Clearly)

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_ Zip \_\_\_\_\_

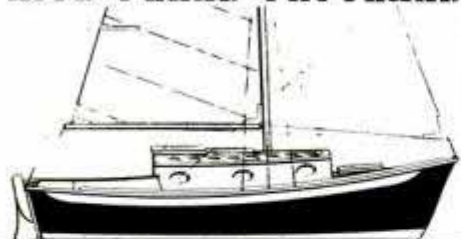


# BUILD YOUR OWN BOAT

Join the thousands who build each year AND SAVE \$\$\$! GLEN-L's proven methods are especially intended for amateurs. Step-by-step pictorial and written instructions with material listings assure **PROFESSIONAL RESULTS!** HUGE 144-page catalog describes over 200 designs, 8' to 55'. Sail & power boats, boat trailers, boating books, AND MORE! Order catalog now and also receive FREE "BOATBUILDING SUPPLIES" brochure.



## KITS - PLANS - PATTERNS



- GLEN-L MARINE DESIGNS**  
9152 Rosecrans, Box 756T, Bellflower, CA 90706
- GLEN-L catalog @ \$2.00 (sent 4th Class) OR
  - GLEN-L catalog @ \$4.00 (sent AIR MAIL)
  - "FIBERGLASS BOATBUILDING-AMATEURS" ..... @ \$22.95 ppd.
  - "BOATBUILDING WITH PLYWOOD" ..... @ \$15.95 ppd.
  - "INBOARD MOTOR INSTALLATIONS" ..... @ \$14.95 ppd.
  - "HOW TO FIBERGLASS BOATS" ..... @ \$ 8.50 ppd.
  - "RIGGING SMALL SAILBOATS" ..... @ \$ 8.50 ppd.
  - "HOW TO BUILD BOAT TRAILERS" ..... @ \$ 6.50 ppd.
- NAME \_\_\_\_\_  
STREET \_\_\_\_\_  
CITY \_\_\_\_\_  
STATE \_\_\_\_\_ ZIP \_\_\_\_\_

**GLEN-L** GLEN-L MARINE DESIGNS  
9152 Rosecrans, Box 756T, Bellflower, CA 90706



**Unique Mini-Van Kit**  
**LASER 49er**  
For VIK Fun, Easy to Build  
Buy Factory Direct and Save  
"Introductory Offer" — Body Kit  
only \$3995. Send \$5. for color  
brochure, prices & specs.  
**Elite Enterprises Inc.**  
Dept. PMX-84  
P.O. Box AF  
690 E. 3rd St.  
Cokato, MN 55321  
Phone (612) 298-5525

## BUILD YOUR OWN JET HELICOPTER

EASY TO FLY—INEXPENSIVE TO BUILD!

- Carries one person-plus
- Simple hand-tool assembly
- Uses low-cost fuel

PLANS—completely illustrated: \$9.00

The HELICOPTER HOBBYBOOK  
Includes Plans for building a  
piston - engine - powered  
Helicopter (illus.): \$8.00.

BOTH ABOVE BOOKS:  
only \$14.00

**HELICRAFT**  
P.O. Box 16488  
Baltimore, MD 21217

# TOOLS

Send for your  
**FREE CATALOG**  
of high quality, low priced, Hard-To-Find Tools for the woodworker or hobbyist.  
Call (414) 248-1150  
Dept. PM3, P.O. Box 542  
Lake Geneva, WI 53147  
**CALL or WRITE TODAY!**

**FREE 72 PAGE AIRCRAFT TOOL CATALOG**  
For free newsletter write:  
**U.S. INDUSTRIAL TOOL**  
TOLL FREE 800-521-7394 or 800-521-4800  
Outside USA 1-313-272-4545 • TWX 810-243-4039  
13560 AUBURN • DETROIT, MI 48223

## E-Z JUMP

The Jumper cable that starts your car through the cigarette lighter. Easy and safe to use, prevents over charging. Can be stored in glove compartment. Instructions included. Satisfaction guaranteed. Send \$25.95 to:

**J. CHATMAN CO.** Dept. 74, P.O. Box 5402  
Carson, California 90746

## LIQUID WINDSHIELD WIPER!!

Amazing new product that disperses rain, sleet and slush on contact! Just wipe it on for super clarity and visibility! Easy wipe on application—protects and conditions against dirt & grime! Makes cleaning a snap! One 5 oz. bottle lasts & lasts (200 sq. ft.) 30-day money back guarantee! Only \$7.95 plus \$2.00 shipping (In Pa. add 6% sales tax). Allow 2-4 weeks for delivery. Order now!

**SPRINGFIELD I.E., Dept. L01,**  
P.O. Box 15291, Pgh., Pa. 15237

## CALL TOLL FREE NOW!

### AMAZING VINYL REPAIR

—\$10 to \$20 in an hour!  
Big earnings, repeat business. Car shops, homes, motels, restaurants, bars, etc. FREE FACTS BY MAIL.  
Call toll free 1-800-621-6633 (Ill. 1-800-572-0444)  
or write VIP, 2021 Montrose, Dept. 183, Chicago, IL 60618

**EMCO COMPACT 5**  
5" x 14" C.C.

**LATHES 3" TO 15"**  
MILLS, DRILL PRESSES, GRINDERS... LATHES CATALOG \$1.00 Precision Tools, Inch or Metric, Aluminum, Brass, Steel - all shapes. Small Screws, taps, drills, saws, Collets... TOOL CATALOG \$1.00

**CAMPBELL TOOLS CO.**  
21000 Selma Road  
Springfield, Ohio 45505  
(513)522-6562

TURNING MILLING DRILLING, THREADING BORKING, DIVIDING

ARE YOU LOOKING FOR EXTRA MONEY? GO INTO BUSINESS!

FOR FULL DETAILS SEE OUR CLASSIFIED SECTION!

## Build a Personal Earth Station for Worldwide Satellite TV Reception

Enjoy direct TV broadcasts from virtually anywhere in the world by setting up your own TVRO station—complete instructions for constructing and installing a unit you can use with any TV! 304 pp., 201 illus. Hardbound. \$15.95 Order No. 1409  
Dept. PMX-384X  
P.O. Box 40  
Blue Ridge Summit, PA 17214

**TAB BOOKS Inc.**

## BUILD THIS TRAILER KIT

Bed 76 1/2" x 16". For personal Use or Resale. Heavy duty steel precut. 7000 lb. axles. Guaranteed. Haul hay, cars, tractor, freight, etc. Send \$3.00 for brochure, parts catalog and prices.

**TRAILER MAKER 1229 No. Jefferson Bldg. C Mt. Pleasant, Texas 75455 Ph. 214-572-5092**

## BASEMENT TOILET

FLUSHES UP To Sewer or Sump Tank  
No Digging Up Floors—Installs Easy, Anywhere!  
Write McPherson, Inc., Dept. 16  
Box 15133 Tampa, Florida 33684

## Save \$500—build it!

No welding!  
Holds 3/4 ton!

Step by step PLANS

• The original Boods Trailer System - a proven design since 1962.  
• Ideal for hauling firewood, moving, building, hunting, fishing, camping, etc. - or start your own sales and rental business.  
• 48 1/4" wide inside, 6' long - front & back panels slide out for carrying 4' x 8' plywood sheets or other long objects.  
• Tough - not a toy - seats strong 14" American car wheels and springs.  
• Easily built for about \$135 with ordinary hand and power tools.  
PLANS - STEP-BY-STEP INSTRUCTIONS - PICTURES - MATERIALS LIST - USEFUL TRAILER HINTS

**JAYBARK, R & D CORPORATION**  
21 RIVER ST., BOX 109, DEPT. J,  
CHATEAUGAY NY 12920

ONLY \$10 PPD  
SATISFACTION OR MONEY REFUNDED

## Portable Steam Cleaner

Steam in 60 seconds

**CLEAN:** Engines, Air Filters, Lawn Mowers. 3 year guarantee on fire box, coils. Uses liquid soap, propane fired. Weight 120 lbs. Auxiliary pump required on low water pressure.

**WEDCO MFG. INC., Dept. M-14**  
940 West Broadway, Jackson, WY 83001

## BUMPER STICKER PRINTING DEVICE

FUN, INEXPENSIVE, PORTABLE  
EASY - NO TRAINING NEEDED  
ANY MESSAGE IN MINUTES

Get FREE DETAILS  
P.O. BOX 22791 (G)  
TAMPA, FLA. 33622

## HEARING AIDS

SAVE \$\$  
All-in-the-Ear Aid will help you hear and understand!  
Try 30 days before you buy!  
No salesman. Free catalog!

**RHODES, Dept. 132-T, Brookport, ILL 62910**

## BUILD YOUR OWN ROCKET MOTORS!

\* 40 POUNDS THRUST!  
\* FIFTY CENTS EACH!  
\* BUILD A DOZEN IN AN EVENING!

Write for our brochure and we'll send you a WORKING SAMPLE of an electric igniter that YOU CAN MAKE YOURSELF from materials you'll find around the house.

Send \$2.00 to:  
**Dept. PM 4, THE TELEFLITE CORPORATION,**  
11620 Kitching St., Sunnyvale, Calif. 92388

## NON-GUNS!

That's right, these precision-built replicas of famous firearms CANNOT CHAMBER OR FIRE REAL AMMUNITION! Made of machined metal, they look, feel and weigh same as the originals. CAN BE DISASSEMBLED. Over 30 blue, hand-finished parts. Comes fully assembled. Safe and perfect for display. MONEY BACK GUARANTEE. Send for FREE CATALOG of over 80 different models.

Model shown U.S. GOV'T 45 AUTOMATIC, DD1U-61-300 \$55 (3.00)

**The COLLECTOR'S ARMOURY, Inc., Dept. PM**  
800 SLATERS LANE, ALEXANDRIA, VIRGINIA 22303



# CLASSIFIED ADVERTISEMENTS

Sophie Gronowicz, Classified Sales Manager Kathy Cusumano, Classified Service Manager

Rate: \$5.70 per word payable in advance each insertion. Minimum insertion ten words.

Bold face capitalized words—\$1.00 per word additional (First word set in Bold Face at no extra charge, Zip Code Free.)

The next available issue to place an advertisement in America's No. 1 Classified Section is **MAY**. The closing is **MARCH 5th**.

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. As a consumer service and in cooperation with our mail-order advertisers

who use post office box addresses for their convenience in handling your order, Popular Mechanics maintains a register of such mail-order advertisers containing their complete names and street addresses.

Advertisers using P.O. Box number must furnish complete name and street address for our records.

To avoid delay in the publication of your ad, please send descriptive materials with your request.

## PUBLISHER'S MART BOOKS & PUBLICATIONS

**WANT To Change Career?** Try Electronics. Get A Start by Ordering **HOW TO UNDERSTAND BASIC ELECTRONIC** Book. Packed with Explanations and Illustrations on How Silicon Chips, Diodes, Resistors and Capacitors Work. The same parts used in Computers. Send \$10.00. How to Company, P.O. Box 2592, Newport Beach, California 92663-1592. Satisfaction Guaranteed.

**FREE** Book. Prophet Elijah Coming Before Christ. Megiddo Church, Dept. 63, 481 Thurston Road, Rochester, N.Y. 14619.

**OUT-Of-Print Books Found.** Send Wants. Booklook, 51V Maple Ave., Warwick, N.Y. 10990

**PUBLISHERS' OVERSTOCKS, BARGAIN BOOKS.** 2,000 titles, all subjects! Free catalog: Hamilton, 98-51 Clapboard, Danbury, CT. 06810

**LEARN THE SECRETS OF BUILDING WEALTH** — Ten Steps To Financial Independence. Order Now. Receive Free Gift \$3.25. KM Associates, 5000 S. Quebec, Suite 660, Dept PM3, Denver, CO 80237

**MATHEMATICAL** insights! \$5. Michael Gilbert, Box 2376, El Paso, Texas 79952

**NUCLEAR** Survival Manual. Declassified. \$3.95. Mills (M-63), Box 520010, Miami, FL 33152.

**BUSINESS SITE SELECTION!** Are you starting a new business? Relocating? "A GUIDE TO COMMERCIAL SITE LOCATING" A seminar manual by veteran site locator. Send \$21.95 Check/MO To: J. Hackett Co., Box 895, Dept. PM, Vancouver, Wash. 98666

**HOW TO FILL YOUR MAILBOX WITH MAGAZINES - FREE.** Send \$3.00 To: C R Smith Associates, 107 Copeland Lane, Yorktown, VA 23690

## CATALOGS

**FREE CATALOG — BEST IN THE INDUSTRY — A COMPLETE CAMERA STORE IN A CATALOG** — One of the World's Great Catalogs, and it is photographic. Send to: Porter's Camera Store, Inc., Box 628, Dept. PM, Cedar Falls, Iowa 50613 for your Free Copy (U.S. Only). 112 tabloid size pages filled with 4,000 items many of them exclusive and very unusual. Plus popular brand cameras, lenses, flash, etc., at discount prices. Huge inventory, fast service, great packaging. You must see it to believe it. Order your FREE copy today.

**POPULAR MECHANICS "PLANS AND IDEAS" CATALOG #1700** — Over 900 ideas on workshop projects, plans for shop tools, storage houses, boats, furniture, toys — just about everything! Send \$1.00 to: **POPULAR MECHANICS P.O. BOX 1014, RADIO CITY STA., NEW YORK, N.Y. 10101**

## AUTOMOBILES

**WHIP THE DEALER!** Special report. California auto dealer reveals all secrets. Drive sporty, luxury cars for less. Possible profit! **LEGITIMATE!** New-Used-Buy-Sell-Lease. \$10. Accent P3, Box 3786, Central Point, OR 97502

**SAVE GASOLINE!** Bypass pollution devices - - easily, reversibly! Posco (GB-3), LaGrangeville, NY 12540

**HIGH** Mileage Carburetors. Free Details, Box 89, Draper, Utah 84020-0589.

**INCREASE MILEAGE/PERFORMANCE EXTRA IN-COME-SELL** for \$25, costs \$2. Vapor Injector, Send \$4, complete details. V Enterprises, Box 3124, Apopka, FL. 32703-0124

**THEFT PROOF YOUR CAR** for under \$2.00. Complete, Simple Instructions, Materials List- \$2.95. MAM, Box 79067C3, Houston, Texas 77279.

**LIKE OLD CARS?** Own an old car or want to own one? Then subscribe to **HEMMINGS MOTOR NEWS**, world's largest old car marketplace. Hemmings has over 500 pages of ads each month, crammed with thousands of old cars for sale - plus parts, literature, restoration supplies and more. Only \$15.50 for 12 giant issues. Subscribe to the 'bible' of old car collectors today. Send to: Hemmings Motor News, Dept. 318, Box 100, Bennington, Vermont 05201

**PREVENT** Valve Cover Oil Leaks on GM Covers Which Lack Reinforcement Lip. 4 Special Washers \$4. Selzer Tool & Die, P.O. Box 1017, Elyria, Ohio 44036

**RUST PROOFING KIT.** Detailed Instructions. Fabricated Plugs. Patent Applicator. \$19.95. Lomar Distributing, Box 2314, Green Bay, WI 53406

**RADIO LIGHT DISPLAY.** Red Leds Respond To Music Beat. Easy Hook Up. Any Radio. \$6.95. **CAZZ-TECH**, Box 285, Briarcliff, NY 10510.

**BIG** 400 CID Chrysler Gets 67 MPG! Carburetor Plans. Kniess, R2PM, Bowling Green, MO. 63334

**PERSONALIZED** License Plate Frames \$5.95 Send SASE. Frames, 38 Taylor Ave., Manasquan, NJ 08736

**SAVE HUNDREDS.** Complete How To Auto Body Book \$4.95. Lomar Dist., Box 2314, Green Bay, WI 53406

## ELECTRIC VEHICLES

**MOTOR**-in-Wheel, Complete Lucas DC Motor Gear Reduction, Tire in Compact Unit. **INDUSTRIAL QUALITY.** Info. \$2.00. Yost, Rt. 1, Box 37, PM-283, Sauk City, Wisc. 53583

## AUTO SUPPLIES & EQUIPMENT

**ALTERNATOR** Generator Rebuilding Book. Price: Hedelund Engineering, Box 26024, Las Vegas, NV. 89126.

**PARTS:** Army Jeep and truck parts. Spare Parts & Equipment Co., P.O. Box 751, Lexington, Kentucky 40501-0751

**STAINLESS STEEL DOES NOT RUST!** Available Now. **STAINLESS STEEL MUFFLERS/PIPES.** American-Made. T304, 18-Gauge. All Welded Mufflers. Mandrel-Bent Pipes. Free-Flow Design For **PERFORMANCE AND ECONOMY.** Built To Last. **BORLA INDUSTRIES**, 2639 Saddle Ave., Dept. PM, Oxnard, CA 93030. (805) 983-7300.

**AMAZING ALL-PETROLEUM PRODUCT** reduces wear, increases fuel efficiency a **GUARANTEED** 10%. Free information: Mark Justus, 3105B Lakeshore Towers, Suite 408, Dept. PM, Anchorage, AK 99503.

