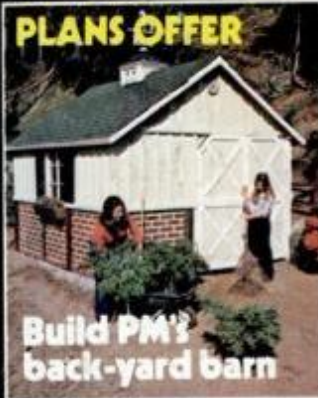


Popular Mechanics



PM RATES THE 4-WHEEL-DRIVE MINI PICKUPS: Datsun, Chevy, Subaru, Toyota

7 ROBOTS YOU CAN BUILD FROM PLANS AND KITS

- 5 OUTDOOR PLANS**
- A-frame tree house for kids
 - 3 easy-to-build planters
 - Wine rack for barbecues

NOW: ONE WOOD STOVE HEATS THIS ENTIRE HOUSE!

- PLANS: 6 SHOP AIDS FOR WOODWORKERS**
- Tabletop lathe that really works
 - 3 lathe accessories
 - Router depth gauge
 - Organizer for molding cutters

TORNADO!
New disasters reveal deadly multi-funnel attack





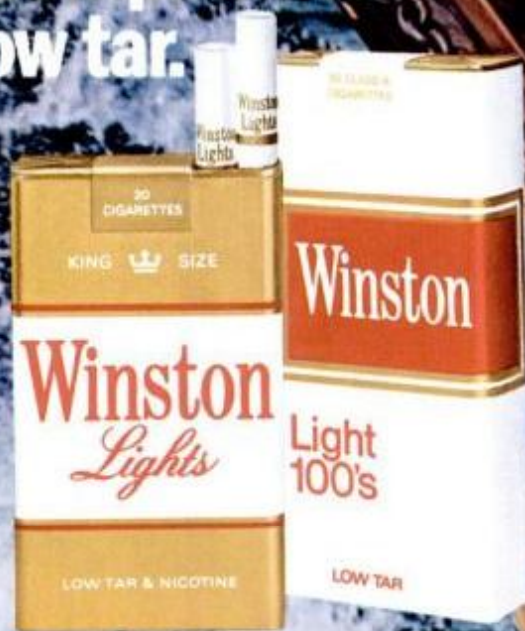
No compromise

Winston Lights didn't compromise on great taste to get low tar. Why should I?

Winston Lights taste good like a light cigarette should.

LIGHTS: 13 mg. "tar", 0.9 mg. nicotine, LIGHT 100's: 13 mg. "tar", 1.0 mg. nicotine, av. per cigarette, FTC Report MAY '78.

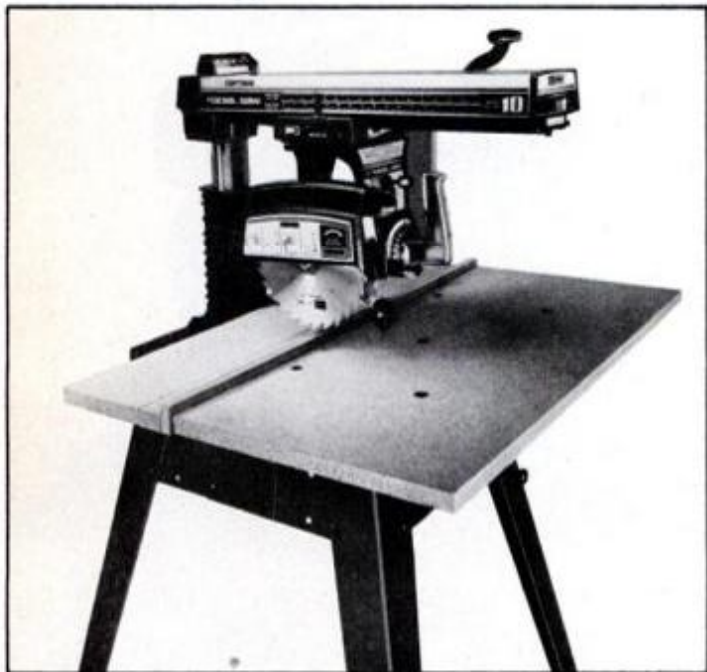
Warning: The Surgeon General Has Determined That Cigarette Smoking Is Dangerous to Your Health.



© 1979 R. J. Reynolds Tobacco Co.

Winston Lights - это не компромисс. Это вкус и низкая смолы.

SEARS CUTS THE PRICE ON CRAFTSMAN® SAWS BY \$110 TO \$150!*



CRAFTSMAN 10-INCH RADIAL SAW

\$110 OFF

Here's a super saving on America's best selling radial saw (#19775) that crosscuts, rips, miters, bevels and more.

Has a powerful 1½ HP motor that develops 2½ HP. And a single lever miter arm control for one-handed single step setups. Leg set included. Radial Saw comes partially assembled. Save \$110. Now \$349.88



CRAFTSMAN 10-INCH TABLE SAW

\$150 OFF

Here's another super savings on Sears Cast Iron Top 10" Table Saw (#29815) that miters, bevels, rips, crosscuts and more.

Outfit includes leg set, one extension and a permanently lubricated 100% ball bearing 1 HP motor that develops 2 HP. Plus, a manual reset overload-protector. And Sears exclusive Exact-I-Cut feature that lines up the cut ahead of the blade. Table Saw comes partially assembled. Save \$150. Now \$349.88

**YOUR CHOICE \$349⁸⁸ COMPLETE
ON SALE AUGUST 3-23**

*These are the minimum savings nationally. Regular prices vary in some markets.

Available in most Sears retail stores. Prices and dates may vary in Alaska and Hawaii.

Sears

**WHERE AMERICA SHOPS
FOR VALUE**

© Sears, Roebuck and Co., 1980

This One



R7GN-L5N-8197

The automatic 35mm Minolta XG-1 makes it easy to get clear, sharp pictures. Because the XG-1 sets itself electronically.

So it does the work. And you take the credit.



The XG-1 is compact, lightweight, and comfortable to hold. And its bright viewfinder tells you everything you need to know to take great pictures.

You can add to your fun by adding accessories. Like a Minolta auto winder to advance the film. Or an automatic Minolta electronic flash. And any of the more than forty superb Minolta lenses.

For more information, write Minolta Corporation, 101 Williams Drive, Ramsey, N.J. 07446. In Canada: Minolta, Ontario, L4W 1A4.

Or see your Minolta dealer. And find out how incredibly easy great pictures can be.

WAIT 'TIL YOU SEE HOW GOOD YOU CAN BE WITH A MINOLTA XG-1.





On the cover

The most deadly tornadoes often do their damage on the ground with multiple, segmented vortices, rather than the single whirling funnel usually associated with these devastating storms. On page 64 you'll learn what scientists now know about tornado behavior.

—PM painting by Ed Valigursky

Popular[®] Mechanics

AUGUST 1980

CONTENTS

VOLUME 154 NUMBER 2

INTERNATIONAL EDITIONS: CARIBBEAN, ITALY, MEXICO, SOUTHERN HEMISPHERE

Special features:

Rating the 4wd mini pickups

Some upstarts, some surprises in PM's evaluation of four exciting new vehicles.

61

Woodworking aids you can build

PM offers designs for a tabletop lathe, lathe accessories, router depth gauge and molding cutter organizer. Begins on ...

98

How one wood stove heats a whole house

An architect combines the traditional Scandinavian methods with modern design for an innovative dwelling that pays energy dividends.

86

Robot plans and kits

The big new rage for the soldering-iron set—machines that "think" before they act.

16

Five great outdoor projects for summer

Complete plans begin with a terrific A-frame tree house.

92

Scandinavian-influence designs for three planters and a portable wine rack.

88

Automobiles and bikes

- 22 Imports and Motorsports**
- 26 Detroit Listening Post**
- 37 Firsthand Report:**
Driving Audi 4000 and 5000 Turbo
- 39 Saturday Mechanic:**
Tuning your suspension for performance and economy
- 49 The PM Garage**
- 56 Car Clinic**
- 61 Four new mini pickups** show their off-road muscle
- 78 PM Owners Report:**
Pontiac Bonneville
- 82 PM Owners Report:**
Lincoln Mark VI

Home and yard

- 46 Homeowners' Clinic**
- 52 Appliance Clinic**
- 86 A home designed to be heated by one stove**
- 95 Put a potting bench in a spare corner**
- 96 Build PM's modular barn**
- 114 Use hardwood scraps for low-cost barbecuing**
- 130 Barbecue in a "well"**

Electronics, radio and TV

- 13 PM Electronics Monitor**
- 16 Robots you can build today**
- 80 New computers can talk,** control your house and sing

Photography

- 54 Photo hints**
- 84 Cameras for the deep**

Shop and crafts

- 32, 51, 122 Hints from readers**
- 36 Toy shooter from the past**
- 53 PM Workbench**
- 88 Weekend workshop:** 4 projects with Scandinavian flair
- 92 Build this treetop hideaway for your youngsters**
- 98 PM's tabletop lathe:** A great tool for miniature makers
- 100 Workshop Minicourse:** Bench plane, part 2
- 109 5 handy projects for your workshop**
- 134 New Now for home and shop**

Boating and outdoors

- 14 All Outdoors**
- 74 Compact camp-cruising by kayak**
- 76 New outdoor gear:** Lighter and stronger than ever

Science and engineering

- 50 Science Worldwide**
- 64 How tornado labs tame giant twisters**
- 70 Terror on wheels—by design**

Every month

- 6 Letters**
- 8 Notes from the Editor**
- 33 PM Briefs**
- 68, 134 It's New Now**

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 (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, \$4.97 for one year; \$14.97 for two years; \$24.97 for three years. Canada and all other countries, add \$6.00 for each year. Controlled circulation postage paid at Salem, Ill., New York, N.Y., and Rock Island, Ill. Authorized as second-class mail by the Post Office Department, Ottawa, and for payment of postage in cash. Registered as second-class matter at the Post Office at Mexico D.F., Mexico, June 20, 1950, © 1980 by The Hearst Corporation. All rights reserved. Printed in U.S.A.

POSTMASTER: Please send Forms 3579 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 or call Joan Harris, Customer Service Department, Popular Mechanics, P.O. Box 10064, Des Moines, Iowa 50350. Telephone: 800-247-3470. State of Iowa residents call 800-532-1272. 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 Forms 3579 to this address

THE WATER TORTURE. AND HOW TO AVOID IT.



Bound and confined in shoes. Difficult to breathe. Forced to carry heavy loads. It's no wonder feet perspire. And that wetness can be torture for your feet.

Dr. Scholl's Foot Powder fights the special problems of foot wetness. Foot Powder absorbs perspiration. And when you avoid wetness, you avoid the uncomfortable, sweaty feeling.

It also helps stop other little "tortures" that come with wetness. Athlete's Foot and other fungi have less chance to get started because Foot Powder prevents dampness. And since it helps control wetness, it helps control odor.

Feet stay cooler, drier and fresher. So your feet are more comfortable. And you're more comfortable. A little shake in the morning or after bathing is all it takes.

And since it's applied directly to the skin, it controls moisture in a way insoles can't.

So why go on torturing yourself?
Use Dr. Scholl's Foot Powder every day.



© 1979 Scholl, Inc.

Popular Mechanics®

Editor-in-Chief: John A. Linkletter
Executive Editor: Robin C. Nelson
Managing Editor: Bill Hartford
Art Director: Ira Herrick

Special Editorial Features: Sheldon M. Gallager, editor

Automotive: Tony Assenza, editor; Michael Lamm (West Coast); Gary Witzenburg (Detroit)

Science and Engineering: Gurney Williams III, editor

Home and Shop: Harry Wicks, editor; Joseph R. Provey, Penelope Angell, assistants

Boating, Outdoors and Travel: Wm. T. McKeown, editor

Electronics: Neil L. Shapiro, editor

Copy and Production: Garry Winter, chief; John Bostonian Jr., art; Peter Easton, Shannon K. Kelley, Daniel J. Oates, assistants

Art: Don Mannes, technical art director; Douglas Quinn, Alan Andresen, 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.

Bureau of Information: Sophie Gronowicz, director; 224 West 57th St., New York, N.Y. 10019. (212) 262-4292

**Associate Publisher,
Director of Advertising**
Daniel J. Coleman

Advertising Offices:

New York: 224 West 57th St., New York, N.Y. 10019; (212) 262-4294

Chicago: 520 North Michigan Ave., Chicago, Ill. 60611; (312) 527-2400

Detroit: 377 Fisher Rd., Grosse Pointe, Mich. 48230; (313) 881-3520

Cleveland: 221 Mercantile Center, 3659 Green Rd., Cleveland, Ohio 44122; (216) 292-7334

Los Angeles: 460 East Carson Plaza Dr., Carson, Calif. 90746; (213) 532-8101

Production Manager: John A. Regina, (212) 262-4800

Classified Advertising Manager: H. E. Kappel, (212) 262-4825

Published by The Hearst Corporation

President

Frank A. Bennack Jr.

Chairman

Randolph A. Hearst

Vice Chairman

John R. Miller

President, Magazines Division

Gilbert C. Maurer

Publisher, Popular Mechanics

Joseph F. Kern

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; Harrison A. Mitnick, Treasurer; 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, Resident Controller; William S. Campbell, Vice President, Director of Circulation; Joseph F. Kern, Vice President for Popular Mechanics.



The first new truck of the 80's...

TOUGH NEW 1980 FORD

with the best gas mileage ratings of any American-built standard-size pickup.*

Ford totally redesigned its pickups to help meet the needs of the 80's: 19 estimated MPG, 29 estimated highway.* That's not only the best mileage ratings of any full-size American-built pickup; it also rivals the best-selling small import! (Toyota: 21 estimated MPG, 28 estimated highway.*)

Tough '80 Fords give you more payload capacity than last year's models with comparable GVWR's. Exclusive Twin-I-Beam front suspension. Aerodynamic styling. A choice of models that includes 4x4's with independent front suspension, rugged new Six-Wheeler, roomy new SuperCab.

For a tough, full-size pickup with gas mileage that rivals the best-selling import, see your Ford Dealer now!



All-new cab interior. More leg room than last year. New instrument panel. New anti-theft features like locking steering column, inside hood release. New options include AM/FM stereo with 8-track or cassette player, underhood tool box.

BEST GAS MILEAGE RATINGS
of any American-built
standard-size pickup.

19 EPA EST. MPG* **29** EPA EST. HWY.*

Standard 4.9L (300 CID) Six with optional overdrive transmission.

LONGEST RANGE

722 **1,102**

EST. MILES HWY. MILES

Std. 72L (19-gal.) tank plus optional 72L (19-gal.) auxiliary tank (on LWB Stylesides only). Total: 144L (38 gals.).

*EPA estimates. Compare these estimates with others. Your mileage and range may differ depending on speed, distance and weather. Actual highway mileage and range will probably be less than estimated. California estimates lower. Diesels and car-trucks excluded.

**America's best-selling pickup
for the 3rd straight calendar year.**

Based on 1977-79 calendar year retail deliveries.



FORD

FORD DIVISION



LETTERS TO THE EDITOR

Another roadside attraction

The May *PM Briefs* ("A \$40 Mailbox That Does the Job," page 40) featured an 80-pound, high-security mailbox. This block of concrete set on a four-foot-high post could become a highly dangerous obstacle if hit by an automobile at high speed. Such an impact could result in 80 pounds of concrete coming through the windshield.

MARVIN G. GIESEKE
MARSHALL, MINN.

Bigger screen, same programs

In the February issue you ran a story on projection TV kits (*Build a Giant-Screen TV—From Kit or Scratch*, page 107). I went out and bought a lens and screen from Televue Optics of Spring Valley, N.Y., and I must say it is better than anything I have seen commercially available to date. I had been skeptical, since the components were purchased sight unseen, with end result completely unknown.

The only modifications I made were choice of set and the addition of a switch.

I used a 13-inch set and then put in a switch that returns the set to normal viewing when the projection system is not in use. I would say your cost estimate was correct; I had to buy the TV, so the entire cost was under \$700.

However, based on the end result, it's a bargain.

PAUL C. MULSON
TROY, N.Y.

Keep your eye on the ball

I read with interest *How Pros Take Those 'Impossible' Photos* (page 120, Apr. '80). Those of us working pros who do not have the budgets or sophisticated equipment have to be clever.

The simplest way to shoot a tennis ball on a racket is to attach it to the racket with a hollow wall fastener and a large washer.

If you should do that, of course,



"Impossible" photos: Poor man's way to make sure the ball is always on the racket.

the pretty model in the ad for the condo or hotel can hit the ball in every shot, even if she's never been on a tennis court.

HARVEY J. KELMAN
TAMPA, FLA.

Champion puts the kick in Mustangs.

On land or in the air, your Mustang will put out winning horsepower with Champions. The spark plugs that are right for virtually every engine. For peak performance, switch to fresh Champions at least once a year.

Champion Spark Plug Company • Toledo, OH 43661



CHAMPION

You can't buy
a better plug.

LEADERS HAVE TASTE

Even the look of the A&C Grenadier rewards the choosy smoker. It's long and lean. Touch a match to it, and here comes rich, exciting aroma, full and satisfying taste. At its heart, a richly rewarding blend of five fine imported and domestic tobaccos. All of this sealed in our Fresh Loc package. When you've got the taste for leadership, light up an A&C Grenadier. In light or dark natural wrapper.



A&C GRENADIERS—THE TASTE LEADER

Car care queries

In your May issue on page 139 (*Car Care Guide 1980*) there is a picture of a 1980 Aston Martin Volante. I've never seen or heard of this one and it looks like a real beauty. Where have I been? Would you know who makes it, how much it costs and if there's a dealer in my area? I hope you can help me.

JAMES C. GONYEA
HOOKSETT, N.H.

We don't know if there's a dealer in your area, but you can find out by writing to Aston Martin Lagonda Inc., 14 Weyman Ave., New Rochelle, N.Y. 10805.

I agree with your statements in the May issue that car care pays off (*A Cared-For Car Is Money in the Bank!* page 142). However, the author of the captions on pages 142-143 needs to brush up on his car identifications. The Chevelle on page 142 is a '66, not a '62. The Olds 442 is a '68, not a '70. The red Chevelle SS on page 143 is a '70, not a '66. I like your magazine, but please make us car freaks and perfectionists happy.

DAVID J. DEGARCIA
ST. LOUIS

You're right, David. We blew it on that one. A local mechanic friend of ours who owns the '70 SS will never let us live it down.

Heartening news

How We'll Build a Working Human Heart (page 76, June '80) was fascinating: I was especially interested in the use of the Hall-effect device to regulate pumping.

The series action of the two pumps in the organ requires close regulation so that the stronger one, the left ventricle, does not outpump the other. Otherwise, death would occur within minutes. Apparently, the Hall-effect sensor accomplishes this regulation in the Hershey heart by pumping only when the chamber is filled and varying the frequency to adjust for volume.

Because the biological heart regulates both the frequency and the volume of each stroke, I wonder if sufficient runaway protection can be provided with an artificial heart.

ED TAYLOR
BREVARD, N.C.

The Hall-effect switch controls the frequency of pumping action in the

Hershey heart. But a second sensor, monitoring pressure in the body's main artery, controls current to the heart-pump motor. If pressure is too high in the artery, motor current is cut back. That, in turn, reduces the volume of blood pumped with each beat.

These feedback systems should prevent the left ventricle from out-pumping the right, the Hershey researchers tell us.

Addendum

We've received many queries about the brush-on plastic tape mentioned in *Photo Hints* in the April issue ("Light-Leak Repairs," page 70).

The plastic tape is currently available in many electronics supply stores or directly from the manufacturer: Tech Spray Inc., Box 949, Amarillo, Tex. 79105.

Correction

In *Build the Basement Water Alarm* (page 56, July '80), we mentioned that a complete kit of parts is available, but we neglected to include the address and price. The alarm costs \$14.95 (kit) and \$19.95 (assembled) from Circuit Craft, 10 Idell Rd., Valley Stream, N.Y. 11580.



**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



NOTES FROM THE EDITOR

John A. Silbiter

Back in the days when we were certain of almost everything, we knew that tornadoes were exclusive to the middle states, just as earthquakes confined themselves to the West Coast and hurricanes to the East Coast. But tornadoes, we've observed, have not had the decency to stay put and have been lambasting almost every section of the country. It seems that their fury and their frequency have been increasing each year. Along about this time of the summer, you'll find some comfort in knowing about the lifesaving precautions listed in our tornado article that starts on page 64. There are lots of fascinating new facts about twisters, too, that authors Franklynn Peterson and Judi R. Kesselman have discovered and reported for PM. . . . **One of our favorite correspondents over the past 15 years** has been a do-it-yourselfer in



The king and I.

Switzerland. Even though he spends his spare time working on cars, he's not your average car buff. He's King Michael of Rumania, who was forced into leaving his throne in 1947. He's an active metalworker and woodworker, and his real passion is maintaining a World War II Jeep. He dropped by our office recently to delve into the mechanics of producing a magazine. As you'll note in the photo at left, we were in the midst of producing the issue you have in your hands, but King Michael was even more interested in tracking down the source for a new wrench for his car. . . .

There's often a reassuring "down home" result to the di-

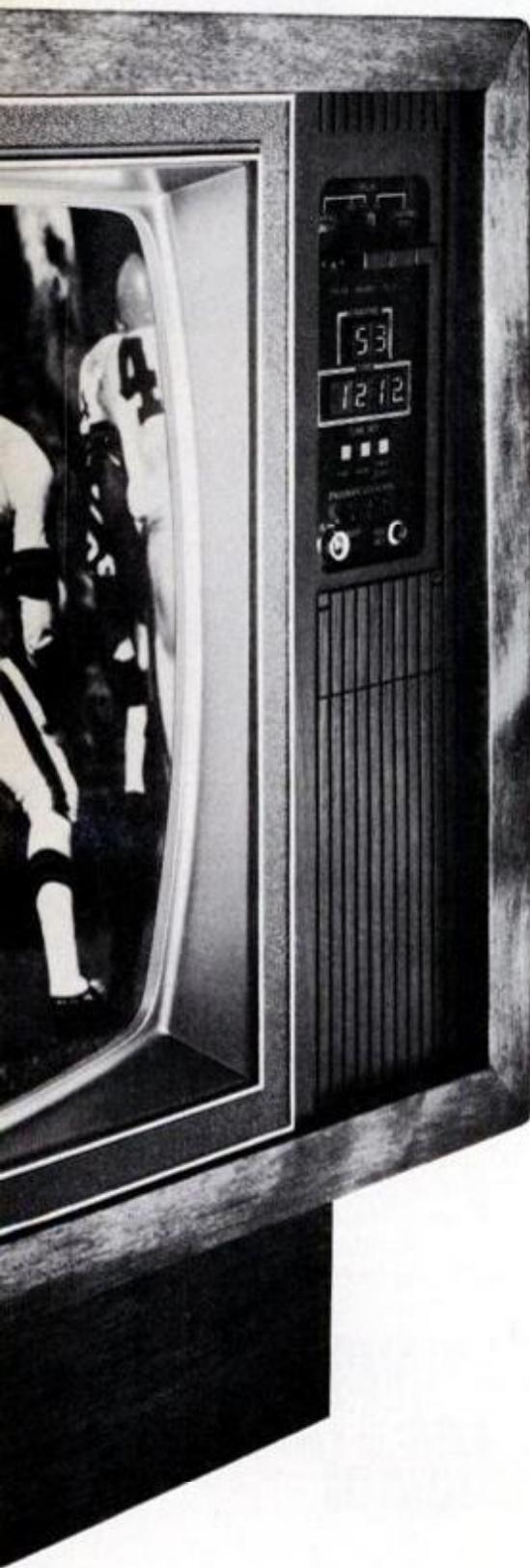
rection—I should say directions—of today's technology. As you'll see in this issue, you could be right in the forefront of things, performing all sorts of wondrous electronic magic with a sophisticated personal computer (page 80) while living in a contemporary home that's heated by a single wood-burning stove. (page 86). At some point, you might even consider building a robot to go out and chop the wood. For practice, try one of our seven do-it-yourself robots (page 16) that aren't quite smart enough for the job yet, but will make fine household pets until a lumberjack version comes along.

Okay, it's tough to photograph yourself on a roller coaster. Robin Nelson tried it, mainly, we think, to prove his iron nerve. Even though this picture isn't great, he *did* get the story (page 70). But what struck us about the photo is the apprehension on riders' faces. Hey, folks, it's supposed to be fun!



PM Just keep saying: "I'm having fun, I'm having fun."

New from NRI! **25"** color TV that DIAGONAL tunes by computer, programs an entire evening's entertainment.



Just part of NRI's training in servicing TV, stereo systems, video tape and disc players, car and portable radios.

Only NRI home training prepares you so thoroughly for the next great leap forward in TV and audio...digital systems. Already, top-of-the-line TV's feature digital tuning, computer programming is appearing, and new digital audio recording equipment is about to go on the market.

NRI is the only home study school to give you the actual "hands-on" training you need to handle servicing problems on tomorrow's electronic equipment. Because only NRI includes this designed-for-learning, 25" diagonal color TV with electronic tuning, built-in digital clock, and computer programmer as part of your training. With this advanced feature, you can pre-program an entire evening's entertainment...even key lock it in to control children's viewing.

Exclusive Designed-for-learning Concept

The color TV you build as part of NRI's Master Course looks, operates, and performs like the very finest commercial sets. But behind that pretty picture is a unique designed-for-learning chassis. As you assemble it, you perform meaningful experiments. You even introduce defects, troubleshoot and correct them as you would in actual practice. And you end up with a magnificent, big-picture TV with advanced features.

Also Build Stereo, Test Instruments

That's just a start. You demonstrate basic principles on the unique NRI Discovery Lab,[®] then apply them as you assemble a fine AM/FM stereo, complete with speakers. You also learn as you build your own test instruments, including a 5" triggered sweep oscilloscope, CMOS digital frequency counter, color bar generator, and transistorized volt-ohm meter. Use them for learning, use them for earning as a full- or part-time TV, audio, and video systems technician.

Complete, Effective Training Includes Video Systems

You need no previous experience of any kind. Starting with the basics, exclusive "bite-size" lessons cover subjects thoroughly, clearly, and concisely. "Hands-on" experiments reinforce theory for better comprehension and retention. And your personal NRI instructor is always available for advice and help. You'll be prepared to work with stereo systems, car radios, record and tape players, transistor



radios, short-wave receivers, PA systems, musical instrument amplifiers, electronic TV games, even video tape recorders and tape or disc video playbacks.

Send for Free Detailed Catalog... No Salesman Will Call

Mail the postage-paid card today for our free 100-page catalog with color photos of all kits and equipment, complete lesson plans, convenient time payment plans, and information on other electronics courses. You'll also find out about NRI's new Computer Technology Course that includes your personal microcomputer. Or Complete Communications with 2-meter transceiver. If card has been removed, write to:



NRI Schools
McGraw-Hill Continuing
Education Center
3939 Wisconsin Ave.
Washington, D.C. 20016



© 1978 VOLKSWAGEN OF AMERICA

Volkswagen's new Pickup: It's built like a truck, but drives like something else.

Where is it written that a truck has to drive like a truck? Certainly not on that brand new Volkswagen Pickup Truck. When it comes to going, a VW Pickup can pick 'em up and lay 'em down with the best of 'em. Under its aerodynamic hood is a very dynamic engine. A fuel-injected, overhead cam powerhouse that can outaccelerate even an MGB.

And should you ever catch up to a VW Pickup, you'll never catch it wallowing through corners like other trucks. Its front-wheel drive and front-mounted transverse engine help keep it moving nimbly. Even when the road throws it a curve. The steering is precise and quick because it's Volkswagen's rack-and-pinion system. What's equally impressive is how good a pickup a VW Pickup is. It's the only truck in its class with a fully unitized body and double-wall

bed construction for extra strength. And its heavy-duty suspension takes the tension out of hauling over 1100 pounds of stuff. So a truck is a truck is a truck, eh? Well, not if it's a Volkswagen Pickup Truck. Then it's something else.

**VOLKSWAGEN
DOES IT
AGAIN**


PM ELECTRONICS MONITOR

Sony's audiodisc

Sony Corp. has interested one other company, Willi Studer of Switzerland, in supporting its own format of audiodisc as a standard one. The audiodisc is the new digital technology that may make obsolete present-day recording methods.

The fledgling audiodisc industry has seen almost as much confusion as the videodisc market, what with competing technologies. Each company's approach to an audiodisc has tended to mirror the company's form of technology developed for videodisc. Both are digital technologies; both offer quantum leaps of quality over what is now available.

It now seems, however, that the audiodisc market may stabilize first as far as technology. If so, this may result in a number of benefits to all audiophiles. With a standard system, immense amounts of software (recorded music) should become quickly available.

There is no doubt that videodiscs and audiodiscs will someday totally change the face of home entertainment. The only thing standing in the way, so far, is the lack of standardization consumers and secondary suppliers need to have.

More on word processing

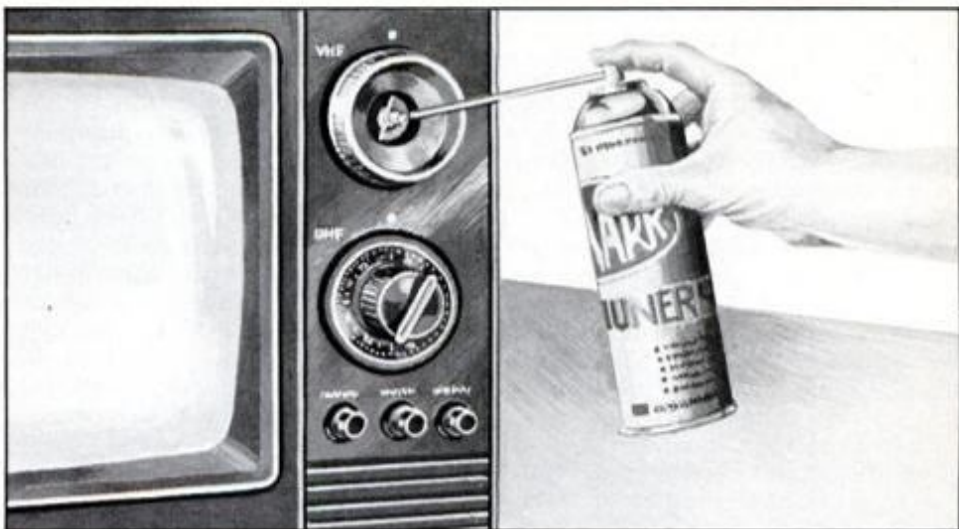
When PM designed a personal computer word processor (page 78, July '80), we mentioned that the Radio Shack computer (TRS-80) was also capable of such tasks but, at the time, not capable of lower case (small) letters. Well, Radio Shack now makes a lower-case modification for the TRS-80 for under \$100.

Even nicer is its new word-processing program "Scripsit," which lets you compose any kind of copy. The program, as the others we reviewed, is a character-based processor. Changes to text can be made easily and neatly.

Super sound from your old TV

In May we had an article on new television sets that feature close-to-high-fidelity sound (*Now: TV With True High-Fidelity Sound*, page 76). One of the featured lines was the Supersound series from Sylvania.

Sylvania is now making the Supersound components available separately so you can add high-fidelity sound to your existing television. The bookshelf-size unit features an 8-watt amplifier and two-way speaker system.



Cleaning your television tuner

If your TV has a mechanical tuner (channel changer), sooner or later it can develop a problem. You may have to rock the channel selector between channels a few times before reception on one channel manages to come in static-free.

Possibly you won't be able to get decent reception at all—but you'll notice that if you lightly strike the tuner knob, the static momentarily clears up.

If this is happening to your set, save yourself the expensive cost of an unneeded service call. It's likely that your tuner just needs cleaning. Most electronic stores (Radio Shack is a

good bet) sell TV-tuner cleaner. The aerosol can comes with a long tube that fits onto the nozzle.

Simply turn off the set (better, unplug the power cord) and remove your TV's tuner knob from the shaft. You'll see the shaft disappears into an enclosed box that contains the tuning mechanism. The box should have a few small openings. Direct the spray into the tuner, through the openings. Turn the tuner through all channels clockwise. Spray. Turn counterclockwise.

This simple procedure just might clear up your TV-reception blues.

The system plugs into Sylvania sets that have audio output jacks. Other brands of sets may need slight modifications.

Talk about pinball wizardry . . .

Pinball machines have always moved with the changing times to provide flipper connoisseurs electronic thrills and excitement. But Williams Electronics has announced a new pinball wrinkle—a talking machine that speaks such epicurean *bon mots* as: "Me got you," "You got me," and the pitiful "Gorgar hurt." The voice is produced by computer synthesis and is capable of 147 variations of 31 basic sounds. Gorgar now has a vocabulary of 21 phrases. Pinball machines have always been personable—now they're talkative.

Have your own war room

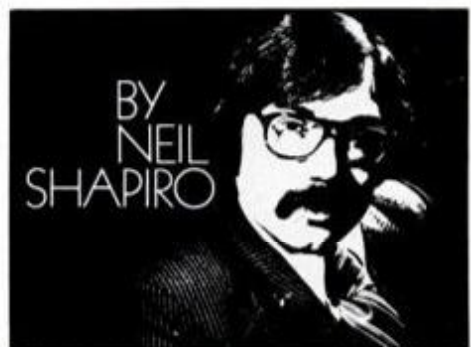
In 1941, the German battleship *Bismarck*, accompanied by the cruiser *Prinz Eugen*, stole into the North Atlantic. The hunt to sink the *Bismarck* was on, led by the ill-fated British battleship *Hood*.

The mission to destroy the *Bismarck* was one of the most complex

tasks in the annals of modern warfare. A new computer game, "Computer Bismarck," recreates all of the complicated maneuvering as it simulates that battle and captains the Germans against you.

The wealth of detail, from the display map of the North Atlantic to rules for refueling aircraft, is hardly short of fantastic. Only real war rooms such as those in the Pentagon have ever before been able to simulate a battle in this manner.

The game (or battle simulation) is available from Strategic Simulations (Box 5161, Stanford, Calif. 94305) in versions for the Apple and TRS-80 home computers. There is nothing else like it! **PM**



ALL OUTDOORS

Rockets' red glare

As if in answer to PM's request last month for signal flares to meet the new Coast Guard requirements (*Pyrotechnics to Save Your Life*), Olin Corp. has announced six new kits.

The new regulation goes into effect in January 1981 for boats over 16 feet long during daylight hours, and for all boats of any size after dark on coastal and Great Lakes waters. States are likely to issue similar requirements for all inland waters, and now is none too soon to carry distress signals afloat.

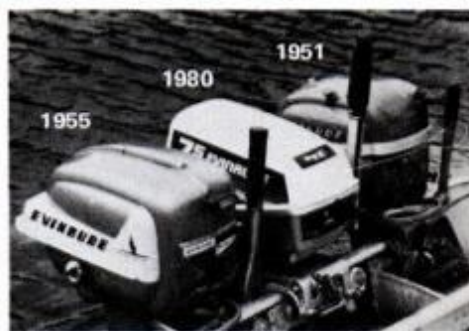
The kits from Olin's Signal Products Operation, a companion division to Olin's well-known Winchester-Western Group, are bargain-priced from \$10 to \$95. For boatmen who are nervous about firing rockets or holding flares, there will even be a \$55 S.O.S. Day/Night Kit with an orange flag for day signaling and a high-intensity light that automatically blinks an S.O.S. to meet the requirements of the new law.

When you're in trouble, you want

to attract a rescuer's attention, alert him to a problem and then show him your location, Olin Signal Products director Carl Johnson points out. A meteor or parachute flare is probably the way to go for an alert, followed by a hand-held flare or smoke signal indicating location. Olin's \$20 alert/locate kit Model 12AL comes in a waterproof canister, has three 12-gauge meteor flares, a pistol launcher and three hand-held flares. It's good for three years, satisfying Coast Guard requirements.

How far have we come

"The good old days" were comparison-tested recently by Evinrude Motors, using 7½-hp motors from 1951, 1955 and 1980. Each was mounted on a 148-pound, 14-foot Alumacraft fishing boat rated for engines up to 25 hp. Evinrude manager Jim Riegler picked the '51 and '55 models, since many of them are still in use around the world. The results seem to indicate we've come a long way.



Comparison tests of two old 7½-hp motors and a new one show outboards are getting lighter, stronger and more fuel-efficient.

Speed trials showed the '51 motor could do 6.06 miles per hour, the '55 topped out at 12.33 and this year's model could plane with the same driver aboard at up to 17.4 mph. Meanwhile, at various speed levels, the new motor had 45 to 147 percent better fuel economy than the '51 mill and 15 to 166 percent better than the '55. When trolling, the new rig is 144 percent more economical than either of the older motors. Accelerations

MOTORCRAFT



HI, SLICK.
WHAT'S
NEW?

ME!

A TOTALLY NEW
MOTOR OIL, FORMULATED
TO MEET THE STRINGENT
REQUIREMENTS OF THE
ENGINES OF
THE '80s..

AND

OFFERING GREAT
PROTECTION TO THE ENGINES
OF OLDER CARS, TOO.

tion is 61 percent better for this year's 7½ than the '51, and 14 percent better than '55. The engineers attribute the big fuel savings to modern designs that are now smaller, lighter, faster and more efficient. It's a good case for rigs we can buy today.

Sailing standing

Surfboards that mount sails aren't new, but their boom in popularity is recent. The Windsurfer was one of the first, but now there are nearly a dozen different brands around and this summer almost every lake appears to have one or more silhouetted against the sun. Once again, it seems to be a trend—like those for compact cars, high gasoline prices, inflatable boats, scuba and cross-country skiing—that got the first big push in Europe.

Like other miniature sailboats, a wind-powered surfboard is not as easy to learn to sail as it looks, but experienced skippers have recorded speeds up to 20 miles an hour. Hoyle Schweitzer, who is credited with inventing the sport, wanted to simulate the sensation of surfing, but without waves, and his success is marked by the over 300,000 now in



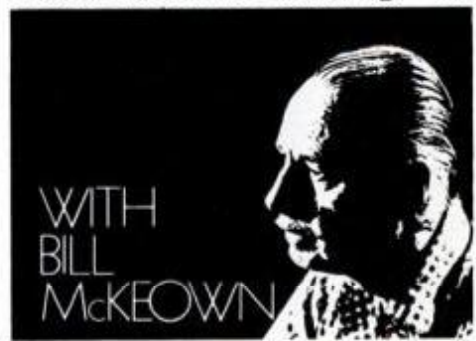
Newest boating boom calls for sailing on a surfboard. Over 300,000 are in use; the sport may become an Olympic event.

use. Premier American yachtsman, America's Cup skipper Bob Bavier, predicts Windsurfers may be in the 1984 Olympics. Meanwhile, they make a fine free-energy way to go boating with one or, more recently, twin sails and two sailors aboard.

On-the-go

Eastern boatmen should mark down Mystic (Conn.) Seaport's Classic Boat Rendezvous, Aug. 1, and plan a mid-month drive or cruise to New York's Thousand Islands. Collected at the Clayton, N.Y., Shipyard Museum are some of the finest antique yachts and oldest outboard motors, and on Aug. 16-17 the annual antique boat show and parade are held on the St. Lawrence River.

Westerners trying that ultimate drive to Alaska and back will be using *The Milepost* in a new 500-page edition with its mile-by-mile log. Now there is a companion book, *Rough Road to the North*, by Jim Christy, that records the romance of that road as well. Both are from Alaska Northwest Publishing. **FM**

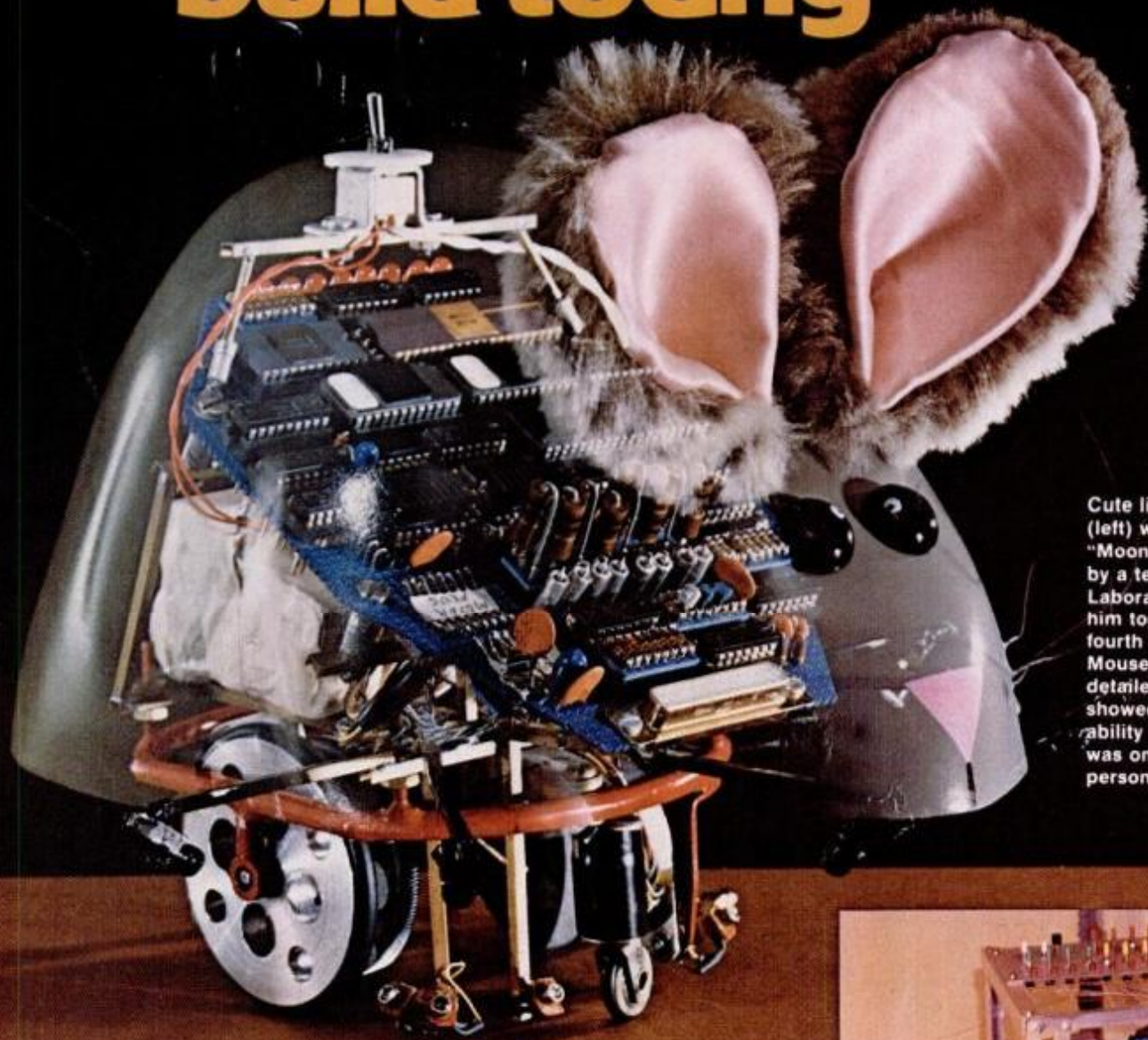


MOTORCRAFT

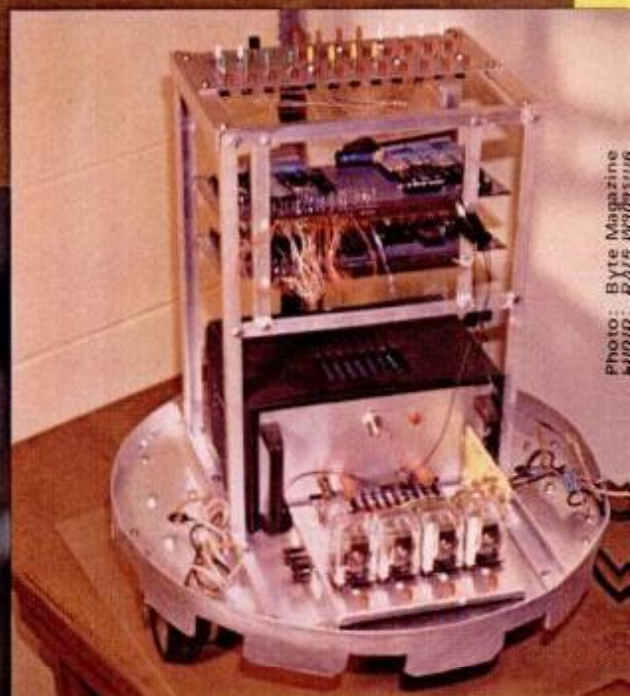
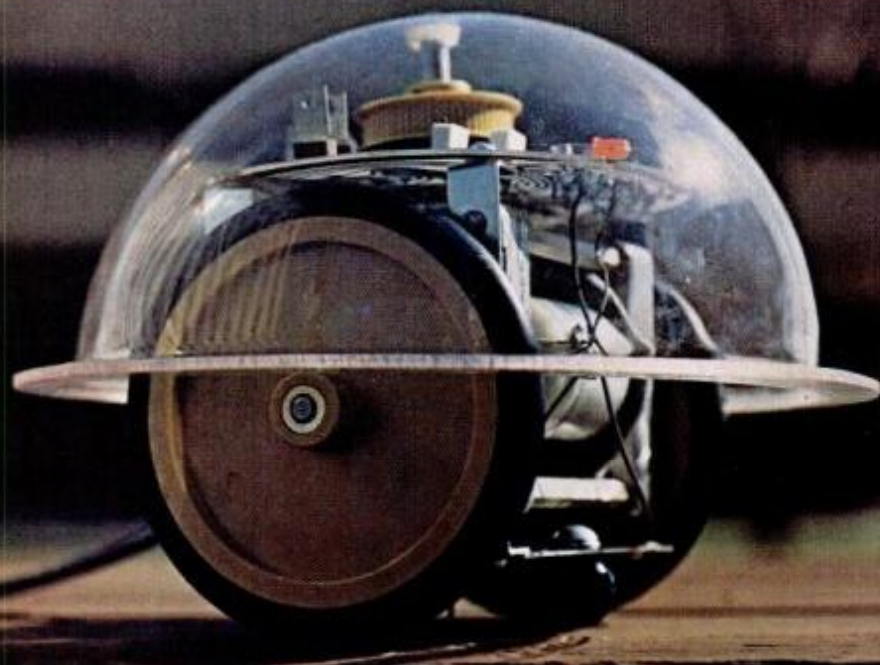
OH...THERE'S NOTHING LIKE AN OIL THAT RUNS ON AND ON.

...FOR SURE

Robots you can build today



Cute little critter (left) was named the "Moonlight Special" by a team at Battelle Laboratories who put him together. He ran fourth in the Micro Mouse maze race as detailed in text but showed second-best ability to learn and was one of the more personable entries.



Terrapin Turtle (left) uses a home computer for a brain. A rolling artist, it drags a ballpoint pen on the floor. Newt (above) rides on three wheels and is planned to have photosensitive "eyes."

Photo: Byte Magazine
4/10/88
Byte 12/88 p.116

Robots have moved out of science fiction and into the home. Though neither Frankenstein monsters nor superhelpers, they're proving to make great pets!

by Bill Allen

You can now build a robot from plans and kits, or buy a complete miniature robot which interfaces with a home computer. But these designs don't ape *Star Wars*' "R2D2" or "C3PO" in form or function. They're small and must be kept to controlled environments (stairs are fatal).

There's not much useful about them, either. They're quite unable to perform anything like housework. For now, consider them amusing pets.

But everything starts somewhere and, enthusiasts predict, 1980 will begin the "home robot boom." Already, there may be more privately owned robots in the United States than industrial counterparts.

Telltale turtle

Surprisingly few similarities exist among seven available robots. Terapin Inc.'s Turtle is simplest, smallest and the only one "ready to plug in" for average home computerists.

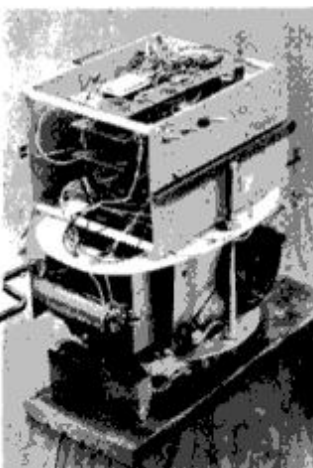
Plug in you must; there's no room for an onboard computer. Five inches high and carrying a 7-inch-wide, see-through, surrounding plastic dome, it roams on two independently driven 4-inch wheels and two fixed knobs.

Turtle's belly holds a vertical pen which lowers to paper on command to tell its view of a room it has explored, or to illustrate answers to mathematical problems.

Turtle costs \$400 in kit form, requiring simple tools and a few hours, or comes ready-built for \$600—both

(Please turn to page 124)

OF MICE AND ROBOTS —IN COMPETITION



There are intelligent and dumb "micro-mice," but the difference isn't in their ability to be house-trained. Any droppings would cause suspicion (unless bearing color-banded resistance codes) because micro-mice are electromechanical creatures.

Why make a mouse? Well, perchance to win \$1000 as in last year's Amazing Micro-Mouse maze contest, sponsored by the Institute of Electrical and Electronics Engineers' *Spectrum* magazine.

From some 6000 applications, perhaps several dozen entries were built, but only 15 showed and six finished at the finals in New York City (four trials were held elsewhere). They were mega-mice relative to their furry fellows, but quite small as robots go.

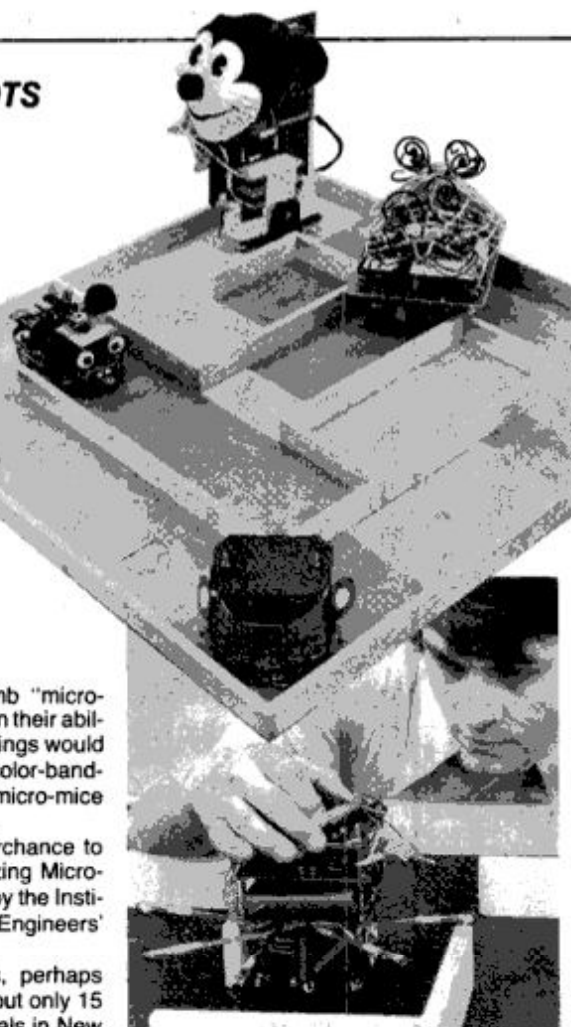
Rules allowed three timed runs through (no jumps over) a level maze up to 20 feet square with 6½-inch-wide corridors and 2-inch-high walls arranged in Ls, Ts, Us, straightaways and dead ends, but no four-way intersections. Configuration was secret until entrants turned their charges over to officials.

Bumping walls over and over

Dumb robot rodents simply bumped repeatedly into either left or right walls without being able to remember the experience for improving successive runs. However, "Harvey Wallbanger," of this type, did the third best time—39.96 seconds.

Another partition hugger, "Brutus," didn't enter. Just as well; it smashed down a test

Grivet series of interchangeable parts allows for different configurations to be built. Manipulators now are being redesigned by the manufacturer.



The Amazing Micro-Mouse contest drew 6000 applications, but only 15 actual entrants. Only six of those micro-mice finished trials. The robotic mice had to find—map—their way through a complex maze without climbing over walls.

maze's walls. "Unfortunately, there's no way of controlling it," lamented one of its builders.

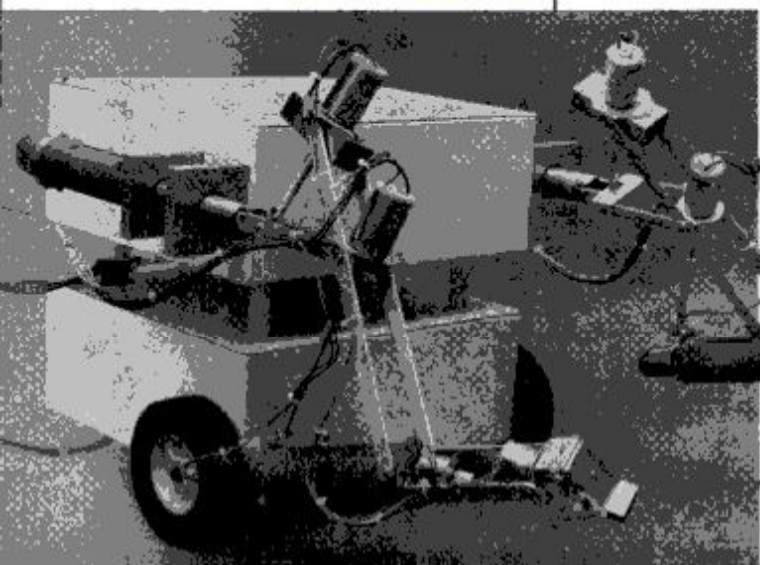
Some designs detected partitions by contact, such as "Kimbot." It also had an entire KIM-1 computer board (turned edge-up, there being no height limit), but didn't finish.

Three employees of Battelle Institute, on spare time, created "Moonlight Special" and "Moonlight Express," aided by preliminary computer simulation. Both incorporated the Z-80A MPU and navigational exacting "stepping motors." They put in successively improved times from 66.98 to 50.38 seconds and 100.88 to 31.16 seconds (second best time), respectively, thus winning "smartest mouse" award.

But the overall victorious varmint was the Battelle team's "Moonlight Flash," a hybrid. It followed the right-hand wall, but also had broken beam light sensors, 8748 MPU and limited memory, and was built for speed—squeaking in at 29.78 seconds.

Dr. Claude Shannon was present for the finals, with his 1950s version of a mechanical mouse maze. He built the relay logic device while at Bell Labs to help work out mathematical theory for optimizing telephone-call switching.

Today's toys frequently test tomorrow's technology.—B.A.



EQUIPMENT AND TRAINING NO OTHER SCHOOL CAN MATCH!

NTS HOME TRAINING INVITES YOU TO EXPLORE MICROCOMPUTERS, DIGITAL SYSTEMS AND MORE WITH STATE-OF-THE-ART EQUIPMENT YOU ASSEMBLE AND KEEP!

When it comes to electronics home study, no school matches the training you get from NTS.

For example, we offer you three different programs in the booming microprocessor field. And each includes one of today's sophisticated microcomputer models for you to assemble and keep.

You not only learn to troubleshoot these remarkable instruments, you learn to program them to do what you want. It's the perfect opportunity



for you to learn BASIC high level language programming and assembly language programming.

It's also important to note that our microcomputers are not home-made training devices. They are production model micro-systems, identical to many you'll encounter in the field. We believe this makes your training a lot more exciting and relevant.



NTS's Master Course in Microcomputers includes the NTS/HEATH H-89 Microcomputer (#1 above). It features floppy disk storage, "smart" video terminal, two Z80 microprocessors, 16K RAM memory expandable to 48K. HDOS included.

The NTS/Rockwell AIM 65 Microcomputer (#2) is included in our Microprocessor Technology Course. It's a single board unit featuring an on-board 20 column alphanumeric printer with 20 character display. This 6502-based unit also has 4K RAM memory, expandable, 8K monitor ROM and 8K advanced BASIC interpreter on ROM.

And in NTS's Master Course in Electronics and Industrial Technology, you'll work with the NTS/KIM-1 Microcomputer (#3). This unit features a 6 digit LED display with an on-board 24 key hexadecimal calculator-type keyboard. It's a 6502-based microcomputer with 1K of RAM memory, expandable.

HOME ENTERTAINMENT ELECTRONICS

Simulated TV Reception



NTS has many different electronics programs to choose from. One of our most popular is Color TV Servicing—and it's no wonder. You build and keep an NTS/HEATH 25 inch (diagonal) digital color TV as part of your training. Choose Communications and you'll train on an NTS/HEATH 2-meter FM transceiver that you'll also build and keep.

And because we're NTS, we include an array of state-of-the-art test equipment—including digital multimeter—with most of these programs.



AUTO MECHANICS Few technical fields can offer the challenges and opportunities that the auto industry can. To train for it with NTS, you'll utilize "shop-tested" instruction plus an impressive array of professional equipment, including a solid-state automotive oscilloscope. You'll learn engine diagnosis, motor overhaul, transmissions and much, much more.



AIR CONDITIONING/HEATING Equip yourself for opportunities in one of the most

essential industries in the world. Learn servicing of commercial, industrial and residential heating and cooling equipment. Your course includes such equipment as a hermetic unit analyzer, leak detector and charging-testing-purging manifold set.



HOME APPLIANCES. Here's an excellent full or part time opportunity with real potential. Saves you money on your own repairs, too! Course covers repair and servicing of washers, dryers, ranges and small appliances. Your equipment will include NTS's amazing circuit trainer plus a multimeter for testing purposes.

For 75 years, NTS has provided quality home training for thousands of students around the world. We look forward to helping you, too, develop important new skills the proven NTS way.

Take advantage of this opportunity now. Send the coupon today for a free color catalog in the field(s) of your choice.

NTS NATIONAL TECHNICAL SCHOOLS

TECHNICAL-TRADE TRAINING SINCE 1905
Resident and Home-Study Schools
4000 SO. FIGUEROA ST., LOS ANGELES, CA. 90037

NATIONAL TECHNICAL SCHOOLS Dept. 201-080

4000 South Figueroa Street, Los Angeles, CA 90037

Please send FREE color catalog on course checked below

- | | |
|---|---|
| <input type="checkbox"/> MicroComputers/MicroProcessors | <input type="checkbox"/> Color TV Servicing |
| <input type="checkbox"/> Communications Electronics | <input type="checkbox"/> Auto Mechanics |
| <input type="checkbox"/> Digital Electronics | <input type="checkbox"/> Air Conditioning |
| <input type="checkbox"/> Industrial Technology | <input type="checkbox"/> Home Appliances |

Name _____ Age _____

Address _____

Apt. _____ City _____

State _____ Zip _____

- Check if interested in G.I. information.
 Check if interested ONLY in classroom training in Los Angeles.

**NO OBLIGATION. NO SALESMAN WILL CALL.
APPROVED FOR VETERAN TRAINING.**

IMPORTS & MOTORSPORTS

New French sedan

Talbot C9 is on 109-inch wheelbase.



Is it just another pretty face, or is this cleanly styled, lightweight, economical, four-door family sedan going to be heavyweight competition in the European marketplace? Here, a car like the Talbot C9 would be pounced on by car shoppers who are finding that designs from Europe and Japan offer cars for the '80s right now. But in Europe, Talbot is up against a goodly number of established and formidable competitors. The Granada and Renault 20 are two of the tough ones.

Interestingly, the car was developed by Chrysler as Project C9—before the company liquidated its Chrysler Europe operation. When the Peugeot empire took over Chrysler-Simca, it changed the marque to Talbot. The C9 will be the flagship of the Talbot line when it's officially named the Arena and formally introduced at the Paris Auto Show next month.

Hot under the hood

It takes a while before we see the cars developed by Japanese automakers. The home market always gets first crack at the latest offerings. And the best-selling set of wheels on the Ginza right now, in the 1600- to 2000-cc class, is the new Bluebird (that's known as a Datsun 810 model on Main Street). But if the Japanese enthusiast really wants to run a hot Bluebird, it's got to be the turbocharged version. The 1.8-liter



Datsun turbo Four displaces 1.8 liters.

Four with turbo, cranked to 6000 rpm, is good for 135 horses. We're likely to get a crack at it when production numbers (only 1000 turbos are built each month) get high enough to allow export.

Datsun also turbocharges its big Cedric and Gloria series (where *do* they get those names!). The powerplant is a two-liter Six. These somewhat frumpy luxury sedans are strictly for the home market, so there's no chance we'll find a Cedric in a Datsun showroom.

Gypsy cab

If you think you "can't take it with you," try the '80 Vanagon camper. The kitchen sink, double beds, stove, city water and electricity hookups all go along for the ride. And, with



VW Vanagon camper gets PM sleep test.

20-mpg economy, riding the range is easy for even campers with nothing more than a gypsy's gas money. Now that we've had a chance to really test the camper—by sleeping in it—we're even more impressed with this mini-motorhome than we were when we first drove it. (For the ride-test evaluation of the Vanagon, see [Driving the 1980 VWs](#), page 98, Feb. '80.)

If there are just two of you, use the master bedroom downstairs. But it's more convenient, and fun, to use the duplex arrangement and sack out upstairs in the tent-like pop-up top, leaving more open space

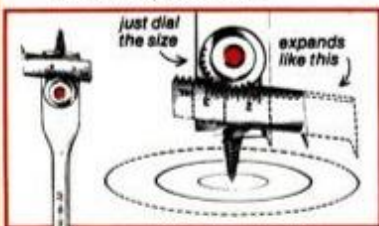


"I want my Popular Mechanics projects to look professionally done. Irwin products help."

Ed Hutchman, V.P. Marketing,
Restaurant/Motel Chain and Do-It-Yourselfer



Highest quality Irwin Speedbor "88" wood bits are ideal for your electric drill or drill press. Original hollow ground point design starts holes faster, lets spade-type cutters bore cleaner, faster at any angle in any wood. 1/4" shank chucks perfectly... no run-out, no wobble.



Irwin "Micro-Dial": one bit bores 35 standard holes! One Irwin No. 22 "Micro-Dial" expansive bit for hand brace lets you bore 1/8" to 3" holes... just by dialing the size you need. No. 21 lets you dial 19 standard sizes, 1/8" to 1 1/4". Both made from the finest Irwin quality steel.

Available individually or in workshop sets of 6 or 13 bits (in metal organizer rack) or 4, 6 or 13 bit sets (in plastic roll).



Strait-Line Chalk Line Reel Box Every serious do-it-yourselfer should have an Irwin 50 or 100 ft. self-chalking line box. Easy action reel. Leak-proof damage-resistant aluminum alloy box fits hand or pocket.

Irwin Screw Starter Marks hole, starts hole, threads hole for screw to easily enter wood and non-metal materials. Handiest hand tool in years for housewife and handyman.

IRWIN every bit as good as the name

at Wilmington, Ohio 45177, since 1885

below. With two or three kids, however, you *have* to sleep below: Just try 'n' tell 'em the tent isn't their turf! The basic Vanagon is now \$10,000 and the camper several thousand more, so getting on the road isn't cheap. But, once you're heading for the hills, the Vanagon is motor-camper heaven.

Whatchamacallit with wheels

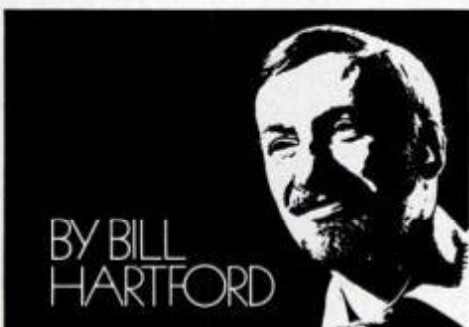
"Let's go riding in the car-car..." go the words of the folk song. The putt-putts and other sound effects you'll have to provide yourself (and you're pretty good if you can do them better than Pete Seeger). A car, that's what the thing with wheels is today. Just... a car. Before the turn of the century, people didn't know what to call it. Horseless carriage was a cop-out. Auto car? Motor car? At first, *automobile* was rejected here because it was a French word.

Recently, a group of craftsmen in England discovered a market for



Modern drive train is under classic van.

specialty vehicles resembling the whatchamacallits of the early 1900s. They started the Albany Motor Carriage Co. Ltd. That tells you what name for "car" they prefer. The classics are built with modern drive trains. The establishment is located at Groveley Rd., Christchurch, Dorset, England. All its motor carriages are sold complete with tyres, headlamps and mudguards—whatever they are. **PM**

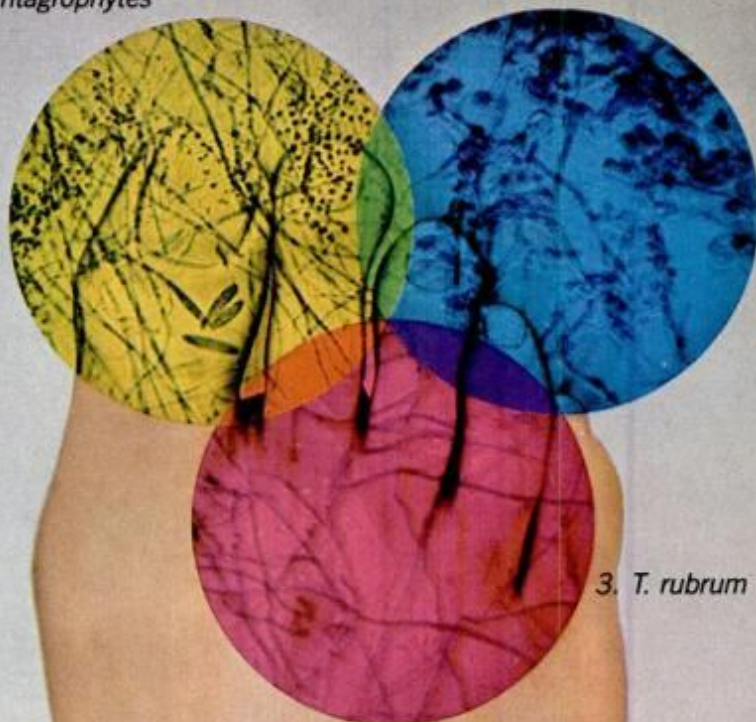


BY BILL HARTFORD

Photomicrographs of the three major types of fungus that cause athlete's foot.

1. *T. mentagrophytes*

2. *E. floccosum*



DESENEX[®] DESTROYS ALL THREE MAJOR CAUSES OF ATHLETE'S FOOT.

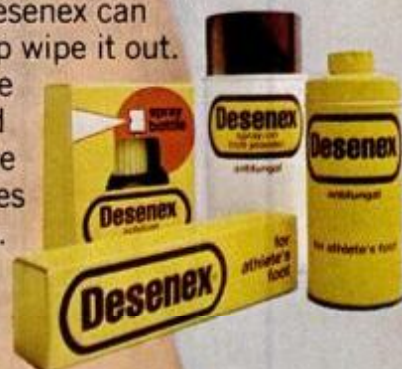
It's a medical fact. Athlete's foot can be caused by not just one—not just two—but three major types of fungus. Without proper treatment, they can grow unchecked—make itching, burning discomfort more and more severe.

Don't take chances. Desenex[®] is effective against all three types of fungus. No matter which one you have, Desenex can stop its growth and help wipe it out.

Desenex does more than relieve itching and burning. It's so effective it destroys all three types of athlete's foot fungus.

Get Desenex now.

Read and follow label directions.



© PENNALT CORPORATION 1980

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

Salem L



The
Country Fresh
Low Tar.

LIGHTS: 11 mg. "tar", 0.8 mg. nicotine, LIGHTS 100's: 11 mg. "tar",
0.9 mg. nicotine, av. per cigarette, FTC Report DEC. '79.

ights



DETROIT LISTENING POST

GM J-cars

Spy photos of General Motors' anxiously awaited J-car front-wheel-drive subcompacts reveal that the Pontiac version sports a nose much like the 1977-'78 Firebird, split grille openings with quad rectangular lights and V-shaped center section. The Chevy version has a simple, low, horizontal mouth between big, twin, rectangular headlamps. Large windows with low "beltlines" give both cars a very European look.

The J-designated cars are now set to replace Chevy's Monza and Pontiac's Sunbird next May, but Olds and Buick won't get their versions until fall or even the following spring. The reason for this delay is to allow added development time for these more expensive versions so the divisional differences will be obvious, and



Chevrolet's new J-car sports a low grille as well as large rectangular headlamps.

strong enough to justify their higher prices. The now-discontinued Olds Starfire and Buick Skyhawk were little more than warmed-over Monzas, which hurt their sales significantly.

There's even talk at GM of giving the Cadillac Div. a version of the economical J-car at some future time.

AMC/Renault future plans

Both American Motors and its technically aggressive French partner, Renault, have been very tight-lipped about future product plans. But we recently visited Renault in France, drove several of its current products and talked with several of its key engineers and executives. We've joined some known facts with educated guesses to come up with a likely scenario of what's ahead.

We'll soon see the very nice front-drive R-18 four-door sedan and five-door wagon making its debut. By September, the excellent R-18-based Fuego sport coupe should arrive, ready to do battle with the likes of Toyota's Celica, Datsun's 200-SX and the rest. A year or so from now, there should be a peppy and econom-

ical diesel engine for the 18, and soon after that may come a turbo-charged diesel and perhaps a turbo gas engine, as well.

Meanwhile, the AMC Spirit-based four-wheel-drive car (code-named "Eaglet") is set to debut in the fall, and the larger Concord/Eagle series should be due for a redesign, becoming slightly smaller and lighter.

Two-seaters coming

Why are GM, Ford and Chrysler all working feverishly to develop new two-seaters when (except Chevy's Corvette) they've ignored this car market for so many years? Certainly the quest for youthful, exciting image cars and the continued success of imported sports cars are factors. But most important is the rapid proliferation of fairly sophisticated econocar machinery that will make good platforms for affordable sports and sporty models.

The original two-seat T-Birds and Corvettes used standard-car components of the time—not very practical or satisfactory. But consider the possibilities of GM X- or J-cars, Ford Escort/Lynx and Chrysler Reliant/Aries-based sportsters. All are front-drive, light, agile and economical. Plop a still lighter and sexier sports-car body on any of these, and you should have an instant winner at a reasonable price. Stir in turbo-charging and some other performance goodies and you have potential Porsche beaters.

All three companies are looking hard at this possibility, and the first (probably the much-rumored GM car being developed by Pontiac Div.) could be available as early as the '83 model year. Tiny, two-seat commuter cars and minivans and trucks are also likely spinoffs from these efficient, new front-drive platforms in the next several years.

Chrysler gears up

Anxious to build interest in its upcoming products, Chrysler treated reporters to an unprecedented tour of its Detroit Clairpointe preproduction plant, where "pilot-line" '81 compact K-cars and luxury Imperials were already being assembled. This small plant (about 200,000 sq. ft. with a permanent staff of only 150) exists for the sole purpose of building preproduction cars to try out tooling and assembly fits and techniques, and to train assembly



The 1981 Plymouth Reliant is being tested for the final-tooling and assembly fits.

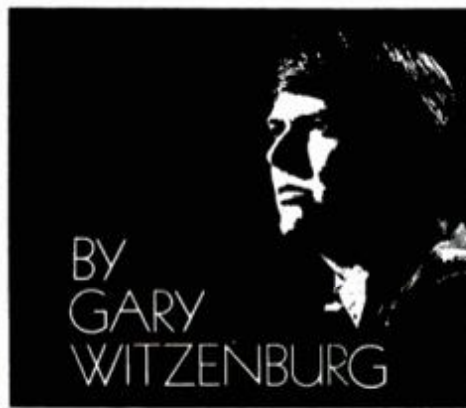


Station-wagon version of the Reliant is being fitted with preproduction doors.

foremen and supervisors for volume production.

Prototype or "pre-pilot" assembly of each new model (using prototype parts, often handmade) begins some 10 months before actual volume production. The resulting cars are used for engineering testing and early photography. Pilot production then commences four months or more before the main assembly plants swing into gear, using parts from actual production tooling. This gives ample time to correct any manufacturing problems well before full-scale start-up.

The K-car and Imperial pilot programs will be 18 and 19 weeks, respectively—Chrysler's longest ever. This is part of what the company calls "the most extensive quality assurance program in the industry." The Imperial will become the new Chrysler flagship, and the fwd K-cars (Plymouth Reliant and Dodge Aries) replace the compact Volare and Aspen. **PM**



Start your own money making business!

Make up to \$12⁵⁰ an hour—
even while learning!

Train FAST
at home!

Get into this booming high-profit business that's
Easy to learn—Easy to do—Easy on You!

Be
Your
Own
Boss!



No Extra Cost! Included With Your Locksmith Training



BURGLAR ALARM and SECURITY SYSTEMS training. Covers all phases of Burglar, Hold-Up and Fire Alarm servicing and installation. This valuable and timely instruction includes all special tools and supplies. ONLY Belsaw offers such extensive training in this rapidly expanding field as a part of your Locksmith training.

ADVANCED Locksmithing! How to change combinations, install and service Safe, Vault and Bank Safe-Deposit Box locks. You learn-by-doing on the locks that we supply. You'll find it fascinating and highly profitable work.

Start Collecting CASH PROFITS Right Away

You're "in business" ready to earn up to \$12.50 an hour a few days after you begin 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 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 Belsaw's Master-Locksmith-approved training can give you the skill you can depend on to EARN MORE—ENJOY LIFE MORE.

BE A LOCKSMITH!

Hundreds of Belsaw trained men have succeeded in this fascinating and highly profitable field...

"Before enrolling I checked other courses and also asked for advice from several of the professional locksmiths in my area. They all said Belsaw was tops and has the most versatile Key Machine. "I always wanted to be in business for myself and now I am... thanks to Belsaw Institute."



David Fairbrother—Dave's Locksmith Service Milwaukee, Wisconsin 53209



"I opened my own business, spare time, seven months after I enrolled and made a profit of \$329 for the first week."
B. A. Deberry Littleton, Colorado

"No more hard, nasty work for me. Now I have my own business and with hardly any effort I average around \$50 a day. Thanks for my new start in life."
Sam Walker Prichard, Alabama



... YOU Can Do It Too!

10-DAY NO RISK TRIAL! Send for details!



THIS PRO KEY MACHINE IS YOURS TO KEEP!

This Pro Key Machine can alone add up to \$200 a month to your income... and it won't cost you a penny extra with your training.

Find out all about it! Send for FREE Facts TODAY!

Just fill in and mail coupon below (or send postcard) to receive full information and details by return mail. DO IT TODAY!

RUSH COUPON!

ALL SPECIAL TOOLS AND EQUIPMENT INCLUDED!



BELSAW INSTITUTE
101P Field Bldg., Kansas City, Mo. 64111

There is NO OBLIGATION and NO SALESMAN Will Call—ever!

RUSH COUPON TODAY FOR THIS FACT-FILLED

FREE BOOKLET!

Tells how you quickly train to be your own boss in a profitable Sparetime or Fulltime business of your own PLUS complete details on our 10-Day NO RISK Trial Offer!



Send for your copy today!

BELSAW INSTITUTE, 101P FIELD BUILDING KANSAS CITY, MISSOURI 64111

YES, please send me the FREE booklet that gives full details about starting my own business in Locksmithing. I understand there is no obligation and that no salesman will call.

Name _____

Address _____

City _____

State _____

Zip _____

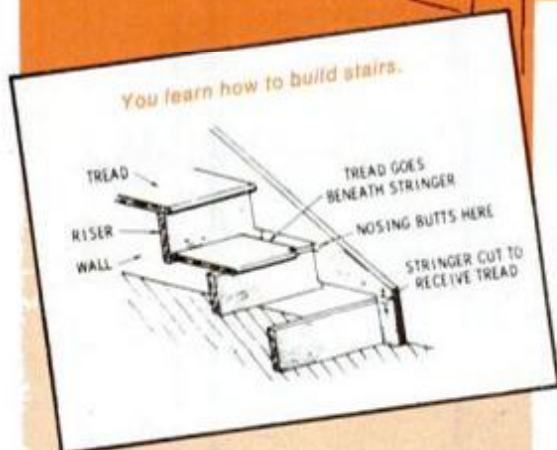


These four matched volumes tell you and show you everything any building or carpentry job...from fixing a roof to building even building an addition or a house!

Take this 4-volume CARPENTERS AND BUILDERS LIBRARY



FOR ONLY **\$395** (regular price \$24.50) when you join Popular Science Book Club



How Popular Science Book Club Works

Just mail the postpaid card to get your \$24.50 4-VOLUME CARPENTERS AND BUILDERS LIBRARY. Send no money now. We'll bill you later for only \$3.95 plus delivery and handling.

Then, about every four weeks (15 times a year), you'll receive a Club bulletin describing the coming main selection and alternate books also available, all at Club discounts. If you want the main selection only, do nothing. It will be sent automatically. If you don't want the main selection, or want alternate books, or no books, please make sure to indicate your wishes on the Instruction Form and return it to us by the date shown. Club mailings are carefully scheduled to assure you of at least 10 days in which to do this. But in the unlikely event that you don't have 10 days, and you receive an unwanted selection, you may return it at our expense.

After receiving your joining shipment, your only obligation is to buy two more regular selections or alternates in the next year. After that, membership may be cancelled at any time, by either you or the Club.

Club books are comparable in every way — paper, printing, binding, jacket — to original publishers' editions, yet you may save up to 50% and sometimes more on hundreds of special books offered each year in the club. To become eligible for these bargains, mail the card today!

AS A CLUB MEMBER, you'll have an opportunity to choose from more than 100 superb, up-to-date books on a wide range of popular science subjects every year—**AT DISCOUNTS OF UP TO 50%**. (And your only obligation is to buy two of them.) You'll be offered books on home improvement, repair and workshops, remodeling, house building, energy and insulation, wiring, plumbing, cars and car repair, electronics, appliance repair, furniture building, machines and technology and many other home handyman subjects.

This information-packed 4-VOLUME CARPENTERS AND BUILDERS LIBRARY brings you professional, easy-to-understand how-to on just about every build-it-yourself question you'll ever have...

- You get a complete how-to book on woods and woodworking tools, how to do all kinds of joinery and cabinetmaking joints, how to do kitchen cabinet construction... *and more.*
- You get a complete how-to book on all standard specs of every element in house construction, including how to read plans and make your own... *how to lay out a home workshop... and more.*
- You get a complete how-to book on laying out the foundation, how to do concrete block construction, house framing, chimneys, fireplaces, porches, patios, insulation... *and more.*
- You get a complete how-to book on every aspect of roofing, flooring, doors, windows, stairs, plus how to use stationary and portable power tools, plus tips on painting, maintenance, repairs, termite protection... *and more.*

You get step-by-step instructions on everything from reading a building plan to building a house (including the foundation), doing all the carpentry in it—and keeping the house in A-1 shape for a lifetime. And thousands of show-how pictures make it all amazingly easy, even for a novice. Let's look at a few of the remodeling and fix-it jobs you learn how to do... You learn how to replace worn or missing shingles. How to fix chimney flashing leaks. How to repair stairs (or build them from scratch).

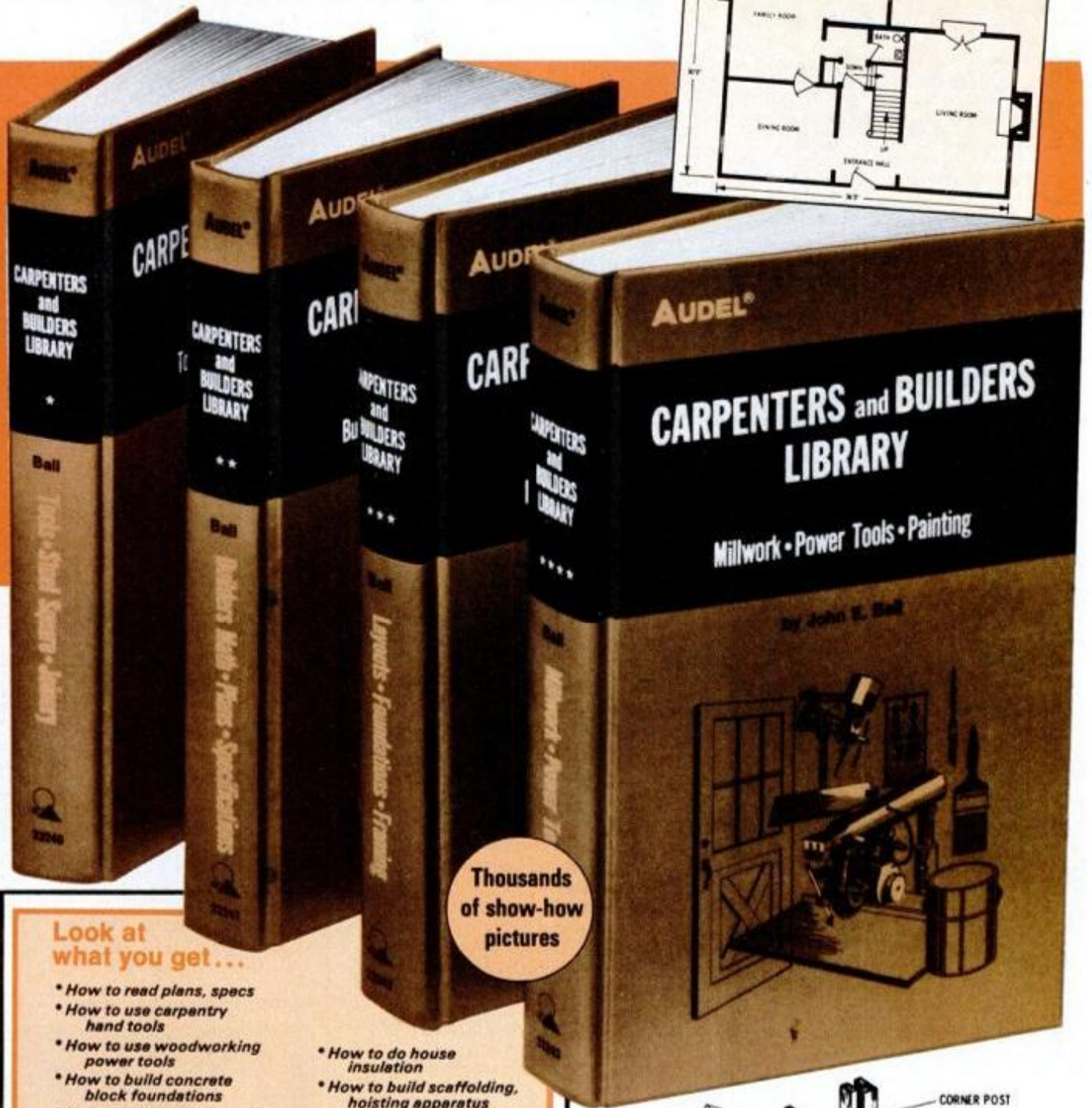
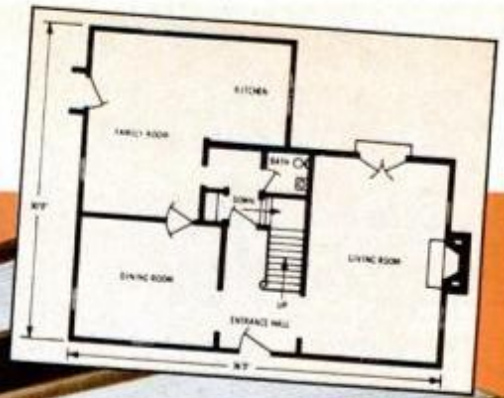
If doors need fixing or fitting, you can find out how to do it from these books. If you want to lay new flooring, you can just turn to these books to find out how to do a first-rate job with wood-tile, linoleum, asphalt, rubber or ceramic tiles. If you want to build a fireplace, you'll find out exactly how from these books...

This marvelous 4-book library also tells you how to use all kinds of power tools to maximum advantage (most of them have great versatility). You learn about woods—their characteristics, strengths, best uses. You learn about fasteners—nails, screws, bolts, more—their holding power, size-strength ratio, and how to use each.

These books teach you scores of tricks and shortcuts used by carpenters for measuring, cutting, raising, fastening, finishing—every technique and job. They give you the answers to just about every carpentry question you'll ever have. And they can save you thousands of dollars in the years ahead.



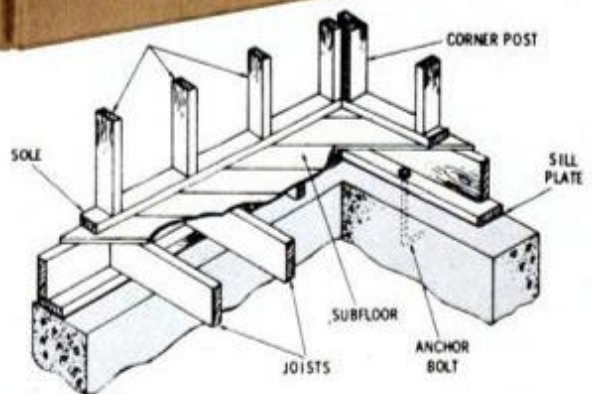
**you need to know to do just about
a foundation, installing new paneling,**



Thousands
of show-how
pictures

**Look at
what you get ...**

- How to read plans, specs
- How to use carpentry hand tools
- How to use woodworking power tools
- How to build concrete block foundations
- How to choose best woods, materials, fasteners
- How to plan and build roofing, flooring
- How to construct walls, doors, windows
- How to make joints
- How to build stairs
- How to build chimneys and fireplaces
- How to use builders' math, do surveying
- How to make kitchen cabinets, counters
- How to do cabinetmaking joinery
- How to build A-frame, 1- and 2-story houses
- How to plan a home workshop
- How to do house insulation
- How to build scaffolding, hoisting apparatus
- How to do wood pattern-making (for castings)
- How to do sheathing and siding
- How to do cornice construction
- How to plan termite protection
- How to do interior-exterior painting
- How to build girders and sills
- How to make concrete forms (and molds)
- How to sharpen saws
- How to build skylights
- How to do house maintenance and repair
- ... and much more



MAIL THE ATTACHED CARD OR WRITE TO:

Popular Science BOOK CLUB
P.O. Box 2006, Latham, N.Y. 12111

ALMOST FREE

Mini-Micro Cassette Recorder

- One-hand, fingertip controls
- Only 1 1/8 x 2 1/2 x 5 1/2 and 11 oz.
- Professional performance and quality
- Solid-state micro-electronics
- Accident-proof magnetic erase
- Less than 0.5% wow and flutter
- Recording signal light
- Complete with tape, earphones, wrist strap, carrying case
- One-year warranty parts, 90 days labor
- INCLUDED . . . 30-minute cassette

Only \$39⁹⁵

The risk is all ours . . . you risk absolutely nothing!

It was a heck of an opportunity. Just what I'd been looking for. But I knew I had to give a "yes" or "no" answer right then and there. No time for meetings or committee decisions.

"Okay," I said, "I'll take them—subject to our quality control tests, of course."

We shook hands on what had to be one of the most astounding closeout deals Roy Thomas & Associates had ever made. A deal that lets me offer you the pro-quality New Sound Mini-Micro Cassette Recorder that's usually priced around \$119.95—all for just \$39.95. And you can choose either black or brushed aluminum case.

I want the chance to prove something to you . . .

This "almost free" closeout deal is exactly the bargain I've been looking for. Why? Because I know there are hundreds of people out there who like the look of our products but hesitate to buy them by mail from a company they don't know. Maybe you're one of them.

A deal like this gives me the chance to prove our product quality to you once and for all. You know you're not risking anything. And I believe that, once you take advantage of this no-way-you-can-lose bargain, you'll stay a satisfied customer of ours for a long time to come.

That's our real goal. Not just quick sales but long-term satisfied customers who'll look to Roy Thomas & Associates for quality products at affordable prices.

Take three weeks to test it . . .

You've got to hold a product like this in your hand to see what an asset it can be. You've got to experience its whisper-sensitive quality for yourself.

So I want you to test it for three weeks. Take it with you in the car. (That's where I



use mine the most.) Use it on a plane or a commuter train. Keep it by your bed. Find out how useful it is—for jotting down ideas . . . summarizing meetings . . . keeping track of expenses. Then, if you want, just



put it back in the carton it comes in (following the simple directions) and send it back for a full refund. In fact, it's precisely because of this return privilege that more and more people are buying by mail today.

If you'd like to use your credit card to order, call the toll-free number below. If you prefer, send a check to Roy Thomas & Associates, Inc. at the address below. (Illinois residents include 6% sales tax.) Please include \$3.15 for shipping and handling and be sure to specify black or brushed aluminum case.

It's the tape recorder you've been looking for—at a price I'm sure you never expected to find. It's covered by an unconditional 21-day money back guarantee. And it's tax deductible when used for business. Order yours now.

CALL 800-621-5559
(In Illinois, call 800-972-5858)

For faster service, give this number 20-3300 as soon as the operator answers!

Lines are open 7 days a week.

**Roy Thomas
& ASSOCIATES, INC.**

733 Lee Street, Dept. 20-3300
Des Plaines, IL 60016

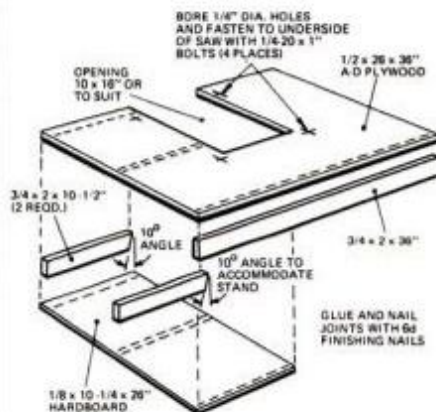
HINTS FROM READERS

Saw-table addition



Shelf provides handy blade storage.

This addition to a saw table gives you a deck for rules and pusher sticks, as well as a convenient shelf to store extra saw blades. The table shown is designed for a 10-in. Craftsman table saw. Change dimensions to suit your saw if necessary.—George J. Danko



Retreading rubber tips



If a rubber crutch or furniture-leg tip has worn smooth, but has enough bottom thickness left, you can give it a new tread. Use a triangular file to make several shallow grooves in a diamond pattern.—Walter E. Burton

IPM BRIEFS



Where's the putting green?

Sometimes you get the feeling that failed brain surgeons, as well as their patients, often retire into the business of thinking up golf aids. This might be yet another example, except that it was developed in Aberdeen, Scotland, the spiritual as well as literal home of the game.

It works this way: With no more than 12 feet of clear space in which to work on your swing, you fill this black rubber box with sand, flail away at it with a specially designed club, measure the 10- to 12-foot blast and use a booklet of tables supplied with the apparatus to tell you how far the box would have gone if it were an actual...well, you get the idea. A rubber ball, which serves as the hitting area, is molded to the rectangular box. When hit, the contraption does actually exhibit golf-ball behavior, including hooks and slices.

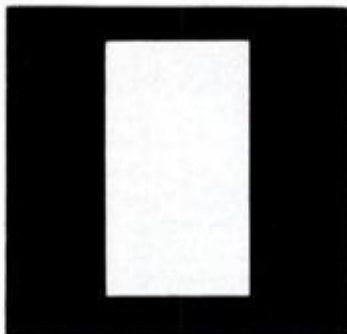
Without a paddle

If you were wondering what new outdoor gimmick was going to help you unwind and keep your mind off the rat race on weekends this summer—now you know. Thanks to the manufacturers of Wonder Wheel, you can experience the wonderful sensation of going nowhere fast while making actual progress over the water—or snow, or sand dunes. They tell us that it's made of rubberized nylon fabric, like inflatable rafts, and weighs 47 pounds deflated for carrying or storage. Rotating handles located on the 94-inch wheel's axis steady the novice rider as he masters the coolie-like art of Wonder Wheeling while, in the words of its marketer, "improving muscle tone and stamina."



PM's Whatsit

From time to time, a group known as the International Organization for Standardization makes recommendations for the adoption of universal symbols to be used on signs throughout the world. Recently, our National Bureau of Standards tested some fire-safety symbols proposed by the ISO on volunteers to determine how well or poorly they would serve Americans in an emergency situation. The results were not always good and certain revisions were recommended to the international group. Meanwhile, can you understand what these four signs are trying to tell you? Turn the page for the answers.



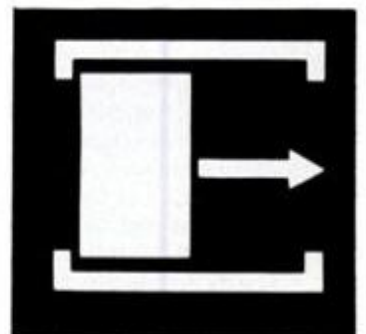
1



2



3



4

IDM BRIEFS

Whatsit revealed

1. Emergency exit. 2. Break glass to obtain access. 3. Blind alley. 4. Door slides right to open.



It's sod and they're happy

Prospects for energy savings in an underground house (page 114, May 1980) may be interesting to people who have yet to build their homes, but some of us are already comfortably ensconced. Well, so were Ken and JoAnn Cowan in Encino, Calif., but that didn't stop them from putting on a sod roof last July as an experiment. The excellent insulating qualities of the new roof became apparent over the summer, when the Cowans' electrical bill dropped by more than half.

As far as any drawbacks go, you're looking at the biggest—and it happens every two weeks.

Meanwhile back in the kitchen

Lockheed had troubles in its Missiles & Space Div. plant in Sunnyvale, Calif. The solvents normally used to clean complex electronic assemblies were found harmful to new materials used in the circuit boards. A special in-house research group was formed and put on the problem, and in the ensuing weeks searched high and low for some kind of industrial process that would solve it.

"Aha," the research group said one day, "detergent and water will do the trick."

Which is why, to this day, you'll find the Lockheed Missiles & Space people putting aerospace circuit boards into a regular dishwasher and throwing in a little commercial detergent.



Reach out and put the touch on someone



It's something you never think about, but—hey—prison inmates like to keep in touch by long distance too. Not to their complete surprise, however, some prisons have had problems with fraudulent billings. And although it pains them to report it, they tell us that in some cases inmates have had the audacity to bill long distance calls to third-party numbers that turned out to be those of high prison officials—including the warden. The coinless freewheeling phone shown in use here at the Dallas County Jail eliminates billing problems since it has been adjusted to accept only collect calls. And rather than requiring someone to escort the caller to a phone booth, the phone comes right to his cell. And remember, it's the next best thing to being there.

Merit Stands Alone.

Research underscores MERIT as proven taste
alternative to high tar smoking.

One low tar cigarette offers proof—not claims—that there is a satisfying alternative to high tar smoking.

That alternative: MERIT.

Latest smoker studies provide documented evidence in key areas of taste, ease of switch and ability to satisfy long term.

MERIT Taste Key To Success.

In the latest survey of former high tar smokers who have switched to MERIT, 9 out of 10 reported they continue to *enjoy* smoking, are *glad* they switched, and report MERIT is the best-tasting low tar they've *ever* tried!

MERIT is the proven alternative to high tar smoking. And you can taste it.



MERIT

Kings & 100's

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

Kings: 8 mg "tar," 0.6 mg nicotine—100's Reg: 10 mg "tar," 0.7 mg nicotine—
100's Men: 11 mg "tar," 0.8 mg nicotine av. per cigarette, FTC Report Dec:79

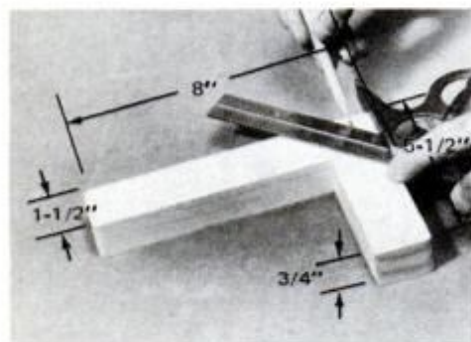
Toy shooter from the past

This toy shooter that I made for my grandson reminds me of the ones I made as a boy (from the corner of an orange crate). Later, my kids made several shooters at a time and had great fun holding contests.

