

FEBRUARY 1981 \$1.25

1/2 MILLION-MILE DRIVE REPORT
Datsun 280ZX owners cheer its pep and economy

Popular Mechanics

AT LAST: SOLAR CELLS PROVIDE ALL ENERGY FOR THIS HOME

IN COLOR: PM's complete guide to the '81 imported cars

PM EXCLUSIVE:

LONGEST HOVERCRAFT TRIP:
2740 miles on the Mississippi

STEREO: 9 NEW STRAIGHT-LINE TONE ARMS

15 COMPLETE PLANS

- Roll-top breadbox to make
 - Pop-art candlestick you can copy
 - 7 clever hangups to make for kitchen knives and accessories
- ...plus much more!

BACK-YARD WATER POWER: Homemade plant generates 80% of house electricity



COMPLETE PLANS INSIDE

TWO LINCOLN CLOCKS YOU CAN MAKE

PLUS:

5 KIT CLOCKS
Make an heirloom timepiece in one weekend

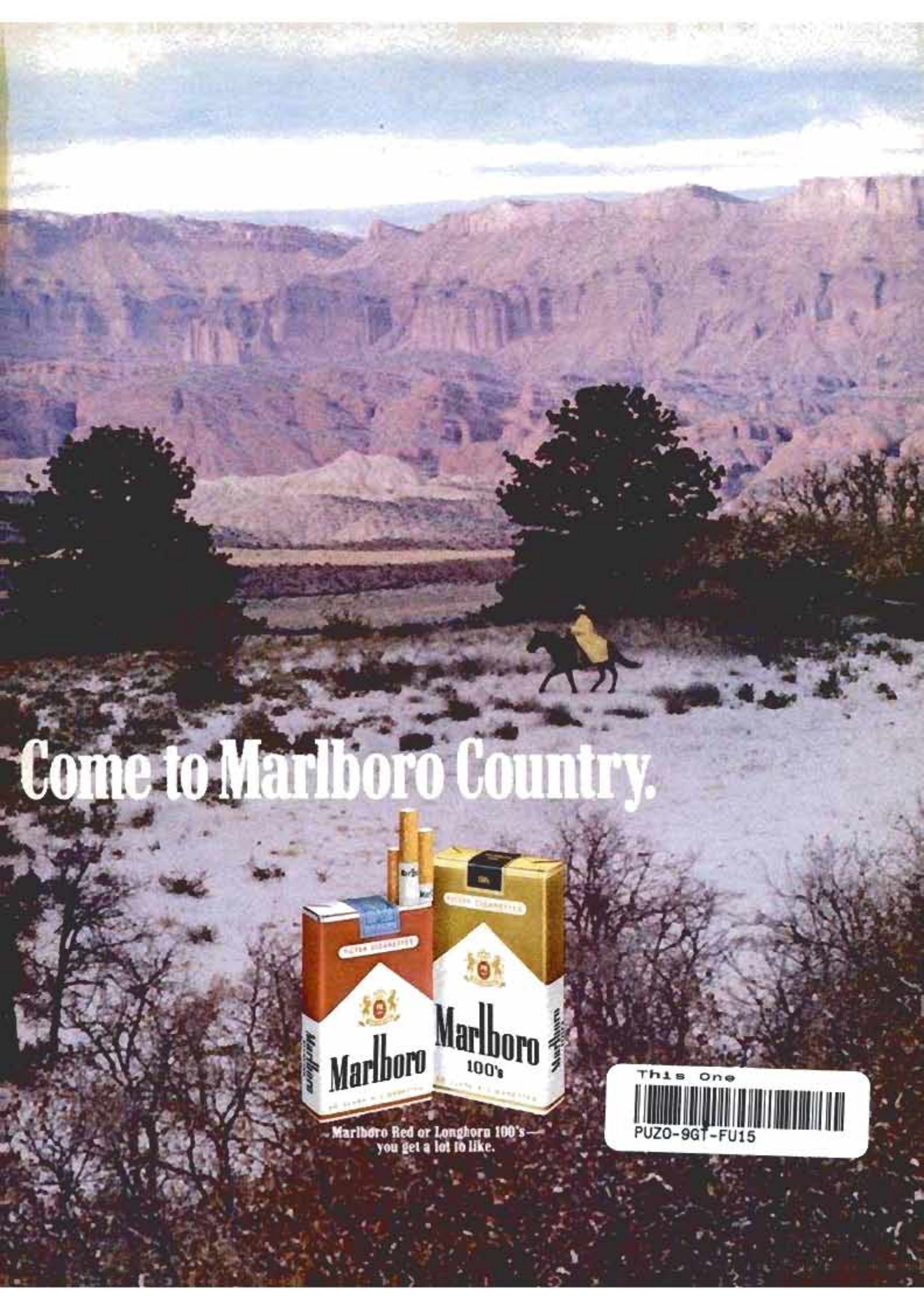




Come to where the flavor is.

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



Come to Marlboro Country.



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

This One



PUZO-9GT-FU15

A comparison of projections from manufacturers' treadwear ratings under the new government Uniform Tire Quality Grading System indicates that on a government-specified course:

To say the Uniroyal Steeler beat major competition is a 15,000 mile understatement.

The U.S. Department of Transportation recently gave the public a standard yardstick to compare tires by.

Now, each tire company is required by law to grade its tires in three areas. Traction. Temperature resistance. And treadwear.

And then to emboss the resulting grades on the side of the tires.

When compared, most of the similarly priced steel-belted radials in the chart fared equally well in the traction test. Same for temperature resistance.

But one tire pulls ahead of the pack when it comes to the important grade that indicates the relative wear rate of your tire.

That tire: the Uniroyal Steeler.

In fact, when you translate its 220 rating into projected miles on the government-specified course, you see it was no photo finish.

On that course, the mileage projection for the Uniroyal Steeler is 66,000 miles.

That's 15,000 miles longer than the ratings the comparable Goodyear, Goodrich, Firestone or General tires would project.

And 24,000 miles longer than Michelin's rating would project.

These mileage projections (including those in the chart) should be used for comparison only. You will probably not achieve these results. Actual treadlife will vary substantially due to your driving habits, condition of vehicle and, in many sections of the country, road conditions and climate.

Nevertheless, what do these ratings say about the Steeler? They say when you compare the ratings, the Steeler should

UNIROYAL outlast its major competition under comparable conditions of consumer use. That's no overstatement.

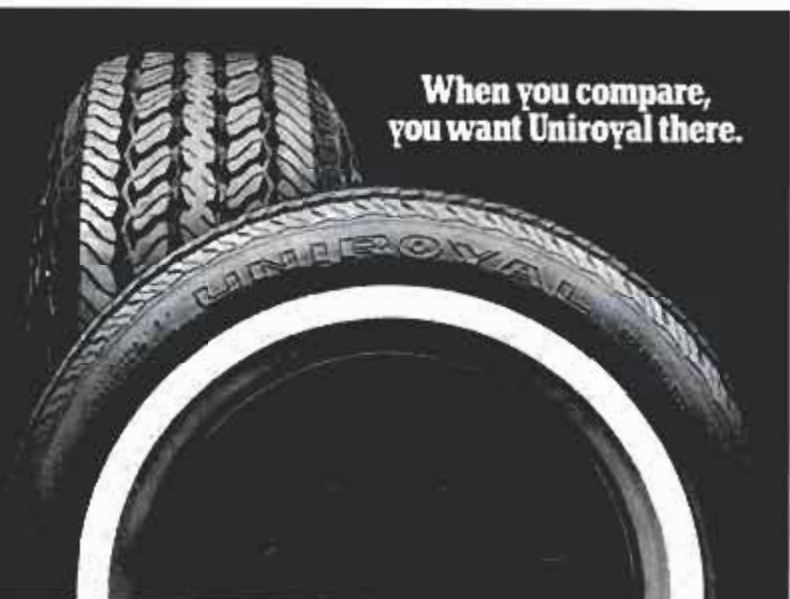
Clip and take this to your Uniroyal dealer:

MANUFACTURERS' RATINGS* FOR U.S. GOVERNMENT QUALITY GRADING SYSTEM			PROJECTION OF MILEAGE ON GOVERNMENT-SPECIFIED TEST COURSE
Manufacturer/Tire:	Traction and Temperature Resistance	Treadwear	
UNIROYAL Steeler	B/C	220	66,000
GOODYEAR Custom Polysteel	B/C	170	51,000
FIRESTONE 721	B/C	170	51,000
GENERAL Dual Steel II	B/C	170	51,000
B.F. GOODRICH Life Saver XLM	B/C	170	51,000
MICHELIN XWW	A/B	140	42,000

For a free booklet on grade-labeling, please send your name and address to: Uniroyal, Inc., Tire Advertising Department, Middlebury, Connecticut 06749.

© 1980 Uniroyal, Inc.

*Source: U.S. D.O.T. Report dated 9/10/80.





On the cover

Beginning on page 130 are complete plans for replicating two mantel clocks from homes that Abraham Lincoln once lived in. Following up on page 134, PM builds and critiques five kit clocks in varying styles.

—PM photo by George Ratkai
Craftsman's tools from Garrett Wade

Popular Mechanics®

FEBRUARY 1981

CONTENTS

VOLUME 155 NUMBER 2

INTERNATIONAL EDITIONS: CARIBBEAN, ITALY, MEXICO, SOUTHERN HEMISPHERE

Special features:

Alternate electric power: from back-yard generators . . .

How a water-powered unit can supply up to 80 percent of your home's requirements.

122

. . . and solar cells

Roof-mounted array makes this house energy-independent.

144

Dynamic Datsun

After 1.5 million miles, drivers of the 280ZX name responsiveness and economy as best features.

128

A hovercraft record

Two men and two teen-agers keep a V8 in skirts pinned together for 2740 miles on the Mississippi River.

111

Straight-line-tracking tone arms

Newest turntables let your playback stylus track the same way records are cut—without any arc—for consistent sound.

126

Import cars for '81

While Detroit counters, import models proliferate with new engineering.

114

Make kitchen hangups

These 7 projects solve your kitchen storage problems.

136

Automobiles and bikes

- [13 Firsthand Report: Driving the Mazda RX-7](#)
- [35 Saturday Mechanic: Overhauling MacPherson struts with replaceable cartridges](#)
- [52 Car Clinic](#)
- [60 Detroit Listening Post](#)
- [70 The PM Garage](#)
- [96 Automatic radar braking](#)
- [108 Imports and Motorsports](#)
- [114 Detroit besieged: PM's guide to the '81 import invasion](#)
- [128 PM Owners Report: Datsun 280ZX](#)
- [148 Running on wind and sun](#)
- [148 Cow magnets for cars?](#)

Science and engineering

- [26 Science Worldwide](#)
- [111 A V8 in skirts beats the mighty Mississippi](#)
- [122 Now: Energy by the bucket from back-yard powerplants](#)
- [144 Raise the solar roof](#)
- [145 Coal's bed partner](#)
- [146 "Water Miser"](#)
- [146 Diver transporter](#)
- [146 Thief marker](#)
- [146 Thumb twiddler](#)
- [147 Radar intrusion alarm](#)

Electronics, radio and TV

- [11 PM Electronics Monitor](#)
- [28 PM installs a superantenna](#)
- [78 Cassette decks: New ways to sound good](#)
- [126 Turntables that play it straight](#)
- [149 Remote-control stereo](#)
- [149 Double-time tapes](#)

Photography

- [50 Two simple darkroom projects](#)
- [102 Photo hints](#)

Shop and crafts

- [32 PM looks at a new carving duplicator](#)
- [64, 68, 172 Hints from readers](#)
- [72 New Now for home and shop](#)
- [92 PM Workbench](#)
- [103 PM looks at sliding table attachment for Unisaw](#)
- [130 A Lincoln legacy: Two mantel clocks you can build](#)
- [134 More heirloom clocks from kits](#)
- [136 7 hangups that make life easier](#)
- [140 Weekend Workshop: 4 quick projects for home and fun](#)
- [143 How to keep sheet plastic scratch-free and shiny](#)
- [150 Workshop Minicourse: More about the sabre saw](#)
- [159 Checkmate in style: Two good-looking playing boards you can make](#)

Home and yard

- [20 Efficient new wood furnace produces no creosote](#)
- [46 Poulan's new chain saw reduces kickbacks](#)
- [63 Appliance Clinic](#)
- [66 Homeowners' Clinic](#)
- [147 Heat-recovery system attaches to flue](#)
- [147 High-heat sensor](#)

Boating and outdoors

- [30 All Outdoors](#)
- [45 New Now for boating](#)
- [106 New Now for outdoors](#)
- [118 New boats for economy and action](#)
- [147 Robotic reel lures fish](#)

Every month

- [6 Letters](#)
- [16 Notes from the Editor](#)
- [23 PM Briefs](#)
- [144 Tech Front Lines](#)

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, \$9.97 for one year; \$18.97 for two years; \$33.97 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. © 1981 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: 800-247-5470. 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

No Bone Crusher
Grip Needed...



... your CHANNELLOCK tongue-n-groover provides the extra muscle. Long, drop forged steel handles. Patented undercut, can't slip adjustments. Parallel grip jaws. Right angle teeth. A power combo that multiplies your grip, generates tremendous leverage with less effort. Be sure you get the genuine CHANNELLOCK. Look for THAT trademark on the pliers you buy.

CHAN NEL LOCK

CHANNELLOCK, INC. • Meadville, Pennsylvania 16335
Meet The Rest Of The Family. Send For Our Free Catalog.



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. PM-2
700 Masonic Bldg. • Portsmouth, Off 45662

2nd MOST IMPORTANT TOOL FOR EVERY WOODWORKING SHOP

VERSATILE
W&H
MOLDER-
PLANER

Almost as basic as your saw . . . molds, planes, rabbets.

From \$410

- Master Charge
- VISA



FREE BROCHURE

WILLIAMS & HUSSEY MACHINE CORP.
Dept. 17, Millard, N. H. 03055
Toll-free 1-800-258-1380

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 Spangler, assistants
Boating, Outdoors and Travel: Wm. T. McKeown, editor
Electronics: Neil L. Shapiro, editor
Editorial Production: Peter Easton, chief; John Bostonian Jr., art; Shannon K. Kelley, Steven C. Fox, 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) 262-4284
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: Ronald Tuosto

Advertising Production: Ronni Beth Siegel
(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. Menck, 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.



Got a ceiling problem?

Cover it up! Dress it up! Light it up! Quiet it down! With a new Armstrong suspended ceiling.

Whatever your ceiling problem—covering up an old or damaged ceiling, adding a new room, or finishing off a basement—an Armstrong suspended ceiling is a problem-solver with style. Beautiful. Washable. Fire-retardant for extra protection. Acoustical to help quiet down any room. Preengineered for energy-efficient fluorescent lights.

Best of all, with an Armstrong suspended ceiling, like Royal Oak shown above, solving your ceiling problem is a do-it-yourself project. There are no staples or glue to mess with, no plastering or sanding. The big 2' x 4' ceiling panels simply drop into the color-matched Super White Grid. The ceiling is easy to install and easy to keep looking fresh and new. If a panel gets damaged, just lift it out, and lay in a replacement.



If lighting is a problem, you can install Armstrong fluorescent fixtures with the ceiling . . . for lighting where you want it, not just where the builder put it.

You can install a beautiful new Armstrong suspended ceiling almost anywhere in your home. Briefly, here's how:

Hang the Armstrong Super White metal runners about three inches below your existing ceiling or open joists (about six inches with light fixtures).

Snap the Armstrong Super White cross tees into the main runners, and lay in the ceiling panels. It takes some time, but it's easy. You can do it!

See your Armstrong ceiling retailer for a broad selection of suspended ceilings. Find him under "Ceilings" in the Yellow Pages. Or send us this coupon, and we'll send you his name and a free full-color brochure.

Armstrong, Dept. 12RPM
Peoria, IL 61614

Please send me your new color
brochure on suspended ceilings.

Name _____

Street _____

City _____

State _____ Zip _____

Armstrong

CREATORS OF



THE INDOOR WORLD®

LETTERS TO THE EDITOR

Telling it like it is

In a day when the common cries of "No nukes!" and "Split wood, not atoms!" are in vogue, I was not only refreshed, but, quite frankly, amazed to read your unbiased and accurate account of *What Everyone Should Know About Radiation* (page 90, Nov. '80). As a nuclear power-plant operator and instructor for some years, I have only one regret concerning your article. It's sad it won't be read by every man, woman and child in the good ol' U.S. of A.

PAUL BICKFORD
SARATOGA SPRINGS, N.Y.

You are to be commended for the technically accurate, yet easily understandable article that put radiation and health into their proper perspectives. Unlike so many of the emotional reports about radiation, PM reported "what is," rather than "what if."

PHILIP A. ANDERSON
PUBLIC INFORMATION COMMITTEE
AMERICAN NUCLEAR SOCIETY
LA GRANGE PARK, ILL.

You state that there is a "surprising amount of radiation from a solar heat-collecting rock bin." As I plan on building a storage bin outside my bedroom wall, this raises the question: How much radiation will be generated?

GEORGE STURGIS
NAPLES, FLA.

We appreciate the comments. As for the amount of radiation emitted from a solar storage bin, it is "surprising" largely in the sense that few would expect there to be any radiation at all. The exact amount would depend on the origin and quantity of rock used and other factors. It almost certainly would not be sufficient to constitute any kind of a hazard to your health.

It may seem backward, but . . .

In your Oct. '80 issue (*How to Keep the Home Fires Burning . . . Safely*, page 74), you say to install stovepipe sections with the crimped ends facing toward the stove. I believe you goofed. It should be the other way around, so smoke and soot won't leak out the joints.

HARVEY DONOVAN
DERRY, N.H.

No, we didn't goof, although a num-

ber of readers did write in to question this practice. As PM correctly stated, the crimped ends should face toward the stove (or downward in a vertical run).

This prevents both creosote and moisture condensation from collecting in the joints and possibly running down the outside of the pipe to drip on the floor. Because the force of the updraft creates a slight suction (vacuum) inside the pipe, outside air pressure will keep smoke and soot from leaking out the joints, no matter which way they are assembled.

Two fine PM tool chests

Here is a photo (below) of my own tool chest, which was inspired by the article in your Nov. '79 issue (*Build PM's Tool Chest for a Master Crafts-*



Two reader-built PM tool chests—Roger Yule's (above), Gil Harrington's (below). Slight differences suit individual needs.



man, page 132). The chest receives on-the-job use daily and works out very well. Thanks for a great project.

ROGER J. YULE
KENOSHA, WIS.

I am enclosing a picture (above) of

the PM tool chest. The plans were very well presented.

GIL HARRINGTON
FIRCREST, WASH.

You both did a beautiful job. Other readers wishing photocopies of the tool chest article can obtain them by sending \$1.50 to *Popular Mechanics*, Box 1014, Radio City Station, New York, N.Y. 10101.

The Japanese had it first

Sorry about that "new" floating airport (*Tech Front Lines*, page 120, Nov. '80). The concept was widely known in Japan in 1938 from a science-fiction story called *Ukabu Hikoto* (Floating Airport). It was a saga about a mammoth British carrier and a Japanese secret agent out to destroy it. The craft carried heavy bombers that were accelerated to takeoff speed on moving belts.

HAN WOOH
LOS ANGELES

Science fiction has been anticipating fact since the days of Jules Verne. But the *Seaforth* proposal is far more lavish than any dream scheme—and closer to reality.

Those great workshops

Your article on Great Shops (*This Master Craftsman's Dream Shop Is in a Log Cabin*, page 108, Nov. '80) delighted me very much. Since my shop is still in the planning stage, I am looking for ideas I can use. However, as a new PM reader, I didn't see the previous 11 articles in your Great Shop series. It is possible to get copies of them?

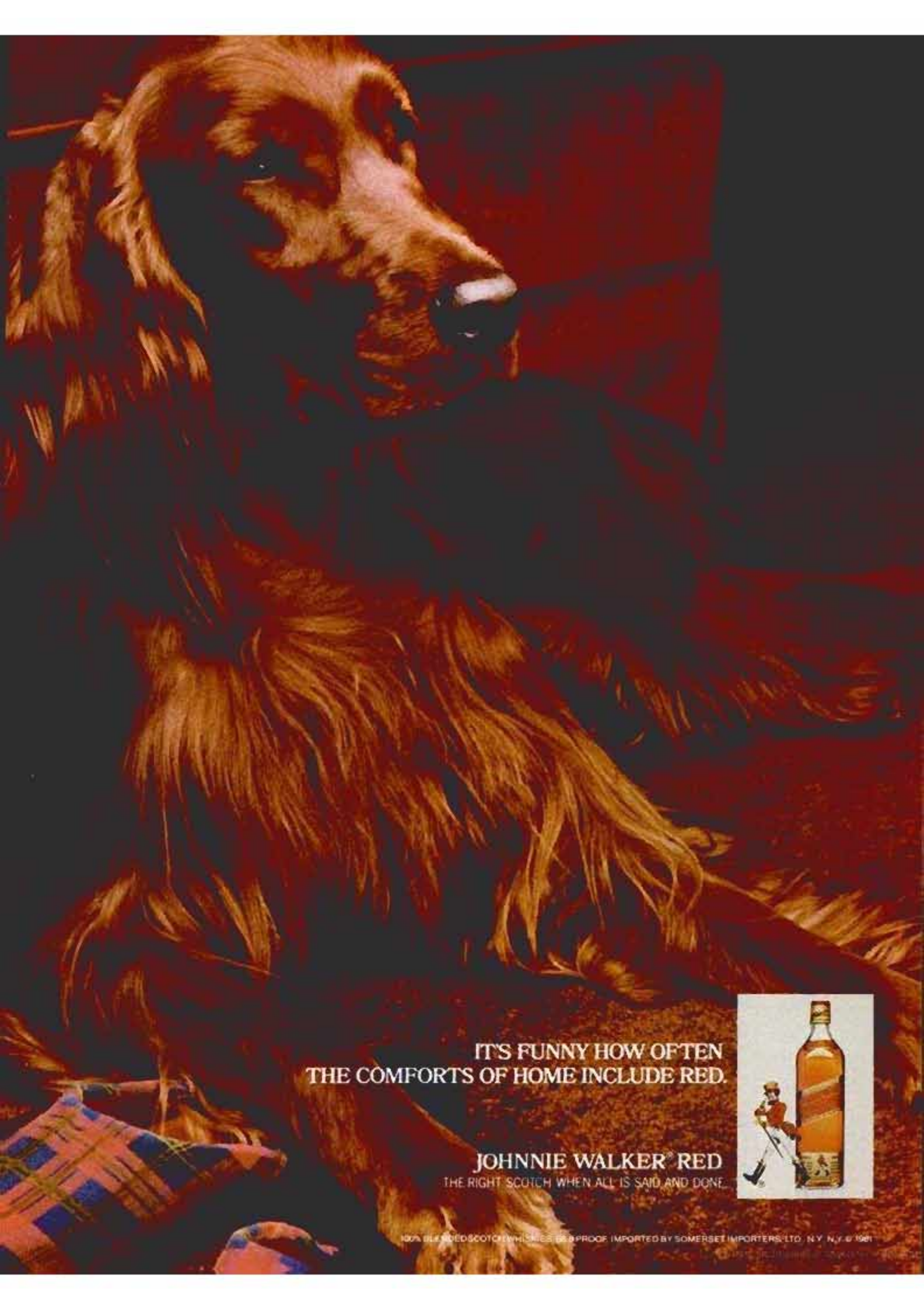
CURTIS L. BUCK
ROCHESTER, MINN.

Yes, indeed. All Great Shop articles are available in photocopy form at a nominal cost. Interested readers should write for a list of titles and prices to Bureau of Information, *Popular Mechanics*, 224 West 57th St., New York, N.Y. 10019.

Bench builders take note

In PM's recent workbench-building project (*A Master Craftsman's Workbench*, page 112, Nov. '80), photo No. 4 at the bottom of page 113 was accidentally reversed in the printing process so it shows the bench with the vise at the left-hand end, instead of the right. All other photos show the bench correctly.

PM



IT'S FUNNY HOW OFTEN
THE COMFORTS OF HOME INCLUDE RED.

JOHNNIE WALKER® RED
THE RIGHT SCOTCH WHEN ALL IS SAID AND DONE.



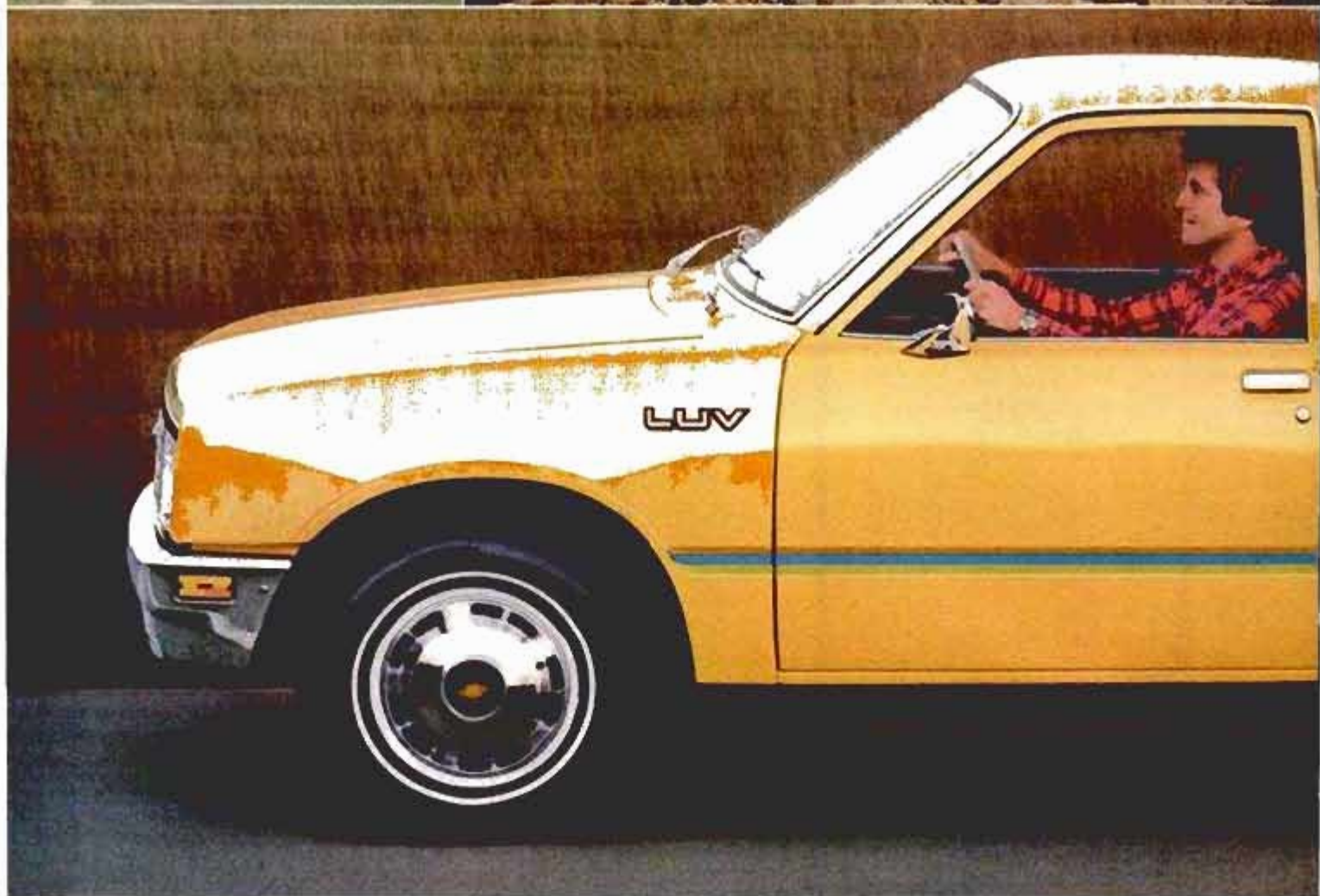
100% BLEND OF SCOTCH WHISKIES 40 & 50 PROOF IMPORTED BY SOMERSET IMPORTERS, LTD., N.Y. N.Y. © 1981



LUV WITH 6-FT. BOX



LUV 4x4



INTRODUCING: THE STURDY, STREAMLINED, SMART,

THRIFTIEST LUV EVER!

The new Chevy LUV has better EPA ratings than ever before!

36 **26**
EST. HWY. EPA EST. MPG (1977)

THRIFTY 4x4, TOO!

LUV 4WD has the best standard-equipped 4x4 pickup mileage estimates in the U.S.A.!

Use the estimated MPG for comparisons. Your mileage may differ depending on speed,

31 **22**
EST. HWY. EPA EST. MPG (1977)

distance, weather. Mileage will be less in heavy city traffic. Actual highway mileage lower. Lower in California, where comparisons do not apply.

BIGGER PAYLOADS THAN ANY HALF-TON SMALL PICKUP. 1680 LBS. The available long cargo box LUV will hold heavier payloads than any other small half-tonner! Payload includes driver, passenger and cargo.

NEW CONVENIENCE



Enjoy thoughtful new touches like side window defoggers and a locking glove box.

LONGEST BOX OF ANY SMALL PICKUP

Not one small pickup can carry longer loads than LUV's 7½-ft. box model.



STURDY 4-CYL. ENGINE

Chevy LUV's standard engine is a rugged 1.8 Liter (110 Cu. In.) Four with new fully-transistorized ignition that increases recommended spark plug change intervals from 15,000 to 30,000 miles. *A Word About Engines:* Chevy LUV engines are produced by Isuzu Motors Limited, Japan.





DISTINCTIVE NEW INSTRUMENT PANEL



OPTIONAL MIKADO INTERIOR



LUV 7 1/2-FT. BOX MODEL

THRIFTY, NEW, LONG, ROOMY, RUGGED CHEVY LUV!

NEW STYLE

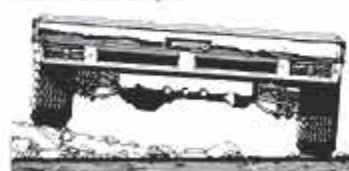
Every inch of sheet metal is new this year, for a sleeker, sportier look. Tie-downs are now inside the box.

STREAMLINED SHAPE

A more aerodynamic shape than ever before, reduces wind drag and contributes to impressive fuel economy.



RUGGED INDEPENDENT FRONT SUSPENSION



Both 2WD and 4WD LUVs have a strong independent front suspension. Beefy 4x4 hardware: torsion bar springs, direct double-acting front shocks, a stabilizer bar, and more!

SMART SWITCH

A remarkably handy device which combines the wiper, washer, turn signal and dimmer switches—all on the steering column!



HIGH 4x4 GROUND CLEARANCE

Chevy LUV 4x4 has a higher ground clearance than many full-size 4x4 pickups.

ROOMIER INSIDE

That spiffy new interior above has more room than last year for your legs to stretch out. Easier entry and exit, too!

See the all-new Chevy LUV at your Chevy truck dealer's soon.



in a world of
less and less
taste...

KOOL's refreshing coolness makes more and more sense. It's a sensation that goes beyond mere tobacco taste...in the 'tar' level of your choice. Original KOOL, low 'tar' KOOL MILDS or ultra low 'tar' KOOL SUPER LIGHTS. Something more in a world of less. C'mon up!



Original KOOL



Low 'tar' KOOL MILDS



Ultra low 'tar'
KOOL SUPER LIGHTS

the coolest
taste around
C'mon up!

Super Lights Kings, 7 mg. "tar", 0.7 mg. nicotine; Milds Kings, 11 mg. "tar", 1.1 mg. nicotine av. per cigarette by FTC method; Filter Kings, 16 mg. "tar", 1.3 mg. nicotine av. per cigarette. FTC Report Jan. '80.

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

PM ELECTRONICS MONITOR

Light on the future

Scientists are making tomorrow's computers even faster and smaller than today's—and they're using light beams to do it.

Conventional digital circuitry, according to researchers at the University of Denver and Ohio State, is now pretty close to the theoretical speed limit due to transistor-switching times. Yet, as quick as computers are now, there are many applications that would benefit by even greater speed.

An optical-digital computer would use light beams instead of electronic circuits to carry information. The light beams would be split by prisms, bounced by mirrors and focused by lenses.

Just as in today's computers, these light-beam computers would "think" in ones and zeros—a binary language. The presence of a light beam would mean a one—its absence, a zero.

Today's small integrated circuitry would be replaced by even tinier sandwiches of liquid crystals. These sandwiches, or optical spatial-light modulators, would control the flow of light much as a complex group of valves control a liquid—but they would do it at the speed of light.

Wireless electric guitars

Wireless FM microphones are nothing new—many people have used them to transmit their voice across a room into a standard FM receiver. But here is an interesting, new application.

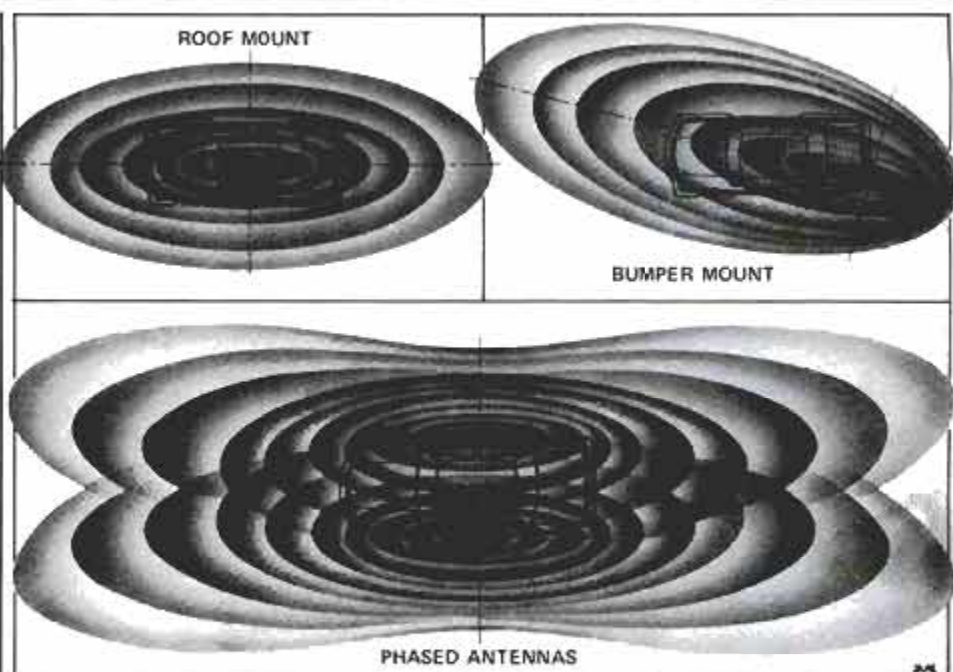
It's called the Lady Bug, and according to its manufacturer, it can be attached to any electric guitar. Once attached, it will broadcast whatever is played to any nearby FM receiver.

This beats tripping over on-stage amplifier cables. You can get more information on Lady Bug by writing to: Lady Bug Inc., Box 589, St. Joseph, Mich. 49085.

Nuclear eavesdropping

If you have a scanner and live near any energy-producing company within the 48 contiguous states, treat yourself to a copy of *Energy-Scan*. The booklet lists some real action frequencies concerned with more than a dozen energy industries.

The nuclear industry is well represented, with frequencies listed where you can hear everything from operations to security. The petro-



Point your power

CB radio has been making a small comeback on the nation's highways of late. So new citizens band users need information on how to set up their rigs for mobile utilization. Above, we show three of the most popular ways to mount your CB antenna or antennas, and what happens to the direction of your talk power employing each method.

Note that the antenna positioned in the middle of the roof tends to spread over all directions evenly. An antenna mounted on the rear bumper sends the wattage up and down the highway. And two antennas phased on each side of the vehicle send the power winging far ahead and behind. So take your choice and drill your holes.

leum industry frequencies cover such areas as offshore drilling, pipeline maintenance and storage facilities. Natural-gas frequencies let you listen to exploration teams and survey reports, as well as pipeline and storage facilities. Your local electric company's "secret" repair, general operation, security and emergency frequencies are also listed.

Energy-Scan is from CRB Research, the same people who sell pamphlets such as *Air-Scan* and *The Top Secret Registry of Government Frequencies*. All its publications are available postpaid at \$5.95 each from CRB Research, Box 56, Com-mack, N.Y. 11725.

If you have a scanner and you're bored with cops and taxis, this is the way to go.

Pamphlet tells all

Received a copy of the new *Electronics Data Handbook* from Joseph Electronics and we were favorably impressed by the wealth of information crammed into its 32 pages.

Just about every chart the hobbyist might need is included. Charts on color codes, constants, power factors, decibels and transistor formu-

las are all in this handy pamphlet.

Copies are \$1 each, 75 cents in lots of 10 and 50 cents in lots of 50 or more. Contact Charles Annella, Sales Manager, Joseph Electronics Inc., 8830 North Milwaukee Ave., Niles, Ill. 60648.

A big turnout

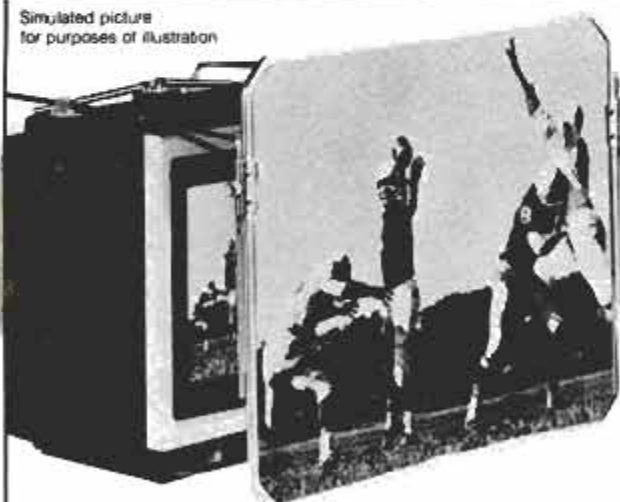
A device that looks like a smoke alarm can help save energy. It's the Seeker Energy Eye and it uses a small microwave motion detector to sense whether or not a room is occupied. If all alone, it turns off lights and appliances.

It's new from Seeker Security Systems, 460 Middlefield Rd., Mountain View, Calif. 94042. **PM**



NOW! The Incredible Beamscope Zoom Lens will Double the Size of your TV Screen!

Simulated picture
for purposes of illustration



- For Black and White or Color T.V.'s
- Installs in minutes without tools
- Requires no power source or wiring
- Can be used under normal lighting
- Giant Screen 16" x 21"
- Improves clarity of T.V. picture

For a
limited time only
\$49.95

ENJOY GIANT SCREEN TV AT ENORMOUS SAVINGS!

So, if you have a 19" portable, the T.V. Zoom Lens will turn it into a console size 27" screen and 336 sq. inch picture. That's two times the normal 160 sq. inch size. Your 15" set will go from a 125 sq. inch picture to a 336 sq. inch picture. This makes for a bigger and more life-like picture.

Of course, if you've been thinking about a new set — wait! Try the T.V. Zoom Lens on your old set. One look will convince you of the hundreds and hundreds of dollars you can save by using the T.V. Zoom Lens to get a bigger, better picture with a small set selling for \$200 or \$300 less!

SEE FOR YOURSELF

Beamscope must be seen to be believed! That's why we are willing to let you see for yourself on your own T.V. Order today, if you don't agree that it is everything we claim and more, return it to us within 15 days for a refund of purchase price.

For Credit Card Orders ONLY

24 Hour Toll Free Service 800-621-5809
In Ill. 800-972-5858

The Incredible Beamscope Zoom Lens represents a new application of technology to the field of T.V. Optics. One which we predict will tie the industry in knots, and force top management to re-examine their technical approach toward large-screen T.V. These are hard facts to face for an industry committed to charging more for what we believe is out-moded technology!

Today SONY, PANASONIC, G.E., ADVENT and SHARP, to mention only a few names, are marketing large-screen projection T.V. systems. These units are designed to offer dramatic theatre size screen presentation in your own living room. They are dramatic, and they are expensive! Expect to pay upwards of \$2,000 and more for a T.V. that must be viewed with separate movie-type screens, require precise placement of the lens with respect to the screen and can hardly be seen in daylight.

BEAMSCOPE SUPERIORITY

Beamscope provides a large-screen, theatre viewing system that can be used in any room, under all lighting conditions. Most important of all, it can be used with your present T.V. All your favorite programs and sports are bigger and better than you have ever seen them before. Every detail sharp and clear. The action easier to follow than it would be from the best seat in the house. Beamscope not only gives you distortionless color and black and white but actually improves the color and sharpness of your present picture.

A PRODUCT OF COMPUTER SCIENCE

Due to the accuracy and precision required, Beamscope could not have been produced at a reasonable price without the aid of a computer. Simply stated, the Beamscope lens is constructed with thousands of spiral microgrooves, so small they can't be seen. They are cut with computer accuracy into one side of a specially fabricated, exceptionally hard acrylic. When the Beamscope is placed in front of your T.V. these grooves literally explode the picture up to twice its normal size.

DISCOVERED BY ACCIDENT

Interestingly, we discovered the Beamscope Lens quite by accident, because it was intended for use by the visually impaired. It has been thoroughly tested and is today being used at the Optometric Center of the Southern California College of Optometry, and numerous other low vision clinics, Universities and Institutes throughout the U.S. Obviously then, the T.V. Zoom Lens is no gimmick, but a scientifically designed optometrically approved, University endorsed optical break-through, manufactured to the highest quality standards.

© Beacon Scientific MCMLXXX

SPECIAL PURCHASE! LEATHER FOLIO



Only
\$34.95

Luxurious handworked pigskin leather
Crafted into a legal size executive folio
Our executive folio is tailored with fine pigskin leathers into a folio measuring 16" x 11". It consists of 3 sections with tuck-in handles. The center section has a zipper closure and carries comfortably under your arm. Regularly sold at \$60.00, but as a result of a special purchase we are pleased to offer it at a mere \$34.95 while the supplies last. Finished in your choice of saddle tan or chestnut. **Satisfaction guaranteed** and 7-day return privilege. Supplies limited. Order today!

BEACON SCIENTIFIC

Dept. B-137 44 Ridge Drive, Plainview, N.Y. 11803
Please send Executive Folio(s) at \$34.95 plus \$3.00 postage and handling (Plus sales tax for N.Y. delivery).

Color _____
For fastest service call Toll-Free 800-621-5809
In Ill. 800-972-5858
 VISA Mastercharge American Express
Charge # _____ Exp. _____
NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____
©Beacon Scientific, MCMLXXX

"All aboard the world's
smallest operating
model railroad."



No
bigger
than
your
thumb

Measuring only 2" long. A break-through in precision miniaturization. (Actual size.)

The Beacon Micro-Train cannot be compared to any other small scale model railroad gear you have seen. Each Micro-Train represents a masterpiece in miniature incorporating a complete model railroad system. Imagine a complete operating railroad so small you can fit an entire layout on a corner of your desk. The set consists of a tank locomotive, low sided freight car and boxcar with 18" x 13" track layout, and is priced at just \$99.95, including the Power-Pack.

SATISFACTION GUARANTEED

BEACON SCIENTIFIC

Dept. B-136, 44 Ridge Drive, Plainview, N.Y. 11803

Send _____ Micro-Train System

My check for \$99.95 plus \$5.00 for shipping and handling (plus sales tax for N.Y. delivery) is enclosed.

USE YOUR CREDIT CARD

MasterCharge Visa Amer. Exp.

Charge # _____ Exp. Date _____

For fastest service call Toll-Free (800) 621-5809.

In Ill. call (800) 972-5858.

Signature _____

Name _____

Address _____

Send your complete 20-page color Micro-Train catalog at \$5.00 each (included with train set). I understand that I may apply catalog purchase toward future Micro-Train orders.

©Beacon Scientific MCMLXXX

FIRSTHAND REPORT

by Gary Witzenburg
DETROIT AUTO EDITOR



Driving the 1981 Mazda RX-7



For '81 the RX-7 is a refined rocket. From the day the RX-7 made its debut in this country, in 1978, it found immediate popularity with sports-car lovers. And for good reason. It was a very reasonably priced sports car, with the performance and styling of other, more expensive sports cars. And it proved reliable and durable—a trait not usually found in hypertensive little sports cars. Owner satisfaction with the RX-7's reliability was proved in our Owners Report (page 86, Oct. '80).

For 1981, the RX-7 benefits from significant changes that further enhance its performance and its position as one of the best sports-car bargains on the market.

From the smoothly integrated, impact-resistant, and soft-polyurethane-covered bumpers to the deep, aerodynamic front spoiler and ribbed, wraparound taillamps to the plusher, more comfortable interior, the refined new look is cleaner and subtler throughout.

Changing to a catalytic converter for emissions control in place of the Wankel rotary's former fuel-wasting thermal reactor contributes (along

with a six-percent improvement in aerodynamics and an 85-pound weight reduction) to an impressive gain in EPA fuel economy to 21 mpg city and 30 mpg highway—23 percent better than the 1980 model. This and a 2.1-gallon-larger fuel tank (now 16.6 gallons) give a 40-percent-longer range between fill-ups for the 2345-pound car.

Performance is also up slightly, to about 8.6 seconds, 0 to 60; 16.5 seconds in a quarter-mile acceleration run; and the rotary's notorious popping and sputtering on deceleration are completely gone. Horsepower of the 1.1-liter rotary is rated at 100 at 6000 rpm.

Handling is better than ever, thanks to suspension refinements and reduced front-end lift at speed, though there's still a slight tail-hap-

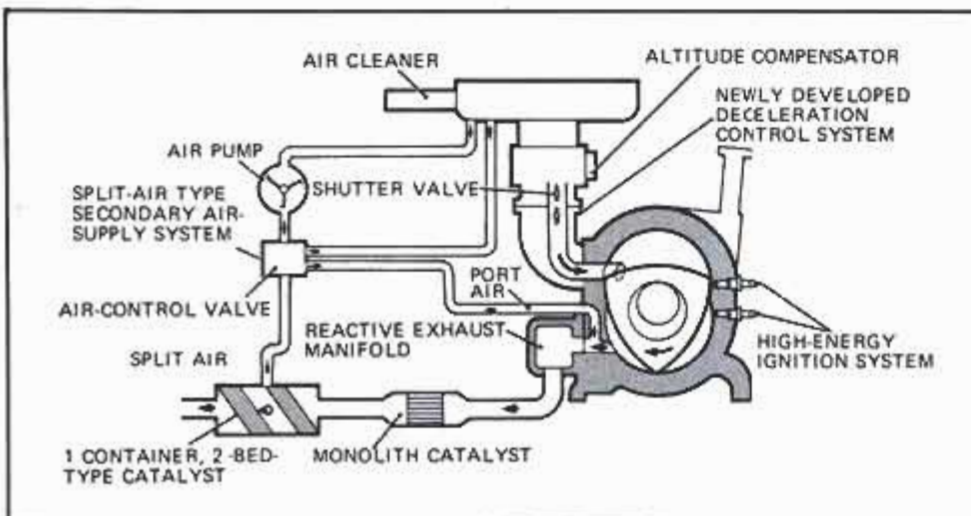
py tendency in hard cornering.

We were fortunate to be able to test the RX-7 at Phoenix International Raceway, using a challenging road-racing course instead of the high-speed oval. Few production cars are more fun on a twisty road course than Mazda's rotary rocket.

The new front-end styling reduces lift at speed, and the body's lower wind drag (with a coefficient of drag of 0.32 with the optional rear spoiler and 0.34 without, compared to last year's 0.36, as measured in Japanese wind tunnels) contributes to improved performance, less interior wind noise and better highway fuel economy. With only minor suspension changes (revised sway-bar sizing and spring and shock rates), cornering response and stability have been improved over past RX-7s. The slight weight reduction itself produces measurable gains in acceleration, handling and braking, in addition to better fuel efficiency.

In short, the 95.3-inch-wheelbase car just seemed to function better everywhere around the course. There is still a slight tendency for the rear end to slide out (oversteer) if you back off on the power partway through a hard corner, but it's less than before, and easily controlled with a small steering correction. The RX-7 already was an excellent Sports Car Club of America showroom-stock (unmodified) race car, and the '81 should be much better.

Most impressive is the very noticeable improvement in engine smoothness, responsiveness and



The RX-7's notorious popping and backfiring on deceleration have been eliminated by a deceleration control on the new engine; it's now equipped with catalytic converters.

(Please turn to page 104)

SPACE S

MARQUIS

16 *EPA
EST.
MPG

25 HWY.
EST.

With the 1981 Lincoln-Mercury wagons, you don't have to give up the space you want for the mileage you need.

The all-new Lynx wagon delivers remarkable cargo capacity... along with the highest EPA mileage rating of any wagon ever built in America.

ZEPHYR

23 *EPA
EST.
MPG

34 HWY.
EST.

LYNX

27 *EPA
EST.
MPG

42 HWY.
EST.

MARQUIS, ZEPHYR, AND LYNX

* Compare to estimated MPG of other cars. Your mileage may differ depending on speed, weather conditions and trip length. Actual highway mileage and California ratings lower.

TATIONS



MARQUIS
53 CUBIC FEET**

The fuel-wise 1981 Zephyr gives you the most cargo space of any

American-built wagon in its class.

And with the 1981

Marquis, you'll find more space than in any wagon built or sold in America, plus mileage that's easy to live with.

Each brings you the comfort and style you've come to expect from Lincoln-Mercury.

See the Lincoln-Mercury lineup today. We've got a wagon that's waiting for you.

ZEPHYR
43 CUBIC FEET**

LYNX
30 CUBIC FEET**

LINCOLN-MERCURY DIVISION



K FROM LINCOLN-MERCURY

**Based on EPA Volume Index figures. All comparisons exclude other Ford Motor Company products. Buy or Lease at your Lincoln-Mercury dealer.

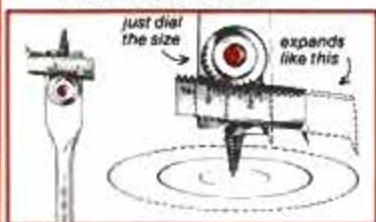


"I want my Popular Mechanics' projects to look professionally done. Irwin products help."

Ed Hutchman, VP 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



NOTES FROM THE EDITOR

John A. Sillitto

This is the third year PM has been able to offer you full plans for reproducing authentic Lincoln furniture relics from measurements and photos made by a team of Illinois history buffs.

Directed by David Warren, frequent contributor of workshop features to PM, team members Matt Doherty, photographer, and Ray Peterson, cabinetmaker, have been making records of all authentic Lincoln items (including the "Butler clock" on our cover) in the Lincoln Home National Historic Site at Springfield. The group has also worked at the Illinois State Historical Library where they copied the "Tad clock," also on PM's cover.

David says he approves of zealous guardianship of our national treasures, even if regulations have often meant all-night stands.

At the Lincoln Home, U.S. Department of the Interior rules require that all work be done after 5:00 p.m. with guards in attendance. As a matter of fact, the white-gloved guards must be called to move any relic that needs moving. And photo lights must be shut off between shots to prevent fading of colors in wallpaper and furnishings.

The Warren team even works without shoes and places bits of Masonite under tripod legs so the carpet won't be damaged.

We're sure it's worth all the fuss to preserve historic relics for the future. We hope you'll enjoy building the reproductions now. **PM**



Craftsman-historian David Warren makes Lincoln relics available to all.



Mahogany Butler clock is displayed in family sitting room at Lincoln Home site.

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

The finishing touch...

Begin by sanding smooth with successively finer grades of sandpaper...



Then finish with the best... Wood Finish by Minwax...



And for extra protection, brush-on Polyurethane or Antique Oil Finish by Minwax.



Our free 16-page booklet shows how easy it is.



MINWAX CO., INC., Dept. PM-21
Box 995, Clifton, N.J. 07014
Send FREE booklet, "Tips on Wood Finishing." Also, color card and name of my nearest dealer.

NAME _____
ADDRESS _____
CITY _____
STATE _____ ZIP _____

MINWAX

Efficient new wood furnace produces no creosote

A new wood furnace that extracts nearly all of the heat from the wood it burns has now been developed for home use. The furnace is adaptable to hot-water or warm-air systems, and it will heat domestic hot water. It emits so few volatile substances containing carbon that virtually no creosote builds up in the chimney.

The secret of burning wood efficiently isn't new: Keep the furnace temperature high—between 1500° and 2000° F. Commercial wood-burners in factories have been doing this for decades.

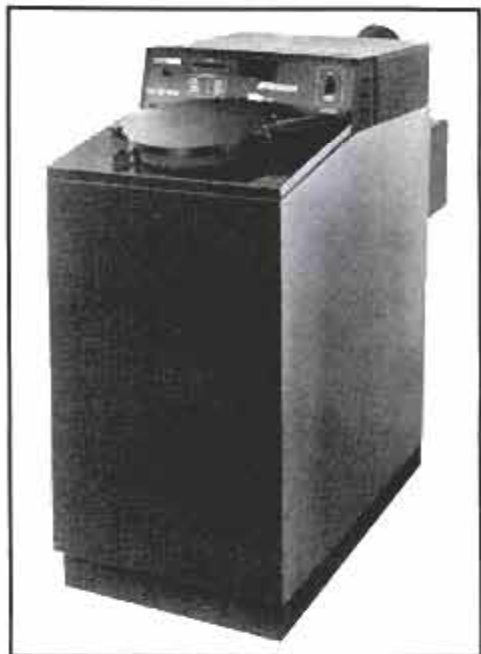
However, no conventional domestic wood stove or wood furnace could hold such high temperatures—not until Prof. Richard C. Hill at the University of Maine in Orono invented a home version of the industrial wood furnace.

That was in October 1979. Presently, three companies are licensed to produce this superhigh-efficiency wood-burner. Prices are in the \$2200 to \$2700 range for units that deliver approximately 115,000 B.T.U./hr.

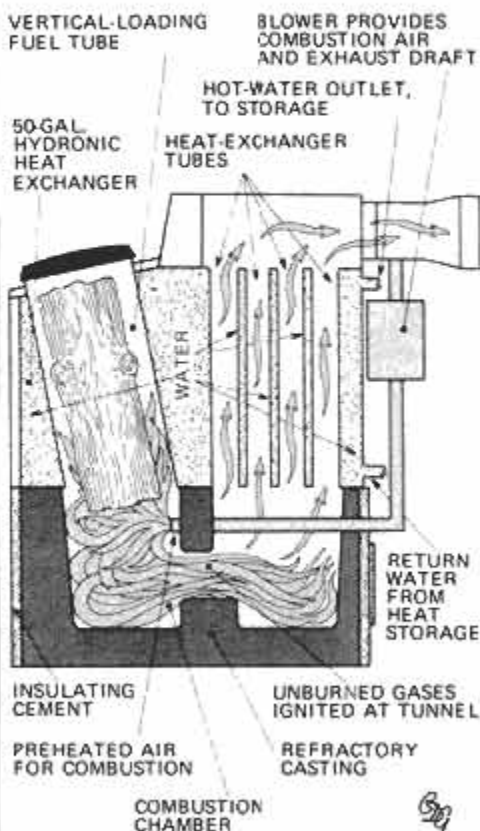
The essence of the system is the division into two separate operations of the heat delivery and the firing of the wood load. Heat for the house is drawn from hot-water tanks, which are heated by exchanger tubes in the furnace. This frees



The young lady is loading a birch log into the combustion chamber of new wood furnace that's designed to burn at 1500° F.



A top hatch leads to the combustion chamber in front. Heat-exchanger tubes (see drawing) are located in back of unit.



the combustion chamber for a hot-as-you-can-get-it, continuous burn, which is the best way to consume wood. Heat in the chamber and refractory channel (see drawing at left) climbs to 1500° F. to generate a near-complete burn.

For more information about the system, write to one of the makers: Hampton Technologies Corp., Box 2277, Charlottetown, P.E.I., Canada C1A 8B9; Madawaska Wood Furnace Co., 86 Central St., Bangor, Me. 04401; Dumont Industries, Main St., Monmouth, Me. 04259. Or send \$2 for Prof. Hill's 26-page report: *Design of a Stick-Wood-Fired Furnace*, from Prof. Richard C. Hill, University of Maine, Orono, Me. 04469.

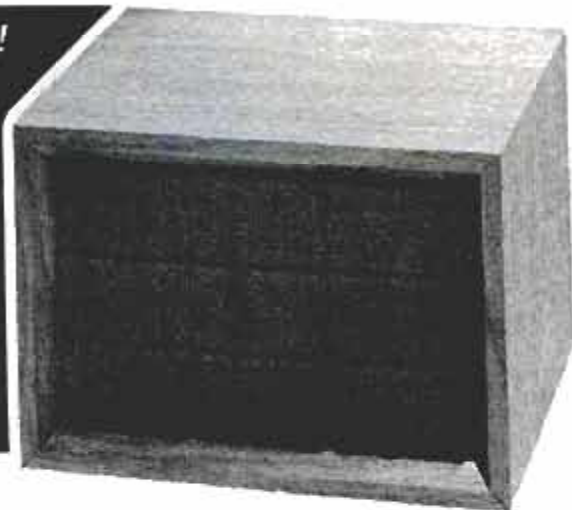
Not Just Another Limited Area Motion Detector!

guardex™

Protects Every Square Inch Of Your Building

Turns On Lights Automatically

Powerful Electronic Siren



Low Cost Computerized Burglar Alarm System Home - Office - Business

The Guardex 8000 Alarm System is walnut grained and disguised to look like a small stereo speaker (6 3/4" x 9 3/4" x 8") and weighs less than 6 1/2 pounds.

NO INSTALLATION

Just plug the Guardex 8000 alarm system in, make two simple control adjustments to suit your particular building and it works! There are no other wires to run. This totally self-contained burglar alarm can completely seal off every square inch of the surface of your building. It protects doors, windows, and what most alarms miss... your roof, walls and floors.

HOW CAN ONE SMALL COMPUTER PROTECT MY WHOLE BUILDING?

Guardex 8000 Alarm System works on the principle of audio discrimination. This, put simply, is the process of electronically separating normal everyday sounds, such as voices, telephones, etc. from break-in type noises such as breaking glass, prying metal, or forcing a door open. The Guardex 8000 protects one story homes and offices up to 2000 square feet and open commercial buildings up to 10,000 square feet. The Guardex 9300 with wireless remote sensor capability is available for multi-story homes and offices or single story with more than 2000 square feet. Call the factory for more detailed information.

TURNS ON LIGHTS AUTOMATICALLY

When the first break-in type sound is detected, the system will instantly turn on lights, radio, or other electronic equipment that you have plugged into the back of the alarm. These lights or other equipment will remain on for a period of five minutes, then automatically turn off.

POWERFUL ELECTRONIC SIREN

The Guardex 8000 alarm is equipped with a loud built-in siren. If during the five minute period the lights or other electronic equipment has been activated, a second break-in sound is detected, (it can be only a second or two after the first break-in sound) the built-in siren will start blasting for 90 seconds. At the end of approximately 90 seconds the siren will shut off and the alarm listens again. If another break-in sound is heard, the siren will come on for another 90 seconds. If no other break-in sound is detected, the siren will stay off and at the end of the five minute period the lights will shut off and the alarm instantly resets.



The rear control panel contains two standard AC plug receptacles for a table lamp, spot lights, radio, etc., terminals for connecting optional outside siren and back-up battery (not included); entry delay time control and sensitivity control.

EXIT AND ENTRY DELAY

The Guardex 8000 alarm has a built-in exit delay allowing you approximately one minute to lock up and leave the building before the alarm is armed. When you enter your building you may find that just your normal entering sounds activate the siren. You may delay it from starting for up to 30 seconds by turning up the siren entry delay control.

BATTERY BACK-UP

Burglars rarely cut power. However, to give you total protection from a burglar and possible power failure, our alarm has provisions for a battery back-up. (Batteries not included). 12 volt lantern batteries are available at most hardware stores.

THE BURGLARY PROBLEM

The F.B.I. statistics show that at the present rate, one out of every four Americans are going to be burglarized. That is not a very pleasant fact, but it is true. You have a greater chance of being burglarized than being a victim of a fire or automobile accident. The time is now to help protect yourself and your valuables with a Guardex 8000 alarm system.

OUTSIDE SIREN

The Guardex 8000 alarm is equipped with a loud, built-in siren, but if you desire an additional siren to mount outside or in an area away from the main alarm, they are available with 50 feet of wire for \$24.95. (Connecting terminals are provided on the back of the alarm).

30 DAY NO RISK TRIAL

This is your opportunity to purchase an alarm system directly from the factory for only \$199.95. Try it in your home or business for thirty days without risking one cent. Put our Guardex 8000 alarm to your own test. See for yourself! It will protect every window and door from break-in. If you are not completely satisfied, return the alarm within 30 days for a complete refund. To order your Guardex 8000 alarm, CALL TOLL FREE to charge your credit card or send your check to Guardian Electronics, Inc. in the amount of \$199.95 plus \$3.50 postage and handling. If you want the optional outside siren, add \$24.95 (California residents add 6% sales tax.)

(If you require more information, call during California business hours, Monday - Friday).



Dealer Inquiries Invited

CALL TOLL FREE
(800) 423-5499

California residents:
(213) 889-1414 collect.

**GUARDIAN
ELECTRONICS, INC.**

31117 Via Colinas, Dept. PM Westlake Village, Calif. 91361

STP Gas Treatment.

Costs more than gas-line anti-freeze.

It should. It does more!

All gasoline anti-freezes fight gas-line freeze.

STP Gas Treatment fights gas-line freeze and a whole lot more. It's the Driver's Edge. It provides more protection for your fuel system. Removes water that can freeze gas lines. Inhibits rust that can cause problems. Cleans your carburetor. And keeps it clean to save you gas.

STP does it all. That's why it outsells them all.

Removes water—fights gas-line freeze.

Water gets into your gas tank through condensation and, sometimes, by contamination at the pump. If it freezes in your gas line, that could mean a stalled car.

In cold weather, just **one ounce** could freeze up to ten inches of gas line!

But the special-action formula of STP Gas Treatment used regularly works to protect against gas-line freeze. It surrounds water droplets and helps carry them through your engine. And the less water in your fuel system, the less chance of gas-line freeze.

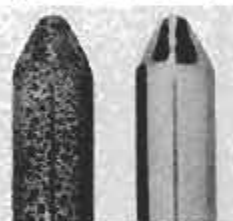
Inhibits rust.

Even a little rust can cause serious fuel system problems. It can clog your fuel filter, or block your carburetor jet. This can mean hard starting, plus stalling and sputtering.

But STP Gas Treatment has a special rust and corrosion inhibitor designed to prevent these problems. Both these steel bars were soaked in gasoline plus water. But the bar on the right—the one without the rust—was protected by STP Gas Treatment. No wonder it's the Driver's Edge.



(1 oz.)



UNTREATED TREATED

Cleans carburetors and keeps them clean.

Normal engine heat and oxidation cause gum and varnish to build up. These deposits can clog openings, reduce tolerances and harm engine efficiency.

STP Gas Treatment cleans your carburetor. And works two ways to prevent these harmful deposits from accumulating again. First, it coats

metal surfaces which works to prevent gum and varnish molecules from getting a toehold. And second, it surrounds these molecules with a stick-proof coating so they can pass harmlessly through the fuel system.



UNTREATED

TREATED

The carburetor sleeve on the left shows fouling and deposit accumulation. The one on the right—the one that still looks like new—was protected by STP Gas Treatment. Which would you want in your engine?

Saves gas.

A dirty carburetor lessens your engine's operating efficiency, reduces mileage, wastes gas.



But STP Gas Treatment cleans carburetors. Intake valves and manifolds, too. And, used regularly, **keeps** them clean. Net results: improved engine efficiency and gas savings.

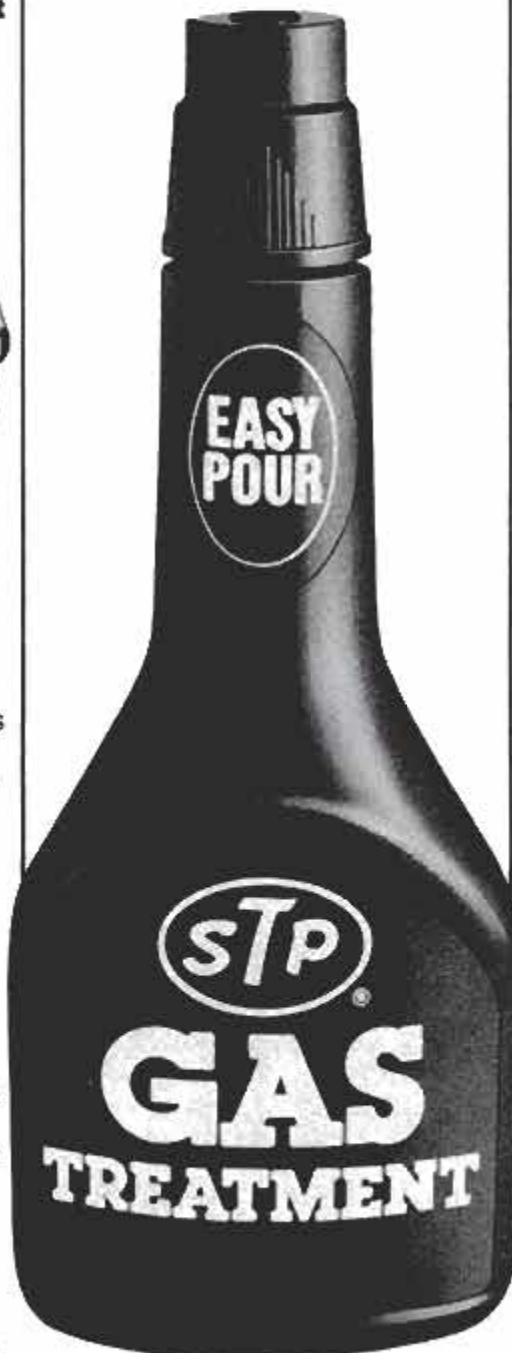
Get the Driver's Edge.

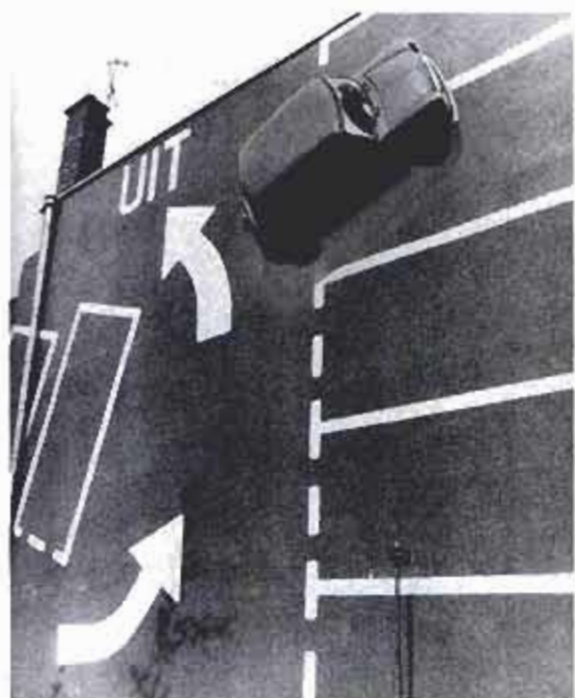
If you demand more from your gas—and more than many gas anti-freezes even promise—join the millions of smart drivers who demand STP Gas Treatment. Keep it on the job—every mile, every fill, every season.

Because STP Gas Treatment **delivers**. Delivers so much more, the year round. *Satisfaction guaranteed or your money back.*

STP Gas Treatment **does it all**. Removes water, fights gas-line freeze, cleans carburetors, saves gas. That's why it **outsells them all**.

The driver's edge.

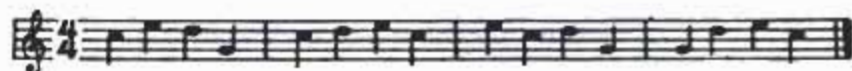




PM's Whatsit

Had to be goin' at least 70 to get that high, you say? Well, we're not expecting you to understand what's happening here, we're just asking you to name the car and trust us. We won't let you down with the answer on the next page.

Like clockwork



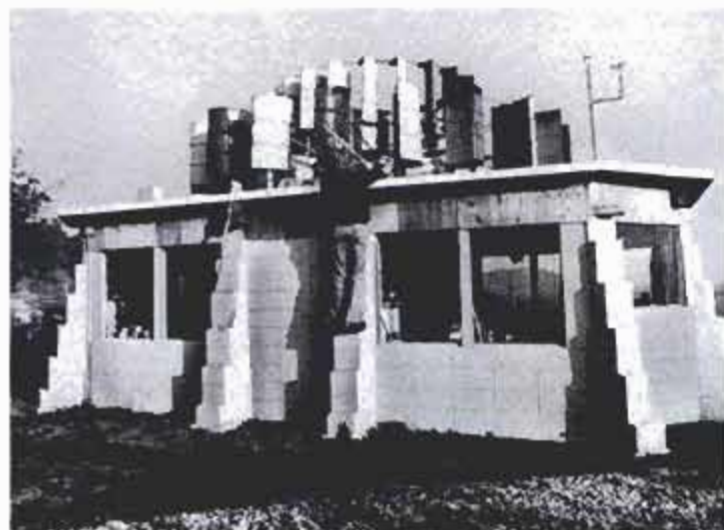
Full Westminster chime, rung on the hour.

There are fascinating aspects to the history of timekeeping, as we incidentally discovered in putting together this month's how-to story on kit clocks (page 134). Among interesting facts about clocks we were not aware of before is that the famous Westminster chimes melodies that are rung out by London's Big Ben—as well as countless clocks in homes around the world—comprise a melody to which there are words.

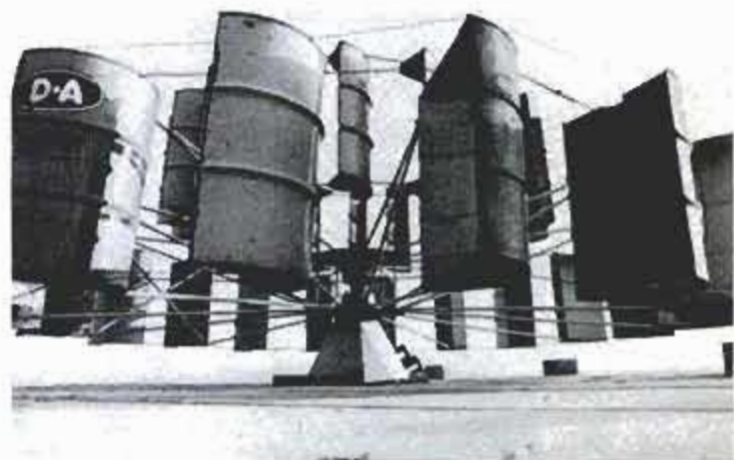
Craft Products Co., clock kit suppliers, advises that the words and music for the Westminster chimes were arranged in 1793 by one William Crotch, who fudged the theme from a Handel symphony. The lyrics are: Lord through this hour/Be Thou our guide/So, by Thy pow'r/No foot shall slide.

That, and rubber heels, should keep us on the straight and narrow.

Free juice



Californian Sam Harkleroad, who lives on a windy hilltop near Novato, still has his home workshop connected to a utility company power line, but it hasn't used a watt of commercially supplied electricity in two years. The reason: Harkleroad's self-



designed wind generator, which he assembled from oil drums cut in half with a torch. Although the unit is heavy, it is well balanced and has provided all the juice Sam needs for power tools and lighting in the workshop.



Whatsit revealed

The car is a Morris Mini. It is up the wall because Dutch taxpayers and the town council of The Hague thought it was worth the effort—and the effect—to relieve the blank wall behind a block of apartment buildings with a painting-and-sculpture, such as it is. The only critical comment, in fact, has been that registered by local kids. They throw stones at it.

Hover for bucks

While human-powered flight is not the uncrossable threshold it once seemed, the design of a human-powered *helicopter* should provide a formidable challenge. The American Helicopter Society, however, will reward the first person to do it with \$10,000, under the rules of its formal contest.

The winning craft must remain airborne, hovering, for at least one minute; it must also reach a height of three meters (9.8 feet) at some point during the hover, and must keep a reference point somewhere on the device within a 10-meter (33-foot) square. Interested applicants can contact the Society at 1325 18th St. N.W., Suite 103, Washington, D.C. 20036.



An 1809 design that didn't get off the ground.



The ring of authenticity

One of the latest developments from the sky-high technology Western Electric Div. of The Bell System is this replica of a 1913 telephone known as the Country Junction model. The company's solid white oak cabinets are supplied by woodworking firms in Indiana and Pennsylvania; the metal parts are die cast, then plated with copper, bright nickel or black nickel. Some of the black nickel finish is even buffed off for an antique look, so that each set looks a little different.

But that's just the half of it. The phone company scientists even came up with a plastic that authentically replicates Bakelite, which is no longer available, on the phone's receiver. For those too young to remember, Bakelite—widely used in early electrical apparatus—was a synthetic resin made from formaldehyde and phenol. In other words, a plastic.

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!

Never before have money-making opportunities been so great for qualified Locksmiths. Now lucrative regular lock and key business has multiplied a thousandfold as millions seek more protection against zooming crime. Yet there's only one Locksmith for every 17,000 people!

Start Collecting CASH PROFITS Right Away

You're "in business" ready to earn 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-spars-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.

No Extra Cost!

Included With Your Locksmith Training

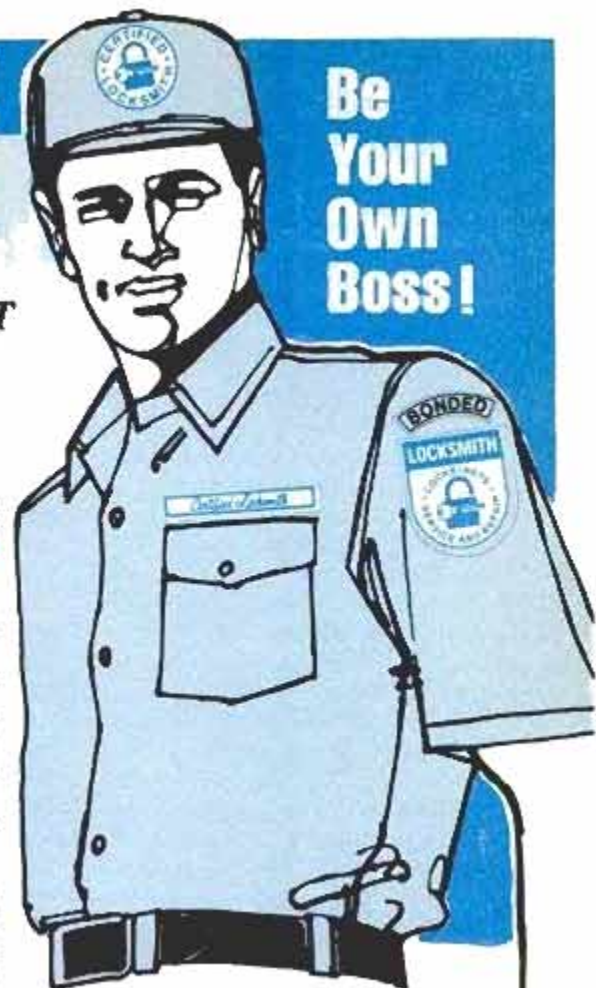


BURGLAR ALARM

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.



Be Your Own Boss!

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

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
101F 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, 101F 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 _____



"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 \$30 a day. Thanks for my new start in life."
Sam Walker Prichard, Alabama



... YOU Can Do It Too!

SCIENCE WORLDWIDE

End of the Shuttle shuffle?

Once again, the National Aeronautics and Space Administration (NASA) has set a date for the maiden orbiting flight of the Space Shuttle. But also once again, observers of the arduous project to boost a reusable space-plane out of gravity's reach have penciled a question mark over the date: March 14.

"We've finally got our act together," a NASA spokesman tells PM. But similar statements have been flown before in announcing shots that never took off. The Shuttle program began in 1972, at a projected cost of \$5.15 billion in 1971 dollars. Then came problems with the main engines, and with an outer shell of silica-fiber tiles—they look like bricks—designed to protect the craft from reentry heat. Costs are now expected to run some 20 percent



Astronaut Robert Crippen reviews a checklist during a Shuttle flight simulation.

higher than planned. And the problems have caused a shuffle of launch dates: from March 1979 to June to September to February 1980 to September to December to March 1981. . . .

It will all be worth it if the Shuttle performs well, providing comparatively easy and inexpensive access to space. But as we write this, some

NASA officials are telling us March 14 is a "target" and that the agency is "committed to a launch before the end of March." We'll know soon if the reference to the end of March is the start of a new shuffle.

The forecast: snowy and stiff

A Minnesota company is offering a new weather-forecast system that predicts the effects of rain, sun, air pressure and other meteorological conditions on health.

Med-Weather Systems Inc. adapted data from a West German service and from U.S. researchers in drawing up health forecasts to accompany weather reports. The service is being offered to dozens of TV and radio stations. Clients would be able to tell viewers and listeners how weather is likely to affect arthritis, asthma, migraine, attention span, cardiovascular functioning and reaction time.

Med-Weather President John Uldrich says even slight changes in weather have been shown to have powerful effects on the body. Reaction times are comparatively slow, for example, when the weather pattern includes scattered low clouds, a high but falling barometer, dry air and cool-to-mild temperatures. But reaction times improve under roughly the same conditions when the barometer is steady, temperatures are above normal and air is very dry.

About a third of all people are not at all weather-sensitive, Uldrich tells PM. A third are somewhat sensitive, and the remaining third are very sensitive.

Uldrich acknowledges that his forecasts might sway the way people feel by suggesting how they ought to feel. But he says this "placebo effect" should wear off as people become used to health forecasts.

Tuning in with a peninsula

Two Stanford University scientists have turned seawater surrounding a peninsula into a giant radio antenna.

Using copper sheets or iron pipes in the water on either side of the base of a peninsula, they were able to transmit signals from seawater off Chappaquidick Island, Mass. Researchers Antony Fraser-Smith and Oswald G. Villard Jr. calculate that the water is almost 50 times as effective as a conventional antenna built along the shoreline would be.

The long seawater antenna, producing very low frequencies (around one cycle per second), may be useful in communicating with submarines. The antenna can also pick up natural low-frequency signals from space.

Scanning the heart with sound

The device below makes it easier for doctors to assess the heart's pump-

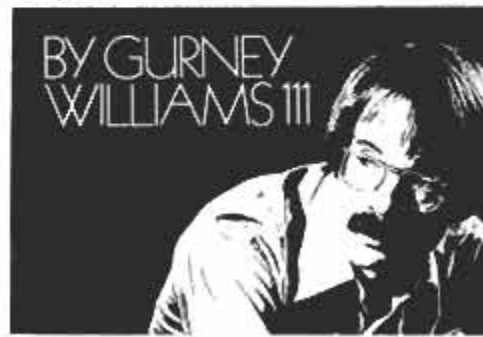


High-frequency sound gives "sonar" image of heart while measuring blood speed.

ing efficiency, volume of blood transported in a single heartbeat and the flow of blood through arteries.

The Ultra Imager, introduced recently by Electronics for Medicine/Honeywell, fires bursts of high-frequency sound through the chest wall and picks up echoes—like a submarine sonar set—that yield accurate data on the speed of blood through the heart. The device can also provide clear pictures of the heart's interior without the radiation exposure of X-rays.

Previously, obtaining some of these data involved minor surgery and a hospital stay. But the Ultra Imager can be used effectively on an outpatient basis. **PM**





Mood Maker

Set the mood in your home or office with this 13 inch wide AM-FM, cassette and 8 track Stereo Music Center.

You're sitting at your desk. Soft beautiful music in full stereo is gently caressing you. You feel your tensions melt, your mind clears, and you're ready to take on the world.

An overstatement? Not really. The power of music has been used for centuries to rouse the troops and relax the kings, not to mention "soothing the savage beast".

Listening to great sounding music while you work at the office or relax at home can make you feel like a whole different person at the end of the day.

The Stereo Music Center by IMA, a Craig company (the language translator people), represents the latest technology in micro-stereo. It is now possible to produce the sound of a full size stereo in the space of an ordinary radio.

IT'S A COMPLETE MUSIC SYSTEM

You're in command. Listen to your favorite FM stereo stations or enjoy your favorite music on the twin built-in stereo cassette and 8 track tape decks. You can also keep up on the latest news with the powerful AM radio.

Dual high fidelity speakers mounted in the acoustically designed wood cabinet are precisely aimed at 180 degrees to provide terrific stereo separation. Listening to the music center is like sitting 10th row center at a symphony concert.

Powerful twin amplifiers have plenty of power to drive extension speakers in other rooms or offices. (Convenient jacks are provided on the rear panel). To really appreciate the power and quality of the sound of this micro-stereo, set it

in front of your home stereo and compare. The results may amaze you.

DIGITAL AM/FM STEREO TUNING

No more guessing. If you want to listen to radio station FM 103.4 or AM 1070, simply dial in the number on the large LED digital display.

With the powerful radio receivers and accurate digital tuning, you'll be able to locate and tune in radio stations other radios can't even find.

The old fashioned "slide rule" radio dial has been replaced by a sophisticated solid state device called a frequency counter. Frequency counters were developed for test equipment and now can be used for exact radio tuning. They actually count and display the exact frequency of each radio station.

The frequency display also becomes an LED clock with the push of a button.



EXTRA OFFICE FEATURES

The music center is also a useful business tool.

DICTATION--You are supplied with 2 microphones to dictate letters or leave memos on standard audio cassettes.

TELEPHONE--A sensitive pickup allows you to record both sides of any telephone conversation on cassette.

RECORD MEETINGS--Simply start the recorder. The microphones will pick up all nearby conversation. Even the recording level is automatic.

TRY THE STEREO MUSIC CENTER RISK FREE

Try the music center in your own home or office for 30 days. Enjoy the beautiful FM stereo, play your favorite cassettes or 8 track cartridges and keep up with the news on AM. Record cassettes from the radios, 8 track, microphones or from the telephone pickup.

If you aren't 100% satisfied for any reason, simply return the music center in its original box within 30 days for a full refund. It comes complete with a limited 90 day manufacturer's warranty.

To order your stereo music center simply send your check for only \$159 plus \$7 for postage and handling to DAK. Credit card buyers call our toll free number. (CA res. add 6% sales tax)

You'll be able to enjoy stereo music from cassettes, 8 track, FM or AM radio with this new 13 inch wide micro-electronic marvel.

DAK INDUSTRIES INCORPORATED

Call TOLL-FREE (800) 423-2636
In California Call (213) 984-1559
10845 Vanowen St., North Hollywood, CA 91605

PM installs a superantenna

An antenna with a rotator on a telescoping tower gives you outstanding ham radio and CB action or fantastic television reception. We show how to erect one at your house.

by Neil Shapiro, WB2KQI
ELECTRONICS EDITOR

One cool winter evening, we sat down in front of our ham radio to put a new antenna system to the test.

The first station we talked with that night was 3D6BS; Ed in Swaziland, a broadcast engineer with Trans World Radio. He talked about his work, which involves traveling among the missionary network's five transmitters in Guam, Monte Carlo, Bonair, Sri Lanka and Swaziland.

Then we met ZS1JO, Frank in Cape Town, South Africa, who is a



Rotator is attached to the plate on top of the tower. Note that the control cable is connected before the tower is raised.

Sea Scout Leader and was participating in the Scouts' jamboree on the air. His radio station was in the abandoned hulk of a wrecked ship the Scouts had made into a clubhouse. South of the Cape, he described sitting with the Indian Ocean on his left, and the Atlantic on his right.

I was pleased to find that my antenna system was doing well. It was bringing in stations that a

lesser antenna would not even have heard, let alone been able to reach.

And, with a bit of help from some friends, the new tower had not been that difficult to erect.

The first steps

Hygain Electronics supplied us with its 50-foot HG-50 MT2 tower and a TH5-DX beam antenna. Alliance Manufacturing supplied its HD-73 "heavy-duty" rotator.

This is a dream combination for ham radio use. The TH5-DX is a beam antenna, which means it can be turned by a rotator to point at the station with which you are talking. Once aimed, it concentrates (beams) your talk power and *also* improves reception.

A CB user would need an antenna



Connecting two out of three bolts will allow the tower to hinge on its base. Four to six people can easily push the tower up.

designed for the CB frequencies instead of the TH5-DX. Someone interested in TV reception would use a TV antenna and a less expensive rotator.

We had never put up such a system

Supported by both a concrete base and house bracket, the antenna installation has already withstood windstorms of up to 50 mph.



before, so we were pleased that Hygain had supplied detailed instruction manuals for tower and antenna installation.

We started on the tower's concrete base. The manual calls for a base about two feet square by eighteen inches deep. But we decided to make ours three feet square by three feet deep instead.

We dug the hole, and then used wooden forms to keep the 400 pounds of concrete square as it cured. Right after pouring, we positioned three long anchor bolts (supplied), to hold the tower's removable base plate on the block.

The concrete would take a few days to set well enough to be trusted with the 200-pound tower. While it

(Please turn to page 82)

INFLATION TURNS SEAMLESS SPRAY INTO AMAZING PART-TIME MONEYSMAKER

Good for \$25,000 a year and more...much more!

When George Singleton made \$4,154.65 on one order for Seamless Spray, he said it seemed like a miracle... making such Big Money with so little effort. But that's the remarkable track record of our SEAMLESS SPRAY... the process that makes old roofs like new again.

One new man after another has enjoyed the same BIG SELL thrill when they introduced Seamless Spray and closed sizable orders on the first call.

Like Joe Kimpel, a former welder, who was making \$1,000 a month. His first 5 weeks with Pace paid him \$2,799.69.

Bob Kronner, 55-year old former steel salesman, made one call, got his first Seamless Spray order, and made \$1,429.43.

How can this happen so easily for men with no experience in our business? It's all very logical.

If you've talked to a roofer lately, you know the incredible charges for putting on new roofs. For industrial buildings, shopping centers, motels, hospitals, schools, etc., prices have gone sky-high. With our process, we bypass the roof contractor. The commercial building owner uses our Seamless Spray to apply Pace Roof Renewal Sealant right over the old roof. The cost is so low, the proven results so satisfactory for such well-known firms like General Motors, American Airlines, Holiday Inns and hundreds more, there is virtually no sales resistance.

Pace ships Seamless Spray equipment on Free Loan. Your customer pays only for the Sealant. His own men apply it. It's as simple as that.

The field-tested sales kit we furnish you gives you all the know-how you need to get into this BIG SELL immediately. There's no waiting, no training needed. You don't waste your time on small, penny-ante business.

YOU CONCENTRATE ON BIG SALES—BIG EARNINGS

That's how part-timer Jim Deveau earned a weekly check for \$2,760. (We think he'll go full-time now!) How Dave Lute, with 2 sales in 2 days, made over \$1,500. And how rookie Bob Shelhorn parlayed several roofs for one company into a \$1,433.78 paycheck!

And that's on just one of the inflation-beating Pace Products that keep you selling big on every call. Along with Seamless Spray, you'll make big sales and see big



**THIS BIG ROOF RENEWAL
PAID GEORGE SINGLETON
\$4,154.65**

profits with PARK-KING Blacktop Sealer, Liquid Metallic Siding, Concrete Plus and all our other 1-coaters that fill maintenance needs wherever you go.

SEE HOW JUST 1 SALE A WEEK IS GOOD FOR \$25,000 A YEAR... AND MORE. ALL FACTS FREE WITH NO OBLIGATION

Just mail this coupon. I'll mail you the impressive facts about Seamless Spray and all the rest of our amazing part-time moneymakers. You're under no obligation. No one will call on you. Everything comes to you by mail. Put this coupon in the mail today so you'll lose no time getting into this BIG SELL!

Dick Rogers

Dick Rogers, President
PACE PRODUCTS, Dept. PM-281
81st and Indiana, Kansas City, MO 64132



Dick Rogers, President
PACE PRODUCTS, Dept. PM-281
81st and Indiana, Kansas City, MO 64132

PLEASE RUSH BY MAIL all facts about Pace SEAMLESS SPRAY, the amazing part-time money maker that's good for \$25,000 a year... and more. No obligation.

Name _____

Address _____

City _____ State _____ Zip _____

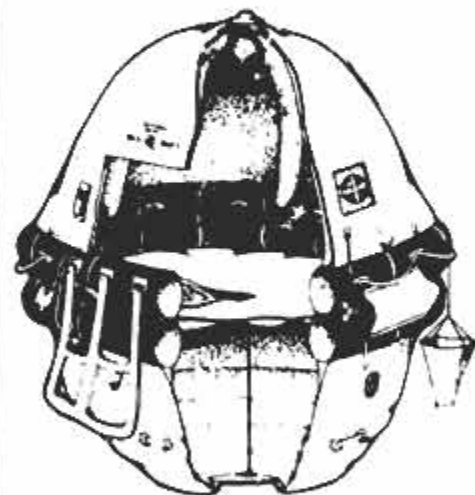
ALL OUTDOORS

Rescue raft award

How do you design a small, inflatable craft so strong and stable that it can keep crew members alive when their big, rugged, rigid ship breaks up in stormy seas? James Givens of Tiverton, R.I., has come up with an answer that recently won him the annual Boating Safety Award of the New England Marine Trade Assn. Newell Garden of Raytheon Co. and Samuel Snow of Medway Marine, when presenting the award, estimated the Givens Buoy Life Raft has already saved more than 150 lives.

Last year's Caribbean Hurricane Allen caught a 48-foot, 30-ton ketch, crewed by four experienced charter-yacht professionals, with seas over 30 feet and winds to 170 knots. The craft was blown completely out of the water above the tops of waves. Two crewmen, washed off the deck but secured to the boat by safety lines, reported they saw daylight under the full length of the airborne hull.

After four knockdowns of over 90° with the masts underwater, the yacht began to founder and the crew launched their Givens Buoy raft. It



To keep the new Givens Buoy raft stable, two underwater ballast systems are used.

inflated upside down, but quickly righted itself, and the crew got aboard as their ketch went down.

Then, for 44 hours, the men inside the covered raft rode out the hurricane. Breaking seas sometimes buried them under six to eight feet of water and rolled them up to 80°, but the inflatable never capsized. "A conventional life raft would have flipped over and been blown away like a Frisbee, and we would have been dead," one crewman commented afterward. When the four were finally rescued by a Norwegian supertanker, they learned the ship's wind gauges had logged gusts to 190 knots.

The water ballast of some rafts can be pushed along by the seas and cause the raft to somersault, Givens explained to PM, so he developed a patented two-part system that maintains an extremely low center of gravity—even when survivors are dumped to one side of their compartment by cresting waves. The rafts have also skidded successfully across coral reefs to get shipwrecked sailors ashore. Larger offshore racing and pleasure craft, as well as

DREMEL CHAINSAVER saves the day.

Don't let a dull chain slow up your cutting project.

Reach for the Dremel Chainsaver and save the day.

In minutes, the new Dremel Chainsaver restores your chainsaw to its original sharpness. No more hand filing. 25,000 rpm motor does the job quickly and easily.

A built-in guide shows at what angle to hold the tool to get a sharp cutting edge every time on most chain sizes.

Chainsaver. Another work-saving tool from Dremel. Available wherever fine tools are sold.

DREMEL, Division of Emerson Elec. Co.,
Racine, Wisconsin 53406.

DREMEL

commercial and fishing vessels, are now carrying his Coast Guard-approved Givens Buoy raft, Jim Givens told us.

Lifesaving fabric

It's 1100 percent more dangerous to hike, jog, bicycle or walk along a highway at night than in the daytime, estimates the National Safety Council. If so, a new 3M product should lower the chances of being hit by a car in the dark by nearly that much. It's called Scotchlite Reflective Finish by 3M, the maker. When applied to nylon fabric by Arthur Kahn, it becomes Early Warning, and when Wamsutta Fabrics uses it with a blend of polyester and cotton, it's called Flashback.

In daylight, the treated jogging suits, running shoes, armbands, headbands, book bags and backpacks look like any other. But viewed at night in a car's direct headlights, the reflective material bounces the beams back to the driver to make the item glow. Microscopic reflective beads aim the bounce-back light, and the fabric itself can be any attractive color.

For youngsters heading for school early or coming home after dusk, a

reflective pack or book bag may be a lifesaver. The Renegade backpack, of Arthur Kahn Early Warning waterproof heavy-pack nylon, can carry books. It's \$30 at sporting goods stores or by mail from Piccadilly International, 11 Belmont Circle, Trenton, N.J. 08618. Frostline, at Frostline Circle, Denver, Colo. 80241, also has reflective do-it-yourself book-bag kits. Bill Rodgers Sportswear, Catalina, Etonics, G.U.T.S., Head, Laguna and others make running items. Garments and gear of the material seem like an easy way to add a major aid to nighttime safety.

Where coastal wildlife is

The government's Department of the Interior has given its latest report the imposing name of *Atlantic Coast Ecological Inventory*, and has announced it is "an important new planning tool for governments and industries that contemplate major developments in the coastal zone." It's all of that, but it is also a series of excellent tip-sheet maps that can show sportsmen where fish and waterfowl are likely to hang out. Later this year, a similar report is scheduled for the Pacific Coast.

The maps locate the various endangered species, migratory waterfowl and commercially important fish populations, so that factories and housing developments can be built elsewhere.

There are 31 maps covering the shoreline from Maine to Florida. Each folds up to 4x8-inch pocket size. They're \$2 each from the U.S. Geological Survey Branch of Distribution, at 1200 South Eads St., Arlington, Va. 22202, or Box 25286, Federal Center, Denver, Colo. 80225. A detailed written report on the study is called *Atlantic Coast Ecological Inventory—User's Guide and Information Base*, and is \$5.50 from the U.S. Government Printing Office, Washington, D.C. 20402. **FM**



FREE Drafting Aptitude Test You Grade Yourself!

Discover if you have ability for drafting—send for free Aptitude Test plus Drafting "Career Kit." No cost or obligation! No salesman will call. Drafting requires no special drawing skill or technical ability. Everything you need supplied with course—plus easy-to-follow, step-by-step lessons and personal guidance from our instructors.

READ WHAT 2 OF OUR BEST STUDENTS SAY!

We are proud of these comments sent to us by students when we asked them to evaluate our course. They may or may not be typical, but 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."

Mr. Elrie Farrell

MAKES UP TO \$200 A WEEK. "The training I have gained from North American School of Drafting has enabled me to work independently. I am now an assistant architect of Summit Development Company, and make up to \$200 a week. The course was very helpful to me."

Mr. Copeland Mosey

North American School of Drafting
4500 Campus Dr., Dept. PB011, Newport Beach, CA 92660

Men! Women! Learn at home in spare time with no previous experience.



Be a DRAFTER!

3 BIG DRAFTING KITS INCLUDED WITH COURSE

When you train at home with us for a job in Drafting.

In addition to your full course of instruction, training aids, supplemental textbooks and personal consulting, you get this beautiful drafting outfit that includes sturdy, adjustable tilt-top drafting table with board, drafting tools—including T-square, paper, etc....plus valuable drawing triangles, lead holders, sharpener and quality steel precision drawing instruments in attractive lined case.



APPROVED FOR VETERANS



TRAIN AT HOME!

For "spare-time" study, there's no place like home! No schedules, no time lost going to class or "getting ready." Everything is always at your fingertips. Go at your own pace. Learn more FASTER... because you're a "class of one!"

Get into a Career Where Pay Has Been GOING UP!

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. Graduation from this course does not insure that you will get a job. To find out how our graduates have done, send for our job placement record. And because opportunities vary from one area to another, check the job market in your area and see how many jobs are available in the field of drafting.

RUSH COUPON FOR FREE "DRAFTING CAREER KIT."

Color Brochure, "Careers in Drafting"—jam-packed with revealing facts on opportunities in drafting and how to train at home in spare time...plus, valuable 5-way Drafting Instrument. Everything sent free and without obligation.

MAIL COUPON TODAY

Accredited Member, National Home Study Council Careers by Home Study

NORTH AMERICAN SCHOOL OF DRAFTING, Dept. PB011
4500 Campus Dr., Newport Beach, CA 92660

Rush aptitude test and drafting career kit...ALL FREE
No salesman will call. Check here for GI or VA

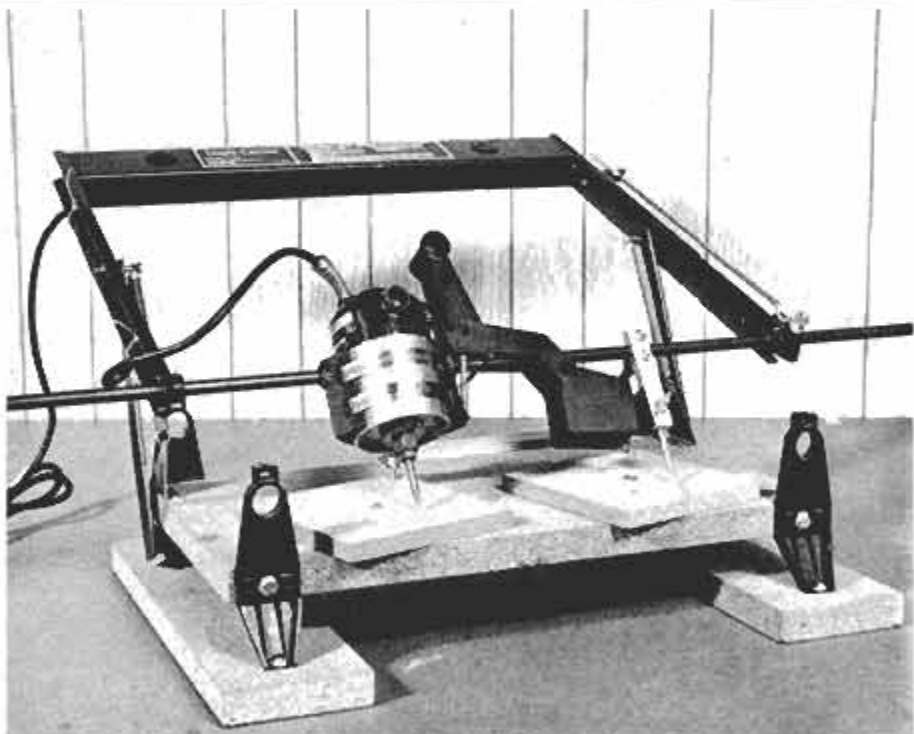
NAME _____ AGE _____

ADDRESS _____

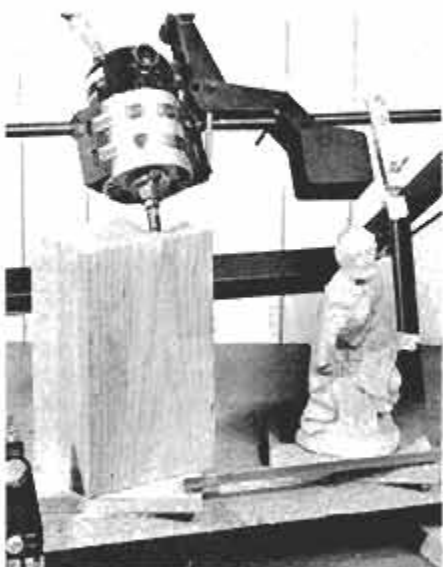
CITY _____ STATE _____ ZIP _____



PM LOOKS AT A NEW CARVING DUPLICATOR



The basic unit comes without the router. You can adapt yours or use their model.



Set up and ready to go. Note turntables are "synchronized" with a tie bar. A 1/2-in. bit is used for roughing block.

Last year PM looked at the 3D Dupli-Carver. This tool is a smaller, less expensive version of that one. Its carving capacity is somewhat less than its cousin, the professional model (it has a capacity of 10-in. diameter x 14 in. tall, compared to 14 x 22 in. for the professional version), but its performance is equally exciting.

Because more do-it-yourselfers are likely to be interested in this version, we tried it out. Here's how it works: You set up the original piece to be duplicated on the right-hand turntable and a block of kiln-dried wood on the left-hand one. A tie-bar connects the two turntables so they rotate in unison. Any router (up to 3 1/2-in. body diameter) is attached to the universal floating shaft. A stylus of a size matching the router bit is attached to the same shaft. You turn on the power and run the tip of the stylus over the contours of the original—the router bit automatically duplicates the same movements on the



Stylus is adjusted so it projects slightly more than the bit for roughing; this leaves enough stock for fine detailing.



A fine stylus and bit are teamed to carve minute details. Router bit follows every contour "traced" by the stylus.



The figure on the left is a completed carving in cherry wood. The original figure on the right is a ceramic piece.



Samples of completed work in cherry, an ideal wood for such duplicate carvings.

SPECIFICATIONS—DUPLI-CARVER

T-100 Dupli-Carver, \$149.; T-110a spindle carver, \$44.95; T-110s speed control, \$39.95; 7600 Black & Decker router, \$39.95; 2V474 work lamp, \$29.95. If purchased separately, the items listed above cost \$303.80. If ordered as a package, the five are \$289. Either way, shipment is via UPS, freight collect. Manufacturer: Laskowski Enterprises Inc., Dept. PM 281, 4004 West 10th St., Indianapolis, Ind. 46222.

block of wood. This remarkable instrument makes you an instant "master carver."

The basic unit comes with three stylus sizes (1/32, 1/4 and 1/2 in.), two router bits (1/32 and 1/4 in.) and two turntables. The router isn't included, but you can use your own if its body diameter is 3 1/2 in. or less.

An accessory speed control is also offered and it's well worth the extra cost. With it, the router can be operated at slower speeds to preserve bit temper and sharpness. It also lessens screeching router noise.

Instructions for Dupli-Carver are easy to follow. Read them before use. Practice with scrap to master setting-up and use techniques.

The tool is engineered to assure success. In the first stage, for exam-



Typical setup for carving with the spindle accessory. Note the speed control here.



Basic set of styluses and cutters. Both ends of second stylus are used to trace.

ple, you start by following the original carving with a stylus that is twice the diameter of the router bit being used. Thus, when carving with a 1/4-in. router bit, you use a 1/2-in. stylus. Also, when you set up the stylus, adjust it to just touch the table. At the same time, you leave a 1/4-in. gap between the bit bottom and the table. Thus, you are assured of leaving material (i.e., you are undercarving) in the rough stage. This is important because you want excess wood to do the fine-detail carving.

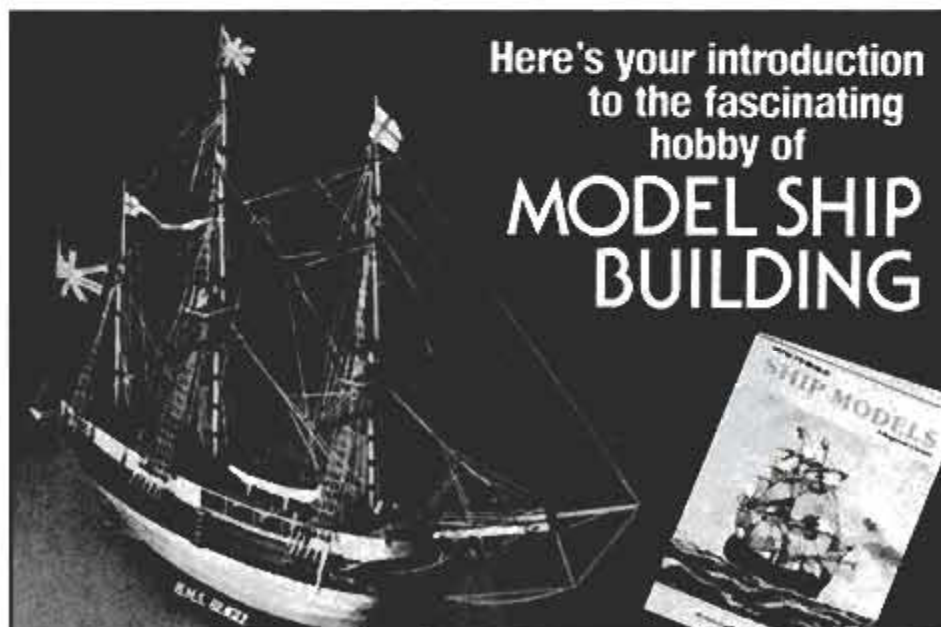
If you plan to do serious duplicating carving it might pay to order the complete setup at once.—Rosario Capotosto and Harry Wicks

Doctors Prove You Can Help Shrink Swelling Of Hemorrhoidal Tissues Due To Inflammation. Relieve Pain And Itch Too.

Gives prompt temporary relief from hemorrhoidal pain and itch in many cases.

Doctors have found a most effective medication that actually helps shrink painful swelling of hemorrhoidal tissues caused by inflammation. In many cases, the first applications give prompt relief for hours from such pain and burning itching.

Tests by doctors on hundreds of patients showed this to be true in many cases. The medication the doctors used was Preparation H®—the same Preparation H you can get without a prescription. Ointment and suppositories. Use only as directed.



Here's your introduction to the fascinating hobby of **MODEL SHIP BUILDING**

Limited time offer gives you everything you need to build the HMS BEAGLE—at an unprecedented low price!

It only looks hard. But with this hand-crafted Mamoli kit—imported from Italy—it really is easy. All parts are pre-cut of walnut and other rich hardwoods; assembly is simple as you follow the step-by-step instructions and large scale plans.

Everything—and we mean everything—is included. You get over \$15.00 worth of tools. You get the 64-page, 8 1/2 x 11 inch book pictured above (sells regularly for \$6.95) and you get a magnificent kit of the HMS Beagle, the ship Charles Darwin sailed during his 5-year voyage to the Galapagos Islands in 1831. A \$160.00 value for just \$99.00!

The Beagle has been faithfully recreated to her earlier conformation as a British man o'war, complete with eight cannons. Solid brass, cast bronze, and detailed wood fittings are used throughout. When completed, you will own a museum quality historic ship model that stands an impressive 25 1/2" long with masts towering 20" high, and worth far more than the original low kit price.

Introductory Special:
Kit, tools, materials and handbook only \$99.00.

(Kit alone regularly sells for \$139.00).
Add \$3.75 for shipping and handling.

FREE BONUS

Tools include: files, X-act knives, hammer, tweezers, sandpaper, and glue.

How to Build Ship Models:

A *Beginners Guide* is illustrated by the author with hundreds of detailed drawings of individual ship parts; gives a comprehensive picture of model ship construction, building techniques, ship lore, and history.

We guarantee satisfaction. If you are less than delighted—for any reason—return it within 30 days and your money will be refunded in full.

MAKES A GREAT GIFT



Send for full-color catalog of other historic ship models, only \$3.00. (Sent free with kit order.)

MODEL EXPO, INC. 23 Just Road, Fairfield, New Jersey 07006 Dept. PM-2
Please send me _____ kit(s) of HMS Beagle @ \$99. Include tools, materials, handbook, and catalog. (N.J. residents add 5% sales tax.) Stock No. MV207.

Charge my credit card: Visa
 Master Charge American Express

My check or money order is enclosed. (Add \$3.75 per kit for shipping and handling.)
 Send catalog only @ \$3.

Name _____
Address _____
City _____ State _____ Zip _____
Account No. _____ Exp. Date _____
Signature _____

For fastest service on credit card orders, call collect (201) 575-6253.



ONLY
\$19.95

Call now 1-800-457-3392
In Indiana call:
1-812-867-6469

GAMN...

Your Chain Saw's Finest Companion.

Tired of a dull chain saw? Sharpen that saw with GAMN's patented, all-metal chain saw sharpener. A MUST for any chain saw owner! GAMN guarantees proper tooth uniformity and cutting geometry for best saw chain cutting efficiency — in minutes.

Just clamp the unit to the bar. GAMN's uniquely designed set-up mechanism securely clamps each tooth in place. Cutting is performed by a dependable carbide burr... never any grinding wheels to wear out. This simple operation assures longer-lasting chain saw life. Use anywhere — at home, shop, or in the forest. Pays for itself many times over the \$19.95 purchase price. Call our toll-free number: 1-800-457-3392 or send check or money order.

GAMN Enterprises, Inc. Please rush _____ GAMN Sharpener(s) at \$19.95 each plus \$1.95 shipping and R.R. 5, Box 39A handling per unit (\$3.00 outside U.S.). Send check, money order, VISA or
Evansville, IN 47711 MASTERCHARGE accepted. No C.O.D.s. Please allow 3 to 4 weeks delivery

Check: VISA MASTERCHARGE Credit Card No. _____ Exp. Date _____

Indiana Residents: Add 4% sales tax.