**BETTER** Mileage Possible!! Secrets Of Super Mileage. Detailed Instruction Manual - \$15.00. Rosina Ltd., 527 North Azusa, Suite 226, Covina, CA 91722

## BICYCLES, SUPPLIES

**BICYCLE SUPPLIES.** Bargain Catalog \$1.00. **BIKERY, PMM**, Box 12039, Costa Mesa, CA 92627.

**BICYCLE ENGINE**, 175 MPG, 4.5 Lbs. \$49.95. Send \$1.00. Yost, RR1, Box 37, Sauk City, WI 53583

**PAINT** Your Bike Professionally **ALSO INCLUDED** Little Known Technique to Make Your Bike Look Like Brand New in Minutes Without Paint or Polish \$3.00. Beaver Bike, 2326 Grange Hall Rd., Beavercreek, Ohio 45431

## MOTORCYCLES, MOTORSCOOTERS & SUPPLIES

**"MOTORCYCLE MECHANICS TRAINING** see our ad under Education & Instruction Page #195.

**GO KARTS**, Minibikes, ATV's, And Kits. Parts, Engines. Lowest Prices. 56 Page Catalog \$2.00 Refundable. Kart World, Dept C., 1488 Mentor Ave., Painesville, Ohio 44077

## AVIATION, HANG GLIDING

**GYROCOPTER**, Hovercraft, Airboat, Ultralight. Drawings \$10.00. Aircraft Supplies, 7932 Ontario Street, Omaha, 68124

**KITES!** Best selection anywhere! Color Catalog \$1.00 (refundable). **INTO THE WIND**, 1729M Spruce St., Boulder, CO 80302

**HOBBY HELICOPTER.** "Choppy" Ultralight Single-Seat Helicopter. Simplified Construction—Motorcycle Engine. Brochure \$3.00. Polynova, Box 670M, St. Remi, Quebec, Canada J0L 2L0

**BOOMERANGS—INCREDIBLE RETURNS!** You can do it. Exciting! Order your **FREE** Catalog Now! BoomerangMan, 306 Park, Monroe, LA 71201.

**DESIGN** Build Airplanes, Hang Gliders, Simplified Publications. Brochure 20c. McCoy Aircraft, 12820 S. Figueroa, Los Angeles, CA 90061.

## SPACE & ASTRONAUTS

**OFFICIAL** Space-Shuttle Patches, Caps, T-Shirts. Write: 'Shuttle', P.O. Box 5108, Titusville, Florida 32780.

**ANTIGRAVITY** Propulsion Device! Free Brochure. RDA, Box 873NM, Concord, NC 28025

## HOVERCRAFT

**AERO-CAR** Amazing Hovercraft built easily with ordinary tools. Lawnmower engine power. Carries one man plus. Hovers, flies forward, backward. Sideways over land/snow/water. Complete construction plans and brochure. \$9.95. Aero-Projects, Box 5118PM, Clinton, New Jersey 08809.

**HOVERCRAFT** Plan All Sizes. Catalog \$1.00. Universal Hovercraft, Box 281, Cordova, Illinois 61242

## CB'S, RADIO & HAM EQUIPMENT

**CB RADIO** Books, Kits, Modifications, Catalog \$1.00 Refundable. APS, POB 263, Newport, RI 02840

**POLICE** Scanners, Bearcat, Regency. HPR, Box 19224, Denver, CO. 80219.

**CB MODIFICATIONS**, Conversions, Books, Plans, Kits. Catalog \$2. **CBCI**, Box 31500M, Phoenix, AZ 85046

## ELECTRONICS

**GOVERNMENT** Surplus receivers, transmitters, snooper-scoopers, parts. Catalog 25c. Meshna, Nahant, Mass. 01908.

## COMPUTERS & SOFTWARE

**TI-99/4A** owners. Get your free catalog of new, exciting, low cost software. Dynamic, Box 690, Hicksville, N.Y. 11801

**T/S-1000 PLUGS** Loose? \$5.00 Gets Diagram For **DIY** \$4.00 Fix. **JWK**, 11108 Bermuda, Cerritos, CA 90701

**SOFTWARE** Atari CBM64 VIC20. Catalog of games, business, education etc. Send \$1.00: Komputer Konsultants, P.O. Box R, Lake Grove, NY 11755.

(Continued on next page)



## COMPUTERS & SOFTWARE

(Continued from preceding page)

**FREE** Atari/Commodore-64/T199-4A/TRS80-coco/TimeX/VIC-20 programs! Send stamps. Box 5222MM, San Diego, 92105.

**TRS-80 COMPUTER DISCOUNTS.** Lowest prices anywhere. Free price list. Radio Shack, 175B N. Delsea Dr., Vineland, NJ 08360. 800-257-0426.

**48K** Apple compatible computer US\$380.00 and hundreds softwares details US\$1.00. Reliant, P.O. Box 33610, Shungwan, Hongkong.

**DO YOU HAVE A PERSONAL COMPUTER?** \$240 to \$480 WEEKLY now possible while using your Personal Computer. No Experience on skills required **GUARANTEED.** For Complete Details please send a stamped self addressed envelope to: WTS, Box 563, Amherst, MA 01059

**PROGRAMS,** Uses needed. Home computer income. Copyrighted booklet covers Writing, Copyrights, Marketing. \$3.00. James Holland, 7828 Alpine, Sparta, MI 49345

## STEREO, CASSETTE TAPES, ETC.

**THOUSANDS OF OLDIES!** Hard-to-find 45rpm hit records from the last 40 years including pop, country, rock, and soul. Send \$2.00 for catalog to: American Pie, P.O. Box 66455, Dept. PM, Los Angeles, CA. 90066

## TV & VIDEO EQUIPMENT NOTICE: USE OF CERTAIN ITEMS IN THIS CLASSIFICATION REQUIRES STATION AUTHORIZATION.

**MAKE BIG MONEY IN HOME SATELLITE TELEVISION.** Be a Dealer. Earn \$50,000.00 - \$75,000.00 yearly. Send \$1.00 for valuable report. Wholesale Satellite Supply, Box 1044, Lake Oswego, OR. 97034. 503-246-8335.

**VIDEO MOVIES.** VHS-Beta-Disc. Catalog \$1.00. Tower, DUNKIRK, MD 20754-0213

**SATELLITE TELEVISION ANTENNAS** complete detailed plans for home construction by anyone \$5.00. Jansen Electronics, P.O. Box 168M, Dundee, Ore. 97115

**PAY TV Amateur TV RECEIVERS.** Wholesale to public. **LOWEST DEALER PRICES!** Free Brochure! Send large SASE to: Janik, 632 West Doran, Suite #107, Glendale, CA 91203. 213-956-5839.

## BOATS, OUTBOARDS, TRAILERS, & KITS

**TRAILER** Books. Enlightening. Buy/Evaluate . . . \$12.00; Tow/Maintain . . . \$12.00. Trailers/Kits Catalogs: Utility. . . \$3.75; Car. . . \$3.75. Trailer Treasury, P.O. Box 3036, Dpt. H-3, So. El Monte, CA 91733. (213)575-3224.

**12V TROLLING MOTOR** Plans \$5.00. P.O. Box 31051, Highland, Michigan 48031

**EVINRUDE/MERCURY** 1983 Bargains . . . all sizes . . . Scott McCulloch parts . . . \$2. handling . . . Electra Marine, 610 Merrick Road, Lynbrook, New York 11563

**FIBERGLASS - RESINS** - Foams - cloth - epoxies - mat - etc. Factory prices - **CATALOGUE** \$1.00 - (Book "**COMPLETE FIBERGLASSING**" \$6.00) - Clarkcraft, 16-P1 Aqualane, Tonawanda, NY 14150

**BOAT PLANS - FRAME KITS - PATTERNS** - Hundreds of designs - Wood - Fiberglass - Steel - Sailboats - Powerboats - Outboards - Canoes - Kayaks - Rowboats - Duckboats - Dories - Houseboats. Proven methods include instructions especially for amateurs. Professional results! No Lifting! "Supplies" - Fastenings - Fiberglass - Resins - Glues - Books. Send \$2.00 for Huge 144-page catalog or \$4.00 Airmail. Includes Free "Boatbuilding Supplies" brochure. Investigate our "Poxy-Shield"/"Poxy-Grip" wood/epoxy boatbuilding system - Manual - \$2.00. **GLEN-L MARINE**, 9152 Rosecrans, Box 756MP, Bellflower, CA 90706.

**BOATBUILDER'S PLANS,** Patterns - Kayaks, Canoes, Sailboats, Pirogues, Fishing Boats, Duckboats, 40 models. Catalog 25c. Outdoor Sports, Box 871C, Brentwood, TN 37027

**PONTOON** and Houseboat Kits from \$1,994.00. Information \$1.00. 1-800-522-1500 Ext. 6042. Watercraft, Box 902B, Columbia, TN 38401

**BOAT KITS** 27 trailerable models - **POWER** and **SAIL** - 11'-30". Molded fiberglass hulls and decks come factory assembled - you install factory supplied interior. Save half factory-built cost. No experience required. 48-page catalog - \$1.00. Luger, Dept. BC-84, 3800 West Highway 13, Burnsville, Minnesota 55337. 612-890-3000.

**I SAILED** Around World 5 Years As Ship's Navigator. So Can You! Hire On One Of 1,000 Private Yachts. Instruction book: Celestial Navigation, Step-By-Step Procedure For Complete Idiot. \$10 To: K. Kenny, 13953 Panay Way, Marina del Rey, CA. 90292

**BOATKITS - PLANS - PATTERNS - FRAMEPACS - LARGEST CATALOG** - 300 Designs 8' 80" - Plywood Fiberglass - Steel - Strip Planking - **POWERBOATS** - Inboards - Outboards - Cruisers - Sportfishers - Hydroplanes - Runabouts - Houseboats (**KAYAKS CANOES** - Largest Selection) - **SAILBOATS** - Daysailers - Trailersailers - Multihulls - **FIBERGLASS MATERIALS** - Cloth - Resins - Foam - New improved - "**EPOXYPLUS**" - "**EPOXYGLUE**" - "**EPOXY-SURFACER**" - Wood/Epoxy construction - **CATALOG** \$2.00 (\$4.00 Airmail) - Includes **FREE** Boatbuilder Materials Brochure (Book - "**AMATEUR BOATBUILDING**" Fiberglass-Plywood - Wood/Epoxy - Steel \$6.00) **CLARKCRAFT**, 16-P Aqualane, Tonawanda, NY 14150

**BOATDOCK** Modern Covered Steel Dock with Foam Floation. Prefab Modular Construction. Single and Double Stall Plans \$15.00, Brochure \$1.00. Johnson Engineering, P.O. Box 968, Braidwood, Illinois 60408

**NOW . . .** A Trim and tilt kit that fits virtually all outboard motors, both foreign and domestic. Simple installation, non-electric allows Trimming at all speeds from the drivers seat. Dole Trim-N-Tilt Kits. Write: Dole Fluid Power Products, Box 1978PM, Hutchinson, Kansas 67501. Call (316) 663-8361.

## ATHLETIC EQUIPMENT AND BODY BUILDING COURSES

**BIGGER,** More Powerful Muscles - faster!! Free Booklet! Universal, Box 6694A, Detroit, Michigan 48240

**KUNG-FU** Free Lessons. Send \$1.00 for Postage. McLisa, Box 1755, Dept. PM84C, Honolulu, Hawaii 96806

**BODYBUILDING** Equipment Catalog \$2.00. Decathlon, 1044 West 7th Street, St. Paul, Minn. 55102

**ATHLETES! NEW METHOD! AVERAGE TO CHAMPION IN WEEKS!** Write: **KAPS**, Box 2726A, Vancouver, WA. 98668-2726

**BUILD MASSIVE MUSCLES!** Free Packet! Mus-L-Up, Box 1616X, Fontana, CA 92335

## GUNS, DECOYS, HUNTING

**GUNSMITHING COURSE** Professional career with a future. Expert instruction in modern facilities. Our 35th year. Write today. **PENNA. GUNSMITH SCHOOL**, 812 M Ohio River Blvd., Avalon, Pittsburgh, Penna. 15202

**FREE** Catalog - Camouflage Gun Chaps, Holsters, Backpacks, Gear Bags, Web Belts. Kane Products, Dept. PM, 5572 Brecksville Road, Cleveland, Ohio 44131.

## BATTERIES, ALTERNATORS

**BATTERY REPAIR,** simple, economical way for you to **EARN EXTRA CASH. BATTERY REPAIR**, Rt 2, Marathon, WI. 54448

**SENTRY** generators with/without engine big discounts. JJ Enterprises, Box 693, Oshkosh, Wisconsin 54902

## BATTERY REBUILDING SCHOOL

**BATTERY** Rebuilding Tools, Instructions \$326.00 Manual \$65.00. Training Available. Sun Battery, 10415 98, Sebring, Florida 33870

## ENGINES, MOTORS

**NEW** Engines For Mowers, **TILLERS, ETC** . . . Fantastic Savings! Illustrated Catalog - \$2.00. (Refundable First Order.) Discount Engines, Box 166PM, Ashland, MO 65010.

## TOOLS FOR SALE

**NEW CORDLESS D.C. CIRCUIT TESTER**, Transistorized, Pen Size G-12-24 Vlt. Send \$12.95. Tradex, 419A Main St. #103, Huntington Beach, Cal. 92648

**GUARANTEED** Low Prices! Tools, Leather Pouches, Tar-paulins, **FREE** Catalog! Veerakit, 617A Fairview, PM3, Arcadia, CA 91006

## UPHOLSTERY SEWING MACHINES

**UPHOLSTERY** Sewing Machines with Walking Feet, complete ready to use—only \$489.00. Thompson Model PW200-AGBP AVAILABLE FROM YOUR LOCAL DEALER, or order direct. (Master Charge-Visa). Datho Mfg., Inc., P.O. Box 12110, Lubbock, Texas 79452—Phone: (806) 744-6774

## MACHINERY, TOOLS & SUPPLIES

**BUY AT DISCOUNT 10% TO 30%** All Your Equipment, Tools Hand, Electric, Air, Motors, Generators, Pumps Supplies For Every Trade, Plumbing, Heating, Electrical, Air-Cond. Refrigeration Automotive Appliance Everything You Need For Industry, Shop, Farm, Office, Home. Over 10,000 Products. Send \$6.00 U.S. For Our Large 11,000 page catalog to: Discount Industrial Supply Corp., 8 Port-Cram Dr., Wharton, N.J. 07885

**IMPROVE** Your Chain Saw-Performance \$1. Champion's, 1115, Westwood, CA. 96137

**SMALL FOUNDRY** Furnaces, Supplies. Free literature. Pyramid Products, 3736 South 7th Avenue, Phoenix, Arizona 85041

**SILVO** Hardware, 188 Page Hand & Power Tool Catalog \$1.00. Dept. PM-4-3, 2205 Richmond St, Philadelphia, PA 19125

**4" METAL** Cutting Lathe \$67.25. Taig, 15048 Proctor, Industry, CA 91746

**STEEL,** Brass, Aluminum. Catalog: \$1.00. **MBM**, 3719 Fremont, Chicago, IL 60613

**BANDSAW BLADES,** Any size, Power Tools & Shop Tools. Free literature. King Saw, 6541 Tidewater Drive, Norfolk, Virginia 23509.

**BOLTS, SCREWS, TOOLS, WHOLESALE, DIRECT.** Guaranteed. Catalog \$1.00 (Refundable). Camelot, Dept. 44, Box 65, Bristol, Wisconsin 53104

**1400** Catalogs Listed and Described. Sources for Everything Imaginable. \$4.00. Masterlog, Box 879-B, Fairfax, CA 94930.

**BRASS,** Steel, Aluminum, Stainless, Acrylic, Nylon, Teflon. No minimum. Catalog \$1.00 (Refundable). **METALS**, Box 11204, Clayton, MO 63105

**BELSAW SHARP-ALL OWNERS** - Save to 30% on name-brand wheels, files, belts, parts. Free catalog. Immediate shipment. Woodmaster, Dept. H24, 2849 Terrace, Kansas City, MO 64108. (800) 821-6651.

**FREE FLASHLIGHT OFFER. RECHARGEABLE.** Pollak Enterprises, Box 6307, Albany, CA. 94706.

**STEEL,** Aluminum, Brass—Sheet, Bar, Shop Supplies. Plans. Write: CEI, RR1, Box 183, Cameron, IL 61423.

**BANDSAW BLADES** any size **SAVE 20-30% EUROPEAN** Wood and Metal Working Machinery. Free Information. Suffolk Machinery, Suite 8, 16 Shore Road, Patchogue, NY 11772

**"SHARPENERS REPORT"** Monthly Newsletter, Sharpening Guidebook, Wall Chart. Send for brochure. Skog Company, Dept. P3, P.O. 22559, Minneapolis, MN 55422

**TRADE SECRET.** Write and erase on tape measure. Uses pencil. Large (\$2.75), fits 20", 25", 50". Small (\$2.25), 16", some 12". Check, M.O. **AHW** Products, P.O. Box 291400, Los Angeles, CA 90029

**BANDSAW** Mill 5-16HP Build \$1,000.00. Literature \$2.00, Plans \$15.00. **SADO** Constructors, Box 1004, Glastonbury, CT 06033

**TOOLS,** Boats, Screws, Hinges, Blocks, Bristle Paint Brushes, Work Gloves. Buy Direct. Dealer Inquiry invited. Codon, 15 Mercer St., New York, NY 10013

## ENERGY SAVING

**LOW VOLTAGE LIGHTING- SAVE 80%** Replace Expensive Sealed Beam Bulbs with Low-Cost Standard Bulbs. Quick, Easy, Safe. Kit for 6 Lights \$17.95 ppd. Thrift-Lite, Box 725E, Cucamonga, CA 91730-0725

**ENERGY** Source from Washer, Dryer. \$4.00. Ener Tech, Box 553, Holmdel, N.J. 07733

**GET 25% To 40% More Heat** From Your Present Heating System. Details \$3.00. Merl Jacklin, 3571 Sherwood Ave., Niagara Falls, N.Y. 14301

**HOMEMADE** Instantaneous Water Heater, Plans \$4.00. Dave Hodges, Reidsville, GA. 30453

**SOLAR AND ENERGY SAVING PRODUCTS CATALOG!** **MATERIALS;** Components; Complete System. 80 pages, 18 Sections. Our 10th year! Order from one expert source—the country's largest energy saving mail order house! Call us at 603-668-8186 or send \$1.00 ppd. **SOLAR COMPONENTS CORPORATION**, Dept. M, P.O. Box 237, Manchester, NH 03105

**HOW** To Build **LOG SPLITTERS** Complete Plans Hydraulic Details **FREE** Guaranteed \$10.00. M. Franssen, Dept. PM1, P.O. Box 483, San Lorenzo, CA 94580-0483



## SOLAR & ALTERNATE ENERGY

**WIND-ELECTRIC SYSTEMS.** Patented, most efficient, cost effective, extremely reliable automatic operation. Output 5 to 100KW. Complete info. \$3.—Valuable Distributorships. International Energy Systems, 119 E. Lucy St., Florida City, FL 33034

## HEATING, FUEL SAVERS

**NECA** Cast Iron Add-on Boilers. Free Literature. WDM Heating, Box 691, Winsted, CT 06098

**HOT WATER** From Your Wood Stove. Plans \$10.00. Sivad Enterprises, Box 437, Union City, PA. 16438

**WASTE OIL BURNER** Simple design, easy to build, clean burning. Plans send \$3.00. Dave Vanlith, Box 306, Delano, MN 55328

## HOME CRAFTSMAN

**ROUTER PROJECTS.** Sell through Retail Florists, Church Bazaars, Flea Markets, etc. Information packet \$1.00 plus SASE. Box 105, Washington, Mich. 48094

**TOYMAKERS!** . . . Free Catalog . . . Patterns, Wheels, Dowels, Parts, Supplies! Hurry! Morgan, P01B08, 1123 Bardstown, Louisville, Kentucky 40204

**OVER 75 PATTERNS!** Enjoy Making Profitable Wooden Gifts, Toys, Household Accessories. PLUS "Shop Secrets". Only \$5.00. Accents (P-34), Box 262, Danvers, MA 01923.