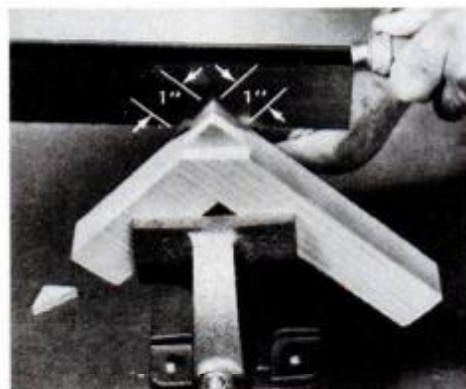
This shooter is cut from a 5½×8-in. piece of nominal 1-in. stock. Balloons make colorful, bobbing targets. —Stan Gilbert



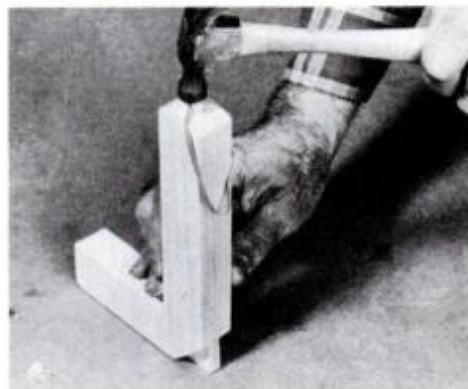
"Bullets" of 1-in. cardboard squares work well. To fire a bullet, slide it under one side of the stretched rubber band. Then roll the rubber band off the trigger with your thumb. Remember, never point a loaded shooter at anyone; even cardboard can damage an eye.



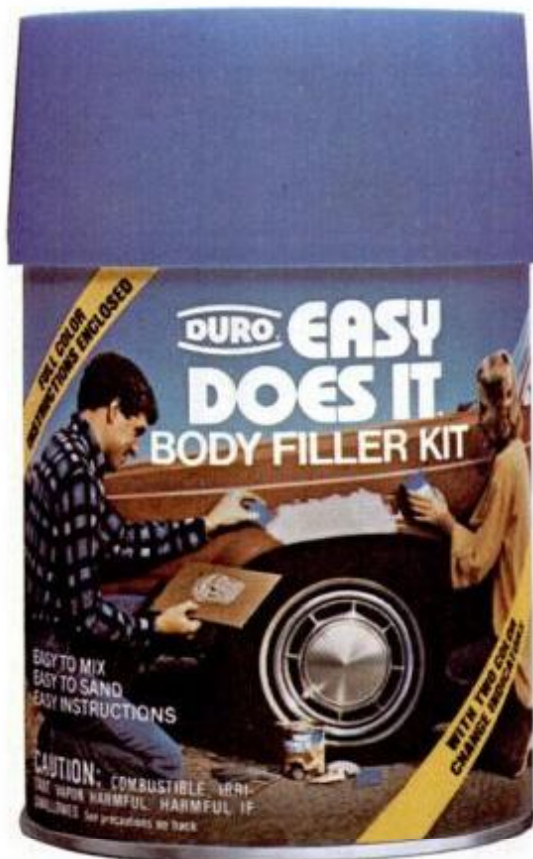
Notch the trigger from both sides of the shooter. First measure 1 in. at the right angle of the shooter in both directions; join these points by a pencil line.



Make ¼-in.-deep cuts on the pencil lines; then make corner cuts to remove waste.



Fasten a heavy-duty rubber band to the muzzle of shooter with an insulated staple.



No Experience Needed.

Now you can make professional-quality body repairs yourself. Even if you've never done body work before. It's as easy as Easy Does It.™

The Easy Does It two-color-change system takes care of the tricky part for you.



This is how Easy Does It looks right out of the can.



The first color change tells you when Easy Does It is properly mixed.



The second change tells you when it's ready to sand.

The easy-to-follow full color instruction booklet explains every step. Easy Does It makes body repair much simpler than other standard methods. It's even easier to sand, and remains sandable up to 48 hours.

You'll get great-looking results, for much less than you'd pay a professional. Easy Does It. One of the Duro family of auto and home repair products.

DURO™

Woodhill Permatex
a Loctite Corporation subsidiary
Cleveland, Ohio 44128

© 1980

Driving the Audi 4000 and 5000 Turbo



The turbocharger adds 30 hp and sparkling performance to Audi 5000's 2144-cc engine.

FIRSTHAND REPORT

by Gary Witzenburg
DETROIT AUTO EDITOR



It was three years ago, late in 1977, when the Porsche+Audi Div. of VW of America unveiled its latest top-of-the-line luxury car, the four-door, front-drive Audi 5000. Roomy, handsome and agile on the road, the five-cylinder 5000 quickly attracted an enthusiastic following. Last year an economical diesel version was introduced, along with a new, smaller 4000 model to replace the Fox subcompact.

For 1980, Audi expands its product line to include a new flagship, the 5000 Turbo, and an automatic-shift version of the 4000 complete with the 5000's 100-hp, fuel-injected five-cylinder engine for extra zip.

At over \$16,000 for the turbo and \$10,000 for the 4000 with the five-cylinder engine, neither is bargain-basement material, yet both represent a lot of car for the price. "Our customers pay premium prices to obtain premium products," asserts Porsche+Audi Div. vice president James R. Fuller, "like buying a Tiffany watch from Tiffany's instead of a Timex from J.C. Penney." Those who have that sort of money to spend should find the Tiffany's comparison is a valid one, at least as applied to the 5000 Turbo, because it's a real jewel. With a 30-percent boost in horsepower over the standard gas-engine 5000, fed through Audi's smooth automatic transmission, it's a delight to drive.

Because of the nature of turbocharging, the engine acts perfectly normal at idle and at slow speeds. But put your foot down to pass or merge into fast-moving traffic, and you get a jetlike surge of power as engine speed increases—extra performance when you need it and only when ordered up from the helm. It'll do 0 to 60 mph in about 10 seconds and even delivers slightly better fuel economy in the city (18 mpg vs. 17) than the regular five-cylinder automatic 5000, provided you don't use the extra turbo power too often.

We tested Audi's new flagship on

(Please turn to page 126)



New 4000 is equipped with the nonturbo version of the 5000's five-cylinder engine.

SOLDER SEAL
THE BEST QUALITY YOU CAN BUY



LIQUID WRENCH NO. 1

America's favorite super penetrant. Frees nuts, bolts, screws, and rusted parts.



PUNCTURE SEAL

Seals and inflates tires in seconds. Great in emergencies.



POWER STEERING FLUID

Works in all power steering systems. Keeps fluid at proper level. Prevents leaks.

**RADIATOR SPECIALTY CO.,
CHARLOTTE, N. C. 28234**

**This
Solidox
outfit welds,
brazes,
solders...**

**and
sometimes
even mends
a broken
heart.**



Here's a handy tool that handles jobs you couldn't do before. It's the Solidox, the original solid oxygen torch. It welds, brazes, solders and easily cuts 3/4-inch bolts and 1/4-inch flat steel. You'll find hundreds of uses for it.

Weighing just under 7 pounds, it's easy to carry and easy to use. It has a single valve control. Oxygen is developed from safe oxygen pellets—color-coded for easy identification—and then combined with propane or high-temperature fuel to produce a 5,000-degree flame.

The Solidox comes completely assembled and ready to use. Operating instructions are printed on the torch, and in minutes you'll be putting your new tool to good use.

Get a new flame in your life—the Solidox. On sale July 23 through August 30 at over 1,600 Kmart stores across the U.S.A.

\$19.88



Quality at a Kmart price. Nice.

Kmart

The Saving Place

Copyright 1980

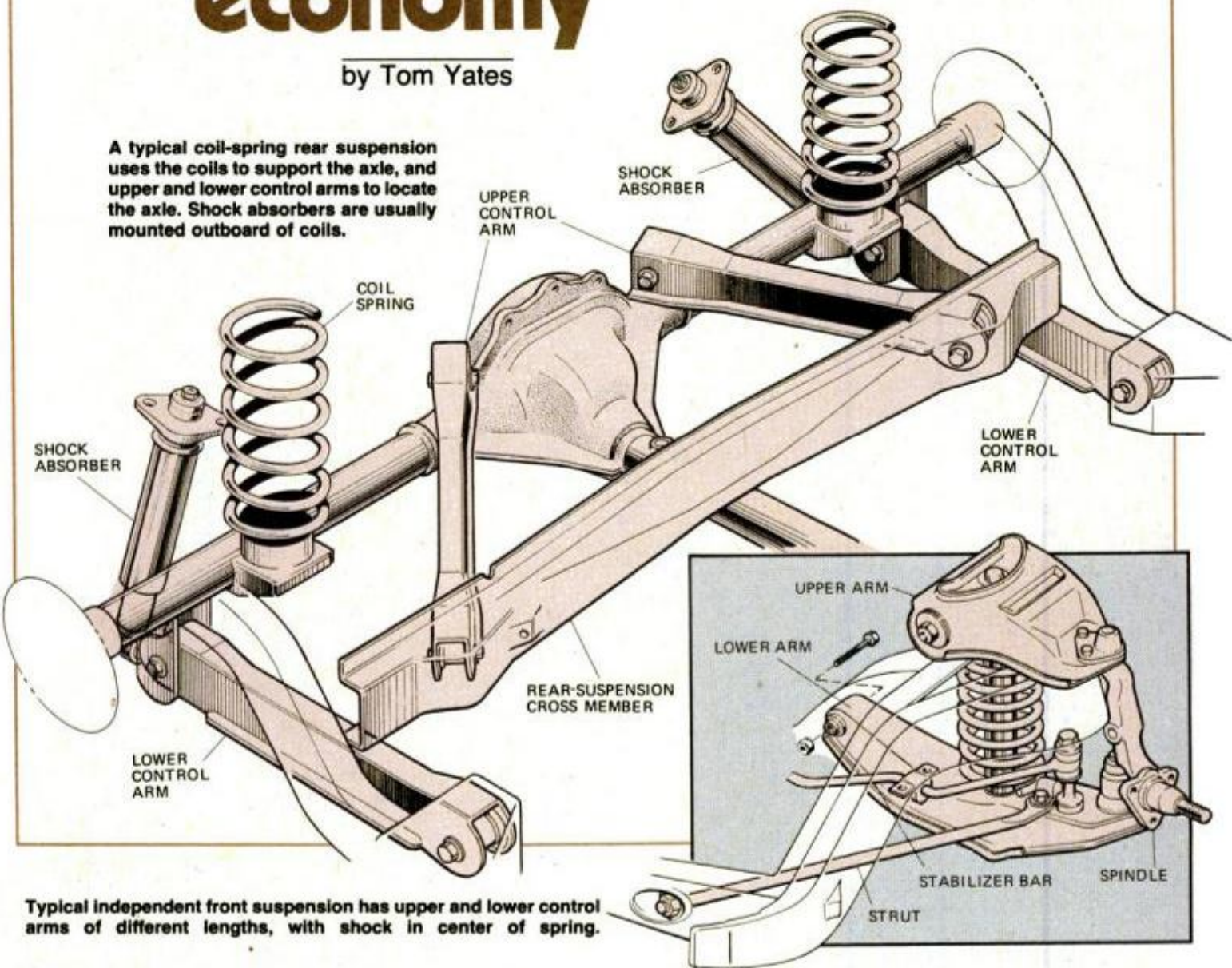
Kmart Corporation

Troy, Michigan 48064

Tuning your suspension for performance and economy

by Tom Yates

A typical coil-spring rear suspension uses the coils to support the axle, and upper and lower control arms to locate the axle. Shock absorbers are usually mounted outboard of coils.



Typical independent front suspension has upper and lower control arms of different lengths, with shock in center of spring.

Most people have only a vague idea of their car's suspension and chassis and what goes on down there. For the most part, the only time a car owner ever gets involved with the underside of his car is to change shock absorbers or do a chassis lube job. This is unfortunate because regular underside inspection and some preventive maintenance could save you a lot of time and money on major repairs, tire wear, shock-absorber life and even mileage.

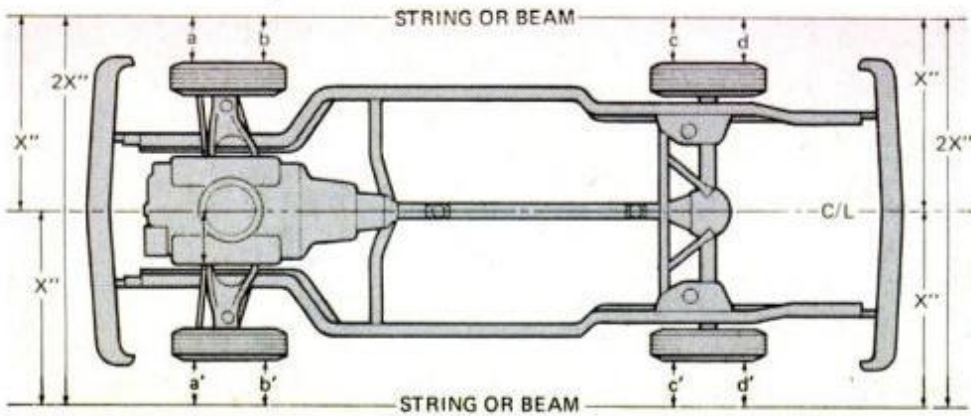
For instance, tires out of align-

ment, out of balance or improperly inflated can shave one or two mpg off your mileage. If the camber angle is off by one or two degrees, it will result not only in uneven and premature tire wear, but it could also adversely affect the handling characteristics your car was designed with.

Every suspension system is designed to accomplish two major jobs. One is to absorb irregularities in the road surface and keep them from being transmitted into the passenger compartment. How well the suspen-

sion performs this job translates into the type of ride it provides—a soft ride, a hard ride or any other increment on the scale from rock hard to ultra plush.

The suspension's other major task is to keep the tires on the road. This may sound like stating the obvious, but a badly tuned or worn suspension won't always do that. One example of the latter is a rear axle that chatters or skips over the surface. If you were to plot rear-axle chatter on a graph, you'd see that the rear tires spend half their time in the air and



Parallel reference lines must be established before measuring toe-in. Outside lines are measured from the center line.

Toe-in (above right) is measured from line to the rim. Use jack stands (right) to secure line and measure from center line.

half on the ground. This not only reduces braking power, but also lessens your control over the vehicle. Rear chatter is usually caused by rear springs that have gone soft or shocks that have gone bad.

This last function of the suspension has less to do with the quality of ride (although it can also affect it) and more to do with road feel and handling.

All modern cars have independent front suspensions. That means the right and left wheels are not connected by a common axle. Instead, the wheels are attached to spindles which carry ball joints at the top and bottom; these ball joints are, in turn, attached to upper and lower control arms. The control arms, also called A-arms, are different lengths. Suspensions with upper and lower control arms and coil springs can carry the coil spring, either on the upper control arm or on the lower one. In most cases, the shock absorber is fitted directly in the center of the coil spring.

On the new, smaller American cars, the McPherson strut is used. In this configuration, the strut is fitted with an integral shock absorber and a coil spring mounted at the top of the strut. With McPherson struts, there is only a lower control arm.

The rear suspension on most American cars is generally a solid axle that runs the width of the body, with the differential in the center. The rear axle is attached to the body by either coil springs or leaf springs. When leaf springs are used, they also serve to keep the axle in its proper location beneath the body. When coil springs are used, locating rods (also called radius rods) run from the body to the axle to keep it in its proper location.

Inspecting the rear suspension

Before beginning any inspection of the system, clean all the components thoroughly. The best way is to have the underside steam-cleaned,

but you could do a decent job with a grease-cutting solvent and a high-pressure water hose. A good cleaning makes it easier to see any damage, cracks or defects and it also reduces the amount of dirt that falls on you while you're working under the car (always use safety glasses when working under your car).

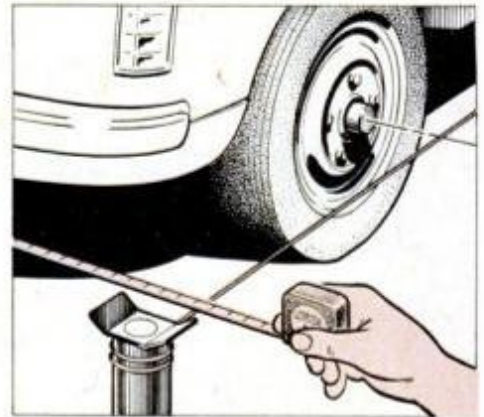
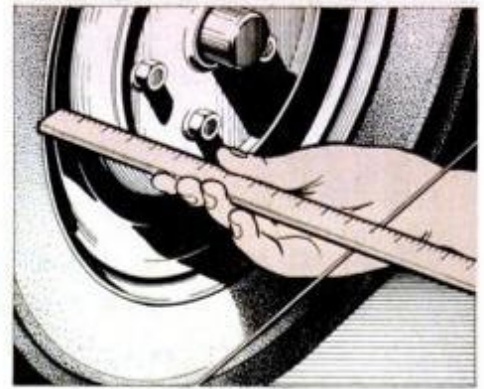
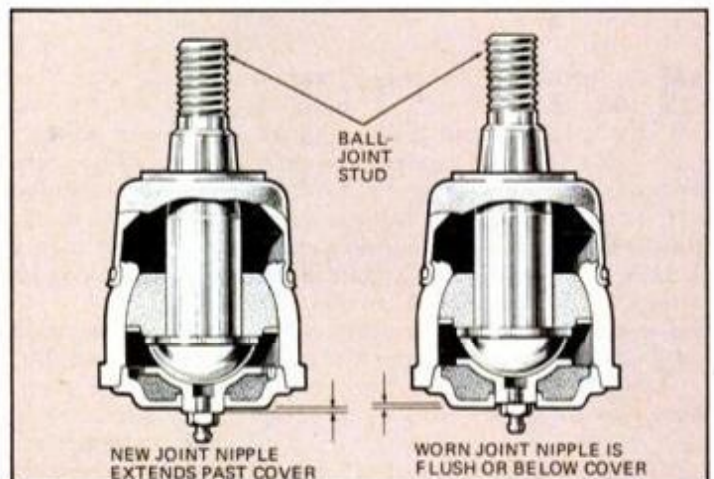
In order to set up the chassis and suspension properly, check the factory manual for recommendations about vehicle loading before making adjustments. Most manufacturers say that the oil and radiator levels should be at full and the gas tank be at least half full before you set ride height, camber and alignment. Also check that you have the correct air pressure in all tires.

At the rear of the car, check the leaf spring shackles for bending or cracks. Also examine the bolt that holds the spring to the shackle to make sure it isn't bent. Then look carefully along the edge of each spring for cracks, and also to determine if the individual leaves are stacked up correctly and not out of line with each other.

If you suspect any cracks in the springs, remove the whole assembly and examine the individual leaves.

If the leaf springs have flattened considerably and the car's ride

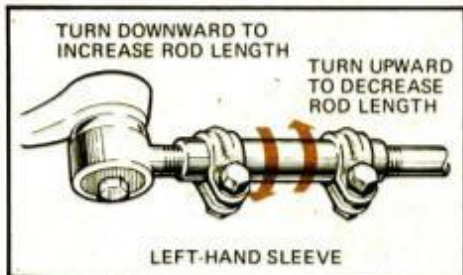
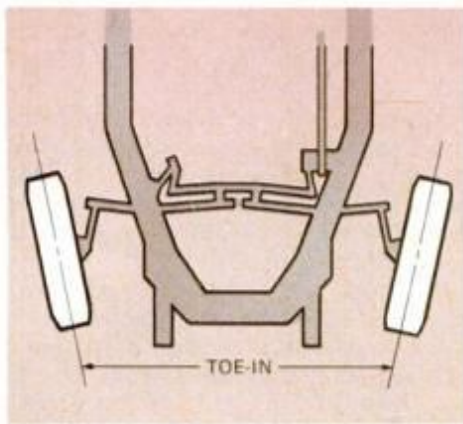
Most modern ball joints have wear indicators which warn you when a ball joint has outlived its usefulness. On some cars, ball joints cannot be removed, but the entire upper and lower control-arm assembly must be replaced. If your ball joints don't have wear indicators, use calipers to measure ball-joint height.



height is less than ideal, you have several alternatives to remedy the condition. You can either have the springs recurved and heat-treated, you can install longer shackles or buy new springs. The cheapest and fastest remedy is the longer shackle. While the longer shackle is a good temporary fix for a borderline spring, it isn't recommended as a permanent repair. Eventually, as the spring flattens even more, it will begin to curve upward, beyond the attachment point of the longer shackle.

The next remedy, having the spring recurved, is a better bet. The critical factor here is that the recurved spring should be heat-treated to maintain its tensile strength.

The last alternative is to go out and buy a new set of rear springs. But you might find it cheaper to have a pro rework the springs than



Toe-in and toe-out are adjusted by rotating the sleeve on rod. Left- and right-hand rods rotate in opposite directions.

to buy a new set, especially if you have an older car for which replacement parts might not be readily available.

If you have coil springs at the rear, check each coil for cracks and check the mounting plates for broken or missing shims. Also be certain that each coil is an equal distance from the coil above and below it, unless, of course, you have dual-rate coil springs. In this case, the coils will be closer together at the top of the coil and further apart at the bottom.

Next, check radius rods, trailing arms and all the bushings. If bushings are cracked, worn or missing, replace them.

To see if bushings are excessively worn, grab the rod or arm and shake it. If there is slop or too much action, replace the bushings. If the coil springs have sagged and lowered the ride height, the body can be raised by inserting shims between the coils and the coil spring mounting plate or the body.

Inspecting the front suspension

Jack up the car, put it on jack stands and remove the wheels. As with the rear end, check all bushings, grommets and rubber bump stops. If you notice the ends of the rubber bump stops are chewed up or worn, it's an indication that the suspension has been bottoming out and the springs and/or shocks are no longer usable.

The classic test for shock absorbers is to bounce the fender a few times and see how many times the car bounces after you release it. It

should stop bouncing almost immediately after you release it.

A thorough test of the springs is a bit more complicated, and the information you need may not be readily available. However, a good indication of spring condition is measurement of the ride height. A shop manual will tell you the suspension point from which the height should be measured. Some makers measure ride height from the bottom of the rocker panel, while others do it from the pivot point of the lower control arm.

In most instances, correct ride height is a good enough indication of spring condition. But, if you want to be really thorough, or if you suspect a bad spring, you'll have to measure the installed spring height and then remove the spring and measure the free-standing spring height. If the springs don't conform to factory tolerances, they should be replaced.

Examining ball joints

The components to examine next are the ball joints. Modern ball joints have wear indicators that warn you when the ball joints are worn. If you don't have this type, proceed as follows:

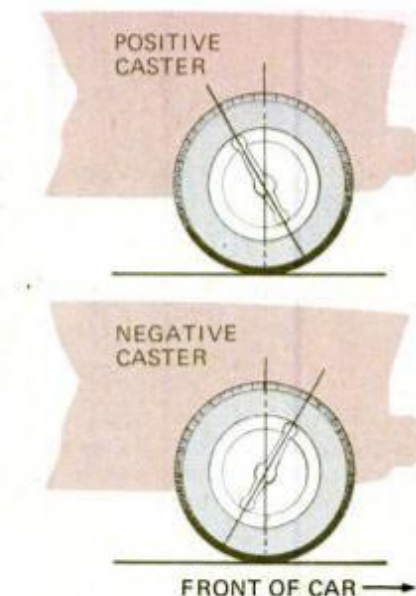
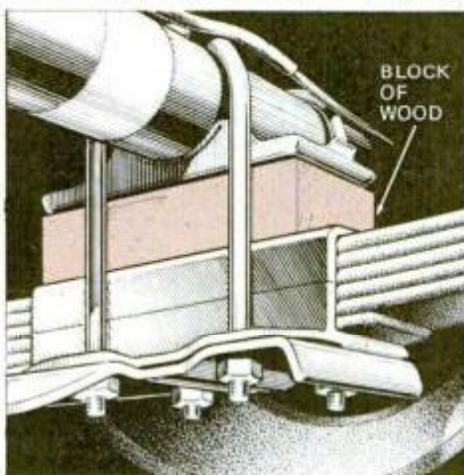
1. Measure the height of the load-bearing ball joint with calipers while the car is on the ground. The load-bearing ball joint is the one which is loaded by the spring. That is, if the spring is mounted on the lower control arm, that ball joint is the load-bearing ball joint. If the spring is on the upper control arm, that ball joint is the load-bearing one.

2. Jack up the car. With a second jack, compress the control arm to release the load on the ball joint.

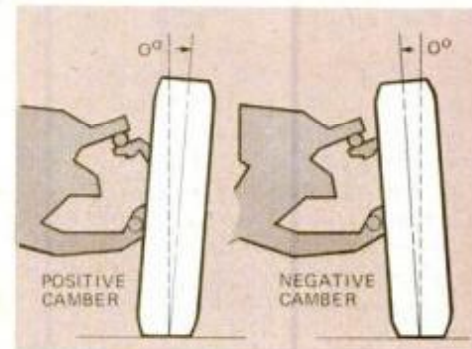
3. Measure the height of the ball joint again.

The differences between the loaded and unloaded position of the ball joint will indicate whether or not it is worn.

A good way to lower ride height is to place a wood block between axle and spring.



Positive caster (top) is the positioning of the top of the spindle to rear of bottom compared to a vertical line. The reverse is negative caster. Positive and negative camber (below) indicate the inclination of the wheel relative to a vertical line.

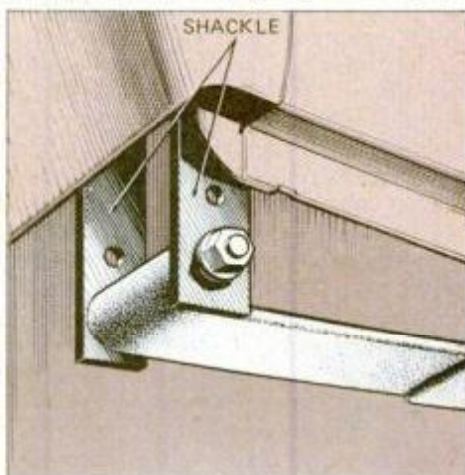


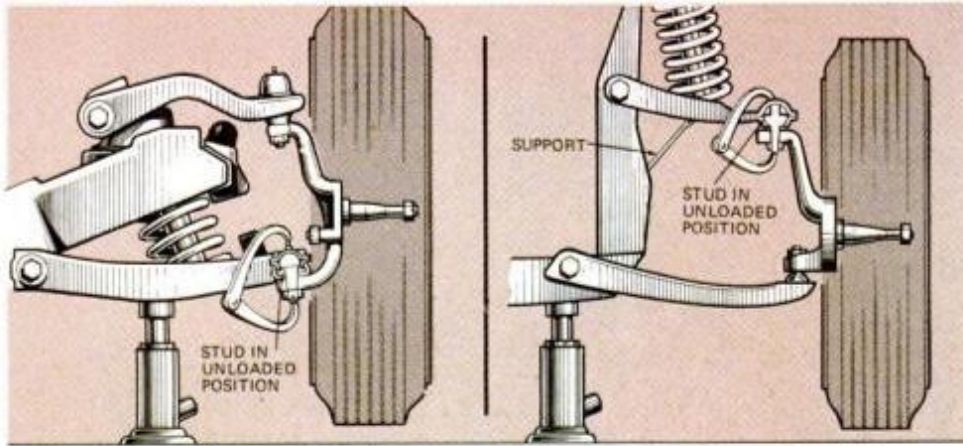
Checking toe-in

Before checking toe-in it's first necessary to set up a reference line against which to measure toe-in. To do this, you must first establish the center line (C/L) of the car. Measure between the pivot points of the two lower front control arms, and establish the center of that dimension.

Go to the back of the car and mea-

To raise ride height, you must use longer shackles on the rear-spring mounting eye.





On cars that have lower coil springs without wear indicators, support the wheel and measure the ball joint with calipers.

With upper coil springs, support the upper control arm and the car and measure for ball-joint wear with calipers.

sure the distance between the rear mounting eyes of the leaf springs and establish the center. Then, with a string and two jack stands, connect the center points of the front and rear.

With four more jack stands and two pieces of string, establish parallel lines on either side of the car. The strings must be the same height as the center of the wheels.

Turn the front wheels to the straight-ahead position and, with a good ruler, measure the distance from the string to the front of the rim and again at the rear of the rim. Remember that this measurement will be valid only if the rims are true. To check the rims, use a dial indicator to test for run-out while the car is raised.

Also keep in mind that each wheel should indicate half the total toe-in. That is, if your wheels need to have a total of $\frac{1}{8}$ -inch toe-in, each wheel should toe-in $\frac{1}{16}$ inch, as measured from your parallel reference line.

Caster and camber

Caster is a measurement which indicates the position of the upper and lower ball joints relative to a vertical center line. On a car with positive caster, the lower ball is further forward than the upper ball joint. Negative caster is the reverse. Most cars are set up for positive caster.

Caster can only be measured with a caster gauge, available through specialty tool manufacturers. Caster is adjusted by means of different sized shims at the front and rear upper control-arm attachment points. For instance, if you need more positive caster, install a bigger shim on the rear upper control arm attachment point. This cocks the entire upper control arm forward.

Camber is the angle the plane of the tire makes in relation to a vertical line, as viewed from the front of the car. There are various camber gauges available, ranging from \$20

to several hundred dollars. One of the best portable gauges is made by Wayne Mitchell Engineering, Box 2335, Leucadia, Calif. 92024.

Camber angle can be adjusted by using shims of the same size on the upper control arm attachment points, or by using eccentric bushings. Check your shop manual for the recommended procedure.

Squaring the chassis

A body shop will charge you quite a bit just to check your chassis for squareness. You can do it yourself for next to nothing. All you need is a plumb line, four jack stands and four jacks.

First, set all four corners of the car on jack stands and remove the wheels.

Next, compress the suspension with the jacks until the center lines

To measure chassis squareness, drop a plumb bob from the center of each wheel hub and mark the location on the ground.

of the four wheels are on the same plane. The parallel lines you set up earlier are good for this operation, too.

Drop the plumb to the floor from the center line of each wheel and mark the position of the bob on the floor. You can paint, use a grease pencil or whatever, as long as it's a good reference point.

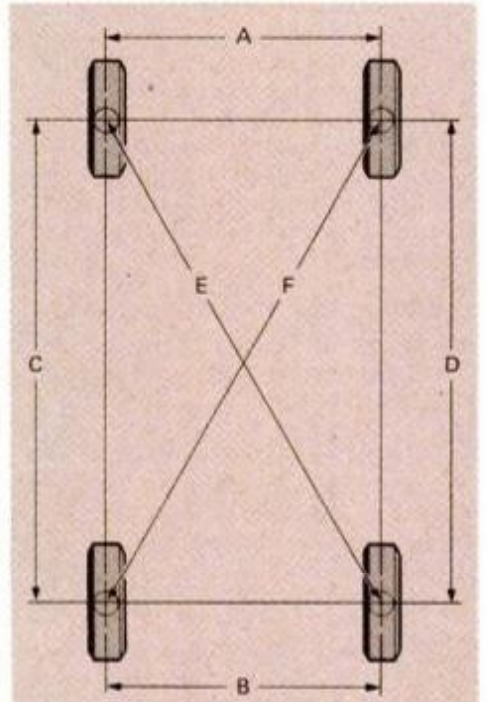
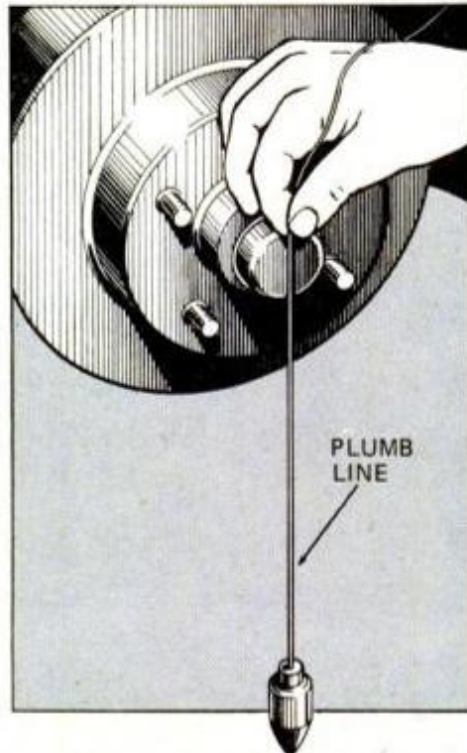
Measure the distances indicated in the illustration. If the chassis is square, A should equal B in most cases. Sometimes, rear track width is different from front track width. C should equal D unless you have a Renault R5, which has two different wheelbases. E should equal F in all cases. If C and D are equal, but E and F are not, then it means the rear axle is cocked to one side. The solution is to unbolt it and slide it back into position.

Another set of marks

If these measurements don't come out right, and you've double checked your work, make a second set of reference marks, this time using the suspension pivot points on the frame, not the suspension. If the frame reference points are square, then it means the suspension is out of line. If the frame reference points are off by the same degree as the suspension reference points, then the frame is bent and must be straightened.

You must take the car to a body shop and have them pull the frame on a jig. No amount of suspension tuning will compensate for a bent frame. **FM**

When all marks are made, take measurements shown. If suspension is off, check again, using chassis mounting points.



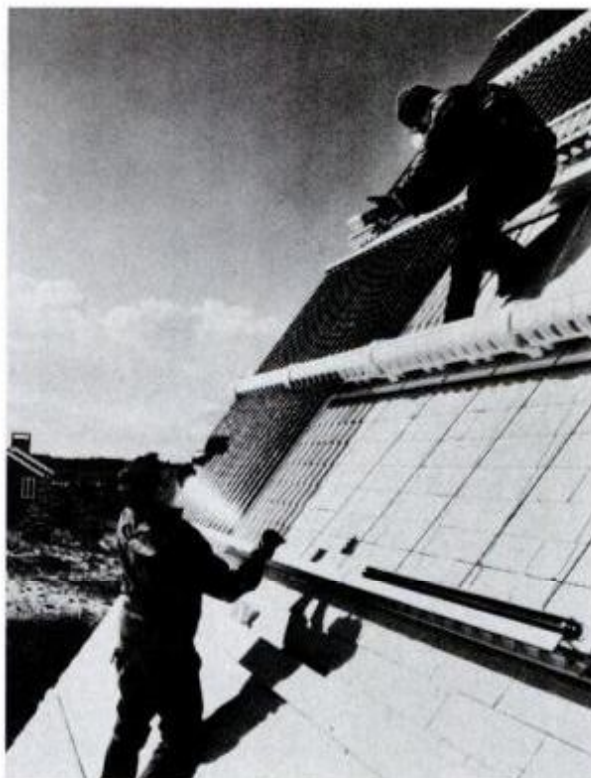
Energy crunch creates new jobs for trained technicians.

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, tillers, outboards, mopeds, motorcycles, and other small engines. NRI training includes professional tools...inductive tachometer, volt-ohm meter, torque wrench, valve spring and ring compressors, and more. And you learn by doing, actually training on a 3 1/2 HP engine we include as part of your training. Choice of basic or advanced courses. Check postcard for catalog.

Electrical Appliance Servicing

Good appliance technicians are hard to come by. NRI trains you for your own full- or part-time business in fixing everything from toasters to refrigerators and microwave ovens. Step-by-step training includes professional tools and instruments like clamp-on ammeter and appliance multimeter. Check postcard for catalog.

Auto Repair and Servicing

A good mechanic can work just about anyplace he wants to. NRI "hands-on" home training covers what you need to know from headlight to taillight. Includes professional tools like inductive timing light, ignition analysis and tune-up instrument, vacuum test pump, and the latest advance in diagnostic instruments, a digital readout tune-up analyzer. Approved by Richard Petty, America's winningest stock car driver and NRI automotive consultant. Choice of two courses, check card.



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

HOMEOWNERS' CLINIC

QUESTIONS ANSWERED

Solar roofing

I am going to make a 21x35-ft. enclosure for my swimming pool. The walls will be continuous sliding-glass patio doors for good ventilation. To aid in winter heating, I'll have a sloping, transparent, flat roof on redwood framing. What type roofing material would be good? It would have to withstand sun, wind, rain, hail and snow.—Dale E. Watt, Tulsa, Okla.

Your local lumber dealer probably carries several brands of corrugated acrylic panels that are mainly used for shed-type protection over patios. Most allow light to pass through.

For a structure such as yours, facing the expense of continuous slid-



Kennedy's energy-saving Sky-Lite has two domes separated by an insulated air space.

ing doors and redwood, it would be wasteful to apply a roofing material that couldn't meet local severe weather criteria for perhaps more than one season. Check out insulated, translucent panels such as those made by Filon-Vistron Corp. and a slightly higher-priced panel manufactured by Kalwall Corp. The latter is a sandwich panel of fiberglass sheets bonded to a grid core of aluminum I-beams. You might also consider dome-type insulated skylights like those manufactured by Kennedy Sky-Lites Inc.

To cut costs somewhat, you can build a shed-type roof with gravel covering about 60 percent of the surface and translucent material covering the remainder. Also, from the standpoint of economics, you might consider using dry, pressure-treated wood (see *Protect Against Rot and Insects with Pressure-Treated Wood*, page 162, Mar. '80).

For brochures, you can write to

the sources mentioned above at these addresses: Filon-Vistron Corp., 12333 South Van Ness Ave., Hawthorne, Calif. 90250; Kalwall Corp., 1111 Candia Rd., Manchester, N.H. 03103; Kennedy Sky-Lites Inc., Box 17832, Orlando, Fla. 32810.

Electric fixtures on panel

When adding furring and paneling to a room, how can I bring the electric receptacle and switch boxes flush with the new wall? I've looked in several books on electrical wiring to no avail.—William S. Love, Perry Point, Md.

Your question is a tough one, but I found a product that can help. It's called Add-A-Depth Ring and is made by Raco. The ring allows quite a latitude of adjustments, depending on the thickness of the wall. If you can't locate the item, write to Raco, Box 4002, South Bend, Ind. 46634, for a nearby distributor.

Also see *PM Looks at Plug-in Outlet Extender* (page 220, Apr. '80).

Removing creosote stains

Creosote from the flue of my wood-burning stove has leaked onto the stove hearth. The stone is unpainted. How can I remove the stains?—Robert Posner, Monticello, N.Y.

First, call in a reliable chimney sweep to check your stove and metal flue. Contrary to popular belief, the male end of a flue pipe should point down. In a proper installation, any dripping creosote will then remain in the pipe.

As for removing the stain on your hearth, any cleaner containing phosphoric acid should do the job. One product is No Soot, a fireplace brick cleaner made by Chattahoochee Research Co., Box 12141, Atlanta, Ga. 30355. A pint bottle costs \$3 postpaid. Another is Cam-Kleen, a heavy-duty ceramic tile and grout cleaner made by Woodhill Permatex. It sells for about \$2 for 12 fluid ounces. Both cleaners are sold in hardware and houseware stores.

Be sure to follow the manufacturer's directions. Wear gloves, goggles and a long-sleeve shirt.

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 this column. For more home repair and maintenance help, get *PM's Home Care Guide*, \$4.95 postpaid. Send order(s) to *PM*, Dept. HCG, Box 1014, New York, N.Y. 10019.

Spiral staircase

There is only an outside entrance to the basement that I intend to finish. As space is limited, I would like to install a spiral staircase in the corner of my living room for access to the basement. I have obtained the name of Duvinage Corp., but do you know of someone else who makes these stairs?—Herbert J. Mones, Selden, N.Y.

I assume you are comparison shopping, which is a good idea. There are many manufacturers of spiral stairs besides Duvinage, Box 828, Hagerstown, Md. 21740. You might also try Woodbridge Ornamental Iron Co., 2715 North Clybourn Ave., Chicago, Ill. 60614. Write for information.

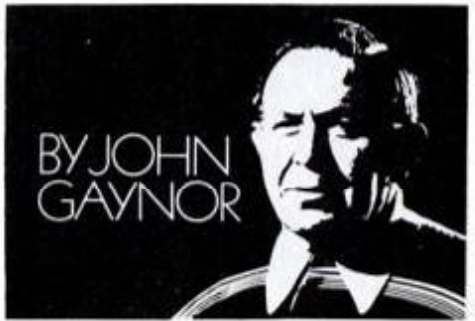
Be certain to describe accurately to the manufacturer your exact condition, as minimum headroom and type platform can govern product choice. The installation is too lengthy to describe in detail, but the suppliers' tables and charts indicate critical dimensions, once you know the type of platform and the distance from floor to floor.

Most stairs come in knockdown kit form, can be assembled with common tools and require no welding on the job. They are packaged to fit through finished doorways. Prices vary, but for the situation you describe, \$900 would be a reasonable ballpark figure.

More on rising butt hinges

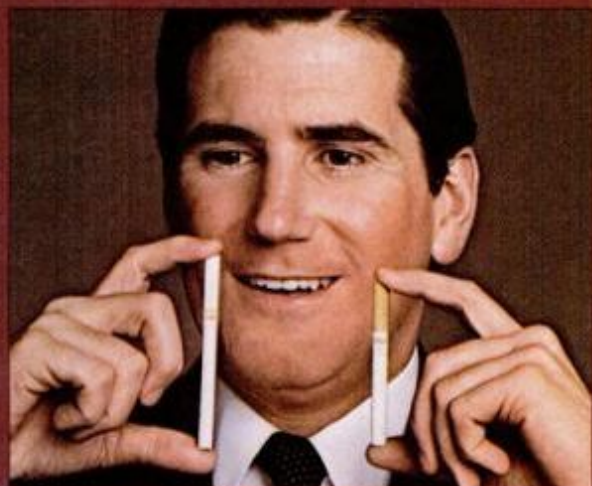
Bob Strong of Windsor, Ont., brings out a good point about rising butt hinges ("Carpet-clearing Hinge," *Homeowners' Clinic*, page 40, Feb. '80): The top of the door or jamb over the hinges may require a bit of shaping, because the door starts to rise as soon as it is opened.

His supplier has sets of three hinges available. These hinges are a good bargain, from: Consumers Bargain Corp., 404 Irvington St., Pleasantville, N.Y. 10570. **PM**



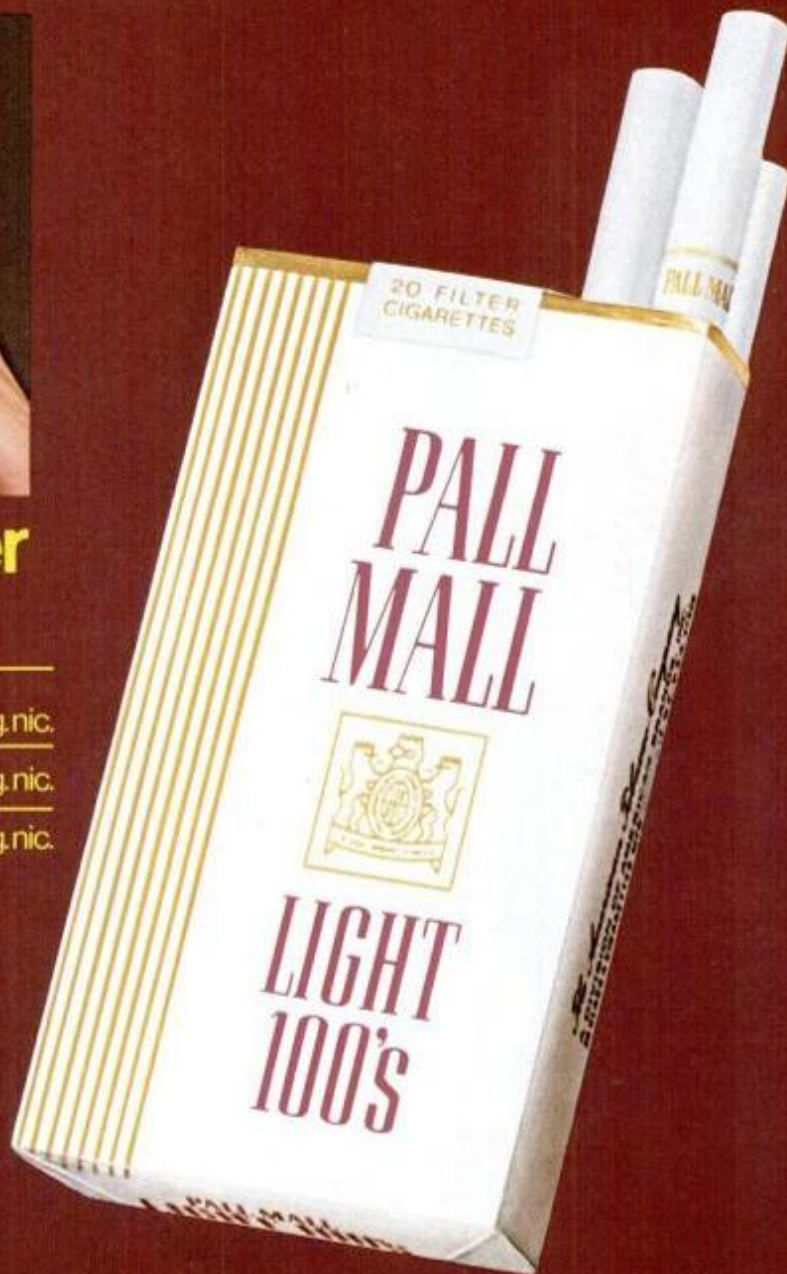
BY JOHN GAYLOR

A third less tar than the leading filter 85



Longer, yet lighter

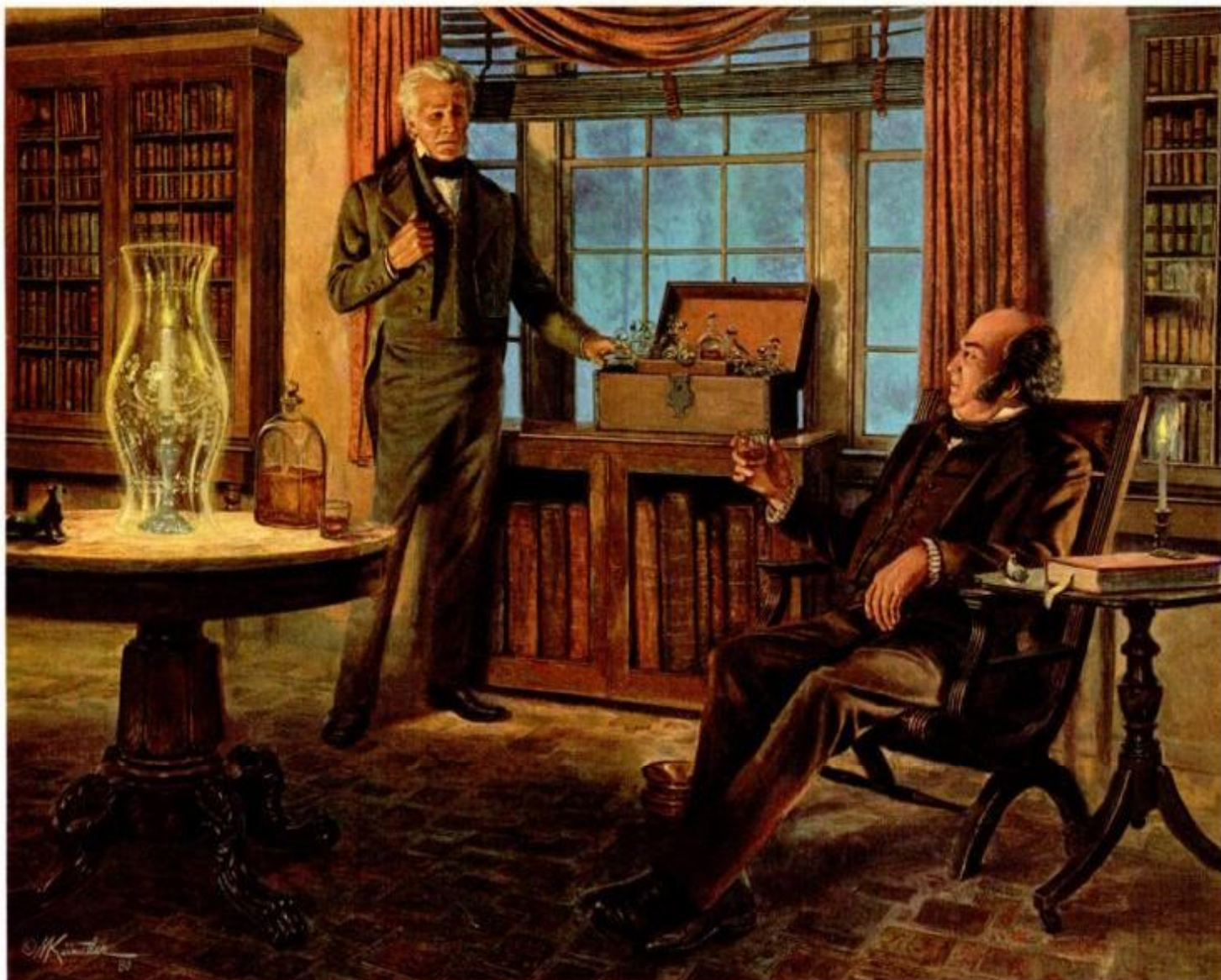
Pall Mall Light 100's	12 mg. tar 0.9 mg. nic.
Winston 85	20 mg. tar 1.4 mg. nic.
Lowest brand	less than 0.01 mg. tar, 0.002 mg. nic.



PALL MALL LIGHT 100's

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

12 mg. "tar", 0.9 mg. nicotine av. per cigarette, FTC Report Dec. '79.



Andrew Jackson entertains Martin Van Buren.

Andrew Jackson, "Hero of the Plain People," enjoyed the simpler pleasures of life. To friends, like Martin Van Buren, he displayed his personal liquor chest. Jackson's decided preference for Old Crow is reported in a 19th-century newspaper.

OLD CROW

THE ORIGINAL SOUR MASH



**OLD CROW. THE PROUD TASTE
OF AMERICA SINCE 1835.**

Kentucky Straight Bourbon Whiskey, 80 Proof, Distilled And Bottled At The Famous Old Crow Distillery Co., Frankfort, KY.

Материал, защищенный авторским правом

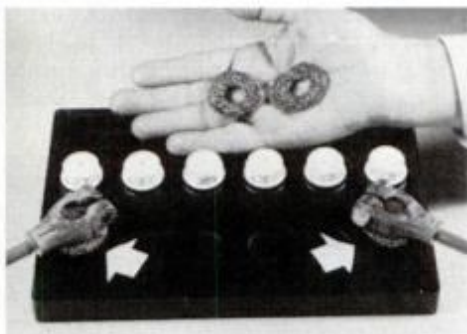
THE PM GARAGE

CAPSULE REPORTS ON NEW AUTO PRODUCTS

Antacid relief

Even if you regularly wash your car battery with baking soda, acid deposits will eventually accumulate on it. If the problem is unchecked long enough, the acid could rot out the battery tray.

A new product called PRO-TEXTors solves the problem. They are



Insulators prevent battery-acid deposits.

chemically treated insulators which slip over the battery posts beneath the cables. I've had them on for several months and they certainly work. PRO-TEXTors, guaranteed for the life of the battery, cost \$3 from Martin Associates, 57 Richmond Rd., West Chester, Pa. 19380.—*B.H.*

Lash it down

On a recent parts-scavenging trip, I had a chance to test a new cargo strap made by Nelson-Dunn. The product is called Strap-All and it really did the trick. I loaded a bunch of body and engine parts onto the roof rack of a station wagon and lashed it all down with the Strap-All. The advantage of the Strap-All is that it



Nylon strap with ratchet secures cargo.

has a ratchet handle which lets you apply tension and lock the strap in place without allowing any slack. And since it's made of nylon, it won't

scratch the paint if it rubs against your car or truck body. It's also much handier to use and stow away than a coil of rope or chain. It costs \$15.89 and is available through Nelson-Dunn, 940 South Vail Ave., Montebello, Calif. 90640.—*T.A.*

Forward vision

The information on the bottle says it's made of "isomeric polymers solubilized in isopropyl alcohol which forms a hydrophobic monomolecular film."

It's a good thing that you don't have to be able to say it in order to use it. The product is called Rain-X and it's one of the best safety items I've come across in a long time. Originally developed for airplane windshields under a different name, it is now available for your car wind-



Invisible shield repels water, road dirt.

shield. You apply it to a clean windshield with a cloth and forget it. You won't notice it's there until it rains. And when it rains, you'll be glad you used it.

The invisible shield it leaves on the glass acts as a water repellent, and water simply beads up and blows away. Most of the time you won't even need to use the wipers—unless rain is unusually heavy.

It costs \$4 for an 8-oz. bottle and is available at most auto retailers. For more information, contact Unelko Corp., 506 Taft Dr., South Holland, Ill. 60473.—*T.A.*

Snow removal

A new type of wiper blade has just been introduced by Anco, a leading maker of replacement wiper blades. Called Snow Blades, the new blades differ from conventional types by being encased in a flexible, 100-per-

cent rubber covering. The rubber bootie prevents ice and snow from building up on the blade's movable metal parts. The wider area of the rubber also acts as a mini-snowplow to push snow out of the way. They



Booted Anco wiper blades remove snow.

cost about \$12 per pair, depending on the size, and are sold wherever Anco wiper blades are available. For more information, contact Anco, 1075 Grant St., Gary, Ind. 46440.—*R.N.*

Lifetime muffler

Here's some good news for budget-minded Saturday mechanics. Maremont has just introduced its Turbo-Flow replacement muffler and offers a lifetime warranty with every unit.

Unlike most replacement mufflers, Maremont's Turbo-Flow is coated with a crinkle-finish black paint for added corrosion protection.



New muffler offers a lifetime warranty.

The Turbo-Flow is available at retail outlets, jobbers and gas stations. But, wherever you buy it, and regardless of whether you install it yourself or have a mechanic do it, the lifetime warranty is always valid. The muffler is priced at less than \$40.

For more information, contact Maremont Exhaust System Products, 200 East Randolph Dr., Chicago, Ill. 60601.—*T.A.*

SCIENCE WORLDWIDE



Nevada-size volcano towers 15 miles high.

Spectacular Mars

Mars may be smaller than Earth, but a new first-ever atlas of the "Red Planet" displays surface features dwarfing our natural wonders.

The 146-page atlas covers the Martian surface—55.7 million square miles, or about a quarter that of Earth. Among the spectacular features is the volcanic mountain, Olympus Mons (photo, above), with an area roughly that of Nevada.

The atlas, based on more than 10,000 photos of Mars taken from spacecraft, is available for \$7 from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

Mixing microwaves and drugs

Battelle Labs scientists are studying whether microwave signals amplify the effect of drugs in the body.

The U.S. Navy ordered the 40-month study out of concern for sailors exposed to microwave radiation from on-board radar. "People are occasionally exposed to microwave bands," said Dr. Richard H. Lovely at Battelle. "The wavelength may be so short that their bodies aren't resonant, but parts of their bodies might still interact with the field and capture a lot of energy. We start to get concerned when one of those parts is the head."

A study by the Navy published last year showed that one commonly prescribed tranquilizer, chlordiazepoxide, seems to gain potency in rats exposed to even low doses of microwaves. Lovely will try to confirm the Navy's results. But he'll also ex-

plore the effect of microwaves on learning, and he may test the effect of mixing microwaves with drugs like caffeine and alcohol.

Lovely said microwave ovens produced exposure levels far below those used in his research.

Magnetic bacteria

The bacteria in a drop of mud under a microscope were behaving like homing pigeons, all steadily moving in the same direction.

Richard Blakemore, a graduate student a few years ago when he first tracked the one-way bacteria, guessed the organisms were picking up signals from a lighted window. But they kept up their single-minded movement even when the microscope was covered by a box, or at night. Then he held a small permanent magnet near the drop. "It caused the bacteria to swerve," he told us, "go into a large U-turn and head toward the north pole of the magnet."

Since then, Blakemore and others have dissected the unnamed bacteria and found chains of magnetic crystals that apparently act as tiny compasses. But why would the bacteria head north?

It turns out, Blakemore told us from his lab at the University of New Hampshire, that the organisms don't care about north. Aiming at the earth's north pole, they wind up heading downward, into richer sediment.

The research may solve a basic problem in studying bacteria: It's hard to measure their growth rates in nature. Investigators could "tag" bacteria by placing them in strong magnetic fields, changing their polarity and that of their offspring, and release them in a natural setting. It would be easy to follow their growth by periodically counting organisms that are swimming the wrong way.

The great Stanford quark hunt

Scientists at Stanford University popped champagne corks recently at the inauguration of a new device to hunt for the elusive quark, hypothetical building block of all matter. But Pier Oddone, coordinator for the \$78-million experimental project, told us it might be months or years—if ever—before quarks are mined out of the debris of smashed subatomic particles.

The centerpiece of the Positron-

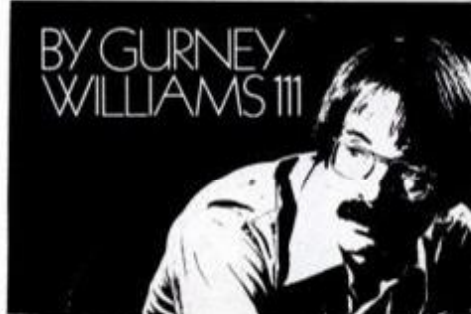
Electron Project (PEP) is machinery to do the smashing and record what happens. Batches of electrons whirl one way through a circular 1.5-mile track. Batches of positrons, particles with the mass of electrons but an opposite electrical charge, whirl the other way. The two clouds of particles are forced to collide at a spot about a tenth of a millimeter square. Each electron-positron collision creates a tiny fireball of pure energy from which new particles of matter will condense. Using sensitive detectors, scientists scout the new parti-



Mirrors in one PEP device, used in quark studies, deflect light from fast-moving particles onto phototube for measurement.

cles, looking among other things for quarks.

One reason the hunt is difficult, Oddone told us, is that electrons and positrons are so small it's hard to make them collide. "It's like a dilute swarm of mosquitoes, each a mile away from the other," he said. "The chance of two mosquitoes colliding is small." A similar device in Hamburg, Germany, has been on the quark trail almost two years. At press time, no quarks had been found in the collision debris. **FM**



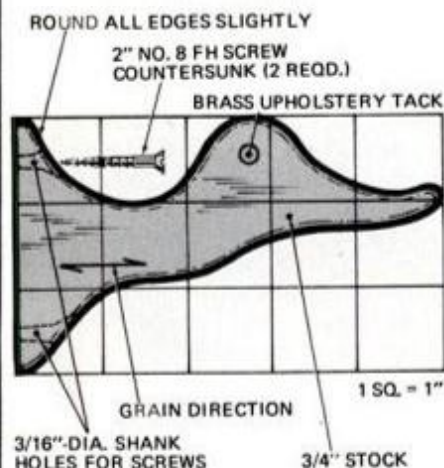
HINTS FROM READERS

Duck-head hangers



Use this duck head as a clothes hook or make two to hold a rifle. Cut them out using a bandsaw; smooth edges with a drum sander in an electric drill. Finish smoothing them with a flap-type sander. Bore screw pilot holes; countersink. Finish and add brass eyes.

—George Trout



Pan aids drill-press work



An aluminum pan is a helpful drill-press accessory. You can bend it as needed to get into restricted areas and catch debris as you clean.—W.E. Burton

The used
aluminum can.
Crushed, bent,
scratched, smashed
...and valuable.



Last year alone,
Reynolds
paid recyclers \$45,000,000.

Today, collecting aluminum cans is highly profitable. Because Reynolds Aluminum Recycling Company will pay you cash for them.

To make recycling easy we've built permanent recycling centers and put mobile recycling units on the road, collecting used aluminum at 1,000 locations, nationwide.

America needs aluminum. And every can you recycle helps conserve our energy and resources. Recycling saves 95% of the energy it takes to make aluminum from ore. Also, every can you pick up contributes to keeping your neighborhood clean.

You can recycle much more than just aluminum beverage cans. To find out how much Reynolds pays and what other aluminum items can be easily cashed-in at Reynolds, check the yellow pages under "Recycling Centers", or, call this toll free number and mention Popular Mechanics.

Call anytime 1-800-228-2525

Reynolds has proved recycling aluminum works. And proved what profits the country can profit the individual, too. So join us.



APPLIANCE CLINIC

QUESTIONS ANSWERED

Dishwasher runs dry

I have a 6-year-old Sears Kenmore dishwasher, model No. 587-721300. While the machine is running, water siphons out during the wash cycle. The drain hose is extended over the machine to prevent this, but it still happens. What can I do about this?—Pete Badolato, Marietta, Ga.

Check the drain hose to make sure the siphon break loop is correct. The drain hose should go from the bottom of the dishwasher up to the underside of the countertop and preferably be secured to the top with a clamp, as shown in the drawing below. Then the drain hose should slant down and attach to the dishwasher tailpiece under the sink.

If the hose position is correct, check the timer. The motor must reverse direction to pump out the water in the tub. An erratic timer could be causing the motor to reverse itself during the wash cycle.

An easy way to test the timer is to open the dishwasher door, unplug the motor-harness connection at the motor, close and latch the door, and turn on the dishwasher to the first fill cycle.

The water will fill, then stop. Listen for any siphoning action. There shouldn't be any. Open the door, reconnect the motor harness connection, and then relatch the door.

Let the motor come on and listen for any siphoning action. If you see

or hear any, replace the timer located behind the control panel.

Pent-up heat

We have a General Electric dryer that runs for about a half hour and then stops. A half hour later, it starts up again. We placed the dryer in an old pantry under a cupboard. Do you think the dryer gets too hot, or is the problem something else?—Ted Oldham, Lewiston, Minn.

It does sound as if your dryer is starved for air. A dryer pulls in surrounding air, moves it across the heat source, circulates it inside the drum, then pushes it out the exhaust duct.

If the room is small or the dryer isn't vented, the surrounding air becomes stale, warm and moist. This could cause the motor to heat up and kick out on overload. As soon as the motor cools, the overload resets and the dryer starts again.

Pull your dryer out of the pantry and do a load of clothes. If it works okay, then the dryer was starving for air and you should permanently relocate it. If not, I would check for lint accumulation in and around the motor. Periodically vacuum all lint around the vents, drum, inside surfaces and the heat source.

Off-on switch

I own a Westinghouse electric range, model No. KEH3D, serial No.

J505479. The switch that controls my right front burner keeps the indicator light on even though I shut it off. I checked the switch and found that a terminal contact was electrically hot when the switch was in the OFF position. What causes this malfunction and how can I correct it?—Matthew J. Foley, Woodridge, Ill.

The fact that one of the terminals was electrically hot in the OFF position is evidence that the internal contacts in the switch are either stuck or arced closed. This could have been caused by a number of factors, such as age, use and moisture.

We would replace the switch. One note of advice: Make sure the replacement switch is the proper one for your range. Carefully read the instructions before you install the new switch. An error could destroy the switch the first time you turn it on. Disconnect the range from power before making the installation.

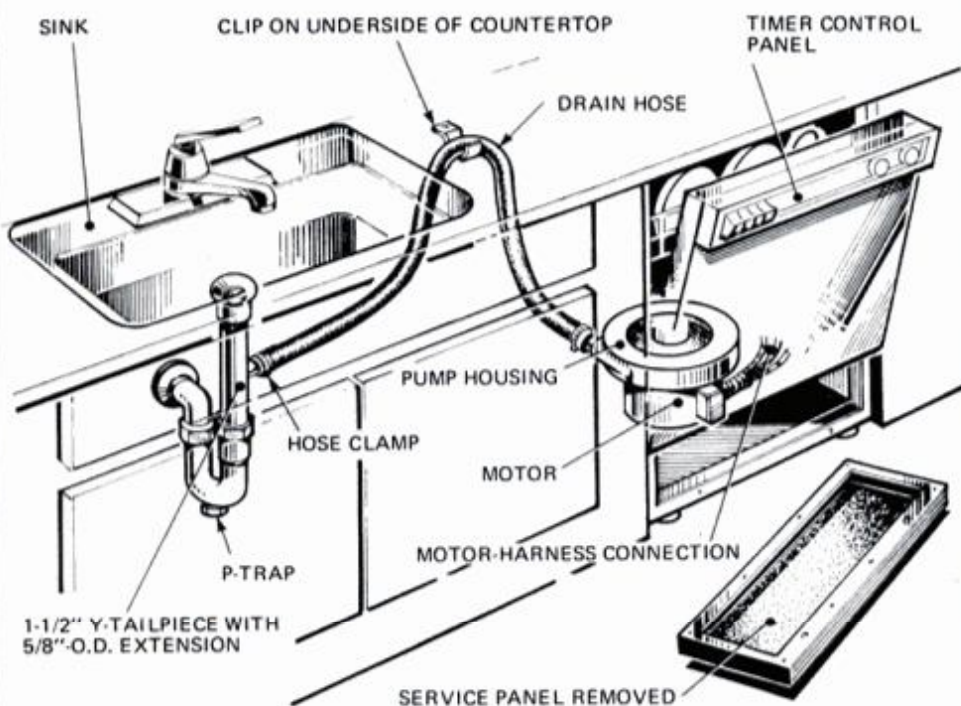
Out-of-balance washer

I have a Maytag washer with a faulty out-of-balance mechanism. It is a combination switch with the lid. The switch itself works, but the out-of-balance mechanism does not. I tried to adjust it, but it still doesn't work. Is there a special way of adjusting it or do I have another problem?—L. Conrad, Depew, N.Y.

The first check to make is for a broken or missing spring on the bracket assembly. The spring is designed to reset the unbalance lever every time the lid is raised. If it is broken or missing, the unbalance lever will never be pulled back up onto the switch.

Next, make sure the spring bracket and plunger aren't broken or sticking. Clean them both and check to make sure that they work easily. If any of these parts is in question, you can replace the assembly for about \$3.50.

To adjust the mechanism, just loosen the two screws by the switch and slide it either forward or backward. Then retighten the screws. Test the washer in the spin cycle with some clothes and water. Readjust the mechanism if needed. **PM**



Properly attached drain hose rises from the washer to countertop, then falls toward sink.

If you have a question about any appliance, send it 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.

PM WORKBENCH

PM EXAMINES PRODUCTS AND SERVICES

Did you know?

Here are some interesting facts that may help you:

■ A faucet that leaks a drop a second may waste 60 gallons of water a week. (That's a lot of money if it's the hot-water faucet.)

■ Many common household plants are poisonous. Keep children from chewing on plants such as philodendron, dieffenbachia, poinsettia and begonias; they can be fatal.

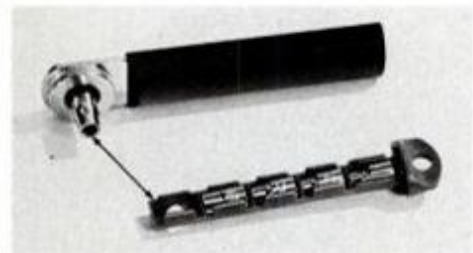
These and more tips are in the *Consumer Information Catalog*, free from Consumer Information Center, Pueblo, Colo. 81009.—H.W.

Pocket socket set

This six-piece, 1/4-in.-drive socket set features a handle that holds five sockets, from 3/16 to 5/16 in., in an integral, removable, spill-proof tray. It's compact enough (1 1/2 x 7 3/4 in.) to be



This well-built wrench set conveniently carries five sockets in its handle. The useful tool is available for under \$20.

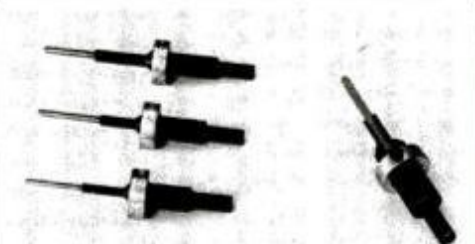


carried in a pocket, and it weighs just six ounces. The Pocket Socket has a removable thumbwheel ratchet for tight jobs. It's about \$18 at hardware and auto-supply stores, from Litton New Britain Tool, Box 1320, New Britain, Conn. 06050.

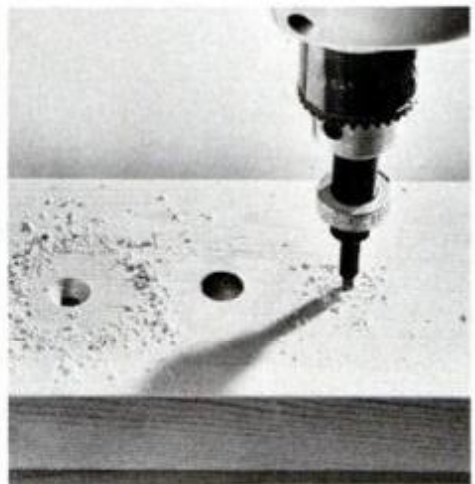
—H.W.

Adjustable pilot drills

This set of completely adjustable pilot drills boasts four sizes to accommodate Nos. 5, 6, 7, 8, 9, 10, 12 and 14 wood screws in all common lengths up to 2 in. It is claimed to replace as



Handy four-bit set (above) replaces more than 30 bits in your drill box. Set countersinks and counterbores (below).



many as 36 conventional pilot and countersink drills.

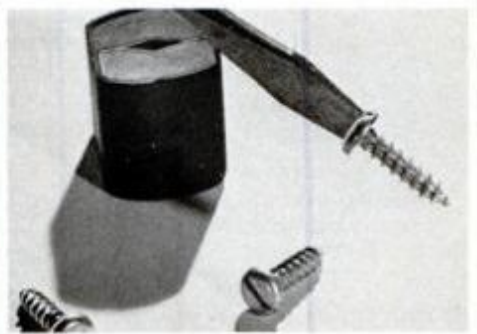
With simple adjustments, you can bore a pilot hole for the thread portion of the screw, a shank hole for the body, and countersink or counterbore in one operation. A stop collar permits repeat drilling to a set depth. Scru-Drill is manufactured by Disstim Corp., 207 West Evesham Rd., Runnemede, N.J. 08078. It's available at hardware stores for about \$14.—R. Capotosto

Low-cost magnetizer

In my opinion, no workshop or toolbox should be without a tool magnetizer/demagnetizer. This little beauty sells for \$2.99 and takes up little space in a tool-box. When turning screws in hard-to-reach places, it



To magnetize a tool, simply insert it into the magnetizer several times and remove it.



One treatment has this screwdriver holding screws tightly for one-hand installing.

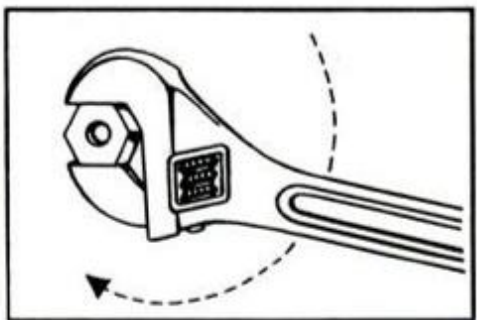


It's just as easy to demagnetize a tool: You simply rub the tool against rounded side.

can be slipped over the driver's shank for full magnetic power. It's sold at hardware stores or direct from Jay-Gee Manufacturing Co., 4191 Southwest 11th St., Fort Lauderdale, Fla. 33315.—H.W.

One good turn

The surest way to better craftsmanship is to use tools properly. According to the Hand Tools Institute, a loosely adjusted (adjustable)



Pull the wrench as shown to tighten the nut; reverse the wrench to loosen the nut.

wrench can slip, causing damage to nut, wrench and, possibly, user. For the best use, tighten the jaws to the nut securely, and pull the wrench as shown.—H.W.

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.



Makes Over \$60 EXTRA a Week In Own Sharpening Shop!

"My Belsaw Sharp-All made me \$3,500 last year just in spare time. Now I'm going full time. It's great to be your own boss."

David Swanson — Utica, Michigan



Let Belsaw prove YOU can do it, too! 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 coupon for FREE facts on this money-making business. How we'll even finance you.

No Obligation — No Salesman Will Call

BELSAW SHARP-ALL CO.

711P Field Bldg. Kansas City, Mo. 64111

RUSH COUPON TODAY FOR FREE BOOK

BELSAW SHARP-ALL CO., Stan Field, Pres.

711P Field Bldg., Kansas City, Mo. 64111

Send details of FREE TRIAL OFFER and Free Book "Lifetime Security"

Name _____

Address _____

City _____

State _____

Zip _____

No obligation . . . No salesman will call



**JOIN THESE SHARP-ALL
MONEYMAKERS**

"Think the world of my Sharp-All. Am grossing \$4,000 a year on a part-time basis."

Lawrence Stevenson
E. Syracuse, New York

"There's excellent profit in sharpening . . . we now do about \$600.00 a month."

Ed Kissler, Jr.
Sarasota, Florida

"I average \$5.00 an hour part time and business gets better all the time."

Roy Jennings
Sandwich, Illinois

'What to do if you're teed off at athlete's foot.'

by Hale Irwin



"The only way I can keep my feet feeling up to par is to use Dr. Scholl's Solvex® Athlete's Foot Products."

When you feel the first itch of athlete's foot, just apply Dr. Scholl's Solvex Ointment or Spray. Solvex kills athlete's foot fungi on contact. And helps control the itching and burning of athlete's foot.

And, if you want to beat the itch before it starts, try regular applications of Dr. Scholl's Solvex Powder. It absorbs the moisture that athlete's foot thrives in and helps prevent reinfection.

"Face it, who knows more about feet than Dr. Scholl's? Their Solvex keeps my mind off my feet. And on the ball!"

DrScholl's



© 1979 Scholl, Inc.

PHOTO HINTS

Forget-me-not



When packing or repacking photo gear, it's easy to leave behind a minor accessory or even a lens if you're in a hurry. An inventory card kept in your bag lets you check off each item as it goes in.

—Bob Berger

110 on a tripod



A ¼-20 nylon nut glued to the base of a 110 camera makes it suitable for use with a tripod. Cyanoacrylate glue works well.

—Charles F. Dayton

Rock around the clock



Tape a ¼-inch rod, slightly off center, to the underside of a developing tray. When prints are in the solution, set the tray rocking. The liquid will surge to and fro several times before stopping. By repeating this agitation every 10 seconds or so, prints will be more evenly developed.

—Robert Hertzberg

Foiled again

Cardboard covered with aluminum foil can be used as a reflector to bounce sunlight into shadowy areas when shooting outdoors.

—Margaret Shauers

YOUR FIRST SALE WILL PROVE IT!

The Big Ones Come Fast with Seamless Spray **ENERGY SAVERS!**

Through a series of circumstances created by inflation, I can now offer one of the most unusual opportunities in the history of direct selling. And best of all, you need no specialized experience to handle it. Absolutely none whatsoever!

If you've done any selling at all you know you can't make it anymore selling nickel and dime items. You can't afford to bust a gut selling a half dozen orders a day and wind up making \$25 to \$30. You need a necessity that everybody needs — that's quickly and easily sold because it solves problems born out of the inflation.



We call our process SEAMLESS SPRAY. It fills a vacuum created by the soaring price of new roofs. Roofs everywhere are leaking — in desperate need of repair. Using our Seamless Spray Equipment, factories, plants, shopping centers, schools, hospitals, apartment complexes use their own maintenance people to renew, waterproof, insulate these roofs at a cost of less than 12 cents per square foot. They save money, save energy, too. We loan

equipment absolutely free. On the average Seamless Spray order you make over \$500. You need absolutely no experience in our business. Our program is organized step by step for easy, successful use whether you sell General Motors (they are Seamless Spray users) or the corner garage.

When I tell you, PACE saved one school \$28,400 with Seamless Spray roof renewal, you'll understand how fast you eliminate sales resistance. Your market is pre-sold. Roof contractors with their exorbitant prices hand you the business on a silver platter.

Give PACE as little as 8 hours a week — that's all we ask. Once you start making \$500 and more on one Seamless Spray order, then you'll consider full time PACING. In addition to Seamless Spray you'll also get our Siliconized PARK-KING Blacktop Sealer — our Liquid Metallic Siding, another Energy Saver that gives winter and summer insulation — and a complete line of highly specialized Labor-Saving One-Coaters designed to save big money on all kinds of building maintenance. Each meets the BIG SELL concept, where you can make a Big Pay-check every day you make calls with Pace.



PRODUCTS, INC.

Dept. PM8-80
81st and Indiana
Kansas City, Mo. 64132



Average school
Seamless Spray
pays over \$500.

This sale to a shopping
center paid \$2,687.66.



FIRST SALE PAID

Byron Fisher .. \$1,015.60	Ben Palzer \$ 551.54
Larry Lucas ... 519.65	George White ... 506.75
Dean Farver ... 748.26	Al Murray 1,087.13
Al Cornman ... 904.80	John Trueman.. 1,357.96
Dan Mathews .. 1,213.25	Ed Donaldson.. 1,175.25
Larry Richardson 890.82	Glynn Lewis ... 1,387.44
Bruce Montfort 894.86	J. W. Huyssoon 929.60
Gordon Kirsch .. 658.22	Morris Barker .. 768.11
Cayle McAllister \$484.51	



I hope you'll mail the coupon today, so we can rush everything you need to get you off to a great, fast, big selling start. You'll like all the help we give you!

Dick Rogers

Dick Rogers, President

PACE PRODUCTS, INC., Dept. PM8-80
81st and Indiana
Kansas City, Mo. 64132

I'd like to try your BIG SELL, Mr. Rogers. Please rush all this exciting information free by mail, without obligation. No one is to call on me.

Name _____

Address _____

City _____

State _____ Zip _____

CAR CLINIC

SOLUTIONS FOR MECHANICAL HEADACHES

BY MORT SCHULTZ



Two years too late

Since the day I purchased my 1978 Ford LTD with 400-cu.-in. engine in December 1977, it has surged when being driven on the highway. The car, which now has 19,000 miles, acts as if it's not getting the proper amount of fuel. I've taken the car to three different Ford agencies. None have been able to correct the problem. I've been told that Ford was having trouble with this engine, but I've been assured a solution is imminent. How much longer must I wait?—Fredrick R. Martindale, San Pierre, Ind.

No longer. The solution you've been seeking came to light 2½ years ago, in the form of Article 3199, Service Bulletin 158 (5/23/78). Among other things, it calls for replacing the carburetor main metering jets with a different design (part No. C3TZ-9533-C), changing the float-level setting, installing a connector (part No. 383003-S) in the hoses to the air-cleaner bimetal sensor and installing an EGR restrictor (part No. D8AZ-9P753-A) between the EGR valve and the spacer.

Although your car has 19,000 miles and is no longer covered by warranty, you shouldn't have to pay a cent to have it fixed. After all, the dealer fouled up by not checking his service bulletins. If you get any flak over the bill, demand to see a Ford zone representative.

Save your turbocharger

In reference to your advice on the GM turbocharged V6 engine a while ago (Feb. '80), I came across an article in PRO Sales and Service that reports a prime cause of turbocharger bearing failure—even more so than not changing oil every 3000 miles, as you emphasized. The procedure is a little more than what a dealer might normally do, so I'm passing the tip along, hoping you'll convey it to PM readers.—Ed Braithwaite, Forest, La.

Thanks, Ed. This is one of those tips which come along once in a blue moon that can save a guy *beaucoup* bucks for a new turbocharger. Says

PRO Sales and Service, which is published by Chevrolet:

"Many 1980 Monte Carlo models equipped with turbocharged V6 engines require special procedures when the oil is changed. Oil and oil filters should be changed every 3000 miles. When refilling, however, technicians must prime the oil feed line to the turbocharger. Running at 120,000 rpm, the turbocharger could be ruined without oil. These are the steps to prime the feed line:

- Disconnect the ignition feed wire from the distributor.
- Crank the engine until the oil warning light turns off.
- Reconnect the ignition wire.

This procedure will bring up the oil pressure without the possibility of the engine starting."

Although the article applies to the Monte Carlo with turbocharged engine, the advice is applicable to all turbocharged engines.

Master charge

I recently experienced a problem with my 1978 Plymouth Horizon which seems to be common with Horizon and Omni. The alternator ceased to provide output, and the battery was drained of power. Cleaning oxidation from the alternator-output

terminals and mating harness connectors appears to be a temporary fix, but I believe Horizon-Omni owners would appreciate any information you might have concerning how to make a permanent fix.—Francis J. Donnelly, West Milford, N.J.

No sooner asked than done. Inspect the alternator field terminal connections for:

- Loose wiring-harness terminals and signs of melting terminal insulators.
- Signs of arcing or overheating.
- Distorted or bent terminals.

If any of these conditions exist, field connections should be replaced, using Service Package 5211772. The procedure is outlined in Service Bulletin 08-27-79 (11/5/79). It applies to 1979, as well as 1978, Omni and Horizon.

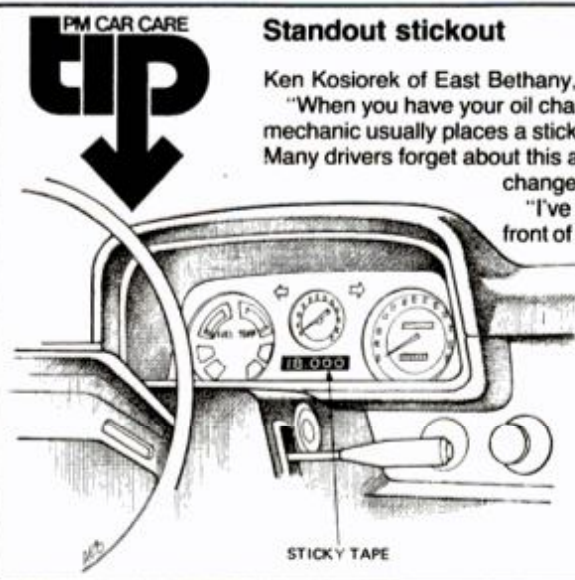
There are two other service bulletins regarding inadequate alternator performance on these two cars to which a dealer's attention should be drawn. One is No. 08-21-78 (8/7/78), which discusses an intermittent loss of alternator ground on Omnis and Horizons built before May 1, 1978. The procedure calls for installing a new ground strap (part No. 5211756), using a new cadmium-plated through bolt (part No. 5206804) on the alternator housing.

The other service bulletin is No. 08-17-78 (4/17/78), which discusses the critical role of proper alternator drive-belt tension on alternator performance.

Waving the yellow flag

I recently took my 1978 VW Rabbit with gasoline fuel-injected engine to the dealer for a tune-up to correct a rough-running problem on initial start-up. The car has 26,000 miles on it. I was told that the injectors were becoming plugged, largely due to

(Please turn to page 58)



Standout stickout

Ken Kosiorek of East Bethany, N.Y., offers this splendid tip: "When you have your oil changed by a dealer or service station, the mechanic usually places a sticker recording mileage on the door jamb. Many drivers forget about this and, thus, exceed the recommended oil change interval," writes Ken.

"I've got a way to keep that information in front of me all the time. When I change oil, I use a labeling gun to stamp out on sticky plastic tape the mileage at which I next want to change oil. I stick the strip on the speedometer window where it doesn't interfere with the instruments. I haven't forgotten to change oil since the day, some years ago, I thought of this idea."

Thanks again for a great tip, Ken. Your engine will reward your thoughtfulness with years of hassle-free service.



Come to where the flavor is. Come to Marlboro Country.



**Marlboro Red or Longhorn 100's —
you get a lot to like.**

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

17 mg "tar," 1.1 mg nicotine av. per cigarette. FTC Report Dec.'79

CAR CLINIC

(Continued from page 56)

"bad" gas, and that it would soon cost me \$500 to replace them. Isn't there some simple method of cleaning this costly injector system, so it doesn't have to be replaced?—Gary L. Myhre, Willmar, Minn.

Watch it, Gary. There's a chance you may be talked into spending a lot of money needlessly.

Replacing the injectors should cost \$20 to \$30 an injector—a total of \$80 to \$120. However, if the dealer is saying that the main fuel-metering regulator also must be replaced, then the \$500 tab is about right. It's rare, though, for that regulator to go bad in 26,000 miles. VW has not experienced any appreciable rate of regulator failure.

There is a way of cleaning injectors in an attempt to avoid replacing them. But the dealer you patronize has to be equipped with an injector pump, which is often referred to as a "pop tester." The unit produces high and sudden pressure to blow out injectors and test their spray pattern.

All in all, if I were you, I would consult a few more dealers, or shops specializing in fuel injection sys-

tems, before committing myself to a \$500 repair.

Just plain mad

In your March 1980 column, you said 1971-73 Capri models were being recalled to repair a problem that may cause the front seat to collapse backward. I've asked a local dealer about this recall (I have a '73 Capri with this exact problem), and he said, "No such thing." Whom can I contact to

get this repair made?—Dennis P. Roz, address unknown.

Man, if this doesn't burn a guy up! Tell that dealer the Ford recall campaign number is 368. Tell him, also, that if he doesn't get off the spot and make the repair, you want to see a service representative from the Ford zone regional office. If he still refuses to act, get in touch with the Ford Customer Service Dept. in Dearborn, Mich., and also call the

Full recovery

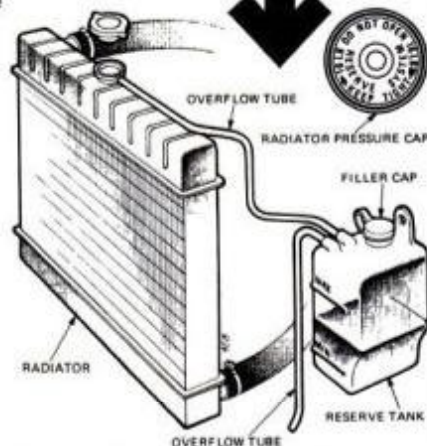
Coolant-recovery units are practically standard on new cars. The system consists, essentially, of a tube that is connected to a clear-plastic reservoir from the radiator. As the temperature rises and the coolant expands, instead of it being lost out the open overflow tube, as is characteristic of older cars, coolant flows into the reservoir. Coolant loss, therefore, is averted.

Older cars can now have coolant-recovery systems. Many companies make units that can be easily installed. One such kit (No. 3-2505) is made by Mopar to fit any make of vehicle. It consists of a reservoir, tube and special hard-to-open radiator cap. You can get it from a Chrysler dealer.

There are others on the market that can be purchased from other car dealers, or from auto supply and accessory stores for as little as \$3.95. The reservoir is mounted in a convenient location near the radiator.

PM CAR CARE

TIP



New from Stewart-Warner

MINI-PANEL

The world's smallest instrument panel alerts you to car problems before they cause costly damage.

Mini-Panel is the miniaturized early warning system that helps you spot problems that develop while you drive. (Unlike traditional warning lights that don't go on until it's too late.) Catch those problems early, and you'll save yourself a lot of grief, as well as expense.

Each gauge serves an important function, enabling you to monitor electrical, cooling, and oil pressure systems at a glance.

Mini-Panel is so compact you can mount it on top of your dashboard—without obstructing your view of the road.

It's easy to install* with no drilling or bolting. No unsightly wires, so you have a professional-looking installation.

You'll find Mini-Panel at auto supply stores and the automotive section of leading retail stores.

STEWART-WARNER ESTABLISHED 1947

We'll send name and address of your nearest dealer.
CALL TOLL-FREE 800-621-5199. IN ILLINOIS 800-972-5855.

*Mini-Panel fits U.S. made AMC, Chrysler, Ford and GM vehicles; adapters are available for most imports.

Elmer's Carpenter's Wood Glue.

How the pros make it look easy.



Grabs instantly.



Aligns easily.



Even do-it-yourselfers can do it like pros with Elmer's® Carpenter's Wood Glue.

It's specially made to penetrate both hard and soft woods, grabs instantly, yet you can still realign the joint before it sets. After drying, it forms a heat and water resistant bond that's stronger than the wood itself.

Elmer's Carpenter's Wood Glue is also sandable, paintable and resistant to gumming. What's more, its solvent-free, non-toxic* formula quickly washes off hands and wood with water.

Now what could be easier than that?

For plans of the Elmer's Dollhouse, please send \$2.00 in check or money order (no cash or stamps) to: Elmer's

Dollhouse, P.O. Box 157,
Hilliard, OH 43026. Allow
up to 6 weeks for delivery.

*As defined by Federal Hazardous Substances Act.

© 1979 Borden Inc.



Elmer's. When results count.

National Highway Traffic Safety Administration at 800-424-9393.

For the good of society

My 1980 Chevrolet Citation (four-cylinder engine and manual transmission) starts instantly and runs well for about 30 seconds. Then it all but refuses to move, unless I tie a string to the choke activator rod and pull the choke open. The dealer says everything is okay. "These new cars just have to warm up before they can be driven," he says. He suggests I start the engine and go back in the house for another cup of coffee to let the engine warm up. Poor advice in a fuel-conscious society, don't you think?—T.M. Crocker, Colorado Springs, Colo.

Awful advice, in any society, T.M. This guy is shirking his responsibility. The engine is obviously getting too much choke. The cause could be an improperly adjusted electric choke bimetal or an improperly adjusted choke. Although this is supposedly a nonadjustable choke, don't believe it. GM has issued several service letters to dealers, telling how to make this adjustment in cases such as yours. But it is tricky and takes work, which is maybe why the dealer gave you that advice.

If your dealer doesn't cooperate, try another GM facility. You're not locked in to this particular guy, although you bought a car from him. A GM spokesman told me that, in the end, if no one satisfies your complaint, you are entitled to have the carburetor replaced under the terms of your warranty. If it comes down to it, call the GM zone office.

Old(s)-timer

I have a 1956 Oldsmobile Super 88 that's a gem, except for a wrinkled left front fender. I've looked around, but can't find a replacement. Do you know where I can get a new fender?—Carl Gill, Silver Spring, Md.

Nope, but there's a good chance you'll find your fender by scanning *Hemmings Motor News*. This monthly magazine is filled with ads for old and antique cars and parts. Write Box 100, Bennington, Vt. 05201, for subscription information.

GOT A PROBLEM WITH YOUR CAR?

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 published in the column.

Safety and service tips

■ If you have a 1971-78 Plymouth Voyager, Dodge Sportsman or Dodge van with power steering, Chrysler wants you to take the vehicle to a dealer so that it can be checked for a possible crack in the left frame rail—a crack that may, at some time in the future, affect the steering.

About one million vehicles are involved in the recall. Chrysler has said that it will inspect and repair any of the vehicles that are involved, if necessary, at the company's own expense.

■ A memo from Chevrolet warns that there are two different types of temperature sensors for every engine.

One type is used with an indicator light, while the other kind is used together with a temperature gauge.

They'll both fit, but if you should accidentally get the one that isn't supposed to be used, you'll either receive no gauge reading, or you'll wind up with a light that stays on all the time.

■ Ford reports in its Motorcraft Service Bulletin 5, Article 51, that any vibration and noise that occur between speeds of 40 and 55 mph in a 1979 F150 pickup having a 3.50 rear axle may be caused by imbalance in the drive line.

The bulletin describes how you go about relieving the condition and calls for the installation of a vibration damper kit (part No. D4TZ-10110A14-A).

PM

Treat yourself like company.



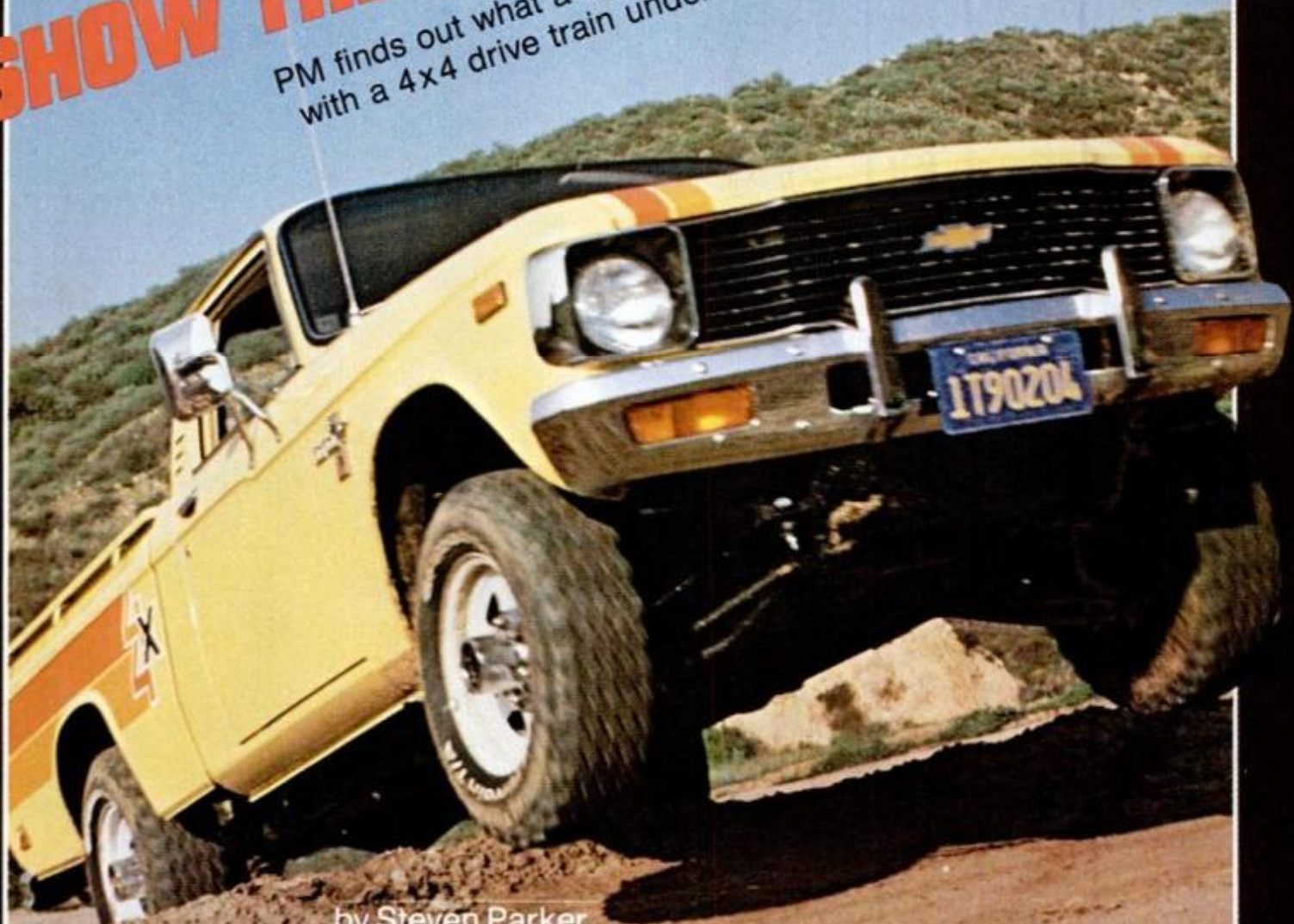
Seagram's V.O.
The symbol of imported luxury. Bottled in Canada.
Enjoy our quality in moderation.

Canadian whisky. A blend of Canada's finest whiskies. 6 years old. 86.8 Proof. Seagram Distillers Co., N.Y.C.

FOUR NEW MINI PICKUPS

SHOW THEIR OFF-ROAD MUSCLE

PM finds out what a lightweight can do with a 4x4 drive train under the bed.



by Steven Parker

Chevy Luv, built by Isuzu, creates a hill in our off-road torture test. Luv has manually locking hubs, 7.5-in. ground clearance and a skid plate to avoid damage to the engine.

A long time ago the only ways you could go adventuring in the boondocks were to build your own dune buggy or find a surplus Army jeep and restore it. When the car companies got wise to the off-road trend they quickly came on the scene with a multitude of brawny 4x4s. While these big-engined vehicles got you as lost as you wanted to get, they consumed fuel like a NASCAR racer.

In an effort to combine fuel economy and off-road capability a new phenomenon was born: 4x4 mini pickups. These little brawlers could go anywhere the big guys went but do it a lot cheaper.

Our 4x4 off-road enduro test includes all the 4x4 mini pickups on the market. Three of them, the Subaru Brat, Toyota and Chevy Luv have been around for a while. The fourth, Datsun, is



brand new and was reported on in June. (See *Bashing through Baja*, page 92).

The trucks are very similar in many respects. All are equipped with part-time four-wheel drive, all have front disc brakes and they all sport plenty of ground clearance and protection for undercarriage components.

It didn't take long for Japan to note that 40 percent of the Amer-

ican light-truck market was being equipped with *factory* four-wheel drive, not the after-market option that could cost up to \$1500 above the price of the standard truck.