Made in the U.S.A.

Name _____

Address _____ Phone _____

City _____ State _____ Zip _____

IMPORTANT: Please state make and model of saw when ordering.

Chain Saw Make _____ Saw Model _____

Gamni

R.R. 5, Box 39A Evansville IN 47711

PM2-81

Strategy & Tactics

SUBSCRIBE TO
DEPT. 1276
AND GET
A FREE
GAME!



A complete game in each issue that recreates one of history's great battles or one of today's potential crises.

- ★ Game, playing pieces, map
- ★ Fascinating historical data
- ★ Game reviews and ratings

Ares



SUBSCRIBE TO
DEPT. 1276
AND GET
A FREE
GAME!

A ready-to-play science fiction/fantasy adventure game in each issue.

- ★ Game, pieces, playing surface
- ★ Science fiction/fantasy stories
- ★ Reviews of games, books, and other media

Send check or M.O. to:



SPI Dept. 1276
257 Park Avenue South
New York, NY 10010

Please enter my subscription to *Ares* for

- 1 yr (6 issues) \$16
- 2 yrs (12 issues) \$30

Please enter my subscription to *S&T* for

- 1 yr (6 issues) \$18
- 2 yrs (12 issues) \$34

Name _____

Address _____

City _____ State _____ Zip _____

You can use Visa or Mastercard (check one).

Acct. No. _____ Exp. Date _____

Join the Painting Revolution with the No Clean up Docken Spray Gun



No Clean up • Instant Color Change • No Clogging • No Overspray

This lightweight spray gun works with any compressor producing 40 to 120 PSI. The adjustable pattern sprays a smooth even line without any clogging. Use it for paints, solvents, soaps even liquid rubber or airplane dope. Our disposable cup system is a painter's dream, color change and cleanup take only an instant.

If you spray anything, you need this spraygun, regularly sold at \$49.95. Send for one today, special offer of \$39.95 includes 1 spray gun, 1 large bore siphon tube and 10 reservoir cups. Include \$2.00 for shipping. Dealer inquiries welcome. If not completely satisfied return in 15 days for a full refund.

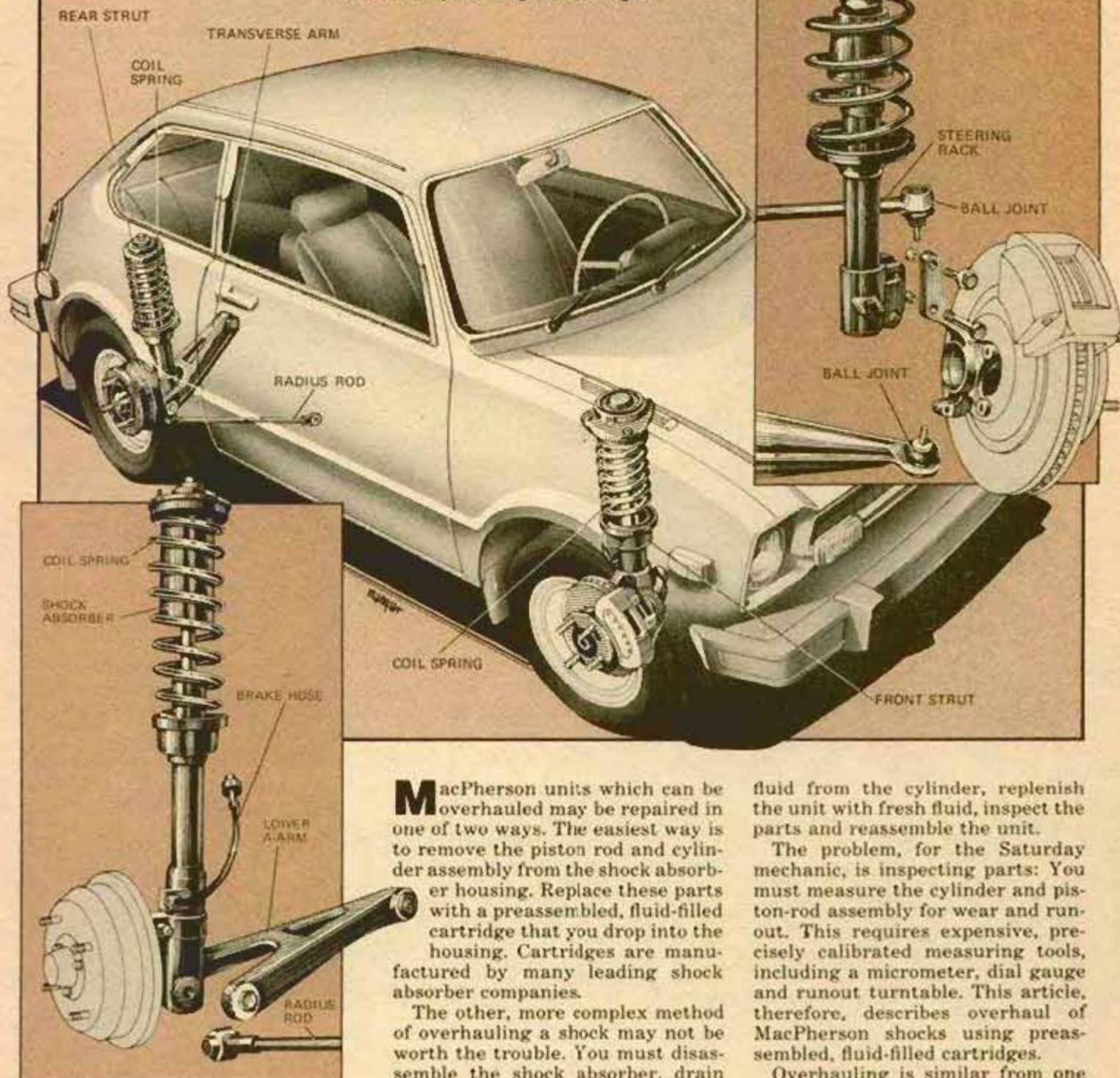
Peter, Paul & Wilbur Inc.

244 Hamline S., St. Paul, MN 55105
1-612-699-1727

Overhauling MacPherson struts with replaceable cartridges

by Mort Schultz

Most foreign cars have MacPherson struts in both front and rear suspensions. When they fail, they are overhauled by installing new cartridges.



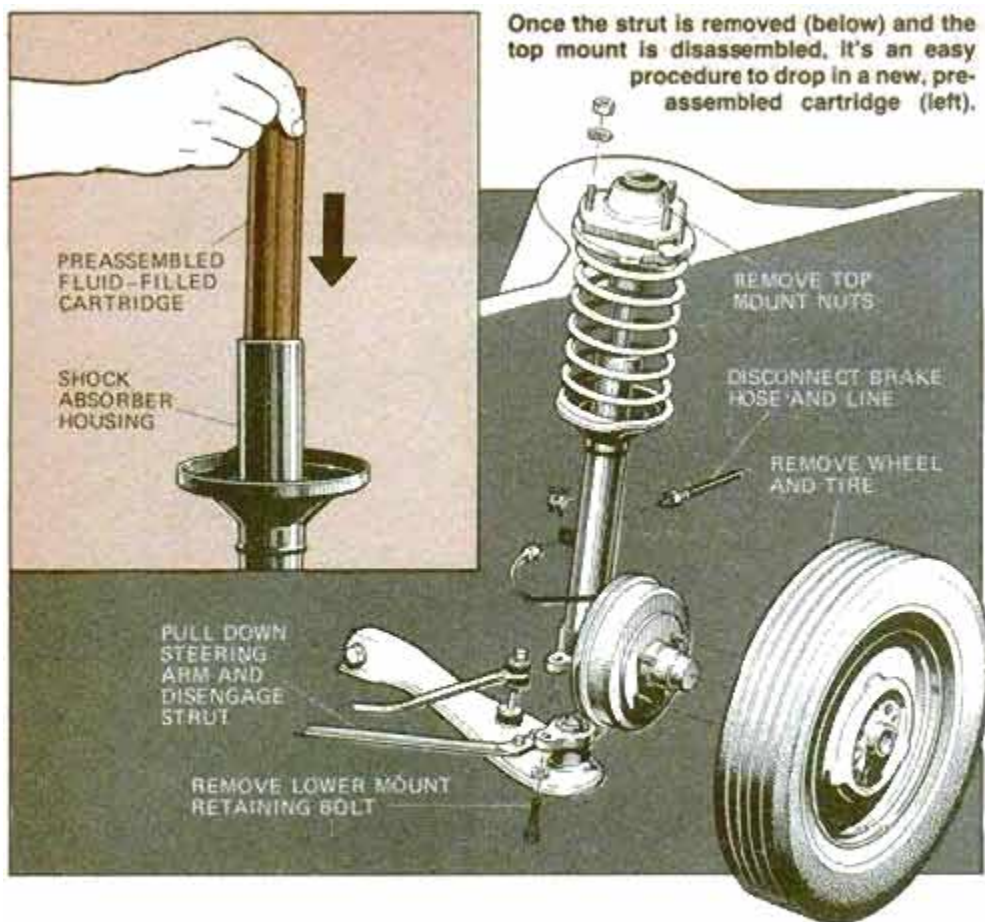
MacPherson units which can be overhauled may be repaired in one of two ways. The easiest way is to remove the piston rod and cylinder assembly from the shock absorber housing. Replace these parts with a preassembled, fluid-filled cartridge that you drop into the housing. Cartridges are manufactured by many leading shock absorber companies.

The other, more complex method of overhauling a shock may not be worth the trouble. You must disassemble the shock absorber, drain

fluid from the cylinder, replenish the unit with fresh fluid, inspect the parts and reassemble the unit.

The problem, for the Saturday mechanic, is inspecting parts: You must measure the cylinder and piston-rod assembly for wear and runout. This requires expensive, precisely calibrated measuring tools, including a micrometer, dial gauge and runout turntable. This article, therefore, describes overhaul of MacPherson shocks using preassembled, fluid-filled cartridges.

Overhauling is similar from one



nuts. Don't work under a car that is supported only by a jack. Remove the wheel and tire.

2. Clean dirt from the brake-hose and brake-line connection, and disconnect the hose and line. Insert clean plugs (golf tees are suitable) into the open ends of the brake hose and brake line to prevent fluid leakage.

3. If the car has electronic brake-pad wear indicators, disconnect the wires from the brake caliper.

4. Remove the three top nuts holding the MacPherson assembly to the fender housing from inside the engine compartment. Then from under the car, remove the two lower-mount retaining bolts that hold the strut to the steering arm.

5. Pull down the steering arm to disengage the MacPherson assembly from the arm. Grasp the MacPherson housing and swing the housing to one side. Pull the unit free from the suspension arm.

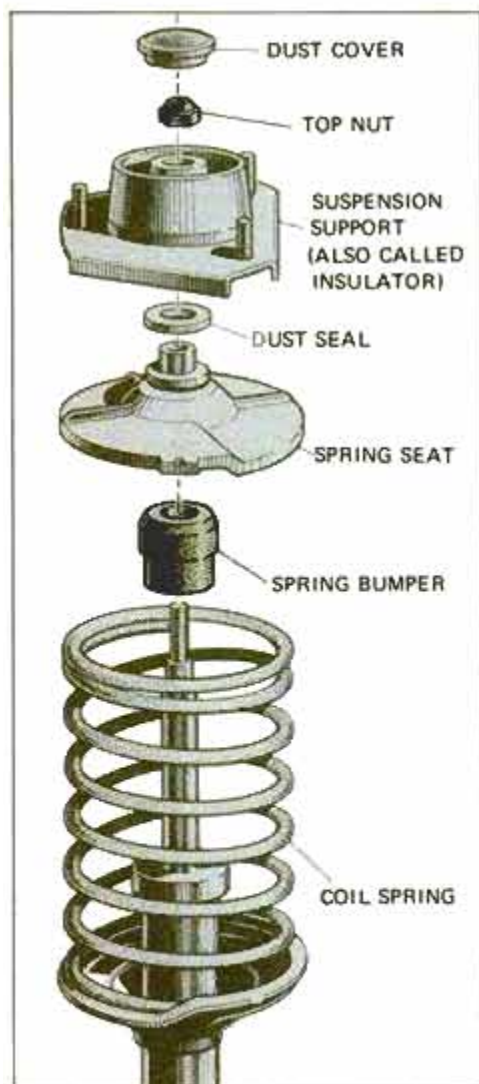
Overhauling MacPherson units

Note: The following discussion, although specifically applicable to Toyotas, can also be used as a repair guide to other MacPherson shock absorbers which can be overhauled.

Mount the assembly vertically in a vise. You may have to fabricate a jig (use the illustration on page 37 as a guide). Grasp the jig by the vise, and secure the bottom of the MacPherson housing to the jig with nuts and bolts.

Using a spring compressor, compress the spring. Then pry the dust cover off the top mount. Loosen the top nut by grasping the spring seat with a spanner wrench, vise grips or some other suitable tool, and then turn off the nut. Now, take off the suspension support, dust seal, spring seat and spring bumper. Slide off the coil spring (still held by the compressor).

Check out the shock-absorber housing to see if fluid is leaking. Then test shock absorber action to



car to another. I've selected the MacPherson struts used in most Toyotas as an example of how to overhaul. Use this procedure as a guide to overhauling units in your car.

First you must remove the unit from the car. Here, the procedure differs from one car to another. I'll explain how to remove a MacPherson strut from a Toyota, and then I'll demonstrate how to overhaul one.

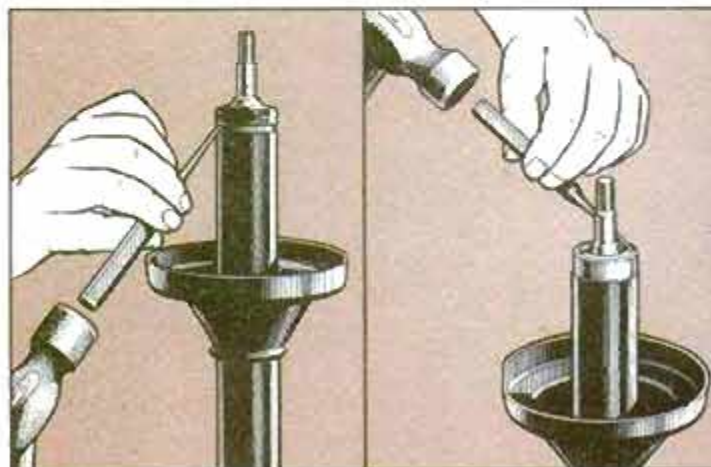
Advice on removing MacPherson struts from other car models follows the discussion of overhaul procedures.

Removing Toyota struts

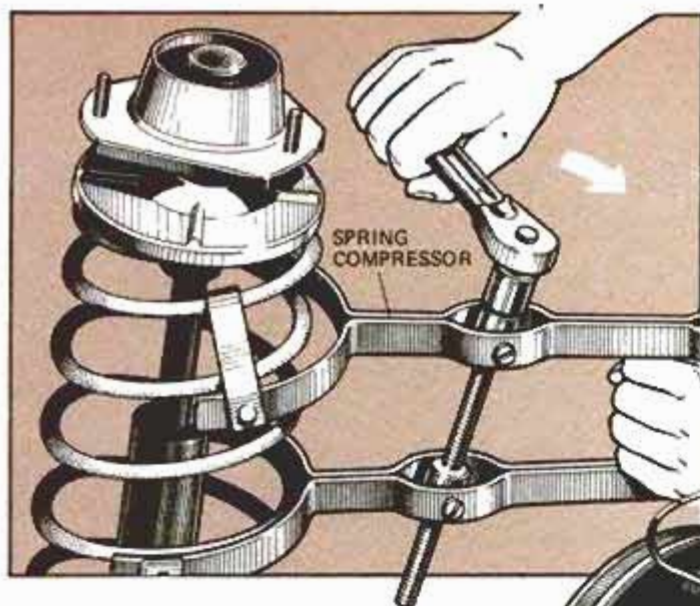
To remove a MacPherson unit from a Toyota, proceed as follows.

1. Raise and support the car on jack stands or ramps after loosening wheel

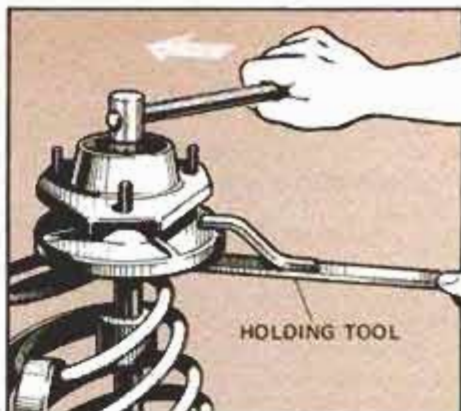
Use a punch and hammer to remove the upper cap of the MacPherson strut. Do this carefully and try to avoid bending in the lips of the housing. If you have banged in the housing lips, straighten them out again, using the punch. If the lips are not properly straightened out, it will be almost impossible to engage the wrench to remove the ring nut.



After strut is removed, disassemble the top mount. Make sketch to ease reassembly.



Before removing the top nut, the coil spring must be compressed (left). You will need a tool to hold the spring seat (right) while removing the top-mount nut. On Toyota models, the maker recommends that you use a new nut when reassembling the strut. To mount the strut on a vise, use jig. Dimensions below are for Toyota strut.



see if it's adequate (see *Saturday Mechanic*, page 37, Dec. '80). If the shock is damaged, open the unit and remove components as follows.

1. With the shock-absorber housing held vertically in a vise, remove the upper cap. Some are screw-type fittings. Others are removed with a brass punch and hammer. If the cap is damaged, replace it.

2. Using a bar-type wrench, loosen and remove the ring nut. If you don't have this kind of wrench, hold a brass punch against a notch in the ring nut and tap the punch with a hammer until the ring nut loosens. If the ring nut is damaged, get a new one.

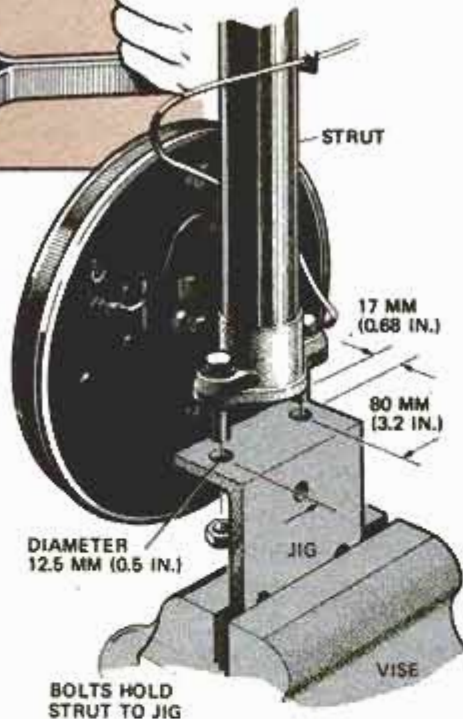
3. Remove and discard the gasket. Use a new gasket when reassembling the unit.

4. Lift up the piston and remove it with the piston-rod guide.

5. Remove the cylinder from the shock-absorber housing and insert the new, preassembled, fluid-filled MacPherson cartridge. Reassemble the unit in the reverse order of the procedure just described.

Toyota strut reinstallation

To reinstall the unit in a Toyota, guide the three studs of the top



mount through the three holes in the fender housing. Place the lower end of the shock-absorber housing over the collars on the steering arm. Hand-tighten the two lower-mount retaining bolts holding the unit to the steering arm.

Install and tighten the top-mount retaining nuts to 15-22 foot-pounds (ft.-lb.) (about 1/2 turn with a conventional wrench after nuts are finger-tight). Tighten the two lower-mount retaining bolts to 59-66 ft.-lb. (1 1/4 to 1 1/2 turns by normal wrench).

Reattach the brake hose and brake line, and the brake-pad wear-indicator multiwire connector. Have front-wheel alignment checked.

How Datsuns are done

All Datsun models, except the pickup truck, have MacPherson strut assemblies up front. Datsun Z-cars (240Z, 260Z, 280Z and 280ZX) have them in the rear, as well.

To remove MacPherson assemblies for overhauling with preassembled, fluid-filled, replacement cartridges, proceed as follows.

1. Raise and support the car's end. Remove the wheel and tire.

2. Remove the brake caliper.

3. Take out the lower-mount retaining bolt that holds the MacPherson shock-absorber housing to the steering knuckle arm. Separate the shock from the steering knuckle arm by pushing the transverse link down with a pry bar. Place a stand under the strut for support as you detach the strut from above.

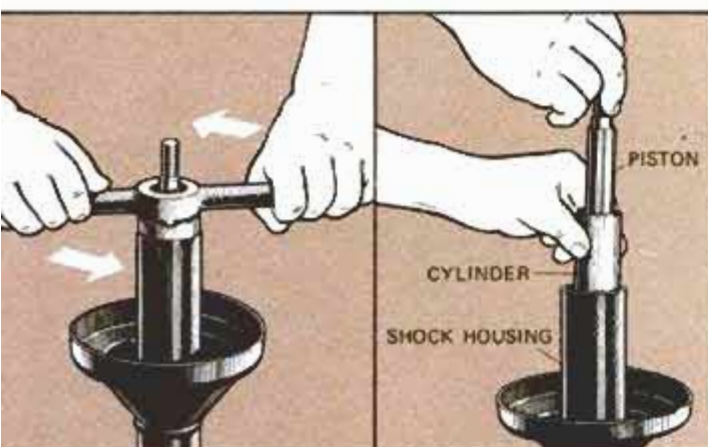
4. Remove the three top-mount retaining nuts from the engine compartment. Then take the MacPherson unit to a workbench for overhauling.

5. To reinstall the assembly, reverse the procedure just described. Tighten top and bottom retaining fasteners by hand. Then, tighten top-mount retaining nuts to 18-25 ft.-lb. (approximately 1/2 turn with a conventional wrench). Tighten the lower mount retaining bolt to 53-72 ft.-lb. (1 1/4 to 1 1/2 turns with a conventional wrench).

Don't forget to have front-end alignment checked.

Overseas-made Chrysler cars

All of these models have MacPherson units that can be overhauled in the same way. However, MacPherson assemblies of Dodge Colt and Plymouth Champ hatchbacks should be treated in the same way as GM X-body models, Ford Escort and Fiesta, and Mercury Lynx (see last month's *Saturday Mechanic*). The following steps show you how to remove and install MacPherson



In order to remove the ring nut from the top of the strut, use a bar-type wrench. If you do not have this type of wrench, then you can knock the nut loose from the unit by using a punch and a hammer. After the nut has been removed from the top of the strut, pull out both the piston and the cylinder.

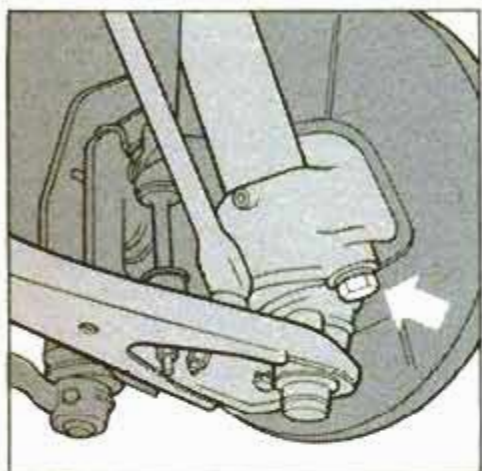
units in the Dodge Challenger, Sapporo and Colt coupe, sedan and station wagon, and Plymouth Arrow.

1. Raise and support the car's front. Remove the wheel and tire.

2. Remove the brake caliper, disc and dust cover.

3. Disconnect the stabilizer and strut bar from the lower arm. Remove the lower arm. This frees the lower end of the MacPherson unit.

4. From inside the engine compartment, remove the top-mount bolts holding the unit. Remove unit from the car and overhaul it.



On Datsun cars, remove the lower-mount retaining bolt in order to release the strut.

Note: To disassemble the top mount, remove the dust cap from over the top-mount securing nut. Before reinstalling this cap, pack the inside of the insulator, which contains a bearing, with wheel-bearing grease.

Reverse this procedure to reinstall the unit, then follow these guidelines.

■ Hand-tighten top-mount bolts. Then tighten them to 7-11 ft.-lb. (about 1/4 turn with a conventional wrench).

■ Hand-tighten the lower end of the MacPherson unit to the steering knuckle. Then tighten it to 29-36 ft.-lb. (3/4 to 1 turn).

■ Have front-wheel alignment checked.

Honda's front, rear struts

MacPherson strut shock absorbers are used in the front and rear suspensions of all Hondas except the station wagon. To remove front-suspension units, proceed as follows.

1. Raise and support the car's front. Remove the wheel and tire.

2. Undo the brake-hose clamp attached to the shock-absorber housing and release the brake hose.

3. Remove the brake-caliper assembly. Fashion a wire hook and hang the caliper from the car body.

4. Undo the bolt attaching the MacPherson shock to the steering knuckle.

5. Tap the steering knuckle with a hammer to separate it from the shock.

5. From inside the engine compartment, pry off the rubber cap covering the MacPherson top-mount retaining nut. Remove this nut. You can now take the MacPherson unit from the car and overhaul it.

Note: The MacPherson top mount contains a roller bearing. During overhaul, handle it carefully. If it's damaged, replace it. Before reinstalling the bearing, lubricate it with wheel-bearing grease.

To reinstall the overhauled MacPherson unit, reverse the order of the disassembly procedure above, and secure lower- and top-mount retaining fasteners finger-tight. Then, tighten and top-mount retaining nut to 33 ft.-lb. (one-half to three-quarters turn with a conventional wrench). Tighten the lower mounting bolt to 47 ft.-lb. (three quarters to one turn with a wrench). Have front-wheel alignment checked.

To remove rear-suspension MacPherson shock absorbers from a Honda, follow this procedure.

1. Raise and support the car's rear. Remove the wheel and tire.

2. Undo the brake-hose clip attached to the shock-absorber housing, so you can shift the brake hose out of the way.

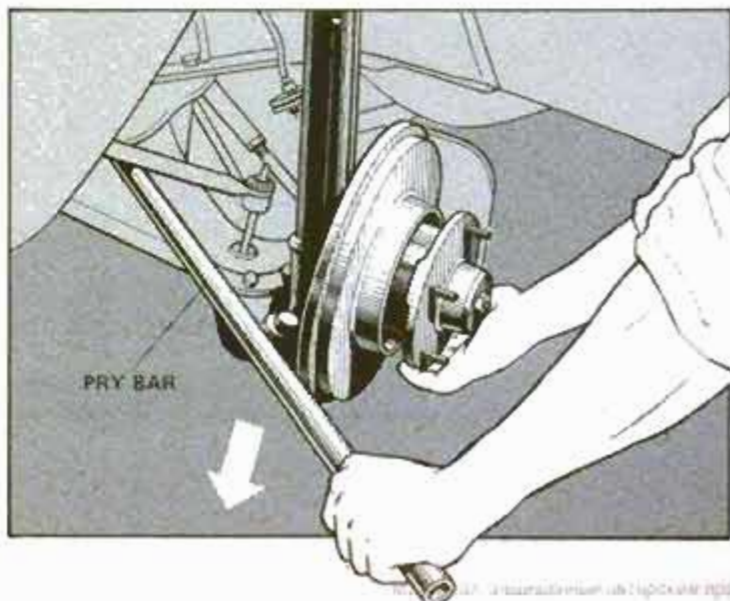
3. Disconnect the parking-brake cable from the brake drum.

4. Loosen the inboard bolt of the lower control arm and the radius-arm forward bolt. Remove the bolt attaching the bottom of the shock to the hub carrier.

5. Working inside the trunk, remove the top-mount retaining nuts. You can now remove the shock absorber, but you may have to twist the hub carrier to gain clearance.

In reinstalling the overhauled unit, reverse the order of the above procedure, and hand tighten all fasteners. Then, using a conventional

To separate the MacPherson strut from the steering knuckle, you may find it necessary to exert some force. The best way to accomplish this is to use a long pry bar. Wedge one end of the pry bar between the lower A-arm of the strut and the body of the car. Then, press down upon the lower A-arm using the shaft of the pry bar.



wrench, tighten them to the following torque values.

■ Shock absorber to hub-carrier bolt—36 ft.-lb. (one-half to three quarters turn).

■ Radius-arm forward bolt—61 ft.-lb. (1 turn).

■ Lower control-arm inboard bolt—40 ft.-lb. (three quarters to one turn).

1971-78 Mercury Capri

To take MacPherson strut units from the front suspension for overhaul, follow these steps.

1. Raise and support the car's front. Remove the wheel and tire.

2. Disconnect the brake hose at the brake caliper if the car has disc brakes, or at the brake backing plate if the car has drum brakes. Stick a plug (golf tee) in the end of the hose.

3. Place a jack under the control arm and lift up to reduce coil-spring tension, easing removal of the MacPherson unit.

4. Pull out the cotter pin from the nut holding the end of the connecting rod to the steering arm. Then remove the nut and separate the connecting rod and steering arm. Lower the jack.

5. Pull out the cotter pin from the nut holding the control arm to the lower end of the shock. Then remove the nut and separate the control arm and shock.

6. If you are working on a model that has disc brakes, remove the brake caliper.

7. Working inside the engine compartment, remove the three bolts that attach the top of the MacPherson shock to the fender housing. You can now remove the shock.

To put the unit back into the car, reverse the order of the above steps, and observe the following.

■ Bleed brakes before installing the wheel and tire.

■ Install a new cotter pin on the nut holding the control arm to the lower end of the shock.



All-in-One Computer



Computer Peripherals



Amateur Antenna Tuner



Oscilloscopes



Giant screen projection TV



Rechargeable Camp Light



Dual Wattmeter



Hand-held Digital Multimeter

FREE HEATHKIT® CATALOG



Educational Programs



Chart Recording Depth Sounder



R/C Gear



Computerized Weather Station



Groundtrack® Metal Locator



Digital Electronic Scale



Car Thermometer



One-button Phone Dialer



Pro-Series Audio Components



Speedometer/Tachometer



4-band Shortwave Radio

400 electronic kits: test instruments, computers, amateur radio gear, electronic educational programs, color televisions, stereo components, R/C gear, home products, energy conservation devices, marine and aviation gear, and more – things you've always wanted and needed, now at low kit prices from Heath.

Discover the fun of kit building – it's a great way to relax in your spare time and share a rewarding

pastime with your whole family. The useful items you build will reflect the pride of your craftsmanship, too. The famous Heathkit illustrated manuals make it easy for anyone to build reliable, professional-quality kits.

SEND FOR YOURS NOW!

The 104-page catalog is Free! If coupon is missing write:
Heath Company, Dept. 017-742, Benton Harbor, MI 49022

Heathkit Heath Company, Dept. 017-742,
Benton Harbor, MI 49022

Send my free Heathkit Catalog now.
I am not currently receiving your catalog.

Name _____

Address _____

City _____ State _____

CL-727 Zip _____

FREE
CATALOG

Heathkit products are displayed, sold and serviced at Heathkit Electronic Centers* nationwide. Consult your telephone directory white pages for location. *Units of Veritechnology Electronics Corporation. Some retail prices may be slightly higher.



Last chance to save \$40 to \$50!

DON'T MISS OUT ON TRAVELLIN' FRIDGES FROM \$99!

Our \$30 off-season discount ends with this ad. To ensure this saving and avoid the \$10 to \$20 '81 price increase call toll free or use the coupon. You save up to \$50 if you act now.

You've nicely gotten away on your long awaited vacation, camping trip or long week-end with the family. You're comfortably cruising in your car, van or rec. vehicle along a busy interstate with few rest stops or restaurants. You guessed it...the kids want to stop for a snack. But your Koolatron P34 or P34A is full of sandwiches, cold pop, fried chicken...home made, fresh and cold. The family helps themselves and you've saved valuable vacation time and another expensive restaurant bill.

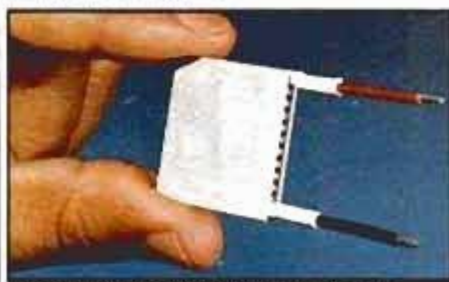
You're a commuter, a salesman or a trucker and you spend many hours in your vehicle daily. You've often longed for a fresh snack or cold beverage as the miles tick away. Now with your amazing Koolatron P10 plugged in beside you, you open the lid and instantly fresh food and drinks are at your fingertips. You're refreshed...you've saved an unnecessary stop, time and money.

AFFORDABLE CONVENIENCE

Home refrigeration has come a long way since the days of the ice box and the block of ice. But most of us resign ourselves to doing without the same convenience once we leave our homes. Or, we revert back to the cooler and ice routine of days gone by, simply because there's never been any dependable and inexpensive alternative. But now, for the price of a good cooler and one or two seasons of buying ice, (or about 10 family restaurant meals), all the marvels of home refrigeration are available electronically. And the sloppy

ice cooler with its soggy and spoiled food can become a stone-age memory for you. An amazing space-age miracle...the thermoelectric solid state module...makes this portable refrigeration revolution possible.

AEROSPACE MODULES



These miniaturized thermoelectric modules replace all the bulky complex piping coils, compressors and motors in conventional portable refrigerators.

Utilized by NASA scientists, as the only refrigeration system for rockets and satellites, thermo-electric cooling has been in use for almost a quarter century. These expensive modules were selected by NASA for some basic reasons...they're small (about the size of your watch)...they're light weight (they weigh less than a package of cigarettes)...they're totally reliable (these modules are completely solid state and have no moving parts)...they require little power (they use the same power as one of your car's tail-lights)...they're completely insensitive to

tilting, bumping, vibration, (which causes failures to conventional compressors, motors and piping)...they're powerful (these modules have the same cooling power as a 10 lb. block of ice)...and they never wear out or break down. And for portable refrigeration where you require 12 volt DC. power, thermo-electric modules are the most efficient. These amazing heat pumps have not only gone to the moon, but have provided the breakthrough for Koolatron's truly reliable, lightweight portable refrigerators.

THOUSANDS IN USE

Koolatron Industries Limited now has tens of thousands of these electronic fridges in use worldwide using these same powerful solid state modules. The reliability, performance and convenience of electronic refrigeration has now been dramatically tested and proven in all kinds of temperatures, conditions and environments from Australia to Alaska. Built to take it, these electronic modules are encased in tough, plastic insulated chests that are designed to be rugged and trouble-free. Non-rusting hinges and latches prevent corrosion in salt water environments. And with only one moving part (a small 12 volt fan) Koolatron portables seldom see a service depot. Koolatron's combination of space-age heat pumps and quality engineering have now led to a whole family of electronic portable refrigerators and food warmers that eliminate costly ice and provide "home refrigeration" convenience at sane and sensible prices

MODEL P10 - THE PERFECT CAR FRIDGE & FOOD WARMER **\$199* \$99.00**
(In Canada \$149* \$109.00) *1981 prices



Holds approx. 17, 12 oz. pop cans—refrigerates in air temps. up to 95°F. Also keeps hot foods hot (150°F) at the flick of a switch. Tough, blue Polypro plastic case. Ext. 16" L x 11" H x 11-1/2" W. Int. 11-1/2" L x 8" H x 8" W, with 10 litre capacity (0.4 cu. ft.) weighs 10 lbs. empty. Operates from supplied 12 volt power cord in vehicles or with optional 12VDC/110VAC power adaptor.

Koolatron's P10 not only makes a great car fridge but at a flick of a switch lets you bring home your favourite fast foods "piping hot". Comes with a 9 ft. power cord that just plugs into your cigarette lighter. Amazingly easy to operate...one switch selects hot or cold. A second switch allows you to refrigerate normally or select maximum cold. With your engine off, you can operate several hours and still start your engine to recharge your battery. "A low battery" indicator warns you when it's time to recharge. With the power off, your P10 keeps everything hot or cold for many hours in its well insulated case.

As a travel fridge the P10 keeps your favourite foods and beverages fresh and cold wherever you go. If you're a salesman, your food samples will arrive perfectly hot or cold every time. If you carry insulin, medical samples, dietetic foods, your P10 will never leave your side. Great for private planes.

Photographers will find it invaluable for keeping expensive films from going bad. And mothers...now you can refrigerate baby's formula in your car then heat it with the flick of a switch. Powerboaters, just plug it into your boat's cigarette lighter, and keep a day's food and drink ice cold without running into shore for ice. You campers, hunters and fishermen will find endless uses for transporting provisions and bait...then take home your catches and game without spoiling. Terrific for golf carts.

And with our optional 110 volt adaptor you'll find endless uses wherever house current is available... At your cottage... as a bar fridge...in your motel room for a midnight snack and drink or as a small office fridge. Use as an auxiliary home fridge when you're having a party. And it's a natural at drive-in movies, auto races and at sporting events.

MODEL P34 - THE STANDARD RECREATIONAL FRIDGE **\$199* \$139.00**
(In Canada \$149* \$109.00) *1981 prices



Holds over 40 lbs. of food and beverages or 48 pop cans. Refrigerates in air temperatures up to 95°F. Rugged ABS case in sand beige colour with dark brown non-corroding latches and handle. Large 34 litre capacity (1.2 cu. ft.) weighs 17 lbs. empty. Ext. 21" L x 16" H x 16" W. Int. 16" L x 12" H x 11-1/2" W. Operates on 12 volts DC with supplied power cord or with optional 12VDC/110VAC power adaptor.

The P34 is our standard recreational size portable refrigerator. This new, improved model has a non-adjustable solid state thermostat which keeps your food at normal refrigeration temperature even in 95°F weather. It holds more than three times as much as the P10.

Imagine dry, dependable refrigeration with the size to match your travelling and camping needs. Fits into any boat, van or camper or back seat of your car. Plugs into your cigarette lighter receptacle and refrigerates over 40 lbs. of food (no space wasted by ice), yet it draws no more power than the P10. With our optional 110 volt adaptor, you'll find endless uses as a bar fridge, cottage fridge, office fridge. Your P34 has all the advantages of the P10 without the heating cycle or low battery indicator but with all the capacity needed for serious boaters, campers, hunters, fishermen and travellers.

MODEL P34A - THE DELUXE RECREATIONAL REFRIGERATOR & FOOD WARMER **\$199* \$159.00**
(In Canada \$149* \$109.00) *1981 prices



The same size, colour, weight and capacity as the P34 but includes food warming features, fully adjustable temperature control and low battery warning indicator.

The P34A is our top of the line portable. It heats, it refrigerates and with specially designed electronic circuit control (patent pending) it allows you to dial a complete range of temperatures from very cold to very warm.

Imagine the versatility. In season, refrigerate all your hunting, camping, boating and cottage provisions. Off-season, keep foods piping hot on your ice-fishing, skiing and snowmobiling weekends. You can even dial wine-cooling temperatures. Our low battery indicator warns you when you need a recharge and the sensing circuits efficiently control your power consumption to save on battery drain. This is our best of the line, recreational fridge and food warmer with all the bells and whistles for the discerning buyer.

READ WHAT OUR CUSTOMERS SAY:

"We took meat from Canada and ate it ten days later after thawing it in Florida. All our produce and drinks stayed unbelievably fresh and cool." SH, Hamilton, Canada

"The way I try to sell my refrigerator one would think I was on commission. We love our unit!" P.O.P., Houston, Texas

"The Koolatron is everything they say about it in its advertising. I personally bought one, tested it and found it so desirable that I gave it to my daughter and son-in-law who made a cross-country trek from Vermont to Oregon with their infant daughter. They told me that aside from their new Dodge van, the Koolatron was the most indispensable item of equipment they carried." K.M., New York, N.Y.

who demands quality, size and complete versatility.

LAST CHANCE TO SAVE \$40 TO \$50!
Due to inflation, our 1981 in-season prices will be \$10 higher than last season for each portable and our adaptor. By ordering from this ad you save \$40 to \$50 off our new 1981 in-season prices.

ORDER TODAY WITHOUT OBLIGATION!

Simply complete the attached order form or phone collect and we'll rush you your portable on our no risk 21 day trial offer. Each unit comes with complete instructions and a written 1 year warranty. In the unlikely event you ever need service, we have major service centres in New York, Arizona and Canada.

When you receive your Koolatron, use it constantly for 3 full weeks without risk. If you ordered our optional 110 volt adaptor, plug it in, then use your portable immediately as a bar fridge or around the patio or pool. Next plug it into your car or RV. Take your family out for a weekend trip. Enjoy fresh home cooked food as you thumb your nose at those expensive restaurant stops. Then use it on your boat or in your office or let your son or daughter try it at their college dorm. If after you've thoroughly tested it, you don't agree that your Koolatron represents a major breakthrough that will save you time, money and bother for years to come, send it back for a full refund. You can't lose...we guarantee it.

So be among the thousands to discover that the ice age is over! Don't waste another dollar on ice...order your Koolatron with no obligation, today!

PHONE FOR IMMEDIATE DELIVERY

For rush delivery, call "toll free" by asking your operator to dial us collect. Quote the Dept. No. in the coupon below to guarantee your saving.

0-705-737-0842

Koolatron Industries Limited

56 Harvester Ave. Batavia, New York 14020
230 Bayview Drive, Barrie, Ontario, Canada

Or use this handy order coupon.

It's unlikely you'll ever see prices this low again.

Save \$40 to \$50 with this coupon

Koolatron Dept. 1605
Industries Limited

56 Harvester Avenue, Batavia, New York 14020
Canada: 230 Bayview Drive, Barrie, Ontario L4N 4Y8

Save me \$40 to \$50 with these off-season prices:

—Koolatron P10 at \$99.00 (\$109.00 in Canada)

—Koolatron P34 at \$139.00 (\$149.00 in Canada)

—Koolatron P34A at \$159.00 (\$169.00 in Canada)

—Koolatron 110V adaptor at \$29.95 (\$34.95 in Canada)

Please add \$8.00 for handling and delivery per unit

No charge for shipping adaptor if ordered with unit

Add \$3.00 for shipping adaptor only

(N.Y., Ont. and Quebec residents add sales tax.)

I understand that I may return any item undamaged

within 21 days and receive a full refund if I am not

satisfied.

I enclose my check or money order for

\$ _____ at please charge it to my

Visa MasterCard American Express

Account Number _____

Expiry Date _____ Send brochure only

Signature _____

(necessary to send merchandise)

NAME _____

ADDRESS _____

CITY _____ STATE _____

ZIP CODE _____ PHONE _____

— DCR2 —

Tough '81 Ford Pickups.

**FORD FIRST: 21 MPG*
WITH 2,530 LBS. PAYLOAD!**



Ford, the pickup designed for the needs of the 80's, is first again. First with 21 estimated MPG in a six-cylinder pickup with payloads as big as 2,530 lbs. And first with new advances like V-8 Automatic Overdrive. Choose from tough, efficient regular Fords. Roomy SuperCabs. Rugged Six-Wheelers. The only standard-size 4x4's with independent front suspension. America's best-selling pickups are first where it counts.



First truck V-8 Automatic Overdrive option
Only from Ford! New automatic transmission shifts into overdrive at about 45 mph . . . automatically. Available with 5.0L V-8.

21

EPA EST. MPG*

29

EST. HWY.*

F-100/150 with 4.9L (300 CID) Six

First Ford 21 MPG Six*
Only the tough '81 Ford has an estimated MPG this high with payloads as big as 2,530 lbs.

798

EST. MILES*

1102

HWY. MILES*

LWB Styleside with optional tank

First in driving range*
Only Ford has this estimated range. Standard and optional 19-gal. tanks, total 38 gals.

*With 4-speed overdrive option. Compare these estimates with others. Your mileage may differ depending on speed, distance and weather. Actual highway mileage, range and California ratings less. Ford's mileage ratings together with the largest fuel tank of any pickup give the longest range.



FIRST IN TOTAL TRUCK SALES SINCE 1970
Based on R.L. Polk & Co. registrations.



First design for the 80's
Totally redesigned last year, Ford pickups are roomy and inviting inside . . . trim and aerodynamic outside for extra efficiency.

FORD

FORD DIVISION



NEW NOW



BOATING



Double-cabin convenience

The pleasures of privacy for two couples or a large family are provided with a separate stern cabin in Wellcraft's new 288 Monaco Sun Cruiser. The Sarasota, Fla., builder has provided two V-berths forward, a main cabin with head and convertible dinette, plus the special aft cabin with head, all in a 28-foot, 8-inch V-hull with 10-foot, 8-inch beam and power to 510 hp.

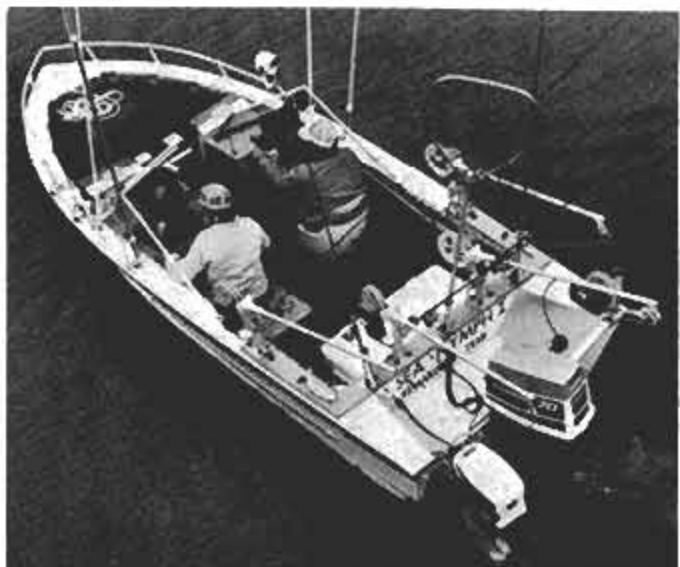
Messy servicing simplified

For the necessary chore of checking lower-unit gearcase grease, OMC Parts and Accessories has a handy \$3.60 Lube Pump that fits its one-gallon containers of Hi-Vis and Premium Blend Gearcase Lubricant; at Evinrude and Johnson dealers.



New salmon-chaser

A deep-V of lightweight aluminum, this new prototype Salmon Boat from Sea Nymph, Syracuse, Ind., uses its 17-foot Striper Boat design, fitted out with the accessories for open-water Great Lakes fishing. Rated for up to 100 hp, the test hull has a 70-hp Evinrude and trolling 15. Long- and short-arm downriggers get coho lures deep.



New canoe with a molded-in memory

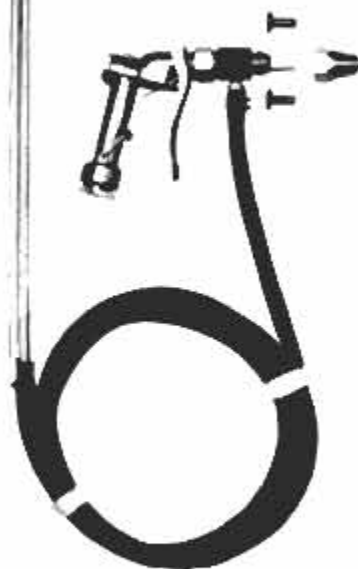
Newest in the long-time line of wood, canvas and fiberglass Old Town canoes from Old Town, Me., the 16-foot, 77-pound Penobscot has a hull of Oltonar/Royalex that can remember its original shape and return to it after a bang-up. The \$755 craft can carry 860 pounds, and has slight rocker-bottom for added white-water responsiveness.



Under/over water light

Designed to light the way for divers, but rugged enough for boatmen, new BL-1000 Bottom Light by Princeton Tectonics, Hightstown, N.J., has been pressure-tested down to 300 feet. The \$16 Lexan case has four C cells, works five hours. (Please turn to page 48)

**NO BIG BUCKS?
NO UNEVEN
SURFACES?
NO KIDDING!**



use the no-nonsense
#700 SANDBLASTER
from TRI-CON®.

The Model #700 means faster, more even work because of its patented design: there's no bulky container to get in your way, just put the aspirator tube right in your bag of sand, the abrasive flow pattern covers the same area as conventional blasters in half the time, and the #700 works with any compressor delivering 1.5 CFM at 60 PSI and up.

At \$52.50 — a cost far below conventional sandblasters — you'll be amazed at the work load the #700 can tackle. It's so easy a first-time user can become an expert in minutes. The #700 is ideal for home shops, metal finishing, auto body repair, cleaning brick, etching wood, etc.

For \$52.50 you get the complete #700 package including a long lasting ceramic nozzle. We pay postage and handling in the continental U.S.A.

Order by April 30, 1981 and receive a coupon good for 50% off any other Tri-Con product.

To order send this ad, your address, and a check or money order for \$52.50 (U.S. funds) payable to:

TRI-CON®, INC.
27331 Tungsten Road
Cleveland, Ohio 44132

FREE FACTS KIT

**Now! Earn up to \$15
an hour making
popular
custom
wood
products**



A Free Fact Kit tells how you can make \$5, \$10, even \$15 an hour or more in your spare time!

A patented, easy-to-use woodworking tool — the 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 dozens of fast-selling items. You can even start a moneymaking 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 FACTS KIT

Mail the coupon and we'll send you information about this profitable opportunity. We help you get started with a "Blueprint for Success" manual, advertising materials, project ideas, patterns, production aids... and more!

Mail your coupon TODAY!



Shopsmith Inc.

The Woodworking Company
Dept. 2607
750 Center Drive
Vandalia, Ohio 45377

YES! Please mail me your Free Facts Kit that tells how I can make money in my spare time with the patented Shopsmith Router Arm. I understand there is no obligation.

Name _____
Address _____
City _____
State _____ Zip _____

Cabinetmakers' and professional woodworkers' inquiries welcome.

Poulan's new chain saw reduces kickbacks

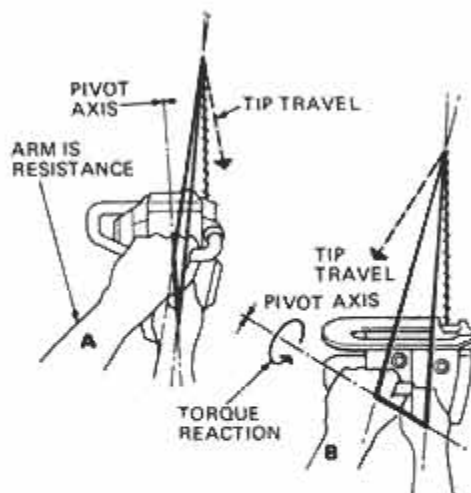


Prices for new, low-kickback line of saws range from \$90 to \$290.

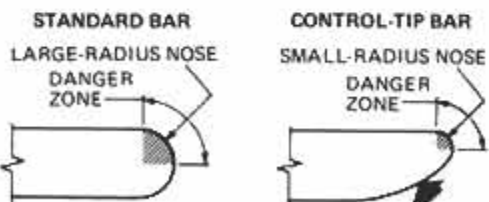
Poulan's new chain saw is designed to reduce the chance of kickback—and reduce its force when it does happen.

Beaird-Poulan, a major manufacturer of chain saws, has made three changes in its homeowner line:

- New low-kick chain with low-profile cutters and depth gauges is less likely to snag on branches and force the saw back on user.
- Saw handles are positioned so that the operator's left arm offers maximum resistance to kickback.
- The shape of the bar's nose offers fewer opportunities for kickback to occur because the area on the nose most likely to cause kickback has been reduced.



Hand position A (above, left) offers more arm resistance to kickback than position B.



New, low-kickback contour works by reducing the tip area, the cause of kickback.



Get in on the PROFITS in SMALL ENGINE service and repair Start your own money



BEAT INFLATION!

Cash in on the huge demand for small engine repair.

Work part time, full time right at home - we help you every step of the way.

making business!

In just a short time, you can be ready to join one of the fastest growing industries in America...an industry where qualified men are making from \$10.00 to \$15.00 per hour...and that's just for labor. Parts, engines and accessories add even more to the profits.



Because the small engine industry has grown so quickly, an acute shortage of qualified Small Engine Professionals exists throughout the country. In fact, it's not unusual for a good small engine man to be three to four weeks behind in the summer and at least a week behind in the winter. When you see how many small engines are in use today, it's easy to understand why qualified men command such high prices—as much as \$17.50 for a simple tune-up that takes less than an hour!

46-million small engines are in service today!

That's right—there are over forty-six million 2-cycle and 4-cycle small engines in service across the U.S.A. That's the official count from the Engine Service Assn., and new engines are being built at a rate of one-million per month! With fully accredited and approved Belsaw training, you can soon have the skill and knowledge to make top money servicing these engines. Homeowners and businessmen will seek you out and pay you well to service and repair their lawnmowers, tillers, edgers, power rakes, garden tractors, chain saws, mini-bikes, go-carts, snowmobiles, generators, snowblowers, paint sprayers...the list is almost endless.



No experience necessary.

You don't have to be a 'born mechanic' or need prior experience. If you can read, you can master this profitable trade right at home, in your sparetime, without missing a single paycheck. Lessons are fully illustrated—so clear you can't go wrong.

You receive trade secrets and business plans

We guide you every step of the way, including tested and proven instructions on how to get business, what to charge, how to get free advertising, where to get supplies wholesale...all the "tricks of the trade"...all the inside facts you need to assure success right from the start.

Increased Income

"I've had about 8 years experience repairing small engines...but repairs were only minor...until I started the Belsaw Course."



Walter H. Strick Campbell, California

With our famous 'learn-by-doing' training method, you get practical 'hands-on' experience with specialized tools and equipment that you'll receive with your training plus a brand-new 4 HP engine—all yours to keep!

SEND FOR FREE FACTS!

You risk nothing by accepting this offer to find out how Belsaw training can give you the skills you need to increase your income in a high-profit, recession-proof business of your own.

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

You get all this Professional equipment with your course —and it's Yours to KEEP!

PLUS... 1 HORSEPOWER CLINTON ENGINE... YOURS TO KEEP!

Send 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!



BELSAW INSTITUTE OF SMALL ENGINE REPAIR
511F Field Bldg., Kansas City, MO. 64111

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

BELSAW INSTITUTE, 511F FIELD BUILDING KANSAS CITY, MISSOURI 64111

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

Name _____

Address _____

City _____

State _____ Zip _____

Accredited Member National Home Study Council

WATER SHORTAGE?

INTRODUCING THE EXPLORER SERIES
COMPLETE SELF-CONTAINED
WATER WELL DRILLING RIG

CAN BE USED FOR:

- MINING & MATERIAL EXPLORATION
- BLAST HOLE DRILLING
- HORIZONTAL DRILLING
- SOIL SAMPLING
- PIER HOLES
- AUGER DRILLING
- CONCRETE CORE DRILLING



The EXPLORER DRILLING RIGS can be purchased and operated for less than the average cost of one commercially drilled water well. Furthermore, the EXPLORER DRILLING RIGS can be used to drill an unlimited number of water wells for home or commercial use.

Gasoline powered, all hydraulic drive industrial grade construction - one man operation - 2" to 8" diameter wells - Up to 600' depth - Fully self contained - Pickup or trailer mounted - High speed drilling - Complete Line of Accessories.

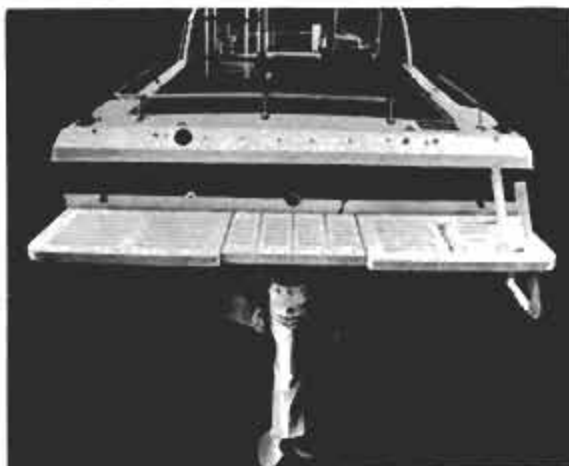
Send \$3.50 (Refundable)
To: Piper Hydro Drilling, Inc.
P.O. Box 237
Alamogordo, N.M. 88310

NEW NOW BOATING *(Continued from page 45)*



Multiseat hovercraft for low-level flying

Speeds up to 50 mph are claimed for the British Jetstream 4-Seater, an amphibious hovercraft from Jetstream USA, 518 Biscayne Blvd., Miami, Fla. Three models—the 4-Seater, a 2-Seater and the Jetstream Racing Hovercraft with one seat, twin thrust fans and reported speeds to 60 mph—are available. Built-in foam buoyancy will keep all models afloat at rest; with lift, the vehicles rise 9 inches.



Safety steps that fit astern

Swimming, diving and re-boarding after skiing become much easier with a transom platform. Models from Tempress, 701 South Orchard, Seattle, Wash., extend aft 20 inches and come in left and right 32-inch sections to combine with various-width center level shapes to clear a tilted lower unit. Right-hand section has a retractable ladder; the left, motor-mount fittings.

Pedal boats for low-energy, large-muscle cruising



A pedal boat built for four is the latest from Ayr-Way Industries, Kendallville, Ind., makers of two-seat models for waterside resorts. Pedals pumped by two passengers operate a direct-drive paddle wheel, steering is by tiller, and the twin foam-filled pontoons of the catamaran design are reported to make the craft almost impossible to capsize. Options include a vinyl fold-down canopy. *(Please turn to page 90)*

Enjoy a roaring fire . . .
the easy way, with PM's Log Splitter! What could be more pleasant on a cold, cold day than the warmth of a roaring fire. And, you can have all the firewood you need and save time and money by splitting that firewood yourself. POPULAR MECHANICS LOG SPLITTER exerts some 10,000 lbs. of pressure and will easily split 2 ft. lengths of maple and ash logs 12 to 14 inches in diameter. With an I-beam backbone, double-acting hydraulic cylinder, control valve oil filter, 3-hp. gasoline engine and other features, you'll find this log splitter easy to build and a fun thing to use. And, you'll save your back from aching as you split logs the easy way. Have more time to enjoy the crackling fire in your fireplace. Use it through this year, or start getting ready for next winter. Either way, it's a very sound investment. Send for complete plans and step by step instructions for just \$8.95. Send a check or money order to PM Plans Library-Log Splitter, Box 1014 Radio City Station, N.Y. N.Y. 10101

PM LOG SPLITTER

STOP BURGLARS BEFORE they enter your home

New wireless micro-computer security system installs in minutes and guards doors and windows—even in outbuildings.

Burglars seek easy targets. Few have the daring or the knowledge to challenge the new Perim-A-Tron™ Home Security System. No other burglar alarm under \$2,000 can give you more protection...or match it for features that will give you and your family safety and peace of mind. For starters, it is wireless, installs in minutes, and is portable should you ever move.



Perim-A-Tron's™ 24 button keyboard gives you protection a \$2,000 commercially installed system can't beat. Includes powerful remote horn.

THE BRAIN VS. THE BURGLAR

Perim-A-Tron's™ central console, or "BRAIN", employs a microprocessor, making it the most advanced security system available for consumer use. With Perim-A-Tron™ on duty, small sensors monitor doors and windows ready to signal the "Brain" from as far as 250 feet, in the event of a break-in attempt. The "Brain" processes each signal instantaneously and sounds not only a self-contained 85db internal alarm, but also a second 95db remote siren to augment the inside alarm or for placement outside to alert neighbors and police.

The Perim-A-Tron™ is so easy to live with that pets can come and go through partly-open windows or sliding glass doors without triggering it, yet so vigilant that an intruder will set it off before he can enter.

The Perim-A-Tron™ Home Security System is not like "hard-wired" commercial systems that require expensive installation, nor is it a one-room "intrusion detector" that warns you only AFTER a prowler has entered your home.

THOUSANDS OF SECURITY OPTIONS

Perim-A-Tron's™ micro-computer lets you choose from thousands of three digit disarm codes. Only you know your code. But if your son's friend receives a "demonstration", you can easily change the code again...and again. You need no specially coded key which can be lost, misplaced, or stolen. The system even has two separate channels, each with its own distinct alarm sound. This feature allows you to zone your system. For example: Channel 1—house, Channel 2—garage, or Channel 1—doors, Channel 2—windows.

HOW IT WORKS

Operating the system is simplicity itself. When leaving, a light on the console tells you that you've armed the system properly, and have from 5 to 45 seconds to leave the house. This variable delay feature, not found on some expensive commercial systems, is selective so that it can apply only to frequently used doors. All other openings would be set for instant alarm. Upon returning home, you have ample time to turn the system off, thereby avoiding a false alarm.

If a break-in attempt occurs while you're away, an alarm memory light on the console tells you so. What's more, after sounding for 10 minutes and scaring away the intruder,

the system shuts off automatically and re-sets itself.

A CONSTANT GUARDIAN

Leave Perim-A-Tron™ in Test Mode during the day and it will signal when anyone leaves or enters. This thoughtful signal will not operate the remote horn but gives a 2½ second warning on the internal speaker only.

If power fails (or is cut-off), the console has a battery back-up. And each battery powered transmitter/sensor will signal at the console if the battery runs low.

The Perim-A-Tron™ system is highly resistant to false alarms because it is not sensitive to motion or sound. Pets can roam at will, curtains can blow in a breeze, you or your children can visit the kitchen for a midnight snack—all without setting off an alarm.

COMING HOME SAFELY

What if you interrupt a burglary in progress? Perim-A-Tron™ protects you again. Carry a transmitter in pocket, purse or briefcase (It's about the size of a cigarette pack). With simple modification, it will set off the alarms, inside and out, at the press of a button.

COMPARE IT

Hard-wired "commercial" burglar alarms can cost \$2,000 PLUS a monthly fee (and you still never own it). Motion and sound detectors cost up to \$200 per unit and cover only limited areas. Your home may require two or three of these units and, in most cases, no alarm will sound until AFTER a prowler is inside for 30 seconds or more. Perim-A-Tron™ combines pre-entry protection with micro-electronic circuitry to provide the most protection at the lowest cost.

U.L. APPROVED

The Perim-A-Tron™ Home Security System is listed by Underwriters Laboratories as a burglary protection device, a rating which goes beyond electrical safety. To earn this listing our alarm was thoroughly tested for critical burglary protection functions such as transmitter range, sound volume, battery back-up, keyboard component life, battery failure warning, and test function. This tough-to-get U.L. listing resulted from the exacting standards engineered into the Perim-A-Tron™.

YOU BE THE JUDGE

We urge you to order just the basic Perim-A-Tron™ system (pictured above) for a 30-day trial period. Use it to protect your family while you sleep and to protect your home while you're away. Then if you're not convinced that the Perim-A-Tron™ is the most advanced, efficient security system available today, return it undamaged for a complete, no-quibble refund—including return postage. You are protected by a 90 day manufacturer's warranty as well as Shelburne's 25 year reputation for satisfied customers.

HERE'S HOW TO ORDER

To order simply send your check for \$199.95 plus \$4.50 for shipping and handling to the address below. Credit card holders can speed delivery of their system by using our toll-free number listed below. We will then promptly ship your Perim-A-Tron™ unit complete with easy-to-understand instructions and decals warning that the premises are protected. Additional transmitters are available for \$29.95 each, but one is not required for every door and window. Instead, magnetic contacts can be purchased and easily connected to the transmitter, allowing you to cover additional openings for as little as \$5 each. The instruction booklet is quite useful in helping you determine the correct combinations to protect your home or office at the lowest possible cost.

Give yourself some peace of mind—order a Perim-A-Tron™ today at no obligation.

CREDIT CARD HOLDERS

CALL TOLL-FREE:

800-638-6170

Maryland Residents Call 363-4304

©1981 The Shelburne Company

The
Shelburne
Company

110 Painters Mill Road Dept. V-10
Owings Mills, Md 21117 (301) 363-4304

Two simple darkroom projects

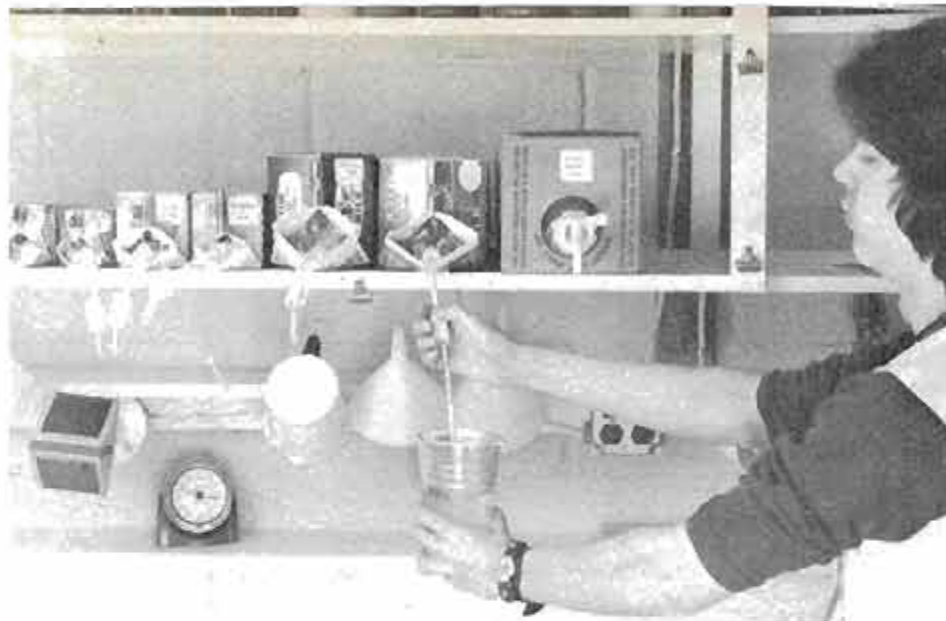
Collapsible bottles keep photo chemicals indefinitely.

It's economical to mix photo chemicals in large batches, but air in the containers can cause oxidation. Collapsible "bottles" made from freezer bags and milk cartons dispense chemicals, but keep out air.

Make sure the bag is long enough for the carton. Place the bag seam diagonally across carton bottom; pour in some chemical to seat the bag; pull it up to center it and remove wrinkles. Add the remainder of the chemical and then insert an outlet tube.

Make the outlet by cutting a 1/2-inch plastic pipe coupling in half. Insert it into a length of heater hose cut flush. Coat an inch of an 8-inch piece of 1/4-inch vinyl tube with epoxy or silicone seal; insert it into the coupling.

Gather the bag evenly around the outlet. Screw on a 1/2-inch circular clamp with a protective strip of milk carton underneath. Screw on another in the opposite direction. With a tubing shutoff on the outlet, evacu-



Homemade darkroom dispensers are convenient and keep air from oxidizing chemicals.



Parts: milk carton, vinyl tubing, freezer bags, heater hose, pipe coupler, clamps.

ate the air. Fasten the outlet to the carton with wire or twine; reshut half of the carton top.

Refill through the outlet and the bag can be reused indefinitely. Or, remove the outlet, refill, cut away damaged bag (if any) and reclamp.

—Robert E. Lewis



Insert tubing into half-coupler assembly.



Tighten clamps in the opposite directions.

Dry mounting with a print dryer

The widespread use of resin-coated paper has relegated many print dryers to the closet, but they may still have some usefulness left. An old dryer can substitute for a dry mounting press.

Preheat the dryer and check the temperature with an oven ther-

mometer. It should be set just above the level recommended for the mounting tissue, because the heat must travel through the mounting board to the tissue.

Make sure all mounting surfaces are clean; align board, tissue and print. With the back of the mounting board on the dryer's metal surface, hold the sandwich securely while

pulling the canvas stretcher over it. Feel the canvas until the heat is even and at a maximum. Seat the print with a rubber roller.

When board is removed, it will be cupped like the dryer surface. While sandwich is still hot, place it under a thick, flat board with weights on it. Remove print when cool.

—Fred and Dora Burris



Sandwich of mounting board, tissue and print is held snugly to the dryer by canvas.



When heat is maximum and even, seat print by rolling back and forth and side to side.



Finished print matches dryer's curve. Flatten by placing under thick board, weights.

BE YOUR
OWN
BOSS!

Now you can cash in on the huge demand
for SHARPENING SAWS and TOOLS.

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.

**Read What These Foley
Shop Owners Say:**

**Shop will gross \$40,000 ...
... likes being independent**

"I worked in various industrial jobs for years, and always wondered if I could make money for someone else, why I couldn't do it for myself. So after losing my regular job, I opened my Foley sharpening shop in the basement of my home. I only had a minimum of cash to start with, but Foley financed the balance. My shop will gross over \$40,000 this year, and I like the feeling of running my own shop without answering to someone else."

**William Wescott
Willoughby, Ohio 44094**



**Husband and
wife have a
going spare
time shop**

"I'm a construction foreman, and my wife is a nurse's aide. Our Foley shop fits in nicely with our regular jobs, and we earn extra money. Our sons help out too, so ours is a real family business."

"I'm still too young to retire, but when I do I'll have a very good business built up. Foley equipment helps us to do good work and brings customers back with more jobs on a regular basis... we have a lot of repeat business the year around."

**Victor Kosloski
Sturgis, Michigan 49091**



**Glad he
chose Foley
for his saw
shop**

"I worked as a carpenter all my life, but when a back injury forced me to quit I decided to go into sharpening full time. I'm very proud of my shop and glad my choice was Foley equipment... it is superb. I made over \$48,000 last year, and this year it will go more than \$50,000."

**Victor Johnson
Lincoln, Nebraska 68507**

**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.

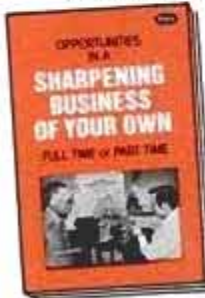
If you need only \$200 or \$400 extra income each month, a sharpening business is ideal for spare time. The additional dollars can be SPENT for more of the good things of life. Or they can be SAVED in a rainy-day fund that the family can bank on.

**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.
5101 Foley Building, Minneapolis, Minnesota 55418

CLIP OUT AND MAIL THIS COUPON TODAY — OR CALL TOLL FREE 1-(800)-328-7140,
(Except in Hawaii or Alaska). 24-HOUR ANSWERING SERVICE.



**FREE
BOOKLET**

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!

**Foley Manufacturing Company
5101 Foley Building
Minneapolis, Minn. 55418**

Foley

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** _____

AREA CODE _____ **PHONE NO.** _____

CAR CLINIC

SOLUTIONS
FOR MECHANICAL
HEADACHES

BY
MORT SCHULTZ



Blanket statements

My car, a 1967 "Blankety-blank-blank," has to have premium leaded gas. Without it, the "blankety-blank-blank" V8 engine experiences loud ping, fouled sparkplugs and after-running and just runs terribly.

Since a lot of oil companies have stopped making premium leaded gas, I have to find an alternative. Someone told me that mixing a half tank of unleaded gas with a half tank of regular leaded gas, which is still available, produces a mixture that's an octane higher than the two alone. But I've also heard that using unleaded gas in an engine designed for leaded gas will damage valves. Is there any truth to either of these rumors?—H.H. Mayton, Dayton, Ohio.

Your letter is one of several I've received lately that deals with problems created by the demise of premium leaded gasoline. I blanketed out your car's name and engine, because I want other readers with the same problem to realize that the possible solutions I'm about to give apply to all makes and engines. Possible solutions come from Chrysler Corp.

Says Chrysler: "With the diminishing supply of premium leaded gasoline, many requests have been received from owners on what they can do to modify their engines so regular or unleaded gasoline can be used."

Here's what to try, in the order you should try it:

■ Retard specified ignition timing 2°, but no more. If you exceed 2°, you run a chance of overheating the engine, burning valves and reducing fuel economy and engine performance.

■ Blend regular leaded gasoline and premium unleaded gasoline in a 50:50 mixture to attain a slightly higher octane level than leaded regular will give by itself. As long as you mix some leaded fuel with unleaded gas, you don't have to worry about valve problems. Exhaust-valve seats of older cars requiring leaded gas are not hardened and

may wear if there isn't lead in the fuel. That's why you should not use unleaded gas alone.

■ Use a thicker head gasket to reduce the compression ratio and, thus, the requirements for premium leaded fuel. When a new gasket has been installed, the engine may run acceptably on regular leaded fuel, without the need to blend it with premium unleaded.

■ Use a piston with a shorter piston compression height. Piston compression height is the distance from the outer line of the pin hole to the top of the piston. A shorter height reduces the compression ratio and, with it, the need for high-octane fuel. If a piston with a shorter compression height isn't made for your engine (ask your dealer), machining .030 inch from piston heads will result in the same benefit.

Zinging it to ping

Last September, in *Car Clinic*, I told how Tom Rosenkranz of Milwaukee solved a ping problem in his 1978 Pontiac Bonneville (301-cu.-in. engine) by replacing a defective thermostatic air-cleaner (TAC) sensor. Two readers found other reasons for ping. Here's what they say:

■ I had all the symptoms men-

tioned by Mr. Rosenkranz and was about to buy a new TAC sensor for my 1979 Buick Regal (301-cu.-in. engine) when I found that the flap valve in the air-cleaner snorkel wasn't working. I checked this valve after a drive of 20 miles. It should have been fully opened. It was completely closed. After working the flap free and lubricating pivots, the engine hasn't so much as bleeped. If you hadn't written about Mr. Rosenkranz's experience, I wouldn't have found this inexpensive solution to a bothersome problem. Thanks, *Car Clinic*.—Gerald Foon, Germantown, Tenn.

■ I'd like to add a word to the tip in the September *Car Clinic* concerning the TAC sensor. My 1979 Chevrolet Monte Carlo engine, a 231-cu.-in. V6, started ping at 20,000 miles. Two trips to dealers cost me \$100. After 10,000 miles, I found the cause—a ruptured diaphragm in the exhaust-gas recirculation (EGR) valve. I found it by moving the valve by hand with the engine running at fast idle. As I did, the ping stopped. I've replaced the EGR valve and haven't heard a ping since.—Charles S. Ratliff, Austin, Tex.

Idle chatter

The steering idler arm of my 1980 Oldsmobile Cutlass LS sedan has considerable up-and-down movement. I found this out when I was under the car checking for something else. My dealer says looseness is normal, because GM has been using spring-loaded idler arms since 1974. According to the dealer, this design is supposed to absorb shock better. The idler arm of my old 1971 Cutlass was replaced at 70,000 miles with a rigid, not a spring-loaded, part. The idler arm of my neighbor's 1977 Cutlass is rigid, too. Is my dealer giving me

(Please turn to page 54)

Bump and grind

The rubber bump stops on your car's suspension are probably the most ignored component of the entire vehicle. Yet, they are important and should be checked every time you get a chance. Our suggestion is to do it each time you change your oil.

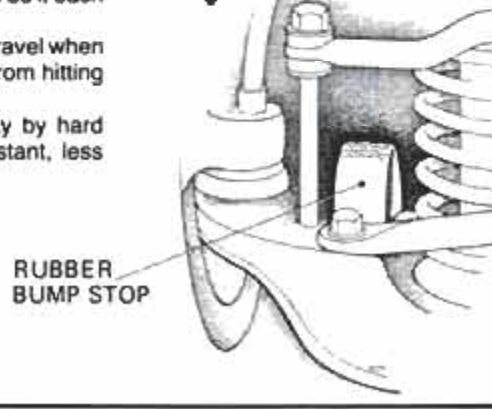
The bump stops are here to limit suspension travel when the suspension bottoms out. They keep metal from hitting metal.

Look for rubber that has been chewed away by hard impacts or compressed and scalloped by constant, less harsh rubbing.

The presence of either of these conditions means that the shocks have gone bad or the springs have lost their tension. After you remedy the condition, don't forget to replace the bump stops with new ones.

PM CAR CARE

TIP



RUBBER
BUMP STOP



The Director.[™] It points the way to lower heating bills.

Kero-Sun® never stops improving the kerosene heater.

Our latest technological breakthrough: The Director.[™] Not only is it portable, like all our heaters, but it swivels 60° to beam heat where you want it.

Like all our Kero-Sun Portable Heaters, The Director also lets you set your central heating system low and heat only the room you're in to cut your fuel bills.

The Director has a stunning contemporary design. High output (rated at 11,700 BTUs per hour) —enough to keep a 24' x 18' living room cozy and warm. With up to 32 hours of burning time for just a few cents worth of kerosene an hour. And no smoke or odor during operation.

There are now 7 U.L.-listed Kero-Sun models to choose from.

See them at a store near you today.



The good news in home heating.

© 1981 Kero-Sun, Inc.

Kero-Sun, Inc., P.O. #387, Washington Depot, CT 06794 PM-2

Please send me more information and the name of a Kero-Sun Portable Heater dealer near me.

Name _____

Street Address _____

City _____

State _____

Zip _____

Check local codes for permitted uses.

CAR CLINIC

(Continued from page 52)

straight talk or double talk?—Jim O'Neal, Columbia, S.C.

Answer your own question based on these facts, Jim:

■ GM uses two different idler arms. One is threaded and not spring-loaded. The other is a rubber bushing design and not spring-loaded.

■ An idler arm is supposed to have some vertical movement, but not "considerable" movement. According to GM specs, the idler arm in your car should have a vertical movement of 1/8 inch under a 25-pound load. To me, this is perceptible up-and-down movement—not considerable. If you need help, call your local GM zone office listed in the owner's manual.

Rundown on diesel fuel

At the 1980 Fuels and Lubricants Conference of the Society of Automotive Engineers (SAE), M.J. McMillan of General Motors Research Laboratories said, "In our opinion, satisfactory fuels are not available for our diesel engines."

One of the problems mentioned by McMillan is the tendency of diesel fuel to form wax and moisture that

turns to ice in cold weather, plugging up filters. One filter is inside the fuel tank, and one is on the engine.

To combat problems, GM developed two pieces of equipment the company has adapted to diesel engines now being manufactured. One is an in-line fuel heater that heats fuel before it passes into the engine filter. The heater cuts down waxing and icing that can plug the filter. The second is a bypass in the fuel tank that's been made part of the pickup filter of the fuel sending unit. The bypass diverts water.

McMillan claims that the two pieces of new equipment have permitted satisfactory operation of GM diesel engines in a temperature of minus 18° F. This, he says, is an 18° improvement over diesel cars without this equipment.

Presently, the in-line fuel heater is not available for cars built before Dec. 8, 1980. Models manufactured after this date have the heater.

The GM diesel fuel electronic system I reported on in the January *Car Clinic* doesn't possess the bypass (the electronic system senses the presence of excessive moisture in the tank). However, you can replace the pickup filter of the elec-

Inflation that's good for you

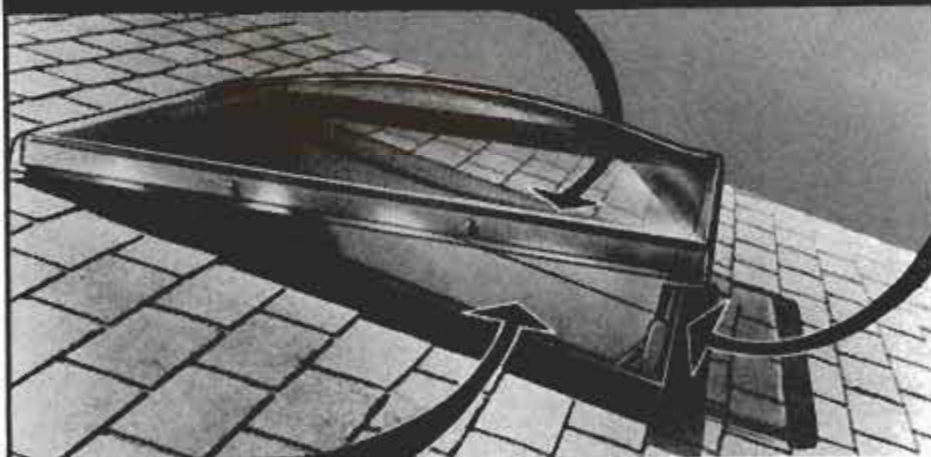
General Motors has good advice regarding the inflation pressure for P-metric radial tires, now being installed on many of its models. The advice is valid for any car equipped with P-metrics, whether the tires are original equipment or replacements.

"Some models (with P-metric tires) will specify pressures up to 35 p.s.i.," GM says. "Note that this is a cold inflation pressure. If the tires are checked when they are hot from driving, their pressure should be set at 4 p.s.i. above the recommended cold pressure. Not maintaining the proper pressure decreases fuel economy and causes tires to wear out faster."

Some cars equipped with P-metrics may have tire information decals that give two recommended pressures—one for maximum load and one as an optional pressure. GM says: "For the longest tire life and best fuel economy, always adjust to the higher of the two numbers."



VENTARAMA the plastic-domed ventilating skylight



LET THE SUN SHINE IN... Skylights offer a striking and inexpensive way to improve your day time living. Pleasant, efficient overhead day-lighting will transform dull rooms into bright, cheerful, much more livable space. Each Ventarama brings definite solar winter heat-gain with natural air-conditioning. Complete package, double domed units fit any roof, any roofing, and any climate. Please write for free literature.



VENTARAMA® SKYLIGHT CORPORATION

75 Channel Drive, Port Washington, N.Y. 11050 (516) 883-5000

© Copyright 1978, Ventarama Skylight Corporation

Do it with



- Stops Squeaks
- Protects Metal
- Loosens Rusted Parts
- Frees Sticky Mechanisms

For anything that Sticks or Squeaks. Dries ignitions in boats, RV's. Protects reels, guns against rust. Cleans, lubricates.

WD-40 COMPANY, San Diego, CA 92110

tronic system with a pickup filter that incorporates the bypass. An alternative is to replace the entire fuel sending unit with the sending unit made for 1981 models.

The SAE discussion about diesel fuel brought to mind questions *Car Clinic* readers have asked me about diesel-fuel blends and do-it-yourself blending for GM diesel engines. Here are some points regarding these questions:

■ According to present GM thinking, you should use No. 2 diesel fuel if the average daily temperature is above 20° F., and No. 1 diesel fuel if the average daily temperature is below 20° F. If No. 1 diesel fuel isn't available, use a blend of No. 1 and No. 2, which is considered a winterized blend. The only way to determine what is going into your fuel tank is by asking the fuel dealer.

■ Under no circumstances, says GM, should you blend home heating oil with diesel fuel in an attempt to improve cold-weather starting. It will plug up fuel-system orifices and cause poor performance.

■ This year, GM says, don't blend gasoline with diesel fuel in an attempt to improve cold-weather starting. Last year, GM said that adding gasoline in a ratio of 75 per-

cent diesel fuel to 25 percent gasoline was okay. What changed the company position? Probably the fact that blending gasoline and diesel fuel is not safe.

Shiftless

The manual transmission of my 1980 Chevrolet Citation is hard to get into first gear—so much so that I frequently have to start the car moving in second gear. The dealer has inspected the shifting mechanism and has found it within specification.—Donald C. Dunn, Blackwood, N. J.

You're one of many GM X-body car owners experiencing shifting difficulty. Service bulletin 80-I-62 calls for inspecting the shifting forks and replacing them if they are worn. Service bulletin 80-I-37 calls for replacing the input shaft bearing to provide a loose, rather than a press fit, which causes the bearing to bind. This leads to hard shifting.

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.

SERVICE TIPS

■ Generally, 1976 to 1981 Chrysler cars and trucks with power steering have been getting kind of messy under the hood. Power-steering fluid has been leaking from the pump reservoir cap because of splashing.

Now, however, there is a new cap available that stops the mess. It has a baffle that keeps splashing fluid inside the reservoir, where it belongs. The new cap, which you can buy from a Chrysler dealer, goes under part No. 4219036.

If only a slight dampness forms on the pump housing, you don't need the new cap. Slight dampness is a normal condition, so save your money.

■ If you own a 1974 Ford or Mercury equipped with a 400-cu.-in. engine and air-conditioning, do not work under the hood with the engine running. About 253,500 of these cars have been recalled to check the flexible fan, which may fly apart and cause injury. If you are a car's first owner, you will be notified if your vehicle is involved.

If you did not purchase the car new, contact a dealer or Ford Motor Co., and give the vehicle identification number, to determine if your car is involved.

■ Don't fret—GM has announced that black carbon (soot) in the air crossover of low-mileage cars with diesel engines is normal, and won't cause any problems. Exhaust gases enter the air crossover, depositing soot, because of the way the EGR works. **PM**

Master Shop
MULTI-TOOL

separates the tools from the toys!

...with cast iron components for accuracy, durability and reliability!

Master Shop uses machined and ground cast iron components just like the manufacturers of heavy industrial machine tools. Why? Because only cast iron can provide the perfect working surface, precision alignment, and reliability demanded by industry. Our rugged cast iron saw tables, arm bases, head rest and tailstock assure you a lifetime of trouble-free service. Master Shop combines the 5 most needed workshop tools in one affordable unit: 10" table saw, 34" lathe, 16½" vertical drill press, horizontal drilling machine, and 11¾" disc sander.

Enjoy the pride of accomplishment and achieve professional looking results on every project with the built in accuracy and versatility of Master Shop Multi-Tool. Repair furniture, remodel a room, make a picture frame or build a house. Even beginners find themselves equipped to comfortably tackle almost any project with the powerful, rugged Master Shop.

More value, quality and engineering for substantially less money than other multi-purpose tools.

Send for information or call today, and learn how easy it is to own the magnificent Master Shop... built for a lifetime of rewarding results.



MAIL TO:
Master Shop, Multi-Tool Division • Dept. MBO212
Phone (513) 866-5300

Yes - I would like to learn more about Master Shop. Please send me your information package

NAME _____

ADDRESS _____

CITY _____ STATE _____

ZIP _____

CHOOSE ANY 3



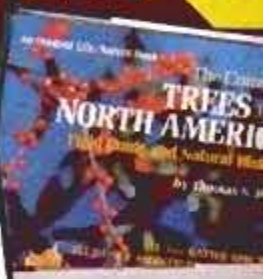
HOW TO SERVICE AND REPAIR YOUR OWN CAR



FREE when you join Popular Science Book Club
WEATHERIZING YOUR HOME

Pub. at \$16.95

As a new member of the Club, you'll also get a FREE copy of **Weatherizing Your Home** by George R. Drake. This valuable \$16.95 hardbound book gives you nearly 400 pages of step-by-step how-to on the best and least expensive ways to heat, cool, and insulate your home. All illustrated!



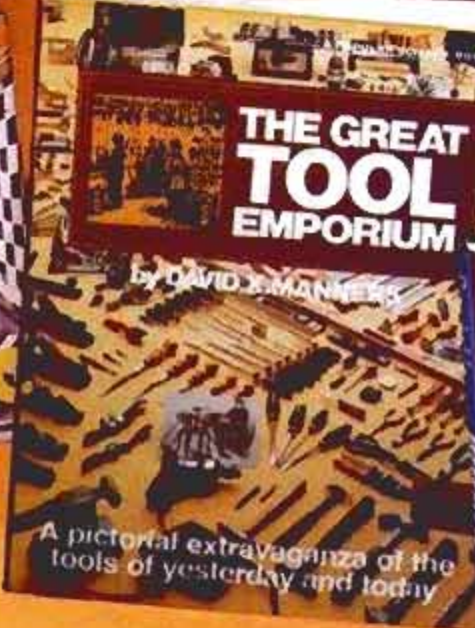
POPULAR SCIENCE B...

CRISTOFORO...

COMPLETE BOOK OF...

POWER TOOL...

BOTH STATION...



COMPLETE BOOK OF...

POWER TOOL...

BOTH STATION...

Basic House WIRING

118. HOW TO BUILD GREENHOUSES, GARDEN SHELTERS & SHEDS by Thomas R. Jones. Pub. at \$11.95

042. FORMULAS, METHODS, TIPS & DATA FOR HOME & WORKSHOP by Kenneth Swezey, Revised by Robert Scharff. Pub. at \$15.95

084. DeCRISTOFORO'S COMPLETE BOOK OF POWER TOOLS by R. J. De Cristoforo. Pub. at \$14.95

119. HOME ENERGY HOW-TO by A. J. Hand. Pub. at \$10.95

128. GREAT TOOL EMPORIUM by David X. Manners. Pub. at \$16.95

089. MASONRY & CONCRETE WORK by Max Alth. Pub. at \$14.95

101. WOODWORKING PROJECTS FOR THE HOME by contributors to Popular Science magazine. Pub. at \$12.95

105. COMPLETE BOOK OF WOODWORKING by Rosario Capotosto. Pub. at \$16.95

116. DeCRISTOFORO'S HOUSEBUILDING ILLUSTRATED by R.J. DeCristoforo. Pub. at \$18.95

161. LEISURE HOMES by Alfred W. Lees with Ernest V. Heyn. Pub. at \$18.95

097. DO-IT-YOURSELF PLUMBING by Max Alth. Pub. at \$12.95

109. BASIC HOUSE WIRING by Monte Burch. Pub. at \$13.95

132. COMPLETE TREES OF NORTH AMERICA BY Thomas S. Elias. Pub. at \$19.95

1163. HOW TO SERVICE & REPAIR YOUR OWN CAR by Richard Day and U.S., CANADA & MEXICO ROAD ATLAS. (counts as 1) Pub. at \$16.90

Mail attached card, clip and mail coupon, or write to:
POPULAR SCIENCE BOOK CLUB, P.O. Box 2006, Latham, N.Y. 12111

BOOKS FOR ONLY \$3.95

when you join the Popular Science Book Club (retail prices up to \$57.85)

And then keep saving on books covering a wide range of do-it-yourself subjects... home repairs and improvement, housebuilding, woodworking, house wiring, tools and workshops, appliance repair, electronics, masonry and carpentry, how things work, home protection, shop math, modern technology, energy, the wonders of space and modern science and many other popular science subjects. Every month you can preview a giant selection of up to forty books and more. These include the best new books from the finest how-to publishers plus the Club's special custom-written books — available to members only, at discount!

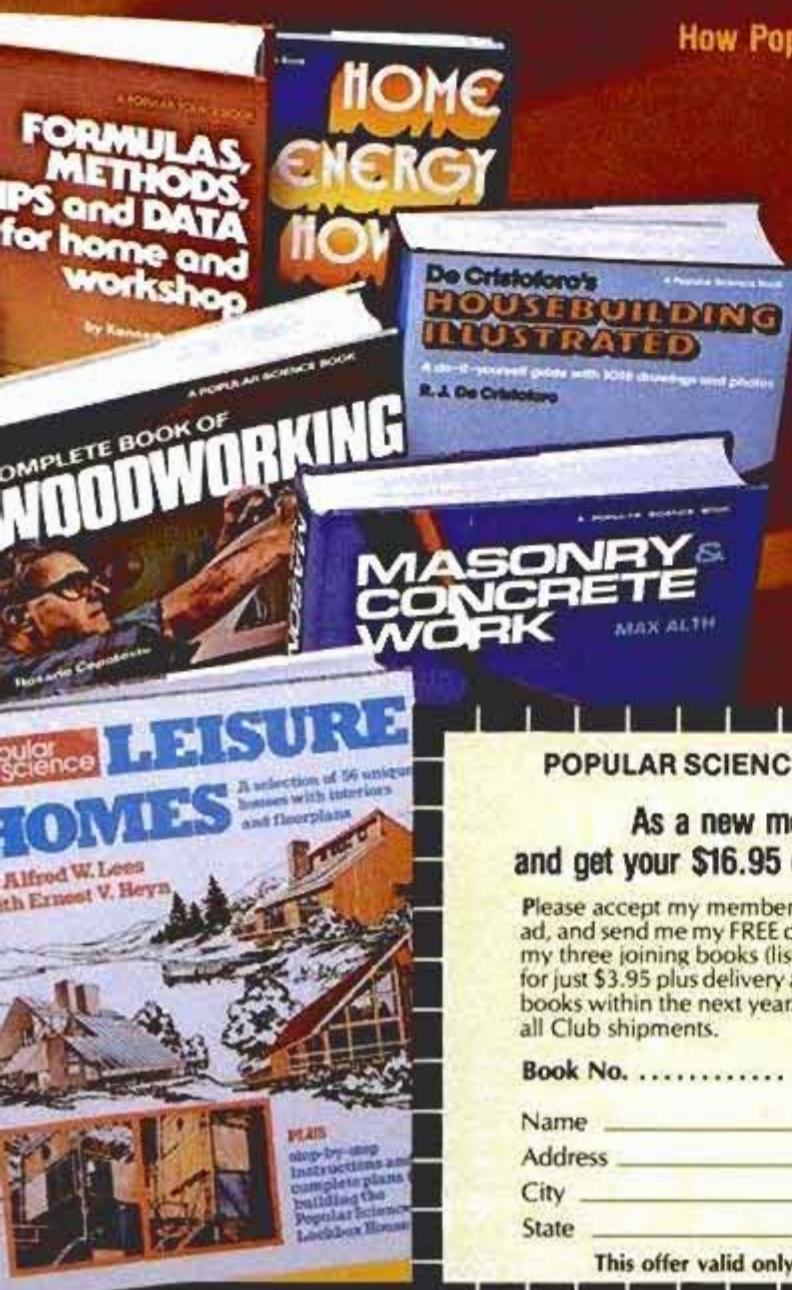
How Popular Science Book Club Works

First, just pick any three of the books listed here (up to \$57.85 worth of books). Indicate your choices on the attached card and mail. Send no money now. We'll bill you later for only \$3.95 plus delivery and handling.

Then about every four weeks (13 times a year), you'll receive a Club bulletin describing the coming main selection and alternate books also available. If you want the main selection only, do nothing. It will be sent to you automatically. If you don't want the main selection, or want alternate books, or no books, simply indicate your wishes on the form that comes with the bulletin and return it to us by the date indicated. 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.

DISCOUNTS! Club books are comparable in every way — paper, printing, binding, jacket — to the original publisher's editions, yet members may save up to 50% and sometimes more on hundreds of bargains offered each year in the Club. Mail the card today!



Clip & Mail to:

POPULAR SCIENCE BOOK CLUB P.O. Box 2006, Latham, N.Y. 12111

As a new member, take any 3 books for \$3.95 and get your \$16.95 copy of Weatherizing Your Home FREE!

Please accept my membership in Popular Science Book Club, as described in the ad, and send me my FREE copy of WEATHERIZING YOUR HOME (265) along with my three joining books (listed below by number on the dotted lines). Bill me later for just \$3.95 plus delivery and handling. My only obligation is to buy just two more books within the next year. A modest charge for delivery and handling is added to all Club shipments.

Book No. Book No. Book No.

Name _____

Address _____

City _____

State _____ Zip _____

This offer valid only in U.S.A. and Canada and only for new members.

PS/H2V

DETROIT LISTENING POST

GM for '82

Ford and Chrysler fired their biggest new-model salvos last fall—now attention shifts to GM's heavy-caliber ammunition being readied for introduction in the next several months. This includes the much-discussed J-car front-wheel-drive subcompacts, downsized A-car intermediates, F-car sporty coupes and smaller, more fuel-efficient light trucks.

As you probably know, the first wave of J-cars will replace Monza and Sunbird in May. Called Cavalier and J-2000, respectively, the Chevy and Pontiac Js will come in two-door, four-door, three-door hatch and five-door wagon variations. Selected Cadillac dealers will get an expensive, extra-luxury, four-door version called Cimarron. Buick and Olds dealers must wait until fall for their own Js. All are powered by a new 1.8-liter (Chevy-built), four-cylinder engine. They feature unique conical, variable-rate coil springs as part of Pontiac-designed rear suspensions.

The '82 intermediate fwd A-cars (due this fall) basically are stretched X-cars with more room, added luxury and extra features in two-door and four-door sedan variations. Tentative names are Chevy Commodore and Pontiac A-6000 (replacing Malibu and LeMans), but Olds and Buick will probably keep their successful Cutlass and Century nameplates. The base engine will be Pontiac's 2.5-liter Four, while both gasoline and (Olds-built) diesel V6s will be optional. The current rear-drive A-car wagons will be retained in GM's lineup for the time being.

Performance-car lovers will be pleased by the redesigned '82 Chevy Camaro and Pontiac Firebird F-cars, which will retain their rear-drive configuration. Spy photos show this handsome pair to be as sleek and sexy as ever, in downsized, lighter, more fuel-efficient form. Both feature soft, body-color bumpers with fixed, quad, rectangular headlamps on the Camaro and pop-up single lamps on the Firebird. The 2.5-liter Four will be standard, but V6s and even small V8s (both fuel-injected and turbocharged) will remain optional, along with (at last!) a new five-speed manual transmission. MacPherson struts will carry the front suspension, while coil springs on a solid axle will support the rear.

Finally, Chevrolet and GMC Divs. plan to introduce American-built minipickups for '82—a bit larger than the Japanese type, but considerably smaller and more fuel-thirsty than current U.S. models.

Ford shopping abroad

Afraid of future diesel emissions standards and hoping to achieve diesel-type fuel economy with stratified-charge, programmed-combustion "PROCO" gasoline engines, Ford Motor Co. has lagged in diesel-engine development. But PROCO is no longer considered a viable alternative, and American buyers seem enamored of GM oil-burners and certain foreign cars. So Ford has taken its giant shopping bag abroad to buy state-of-the-art diesel technology.

First stop was to respected German carmaker BMW, which will supply high-tech, six-cylinder turbodiesels for '84-model Lincoln and Mark luxury cars. Then it was off to Japan to strike a deal with Toyo Kogyo (TK is Ford's Japanese partner and maker of Mazda cars and trucks) for small, four-cylinder diesels that may find their way into Escort/Lynx (E/L) and other fwd subcompacts by late '82. Starting this fall, TK, which already manufactures the E/L four-speed manual transaxles, will also supply closer ratio E/L five-speed boxes.

Ford mini due in '84-'85

In response to rival GM's plans to put three-cylinder minicompacts on the U.S. market by the '84 model year, Ford is planning its own mini-commuter car. It will be introduced at approximately the same time as the GM mini. Word is that the fwd Ford two-seat mini will be powered by an imported, three-cylinder engine displacing about 0.9 liters.

More Chrysler small cars

Chrysler, meanwhile, is preparing future variations of its two major fwd platforms: the L-car (Omni/ Horizon) and the all-new K-car. The former is scheduled for a major face lift for the '83 model year and possible replacement by a smaller Mitsubishi Champ/Colt-like design by mid-decade. Chrysler partner Mitsubishi has been asked to supply its four-cylinder engines beginning in late 1984. K-car spinoffs planned for '82 introduction include at least one sport model, a minipickup and (a

year earlier than expected) a line of larger, fancier versions to replace the current mid-size LeBaron and Diplomat.

Five-speed transmissions

One of my pet peeves, as a confirmed self-shifter, is that, to my taste, there isn't a decent manual transmission available in an American-built car. Among the hod-rod set, "three on the tree" gave way to "four on the floor" years ago. But Detroit was looking the other way when the imports started including really versatile five-speeds in virtually all of their cars a few years ago.

Ford designed a new four-speed manual for its Escort/Lynx (built by Toyo Kogyo of Japan, which produces marvelous five-speeds for its own Mazda cars). But it's obviously designed for economy alone—not for fun and smoothness of operation. Ford's new Mustang/Capri "five-speed" is actually a four-speed with an overdrive gear inconveniently placed far right and back, requiring an awkward U-shaped shift from fourth. And there's no available five-speed for Chrysler's new Reliant/Aries or GM's X-cars. However, Chrysler says one is coming, and GM may purchase some from Isuzu for its upcoming J-cars.

Key Detroit gathering

Auto engineers from all over the world will meet in Detroit the week of Feb. 23 to trade ideas on the industry's technical problems and possible solutions. The occasion is the annual Society of Automotive Engineers (SAE) International Congress and Exposition. The 1981 theme is: *The '80s—Decisive Decade for Global Automotive Technology*. SAE says this year's Congress should be one of the largest ever held. **FM**



CHECK OUT COURIER

GREAT GAS MILEAGE
IN ONE TOUGH TRUCK.

27/39
EPA EST. MPG*
EST. HWY.



If you're into import pickups—
check out Ford's tough 1981 Courier! Its EPA est. MPG is unbeaten. Yes, Courier actually beats the best-selling compact, Toyota, in gas mileage ratings. Fun to drive, Ford Courier is one tough truck: ladder-type frame 6-leaf springs front stabilizer bar power brakes 2.0L and opt. 2.3L engines 1,400 lb. payload and much more. Check out Ford Courier!

*Ford with 2.0L engine and optional 5-speed. Compare this estimate to the estimated MPG of other trucks. Your mileage may vary depending on speed, distance and weather. Actual highway mileage will probably be less. California estimates lower. Diesels excluded.

**Tough
Ford
Courier**

7-Ft. Box Option

Sport Group Option

5-Speed Option



FORD

FORD DIVISION



BLACK VELVET® BLENDED CANADIAN WHISKY, 80 PROOF. IMPORTED BY © 1986 HEUBLEIN, INC., HARTFORD, CONN.

Feel the Velvet



Premium. Imported.

APPLIANCE CLINIC

QUESTIONS ANSWERED

Meddlesome metal

I have a Maytag dryer model No. KDE406, serial No. 171117. Three or four times a year, metal objects get past the seal and short out the elements. What is the problem and what can I do?—T.E. Stockner, Winston-Salem, N.C.

Your problem could be the result of either foreign objects in the drum or a loose or missing drum seal. The drum seal is a felt strip that adheres to the circumference of the drum. It keeps the heat from escaping and protects the elements from foreign objects.

To check the felt seal, open the dryer door and bend back the rubber flap. The seal should be visible. Check various places around the flap. If the felt seal is missing in spots or totally gone, it must be replaced.

The replacement procedure is time-consuming and complex. It should be done by an authorized service technician.

A final tip: Always examine all clothes for loose change, hairpins, jewelry and the like before placing them in the dryer.

Exhaust fan doesn't

Our Nutone model No. 3093 stove hood with fan doesn't pull as well as it once did. The motor was examined by an electrical repair shop and it checked out okay. What is my problem?—Donald J. Smith, Alexandria, La.

If your motor and fan have been bench-checked, it's a pretty safe guess that the problem is in the ductwork.

Start by checking that the spring-loaded flap in the roof or wall cap is working. Turn on the fan and inspect it visually. Regardless of the speed of the fan, the flap must open so that air can pass through. It is common for such flaps to become "frozen" due to rust, corrosion, or a stuck spring.

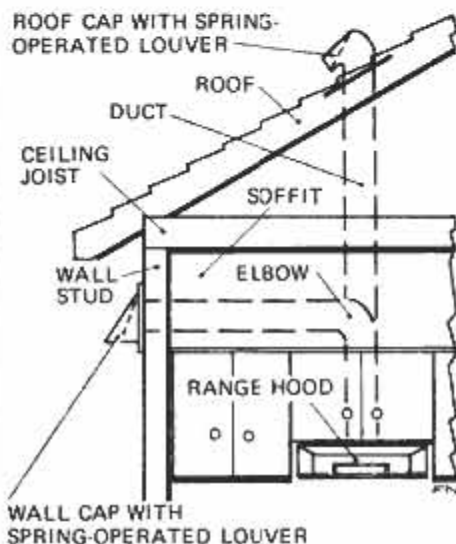
In some cases, a sticking flap can be simply cleaned and lubricated; in others, it must be replaced with a compatible part from the fan's manufacturer.

If the flap is okay, remove the fan from its housing, and using a lamp with a strong beam, inspect the inside of the duct. Repeat the inspection from the other end of the duct by removing the wall or roof cap.

If there is excessive grease build-

up, remove it, using a safe cleaning solvent. Tie rags around a long pole, such as a broomstick, and work all matter loose. Under no circumstances should excessive grease buildup be permitted to remain in the ductwork. If it cannot be removed easily, replace the clogged sections.

Occasionally, ducts may be clogged by nesting insects such as bees, wasps and hornets. If your inspection reveals this problem, call in a professional to have them removed.



Whether fan is ducted through roof or wall, clean out the ductwork regularly.

Finally, there is a remote possibility caused by the energy-conscious tightening up of homes these days. An exhaust fan must have make-up air. This means that air must be fed to and drawn through the fan constantly. Make-up air is usually supplied by ill-fitting windows and spaces around doors. If your kitchen is tightly sealed, the fan's efficiency will be greatly diminished. In this case, remove at least a 1/2-in. strip from the bottom edge of each interior door, or leave a door open during fan operation.

Ice man cometh

I have a 6-year-old Ward's refrigerator-freezer model No. UPO 1753. Last summer, the freezer blower motor stopped running. I found ice in the bottom of the impeller housing. The heaters checked okay. Now, the blower has stopped again. Once more, I've found ice in the bottom of the housing, causing the impeller to drag. What is causing this ice buildup?

—Justin G. Hengen, Omaha, Neb.

Frost-free refrigerators such as yours usually have a timer motor located underneath the refrigerator that activates the heaters. Looked at head on, the setting should be at a 350° angle for the "off" position and at a 10° angle for the "on" position. Perhaps your points are worn or pitted in the motor (likely), or there's a loose connection or frayed wire (less likely).

There is a thermostat inside, under the freezer floor, near the heaters. This is a temperature-sensing type, and is not adjustable. If it is defective, it should be replaced. (Refer to the convenient wiring schematic most manufacturers glue inside the frame.)

A tricky trouble spot in many of these units is the internal drain from the upper freezer compartment. If food or packaging scraps partially block this, melt-water cannot drain out during a melt cycle. This water will refreeze, and gradually ice will build up. Check your drain hole carefully.

No frost on her punkin'

I have a 5-year-old frost-free Westinghouse, Model RT 145R. Recently, food began to defrost in the freezer, and the refrigerator began to get warmer. The serviceman said to let the unit defrost completely and it would be okay. I did this and it seemed to work. But he said I should also put in another heater. Why did this happen? Should I put in another heater?—Mariane Deptula, Bensalem, Pa.

Since the unit is 5 years old and apparently has operated well previously, we see no reason to put in another heater. Again, we think you can take a cue from Mr. Hengen's problem above: Check the internal drain for food particles or other material that may be blocking it. A good maintenance tip to get the most out of your cooling coils is to vacuum them clean. This is a most important and frequently neglected operating hint. The job can be messy and tedious, but attention to it will pay off. **PM**

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.

LIQUIDATORS OF INVENTORY

NOW YOU CAN BUY DIRECT FROM A LIQUIDATOR!

We buy large inventories from companies throughout the U.S. Merchandise becomes available through overruns, discontinued, last years models, close-outs, bankruptcies, bank foreclosures, etc. We offer this vast variety of merchandise for sale to you through our monthly catalog "Liquidators of Inventory". All merchandise listed in our publication is in our warehouses. This merchandise changes each month as orders are filled and new inventories brought in. The monthly catalog you will receive will include all new merchandise recently acquired. Everything sold is new and unused. Many items can be purchased from us at below manufacturing cost.

Pictured below is a sampling of just a few of the items appearing in a recent publication.



**20" Cast Iron
Fireplace Grate**
Sug. List \$19.95 ea.
Our Price \$9.99 ea.
10 Or More \$7.99 ea.

**All Cast Iron
Heater-Stove**
Sug. List \$149.95 ea.
Our Price \$59.95 ea.
10 Or More \$49.95 ea.



Goodyear Wheel
11 x 4.00-5 Two ply
3/4" I.D. Bearings.
Sug. List \$26.50 ea.
Our Price \$13.95 ea.
10 Or More \$11.95 ea.



**Galvanized Steel 5 Lb.
Folding Boat Anchor**
Sug. List \$12.95 ea.
Our Price \$5.99 ea.
10 Or More \$4.99 ea.

The Green Machine
Nylon String Weed and
Grass Trimmer - Model 1200
Sug. List \$59.95 ea.
Our Price \$24.95 ea.
10 Or More \$22.95 ea.



**50 Ft. Outdoor
Extension Cord**
16 Gauge-2 Wire
Sug. List \$8.79 ea.
Our Price \$4.49 ea.
12 Or More \$3.99 ea.



**Tractor or Riding
Mower Seat**
Sug. List \$28.95 ea.
Our Price \$14.95 ea.
10 Or More \$12.95 ea.

Mini Bike Clutch
Sug. List \$22.95 ea.
Our Price \$10.95 ea.
10 Or More \$8.95 ea.



Lawn Mower Blade
Sug. List \$5.95 ea.
Our Price \$1.49 ea.
10 Or More \$1.00 ea.