**35 WOODEN TOY PATTERNS!** - Cars, Trucks, Train, Airplanes, Earthmovers! - Only \$5.00! - FRANKS, 1202P17 Second, Booneville, MS 38829

**LARGE** Selection of Plans. Furniture Designs, Loom, Spinning Wheel, Clocks, Dollhouses, Cradles, Toys, Alphabets, Bird Houses, Weathervanes, Kites and More. Catalog 50c. Craftplans Co., Rogers, Minnesota 55374.

**WOODEN** Toy Parts and Patterns. Fun With Wood Catalog \$1.00. Howard Co., Dept. PM, Box 442, New Albany, IN 47150

**WOODWORKERS,** Hobbyists. 1984 Catalog Containing Chair Cane, Wooden Wheels, Lamp Parts, Tools, Finishing Materials, Hardware, Plans, etc. Send \$1.00. Barap Specialties, PM384, 835 Bellows, Frankfort, MI 49635

**YOU CAN BUILD** Furniture, Toys, Accessories and Shop Equipment. Five Free Plans with Illustrated Catalog 700 Items. Send \$1.00 for Details. Mayco Sales, Box 2931PM, Mesa, Arizona 85204

**UNFINISHED** picture frame moulding. Factory closeout. 50% discount. 200 styles. Write: Japs. 126-PF Seventh North, Hopkins, MN 55343

**MAKE TOYS-** Plans, Kits- Hardwood Wheels, Parts, Dowels- Catalog \$1.00- Cherry Tree Toys, Belmont, Ohio 43718.

**WORLD'S LARGEST CATALOG?** Three pounds 704 pages. Every Tool, Supply, Machine Imaginable \$5.00. Refundable. McKiligan, PM-384, Johnson City, New York 13790

**WOODCRAFT PATTERNS,** Windmills, Wishing Wells, Bird Houses, Feeders, Flying Duck, Pheasant, Outdoor Planters, Catalog \$1.00. Crafters, 11840 US. 27 North, DeWitt, Michigan 48820.

**CATALOG FULL-SIZE FURNITURE PLANS** — \$2.00. Refunded with first order. Traditional, Early American, over 170! Furniture Designs, 1425 Sherman, Dept. CP-83, Evanston, Illinois 60201.

**KIENZLE** Battery Clock Movements, (Quartz) and accessories. Free price list. North American, Box 77-APK, Fox River Grove, Illinois 60021.

**BATTERY CLOCK MOVEMENTS.** Below wholesale prices. Best Quality Catalog \$1.00 (refundable). Yankee, Box 26, Thompson, Connecticut 06277

**WOODEN** Toys Are Better. List Of Plans \$1.00 U.S. Currency Only. Woodbutchers Toys, Box 514, Leslie, Mich. 49251

**FAVORITE WOOD TOYS,** Patterns, Parts, Wheels, Catalog \$1. Toys And Joys, Box 628M, Lynden, Wash. 98264

**GIANT** catalog of patterns, parts, books for making wooden toys; Free. **THE TOYMAKER SUPPLY COMPANY,** Dept. PM3, Tahoe, CA 95730

**WOODEN TOY PLANS** - All new. Modern trucks and more. Catalog \$1.00. D & E Crafts, 6118 N. Coast Hwy., Newport, Oregon 97365

**DRAFTING TABLE,** professional size, adjustable, inexpensive A-frame construction. Complete plans \$8.00. Project Design, 836 Monroe Street, West Hempstead, New York 11552

**UNIQUE PISTOL DISPLAY CABINET** with Storage Drawer Complete Instructions \$5.49. Country Crafts, Route One, Box 223-A, Audubon, Minn. 56511

**HARDWOOD CABINET DOORS** Made to your Sizes in Many Designs. Brochure \$2.00 (refundable.). **AMADAR,** Box 1349, Solvang, Calif. 93463

**CARVE WOODEN BIRDS** For Fun, Profit. We Offer Patterns, Kits, Parts. Details \$1.00. Leazenby, Box 66, Paradise, Mich 49768

**COUNTRY FURNITURE** Plans - Catalog \$3.00. Riedel Reproductions, P.O. Box 862, West Chester, OH 45069

**BIRDFEEDERS . . . HOUSES.** Six Successful Designs. Plans \$3.00. Innovative Info., Box 1088A, Saratoga Springs, NY 12866

**WOODEN PATTERNS-** Catalog of over 50 available plans and building instructions for wood toys, furniture, antiques, and more. Send \$1.00 (refundable). J.J. Enterprises, P.O. Box 19658, Rochester, NY 14619

**WOODWORKERS** — 25 Full Size Plans, 2' x 4' Toys — \$5.00. DACO, Box 141, Westland, Mich. 48185

## WOOD, WOODWORKING

**WOODWORKERS-** Gum-Ball Machine Plans. \$3.95. Gil-Son's Crafts, 113 Oakhaven, Aransas Pass, Texas 78336.

**FREE** catalog! . . . . Toymaking, veneering, caning supplies. Furniture plans, woodworkers' books, dowels, buttons, spindles, shaker pegs, mug pegs, candle cups. Hurry! Morgan, P01M07, 1123 Bardstown, Louisville, Kentucky 40204.

**EXTRA HAND,** Home computer + radial arm saw = **AUTOMATIC CARRIAGE.** Build attachment yourself. Copyrighted instructions \$7.95. James Holland, 7828 Alpine, Sparta, MI 49345

**FREE BROCHURE.** Wooden Toy Supplies, Box 133, North Attleboro, MA 02761

## PLANS, BLUEPRINTS, PROJECTS

**COMPLETE** Plans To 76 1/2' x 16' Trailer. Weight Cap. 7,000 Lbs. Haul Cars, Tractor, Freight, etc. Send \$5.00 To: JD Karkin, Rt. 1 Dodge Rd., Box 5, Brady, TX 76825

**FREE** brochure, most unusual electronic clock. Its about time. Send Stamped Envelope. DeFino, Box 6155, Bridgewater, NJ 08807

**PICNIC** Table Plans! Build for Springtime! Drawings! Instructions! \$2.00. Proud Co., 11 Amherst Road, Hopkinton, MA 01748

## LOG CABINS AND "A" FRAMES

**ROUGH, RUGGED & RUSTIC. LOG PROJECTS!** Make chairs, benches, tables, gates, fences. A summer house, birdhouses, signs and house numbers, lamps, tables, shelves, bookends. Photocopy of articles as they appeared in Popular Mechanics available Send for Plan RS-85 + \$4.00 to: Popular Mechanics, P.O. Box 1014, Radio City Sta., New York, NY 10101

## FOR THE HOME

**LOW VOLTAGE LIGHTING- SAVE 80%** Replace Expensive Sealed Beam Bulbs with Low-Cost Standard Bulbs. Quick, Easy, Safe. Kit for 6 Lights \$17.95 ppd. Thrift-Lite, Box 725H, Cucamonga, CA 91730-0725

**FREE** Time By Saving Work. New Product Cleans Easy, Fast. Use on Everything. Guaranteed. Safe. 32 Oz. Spray \$5.75 Plus \$1.00 Shipping. J&M Enterprises, Box 102PM, Westland, MI 48185

## HOME BUILDING & REMODELING

**CONSTRUCT** safety homes fifty spanish lessons \$4.00 each. Technical Portland Institute, Apd. 7954, Mexico, DF 06000.

**BUILDING? REMODELING?** Illustrated Manual Describes Money-Saving, Least-Effort Solutions To Common Problems. Only \$5.00 Postpaid. Moneyback Guarantee. **FREE** Information. Jayno, RRA4, Newton, Illinois 62448.

## PLASTICS

**CASTOLITE** Liquid Plastics. Crystal clear, colors. For casting, embedding, coating, fiberglassing; in industry, laboratories, craft work. Reproduce your designs with our mold materials. Catalog \$1.00. **CASTOLITE,** Dept. 84C/PM, Box 391, Woodstock, IL. 60098.

## DO IT YOURSELF

**HYDROGEN WELDING UNIT** simple-effective, no flux for aluminum or stainless steel. Powered by electric welder or car battery. Plans \$10, from: M. Buchacek, #5, 14423 Berendo Ave., Gardena, CA 90247 USA

**SAVE** Big Bucks on 8- and 16-bit professional computers in money saving do-it-yourself kits. Send for Free Catalog to: Heath Co., Dept. 017-154, Benton Harbor, MI 49022.

**HOW TO BUILD YOUR ALL-SOLAR HOME.** No more utility bills! Free details. Appelt, Box 324PB, Portal, AZ 85632.

**1400** Catalogs Listed and Described. Sources for Everything Imaginable \$4.00. Masterlog, Box 879-F, Fairfax, CA 94930.

**FLOATING** Residential Dock? Plans with "how-to" **BOOK** \$9.95. **FREE** Brochure. ADSCO, Department C-34, Savannah, Georgia 31414-5772

**DISCOUNT CATALOG:** Chainsaws, Three-Wheeler, Log-splitters, Motorcycle, Snowmobile, Small Engine, parts, accessories. (\$1.00). Manufacturer's Supply, Box 157-PM6, Dorchester, WI 54425.

**FREE** Kit Catalog contains over 450 do-it-yourself kits: Computers; Test Instruments; Stereo and Color TVs; Ham gear; Auto, Marine and Home Energy products. Write: Heath Co., Dept. 017-153, Benton Harbor, MI 49022.

**SAVE** on parts for Lawnmowers, Minibikes, Karts, Chainsaws, Small Engines. **THOUSANDS OF PARTS.** Send \$3.00 For Catalog. Sav-On-Parts, P.O. Box 231, Somerville, Mass. 02145

**HITECH** Materials, Components. Graphite, Kevlar, Alloy Tubing. Purchasing Service. Catalog \$2. **TECHNAPARTS,** B1, Box 2988, Saratoga, CA 95070

**ELECTROPLATING.** Complete amateur's textbook. All metals Electroplate metallic/nonmetallic items \$11.95. Details free. Tropic, Box 95-P4, Palm Bay, Florida 32905.

**DON'T OVERLOOK THESE TAX DEDUCTIONS!** Money Saving Manual Only \$2.00. Double M, Box 321, Clarion, Iowa 50525

**UPHOLSTERING SUPPLIES** \$1.00 for Prices. Variety Products, Box 566P, Lathrup Village, Mich. 48076-0566

**WATERBEDS!** Plans and Accessory Catalogue \$1.00. Waterbeds, 1210A "Z" Street, Vancouver, WA 98661

**SHOE REPAIR** Step-By-Step Illustrated Manual. \$8.95. Shoe Doctor, Box 458, Forest Lake, MN 55025

**1700 CATALOGS** Everything Conceivable! Many **FREE!** Directory \$4.00. Catalogs, 134-M, Stevenson Lane, Baltimore, MD 21212

## REPRODUCTION MOLDS

**LEAD SOLDIER MOLDS.** Scarce Civil, WWII, Cannon Fantasy. Illustrated Brochure \$1.00 (Refundable). Dunkens, Calvert, TX 77837

## ARTS, CRAFTS, SUPPLIES

**STAINED GLASS SUPPLIES** Complete Catalog \$2.00 (refundable). Sunshine Glassworks, 3690 Harlem, Dept CT, Buffalo, NY 14215

**LEATHERCRAFT** Supplies Catalog, \$1.00 (Refundable). Craftel, 1909 75N, Sherman, TX. 75090

**STAINED GLASS SUPPLIES: EXCITING SUPER CATALOG-PM \$3.00. CORAN-SHOES INDUSTRIES, 509 E. SECOND, BOSTON, MA 02127.**

**PRECUT STAINED GLASS.** Useful, Decorative. How To Kits Catalog \$1.00. Renee's Creative Stained Glass, 1216 Glen Arbor, Los Angeles, CA. 90041

**LEATHERCRAFT** Catalog. Tools, Leather, Dyes, Dressings, Saddle Stamps, Buckles much more. Send \$2.00 (refundable with order) to: MacPherson Bros., P.O. Box 99442, San Francisco, Calif. 94109

**EVERYTHING - You - Need.** Stained Glass Catalog \$1.00. Craftsmen, Hobbyist. Saylescrafts, 171 Main, Nyack, NY 10960

"**GETTING** Started in Stained Glass" \$1.00. Whittemore, Box 2065T, Hanover, Mass. 02339.

## CARTOONING, COMMERCIAL ARTS, SIGN PAINTING

**SIGN** Painting — Easy method. Free catalogue. Kaufmann Company, Centertown, Missouri 65023

**CARTOON** For Fun and Money!!! Free booklet!!! Cartoons, Box 40614A, Detroit, Michigan 48240

**35 LESSON** cartooning course. Cartoonist's Magazine, both \$4.00. Hartman, Box 30367, Lincoln, Nebraska 68503-0367

**MODERN** Cartooning taught by mail. Write for free brochure. Cartoonorama, Box 263-5Y, Branford, Conn. 06405

## MODELS, MODELS SUPPLIES

**FIRING CIVIL WAR** Model **CANNON** Plans: Catalog free. Green—PM-384, Box 892, Shalimar, Fla. 32579

**RADIO CONTROL-** Airplanes, Boats, Helicopters, Supplies. Big Discount Catalog \$5.00 (Refundable). Modelers Supply, Box 7185, Montgomery, AL 36107.

(Continued on next page)



## MODELS, MODELS SUPPLIES

(Continued from preceding page)

**SCALE SHIP MODELS** Since 1905 our Model Ship Kits and Fittings have been the Favorites of Discriminating Modelers. Send \$2.00 for Big Catalog. **BLUEJACKET SHIPCRAFTERS**, Box 533P, Shelton, CT 06484

**LEARN TO BUILD SHOW QUALITY CAR MODELS \$5** Booklet. Suite 425, 107 Delaware Avenue, Buffalo, New York 14202

## TOYS, GAMES, KITES, PUZZLES, NOVELTIES

**EASY** Windsock/Kite Patterns: Elephant, Whale, Loch Ness Monster, Manta \$5.00. Wholesale Publications, Box 6286, Kennewick, WA, 99336

**1001 THINGS YOU CAN GET FREE!** Gameworld, P.O. Box 892, Sharon, PA 16146.

## MAGIC TRICKS, JOKES, VENTRILOQUISM

**LEARN VENTRILOQUISM!** Guaranteed Instruction, Supplies, **DUMMIES**. Information Free! Maher, Box 420-PM, Littleton, Colorado 80160.

**FREE!** World's Leading Novelty Catalog. 1600 Jokes, Tricks, Science, Sports, Hobbies. Johnson-Smith, C-6013, Mt. Clemens, MI 48043

## HOBBIES & COLLECTIONS

**NAZI** war souvenirs. **FREE** illustrated catalog. Delta, Box 31224PS, Honolulu, Hawaii 96820

**TOY SOLDIER MOLDS.** Make military, chess, medieval figures. Profitable - fun! Free information. Castings, P.O. Box 3482-PM, Longwood, FL 32750.

**MILITARY** Medals Catalogue 50c. Yearly Subscription \$4.50. Vernon, Box 387PM, Baldwin, NY 11510.

## DECALS, EMBLEMS, PATCHES

**SAVE** Big. Buy Patches, Decals, Pins & Caps Factory Direct. Free Catalog. Free Pricing. Eastern Emblem Co., Box 828-PM, Union City, N.J. 07087

**EMBLEMS**, Embroidered-Your Design. Low Minimum. Free Catalog with Prices. Southern Emblem, Box 8P, Toast, NC 27049

**GUARANTEED** Lowest Emblem Prices! Free Catalogue. Stadri, 61P Jane, NYC 10014. (212) 989-0009.

## ANTIQUES, RELICS, INDIAN GOODS & CURIOS

**FREE** List to Serious Collectors. 30,000 Indian Artifacts, Pots, Spears, Axes, Slate, Beadwork. Caddo Trading, Box 669, Murfreesboro, AR 71958

**ARROWHEADS \$7.50** Doz., Flintwork, Stonework, Flugs, Baskets, Pottery, List 40c. Secrist Antiques, Deerfield, MO 64741

## STAMP COLLECTING

**FREE!** 55 Stamps Including Space, Triangles, Others. Baird, Box 8128, Portland, Oregon 97207

**FREE** British Commonwealth, discounted approvals. Volkman, Box 71829, Los Angeles, Calif. 90071

**15 COLORFUL** stamps from Greece, 15c Approvals. Pappas, Box 413, Seymour, Conn. 06483

**FREE** — \$2.00 Packet. Request approvals. Gains, 716-S Sixteenth, Mattoon, IL 61938

**FREE** 50 Different US Commemoratives With Approvals. Low Prices. Manasquan Stamp, 26 Broad, Manasquan, NJ 08736

**U.S. 6** Commemorative Plate Blocks \$1.00! Approvals. Gordon Davison, Nokomis, FL. 33555

**50 YEARS** Old fifteen different United States, over fifty years old—25c with approvals. Jaxon, Box C11-P, New Rochelle, New York 10804

**FREE** Surprise Collection with approvals. Gould, Box 2130, Petaluma, CA 94953

**GREAT** Gift free with 1st purchase—fine United States approvals and want list service. Send .15c for handling. The Stamp Boutique, P.O. Box 456, Madison, NJ 07940

**BREATHTAKING** Beautiful. 50 Different mint Monaco pictorials commemoratives only \$1.50 with mint complete set approvals. Pagoda, Box 132P, Sidney, Ohio 45365.