Subaru was the first to catch on to the trend. Fuji Heavy Industries' BRAT (Bi-drive Recreational All-terrain Transporter) came out in the mid-'70s and set the stage for a dramatic image change for underrated Subaru. It didn't take the country by storm, but the BRAT didn't go unnoticed, either.

Toyota and Chevrolet (Isuzu) came on with their own models in 1978 at about the same time.

Just what exactly is a mini pickup? Well, for the most part they weigh in at about 2200 pounds and can carry about 1100 pounds of payload. They are quick off the line, are fuel efficient and they have started an entire industry of after-market equipment manufacturers. But, most of all, mini pickups provide maxi-fun.

All the 4x4 vehicles we tested

(Please turn to page 102)



Toyota's mini pickup (left) has the biggest engine of the lot, 2189 cc, and is also the most expensive, \$6498. The interior (below left) is also the most functional of the four pickups. It has 7.9 in. of ground clearance and its rugged construction outshone the competition.



Subaru Brat (right) is least expensive and the most fun, has two jump seats, full carpeting in the bed. Spartan interior (left) reflects low sticker price. It's closest thing to a 4x4 sports car.



Datsun's 4x4 (top right) is the newest of the four and Datsun's first entry into this market. Interior (top) is cluttered. Chevy Luv (right) is the most comfortable on pavement; interior (above) was the most accommodating.



HOW TORNADO LABS TAME GIANT TWISTERS

Scientists on several fronts are closer than ever to unraveling the mysteries inside nature's monstrous funnels.

by Franklynn Peterson
and Judi R. Kesselman

Television newsman Wally Hubbard was driving back from Muncie, Ind., where he'd bought a weather-channel crystal for his scanning receiver, when he heard on the radio that police had spotted a tornado nearby.

"At that moment, the hail was falling so hard on my car, it was like sitting inside a corn popper," Hubbard recalls. "But I stopped anyway and looked out the window toward the south—and there was the tornado. I did what any newsman would do—I grabbed the old windup Bolex movie camera out of the back seat and started shooting." He got off four 30-second bursts before the tornado disappeared.

Hubbard's two minutes of film gave tornado experts their first conclusive evidence of something they had suspected for many years. In his frames, the main funnel divided into four

Tornadoes are spawned in thunderstorms when fronts collide. Shown here in simplified form, a typical big tornado system comprises a slowly circling parent tornado cyclone and two main vortices, resembling wheels within a wheel. Vortex 1, in cool air, spins harmlessly up near cloud ceiling. Vortex 2 has picked up enough energy in warm air at southeast section of

parent cyclone to reach the ground. There, it has divided into still-smaller vortices. Parent cyclone will soon steer Vortex 2 back toward cool air, where it will shrink up into the cloud. Then, Vortex 1 will touch down. Purdue scientists theorize that the up-down movement of dangerous vortices causes notchlike paths of destruction that follow the worst twisters.

AREA DAMAGED
BY VORTEX 1

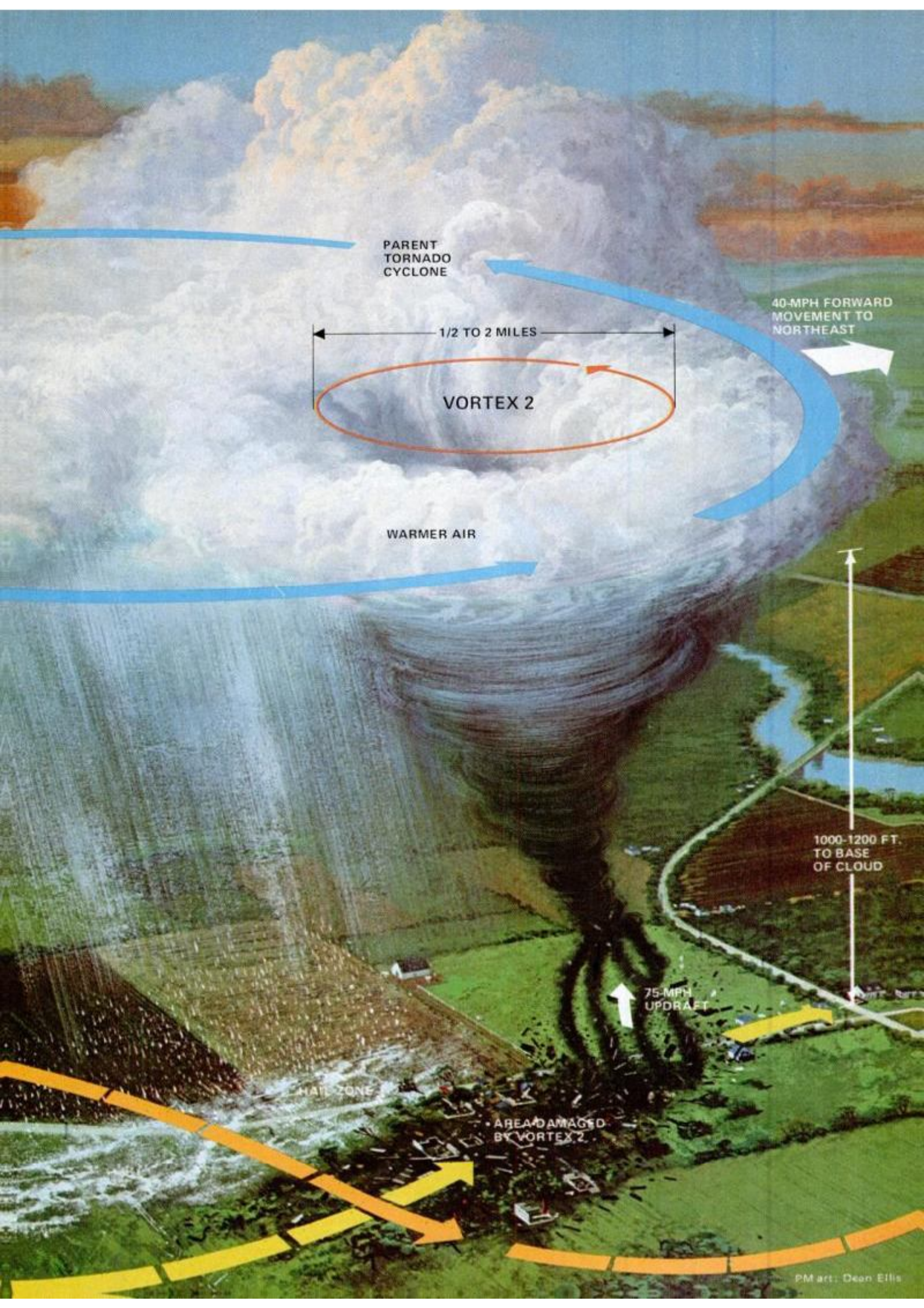
PATH UNDER
VORTEX 2

PATH UNDER
VORTEX 1

RAIN ZONE

COLDER AIR

VORTEX 1



PARENT
TORNADO
CYCLONE

1/2 TO 2 MILES

VORTEX 2

WARMER AIR

40-MPH FORWARD
MOVEMENT TO
NORTHEAST

1000-1200 FT.
TO BASE
OF CLOUD

75-MPH
UPDRAFT

HAIL ZONE

AREA DAMAGED
BY VORTEX 2

PM art: Dean Ellis



Two tornado funnels (above), dropping out of the same cloud, struck Nashville, Tenn., in 1974. That year, twisters devastated 10 southern and midwestern states and Ontario, killing more than 337. Single-funnel tornado (left) pulled dirt into a black cloud over a road in Stratford, Tex., in 1978. However, the resulting damage was minor.

funnels, each snaking over the land like an inverted Hydra monster.

Hubbard's confirmation six years ago that the most powerful tornadoes have more than one funnel made twisters seem more terrifying than ever. But since then, scientists have expanded research on at least four fronts to unravel the mysteries of tornadoes:

■ In an Indiana laboratory, Purdue University scientists are making

and studying miniature tornadoes to find out how to tame them.

■ U.S. weathermen in Norman, Okla., are monitoring multicolored screens displaying blotchy returns from radar signals. By reading the colors correctly, they can pinpoint tornadoes in the making.

■ Other researchers are building scale models of homes, and watching them come apart in wind tunnels. Their work suggests inexpensive

building techniques that should make homes of the future safer even in screaming winds.

■ New research also suggests how to avoid injury during a tornado. The major strategy: Seek shelter on the lowest level of a building, away from windows or walls. *Don't try to drive from a tornado's path.*

Most of the approximately 1000 tornadoes that strike the United States annually touch down in a band nicknamed "Tornado Alley." But the band is misnamed: the "Alley" is actually a broad corridor, stretching all the way from Texas to Ohio, between the Appalachians on the east to the Rockies on the west.

Weather maps and satellite photos can't begin to convey the fury of the tornado. Twisters often display a kind of bizarre personality, crumpling one house and leaving its neighbor whole, driving straw into fenceposts, spawning superstition and strange stories.

There's the story of farmer Howard C. Anderson and his cattle, for instance. Last April 7, Anderson heard reports of tornadoes in the vicinity of his Elgin, Tex., farm.

Around 5:45 p.m., he saw "the

Protection from wind—for \$85

With little extra work, material or expense, a builder can reinforce a medium-size home to withstand the force of all but the worst tornadoes.

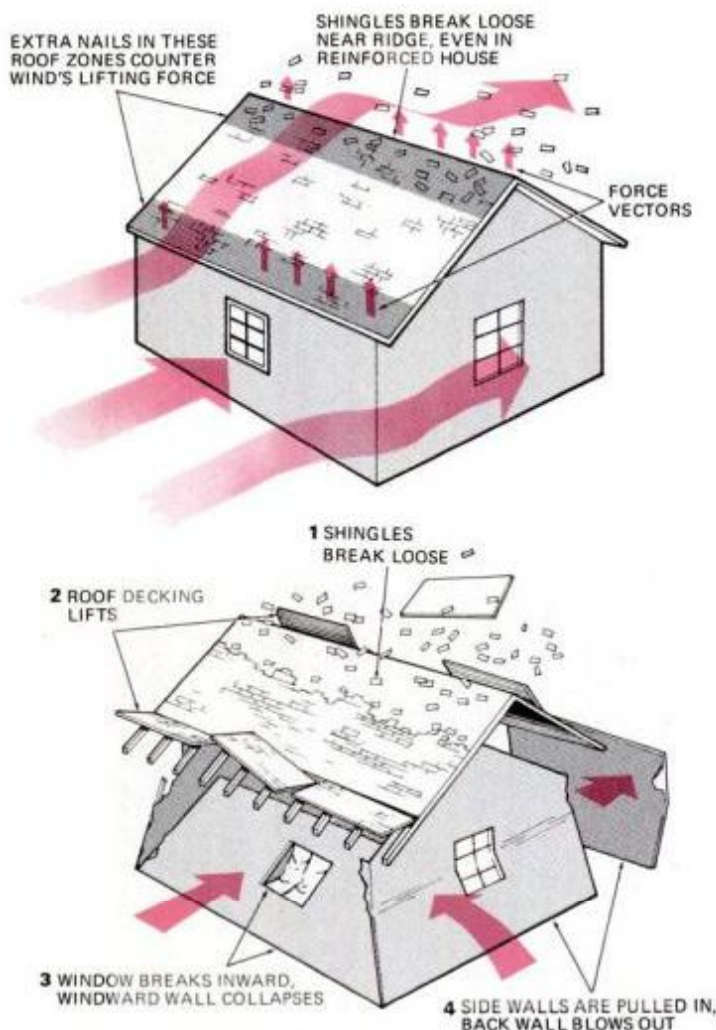
The drawing at right shows wind, typically from the southwest, flowing over house surfaces. Lifting forces are greatest near ridges and eaves (note force vectors), so the top priority is adding extra fasteners between roof decking and trusses in the darkened area on both sides of the roof. Cost for 10 pounds of 8d nails: about \$5. Better yet, add fasteners to the total roof for about \$15.

Second, strengthen roof-to-wall connections with "hurricane clips," metal rectangles with teeth punched out to bite into wood after being nailed in place. Cost of 50 or 60 of these, for installation around the roof's perimeter: about \$30.

Third, put in anchor bolts at six-foot intervals around the perimeter to strengthen wall-foundation connection. Cost: about \$40 for a 160-foot perimeter.

The lower drawing at right shows the sequence of failure in an unreinforced house, from lifting of roof decking to collapse of windward wall and side walls to blowout of back wall. But tornado research indicates builders can block this sequence, and provide protection against winds up to 180 mph, for about \$85.

For further information, write for free NOAA Technical Memo ERL NSSL-82, National Severe Storms Laboratory, Norman, Okla. 73069, or free pamphlets from the Institute for Disaster Research, Texas Tech University, Box 4089, Lubbock, Tex. 79409.—*John F. Weaver, Dr. Thomas M. Murray and Roland Weaver*



The other killers—hurricanes, floods, lightning

Even in good years, tornadoes kill dozens of people in the United States—the average was 50 deaths annually between the relatively mild years of 1974 and 1978. And the monstrously focused power of twisters terrifies people, even if they have never seen a funnel on their horizon. But hurricanes, floods and lightning easily rival the deadly power of tornadoes. Here's a partial listing of losses following assaults from other killer weather:

Hurricanes

Last year, Hurricane Frederic violently upheld the reputation of hurricanes as the most awesome storms to hit the United States. Spawned off the west African coast, Frederic swept across the Atlantic, past Puerto Rico and Cuba, hitting the U.S. mainland near the Alabama-Mississippi line. It ripped northward to Pennsylvania, New York and western New England, exiting from northern Maine. In its wake, Hurricane Frederic left five dead and an estimated \$2.3 billion in property damage, making it the costliest U.S. hurricane ever.

Frederic followed on the heels of another bad actor, David, a storm that generated winds up to 150 knots, making it the most intense of the season. As it moved through the Caribbean, it leveled the island of Dominica, leaving 56 dead and 60,000 persons homeless, and battered the Dominican Republic. The toll there: 1200 dead and 200,000 homeless.

Floods

In 1979, flood and flash-flood property losses reached an estimated \$4 billion, with more than 100 lives lost. In recent flood annals, this is topped only by 1972, when there were over \$4.4 billion in losses and some 550 fatalities.

April, as the poet said, is the cruelest month. After one of the wettest winters in years, soil conditions in southeast Texas last year set the stage for flash floods. There were three periods of heavy rainfall during April, according to

the National Weather Service, causing some of the worst flooding in southeast Texas since 1973. Economic losses exceeded \$500 million, and there was one fatality. In southern Texas, four lives were lost in flash floods.

The storm system moved eastward into Louisiana, Mississippi and Alabama, causing damage of nearly \$1 billion and claiming 15 lives. The rising flood toll of recent years is attributed by the National Oceanic and Atmospheric Administration to increasing urban development along rivers and in narrow canyons in mountainous areas.

Lightning

For many years, more deaths were attributed to lightning than to any other form of killer weather. One study shows that from 1940 to 1973, there was an annual average of 204 lightning fatali-

ties. Tornadoes accounted for 132; floods, 90, and hurricanes 54.

Since 1953, lightning deaths have been on the wane—the number now averages 100 annually—but the change may be largely statistical. Prior to '53, statistics included deaths from lightning-caused accidents—felled trees, forest and home fires, and downed power lines.

The records suggest where *not* to be in a thunderstorm: the most dangerous places are under a tree, on a golf course or on or near open water.

On the other hand, the value of being inside a metal vehicle during an electrical storm was made vividly evident in Plainview, Tex., when a pickup truck was hit by a bolt. Of four persons riding in the truck's open back, three were killed, one injured. Three others inside the cab were unhurt.—*John Pearson*



Hurricane Frederic lashed Puerto Rico, then ripped through mainland last year.

blackest cloud I've ever seen" approaching his land from the west, and took shelter in his home. After the storm had blown through, Anderson looked out toward his pasture. He was surprised to see half a dozen head of cattle on a hill and went outside to see how they were. Then:

"All of a sudden, here came five cows and calves.

"At first I didn't know whose they were," Anderson told us, "because they were caked with mud. As they came closer, I saw they were mine ...

They were making a beeline back to the pasture." None was injured.

Anderson followed their tracks eastward. There were a couple of extraordinary things about those tracks. They stretched out straight for a full two miles from the farm, through land so furrowed by wind that it looked like frozen ocean. *And the tracks were only going one way.* How did Anderson's cattle make the round trip of roughly four miles in 20 minutes, averaging 12 mph?

"My cows and calves don't run that fast," he said. "They had to be

rolled, or picked up and tiptoed through the air by the wind."

To understand the bludgeoning force behind such occurrences, Purdue scientists have scaled tornadoes down, turning twister models on and off like a fan.

In a lab on the top floor of Purdue's Geoscience Building, Professors John Snow, Ernie Agee and Chris Church started by erecting a 10-foot-wide, carousel-like aluminum frame, 2 feet high. They perched the apparatus 2 feet off the

(Please turn to page 116)

IT'S NEW
NOW

Solar troller

It had to happen. Six 1×4-foot photovoltaic panels perched on the sarray top of this boat power its electric trolling motor. Fully loaded with six passengers, the 14½-footer is said to hum along at 3 mph.

Each panel puts out about 12 volts and 3.5 amps. Panels are wired in parallel. The boat can run on solar alone, on six lead-acid batteries, or both. The panels can also charge the batteries. Nordskog

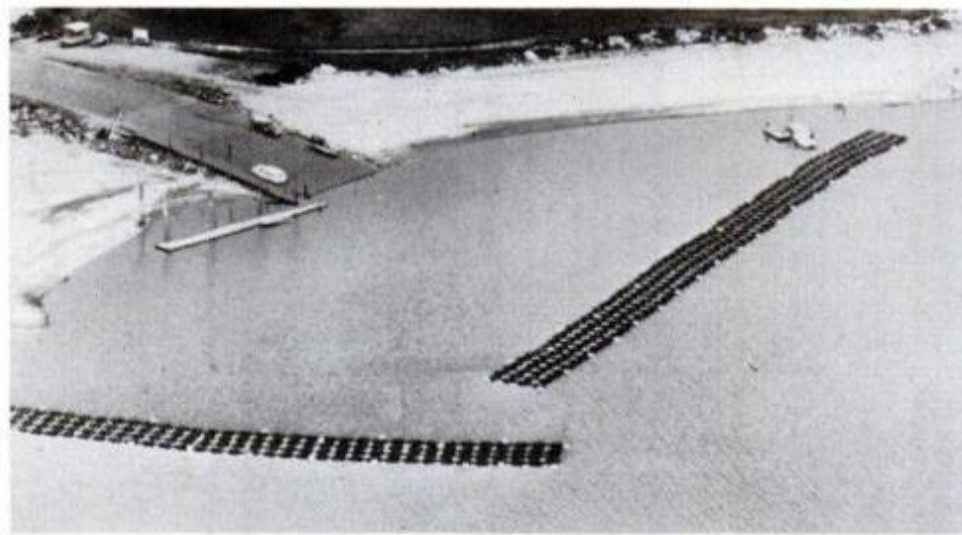
Industries of Van Nuys, Calif., put the drive system together, and Wellcraft Boats of Sarasota, Fla., built the boat. Wellcraft will soon market the boat; solar add-ons may be sold separately.



Reviving tired tires

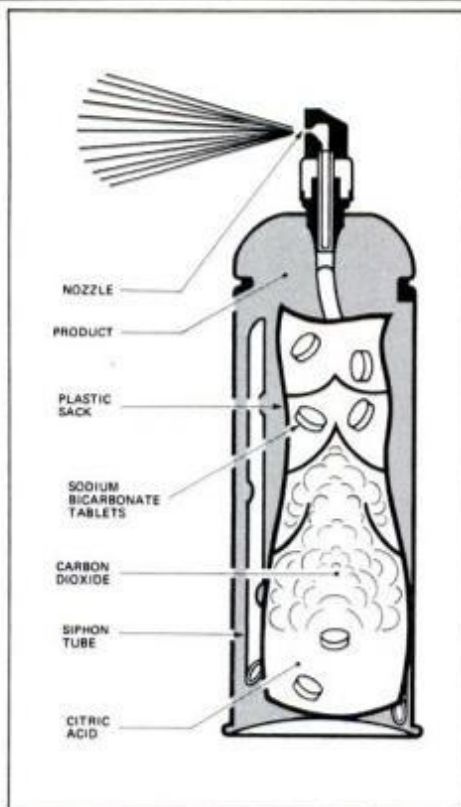
The use of old tires to form low-cost breakwaters is not new, but the two shown here are the first commercially built facilities, according to Topper Industries of Vancouver, Wash. The tires are filled with polystyrene foam via a patented

process and then linked together. The resulting, floating breakwater is said to be cheap and easy to construct, able to withstand freezing, and a snap to move. A 330-foot project for Exxon (right) took six weeks from inception to completion.



Pressure tractics

Enviro-Spray uses nonflammable carbon dioxide (CO₂) as its propellant in yet another effort to supplant fluorocarbon aerosols. Developed by Grow Group Inc., it is said to spray more of the contained product, more evenly and in any position, than its competitors, including hydrocarbon propellants. A compartmentalized plastic sack containing citric acid is prepressurized with CO₂. When the spray button is pushed, the sack expands, breaking the compartments and allowing sodium bicarbonate pellets to drop into the citric acid, creating more CO₂. Since the propellant never touches the product, virtually anything can be dispensed. Also, a whole can may be sterilized at temperatures up to 250° F., unthinkable with other propellants.



Bagpipes skirl electronically

Pipes on these bagpipes are strictly for show; microprocessor circuitry enclosed in the bag generates the musical tones. Keltic Pipes were designed to make it easier to learn the bagpipes by allowing the student to concentrate on fingering techniques. Here the musician holds the electronic chanter used to send pulses to the instrument's amplifier. A speaker is in the bag, but headphones can be hooked up for practicing without bothering others. Unit runs on batteries or a.c. voltage.



An absorbing tale

If that egg is hit hard enough, even the Sorbothane surrounding it won't keep it from breaking, but the polymer will absorb up to 95 percent of the impact. Originally designed to simulate the energy absorption of human flesh, Sorbothane is said to have the dimensional stability of a solid but some of the hydraulic properties of a liquid. The British-developed substance is already being used in sports shoes and sports protection equipment, for noise and vibration damping, and for sealing applications.

Terror on wheels. by design



A multimillion-dollar theme park is only as good as its hottest thrill ride, which is why screams warm an engineer's heart.

by Robin Nelson

At Kansas City's Worlds of Fun park, the Orient Express coaster dives toward the awesome Kamikaze Kurve (opposite page).

PM photos: Hank Young



Orient Express coaster's state-of-the-art claim is based mainly on a feature called the "boomerang" by the ride's designer, Arrow Development Co., and the Kamikaze Kurve by the park's thrill



marketers. Within 13 seconds the coaster enters (left photo) and leaves (right) a kidney-shaped, double-barrel-roll track section, inverting twice and blasting back out the same way it roared in.

Of the 28 people squirming into the coaster's seats and pulling the padded restraining bars down over their heads, probably two were older than 20. One was an electrical engineer working for Arrow Development Co., which had designed and built Worlds of Fun's Orient Express roller coaster. The other was me. The rest were Kansas City kids lucky enough to win a radio station call-in contest that gave them a free shot at the Midwest's hottest new ride on the day before its official opening.

The engineer, who had just finished—hopefully, I should say—the final adjustment on a photocell sensor plus microprocessor control system that would oversee safe braking and interval operation of the



Small rollers keep coaster on the tracks.

three coaster trains, grunted as he lowered himself into the seat. It was snug on me too. "Well," he said, glancing over with an odd, fleeting smile, "guess I ought to ride the

thing once, anyway." Taking a last quick glance over the side at the insubstantial-looking polyurethane-tired wheels (photo at left), I felt the brakes let go as we slid into a short, dark tunnel from the station. As we ratcheted up toward the 117-foot-high first drop in a brisk prairie wind, I was prepared for the worst.

It was over in two and a half minutes. The first drop was a screamer, like every coaster I've ever been on, and you pulled up into and out of the first loop almost before you knew it was happening. Time for one breath and into the second interlocking loop—even tighter, if a little slower—and then, while you were congratulating yourself on making it this far without letting any shrill, piercing sounds escape the lips of a

44-year-old man wearing a London Fog trenchcoat, it happened. An unusual thrust of sideways pressure threw you smack into the Kami . . . ka . . . ze Kuuurrve!

It is not possible to remain completely oriented through this 13-second maneuver: An initial barrel-roll shoots you out at right angles to your original course of entry; pulling up sharply, you flip again and come out heading back in the direction from which you came.

The effects of the Kurve were still with me a few seconds later as I pulled into the final braking section, following just one more sharp, but level, turn. The engineer looked relieved, and satisfied. "I think," he said reflectively, pausing to let a surge of giggles from exiting riders die out, "we've got a winner."

Since Worlds of Fun owner Lamar Hunt has invested \$4 million in the system, it had *better* be a winner. The park's marketing brains are banking on it, in fact, having hiked the entrance fee to slightly over \$10 for the 1980 season. Ten bucks is still considered a never-exceed figure by most people in the theme-park business, but with a draw like the Orient Express—the country's "state of the art" roller coaster—Worlds of Fun made the move with confidence. (With numerous promotional rates and discounts in effect, few customers actually pay full price anyway.)

It looks steeper than it is

There are probably 20 or more parks in the country today claiming superlative—tallest, fastest, scariest—thrill rides. Yet engineering dynamics confine most amusement rides to limits of about a 55° initial incline and top speed of under 70 mph. It may look straight down when you pitch over the top of that first drop, but 55° is what you're getting. And it doesn't take an engineering degree to figure out that while designers want drops as steep as safely possible for thrill potential, the speed built up must be killed off one way or another before the train completes a circuit.

Make the ride too long and the park can't move enough people through it per hour. Too abrupt a pull-up and you risk back and neck injuries from G-force compression. Carry too much speed into mechanical braking systems and maintenance problems, or something worse, will be the result.

The speed that's a problem to kill off is also expensive to buy; gravity gives it up only as a function of the square root of height. Adding 20 feet to a 120-foot-high coaster, for instance, would only give it about 5 mph more, or about 65 mph at 140 feet, assuming a constant 55° incline. To get to 100 mph, you'd have to build a 400-foot drop. Thus, the promotional claims of highest, fastest and the like, bandied about in theme park advertising these days, are based on such minor in-



Heading into loop on the Loch Ness Monster at Busch Gardens, Williamsburg, Va.

crements that they have very little bearing on what the ride does to the pit of your stomach. With height (therefore, speed) bumping up against its practical limits, thrill ride designers have only the geometry of the track as a readily available avenue for pursuing more intentional terror on wheels.

"In the future," says design engineer Ron Toomer, "you'll probably see even more features analogous to high-performance aircraft." Toomer, who works for California's Arrow Development Co., helped conceptualize the "boomerang" feature that Worlds of Fun calls the Kamikaze Kurve (with a potential market in Japan, the designer prefers the former name).

In the past decade, the new geometry of roller coasters has provided a fertile market for both Arrow and West Germany's Schwarzkopf firm (story on

Telephoto lens gives thrill ride a "promotional" perspective; that's only a 55° drop.



opposite page). These two companies dominate the field and compete head-on for multimillion-dollar contracts. Interestingly, in working with gravity and geometry, the two competitors have evolved highly differentiated mechanical systems.

Different brakes and wheels

Take the track: Schwarzkopf tracks are bolted together with slip joints to allow for hot weather expansion. Arrow uses welded pipe-type track with no expansion joints—the system simply expands as a whole.

Wheels: Schwarzkopf uses a proprietary mixture of nylon and other materials for tires; Arrow uses polyurethane—just like roller skates. Schwarzkopf's three-bearing (one ball, two roller) system is sealed and lubricated with molybdenum disulfide; Arrow's two-roller bearing system is lubricated with ordinary crankcase oil (as weather warms, heavier oil is added to the system to keep the coaster speeds in line).

Both systems use automotive-type, metal-to-metal caliper braking systems. Arrow's single brake fin (cold-rolled steel) extends vertically underneath each car; Schwarzkopf has fins extending horizontally on each side of the car—and therefore more braking surface to grab. Arrow's brakes are activated (closed) by air pressure, relying on emergency pressurized tanks in event of compressor failure. Schwarzkopf brakes are kept inactive (open) by air pressure and then are automatically spring-closed in the event of power failure.

Says one park's ride operations manager, who has worked with both systems: "It's obvious that the European setup is more sophisticated—whether that's best depends on who is going to buy and run it."

But are they safe?

Safety questions arose earlier this year when an electronic malfunction on a Schwarzkopf-designed ride at Marriott's Great America park at Santa Clara, Calif., resulted in a fatal accident. Authorities in the field seem to indicate, however, that today's system design, including model and full-scale testing, photocell and magnetic sensors for interval control—even microprocessors—is resulting in essentially safer thrill rides than have ever been built. Yet both the cost and complexity of local maintenance have increased, and the consumer might be guided by the overall appearance of a theme park and the caliber of its employees as well as anything.

Over 100 million Americans visit theme parks each year. Fatalities on all amusement rides are averaging less than 10 per year—including ski lifts. Ironically, cable-suspended rides, the tamest around, account for far more fatalities than the rides designed to scare you to death. **PM**

Anton Schwarzkopf—just a simple 'pretzel' merchant

Today's cult of individualized roller coasters, those with names like "The Scream Machine" and "Mindbender," owes more to one man than any other. He is a former cartwright named Anton Schwarzkopf, 56, who employs roughly a third of the work force of the Bavarian town of Munsterhausen (population 1500). Because of Schwarzkopf, Munsterhausen is occasionally called "the Peenemünde of thrill rides."



A. Schwarzkopf

Schwarzkopf was contentedly operating the family cart and wagon business until 1955, when he visited an amusement exposition in Munich, 50 miles away, and got the idea that he could build a better merry-go-round. In a few years, he had worked up to bumper cars, and in 1964, Schwarzkopf designed and built the first roller-coaster system made from steel instead of the usual wooden trusses and supports. Since then, Schwarzkopf has registered 60 patents in the field and has produced upwards of 55 coaster systems that have been sold in countries around the world at prices ranging up to \$4 million each.

A number of Schwarzkopf innovations not protected by patent have been adapted by other manufacturers in the field. It makes him reluctant to discuss certain aspects of his designs. He will not disclose, for example, the exact composition of his wheel material—except to say that it includes nylon and Teflon in a combination hard enough to sustain high speeds, but not so brittle that it will crack under stress.

Perfecting the loop

In 1973, he began research on one of his most important projects: the loop. "We didn't invent it," he concedes, "since there had been a roller coaster with a loop at a Russian amusement park in the late 19th century, and one built at New York's Coney Island in 1901.



But they were too small and coasters going through them were subject to as many as 12 Gs. There were many injuries."

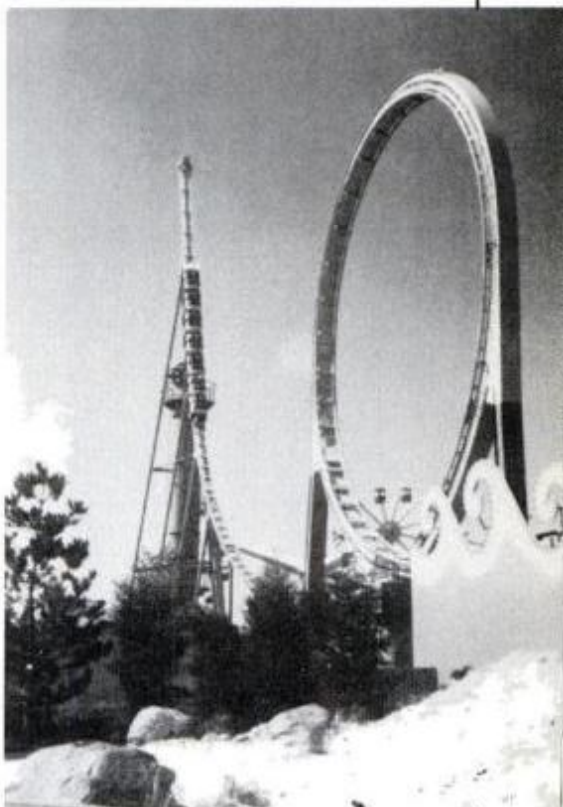
By comparison, astronauts at liftoff pull under 5 Gs. Besides being too small, those early loops were perfectly circular and this, as Schwarzkopf found out through experimentation, is not a good shape for a coaster. Trying a number of mathematically correct curves, Schwarzkopf and his associates found that a spiral in which the radius of curvature decreases at a constant rate would provide excellent geometry for a safe loop.

Thus we have the modern, teardrop-shaped loop, in which a coaster can maintain a minimum of 0.6 Gs at the top, keeping riders in their seats, without exceeding 6 Gs—and only approaching that briefly—as it enters and exits.

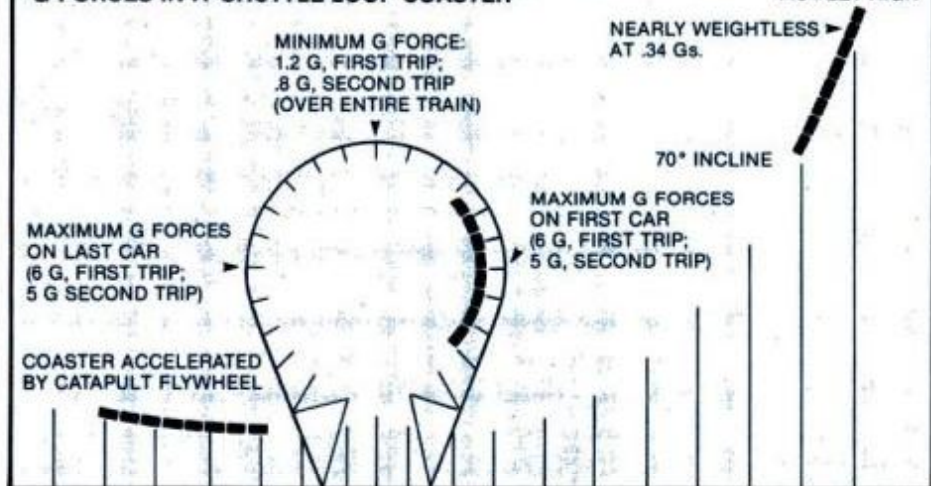
With his loop tested and proven in 1975, Schwarzkopf further developed cars, undercarriage, tracks and trusses now used every-



Simple wooden trusses supported test track at Schwarzkopf's works in Bavaria, where the teardrop-shaped loop (above) was perfected in 1975. An outgrowth was the Shuttle-Loop (below), in which counterweight or catapult gets train up to speed for forward/backward runs.



G FORCES IN A SHUTTLE-LOOP COASTER



Shuttle-Loop schematic shows the "nodes" at each side of the loop, where high-G conditions are encountered. First car of the train gets highest Gs on entry

side (right); rear car pulls highest on exit. After incline tower halts the train for the backward run, the situation is reversed. Moral: For least strain, ride mid-train.

where to support inverted thrill rides. When some American insurance underwriters questioned whether his restraining bar design would be safe under emergency circumstances, he flew them to Munsterhausen, put them on a coaster and had them braked to a stop at the top of a 70-foot loop—where they hung from the restraining bars until they got the point.

Schwarzkopf is exacting in his ideas on safety; if it were up to him, anyone who directly operates a thrill ride would have to be licensed.

For the future, Schwarzkopf envisions extending the inverted regimes on his coasters, with cars hitting 50 mph while suspended in upside-down straightaways.

"To design a coaster," he says, "you just have to think of a pretzel. And we have plenty of pretzels in Bavaria."—John Dornberg

Compact camp-cruising by kayak

The boat may be small, but your trip can be a long one. So far I've paddled about 3000 miles in my present kayak, and today's touring models make it possible to copy safely the Eskimos' mode of travel. But for the long solo passages I enjoy, I've found you can do some customizing and improve on a good thing.

A little planning can make a kayak cockpit as ship-shape as a submarine, with all essential safety and convenience gear stowed securely right at your fingertips. To plan placements aboard my 17-foot folding Klepper Aerius II kayak, I assembled the frame first without its

With a little customizing, you can turn a minicraft into a passagemaker

by E.P. Haddon

Hypalon hull-covering. In the past, I had tested arrangements for storage of gear and supplies in a Folbot and other kayaks I have owned. (My first was one I built from Dan Beard plans when I was 9 years old, just 62 years ago.) Fitting out hard-shell fiberglass

kayaks can be done in much the same way.

First, I installed a nylon pocket that holds a nylon storm suit ready for instant use. Next to it came a canteen and a quart-size plastic Gatorade bottle with sipper tube. These are attached to the inside gunwale next to a knee, and held in place with 1/2-inch nylon straps like those used on



This 71-year-old author-adventurer knows how to select and secure his gear carefully. He's looking forward to more long, solo, paddle-powered voyages.



Supplies are packed aboard for a month-long exploration of some of Lake Amistad's 850 miles of Texas and Mexico shoreline.

backpacks. On the opposite gunwale, four small tackle boxes are conveniently held in place with Velcro tabs. One drop of instant glue permanently attaches tabs on each box and matching tabs on the gunwale. No fisherman has ever had lures within such easy reach. A single Velcro tab secures a small, liquid-filled compass to the kayak floor or to the deck when traveling offshore or in foggy weather.

Because of a kayak's low center of gravity, particularly

(Please turn to page 120)



Stow canteens, foul-weather gear, anchor and fishing tackle where you can reach them easily. Uncovered kayak shows how.

New compact-cruise accessories

Mini-boats have minimum storage space for camp and cruise gear, but most have bow and stern compartments that can hold float bags with backpack-type essentials.



The Pocket Hotel, from Early Winters Equipment, needs no rain fly since it's Gore-Tex; it weighs two pounds, is \$128. From 7¼ feet, it folds down to a compact 4¼ x 15¾ inches.



Inflatable Voyageur Tour Paks, from Voyageur's Ltd., Gardner, Kan., open to store a sleeping bag, tent or supplies, and fit fore or aft in a kayak to provide extra flotation.

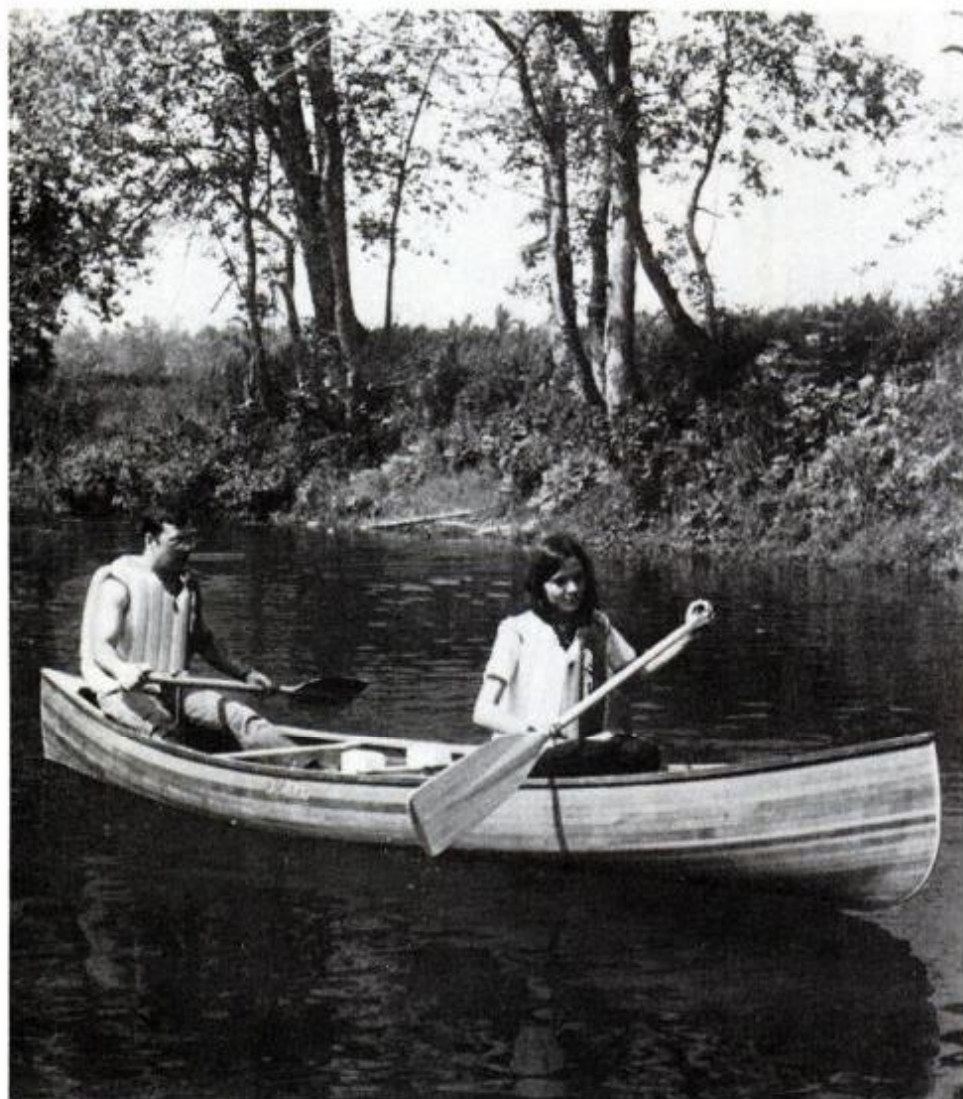


Adding only one extra ounce for the packer or paddler with a Coleman Peak 1 stove, the new stuff sack for the little cooker can also cushion a camera or fragile binoculars.



A bivouac sack of Gore-Tex that lets perspiration out without leaking rain in, the Early Winters Sleep Inn makes a \$69 bivy bag tent substitute to cover your sleeping bag.

New outdoor gear: Lighter



The classic look of a cedar strip-planked canoe is available for home builders in a Canoe-In-A-Box kit, complete with cedar and fiberglass, for \$645 from Old Town Canoes.

Spinoffs from space-age materials, production methods and electronics provide a bonus in sports equipment.

by Bill McKeown
OUTDOORS EDITOR

Outer space is lending its leadership in technology to the outdoors. New compounds that can resist tremendous stress and still last longer and weigh less are already being incorporated into this year's sporting goods.

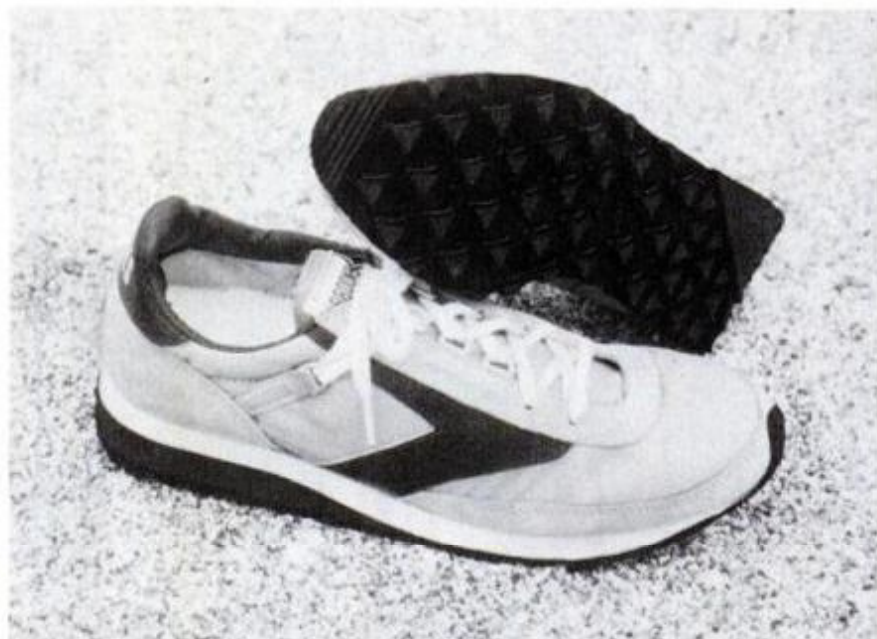
Graphite, boron, magnesium and titanium are chemical and metallurgical names that are appearing on outdoor equipment and tackle. Kevlar, Kodofil, Thinsulate, PolarGuard, Teflon and Hollofil are among the made-up titles for compounds that are keeping sportsmen warmer, dryer, safer and more relaxed because they're required to use less energy to brave the elements.

"Wonder" and "miracle" products are less in evidence. We now know that "all-purpose" and "maintenance-free" boats, tackle, knives and guns are unlikely, but better-made gear will wear out more slowly and have more dependable life span. Stainless steel can eventually corrode and is harder to sharpen to a keen edge, but it provides a trade-off

(Please turn to page 123)



Programmed for user's metabolism, \$70 Cal-Count totals calories burned by all forms of exercise.



The \$40 Brooks Hugger GT is called the first breathable but waterproof jogger's shoe by Early Winters Ltd. of Seattle. Uppers are made of Gore-Tex fabric.

and stronger than ever

New from Smith & Wesson, Maverick is stainless.



Ka-Lok, new from Ka-Bar, locks with bottom bolster.



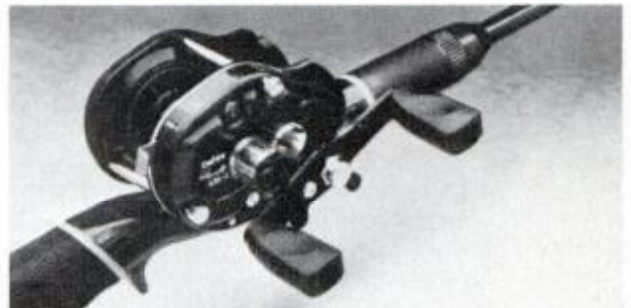
A mini lockback is the new 2½-inch Case model.



Quality knives, many with lockback and stainless steel, are newly popular: \$30 Maverick with sheath, \$29 Ka-Lok with invisible lock, \$19 mini Case.



Omniskates has combined what it calls the lightest high-top shoe, from Adidas, with roller-skate bottoms, for \$100.



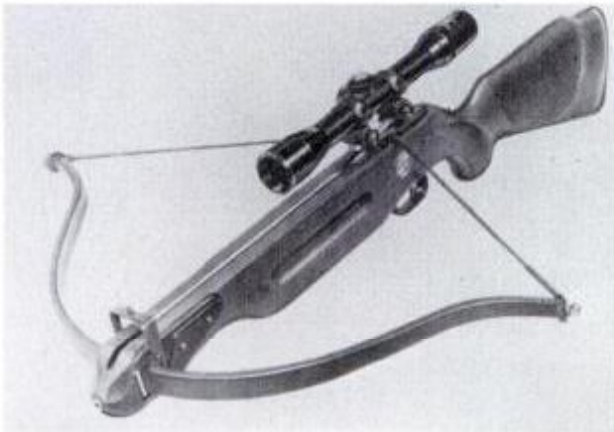
Fastest retrieve of any level-wind is Daiwa's claim for their Procaster SM-2A reel (\$65), which has a 5.2:1 gear ratio.



For towing behind a compact and then stowing folded in a 20-inch space, \$459 Tow 'N Stow is by Trail-R-Craft.



Kevlar aramid fiber and a new vacuum-bag molding process make possible this 18-foot, 35-pound canoe, available from We-no-nah.



This crossbow with a telescopic sight is available as a rifle or pistol from B.&P. Barnett Ltd. of Lambeth, Ont.



A new pole system for the Coleman 6-pound Backpack Classic two-person tent now makes it free-standing without use of pegs.

Remember when buying a Pontiac meant you were on your way up—up toward a Buick or maybe even a Cadillac?

Pontiac was General Motors' stepping stone back then. You moved from a Ford or Chevrolet to Pontiac. Later, if your boat really came in, you traded your Pontiac and kept climbing.

No more. No longer is Pontiac just a stepping stone. In this age of fairly shallow owner loyalties—an age when Americans switch freely between domestics and imports and check prices and EPA ratings long before they look at name-



For the first time in many years, Bonneville and Catalina share the same front end.

plates—Pontiac bucks the trend by spawning the fiercest sort of owner loyalty. Pontiac owners, it seems, would rather stick than switch.

Actually it's no big mystery. Pontiac became an image car during the 1960s and

PM
OWNERS
REPORT:
**PONTIAC
BONNEVILLE**

'70s, first on the track and later by engineering such hits as the GTO, Trans Am, Grand Am and Grand Prix. What these cars have given Pontiac is an identity—an identity that's a lot sharper than most.

Nearly half the Bonneville owners we surveyed listed *past experience* with Pontiacs as their main reason for buying. In other words, they'd owned them before and had come back for more. That's very unusual in this day and age.

In addition, 91.7 percent of our respondents said they'd choose another Pontiac next time they buy. Again, that's an extremely high percentage, and shows owner loyalty right up there with cars like the Cadillac Seville. And the fact that such loyalty comes from owners of full-

size Bonnevilles makes this statistic that much more amazing.

People kept telling us about all those previous great Pontiacs they'd owned and driven. "This is my ninth since 1955," said a New Mexico teacher, "and all from the same dealer."

A Texas rancher beamed that he'd driven nothing but Pontiacs since 1941, and a Kentucky horseman confessed that, "I've owned Pontiacs all my life." These aren't isolated comments either—they're typical.

Fuel mileage became a big point of discussion. About 71 percent of the Bonneville owners we surveyed had opted for the medium-size 301 (4.9-liter) V8. Surprisingly, the 231 V6, the 301 V8 and the 350 gasoline V8 all delivered very nearly the same mpg. Highway mileage differed by only 0.1 mph between Pontiac's small-



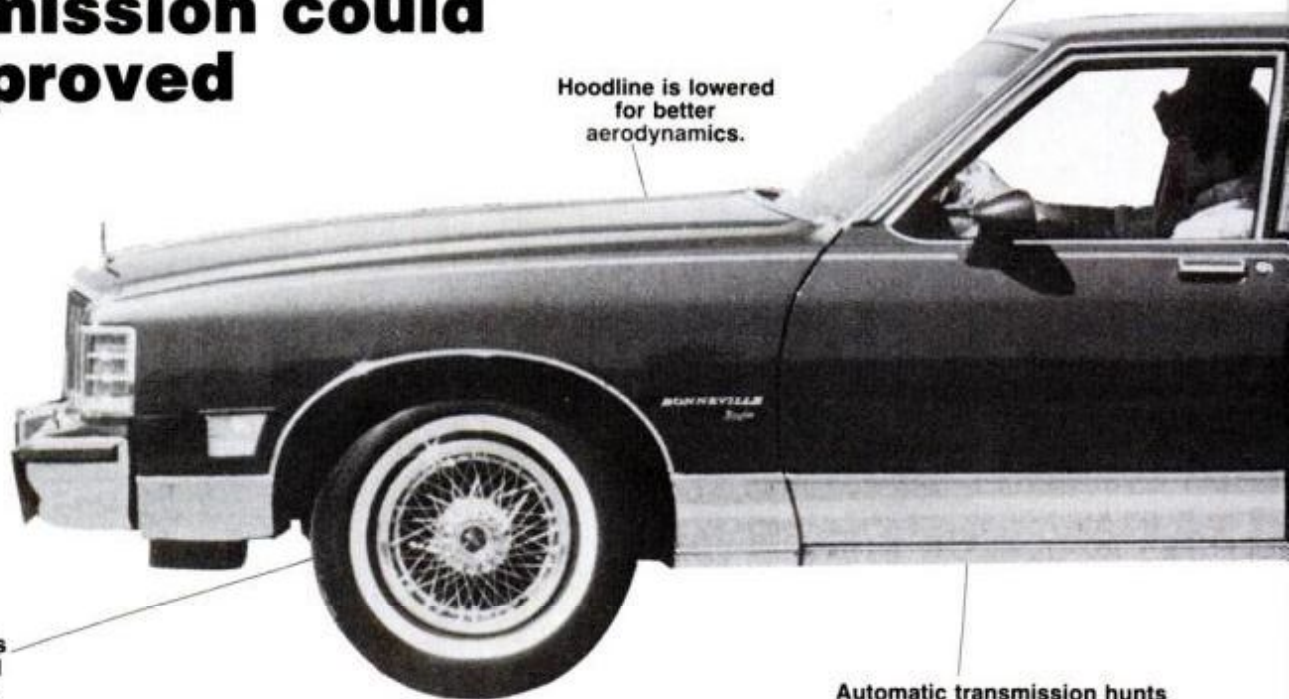
Roomy interior offers split front seat, rally gauge cluster and walnut dash panel.

BY MICHAEL LAMM WEST COAST EDITOR

Loyal Pontiac owners love the Bonneville, but the transmission could be improved

Four-door models have a restyled upper window area.

Hoodline is lowered for better aerodynamics.



Improved ball joints reduce friction and rolling resistance.

Automatic transmission hunts for gears between 40 and 50 mph.

est engine and the largest one offered.

This fact left owners of the V6 miffed and those who'd chosen the big 350 gasoline V8 elated. It shows, though, that small engines in big cars don't always equal economy.

The V6, naturally, must work harder to move the car and thus the driver often tromps the accelerator just to keep up with traffic. The big V8, on the other hand, has no trouble keeping up and loafs at quarter throttle on the highway.

About 10 percent of our respondents chose the 350-cu.-in. diesel V8. This engine, new for Pontiac this year, averaged seven to eight mpg more in both city and open-road driving than any of its gasoline-fueled peers. The Olds-supplied diesel V8, by the way, is the same powerplant available in Cadillacs, Oldsmobiles, Chevrolets and General Motors pickups. In the Bonneville, our survey showed the diesel V8 logging 22.8 mph in town and 28.6 on the highway.

Pontiac owners gave the Bonneville an overall workmanship rating identical to the Cadillac Seville's. In both cars, 74.2 percent of our respondents rated workmanship *good to excellent*.

Commenting on workmanship, a South Carolina textile manufacturer observed, "It's excellent. I haven't even seen a loose string end on the upholstery."

An Ohio steam-plant operator: "This car was a special order, and the factory

made a fine machine for my money."

A Minnesota plater: "It's the best American car made. To beat it you'd have to move up to a Mercedes or Porsche."

And a New York elevator manufacturer: "Excellent workmanship. I've had no quality problems at all."

When we asked Bonneville owners for suggested changes or improvements, 20.1 percent said "none." The loudest suggestion came from V6 owners, who told us they'd like better gas mileage.

A number of owners also felt that the lockup torque converter inside the automatic transmission could do with some improvement. This feature, new for 1980



The 301-cu.-in. V8 is the most popular engine option. It produces 15/19 mpg.

in several GM cars, locks up direct drive in high range so there's no hydraulic slippage—a good idea because it saves fuel. However, the lockup mechanism cuts in

(Please turn to page 132)

Backstage with the Bonneville

General Motors downsized its B-bodied cars for 1977, including Pontiac's big Bonneville and Catalina. That year's 700-pound weight loss netted an across-the-board gain of three mpg.

For 1980, Pontiac has managed to shave another 150 pounds from its full-sized cars through the use of lighter materials like an aluminum hood and tape-drive window lifts.

Less weight, coupled with a new lockup torque converter, high-pressure radial tires, aerodynamic fixes, plus the new-for-'80 V6 and diesel V8 all combine to add another two to three mpg to the line.

The Bonneville coupe's roofline is new this year. All of the big Pontiacs, including the Catalina, share coupe, four-door and wagon body styles with the full-size Chevrolet, Olds and Buick.

The Bonneville's standard engine is a Buick-supplied 231 (3.8 liter) V6, and the Brougham lists a 4.3 (265) V8 as standard. California buyers, however, are limited to the 350 gas or diesel V8s.

The most popular engine in our survey turned out to be Pontiac's own 301 V8.

All Bonneville comes with power steering, power front disc brakes, automatic transmission and high-pressure, steel-belted radial tires.

The top-line Brougham's repertory of standard equipment includes power windows, as well as extra trim and insulation.

A NATIONWIDE SURVEY BASED ON 1,394,393 OWNER-DRIVEN MILES

Current model is 100 lbs. lighter than the older one.

Although the rear overhang was shortened, available trunk space was increased by 1 cu. ft. Rear seat comfort was rated excellent by most Bonneville owners and 91.1 percent would buy another one.



Trunk is 21 cu. ft., 1 cu. ft. bigger than the '79 model.

High-pressure tires improve fuel economy.

A computer that can talk

"What did you say?" The Texas Instruments TI-99/4 computer should get a rise out of your friends when you demonstrate its talking ability. You can have it say over a hundred preprogrammed words.



NEW COMPUTERS CAN TALK, CONTROL YOUR HOUSE AND SING

Texas Instruments' TI-99/4, Ohio Scientific's C4P MF and the Atari 800 are three brand-new personal computers with exciting features. Here's how they compare.

by Neil Shapiro
ELECTRONICS EDITOR

Three new state-of-the-art personal computers offer some exciting and innovative features. Ohio Scientific's C4P MF (at \$1795), Texas Instruments' TI-99/4 (\$1095) and the Atari 800 (\$1000) are available now. We took a look at all three: Here's how they compare.

The basics and Basic

Nowadays it seems as if you can't market a new computer unless it offers a full-color display. All three of these machines offer full 16-color capability. If they will be used for games/recreation, then this is a must. Business uses of color are certainly possible, but more optional.

The three computers, as do most

personal computers, speak Basic. Because this English-style language is now considered a *de facto* standard, there is a good deal of software already written in it. If you want a program to automate something such as a checking account, it is likely you can find a program in a book, and you will just have to type it in.

Speak to me

Texas Instruments' TI-99/4 offers an optional voice. The electronics involved are based on the same technology that produced the popular "Speak and Spell" line of toys from Texas Instruments.

The speech editor program is con-

tained in a plug-in cartridge (more on that system later) that holds both the vocabulary and the electronics to interface it to the computer. The unit we saw had a vocabulary of over a hundred words.

The computer can be made to talk in two ways. The simplest method is to just type in the words onto the screen, then hit the ENTER key. Harder, but more versatile, is to program the computer to use the electronic voice as a subroutine in a larger program. Then, if you program an unbeatable tick-tack-toe opponent, you will be able to have it say, in well-modulated, gleeful computer tones, "I win again!"

Ohio Scientific's C4P MF offers



Great color and smooth sound

We were truly impressed by some of the features of the Atari 800 (above and left). Programs and languages can be easily changed by plugging them in (1). Expanding this computer's memory couldn't be simpler. Memory is available on plug-in cartridge cards (2) that make installation a one-minute snap. The chips inside the memory cartridges (3) can extend the Atari 800's memory to 48,000 bytes. The Atari 800 is shown above with its matching printer and floppy disc drive. Both attach as plug-ins and can be learned in less than half an hour.

the most interesting home control features we have yet seen built into a computer, rather than offered as add-ons by secondary manufacturers. They use the popular BSR home control system, but controlled by the computer.

The automated house

The BSR system (which you can buy just to use without any computer at all) controls up to 16 lights and appliances in your home. There is a small control box with 16 buttons for each controlled light or appliance, as well as buttons for ON and OFF, DIM, ALL ON and ALL OFF.

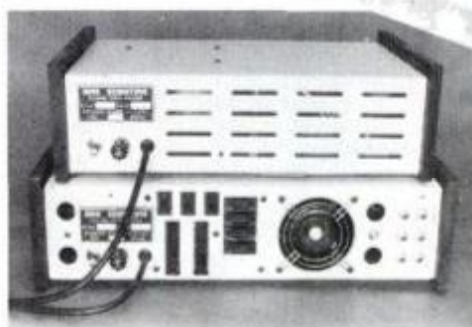
A unit to be controlled plugs into a special remote outlet, which in turn plugs into an a.c. wall socket. (There are also special wall switches available that may be remotely controlled.) These remotes and the main control box are in constant communication over the a.c. wiring of the house through pulsed signals.

The BSR system by itself is marketed for manual control. By pressing the buttons, you can turn your lights and appliances on and off as you want, from one centralized loca-

(Please turn to page 106)

Control everything in your home

Ohio Scientific's C4P MF, shown with matching disc drive, features amazing system. It can control 16 lights and appliances in your home. Program the appliance schedule to your needs. Back of the machine (below) shows some of the connections for accessories.



Styling does sell cars. If these Owners Reports prove one thing, it's that auto stylists—not engineers—make cars move.

America's economy owes more to the stylist than to any other single element in the automotive sales chain. Again and again, when we ask owners the main reason they choose this or that car, the answer comes back, "Styling."

That's as true for the "economini" as for the "luxocruiser." Styling makes millions of dollars move through our economy year after year after year.

The 1980 Lincoln Continental Mark VI makes a case in point. Nearly half the 1000 owners we queried listed *styling* as their No. 1 reason for buying. And styling also proved the prime motivator for choosing the Mark V in 1977, the Mark IV



Unique trunk styling is just part of the enduring design that the Mark owners love.

PM
OWNERS
REPORT:
**LINCOLN
CONTINENTAL
MARK VI**

in 1972, and the Mark III in 1968.

"I feel Lincoln did an outstanding job of downsizing the Continental and Mark VI for 1980," commented a New York electronics engineer, "while still keeping the classic look that has prevailed over the past decade. The stylists deserve a big round of applause."

Brand loyalty ranked second as a reason for purchase. A Florida retiree told us, "I've owned Marks in the past and liked them all. I think this four-door Mark VI is the best-looking, best-made car on the market."

And yet many owners had their own, very special reasons for choosing the Lincoln. "I found the Cadillac Eldorado too

small," noted a New York gas-station owner.

"Lincoln finally came through with a four-door Mark," smiled a Texas restaurateur. "I transport a Little League baseball team and desire a large, safe car."

"I bought mine as an anniversary gift for my wife," confided an Ohio carpenter.

An Illinois construction-company president: "I wrecked my previous Town Coupe, which was all right because I wanted a smaller Lincoln with better mileage."



The cockpit features first-rate comfort and some space-age electronic instruments.

A preschool director from Illinois told us, "My husband is a truck driver and wants to have a nice-riding car when he's home. Also, we feel the Lincoln's safety margin is much better."

BY MICHAEL LAMM WEST COAST EDITOR

Owners like the styling and comfort, but transmission and electronics need debugging



The 1980 Mark weighs 924 lbs. less than last year's.

Keyless entry system is standard on Signature edition.

The four-door's wheelbase is 3 inches longer than the two-door's.

When we asked owners what they like about their Mark VIs, now that they've had ample opportunity to live with them, the responses they offered included the following.

"The feeling of built-in quality and Ford's all-out attempt to build a fine car," said an Ohio cafe owner. "What I really appreciate is the genuine feel for a first-class auto."

"Very comfortable, tracks well on the road, good visibility, roomy, large trunk"—California housewife.

"I especially like the keyless entry, the digital instruments and computerized dash, appearance, roadability, comfort, and appointments"—California school administrator.

A Michigan company president: "I like the better gas mileage this new car gives me. It's lighter but still feels and rides like a heavy car, and it has a sharp and attractive body design."

A Texas salesman: "I appreciate the new 351-cu.-in. V8 and the great push-button door locks. The trip computer is excellent for trips. It's interesting and informative and, to me, now irreplaceable. I love it!"

Most Mark VI owners echoed this delight with the trip computer, but a few were miffed by its inaccuracy. A Texas geographical explorer lamented, "The otherwise excellent onboard computer suffers from the same inaccuracy as the old gas

gauge. I can average over 20 mpg on a trip, and this car has a 20-gallon fuel tank; yet at half full, the computer tells me '125 miles to empty.' The average distance per gallon is far too conservative. I wish Lincoln would concentrate on accurate data and quit worrying about the ninny who will run out of gas without a 2- to 3-gallon reserve."

And a retired optical technician from New York brings up an associated point. "I wish they'd simplify the electronic instrument panel. It's rather confusing to [\(Please turn to page 128\)](#)



Hangar-like trunk of the Mark has ample storage for even the chronic overpackers.

1980 Lincolns in a nutshell

Last year's Mark V coupe weighed 924 pounds more than the 1980 Mark VI. And the '80 Lincoln's standard engine has been downsized, too, by nearly two liters.

Instead of the 7.0-liter (400-cu.-in.) V8, today's Lincolns come with the fuel-injected 5.0-liter (302-cu.-in.) V8 as standard equipment and with the 5.8-liter (351-cu.-in.) variable-venturi-carbureted V8 available as an option.

The 1980 Lincolns come in three basic series: Continental, Mark VI and Signature. All of them are built on the same coupe or four-door-sedan body structures; the sedan's wheelbase is currently 3 in. longer than the coupe's.

You can recognize the Mark VI by its hidden headlamps and the oval opera windows. Inside, the Mark VI also lists a digital electronic instrument panel and trip computer among its super-extensive standard equipment.

And, in the top-line Signature series, even the keyless pushbutton entry comes standard.

The Signature is recognizable by its metallic maroon or silver paint and added brightwork. It sells for upward of \$20,000, while the Mark VI stickers out around \$16,000 and the Continental at about \$13,000.

The Mark VI offers four designer models within the series. These are by Bill Blass, Cartier, Givenchy and Emilio Pucci. The designer models cost \$1800 to \$2100 more than the regular Marks.

A NATIONWIDE SURVEY BASED ON 1,156,952 OWNER-DRIVEN MILES

Distinctive grille and hidden headlights have become part of the Mark mystique. That look is still the major selling point of the car. Interior options like the sliding moonroof can take this luxury one step further—into opulence.



Dash-mounted trip computer is inaccurate, owners complain.

The 400-cu.-in. V8 is no longer available. Standard is 302-cu.-in. V8.

Automatic overdrive transmission was criticized for hunting for gears at 35 mph.

Many owners complained of underhood electrical problems.

Taking pictures under water—that's strictly for Jacques Cousteau and his high-tech pals, right? Not any more. Two new cameras, one in the popular 110 film format and one a Super-8 movie camera, can be taken by a casual swimmer into the water, onto the beach or out in the rain. Better still, they won't plunge your bank account below sea level.

Minolta's Weathermatic-A, with its bright yellow plastic body, is the first 110-cartridge camera made to survive beneath the waves. It's designed to function to a depth of 15 feet and features a built-in electronic flash. Its Super-8 soul mate, the Eumig Nautica, sports a zoom lens, close-up and single-frame shooting, built-in depth indicator and a wide-angle attachment. The Nautica is designed to work down to a depth of 115 feet, also a first. Both cameras have built-in light meters; the Nautica's exposure control is fully automatic, while the Weathermatic's is semi-automatic with three settings.

Before now, the only underwater camera accessible to most consumers was Nikon's

Freshly-dunked Eumig Nautica (right) and Minolta Weathermatic-A (below right) are unaffected by submersion. Both depend on O-ring seal to stay watertight. Nautica is shown with orange sportsfinder for underwater use. Nikon's venerable Nikonos (below) comes up for air.

Cameras for

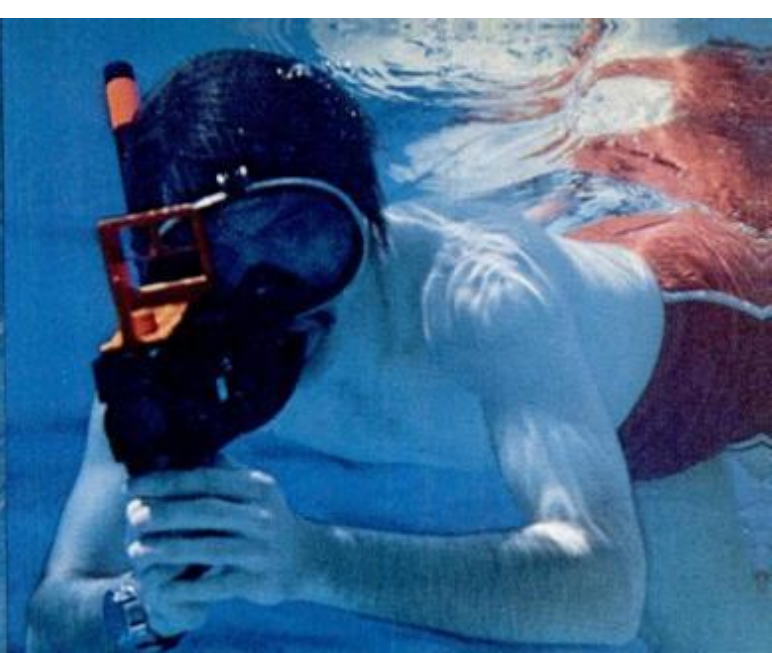
Two new underwater cameras shoot where others fear to tread.

by Tom Sahagian

PM photos: Frank Lusk



the deep



Make your own home-movie version of *Twenty Thousand Leagues Under the Sea*: camera technique takes a little practice. The lens cannot be zoomed underwater.



venerable (and venerated) Nikonos. Only trouble was, features most people would insist on in their only camera (like a built-in light meter) were extra, and it cost too much (\$527 list) to buy in addition to a regular camera.

Not so with the Minolta and

Eumig. Each can be used in place of a standard camera without giving up a lot in performance. Not only can they both survive below sea level, but, perhaps more important, they can function in rain, snow, dust, dirt and places

(Please turn to page 127)

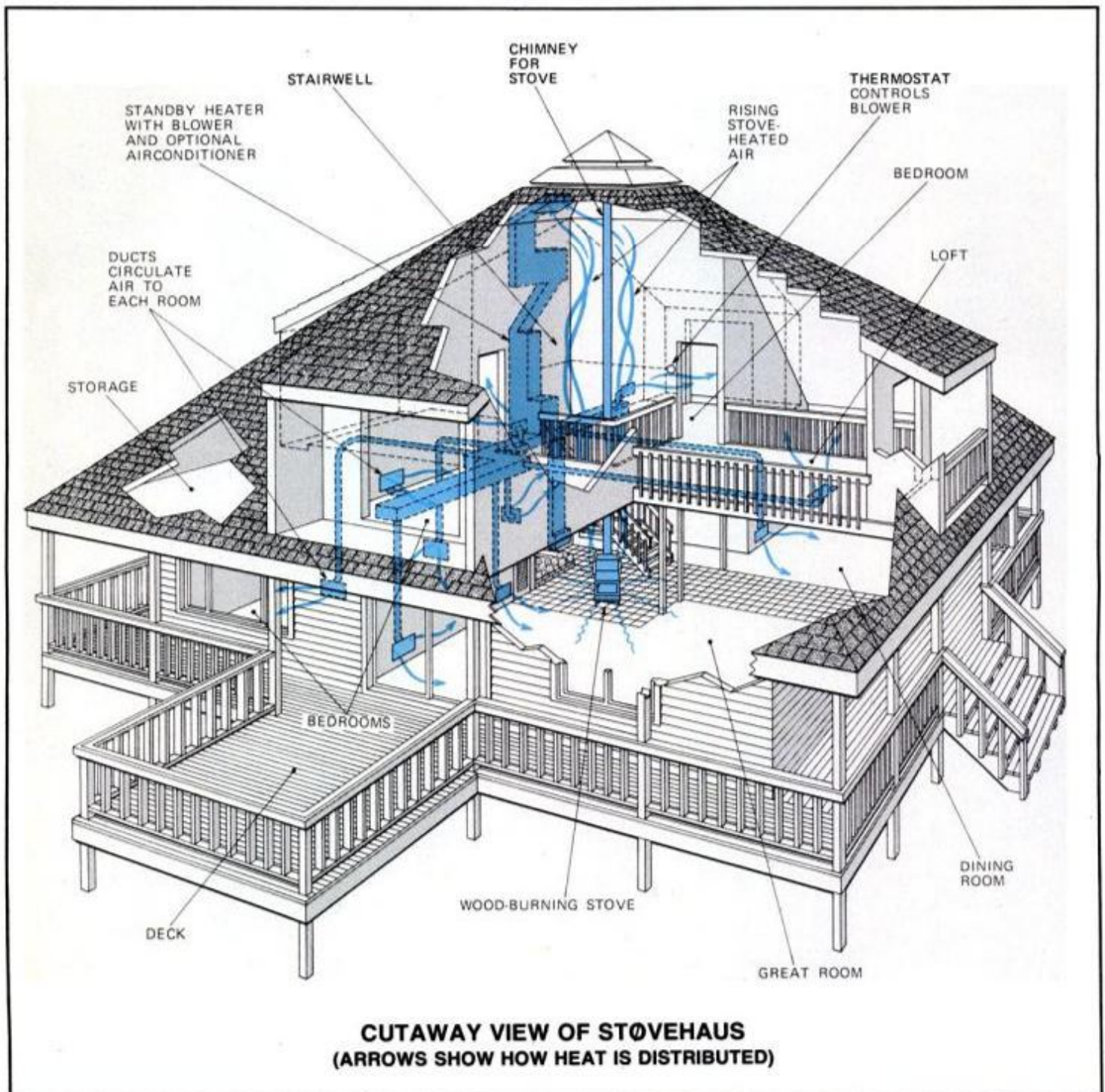
A home designed to be heated by one stove

And in summer, it creates a cool flow of air.

by John Gaynor

This remarkable, factory-built house is one of those rare examples of form logically following function—one of the primary functions of a home being to protect inhabitants from temperature extremes at a reasonable cost. Dubbed the Støvehaus by its manufacturer, it incorporates an airtight wood stove with a central heat-distribution system, thereby making the most of the stove. It allows the interior to be naturally air-cooled during summer.

The house is square to allow even radiation of stove heat which is collected and distributed to all areas—and to minimize the exterior area exposed to the weather. Hence, heat loss (gain in the summer) is minimized. The square format also econ-





Air, warmed by stove, rises via stairwell and then is recirculated throughout house.



Thermostat in loft area activates the blower when temperature reaches a preset limit.



The 14x21-ft. great room provides a comfortable focus for your family activities.

omizes materials and manpower.

The square is topped by a pyramid-shaped roof that creates a large volume to draw hot air away from the living areas. The specially made metal roof cap allows roof ventilation, as well as venting of the stove flue gases. Dormers, with door openings that extend the upstairs loft areas during mild weather, act as large natural vents.

In the center of all this is an airtight wood stove. The stairwell, next to the stove, allows natural convection of the warmed air to the loft. A duct and blower system "catches" the rising warm air and recirculates it to every room. A standby furnace (oil, gas or electric) uses the same blower and distribution ducts to heat the house when the stove is not in use. It's located in a large upstairs closet. An air conditioner, for summertime cooling, can also be added.

For a quick tour of the house, start at the entrance foyer. To each side are two "public" rooms, the great room for family activities and entertaining and the dining room. Both have cathedral ceilings. The private side of the lower level includes the kitchen, a breakfast room and the master bedroom with a full bath, accessible from either the hall or the bedroom. The upstairs contains two bedrooms with private balconies and another bathroom.

The cost of this panelized house is about \$22,000, excluding land, foundation, mechanical, electrical and plumbing systems, interior finishing and roofing. For further information, write to Mayhill Homes Corp., PM Box 1778, Gainesville, Ga. 30503. **PM**



Roof overhang shelters veranda and shades windows and doors from hot summer sun.



Low dividers separate the entrance hall from the great room and help prevent air drafts.

Architect: John Odgaard; manufacturer: Mayhill Homes Corp.; technical artist: Carl DeGroot; PM photos: E. Alan McGee. Note: The Stevehaus logo and plans are copyrighted and all rights are reserved by the manufacturer.

**WEEKEND
WORKSHOP:**

4 projects with



1

Scandinavian flair

For many of us, warm weather turns our lifestyles inside out. From late spring to early fall, the focus is on family cookouts, swimming pools, gardening and garden parties. The four simple projects shown on these pages will add a little more charm to your back-yard living.

All of the designs are easy and inexpensive to build. No difficult joinery is involved—only careful bores and square cuts. For those projects that will receive sustained exposure to the weather, or will be in constant contact with soil, choose a naturally decay-resistant wood, such as cedar or redwood. Although pressure-treated wood is not as good-looking initially (unless you paint or stain), it's also a good choice. Note that pressure-treated nominal 1-in. stock is not readily available at many lumber yards. *Plans and how-to instructions begin on the next page.*

1. A dowel "wall" makes this planter ideal for espalier or climbing vegetables and vines. Unit is also a privacy screen.

2. An easy-to-make, airy and suspended planter is created using $\frac{3}{4}$ -in. strips of wood and dowels.

3. Standing planter for deck or patio is large enough for holding four to nine of your potted favorites.

4. Bottle rack keeps beverages handy and can be used with a barbecue bench, such as the one made of cement blocks, below.



1 Trellis planter for vines

Your peas, cukes or beans will love this portable trellis. It holds about 8 in. of soil and gravel (layered at the bottom for proper drainage).

To build it, cut all parts to the dimensions provided in materials list. Then carefully lay out, centerpunch and bore dowel holes in trellis top and bottom (C).

Ideally, the holes should be bored with a drill press or drill accessory designed for drilling perpendicular to the surface. A true hole can also be bored by visually aligning the drill-bit shank with the blade of a small try square held butt end against the workpiece.

Cut notches for the posts in the planter bottom (H) and you are ready for assembly. If you intend to stain or paint your planter, do it now. Use a protective stain with a linseed-oil base. These are available in transparent or opaque colors. If you want a natural look, use a clear preserving stain. Do not use a poly-

urethane-based coating, since clinging vines, such as peas, need a slightly roughened surface that they can cling to.

Start assembling by nailing cleats to sides (D) and ends (E) as required. Then nail the sides and ends to the posts (A and B). Fit in the bottom (H) and make certain you bore at least eight evenly spaced drain holes into it.

Next, nail the trellis bottom pieces (C) to the inside of the box as shown in the plans. Insert the dowels in the predrilled holes. Finally, align tops of dowels with holes in the trellis top (C), insert the dowels, and then nail the last C piece into place between the posts (B).

MATERIALS LIST—TRELLIS PLANTER

Key	No.	Size and description (use)
A	2	1½ × 1½ × 14" redwood (front leg)
B	2	1½ × 1½ × 48" redwood (rear leg)
C	2	1½ × 1½ × 27½" redwood (crosspiece)
D	4	¾ × 5½ × 32" redwood (front and back)
E	4	¾ × 5½ × 14½" redwood (sides)
F	2	¾ × 1½ × 27½" redwood (front and back cleats)
G	2	¾ × 1½ × 11½" redwood (side cleat)
H	1	½ × 14½ × 30½" exterior plywood (bottom)
I	6	¾"-dia. × 34" dowels
J		6d casing nails (as reqd.)
K		10d casing nails (as reqd.)
L		No. 10 × 1¼" fh screws (as reqd.)

2 Hanging cage planter

This interesting planter is well suited to a garden or porch, but can be hung inside as well.

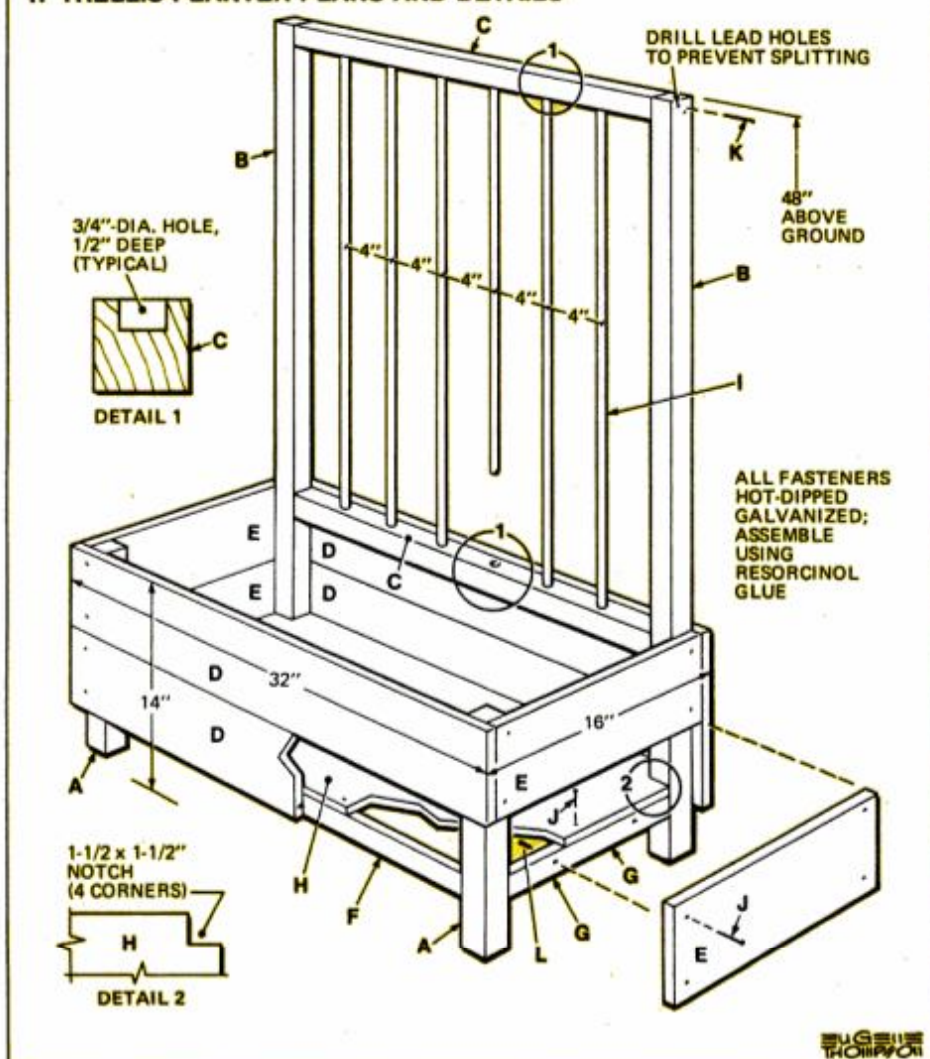
To build it, rip ¾-in.-wide strips from nominal 1-in. stock and cut to lengths given in the materials list for A and B. Then cut the side and bottom dowels (C and D) to their respective lengths. Note that the bottom dowels of the planter are ¼ in. longer than the side dowels.

Bore holes for leather thongs in top of uprights A as shown. Think in terms of panels for the assembly. Start by gluing dowels into two pairs of uprights A to form two panels with 10 side dowels left over. Then glue the bottom dowels between pieces B. Use resorcinol glue if the planter is to be hung outside and exposed to all kinds of weather.

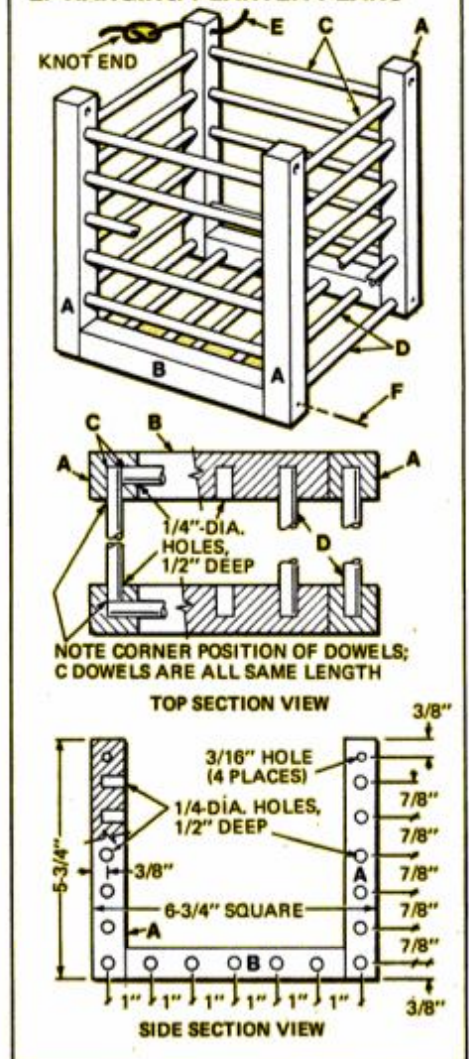
When the glue is dry on the three panels, apply glue to the remaining dowels and assemble the three panels by nailing uprights A to bottom pieces.

Attach the leather thongs by

1. TRELLIS-PLANTER PLANS AND DETAILS



2. HANGING-PLANTER PLANS



threading through the predrilled holes and knotting the ends.

MATERIALS LIST—HANGING PLANTER

Key	No.	Size and description (use)
A	4	3/4" x 3/4" x 5 1/4" pine or redwood (corner posts)
B	2	3/4" x 3/4" x 5 1/4" pine or redwood (bottom rails)
C	20	1/4"-dia. x 6" dowels (side)
D	7	1/4"-dia. x 6 1/4" dowels (bottom)
E	2	36" long, or to suit, leather thongs (to hang planter)
F		6d casing nails (as reqd.)

Misc.: Resorcinol glue.

3 Large-capacity floor planter

Use this pretty plant stand to accent the corner of a patio or use several of them to break the monotonous lines of a long deck railing.

Construction of the plant stand is as straightforward as with the previous projects. Start by cutting all members to size. Then bore the drain holes in the bottom piece (D).

As with the trellis planter, fasten the cleats (C) first to four of the sideboards (B). Then nail and glue the

side boards to the legs (A) as shown in the drawing of the assembly below, left.

Join the four sides together with screws. Counterbore and plug for a finished appearance. Finally, drop in the bottom of the stand (D) and use finishing nails through the sides to secure it firmly.

Use only galvanized fasteners on this and all projects that will be exposed to water.

MATERIALS LIST—STANDING PLANTER

Key	No.	Size and description (use)
A	8	3/4" x 3 1/2" x 24" redwood (leg)
B	12	3/4" x 3 1/2" x 21 1/4" redwood (side)
C	4	3/4" x 1 1/2" x 20 1/4" redwood (cleats)
D	1	1/2" x 21" x 21" exterior plywood (bottom)
E	8	No. 10 x 2" fh screws
F	12	No. 10 x 1 1/4" fh screws
G		10d casing nails (as reqd.)
H		6d casing nails (as reqd.)

Misc.: Resorcinol glue.

4 Patio wine rack

This rack was made to fit the beverage compartment of the barbecue bench shown on page 89. It will hold six bottles and prevent

trips in and out of the house once your party gets started.

Boring true holes is particularly important for this project. Otherwise, the result will be out of square. Once all the members have been cut and holes bored, apply a small amount of glue to each hole and assemble. Make certain that you allow the glue to dry.

To prevent the rack from pulling apart under stress, drill lead holes at each joint and pin the dowels in place with 1/2-in. brads. Neglecting to drill these important lead holes will, in all likelihood, cause splitting of the rack.

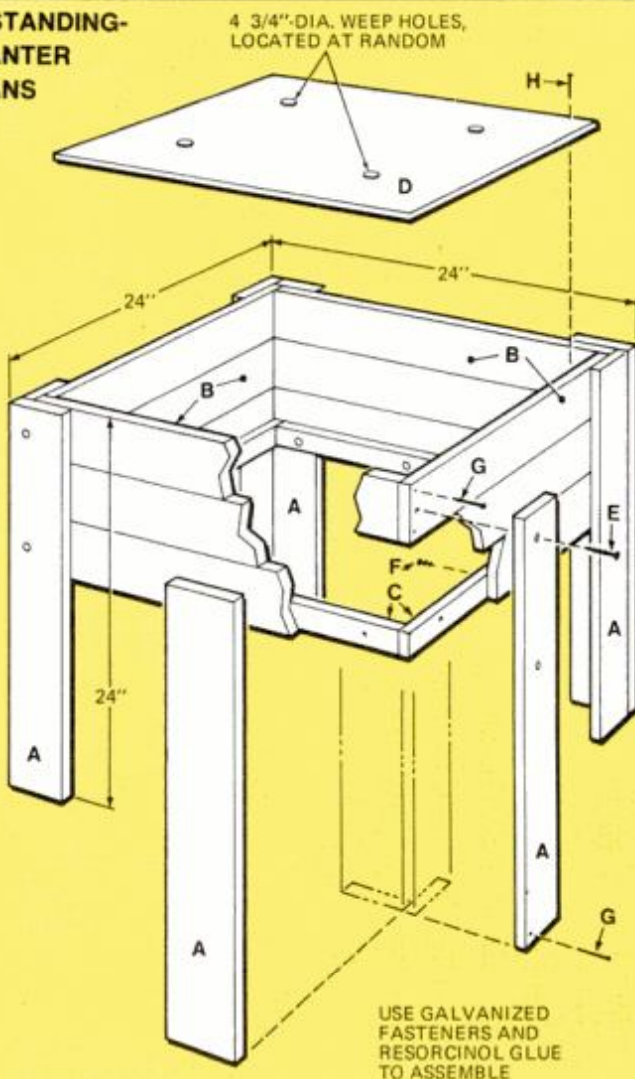
Note: The barbecue bench into which the wine rack fits was constructed of lightweight, concrete building blocks. White-painted pine or exterior plywood forms the lower shelf and pine or hardwood, such as maple, was used as the food-preparation surface. **PM**

MATERIALS LIST—WINE RACK

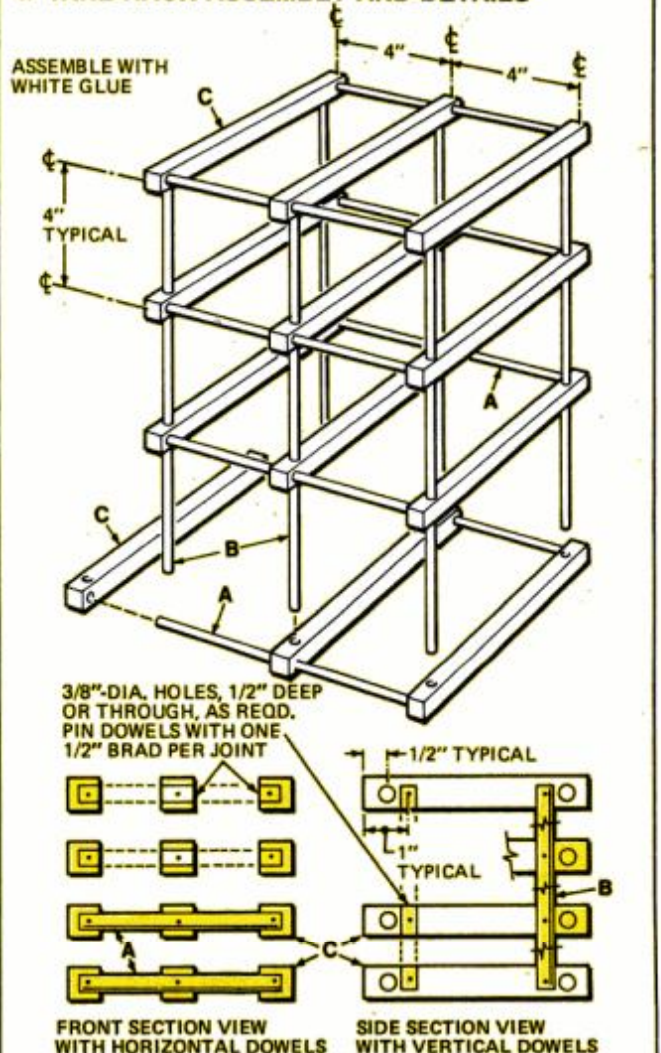
Key	No.	Size and description (use)
A	8	3/4"-dia. x 8 1/4" dowels (crosspiece)
B	6	3/4"-dia. x 12 1/4" dowels (uprights)
C	12	3/4" x 3/4" x 8 3/4" pine (rails)

Misc.: Resorcinol glue.

3. STANDING-PLANTER PLANS



4. WINE-RACK ASSEMBLY AND DETAILS





Build this treetop hideaway for your youngsters

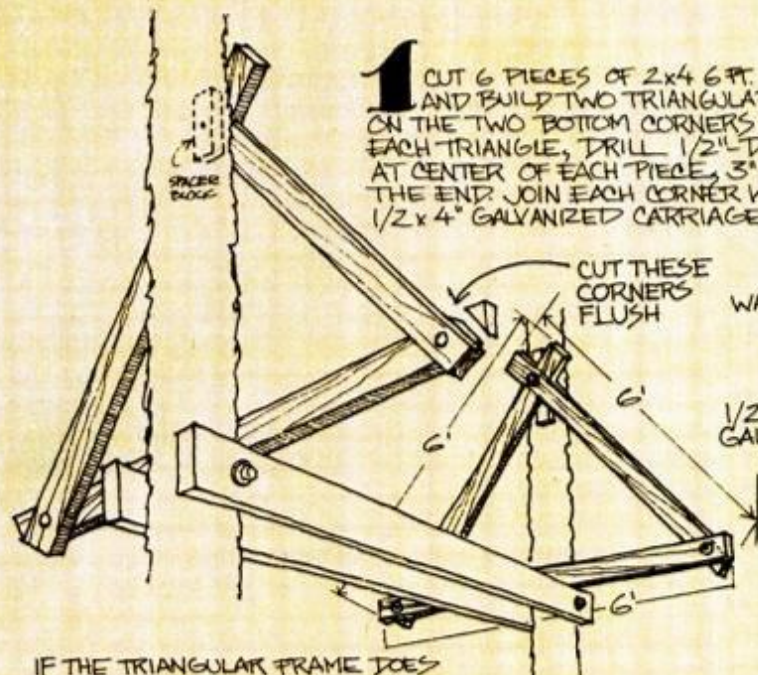
by Harry Wicks
HOME AND SHOP EDITOR

Artwork on the facing page is from *The Tree House Book*, copyright © 1979 by David Stiles, and is reprinted by permission of Avon Books. The book sells for \$3.95 at bookstores.

Not all do-it-yourself is of the maintenance, must-do variety. The tree house shown on these pages is a good example of a project that is lots of fun to build, as well as use. If your youngster is old enough to want a tree house, he is also old

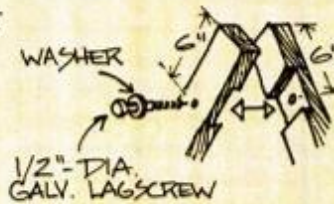
enough to share in a rewarding building experience. This project is a fine opportunity for Pop to pass along some know-how, and for Junior to appreciate the value of using something he has built himself.

The house shown is one of four de-



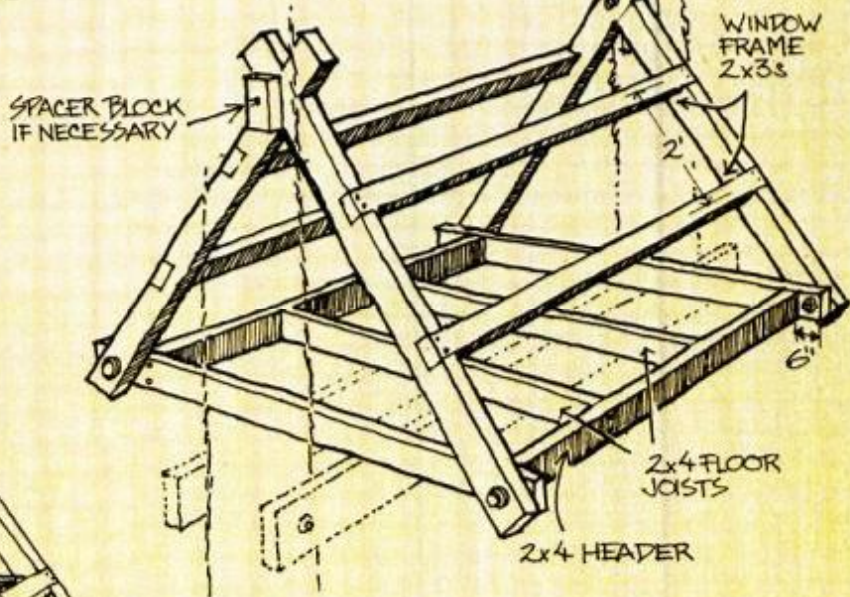
1 CUT 6 PIECES OF 2x4 6 FT. LONG AND BUILD TWO TRIANGULAR FRAMES ON THE TWO BOTTOM CORNERS OF EACH TRIANGLE, DRILL 1/2"-DIA. HOLE AT CENTER OF EACH PIECE, 3" IN FROM THE END. JOIN EACH CORNER WITH A 1/2 x 4" GALVANIZED CARRIAGE BOLT.