**Tecumseh/Craftsman
3 1/2 HP. Engine**
Sug. List \$133.50 ea.
Our Price \$59.95 ea.
6 Or More \$54.95 ea.



This catalog is an asset to anyone interested in purchasing merchandise such as lawn and garden products, motorcycle and mini-bike parts, tools, agricultural goods, electrical products, household items and all types of hardware and industrial stocks.

Due to the variety of products we sell and especially because of the prices we're so sure that you will order merchandise from our catalog that if after receiving it you are dissatisfied for any reason your subscription fee will be refunded for the unused portion.

We are a fully authorized and licensed liquidator and mail order corporation and invite you to check with our local Chamber of Commerce.

Fill out the handy order blank below and send for the "Liquidators of Inventory" catalog today.

Bailey Sales Corp., P.O. Box 127, Corunna, MI. 48817

**Bailey Sales
Corporation**

BOX 127
CORUNNA, MI. 48817

Master Charge VISA

Expires _____

Account Number _____

Enclosed is my check or money order for \$14.50 for one year's subscription.

Charge to my credit card.

Outside U.S. \$29.00 in U.S. funds.



Name _____ PM

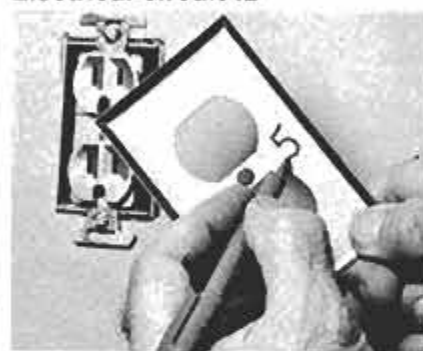
Address _____

City _____ State _____ Zip _____

Signature _____

HINTS FROM READERS

Electrical-circuit ID



To identify electrical circuits in your home, number the inside of each outlet cover plate with a felt-tip marker to correspond with its circuit number on the control box, circuit breaker or fuse cabinet.

—Leslie J. Nutting

Holder for auto parts

A sardine can with two magnets glued to one side is a handy small-parts holder for under-the-hood car work. Attach can to the engine and drop in nuts, washers and other small items to keep them in sight.

—Lane Olinghouse

Cleaning paint off hands

You can clean your hands more quickly after you've completed painting jobs around the house if you rub your hands with a small amount of cooking oil before washing them off with soap and water.


—Robert Slade

Protective labels



Protect typed or written labels from soil and wear by coating them with clear polyurethane finish. It protects labels without streaking and smearing the ink, as other clear coatings often do.

—Walter E. Burton



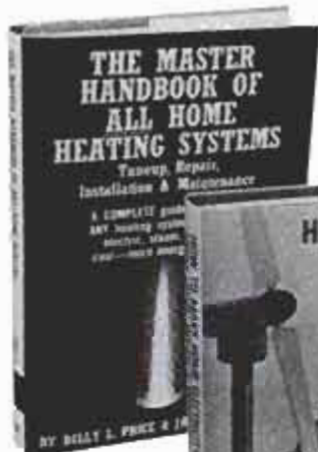
HOW-TO BOOK CLUB

Into energy?

Take all 4 of these
money-saving,
fact-filled books for

\$1.00

... and get one
FREE!



The Master Handbook of All Home Heating Systems—Tuneup, Repair, Installation & Maintenance. Oil, gas, electric, steam, wood, or coal... any aspect of every system. Publisher's List \$12.95.



How To Make Home Electricity from Wind, Water and Sunshine. A complete guide to using Nature to home-brew electricity, so you can become energy self-sufficient. Publisher's List \$9.95.



Adding Solar Heat To Your Home. Step-by-step instructions on planning and installing solar-powered heating systems in a new or existing home. Publisher's List \$12.95.

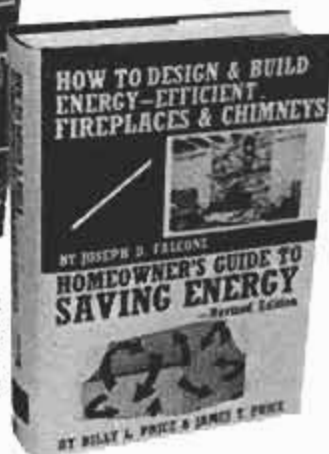


List 9.95

PLUS . . .
receive a
**1981 How-To
Projects Calendar**
as our gift
when you join!



List \$4.95



How To Design & Build Energy-Efficient Fireplaces & Chimneys/Homeowner's Guide To Saving Energy—Rev. Ed. A bible of energy-and-money-saving advice on making your home energy-efficient... from the ground up. Publisher's List \$27.90.

- **List Price \$78.65**
- **Over 1,800 pages**
- **More than 1,000 illustrations**

7 very good reasons to try How-To Book Club . . .

- **Reduced Member Prices.** Save up to 75% on books sure to increase your know-how.
- **Satisfaction Guaranteed.** All books returnable within 10 days without obligation.
- **Club News Bulletins.** All about current selections—mains, alternates, extras—plus bonus offers. Comes 13 times a year with dozens of up-to-the-minute titles you can pick from.
- **"Automatic Order".** Do nothing, and the Main selection will be shipped to you automatically! But... if you want an Alternate selection—or no books at all—we'll follow the instructions you give on the reply form provided with every News Bulletin.
- **Continuing Benefits.** Get a Dividend Certificate with every book purchased after fulfilling Membership obligation, and qualify for discounts on many other volumes.
- **Bonus Specials.** Take advantage of sales, events, and added-value promotions.
- **Exceptional Quality.** All books are first-rate publisher's editions, filled with useful, up-to-the-minute info.

HOW-TO BOOK CLUB Blue Ridge Summit, PA 17214

Please accept my Membership in How-To-Book Club and send my 4-volume Energy Library, plus a free copy of *How To Make Your Own Alcohol Fuels* and the *1981 How-To Projects Calendar*, all for \$1.00 (plus shipping/handling). If not satisfied, I may return the books within ten days without obligation and have my Membership cancelled. I agree to purchase 4 or more books at reduced Club prices during the next 12 months, and may resign any time thereafter.

Name _____ Phone _____

Address _____

City _____

State _____ Zip _____

(Valid for new members only. Foreign and Canada add 15%.)

PM-281

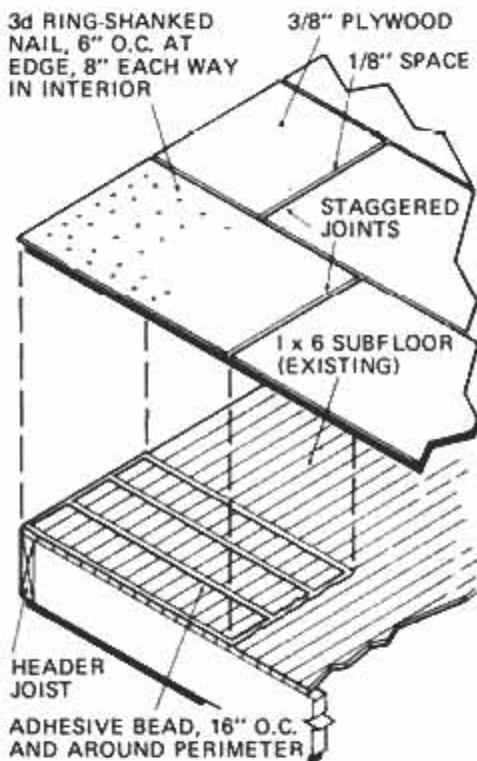
HOMEOWNERS' CLINIC

QUESTIONS ANSWERED

Screeching floor

My redwood 1x6-in. floor (not tongue-and-groove) started screeching about four years after it was installed. It's covered with a heavy pad and wall-to-wall carpeting. The boards are fastened with 8d common nails to 2x12s, 8 in. on center. How can I stop this screeching? Will powdered resin or graphite help me out?—Emmet, R. Winapey, Eatontown, N.J.

Emmet, an occasional whisper or small talk I could live with, but screeching—no way. Your carpet and pad are really over a subfloor of



Install $\frac{3}{8}$ -in. plywood over an existing subfloor to stop bothersome floor creaks.

one-bys without underlayment. This is a builder's shortcut. If he had used $\frac{3}{8}$ -in. plywood with that joist spacing, he would have done a better job. To uncover the source of the screeching, check the following two possibilities:

1. Determine whether the nails are tight. If they're loose, walking on them will sound just like removing nails from hardwood with a claw hammer.

2. The boards may be rubbing against each other. It took four years for your boards to shrink just enough to allow movement, whether through rubbing against themselves, or through individual action on the loose nails.

Make certain that your nails are galvanized and not cement-coated. The latter coating has been known to disappear over a period of time, leaving the nail in a larger hole. You'll have to re-nail the floor if it is attached with cement nails or nails that are loose.

If the nails aren't loose, the only certain way that I know to stop the noise is to install an underlayment of $\frac{3}{8}$ -in. plywood over your flooring, as shown in the sketch. The adhesive costs about \$5 per tube; it should meet APA (American Plywood Assn.) Spec AFC-01. Goodrich PL400 and 3M Scotch Grip Wood Adhesive 5230 are two such adhesives. Place a bead around the perimeter of each piece and at 16 in. on center lengthwise. Nail with 3d ringed-shank nails at 6 in. on the edges and 8 in. each way on the interior of the panel. The APA recommends $\frac{1}{8}$ -in. spacing between panels at the edges and ends to allow for any swelling due to humidity changes.

Sparking electrical outlets

Every wall switch in my new home produces an internal spark when the switch is turned on. Sparks also result when I unplug appliances. What's my problem?—R.G. Kelley, Aurora, Colo.

I checked your plight with both an electrical engineer and the engineering department of Leviton, a large manufacturer of wiring devices. Both agree that you have a problem that should not go unattended. Since your house is new, try contacting the builder. If you cannot get satisfaction there, Leviton suggests sending one or two of the switches back to the manufacturer (not Leviton, by the way). If checking for loose terminals isn't your cup of tea, by all means, consult a licensed electrician.

Gasping for air

I would like to solve a problem before next summer arrives. Last summer, on hot days, the temperature inside my house reached 95° or even 100° F.

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.

It took a considerably long time to cool down each night. My attic is fairly well insulated with cellulose. Could it be that I don't have proper attic ventilation? If not, how would I ventilate it? Should I close the vents in the winter?—Clayton Thompson, South Omaha, Neb.

A "fairly well" insulated ceiling may not be enough. A minimum of 6 in. is required nowadays. Ventilation is also important. Prolonged exposure of insulation to heat of over 100° F. allows the insulation to hold some of the superheated air, which, in time, can warm the ceiling below. By the time the cooler evening air can take effect, the sun is up and another day has begun.

Soffit and gable-end vents, along with power-driven roof fans, are all methods that can be used to help cool your attic. The fans are usually set to activate themselves at 115° F. and shut off at 95° F. If you have soffit vents, check to make certain that they're not clogged with insulation. A "through" flow of air is best.

A minimum requirement for ventilation is 1/150 of the ceiling area. For example, a 20x30-ft. ceiling area of 600 sq. ft. \times 1/150 = 4 sq. ft. of ventilation required for adequate performance.

Do not close the vents in the winter. However, if you have water pipes in the attic, insulate them well against freezing.

More on roofing products

In "Reroofing Products" (*Homeowners' Clinic*, page 52, July '80), we mentioned a membrane roofing product, called Plyroof, in answer to a leaky-roof problem. The manufacturer of Plyroof products is Plymouth Rubber Co. Inc., 104 Revere St., Canton, Mass. 02021. The makers sell and warrant the system to approved applicators, or to those willing to pay for the services of a technical person from the company. It's not a do-it-yourself job. **PM**



If you thought "Swiss-Precision" could only be found in watchmaking, then you don't know about our power tools.

Only you know how good your tools have to be. When it comes to woodworking machinery, they should be better than you are—even if you're already an accomplished craftsman. Therefore, you owe it to yourself to learn more about our Swiss-made line of INCA stationary power tools which we sell throughout these 50 states.

Take the 10" Cabinetmaker's Saw, for example. It has a 20mm (25/32") arbor at the blade for strength and rigidity where it counts. The table castings are tough, precision milled alloys and the guide rails are aircraft quality extrusions. All the major rotating parts are dynamically balanced. The bottom line is a machine that takes higher loadings and gives you less vibration with a truer running saw blade.

If fact, every one of our INCA saws, jointers, planers and shapers are built to quality standards which are becoming increasingly hard to find in this country. That's because they're made with the same pride of workmanship as the Swiss put into their watches.

Our catalog is a good place to begin your comparisons. We want you to be as good as you can get.



Garrett Wade Co., Dept. PM-2-81
161 Ave. of the Americas, N.Y., N.Y. 10013

National Sales

Gentlemen:

- Send me your INJECTA INCA catalog. Enclosed is \$1
 Here's another \$1 for your 116 page catalog of quality hand tools.

Name _____

Address _____

City _____ State _____ Zip _____

How to get rich

START YOUR OWN BUSINESS RIGHT FROM YOUR HOME — AND MAKE A FORTUNE IN MAIL ORDER!



Mail Order Beginners Get Cash by Mail!

Have you ever thought of operating a little mail order business of your own? Something you could start on a shoestring right from home in your spare time. It's a fabulous business!

Bob Carter of Newark, N.J. ran his first small mail order ad in House Beautiful magazine — offering an auto clothes rack. Business Week reported that his ad brought in \$5,000 in orders. By the end of his first year in Mail Order, he had grossed over \$100,000!

Another beginner—a lawyer from the midwest, sold a mail order item to fishermen. Specialty Salesman magazine reveals, "he made \$70,000 in the first three months!"

There is no other business where you can make a fortune so fast. Come up with a "hot" new item... and WHAM!

It strikes like a bolt of lightning!

Millions of people read your ad and suddenly, you are swamped with cash orders from all over the country... MORE MONEY in 60 days than you could earn in a lifetime!

Like the Vermont dealer who ran one ad in Sports Afield magazine. His ad pulled 22,000 orders—over A HALF MILLION DOLLARS IN CASH!

Yes, Mail Order is the fastest-growing, most profitable business in America! And now with the population explosion... the huge teenage market... and more people moving to the suburbs—we are on the verge of the BIGGEST BOOM in Mail Order history!

Free

If you are sincerely interested in starting a lucrative business of your own ACT NOW! We can help you get rich in Mail Order just as we've helped others. Mail the coupon or send a postcard. We'll send you a free book, catalog, ads and complete facts about our offer. No salesman will call. No obligation. You don't need previous experience but you must be over 21. Write to:
Mail Order Associates, Inc., Dept. 336
Montvale, New Jersey 07645

Mail Order Associates, Inc., Dept. 336
120 Chestnut Ridge Rd.
Montvale, New Jersey 07645

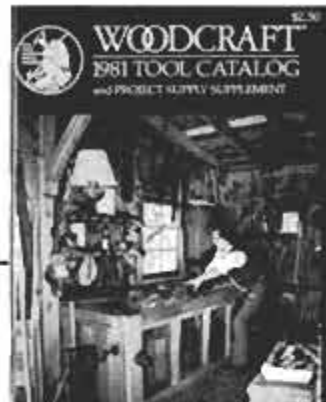
Please rush full details immediately.

Name _____

Address _____

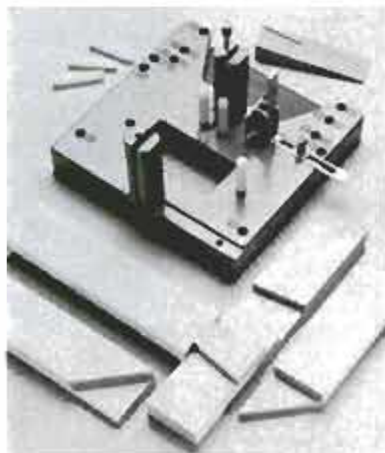
City _____

State _____ Zip _____



128 PAGE CATALOG AVAILABLE NOW

Our new catalog details over 3000 imported and domestic products, tools, benches and accessories which allow you the results you want with the satisfaction of using the best tools available. Many of these products are not generally available at local outlets. Send for your catalog today and see for yourself.



PRECISION MITERING SIMPLIFIED

The **Jointmaster** is an ingenious device which enables the woodworker to make mitre, butt, tenon, closed halving, tee, and many other joints not capable with any other mitre box available today. The precision casting has 13 different preset angle settings for a wide variety of applications. No clamps are necessary and marring of the wood is practically impossible. Accepts stock up to 4" wide at 90°.

12E07-AX \$45.00 ppd.

WOODCRAFT®

Dept. PM21, 313 Montvale Ave.
Woburn, Mass. 01888

Please send _____ Jointmaster(s)
12E07-AX \$45.00 ppd.

I enclose \$1.00 for a 2 year subscription to the Woodcraft Catalog (free with order)

Payment by...
 Check enclosed VISA
 Mastercharge American Express
* _____ Expires _____

Name _____

Address _____

City _____

State _____ Zip _____



Now, seven beautiful ways to keep warm

At last — a superbly efficient woodburning stove beautiful enough for your home. And now in your choice of seven decorator tile colors!

The WESO Ceramic Tile Stove employs both convection and radiant heat to surround you with gentle all-over warmth. The fire burns all night without tending — when the coals have finally died, the tiles continue releasing heat into your rooms.

The WESO burns both wood and coal and offers every efficiency feature you could ask for. It enhances the beauty of your home, where a black metal stove would be rudely out of place.

Enclosed is \$1. Rush me your literature showing the WESO CERAMIC TILE STOVE in all 7 tile colors — plus details about WESO's new COALBURNING STOVE — and shipping schedule for winter delivery.

Name _____
Address _____
Zip _____

Ceramic Radiant Heat
6012 Pleasant Drive, Lockmere, N.H. 03252

Convert your fireplace into an energy cost-saver



Save up to \$50. monthly and more. Install a new fireplace furnace insert.



Up to 100,000 BTU/hr heat output with efficiency. Dual internal blowers. Interchangeable air-tight and glass doors. Lifetime burnout warranty. MONEY BACK satisfaction Guarantee.

Write for FREE catalog.

Envirostyle Direct
Dept. 840-102 P.O. Box 43021
St. Paul MN 55164
Call 1-800-328-0882 TOLL FREE.

ROAD GLUE.



Around sharp curves. Over rough roads or countryside. At higher speeds. KYB's Gas-a-just shocks give you superb control that's just not possible with ordinary shocks.

How? Their patented large diameter design uses pressurized nitrogen gas and all-weather fluid to create an automatically adjusting, double action shock that won't fade or suffer lag control. So you won't suffer unnecessary bounce, sway or poor cornering.

KYB's Gas-a-just shocks. For car owners who not only appreciate performance, but demand it. Find them where you buy parts, available to fit most cars, light trucks and vans.

They'll keep you glued to the road.

Write for free brochure:

KYB

KYB Corporation of America
207 Eisenhower Lane South
Lombard, Illinois 60148

Built under license of Dr. deCarbon system.



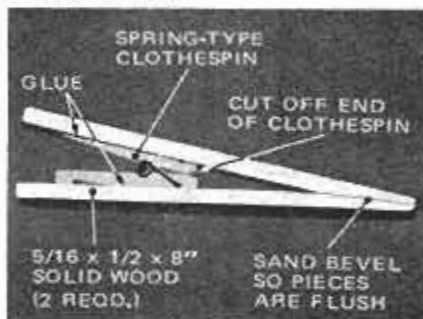
HINTS FROM READERS

Holder for spray extender



Use part of a drinking straw as a holder for a spray extender to keep it with the spray can. Flatten or staple one end of the straw closed and tape it to the side of the can.—*Dan Leverty*

Utility clamp



Make a useful clamp from a spring-type clothespin glued to two wood scraps.



Use clamp as a pickup tool or to hold parts together when building models.

Make this clamping and pickup tool from a spring-type clothespin and wood extenders. Use a pin that tapers at the nose. Cut off the nose for more taper; assemble with glue.—*R.R. Busch*

FREE

Booklet

HOW TO BUILD A MORE POWERFUL BODY

TAKE
YOUR CHOICE!
You Can Do This...

- SHAPE UP!
- BIGGER, MORE POWERFUL MUSCLES!
- TRIM YOUR WAIST!
- INCREASE MUSCLE TONE!
- MAKE THE MOST OF YOUR PHYSICAL POTENTIAL!



Shape-Up, Get that waistline down and muscularize it!

GET INTO SHAPE

LIKE MORE INFO?

We'll be glad to send you free colorful brochures and even a free booklet. All you have to do is send us your name and address.

BE GREAT - BE SOMEBODY SPECIAL!

Be a bodybuilder! As you get more into shape, you can improve your health, self-confidence, and overall outlook on life! Build up your body to be the very best it can be! Live up to your top physical potential and let us help! Whatever your condition, chances are you can improve!

- ARMS** -- Huge biceps and triceps are the goal of just about every bodybuilder today! You can develop your arms to their fullest potential -- find out just what YOU can accomplish!
- CHEST** -- A large chest has always been a sign of a powerful man! Put bodybuilding to work on your chest muscles! Be at your very best!
- BACK** -- Start working on that upper back -- you can work on getting that fantastic V-Shape! It's real attention getting!
- SHOULDERS** -- Learn the methods that can help bring those shoulders up to their full development!
- LEGS** -- Muscular, powerful legs are essential! Let us show you the ways that top bodybuilders develop their legs to the absolute maximum!
- ABDOMEN** -- A firm, well-developed washboard waist is the positive result of properly developed abdominal muscles. Why carry around a pot belly when you can do something about it?

Would you take just a little time, only three times a week, to build a more powerful and muscular body? And who knows, you might even make a few heads turn in admiration!

Most men never realize their true physical potential for muscularity! Don't let this happen to you! Make the most of your physical capabilities -- through bodybuilding, you can discover your very top potential!

Wouldn't you like to get into shape? Really into shape? Better than you have ever been, or back into the good shape you were once in? With the Universal Bodybuilding program, you can use the same types of methods that the top bodybuilders use to build their great physiques!

Of course, not everyone can attain the massive muscularity shown here! Then again, some can exceed it! But what is important is that you know that everyone can develop to his maximum potential!

Besides looking better, when you get into shape, chances are that you are going to feel better and have much more energy! That's how much bodybuilding can do for you! And think of the psychological benefits possible! As bodybuilding becomes a habit, you'll have a greater awareness of self and being in touch with your body.

With progressive bodybuilding, you can get results that you can see and feel! And just think of all the personal satisfaction that you can get from knowing that you are the very best that you can be!

Why not give bodybuilding a try? Who knows what your own physical potential could be! Get started today on the road to improving yourself -- send for our information -- and see just what bodybuilding can do for you!

FREE!

Universal Bodybuilding
Box 6694, Dept. -- 605
Detroit, Mich. 48240

You bet I want bigger, more powerful muscles! Rush me your FREE Booklet and all your free brochures!



Name _____

Address _____

City _____ State _____ Zip _____

MAIL THIS COUPON TODAY

THE PM GARAGE

CAPSULE REPORTS ON NEW AUTO PRODUCTS

Rear-view mirror kit

The glue that holds rear-view mirrors to the windshield is pretty strong stuff, but for some reason the mirrors come unglued all too often. If you want a permanent solution that lets you attach and use the mirror immediately, consider this special repair kit.

It has an oversize replacement bracket, so there's more adhesion surface on the windshield. You place the bracket up against the windshield and draw a circle where it will go. Then apply a film promoter, which improves holding power to the glass of the adhesive on the back of the bracket. After applying the promoter, peel off the plastic back-



New adhesive kit enables you to attach rear-view mirror to windshield instantly.

ing from the bracket to expose the adhesive.

Just press it into place on the marked circle, attach the mirror to it, and you're ready to go. The mirror will hold in place immediately.

Price is \$4.95 from Thexton Manufacturing Co., 7685 Parklawn Ave., Minneapolis, Minn. 55435.—Paul Weissler

Cars and stripes forever

Pinstriping is an art I've long admired, but just now mastered. I'd seen ads for the Beugler Stripper for



Professional-looking results are possible with Beugler's pinstriping roller kit.

25 years. When I finally watched it demonstrated, I was so taken by the stripper's ease of use, its versatility, and its quality of construction that I had to buy one.

The deluxe striping set comes with a chrome-plated paint reservoir, three striping wheels of different widths, three guides and complete instructions.

Striping with the Beugler takes about 20 minutes of practice. I used a water-based latex paint to practice laying a straight, smooth stripe on a piece of glass. For actual striping, it's best to use a good lettering enamel.

Send for Beugler's catalog/order form from Beugler Stripers Inc., Box 29068, Los Angeles, Calif. 90029.—M.L.

Charging-system tester

We've seen charging-system testers before, but nothing as easy to use as this one.

It simply plugs into your cigaret lighter and allows you to test for battery cranking load, alternator output and regulator condition.

A three-position switch on the tester allows you to switch from one



Check battery voltage and alternator output from dash with charging system tester.

function to another. It is available for \$39.95 from Milton Industries Inc., 4500 West Cortland St., Chicago, Ill. 60639.—T.A.

Emergency fan belt

What happens if a fan belt lets go in the middle of nowhere and you're not carrying a spare?

If you had been fortunate enough to have this neat gadget called the Rescue Ring, you'd cinch it up in place of the belt and be on your way.

The belt is made to be used with



Emergency fan belt you cut to fit snaps together with unique locking system.

cars with 3-liter engines or smaller, so you won't be able to use it on a big V8. The only tool that accompanies the Ring is a safety blade for cutting it to the appropriate length.

It costs \$5.98 from Base Products Co., 9099 Westheimer, Suite 107, Houston, Tex. 77063.—T.A.

High-class creeper

Would you consider spending \$35 for a creeper?

Sure, you can get one for \$10 to \$20, but this one probably is the best anywhere.

It is made with 3/4-inch solid hardwood boards (no plywood) and is available in a 42-inch length for over-six-footers, along with the standard 36-inch length. A steel frame at the corners allows recessing of the steel casters, so the creep-



Heavy-duty creeper has very low ground clearance and uses high-grade hardware.

er really hugs the floor.

Called the Geiger creeper, it was introduced more than 40 years ago, but has been out of production for about five years. Cal-Van Tools, 1500 Walter Ave., Fremont, Ohio 43420, bought the rights to it and put it back on the market, selling it through auto parts stores.—Paul Weissler

IF RISING FUEL COSTS MAKE YOU BLUE, THINK PINK.

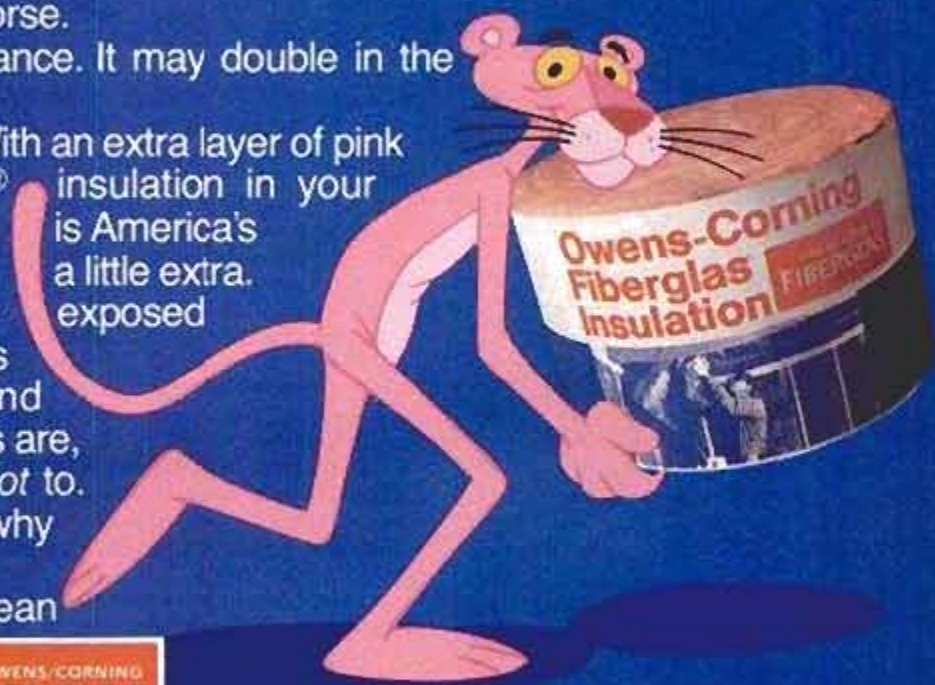
Cheer up, things could get worse.

The cost of fuel, for instance. It may double in the next ten years.*

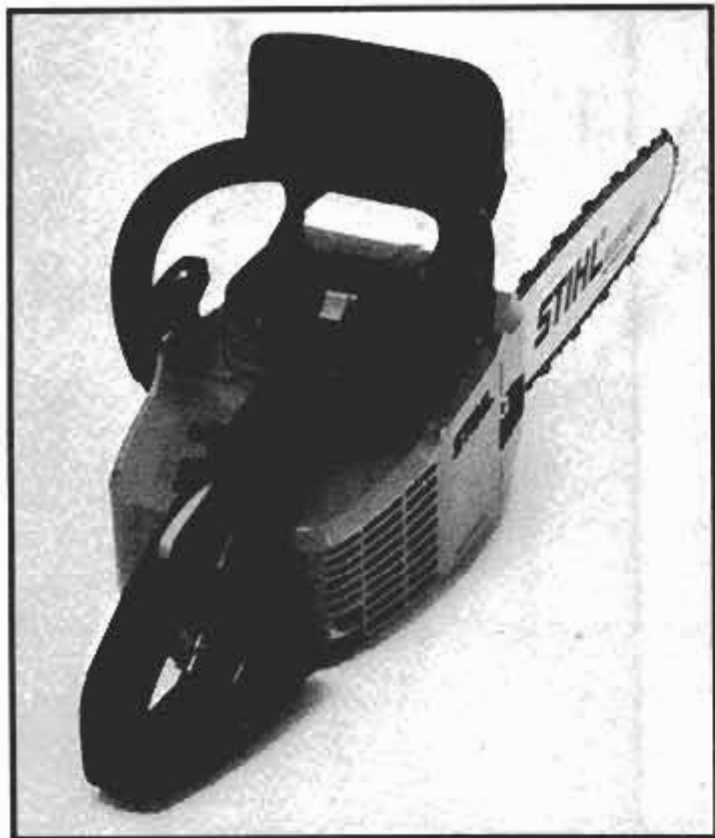
But you can fight back. With an extra layer of pink Owens-Corning *Fiberglas*[®] insulation in your attic. Pink Owens-Corning is America's best-selling insulation. Add a little extra.

Insulate your attic, walls to heat and cold, and floors over unheated garages and crawl spaces. The way things are, it could be more expensive *not* to.

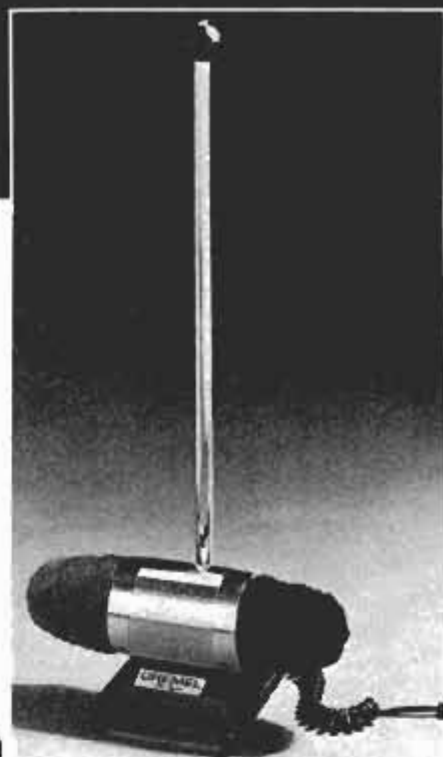
Savings vary. Find out why in the sellers fact sheet on R-values. Higher R-values mean greater insulating power.



NEW NOW for home and shop



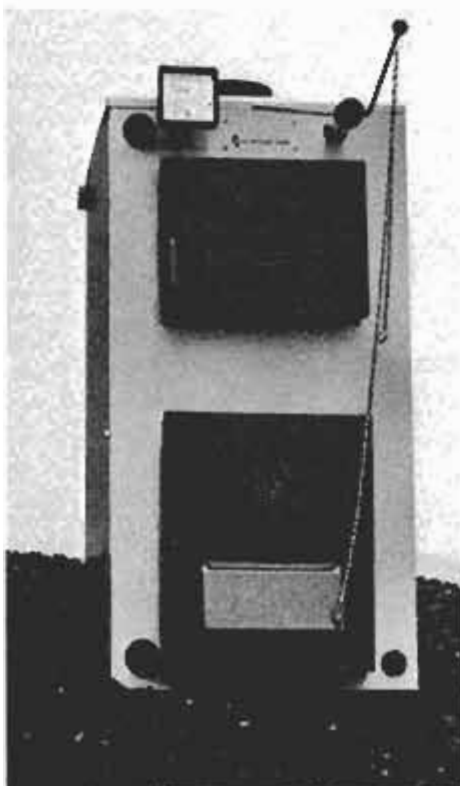
A



B



C



D

A Although the compact 101AV Stihl chain saw weighs less than 10 pounds, it packs the power of 2.3-cu.-in. displacement. The saw is said to be the quietest gasoline-powered model available in the world, with an adjusted decibel level of 98 at 8500 rpm (normal level is 115 dB). This low noise level is accomplished by a fan-cooled internal muffling system and a diaphragm valve between the carburetor and crankcase. It's made by Stihl Inc., 536 Viking Dr., Virginia Beach, Va. 23452, and costs about \$185., depending on area.

C This two-handle, Victorian-style bath fitting is designed to give the elegance of vitreous china at an affordable price. The faucet spout, escutcheon and level handles are vitreous china with polished chrome trim. The faucet carries the maker's free cartridge-replacement warranty for 1000 months, if leaks or drips develop. Its price is \$110. Other Victorian bath fittings are also available from Bradley Corp., Menomonee Falls, Wis. 53051.

B The Model 795 shoe polisher features a 30-in.-high, chrome-plated handle with a built-in starter button, so you don't have to stoop to turn on the machine. It has two polishing bonnets which are made of wool and polyester blend. A 6-ft.-long coil cord stays neatly in place when it's not extended to full length. The polisher has a 115-volt a.c. motor.

It's available for \$85. The manufacturer is Dremel, a division of Emerson Electric Co., 4915 21st St., Box 518, Racine, Wis. 53406.

D Use the TARM 202 coal-burning boiler either as a central heating system or in conjunction with an existing oil- or gas-fired system. Maximum output on coal alone is 80,000 B.T.U. per hour. The firebox holds enough coal for over 14 hours of burning at full output, or 24 hours at lower output. A horizontal water-tube heat exchanger is designed for fast warm-up. The boiler, which costs \$1100, is manufactured by Tekton Corp., Conway, Mass. 01341.

**EVERYONE
NEEDS A LITTLE COMFORT.**



When close friends drop by,
there's no better way to get
comfortable and share the good
times than with the smooth,
easy taste of Southern Comfort.

Its uniquely delicious flavor
was created in Old New Orleans
almost a century ago. And
it has been enjoyed ever since.

Try this world famous
liquor straight, on the rocks, or
mixed any way you like it.

It's one of the real comforts
of life.

**SOUTHERN
COMFORT.**



Send gifts of Southern Comfort anywhere by phone. Call toll-free 800-528-6148. Charge to major credit cards.
Offer void in states where prohibited. Southern Comfort Corp., 90-100 Proof Liqueur, St. Louis, Mo. © 1980

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.

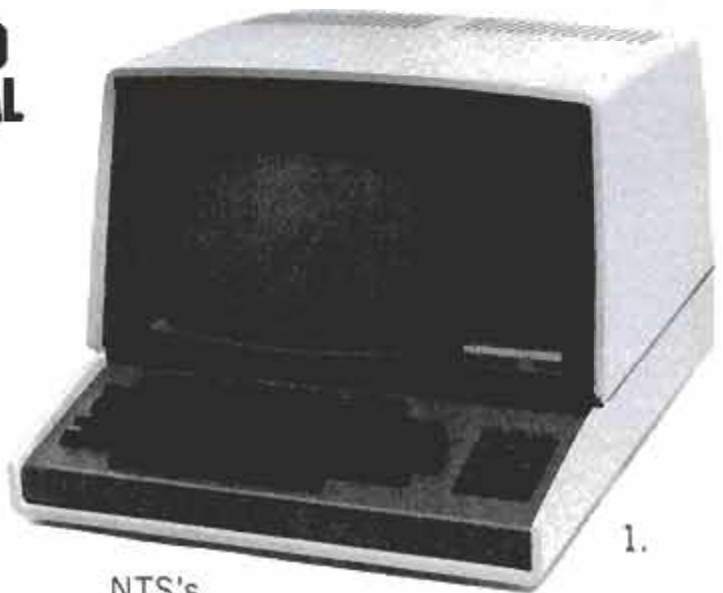
For example, we offer you three different programs in the booming microprocessor field. And each includes one of today's sophisticated microcomputer models for you to assemble and keep.

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

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.



Simulated TV Reception



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. 201-021

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 _____

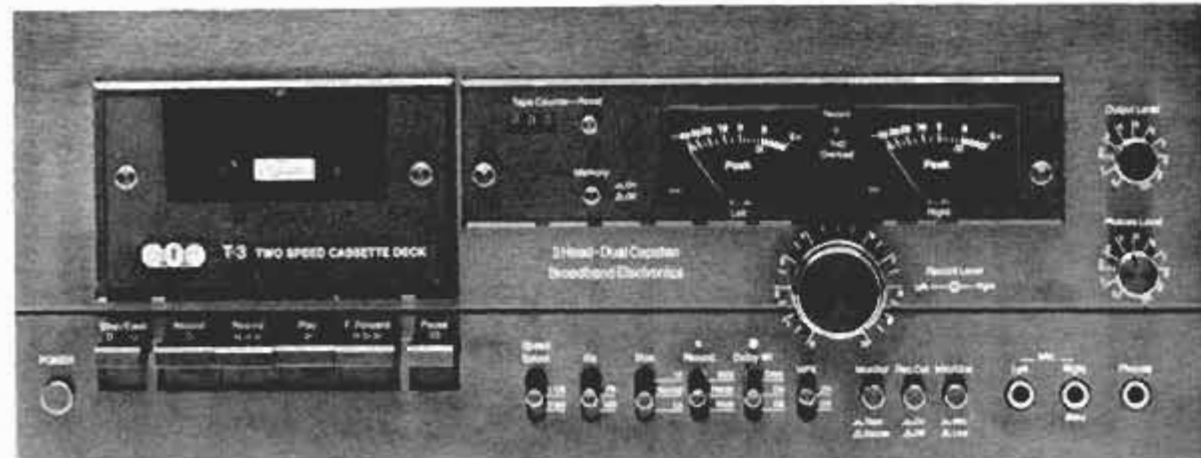
- Check if interested in G.I. information.
 Check if interested ONLY in classroom training in Los Angeles.

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

Cassette decks: New ways to sound good

These two new cassette decks offer surprising versatility. B.I.C.'s deck uses two speeds to challenge metal tape; Teac's can record and mix two separate sources into one harmony.

by Art Zuckerman



You can record on the right track while listening to the left with a Teac Model 124 Synca-set cassette deck (top). Other features include blending of monophonic microphone recording with stereo line source. A two-speed deck such as B.I.C.'s T-3 (left) helps you get the most out of tapes. This model features three heads along with dual capstans to control the two available speeds.

Dramatic improvements in sound quality and in freedom from noise have helped make cassette tape recorders the odds-on favorites in home music systems over the past decade. But for years the cassette format has been limited to a single speed, 19 inches per second (i.p.s.).

Stereo units were also limited to recording either stereophonically on a pair of adjacent tracks, or monophonically across the width of the same pair of tracks. These tracks could not be used separately.

The purpose of these restrictions was to satisfy the requirement of Philips of the Netherlands (patent holder on the cassette format) that all recorders made under its license be compatible with one another. Every cassette machine was supposed to be able to play a tape made on any other cassette recorder. A stereo tape even had to be able to function on a mono machine.

Fast-speed innovation

Then along came B.I.C., a company noted for its turntables and

speaker systems, with a new idea. It entered the home tape-recording field with a cassette machine that operates at 33 i.p.s. as well as 19 i.p.s.

Apparently, B.I.C. feels the 19 i.p.s. option takes care of the compatibility problem. The value of the higher speed is precisely the same as it is in an open-reel tape deck. It extends frequency response, or accurately reproduced tonal range. At this speed, it becomes possible, with a conventional ferric-oxide tape, to get performance that normally requires more expensive chrome tape or one of the new, much costlier metal tapes—not to mention a deck that can play metal tapes.

The saving can be an illusion, though, because the higher operating speed cuts recording time in half.

More important is what doubling the tape speed does for *dynamic range*, the spread between the softest and loudest sounds you can record without distorting them. This is particularly important in

recording a live musical performance with microphones. The dynamic range of a rock or pop combo, or even a chamber-music group, stretches far beyond the capabilities of a conventional cassette recorder. But the higher the tape speed, the broader the dynamic range that can be captured.

There is still another advantage to an extra tape speed. It can provide you with a key to making creative productions—special effects for theatrical work or whatever—that normally are reserved for open-reel machines. For example, you can make an electric mixer sound like an outboard engine by recording it at 33 i.p.s. and playing it back at 19 i.p.s.

B.I.C. now has a complete line of dual-speed cassette decks, including three-head, dual-capstan models such as the T-3 and a model that uses metal tapes. Other manufacturers liked the idea enough to adopt it, notably Fisher, Nakamichi, which had created a cassette deck

(Please turn to page 80)

Know your car inside and out.

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

factory workshop manuals. Each one is carefully re-written for use by the do-it-yourself car owner. Clear and easy to follow, yet complete and detailed 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

1711	ALFA ROMEO 62-73 for all Quina, G1 & Spider models	\$12.95
9621	ALFA ROMEO ALFETTA 73-79 covers all models	\$12.95
8677	AMC GREMLIN, HORNET, PACIER 71-79 for all models	\$10.95
8190	AMC MATADOR, REBEL 67-74 covers all models	\$10.95
0991	ARRON, PLYMOUTH 76-77 for all models	\$10.95
9404	ASPEK, DODGE 76-79 covers all models	\$10.95
7123	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	\$9.95
8154	BLAZER, CHEVY 67-79 all mds plus Suburban & GMC Jimmy	\$10.95
1042	BMW 2000, 2002 66-76 covers all mds inc CA, CS, TI	\$10.95
9813	BMW 320 75-79 covers all models	\$10.95
9326	BMW 75-79 inc 528i, 530i, 630i, 630CS, 633CS, 733i models	\$10.95
9760	BMW 2500, 2800, 3.0 all mds inc Bavaria & CS	\$12.95
0504	BRONCO, FORD 66-77 all 2 & 4 wheel drive models	\$9.95
0011	BUICK 66-68 factory shop manual, must give year	\$18.95
0025	BUICK 68-79 shop manual, must give year, no 1972-73	\$18.95
0727	CADILLAC 68-74 all models except El Dorado	\$10.95
8658	CAMARO 67-79 covers all 6 & V8 models	\$10.95
9577	CAPRI 70-76 for all 2000, 2600, 2800 mds	\$10.95
0379	CHALLENGER 70-72 covers all 6 and V8 models	\$9.95
8331	CHARGER 67-70 for all models inc 500 & R/T	\$9.95
8212	CHARGER 71-75 covers all models	\$9.95
0383	CHEVELLE 64-76 inc Malibu, Monte Carlo, El Camino	\$9.95
0838	CHEVETTE 76-79 covers all models	\$10.95
1030	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	\$9.95
8187	CHEVY 61-62-68 covers all 4, 6 & V8 models	\$10.95
0779	CHEVY LUV 72-78 covers all models	\$10.95
8154	CHEVY PICK-UP 67-79 all 2 & 4 wheel dr mds 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	\$12.95
0020	CHRYSLER 72-79 factory manual, must give year	\$23.95
9148	CITATION, CHEVY also covers Omega, Passero, Skyhawk	\$9.95
9588	CITROEN ID, DS 67-75 covers all DS19, 70, 21 mds	\$12.95
8248	COLT, GOGGLE 71-77 covers all models	\$10.95
9422	COMET 60-65 covers all models	\$8.95
8211	COMET 70-75 covers all models	\$8.95
0212	CORONET, DODGE 71-75 covers all models	\$9.95
8477	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
1756	CRICKET, PLYMOUTH 70-73 also covers Hillman Avenger	\$10.95
9440	DART & DEMON 65-67 covers all models	\$9.95
8188	DART & DEMON 68-76 covers all models	\$9.95
1057	DATSUN 510 & 210 76-79 covers all models	\$10.95
1154	DATSUN 2000 77-79 covers all models	\$10.95
8065	DATSUN 1300 & 8210 71-78 covers all models	\$10.95
0783	DATSUN 210 79-80 covers all models	\$10.95
1821	DATSUN 240Z, 260Z, 280Z 70-78 covers all models	\$10.95
9152	DATSUN 280Z 79-80 covers all models inc 280Zi	\$9.95
1351	DATSUN 510 68-73 covers all sed & wagon mds	\$10.95
1074	DATSUN 510 76-79 covers all models	\$10.95
9583	DATSUN 610 68-77 covers all models	\$10.95
0925	DATSUN 710 73-76 covers all models	\$10.95
8271	DATSUN 810 77-78 for all models	\$10.95
1258	DATSUN 311 sports car 1600-2000 SPL & SR, mds	\$16.95
9297	DATSUN PICK-UP 68-79 for all 571 & 620 models	\$10.95

1145	DODGE 55-71 all inc Lorain, Monaco, Polara	\$12.95
0871	DODGE 72-77 for all Monaco & Polara models	\$9.95
1259	DODGE 78-79 covers all models	\$10.95
8208	DODGE RAMCHARGER 74-75 covers all models	\$9.95
1288	DODGE PICK-UPS 71-79 covers all models	\$10.95
8203	DODGE VANS 67-70 all 1/2, 1 & 1 1/2 ton mds inc Plymouth	\$9.95
6070	DODGE VANS 71-79 covers all models	\$10.95
8192	DUSTER 70-76 for all models, inc. Scamp	\$9.95
8189	FAIRLANE, FORD 67-70 covers all models	\$9.95
8366	FAIRMONT, FORD 72-79 covers all models	\$10.95
9422	FALCON 60-64 covers all models inc Mercury Comet	\$9.95
9874	FALCON, FORD 6 64-70 covers all 6-cyl models	\$9.95
0480	FALCON, FORD V8 65-71 covers all V8 models	\$9.95
9476	FIAT 124 67-77 all inc sdlt, sdg wgn, TC, spcl	\$10.95
0844	FIAT 124 SPORT 68-78 all coup & convertible models	\$10.95
9640	FIAT 128 72-79 for all models inc SL & Rally	\$10.95
8742	FIAT 131 75-77 covers all models inc Mirafiori	\$10.95
1201	FIAT 850 64-74 all sedan, coup & spider models	\$10.95
0399	FIAT X1/9 73-78	\$10.95
1073	FIESTA, FORD 77-79 for all models	\$10.95
0675	FIREBIRD covers all LTDs-67-74	\$9.95
9611	FORD 71-78 inc LTD i, Ranchero, Thunderbird	\$9.95
0872	FORD 68-79 for Galaxie, LTD, Custom, XL & wagons	\$9.95
9369	FORD COURIER 72-77 covers all models exported	\$10.95
8205	FORD PICK-UP 65-68 all 2 & 4 wheel dr mds, 1/2-1, 1-ton	\$9.95
0451	FORD PICK-UP 69-75 covers all models	\$10.95
8204	FORD VANS 61-68 for all 1/2, 3/4, & 1 ton models	\$9.95
0453	FORD VANS 69-75 covers all 1/2 & V8 models	\$10.95
9436	GRANADA, FORD 75-80 covers all models	\$9.95
0644	HONDA 360, 500, 67-75 for all models inc T	\$10.95
0885	HONDA CIVIC 77-79 covers all models	\$10.95
8694	HONDA Civic, 73-79 covers all models inc Civic	\$10.95
8206	INTERNATIONAL SCOUT 67-73, 800, A, B & i models	\$9.95
8565	INTERNATIONAL 62-78 fire/marlin Scout, wagon, pick-up	\$9.95
1206	JAGUAR XJ 65-69 sedan mds 2A, 2A, 3E, 240, 340	\$10.95
1043	JAGUAR X-TYPE 61-72 covers all 6-cylinder models	\$12.95
9612	JAGUAR X-TYPE V12 71-74 covers all models	\$12.95
9390	JAGUAR XJ6 68-78 covers all models	\$12.95
9617	JAGUAR XJ12 72-77 for all models inc Daimler	\$12.95
9769	JEEP 52-65, 4x4 & 6-cyl station	\$16.95
8267	JEEP 66-79 for all Cherokee, Comands & Wagoneer mds	\$9.95
9805	JEEP WAGONEER 3 series with 230 cnc eng	\$18.95
9904	JEEP UNIVERSAL C3, C3, C3 3 reprint factory manual	\$16.00
0509	JEEP CJ 5, CJ 6, CJ 7, 55-79	\$9.95
8856	JEEP FC150, 170 covers all 4x4 cab models	\$18.95
8739	JENSEN-HEALEY reprint of factory manual	\$20.95
1254	LAND ROVER 59-77 covers 2, 7A, 3 gas & diesel models	\$10.95
9773	LINCOLN 71-77 all models inc Versailles	\$12.95
0481	MAVERICK 69-71 6-cyl, 170, 200, 250 cu. in. eng.	\$8.95
8211	MAVERICK 72-77 covers all models	\$8.95
1550	MAZDA GLC 77-79 covers all models	\$10.95
0370	MAZDA RX2 70-75 covers sedans & coupe models	\$10.95
0371	MAZDA RX3, 100 70-74 covers all models	\$10.95
0444	MAZDA 71-78 includes RX4 and Caprio models	\$9.95
9941	MAZDA RX7 79-80 covers all models	\$10.95
0880	MAZDA PICK-UP 72-75 6-1600 & rotary eng. mds	\$9.95
0593	MAZDA 808, 818 72-78 covers all models	\$10.95
0573	MAZDA 1500, 1800 67-74 covers all models	\$10.95
8157	MERCEDES-BENZ 59-70 all inc 190, 200, 300 & diesel mds	\$9.95
0781	MERCEDES-BENZ 190SL reprint of owner's manual	\$8.95
1746	MERCEDES-BENZ 220 59-65 covers all mds	\$12.95
9483	MERCEDES-BENZ 220 68-72 mds, except Diesel	\$12.95
1747	MERCEDES-BENZ 230 63-68 inc 230S & SL	\$12.95
1748	MERCEDES-BENZ 250 65-68 covers all models	\$12.95
9485	MERCEDES-BENZ 250, 280 68-72 all models plus 230	\$12.95

0416	MERCEDES-BENZ 68-73 inc 280, 300 & 350, 450 V8 mds	\$10.95
8439	MERCEDES-BENZ 74-79 Covers all models inc Devils	\$10.95
9773	MERCURY 71-77 for all models inc Cougar	\$12.95
1105	MG TA, TB, TC, TD, TF 36-55	\$12.95
1098	MG MIDGET 58-78 covers all models	\$10.95
6038	MG 55-62 covers all models	\$12.95
0660	MG 62-74 covers all models inc MGB GT	\$17.50
9698	MG 75-80 covers all models inc MGB GT	\$17.50
8396	MGC reprint of factory manual	\$20.95
0917	MINI 59-78 covers all models inc Mini-Cooper	\$10.95
9436	MONARCH, MERCURY 75-80 covers all models	\$9.95
0884	MONZA, CHEVROLET 75-80 plus Astra, Starfire, Skyhawk	\$9.95
9878	MUSTANG 6 65-72 covers all 6-cylinder models	\$10.95
0479	MUSTANG V8 65-73 covers all models	\$10.95
8272	MUSTANG II 74-78 covers all 4, V6, & V8 models	\$10.95
0951	NOVA, CHEVROLET 69-79 covers all models	\$10.95
7107	OLDS CUTLASS 70-77 covers all inc 442 models	\$9.95
0002	OLDS 68, 71, 74 factory shop manual, must give year	\$18.95
0008	OLDS 75-79 factory shop manual, must give year	\$17.95
1324	OPEL KADETT 62-79 1000, 1100, 1200 models	\$12.95
1752	OPEL KADETT 67-73, 1500, 1700, 1900 models	\$12.95
8273	OPEL 66-79 for all models inc 1900 Monza & Insa	\$10.95
9589	OPEL GT 59-73 covers all 1900 models	\$12.95
0876	PEUGEOT 504 68-76 includes diesel models	\$9.95
7134	PEUGEOT 504 68-79 for all gasoline engine models	\$12.95
0883	PINTO 70-79 covers all models inc Mercury Bobcat	\$9.95
1145	PLYMOUTH 65-73 all inc Belvedere, Fury, Satellite	\$12.95
0874	PLYMOUTH 72-76 Fury, VIP, Gran, Suburban mds	\$9.95
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 mds inc GTO, Le Mans	\$9.95
1650	PORSCHE 356 57-65 covers A, B & C models	\$12.95
1591	PORSCHE 911 64-73 covers all models	\$12.95
8173	PORSCHE 911 74-77 includes H, S, Targa, Carrera	\$12.95
1190	PORSCHE 912 65-69 with 1582cc engine	\$12.95
9834	PORSCHE 914 70-76 all models inc 914/6	\$10.95
0993	PORSCHE 924 76-78	\$10.95
0372	RENAULT 5 72-78 for all models inc Le Car	\$10.94
1224	RENAULT 6 10 62-72 covers all models inc 1100	\$10.95
9429	RENAULT 12 69-79 covers all models inc auto trans	\$12.95
0645	RENAULT 15, 17 71-78 all mds inc TL, 15	\$12.95
1554	RENAULT 16 65-78 covers all models	\$12.95
0395	ROADRUNNER & SATELLITE 68-73 all models	\$9.95
0750	SAAB 99 69-76 covers all models inc fuel injection	\$10.95
8440	SAAB 97-79 covers all models inc Sunnet	\$10.95
1098	SPRITE 58-71 covers all Mk 1, 2, 3 & 4 models	\$10.95
8058	SUBARU 71-77 covers all models imported	\$10.95
0845	SUMBERAIN TIGER reprint of factory shop manual	\$20.95
0489	TEMPEST, GTO, LE MANS 68-73 all models	\$12.95
9773	THUNDERBOLT 71-77 covers all models	\$12.95
8189	TORINO 68-75 all models inc Elite, Ranchero	\$9.95
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-speed trans	\$10.95
0926	TOYOTA CORONA 68-73 for all 4-cyl models inc MK 4	\$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 H-LUX 68-79 covers all pick-up models	\$10.95
8324	TOYOTA LAND CRUISER 56-77 covers all models	\$10.95
1200	TRIUMPH SPITFIRE 59-78 covers all models	\$10.95
1231	TRIUMPH TR4 61-67 covers all models	\$10.95
1015	TRIUMPH TR6, TR6, 67-76 all models inc TR250	\$10.95
8693	TRIUMPH TR7 75-79	\$10.95
0384	VALIANT 63-67 covers all 6 & V8 models	\$10.95
8192	VALIANT 68-76 all mds inc Scamp, Signette	\$9.95
0567	VEGA 72-73 all 140 CO & GT 140 CO models	\$9.95
0894	VEGA 74-77 all models inc Monza, except Cosworth/Vega	\$9.95
0782	VOLARE, PLYMOUTH 76-79 covers all models	\$10.95
1227	VOLKSWAGEN BEETLE 54-65 covers all models	\$10.95
9644	VOLKSWAGEN BEETLE 66-69 all mds inc Karmann-Ghia	\$18.50
9647	VOLKSWAGEN BEETLE 70-79 all inc Super & Karmann-Ghia	\$18.50
0419	VOLKSWAGEN HAMBURG SCROCCO 75-79 all gasoline models	\$18.50
6009	VOLKSWAGEN RABBIT 1980 gasoline mds, also Scrocco	\$18.50
8166	VOLKSWAGEN RABBIT 77-80 covers diesel models only	\$18.50
1547	VOLKSWAGEN BUS 54-67 all camper, van, transporter mds	\$10.95
0686	VOLKSWAGEN BUS 68-79 all camper, van, transporter mds	\$18.50
5582	VOLKSWAGEN TYPE 3 62-73 for subcompact, feedback	\$10.95
9778	VOLKSWAGEN 411, 412 68-74 covers all models	\$10.95
8748	VOLKSWAGEN DASHER 74-79 covers all models	\$17.95
9444	VOLVO P1800 60-73 all models inc E & ES	\$10.95
1754	VOLVO 142, 146, 143 66-74 for all models inc S & E	\$10.95
9558	VOLVO 164 68-75 for all models inc fuel injection	\$10.95
3729	VOLVO 243, 244, 245 74-79 for all inc fuel inj models	\$10.95
8311	VOLVO 262, 264, 265 75-78 all models inc fuel injection	\$10.95

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

9407	CHILTON AUTO REPAIR 74-81 for all American cars	\$17.95
1264	CHILTON AUTO REPAIR 73-80 for all American cars	\$16.95
1228	CHILTON AUTO REPAIR 71-78, Reg. \$13.95, Special	\$8.95
7137	CHILTON AUTO REPAIR 64-71 for all American cars	\$19.95
1763	CHILTON AUTO REPAIR 54-63 for all American cars	\$19.95
7111	CHILTON TRUCK REPAIR 71-80 American & imported mds	\$19.95
8561	CHILTON TRUCK REPAIR MAN 61-71 for all 1/2-2 1/2 ton mds	\$19.95
9700	CHILTON IMPORT CAR MANUAL 73-79 for all pop imports	\$18.95
0492	AUTO REPAIRS & PRICES list rate 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	MORE MILES PER GALLON 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	ELECTRONIC FUEL INJ MAN 70-77 for all imported cars	\$9.95
9976	CARBURETOR BASICS, troubleshooting all U.S. makes	\$8.95
9411	HOLLEY carbs, all 2 & 4 cyl, tune & rebuild	\$5.95
9652	ROCHESTER carbs, all inc 4MV Quadrajet	\$9.95
9656	SOLEX CARBURETORS all 1 & 2 barrel downdraft models	\$3.95
6344	SU CARBURETORS tune & rebuild all to 1976	\$8.50
9423	STROMBERG CD CARBS tune/rebuild all to 1976	\$8.50
0734	WEBER COE overhead manual	\$4.95
1511	WEBER CARBURETORS, tune & rebuild all models to 1979	\$8.50
0827	AUTOMOT	

Just a push on the "simul-sync" button (right) and you record on one track while monitoring the other. First the left track is recorded while in stereo mode; then rewind the tape for simul-sync recording. This time through the tape, the left meter is off and the left-channel head remains in play mode, so that you can hear the left channel and synchronize it with what you're recording on the right channel.



We tested the B.I.C. T-3 in our own lab and, using some very advanced equipment, proved to ourselves the manufacturer's claim that its two-speed capability increases dynamic range. The deck (left) recorded on chrome tape, at its second speed, with results that equaled or surpassed metal-tape recording on other machines. When metal tape was combined with its high speed, results were among the best we have heard.

that provided 3 3/4 i.p.s. for studio recording, went the other way in its consumer line and now offers a deck with a second tape speed of 1 1/4 i.p.s. for home use. And Superscope has added the 1 1/8 i.p.s. speed to some of its battery-powered portable recorders.

So now you can have your choice of higher recording quality or lower tape cost and still enjoy the convenience of cassettes.

Sound on sound

Another advantage of open-reel decks has been synchronous recording. This is the ability to record one track alone and then play it back while recording a second track, then perhaps, if desired, a third and a fourth.

In the days when the open-reel format was king, this was possible on most inexpensive recorders that had dual-purpose record/playback heads. That was because the heads for the left and right tracks were parallel to each other. Such two-head, open-reel machines are a rarity today.

Synchronous recording can't be done on conventional, three-head machines because the record heads come before the playback heads. If

you record one track on such a machine to match a recording being played back on another track and then try to play them back together, the result is that they will be out of sync.

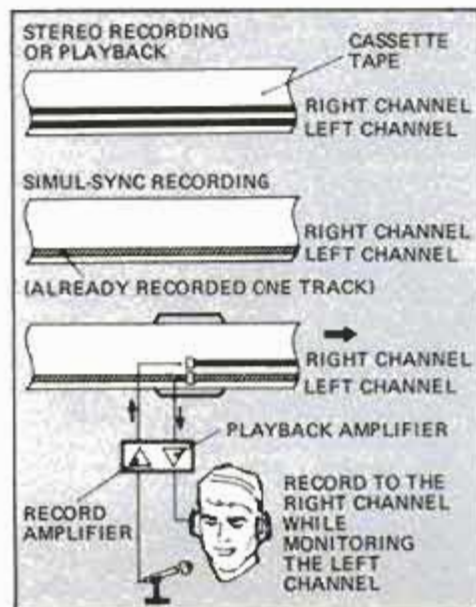
But today's four-track, open-reel

recorders are built for synchronous recording. A switch on such machines converts record heads to the playback function. This provides the needed sync with the record heads used to lay down the new, add-on, tracks. The result is that tracks recorded separately can blend into perfect harmony.

Until recently, this kind of recording was found only in the field of special educational applications. A case in point is the Sony line of Learning Lab Cassette-Corders. These are designed so that the two adjacent tracks can be recorded independently of one another and then played back together. That way, a teacher can record a passage on one track for the student to listen to and then repeat on the other track. This technique is used in foreign-language instruction and to improve English diction.

But the cassette format offered nothing approaching this kind of recording for home use until Teac brought out its Model 125 Syncaset deck. With this machine, the two stereo tracks can be recorded separately.

Actually, the left track is recorded with the deck set in the stereo mode. Then the tape is rewound and the



The usual method of stereo recording is to record both tracks at once. A simul-sync system lets you first record the left track. You then monitor the left while making a recording of the right track.

simul-sync button is pushed in. With the deck set for RECORD this time, the left recording meter stays off, and the left-channel head remains in PLAY mode. All you have to do, then, is listen to the left track with headphones while recording on the right track, and you wind up with a duet with yourself.

The Syncaset does a couple of other tricks. One is a cross-feed arrangement. It literally feeds a small part of the left channel into the right channel, and vice versa, while recording. This permits you to set up your microphones to get the best possible coverage of the performers without worrying about excessive separation of the two channels. Pressing the CROSS-FEED button assures a more natural balance in the final recording.



This deck from Fisher (CR4016) provides two-speed and full-frequency recording.



This battery-powered Sony ER-96 allows independent track recording on cassettes.

Although the Syncaset lacks conventional mic/line mixing facilities, a special feature permits you to blend in one microphone with material being recorded in stereo from a phonograph record, tape or other line source. The microphone is plugged into the left-channel input, and the input buttons are set for LINE.

A MIC BLEND knob is then turned while the deck is in RECORD mode to balance the microphone with the line inputs. The microphone feeds into both channels in equal strength if the two recording-level controls are set at dead center. Boosting the left channel or dropping the right channel will make the mic input move to the left. A right-channel boost or left-channel cut moves the mic signal to the right. **PM**

Now you don't have to spend a fortune to enjoy a complete home workshop



The Shopsmith MARK V — the tool to start with . . . the system you grow with. It's a 10" table saw, a 16½" vertical drill press, a horizontal boring machine, a 34" lathe and a 12" disc sander.

Experienced craftsman . . . all-around handyman . . . weekend do-it-yourselfer — you've probably dreamed of owning your own complete home workshop to let you do more accurate woodworking. Let's face it, a few hand-held power tools just aren't enough. They won't let you handle those complex remodeling jobs, money-saving home repairs, or build furniture, cabinets and other beautiful wood projects.

You should have a big-capacity table saw, a top-quality drill press, a horizontal boring machine, a lathe and a disc sander.

But these five most needed woodworking tools take up a lot of space, and could cost you several thousand dollars more than you can afford.

The Better Alternative

Over 250,000 woodworkers have found the better alternative to single purpose tools. A precision tool that combines all five of the major power tools into one multi-purpose unit . . . at about ONE-THIRD the cost and taking less space than a bicycle.

It's the amazing Shopsmith MARK V. And even if you have unlimited space and money, it can outperform a shop-full of individual tools, because the skill and accuracy are built-in.

This ingenious woodworking system is powered by a rugged 13.5

amp motor that develops more than 2 hp. That's more than enough power for the toughest jobs. An exclusive speed dial even lets you change operating speeds without turning off the motor.

After a little practice, you'll be able to change from one tool to another in 45 to 90 seconds. And it's simple enough for a beginner to learn to use, but delivers results that a professional would be proud of.

**Get the FREE Facts
by Mail
Without Obligation!**

Send for them today!



Shopsmith Inc.

The Woodworking Company
Dept. 2606
750 Center Drive
Vandalia, Ohio 45377

Yes! Please mail me your FREE Information Kit on the Shopsmith MARK V, and facts about Shopsmith's exclusive 30-day Money Back Guarantee.

Name _____

Address _____

City _____

State _____ Zip _____

PM INSTALLS A SUPERANTENNA

(Continued from page 28)

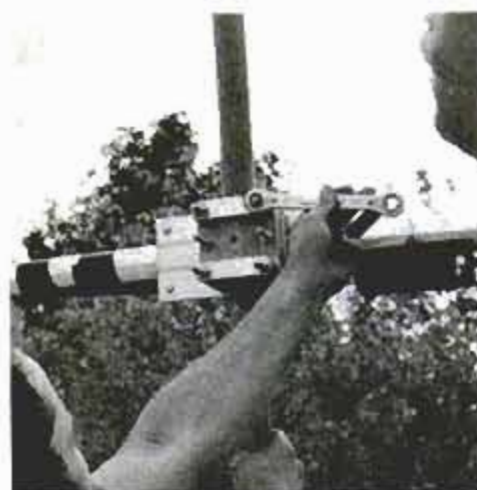
was curing, we started to build the antenna.

The TH5-DX antenna was packed in a slim, six-foot, rectangular box. Inside the box was a mountain of aluminum tubes, swaged at their ends to fit together like partially telescoping rods. The fit-together tubes would be held in place by clamps that could be tightened over an outer pipe's swaged portion to hold the inner pipe firmly in place.

First we assembled the 18-foot-



House bracket is lag-bolted to rafters in the roof and located close to the tower.



Mast clamp must be tight to prevent the antenna from moving in the rotator clamp.



The traps contain drain holes so that rain will run out. Keep them pointed downward.



Two helpers positioned antenna mast, but three men would have made the job easier.

long boom. It went together so quickly that we wondered how we would pass the time until the concrete set. I need not have worried.

Every subassembly following the boom requires critical measurements of distance. These must be accurate to within a half inch. An antenna is more than just an assembly of tubes—it is a sophisticated electronic design.

The front and back elements (director and reflector) are the longest and most critical parts of the antenna. Each has four "traps," which are cylindrically encased coils of wire that tune the elements to the different ham frequencies. My measuring tape got as much of a workout as my wrench.

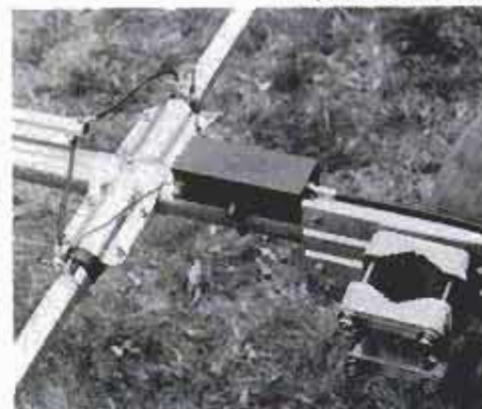
In the course of two days, the tubes finally became an antenna. With the boom supported on two picnic benches, the tips of the elements reached from our porch deck to our property fence. The only way to walk across the yard was to jump over each element in turn. But I knew that once it was 50 feet in the air, it would be less of an obstacle.

The tower party

By now, three days after beginning the project, the concrete was ready. We assembled the rotator and mounted it on top of the tower. (The Alliance rotator's mounting plate perfectly matched the Hygain tower.) We connected the rotor cable to the rotator and we attached the feedline to the antenna *while everything was still on the ground.*

Recruiting six or eight helpers from my pool of curious and willing neighbors proved to be no problem. Two other hams also dropped by.

PM photos: Don Mannes



Beta Match, where coax feedline attaches, must be carefully positioned by builder.

The manual suggested that we should first attach the tower to the concrete base and base plate with two out of three bolts. The missing bolt allows the tower to hinge on the base. Then, with the loosely hinged tower supported off the ground on a sawhorse, we were supposed to attach the beam to the rotator on top of the tower. Finally, everyone would push the entire assemblage to a vertical position and drop in the last bolt.

But it was not that easy because of power lines that were in the way. We had to raise the tower without the antenna attached. Then the people on the ground passed the antenna up to the two volunteers on the low roof. In retrospect, it would have been safer to have more helpers on the roof.

The tower and beam were up—but still lowered to a rooftop level. Now the tower had to be bracketed to the house. Unfortunately, the Hygain bracket did not line up with the

(Please turn to page 84)

STP OIL TREATMENT ADDS AN ANTI-WEAR AGENT AND VISCOSITY IMPROVERS TO YOUR OIL.

IMPROVED VISCOSITY MEANS IMPROVED LUBRICATING QUALITIES.

Today's multi-grade oils begin to lose their effectiveness as you drive. STP Oil Treatment, the world's best selling oil treatment, is an exclusive formula which contains temperature-activated long-chain polymers. In Winter or Summer, as engine temperatures rise, these temperature-activated polymers "uncurl" to actually improve your oil's viscosity and therefore its lubricating qualities. Plus it contains ZDDP (zinc dialkyl dithiophosphate), an anti-friction, anti-wear, anti-oxidant agent. This special formula:

- Increases viscosity and anti-wear properties
- Promotes lubricating qualities
- Reduces oil consumption in many cars

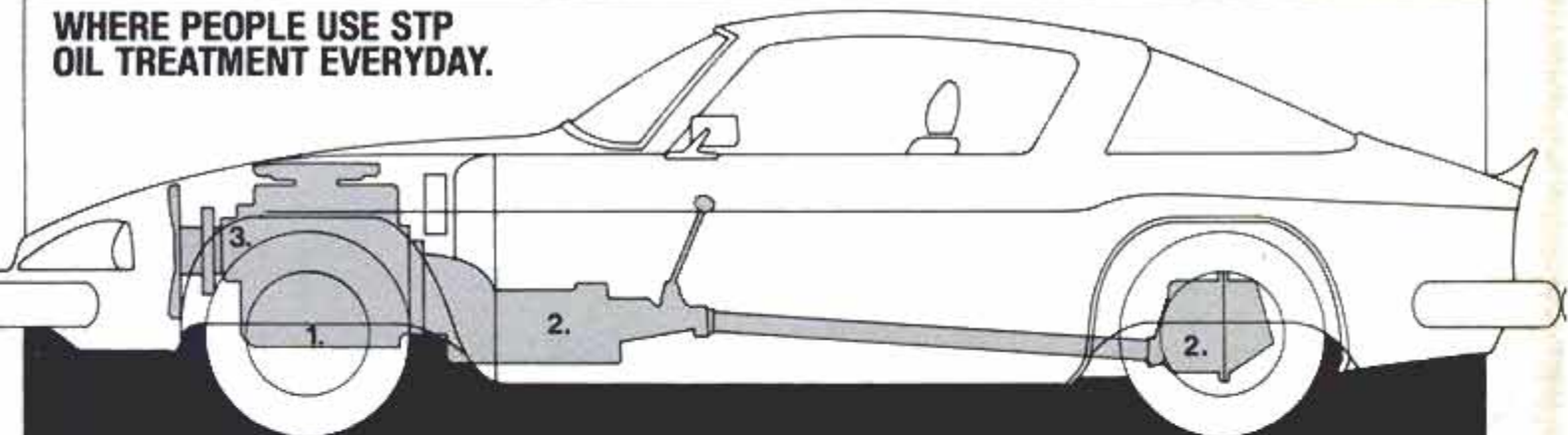


WHEN TO USE STP OIL TREATMENT.

Use STP Oil Treatment year 'round. Always change your oil at manufacturers' recommended intervals.

The first time you need oil and every time you change oil add STP Oil Treatment. It blends with all petroleum base, graphite and synthetic oils or greases.

WHERE PEOPLE USE STP OIL TREATMENT EVERYDAY.



1. Your engine's crankcase. The first time you need oil and every time you change oil add STP Oil Treatment when the engine is running and warmed up. Use one can of STP Oil Treatment to 4 or 5 quarts of oil. Maintain 10% by volume.

2. Manual transmission, gear boxes and differentials. Add one part STP Oil Treatment to 10 parts regular lubricant. For trucks and tractors, add up to 1 part STP Oil Treatment to 6 parts of lubricant. (Not recommended for use in friction drives and wet clutches.)

3. Power Steering. Use 1 part STP Oil Treatment to 10 parts power steering fluid.

Engine assemblies. If you work on your engine, coat all moving engine parts prior to assembly with a mixture of 1 part STP Oil Treatment and 1 part motor oil.

Extra uses: Two cycle engines, motorcycles, outboards and lawn mowers. Add 1 part STP Oil Treatment to 10 parts recommended oil and then add to fuel as directed.

General Shop Use Lubrication. Mix 1 part STP Oil Treatment with 4 parts general all-purpose oil.



SATISFACTION
GUARANTEED
OR YOUR
MONEY BACK
FROM STP

STP Corporation, an E-MARK Company
Ft. Lauderdale, FL 33310
© 1981 STP Corporation

**AROUND THE TRACK, AROUND THE WORLD...
STP OIL TREATMENT IS NUMBER ONE.**

FREE



Buyer's Guide

- 100 pages of car stereos, personal computers, home mini-stereos, portables, telephones, accessories, and much more.
- Industry's most quoted and prestigious publication.
- Plus important shopping information and discount prices on hundreds of products.

PUBLISHED BY
CRUTCHFIELD

- Nation's largest and most respected car stereo specialist
- 13 toll-free WATS order and assistance lines
- Same day shipping and overnight delivery on Federal Express orders
- Nationwide Installer Service
- Installation and Satisfaction Guarantees
- Huge inventories
- Master Card and VISA

Call or Write now for
Your **FREE** Catalog

Use the coupon below or call toll-free:

800-446-1506

In Virginia Call 800-552-3961

* Featured car stereo is the Pioneer KP-7500

Send me your FREE catalog by Third Class Mail

Rush me your FREE catalog! I'm enclosing \$1 for First Class Mail

Name _____

Address _____

City _____

State _____ Zip _____

Send to CRUTCHFIELD
1 Crutchfield Park,
Charlottesville,
Virginia 22906
Dept. W



Be an ELECTRICIAN



• CONSTRUCTION • MAINTENANCE • CONTRACTOR

Train at home in spare time

No previous experience needed. Experts show you what to do, how to do it...guide you step by step. 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 saving money on your own electrical work. Learn to specify and install wiring, operate and control motors and generators, use and maintain transformers and storage batteries.

You'll learn how to use electrical instruments, how to find short circuits, overloads and open wires. You'll be ready to take almost any electrician licensing examination. 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.

ELECTRICIANS average more than \$11.00 AN HOUR!

Don't count on getting into a union or earning union wages as soon as you graduate, but these figures from the U.S. Dept. of Labor Occupational Outlook Handbook show that electricians are among the highest paid construction workers. In 1978, wage rates in metropolitan areas for electricians averaged \$11.25 an hour after regular apprentice training program. Union wages were even higher.

Employment of construction electricians is expected to increase faster than the average for all occupations through the mid-1980's.

NO NEED TO QUIT YOUR JOB OR REGULAR SCHOOL

Everything is explained in easy-to-understand language with plenty of drawings, diagrams and photos. And you learn at your own pace...at home in spare time. No time wasted traveling to class. Consultants are as close as your telephone. No charge! Use our toll-free 24-hour home-study hotline as soon as you enroll!



Here are just a few of the subjects covered in your course.

Principles of Lighting, Heating, Air Conditioning, Conductors and Conduit—Electrical Wiring—Lighting Control—Transformers and Storage Batteries—Generators and Motors—Electrical Estimating...Plus much, much more.

You receive everything you need to get you off to a fast start!

Tools, materials, tester are all included with your course...plus the National Electrical Code—the "Electrician's Bible" that gives you all the requirements and do's and don'ts of proper electrical installations.

MAIL COUPON TODAY!
No cost, no obligation,
no salesman will call!



ICS ELECTRICIAN SCHOOL, Dept. PB011
ICS Center, Scranton, PA. 18515

Rush free facts that tell how I can train at home in spare time to be an electrician.

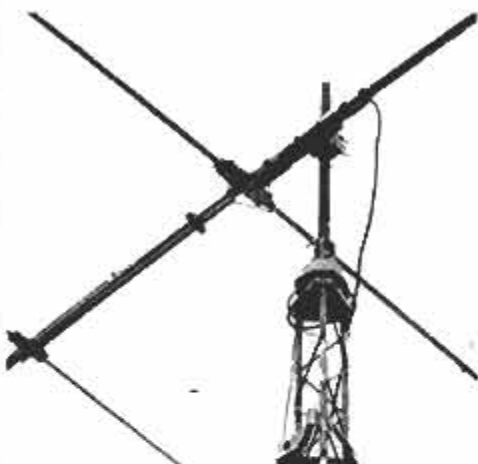
NAME _____ AGE _____

ADDRESS _____

CITY/STATE/ZIP _____

PM INSTALLS A SUPERANTENNA

(Continued from page 82)



Cables go around tower so that there will be slack to allow for antenna rotation.

rafters on my house. So I went to a radio parts store (quickly) and bought a Rohn Universal Tower Bracket. We lag-bolted the bracket into the rafters to help support the tower against the house.

We cranked the tower up to its full 50-foot extension—the huge antenna suddenly seemed small to all of us on the ground. Cranking was easy, thanks to an ingeniously designed winch that can also be reversed without having to unlock the gears manually.



Control box indoors rotates the antenna so that it points in the direction of signal.

I went into the ham shack and attached the other ends of the cables that had been routed from the tower through the attic to my second-floor ham "shack." I moved the bar on the rotator's control box to point the antenna East. The sounds of cheering and beer can flip-tops popping told me that the antenna was rotating successfully.

Loud and clear

The night we spent meeting African ham operators was typical of the system's superlative operation. In less than three months, we talked with hams in France, Yugoslavia, Greece, Russia, Italy—almost a hundred different countries.

The superantenna has made the world seem small.

PM



FANTASTIC!
 A FULL POUND OF BRAND NEW
 NUTS, BOLTS, SCREWS AND OTHER
 FASTENERS... ALL TOP QUALITY...

JUST

99c

NO SHIPPING
 AND HANDLING CHARGE
 IF 10 LBS. OR MORE IS
 ORDERED!!
 \$1.50 shipping and handling
 on orders up to 9 lbs.
 (Minimum 5 lb. order.)

**A POUND!!!
 WHILE THEY LAST!!!**

FREE
 with each
 order
 A \$2.50-value
 wall-size (17" x 24") Speci-
 fications Chart
 Tells you every-
 thing you need to know
 about fasteners to do a quick
 professional job every time.
 Yours FREE whether or not you
 decide to return your order!!

Order as many pounds as you like (minimum 5 lbs.)

An unbelievable value!

A full pound of assorted fasteners with an estimated retail value of \$10.00-\$15.00 for just 99c!! NO SHIPPING AND HANDLING CHARGE IF 10 LBS. OR MORE IS ORDERED. \$1.50 shipping and handling on orders up to 9 lbs. (Minimum 5 lb. order.)

IF YOU'RE NOT AMAZED—ABSOLUTELY ASTOUNDED—AT ALL YOU GET, WE'LL REFUND EVERY PENNY YOU'VE PAID IMMEDIATELY!

Millions and millions of assorted top-quality fasteners that we must dispose of immediately!!! All top-quality. All #2 grade, plated steel. All brand new. A variety of types and sizes. These are not "seconds" or "rejects" or anything else but top-quality... the same thing or better than you'd expect to find in a good hardware store.

The problem is that they're assorted... mixed... and it would take too much time and money for us to sort them all out.

We're the same people who originated and sell, among other things, The Nut & Bolt Shop™... a complete set of fasteners in a multi-bin cabinet. And these mixed fasteners are 5 years worth of overages, mixed inventory, spillage and broken kegs.

Take advantage of this once-in-a-lifetime offer!! Buy a lifetime's supply of top-quality fasteners for a fraction of their real value. Simply complete and mail the coupon at right along with your check or money order... or charge it to any one of 5 major credit cards. If you're dissatisfied in any way, for any reason, just send it back within 30 days and we'll promptly refund your money.

©Copyright 1978, D.R.I. Industries, Inc., 11100 Hampshire Ave. So., Bloomington, MN 55438
 **Nut & Bolt Shop is a trademark of D.R.I. Industries, Inc.

We're the largest retailer of nuts, bolts and screws in the world!

SURPLUS LIQUIDATION

Your payment will be returned within 48 hours if your order arrives after inventory is depleted. You are urged to order right away to be assured of delivery.

ORDER TODAY!!!
 JUST SAY
 "CHARGE IT" IF YOU LIKE

30-DAY UNCONDITIONAL MONEY-BACK GUARANTEE

If you're not amazed at all you get for your money — if you're not absolutely astounded — return your order anytime within 30 days for an immediate refund

Send to and make remittance payable to: D.R.I. Industries, Inc.
 11100 Hampshire Ave. So., Bloomington, MN 55438
 Dept. PM-281

Number Pounds You're Ordering (Minimum 5 lbs.) _____ @ 99¢ per pound = \$ _____

NO SHIPPING & HANDLING CHARGE IF 10 LBS. OR MORE IS ORDERED!!
 Plus \$1.50 shipping & handling on orders up to 9 lbs.

Check or money order (MN residents: add 4% sales tax)
 Charge it to VISA MasterCard American Express Diners Club Carte Blanche
 Card No. _____ Exp. Date _____

Signature X _____
Please to sign only if charging order!

PLEASE PRINT NAME _____

ADDRESS _____ Street & No.

City _____ State _____ Zip _____



All top-quality.
 All #2 grade,
 plated steel
 fasteners.

48118



\$19,300 NO DOWN PAYMENT. BELOW MARKET FINANCING.



The Trenton

If you thought you couldn't afford a home of your own, think again. You still can! Over 15,000 families just like you have built Miles Homes using our step-by-step instructions. 50 exciting do-it-yourself models plus a full selection of optional packages — like heating, plumbing and electrical packages — are available to give you the home you want at a price you can afford.

NO DOWN PAYMENT — 50 MODELS
Sample Credit Terms: Cash price \$24,000.
Annual percentage rate 11%. Deferred payment price \$29,402 payable in 22 monthly payments of \$241 and one final payment of \$24,100. Terms are not for model shown and may vary state to state.



**You're Miles ahead
with no down payment.**

Find your home in our FREE full-color catalog.

- 80 pages filled with photos, illustrations and plans.
- 50 exciting models.

See our ranch homes, split-level homes, split-foyer homes, 2-story homes and 1 1/2-story homes. Plus the complete Miles story including details of our unique Shelter Finance Plan, pre-cut quality, available options and more — everything you need to pick out your dream home. Send for yours today. Mail to:

Miles Homes 4700 Nathan Lane, P.O. Box 41310, Minneapolis, MN 55442

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

MPM1

TAKE OFF FOR FUN FLYING WITH...
The WEEDHOPPER



- Build it in 40 hours
- Fly it without a license
- Full kit: \$2995; Info pak \$5

The GYPSY



- Easy to build in 100 hours
- No license required to fly
- Kit: \$3295; Info pak \$5

WEEDHOPPER OF UTAH™
Box 2253-M • Ogden, Utah 84404
801-621-3941

NOW...The Hunting Knife You've Always Wanted At A LOW, LOW Price You Can Easily Afford!

FREE Genuine Leather Carrying Case!

Comes with FREE genuine leather case contoured to cradle your knife on your belt, ready for instant use and to prevent loss or damage.

- RAZOR SHARP STAINLESS STEEL BLADE
- 7 1/2" LONG OPENED; ONLY 4" CLOSED
- SOLID BRASS HANDLE INLAID WITH EXOTIC WOOD

Here's the classic sportsman's knife. You'll know it the moment you feel its rugged heft... its precision-balanced craftsmanship... its solid brass handle beautifully inlaid with exotic wood. The gleaming stainless steel blade is honed to such razor sharpness that you can almost hear the hiss as it zips through meat, dresses game, bones fish, even cuts kindling and tent stakes.

It's a sheer joy to carry... only 4" long when closed, 7 1/2" open. Locks firmly and safely in position. (Accidental closing is impossible!)

LIFETIME GUARANTEE!

It's unconditionally guaranteed in normal use against all manufacturing defects for the life of the purchaser! If anything should go wrong, simply return it to the manufacturer, postpaid for free repair or free replacement!

90 DAY TRIAL OFFER... MONEY BACK IF NOT ABSOLUTELY DELIGHTED!

Use it for 90 full days entirely at our risk. If not completely delighted, simply return for full purchase price refund (except postage & handling.)

Not \$19.98...
Not \$14.98...
But...

**ONLY
\$5⁹⁸**



SPORTSMEN, HUNTERS, FISHERMEN, CAMPERS... HERE IT IS! THE KNIFE YOU'VE ALWAYS DREAMED OF OWNING. FROM ITS DISTINCTIVE SILHOUETTE TO THE TINIEST DETAIL THIS IS THE KNIFE OF A LIFETIME.

OPENS SMOOTHLY AND LOCKS FIRMLY IN POSITION

SPECIAL SAFETY LOCK

MAIL NO-RISK COUPON TODAY
WESTPORT HOME PRODUCTS, Dept. HK-234
80 Wilton Road, Westport, CT 06887

Please send me _____ (#0057) Folding Hunting Knives with FREE Leather Carrying Cases for only \$5.98 plus \$1.50 postage and handling each; **SAVE!** Order 2 for only \$10.98 plus \$2 postage & handling.

SAVE EVEN MORE! Order 3 for only \$15.98 plus \$2.50 postage & handling. If after using for 90 Day Trial I am not delighted, I may return the knives for full refund (except postage & handling).

Enclosed is \$_____ (CT Residents Add 7 1/2% Sales Tax)

Yes I charge orders over \$10:
 Visa Master Charge

Card # _____ Exp. Date _____

Name _____

Address _____

City _____

State _____ Zip _____

© 1980
Westport
Home
Products
80 Wilton
Road
Westport
CT 06887

Rechargeable Aerosol Spray Can!

New British Invention...

Make your own aerosol spray paints, cleaners, lubricants, etc. and save yourself a small fortune.

Environmentally Safe — No Fluorocarbons

Re-fill the Rechargeable Aerosol Can and use it over and over... it actually makes a great deal of sense. When you go to the store and purchase spray paint or any other liquid aerosol spray, you usually pay more for the aerosol canister (plus the cost of filling and pressurizing it) than for the contents. Push-button convenience has been most expensive...but now you have an ingenious and easy alternative.

Fast and simple to operate... Fill the can 2/3 full with the liquid to be used, thinning according to instructions. Screw on the Aerosol Valve Top and pressurize to 50 psi with any bicycle pump, air hose or other air source (a unique pressure relief valve insures against overcharging). When the large (1 pint) can is empty, simply re-fill and pressurize. You're back to the job in minutes. When finished, clean the can thoroughly and you're ready for your next project!



Touch-up body work



Clean photo equip.

Genuine Professional results... without the noise and hassles of a cumbersome and expensive compressor. Starshine's Rechargeable Aerosol is a quality spraying instrument...the first of its kind for home, garden and industrial use. It is available only from Starshine's Mail Order Sales Division and arrives quickly at your door complete with two interchangeable spray heads. One, a wide angle spray, is for flawless application of paints and other liquids requiring an even coating. The other, a special extension tube, is for applying lubricants, cleaners, etc., in hard-to-get-at places such as complex electronic equipment.



Large size can: 2 1/2"W x 8"H

For example, a few suggested uses:

- Paints
- Lubricants
- Rust inhibitors
- Solvents
- Engine degreasers
- Photo equipment
- De-icer
- Household cleaners
- Insecticides
- Disinfectants
- Electrical contact cleaners
- A world of applications



Paint metalwork



Lube office equip.

Tough, precision construction plus Starshine's exclusive 5-year guarantee. Designed in England, the solid canister is one-piece aluminum with no seams to come apart. The aerosol valve body is also solid aluminum and knurled for easy handling. Should your Starshine Rechargeable Aerosol ever malfunction due to a manufacturing defect within 5 years, you may return it for repair or replacement at our prompt service-by-mail facility. We pride ourselves on our quick, courteous service.

Test it yourself at home or work for 2 weeks... with no obligation.

**Order Toll-Free: 800-235-6945 or
if busy 800-235-6951**

CA residents call: 805-966-7187
or send coupon.

-
- Please send by return mail one Starshine Rechargeable Aerosol @ \$19.95 (plus \$2 shipping and handling). If not completely satisfied, I may return within 2 weeks of receipt for a prompt refund with no questions asked.
- Save \$4 or more!** Order two or more Aerosols at the quantity price of only \$17.95 ea. (plus \$2 shipping and handling ea.)
- Check or money order enclosed (CA residents add 6% sales tax)
- Charge my credit card number listed below
- BankAmericard/Visa Master Charge (Interbank no. _____)
- American Express Diners Club Carte Blanche

Credit Card No. _____

Exp. Date _____

Name _____

Address _____

City/State/Zip _____

STARSHINE GROUP

924 Anacapa St., Dept. AC467, Santa Barbara, CA 93101

AC467

Copyright Starshine Inc., 1980

ELECTRIC BILLS TOO HIGH? GET A

watt saver



Advanced-design Power Factor Controller cuts the cost of running electric appliances by as much as 40%! See for yourself—try it for 60 days!

National Aeronautics and Space Administration
Patent #4,052,648

If you think your electric bills are high now, brace yourself. They'll be even higher next year, and for years to come—even if your use of electricity remains constant—due to utility company rate increases.

Right now, it's probably costing you \$120 to \$160 a year to run a refrigerator...about \$130 for a freezer...and other outrageous sums to power your attic fan, washing machine, sump pump, electric typewriter and/or trash compactor. Even a gas clothes dryer uses expensive electricity (to rotate the drum).

So it makes a lot of sense to use a lot less electric power. And now you can do just that—without cutting down on your use of electric appliances!

INTRODUCING THE WATT SAVER

Our exclusive new Watt Saver is based on an invention developed and patented by the National Aeronautics and Space Administration. "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 ½ 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 in industry." Such as those in refrigerators, freezers, washing machines, dishwashers, trash compactors, table saws, drill presses, electric typewriters, gas dryers (without electric igniters), fans, grinders, food processing machines, lathes and various types of pumps (e.g., heat, sump, swimming pool).

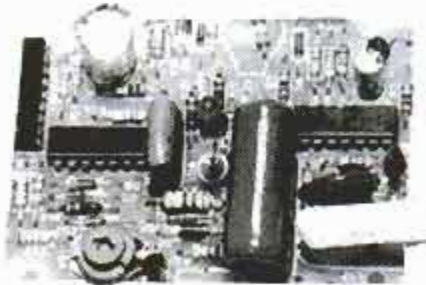
HOW IT SAVES POWER

Popular Electronics explained it this way: "AC induction motors characteris-

tically 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." (The wasted power is given off as heat.)

"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."

Besides saving power, the Watt Saver also allows motors to run cooler—which lengthens their life—and quieter.



Inside the Watt Saver: electronic components work automatically, microsecond by microsecond, to make sure an electric motor receives no more voltage than what's needed to handle the load at any given instant...to save you money!

IT'S SIMPLE TO USE

The Watt Saver—made in the U.S. under license from NASA—is housed in a sturdy metal case (just 5¼" W x 3"H x 2"D) with an electrical outlet and a 2-foot cord. Simply plug the cord of your appliance into the Watt Saver, then plug the Watt Saver's cord into any electrical outlet. You can move the Watt Saver to various locations as needed or, better yet, get two or more.

(For air conditioners, order the wired-in model and if you are electrically inclined no electrician is necessary to connect it.)

Whenever the appliance is used, the Watt Saver goes to work instantly. There are no buttons to push, no gauges to watch. The Watt Saver works automat-

ically, to reduce the amount of electric power used and (therefore) to reduce your electric bills—without reducing the efficiency of your appliances!

LOW COST—AND A TAX CREDIT

Although we're the only company in the world offering the Watt Saver, the cost is modest—only \$39.95 for the 110V, 15-amp model that handles motors up to and including 1 H.P. Want two? They're just \$37.95 each. Or splurge and get three at \$34.95 each. Specify plug-in or wired-in models.

We also offer a 220V, 15-amp model for motors up to and including 2½ H.P. The price is \$49.95 for one; \$47.95 each for two or more. Specify plug-in or wired-in.

No matter which model you order or how many units you order, the postage/handling charge is just \$2.50 per order.

And next year, when you fill out your tax return, you can deduct a 15% energy tax credit—for additional savings.

60-DAY MONEY-BACK GUARANTEE

Try the Watt Saver for as long as 60 days. If not completely satisfied, return it (insured) for a full refund.

Naturally, the sooner you send for the Watt Saver, the more you can save on your electric bills. So order today. Send your check or money order to the address below. Or charge it to your Visa, Master Card, Diners Club or Carte Blanche account. If using your credit card, you can order via our toll-free number:

800-526-2801

If it's busy, or no answer, call our other toll-free number:

800-257-7850

(In New Jersey, call: 800-322-8650. N.J. residents: add 5% sales tax.)

Or mail your order to:

NATIONAL SALES GROUP
MERCURY
THE IMAGINATION PEOPLE®

Dept PM-2404 Madison Avenue
Lakewood, N.J. 08701
201-370-0446

Your home workshop can PAY OFF BIG!



This One Low-Cost Power Tool—

SAWS to desired Width...

PLANES to desired Thickness...

MOLDS all popular Patterns...

—All at once or separately... **All By Power Feed!**

The 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 easily pays for itself by quickly converting low cost rough lumber into high value finished stock. In just one pass turn out your own quarter-round, door and window stop, casing, tongue-and-groove... all popular patterns. Other Belsaw operators are making cases for grandfather clocks, furniture, picture frames, fencing, bee hives, bed slats, surveying stakes... all kinds of millwork.

Built For Pros... Priced For Home Craftsmen... it is engineered and built to industrial standards, but factory-direct selling keeps the price low. Handles tough oak and walnut as easily as pine, and so simple to operate even beginners with no experience can use it.

Try The
Belsaw In Your
Own Shop On Our
**30-DAY FREE
TRIAL OFFER**

Mail Coupon Below
For Complete
Details!

**You Take NO RISK! The Belsaw
Is Backed By Our Exclusive 100%
Guarantee of Satisfaction:**

• "Try the Belsaw in your own shop for a full 30-Days and put it to work for you. Give it a thorough test and make it prove that it can do everything we say it will... use it just as much as you want. Then if you are not completely satisfied, just send it back and we'll return every penny you sent. And YOU are the sole judge! There are no questions asked... there are no fine print 'use' charges. Our flat guarantee is that YOU must be 100% satisfied or you get your money back."

**Start
Your Own
Business!
Earn Extra
Income
Right At
Home.**

With just this one low cost power-feed machine in a corner of your garage or basement, you're set up to supply lumberyards, cabinetmakers, carpenters, remodelers, contractors and hobbyists in your area with custom-planed lumber, trim, molding... ALL of their millwork requirements. You can supply picture molding to art shops, hardware and department stores, or sell direct to framing shops. All standard patterns are available from stock, or we'll custom grind a knife to your own special design or sample.

Does The Belsaw Pay? YOU BET!

READ WHAT OTHER BELSAW OWNERS SAY:

A Good Investment • Robert Sawyer, Roseburg, Oregon: "I believe that the Belsaw is the best investment I ever made. I've been a planer man for years and am now retired. The Belsaw has earned me over \$60,000 extra income in the past eleven years."

Pays For Itself • R. S. Clark, Springfield, Ohio: "I bought a batch of walnut in the rough, and after planing it on the Belsaw I figured up the money I had saved. It was enough to pay for two-thirds the cost of the Planer. It really does a good job."

More Than Expected • Stephen Schultz, Orangeville, Penna.: "This machine pays for itself by making money out of scrap boards. It is a very well built machine and I confess it is more than I expected for the price. It does everything you say it will."

... And Belsaw Is The Choice Of Professionals:

"I recommend Belsaw's Planer-Molder-Saw as the most useful shop tool that any craftsman could own. We use ours every day in the WORKBENCH model shop, and couldn't get along without it."

JAY HEDDEN—Editor of WORKBENCH Magazine

**FREE
BOOKLET!**

Get FREE
Book with
facts and
full details
... RUSH COUPON TODAY!



**Just Mail Coupon...
NO OBLIGATION and
NO SALESMAN Calls!**

ACT NOW!
Coupon
Brings
Full Details!

If coupon has been removed, just send postcard with name and address to:
BELSAW POWER TOOLS Co.
901F Field Building
Kansas City, MO 64111

BELSAW POWER TOOLS Co.
901F Field Building
Kansas City, Missouri 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 _____

ROLLABOUT TILT-TOP TABLE HAS 101 USES!

ONLY \$24⁹⁸

compares to similar products
selling at \$54.98!

For office, sick-room, child's room, study, bedroom, den. You'll wonder how you ever managed before you got this sturdy, walnut grain finished, totally adjustable wonder! 22" x 15" spill-proof, wipe-clean top swings across bed, is ideal for serving meals, reading, writing, drawing. Height, angle adjust easily, instantly. Three high-impact plastic wheels won't mar floor, roll easily on carpet. Rugged, black painted metal frame is sturdy enough for typewriter or calculator. Great for kids' homework table, sidetable for convalescent's chair, many office uses, too. And incredibly — the entire table folds down for storage under bed or in closet to an amazing 2 1/2"! You'd expect to pay over \$50.00 for a table this well-made, this useful, yet it's yours for only \$24.98 on a no-risk money back guarantee — if not delighted return within 14 days for full refund (except postage and handling). Order an extra for the office and save-mail coupon now!

© 1980 Westport Home Products, 60 Wilton Road, Westport, CT 06887

FOR HOME & OFFICE

VERSATILE
ADJUSTABLE • STORABLE

MAIL NO-RISK COUPON TODAY

WESTPORT HOME PRODUCTS, Dept. TTP-49
60 Wilton Road, Westport, CT 06887

Please send me (#0099) Tilt Top Table(s)
at only \$24.98 plus \$3.50 postage & handling each.

SAVE: Order two for only \$44.98 plus \$6 postage
& handling.

If after receiving my order I am not delighted, I may
return it within 14 days for refund (less postage &
handling).

Enclosed is \$_____ Check or money order,
no C.O.D.s, please. CT residents add 7 1/2%
sales tax.

Charge my: Visa Master Charge

Card No. _____

Exp. date _____

Name _____

Address _____ Apt. # _____

City _____ State _____ Zip _____



LEARN PROFESSIONAL UPHOLSTERY

AT HOME! SPARE OR FULL TIME...
MEN & WOMEN ALL AGES! Send for
free book on learning to upholster
chairs, divans, footstools, all furniture for
BIG MONEY in spare or full time. No
experience needed, no age or educational
limits. We show you how and provide
EVERYTHING needed to start: (1) Self-study
program covering all phases, (2) All tools and 3 big
furniture kits for practice, (3)... all supplies, frames and
materials to build \$300 worth of furniture, yours to keep or
sell. Write for big, free opportunity book. No obligation, no
salesman will call.
MODERN UPHOLSTERY INSTITUTE,
8117 Field Building, Kansas City, Missouri 64111

USE ON:
Oval press
Small motor
Lathe
Shaper
Rockwell
Montgomery Ward
Craftman
1 1/4" Elec. drill

Sleeveless DRUM SANDER

NO PRE-MADE SLEEVES TO BUY

ECONOMICAL—Simply cut sandpaper from stan-
dard size sheets. **UNIQUE** way of holding paper
to drum. Twist of key and paper is tight.
SPONGE RUBBER backing insures long wear of
paper. Holds 1/2" bore. Price includes 1/2" adapt-
er but upon request we will substitute a 1/4"
adapter for small drills. **ADD \$2.25 PER ORDER**
FOR HANDLING.

—1" x 2" long	\$12.70
—2" x 3" long	13.75
—2-1/2" x 3" long	14.40
—3" x 3" long	15.70

ABOVE 4 DRUM \$51.20
2-1/2" x 4-1/2" \$19.00
3" x 4-1/2" \$21.25

Above sizes (without adapters) also available
with 1/2" 30 & 1/4" Thread (Sears, Ward)
5/8" bore (Shaperite) except 2" x 3"
Send Check or Money Order
MONEY BACK GUARANTEE

SINGLEY SPECIALTY CO., INC.
P.O. Box 711 P
Hendersonville, N.C. 28793



DIESEL ENGINES & ADAPTERS

1.5, 1.8 and 2.5 Litre 4 cylinder water cooled Diesel Engines.
Suitable for installation in Mini-Pickups - Compacts and Sub-
Compact Cars. Engine to Transmission Adapters available for
Toyota, Mazda, Courier, Chevrolet Borg-Warner and Land
Rover. Also available, 10 to 300 KW Diesel Generator Sets.
Send \$1.00 for specs and price catalog.

HOLT-FELL DIESEL
5225 Flagstone St.
Long Beach, Cal. 90808



Airtight Wood Stove Plans. Save hun-
dreds of dollars by building your wood
heater. Slash your heat bills. Attractive
and efficient. Two styles with two sizes
each. All four plans, material list and
step-by-step instructions only \$10. All
machined parts available.

G & W Alpine Design
19604 122nd PL SE
Renton, Washington 98055

NEW NOW BOATING

(Continued from page 48)



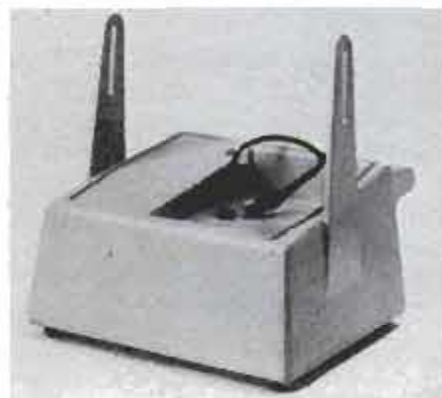
Bilge switch can lean

Designed to tilt up to 35° from level, the
AFS 2000 Attwood Automatic Float
switch can mount deep in the angled
bilge of a deep-V hull and operate any
size bilge pump as needed. The \$22
waterproofed unit has a closed-cell
polyurethane-foam float that won't wa-
terlog. No leveling pads or internal
flexing wires are required for the stur-
dy unit.

Emergency flash floats



For the new
boat-equip-
ment require-
ments for
emergency
signals, the
\$110 Signa-
Flash electronic flashing bea-
con from Signa
Flash Florida,
in Sarasota,
will flash an
SOS for 36
hours automati-
cally.



Portable flasher power

Permanent-mount flashing depth and
fish finders can now be swapped from
boat to boat with the new power pack
for gimbal-mount units from Lowr-
ance, Tulsa, Okla.

SPARE TIME INCOME? SELL KNAPP SHOES!

Sell famous Knapp Cushion Comfort
Shoes full time or part time to supplement
your income. Enjoy the financial success
and security you've always dreamed about.
Millions of repeat customers. Earn higher
commissions plus bonuses. No investment.
Free selling and training kit to qualified
applicants. America's No. 1 company in the
direct selling shoe industry. Write: Knapp
Shoes, Dept 5065 Knapp Centre, Brockton,
Mass. 02401.

KNAPP
America works in Knapp Shoes.

PM WORKBENCH

PM EXAMINES PRODUCTS AND SERVICES

Firewood carrying hook

Anyone who has lugged firewood from cutting site to truck, or from truck to woodpile, knows that loading up is often awkward and time-consuming. The log carrier shown here makes the process much easier, since it can snatch logs off the ground quickly. To get maximum



Drop Woodhook over a log to engage hooks (inset) and lift for easy carrying.

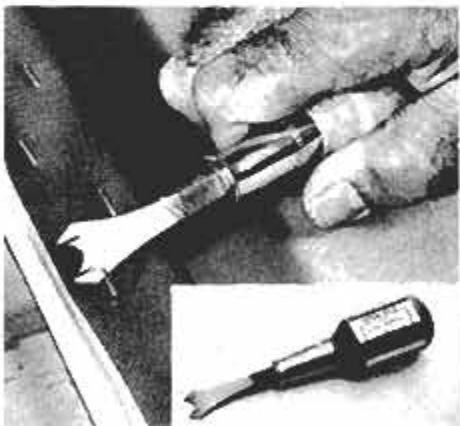
benefit from this device, you should order two—one for each hand—to balance the weight. Woodhooks, as they are called, cost \$7.95 each postpaid.

You can get them from Budget Sales, 154 East Center St., Shelley, Idaho 83274.—*Joseph R. Provey*

New staple remover

This new tool, called Sta-Pul, makes quick work of removing staples, no matter how stubborn they are. Slide one point of the tool under a staple, turn your wrist so the tool's working end is parallel with the stapled surface and lift out the crimped staple with ease.

The Sta-Pul comes in handy on reupholstering and rescreening jobs



Simply slide a Sta-Pul point under a staple, turn your wrist and remove the staple.

and when opening cartons. You can order it by sending \$14.95 to Holmes Marketing, Dept. PMM, Box 1254, Lubbock, Tex. 79408.

—*Rosario Capotosto*

Buying guide on home heating

An eight-page buying guide on home heating, *The Money-Saving Guide to Buying a New Boiler*, is available free.

You can get it from any Weil-McLain heating contractor or by writing to: Weil-McLain, Energy Efficiency Institute, Blaine St., Michigan City, Ind. 46360.—*H.W.*

Calling Sears miter saws

If you purchased a Sears motorized miter saw between July 1978 and June 1980, you may have a tool that is subject to safety problems under certain conditions.

The trouble arises when the saw is used with a carbide-tipped blade. These blades are thicker than conventional blades and the thickness makes it difficult to secure the blade properly. The possible result: The blade may come off the saw, causing injury to the user.

If you own a Craftsman miter saw, check the model number located on the motor end. Models No. 315.23730 and 315.23731 are the tools in question.

If you own either one, don't use it with a carbide-tipped blade. Contact your local Sears store or call the toll-free number, 800-845-4781, to make arrangements for a correction kit.

—*H.W.*

Brad-point drill set

Here is an excellent set of precision drill bits for workshoppers who won't settle for anything but a craftsmanlike look. The MH-20 set contains 12 high-carbon, tool-steel bits from 1/8 to 1 in. in diameter. They're packed in a handsome ma-



The 12 bits range from 1/8- to 1-in. dia.



Brad point on the new bit prevents drift.

hogany box, which protects cutting edges during storage. The bits are designed with a brad point, which eliminates any chance of bit drift as the tool enters the workpiece. Extended spurs score a perfect circle every time.

It's priced at \$78 postpaid from Morris Tool Co., Dept. PM 281, Highway 11-E, Box 249, Morristown, Tenn. 37814.—*H.W.*

Circle scriber

You can scribe circles accurately from 4-in. diameter to as large as a tape measure will allow with this circle scriber. It consists of two plastic parts: the main body, which is attached over the rule's locking button, and the pencil holder that fits over the blade tip.

Although the maker claims the scriber fits most tapes, it seems ideally suited to the Stanley Powerlock case with 3/4-in.-wide blade. To use it, simply insert a pencil or ball-point pen in the holder, pull tape to desired measurement and scribe



Attach body with self-tapping screws in prebored holes (inset). Scribing is easy.

clockwise, while pressing down on the pivot. It's \$7.48 postpaid from Circle R Corp., 17815 Valley Vista Blvd., Encino, Calif. 91316.