**UNITED NATIONS** 3 Complete Mint Sets 25c. Approvals. Cornetta, POB 1509-M, Lake Placid, Florida, 33852

**OLD U.S. Stamps** on Approval. Chester, Box 15355G, Philadelphia, PA 19111.

**FREE** - U.S. Discount Catalogue. Shelton, Box 547B, North Miami, Fla. 33161.

**FREE** U.S. Mint Set. Approvals. Hildebrand, Box 4867, Santa Clara, California 95054

**100** Different U.S. 25c. Approvals. Bradley, Box 425P, Midlothian, VA 23113

**FREE** Worldwide Packet. Penny approvals. Froehlich, Drawer 968A, Morton Grove, IL 60053

**FREE** Bargain U.S., Canada 36 Pg. List; also Foreign New Issue Bulletins. Brooks, Box 62, Brooklyn, NY 11229

**ISRAEL** 15 Different 10c Approvals. Sam Chazen, Box 666, Delray Beach, Florida 33444

**50 PICTORIALS** 25c when Requesting Low Priced Foreign Approvals. Stewart Kent, Box 2396T, Bellingham, WA 98227

**101** Large Pictorials 50c when requesting worldwide approvals. Benat, P.O. Box 210244, Dallas, TX 75211.

**WORLD** Wide Stamps mounted in books on approval 2c and up. **TRUST STAMP COMPANY**, P.O. Box 100-P, Jamaica, N.Y. 11435

**50 DIFFERENT** Old U.S. between 1861 and 1939 - \$1.00. Ed Roush, 423 Shepard, Mansfield, Ohio 44907.

**7 CANAL** Zone 25c. Approvals. Merkel, 30 Grandview, South Hadley Falls, MA 01075

**FREE** Foreign Stamp Price Lists with Bargain Approvals. CK Stamps, 17902 Marklee Drive, Jamul, CA 92035

**FREE!** Big Bargain Catalog - New Edition listing thousands of bargains including U.S. & B.N.A. Stamps, Packets, Albums, accessories and supplies. Also fine stamps from our approval service. Buy only what you like. Return balance promptly! Thank you. Jamestown Stamp Co., Dept. E34PM, Jamestown, NY 14701

**EXOTIC ANIMALS** 25c Worldwide Approvals. Birmell, 8525 North Lamar, Suite 185, Austin, Texas 78753

**100** Different World 25c. Approvals. Strange, 309 Amhurst, Chattanooga, Tenn. 37411

**25 DIFFERENT** older U. S. 10c with approvals. Hill Co., Box 51, Defiance, Ohio 43512

**300** Worldwide 50c, Approvals, Discounts, Bonuses. Send Today. J. Martin, P.O. Box 245, New York, NY 10023

**CANADA.** 50 different 25c. Approvals. Oroszky, Box 1-C, Sarnia, Ontario, Canada N7T 7H8

**200 WORLDWIDE** - 25c with Approvals. Write Today! Bantam Stamps - D24, Box 99, Slippery Rock, PA 16057

**"INVERTED ERROR"** + 100 Different United States, 50c with approvals. Luray, P.O. Box 7088, Silver Spring, MD 20907

**FREE** 100 Canada with request of World Wide Approvals. Briner's, P.O. Box 5607, San Mateo, Calif. 94402

**"WHOLESALE"** U.S.—Foreign Pricelist and catalog Free! Everything Guaranteed. Schneider, Box 1240, Grand Rapids, Michigan 49501

**BARGAIN** 100 World-wide Stamps 25c. Quality Approvals. R. Parker, Box 143, West Brookfield, MA 01585

**FIFTY FREE** Stamps With Approvals. J&D Stamps, Box 747, Melbourne Beach, FL. 32951

**35 DIFFERENT** Old U.S. Revenue Stamps \$1.00. Winchester Stamps, Box 3592, Mansfield, Ohio 44907

**ABSOLUTELY FREE** — 50 different British Colonies **COMMEMORATIVES**. Approvals. Gobestamps, Box 690, Saco, ME 04072

**FREE** 1983 Disney Set, request Approvals. Aipaugh, Box 225, Highbridge, NJ 08829

**107** Different Triangles, Space, Animals, Etc. \$4.00 Value. Only 10c. Approvals. Fayette Stamps, Dept. 418M, Fayetteville, NY 13066

**LOOK! 100 DIFFERENT WORLDWIDE STAMPS** 25c Approvals. Galber, Box 1513M3, Huntington Beach, CA 92647

**1984** Winter **OLYMPIC** Collection — Free! Approvals. William Deems, Ravenswood, West Virginia 26164

**VERY OLD USED U.S.** Unusual, uncommon. Better stamps, minor problems. Special savings. Approvals for adults. Rivertown, Dept. 152P, Ada, Michigan 49301

**CANADA** Ten Late Commemoratives 10c Canadian approvals. Harley Boardman, Little Valley, New York 14755

## COINS, TOKENS, CURRENCY

**"SAVE MONEY"** Price List of U.S., Canadian Coins, Tokens, Send \$1 Now; Willis Coins, Box 1231 PM, Guelph, Ontario, Canada N1H 6N6

## PLAYS, SONGS, MANUSCRIPTS

**POEMS**, Songs Wanted. Free Recording/Publishing. Broadway Music Productions, Box 7438PM, Sarasota, FL 33578

## MUSIC INSTRUCTIONS & INSTRUMENTS

**ACCORDION** Top Brands, Cordovox, Buy Direct. Tremendous Discounts. Trades accepted. Free brochure. PM, Accordion-O-Rama, 16 West 19th Street, New York, NY 10011

**FREE** Catalog! Kits and Completed. Harpsichords, Hammered and Appalachian dulcimers, guitars, banjos, mandolins. Hughes Dulcimers, 4419 West Colfax, PM, Denver, Colo. 80204.

**CATALOG** For Makers, Repairers of Stringed Instruments, Imported Tonewood, Tools, Varnishes, Parts, Accessories, Strings, Cases. Fine European Instruments, Bows. Assemble Yourself Carved Violin Kit. Catalog \$1.00. Includes 10% Discount Certificate. International Violin Company, Ltd., Dept. GC, 4026 W. Belvedere Ave., Baltimore, MD 21215

**PIANOS, PLAYERS, PUMP ORGANS.** Rebuild and repair. Catalog of "How-To" books, \$2.00 (refundable). Vestal Press, Vestal 11, New York 13850.

**ELECTRIFY** Player Pianos, Pump Organs Quickly. Inexpensively with Lee Silent Suction Units. Write: Lee Music, P.O. Box 308F, Culver, Oregon 97734

**VIOLIN** Making Kits, One for Beginners and One for Advanced. Write for Free Brochure. Vitali Import Company, Inc., P.O. Box 249, Maywood, CA. 90270

**VIOLIN**, Guitar, Banjo, Mandolin Making Materials. Accessories, Books, Piano Tuning Kits, Catalog \$1.00. International Luthiers Supply, Box 15444, Tulsa, OK 74158

**FINGER-STYLE GUITAR:** Made Easy with Exciting New (Play-by-Ear) Technique-Breakthrough. Utilize chord formations to Play Melody, Harmony, Rhythm, Bass Simultaneously. 40 Page Manual Guide; **STEP-BY-STEP INSTRUCTIONS**. + Free song booklet. No experience necessary. We pay purchase postage. **MONEY-BACK-GUARANTEED!** \$5.00, full price. **GUITAR**, 453DP, Lehi, Utah 84043

**SAVE**, Complete Catalog. Musical Accessories, Strings, Microphones, Percussion, etc. \$1.00. Super Save Music, Box 944, Morganton, N.C. 28655.

**HOW TO RECOGNIZE AND PURCHASE A GOOD PIANO.** Easy Illustrated Text reveals Technicians Secrets. \$4.50 Guarantee. Curtis Enterprises, Box 2520, Southfield, MI 48037

## EDUCATION & INSTRUCTIONS

**WELDING TRAINING.** Basic and Advanced for Major Processes — SMAW, GMAW, FCAW, GTAW, OAW, Pipe all processes. Non-profit school. Approved for eligible veterans. Accredited member NATTS. Approved Ohio 70-12-0064 HT. Write for school bulletin, course schedule. **HOBART SCHOOL OF WELDING TECHNOLOGY**, Box 84, Troy, OH 45373.

**BE A PARALEGAL** - Handle Your Own Legal Affairs. Accredited Attorney Instruction. Home Study. **FREE CATALOG.** Southern Career Institute, Drawer 34PM-2158, Boca Raton, FL 33427. (305) 368-2522.

**TRIPLE YOUR INTELLIGENCE!** Free Lesson! **EDEMP**, Box 1462, Glendora, CA. 91740

**LEARN** Gardening and Landscaping at home. Free booklet. Lifetime Career Schools, Dept. A102, 2251 Barry Avenue, Los Angeles, California 90064.

**"JET/GAS TURBINE CAREERS!"** Homestudy courses — theory, maintenance, overhaul — Established 1957. **AMERICAN JET SCHOOL**, Department PM-3, Darby, Montana 59829. (406) 349-2100

**LEARN** Asleep or awake. Records, tapes, equipment! Free catalog! Drawer PM-400, Ruidoso, New Mexico 88345

**DETECTIVE** Profession, Easy home study; free tie-tack or lapel pin, certificate, future. Professional investigators Training School, Dept. CP, P.O. Box 41256, Los Angeles, CA 90041

**LEARN** Sewing Machine repairing. A profitable Trade. Easy to learn. Free details. Sewing Center, 187 FR, Rochelle, GA 31079.

**HIGH** School at home, no classes. Diploma awarded Information Free, Phone Free Anytime 1-800-228-5600, or write: American School, Dept 30345, 850 E. 58th St., Chicago, IL 60637.

**UNIVERSITY DEGREES BY MAIL!** Accredited Bachelors, Masters, Ph.D.s... Free revealing details. Counseling, Box 317-PM3, Tustin, California 92680.

(Continued on next page)

Материал, защищенный авторским правом



## EDUCATION & INSTRUCTIONS

(Continued from preceding page)

**EXTENSION** And Post-Graduate Awards in Philosophy, Art, Science, Botanic, Medicine, Homeopathy, Radionics, and others. 30 subjects Curricular free (airmail \$1.00 refundable). Registrar, Sussex College of Technology, Highfield, Danehill, Sussex, England.

**RADIESTHESIA**, Radionics, Dowsing E.S.P. Courses and Equipment Illustrated Catalog \$1.00 (refundable) Established 27 years. Dept. PM/R, Bruce Copen, Highfield, Danehill, Sussex, England RH17 7EX.

**UNIVERSITY** Degrees! Economical home study for Bachelor's, Master's, Doctorate. Prestigious faculty counsels for independent study and life experience credits. Free proof — Richard Crews, M.D. (Harvard), President, Columbia Pacific University, 1415 Third Street, Suite F603, San Rafael, CA 94901; Toll Free: 800/227-1617, Ext. 480; California: 800/772-3545, Ext. 480.

**DETECTIVE** - Exciting profession. Use secret equipment; Diploma. Free details - Rouse, Dept. PM403, Box 2469, Costa Mesa, CA. 92626

**PIANO TUNING PAYS** - Piano tuning - Electronic organ servicing. Learned easily at home. Free booklet. Niles Bryant School, P.O. Box 20153, Sacramento, CA 95820

**LOCKSMITHING**, Universal School of Master., Correspondence and Shop Training. Box 214652, Sacramento, CA 95821

**FREE** 120 page Career Opportunities Guide - shows how to train at home for top paying jobs. Granton Institute, 263A Adelaide Street West, Toronto, Canada M5H 1Y3.

**UNIVERSITY DEGREES BY SPECIAL EVALUATION** of EXISTING Job Experience, Education, Achievement. Fast, inexpensive. Call (614-863-1791). Or Write: Box 13151-T3, Columbus, OH 43213

**UNIVERSITY DEGREES** By Mail. Accredited Bachelors, Masters, PhD's. Free Facts Revealed. Careers-PM3, Box 470886, Tulsa, OK 74147.

**AUTOSUGGESTION**. Sleep-learning headquarters! Tapes, records, books. Gigantic catalog free. Research Association, Box 24PM, Olympia, Washington 98501.

**FREE CATALOG—LEARN AUCTIONEERING!** Nashville Auction School, 233 E. Gaines St., Box 190, Department 2, Lawrenceburg, TN 38464

**FREE** Information Real Estate Appraisal College. International College Real Estate Appraisal, Dept 190, Lawrenceburg, Tennessee 38464

**START AN EXCITING CAREER AS A MOTORCYCLE MECHANIC**. Study At Home or resident school. Nationally accredited, Federal Guaranteed Student Loans & Grants available. Write: AMS, Dept. PM, 10025 Shoemaker, Santa Fe Springs, Ca. 90670 or call free 1-800-423-4678. California Residents call collect 213-944-0121.

**TYPEWRITER** Repair at home. Moneymaking career. Typewriter Inst., 147A Crooks, Paterson, N.J. 07503

**EARN \$600+ WEEK!** Get your "F.C.C. Commercial Radio-telephone License" - Fast, inexpensive! Electronics Home Study. Free details. Command, D-103, Box 2223, San Francisco, 94126

**REPRESENTING** Christ, Pray Each Receive Acts 2:37-43. Continue. 1127 NE Fifth St., Ocala, Fla. 32670.

**DEGREE** Programs/Off-Campus Quality California Bar. Registered Law School. Bachelors-Masters-Doctorate in Business, Engineering, Public Administration, Psychology, Education, Film & Video. Authorized California Department of Education. Credit for work & life experience - Southland University, 35 N. Craig Ave. Dept. M-8, Pasadena, CA 91107. Toll-free-800-423-4530, CA toll-free-800-362-7052/213-795-5558.

**PRIVATE DETECTIVE** or **FINGERPRINT TECHNICIAN** Training at Home. Detective Kits. Badges, Diploma. **GLOBAL SCHOOLS**, Box 191-PM, Hanover, MA 02339

**REISCH WORLD WIDE COLLEGE OF AUCTIONEERING, INC.** World's Largest-48 Years. Term soon, Free Catalog. Approved for VA. Modern Auction Library "FREE" with enrollment. 515-423-5242 - Col. Gordon E. Taylor, P.O. Box 949, Dept. 19, Mason City, IA 50401

**DETECTIVE TRAINING COURSE**. American Detective Institute, Box 418-P, Fairfield, AL 35064

**IMPROVE YOUR MATH SKILLS** . . . New Books Show You How. Satisfaction Guaranteed. Silverbell Press, Box 1052, DeRidder, LA 70634

## SCHOOLS

**WHY NOT INVESTIGATE COMMERCIAL DEEP SEA DIVING AS YOUR CAREER?** Our Graduates are working worldwide making excellent money. Send \$2.00 for catalog containing disclosures, credentials, course outline, employment statistics, instructor, qualifications, progress standards, financial assistance to: Divers Institute of Technology, Inc., P.O. Box 70312, Dept. PM, Seattle, WA 98107

## EMPLOYMENT INFORMATION

**HOW** To Get A Better Paying Job! New Method Guarantees Success! Handbook \$3.00. Visonci, 12925 Abra Drive, San Diego, Calif. 92128

**ROCKY MOUNTAIN EMPLOYMENT NEWSLETTER!!** Colorado, Idaho, Montana, Wyoming! Exclusive computerized openings - ALL occupations - greatest weekly selection! **FREE INFORMATION!!** Intermountain-L, 3115N Hancock, Colorado Springs, Colorado 80907.

**FLORIDA EMPLOYMENT NEWSLETTER**. Complete Sunshine State Coverage Weekly. Free Details: FEN, Box 845PM, Jupiter, FL 33468.

**JOBS!!! COLORADO, WYOMING, UTAH, IDAHO, MONTANA**. Weekly Newsletter with 200+ CURRENT Jobs!!! All Occupations. Free Details! Mountainwest, 925-PM Canyon, Logan, UT 84321

**GOVERNMENT JOBS** - Thousands of vacancies must be filled immediately. \$17,634.00 to \$50,112.00. Call: 1-716-842-6000. Ext. 33941.

**JOBS** Overseas - Big money fast. \$20,000 to \$50,000 plus per year. Call 1-216-453-3000. Ext. 24561

**JOBS OVERSEAS** . . . (including Alaska). Free Details. Global Employment, Box 81833PM, San Diego, California 92138

**RIVERBOATS** - Tugs \$15,000-\$60,000. Expenses paid. Work month. Home month. Experience unnecessary. All water-ways including Alaska, Hawaii. Free report. Send stamp envelope. Marine Employment, Box 207, Central, Indiana, 47110

**BIG BUCKS OVERSEAS:** plus Australia! Now! 213-926-4355. Information. Jobworld, Box 681E, Cypress, CA 90630.

**ENLISTING?** Prepare with practice entrance exams. Recruiters won't tell you how. LUCO, 980 Carlton Dr., St. Paul, MN. 55112

**WORK** Overseas \$20,000 - \$60,000 opportunities! For Information Call 317-839-1712. Ext 24.

**HAWAII** . . . **JOBS** in Hawaii!!! Information letter! \$3.00. Hawaii-Now, Box 1348PM, Kihel, Hawaii 96753. Full Guarantee!!!