NOTCH BOTH PIECES OF 2x4 AT THE TOP OF THE TRIANGLE 6" FROM THE ENDS, SO THEY FIT INTO EACH OTHER TO FORM A FLUSH JOINT. THEN BORE A 5/8"-DIA. HOLE THROUGH THE CENTER OF EACH NOTCH AND SCREW-FASTEN TRIANGLE TO THE TREE WITH A LAGSCREW. AT LEAST 1-1/2" OF THE LAGSCREW SHOULD PENETRATE THE TREE.

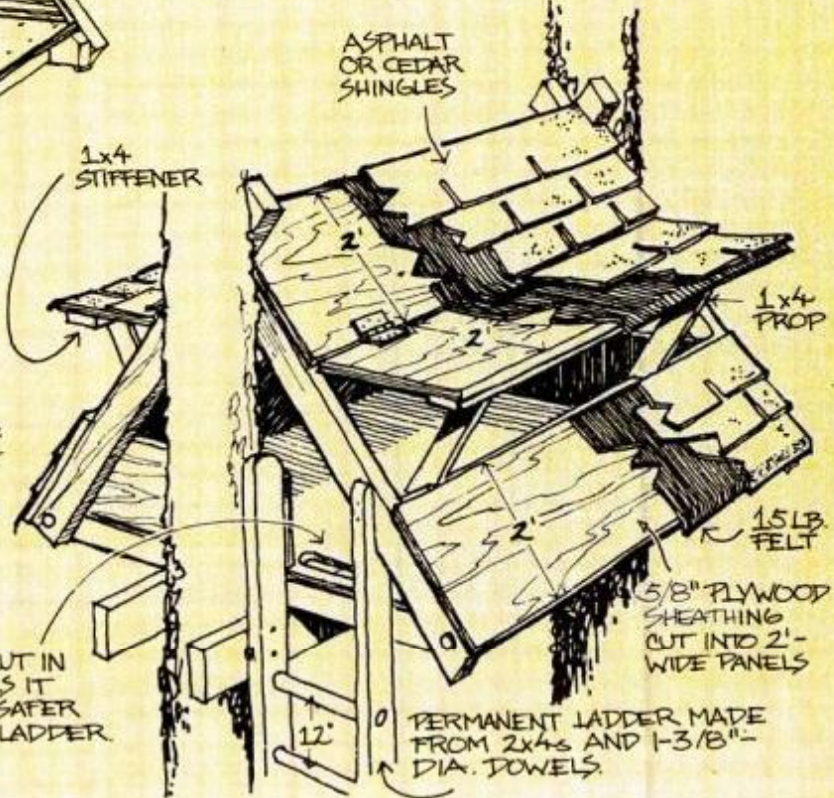
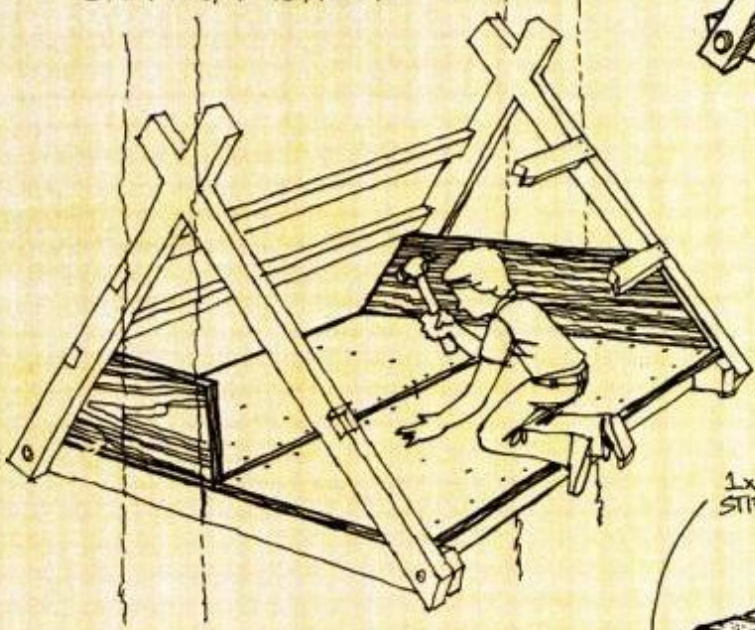


IF THE TRIANGULAR FRAME DOES NOT REST VERTICALLY (PLUMB) AGAINST THE TREE, MAKE A SPACER BLOCK FROM SCRAP 2x4 AND WEDGE IT BETWEEN THE FRAME AND THE TREE.

2 FRAME THE STRUCTURE AS SHOWN USING 2x4s FOR FLOOR JOISTS AND 2x3s FOR THE WINDOW FRAME.



3 FLOOR AND END PANELS ARE CUT FROM TWO SHEETS OF EXTERIOR GRADE 3/4" PLYWOOD.



4 THE ROOF IS MADE FROM THREE SHEETS OF EXTERIOR GRADE PLYWOOD. RIP PLYWOOD DOWN THE MIDDLE TO CREATE SIX PIECES.

HAND HOLD, CUT IN FLOOR, MAKES IT EASIER AND SAFER TO CLIMB UP LADDER.

In his A-frame plan detailed here, David Stiles keeps the construction super-simple to hold down the cost—as well as to eliminate the need for professional building expertise. His newly published tree-house book features three other basic designs in addition to the A-frame shown. For the safety of the children, be sure that you pick two healthy trees of adequate size and that you anchor your tree house securely to them.



To level beams, secure one end with lagscrew and swing board up until level. Mark tree, secure second end with lagscrew.

Next, secure the two end triangles to tree and beams. The shim between tree and triangle assures a plumb structure.



The floor is framed and skinned to provide a safe working platform so that the work on the A-roof can proceed.

signs offered in the book by David Stiles. We chose the A-frame for its simplicity of design and ease of construction. Building details on page 93 clearly spell out how the structure goes together, although the book provides additional drawings not shown here.

Preliminary planning

Start by picking the two trees which the unit will be built in. Ideally, these will be in the kids' corner of the yard and away from gardens, decks and the like. They should be sturdy and healthy, and the site should be within easy view of the house (so Mom can make periodic visual checks).

Locate the floor no more than 6 ft. above the ground. Greater height adds nothing to the treehouse effect and, in fact, can make it more difficult for occasional parental inspections.

If you decide to create any custom items (such as built-ins) on your tree house, give priority consideration to safety. For example, do not over-build walls or openings so that it would be impossible for an adult to squeeze through them. Make certain that no locks are used on the outside of the house to avoid any chance that one youngster might lock another one inside. And be sure that access ladders, ropes and the like are permanently affixed.

A good safety feature to consider is a "soft" area beneath the structure. To install it, simply lay out a square or rectangle approximately 6 ft. wider and longer than the structure itself. Install a perimeter of 2x6s. Excavate the interior to a depth of 6 in., then fill the hole with mason's sand.

Selecting materials

You may prefer to paint your completed house but the wisest route is

to pick materials that call for a minimum of maintenance—yet retain their looks. By selecting either redwood or pressure-treated lumber you will eliminate time-consuming and expensive periodic painting. Both types of wood age to a handsome silver patina and the house will be a visual asset in most back yards.

The roof and the floor should be skinned with exterior grade plywood. Although the drawings call for $\frac{5}{8}$ -in.-thick material, $\frac{1}{2}$ in. is adequate and using it will save you a few pennies. The roof should be covered with 15-lb. felt followed by either asphalt or a layer of wood shake shingles.

The floor can be left as is as long as the plywood edges are protected from moisture. (Even exterior-grade plywood will delaminate eventually if left exposed to the weather.)

Building the A-frame

Start by measuring the distance between the chosen trees and cut the pair of 2x6s for the beams. Locate and bore the shank holes for the lagscrews in both ends of both boards. (Note: The shank hole should allow the screw to pass through easily; i.e., use a $\frac{9}{16}$ -in. bit for a $\frac{1}{2}$ -in. lagscrew.)

Position the first end of the board at the correct elevation and use the prebored hole to locate the screw position on the tree. Bore the pilot hole in the tree to receive the screw. Have a helper hold the board firmly in position while you install the lagscrew.

Slip a washer on the screw before passing it through the 2x6. Do not tighten the screw fully at this time; leave the screw loose enough so that the board can be swung up and leveled.

While your helper holds the board level, mark the second tree for the

second lagscrew. Bore the pilot hole and install screw as before. Repeat the procedure for the second 2x6, making certain it is level with the first one. There should be at least $1\frac{1}{2}$ in. of lagscrew embedded in hardwood trees and $2\frac{1}{2}$ in. in softwood trees. Finally, turn all four lagscrews tight.

Making the triangular ends

Next, build the two end triangles. It is easiest to assemble these on the ground; then install them on the beams. For this, you *must* have a helper; there is simply too much weight for one person to hold steady while locating and boring screw and bolt holes. Notice that all frame assembly is with lagscrews and carriage bolts; since they are exposed to the weather, use only galvanized hardware.

If both end triangle panels are built accurately, they will be perfectly level when set upon the main beam. While both panels are still on the ground, carefully align them and mark both for positioning on the beam.

With end panels installed, the floor can be framed and skinned with plywood. This way you will have an ample deck to work upon while completing the house. Install floor joists using 12d galvanized common nails spiked through header joists into joist ends. Add several toenails through joists into the beams. Horizontal roof rafters are installed by spiking through the rake rafters on the ends.

Cover the roof with plywood and shingles, build the ladder and install. Designer Stiles suggests leaving the house window- and door-less to maintain a "welcome" attitude to neighborhood kids. If you install windows, make them of a sheet acrylic, such as Plexiglas, to avoid any accidents.

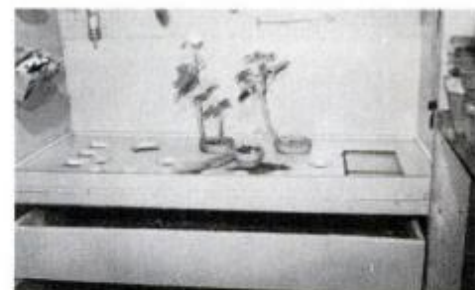
PM



The 3-ft.-wide storage area, which forms outside wall of carport, holds bench.



Potting tools are hung on pegs; shelves for pots are installed between wall studs.



Holes in work surface are sized to hold the pots being worked. Excess soil pushes through to the drawer below for storage.

store pots, peat moss, fertilizer and sprinkling can. If there is any floor dampness, construct a removable duckboard-style floor rack for these items.—*Ralph S. Wilkes*

Put a potting bench in a spare corner

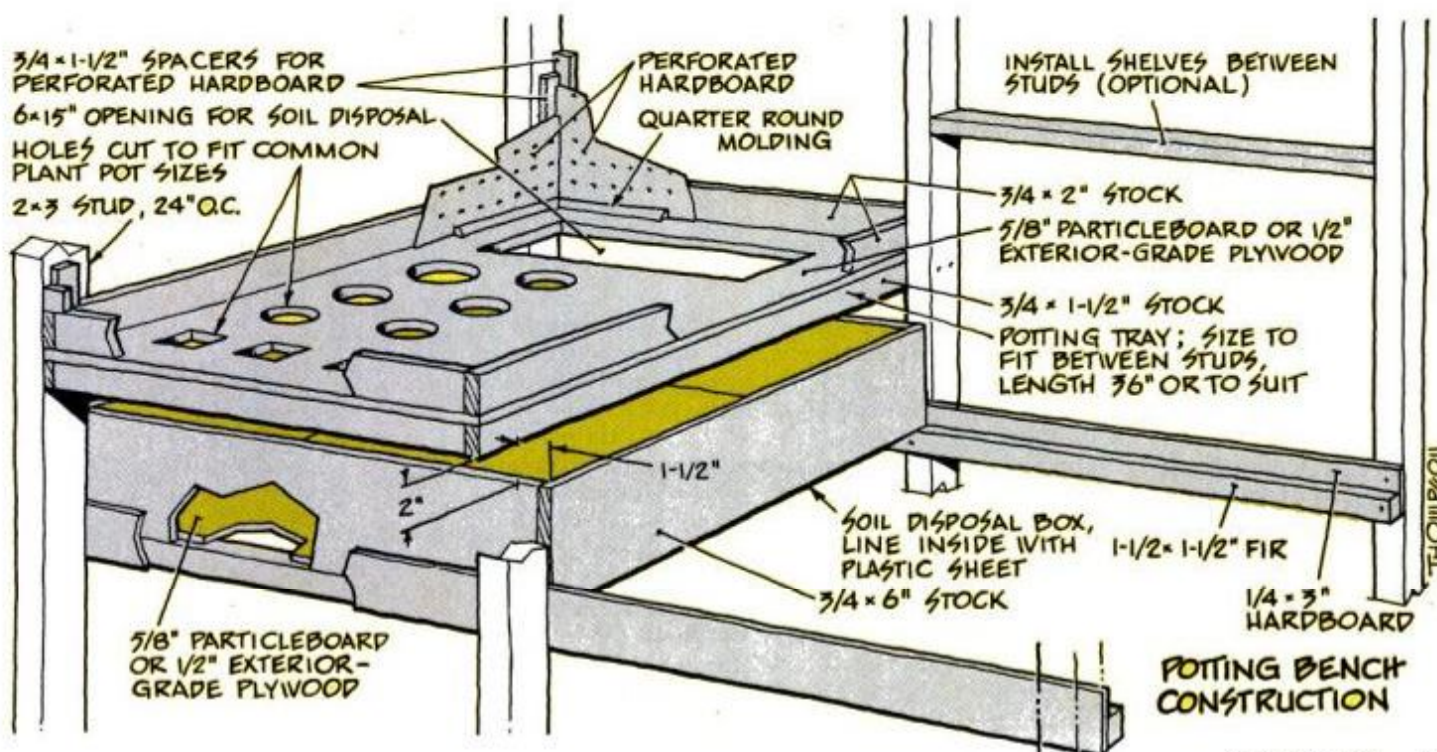
Repotting house plants and transplanting vegetable seedlings from flats to pots can be messy and time-consuming if you're not fitted out for the task. However, not many of us have the space or time to build a full-fledged potting bench.

Charles and Judith Morgan of Ruxton, Md., solved the problem by designing this compact bench. They constructed it in the storage enclosure which supports the outboard end of their carport. It also could be built in the corner of a garage or in a basement, if you add a supporting partition.

The bench consists of a tray with

pot-holding and soil-disposal holes—and a drawer below to store unused soil. Perforated hardboard surrounds the work surface and organizes tools. A fluorescent fixture with two 40-watt tubes is mounted on the ceiling to provide good lighting. Two 250-watt, infrared bulbs, installed above and in back of the operating position, provide heat when needed.

For easy cleaning, prime and coat all surfaces that contact the soil with a durable, exterior enamel. Line the inside of the soil storage drawer with a plastic sheet. Use the floor space beneath the bench to



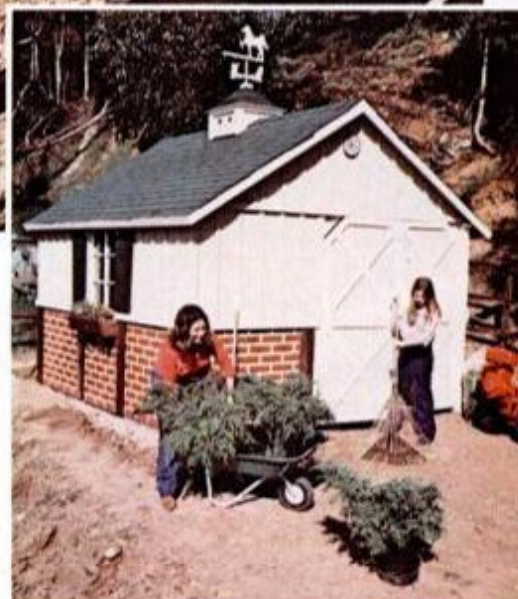


Build PM's modular barn

If you need a versatile outbuilding, but don't feel like spending warm-weather months putting it together, consider preassembling this modular barn/storage shed during the winter months. Maximum size of the panels is 4 x 8 ft., so each module can be built in the basement or garage and put together where and when you wish.

Finish details, like shutters, window box, weather vane (functional) cupola (with birdhouse) and Dutch doors can also be preassembled and stacked against the wall of the gar-

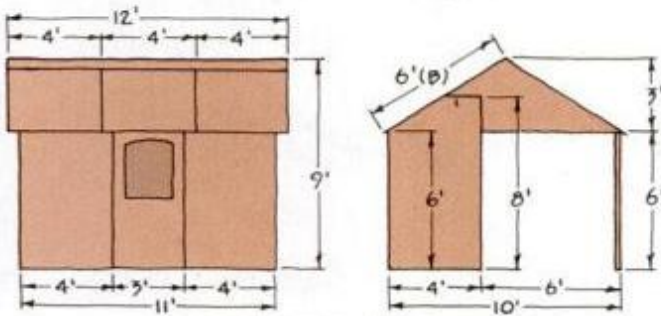
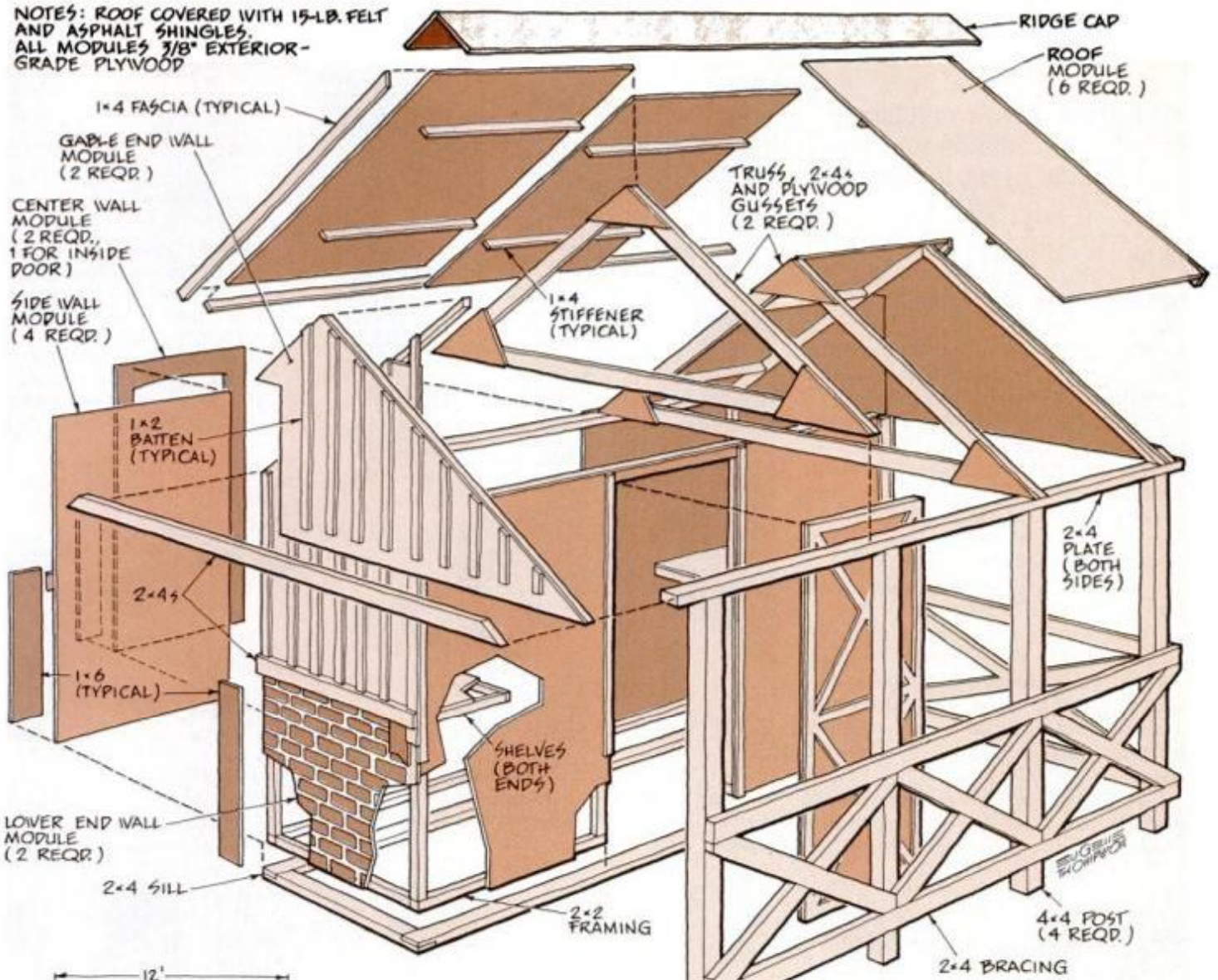
rage or shop while awaiting assembly time. The wall modules are even prefinished, right down to the painted brick pattern, to speed up final construction. Used windows can be incorporated in your barn to save money. The floor plan is divided into two areas, one enclosed for weather-tight, lockup protection and a larger area that can either be left open or enclosed. The large portion works as a stable, small carport, woodshed, or a shed for rolling stock like garden carts, mowers, tractors and the like.



Large, open section of barn can work as a stable, woodshed or carport for a compact auto; enclosed section holds tools.

PM

NOTES: ROOF COVERED WITH 15-LB. FELT AND ASPHALT SHINGLES. ALL MODULES 3/8" EXTERIOR-GRADE PLYWOOD



MODULE DIMENSIONS

HOW TO ORDER PLANS

Complete plans for PM's modular barn, including how-to-build instructions and a list of materials, are available for \$7. Send your check or money order to PM Barn, Stevenson Publications, Box 584, Del Mar, Calif. 92014. Allow two to four weeks for delivery for third-class mail; add 75 cents if you prefer faster, first-class mailing.



The barn is built of preassembled panels, small enough to be constructed in a garage or shop during the winter months.



On-site assembly took the designer, his son and friend one day to complete—although all of the steps can be handled by one man.

PM's tabletop lathe: A great

You needn't be a machinist to build this little beauty—it's made of hardwood.

by John Gaynor

The chips really fly when you go to work on this little, homemade hobby lathe. The tool turns small wood parts for toys, models and other miniatures with precision.

Although the lathe is designed to be powered by a Dremel Moto-Shop, it works with any motor of about 3400 rpm. If the motor has a higher speed, a variable-speed control allows you to dial the rpm setting to suit. Cost of materials, including the spur center and faceplate (both from Dremel), is about \$6.

For a smooth finish, sand all parts with 120-grit sandpaper and dust with a tack cloth. Spray with two coats of Krylon No. 1301 clear lacquer, rubbing with 4/0 steel wool and dusting with a tack cloth between coats.

Cut the motor bracket parts (M and N) and assemble with glue and screws. To assure alignment of live



Our lathe project is designed around Dremel's Moto-Shop; you will have as much fun building the lathe as you will creating turnings on it. High-quality work, like the turnings here, can be produced after a few practice sessions.

PM photos: Rosario Capotosto

point (C) with spur point, bore holes for the lathe-bed fasteners only after the bed and tailstock are assembled.

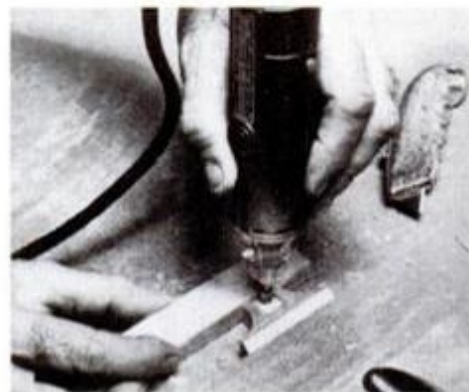
Cut the groove in the lathe bed (O). This groove receives the tailstock carriage bolt (D) and the toolrest (Please turn to page 104)



1 Groove the lathe bed and cut a slot with the Moto-Shop. Bore holes at the slot ends for blade entry and maneuverability.



2 Next, cut out the toolrest with jigsaw; bevel face after sanding or planing.



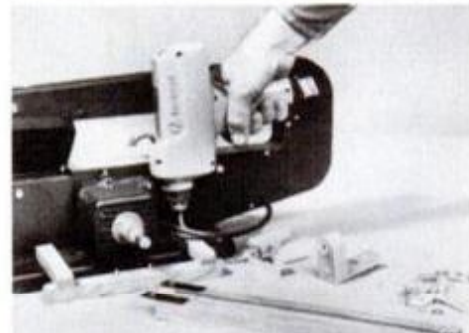
3 Use a hand grinder and end-milling bit to shape the small recess on the toolrest. First mark borders with knife cuts.



4 To guarantee true alignment, locate the hole for the dead center by pushing the tailstock into the live-center spur point.

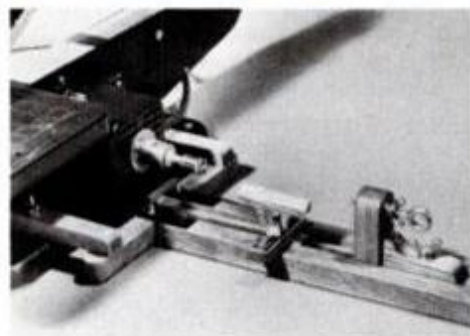
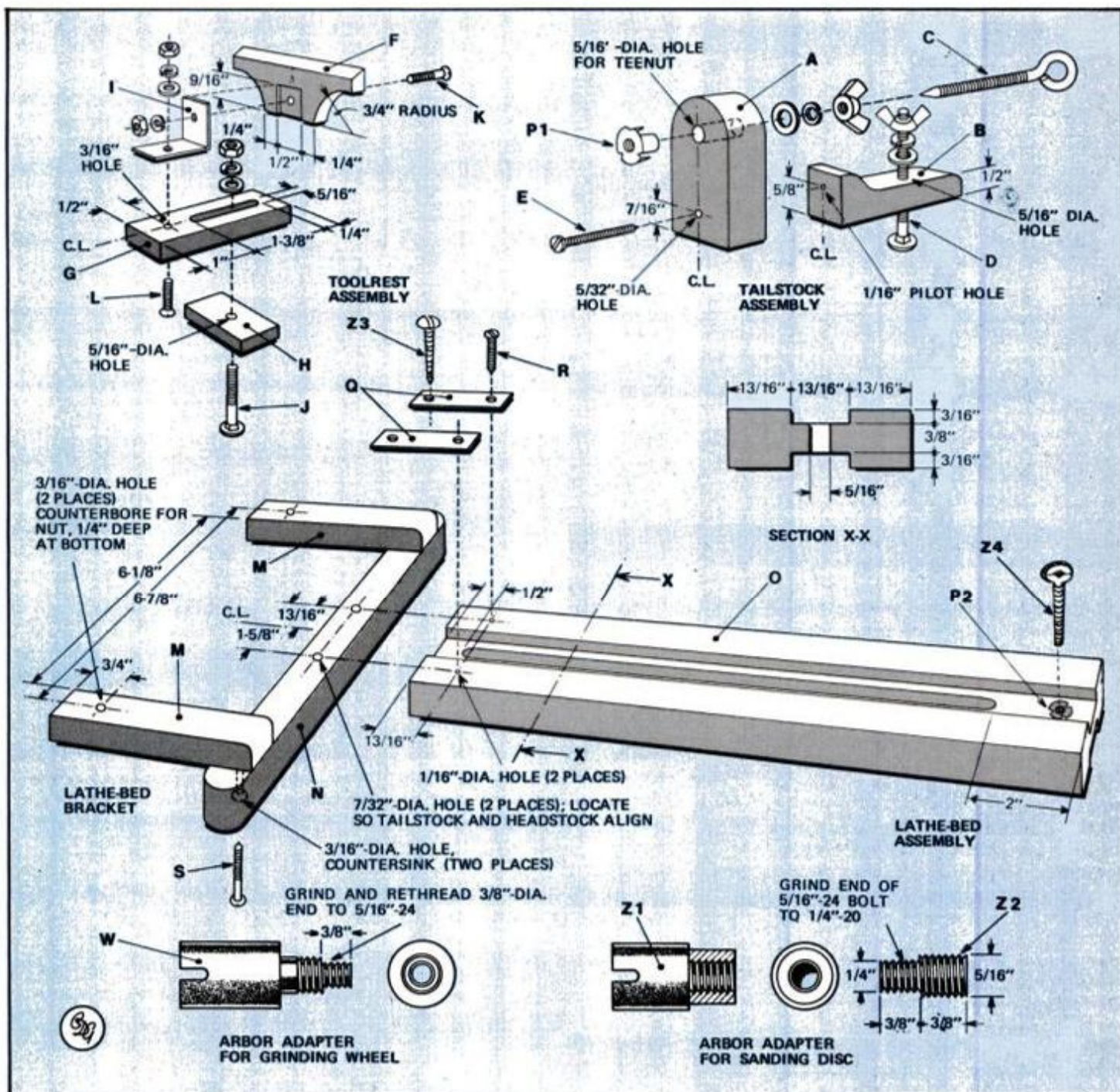


5 The parts are ready to assemble. Stock is oak, but you can use any hardwood.



6 Bore mounting holes in the saw base after centering the attaching bracket.

tool for miniature makers



7 The finished lathe is ready for use. You can purchase the live-center spur and lathe chisels at any Dremel supplier.



8 You can turn quite intricate spindles using your small chisels and this lathe.



9 With practice, you can do faceplate turning and achieve excellent results.

WORKSHOP MINICOURSE

BENCH PLANE, PART 2



Hold the iron and cap securely and tighten the screw that holds the parts together.

In last month's *Workshop Minicourse* on the bench plane (page 102), we left off with the blade and cap iron aligned. The first step (above) in this month's discussion shows the lever capscrew being turned home to hold that assembly rigid.

Though basically a simple tool, there is much more to assembling and using a plane than its looks might imply. It is important that you understand tool assembly so that you can get the tool back together exactly as it should be. Failure to correctly assemble the bench plane is sure to bring about failure using it.

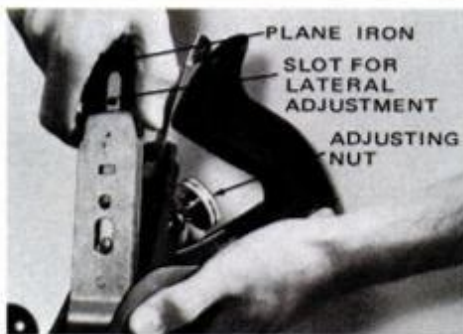
But let's back up a bit. Anytime you take your plane apart or adjust the blade, first inspect the plane iron. Check for sharpness and hone it slightly, if necessary. If the iron sports ungainly nicks or the like from rough usage, grind the blade before honing. Reassemble the iron and its cap so that the sharp edge of the cap iron is tight against the small, flat surface next to the cutter (which it bears upon) when they are screwed together. This will prevent shavings from working between them; keep in mind that the cap iron is intended to serve as a shavings deflector.

Assembling the plane

When you put the assembly in the plane, make sure that the cap iron is on top and on the unbeveled side of the plane iron. The blade's beveled side *must be down* when in the plane.

Slip the lever cap over the screw and snap the lever cam down to lock it in place.

Hold the plane in your left hand



The plane is assembled with the plane iron laid bevel-side down. You should make certain that the end of the Y-adjusting lever, the roller on the lateral adjusting lever, and the head of the plane-iron capscrew are seated correctly.

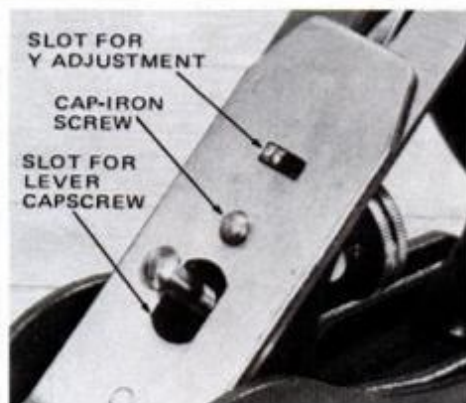


Slip lever cap under the lever capscrew and push the cam down. The iron should be held firmly with the cam in place.



Sight along the plane's bottom (dotted line) while you adjust the plane's blade in or out using the adjusting screw (arrow).

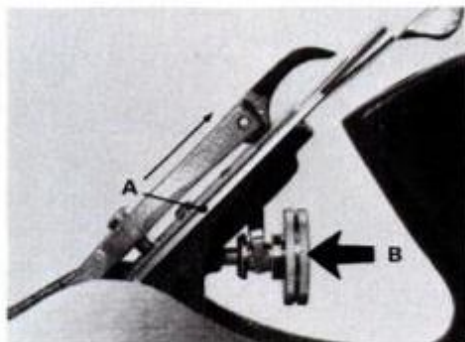
and sight along the bottom to adjust the iron. With your right hand, move the adjusting lever until both corners of the blade project the same distance from the throat. Then use the adjusting nut to project the blade through the throat and slightly beyond the plane bottom. In the next plane installment, in the October issue, we will discuss the lateral adjustment and more. **FM**



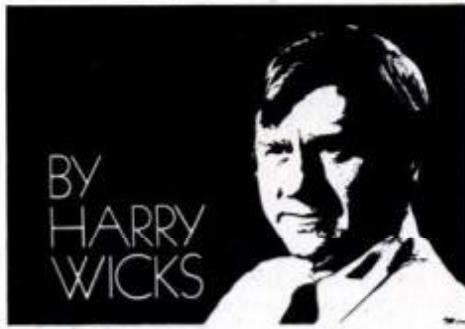
Properly installed iron assembly lies flat in the plane, as shown above. Notice Y-adjustment lever is in its slot.



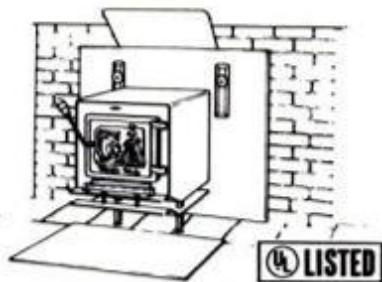
If the plane iron is not held securely when the cam is in place, remove the lever cap and slightly tighten lever capscrew.



Plane iron A is retracted (arrow) when adjusting knob moves in direction of arrow B. To push blade out, reverse knob rotation.



Be glad your home has a fireplace!



Pat. Pending Model DFP-1

Now, with **Hearth Mate, the Fireplace Stove**, you can fill your home with warmth and still save up to 60% and more on home heating costs.

Let us show you how **Hearth Mate** installs securely in minutes, how easy it is to operate, how efficiently it warms your home, how owners save up to 60% on heating costs. Send for free brochure.

Dealer Inquiries Invited

Hearth Mate
the Fireplace Stove

C & D DISTRIBUTORS

P.O. Box 766, Dept. 428

Old Saybrook, CT 06475 (203) 388-3408

Screw loose?

RIVETS CAN'T STRIP, CAN'T SHAKE LOOSE... LIKE NUTS, BOLTS, SCREWS.

POP Brand RIVETOOL

For all kinds of fastening jobs, rivets are faster and easier than nuts, bolts, screws. Fasten from one side—automatically, securely. On metal, leather, plastic, canvas. With the POP Brand RIVETOOL.

Bostik Consumer Division Reading, PA 19605

An EMHART Unit

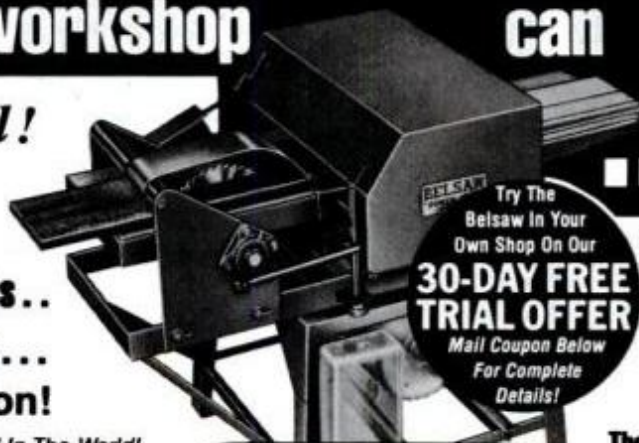


Your home workshop

can PAY-OFF

3-in-1 Power Tool!

This one power-fed tool—
SAWS to desired Width...
PLANES to desired Thickness...
MOLDS all popular Patterns...
—all in one fast operation!



...BIG!

Try The Belsaw In Your Own Shop On Our **30-DAY FREE TRIAL OFFER**
Mail Coupon Below For Complete Details!

Send TODAY for this fact-filled **FREE BOOKLET!**



Only Complete Workshop Tool Of Its Kind In The World!
From the day it arrives the Belsaw will make and save you money. With shortages and inflation driving lumber prices sky-high, this versatile power tool quickly pays for itself by easily converting low cost rough lumber into high value finished stock. Make your own quarter-round, base mold, door and window stop, casing, tongue-and-groove... all popular patterns. Other Belsaw operators turn out picture frames, fencing, clock cases, furniture, bee hives, bed slats, surveyor's stakes... all kinds of millwork. Handles tough oak and walnut as easily as pine using only one small motor, and so simple to operate even beginners can use it.

YOUR OWN BUSINESS Part Time or Full Time—Right At Home!
Men and women everywhere are using this one low-cost power-feed machine to start and build their own new businesses... and YOU can do the same. Supply lumberyards, carpenters and contractors in your area with door and window trim... base shoe... bed mold... cove and quarter round... ALL of their trim. You can sell picture frame to custom framing shops, paint stores, department stores and direct to users. All patterns available or design your own. **Get FREE Booklet with facts and full details... RUSH COUPON TODAY!**

Does The Belsaw Pay? YOU BET!
READ WHAT BELSAW OWNERS SAY:
"I bought a batch of walnut in the rough, and after planing it on the Belsaw I figured I saved enough money to pay for two-thirds the cost of the Planer. It really does a good job."
R. S. Clark—Springfield, Ohio
"This machine pays for itself making money out of scrap boards. It is a very well built machine and I confess it is more than I really expected for the price. It does everything you say it will."
Stephen Schultz—Orangeville, Penna.
"I've been a planer man for years and am now retired. The Belsaw has earned me \$60,000 in eleven years... it's the best investment I ever made."
Robert Sawyer—Roseburg, Oregon
"I recommend the Belsaw as the most useful shop tool any craftsman could own. We use one every day in the Workbench model shop... couldn't get along without it."
Jay Hedden, Editor Workbench Magazine

There is **NO OBLIGATION** and **NO SALESMAN** will Call—ever!

If coupon has been removed, just send postcard with name and address to:
BELSAW POWER TOOLS Co.
901P Field Building
Kansas City, MO 64111

BELSAW POWER TOOLS Co.
901P Field Building
Kansas City, MO 64111

YES, please send me the **FREE Booklet** that gives me complete facts about Belsaw's 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 _____

Be an Electrician



**CONSTRUCTION
MAINTENANCE
CONTRACTOR**

Train at home
in spare time

MAKE MORE MONEY! Check out Electrician's wages against the kind of money you make now!

Even before you're ready to go after a full-time job as an electrician, you could be making extra money doing odd jobs for friends and neighbors. And think of the money you'll be able to save doing your own electrical work. Learn to specify and install wiring, operate and control motors and generators, use and maintain transformers and storage batteries.



We show you how to troubleshoot for short circuits, overloads and open wires. You'll be ready to take almost any electrician licensing examination offered by state, city or county. Because opportunities vary from time to time and from one part of the country to another, we encourage you to check on the job market in your area. Mail coupon for free facts and results of survey showing employment success of our graduates.

NO NEED TO QUIT YOUR JOB OR REGULAR SCHOOL

Everything explained in easy-to-understand language with plenty of drawings, diagrams and photos. Tools, materials, test equipment included with course. You learn at your own pace. No time wasted traveling to class. Teachers are as close as your telephone. No charge! Use our toll-free 24-hour home-study hotline as soon as you enroll. **MAIL COUPON TODAY!**



ELECTRICIAN SCHOOL, Dept. PB070
ICS Center, Scranton, PA 18515

Rush free facts that tell how I can train at home in spare time to be an electrician. No obligation, no salesman will call!

NAME _____ AGE _____
ADDRESS _____
CITY/STATE/ZIP _____

The smartest call you'll ever make...
(on our dime).



Toll Free
(800) 547-2504*

Call now and find out how you can put the efficient **Schrader Wood Stove** in your home or office this Winter. Save on costly utility bills. Find out why **Schrader** is the outstanding wood stove buy in the nation. You'll receive details by mail without obligation. Call any time day or night. (Dealer Inquiries Welcome)



600 So. Seneca, Dept. A.
P.O. Box 2898,
Eugene, OR 97402

*Oregon residents call: 1-800-452-6585

PM TESTS NEW MINI PICKUPS

(Continued from page 63)

are rated by the Environmental Protection Agency (EPA) at over 20 mpg. They can get you into the back country with room to spare and they are more maneuverable than their bigger cousins from Detroit. The Toyota and the Datsun are available with larger storage beds and maxi-sized cabs. To keep the testing even, though, we chose the base models offered by all the companies.

The off-road portion of the test took place at Saddleback Park in Orange County, Calif. The street testing was done on the freeways and side streets of Orange County and Los Angeles. We lived with the trucks for a couple of weeks, and formed some opinions, positive and negative, about all four of them. We put each 4x4 through its paces to explore its unique personality traits. First, we'll sum up our opinions and then we'll tell you how we formed them.

We liked the Toyota and the Subaru best. The Toyota seemed to exemplify everything about a workingman's 4x4 that we could think of. It is a bit bigger and more massive than the other trucks, in places where it counts. It is also wider and taller than the others.

The Toyota has the most functional and easiest-to-read-and-operate dashboard and air/heat controls. It has the largest gas tank and the biggest engine for the most pulling power. It is also the most expensive, but we think you get your money's worth. It doesn't get as good mileage as the other trucks, but we think that is because Toyota built this truck with endurance and working ability first in mind, economy second. It weighs more than the other three trucks we drove. If we had to pick one truck we were going to drive to the job site, one truck that we had to depend on as part of making our day-to-day living, it would be the Toyota. It's the most *serious* of all the 4wd mini pickups we tested.

We liked the Subaru for all the opposite reasons. If ever there was a

sleeper, if ever there was a vehicle that held a lot of hidden promise, it is the Brat. It is smaller, lighter, less expensive and sportier than all the other trucks. So much so that the word *frivolous* comes to mind when trying to think of one all-encompassing term for the truck, but it sure is fun.

It comes with carpeting in the back bed and two jump seats with handholds as standard equipment; so this is not any kind of serious hauling vehicle. This is a pleasure machine and sports car rolled into one. The Brat went quicker and stopped faster and used less gas than its competition. It comes with front-wheel drive, which makes for some unnecessary excitement on the paved road, because the back end desperately wants to say hello to the front end whenever you take a turn even a bit over the legal limit. This is because all the weight, as well as the driving wheels, are in the front. But flip the floor lever into 4wd and you've got yourself a little wonder rig that never falters off the road.

The Brat, which we at first considered to be the little baby of the four trucks, the truck most likely to get stuck in the tough stuff, proved itself worthy at every turn during our sometimes rugged dirt testing. It went everywhere the big trucks went and it never complained.

The Chevy Luv (Light Utility Vehicle) by Isuzu is really a Chevrolet at heart. Don't let that import sticker fool you. The Luv was hearty, dependable and never faltered, just like every Chevy you ever owned.

The Luv comes stock with a bench seat, and we like that change from the buckets, which tended to waste space in the cabs rather than create it. Even with the bench-seat arrangement, the shifting levers for gear box and transfer case were easily within reach.

The Luv didn't come with a trip odometer on the dash, something you'd better have when heading for

SPECIFICATIONS AND TEST DATA—MINI PICKUPS

	Chevy Luv	Datsun	Subaru Brat	Toyota SR5
Length	173.8 in.	171.7 in.	164.8 in.	170.1 in.
Width	63.2 in.	63.4 in.	61 in.	66.5 in.
Height	60.8 in.	63.4 in.	56.7 in.	65.9 in.
Ground clearance	7.5 in.	8.8 in.	7.1 in.	7.9 in.
Fuel tank	13 gal.	13.2 gal.	11.9 gal.	13.7 gal.
Weight	2585 lbs.	2788 lbs.	2200 lbs.	2815 lbs.
Engine displacement	1817 cc	1952 cc	1595 cc	2189 cc
EPA (highway)	22 mpg	20 mpg	26 mpg	20 mpg
Base price	\$6383	\$6419	\$5398	\$6498
Tires; tread	Goodrich T/A F70-14; 6 in.	Dunlop Cross Lug G78-15; 6½ in.	Bridgestone Mud and Snow 155SR-13; 5 in.	Dunlop Snow Cruiser H78-15; 6 in.
0-50 mph (2-wheel)	13.3 sec.	16.8 sec.	11 sec.	13 sec.
0-50 mph (4-wheel)	14.1 sec.	17.4 sec.	11.2 sec.	14.2 sec.
Braking (50-0 mph)	71 ft.	89 ft.	60 ft.	75 ft.

the back country, but it did have one neat feature none of the other trucks could claim. Borrowing a note from their motorcycle-making friends in Japan, Isuzu designed the Luv 4x4 so that it couldn't be started unless the clutch is depressed. This could mean you might have to use the parking brake in off-road situations when you start the rig on an incline, but it does provide a nice extra measure of safety.

The Luv comes with perhaps the finest tires of all the 4x4s we tried (Goodrich radials) and the Luv was without a doubt the most comfortable truck on paved highway. On the road, it didn't feel like a truck; in the dirt, it could more than take care of business.

The best and most innovative thing about the Datsun 4x4 is that it has the only independent front suspension of all the trucks and also has the most ground clearance.

The Datsun had no trouble keeping up with our 4x4 caravan off the road, and in fact led many of the miles we traversed in the dirt.

There were things about the Datsun we didn't, especially like. The steering arms were about 3 inches off the ground, as they were admittedly low on the Luv truck. In contrast, things like steering arms and exhaust systems are nicely tucked away on the Brat and Toyota. The Datsun and Luv, to a certain extent, failed in some of these packaging areas. You have to take things like that into account when you are talking about buying a vehicle for going off the road.

The Datsun does have an identity crisis. It doesn't know whether it is a serious 4x4 for the workingman or a fun truck like the Brat. But a lot of people will probably buy it because it is such a *good-looking* vehicle.

Final results? The Toyota wins overall for construction quality and utilitarian image. The Brat finishes second for price, economy and performance, and for not being afraid to be nothing more than what it is: a fun toy for big kids. The Chevy Luv comes in a close third. It ran best on the road and provided the kind of creature comfort we've come to expect from the Chevrolet marque. The Datsun brings up the rear with a nice first-year effort.

The results of the test didn't surprise us. Toyota and Subaru have the most experience in building 4x4s. So it's nice to see that they were able to translate all their experience into the mini pickup so successfully.

FM

LUBRIPLATE® "MARINE" LUBRICANTS

For protection beyond the call of duty!



LUBRIPLATE DIVISION / FISKE BROTHERS REFINING COMPANY / 129 LOCKWOOD STREET / NEWARK, N.J. 07105
MANUFACTURING PLANTS IN NEWARK, N.J. 07105 AND TOLEDO, OHIO 43605 / DISTRIBUTORS NATIONWIDE

AQUA DRILL FOR WATER INDEPENDENCE

HAPPY HEALTHY LIVING
REQUIRES A PLENTIFUL AND
CONTINUOUS SUPPLY OF
GOOD QUALITY WATER.

ODDS ARE IN YOUR
FAVOR THAT THIS WATER
SUPPLY IS LESS THAN 200
FEET BELOW THE SURFACE
OF YOUR PROPERTY.

THE **AQUA DRILL®** IS THE
INEXPENSIVE WAY TO
ACHIEVE **WATER INDEPENDENCE**.

FOR FULL INFORMATION
ON THIS APPROACH TO
WATER WELL DRILLING
CALL TOLL FREE

800-231-2735

OR WRITE

AQUA-WELL MFG. CO.
P.O. BOX 10839, DEPT. W-102
HOUSTON, TEXAS 77018



BUILD PM'S TABLETOP LATHE

(Continued from page 98)

carriage bolt (J). Bore a hole near the end of the lathe bed for the leveling Teenut (P2).

Cut tailstock parts (A and B). You can determine the height of the live (bolt) center (C) after fastening together the bed, bracket and motor. To avoid splitting, round off the top of the tailstock only after tapping in the Teenut (P1).

Cut toolrest parts (F, G, H). Floating spacer (H) is primarily used to retain the toolrest height when us-

ing a faceplate. Bevel the top edge of the toolrest at a 45° angle.

Dremel's spur center and faceplate receive a 5/16-in.-dia. × 24-thread shaft (W). If you use power other than the Moto-Shop, you must adapt it to these accessories.

With a 5/16-in.-dia. × 24-thread die (about \$1.50), you can grind most shafts or arbors by holding a flat file against the turning shaft until a 5/16-in. dia. is reached. By chucking a 1/4-in. eyebolt in your drill, you can grind a live point (C).

For information on Dremel products or parts, write: Dremel Manu-

facturing Div., Emerson Electric Co., 4915 21st St., Racine, Wis. 53406. **PM**



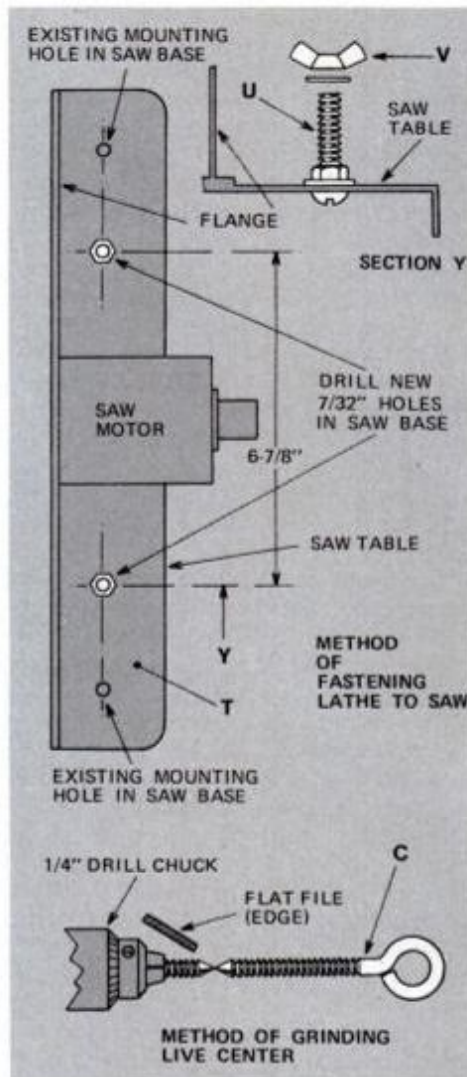
Sometimes It Pays To Have Nosey Friends

... friends that give you a firm grip on fine work in tight places. That make it easy to reach the hard to reach. Long nose pliers by CHANNELLOCK. Slender, perfectly mated jaws with no side wobble. Sharp, hand honed cutters. Beautiful high polished finish. Blue dipped plastic comfort grips. Quality in every detail (at no premium in price). CHANNELLOCK. Be sure that name is on the pliers YOU buy.

CHANNELLOCK

CHANNELLOCK, INC. • Meadville, Pennsylvania 16335

Meet The Rest Of The Family. Send For Free Catalog.



MATERIALS LIST—TABLETOP LATHE

Key	Amt.	Size and description (use)
A	1 pc.	3/4 × 1 1/4 × 2 1/4" hardwood (tailstock)
B	1 pc.	3/4 × 1 × 2 1/2" hardwood (tailstock guide)
C	1	1/4-20 × 2 1/2" eyebolt and corresponding washer, lock washer and wingnut; grind end to point (live center)
D	1	1/4 × 1 1/2" carriage bolt and corresponding washer, lock washer and wingnut
E	1	1 1/4" × No. 6 panhead screw
F	1 pc.	3/4 × 1 1/4 × 2 1/2" hardwood (toolrest)
G	1 pc.	3/4 × 3/4 × 2 1/4" hardwood (toolrest base)
H	1 pc.	3/16 × 3/4 × 1 1/4" hardwood (floating spacer)
I	1	1 × 1" steel corner brace; grind leg attached to F to 3/16" length
J	1	1/4 × 1 1/2" carriage bolt and corresponding washer, lock washer and hex nut
K	1	No. 8-32 × 1/2" fh machine screw and corresponding lock washer and hex nut
L	1	No. 8-32 × 1/2" fh machine screw and corresponding washer, lock washer and hex nut
M	2 pcs.	3/4 × 3/4 × 4" hardwood (bracket)
N	1 pc.	3/4 × 3/4 × 8 1/4" hardwood (bracket crosspiece)
O	1 pc.	3/4 × 2 7/16 × 12 1/4" hardwood (lathe bed)
P1	1	1/4-20 Teenut
P2	1	No. 8-32 Teenut
Q	2	1/2 × 2" mending plates
R	2	3/4" × No. 6 fh wood screws
S	2	1" × No. 8 fh wood screws
T	1	Dremel Moto-Shop
U	2	No. 10-24 × 1" rh machine screws and corresponding lock washers and hex nuts
V	2	No. 10-24 wingnuts and washers
W	1	Dremel Moto-Shop modified arbor adapter
Z1	1	Dremel Moto-Shop arbor adapter
Z2	1	Sanding-disc fastening stud
Z3	2	1" × No. 6 panhead sheet-metal screws
Z4	1	No. 8-32 × 1" thumbscrew

Misc.: Franklin Titebond glue; Krylon No. 1301 clear lacquer; 4/0 steel wool; 120-grit sandpaper.



Be a Draftsman

Learn at home in spare time with no previous experience

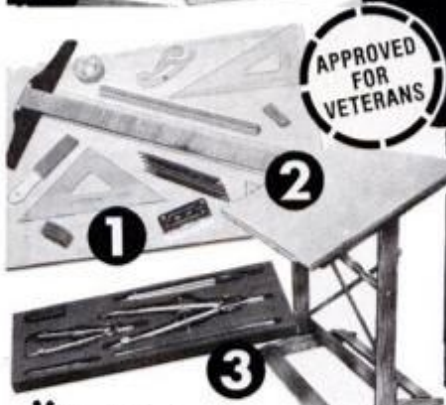
**INCLUDED!
WITH COURSE**

... Salaries for draftsmen climbed 23% during the 3 years from 1973 to 1976, according to 1977 survey of 12,000 draftsmen by American Institute for Design & Drafting. Because opportunities vary from one area to another, we ask you to look into the job market in your area and see how many jobs are available in the field of drafting. We supply necessary equipment plus easy-to-master, step-by-step instructions. Our professional staff guides you all the way.

THESE 3 BIG DRAFTING KITS*

...when you train at home with us for a

FINE JOB IN DRAFTING!



APPROVED FOR VETERANS

* Precision Drawing Instrument Set, Professional Drafting Board Outfit & Fingertip Tilting Drafting Table are included with your complete North American Course in Drafting

We are proud of these comments sent to us by students and graduates when we asked them to evaluate our course. They may or may not be typical because opportunities vary from time to time and from one place to another. But these comments show what can be done by those who set their goals high and go after what they want.

Salary increased by 56% "Upon earning this diploma, I was made senior draftsman and my salary increased by 56%. I owe such an achievement to North American School of Drafting and its wonderful staff."



... Elrie Farrell

Recommends North American Course "The training I have gained from North American School of Drafting has enabled me to work independently. I am now an assistant architect at Summit Development Company and make up to \$200 a week! The course was very helpful to me, and I now recommend N.A.S.D. to young men and women coming into the field."



... Copeland Moxey

ALL FREE!
Rush Coupon today!

CAREERS IN DRAFTING

APTITUDE TEST

North American School of Drafting, Dept. PB070
4500 Campus Dr., Newport Beach, CA 92660

Rush free "DRAFTING CAREER KIT" showing how I can prepare for a good job in Drafting. No salesman will call.

Name _____ Age _____

Address _____

City _____ State _____ Zip _____

North American School of Drafting, 4500 Campus Dr., Dept. PB070, Newport Beach, CA 92660

Order Eyeglasses by Mail and Save.



Yes, prescription glasses (or your present lenses duplicated) by mail and at big savings. As low as \$14.95 — frames, lenses, and case! Satisfaction guaranteed. Write for free catalog. All lenses, all styles.

Est. 1959
Prism Optical, Inc., Dept. PM80
10992 N.W. 7th Ave., N. Miami, FL 33168

YOU DON'T NEED CASTRO'S PERMISSION TO ENJOY THE UNIQUE HAVANA FLAVOR.



If you remember savoring and lingering over a fantastically mild and flavorful Cuban leaf cigar in the days before the Cuban embargo, you will be interested in this offer — and the story behind it!

When the Cuban embargo hit, we and other small manufacturers of fine custom-made cigars faced ruin. Our very existence depended on maintaining the same incomparable quality we had staked our reputation on.

The solution was pure cloak-and-dagger. One dark night a few years ago a group of daring Cuban expatriates put to sea carrying a precious cargo of Cuban tobacco seeds. After running a gauntlet of Cuban gunboats they finally reached their destination — Honduras. Here under almost identical conditions of climate and soil, this prime tobacco flourishes to this day, far from its native land. This is the tobacco we use to make our superbly mild and flavorful cigars — cigars an expert can't tell from Havana.

mate and soil, this prime tobacco flourishes to this day, far from its native land. This is the tobacco we use to make our superbly mild and flavorful cigars — cigars an expert can't tell from Havana.

MY OFFER TO CIGAR LOVERS

I will send you postpaid a variety of 50 factory fresh cigars. Smoke one or a half-dozen with my compliments. If these cigars aren't all you expect and a great deal more, return the remainder by parcel post within 30 days and I'll refund your money. No questions asked. Your delivered cost is only \$10.90 for 50 Factory-Fresh Cuban Seed Leaf Cigars.

STEP FORWARD INTO THE PAST



FANTASTIC FACTS

- Saves up to 35% on air cond. costs
 - Quality manufacturing since 1939
 - UL approved
 - 90 day \$ back and 3 yr. guarantee
- To order call 1-800-241-7788
Ga. call coll. 1-404-498-1278
Send 25¢ for color catalogue
- UNIQUE ENERGY PRODUCTS**
P.O. Box 1009 - Dept. PM-8
Stone Mountain, Ga. 30086

A489 To order fill in and mail coupon to
THOMPSON CIGAR CO.
200 N. Edison Ave., Dept. A489, Box 1839, Tampa, FL 33601

O.K., TOMI Ship me the Victory Sampler under your money-back guarantee for only \$10.90.

- Check of \$10.90 enclosed. (Fla. residents add 4% sales tax.)
- Charge \$10.90 to my
 - Visa Master Charge
 - American Express
 - Diners Club

(OFFER GOOD IN U.S. ONLY)

Credit Card No. (Print all digits)

Master Charge Also Enter EXP. DATE
4 Digits Below Your Acct. No.

name

street

city

state

zip

Credit Card Holders Use **TOLL-FREE: 800-237-2559**
IN FLORIDA CALL: 800-282-0646

The Earth Stove

ECONOMY COMFORT BEAUTY

The Earth Stove®
gives you all three.



Everything you've demanded in an airtight wood stove is available in the amazingly efficient The Earth Stove.® Whether you burn it as a thermostatic heater or as an open fireplace you'll agree that The Earth Stove is an outstanding solution to the energy problem.

THIS UNIQUE COMBINATION OF FEATURES IS THE BASIS
OF THE EARTH STOVE'S REMARKABLE SUCCESS:



1. Thermostatic Draft Control
2. Downdraft Heating Manifold
3. Rear Draft Inlet
4. Secondary Draft Tubes
5. Insulated Firedoor
6. Chimney Air Mix Assembly

Lab tested, ICBO #3340
APPROVED MOBILE HOME MODELS AVAILABLE

For more facts see your local dealer
or write

THE EARTH STOVE
DEPT. 1 PM
P.O. Box 129
Tualatin, Oregon 97062
Phone (503) 638-3502

Some Dealerships Available

Copyright THE EARTH STOVE, Inc. 1980

COMPUTERS TALK, CONTROL YOUR HOUSE, SING

(Continued from page 81)

tion. This is quite handy but, when coupled to the C4P MF, it becomes fantastic. The computer can be programmed to do the button pushing—all automatically, and orchestrated to your own rhythms of living.

Coffee at 7:00 a.m. on weekdays and 11 on weekends? The C4P MF can be told your preference and will never turn your coffee pot on too late for a commuter's Monday, or disturb a hard-earned Sunday's sleep.

Best of all is what Ohio Scientific calls its "background" feature. You can still use the computer for other things while it is minding the house. It will continually run the house control program in the "background" of its memory, while the "foreground" plays Ping-Pong or forecasts stock-market futures.

Lots of color and sound

As might be expected from a company that has made a name for itself in games and arcade devices, Atari has lavished attention on the 800's display and audio capabilities. If you are interested in sound and colorful displays, check out the 800.

Though the other computers also offer color graphics, we found the Atari's to be the easiest to program for quick and lively on-screen animation. Colors and resolution were excellent.

Sound, too, was simple to program and—to our ears—sounded the smoothest and easiest to use in a true musical manner.

Anti-pirate or pro-toddler?

Both Atari and Texas Instruments use solid-state software in these new machines. The programs are in specially encoded ROM (Read Only Memory) chips within a plastic-cased cartridge. To run the program, the cartridge has only to be plugged into a slot.

Frankly, we were, and still are, less than enthusiastic about this method of program distribution. The advantages are that such programs are very simple to load. Children can quickly learn how to "use" a computer equipped with plug-in programs. The programs work every time, with no "dropped bits" due to loading glitches. Further, you don't have to worry about the delicacy of either cassette or floppy disc storage.

Disadvantages are their higher cost and the inability to change a program to meet your own personal needs or whims. This last bears investigating. Most computer owners soon become programmers. After all, the main strength of a computer is that it is a tool to extend its owner's imagination. A program on tape or disc can be changed, reprogrammed a bit or a lot.

Trouble is: A tape or disc program can be pirated. A copy can be made and given to a friend or two (or 50). There go the sale royalties for the programmer. Solid-state software cannot be copied by the user—so no pirates.

We talked with TI and they told us that, indeed, they were also bringing out tape programs for the TI-99/4. Ease of use, they told us, is the only reason they have gone to cartridges.

They certainly *are* easy to use. And having them in no manner handicaps you from doing your own programs from scratch. And, if a child will be using the computer, they are a plus.

Still, we hope that these companies (and others too) will not neglect the home programmer.

Read all about it

The worst thing about new computers *used to be* the quality of the instruction manuals. Often, only the

computer store could translate them and sometimes not even they could help.

Don't be afraid of these machines on that score. All three companies are supplying some excellent manuals and aids.

Atari even commissioned a book on Basic which will be sold separate from the computer. It's a lively and informative guide we really enjoyed reading.

Texas Instruments put a lot of obvious thought and effort into its detailed and easy-to-read manuals. From setting it up to advanced programming there are markers all along the route.

Ohio Scientific's machine comes with a huge three-ring binder of looseleaf material. Much of it will come in handy only once you really learn to program and understand the machine. But there is enough beginner material to get you going.

Hooking into other things

Ohio Scientific's C4P MF has a wealth of *ports* (computer terminology for sockets) on the back. This is probably one of the easier computers to hook up to equipment, such as printers from other manufacturers.

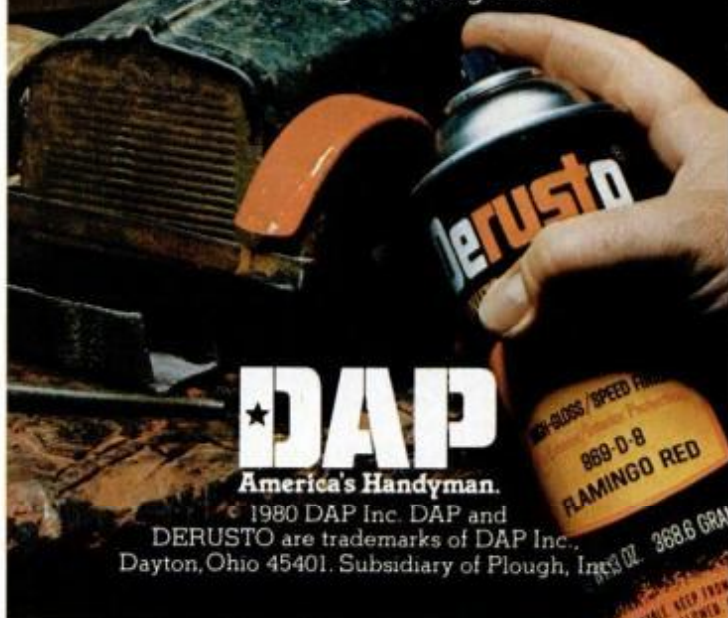
The Atari 800, however, is even easier to hook up to Atari-only peripherals. The only thing is that Atari has chosen a unique "daisy-chaining" hook-up system that will not (at this time) support any other manufacturer's equipment. However, its printers are reasonably priced and seemed reliable.

At the keyboards

The C4P MF and the 800 both have beautiful, Selectric-style typewriter keyboards. If you are a touch

FINGER PAINT.

Industrial strength DERUSTO Minute Finish renews rusted surfaces of furniture, toys, tools and decorative iron with each quick-drying coat. Works great on wood, too. Has a built-in rust preventive primer. Comes in 18 beautiful high-gloss colors. And lasts a good long time.



DAP
America's Handyman.

© 1980 DAP Inc. DAP and DERUSTO are trademarks of DAP Inc., Dayton, Ohio 45401. Subsidiary of Plough, Inc. 3686 GRAN

FILLS CAVITIES.

DAP Interior Spackling Compound is a ready-mixed vinyl paste that's soft and as easy to spread as butter.

Fills surface cracks and breaks in plaster ceilings and walls.

Works great on wood and drywall, too.

Dries fast. Sands feather smooth.

Takes paint beautifully.

DAP

America's Handyman.

© 1980 DAP Inc. DAP is a trademark of DAP Inc., Dayton, Ohio 45401. Subsidiary of Plough, Inc.



typist, your fingers can really fly along these keys. TI, on the other hand, opted for large, calculator-style keys. The keyboard will be liable to throw off a touch typist until he gets used to the keys.

Besides just putting letters on the screen, these machines also have capability to print out different shaped letter-sized graphic shapes. These designs allow you to build "pictures" on the screen. Atari's graphic set is available right from the keyboard and you can define others to use in programs. TI and Ohio Scientific both let you define your own shapes (and C4P MF has a number of predefined ones).

Looking into the future

Software support is a major consideration when you buy a computer. New computers such as these will, of course, not have as much software available as computers that have been on the market a while. But TI has already entered into a deal with Mattel, which will be supplying some solid-state software. And many computer software houses are now gearing up to offer Atari-compatible programs on disc and cassette tape.

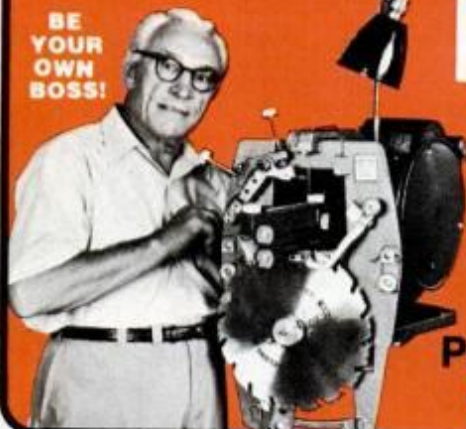
One thing you may already have noted: These machines are not cheap. The cost curve has not yet come down for state-of-the-art personal computers. Another cost to be considered is the color television for the Atari and OSI systems; TI supplies its own color monitor.

We don't foresee prices tumbling for a good long time yet. Still, the prices really are not so high when you consider the million-and-one tasks the computers are capable of tackling.

Now is a great time to become computerized. **PM**

Now you can cash in on the huge demand for SHARPENING SAWS and TOOLS.

BE YOUR OWN BOSS!



Make \$8⁰⁰ an hour...

or more. Work part time, full time, right at home. No layoffs. No strikes. Provides a steady source of year round income.

This can be one of the most important decisions you ever make

Going into business for yourself can be the most exciting and rewarding decision you're likely to make in your lifetime.

Owning your own business brings you a sense of independence. You're the boss, setting your own work hours. Your own effort builds the business for yourself and your family. You can achieve great satisfaction and profits, if you choose and manage your business wisely. That's why so many men, just like you, are cashing in on the big profits to be made in this fast-growing service field.

The sharpening business allows you to get started with only a minimum investment, requiring little space and effort for a successful operation. It lets you build and expand as fast, or as slowly as you like. You pocket most of the money you take in, because there are exceptionally high profits with no investment in merchandise.

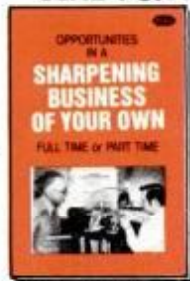
If you need only \$200 or \$400 extra income each month, a sharpening business is ideal for spare time. The additional dollars can be SPENT for more of the good things of life. Or they can be SAVED in a rainy-day fund that the family can bank on.

More sharpening businesses are needed every year

As original equipment continues to climb in cost, owners are becoming more concerned that the equipment be maintained so that it performs like new. This means more companies, contractors, carpenters and home owners are having their old saw blades and tools resharpened many times, where in the past, they would have replaced them with new blades or tools. This is where you

can step in with the much needed service of sharpening saws and practically any kind of tool.

SEND FOR FREE FACTS TODAY!



This FREE booklet has helped thousands

Thousands of good men have been inspired by this fact-filled book into making that first important step of starting their own business. It can be yours just for the asking.

It covers these important subjects...

- How much money can you make
- Age, education not a factor
- No selling is required — customers bring their business to you
- Lawn mowers and chain saws
- Sharpening business is year-round
- Sharpening opportunities in small towns and large cities
- A sharpening business provides excellent retirement income
- How Foley helps you start
- No experience needed, any age can succeed

Act today, so you can have a brighter, more secure tomorrow

Right now, while this is still fresh in your mind, fill-in the coupon below. We will send your FREE copy of "Opportunities in a Sharpening Business of Your Own". There is absolutely no obligation and there are no franchise fees in starting your Foley Sharpening Business.

Send your name and address to: Foley Manufacturing Co. 3207 Foley Building, Minneapolis, Minnesota 55418

FREE BOOKLET

Send NOW For Your Free Copy!

This little book has helped change the lives of thousands of good people, just like you. Just complete the coupon, clip it out and mail it to us today. Get started now for a brighter, more prosperous tomorrow!

24-HOUR ANSWERING SERVICE

CALL TOLL FREE 1-(800)-328-7140 (Except in Hawaii or Alaska)

RUSH COUPON TODAY!

Foley Manufacturing Company
3207 Foley Building
Minneapolis, Minn. 55418



YES, I would like to receive complete details about how I can easily start a profitable, Foley-equipped sharpening shop. Please rush me your FREE booklet, without any cost or obligation, that gives me full details on how I can quickly start my own business.

NAME _____

ADDRESS _____

CITY _____

STATE _____ ZIP _____

LEARN AT HOME IN SPARE TIME without previous experience

SCREEN Printing

ALL EQUIPMENT PROVIDED BY US — FITS ON KITCHEN TABLE. Prints on paper, plastic, metal, glass or fabric... almost any surface — every color of the rainbow. Easy to follow home-study course starts you fast. Nothing left to chance — do screen-printing for stores, realtors, mail order, factories, politicians. Print and sell Xmas wrappings, fabrics, etc.

PRINT WITHOUT A PRINTING PRESS. Signs, bumper stickers, T-shirts, banners, posters. We show you what to do, how to do it.

NEW HOME BUSINESS Full or Part-Time

How to MAKE MONEY in SCREEN PRINTING

SEND FOR FREE FACTS — BROCHURE

SCREEN PRINTING CENTER, Dept. PB070
4401 Birch, Newport Beach, CA 92663

Send me free facts on how I can learn screen printing. No obligation. No salesman will call.

NAME _____ AGE _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____

Kirsten



FREE COLOR CATALOG

Send for our free color catalog showing all of the Kirsten pipes, accessories and tobaccos.

KIRSTEN PIPE CO. INC.
P.O. Box 70526, Seattle, WA 98107
Dept. D

\$300^{Wk} Paid

NO SELLING • CAMERA AVAILABLE • for shooting 17 rolls film!

Great SPARETIME after your regular job! Do shooting yourself or have others work for you. Genuine opportunity!

WRITE FREE REPORT # PM8
3110 Fulton Ave, Sacramento, CA 95821

MOLDS

for making Ornamental Concrete Items...



Book about Aluminum Molds with prices and production trade secrets direct from world's largest mold manufacturer.

SEND \$5.00

CONCRETE MACHINERY COMPANY, INC.

P. O. BOX A99 - HICKORY, N. C. 28601



LEARN MEAT CUTTING

Train quickly in 8 short weeks at Toledo for a bright future with security in the vital meat business. Big pay, full-time jobs — HAVE A PROFITABLE MARKET OF YOUR OWN! Time payment plan available. Diploma given. Job help. Thousands of successful graduates. OUR 57th YEAR! Send NOW for a big new illustrated FREE catalog. No obligation. G.I. approved. NATIONAL SCHOOL OF MEAT CUTTING, No. 71-02-0197T, Dept. 50-F 33 N. Superior, Toledo, Ohio 43604.

5 handy projects for your workshop

Lathe supports for spindle turning

When turning long, slender stock on a wood lathe, stock vibration will often make it impossible to produce a smooth finish.

It's possible for you to eliminate this problem by first turning down an inch or two near the middle of the stock so a support may be used. Sand this portion smooth while you're running the lathe at a low rate of speed.

A simple support, good if you're only making a few turnings, can be made, using a V-notch for the support bearing.

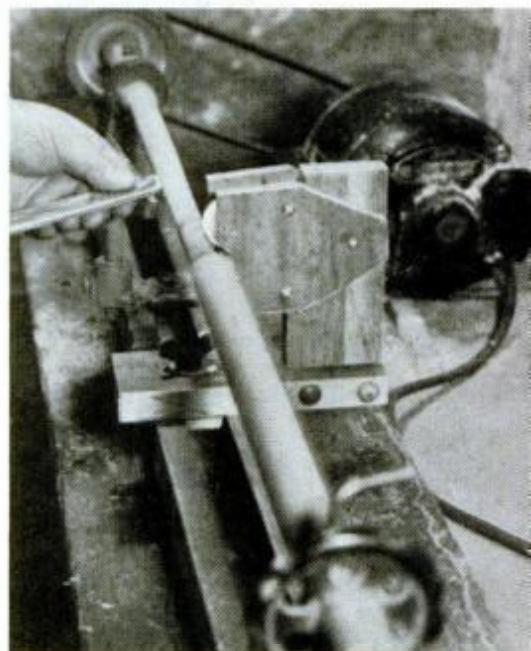
Use a few drops of candle wax to lubricate the bearing surface. Clamp in place and adjust the support so that it centers and touches lightly against the turning.

To make a heavy-use version, which produces less friction, use two discarded plastic caster wheels, with nails cut to serve as axles. I found 20-penny size to have the right diameter for the wheels I used. Smooth the bearing surface of the nails with a fine emery cloth until the wheels spin freely.

By providing a free-floating roller support, the rollers will automatically adjust to any slight error in



Simple-to-make lathe accessory supports a long spindle having a V-shaped notch.



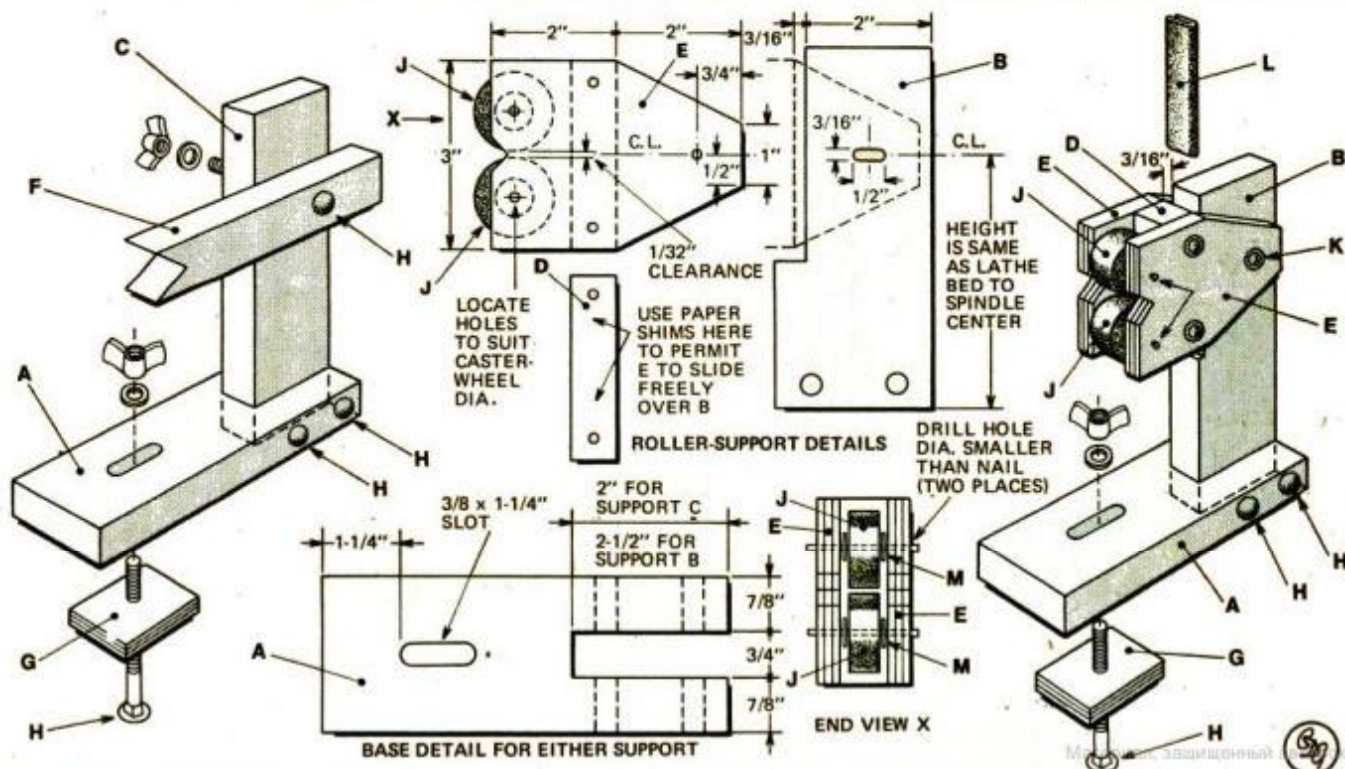
More sophisticated version, for frequent turnings, holds spindle at the wheels.

height; the rubber backing permits constant light contact with the work being turned. The rollers will last a long time if they are oiled occasionally.—Ralph S. Wilkes

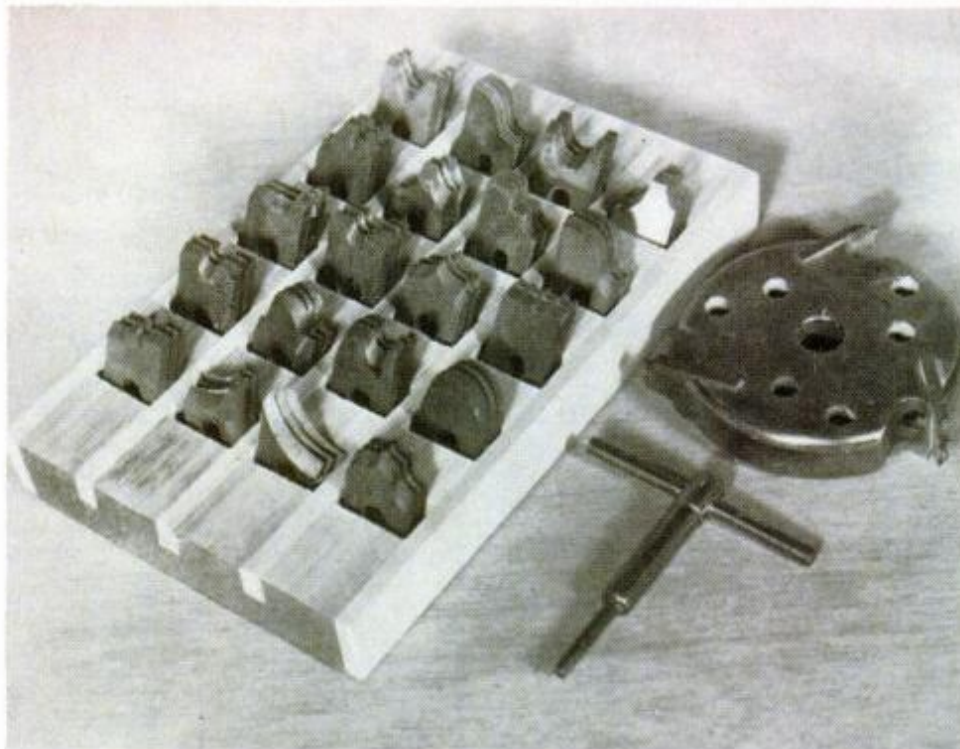
MATERIALS LIST—LATHE SUPPORTS

Key	No.	Size and description
A	2	$\frac{3}{4}$ x $2\frac{1}{2}$ x $6\frac{1}{2}$ " hardwood
B	1	$\frac{3}{4}$ x $2\frac{1}{2}$ x length to suit, hardwood

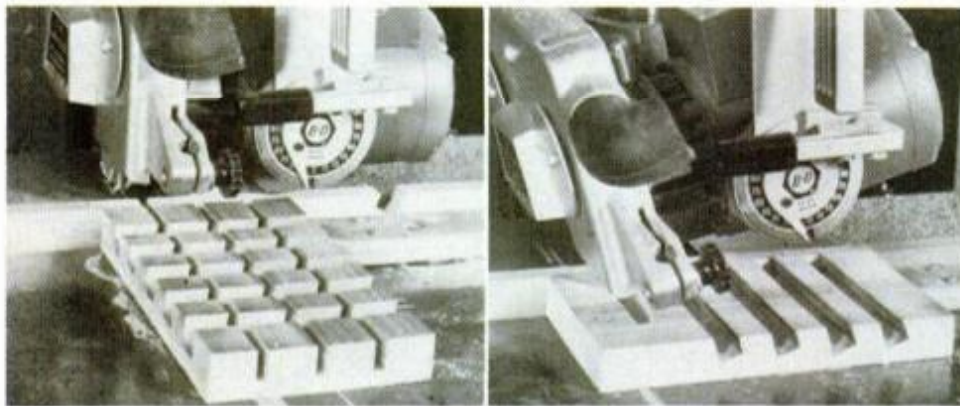
C	1	$\frac{3}{4}$ x 2" x length to suit, hardwood
D	1	$\frac{3}{4}$ x $\frac{3}{4}$ x 3" hardwood
E	2	$\frac{3}{4}$ x 3" x length to suit, plywood
F	1	$\frac{3}{4}$ x 1" x length to suit, hardwood
G	2	$\frac{3}{4}$ x $1\frac{1}{2}$ " x length to suit lathe bed, plywood
H	7	$\frac{3}{8}$ " carriage bolt with washer and nut (wingnut where indicated)
I	3	20d nail, cut to suit
J	2	1 $\frac{1}{2}$ "-dia. caster wheel
K	3	$\frac{3}{8}$ x $1\frac{1}{2}$ " rh stovebolt (with 2 washers, nut)
L	1	3 x 3" square of soft rubber tubing (fold in thirds)
M	4	$\frac{1}{4}$ " common washer



Storage for molding cutters



Holder keeps cutters protected and can be stowed in accessory drawer or in a cabinet.



Use a dado head on a radial-arm saw as shown, or with a table saw to plow the grooves and dados. Tilt saw's head 15° to create the slightly angled dados (right).

Loose cutters, banging around in a drawer with other tools, are easily dulled and damaged. They also get mixed up and take time to sort and match up.

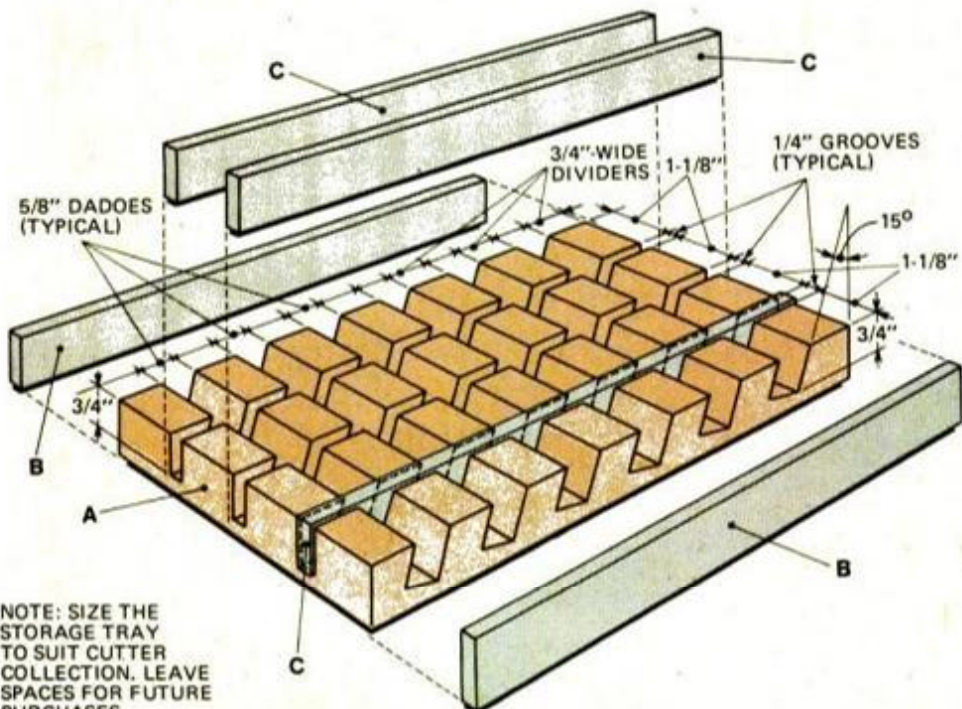
This cutter holder solves these problems by protecting the cutting edges and allowing profiles to be identified quickly.

The method for creating the egg-crate-like storage shown in the photos is simple. Start by cutting a 1½-in.-thick board to the dimensions given in the materials list. The prototype was made of hardwood, although softwood works well, too.

On a radial-arm saw, set a dado head ⅝-in. wide and at a 15° angle to cut ¾-in.-deep dados. Rotate workpiece and reset saw to 90° and the dado head for cutting the ¼-in. grooves, ¾ in. deep. A dado head on a table saw can also be used to cut the grooves and dados. Use marks at the edges of the base (A) to locate the cuts.

Now cut divider strips (C) slightly higher and longer than the grooves into which they are to be inserted. Also cut the sidepieces (B) slightly longer and higher than required. Apply glue, assemble and clamp. When the glue is dry, sand all surfaces flush for a good-looking project. The holder can be readily varnished, if desired, but a finish is not necessary.

Size your cutter selection board to suit your collection. If it's stored in a drawer, tack-fasten it to the drawer bottom to keep it from shifting around.—C.E. Banister

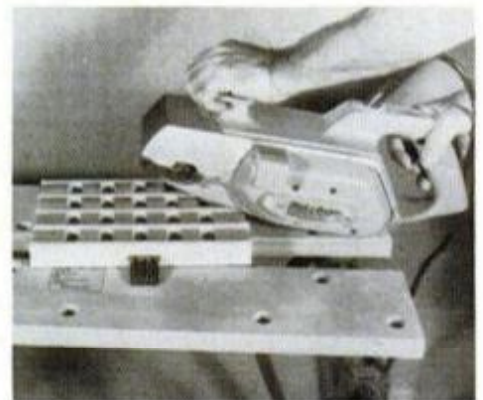


NOTE: SIZE THE STORAGE TRAY TO SUIT CUTTER COLLECTION. LEAVE SPACES FOR FUTURE PURCHASES.

MATERIALS LIST—CUTTER STORAGE

Key	No.	Size and description
A	1	1½ × 5¼ × 9" hardwood
B	2	¼ × 1½ × 9½" hardwood
C	3	¼ × 1½ × 9½" hardwood

Misc.: White glue, polyurethane.



After dividers have been glued in place and have dried, sand away excess material.

Router depth gauge

This router cutter gauge makes depth setting accurate and rapid—and eliminates the chance of dulling the cutter bit from metal-to-metal contact when you're using steel rules or squares.

To begin, use a carbide-tipped blade to cut the laminate to the given dimensions. Cut a couple of extra pieces to allow for spoilage and practice drilling. Protect your eyes and face with a dust mask while working laminate.

Build the drilling jig by constructing a snug-fitting box from $\frac{3}{4}$ -in.-thick pine or plywood around the laminate pieces (A). The box should be about $\frac{1}{4}$ in. higher than the stack. Glue and nail one end of the box in place; use screws at the other end.

Next, glue and nail the box to a $1\frac{1}{2}$ -in.-thick base. The base, made from two $\frac{3}{4}$ -in. pieces of plywood, allows the spade bit to pass cleanly through the laminate pieces without running into the drill-press table. Size the base so it can be clamped to the drill-press table. Choose one piece of laminate for the top or guide piece and lay out hole centers for drilling. Prick-punch at the centers; then put 15 blank pieces in the jig and lay the guide piece on top. Set aside the 17th piece for use as the bottom (no holes) piece.

Use a $\frac{7}{8}$ - or 1-in. spade bit at medium speed to bore hole No. 1. Lift off the guide piece and remove the piece under it. Set the piece you just removed on top of the blank previously set aside. Replace the top guide piece and bore holes No. 1 and 2. Once again, remove the piece under the guide piece and set it down on the second pile. Don't disturb this

pile since it is in the proper sequence to glue the pieces. Repeat these steps until 16 pieces are bored, each with the appropriate number of holes (see drawing, far right). Remove all pieces from the jig after each hole is drilled to brush out the shavings and prevent sloppy bores.

To use the drilling jig as a gluing jig, unscrew one end of the box and put a shim at the other end. Slide in the drilled pieces and glue the side-

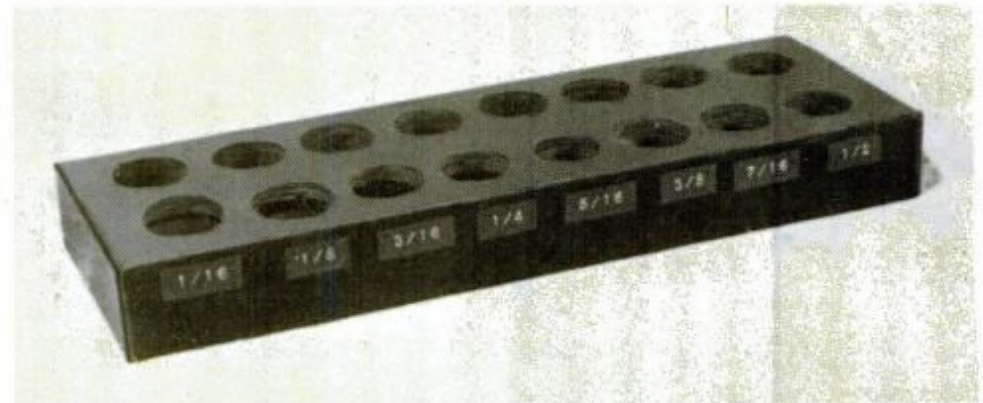
piece (C) to the exposed end. Remove the pile and complete gluing on the sides and ends. Compress and stack before gluing.—Robert Bessmer

MATERIALS LIST—DEPTH GAUGE

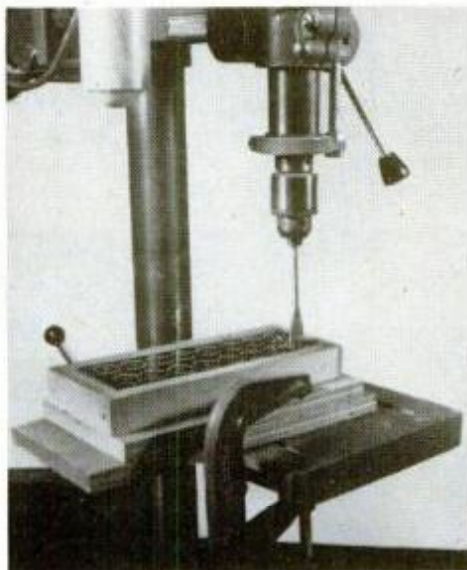
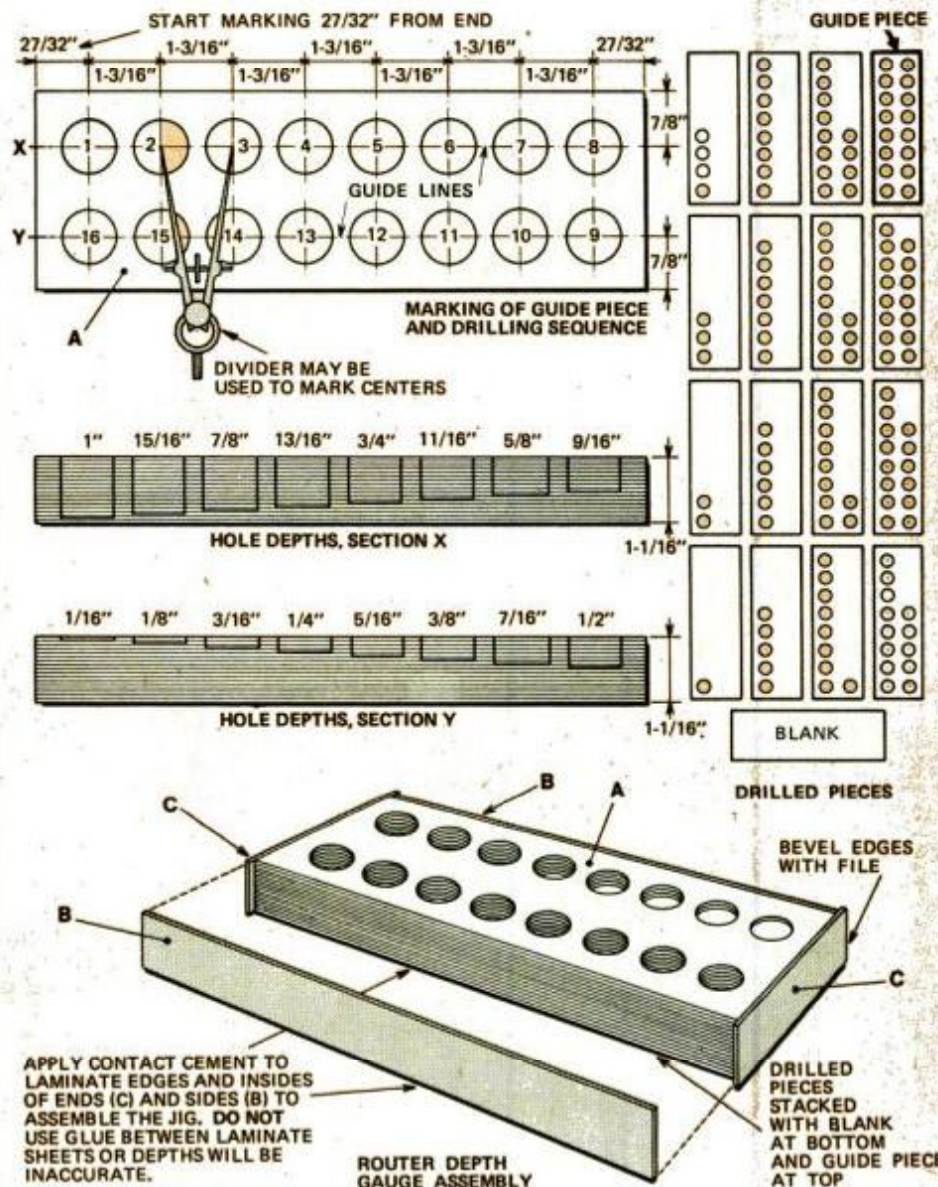
Key	No.	Size and description
A	17	$\frac{1}{16}$ x $3\frac{1}{4}$ x 10" plastic laminate
B	2	$\frac{1}{16}$ x $1\frac{1}{16}$ x 10" plastic laminate
C	2	$\frac{1}{16}$ x $1\frac{1}{16}$ x $3\frac{1}{2}$ " plastic laminate

Misc.: Contact cement

Note: To build the drilling and gluing jig, you'll need a few scrap pieces of $\frac{3}{4}$ " pine and fir plywood, 8d common nails, 4d finishing nails and white glue.