—*Rosario Capotosto*

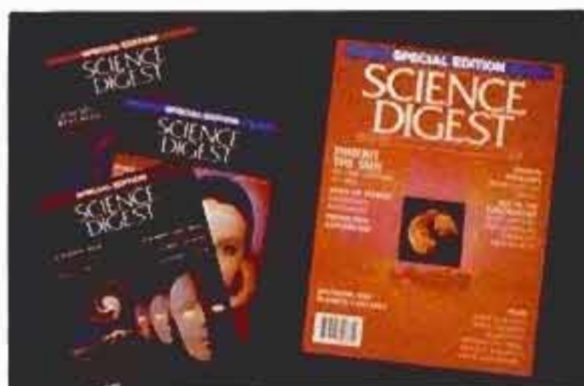
If you've come across a new product with some special features let us know about it. Write to PM Workbench, Popular Mechanics, 224 West 57th St., New York, N.Y. 10019.



A moment spent understanding is worth a lifetime spent in awe.

Introducing Science Digest . . . where fact is more exciting than fiction! Crammed with news, up to the minute discoveries and fascinating theories in all areas of science . . . from anthropology to ecology to medicine to space to zoology — the disciplines, the research, the breakthroughs that affect you and your way of life, your way of thinking. And, it is written specially for you to read with an ease, speed and clarity that at last makes science come alive.

Pick up a copy at your newsstand now. Or better yet, subscribe today at once-in-a-lifetime introductory savings.



Send to: SCIENCE DIGEST
P.O. Box 10090, Dept. WPPM, Des Moines, Iowa 50350

Special Introductory Subscription Offer Save 50%

Yes, I want to experience the exciting world of science. And subscribing to Science Digest now at 50% savings makes it even more exciting. Please enter my subscription for:

10 issues for only \$5.99 20 issues for just \$11.97
 My check is enclosed (or) Please bill me later

Initials _____

Name _____ (Please Print)

Address _____

City _____

State _____

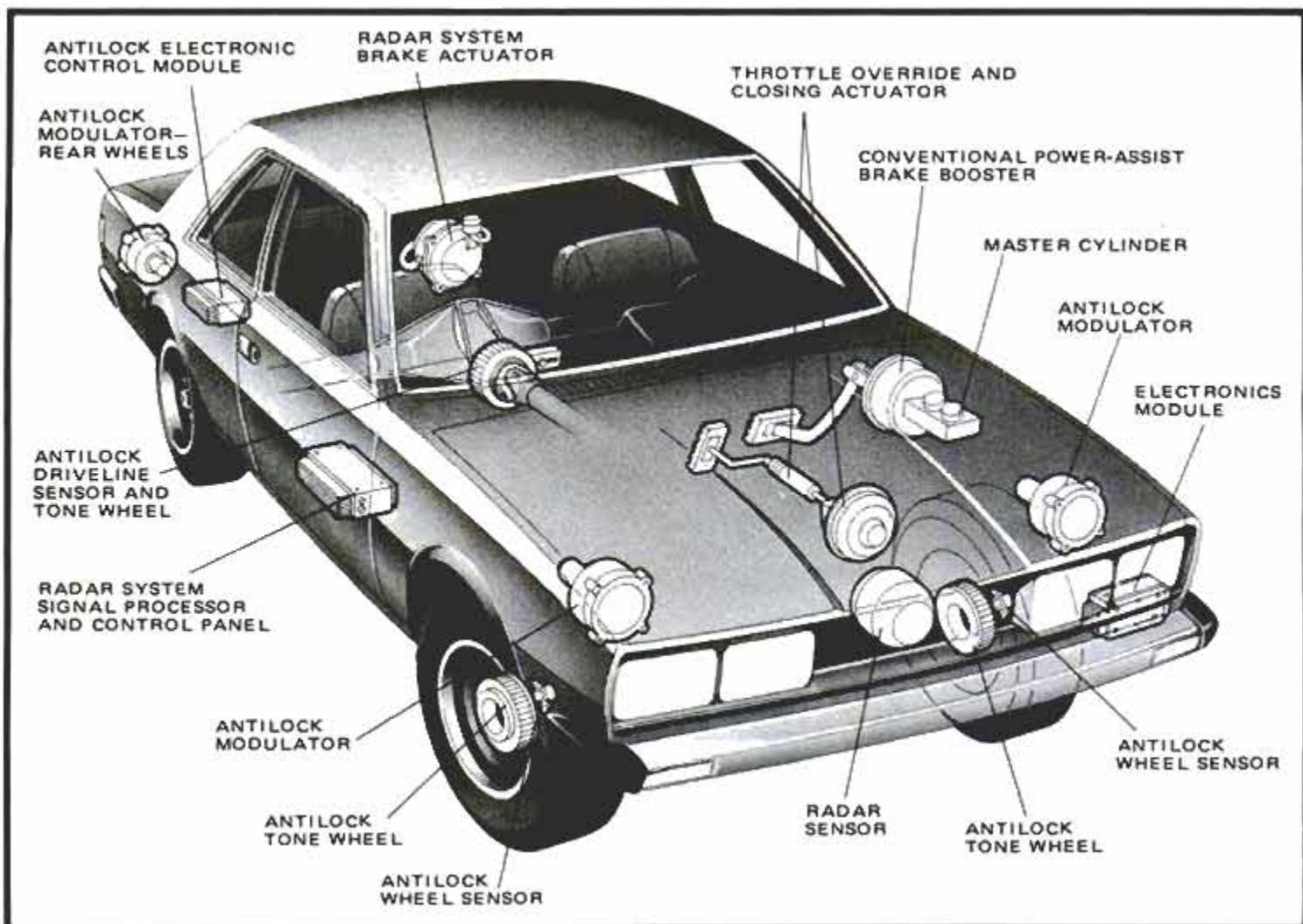
Zip _____

Watch for your first copy on its way to you in 6 to 12 weeks.

Charge Orders subject to Publisher's Acceptance.

Science Digest, \$2.00 a copy. Regular subscription prices in U.S. and possessions: 10 issues \$11.97, 20 issues \$19.97. Canadian and foreign prices on request. Offer expires: 9/30/81. A Publication of Hearst Magazines, A DIVISION OF THE HEARST CORPORATION

SCIENCE DIGEST



Brains of radar braking system is the electronics module. It processes information from all the sensors, including the radar sensor.

How we'll avoid close encounters: Automatic radar braking

by Mort Schultz

The 1977 Ford Granada sped down the highway toward the barricade.

"Hit it," I was ordered. "Don't maneuver. Keep your foot on the accelerator; don't use the brakes."

Hit it? This guy had to be kidding. But orders were orders, so I kept the speedometer at 65 as I passed the 500-foot-from-target mark—400 . . . 300 . . . 250. A light on the control panel began flashing and a beeping sound from inside the glove box warned of an imminent collision.

"Keep going," my instructor ordered.

Two hundred feet from target—175 . . . 125 . . . 100. And at that moment, the strangest thing I've experienced in 35 years of driving occurred: The control of the vehicle was taken away from me.

The engine suddenly decelerated to idle, and the brakes applied them-

selves, forcing my chest and stomach against the belt restraints. The car stopped a few feet from the barricade.

In reality, the "highway" was a half-mile test track at Fort Myer in Washington, D.C. The barricade was a 3½-foot-high wooden stand that would have been shattered if struck by the Granada. But if the obstacle had been a car or a concrete barrier, this collision-avoidance radar braking system would have saved my life.

"This system will activate itself and stop a car when the driver fails to do the job," Dr. Yung-Kuang Wu of the National Highway Traffic Safety Administration (NHTSA) explained. Dr. Wu was my instructor in radar braking, which was made for NHTSA by Bendix Corp.

What Dr. Wu means is that radar brakes can prevent accidents in cases where drivers don't apply the brakes soon enough. "Failure-to-apply-the-brakes-in-time" accidents

usually occur in fog, or when drivers are sleepy, inattentive, intoxicated or ill.

It can save lives

In 1979, there were 16,552 single-car accidents, resulting in 18,231 vehicle-occupant and pedestrian deaths. Dr. Keith Brewer, chief of the NHTSA automotive systems branch, estimates that 6000 to 7000 of these fatalities (33 to 38 percent) might have been prevented if the cars had been equipped with radar braking systems and four-wheel, anti-locking brakes.

His estimate coincides with that of the Institute for Research in Public Safety at Indiana University at Bloomington. The Institute studied 215 accidents on a case-by-case basis. Researchers concluded that with a full-time radar braking system, coupled with four-wheel, anti-locking brakes, 39 of the accidents (18 percent) could definitely have

(Please turn to page 99)

CANADA AT ITS BEST[®]

Light. Smooth. Imported Canadian Mist.[®]
The whisky that's becoming America's favorite Canadian.

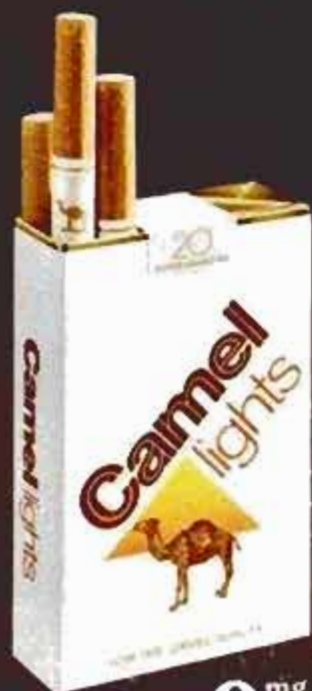


Share some tonight.

IMPORTED BY B-F SPIRITS LTD., N.Y., N.Y. CANADIAN WHISKY—A BLEND. 80 PROOF. © 1980
Photographed at Medicine Lake, Jasper, Canada

CAMEL

Where a man belongs.

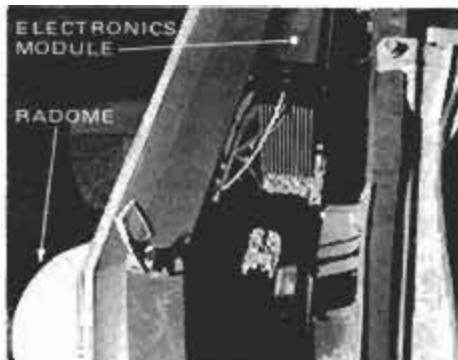


9 mg
tar.

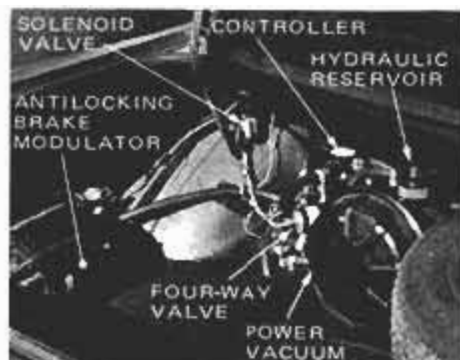
Camel Lights. Low tar. Camel taste.

9 mg. "tar", 0.8 mg. nicotine av.
per cigarette by FTC method.

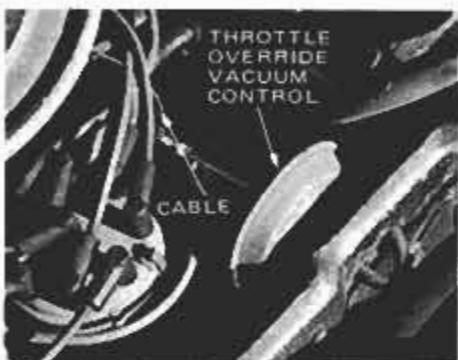
Warning: The Surgeon General Has Determined
That Cigarette Smoking Is Dangerous to Your Health.



The radome (radar dome) is mounted externally on the car in this prototype model.



If the system is mass-produced, this hardware will not take up room in the trunk.



Throttle override control automatically decelerates the engine to idling speed.



Speed sensor is an optical device which "reads" the segmented disc on driveshaft.

AUTOMATIC RADAR BRAKING

(Continued from page 96)

been avoided. Furthermore, up to 90 of the 215 accidents (41.9 percent) might have been prevented.

The NHTSA study of radar braking began in 1972 and it will continue. Despite the existence of a seemingly workable system, there are problems. For instance, the system is sensitive to heavy rain. It perceives raindrops as targets and triggers the brakes. Furthermore, NHTSA wants to study other types of radar braking units that exist or are under development.

Cost is also a factor that prevents the NHTSA from recommending a government standard which would require cars to have radar brakes. Dr. Wu estimates that a radar braking system, coupled to a four-wheel, antilocking system, would add about \$1000 to the cost of a car.

Antilock brakes are the key

The Automotive Information Council feels that as computer control costs decline, systems like radar braking may become cost-effective.

Four-wheel antilocking and radar braking are two separate systems which may be operated independently. However, to attain the most effective braking system possible, NHTSA has combined the two in its vehicles—the Granada and a 1977 Plymouth Fury.

The Indiana University study

confirms the wisdom of doing this. Of the 215 accidents that were investigated, only one would definitely have been prevented by the radar braking system without a four-wheel, antilocking system. In other cases, radar would have applied the brakes in time, but cars probably would have skidded as brakes locked, resulting in accidents anyway.

Four-wheel antilocking prevents brake lockup that can cause skidding when panic braking occurs.

The Bendix experimental radar braking system consists of five assemblies: radar sensor, electronics module, signal processor, brake actuator and control panel.

The radar sensor beams sound signals to detect the presence of an obstacle or pedestrian in the car's path. Signals bounce off the target and back to an electronic module that computes range-to-target and closing-rate data. The signal processor receives these data and generates a signal to trigger the brake actuator, a mechanical device that causes engine deceleration and braking.

The Doppler effect

The radar sensor is located in the center of the grille. It's a dual-signal, continuous-wave Doppler-effect transmitter. It operates at 36 gigahertz with a peak power of 25 milliwatts. The transmitter is a Gunn-effect diode oscillator mounted on

the back of an 8-inch-diameter, parabolic-reflector antenna behind a dielectric-filled, fiberglass-epoxy radome. This radome provides the car with an aircraft-type snout.

Signals bounced back from a target echo to the radar and are transmitted to a Schottky diode. There, Doppler-effect data are discerned from other signals and transferred to the electronics module.

The Doppler effect establishes distance and closing rate between the car and a target by the frequency shift of a signal. As the car and target converge, the returned signal frequency increases. As a signal reaches a preset peak frequency, it triggers a response from the braking actuator.

The Doppler effect is named for its discoverer, Christian Doppler, who was a 19th century Austrian mathematician and physicist.

In the electronics module, Doppler signals are decoded and processed to produce range-to-target and closing-rate information. Data are then sent to a signal processor.

The signal processor (microprocessor, really) is a computer that



Control panel next to driver can activate the entire system or selected functions.

converts range and closing-rate information to a digital format. At 250 feet from the target, the signal processor activates a warning light and beeper. At 100 feet, the signal processor triggers the brake actuator if the driver has neither braked nor taken evasive action.

The brake actuator consists of a Bendix Power-Vac (similar to the power brake assembly in your car), a controller and a four-way valve to send hydraulic-fluid pressure to each of the four wheels and the hydraulic-fluid reservoir. The actuator augments regular braking components mounted in the engine compartment. They are totally independent. The actuator operates only when regular braking equipment isn't activated when it's supposed to be.

When the signal processor activates the brake actuator, it applies sudden hydraulic pressure to the

(Please turn to page 100)

Save time and be incredibly accurate for \$8.95.

SLIDECOMP:
An adjustable, direct reading compass with metric, fractional and decimal scales.

Virtually unbreakable plastic. White fine matte finish, black printed scale and red hairline provides excellent readability.

An exciting breakthrough in drafting instrument design has been achieved with the development of SLIDECOMP. Ideal for architects, draftsmen, engineers, artists, students and home handymen. Over 100,000 already sold throughout the world.

Built-in scale under hairline index lets you draw the exact circle with precision of .005 inches.

Draws circles in pencil from .125 to 6 inches in diameter. Uses standard lead refills.

MAILSUAL PM2
4 Oak Hill Rd., Chappaqua, N.Y. 10514

Please send me _____ SLIDECOMPS. Enclosed is \$8.95 plus \$5.55 for postage and handling for each unit. N.Y. State residents please add applicable sales tax. No C.O.D.s. U.S. Currency

Name _____

Address _____

City _____ State _____ Zip _____

30 day money back guarantee for any reason.

EVERYTHING YOU NEED TO DO YOUR OWN WELDING

Basic Welding Instructions/Input Cable, Plug & Receptacle/Welding Accessories/Sample Electrodes

That all comes along with your 225 ampere portable U.L. listed Lincoln AC-225-S. You can perform a wide variety of welding, cutting, brazing and hardsurfacing jobs. Plus... the free "Welder's Guide" gives complete step-by-step instructions. For all the facts, see your local Lincoln Electric Distributor. Or send in the coupon for free bulletin. The Lincoln Electric Company, Cleveland, Ohio 44117.

The Lincoln Electric Company

Dept. PM-2, Cleveland, Ohio 44117

Send free copy of bulletin E320

NAME _____

ADDRESS _____

CITY _____

STATE _____ ZIP _____

LINCOLN
ELECTRIC

AUTOMATIC RADAR BRAKING

(Continued from page 99)

brakes, and vacuum to a throttle override mechanism on the carburetor. Immediately, the throttle closes, acceleration stops, and maximum braking force is applied to the vehicle.

At this point, the four-wheel, anti-locking system does its "stop-go" act if brake lockup begins. Sensors on front wheels and at the junction of the driveshaft and differential measure the wheel speed. Sensors are connected to an analog computer that detects wheel locking by comparing wheel speeds and computing the slip factor. If locking occurs, the computer issues a command to brake modulators to alternately release and apply the brakes, thus preventing brake lockup and subsequent skidding.

Steering limit control

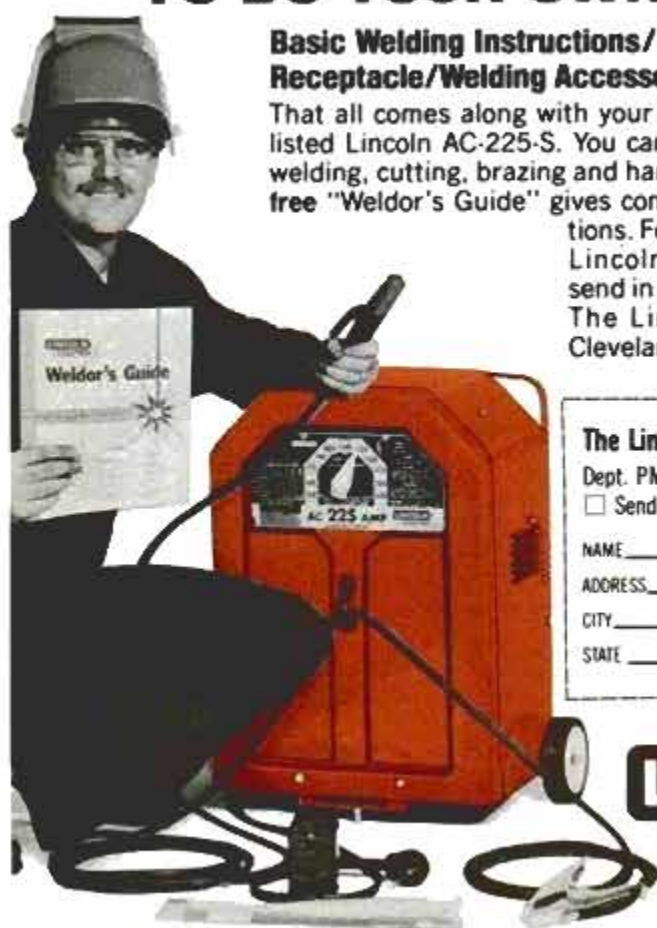
The radar-brake control panel allows the driver to turn the system on and off. The driver can operate the system fully automatically or semiautomatically. On semiautomatic, brake actuation is deactivated, but the beeper and flashing light remain in operation.

The control panel also allows the driver to deactivate the system's steering inhibit limit control. This device overrides the radar braking system when the steering wheel is turned 15° to either side. This averts brake application when false signals are given.

For example, when the car is negotiating a highway ramp with the radar sensor facing a barrier, the barrier would give a false signal, activating the braking system, if it weren't for the 15° steering-wheel limit. On a ramp, a driver turns the steering wheel a minimum of 15°.

The radar braking system also has a brake-pedal override that operates when the driver steps on the brake pedal. The radar system does not automatically reactivate itself after the driver releases the brake pedal. The driver has to flip a switch on the control panel to accomplish this. This override is useful in bumper-to-bumper traffic, where brakes are in constant use.

As enthusiastic as people at NHTSA are about radar braking, they don't have any false illusions. It will be a decade, at least, before bugs can be worked out and the cost of the system approaches a suitable level for public acceptance. Sooner or later, though, cars will be equipped with radar brakes, because the system has demonstrated that it can save lives.



Turn Extra Time Into **Extra Income!** Earn **\$5 TO \$8** an Hour

**Be your own boss
in a money-making
business of your own.**

No
Experience
Needed

Sharp-All

lets you
Sharpen Saws

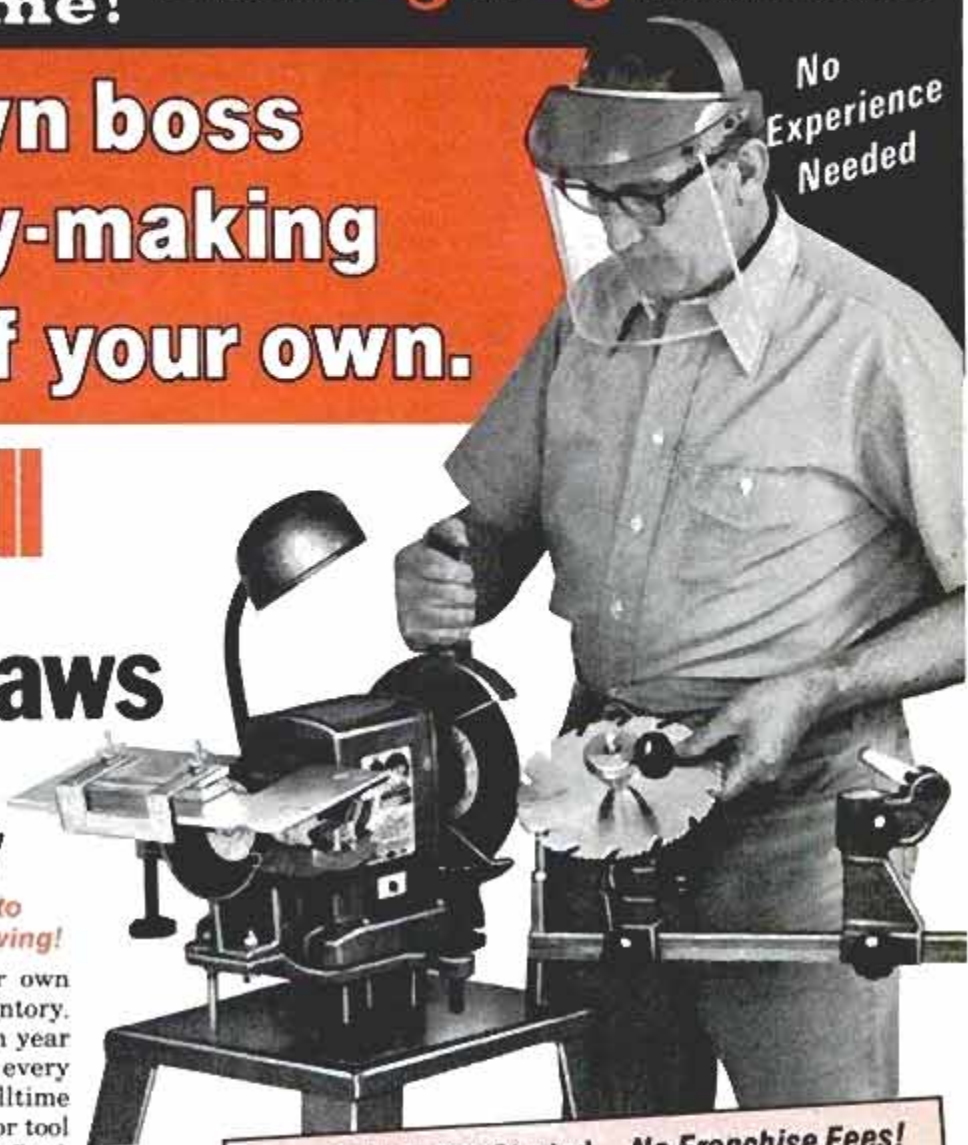
garden and shop tools
for home and industry

NOW! Use your **SPARETIME** to
BEAT inflation and the high cost of living!

With SHARP-ALL it's easy to start your own business. No selling is involved, no inventory. People bring in their work... you take in year round CASH Profits and keep 90¢ out of every dollar you earn. Work sparetime or fulltime right at home in your garage, basement or tool shed. Work the hours you want—**FREE** Book tells how to start your own business even while working at your regular job.

Big PROFITS — Plenty of business waiting for qualified men.

Every home and business has saws and tools that need periodic sharpening. There's plenty of business waiting for the man who can sharpen saws, planer knives, jointer blades, wood chisels, scissors, pinking shears, snips, lawnmowers, axes and other garden, shop and home tools. SHARP-ALL does ALL these jobs and more... quickly, and at a big profit. You will be sharpening headquarters for carpenters, builders, lumberyards, factories, home workshops and hobbyists... hundreds of jobs right in your own neighborhood.



It's EASY To Get Started — No Franchise Fees!

You don't have to invest thousands of dollars to get started in business for yourself. Low Cost SHARP-ALL and our 45 years of experience in helping sincere men earn extra income, plus the desire to get ahead is all you need. Fully illustrated Operators Manual gives clear, step-by-step instructions, shows exactly how to sharpen each tool, where to get business, what to charge, how to get free advertising... all the "tricks of the trade". And, SHARP-ALL does the kind of precision job that brings customers back time after time.

Send for **FREE** Book "Lifetime Security." **Do It Today!**

There is **NO OBLIGATION** and
NO SALESMAN Will Call!

ACT NOW!
Coupon
Brings
Full Details!

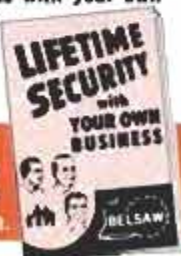
SEND FOR FREE FACTS TODAY!

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. Send coupon or mail postcard for full details on our exclusive **30-Day FREE Trial Offer!**

FREE Booklet gives full details —

Our Free Book tells how to start a profitable, lifetime home sharpening business, how we help you grow, how we'll finance you.

Send for
your copy
today. No
obligation.



No Obligation... No Salesman

BELSAW SHARP-ALL CO.
711F Field Bldg.
Kansas City, MO 64111

Please send my **FREE** copy of your book "Lifetime Security" and full details on your 30-Day Free Trial Offer!

Name _____

Address _____

City _____

State _____

Zip _____

BELSAW SHARP-ALL Co., 711F Field Bldg., K.C., MO 64111

FEBRUARY 1981

101

INSTANTLY STOPS LEAKS!

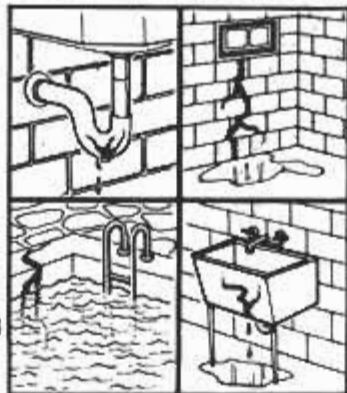
SPRAY AWAY LEAKS PERMANENTLY WITH LIQUID METAL



STOPS LEAKS INSTANTLY IN POOL • BASEMENT • PIPES • GUTTERS • ROOF • CHIMNEY • AUTO MOBILE HOME

SEALS CRACKS IN WOOD • CEMENT • COPPER • BRICK • IRON • ALUMINUM
INSULATES AGAINST DRAFTS AROUND WINDOWS • DOORS

Now make hundreds of home repairs as easy as pressing a button! Spray Liquid Metal from its pressurized can to close any crack, seal any leak. Adheres instantly and forms a bond with almost any material or surface — saves money, time, labor! Weather resistant — won't become brittle in — 140°F cold or soften in 160°F heat! Order risk-free — if not delighted return within 14-days for a full refund (except postage and handling). Mail coupon now!



© 1980 Westport Home Products, 60 Wilton Rd., Westport, CT 06887

MAIL NO-RISK COUPON TODAY!

WESTPORT HOME PRODUCTS, Dept. LSA-19
60 Wilton Road, Westport, CT 06887

Please send me _____ (#0085) spray can(s) of Liquid Metal, at only \$3.98, plus \$1.50 postage & handling each.

SAVE: Two cans of Liquid Metal for only \$6.98, plus \$2 postage & handling.

GOT A LOT TO FIX? SAVE MORE!

THREE cans for only \$9.98, plus \$2.50 postage & handling.

SIX cans for only \$17.98, plus \$3.50 postage & handling.

If after receiving my order I am not delighted, I may return it within 14 days for refund (except postage & handling).

Enclosed \$_____ CT residents add 7 1/2% sales tax. Check or money order, no COD's please.

You may charge orders over \$10: VISA MASTER CHARGE

Card No. _____

Exp. Date _____

Name _____

Address _____ Apt. # _____

City _____ State _____ Zip _____

LOW COST HEATER

**Burns over 24 hrs. on low setting
No more middle-of-the-night stokings
Pays for itself in weeks
Engineered to prevent drum burn-out**



OUR 24th YEAR

Sotz Corporation, 13643 Station Rd., Columbia Station, OH 44028

Before you spend \$500 to \$600 on a wood heater, try the Sotz Heater Kit for under \$60 — at our risk. If (within one year) you don't agree it outperforms any wood heater money can buy, or (within 10 years) if the kit cracks, warps, or burns up, your money will be refunded, including shipping charges.

Kit converts a 55 gallon drum (not supplied) into a high capacity wood burner. Features large 11 1/2" square door opening, cam-lock door catch, and spark-proof design. Patented internal draft channel, draft control, and airtight design allow controlled, efficient heat, while limiting metal temperatures of barrel, to prevent burn-up. Use of draft control allows you to heat large or small areas. Basement installation heats your entire home. Great for your garage, workshop, or cabin. Top drum squeezes 50% more BTUs from heat normally lost up the chimney. Heavy steel kit bolts together quick and easy.

Thousands in use by U.S. Army, Navy, Depts. of Nat. Resources, Agriculture, Federal, state and local government agencies. Assembled heater tested to UL specs. Member: BBB.

Price delivered to your door. Bottom Kit \$38.95. Top Kit \$20.95. Master card: Visa welcomed.

Free info: about 15-30 gal. drum kits, heating water, drying wood, fireplace to wood stove and much much more.

PHOTO HINTS

Roomy two-layer bag



Make a stiff cardboard shelf; then a small bag holds an entire 35-mm outfit. Under shelf, three compartments formed by vertical, cardboard legs hold bulbs and flash gun.—*R. Hertzberg*

See around corners

Placement of lights or proximity to the subject often interfere with visibility of camera settings. You can use a mechanic's inspection mirror to see your way out of this kind of tight, photographic problem.—*Parry C. Yob*



Frames for free

Many people have a mountain of empty tape cassette holders around—but if you're a photographer, don't discard them.

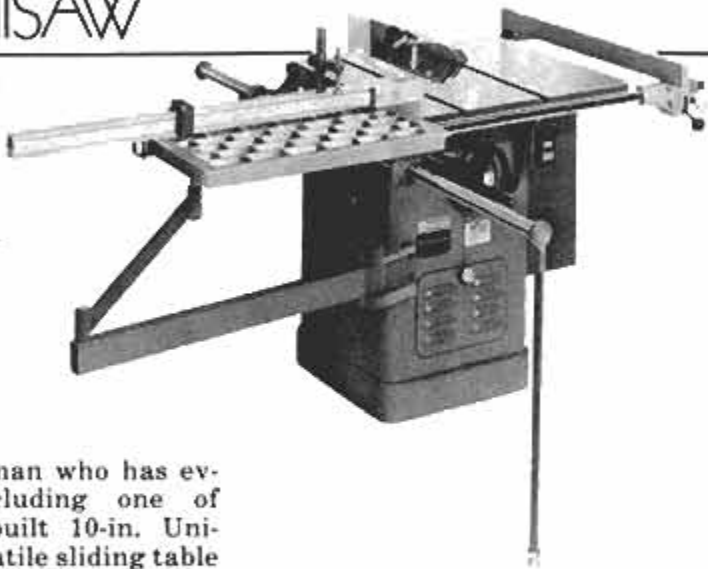
The boxes make great frames—stand them up or drill a hole to hang on wall.

—*John Konciewicz*



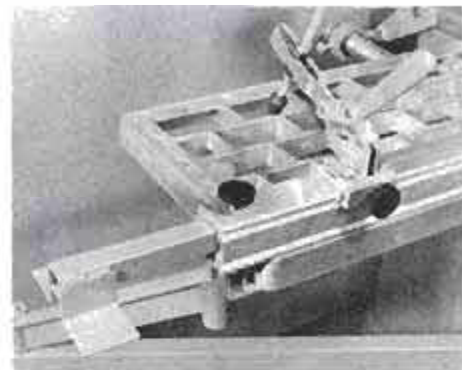
PM LOOKS AT SLIDING TABLE ATTACHMENT FOR UNISAW

The sliding table attachment, which converts any Rockwell Unisaw into a sliding table saw, is ideal for handling large panels or heavy stock. The articulating arm gives full support and causes no drag during sawing.



For the craftsman who has everything, including one of Rockwell's well-built 10-in. Unisaws, a new, versatile sliding table attachment is now offered. Marketed mainly to professional woodworking and maintenance shops, the attachment is a product we thought PM craftsmen would want to know about, too.

The sliding table makes ripping and crosscutting large sheets of plywood or paneling a lot easier, since the supporting surfaces glide with the workpiece and don't add friction. The operator is allowed to concentrate on the cut; pushing



Accessories to table attachment include clamp which tracks on fence and extension to support lengths over 8 ft.

the wood through the blade is almost effortless.

Features include a hold-down clamp, which keeps the workpiece from creeping or jumping; an adjustable stop, which can be positioned anywhere on the fence to measure automatically for repetitive cuts; and cast-in miter increments, which simplify rotating the fence to the correct position when cutting a desired angle.

With very little modification of the original saw unit, the attachment can be installed quickly (one man, two hours to assemble and complete adjustments). The owner's manual includes 42 step-by-step illustrations.—C.E. Banister

SPECIFICATIONS—SLIDING TABLE

Model: No. 34-485 (fits 10-in. tilting arbor Unisaw).
Table: Lightweight, die-cast aluminum, 14 x 27 in.
Fence: 45 in. long
Guide bar for sliding table: Ground steel.
Shipping weight: 125 lbs. Price: \$527.50
Accessories: Quick-clamp attachment (No. 34-486), fence extension (No. 34-489).
Manufacturer: Rockwell International, Power Tool Div., 400 North Lexington Ave., Pittsburgh, Pa. 15208.



Sliding table moves with the cut to allow smooth action and ensure a precise cut with no chance of the work binding.



Long fence on sliding table rotates for cutting angles up to 45°. The fence can be positioned on front or rear of table.

SUPER KNIFE SPECIAL

Compare These Prices Anywhere

- 19" overall
- 15" edge
- steel blade
- canvas sheath

A BUSHWHACKER

- 25" overall
- 18" edge
- steel blade
- canvas sheath

B MACHETE

- 20" overall
- 18" edge
- steel blade
- canvas sheath

C BOLD MACHETE

- wooden handle
- 15½" overall
- 2 lbs.

E HATCHET

- fiberglass handle
- 15½" overall
- 1½ lbs.

F CAMP AXE

- 12" overall
- 7" edge
- steel blade
- sheath

G COMBAT KNIFE

- 10½" overall
- 5" edge
- steel blade
- sheath

H MARINE KNIFE

- 9½" overall
- 5" edge
- steel blade
- sheath

I SURVIVAL KNIFE

LIMITED TIME OFFER

ONLY

\$5.95

Each

Plus Postage

- 9½" overall
- 5" edge
- steel blade
- sawteeth on back
- sheath
- whetstone

Send \$2.00 for complete catalog. Catalog free with order.

Please send me _____ knife(s) at the Limited Time Offer of \$5.95 each or \$5.00 each in quantities of 3 or more. Add \$1.00 postage for first knife and 50 cents for each additional knife. Make checks or money orders payable to TIFFIN INTERNATIONAL.

Alabama residents add 6% sales tax.

Knives Available (Enter number(s) desired)

Quan.	Quan.	Quan.	Quan.	Quan.
A _____	C _____	E _____	G _____	
B _____	D _____	Y _____	H _____	I _____

Name _____

Address _____

City _____ State _____ Zip _____

VISA _____ MASTER CHARGE _____

Exp. Date _____ Card Number _____

Signature _____

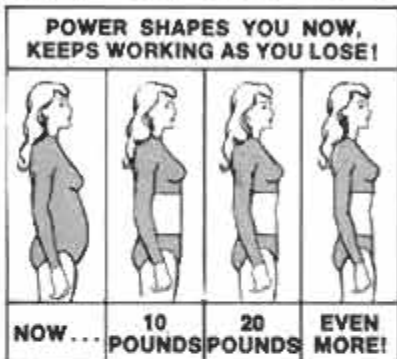
Mail to: TIFFIN INTERNATIONAL,

P.O. Box 881, Dept. PM-2 Clanton, AL 35045.

Dealer Inquiries Invited



LOOK SLIMMER INSTANTLY! LOSE 25 POUNDS OR MORE, IT STILL KEEPS WORKING!



- Controls waistline, tummy, supports back

- Gives you a sleeker look right away



LOOK SLIMMER, STAND TALLER, FEEL YOUNGER ALL DURING YOUR REDUCING PROGRAM!

Now you can look in your mirror and see a sleeker silhouette the very instant you put it on! Power-slim gives you real control, helps deflate that spare tire, flatten unsightly tummy bulge, smooth out rolls, because it fits you "like a glove" from the very first day — keeps on fitting perfectly as you slim down!

It smooths your figure, boosts your ego, because it shrinks with you day by day as your pounds melt away. One size fits men or women, and you must be de-lighted or return within 14 days for full refund (except postage & handling). Why wait — mail coupon today!

© 1980 Westport Home Products,
60 Wilton Rd., Westport, CT 06887

WESTPORT HOME PRODUCTS, Dept. TB-312, 60 Wilton Road, Westport, CT 06887

Please send me _____ (#0005) Power Slim(s) at only \$7.98 plus \$1 postage & handling.

SAVE: Order two for only \$14.98 — one to wash and one to wear — and we'll pay postage.

If after receiving my order I'm not delighted, I may return it within 14 days for refund (except postage & handling).

Total amount enclosed \$ _____ CT residents add 7 1/2% Sales Tax. Check or money order, no C.O.D.'s please.

MAIL NO-RISK COUPON TODAY

You may charge orders over \$10: Visa Master Charge

Card No. _____

Exp. Date _____

Name _____

Address _____ Apt. # _____

City _____ State _____ Zip _____

THE FIVE MORGAN DOLLAR INVESTMENT COLLECTION.



Numismatic Collectors Guild has acquired a limited supply of fine Morgan Solid Silver Dollars, considered by experts to be the peak of the engravers art. These Solid Silver Dollars, 412.5 grains of 900% Fine Silver, are the most sought after coins ever minted in the United States. Some Morgan Silver Dollars sell for as much as \$20,000 and a prime mint condition Morgan Silver Dollar recently sold for \$42,500. The coin has become so popular that collectors and investors have been hoarding them for years. As a result, there are no longer any Morgan Silver Dollars in circulation. Silver Dollar coins, in general, have increased over 1,000% (that's right, over 10 times) in value in preceding years.

Now Numismatic Collectors Guild has assembled an exquisite Solid Silver Investment Collection of 5 Rare Morgan Dollars. Each set is displayed on a royal blue background in a handsome presentation case with embossed lettering. Makes a lifetime gift which can be handed down from generation to generation.

Recently, these rare coin sets were selling at \$250.00 per set, but we are now able to offer them to you at our low price of \$175.00 per set for the next 30 days only.

Numismatic Collectors Guild, dealers in gold and silver bullion and rare coins for over 30 years, is a member of the Retail Coin Dealers Association and the American Numismatic Association. Money back if not completely satisfied.

Minted about 100 Years Ago.

Due to the fluctuation in the price of silver and gold, orders will be filled on a first come-first shipped basis until our limited supply is exhausted.

NUMISMATIC COLLECTORS GUILD, INC. Dept. PM651
31 Second Avenue, New York, N.Y. 10003

Please send _____ set(s) of 5 Morgan Silver Dollars at \$175.00 per set plus \$5.00 postage, handling, insurance. (Limit 5 sets per customer.) I enclose check, money order, in the amount of \$ _____ New York residents please add sales tax.

Name _____

Address _____

City _____

State _____ Zip _____

CHARGE MY Visa American Express

Master Charge Diners Club

Master Charge Inter Bank No. _____ Expiration Date _____

Credit Card No. _____

Signature _____

DRIVING THE MAZDA RX-7

(Continued from page 13)

power that's been achieved with the new emissions system. A "reactive" exhaust manifold reduces carbon monoxide (CO) and unburned hydrocarbons (HC) immediately as exhaust gases leave the cylinders, but a three-way catalyst and a second "backup" oxidizing catalyst take care of remaining emissions, with no loss of efficiency.

There is an air pump to supply extra oxygen to the catalyst, the exhaust manifold or the carburetor as needed, but no exhaust-gas recirculation (EGR) is necessary, since



Standard equipment includes a tachometer, oil-pressure gauge and voltmeter.

the rotary engine is inherently low in nitrogen oxides (NOx) emissions.

The bottom line is squeaky-clean exhaust, along with better performance and much-improved fuel economy, compared to the previous thermal-reactor system.

Inside, the instrument panel is nicely redesigned, and a tachometer, oil-pressure gauge and voltmeter have been added as standard equipment. Also added are two storage boxes behind the seats.

A new luxury version, the GSL, takes its place at the top of the RX-7 line, complete with standard four-wheel disc brakes, limited-slip differential, aluminum wheels and power windows. RX-7 prices run from the bottom-line S model at about \$8600 to \$10,500 for the GSL with standard five-speed transmission; automatic is optional.

Toyo Kogyo emphasizes that it currently manufactures three types of engines—gasoline, rotary and diesel—and it intends to improve each one for passenger-car use. In fact, a diesel 626 is a likely candidate for '82 introduction in the United States. The 1981 U.S. Mazda line's CAFE (Corporate Average Fuel Economy) rating stands at slightly over 31 mpg, a good margin beyond the 22 mpg required by law, and the company plans to better that by 20 to 25 percent in the next four years. Look out, competition!

FOR CREDIT CARD ORDERS
CALL TOLL FREE! 800-257-7880
(New Jersey Residents call 1-800-322-8650)

Here it is!

*Bigger, better, more exciting than ever
32 pages . . . dozens of illustrations
. . . more than 900 listings*

Completely revised and updated, this latest edition of PM's famous PLANS, PROJECTS AND PUBLICATIONS catalog is a must for homeowners, handymen, hobbyists, craftsmen, outdoorsmen and do-it-yourselfers of all kinds. You'll find it packed with great ideas for home improvement, challenging shop projects, exciting leisure-time activities, valuable know-how to help you in virtually every area of construction, remodeling, repair and maintenance.

The most valuable catalog you may ever use and only 50 cents postpaid!



The new Popular Mechanics catalog Plans, Projects, Publications

*Use this coupon
to order your
copy today*

Send coin, check or money order to:

PM Catalog

Box 1014, Radio City Station, New York, N.Y. 10101

I am enclosing \$_____ for _____ copy (copies) of PM's new edition of Plans, Projects, Publications. (Please make check or M.O. payable to Popular Mechanics)

Name _____

Address _____

City _____

State _____

Zip code _____

(Please allow three to four weeks for delivery)

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

FEBRUARY 1981

105

NEW NOW



OUTDOORS

Quick-change shooting

Slip off the grip of Crosman's 1377 or 1322 air pistols, plus a number of older models, slide on the new Crosman 1399 shoulder-stock accessory, secure it with the two grip screws, and the handgun becomes an air rifle. The 16-inch stock (\$12) is high-impact plastic.



Power panning for gold

From a \$500 backpack model to this \$3200 twin-engine surface-gold dredge for vacuuming up "color," Treasure Emporium, 6507 Lankershim Blvd., North Hollywood, Calif. 91606, has many prospecting aids. Model here gives divers air.

Snow-and-sod mobile



Arctic Cat's Kitty snowmobile for youngsters can also be used in the spring. The builder, Arctic Enterprises, has a kit that adds wheels to the front skis. Replacement of carburetor silencer with air filter is only other modification needed.



Midriff tackle tote to wear

Called a Fishin' Partner by Berkley, this neat little plastic tackle box can be worn on a belt around the waist or slung over a shoulder. Hinged down, the 5x12x1 1/4-inch unit becomes a shelf that opens as a lure and leader storage box and provides work space and rod rest. It's under \$20 from the Spirit Lake, Iowa, company, and is at sporting goods shops.



Lock-blade mini-hunter



An outgrowth of the Buck Folding Hunter of 1963, the new Classic Model III, from Buck Knives, El Cajon, Calif., is smaller and lighter, with a 4 7/8-inch length, 4-inch blade and patterned handles. It has a leather sheath and costs \$47.



Spotting string

Saunders Archery, Columbus, Neb., calls it a Turkey Tracker, and it draws a 100-yard, bright-orange string pointer through the underbrush. Tied to the head of an arrow, the string is pulled out of a capsule mounted on the bow or stabilizer. The Tracker is \$10, with refills \$4 for two, and pulls free to make sighting easy.

TALKING TIME

Now a breakthrough in
Speech Technology
gives Time A Voice.

Rapidly emerging electronic progress in solid state speech synthesis brings micro computer generated speech to timekeeping.

In the fall of 1978, Texas Instruments engineers developed "Speak and Spell"™, an electronic spelling aid with speech generated entirely by a tiny electronic micro computer chip. In 1979, talking language translators were introduced.

Today, most semi conductor houses around the world have major research efforts in solid state speech synthesis. In the next few years many new speech products will reach the marketplace. Now there is Talking Time. One of the first to be introduced, it may be the most useful and unique.

No Recorder—No Pull String

Like R2D2 in Star Wars, Talking Time seems to spring to life when speech synthesis and quartz timekeeping technologies come together. There are no recorders or talking doll pull strings in Talking Time, only solid state electronics. Electronics that are on the leading edge of both technologies. The forerunner of things to come. Here's how it works.

Micro Computer Brain to Slight Japanese Accent

Humans produce speech in much the same way that Talking Time does. Our brain sends nerve impulses to our jaw and chest, for our mouth to move and our lungs to push air across our voice box. Talking Times' single microprocessor chip sends electrical impulses digitized into speech patterns to an audio loud speaker. The loud speaker vibrates and out comes a clear voice that says "Attention please, it's now six o'clock, please hurry"—with a slight Japanese accent. Talking Time is made by Sharp Electronics, a leading electronics company in Japan. So finely processed is the speech synthesis that you will swear it seems to speak with a slight Japanese accent. Texas Instruments Speech products are said to have a Texas drawl. Perhaps it's our imagination. You can decide for yourself.

4:58:00 AM

Single Microprocessor Chip generates signals that both speak with slight Japanese accent, and time with quartz accuracy.

No Heart Failure with this Alarm

An effective alarm with a snooze feature that reminds you any minute of a 24 hour day. First a chime to get your attention, then, "It's now six o'clock," followed by a rousing melody over Talking Time's loud speaker. After a 5 minute

snooze, Talking Time warns you, "Attention please, it's now six o'clock, please hurry." It warns you again after 10 minutes, loud enough to wake even a sound sleeper, but pleasant enough not to give you heart failure.

Desk Top Reminder

Talking Time is ideal as a personal reminder. A perfect gift for that busy executive who is engrossed in work and forgets the time. In the **Time Announcement Mode** you're reminded automatically, every 30 minutes by, "It's now two-thirty p.m." If you want more reminders, choose the **Elapsed Time Mode**. Select 1, 5 or 30 minute intervals. Talking Time will announce each interval with "Five minutes elapsed," then "ten minutes elapsed," etc. No more missed meetings or appointments—Talking Time is Here!

Jogging Companion

Talking Time is small enough to be a handheld or pocket jogging companion. In the **Stopwatch Mode**, it's a stopwatch with one second precision and automatic as well as manual operation. In manual it announces the elapsed time at the push of a button for 10 full hours. When in automatic, it announces the elapsed time automatically every 10 seconds. During your entire run, Talking Time keeps you informed. You never have to break stride to look at your watch. Comes with a hand strap so it's easy to carry.

Interval Timer to Space Work or Fun

Talking Time is great for a periodic check against how much time has elapsed on a given task. Speed up or slow down as necessary. Production supervisors, doctors, and engineers, anyone with critical time measured functions to perform, find it useful. Pilots can use it to call out elapsed time every 10 seconds while they shoot approaches. Talking Time has both performance and functions unheard of even one year ago. The voice adds usefulness, which we think you'll agree, can only be described as Revolutionary.

Superb Chronometer That Can Keep Its Mouth Shut

Talking Time is a great chronometer in its own right. Its famous quartz accuracy is unsurpassed by chronometers costing \$200 or more, but with half the functions. It has a large easy-to-read liquid crystal display (LCD) with 8 digits. A welcome relief for anyone who has poor eyesight. With Talking Time you hear as well as see the time. If you want silence, however, just tell it to keep its mouth shut. It won't let out a peep. You can still use it for its unsurpassed timekeeping accuracy.



A miniature marvel of microcomputer speech and timekeeping technology. It measures only 4 1/2 x 7 7/8 x 2 3/8.

Talking Time is easy to set in all modes, since it talks to you as you go along. You can keep track of what you're setting and how to do it. It may not be foolproof, but it's close.

Talking Time is worth its price as a superb clock alone. Its uses seem endless. It may add a whole new dimension to time. But don't take our word for it. Find out for yourself!

30 Day No-Risk Trial

To prove to you that Talking Time is everything we say, we offer it for 30 days at no risk. If during 30 days from receipt, you are unhappy with Talking Time for any reason, return it for a prompt refund of your purchase price. What have you got to lose?

One Full Year Warranty

Talking Time is all solid state. It should give you years of trouble free operation. If, in the unlikely event, anything should go wrong, it is warranted for one full year by Sharp Electronics. Talking Time comes complete with 2 AA batteries and handstrap. Under normal use, batteries should last for one year or longer.

To Order

Just fill in the order form and send it along with check or money order to our address. For even faster service credit card customers can call our Toll Free number listed below. Order yours today!

MEDIA MARKETING

10155 Plano Road • Dallas, TX 75238

Yes, send me Talking Time with a 30 day no-risk return at \$89.95 plus \$3.00 delivery.

SAVE \$10.00 Send me two Talking Times at \$84.95 ea. plus \$2.00 ea. delivery.

SAVE \$30.00 Send me three Talking Times at \$79.95 ea. plus \$1.50 ea. delivery

Texas residents add 5% sales tax.

Name _____

Address _____

City _____

State _____ Zip _____

Check of M.O. Enclosed

For even faster service, charge to:

MC/Visa — Expires _____

Account # _____

Signature _____

Order Toll Free 1-800-527-7066

In Texas call COLLECT: 214-349-3120 PM-021

IMPORTS & MOTORSPORTS

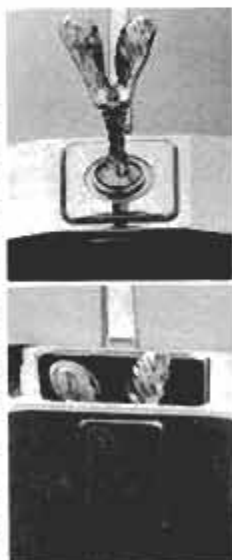
New model rolls out



Rolls-Royce's new Silver Spirit.

In a couple of months a new import will roll off the docks to join the others that are besieging Detroit (see PM's imports guide, page 114). But, like some other classy cars on that list, this one really doesn't have any competition from Motor City. The Rolls-Royce Silver Spirit is in a class by itself. The all-new, aerodynamically smoother Spirit replaces the Silver Shadow, a motor car that has seen 15 years of continuous production. Fifteen years in the world of cars is bloody old: The gentlemen at Rolls had to pull the plug on the old Shadow. At the same time, they laid to rest the Silver Wraith which is replaced by the Silver Spur, and the Bentley T2 which is replaced by the Mulsanne (this name, of course, is taken from the famous straight that's on the road circuit used for the 24 Hours of LeMans). When it arrives here, the Silver Spirit will cost slightly more than \$100,000 and be the lowest priced Rolls you can buy. The Spirit has a more contemporary design with a lot more glass area, lower profile, better handling with its new rear suspension and rounder, smoother prow—a less

stately front end, as some potential Rolls customers will undoubtedly mutter. The Spirit still falls into the 5000-pound weight class and, with its 6.7-liter V8, gets 10 mpg city and 18 mpg highway, so Uncle Sam will continue to collect a gas-guzzler tax from Rolls. Doors remain large enough to let you slide into the car with aplomb, and the interior is nonpareil. Rolls' manner of doing up a regal living compartment boggles the mind; those butter-smooth, luscious leather seats boggle the behind. Rolls will be building only 3000 in '81. Of those, we'll get 1000.



Spirit of Ecstasy, not wont to impale pedestrians, vanishes with just a touch.

Getting off the road

What is a BMW doing in the dirt, you may ask. It's simple, according to BMW's observations: That's where riders want to go. So, even though you may gasp at the idea of a mud-caked and pummeled piece of fine machinery from the Bavarian Motor

Works, the famous manufacturer, whose motors range over land and sea, now has an off-road bike.

The R80GS is a dual-purpose, 800-cc addition to BMW's motorcycle lineup for 1981. With the agile 80, the long-time admirer of BMW road tourers can now have his street bike and the capability to blaze a trail when he wants. The 80 is a scant 368 pounds, lightest of BMW's Twins, and features a monolever rear-axle swing arm. The monolever, together with BMW's traditional shaft drive, makes the rear-wheel mounting and removal a simple operation. A fixed-caliper disc brake system is used in front, and the familiar flat-twin engine layout identifies the bike as a BMW. So does the price: \$4800.

A Porsche to ride

You can drive a Porsche, pedal one or wear one on your wrist, so why not ride one—a motorcycle. This bike, based on a Yamaha 500, is Porsche's exercise in safety and fuel economy for a bike of the future. "Model" is world champ Barry Sheene.

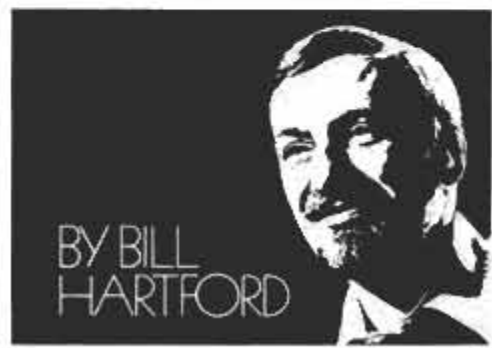
Experimental bike has wheel fairings, frame fairing with leg cutouts.



Back on the high banks

It's Speed Weeks time again, which means the high-banked turns of the famous Daytona International Speedway will soon be buzzing with stockers looking for the big win: the Daytona 500. It's the first bammin' and frammin' date on the National Association for Stock Car Racing (NASCAR) calendar, and it's February 15th. **PM**

BMW of North America, in addition to cars and marine engines, now imports the BMW line of motorcycles. New for '81 is the R80GS, which is a dual-purpose, on-road, off-road machine.



Kings, 1 mg. "tar", 0.2 mg. nicotine; 100's, 3 mg. "tar",
0.4 mg. nicotine av. per cigarette by FTC method.



Kings, 100's

The pleasure is back.

BARCLAY

*99% tar free.*TM

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

Roundtrip Tickets

Suzuki figures the most important thing that'll ever go on a family-sized bike is just that. Family. That's why DS Playbikes are made as dependable and hassle-free as possible. So you can count on them to get your gang there. And back again.

All three (DS-80, 100, 125) use a gutsy Power Reed™ engine. This tough 2-stroke needs about as much attention as a cactus. Thanks to a PEI Ignition (no points to adjust) and a "CCI" oil injection system (no pre-mixing of gas and oil).

These low-cost machines also come with rugged long-travel suspensions, full knobby tires, sleek motocross styling and full off-road lighting.

For family fun, reliable DS Playbikes are just the ticket. Roundtrip tickets.



Suzuki 1981



The Performer.

This 2740-mile cruise was a record trip for unsupported hovercraft. While not without incident, it proved that the versatile machines can really take it.

by Richard Dunlop

Downstream ahead, the Mississippi's broad expanse boiled over a concrete dam that reached from bank to bank, except close to the Illinois shore where the gates of Lock 22 yawned open. A sizable backup of barge tows, launches and houseboats was assembled, all waiting their turn at the locks.

Bob Windt was at the controls of the 26-foot-long UH-26S hovercraft, which he had designed and built, as it bore down on the dam. He had decided not to wait in line, not to lock through like a normal watercraft. Instead, he intended to hover right over the dam, almost as if he were riding over a large snag in the river. The 37-year-old Windt eyed the river, judging the cascading

The UH-26S hovercraft, Bob Windt at the helm, reaches New Orleans, hauling come from Cordova, Ill.

A V8 in skirts beats the mighty Mississippi



Windt's craft could be moored afloat (left) for quick supply stops or minor repairs. Above, Mike Kiester (left) tries makeshift clutch-puller, as Dean Pollee helps.

waters with calm precision as his 2½-ton craft, riding on its cushion of air, wafted toward the dam.

Windt gave the engine full power to provide maximum lift. The UH-26S rose higher and surged forward. The bow hung for an anxious moment over the edge and dropped. The hovercraft slid down the watery face of the dam. When its bow hit the standing wave at the bottom, it dipped, but instantly popped up. Resilient, protected by its air cushion, the hovercraft leveled off.

Windt and his crew, 17-year-olds Dean Pollee and Terry Chapman, whooped in triumph.

It was mid-July and the big hovercraft was on a 2740-mile journey from Cordova, Ill., Bob Windt's home port, down the Father of Waters to New Orleans and back. All along the river, people in boats and on the levees were watching the craft as it zoomed along, sometimes at upward of 50 mph, throwing up a fine spray. It sped over roller dams, wing dams, sandbars and snags that would have cracked a boat wide open.

"What kind of UFO is it?" a New Orleanian later asked, as he saw the craft glide up onto the shore close to the Algiers ferry dock in New Orleans. He was relieved to see stocky Bob Windt, the two grinning boys and red-headed Mike Kiester, who had joined the expedition in St. Louis—all obviously Earthlings—emerge from the craft.

Trying for a world record

Windt had set out to prove the reliability and range of hovercraft. If the UH-26S could make the trip successfully, it would set a world's record for the longest unsupported

(Please turn to page 167)

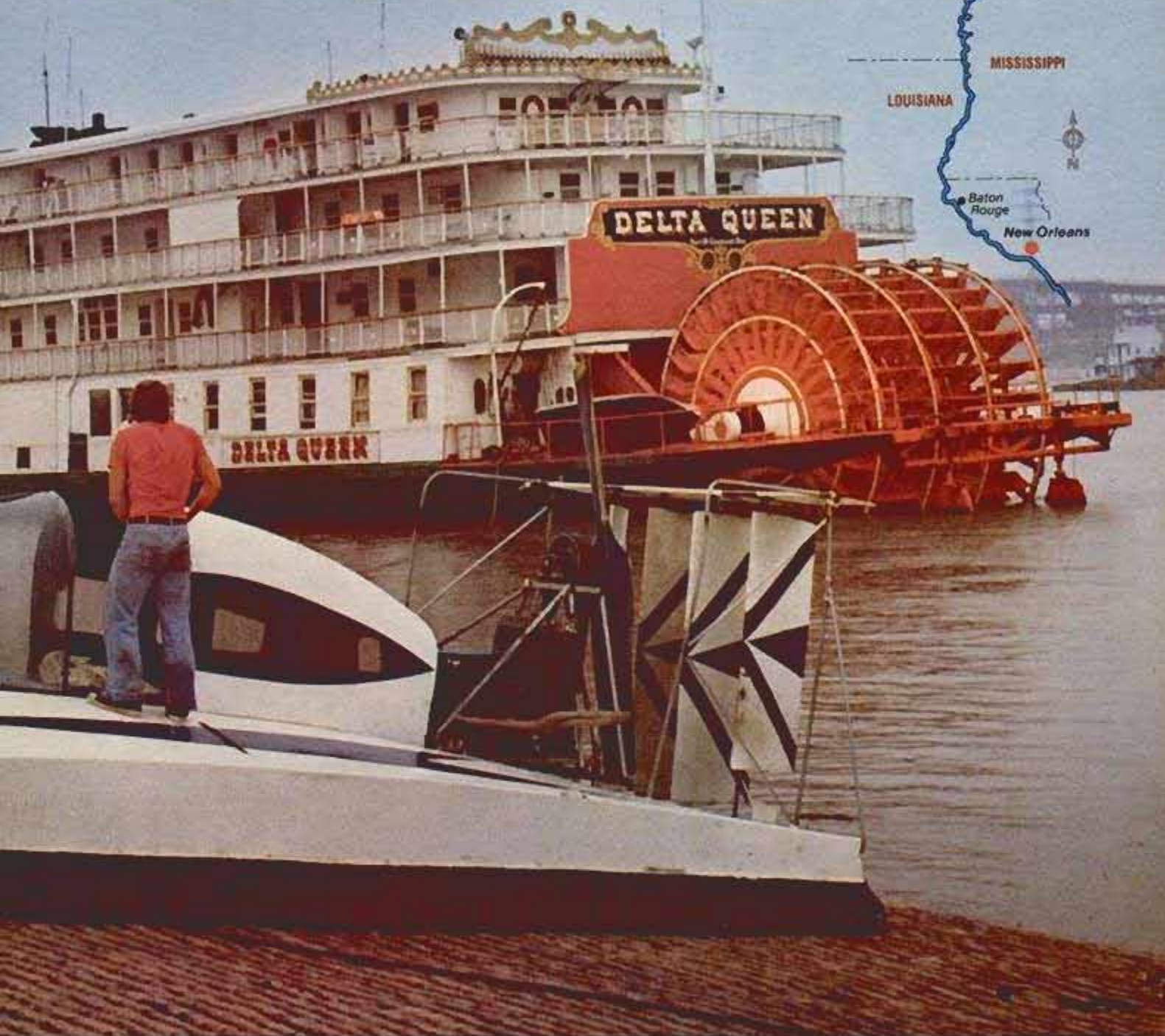
'A guy from New Orleans took one look and asked us what kind of UFO we were driving.'



Reaching New Orleans, Bob Windt pulls his UH-26S hovercraft up on the levee alongside the stern-wheeler excursion boat, *Delta Queen*.



Hovercraft was powered up while tethered to a tree, so logs could be put underneath as jacks to give Windt working room to install a new air splitter. Wear and tear were robbing the "Monster" of performance near the end, but the finish was no less triumphant.



A colorful illustration at the top of the page shows several cars of various colors (yellow, orange, blue, red, green) parachuting from the sky. The parachutes are in various colors and patterns, including stripes and solid colors. The cars are suspended from the parachutes by thin lines, and they appear to be descending towards a sandy beach area at the bottom of the illustration.

Detroit besieged: PM's guide to the '81 import invasion

Full-scale war has started. Detroit has counterattacked with its own small cars, but the imports keep coming.

by Gary Witzenberg
DETROIT AUTO EDITOR

The beachheads are established, and U.S. automakers are battling fiercely to regain ground they have lost to the imports. Chrysler's K-cars and Ford's Escort/Lynx are leading the front-line charge, ably backed by improved Omnis and Horizons and GM's ever-popular X-cars. Ford's EXP and LN-7 Escort-based sport coupes and GM's all-new J-cars are poised and ready to join a renewed spring offensive in just a



Honda's little Civic is fun, fast, efficient and well-appointed for an economy car. For 1981 the Civic offers a three-speed automatic transmission as an option.



After a seven-year gestation period, the new Mercedes 380SEL enters the fray. It's packed with such technical innovations as heated windshield-washer nozzles, optional reclining rear seats and a computerized stereo with memory, which can turn itself on and off at any preprogrammed time.



Mazda's all-new front-wheel-drive GLC looks like it will be strong competition for Ford's new Escort/Lynx cars. Its rear suspension prevents rear wheel toe-in while cornering.



The fuel-injected Renault 18i offers optional leather seats as well as one of the nicest interiors around.



'81 import invasion

few short months down the road.

But the import makers aren't about to take Detroit's latest counterattack lying down. Several new models, as well as many existing ones bolstered by significant improvements, strengthen this year's foreign auto collection. Whatever

ground is lost will not go without a fight.

New entries in the supercompetitive, small-car arena include Toyota's highly fuel-efficient Starlet, Honda's handsome four-door Civic sedan, Mazda's front-drive GLC and Isuzu's I-Mark series, which features optional diesel power.

Significantly, these important new econocars are all from Japan. The mid-range ranks for '81 feature an impressive arsenal of cars. These include: Toyota's redesigned Cressida, Datsun's new 810 (which is also from Japan), a couple of new variations on the Audi 4000 from

Germany, a turbocharged Volvo and a new notchback Saab 900 sedan from Sweden, Renault's admirable 18i and Peugeot's turbodiesel 505 from France and a turbocharged Fiat Brava from Italy. Fiat is also preparing a turbo Spider sports car, while Alfa Romeo is getting ready to introduce a new V6 version of its good-looking GT sport coupe. England's Jaguar Rover Triumph is adding fuel injection to its TR-7 and TR-8 sports cars nationwide, and Ireland's DeLorean is gearing up its rear-engine, gull-wing sportster for introduction this spring.

Finally, in the champagne-soaked luxury battleground, Mercedes of Germany has already placed its wonderful new "S-class" sedans on sale, and Rolls-Royce of England is currently preparing a stunning pair of ultraluxury sedans for their U.S. debut.

Before you begin making reconnaissance patrols into showrooms and engaging in hand-to-hand combat with tough imported-car dealers, here's a spotter's guide to the invading forces.



Audi 4000 is available with an automatic or manual gearbox, has five-cylinder engine.



Peugeot's crisply styled 505 can be had with either a gasoline or diesel engine.



Toyota Celica's Supra package includes air dam, spoiler and modified suspension.



Audi's 5000 turbo is firm's new flagship; it offers luxury and super performance.



Toyota's newly restyled Land Cruiser is better appointed than its predecessor.



Toyota's all-new Starlet wins mileage honors with a 54-mpg highway rating.

Datsun's sharply styled, zippy 200SX was success in '80 and will do better in '81.



The Subaru GL, as well as the rest of the line, has been upgraded for the new year.



What Detroit is up against in '81

Number-one importer Toyota is introducing a truly amazing little car called Starlet, which wins the gas-engine mileage sweepstakes with a startling 39/54 EPA city/highway rating.

It's conventional (rear drive) and as simple as plain-pocket jeans. It's not much to look at and not overly spacious inside, but there's enough seat-adjustment range in front to fit even long-legged Americans.

Starlet's handling is surprisingly agile in the turns, and the little 1.3-liter, four-cylinder engine supplies plenty of zip through its five-speed manual transmission. There's only one three-door hatchback body style, one fairly stark interior, no automatic transmission and few options, but it's a good value at a base price of about \$4700.

At the other end of its price and size scale, Toyota is also unveiling new six-cylinder Cressida four-door sedans and wagons. These entries will offer luxury-style quiet, comfort and equipment levels—at a cost of \$10,000 and up. A five-door hatchback joins the popular front-drive Tercel lineup for '81, and many important improvements have been made to Toyota's Corolla, Corona, Celica and Supra series, as well.

Datsun, too, has redesigned its six-cylinder luxury car, the 810. It's now available as a base-trim four-door sedan or wagon with five-speed transmission (about \$7600). It also comes in the ultraplush Maxima versions with automatic transmission and a long list of standard equipment. Datsun's 210, fwd 310, 510, 200SX and 280ZX series have all received evolutionary styling, trim and equipment improvements.

New from Honda this year is a handsome four-door notchback sedan version of the ever-popular fwd Civic, a comfortable and well-equipped gas-saver priced at about \$5,800. This and the other Civic models have an optional three-speed automatic for '81 in addition to the four-speed and five-speed manual transmissions. There is also a new limited-edition SE model of the four-door Accord. It features a leather interior, power windows and much more for a price tag of about \$8000.

Mazda is coming on strong this year with its all-new GLC subcompact in three-door and five-door hatchback and four-door sedan variations. With its surprisingly comfortable and roomy interior; slick, state-of-the-art styling; peppy 1.5-liter engine; 35/45 mpg EPA economy; extra-nimble handling and a \$4800 base price, this one promises to be a certain winner. Mazda's 626

(Please turn to page 151)

OUR CARS	BASE PRICE	THEIR CARS	BASE PRICE
SUBCOMPACT			
AMC Spirit	\$5033	Datsun 210	\$4299
Chevrolet Chevette	4695	Datsun 310	5189
Chevrolet Cavalier	NA	Dodge Colt	4988
Dodge Omni	5299	Fiat Strada	5596
Ford Escort	5158	Honda Civic	4399
Mercury Lynx	5603	Mazda GLC	4800
Plymouth Horizon	5299	Plymouth Champ	4988
Pontiac J-2000	NA	Renault LeCar	NA
VW Rabbit hatchback	5175	Toyota Starlet	4798
		Toyota Corolla	4828
		Toyota Corolla Tercel	4398
COMPACT			
AMC Concord	\$5621	Audi 4000	\$6990
Buick Skylark	5405	BMW 320i	12,105
Chevrolet Citation	6270	Datsun 510	5989
Dodge Aries	5880	Fiat Brava	8400
Ford Fairmont	6032	Honda Accord	6749
Mercury Zephyr	6103	Isuzu I-Mark	NA
Oldsmobile Omega	6343	Mazda 626	6495
Plymouth Reliant	5880	Peugeot 504 wagon	11,660
Pontiac Phoenix	6307	Renault 18i	7398
		Toyota Corona	6269
		VW Dasher	8830
		VW Jetta	7975
FULL SIZE AND PERSONAL LUXURY			
Buick: LeSabre (\$7715), Regal (7555); Chevrolet: Impala/Caprice (7129), Monte Carlo (7299); Chrysler: Newport (7805), Cordoba (7199); Dodge: St. Regis (7674), Mirada (7700), Ford: LTD (7527), Thunderbird (7551); Mercury: Marquis (7811), XR-7 (7799); Oldsmobile: Delta 88 (7429), Cutlass Supreme (7484); Plymouth: Gran Fury (7387); Pontiac: Catalina/Bonneville (7367), Grand Prix (7424).		NO COMPETITION	
(No imports offer the combination of features and price that would make them competitive with these Detroit models.)			
SPORT/GT			
Chevrolet Camaro	\$6780	Alfa Romeo Spider	\$14,895
Chevrolet Corvette	15,248	Alfa Romeo GT-V6	NA
Dodge Omni 024	6149	Audi 5000 Turbo	17,650
Ford Exp	NA	Datsun 200SX	6989
Ford Mustang	6171	Datsun 280ZX	10,699
Mercury LN-7	NA	Dodge Challenger	7331
Mercury Capri	6665	Fiat X1.9	9052
Plymouth Horizon TC-3	6149	Fiat Spider 2000	10,006
Pontiac Firebird	6901	Honda Prelude	7395
		Lancia Beta	9975
		Lancia Zagato	11,880
		Mazda RX-7	8600
		Plymouth Sapporo	7249
		Porsche 924-924 Turbo	16,770/21,500
		Porsche 911	28,365
		Saab 900 Turbo	13,325
		Triumph TR-7	8485
		Triumph TR-8	11,150
		Toyota Celica/Supra	6299
		VW Rabbit convertible	9900
		VW Scirocco	8495
		Volvo GLT/Turbo	13,630
INTERMEDIATE LUXURY COMPACT			
Buick Century	\$7094	Audi 5000	\$11,240
Cadillac Cimarron	NA	Datsun 810/Maxima	7579
Chevrolet Malibu	6498	Peugeot 505	10,990
Chrysler LeBaron	6495	Saab 900	9625
Dodge Diplomat	6495	Toyota Cressida	10,799
Ford Granada	6474	Volvo DL	9315
Mercury Cougar	8535	Volvo GL	12,770
Oldsmobile Cutlass	6955		
Pontiac LeMans	6689		
LUXURY SPORT			
NO COMPETITION		BMW 633 CSi, \$33,645; DeLorean, 25,000; Ferrari: 308GTB, 49,812; GTSi, 55,272; Jaguar XJ-S, 30,000; Lotus: Esprit, 35,600; Elite, 37,900; Ecstac, 36,650; Mercedes: 380SL, 38,993; 380SLC, 46,638; Porsche 928, 38,850	
(No Detroit models are built that would be considered competition for these imports.)			
LUXURY			
Buick Electra	\$10,237	BMW 528i	\$20,650*
Buick Riviera	12,147	BMW 733i	29,670*
Cadillac DeVille	13,450	Jaguar XJ6	25,000
Cadillac Eldorado	16,492	Mercedes 240D (manual)	19,312
Cadillac Seville	21,088	Mercedes 240A (automatic)	20,556
Chrysler New Yorker	10,643	Mercedes 300D	25,640
Chrysler Imperial	18,311	Mercedes 300CD	29,231
Lincoln Town Car	13,707	Mercedes 300TD	31,373
Lincoln Mark VI	16,858	Mercedes 300SD	34,185
Oldsmobile 98	9951	Mercedes 280E	26,846
Oldsmobile Toronado	12,148	Mercedes 280CE	20,314
		Mercedes 380SEL	44,298
		Peugeot 604	NA
		Rolls-Royce Silver Shadow	85,300*
		Rolls-Royce Silver Wraith	100,000*
		Rolls-Royce Corniche	146,160*
		Rolls-Royce Camargue	152,000*
		Rover 3500	15,900
		Volvo GLE	15,000
		Volvo coupe	19,550
FOUR-WHEEL DRIVE			
AMC Eagle	\$7578	Subaru hatchback	\$4299
AMC Eagle SX-4	5995	Subaru four-door	5449
AMC Kammback	5995	Subaru wagon	5699
Note: * Indicates 1980 price. NA=Figures not available. All prices are as of November 1980.			

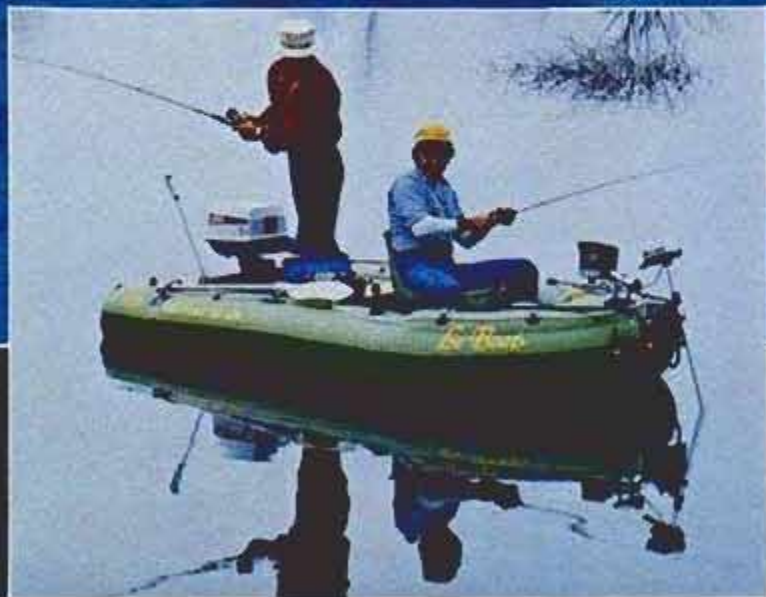
New boats for economy and action

Performance now means more water miles per gallon, rugged construction and less maintenance.

by Bill McKeown BOATING EDITOR



A twin-hulled, fiberglass, tunnel runabout with a picklefork bow, the 600-pound Eliminator Daytona 19 from Anaheim, Calif., has done 72 mph with a 200-hp Mercury outboard.



An 11-foot, 88-pound inflatable that can come out of a closet or car trunk to become a bass boat, the Seylor XK-330 Le Boat can bow-mount an electric and clamp a 7-hp astern.

More boatmen this spring will be learning the answer to more fuel savings and more performance. The secret: more boat.

The new models are not necessarily longer. But many are larger—yet lighter—

with higher sides (freeboard), added compact features and accessories. Foam-core construction and new synthetics like Kevlar are making possible stronger hulls that weigh less and require less power to push.

Speed has become less important when

a slightly slower pace can save gasoline and dollars. Backing off on the throttle, once planing attitude is reached, has been found to save as much as 50 percent in fuel, while cutting only a few miles an hour from top speed. Small motors are not al-



Hammond V-2150 Challenger MK II has clocked 60 mph with a 260-hp MerCruiser, and has an outboard version rated for 250 hp.



For the ninth year, "Mr. Bass" Ray Scott chose a Ranger bass boat, this time the new 17-foot R-335V, as the BASS Classic boat.



At helm of his new Ranger Chief 380, from Wood Boats, Flippin, Ark., designer-builder Forrest Wood tests this deep-V 19-footer, enlarged for deep-water fishing.



Offshore features in a 25-footer are provided by Grady-White Sailfish outboard, and Kingfish sterndrive or inboard gas or diesel models. Both have walkways outside the cabin.

Over 70 companies make sailboards; Surf-Sailing Canada, 9 Davies Ave., Toronto, includes this North American championship tandem board among its five latest models.

ways the answer: plenty of models are available, but a large mill at cruise setting may burn less gas than a smaller engine running full bore for the same speed.

Craft that can be car-topped or trailed behind a compact car are getting new at-

tention. Designs that will handle rough or offshore water safely, and without excessive pounding, are gaining popularity. Multipurpose rigs suitable for both fishing and water skiing are the choice of many families. Here are some of the latest trends:

Bass boats

A type of hull that has seen tremendous growth, this versatile, two-pedestal-seat 16-footer is now stretching out to 20 feet and more, adding a veed hull when it's intended for rougher water and less stand-



OMC Sea Drive prototype powers 33-foot Bertram. Waterproofed units are lighter than inboards, take less space, can go faster on less fuel.



An Avon S4.6 15-foot inflatable, from Inland Marine, Wilkes-Barre, Pa., "The Alternative" is fitted with fishing seats, Teleflex steering and mid-console control center.

Cruisers Rally 160 runabout, from Mirro Marine, Oconto, Wis., comes with a ski-tow pylon and stern boarding steps in a new Jim Wynne deep-V-design hull.



up casting. It's getting lighter through the use of aluminum or new fiber compounds. Current outboard and stern-drive motors are providing all the gas and electric power required for more economical running.

Inflatables

Boatmen are learning that a good blow-up costs just as much as a more conventional rigid hull, but that the fold-ups are often much easier to stow and move around, and are inherently stable. This

spring several will be offered with fish-boat fittings—swivel seats, center control console with newly designed remote steering controls, downriggers and an electric trolling motor forward. These new, rugged craft can be powered, sailed or rowed, and

[\(Please turn to page 153\)](#)



A stretched-out bow-rider, 22-foot Tri-Sonic 2200 LTD, from Fort Worth, Tex., has a tunnel-type hull, optional hardtop over helm position.

No gas nor even paddle power is required to push the 14-foot Princess from Dolphin Products, Wabasha, Minn. This "mopad" replaces the paddle with a motor that is pedal-controlled and battery-powered.



An aluminum bass boat with a new full-length V-hull, Rover III V-20, by Fisher Marine, West Point, Miss., is 20 feet long, takes a 40-hp outboard, weighs 420 pounds.

Newest in the Glastron Carlson line, the 20-foot Ski Machine is a V-bottomed tournament boat rated for outboard power with motors up to 200 hp.

Now: Energy by the bucket

Fish watts from flowing water by using miniature hydroelectric equipment.

by John Ingersoll

Harry Langhorne of Lowesville, Va., gets his hot water from a cold mountain stream.

Langhorne enjoys a hot, leisurely shower every morning without wor-

rying about his energy bills. He also runs lights and a few appliances and even heats up millstone tables (opposite page) to help heat his house—all with a 6.5-kilowatt hydroelectric plant he built himself. The little homemade turbine, which can spin out more than 130 kilowatt-hours per day when the stream is high, meets about 80 percent of his electrical needs.

Langhorne is not alone. Backyard hydropower is gaining enough

popularity to worry a few private and public utility officials. They view it as an erosion of their monopoly, rather than as a solution to foreign oil dependence.

But it's happening—from the fir forests of the Olympic Peninsula in Washington state to the hills of Georgia. Tiny generating plants are springing up, and they're being encouraged by the Department of Energy (DOE) and new protection from the Federal Energy Regulatory



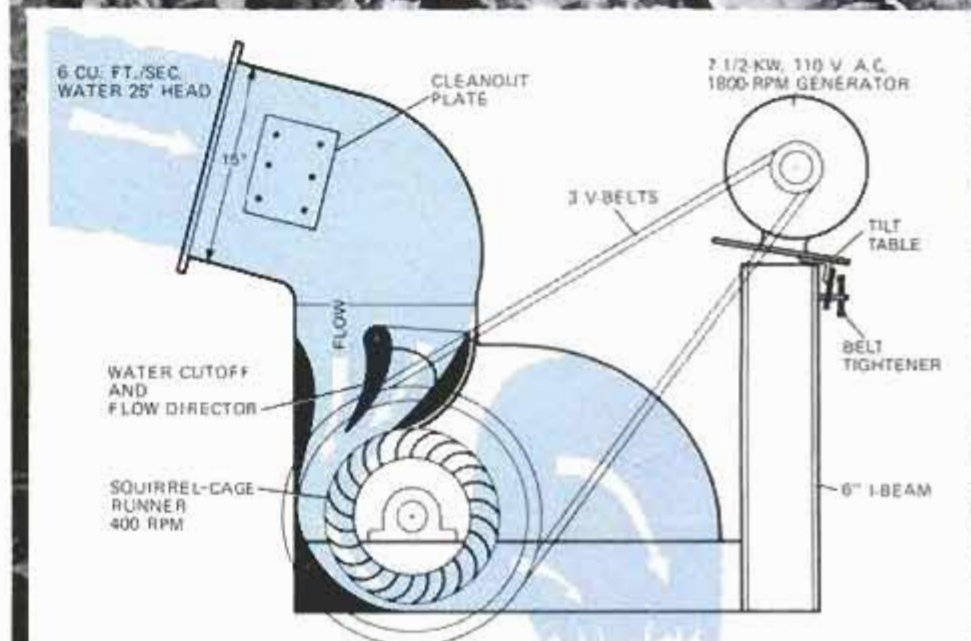
Langhorne cut steel end plates (above), then fitted curved blades to complete the turbine (top), heart of small hydro plant.



Four voltage-sensitive relays kick on in sequence to add load to Langhorne's system when power supply exceeds demand.



Mountain stream is diverted to enter supply pipe, lined with polyethylene. Screen keeps out leaves, sticks and debris.



In Harry Langhorne's homemade system, a belt drive transfers turbine energy to a 7.5-kilowatt generator mounted on a tilting table. Water flows to the turbine through 100 feet of pipe running from a concrete box that collects diverted water.

from back-yard powerplants

Commission (FERC). DOE estimates that there are hundreds of such installations supplying millions of kilowatts. And increasing numbers of homeowners are drawing up plans right now.

The fundamentals are simple. Moving water contains energy, converted to electricity through a water-spun turbine (basically a sophisticated water wheel), which turns a generator. "Water power is the most efficient, most dependable

source of energy known to man," says Ron Corso of FERC. Moreover, it is environmentally clean.

A DOE/Army Corps of Engineers report recently predicted that redevelopment of existing dam sites, development of new sites and back-yard powerplants could raise the contribution of hydro to 160,000 megawatts, saving 727,000 barrels of oil daily. At that level, hydro power—from tiny 500-watt generators to mammoth 500-megawatt plants—

would deliver five percent of the country's power, or about 24 percent of total electric-power needs. Hydro now meets 15 percent of national electrical demand.

With so much in hydro's favor, why isn't it sweeping the nation? One pragmatic reason is its cost. The National Center for Appropriate Technology in Butte, Mont., estimates that labor and materials for a system to generate house power would cost between \$800 and \$1500



PM photos: Robert Tripolsky and Harry Langhorne



Langhorne attached 450-watt heating element to bottom of a stone coffee table (above and top), which helps heat house.



Another heating element powered by hydro warms chair seat. Hydro supplies 80 percent of the electricity used in house.

per kilowatt of generating capacity. Estimates of peak demands for a household vary between 1 kilowatt (for a cabin with just a few lights) to more than 12 kilowatts. The DOE estimates *average* demand at any given time—including nights—at 1 to 1.5 kilowatts. Still, buying hydro equipment to meet peak demands could easily cost \$10,000 installed, and some people have spent up to \$40,000 for 12-kilowatt equipment. By comparison, Langhorne paid less than \$2100 for materials in 1975 to build his plant, which is capable of

producing about 6.5 kilowatts when water is gushing. (His turbine is connected to a 7.5-kilowatt Onan generator, but water seldom flows fast enough to bring the Onan up to rated capacity.)

Why are there such extremes? For decades, companies here and in Europe have made huge turbines and generators to supply the big utilities. Small power users were bypassed or given scaled-down versions of the monster systems. These units were expensive and rated for high performance.

Hardware shrinks, prices drop

But today, new companies are introducing product lines specifically designed for small plants. These entries are cheaper than older systems, and competition could drive the prices even lower.

That's the good news. The bad news is that no accepted standards for microhydro equipment (from .5 to 5000 kilowatts) exist at present. According to engineer George Grimes of DOE, that means "buyer beware." At the end of this article, we list manufacturers and additional sources of information. It's an incomplete list and it isn't meant as an endorsement of the companies. But each company has been in the marketplace long enough to survive faulty-product claims. And several are well known in other fields.

Drastically reducing or eliminating electric bills is one spur for the enthusiastic new wave of microhydro developers. The second spur is *making money*.

Sell your power

John and Susan Craft own and direct the Liliwaup Falls Research Station in Washington. Flowing water on their property generates 160 kilowatts with existing equipment. But the potential power in their stream, they estimate, is 1200 kilowatts.

When this is tapped, the Crafts intend to draw what they need for the research center and sell the remainder to local residents. This income will be plowed back into research—essentially of a biological nature.

Last summer, the Crafts were visited by a local utility representative who had gotten wind of their plans. At first, he was pleasant and patient in trying to dissuade them. When that proved futile, he implied that the power company could stop them legally.

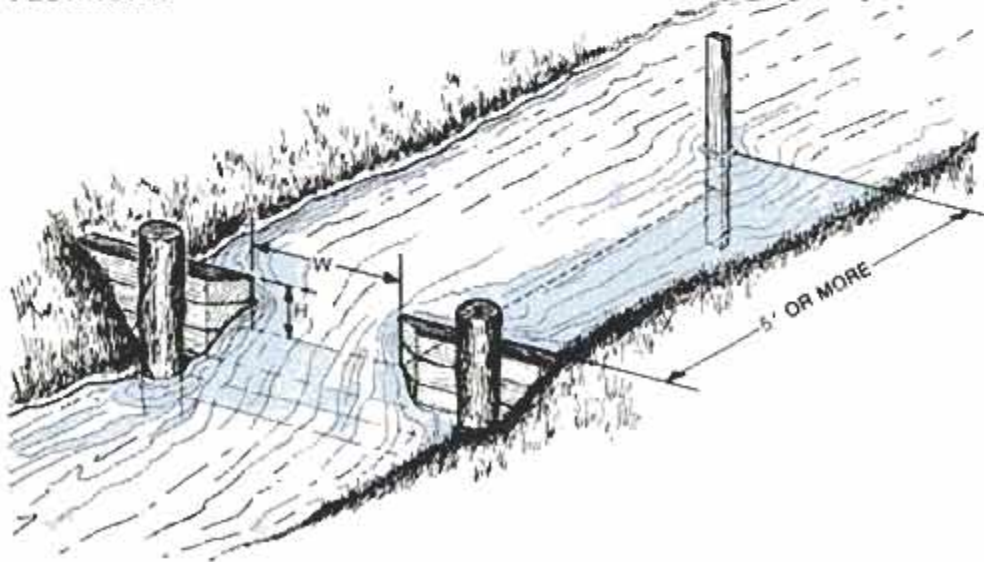
Whether a utility could take such action was debatable last summer. Now it isn't. On Oct. 29, 1980, the Commissioner of FERC offered official protection to anyone producing hydroelectric power up to 5000 kilowatts.

Ron Corso of FERC says, "Once the individual's application is submitted and approved (which takes about 120 days), the property is exempted from licensing, which means no one—private or public utility, state or city—can condemn or take away their site or prevent them from developing hydropower.

"Second, this individual may sell power at whatever rate he wishes.

"Third, privately developed power can be sold to a utility, and the util-

HOW TO MEASURE FLOW RATE



Is back-yard hydro practical for you? It depends in part on flow rate (see accompanying article).

In small streams, you can measure flow by diverting the stream into a drum of known volume and timing how long it takes to fill up. In larger streams, however, that can be difficult. And that's where the *weir method* of measuring flow comes in.

Begin by building a temporary dam with an opening large enough to let through all water in the stream without the water spilling over the top of the dam. The width of the dam opening (W) should be at least three times the opening height (H). Sink a stake into the stream at least five feet up from the dam. Run a piece of cord from the lip of the

dam to the stake. Use a mason's line level on this line (water won't hurt it) to make sure the bottom of the dam lip is level with the point where the cord attaches to the stick.

Now carefully measure the distance in inches along the stake from the cord attachment to the water surface. Move to the weir table (which we have abbreviated below) and determine what rating equals the measurement. Multiply the rating by the width of the dam opening in inches. The result will be the cubic-feet-per-minute (c.f.m.) flow for the stream. It's important during measurements that leakage does not occur in the dam; caulk any leaky seams with clay-filled mud.

Depth on stake (in inches)	C.F.M. per inch of notch width	Depth on stake (in inches)	C.F.M. per inch of notch width
1	0.40	13	18.87
2	1.14	14	21.09
3	2.09	15	23.38
4	3.22	16	25.76
5	4.50	17	28.20
6	5.90	18	30.70
7	7.44	19	33.29
8	9.10	20	35.94
9	10.86	21	38.65
10	12.71	22	41.43
11	14.67	23	44.28
12	16.73	24	47.18

C.F.M. = Cubic feet per minute.

ity must buy it, but at rates established by the state commission."

This new rule frees the Crafts to develop their stream. It also gives people with much smaller operations a chance to make money.

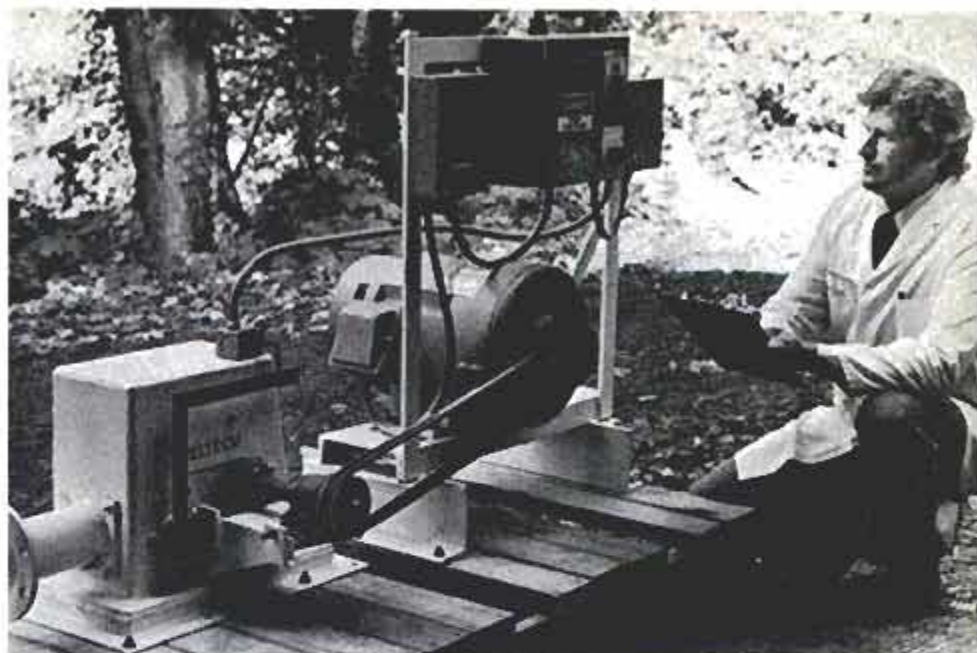
Running the meter backward

For example, a house with a 10-kilowatt demand may be served by a plant generating 15 kilowatts. Five kilowatts is available immediately for sale back to the grid. As demand in the house drops, the homeowner can sell more of his power. A standard meter, running backward, keeps track of electricity sent to the grid in kilowatt-hours. At the end of each month, the owner may receive a check, instead of mailing one.

Sound enticing? It is. Sound easy? It isn't. While the technology for large hydro systems was perfected decades ago, the engineering of microhydro is an emerging art. The most fundamental and critical problem associated with sending power back to a utility grid is generating 60-cycle current with a wave form that precisely matches that of the grid with consistency and no transient voltage.

Another potential problem: Private power can zap lineman working to restore a public-power outage.

FERC and DOE have laid the groundwork for small private-power sales. But the details that are going



Complete 7.5-kilowatt hydro powerplant is from Energy Independence Research Corp., Bellingham, Wash. Its circuitry maintains a continuous output under changing loads.

to protect owners and utilities have yet to be hammered out. Before leaping into a power operation for profit, seek the best advice you can get from manufacturers, utilities and, if necessary, a good consulting hydroelectric engineer.

Here are some common questions and answers to serve as a guideline for your further research.

■ *How much water is required?* More than a trickling spring, but

probably a lot less than you expect. Alan Van Hook of Nooksack, Wash., draws 6 kilowatts from a small, but steady spring. His powerplant works because the spring is 350 feet above his turbine. In hydro terminology, the system operates on a 350-foot "head."

Head, or the vertical drop from water source to turbine, and *flow*, the quantity of water moving past a given point in gallons or cubic feet per minute, are the two conditions of moving water that determine power potential.

To generate house power, a high head and low flow will serve as well as a low head and high flow.

A rough rule of thumb equates high head with smaller, less costly equipment; low head with larger, more expensive turbines.

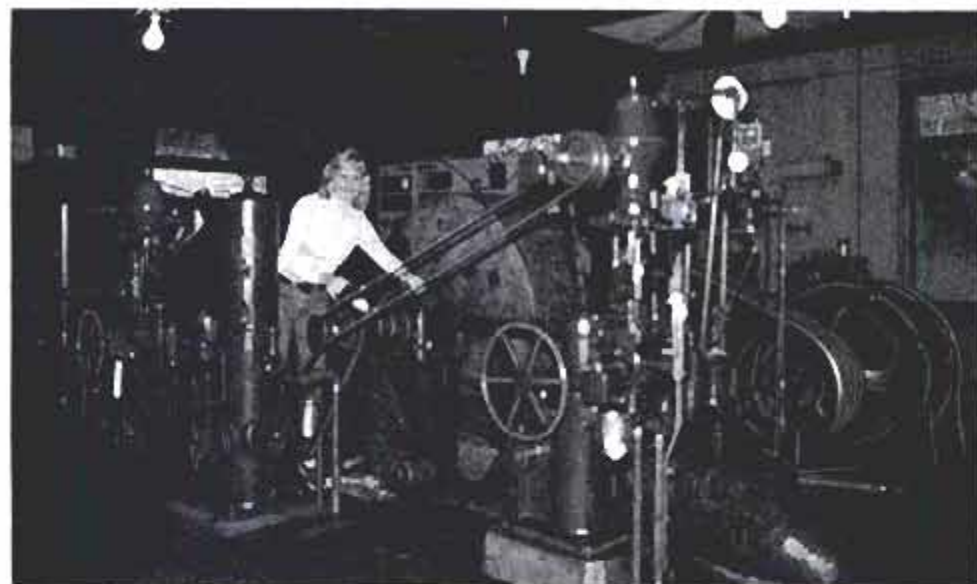
Because the slope from water source to turbine is almost always gradual, you can use simple surveyor's measurements to calculate head. You don't need to rent a transit, though you can. You can manage with a tripod, spirit level, tape rule and a tall pole or stick marked, at least, in one-foot increments.

Stand the tripod close to the water at the top of the slope. Place the spirit level on the tripod platform. Measure the height of the level above the water.

You'll need a partner to hold the pole. Move him down the slope to a point at which the upright pole is just within sight across the top of the spirit level. Aim the level as you would sight a rifle.

Make certain the level bubble is centered; have your partner record the span between the ground and

(Please turn to page 158)



Hydro equipment (above) provides 160 kilowatts to the owners, Susan and John Craft. However, the potential from the stream, which is diverted through a pipe (left), is higher. The Crafts plan to sell excess wattage to others.



Here's a straight-line turntable that won't play your records lying down. It's the LT 5V from Mitsubishi, and it must stand vertically during operation. A pressure pad on the spindle holds records in place, while arm and stylus track in a straight line along a recessed worm gear.

PM photo: Steve Fay

TURNTABLES THAT PLAY IT STRAIGHT

These straight-line turntables move the needle across your records in the same manner the record grooves were originally cut on the masters. This accuracy results in high playback quality.

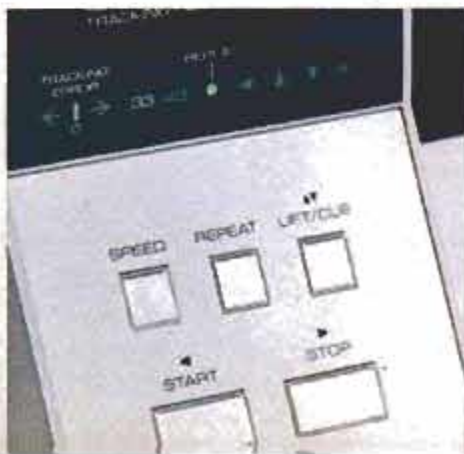
by Fred Petras

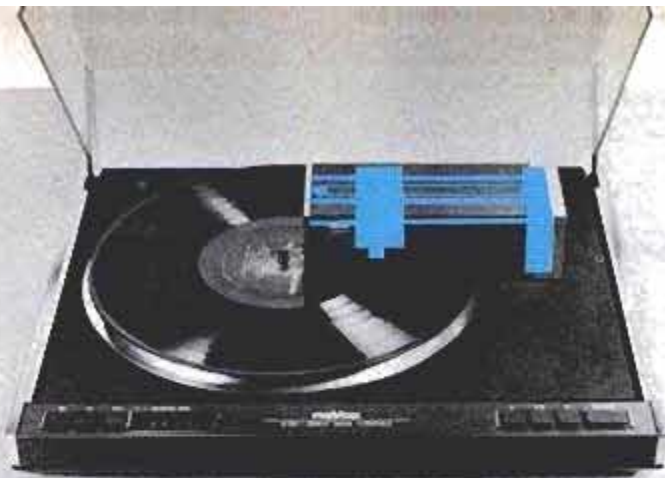
Shortly after celebrating the phonograph's 100th anniversary, the audio industry is rediscovering Thomas Edison's approach to the phonographic art. Edison believed that the radial-drive, straight-line, tangential tracking method was the best way to move a pickup and its

"needle" to extract all the nuances of sound in the record groove. After all, that's the method used to engrave the sound in the record groove in the first place.

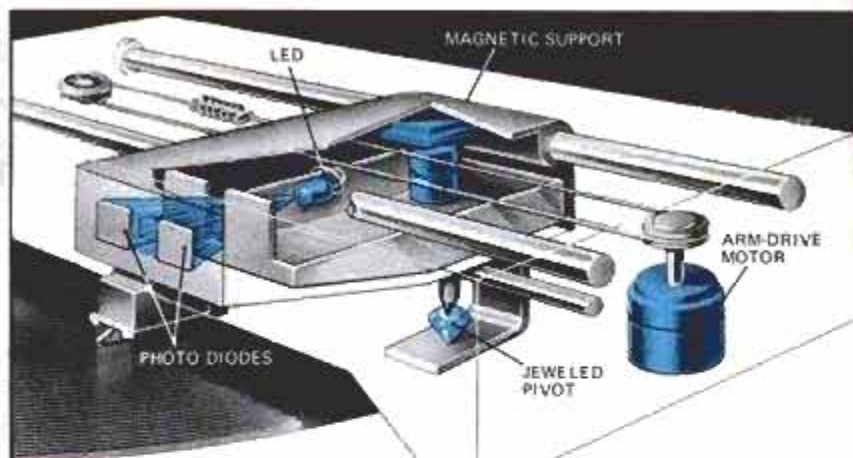
The audio industry is taking a new look at Edison's tangential tracking method—relative to today's state-of-the-art records that impose stiff demands on the equipment meant to play them.

Easy-on-the-fingers controls set functions of the LT 5V, including lifting tone arm.





Revox Model B795 sells for \$599. Stylus is carried not by a tone arm, but by a "trolley" arrangement. The system, called Lina-track, is one of the most novel. It's explained at right.



Revox's Lina-track system moves the stylus across the record much as an industrial crane moves along its tracks. Photodiodes watch upcoming grooves and keep stylus angle properly adjusted.

In some forms, a tangential tracking system dispenses with tone-arms; in others, it utilizes an abbreviated tone arm. But in all systems, the stylus moves in a straight line across the record surface, as opposed to moving in an arc, as on a pivoted tone arm. This arc skews the position at the outside grooves of a record, causing improper groove tracking and distortion that's greatest at the inside grooves of the record. While this distortion, even in high-quality, well-engineered turntables, may not be noticeable to many buffs, it is there.

Following is a rundown on how seven manufacturers achieve proper tracking. We describe nine current turntables with unusual tone-arm drive mechanisms.

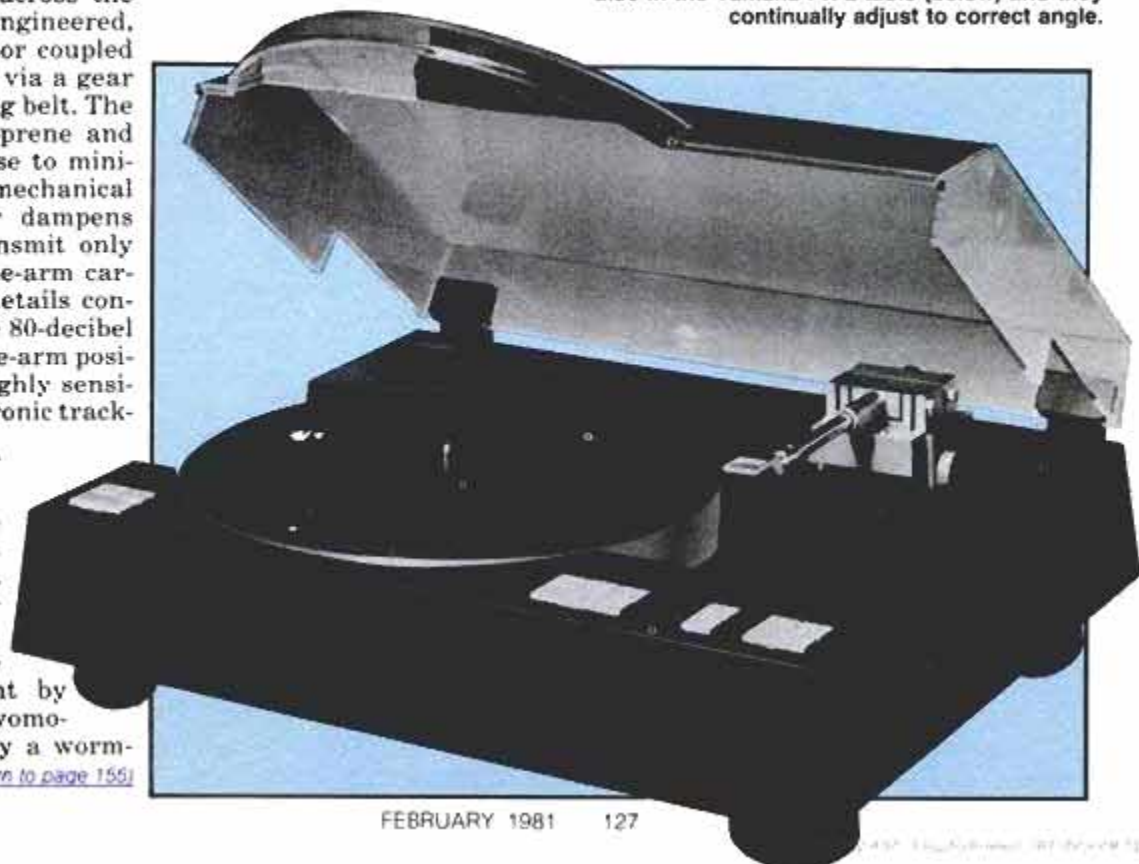
In *Yamaha's Model PX-2* (\$900), the tone arm is driven across the record by a precision-engineered, high-torque coreless motor coupled to the tone-arm carriage via a gear system and noise-damping belt. The motor is encased in neoprene and supported on a butyl base to minimize transmission of mechanical noise. The belt further dampens mechanical noise to transmit only smooth power to the tone-arm carriage. All these design details contribute to the PX-2's fine 80-decibel signal-to-noise ratio. Tone-arm position is controlled by a highly sensitive, dual-CDS opto-electronic tracking sensor.

Mitsubishi Model LT 5V (\$450) is a vertical "stand-up" radial-drive turntable. A high-precision servomotor drives the tone arm assembly via a specially wound stainless-steel wire. Wire tension is kept constant by spring loading, and servomotor rotation is applied by a worm-

(Please turn to page 155)



The most unusual feature of Aiwa LP-3000 is that the tone arm is powered by two separate motors—one drives the arm across the record and other lifts and cues it. Photodiodes are also in the Yamaha PX-2 table (below) and they continually adjust to correct angle.



Datsun pulled one heckuva coup back in November 1969 by offering the world a marvelous, inexpensive sports car—the now near-classic 240Z. Price: \$3526 p.o.e. Customers flocked to Datsun showrooms, and demand outstripped supply well into 1973.

For '74, the 2.4-liter, sohc Six was expanded to 2.6, and the car became known as the 260Z. A 2+2 also arrived that year. Displacement rose again in 1975 for the 280Z. Because of inflation, though, and the strength of the Japanese yen, the 280Z cost \$9408 by 1978.

Finally for 1979, Datsun redesigned



Although styling looks similar to earlier Z's, the 280ZX sports a totally new body.

and reengineered the Z-car's body, suspension, brakes, interior and image. Result: the present 280ZX. The ZX shares no sheet metal and very few mechanical components with previous models. Only



the 280's fuel-injected engine and optional transmissions remain.

Nor does Datsun deem the 280ZX a sports car. It's now called a luxury tourer. That's not to say it lacks handling or responsiveness, but most owners—and even the factory—agree that the ZX is a boulevard cruiser, rather than a back-road bomber.

Our survey of 280ZX buyers shows that at least 16.5 percent had owned Z-cars before.

Comparisons between old and new were inevitable. Representative comments, gleaned from our questionnaires, include the following:

A Louisiana physician told us, "I'd had very good experience with my previous Zs. All three handled well. The standard-

Bridgestone radials on this ZX, though, tend to skid on wet roads."

An Alabama bookkeeper: "The new car rides great, but handling isn't as good as with the older models."

A California marketing director: "I had a 260Z and loved it. Quality seems very good on the ZX, but I wish they'd go back to sports-car engineering. The new suspension isn't as tight as it could be."

And a California student: "I liked the 280Z I owned previously. This ZX rides much smoother than my 280Z, and it's roomier and more comfortable. While I feel workmanship is still good, I think Zs have gone down a little in quality."

Not many owners, though, agreed with that last comment on quality. Nearly 98 percent rated the ZX's workmanship *good to excellent*, while back in 1973, when we did a similar survey of 240Z owners, only 80.7 percent gave workmanship a *good-to-excellent* rating.

ZX owners compared their cars not only with previous Zs, but with the competition, as well. A Texas theater projectionist commented, "I had been intent on buying a Corvette, but I discovered the ZX was by far a better value."