## EMPLOYMENT WANTED

**ARE YOU LOOKING FOR EMPLOYMENT?** Try our Classified Section! It costs only \$5.70 per word. And, if you wish to run all or part of your ad in bold capital letters-you can do so for as little as \$1.00 per word additional. Act now! Send your ad to: **POPULAR MECHANICS, CLASSIFIED DEPT., 224 WEST 57TH STREET, NEW YORK, NY 10019**

## HELP WANTED

**AUSTRALIA WANTS YOU!** Jobs! Big Pay! Transportation! Newest Handbook — \$2.00. **AUSTRALIAN INTERNATIONAL**, Box 19107-AC, WASHINGTON, DC 20036.

**OVERSEAS** Employment . . . \$20,000 - \$60,000+. Free Report! Employment, Box 19760-AC, Indianapolis, Indiana 46218.

**DESIGNERS WANTED** — National rental equipment firm headquartered in Phoenix, AZ seeks designers with following background: metal stampings, welded assemblies, hydraulics, fiberglass, vacuum forming, injection molding, foam laminates. These technologies are to be applied in the following product areas: utility trailers, travel trailers, motor homes, van bodies, tilt cabs, light machinery, farm machinery. Hands-on, through-the-ranks fabrication background a necessity. Demonstrated record of design accomplishment a necessity. Salary negotiable based on ability. Send resume to: **U-HAUL**, P.O. Box 21509, Phoenix, AZ 85036. All applicants will be Contacted. E.O.E.

## FOR INVENTORS

**INTERNATIONAL** Trade Exposition for Inventions, New Products, Technologies. Call (412) 288-1383.

**NONPROFIT** Foundation helps inventors. Widest range of services. Free recording forms. Free evaluation. Affiliated Inventors Foundation, 501-B, Iowa, Colorado Springs, CO 80909

**PATENT AND DEVELOP** Your invention. Registered Patent Agent and Licensed Professional Engineer. Send for **FREE PATENT INFORMATION** Every Inventor Should Have. Richard L. Miller, Woolworth Building, 233 Broadway, Suite 3612-M, New York, N.Y. 10007. (212) 267-5252.

**PROTECT** Your Invention. Registered Patent Attorney. Many Years Experience, all Fields. Individual Inventor's Problems Given Special Consideration. Very Reasonable Charges. Write for Free Information. Paul H. Gallagher, 2530 Crawford Ave., Evanston, Illinois 60201

**REGISTERED PATENT ATTORNEY** Washington D.C. Suburb. Donald A. Kettlestrings, 414 Hungerford Drive, Rockville, Maryland 20850

**INVENTORS! IDEAS HAVE VALUE!** Ever think of an idea, forget it and see it later on the market? Many people don't forget, act quickly and are rewarded by American industry. Write down your idea! We offer free disclosure registration and initial consultation regarding your idea's potential value. Call or write without delay for your free information package. **AMERICAN INVENTORS CORPORATION**, 82 Broad Street, Dept. PM, Westfield, MA 01086 (413)568-3753. A Fee Based Marketing Company. Offices Coast to Coast.

**PATENT IT ECONOMICALLY!** Free Details. N. Raner, 2008 Fondulac, Richmond, VA 23229

**PATENTS AND INVENTIONS — 101 QUESTIONS AND ANSWERS** — By Registered Patent Attorney. 1984 Edition. "Must" Reading For Serious Inventors. Send \$12 (Check, Money Order) To: Craig Publishing Company, P.O. Box 1990A, Wheaton, MD. 20902.

**LET** us help you incorporate, find Venture Capital and get your product to market. Call Richard Bell, President, Harvard Business Services, (302) 798-7686.

**INVENTORS:** Free information on offering your invention for sale. Kessler Sales Corporation, C-5-F1, Fremont, Ohio 43420

**INVENTION SERVICES:** Development Assistance, Prototyping, Marketing by professional scientists. Write for informative literature. **FREE** initial evaluation. Keesee, Kolasa, Galea, Oleksik and Associates, Box 259, Roseville, Michigan 48066

**PROTECT YOUR INVENTION.** Registered Patent Attorney. **FREE** Preliminary Review of your Description. Box 392-PM, Millwood, NY 10546

## INVENTIONS WANTED

**IDEAS, INVENTIONS, NEW PRODUCTS WANTED** FOR Presentation to Industry and Exhibition at National Technology Exhibition. Call free 1-800-528-6050. Arizona, 1-800-352-0458. X831. **IMI-PM** 701 SMITHFIELD PITTSBURGH, PA 15222

**EARN ROYALTIES.** NUPRODUX INTERNATIONAL, 1377 K. NW 141, WASHINGTON, DC 20005

**INVENTORS:** If you have an invention for sale or license, write for free booklet explaining how we can help you. Kessler Sales Corp., C-5-IW, Fremont, Ohio 43420

## REAL ESTATE & FARMS

**FREE! SPRING '84 CATALOG!** 266 pages; over 5000 properties. 2000 pictures! Values in every type of real estate, many owner financed! From 600 offices in 43 states. Get your **FREE** copy **NOW!** **STROUT REALTY**, Plaza Towers, Dept. 5800, Springfield, MO 65804. Call toll free: **1-800-641-4286**.

**FREE CATALOG!** Top real estate values coast to coast! Please specify type property and location desired. **UNITED FARM AGENCY**, 612-PM West 47th, Kansas City, MO 64112

**GOVERNMENT LANDS** from \$20/acre! Homesites, farming, vacationing, investment! "Land Buyer's Guide" plus nationwide listings—\$2.00. Lands, Box 19107AO, Washington, DC 20036.

**45 WAYS TO BUY A HOUSE** Write: **JMJ** Real Estate Clearing House, P.O. Box 88159, Atlanta, Georgia 30356

**CALIFORNIA.** Lots. Acreage. \$40 Down. \$40 Monthly. Box 35291, Los Angeles, 90035.

**CANADIAN** Country Properties. Our 68th year. Terms available. Catalogue airmailed \$1.00. Dignam Corporation, Suite 496, 85 Bloor East, Toronto, Ontario M4W 1B5.

**REAL ESTATE RICHES: TEN SUCCESS STEPS!!** Free Information. Nowak Moneybooks. 1101-PM Clay, San Francisco, California 94108

(Continued on next page)



## REAL ESTATE & FARMS

(Continued from preceding page)

**SAVE THOUSANDS** Purchasing a Home! Over 150 Easy To Understand Tips. \$4.95. Greg Doppler, P.O. Box 38, Mason, OH 45040

## PLASTIC BAGS

**ALL Sizes.** Buy Small Quantities. Free Catalog. SAKet, 6151-C Colbath, Van Nuys, Calif. 91401

**HUNDREDS** Of Sizes, Lowest Prices, Free Catalog. Action Plastics, 1460D 93rd Lane N.E., Minneapolis, Minn. 55434

## BUY IT WHOLESALE

**BELTS** and Buckles. Complete line fast sellers, including truckers, motorcycles, wildlife, westerns etc. Big Profits. Complete dealer set up. Catalog \$1.00. Anchor Specialties, Box 3958-BPM, North Providence, RI 02911

**400,000 BARGAINS** Below Wholesale: Many Free! Liquidations . . . Closeouts . . . Job Lots . . . Single Samples. Free Details. Bargainhunters Opportunities, Box 730-A, Holland, Michigan 49423.

**CLOSEOUT** Jewelry 55c dozen. (Catalog 25c), Roussels, 107-1631 Dow, Arlington, MA 02174

**CLOSEOUTS!** Discounts! Below Wholesale! Freebies! Information/stamp: DDN, Box 20152K, Ferndale, Michigan 48220.

**EARN MONEY** selling rings, jewelry, buckles, watches—buy direct. 130% below retail. Catalog \$1.00 (refundable). Anka-PM, 90 Greenwich Ave., Warwick, RI 02886.

**BEAUTIFUL** Elephant Bead Necklace from India. Said to bring good fortune. Details: Floride, Dept. 10, 590 Kalanikoa Street, Hilo, Hawaii 96720

**WORLDWIDE BARGAINS** . . . Imports — Dropship — Closeouts — Surplus — Freebies — (Stamped Envelope). Marnees, Box 1717PM, Highland, IN. 46322

**MAKE Money!** Save Money! 2,600 Items Below Wholesale Free Sample Offer. Lindbloom, 3636PM Peterson, Chicago, 60659

**BUY Wholesale,** Import Free Details. Opportunities Unlimited, P.O. Box 116, Randallstown, Maryland 21133

## ADVERTISING AGENCIES, ADV. SER. MAILING LISTS

**FREE** Mailing List Analysis. Details. GOC-1P, Box 1107, Stuart, FL 33494. (305)334-5205.

**OPPORTUNITY** Seekers Names—Fresh/Guaranteed. Free Brochure. Venlists-PM, Box 336, Riviera, AZ 86442

## BUSINESS SERVICES

**ELIMINATE** Taxes Legally \$4.95 Report. V. Medina, POB 523, Cleburne, Texas 76031

**INCORPORATE** without legal fees! Free booklet tells how, includes forms. Call now 800-345-CORP.

## PRINTING PRESSES, RUBBER STAMP OUTFITS

**TYPE** for printing. Catalog \$1.00/eductible 1st order. Quaker City Type, R.D. 3, Box 134, Honeybrook, PA 19344

**MANUFACTURE** Rubber Stamps. Regular and Pre-inked. Catalog 1-800-851-4945. Jackson, Brownsville Rd., S110, Mt. Vernon, IL 62864.

**TYPE** Fonts. Hand Printing Presses, Supplies. 120 Pages. \$1.00 Deductible first order. Acme Type, 1720 N. Marshfield, Chicago, 60622

**COMPLETE** Rubber Stamp Outfits, Supplies. Same day shipment. Sign Engraving Machines, Wholesale Catalog \$1.00 Deductible. Star Stamp, 1720 N. Marshfield, Chicago, 60622

**BARCO** Type Founders. Type and Rubber Stamps catalogue. Mail \$1.00 refundable on first order. 237 S. Evergreen, Bensenville, 60106.

## PRINTING SUPPLIES

**QUALITY** Printing. Free Samples. Richard Keene, Box 2279, Altoona, PA 16603-2279.

**QUICK** Copy Printing. Low Prices. Write: Nationwide, 614 North Main, Bloomington, Illinois 61701

## GUMMED LABELS

**LOOK!** 800 quality return address labels \$2.55. Lee Enterprises, Box 80032, PM3, Indianapolis, IN 46240.

1,000 Address Labels \$3.00. Free Literature. Acme, Box 44089A, Pittsburgh, Pennsylvania 15205

## GIFT SHOPPING

**DECORATIVE** beautiful gifts catalog \$2.98 postpaid. LoMar's World of Gifts, 202 South 5th St., Easley, SC 29640

**FREE** Catalog. Distinctive gifts by mail. Write: NINA NICHOLS, 14937-2 Saticoy, Van Nuys, CA 91405

## CLOCKS, WATCHES, OLD GOLD, JEWELRY

**LCD** watch \$2.50, Penwatch \$2.00, Catalogue \$1.00. Reliant, P.O. Box 33610, Sheungwan, Hongkong.

**HIGHEST CASH** for Gold, Jewelry, Gold Teeth, Rings, Diamonds, Watches, Silver, Platinum. Mail Articles Today. Free gift with information. Chicago Gold & Precious Metals, 6 E. Monroe, Dept. 758, Chicago, 60603.

**CLOCK** and Watch Repairing books, tools, materials. Free book catalog. North American, Box 77-AP, Fox River Grove, Illinois 60021.

**TAKE NO CHANCES.** Deal with oldest, most reliable firm in old gold business. Established 1934. We buy Gold, Silver, Platinum, Diamonds. Highest Cash. Free information. Rose Industries, 29-A East madison, Chicago, 60602

## JEWELRY, STONES, MINERALS

**GOLD AND SILVER ORE FIRE ASSAYED** \$10.00. ARGONAUT MINERAL ASSAY, 1134 River Dr., Norco, CA. 91760. 371-1699

## TREASURE FINDERS

**FORGET** costly "locators"! Dowsing for gold, lost treasure, minerals, oil, water, etc. learned easily, inexpensively. Details: Onaway, D35, 28 Lucky Drive, San Rafael, CA 94904.

**TREASURE-** Locate quarter mile away with ultra sensitive locator - brochure free. Research Products, Box 270270 - AMC, Tampa, Florida 33688

**FIND** coins, jewelry, nuggets, treasure. New revolutionary patented detector. Astounding range. Unaffected by black sand, mineralized ground. Rejects metallic trash. Free catalog. Gardiner, 4729M N. 7th Avenue, Phoenix, AZ 85013

**SAVE** up to 40% on new metal detectors. All major brands including White's and Garrett. **FREE** discount price list. Northwoods General Store, P.O. Box 9874PM3, Madison, WI 53715. (608) 274-4680.

## PROFITABLE OCCUPATIONS

**FREE** Catalogs. Repair air conditioning Refrigeration, Tools, supplies, full instructions. Doolin, 2016 Canton, Dallas, Texas 75201.

**FT. SMITH** Auction School, Ft. Smith, Ark. 72903. Resident & Home study. Veteran Approved.

**DEMAND HIGH WAGES!** Learn Skills. Construction Trades made Simple. Start Immediately. Send \$6.00. Todd Const., Box 1475-PM3, Cushing, OK. 74023

**REPAIR** lawnmowers thousands of parts and tools wholesale list 40c. Ellwanger's, PM, P.O. Box V, Port Jarvis, NY 12771

**TECHNICAL WRITERS** make big money! Free details. TekPubs, Box 2458-P, Oroville, CA 95965

**TIRED** of SEEKING GOOD EMPLOYMENT? Start your own Business. Listing of 500+ Businesses. Many very easy to start, low investment, high income with advice about getting started, obtaining loans. Send \$2.98 to: Information Research Assn., Box 1336, Hammond, IN 46325-1336

**PLASTERCRAFT** . . . Profitable Home Business 3000 Molds Available. Details. Lynnette, 6251C Mentpark, Mentor, Ohio 44060.

## SALESMEN-DIST.

**BE A NEO-LIFE** distributor. Complete line of health and environmental products in great demand. Free information. BIOTEK, 20414 Saticoy St., # 10, Canoga Park, CA 91306

## AGENTS WANTED

**FROM HOME** \$72,000: Receive Four New Cars, Big Vacation, \$4,000 Wardrobe, No Experience Necessary. (Not a Contest-Free) Details \$2.00 To: Fair Publishers, P.O. Box 1407, Dept. 13F, Newark, NJ 07101

**WITH** Mason Shoes, pay day is when you want it! Take orders from friends and neighbors. Watch your business build, without risk or investment. Call Toll Free 1-800-826-7030, Ext. 222; in WI 1-800-472-7003, Ext. 222 or write: Mason Shoes, K-785, Chippewa Falls, WI 54774.

**HUNDREDS** of dollars a week possible working just part time. Details \$1.00. Sunbrite Enterprises, P.O. Box 101, Z11, Avon, MA. 02322

## AN EXCITING IN-HOME SERVICE

**BATHTUB REFINISHING** has been around for twenty five years and has proved to be successful. It has saved families millions over the cost of replacing. In the past three years alone, **MIRACLE METHOD, INC.** franchisees have refinished over 10,000 bathtubs. We proudly offer our customers a 5 year certified warranty on tubs and tile. **MIRACLE METHOD, INC.** is now nationwide. We are offering franchises to people like you so they can have the satisfaction of knowing that a corporation with a track record for success is standing behind them ready to help. To find out if you can qualify to get your own prosperous **MIRACLE METHOD, INC.** bathtub refinishing franchise, just write: **MIRACLE METHOD, INC.**, 1280 Monument Blvd., Concord, CA. 94520 or call (415) 680-8850 and ask for Don Holloway Director of Franchise Sales.

## 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. M2703, Woodland Hills, California 91367

**PIANO** Tuning learned quickly at home! Free information. Empire School, Box 1014, Jupiter, FL 33458

**MILLIONDOLLAR** opportunity!! Battery manufacturing secrets revealed. Details \$1.00. Everlast, Box 365, Bogota, NJ 07603.

**BECOME** A Tax Consultant. Our students earn \$3,000 - \$5,000 every tax season preparing returns, evenings. Accredited Program. National Tax Training School, Monsey 2CR, New York 10952.

**MAKE MONEY WOODWORKING** - Easy profits making unusual gifts, toys, novelties. Free details. Williams, 32K Titus, Glen Cove, NY 11542

**MAKE** \$15.00 Hourly building custom luggage/cases at home. Huge nationwide demand. Fill mail orders. We supply materials, instructions, everything! Free details. Custom Case, 9329 De Soto Ave., Dept. C20-39, Chatsworth, CA 91311.

**FREE** Information. Build a Saw Sharpening Machine. Sharpeze-2, Box 6004, San Bernardino, CA 92412

**5,001** Moneymaking Opportunities - Free catalog! Dynamics, Box 1306G, Stow, OH, 44224

**COMPUTER** Skills Mean High Earnings. Inexpensive Hands-on Training with or Without a Computer. Free information. K.F. Group, Section 0L1, 3438 Clearview, Indianapolis, IN 46208.

**FREE** Literature Highlights Easiest Business Anywhere! Victor PM3, P.O. Box 958, Cadillac, MI 49601

**TURN** Junk Cars into Big Dollars. For Complete Information Send \$3.00 to: B&B Enterprises, P.O. Box 559, Flat Rock, Michigan. 48134

**YOU'LL** make "Big Profits Fast!" New Discovery in Battery Reconditioning. Eighteen Months Guarantee. Twenty Five Years Experience! Complete Set Up. This System Sells Itself! Electone, 7415 Gable Drive, Little Rock, AR 72205

**EXPLOSIVE EXPANSION!** Revolutionary New Food Company Needs Distributors. Profit Potential Unlimited. Write: KSB-PM, Box 403, Rockledge, Florida 32955.