Label holes for quick and easy depth setting of pilotless router bits.



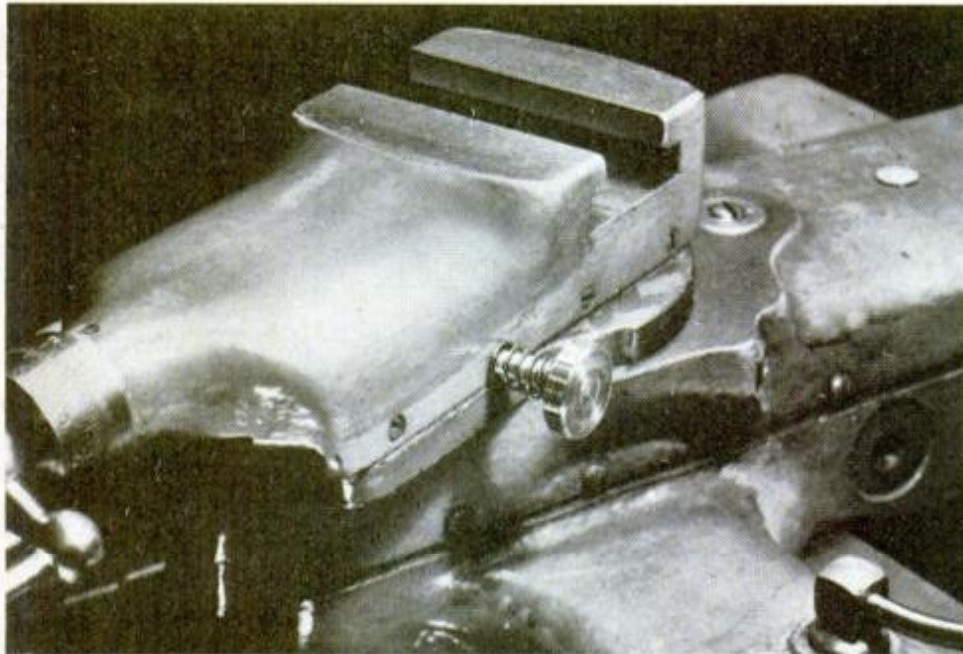
Plywood base, fastened to box which serves as drilling jig, is clamped to table.

Lathe compound-rest lock

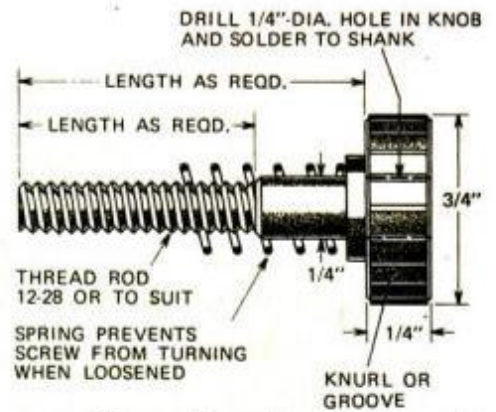
Sometimes, in lathe operations such as threading, it's desirable to keep the compound rest (which carries the toolpost) from moving, while in-and-out tool movement is controlled by the cross-feed screw. If the operator should bump

the compound-rest feed crank accidentally, the work could be damaged.

A gib screw sometimes is tightened to discourage the compound rest from moving, but this normally involves the inconvenient use of a



Knurled screwhead makes it convenient to lock the compound rest when required.



screwdriver. To make locking and unlocking operations easy and rapid, the knurled-head screw in the photo was made; it was designed for a 9-in. lathe. It has a 12-28 thread extending $\frac{7}{8}$ in.

Machine the threaded portion on the lathe from $\frac{1}{4}$ -in. brass rod. Make the grooved knob from $\frac{3}{4}$ -in. brass rod and drill a $\frac{1}{4}$ -in.-diameter hole in its center. Then solder the unthreaded (shank) end of the screw to the knob.

In use, the screw tip presses against the compound-slide gib to keep it from moving.

A coil compression spring was installed to help prevent the screw from turning when loosened, but perhaps it could be omitted.—Walter E. Burton

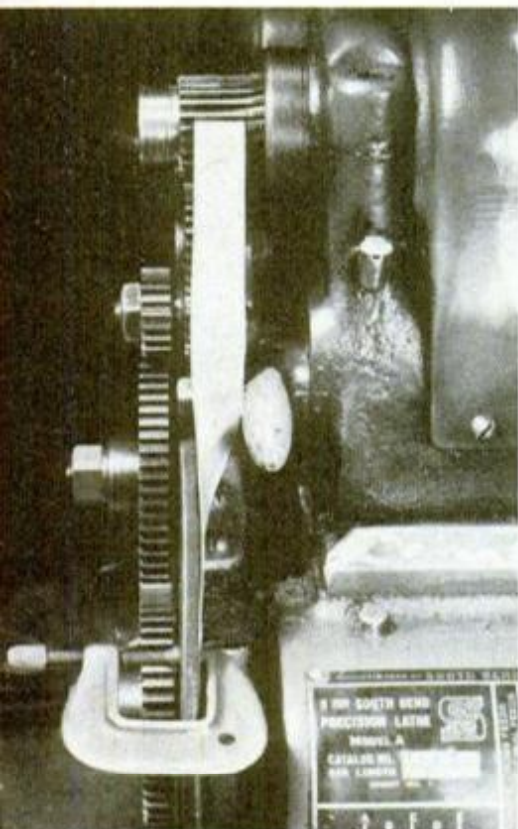
Simple lathe indexer

A simple way to provide for indexing operations on a lathe, as in cutting equally spaced grooves around the rim of a thumbscrew, is to clamp a metal strip so its tip presses against the gear teeth at the end of the headstock spindle. The (white) strip seen in the photo, about $\frac{3}{4}$ in. wide, was cut from scrap aluminum siding. It has enough springiness to keep it in contact with the gear. Bend the upper end of the strip so it will snap into spaces between the teeth when the spindle is turned backward by hand. Use a C-clamp to fasten the lower end to the gear-support plate.

To index, disengage the belt and any involved gears so the spindle can be turned freely, backward, by hand. Disconnect the motor power cord. Groove the workpiece (such as a thumbscrew head) with a pointed tool clamped on its side in the toolholder. Move the carriage back and forth along the bed, while controlling the cross feed so the tool makes a shallow cut, such as one-thousandth of an inch, at each pass.

The spindle gear on the lathe in the photo has 24 teeth. This permits a workpiece to be divided into 2, 3, 4, 6, 12 or 24 segments (or grooves). Equal spacing will depend on how accurately the "click strip" is positioned in each gear groove. A little practice can make the operation easier.

Accuracy is adequate for many jobs, such as making thumbscrews when a knurling tool is not available.—Walter E. Burton



Aluminum "click strip" bears against the lathe-spindle gear teeth and converts the lathe into a handy indexing machine.



Longitudinal grooves on the rim of thumbscrew were spaced with indexer at left.

NEXT MONTH IN PM

- *The car that could save Chrysler.*
- *Amateur telescopes are better than ever.*
- *Annual Home Energy Guide.*
- *How to choose and install automotive options.*

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.

Should you have any problem with your subscription, please write or call Joan Harris, Customer Service Department, Popular Mechanics, P.O. Box 10064, Des Moines, Iowa 50350. Telephone: 800-247-5470. State of Iowa residents call 800-532-1272. 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 my subscription to POPULAR MECHANICS for:

WJPM

- 1 year \$8.97
 2 years \$16.97

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!

Charge orders subject to publisher's acceptance.

(Above prices apply in U.S. & Possessions only. All other countries add \$6.00 per year.)

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.

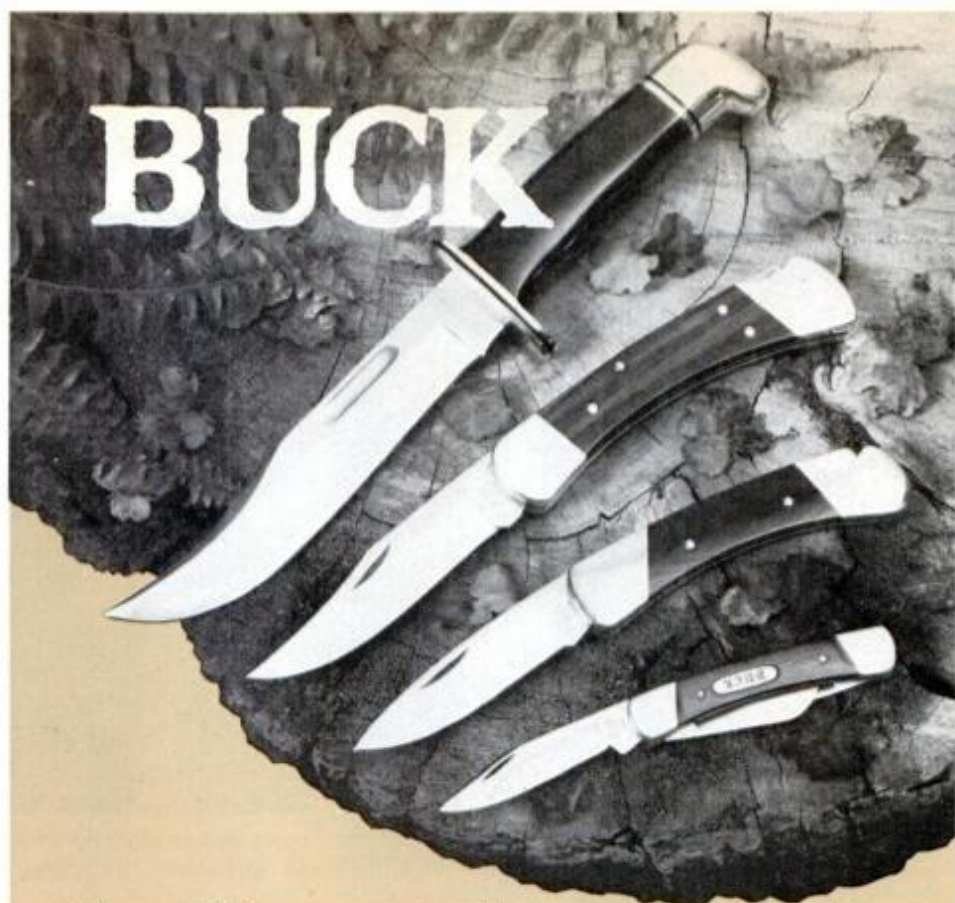
Send old label with your name and new address to:

POPULAR MECHANICS
 P.O. Box 10064, Des Moines, Iowa 50350
 or call toll free 800-247-5470
 (State of Iowa residents call 800-532-1272)

NAME (Please print) _____

NEW ADDRESS _____

CITY STATE ZIP CODE _____



The difference is the way we make them . . . and the materials we use

Every knife earns its own reputation. Ours are known for holding an edge, and for fine quality. We've worked hard to earn that reputation for three generations. And there is a difference in our knives. It starts with the materials: the very finest obtainable. Even more important is the way we make our knives: each one created by a craftsman who cares. That's why every Buck Knife carries a guarantee against defects in materials and workmanship for the life of the purchaser. And we never forget, our name goes on every knife we make.

Charles T. Buck, President

BUCK

KNIVES

Free Booklet
KNIFE KNOW-HOW
 Buck Knives, Dept. PM-880
 P.O. Box 1267,
 El Cajon, CA 92022

Print For Profit

Cards, stationery, envelopes, advertising labels, tickets, QSL cards, announcements, greeting, sympathy, prayer cards, tags, etc. Save money.

Own a Printing Business.

We supply everything direct from factory. Easy instructions. Also raised printing like engraving. Have home shop. Add to income. Send 25¢ for catalog.

Kelsey Presses, 80-BH Meriden, CT 06450



HYDRAULIC JACK REPAIRS

Earn While You Learn In Your Spare Time

Trained and qualified mechanics needed NOW to service inoperative hydraulic jacks. BIG opportunity for ambitious men. We show you HOW - in your basement or garage to earn spare time cash in an expanding industry. Don't wait, ACT NOW! Get the facts.

Write for folder No. PM8 and free bonus offer.

Hydraulic Jack Repair Manual Co., Inc.
 G. P. O. BOX 3 # STATEN ISLAND, N. Y. 10314



USE ZIP CODES WHEN ANSWERING ADS

Be an INCREDIBLE HUNK of MAN! In 7 days

DYNAMIC-TENSION

starts giving results you can feel and your friends will notice. Big, useful muscles. Gain weight, if needed. Lose "pot belly" Send name and address for 32-page book—FREE.

CHARLES ATLAS, 49 West 23rd St., N. Y., N. Y. 10010 Dept. WB



Be an AUTO MECHANIC

Learn at Home in Spare Time with No Previous Experience. You'll learn to tear down the engine, re-line brakes, repair and replace steering, front end, clutch, differential...even transmission, fuel, cooling, electrical systems... everything from minor tune-up to major overhauls. Approved for vets. Send for free facts.



Auto Mechanics School, Dept. PB070
 ICS Center, Scranton, Pennsylvania 18515

Wood Saver

BIG MOE DELUXE



The **incredible ALL NIGHTER STOVE** burns all night long... on just **ONE LOAD** of wood!

IT'S A PLAIN FACT—no other stove burns a load of wood longer than an ALL NIGHTER! Our stoves have special features and a scientific design that slows the burn rate to a minimum, captures EVERY bit of heat BEFORE it escapes and then distributes that heat through THE WHOLE HOUSE! So you SAVE WOOD, SAVE MONEY and stay warm and cozy even through the coldest day and night.

Plus, these beautiful stoves are rugged, safe (UL Listed) and come fully guaranteed for up to 25 years. They can even heat water! Burn coal, too!

"Let me send you this BIG, ILLUSTRATED newspaper about woodburning!"

We publish THE WOODBURNER here at the stove factory. This latest issue has plenty of photos and articles to help "wood" & "coalburners"

SAVE MONEY and AVOID TROUBLE! Plus—full details about all our STOVES and unusual accessories. All for just \$1 on our money-back GUARANTEE! Please mail coupon TODAY!



Ed Dione, Sales Mgr.

24 PAGE ISSUE

Ed, here's my \$1. Please RUSH me my WOOD-BURNER. I must be 100% satisfied with it or you'll refund my \$1—and still let me keep the paper!

Name _____

Address _____

City _____ State _____ Zip _____

All Nighter Stoves

Dept. PM 80 Commerce Street
Glastonbury, CT 06033

Use hardwood scraps for low-cost barbecuing



Form glowing coals by burning a pyramid-shaped pile of small hardwood blocks. Shavings of softwood, when used as kindling, eliminate the need to buy costly lighter fluids.

As a boy in rural New York, I had grown up assuming that if you had a picnic, you roasted your hot dogs or hamburgers on a wood fire. Then, after I moved off the farm, I purchased a grill and adopted the habit of cooking over charcoal. As charcoal became harder to obtain, I tried using briquets. They produced a hotter fire and the coals lasted longer, but they were expensive, slower to ignite, and left huge piles of ashes to be disposed of.

It seemed as though there must be a better way. I decided to try cutting seasoned hardwood into small pieces, similar in size to briquets, and using them for fuel. In short, I found that hot dogs, hamburgers, steaks and fish were all easier to cook and better tasting when broiled over a wood fire.

If you want to try barbecuing over wood, I have several suggestions. First, use seasoned hardwood either from the shop scrap pile or from the woodpile. The easiest way to cut up scrap is on a table saw. When cutting firewood, select a large-diameter log and slice it into 3- or 4-in.-thick discs. Then split it with a hatchet or wedge and hand maul into blocks.

Make sure not to use softwood, except for kindling. It doesn't give lasting coals and the pitch content gives an undesirable flavor to grilled foods.

There are advantages to barbecuing over wood. First, it takes less time to get a fire ready than when using charcoal or briquets. It's also

easier to judge when the fire is right for cooking. You will, however, have to build a much larger fire than with charcoal. Leave the cooking grid off and build the fire up in a pyramid shape. As the blocks catch fire, put more on immediately. After the blocks are all flaming, spread them out. Then start cooking your food as soon as the flames subside.—Warren H. Giles



Use a chain saw to slice up a hardwood log into 3-in.-thick discs. Then, with a hatchet, split discs into blocks of equal width.



When flames die down, spread hot coals and begin cooking immediately. The heat doesn't last as long as that of mineral fuels.

MUST LIQUIDATE AT BELOW DEALER COST! 2 hp. Metal, Brick, Concrete, Plastic CUT-OFF SAW

FACTORY NEW! FACTORY PERFECT!

- Cuts quickly through steel, iron, brass, copper, aluminum, zinc.*
- Zips easily through plastic and tile.*
- Cuts pipe, rods, tubing, bars, conduit, PVC, etc.
- Cuts fast, smooth with abrasive cutting wheel.

*Cutting wheels included for metal but not for plastic or tile.

Cuts stock up to 4" high, 5½" wide. Miter cuts up to 45°.

Here's a powerful 2 hp. saw that uses an abrasive cutting wheel to zip quickly and smoothly through most of your toughest cutting jobs!

When you have difficult stuff to cut... like hard steel... you need something really special to tackle the job. And here's the baby that can do it! This fast action saw has all the power, all the guts you need to slice through hard metals in a hurry!

- Operates at 4000 rpm. on ordinary 115V house current. 50/60 Hz.
- Standard arbor lets you switch to a variety of other standard abrasive wheels for special cutting jobs.
- Uses 12" abrasive cutting wheels with 1" center hole.
- Turnscrew vise can be securely angled for miter cuts up to 45°.
- Spring lever automatically keeps the saw head upright when not in use.
- Strong, sturdy metal base with shock-absorbing feet at all four corners.
- Metal shield helps trap and deflect sparks produced in cutting operation.
- A convenient carrying strap makes it easy to pick up and carry the saw.
- 6½-foot power cord with strong, rugged, 3-prong plug for grounding.
- Sturdy, solid construction. Fine quality. Designed for lasting durability.
- Shipping weight, approximately 42 lbs.

**ONE
YEAR
LIMITED
WARANTY!**



Includes One Cutting Wheel PLUS Two EXTRA Wheels Worth \$12.00... Yours FREE!
You get 3 wheels in all for cutting a variety of metals!

Comparable retail:
\$269.00

OUT THEY GO AT ONLY:
\$168



2 hp. MOTOR! Powerful motor operates cutting wheel at 4000 rpm. on 115V.



MITER CUTS! Vise adjusts easily for angle cuts up to 45°.



CHAIN FASTENER! Locks saw head in down position for easy portability.



FINGERTIP CONTROL! On/off switch conveniently located by your thumb.



Credit card customers can phone in their orders:



Toll-Free: 800-328-5082
If busy signal, or after business hours, or if in Minnesota, call 800-228-2606. 24 hours a day, 7 days a week.

C.O.M.B. Co.

ONE OF THE NATION'S LARGEST AUTHORIZED MAIL ORDER LIQUIDATORS OF CONSUMER PRODUCTS
3258 MINNEHAHA / MINNEAPOLIS, MN 55406
Phone: 612-721-8581 Toll-Free: 800-328-5082

C.O.M.B. Co. / Authorized Liquidators Dept. B-194-3110
3258 Minnehaha Ave. S., Minneapolis, Minn. 55406

Send _____ Cut-Off Saw(s) at the liquidation price of only \$168.00 each plus \$9.50 each for shipping and handling. (Allow up to 5 weeks for delivery. Add an extra 2 weeks if paid by check. Sorry, no C.O.D. orders.)

My check or money order is enclosed.

Charge to: Mastercharge VISA American Express
Account No. _____ Expires _____

PLEASE PRINT CLEARLY

Name _____

Address _____

City _____

State _____ ZIP _____ Phone _____

Rural Route Customer: If truck carriers do not normally deliver to your home, include a note with this order, stating address of nearest store, friend, truck terminal where we can ship.

Jock Itch is a fungus.

Cruex[®] kills it.



Read and follow
label directions.

It's a medical fact: the painful itching, chafing, burning rash of Jock Itch is caused by a fungus that can't be killed by non-medicated powders, creams, or salves.

You need Cruex antifungal medicine. Its active ingredient is medically proven to kill Jock Itch fungus. And Cruex soothes the itching, chafing and burning.

Get fast relief and kill Jock Itch fungus—with Cruex. From the makers of Desenex[®]

© PENWALT Corporation 1980.



Sophisticated personal computers for serious people.

Ohio Scientific microcomputers are not just game machines that have spread wings. We've been making microcomputers since the industry began in 1975. No matter what your application, we have a computer that merits your serious consideration.

For literature and the name of your local dealer, CALL 1-800-321-6850 TOLL FREE.

OHIO SCIENTIFIC
1333 SOUTH CHILLICOTHE ROAD
AURORA, OH 44202 • (216) 831-5600

TAMING GIANT TWISTERS

(Continued from page 67)

floor and powered it with a variable-speed d.c. motor capable of rotating the frame on its bearings from 1 to 11 rpm. They wrapped a fine mesh around the frame, creating a cylindrical screen that looks like a giant beekeeper's bonnet.

The space above the "bonnet" is enclosed in a sheet-metal cylinder. In an attic over the apparatus, the Purdue technicians mounted a blower capable of drawing air through a hole in the ceiling.

Snow explained how the simulator mimicked the real thing. To start with, researchers rotate the "bonnet" slowly as air passes through its wire mesh from all sides. This movement of air at the base of the simulator matches the counterclockwise wind rotation that accompanies the large, low-pressure systems moving west to east in the United States each spring. When air to the east of the warm front is unusually warm and moist, collisions with a cold front can generate thunderstorms.

A glancing blow

Within the thunderstorm itself, rain pulls cold air to the surface. This blanket of dense air thrusts warm, lighter air upward. The collision between warm and cold air within the thunderstorm is not head-on; instead, the cold air is traveling south or southeast, the warm air north or northwest when they meet in the storm. The result is the kind of spin you might expect to see if cars collided at an angle.

But in this case, after the glancing blow as fronts collide, the warm air spins upward. In the simulator, the overhead blower creates the up-draft, pulling spinning air into neat miniature tornadoes 6 or 7 feet tall.

As Snow turns on the blower and starts the screen rotating, he also flips on a bank of spotlights inside the tornado generator. In nature, condensed water vapor or "cloud material" and swept-up dust and debris make tornadoes visible. At Purdue, Snow injects smoke at the very bottom of the lower chamber.

Within seconds after the gentle snake of smoke climbs up to the hidden blower, it snaps stiffly to attention and starts swirling inside the chamber. It's already a full-blown tornado. Seconds later, the snake grows stronger, beginning to twist and dance around the chamber like the twister that hit Kansas in *The Wizard of Oz*.

Soon the snake seems ready to give up, swelling slowly from the top

down, until a bloated column of smoke remains. But it's just cloning, like the tornado photographed by Wally Hubbard. Soon two snakes dart out of the column, dancing around each other. Then a third appears, and a fourth.

Before John Snow could customize tornadoes in his lab, researchers like him were limited. They could conduct detective-like investigations after tornadoes struck. Or they could guess when and where one would hit, then hurry there to make on-the-site observations; a lucky scientist might observe just two tornadoes during the summer storm season because forecasting methods are so imprecise. Currently there just isn't enough warning time for scientists who want to chase tornadoes—or for local residents who want to evade them.

No warning in Round Rock

The only warning to the town of Round Rock, Tex., clacked over a teletype in the police station at 3:00 p.m. on April 7. But the message said nothing of tornadoes. The news was that hail and heavy rain were falling about 30 miles to the west. Around 4:30 p.m., Chief Gene Collier stationed himself on a hill north of his town to watch the western sky.

He knew as soon as he saw the approaching cloud that it was no ordinary thunderstorm. "It was a small, white whirling cloud," he told us. It crossed the town line, then arched like a claw to the roof of Murffys Nursery.

Mike Robinson at the nursery was even less prepared for what happened than Chief Collier. "I've always heard it gets quiet before a tornado, but that's bullcorn," he told us. Just before the "cloud" struck, about 4:50, wind howled. "We have a big tin barn and it hailed on one end, stopped and hailed on the other. Then it started raining real hard. I went out to move some tomatoes under some shade cloth because of the hail. Then I looked up and saw some lumber flying up in the air, pieces of firewood, two-by-fours. Apparently I looked up just as it started to hit the building." Three seconds later it was gone—along with half of the tin roof covering the 120-foot-long building. Again, the tornado displayed a perverse personality. The winds picked up about 50 packages of herb seeds, blew them five miles away and scattered them like a drunken planter on the lawn of one of Robinson's friends.

A better warning system would not prevent such damage, of course, but it might save lives by allowing

(Please turn to page 118)

DO SOMETHING SPECIAL FOR YOUR CHILDREN WITHOUT SPENDING A LOT OF MONEY.

By following my material list and step by step instructions, you can build them a good, sturdy six piece living room set for as little as \$20 to \$25 dollars.

For complete information, send only four dollars to LIBERTY ENTERPRISES. We will also include simple upholstery instructions, and if you are not completely satisfied, simply return mailing within TEN DAYS FOR COMPLETE Refund.

© 1980 LIBERTY ENTERPRISES.

Please send check or money order to:
LIBERTY ENTERPRISES, P.O. Box 534
SOUTH BEND, INDIANA 46624

Name _____

Address _____

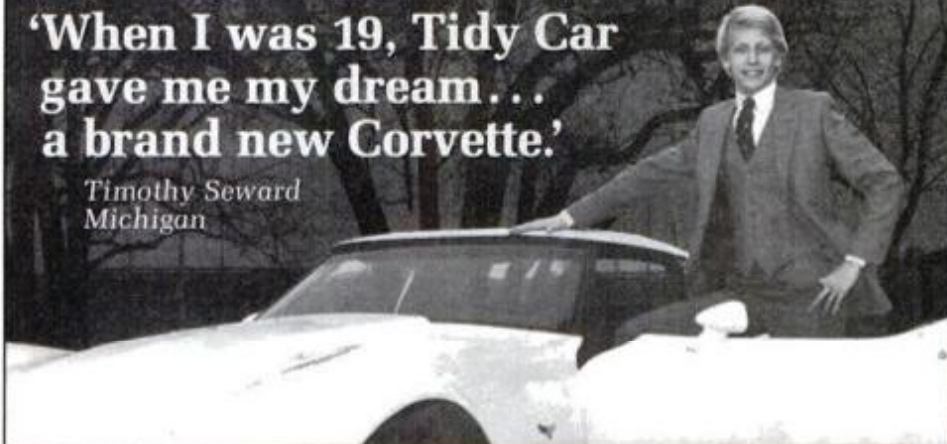
City _____ State _____ Zip _____

We take pride in responding promptly.

A Continuing Tidy Car Success Story...

'When I was 19, Tidy Car gave me my dream... a brand new Corvette.'

Timothy Seward
Michigan



In our last report from Tim Seward, he said that at 18 years of age he had his own Tidy Car business, four employees and a goal to make a million before he was 25.

Now, with a dozen employees, new offices and an impressive garage facility, he's already making many of his dreams come true. Yes, one dream is to make a million before he's 25, but another dream was to own a brand new Corvette.

One down. One to go.

When Tidy Car Inc. announced a new Corvette would be the grand prize in a Dealer incentive program, Tim, determined to win it, bought a one-way airplane ticket to the awards presentation at the International Tidy Car Convention. He drove home a new Corvette.

That's the kind of positive thinking that's continuing to make Tim and many Tidy Car Dealers like him successful. Tim gives as many as 250 cars, trucks, vans and recreational vehicles Tidy Car's Tough 'N Tidy® Treatments each month.

He started for less than \$1500.

"Now I invest more than that in advertising each month. The potential of this business is unlimited," says Tim. "People are becoming more and more aware of the need to protect the surfaces of all types of vehicles. There's no doubt that these services will boom in the '80s."

Exclusive processes, equipment and a guarantee!

Two of the most famous Tidy Car Tough 'N Tidy Treatments are Preserv-A-Shine® and

Upholstery-Gard 2® (for new car fabric interiors). Both are guaranteed in writing, with minimal maintenance, for as long as the customer owns the car. Plus, Tidy Car has other restoration and protection treatments for metal, vinyl, fiberglass and fabric covered surfaces.

When you think of all the boats, vans, trucks, not to mention all the family cars that need protection from sun, salt, pollution and oxidation; you can begin to understand why Tidy Car has so many successful Dealers throughout North America.

Find out now how you can win with Tidy Car!

If you qualify, you can join the hundreds of Tidy Car Dealers enjoying high profits and low fixed costs, plus a business they can be proud of. Send in the coupon today!



Gary Goranson, President
Tidy Car Inc., Dept. PM8
3918 Broadway
Cheektowaga, NY 14227
(716) 856-2826

I'm interested in Tidy Car! Please send me your free 20-page brochure on how to win with Tidy Car!

Name _____

Address _____

City _____ State _____ Zip _____



**FINANCING
NO
PROBLEM!**

Have you been priced out of today's housing market?

Miles Homes could be the answer!

If you have the ambition and desire to build your own home, then the Miles Plan could be for you. **THE MILES HOME OWNERSHIP PLAN IS UNIQUE.** Your desire and dedication are more important than ready cash — start now to build the home of your dreams...the Miles Way.

- Liberal credit — Low monthly payments while building.
- Foundation assistance.
- Land may not have to be fully paid for.
- Pre-cut materials, blueprints, **step-by-step instructions.**

- 24 months to build.
- There is a representative near you. Phone: (612) 588-9700.

Miles has nearly 30 years experience helping over 15,000 families to build their own home. Send coupon today to see how Miles can help you.

Miles Homes
12 Insilco A Division of Insilco Corporation

Send me your **FREE** Great Homes Idea Book

MILES HOMES, Dept. MPMO 0810
4500 Lyndale Ave. N., Minneapolis, MN 55412

Name _____

Address _____

City _____ State _____ Zip _____

County _____

Phone () _____

I plan to do all or part of the work

\$1.00 enclosed for priority handling

TAMING GIANT TWISTERS

(Continued from page 117)

people time to take cover. Robinson, who faced the twister outside, was lucky to have escaped injury.

Two technological breakthroughs should help weather experts spot conditions preceding a tornado, and sound warnings earlier.

One breakthrough is an infrared atmospheric probing system called VAS, an acronym for Visual and infrared spin-scan radiometer Atmospheric Sounder. "Comparing existing forecast methods to VAS is like comparing an Instamatic snapshot to a professional motion picture," said Dr. Fred Mosher, manager of the VAS program.

A satellite launched this summer will hang south of Kansas City and scan the atmosphere at 12 infrared frequencies. Each frequency penetrates different distances through the atmosphere, so computers will be able to display data at three-mile bands from the ground to 36 miles over the earth. Forecasters will be able to watch storms as they develop, pinpointing thunderstorms accurately. But which thunderstorms will spawn tornadoes?

Doppler radar may answer that question. At the Norman, Okla., National Severe Storms Laboratory, technicians have developed a Doppler radar system that uses the same principle behind speed-trap radar units to measure wind velocities inside thunderclouds. Winds moving toward the radar station are displayed on a computer screen as green blips, and winds moving away as red blips. The greater the wind force, the brighter the colors.

If a forecaster spots a bright green blip next to a bright red blip, it means a tornado is probably imminent. Early tests with the Doppler radar have provided 30-minute advance warnings of tornadoes.

Doppler radar and VAS will enhance forecasting and provide early warnings, perhaps by 1990. In the meantime, scientists are at work on a third front: trying to avoid the death and destruction caused every summer by tornadoes.

Wind-tunnel test for houses

Until recently, most of the investigation into how and why tornadoes collapse buildings and injure or kill the occupants has been done at the University of Kansas by Prof. Joe Egleman and colleagues. In the wake of major tornadoes, Egleman studies injuries to both buildings and people. A natural-born tinkerer, Egleman has also built dozens of scale-model homes from popular

BREW YOUR OWN FUEL

BROWN'S ALCOHOL MOTOR FUEL COOKBOOK
Contains step-by-step procedures for the making and using alcohol as a motor fuel. How to build your own home still, how to modify your car's carburetor to run on alcohol & other engine modification to get up to 100 miles per gallon, & much more. Loaded with large clear photo's, you'll be amazed at how easy it really is. Don't hesitate order your copy today!!
Book No. 300 \$9.95 postpaid
DESERT PUBLICATIONS
DEPT. PM - CORNVILLE, ARIZONA 86325

BASEMENT TOILET

Flushes up to existing sewer or septic tank by powerful, self-contained pump operated by normal water pressure. No digging up floors. Clog resistant, easily installed. Make basement into game room, den, apartment with private bath. Write for free literature. Dealer inquiries invited.
DOSS MFG. Dept. J-25, Box 10947, Houston, Texas 77018



GARAGE DOOR OPENERS

HELMATE
• Radio Controlled
• Buy Factory Direct and Save
• Thousands In Use • Free Brochure
• Easy Homeowner Installation
• Immediate Shipment by UPS or PP
HELMATE Equipment Co. Dept. PMB-80 Baroda, MI 49101

SAVE MONEY!

Assemble our unique **Megastrac** Tractor Kit. Buy factory-direct Catalog of Kit construction and uses — \$ 50. "Build-it-yourself" Plans — \$7.00 (refunded on any purchase).
STRUCK KIT, Dept. PM80 Cedarburg, WI 53012



standard designs and put them in wind tunnels. While he knows that very few buildings of ordinary construction will withstand a direct hit by a major tornado, he's also seen that two-thirds of the seriously damaged buildings are not hit directly.

Eagleman blames builders and building code authors. Most building codes, calling for protection against 70-mph winds, are inadequate, Eagleman asserts. He finds that builders expect gravity to hold roofs on top of walls, which works fine except when a nearby tornado vacuums up the tops of homes and collapses walls. He's convinced that homes could safely withstand 200-mph winds if all that expensive lumber weren't fastened together so poorly. (See *Protection From Wind*—for \$85, page 66).

Studies Eagleman has conducted also show that the southwest corner of the house—once suggested as the place to go to escape injury—is *the most dangerous place* to be. That's where tumbling and flying debris lands most often. The north and east, he reports, are safest.

Other survival strategies

Other suggestions for survival arose from a study of the destruction and death caused by a severe tornado that struck Wichita Falls, Tex., in 1979. Forty-seven died.

Researchers from the federal Center for Disease Control and elsewhere analyzed the deaths to assess existing recommendations about what to do in a tornado. Their major finding: It's dangerous to be in a car or mobile home when tornadoes hit. Some 60 percent of those killed immediately were people who had run to their cars to drive out of the storm's path. People in mobile homes were at greatest risk of serious or fatal injury. The researchers' recommendations:

- If you're in a motor vehicle, seek shelter as soon as you hear a tornado warning. Don't try to drive from the tornado's path.

- If you live in a tornado-prone area, you should identify and reinforce some interior portion of your home as a shelter.

- Mobile home communities should offer shelters to residents.

As frightening as tornadoes are, the report did contain some reassurance for homeowners: If a twister scores a direct hit while you're inside your house, the chance of suffering a fatal injury is only about one in a thousand. And the tornado research now underway is likely to further enhance the safety of your home, even if it's struck by one of nature's most frightening killers. **PM**

Helps Shrink Swelling Of Hemorrhoidal Tissues Due To Inflammation. Relieves Pain And Itch...

Gives prompt temporary relief in many cases from hemorrhoidal pain and burning itch in such tissues.

There's an exclusive medication which actually helps shrink painful swelling of hemorrhoidal tissues caused by inflammation. And in many cases it gives prompt relief for hours from rectal itching and pain in such tissues.

Tests by doctors on patients showed,

while it gently relieved such pain, it also helped reduce swelling of these tissues.

The medication used in the tests was *Preparation H*®. No prescription needed for Preparation H. Ointment and suppositories. Use only as directed.

Here's everything you need to be a successful sign-maker. Investment: about \$700*

Now you can start your own sign-making business with the New Hermes Engravograph™. This one versatile machine lets you engrave all kinds of attractive signs. Quickly, easily, and very profitably. Signs for stores, banks, hospitals, you name it. Unique feature: adjustable to 21 finished letter sizes. And its cost is so small, it pays for itself in no time. You can learn to operate it in minutes.

New Hermes will also help get your business started. And we stock all the sign materials you'll ever need. New Hermes. The source for all your engraving needs.

New Hermes
incorporated

Offices: New York, New York; Alsip (Chicago), Illinois; Dallas, Texas; Decatur, Georgia; Hialeah, Florida; Garden Grove, California; Mexico City, Canada; Mississauga (Toronto); Montreal (Quebec)



*Price includes machine, 2 different brass alphabet assortments, and sign material.

New Hermes
20 Cooper Square, New York, NY 10003 Phone (212) 777-3080
Please send me more on the Engravograph and other New Hermes products.

NAME _____ ADDRESS _____ COMPANY _____ CITY _____ STATE _____ ZIP _____ PHONE _____ PMS-80

TV TO STEREO SOUND ADAPTER



GET SIMULATED STEREO SOUND FROM YOUR TELEVISION!

TELEDAPTER® easily connects to your own TV and stereo system to give you full rich simulated stereo sound through your amplifier and speakers. **TELEDAPTER'S** electronic circuitry matches the impedance between your TV and stereo amplifiers' aux., tape, or tuner input, while completely transformer isolating the TV's & stereo's chassis, for safety. The matrix circuitry provides two channels of output that plug directly into your stereo. Those ballgames and movies will never be the same after you hear the realistic thundering sound. Complete with hookup instructions. 2 year warranty. If not satisfied after 15 days, return for full refund.

\$19⁹⁵ plus \$2⁰⁰ shipping & handling

To order: enclose check • VISA or Master Card # _____

Expiration Date _____ Bank # _____

Name _____

Address _____

City _____

State _____ Zip _____

RHOADES
NATIONAL CORPORATION

P.O. Box 1052 Dept PM
Columbia, Tenn. 38401
(615) 381-9001

LYNCHBURG HARDWARE & GENERAL STORE

42 Main St., Lynchburg, TN 37352



Old-time Riverboat Playing Cards

Both of these decks are prettier than a painting, and so is the antique tin card case. Each card is a bit larger and thicker than normal—like those used on riverboats in the 1890's. There's a black and a green deck—both with an antique gold "distillery design." The face cards are reproduced from 100-year-old artwork. So it's a real unusual set of cards for the serious player. Twin deck in antique case: \$8.50. Postage included.

Send check, money order, or use American Express, Visa or Master Charge, including all numbers and signature.

(Tennessee residents add 6% sales tax.) For a color catalog full of old Tennessee items and Jack Daniel's memorabilia, send \$1.00 to above address.

CAMP-CRUISE BY KAYAK

(Continued from page 75)

with air-filled side sponsons, there is little likelihood of capsizing it, but cargo bags, spotlights, sleeping bags and camera cases should be pretested for waterproof quality. Then attach them to the kayak with $\frac{1}{8}$ -inch nylon lines to prevent loss. During an emergency, they can also provide added buoyancy. As a precaution, cargo bags may be lined with three-mil plastic garbage bags tied off with rubber bands. Life preservers are required equipment. The necessary bailing bucket



Duffel bags, sleeping bag, spotlight and all "waterproof" and "floatable" items should be tested, then secured to boat.



Mitey Brush anchor for tossing ashore hangs on gunwale; a tackle box and kit bags are tied or held in place with Velcro.



Handy shelf of $\frac{1}{4}$ -inch plywood makes a mini-table for lunches, brace for telephoto shots, tent table ashore or base for stove.



For photos en route, Haddon mounts tripod with one leg through mast socket and rubber tube with bulb extended to paddler.



Compass, wind-speed indicator, waterproof match container, waterproof bag are items to Velcro-mount or tie in cockpit.



Cut the bottom off a plastic bleach bottle to make a bailing scoop that can be tied to a gunwale with $\frac{1}{8}$ -inch nylon line.

can be made from a Clorox container or similar plastic bottle with its bottom sliced off. Flexible and more attractively shaped than a bailing can, it has a built-in handle and conforms to the contours of your craft.

For kayakers who travel along steep, rocky shores, a 20-ounce Mitey Brush anchor can be useful. Tossed into shoreline bushes or among rocks, its 50 feet of $\frac{1}{8}$ -inch nylon line holds the hull firmly against the shore for easy stepping out. Metal points on this anchor are flexible enough to permit yanking it free if necessary.

I also use a Klepper inflatable camera bag for flotation and cushioning. A pocketable Dwyer wind-velocity meter is another useful accessory.

I simplify photography aboard by an-



Using a free-standing Jansport lightweight dome tent that's big enough for two, Heddon camps alone, fitted out for comfort.

choring my tripod in the mast step with a bungee cord. The camera is snapped with an air tube and bulb taped to the floor where I can push it with one foot. By pre-focusing, I can record anything from scenes to fish being landed.

A motorized camera would allow you to take shots in sequence without having to lean forward in order to advance the film. A built-in automatic exposure control would be helpful.

A versatile table

My simple kayak table has proved its worth for everything from brunching to steadying elbows while using telescopic lenses or 16-power binoculars. It's a piece of enameled, 1/4-inch plywood with blocks below to keep it from shifting sideways. It can slide fore and aft along the gunwales.

In stormy weather while ashore in the tent, it serves as a table or base for the butane cookstove.

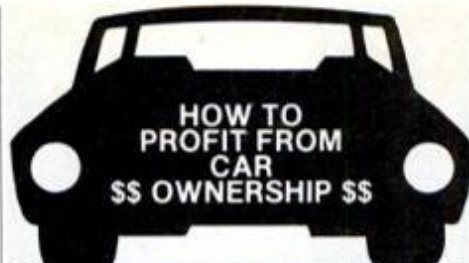
Personalized equipment

Customizing means fitting out and installing aids and equipment that are selected and positioned just right for you. Velcro tabs, shock and bungee elastic cord, oversize rubber bands slit from discarded inner tubes and nylon line are good for securing accessories. Nylon cord, like the surplus type used for static lines of parachutes, will lash gear in place, but still untie easily, as a rule, when the knots get wet. Make good use of the line for lanyards on items like your bail scoop, searchlight and inflatable cushion, as well as cargo duffel. A pull on a color-coded line from your paddling position can bring your bailer quickly to hand without your leaving your seat. The tie-lines keep gear from floating away after an unlikely capsizing.

All of this makes a boat particularly safe and comfortable. Adventurers using Kleppers like mine have crossed the Atlantic alone, but almost any other kayak can be adapted for long solo passages, too.

Pack it right and you can still get away from it all.

FM



You don't have to be a car dealer to make big money on cars! For the first time ever there is a complete guide that makes owning a car very profitable. It shows you exactly

- How to buy and sell new and used cars for a maximum profit!
- Where to find true bargains!
- What to do and say when buying or selling!
- When to sell and buy for big money!
- Where to find buyers!
- Which cars are proven money makers!
- How to spot bad used cars!
- How to prepare a car like professionals!
- How to avoid common costly mistakes!
- How to complete a sale and much, much more!

For less than the price of a tank of gas you could start making money while driving and profiting from beautiful cars!

Send \$10.00 plus \$1.50 for shipping and handling to:

Freedom Pays
Box 1260
Morinville, Alberta
Canada, T0G 1P0

Name (print) _____

Address _____

City _____ State _____ Zip _____

\$11.50 cash, check or money order payable to:
Freedom Pays Ltd.

14 Day Money Refund if Not Completely Satisfied

Save gas! Electrify your compact!

Step-by-step illustrated instructions on converting a compact car into a reliable electric car for just \$1500. Operating cost is only 2¢ per mile, range is 50 miles. Details on motors, batteries and battery technology, news about ready-to-drive electric cars, much more.

HOW TO CONVERT TO AN ELECTRIC CAR

by TED LUCAS
and FRED RIESS

A Crown/Herbert Michelman Book.
Size 8 1/2" x 11". Paper \$5.95, cloth \$10.00,
now at your bookstore, or send check to
Crown Publishers, One Park Ave., N.Y.,
N.Y. 10016. Please add \$1.50 postage
and handling charge. N.Y. and N.J.
residents, add sales tax.

CROWN

Turn a part-time hobby
into big profits



You'll pocket real profits making handsome coach lanterns like this ... and dozens of other popular wood gifts.

NOW! Earn up to \$15 an hour making popular custom wood products

Now, a Free Information Kit tells how you can make \$5, \$10, even \$15 an hour or more in your spare time, in your own basement or workshop.

A patented, easy-to-use woodworking tool - the famous Shopsmith Router Arm - lets even beginners quickly turn out a big volume of beautiful wood products and gifts that sell themselves on sight, at handsome profits.

You'll have fun making and selling deep-etched custom signs for home or business, beautiful picture frames, decorator wall plaques, coach lanterns, serving trays, trinket chests, and dozens of other popular, fast-selling items. You can even start a money-making furniture repair and restoration business if you like. It's the perfect way to turn an enjoyable and satisfying hobby into extra cash while being your own boss!

FREE BUSINESS-ASSISTANCE PLAN
Mail the no-obligation coupon below to receive, by mail, a Free Information Kit, "Your 'Rout' to Woodworking Profits," that tells you all about this profitable opportunity. We help you get started with a complete, thoroughly researched "Blueprint for Success" that includes advertising materials, project ideas and patterns, production aids... the "works". And, we'll help your business grow by sending you a constant flow of new project plans and business-building ideas.

Don't miss getting the free facts about this unusually good money-making opportunity! Mail the coupon today!

FREE FACTS KIT



Shopsmith Inc.

Dept. 2545
750 Center Drive
Vandalia, Ohio 45377

Please mail me your Free Information Kit, "Your 'Rout' to Woodworking Profits" that tells how I can make money in my spare time with the patented Shopsmith Woodworking Router Arm - including the details of your complete "Business Plan". I understand there's no obligation.

Name _____

Address _____

City _____

State _____ Zip _____

Cabinetmakers' and professional
woodworkers' inquiries welcome.



ONLY
\$84⁹⁵

Jack up in seconds by exhaust gas.

RAISE YOUR VEHICLE IN SECONDS WITH THE B&Q EXHAUST JACK

Highly effective for getting out of ditches, holes and for changing tires. Comes complete with operating instructions. For Single exhaust systems.

- FEATURES**
- Power lift over 2 tons
 - Durable Construction
 - Easy installation for chains
 - Portable / Lightweight
 - MANY MANY USES

SEND \$84.95 FOR EACH CHECK/MONEY ORDER TO

B&Q EXHAUST JACKS

18940 11th N.E. • P.O. BOX 55423
SEATTLE, WASHINGTON 98155

SHIPPED PREPAID UPS WITHIN 40 DAYS

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

(WASH. STATE RESIDENTS ADD 5.3% SALES TAX)



Be an AUTO BODY REPAIR SPECIALIST!

Learn at home in spare time—no previous experience needed. Experts show you what to do, how to do it...guide you step by step with easy-to-follow directions. Tools and materials included with lessons to get you off to a fast start. No need to quit school or job! Start doing small jobs with first shipment. **Send for free facts.**

ICS Auto Body Repair School

ICS Center, Dept. PB070
Scranton, PA 18515

Underground Homes



- **The Primer To Earth Sheltered Living** — 24 Page Booklet gives basic information on underground homes — advantages, site selection, planning, financing, building tips, construction and landscaping. *\$3.00 ppd.
 - **Plans For The Future** — 44 Page Book features full color renditions of 25 different underground home designs, plus floor plans. Blueprints available. *\$6.95 ppd.
- Order Today! Satisfaction Guaranteed.
Underground Homes • Dept. PM8
700 Masonic Bldg. • Portsmouth, NH 04862

MAKE CASH CLEANING CHIMNEYS

It's easy with the August West System — a proven method of cleaning residential wood-burning chimneys in less than an hour. (And the average charge for this service is \$45.00 a flue.)



Here's one heck of an opportunity. You can now live the life you want to live. And work when you want to work. Perform a much needed service. Wear a top hat to work. And clear more than \$100 a day! With the August West System **YOU CAN DO IT!** We'll show you how.

For FREE details on how you can

BE A CHIMNEY SWEEP

Call TOLL FREE 800-243-5166

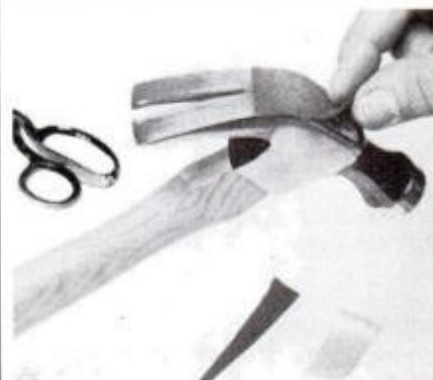
(In Connecticut call 226-0754)

or write: August West Systems, Inc.

Box 603 Dept. PCT, Westport, CT 06881

HINTS FROM READERS

Prevent hammer marks in wood



Glue felt to the top of the hammer head.



Felt prevents mars and dents in wood.

I had to remove a nail from such close quarters that I couldn't slide plywood under the hammer head to protect the wood surface. Instead, I glued felt to the hammer as shown and gingerly removed nail.—Howard E. Moody

Tire-tread gauge is shop tool



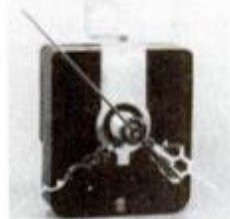
You can use a gauge that normally measures tire-tread wear as a shop depth tool. The one here is calibrated in 1/32-in. divisions and has a 1-in. range. While not as precise as a micrometer gauge, it's fine to measure depth of blind holes, grooves and rabbets.

—Walter E. Burton

QUARTZ BATTERY CLOCK MOVEMENTS

LARGEST SELECTION at the Lowest

Prices Ever From KLOCKIT



PR QUARTZ SERIES

PR #202 - for dials up to 1/4" thick.

PR #203 - for dials up to 7/8" thick.

PRICES:

1 Mvt. \$8.75.

5 Mvts. \$8.00 ea.

10 Mvts. \$7.50 ea.

FREE Hour & Minute Hand!

Second hand S-300 - .35c ea.

- Pendulums!
- Decorative Dials!
- New "Mini-Quartz"
- Numerals!
- Chime Movements!
- Wt. Shells!

Add: Shipping & Handling!

1 unit \$1.50, 5 units, \$2.00

PHONE ORDERS WELCOME!

SAVE with #154

American made 4-jewel Battery Clock Movement

Free Hr. & Min. hand

LOW PRICES:

1 Mvt. \$7.95

5 Mvts. \$5.85 ea.

10 Mvts. \$5.40 ea.

For dials up to 1/4" thick - long shaft available - at slight extra cost, shipping extra.

For complete QUARTZ series send for a Free Catalog.

Write KLOCKIT, Dept. MS80, P.O. Box 629, Lake Geneva, WI 53147

or Call: [414] 248-1150 [For 1st class catalog delivery - send 50c]

NEW OUTDOOR GEAR

(Continued from page 76)

in its fine rust-resistant qualities.

Look to graphite, boron and magnesium, combined with fiberglass, to provide more strength, lightness and sensitivity in fishing rods. Check the percentage included, however, since trace amounts are sometimes included only as a sales gimmick, while 100 percent allows for no binding agent.

While you're backpacking, ounces may start to feel like pounds along



For fish with finicky appetites, anglers can assemble pattern-switching lures with Create-A-Lure's "quick change" spoon kit.

the trail. Hiking has inspired the search for gear that's lighter and stronger. Tough duffel of Cordura doesn't have the weight or bulk of heavy canvas but lasts longer. Synthetic fabrics like nylon can be treated with synthetic products like Teflon to produce cloth like Gore-Tex or Klimate. On tents and garments, such cloth lets sweat vapor evaporate but keeps out rain. Polyester insulation nearly matches down in lightweight fluffiness for loft in sleeping bags and jackets, and more than surpasses it in washability, warmth when wet, and ease of fabrication.

Afloat, less weight in a boat hull can add miles per hour without increasing power, or can cut fuel consumption. Aluminum and inflatable boats reduce weight. Some fiberglass-reinforced plastic craft are substituting Kevlar aramid fibers for a portion of the glass. Similar to bulletproof-vest material, the plastic product has a high strength-to-weight ratio and can lighten a boat without weakening it. Plastics are appearing as marine hardware, sails and lines, as well, and can resist the ravages of salt spray with less maintenance.

So far, the new compounds can add considerably to cost. But the hope is that increased production will make them less expensive, and that would be an extra bonus. **PM**



Save \$10

1/3 off
**Heathkit
Digital
Alarm Clock**

Now only \$19⁹⁵ Reg. \$29⁹⁵

Now discover the fun of kitbuilding and get a great value, too. The beautiful Heathkit Digital Alarm Clock is an easy 4-hour kit with a simple step-by-step instruction manual that makes assembly a snap. You'll enjoy building it and you'll be proud of the results. And you'll save \$10, too.

The Heathkit Clock features:

- Big clear digital readout
- Snooze button at 9 minute intervals
- Blue-green display that adjusts automatically to any room light
- 12- or 24-hour formats
- Special alert that tells you when time has been interrupted by power failure
- Handsome, simulated woodgrain cabinet

Remember, along with the easy-to-follow assembly manual, you can count on a nationwide network of service centers and over-the-phone technical assistance. You can't miss.

So go ahead. There will never be an easier, less expensive way to try your hand at kitbuilding. Order by phone or mail. Do it now and save.

Offer good thru September 30, 1980.

The same big \$10 savings is available at **Heathkit Electronic Centers*** where the Digital Alarm Clock is on display. See your telephone white pages.

*Units of Veritechnology Electronics Corp.

Order by phone or mail

Call toll-free 800-253-0570

In Michigan, Alaska & Hawaii, call (616) 982-3411

Please rush me my GC-1107 Digital Alarm Clock Kit(s) at \$19.95 each, plus \$1.90 each shipping & handling. Michigan residents add 80c (4%) sales tax.

Payment by check, money order,

VISA, Master-Card Code No. _____

Card No. _____ Ex Date _____

Signature _____
Necessary to send merchandise

Name _____
Please print

Address _____

City _____ State _____

Zip _____ GX-381

Send to Heath Company, Dept. 017-682,

Benton Harbor, MI 49022

SEE YOUR DEALER TODAY

DEMAND THE ORIGINAL

'Firestik'[®]

"THE FUEL-SEEKER"

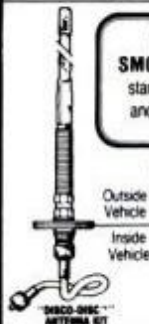
**DON'T TAKE NO FOR AN ANSWER!!
THE #1 WIRE-WOUND AND MOST
COPIED ANTENNA IN THE WORLD!**

Rugged, Shatterproof Fiberglass . . .

CB Antennas and accessories for marine, RV, truck, auto, van and motorcycles, etc.

SIX COLORS:

Clear, Spun-Gold, Silver-Gray, Black, Red and White.



Watch for the New Film
SMOKEY and the BANDIT II
starring **BURT REYNOLDS**
and "Firestik" Antennas!

A TOUCH OF CLASS!



SEND FOR FREE CATALOG

'Firestik' Antenna Company
2614 East Adams/Phoenix, AZ 85034

Name _____

Street _____

City _____

State _____ Zip _____

Serving the CB and
Communications Market Since 1962.

5-YEAR REPLACEMENT WARRANTY

FREE COLOR BROCHURE

Do-it-yourself pre-cut kits • Completely finished and assembled models • Antique furniture reproductions • Wall and shelf clocks • Grandfather clocks • Beautiful solid woods (walnut, oak or cherry) • Solid brass West German movements • Prompt delivery • Money back guarantee

VIKING CLOCKS

QUALITY
CLOCKS AT
FACTORY
DIRECT
PRICES.



FREE Color Brochure. Write: Viking Clocks, The Viking Building, Dept. 802, Foley, AL 36536. Phone: (205) 943-5081

Visit our showrooms: I-10 Exit 35, Spanish Fort, Ala. and Hwy. 59 one mile south of Foley, Alabama.

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. 46,000,000 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 Belsaw training, you can soon have the skill 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.



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
BELSAW INSTITUTE
511P FIELD BUILDING
KANSAS CITY, MO 64111



FREE BOOKLET!
Send for your copy today!

BELSAW INSTITUTE
511P FIELD BUILDING
KANSAS CITY, MO 64111

Accredited Member
National Home
Study Council



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 _____

ROBOTS YOU CAN BUILD TODAY

(Continued from page 17)

less interface and software (programming aids). Initial software exists for the KIM-1 and soon will be available for DEC and Radio Shack computers (see addresses at the end of this article).

Robot by mail

Mentor VI is a boxy-looking robot presently undergoing final design. Like its predecessors, it will come piece by piece with an International Institute of Robotics correspondence course (starting with basic electronics, expected to cost around \$990).

Mentor VI will be about 4½ feet high with an upended-box body, a box head and two legs on wheels. The movable head is planned to carry "sonar" and a stereoptical scanner.

Dale Cowser's International Institute of Robotics, a nonprofit organization, publishes *Robotics Newsletter*.

Make a 'Mike'

Scratch building may save some cost, but expect to spend all your spare hours over two to six months. You can use common shop tools for the most part, but some specialized equipment may be necessary.

Mike, a robot you can build from plans in a book, has ribbon switches on each of eight sides for impact sensing. Ultrasonic sonar detects obstacles up to 10 feet ahead. The 14-inch-high, 27-inch-wide, three-wheeled structure can carry 600 pounds. A "voice recognition" system is detailed, whereby Mike's program can be overridden by words or whistles.

Music over matter

Author Frank Da Costa's Lek-tranimal is, in some ways, simpler than Mike—certainly smaller and lighter, but without Mike's room for expansion. You build its "brain," but only deal with a limited device, not a general-purpose computer.

About 1 foot tall, 1½ feet long and 6 inches wide on three wheels, it is an apartment-sized robot "pet." Front/left/right sonar is used. Its microcomputer has an 8085A "brain" and operates on a skimpy 512 or 768 bytes of memory. (A byte is memory storage space for one letter or two numerals.)

Programming randomizes behavior by, in effect, continuously "flipping an eight-sided coin" to choose among eight tasks. One is "bark"—actually "more like 'warp,'" says Da Costa, which "drives my parakeet

crazy." Some tasks are commanded externally through circuitry, interpreting groups of five musical pitches from voice or instrument (or perhaps vengeful parakeets?).

Cost is about \$250 to \$300, of which the "brain board" is only \$70 to \$75.

What's Newt?

Probably the closest thing to R2D2 is Ralph Hollis's cylindrical Newt, a one-of-a-kind widely considered to lead the hobbyist field. It has been several years in development, isn't finished yet and already has cost over \$600, not counting 100-plus custom-machined parts.

An R2D2-like "sensory turret" will revolve 360° atop Newt with several light, optical, sound and infrared sensors. The manipulator has its own optical scanner.

Programming employs highly advanced "propositional" computer language and takes about 32 kilobytes (32,768 bytes) total memory. And, Newt still won't do housework and will never outwit his owner!

Robot gets smart

David Heiserman's Rodney is the closest thing to Newt available in book-plans, although it presently lacks manipulator and turret.

Rodney recharges itself whenever bumping across its "nest." Rather than directly detecting obstacles, it senses when either of its drive motors has stalled. (Most robots grind away if parts other than impact sensors touch objects first.)

The 8085A-based computer you build is programmed to remember past encounters with obstacles, and then to provide generalized responses to new situations. That is, Rodney learns—a big step in artificial intelligence. Rodney (and Buster) materials are estimated to cost under \$400.

Et-2, Robotus?

Lour Sales Group's et-2 three-wheeled, polyvinylchloride (PVC) robot chassis is for experimenters able to install a computer of their own and originate all programming. Cylindrical and 20 inches tall, it includes two empty shelves, drive motors, bumper sensors, battery mount and associated electronics. An optional manipulator should be available soon. The complete et-2 is \$495; kits, \$375; superb plans, \$15.

A similar idea was the Grivet robot base module by Gallaher Research Inc. Kits, plans, parts and manipulators, widely publicized un-

til late 1979, may continue to be produced under new ownership soon.

Simulated robots

Heiserman (Rodney's designer) says your best first robot might be no robot at all. Instead of the "expense and trouble of building," he suggests computer simulation and has two related texts in preparation for TAB Books.

This way, your existing home computer can run robot programs. The video monitor shows a robot exploring a room, appearing much like a TV game. Or you can depict just one part, maybe a manipulator, to study its function.

A robot 4U2?

Outside a hobbyist robotics seminar at the 1979 National Computer Show in New York City, 18-year-old Holden Caine had his own creation on display. Occasionally, hip-high Herb slipped quietly into the crowd when Caine wasn't watching.

Herb's development now continues its existence at a college Caine selected for its facilities to help. For him and many others, robots aren't science fiction, but an everyday part of life.

Could it be time for the "roller-rolling of little wheels" in your home, too? **FM**

Where to obtain further information

Assembled robots, kits, parts

- Gallaher Research Inc., Box 10767, Winston-Salem, N.C. 27108 (response may be delayed).
- International Institute of Robotics, Box 615, Pelahatchie, Miss. 39145.
- Lour Sales Group, 1822 Largo Ct., Schaumburg, Ill. 60194 (send 50 cents for information).
- Terrapin Inc., 33 Edinborough St., Boston, Mass. 02111 (send \$1 for information).

Plan books

- "Buster" by Heiserman, *Build Your Own Working Robot*, \$5.95, TAB Books, Blue Ridge Summit, Pa. 17214.
- "Lektranimal" by Da Costa, *How to Build Your Own Working Robot Pet*, \$6.95, TAB Books (see address above).
- "Mike" by Looftbourrow, *How to Build a Computer-Controlled Robot*, \$7.95, Hayden Book Co. Inc., 50 Essex St., Rochelle Park, N.J. 07662.
- "Rodney" by Heiserman, *Build Your Own Self-Programming Robot*, \$7.95, TAB Books (see address above).

General books

- The Complete Handbook of Robotics*, by Safford, \$7.95, TAB Books (surveys concepts).
- Robots: Fact, Fiction and Prediction*, by Reichardt, \$8.95, Penguin Books, 625 Madison Ave., New York, N.Y. 10022 (general overview).
- Robots on Your Doorstep*, by Winkless & Browning, \$7.45, Dillithium Press, Box 92, Forest Grove, Ore. 97116 (unusual commentary).
- Simulation*, \$6.60, Byte Books, 70 Main St., Peterborough, N.H. 03458.

Magazines

- Byte (\$18 for 12 issues; many robotics articles), 70 Main St., Peterborough, N.H. 03458.
- Interface Age (annual April robotics issue), 13913 Artesia Blvd., Cerritos, Calif. 90701.
- Robotics Age (\$7.50 for four issues; new, to include U.S. Robotics Society News), Box 4029, Houston, Tex. 77210.
- IIR Robotics Newsletter (\$8 for 12 issues), Box 615, Pelahatchie, Miss. 39145.

Easy! DRILLS WATER WELLS 50-100-200 FEET DEEP!

SAVES YOU HUNDREDS OF DOLLARS!!!

Did you know that vast quantities of fresh, sparkling clear water lie within 200 feet of the surface of the ground almost *everywhere*? In the city. In the suburbs. In the country. Pure, tasty water untouched by chemicals or pollutants.

Trouble is, until now, the only practical way to tap this wonderful supply of free water was to hire a professional driller—and that could cost you a thousand dollars or more.

But now YOU can drill your own well and save hundreds of dollars!

With the remarkable Hydra-Drill you can drill your own well. It's amazingly uncomplicated and simple to operate. More than 47,600 water wells have been drilled with Hydra-Drills by homeowners who have had no previous experience in well drilling.

You owe it to yourself to find out more about this practical economical way to provide good, year 'round water for your home and garden.

Write or call today for our FREE information package including the booklet "HOW TO DRILL YOUR OWN WELL". There's no obligation—ACT NOW! No salesman will call.



Deeprook Mfg. Co.
Opelika, Alabama 36802
FREE Phone Toll-Free

(800) 821-2280

IN ALASKA & HAWAII CALL (800) 821-3777
(Ask for Ext. 5124)

Call anytime including Sundays.
OR CLIP COUPON AND MAIL TODAY!

Deeprook Mfg. Co., Dept PM 80
Opelika, Alabama 36802

Please mail your free information kit immediately. I understand there is no obligation and no salesman will call.

Print Name _____

Address _____

City _____ State _____ Zip _____

REPAIR CLOCKS

Home Study Course prepares you for Good Income — Professional Status. Free Details. No salesman will call.

NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____

CLOCKMAKERS INSTITUTE
P.O. BOX 449, LEWISTOWN, PA. 17044

Learn ACCOUNTING at home

Learn about careers in Accounting, Bookkeeping, Tax Returns. Send for FREE "ACCOUNTING CAREER KIT" WITH COURSE. Veterans benefits.

NAME _____ AGE _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____

FREE BOOK NORTH AMERICAN SCHOOL OF ACCOUNTING, Dept PB070
3000 Campus Dr., Newport Beach, CA. 92663

Enjoy Fireplace

Beauty PLUS Both Highest Heat Output and Efficiency!



Unique design of THERMOGRATE® Free-Standing Fireplace/Stove produces more heat at high efficiency than any stove (55,000 BTU/hr. at 63.2% efficiency) . . . so you burn less wood while enjoying glass door elegance!

For FREE information, write: Envirostyle Direct, Dept. 840-008 P.O. Box 43021 St. Paul MN 55164
Or CALL TOLL FREE: 800-328-0882

\$1.50 a gallon vs. 1/10¢ a mile

Electrify Your Bike!



Travel with PEDALPOWER®, low-cost electric drive for your bike or adult trike. Just 10¢ worth of electricity gives you 100 miles of effortless riding. Save on gas, taxis, stop begging rides from friends. Perfect for shopping, visiting, commuting, just plain fun!

PEDALPOWER fits men's, women's, children's bikes and adult trikes, installs in minutes without special tools. Safe single-lever handlebar control, instant start without pedaling, up to a 40-mile range on a single charge. Satisfaction guaranteed. Send coupon for free catalog showing PEDALPOWER motors, Take-Apart bikes, and adult trikes. Get PEDALPOWER and laugh at gas prices!

SEND TODAY FOR FREE CATALOG

PEDALPOWER®

5945 Mantua Blvd.,
Sewell, N.J. 08080

Rush me my FREE
Pedalpower catalog by
first-class mail.



Name _____

Street _____

City _____

State _____ Zip _____

DRIVING THE AUDI 4000 (Continued from page 37)

twisty, two-lane roads in the mountains of western North Carolina, and what a lively, agile mountain goat it was! The turbo package offers a special performance suspension, wide, low-profile steel radial tires on snazzy, 15-inch, spoked alloy wheels, power rack-and-pinion steering and power four-wheel disc brakes. It all works beautifully to



The 5000's cockpit provides full instrumentation and a first-class environment. It is available only with an automatic.

make the car go, stop and corner like a thoroughbred.

The Turbo is a finely tuned, spirited sports car disguised as a luxury sedan. Our only regret is that the turbo engine comes with automatic only; you can't get it with Audi's new five-speed manual transmission.

Inside the quiet and comfortable cabin, cradled by the excellent, form-fitting bucket seats with infinitely adjustable backrests, you're treated to a fully instrumented panel which includes tachometer, vacuum/boost and oil-temperature gauges, all easily visible through the Turbo's special four-spoke steering wheel. Controls for wipers, lights, turn signals and the standard cruise control are on handy steering-column stalks. There's a storage tray under the dash and a bin on the console (whose top cover doubles as a beverage tray for rear-seat passengers). A sharp-looking digital electronic clock glows from its perch between the sun visors.

Additional standard equipment includes an aerodynamic front air dam under the bumper, power windows and door locks, airconditioning, tinted glass, four-speaker stereo radio with cassette player and automatic power antenna, dual remote-control outside mirrors, a lighted vanity mirror, intermittent wipers, electric rear-window defogger and much more. The only options are leather and/or heated seats, a power sunroof, metallic paint and power outside mirror adjusters.

There's also a lot more under the stylish body to separate the Turbo from the "ordinary" 5000. The engine pistons are cooled from the bottom by a fine oil spray, a system similar to that in the Mercedes-Benz 300SD. Exhaust valves are sodium-filled, with an engine oil cooler and a separate oil system and filter just for the turbocharger. Larger driveshafts and special forged spindles carry the Turbo's 30 extra hp to its front drive wheels. Yet maintenance is no different from that for the normal 5000, since the turbo unit itself is maintenance-free. If turbo trouble does arise, Porsche+Audi dealers are already experienced with turbocharged Porsche engines, so they should be able to handle the Audi system.

When Audi engineers decided to make an automatic transmission available in the 4000 coupe and sedan, they felt its standard four-cylinder engine would be a bit too sluggish, so they simply adapted the 5000's five-cylinder engine/automatic package to fit. The result is pleasingly snappy performance (0 to 60 in 13 seconds) combined with reasonable (20-plus mpg) fuel economy. And—good news for manual shifters—there will be a five-cylinder, five-speed version later.

We've covered the 4000 in previous issues (*Firsthand Report: Driv-*



The 4000's interior is leaner, but by no means Spartan. A five-speed manual transmission will be available in near future.

ing the Audi 4000, page 32, June '79) so suffice it to say the car has the look and pleasant character of its larger brother in a slightly smaller, less plush and less expensive package. A power assist for the rack-and-pinion steering and a tachometer come with the automatic, in addition to the standard 4000's equipment. The option list includes airconditioning, stereo radio (with or without cassette player and power antenna), manual sunroof, cruise control, alloy wheels (13-inch or spoked 14-inchers with low-profile tires), power door locks, right outside mirror, metallic paint and a driver's seat-height adjustment. **PM**

CAMERAS FOR THE DEEP

(Continued from page 85)

where other cameras must be kept in their cases.

PM tried these cameras recently above and below water. Aside from the Eumig's stiff zooming (due to water sealing), both units were about as easy to use as their dry cousins. They weigh slightly more than dry cameras with similar features, but both float. Each relies on an O-ring to seal out water; the Nautica's needs occasional lubrication.

We weren't able to test the Eumig down to 115 feet, but we put both cameras through their paces for several hours to a depth of 8 feet. After lots of splashing and swimming we can report that nary a drop of water found its way inside either unit.

Underwater picture-taking takes practice, but our biggest problem had nothing to do with the cameras; we just kept running out of air. Using a snorkel and staying near the surface should solve that.

Under water, framing the shot with either camera is harder than on land, especially with a mask. Eumig's accessory sportsfinder makes it easier; Minolta offers one as a \$9-list option.

Our testers generally liked both cameras. The Weathermatic was praised for its built-in flash, and its oversized controls eased handling. One staffer preferred a movable cover to protect the lens and flash.

On the Nautica, the backlight compensation knob was appreciated. Stiff zooming of the 9- to 30-mm f/1.9 lens was a drawback, as was the loss of zooming under water.

Although both cameras appear quite rugged, they can still be abused. Minolta recommends that the Weathermatic not be subjected to extreme heat (as on sun-baked sand or in a glove compartment), and of course it can't be indiscriminately dropped. The Nautica's lens is as susceptible to scratching as other lenses. Both cameras should be rinsed off thoroughly after exposure to salt or chlorinated water.

Given the limitations of the 110 format, the Weathermatic could easily function as an all-around camera. The Nautica, while not as feature-packed as other Super-8 units, brings a new dimension to home movies. Don't be surprised if other manufacturers follow the lead of these two companies. The A after Weathermatic may imply B and C models from Minolta, too.

Weathermatic-A lists for \$160, the Nautica, \$500; both will probably be available at a discount.

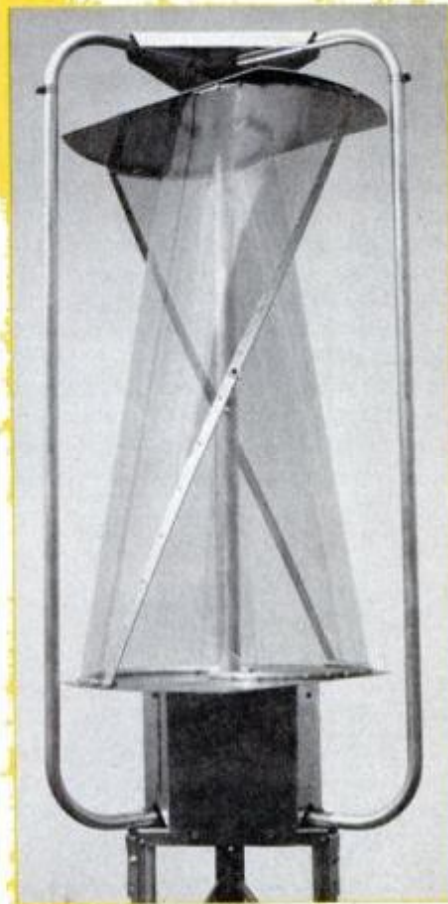
PM

AN ALTERNATIVE TO EVER-HIGHER FUEL AND POWER BILLS—

FREE ENERGY

START GENERATING YOUR OWN POWER FROM THE WIND!

Buy a Complete Helius Windpower Kit, or Buy Only the Generator and Get FREE PLANS to Build 3 Energy Producers

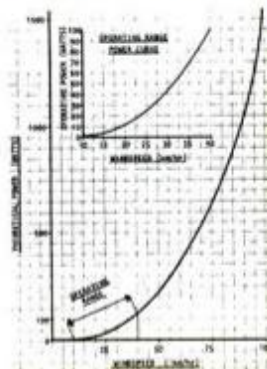


Overall Dimensions: 1380 mm (4 ft 6 1/2"), 720 mm (2 ft 4 1/2")

HELIUS® TC25K WINDPOWER CONVERTER

Use it to charge 12-volt batteries, for emergency power, lights, water pumps. For cottages, RVs, camping. Measure wind energy. Mounts on TV tower or pole.

Rated power 25 watts 12 volts
Max. power 150 w. Convertible to 110 volts AC.



BEGIN YOUR ENERGY INDEPENDENCE TODAY!

HOW TO MAKE A SMALL WIND GENERATOR THAT WORKS

Until now, it was no easy task to build your own wind generator. So Thermax engineers were assigned to designing a rotor which was not only low in cost, sturdy, reliable and safe in high winds, but must also be omnidirectional (meaning that it should capture the full energy of wind from all directions, without slewing to face into the wind). The performance of many known rotor types was carefully compared, and they all had drawbacks: one type was omnidirectional but not self-starting; another was self-starting but required too much special mechanism; another was noisy and inefficient. Finally, by a process of elimination, they selected the simple and durable Savonius rotor. It had one characteristic problem: its output torque was cyclical, meaning that it delivered power in pulses, and could be stalled at its lowest-torque position. Otherwise, it was ideal for the purpose.

THE PROBLEM SOLVED—INVENTION OF THE HELIUS ROTOR

The solution turned out to be simplicity itself! Everybody knew that the torque characteristic of a Savonius rotor could be improved - at some cost - by stacking two or more phase-shifted rotor segments. Three is better than two; four is better than three. Thermax engineers then reasoned that the ideal torque output would theoretically be achieved by stacking an infinite number of such rotor segments, and so they invented the "Helius" rotor. The 90-degree twist of the vanes gives this rotor a completely smooth output torque. The problem was solved, and a new type of rotor had been born!

THE MARKETING EXPERTS WERE WRONG AGAIN

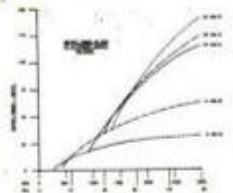
They told us that nobody would ever want to own a small windpower system, less than kilowatt size. But renewable energy enthusiasts and educators kept asking us for a simple and inexpensive wind generator power for a weekend cottage, RVs, electric fences, battery charging and many other uses. Now our customers tell us the TC25 Helius Rotor is "exactly what we were looking for"—they proved the experts wrong again!

GET THE FEEL OF WIND ENERGY—WITHOUT SPENDING A BUNDLE!

You really save by assembling your own Helius rotor. You pay only for high quality components, such as tough Lexan vanes, sealed permanent lubed bearings, aluminum and plated steel structural components, (and all necessary hardware). Each rotor kit comes complete with a user's guide: all you need to know about installation, wiring, batteries, regulators and inverters. You don't have to be an expert to put the TC25K kit together—just a few hours, with simple step-by-step instructions and ordinary hand tools, and you can build your own Helius rotor. All you need to complete your installation is a TV tower or other mounting and, of course, a battery and regulator.

FEATURING—THE AMAZING TC25G PERMANENT-MAGNET LOW-RPM GENERATOR

Each Helius Rotor kit comes complete with the TC25G generator. You can also order the generator separately for only \$69. (two for \$130 plus \$3 each for postage and handling, and receive a complete Users Guide and FREE PLANS for a Waterwheel, a Helius rotor, and a Pedal-power generator. The TC25G generator is rated for 12 volts dc at 25 watts, and will generate 6, 12, 24 or 32 volts with the appropriate regulator. Maximum power: 150 watts. Short circuit current over 6 amperes.



SPECIAL INTRODUCTORY OFFERS CHOOSE OFFER 1, OFFER 2, OR BOTH

OFFER 1 COMPLETE WINDPOWER CONVERTER KIT
Order your TC25K Helius Rotor kit now for only \$379 (two for \$720) plus \$20 per kit for shipping and handling in Continental USA and Canada.
OFFER 2 GENERATOR AND PLANS ONLY
Order the TC25G Generator alone for only \$69 (2 for \$130) plus \$3 each for postage and handling, and get FREE three sets of plans (regularly worth \$25.95).
WATER POWER Build your own small hydroelectric generating station.
WIND POWER Complete plans to build a Helius rotor.
PEDAL POWER Convert an old bicycle to generate electricity.

THERMAX CORPORATION RENEWABLE ENERGY PRODUCTS

Credit card customers CALL TOLL FREE (24 Hours)
800-227-1617. ASK FOR EXTENSION 211. (In California call 800-772-3545), or mail your check or money-order to:

Thermax Corporation
1278 Civic Drive
Walnut Creek, California 94596

Please allow 2-4 weeks for us to process and ship your order. California residents add 6% sales tax. Canadian customers call 613-632-0134

watch all those green bars rise and fall and the numbers flash up and down. Also, I understand there are 315 circuits in this dashboard, which could be a nightmare to repair. I'm not ready for the space age yet!"

But the area of most complaint centered on the Mark's new overdrive automatic transmission. In light-throttle driving, it shifts to fourth at about 35 mph. It also shifts out of fourth at that speed, which means that around town it's continuously hunting and pecking between third and fourth gears. Many owners found this annoying, and 34.2 percent reported taking their cars back to their dealers for a cure. There is no cure, of course, except to leave the transmission selector in third range for in-city driving and then shifting manually to fourth on the open road.

"I wish they'd eliminate the overdrive automatic entirely," sighed a Michigan businessman, who added that, "... when trying to pass another vehicle on the highway, you'd best have a lot of room and time."

"The overdrive automatic has a jerky motion," reiterated a Tennessee contractor, and an Iowa clothing merchant grumbled, "Overdrive not smooth." General Motors is experiencing similar complaints



Most owners chose 5.8-liter V8 engine. They found it yielded 18.1 mpg on highway.

with its torque-converter lockup. So it's not a problem unique to Ford.

On the topic of quality control, 60.6 percent of our respondents graded workmanship *good to excellent*. That's not a glowing mark; in fact, it's 14 percentage points below the 1980 Cadillac Seville, which also won no prizes in the workmanship department.

A good many of the economy imports have scored in the high 90s in recent PM Owners Reports—cars like the VW Rabbit, Toyota Tercel, Mazda 626 and others

that cost half to a third what a new Lincoln or Cadillac does.

Nor did dealer service win much praise from Mark VI owners. Of those surveyed, 43.6 percent rated it *average to poor*. And 65.1 percent reported mechanical problems of some sort, which means most owners got the opportunity to test dealer service.

"I'm unhappy about the three trips I had to make to the dealer to repair the automatic enrichment device on the fuel-injection system," complained a Minnesota apartment-building owner.

An Arizona retiree whose electronics wouldn't let him open the doors or trunk griped, "I bought a \$20,000 car, and they can't get the computer parts for it!"

And a California accountant moaned, "Oil leaks out on the garage floor, and the engine smokes after I shut it down. I've had the car in three times for the cruise control and had to put in four quarts of oil in the first 5000 miles. The dealer just can't get the little things fixed."

But even despite these and more minor complaints, most Mark VI owners wouldn't trade their cars for anything else, and most would buy another Lincoln.

"Yes, I wouldn't change. This is by far the quietest automobile I've ever owned,"

NEW DREMEL BELT SANDER & DISC SANDER IN ONE.

The ingenious combination of a quiet-running, 5" disc sander and 1" wide x 30" long sander-belt makes this the most useful power tool you'll ever own.

The disc handles rough sanding and shaping. The belt sander takes care of the finishing.

3" throat depth, easy belt adjustment make inside sanding simple. Has a platen that provides a rigid sanding surface if you need it but removes for flexible belt sanding.

Great tool if you don't have a workshop. Great tool if you do. Available wherever fine power tools are sold.

Dremel, Division of Emerson Electric Co., Racine, WI 53406.

YOU'LL NEVER RUN OUT OF USES FOR IT.



MODEL 730



Sharpens, polishes, cleans, grinds metal, wood, some plastics.



Large tilting table, adjustable miter gauge for sanding accurate angles.



Compact. Weighs just 11 lbs. Only 15" high x 10" x 11".

DREMEL

said a Tennessee real-estate broker. "Yes, I consider the Lincoln a much better automobile than the Cadillac"—Illinois funeral director.

"Yes, especially since our first Lincoln was a 1938 Zephyr V-12 and we've been driving Lincolns ever since. Too late to change now!"—Retired California photographer.

A New York banker put it this way: "The Mark is the ultimate statement of what the American luxury car is all about. It provides unparalleled comfort and a great ride. And now, with the smaller engine, the fuel economy is also good."

"Yes, I'd certainly buy another," rhapsodized a Texas secondary-school teacher, "because the Mark series Lin-

colns don't need to be sold. They sell themselves. We have owned one of each since the Mark III in 1968."

She sums up her own response and that of many owners this way: "Here's a car with distinctive appearance, a new economical design, deluxe appointments, fine driveability, and a superb ride. It's a totally great car!" **FM**

Summary of 1980 Lincoln Continental Mark VI Owners Reports*

Total miles driven 1,156,952	Handling 32.1 Ride 28.8 Economy 17.7	Good 12.1 Fair 1.7 Poor 1.3	Average 21.1 Fair 9.3 Poor 13.2
Average miles per gallon	Specific dislikes:	Comfort opinion (rear seats):	Number of vehicles owned:
5.0-liter V8 In town 14.0 Long trips 18.9	No complaints 20.4%	Excellent 41.0%	Mark VI only 29.7%
5.8-liter V8 In town 13.6 Long trips 18.1	Lower-than-expected mileage 18.4	Very good 30.8%	Two cars 49.1
Engine choices:	Workmanship 13.4	Good 19.5	Three cars 13.4
5.0-liter V8 18.1%	Transmission 9.5	Fair 4.6	Four or more cars 7.8
5.8-liter V8 81.9	Poor dealer service 8.5	Poor 4.1	Makes of other cars owned:
Body-style choices:	What changes would you like?	Had any mechanical trouble?	Ford 26.3%
Two-door sedan 59.5%	No changes 21.8%	Yes 65.1%	Chevrolet 19.4
Four-door sedan 40.5	Better materials 15.4	No 34.9	Lincoln 16.9
Why did you choose the Mark VI?	Better fuel mileage 11.2	What type of trouble?	Mercury 15.6
Styling 47.3%	Smoother transmission 6.9	Transmission 34.2%	Cadillac 12.5
Owned Lincolns before 35.1	Better workmanship 5.9	Carburetor 16.4	Age distribution of owners:
Economy 10.4	Workmanship opinion:	Electrical 15.1	15-29 years 3.3%
Comfort 7.2	Excellent 30.3%	Smog system 8.9	30-49 years 37.4
Size 7.2	Good 30.3	On-board computer 6.8	50-plus 59.5
Specific likes:	Average 17.3	Dealer repairs satisfactory?	Would you buy another Lincoln?
Styling 53.0%	Fair 11.7	Yes 57.1%	Yes 77.9%
Comfort 32.6	Poor 10.4	No 42.9	No 22.1
	Comfort opinion (front seats):	Dealer service opinion:	Would you buy another Mark VI?
	Excellent 58.2%	Excellent 27.8%	Yes 76.4%
	Very good 26.7	Good 28.6	No 23.6

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

FREE \$29.95 VALUE WHEN YOU JOIN THE HEATHKIT AUTOMOTIVE PROGRAM.

Save on repairs and tune-ups. Learn to do it yourself the fast, easy Heathkit way. You gain the skill to diagnose and correct problems, and keep your car in top running order. Save on gas and maintenance. Save \$29.95 on Unit 1 when you buy Unit 2 at regular price. Money-back guarantee. You can't lose!

This professionally designed program gives you a complete understanding of the principles of automotive electrical and ignition systems, as well as a practical guide to performing your own service.

The 6-unit program covers in depth: •Unit 1: Electrical Principles and Battery •Unit 2: The Starting System •Unit 3: The Charging System •Unit 4: Accessories and Body Electrical •Unit 5: Ignition Fundamentals, Troubleshooting & Tune-Up •Unit 6: General Motors, Ford and Chrysler Electronic Ignition Systems.

You'll know how to test each part of your starting and charging systems, how to repair all lights and accessories, how to diagnose and tune your ignition, and how to keep your car in peak condition. And a car in peak condition can reduce gas consumption by up to 15%.

Easy, step-by-step learning—This award-winning program combines clear, color visuals with audio cassettes, so you see and hear each step. This is reinforced by a *programmed-instruction* text that organizes the material into easy-to-follow steps. Learning is further reinforced by hands-on projects performed by you on your car. You learn by *doing*, and you move at your own pace.

Save \$29.95—This limited-time introductory offer allows you to get Unit 1 free when you purchase Unit 2 at the regular price. If you agree to keep Units 1 & 2 and become a member of the Heathkit Automotive Program, you will receive Units 3-6 at 6-week intervals at \$29.95 each.

Order by phone or mail

For fastest ordering, call toll-free 800-253-0570
In Michigan, Alaska & Hawaii, call (616) 982-3411



Send to Heath Company, Dept. 017-683, Benton Harbor, MI 49022

Please rush me Units 1 & 2 of the Heathkit Automotive Program at no charge for Unit 1. Enclosed is \$29.95 for Unit 2, plus \$4.30 shipping & handling. Michigan residents add \$1.20 (4%) sales tax.

I understand that I have 30 days to examine Units 1 & 2 and that I may return them at any time during the 30 days if I am not completely satisfied. If I choose to return them, the purchase price will be refunded to me in full and I will be under no further obligation. If I accept Units 1 & 2, I am obliged to buy Units 3-6 at \$29.95 each, mailed at 6-week intervals.

Enclosed is my check money order or charge to VISA, Master Card Code No. _____

Card No. _____ Expiration Date _____

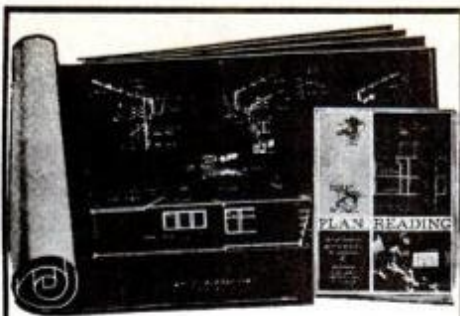
Signature _____ Necessary to send merchandise

Name _____ Please print

Address _____

City _____ State _____

ED-142 _____ Zip _____



FREE BLUEPRINTS and TRIAL LESSON

—for your greater success in Building

Beginners, craftsmen, even foremen and superintendents, have sent for these free blueprints and trial lesson in Plan Reading as a means of trying out Chicago Tech's home-study Builders training. See how you can learn Plan Reading, Estimating and the practical details of all types of construction in your spare time at home. Mail coupon or phone TOLL FREE today for your free ranch home blueprints, trial lesson and catalog on CTC Builders training.

• PHONE TOLL FREE (24 HRS.)
1-800-528-6050 Ext. 810

CHICAGO TECH/School for Builders
2000 S. Michigan Avenue, Chicago, Ill. 60616

CHICAGO TECH/School for Builders Dept. PM-80 2000 S. Michigan Ave., Chicago, Ill. 60616 Veterans Check Here

Please mail me a Free Trial Lesson, Blueprints and Builders Catalog. I understand there is no obligation—no salesman will call.

NAME _____ AGE _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____

Barbecue in a 'well'

This "well-made" barbecue with a roof lets you cook out on rainy days and has a grill that's infinitely adjustable. After choosing an appropriate site for the barbecue, pour the circular-slab footing and let it set. A ring-shaped footing can also be poured to save concrete. Make the trench 10 in. wide.



Although it looks like a well, it's really a large-capacity barbecue with a roof.

To form the circular brick wall, drive a ½-in. pipe into the ground at the center of the well (with a ring-type footing) or set it in the concrete (with a slab-type footing). Slip a small hose clamp over the pipe. Next, rip a narrow wooden strip 24 in. long. Bore a hole slightly larger than the pipe diameter at one end of the strip and fit it over the pipe. Then mark the outboard end of the stick at the well circumference and use it to lay each course of bricks accurately. The clamp, used as a stop for the pipe end of the strip, should be raised after laying each course.

Erect the roof and grill support. Then hang grill from a pulley, using four lengths of chain joined with an S-hook.—W.J. Edwards

MATERIALS LIST—BARBECUE

Key	Amt.	Size and description (use)
A	2	3½" x 3½" x 12' 6" pressure-treated wood (post)
B	1	1½" x 3½" x 48" fir (cross brace)
C	4	1½" x 3½" x 41½" fir (rafters)
D	4	1½" x 3½" x 34½" fir (diagonal braces)
E	14	½"-dia. x length-to-suit dowels (pins)
F	10	¾" x 5½" x 50" cedar (nailers)
G	1	½" x 11' galvanized chain, cut to suit
H	5'	¼"-dia. sash cord
	340	2¼" x 4 x 8" (nominal) brick
	36	2½" x 4½ x 9" (nominal) firebrick
	22 cu. ft.	Concrete (or as reqd.)
	9 cu. ft.	Gravel and sand
	4 pcs.	½"-dia. x 9' drainpipe

Misc.: Wooden or brass cleat, bundle cedar shakes, well or other pulley, S-hooks, 29"-dia. grill (or to suit—ours was cut from expanded metal grate obtained from machine shop).

DO-IT-YOURSELF

FINE GRANDFATHER CLOCK KITS

STARTING UNDER

\$225

(including movement and dial)

- Factory direct prices
- Heirloom quality
- Solid ¾" hardwoods: black walnut, cherry, mahogany, oak
- Easy to assemble, parts pre-cut
- Solid brass West German chiming movements
- Money back guarantee
- Prompt shipment

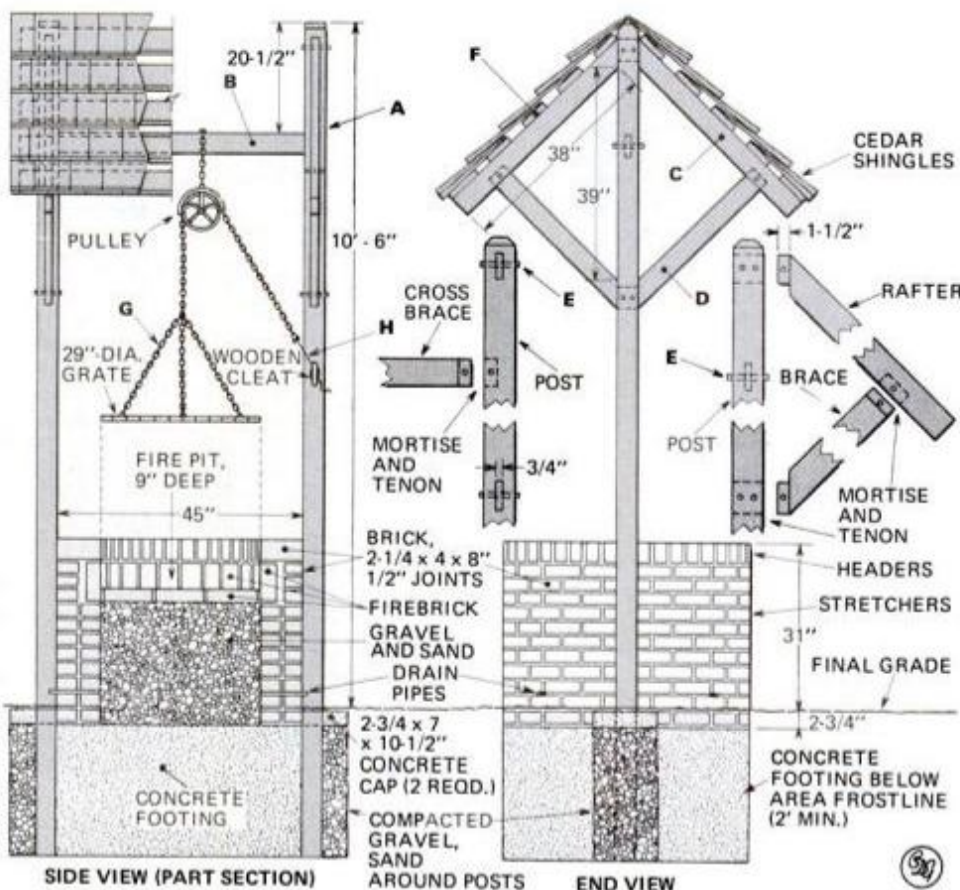


MASTER CHARGE and BANKAMERICARD/VISA ACCEPTED

Write for FREE color catalog

EMPEROR
CLOCK COMPANY

WORLD'S LARGEST MANUFACTURER OF GRANDFATHER CLOCKS
Dept. 527 Emperor Industrial Park
Fairhope, Alabama 36532





Bill C.
He's been a woodworker for years — for the fun of it. But his work is so professional he could sell everything he makes.



Jerry R.
He's your basic weekend "putterer". He's always got a project going to add value to his home.



Walt and Mary D.
They found that the only way they could afford to improve their home was to do it themselves.



Jack B.
He does it for fun like Bill C. But he sells his work at fairs and street markets — at fancy prices.

Which Do-It-Yourself Type Are You?

No matter which do-it-yourself type you are, you've probably already learned one important fact. If you're going to do the job right, you need more than a couple of hand-held power tools.

You need things like a separate table saw, a vertical drill press, a lathe and more. And you need space — lots of space for the tools. And lots of money to afford them all.

But now you can enjoy a complete home workshop at a substantial savings — and in less space than a bicycle.

No matter what your level of woodworking skill and no matter how many power tools you now own, you owe it to yourself to find out more about the Shopsmith Mark V. Simply mail the coupon for the free facts about the 5-in-1 tool.

The Mark V actually gives you five of the most needed workshop tools — 10" table saw, 12" disc sander, horizontal boring machine, 16½" variable speed drill press, and 34" lathe — in one sturdy, free-standing unit . . . that takes up less space than a bicycle.

Better savings . . . better economy . . . more versatility, too!

Because the Mark V has one rugged, precision-built, 13.5 amp., 110 volt motor to power all five tools, it actually costs less (and provides better quality) than the five single purpose tools it replaces.

And the Shopsmith Mark V is easy to change from one operation to another. After about an hour's practice, you'll be switching tool operations in less than 90 seconds.

What's more, you can actually accomplish

more with this amazing 5-in-1 tool because you can "borrow" features from one tool to increase the versatility of another.

The result is convenience and precision that you just can't get with your individual tools. So you'll find yourself sawing and sanding cabinets, beveling and mitering picture frames and windowsills, spindle turning and doweling to produce elegant tables, even metal drilling hinges, fence posts and more with a minimum of effort and cash outlay.