Another Texan, a schoolteacher, echoed: "The choice was between the Mazda RX-7, Porsche 924 and Corvette. The ZX's 2+2 feature put it ahead of the RX-7 and Vette, and price placed it ahead of Porsche."

BY MICHAEL LAMM WEST COAST EDITOR

It's less agile than the old Z, but owners love the ZX's economy and comfort

Fuel tank holds 5 gallons more than previous model's, and it occupies a safer position.

280ZX's rear discs come from front of Datsun 210, suspension from the Datsun 810.

Panels lift easily off T-top, store in hatch.



PM photos: John W. Lamm

And a California sales rep confided, "I recently drove my friend's Mercedes 450SL for two weeks. My 280ZX is much more comfortable to ride in. I drove both cars on 1000-mile trips and find the Datsun much more comfortable."

Comfort, in fact, received an extremely high rating; 98.7 percent of our respon-



Seat tilt, rake and lumbar adjustments earn the 280ZX great praise for comfort.

dents gave front-seat comfort a *good-to-excellent* score.

Owners with the 2+2 feature graded rear-seat comfort *fair to poor*, but this came as no surprise to anyone. The rear buckets are strictly for kids. "The multiposition front seats with lumbar support can be adjusted to suit any driver and passenger," mentioned a Delaware engineer. "As for the rear 'seats,' they're for occasional or emergency use only."

Not surprisingly, styling was the Datsun 280ZX's best-liked feature. Styling caused 58.8 percent of the people in our survey to choose the ZX initially, and it remained the car's most appreciated attribute with 75.2 percent. "It's a sleek, classy, sporty fun car for a single lady to be seen in," quoth a California draftsman.

A Florida CPA: "Appearance sold me. I've had Z fever ever since the first one came out."

"Looks, resale value, reputation and the T-top sold me," stated a Texas manufacturer.

Given the opportunity, owners eagerly listed the many other things they like about their 280ZXs. A cross section of comments follows.

A Texas student: "It's luxurious, yet racy. I love the interior design, particularly the warning display that monitors fluid levels, lamps and so on. I appreciate all

(Please turn to page 156)

Datsun 280ZX particulars

What's left of previous Z-cars? The ZX's engine and transmissions—that's about all. Everything else—body, suspension, brakes, interior—was reengineered for the ZX's introduction in 1979. Virtually no body or chassis items can be interchanged with earlier Datsun models.

This radical transformation takes the ZX out of the sports-car category and makes it a true GT—a luxury tourer. The ZX comes in two body configurations: two-seater and 2+2. Wheelbases are 91.3 and 99.2 inches, respectively.

Engine remains the long-lived, 2753-cc, electronic-fuel-injected, sohc Six, shared with the Datsun 810. A five-speed overdrive manual transmission is standard, with a three-speed automatic optional.

The ZX has four-wheel disc brakes, the rear solid rotors being the same as the 10.6-inch fronts on the Datsun 210.

Once again, the suspension is four-wheel independent, most ZX underpinnings coming from the 810.

The 280ZX harbors a very impressive array of standard equipment, including AM/FM stereo, reclining bucket seats with adjustable lumbar support, rear defroster, quartz clock, console and locking fuel filler. The Grand Luxury package adds such items as power steering, power windows, airconditioning, alloy wheels, rear wiper, electric outside mirrors and an electronic monitoring system. All ZXs have a dual fuel gauge that tells you how much gas remains in the last quarter of the 21-gallon tank.

A NATIONWIDE SURVEY BASED ON 1,605,764 OWNER-DRIVEN MILES

280ZX's glass area is up 20 percent over 280Z's.

Engine and trans are among items held over from 280Z.

Fuel-injected 2.8-liter, sohc Six, shared with Datsun 810, delivers 135 hp. Performance remains sparkling, though some owners suggest turbocharging. All but a minority praise fuel mileage.



Considerable wind-tunnel work led to ZX's drag coefficient of 0.385.

Power steering, standard on GL, is recirculating ball type; manual uses rack-and-pinion.



PM Reproductions

A LINCOLN

Two mantel clocks



Shown above is PM's reproduction of the mahogany clock that was in the Butler family home, where Lincoln stayed while starting his Springfield law practice. The original clock (photo at top) is now in the Lincoln home.

LEGACY you can build

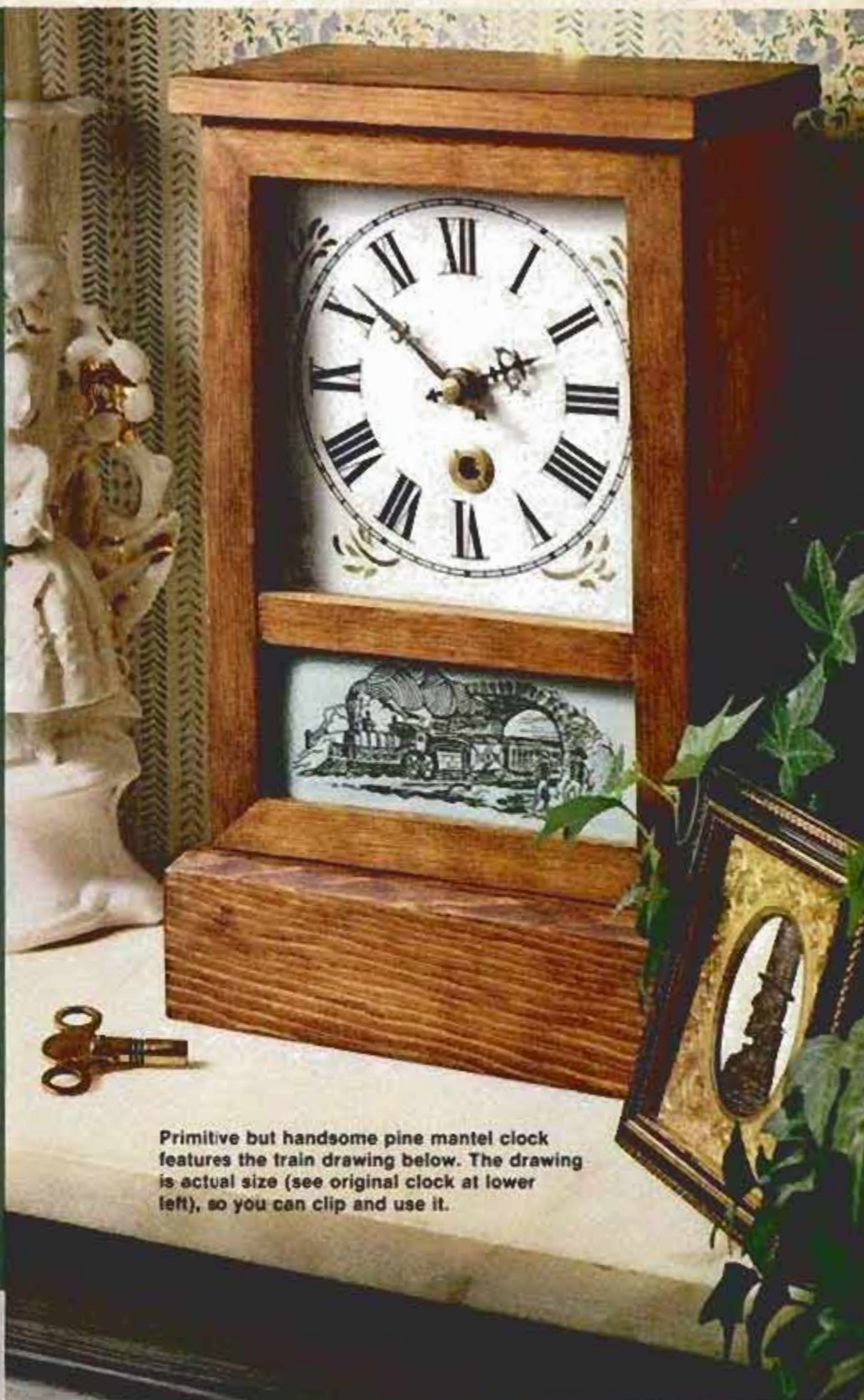
by David A. Warren

We've gone back into history to bring you two clocks that Abraham Lincoln must have checked time by during his early days as an aspiring young lawyer, and later as a U.S. statesman. The mahogany clock (left) was in the Butler home where Lincoln stayed when opening his law practice in Springfield. Today, it is in the sitting room of the Lincoln Home National Historic Site in Springfield, Ill.

The back of the illustration in the pine clock (right) bears an inscription by Lincoln's son Tad. To help you make your reproduction a faithful one, we've reproduced both this inscription and the decorative drawing. Complete plans for duplicating both clocks are on the following pages.

There are minor differences between the original clocks (in the smaller photos) and the PM reproductions: The originals have 30-hour movements, while ours are eight-day clocks. The original

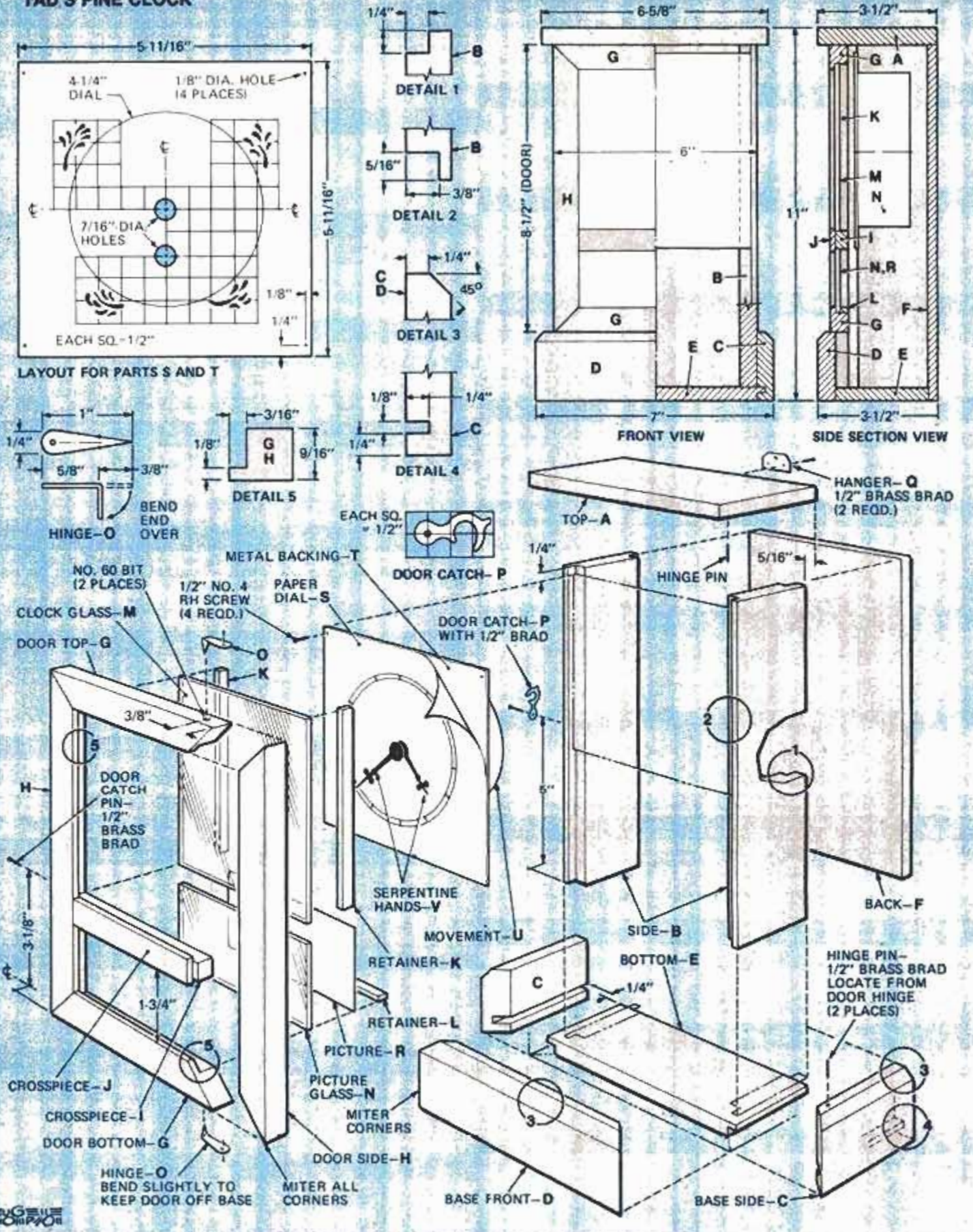
PM photos: Reproduction clocks, George Ratkaj; original clocks, black-and-white photos, Matt Doherty
Cabinetmaker: David Joseph Warren



Primitive but handsome pine mantel clock features the train drawing below. The drawing is actual size (see original clock at lower left), so you can clip and use it.



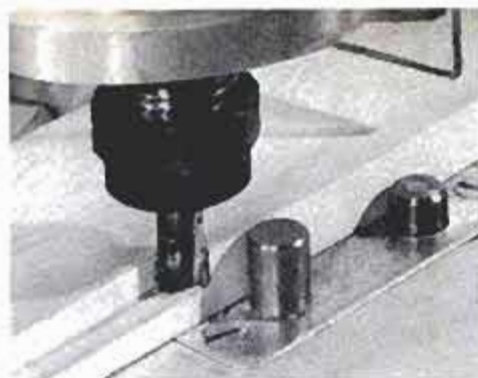
TAD'S PINE CLOCK



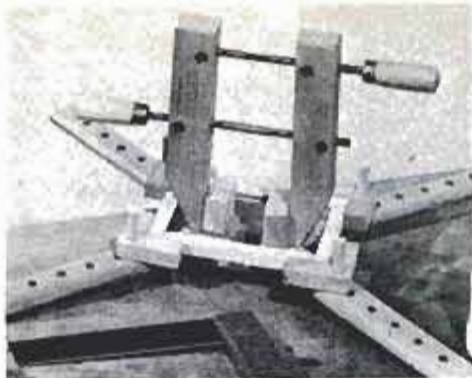
Inscription (below), by Lincoln's son Tad, can be clipped out and pasted behind the door.

*Sept 10th
1859
Abraham Lincoln
Tad Springfield Ill*

movements are screwed to the backs of the cases. In the reproductions, we've mounted the movements on a sheet-metal faceplate. The winding arbors on the reproductions are at 6 o'clock, whereas on the originals they are at 3:00 and 11:00.



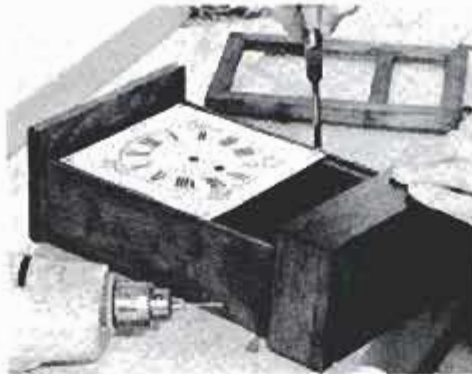
Edge rabbets for sides, bottom and door frame can be cut with a table saw, router or, as here, a router in an overhead arm.



Glue and clamp mitered door-frame pieces. When joints are dry, bore pilot holes in corners to reinforce them with 3d nails.



Pin hinges for door are reproduced from thin, polished brass. See text and drawing on facing page for installation details.



Paper clock face is glued to metal backing plate, and plate is fastened into rabbets in the case with small screws at corners.

For both clocks, we selected an Urgo eight-day, spring-wound, pendulum movement available from the source given in the materials lists. Modern hands come with the mechanism, but for more authenticity you'll probably want the older styles

we've specified. These hands, plus the appropriate paper dial faces, are available from the same source. You merely glue the paper dial to the metal backing plate.

There are, however, many other types of clock movements that you might wish to consider, such as quartz, electric or battery models. For your convenience, we've listed additional sources for clock movements and parts in the box at right.

Building the pine clock

Tad's pine clock has a fairly straightforward rectangular cabinet. Rip the base stock in one piece and cut the bevel before dividing it into the three parts. Then cut the grooves in the two sidepieces. Next, rip the sides for the case and cut the rabbets, using a table saw, router or jointer.

Glue and nail the bottom and base pieces so the assembly is square. Clamp if needed. Sand the exposed edges of the remaining pieces with 100-grit paper. Glue and clamp the sides to the base, making sure the sides are square. Cut and attach the back, then the top.

Rip stock for the door and make the rabbet to hold the glass. Sand the inside edges with 100-grit paper. Glue up the door; when it's dry, cut the crosspieces and glue them in place. Sand the upper and lower door edges at a 2° or 3° inward angle

CLOCK SOURCES

Clock building is an absorbing leisure activity that's easy to get hooked on. The National Assn. of Watch and Clock Collectors Inc., Box 33, 514 Poplar St., Columbia, Pa. 17512, provides hobbyists with a bi-monthly bulletin, lending library and other benefits. Membership fee is \$20 per year.

The Antique Nook Inc., 6226 Waterloo Rd., Atwater, Ohio 44201 (clock parts).

C & R Clock Shop, 11906 Q Drive North, Battle Creek, Mich. 49017 (bezel for PM reproduction and antique movements).

Caldwell Industries, Box 591, Luling, Tex. 78468 (Arrow Electric Ball Clock kit).

Campbell Tools Co., 1424 Barclay Rd., Springfield, Ohio 45505 (clock parts).

Clock Crafts, 1215 Springfield Pike, Cincinnati, Ohio 45246 (clock parts).

Craft Products, 2200 Dean St., St. Charles, Ill. 60174 (kits and parts).

Constantine, 2050 Eastchester Rd., Bronx, N.Y. 10461 (kits, parts and fine hardwoods).

Craftsman Wood Service, 1735 West Cortland Ct., Addison, Ill. 60101 (kits, parts and fine hardwoods).

Crown Clock Co., 756 Nicholas Ave., Drawer G, Fairhope, Ala. 36532 (kits and parts).

Devore's Antiques, 57 Canton Rd., Akron, Ohio 44312 (clock parts).

Emperor Clock Co., Industrial Park, Fairhope, Ala. 36532 (clock kits).

Empire Clock Co. Inc., 1295 Rice St., St. Paul, Minn. 55117 (clock parts).

Heinz Jauch Clock Co., Box 1150, 200 West Fremont St., Burgaw, N.C. 28425 (clock parts).

S. La Rose Inc., 234 Commerce Pl., Greensboro, N.C. 27420 (kits and parts).

Marshall-Swartzchild Co., 2040 North Milwaukee Ave., Chicago, Ill. 60647 (clock parts).

Mason & Sullivan Co., 39 Blossom Ave., Oosterville, Mass. 02655 (kits and parts).

Merritt's Antiques, Rte. 2, Douglassville, Pa. 19518 (clock parts).

Modern Technical Tool & Supply Co., 211 Nevada St., Hicksville, N.Y. 11801 (clock parts).

Southwest Clock Supply Inc., 2442 Walnut Ridge St., Dallas, Tex. 75229 (clock parts).

E & J Swigart Co., 34 East Sixth St., Cincinnati, Ohio 45202 (clock parts).

Swisscraft, 224 West Eighth St., Holland, Mich. 49423 (clock parts).

The Tiny Clock Shop, 1354 Old Northern Blvd., Roslyn, N.Y. 11576 (clock parts).

Turncraft Clock Imports, 611 Winnetka Ave. N., Golden Valley, Minn. 55427 (clock parts).

Versage Antiques, Cuddebackville, N.Y. 32729 (clock parts).

Westwood Clocks N Kits, 3210 Airport Way, Long Beach, Calif. 90806 (kits and parts).

MATERIALS LIST—TAD'S PINE CLOCK

Key	Amt.	Size and description (use)
A	1	1/2 x 3 1/2 x 6 5/8" pine (top)
B	2	1/2 x 2 5/8 x 10 1/8" pine (side)
C	2	1/2 x 2 x 3 1/2" pine (base side)
D	1	1/2 x 2 x 7" pine (base front)
E	1	3/8 x 2 3/4 x 6 1/2" pine (bottom)
F	1	1/4 x 5 1/2 x 10 1/2" pine (back)
G	2	3/16 x 1 1/16 x 6" pine (door top/bottom)
H	2	3/16 x 1 1/16 x 10 1/8" pine (door side)
I	1	3/16 x 1/2 x 5" pine (crosspiece)
J	1	1/8 x 3/8 x 4 5/8" pine (crosspiece)
K	2	1/8 x 1/4 x 4 15/16" glass retainer
L	1	1/8 x 1/4 x 4 15/16" glass retainer
M	1	4 1/16 x 4 3/16" single-strength glass (for clock)
N	1	1 5/16 x 4 5/16" single-strength glass (for picture)
O	2	1/4 x 1" 20-gauge brass (hinge)
P	1	1 x 2" 20-gauge brass (door catch)
Q	1	5/8 x 3/4" 20-gauge brass (hanger)
R	1	2 x 5" (picture, clip from magazine)
S	1	4 1/4-dia. dial with 5/8" Roman numerals (paper clock dial; see note below)
T	1	5 1/16 x 5 1/16" 20-gauge sheet metal (metal backing for clock dial)
U	1	Urigo 8-day pendulum clock movement (see note below)
V	2	1 3/8" and 2 1/8" serpentine clock hands (see note below)

Misc. 1/2" No. 4 brass screws (4); 1/2" brass brads; epoxy cement; 3d finishing nails; stain; French polish (80% orange shellac and 20% boiled linseed oil).

Note: The 8-day Urigo clock movement (Model 567982) is about \$30 from Marshall-Swartzchild & Co., 2040 North Milwaukee Ave., Chicago, Ill. 60647; hands and paper dial face can also be ordered from this company or obtained locally. There is no brass bezel on this clock style. Also, on the original, there is no brass grommet in the winding-arbor hole, but one can be added if you wish to protect the face from being scratched by the key.

(bevel) so the door will close smoothly.

Sand all parts, breaking the corners, dust and wipe with a tack cloth. We applied a dark walnut stain to the wood. When the stain is thoroughly dry, rub on several coats of French polish (20 percent boiled linseed oil and 80 percent orange shellac), using 4/0 steel wool. Next, buff with carnauba wax.

You can make pin hinges from 20-ga. brass to mount the door. Cut two hinges as shown in the drawing. Bore a hole for a small brass nail. File the hinges smooth and bend to shape. Use a No. 60 bit to bore hinge-mounting holes in the door. Bend the lower hinge upward slightly, so

(Please turn to page 171)

More heirloom clocks from kits

For a timesaving alternative to building a clock from scratch, try assembling one of the many kits available. These clocks come in virtually any style you could want. Or you can adapt a kit to your own design. To give you an idea of what to expect, five PM staffers and freelancers of varying workshop skills report on assembling the clocks shown.

Crystal mantel clock

This French-style clock with brass-bell strike movement and beveled glass on all four sides became popular in the late 19th century. After putting the clock together, I can say it's a gem of a kit. It comes with pre-cut wood parts of either cherry (\$131.50) or walnut (\$146.50) and includes the beveled glass, clock parts and hardware. You supply the finish, tools and glue.

The instructions are clearly

written and the accompanying art was a big help. The kit maker, Mason and Sullivan Co., also provides a diagram of screw sizes and bit sizes for boring both pilot and clearance holes.

The introduction to the assembly instructions offers sound advice to beginning woodworkers, so that anyone who follows the instructions should be satisfied. For exam-

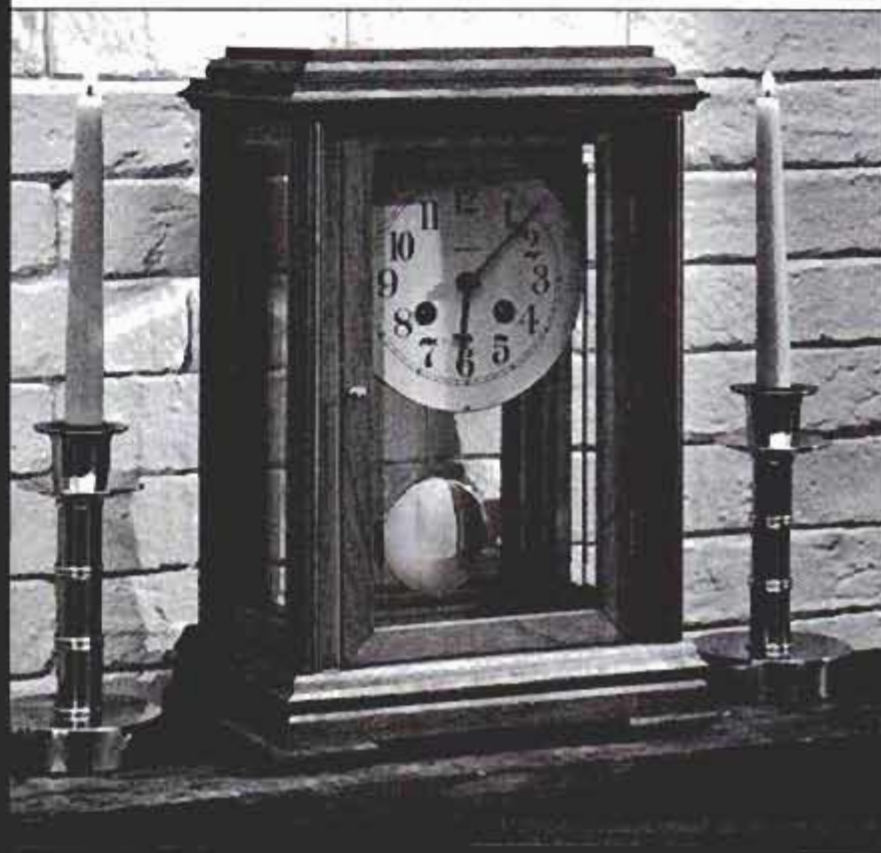
(Please turn to page 166)

Vienna regulator clock

This classic antique European design is 36½ in. high and combines the rich elegance of an oak and glass case with a gleaming brass movement. The kit comes with pre-cut solid-oak parts, all hardware and a choice of two clockworks. With a basic regulator (striker) movement, the kit is \$349; with Westminster chimes, it's \$399. I chose the chimes for their beautiful sound and added visual effect through the glass. Either kit is also available in cherry, instead of oak, for about \$30 more.

The three panes of beveled glass for the front and sides are optional and list for about \$70 extra. While you can use cheaper float glass, supplied locally, the beveled gives an expensive crystal look that's worth the money. I strongly recommend that you don't

(Please turn to page 166)





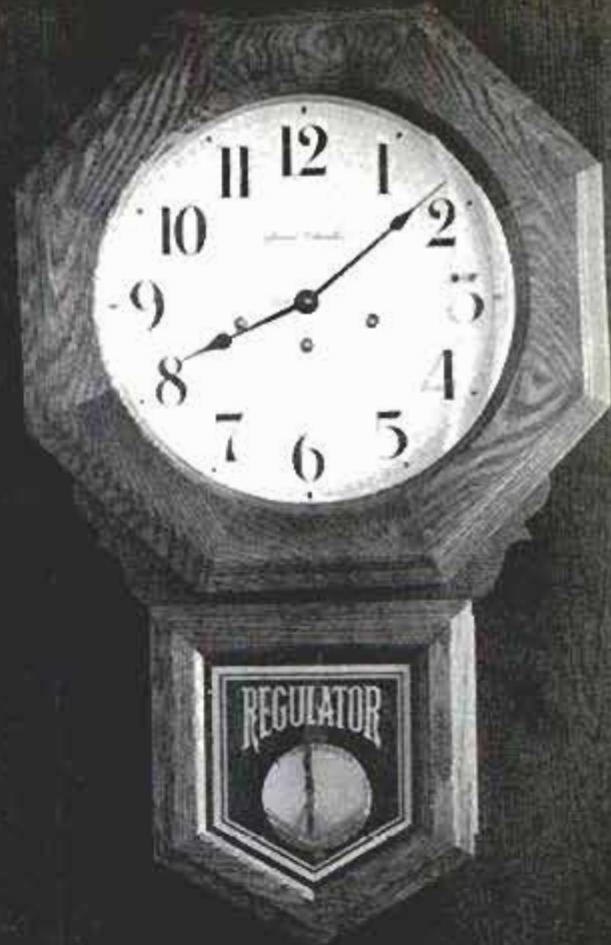
Oak regulator clock

The regulator clock from Emperor is a good-looking piece when it's done, but it did cause some frustration during assembly. The term "regulator," incidentally, was first applied to weight-driven clock mechanisms up until about 1890, when it then came to include spring-driven movements, as well. The word is frequently found printed on the face glass of some classic clock designs. In general, it has come to mean any fine, precision clockworks.

One problem I encountered was with the door frame, which has doweled corners. The frame comes with one corner already glued and the other three not. It took a lot of doing to separate the unglued corners to insert glue without damaging the preglued corner. Another annoyance was that one of the strips in the right side panel proved difficult to finish. The panel is made up of several glued strips, and the final top coat on one of these strips would not dry. I don't know what caused the problem, but it meant I had to wash off the top coat with solvent, then recoat the strip.

Otherwise, construction went fairly smoothly, except for one change in the instructions that I feel is necessary. This is to cut the recesses for the door hinges *before* assembling the case, rather than afterward, as the

(Please turn to page 175)



A classic school clock

The day the classic American school clock kit arrived from Craft Products Co. (its Amherst model, which sells for \$129.50), I was immediately impressed with the look and fit of the pre-cut oak parts. But one major wooden part was missing—immediately forwarded upon request—as were some small brass screws for attaching the dial face, which I have not been able to find in local stores. This missing-parts

problem plagues many shippers of kits—not just Craft Products—so check your kit carefully, whatever the make.

Thanks to the accuracy of the pre-cut parts, assembly of the clock's wooden frame is simple, and can even be accomplished without clamps, by using any convenient weight to hold the frame assembly together until the glue sets. (Oak shouldn't be finish-sanded with abrasive finer than 150 grit if you want

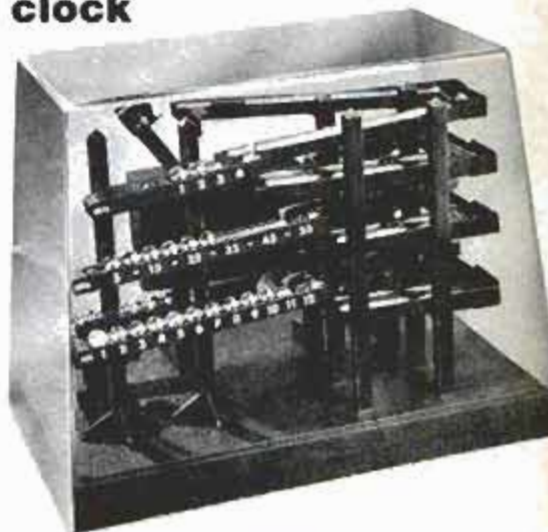
(Please turn to page 166)

Electric ball clock

You can have a ball anytime with this clock. Balls traveling through a maze of plastic tracks and holes denote the time by their positions on hour and minute scales along three teeter-totter racks. A 1-rpm motor feeds the $\frac{3}{8}$ -in. steel balls with electric-clock accuracy.

The kit includes all

(Please turn to page 166)





7 HANGUPS THAT MAKE

Functional, handsome and fun to make, all provide quick access to

by Harry Wicks HOME AND SHOP EDITOR

Nowadays the decorating preference seems to be to put functional items on a wall—in full view—so they will be handy when needed. The concept works if the items are displayed with a flair that makes them visually pleasing.

We asked architect Lester Walker to come up with projects that would solve seven everyday storage problems with eye-pleasing good taste. His solution to the problems are the projects shown on these pages.

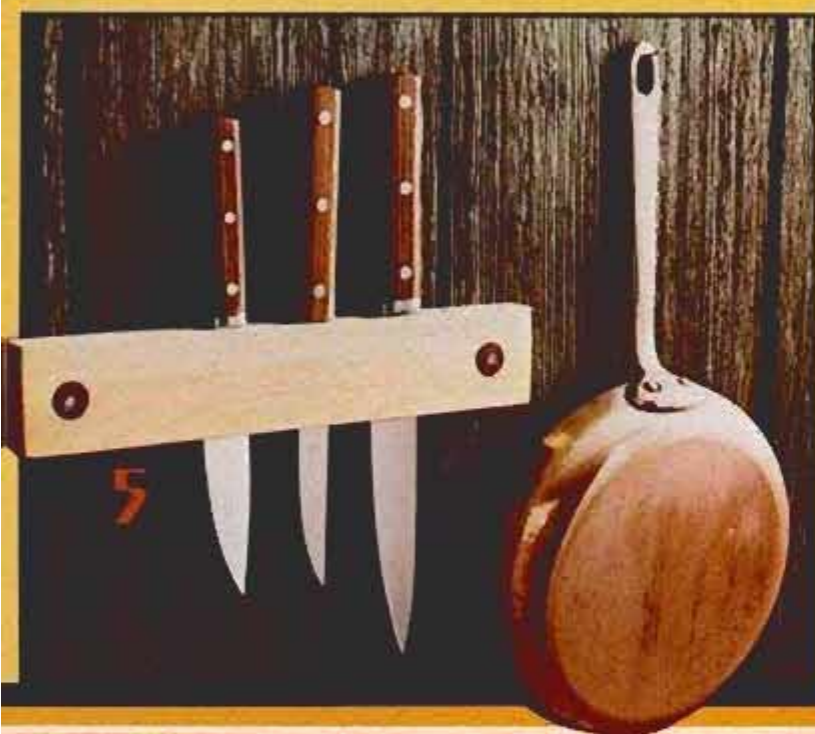
All the hangups are easier to build than their looks might suggest. Created of pine and using simple construction methods such as butt joints, the clever

designs are enhanced by Walker's expert color selections. Using just modest tools, you should be able to build at least one in a single weekend work session.

If possible, use clear pine throughout because knots seem to have a way of being in inconvenient areas on small projects such as these. Since each project uses just a minimal amount of material, it pays to invest in the clear stock and avoid aggravation.

Make all cuts with a hollow-ground planer blade to minimize edge splintering. The projects are contemporary in design; the edges will be just slightly broken with sandpaper and not rounded over with a router and rounding-over bit.

After you have cut the parts for your project, test-



LIFE EASIER

some everyday house 'tools'.

assemble them without glue to check for fit and square. When satisfied, disassemble and sand all parts smooth. Then assemble, using glue and fasteners as shown in the drawings.

On these projects, all finishing should take place after the project is assembled.

Deli container rack

Lay out and cut all parts as shown in the drawing. Use the miter cut on the bottom of the sides to determine the bevel cut of the front and rear edges of the bottom shelf. Locate the holes for the dowels in the shelf and side pieces and bore them approximately $\frac{1}{4}$ in. deep. Cut dowels to length and test-assemble

Designs by architect Lester Walker confirm the notion that "less is more." All projects shown are built of $\frac{1}{2}$ -in. pine using simple construction throughout.

1 Vertical rack holds a healthy supply of deli containers and lids.

2 Eight spice bottles hang from dowels which are inserted in the pine back.

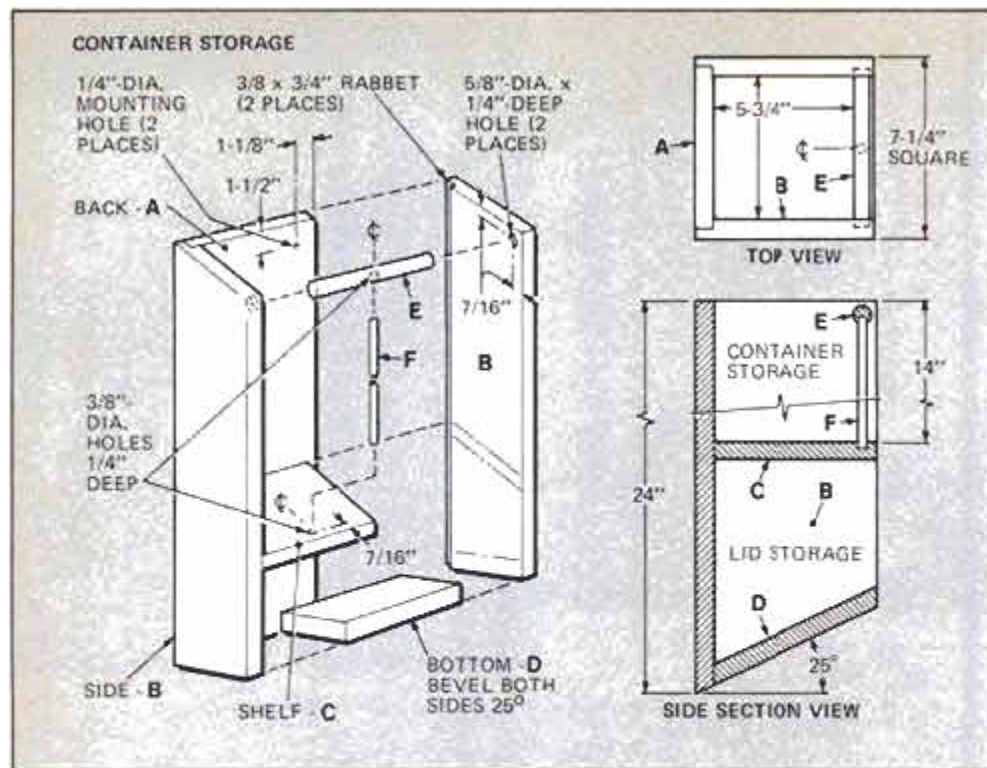
3 Five-piece kitchen-tool set also hangs from dowels glued into pine backboard.

4 Three-board flowerpot shelf cutouts simply rest on window's meeting rail.

5 For safety this knife rack keeps blades close to wall.

6 This hangup lets you park a large roll of paper towels on a convenient kitchen or bath wall; hand towels are displayed below.

7 Clever clipboard sports a pencil keeper, convenient note pad and a place to park the phone when someone's at the door.

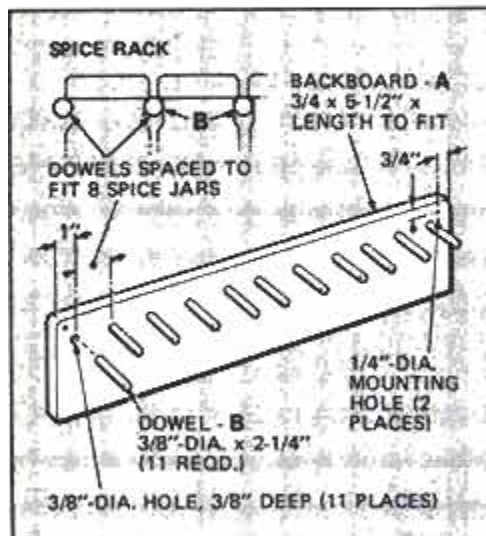


MATERIALS LIST—CONTAINER

Key	No.	Size and description (use)
A	1	3/4 x 6 1/2 x 24" (back)
B	2	3/4 x 7 1/4 x 24" (sides)
C	1	3/4 x 5 3/4 x 6 1/2" (shelf)
D	1	3/4 x 5 3/4 x 8" approx., trim to fit (bottom)
E	1	5/8"-dia. x 6 1/4" (dowel)
F	1	3/8"-dia. x 13 7/8" (dowel)
	2	3/16 x 3" toggle bolt

the rack without glue. When you're satisfied with the fit, disassemble and sand all parts smooth. Using white glue (sparingly) and 1 1/2-in. finishing nails, reassemble the box in this fashion:

- Attach the back to one side (in the rabbet).
- Add the middle and bottom shelves.
- Insert the longer dowel into the hole bored at the center of the shorter one, then install this T-configuration as a unit into the partial assembly. (Use glue only on dowels.)



MATERIALS LIST—SPICE RACK

Key	No.	Size and description (use)
A	1	3/4 x 5 1/2" x length to fit, (back board)
B	11	3/8"-dia. x 2 1/4" dowel
	2	3/16 x 3" toggle bolt

- Finally, apply glue where required and fasten the second side.

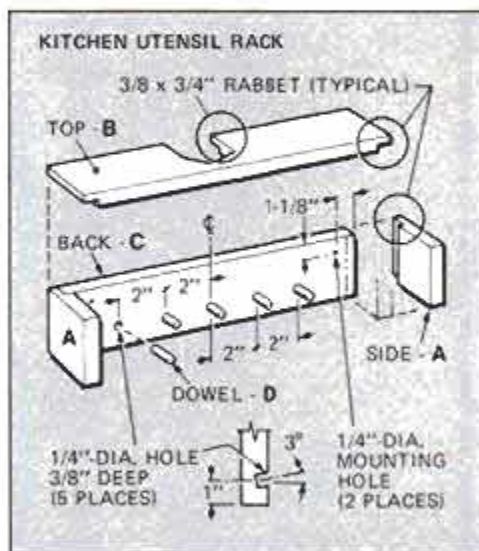
Using your combination square, check the box for square and set it aside to dry overnight.

Applying the finish

Next day, wipe the box with a tack rag, and completely protect the dowels with masking tape. Prime-paint the entire box with a pigmented shellac such as Bin, or use flat white spray paint as it comes from the can.

Allow the prime coat to dry completely before spraying with the color of your choice.

We used a burnt orange spray paint on the deli-container rack shown on page 136.



MATERIALS LIST—UTENSIL RACK

Key	No.	Size and description (use)
A	2	3/4 x 3 1/8 x 3 1/2" (side)
B	1	3/4 x 3 1/2 x 13 1/2" (top)
C	1	3/4 x 3 1/8 x 12 3/4" (back)
D	1	1/4"-dia. x 1 3/4" dowel
	2	3/16 x 3" toggle bolts

When the color has dried completely, peel off the masking tape and spray-paint the entire box—dowels and all—with clear varnish.

Hanging the rack

Since the deli-container rack, like all other projects in this roundup, is relatively lightweight, toggle bolts will supply ample holding power.

Holding the box in place and level on the wall, mark a line on the wall along the top edge (out of view).

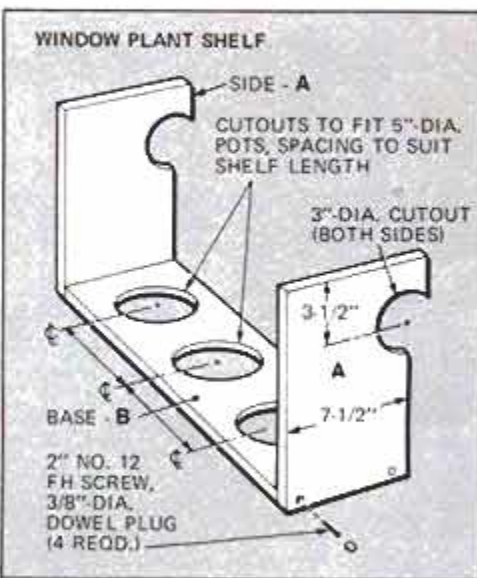
Using an awl, mark the locations for the screw-mounting holes on the wall. Remove the box and, with a drill, bore holes to suit the toggle bolts that you are using.

Remove the toggle wings from the bolts and insert the latter through the holes in the case. Reattach the wings. Lift the box into position and insert all of the toggle bolts into their respective holes. (You will probably need a helper at this stage.) When all wings are in the wall, turn the boltheads fully home, using a screwdriver.

If you are lucky, one or more of the hanging holes may line up over a wall stud. If so, simply bore a pilot hole through the wall and into the stud to receive the screw. In most cases, a 2 1/2-in. No. 10 screw will suffice. For good grip here, I prefer using panhead sheet-metal screws, rather than roundhead wood screws.

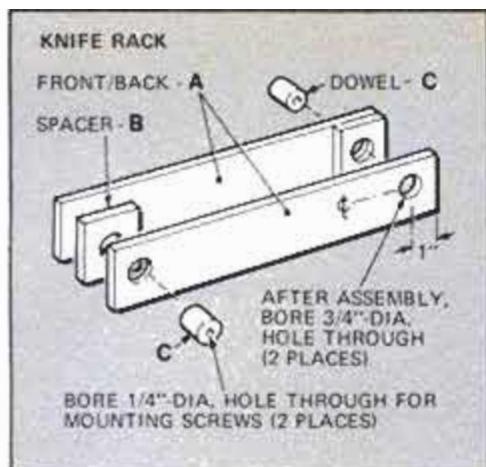
Spice rack

This, obviously, is the easiest project of all to create. Though its construction is simple, when the spice bottles are in place, it becomes a surprisingly attractive and functional piece.



MATERIALS LIST—PLANT SHELF

Key	No.	Size and description (use)
A	2	3/4 x 8 1/2 x 12" (side)
B	1	3/4 x 7 1/2" x length to suit; see text (shelf)
	4	2" No. 12 fh screw
	4	3/8" dowel plug



MATERIALS LIST—KNIFE RACK

Key	No.	Size and description (use)
A	2	1/4 x 2 1/4 x 12" lattice (front/back)
B	2	1/4 x 2 x 2 1/4" lattice (spacer)
C	2	3/4"-dia. x 3/4" dowel
	2	3/16 x 3" toggle bolt

Start by selecting the type and number of spice bottles that you want to display. Arrange them so you can verify dimensions for the dowel-hole locations. If necessary, adjust the spacing—and length of the board—to suit. At this time, also check dowel length to see if your bottles need more or less dowel.

Bore the dowel holes through. Change bits and bore the pair of holes for hanging. Sand the pieces smooth, dust and tack off.

This piece is easier to finish before assembly. Before spray-painting, insert short lengths of scrap dowel into the holes to protect the surfaces to be glued.

Prime and paint the board. When it's dry, pull out the waste dowels. Apply a small amount of glue to dowels (D) and insert them into the holes. Allow to dry overnight. Finish by spraying the entire piece with satin-finish varnish.

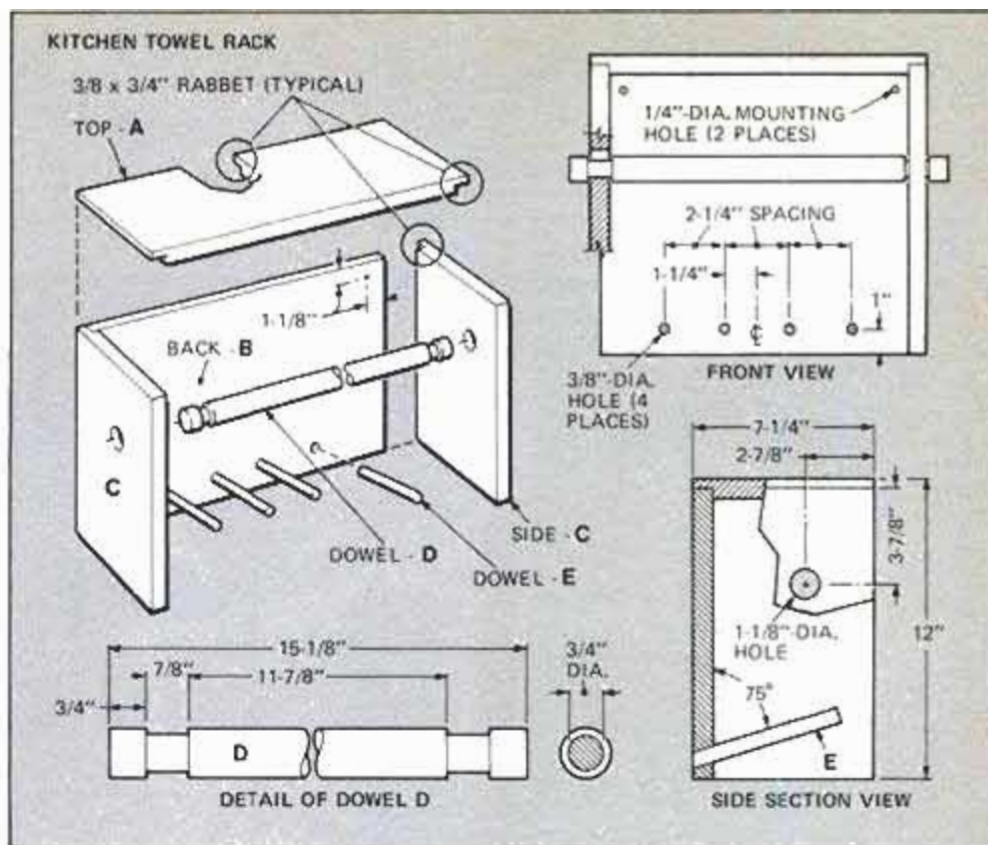
Kitchen utensil rack

Cut the four boards to size, as shown in the drawing. Next, set up your saw to cut the 3/8 x 3/4-in. edge rabbets in the sides and top pieces. Temporarily assemble the pieces and mark where the sidepieces rest on the back (on the inside).

Draw a light pencil line across the front of C (1 in. from the bottom edge) to serve as an aid for locating the dowel holes. To lay out the dowel locations, make a mark at the board's center (E on drawing) and space the dowels 2 in. apart, right and left.

The dowels on the prototype rack were located to suit the equipment to be displayed. To be safe, lay out the actual tools that you plan to hang on the board to check dowel locations. Relocate dowel holes, if necessary.

If you have a steady hand, you can



MATERIALS LIST—TOWEL RACK

Key	No.	Size and description (use)
A	1	3/4 x 7 1/4 x 13 1/2" (top)
B	1	3/4 x 11 1/2 x 12 1/4" (back)
C	2	3/4 x 7 1/4 x 11 1/2" (side)
D	1	1"-dia. x 15 1/8" dowel
E	4	3/8"-dia. x 6" dowel

bore the angled blind holes to receive the dowels with your portable drill. Otherwise, tilt your drill-press table 3° and clamp a jig to keep the workpiece from sliding while you bore the row of holes.

Before assembling, sand all pieces smooth.

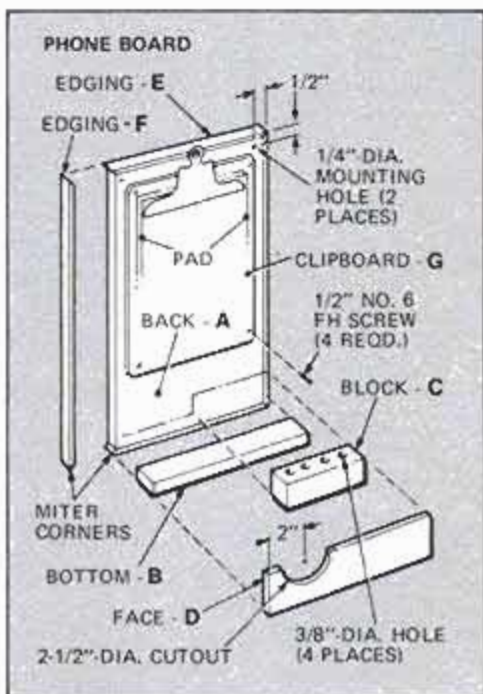
This project is also easier to paint

before assembly. First, test-assemble the box with partially driven nails to make certain you are satisfied with the fit, then disassemble it to apply the finish. Protect all surfaces that will make glue contact by covering them with masking tape.

The dowels can be glued into their holes. Next, board C is wiped with a tack rag and varnished. The board shown received two coats of varnish, with a light sanding between coats.

The sides and top are prime-painted and then sprayed with two coats of a chocolate-brown spray paint.

When the paint is dry, strip off the masking tape and assemble the rack, using white glue (sparingly) and 1 1/2-in. finishing nails. If you assemble in this manner, you will have a mar-free finish: Drive the nails through the back piece into the rabbets in the sides and top. Using wood pads under clamp jaws for protection, clamp the sides into the rabbets at the ends of the top piece. There is no need for nails at these joints, as long as the joint is adequately clamped after gluing.



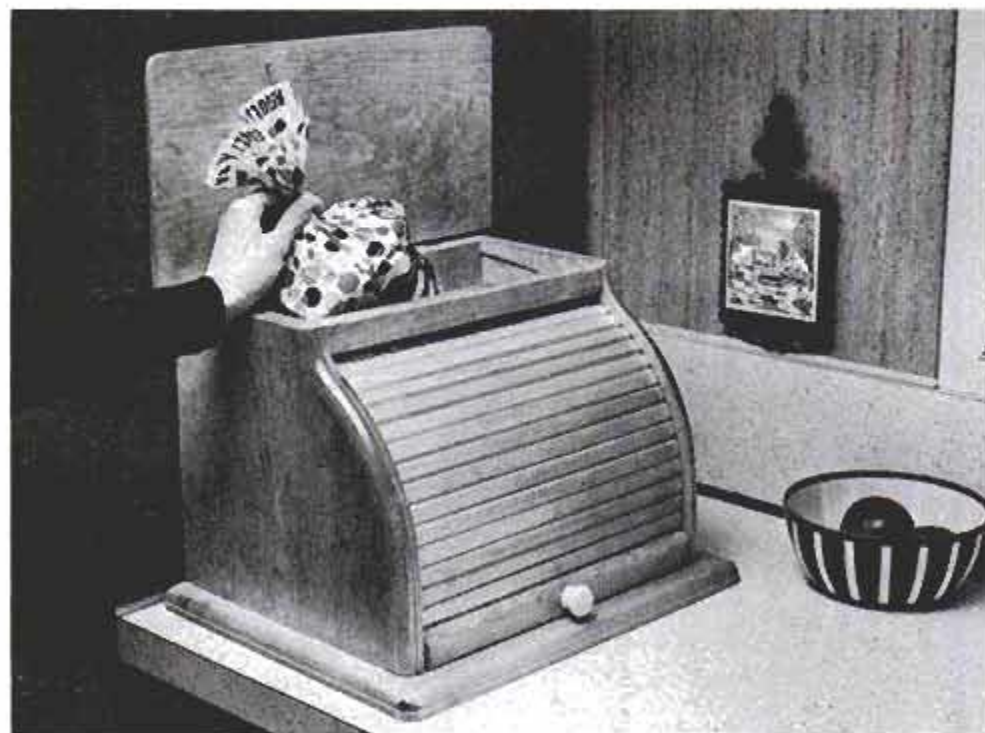
MATERIALS LIST—PHONE BOARD

Key	No.	Size and description (use)
A	1	3/4 x 7 1/2 x 15 1/2" plywood (back)
B	1	3/4 x 1 1/2 x 8" (bottom)
C	1	1 1/2 x 1 1/2 x 4" (block)
D	1	1/4 x 1 7/8 x 8" lattice (face)
E	2	1/4 x 3/4 x 8" lattice (edging, top/bottom)
F	2	1/4 x 3/4 x 18" lattice (edging, side)
G	1	1/4 x 6 1/2 x 11" (standard clipboard)
	1	5 x 8" memo pad
	4	1/2" No. 6 fh screw
	2	3/16 x 3" toggle bolt

Window plant shelf

Start by checking the window size where you plan to use this shelf. As

(Please turn to page 174)



Things aren't always what they seem. The tambour door is a fake, but the lid is hinged.

Roll-top breadbox

This project is a perfect example of something not being what it appears to be. Although the breadbox has the roll-top look, its tambour door is a sham; the loaves are lifted in and out via a hinged top. The box holds two loaves of bread.

To build the box, start by cutting the sides (B) and bottom (A) from a length of 1×12. Since the actual dimension of a 1×12 is $\frac{3}{4}$ × 11½ in., glue on a ¼-in.-wide strip to get the right width for a 12½-in. bottom.

Use a band, jig or sabre saw to cut the contoured sides; then make the groove with a router equipped with a ¼-in.-dia. straight bit (guided by a template).

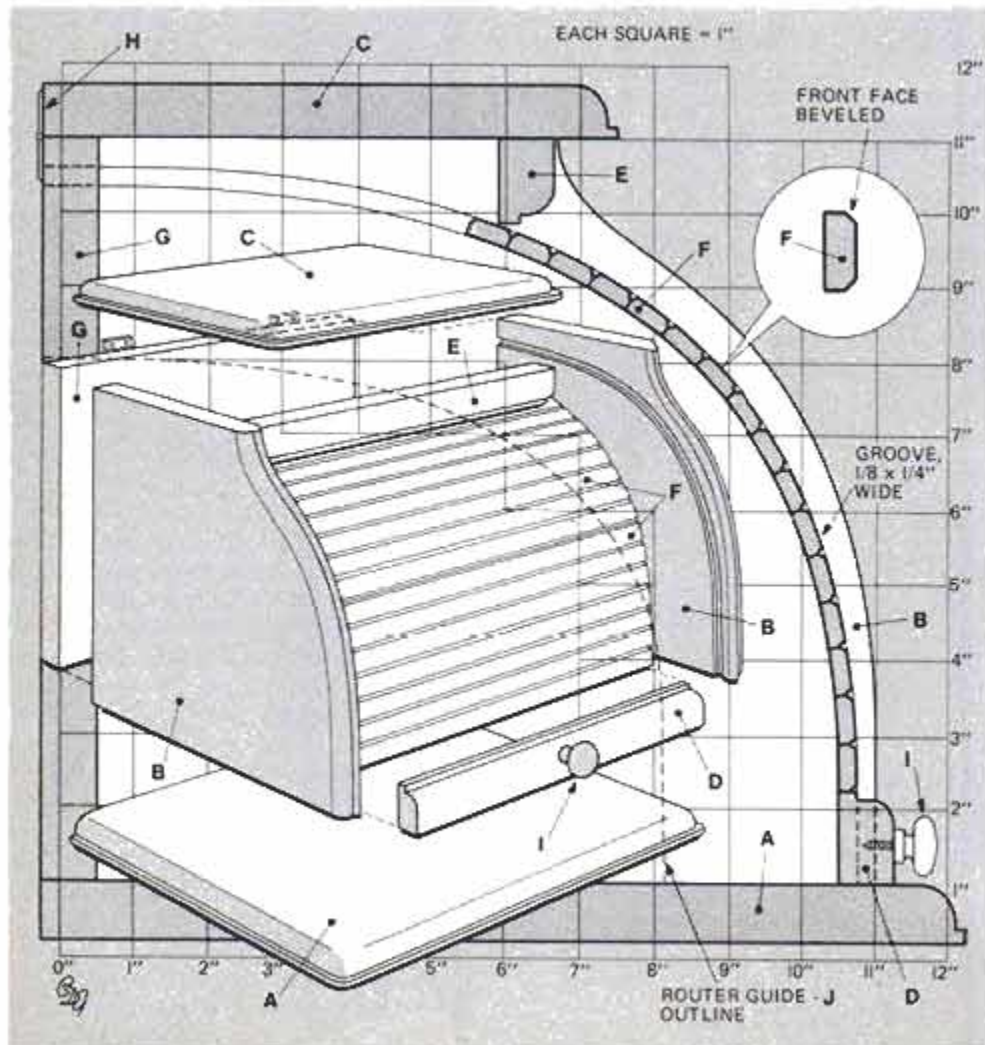
Create a template in ¼ in. plywood, using your router and straight cutter to determine dimensions. Tack template to scrap wood; test for accuracy before cutting box sides.

Tack-nail the template to the workpiece as indicated in the drawing and set the bit to cut to ¼-in. depth.

Next, cut top (C), bottom and top rails (D,E) and back (G). Then cut the $\frac{5}{8}$ × 13¼-in. slats from ¼-in.-thick (lattice) stock. Sand or plane a slight bevel on the front edges of all the slats. After sanding all parts smooth, assemble them as follows.

1. Glue and nail the bottom to the sides.
2. Tack-nail the back temporarily (it must be removed to insert the slats).
3. Slide in the slats without using glue and replace the back. Nail it into place.
4. Set all nailheads and fill the depressions with wood filler.
5. Install the top of the box with a pair of butt hinges.
6. Locate and bore the hole for the

(Please turn to page 175)



MATERIALS LIST—BREADBOX

Key	No.	Size and description (use)
A	1	¾ × 12½ × 16½" hardwood (bottom)
B	2	¾ × 10 × 10½" hardwood (side)
C	1	¾ × 7¾ × 16" hardwood (top)
D	1	¾ × 1¼ × 13" hardwood (bottom rail)
E	1	¾ × 1¼ × 13" hardwood (top rail)
F	16	¼ × 5/8 × 13 ¼" lattice stock (slat)
G	1	¾ × 10 × 13" hardwood (back)
H	2	1½ × 1¼" butt hinge
I	1	¾"-dia. wood knob (knob)
J	1	¼" plywood (router guide)

Misc.: Nails and screws required, McCloskey's Tungseal light-oak stain, All American Satin Finish varnish.

for home and fun

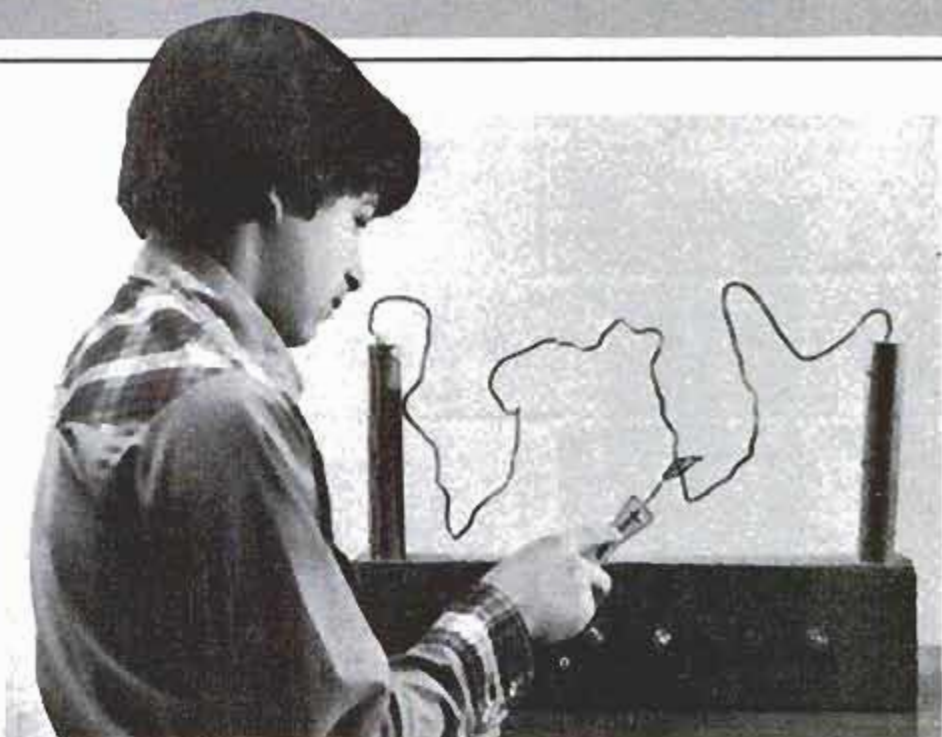
Shakey-Jakey—Test for steady hands

The challenge of Shakey-Jakey is to keep a steady hand while passing the wire loop along a curved, electrified wire. If the loop touches the wire at any point, a light goes on and a buzzer sounds—they remain "on" until the reset button is pushed. The challenge can be increased by adjusting the size of the loop and/or increasing the curve of the wire field.

Cut the parts out as shown in the drawing at right, below. Nail all panels together, except the back, with 1-in. brads.

Next, cut the dowel to suit, and bore 1-in.-dia. holes in the top panel

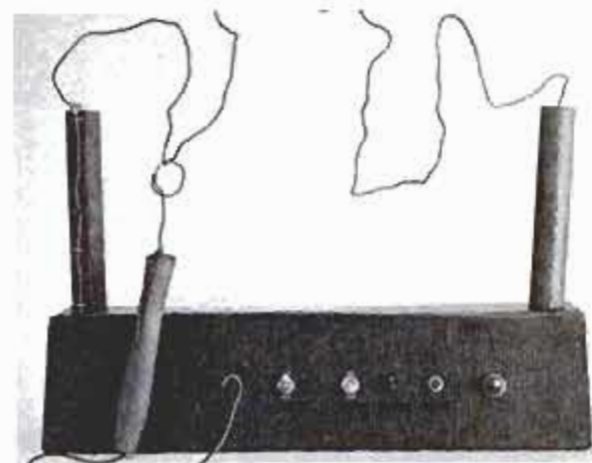
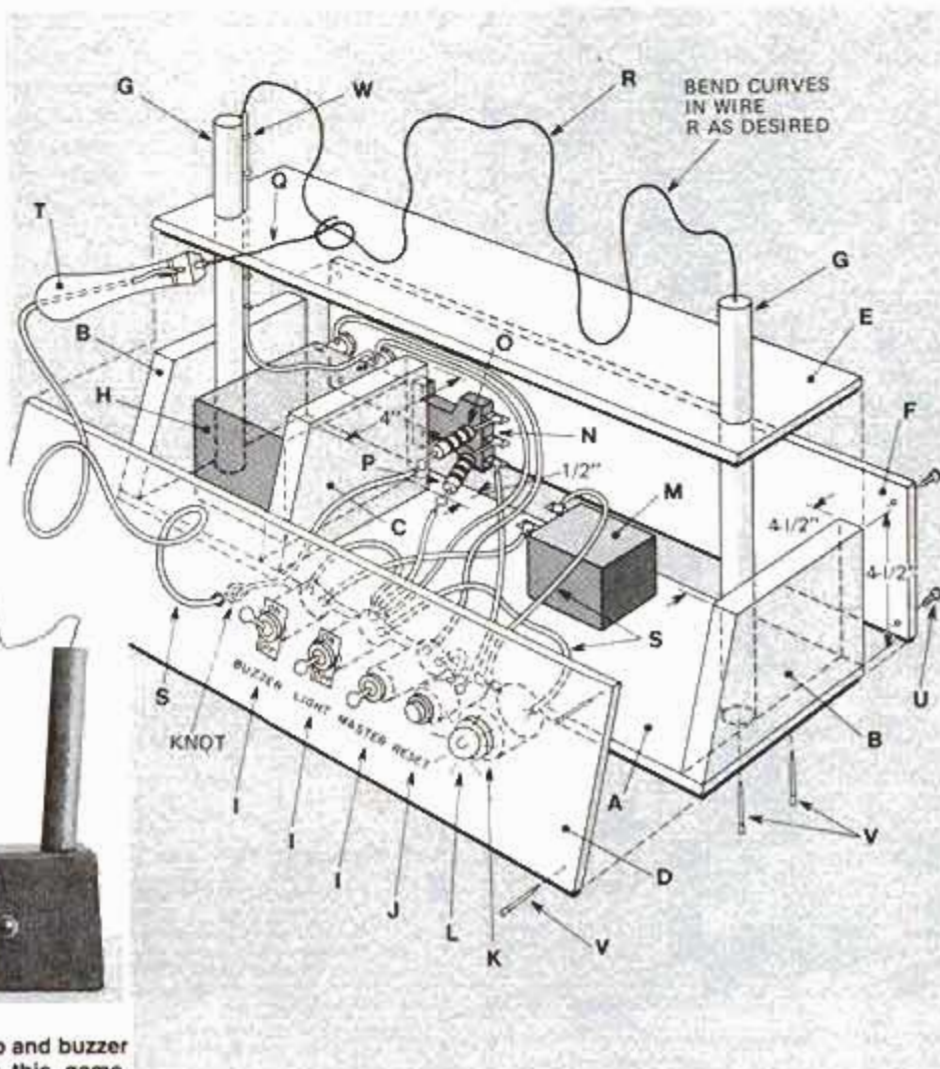
(Please turn to page 175)



Game tests youngster's hand for steadiness. Alter length and curve of wire for challenge.

MATERIALS LIST—SHAKY-JAKEY

Key	No.	Size and description (use)
A	1	1/4" x 6" x 20" plywood (base)
B	2	3/4" x 4 1/2" x 6" pine (side)
C	1	3/4" x 4 1/2" x 5 1/2" pine (partition)
D	1	1/2" x 4 3/4" x 20" plywood (front)
E	1	1/4" x 4 1/2" x 20" plywood (top)
F	1	1/4" x 5" x 20" plywood (back)
G	2	1 1/2" dowel, 1" dia.
H	1	Battery, 6-volt lantern-type with screw terminals
I	3	Single-pole, single-throw switch
J	1	Reset button—push to release
K	1	Lamp socket for 6-volt lamp
L	1	Lamp—6 v.
M	1	Buzzer—6 v.
N	1	Rectifier—No. 106Y1-C silicon-controlled
O	1	Resistor—10,000 ohm, 1/4 watt
P	1	Resistor—500 ohm, 1/4 watt
Q	1	9'-long No. 10 wire (to form loop)
R	1	27'-long No. 10 wire (to form game loop)
S	1	25' bell wire (circuit wire)
T	1	Handle to suit (optional)
U	4	1/4" No. 7 wood screws, 3/4" (screw)
V	40	1" finishing nails
W		Electrical staples
X		2' flexible, insulated wire



If the handheld loop touches the wire, a lamp and buzzer will let you know. Kids are fascinated by this game.

Sparky candlestick

A fun way to recycle a worn-out sparkplug is to turn it into a novelty candlestick. It makes a unique gift for (or from) an auto buff. Its wood base can be cut or turned to suit any shape or size that you desire.

In the top of the base, bore a hole into which the threaded end of the plug will fit snugly. In a $\frac{3}{4}$ -in.-long rod of $\frac{7}{16}$ -in. aluminum or other metal, drill a $\frac{3}{16}$ -in. axial hole to accommodate a small birthday-cake candle.

Enlarge approximately $\frac{1}{2}$ in. of this hole to fit over the plug cap. Under the candle socket, place an

(Please turn to page 175)

MATERIALS LIST—CANDLESTICK

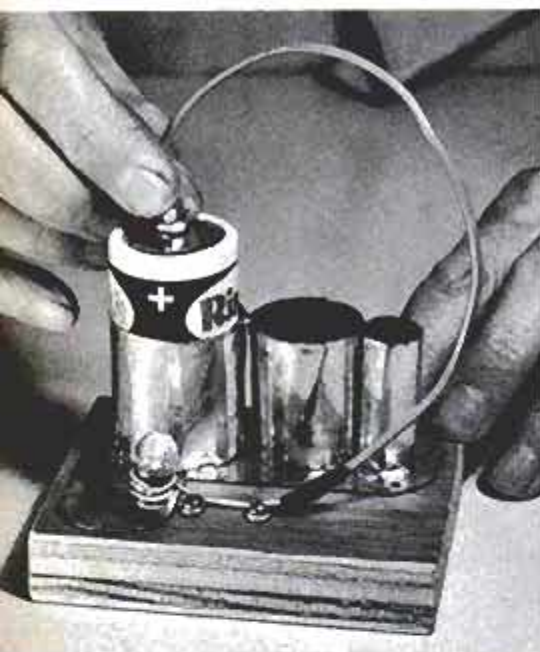
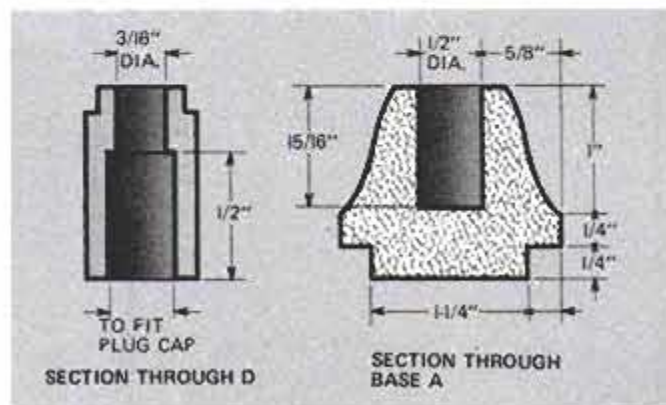
Key	No.	Size and description (use)
A	1	1 $\frac{3}{4}$ "-dia. x 1 $\frac{1}{2}$ "-high hardwood (base)
B	1	Sparkplug
C	1	$\frac{7}{8}$ "-dia. aluminum disc (hole to suit sparkplug)
D	1	$\frac{7}{16}$ " aluminum or other metal rod, $\frac{3}{4}$ " long (candle socket)
E	1	$\frac{3}{16}$ " candle



Pop-art candlestick is a guaranteed conversation piece for all auto buffs.



Except for candle, all parts are from author's scrap box.



You can test a D-cell's charge by noting how brightly the flashlight lamp lights.

Battery tester

A little wire, some tin-can metal and a flashlight lamp combine to make the simple tester illustrated. I use mine to compare flashlight batteries and similar battery cells for power.

The cell to be tested is inserted, either end down, into the appropriately sized cylinder, and the end of the flexible wire is touched to its top terminal (top photo, left). A good cell lights the lamp with considerable brilliance (brightness depends upon the characteristics of lamp used). An exhausted cell will not light the lamp. With a little practice, you'll be able to spot tiring batteries by noting the brilliance of the lamp.

To make the cylinders, wrap three layers of heavy paper around a battery cell of each size that you plan to

use in the tester. Then, bend 1 $\frac{1}{2}$ -in.-wide strips of bright tin-can metal over the paper wrapping. Trim the metal, leaving a small overlap, and solder the seam. The paper provides clearance between the metal tube and the (unwrapped) cell. Solder the cylinders to an L-shaped piece of metal.

Use small box nails to fasten the metal piece to a wooden base. Before soldering the cylinders in place, temporarily position them on the inverted L-shaped plate and mark the center for each. Next, rest the plate on soft pine and use a ball-end

(Please turn to page 175)

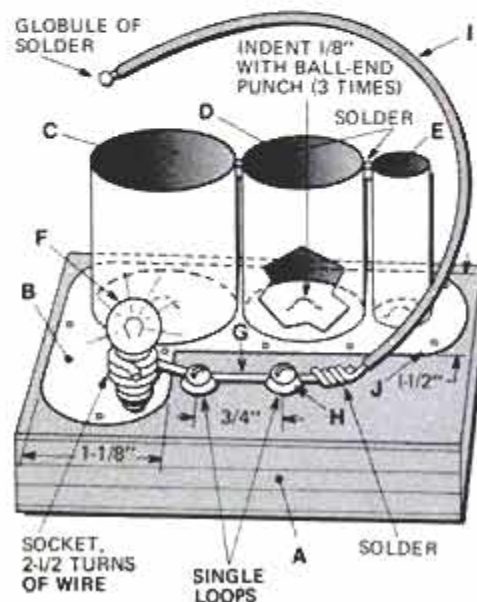


To form the lamp socket, wind copper wire around threads of a lamp base as shown.

MATERIALS LIST—BATTERY TESTER

Key	No.	Size and description (use)
A	1	$\frac{3}{4}$ x 3 x 4" wood (base)
B	1	2 $\frac{5}{8}$ x 3 $\frac{5}{8}$ " overall L-shaped piece of tin-can metal
C	1	Cylinder of tin-can metal to suit D-cell battery
D	1	Cylinder of tin-can metal to suit C-cell battery
E	1	Cylinder of tin-can metal to suit AA-cell battery
F	1	Flashlight lamp (rated 1.25 to 1.35 v.)
G	1	Lamp socket formed with 6" length of No. 14 copper wire
H	2	rh No. 7 brass screw $\frac{1}{2}$ " long (mounting screw)
I	1	9"-long, flexible, stranded copper wire
J	9	Small box nails $\frac{1}{2}$ " long

Misc.: solder.



Arylic sheet has taken the place of glass in many places around the home. Yet, while most people know how to keep glass looking good, few know the proper care for acrylic sheet which, despite its advantages, is more susceptible to scratching. CY/RO Industries, an acrylic-sheet manufacturer, offers the following suggestions for maintaining and restoring sheet plastic.

When acrylic sheet becomes dirty, wash it with mild soap or detergent and plenty of water. Use a soft, clean cloth or a soft mop for larger areas. Do not use any pressure; let the soap do the work. Then dry with a clean, damp chamois. Rubbing a dirty sheet of acrylic with a dry cloth will scratch its surface. Grease and oil can be removed with hexane or naphtha. Do not use other cleaning agents, solvents or sharp tools to remove spots.

Fine scratches can be removed by hand polishing. Several companies manufacture special cleaners and polishes for plastics. If you cannot obtain these locally, good-quality auto cleaner will suffice. Apply it to a soft flannel pad and rub back and forth, or with a circular motion. When the scratches have disappeared, remove all residue and apply a quality auto wax.

Power buffing

To remove scratches that are too deep for hand polishing, use a polishing wheel in a bench grinder or electric drill. On a grinder, use a 6- to 12-in.-dia. by 1½- to 2-in.-thick wheel, or whatever size your grinder will accept. Smaller wheels, chucked into a drill, are best for large workpieces that are too difficult to handle on a stationary buffing wheel.

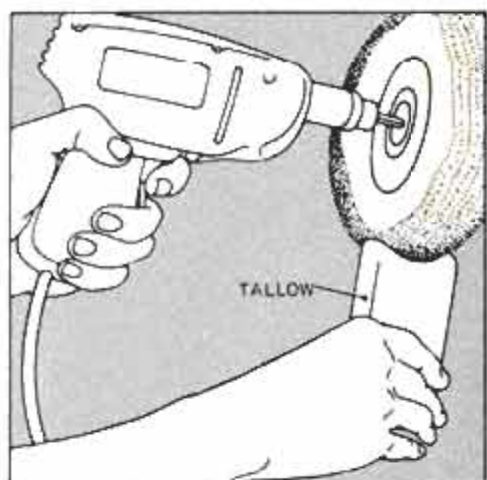
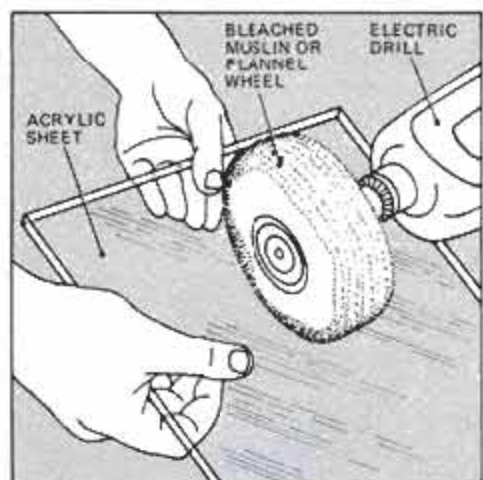
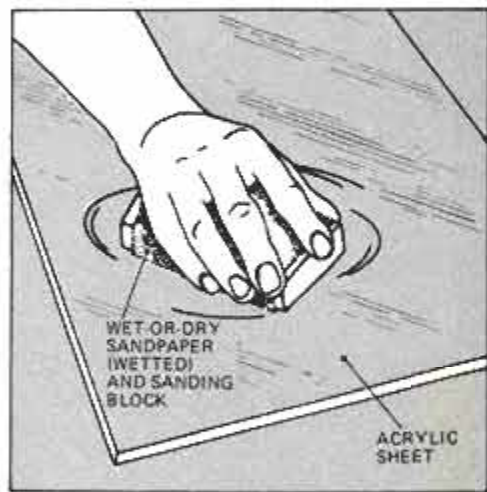
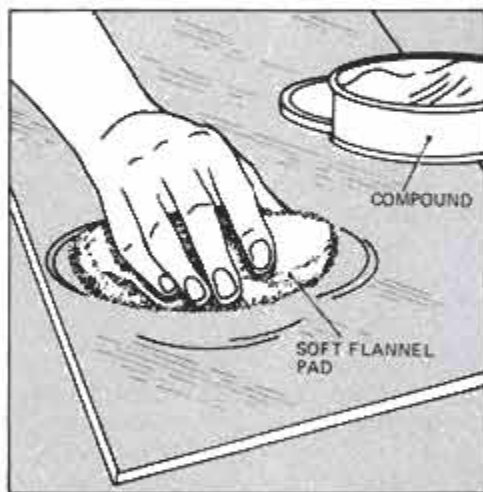
The first step in buffing is to use a bleached muslin wheel with a medium-coarse or fine compound, depending on the depth of the scratches. Keep the piece in motion at all times. Too much pressure can soften and burn any spot on which you linger.

Do not start near the top of the piece as the wheel may catch the edge and tear the piece from your hands. Start approximately one-third of the way down, and keep moving back and forth until you have reached the bottom edge. Then turn the piece upside down and repeat the operation. For final finishing, use a Domet flannel wheel with a little tallow to lubricate the surface of the wheel.

Removing deep scratches

A scratched acrylic surface should not be sanded unless the imperfec-

How to keep sheet plastic scratch-free and shiny



Polish sanded area with medium-coarse compound on bleached muslin wheel, then use fine compound on flannel wheel.

While polishing, use a small amount of tallow to lubricate the surface of the polishing wheel and to prevent heat buildup.

tions are too deep to be removed by polishing alone. If the scratches are deep or cover a large area, a portable pad sander should be used. Use wet-or-dry sandpaper for best results and apply water to its surface with a sponge. Don't apply pressure; let the sander do the work.

If the scratched area is small, sanding can be done by hand. Wrap a piece of wet-or-dry sandpaper around a block and sand an area that is slightly larger than the scratched area. This is to avoid the formation of a sharply defined "low spot," which would cause optical distortion.

Whether you sand by hand or use a machine, start with the finest grit sandpaper that will remove the im-

perfections. If you start with too coarse a paper, it may cause additional scratches that are deeper than the original ones. Unless the scratches are very deep, 240-grit or 320-grit paper is coarse enough to start the sanding process.

As you change from coarse to medium to fine paper, keep in mind that you are continuously replacing a small number of deep scratches with a larger number of shallow scratches. It is essential that you remove all deep scratches before you change to the next finer grit.

After rinsing, use a 400-grit, then a 500-grit paper; use plenty of water to sponge off the sandpaper frequently. Once a satin-smooth finish is obtained, you can polish. **FM**

TECH FRONT LINES

Raise the (solar) roof and lower your utility bills

Prices are still going through the roof, but the roof is looking more attractive all the time as a direct source of electricity for your home.

As houses on these pages attest, it's possible today—with a healthy bankroll—to pack your south-facing roof with off-the-shelf photovoltaic (PV) cells that convert sunlight directly into energy. These cells could provide enough power to handle perhaps 75 percent of household requirements. In fact, one of the houses

shown on the opposite page is expected to produce more electricity than its owners need. This will allow them to sell power back to the utility.

Much of the current work on photovoltaics is happening on the drawing boards and in the test labs of large companies. General Electric, for instance, is evaluating an experimental solar-cell "shingle" (illustrated below). It combines a solar cell with a protective roof cover. Will it be sold commercially? A spokesman says GE can't predict the shingle's future until testing is completed some time next year. Westinghouse and other companies are committed to reducing the price of solar cells, within the next five or six years, to 70 cents a peak watt. A peak watt currently costs from \$7 to \$22.

Westinghouse is also at work on a complete design for a 1700-square-foot PV-powered house to meet conditions for the north-eastern United States. Passive-solar components—south-facing windows, natural ventilation and

extensive insulation—will complement the photovoltaic system in meeting heating and cooling needs. The Westinghouse goal is to eliminate the technical bugs from photovoltaic housing systems by the time solar cells become cost-effective.

But the first crop of actual PV-powered houses is already growing, and yielding data that should be immensely useful to designers of future photovoltaic homes—yours, perhaps.

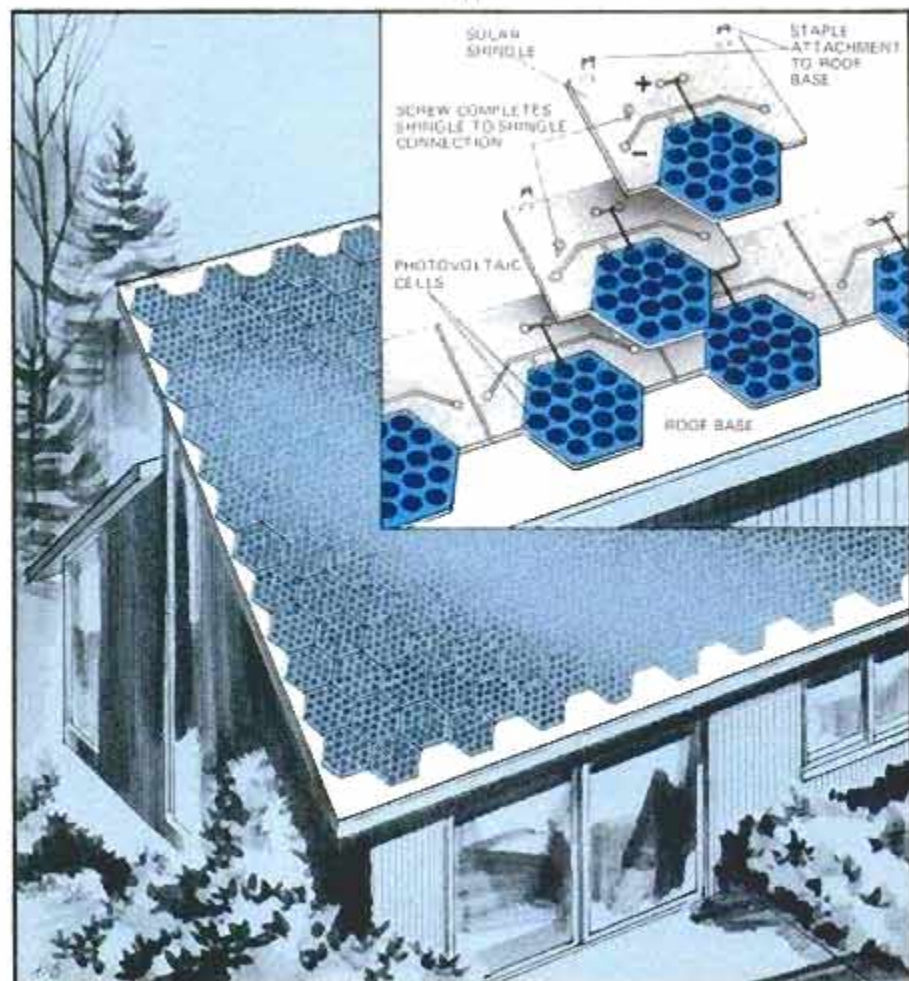
ENERGY

Right now, there are at least eight photovoltaic houses in the United States. And a spokesman for Lincoln Labs, an affiliate of the Massachusetts Institute of Technology in Lexington, Mass., says that by the end of the year, nearly 100 solar-cell houses will be up and operating. PM investigated two existing houses. One, in Cape Canaveral, Fla., is a project of the Florida Solar Energy Center (FSEC), a part of the state university system. The other, in Phoenix, Ariz., was built by John F. Long Homes Inc. Both houses were constructed with partial backing from the U.S. Department of Energy. Both are wood-frame constructions, with three bedrooms, two bathrooms, a living room-dining room combination, a kitchen and a garage. They are both uninhabited, at least for now. They're full-sized models of what mid-1980s houses can be if the PV movement gets off the ground.

Backup: local utility

Solar cells on the Florida house occupy 640 square feet of the 918-square-foot asphalt-shingle roof. Each of the 168 modules is rated at 30 watts, which translates to a potential for about 8000 kilowatt-hours annually. That's just shy of the 9000 kilowatt-hours that the Edison Electric Institute estimates U.S. homes consume each year. The local utility will fill in when needed.

The cost for the system is a daunting \$55,000. But builders of the Florida house say that if the price drops as expected during the first half of the decade, a comparable rooftop powerplant



GE shingles connect electrically to provide power while protecting roof.

would cost between \$10,000 and \$18,000 (in 1980 dollars) in 1986. That investment, when stretched over cell life (20 years now and expected to increase), would provide power at rates comparable to utility charges, according to Arthur H. Litka, project engineer for FSEC.

Litka tells us that so far, the system has been working "right up to predictions." And one day last November, when high cumulus clouds reflected sun and heightened its effective intensity, the modules exceeded their rated output by 25 percent.

Phoenix builder John F. Long built his experimental house at even greater expense—his system cost some \$70,000. But for the extra financial outlay, the Long house is capable of achieving total energy independence from the power utilities.

The 120 photovoltaic cell modules on Long's south-facing roof are laminated into rectangular metal panels. Each module is rated at 60 watts.

Long expects the sun to provide him with about 12,000 kilo-



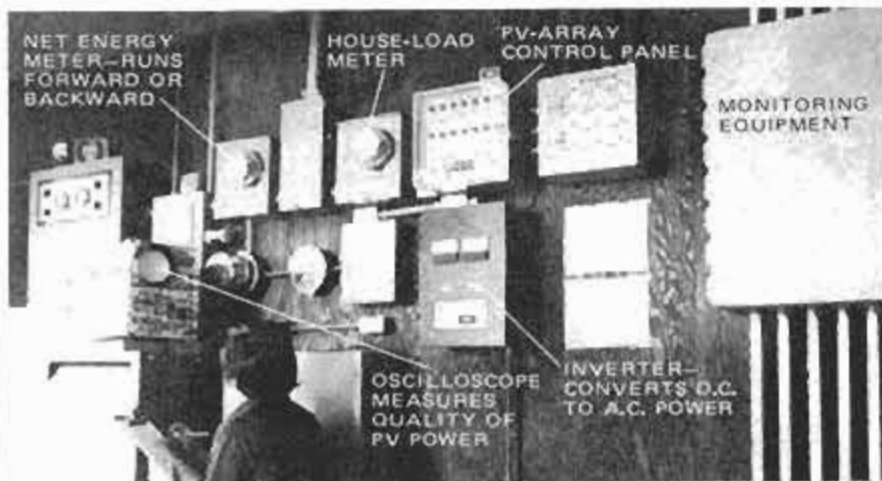
Long house: excess power for sale.

watt-hours annually, which would permit the sale of unused power to a utility. By law, utilities are required to pay for electricity returned to power grids.

The owners and builders are monitoring the performance of these and other PV systems with the burning curiosity of a homeowner ripping open a utility bill. The common hope is that the houses will prove so practical, that someday the utility will routinely send checks, not bills.



Florida house: three bedrooms, two baths, thousands of watts from the roof.



Monitoring and control equipment in Florida house covers a garage wall. Preliminary report: Cells sometimes produce power beyond rated output.

Coal's bed partner

It appears to be an unlikely fuel. The gray pebbles are hard—like driveway gravel. Nothing happens when you apply a match to them. But this fine-crushed oil shale is rich in energy, plentiful in this country, and—new research suggests—a serendipitous bed partner for coal.

The bed in this case is a fluidized bed: a kind of high-powered furnace in which fuel is dropped down on upward-thrusting jets of air. This creates a roiling, combustible mixture which is noted for producing high heat in a small area. The particular bed, in some promising new research, is a small model at the Alliance Research Center of the Babcock and Wilcox Co. in Alliance, Ohio. There, researchers under the direction of John B. Doyle set out to see if shale can be burned like coal.

The incentive behind this research is shale's abundance. Conservatively, shale in this country could yield hundreds of billions of gallons of oil. For comparison, the United States currently imports about 2.5 billion barrels of oil per year. The problem is freeing the oil from shale's molecular structure. Raw shale is not a sponge; simply crushing it does not squeeze out liquid oil. Shale must be heated to 800° F. before it begins to release kerogen, a grayish-black substance which can be converted to oil.

Alliance researchers were seeking a shortcut in this complicated and expensive process. In their first experiment, they created a hot coal fire in the fluidized bed, then gradually added pebbles of raw shale while reducing the coal supply. Temperatures dropped, but the carefully tended fire continued to roar when shale was burning alone.

That finding raises some hope that shale energy might be released economically through mere combustion. One application: Shale could be burned on the surface, generating steam which would be piped deep underground. There, it would heat up buried shale. Steam would unlock shale's kerogen. Another pipe would carry the kerogen to the surface for processing.

But in the course of the test

burning, researchers made another discovery. And here is the serendipity: As it burned, limestone in the shale reacted with sulfur dioxide, the major air pollutant produced by burning coal. The reaction yielded a solid powder, which was easily recovered. In other words, shale cleaned up the coal while releasing energy.

'Water Miser'

A part-time inventor from Kalamazoo, Mich., has developed a system designed to stretch water supplies and ease droughts.

The "Water Miser," developed by Gerald McCormick (who offers plans for do-it-yourself installation), channels waste water from your washing machine, bathtub and shower to a 55-gallon holding tank. From there, the filtered and chlorinated "gray water" goes to toilets for flushing and to some faucets where it's drawn for washing floors, house siding and walk-

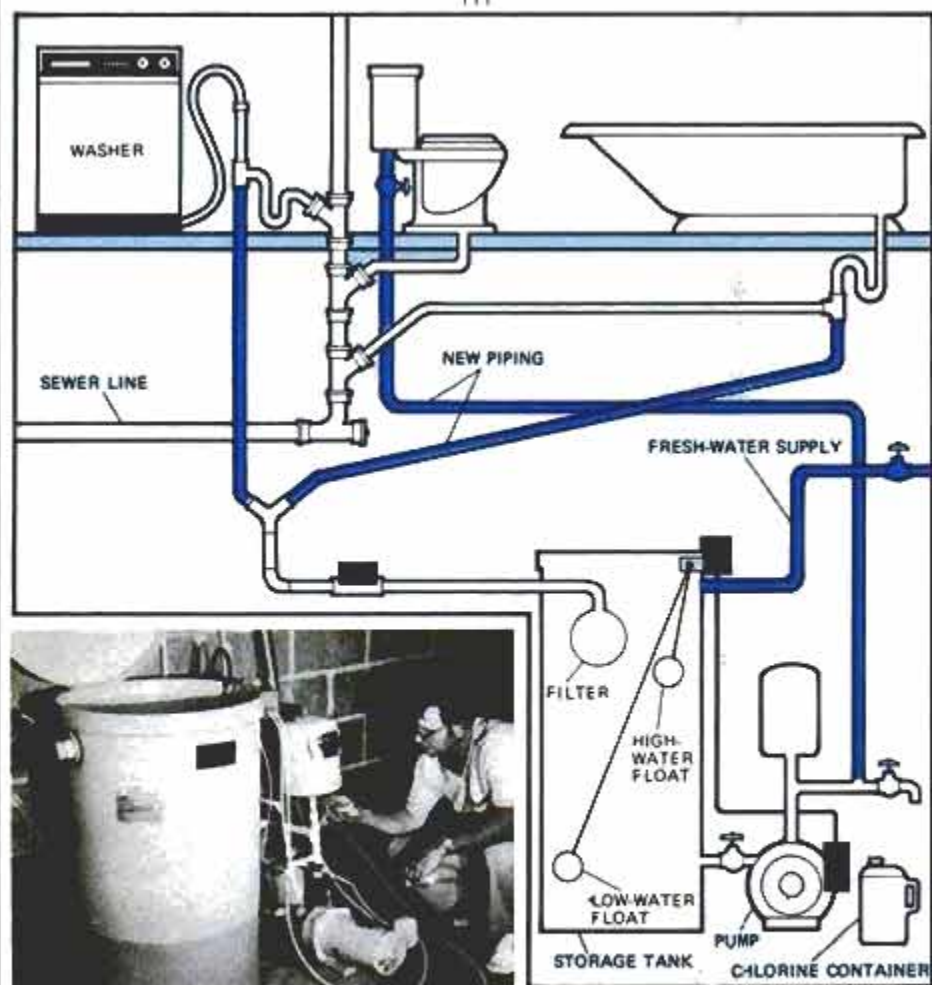
ways. The system, McCormick says, cuts his water usage by 50,000 gallons per year.

A similar system, in an energy-efficient house built by the National Aeronautics and Space Administration (NASA), in Langley, Va., reduced water usage by about 33 percent.

Interest in "gray-water" research comes amid warnings that continued water shortages could lead to a dramatically lower standard of living. Charles I. McGinnis, head of the water policy task force of the National Society of Professional Engineers, thinks the federal government will eventually be forced to regulate water use.

Plans for McCormick's device are \$14.95 plus \$1.50 for postage and handling from McCormick Enterprises, 109th Avenue, R.R. 7, Allegan, Mich. 49010. McCormick says costs run about \$350.

He has a stock of major components for sale if homeowners have difficulty finding them.



Gerald McCormick's system stores "gray water" from washer and bath for use in toilet. Float prevents overflow. Warning: Before installing any water-reuse system, be sure to check with your local building inspector.

INVENTIONS

Diver transporter



Small pressure tank moves victim.

Divers injured under offshore oil rigs can be transferred safely to treatment centers ashore in small chambers patented by Andre Galerne. The chambers, which are filled with breathing gas under high pressure, are easily carried by helicopter to decompression facilities. (Patent 4,227,524.)

Thief marker

A Seattle man has invented a way to chemically label money, goods, and people who handle them in the course of a robbery. As explained in Donald T. Grahn's patent (No. 4,226,194), a chemical reagent can be sprayed on articles by a concealed switch. Twenty minutes after a thief handles the goods, a blue-purple stain forms on his hands. The chemical remains invisible on goods, but can be "developed" for identification.

Thumb twiddler

The problem, as Horace A. Knowles, a government speechwriter in Washington, D.C. sees it, is that thumb-twiddlers are a frustrated lot. A lack of coordination often leads to "the inadvertent bumping of thumbs against one another during the twiddling motions." Not to worry. Mr. Knowles has been awarded patent No. 4,227,342 on a two-holed device which assures that thumbs will remain separated during twiddling (and also makes it hard to tell whether politicians are voting thumbs up or down).

PRODUCTS

Radar intrusion alarm

The Seeker 1 is a lightweight burglar alarm that detects movement with a small radar sensor.

The sensor can be mounted behind a picture or in a bookcase or vase. It picks up movement anywhere within a teardrop-shaped area extending for about 40 feet. When tripped, the device sounds an electronic siren. It can also be wired to activate a tape recorder or telephone dialer. Adjustable sensitivity prevents false alarms, and its maker tells us that the device is not set off by movement on other floors.

It costs \$299.95 from Seeker, 490 Middlefield Rd., Mountain View, Calif. 94042.



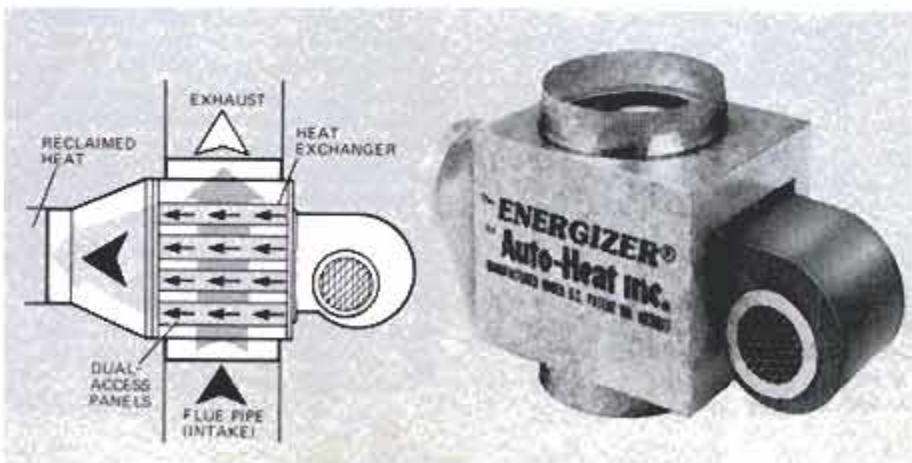
Heat-recovery system attaches to flue

The UL-approved Energizer captures some of the heat that normally goes up the chimney, returning it to basement or heating ducts.

Hot exhaust gases pass around the outside of heat-exchanger tubes that contain cool air blown through the tubes by a fan. Without contamination, basement air is warmed and discharged into a room or duct. Energizers are available for flue-gas temperatures up

to 1200° F., and blower capacities range from 465 to 1869 cubic feet per minute. The 50-pound device does not reduce the flue-venting area of the chimney.

A spokesman for the manufacturer (Auto-Heat Inc., 2327 Florence Ave., Cincinnati, Ohio 45206) says the Energizer costs about \$475 installed. The company claims owners will save enough in a year to pay for the device.



Robotic reel lures fish, then hauls them in

Fishermen punch in desired fishing depth, jigging cycle and jigging space. Then the new ME-1000 robotic reel from Miya Epoch (1635 Crenshaw Blvd., Torrance, Calif. 90501) does just about everything but filet the fish.

The battery-operated motor releases or pulls in line, following punched-in instructions. When a fish takes the hook, the reel winds it in, automatically changing speeds according to load. If the

load becomes excessively heavy, the reel automatically stops winding and sounds an alarm. Reeling also stops when the fish reaches a preset spot near the transom.

Drag on the reel can be adjusted up to 210 pounds. The \$1495 device also comes with a spool-revolution counter, a digital display indicating how much line is out, and backlash control. The spool holds up to 1300 yards of 80-pound Dacron line.



High-heat sensor

The Thor Sentry senses unusually high temperatures near wood or coal stoves, fireplaces or furnaces, and sounds an alarm before walls or floors can ignite.

The heart of the fire alarm is a tiny heat-sensitive thermistor, which is made of rare metals. The thermistor responds to temperature changes within seconds. The Sentry sounds at 130° F. The suggested retail price is \$33.25. It's made by Thor Metal Works Ltd., Box 378, Eastwood Station, Syracuse, N.Y. 13206.

AUTOMOTIVE

Running on wind, sun

Can wind or sun help run a car? The determined inventors shown with their cars at right have proved that both can.

Julius A. Tamosiunas of Framingham, Mass., a 62-year-old tool and die maker, runs his 1973 Renault station wagon on a combination of gasoline and electricity generated by wind power.

Dr. Wallace Moore, 77-year-old retired Long Beach State (Calif.) administrator, operates his Honda Civic wagon on gasoline and electricity from nine solar panels of 396 silicon photovoltaic cells.

According to George Hartley, chairman of the Electric Vehicle Council, the concept of harnessing wind or sun for automotive power isn't brand-new. But converting the idea to operating autos is "unique."

Both men chose to keep their conventional internal combustion engines because, for now, all-electric cars are inconvenient to operate over medium or long hauls. Running on electric power part of the time stretches gas mileage to roughly 60 mpg for the sun car, and between 80 and 100 mpg for the wind car.

Tamosiunas's auto carries an air turbine just behind the windshield and a wind propeller further back on the car roof. Both generate more than 30 amps. at 55 mph to recharge a 12-volt, 360-amp., deep-cycle battery in the car. The battery provides



Tamosiunas recharges battery, using roof-mounted air turbine and propeller.



Panels on Moore's car contain 396 photovoltaic cells feeding six batteries.

power for the transmission. And an 8-hp engine attached to the right rear wheel provides added power for hills. Tamosiunas starts out on gas, and once he reaches 55 mph, he switches to electric power for about 10 miles; then back to gas for a recharge.

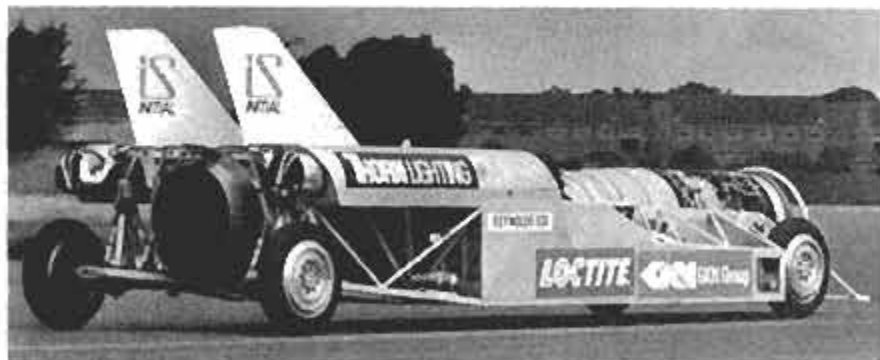
Solar cells on Dr. Moore's car produce up to 100 watts, collected in six, 6-volt, lead-acid batteries located behind the wagon's rear seat. This power drives twin GE 3.5-hp electric motors for

driving torque. The car's electric-power range is about 80 miles for eight hours of solar charging.

Tamosiunas's adaptation of his Renault cost approximately \$2000 for materials. Dr. Moore spent roughly \$11,000 for his Honda and its modifications.

Cow magnets for cars?

For several years, farmers in Montana have been forcing cows to swallow small magnets. The magnets retain bits of metal cows swallow while grazing. Veterinary equipment stores, however, are having a hard time stocking cow magnets. The reason: Motorists are attaching the magnets to the metal fuel lines of their cars, and say they get an extra five miles per gallon. Scientists and engineers in the Environmental Protection Agency (EPA) argue the whole idea is a lot of bull. Drivers attracted to cow magnets are driving more conservatively because they want their cow magnets to work, the EPA says. There is no physical reason why magnets should improve mileage. The only people making hay out of all this are the magnet makers.



Race driver Richard Noble hopes to push this British jet car, Thrust 2, up over Gary Gabelich's 682.407-mph record. (Stan Barrett did 739.66 in a

rocket car; that run wasn't sanctioned by the Federation Internationale de l'Automobile.) Noble's try is expected to come later this fall.

ELECTRONICS

Remote-control stereo

Maybe we're all getting lazy. It certainly seems that way when you look at the latest design trend in stereo. No more getting out of your chair or off your couch to play records, change radio stations, volume level, or to shuttle your tape back and forth in search of the music you want. Now you can do it *all* by remote control.

For a while, ultrasonic commands replaced the cord. But ultrasound can get confused by Doppler effects when you move the control box. That's why most of the latest control devices employ infrared beams. They aren't bothered by Doppler—unless you happen to be moving near the speed of light.

At last count, remote-control audio components were available from Sony, Dual, Akai, Aiwa, SAE, BSR, Technics, Kenwood and Fisher, with others rushing into the act.

A handheld command transmitter usually sends out a coded sequence of light pulses through an infrared light-emitting diode. Across the room, the receiver decodes these pulse patterns—usually by a digital (computer) process—and then generates the control voltages which activate various circuits to make the sound components carry out the commands.

A typical remote-control module is Technics' SH-R808. You can control all major audio functions from your listening position. These include: program source selection (FM, AM, phono or tape); radio-station selection (any of eight FM or eight AM stations); turntable start, stop, and tone arm up/down cuing; tape deck control (play, stop, rewind, fast-forward, record and pause); volume adjustment; and on-off power-switching.

Several turntables by Optonica, BSR and Fisher offer even more expanded remote-control options. They let you pick out



Prototype Variable Speech recorder speeds up tape without losing clarity.

any particular track you want to play on a record. A tiny, light-sensitive device on the tone arm registers light reflections from the surface of the record. The gismo can distinguish and count the different tracks on the record. Thus, you can command it to count up to three and play the third track, or the fifth, or whichever you like.

By far the fanciest of all remote-control systems has been developed by Toshiba, and it may hit the market soon. You can talk to this phonograph, but it has a limited vocabulary. The Toshiba rig registers only 15 words—in any language you choose—but that's enough to cover all the normal stereo-control functions. Like a well-trained dog, the machine responds only to its master's voice.

None of this comes cheap. Components steerable from afar usually run at least \$300 more than equivalent sound gear without such automation.

Double-time tapes

So you've recorded a long speech—a two-hour tape—and now you've taken it home to study. How long will it take to hear it through? With new time-saving units, just an hour—and you won't miss a word.

A Variable Speech-equipped recorder can *double-speed* a tape, and not sound like Donald Duck throwing an animated tantrum.



Slide switch controls playback rate.

The recorder uses a microcomputer-like circuit to compress the spoken word. Simply put, the recorder can blank out tiny segments of sound. The sound lost this way doesn't make the tape any harder to understand. It just makes it play faster.

The Variable Speech Co. (VSC) of San Francisco pioneered these efforts a few years ago. But equipment was still a mite expensive. Now VSC has developed a tiny circuit board that can be added to almost all tape mechanisms at a cost of about \$30 to the manufacturer.

It can even speed up video tape and, of course, does so without any audio distortion. JVC already has a unit (HR-6700U) that uses the VSC technology.

More recorders and VTRs with variable speed, and no intelligence loss, will soon be appearing. Already, VSC has sold its boards to some major recorder manufacturers.

With this technology, double-time means double the information.

Editor: Gurney Williams III

Contributors: Tony Assenza, Boyd Harnell, John Ingersoll, Stacy V. Jones, Barbara Rousseau, Mort Schultz, Neil Shapiro

TECH
FRONT
LINES

WORKSHOP MINICOURSE

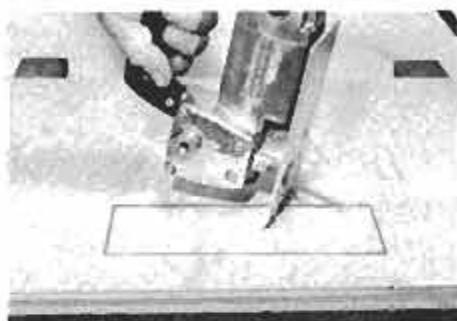
MORE ABOUT THE SABRE SAW

The pair of tasks shown on this page are jobs that make owning a sabre saw a must. Making cutouts is a frequent need in the shop, as well as in household carpentry. Once you've mastered good sabre-saw technique, you will make better cutouts faster than you've ever done before.