**"FINANCIAL SECURITY** through profitable home business. Free Details. FTOE, 3717P3 Dusty Lane, Raleigh, NC 27604"

**SOLAR** Heating learned quickly at home! Free information. Empire School, Box 1014S, Jupiter, FL 33458

**MAILORDER** Opportunity! Start profitable home business without experience or capital. Write for free book, plus details. Mail Order Associates, Inc., Dept. 626, Montvale, NJ 07645.

**\$700** Per month earnings possible preparing income tax returns at home or tax office. We show you how. Quickly learned. Details free. No salesman. Federated Tax, 2065 Montrose, Chicago, 60618.

**"PROFESSIONAL" GIANT SCREEN PROJECTION TV** . . . "Don't be fooled by cheap imitations!" . . . "Build and sell the best with lenses and screens utilized by Sony, Zenith, Pioneer and Magnavox!" . . . Simple construction! . . . Unlimited profits! . . . Illustrated dealers information and complete parts catalog \$2.00 . . . Money Back Guarantee! . . . **POLI-VISION**, 157B Cypress St., Throop, Pennsylvania 18512

**DON'T** Miss This! Unlimited Income with your Electric Drill. 2895 Belhill, Kelseyville, CA 95451

**WOODWORKING PROFITS** \$20.00 hourly hottubs furniture toys catalogue \$1.00 refundable. Tradewinds, Box 3187C, South Padre Island, Texas 78597

(Continued on next page)

Материал, защищенный авторским правом



## BUSINESS OPPORTUNITIES

(Continued from preceding page)

**ALUMINUM SCRAP** - Recycle Yourself - **MAKE \$25.00/POUND!** Free Information: Industrial - PM3, Box 127, Alexandria Bay, New York 13607

**"TAKE** Catalog Orders. We drop-ship 2500 best-selling specialty products. Lowest below wholesale prices. Immediate delivery. Spectacular home business opportunity. Free Book. SMC, 9401 De Soto Ave., Dept. 20-39, Chatsworth, CA 91311."

**CLIP** newspaper items — \$2 - \$25 EACH!! **FREE** Report! Clippings-KB-3, Billings, NY 12510

**ASSEMBLE PRODUCTS AT HOME.** Many opportunities paying High Weekly Profits presently available without investment. Write: Businesses, 92B Brighton 11th, Brooklyn, New York 11235.

**VINYL'S** Where the money is! Professionally repair, re-lin, re-color furniture, luggage, car tops. Quick, easy. Two small \$20 jobs a day earn you \$1,000 a month. Homes, cars, offices, restaurants, unlimited customers. Start earning after a few days practice. Sensational details free. VIP, 2007 Montrose, Chicago, 60618

**PIANO** Tuning quickly learned with home study courses. Diploma granted. American Tuning School, 17050 Teller Drive, Morgan Hill, Calif. 95037.

**PICTURE** Framing—Profitable full or spare-time business. Easy to learn with handbook-course "Guide To Picture Framing Profits." \$3.00 Guaranteed. Free framing-supplies catalog included. Japs, 126-PM Seventh North, Hopkins, Minnesota 55343.

**LEARN** Sewing Machine Repairing. Men. Women. Lucrative Profits. Gresslin Correspondence School, Box 5104, Spencer, Iowa 51301.

**RECONDITION JUNK BATTERIES.** \$40,000 year, spare time! Easy. Free information. Owen, 771PM, Battle Ground, Washington 98604.

**SELL** Books By Mail. Dealership-25¢. Midwest, Box 44R2-PM, Shawano, Wis. 54166

**GET RICH** using OTHER PEOPLE'S MONEY!! Unique — amazing business!! Details **FREE!** Finance Consultants, 5B-3, Billings, NY 12510

**CONCRETE** Block Machines: Catalog \$1.00. Route One, Box 3740, Rapid City, South Dakota 57701-3740

**REPAIR HYDRAULIC JACKS — DETAILS FREE. WRITE: HYDRAULIC PARTS SUPPLY, BOX 4157, BROWNSVILLE, TEXAS 78520.**

**GET RICH!!** Secret Law smashes debts—brings cash and credit!! Details **FREE!** WealthKit-WB-3, Billings, NY 12510

**PROVEN** Get-Rich-Slow Programs. Free Information. AJ Enterprises, Drawer PM2, P.O. Box 5076, Sparks, Nevada 89432-5076

**PROFITABLE OPPORTUNITY!** 100 BUSINESSES you can start now with little or no investment. Free details. Cavanagh Associates, P.O. Box 255, Dept. PM11, Northport, NY 11768

**MONEY** Making Home Businesses. Details. Nadine Rice, P.O. Box 2356, Rohnert Park, Calif 94928-6332

**MAKE MONEY BY THE MINUTE** around the clock for doing 8 hours a week paperwork from home. Grows to lifetime income. Totally new ultramodern project unlike anything before. Still ground floor. No experience or education requirements. 10,500 people already doing. Division of major U.S. corporation. For details dial (216) 452-2171, 24 hrs., 7 days. Ask for ext. H338.

**\$480** Weekly. Home mailing program. Goodworld, Box 26233-R, Tamarac, Florida 33320

**ARAB BUSINESSMEN** Have Money to Buy & Invest. Top Finders Fees Paid. Int. MiddleEast Assoc., 384PM1, 8291 Flaxman, Huntington Beach, CA 92646

**FREE** Samples - Amazing crystals turn water into 5 bottles delightful full strength wine. Earn \$2 - \$300 weekly sparetime. \$1.00 postage would be warmly appreciated. Send to: Presto Wine, Dept. 9101, 1681 Bayview Avenue, Suite 101, Toronto, Ontario M4G 3C1.

**\$15.00 (HOURLY) WOODCRAFTING NOVELTIES!** Brochure-25¢. Woodmart, Box 468A, Springfield, Oregon 97477

**TAX FREE ACCOUNTS.** Off Shore Private Banking. For Information Send \$5.00 To: NEHAUL, Rindogatan 34, Stockholm 11535, Sweden

**BEAUTIFUL BATHTUB REGLAZING** applicators and distributors wanted coast to coast. Excellent opportunity. Call toll-free 1-800-235-6557. Unique Coatings Corp., 26620 Grand River, Redford, MI 48240.

**BRONZE BABY SHOES** \$250.00 Daily Possible. NBSPM, 398 Airport, Sebring, Fla. 33870

**EARN** hundreds weekly selling information by mail! Free details! Success-PB, Box 1762, Bristol, CT 06010

**I MADE \$40,000** Year by Mailorder! Helped others make money! Details 25¢. Torrey, Box 318YY, Ypsilanti, Michigan 48197.

**LEARN** The secrets of repairing junk batteries "Fabulous Profits." **FIRST ESTABLISHED COURSE.** Apex Engineering, 5454 Bolsa, Atascadero, Calif. 93422

**VENDING MACHINES.** No selling. Routes earn amazing profits. "Big Catalogue **FREE.**" Parkway Corporation, 1930 PMB Greenspring Drive, Timonium, Maryland 21093

**\$92.00** From Square Foot Plywood. (Huge Demand). Revealing Proof 25¢. (Refundable). Woodwin, Bridgewater, Mass. 02324

**RECONDITION** Used car batteries! **\$100.00+** daily! Secrets others don't tell. Stamp please. Battery Outlet, Box 3300, Hickory, N.C. 28603.

**ACQUIRE** Personal wealth, free details. Burgess Enterprises, 3906 Limerick, Dept. PM1, Lansing, Michigan 48910.

**\$3,000 MONTHLY** selling information by mail. Free information, Box 10179, Alexandria, VA 22310

**MAKE MONEY NOW** from Microcomputer Boom! Box 218, Washington, IL 61571

**EARN CASH** full, part time selling unique kitchenware information and sample, \$15.00 money order. Skaha Wood Craft, Maple Street, Okanagan Falls, B.C., Canada, V0H 1R0

**"HOW TO START AND OPERATE YOUR OWN PROFITABLE BUSINESS AT HOME"** Guaranteed, Free Details. Dewitz Publications, Box 1313, Waterloo, Iowa 50704

**HOW** To Change Your Financial Luck in the 80's. **FREE INFORMATION.** Stewart Co, 225K DUNBAR Lane, Horsham, PA 19044

**EXCELLENT** cash flow with your own auto oil change business. Details only \$3.00. Continental Publishers, Box 70058-1611, Harvey, LA 70058.

**PROVEN-MAILORDER-CASH-PRODUCER!!** **FREE** Information!! MIC, 1424 Irishill-M11, Biloxi, MS. 39530

**RUBBER** Molds for cement or plaster to make animals or figurines, send \$5.00 for catalog. Florida Mold, Box 3488, Jacksonville, Fla. 32206

**WOODWORKERS - IDEAL HOME BUSINESS.** No Selling. Huge Market. Free Details. Pine Shop, 78AE, West Peterboro, NH 03468

**\$15.00 HOURLY** with a Band Saw. No Gimmicks. Complete Details \$3.00. Band Saw, Dept. 298-01, P.O. Box 4900, Tyler, Texas 75712

**HOW** to start **SEVEN** moneymaking home businesses without experience or capital. Free information; Quesnell, Box 3943M, San Clemente, CA 92672

**PROFITABLE** Business can be yours! Proven Methods will Work for You. Write Today. Michael Nielson, Dept. 101, 380 North 1100 West, W. Bountiful, Utah 84087

**BIC LIGHTER VENDING MACHINES** No Selling (5) Machines Can Earn Up To \$500.00 Monthly. Only \$1800.00 Investment. Free Information. Vendgood Manufacturing Company, 6482 Westminster Avenue, Department 36, Westminster, California 92683

**MAKE PILES OF MONEY** with piles of "junk". Others work. YOU profit. Details: Bradley's, 4070 West Third Street, Los Angeles, California, 90020.

**VERY** High Profit Potential! Yurika . . . Details - Rizzo, SR105, Cloudland, Georgia 30709

**CRUSH DEBTS!!** Be Wealthy! Exciting Home Business. Free Details. Success-PM3, 780 Ballantyne #A, El Cajon, CA. 92021

**FINANCIAL** Independence in your Own Business! No Major Investment! (SASE) To: Research, P.O. Box 146, Nebo, N.C. 28761

**NEW!!** . . . I Bend Aluminum Trim! . . . \$350.00 Daily! Helped Others! . . . "Published Authority!" . . . Easiding, Box 22601, Minneapolis, Minnesota 55422

**GET A FRESH START.** A Bankruptcy Lawyer will tell you how the **U.S. BANKRUPTCY LAW** can help you. Send \$3.00 to: Legal, P.O. Box 822PM, Batavia, NY 14020

**MAKE BIG MONEY REPAIRING WINDSHIELDS** and Plate Glass! Earn up to \$50,000 yearly. Send for Valuable Free Report. Glas-Weld Systems, P.O. Box 5755D, Bend, OR 97706. 503-388-1156

**HOW** To Start And Operate Your Own Home Business Without Experience Or Capital. Free Details! Write Today! Multidivision Corp., RT. 2, Box 738PM, Spring City, TN 37381

**GET RICH SELLING BOOKS BY MAIL.** Write: National Publications, 501 West Moana 39, Reno, NV 89509

**ALTERNATOR/Starters** Rebuilding Made Easy Start Without Capital. ADM, Box 33, Buffalo, N.Y. 14207

**\$1000.00** Weekly With Pickup Truck. \$1.00. Kettco, 2713P Walnut, Columbus, Georgia 31904

**RECYCLE METALS. NO, NOT BEER CANS!** Easy \$450 weekly! Free information. Recycler, Box 1657, Brenham, TX. 77833

**405% Profit!** Birthday Reminder Calendar sells on sight year round. Calendars, Box 802P, Brigham City, Utah 84302

**FORTUNE . . . \$SSSS** By Mail. 750% Profit. Free Details. Coronet, 323 Franklin #804/C263J, Chicago 60606-7093.

**MAKE MAIL ORDER WORK FOR YOU!** Learn Secrets of Mail Order Success. Details. **PIEDMONT.** Dept. 303, 224 E. Broadway, Bel Air, Maryland 21014

**BIG** Fast Profits Selling "How To Make Money Books" By Mail. Unusual Opportunity. Details \$1.00. K & S Enterprises, 36 Victory Dr., Dept. M3, New Haven, CT. 06515

**BE HIGHPAID** Specialist In One Week With Your Toolbox. **DRESSMECH.** Box 421, Yardley, PA 19067.

**YOU TOO,** Can "MAKE BIG MONEY" at Home! Successful Methods Revealed **FREE!** **SSCA,** 6940 1/2 70 Avenue North, Pinellas Park, FL 33565

**\$40,000 ON 1/3 ACRE!** New Hydroponics — Inexpensive, Practical! Little Manual Labor. Free information. Robin's, Box 1657, Brenham, Tx. 77833

**RINGS, WATCHES, JEWELRY - 600% Profit.** Free Sales Kit/Catalog. Spotlight, 2141, 156 Fifth Avenue, New York, N.Y. 10010

**OUTSTANDING OPPORTUNITY! SELL 70 MONEYMAKING REPORTS! 1000% PROFIT! WE SUPPLY BUYERS! WRITE: PUBLICATIONS, #30PMR, AMBLER, PA 19002**

**BORROW** to \$500,000! Any worthwhile business venture! For details Write: AIBM-99, 1601 Main, Plainfield, IN 46168.

**\$1.00** Send Your Name To Every Business Opportunities Ad In This Issue!—Krause, Box 6232, Flint, Mich. 48506.

**POON TANG** Cologne sells fast. Gordon, Box 143646, Miami, FL 33114

**\$1,000** Weekly Home Business Directory, Box 2019-PM, New York, New York 10163.

**NEW-** \$500.00 From one sheet of Plywood. Guaranteed. Oakstump Woodcraft, 3630-PM3, Pacific Way, Longview, Wash. 98632

**BORROW** by Mail! \$500-\$25,000 Fast! Easy! Confidential! For details write: Accurate, 2120 Crestmoor, Nashville, TN 37215

**SEIZED IN GOVERNMENT NARCOTICS RAIDS!!** Automobiles . . . Vans . . . Boats . . . Furniture . . . Thousands other items. Buy Dirt Cheap - Resell for Big Profits! Free Information: Marcel, Box 7557-M, Monroe, LA 71211

**MAKE** lots of **EXTRA CASH** without lots of extra effort. Free Subscription to Opportunity Magazine offers hundreds of proven ways. Write: Opportunity, Dept. B77, 6 N. Michigan, Chicago, IL. 60602.

**NEED** credit cards? Bankrupt? Slow Credit? No credit? Let us help. Call Now! 1-317-839-1712. Ex.C5E.

**SEVERAL HIGHLY PROFITABLE** Home Businesses Requiring **NO** Equipment, Experience, Inventory or Investment. **FREE** Details. Opportunity Publishing, 4887 Trail, Salt Lake City, Utah 84120.

**EARN** Big Money! Easy business. Start part-time. National firm trains, assists. Opportunity, Box 6489P, Laguna Niguel, CA 92677

**NEW** Luxury Car without cost! **WRite:** AMCO 9, 1601 Main, Plainfield, IN 46168

**MAKE MONEY BY THE MINUTE** around the clock for doing 8 hours a week paperwork from home. Grows to a lifetime income. Totally new ultra modern project unlike anything before. Still ground floor. No experience or education requirements. 13,000 people already doing. Division of major U.S. corporation. For details write: Omega Enterprises, 3601 Allen Parkway #49, Houston, TX 77019.

**AMAZING** "Eye-Catching" moneymakers! Take catalog orders. Free Brochures! Wholesale Unlimited, 277M Church St., Poughkeepsie, N.Y. 12601

**LEARN MIRROR RESILVERING** Free Information. Write: Elison, Box 71, Folcroft, PA 19032

**SCREEN PRINT T-SHIRTS.** Inexpensive Kits. Free Details. "T-Printer", POB 23991 (G.C.), Tampa, FL 33623

**200%** Profit selling information by mail. Free Details. Alpha Products, 46 Walcott Valley Dr., Hopkinton, MA 01748

(Continued on next page)



## BUSINESS OPPORTUNITIES

(Continued from preceding page)

**MAKE** Rubber Stamps, Highly Profitable Business. Free Details. Stamper, POB 22809(GC), Tampa, FL 33622

**PROFITABLE GOLD FOIL PRINTER.** Personalize business cards, pencils, matches. Free Details. Gold, POB 24886(GC), Tampa, FL 33623

**OWN** Your Profitable PVC Tube Furniture Business. Complete Report Free. Write: Unique Designs, Box 0058, Syracuse, NY 13215

**START** Your Own Business. No Frills Details. Free Information. A. Garfield, 1099 Ste. 130-P3, Robbinsville, NJ 08691

**FREE!** "Your Business Success" Catalog. AVEC-PM384, 13632 Carroll, Tustin, CA 92680

**EARN** At Home Legitimately, \$3.00 + SASE. Glenn T. Wadopian, Economist at Large, Box 56, Donovan Road, Brockney, PA 18812

**SBILLION** Coffee Market! Save Earn. Sample Details \$1. Coffee, 4421 139th S.E., Bellevue, WA 98006

**START HOME MAIL ORDER BUSINESS.** High profits! Full or part time. Experience or Capital Unnecessary. Free Information. Write: Creston, Dept. 1-A, 2465 Grand Ave., Ventura, CA 93003

**FREE INFORMATION** New Multi-Level. Top Brands. Super Discounts. Big Commissions. Jo-Allen, 6233 Arabella Street, Lakewood, CA 90713

**BUMPER STICKER PRINTING DEVICE.** Cheap, Simple, Portable. Free Details. Bumper, POB 22791(GC), Tampa, FL 33622

**OUT OF WORK? NEED MONEY?** \$1.00 booklet shows you how to start your own business through classified advertising. Popular Mechanics, Dept. KC, 224 W. 57th St., New York, NY 10019.