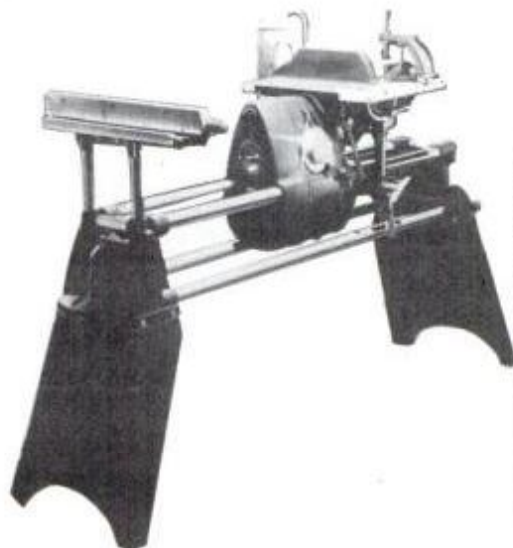
You'll enjoy tackling jobs you wouldn't even have considered before — actually cutting down your home maintenance bills as you add thousands of dollars to its value. And each job you tackle you'll end up doing right — thanks to the Mark V.

Mail the coupon for more free facts today! Find out why — even if you already have a workshop full of tools (and especially if you don't) the Mark V should be your choice.

One happy Mark V owner sold all \$12,000 worth of his commercial tools and replaced them with one Mark V. Why? Because, as he puts it, "I can do anything I was doing on all the machines and have a lot more room."

Don't you owe it to yourself to find out more about something so versatile, so high quality that it can replace \$12,000 worth of tools — and for less than 1/10 of the cost? You certainly do — especially when that information is free and without obligation.

**Shopsmith Mark V —
The tool to start with . . .
the system you grow with.**



Send for your FREE information



Shopsmith Inc.
The Woodworking Company
Dept. 2544
750 Center Drive
Vandalia, Ohio 45377

Yes! Please mail me your FREE Information-Kit on the Shopsmith Mark V. I understand there is no obligation.

Name _____

Address _____

City _____

State _____ Zip _____

and out at speeds between 40 and 55 mph, and it does so with a perceptible surge. Some 6.1 percent of our respondents felt strongly enough about this to mention that it ought to be improved.

Other suggested changes included these: A glassblower from North Carolina: "I'd like the electric windows to have auxiliary handles so they could be operated manually with the key off."

A Wyoming rancher: "I don't like the aluminum hood and deck lid. They're too easy to dent."

A Michigan engineer and diesel owner: "They ought to make the starter interlock with the glowplug relay, so people who don't know it's a diesel can start it. There also ought to be a water separator or drain in the fuel tank." (Watery diesel fuel is a national problem, but aftermarket separators are available, and even GM offers one for about \$70 installed.)

Once again, our old bugaboo of quality control reared its head. These owners, while they liked the car, were irritated by the kind of minor problems that could have been corrected at the factory.

A Michigan auto parts counterman states, "The trunk lid doesn't fit right. There's a big gap between the lid and the left fender, and a very small one between

the lid and right fender. It's not a big deal, but it just shows that nobody's looking at these cars when they roll off the line. Otherwise, the car is fine."

A Louisiana boat contractor: "I feel they ought to take a little more time to fit things together when assembling the automobile. Because of poor assembly inside the radiator, water leaked into my automatic transmission."

Comfort was judged *good to excellent* by 96.9 percent of front-seat riders and 95.8 percent of those in the rear. In this day of generally cramped rear compartments, that's a real tribute.

A Michigan manager told us, "Nothing



The huge, 21-cu.-ft. trunk makes this an ideal car to use for a long family vacation.

but good comments from all passengers—plenty of legroom, good ride, easy entry and exit from the rear seat. My father and I both owned 1978-79 Cadillacs, and we both bought 1980 Bonneville Broughams. We find our Pontiacs as satisfying to drive as the Cadillacs."

Specific complaints tended to be minor and half-hearted. An Ohio farmer, for example, grumbled that, "... when I spend \$10,000 for a car, it should at least have a normal spare tire, not that skinny thing."

A Wisconsin shipping clerk: "How come they put such a small oil filter on the 301 V8? Do they want the engine to wear out faster?"

And a South Carolina sales manager: "The paint finish could be better. It seems awfully thin."

But, far and away, the majority expressed satisfaction with their cars. A Minnesota salesman and diesel owner told us, "On one recent trip of 468 miles, I used 12.7 gallons of No. 2 diesel fuel. That looks like 36.85 mpg—not bad at all. Please don't tell everyone that a diesel is the car!"

An Ohio surgeon: "Best new car I've ever had. Better gas mileage from my Bonneville with the 301 V8 than my 1980 Le Mans with V6. I find that the car has

Carve rustic signs, plaques, cut-out letters or parts in seconds with patented GUIDE-ALL II router attachment!



PRICE BREAKTHROUGH IN 3-D CARVING

A Great Small Business Opportunity!

The new GUIDE-ALL II is an affordable attachment for your router that gives you a fast, safe, accurate and easy-to-use way to do carving of all types. This versatile, portable unit sets up anywhere on a sturdy workbench (swap meets are great), and in minutes can be carving signs, plaques, cut-out letters... even industrial parts! Templates for incised, raised or cut-out letters in up to 6 styles are available from just \$25 (1½" Gothic Incised Alphabet), plus \$2 shipping. Available in 3 sizes, we pay freight (Cont. US) on 4' model at \$135. You pay freight on 6' model at \$165 and 8' model at \$195. Calif. res. add 6% sales tax.

Order today, or send for free brochure with complete details.

THE RUSTIC SHOP

7431 Artesia St., Buena Park, CA 90621
(714) 521-1464

Build a picnic table you can store indoors



READY TO USE



FOLDED

Parking a bulky picnic table indoors when summer is over is practically impossible. So it sits in the yard or on the patio 12 months of the year. Not so with this unique design. Both table and benches fold scissor-fashion into an incredibly small unit which means the whole thing can be stored in your garage or basement with room to spare. And if made of redwood, the table will last for years. To obtain plans and instructions for building this stowaway table send \$3.95 to Popular Mechanics Plans Service, Box 1014, New York, N.Y. 10101. 880 Popular Mechanics is a Publication of Hearst Magazines, a Division of THE HEARST CORPORATION!



HIGH PERFORMANCE SPEAKER CABLE

\$15.95 buys a pair of 20-foot rolls of 12-gauge, twin-conductor, color-coded speaker cables. You could be losing up to half your system's performance in puny speaker wire! Ultra-low-resistance cable allows maximum damping factor in your system to get the full transient response and dynamic range your speakers are capable of. Supplies limited. Add \$2.50 per set for postage and handling.

Speakerlab
Dept. PM08, 735 N. Northlake Way
Seattle, Washington 98103

America's Quality Kits For Over 50 Years

Save 50%-Build your own Grandfather Clock



Build a quality Grandfather Clock by Kuempel that can be a true heirloom in your family for years and years. Available in easy-to-follow plans or complete semi-assembled hand-crafted kits with illustrated instructions. We'll show you how to assemble your own at less than half the cost. Write for Free descriptive literature.

KUEMPEL

CHIME & CLOCK WORKS
Dept. 501 21195 Minnetonka Blvd.
Excelsior, Minnesota 55331

outstanding ride and easy handling."

A Michigan sales rep: "I consider the exterior styling excellent and the interior design and materials likewise. I also appreciate the car's roominess and huge trunk. I feel it's a fine automobile."

Another salesman from Michigan says, "I do a lot of traveling in my job and I need to carry a lot of cargo. That enormous

trunk is the thing that sold me on the car. The mileage on a car this size is really good. I get 20 mpg."

An Indiana dentist had this to say: "I have a large family, so I was really forced into buying a big car. I was prepared to pay a mileage penalty, like 14 to 16 mpg. But I was surprised to get 19 to 21 with the Bonneville."

An Ohio utility risk manager: "Good ride and handling. Also, the V6 performs well in terms of power. This is my fifth Pontiac, and they've all been good."

And finally, from a Florida home-products distributor: "I feel the Bonneville Brougham constitutes the best American luxury car you can buy for the money. I enjoy driving it." **PM**

SUMMARY OF 1980 PONTIAC BONNEVILLE OWNERS REPORTS*

Total miles driven 1,394,393	Economy 8.2	Comfort opinion (front seats):	Good 32.0
Average miles per gallon	Performance 7.0	Excellent 55.6%	Average 15.4
231-cu.-in. V6	Ride 7.0	Very good 30.9	Fair 7.1
In town 16.1	Specific likes:	Good 10.4	Poor 6.6
Long trips 19.9	Styling 42.9%	Fair 2.7	
265-cu.-in. V8 (too few to tabulate)	Handling 33.9	Poor 0.4	
301-cu.-in. V8	Comfort 33.9	Comfort opinion (rear seats):	
In town 15.3	Economy 29.2	Excellent 40.4%	
Long trips 19.9	Performance 15.0	Very good 34.5	
350-cu.-in. gasoline V8	Specific dislikes:	Good 20.9	
In town 15.6	No complaints 40.1%	Fair 3.8	
Long trips 20.0	Disappointed in gas mileage 14.6	Poor 0.4	
350-cu.-in. diesel V8	Poor paint and finish 7.5	Had any mechanical trouble?	
In town 22.8	Poor workmanship 7.1	No 64.6%	
Long trips 28.6	Car noise and rattles 6.1	Yes 35.4	
Engine choices:	What changes would you like?	What type of trouble?	
231-cu.-in. V6 7.8%	No changes 20.1%	Carburetor 23.1%	
265-cu.-in. V8 2.9	Better fuel mileage 16.4	Transmission lockup 17.6	
301-cu.-in. V8 70.8	Better material 7.5	Windshield wipers 7.7	
350-cu.-in. gasoline V8 9.1	Smoother transmission lockup 6.1	Speedometer cable 5.5	
350-cu.-in. diesel V8 9.5	Better workmanship 6.1	Electrical 5.5	
Model choices:	Workmanship opinion:	Dealer repairs satisfactory?	
Bonneville Brougham 52.2%	Excellent 26.5%	Yes 65.9%	
Bonneville 47.8	Good 47.7	No 34.1	
Why did you choose the Bonneville?	Average 13.8	Dealer service opinion?	
Owned Pontiacs before 47.7%	Fair 5.4	Excellent 39.0%	
Styling 29.3	Poor 6.5		
			Number of vehicles owned:
			Bonneville only 45.1%
			Two cars 41.6
			Three cars 10.9
			Four or more cars 2.4
			Makes of other cars owned:
			Pontiac 43.3%
			Chevrolet 19.9
			Ford 14.9
			Oldsmobile 7.8
			Buick 5.7
			Age distribution of owners:
			15-29 years 11.1%
			30-49 years 35.1
			50-plus 53.8
			Would you buy another Pontiac?
			Yes 91.7%
			No 8.3
			Would you buy another Bonneville?
			Yes 91.1%
			No 8.9

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

BUILD SOLAR!



SAVE ENERGY!

10 Affordable Designs,
Contemporary to Traditional.

Tax credits available.

Your full satisfaction
is Guaranteed.

Send \$10 for: 10 Passive Solar Designs TO:

SUNPOWER RESEARCH
5025 W. Saginaw
Lansing, Michigan 48917

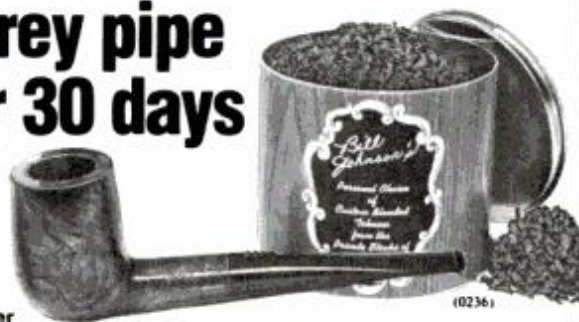
NAME: _____

ADDRESS: _____

CITY: _____

Try this Carey pipe "FREE" for 30 days

and we'll even
give you the
tobacco FREE!



Smokes like no pipe you've ever
known! Be delighted or smash it with a
hammer and the trial will cost you nothing.

It's a new concept in pipe smoking. Top grade Mediterranean briar with patented innovation—"Magic Inch"—harnesses Nature's own laws to provide the sweetest, smoothest, coolest, most satisfying smoke of your life! Not a filter, or a trap. No sludge, moisture or bitterness. Nothing but pure smoking satisfaction you've never known before.

Whether you're a pipe smoker or merely wish to cut down on cigarettes, you're invited to take advantage of this unusual offer. After 30 days, if you don't agree that no other pipe gives you the full rich aroma, deep down smoking pleasure and peace of mind only a Carey pipe can give, smash it with a hammer. The trial has cost you nothing. Even the half-pound humidor of tobacco is yours to keep free.

Send for a free color brochure and select the style and shape pipe you want for your free 30 day trial. Mail coupon today or call toll-free.

FOR FAST INFORMATION
Call Free! 1-800-323-1717.
(In Illinois: 800-942-8881.
Ask for Operator 67.)

E. A. CAREY COMPANY
639 Academy Drive, Northbrook, IL 60062

HOW THE "MAGIC INCH" COOLS, DRIES AND MELLOW'S YOUR SMOKE



Cool Air
Fresh air enters through vents, mixes with smoke from bowl, cooling and condensing it.



Condensation
Condensation squeezes excess moisture from smoke and is absorbed by the Magic Inch.



Evaporation
Moisture evaporates into outside air. You get a cool, dry smoke.

E. A. CAREY COMPANY, DEPT. 255KX
639 Academy Drive, Northbrook, IL 60062

Yes! Send me your full color brochure so I can select a pipe to smoke for 30 days on a free trial basis.

Name _____

Address _____

City _____

State _____ Zip _____

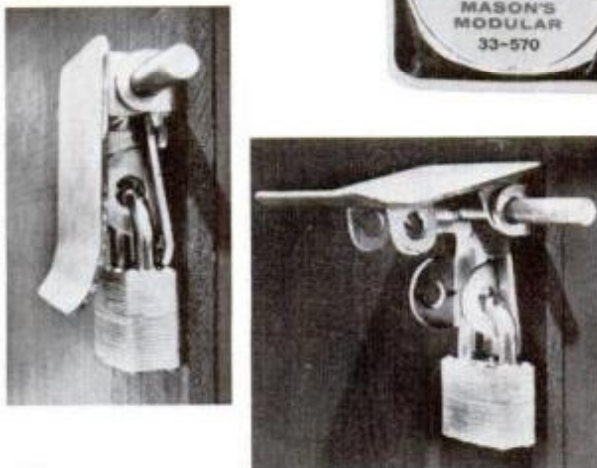
NEW NOW for home and shop



A

A Both of these rules should be a boon to professional and amateur masons. The Mason's Modular Spacing Rule (No. 33-570) is designed for brick masons and tile setters using the modular system. It's marked with six scales in 16-in. modules, as well as $\frac{1}{8}$ - and $\frac{1}{16}$ -in. graduations. The modular scales include those for building blocks, facing tile, economy brick and small facing tile, engineered brick, standard brick and Roman brick. The Brick Mason's Spacing Rule (No. 33-575) is designed for gauging and maintaining even spacing of brick courses. It has 10 different brick-spacing scales, as well as $\frac{1}{8}$ - and $\frac{1}{16}$ -in. graduations for quick and easy reading. Both rules have $\frac{3}{4}$ -in.-wide by 10-ft.-long blades that are protected by Mylar film. They come with belt clips on their cases for handy carrying and they are priced at \$9 each. The rules are manufactured by Stanley Tools, Box 1800, Dept. PID, New Britain, Conn. 06050.

B



B This heavy-duty slide bolt helps keep mini-warehouses and other commercial and residential storage areas secure. The 11-ga., steel-center lock fits either the right or left side of a door. The zinc-plated shield is designed to protect a padlock from being cut. Yet for double protection, a second padlock can be secured on the unit, even when the shield is locked in place. The security slide bolt weighs about 1 $\frac{1}{2}$ lbs. It is priced at \$7 and is manufactured by Holmes-Hally Industries, 7460 Bandini Blvd., Los Angeles, Calif. 90040.

C



C This resilient sheet flooring has a special moisture-barrier coat called Aquabar, which makes it particularly suitable for bathrooms, where condensation from the toilet tank and shower is a continuing problem. You can update your bathroom at minimal cost by installing this no-wax flooring yourself, following the manufacturer's directions. It's easy to maintain by cleaning periodically with a solution of vinegar and water. The pattern, called Haddonfield, has the look of ceramic tile. It comes in four colorations: white with beige tones; orange with beige; beige; and brown with light beige. Haddonfield is priced at about \$16 per square yard from Mannington Mills Inc., Box 30, Salem, N.J. 08079.

D Lexan polycarbonate resin replaces die-cast zinc and aluminum in the handle and flanges of this outdoor faucet (hose bibb). According to the General Electric Plastics Div., which makes Lexan, the material weathers as well as metal, yet is stronger and has greater impact resistance. The complete faucet is made by Woodford Manufacturing Co., Box 3369, Des Moines, Iowa 50316. It comes in various models for use on walls from 4- to 24-in. thick. The faucet is priced from \$10; with vacuum breaker it is priced from \$20.

D





**"For an amateur,
he's a whiz.
How'd he get
so good?"**

Whatever practical skills you've been wanting to develop, Audel has comprehensive, step-by-step Guides to help you. They show you all the professional tricks of the trades in clearly dia-

grammed and illustrated "how-to" steps. They can save for you, over and over. Here are four of Audel's many fields . . .



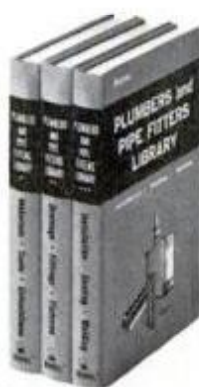
CARPENTERS AND BUILDERS LIBRARY

1,320 pages of the latest information on modern construction in four volumes. They cover every phase of carpentry from foundations to finishing with easy-to-grasp, step-by-step instructions . . . all illustrated with thousands of diagrams, charts and photos. No. 23244—4 Volumes—\$27.95



MASONS AND BUILDERS LIBRARY

Two illustrated volumes on the science of masonry and bricklaying. Packed with how-to information and directions, rules, processes, definitions, formulas, diagrams, tables, estimating. A complete and authentic trade reference library. 731 pages. No. 23185—2 Volumes—\$13.95



PLUMBERS AND PIPE FITTERS LIBRARY

A valuable 3-volume guide to the principles, methods and short cuts of modern plumbing. Tools, fittings, fixtures, installation, drainage, welding and much more are all covered in these fully illustrated, easy-to-understand volumes. No. 23255—3 Volumes—\$20.95



MACHINISTS LIBRARY

Three books covering the entire field—1189 profusely illustrated pages on practical fundamentals of basic machine shop operations, setup and operation of spot machines, down-to-earth data on toolmaking procedures, layouts, jigs and fixtures, etc. . . . equally valuable for beginners and experienced men alike. No. 23300—3 Volumes—\$23.95

If coupon is detached, mail your order to Audel, Dept. X1027, 4300 West 62nd St., Indianapolis, Indiana 46206

MONEY-BACK GUARANTEE

Send no money! We'll send you any Audel Guides for 10-day FREE EXAMINATION. If not completely satisfied, return them for refund.

THEODORE AUDEL & CO.
Division of

The Bobbs-Merrill Company, Inc.
Indianapolis, Indiana 46206

SEND NO MONEY—10-day FREE EXAMINATION

Theodore Audel & Co. X1027
4300 West 62nd Street, Indianapolis, Indiana 46268

Please mail me for 10 days FREE EXAMINATION the books I have checked at the right.

- I agree to be invoiced for the total purchase price plus \$1.00 postage and handling charges (and any applicable sales tax) in the amount of \$_____
- I prefer to save postage and handling charges. Enclosed is my check or money order for \$_____ in full payment (including any applicable sales tax). I have same return privileges if not satisfied.

Name _____

Address _____

City _____ State _____ Zip _____

- 23185
- 23244
- 23255
- 23300

NOW AVAILABLE!

WATT WIZARD™

POWER FACTOR CONTROLLER CUTS THE COST OF RUNNING ELECTRIC APPLIANCES BY AS MUCH AS 50% -- AND YOU CAN EVEN SEE THE SAVINGS!

For over a year now, in magazines and newspapers the world over, there have been enthusiastic write-ups on a remarkable new device that can cut your electric bill while helping the U.S. save huge quantities of fuel.

"The NASA/Nola power saver," wrote a *Popular Science* senior editor, "was developed by Frank Nola at NASA's Flight Center in a program to reduce power consumption in spacecraft motors. Nola calls it a PFC — power-factor controller. I prefer to call it a power saver, however, because that's what it does."

NASA TESTED IT

According to NASA documents, "The device has been tested at Marshall Center on over 40 types of motors, with power savings ranging up to 60%, depending on the loading. The motors tested were both single-phase and three-phase, ranging from 1/2 H.P. to 5 H.P. Most motors will show up to 40 — 50% savings when running lightly loaded or unloaded, and some will show 5-to-7% savings at rated load."

NASA's Technical Support Package showed that "The Power Factor Controller applies to induction type electric motors — the most commonly used type in all major home appliances and the most commonly used by industry."

HOW IT SAVES POWER

Popular Electronics explained it this way: "AC induction motors characteristically run at a nearly constant speed that's fixed by power-line frequency and independent of load and supply voltage. When heavily loaded, the motor draws line current that is nearly in phase with the applied voltage...Under light load conditions, the motor develops less torque by allowing more lag between the voltage and the current. This reduces the power factor while leaving the current essentially the same in magnitude.

"To minimize this waste, Nola's device monitors the motor's power factor and when it detects light load conditions, it reduces the supply voltage..... The current, now more nearly in phase with the voltage, therefore does as much useful work as before, but it and the voltage are smaller, resulting in a net savings of electric power."

THE SAVINGS CAN ADD UP

The cost of electric power keeps going up. In 1980-81 and beyond you'll pay more and more for the privilege of running your electric appliances.

Right now, the typical consumer pays about \$8 per month to operate a 16.5 cu. ft. frost-free freezer...\$10 to run a 17.5 cu. ft. frost-free refrigerator...and

National Aeronautics
and Space Administration
Patent No. 4,052,648

about \$60 for an air conditioner used during summer months. That's what you're paying to run just one of these appliances per year.

Nola's power saver can soon pay for itself, then start reducing your electric bills. Until now, the device has not been available — except for industrial models priced at \$80 or more.

INTRODUCING THE WATT WIZARD

Cynex, an American manufacturer of electrical and electronic products and a prime contractor for the U.S. Army, has been licensed by NASA to manufacture Frank Nola's power saver. Cynex calls it the Watt Wizard.

The "Watt Wizard" says Ray Beauchea, the firm's Marketing Director, regulates the voltage fed into an induction motor making the motors run more efficiently and quieter, while lengthening motor life.



The Watt Wizard features a unique, constant power saving readout. So you can constantly monitor you're energy savings.

SIMPLE TO USE

Cynex makes several models of the Watt Wizard (all with solid state design), including the 110 v. AC plug-in model we're offering. It's for single phase fractional H.P. motors (less than 1 H.P.) used in most freezers, refrigerators, fans, swimming pool pumps, vacuum cleaners, sewing machines, etc.

Simply plug the Watt Wizard into any electrical outlet, then plug the appliance into the Watt Wizard. There's no wiring required. Unlike some competitor's models (if and when available), the appliance does not have to be turned on before being plugged into the power saver. You can leave the appliance — whether on or off — plugged into the Watt Wizard all the time. Or you can move the Watt Wizard to various locations.

OTHER MODELS AVAILABLE

Air conditioners, washers and dryers require wire-in model. If you lack mechanical skill, you probably need an electrician to install it. We also offer it in 220 VAC single or three-phase.



MERCURY 1980 ©

EXCLUSIVE ADVANCE FEATURES

The Watt Wizard also includes two more unique features which no competitor has. It's fused so if you accidentally overload the device, it won't burn out. Just change the fuse, which is available at any auto supply store.

And Watt Wizard features a unique LED readout, so you can actually tell, at any moment, exactly how much power you're saving — 10%, 20%, 30%, 40% or 50%. This feature is available only on the Watt Wizard.

There's a "power-on" light, too. And the Watt Wizard comes with the manufacturers 1 year limited warranty.

LOW COST — AND A TAX CREDIT

We're offering the Watt Wizard for only \$39.95, with immediate delivery. Want two? Then its just \$37.95 each. Or splurge and get three at \$34.95 each. Wire-in models for heavy duty motors are \$6 more for each unit. Add just \$2.50 postage/handling for each order (not each unit).

And next year, when you fill out your tax return, you can deduct a full 15% energy tax credit - for additional savings.

30-DAY MONEY-BACK GUARANTEE

Try the Watt Wizard for up to 30 days. If not completely satisfied, return it (insured) for a full refund.

The sooner you send for the Watt Wizard, the more you can save on your electric bills. To order, send your check or money order to the address below. Or charge it to your Visa, MasterCard, American Express, or Carte Blanche credit card. If using your charge card, you can also order via our toll-free phone number:

800-257-7850

(In New Jersey, Call: 800-322-8650)
N.J. residents, add 5% sales tax.

Or mail your order to:

The Imagination People®



Dept. PM-8, Lakewood Plaza
Lakewood, New Jersey 08701

Материал, защищенный авторским правом

PUBLIC NOTICE!

As one of the largest authorized mail order liquidators in the U.S., we frequently receive inventories that manufacturers must quickly sell at "sacrifice" prices.

There are many reasons for these closeouts, such as: Last year's models. Discontinued products. Bankruptcy or other serious financial problems. Overproduction. Plant closings. Rising production costs, etc., etc. If you know of any company in a situation that requires them to sell large inventories for quick cash, call us Toll-Free: 800-328-5082. Only products in perfect operating condition will be considered.

MUST LIQUIDATE AT BELOW DEALER COST! 12-Speed, Heavy-Duty 3/4 hp. DRILL PRESS FACTORY NEW! PERFECT CONDITION

A great bench model drill press with 5/8" chuck and Morse Taper. Ideal for the home handyman.

Here's a heavy-duty 14" drill press at a money saving, low liquidation price! The cost is even less than some of those little "sissy" models you see around town.

This 160 lb. "brute" has the power and the "guts" you need to drill through steel, cast iron, aluminum, brass, wood, plastic. Head and base are made of strong, fine-grained cast iron. Heavy walled machined column increases rigidity, cuts down vibration for smoother operation. Includes 3/4 hp. motor with standard NEMA 56 frame.

Oil table swings 360° and tilts 0° to 45°. Precise up and down movement of table with rack and pinion. Recessed socket in head lets you put in an electric light bulb for bright illumination of work. We priced these way down low to sell them FAST! Don't delay. Order yours right away.

- Capacitor start 110V motor; grounded receptacle; 10 amps.
- All belt pulleys on ball bearings. 5" largest pulley on spindle (high torque).
- Quick release belt tension.
- Chuck is 5/8" No. 3 J.T. Arbor
- 11" x 17" base; 2 5/8" column diameter.
- Height: 40 1/2". Weight: 160 lbs.
- Spindle to table (max.): 15 1/4".
- Spindle to base (max.): 23 5/8".
- 7" from spindle center to column.
- 1 1/4" diam. oil table with "T" grooves.

Fully enclosed belt guard case for safety!

Precision ground quill has milled rear rack



Recommended bit sizes to use: In cast iron, 1/2". In steel, 3/8". In wood, 1/2" or even more with Morse Taper bits.

Table rotates 360° tilts 0° to 45°. Indicator scale both sides!

A big, 160 lb. heavy-weight!

Quick release for belt speed changes.

CAPACITOR START, 110V, 3/4 h.p. MOTOR!

Recessed light for bright illumination of work!

Adjustable stops, MORSE TAPER

HEAVY DUTY 5/8" CHUCK



VARIABLE 12 SPEEDS!

Change speeds easily with the V-belt drive. Select from 12 different speeds: 280-3650 rpm. Uses standard size V-belts.

Rack and pinion for fast, precise vertical adjustment of table!

Heavy walled machined column cuts down vibration!

Sturdy 2-7/8" diam. column is bolted to base, NOT pressed on!

Strong, cast iron base reinforced with longitudinal ribbing!

Big 11 1/4" diam. oil table!

Over \$595.00 value!

OUT THEY GO AT ONLY:

\$198



Vise Attachment . . . \$25.00
For maximum clamping, holding power. Steel jaw faces; 4" jaw width, 1 1/4" jaw depth, 3/4" jaw opening. Cold rolled steel screw.

Credit card members can phone in their order.
Toll-Free: 800-328-5082. If busy signal, or after business hours, or if in Minn., call 800-228-2606. 24 hours a day, 7 days a week.

AMERICAN EXPRESS

master charge

VISA

C.O.M.B. Co. / Authorized Liquidators
3258 Minnehaha Ave. S. Minneapolis, Minn. 55406

Dept. B-198-1010

Please send _____ 12-speed Drill Press(es) at \$198.00 each. I will pay the shipping charge to driver upon delivery. (Allow up to 5 weeks for delivery. Add an extra 2 weeks if paid by check. Sorry, NO C.O.D.)

Also send Vise Attachment for \$25.00. (In separate carton; NO shipping charge.)

My check or money order is enclosed.

Charge to my credit card: Mastercharge VISA American Express

Acct. No. _____ Expires _____

PLEASE PRINT CLEARLY

Name _____

Address _____

City _____ State _____ ZIP _____

C.O.M.B. Co.

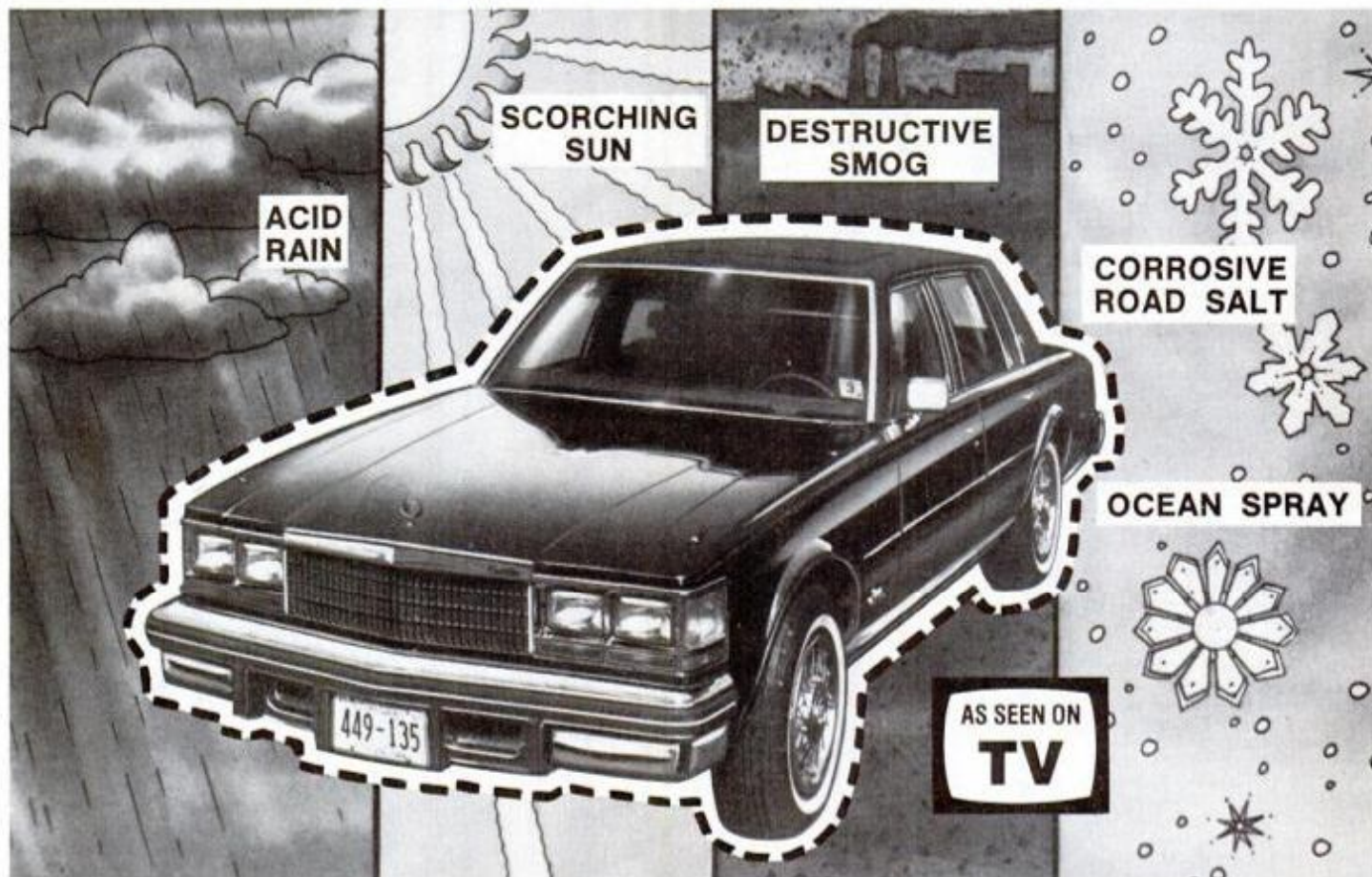
ONE OF THE NATION'S LARGEST AUTHORIZED MAIL ORDER LIQUIDATORS OF CONSUMER PRODUCTS
3258 MINNEHAHA / MINNEAPOLIS, MN 55406
Phone: 612-721-8581 Toll-Free: 800-328-5082

FINE QUALITY!
ONE YEAR PARTS WARRANTY!

Rural Route Customers: If truck carriers do not normally deliver to your home, include a note with this order, stating nearest town address of a store, friend, truck terminal where we can ship this.

PRICE BREAK! NOW ONLY \$5.98!

GLASSCOTE™ POLY-SEALS YOUR CAR FOR YEAR-ROUND SHOWROOM SHINE!



WIPE ON THIS REVOLUTIONARY ONE-STEP POLYMER SEALANT IN LESS THAN AN HOUR — AND NEVER WAX OR POLISH AGAIN!

Here it is — the miracle of modern chemistry that ends the slavery of compounding, waxing, buffing, and polishing for all time! Consider these amazing facts that make all other car-care products obsolete:

1. Glasscote dissolves road tar, gasoline stains, grease, gum, tree sap, in seconds and removes old oxidation and wax without harm to the finish underneath. It's safe even for antique cars and expensive limosines!

2. Glasscote forms a molecular bond with your car's finish to create an invisible shield that's as transparent as glass, hard as nails, protects it from salt spray, road salt, and acid rain that corrodes and rusts. It's like wrapping your car in "liquid glass"!

3. Your car fairly sparkles with a showroom shine that's more than just beauty alone — it's so super smooth and glossy practically nothing can stick to it! A simple hosing down removes most road grime, slush, and mud and restores the gloss. Even pesky nuisances, like crushed insects and bird droppings — and vandalism from marking pens — simply slide off with a wipe or two of Glasscote.

4. Glasscote protects all painted, plated, and porcelain surfaces — chrome bumpers, mag wheels, appliances, motorcycles, fiberglass boats, marine hardware, countertops, metal patio doors, screens and storm windows. Helps prevent corrosion, pitting on chrome and aluminum, and tarnish on brass.

5. Many car dealers offer to polymer seal your new car before delivery as an optional extra costing \$125-\$150 or more.

But you can do it yourself in less than an hour with Glasscote.

6. One bottle of Glasscote protects your car for all four seasons — and that's a guarantee! If at any time you're not delighted, return the unused portion within one year for a full refund, except postage & handling.

So you can try Glasscote risk-free, and prove it to yourself! Mail coupon now!

MAIL NO-RISK COUPON TODAY

NATIONAL HOME PRODUCTS, Dept. GCX-208
60 Wilton Road, Westport, CT 06880

Please send me _____ bottle(s) of Glasscote at \$5.98 plus \$1 shipping & handling per bottle.

If for any reason I'm not pleased, I may return the unused portion any time within 3 years for full refund (except shipping & handling).

SAVE: Order 2 bottles for only \$10.98 plus \$2 shipping & handling.

Enclosed is \$_____ CT residents add 7% Sales Tax. Check or money order, no C.O.D.'s please.

Charge it please to: Visa Master Charge (Bank No. _____)

Card No. _____ Expiration Date _____

Name _____

Address _____ Apt. # _____

City _____ State _____ Zip _____



© 1980 National Home Products
60 Wilton Road, Westport, CT 06880

World's First and Only Solar-Powered Watch*

Guaranteed to outperform any watch sold today... or costs you nothing!

The Sunwatch; acclaimed as the most accurate, most versatile, most rugged watch ever made.

These features make all other watches obsolete:

- Clearly visible by day or night
- Natural side-view window simplifies reading
- 100% solar-powered, you never replace batteries
- No resetting of calendar, not even in leap years

Space age accuracy

Now you'll never worry about accuracy again. Because the Sunwatch will keep you on time for the rest of your life. (Accurate to within 1 sec. per month.)

Solar age efficiency

Miniature solar cells automatically convert sunlight, daylight or ordinary bulb light into usable energy for storage. The solar cells last virtually forever. So you'll never replace a watch battery again.

Programmed for over a century

The built-in computer on a chip will always display the correct time date and month. Also, it automatically adjusts the watch calendar for long and short months, leap years and it's programmed until the year 2100!

Easy to read

The natural side-view display lets you tell the time, day and date without twisting your arm into an uncomfortable position.

Numbers always visible

Four varying light intensities are built into the viewing display, allowing the Sunwatch to adjust automatically to any light. This means you can always read it, even in the brightest sunlight.

10 Display functions

The Sunwatch is capable of displaying the following information: hours • minutes • seconds • months • date • day • leap year • speed calibration • AM/PM indicator • seconds count-off.

Extreme accuracy

Unlike other electronic watches using tuned crystals to control timing accuracy, the Sunwatch incorporates a unique, programmable, microcircuit synthesizer to make it the first watch in history that is accurate to less than 1 second per month. That's 5 times more accurate than the latest quartz Accutron.

The Power Source

Tiny silicon power cells, which are constantly being energized by natural sunlight, daylight or an ordinary light bulb keep the Sunwatch energy storage system charged. Should the watch not be exposed to light, it will continue to operate for months on stored power.

The most indestructible watch in the world
The workings of the watch: solar panels, energy cells, quartz crystal, computer on a chip, etc., are all permanently sealed in a Lexan module. This module is so unique it's protected by U.S. and foreign patents.

Completely waterproof

Leave the Sunwatch in salt water for months. Dive with it in depths up to 750 feet. There are no openings — magnetic slide bars activate all functions. With Sunwatch's exclusive, permanently sealed Lexan module, there are no "O" rings or seals to leak.



Shock resistant to 25,000 G's

You can crash it into a rug-surfaced brick wall at 90 mph with no noticeable effect. Wear it while doing heavy work, exercise or any strenuous activity.

Temperature resistant

Put the Sunwatch in boiling water for 30 minutes, freeze it in a block of ice for a year. Extreme temperatures will not damage your Sunwatch.

Pressure resistant

There are no air spaces inside the Sunwatch. Therefore, it is not susceptible to high pressures such as might be encountered diving to great depths.

The perfect watch for a lifetime

Imagine split-second accuracy for the rest of your life. Sunwatch is a virtually indestructible, beautifully styled, space-age timepiece, and it's available in three exciting finishes: Brushed stainless steel, Gold tone stainless steel, or a Durable black finish on stainless steel. All Sunwatches come with a matching stainless steel band with removable links and adjustable clasp.

Made in the United States

The Sunwatch, designed by Roger Riehl, was being worn by its inventor nearly a year before the first electronic digital watch was even available to the general public. Since that time constant engineering evaluations and design improvements have been made on the Sunwatch to incorporate the latest in digital microcircuit and solar power technology. Thus the Sunwatch today represents state-of-the-art electronics technology. It is built to the same rigid standards practiced by the manufacturer in creating sophisticated computer microcircuits for the U.S. Government and other major users of these components.

* A word about other "Solar Watches"

Roger Riehl, designer of the Sunwatch, states that there is no other completely solar powered watch on the market today. Claims of solar power by other watch manufacturers are based on the use of a small solar cell. Due to their limited size, these cells can be proven, in technical terms, to be of virtually no significant value in extending the life of a watch battery. For this reason, all other so-called "solar watches" must have replaceable batteries. The Sunwatch's power storage system, however, need never be changed and is, in fact, permanently sealed to withstand abuse and the elements.

Unique and memorable gift

Available in a special gift box (see order form) the Sunwatch makes an ideal gift for special holidays, birthdays, graduation, Father's Day, etc. Perfect for business people, commuters, teachers, athletes and sportsmen, who require split second accuracy.

Free custom engraving

At your request, each Sunwatch will be hand-engraved with the name you specify.

Limited Warranty is your protection

The Sunwatch is covered by a 2 year limited warranty issued by Riehl Time Corporation (manufacturers of the prestigious Synchronar 2100) and included with your watch. A copy of the warranty may also be obtained free of charge by writing to Riehl Time Corp., 53 S. Jefferson Rd., Whippany, NJ 07981. This warranty gives you specific legal rights, and you may have other rights which vary from state to state.

15 Day no risk trial offer

Order your Sunwatch today and use it for 15 days. Then, if you are not completely satisfied return it for full money back.

CREDIT CARD ORDERS CALL

TOLL FREE 800-621-5199

Ill. Residents Call 800-972-5855

OR MAIL THIS NO RISK COUPON

RIEHL TIME CORP.

53 S. Jefferson Rd., Dept. 4A Whippany, NJ 07981.

Please send me:

- _____ Brushed Stainless Steel Sunwatches at \$129.95 each
- _____ Black Finish on Stainless Steel Sunwatches at \$159.95 each.
- _____ Gold Tone Stainless Steel Case Sunwatches at \$159.95 each.
- _____ 24 Hour (Military Time) \$10.00 Additional.
- _____ Gift Boxes at \$4.95 each.

Please add \$3.95 per watch shipping and insurance. Enclosed is \$ _____ Check or Money Order (N.J. Residents add appropriate sales tax)

CHARGE IT: (Check One)

Master Charge VISA (BankAmericard)

Credit Card# _____ Bank# _____

Issue Date _____ Exp. Date _____

Signature _____

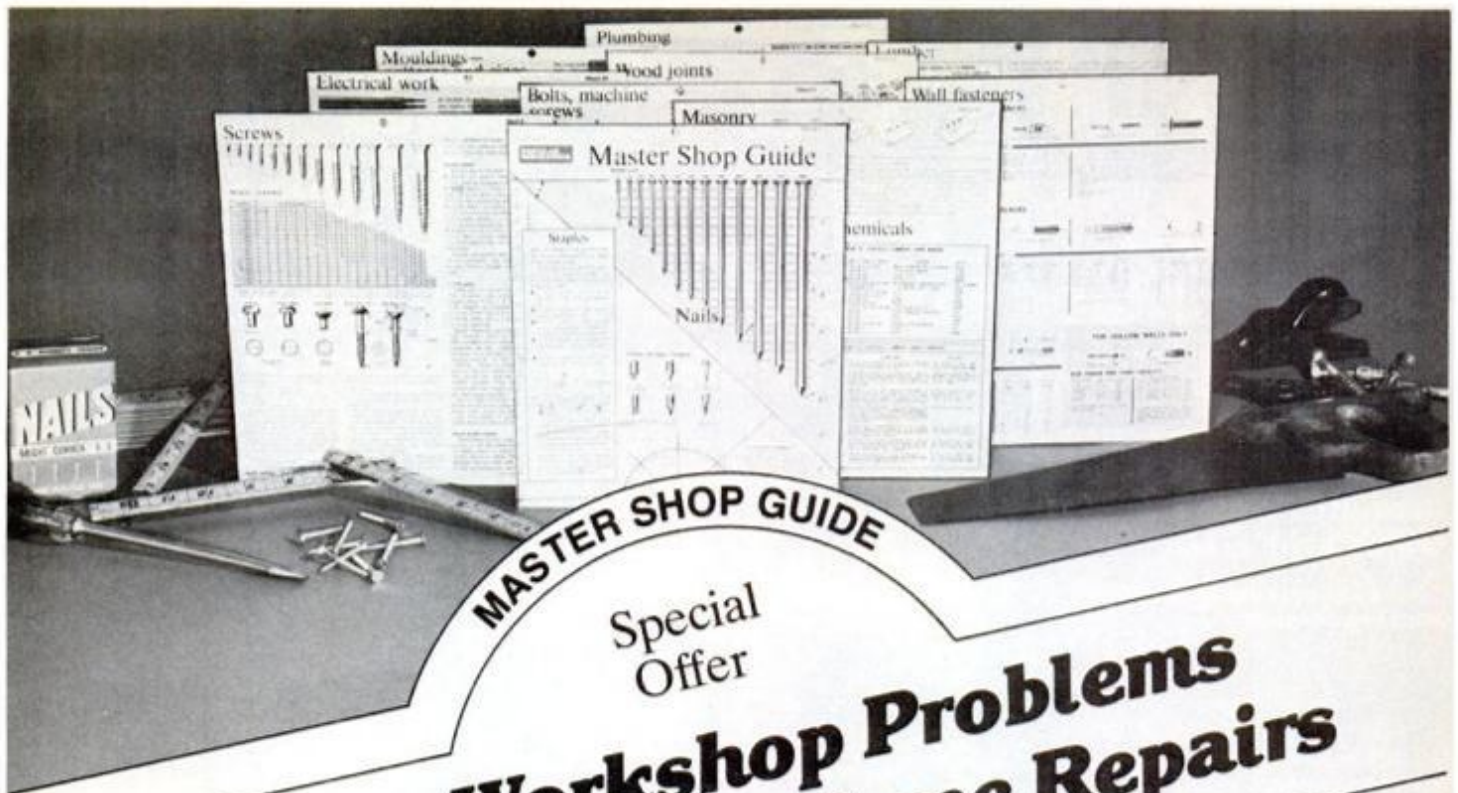
Name to be engraved _____

Name _____

Address _____

City/State/Zip _____

Quick delivery direct from the manufacturer



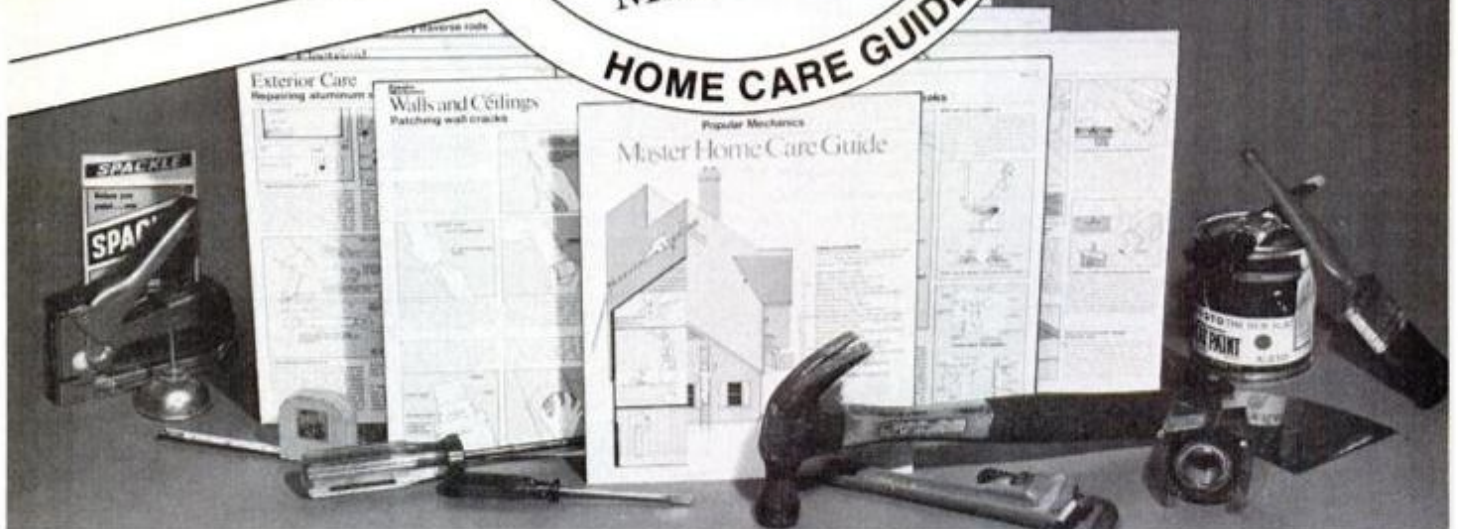
MASTER SHOP GUIDE

Special Offer

Solve Workshop Problems Save Money On Home Repairs

On Master Guides

HOME CARE GUIDE



Take advantage of this special offer on Popular Mechanics' famous Master Guides.

The POPULAR MECHANICS MASTER SHOP GUIDE has helped hundreds of thousands of do-it-yourselfers solve workshop problems. We think it is one of the most important tools you'll ever buy.

The Shop Guide lays out everything you need to know, graphically and ready-to-use. All about nails, screws, bolts, wall fasteners, drills, abrasives, lumber, plywood, gypsum, adhesives, paneling, shop math, stair construction, masonry, wood finishing, plumbing, pipe fittings, electrical work, gutters,

concrete, remodeling measurements plus a built-in ruler, protractor, 45° triangle and compass.

The perfect companion to the Shop Guide is the POPULAR MECHANICS MASTER HOME CARE GUIDE. The Home Care Guide will enable you to tackle common home repair jobs like an expert. You'll be able to patch wall cracks, paint your house or apartment, hang wallpaper, hang drapery rods, hang a door and install a lockset, repair scratches in furniture and much more. The Guide also instructs you on methods of saving energy to help cut your fuel bills.

By using the coupon that appears on this page you can order both Guides for

\$7.95 postpaid. You'll save \$2.95 off the regular price. ORDER NOW! They also make great gifts.

PM MASTER GUIDE OFFER, Dept. 880
Box 1014, Radio City Station
New York, N.Y. 10101

Yes! Please send me the POPULAR MECHANICS MASTER GUIDES that I have indicated below:

___ Set(s) of both Guides at \$7.95 per set \$ _____
___ Home Care Guide(s) only at \$5.45 per Guide _____
___ Shop Guide(s) only at \$5.45 per Guide _____

TOTAL AMOUNT REMITTED \$ _____

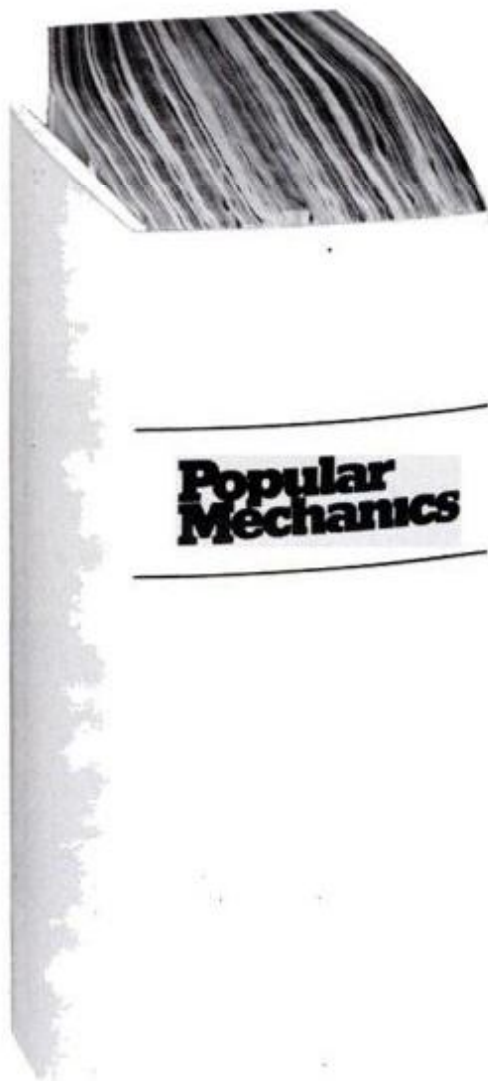
Name _____

Address _____

City _____ Zip _____

Make check or money order payable to Popular Mechanics.

Your Own Popular Mechanics Library! 1979 Index & Cover



1979 Index

The 1979 Popular Mechanics *Index & Cover* actually converts your '79 PM issues into a veritable "reference library." That's right, there are over 5,000 cross-reference entries of the PM articles that appeared during the year.

The *Index* is bound into a handsome cover constructed of sturdy high-gloss lacquer board designed to withstand years of use. Precisely encasing twelve issues, it makes an attractive addition to your bookshelf, while protecting the copies from dust and abuse.

As years pass, your PM issues will increase in value as a reference source. You'll be able to retrieve important articles as you need them from a growing information bank. And you'll avoid the headaches of trying to dig up valuable misplaced information.

The articles you want jump out of back issues—Complete 1979 Car Care Guide; Propane for Your Car; Install a Solar Water Heater; New Furnace that Burns 5 Fuels; Ultralight Plane You Can Build at Home; Plans for a Classic Oak Dining Table; Tests on 6 New Compact Stereos; 10 Best Shop Tricks of a Master Craftsman; and hundreds more at your fingertips!

Or you can find *all* the articles indexed under broad categories such as auto repairs, fishing, plumbing, tools and woodworking.

The entire package—*Index and Cover*—is yours for only \$3.95 postpaid. Why wait? Send for your *Index & Cover* today, and start building your own Popular Mechanics reference library.

Make check or money order payable to:

880

POPULAR MECHANICS INDEX
Box 1014, Radio City Station, PM780
N.Y., N.Y. 10101.

Please send the Index and covers for the years I have checked below:

1979 1978 1977 1976 1975 1974 1973
 1972 1971 I enclose \$3.95 (postpaid) for each Index ordered.

Name _____

Address _____

City _____ State _____ Zip _____



Lose 4-6 Inches of Ugly Bulge BEFORE WE CASH YOUR CHECK!

**We'll Hold Your Check, M.O.
Visa or M.C. Slip For A Full 30 Days**

**Let the *SHRINK WRAP SYSTEM* reduce the size of your waist
and hips without starving, completely at our risk!**

Just fill out the coupon below and postdate your check for 30 days from today! Or send us your m.o. or your Visa or M.C. account #. We'll hold your check, m.o. or credit card slip for 30 days, but we will send your Shrink Wrap NOW! Try it. Use it. Watch inches disappear. If for any reason you are not delighted, send it back. We will return your check or m.o. **UNCASHED!** We'll tear up your charge! Thousands of happy customers make us bold enough to make this super guarantee!

No Glorified Girdle! No Flimsy Elastic!

We don't just squeeze it in. We know our quality materials and scientific design works. It has worked for years for athletes, taking the body's heating effect, concentrating it on areas of specific fluid retention like the waist and hips to trim inches fast.

Lose 2-3 Inches In The First 24 Hours!

That's right! Shrink Wrap System can work on waist and hips that fast. You see, the slimming action of our special design and the quality of our washable rubberized construction is the same as the belts athletes use to sweat away excess moisture that forms bulk and bulges... quickly. And you can use it as often as you need it to keep those inches off. It's so soft you can wear it comfortably during our five minute exercise program.

It Really Works!

Yes, Shrink Wrap's isometric effect will help you to actually tighten up that loose muscle tissue without starving! And, our rubberized construction allows Shrink Wrap to adjust to your new size as you shrink away. Remember, Shrink Wrap is not a glorified corset and it has no bothersome attachments. This type of system is working right now for some of the most famous athletes and entertainers in the world!

There's More!

The strong quality construction of Shrink Wrap has added benefits which give soothing, invigorating support to tired, tense back muscles, relieving pain while trimming inches easily and comfortably. So don't delay. You risk nothing but those unsightly bulges. Order NOW!

© 1980 The New Body Boutique, Inc. 7 Norden Lane, Huntington Station, New York 11746

COMPARE!!!

Shrink Wrap is stronger than other belts. It's 50% thicker than its closest competitor. It's reversible! What other belt can say that? Don't be fooled by pictures that look like Shrink Wrap but deliver something less. Get the real thing! **SHRINK WRAP!**

*You can use the SHRINK-WRAP System anywhere:
doing housework, office work, tennis or even jogging.*



The New Body Boutique, Inc. Dept. BL101
7 Norden Lane, Huntington Station, New York 11746.

Sirs: I have enclosed my check m.o.
 M.C. Visa information which you will hold
UNCASHED under your no-risk 30-day guaran-
tee. N.Y. residents add sales tax.

Waist Size: (Men's) _____ (Women's) _____
_____ Rush 1 belt at \$19.99 plus \$1.00 p&h
_____ (Save \$2) Rush 2 belts at \$37.99 plus
\$2 p&h

Name _____

Address _____

City _____ State _____ Zip _____

Acct # _____ Interbank # _____ Expir. _____

BARGAIN HUNTER SECTION

INVENTORY ADJUSTMENT SPECIAL!

PILOT'S GLASSES AT UNBELIEVABLE PRICES!



• Impact Resistant
• Handcrafted
• Polished Glass Lenses
• Hardened Metal Frames
• Money Back Guarantee

ONLY \$6.95

Send check or money order (plus \$1.00 for postage and handling) to United States Optics, Dept. 748 P.O. Box 14206 Atlanta, GA 30324. Credit Cards accepted. Include number and expiration date. (Specify gold or silver frames.) SPECIAL: Order now and get TWO PAIR for \$13 plus one dollar handling charge. Ten-day money-back guarantee.

FREE! During this limited offer.
Deluxe velour lined protective case. A \$3.00 value.

LIMITED OFFER FROM U.S. OPTICS

FREE SATELITE TV IN YOUR HOME NEW AND IMPROVED

SATELLITE TV
FANTASTIC 80 TV CHANNELS

A must for all homeowners and Do-it-yourselfers. Build a Video System the whole family can enjoy! No commercials. FREE movies, sports and Vegas Shows - worldwide, crystal clear reception connects to any TV set. 100 pages (8 x 11) loaded with photos, plans, kits - TELLS EVERYTHING!

Send \$7.95 TODAY! Add \$2.00 for 1st class air mail. Satisfaction Guaranteed. GLOBAL TV ELECTRONICS, P.O. Box 219-D, Matland, FL 32793

PROPANE - CONVERSION

RUN CARS - TRUCKS - ON PROPANE

Return to gasoline anytime without even stopping vehicle! Completely **PROVEN** and **TESTED**—and very efficient. Build it yourself in 2 days for as little as \$50 with **LOCALLY AVAILABLE** parts. **EASY** to build—only hand tools and simple plumbing required. Uses ordinary gas stove tanks—refillable anywhere. For **COMPLETE** plans—drawings—part list, send \$10 to Fleming Engineering, P.M.D-8 Remsen, NY. Zip 13438. **SATISFACTION GUARANTEED**

A SOLAR WATER HEATER makes sense in today's high priced energy market. **BUILD - IT**.....

Our full sized workable plans include material list, and step by step instructions. A unique heat exchanger and proven design make this design extremely cost effective. **SEND \$8.95 ppd.** check or money order for complete package. Money Back Guarantee. **SANITRON TECHNICAL SERVICE, P.O. Box 61, Church Hill, Maryland 21623**



Also — Plans & Kits For:

ConSuntrator PLANS FOR

KillowindSM Windmills
Heat, Electric Light & Power
Plants High Mileage Cars & Trucks Water
Wheels & Turbines Free Information From
GOODMAN ASSOCIATES, 4 BERRYVILLE PIKE SUMMIT POINT, WEST VA. 25446

SOLAR HEATER

CLOCK COMPONENTS

Clock Movements, Battery, Quartz, Electric, Urgos Grandmother, Grandfather, Westminster & Triple Chime, & Day Key Winds & Westminster, Bin Bams, Barometers, Metal, Bezel, Paper dials, Hands, Brass & Plastic Numbers & Markers. Hundreds of items. Quantity Prices. Send \$1.00 for 60 Page Catalog. Refunded on \$10.00 Order.

NEWPORT ENTERPRISES, INC. Dept. A
2313 West Burbank Blvd., Burbank, Calif. 91506

Prevent Engine Overheating

...New Air-Cooling-Jacket converts any car or RV engine—oil-filter into an engine—oil-cooler to help prevent costly overheating and repairs. Easily installed in minutes by anyone—Guaranteed.

SEND \$7.35 plus 50c post. & hdg.

ALJAC LTD. DEPT. PMD
BOX 3504, REDONDO BEACH, CA 90277


EARN BIG COMMISSIONS

WORK FULL OR PART TIME!

Show big **FREE SALES KIT** featuring complete line low priced business printing and ad specialties to business people. Build profitable repeat business. Start now.

NATIONAL PRESS, INC.
DEPT. 082 NORTH CHICAGO, ILLINOIS 60064

Build the world's most energy-efficient home.
And save for years to come.



Your Monterey Domes geodesic shell package is delivered, ready to assemble using simple tools. No skills necessary. Monterey Domes meet all building codes and VA/FHA standards. Save on construction costs and up to 50% on energy costs! Priced from \$3995. Send \$4.00 now for our 80 page catalog and planning kit!

Please rush me your 80 page full color catalog and planning kit. I am enclosing \$4.00.
Also send me the Monterey Domes Assembly Manual for an additional \$5.00.

NAME _____
ADDRESS _____
CITY, STATE, ZIP _____

Mail to: **Monterey Domes, Dept. 156**
P.O. Box 5621, Riverside, CA 92517

Genuine Wooden Keg 995
plus \$2.00 shipping & handling

Flowers not included

- Planter
- Furnishing
- Decorative
- Umbrella Stand

This all-wood keg is ready to finish, 18 inches tall, with a solid wood lid and metal hoops. Satisfaction Guaranteed or return in ten days for full refund.

Send check or money order to:
Nashville Distributing Co.
P.O. Box 32 Dept. B Nashville, IN 47448
Indiana residents add 4% sales tax



USE THE TOOLS PROFESSIONALS USE
INDUSTRIAL QUALITY CARBIDE TOOLS
AT HOMEOWNER'S PRICES

GENERAL PURPOSE BLADE #24714
7 1/4" diameter, 24 teeth.
Arbor 5/8" with Skill knockout **\$9.95**

2 FLUTE FORMICA TRIM BIT #1212F
1/4" shank with ball bearing guide. **\$8.95**
Full 1/2" carbide cutting length. Fits American or foreign machines.

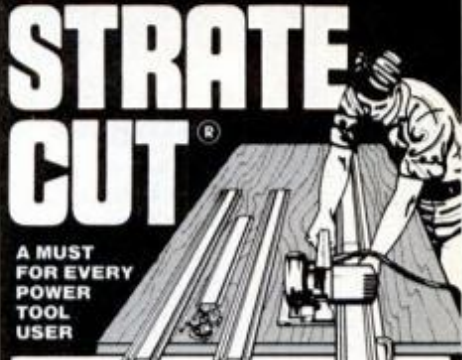
Made in U.S.A. Fully Guaranteed. Money back if not satisfied.



Check items desired. BIT BLADE
Add \$1.50 for shipping. N.Y. Res. add appropriate sales tax. Send check or M.O. to:
PROLINE CARBIDE TOOLS INC.
P.O. Box 450, Rockville Center, N.Y. 11570

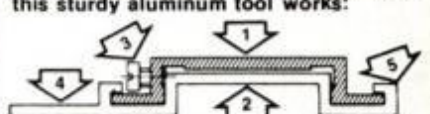
NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____

CUT STRAIGHT WITH STRATE CUT



A MUST FOR EVERY POWER TOOL USER

Use "STRATE-CUT" Cutting Guide with any portable circular saw, jig saw or router. **Extends to 8'6"**, reduces to **51"** for short cuts and portability. Clamps to paneling, doors and other long work. Rip 4'x8' sheets down the center; trim 1/16" off a door. Make precision 90° cuts, tapers, angles, dados, bevels, grooves. Unbeatable for scoring wall-board. Guides utility knife. **Here's how this sturdy aluminum tool works:**



(1) Patented connector joins and aligns (2) two 51" guide sections with four set screws (3) C-clamps (4) attach guide to work. Tool follows guiding edge (5) Clamps and illustrated instructions incl. only **\$19.95 plus \$2.00 shipping and handling, U.S.A. only.** Send check or M.O. to: **R.A.K. PRODUCTS, Department M-47** Box 23426, Milw., WI 53223. **MONEY BACK GUARANTEE.** Wis. Res. 4% tax.

130 SPORTS REPLICARS
You Can Build from Kits

Kit Cars Just Published 160 Pages
Over 500 Photos
Giant Buyers Guide



ASSEMBLE & DRIVE YOUR OWN FULL-SIZE SPORTS CAR

Discover 130 full-size kit-built antique, classic and modern sports cars. Most sell for a fraction of their apparent value. See and compare all the latest kit cars and manufacturers. **Brand new Buyers Guide** is packed full of photos • Specs • Comparisons • Tech Data • Articles. Everything from 40 mpg roadsters to sizzling V8's and electric conversions. Hundreds of dollars worth of valuable information not available anywhere else.

★ 14 Day Money Back Guarantee ★



AUTO LOGIC PUBL.
P.O. Box 2073
Department PM80
Wilmington, DE 19899

Please mail my copy
 \$8 (3rd Class, US only)
 \$11 (1st Class, US/Can.)
 \$12 (Foreign Air)

Name _____ (print)
Address _____
City _____ State _____ Zip _____

Master Charge Visa Exp. Date _____

Order TOLL-FREE by phone.
Master Charge or VISA REQUIRED!
(800) 331-1000 Day or Night.
(918) 664-8300 in Okla. call collect.

Ted Horsley is saving at least \$180 a year on his electric bill...

How is he doing it?

With the Efficiency II™ water heating heat pump. The Efficiency II attaches to the existing electric or oil water heater and draws heat from the surrounding air to heat the water, providing the same amount of hot water while using half as much electricity or oil.

Ted Horsley is pleased with the results:

"We do everything we can to save energy. The Efficiency II is an energy-saving device that works and pays back."

Find out more about the Efficiency II and how it can save you money. Call or write TODAY.



Mail to:

E-Tech, Inc.
Dept. PMC
3570 American Dr.
Atlanta, Georgia 30341
or
Call TOLL-FREE:
1-800-241-7755

Name _____

Address _____

City _____

State _____ Zip _____

Our home is heated by:

electricity oil gas wood

Our electric or oil water heater is located in the _____



America's fastest growing sports

PROFIT WITH A HOBBY!

read our customers stories about gold nuggets!

FIND GOLD, SILVER, COINS, RELICS AND MORE WITH WHITE'S. LARGEST MANUFACTURER OF ELECTRONIC MINERAL/METAL DETECTORS KNOWN WORLD WIDE. TAKE IT WITH YOU ANYWHERE WHEN TRAVELING. GREAT OUTDOOR FUN.

Covered by U.S. Patents



For your nearest dealer, \$59.95 and up. Budget and free catalog call toll terms available. free 1-800-547-6911.

PA-0

white's electronics, inc.

RICKA DUO-WHEEL CONVERSION KIT AND FIBERGLASS FENDERS



New wide tire adapters & fenders to fit most mini - 1/2, 3/4 & 1 ton trucks. Simple bolt on installation. Increases traction, tire capacity & life.

The ultimate in safety protection for your family.

RICKA MFG. DEPT. RPM-8 Pequot Lakes, MN 56472



BUILD YOUR OWN TWO BEDROOM, INTERSECTING DOUBLE "A" Frame with cathedral ceilings and balconys. Plans include step-by-step illustration manual and complete lumber list. Send \$7.00.

OVER 1200 SQ. FT. FLOORING SAVE! SAVE! SAVE!

ALPINE — DESIGN PM-71, Box 38 Duke Center, Pa., 16729

WEEDHOPPER—ULTIMATE FUN MACHINE!



No licenses required on plane or pilot; 40 hour construction time; complete kit \$2695.00; carries 220 lb up to 50

mph! Send \$5.00 for info-pak to: WEEDHOPPER OF UTAH, INC. Box 2253, Ogden, Ut. 84404

HOW TO BUY A GOOD USED CAR

Our material gives the know how to separate used cars from abused cars. Know the questions to ask and things to look for and how to get an accurate current price. Know the better makes and models and the ones to avoid. If you are not knowledgeable about cars, or even if you are, using our materials will greatly increase your chances of buying a good used car. Price complete & postpaid is \$7.95.

THE DALE CORP. P.O. BOX 2977 LITTLETON, CO 80161



PLANS AND INSTRUCTIONS FOR
Go Kart \$2.50
Mini Bump \$2.00
Mini car \$3.00
12" Sail Boat \$4.00
Front Traction Go-Kart with Gearless Differential \$10.00
Mini Jeep \$3.00
Pedal Boat \$4.00
8 H.P. Tractor \$10.00
Soap Box \$3.00

Mini Vehicles Plan Dept. C Chazy, N.Y. 12921



TRAILER FOR THE 80's — Burno Travel Trailer kit sleeps four. Under 1000 lbs. Fiberglass. Ready to tow. Finish interior only. Write Burno PMB 18183 21st Avenue North, Plymouth, MN 55441. For full color catalog send \$2.00 to cover postage and handling.

BURGLARISED??



Protect yourself now with the latest "Do it yourself" name brand alarm kits and other protection devices. Our manual and product catalog (with prices) offers the widest selection of systems for your home, apartment vehicle, boat, business and yourself!! For this complete book of protection ideas, products and how to order them send \$3.98 to "FIGHT BACK" 16711-A Roscoe Blvd. Sepulveda CA 91343

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-11 Scott Lane • Box D, Jackson, WY. 83001

110 VOLT A.C. GENERATORS

60 cycles, 3000 watts, W.T. 27 pounds, 5' x 10' Fiberglass driven from car or pickup. Operates T.V. All power tools. Over 17,000 in service. This is our 30th year. Guaranteed 6 months, \$169.00. Our X1200-watt generator needs no battery. Special price \$159.00. Add \$6.50 for postage & handling, per unit. Send for our free catalog.

VIRDEN PERMA-BILT Box 7160 PM 2821 Mays, Amarillo, TX 79109 Phone: 806/352-2761

MID-ENGINE CONVERSION

A new catalog describing our expanded product line is now available! Send \$3.50 (U.S. funds) to:

MID-ENGINEERING INC.
Dept. PMB
P.O. Box 14007
Lansing, Michigan 48901

- Mid-engine frames for popular kit cars
- Mid-engine universal module sub-frames to convert production cars to mid-engine
- Mid-engine T Roadster street rod frames
- Mid-engine Corvair conversion kits
- Blueprint packages

Please allow 3 to 4 weeks for delivery.

GAS TO ELECTRIC

2 bulb fixture duplicates the charm and increases the light output of any existing double mantel gaslight. Kit includes on-at-dusk, off-at-dawn photo control, fixture, bulbs, detailed instructions. Approximately 60¢ per month to operate compared to \$5.00 with gas. 115 volt kit \$29.95 postpaid, or safe 120 volt kit including plug-in transformer, \$44.95. Dealers and installers inquiries invited.

Yardlighting Systems, Inc.

1039 Charles Ave., Dept. 45 • St. Paul, Minn. 55104

Satellite TV

FOR THE HOME

We don't just sell information!
We Manufacture Hardware!

Our 75-page catalog and information book tell the whole story! Inexpensive dishes, high pro-feeda, computer aiming software! Spec. Kits and more! Send \$7.95 today!

24-hour C.O.D. Hotline SPACECAST RESEARCH (305) 869-4283 Dept. R, P.O. Box 462, Altamonte Springs, FL 32711

SAVE GAS \$

4 Cylinders from 8!

Convert your big car to run economically on four cylinders. Enjoy big car comfort and safety plus economy size mileage performance. Can convert back to 8 cylinders anytime. Two hours work. Simple, easy installation. We guarantee your Econosize conversion will reduce gas consumption 30-50% (depending on your driving habits) or you may return your kit within 60 days and we will refund your money. Average saving is \$600 to \$800 per year!

Don't wait! Beat the high cost of fuel and inflated prices of smaller cars. Econosize your car now! Only \$92.50* complete kit, postage paid. Full instructions included. Do it yourself or have your local service station install. Use our handy order form. Send your check or charge to Visa or Master Charge today! *Limited Time Only

Fuel Econosizer Corporation
P.O. Box 400107, Dept. M, Nashville, TN 37210

Yes! Please send me _____ Econosize Conversion Kit(s) prepaid with written 60 Day Trial Guarantee.

____ Visa _____ Mastercard _____ Check or Money Order

Exp. Date _____ Card No. _____

Name _____

Address _____

Make of Car _____ Model Year _____

*Engine Size in Cubic Inches (C.I.D.) _____

*Not Available for Foreign or 1979 or Later Domestic Cars.

10 YEAR Guarantee
\$4.50



A GREAT all purpose knife for the outdoorsman. Offers you the quality of **CUSTOM** made models selling for much more! Hand polished untempered surgical steel blade has **SAFETY LOCK** to prevent accidental closing. Expensive **Pacca** wood handle. **SOLID BRASS** bolsters and liner. Popular 4" size (7 1/2" open). **IF BROKEN IN 10 YEARS WE WILL REPLACE AT NO CHARGE!** Use 30 days, money back if not pleased. Send \$4.50 plus 48¢ postage & handling **TODAY.** Midwest Knife Co., Dept. W.X.2808, 9043 S. Western Ave., Chicago, Ill. 60620. Mail orders only.

BONUS 2 KNIVES Only \$8.98 Postpaid
Sturdy Leather Belt Cases \$1.25 ea.



AT DEALERS OR ORDER DIRECT POSTAGE PAID

WS-1 STANDARD MODEL \$5.00
 PS-1 COMPACT FOLDING MODEL \$7.00
 S9 SLINGSHOT WITHOUT WRIST-BRACE \$4.00
 RR-1 REPLACEMENT BANDS & LEATHER POUCH \$2.00
 SA50 500 ROUNDS 1/2" DIA. AMMO. ONLY USA \$6.00
 NO C.O.D.'S. FOR AIR POST. FOREIGN ORDERS ADD PER ITEM \$2.00
 TRUMARK SLINGSHOTS: P.O. BOX 15171, BOULDER, CO. 80306

Actual Photo!



mini-bike
New plans reveal step by step details how to build your own mini-bike. FREE discount coupons for parts.

RUSH \$2 for PLANS and everything to:
Box 34422, Dept. PM8 Omaha, Nebr. 68134

BUY STAINED GLASS SUPPLIES DIRECT FROM MANUFACTURER

Came Leads, Glass, Solder & Tools! Everything you need for the professional or beginner. Wide selection of tools and materials with instructions all in our exciting new catalog. For your copy send \$3.00, refundable with first order.

CORAN-SHOLES INDUSTRIES
509 E. 2nd St., Dept. PM 5e, Brimston, MA 02127
16171 268-3780

BUMPER STICKER PRINTING DEVICE

BUMPER—MAGIC
P.O. BOX 22791 (GC)
TAMPA, FLA. 33622

SEND FOR **FREE DETAILS**

THE FUN MACHINES
... that work, too!



• FUN TO BUILD!
• FUN TO RIDE!

These rugged off road vehicles are powered by 5 hp to 16 hp American-made engines. Engine is completely assembled, frame is welded and painted. You just bolt everything together and start riding. Kit priced from \$479.95 to \$999.95. For a **FREE color brochure with complete details, write today to:**

Carl Heald, Inc. Dept. PM08 P.O. Box 1148, Benton Harbor, MI 49022
From the largest Maker of Bike and Tryke Kits in the World — Carl Heald, Inc.

WHY HOE WEEDS ALL SUMMER?

NEW AGCO POWER HOE MAKES YOUR GARDEN WEED FREE... FAST... NO HARD WORK OR PAINFUL BACKACHE!



TILLS DEEP



9 INCHES WIDE... WEIGHS 20 LBS! **WEEDS NARROW ROWS FAST!**

GASOLINE POWERED - EASY TO USE IMPROVES YOUR GARDEN 7 WAYS!

1. High speed tiger tines granulate toughest clays into sandy loam. Unique tilling action improves your soil, can till 6 to 8 inches deep.
2. Makes weeding fast easy and fun. weeds 1 to 3 inches deep in narrow rows set 12 inches wide.
3. Gives you bumper crops of lush fruits and vegetables.
4. Gives you excellent flower beds, helps your garden burst with beautiful blooms.
5. Gives you a garden others will envy.
6. Aerates and thatches your lawn.
7. Cuts neat borders around gardens, walkways, shrubs and trees.

Amazing new tiller takes hard work out of gardening. Warranted unbreakable tiger tines chew through the toughest soils and grass covers. Weeds 20 x 40 ft. section in 20 minutes or less. Can increase crop yields 50%. Made by company with over 55 years experience in the manufacture of tough reliable gardening tools. Liberal warranties. 15-day trial period. your money back if not fully satisfied.

NOT SOLD IN STORES: FOR INFORMATION WRITE TO:

AGCO P.O. BOX 75 DEPT. P2
SOUTHAMPTON, PA. 18966

I want more information... please send literature. My shipping address is:

Name _____
 Street _____
 City _____
 State _____ Zip _____

For Rush Delivery of Literature Call 215-947-8855
 Mon.-Sat. 10am-4pm Charge Card Orders accepted.


FREE SAMPLE IMPORT **MEN WOMEN START MAIL ORDER HOME IMPORT BUSINESS**

I'll send you a free sample import to prove you can make big money in your own spare/full time business. No investment in stock. World's most famous importer will guide you. Clip this ad, good for free sample and big Free Report — tells all! Offer limited to adults. Mail this ad today. **THE MELLINGER CO.,** 6100 Varlet Ave., Dept. A2258, Woodland Hills, CA 91364.

TILLER USERS...
Can your machine do all of this? **Save \$143.80 NOW**

- ★ Handle with just **ONE HAND.**
- ★ **EVENLY** break, turn & till soil.
- ★ Shred vegetation without tangling.
- ★ Leave **NO WHEELMARKS** or **FOOTPRINTS.**

The **TROY-BILT® ROTO TILLER-POWER COM-POSTER** can do all this and more! That's why serious gardeners consider it the finest tiller available. See for yourself! For complete details, **OFF-SEASON SAVINGS**, and **FREE 24-page booklet** clip this and mail today to:



TROY-BILT® Tillers
102nd St. & Ninth Ave., Troy, N.Y. 12180

TROY-BILT® Roto Tiller-Power Composters
Dept. A366
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)

Mr. _____
 Mrs. _____
 Ms. _____
 Address _____
 City _____
 State _____ Zip _____

With Energy Costs Exploding

COST \$\$\$ = 3 **ENERGY** — Kutrieb Research Waste Petroleum Products

INEXPENSIVE HEAT FROM WASTE PETROLEUM PRODUCTS FOR:

- GENERAL HEATING PURPOSES
- Space Heaters through Industrial Models.
- Grain Drying — Alcohol Production and Special Power Burner Applications.

Let us know how we can help you!

Computer Technology — Micro Processors and Quality Kutrieb Engineering have opened a "New Horizon in Energy Reclamation."

Documented tests using Environmental Protection Agency approved methods show that ordinary untreated crankcase drain oils may be used as fuel!

Kutrieb features exclusive "State of the Art" computerized combustion systems affording control never before possible using vaporizing type burners.

Call or write for **FREE information** 715-924-4871

Kutrieb Corporation
P.O. BOX 4305
430 PHILLIP STREET
CHETEK, WISCONSIN 54728
DEALER INQUIRIES INVITED

GET UNSTUCK IN SNOW, MUD, OR SAND!

If you get stuck, the patented* X-TRACTOR™ brand traction ramp is engineered to use your vehicles own momentum to get you UNSTUCK and out of trouble. Avoid costly towing, transmission repairs and wasted time. X-TRACTOR™ is the first all-purpose, year-round device of its kind and works with cars, vans, light trucks, RV's, front and 4-wheel drive vehicles. Don't be fooled by imitations. X-TRACTOR™ weighs only 2 1/4 lbs. and is constructed of durable space-age plastic to withstand sub-zero degree temperatures. X-TRACTOR™ is guaranteed for life against breakage. **ORDER NOW FOR 15 DAY TRIAL:** Send check or money order for \$13.95 + \$2.50 post & hand. (NJ Res. add 5% Sales Tax) to: **JERLEN ASSOCIATES, Dept. B, 12 Moline Road, East Brunswick, NJ 08816.**

*Covered by U.S. Pat. No. 3 395 862

† A Trademark of X-Tractor Corp. of America

SAVE UP TO 85% GOV'T SURPLUS and NEW EQUIP'T

Powerful Battery Motor

BUILD MOTORIZED BICYCLE, ELECTRIC CAR, ETC.

Send 50¢ Cash or Stamps

\$34.95

BIG, Equip't. Catalog

EQUIPMENT CATALOG

SURPLUS CENTER

LOWEST PRICES ON:

- WOOD SPRAYING CABLE
- GEAR MOTORS WINCHES
- SPEED REDUCERS PUMPS
- COMPRESSORS TELEPHONES
- POWER PLANTS REFRIGERATORS
- HYDRAULIC ELECTRONICS
- SURVEYING INSTR. HOOD
- WELDERS. MANY OTHERS

SURPLUS CENTER PMO80 Lincoln, Nebraska Zip Code 68501

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!

MASON SHOE MFG. CO., Dept. H-531 Chippewa Falls, WI 54729

Rockwell Speed-Bloc Sander—

Palm grip design for one hand use. Thumb control switch, offset pad for 4 way flush sanding, 12,000 OPM, 100% Ball Bearing, 5/64" Orbit, 115 V. Direct Motor to pad design. Pad size 4 1/2" x 4 1/8". Add \$2.00 for shipping. Reg. \$69.99 **4480(330)-R7 \$53.98**

SILVO (BRAND NAME) TOOL CATALOG

THOUSANDS OF EXCITING TOOL VALUES: Stanley, Wen, Speedy-Sprayers, Milwaukee, Rockwell, Dremel, Skil, Nicholson, Disston, Millers Falls, Helios, Welisaw, Plumb, Kennedy, Huot, Rigid, Crescent, Vise-Grip, Audel Books, Unimat, Wiss, Channel-lock, General, Pony Clamps and many Nationally Advertised brands of tools and supplies. We ship Coast to Coast at prices hard to beat. Send \$1.00 for our big SILVO TOOL CATALOG today.

SILVO HARDWARE CO.
2205 Richmond St., Dept. PMO-8 Phila., Pa 19125

BEST "LEARN-IT-YOURSELF" BOOKS!

<input type="checkbox"/> How To Make Your Old Car Run Like New 238 p., 123 il.	\$7.95
<input type="checkbox"/> Practical Knots & Ropework 406 p., 305 il.	\$9.95
<input type="checkbox"/> The Welder's Bible 420 p., 333 il.	\$9.95
<input type="checkbox"/> Plumbing With Plastic 406 p., 263 il.	\$8.95
<input type="checkbox"/> The Brickworker's Bible 378 p., 284 il.	\$8.95
<input type="checkbox"/> How To Build Your Own Underground Home 256 p., 128 il.	\$6.95
<input type="checkbox"/> The Complete Handbook of Leathercrafting 352 p., 330 il.	\$12.95
<input type="checkbox"/> How To Make Your Own Knives . . . etc. 232 p., 655 il.	\$6.95
<input type="checkbox"/> 66 Children's Furniture Projects 448 p., 1139 il.	\$8.95
<input type="checkbox"/> The Complete Handbook of Taxidermy 352 p., 244 il.	\$9.95
<input type="checkbox"/> Making & Using Electricity From The Sun 144 p., 73 il.	\$5.95
<input type="checkbox"/> All About Telephones 192 p., 140 il.	\$5.95
<input type="checkbox"/> The Master Lawn Mower Repair Handbook 406 p., 433 il.	\$7.95
<input type="checkbox"/> The Bicycle Builder's Bible 378 p., 280 il.	\$8.95
<input type="checkbox"/> All About Swimming Pools 182 p., 65 il.	\$4.95
<input type="checkbox"/> The Practical Handbook of Blacksmithing & Metalworking 448 p.	\$9.95
<input type="checkbox"/> The Complete Handbook of Locks & Locksmithing 352 p., 246 il.	\$6.95
<input type="checkbox"/> How To Build Your Own Boat From Scratch 252 p., 192 il.	\$6.95
<input type="checkbox"/> Auto Air Cond. Hdbk—Install., Maintenance & Repair 280 p., 157 il.	\$6.95
<input type="checkbox"/> How To Repair Video Games 270 p., 182 il.	\$7.95

SEND NO MONEY. We'll invoice you on 10-DAY FREE TRIAL. All paperback books. TAB BOOKS Inc., Dept. PM-880, Blue Ridge Summit, Pa. 17214

Industrial Supplies Discount Priced

Buy where the manufacturers do—by mail or visit one of our 3 great fully stocked stores

WHOLESALE TOOL CO., INC.
12155 Stephens, Warren, MI (313) 754-9270

WHOLESALE TOOL CO. OF OKLAHOMA
7240 E. 46th, Tulsa, OK 74145 (918) 627-2240

W T TOOL/SOUTH
4200 Barringer Dr., Charlotte, NC 28210 (704) 527-4071

Some products we stock: High Speed Drills, Taps, Milling Cutters, End Mills, Carbide, Hand Tools All Kinds, Precision Tools, Calipers, Abrasive Cloth, Points, Wheels, etc. Drill Presses, Lathes, Mill Bench Grinders, Machine and Bench Vises.

Order our 136 page catalog from the store nearest you. Cost \$1.00, refundable with first \$10.00 order. You may pick up same, no charge, any store. Free WATS lines for order convenience. 30 day unconditional guarantee. Visa and Master Charge

Name _____
Address _____
City _____
State _____ Zip _____

AMAZING ELECTRONIC PRODUCTS

Lasers super powered, burning, cutting, rifle, pistol, pocket—see in dark—shotgun directional mike—mascramblers—giant Tesla—Stunwand—TV disrupter—energy producing, surveillance, detection, electrifying, chemical, ultrasonic, cb, aero, auto and mech devices, hundreds more—ALL NEW PLUS INFO UNITED PARTS SERVICE.

CATALOG \$1. INFORMATION unlimited

DEPT. MB BOX 716 • AMHERST, N.H. 03031

Custom Quality FOLDING SPORTSMAN'S KNIFE

An outdoor Pocket Knife with features worth four times the price. Return for replacement if broken within 10 years. Only \$4.50 plus 50¢ postage & handling.

Handmade Styling

- Solid Brass Bolster & Lining
- Rosewood Handle
- Sharp Stainless Steel Safety-Locking Blade

Add \$2 for Genuine Leather Holster

MONEY BACK GUARANTEE

A pocketable 4" size (7-V open)

EGBERT Co. Dept. PM80
11055 Sunset Blvd.
Los Angeles, CA. 90049

TALK TO THE BIRDS! (and mystify your friends)

Small, thin "CANDY-BIRD" fits against the roof of your mouth—produces a variety of songs, chirps, shrieks & whistles, imitating many birds & small animals! Durable, easy to use. 5 "CANDY BIRDS," compl. instr. & carrying case, only \$9.95 (money-back guar.).

CANDY-BIRD, Box 878-K
Jennings, LA 70546

THE BOSS LOG SPLITTER!

Splits EASIER & FASTER!

Only \$49.95 plus \$5 p. & h. for adaptable cone, or \$99.95 plus \$8 ready-to-attach to hub of car or light truck (specify vehicle). Pa. — send 6% sales tax. Free info—send stamped self addressed envelope. **Good Products, Route 3 Box 88-A PM, Kutztown, Pa. 19530**

AIRCRAFT KITS

Complete And Detailed Plans

Fuel-efficient & High-performance Aerobatic & Cross-country

MANY TYPES 1,2&4 Seat

SEND TO: **AIRCRAFT KIT CATALOG**
Dept. A • P.O. Box 19828 • Houston, Texas 77024

CATALOG \$3.50

the New Look from Elite

The ultimate in a GT Sports Car Kit. Take a VW chassis, combine it with your choice of power. Bolt on the LASER 917 Kit and drive away in the most uniquely designed Street Sports Car of the times.

Fly to Mpls. / St. Paul **FREE*** to personally order your LASER 917

ELITE ENTERPRISES, INC.
Dept. PM8-80
690 E. Third St.
Cokato, Minnesota 55321 (612) 288-2660

NAME _____ AGE _____
ADDRESS _____
CITY _____ STATE _____
ZIP _____ PHONE _____

To order \$29.95 Full Pack call Toll Free 1-800-328-8898. Refundable with Kit Purchase. Major Credit Cards Accepted.

* This information included in Full Pack Only

Know your car inside and out.

Know how to fix it... 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.

factory workshop manuals. Each one is carefully rewritten for use by the do-it-yourself car owner. Clear and easy to follow, yet complete and detailed enough even for professional use. You get all the important information plus hundreds of the best pictures, diagrams, and specifications.