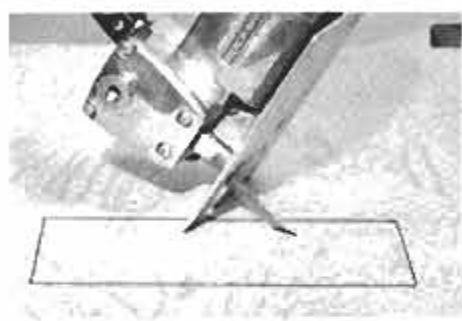
To cut a perfect circle, you should know about a couple of professional tricks:

■ Though your first inclination may be to insert a fine-tooth wood-cutting blade, don't. The blade to use for a circle cut is a rough-cutting wood blade with a heavy tooth set. The reason is that this blade will cut sufficient clearance for making the turn accurately. Cut outside the line so you'll have stock to sand smooth.

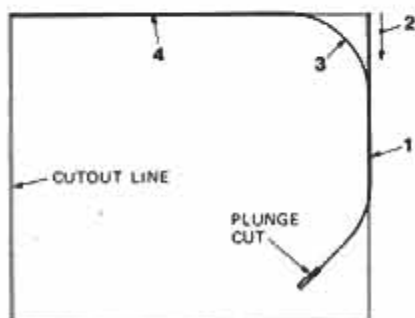
■ Second, cut with the maximum saw strokes per inch. To do it, use a fast saw speed and a slow feed. **PM**



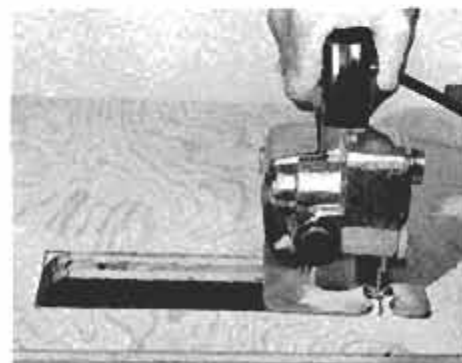
To make a plunge cut, tip saw onto front edge of shoe, as shown, then start motor.



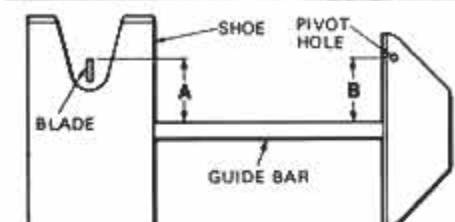
Slowly—and with tool held securely—lower the moving blade into the waste area.



When blade is fully into work, with saw shoe flat on the work, cut toward one of the cutout lines (1) and then cut straight into the corner. With blade moving, back the saw up (2) and turn the corner (3). Step 4 simply repeats step 1 and so on.



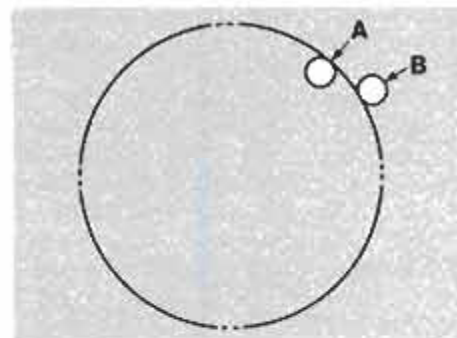
When cutout is dropped, reverse saw direction 180° and cut out triangular-shaped corner pieces. Note that workpiece straddles either 2x3s or sawhorses for blade clearance and maximum support.



The rip guide that comes with this saw features a drilled hole so that the guide can be used to make circles. The pivot point (nail) must be lined up with the front edge of the blade, as shown in the inset drawing above (for example, A must equal B).



Stop the saw periodically when cutting circle so workpiece can be shifted on its support (a pair of 2x3s here). Saw blade should cut only the work, not the supports.



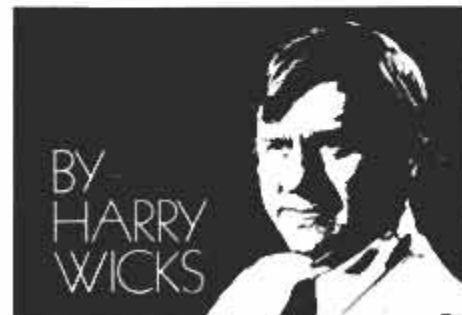
If cutout opening must be perfect, bore entry hole A. For a neat disc, such as one cut here, start with entry hole B.



For best results when cutting a circle, use a rough blade with a heavy set (the tooth set assures blade-turning clearance). Push the saw with a slow feed rate and, if your saw has variable speed, set it to the fastest cutting speed to obtain maximum strokes per inch as you make the cut.



Perfect circle needs nail hole at center filled and sanded and its edges smoothed; then it's set for finishing or painting.





DeLorean mid-engine sports car will cost \$25,000 when it goes on sale next month.

'81 IMPORT INVASION

(Continued from page 117)

coupe and sedan and rotary-engine RX-7 sports car (see *Firsthand Report*, page 12) are nicely restyled and upgraded for '81, as well.

Mitsubishi, which markets its cars through Chrysler-Plymouth and Dodge dealers in the United States, is carrying over its fine little fwd Champ and Colt intact, while giving a subtle redesign to its already excellent Sapporo and Challenger sport coupes.

Subaru, pioneer of the 4wd car, is improving its line with extended availability of the more powerful 1.8-liter engine and a new dual-range transmission for the 4wds. Subaru is also adding a more luxurious GL version of its 4wd hatchback model.

Finally, from Japan, Isuzu is now entering the U.S. market on its own. Isuzu is best known, in this country, for supplying Buick's Japanese Opel a few years back, as well as Chevy's LUV mini-pickup.

First to be marketed here is a series of subcompact I-Mark two-door and four-door sedans powered by a 1.8-liter, four-cylinder gas engine or optional (and very economical at 41/63 EPA city/highway mpg) 1.8-liter diesel. I-Mark prices start at about \$5200.

Germany

The biggest news from Germany this year is Mercedes' wonderful (and very expensive) new S-class sedan, which is available as the turbodiesel 300SD (\$34,000) or the long-wheelbase, gas-V8-powered 380SEL. The smaller Mercedes sedans, coupes and wagon are unchanged, but the classy sports car and sport coupe have become the 380SL and 380SLC with substitution of the new, more fuel-efficient, 3.8-liter V8 engine for the former 4.5-liter.

VW of America has slightly larger gas and diesel engines and other improvements for its German-built Scirocco, Dasher and Rabbit con-

vertible (as well as the U.S.-manufactured Rabbit and pickup) for '81.

From the Porsche+Audi division comes a slick three-door hatchback Audi 4000, plus a sporty new five-cylinder, five-speed-transmission version called 5+5. There's also a power boost for the Porsche 924 Turbo and a new high-performance suspension and trim package for the flagship 928 sports car.

The Audis start at around \$8700, and the base Porsche 924 goes for nearly twice that amount.

BMW is adding a five-speed manual transmission as standard equipment for its topline 733i sedan and 633CSi coupe, but it's retaining the four-cylinder 320i and mid-range 528i with little change.

Italy

From Italy comes a new, improved V6 version of Alfa Romeo's GT coupe called GT-V6. It's priced at around \$16,000.

Fiat now has electronic fuel injection across the board in its Brava and Strada sedans, Spider and X1/9 sports cars and Lancia Beta and Zagato models—and watch for new turbocharged Brava and Spider versions in the next month or two.

The beautiful and exotic Ferrari 308GTBi, 308GTSi and GT-4i (which are also imported by Fiat) are receiving special new Michelin TRX tires and wheels and other improvements for '81.

Great Britain

A brand-new sports car from northern Ireland is slated to make its debut in the next few months. Called the DeLorean (after its ex-GM executive creator), it will feature a rear-mounted V6 engine, unique stainless-steel body and gull-wing doors. It will sell for approximately \$25,000.

England's Rolls-Royce doesn't introduce new models very often, but when it does, you can bet they're very special. In this case, the new Silver Spirit and Silver Spur are

(Please turn to page 152)



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. Learn how you can master Plan Reading—Estimating—and the practical details of all types of construction in your spare time at home. Mail coupon below or phone TOLL FREE—see how you, too can prepare for a better job—higher income, or start your own contracting business.

• PHONE TOLL FREE (24 HRS.)
1-800-528-8050 Ext. 810

CHICAGO TECH/School for Builders
2000 S. Michigan Avenue, Chicago, Ill. 60616

CHICAGO TECH/School for Builders Dept. PM21 1737 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 _____

ANTIQUe LAMP DESIGNS



THE WORDEN SYSTEM

Build Tiffany Style Lamps For Hobby & Profit At Most Stained Glass Dealers

BIG COLOR CATALOG \$1.00

H.L. WORDEN CO. (PM80)

Box 519, 118 Main St. Granger, WA 98932

W18-1 Wisteria

Make Money in SCREEN PRINTING HOME BUSINESS!

Print without a printing press! Signs, bumper stickers, T-shirts, banners, posters. Print on paper, plastic, glass, wood, metal, fabric... almost any surface—every color of the rainbow... for stores, realtors, mail order, factories, politicians, etc. Easy home-study course starts you fast. We show you what to do, how to do it... guide you step-by-step. Send name, address, age for free facts. SCREEN PRINTING CENTER, 4401 Birch St., Dept. PB011, Newport Beach, CA 92663

WOODWORKERS

Do-it-Yourself CATALOG

SAVE VAST SUMS. Build, restore, re-finish anything of wood! Here's everything you need. Fine woods, veneers, specialty tools. Cabinet hardware, period & modern. Pro finishes. Cane. Lamp parts. Uphol. supplies. Picture moldings. Clock kits. 100's of plans. Instruction books. Thousands of hard-to-find woodworker products in big new catalog. Mail ad for Catalog & 3 FREE issues of Woodcrafters News!

CONSTANTINE Est. 1812

2051 Eastchester Road, Bronx, N.Y. 10461

Send \$1 for 104-page Woodworkers Catalog with 3 FREE issues Woodcrafters News, practical guide to useful projects, materials and methods!

Name _____

Address _____

ZIP _____

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.

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

NEW, USEFUL TOOL!
**SPOTLIGHT®
SCREWDRIVER**

Ideal for dark, hard-to-get-to places 9" long. Comes with Standard and Phillips Chrome Vanadium blades. Lifetime Warranty. Made in the U.S.A.

2 for \$15.00. Add \$1.00 for shipping.
Calif. Res. add 6% tax. Allow 2-3 weeks for delivery.

\$7.95
STANDARD AND PHILLIPS
BLADES
BATTERIES & BULBS
INCLUDED

MONEY BACK GUARANTEE

NU WAVE PRODUCTS 2850 E. Apalachian Court, Dpt. M
Westlake Village, CA 91362

The New Look from Elite

The ultimate in a GT Sports Car Kit for a VW chassis.
Send \$3.00 Color Brochure, and Prices or \$29.95 for Full Pack. (Refundable with kit purchase) Color Brochure, Piece Assembly Manual, Color Chart, Free Flight Information.

ELITE ENTERPRISES, INC. PM2-81
690 E. Third St. Colton, MN 55321
To order \$20.00 for check call Toll Free 1-800-339-8888.
Purchase with Kit Purchase. Major Credit Cards Accepted.
Fly to Motel/Kit. Post FREE! Kit personally order your LASER 917.
*Free information included in Full Pack only.

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, 81-88 Meriden, CT 06480

An ATLAS BODY? In 7 days

my method of DYNAMIC-TENSION starts giving results you can feel and your friends will notice. Big, useful muscles. Gain weight, if needed. Lose "pot belly." Send your name and address for 32-page book—FREE. **CHARLES ATLAS**, 49 West 23rd St., New York, N.Y. 10010 Dept. 83



'81 IMPORT INVASION

(Continued from page 151)

about to replace the stately Silver Shadow and Silver Wraith this April (see *Imports & Motorsports*, page 28).

With fuel-injected V8 engines and redesigned rear suspensions, in addition to updated styling and engineering throughout, these new models will take their place at the bottom of the Rolls-Royce lineup for \$100,000 and up.

Lotus Esprit, Elite and Eclat sports cars will remain unchanged for '81.

Jaguar Rover Triumph is standing pat, with only minor improvements. These include more standard equipment for its Jaguar XJ6 sedan, color-coordinated tops for its TR-7 and TR-8 sports cars and fuel injection across the board.

France

From Peugeot of France comes a new turbodiesel engine for the 505 sedan, but rival Renault is stealing the '81 limelight with the introduction of its excellent 18i sedan and wagon. The 18i's are attractive, comfortable and very fuel-efficient (their EPA ratings are 26/37). They're available through both Renault and American Motors dealers, with prices starting at about \$7400.

Sweden

Sweden's Saab is introducing a redesigned and lightened 2.0-liter, four-cylinder engine for its 900 series. It's dropping the older-model 99 sedan from its U.S. lineup, replacing the five-door hatchback body style with a new four-door notchback sedan. Also, a new mid-range S model is supplanting both the sporty EMS and luxury GLE, leaving the wonderful 900 Turbo, for \$14,000 (three-door hatchback and sedan), alone at the top of the Saab line.

Volvo of Sweden is joining the turbo-charged ranks for '81 with an exciting new GLT Turbo two-door (about \$13,000), featuring special suspension and trim, full instrumentation, power door locks and windows, airconditioning, Pirelli P6 tires on light alloy wheels and much more.

Interestingly, the GLT Turbo is also available as a four-door wagon, and a special Silver Anniversary wagon version will mark Volvo's 25th year in America. All Volvos benefit from a crisply modern new "panoramic" instrument panel and the addition of electric overdrive as standard equipment with the four-speed manual transmission. **FM**

NEW

MORE INCOME WITH A MAN-SIZED CRAWLER!

NEW— Utility Crawler Tractor, high flotation steel cleated rubber tracks. Buy Factory Direct in KIT or Completely Assembled. Over 30 attachments - backhoe, loader, blade, garden plow, etc. Odd job & resale opportunities are great! Send for 16 pg. Catalog 75¢, or for "Build-it-yourself" plans.. \$7.00 (refunded on any order).

SEND TO:
DAHLCO
DEPT PM21
Cedarburg, WI 53012

NEW BOATS

(Continued from page 121)

are a long step ahead of pool-toy rubber rafts.

Canoes

Like larger craft, these traditional paddle boats come in wood, fiberglass, aluminum and plastic. Designs include a number of cruise, cargo, racing and white-water kayak and pirogue models, with tran-



A canoe that can convert into a rowboat or power boat, the new Coleman Scanoes is 15 feet, 8 inches, weighs 92 pounds, is \$400.



Grumman's new 4.6 Striper is light, center-console, aluminum 15-footer for fishing that can tow skiers, take motors to 40 hp.



Mounting twin MerCruisers, the Excalibur 32-footer from Sarasota, Fla., is available in light Kevlar or in fiberglass.



Cruisers' 22V Baron 222 combines run-about performance with cuddy cabin and gas or diesel sterndrive in a deep-V hull.

som sterns making it easier to clamp on a gas or electric outboard.

Cruisers

Sterndrive and inboard-powered cabin craft are packing more accommodations aboard. Select carefully and you'll be able to find a small one that sleeps a large family. **PM**

12 Ways To Get RICH!

- Check the ones that INTEREST YOU! Then cut out this ENTIRE AD AND MAIL IT BACK TO US FOR FREE FACTS!
- MAIL ORDER
 - SUB-WHOLESALE
 - CATALOG DISTRIBUTOR
 - FLEA MARKETS
 - PARTY PLANS
 - WAGON JOBBING
 - RACK MERCHANDISE
 - ADVERTISING SPECIALTIES
 - BUSINESS GIFTS
 - FUND RAISING SALES
 - DROP SHIP SALES
 - GENERAL WHOLESALE

We will mail complete information on how to get started. It's easy... because we supply everything you need from sales plan to catalogs to top quality, high-profit merchandise.

There's no other COMPANY like...
SMC SPECIALTY MERCHANDISE CORP.
 6061 De Soto Ave, Dept. 308-02
 Woodland Hills, CA 91365

Name _____
 Address _____
 City _____ State _____ Zip _____

COIN GRAB BAG FREE!

***Partial List of Coins in Collections:**
 Half & Large Cents
 Flying Eagle Cents
 Indian Head Cents
 Two Cents
 Three Cents
 Liberty Nickels
 Shield Nickels
 Buffalo Nickels
 Half Dimes
 Seated Liberty 10c
 Barber Dimes
 Seated Liberty 25c
 Barber Quarters
 Seated Liberty 50c
 Barber Half Dollar
 Walking Liberty 50c
 Civil War Tokens
 Coins of the World

GIANT SURPRISE COIN ASSORTMENTS packed in big style from collectors' including rare scarce and valuable coins up to 2000 years old! & real exciting treasure hunt unknown unsorted—just as they are received... no 2 assortments available unless you know what's in them! But each contains at least our guaranteed minimum \$4.50 catalog value for only \$2.98 plus 25c. Our Super-Save \$1.00 minimum! Catalog value only \$4.98 each plus 50c (p. 88)! Over a 1/2 million size (get 1 same size FREE)! Ideal gift for beginner or advanced collector. Hand some illustrated 32-page Guide: Catalog and Price List included free with order. Allowance 50c.

MATT NUMISS, Dept. PM-2, Great Neck, N.Y. 11022

10 YEAR GUARANTEE \$395

GREAT at purpose knives for the outdoorsman. Offers you the quality of CUSTOM made models selling for much more! Hand polished imported surgical steel blade has SAFETY LOCK to prevent accidental closing. Expensive Pica wood handle SOLID BRASS bolsters and liner. Popular 4" size (3 1/2" open). IF BROKEN IN 10 YEARS WE WILL REPLACE AT NO CHARGE! Use 30 days, money back if not pleased. Send \$3.95 plus 15% postage & handling TODAY! Midwest Knife Co., Dept. W-3204, 9043 S. Western Ave., Chicago, Ill. 60620. Mail orders only.

BONUS 2 KNIVES Only \$8.98 Postpaid
 Sturdy Leather Bell Cases \$1.25 ea.

a \$45.00 Value!



Finish this exciting CLOCK Yourself and Save!

- Fun and easy... everything included.
- Cedar "Burl" 14-17" x 1 1/4" thick, prerouted and predrilled. Easy to finish.
 - Superb #756 quartz movement (West Germany's finest).
 - Goldtone Serpentine Hands, elegant.
 - Goldtone Roman Numerals, self-adhesive.
 - Complete, easy-to-follow instructions.

Introductory price just **\$17.95*** plus \$2.50 shipping & handling, each quan. _____

Create your own clocks, order addl. #756 quartz movements! Accurate to 1 min. year. Runs up to 4 years on one "C" battery. Goldtone hands incl. with this ad. Warranted full year. Only \$7.95* plus \$1.50 per order shipping & handling quan. _____

*Calif. residents add sales tax. Free catalog with order. All others 50c P&H.

Please send me the merchandise checked above:

Total mds. _____ Ship. & hand. _____ Total _____

VISA/M.C.# _____ Exp. Date _____

Name _____

Address (IF USING P.O. BOX NO. PLEASE ADD ADDL. \$1 POSTAGE)

City/State/Zip _____

CLOCK CRAFTERS
 INTERNATIONAL LTD.

5605 N. Peterson Ave., Sedalia, Co. 60135
 Att: Dept. D

BE A CHIMNEY SWEEP

Your Own Business:

A chimney sweep can clean a chimney with the August West[®] System in one hour. Nationally, the average charge is \$45.00. Earnings of \$300-\$500-\$700 or more per week are common.

A Growing Need:

The energy crisis has resulted in a dramatic increase in wood burning. Wood smoke deposits flammable creosote in chimneys. Regular cleaning is necessary to prevent fire damage.

Our revolutionary new system is fast, efficient, cleaner and easier than old-fashioned ways. You often clean from below, working indoors.

You get started quickly, without home study or an enormous investment. And we'll help you every step of the way toward success.

The August West[®] System:

More sweeps use it than any other method in the country.

Send for our free booklet, or call TOLL-FREE any time and ask for "The August West Story".

Call Free:
800-243-5166
 EXT. 212 - 9 A.M. - 5 P.M., E.S.T.
 Ask for "The August West Story"

Or write:
August West Systems, Inc.
 Box 603 - Dept. 2121
 Westport, CT. 06880

A WEALTH OF HELPFUL INFORMATION AT YOUR FINGERTIPS

BUILD YOUR OWN POPULAR MECHANICS LIBRARY!

1980 INDEX & COVER

The 1980 POPULAR MECHANIC Index & Cover is a handy two-in-one aid that you will use over and over again.

It contains a complete index of all this year's articles for quick reference to the practical information you find each month in POPULAR MECHANICS. A treasure-trove of money-saving hints and ideas.

The Index is bound in a handsome cover of sturdy, high gloss lacquer-board designed to hold twelve issues and to withstand years of use . . . A full year of valuable information and hints neatly enclosed to brighten and tidy up your book shelves.

The 1980 Index & Cover will be issued in early 1981. YOU CAN PLACE YOUR ORDER NOW and RESERVE YOUR 1980 EDITION! We will hold your order and rush the 1980 Index to you as soon as it is published.

Index & Covers for the years 1971 through 1979 are available now.

The POPULAR MECHANICS Index & Cover can convert an unorganized collection of magazines into

a valuable Reference Library. Thousands of entries cross-reference the articles that have appeared in PM.

FIND THE INFORMATION YOU NEED WHEN YOU WANT IT in this growing information bank. Needed information "jumps out" of the back issues of PM with the help of the Index.

HUNDREDS OF ARTICLES AT YOUR FINGERTIPS: New cures for wet basements, 39 ways to prevent freeze-up when your furnace quits, 7 places to find free firewood, 90-page Car Repair Manual, 10 home shop plans and more.

Broad category listings help you locate articles on boats, solar energy, photography, medicine, home remodeling, energy saving and other subjects.

THE ENTIRE PACKAGE - INDEX & COVER IS YOURS FOR ONLY \$3.95 postpaid.

Order the earlier years and receive them immediately. Remember . . . WE WILL SEND YOU THE 1980 AS SOON AS IT BECOMES AVAILABLE IN 1981.



Popular Mechanics

281

Make check or money order payable to
POPULAR MECHANICS,
Box 1014, Radio City Station,
New York, NY 10101

Please reserve the 1980 Index & Cover and
rush it to me as soon as it is available early in
1981. Also send me immediately the

1979 1978 1977 1976 1975 1974 1973
 1972 1971 Index & Cover as checked. I enclose \$3.95 (postpaid) for
each index ordered.

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

1980 Index

type reduction gear. This system holds the tone-arm assembly firmly in position. The tone-arm assembly rides on a mirror-finished, high-precision rod of nonmagnetic stainless steel.

The 8¼-inch tone arm hangs down vertically, statically balanced in all three directions for stable and accurate tracking of the grooves. It's even able to follow warped discs—and handle vibrations—with less tendency to skip out of the groove.

A spring-loaded clamp anchors the disc to the vertical platter. It hinges out of the way for convenience. Vertical operation offers a major benefit: virtually dustproof operation for "cleaner" sound.

The LT 5V accepts both moving-coil and moving-magnet cartridges mounted in "universal" headshells.

Mitsubishi Model LT 30 (\$690) is a lay-down table with an 8¼-inch tone arm. It uses two sensitive, optical sensors to maintain perfect tracking. Any departure from the tangent position detected by the sensors activates a servomotor that immediately moves the tone-arm base the correct amount to restore exact tangential tracking.

Revox Models B790 (\$899) and **B795** (\$599) appeal to two budget levels.

Both models feature Linatrack straight-line tracking. With Linatrack, the 1½-inch servo-controlled tone arm moves across the record on a carriage mounted on guide rails, traveling much like the trolley on an industrial crane. Variations in groove spacing can't surprise the tone arm. A photosensor scans the light from two LEDs, and it reports tracking contour to a computer.

Built-in minicomputer

The computer generates the appropriate signals required by the servomotor, which alters the speed of the tone-arm carriage accordingly. Result: The tracking position of the pickup system is optimized.

Technics Model SL-10 (\$600), with a moving-coil cartridge (and required head amp), is unusually compact for a turntable: Its top measures a mere 12½ inches square. The tone arm is 4½ inches long. Instead of conventional ball bearings or rollers, the arm uses a slide bearing with a very low friction coefficient to avoid undesirable vibrations, allow silent, smooth operation and provide precise tone-arm transport. Gimbal suspension and dynamic balance allow the SL-10 to function standing up, angled at 45°, or in any other position, without loss of proper tracking.

The SL-10 is unique. It's a two-piece system joined in the middle. The top half has the linear-tracking tone arm, the drive system, and a microcomputer electronic control block. The lower half has an integral direct-drive turntable and motor with their driving and quartz-phase-locked control circuit.

To use the SL-10, place a record on the platter, close the lid and press the start button. The SL-10 uses an opto-electronic detection system to determine stylus contact points, and the beginning and end of play.

Bang & Olufsen's Beogram 4004, (\$850) with installed moving-magnet cartridge, uses a 6¼-inch low-mass tone arm. The tone-arm assembly is electronically controlled and driven by its own d.c. motor which moves the entire system toward the center of the record with constant accuracy. Ultralow-friction bearings reduce horizontal and vertical friction to a minimum. Riding tandem with the tone arm is a detector arm that includes an optical scanner to sense the presence or absence of a record.

A 7½-inch tone arm is used in **Aiwa Model LP-3000** (\$1000). The arm is transported by a precision-machined, single-support, rack-screw drive mechanism turned by its own coreless motor. It's said to minimize torque fluctuations and vibrations to the arm. Also, to assure stable lifting and lowering of the arm mechanism, Aiwa eliminated the traditional hydraulic damping mechanism and gave the arm an independent coreless motor, instead.

Preselection feature offered

You can preselect up to 15 musical passages in any order, including multiple plays of the same passage. The selected program can be set to play up to 24 times or until halted manually.

Phase Linear Model 8000 (\$750) has a direct-induction linear motor that moves in a straight line. The motor is essentially a permanent magnet, moved by an electromagnet. The 8000's tone-arm base is a permanently magnetized armature that glides along guide bars above the coil. When the current flows through the coil, the tone arm travels along a straight path. Current fluctuations instantly alter the tone arm's movement.

Inside the tone-arm base is an opto-electronic detector cell that senses the slightest tracking error, and instantly sends correcting signals to the differential amplifier that powers the coils. **FM**

\$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



5271 Mantua Blvd., Sewell, N.J. 08080

Rush me my FREE Pedalpower catalog by first-class mail.



Name _____
 Street _____
 City _____
 State _____ Zip _____

the 'options' that come as standard equipment—also the thoughtful touches, like extra compartments here and there."

A Colorado mortgage officer affirmed, "If you wonder why the Japanese are beginning to dominate the auto market, owning a 280ZX will give you the reason. Every detail reads quality, from the glove-box hinges to the lumbar adjustment in the seats. I traded a 1978 Cadillac for this car and have owned Mercedes and BMWs, but this Datsun is the first car that's come up to my own high quality standards. The 280ZX is every bit as good, if not better, than my \$30,000 BMW."

An Iowa safety engineer: "It's an excellent blend of sports/luxury car. It doesn't handle as well as a true sports car, but still runs circles around most automobiles. It's powerful, yet fuel-efficient. It's also dependable and tough. I've slammed sideways into curbs in icy driving with no damage. Absolutely nothing has gone wrong with this car in 4200 miles."

Only 43 percent of our interviewees reported mechanical troubles with their 280ZXs—not a high figure—and no single malady dominated. Problems were spread fairly equally among fuel injection, the manual shift mechanism, the aircon-

ditioner, engine oil consumption before break-in, electrical flaws and squeaky four-wheel disc brakes.

A New Mexico electrical engineer mused, "The shift pattern makes it hard to get into fifth gear, and there's no lockout



Two-seat 280ZX boasts 25.7 cu. ft. of cargo volume, while the 2+2 has 13.9 cu. ft.

for reverse. The shifter, though, loosens up as I put more mileage on the car. The dealer told me this would happen." Owners ranked dealer service well above average, with 67.7 percent scoring it good to excellent.

When we asked for suggested changes that might improve the 280ZX, 13.2 percent in our survey said, "No changes—leave the car as is." Others, though, did make recommendations, including these:

"I'd like to see the engine turbocharged," proposed a California CPA, and a Texas bank examiner added, "I understand Datsun will add a turbocharger soon. [One is on the way—Ed.] No other changes are needed."

"Upholstery quality should be as good as the rest of the car. Considering the car's price, seats should actually be done in leather!"—Texas housewife. [Leather upholstery is available optionally.]

Overall, though, complaints were very subdued, especially compared with praise, which tended to be loud and enthusiastic. Satisfaction extended even to fuel mileage—unusual these days. While 6.2 percent of our respondents would have liked better mpg, most owners expressed satisfaction (or better) in



**NEW
SECOND
EDITION**

has more parts for

ELECTRIC VEHICLES

Our latest edition of the ELECTRIC VEHICLE COMPONENTS CATALOG has expanded selections of all components — more motors, adaptors, control systems and accessories.

PLUSHard-to-find Parts for "Mother Earth News" And Quincy-Lynn TRIMUTER Plans

Send \$3.00 check or money order. (\$4.00 First Class and Canada/\$5.00 overseas) to:

**FLIGHT SYSTEMS
EVCC, Dept. EV-2
P.O. Box 25
Mechanicsburg, PA 17055**

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. PM-2 and free bonus offer.

Hydraulic Jack Repair Manual Co., Inc.
P.O. BOX 18 STATEN ISLAND, N.Y. 10314

INVENTORS: CONTACT THIS FIRM

If you have an invention, patented or unpatented, write or call us at once for booklet that tells you how to offer it for sale. Booklet reveals every step, also gives current royalty rates manufacturers are paying, present markets, and outlines our service and modest fee. Call toll free 800-537-1133, ext. 52, or write Kessler Sales Corporation, Dept. 52, Fremont, Ohio 43420

Fine Cabinet Plywood

- Cut Sizes
- Full Sheets
- Many Species



Name _____

Address _____

City _____ State _____ Zip _____



P.O. Box 897
Gaylord, Mn.
55334

POPULAR MECHANICS LOW-COST POWER HACKSAW PLAN

Build this power tool and make hacksawing a lot easier and more accurate. This will end up being your "best tool in the shop." To build few tools are necessary. All steel parts are considered stock items. Power source can be any 1/2-hp. electric motor (or larger). For easy to follow plans send \$3.75 to Popular Mechanics, Box 1014, Radio City Station, New York, NY 10101.

At Least a New Amazingly Simple
**GAS TURBINE
JET ENGINE**

Build from easy to follow plans. Length 15", Dia. 8 1/2", Wt. 15 lbs. Fuel Gasoline or Kero. "Screaming Demon" develops 30 H.P. Ideal project for serious-minded hobbyists, students, scientific and industrial arts classes. Make on 9" metal cutting lathes with milling attachment. For use on small racing boats, midget cars, etc. Full size assembly drawings with critical dimensions, bill of materials and photos. Price \$67.00. No. C.O.D. 1510 26th St., Box 1398
SAVOY SCIENTIFIC SANTA MONICA, CALIF. 90408



REPAIR CLOCKS

Home Study Course prepares you for Good Income — Professional Status. Free Details. No salesman will call. *Home business* *Big money*

NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____

CLOCKMAKERS INSTITUTE
P.O. BOX 449, LEWISTOWN, PA. 17044



that department. "Where else will you find a car with such excellent styling and performance getting this sort of gas mileage? I'm averaging 20 in town and 27 on the highway," exulted a Florida financial consultant.

It turns out that the 1980 280ZX's mpg figures are even slightly better than those we recorded in 1973 for the 240Z. The

current car beats its forebear by 0.1 mpg around town and by 2.5 mpg on the open road. That's with the five-speed manual gearbox.

Economy, though, extends beyond fuel mileage—a point mentioned by several 280ZX owners in our survey. An Alabama food processor wasn't alone in calling his ZX an "investment." He told us, "I bought

a Z in 1977, owned it for 20 months, had no problems with it, but then wrecked it. I was paid more by the insurance company than I paid for the car when I bought it. With resale value like that, I'd have been crazy not to buy another Z!"

Like 93.2 percent of his fellow 280ZX owners, he'd go the Z route again next time, too. **FM**

SUMMARY OF 1980 DATSUN 280ZX OWNERS REPORTS*

Total miles driven 1,605,764	Economy 37.6 Performance 34.1 Comfort 27.0	Comfort opinion (front seats): Excellent 59.2% Very good 33.0 Good 6.4 Fair 1.3 Poor 0.0	Dealer service opinion: Excellent 29.1% Good 38.6 Average 17.7 Fair 7.3 Poor 7.3
Average miles per gallon Five-speed manual transmission In town 20.4 Long trips 26.8 Three-speed automatic transmission In town 17.9 Long trips 23.0	Specific dislikes: No complaints 26.5% Lower-than-expected mpg 6.2 Not enough power 5.7 Noises and rattles 5.7 Poor radio 4.7 Poor dealer service 4.7	Comfort opinion (rear seats): Excellent 3.4% Very good 5.2 Good 12.1 Fair 34.5 Poor 44.8	Number of vehicles owned: 280ZX only 32.2% Two cars 42.6 Three cars 14.8 Four or more cars 10.4
Transmission choices: Five-speed manual 83.1% Three-speed automatic 16.9	What changes would you like? No changes 13.2% More horsepower 5.9 Better seat materials 5.9 Better vent system 4.9 Better stereo 4.9 Turbocharger option 4.9	Had any mechanical trouble? No 57.0% Yes 43.0	Makes of other cars owned: Chevrolet 23.9% Oldsmobile 14.2 Ford 13.5 Datsun 12.9 Cadillac 8.4
Body-style choices: Two-passenger coupe/hatchback 73.2% 2-plus-2 coupe/hatchback 26.8	Workmanship opinion: Excellent 72.5% Good 25.3 Average 0.9 Fair 0.9 Poor 0.4	What type of trouble? Fuel injection 8.2% Shifter 7.1 Air conditioner 7.1 Engine burns oil 7.1 Electrical system 7.1 Brakes 7.1	Age distribution of owners: 15-29 years 28.8% 30-49 years 59.3% 50-plus 11.9
Why did you choose the 280ZX? Styling 58.8% Economy 27.3 Performance 19.5 Owned Z-cars before 16.5 Handling 10.8		Dealer repairs satisfactory? Yes 64.7% No 35.3	Would you buy another Datsun 280ZX? Yes 93.2% No 6.8
Specific likes: Styling 75.2% Handling 38.9			

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

CUT TOUGH TOE NAILS DOWN TO SIZE EVEN INGROWN NAILS QUICK, SAFE, EASY!

Extra long shanks for greater leverage. Surgical tapered blade slides under ingrown nails for fast, safe removal. For all trimmings, pedicure, manicure. Strong, stay sharp steel from Solingen Germany, 4" long.

One Pair \$3.99 + 50¢ handling
Two Pairs \$6.98 + 50¢ handling
Full money back guarantee.

Med Ind. Inc. Dept. 20
1113 E. Wendover Ave., Greensboro, NC 27405



Telephone Listening Device

Record telephone conversations in your office or home. Connects between any cassette or tape recorder and your telephone or telephone LINE. Starts automatically when phone is answered. Records both sides of phone conversation. Stops recorder when phone is hung up. This device is not an answering service.

Each \$18.95
By One Deal

Super Powerful Wireless Mic

10 times more powerful than other mics. Transmits up to 1/2 mile to any FM radio. Easy to assemble kit. 15V battery (not incl.)

Call (305) 725-1000 or send \$18.95 + \$1.00 shipping per item to USI Corp., P.O. Box PM-2052, Melbourne, FL 32901. COD's except. For catalog of transmitters, voice scramblers and other specialty items, enclose \$2.00 to USI Corp.



"Hello-I'd like to order three sheriff's badges, 2 Budweiser mugs and a player piano to go."

Anheuser-Busch brings you The Clydesdale Collection. Over 260 unique and unusual items featured on 36 fascinating pages.

To order this beautiful \$2.00 catalog call TOLL-FREE 800-325-9665

In Missouri call TOLL-FREE 800-392-9169

Or write THE CLYDESDALE COLLECTION Dept. PM5, P.O. Box 1977, St. Louis, MO 63118



GARAGE DOOR OPENERS

• Radio Controlled


• Buy Factory Direct and Save
• Thousands In Use • Free Brochure
• Easy Homeowner Installation
• Immediate Shipment by UPS or PP

HELPMATE Equipment Co. Dept. PM 281 Baroda, MI 49101



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 job—HAVE A PROFITABLE MARKET OF YOUR OWN! Time payment plan available. Diploma gives Job help. Thousands of successful graduates. OUR 38th YEAR! Send NOW for a big new illustrated FREE catalog. Its obligation. C.I. approved. NATIONAL SCHOOLS OF MEAT CUTTING, Inc. 71-02-0157T, Dept. M-M, 33 N. Superior, Toledo, Ohio 43604.



STAINED GLASS

Send 50¢ for fascinating catalog of kits, tools, ideas, books and supplies.

BIG STARTER KIT
Only \$17.95 ppd.

WHITTEMORE,
BOX 2065EM, HANOVER, MASS. 02339



UNIQUE COIN COUNTER & PACKAGER

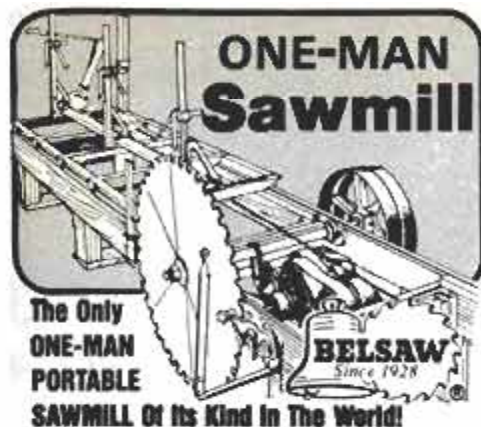
\$3.00
2 for \$5.00;
3 for \$6.00
plus 50¢ each (p-h)
1/2" residue add
6% sales tax.

Patent #4109668

Enables you to accurately count pennies, nickels, dimes and quarters in standard amounts and easily place them into standard tumbler coin wrappers. Plastic and pocket-size. Dealer inquiries invited.

Cheesman
Suite 204, 307 Susquehanna Avenue
Wyoming, PA 18644





ONE-MAN Sawmill

The Only
ONE-MAN
PORTABLE

SAWMILL of its Kind in The World!

If you need good, high-quality lumber, don't let inflated lumber prices stop your important building projects. The Belsaw goes right to the trees and turns out smooth, true-cut lumber... even beginners get excellent results. Just one man (no crew needed) can easily cut enough on weekends to save hundreds of dollars over high lumberyard prices. For power use tractor PTO or other low HP diesel or electric unit. Factory-direct selling keeps price low, and convenient time payments may be arranged.

Send for **FREE BOOK!** Just mail coupon below for "How To Saw Lumber" booklet and complete facts on the One-Man Sawmill. There is **NO Obligation** and **NO Salesman Will Call on you. Do it TODAY!**

FREE BOOK

BELSAW MACHINERY CO.
361F FIELD BUILDING
KANSAS CITY, MO 64111

Please send all facts and details in your **FREE BOOK** "How To Saw Lumber". I understand there is **No Obligation** and that **No Salesman** will call on me.

Name _____
Address _____
City-State _____ Zip _____

DO-IT-YOURSELF

FINE GRANDFATHER CLOCK KITS

STARTING UNDER

\$235

(including movement and dial)

- Factory direct prices
- Heirloom quality
- Solid 3/4" hardwoods: black walnut, cherry, oak
- Easy to assemble, parts pre-cut
- Solid brass West German chiming movements
- Money back guarantee
- Prompt shipment



MASTER CARD and VISA ACCEPTED

Write for **FREE** color catalog

EMPEROR®
CLOCK COMPANY

WORLD'S LARGEST MANUFACTURER
OF GRANDFATHER CLOCKS
Dept. 739 Emperor Industrial Park
Fairhope, Alabama 36532

ENERGY BY THE BUCKET

(Continued from page 125)

the level on the pole intersected by your line of sight.

Move down below the pole position and set up the tripod so its top is even with the bottom of the pole. Have your partner move down the slope and repeat the process. Continue until your partner reaches the turbine site, then sight the last measurement.

To compute the head, add up all the sighted elevations and subtract the height of your tripod.

Measure your flow

You can measure flow in a small stream or spring by diverting the entire flow into a container of a known size. For example, suppose the water fills a 55-gallon drum in 32 seconds. That translates to 1.72 gallons/second or 103.13 gallons/minute, or 13.79 cubic feet/minute.

Flow in a larger body of moving water is measured by the method shown in the drawing on page 124.

To determine the potential power in a moving stream, insert head and flow into this formula: $P=(Q \times h)/709$, where P = theoretical power in kilowatts; Q = flow in cubic feet per minute; h = head in feet.

For example, suppose the head turned out to be 20 feet, and the flow was 8 cubic feet/minute. Theoretical power would be 8 times 20 divided by 709—0.23 kilowatts or 230 watts. At that figure, your stream wouldn't represent enough potential to justify investing in costly equipment.

Measurement should always be taken in the dry season, when the water is running at its lowest. If the potential meets requirements at that time, it will always suffice.

■ *There's no water on your property. How do you gain access to water?* If possible, buy land nearby on which there is running water. Or tap a public source. Bob and Lauri Jepsen own land in Washington state. Water courses down a mountain rill seven months of the year, and they draw enough power with their system during that period. But during dry summer months, their water and power run out (they're a quarter-mile from the nearest public power lines).

So Bob applied to various state agencies for the right to draw water from a state-owned lake that is spring-fed. Twenty months and miles of red tape later, he's building a pipeline to the lake. The moral: You won't get permission overnight, but persistence can win out.

■ *What kind of turbine is best?* Harry Langhorne built a cross-flow or

Banki turbine, and it's served him well. Most small power developers choose some form of a Pelton wheel, which looks like a collection of tiny cups on the edge of a metal wheel.

Choosing the best turbine for your site is a decision you ought to make with the manufacturer, given your particular set of head, flow and demand facts.

■ *How do you direct water from source to turbine?* By pipe, or open sluice or penstock. Most home power developers choose polyvinyl-chloride pipe, which is noncorrosive, relatively inexpensive and easy to install. However, some users report cold-weather cracking and breaks in the joints, according to Bill Kitching, manager of Small Hydroelectric Systems. Longer lasting, but more expensive materials include clay culvert pipe banded with concrete at the joints, and wood pipe. One producer of wood pipe is listed at the end of this article.

■ *Is it easy to switch from home hydro to public power?* Yes. A transfer switch at your service entrance allows you to use hydro power up to maximum, and public-utility power for the balance.

■ *Are there regulations that govern a home hydro system?* For a system under 5 kilowatts, perhaps not. But check before you invest in equipment. In many states, especially in the West, laws on water rights are strict. You may need to obtain a water-use permit.

And in some areas, tapping water for energy, even on your own property, is checked by an environmental agency (such as a fish and game commission).

If you intend to build a plant that will generate more than 5000 kilowatts, you must secure a license from FERC, and almost surely from state agencies, as well.

Two sources for additional information are: Volunteers in Technical Assistance (VITA), 3706 Rhode Island Ave., Mount Rainier, Md. 20822 and U.S. Department of Energy, Idaho Operations Office, Hydropower Program, 550 Second St., Idaho Falls, Idaho 83401. **PM**

MANUFACTURERS LIST

- Allis-Chalmers, Hydroturbine Div., Box 712, York, Pa. 17405.
Brown Boveri Corp., 1460 Livingston Ave., North Brunswick, N.J. 08902.
Canyon Industries, 5342 Mosquito Lake Rd., Deming, Wash. 98244 (send \$1 for data flyer).
Energy Independence Research Corp., 4191 Meridian, Bellingham, Wash. 98225 (electronic controls).
Independent Power Developers, Box 1467, Noxon, Mont. 59853.
James Lettel & Co., 426 East St., Springfield, Ohio 45501.
Leroy-Somer Co., 16 Passaic Ave., Fairfield, N.J. 07006.
F.E. Myers Co., 400 Orange St., Ashland, Ohio 44805.
National Tank & Pipe Co., 10037 Southeast Mather Rd., Box 7, Clackamas, Ore. 97015 (wood pipe).
Small Hydroelectric Systems, 15220 State Rte. 530, Arlington, Wash. 98223.

Checkmate in style: Two good-looking playing boards you can make

To an avid chess player, there are two kinds of boards that matter. One must be ever handy for a quick game or for solving the Sunday paper's chess problem. The chessboard table (right) fits the bill.

The second is a unit small enough to take along on trips, but not so small that you have to squint at the pieces.

The chessboard table is ingenious in that it simulates the look of inlaid veneer, and requires very little work. First, cut the board stock (plywood of your choice) to overall size. This should be a perfect square with a side dimension equal to eight times the side of a playing square, plus seven times the width of the saw kerf. Assuming you are going to make a fairly common-size board with squares of $2\frac{1}{8}$ in. and a kerf width of $\frac{1}{8}$ in., then the formula would be $8 \times 2\frac{1}{8}$ in. plus $7 \times \frac{1}{8}$ in., which comes out to $17\frac{7}{8}$ in. Of course, the formula is flexible. You can fashion larger or smaller squares to suit the dimensions of your favorite chess pieces.

Follow the procedure in the diagram (below, right) until all grooves are made. Work with a smooth-cutting blade and make the grooves about $\frac{1}{4}$ in. deep. A hollow-ground blade or a fine-tooth crosscut blade may be used. Avoid working with a combination or a rip blade with a heavy set.

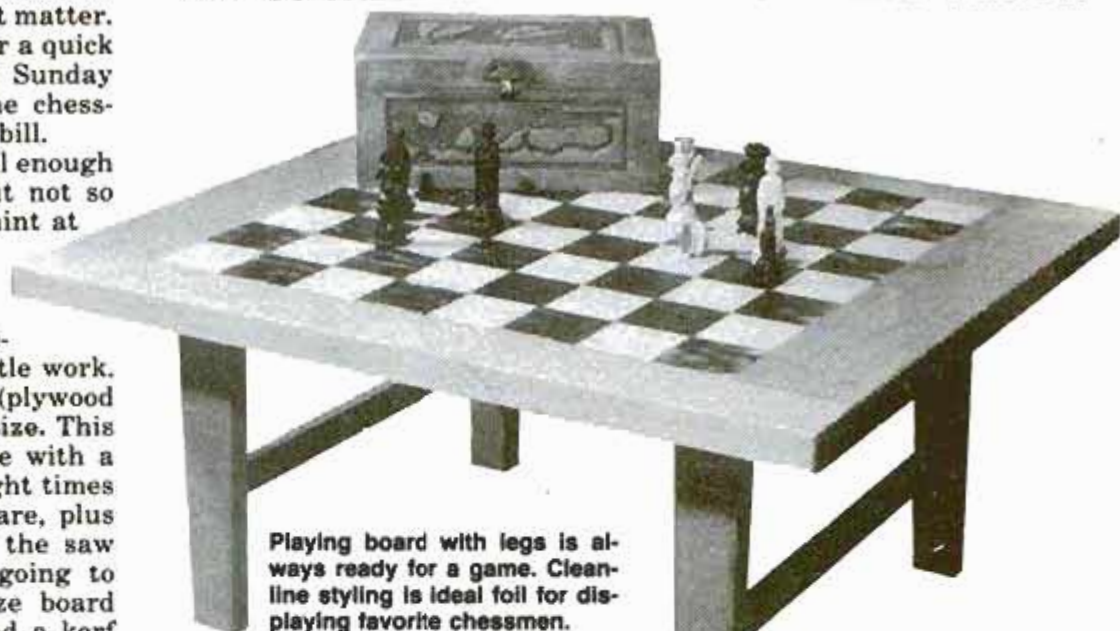
Cut the inlay strips from contrasting wood. Make them a bit wider than the depth of the grooves and a little thicker than necessary, leaving enough so that you can sand them down to fit.

Sand the strips

An effective sanding technique is to pass the oversize strips between a fence and drum sander mounted on a drill press. Move the strip through the sander assembly in one continuous pass, taking light cuts. Be sure to work against the direction of rotation of the drum for optimal results.

Next, apply a small bead of glue in a groove and tap in the long inlay strip. These strips may be cut a bit

CHESS TABLE WITH THE LOOK OF INLAID VENEER



Playing board with legs is always ready for a game. Clean-line styling is ideal foil for displaying favorite chessmen.

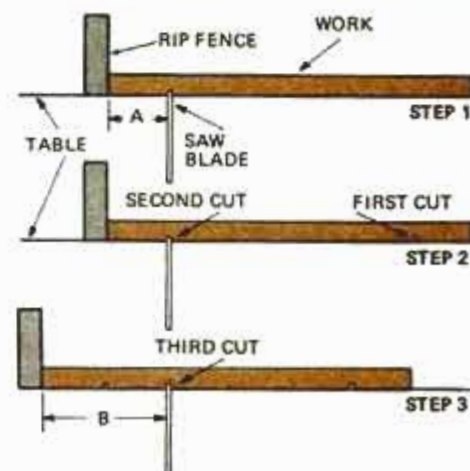


To simulate veneer, cut grooves as shown in drawing (below, right). Apply glue to grooves; tap in contrasting wood strips.

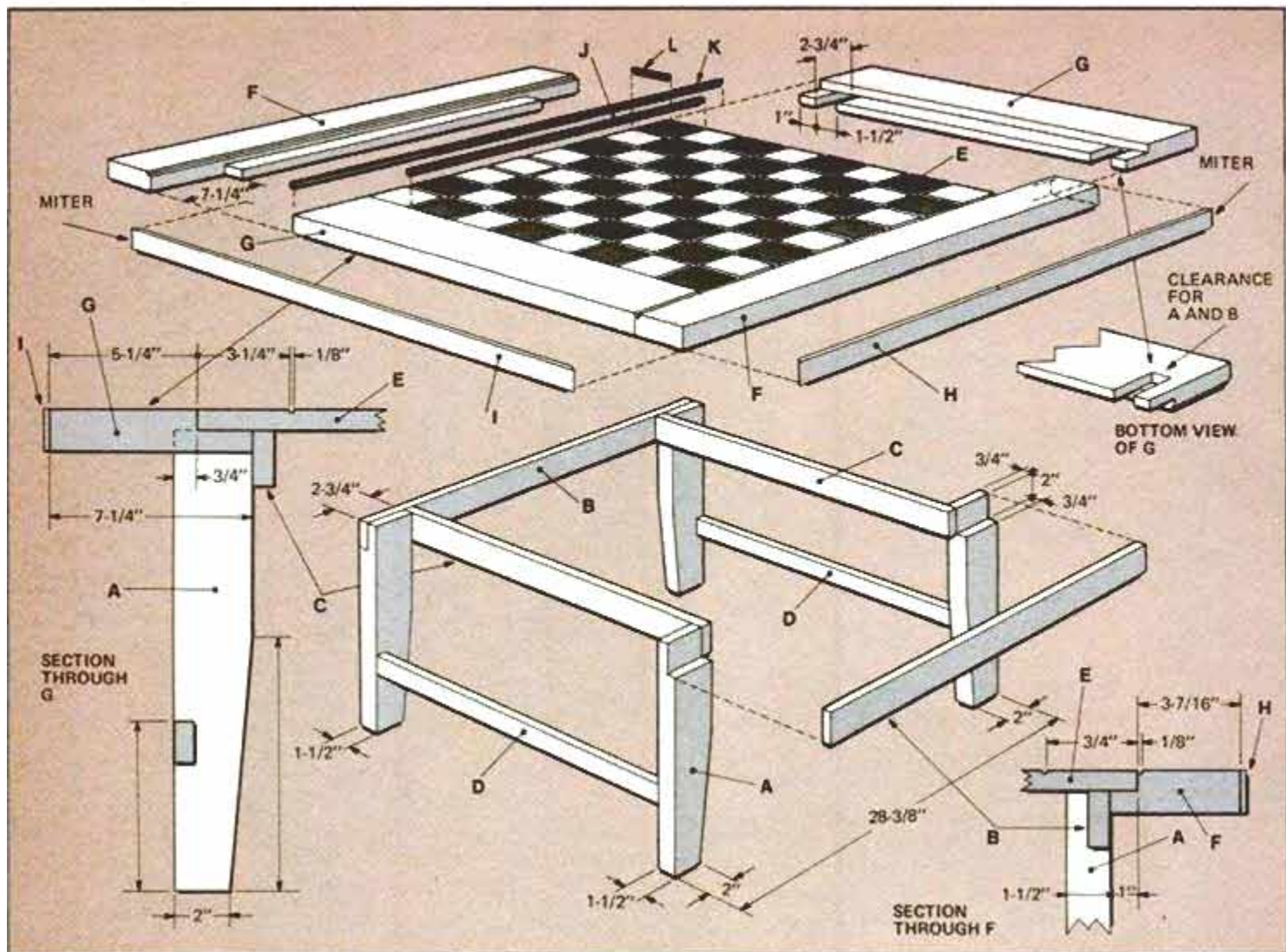


After inlaying strips in perpendicular grooves, sand them flush to playing surface. Use pad sander to avoid gouging.

For neatest-looking job, stain dark squares to match color and value of dark inlay strips.



For fast cutting of grooves, set fence to width A and make first cut. Then rotate board for second cut. Reset fence to B (twice A plus kerf) for the third cut.



longer than necessary, just to supply a safety factor. After all long strips are placed, sand them flush to the surface of the plywood. Follow with the short segments (L), setting them in place.

Another method is to cut all grooves in one direction first, install the strips, and then cut the grooves in the opposite direction. Install the full-length strips and sand the board smooth.

Once the board is smooth, stain the dark squares. This job isn't difficult if the stain matches the tone of the inlay strips. Other methods for staining include making a template from stiff cardboard that you can use like a stencil, or working with masking tape. Remember that the player's end of the board must have a dark square at the left in the first row.

Alternate method

Cut all the grooves first, then stain the dark squares before inlaying the strips. If you choose this method, inlay one set of strips, then resaw the kerfs that run at right angles to them, cutting through the strips already in place. Then set in the second set of strips. After the stain is dry, coat the squares with

MATERIALS LIST—CHESSBOARD		
Key	No.	Size and description (use)
A	4	1 1/2 x 2 3/4 x 16 1/4" hardwood (legs)
B	2	3/4 x 2 x 26 7/8" hardwood (rails)
C	2	3/4 x 2 x 23 7/8" hardwood (rails)
D	2	3/4 x 1 1/2 x 21 7/8" hardwood (stretchers)
E	1	3/4 x 26 7/8 x 26 7/8" plywood (chessboard)
F	2	1 1/2 x 4 7/8 x 37 1/8" hardwood
G	2	1 1/2 x 7 1/4 x 26 7/8" hardwood
H	2	1/4 x 1 1/2 x 37 7/8" hardwood
I	2	1/4 x 1 1/2 x 36 1/4" hardwood
J	7	1/8 x 1/8 x 26 7/8" hardwood (dividers)
K	2	1/8 x 1/8 x 37 3/8" hardwood (divider strips)
L	56	1/8 x 1/8 x 3 1/4" hardwood (divider strips)*

Misc.: White glue, 6d and 10d finishing nails, 1" brads.
 *Note: For an easier way to install divider strips, see text, this page.

shellac, so that the final sanding will not remove the stain.

Table construction

When assembling the board, glue on the endpieces (G) first, then fit the sidepieces (F). Cut the kerfs for the two inlay strips (K) after the board and the frame pieces have been glued together.

Construct the understructure as a separate assembly, starting by shaping the legs (A). Attach the side rails (C) with glue and nails hammered into the legs and through the outside of the side rails. Add the stretchers (D) by clamping them in place with glue, reinforcing with finishing nails through the legs. Or

drill through the entire assembly, and insert a dowel that you can sand flush after the glue has dried.

Attach the understructure to the tabletop by setting it into place, then nailing or using screws through the side rails (B) and into the side frame pieces (F). The edging strips (I and H) may be attached with glue only.

Finishing the project

After all parts are sanded smooth, apply a coat of sealer to all parts—including the underside of the top. Make up your own sealer by mixing 3-lb.-cut shellac with denatured alcohol in a one-to-one ratio. Stir the mixture—do not shake it; that will introduce air bubbles. Apply sealer with a quality bristle brush. One coat is enough. For a final finish, apply several coats of satin-finish varnish, sanding lightly between coats.

Don't allow any dust to settle on the still-wet varnish. Wipe with a tack rag after light sandings. Finally, sand lightly and apply a coat of paste wax—after the varnish has dried for several weeks.

You're now ready to christen your new board with a brilliant win.—R. Jay Jr.

FULL-SIZE PORTABLE BOARD AND CASE



Handsome traveling chessboard has two built-in, felt-lined drawers for convenient storage of your favorite playing pieces.

Case folds in half at invisible hinges for easy toting to park or club. Handles retract out of the way when not in use.

On the second board, the inlay is real. Black lines between the squares are optional. If you wish to keep the veneering as simple as possible, omit the lines and increase the size of the squares by $\frac{1}{8}$ in. If desired, obtain black-dyed $\frac{1}{8}$ -in. veneer strips or cut them from sheet veneer with a cutting gauge; stain them with a black felt-tipped marker.

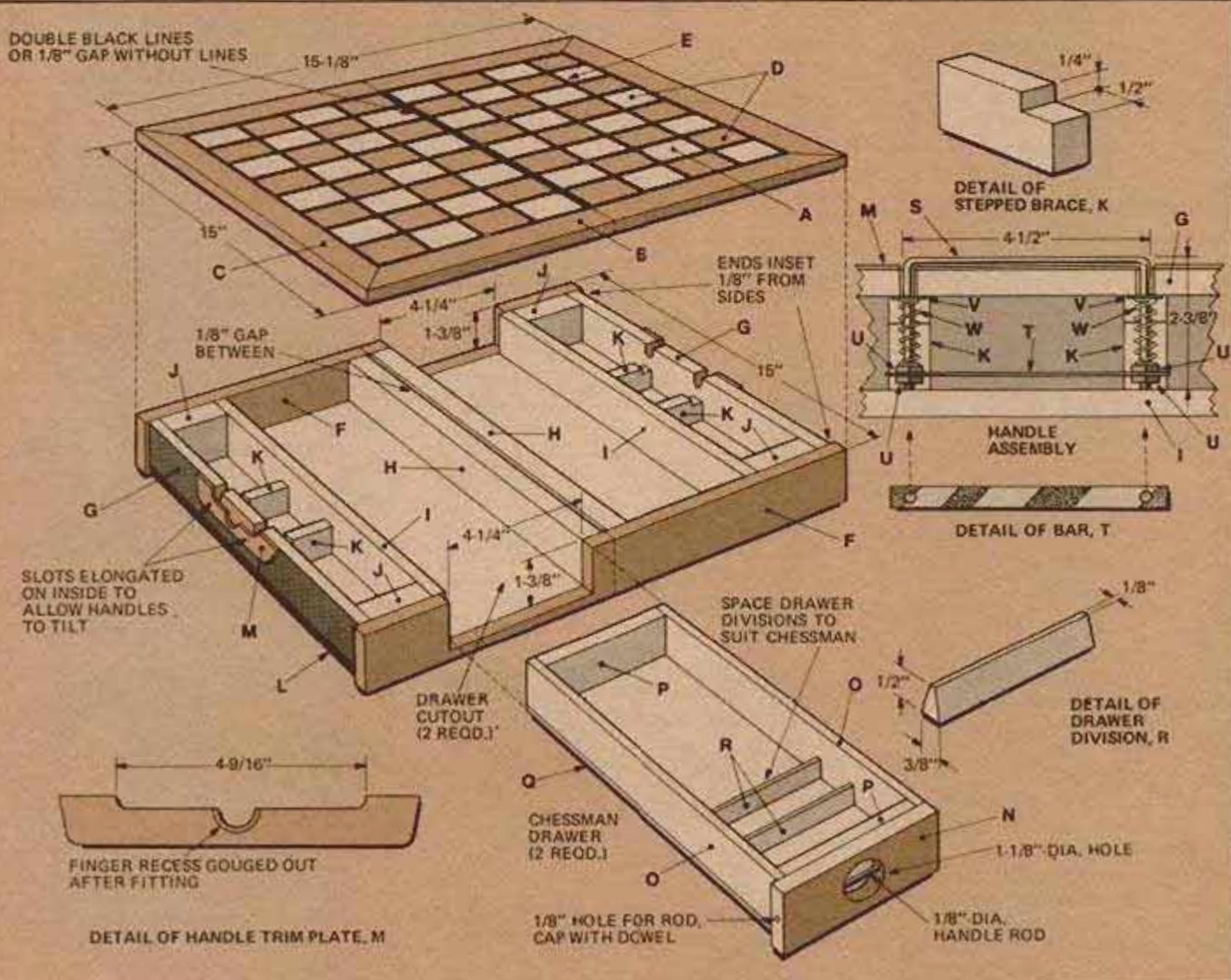
To prepare the veneers for the squares, support each sheet, in turn, on a piece of wood, then plane edges straight. Cut strips to width with a sharp cutting gauge, and assemble the alternate light

and dark strips (with or without black lines), using transparent tape. Cover these strips with self-adhesive plastic film to strengthen them

MATERIALS LIST—TRAVEL BOARD

Key	No.	Size and description (use)
A	1	$\frac{3}{16}$ x 13 x 13 $\frac{1}{8}$ plywood (top)
B	2	$\frac{3}{8}$ x 1 x 15 $\frac{1}{8}$ hardwood (edging)
C	2	$\frac{3}{8}$ x 1 x 15" hardwood (edging)
D	64	$\frac{1}{16}$ x 1 $\frac{1}{2}$ x 1 $\frac{1}{2}$ veneer if used with E or $\frac{1}{16}$ x 1 $\frac{1}{8}$ x 1 $\frac{1}{8}$ veneer without E (squares)
E	as reqd.	$\frac{1}{16}$ x 1 $\frac{1}{8}$ black veneer (optional divider strips)
F	2	$\frac{1}{2}$ x 11 $\frac{1}{16}$ x 15 $\frac{1}{8}$ hardwood (case sides)
G	2	$\frac{1}{2}$ x 1 $\frac{3}{8}$ x 14" hardwood (case ends)
H	2	$\frac{3}{4}$ x 1 $\frac{3}{8}$ x 14" pine
I	2	$\frac{1}{2}$ x 1 $\frac{3}{8}$ x 14" pine
J	4	$\frac{3}{4}$ x 1 $\frac{3}{8}$ x 1 $\frac{3}{8}$ pine
K	4	$\frac{1}{2}$ x 1 $\frac{3}{8}$ x 1 $\frac{3}{8}$ pine
L	1	$\frac{3}{16}$ x 14 x 14 $\frac{1}{2}$ plywood (bottom)
M	2	$\frac{3}{16}$ x 7 $\frac{1}{2}$ x 6 $\frac{1}{2}$ overall plywood
N	2	$\frac{1}{2}$ x 1 $\frac{1}{16}$ x 4 $\frac{1}{16}$ hardwood (drawer fronts)
O	4	$\frac{1}{4}$ x 3 $\frac{1}{2}$ x 13 $\frac{1}{4}$ pine (drawer sides)
P	4	$\frac{3}{8}$ x 3 $\frac{1}{2}$ x 3 $\frac{1}{4}$ pine
Q	2	$\frac{1}{8}$ x 3 $\frac{1}{2}$ x 13 $\frac{1}{4}$ plywood (drawer bottoms)
R	18	$\frac{3}{8}$ x $\frac{1}{2}$ x 3 $\frac{1}{8}$ pine (drawer dividers)
S	1	$\frac{1}{4}$ -dia. x 20" brass, aluminum or stainless-steel rod (handles)
T	2	$\frac{1}{2}$ x $\frac{3}{8}$ x 5" steel (tie bar)
U	8	$\frac{1}{4}$ " nuts
V	4	$\frac{1}{4}$ " washers
W	4	$\frac{1}{4}$ " id. x 1 $\frac{1}{2}$ " compression spring

Misc.: White glue, veneer glue, 6d finishing nails



for the next cutting operation and to prevent glue penetration when applying veneer.

Cut strips to width with a sharp cutting knife and a steel straight-edge. Check for square as you go. Mark width at each end with a cutting gauge and align straightedge with the marks before cutting. Reverse each alternate strip end to end, then tape together as before. Leave a 1/8-in. gap (or include a twin black line) where the board will be cut in half.

After spreading the veneer glue, clamp veneer to the plywood top (A). When dry, trim edges, then miter ends of the solid edge pieces to fit. Glue and clamp in place. Next, make the drawers (except for the fronts which are fitted later), then assemble the case around them. Fit and glue spacer pieces into drawers to suit the chessmen. Cover with felt, using rubber cement. Cut remaining case members to size. A bench disc sander is ideal for trimming ends square. Glue and nail pieces to one another and to the base.

Thread the handle rods (S), then bend in the vise before drilling tie bars (T) to suit. The slightly larger handle holes in the front (G) are drilled at the same centers as the tie bars. These holes are later cut into slots. Use compression springs for the handles and check that handles, when fully extended, can tilt enough for the tie bars (T) to engage the stepped guides (K).

Making the drawer fronts

Make cutouts for drawer fronts, then glue and clamp the sides in place. Cut finger recesses with a gauge after gluing on trim pieces (M). Cut drawer fronts to fit. Bore the drawer-pull holes and tap in the rods. Glue and clamp the fronts to the drawers while both are set in the case.

Place the top in position with the double black line (or gap) aligned with the space between center dividers (H). Mark around the overlap of the top. Plane away overlap, then refit in place with handles in the retracted position. When the handles operate smoothly, glue and clamp the top in place. Cut the board in half with a fine-toothed saw.

After truing the cut edges, mark positions for the invisible (Soss) hinges. Pare away the waste to receive the body of the hinge and cut recesses for the flanges with a chisel and gouge.

Smooth down exposed surfaces with fine-grit paper, and finish as desired. Cut leather or stretch black vinyl to fit, and secure with rubber cement.—*Kenneth Wells*

APPLYING THE VENEER AND BUILDING THE CASE



Before cutting squares from veneer, sandwich sheet between straightedge wood blocks and plane edges straight.



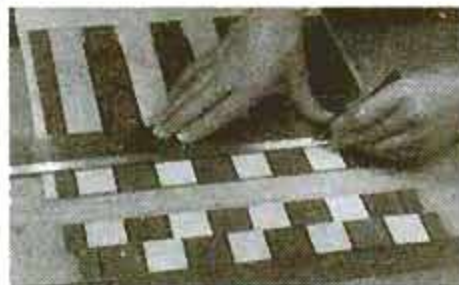
Cut strips with sharp cutting gauge. We chose 1 1/2-in. widths for the prototype, but this can be changed to suit pieces.



Alternate light strips, dark strips and black divider strips (optional), then preassemble pieces with transparent tape.



Next, cover assembly of strips with sheet of self-adhering transparent plastic film to strengthen the veneer for next cut.



Cut strips of alternating squares with steel straightedge and sharp knife. Make sure patterns are square before cutting.



Reverse every other strip for a checkered pattern and glue onto plywood. Clamp between two 1/4-in. plywood pads.



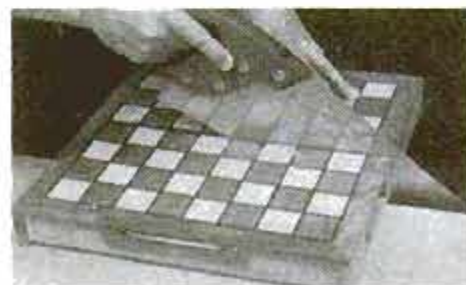
Cut solid edge pieces, mitering corners, and glue them to board. Use four bar clamps, two topside, two underneath.



Use bar clamps to glue up box and interior frame. C-clamps, with protective scrap blocks, hold the trim pieces in place.



When perpendicular to case side, handle is engaged by step in piece K (see plans on page 161). Tilt it outward to retract.

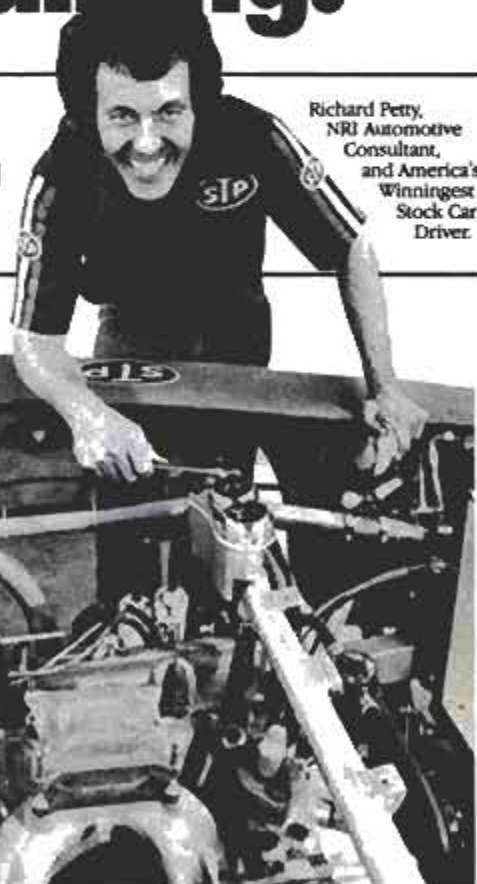


Use a fine-toothed saw to cut the nearly completed case in half. Then finish with oil or varnish and install the hinges.

Richard Petty says,

"If you really want to learn how to repair cars, check out new NRI home training."

You learn in your spare time and they give you the training and equipment you need to get you started in a hurry.



Richard Petty,
NRI Automotive
Consultant,
and America's
Winningest
Stock Car
Driver.

My Dad made auto mechanics out of us long before he'd let us enter a race...so I learned the importance of a good mechanic early...and the opportunities that are out there for well-trained men. That's why I'm sure glad to see training like the two NRI courses come along. With NRI, you learn at home in your spare time, at your own pace. And get solid, "hands-on" training for practical experience. It's a lot of training for the money.

Learn Auto Servicing Fast

NRI's basic automotive servicing course covers the fundamentals of auto repair in 30 "bite-size" lessons. You specialize in big-demand under-hood services, plus tire and brake work. Your hands-on training includes a complete kit of famous Sun equipment such as inductive timing light, diagnostic analyzer, compression tester, and much more.

Includes Diesel Engine Training

NRI's 51-lesson Master Mechanic course has it all. You get all the Basic course equipment and training, plus lessons on transmissions, engine rebuilding, suspension and alignment, power steering, air conditioning, and much more. You even get six special lessons in automotive diesel engines, and seven special reference manuals



NRI training includes professional instruments and tools.

covering foreign cars, running or managing a business, body and framework, etc. And you get the master instrument for the master mechanic, the Heath ignition analyzer oscilloscope. Built by one of the most respected names in electronics, it lets you "see" the motor at work, even tune up high performance and racing engines.

Train with the Leaders — NRI and McGraw-Hill

No other school has NRI's experience in home training or McGraw-Hill's background in continuing education. More than 60 years of experience and over a million students prove that they really know how to get you started on a good future. Mail the postcard for a free catalog telling all the facts, describing the complete course, and showing all the professional tools you get. Get your training at home, the convenient NRI way. If the postcard

has been removed, write to address below. No salesman will call.

Or check out these other growing fields.

Small Engine Repair

There's plenty of opportunity for the man who can service lawn 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 building a 3 1/2 HP engine as part of your training. Choice of Basic and Advanced Courses. Check postcard for catalog.

Air Conditioning/Refrigeration/Heating Including Solar Technology

Gets you into a wide-open, fast-growing area with practical training that includes lessons on solar heating, heat pumps, etc. Course is complete with professional tools, including top grade professional vacuum pump, key tool in the proper servicing of

refrigeration and air conditioning units. Two courses, with Master Course including optional postgraduate training at York Institute Resident School at no extra charge. Check card for catalog.

Electrical Appliance Servicing

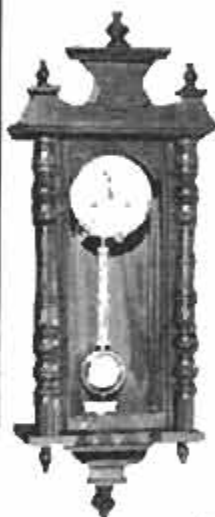
Good appliance repairmen are hard to come by. NRI trains you for your own full- or part-time business in fixing everything from toasters to refrigerators and freezers. Step-by-step training includes professional tools and instruments like clamp-on ammeter and appliance multimeter.



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

FREE COLOR BROCHURE

QUALITY GRANDFATHER, WALL
AND MANTEL CLOCKS
AT FACTORY DIRECT PRICES



- Do-it-yourself pre-cut kits
- Completely finished and assembled models
- Antique furniture reproductions
- Grandfather clocks
- Wall and shelf clocks
- Beautiful solid woods (walnut, oak, or cherry)
- Solid brass West German movements
- Prompt delivery
- Money back guarantee



**VIKING
CLOCKS**

FREE Color Brochure. Write: Viking Clocks, The Viking Building, Dept. 807, Foley, AL 36536. Phone: (205) 943-5081

Visit our showrooms: 110 East 35, Spanish Fort, Ala and Hwy. 59 one mile south of Foley, Alabama

MORE HEIRLOOM CLOCKS FROM KITS

VIENNA REGULATOR CLOCK

(Continued from page 134)

pass it up. Also optional is a finishing kit that includes a web clamp. The clamp is very handy, I found, for holding glued parts in place during assembly.

The sides of the case are let into blind mortises in the top and bottom, and fit very well. The door is easy to put on with invisible hinges that slip into predrilled holes. The back is nailed on, and here it's very important, I discovered, to drive the nails close to the edge of the panel to keep their points from projecting into the cabinet interior.

Don't hurry the finish

As in any fine wood project, finishing is the key to success—don't rush it. Be sure to check each panel for cross-grain sanding marks that may be left from the factory. They're hard to spot on unfinished wood, but will show up during staining. Sand them out by rubbing in the direction of the grain.

I used two coats of stain, with lots of rubbing with fine steel wool, then applied a tung-oil finish (part of the finishing kit). After buffing and waxing, it looks terrific.

Installing the glass is a snap. The panes fit into rabbeted edges inside the case and are held snug by rubber retaining strips you just press into place. In general, I felt the instructions were quite clear, though the diagrams for installing the clock mechanism might have been a bit more detailed. Still, the works went in with no real difficulty, and the chimes have a wonderfully clean, crisp tone.

The clock, in my opinion, is an impressive, authentic-looking piece and, at a saving of about 50 percent over an equivalent ready-made clock, is well worth your time and effort.

The kits are sold by Westwood Clocks 'N Kits, 3210 Airport Way, Dept. 104-F, Long Beach, Calif. 90806. A catalog costs \$1.—*Don Mannes, Technical Art Director*

CLASSIC SCHOOL CLOCK

(Continued from page 135)

the rugged, grainy look that the original, old schoolhouse clocks had.)

There is nothing highly complicated in the installation of the chime bars and clock movement either, but I found that the template for locating the screw holes for the chime-bar assembly leaves the bars angled too close to clear the chime-hammer arms. And, once you've located the movement, using the same template, you have to remove it completely to read-just the chimes.

Instead, I would suggest moving the chime-bar assembly's left screw hole

(facing the clock from the front) about 1/8 in. counterclockwise (from the template position) on a radius from the right screw hole. This should leave room for the chime bars to clear both the clock case and the hammer arms.

I used a mahogany stain and Minwax Antique Oil finish to give my clock a hand-rubbed look. It not only looks good, but the Westminster chimes ring out with a surprisingly big sound. The kit can be ordered from Craft Products, 2200 Dean St., St. Charles, Ill. 60174. Or write for a catalog, available for \$1.50.—*Robin Nelson, Executive Editor*

ELECTRIC BALL CLOCK

(Continued from page 135)

parts and is easy to assemble, requiring only a screwdriver. No glue is used: The plastic parts simply snap together. The only difficulty I had was with one track I had neglected to fit into place properly. Balls on the lowermost track indicate hours; on the middle track, five-minute intervals; and on the top track, one-minute intervals.

The Arrow Electric Ball Clock is intended for anyone 12 years and up. It's priced at \$29.95, plus \$2.25 postage, from Caldwell Industries, Box 591, Luling, Tex. 78648. A larger version, with 3/4-in. balls, is about \$60.—*Walter E. Burton*

CRYSTAL MANTEL CLOCK

(Continued from page 134)

ple, the instructions suggest that you identify all parts before beginning work. I was pleasantly surprised to find that most of them were already labeled in pencil.

Major parts of the kit are pre-cut; I simply bored holes as needed. Even at that, most of the holes are already marked by an awl.

The only cutting needed was near the end of the project, when I cut wood strips to keep the glass in place. Throughout the project, extra brads and screws were provided.

Results should please you

In short, the kit contains all necessary instructions and materials so that anyone willing to take the time will be happy with the project.

Some woodworkers may prefer one of the other packages that are available for this same style of clock. The crystal mantel clock also comes with uncut lumber and all other parts; or you can simply purchase the plan and parts without the lumber.

The kits are from Mason and Sullivan, 39 Blossom Ave., Osterville, Mass. 02655. You can obtain a catalog for \$1.—*Penelope Angell, Asst. Home and Shop Editor*

Free!

Edmund Scientific Catalog



**OUR
40th
YEAR!**

Astronomy, Microscopy, Biofeedback, Weather, Alternate Energy, Binoculars, Optics, Magnets, Magnifiers, Tools, Unique Lighting, Lab Equipment, and much more. Over 4,000 unique and fascinating products. Send for our **FREE** 112-page, colorful 1981 Edmund Scientific Catalog... Today!

Rush me your free catalog!

Name _____

Address _____

City _____

State _____

Zip _____

Clip And Mail Coupon Today To:
Edmund Scientific Co., Dept. 3016 H-04
Edscorp Bldg., Barrington, N.J. 08007

No. 226 *1981 Edmund Scientific Co.

(no auxiliary vehicles) hovercraft journey. Windt is not only a premier pilot, but a leading hovercraft designer.

Ten years ago, Windt, an aeronautical engineer, moved to Cordova, a sleepy river town, where he settled on a slough off the Mississippi. The slough proved too shallow and full of snags for a boat. After he sheared a propeller pin once too often, Windt decided to build his first hovercraft, since it could come and go over the shallow waters with impunity.

When Chris Fitzgerald, an Australian hovercraft designer, moved to Terre Haute, Ind., five years ago and inspired the formation of the Hoverclub of America, Windt joined.

teered. He was happy to take them, since he knew that they were not just eager teen-agers, but could be counted on to help with difficult repairs and tricky operations. Dean had built two hovercraft to Windt's designs, and Terry had built three. Mike Kiester had built an 18-footer to a Windt design, so that all of them were familiar with the characteristics of the large UH-26S, which they soon were calling the "Monster."

Twenty-six feet long and 12 feet wide, the UH-26S on cushion has a 14-inch hard clearance. It is powered by a single 350-cu.-in. V8 Ford engine. A 42-inch axial fan, situated directly under the driver's cockpit, generates the air cushion, which is



The town turned out as Windt hit ramp at Cordova within an hour of his pretrip estimate.

He then met Mike Kiester, an oil-drilling equipment manufacturer and hovercraft builder, at a Hoverclub meet. It was at one of these meets that he also first met the two youthful members of the Mississippi River expedition, Dean Pollee and Terry Chapman.

Hoverclub members tend to be family people, and experienced men take a genuine interest in instructing younger members and encouraging them to build and operate their own craft. Dean and Terry were clearly among the most promising of the junior members. Both were good students in high school, with a marked talent for mechanics and a youthful yen for adventure.

Riding the 'Monster'

When the two boys learned that Bob Windt was planning his trip down the Mississippi, they volun-

contained within a 17-ounce neoprene skirt. A two-bladed wooden propeller provides the thrust. A 25-gallon fuel tank gives the "Monster" only limited range, which varies with wind and surface conditions, so portable marine tanks are usually stowed aboard for a cruise.

Constructed entirely of wood and weighing 2500 pounds empty, the craft contains a cabin, enclosed with Plexiglas, that holds 11 people. Storage space is located under the bulkheads. Bunks, hung beneath the bulkheads, and benches can be used for sleeping, but on the trip a four-man tent was also carried along.

For optimum speed and easy handling, supplies and gear had to be limited to between 1500 and 1700 pounds. The night before the trip was to begin, Windt and the two boys worked late, weighing every item

(Please turn to page 168)

You and your lady can build this Lincoln Log home in 3 weeks.



We give you everything you need, down to the last nail. If the skyrocketing costs of housing are making you think twice about buying a home, think about this. With a basic Lincoln Logs Home Package, you can build the log home shell pictured above, fully sealed from the weather, for less than \$15,770.

Dollar for dollar, the basic Lincoln Logs Home Package is the most complete in the industry, designed and engineered for quick, easy construction. We supply all blueprints, plans and an instruction manual that gives you the "How To" in simple language with easy-to-follow illustrations. And your local Lincoln Logs Distributor will give you 4 hours of on-site instruction to answer any questions you might have. Lincoln Logs will even assemble a package based on your floor plan or architectural design... AT NO EXTRA COST.

Send just \$4 for your Lincoln Logs Home Planning Kit with plans for 17 different log homes.

The Lincoln Logs exclusive "STACK 'N BUILD" construction method



(Dealer inquiries invited)

Lincoln Logs Ltd.
2 Chestnut Rd., Chestertown, New York 12817
Here's my \$4. Please send my Lincoln Log Home Planning Kit by return mail.

Name _____
Address _____
City _____
State _____ Zip _____

 **THE ORIGINAL**
Lincoln Logs Ltd.
1-518-494-2426 © 1980 Lincoln Logs, Ltd.

and making sure that it was carefully stowed.

"Bob brought along a toolbag weighing only 20 pounds," marveled Terry after the trip was over. "I carry that much for a day's cruise on our little lake near home."

At 6:30 a.m. on Wednesday, July 11, Windt flew the UH-26S down a concrete ramp from its garage and onto the slough. It was up to Terry to keep the journal, which was to be submitted later as one of the requirements for their *Guinness Book of World Records* application. That first day everything went smoothly.

Up to a mile a minute

The crew took turns at the controls to get the feel of the craft. A hovercraft travels faster over land than over water because of spray drag and the action of waves on the skirt. A craft that can travel at 50 mph over water can make 55 mph over level land, and up to 60 mph over ice or snow.

"Sand or mud, the slimier the better, provides a fast surface," Bob Windt explains.

On the other hand, a hovercraft cannot travel well along roads, because most roads are crowned, and since the craft seeks the lowest level, it keeps sliding off the road. In operating a hovercraft, it's the direction of movement that is important, not the direction in which the craft is pointed. It is brought to a quick stop by making a 180° pirouette and firing a blast of air—in much the same way a spaceship is halted. The higher the speed, the greater radius it requires to make a turn, and if a wind picks up, it may increase the radius still further.

"We ended this first day of hovering by setting up camp on a sandbar," Terry noted in his journal. "It seemed like we were the only ones in the whole world, with the stars overhead and the water slowly flowing past the shore."

In the morning, the hovercraft adventurers gathered their gear, fired up the engine, and let the Monster glide down the beach into the river. Windt gave the craft full left rudder, opened the throttle, and they sped down the river. Windt and his crew visited Mark Twain's boyhood home at Hannibal, Mo., and then hovered 50 miles downstream for that exciting encounter with Lock 22. Only a few miles after they hovered over the dam, Windt discovered that their furious descent had ripped a small section of the skirt. He piloted the craft ashore on a sandbar, where the crew repaired

the tear and camped for the night.

On Friday, July 13, the Monster hovered downriver to the mouth of the Illinois, then ascended that river for 12 miles to participate in a Hoverclub rally.

Two other hovercraft escorted the Monster following the rally, as it headed down the Mississippi on Sunday about noon. They went through Lock 26 after a wait of half an hour.

The Monster glided through the Chain-of-Rocks without incident, and at St. Louis scooted right up onto the shore to park at the foot of the Gateway Arch. There a crowd of St. Louisans gathered and questioned its occupants. Mike Kiester, who had come from Duncan, Okla., to rendezvous with Windt, came swinging down the levee and jumped aboard.

After a gas and provisions stop at a marina downriver, Windt hovered the UH-26S up onto a sandbar for the night's camp.

Monday, July 16, was the sixth day of the trip. At Cape Girardeau, Mo., where the last bluffs of the Mississippi frown down on the rolling river, the expedition halted so that the front engine-mount bolts, which had snapped, could be replaced with bolts of hardened steel. At Cairo, Ill., at the confluence of the Ohio and Mississippi, a river marker indicated that they were 280 miles from Memphis and 860 miles from New Orleans. The crew jumped in the warm river for a swim to celebrate.

A wave blows the skirt

All along the river, the craft crossed over wing dams that the Corps of Engineers has extended into the river to protect the banks from erosion. Then without warning, while negotiating a wing dam, Windt struck a large standing wave on the downriver side. With the impact, the air pressure blew out the tacks holding the rear of the skirt. The Monster lost pressure and settled down into the water. After "boating" the craft to shallow water, they repaired the damage.

The next day, a 20-mph wind blew down from the north. It picked up the craft's speed so that they reached Greenville, Miss., ahead of schedule. This town's harbor is situated some 15 miles up a dredged channel from the big river. Since they were running short on gasoline, Windt decided to backtrack up the channel, despite the strong north wind.

As the UH-26S ran against the wind, the combination of wind and propeller blast caused the elevator

to rise and pull against the upper rudder mounts. One of the rudder connecting bars suddenly snapped off. But Windt was able to fix the rudder with a stick and some baling wire, and the Monster continued on.

With the wind again blasting from behind the next day, the Monster whizzed down the river to stop at Vicksburg, where the crew beached the craft beneath the highway bridge over the river and trooped ashore for a visit to the Civil War battlefield. Then Terry, who was piloting the craft below Vicksburg, hit a barge wake too fast and broke loose some Styrofoam flotation. Not being certain what damage lay beneath the craft, he jumped into the river, and Windt flew the craft over him so that he could inspect the bottom. The damage wasn't serious, and by lunchtime they were dining on catfish in Natchez.

A long, wet night

That evening, they stopped early when the skies filled with angry black clouds. The boys decided to sleep in the Monster, but the men set up the tent on the shore. They had anchored it with extra guy lines, but when the storm hit, it blew down the tent, and Bob and Mike had to make a wet run for the craft.

Thursday, July 19, the sleepy crew made it downstream to Baton Rouge, La., although all were worried about a low oil-pressure indication on the gauge. South of White Castle, La., they stopped on a sandbar to change the oil and filter, which took care of the problem. While there, they saw their first ocean ship, which came up the river toward them, huge and forbidding, as it drew near. To the hovercrafters' surprise, it left a smaller wake than did the barges. The winds were now whipping the vast river into large waves. As the hovercraft topped one giant, it plunged down into the next wave so that the left air "splitter plate" was ripped away. The craft could still fly, but with minimal lift. Windt worked it up onto a muddy shore, where the crew worked late, sawing a new splitter from a 1/4-inch-thick bed board with a hacksaw blade clamped in Visegrip pliers for a handle. Windt fiberglassed the board into place. Exhausted, they slept.

In the morning, Windt discovered that some of the tacks had torn loose from the skirt again, and he needed to get under the craft. The Monster weighed much too much for the four of them to lift, so they tied the stern to a tree and powered it up on the cushion; that way they could shove

(Please turn to page 170)

you and your food toasty warm . . .

Clean, Instant Heat Whenever & Wherever You Need It!

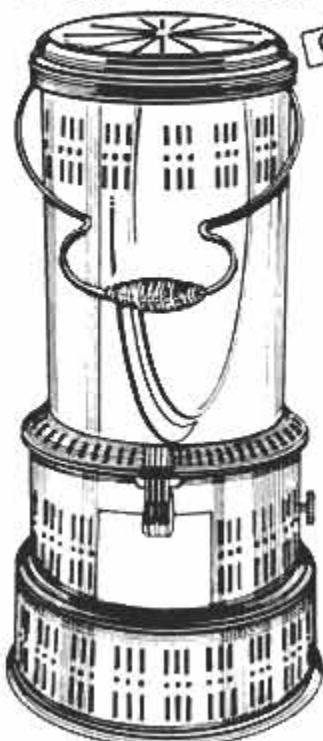
11,000 B.T.U.
PORTABLE HEATER

Heats up to 10 full hours on less than a gallon of fuel!

24³/₈" x 13¹/₈"
Weights **only** 10 lbs.

Here's a hot idea you can use anytime just about anywhere — small on size, yet big on performance — scientifically rated at a whopping 11,000 B.T.U.'s! Heats up to a spacious 1,500 cubic feet. Doubles as a terrific single-burner food warmer — keeps food and coffee deliciously heated and ready to serve. Operates on clean burning plentiful kerosene. Outheats catalytic and propane type units. And no hard-to-get-filled pressurized canisters to fool with either! Economical — heats 8 to 10 hours on only 1/2 gallon of fuel. Safe and efficient. Needs minimum ventilation when used in closed areas. Dozens of applications including outdoor recreation, garage, workshop, utility shed emergencies. All-metal construction. Made in U.S.A. Compact and lightweight. Complete with easy illustrated instructions. Long-life wick included. Order NOW while supplies last!

Portable Heater (#403)
ONLY \$49.95 SAVE! 2/\$89.50



Quality Built in USA

Just some practical uses:

- Camping, Hunting, Fishing
- Garage, Shop, Utility Shed
- Emergency Power Outages
- Most Any Hard-to-Heat Area!

11,000 B.T.U. Output

Air Cooled Handle

Durable All-Metal Construction

1/2 gallon, zinc-coated steel reservoir

Double Safety Latch

Baked Enamel Lower Drum & Top

Protective Metal Floor Tray

Keeps Food & Coffee Deliciously Warm for Hours!

Your Risk-Free Guarantee
11,000 B.T.U. Portable Heater must be exactly as described. You must be convinced that it is a superior product — quality built in U.S.A. from the finest materials — with outstanding heat performance or simply return the unit within thirty days for an immediate replacement or refund your choice and no questions ever.

Spare Long-Life Wicks
Unique 'Inner-Flow' design is made of specially spun durable fabric with exclusive 3-ply construction for uniform fuel flow and long-lasting service. Order several for emergencies.

\$4.95 ea.

The ENERGY WAREHOUSE
150 South Main St.
Wood-ridge, NJ 07075
(201) 772-2929

—SATISFACTION GUARANTEED! MAIL TODAY—

The ENERGY WAREHOUSE, 150 South Main Street, Dept. 801, Wood-ridge, NJ 07075 • (201) 772-2929

Please rush _____ Portable Heater(s) (#403) at the low, low distributor-direct price of only \$49.95 each plus \$5.50 heavyweight shipping, handling and insurance. Full Money Back Guarantee of Satisfaction.

SAVE \$13.15! Order Two (2) Portable Heaters, just \$89.50 plus \$8.25 heavyweight shipping, handling and insurance. (Each unit packaged separately; same guarantee applies)

I Send _____ spare Long-Life Wick(s) (#410) @ \$4.95 ea. \$ _____

Enclosed is Check Money Order totaling \$ _____ (NJ residents add 5% sales tax)

CHARGE MY VISA/BankAmericard Master Charge

Account No. _____ Exp. Date _____

Signature _____

PRINT NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

Check state and local laws regarding use in your area. © 1980 Energy Warehouse

Amazing Thermal Bed Sheet

KEEPS YOU WARM WITHOUT ELECTRICITY



- No need for layers of heavy blankets!
- No uncomfortable wires!
- No costly electricity!
- 100% safe!

Price Break As low as \$3.98

YOUR NO-RISK MONEY BACK GUARANTEE

Your Heat Sheet(s) must be exactly as described. You must be happy with your purchase, or simply return it to our Customer Service Manager within thirty days for an immediate refund or replacement, your choice and no questions asked. That's our Dorsay Promise to you. Serving satisfied customers since 1932.

member Today! Twin, Double, King sizes. Regular and Super Deluxe Models. Super Deluxe (shown in picture) is "extra" reinforced with cross-cross pattern, and is slightly larger to cover more bed area. Ideal for restless sleepers.

Prices: Twin: Regular \$4.98 ea. 2 for \$5.98 ea. Super Deluxe \$8.98 ea. Double: Regular \$6.98 ea. 2 for \$5.98 ea. Super Deluxe \$9.98 ea. King: Regular \$7.98 ea. 2 for \$6.98 ea. Super Deluxe \$11.98 ea. Add \$1.50 per order shipping & handling. New Jersey residents add 5% sales tax.

Your body is a natural source of heat — but all too often this heat is lost. Now our thermal bed sheet will help you harness this heat. Capture it so you can sleep comfortably on the coldest nights, even with the thermostat down low. Outdoor campers have been using these heat sheets for years!

Simply place our thermal sheet under you — right between your mattress and bottom sheet. Its special insulating space-age material reflects your body heat right back to you. You stay warm and toasty all night — and it costs you nothing in electricity or added blankets. Lightweight, portable, and stain resistant. Order one for each family

DORSAY MARKETING, 142 MacArthur Ave. Dept. 799, Garfield, New Jersey 07026

Please send me _____ Heat Sheets. (State quantity desired below each item)

TWIN
Regular: \$4.98 for 1; 2 for \$7.96 (\$3.98 each). Add \$1.50 per order for postage and handling.
Super Deluxe: \$8.98 for 1; 2 for \$16.96. Add \$1.50 per order for postage and handling.

DOUBLE
Regular: \$6.98 for 1; 2 for \$11.96. Add \$1.50 per order for postage and handling.
Super Deluxe: \$9.98 for 1; 2 for \$18.96. Add \$1.50 per order for postage and handling.

KING
Regular: \$7.98 for 1; 2 for \$13.96. Add \$1.50 per order for postage and handling.
Super Deluxe: \$11.98 for 1; 2 for \$23.96. Add \$1.50 per order for postage and handling.

CHARGE IT (Orders \$10.00 or over)
 MasterCharge Visa Exp. Date _____

Acct. # _____

Signature _____

N.J. resident add 5% sales tax. Enclosed is \$ _____

Name _____

Address _____

City _____ State _____ Zip _____

© 1980 Dorsay

**LOW-COST
FLYING
MADE
EASY**



INEXPENSIVE BENSEN GYROCOPTER

Kits easily built and flown by hobbyists aged 14 to 75. You too can now enjoy the fun of flying at low cost. Send \$18 for Specs, 3-view Dwg. and Flight Test Report to:

Bensen Aircraft Corp. Name _____
P.O. Box 31047 Dept. PM-21 _____
Raleigh, NC 27612 Address _____

SEND
10



Rockwell Speed-Bloc Sander—Palm grip design for one hand use. Thumb control switch, off-set 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, Diason, Millers Falls, Helios, Wellsaw, Plumb, Kennedy, Huot, Ridgid, 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. PM1-2 Phila., Pa 19125

TOY TRUCK PLANS



FULL SIZE PLANS for wood toys are easy to follow. Just trace and cut. Trailer 18" long. All FOUR PLANS — \$5.00. Catalog — \$1.00.

ARMOR PRODUCTS

Dept. C, Box 290 Deer Park, NY 11729



BUILD YOUR OWN STORAGE BUILDING

Imagine yourself the builder of this attractive All Purpose Barn 24 by 36 by 16 high with easy to follow plans. Appealing to the eye in suburban farm, ranch like area. Many uses as 3 or 4 car garage, boats, campers, store, storage. Plans call for concrete floor, ceiling, roof, plywood left flooring, suggested window and door locations. Send \$10.00 for plans and material list. 24 by 36 Horse Barn. Plans showing 3 styles, tack room \$12.00. Send \$5.00 for brochure on other projects for barns. **HARMON BARNES**, Dept. PM61-3, Box 584, 3130 Hardware Court, New Castle, Indiana 47302.

AUTOMATIC SAW SET

Set saw teeth automatically—400 per minute without effort. Perfect hammer and anvil action sets teeth uniformly—no tooth breakage.



FOR HAND SAWS AND BAND SAWS

Write for details

BURR MANUFACTURING CO.

8931 Venice Blvd.
Los Angeles, Calif. 90034

A V8 IN SKIRTS

(Continued from page 168)

logs under it as jacks. This gave Windt room in which to work. Its repairs completed, the Monster headed downstream to New Orleans, where about 10 a.m. it hovered up onto shore next to the antique sternwheeler *Natchez*.

Originally, the hovercrafters had planned to land at New Orleans and then immediately set out upstream on the return leg of their journey. Instead they found themselves having doughnuts and coffee at the Cafe du Monde close by the river bank, then enjoying a river tour on the *Natchez*, and that night dining on Creole cuisine at a fine restaurant and taking an eye-popping stroll along gaudy Bourbon Street.

Cookie sheet to the rescue

The high humidity had kept the fiberglass on their homemade splitter from binding properly, and a new part was needed immediately.

"You just don't go into a store and ask for a splitter," observed Dean. "We went to a K-Mart, and Bob picked up a steel cookie sheet."

Back at the Monster, they put the cookie sheet in place, and it served as a splendid splitter all the way back home. Once again in New Orleans, as they had before in Memphis, newspaper reporters and TV crews descended upon the Monster, and New Orleanians came down to the levee to see the strange boat that had "walked" up on shore.

On Day 12, Sunday, July 22, with a wind blowing from the south, the adventurers started back toward home. Within a couple of hours, they were riding five-foot waves, and rain threatened. When the Salisbury clutch unit (taken from a snowmobile) began to fail, they had no choice but to run up onto a sandbar again for repairs. The clutch unit allows the Ford V8 engine to power both the propeller and lift fan.

Windt had patented a system using such a clutch which gives full lift at low forward speeds, and it had worked well until now. There was nothing to do but pull the unit with a jury-rigged hub puller employing a plate, a threaded rod, a welded bolt and shock cords. A small piece in the unit had cracked. They got to it and fixed it.

The race to reach Natchez

Gusty tail winds plagued the craft as it hovered upriver. Sparkplugs were fouling, increasing fuel consumption from a normal six gallons per hour to about eight. Five miles below Natchez, the craft was run-

ning critically short of fuel. Studying the map, they could see that the Mississippi makes a huge loop there. If they could hover across a neck of land, they might cut off miles and reach Natchez before the gas ran out. They headed for the shoreline.

"Off we went, dodging trees and bushes as we traversed the swampy terrain," recalls Kiester. "After a mile or so, we passed some people swimming and waved to them." Only 300 yards beyond that, the engine sputtered and died. Scrounging enough fuel from their emergency outboard motor, they were able to hover back to where the swimmers were, and negotiated a couple of gallons of gas. They bored on across the bottom land, dodging trees, and emerged on the river below Natchez.

Problems plague homeward trip

Rains bedeviled the Monster as it hovered upriver. The skirt was wearing, and every day the crew now had to spend two to three hours repairing it. The 17-ounce neoprene-coated nylon skirt had proved too thin for a hovercraft as big as the Monster. By Thursday, July 27, the craft was in St. Louis where Kiester was to catch a plane home. After he left for the airport, the others traveled extra late that night, looking for a sandbar on which to camp.

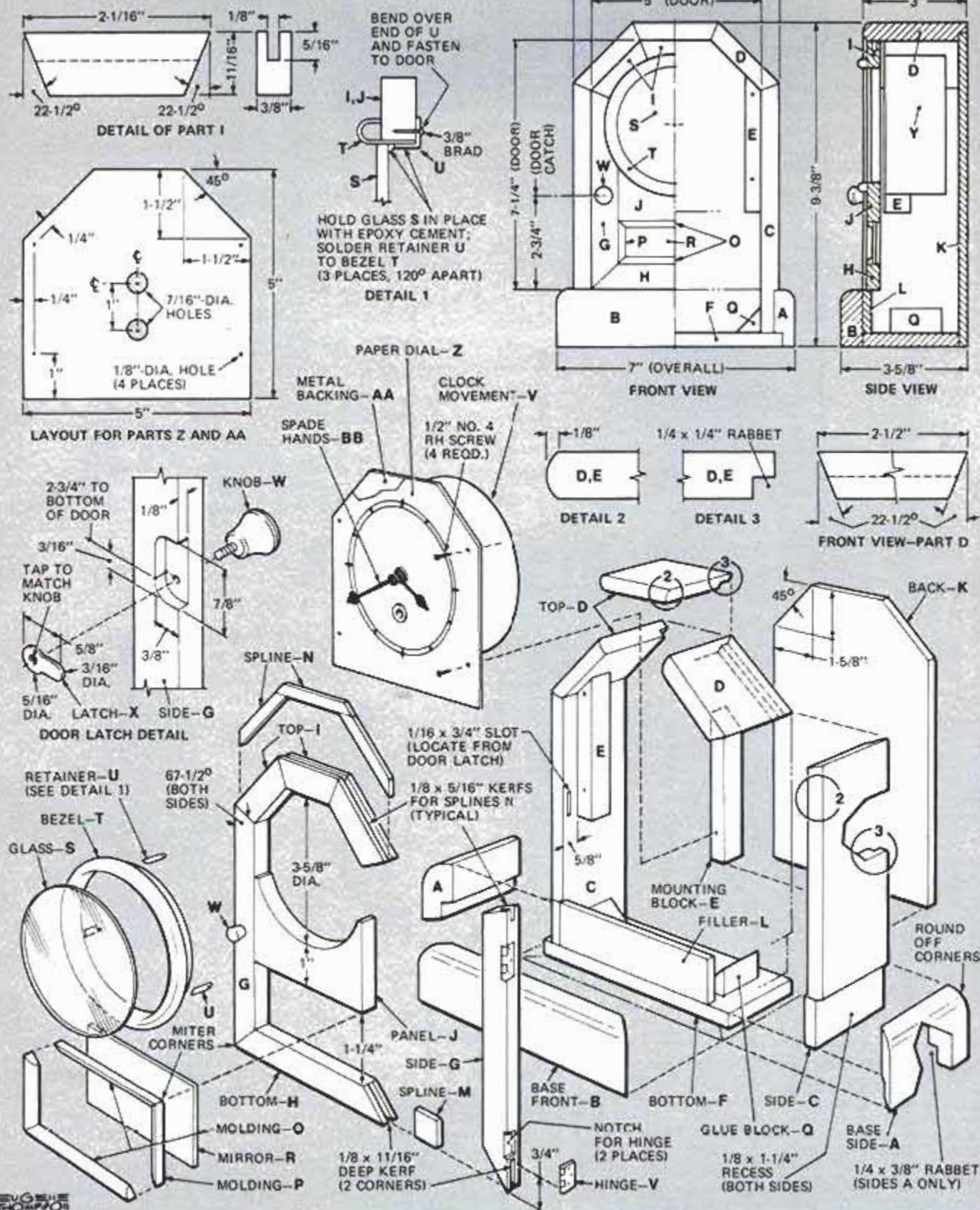
"It was a very eerie feeling being out on the river at night," Dean reported. "The Monster had two spotlights mounted, so we were able to pick out obstructions before we ran into them. We found that it's best to place lights as high as you can. Otherwise, the glare off the water and the fog make travel almost impossible."

But soon they were in familiar water. Windt took them through the final lock, and then a point of land came up to starboard, marking his home slough. He cut the power to just where it kept the craft on a hump of air, and swung up the slough.

Friends waiting in Cordova had decorated the trees along the slough with streamers and had lettered a big "Welcome Home" sign. It seemed like half the town had turned out, and there were cheers and shouts of triumph. The Monster had returned to its home port within an hour of Bob Windt's advance estimated arrival time.

The UH-26S had flown for 13 traveling days, used 450 gallons of gasoline and gone 2740 miles. It had set a world's record for a hovercraft trip without auxiliary support facilities, and had successfully demonstrated that a hovercraft can make a long and strenuous voyage. **PM**

BUTLER MAHOGANY CLOCK



A LINCOLN LEGACY

(Continued from page 133)

that the door doesn't rub on the base.

Carefully cut the paper face to fit the opening. Cut the sheet metal to

fit the face. Bore holes for the hands, winding arbor and mounting screws in the metal. Apply the paper face to the metal with rubber cement.

Paint flowers at four corners of the dial with light green paint to create the decorative tole design shown

on the original. File the paper away from the arbor holes with a round file. Mount the movement to the metal faceplate and screw the assembly into the case. Cut wood strips to hold glass. Attach glass

(Please turn to page 173)

Drill cleanly shaved,
precisely placed holes

WOODBITS

WON'T TEAR GRAIN,
SPLINTER, CLOG OR BIND
LIKE ALL-PURPOSE BITS

**FREE
PLASTIC
INDEX**
for handy
storage

Designed to satisfy the standards of the most meticulous craftsman, this unique bit also gets the beginning woodworker off to a great start.

- Center spur point holds the bit on target, pilots the hole, and prevents walking.
- Two knife-sharp cutting flutes cut and shave a perfectly round, clean hole.
- Flutes are designed with maximum clearance for chip ejection—won't clog or bind.

Chrome, vanadium alloy steel set includes 1/8, 3/16, 1/4, 5/16, 3/8, 7/16, 1/2" sizes. Fit any 1/4" or larger power drill.

Buy direct. Not available in hardware stores.



7 piece WOODBIT SET packaged in plastic index with hinged cover for easy access and handy storage—\$15.95

Send me _____ sets @ \$15.95 each.

- Check or Money Order (Illinois residents add 6% sales tax)
 Master Charge VISA

Acct. # _____ Exp. Date _____

Name _____

Address _____

City _____ State & Zip _____

Orders shipped within 48 hours.

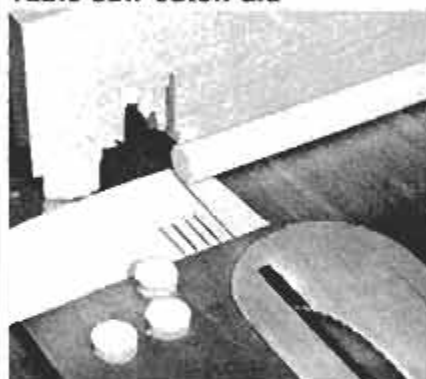
Satisfaction guaranteed—
full refund if returned within 30 days.

AMERICAN INTERTOOL, INC.

1600 Jarvis Ave.,
Elk Grove Village, IL 60007

HINTS FROM READERS

Table-saw cutoff aid



If you must make several small cuts on your table saw that are too short to permit using the rip fence and a cutoff stop, try this. Place a piece of masking tape on the table and mark the desired cut distance from the blade onto the tape. Move the rip fence out of the way, advance the stock to the desired mark and make the cut.

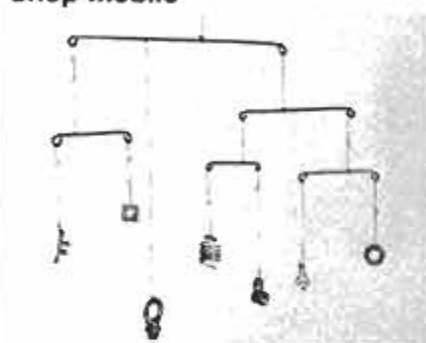
—John F. Dinges

Sandpaper identification

Before cutting a small piece of sandpaper from a larger sheet, transfer the grit number to the back so you can identify it when working with a variety of grits.

—Lane Olinghouse

Shop mobile



You can make a shop mobile with extra springs, gears or other small hardware items. The cross-arms are coat-hanger wire with small loops bent on the ends. Parts dangle from carpet thread. Balance points are found by trial.—Walter E. Burton

Cleaning plastic laminate

A piece of heavy wood dipped in lacquer thinner cleans contact cement off plastic laminate much more efficiently than a cotton cloth does.—Mark Wilson



The pride of your toolchest... Cabinetmaker's Screwdrivers from England.

Designed especially for wood screws, beautifully balanced for excellent control. Sheffield carbon steel blade is machined flat for extra leverage. Oval-shaped, lacquered Beechwood handles fit the palm of your hand. Bright steel ferrules... a handsome screwdriver set. Blades: 2, 3, 4, 5, 6".