## MONEYMAKING OPPORTUNITIES

**BECOME** a millionaire using our money—Free! Jadco, Box 383H, San Pedro, CA 90731

**PUT** together PVC pipe furniture. \$570.00+ weekly. Spare time. Free Information. Blossom, Box 5938, Richardson, TX 75083

**MAKE** Big Money. Write how-to booklets. Free details. American House, 8 Sandy Street, E. Northport, N.Y. 11731

**RID** your Buildings of Mice, and Make Money Doing It. No Poisons or Chemicals. Full Particulars \$1.00. H & B Traps, P.O. Box 249, Fort Frances, Ont. P9A 3M6

**RECONDITION** junk batteries. \$760.00+ weekly, spare time. Free Information. Blume, Box 5938, Richardson, TX 75083.

**BOX** Tops, Labels Bring Cash! How, Where To Sell - \$3.00. Edsam, Box 23PM, Mahopac, NY 10541.

**T-SHIRT AIRBRUSHING** Book \$5.95. Gellis, 213 N. Elms Road, Flushing, Mich. 48433

**MAKE EXTRA MONEY** With Easy Made, Fast Selling, Food Grater Boxes. For Plans Send \$5.00. Jed's Gifts, 4743 Holly Lane, Holladay, UT 84117

**DON'T WASTE TIME WITH "FREE" AD'S** make Money Nine Ways, Send \$3.50. Continental Trade Co., 28 Virginia Rd., Natick, MA. 01760

**\$500.00 WEEKLY** Recycling Discarded Tires. (Free Information). LeValleys, Fountain, FL. 32438

**FANTASTIC** earnings mailing from home! Offer: Rush Stamped Addressed Envelope. Imperial, P-8 X17410, Fort Lauderdale, FL 33318

**MONEY** from discarded tires! Details, Brownie, Box 53, Fishers, Indiana 46038.

**MAKE PVC PIPE FURNITURE.** \$30,000 year, spare time! Easy. Free Information. Owen, 771PF, Battle Ground, Washington 98604

**GET RICH!** Secret law smashes debts — brings Cash, Credit! **FREE** report!! WealthKit-WBM-3, Billings, NY 12510

**VINYL'S** where the money is! Professionally repair, refinish, recolor furniture, luggage, car tops. Quick, easy. Two small \$20 jobs a day earn you \$1,000 a month. Homes, cars, offices, restaurants, unlimited customers. Start earning after a few days practice. Sensational details Free. VIP, 2063 Montrose, Chicago, 60618

**FREE DETAILS** Get just about all the money you want. The Book Rack, 222 N. Delaware, Chrisman, IL-61924

**EXCITING \$10-\$25 HOURLY** Income. Unusual opportunity making, assembling products at home. Merritt, Drawer 428P, Richardson, TX 75080

**GROW RICH!! SECRET FEDERAL PROGRAM REVEALS HOW! FREE DETAILS.** Classic, Box 15564, Honolulu, 96815

**\$6,000 Monthly or Money Back.** Send \$10.00 To: Morton's Research, Box 54973, Lexington, KY 40505

**PEOPLE PROFIT YOU MILLIONS.** \$1.00 Details, \$5.00 Plans. M. Bower, Box 8, Vivian, SD 57576

**BUY** many 2 for 1! Keep! Sell! Exotics, 1000s! \$8.75. Refundable. Jim Eskes Enterprises, 6531 Crown Blvd., 3A, San Jose, CA. 95120

**MAKE MONEY WITH YOUR CAMERA;** Proven Methods From A Professional, Anyone Can Use: \$3.00. Walker Model Service, Box 325, Downers Grove, Illinois 60515

**CRUSH DEBTS!!** Be Wealthy! Exciting Home Business. Free Details. Success-PM3B, 780 Ballantyne #A, El Cajon, CA. 92021

**MAKE** Money While Traveling About The World. Cap, Box 554, Belleville, MI 48111.

**GAIN WEALTH!!** Exciting Details Free: Write - Treehouse Publications, Box 9468, North Hollywood, California 91609

**\$200.00 DAILY:** Rush \$2.00 for plan, LTD Industries, 2205 Glenwood Road, Brooklyn, N.Y. 11210.

**PROFITABLE** Business! Order Report - How To Make Money In Import - Export. \$2.50. Aina's Gifts International, 5210 Likini Street #307, Honolulu, Hawaii 96818

**AMAZING FREE REPORT!** How To Raise \$200,000 In 24 Hours Without Capital! Fabulous Legal Method! U.S.A. & CANADA. Write, Hearn Company, 6 Sunray, Aurora, Ont. Canada L4G 2V2

**NEW** Luxury Car Without Cost! Write: AMCO 9E, 1601 Main, Plainfield, IN 46168

**MONEYMAKER!** Learn Facts! Free Details! Power Publications, PM3, Box 388, Rogue River, OR 97537

**THE EASY WAY OUT -** We will send your name to all money making opportunity ads in this issue - Plus + Send \$1.00: TEWO, P.O. Box 4675, Remer, MN 56672

**BORROW** by Mail! \$500-\$25,000 Fast! Easy! Confidential! For Details Write: Accurate, 2120 Crestmoor, Nashville, TN 37215

**EASY** Businesses. You can Start Now! **LOW** Investment. **FREE** Information. SFENT, Box 4232, Covina, Ca 91722

**SURPRISE** Neighbors. Make Fortunes **NOW** in Mail-Order. **INCREDIBLE** Opportunity with Professional Assistance **FREE.** Banish Unemployment. Write: POB 5783, Charleston, OR 97420

**BUMPER STICKER PRINTING DEVICE,** Cheap, Simple, Portable. Free details, Bumper, POB 22791(GG), Tampa, FL 33622

**RELAX AND GET RICH!** Sell-Made Millionaire Shows **YOU** How. Free Details. Quality House, 6687 Arbutus Street, Arvada, CO 80004

**PROFITABLE GOLD FOIL PRINTER.** Personalize Business Cards, pencils, Matches. Free Details. Gold, POB 24886(GG), Tampa, FL 33623

**START** Bicycle Repair Business! Three Manuals: \$12.00. Details: Irene's, Box 4552P, El Paso, TX 79914.

**OPPORTUNITY** Of A Lifetime. Unlimited Potential as Yurika Foods Distributor. Free Details. RB Enterprises, 201 Main Street 310-D, North Syracuse, New York 13212

**EARN** 50% interest on your money. For information send SASE to: Bob Lee, 1416 South Madison, Bloomington, IN 47401

**MAKE MONEY IN SPARE TIME.** Earn generous commissions as a subscription representative for leading magazines. For free details, send this ad with your name and address to: **POPULAR MECHANICS**, Dept. AB-S, 250 W. 55th St., New York, NY 10019

## MAILORDER OPPORTUNITIES

**BEAUTIFUL MERCEDES BENZ & FUR COAT** Giveaway, Catalogue \$1.00. P.O. Box 28358, Dallas, Texas 75228

**MAIL** Order Know How, 150 Reports, \$1.50. Reports, PM3, P.O. Box 1147, Marion, Ohio 43302

## RABBITS-CHINCHILLAS-FUR BEARING ANIMALS

**\$500-\$1000** Month Plan raising rabbits for us. Free details. White's Rabbitry, Box 1388PM, Hudson, Ohio 44236

**AMAZING** Profits! \$10,000 Yearly Raising Rabbits for Wool and Breeding. Details—\$2.00. American Angora, Malta 12, Montana 59538.

## EARTHWORMS, LIVE BAIT

**FREE** Literature. Raise Fishworms, Crickets, Redworms—1000-\$8.95, 5000-\$42.50. Book on How and Where to Sell with Order. Carter Fishworms, Plains, GA. 31780.

## OF INTEREST TO ALL

**ARE YOU OR A MEMBER OF YOUR FAMILY ALWAYS BROKE? DO YOU SPEND MORE THAN YOU MAKE?** If the answer is yes, you need the **FOND MEMORY** package. You get 5 pages of helpful ideas to make your \$5 go farther and 24 check yourself sheets. It will be the best \$11.95 you ever spent. Send check or money order to: **FOND MEMORIES**, P.O. Box 1239, Middletown, Ohio 45042

**FREE** Subscriptions To Over 60 Magazines. Free Details. TDS, Box 1103, Gibbons, Alberta T0A 1N0

**COMPUTERIZED** Weather Stations, Most Accurate Clock, Digital Barometers, Television Computer Systems, Robots and more in the Free Heathkit Catalog. Write: Heath Co., Dept. 017-156, Benton Harbor, MI 49022.

**CASINO GAMBLING.** Win \$Thousands Confidential Information \$2.00. 9 Roberts, Staten Island, 10306

**FREE** Promotional Albums, Concert Tickets, Stereos, etc. Information: Barry Publications, 477 82nd Street, Brooklyn, NY 11209

**VACUUM** Cleaners "Discount Prices" "New" Rainbow \$389.95, Kirby, Filter Queen, Compact, Details: ABC Vacuum Warehouse, 7021 Burnet - PM, Austin, Texas 78757

**DISNEY** artist shows you how to draw. First easy lesson **FREE!** Get started today! Bruce McIntyre-PM3, 3471 Crownsworth, Corona, CA 91720. (714) 953-7452.

**SMOKE-QUITTERS!!** Eliminate Craving Healthfully—"Placebodrugs", \$3.95. Lucky Days Unlimited, Box 38371, Colorado Springs, CO 80937

**ATARI** Owners. Save Money. Repair Your Joysticks Quickly And Easily With A Fix A Stik Repair Kit. Kit Contains 2 Joystick Inserts, 1 Printed Circuit Board And Instructions For only \$3.95, Plus \$1.00 For Shipping. Send Check Or Money Order To: Fix A Stik, Inc., Box 207P, Holcomb, NY 14469. No COD's. Delivery Two Weeks.

**ANCHOR** Shaped Corkscrew. Bottle Opener. Brass. 5 1/4" x 3 1/2". We Engrave. Fourteen Letters Maximum. \$15.00 P.P. Lakes Distributing, 3206 Shoreview, Indian River, MI 49749

**FREE CATALOGS?** Products Received from Around the World. Excellent Quality — Discounted — 50% Off! **HOUSE OF CATALOGS**, 815 Neck Road, Brooklyn, New York 11223

**DO YOU REALLY NEED A COMPUTER?** Find out BEFORE you buy one. Send \$2.75. Computer Literacy, 501 Russell Ave., Wyckoff, N.J. 07481

**DIAMONDS, WHOLESALE PRICES,** Guaranteed Quality, Certificate for each Stone. Send \$2.00 to: A. Trent, 10626 Steele St., Tacoma, WA. 98444

**BOOST** home radio reception hundreds of miles. Complete easy to follow plans. \$10.00. Veegee Varieties, Box 1203, Santa Maria, CA 93456

**SURVIVE NUCLEAR ATTACK!** Send Stamp. **RADSADS**, P.O. Box 40-A, Castor, LA. 71016

**NEED** Credit? Get MasterCard, others, without credit check. Legally discharge debts, protect assets, restore credit. Loans. Guaranteed. Details: Inflation Reports, PMS, Box 60148, Los Angeles, CA 90060

**SUCCESSFUL SWEEPSTAKES SECRETS.** Win Now! Free Report. Write: Timberhill Company, Box 51, East Aurora, NY 14052

## GOVERNMENT SURPLUS

**"GOVERNMENT SURPLUS" JEEPS** \$30.00! 5,000,000 items! Complete Information Your Area. **1984 OFFICIAL DIRECTORY.** \$2.00 (Guaranteed) Surplus, (A671), 4620 Wisconsin Northwest, WASHINGTON, D.C. 20016

**MILLIONS OF SURPLUS BARGAINS!** Many 1% original cost. Jeeps included! "Nationwide Government Buyer's Guide/Directory"—\$2.00 (Guaranteed). **DISPOSAL**, Box 19107AO, WASHINGTON, DC 20036.

**G.I. SURPLUS,** Hunting, and Camping Equipment. 56 Page Catalog \$2.00. Red Bank Army Navy, 12-M Monmouth Street, Red Bank, N.J. 07701.

**IS IT** True You Can Buy Jeeps For \$44 Through The U.S. Government? Get The Facts Today! Call (312) 742-1142 Ext. 7133.

## LOANS BY MAIL

**BORROW** \$30,000 without interest! Free details! Infohouse-PM, 808 Post, San Francisco, CA 94109.

**LOANS\$** On Signature To - \$100,000! Any purpose. Write: Elite, Box 206P, East Rockaway, New York 11518.

(Continued on next page)

Материал, защищенный авторским правом



## LOANS BY MAIL

(Continued from preceding page)

**BORROW \$25,000** "overnight." Any Purpose. Keep Indefinitely! Free Report! Success Research, Box 19739-AO, Indianapolis, Indiana 46219.

**MONEY Problems?** Free Book describes Loans, Cash, Government Grants, Other benefits, available to individuals. Write: Associates, Box 98-A4, Brooklyn, New York 11235

**BORROW \$100—\$25,000—No Cosigners—Confidential—Convenient—Free Details—** Box 814584M, Dallas, Texas, 75381.

**CASH LOANS** Borrow By Mail. Any Amount. Free Details, Application Rushed. Moneymasters, D-106, Box 3169, Pinehurst, N.C. 28374.

**CASH Loans—Borrow by Mail \$500.00 to \$25,000!** Free details, Application! LTD-PM, Box 937, Ft. Lauderdale, FL 33302

**BORROW \$100-\$100,000!** Instant Reply! No Co-signers! Rush Stamped Envelope! Financial, Box 5487(P), Richardson, TX 75080

**BORROW \$500.00 - \$500,000** Cash, Immediate Processing, Confidential, Send Stamped Envelope. FB&T, Box 532894P, Grand Prairie, Texas 75050

**LOW RATES!** Get 8 1/2%! Signature & Business Loans. Details: ANA, Dept. 0341, 1321 Newcastle, Suite E-12, Durham, NC 27704

**BAD CREDIT!** Borrow overnight. Keep indefinitely. LAF, P.O. Box 53842, Fayetteville, NC 28305

**BORROW FROM HOME.** Any worthwhile purpose within 30 days. Competitive Rates. Also earn substantial income helping others. No experience, own hours. National company to assist. No gimmicks. Free details: DFC, Dept. 10-C-3, 1145 Reservoir Avenue, Cranston, Rhode Island 02920.

**BORROW** By Mail! Free Details! MBG-PM384, Box 2298, Sandusky, OH. 44870.

**NEED** credit cards? Bankrupt? Slow Credit? No credit? Let us help. Call Now! 1-317-839-1712 Ex.C5.

## DIVORCE

**WINNING** Information. \$1.00. **MEN'S RIGHTS ASSOCIATION**, 189B, Forest Lake, MN 55025-0189

## PERSONAL

**FRIENDSHIP** Worldwide 143 Nations! All Ages. Free Details. International Penfriends, Box 443D, Lindsborg, Kansas 67456.

**START A MULTI-LEVEL PROGRAMS;** With an Organization That Helps Build Your Down Line. **BOWEN** Products Co., Box 572, Cedar Springs, MI 49319

**COLLEGE DEGREES BY MAIL.** Renowned Universities offer fully-accredited Bachelors, Masters, Ph.D.s... Free revealing details. Counseling, Box 317-MP-3, Tustin, California 92680.

**BIBLE** Questions answered. Stamped envelope. Bylon, 17167 Bentler, Detroit, Michigan 48219

**ASIAN**, European friendship! Free details: Inter-Pacific, Box 304PM, Birmingham, Michigan 48012.

**MAKE** Friends worldwide through international correspondence. Details free! Hermes-Verlag, Box 110660/PM, Berlin 11, W. Germany

**UNIVERSITY DEGREES BY SPECIAL EVALUATION** OF EXISTING Job Experience, Education, Achievement. Fast, Inexpensive. Call (614-863-1791). Or Write: Box 13151-T3, Columbus, OH 43213

**FINANCE YOUR DREAMS** with Government and Foundation Grants. Free Details. Tou-PM1, 432 PCH, Hermosa Beach, California 90254.

**YOUR** "Birthday Verse" from the Bible. Send Birthdate and SASE. Bob Forbes, 1812 Meadow Greens, Florence, SC 29501.

**MONEY . . . JOBS . . . DEGREES.** New opportunities. Latest information. Fast results. Free catalog. Eden Press, Box 8410PG, Fountain Valley, CA 92728. Toll-Free: (800) 824-7888, Operator #545.

**ORIENTAL** singles seek correspondents. Free information. Filam, Box A3713PM, Chicago, Illinois 60690

**BALDNESS!** 80% chance to regenerate your hair loss—Details. Emtron-H Box 494, Avon, MA 02322

**FREE!** "Enrich Your Life" Catalog. AVEC-PM384B, 13632 Carroll, Tustin, CA 92680

## REMAILING SERVICE

**CONFIDENTIAL FORWARDING REMAILING TELEX SERVICES.** FREE BROCHURE. C&F INDUSTRIES, BOX 807-A, AZLE, TEXAS 76020

**CALIFORNIA** Mail/Remail Service. Mershon, 14361 Mervyn Place, Tustin, CA 92680

**UNLISTED ADDRESS.** Discreet and confidential. Remail \$1.00 Single. Mail Forwarding Service, 8050 S. Main, Houston, Texas 77025

**DEPENDABLE** Remails, Messages, Saves Money. Central, Box 504, North East, MD. 21901

**CONFIDENTIAL** Mail Receiving/Forwarding. Mail Drop, Box 18039PM, Orlando, FL 32860

**REMAILING** 20c. Forwarding \$18.00 yearly. "Economail", Box 541, Ephrata, Washington 98823

**CONFIDENTIAL** Mail Forwarding. Postal Shoppe, 369 East 900 South, Salt Lake City, UT. 84111.

**START** Your Own Remail Business. Kassouf, 11632 Las Lucas, Santa Ana, CA 92705

**LOS ANGELES** Remails/Forwarding. Daily Service. Dependable. Box 1001A, 560 South Vermont, Los Angeles, CA 90020

**YEARLY, MONTHLY, SINGLES \$1.00.** 2235 OLD MILL ROAD, CRESCENT CITY, CA 95531

**WASHINGTON DC** Postmarked Remails \$1.00. Atlantic Enterprises, Box 15614, Alexandria, VA 22309.

**NEW YORK** Remails \$1.00. Single. Roberts, Box 26827, Rochester, New York 14626-0827

**SEATTLE** Receiving/Forwarding \$2.50/Month! Remail \$1.00 Each; Confidential. Mailbox, 15 Central Way, Kirkland, Washington 98033

**LOS ANGELES** Remailing Service. Single Pieces \$1.00, Monthly Service \$10.00. Receiving/Forwarding Service. Guaranteed Daily Service! Will Mail you Local Post Cards of LA Area Upon Your Request. Gerald's, Gerald Castleberry, P.O. Box 167, 6320 Wilcox Ave., Bell, Calif. 90201

## MISCELLANEOUS

**COLLEGIATE** research catalog—306 pages—15,278 topics! Rush \$2.00. **RESEARCH**, 11322 Idaho, #206PK, Los Angeles, 90025. (213) 477-8226.