TOTAL SERVICE MANUALS are digests of official

TOTAL SERVICE MANUALS

SATISFACTION GUARANTEED OR YOUR MONEY BACK

1713	ALFA ROMEO 62-78 for all Giulia, GT & Spider mdls	\$10.95
9641	ALFA ROMEO ALFETTA 73-78	\$10.95
8677	AMC GREMLIN, HORNET, PACER 71-79 for all models	\$10.95
8190	AMC MATADOR, REBEL 67-74 covers all models	\$9.95
0991	ARROW, PLYMOUTH 76-77 for all models	\$10.95
9404	ASPEN, DODGE 76-78 for all models	\$8.95
7122	AUDI 100 70-77 for all models inc 100L	\$10.95
0664	AUDI 5000 77-79	\$10.95
8749	AUDI FOX 73-79 covers all models	\$18.50
0916	AUSTIN AMERICA 68-71 covers all models inc 1100, 1300	\$10.95
1203	AUSTIN HEALEY 100/6, 3000 56-68 for all models	\$10.95
0752	AUSTIN MARINA 71-75 sedan and GT models	\$10.95
0379	BARRACUDA & CUDA 65-72 all 6 & V8 models	\$8.95
8154	BLAZER, CHEVY 67-79 all mdls plus Suburban & GMC Jimmy	\$10.95
1042	BMW 2000, 2002 66-76 covers all mdls inc CA, CA, TX	\$10.95
9813	BMW 320 75-79 covers all models	\$10.95
9326	BMW 75-79 inc 528, 530, 630, 630CS, 633CS, 733 models	\$9.95
9760	BMW 2500, 2800, 3.0 all mdls inc Bavaria & CS	\$11.95
0883	BOBAC, MERCURY 76-79 covers all models	\$8.95
0504	BRONCO, FORD 66-77 all 2 & 4 wheel drive models	\$8.95
0011	BUICK 66-68 factory shop manual - must give year	\$18.95
0025	BUICK 71-79 shop manual - must give year no 1972-73	\$18.95
0727	CADILLAC 68-74 all models except El Dorado	\$10.95
8678	CAMARO 67-78 covers all 6 & V8 models	\$10.95
9557	CAPRI 70-76 for all 2000, 2600, 2800 models	\$10.95
0379	CHALLENGER 70-72 covers all 6 & V8 mdls	\$8.95
8331	CHARGER 67-70 for all models inc 500 & R/T	\$8.95
8212	CHARGER 71-75 covers all models	\$8.95
0383	CHEVELLE 64-79 inc Malibu, Monte Carlo, El Camino	\$8.95
0838	CHEVETTE 76-79 covers all models	\$10.95
1038	CHEVROLET 29-40 covers all 6-cyl models	\$16.00
0888	CHEVROLET 49-54 reprint of factory shop manual	\$17.00
0051	CHEVROLET 55 or 57 reprint factory manual give year	\$19.95
8407	CHEVROLET 56 supplement to 55 manual	\$10.95
0870	CHEVROLET 68-79 for Biscayne, Bel Air, Impala, Caprice	\$8.95
8187	CHEVY II 62-68 covers all 4, 6 & V8 models	\$9.95
0779	CHEVY LUV 72-78 covers all models	\$10.95
8154	CHEVY PICK-UP 67-79 all 2 & 4 wheel dr mdls plus GMC	\$10.95
1662	CHEVY VANS 67-78 for all models & GMC	\$10.95
1145	CHRYSLER 55-71 all inc Newport, 300, New Yorker	\$10.95
0020	CHRYSLER 72-79 factory manual - must give year	\$23.95
9148	CITATION, CHEVY also covers Omega, Phoenix, Skylark	\$8.95
9588	CITROEN II, DS 67-75 covers all DS19, 20, 21 mdls	\$10.95
8264	COLT, DODGE 71-77 covers all models	\$10.95
9422	COMET 60-65 covers all models	\$8.95
8211	COMET 70-77 covers all models	\$8.95
8212	CORONET, DODGE 71-75 covers all models	\$8.95
0477	CORVAIR 60-69 covers all models	\$10.95
0478	CORVETTE 57-65 covers all 283 & 327 models	\$10.95
9481	CORVETTE 66-79 covers all 327, 350, 427, 454 models	\$10.95
9655	COSWORTH/VEGA factory shop manual	\$18.95
1756	CRICKET, PLYMOUTH 70-73 also covers Hillman Avenger	\$10.95
9440	DART & DEMON 65-67 covers all models	\$8.95
8188	DART & DEMON 68-76 covers all models	\$8.95
1657	DATSUM 110 76-78 covers all models	\$10.95
1164	DATSUM 2000X 77-79 covers all models	\$10.95
9442	DATSUM 2000 70-73 covers all models	\$10.95
8065	DATSUM 210 74-78 covers all models inc 8210	\$10.95
8127	DATSUM 240Z, 260Z, 280Z 70-78 covers all models	\$10.95
9152	DATSUM 280 79-80 includes 280ZX	\$8.95
1551	DATSUM 510 68-73 covers all sedn & wagon mdls	\$10.95
1074	DATSUM 510 78-79 covers all models	\$10.95
9583	DATSUM 610 68-77 covers all models	\$10.95

0935	DATSUM 710 73-76 covers all models	\$10.95
8271	DATSUM 810 77-78 for all models	\$10.95
1258	DATSUM 311 1600/2000 SPL & SRL sports car mdls	\$11.95
9297	DATSUM PICK-UP 68-79 for all 521 & 620 models	\$10.95
1145	DODGE 55-71 all inc Coronet, Monaco, Polara	\$10.95
0871	DODGE 72-77 for all Monaco & Polara models	\$8.95
1259	DODGE OMNI 78-79 covers all models	\$10.95
8208	DODGE RAMCHARGER 74-75 covers all models	\$8.95
1298	DODGE PICK-UPS 71-79 covers all models	\$10.95
8203	DODGE VANS 67-70 all 1/2, 3/4 & 1 ton mdls inc Plymouth	\$8.95
6070	DODGE VANS 71-79 covers all models	\$10.95
8192	DUSTER 70-76 for all models inc Scamp	\$8.95
8189	FAIRLAME, FORD 62-70 covers all models	\$8.95
8366	FAIRMONT, FORD 67-79 covers all models	\$10.95
9422	FALCON 60-64 covers all models inc Mercury Comet	\$8.95
9874	FALCON, FORD 64-70 covers all 6-cyl models	\$8.95
0480	FALCON, FORD 65-71 covers all V8 models	\$8.95
9776	FIAT 124 67-77 all inc sedn, sta wagon, TC, spcl	\$10.95
0844	FIAT 124 SPORT 78-78 all coupe & convertible models	\$10.95
9640	FIAT 128 72-79 for all models inc SL & Rally	\$10.95
8742	FIAT 131 75-79 covers all models inc Mirafiori	\$10.95
1201	FIAT 850 64-74 all sedan, coupe & spider mdls	\$10.95
0399	FIAT X1/9 73-79	\$10.95
1073	FIESTA, FORD 77-79 for all models	\$10.95
0675	FIREBIRD covers all models-67-74	\$8.95
0872	FORD 68-79 for Galaxie, LTD, Custom, XL & wagons	\$8.95
9369	FORD COURIER 72-77 covers all models imported	\$10.95
8205	FORD PICK-UP 65-68 all 2 & 4 wheel dr mdls, 1/2-1 ton	\$10.95
0451	FORD PICK-UP 69-79 covers all models	\$10.95
8204	FORD VANS 61-68 for all 1/2, 3/4, 1 ton models	\$8.95
0453	FORD VANS 69-79 covers all 6 & V8 models	\$10.95
9436	GRANADA, FORD 75-77 covers all models	\$8.95
0644	HONDA 360, 600, 67-75 for all models inc "Z"	\$10.95
0885	HONDA ACCORD 77-79 covers all models	\$10.95
8694	HONDA CIVIC, 73-79 covers all models inc CVCC	\$10.95
8206	INTERNATIONAL SCOUT 67-73 800, A, B, II mdls	\$8.95
8565	INTERNATIONAL 62-78 turbine/maintan SCOT, wagon, pick-up	\$8.95
1206	JAGUAR 55-69 sedan mdls 2, 4, 3, 4, 3.8, 240, 310	\$10.95
1043	JAGUAR E-TYPE 61-72 covers all 6-cylinder models	\$10.95
9612	JAGUAR E-TYPE V12 71-74 covers all models	\$10.95
9399	JAGUAR XJ6 68-78 covers all models	\$10.95
9617	JAGUAR XJ12 72-77 for all models inc Daimler	\$10.95
9769	JEEP 50-65 for 4 & 6 cyl station	\$16.95
8207	JEEP 66-79 for all Cherokee, Commando & Wagoneer mdls	\$8.95
9805	JEEP UNIVERSAL J-series with 230 cc eng	\$16.95
9806	JEEP WAGONER CJ-2, CJ-3 reprint factory manual	\$16.95
0509	JEEP CJ-5, CJ-6, CJ-7, 55-79	\$8.95
8856	JEEP FC150, 170 covers all front cab models	\$16.95
8735	JENSEN-HEALEY reprint of factory manual	\$20.95
1254	LANDROVER 59-77 covers 2, 2A, 3 gas & diesel models	\$10.95
9773	LINCOLN 71-77 all models inc Versailles	\$10.95
0481	MAVERICK 69-71 6 cyl, 170, 200, 250 cu. in. eng.	\$8.95
8211	MAVERICK 72-77 covers all models	\$8.95
0370	MAZDA RX2 70-75 covers sedan & coupe mdls	\$10.95
0371	MAZDA RX-3, 100 70-74 covers all models	\$10.95
0444	MAZDA 71-78 includes RX4 and Cosmo models	\$8.95
0880	MAZDA PICK-UP 72-75 81600 & rotary eng. mdls.	\$8.95
0593	MAZDA ROE 812-78 covers all models	\$10.95
0573	MAZDA 1500, 1800 67-74 covers all models	\$10.95
0781	MERCEDES-BENZ 190SL reprint of owner's manual	\$8.95
1746	MERCEDES-BENZ 220 59-65 covers all mdls	\$10.95
9483	MERCEDES-BENZ 220 68-72 mdls except Diesel	\$10.95

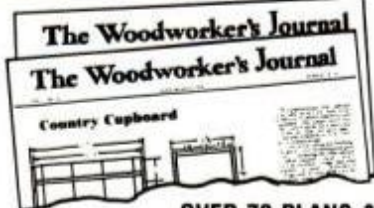
1747	MERCEDES-BENZ 230 63-68 inc 230S & SL	\$10.95
1748	MERCEDES-BENZ 250 65-68 covers all models	\$10.95
9485	MERCEDES-BENZ 250,280 68-72 all models plus 230	\$10.95
0416	MERCEDES-BENZ 68-73 inc 280, 300 & 350, 450 V8 mdls	\$9.95
8439	MERCEDES-BENZ 74-79 Covers all models inc Diesels	\$10.95
9773	MERCURY 71-77 for all models inc Cougar	\$10.95
1105	MG TA, TB, TC, TD, TF 36-55	\$10.95
1098	MG MIDGET 58-78 covers all models	\$10.95
1106	MGA, MGB 55-68 covers all models inc twin cam	\$10.95
1720	MGB, MGBGT 69-79 all roadster & coupe models	\$10.95
8396	MGC reprint of factory manual	\$10.95
0917	MINI 59-78 covers all models inc Mini-Cooper	\$10.95
9436	MONARCH, MERCURY 75-77 for all models	\$8.95
0884	MONZA, CHEVROLET 75-80 plus Astro,Starfire,Skylark	\$8.95
9876	MUSTANG 6 & 6.5-72 covers all 6-cylinder models	\$10.95
0479	MUSTANG V8 65-73 covers all models	\$10.95
8172	MUSTANG II 74-78 covers all 4, V6, & V8 models	\$10.95
8287	NOVA 69-79 covers all 4, 6 & V8 models	\$9.95
7107	OLDS CUTLASS 70-77 covers all inc 442 models	\$8.95
0002	OLDS 68, 71, 74 factory shop manual - must give year	\$11.95
0008	OLDS 75-79 factory shop manual - must give year	\$17.95
1724	OPEL KADETT 67-73 1000, 1100, 1200 models	\$10.95
8273	OPEL 65-79 for all models inc 1900 Manta & Isuzu	\$10.95
9589	OPEL GT 68-73 covers all 1900 models	\$10.95
0876	PEUGEOT 504 68-74 includes diesel models	\$8.95
7124	PEUGEOT 504 68-78 for all gasoline models	\$10.95
0883	PINTO 70-79 covers all models inc Mercury Bobcat	\$8.95
1145	PLYMOUTH 55-71 all inc Belvedere, Fury, Satellite	\$10.95
0874	PLYMOUTH 72-76 Fury, VIP, Gran. Suburban mdls	\$8.95
1660	PLYMOUTH HORIZON 78-79 covers all models	\$10.95
0030	PONTIAC 71-78 shop manual give year No 1974, 1976	\$18.95
0489	PONTIAC TEMPEST 68-73 all mdls inc GTO, Le Mans	\$8.95
1650	PORSCHE 356 57-65 covers A, B & C models	\$10.95
1591	PORSCHE 911 64-73 covers all models	\$10.95
8173	PORSCHE 911 74-77 includes N, S, Targa, Carrera	\$10.95
1590	PORSCHE 912 65-69 with 1582cc engine	\$10.95
9834	PORSCHE 914 70-76 all models inc 914-6	\$10.95
0993	PORSCHE 924 76-78 covers all models	\$10.95
0372	RENAULT 5 72-78 for all models inc Le Car	\$10.95
1224	RENAULT 4 60-72 covers all models inc 1100	\$10.95
9429	RENAULT 12 69-79 covers all models inc auto trans	\$10.95
0645	RENAULT 15, 17 71-78 all mdls inc TL, TS	\$10.95
1554	RENAULT 16 65-78 covers all models	\$10.95
0395	ROADRUNNER & SATELLITE 68-73 all models	\$8.95
1090	SAAB 99 69-76 covers all models inc fuel injection	\$10.95
8448	SAAB 67-79 covers all models inc Sunnet	\$10.95
1099	SPRITE 58-71 covers all Mk 1, 2, 3 & 4 models	\$10.95
8058	SUBARU 71-77 covers all models imported	\$10.95
0845	SUNBEAM Tiger reprint of factory shop manual	\$20.95
0489	TEMPEST, GTO, LE MANS 68-73 all models	\$8.95
9773	THUNDERBIRD 71-77 covers all models	\$10.95
8189	TORINO 68-75 all models inc Elite, Ranchero	\$8.95
0912	TOYOTA CELICA 70-77 covers all models imported	\$10.95
0829	TOYOTA CELICA 78-79	\$10.95
7127	TOYOTA COROLLA 68-74 for all models	\$10.95
9812	TOYOTA COROLLA 75-78 all models plus 5-spnd trans	\$10.95
0926	TOYOTA CORONA 69-73 for all 4-cyl models inc MK II	\$10.95
0886	TOYOTA CORONA 74-77 covers all 4-cyl models	\$10.95
0754	TOYOTA CORONA Mk 2 72-76 for all 6 cylinder models	\$10.95
0647	TOYOTA LAND CRUISER 68-79 covers all pick-up models	\$10.95
8524	TOYOTA LAND CRUISER 66-77 covers all models	\$10.95
1200	TRIUMPH SPITFIRE 69-78 covers all models	\$10.95
1231	TRIUMPH TR6 61-67 covers all models	\$10.95
1015	TRIUMPH TR5, TR6, 67-76 all models inc TR250	\$10.95
8693	TRIUMPH TR7 75-79	\$10.95

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

1264	CHILTON AUTO REPAIR 73-80 for all American cars	\$16.95
1225	CHILTON AUTO REPAIR 71-78, Reg \$13.95, Special	\$8.95
1775	CHILTON AUTO REPAIR 68-75 Regular \$12.95, Special only	\$7.95
1713	CHILTON AUTO REPAIR 64-71 for all American cars	\$17.95
7163	CHILTON AUTO REPAIR 54-63 for all American cars	\$17.95
7111	CHILTON TRUCK REPAIR 73-80 American & imported mdls	\$17.95
8561	CHILTON TRUCK REPAIR MAN 61-71 for all 1/2-2 1/2 ton mdls	\$19.95
9700	CHILTON IMPORT CAR MANUAL 73-79 for All pop imports	\$18.95
0442	AUTO REPAIR & PRICES list rates times 74-79 U.S. cars	\$7.95
0445	CAR ECONOMY TUNING GUIDE getting most from the least	\$2.95
7125	AUTO AIR CONDITIONING... service & repair all	\$6.95
8726	TRANSISTOR IGNITION SYSTEMS covers them all	\$5.95
1067	WIRE MILLS PER GALV GUIDE How to do it good & cheap	\$7.95
0546	ALCOHOL FUELS How to make your own	\$4.95
7110	WEEKEND MECHANIC'S HANDBOOK ideal manual for beginner	\$8.95
9622	HOW TO TUNE YOUR CAR good for all cars	\$5.95
8030	POWER TUNING your car, truck, van or RV	\$5.95
8859	GM DIAGNOSIS & REPAIR MANUAL 70-80 for all GM cars	\$9.95
9671	BASIC CAR MAINTENANCE & REPAIR good one to start with	\$4.95
1712	BASIC AUTO REPAIR MANUAL, a must for any car	\$5.95
1707	BASIC BODYWORK & PAINTING	\$4.95
1711	BASIC CARBURETORS & FUEL SYSTEMS	\$4.95
1706	BASIC CHASSIS, SUSPENSION, BRAKES... tune & service	\$4.95
0791	BASIC ENGINE HOTTRODDING	\$4.95
1708	BASIC IGNITION & ELECTRICAL SYSTEMS	\$4.95
0680	BASIC AUTO TROUBLESHOOTING for all cars	\$4.95
8359	BRAKE SERVICE GUIDE for repairing all makes & types	\$7.95
3759	ECONOMIC FUEL INJ MAN 70-77 for all imported cars	\$9.95
9976	CARBURETOR BASICS... troubleshoot/rebuild all U.S. makes	\$8.95
9411	HOLLEY carbs, all 2 & 4 bbl, tune & rebuild	\$5.95
9652	ROCHESTER carbs, all inc 4MV Quadrjet	\$9.95
9656	SOLEX CARBURETORS all 1 & 2 barrel downdraft	\$2.95
6354	SU CARBURETORS tune & rebuild all to 1976	\$8.50
9423	STROMBERG CO CARBS tune & rebuild all to 1976	\$8.50
0734	WEBER DCOE overhaul manual	\$4.95
1511	WEBER CARBURETORS tune & rebuild all models to 1979	\$8.50
8425	WINDOR AUTO BODY REPAIR step by step how to	\$6.95
5104	AUTOBODY REPAIRING & REPAIRING... the best	\$9.95
5106	GLASS FIBER AUTO BODY construction & repair	\$5.00
9638	DESIGNING TOMORROW'S CARS from idea to finished car	\$19.95
1071	PRACTICE CUSTOMIZING how to do-it like a pro	\$6.95
8491	CREATIVE ENGINE SWAPPING how to do it right	\$5.95
6029	DIESEL GUIDE covers everything owner/buyer should know	\$8.95
0541	MODERN DIESEL CARS describes all models now sold	\$5.95
7128	DIESEL, How to convert your car, van, pickup to	\$6.95
0682	GLENN DIESEL/GAS FI MAN 65-73 Bosch, Kueffelscher, Spca	\$4.95
8432	DIESEL ENGINES, HOW TO REPAIR...complete training course	\$7.95
1017	AUTOMOBILE ENGINE REBUILDING	\$13.75
9780	AUTO RESTORATION GUIDE...best ever published 291 pgs	\$11.95

0995	CAR INTERIOR RESTORATION useful for all cars	\$3.95
0952	PRICE GUIDE, USED CARS all U.S. & imp cars, trkts, vans	\$2.50
0906	OLD CAR VALUE GUIDE latest edition	\$7.95
6331	GOOD BOOK official used car value guide 66-70	\$7.95
8001	IMPORTED CAR SPOTTERS GUIDE...all post-WW2 imports	\$12.95
8474	BYPASS EMISSION CONTROLS 71-77 GM cars	\$8.95
9534	BUICK POWER MANUAL performance tuning the V6 models	\$5.95
8885	GRAT CAMARO ultimate picture/technical book on car	\$18.95
9843	CAMARO 66-70 road tests, reprint mag articles, plus	\$11.50
8421	CHEVROLET RACING ENGINE how to build	\$7.95
1243	CHEVY RACING THE SMALL BLOCK...super performance	\$5.95
9795	CHEVY PERFORMANCE getting the most from small blocks	\$7.95
8125	CHEVY SMALL BLOCK, how to rebuild	\$5.95
9409	CHEVY SMALL BLOCK, How to hotrod	\$5.95
0949	CORVETTE RESTORATION SOURCE BOOK 53-67 the 'biote'	\$19.95
9402	CORVETTE PARTS BOOK 53-72 every part, pic, #s	\$24.95
0563	FABULOUS FIREBIRD new picture/technical history	\$18.95
0946	FORD SMALL BLOCK, How to rebuild	\$5.95
94		

IF YOU WORK WITH WOOD GET...



OVER 70 PLANS & PATTERNS FEATURED EACH YEAR

Each issue of Woodworker's Journal is filled with actual plans and patterns, shop tips, money-making ideas, antique repairing and cabinetmaking techniques.

Whether you're a novice or a veteran you'll enjoy every page of detailed instructions for all types of practical woodworking projects. Build fine Early American, Shaker, Contemporary Furniture, Toys, Gifts, Clocks, Lamps and much more.

SUBSCRIBE NOW

1 YEAR (6 issues)—only \$7.00
 2 YEARS (12 issues)—only \$13.00
 Foreign Rates—Add \$2.00. Please make payment in U.S. Funds.

GUARANTEED: Full refund on all unmailed issues if not completely satisfied

Send Check or M.O. to:
THE WOODWORKER'S JOURNAL, Dept. 518
 P.O. Box 1629, 25 Town View Drive,
 New Milford, Ct. 06776

6 issues—\$7.00 12 issues—\$13.00

Name _____
 Address _____
 City _____ State _____ Zip _____

If You Need *Super Quick*
RUBBER STAMPS
Anytime Day or Night
 CALL Toll Free 1-800-547-8678



MAKE TOP MONEY IN STAINED GLASS

Learn at home in your spare time. Program includes your book of completely illustrated lessons, all professional tools, interesting projects and more. Our self study program gives you every thing needed to start you on your way to success. You can earn big money making stained glass lamp shades, windows, jewelry, sun catchers and more. **FREE INFO:** (1-813) Regina Carvers Ltd. - Publication Dept. (PMG-81) 33 E. Main St., Round Lake Park, Ill. 60073

PUMPS BUY DIRECT AND SAVE
 Drain • Irrigate • Circulate • Spray



Heavy duty ball bearing pump. All metal, rust-proof Type XB. Stainless shaft. Use 1/4 HP or larger. 1 HP 1,200 GPH 60" high or 3,000 GPH 25" well. 5,200 GPH max. 1 1/4" in. 1" out. Belt or direct drive. \$19.95 Type P won't rust or clog. Bronze bearing. To 2,400 GPH 1" in; 3/4" out. \$13.95 ADD \$2 pstge & hndng. Money back Guarantee. LABAWCO, 80 Hwy 206, Belle Mead, N.J. 08502

Ideal Car Clock



Time & date digital clock in 6 colors: Black, Blue, Brown, Beige, White, Yellow. Velcro backing sticks anywhere. Liquid crystal display. Battery operated.



\$23.95 includes handling & shipping
 Clocks Incorporated
 2035 E. Camelback Rd.
 Phoenix, Arizona 85016

DISCOVER BADGE POWER



Badge-A-Minit gives you the power to earn extra income by taking orders for pin-back buttons and badges. Clubs, political groups, schools, businesses and lodges have many needs for badges that promote their activities and identify members. With Badge-A-Minit, you create badges for all those needs with badge parts that cost just pennies each. Finished badges sell for much more!

Here's the lowest price ever for a complete badge-making system. New starter kit includes sturdy Lexan die press; color-coded, BUT-N-LOK dies; quality, pin-back badge parts; and easy-to-follow instructions. Discover badge power for only \$17.95.



NEW LOW PRICE only \$17.95

BADGE-A-MINIT, Ltd., Dept. PM-80
 Box 618, Civic Industrial Park, LaSalle, IL 61301

- YES, RUSH ME the Badge-A-Minit starter kit for only \$17.95 plus \$1.75 shipping. (Ill. res. add \$.90 tax)
- Personal check or m.o. enclosed.
- Use charge card below:
- VISA Mastercharge Am. Express Diners Club
- SEND ME FREE, the all color Badge-A-Minit catalog.

Credit Card # _____
 Interbank # (MC) _____ Exp. date _____
 Signature _____
 Name _____
 Address _____
 City _____
 State _____ Zip _____

UNCONDITIONAL MONEY BACK GUARANTEE

COUNTERFEIT GUNS BLANK-FIRING (STARTER PISTOLS)

AUTHENTIC! FULL-SIZE MACHINED METAL PISTOLS CANNOT BE MADE TO FIRE REAL AMMUNITION. These blank-firing pistols are NOT firearms! No federal license required. Purchaser MUST be 18 years or older. Money back (less postage) if not satisfied.

SAME SIZE & WEIGHT AS ORIGINAL **\$47.95 PLUS POSTAGE**

POLICE .357 MAGNUM
 Length: 9.25" Weight: 2.2 lbs.
 U50-2061 \$47.95
 U50-22BC. Blank cartridges. Box of 100 \$4.95
 Add \$1.50 POSTAGE/HANDLING TO EACH ORDER



UNIQUE IMPORTS, INC., Dept. PM080
 800 SLATERS LANE, ALEXANDRIA, VA 22313

Send U50-2061 U50-22BC FREE COLOR CATALOG
 Charge to: VISA MC AX CB DC

(LIST ALL NUMBERS ON CARD, INCLUDE EXP. DATE)
 NAME _____
 ADDRESS _____
 CITY / STATE / ZIP _____
 (MONEY BACK (LESS POSTAGE) IF NOT SATISFIED)

NEW LENAIR WASTE OIL HEATERS



CUT HEATING COSTS
 Waste Oil Worth Over \$1.00 Per Gallon as a Heating Fuel. For Commercial And Industrial Use. Heat With Any Type Waste Oil. If you have Access to Waste Oil, then **LENAIR WASTE OIL HEATERS ARE A SMART INVESTMENT. MODELS RANGING FROM 55,000 BTU'S, RADIANT AND FORCED AIR.**

Write
Lenoir Industries Inc.
 P.O. Box 1017-N
 Janesville, WI 53545
 Dealer Inquiries Invited

2000 WATT DARRIEUS ROTATING AIRFOIL



Build this **DARRIEUS** Vertical Shaft Airfoil from simple parts and generate up to **2000 WATTS** of Valuable Electricity! Newest concept in Windpower! Ideal for homes, farms cottages. Offers high efficiency, even in low windspeed areas! Simple, Economical Construction. **COMPLETE PLANS** including charge circuit: \$7.95.

GLENVALE PRODUCTS Dept PM8
 Box 358 Station D, Toronto Ontario M6P 3J9



EARN EXTRA MONEY

**For Home Upkeep . . .
 Tools . . . Hobbies . . .
 Or Anything Else**

If you can use extra cash to help meet the cost of home repairs — car maintenance — lawn and garden equipment — or the many other things that you need to provide a better life for yourself and your family — we would like to tell you about an easy way to add to your income in your spare time.

As a subscription representative for *Popular Mechanics* and other leading magazines, you can enjoy all the important advantages of operating your own independent part-time business with virtually no investment but the number of hours you decide to devote to it. Be your own boss. Work from your own home. Your family can help you, too. Best of all you already know your first customers! Your friends and neighbors are waiting for the service you can provide — at no extra cost to them.

Send for full details on how you can earn generous commissions selling new and renewal magazine subscriptions in your community. No previous selling experience is required. We will send you all the information you need to begin — free and without obligation. Just fill out the coupon below and send it in. Act today! You'll be glad you did.

INTERNATIONAL CIRCULATION DISTRIBUTORS
The Hearst Corporation, Dept. PM8-80
 250 W. 55th St., New York, N.Y. 10019

Please send me complete free details of your money-making subscription plan.

NAME _____
 STREET & NO. _____
 CITY, STATE, ZIP _____

CLASSIFIED ADVERTISEMENTS

Rate: \$4.30 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 **OCTOBER**. The closing is **AUGUST 5th**.

Send remittance payable and order to Popular Mechanics, ATT.: Hildegard E. Kappel, Class. Adv., Mgr., 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.

To avoid delay in the publication of your ad, please send descriptive materials with your request.

AUTOMOBILES

MPG INCREASED 30% + !! No gimmicks — no gadgets. Professional secrets revealed. Free details — Posco (#GB8), Box 300, LaGrangeville, N.Y. 12540

PROPANE/GASOLINE DUAL-FUELED AUTOMOBILE! Complete Plans, Instructions, and Parts Sources for converting your car. \$10.00. RDA, Box 873, Concord, NC 28025

NO GASOLINE AVAILABLE!!! Prepare yourself. Build a woodgas-generator like the one which kept vehicles running during the - **NO GASOLINE** - period of W. W. 2. Old inventions, Re-discovered in the archives of Europe. Drawings and details \$5.95 to: **GEN-GAS**, Box 671, Chatsworth, California 91311.

PROPANE SURPLUS! — Low Prices!! — Convert Your Engine — Keep Gasoline Standby! — Easily Followed Book — \$4.95 — **GUARANTEED!!** — LPG Automotive, Box 1045MH, Newport Beach, California 92663. **DON'T BE MISLED!!** Legal Conversions Cost More Than \$50.

SAVE GAS AND DRIVE. What you know and **NEED TO KNOW** about saving gasoline. **ITS HERE NOW**, seven page booklet \$2.00. Box 6271, El Monte, Calif. 91734.

GAS SHORTAGE/RATIONING Prepare now! Plans for underground storage system you can build easily and inexpensively. **VALUABLE** information package on fuel storage included **FREE** with plans. Money back guarantee. \$3.00. MLH, Inc., Dept. PDH, P.O. Box 32, Dyer, Ind. 46311

SAVE \$200 PER YEAR. Stop Wasting Gas. Proven Gas Saving System Exclusively Available and Guaranteed to Save Up to 18% of Fuel Costs. If Not Completely Satisfied, Money Fully Refunded. Rush \$4.95 Plus 50¢ Handling To: P.M.A., Department 77, 30 North San Pedro Road, San Rafael, California 94903

LECTRICKAR — Convert VW's, Fiats to electric 50 mph plans \$25.00. Info. \$1.00. Robert Bucy, Box 28794, Dallas, Tx. 75228.

GASOLINE SHORTAGES? Keep running with Propane. Flip a switch while driving, engine runs on Propane. Two simple Propane systems to choose from. Build either for around \$50. Complete Plans-\$10. Fully Guaranteed. Also included: Professional Propane Conversion Information. Gac Engineering, Box 266M, Owls Head, Maine 04854

SECRETS OF THE 200 MPG CARBURETOR! Patent Drawings and Instructions \$10.25—Money Back Guarantee. Roadrunner Publications, Raymondville, Texas 78580

WATER INJECTOR, better performance/mileage, build from readily available household materials, plans \$3.00. BRALU Enterprises, Box 5632, Huntington Beach, California 92646.

GAS SAVER'S HANDBOOK! Eight Years Research, Proven Methods. \$3.00. Roger Bray, Box 4510, San Clemente, Calif. 92672

MOTALOY Ring-Valve Replating Job—\$6.50. Money-Back Guarantee! Free Brochure! Arrow Products, Box 374M, Broken Arrow, OK 74012.

BEAT TRAFFIC TICKETS! Bypass fines; simple, proven methods work—guaranteed. Send \$2.50 Now!! Tribune P8a, Box 18553, Wichita, Kansas 67218

ALCOHOL FUEL LEGALLY. Run Car, Furnace for .30¢ Gallon. New Plans, Instruction, Formulas \$4.00. Geans Publishing, Box 98P, Payson, Utah, 84651

TURBOCARB!! — Fantastic Mileage, Power Increase! — Turbine Atomizer Fits All Carbs — The One **BIG OIL COULDN'T BUY!** — Being Patented — Complete Plans and Manual \$7.00 — Guaranteed — Avtek, Dept. PM8, Box 5202, Rockford, IL 61125

MIRACLE Carburetor Vaporizes Gas 100 Plus MPG Drawings — Details \$10.00. Money Back Guarantee. Carbu, Route 1P, Hitchcock, SD 57348

BUYING USED CAR? Quick precise instructions \$3.95. Money Back Guarantee. George Motor Co., P.O. Box 222, Oceanside, California 92054

MORE MPG, BETTER PERFORMANCE. Easy do-it-yourself project can save you \$\$\$, Costs under \$5.00 for parts. **ILLUSTRATED INSTRUCTIONS** only \$2.00. JML Research, P.O. Box 308, Enfield, CT 06082

STUDEBAKER Drivers Club. Write: S.D.C., 341 Wagner, Claremont, CA 91711

IMPROVE GASOLINE MILEAGE yourself. Simple existing carburetor modification. Complete details \$5.00. S&F Benson, 14047 Yancy St., Hamlake, MN. 55303

RUN YOUR CAR ON MOONSHINE! Free recipe, Automobile Adjustments. Lovebooks, Box 58163-pm, Louisville, Kentucky 40258

GASOLIN, Fuel Alcohol, What You Should Know! Complete Information Package \$5. National Energy, Box 40836, Washington, D.C. 20016

SAVE Dollars — Buy A Used Car. Guide \$6.00. SIDCO, Box 1770, Fort St. James, B.C., Canada V0J 1P0

FREE INFORMATION! Fuel-economy tuning secrets explained. Techneering, Box 12191B, Norfolk, VA 23502

WATER ALCOHOL INJECTION Information—\$1.00. SASE. Arndt, 2906 47th, Des Moines, Iowa 50310

WATERGAS REPLACES GASOLINE — Watergas Generator Builders' 30 Years Experience Help build your Truck Tractor Inexpensively. Information \$1.00, Instructions \$20.00. Friendly, 3481 Carrmunn, Cleveland, Ohio 44111

SAVE MONEY Easy steps for car tune-up. Send \$3.00 to: 4M Publications, Box 1427, Highland Park, N.J. 08904.

ORIGINAL MAKE YOUR OWN FUEL BOOK by Jerry Wilkerson. Nationally advertised book has plans for alcohol still, mash formulas, car and furnace conversion instructions, complete how-to. Money back guarantee. \$6.95. Fuel Inc., Box 9622, Ogden, Utah 84403

GASOLINE MILEAGE INCREASED DRAMATICALLY! Up to 30%. **DETAILS FREE!** Gasavers News, 25 So. 300 East, Salt Lake City, Utah 84111

EX-SALESMAN Tells All! Used Car Buyer's Pocket Guide Saves Money and Grief. \$2.00. S. Martin, RRI, N. Windham, CT 06256

TURN YOUR CAR INTO "MONEY MAKING MACHINE" . . . showing engineer's patented **FUELSAVER**. \$300 weekly sparetime potential! Incredible **MPG!** **FREE** test offer. Almquist Manufacturing, GT-8, Milford, PA 18337.

ALLERGIC TO SUN? Make auto side window curtain, detailed instructions \$3.00. Pamerleau Sales, 21540 W. 11 Mile Road, Southfield, Mich. 48076

SLIK-KOAT Super Lube!! - Forget expensive additives! **SLIK-KOAT ENGINES RUN BETTER.** More Power! Better Mileage! Longer Life! Details 25¢. Avtek W6, Box 5202, Rockford, Illinois 61125

BREW ALCOFUEL! 45¢ gallon? Distiller's Manual, plus Supplies Catalog, \$2.95. Alchostills, 5133 Fairhill, Philadelphia, Pa. 19120

HUNDREDS OF EFFECTIVE MILEAGE PRODUCTS, plus the technical expertise to help you get it together! Information-packed Catalog, \$2.95 (add \$1 for 1st Class Mail). **THE MILEAGE SHOP, INC.**, POB 4185-PM, Hayward, California 94540.

PAINT A Car Without Spraying Under \$30. Report \$1. J. Iznaga, Box 309, Collegedale, TN 37315

"THE TRUTH ABOUT EMISSION CONTROLS" Award Winning Automotive Writer Explains How They Work, Which Ones Affect Mileage, Tampering, The Law, Etc. Information Unavailable Elsewhere. Illustrated \$4.95. Tanglefoot, P.O. Box 31, Marlboro, NJ 07746

PROPANE Conversion — Cars — Trucks. Return to gasoline anytime while driving. Uses regular refillable trailer tanks. No engine modifications. **COMPLETELY PROVEN — TESTED — THIS SYSTEM WORKS!** Uses inexpensive **LOCALLY** available parts. Engineered for amateur mechanics. Build for around \$50.00 in two days with ordinary hand tools. Satisfaction **ABSOLUTELY GUARANTEED** or immediate refund. For complete plans **RUSHED** First Class, send \$10.00. Fleming Engineering - PM-12, RD1, Remsen, New York 13438

PICKUP TRUCK MADE FROM YOUR STATION WAGON! \$6.00 Materials, 6 hours, no welding. Illustrated Manual — \$10.00. Box 817, Provo, Utah 84601

BUNGEE TRUNK HOLD For overloaded trunks. Installation easy. Fits all cars. \$5.95. Specialties, Box 2088, Rancho Santa Fe, CA 92067

ALCOHOL Production/Car Conversion . . . **FREE** Details! NATCO, Box 3353, Ontario, California 91761

COMPLETE CAR PROTECTION AGAINST THEFT AND VANDALISM Offered by "Electricity's Latest Marvel" Alarm (Hood, Trunk, Contents). Easily Installed. 10 Year Warranty. Money back Guarantee. \$19.95 — (VISA, Mastercard — State Number, Expiry Date). Janra, Dept. PM280, Box 3700, Ogdensburg, New York 13669. (Box 6118, Station J, Ottawa, Canada K2A 1T2)

100 MPG Electric-Gas Combination, \$5.00. Home-craft, 2350 W47P, Denver, CO 80211.

TRADE YOUR MONEY? NO! SELL YOUR CAR. DON'T TRADE! SECRETS REVEALED. PROVEN. COPYRIGHTED! MONEY BACK GUARANTEE. SEND \$11.95 TODAY. AUTOFACT, POST OFFICE BOX 220H, SEASIDE, CA, 93955

REPAIR! Don't replace damaged windshields! Chemical Glass Repair, For Information, \$2 SASE. Glaser, Box 252, Big Spring, TX 79720

SAVE GAS! AMAZING NEW INVENTION Increases Mileage Up To 30%. Free Information or Send \$14.95 (money back guarantee) To: Auto-Sciences, P.O. Box 6008, Orange, CA 92667

TRADE SECRETS OF THE PROFESSIONAL AUTOMOBILE WINDOW FILM INSTALLER. Told for the first time. Full instructions. For amateur or professional. Increase your **INCOME**. Send \$18.95 to: LindHoff Corporation, P. O. Box 18000/142/P., Las Vegas, Nevada 89114.

50 TO 200 MPG Patent drawings and instructions. 5 different carburetors inventions \$12.00. BJC, P.O. Box 1451, Paradise, CA 95969

WATER INJECTOR — Build Easily, Inexpensively!!! Free Details!!! Send stamped 4"x9" Envelope. U&I, Box 4873-AP, Boise, Idaho 83704

JEEP RENEGADES: CJ-5 '76 up. 2 can carrier, rear mount, bolt on, no holes to drill, no body alterations, Canyonlands tested. Send \$57.75 cash or money order. Patent pending. F&S Off Road Accessories, P.O. Box 505, Dewey, Okla. 74029.

LIQUID FUEL POLARIZER UNIT. Attaches in 10 seconds without tools. Adds 3 to 10 MPG or refund. Pays for itself fast. \$15 each to: LFP-P1, Box 194, Kaysville, Utah 84037

SAVE \$200 PER YEAR AND STOP WASTING GAS! Proven gas-saving system exclusively available and guaranteed to save up to \$200 of fuel costs. If not completely satisfied, money fully refunded. **SPECIAL INTRODUCTORY OFFER. FREE \$50 IN DISCOUNT COUPONS** for other exciting auto products. Rush \$6.95 to: Power Marketing, Inc., Dept. 177, 30 No. San Pedro Road, San Rafael, California 94903

MORE MPG SAVE MONEY. Compare 1980 domestic and foreign cars and trucks by MPG, models, engines, transmissions, carburetion, options, price (cars). Buy MPG publication, get price publication **FREE!** Send \$5. Automotive Information Clearinghouse, Box 1746, La Mesa, California 92041.

THE "Oil Stretcher" Test Kit. Easy to use kit for testing condition of engine oil. Simple, effective! Send \$3.95 to: "Oil Stretcher", Hauser Laboratories, P.O. Box G, Boulder, Colorado 80306

TURBOCHARGERS: 6.M., Mopar. Phone 1-800-327-9009, Ext. 793, For Free Brochure.

94-MPG CARBURETOR! \$295.00 Wholesale! Free details . . . **INFORMAT**, 4N270-PC Randall, Saint Charles, Ill. 60174

SAVE 60% On Auto And Marine Regulators, Alternator Parts, Transistorized Ignition Modules. Send For Price List. LES, Box 3629, Kent, Wa 98031

HELP Stop Recession—Use Bumper Stickers: (1) Foreign Cars Cost Everyone — (2) Foreign Cars enrich foreigners — (3) Foreign cars hurt U.S. — (4) Foreign cars hurt your job. Postpaid; check or M.O. — Specify Number. Copyrighted. \$1.00 each, 2 for \$1.75, 4 for \$3.00. Quantity Discounts. Stickers Company A, Box 5011, San Pedro, CA 90732

REPLACEMENT CARPETS, HEADLINERS, TOPS! Top Quality-Reasonable Prices-Catalog 50¢. Visual Image, Box 1804, Maitland, Florida, 32751

ELECTRIC VEHICLES

ELECTRIC Car Conversion: Simple, Easy To Follow Step-By-Step Instructions. 5 Years Research and 3 Working Cars. — \$27.00. — Manual Coverage Information \$2.00. Eilers, P.O. Box 2781, Santa Clara, CA 95051

GUIDE TO ELECTRIC AUTO CONVERSION. Comprehensive 64 page Conversion Manual. Includes Proven Diagrams, Schematics, Parts Procurement, Valuable Contacts, and more!! Loaded with information!!! \$14.95. Bill Williams, 1A8, Box 1548, Cupertino, CA 95015

(Continued on next page)

ELECTRIC VEHICLES (Continued from preceding page)

HYBRID — Electric Car Catalog. Wholesale Parts — Equipment — Plans. \$2.00. Ideal-PM, Box 1237-EG, Melbourne, Florida 32935

CONVERT your VW to electric! Uses NO GAS! Thumb your nose at the gas pumps! Send today for your COMPLETE plans package. Send \$10.95 to: E.M.F., P.O. Box 2374, Jackson Hole, WY 83001.

AUTO SUPPLIES & EQUIPMENT

PARTS: Army Jeep and truck parts. Spare Parts & Equipment Co., P.O. Box 751, Lexington, Kentucky 40501

BUILD Your Own Switch for Dual Battery System. Plans & Details \$3.00. L.S. Crimp, POB 587, Madison, GA 30650

ALTERNATOR/Generator Rebuilding Book. Details: Hedelund Engineering, 7505 Barkentine, Las Vegas, Nevada 89128.

SILICONE GLAZE AUTO POLISH. Uniquely balanced formula containing three silicones. Provides showroom shine, lubricity and detergent resistance; 16-oz. can \$3.95. Money back guarantee: J. Powell, Box 826, Spencer, W.V. 25276

TIRED Of Car Falling Off Jack? Free Information. Wheatland, Box 30056, Winona 55987

THE LAST AIR FILTER YOUR CAR WILL EVER NEED! ONLY \$12.95. For complete information send \$1.00 (Refundable On Purchase) To: Lifetime Air Filter, 2211 East Ocean Blvd., Long Beach, California 90803

COMPARE, Save: 40 Piece, 3/4" Drive Ratchet, Standard And Metric Set \$16.95. 21 Piece, 3/4" Drive Ratchet, Standard Or Metric Set \$14.95. Pre-paid, Satisfaction Guaranteed. C+L Sales Co., Inc., Box 4573, Denver, Colo. 80204

PROTECT Your Vehicle And Contents FROM THEFT. Complete Electronic Alarm System, 30 Minute Installation. \$15.00. Free Details. AutoLarm, 2033 Oakview, Ashtland, Kentucky 41101

AUTO PARTS SOURCES DIRECTORY! \$2.00 Postpaid. Brannon Specialties, 700 Brown, Lafayette, Indiana 47904

WINDSHIELD Washer Doesn't Work? Maybe The Washer Nozzles Are Clogged. If So, We Have A Unique New Product That Will Help! Send \$4.80 For A Set Of Washer Nozzle Cleaners To: Files, Dept. 1M, Box 50202, Columbia, S.C. 29250

STOP OIL CHANGES. GUARANTEED. INFORMATION \$2.00. 98-1106 Kahapili, Aiea, Hawaii 96701

HYDRAULIC Jack repair kits parts and supplies. Catalog \$1.00. Hydraulic Jack Packing & Tool Co., Inc., General P.O. Box 3, Staten Island, N.Y. 10314.

MOTORCYCLES, BICYCLES, MOTORSCOOTERS & SUPPLIES

PLANS Go-Kart \$2.50, Mini Bike \$2.00, Three Wheeler \$3.00, Soap Box \$3.00, Mini Vehicle, Dept. C2, Chazy, N.Y. 12921

HONDAS, Schwinn's, Raleigh's \$25.00. Catalog \$1.20 (Refundable). Surplus, 443, Bend, Oregon 97701

SHEEPSKIN Bicycle Seat Cover, Racing or Tourist Saddle, Washable, Snug Fit, Refundable, \$16.00 Each. Dal Phillips, 901 McKenzie Ave., Victoria, B.C., Canada V8X 3G6

HANG GLIDING—AVIATION

ONE-MAN JET HELICOPTER — Easy, inexpensive to build! Detailed plans, drawings—\$7.00. HELICOPTER EXPERIMENTER'S HANDBOOK—\$4.00. Both—\$10.00. Helicraft, Box 3053, Redondo Beach, California 90277

POWERED GLIDERS by WORLD'S LARGEST MANUFACTURER. Over 1100 deliveries world-wide! Proven, economical Flying Fun: No License Required. Brochure \$5. Rotec Engineering MP8, Box 124, Duncanville, TX 75116

BOOMERANGS — INCREDIBLE RETURN! Exciting sport. FREE catalog. 30 designs, books. BoomerangMan, 306 Park, Monroe, LA 71201

SPACE & ASTRONAUTS

ANTI GRAVITY Propulsion Device. Free Brochure! RDA, Box 873N, Concord, NC 28025

HOVERCRAFT

AERO-CAR Amazing Hovercraft built easily with ordinary tools. Lawnmower engine power. Carries one man plus. Hovers, flies forward, backward. Side-ways over land/snow/water. Complete construction plans and brochure. \$8.95. Aero-Projects, Box 5118PM, Clinton, New Jersey 08809.

HOVERCRAFT Plan All Sizes. Catalog \$1.00. Universal Hovercraft, Box 281, Cordova, Illinois 61242

CB-RADIO, TV & HAM EQUIPMENT

POLICE Scanners, Crystals, Antennas, CBs, Radar Detectors. HPR, Box 19224, Denver, CO 80219

GOVERNMENT Surplus receivers, transmitters, sniperscoopers, parts. Catalog 25¢. Meshna, Nahant, Mass. 01908

INCREASE YOUR CB RANGE — LEGALLY! Free Information. "SKIPPER", Box 130-88, Paradise, Calif. 95969

FREE Educational Electronics Catalog. EduKits Workshop, Department 808B, Hewlett, New York 11557.

CB FREQUENCY EXPANDERS, how-to books, boosters, plans, kits. Catalog \$1. CB City, Box 31500M, Phoenix, AZ 85046

ADJUST YOUR OWN COLOR T.V. Instructional Booklet \$2.95. T.V. World, Box 5227, Corpus Christi, Texas 78405

CATALOG OF ELECTRONIC DESIGNS. Accessories for CB, Ham Radio, Stereo and PA Systems, Telephone, and more. Catalog and Construction Guide, \$1.00. Peter-Schmitt Enterprises, Dept. ME, P.O. Box 07071, Milwaukee, WI 53207.

ELECTRONICS

MECHANICALLY INCLINED INDIVIDUALS! Assemble electronic devices in your home. Knowledge or experience not necessary. Get started in spare time. Above average profits. \$300-\$600/wk. possible. Sales handled by others. No investment - Write for free details: **ELECTRONIC DEVELOPMENT LAB, BOX 1560PM, PINELLAS PARK, FL 33563**

STEREO, CASSETTE TAPES, ETC. . . .

FREE Catalog—Electronics Kits—Amplifiers—Pre-amplifiers—Psychedelic Strobes—SCA Adaptors—Color Organs—Digital Instruments—Guitar Amplifier. FREE Subscriptions. SWTPC, Box PM32040, San Antonio, Texas 78284.

RECORD-TAPES! Discounts to 73%; all labels; no purchase obligations; newsletters; discount dividend certificates; 100% guarantee. Free details. Discount Music Club, 650 Main St., Dept. 1-0880, New Rochelle, New York 10801.

INCREDIBLE!! Cassette Tapes containing "Sound Waves" Created by a computer! Details: Hamilton, Box 03408-PM, Cleveland, Ohio 44103

OLDIES — Original Hit 45's, Catalog \$2.00. C&S Record Sales, Box 22A, Wampsville, NY 13163

MOTION PICTURES & SOUND EQUIPMENT

16MM Films, Videotapes, Bargains. Urbanski, 8142 S. Kenneth, Chicago, Illinois 60652

FREE HOME ENTERTAINMENT CATALOG. Hundreds of titles in videocassette, super 8 or 16 mm film. New releases from Paramount, Warner Bros., Columbia, MGM, Allied Artists, Disney and more. Specify film or video. Write: Niles, Box 1576-PM, South Bend, IN 46634.

CAMPERS & TRAILER KITS—PLANS

R-V KITS — PLANS — PATTERNS Campers — Trailers — Fifth Wheels — Vans — Covers — Motorhomes. Simple construction. Save! R-V Kits/Equipment catalog \$1.00. Glen-L R-V's, 9152PM Rosecrans, Bellflower, CA 90706

BOATS, OUTBOARDS, TRAILERS & KITS

BOATKITS — PLANS — PATTERNS — FRAMEPACS — FIBERGLASS — World's largest Catalogues — 300 — designs — 8'/80' — plywood — fiberglass — steel — POWERBOATS — inboard — outboard — jets — cruisers — sportfishers — hydroplanes — runabouts — SAILBOATS — Daysailers — Trailer-sailers — Multihulls — motorsailers — (KYACK-CANOE) — large selection wood — canvas — fiberglass — BOATBUILDING — materials — hardware — fastenings — rigging — sails — plywood — FIBERGLASS — polyester epoxies — foams — cloth — mats — C-flex — special section boatbuilding with wood epoxy saturation system — catalogues \$2.00 (Book "One-Off Boatbuilding" \$6.00) CLARKCRAFT, 16-P Aqualane, Tonawanda, NY 14150

BOAT PLANS — FRAME KITS — PATTERNS — Huge 140-page catalog! Powerboats — Sailboats — Outboards — Jets — Rowboats — Houseboats — Runabouts — Dories — Workboats — Racing Boats — In plywood — Cold Molded — Wood/Epoxy — Fiberglass — 8' to 49'. Lowest cost, highest quality for 27 years. Easy, proven methods include instructions especially for amateurs. No lofting! "BOATBUILDING SUPPLIES" — Fastenings — Fiberglass — Resins — Glues — Equipment — Spars — Books — Boat Trailer Plans. Send \$2.00 for catalog plus free "Boatbuilding Supplies" brochure. "Inboard Marine Hardware" catalog also \$2.00. Glen-L Marine, 9152 Rosecrans, Dept. MP, Bellflower, CA 90706

EVINRUDE 1979 Bargains . . . all sizes . . . Scott McCulloch parts . . . \$1. handling . . . Electra Marine, 610 Merrick Road, Lynbrook, New York 11563

SAVE On Outboard Repairs. Many Little Known and Often Overlooked Tips that will Save you Money \$4.00. Service Manuals for Mercury, Evinrude, Johnson, Chrysler, Mercruiser, & OMC. State Year & Model. Mr. Outboard, 8618 Jordan, Lubbock, Texas 79423

BOAT KITS — 22 trailerable models — POWER and SAIL — 16'-30'. Molded fiberglass hulls and decks come factory assembled - you install factory supplied interior. Save half factory-built cost. No experience required. FREE catalog. Luger, Dept. BC-80, 3800 West Highway 13, Burnsville, Minnesota 55337 —(612) 890-3000

PARA-SAIL, The Ascending Parachute. Flies like a Kite behind your Motorboat, Car, Jeep or Snowmobile. Sky Supplies, Rt. 1, Box 894A, Dept. M, DeLand, FL 32720. (904) 734-9641. Also available: kites for towing.

FIBERGLASS — RESINS — Foams — glass — epoxies — mat — etc. Factory prices — Catalogue \$2.00 — Book "Complete Fiberglassing" \$5.00 — CLARKCRAFT — 16-PI Aqualane — Tonawanda — NY 14150

KYACK — CANOES — PLANS — KITS — Patterns — Materials 40 models in fiberglass — plywood — canvas — Catalogues with "Boatbuilder's Guide" \$1.00 — CLARKCRAFT — 163 Aqualane — Tonawanda — NY 14150

MARINE EQUIPMENT & SERVICE

LIFETIME Impellers, Inc. Announces New Water Pump Impellers Guaranteed To Last Five Times Longer Or Will Be Replaced Free. All Makes Outboard And I.O. Pumps. Send Year, Make, Model, Serial Or Old Impeller And \$12.95 Plus \$1.25 Postage And Handling To: P.O. Box 903, Dunedin, FL 33528

CAMPING EQUIPMENT & TENTS

FREE Catalog. Everything for camping. Campmor, Box 407N, Bogota, New Jersey 07603

CAMPERS KNIFE — Versatile Knife, Fork, Spoon. Combination \$6.98. Keanco Enterprises, 30 Loyalist Lane, Saint John, New Brunswick, Canada E2M 4B2

OUTDOORSMAN! Military Surplus Ponchos. Use For Rainwear, Windbreaker, Tent, etc. \$6.98 pp.-Dodge City Surplus, Box 97, Denton, N.C. 27239

ATHLETIC & BODY BUILDING COURSES

KUNG-FU Free Literature. McLisa, Box 1755, Dept.-PM-8, Honolulu, Hawaii 96806

PHYSICAL Fitness Newsletter, Dept. 40, P.O. 195, Western Springs, Illinois 60558, Introductory copy.

SPORTING GOODS AND EQUIPMENT

ARCHERY Lowest Discount Prices. All top brands. Orders shipped same day received. Money-back guarantee. World's Largest Supplier. Free Catalog. Anderson Archery Corporation, Grand Ledge, Michigan 48837

WEIGHT LIFTING BELT. Mandatory for Lifting. Rugged Lustraflex® Construction. Direct Factory Shipment Makes Possible Low Price of \$13.95 alone, or \$18.95 With Dipping/Chinning Attachment for Two Belts in One! PROMPT Delivery . . . MONEY-BACK Guarantee . . . Include Belt Size, Send check or Money Order. V. Shaw Enterprises, Box 724, Latrobe, Pennsylvania 15650

PITCHING Washer set. Official size with rules \$12.95 postpaid. Parnell Enterprises, Box 9295, Odessa, Texas 79760

FISHING, TACKLE, LURES

"HOMEMADE LURE PLANS!!!" FREE DETAILS: "Lures-PM," Box 340, East Hanover, New Jersey 07936

SHEEPSKIN Fly Drying Patch, Attaches to Button. Send \$2.00, Dal Phillips, 901 McKenzie Ave., Victoria, B.C., Canada V8X 3G6

ENGINES, MOTORS, MAGNETS

ENGINES aircooled to 16 HP for Mowers, Tillers, Riders, Hobby. Tremendous discounts, illustration, prices. \$2.00 Refundable. Ashland Small Engines, Ashland, MO 65010

MANUFACTURER'S Surplus New 5.2 CID 2-Stroke, Chainsaw Engines with Recoil Starter, Choke, Air-cleaner, Ignition Switch, Muffler and Clutch. Shipped Prepaid in Contiguous U.S. \$249.95. Send Check or Money Order to: Olympic Instruments, Inc., Rt. 1, Box 730, Vashon, WA. 98070.

GOOD THREE PHASE From Single—Run Anything! Plans \$3.00. Harrit, Box 495, Great Neck, N.Y. 11022

CONVERT Four cycle lawn mower engines to propane. Details \$3.00. Efficiency Research, Box 343, Porterville, California 93257.

TOOLS FOR SALE

AIR TOOLS — Free Wholesale Catalog; Hoosier Distributing, 3009 Sample, South Bend, Ind. 46619

AIR AND BODY TOOLS, Savings, Selection. FREE CATALOG. AZG, 7711 Main, Reynoldsburg, Ohio 43068.

MILWAUKEE SAWZALL As Low As \$99.75 SK-Stanley-ingersoll Rand & Other Name Brand Tools 10%-50% Off Catalog \$1.00. Tool Warehouse, Box 754, PM880, Farmingdale, N.Y. 11735

HAND Tools — Buy Tools Below Wholesale For Yourself Or Re-Sale. All American Made Brands In Stock. Catalog \$1 Refundable. Tool Warehouse, Ltd., 115 No. Wolf Rd., Wheeling, Ill. 60090

MACHINERY, TOOLS & SUPPLIES

1600 CATALOGS listed and described. Sources for everything imaginable. \$3.00. Masterlog, Box 879, Fairfax, California 94930

(Continued on next page) авторским правом

MACHINERY, TOOLS & SUPPLIES

(Continued from preceding page)

COMPLETE LINE of high quality, low-priced CUTTING TOOLS, HOLDING FIXTURES, PRECISION INSTRUMENTS, METAL CUTTING LATHES, DRILL PRESSES, MILLING MACHINES, BANDSAWS AND MUCH, MUCH, MORE. Most items delivered free. Send \$3. for 332 page 1980 catalog, refundable with first order. **KABACO TOOLS, INC.**, P.O. Box 343, Sterling Heights, Mich. 48078

UNIMAT Owners. 10 Standard Threads, 5 Feeds with Threading-Power Feed Attachment. Free Brochure! Carico, 3551 Grant, Corona, Ca. 91720

SMALL FOUNDRY Furnaces, Supplies. Free literature. Pyramid Products, 3736 South 7th Avenue, Phoenix, Arizona 85041

4" METAL Cutting Lathe \$72.65. Taig, 15048 Proctor, Industry, CA 91746

BUILD FULL SIZE METAL WORKING LATHE. Use Scrap/Junk. **FREE DETAILS.** Tennantville Company, P.O. Box 838B, Northville, N.Y. 12134

CLEANSTICK, extends life of sanding belts/discs, 6" long by 1-1/4" diameter. \$3.95 each prepaid. 25 each prepaid \$86.25. Instructions included. Lucien Harmon Company, 3055 Kinkaid Drive, Dallas, Texas 75220.

LOG SPLITTER Parts, 2 Stage Pumps Cylinders, Valves \$37.50, Engines, Etc. Top Brands, Discount Prices. Send \$1.00 for Catalog. Northern Hydraulics, 1289 Valmark, Eagan, Minn. 55123

LATHES - Unimat - Maximat - Sherline - Machinex. Catalog \$1.00, Shop Supplies \$1.00. Campbell, 2100 Selma Road, Springfield, Ohio 45505

MILLING Cutters, lathe milling attachments, Catalog \$1.00. Potter, Box 73, Cedar Rapids, Iowa 52406.

STEEL, Aluminum, Brass - Sheet - Bar - Tube, Shop Supplies, Plans. Write: CEI, Box 152A, Knoxville, Ill. 61448

RUN three phase motors with single phase power. P-7 wiring diagram and instructions \$5.00. Advance Research, 3232 Shawnee, Fort Worth, Texas 76135

30 LATHE Tool Projects, -Mill, Slot, Grind etc. -Catalog \$2.00. EJ Cafarelli, 4735 Hayman, Warren, MI. 48092.

BUY Equipment at the same LOW price as large industrial plants. Write for **FREE** Industrial Catalog for home craftsman. Hapco, 36P Letchworth St., Buffalo, N.Y. 14213

MORTISING ATTACHMENT For Cummings, Enco, Continental or Similar Drill Presses. Send for Free Literature. Ted Vander Putten, 673 Hickory Road, Oneida, WI 54155

BLACKSMITH & FOUNDRY SUPPLIES

FORGES: gas, coal - hammers - tongs - anvils - anvils benches—all blacksmith supplies. Catalog \$1 (refunded first order). Mankel Blacksmith Shop, 7836 Cannonsburg, Cannonsburg, MI 49317.

ENERGY SAVING

CENTRAL HEAT FROM WOOD! Wood-burning boilers heat whole house, yield hot water! Details: Tekton Corporation, Box 999, Conway, MA 01341.

COMFORTABLE, Warm Air Near Floor Level, if you have Heat on the Ceiling. Make it yourself: \$60.00. Pat. Pend. Proven, Portable. Simple. Complete Plans and Instructions. \$10.95 ppd. USA. Conserv-A-Temp, Box A1513, Lawton, Okla. 73502.

YOU Build; Solar Water Heater. \$5. Drawings - Materials List. Department A - P.O. Box 27964, Tempe, Arizona 85282.

SAVE 30% of your gas heating bills - 10 Minute Installation. AGA Approved - **FREE DETAILS.** Sunway of Youngstown, Box 4192, Youngstown, Ohio, 44515 - Enclose \$1.00 for postage and handling.

SAVE 58% on water and up to \$700 on energy. Send \$4.25 for 3 aquasavers to: C. M. Inc., P.O. Box 43258, Cleveland, Ohio 44143.

SAVE BIG - Water Cool Your Home - Simple Guide - \$4.95. Merritt, 110 Penman, Jacksonville, FL 32233

NEW ENERGY SAVER! 7 1/2 watt night light features built-in light sensor. Lights and shuts off automatically to conserve energy. \$6.95. Free details. **BERTSCH'S,** 512 Prairie, Roanoke, Ill. 61561

VALUABLE 280 PAGE ENERGY HANDBOOK. Must save money or full refund. Send \$3.95 today. **WORD ASSOCIATES,** 512 Van Buren Crt., Dept. HMA, Bowling Green, Ohio 43402

COMPUTERIZED ANALYSIS recommends home energy conservation investments returning to 100%. Details and 170 energy saving ideas \$3.00. Energy Consultants, Box 66892, Seattle, WA 98166

HOW TO KEEP HOME OFFICE COOLER. BILLS LOWER. New fiberglass Solar Screen. Kits for all glass areas. Easy to make, install. Brochures, Samples, \$1.00 (Refundable). DOWCO, Box 11437P, Fort Worth, TX 76109

BEAT THE SYSTEM! 101 Energy Savers. Only \$3.00. D&G Publications, Suite D-1-PM1, 1105 N. Main, Gainesville, FL 32601.

INSULATING SOCKET SEALERS. Stop up to 20% air loss, according to Texas Power & Light. Sockets and switches leak more air than both doors and windows combined. UL listed. Fire retardant. 9 socket, 3 switch sealers, \$1.99 postpaid, 2 Pkg. \$3.75. DOWCO, Box 11437P, Fort Worth, TX 76109

HIGH ENERGY COSTS? Reduce them my way! \$3. Waldron, 4503 E. 5th St., #48, Vancouver, Wash. 98661

SAVE 30% on Fuels, Gas, Electric, Bills. Details \$3.00 and SASE To: B.P., Box 647, New Brunswick, N.J. 08903

FREE HOT WATER from Air Conditioning and Heat Pumps. Details \$3.50. Heating, 3 Golf Ave., Eagle Nest Estates, N. Myrtle Beach, S.C. 29582

WOOD-STOVE MANUFACTURER: 25 LB. Castiron Door, \$70.00 Each, Freight included. Catalog \$1.00. Fabstove, P.O. Box 285, Graham, N.C. 27253. 919-226-9337.

50% Savings on home water and fuel. Free details. CSD Associates, Box 185, Camarillo, California 93010

DIGITAL ENERGY COMPUTER Programs - Heat, Airconditioning, Lights, Diamon Systems, 3726 S. Peoria, Tulsa, Oklahoma 74105

BURNING COAL EFFICIENTLY - Complete practical guide, novice - householder, 48p. \$3.75 saddle-bound, \$4.50 squarebound. Anthracite burns cleanly. Saco Valley Printing, Dept. PM, Fryeburg, Maine 04037

SOLAR & ALTERNATE ENERGY

400-PAGE METHANE FUEL MANUAL! Plans, formulas, diagrams, equations, etc. Everything you need to know. Convert home farm, etc. Generate fuel from garbage! **ONLY \$15.00!** RDA, Box 873, Concord, NC 28025

AMAZING Forced-Air Wood Heater. Supplement your Furnace or use Alone. Write: Box 3, Rockton, Ill. 61072

KALWALL'S SOLAR HEATING CATALOG! FULL Line of Solar Heating Components, Including Sun-Lite® Glazing and Tubes. Order all Materials from one Source. Send \$2.00 for Catalog. Solar Components. Dept. M, P.O. Box 237, Manchester, New Hampshire 03105

ENERGY INTEGRATION - Book on Alcohol, Methane, Electricity & Solar Systems for Homesite Energy Production. \$2. AlEnSy, Rt. 2, Box 43, San Marcos, Texas 78666

BUILD Underground Air-Conditioner For Your Home. Plans \$3.00. PKP, Box 166, Delta, Louisiana 71233

ALTERNATIVE ENERGY ALMANAC - Handbook Containing Design Equations, Meteorological Data, rules-of-thumb, Wiring Diagrams, etc. Send \$8.00: Tri-Century, Box 258M, La Mesa, CA 92041

SOLAR POOL HEATER - SEND \$4.95. For Plans. Haley Enterprises, Box 1113, New Caney, Texas 77357

FREE HOT WATER. Build system from discarded parts. Plans \$2.00. List of publications \$1.00. Handi-Tech Publications, Box 1192, Hickory, N. C. 28601

MAKE Money heating your home, shop, greenhouse! Simple, Versatile, Cheap (not solar). Plans \$5.00. Forester, 4025 Patricia, Boise, Idaho 83704.

WIND ELECTRIC SYSTEMS Most advanced, cost effective. Residential, commercial. Dealerships. Information \$2. International Energy Systems, 119 E. Lucy St., Florida City, Fl. 33034

SIMPLE Solar Secrets that Slash Home Heating Costs. Report. \$4.00. JET Publications, Box 298PM1, Gant, AL 35747

HOME HEATING, FUEL SAVERS

BUILD YOUR OWN FIREPLACE! This manual comes complete with all working drawings and specifications needed for a clear understanding of a typical fireplace construction. Send \$5.95 to: Aguayo, Samaniego Assoc., 1140 Airway #123, El Paso, Texas, 79925

\$MILLIONS GO UP IN SMOKE YEARLY! Make Fireplace Logs from LEAVES and Solve an Annoying Disposal Problem. For Complete Plans and Instruction send \$5.00 To: E. Williams, P.O. Box 306, Lansdowne, Pennsylvania 19050

HOME CRAFTSMAN

UNFINISHED picture frame moulding. Factory close-out. 50% discount. 200 styles. Write: Japs, 126-PF Seventh North, Hopkins, MN 55343

CATALOG FULL-SIZE FURNITURE PLANS - \$1.00. Refunded with first order. Traditional, Early American, over 150! Furniture Designs, 1425 Sherman, Dept. CP-80, Evanston, Illinois 60201.

WORLD'S LARGEST CATALOG? Three pounds 832 pages. Every Tool, Supply, Machine, imaginable \$5.00. Refundable. McKiligan, PM-880, Johnson City, New York 13790

WOODWORKERS- Projects with plastics instead of wood, using woodworking tools. Instructions, Projects, and Sources, \$5.00. Westons, Box 7614, Greensboro, N.C. 27407

FREE HOBBY Tool Catalog, 1,000 items below Wholesale! International Curio Shoppe, D-64, Box D, Mountaintale, New York 12763

EXOTIC, Domestic Hardwoods. 50 Species. Brochure \$1.00. Austin Hardwoods, Box 3096, Austin, Tx. 78764

WIPE-ON WOOD FINISHING: Dustproof, No Messy Brushes, Professional Results Yet Easy as 1-2-3. Recommended by Craftsmen For Over 50 Years. **FREE** Booklet - **GENERAL FINISHES,** Box 14363P, Milwaukee, WI. 53214.

ROOFING Information Booklet by Professional. Save Hundreds on Buying or Repairing. Send \$3.00 to: Ted Hamilton, 1514 Roosevelt, National City, Calif. 92050

END and cocktail tables, marble appearance, five sizes, catalog \$1.00. Refundable. Tables, Box 990, Round Rock, Texas 78664

101 PATTERNS, Gifts, Novelties, Action Windmills plus "Make Money Jig Sawing". Only \$4.00 Prepaid 1st. Class. Mastercraft 85M, P.O. Box 631, Park Ridge, Illinois 60068

BEAUTIFUL CALIFORNIA ROCKING CHAIR FOR UNDER \$35. Plans \$5.50. Perry, Box 109, Providence, Utah 84332

FREE! EXOTIC VENEER SAMPLE plus illustrated supply catalog with simplified instructions! Learn how to create beautifully veneered furniture quickly, easily! Exotic veneers, inlays, supplies. Hurry! Morgan, PO1K12, 1123 Bardstown Road, Louisville, Kentucky 40204.

PORTABLE PICKNICK TABLE. Fits in trunk. Unbelievable easy design. \$2.00. Box 942, Minneapolis, MN 55440

PLANS - Versatile Game Table, Backgammon, Chess + More. \$5.00. Designs, 447 N. Swidler, Orange, CA 92669

A 10 Place Gun Cabinet For Under \$60.00. Plans And Material List \$3.00. G. Pistner, 154 Comet Rd., St. Mary's, PA. 15857

BED PLANS, INSTRUCTIONS. Single - \$2.95 Bunk - \$3.95. Crow Enterprises, Dept. 8P-0, Box 638, Westmont, Illinois 60559

WOODWORKING - Catalog of Early American Plans and Kits available for gifts. Decorator items and furniture. Send \$1.00 to: SugarBranch Woodworks, P.O. Box 499, Rogue River, OR 97537

FREE CONSTRUCTION GRADE LUMBER - Easily/Legally procured your area! Complete report \$3.00. Continental Services, Publishing Dept., P.O. Box 339, Montvale, N.J. 07645.

RECREATIONAL FURNITURE PLANS - Unique Designs To Provide Years Of Lasting Service. Send \$1.25. Refundable. For Descriptive Literature To: K. E. Leinan, 2421 Maverick, Dallas, Tx. 75228.

NEW! UNIQUE! Woodcraft Product. Make, Demonstrate, **EASY! Solid MONEYMAKER!** Details **FREE.** Glenn-Art, 202 Johns Ave., Lebanon, PA 17042

BACKBUG Looks like a VW but it's a relaxing massager. Easily made from scrap lumber. Plans \$2.00. K. Chase, 4489 Leonora Drive, Tucker, GA 30084.

UNIQUE PATTERNS - Nativity Scene Puzzle, Toys; Catalog \$1, Free Pattern: Woodbox, Box 530, Williamsburg, New Mexico 87942

QUALITY PICNIC TABLE Built To Take it. For Complete Working Plans Send \$3.00 To: Reinhardt Furniture and Cabinets, Box 116, Tiffin, Ohio 44883

GEARLESS CLOCKWORKS, Wooden; Complete Plans, Drawings, Templates. \$4. Candlepress, 1124 Northwest 40 Ave., Gainesville, FL 32601

SANDER/GRINDER you can build from easily available materials. Plans \$3.75. R. Kasel, Box 97, Lakeville, MN 55044

WATER WHEEL PLANTER 41" high 1/4 circle. Plans, patterns, average woodworking ability. \$2.50. CCI, P.O. Box 5563, Lakeland, FL 33803

70 PROFITABLE PATTERNS! Wooden Decorative Items, Toys, Gifts. Plus "Guide to Selling Your Crafts" Only \$5.00. Wood 'N Things, Dept. PM708, 183 Ashland St., Melrose, Mass. 02176

CONSTRUCTION PLANS, BLUEPRINTS

STORAGE Problems??? Plan Catalog of Garages, Sheds, Workshops . . . \$2.98! Whip-Poor-Will Publications, Box 339PB, South Boston, Va. 24592.

STORAGE Barn or Play House Plans. Gable, mansard, gambrel, Shed. One, \$7.50, Two \$11.50, Four \$19.80. Architect Plans C, P.O. Box 421, Twinsburg, Ohio 44087

SAVE THOUSANDS \$\$\$ building own home. Builder's Manual tells how. \$7.95. CUMBUS, 1005 Pebble Drive, Greensboro, N.C. 27410

BUILD BACKYARD PLAYGROUND: Five-project Booklet \$3.75! Talbot, 305 W. Milton, Austin, TX 78704

DUTCH BARN Utility Shed 8'x12'x8' Plans, Material List. \$3.00. Lee's, Box 5637EKs, Johnson City, TN 37601

TOMORROW'S HOMES TODAY Highly energy efficient Earth-Sheltered home designs. Construction blueprints available through catalog. For catalog send \$5.00 to: Earth-Sheltered Home Designers, P.O. Box 1191, Cape Girardeau, Mo. 63701

LOG CABINS & "A" FRAMES

AFFORDABLE Housing In Energy Efficient Permanent Pre-Cut Log Homes, 1980 Color Catalog \$5.00; Heritage Log Homes, Dept. PM, Box 610, Gatlinburg, TN 37738. Dealership Kit \$8.00.

HOME BUILDING & REMODELING

PRE-FAB 5-room house in your garage
Truck to Building Site . . . Assemble . . . Finish
Interior . . . \$8,600 Complete . . . Easy Plans . . .
\$10. Herman's Sim-ply Homes, Box 5531, Charlotte,
N.C. 28225

ARCHITECTURAL Services thru Mail. Panu Architects,
34-14 87 Street, Flushing, NY 11372.

UNDERGROUND HOUSE PLANS Complete for Building.
Licensed Structural Engineer. No Heating,
Cooling or Insurance needed. All Air Filtered.
Sketch - Information \$2.00. Waymon Rudder,
Ramer, Ala. 36069

REDUCE REMODELING TIME. Recessed Cover Plate
Adapter Eliminates Need to Move Electrical Boxes.
Free Matching Cover Plate With Each Adapter. Write:
Johnson Enterprises, Box 406, Glenside, PA 19038

HOW TO BUY Or Build a New Home. Easy Step by
Step Guide Shows You How to Get the Most For Your
Money! Written by Builder. Send \$5.00 to: Jonathan
Publications, Box 2722-M, North Canton, Ohio 44720.
Satisfaction Guaranteed.

HOME RESTYLING Discover hidden potential of your
home. Designer develops exciting ideas for beautiful
new look. Send only \$9.95 and home photo to:
Wonder House, 6502 Swallow Cove Road, Jacksonville,
Fla. 32211

ALUMINUM SIDE YOUR OWN HOME. Step-by-step,
do-it-yourself instructions from planning to finish
save \$1000s. Send \$8.50 to: Goodwin Enterprises,
P.O. Box 855, Lombard, Illinois 60048.

GET LATEST EARTH SHELTERED HOME INFORMATION!
Two new books, manual, blueprints. Free
color brochure! Underground Homes, 700 Masonic
Building, Dept. PM8C, Portsmouth, Ohio 45662.

BEAT INFLATION — BUILD YOUR OWN HOME Save
\$10,000 to \$20,000. Step by step instructions and
illustrations. Send \$20 cash, check or money order.
Paulin Construction, Rt. 3, Clinton, Arkansas 72031

PLASTICS

CASTOLITE Liquid Plastics. Crystal clear, colors.
For casting, embedding, coating, fiberglassing; in
industry, laboratories, craft work. Reproduce your
designs with our mold materials. Profitable. Illustrated
Catalog \$1.00. CASTOLITE, Dept. 80J/PM,
Box 391, Woodstock, IL 60098.

AIR CONDITIONING

AIR Conditioning and Refrigeration Technician . . .
Classroom plus practical training . . . One year
diploma . . . Vets OK . . . Accredited. Montgomery
Technical Institute, Box 487V, Troy, NC 27371

DO IT YOURSELF

HOW TO Test/Repair House Wiring. Make Testing
Equipment. Illustrations. \$3.00. Bennett Enterprises,
Box 116-PM, Atwood, TN 38220

SILVER Repairs. Illustrated Details on Common
Repairs. \$5. Laramans Silver Shop, 902 Laura St.,
Casselberry, Fla. 32707

REFRIGERATOR REPAIR MANUAL written by a
licensed technician \$17.95. McAnally, Box 19931,
Memorial Park Station, Houston, Texas 77024

ELECTROPLATING. Complete amateur's textbook.
All metals Electroplate metallic/nonmetallic items
\$9.95. Details free. Tropic, Box 95-P3, Palm Bay,
Florida 32905.

UPHOLSTERING SUPPLIES, Fabrics, Vinyls, Tools,
Cane, Instruction Books, Free Catalog. Jim Dandy
Sales, Box 3077P, Cincinnati, Ohio 45230

LET THE SUN SHINE IN. Build, install skylights for
under \$75.00. Plans, instructions, \$2.95. Delfin
Publications #C, 2450 Montgomery, Cardiff, Ca.
92007

SAVE: Costly Repairs on Aluminum and Vinyl
Siding; Special Tool, eliminates Dents, Cracks
and Bubbly Waves; Send \$9.95 to: Albert
Lapointe, 13001 Kingswell Dr., Woodbridge, VA
22193

WATERBED — Build it yourself — Save \$100's.
Complete Plans \$3.95. W. Plant, 4620 Panorama
Drive, Huntsville, Alabama 35801

SAVE Thousands — How to Sell your Home without
a Broker! FREE Brochure. D&B Gifts, Dept. PM,
P.O. Box 1627, Albany, Oregon 97321

YOU CAN TRAIN YOUR DOG! Easy! Inexpensive! Free
Details. K9'er, POB 1681, Moxee, Washington 98936

HOW TO CONTROL PESTS IN YOUR HOME! Protect
your health and save!!!!!! Booklet, \$1.95. Box 18937,
Tampa, Florida 33679

NEGATIVE ION GENERATOR Save! Complete Plans,
Instructions, Parts List — Only \$4.90. Inside
Changes, P.O. Box 18589, Denver, Colorado 80218

SHARPEN Antique Two Man Saws, Illustrated
Detailed Booklet \$3.00. Andy Huntington, P.O. Box 5,
Clayton, Ontario, Canada K0A 1P0

SECURITY BOX PICTURE FRAME. 8" x 12" In
Wall you can Build. Unique, Easy Plans. Money Back
Guarantee. Send \$4.95 To: H&H Products, P.O. Box
2188, Akron, Ohio 44309

DOGHOUSES — With Windbreaker and Maintenance
Door. Build Your Own, or Construct and Sell
for Profits. Three Sizes to Choose From, Large,
Medium and Small. Easy to Read Plans. Send \$3.00
for all Three Models To — Design, P.O. Box 297,
Elk Grove, Illinois 60007

BIRDHOUSE—Castle Purple Martin has 16 apts
concrete base with steel pipe towering- 10 feet
off ground. Build your own or construct and sell
for profits. Easy to read plans. Send \$4.00 to:
Design, P.O. Box 297, Elk Grove, Illinois 60007

SAVE UP TO 80% OR MORE When Having Your
Car Painted. For Details Send \$2.95 Plus 60¢ Postage
Handling. E & G Sales, P.O. Box 5885, High
Point, N.C. 27262

DOES YOUR MOBILE HOME HAVE ALUMINUM WIRING?
"How to Repair your Own Mobile Home." Covers
Aluminum Wiring and All Repairs, Maintenance, and
Improvements. Send \$5.95 To: R&T Enterprises, Box
4702, Redding, Calif. 96099

AIR CONDITIONING BOOK: Learn to Do It Yourself
with a Practical Guide for Air Conditioning Repairs.
"You and Your Air Conditioner". Send \$5.95 to: Box
3466, San Antonio, Texas 78211

"BACKYARD Mechanic" Maintenance on carburetors,
timing, ignition, spark plugs. \$3.00. Murray, RR. 1,
Box 627, Stonington, CT 06378

PRACTICALS Success. No recordings, No travel
Brutal Truth Seminar, Uplift Publications, Box 352,
Palestine, Texas 75801

ATTRACTIVE MASONRY. Save labor costs. Fire-
places, walls, etc. Illustrated Instructions. \$3.25.
Box 100467, Nashville, TN 37210.

GIANT SCREEN TV Projection Kits Buy Direct
\$9.95. Bell Enterprises, 4616 Belair Road, Baltimore,
MD 21206. Dealer Inquiries Welcome.

COMPLETE KNIFE KITS — Hunting folding, kitchen.
No power tools needed. Send for free
information. KITCO-3, Box 861, Carmichael, CA
95608

COOL Pets Inexpensively! Send \$3.00 for **PATENTED**
Plans. Pet-Co, 7 Royal Oak Court, Holbrook,
N.Y. 11741

WINE cellar! How and Where! \$2.00. Timmerman,
90 Franklin Ave., Hawthorne N.J. 07506

KEEP LEFTOVER PAINT FRESH INDEFINITELY! Ingenious
new patented paint-saver pays for itself or
money back. Send \$3 (one) or \$5 (two). Box 528,
Deerfield, Illinois 60015

TAKE ME APART! Unique Porta-Desk. Plans/Instructions —
\$3.00. Plans - A1, 6178 Deewood
Court So., Columbus, Ohio 43229

CONVERTABLE Picnic Table/Lawn Bench. Instructions
\$5.00. 729 31st No., Fargo, ND 58102

SAVE Money! Fix Your Lawnmower Computerized
Instructions \$3.00. Helmut Motors, 2419 Aberdeen,
Kenner, LA 70062

SAVE \$40 to \$120 next years heating bill. How to
clean, service, maintain, gas-oil fired equipment.
Money back guarantee. \$4.00. HPH, Box 582 A,
Manistee, MI. 49660

HOW I PURCHASED A New Home For 30% Less
Than its Market Value **AND YOU CAN TO** Send \$5.00
to: SAK, P.O. Box 17, Andover, Kansas 67002

ALCOHOL FUEL STILL. Tested and producing. Send
\$12.50 for Blue-prints Material List Mash-Recipes
Federal Regulation Gasohol. Check M.O. to: M.M.
Engineering, 75 Bank Str., Unit #20, Sparks, Nev.
89431

SAVE Hundreds of Dollars Complete Pumping
System. 5 Year Guarantee. Send us your well
specifications! We will send you all prices on a do-
it-yourself installation. Pump House, 195R West
Newberry Road, Bloomfield, Ct. 06002

PROTECT YOUR VALUABLES Engraving tool marks
metal, glass, plastic. Needs no sharpening batteries
\$3.88 postpaid. Regal Products, Box 55205B,
Riverside, Calif. 92517

WATERBEDS BY MAIL! Complete plans for Frames,
Headboards, Drawer Pedestals. Also offering Top
Quality Guaranteed Mattresses, Heaters, Accessories.
Catalogue \$1.00. Discount Waterbeds, 1805 2nd
Street #H, Berkeley, CA 94710

ARTS & CRAFTS

MAKE Figurines, Plaques, candles, lawn ornaments.
Molds, plastercraft kits, liquid rubber. Sample and
catalogue 25¢. Wooley Company, Box 29, Peoria,
Illinois 61650.

"GETTING Started in Stained Glass" 50¢.
Whittemore, Box 2065T, Hanover, Mass. 02339.

STAINED GLASS Catalog-P Send 50¢. Tools, Supplies,
Books. Sayfescrafts, 171 Main Street, Nyack,
New York 10960

CREATE EXCITING GRAPHIC MURALS and Wall
Hangings. 300 patterns - \$1.00 each. Animals, Sports,
Nostalgia. Instruction Book with Illustrated Catalog -
\$3.95. Coastgraphics, Box 40273-J, Santa Barbara,
Ca. 93103.

\$ CRAFTS \$. . . Discover the what, where and
how of marketing your handicrafts. \$2.00. Earth
Publications, PO Box 367 PM, Worth, Illinois 60482

DRIFTWOOD Mobiles, sand dollar Christmas tree
ornaments. Instructions \$4.00. Driftwood, Box
1337-P1, Panama City, Florida 32401

CYPRESS WALL CLOCK KIT - Includes everything
to assemble and finish. Shipped promptly by UPS.
Satisfaction **GUARANTEED.** Send \$34.95 to: BIOTA
Company, Dept P, 745 Indian Hills Parkway,
Marietta, Georgia. 30067

SCRIMSHAW Manual, Supply Catalogue—50¢.
Unicorn, 8205 134th Street, Jamaica, NY 11435

CARTOONING, COMMERCIAL ARTS, & SIGN PAINTING

MODERN Cartooning taught by mail. Write for free
brochure. Cartoonerama—Box 263-2H, Branford,
Conn. 06405.

35 LESSON cartooning course. Cartoonist's Magazine,
both \$3.00. Hartman, Box 30367, Lincoln,
Nebraska 68503.

SIGN Painting Learned At Home. No Special Talent
Needed. Free Proof. Watson's, Phillips, Nebraska
68865

SIGN Painting — Easy method. Free catalogue.
Kaufmann Company, Centertown, Missouri 65023

MODELS—CARS—SHIPS—TRAINS—PLANES ETC.

BOOMERANG 14" SQUARE. Send \$2.50: Jarvco,
1802 Sandalwood, Caldwell, ID 83605

BUILD museum-quality ships models, gun models,
dollhouse room settings. 1980 Model Catalog features
complete kits, fittings, plans, construction
materials, tools. "How-To" books. 88 pages. Only
\$1.00. James Bliss & Company, Dept. PM, Route 128,
Dedham, MA 02026.

CIVIL WAR Model CANNON Plans: Catalog free.
Green—PM-88, Box 892, Shalimar, Fla. 32579

RADIO CONTROL—Airplanes, Boats, Motorcycles,
Helicopters, Supplies. Big Discount Catalog—\$3.00
(Refundable). Modelers Supply, Box 7185,
Montgomery, AL 36107.

MODEL ROCKETS, KITS, ENGINES, and SUPPLIES.
Send \$1.00 For Catalog and Price List. The Mail
Box, Post Office Box 110338, Nashville, TN. 37211

MODEL AIRPLANES — Huge Catalog. \$2.00. Sig
Manufacturing Co., Inc., Montezuma, IA 50171

TOYS, GAMES, PUZZLES, NOVELTIES

CHESS Computers. Other Game Computers. Latest
Models. Discounted. Information — Prices —
Orders (Visa/Mastercharge) — (516) 872-3333 —
10 AM-4:30PM (Eastern Time). \$2 Price Deduction
for Callers or Write: ICD Corp., 71-A West Merrick
Road, Valley Stream, New York 11580

VOLCANIC Ash. Souvenir vial of ash direct from
Washington's Mt. St. Helens. Dated and Certified.
\$3.00. Homestead, P.O. Box 618, Madras, Oregon
97741

WASHER TOSS. New skillful outdoor game.
Friendly competition. Fun for all ages. Send \$9.95
prepaid. Pamela Games, 12253 S. McDaniels, Alsip,
Illinois 60658

MT. ST. HELEN Volcanic Ash Souvenir. Send \$2.00
To: Gower Industries, P.O. Box 7083, Olympia,
Washington 98507

MAGIC TRICKS, JOKES, VENTRILOQUISM

FREE! World's Leading Novelty Catalog. 1800 Jokes,
Tricks, Science, Sports, Hobbies. Johnson-Smith,
C-10, Mt. Clemens, Mich. 48043

VENTRILOQUISM/Puppets! Catalog \$1.00 (Refundable).
Maher, Box 420PM, Littleton, Colorado 80160.

PROFESSIONAL MAGIC Catalog, \$1.00. Same day
Service, No Substitutes. Fabulous Magic, 3319 E.
Charleston, Las Vegas, Nevada 89104

FREE! \$2.00 Trick, Huge Catalog, all 50¢.
Abracadabra-MP, Scotch Plains, New Jersey 07076

VENTRILOQUISM! COURSES, DUMMIES. Brochure
\$1.00. — Rizzy's, 6034 So. Pulaski, Chicago, Illinois
60629

HOROSCOPES FOR CYNICS A Must For All
Astrology Freaks \$2.00. Russ Wilson, Box 76477, Los
Angeles, Calif. 90076

HOBBIES & COLLECTIONS

"OLD Time Soldier Molds", Write for free information
and special offering. Castings-PM, P.O. Box
542, Highland Park, Illinois 60035

BEER CAN COLLECTORS — Write For Our New
FREE Catalog. Box 3807-E, Stamford, CT 06905

COLLECT COINS — How to collect, where to
buy, sell and how to get started. \$1.50 ppd.
Satisfaction Guaranteed. Ken's Gifts, 10 Spencer
Ave., Box 107PM8, Candor, N.Y. 13743

HOBBIES — BELT BUCKLES For Coins or Stones,
Specialty Buckles, Jewelry Mountings, Cut Stones,
Rockhound Supplies. Wholesale Catalog. 25¢. Elkoite
Corp., 806½ 10th St., Wheatland, Wyoming 82201

DOLLHOUSES And **MINIATURES.** Send \$1.00 (Refundable
with First Order) For Catalog and Price
List. The Mail Box, Post Office Box 110338,
Nashville TN 37211

(Continued on next page)

HOBBIES & COLLECTIONS

(Continued from preceding page)

VOLCANIC ASH From The MT. ST. HELEN'S Eruption May 18, 1980. For your Rare Historical Collection of "Ash Fallout" Send Name & Address with \$9.95 Postage Paid to: C.E. Lindgren, 8958 N. Wall, Portland, OR 97203

SEALS, STICKERS, SCRAPS, DECALS, LABELS. 500 Varieties. Catalog 65¢. Sil-Ken Reflections, 421 Cliffwood Avenue, Cliffwood, N.J. 07721

EXCLUSIVE Information on fascinating, valuable, inexpensive hobby \$2 — Jerry, Box 2062, Kettering, Ohio 45429

ANTIQUES, RELICS, INDIAN

INDIAN Artifacts Lists 25¢, Birdpoints \$7.50 Dozen, Guide Book \$8.81 P.P. Secrist, Deerfield, MO 64741

INDIAN Artifacts List 25¢, Birdpoints \$7.50 Dozen, Guide Book \$8.81 P.P. Secrist, Deerfield, MO 64741

STAMP COLLECTING

16 Foreign Stamps 54-86 Years Old, Only 10¢. (Adults Only). Goliath, CS-1, Bethlehem, New Hampshire 03574.

BREATHTAKING Beautiful, 50 Different mint Monaco pictorials commemoratives only \$1.50 with mint complete set approvals. Pagoda, Box 132P, Sidney, Ohio 45365.

GREAT Gift free with 1st purchase — fine United States approvals and want list service. Send .15¢ for handling. The Stamp Boutique, Box 86M, Wheeling, Ill. 60090

SINGLE STAMPS 2¢ and up. Mounted in books. **TRUST STAMP COMPANY**, P.O. Box 100-P, Jamaica, New York 11435.

50 YEARS Old fifteen different United States, over fifty years old—25¢ with approvals. Jaxon, Box C11-P, New Rochelle, New York 10804.

50¢ BRINGS You 100 pictorial plus worldwide approvals. Capt. Shaw's Stamps, Box 277, Ocean Park, Maine 04063.

50 DIFFERENT Old U.S. between 1861 and 1939 - \$1.00. Ed Roush, 423 Shepard, Mansfield, Ohio 44907.

PENNY! Approvals! Regardless catalogue! Kloster, 4164 52nd St., San Diego, Calif. 92105.

2,000,000 Stamps—150 Countries—2¢ Each. Belden, Box 4149, Dearborn 48126

FREE Surprise collection sent with approvals. Gould, 1784 Union, San Francisco 94123.

100 INDIA 10¢ Approval Applicants. Gibson, Box T, Williamstown, N.J. 08094

OLD U.S. Stamps on Approval. Chester, Box 15414G, Philadelphia, Pa. 19149

FREE: 32 Page United States and United Nations Price List. Shelton, Box 610547C, North Miami, Florida 33161.

CANADA. 50 different 25¢ Approvals. Oroszky, Box 1-C, Sarnia, Ontario, Canada N7T 7H8

HISTORIC Visit to U.S. of POPE JOHN PAUL II Commemorated by a Fantastically Beautiful first Time Cover with Official Postmarks and Lovely Engraved Portrait of His Holiness. Only \$1.25. K.M. WALSH, BOX 308A, TUCKAHOE, NEW YORK 10707

100 Different U.S. 25¢ Approvals. Bradley, Box 425P, Midlothian, VA 23113

72 DIFFERENT US, 10¢ with approvals. Album Service, Soledad, Calif. 93960

BARGAIN 20 U.S. over 40 years old - 10¢. Quality Approvals. PAL, Box 886, Alamo, Ca. 94507

U.S. Bargain. 24 Different Air Mails \$1.00 with beautiful worldwide approvals. Stamp Center, Kennebunk, Maine 04043

UNITED NATIONS 3 Complete Mint Sets 25¢, Approvals. Cornetta, POB 1509-M, Lake Placid, Florida, 33852

BARGAIN 100 World-wide Stamps 25¢. Quality Approvals. R. Parker, Box 143, West Brookfield, MA 01585

U.S. MINT Specials! Flag Set complete \$2.00; 1936 Army-Navy complete \$2.00. Free List. Brooks, 2601 Avenue "U", Brooklyn, New York 11229

FREE World Wide Stamps with Approvals. Chapmans, Box 487W, Galesburg, Michigan 49053

SAVE \$10.00! OLD, VALUABLE U.S. COLLECTION: 100 DIFFERENT between 1849 and 1934. **GUARANTEED** \$15.00 value. **SPECIAL: \$5.00.** Anderson, Box 1143, Cupertino, California 95014

\$5.00 Value, 100 Different United States Commemoratives \$1.00: Bryson, Box 8123, Toledo, Ohio 43605

50 ARGENTINA — Different 10¢ Approvals. Gobstamps, Box 690, Saco, Maine 04072

SPECTACULAR World Collection — 10¢. Vatican Ghana, San Marino U.S., Russia, Animals, Space. Over 100 different! Plus U.S. Catalog, Approvals. Global, Box 7429-P-30, Olympia, Washington 98507

WOW! Bicentennial Souvenir Sheet Worth Over \$2.00 Plus 100 Different Worldwide 25¢ With Approvals. Tarheel Philatelics, Siler City, North Carolina 27344

500 Different World-Wide Stamps for \$1.00. Approvals included. R.G. Sales, Dept. M. Box 1065, Jamaica, N.Y. 11431

50 U.S. 50¢ Approvals Adults. Happy, Box 124, Springvale, Maine 04083

COMMEMORATIVES — U.S. Assortment 25¢ Approvals. Lee's, Box 2105, Albany, N.Y. 12220

BUYING U.S. World for Packaging, Send Quantities, Samples, Your Price to: Carrad's Stamps, Box 5210, Auckland, New Zealand. 200 Different, Australia — N.Z. \$6.00.

FREE New Disney Set. Request Approvals. Alpaugh, Box 225, Highbridge, NJ 08829

"WHOLESALE" U.S. — Foreign Pricelist and catalog Free! Everything Guaranteed. Schneider, Box 1240, Grand Rapids, Michigan 49501

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 any or none, return promptly, please. Jamestown Stamp, Dept. E80PM, Jamestown, NY 14701

1,000 Different World + 100 Different Mongolian Beauties \$3.00. Approvals. Adults Only. Gouge, Box 88-MJ, Elizabethton, Tennessee 37643.

16 DIFFERENT U.S. Airmail stamps worth over \$1.00 Only 10¢. (Adults Only). Limit One Set. Wonderful Lists included. Littleton Stamps, AH-1, Littleton, New Hampshire 03561.

U.S. 30 Mint Commemoratives \$1.00! 6 Commemorative Plate Blocks \$1.00! Approvals. Gordon Davison, Contocook, New Hamp. 03229

FREE Mint Project Mercury and 220 United States and Foreign Stamps — Approvals. Stamps PM, Box 1427, Bellflower, CA 90706

U.S. DIFFERENT! 500; \$5.00, 1000; \$25.00, 1200; \$45.00. "Granny's", Box 134M, Seagrave, NC 27341

TOPS! 100 Popular Poland Stamps (all different) only 25¢. Mystic, Dept. PS1, Camden, New York 13316.

WOW! 110 All Different Germany 10¢. Commemoratives, Airmails, High Values, Big Catalog, bargain lists. Also, fine stamps from our approval service, buy any or none, return promptly, please. Jamestown Stamp, Dept. AB0PM, Jamestown, NY 14701

US AIRMAILS 25 Different 25¢. Princess City Stamps, Box 908, Mishawaka, Indiana 46544.

31 U.S. Commemoratives, Bargain Lists Used U.S., Foreign Dollar Packets, 10¢. Hadley, Box 2869, San Francisco, 94126

UNITED NATIONS. Free set with price list. Ftacek Stamps, Box 1023, Manteca, California 95336

WOW! 50 Stamps all Different, 15¢ When You Order My Approvals. Ellis E. Hendrix, 1001 Erin, Houston, TX 77009

COINS, TOKENS, CURRENCY

TEN Foreign Coins from Iceland, Israel, Pakistan, Algeria, etc. Only 10¢. (Adults Only.) Wonderful Price Lists included. Littleton Coins, MB-1, Littleton, New Hampshire 03561.

3 OLD Liberty Head Nickels Only \$1.00. Issued before 1913. Limit 1 Set. (Adults Only.) Plus price lists. Littleton Coins, HL-1, Littleton, New Hampshire 03561.

15 DIFFERENT (scarce) Buffalo Nickels \$7.00; 10 Different \$5.00. Coin Fair, Box 911, New York, NY 10008

VALUABLE COINS May still be found in circulation. Send for illustrated checklist, only \$1.00. William Smilie Associates, 1482 Valley Rd. #A122, Montecito, Calif. 93108

COLOR SLIDES

TRAVEL Colorslides — Worldwide Catalog 75¢. Worldwide, 7427-M Washburn, Minneapolis, Minn. 55423

BOOKS & PUBLICATIONS

CRIME By Computer, \$6.95 Postpaid — 300 Pages — Quimtronix, Box 548-PMO, Seattle, Washington 98111

PUBLISH Your Book! Join our successful authors. Publicity, advertising, beautiful books. All subjects invited. Send for fact-filled booklet and free manuscript report. Cariton Press, Dept. PMH, 84 Fifth Avenue, New York 10011.

FREE Book. Prophet Elijah Coming Before Christ. Megiddo Mission, Dept. 63, 481 Thurston Road, Rochester, N.Y. 14619.

PUBLISHERS' OVERSTOCKS BARGAIN BOOKS. 3,000 titles, all subjects! Free catalog: Hamilton, 98-51 Clapboard, Danbury, CT 06810

FREE FOOD? Food stamp report \$2.00. ELLGEE, Box 25258PM, Atlanta, GA. 30328.

COMPUTER Survival Kit Help for Harried Bill-Payers \$11.95 postpaid- MISCO, Dept. A, P.O. Box 2846, Grand Rapids, MI. 49503

MANY Helpful, Interesting titles. Gooch, 265 W. Robinson, Hernando, Ms. 38632

HOW TO Landscape with railroad ties booklet, \$4.50. Hawkins, 3900 Scobie, Peninsula, Ohio 44264

HORSE RACING! Beginners learn to handicap in eight chapters. For free information write: Chidley Publications, Box 647, Ruidoso Downs, New Mexico 88346

COPYRIGHT, PUBLISH IT YOURSELF! Informative new booklet, \$1.95 PPD. R.T. Baum, Box 6501, San Jose, California 95150.

"PROFITS in Welding". Bk. \$3. Trader, Box 8-A, Wilmore, PA 15962

GUARANTEED Lowest rates on America's most popular magazines. Free list. Magazines, Box 14564-A, St. Louis, Missouri 63178.

BOOKS — Save — 50%. Catalog \$1.00. Phillippi Ent., 490 N. 26 St., Wytheville, VA 24382

FREE Details On Making Money By Mail Order. Goal, Box 44081A, Shreveport, LA 71104.

TOTAL MIND POWER (How to Use the Other 90% of Your Mind), Free Booklet. Total Mind Power Institute #21, Larkspur, CA 94939

FREE catalog. Over 400 Books. World, 449 W. 24th, Hazleton, PA 18201

WILDERNESS Living! Shelter, Food, Power, Self-Defense Books. Free Catalog. Aspen Cabin, Box 2517, Flagstaff, Arizona 86003

MUSIC INSTRUCTIONS & INSTRUMENTS

INTERNATIONAL Catalog valuable to makers, repairers of stringed instruments. Imported woods, parts, accessories, kits. Fine German-made violins, violas, cellos, basses and bows. Send 25¢ for catalog. 10% Credit Certificate will be enclosed. International Violin Company Ltd., Dept. CD, 4026 W. Belvedere Ave., Baltimore, Md. 21215.

SUPER-SAVINGS Guitar Strings, Accessories, Effects Pedals, Microphones, etc. Free Catalog. Super-Save Music, Box 387, Boca Raton, Florida 33432

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

FREE Catalog! Kits and Completed. Harpsichords, Hammered and Appalachian dulcimers, guitars, banjos, mandolins. Hughes Dulcimers, 4419 West Colfax, PM, Denver, Colo. 80204.

ACCORDION Top Brands, Cordovox, Buy Direct. Tremendous discounts. Trades accepted. Free brochure PM. Accordion-O-Rama, 16 West 19th Street, New York, N.Y. 10011.

BANJO GUITAR Cassette Lessons. Free Catalog. Bailey, 4005PM-2 Lara, Chattanooga, TN 37416

EASY Play and Make! Quality Dulcimers, Banjos, Hammered Dulcimers, Instruments and Kits, from \$29. (Brochure) HERE, INC. #P, 29 SE Main St., Minneapolis, Minnesota 55414

GUITAR, Banjo, violin, Mandolin Making Materials, Accessories, Books, Piano Tuning Kits, Catalog 50¢. International Luthiers Supply, Box 15444, Tulsa, Ok. 74112

ACCORDIONS — Famous Makes. 40 Models! Importer-to-You Prices. Save! Cordovox and Button Style. Home Trial. Trade-ins. Terms. Free Catalog! Accordion Corporation, Dept. R, 5535 Belmont, Chicago 60641

PLAY Piano and Organ at Once! Easy, Enjoyable, Three-Cassette Tape Course Teaches you to Play by Ear. Proven, Copyrighted Method Developed by Professional Musician. It Works! Moneyback Guarantee. \$29.95. Professional Communications, P.O. Box 18776, San Jose, Ca. 95158.

POEMS Set To Music. Nashville Music Productions, Box 40001-PM, Nashville, Tennessee 37204.