5-Piece Cabinetmaker's Screwdriver Set \$24.95

Enclosed is \$24.95 plus \$1.75 Shipping/Insurance for Cabinet Screwdrivers. Include NEW catalog FREE VISA or MC, order toll free 1-800-343-6130

Name _____

Address _____

City _____ State _____ Zip _____

Enclosed find \$1.00 for NEW 80-81 Catalog only

THE PRINCETON COMPANY
P.O. Box 276-75, Princeton, MA 01541

You Can Build This Clock!

AMHERST SCHOOL CLOCK

- Solid Oak
- Westminster Chimes
- Solid Brass West German Movement

This beautiful clock arrives ready to assemble. A classic heirloom! Comparable retail clocks are \$300.00 and up.



Complete Kit - Only \$129.50

Includes wood parts, assembled dial ring and door, movement, dial glass, hardware and illustrated instructions.

HUGE SELECTION

115-page catalog of clock kits, plans, movements, dials and more.

CRAFT PRODUCTS COMPANY

Dept. 01, 2200 Dean St. St. Charles, IL 60174

- Amherst Kit - \$129.50 (plus \$6.00 shipping)
 Please send new catalog - \$1.50 enclosed

Name _____

Street _____

City/State/Zip _____

Serving America's Craftsmen Since 1940



Carefully cut grooves for splines in the door-frame pieces. To prevent the narrow wood from slipping through blade slot, run scrap of 1/4-in. hardboard partway through saw to make temporary table surface.



To finish the mahogany clock, wood was immersed in a lye solution. When dry, it was polished, using 4/0 steel wool and a mixture of one part boiled linseed oil with four parts orange shellac.

A LINCOLN LEGACY

(Continued from page 171)

with epoxy resin, glue train art and cement wood strips.

Finally, shape the door catch of 20-ga. brass and attach it with a 1/8-in. brass brad. Nail another brad to the door to receive the catch. Marks on the original indicate that the clock was hung on the wall at one time. If you wish, snip a brass hanger to shape, bore holes as needed and fasten with brads to the case back.

Building the Butler clock

Before you begin construction on the mahogany clock, study the drawing carefully. Start by ripping the stock for the sides and top. Round the front edges as shown in the drawing with a spokeshave or other shaping tool.

Cut the bottom to size. Then rip base stock and round its edge as shown before cutting individual lengths. Cut the rabbets and the miters for the front corners. Assemble the sides to the base with glue; when dry, glue and nail the base to the bottom. Bore pilot holes before driving any nails to prevent splitting the hardwood. Miter the three top pieces, and glue and nail them in place. To complete the case, cut the



After cutting and grooving the door-frame pieces, rout out recess for the door catch.



First, cut paper clock face to fit the case opening, then use paper cutout to transfer shape onto sheet metal. Cut and bore metal and glue paper to it. Movement mounts on back of metal with brass nuts.

backpiece, and glue and nail it in place.

To construct the door, rip stock and cut the pieces to size, carefully trimming the ends to the correct angles. Then cut grooves for the splines. Notch the door catch on the left sidepiece, and cut panel J (see art) to size.

Dry-assemble and test-fit the door before you glue all of the parts. After gluing, sand with 120-grit paper, beveling the edges to a slight inward angle so the door will close easily.

Next, glue a filler strip (L) on the inside of the front at the bottom, and glue in the mounting blocks (E). You can make the small quarter-round molding in front of the mirror by ripping a 1/2-in. dowel in half, then the halves into quarters. Paint the quarter-round with gilding.

We finished the case by dipping it and the door (not yet attached) in a solution of 1 tablespoon of lye to 1 gal. of water. Note: Use extreme caution when working with lye. Wear goggles, gloves and long sleeves.

The lye acts as a bleach, lightening the tone of the wood and helping to get rid of the purplish tinge that mahogany often has. When the wood reaches the desired shade, wash the

case off with water and wipe it dry. When completely dry, apply French polish, a mixture of 20-percent boiled linseed oil and 80-percent orange shellac, rubbed in with 4/0 steel wool.

Fill in the nail holes with the appropriate shade of wax stick and buff with carnauba wax.

Cut a latch from 20-ga. brass and attach it to the knob with epoxy cement. Cut a slot in the case for the catch. Mark and cut the paper dial face to fit the opening, then use it as a pattern for cutting the sheet-metal backing. Bore holes in the metal for the hands, winding arbor and mounting screws. Apply the paper dial to the metal with rubber cement, and trim the paper away from the holes with a round file. Then fasten the clock movement to the metal faceplate with the grommets provided and screw the plate into the case.

Mortise hinges into the door and fasten the door in place. Cement the quarter-round molding to the mirror and the mirror into the door with epoxy.

Also apply small dabs of epoxy to hold the glass in the brass bezel. Install the bezel in the door, attach the hands and pendulum, and your clock is finished. **FM**

MATERIALS LIST—BUTLER CLOCK

Key	Amt.	Size and description (use)
A	2	5/8 x 1 1/2 x 3 3/4" mahogany (base side)
B	1	5/8 x 1 1/2 x 7" mahogany (base front)
C	2	1/2 x 3 x 7 1/4" mahogany (side)
D	3	1/2 x 3 x 2 1/2" mahogany (top)
E	2	1/2 x 3/4 x 4" (mounting block)
F	1	3/8 x 2 3/4 x 6 1/4" (bottom)
G	2	3/8 x 1 1/8 x 5 3/4" mahogany (door side)
H	1	3/8 x 1 1/8 x 5" mahogany (door bottom)
I	3	3/8 x 1 1/8 x 2 1/8" mahogany (door top)
J	1	3/8 x 2 x 3 5/8" mahogany (door panel)
K	1	1/4 x 5 1/2 x 9 1/8" (back)
L	1	1/4 x 1 1/4 x 5" (filler)
M	2	1/8 x 3/4 x 3/4" (spline)
N	3	1/8 x 5/16 x 3" (spline, trim to fit)
O	2	3/8" quarter-round molding for top/bottom (cut quarter rounds from 1/2"-dia. dowel x 6")
P	2	1 1/2" quarter-round molding for sides (cut from dowel as above)
Q	2	3/4 x 3/4 x 1 1/2" (glue block)
R	1	1/8 x 1 1/4 x 3 3/8" mirror
S	1	3 7/16"-dia. single-strength glass (for clock)
T	1	4"-dia. brass clock bezel (see note below)
U	3	1/4 x 3/8" 20-gauge brass (retainer)
V	2	1/2 x 3/4" brass butt hinge
W	1	1/2 x 1/2" brass knob
X	1	5/16 x 5/8" 20-gauge brass (door latch)
Y	1	Urgo 8-day pendulum clock movement (see note below)
Z	1	3 1/2"-dia. paper dial face (see note below)
AA	1	5 x 5" 20-gauge sheet metal (metal backing for clock dial)
BB	1	1 3/4" and 1 1/2" spade clock hands (see note below)

Misc.: 1/4" No. 4 rh screws (4); 3d finishing nails; 3/8" brads; extra grommet for winding-arbor hole; gold gilding.

Note: The brass bezel is available from C & R Clock Shop, 11906 Q Drive North, Battle Creek, Mich. 49017 (\$9 postpaid). C & R Clock Shop also stocks antique clock movements; write for information. The 8-day Urgo clock movement (Model 567982) is about \$30 from Marshall-Swartzchild & Co., 2040 North Milwaukee Ave., Chicago, Ill. 60647; hands, paper dial face, circular glass and extra grommet can also be ordered from this company or obtained locally. Mahogany, if not available locally, can be purchased from mail-order suppliers, such as Craftman Wood Service, 1735 West Cortland Ct., Addison, Ill. 60101 and Constantine, 2050 Eastchester Rd., Bronx, N.Y. 10461.

BE YOUR OWN BOSS!



Start a MONEY-MAKING SMALL ENGINE REPAIR BUSINESS of YOUR OWN

Earn EXTRA CASH income working
at home—SPAREtime or FULLtime

Small Engine Repair is A Wide Open Field

Over 65-Million small engines are in use today, and a million new units are being built each month. This means there's plenty of business and big profits available for qualified men who can service and repair them. Industry growth has been so fast that there is a shortage of small engine repair pros. That's why NOW is the time for you to get into this profitable field where you can command hourly rates equal to any other skilled craft. The sale of parts, engines and accessory items add even more profits... profits YOU earn and keep in YOUR pockets, not someone else's.

Start A Fulltime Business Or Work Spare Hours For Extra Cash Income

When you're the boss in a fulltime business of your own there's never a worry over strikes or layoffs, and you earn year round profits repairing chain saws, tillers, tractors, mowers, mini-bikes, power rakes, generators, snowmobiles, snowblowers and many more items. There is no huge investment for equipment, no expensive inventory. Work right out of your garage, basement or a spare room. Ideal for sparetime income too. In just evenings and weekends you can earn extra cash for a rainy-day or retirement fund, or use the extra money for the things you want NOW.

It's Easy To Learn—No Experience Needed

You can learn this craft at home in your spare hours with our time-tested "hands on" training methods. Age, education, minor handicaps are no barrier. You get latest test materials, special tools and 3 1/2-HP Briggs & Stratton engine, but that's not all. We also help you with detailed data on how to get started, where to get business, what to charge, where to get parts at wholesale... all the shortcuts and proven methods you will need to get your business off to a fast, profitable start.

Send TODAY For FREE Facts
There is NO Obligation
—NO Salesman Calls

Our FREE Information Kit tells how to quickly start your own business, how to grow, and how you can inspect the Foley Small Engine Repair Course on our 15-Day NO RISK Trial Offer. Mail coupon (or send postcard) to:
**Foley Small Engine Repair
6001 Foley Building
Minneapolis, Minnesota 55418**

Foley

SCHOOL
INFORMATION
KIT

FREE
SCHOOL
INFORMATION
KIT

YOU GET THESE QUALITY TOOLS
AND INSTRUCTIONS PLUS THIS
3 1/2 HP
BRIGGS AND STRATTON ENGINE
YOURS TO KEEP!

Foley Manufacturing Co.
6001 Foley Building
Minneapolis, Minn. 55418

RUSH
COUPON
TODAY!

YES, please send FREE Data Kit and full details on how I can start a profitable Small Engine Repair business of my own, and facts about Foley's exclusive 15-Day No Risk Trial Offer. No obligation. No salesman will call on me.

NAME _____
ADDRESS _____
CITY _____
STATE _____ ZIP _____

7 HANGUPS

(Continued from page 139)

can be seen in the photograph on page 137, the unit hangs from the "3/4-moon" cutouts which simply rest on a double-hung window's meeting rail. The vertical sides bear against the window stiles beneath the meeting rail. So, measure from center to center of the stiles of your window, and use this dimension for the *outside* (overall length) dimension of your shelf.

Cut all three parts to size. Then, using nails in the waste area, tack both sides together. Cut both sides to shape at one time, using either band or sabre saw.

Refer to the actual pots to be displayed to lay out the holes in the shelf. Use a compass to scribe the circle diameters and cut the holes out using a sabre saw. Check all holes for fit with the pots before proceeding.

Assemble the shelf, using 8d (2 1/2-in.) finishing nails and white glue.

When it's dry, mask the shelf (B), using tape and newspapers. Prime and paint the sides with the color of your choice (a burnt orange was used on the prototype). When the paint is dry, remove masking materials and apply two coats of varnish to all surfaces.

Knife rack

Before cutting out the four wood pieces, lay out the collection of knives that you intend to display. Adjust rack length if necessary.

Assemble the pieces using glue, and clamp the pieces overnight. Next day, when glue is dry, remove the clamps and secure the joints by driving several 3/8-in. brads through the back and spacer into the front. Do this at both ends. Make certain brads aren't driven where the dowel holes must be bored.

The walnut dowels are actually just for looks. Locate them and bore neat, round holes. Using glue sparingly, install the dowels. Allow the glue to dry completely before going on to the next step.

Sand all exposed surfaces smooth, dust and wipe with a tack cloth. Finish with two or three coats of spray varnish.

Using a center punch, carefully mark the centers of the dowels for drilling. Bore holes through the dowels to accommodate the hanging screws, or bolts. Install on the wall as described earlier.

Kitchen towel rack

This case is assembled by using the same construction as for other hanging cases.

First, cut the parts to size. Next, to bore the towel bar holes, clamp the sides together and bore both at one time. Lay out and bore the holes for the dowels and assemble the box.

Insert scrap pieces of dowel into the dowel holes to protect gluing surfaces from the paint. Sand the box smooth, prime and paint with the color of your choice. We used blue spray paint on the case shown.

Cut the towel bar to length and mark for the grooves upon which the bar rides the sides. To cut the grooves, use your miter gauge and table saw.

Raise the saw blade to cut to a depth of 1/4 in. and, slowly and carefully, rotate the dowel to make the cuts.

If you're unfamiliar with this technique, consult the manual that came with your saw.

You can use a conventional blade and make a series of overlapping cuts. Or you can install the dado head, set up to cut a 3/8-in.-wide groove. The first method takes longer, but you might feel more comfortable doing it.

Test the bar for fit; when you're satisfied, apply two coats of varnish to it.

Glue the 3/8-in. dowels in place and set the unit aside to dry overnight. Next day, apply one or two coats of varnish. Sand the first coat lightly when dry, then dust with a tack cloth before applying the second.

Phone board

For this project, start by buying the clipboard and memo pad because the backup board (A) is sized to suit the clipboard.

Cut the three parts that make up the tray at bottom, and drill all the pencil holes in C. Sand these parts before fastening them to the backup board.

Miter-cut the edging and fasten it to the plywood board, using white glue (sparingly) and brads.

Locate the clipboard on A and bore pilot holes through for the screws. Countersink the holes in the clipboard and remove it from the phone board.

Dust all pieces and wipe with a tack cloth. Apply prime paint to all surfaces. (Note: If you use spray paint, plug the pencil holes first.) Paint the phone and clipboards in the colors of your choice. When the paint is dry, mount the clipboard, using flathead brass screws, or apply dabs of paint to the screw-heads.

Install the board on the wall, using toggle bolts as described earlier.

SHAKEY-JAKEY

(Continued from page 141)

near the front. Insert the dowel posts into the base.

Wedge the partition approximately 4 in. from the sidewall, so that the battery fits snugly between it and the dowel. You will also need a 1/2-in. space at the rear of the partition to mount the silicon-controlled rectifier.

Bore the holes in the front panel and insert the lamp in its socket. Attach the reset button, the three single-pole switches (master power switch, buzzer switch, light switch) and the 2-ft. length of flexible wire.

The wooden handle is optional. If it is desired, bore a hole lengthwise through the handle's center and pass the wire through it. Make a wire loop, using 9 in. of No. 10 wire; solder it to the flexible wire.

Next, screw the buzzer onto the base panel; screw the silicon-controlled rectifier to the back of the partition. Curve a No. 10 wire between the two dowels as shown on page 141.

Using the bell wire, connect the buzzer, lamp, the three switches, 500-ohm resistor, 10,000-ohm resistor, silicon-controlled rectifier, battery and wire field. Solder all connections. Finally, install the back panel using wood screws.—*Caryl K. Sills.*

OAK REGULATOR CLOCK

(Continued from page 135)

instructions indicate. My reason for changing the sequence was to permit making the cuts on a table saw, instead of by hand with a chisel. It's also easier—and safer for the clock—to handle a single piece of wood rather than the whole assembled case.

To finish the clock, I applied a stain mixture to get a warm, gold hue. I mixed two parts of Carver Tripp 9304 American Walnut stain with one part of Tripp's 9305 Provincial Maple. Next, to fill the oak's open pores, I rubbed in natural paste wood filler tinted with the above stain.

The finish is McCloskey Heirloom Eggshell, a varnish. The first coat was thinned 50 percent with turpentine. After a light sanding with 180-grit abrasive and dusting, I applied a final coat as the varnish comes from the can.

Despite the few petty annoyances described above, the clock is a quick and interesting project, and certainly a rewarding one when you view the finished piece. The kit sells for \$149.50 from Emperor Clock Co., Emperor Industrial Park, Fairhope, Ala. 36532. The clock is also available assembled and finished for \$199.50. Clock brochures are free.—*Harry Wicks, Home and Shop Editor*

BATTERY TESTER

(Continued from page 142)

punch to make indentations about 1/8-in. deep at each mark.

When the plate is righted, and the cylinders are soldered in position, the little domes will assure contact with the battery cell bottoms.

Use wire to make the lamp socket as shown in the photo. After making two-plus turns on the lamp base, leave enough wire at one end of the coil to form two loops, 3/4 in. apart for mounting screws. Position the coil on the base so that it extends 1/2 in. over the L-shaped plate, without touching it. Adjust it so that the tip of the lamp base rests against the plate when a lamp is screwed into it. Solder one end of a 9-in. flexible stranded copper wire to the lamp coil. At its other end, tin the wire and finish it with a drop of solder.

Miniature screw-base lamps of various voltage ratings can be used in this tester. Those rated at 1.25 to 1.35 volts will glow with maximum brilliance on a single, fresh D-cell; the intensity will be a bit less with a C or AA cell.—*Walter E. Burton*

ROLL-TOP BREADBOX

(Continued from page 140)

knob screw, but don't add the knob until the box has been finished.

Thoroughly dust and wipe all parts with a tack cloth. Apply the stain of your choice, following the manufacturer's directions on the can. When it's dry, seal the wood, using either shellac or varnish.

The breadbox shown was finished with McCloskey's Tungseal light-oak stain, followed by two coats of the same maker's All American Satin Finish varnish.—*Ronald Gruver*

Editor's note: Mr. Gruver's original box was sized to serve as a recipe-card file. We enlarged Mr. Gruver's plans in the PM shop to create the breadbox shown.

SPARKY CANDLESTICK

(Continued from page 142)

aluminum disc of about 1/8-in. diameter to catch wax drippings (this part is called a bobèche).

Finish the base appropriately; for example, you might use gold lacquer. Also apply lacquer to the metal body of the plug if it is rusty or otherwise unattractive. If you prefer, paint the plug and the base with high-gloss enamel to emphasize the Art Deco look of the piece.

Fasten all parts together, using epoxy glue.—*Walter E. Burton*

DIRECT FROM U.S. OPTICS QUALITY SUNGLASSES AT FACTORY PRICES

Each pair features: Impact resistant lenses • Handcrafted • Polished glass lenses • Hardened metal frames • No non-sense guarantee.

FREE—limited time only—deluxe velour lined case with each pair of glasses ordered (a \$3.00 value). Credit cards accepted. Dealer inquiries invited. **NOTICE:** Don't be fooled by cheap imitations. These glasses are made exclusively for U.S. Optics. To make sure you get the best, order now and if not completely satisfied return for refund within 30 days.



Only \$7.95

World Famous Pilot's Glasses

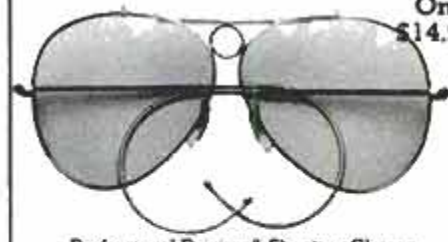
These precision flight glasses are now available to the public for only \$7.95. If you could buy them elsewhere, they'd probably cost you over \$20.00. #20P available in gold or silver frame. A \$20.00 value only \$7.95. Two pairs for \$14.00



Only \$9.95

Aviator Teardrop Flight Glasses

Flexible cable temples • #30A gold frame only. A \$30.00 value only \$9.95. 2 pairs for \$18.00



Only \$14.95

Professional Driving & Shooting Glasses

Wide angle amber lens brightens visibility. #30D gold frame only. A \$30.00 value only \$14.95. 2 pairs for \$28.00

To order send check or money order to U.S. Optics, Dept. 748, P.O. Box 14206, Atlanta, Georgia 30324. Credit card customers please fill in card # and Exp. date

QUANTITY	MODEL #	GOLD	SILVER	PRICE
	20P			
	30A	X		
	30D	X		

Add Postage, Handling, and Insurance

\$1.00 per pair _____ Total _____

Visa or Master Charge # _____ Exp. Date _____

Name _____

Address _____

City _____ State _____ Zip _____

FREE case with each pair.

YOUR QUICK WAY TO EASY MONEY!

VIP
VINYL
INDUSTRIAL
PRODUCTS

VINYL REPAIR

GIVE "on-the-spot" SAME DAY SERVICE
GET "on-the-spot" SAME DAY PAY!!!

You can be in business IN A FEW DAYS!

Sensational! That's the **MONEYMAKING POWER** of VIP Professional Vinyl Repair . . . the business of your own that can be part or full time for **QUICK AND GROWING PROFITS!** You need no study — no training — just a few hours' practice and you're ready to do repairs for pay. — **BIG PAY!** You can be in business practically overnight.

Start for less than you make in 1 hour on first job!

With just a small down payment, you get the complete VIP going-into-business kit . . . all equipment, materials, complete step-by-step instructions, business-building helps . . . everything you need!

\$513⁰⁰
in first 10 days!

The first 10 days I made \$513. Now getting business from 15 car dealers, furniture stores, a restaurant and bars, and clothing stores in Miami, Wash.

"Wherever I see vinyl, I can do business"



"I've made as much as \$60 in 3 hours."

C. Herrera, Jr., Ariz.

9 HOLIDAY INNS FOR HUSBAND/WIFE TEAM

"These Inns have put us on a monthly allotment. We are busy every day. Wonderful to be one's own boss. We are putting on one repairman to handle business other than Holiday Inns. With our setup, we have weekly checks coming from just the Inns."

Mr. & Mrs. Bechtel, Ohio

STEADY WORK FOR 20 CAR DEALERS



"20 car dealers give me all their repair work. I call on two or three every day, take care of what's needed. No matter what the repair is, it's easy to do with VIP."

R. Lanning, Ky.



\$440 IN 9 HOURS!

"I repaired 55 chairs at the NCO Club at \$8 each — \$440 for 9 hours' work. Materials and transportation cost only \$35!"

D. Gagnon, S.C.

HERE'S THE VIP VINYL REPAIR KIT that puts you in your own HIGH-PROFIT BUSINESS

They all started by mailing a coupon like this. **YOU CAN TOO!**

ALL FACTS FREE BY MAIL — NO SALESMAN WILL CALL. MAIL COUPON NOW

MAKE \$20 TO \$30 FOR AN HOUR'S JOB LIKE THIS



UNLIMITED CUSTOMERS FOR YOUR SERVICE

Auto dealers, car shops, restaurants, motels, bars, clubs, hospitals, bus companies . . . these are just a few of the places that need vinyl repairs, repeatedly. The business is there, waiting for you. And a repair job that takes 1/2 an hour to an hour can mean a quick \$15 to \$30 for you . . . most of it **PURE PROFIT!**

MEN, WOMEN, HUSBAND/WIFE TEAMS FIND VIP QUICK, CLEAN, EASY, PROFITABLE!

Both women and men enjoy this easy, profitable way to make good money fast and steady. The VIP exclusive process is so easy, the directions so simple, that anyone who can read plain English can do it. And what a money-maker! A sure way to have an independent income, or build to a business as big as you want to make it. There's no end to the demand!

GET ALL INFORMATION FREE BY MAIL. NO SALESMAN WILL EVER CALL.

MAIL THE COUPON BELOW OR PHONE
TOLL FREE **800-621-6633**
In Illinois 800-572-0444



VINYL INDUSTRIAL PRODUCTS
2021 Montrose Ave., Dept. 185
Chicago, Ill. 60618

Vinyl Industrial Products, Dept. 185
2021 Montrose, Chicago, Ill. 60618

PLEASE RUSH BY MAIL FREE FACTS about VIP Vinyl Repair and how I can start making money within a few days! No salesman is to call. I am under no obligation.

Print Name _____
Print Address _____
Print City/State/Zip _____

TV TO STEREO SOUND ADAPTER



GET SIMULATED STEREO SOUND FROM YOUR TELEVISION!

TELEADAPTER® easily connects to your own TV and stereo system to give you full rich simulated stereo sound through your amplifier and speakers. TELEADAPTER'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 ball-games 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.

***\$29.95 plus \$2.00 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

SEND FREE CATALOG

Custom Quality FOLDING SPORTSMAN'S KNIFE

Why pay \$20.00 or more for a folding hunter. An Egbert knife is made of sturdy, highest quality materials. Our 60% off retail price is the lowest ever offered. \$1.00 more than wholesale on 100! Order several direct from the source.

Return for replacement if broken within 10 years.

- Solid Brass Bolster & Lining
- Rosewood Handle
- Sharp Stainless Steel Safety-Locking Blade

EGBERT Co., Dept. PM20
11055 Sunset Blvd.
Los Angeles, CA. 90049



Only **\$3.98 / \$5.98**
4" size / 6" size
plus 50¢ post. & hand.

Add \$2 for Genuine Leather Beltcase

MONEY BACK GUARANTEE

A pocketable 4" size (7.5" open)

GAS TO ELECTRIC

2 bulb fixture duplicates the charm and increases the light output of any existing double mantle gas lamp. Kit includes on-off-gas, off-at-dawn photo control, fixture, bulbs, detailed instructions. The "RELITE" kit is available in both 115 volts and 12 volts. Ask for the "RELITE" kit at your local hardware store or write for more information. Dealer inquiries also invited.

Yardlighting Systems, Inc.

1039 Charles Ave., Dept. 45 • St. Paul, Minn. 55104

BUILD YOUR OWN POOL TABLE

Plans & kits avail. for two 8ft models: One with ball returns, other with deep pockets. Plans include detailed instructions, bill of material, templates, exploded view dwgs.

Plans for each \$5.95. Plans for both \$9.95 (US Currency). Or send \$1.00 for brochure. Pa residents add 6% sales tax. TIERCRAFT, Dept. B, P.O. Box 8151, Erie, Pa. 16505

KEEP MAGAZINES, CATALOGS, MANUALS, JOURNALS NEAT and ORGANIZED in HOME, OFFICE, WORKSHOP!



END CLUTTER! FIND IT FAST... THE FIRST TIME WITH HANDY, HUSKY, HEAVY DUTY FIBERBOARD SHELF FILES

Eliminate the mess of loose magazines, newspapers, catalogs, etc. at home, in the office, in garage or workshop. Find what you want when you want it by using these handy shelf or desk top files. Ends personal paper pollution problems once and for all! Adhesive ID labels included.



ALL POPULAR SIZES AVAILABLE

From digest size to newspaper size! Popular letter and magazine size (9" X 11 1/2", 3 3/4" box width) — 8 for \$12.95, 25 for \$29.97 postpaid. Sturdy heavy-duty fiberboard will last for years! Charge it! Mail coupon below.

Professional Aids Co., Suite 222
3685 Commercial Ave., Northbrook, IL 60062

Please rush postpaid Fiberboard Desk and Shelf Files as checked below:

How Many	Qty	Size	Price	Total Price
	8	Letter Size	\$12.95	
	25	Letter Size	29.97	

Check for Free Catalog

I enclose \$ full payment. Ship postpaid.

Charge it to Visa Mastercharge TOTAL _____

Acct No. _____ Exp. Date _____

Name _____

Address _____

City/State/Zip _____

Illinois Residents add 6% Sales Tax, please. Other sizes from digest to newspaper available.

Master Math Easily!

Now **CHE COMPLETE VOLUME** deals with all practical aspects of MATH—Simple Arithmetic, Algebra, Geometry, Trigonometry, even Calculus! Written in simple language with emphasis on **PRACTICAL APPLICATIONS**. Clearly presented step by step format with summaries throughout make review & reference easy. **MASTER Practical MATH** with minimal cost & effort! **ORDER NOW** and get our **SENSIBLE FINANCING HANDBOOK FREE!** Both: **\$9.95**

GLENVALE PRODUCTS, Dept. 60, MPO Box 1368
Niagara Falls, NY 14302

PLANS AND INSTRUCTIONS FOR

Go Kart	\$2.95
Mini Bike	\$3.00
Mini car	\$3.00
1/2" Mini Boat	\$4.00
Front Tractor Go-Kart with Gearless Differential	\$10.00
Mini Jeep	\$13.00
Podal Boat	\$4.00
4 H.P. Tractor	\$10.00
Soap Box	\$3.00

Mini Vehicles Plan Dept. 4 Chevy, N.Y. 10991



EXPLORE A NEW HEMISPHERE FOR \$5.00

If you're considering a new home, the new Monterey Domes literature package is a must. It has 80 pages of exciting designs, color photographs, floor plans, solar applications and factual information. Learn why it is the world's most energy-efficient design. You can assemble your shell kit in a few days. Dozens of models. Extremely affordable. If you're a serious home-shopper, mail this coupon today.

Rush your new Literature Package. Enclosed is \$5.00, plus \$1.00 pstg./hdg.
 Also send your Dome Assembly Manual for an additional \$5.00.

Name _____
Address _____
City _____ State _____ Zip _____
Mail to: Monterey Domes, Dept. AQ2, 1855 Iowa Avenue, Riverside, CA 92517

MAKE MONEY REPAIR FISHING TACKLE

BE YOUR OWN BOSS! LEARN HOW EASY YOU CAN MAKE YOUR OWN TACKLE REPAIR BUSINESS! START AT HOME IN YOUR SPARE TIME WITH A VERY SMALL INVESTMENT.

FREE DETAILS Send Today

83 TO 130 AN HOUR ROCKET REPAIR! • BUILT FORECAST FISHING ROES • AND MUCH MORE ACCESSORIES!

MUST DEMAND FOR SERVICE ROES! NEEDS! NOW EXCEEDS 20 MILLION DOLLARS A YEAR!

Dept. PK22, Colts, Maine 04018

DISNEY ON STAMPS

For only 25¢, get all your favorite characters on seven colorful Postage Stamps. We'll also send you information on how to get a different collection of Disney Stamps — FREE. Plus selections to examine. Buy any or none, return the balance. Cancel our service anytime. **See us at GANDELON STAMP CO.** Dept. PK22, Colts, Maine 04018

TRAILER FOR THE 60's (Burt's Travel Trailer and Sleep Inn) Under 1,000 lbs. 4 Berths. Ready to Use. 7' x 10' interior only. **Model PV201** \$143. 21st Avenue North, Plymouth, MN 55441. Full full color catalog sent \$2.00 to cover postage and handling.

Full-Size FURNITURE PLAN 18th Century PINE CRADLE

Authentic 18th century design. All joints hand-pegged like the original 36" long, 29 3/4" high. Perfect for fireplace wood, magazines, baby, tool A woodworker's delight. Plan #120... only \$5.00.

CATALOG 150 diff., full-size \$1 FURNITURE DESIGNS, Dept. PP-21 prof. plans—\$1.00 refunded with 1st order, 1425 Sherman Avenue, Evanston, Ill. 60201

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. \$21.95

Type P won't rust or clog. Bronze bearing. To 2,400 GPH. 1" in; 3/4" out. \$15.95

ADD \$2 pstge & handg. Money back Guarantee.

LABAWCO, 80 Hwy 206, Belle Mead, N.J. 08502

Splits **EASIER & FASTER!** **THE BOSS LOG SPLITTER!**

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**

AMERICA'S 7 BEST POWER TOOL BUYS

LOG SPLITTER PARTS

2-STAGE CAST IRON GEAR PUMP FOR 5HP ENG.



Supplies 10 1/2 GPM at 650 PSI until more pressure is needed. Then kicks down to lower GPM and up to 2500 PSI. Right hand rotation (direct couple). 3600

max. RPM, Wt. 12 lbs.

With 5HP anywhere in U.S. for \$3 FR!

22GPM 2-stage pump

\$137

\$268

4-WAY CONTROL VALVES

Built-in relief valve. 3/4" in-out ports. 1 1/2" cylinder ports. Item E102V

\$38⁷⁵

With pressure sensitive detent: on return stroke you don't have to hold handle.

Item E:102V0 Int \$3

\$59⁰⁰

Double-Acting Cylinders



- 3 x 24 x 1 1/4" **\$83**
- 3 1/2" bore, 18" stroke, 1 1/2" rod, 43 lbs **\$88**
- 3 1/2" x 24" stroke, 1 1/2" rod, 52 lbs **\$105**
- 4 x 24 x 2" rod, 77 lbs **\$140**
- 5 x 24 x 2" **\$205**
- 5 x 30 x 2" rod **\$228**

NEW ENGINES

- 5 HP Tecumseh recoil start, 3/4 shaft **\$115**
- or Briggs **\$117**
- 8 HP Tecumseh, recoil start, 1" shaft **\$164**
- 10 HP Tecumseh, recoil start, 1" shaft. Cast iron Sleeve **\$189**

All of our products are guaranteed. Send \$1.00 for our catalog on log splitter parts.

NORTHERN HYDRAULICS

1289 Vildmark, Eagan, Minnesota 55123
(612)452-1108 Order 1-8 P.M.

REPAIR AIR COMPRESSORS

Very few trained in this field. Thousands need repairing. In industry, farm and automotive. Illustrated Manual Tells How. Directory included. \$5.95 Post-paid.

P.O. Box 1411, Hickory, N.C. 28601

Saw Logs Easily with LOG JACK

Handles logs up to 16" dia. almost effortlessly. Places log in perfect position for sawing. Saves your saw - eliminates pinching, running saw into ground. Saves your back - eliminates manual positioning. Heavy-duty all welded tubular steel construction. 48" handle, 3 1/2" dia. tubum. Buy 4, try it. If not satisfied, return postpaid for cash refund. Only \$24.95 plus \$3.00 postage handling. THE R. B. COMPANY, Dept. PM-22267 Routes Rd., Maria Stein, Ohio 45860.

Wooden Toy Patterns

PATTERNS & SUPPLIES CATALOG over 250 designs! ONLY \$1 refundable

Low-Built Toys & Crafts Inc. Dept. 221 TAHOE CITY CA 95730

10 YEAR GUARANTEE! AIR FORCE STYLE FLIGHT GLASSES

SPECIAL **\$3.88**



Now! Your eyes can have the same protection from glare that many pilots demand, and SAVE MONEY too. These four quality flight glasses compare as value to others selling for up to \$20. Hand-crafted features include impact-resistant polished glass lenses (tinted for perfect glare reduction), strong metal frames. IF BROKEN IN 10 YEARS WE WILL REPLACE AT NO CHARGE. Specify gold or silver frames. Only \$3.88 plus 62¢ postage handling. Send total \$4.50. If not satisfied, return for refund in 30 days. ORDER TODAY! United Binocular Co., Dept. G-208, 9041 S. Western, Chicago, Ill. 60620. BONUS: 2 Glasses for \$8 postpaid.

30 DAY MONEY BACK OFFER

1 **8" TILT ARBOR SAW**

8" tilt arbor saw crosscuts, rips, mitres, cuts compound angles, dados, coves, moldings. Less blade, motor. Rip fence for easy alignment \$6.50 add'l. Ball bearing model \$9.75 add'l. Takes 1/3 h.p. motor or larger, standard blades, attachments **\$49.60** 23 lbs. f.o.b. factory

2 Changes from horizontal to vertical in seconds

BELT SANDER

Precision heavy duty sander includes a 4" x 36" sanding belt. Uses 1/3 h.p. or larger motor. V-pulley drive and multi-purpose drive spindle. Disc sander accessory, \$14.50 add'l. Mitre gauge, \$2.95 add'l, 18 lbs. f.o.b. factory **\$49.50**

3 12" swing industrial size 3 speed pulley

4 FOOT WOOD LATHE

Does the job of \$150 unit. Tubular steel bed rails, screw action tail stock. Use any size motor. 4" face plate. \$2.90. 30 lbs. f.o.b. factory **\$64.00**

DELUXE HEAVY DUTY LATHE

Double shielded, lubricated for life ball bearings. 30 lbs. f.o.b. factory **\$75.00**

4

LONG BED WOOD LATHE

55" version of the deluxe heavy duty lathe, has ball bearing live center in tail stock and extra heavy bed tubes. 40 lbs. f.o.b. factory **\$89.00**

HIGH SPEED TURNING CHISELS

Set of 3. **\$8.50**
Set of 8. **\$23.00**

5

JOINTER-PLANER

4" x 22". Cast iron and steel, precision ground adjustable tables. For planing, joints, bevels. Cuts to 1/8" depth. Fence adjusts from 0° to 50°. Steel knives and dual guards. Use any motor. Precision ball bearing industrial model. \$14.65 add'l. 19 lbs. f.o.b. factory **\$59.85**

6

32" RADIAL DRILL PRESS

Precision 32" radial unit has standard features and many extras. Depth of throat up to 16". Head tilts and table stays level. Drills to center of a 37" circle. Cast iron and steel. Less motor, belt and pulley. 30 lbs. f.o.b. factory **\$89.90**

7

WOOD SHAPER KIT

Makes beads, coves, moldings, tongue-and-groove joints. Accurate at high speeds. Sealed and greased for life ball bearings. Less wood. Takes 1/3 h.p. motor or larger, standard cutters. Opt. hold down assem. \$4.50 add'l. 6 lbs. f.o.b. factory **\$39.90**

These power tools have no chrome, embossed nameplates or any other useless extras... but they do the same job as tools costing 2 to 3 times the price! And their performance has been proven in the shops of literally millions of professionals and serious amateurs.

Don't be misled by AMT's low prices, these are quality tools. They are full scale, full speed and offer top performance and precision. There are good reasons why we are able to offer such values. Here is how we do it.

Engineered for simplicity: After years of engineering refinements, virtually all the frills have been eliminated in order to save you money. **Faster machining:** Specially designed automatic machining equipment cuts costs by cutting production time. **Standard parts:** Ordinary hardware items replace custom parts for enormous savings.

Volume: Our own foundry, our huge mass production facilities and our large buying power—all keep costs down. **Direct factory purchase:** You pocket the savings but we still offer our two terrific guarantees!

POWER SAW: Our lift arbor saw comes completely assembled with ground cast iron table, safety guard, splitter and mitre gauge.

In addition you get a free set of cabinet base plans that show you how, with one sheet of 3/4" plywood, you can convert this saw into a floor model with a big 27" x 24" top. Cabinet rip fence only \$7.50 additional! And you can use your new saw to cut out the cabinet base!

BRAND NEW ELECTRIC MOTOR

Develops a full 1 h.p., 17 lbs. f.o.b. factory. (purchased separately \$49.85) **\$44.80.**

AMT OFFERS TWO GUARANTEES:

OUR 10-DAY MONEY BACK GUARANTEE

Try any of these power tools and compare it with any similar machine at any price. If not satisfied return it for prompt no questions asked refund! We pay the return shipping charges.

10-YEAR FULL SERVICE GUARANTEE

Any part or parts of these AMT power tools (except motor which carries a one year guarantee) which becomes inoperative for any reason within 10 years after purchase date will be repaired or replaced by the factory with no charge to the purchaser other than postage.

AMERICAN MACHINE & TOOL CO., 4TH AND SPRING STS., ROYERSFORD, PENNSYLVANIA 19468

BUY DIRECT... USE THIS HANDY ORDER COUPON TODAY

AMT American Machine & Tool Co., Dept. PM21, Fourth & Spring Sts., Royersford, Pa. 19468

Please send me the units checked. Payment in full enclosed \$_____ or \$5 deposit each item enclosed, balance C.O.D. I must be fully satisfied or will return unit within 10 days for full refund. No questions asked.

1 <input type="checkbox"/> 8" tilt arbor saw, \$49.60	4 <input type="checkbox"/> Long bed wood lathe, \$89.00	7 <input type="checkbox"/> Wood shaper kit, \$39.90
<input type="checkbox"/> Standard rip fence, \$6.50	<input type="checkbox"/> Face plate, \$2.90	<input type="checkbox"/> Optional hold down kit, \$4.50
<input type="checkbox"/> Long cabinet rip fence, \$7.50	Turning chisels for any lathe <input type="checkbox"/> Set of 3, \$8.50 <input type="checkbox"/> Set of 8, \$23.00	
<input type="checkbox"/> Ball bearing spindle, \$9.75		
2 <input type="checkbox"/> Belt sander, \$49.50	5 <input type="checkbox"/> Jointer-planer, \$59.85	General Electric Motors <input type="checkbox"/> \$44.80 (with other item) <input type="checkbox"/> \$49.85 (purchased separately)
<input type="checkbox"/> Disc sander attachment, \$14.50	<input type="checkbox"/> Ball bearing spindle, \$14.65	
<input type="checkbox"/> Mitre gauge for sander, \$2.95	6 <input type="checkbox"/> 32" radial drill press with lifting head, \$89.90	
3 <input type="checkbox"/> 12" swing, 4' lathe, \$64.00		
<input type="checkbox"/> Deluxe ball bearing lathe, \$75.00		
<input type="checkbox"/> Face plate, \$2.90		

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

Visit our Royersford factory showroom for these same low prices 4th and Spring Sts. From 9 to 4:30 on weekdays and 9 to 12 on Sat.

EARN EXTRA INCOME

NOW! BADGE-A-MINIT makes it possible for you to fill orders for pin-back badges you make yourself for every community use. Clubs, political groups, schools, businesses and lodges have many needs for badges throughout the year to promote their activities and identify members. With BADGE-A-MINIT you create 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 badgemaking 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-21

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

130 FULL SIZE SPORTS CARS You Can Build from Kits



Just Published Giant Buyers Guide
160 Pages, 500 Photos

Discover 130 full-size kit-built sports cars like the one shown here. Most sell for a fraction of their apparent value and virtually all are easy to assemble at home. 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 V8s 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 9187
Department PM281
San Jose, CA 95157

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.

IMPORTED LOCK BLADE

9" Overall Length
5" When Closed
• Not a Switch Blade
• Sharp and Tough
• Stainless Steel Blade

\$3.50 Ea.

Model # K-12-AL

Not for sale in areas where prohibited by law

Flips open instantly and locks automatically to prevent accidental closing. Razor sharp tough stainless steel blade for reliable use and hard long service. Send \$3.50 plus 50¢ to cover postage and handling.

WESTBURY SALES CO.
373 MAPLE AVE. Dept. L-2-PM WESTBURY, N.Y. 11590

ZENEX

Up to 15% GAS SAVING!

NEW! Science Re-invents oil!

VASTLY SUPERIOR TO PETROLEUM

- 100% synthetic
- Slashes engine wear
- 25,000 miles between changes
- SF RATED - Exceeds all auto industry warranty requirements
- Pays for itself over and over

SATISFACTION GUARANTEED
6 Qt. Case - only \$29.95

ZENEX
ZENEX SYNTHETIC LUBRICANTS, INC.
8008 N.W. 54, New Dr., Miami, FL 33166

ORDER TOLL FREE 800-327-4808
In Fla. 305-883-2220

SPECIAL "TOOL OF THE MONTH"

Price Good till Feb. 28, 1981

DREMEL 381 MOTO-TOOL KIT
Ball Bearing Model 9 AMP 115V 60 Cycle variable speed tool 5000 to 28,000 RPM with 34 acc. in storage case

DREMEL

381 Vari. Speed Kit \$49.95
New Jersey Residents Add 5% Tax

SEND FOR OUR ILLUSTRATED DISCOUNT TOOL CATALOG
Arrow Coastal Devon Diamond Disston Dremel Easydriver Evans General Hot Stuff Intermatic Air Jaxmac K&S Engineering Edison Merit Microflame Moody Morris Northwest Shoreline Paasche Plastruct Sandvik Sherline Swanson Triumph Wahi X-Acto

Send \$2.00 for catalog or free with order of above. UPS Prepaid coast to coast in 48 states. No extra charge for using Visa or MasterCard. Call 201-342-5097

PATTY'S CORNER, INC.
P.O. BOX 8326 DEPT. PM HALEDON, N.J. 07538

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. H685
Chippewa Falls, WI 54729

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 So. Boston, MA 02127
(617) 268-3780

Add bolts and love and what do you get?



A quality machine that YOU built!

7 Tryke Models, and 6 Bike Models. Many accessories, including bench seat



SUPER TRYKE

Easy-to-build semi-kit saves you money. Engine is completely assembled, frame is welded and painted. With common tools and our 22" x 34", fully illustrated instruction sheet, you just bolt everything together and start riding!

For exploring, hunting, fishing, and occasionally even for work, these machines bring a lot of pleasure. If backwoods riding is your kind of fun, write today for a FREE color brochure, to:

Carl Heald, Inc. Dept. PM-82 P.O. Box 1148, Benton Harbor, MI 49022

From the Largest Maker of Bike and Tryke Kits in the World — Carl Heald

© 1981 Carl Heald, Inc. All rights reserved.

THE GREAT BOOK OF CATALOGS

HOW TO FIND ANYTHING BY MAIL

Directory of over 2000 of the best mail order catalogs, what's in them and how to get them. Most FREE! 176 indexed pages. If not satisfied return it within 30 days for immediate refund.

Order Now. Send \$9.95 check or Master Charge/Visa no. and expiration date to:

PINKERTON MARKETING INC.
13558 Oak Terrace, Lake Bluff, IL 60044

If you order within the next fifteen days we will send you absolutely FREE a three month subscription to "The Best to You by Mail," a fascinating monthly newsletter. Each issue brings you details on at least 20 new catalogs, special offers, listing changes, bargains and much more. Send in your order today!

FREE BONUS

HATE SNOW?

Revolutionary new snow removal tool. Clear 4" off 100' Driveway in 10 minutes. Send \$3.00 for plans and instructions. Arma Industries P.O. Box 1235 North Riverside, Ill. 60546

THE NEW Remotostart

Remote Control Engine Starter WITH OR WITHOUT BUILT IN BURGLAR ALARM SYSTEM

With a REMOTOSTART, you'll have one of the most advanced electronic instruments available today. The REMOTOSTART is a remote control electronic engine starter... a device that will turn on your car or truck engine and/or the machine's heating and air conditioning system from any distance up to 400 feet. It will also defeat the windshield during the winter months, and if the motor should stall, the REMOTOSTART will automatically restart the motor. No need to worry about thefts after you've started the engine either... if the door is opened, or the foot brake applied, the REMOTOSTART will turn off the engine and prevent the vehicle from being driven away.

EASY TO INSTALL. AUTOMATIC TRANSMISSIONS ONLY. INTRODUCTORY SALE PRICE \$229.00. HAVE A WARM CAR READY TO GO THIS COLD WINTER.

CARR ELECTRONICS
Main & Rolland Rd., Telford, Pa. 18969

AMATEUR RADIO HOURS:
USED RADIO EQUIPMENT Mon.-Wed. 9:30-6
SHORT WAVE RECEIVERS Tues.-Thurs. 9:30-6
BUSINESS RADIO Fri. 9:30-6
TELEPHONES & ACCTS. Sat. 9:00-6
215-723-1200 215-646-2600

SCANNERS • CB RADIO • AUTOMOTIVE STEREO
REMOTOSTART CAR ALARMS
INSTALLATION AVAILABLE BY YOUR MECHANIC
OR BY US IN PHILA. AREA.
DEALERS WELCOME

BUILDING CLEANING MEANS BIG DOLLARS FOR YOU

CLEAN • Brick • Stone • Aluminum Siding
Instantly, Safely, Low Cost

Spray-on, rinse-off method. Factory training provided. Send for FREE booklet, complete details. Write or call (216) 292-4727

National Surface Cleaning Corp.
4959 Commerce Parkway
Cleveland, OH 44128

SEND FOR FREE BOOK

WEIGHT LIFTING EQUIPMENT

Complete catalog of over 90 items used by strong men, body builders and athletes to develop strength and muscles.

Send 35¢ today for your copy

WEIGHT LIFTING EQUIPMENT
P.O. Box 862 Holyoke, Ma. 01040

Fabulous FOLBOTING Now

without 'motorized aggravation' as you delight to SENSIBLE and most GRACEFUL Folbot action for your VITAL and CAREFREE Recreation!

Avoid the risks and discomfort of tippy canoes, skimpy kayaks, wobbly inflatables or awkward rafts! NOW, you GLIDE securely in perfect Folbot, completely relaxed in EXCLUSIVE swivel-back COMFORT. Many practical sizes from 1 to 4 seaters in BEAUTIFUL two-tone or drab for wildlife activities. You GLIDE smooth and faster with light and EASY double blades... efficient sailtrigs or small motors. Large loads under PROTECTIVE decks, perfectly EFFICIENT for nature study, float-cruising, racing, RECORD FISHING and hunting. So prime in WHITEWATER or marsh, Surf and out to Sea. Economic BASIC frame kits - easy PRE-FAB kits - Factory BUILT - or travel-smart FOLDING to fit inside trunk or aircraft

FOLBOT
AMERICA'S foremost shipshape small Craft

You missed YOUR Folbot long enough

FREE Action color catalog with startling FACTS & FIGURES

Mail coupon or address to:
Folbot Corp., PM281 Charleston, S.C. 29405 or Telephone 803-744-3483
For rush inc. \$1 First Class Postage

NAME _____
ADDRESS _____
CITY _____
STATE _____ ZIP CODE _____

BUILD YOUR OWN MOTORHOME

- 5th WHEEL
- CAMPER
- TRAILER
- COVER
- VAN

KITS • PLANS • FULL SIZE PATTERNS

GLEN-L component kits, plans, and full size patterns make it easy AND YOU SAVE \$\$\$! Factory-like methods adapted for amateurs assure professional results you'll be proud of. Pictorial instructions cover frame construction, undercarriages, cabinetry, framing electrical, plumbing, aluminum skin, and more! Building is fun! No special skills or tools required. Dozens of models PLUS equipment, parts, aluminum skin all available at DISCOUNT PRICES! Send \$1 today for illustrated catalog showing RV PLANS, KITS, & EQUIPMENT.

GLEN-L RV's 9152P Rosecrans Bellflower CA 90706

NAME _____
Address _____
City _____ State _____ Zip Code _____

BUILD YOUR OWN BOAT

Join the thousands who build each year AND SAVE \$\$\$! GLEN-L's proven methods are especially intended for amateurs. Step-by-step pictorial and written instructions with material listings assure PROFESSIONAL RESULTS! HUGE 140-page catalog describes over 180 designs, 8' to 49'. Sailboats, powerboats, boat trailers, boating books, AND MORE! Order catalog now and also receive FREE "BOATBUILDING SUPPLIES" brochure.

KITS • PLANS • PATTERNS

GLEN-L 9152P Rosecrans Dept T Bellflower CA 90706

NAME _____
STREET _____
CITY _____
STATE _____ ZIP _____

PORTABLE ELECTRIC POWER

Build your own 110-Volt Electric Plant from used parts. Will operate lights, power tools, heating units, brush-type elect. motors, plus charge batteries and arc weld. Ideal for boats, campers and portable shops. Plans \$9.95 check or M.O. CHAPALA CO.
1020 E. Irvine, Dept. M Tustin, Calif. 92680

TILLS & HOES & SAVES

KEEPS GARDEN CLEAN, PRODUCTIVE

Low priced, multi-purpose tiller/power hoe. A joy to operate. 30-day home trial. Shipped prepaid (ex. AK, HI). Free information.

AUTO HOE,
P. O. Box W121A, De Pere, Wis. 54115

BONUS! Pocket "Math-Wizard"

with Math book

Get the Right Answers in a Flash Without Paper or Pencil!
Detachable Math tables to carry in your pocket. Gives instant answers when you convert fractions into decimals, percentages, and the reverse. Plus many other tables that solve the toughest math problems in a jiffy!

MADE SIMPLE MATH Self Teacher

New Short Cut Math Skills in Only Weeks -10 minutes a day...for Higher Pay Jobs.

Now one large volume combines all the separate subjects—arithmetic, algebra, geometry, trigonometry, intermediate algebra, analytic geometry, advanced algebra, vector analysis, calculus. Tackle any math problem even if you never finished high school. Basic and advanced math taught in terms of everyday experience. Clearly presented step-by-step and illustrated. Learn theory and practice from "scratch", "brush-



up", or reference. Summary makes review easy. Exercises track your progress. Catch errors instantly. Pass civil service and job tests. A must for all office, sales, industrial jobs, home finances. Send \$7.95 + 60¢ for shipping. Return book within 10 days for a refund if not satisfied.

VALCO Publishing Co. • Dept. 662
Box 2012, New Rochelle, N.Y., 10802

Hydraulic Log Splitter

PARTS ALSO AVAILABLE TO BUILD YOUR OWN

- 10-1/2 tons splitting force
- Fast splitting cycle (10-sec.)
- Splits logs up to 24" long
- 5 hp BRIGGS gas engine
- Powerful 2-stage hyd. pump
- Detent control valve returns to neutral automatically

Shop wt. 300 lbs.



BRAND NEW \$789.50 F.O.B. Lincoln

• Split wood for your own use, split logs for profit, earn money on rentals. Built from finest quality components.



* "BUILD-YOUR-OWN". Save Money! Top quality components at lowest prices. See our catalog. 100's of other items. BIG SAVINGS!

SURPLUS CENTER PM-021 Lincoln, Nebraska Zip Code 68501

NOW COMES IN 2 SIZES:
PONY FOR SMALL GARDENS,
HORSE FOR LARGE GARDENS.



JUST ONE HAND!

So easy to handle you guide it with just one hand. And now the Troy-Bilt Roto Tiller-Power Composter is yours in 14 1/2" and 20" tilling widths. For complete details, prices, off-season discounts, send coupon below for free booklet.

Troy-Bilt, 102nd St. & 9th Ave., Troy, N.Y. 12180

Troy-Bilt Roto Tiller-Power Composters, Dept. A559
102nd St. & 9th Ave., Troy, N.Y. 12180

Please send the whole exciting story of Troy-Bilt Roto Tiller-Power Composters, including prices, specifications and off-season savings.

Mr. _____ (Please Print Clearly)
Mrs. _____
Miss _____
Address _____
City _____ State _____ Zip _____

"PAY" YOURSELF \$1000+ to BUILD THIS NEW 4-WHEEL HAULER

- 16 or 11 H.P. Briggs & Stratton electric start engine • automatic torque converter transmissions
- 500 lbs. payload plus two passengers • dump box 44 1/2" x 40" x 11"
- steering wheel, foot pedal controls • forward and reverse gear • rear dual hydraulic disc brakes

Tough Mark Series Haulers lug 500 lbs. of cargo plus you and a passenger almost anywhere. 16 H.P. opposed Twin-Cylinder or 11 H.P. Synchro-Balanced Briggs & Stratton engine, automatic torque converters (no manual shifting), alternator and electric start. Steering wheel, foot pedal accelerator and brake (rear dual hydraulic disc), forward and reverse gear let you maneuver easily with speeds up to 25 MPH. Dump bed 44 1/2" x 40" x 11" extends to over 4' with tail gate opened. Many accessories.

Build it yourself and SAVE \$1000+. Engine mounts to welded & painted frame. Tires mounted on rims. You bolt parts together and pocket assembly costs. Only simple tools needed. Thousands from eight to 80 have built a Carl Heald Kit.

For more information call 616/849-3400 or write for FREE brochure today:



Heald Hauler Mark 4 Model HH-4 16 shown with optional headlights and knob tires.

Also 3-wheel models and with steel cab.

Carl Heald, Inc. Dept. PM-28
P.O. Box 1148, Benton Harbor, MI 49022

Rare Technical Books!

If you haven't written for this unusual catalog yet, you've really missed something!

In it you'll find scores of pamphlets, manuals, paperbacks, textbooks, engineering and professional handbooks on lathes, machine tools, electric and steam autos, fuel alcohol, wind and water power, steam engines, methane, welders, homesteading, crafts, electronics, woodworking, electroplating, blacksmithing, alternator secrets, three-phase motors, foundry, small business and much, much more!

FOR INSTANCE:

- ...discover a brand new book that shows you how to convert any small car to electric!
- ...a series now being released that shows you how to build a complete metal shop including a screw-cutting lathe from scrap metal without expensive tools!
- ...collections of rare patents on the Stanley Steamer, forgotten carburetors, and high-performance metal detectors.
- ...a fantastic 1900 page handbook used by professional engineers that covers just about any topic you can think of.
- ...a pair of top-rate hydraulics manuals used by the best technical schools
- ...plans for steam engines, water wheels, sheer metal brakes, fuel alcohol stills, kilns, and much more!

Learn why people are talking about this dynamite catalog, and why Lindsay Publications is fast becoming the number one source of rare information for engineers, inventors and do-it-yourself enthusiasts throughout the world.

Every publication is fairly priced, and satisfaction is guaranteed or money back. There is no charge for the catalog itself, but we ask that you send 45¢ in stamps to cover 1st class postage.

See what you've been missing. Write for your catalog today!



USE THIS HANDY COUPON

Lindsay Publications, PO Box 12-jg, Bradley IL 60915

Send me your latest technical book catalog. Fast! I've enclosed 45¢ in stamps for postage.

Name _____

Street _____

City _____ State _____ Zip _____

39.95 ADD \$2.00 FOR POSTAGE
30 CHANNEL CABLE TV CONVERTER
FREE! UNUSUAL 96 PAGE ELECTRONIC PARTS & IDEAS CATALOG!
ORDER No. 174AE047
INCO ROUTE 8W PLATTSBURGH, N.Y. 12901 Tel.: (518) 561-8700

OFFER EXPIRES MAY 31
Hardened Steel. For filing, drilling, milling, carving, routing any metal or wood. Cutting edges from 1/4" to 1", all sharps 1/4". Brand new in air tight G.I. packs.
32-Tool Set, G.I. cost \$295⁰⁰ now \$24⁹⁵
4-Tool Set, G.I. cost \$120⁰⁰ now \$19⁹⁵
Save Even More, Both Sets now \$36⁹⁵
Two 1/2" Sets (Limited Time) \$50⁰⁰
Money Back Guarantee. Add 13% for shipping.
\$125 orders add 5% tax. Export orders add 4%.
U.S. SURPLUS CENTER, Dept. 503
715 Camden, San Antonio, Texas 78215

FREE! HARDWOOD VENEERS & LUMBER CATALOG
88 varieties world's rarest veneers and lumber at reasonable prices. Simplified veneering instructions plus full color wood selector included. Send for free catalog now and get special bonus starter offers. **SAVE 25% Hurry!**
BOB MORGAN WOOD, Dept. P01K18
1123 Bardstown Rd., Louisville, Ky. 40204

GREAT SAUSAGE RECIPES
227 page illustrated book explains sausage making plus home curing and smoking of meat, fowl and fish. Over 100 recipes. Free equipment and supply catalog has more information. For yours, send to:
The SAUSAGE MAKER Dept. 6
177 Military Rd. Buffalo, N.Y. 14207

MODEL III **DISCOUNT TRS-80[®] DEALER A301**
COMPUTER SPECIALISTS
26-3001 4K Color \$360.00
26-1067 16K III 888.00
76-4002 64K I Drive 3440.00
1-800-841-0860 TOLL FREE
MICRO MANAGEMENT SYSTEMS, INC.
Downtown Plaza Shopping Center
115 C Second Ave., S.W.
Cairo, Georgia 31728
(912) 377-7120 Ga. Phone No.

QUICK START

250
AMPS
12 VDC

100%

STARTER and Charges Too

Weights only 15½ lbs.
Easy! Just Clamp to
Battery and Plug into 120 V Outlet.

Quick Start Will Start your Engine in Seconds.

Only \$97.50 and we pay the freight.

GREAT PLAINS PRODUCTS

P.O. BOX 2532 Olathe City, OK 73143

In Canada contact PERSISTA, Box 593, Brampton, Ont.

Enjoy Satellite TV Now



Better than Cable TV—Over 200 TV and radio services. Why waste money? Learn the whole story and build a video system the family can enjoy. No commercials, FREE movies, sports and Vegas shows—worldwide, crystal clear reception connects to any TV set. Big (8 x 11 in.) book loaded with details, photos, plans, kits—TELLS EVERYTHING! Satisfaction Guaranteed.

Send \$7.95 TODAY! Add \$2.00 for 1st class (air mail) or call our 24 hour C.O.D. rush order line (305) 862-5068.

GLOBAL ELECTRONICS,
P.O. Box 219-D, Maitland, Florida 32751

TRAVEL CAREERS ACADEMY PACIFIC

Train to Travel the World
Airlines-Amtrak-Cruise Ships
Airline Reservation Computers
Ticket Agent, Air Cargo, Travel Agency
Nests Accredited, Financial Aid Available
FREE INFOR. Estb 1946. WRITE NOW

6253 Hollywood Blvd., Hollywood Vln Dept PM281
Hollywood, CA 90028 (213) 4623211

CLOCK COMPONENTS



Clock Movements, Battery, Quartz, Electric,
Urgos Grandmother, Grandfather, Westminster & Triple Chime, 8 Day Key Winds & Westminster, Bin Bars, Barometers, Metal, Brass,
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

Men-Women! Make Money In Your Own Home Business!

"I STARTED WITH \$100 AND MADE MILLIONS IN MAIL ORDER"

You can make a Mail Order Fortune much easier today. I want to help you but: If you are looking for a get-rich-quick-scheme... please turn the page. I did not get rich overnight. But I can tell you that within a short time in mail order I was making more money than any of my friends. The millions came later... and I owe every penny of it to mail order! If you are ambitious and willing to follow directions... I will help you get started on your way to mail order success!

YOUR HOME MAIL ORDER BUSINESS

Just a few hours a week part time at the start! Then branch out into full time! Keep present income while adding welcome "second income." Use Mail Order profits for travel, savings, education, retirement. It's up to you.

I learned long ago the success secret in Mail Order is picking the right product. I reveal in my Free Course 3 tests your product must pass to be a Mail Order winner! I'll show how to make up simple little ads that bring in orders and cash. Everything I tell you is based on my own success. I know it works.

BUY BELOW WHOLESALE FOR BIGGEST PROFITS

Imports are great for Mail Order. I travel the world searching out new imports you can turn into quick profits. Start with 24,221 best selling imports. Deal in one or many. Buy Below Wholesale direct from overseas supplier. You keep all the profit. I will also

ACTUAL CUTS OUT GREEDY L.T. MEMBER STRIKES
REPORTS MIDDLEMEN. "Can make IF RICH." Followed your
OF MAIL 80% more profit import- ing merchandise. The Mail
ORDER ing Plan gave me new
MONEY Name, new car, two stores." I made \$12,000 this first
MAKING!! Bill Thieson, Canada try, without investment in
stock." L.M., Pennsylvania

INTERNATIONAL TRADERS

reveal my Drop Ship Plan that starts you with little or no product investment. Buy one at a time or in quantity.

1000's NEW PRODUCTS EVERY YEAR

With my Plan you get free Membership in International Traders. Vast world wide organization keeps you supplied with new products every month to sell by mail or other ways. Members also attend my personal seminars held in cities near you. Mail coupon for Course and home business report. No charge or obligation. No salesman will call! Find out what Mail Order holds for you!

**FREE
MAIL ORDER
COURSE**



B. L. MELLINGER,
Famous World Trader,
Internationally known
Mail Order Expert.

I started in Mail Order a few years ago, part time in my garage. I had less than \$100. I discovered how to make Mail Order pay big. Today my business empire spans the globe... 1,253 acres of land, office buildings, warehouses. My Plan lets you use my experience to make a fast start in your own big profit home business.

FREE MAIL ORDER COURSE COUPON

The MELLINGER Co., Dept. M2252
6100 Variel Avenue, Woodland Hills, CA 91367

Send Free Mail Order Course... Show me how I can start a Mail Order/World Trade Business of my own. There is no obligation; no salesman will call.

Name _____
Address _____
City _____ State _____ Zip _____

+Save 3 days, give ZIP for fast reply!

GARDENING? NEW TILLER GIVES YOU LUSH LAWN AND FLOWERS PUTS GREEN IN YOUR POCKET WITH BIG \$ SAVINGS ON FRUITS & VEGETABLES WINTER DISCOUNTS NOW!



WEIGHS 20 LBS!



TILLS DEEP



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 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.

**NOT SOLD IN STORES.
FOR INFORMATION WRITE TO:**

AGCO P.O. BOX 75 Dept. PF
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
24 Hrs. A Day... Charge Card Orders Accepted

SPARE TIME CASH

Assemble 16 hp. Big Wheel Tractor Kit for yourself or resell for profit. Factory direct savings. 30 attachments—57" mower, plow, loader, backhoe, snowblower, etc. Catalog, 75¢; "Build-it-Yourself" Plans, \$7 (refunded on any purchase).

Struck Kit, Dept. PM21T Cedarburg, Wis. 53012

Be a LOCKSMITH!

EARN WHILE
YOU LEARN
Send for
FREE BOOK

Locksmithing Institute, Dept. 110-021

The Technician Home Study Schools,

Big opportunities. Big profits. Earn quickly. Full or part time. Learn at home, it's easy. Do real jobs. All Tools—Materials Supplied. Lic. State of NJ—Appd. for Veterans. Send Name and address for FREE book.

Little Falls, N.J. 07424

SAVE YOUR HOT AIR

5 TO 12% OF THE HOT AIR LOSS IN YOUR HOME COULD BE GOING THROUGH THE VENT IN YOUR KITCHEN RANGE HOOD

THE THERMOMISER™ AUTOMATIC DAMPER IS DESIGNED TO STOP THIS LOSS...

- EASILY INSTALLED
- FITS ANY SIZE VENT
- STOPS COLD DRAFTS
- NO WIRING NEEDED
- SATISFACTION GUARANTEED
- QUALIFIES FOR 15% FED. TAX REBATE

SEND ONLY \$8.95 (CA RES. ADD 5% SALES TAX)
ZT ENGINEERING, DEPT. PM2 • 472 LOTUS LANE
P.O. BOX 125 • MOUNTAIN VIEW • CA 94042



BUMPER STICKER PRINTING DEVICE

FUN, INEXPENSIVE, PORTABLE
EASY - NO TRAINING NEEDED
ANY MESSAGE IN MINUTES

Get FREE DETAILS
P.O. BOX 22791 (G)
TAMPA, FLA. 33622

COUNTERFEIT GUNS

AUTHENTIC! FULL SIZE MACHINED METAL MODELS. Museum quality precision machined metal classics weigh, look and feel like real guns. Will fool experts. Perfectly legal—CANNOT BE FIRED. Blued and disassemble like originals. Decorate your den, office, rec-room. Send for FREE FULL-COLOR CATALOG. Made of over 30 blued, hand-finished parts—DELIVERED FULLY ASSEMBLED.

SAME SIZE AND WEIGHT AS THE ORIGINALS! MONEY BACK IF NOT SATISFIED!

GOVERNMENT .45

STANDARD BODYPAN OF Q'S. SLIDE WORKS LIKE ORIGINAL. WITH SAFETY THAT WORKS. LGTH. 9 1/4". WT. 2 1/2 LBS. DISASSEMBLES. ADD \$1.50 POSTAGE/HANDLING LIKE ORIGINAL. Model R300.....\$44.95

THE COLLECTOR'S ARMOURY, P.O. BOX 1081

DEPT. PM 800 SLATERS LANE, ALEXANDRIA, VA 22313

Send R300 Send FREE COLOR CATALOG

Charge to: SAC MasterCard Am. Express Diner's Club

(LIST ALL NUMBERS ON YOUR CARD)

NAME

ADDRESS

CITY/STATE/ZIP

MONEY BACK IF NOT SATISFIED

HEARING AIDS up to 50% OFF

COMPARABLE AIDS BUY DIRECT & SAVE

END DEALER MARKUPS • 30 DAYS FREE TRIAL. Body Aids \$99.50 up. Behind-the-Ear; Eye Glass Aids. One of largest selections. Terms arranged. Very low battery prices. Write for FREE literature. No salesman will call.

LLOYD, Dept. PM-2 128 Kishwaukee St., Rockford, Ill 61104

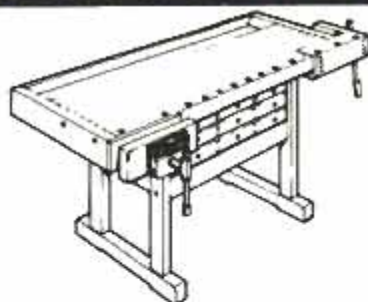
FIGHT BACK! FREE ENERGY PATENTS REVEALED!

• Automotive Breakthru — Pulsed Capacitive Discharge Electric Motor runs on two car batteries. System indefinitely recharges itself. (Inventor received certificate of merit from then Governor Ronald Reagan.)

• Simple 2 magnet generator. Inventor claims six times more output than input. Can power home, auto. • Five different self powered (no input) permanent magnet motors. • For a complete set of U.S. Patent drawings and full details on all of these, send \$15 Ppd. (Or add \$2 extra for First Class Post, and same day speedy service. Foreign orders \$18 U.S. Ppd Airmail.)

THE FREE ENERGY PRESS Dept. PM-203 P.O. Box 22469, Robbinsdale, Minnesota 55422

WOODWORKERS!



This fine Cabinetmaker's Workbench is just one of the 70 projects that have appeared in the past 6 issues of

The Woodworker's Journal.

Whether you're a novice or a veteran woodworker, you'll enjoy the detailed drawings and instructions for building all types of practical projects including Early American and Contemporary furniture, toys, clocks, gifts, and much more.

In addition to plans, each issue contains shop-tips, money-making ideas, antique repair tips and cabinetmaking techniques.

Subscribe now to the project magazine that features 70 plans each year.

1 YEAR (8 bimonthly issues)—only \$12.00
2 YEARS (12 bimonthly issues)—only \$22.00
Foreign Rates: 1 year—\$14.00, 2 years—\$26.00
(Please make payment in U.S. Funds)

GUARANTEED: A full refund on all unmailed issues if not completely satisfied.

Send check or money order to:
THE WOODWORKER'S JOURNAL, Dept. B2
P.O. Box 1629, 25 Town View Drive
New Milford, CT 06776

6 issues—\$12.00 12 issues—\$22.00

Name

Address

City

State

Zip



"SAVE YOUR HEART"

with a STAIR-GLIDE® Stairway Lift RENTAL-PURCHASE Program Available

America's largest selling stairway lift. Ideal for people who cannot or should not climb stairs. Easily installed in less than 2 hours without damaging stairway. Runs off household current. Choose from Deluxe or Economy models.

AMERICAN STAIR-GLIDE® CORP.

4001 East 138th, Dept. POP-021
Grandview, Missouri 64030

BUILD YOUR OWN POWER TOOLS

METAL PARTS KITS AT LOW FACTORY DISCOUNT PRICES FOR:

- 12-IN. BAND SAW
- 18-IN. BAND SAW
- 10-IN. TILT/ARBOR SAW
- COMB. DRILL PRESS-LATHE
- 9-IN. TILT TABLE SAW
- 6-IN. BELT SANDER
- SPINDLE SHAPER

SAVE \$50 TO \$500

PLANS \$3.00 Full-Size Patterns \$1,000 Deductible per plan in U.S. Sold for 34 Years

KITS FROM \$34.99 TO \$139.99
Featured in Workbench, Popular Science, Mechanix Illustrated. No machining, no waiting. 5-year full service guarantee. Step-by-step plans, photos, full-scale patterns show how. Send \$3.50 each (postpaid) existing tool plans wanted. Catalog included. Or send 50¢ for Catalog. GILLIOM MFG., INC.; Dept. PM-2, St. Charles, Mo. 63301

NEVER MAKE A MORTGAGE PAYMENT AGAIN WITH THIS LOW-COST ENERGY SAVER!



Build this beautiful \$35,000 - 3 bedroom, 1140 sq.ft. home for under \$7500, without full basement and 2 car garage, and cut your heating & cooling bills 50%. Sounds incredible but it's true! See for yourself how easy it is to build the HOME KIT "80" and never make a mortgage payment again!

Tanyons' new do-it-yourself HOME KIT "80" includes 3 sets of building prints, special instructions, and easy to use material lists that show you how little the "80" costs. You'll discover, like thousands of others have, how easy and inexpensive it is to build & own this no-mortgage home!

If you want to price several low-cost energy saving homes before choosing one, then the HOME PRICER PLANNING BOOK is for you. It contains 50 home designs with floor plans & material lists that show you exactly what you need for any style you choose. HOME PRICER'S special section on finance

shows you how to build your new home with only \$500 working capital.

Order both today and never make a mortgage payment again!

HOTLINE SERVICE: Call 814-833-2620 10 am - 4 pm E.D.T. Visa, Master Cng. or C.O.D.'s accepted

TANYON PRESS Dept. PM-281

2427 W. 26th St Erie, PA. 16506

\$8.00 for Home Kit "80", \$10.00 for

Home Pricer. \$15.00 for both, saving you

\$3.00! Or send \$1.00 for Information Pkg.

NAME

ADDRESS

CITY

STATE

ZIP

In Canada please add 15%

• 30 Day Money Back Guarantee •

MEN'S WIDE SHOES

EE-EEEEEE, SIZES 5-13

Extra width for men who need it. In excellent variety, styling and quality Available only through our FREE CATALOG. Send for it!



Hitchcock SHOES, INC., 165 Beal Street, Dept. 28A, Hingham, MA 02043

The Winter Bicycle

The traditional cross-country sled from Norway. It's versatile, practical & fun. Be the first in your neighborhood to own one! Children love them. Adults think they're a kick.

Send for FREE Brochure today!

CARDON, JDC, Dept. H, Ardmore, Md. 21202

A Great Gift!

PROJECTION TV

Buy kits factory direct. Our glass lenses are world famous. Aug. letter to Popular Mechanics says "Better than anything seen commercially." Systems incl. Lens, giant screen, hardware, from only \$368.

Yolo-KH, Dept. PM, 15 Green Hill LA, Spring Valley, NY 10977
Ph. 914-354-4282

COMPLETE INSTRUCTIONS - \$2.

AIRCRAFT KITS

Complete Detailed Plans
Fuel-efficient & High-performance
Aerobatic & Cross-country

MANY TYPES 1,2,4,4 Seat

SEND TO: CATALOG - \$5.00 (FOREIGN ADD \$1.00)
LIGHT FLIGHT PRO.
Dept. A * P.O. Box 19828 * Houston, Texas 77024

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 **APRIL**. The closing is **FEBRUARY 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

INFLATION Costs. But you can save with Petrolon Slick 50. This unique product can effect up to 40% increase in gas Mileage, 25% increase in horsepower, 50% reduction in maintenance with guaranteed safety and performance. Treatment and instructions for average car only \$24.95 plus \$2 shipping. Guydon Specialty, Dept. PM, Box U, Kaneohe, HI, 96744

RESTORE Your Favorite Car: Hard-To-Find Tools for Body and Fender, Lead Repair, Metal Forming, Welding, Die Cast Repair, Trim Refinishing, Sandblasting. "How To" Books, Catalog, \$1.00 (Refundable), Eastwood, PM2A, 720 Lancaster, Berwyn, Pennsylvania 19312

V-8 to V-4 Engineered Conversion in Two Hours. Detailed instructions \$4.95 Includes Parts List. ECS, 937 E. Ranch Rd., Tempe, Arizona 85284.

AUTO UPHOLSTERY—ready to install. No sewing. **SEAT COVERS**, headliners, carpets, convertible tops, masks, exterior covers, tonneau covers. Available for Mustang, Volkswagens, Ghia, Datsun, Toyota, Mini trucks, Sports Cars, Corvette, Porsche, and More! Send \$2.00 for **CATALOG**. Car's Tops & Covers, 1733 E. Colorado Blvd., Dept. D, Pasadena, California 91106. 213-795-4148.

CARS can be investments. Booklet \$3.50. Consumer Research Publications, P.O. Box 756, Twentynine Palms, Calif. 92277.

ALCOHOL Fuels: How To Make Your Own. 182 pages. \$4.95 plus \$1.00 postage. ARCSoft, Box 132A, Woodsboro, MD 21796.

HYDROGEN Generator 12 volt. Plans \$25.00, Kit \$200.00. Power your Car with Hydrogen. Tierra, P.O. Box 779, Vashon, Washington 98070

INCREASE EFFICIENCY & PERFORMANCE Send \$5.95 for carburation system - U.S. Patent copy - to: Future Ideas, Box 2463, Kansas City, Missouri 64142

ELECTRONIC AUTO THEFT DEVICE STOPS THIEVES Cold! Simple Installation Instructions, Complete Parts, Foot-Proof! \$6.95. M. Durnal, Box 1177, Lamesa, California 92041

SAVE GASOLINE!! Bypass pollution devices - easily, reversibly! Posco (GB-2), LaGrangeville, NY 12540

50% MORE MPG POSSIBLE!!! FREE INFORMATION. Write: JML Research, Dept. 10, P.O. Box 585, Windsor Locks, CT 06096

LECTRICKAR — Convert VW's, Fiats to electric 50 mph plans \$25.00. Info, \$1.00. Robert Bucy, Box 28794, Dallas, TX, 75228.

NEW CARBURETOR Book 100+ MPG! Four Ways to Vaporize Gas! Drawings and Instructions \$10.00. Moneyback Guarantee. CARBO, Route 1, Hitchcock, South Dakota 57348

PROLONG ENGINE LIFE with Proper Oil Changes. Fluorescent Reminder Stickers. 20 for \$2.00. Nored Inc., Box 306-PM2, Montclair, NJ 07042.

AMAZING NEW PORTABLE FOOT PUMP. Inflates everything—anything that's inflatable. Built-in pressure gauge. Up to 100 lbs pressure instantly. 90 gauge, 24" hose, quick-lock tire clamp and nozzle valve. Compact. Send \$14.95 plus \$1.05 postage to: Guidry International, P.O. Box 27409, Dept. PM281, Houston, Texas 77027 — 10-Day money-back guarantee!

OLD CAR FANS: Subscribe to **HEMMINGS MOTOR NEWS**, world's largest old car marketplace since 1954. Over 450 pages of ads each month, crammed with thousands of old cars for sale — plus parts, literature, restoration shops and more. Only \$9.75 for 12 giant issues. Subscribe to the bible of old car nuts today. Send to: Hemmings Motor News, Dept. PM, Box 100, Bennington, Vermont 05201

AUTOMOBILE RE-TUNING FOR MAXIMIZED ECONOMY. Details FREE! Technear, Box 12191B, Norfolk, VA 23502

"THE MILEAGE GUIDE", Thirty Years Experience. Details Free. Precision, 111 Ord, PM3, Nampa, Idaho 83651

DEAD BATTERY? Let Your Lights On? Warning Device Plans \$3.00. Ted Ling, 4740 Fairway, Chino, CA 91710

CUT TIRE WEAR while saving gas. Visually check tire pressure with easily installed monitors. Handles pressure range 22-45 lbs. Four for \$6 + 1 FREE for spare tire. Guaranteed. Milford's, Inc., Desk M2, 2553 Kalmia, Boulder, CO 80302.

HOW TO THEFT PROOF Car and Stereo, \$2.95. Precision, 111 Ord, PM2, Nampa, Idaho 83651

MOTALOY Ring-Valve Replating Job—\$6.50. Moneyback Guarantee! Free Brochure! Arrow Products, Box 374M, Broken Arrow, OK 74012.

ATTENTION Colorful Removable Vinyl Bumper Stickers (A) **SUPPORT AMERICA BUY AMERICAN MADE PRODUCTS** (B) **BUY AMERICAN THE JOB YOU SAVE MAY BE YOUR OWN** 2.00 each. Jerr's Gifts, Dept. D, 2551 W. 105th Pl., Denver, Colo. 80234

AUTOS and Trucks for Sale Primarily by Individuals. Weekly Publication, Classics, Collector's Items, and Restorables. Send \$1.00 (refundable) to: Trader, 301 Woodlawn Road, Charlotte, N.C. 28210.

AT LAST - HERE IT IS! A complete in depth manuscript written by an independent dealer with over 20 years experience in the business, explains to you in detail the **DO'S** and **DON'TS** of buying, selling, and caring for your automobile. **GUARANTEED** to save you money when buying and make you money when selling. Send \$6.95 plus \$1.00 postage and handling to: Johnson's Auto Sales, 105, P.O. Box 15061, Durham, N.C. 27705

GAS Crunch Gotcha? Build our vapor carburetor. Plans and instructions \$50.00. Information \$1.00. Ultra Lean Carburetors, 9514-9 Reseda Blvd., 416-M, Northridge, Calif. 91324.

PROPANE/GASOLINE DUAL-FUEL AUTO! Conversion Plans and Instructions, Parts Sources. Only \$10.00! RDA, Box 873, Concord, NC 28025

SECRETS OF THE 200 MPG CARBURETOR! Details FREE! RoadRunner Publications, Raymondville, TX 78580

YOU CAN PAINT YOUR OWN CAR FOR \$100! Booklet tells how. Many "TRADE SECRETS." Complete material list. **SAVE HUNDREDS.** \$0.00. Revised Editions, 5466 N.E. 20th Ave., Ocala, FL 32670

TURN YOUR CAR INTO "MONEY MAKING MACHINE" ... Showing engineer's patented **FUEL-SAVER™**. \$300 weekly sparetime potential. Incredible MPG! **FREE** test offer. Almqvist Manufacturing, GT-2E, Milford, PA 18337

WATER Injector! Easily Built Under \$15!!! Free Details—See US! PM21, Box 4873, Boise, Idaho 83704.

SECRETS OF FANTASTIC GASOLINE MILEAGE!! - Free Information! Avtek, Box 5202-A2, Rockford, Illinois 61125

ALCOHOL Brewing Stills Recipes. Vehicles Burning both Alcohol or Gasoline. Easy Methods \$5.00. Alco, Box 1603, Plains, PA 18705

"SAVE GAS" low cost energy atomizer fits all cars and RV's - lower emission improves efficiency. Gas economy improved as much as 30% - no moving parts. Save now - 30-day money back guaranty. Send \$10.95 to: Townson Distributing Co., P.O. Box 40231, Dallas, Texas 75240.

HYDROGEN POWERED VEHICLES: If you can afford to wait in line for gasoline or can afford the high price of gasoline, do not send \$4.95 to: Ventas Union Center, South Dakota, 57787, to obtain information required to convert your vehicle to burn hydrogen fuel.

CAR BATTERIES are Expensive. Make Yours Last 3 Times Longer. Details \$9.95. Box 63, East Kelowna, BC Canada, VOH 1G0

TIME Magazine reports 35,000 Cow Magnets sold in just ten days for saving gas on cars and trucks. Send \$14.75 for a set of our super-strong Kar Magnets and instructions to: Norick, Inc., P.O. Box 229, Minneapolis, MN 55440. Dealer Inquiries Invited

RESTORE ENGINE PERFORMANCE With **POWER** Amazing Tuneup Compound, Treatment \$5.95 Guaranteed. Arketex, Box 14157, Austin, Texas 78761

EXTRA GAS FREE At Self-Serve Stations. Honest, Legal Technique Works! Details \$4.00. Oakster Motor, Box 1582, Beaverton, OR 97075

VOLKSWAGEN OWNERS National Newsletter Save \$\$\$ Economy Tips, Wholesale Paper Sources, Free Ads, Clubs Contests, Kits, Swaps, Fun. Sample \$2.00. Details. Ywonn, P.O. Box 5042P, Lynnwood, Washington 98036

FANTASTIC GAS SAVINGS At Wholesale Prices: 140 Pages Of Proven Products and Information. \$2.95. TMSI, Box 4185PM, Hayward, CA 94540

GAS GUARD Keeps Your Precious Gas Safe From Thieves. \$2.00. Safety Devices, 333 Sandy Springs Circle, Atlanta, GA 30328

REALISTIC Ways To Save Gasoline. Thorough Pamphlet. Send \$3.98 to: Publications Inc., P.O. Box 652, Muskegon, Michigan 49443

ELECTRIC VEHICLES

ELECTRIC Car conversion manual breakthrough. Exact Step-by-step Instructions, Diagrams Drawing. Conversion approx. \$1300.00. Five years Research-Development. \$27.00. Information \$2.00. Mr. Eilers, Box 2761, Santa Clara, Ca. 95051

AUTOMATIC SCR CONTROLLED BY BATTERY CHARGERS. Efficient, light-weight, dependable, designed for Electric Vehicles. Information \$5.00. Efficient Energy, 8643 Shaw Square Rd., Aumsville, Oregon 97325

AUTO SUPPLIES & EQUIPMENT

SAVE MONEY! Tires, Custom Wheels, Auto Accessories - Buy Direct and Save. Send \$2.00 For Catalog. Tyres International, 619 E. Tallmadge Ave., Akron, Ohio 44310

NEW - Starter Drives for Chrysler, Ford and G.M. State Make, Year and Model: \$9.88 Each-Plus \$2.00 Postage. Check or M.O. - Camco, 2 Eastern Ave., Gloucester, Mass. 01930

PARTS: Army Jeep and truck parts. Spare Parts & Equipment Co., P.O. Box 751, Lexington, Kentucky 40501

ALTERNATOR Generator Rebuilding Book. Details: Heddelund Engineering, 7505 Barkentine, Las Vegas, Nevada 89128.

PROPANE CONVERSION—You're convinced? But, Where to get parts for YOUR auto?? Impco and Century components ready for shipment. Send model, year, C.I.D., barrel carb. and \$10 (refund with order) for detailed estimate. L.P. Conversion Center, Bond Road, Poulso, Wash., 98370.

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.

LICENSE Plates: 1932 Mississippi, 1935 Georgia, \$6.00 Each, 1946, 1948, 1949 Alabama \$5.00 Each. Eugene Gardner, Route 1, Palmetto, GA. 30268

FAMOUS HULL COMPASSES at **DISCOUNT PRICES** **SAVE GAS TIME MONEY.** Traveller Gifts, P.O. Box 271, Warren, Ohio 44482

JEEP - Military, Civilian, Truck, Wagon Parts. Write: Blair, 1436 Sherwin, Chicago, Illinois 60626

MOTORCYCLES, BICYCLES, MOTORSCOOTERS & SUPPLIES

MOTORBIKE Plans, No Welding. Information 20¢. Box 784, Columbia Falls, Mt. 59912

BICYCLE And Save!! Free Information—Daoni Publications, S-5344 Eastwood Drive, Hamburg, New York 14075

HANG GLIDING - AVIATION

ONE-MAN JET HELICOPTER — Easy, inexpensive to build! Uses inexpensive fuel! Detailed plans, drawings — \$8.00. **HELICOPTER EXPERIMENTER'S HANDBOOK** — \$5.00. Both — \$11.00. Helicopt, Box 16488, Baltimore, Maryland 21217.

DESIGN Build Airplanes Hang Gliders. Simplified Publications. Brochure 20¢. McCoy Aircraft, 12820 S. Figueroa, Los Angeles, CA 90061

SPACE & ASTRONAUTS

ANTI GRAVITY Propulsion Device. Free Brochure! RDA, Box 873N, Concord, NC 28025

UFO'S. Find Them! Pocket Size Detector \$29.95. Easy to Build Plans, \$3.95. H. C. I., P.O. 348, Reedsville, PA 17004

HOVERCRAFT

AERO-CAR Amazing Hovercraft built easily with ordinary tools. Lawnmower engine power. Carries one man plus. Hovers, flies forward, backward, sideways over land/snow/water. Complete construction plans and brochure. \$6.95. Aero-Projects, Box 5118PM, Clinton, New Jersey 08809.

HOVERCRAFT Plan All Sizes. Catalog \$1.00. Universal Hovercraft, Box 281, Cordova, Illinois 61242

BOOMERANGS—INCREDIBLE RETURN! You can do it. Exciting! Order your Free catalog today. BoomerangMan, 306 Park, Monroe, Louisiana 71201

NEOVA VW Hovercraft Kit-Information \$8. Neoteric, Terre Haute, IN 47804

3 BARTLETT FLYING SAUCER Complete Plans And Supply Sources \$3.00. Write: Herb Bartlett, P.O. Box 156-M, Silverdale, WA 98383

CB-RADIO, TV & HAM EQUIPMENT

LINEAR PLANS, parts, other goodies. Free catalog, "Skipper", Box 130, Paradise, CA 95969

SAMPLE INSTRUCTIONS TO BUILD H.B.O. and Select T.V. Descramblers. Send \$5.00 to: GPREA, Box 23064, Milwaukee, WI 53223

POLICE Scanners, Crystals, Antennas, CBs, Radar Detectors. HPR, Box 19224, Denver, CO 80219

RECEIVE FREE Uninterrupted movies, sports, shows with your own **AMATEUR SUBSCRIPTION T.V. ANTENNA**, Easy to build, Fully Guaranteed or Full Refund, \$9.95. Phillips-Tech Electronics, Dept. SP-1, 5025 North 68th Street, Scottsdale, Arizona 85253.

CABLE TV DESCRAMBLERS AND CONVERTERS. Build or buy. Plans and parts. For information send \$2.00. C&D Company, P.O. Box 21, Jenison, MI 49428

LINEARS - Send Stamp for Details - MATCO Electronics, Box 316C, Cadillac, MI 49601

BEARCAT Scanners. Discount Prices. **CRYSTAL Certificates** - \$2.75. Radio Sales, 3482 Oakland, Oshkosh, Wis. 54901.

CB FREQUENCY EXPANDERS, Boosters, How-to Books. Catalog \$1. CB City, Box 31500M, Phoenix, AZ 85046

FREE Educational Electronics Catalog. EduKits Workshop, Department 812B, Hewlett, New York 11557.

RECEIVE Satellite Television Transmissions without Cablevision \$2.00. Downlink, Box 56, Greenville, Alabama 36037

NEW! Stereo T.V. Sound Space-age electronic device connects T.V. to your stereo. Free! Details. Drab Company, Dept. A, 112 Craigmont, Gallatin, TN 37066

NEW! FM + CB POWER-BOOSTER— Improve Your Car Radio and CB Reception 25% Or More with this New Electronically Tuned Antenna Booster, Not Sold in Stores, Guaranteed. Just \$19.95 + \$2.00 Handling To: Vic's Electronics, P.O. Box 4387, Dallas, Texas 75208. Won't Work on Windshield Antenna. 1-214-946-7004.

ELECTRONICS

SURVEILLANCE ELECTRONICS. Build your own. Details Free. PCEP Enterprises, Box 837-A, New York, N.Y. 10274

CAR STEREO! —Video recorders! Everything in-between! **CHEAP!** Catalogue. Alabama Audio, 109 South 21st, Birmingham, Alabama 35233. MC/VISA. 800-633-4694.

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 33565**

OWN YOUR OWN PHONE! Saves \$! Decorator, Desk, Cordless, Answerers, Dialers, Accessories. Catalog 50¢ refundable. R. J. Communications, 674 Amsterdam Avenue, Suite 201, New York, New York 10025 —

TELEPHONE Calls Recorded Automatically, Unattended, Build Yourself For Less Than \$10.00. Detailed Plan \$2.50. Garrett Electronic, 6451-M Imperial Ave., San Diego, CA 92114

COMPUTERS TRS-80's. Big Discount Prices. Catalog \$1.00. Radio Shack Dealer, Hancock, MD. 21750. (301) 679-8000.

STEREO, CASSETTE TAPES, ETC

THE Black Hank Williams Sr. Albums \$4.98. ReedSound, 120 Mikel, Summerville, SC 29483

RARE Out-Of-Print Albums. Factory Sealed. Over 25,000 in Stock. List \$2.00. Refundable With First Order. Record Warehouse, Box 4617, Rochester, New York 14613

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. 1-0281, New Rochelle, New York 10801.

"COMPUTERIZED" Sound Waves Captured on Cassettes! Details: Hamilton, Box 03408-F, Cleveland, Ohio 44103

RECEIVE FREE TAPES AND ALBUMS OF YOUR CHOICE BY OUTFIXING COMPANY COMPUTERS. WRITE FOR INFORMATION WITHOUT OBLIGATION: THE METHOD, RR3 BOX 282, MARSHFIELD, WISCONSIN, 54448

ANTISTATIC Generic Turntable Mats, \$3.49 only. Dealers Welcome. Rihs Products, 157 Glenfield Road, Sewickley, PA 15143

VIDEO EQUIPMENT

WWW Hollywood Foreign Classics on Video Cassette. Catalog \$1.00. Video Archives International, 7223 So. Campbell, Chicago, IL 60629

CAMPERS AND TRAILER KITS-PLANS

CAMPER/TRAILER KITS-PLANS - Fifth Wheels - Vans - Covers - Motorhomes - Simple construction - Save! Catalog \$1.00. GLEN-LR-V's, 9152 PM 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 — sport-fishers — hydroplanes — runabouts — **SAILBOATS** — Day-sailers — Trailersailers — Multihulls — motorsailers — (KY-ACK-CANOEES — 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 Aquilane, Tonawanda, NY 14150

LEARN BOAT LOFTING This Value Packed Booklet, Just \$17.95. 1601 SW 58 Ave., Gainesville, FL 32608

EYVRUDE 1961 Bargains... all sizes... Scott McCulloch parts... \$1. handling... Electra Marine, 610 Merrick Road, Lynbrook, New York 11563

BOAT PLANS - FRAME KITS - Patterns - Powerboats - Sailboats - Outboards - Canoes - Kayaks - Rowboats - Duckboats - Houseboats - Runabouts - Dorries - Workboats - Fishing Boats - 8' to 49' - Construct In - Plywood - Cold Molded - Wood/Epoxy - Fiberglass - Steel. Lowest cost, highest quality! Easy, proven methods include instructions especially for amateurs. No lofting! Supplies - Fastenings - Fiberglass - Resins - Glues - Spars - Books - Trailer Plans. Huge 144-page catalog. \$2.00 - Includes Free "Boatbuilding Supplies" brochure. Glen-L Marine, 9152 Rosecrans, Dept. MP, Bellflower, CA 90706

BOAT KITS - 27 trailerable models - **POWER and SAIL** - 11'-30'. Molded fiberglass hulls and decks come factory assembled - you install factory supplied interior. Save half factory-built cost. No experience required. **FREE** 48-page catalog. Luger, Dept. BC-81, 3800 West Highway 13, Burnsville, Minnesota 55337. 612-890-3000

TEAK Lumber and Plywood. Quality Woods Ltd., P.O. Box 205, Lake Hiawatha, NJ 07034. (201)927-0742.

PLANS, Patterns, Some Kits. Large Catalogs: Powerboat \$2.00. Sailboat \$1.00. Mannercraft, Box 161-M, Brighton, Mass. 02135

CAMPING EQUIPMENT & TENTS

FREE Catalog. Everything for camping. Campmor, Box 407N, Bogota, New Jersey 07603

ATHLETIC & BODY BUILDING COURSES

BEST EXERCISES for those over 26. Different, Beneficial. Easy to maintain schedule. Diagrams, Instructions: \$5.00. Kelly, Box 2206X, Deming, N.M. 88030

RODEO COWBOY - Step-by-Step You Can Become One. Details. Cowboy, Box 99, Forest Lake, Minn. 55025

SECRETS of Powerful Muscles Guaranteed. Free Details. John Associates, Box 1172, New Braunfels, Texas 78130

INCREASE Height! Details 35¢. Guaranteed. Tail-Up (60001), Box 32307, Louisville, Ky. 40232

KUNG-FU Free Literature. McLisa, Box 1755, Dept.-PM-81B, Honolulu, Hawaii 96806

DYNAMIC MUSCLES, No Equipment, Send \$3.00 to: James Kramp, 326 W. Merry, Bowling Green, Ohio 43402

FITNESS Newsletter, Dept 400, PO 195, Western Springs, IL 60558, Introductory Copy \$1.00.

MUSCLES FAST! "Double-Power" Bodybuilding System builds powerful muscles! Send \$1. **CHAMPION**, Dept. 300-PC, P.O. Box 4900, Tyler, Texas 75712

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

POUR YOUR OWN! Sinkers Molds, Fishing Accessories \$1.00 for Catalog. R-L-M Sales Co., P.O.B. 69, Tualatin, Oregon 97062

FISHING, TACKLE, LURES

FISH RECORDER - Eliminate the guess work. Our handy fish scale and measuring tape is a must for every fisherman. Fits right into your shirt pocket. Weighs up to 28 lbs. and measures up to 40" — all in one simple operation. \$3.98 Calif. Residents add 6% sales tax. R & B Gifts, 10113 Joerschke Drive #204, Grass Valley, CA 95945.

PLASTIC WORMS make your own! Molds, supplies, tackle. Send 50¢ Catalog. Super-Sport, 422 N. Vamey Street, Burbank, Calif. 91502

FREE TACKLE SAMPLES! Tackle Duster Wanted! No Experience Required! Free Rods!... Reels!... Lures! Free Details! TPC, Box 7432-PM-2, Trenton, NJ 08628

BATTERIES, GENERATORS

GENERATORS With or Without Engine. Big Selection Discounted. JJ Enterprises, Box 693, Oshkosh, Wisconsin 54902.

ENGINES, MOTORS, MAGNETS

REWIRE Car Alternator for 110 AC. Plans for \$3.00. Sweett, Box 591, Titusville, Florida 32780

REPAIR ELECTRIC MOTOR! GENERATORS! ALTERNATORS! Details! ModEquip, Box 7266, Kansas City, Missouri 64113

ENGINES to 19 h.p. for Mowers, Tillers, Hobby Parts, Repair Manuals, Tremendous Savings, Fast, Dependable. Illustrated Price Catalog \$1.00. Ashland Small Engines, Ashland, Mo. 65010

ENGINE Repair Manuals. Engines 2-16 HP. For most applications Prices Illustration \$2.00. Refundable. Valley Equipment Co., 11975A Hesperia Rd., Hesperia, Calif. 92345

STEAM ENGINE CASTINGS and Model Engineering Supplies Catalog \$1.00. Refundable With Order. D & M Model Engineering, Box 400, Dept. 110, Western Springs, IL 60558

GOOD THREE PHASE Motor From Single — Run Anything! Plans \$3.00. Harrit, Box 495, Great Neck, N.Y. 11022

INVESTIGATE the **CRUISE ENGINE** concept. Power your vehicle when you reach highway speeds with a 7 to 20 hp auxiliary engine. Designer's package \$12.00. Guaranteed. Faith Enterprises Inc., Box 512, Route 4, Stevensville, Md. 21666

TOOLS FOR SALE

AIR TOOLS — Free Wholesale Catalog: Hoosier Distributing, 3009 Sample, South Bend, Indiana 46619

MACHINERY, TOOLS & SUPPLIES

4' METAL Cutting Lathe \$76.25. Tag, 15048 Proctor, Industry, CA 91746

MACHINE TOOLS, Mills, Lathes, Drill Presses, Band Saws, Accessories. Catalogue \$2.00. M&M Tool Supply, Box 622, Mauldin, South Carolina 29662

BANDSAW BLADES, Carbide Tipped Saws, Any Size, Free literature. King Saw, 6541 Tidewater Drive, Norfolk, Virginia 23509

REPAIR Parts for Chainsaws, Lawnmowers and Small Engines Combine Top Quality and Low Prices. Service tools for shop use. Guaranteed. Free Catalog. For special dealer information also give sales tax no. Repair Parts, Dept. 23803, Box 6329, Erie, PA 16512

POWER-MITER Box. Build For Your 7 1/4" Saw. Plans \$1.98. Metal Parts \$5.98. **DEJON**, Box 111, Summit Station, Ohio 43073

SMALL FOUNDRY Furnaces. Supplies. Free literature. Pyramid Products, 3736 South 7th Avenue, Phoenix, Arizona 85041

BANDSAW BLADES, Carbide Tipped Saws, Any Size, Free literature. King Saw, 6541 Tidewater Drive, Norfolk, Virginia 23509

LATHES - Unimat - Maximat - Sherline - Machinex. Catalog \$1.00. Shop Supplies \$1.00. Campbell, 2100 Selma Road, Springfield, Ohio 45505

JEMCO LEVER - Use with Pipe Clamps - **SPREADS, CLAMPS, WINCHES, LIFTS** - Free Brochure. Inexpensive. **JEMCO**, P.O. Box 13615, Portland, Oregon 97208

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, IL 61448

1400 Catalogs listed and described. Sources for everything imaginable \$3.00. Masterlog, Box 879-B, Fairfax, California 94930

MACHINE SHOP PRINTS - 8 1/2" x 11" Ink and Watercolor Prints. Lathe, Radial Drill, Miller, Surface Grinder - \$7 Each. Allow 4-6 Weeks Delivery. Newell Graphics, 76 Ring Drive, Groton, Conn. 06340

BUFFING & POLISHING

REFINISH all Metals; Hard-To-Find, Buffs, Compounds, Buffing Motors. Catalog, \$1.00 (Refundable). Eastwood, PM2B, 720 Lancaster, Berwyn, Pennsylvania 19312

BLACKSMITH & FOUNDRY SUPPLIES

FORGES: gas, coal — hammers — tongs — anvils — anvil benches — all blacksmith supplies. Catalog \$1 (refunded first order). Markel Blacksmith Shop, 7836 Cannonsburg, Cannonsburg, MI 49317.

ENERGY SAVING

HOW TO BUILD A RUSSIAN FIREPLACE. Complete illustrated instructions with construction plans for this 90% efficient masonry wood heater as featured in May '80 *Builders Magazine* and August '80 *Mechanix Illustrated*. We've built 8 units and can show you how. Send \$10 to: Russian, Dept. PM, Box 362, Toms, NM 87060.

NEW ALTERNATE ENERGY BOOKS. . . Free information. . . Write . . . Parker Publications, Box 1142PMA, Pacifica, CA 94044

SAVE UP TO FIFTY PERCENT ON YOUR ELECTRIC BILL. Send \$4.95 to: Energy Publishing Co., Box 11715, Costa Mesa, Ca. 92627, for Manual containing full information. Money back if not satisfied.

ENERGY SAVING

(Continued from preceding page)

FIREPLACE Heats Home! Offers Heatstorage Capability, Quietness, Adaptability. Build Your Own. Plans \$9.95. Island Systems, 215 East Hawaii, Nampa, Idaho 83651

REDUCE ENERGY BILLS. Make your Home Energy Efficient. 50 Ways. Booklet \$3.00. Parker Enterprise, Box 531, Boulder, MT 59632

STOP dangerous creosote buildup, chimney fires, get up to 50% more heat from your wood. Guaranteed! Free information: N.E.S., Box 851, Ft. Morgan, Colo. 80701.

METHANE, WIND, SOLAR, FUEL CELLS. Enjoy free heat + Power send for Energy Encyclopedia. A list of Mfg., Costs, Specs, on Alternate Sources of Energy. Plus Catalog of Plans, Books & Energy Saving Devices for the do-it-yourselfer. Send \$4.00 to: Energy Service, 14a Hughey Ave., Nashua, N.H. 03060

SURVIVAL SOURCE BOOK AND BUYERS GUIDE. Solar, Wind, Hydro, Fuels, Electric Vehicles, Survival. The absolute source. \$5 year — Biannual Seaberg Information Systems, P.O. Box 368, Montgomery, NY 12549

CENTRAL HEAT FROM WOOD! Wood-burning boilers heat whole house, yield hot water! Details: Tekton Corporation, Box 999, Conway, MA 01341.

INSULATE your water pipes NOW with Polystyrene direct from fabricator. BISCO, 11544 Anabel Ave., Garden Grove, CA 92643

YOU SAVE 70%!! How a Family of 6 Reduced their Utility Bill 70%. Send \$5.00 to: Energy Saving, P.O. Box 228, Poplarville, Miss. 39470

VERY Warm. Build Electric Kotatsu to: Table. Box 145, Green Creek, N.J. 08219

DO-IT-YOURSELFERS—How To Clean-Service and Save Money maintaining your own oil or gas fired heating equipment. My 30 years experience is yours. Send for my step-by-step instructions. \$10.00 to: HEATING, Box 281, West Chester, PA 19380.

SAVE Money. NEW Window-mounted Solar Heater, easy to build. FREE information. 35e P&H. HowTo Co., Dept. PM, 2020 Kinyon St., Falls Church, VA 22043

SECRETS OF FANTASTIC GASOLINE MILEAGE! - Free Information! - Avtek, Box 5202-C2, Rockford, Illinois 61125

"EXTRA INSULATE" Your Freezer! — EASY instructions \$2.00 SASE — Hobbs, 178K Steffy, Ramona, CA 92065

SAVE Energy. Save Life Bulbs. Information and Sample: Send SASE to: Brandon Int'l. Enterprises, 209 Harvard Ave. East, Seattle, Washington 98102

BOOKLET Many Easy Ways to Save Energy for Home and Auto, \$3.00. Evans, Box 423, Saugerties, New York 12477

SAVE Money By Saving Energy in Your Home and Car. Details \$1.00. Energy, Box 388, Deltona, Fla 32725

WINDMILL Electric Car, Engineer Drives to Work Free Or House Windmill Plans \$3.95. Hadley, 2100 3RD Avenue, Seattle, WA 98121

BUILD YOUR OWN LOG SPLITTER. 140 Pages instructions, 50 Pages Parts. Both \$9.95. Parts Catalog only \$2.50. Hardy's Equipment, Box 142M, Candia, NH 03034

FREE Catalogue Book Bargains. Opportunity, How-To, Self-Improvement. Includes Energy Saving Subjects. Barbro Publications, P.O. Box 2827, Petaluma, CA 94953

SOLAR & ALTERNATE ENERGY

JOIN THE MOVEMENT To Beat OPEC! Send \$1.00. SASE: Energy, Box 8132A, St. Louis, MO 63156

ATTENTION WOODBURNERS - Stovepipe Cleaning Tool Removes Creosote FAST and EASY. Plan - \$2.00. Tom Ulrich, Box 252, Farmersville, Ohio 45325

WIND ELECTRIC GENERATORS + SOLAR CELLS In Stock. National Company Guarantees Lowest Cost. Latest Technology From 12 Volt DC To 5000 Watts AC. Dealers Wanted. Exclusive Territory. Send \$3.00 For Complete Distributor Price Catalog. c/o: Gregory Hamilton, P.O. Box 989M, Sun Valley, California 91352

ENERGY INTEGRATION — Book on Alcohol, Methane, Electricity & Solar Systems for Homesite Energy Production. \$2. AEnSy, Rt. 2, Box 43, San Marcos, Texas 78666

SOLAR ELECTRIC POWER PLANS. Built and Tested under D.O.E. Grants. (-) Solar Home Lighting. (-) Solar Electric Car. (-) Solar Power for Boats, Campers. (-) Science Fair Projects - Solar Toys. Plans \$3.50 each. All for \$12.00 Check or M.O. to: Solar Studios, 4321 1st Ave. N., St. Petersburg, Florida 33713.

SOLARTILE — Amazing Pool Heating Pavement. Ameropean, 71 Hartford Tpke., Wallingford, CT 06492

SOLAR Powered 9V Battery Replacement! Tired of replacing Batteries in your Radio? Then let the Sun Power it with this amazing Solar Cell Panel. Has Battery Clip for Connection. Send \$12.00 for p.p.d. shipment anywhere in the USA or send 50¢ for Brochure describing Complete Line of Solar Cells, Panels and Products. Solamp, Box 27885, Denver, Colo. 80227. 303-781-1589

STEAM ENGINES, Wood Fired Boilers, Turbines, Stove Powered Generators, Gasoline Engine Conversions, Complete Systems, Parts, Plans. Catalog \$5.00. U.S. Steam Power Products, Dept. PM, RR 2, Koshkonong, MO 65682

SOLAR TIPS: 100 + Sterns. Investigate first. One tip can Save Thousands. \$3.00. R. Drier, P.O. Box 21164, Eagan, MN 55121

SOLAR CELLS - Make in Your Garage, Process Specifications, Suppliers Directory, Instructions. \$12.95. Vortex, Box 5633, Richardson, TX 75080

SOLAR Hot Water Heater. Plans for three award winning designs which you can easily build. \$5.50. Energy Alternatives, Box 22368, Knoxville, TN 37922

ILLUSTRATED MANUAL describing materials, sources and construction of inexpensive automatic HOT AIR SOLAR COLLECTOR Unit. Send \$9.00 to: STUDIO 273, Park Ave., Hammonilton, N.J. 08037

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

INEXPENSIVE . . . High Output, SOLAR FURNACE—Detailed Assembly Installation Instructions—Send \$14.95. . . GUARANTEED!!! SOLWIN, Box 1766, Ashtabula, Ohio 44004

CASH In On Solar For Yourself And Others. Details \$1.00 (Refundable). Crossroads, Box 98, Suring, WI 54174

HOME HEATING, FUEL SAVERS

FIRESTARTER: Organic, Quick, Clean. \$3.00. JAZWORKS, 3455 Table Mesa Dr., #111B, Boulder, CO 80302

HOW to get the most from your Steam/Hot Water Radiators. \$2.00. Results guaranteed. R. Kenie, Box 166 D, RD 1, Honesdale, Pa. 18431

COAL! How To Convert And Operate Your Wood Stove Using Safer, Less Expensive Coal. Everything You Need To Know - \$4.75. Energy Associates, R.D.#2, Schoharie, NY 12157.