**ORNAMENTAL** Iron Designs. Book of 1600 beautiful practical designs for railings, columns, etc. Free Literature. Cunningham, Box 20005, Salt Lake City, Utah 84120-0005 — (3881 South 3200 West)

**ONE** Free World Newsletter. Four Issues \$1. Box 140247, Dallas, TX 75214

## WANTED MISCELLANEOUS

**SCRAP SILVER CONTACTS, FORKLIIFT CONTACTS, Silver Solder, Sterling, Gold Plated.** Robert Leszczak, 652 Myrtle St., Elizabeth, NJ 07202

**GOLD, Silver, Platinum, Mercury, Tantalum.** Samples evaluated free. Ore assaying service. Call Wholesale Terminal toll free: 1-800-932-1010.

## FOR SALE MISCELLANEOUS

**SILVER FORK-TRUCK CONTACTS AND SILVER Solder CHEAP.** Robert Leszczak, 652 Myrtle St., Elizabeth, NJ 07202

## HEARING AIDS

**HUGE SAVINGS** Eliminate Dealer Markups. Free Trial. Batteries Wholesale. Terms Arranged. Call Toll Free 1-800-323-1212. Or Write: Lloyds-PMC, Rockford, IL 61110

**GIANT SAVINGS** All Types. In-The-Ear Specialists. Month Trial. Terms. Riteway, Box 59451PM, Chicago, Illinois 60659

**SAVE** Half Buying Aids by Mail. All Major Brands Available. REA Company, Box 364, Bridgeport, Ohio 43912

**FREE HEARING AID CATALOG** - Save 1/2 by mail! Write: "MoneySavers", 9530-PM-3, Langdon, Sepulveda, California 91343. **NOT** sold in California.

**TREMENDOUS SAVINGS** On Brand Names. LeBaron Company, RR7C, Saratoga Springs, NY 12866

## TOBACCO

**BRIAR PIPE** Make or repair your own. Photocopy of article shows you all the details. Send for Plan X-476-G + \$2.00 to: **POPULAR MECHANICS**, Box 1014, Radio City Sta., New York, N.Y. 10101

## FORMULAS, PLANS, ETC.

**MONEYMAKING CHEMICAL FORMULAS — THOUSANDS!** CATALOG \$3.00 (REFUNDABLE): GWA3, Box 193, Brookfield, Wisconsin 53005-0193

**ANY FORMULA** \$10.00. Catalog \$1.00. J. Belfort, Box 568, Chicago, 60690

## GENEALOGY

**FIND YOUR FAMILY HISTORY** in the National Archive records searching at home. Free information. Archive Films, Dept. C21, Box 415, Hollis, NH 03049

## TRAVEL AND RESORTS

**FREIGHTER** Cruises, First Class - Less than \$50 Daily! TravLips Association, Box 188N8, Flushing, NY 11358

## SPECIAL SERVICES

**INFORMATION** On anything. Ferguson Research Specialists, 60-15 Woodside, Woodside, New York 11377.

## HEALTH, VITAMINS

**THINK YOURSELF THIN.** Positive Approach to Permanent Weight Loss, by Noted Nutritional Specialist R. N. For Complete Program Send \$3.00. Howco, Box 2356, Liverpool, N.Y. 13089

## GARDENING & LAWN CARE

**THE ULTIMATE EDGER.** Today's Edging with Tomorrow's Technology. For Free Information: 4941 Hialeah, Abilene, Texas 79606

## FLOWERS, PLANTS & NURSERY SUPPLIES

**GROW GINSENG,** Very Profitable. Have seeds, roots, Goldenseal. Complete information. K. Collins, Viola, Iowa 52350

**MAKE** Money Growing-Selling Baby-Fig Trees. Complete Information. Booklet \$2.00 SASE. Parc Enterprises, Box 8672, Albuquerque, NM 87198

## RECIPES, COOKING, ETC.

**KID'S** International Cookbook \$5.00. Wholesale Publications, Box 6286, Kennewick, WA. 99336

**PICKLES** — 6 Easy Prize Winners \$2.00. Spinsir, Rt. 2, Box 14, Lexington, OK 73051

**FAVORITE** Cookie And Fudge Recipes. \$3. Box 51084, Livonia, MI 48151—5084

**CAMPSITE** Favorites. Economical Easy Recipes. \$2.50. Hope, P.O. Box 14, Chiefland, Fla. 32626

**1000 MEALS UNDER 50c.** SEND \$2.00. Penny Gourmet, Box 916X, Sanibel Island, FL 33957

**"THE BEST ARTICHOKE DIP"** send SASE, along with \$3.50 to: Epicure, P.O. Box 1985, Evanston, Illinois 60204

**HOT DRINKS!** 25 Great Winter Warmers. Send \$3.00 to: W. Morris, 873C East Dublin-Granville Rd., Columbus, Ohio 43229

**FREE MEXICAN SILVER DOLLAR** with Fifteen Chili Barbecue and Menudo Recipes \$3.00, or 120 Mexican Recipes, Colorful book \$6.00. Both \$7.50. Aztec, Box 870, Los Fresnos, Texas 78566

## WINEMAKING, BEERMaking, ETC.

**WINEMAKING-BEERMaking-GASOHOL.** Free Supply Catalog. Yeast Equipment. Continental, Box 188PM, Casselberry, FL 32707

**WINEMAKERS-BEERMakers—** Free Catalog—Fast Service—Large Selection: Kraus, Box 7850-L, Independence, Missouri 64053.

**WINEMAKERS-BEERMakers** Fresh Stocks. Fast Service. Free Catalog. O'Brien's, Box 2840, Wayne, IL 60184

**BEERMakers ONLY!** Free Catalog/Newsletter. William's, Box 461M, Oakland, California 94604.

**BEERMaking-WINEMaking** We're #1. Free Catalog. Vineyard & Brew, P.O. Box 401-B, Sault Ste Marie, MI 49783

**WINE/BEER MAKING** Catalog: B&J Enterprises, 1845 South 19th, Springfield, Illinois 62703

**FREE ENCYCLOPEDIA** Winemaking, Beermaking Supplies, Equipment, Ingredients. Vynox, P.O. Box PM15498, Rochester, NY 14615

**FREE BEERMaking BOOK** Plus Catalog. Finest Equipment, Ingredients. Fully Guaranteed. SPI, Box 784-M, Chapel Hill, NC 27514

**MAKE QUALITY BEER,** Wine. Free catalog. Village Store, Box C-51PM, Westport, MA 02790

**AMAZING NEW WINEMaking CRYSTALS—** Specify Red, White, \$3.00. Albar, 2016 E. 56th, Savannah, GA. 31404

**FREE BEERMaking CATALOG.** Quality. Selection. Lowest prices anywhere. **HOMEBREW**, Box 158M, Haslett, Michigan 48840

**BEER LOVERS—**Brew your own. Delicious! Inexpensive! Free Catalog. Beer Gear, Box 25093M, Lansing, Michigan 48909

**WINEMAKERS-Beermakers.** Free illustrated catalog of supplies. Semplex, Box 12276R, Minneapolis, Minnesota 55412-0276

## BURGLAR ALARMS & HOME PROTECTION

**WARNING** Cards. Proven home Warehouse. 20 for \$5.00 Check. HGCO, 2150 Cross, Eugene, Ore. 97402



# 1-Carat Emeralds \$4 Apiece

---

## This is *NOT* a Misprint.

---

### A letter from the President of Carter & Van Peel

Dear Reader:

Today the famous New York jewelry firm of Carter & Van Peel, of which I am President and Chairman of the Board, has begun removing 1-carat emeralds from its New York corporate vault and will distribute them, on a first-come basis, for only \$4 apiece to every person who mails this ad to the company address (below) before Midnight, May 31, 1984.

All emeralds are 1-carat in size or larger (some may be as large as 1½ carats) and will be accompanied by a Certificate of Authenticity to that effect issued by gemologists of the firm of L.G.P. Gem, Ltd., of New York.

All emeralds are genuine precious stones of the same size and quality that the firm of Carter & Van Peel regularly sells to its customers and advertises in leading publications such as *The New York Times*.

All emeralds are completely finished stones, each one cut, faceted and polished, ready to be displayed in a collection of precious stones or set in jewelry of the owner's choice.

These emeralds will not be sold at this price by the company in any store. To obtain one at this price, mail *this original printed ad* to the company address below no later than Midnight, May 31, 1984.

#### Why do we offer genuine emeralds for \$4 apiece?

Being neither philanthropists nor saints, we at Carter & Van Peel expect to gain far more than we lose from this publicity campaign. Our firm is already well known to the public as one of the largest direct marketers of diamonds and precious stones in America. We expect this publicity campaign to make us *the* largest, and to increase our yearly sales by millions of dollars.

We will also gain the names of persons such as yourself, who will constitute a valuable roster of potential clients to whom we can mail announcements of future sales.

As we readily admit, this publicity campaign is unashamedly profit-oriented and self-serving. If you accept in the same spirit, I think we shall both be well pleased—or your money will be speedily refunded.

There is a limit of two (2) emeralds per address at this price, but requests which are mailed early enough (before May. 25) may request as many as seven. Therefore I suggest you respond promptly—or forever regret an extraordinary opportunity missed.

Sincerely,



President and Chairman of the Board,  
Carter & Van Peel, New York

**TO OBTAIN YOUR EMERALD:** Mail *this original printed ad* (copies or photostats are *not* acceptable) together with your name and address and \$4 for each emerald. Add only \$2 shipping and handling no matter how many emeralds you are requesting. Allow up to 6-8 weeks for shipment. Mail to: **Carter & Van Peel, \$4 Emerald Offer, Dept. 114-14, Box 1739, Hicksville, N.Y. 11802.** (V23782)

**NOTE:** All emeralds are covered by a full money-back guarantee. For your protection, they will be self-insured by the company and shipped direct from our corporate vault in New York.



# HEIRLOOM.

"Let it be plain and simple." With these words, Mother Ann Lee, founder of the Shakers, defined an attitude and a philosophy that has resulted in some of the most beautiful furniture ever created. Furniture that has survived the test of time and the whims of fashion.

Like this Shaker writing table. Decidedly simple. Perfectly functional. Its very *lack* of decoration makes it stunning. A piece you'd love to own. A piece you could keep for generations. The kind of piece the serious home craftsman loves to build.

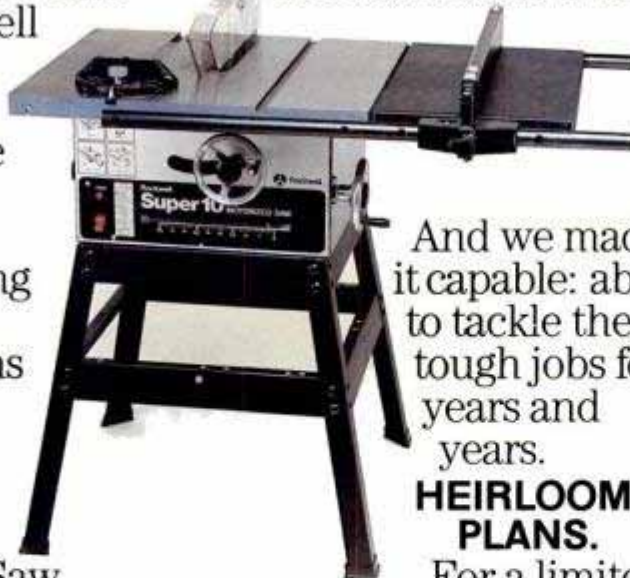
But creating an heirloom isn't easy. That's why at Rockwell International we build our tools to handle serious work. And we build them to last long enough to become heirlooms themselves.

## HEIRLOOM SAW.

Our Super 10 Motorized Saw is a perfect example. We made it sturdy and durable, with cast-iron construction.

We made it safe and easy to operate: with

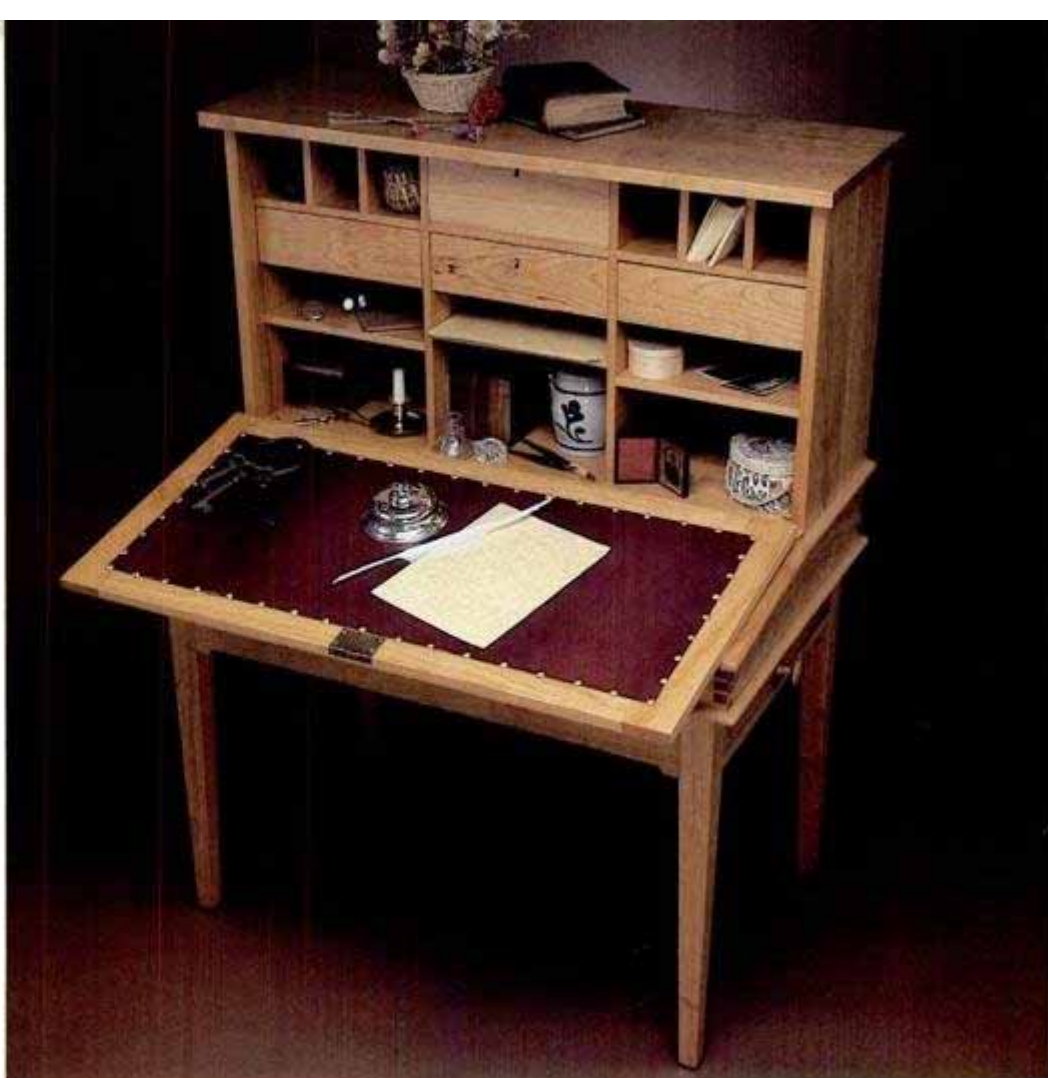
a self-aligning rip fence, see-through-blade guard with splitter and anti-kickback attachment.



And we made it capable: able to tackle the tough jobs for years and years.

## HEIRLOOM PLANS.

For a limited time, 1/2 scale working plans for the Shaker writing table will be supplied with every purchase of our Super 10 Motorized Saw. The



plans are based on the original table, on permanent display at The Shaker Museum, Old Chatham, NY. It's a very special offer, for the very special craftsman. And now the Super 10 Saw is available at very special prices.

To find out the Rockwell machinery dealer nearest you, call Rockwell Power Tool Division toll-free 800-438-2486 (in PA, 800-438-2487).

Offer good only in the continental U.S., January 1, 1984 through December 31, 1984, or until supplies are exhausted.



**Rockwell International**

...where science gets down to business



Warning: The Surgeon General Has Determined  
That Cigarette Smoking Is Dangerous to Your Health.

© 1984 B&W T Co.

Kings, 9 mg. "tar", 0.7 mg. nicotine; 100's, 11 mg. "tar",  
0.9 mg. nicotine av. per cigarette, FTC Report Mar. '83.



**There's  
only one way  
to play it.**

There's only one sensation this refreshing.  
Low 'tar' Kool Lights. The taste doesn't miss a beat.