STRINGS, ACCESSORIES, SCARCE PARTS, REPAIR BOOKS. Catalog 25¢. Stringking, Rifton, New York 12471

TENOR BANJO New Orleans style. Beginner to soloist self taught; \$11.95 Postpaid. Details for SASE. BanjoA, Box 1225, Metairie, Louisiana 70004.

PIANO Breakthrough: Play chord piano in 10 days or money back. Free details! Piano University, Box 192-B, Medford, Oregon 97501

EDUCATION & INSTRUCTIONS

LEARN Law Enforcement. Patrol procedures, criminal investigation, making arrests and more. Course includes scientific kits—fingerprinting, crime photography, evidence collection. Free facts. Police Sciences Institute, Dept. PBC50, 4401 Birch, Newport Beach, CA 92660.

EARN HIGH SCHOOL DIPLOMA AT HOME IN 1 - 6 MONTHS!

STATE registered. Lowest tuition available. Individual counseling. Up to 1/2 of your credits awarded for job experience. Call free 1-800-327-8103. Cambridge Academy (PM-8), 409 E. Osceola, Stuart, FL 33494.

BOOKKEEPING Or Accounting! Easy home-study plan prepares you quickly to do your own books . . . or others. Approved for Veterans. Free "Accounting Career Kit." Write: Accounting School, Dept. PBC40, Newport Beach, CA 92660.

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, Daneshill, Sussex, England.

(Continued on next page)

EDUCATION & INSTRUCTIONS

(Continued from preceding page)

INSTANT MEMORY . . . NEW WAY TO REMEMBER. No memorization. Release "photographic" memory. Forget nothing! Liberates extraordinary knowledge, talents, ESP. Immediate results! Free information. Institute of Advanced Thinking, 845PM ViaLapaz, Pacific Palisades, California 90272.

COLEMAN CAMP GEAR Repair. Earn as you learn at home for profit or hobby. Lanterns, Stoves, heaters, all models. Modern Schools, Dept. PM, 4225 N. Brown Ave., Scottsdale, AZ 85251.

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.

DETECTIVE Profession. Easy home study; free tie-tack or lapel pin, certificate future. Professional Investigators Training School, Dept. CP, P.O. Box 1890, San Pedro, CA 90733

UNIVERSITY DEGREES BY MAIL Programs! Bachelors, Masters, PH.D's . . . Free revealing details. Counseling, Box 317-PM8, Tustin, California 92680.

LEARN Asleep or awake. Records, tapes, equipment! Free catalog! Drawer PM-400, Ruidoso, New Mexico 88345

BARTENDING - Bar Management Home Study. Bartending Training, 3843-C San Fernando Road, Glendale, CA 91204

AUCTIONEERING: Mendenhall School of Auctioneering, High Point, North Carolina 27263. Free information.

REFRIGERATION or Aircraft Mechanics. Sample \$1.00. Box 13660, Portland, Oregon 97213

AUTOSUGGESTION. Sleep-learning headquarters! Tapes, records, books, Gigantic catalog free. Research Association, Box 24PM, Olympia, Washington 98501.

REISCH WORLD WIDE COLLEGE OF AUCTIONEERING, INC. World's Largest-46 years. Term soon. Free catalog, VA Approved, Modern Auction Library "FREE" with enrollment, 515-423-5242 — Col. Gordon E. Taylor, P.O. Box 949, Dept. 19, Mason City, IA 50401.

LEARN Sewing Machine repairing. A profitable Trade. Easy to learn. Free details. Sewing Center, 187 FR, Rochelle, GA 31079

SCREEN-Printing. Learn how to make money at home spare time printing signs, bumper stickers, T-shirts, more. Print on paper, plastic, glass, metal, fabric . . . for stores, realtors, mail order, factories, politicians, etc. Write: Screen Printing Center 4401 Birch, Dept. PBC40, Newport Beach, CA 92660

AUCTIONEERING - Free catalog. Resident or Home Study Course, Nashville Auction School, Nashville, TN. Mailing address - P.O. Box 190, Lawrenceburg, TN 38464.

GUN Repair! Train at home! Career or home business. Learn gun repair, customizing, ballistics, ammo-making, buying, selling . . . more. Get free facts. Firearms School, Dept. PBC60, 4500 Campus, Newport Beach, CA 92660

LEARN GAS TURBINES! Homestudy training - Theory, Operation, Maintenance, All Systems, Overhaul, Inspection, Technical Skills, etc. Aircraft, Nonaircraft, Automotive, Marine, Truck, Generation, more. Established 1957. Diploma Awarded! Details - American Jet School, Dept. PM, Darby, MT 59829

HOW TO Sell—Successfully. Direct from Author. Send \$3.00. (Money Back Guaranteed). AL SPAETH ENTERPRISES, P.O. Box 132, Kenosha, WI 53141

USED Courses! Books! Lists 25¢. Smith's, 124 Marlborough, Salem, Massachusetts 01970

UNIVERSITY DEGREES BY MAIL . . . OUR SPECIALTY. FREE Revealing details. Success, Box 13151-MB, Columbus, Ohio 43213.

PIANO TUNING EASILY LEARNED Ultramodern Methods. Inquire: Allison, E. Patchogue, NY 11772

LEARN Motorcycle Repair - tune-up & repair your own or make extra money fixing motorcycles for others. Tools included. Write for free facts. Motorcycle Repair School, Dept. PBC70, 4500 Campus, Newport Beach, CA 92660.

ENGINEERING Careers. Should your Son or Daughter be an Engineer? Informative two page report by noted engineering educator. \$1.00 to: Careers, Box 608, Birmingham, MI 48012.

LEARN Home Construction . . . Classroom plus practical training . . . One year diploma Vets OK . . . Accredited. Montgomery Technical Institute, Box 487V, Troy, NC 27371

DRAFTING is a great career! Men, women. No previous experience or special talent needed. We train you at home in spare time. Get free facts. Write: North American School of Drafting, Dept. PBC70, 4500 Campus, Newport Beach, CA 92660.

MECHANICS OF STRUCTURING SALES IDEAS Giving Them Force & Direction For Profitable Results — Told in an interesting way from 40 years experience of successful selling \$9.95 postpaid - McWatty, 3247 63 Ave S.W., Seattle, WA 98116

BACKGAMMON Winning Secrets. Successful Play For Beginners And Advanced Players. Opening Moves, Mathematics. Only \$2.00. Roscco, 104 Sunnyside St., Chicopee, Mass. 01020

HYDRAULICS BASIC Course. Learn at Home. Heavy Equipment, Industrial, Aircraft. Certificate Awarded. \$10.00 Cash, Check or Money Order. HYDRAULICS, Box 14173, Savannah, GA 31406

PLAY WINNING TENNIS! Read how to use the right shot at the right time, use other player's weaknesses and make best use of wind, sun and court surfaces. Send \$2.50 to: Compleat Tennis Strategist, Dept. PM1, 4657 Winnebago, San Diego, California 92117

MAKE BIG MONEY repairing air conditioners. Your own business full or part time. Complete simple course. \$9.95. Send to: A/C, Box 7654, St. Paul, MN 55119

MONEY SUCCESS WEALTH The Key is Mind/mind. Send \$2.00 to: S&S Co., P.O. Box 16456, St. Louis, Mo. 63125

SELF study business law courses. Satisfaction guaranteed. Box 605, Griffin, Ga. 30224

AUTO Mechanics. Learn at home in spare time. Engine, brakes, steering, front end, clutch, differential . . . even transmission, fuel, cooling, electrical systems. Everything—minor tune-up to major overhaul. Approved for veterans. Get free facts from: ICS Auto Mechanics School, Dept. PBC70, Scranton, Pennsylvania 18515.

FREE CASSETTE, if Your Family really comes First with you, give them the tools to win at life. Sundance, 34A 4th Roslyn, WA. 98941

ELECTRONIC GAME REPAIR - COIN MACHINE TRAINING. Growing field needs qualified technicians. BECOME ONE. Call toll free 800-634-6537. Nevada Gaming School, 3100 Sirius Rd., Las Vegas, NV 89102 (Approved for Veterans.)

IS YOUR CHILD READY FOR SCHOOL? Practical guide with activities, checklists, school's completion certificate. **START TODAY!** Send \$5.00 . . . 30-day money-back guarantee! Rainbow's End, #3-PM8 Pompano Court, Arlington, Texas 76013

EMPLOYMENT INFORMATION

WORK OVERSEAS, DOMESTIC, OFFSHORE, ONSHORE, FREE DETAILS. JOBS, BOX 73542, HOUSTON, TX 77090

RIVERBOATS need crewmen. Male-Female. Unbelievable pay, travel, prestige, leisure. Report tells all. \$3.95 to: Bianco, P.O. Box 64658PM, Baton Rouge, La. 70896.

AUSTRALIA - New Zealand want you! 50,000 Jobs! Big Pay. Free Transportation. Employer Listings \$2.00. Free Information 68 Countries! Austco, Box 4116-E, Hayward, CA 94540

FLORIDA EMPLOYMENT OPPORTUNITIES — Help Wanted Sections from Newspapers of Six Major Florida Cities Sent by First Class Mail. Cities include Tampa, Orlando, Miami, St. Petersburg, Jacksonville, Gainesville. Send \$6.00 to: J. McMillin, Box 929, Hawthorne, Florida 32640

JOB GETTING RESUME KIT. Step-by-step instructions, Work Sheets, Samples. \$4.25. Resumes, Box 9794, Tulsa, Oklahoma, 74107

JOBS OVERSEAS . . . (Including Alaska.) Free Details, Global Employment, Box 808-PM, National City, California 92050.

"BIG MONEY"!! (Casino Jobs) Atlantic City!!! "Information Free" . . . (SASE). Blizzard, Dept. PM1, Northfield, NJ 08225

100 JOBS—need one-need change—ideas where to find—SASE \$2.00—Sunshine, P.O. Box 459, Poulisbo, WA 98370

RESUMES \$15.00. Send work history, education, skills, personals, hobbies, goals. J. Vanbuskirk, 2363 Needham Road, Suite 222, El Cajon, Ca. 92020

HIGH Paying construction jobs in Saudia Arabia. Send \$3.00 to: L.S., Box #1054, 2000 Center St., Berkeley, Cal. 94707.

ROCKY MOUNTAIN EMPLOYMENT NEWSLETTER!! Colorado, Idaho, Montana, Wyoming!! Current Openings — All Occupations!! Free Details . . . Intermountain-I, 3506 Birch, Cheyenne, Wyoming 82001.

FLORIDA EMPLOYMENT — Complete Classified listing of Jobs and Apartments available — Mailed — State Area Preference — \$2.00. Moseman, 200 Grove, Ormond Beach, Florida 32074

TEXAS SUN COAST Needs you. High paying jobs in energy. \$5.00 brings current list. U.S. Help, Box 1627, Fulton, Texas 78358

WE'LL Write, Print, Mail your Resume to 500 Personnel Managers Nationwide, \$25.00. Details, Preparation Forms \$5.00 (Applies). Austin, Box 1953-B, Glendale, CA 91209

EMPLOYMENT WANTED

ARE YOU LOOKING FOR EMPLOYMENT? Try our Classified Section! It costs only \$4.30 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

OVERSEAS Employment . . . \$10,000-\$50,000 +. Free information! Employment International, Box 29217-AH, Indianapolis, Indiana 46229.

EARN \$20,000, NO EXPERIENCE NECESSARY. WRITE: DOLAN, BOX 368B, MOUNT HOLLY, NEW JERSEY 08060

FOR INVENTORS

INVENTORS — United States Patent Office Searches, Patent Development Engineering and Marketing of your inventions. Ideas with manufacturers contracts. Send for **FREE INVENTION CERTIFICATES** and invention information. Serving Inventors Since 1948. **GEORGE SPECTOR, LICENSED PROFESSIONAL PATENT ENGINEER.** Former United States Patent Office EXAMINER—3615 Woolworth Building, New York, 10007

NONPROFIT Foundation helps inventors. Widest range of services. Free recording forms. Free evaluation. Affiliated Inventors Foundation, 501-B Iowa, Colorado Springs, Co. 80909.

U.S. PATENT Office Searches, 234 Broadway, Room 3615, New York 10007. Free invention certificates.

REGISTERED PATENT ATTORNEY Washington D.C. Suburb. Donald A. Kettlestrings, 414 Hungerford Drive, Suite 411, Rockville, Maryland 20850

REGISTERED PATENT ATTORNEY. Applications and Searches. Mail Service. Free Preliminary Review. Box 392PM, Millwood, N.Y. 10546

THE ONLY SUCCESSFUL WAY to sell/license your invention. **FREE** booklet outlines inexpensive selling program completely under your control reaching American plus **INTERNATIONAL** manufacturers. SPC, 532 Broadway, Suite 20F, El Cajon, CA 92021

RECORD Your New Idea or invention immediately with the U.S. Patent Office for \$10.00 Filing Fee. Prove beyond doubt that you are first inventor. Complete Instructions and Forms Kit \$6.00. Duggar Associates, Box 212, Jasper, Alabama 35501

PRODUCT SOURCE DIGEST publishes information on new and existing products that are available for acquisition. If you are interested in selling, licensing or divesting a product or idea send for free information. This service available to both companies and individuals. RCF, 2509 Browncoft Blvd., Rochester, NY 14625.

NEW! "Patenting Your Invention Yourself!" \$29.95. Guaranteed! Registered Practitioner, 7400PM, Washington, D.C. 20044. Invention Record Free!

DESIGN STUDIO will help inventors. Ken Roddy Design, 3701 W. Alabama, Suite 470, Houston, Tx. 77027

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, 105 W. Adams, Chicago, Illinois 60603

INVENTORS: If you have an invention for sale or license, write for free booklet explaining how we can help you. Kessler Sales Corp., C-58-F1, Fremont, Ohio 43420

PATENT AND DEVELOP Your invention. Registered Patent Agent and Licensed Professional Engineer. Send for **FREE PATENT INFORMATION** Every inventor Should Have. Richard L. Miller, 3612 Woolworth Building, New York, New York 10007. (212) 267-5252

INVENTIONS WANTED

IDEAS, inventions, new products needed by innovative manufacturers. Marketing assistance available to individuals, tinkerers, universities, companies with feasible concepts. Write for: Kit-PM, IMI, 701 Smithfield, Pittsburgh, PA 15222.

INVENTIONS MARKETED! Cash Royalties! **FREE INVENTION PROTECTION CERTIFICATES.** George Spector Manufacturers Representatives, Woolworth Building, New York, N.Y. 10007.

MANUFACTURER SEEKING INVENTIONS. ADVANTEK INTERNATIONAL, 1100 17TH NW, WASHINGTON, DC 20036.

INVENTIONS WANTED FREE CONSULTATION NO IDEA TOO SMALL Disclosure registration. Potential cash or royalties from manufacturers seeking new ideas. For free information on how to register your ideas, Call or write: **AMERICAN INVENTORS CORP.,** 59 Interstate Dr., Dept. PM, West Springfield, MA 01089. (413) 737-5376. A Fee Based Marketing Company

LEARN how to offer your invention for sale or license. Free booklet outlines procedures, royalty rates, requirements. Kessler Sales Corporation, C-58-IW, Fremont, Ohio 43420.

REAL ESTATE & FARMS

NEW! FREE! Big Fall-Holiday Catalog! Over 5,400 country properties described, pictured! Land, Farms, Homes, Businesses, Recreation, Retirement buys! Selected best throughout the U.S. Over 700 offices, 43 states All Across America! Yours **FREE** from the World's Largest! **STROUT REALTY, Inc.,** 7 S. Dearborn, Dept. 5800, Chicago, IL 60603.

CANADIAN LAND FROM \$47.00 AN ACRE. Low monthly payments. Choice properties across Canada. Ideal for cottages, hunting, fishing & investment. 6 month money back guarantee. 12 month exchange privilege. Catalogue, \$1.00. Write: Canadian Estate Land, Dept. 23C, 286 Lawrence Ave. West, Toronto, Canada M5M 3A8

TAKE OVER 10 acres Texas ranchland, beautiful valley. No down. \$25.00 month. Box 2851-D, Van Nuys, CA 91404

(Continued on next page) авторским правом

REAL ESTATE & FARMS

(Continued from preceding page)

MAKE A Fortune in Real Estate. \$4.00. John Varrone, 2902 Park, Cleveland, OH 44134

HOW TO BUY AND SELL LAND. Your lifetime guidebook to success. \$5.00. Wiseman Opportunities, Route 1, Box 561, Elgin, Texas 78621.

CALIFORNIA. Acreage. Lots. \$40 down. \$40 monthly. Box 35291, Los Angeles 90035

RECREATION Land Tracts. 5-40 Acres, Idaho — Washington — Montana. Timber — Views — Streams. Insured title — Access — Low down. Write: Western High Lands, Inc., Dept. A, Box 969, Hayden Lake, Idaho 83835

SAVE Thousands in Brokerage Costs — \$1.75. Homeseller's Guide, Box 18, Hopedale, MA 01747

BIG . . . NEW . . . FREE . . . FALL CATALOG! Over 2,700 top values coast to coast! UNITED FARM AGENCY, 612-PM West 47th, Kansas City, Mo. 64112.

LIQUIDATING Michigan Land, Lake Superior area, \$5,995, 40 Acres \$59.00 down, \$59.00 month, other properties available. Outside Michigan 1-800-521-4996, Michigan 1-800-482-4974 Bloch (F) 3650 Dixie Highway, Drayton Plains, MI 48020

SELL YOUR OWN HOME . . . save THOUSANDS . . . BROKER tells how . . . PROFESSIONAL SYSTEM . . . Free details . . . Self Help Systems, Box 1005-M, Maywood, New Jersey 07607

MOVING? Enjoy — better climate, jobs, outdoor life, freer life-style, in Santa Clara County, Calif. Guaranteed. Information on employment, living conditions & trends. \$5.00. West Coast Services, Box 51652, Dept. C, Palo Alto, California 94303

BUYING & SELLING

WE CAN HELP you buy, sell, trade almost anything you have or want. Send Stamped Envelope To: Locators, 2223 Gateway Circle, Lodi, 95240

SCRAP Silver Electrical Contact Points, Forklift Contacts, Industrial Scrap Silver, Sterling and Gold Jewelry. Send Sample for My Offer. All Samples Returned. Bob Leszczak, 652 Myrtle St., Elizabeth, NJ 07202. (201) 353-5049.

EXPORT-IMPORT

2500 "Fast selling" products. Free brochures! Balco, Box 91309-B8, Cleveland, Ohio 44101

BUY IT WHOLESALE

REPLACEMENT PARTS, Service tools for Chain Saws, Small Engines. First Quality. Substantial savings. Free Catalog. Stores, shops, give sales tax number for dealer information, Repair Parts, Box 6329-K77, Erie, PA 16512

SAVE ON PARTS! Free catalog jammed with Motorcycle, Snowmobile, Small engine parts, Accessories. Manufacturer's Supply, Box 157-PM, Dorchester, Wisconsin 54425

BELTS And Buckles. Complete line fast sellers including truckers, motorcycles, CB's, westerns, etc. Big Profits. Complete dealer set up. Catalog, details free. Anchor Specialties, Box 3958-BPM, North Providence, RI 02911

RINGS, Jewelry priced 130% below Retail Price. Catalog, \$1.00 (Refundable). Anka-PM, 95 Washington, West Warwick, RI 02893

WORLDWIDE Wholesale Bargains: Imports . . . Closeouts . . . Liquidations . . . Marnees, Box 1717-PM, Highland, Indiana 46322

400,000 BARGAINS Below Wholesale: Many Free! Liquidations . . . Closeouts . . . Job Lots . . . Single Samples. Free Details. Bargainhunters Opportunities, Box 730-A, Holland, Michigan 49423.

HAVE Own Business. World's largest wholesalers. American, foreign. Bargains. Free details. International Buyers, Box 16386-M, Portland, Oregon 97216

CLOSEOUTS! Discounts! Below wholesale! Freebies! Samples! DDN, Box 20152-PM, Ferndale, Michigan 48220.

HEARING Aids, Batteries. Wholesale. Catalog 25¢. Fiston, Box 1444, New Preston, Conn. 06777

BELT BUCKLES— Over 1500 styles available. We are distributors for Baron Brass, IMC, Bergamot, Great American, Raintree, Froz'N Color, and more. Also complete line of leather goods. Increase your profits with our low prices. Dealers send for free catalog and prices. Sundown Leather Co., 26168 Six Mile, Redford, MI. 48240. (313) 531-4355.

PRECISION SPRINGS. Over 400, Expansion, Compression, Coil, Flat. Assorted Sizes, Shapes \$4.00 Postpaid. SESCO, Box 127MO, Milford, Conn. 06460

ADV. AGENCIES, ADV. SERVICES, MAILING LISTS

EXPERT Assistance for mailorder, advertisers. Ratebook leading newspapers, magazines \$1.00. Chicago Advertising Agency, 28-EM Jackson, Chicago 60604

BUSINESS SERVICES

SIMPLE WILLS — \$20.00. Reply to: P.O. Box 13592, Savannah, Georgia 31406.

INCORPORATE Yourself. Save Attorney Fees. Guide Tells How. Free Information. Long, Box 14453, Savannah, Georgia 31406.

RUBBER STAMPS

BARCO Type Founders. Type and Rubber Stamps catalogue. Mail \$1.00 refundable on first order. 237 S. Evergreen, Bensenville, 60106.

PERSONALIZED Pocket Rubber Stamp. 3 Lines \$2.85. Bett-R Enterprises, 12100 Valley Spring Lane, #308-P, Studio City, California 91604

LOW Cost Rubber Stamps. 3 Lines \$2.10, 4 lines \$2.60, 5 Lines \$3.10. Pyramid Stamp Works, 1292 PMA Maple Hill Rd, Castleton, NY 12033

PRINTING PRESSES— RUBBER STAMP OUTFITS

PRINT YOUR OWN — Printing presses, type, supplies direct from factory. Send 25¢ for catalog and samples to: Kelsey Co., DM, Meriden, Conn. 06450.

RUBBER Stamp supplies catalog. Jackson, Brownsville Road, S-110, Mt. Vernon, Illinois 62864

COMPLETE Rubber Stamp Outfits, Supplies. Same day shipment. Sign Engraving Machines, Wholesale Catalog \$1.00 Deductible. Star Stamp, 732 S. Federal, Chicago 60605

TYPE Fonts, Hand Printing Presses, Supplies. 120 Pages. \$1.00 Deductible first order. Acme Type, 732 Federal, Chicago, 60605

PRINTING AND SUPPLIES

100 BUSINESS CARDS \$1.95 Postpaid. MERRICK, Box 365, Dinuba, CA 93618

QUICK Copy Printing. Low Prices. Write: Nationwide, 614 North Main, Bloomington, Illinois 61701

QUALITY BUSINESS PRINTING, Selco Products, Department 37, Danvers, Massachusetts 01923

BUSINESS CARDS — Raised Printed. 500 — \$8.95. 1000 — \$10.95. Cards, Box J, Kingston, Mass. 02364

GUMMED LABELS

1,000 Deluxe Gummed Address Labels \$2.00. Free Literature. Acme, 55 Tomoka, Pittsburgh, Pennsylvania 15229

GIFT SHOPPING

SAVE GAS! Shop By Mail. Free Catalog. Retco Gifts, 4205 Mescale Road, Riverside, CA. 92504

SMELL what Austrian Emperor Franz Joseph and famous Grinzing Musicians made happy. Original air from Vienna for \$3.00. to: Postfach 79, . . A-1205 Vienna, Europe

SAVE Gas! Over 200 Personal Gifts By Mail. Free Catalog! Woody's General Merchandise, Route 1, Siler City, NC 27344.

CLOCKS, WATCHES, OLD GOLD, JEWELRY

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. 1258, Chicago, 60603.

HIGHEST CASH IMMEDIATELY For old gold, silver, platinum, jewelry gold teeth watches, diamonds, spectacles. Free information. Rose Industries, 29-A East Madison, Chicago 60602. Established 1934.

WATCH And Clock repairing books, tools, materials. Free Catalogs. North American, Box 77-AV, Fox River Grove, Illinois 60021

MEN'S Solar Watch, powered on sunlight, 6 functions — Guaranteed: \$51.00 pd. Solar Inc., Box 117 C, West Baden, Ind. 47469

PAYING \$10 to \$100 Each For Unwanted Class Rings, Wedding Bands. Satisfaction Guaranteed. Request Mailing Carton. Burns, 727 S. Grace, Lombard, Illinois 60148

BUYING GOLD — SILVER ARTICLES! Any Condition! Absolutely No Risk! Free Details. Reliance, 48-C Margin, Salem, Mass. 01970

GOLD

FIND GOLD — Guide tells how, free information David Hunt, Roosevelt, Utah 84066

GOLD PAN — new durable lightweight plastic with panning booklet. \$7.95 Ppd. ALPINE COUNTRY, P.O. Box 1880, Covina, Ca. 91722

GOLD PROSPECTING SECRETS . . . No Gimmicks . . . \$3.00 . . . Ole Svenson, P.O. Box 1598, Bishop, CA 93514

PRECIOUS STONES & MINERALS

GET Free catalog no serious rockhound, gem Cutter, jewelry maker, hobbyist or craftsman can be without. Full of bargains, exclusive items, low prices from largest suppliers and authorities in the field. Free new catalog just off the press, yours for the asking. Write: Grieger's, Dept. C-12, 900 South Arroyo Pkwy., Pasadena, California 91109

500 Polished Gemstones \$7.00. Tumblecraft, 5401 North James, Minneapolis, Mn. 55430

VOLCANIC ASH from CATAclysmic Mt. St. Helens ERUPTION. GREAT FOR GIFTS. \$3.00 FOR ALMOST 3" BOTTLE. TEN for \$25.00. Spirit of St. Helens, Box 6467, Portland, Oregon 97228.

VOLCANIC ASH from Mt. Saint Helens, glass canister filled with ash and description, \$4.00. Send to: ASH, 5268 35th NE., Seattle, Washington. 98105

MOUNT ST. HELENS Volcanic Ash and Rock Specimens. \$4.00 postpaid. Graham, 125 Mtn. View, Packwood, WA 98361

TREASURE FINDERS

FIND Lost coins, jewelry, buried treasure, gold nuggets, relics. New revolutionary patented detector analyzes objects, tremendous range, no ground pick-up. Free catalog. Gardiner, 4729M N. 7th Ave., Phoenix, Arizona 85013

TREASURE — Locate quarter mile away with ultra sensitive locator - brochure free. Research Products, Box 13441 - AMC, Tampa, Florida 33611

REDUCES PRICES! Manufacturing Overage Topline Metal Detectors. Contact: D-TEX, 614 Easy Street, Garland, Texas 75042

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. 72901. Resident & Home study. Veteran Approved.

FREE INFORMATION — Start your own cleaning business. No investment. Details: 3413 Stratton, Ft. Collins, CO 80525.

PLASTERCRAFT!!! Profitable home business. Molds available. Details: Lynnette, 6251C Mentor Park, Mentor, Ohio 44060

MAKE MONEY IN SPARE TIME. Earn generous commissions as a subscription sales representative for leading magazines. For full details and instructions, send this ad with your name and address to: POPULAR MECHANICS, Dept. AB-M, 250 W. 55th St., New York, NY 10019

TECHNICAL WRITERS make big money! Free details: Tek Pubs, Box 4778P, Santa Clara, CA 95054.

SALESMEN—DISTRIBUTORS

SELL SENSATIONAL LOW-COST BURGLAR ALARM. Lightening seller. Exceptional margin. Samples for trial. Northwest Electric, Ave. 2119, Mitchell, S. Dk. 57301

MAKE EXTRA MONEY DURING YOUR SPARE TIME! Show our New Line of Calendars, Pens and Popular Advertising Gifts to local firms. Prompt, friendly service from small town AAA-1 Company in our 71st year. No investment or collections. Weekly commissions. Be your own boss. Full time potential. No experience necessary. Write to: Frank Buckley, NEWTON MFG. CO., Dept. PMCB, Newton, Iowa 50208

SOLAR ELECTRIC BATTERY CHARGERS — Barn Ventilators - Lighting Systems. Inexpensive - 3 Year Warranty. Technical Data \$1.00. Box 66b, Carpinteria, CA. 93013

AGENTS WANTED

MAKE UP To \$15.25 Per Pair selling America's finest shoes. No investment! No experience necessary! Free catalog and selling kit! Mason Shoes, K-552, Chippewa Falls, WI 54729.

PRINTING Advertising Salesmen—Excellent money making sideline selling Decalomania Name Plates, small quantities. Advertising Specialties, sign letters. Free samples. Raico XL, Boston, Mass. 02119.

STOVES converts 50 gallon drum to Efficient Home Heating Unit. \$32.50 post-paid. Dealers Wanted. Indian Country Inc., Deposit, N.Y. 13754.

SPARE TIME CASH. Sell famous Hanover Shoes. Samples, sales kit free. No experience needed. No age limit. Big commissions. Hanover Shoe, Dept. 2748, Hanover, Pa. 17331.

SELL "Name Brand" Ball Pens, Markers, Etc. — Buy Wholesale — 40% Profit — Free Details — Business Supply Co., P.O. Box 244, Fairview Village, PA 19409

BUSINESS OPPORTUNITIES

\$534.00 Weekly Working Three Hours Daily at Home. \$356.00 Weekly Working Two Hours Daily. \$178.00 Weekly Working One Hour. Start immediately. Paid Daily (Advance) — \$106.80, \$71.20, or \$35.60. Written Earnings Guaranteed. Free Bulletin/Application. FAS, Postal Unit 13703-F, San Antonio, Texas 78213

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.

TURN Your Dreams Into Dollars!! Everything You Need Furnished For Successful Mailorder Program. Free Details. Royal Mailorder, 3225 West 111th, Chicago, IL 60655.

ASSEMBLE PRODUCTS AT HOME. Many opportunities paying High Weekly Profits presently available without investment. Write: Businesses, 928 Brighton 11th, Brooklyn, New York 11235.

VENDING Machines. No selling. Routes earn amazing profits. Big catalogue Free. Parkway Machine Corporation, 1930PMB Greenspring Drive, Timonium, Maryland 21093.

(Continued on next page)

BUSINESS OPPORTUNITIES

(Continued from preceding page)

GET RICH!! Secret Law smashes Debts — brings Cash and Credit. Details Free! WealthKit, Box 350-B, Billings, New York 12510

ERASE DEBTS with little known law — **CREATE Wealth!** Details FREE! Blueprints, #88, Box 100, LaGrangeville, N.Y. 12540

REPAIR HYDRAULIC JACKS — DETAILS FREE. WRITE: HYDRAULIC PARTS SUPPLY, BOX 4157, BROWNVILLE, TEXAS 78520.

PIANO Tuning quickly learned with home study courses. Diploma granted. American Tuning School, 17050 Telfer Drive, Morgan Hill, Calif. 95037.

PHOTOSTAMP Agents Wanted! Make big Money From Home mailorder. Free Samples, Information. Postmatic-C7, East Providence, R.I. 02914.

AMAZING! \$265,000 Yearly with classified ads. Free Proof for Stamp. Moneycraft, PM-8, P.O. Box 845, Ceres, Ca. 95307

\$500.00 MONTHLY clipping newspaper items. Experience unnecessary. Free Details. Colonial, 1108 Colonial, Inkster, MI 48141

HOT — Stamper Prints Gold Leaf. Personalize everything. Print Business Cards, Pencils, Matches. Free Details. Gold Magic, POB 24986 (GC), Tampa, Florida 33623

BUMPER STICKER PRINTING DEVICE. Cheap, Simple, Portable. Free Details. Bumper, POB 22791 (GG), Tampa, Florida 33622

SURPRISE EVERYBODY. Become Notary Public now. We guide you, free. We sell notary needs. Raise your image, job value, income. Assistance nationwide. Brochure: Gulf, 234 Club-A, San Antonio, Texas 78201

WE PAY \$1 EACH PHOTO done! \$12.50 hr. Easy! Write: FREE Report, #PM8, 3110 Fulton, Sacramento, CA 95821

MAKE \$22.50 An Hour! Spare Time at Home. Rubber Stamp Industry Needs Local Manufacturers. Equipment and Know-How Furnished! Particulars Free. Write: Thomas, RC-2-JH, 1512 Jarvis, Chicago, IL 60626

366% Profit. Unique BIRTHDAY REMINDER CALENDAR Sells on Sight. Calendars, Box 802-P, Brigham City, UT 84302

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, 2007 Montrose, Chicago 60618.

HOME Inspection Service. Ideal Retired Construction Men. All Details, Sample Report, Check List - \$14.95. 994 Claire, Huntington Valley, PA 19006

HOW TO MAKE MONEY THROUGH CLASSIFIED ADVERTISING. Booklet shows you how to start your own business with Classified Advertising. ONLY \$1.00 FOR BOOKLET — (\$2.00 coupon refundable with first order). H.E. KAPPEL, POPULAR MECHANICS, DEPT. P, 224 WEST 57TH ST., NEW YORK, NY 10019

\$700 Per month earnings possible filling out income tax forms at home or tax office during tax season. We show you how. Simple, quickly learned. Details mailed free. No salesmen. Hurry. Big demand. Federated Tax, 2065 Montrose, Chicago 60618

DOUBLE Or triple your cost on gift items, novelties, carded merchandise, 1001 others. Giant catalog \$2.00, refundable on first order. Magaz, 4024 North Ashland, Chicago, Illinois 60613

LEARN The secrets of repairing junk batteries "Fabulous Profits" small investment. Apex Engineering, 5454 Bolsa, Atascadero, Calif. 93422

NOTICE: 500% Profit Repairing Vacuums! Baron, Box 863F, Portales, New Mexico 88130

WOODWORKERS - Turn \$4 material into \$34.95. Free Brochure! Pine Shop, 78P, West Peterborough, New Hampshire 03468

14K GOLD, Sterling Silver Jewelry. Make 250% Profit. Send \$1.00 (refundable) for Catalog. Courtesy Gems, 1634 Bogart, Bronx, NY 10462

START Profitable Service Business-Easy! Alena, Box "A", Farmingville, New York 11738

SELL Books By Mail. Complete Dealer Set-up—25¢. Midwest, Box 44-R2PM, Shawano, Wisconsin 54166.

\$480 Weekly. Home mailing program. Goodworld, Box 26233-R, Tamarac, Florida 33320

FREE Mailorder Dropship Business Journal! Mailer's World, Box 1355K, Sioux Falls, South Dakota 57101.

LEARN Sewing Machine Repairing. Men. Women. Lucrative Profits. Gresslin Correspondence School, Box 927, Spencer, Iowa 51301.

MAKE \$2,000.00 MONTHLY. Spare time. Unique proven enterprises. No selling. No Capital to start. Free brochure. Kashbuilder, Box 1132-19K Indianapolis, Indiana 46225.

\$500 Weekly! Work 10 Hours taking catalog orders! Midwest Wholesalers, Hwy. 35A, Siren, Wis. 54872

2000% Profit Selling Health Reports With Re-printing Rights. Details. Mitchell, Box 1058-HRP, Benton, AR 72015.

MAILORDER Streamlined home study course. Free details — Paul Stephen Associates, Box 145-PM, New Britain, Ct. 06050

\$220,000 Second Income. Sound Impossible? Free proof - \$20 Bonus! Wilcoxon, Box 4321-P2, Fremont, CA 94538

\$92.00 From Square Foot Plywood. (Huge Demand). Revealing Proof 25¢. (Refundable). Woodwin, Bridgewater, Mass. 02324

\$250 Weekly . . . Unique Mailorder Business. Meier, Maple Street, Charlevoix, Michigan 49720

I MADE \$40,000 Year by Mailorder! Helped others make money! Details 25¢. Torrey, Box 318YY, Ypsilanti, Michigan 48197.

BECOME REAL ESTATE INSPECTOR - \$100.00 HOURLY Potential. Be Boss. Part/Full Time. Home Operation Eliminates Investment. Simplified Instruction, Forms, Assistance. Free Information. IOREI, Box 418-M12, Sullivan, MO 63080.

IMPORT-Export Opportunity. Profitable World-Wide. Mail Order Business from home, without Capital. We ship plan for no risk examination. Experience Unnecessary. Free Report. Meilinger, Dept. C2708, Woodland Hills, California 91367

HOW TO MAKE \$1,000's YEARLY IN MAIL ORDER! NO GIMMICKS! OWN HOURS! UNIQUE PROVEN METHODS! "FREE DETAILS". JJ PUBLICATIONS, BOX 3201, REDONDO BEACH, CA 90277.

STOP Wasting Money Answering Questionable Advertisements. 1000 Offers Explained. Globe, Box 20588-PR, St. Louis, Mo. 63139.

TAKE Catalog Orders. We drop-ship 2500 best-selling specialty products. Lowest below wholesale prices. Immediately delivery. Spectacular home business opportunity. Free Book. SMC, 6061 De Soto Ave., Dept. 20-92, Woodland Hills, CA 91365.

PREPARE Tax Returns - Policeman Albert Myers made \$2,000 his very first season. Train at home. VA Approved. National Tax School, Monsey, 2HM, N.Y. 10952

PIANO Tuning learned quickly at home! Free Information. Empire School, Box 450327, Miami 33145

Big Money in proven small business. Not mail order or envelope stuffing. Send SASE . . . TCC, 1000 Pennington Flats Rd., Morehead, KY 40351.

ARAB BUSINESSMEN Have Money to Buy & Invest. Top Finders Fees Paid. IMEA, 8-0PM, P.O. Box 5127, Huntington Beach, CA 92646

FREE TV-RADIO ADS!!! Details FREE — CENTURY, Box 2571-PM4, Landover Hills, MD 20784

FREE Inflation-Beater Book "2042 Unique Proven Enterprises." Fabulous "Little Knowns." Work home! HAYLINGS-B, Carlsbad, Calif. 92008.

MONEY in your mailbox! Free Report tells how! Lyndel, Box 26304P, San Diego, Calif. 92126

\$400 Weekly Easily Possible Working At Home. Start Immediately. Free Details. Conner, Box 1451M, Paradise, CA 95669.

They laughed when I said make two to three times your cost on 2500 gift items, with no investment; now I'm laughing at them. Catalog \$2.00 refundable. Wilkin's Distributors, 437 South 16th Street, Richmond, CA 94804

AUTO INTERIOR CUSTOMIZING AND UPHOLSTERING are today's high demand skills - yet easily learned at home! Fabulous profit potential. Send for FREE Opportunity Kit, details. Auto Upholstery Institute, 412 S. Lyon St., Dept. SA080, Santa Ana, CA 92701.

SELL Books by Mail. Jones, Box 24484, D680, Vancouver, Canada V5T 4E1

RICHES in Mail Order. Free Details. Mansfield, 23011 Moulton G-6, Laguna Hills, Ca 92653

EARN BIG FEES! Easy-Fascinating Opportunity. Become Money Broker. Own Hours. No experience. Proven success formula. Free Report: DFC, Dept. 10-P-8, 1145 Reservoir Avenue, Cranston, Rhode Island 02920

BIG MONEY Wholesaling Quality Products. Free Information, DCO Enterprises, P.O. Box 1705, Dept. MIB, La Mesa, California 92041

MAILORDER Opportunity! Start profitable home business without experience or capital. Write for free book, case histories, plus complete details. No obligation. Mail Order Associates, Dept. 632, Montvale, NJ 07645.

MAKE MONEY NOW! Sensational New Program For Mail Order Business. For Free Info Send Self-Addressed Stamped Envelope To: Brandon Int'l Enterprises, 209 Harvard Ave. E., Seattle, Wash. 98102

F-A-N-T-A-S-T-I-C S-U-R-P-L-U-S BARGAINS! FREE DETAILS! "MONEYMAKER", BOX 99279-82, SAN FRANCISCO, CALIFORNIA 94109.

\$100,000 Opportunity. Selling Profitable Information Through Mailorder. Details Free. Shelley, Box 765, Columbia, S.C. 29202

VALUABLE REFERENCES To Start Mail Order Business. A must for beginners. Rivina- PM2, 1012 Dore, West Covina, CA 91792

BECOME Loan Broker. American Business Finance, 22 Gerdes, Verona, New Jersey 07044

FREE REPORT WHAT IS THE BEST FRANCHISE!

The first and only analysis and rating of every viable franchise in the U.S. and Canada has just been completed by the nation's top business magazine. Complete details on this report FREE. Write: A.E.A., 2311 Pontius Ave., Suite B824, Los Angeles, CA 90064.

MAKE \$100 DAILY WHOLESALING! 2500 below-wholesale products. Spectacular home business. **FREE DETAILS!** Richway, Box 1729PM, Sonora, CA 95370.

EARN \$175 weekly at home guaranteed. Free information. SIR, 470 Granville Street, Suite 315, Vancouver, British Columbia V6C 1V5.

SELLING KNAPP SHOES IS EASY. Highest cash commissions immediately. Enjoy a steady income with satisfied repeat customers. Your own hours. No investment. Free selling and training kit to qualified applicants. Write: Scott McCutcheon - Knapp Shoes, 612 Knapp Centre, Brockton, MA 02401.

500 WAYS TO GET RICH IN MAIL ORDER. Free information. Januz, D-3060, Box 1000, Lake Forest, IL 60045

\$50,000 year Selling Books By Mail Instructions - \$1.00! Veranica, B-3638, Midland, TX 79701

MAIL-ORDER: FREE DROP-SHIP DIRECTORY. Clifco, Box 9914, PM8, Phoenix, Arizona 85068

\$300 WEEKENDS! Fantastic profits saving motorists almost \$2.00 every tankful! Engineer's patented FUELSAVER installs minute. Independent laboratories verify savings. **FREE** test offer. Almuist Manufacturing, GT-8, Millford, PA 18337.

FREE Details - Seven Proven "Money-Makers." Ponderosa, Box 15224, Spokane, Wash. 99215

LEARN LETTER WRITING. Easy. Profitable. Word-shop, 7219-D Promenade, Salt Lake City, UT 84121.

IMMEDIATE INCOME!! Take Catalog Orders. Thousands Of Fast Selling, High Profit Products. Perfect Home Business. Free Details. Kinco, Box 16703, Kansas City, Mo. 64133

IS your time worth \$50/hr.? It can be in this fast growing service industry. Low start-up cost. Detailed information: \$2.00. Charmar Publishing, Box 2105, Bloomington, Indiana 47402

YOUR OWN CABLE TELEVISION NETWORK. Complete information. \$5.95. Merit, 2307 Tyler Lane, Louisville, Kentucky 40205

HOW to make money with your telephone. Operate from your home sparetime. Complete working instructions \$3.00. Mary Helen Davison, 537 Front St., Warrior Run, Pa. 18706

\$100 A Day Wholesaling. Free Brochure. Thomas Co., 27 Neal St., Brockton, MA 02401

CHIMNEY SWEEPING. High profit business. Free information! Michael James Chimney Sweeping, Box 1078-PM, Aptos, California 95003.

ABANDONED INDUSTRIAL SILVER—Take it! Details: Metals, Box 548, Woodville, Texas 75979

NEED Dealers to handle incredible demand: 110 dealerships now available for Pedalpower Electric Bikes. Sales up 600%. Only \$995. for initial equipment. Start selling immediately. Call now: 800-257-7955.

FREE Mailorder Information! **BIG PROFITS.** Specialty Wholesale Products. JSR, Box 626, Long Beach, N.Y. 11561

BAD CHECKS, STOLEN CREDIT CARDS! . . . Sell Prevention Kits! . . . Financial Independence! . . . Information \$1.00. GUPTON, Box 8200, Long Beach, CA 90808

\$2.00 Lists Your Name Sent to 1,000 Importers, Jobbers, Mailers for One Year. California Pacific Mailers, Clayton, CA 94517

MAILORDER MAKE \$2000.00 MONTHLY SELLING INFORMATION! Free details. UCI, 2385 Roscomare, 148, Los Angeles, California 90024.

1000% PROFIT SELLING INFORMATION By Mail. EIA ASSOCIATES, Box 1400, Manassas, VA 22110

HOW TO WIN MAGAZINE AND TELEVISION CONTESTS. Send \$5.95 Check or Money Order To: E & D Associates, Box 255, Blytheville, AR 72315

HOLLYWOOD Cementcraft: Profitable home Business. Experience Unnecessary. Unlimited Pottery Designs Made Without Moulds. Birdbaths, Fountains, Washing Wells, Waterfalls, etc. Chemical Coloring Formulas, Marble-Glazing. Free Brochure. Concrete Facts, Box 7B, Altadena, CA 91001.

\$20,000 - \$100,000 Yearly. Start your own JANITORIAL business. Write: CleanPro, P.O. Box 17080PM, Portland, Oregon 97217

RECENTLY DISCOVERED Method For Operating Your Own Auto Salvage Business. Send \$20.00 For Information To: Jim E. Pouiton, 1322 North 5 Mile Road, Boise, Idaho 83704.

SPECTACULAR Business Opportunity — \$10.00 (Refundable) investment. Skyline Products, 12200 Bishop Drive, Mesquite, Texas 75180

STOP GUESSING !!! - Read Mailorder Laws And Regulations - Also - Complete Homestudy Mailorder Course - ONLY!! - \$3.00 Each — Galaxy Enterprises, Box 73-JA, Mamaroneck, N.Y. 10543

GUARANTEED Weekly Income of \$238.00. Work at home. Earnings Guaranteed. S.I.A., Box 182, Quitman, Texas 75783

(Continued on next page)

BUSINESS OPPORTUNITIES

(Continued from preceding page)

MOBILE DISCO: \$60,000 First Year Earnings — No Investment. Offer Clubs, Schools RECORDED Music Instead of Expensive Bands, Booklet Reveals Starting without Capital, Secrets for Immediate Success. \$14.95 To: Dances, 1005 Paddington Place, Annapolis, MD 21403

NOW ONLY!!! \$1.00 Will Obtain You Details On The WORLD'S EASIEST MAILORDER BUSINESS — Galaxy Enterprises, Box 73, Mamaroneck, NY 10543

"HOW To Break Into Radio!" Gain Prestige! Send \$4.95! DR, Box 241034, Charlotte, North Carolina 28210

ATTENTION!! New!!! Recession-Depression Proof Business!! Guaranteed!!! Free Details! 22891 Via Santiago, Suite 11, Mission Viejo, California 92691

MONEYMAKING OPPORTUNITIES

\$625/Weekly! Home mailing program. Free postage, supplies, \$20 bonus! V-J, 323 Franklin, 804/H-98, Chicago, IL 60606

SWEEPSTAKES - Contests - Crosswords! 60-page sample Free! Prizewinner-P, Box 10596, St. Petersburg, Fla. 33733.

YOUR CHILDREN Can Be Earning Money this Summer! Proven Money Making Plans for Kids. Only \$1.00. Satisfaction Guaranteed. American Publications, P.O. Box 3653, Honolulu, Hawaii 96811

\$54.30 Daily Starting Next Week. No Mailorder Swindle or Stuffing Envelopes Ripoff. Send 15¢ poststamp. SBIAEMKS, Drawer 4099, Valley Village, Ca 91607.

NEW Discovery in Battery Reconditioning Means "Big Profits Fast." Electone, 7415 Gable Dr., Little Rock, Ark. 72205

EXTRA MONEY: COPYRIGHTED REPORT. #MO-56T. \$2.50. SELVON RAMRAJ, 610 GARDEN STREET, HOBOKEN, NJ 07030

FANTASTIC Money Making Opportunity! Made Fortune Working with Nature in my Spare Time. Free Details. Paul, Box 2466, Clarksburg, WV 26301

WIN Poker Craps. Expert Tells How. \$3.00 Each. Free Titles Listing. Donnling, 224 Pegasus, Lompoc, Calif. 93436

NOT Afraid Of Hard Work? Have the desire to own your own business? We will supply everything. Write for Free Details. — Woody, Room MC-4-JH, 1512 Jarvis, Chicago, IL 60626

\$386.00 Weekly possible 2 hours daily at home. Start immediately. Massplan (B2), Box 1439, Edmonton, Alberta T5J 2N5

HELP PRODUCE PORK And Make Money Doing It. Free Detailed Brochure. Lorenza Jewell, Box 196, Jamaica, N.Y. 11420

GAMBLERS — FREE! WIN lifetime income from dice, roulette, thoroughbred, harness, dog racing. Guaranteed! Research, Box 551PM46, Mineola, NY 11501

WE BUY NEWSPAPER CLIPPINGS of Wedding Announcements for \$1.00 each. Instructions \$1.00. Clippings, Box 491-PM, Gatesville, Texas 76528.

MAKE Statuettes, Novelties, Imitation Marble. Sell to Stores or Start Gift Shop. Details 25¢. Marbleizing, P.O. Box 1178, Ballwin, Missouri 63011

\$1000 Weekly Possible, Collecting Names. Free Details. Godwin, Box 15083P, Fort Worth, Texas 76119

GUARANTEED Ways to Make Money And Protect Yourself During Inflation or a Recession Send \$3.00 to: Linden, 605 Rockview Drive, Chambersburg, PA 17201

INFLATION CAN MAKE YOU RICH. New Book. How to use inflation to make money and escape taxes. Free brochure. Box 15655, Tulsa, Oklahoma 74112.

SALES VOLUME WITHOUT PROFIT . . . IS WASTED EFFORT! How to plan business profit dollars monthly . . . one year in advance. Free details . . . Swanson's Profit Plan, 1220-528 Vienna Dr., Sunnyvale, Calif. 94086.

PROFITS IN VIDEO - Start your career in America's newest, most exciting field. Manual explains starting and operating procedures for 11 videotape businesses. Send \$7.00. Videotec, P.O. Box 242, Staten Island, New York 10305.

7 WAYS to earn up to \$200 or more, weekly, in your spare time. For complete details, send \$1 and stamped, self addressed envelope to: **GENERAL MERCHANDISE MARKETING**, P.O. Box 6061, Orange, California 92667

NEW PROVEN System to Successful Blackjack FIRST TIME Introduced, NOT AVAILABLE in Stores. \$11. Send check or money order to: Creative Agency, 2301 El Camino, San Mateo, Calif. 94403.

500 MONEY MAKING MAIL ORDER IDEAS \$10.00. Colco, Forsyth, Georgia 31029

"THINK AND GROW RICH" - Case Histories, Money-making methods. \$3.50. G&B Associates, 16110 Norma Lane, Sterling, IL 61081

WIN CONSISTENTLY at the Racetrack! Guaranteed! Free information—Write: Jayco, Box 1029-DB, Plainfield, N.J. 07061

FANTASTIC Home Mailing Program Guarantees \$600.00 Weekly Immediately. Dealers Wanted. Worldwide PM-1, Box 1022, Cobourg, Ontario K9A 4W5

FREE "Buying Wholesale" Booklet. With Your Order Of "How To Import Your Own Products." \$3.98. 4/D's, Box 5968, Bend, Oregon 97701

\$72,000 OPPORTUNITY! Selling most required information by mail. Rivina- PM1, 1012 Dore, West Covina, CA 91792

MONEY MAKER MAGIC MANUAL! FINALLY AVAILABLE, MAIL ONLY! 1,000 SECRETS SLASH CAR AND HOME COSTS, SAVE HUGE ON TRAVEL, STOCKS, COLLECTIBLES, WHOLESALE, IMPORT! PROMPT REFUND IF YOU DON'T FULLY AGREE IT'S WORTH FIVE TIMES PRICE! \$10. S. KEYED, BOX 490266, KEY BISCAYNE, FLA. 33149.

BIG Money By Mail! Free Proof. Guaranteed. CWE, Box 6827PM, Atlanta, GA 30315

CANADIAN MILLIONS in mail. Instant money info. Write: Millions, Dept. P.M. Box 6722, Station A, Toronto, Ontario M5W 1X5

HOW To Win Contests! \$2.25. B&L, Box 1431, Manassas, VA 22010

BLACKJACK Win Free Information. Scientific Research Ent., 5025 South Eastern Ave., Suite 16, Box 219A, Las Vegas, Nevada 89119

WIN CONTESTS! \$2.95 for booklet. Money-making, money-saving, self-help/lifestyles, and how-to-books. Peak Publications, 6427 Hillcroft, Box 243, Houston, TX 77081

HOW To start your own Air Conditioning and Heating Service. Step by Step instructions and drawings. No need to use your savings. Send self addressed stamped envelope and \$3.00. MP, Box 4808, Las Vegas, Nev. 89106

50 MONEYMAKING REPORTS YOU CAN REPRINT, SELL, 100% PROFIT! SASE: GROVE PM880, 8519 Hazen, Houston, Texas 77036.

NEED MORE MONEY? Examine over 1,000 ways to earn it full time, spare time, part time on weekends! Get 5 issues of Opportunity Magazine Free! Write: Opportunity, Dept. 566, 6 N. Michigan, Chicago 60602.

EARN EXTRA MONEY at home. Proven program. Free details. BMO Enterprises, Box 8129, Kitchener, Ontario N2K 2B6

MAKE \$\$\$ — Learn How To Use Your Company Suggestion System. Brochure Offers Tips On Presenting Suggestions And Many Money Making Ideas. Corp. Eng. Director Shows How. Send \$2.00 To: Suggestions, 65 Alameda St., Rochester, New York 14613

MAIL ORDER SCHEMES EXPLAINED! Learn The Traps Before You Get Burned. Money Making Opportunities May Not Be. Complete Report, \$3.00. Report #808, Box 151072, Salt Lake City, Utah, 84115

SECRETS of Making Money from your Experience. Write for Details. Bell Book Sales, Dept. P, P.O. Box 17095, Kansas City, Mo. 64132

20%-50% INTEREST . . . Guaranteed Free details . . . R. Barker . . . Box 7425, Jacksonville, Florida 32210.

FREE SAMPLES. How to win contests. HSB, Box 1038, Langley Park, MD 20787

OVER 1,000 Extra Income Ideas. Information for 15¢ stamp. Jay Yocum, Clayton, CA 94517

CASINO Place Betting — Intelligent approach to Winning at craps — \$5.00. Gotand, Box 836, Kailua, Hawaii 96734

WIN \$\$ Consistently at Roulette. I do. Proven Formula, Chart. Complete Details \$5. Win, 3281 NW 20 St., Miami, FL 33142

EARN MONEY WITH YOUR GOOD CREDIT CHANGE BAD CREDIT to GOOD sooner than you think. Information \$1.00 (refundable with order). MANESS CREDIT CONSULTANTS, Box 61331, Sunnyvale, Ca 94086

TURN 5,000 Names into \$50,000, we buy all you collect. Detail \$1.00 (Refundable). Colbert, Box 674-AZ, Richmond, California 94808.

EARN Money Collecting Names! Write: Dolores, 104 Third, Salem, Missouri 65560.

HOW To Hit Daily Lotteries. Seven Secret Methods —Proofs. Act Now! \$3.00. Box 1754-PM8, Baltimore, Maryland 21233

RABBITS—CHINCHILLAS—FUR BEARING ANIMALS

AMAZING Profits! \$10,000 Yearly Raising Rabbits for Wool and Breeding. Details—\$1.00. American Angora, Maita 12, Montana 59538.

\$500-\$1000 Month Plan raising Rabbits for us. Free details. White's Rabbitry, PM, Hudson, Ohio 44236.

RAISE RABBITS SUCCESSFULLY 68 Page Booklet Tells How. 50¢. American Rabbit Assn., H1, P.O. Box 426, Bloomington, Illinois 61701

EARTHWORMS, LIVE BAIT

FREE Literature. Raise Fishworms, Crickets. Red Wrigglers — 1000 — \$6.95, 5000 — \$32.50. Postpaid with Free Book on How and Where to Sell. Carter Fishworms, Plains, GA. 31780

REDWORMS Bedrun 5,000-\$22.00; 20,000-\$57.00 including postage. Raising instructions. Brazos Worm Farms, P.O. Box 4185PM, Waco, Texas 76705

POULTRY & GAME BIRDS

FREE COLOR GAME BIRD CATALOG. Fun & Profit. Gifts for your sportsman. Source for incubators, brooders, hatching eggs, books. Marsh Farms, P.O. 7-FF, Garden Grove, CA 92642

OF INTEREST TO ALL

HOTTEST NEW COLLECTIBLE - RARE GEMS! Details Free! Taylor's, 113PM Martin, Indian Harbor Beach, Florida 32937

DR. LINDNERS Special Weight Control Method. \$2.00. John Varrone, 2902 Park, Cleveland, OH 44134

RACETRACK FANS * Pick Winners, Exatas, D.O.'s, Amazing Wallet Size Chart, 3 Years Perfecting. Order Now! \$35.00 MO or Cash only. Ross Methods, Box 443, Concord, CA 94522

DON'T DIE Without a will! Blank will form protects your family. Send \$4. MCS Products, 10791 Reservoir Drive, Mantua, Ohio 44255

GUARANTEED Lucky — Genuine Four-Leaf Clovers!! "If You Don't Get Lucky In The Next Year With This Genuine Four-Leaf Clover, We'll Give You Your Money Back." Send \$3.00 To: O'Malley's, Box 27492, West Allis, WI 53227.

MESSLESS YARD keeps dogs and cats away from garbage for pennies per garbage. Details \$3.00. Box 219, North Branch, MI. 48461.

DETAILS Of Patents. Send Patent Number, \$3.00 Each. Arnico, Box 5, So. Beloit, Illinois 61080

AMERICAN TAX REVOLV - DETAILS FREE! ATR, 957 N. 13TH STREET, MILWAUKEE, WI 53233

CREDIT CARDS! Secret To Get Them, \$4. David L. Johnson, 950 Bon Air Street, Titusville, Florida 32780

HOLD'EM- Poker Of The 80's, Free Details. D&K Enterprises, Box 344, Northport, AL 35476

"I'M A PEPPER" Iron-Ons \$1.00. SASE. Iron-Ons, Box 198, Providence, Utah 84332

UNIQUE MUSICAL METAL SCULPTURES. Great Conversation Pieces. Perfect Gift Ideas. Each Plays 18 Note Tune. Windmill — \$24.50 ("Windmill of your Mind"); Piano Player — \$19.50 ("The Sting"); Motorcycle — \$19.50 ("King of the Road"); Cafe Scene — \$18.50 ("Tea for Two"). California Residents add 6% Tax. Send Check Postpaid To: Cinnamontree, 13935 Tahiti Way #153, Dept. 4PM8, Marina del Ray, CA 90291

GET ATTENTION. Englands Bobby Whistle, 3/4". May be worn around neck. \$3.98. Mikilyn, 912 Jaki, Sarasota, Florida 33582

SHOULD YOU TRADE YOUR CAR? Rising costs of fuel, maintenance, and new cars, along with better gas mileage on smaller new cars, make this decision too complex for intuitive judgement. Yet the answer can mean thousands of dollars to you. For detailed computer analysis of your situation, send \$10 and year, make, odometer reading, miles/gallon, and trade in value of present car. Also miles driven per year, and price and miles/gallon for proposed new car. State whether you would pay cash or finance new car. Miller Associates, P.O. Box 767, Edgewood, MD. 21040.

MAKE YOUR WILL! Don't delay! Protect loved ones. Will forms, with instructions, \$4.00. Mantor, 100 Glenwood, Portland, Maine 04103

"WISH I'D SAID THAT!" Now you can. Thirty great one liner comebacks and hilarious ways to stop verbal abuse. \$3.00. Comebacks, Box 3064, Saxonville, MA. 01701.

LET OTHERS PAY FOR YOUR GAS - FUEL!!! No gadgets, conversions, brewing, etc. Fascinating working report \$5.00. American, Box 26543M, New Orleans, La. 70186.

FOUND! Vietnam Combat Recording. Details - SASE: Tape, 7245 E. Garfield (P), Scottsdale, AZ 85257

SAVE! TOP NAME CLOTHES For Pennies. \$3.00 Guaranteed! Box 11052, Indianapolis, IN 46201

NOW Available! Original Medical Penlight, 1000 Uses! Send \$2.50 to: Penlight, Box 683, Auburn, NY 13021

LEARN Secrets of Winning Sweepstakes, Bingo, Puzzle Contests! Write: Timberhill, Box 51-P, East Aurora, New York 14052

FREE Oil Shale, The Burning Rock. Approximately One Pound. Postage/Handling \$3.00. Shale, 2233 Orchard, Grand Junction, CO 81501

OF INTEREST TO WOMEN

AUNT GUSSIE'S Meal Planning Guide, Information, Illustrations \$1.00. Address Finder, Christmas Card Record. Appleknockers, Inc., Beaver Falls, N.Y. 13305

BOBBY WHISTLE. Direct from England! Emits a loud shrieking sound—ideal for emergencies. Wear it around your neck or keep in purse. 3/4" long. \$5.25. Alva House, 7700 Leesburg Pike, Suite 102B, Falls Church, VA 22043.

DARLING BABY QUILT Appliques. 12 Patterns \$3.00. SASE. "Appliques," Box 224, Providence, Utah 84332

GOVERNMENT SURPLUS

JEEPS, Trucks, from \$52.40 . . . Boats, Airplanes, Automobiles, Motorcycles, Typewriters, Tools, Clothing, Sports, Camping, Photographic, Electronic Equipment . . . 300,000 Amazing Bargains direct from Government Nationwide . . . low as 2¢ on dollars! Surplus Catalog and Sales Directory \$2.00 (refundable). Surplus, Box 954-PPM, Muskegon, Michigan 49443

(Continued on next page)

GOVERNMENT SURPLUS

(Continued from preceding page)

"GOVERNMENT SURPLUS DIRECTORY!" . . . Buy 500,000 items (including Jeeps) . . . low as 2¢ on dollar! Most complete information available — \$2.00 (guaranteed) SURPLUS DISPOSAL, Box 19107-AH, WASHINGTON, DC 20036.

GOVERNMENT LANDS FROM \$7.50 ACRE! Homesites, farming, vacationing, investment opportunities! "Government Land Buyer's Guide" plus current listings—\$2.00. Surplus Lands, Box 19107-AH, Washington, D.C. 20036.

1980 Surplus Army, Navy store 64 page illustrated catalog. Send \$1.00. Ruvel, 3037 North Clark, Dept. J-8, Chicago, Illinois 60657

O-F-I-C-I-A-L UNITED STATES DIRECTORY
Jeeps . . . \$37.22!! . . . 400,000 Listings!! . . . Your Immediate Area!! . . . UNEQUALLED!! . . . \$2.00 (INCLUDES G-LANDS, G-LOTTERIES INFO-GUIDE!!) UNCONDITIONALLY GUARANTEED!! . . . United States/Great Lakes Federal Surplus Depository, B-807PD, Marshfield, Wisconsin 54449. (COPYRIGHT 1980)

J-E-E-P-S . . . \$18.88!! . . . 675,000 Items! Buy In Your Area! How! Where! — "Moneyback G-U-A-R-A-N-T-E-E-D 1980 Government S-U-R-P-L-U-S Directory" — including: "Buy G-LANDS" — "G-Oil/G-Gas L-O-T-T-E-R-I-E-S," — \$2.00. G-SURPLUS, Box 2009-E, Syracuse, New York 13220

GOVERNMENT SURPLUS — Automobiles, Boats Over 100,000 Items. How — Where — Exact Information from Retired Government Disposal Officer — \$3.00. Windham Sales, P.O. Box 495, Windham, N.H. 03087

J-E-E-P-S — \$19.30! — C-A-R-S — \$13.50! — 650,000 ITEMS — GOVERNMENT SURPLUS — MOST COMPREHENSIVE DIRECTORY AVAILABLE TELLS HOW, WHERE TO BUY — YOUR AREA — \$2 — MONEY-BACK GUARANTEE — "GOVERNMENT INFORMATION SERVICES," DEPARTMENT B-8, BOX 99249, SAN FRANCISCO, CALIFORNIA 94109.

J-E-E-P-S . . . !! Under \$20.00!! Much more . . . 650,000 items!! COMPREHENSIVE DIRECTORY tells how, where, YOUR AREA!! \$2.00!! MONEY BACK GUARANTEE!! Surplus America, Department C-8, Box 20390, Jackson, Mississippi 39209.

JEeps \$52.40, Airplanes \$75.01, Boats \$7.50, direct from government. Directory and Catalog \$1.00 (refundable). Midwest Surplus, Box 401-PM, Dayton, Ohio 45401

DISCOUNT Catalog — Viet-Nam Boots, Canteens, Jackets, Knives, Packs, Helmets. Send \$1.00 Refundable. Dixie Military Surplus, Box 8149-PM, Nashville, Tennessee 37207

GOVERNMENT BENEFITS

LOW INCOME ??? Qualify for FEDERAL RENT ASSISTANCE. How, Where To Apply. \$4.98. M. Shields, 4040 Moorpark, #200P, San Jose, Ca. 95117

LOANS BY MAIL

BORROW \$25,000 "overnight." Any purpose. Keep indefinitely! Write: Success Research, Box 29263-AV, Indianapolis, Indiana 46229.

FREE Details on How to Borrow up to \$10,000 entirely by Mail. Write: Postal Financial Services, Inc., Dept. 1383, 814 Pierce St., P.O. Box 268, Sioux City, Iowa 51102.

CASH Loans and Outright Grants to individuals refused Elsewhere. No Collateral, Co-signers, interviews. 98% Accepted. Associates, Box 98-A4, Brooklyn, NY 11235

BORROW \$125,000 Interest-Free! Repay Anytime. Everyone eligible. Free Report: Executive PM-8, Box 996, Dundee, Florida 33838

THE ARABS HAVE MILLIONS to Loan, Invest. Business, Investment Purposes. \$25,000—\$10,000,000 Possible. (Not Iranian) Free Details. Arab Ventures, —PM, 935 Main, Vidor, TX 77662

BORROW FROM HOME! Any amount, any purpose, within 30 days. Competitive Rates. Also, you can earn unlimited income as our Money Agent. No experience - own hours. National Company to assist every way possible. No Gimmicks! Free Report: DFC, Dept. 10-C-8, 1145 Reservoir Avenue, Cranston, Rhode Island 02920

GET Cash Grants—From Government. (Never Repay.) Also, Cash Loans. All Ages Eligible. Complete Information, \$2 (Refundable). Surplus Funds-PM, 1629 K St., Washington, D.C. 20006

BORROW \$30,000 without interest! All eligible. Repay anytime. Free details! Infohouse-PM8, Box 1004, New York, NY 10276.

PERSONAL

COLLEGE DEGREES BY MAIL. Renowned Universities offer full-accredited Bachelors, Masters, Ph.D.'s . . . Free revealing details. Counseling, Box 317-MP-8, Tustin, California 92680.

COLLEGE Diplomas Without Classes. Accredited Degrees by Mail. Free Details. DACS, Box 33428, Seattle, WA 98133

FINANCE YOUR DREAMS With Government and Foundation Grants. Free details. Tou-PM8, 432 PCH, Hermosa Beach, California 90254.

BIBLE Questions answered. Stamped envelope. Byron, 17167 Bentler, Detroit, Michigan 48219

CONFIDENTIAL Chicago Mailing Address: Business, Personal. Since 1944! Mail Center, 323(K) Franklin, Chicago 60606

UNIVERSITY DEGREES BY MAIL . . . OUR SPECIALTY. FREE Revealing details. Success, Box 13151-T8, Columbus, Ohio 43213.

PROPHECY FROM THE BIBLE is interesting. Let My Bible Reference List Prove It \$3.00. Frank Surface, 3104-S Autumn, Albany, GA 31707

SELECTED SUCCESS SECRETS! Condensed, revealed in monthly publication. FREE INFORMATION. GUIDANCE, 2919 Nancycreek, Atlanta, GA 30327

COMPUTER BIORHYTHMS — \$5/6 months. Astrological profile — \$6. Include date, place, time of birth. Artemis Enterprises, P.O. Box 106, E. Elmhurst, N.Y. 11369

400 Ways to Improve Health . . . Popularity . . . wealth. Free Brochure. Sunshine Enterprises, P.O. Box 44706-A, Indianapolis, Indiana 46204

GET EVEN without getting caught. Free details. Wordwise, Dept. PM4, Box 27, Uniondale, New York 11553.

HOW to end Loneliness and Depression. Free information. JWB, Box 2350-M, Minneapolis, MN 55402

PSORIASIS SUFFERERS AMAZING Relief without drugs. \$1.00. Bonanni, P.O. Box 9102, Albany, New York 12209

BRONZE YOUR BELLY BUTTON LINT!

PLACE Your Navel Lint in a Small Fold of Paper and Send it to THE PEPPER MINT. We Will Return your Lint Bronzed (100% Lead over Aluminum) Appropriately set in a Gold or Silver Colored Nut Ready to Wear or Display. Send your Lint with \$8.00 To: THE PEPPER MINT, Box 237, Marshall, MO 65340

PSORIASIS SUFFERERS: DISCOURAGED: Write for Free important information that is helping thousands. Pixacol, Box 29277PM, Parma, Ohio 44129.

REMAILING SERVICE

UNLISTED ADDRESS. Discreet and confidential. Remail 50¢ Single, Mail Forwarding Service, 8050 S. Main, Houston, Texas 77025

FLORIDA REMAILS Receiving-Forwarding. Allen, 6326 Autian Drive, Jacksonville, Florida 32210

INTERNATIONAL DIRECTORY OF REMAILERS, \$10.00. IRFA, Box 1536M, Hilo, Hawaii 96720

PACIFIC Northwest Address. Discreet Remailing Service. Write: Jobal, Box 546, Woodinville, Wa. 98072

YOUR mail Received-Forwarded-Confidential. DAL Mail Service. P.O. Box 98, Southview Station, Binghamton, NY 13903

FREE! Remailers Listing. (New Agents Wanted): Box 471PM, Atlanta, Texas 75551.

NEW YORK Remails. Discreet. Confidential. Stamped Singles 50¢. Elisco, Dept-H3, GPO Box 2095, Brooklyn, New York 11202.

NEW JERSEY Remail — Forwarding. Information — Researchers. LEH, Box 83, South River, NJ 08882

CONFIDENTIAL MAIL and PHONE Calls Received and Forwarded Daily. Central, Box 387PM, Claymont, DE 19703

CONFIDENTIAL. San Diego Area Stamped Singles 45¢. Smith, Box 537, Imperial Beach, California 92032

SANTA BARBARA REMAILS. Receiving/ Forwarding. Confidential. Single, 50¢. Major's Remailing Service, Dept. PM, 408 East Anapamu, Santa Barbara, CA 93101

OHIO Remails — Stamped Singles 50¢. Telegal, 225 N. Rauthland, Wapakoneta, Ohio 45895

SAN FRANCISCO Only \$25.00/year! Profiteer, Suite 402, 150 Powell, San Francisco CA 94102.

WORLD WIDE REMAILERS, Agents Wanted, FREE Remailers List. Write! Simpco, P.O. Box 25, Willard, Mo. 65781

MISCELLANEOUS

MOUNT SAINT HELENS DUST. Rush \$3.50 for Certified Sample. Volcanic Dust, P.O. Box 954, Ephrata, Wn. 98823

COOK Turkey Hawaiian Style. Send \$5.00. P.O. Box 29842, Honolulu, Hawaii 96818

CIGARETTE LIGHTERS. Send \$1.00 ppd. to: Lighters, P.O. Box 9599-PM, Minneapolis, MN 55440.

ORNAMENTAL Iron Designs. Book of 1600 Beautiful, Practical Designs for Railings, Columns, etc. Free Literature. Cunningham, 3881 South 3200 West, Box 20005, Salt Lake City, Utah 84120

PHOTO IDENTIFICATION CARDS . . . Certificates . . . GUARANTEED!! Samples 25¢ . . . Bascco, Box 3461-P-80, Providence, R.I. 02909.

SURPRISE Package girl's clothes, sizes 1-8 guaranteed, \$7.95 post paid. M & L Enterprises, 1G6, Box 1563, Homewood, IL 60640

PHOTO ID. Sealed in plastic. All states, provinces. 24-hours. GUARANTEED. Free Social Security Card. Send \$5.00 (2/\$8.00). Photo, Name, Address, Height, Weight, Hair, Eyes, Birthdate. CARDINAL, Box 5200-DR46, Jacksonville, Florida 32207.

IDENTIFICATION CARDS . . . CERTIFICATES . . . 52 SELECTIONS. Samples 25¢. Documents, Box 5684-T, El Monte, Calif. 91731.

WANTED—MISCELLANEOUS

GOLD, Silver, Platinum, Mercury, Tantalum wanted. Ores assayed. Free circular. Wholesale Terminal, Norwood, Ma. 02062.

BUYING Tungsten Carbide, Top Prices — Poley's Industrial Salvage, 12389 S. Minges, Battle Creek, MI 49017 (616) 979-4075.

FOR SALE-MISCELLANEOUS

INEXPENSIVE "Overseas" Giftware. Free Brochure! Allgiftco, Box 91309-K8, Cleveland, Ohio 44101

HEARING AIDS

HUGE SAVINGS. Eliminate dealer mark-ups. Free Trial. Batteries Wholesale. Terms arranged. Lloyds-PMC, Rockford, Illinois 61104.

FREE HEARING AID CATALOG - Save ½ by mail! Write: "MoneySavers", 9530-PM8 Langdon, Sepulveda, California 91343. Not sold in California.

TRY Before You Buy! Free Details. Rhodes Hearing Aids, Dept. 132-P, Brookport, Ill 62910

TOBACCO

MAKE Pipes. Information: Pimo, Inc., P80, Box 59211, Chicago, Illinois 60659

THE ULTIMATE PIPE TOBACCO "WORLD'S FINEST AROMATIC" 4 ½ ounces \$10 post-paid insured. Nebula One Group, 957 N. 13th St., Milwaukee, WI 53233

SMOKE A PIPE? Try our BOURBON VANILLA Tobacco. Send \$1.00 for Generous Sample and Catalog. Pipe 'N Tobac, Ltd., Broadway Square Mall, Tyler, Texas 75703

FORMULAS, PLANS, ETC.

20,000 MONEYMAKING FORMULAS! CATALOG — \$2.00 — REFUNDABLE! GWA3, Box 193, Brookfield, WI, 53005

TRAVEL AND RESORTS

BETTER VACATIONS 100+ proven tips \$2.00. Better Vacations, Box 1265, Mountainside, NJ 07090

SAVE Money on Luxury Cruise! (Passenger Ship or Freighter). Travltips, 163-09 N808 Depot, Flushing, NY 11358

FREE/INEXPENSIVE AIR TRAVEL. Learn Secret Methods. Details \$1. J. Levandis, Dept. PM80, RI, Syracuse, IN 46567

SPECIAL SERVICES

INFORMATION On anything. Ferguson Research Specialists, 60-15 Woodside, Woodside, New York 11377.

HOW TO MAKE MONEY THROUGH CLASSIFIED ADVERTISING. Booklet shows you how to start your own business with Classified Advertising. ONLY \$1.00 FOR BOOKLET — (\$2.00 coupon refundable with first order) H.E. KAPPEL, PM, DEPT. P, 224 WEST 57TH ST., NEW YORK, NY 10019

ASK Me Anything. Detailed information. Business. Personal. \$2.00. Data, 1006 S. Dixie Highway, West Palm Beach, FL 33401

BETTER HEALTH

SLEEP, Immediately, All Night, Awake Refreshed, Learn Sleeping Techniques By Cassette. Send \$9.95. Behavioral Management, Box 8024P, Roseville, Minnesota 55113

LOWER DENTURES THAT DON'T "FLOAT!" No Gimmicks — Professionally done. Write To: Lower Denture Security Co., P.O. Box 20952-PM, Oklahoma City, Oklahoma 73156

HOW TO LIVE TO BE A HUNDRED!!! Effects of inheritance, job satisfaction, diet, retirement, sexuality. Hardcover book, 200 pages. \$4.49. JET Publications, Box 298PM1, Grant, AL 35747

GARDENING & LAWN CARE

HOW TO ESTABLISH, MAINTAIN, OR RENOVATE YOUR LAWN. Detailed Instructions. Booklet \$5.00. Mar-Mac Consulting, Box 235, Stafford, Kansas 67570

WEED FREE LANDSCAPING Without Plastic!—\$3.00 —Box 899PM1, Graham, NC 27253

FLOWERS, PLANTS & NURSERY SUPPLIES

LEARN Landscaping at home. Free booklet. Lifetime Career Schools, Dept. A-800, 2251 Barry Avenue, Los Angeles, California 90064

GROW Ginseng! \$50 Pound. Have Seeds, Roots. Goldenseal. Full information. K. Collins, Viola, Iowa 52350

WINEMAKING & OTHER RECIPES

ATTENTION BEER MAKERS: 6 lbs. Munton & Fison Hopped Malt Extract: Specify Light, Amber, Dark. Prepaid \$9.50, Money Order Only. Home Winery Supply, Dundee, MI 48131

(Continued from preceding page)

WINEMAKING & OTHER RECIPES

(Continued from preceding page)

WINEMAKERS-BEERMAKERS— Free Catalog—Fast Service—Large Selection: Kraus, Box 7850L, Independence, Missouri 64053.

WINEMAKERS-Beermakers: Free illustrated catalog of supplies. Semplex, Box 12276R, Minneapolis, Minnesota 55412.

TRAIL RIDERS CHILI. Hot, spicy. No tomatoes. Extra good. \$2 and SASE. Cook Shack, Box 9551, Tulsa, Oklahoma, 74107.

FREE ENCYCLOPEDIA Winemaking, Beer-making, Supplies, Equipment, Ingredients. Vynox Industries, Box PM-7498, Rochester, New York 14615

BEERMAKERS, Winemakers, Free Catalog, Recipe. Finest Ingredients, Equipment, Service. SPI, Box 784M, Chapel Hill, North Carolina 27514

HOMEMADE — **GALLIANO** and **KAHLUA**. Easy! Inexpensive! \$3.00. Kountry Kitchen, Box 353, Bethel Park, Pa 15102

MAKE BEER, Wine, Liqueurs. Free Catalog. Bacchanalia, Box 51, Central Village, Mass. 02790

BEER LOVERS — Brew your own. Delicious! Inexpensive! Free Catalog. Beer Gear, Box 25093M, Lansing, Michigan 48909

WINEMAKERS-BEERMAKERS Fresh stocks, Fast service, Free catalog. O'Brien's, Box 284B, Wayne, IL 60184

BOOK — Make Moonshine and Build small still includes Home Beer-making. \$1.75. Box 276B, New Berlin, Ill. 62670

WINE, Three Weeks; Beer, Two. Catalog, Supplies. Jim Dandy Sales, Box 30377PM, Cincinnati, Ohio 45230

BEERMAKERS-FREE Catalog/Newsletter. Our 42 page Beginner's Beer-making Guidebook \$2.00. William's Brewing, Box 461-M, Oakland, California 94604

RED VELVET CAKE Recipe. Delightfully Delicious! \$2.00. B. Whiteside, P.O. Box 16313, Temple Terrace, Florida 33617

WINEMAKING-BEERMAKING-GASOHOL. Free Supply Catalog. Yeast Equipment. Continental, Box 68016-PM, Indianapolis, Ind. 46268

ITALIAN Recipes — Grandad's Anisette and Galliano Liqueurs \$3.00. c/o Chef Rocco, Box 266, Wilmerding, PA 15148

OLD Fashioned Creamed Veal Recipe — \$2.00. Salemwoods, 39090-PM Salem Drive, Mt. Clemens, Michigan 48043

APPETIZERS - Three great recipes. Unusual, quick, delicious. \$1.00. SASE. 1054 Coldwater, Rochester, NY 14624

WINE - How to make great Madeira, \$3.25. Hepaca, Box 110453, Nashville, Tenn. 37211

FUDGE Recipes Cheese, Chocolate, Peanut Butter \$1.95. Moody, P.O. Box 16041, Greenville, SC 29606

KEY LIME PIE — **DELICIOUS** \$4.00 — SASE — Torongo, Box 6991, Fort Myers, Florida 33901

DELICIOUS HOMEMADE WINE AND CHAMPAGNE RECIPES. MANY FLAVORS. (ILLUSTRATED). \$3.00. Thomson Company, 3846 Ellwood, Berkley, Michigan 48072

MOONSHINE Liqueur Recipe. Send \$2.00 plus SASE. S.A. Cox, Rt. 2, Box 258, Central, SC 29630

GREAT BARBEQUE SAUCE for Beef, Chicken, Pork, Etc. Two Recipes \$2.00. Cornell, P.O. Box 578, Warrington, Pa. 18976.

BARBEQUE Sauce. Never Before Revealed. Old Family Recipe. \$1. Vesey's, 1275 Bear Mountain, Boulder, Colorado 80303

CAN DEER, Rabbit, Etc. Recipe \$2.00. Mark, Box 155H, Honor, Mich. 49640

SMOKED TURKEY RECIPES, Four Southern Originals Plus Addresses for Several Discount Gourmet Delights \$3.00. DCS, Box 673, Marshville, NC 28103

KAHLUA RECIPE — Two Easy Recipes Rated X. \$2.00. KS, Rt. 3, Box 3359, Nampa, ID 83651

JALAPENOS! Stuffed — Fried — \$1.00 SASE. WestTexAnn, Box 252, Big Spring, Texas 79720

HAWAIIAN Breads. Four Fantastic Recipes. \$3.00: Cookbook, P.O. Box 1035, Stockton, Calif. 95201

FAMOUS HEART-C-RANCH CHILI RECIPE. Send \$2.98. P.O. Box 1221, Plano, Texas 75074

PICNIC Recipes Delicious Chili \$2.00 S.A.S.E. Hazel's Kitchen, Box 3136, Knoxville, Tenn. 37917

TEN unusual cake recipes. \$2.00 SASE. Ellenor's, 5239 Grande Road, Hillsboro, Ohio 45133.

HAWAII Cookbook, 180 Island Recipes & Cooking Methods — Satisfied or Money Back. Send \$3.00 to: Books of Hawaii, P.O. Box 15672X, Honolulu, Hawaii 96815

MY FANTASTIC SUPER Sandwich Booklet \$3.54. P.O. Box 26284, Fort Worth, Texas 76116

FROM RUSSIA WITH LOVE. 10 Unknown Recipes—\$2.00. ISERA, Box 2857, Cherry Hill, NJ 08034

SCRUMPTIOUS, Cheese Cake, Jerky and Smoke-house Recipes. \$2.00 To: Recipes, 4503 Broadway, Vallejo, CA 94590

BEERLOVERS! Finest homebrew ingredients, supplies. World Famous **COMPLETE** brewing outfits. Free details, handbook. Duane Imports Ltd., Department PM80B, 508 Canal Street, New York, New York 10013

DELICIOUS Pecan **TORTE** (cake) and Potato Salad Recipes. SASE or 25¢ for postage & handling and \$1.00. Recipes, P.O. Box 9599-PM, Minneapolis, Minnesota 55440

MEXICAN RECIPES — Authentic, Delicious, inexpensive. Send \$4.00: Larick Enterprises, P.O. Box 867, Bremerton, 98310

WORLD'S BEST PICKLES — Crispy, Easy, Indescribably Delicious. \$1.00. Recipes, 2758 San Juan Road, Hollister, California 95023

KENTUCKY Vegetable Soup. An Experience In Eating. \$1.00 + SASE. Box 804-P, Ashland, KY 41101

EUROPEAN Soup. Mother to Daughter Recipe. One Meal In itself. Send \$1.15. P.O. Box 1983, Winter Park, Florida 32790

BURGLAR ALARMS & HOME PROTECTION

POLICE DIALER \$29.95, Free Catalog. SASCO, 5619 St. John, Kansas City, Mo. 64123

FINEST Equipment! Save! **FREE CATALOG!** AAS, 1868 Oxmoor Road, Birmingham, Al. 35209

STOP BURGLARS! Do It Yourself. Diagramed Report \$3.95. Tenterprises, P.O. Box 3863, Corpus Christi, TX 78404

SAVE UP TO \$1200! How to Install a Professional Security System. Send \$5 To: Champion Security Systems, Inc., P.O. Box 409, Bohemia, NY 11716

MAGNETIC LOCK No Keyhole, pick-proof! Information, Shimming's, P.O. Box 136, Regina, Sask., Canada S4P 2Z6

Popular Mechanics

224 West 57th Street, New York, N.Y. 10019
Classified Advertising Dept. (212) 262-4825

Order Form

DEADLINE FOR ADS: Copy and Payment must be in by the 5th day of the 2nd preceding month for the issue in which the ad is to appear. See Head of Classified Section.

HOW TO COUNT WORDS: Name and address must be included in counting the number of Words in your ad. Each initial or number used counts as 1 word: H.E.Kappel, 224 West 57th Street, New York, New York 10019: 9 WORDS. Zip codes are not counted. Phone #: 2 Words. Symbols used as keys are charged for. City or State count as 1 word each.: New Brunswick, New Jersey: 2 Words. Abbreviations such as C.O.D., F.O.B., R.P.M., U.S.A., P.O., 5x7, 16mm are counted as 1 word. (P.O.Box 392 counted as 3 words) Webster's International Unabridged Dictionary will be used as our authority for spelling, compound words, Hyphenations, abbreviations, etc. Please make checks payable to **POPULAR MECHANICS**.

Only \$40 for 10 word minimum

\$4.00 each additional word

BOLD FACE CAPS add
\$1 per word

(First Word: No Charge For Bold Face)

Remittance of \$ _____ is enclosed to cover _____ insertion(s) in the _____ issue(s). _____ Classification

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20
21	22	23	24
25	26	27	28
29	30	31	32

YOUR NAME _____ **PHONE:** _____

FIRM (NAME IN AD) _____ (PLEASE PRINT)

YOUR ADDRESS _____

CITY _____ **STATE** _____ **ZIP** _____

DATE: _____ **YOUR SIGNATURE** _____

(PLEASE PRINT OR TYPE COPY • FOR ADDITIONAL WORDS ATTACH SEPARATE SHEET)

Magazine Offers LIFETIME Subscriptions for \$7.95!!!

NEW YORK—Better Living, the nation's leading service monthly—devoted to home, garden, health, fitness, recreation, and personal finance—has stunned the publishing world by announcing Lifetime Subscriptions for just \$7.95, an unprecedented bargain.

Lifetime Subscriptions last for the remainder of a purchaser's lifetime. Other periodicals charge \$300 to \$500 for such subscriptions.

"This offer has been made possible," a Better Living spokesman said, "by today's astronomical interest rates.

"The interest alone on prepayment of a \$7.95 Lifetime Subscription now covers postage, our biggest cost in filling Better Living subscriptions. Thus we can offer these Lifetime Subscriptions so cheaply.

"Consistent with our policy of passing along to subscribers economies we are able to effect, and maintaining Better Living's position as America's Number One Biggest Magazine Bargain, we're offering Lifetime Subscriptions at this GIVEAWAY price.

"This is one of the few instances we know of where a consumer actually benefits from today's stratospheric interest rates.

"We don't know how long we'll be able to continue this \$7.95 Lifetime offer. It all depends on how long interest rates stay high. Once they drop appreciably, this offer will automatically be withdrawn."

HOW TO ORDER

Readers who wish to accept this unprecedented offer should send their name and address with \$7.95 (check or money order, or Visa or Master Charge number) to: Lifetime Subscriptions, Dept. PM, Better Living, 251 W. 57th St., New York, NY 10019.

Better Living, circulated nationally, is America's most comprehensive service magazine, covering home design and decor, food, fishing, camping, the outdoors, travel, photography, gardening, cars, sports, boating, beauty, crafts, hobbies, health, fitness, product ratings, and other consumer affairs, leisure activities.

Typical of the kinds of wallet-fattening, useful articles in Better Living are:

Recession-Proof Jobs

Car "Econometers" Can Save Gas

The West Point Diet

A Consumer's Guide to Inflatable Boats

How to Collect Social Security from U.S. and Canada—SIMULTANEOUSLY

Investments that Outpace Inflation

Trout Flies Fit to Be Tied

New Computerized Combination Locks

High-Yield Vegetable Gardening

How to Get a Job as a Forest Ranger

Fill 'er Up—With Propane?

Ski Camping: Winter's Newest Sport

How to Build a Super Intrusion Alarm

Second Night Free: 1,000 Hotels, Motels

Offer an Incredible New Bonus

How to Travel and Get Paid for It

Navy School: Photo Career Port of Entry

Interest in Electric Cars Is Surging

How to Exercise While Driving

Sidestepping the Hazards of Jogging

Fishermen Swarm to School

Ford Pins Hopes on Graphite Car

How to Stop Snoring

Night Glasses for Safer Driving

The Dollar-A-Day Diet: It Really Works

How to Select How-To Books

Silencing Apartment Noise

Bionic Bassing

What It Costs to Run Your Appliances

Buying a Boat as an Investment

Home Offices that Work

Lights *INSIDE* Your Camera

Growing Exotic Vegetables from Europe

House Remodeling: Adding an Energy-

Efficient Room at the Top

Boat Camping

Canada, Where College Costs Half

How to Save \$300 a Year on Utility Bills

Logging Roads Open Up to Fishermen

Home Is Where You Find It: Converted

Schoolhouse, Ferry, Ice House

Return of the Three-Wheel Car

Natural Look: Alternatives to the Lawn

Split Equity: Sell Your House, Keep It Too

Couples Who Divorce to Cut Taxes

Canoe Vacations: Strokes of Genius

35MM Autofocus: Taking a Sharp Look

Estate Planning: Protect Your Heirs

from the Tax Collector

As you see, Better Living is an easy-to-follow instruction manual for building a better life. It can make your home more beautiful and comfortable, your family more fit and attractive, your leisure time more exciting and rewarding.

Celebrities and influential tastemakers whose opinions spark the pages of Better Living include:

Jack Anderson, Senator Howard Baker, Isaac Bashevis Singer, Lawrence Welk, Julia Child, Gay Talese, Bob Hope, Cleveland Amory, F. Lee Bailey, Henny Youngman, Helen Gurley Brown, Isaac Asimov, Charles Schulz, Andy Warhol, David Reuben, Ann Landers, Joyce Brothers, Rodney Dangerfield, Alice Cooper, Abigail Van Buren, Rex Reed, Flip Wilson, Senator George McGovern, Don Rickles, William Kunstler, Johnny Rutherford, Cale Yarborough, Bobby Allison, A.J. Foyt, Al Unser, Colonel Harland Sanders, Art Linkletter, Jackie Gleason, Liberace, Alastair Cooke, Dan Greenburg, Keir Dullea, Arthur Godfrey, Rocky Graziano, Arlene Francis, Benjamin Spock, MD, Pat Boone, Lucille Ball, Johnny Mathis, Dennis Weaver, Debbie Reynolds, Bob Newhart, Jack Palance, Victor Borge, Bill Cosby, Mario Andretti, Loretta Lynn, Merv Griffin, Robert Goulet, Carol Lawrence, Red Skelton, George Wallace, Bill Dana, Tom Smothers, Dick Smothers, Bob Guccione, Jim "Catfish" Hunter, Curt Gowdy, Billie Jean King, Ed McMahon, George Jessel, Howard Cosell, Reverend Ike, Jimmy Carter, Marie Osmond, Bill Blass, Barry Goldwater, Jr., Werner LeRoy, Della Reese, Monty Hall, Roberta Peters, Dick Clark, Huntington Hartford, Ed Asner, William Shatner, Paul Winchell, John Travolta, Cher, and George Burns.

Clearly, Better Living has it all: celebrities, money savvy, advice and information on enriching your life in every way.

NOW WITH A PRICE FOR LIFETIME SUBSCRIPTIONS—\$7.95!—THAT IS POSITIVELY DUMBFOUNDING, THAT IS LOWER THAN MANY MAGAZINES CHARGE FOR JUST ONE YEAR!

TO TAKE ADVANTAGE

To take advantage of this unprecedented offer, send your name and address with \$7.95 (check or money order, or Visa or Master Charge number) to: Lifetime Subscriptions, Dept. PM, Better Living, 251 W. 57 St., New York, NY 10019.

Limit: No more than two subscriptions per address, including gift subscriptions.

"When today's high interest rates drop appreciably, this offer will automatically be withdrawn," the Better Living spokesman said. "Those who have foresight and take advantage of it will be congratulating themselves all the rest of their lives."

© Better Living mcmxxx

CANADIAN WHISKY—A BLEND • 80 PROOF • IMPORTED AND BOTTLED BY THE WINDSOR DISTILLERY COMPANY, NEW YORK, N. Y.

ONE CANADIAN STANDS ALONE



WINDSOR



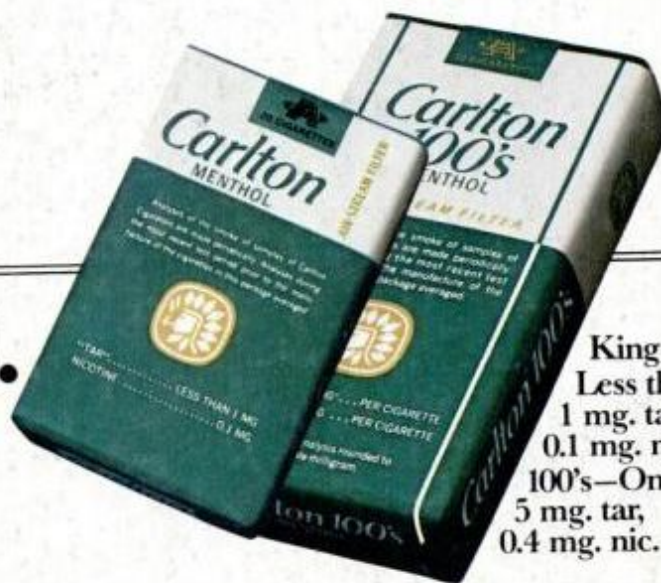
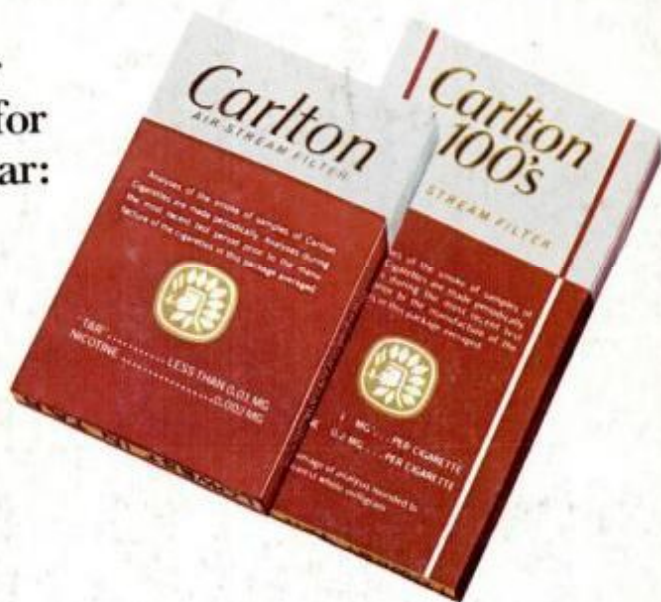
Материал, защищенный авторским правом

In either length—King or 100's:

Carlton is lowest.

See how Carlton stacks down in tar compared with U.S. Gov't. figures for brands that call themselves low in tar:

	tar mg./cig.	nicotine mg./cig.
Carlton Box (lowest of all brands)	less than 0.01	0.002
Carlton Soft Pack	1	0.1
Carlton 100's Box	1	0.1
Carlton 100's Soft Pack	less than 6	0.5
Kent	11	0.9
Kent 100's	14	1.0
Merit	8	0.6
Merit 100's	10	0.7
Vantage	11	0.8
Vantage 100's	12	0.9
Winston Lights	14	1.1
Winston Lights 100's	13	1.0



Carlton Menthol.
King & 100's
**The lighter
menthols.**

King—
Less than
1 mg. tar,
0.1 mg. nic.
100's—Only
5 mg. tar,
0.4 mg. nic.

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

Box: Less than 0.01 mg. "tar", 0.002 mg. nicotine; 100's Box: 1 mg. "tar", 0.1 mg. nicotine av. per cigarette by FTC method. Soft Pack: 1 mg. "tar", 0.1 mg. nicotine; Menthol: Less than 1 mg. "tar", 0.1 mg. nicotine; 100's Soft Pack: Less than 6 mg. "tar", 0.5 mg. nicotine; 100's Menthol: 5 mg. "tar", 0.4 mg. nicotine av. per cigarette, FTC Report Dec. '79.