HOME CRAFTSMAN

TIRED OF CARRYING FIREWOOD IN EVERY NIGHT. My Wood Crib will hold up to one wheelbarrow full of firewood, yet is unique, attractive, and decorative. Send \$3.50 for plan #101 or \$19.95 for complete pre-cut kit. Northwest Custom Woodcrafts, Box 388, Roy, Wash. 98580.

BLACKSMITHING FOR THE HOME CRAFTSMAN. Book Written By Practicing Smiths. Covers Shop Layout, Fire, Forge Welding, Tool Smthing, Exercises, Bibliography. Joe Pehoski, Box 84, Salado, Texas 76571. \$3.95 Post Paid (PD).

FREE HOBBY Tool Catalog, 1,000 Items below Wholesale! Post Cards Only. International Curio Shoppe, D-64, Box D, Mountaintale, New York 12763

MAKE MONEY — Wooden Toys — Puzzles, Plans — Instructions included \$3.50 — Norfolk Pine, P.O. Box 365-2, Simcoe, Ont. N3Y 4L2

IT'S a poor craftsman who blames his tools. Written on beautiful parchment, Suitable for framing. \$2.00. The House of Graffis, P.O. Box 26057, Phoenix, Arizona 85068.

OVER 75 PATTERNS! Enjoy Profitable, Wooden Gifts, Toys, Household Accessories. PLUS "Shop Secrets". Only \$5.00. Accents (P-21), Box 262, Danvers, Mass. 01923

FURNITURE RESTORATION AND REFINISHING SUPPLIES. Industrial Paint removers and furniture stripping systems. Complete catalog \$1.00. Write: Kwick Kleen, P.O. Box 905, Vincennes, IN 47591.

PICTURE Framing Supplier Catalog \$2.00. Mr. Frame Inc., 7217 Centreville Road, Dept. P, Manassas, Virginia 22110

UNFINISHED picture frame moulding. Factory closeout. 50% discount. 200 styles. Write: Japs, 128-PF Seventh North, Hopkins, MN 55343

WORLD'S LARGEST CATALOG? Three pounds 832 pages. Every Tool, Supply, Machine Imaginable \$5.00. Refundable. McKiligan, PM-281, Johnson City, New York 13790

WOODEN ROLL TOP BREAD BOX. Plans, Detailed Instructions. Only \$3.50. Pines, P.O. Box 4013, Hampton, VA 23664

HOT TUBS SAVE \$600. Build your own 5 or 6 ft. tub. Complete plans and instructions: (\$10 refund if not satisfied.) Skipco Eng. Co., 16650 Marshall, Elsinore, CA. 92530

FREE GUIDE to Beautiful Wipe-On Wood finishing. General Finishes, Box 14363P, Milwaukee, Wf. 53214

WOODHOLDER, 1/2 Cord, Attractive, Inexpensive. Plans \$2.00. Techserv, Box 15154 Durham, NC 27704

101 PATTERNS, Gifts, Novelties, Action Windmills plus "Make Money Jig Sawing". Only \$4.00 Prepaid 1st. Class. Mastercraft J5M, P.O. Box 851, Park Ridge, Illinois 60068

CATALOG FULL-SIZE FURNITURE PLANS— \$1.00. Refunded with first order. Traditional, Early American, over 1501 Furniture Designs, 1425 Sherman, Dept. CP-81, Evanston, Illinois 60201.

REDWOOD Burl, Myrtlewood, Olive, Fig Slabs. BROCHURE, 25e. Redwood Burlisque, Dept. PM-2, 1454 Orchard Home Drive, Medford, Oregon 97501.

WOODCRAFT HOBBIES!— Make your own Bread Box or twin Medicine Cabinet. Complete Plans, Materials List, Directions and Picture. Send \$3.50 cash, check or MO for each. Both for \$6.00. Paul Rubendall, 3200 Mohamed Lane, Carmichael, California 95608.

WEEKEND PROJECTS— 15 Assorted Plans. \$3.50. The Woodworker, Box 12794, Jackson, Mississippi 39211

STAINLESS Steel and Brass, Screws and Bolts. Small Quantities, Free Catalog. Elwick, Dept. 409, 230 Woods Lane, Somerdale, N.J. 08083

BUILD Your Own 30" x 64" 15 Drawer Workbench. Plans \$5.00—Send to: Workbench, P.O. Box 211, Chicago Ridge, Illinois 60415

DETAILED Plans for Potato Bin That's Beautiful, Useful and Very Successful at Craft Shows. An Original Design for a Country Kitchen by the Country Woodwork Store. Stores Potatoes, Onions, and Beans Neatly. \$4.00. Denny Zilla, Route One, Box 285H, Town Creek, AL 35672

FURNITURE, Toys, Shopbench, Office, Plans. Original Designs. Send BASE \$1.00 For Catalog, Sample Plan. Original Idea Plans, Box 13127, Sacramento, CA 95813

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

BEYOND REPAIR? Miracle Putty Restores Everything. "Putty", 2737 Hampden, Chicago 60614.

CONSTRUCTION PLANS, BLUEPRINTS

BARN-GARAGES-WORKSHOPS— Many sizes, styles, shapes. Booklet \$2.00 (Refundable.) Ashland Barns, 990 Buttercreek, Ashland, Oregon 97520

HOME BUILDING & REMODELING

HOME Buying Guide—How to compare features of all major systems. Send \$5.00 to: High-Tech Information, P.O. Box 1384, Minnetonka, MN 55343

HOME building and remodeling guide explaining the sequence of complete home construction through the proper use of supplies and subcontractors 16 pages \$10.00. Intercontinental Construction, 2828 Foxfire Road, Matthews, N.C. 28105

BATHROOM Vanities, Tops, Cabinets, Plumbing, Lighting, etc. All Manufacturers. We ship direct. Save Time, Money, Worry, with our Color Brochures, Discount Prices and Recommendations. Send \$6.00 for Buyers Information Package to: American Porcelain, BSA Building, 1300 East Rand Road, Arlington Heights, Illinois 60004

EARTH SHELTER Digest Magazine is devoted entirely to Earth Sheltered Housing. Articles, Color Photos and Plans for Underground Houses. Subscription \$18. Sample \$3. WEBCO PUBLISHING, Dept. PM, 1701 East Cope, St. Paul, MN 55109.

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. 81B/PM, Box 391, Woodstock, IL 60096.

DO IT YOURSELF

YOU Can Build A Dump Truck From Your Pickup For About \$75.00. Send \$2.00 To: Erico, 1478-PM, Oceanside, CA 92054

STEPLADDERS made taller and to set level on any uneven surface. \$4.00. P.O. Box 1341, Parkersburg, WV 26101

HOW To Build YOUR OWN FISH POND Easy, Inexpensive, Send \$7.00— Royal Publishers, 5A Hallam Pl., San Francisco, CA 94103

SATELLITE TELEVISION -Inexpensive System, Receive Anything, Build Antenna under \$175.00. Plans and Manual \$19.95 MONEY BACK GUARANTEE. Sateleco, Box 265, Salem, Ohio. 44460

NEW!! Exclusive, Automatic, Chimney Fire Detector and Extinguisher. Send \$4.98 NOW for plans. Sky High Enterprises, Dept. 11, P.O. Box 84, Puslinch, Ontario, Canada NOB 2J0.

YOUR CAR IS YOUR SECOND LARGEST INVESTMENT! Preserve It! Stop Rust! Send \$4.95 for Details to: Scott Itner, Box 122-M, Frankenmuth, Mich. 48734

CABLE SPOOL FURNITURE; Ten Ideas, \$2.00. Tabco, 3633 Parsons Avenue, Anchorage, Alaska, 99504

BUILD YOUR OWN POOL TABLE! SAVE HUNDREDS!! Detailed Plans!! Easy Step By Step Instructions!! \$10.95. — Billiards Unlimited, Box 16585, Houston, Texas 77022

QUIT GUESSING! Chart for 16" Self-sticking Wallpaper. \$1.00. B&D, 36444 Co. Rd. 39, Otis, CO 80743

WATER Well Drilling by Hand. . . . I Did! Details. . . \$5.00 to: D. Mills, Box 54, Farmland, Ind. 47340

(Continued on next page)

DO IT YOURSELF

(Continued from preceding page)

ATT. MOBILE HOME OWNERS — UNICOVER — Insulated Mobile Home Roof. A System of Aluminum & Foam Panels, with Interlocking Water Tight Standing Seams. Do-It-Yourself Kits. Stops Leaks & Roof Noise Permanently, also reduce Heat in Summer by 30°F. Keeps Heat in During Winter & is Guaranteed for 20 Years in Writing. Unicover, 3495 Switzer Rd., Loomis, CA, 95650 — For Information Call Toll Free, IN Cal. 1-800-852-7777 Ask for Oper. 920 — Out Cal. 1-800-824-7888

SNOWMOBILE Food Warmer — Easy Build — Plans \$3.50. Box 1, Errol, N.H. 03579

RE SILVER MIRRORS — Old Formula and Instructions. Send \$4.00. — Parnell, 701 North 8th, Frederick, Oklahoma 73542

SURPLUS Catalog 8,000 Items: Electronics, Stereos, Speakers, Alarms, Tools, Games, Solar, Auto-Home, 8 Issues \$2.00. BNF(P), 119 Foster St., Peabody, MA 01960.

HOW TO WRITE YOUR OWN RESUME 30 pages practical instruction, samples \$4.95. Arthur Dyke, Certified Personnel Consultant, 706 EST Bldg., Elyria, Ohio 44035

UPHOLSTERING SUPPLIES, Fabrics, Vinyls, Tools, Cane, Instruction Books, Free Catalog. Jim Dandy Sales, Box 30377P, Cincinnati, Ohio 45230

MOBILE HOME OWNERS Guide to Fixing Roof and Window Leaks. Send \$3.95 to: B&S Enterprises, 3072 Delta Waters Rd., Medford, OR 97501

ELECTROPLATING, Complete amateur's textbook. All metals Electroplate metallic/nonmetallic items \$9.95. Details free. Tropic, Box 95-P3, Palm Bay, Florida 32905.

BEAUTIFUL CYPRESS CLOCK FROM FLORIDA. Low prices, 100% guaranteed. Complete clock kits with cypress wood, battery operated quartz clock movements, clear epoxy resin. For information and price list send \$2.00 to: STEJON ENTERPRISES, 1110 S. Rio Grande, #1807, Dept. 107S, Orlando, Florida 32805. (\$2.00 refundable with first order)

PROJECTION TV ... Convert your TV to project 7 Foot picture ... Results equal to \$2,500 projector ... Total cost less than \$20.00 ... **PLANS & LENS** \$16.00 ... Illustrated information FREE Macrocomb, Washington Crossing, Pennsylvania 18977

SAVE — Make your own cleaning detergents for less than 12¢ per quart. Safe, strong guaranteed formulations. Send \$5.00 for instructions and sample Chemicals, Inc., Box 3533, Champaign, Illinois 61820

FRAME Your Own Pictures, Manual Explains How. Details: Hudson Frames, Box 340, Sutherlin, Oregon 97479.

SECRETS OF REPAIRING TV'S REVEALED. Anyone can do it ... Guaranteed. Details Free. Research, Box 517P, Brea, CA 92621.

FLOOR COVERING. Complete instructions: Buying, installing, Maintaining Carpet, Linoleum, Tile. 150 Illustrations. \$14.95: Carpets, Box 537PM, Rockport, MA 01966.

EXTERMINATE ROACHES, SPIDERS, RATS, MICE and many other Household Pests. Learn about the Methods and Chemicals the Professionals use. Send \$3.00 to: D. F. M., P.O. Box 582, Vandalia, Ohio 45377

BUILD Powerful Air Compressors from Old Lawnmower Engines. **SAVE Hundreds**. Plans — \$5.00. Vandergrift, 437 Houston, Ambler, Pennsylvania 19002

ATTENTION PORK LOVERS: Build your own portable pig cooker. Complete easy plans. \$5.00 (include's bonus tips on cooking). Pork Lovers 102, P.O. Box 15061, Durham, N.C. 27705

RECEIVE 80 Television Channels By Satellite! Secrets Revealed. \$1. Meier, Maple Street, Charlevoix, Michigan 49720

SECURITY VAULT — Protect From Fire, Theft, Water at Home, Your Valuable Documents, Jewelry, etc. Guaranteed Undetectable Plans, Instructions \$5.00. CK Shelton, P.O. Box 250, Clermont, Florida 32711

ROTARY Wood Splitter Plans—, Pictures—\$5.00. P.O. Box 694, Lander, Wyo., 82520

FREE WOODWORKING PLANS 13 Unique Designs. Postage & Handling—\$1.00.—Plans, 2318, Liberty, Cuy. Falls, Ohio 44221

36 BEER Recipes - \$3.00. 52 Wine Recipes - \$3.00. Both \$5.00. Stampland, Department 374P, 625 Post Street, San Francisco, CA 94109.

WATERBEDS \$88.00 AND YOUR WOOD, COMPLETE! Catalogue \$1.00. Discount Waterbeds, 3615-H R Street, Vancouver, Washington 98663

HOW to reduce your phone bill by installing your own extension telephones. For guaranteed booklet send \$2.29 to: Telephones, 115 Russell S.W., Orangeburg, S.C. 29115.

SMASH Aluminum Cans the easy way.—Blueprint \$2.00. Dewey Publications, Box 6232, Louisville, Kentucky 40207

TV PICTURE Enlarger (5'x6') Projector Kits, Send Self Addressed Stamped Envelope for Free Info. Precision Lens, Illustrated DWGS., Inverter Switch Kit \$24.95 PPD. Cal. Residents Add 6% Sales Tax. M/C, Vista, Miles - N - Miles, 9252 Garden Grove Blvd, Ste 19, Garden Grove, CA 92644.

ARTS & CRAFTS

MAKE Figurines, Plastercraft, Liquid Latex Rubber, Cement Lawn Ornaments, Plastic Molds Sample & Catalog - \$1.00. Woolley Company, Box 29, Peoria, Illinois 61655

STAINED Glass Lamp Kits Send \$2.00 For Color Catalog. Spector Distributors, 1870 Bailey, Buffalo, New York 14240

LEARN Stained Glass Art, send \$10 for 2 Volumes to: Stained Glass Primer, Dept. SGP, 10033 Broadway Terrace, Oakland, CA 94611

CREATE METAL SCULPTURES Using NUTS, BOLTS, Etc. 58 Illustrations \$5.00. Ralph Meinert, 302 Slavens, Bettendorf, Iowa 52722

"GETTING Started in Stained Glass" 50¢. Whittemore, Box 2065T, Hanover, Mass 02339.

STAINED GLASS Catalogue-P. \$1.00 (Refundable). Books, Tools, Glass. Saylescrafts, 171 Main Street, Nyack, N.Y. 10960

SUNS AND STARS. Design them yourself. Send self-addressed return envelope and 50¢ for simple instructions and 36 radiant designs. Suns and Stars, Box 1163, Salt Lake City, Utah 84110

SILK — SCREENING — For PROFIT — And Fun. T-Shirts, Decals, Etc. \$2.75. TC Ent., P.O. Box 13751, Orlando, Florida 32859.

CARTOONING, COMMERCIAL ARTS & SIGN PAINTING

CARTOON for money!!! Free information. Calico, Box 4117-P, Anaheim, California 92803

MODERN Cartooning taught by mail. Write for free brochure. Cartoonorama—Box 263-2N, Branford, Conn. 06405.

SIGN Painting — Easy method. Free catalogue. Kaufmann Company, Center town, Missouri 65023

35 LESSON cartooning course. Cartoonist's Magazine, both \$3.00. Hartman, Box 30367, Lincoln, Nebraska 68503.

LEARN cartooning. Free brochure. Write: Cartooning, Box 7059G, Colorado Springs, Colorado 80933

CARTOON for Fun and Money!!! Free booklet!! Cartoons, Box 40614A, Detroit, Michigan 48240

MODELS, CARS, SHIPS, TRAINS, PLANES, ETC.

FLYING COATHANGERS? Yes! Durable Flying Fun Toy for Pennies. Simple Instructions and Full Size Plans. Only \$5.00. Arthur DeSiller, Box 238PM, Indian Orchard, MA 01151

LIVE Steam Engine Kits. Marine, Stationary, Walking Beam. Boilers. Fittings. Fascinating Modeler's Hobby. Catalog \$2. H.P.K., Centuck 34, Yonkers, "Z", New York 10710

RADIO CONTROL—Airplanes Boats, Helicopters, Motorcycles, Supplies, Big Discount Catalog—\$4.00 (Refundable). Modelers Supply, Box 7185, Montgomery, AL 36107

MODEL AIRPLANE DESIGNERS. Here is the information you need to secure maximum performance of your models. Book includes airfoil section lay-out, lift and drag data on eight airfoils suitable for models, propeller data for determining the proper pitch and diameter to match the engine and airspeed, drag data for fuselage, engine cylinders, cowled and uncowled, and other useful data. The dimensions are in modeler's units, inches and ounces rather than feet and pounds. All formulas are simply and clearly explained with worked out examples. Send \$5.00 to: ADCO, 2719 Scott Ave., Ft. Worth, TX 76103

MODEL AIRPLANES — Huge Catalog. \$2.00. Sig Manufacturing Co., Inc., Montezuma, IA 50171

FIRING CIVIL WAR Model CANNON Plans: Catalog free. Green—PM-2, Box 892, Shakmar, Fla. 32579

TOYS, GAMES, PUZZLES, NOVELTIES

WIN Backgammon Games. Booklet \$1.50. J.A. Larson, Rt. 2, Box 2341-35, Deer Island, Ore. 97054

EXCITING NEW Games of Mermaids - Shelmate. Instructions plus exquisite seashells. Send \$4.95. Art-Facts, 50S. Los Robles, #197, Pasadena, California 91101.

SPACE INVADER BLOCKBUSTER. 2 in 1 electronic hand held game. Send for free brochure. Algor, 1015 Bishop Street 454, Honolulu, Hawaii 96813

SOLVE RUBIK'S CUBE! Illustrated Step-By-Step Instructions. Satisfaction Guaranteed. Rushed First Class. \$5.00. Cube Solution, Box 58, Berrien Springs, Michigan 49103.

TOY Wooden Trains-Kit Or Assembled Handcrafted. Catalog \$1.00 Refundable. Muellerkuffl, P.O. Box 142, Antioch, IL 60002

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

VENTRILOQUISM! COURSES, DUMMIES. Brochure \$1.00 — Rizzy's, 6034 So. Puleaski, Chicago, Illinois 60629

GIANT MAGIC CATALOG — Over 400 Tricks, \$2.00 — Refundable with 1st Order. Pandora's Box 691 Richmond, Richmond Hts., Ohio 44143

HANDCUFF Escape Method Revealed. \$2.00 SASE. Mr. Davis, P.O. Box 1428, Warren, MI 48090.

HOBBIES AND COLLECTIONS

COLLECT Military Medals. List 50¢. Vernon, Box 387 PM, Baldwin, New York 11510.

DECALS, EMBLEMS, PATCHES

EMBLEMS and Insignia Made in Small or Large Lots for any Purpose. Free Catalog. Eastern Emblem, 511PM 18th St., Union City, N.J. 07087

ANTIQUES, RELICS, INDIAN GOODS AND CURIOS

INDIAN Artifacts Lists 25¢. Birdpoints \$7.50 Dozen, Guide Book \$8.81 P.P. Secrist, Deerfield, MO 64741

STAMP COLLECTING

50 YEARS Old 15¢ different United States, over fifty years old—25¢ with approvals. Jaxon, Box C11-P, New Rochelle, New York 10804.

1000 Foreign \$2.00, 5000 \$6.00. 10 pounds on paper \$35.00. 5000 USA \$6.00, 10 pounds on paper \$35.00. Contains regulars, commemoratives, high values, older issues, etc. Foreign large size only pictorials and commemoratives on paper \$10.00 per pound; 3 pounds \$25.00. Delivered. Meyers, 5321 Fleming, Richmond, CA 94804

TOPS! 100 Popular Poland Stamps (all different) only 25¢. Mystic, Dept. PS1, Camden, New York 13316.

1,000 DIFFERENT WORLD + 100 DIFFERENT GERMAN PICTORIALS \$3.00. Approvals. Cancel service anytime. **ADULTS ONLY**. Gouge, Box 88-MS, Elizabethton, TN 37643

MICKEY MOUSE (Apollo Moon Landing Anniversary), Minnie Mouse, Donald Duck, Goofy (Hippopotamus), Anguilla Triangle. Only 10¢ when requesting approvals. State age. Douglas Cook, Dept. PM-10, Las Vegas, Nevada 89119.

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. E21PM, Jamestown, NY 14301

\$10.00 Catalog Value Foreign Mint \$1.00 with Approvals. J&D Stamps, Box 747-M, Melbourne Beach, FL 32951

ICELAND Collection, 20 Different \$1.00. Approvals. Sandell, Box 6664, St. Paul, 55106

101 Worldwide Stamps 10¢! Exciting approvals included. Jay-Lyn, Box 178-4, Chittenango, NY 13037

50 DIFFERENT Mint British Colonies. Large Pictorials. Bargain Packets Catalog \$1.50. Grenier, 36 Cantley, London, Ontario, Canada N6E 1G6.

RONALD REAGAN INAUGURATION DAY Souvenir Cover. Officially postmarked, addressed any name of your choice, or unaddressed, \$1 each. K.M. WALSH, BOX 308, TUCKAHOE N.Y. 10707

25 TOPICALS 25¢ when requesting low priced approvals. Stewart Kent, Box 2388A, Bellingham, Washington 98227.

CANADA Ten Late Commemoratives 10¢ Canadian Approvals. Harley Boardman, Little Valley, New York 14755

\$20.00 Catalogue Value for \$1.00 with Approvals. V. Bernotas, 65 Charlene Drive, New Britain, Connecticut 06053

ALL DIFFERENT MINT U.S. at only 2¢ over face value per stamp. Send any amount from \$2 to \$40. The Wood Company, Dept. M2, Box 2404, Muncie, IN 47302

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. A21PM, Jamestown, NY 14701

BREATHTAKING Beautiful. 50 Different mint Monaco pictorials commemoratives only \$1.50 with mint complete set approvals. Pagoda, Box 132P, Sidney, Ohio 45365.

FREE Worldwide packet. Penny approvals. Froelch, Box 412-A, Morton Grove, Ill. 60053.

PENNY! Approvals! Regardless catalogue! Kloster, 4164 52nd St., San Diego, Calif. 92105

STAMP COLLECTING

(Continued from preceding page)

50¢ BRINGS You 100 pictorial plus worldwide approvals. Capt. Shaw's Stamps, Box 277, Ocean Park, Maine 04063.

UNITED NATIONS 3 Complete Mint Sets 25¢. Approvals. Cornetta, POB 1509-M, Lake Placid, Florida, 33852

50 DIFFERENT Old U.S. between 1861 and 1939 - \$1.00. Ed Roush, 423 Shepard, Mansfield, Ohio 44907.

OLD U.S. Stamps on Approval. Chester, Box 15355G, Philadelphia, Pa. 19111.

2,000,000 Stamps—150 Countries—2¢ Each. Belden, Box 4149, Dearborn 48126

WORLD Wide Stamps mounted in books on approval 2¢ and up. TRUST STAMP COMPANY, P.O. Box 100-P, Jamaica, N.Y. 11435

CANADA, 50 different 25¢. Approvals. Oroszky, Box 1-C, Sarnia, Ontario, Canada N7T 7H8

FREE Surprise collection sent with approvals. Gould, 1784 Union, San Francisco, 94123.

PLATEBLOCKS AND MINT SINGLES. NEW WHOLESALE PRICE LISTS. BIG DISCOUNTS. AMPBCO, Box 28066M, St. Louis, Mo. 63136

FREE 220 United States and Worldwide Stamps. Approvals. Stamps PM, Box 1427, Bellflower, CA 90706

FREE U.S. Mint Set Approvals. Hildebrand, Box 4867, Santa Clara, California 95054.

FREE: 32 Page United States and United Nations Price List. Shelton, Box 610547C, North Miami, Florida 33161.

COMMEMORATIVES — U.S. Assortment 25¢. Approvals. Lee's, Box 2105, Albany, N.Y. 12220

ISRAEL 15 Different 10¢ Approvals. Sam Chazen, Box 666, Delray Beach, Florida 33444

100 Different U.S. 25¢. Approvals. Bradley, Box 425P, Middletown, VA 23113

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

BARGAIN 100 World-wide Stamps 25¢. Quality Approvals. R. Parker, Box 143, West Brookfield, MA 01585

WOW! Bicentennial Souvenir Sheet Worth Over \$2.00 Plus 100 Different Worldwide 25¢ With Approvals. Tarheel Philatelics, Siler City, North Carolina 27344

SPECTACULAR World Collection — 10¢. Vatican Ghana, San Marino U.S., Russia, Animals, Space. Over 100 different! Plus U.S. Catalog. Approvals. Global, Box 7429-P36, Olympia, Washington 98507

FREE World Wide Stamps with Approvals. Chapmans, Box 487W, Galesburg, Michigan 49053

\$5.00 Value, 100 Different United States Commemoratives \$1.00. Bryson, Box 8123, Toledo, Ohio 43605

111 World-15¢. Includes triangles, diamonds, Mongolia. Approvals. KEMSCO, Dept.-D, Box 531, Wetumpka, Alabama, 36092

50 ARGENTINA — Different 10¢ Approvals. Gobestamps, Box 690, Saco, Maine 04072

LOOK! 358 World Stamps \$1.00 Worldwide Approvals. Kondike, Harrisburg, IL 62946

"INVERTED ERROR" + 100 Different United States, 50¢ with Approvals. Belmont Stamps, Washington, D.C. 20015

U.N. 8 Mints Sets \$1.00! U.S. 100 Different Commemoratives \$1.00! Approvals. Gordon Davison, Key Largo, Florida 33037

110 Large Colorful Worldwide Pictorials and Topicals - 25¢ with Approvals. Whitney, Box 2279, Bramalea, Ontario L6T 3S4.

OLD U.S. STAMPS! "Unfine" used medium and higher values. Bargain priced approvals for serious adult collectors seeking a worthwhile and different service. (No mint). Rivertown, Dept. 152PB, Ada, Michigan 49301.

FREE Scotts Master Global Albums When You Buy Approvals. Bargain Service, Box 5345, Santa Ana, Calif. 92704

FREE Mafkie Disney Set, Request Approvals. Alpaugh, Box 225, Highbridge, NJ 08829

ONE To Three Cent Approvals. Catalog Ignored! Piper, Box G-1, Pleasant Hill, OH 45359

45 DIFFERENT U.S. AIRMAILS \$2.00; Mint \$15.00; Eberling, Box 2216, Neptune City, NJ 07753

717 U.S.A. (Plenty Commemoratives)—35¢. Approvals. Gatewood, Box 12506, Winston-Salem, NC 27107

TOPICALS 25 BEAUTIES 10¢ with Approvals. Datastamps, Box 5552, Jacksonville, Fla. 32207

FREE! 3 Different Foreign Sets when requesting approvals. Discounts - Special Offers. R.G. Sales, Box 1065, Jamaica, N.Y. 11431

200 BEAUTIFUL Worldwide Commemoratives - 25¢. Includes Large, Colorful Stamps Picturing Animals, Space, Sports, Ships, Others. Exciting Approvals Enclosed. Savage, Dept. B-21, Box 482, Quincy, MA 02169.

U.S. SPECIAL, 25 Different Airmails, \$1.00 When Requesting U.S. or Worldwide Approvals. Specify Interests. Diamond Stamp, Box 524-M, Biddeford, ME 04005

500 Lithuania, Estonia, Latvia, Ukraine — Five Dollars; Riga. 173 Linden, Middletown, New York 10940

50 SPORTS PICTORIALS 35¢. Approvals. Arbour, 3727M Downeydale, Randallstown, MD 21133

"WHOLESALE" U.S.—Foreign Pricelist and catalog Free! Everything Guaranteed. Schneder, Box 1240, Grand Rapids, Michigan 49501.

COINS, TOKENS, CURRENCY

FIVE Different Mint Error Coins \$2.00. Coin Lists Free. Sayers, 1000 Unaka, Johnson City, Tennessee 37601

CURRENCY For Collector or Investor, List \$1.00. Horwedel, Box 2395, West Lafayette, Indiana 47906

SCARCE CENTS, 25 - Different Lincolns 1910P-1939S. \$5.00. Tispico, Box 3413PM, Tucson, AZ 85722.

COIN Collecting for Investment and Profit! One Roll of Buffalo Nickels are now worth \$13,000.00. Where to Buy and Sell Coins. \$2.50 Brings you the Information. Mogert Enterprises, Dept. 103, 1325T Street, P.O. Box 63, Richmond Hill, NY 11419.

BINOCULARS, TELESCOPES, MICROSCOPES, MAGNIFIERS

BINOCULARS Repaired. Expert Professional Service. Tele-optics. 5514 Lawrence, Chicago, IL 60630.

PHOTOS & PHOTO SUPPLIES

KODAK FILM 99¢ 110-135mm Certificates for ten rolls of fresh Kodak film plus ten custom enlargements 8x10 or 5x7. Send \$9.90. AZ MARKETING, 3742 E. Indian School, Box 102, Phoenix, Arizona 85018

COLOR SLIDES

TRAVEL Colorslides, Worldwide Catalog 75¢. Worldwide, 7427-M Washburn, Minneapolis, MN 55423

VIETNAM Color Slide Club \$3.98 each. c/o Aberdeen Place, Atlantic City, New Jersey 08401

BOOKS & PUBLICATIONS

FREE BROCHURE!! 400 Self-Improvement Books! Home Marketplace, 106-A Rialto, Clovis, California 93612

SELF-IMPROVEMENT BOOKS. Free Catalogue. Nolan, Rt.4 78C, Batesville, Ark. 72501

FREE - Book Catalog - All Subjects - WRITE - R & B Gifts. 10113 Joerschke Drive, #204, Grass Valley, California 95945.

PUBLISH Your Book! Join our successful authors. Publicity, advertising, beautiful books. All subjects invited. Send for fact-filled booklet and free manuscript report. Carlton Press, Dept. PMN, 84 Fifth Avenue New York 10011.

PUBLISHER'S OVERSTOCKS. BARGAIN BOOKS. 2,000 Titles. all Subjects! Free Catalog: Hamilton, 98-51 Clapboard, Danbury, CT 06810

FREE Book. Prophet Elijah Coming Before Christ. Megiddo Mission, Dept. 63, 481 Thurston Road, Rochester, N.Y. 14619.

HOW TO LIVE WITH THE METRIC SYSTEM Informative, illustrated. Simplified Language Satisfaction/Money back. Only \$3.00 (Postpaid). METRIONICS, Dept. PM, Box 12448, Fort Wayne, Indiana 46863

WILDERNESS Living! Shelter, Food, Power, Self-Defense Books. Free Catalog. Aspen Cabin, Box 2517, Flagstaff, Arizona 86003

BOOK Patent Drafting. Forms for Patents \$3.00. P.O. Box 400914, Dallas, TX 75240

HOME EMPLOYMENT AND LOCAL ZONING. Booklet lists home businesses not involving customer traffic in your house plus suggestions for dealing with zoning laws. \$4.00 to: MultiMartin, Inc., Box 174B, Dresher, PA 19025.

SAVE 30-70% on paperbacks. Many titles. FREE catalog. Send two 1st. class stamps: Fragoza Enterprises, 623 Olive Street-PM2, Santa Barbara, California 93101 USA

THOUSANDS Made Through Simple Homemade "How To" Booklets. Low Investment; Large Return. Complete Details. Bowen, P.O. Box 304, Houghton, MI 49931

BIORHYTHM BREAKTHROUGH! Find HIGH, LOW, CRITICAL days. Test COMPATIBILITY with lover, friends! Free details. Kellico Enterprises, 2801 West T. C. Jester, Suite 120, Houston, TX 77018

BOOKS GALORE! Over 400 Titles to Choose from. Free Catalog. Brittain, 2244 Manor, P2, UpperDarby, PA 19083

HOME BUYING AND LOAN GUIDE Booklet by Real Estate Attorney. Save \$\$\$ on Closing Costs. Hidden Costs. Gimmicks, What Bankers, Brokers and Lawyers Don't Tell! Send \$3.98 to: Laura Publications, Dept. P, Box 6411, Portsmouth, VA 23703

FREE Catalog!! 400 Self Improvement Books. BC-7, Box-206, Flint, MI 48503

GOLD MINE IN GARAGE SALES A Practical Guide Showing How To Operate Garage Sales for Profit \$3.00. Consumers Press, Box 25680, Chicago, IL 60625

FREE MAGAZINES Educational Details. JN Sales, 99 Featherbed, Boothwyn, Pa. 19061

PLAYS, SONGS, MANUSCRIPTS

WRITE, SELL HIT SONGS, \$7.50. Stewart, 4008 Bridge, Cleveland, Ohio 44113

MUSIC INSTRUCTIONS & INSTRUMENTS

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

DON'T MAKE A COSTLY MISTAKE Carefully researched booklet tells how to select a new or used piano. Send \$3.00 to: C. R. Beach, Dept. 1-A, 9110 Whitcomb Dr., Richmond, VA 23229

BEAUTIFULLY SIMPLE KITS — SIMPLY BEAUTIFUL DULCIMER. Mountain and Hammered Dulcimer kits of exceptional quality. Free 12 page catalog upon request. Green River Dulcimers, Box 768, Elkhorn, Kentucky 42733

NEW - GUITAR NUMBER BOOK. No notes. Arrangements for the beginner or the accomplished guitarist. Each position illustrated. "Shadow Of Your Smile" — "September Song" and others. \$4.95. Glenview Publications, P.O. Box 523, Grand Blanc, Mich. 48439.

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. FF, 4026 W. Belvedere Ave., Baltimore, Md. 21215.

PLAY MUSIC by Learning and Understanding Musical Structure and Harmony Through Chords and Scales. Two New Books for Novice and Experienced Musicians and Teachers. Write for Free Information. MLS Publishing, Dept. 1100, Box 2261, Mansfield, Ohio 44905

SUPER-SAVINGS Guitar Strings, Accessories, Effects Pedals, Microphones, etc. Free Catalog. Super-Save Music, Box 944, Morganton, N.C. 28655

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.

PIANOS, PLAYERS, PUMP ORGANS. Rebuild and repair. Catalog of "How-To" books, \$2.00 (refundable). Vestal Press, Vestal 11, New York 13850.

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

ELECTRIFY Player Pianos, Pump Organs Quickly. Inexpensively with Lee Silent Suction Units. Write: Lee Music, P.O. Box 308F, Culver, Oregon 97734

STRINGS! ALL KINDS - DISCOUNTS Parts, Accessories. Catalog 25¢. Stringking, Box 5444, Lindenhill, Flushing, NY. 11354

POEMS Set To Music. Nashville Music Productions, Box 40001-PM, Nashville, Tennessee 37204.

MUSICAL Instruments Hot Line! Incredible prices: Amps, PA Gear. All instruments. Huge selection. Sam Ash, Established 1924. 800-645-3518. NYS: (212) 347-7757.

HOW To Write a Hit Song and Sell it. \$7.50 Postpaid. Austin House, 19 Horton Ave., New Rochelle, N.Y. 10801

BANJO AND MANDOLIN KITS: Beat the Incredible Prices of Finished Instruments by Building Your Own from Our Well-Known Quality Kits. Free Information, Write: Stewart-MacDonald, Box 900B, Athens, Ohio 45701. Or Call Toll Free 800-848-2273.

EDUCATION & INSTRUCTIONS

DETECTIVES. Exciting Profession. Use Secret Equipment. Easy home study course; Diploma. Send \$1.00 for "Detective Career Kit". Rouse School, Dept. PM-102, Box 2469, Costa Mesa, CA 92626

FREE Self Improvement Information! Cline Clark, Box 75825-PM, Los Angeles, Calif. 90075

SPECIAL AGENT COURSES. Free Information. Criminology Center, P.O. Box 8935-M, Washington, D.C. 20015

COLLEGE DEGREES BY MAIL! New directory, "College Without Campus" reveals where, how to obtain your accredited degree by mail. Hundreds of colleges all over the country. Only \$3.98 postpaid. Moneyback guarantee. Eastern Enterprises, 100-19 Casals Place, Bronx, NY 10475.

UNIVERSITY DEGREES BY MAIL . . . OUR SPECIALTY. FREE Revealing details. Success, Box 13151-M2, Columbus, Ohio 43213.

(Continued on next page)

EDUCATION & INSTRUCTIONS

(Continued from preceding page)

LEARN EASY! 10 Tips On How To Become A Better Student. Free Details. Ward Enterprises, P.O. Box 94-C, Ellicott Station, Buffalo, New York 14205

OVERCOMING FINANCIAL STRESS Proven effective steps to cure economic woes! \$3.50 check or M.O. to: S & L Enterprises, P.O. Box 805-A, Morrisville, PA 19067

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. PBCCO, Newport Beach, CA 92660.

LEARN Flower Arranging and Floristry. Start business or hobby. Free information on home study course. Lifetime Career Schools, Dept. B-774, 2251 Barry Avenue, Los Angeles, California 90064.

UNIVERSITY DEGREES BY MAIL. Programs! Bachelors, Masters, Ph.D.'s... Free revealing details. Counseling, Box 317-PM2, Tustin, California 92680.

TRAVEL Agent/Tour Guide! Home-study plan explains exciting Travel Careers, how to qualify for travel benefits. Approved for Veterans. Free Brochure. Travel School, Dept. PBCCO, Newport Beach, CA 92660.

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.

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.

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. PBCCO, 4500 Campus, Newport Beach, CA 92660.

PIANO TUNING PAYS. Learned easily at home. Accredited NHSC. GI Approved. NILES BRYANT SCHOOLS, INC., Dept. P, 3631 Stockton, Sacramento, California 95820

EXTENSION AND Post-Graduate Awards in Philosophy, Art, Science, Botanic, Medicine, Homeopathy, Radionics, and others. 30 subjects Curricular free (airmail \$1.00 refundable). Registrar, Sussex College of Technology, Highfield, Danehill, Sussex, England.

RADIESTHESIA, Radionics, Dowsing E.S.P. Courses and Equipment Illustrated Catalog \$1.00 (refundable) Established 27 years. Dept. PM/R, Bruce Copen, Highfield, Danehill, Sussex, England RH17 7EX.

FREE CATALOG - LEARN AUCTIONEERING! Nashville Auction School, Box 190, Department 2, Lawrenceburg, Tenn. 38464

LEARN Sewing Machine repairing. A profitable Trade. Easy to learn. Free details. Sewing Center, 187 FR, Rochelle, GA 31079

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.

YOU CAN BE A JET ENGINE/GAS TURBINE OPERATOR, Maintenance Technician, Inspector. More! 44 Lesson Homestudy Course - Theory, Operation, Maintenance, Overhaul, Inspection, Technical Skills - Aircraft, Non-Aircraft. Diploma Awarded! Established 1957. Details - American Jet School, Dept. PM, Derby, MT 59829 (406)349-2100.

LEARN Asleep or awake. Records, tapes, equipment! Free catalog! Drawer PM-400, Ruidoso, New Mexico 88345

AUCTIONEERING: Mendenhall School of Auctioneering, High Point, North Carolina 27263. Free Information.

EARN Money - Commercial Art, Calligraphy. Yerney, Box 1181-M, Piqua, Oh. 45356

HIGH SCHOOL DIPLOMA AT HOME FAST!

DIPLOMA in just 1-6 months! Tests taken at home. Low tuition/only \$49 down. Nationally recognized. Individual counseling. Free school ring. Call Free 1-800-327-8103. Cambridge Academy (PM-2), 409 E. Osceola, Stuart, FL 33494.

AUTOSUGGESTION. Sleep-learning headquarters! Tapes, records, books. Gigantic catalog free. Research Association, Box 24PM, Olympia, Washington 98501.

HIGH SCHOOL at home. No classes. Diploma awarded. Information free. No salesman will call. American School, Dept. 30245, 850 E. 58th St., Chicago, IL 60637. Phone Free 1-800-621-5809 (Illinois 800-972-5858). Give last year High School completed.

USED Courses! Books! Lists 25c. Smith's, 124 Marlborough, Salem, Massachusetts 01970

CLOCK AND WATCH REPAIR Books. Free catalog. North American, Box 77ABA, Fox River Grove, Illinois 60021.

HOW To Become Financially Secure in 90 Days! Speed promotions. Raise you IQ. Free details. LMS, Box 217, Norwell, Mass. 02061

KIDS IN HIGH SCHOOL? CAN'T AFFORD COLLEGE? THOUSANDS of scholarships and grants are available. For complete addresses and instruction. \$14.95 to: L. GODIN, P.O. Box 16661, San Antonio, Texas 78216.

KNOW YOURSELF through your handwriting. Details Free. Alphagraphs, Box 2823, Lakeland, Florida 33803

LEARN DIGITAL Computer Technology through correspondence. Free Course Description. Innovative Home Study, Box 1046-M, Indian Rocks Beach, FL 33535

EARN \$15 to \$30 in Air Conditioning - Refrigeration. Basic Course with Tests and Answers. \$37.50 Sample Session \$3.50. Box 221907, Carmel, CA 93923

LEARN DRAFTING. Good jobs for men, women. But before spending for expensive schooling, read "Drafting Preview" only \$12.50. Jeanne Sales, Box 22489, Ft. Lauderdale, FL 33335

EMPLOYMENT INFORMATION

JOB Market 1980's - Labor Report - \$2 - Concepts. Box 228, Lenox Hill Station, New York, New York 10021

SAUDI ARABIA NEEDS YOU - "How To Get A Job In Oil Rich Saudi Arabia" could change your future. 62 page complete information guide. \$6.50. Astor Publications, Box 482M, South Orange, New Jersey 07079.

A-U-S-T-R-A-L-I-A... N-E-W Z-E-A-L-A-N-D WANT YOU!! - 17,500 JOBS!! - PAID TRANSPORTATION!! - NEW REPORT!! - \$2 - MONEYBACK GUARANTEE!! - "AUSTRALIA COMMISSION," DEPARTMENT 894-T3, NATIONAL PRESS BUILDING, WASHINGTON, D.C. 20045

CAREER Selection - Discover Aptitudes - Abilities - Interests - Job Fields - At Home - Guaranteed - \$30 - Concepts. Box 228, Lenox Hill Station, New York, New York 10021

ROCKY MOUNTAIN EMPLOYMENT NEWSLETTER!! Colorado, Idaho, Montana, Wyoming!! Current Openings - All Occupations!! Free Details... Intermountain-L, 3506 Birch, Cheyenne, Wyoming 82001

JOBS OVERSEAS... (Including Alaska) Free Details. Global Employment, Box 808-PM, National City, California 92050.

AUSTRALIA - New Zealand! 50,000 Jobs! Big Pay! Free transportation. Listings \$2.00. Information 68 countries. Austco, Box 772, Cypress, CA 90630.

FLORIDA Needs policemen, security officers, wardens. City-County-State, 1001 employers. Live in the sunshine state. Details. SASE. Col. Stanley, Bond Building 144, 500 East Central, Winter Haven, Florida 33880.

CROSS-COUNTRY EMPLOYMENT NEWSLETTER!! Portland, LA, Dallas, Miami, Chicago, NY!! Current openings - All professions!! Free Details... National, 1367 Robert Drive, Zionsville, IN 46077

OVERSEAS EMPLOYMENT - Men and Women - Europe, South Pacific, Asia, South America and Alaska - Earn \$10,000 - \$50,000 yearly - Most Occupations - Free Details on Latest Computer Lists. Race International, Box 8640-A, San Diego, California 92106

HAWAII Employment Information Pacific Employment News, Dept. PM, Box 971, Kila, Hawaii 96753

SAUDI ARABIA Needs You. You Need "How To Get A Job In Saudi Arabia" 62 Page Information Guide \$6.50. Astor Publications, Box 482M, South Orange, N.J. 07079

NORTH CAROLINA: Complete list of current opportunities in and around the very rapidly growing Research Triangle Park, including Raleigh, Durham and Chapel Hill. \$5.00. Triangle Opportunities 103, P.C. Box 15061, Durham, N.C. 27705

TEXAS, Some Areas Booming. Send Type Work Desired with \$5.00 for Job Information. Reports, Box 38618, Houston Texas 77088

\$21,000.00 to \$40,000.00 as Tractor Trailer Operators Men and Women are needed. Free info on learning. POH Inc., 5030 Paradise Rd., Suite B107PM, Las Vegas, NE 89119

SAUDI ARABIA, Skilled Americans Wanted, Big Money. No Taxes. Free Travel. Gas - 25c. - Send \$6.00 for List of 40 Firms Hiring now. Free Report included. Kesco, Box 129, Khobar, Saudi Arabia

HELP WANTED

TEXAS REFINERY CORP. offers PLENTY OF MONEY plus cash bonuses, fringe benefits to mature individual in your area. Regardless of experience, Write: W.F. Sears, Pres., Texas Refinery Corp., Box 711, Fort Worth, Texas 76101

OVERSEAS Employment... \$20,000 - \$60,000 + Free Report! Employment International, Box 29217-AB, Indianapolis, Indiana 46229.

YOUR Name to all free Classifieds under heading you mark, this issue \$1.00. - Future, P.O. Box 605, Dept. 2, Alabaster, Ala. 35007

WOODWORKERS Needed. Build parts for us. For specifications and prices paid, send \$1.00 to cover costs to: Box 33324, Denver, CO 80233.

MAKE \$4,000 monthly, at home, all ages, inexperienced. Send \$10.00 for security. Paul Albrecht, 129 Church Street, Keyport, New Jersey 07735

FOR INVENTORS

INVENTORS: If you have an invention for sale or license, write for free booklet explaining how we can help you. Kessler Sales Corp. C-52-FI, Fremont, Ohio 43420

PROVEN TRACK RECORD - If you have a marketable invention, we can help you to "cash in". We have marketing, manufacturing and engineering expertise - and successful products selling in stores nationwide. Let's get started! Send for Disclosure statement today. TRANSCONTINENTAL MARKETING, INC., 6536 Sunset Blvd., Los Angeles, California 90028

FREE CATALOG, TWO INVENTIONS ILLUSTRATED. How To Promote Your Invention, P.O. Box 2, Billerica, MA 01821

PROFESSIONAL Machine Shop Now Available to Inventors and Hobbyists. Herrick, P.O. Box 1221, Bolingbrook, IL 60439

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

U.S. PATENT Office Searches, 234 Broadway, Room 3615, New York 10007. Free invention certificates.

REGISTERED PATENT ATTORNEY. Applications and Searches, Mail Service. Free Preliminary Review. Box 392PM, Millwood, N.Y. 10546

INVENTORS Patent Your Invention. Free Initial Consultation. We are Registered by the U.S. Government. Victor J. Evans & Co., 4637 Eastern Ave. N.E., Washington, D.C. 20018. Since 1898.

REGISTERED PATENT ATTORNEY Washington D.C. Suburb. Donald A. Kettistrings, 414 Hungerford Drive, Suite 411, Rockville, Maryland 20850

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

NONPROFIT Foundation helps inventors. Widest range of services. Free recording forms. Free evaluation. Affiliated Inventors Foundation, 501-B Iowa, Colorado Springs, Co. 80909.

PROTECT, Sell inventions by YOURSELF; Patent Counselor Reveals How; \$5.00. C.T. Bergesen, Box 436, Wrightstown, N.J. 08562

BREAKTHROUGH for inventors! Experienced Patent Attorney, Member of APLA, Explains the Patent Process thoroughly, step-by-step. How to Evaluate New Ideas, Avoid Pitfalls, How to Develop, Protect and Market inventions Safely, Successfully! Cassette, Send \$12.95, plus \$1.50 Handling to: Boottape Corporation, Box 6126, Grand Rapids, Michigan 49506.

NEW! "Patenting Your Invention Yourself!" \$29.95, Guaranteed! Registered Practitioner, 7400-PM, Washington, DC 20044

NEED FINANCING FOR YOUR INVENTION? We bring inventors and private investors together. Call: 800-835-1027 toll free. In Kansas: 316-221-0552. Investment Connections, 421 State Bank Bldg., Dept. M, Winfield, Kansas 67156.

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

MAIL SERVICE. Applications and searches. Free preliminary review and estimate. Enrolled by U.S. Patent Office. Nelson Berman, 1006 Hill, Pacific Palisades, California 90272

INVENTIONS WANTED

LEARN how to offer your invention for sale or license. Free booklet outlines procedures, royalty rates, requirements. Kessler Sales Corporation, C-52-IW, Fremont, Ohio 43420.

(Continued on next page)

INVENTIONS WANTED

(Continued from preceding page)

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 CORPORATION**, 59 Interstate Dr., Dept. PM, West Springfield, MA 01089 — (413)737-5376 — (A Fee Based Marketing Company).

IDEAS, inventions, new products needed by innovative manufacturers. Marketing assistance available to individuals, inventors, universities, companies with feasible concepts. Write for: **KI-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.

REAL ESTATE & FARMS

CANADIAN LAND FROM \$47.00 AN ACRE. Low Monthly Payments. Choice Properties across Canada. Ideal for Cottages, Hunting, Fishing & Investment. 12 Month Exchange Privilege. Catalogue, \$1.00. Write: **Canadian Estate Land**, Dept. 23C, 286 Lawrence Ave. West, Toronto, Canada M5M 3A8

FREE! Big Spring 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.

BIG . . . FREE . . . SPRING CATALOG! Over 2,800 top values coast to coast! **UNITED FARM AGENCY**, 612-PM West 47th, Kansas City, Mo. 64112.

LIQUIDATING Florida Land. 75' x 125' Lots For Homes Or Mobile Homes, Lake Weir Access, Ocala Area \$5,995, \$59 DN, \$59 MO. PH. Free 1-800-521-4996 Or Write: (I) 1424 NW First Ave., Ocala, FL 32670.

42,000,000 ACRES Valuable Government land available low as \$6.80 per acre. Campsites, farms, homesites. Fabulous business opportunities. Latest report! Send \$2.00. Satisfaction Guaranteed. **American Land Disposal**, Box 913-A, Holland, Michigan 49423.

10-20 ACRES in fabulous Northern IDAHO. Choice land in beautiful timbered settings. In the heart of lake, hunting & recreation country. Reasonably priced. Terms. Parcels with domestic water and power available. A unique opportunity for country living at its best. Write for free information: **NATIONAL ASSOCIATED PROPERTIES**, Dept. GC, 1121 Sherman, Coeur d'Alene, ID. 83814. (208/664-8161)

CALIFORNIA. Acreage. Lots. \$40 down. \$40 monthly. Box 35291, Los Angeles 90035

SELL Your Own Home \$6.95. P.O. Box 726, Tiffin, Ohio 44883

SOUTHERN California Super Rental Units. Makes Own Payment With 35% Down. 25939 Lucille, Lomita, CA 90717

BUYING & SELLING

SCRAP Silver Electrical Contact Points, Forklift Contacts, Industrial Scrap Silver, Silver Solder, 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-Sellers." Free Brochures! Brightco, Box 91309-B2, Cleveland, OH 44101

PLASTIC BAGS

ALL Sizes. Buy Small Quantities. Free Catalog. **SAKet**, 6151-C Colbath, Van Nuys, Calif. 91401

BUY IT WHOLESALE

SAVE ON PARTS! Free catalog filled with motorcycle, snowmobile, small engine parts, accessories. **Manufacturers Supply**, Box 157-PM2, Dorchester, WI 54425

HEARING Aids. Batteries. Wholesale. Catalog 25c. **Fiston**, Box 1444, New Preston, Conn. 06777

RINGS, Jewelry priced 130% below retail. Catalog \$1.00 (refundable). **Ankapm**, 95 Washington, West Warwick, RI 02893.

WORLDWIDE Bargains . . . Imports . . . Closeouts . . . Dropship . . . Surplus . . . Freebies . . . Namees. Box 1717-PM, Highland, Indiana 46322

ALL Brand Name Rubber Goods. Send stamp for confidential wholesale price list. **Distributor Sales**, Dept. 118, Box 6041, Kansas City, MO 64110

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

400,000 BARGAINS Below Wholesale: Many Free! Liquidations . . . Closeouts . . . Job Lots . . . Single Samples. Free Details. **Bargainhunters Opportunities**, Box 730-A, Holland, Michigan 49423.

CLOSEOUTS! Discounted Below Wholesale! Freebies! Samples! **DDN**, Box 20152-PM, Farmdale, Michigan 48220.

SAVE MONEY On Thousands Of Brand Name Items! (Appliances, Video/Stereo Equipment, Furniture, Diamonds, Cameras, Luggage - almost anything.) Guaranteed lowest prices on all merchandise! Many more **SUPER BENEFITS!** **FREE** details! **TMF Enterprises**, P.O. Box 2027, Kettering, Ohio 45429

SAVE POSTAGE!—Only \$1.00 Sends Your Name to all Free Information Advertiser's this issue—plus Hundred's More. **GUARANTEED.** **Richard Joyce**, Box 306-C, Villanova, PA 19085

ADV. AGENCIES, ADV. SERVICES, MAILING LISTS

EXPERT Assistance for mailorder, advertisers. Rate-book leading newspapers, magazines \$1.00. **Chicago Advertising Agency**, 28-EM Jackson, Chicago, 60604

MAILORDER ADVERTISERS! CLASSIFIED ADVERTISING CAN BE MOST PROFITABLE AND REWARDING. PROBLEM IS TO KNOW WHAT TO DO, WHAT NOT TO DO. **COLUMBIA CAN HELP YOU WITH YOUR MAILORDER PROGRAM.** OVER 20 YEARS CLASSIFIED ADVERTISING EXPERIENCE. KNOWLEDGE OF BEST PULLING PUBLICATIONS. **EXPERT COPY SERVICE IS ALL YOURS AT NO INCREASE OVER PUBLISHER'S STANDARD RATES.** CHANCES ARE YOU WILL SAVE MONEY. WRITE TODAY FOR FREE DETAILS PLUS YOUR FREE COPY OF "MAIL-ORDER ADVERTISER'S RATE GUIDE". **COLUMBIA ADVERTISING AGENCY, BOX 1285-PM-2, RICHMOND, INDIANA 47374**

HOW TO WRITE A CLASSIFIED AD THAT PAYS! Step-By-Step Manual. Order Today! \$3.00 - Refundable. **Winston Associates**, Suite 385, PM2, 2040 Waconia, Milwaukee, Wis. 53233

RUBBER STAMPS

PERSONALIZED Pocket Rubber Stamp. 3 Lines \$2.95. **Bett-R Enterprises**, 12100 Valley Spring Lane, #308-P, Studio City, California 91604

BARCO Type Founders. Type and Rubber Stamps catalogue. Mail \$1.00 refundable on first order. 237 S. Evergreen, Bensenville, 60106.

OFFICE SUPPLIES

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**

TIRED OF LICKING POSTAGE STAMPS? Task Simplified with E-Z Stamper—Holds Rolls of 100 or 500 U.S. Postage Stamps—Automatically moistens and affixes one stamp at a time—Send \$17.95 (Add \$1.50 for Postage and Handling) Today—Write for free Brochure. **Bourne's**, Box 890-BB, Cotuit, MA 02635. **SATISFACTION GUARANTEED.**

PRINTING PRESSES—RUBBER STAMP OUTFITS

RUBBER Stamp supplies catalog Jackson, Brownsville Road, S-110, Mt. Vernon, Illinois 62864

TYPE Fonts, Hand Printing Presses, Supplies. 120 Pages. \$1.00 Deductible first order. **Acme Type**, 732 Federal, Chicago, 60605

COMPLETE Rubber Stamp Outfits, Supplies. Same day shipment. Sign Engraving Machines, Wholesale Catalog \$1.00 Deductible. **Star Stamp**, 732 S. Federal, Chicago 60605

PRINT YOUR OWN — Printing presses, type, supplies direct from factory. Send 25c for catalog and samples to: **Kelsey Co.**, DM, Meriden, Conn. 06450

PRINTING AND SUPPLIES

QUICK Copy Printing. Low Prices. Write: **Nationwide**, 614 North Main, Bloomington, Illinois 61701

5 MEMO Pads Printed Name Address. \$6.00 Postpd. Low, 24 Post. **Newfoundland**, NJ 07435

GUMMED LABELS

1,000 Deluxe Gummed Address Labels \$3.00. Free Literature. **Acme**, 55 Tomoka, Pittsburgh, Pennsylvania 15229

GIFT SHOPPING

FREE CATALOGUE. Destructive Gifts by Mail. **Stardust Enterprises**, Box 3937, Kingman, Arizona 86401

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. 658, Chicago, 60603.

\$25 TO \$190 GOLD CLASS RINGS! Buying gold, sterling silver, dental gold. Free information. **Howard's**, 1519 Hursh, Wichita Falls, TX 76302.

WANTED — Gold, Silver, Platinum, Watches, Coins (Any Form). Information Free. **Wilmof's**, 345-D S. Gaseell, Orange, CA 92666

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.

BUYING GOLD — SILVER ARTICLES! Any Condition! Absolutely No Risk! Free Details. **Reliance**, 48-C Margin, Salem, Mass. 01970

HIGHEST IMMEDIATE CASH!! For Gold, Silver! Any Condition! Guaranteed! Free Shipping Kit! **Marshall Pogue Company**, 150 Terrell Plaza, Suite 131-PM, San Antonio, Texas 78209

WATCH And Clock repairing books, tools, materials. Free Catalogs. **North American**, Box 77-AB, Fox River Grove, Illinois 60021

CLOCKS Handcrafted Wood Brochure \$1.00. **Fisk**, 631 Union, Middlesex, New Jersey 08848

MAN'S QUARTZ WATCH— 6 Function-L.C.D. Limited Offer \$19.95. **Kearns Promotion**, P.O. Box 440PM, Saddle Brook, N.J. 07662

ANTIQUE Pendulum Clocks Expertly Repaired. **UPS To: Walker**, 220 Westheimer, Houston, Texas 77006. (713-782-7366)

CASH For Gold. Postage Paid. Free information. **Security**, 2108N Broadway, McAllen, Texas 78501

GOLD

GOLD Placer Samples \$1.00. Phase One, Box 374, Gold Hill, OR 97525

\$2 GOLD Nuggets plus Goldminer's Facts . . . \$4.95, **Mark D. Canoy**, Box 30-A, Staley, NC 27355. "Genuine Collector's Item and Conversation Piece!"

GOLD Dredger's Handbook, \$4.75; **Placer Miner's Manual**, \$5.75. Other Informative Mining Books! **Exanimo Publications**, Box PS, Segundo, Colorado 81070

GOLD—Where and how to find IT. Booklet by **REAL** Prospector and Miner. \$3.95. **Paul's Peak Prospect**, Box 190, Deer Lodge, Montana 59722

DREDGE For Gold. Build Your Own 3 Inch Dredge. Inexpensive. Complete Plans and Instructions. \$10.00. **Gold-Dredge**, S16-C70, R.R. #1, Westbank, B.C. V0M-2A0

SILVER

SILVER STOCK FOR JEWELRY! For immediate shipment. Silver plate, wire, tubing, chain and complete line of findings for craft jewelry. 14 Karat gold and gold filled stock also available. Call your stock room (212) 247-4750. **Myron Toback Inc.**, 23 West 47th Street, New York, NY 10036

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

TREASURE FINDERS

FIND Lost coins, jewelry, buried treasure, gold nuggets, relics. New revolutionary patented detector analyzes objects, tremendous range, no ground pickup. Free catalog. **Gardiner**, 4729M N. 7th Ave., Phoenix, Arizona 85013

TREASURE - Locate quarter mile away with ultra sensitive locator - brochure free. **Research Products**, Box 270270 - AMC, Tampa, Florida 33688

PROFITABLE OCCUPATIONS

FREE Catalogs. Repair air conditioning Refrigeration. Tools, supplies, full instructions. **Dookin**, 2016 Canton, Dallas, Texas 75201.

TECHNICAL WRITERS make Big Money! Free details: **TEK PUBS**, Box 4778-P, Santa Clara, CA 95054.

FT. SMITH Auction School, Ft. Smith, Ark. 72903. Resident & Home study. **Veteran Approved.**

MAKE \$30 HR Etching Glass at Home! Free Details. Write: **Etching**, P.O. Box 445, Strathmore, CA 93267

PLASTERCRAFT! Profitable home business. Molds available. Details: **Lynette**, 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

(Continued on next page)

PROFITABLE OCCUPATIONS

(Continued from preceding page)

MECHANICALLY Inclined. Make \$100.00 Per Day Extra Income in Home Repairs. No Investment. \$1.00 Plus Self Addressed Stamped Envelope. Rosed Co., Box 6094-PMH, Shawnee Mission, Kansas 66201

UNDERCOVER AGENTS NEEDED. Experience not essential. No need to relocate. Free details. The Recruiter, H. J. H. Company, Suite 1325, Commerce Tower, 911 Main Street, Kansas City, MO 64105

SALESMEN - DISTRIBUTORS

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 72nd year. No investment or collections. Weekly commissions. Be your own boss. Full time potential. No experience necessary. Write to: Frank Buczley, NEWTON MFG. CO., Dept. PMC2, Newton, Iowa 50208

BIG MONEY IN BUSINESS PRINTING! 25% COMMISSION PLUS BIGGEST CASH BONUS! Build your own profitable year around business. Show tremendous line of sales-books, register forms, unit sets, letterheads, envelopes, invoices, statements, business cards and dozens of other printed products. Lowest prices in industry. Something for every business and professional person. Free sales kit includes ad specialties, calendars, signs and ad matches. No experience needed. Our catalogs are easy to understand. We're over 50 but still young and aggressive, so we can show you the road to a very profitable full or part time career. Free sales kit. National Press, Dept. 118, North Chicago, IL 60064

SELL SENSATIONAL LOW-COST PRE-ENTRY PRO-TECTOR FOR AUTOMOBILES, HOMES, ETC. Distributors wanted. Exceptional margin. Samples for trial. Northwest Electric, Ave. 150, Mitchell, SD 57301.

AGENTS WANTED

SPARE TIME CASH. Sell famous Hanover Shoes. Samples, sales kits free. No experience needed. No age limit. Big commissions. Hanover Shoe, Dept 2785, Hanover, Pa. 17331.

PRINTING Advertising Salesmen Excellent money making sideline selling Decalcomania Name Plates, small quantities. Advertising Specialties, sign letters. Free samples. Raico XL, Boston, Mass. 02119.

AMAZING New Development in Roof Repair pays Commission of over \$1,000 on Minimum Order! Seamless Spray Process requires no experience. Schools, Factories, Motels, Shopping Centers, Plants by Pass High Contractor Costs. Proven Sales Plan Shows You How. Write for Free Facts. Pace, Dept. 519-1, 81st & Indiana, Kansas City, MO 64132

ENJOY extra pay days without investment or risk. Take orders for quality Mason Shoes from friends and neighbors. Immediate commissions. Write for free starter kit. Mason Shoes, K-580 Chippewa Falls, WI 54729.

BUSINESS OPPORTUNITIES

IMPORT- Export opportunity, profitable world-wide. mail order business from home, without capital. We ship plan for no risk examination. Experience unnecessary. Free Report. Mellinger, Dept. M2702, Woodland Hills, California 91367

PREPARE Tax Returns - Policeman Albert Myers made \$2,000 his very first season. Train at home. VA Approved. National Tax School, Monsey 2BN, N.Y. 10952

STOP Wasting Money answering questionable advertisements. 1000 offers explained. Globe, Box 20588-PN, St. Louis, Mo. 63139

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, Dept. 7B, 2013 Montrose, Chicago 60618. Or. Call Free 800-821-5809, (Illinois 800-972-5858).

MAKE Durable Building Plastic easily. Waterproof, Fire-proof, Economical. Bays Laboratory, 2086-2075 Drive, Cedaredge, CO 81413.

BIG Profits in Mailorder. Expert tells How. Send \$8.95 to: Riches, Box 141007, Dallas, Texas 75214.

GET RICH! Secret Law smashes debts--brings cash and credit!! Details FREE! Wealth-Kit-B, Billings, WY 12510

HANDYMAN'S DREAM! DIE-MAKING SIMPLIFIED! New Manual Explains Easiest Method. You Can Quickly Master this Extremely Profitable Craft. Full Details Free. Directcorp, Trimex Building, Moores, N.Y. 12958

RESTAURANT Of Your Own For Less Than You Think. More Information. Creative Restaurants, Box 99, Forest Lake, Minn. 55025

PROMOTION & RAISE! Free Information - How To Handle Your Boss Effectively; exclusive cassette. Ten-Strike, Dept. 2PM, 373 Fifth Ave., Box 2201, New York, NY 10016.

EARN MONEY writing articles at home. Complete information. \$2.50. Phillip's Enterprises, 1330 Skyline Drive, Daly City, California 94015

NEWEST Windmill Unpatented Seek Manufacturer Partner. Apartado 310, Santiago, Dominican Republic.

DEBTS WIPED OUT with secret Federal Law! Fortune building FREE REPORT! Blueprints #B-2, LaGrangeville, NY 12540

EASIEST And Most Profitable Method. Sell Information by Mail. Free Details. Semos, 231-P Columbia, Tampa, Florida 33608

HOW TO SUCCEED IN BUSINESS. Step by Step to Profit! Free Details! Counselors, 4709 N. Britton, Stillwater, Oklahoma 74074

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. 472, Montvale, NJ 07645.

MILLIONS WILL SEE YOUR AD! New Booklet gives you the Advertising Knowledge to make Your Ad a Success! Order Today! \$3.00. Dee Enterprises, 217 Redwood, Vernon Hills, Illinois 60061

NAME YOUR OWN INCOME! No Selling. Work Home. Guaranteed. Profits Daily. Grow Big Fast. New Book Reveals Secrets, Tells How. Free Details. Write Now. Browne, Box 1645, South Miami, Florida 33143

BUILD Profitable Wholesaling Business. Free Details. Wholesaler Associates, Dept. PM20, 50 Woodard Road, West Roxbury, Massachusetts 02132

SPECIAL 6 Ways to make \$100/Day with Screwdriver Drill. Complete Report \$1.00. Johnson, 3322 Kelox, Baltimore, MD 21207

BECOME Loan Broker. American Business Finance, 22 Gerdes, Verona, New Jersey 07344

ABANDONED INDUSTRIAL SILVER - Take it! Details. Metals, Box 548, Woodville, Texas 75979

SELL Books By Mail. Jones, Box 24464, F81, Vancouver, Canada V5T 4E1

MAKE \$15.00 Hourly Building Custom Luggage/Cases at Home. Huge Nationwide Demand. Fill Mail Orders. We supply Materials, Instructions . . . Everything. Free Details. Customcase, 8067 De Soto Ave., Dept. X20-02, Woodland Hills, CA 91365

ASSEMBLE PRODUCTS AT HOME. Many opportunities paying High Weekly Profits presently available without investment. Write: Businesses, 928 Brighton 11th, Brooklyn, New York 11235

FREE! Proof I made \$265,000 yearly with classified ads. Write: Moneycraft, PM-2, P.O. Box 845, Ceres, CA 95307

PERSONALIZED POSTERS, photos all sizes! Earn Money from home! Free Samples including "Profits in Pictures" Posters. SMC, 6061 De Soto Ave., Dept. 20-02, Woodland Hills, CA 91365

PIANO Tuning quickly learned with home study courses. Diploma granted. American Tuning School, 17050 Teller Drive, Morgan Hill, Calif. 95037.

"EVERYTHING You Ever Wanted to Know about the Mail Order Business." \$5.00. Dealers Wanted. Descriptive Literature Free. Neil H. Tasker, Shamokin, Pennsylvania 17872

GET Rich In Your Own Home Business. Guarantee yourself success in Mail Order. Flea Markets. General Wholesaling programs. Deal direct with major world supplier. Select from 2534 products at lowest below wholesale prices. First day profits. We supply instructions. Catalogs-everything! Free information. SMC, 6061 De Soto Ave., Dept. 20-02, Woodland Hills, CA 91365.

WOODWORKERS - Start profitable business making unusual gifts, decorative novelties. Easy!!! Everything explained!!! Free details. Williams, 32P Titus, Glen Cove, NY 11542

MAKE MONEY BY MAIL. Home Operated. Simple instructions. Free Details. (SASE): J/M Enterprises, Box 272-P2, Pickerington, OH 43147

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.

REPAIR HYDRAULIC JACKS - DETAILS FREE. WRITE: HYDRAULIC PARTS SUPPLY, BOX 4157, BROWNSVILLE, TEXAS 78526.

VENDING Machines. No selling. Routes earn amazing profits. Big catalogue Free. Parkway Machine Corporation, 1930PMB Greenspring Drive, Trionium, Maryland 21093.

HOTTEST, most Profitable Business Opportunity on the Market. Free details. Richards Publishing, Box 1113-B, Wilkes Barre, Pennsylvania, 18702

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

TURN 5,000 names into \$50,000. Yearly. Free Details. SASE: Bowling, 195 Guilford Circle, Magalia, CA 95954

NEW Tax Loopholes Discovered—Everyone Eligible. Free Sample Newsletter. Write: ULC, Box 179-BL, Clarkston, GA 30021

LEARN The secrets of repairing junk batteries "Fabulous Profits" small investment. Apex Engineering, 5454 Bolsa, Atascadero, Calif. 93422

START Bicycle Repair Business! Three Manuals \$9.95. Free Details. Bicycles, Box 4552, El Paso, TX 79914.

MAILORDER Business Counseling, \$10.00 per letter. Neil H. Tasker, Shamokin, Pennsylvania 17872

SAVE TAXES! Amazing booklet by CPA explains new, overlooked business, personal deductions. Hurry for 1980 return! \$3. Salmars, PM-2, 7517 Crisp, Raytown, Mo. 64138

\$92.00 From Square Foot Plywood. (Huge Demand). Revealing Proof 25c (Refundable). Woodwin, Bridgewater, Mass. 02324

P.O. BOX SHORTAGE CRITICAL! Private mailbox rentals booming. New 25,000 word manual shows how we gross \$60,000 per year. Free information. MailCenter #5, 18783 Beach Blvd., Huntington Beach, CA 92647

MAKE Money Printing business cards, pencils, matches in Gold. Easy. Details: POB 24986 (GC), Tampa, FL 33623

HUGE Profits Selling Money Making Opportunities. Reprint Rights. Write: W & J Enterprises, 9220 Wingtip, Houston, Texas 77075-(A)

MAKE Rubber Stamps for profit. Inexpensive machine. Very easy. Free Details. POB 22809 (PM), Tampa, FL 33622

ENJOY MAKING BUMPER STICKERS - Inexpensive kit - Easy, Profitable, Portable. Details. POB 22791 (GC), Tampa, FL 33622

\$360 WEEKLY/UP. New. Proven mailing program! Cash in now. Sincerely interested send reply envelope: CMONA, Chicago Division, Box 484-P2, Woodstock, Illinois 60096.

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

SELL Books By Mail. Complete Dealer Set-up—25c Midwest, Box 44-R2PM, Shawano, Wisconsin 54166.

FREE BOOKS 2042 Unique Proven Enterprises. Fabulous "unknowns." Second inflation income. MAYLINGS, Carlsbad, CA 92008

J-E-E-P-S - \$17.00 C-A-R-S - \$9.50! FANTASTIC BARGAINS! FREE DETAILS! "MONEYMAKER", Box 99279-82, San Francisco, California 94109

BECOME REAL ESTATE INSPECTOR - \$100.00 HOURLY Potential. Be Boss. Part/Full Time. Home Operation Eliminates Investment. Simplified Instruction, Forms, Assistance. Free information. Box 418-M18, Sullivan, MO 63080

I MADE \$40,000 Year by Mailorder! Helped others make money! Details 25c. Torrey, Box 318YY, Ypsilanti, Michigan 48197.

2000% Profit Selling Health Reports With Reprinting Rights. Details. Mitchell, Box 1058-HRP, Benton, AR 72015.

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

LEARN Sewing Machine Repairing. Men. Women. Lucrative Profits. Gresslin Correspondence School, Box 927, Spencer, Iowa 51301.

START Profitable Service Business-Easily! Alena, Box "A", Farmingville, New York 11738

FREE Mailorder Dropship Business Journal! Mailer's World, Box 1355K, Sioux Falls, South Dakota 57101.

REPAIR Hydraulic and Air Jacks and Power Tools. Earn big money, short course \$4.95. Air Hydraulic Consultants, Box G, Christmas, Florida 32709

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.

2,000% PROFIT Selling "How To" Reports and Valuable Information by Mail. No Experience Needed. FREE details. Send SASE: Guidry International, P.O. Box 27409, Dept. PM281, Houston, Texas 77027.

SELL BOOKS, MANUALS, REPORTS by Mail. 500% Profit. NLRC, 55 Sutter Street 863A1, San Francisco, Calif. 94104

\$1200 MONTHLY Possible Raising Earthworms for us. Free Details. Baker Enterprises, Box 149P, Millersburg, Ohio 44654

I HAVE MADE A FORTUNE IN MAILORDER. Selling information! Let me show you How. FREE Proof. Mailorder Information Services, 2385 Roscomars, D-11-142, Los Angeles, California 90024.

MAIL ORDER BEGINNERS! Sell Information by Mail. Our Complete Program and Newsletter Service can Guide you Quickly and Easily to an Independent and Lucrative Future. Free Brochure! Cargen-P, 1829 Euterpe, Box 52752, New Orleans, LA 70152

\$110,000 Yearly Writing Easy Newsletters. Details: Career Publishing, PM281, Haverhill, MA 01830

\$800 Per Week. Guaranteed. How to Buy and Sell Scrap Jewelry with no Investment. Free Details. The Entrepreneur, Box 20034, Cincinnati, Ohio 45220.

SEE FOR YOURSELF - Local AMWAY Distributors Are Enjoying Extra Income. We Show You How. Paushter, 1254 51st Street, Brooklyn, NY 11219

PROJECTION TV . . . Make 200+ per evening assembling projectors . . . Easy . . . Results equal to \$2,500 projectors . . . Your total cost less than \$15.00 . . . PLAN, LENS & Dealer's Information \$14.00 . . . Illustrated information FREE . . . Macrocomb, Washington Crossing, Pennsylvania 18977

BUSINESS OPPORTUNITIES

(Continued from preceding page)

FREE! "Secrets of Multi-Level Fortunes - How To Find - Sponsor - Successful Distributors." Recruiters, Box 2447, PM281, Springfield, Illinois 62705.

MAIL-ORDER OPPORTUNITY, Amazing Profit **DANIEL** PM-1, 11814 Coursey Blvd., Suite 221, Baton Rouge, LA 70816

BIG PROFITS in Wholesaling Complete Details, Catalog \$3.00 (Refundable) Southall, P.O. Box 21113, Philadelphia, PA 19114

MAILORDER Profit Newsletter - Professional Advice, Advertising Recommendations. Free Report. Communications, Box 405-PM, Boston, Mass. 02199.

TRY! 27 Opportunities for Independent Success Working from Home. Free Details. **PMLOV** - PM281, 1749 Meadowbrook, King, N.C. 27021

GUARANTEED, \$100,000. YEARLY. Stamp Brings Details. Midwest Marketing, P.O. Box 118, Alexandria, IN. 46001

RELIABLE Arab Money Sources. Brief gives you many Private Lenders, phones, addresses, interest tables - \$6.95 P/P. Jepsen, 2917 Los Amigos, Las Cruces, N. M. 88001

BECOME Financially Independent with our Unique Service Business. Make \$500-\$1000 Per Day. Requires \$30,000 to start. For More Information Phone Toll Free (800)821-5680.

PIANO Tuning learned quickly at home! Free information. Empire School, Box 1014, Jupiter, Florida 33468

SELL Information Books, by mail. Write: Grahamco, PMB3 99371, Tacoma, WA 98499

\$480 Weekly. Home mailing program. Goodworld, Box 26233-R, Tamarac, Florida 33320

WHOLESALE WANTED! Full/Part Time. Lang Company, Post Office Box 28407MF, Washington, DC 20005.

\$500 Weekly! Become our Distributor. Massplan (C2), Box 1436, Edmonton, Alberta T5J 2N5

TOOL Supply Business, Part Time. Malone, 3370-N. 53, Milwaukee, Wis. 53216

INDEPENDENCE! \$20 per hour washing windows! Low investment. Suvai Enterprises, POB 764P3, Coupeville, WA 98239.

MAILORDER Profits! How? Free Details: James, Box 1015, National City, CA 92050

I HAVE MADE A FORTUNE IN MAILORDER! Let me show you how. **FREE** proof: MIS, 2385 Roscomare, D-11/147, Los Angeles, California 90024.

YOU CAN GET RICH IN MAILORDERS. ... free details. ... write: Parker Publications, Box 1142PMB, Pacifica, CA 94044

\$1104.00 Monthly For Ten Hour Work Week! Guaranteed!! Homework ... Start Immediately ... Paid Daily - Free Information/Application - AHV, Box 1028, Kalaeo, Hawaii 96741

SELL BOOKS BY MAIL - CRAZY MAN'S WAY, PM 281, #6701, Burbank, 91510

PART Time - Sell Auto Parts Wholesale. Suburban, Box 544, Merrick, New York 11566

NEW Handbook Investigates "Opportunity" Ads. Identifies Opportunities. Exposes Ripoffs. Loaded with Information, Answers, Resources. Indispensable! \$5. Vermont, Box 1381, West Concord, MA 01742

"MAKE Money at Home ... Seven Profitable Programs ... Details \$1. Exodus, Box 132 P, Hudsonville, MI. 49426."

GET Free Oil For Your Car - 800% Profit Possible. Information \$5.00. (Refundable). Guarantee Mail Order, Box 4637, Corpus Christi, Texas 78408

TRACE MISSING PERSONS. Big Money, Adventure. Learn How. Tracer, Box 1132-F, Doylestown, PA 18901

EXCLUSIVE FROM EUROPE! Unique advanced Fire Extinguisher and Fire Barrier. Dealerships Available. Sargom, P.O. Box 241, Spencer, Iowa 51301

OUTSTANDING GUIDE! Starting Business Through Classified Ads. Free Brochure. MTB, Box 14823, San Francisco, California 94114

HUNDREDS WEEKLY POSSIBLE! MAILING PROGRAM: Nationwide, Box 58806, Dallas, TX 75258

EARN Top Commissions Offering Leases and Loans to Physicians and Dentists. Free Details. Hempel Financial, 10880 Wilshire Blvd., Dept. Q, Los Angeles, CA 90024

STRIPE PARKING LOTS. Make \$300.00 Parttime on Weekends. \$1.00 For Info. A-1 Stripe, 8011 No. 30TH St. Omaha, Nebraska 68111

MAILORDER OPPORTUNITY, SELL 70 POPULAR MONEY-MAKING REPORTS. 100% PROFIT. Ventures, Box 19033, Las Vegas, NV 89119

WROUGHT Iron Instruction Book \$8.00. Rice, 1009 South "A" Street, Santa Rosa, California 95401

GET Rich in an Energy Business. Trifling Investment. Details \$3. Diadem, Box 95C, Demarest, NJ 07627

TOP COMMISSION in mail order business. Starting instructions - \$1.00. Gillett 5A-07, Box 1906, Picoima, CA 91331.

HUGE Profits! Sell Books by Mail. We Wholesale, Dropship. Ram, Box 486-PB, Brooklyn, New York 11230.

"TRUE SUCCESS STORY" Paralyzed at 18, he now helps people around the world solve their financial and business problems. Offers new unique part-time moneymaking opportunity and many unusual services. Free Proof: DFC, Dept. 10-D-2, 1145 Reservoir Avenue, Cranston, Rhode Island 02920

CLIP newspaper items - \$2 - \$25 EACH!! **FREE** Report! Clippings-B, Billings, NY 12519

MONEYMAKING OPPORTUNITIES

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. 603, 6 N. Michigan, Chicago 60602

SPARE Time fortune in Vinyl Repair! Huge demand creates exceptional profits. We supply everything. Details free. VIP, Dept. 5B, 2063 Montrose, Chicago 60618. Or, Call Free 800-621-5809, (Illinois 800-972-5858).

SILVER Breakthrough! High-profit, low-cost recovery system! Details \$10. Great Western Silver, 1018-28th Street, Orlando, FL 32805

"HORSEPLAYERS WINNING CONSISTENTLY- Guaranteed proven method!" Free report: Write: Jayco, Box 1029-DL, Plainfield, NJ 07061

ULTIMATE Answer For Genuine Mailorder Success!! Unlock Your Goldmine ... Unlimited Profits Possible. Details: Scott, 2025PM1 Northwest, Lansing, MI 48906.

GOLD, SILVER, PLATINUM FROM SCRAP. FREE BOOKLET. \$2.00 POSTAGE AND HANDLING. BURTON'S, P.O. BOX 371, ST. CHARLES, ILLINOIS 60174

\$300 WEEKLY SPARE TIME- Mailing Salesletters. Delta, Box 2902-M, Rock Hill, SC 29730

BE BOSS! Start home! Easy wealth producing Business. Details: M.A.P. Distributors PM-1, 5013 7th Ave., Los Angeles, Calif. 90043

COLLECT Names!! Guaranteed weekly income. Beginners welcome. Free supplies: CMO, Box 171-PM, Natalia, TX 78059

EARN EXTRA MONEY at home. Proven programs. Free details. BMO Enterprises, Box 8129-G, Kitchener, Ontario N2K 2B6

REFINE SILVER YOURSELF! Closely guarded secrets reveal how! Detailed instructions \$10.00. Precision Casting Company, 308 South James, Carlsbad, N.M. 88220

MONEY in garage sales. **FREE** booklet. Brookside Publications, Box 234-P, Bryan, Tx. 77801

\$56.40 DAILY starting next week. Details send 15cst post-stamp: Sbiatex, Box 4099, North Hollywood, California 91607.

NEW Discovery in Battery Reconditioning ... Eighteen Months Guarantee Means "Big Profits Fast." Electone, 7415 Gable Drive, Little Rock, AR 72205

WE BUY NEWSPAPER CLIPPINGS of Wedding Announcements for \$1.00 each. Instructions \$1.00. Clippings, Box 491-PM, Gatesville, Texas 76528.

EARN Money Collecting Names! Write: Dolores, 104 Third, Salem, Missouri 65560.

STAY Home! \$265,670 Yeasty with Classified Ads. (Guaranteed). Free Proof. Stamp Appreciated. Spectrum, Box 394-PM2, Fox Lake, IL 60020

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

SPARE TIME CASH. Sell famous Hanover Shoes. Samples, sales kit free. No experience needed. No age limit. Big commissions. Hanover Shoe, Dept. 2999, Hanover, Pa. 17331.

GOVERNMENT Program Offers adult Citizens chance to **WIN THOUSANDS.** Manual shows how and where. Send \$6.95: Accufax Publications, Dept. PM281, Box 1093, Hagerstown, Maryland 21740

THE ONLY MAIL ORDER BUSINESS START-UP GUIDE YOU WILL EVER NEED! How To Find Winning Products. Write: Moneymaking Advertisements, Determine Best Asking Prices. Instructions, Worksheets All Included! \$9.95. Parke Brooke, Box 45503, Los Angeles, CA 90045

RECYCLING DIRECTORY Tells How - Recycle Twelve Different Items. \$9.95. Bolton, Dept. PM-2, 941 Valley Ave., Birmingham, AL 35209

WIN MONEY! Learn Secrets of Winning Contests. Send \$2.50! Stanford Enterprises, Box 841, Bryn Mawr, PA 19010

FIFTY \$100.00 Day. Plans \$5.00. Homecraft, 2350 W47P, Demer, CO 80211.

WIN Cash! Cars! Gold! Details, \$1.00. 12 issues, \$10.00. Prizewinner-R, Box 10596, St. Petersburg, FL 33733

WOODWORKERS - MAKE UP TO \$100.00 AN HOUR (EVEN MORE)! NO GIMMICKS! SEND \$9.95 FOR COMPLETE INFORMATION. DOYLE WOOD PRODUCTS, BOX 836-B, PINCKNEY, MI 48189.

"MAKE \$50,000 COLLECTING NAMES" GUARANTEED! We pay you \$5.00 for each name. send \$3. (cash or moneyorder) TO: WILLIAMS ENTERPRISE, BOX 908-AA ROSEDALE, MS 38769

MAIL Order! \$10.00 Sales - \$9.00 Profits. Irene's, Box 4552-P, El Paso, TX 79914.

\$1000 WEEK 12 Ways. Send \$1.00 for information. American Ideas. Dept. PM2. 2145 W. Broadway, Suite 200, Mesa, AZ 85202.

WIN Sweepstakes Consistently! Free Report Shows How! Sunnyside, Box 29-PMB, Lynn, MA 01903

LAMPS And Vases. How To Make Them From Bottles? Details \$2.00. Daley, 12P Maple Pl., Ossinging N.Y. 10582

STOP SMOKING- WIN Magazine and T.V. Contests-GOLD Mine in Garage Sales. Each Booklet \$3.00 - All Three for \$7.00. Omega Enterprises, P.O. Box 1165, Oak Park, IL 60304

MAKE \$400.00 Daily. Easy instructions. One Man Operation. No Gimick. Informative Manual \$5.00. Ward, Box 1134, Bricktown, New Jersey 08753

HOW To Earn Money - Sewing - At Home \$2.00. Pond Enterprises, Box 23-P, Stafford Springs, CT 06076

PLASTERCRAFT! Moneymaking home business. Details. Mailway, 24949-BF2, Nashville, Tn. 37202

FORTUNE - From little known United States Law. Send \$1.00 for information: Ranco, Box 512P, Camp Hill, PA 17011

"100 - INFORMATION REPORTS!" MAKE MONEY! Reprint, Sell. **ORDER NOW!** \$2.00. Winston Associates, Suite 365, PM2, 2040 Wisconsin, Milwaukee, Wis. 53233

SECRETS of Game-Show Champion! Become Winning Contestant! Send \$10.00 for Manual. K-Creations, P.O. Box 5169, New York, New York 10150

INSTANT Profits With Instant Pictures! Unlimited Income! Details ... Workbooks, Box 8504A, Atlanta, GA 30306

MAKE Statuettes, Novelties, Imitation Marble. Sell to Stores or Start Gift Shop. Details 25c. Marbleizing, P.O. Box 1178, Belwin, Missouri 63011

TRIPLE Your Money at Home. Absolutely no Risk. 30 Page Report. \$3.95. S&O Investments, P.O. Box 42812-0211, Houston, TX 77042

GET RICH! Secret law smashes debts - brings Cash, Credit! **FREE** report!! WealthKit-B, Billings, NY 12510

RABBITS—CHINCHILLAS—FUR BEARING ANIMALS

TANNING, Dyeing, Finishing hides for Fur and Leather. Easy instructions and formulas. \$2.00. Jaimi Forns, 465 Laurier, Lyster, Quebec, Canada. GOS 1V0

AMAZING Profits! \$10,000 Yearly Raising Rabbits for Wool and Breeding. Details—\$2.00. American Angora, Malta 12, Montana 59538.

RAISE RABBITS SUCCESSFULLY 66 Page Booklet Tells How. 50c. American Rabbit Assn., H1, P.O. Box 426, Bloomington, Illinois 61701

\$500-\$1000 Month Plan raising Rabbits for us. Free details. White's Rabbitry, PM, Hudson, Ohio 44236.

PETS—BIRDS, CATS, HAMSTERS, ETC.

TROPICAL FISH. Heaters, Filters, Airpumps, 1,000's. By Mail. Catalog 25c. Aqua, Orionville, Michigan 48462

EARTHWORMS, LIVE BAIT

FREE Literature. Raise Fishworms, Crickets, Red Wigglers - 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

QUAIL And equipment catalog. Also booklet "How to Produce and Sell Quail Year Around". Send 25¢ For Booklet: GOF Mfg., P.O. Box 1552, Dept. 1552-L, Savannah, Ga. 31498

OF INTEREST TO ALL

PHOTO ID. Sealed in Plastic. All states, provinces. 24-hours. **GUARANTEED.** Send \$5.00 (2/\$8.00), photo, name, address, height, weight, hair, eyes, birthdate. **CARDINAL,** Box 5200-403, Jacksonville, Florida 32207.

FIVE STEPS TO SUCCESS. Tape Cassette—Send \$6.95.—Positive Dynamics, Box 412, Rumson, N.J. 07760

DIVING RODS. Save Time and Money Locating Underground Pipes and Service Lines. Money Back Guarantee. \$14.95. Otto Enterprises, P.O. Box 849, Roswell, Georgia 30077

MAKE CANDY AT HOME. Sister May's Recipes used since 1900. Maple Fudge, Fountant, Rocky Road, Old Fashioned Fudge, Divinity and Nougat. For Entertaining and Gifts. Complete instructions. Send Two (\$2) Dollars to: **MAIL ORDER RECIPES,** Box 86, Le Grand, California 95333.

SURVIVE NUCLEAR ATTACK! Free Information: Send Stamp. **RADSADS,** P.O. Box 40-PM, Castor, Louisiana 71016

SCUBA how to, information book. \$15.00. **FUN DIVING,** P.O. Box 415, Indianapolis, IN 46206

"PURCHASE Your Mortgage-Free Home." \$1.00. Bob's Books, 2204 West Memphis Street, Broken Arrow, Okla. 74012.

DON'T PAY INCOME TAX, unnecessarily. Book lists hundreds of income Tax Deductions both personal and business. Taken directly from Federal Tax Regulations and reduced to easy to read, simplified, no nonsense list. Cost of book itself tax deductible, you can't lose. Request Book 4 \$5.50. Tax Research Company, Post Office Box 775, Clemson, South Carolina 29631

MAKE TOP MONEY IN STAINED GLASS Our self-study program teaches you at home. Includes illustrated lessons—plus free with program all professional tools, many interesting projects and more. For information send \$1.00 to: Regina Carvers, Ltd., 33 E. Main Street, Dept. PMG-2, Round Lake Park, IL 60073

HOTTEST NEW COLLECTIBLE - RARE GEMS! Details Free! Taylor's, 113PM Martin, Indian Harbor Beach, Florida 32937

HOW TO SAVE up to \$74,558 (or more) on your HOME MORTGAGE. Detailed report. \$5.00. Mortgage Report, P.O. Box 1182-PM2, Belleville, Illinois 62223

NEED CREDIT? Get a Visa, Master Charge Card . . . with no credit check. Guaranteed! It's simple, legal. Plus other credit secrets. Free details! Send S.A.S.E. to: Inflation Reports, PM-5, P.O. Box 60148, Los Angeles, Ca. 90060

INCOME TAX PREPARATION. Write immediately for free information. Charles Lynn, Enrolled to Practice before the IRS. P.O. Box 20567, Pico Heights Station, Los Angeles, California 90006

"COMPOUNDING YOUR CAPITAL" Send \$4.95. Grifmark, Box 4922, Albuquerque, N.M. 87196

FREE Toy for Cats with Humorous \$2.00 Booklet, "LITTLE KNOWN WAYS TO DELIGHT YOUR CAT." Zarbock Enterprises, P.O. Box 871-M, Albuquerque, NM 87103

SHARK TEETH—Genuine, from Gulf of Mexico. Send \$1.85 each, to: **BLUE SUN,** P.O. Box 366 Osprey, Fla. 33559

BANK CREDIT, how you can establish Bank Credit at any age. Proven, Tested methods, Ten explosive chapters, written by a career Bank Loan Officer. Send \$7.50 plus .45¢ postage to: Robert M. Cross Enterprises, Box 945, El Toro, CA 92630

PHOTOGRAPHS COPIED, Receive Negative and Print. Black and White or Color, \$9.95 Postpaid. Extra Print, \$3.00. Ed Johnson, Box 185, Hatboro, PA 19040

NEVER WON ANYTHING Anyone Can Win Sweepstakes Contests! Free Details. Elmhurst Gifts, 9407 58th Avenue-M, Elmhurst, N.Y. 11373

ATOMIC Bomb? Get Shelter Plans For Basement And Aboveground. Rush \$5.00, Cash, Money Order. Forms Industries, 100 Lyster, Quebec, Canada G0S-1Y0.

SAVE TENS TO HUNDREDS OF DOLLARS on your 1980 taxes by using little known but totally legal deductions. For extensive list send \$2.50 to: N. Douglas, 576 Santa Fe Drive, Encinitas, California 92024

RECYCLED Levi Jeans - (\$7.75) - Cut-Offs (\$3.75) C.O.D. Midwest Jean Market, 2302 University, Des Moines, Iowa 50311

MEXICAN FOOD. Four Extraordinary Recipes. Send \$2. Vantage, 1136 Laguna, Farmington, New Mexico 87401

VOLCANIC Ash, Mount Saint Helens eruption. Satisfaction guaranteed! \$2.50. Doug Coubert, 2113 North 53rd, Seattle, WA 98103

LOOSE Las Vegas Slots. \$3.00 for List. Listing, PM, Box 365, Chelsea, Michigan 48118

"LOVE A WIFE TODAY" T-Shirt. \$9.95 Postpaid. Mens Sizes. Elaine Johnson, Box 185, Hatboro, PA 19040

RID YOUR PETS OF FLEAS! Send \$2.00 with self-addressed envelope to: P.O. Box 8291, Macon, Georgia 31204

HOW To Save Thousands Off Home Mortgage. FREE Information. Cut Your Interest. P.O. Box 54, Nappanee, Ind. 46500

TURN YOUR ORDINARY PHOTOS INTO CASH! Special Report: 100 Cash Buyers and What They Need. \$7.95. **PHOTOBUX,** Box 1285, Roswell, GA 30075.

OF INTEREST TO WOMEN

"FREE!" "ORANGE PEELER", Reg. \$1.00 each, Now 2 for \$1.00. Instructions, "Create Craft". Gadget, Saves Fingernails. Orange Peeler Man, 1033 Bakewell, St. Louis, MO 63137

DOLLS - Learn to make, repair and dress dolls at home. Free information on home study program. Lifetime Career Schools, Dept. D-890, 2251 Barry Avenue, Los Angeles, California 90064.

GOVERNMENT SURPLUS

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 — MONEYBACK GUARANTEE — "GOVERNMENT INFORMATION SERVICES," DEPARTMENT B-2, BOX 99249, SAN FRANCISCO, CALIFORNIA 94109.

HOW to make money in Government Surplus—\$1.50 to: Abel's, 3661 West 86th Street, Indianapolis, Ind. 46268

SURPLUS JEEPS WORLD WAR II and newer large selection. Duryea Ford, Brockport, New York 14420. (716)637-3955

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-AB, Washington, D.C. 20036.

1981 Surplus Army, Navy store 64 page illustrated catalog. Send \$1.00. Ruvel, 3037 North Clark, Dept. J-2, Chicago, Illinois 60657

"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-AB, WASHINGTON, DC 20036.

OTORCYCLES — JEEPS — HELICOPTERS — AUTOMOBILES . . . GOVERNMENT SURPLUS DIRECTORY — MONEYBACK GUARANTEE— How, where—\$2.00. GS Information, Department 12, Federal Building, Box 3913, Springfield, Massachusetts 01101

J-E-E-P-S — \$18.88! . 675,000 items! Buy In Your Area! How! Where! — "Moneyback Q-U-A-R-A-N-T-E-E-D 1981 Government S-U-R-P-L-U-S Directory" — Including: "Buy G-LANDS, — G-Old-Gas L-O-T-T-E-R-I-E-S," — \$2.00. **GSURPLUS,** Box 2009-E, Syracuse, New York 13220

MILITARY Surplus. Boots, Canteens, Hats, Jackets, Knives, Pants, Rucksacks, Sleeping Bags, Tents, Etc. Hundreds Genuine Surplus Bargains. Illustrated Catalog \$1.00 (Refundable). Southern Surplus, Box 262-PM, Manchester, Ky. 40962

JEEPS \$52.40, Airplanes \$75.01, Boats \$7.50, direct from government. Directory and Surplus Catalog \$2.00. Midwest Surplus, Box 401-PM, Dayton, Ohio 45401

DISCOUNT Catalog. Viet-nam Boots, Canteens, Fatigues, Helmets, Jackets, Knives, Parkas. Send \$1.00 Refundable. Dixie Military Surplus, Box 8149-PM, Nashville, Tennessee 37207

FANTASTIC MONEY in Government Surplus. Book Tells All! \$2.00. Thomas Associates, Route 2, Box 56B, Gilmer, Texas 75644

J-E-E-P-S . . . IF CARS . . . UNDER \$30.00!! MUCH MORE . . . 650,000 ITEMS!! COMPREHENSIVE DIRECTORY TELLS HOW, WHERE, YOUR AREA!! \$2.00!! MONEY BACK GUARANTEE!! Surplus America, Department C-2, Box 20390, Jackson, Mississippi 39209.

GOVERNMENT SURPLUS RESEARCH CO., Assistance in Finding Military Surplus Equipment or Selling it. Military Surplus Sales, 1047C Aylesford Place, Columbia, SC 29210

GOV'T BENEFITS

H-O-W-T-O COLLECT TO \$112,501 GOVERNMENT BENEFITS OWED YOU!! — NEW REPORT!! — \$2 — MONEYBACK GUARANTEE!! — "BENEFITS ADMINISTRATION," DEPARTMENT 894-B1, NATIONAL PRESS BUILDING, WASHINGTON, D.C. 20045.

LOANS BY MAIL

QUICK \$Cash\$ Signature Loans! Write: Elite, Box 454-P, Lynbrook, New York 11563.

BORROW \$30,000 without interest! All eligible. Repay anytime. Free details. Infohouse, Box 1004PM, New York, NY 10003

BORROW \$25,000 "overnight." Any Purpose. Keep indefinitely! Free Report! Success Research, Box 29070-AN, Indianapolis, Indiana 46229.

BORROW \$125,000 Interest-Free! Repay Anytime. Everyone eligible. Free Report: Executive PM2, Box 996, Dundee, Florida 33838

FREE details on how to borrow up to \$10,000 entirely by mail. Write: Postal Financial Services, Inc., Dept. 1306, 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, New York 11235

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 \$1,000-\$50,000 secretly—"overnight." Anyone! Credit unimportant. Repay anytime. No interviews, collateral, co-signers. Unique "Financier's Plan." Full information, \$2 (refundable). Spectrum, 120 Wall St.-7, New York 10005

NEED MONEY? Borrow \$1,000—\$35,000! 20 Companies offering (no collateral) signature loans. Complete information, \$1.00. Money-PM, 935 Main, Vidor, TX 77662

LOANS Available - Shopping Centers, Equipment, Expansion, Ventures, Others. Thompson Enterprises, Box 04119, Cleveland, Ohio 44104

BORROW By Mail! Free Details! MBG-PM381, Box 2298, Sandusky, Ohio 44870.

"BORROW FROM HOME" Any amount, any worthwhile purpose, within 30 days. Competitive Rates. Also, you can earn substantial income as a Money Agent. No experience - own hours. National Company to assist every way possible. No Gimmicks! Free Details: DFC, Dept. 10-C-2, 1145 Reservoir Avenue, Cranston, Rhode Island 02920

PERSONAL

TEST YOURSELF — Find your hidden talents. Maximize your potential for Success and Happiness. Send \$2.50. **TALENTS,** 6948W 35th, Berwyn, Illinois 60402

SONG Written for Your Sweetheart! Information: Okid Productions, Box 6876, Rochester, Minnesota 55901

UNIVERSITY DEGREES BY MAIL . . . OUR SPECIALTY. FREE Revealing details. Success, Box 13151-T2, Columbus, Ohio 43213.

COLLEGE DEGREES BY MAIL. Renowned Universities offer fully-accredited Bachelors, Masters, Ph.D.'s . . . Free revealing details. Counseling, Box 317-MP-2, Tustin, California 92680.

FINANCE YOUR DREAMS With Government and Foundation Grants. Free details. Tou-PM2, 432 PCH, Hermosa Beach, California 90254.

CONFIDENTIAL Chicago Mailing Address: Business, Personal. Since 1944! Mail Center, 323(k) Franklin, Chicago 60606

BIBLE Questions answered. Stamped envelope. Bylon, 17167 Bentler, Detroit, Michigan 48219

ELECTRIC RAZORS! Direct From Swiss Manufacturer . . . \$14.00 . . . Guaranteed. Stadler Bros., 5624 Maple Road, West Bend, WI 53095

CHART YOUR OWN BIORHYTHM! Easy Step-By-Step Instructions. Send \$7.00 to: Diversified Publishing, Box 652-PM1, Sandy, UT 84070

ARREST Stress Info, \$2.95 Check, M.O. Consultations Unlimited, Box 1574, Hartsville, S.C. 29550

REMAILING SERVICE

NOTRE DAME University Postmark Remail. Box 682, Notre Dame, In. 46558

CARMICHAEL Remails. Stamped Single .50¢. V. Goetz, Box 390, Carmichael, CA 95608

UNLISTED ADDRESS. Discreet and confidential. Remail \$1.00 Single Mail Forwarding Service, 6050 S. Main, Houston, Texas 77025

CONFIDENTIAL UNLISTED ADDRESS!!!! WRITE TODAY!!!! REMAILCO, BOX 32, BEDFORD, MASSACHUSETTS 01730

FLORIDA REMAILS Receiving-Forwarding. Allen, 6326 Aultan Drive, Jacksonville, Florida 32210

PACIFIC Northwest Address. Discreet Remailing Service. Write: Jobal, Box 546, Woodville, Wa. 98072

YOUR mail Received-Forwarded-Confidential. DAL Mail Service, P.O. Box 98, Southview Station, Binghamton, NY 13903

CANADIAN Remails - Singles \$1.00 - JRG Enterprises, Box 6545, Ottawa, Ontario K2A 3Y6

MISCELLANEOUS

FORGETTING? FREE introductory reminder. MemALERT Reminder Service, 569 Crain M-2, St. Paul, MN 55116

PHOTO ID. Sealed in plastic. All states, provinces. 24-hours. **GUARANTEED.** Send \$5.00 (2/\$8.00), photo, name, address, height, weight, hair, eyes, birthdate. **CARDINAL,** Box 5200-DR46, Jacksonville, Florida 32207.

(Continued on next page)

MISCELLANEOUS

(Continued from preceding page)

ORNAMENTAL Iron Designs. Book of 1600 Beautiful, Practical Designs for Railings, Columns, etc. Free Literature. Cunningham, 3681 South 3200 West, Box 20005, Salt Lake City, Utah 84120

PHOTO IDENTIFICATION CARDS . . . Certificates . . . **GUARANTEED!!** Samples 25c . . . Basco, Box 3461-P-81, Providence, R.I. 02909.

IDENTIFICATION CARDS . . . CERTIFICATES . . . 52 SELECTIONS. Samples 25c. Documents, Box 5684-T, El Monte, Calif. 91731.

GIN RUMMY TIPS II Stop Cheater's. Prevent Opponent's from Playing Location. Reveals Percentages, Codes, Signals. Increases your Chances of Winning. New Booklet - \$5.00 Postpaid. William Hall, Box 11267C, Durham, NC 27703.

U.S. FLAGS at Wholesale Prices. C-1 Industries, Box 184, River Forest, IL 60305.

WILLS, Complete Kit Includes Attorney's Booklet. \$5.00. Combs, Rt 1 54A, Brookier, Florida 32622.

WANTED MISCELLANEOUS

GOLD, Silver, Platinum, Mercury, Tantalum wanted. Ores assayed. Free circular. Wholesale Terminal, Norwood, Ma. 02062.

BUYING Carbide, Silver Solder, Silver Contacts, Tantalum & Stellite - Poley's Salvage, 12389 Mingas, Battle Creek, MI 49017

FOR SALE-MISCELLANEOUS

AIRLESS Tips unstopped with Back-It-Out. Fits Graco Binks and any Gun with Graco Screen Adapter. Mail \$5.75 to: Back-It-Out, 1241 Rock Springs Road, San Marcos, Calif. 92025

HEARING AIDS

HUGE SAVINGS. Eliminate dealer mark-ups. Free Trial. Batteries Wholesale. Terms arranged. Lloyds PMC, Rockford, Illinois 61104

FREE HEARING AID CATALOG - Save 1/2 by mail! Write: "MoneySavers", 9530-PM2, Langdon, Sepulveda, California 91343. Now sold in California.

FREE Hearing aid catalog. Huge Savings. No salesman will call. Try before you buy! Rhodes, Dept. 132-B, Brookport, IL 62910

TOBACCO

MAKE Pipes. Information: Pmo, Inc., P11, Box 59211, Chicago, Illinois 60659

SCIENCE & CHEMISTRY

PENNY FORMULAS, 1,000. Easily Prepared Product Formulas. Send \$10.00 to: Nile Co., Box 3520, Nashua, N.H. 03061

LABORATORY Chemicals, Glassware - Apparatus. Catalogue \$1.00. Deluxe Scientific, 934 S. 13 Street, Manitowoc, Wisconsin 54220

LASER HANDBOOK with Burning, Cutting, Ruby Reds, CO's Complete with Plans, Books, and Parts. Send \$4.00 to: Fanco, Dept. PM, Box 1902, Rochester, N.H. 03867

OPTICAL Plans - Baffling, Useful. Information Free. Clark Products, 1630 Altridge Road, Churchville, N.Y. 14428

FORMULAS, PLANS ETC.

IMITATION GOLD! Three Formulas for \$2.00. Ed Powers, Box 409, Frazeyburg, OH 43822

20,000 MONEYMAKING FORMULAS! CATALOG - \$2.00 - **REFUNDABLE!** GWA3, Box 193, Brookfield, WI 53005

ANY Formula \$10.00. Catalog - Treatise \$1.00. Belfort, Box 568, Chicago 60690

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, POPULAR MECHANICS, DEPT. P, 224 WEST 57TH ST., NEW YORK, NY 10019

HERBS

PURE HERBS From Folklore. For Colds, Arthritis, Overweight, Cholesterol, Blood Pressure, Nervousness, Indigestion, Tiredness. Free Brochure. Estes-PMC, Alma, Georgia 31510

BETTER HEALTH

FAT Chart. Free information. Guaranteed. Charthouse, Box 481P, Brainerd, MN 56401

REDUCE THE RISK FROM SMOKING through the Smoker's Choice Correspondence Program. Choose either to quit completely and permanently, or to continue smoking but at lower risk to your health. No meetings to attend. Personal guidance and evaluation, all by mail. Fee is much less than the \$300 you might pay for smoking cessation programs. Satisfaction guaranteed. Free introductory information. Smoker's Choice, 6110 Executive Blvd, Suite 203A, Rockville, Maryland 20852

HEALTH, Wealth and Wisdom. Report \$2.00. Carns, 215 No. Main, Kanton, Ohio 43326

MEN OVER FORTY: Keep Ft. Right in your Own Home. \$6.95 - Shipping \$1.25. Fitness, Box 8132A, St. Louis, MO 63156

ATHLETE'S FOOT, Simple, Proven Cure to all types. Money Back Guarantee. \$3.50 - KYMC, P.O. BOX 437, PICKERING, ONTARIO, CANADA L1V 2R7

SKINNY? Embarrassing? New Life Now. Gain desired weight. Free information - write: PJSP(2), Box 15239, Phoenix, Arizona. 85060.

STALE Food Causes Choked Arteries. Free Details. SASE: Brock Hopkins, 4234 West 55th Street, Chicago, Illinois 60632

SCIENTIFIC BODYBUILDING SECRETS! Authoritative Manual \$4.00. Dr. Francko, Box B2, Augusta, MI 49012

OVERWEIGHT? Try the MAZE diet plan. Economical, Healthful, Effective. Send \$2.00. P.O. Box 68061, Birmingham, Alabama 35210

TRIM Waistline, Exercises Guaranteed, \$3.95. Action Press, 2707 Lafayette, Huntsville, Alabama 35801.

FOR THE HOME

CUT Household Bits! Free information: JEI, Box 587, Bath NY 14810

WEARING APPAREL

POPULAR MECHANICS KNIT SHIRT. Tailored by Palm Beach. Four button, short sleeve shirt. Available in white, navy and light blue. Blend of 50% cotton and 50% polyester. Embroidered lettering that says **POPULAR MECHANICS ACHIEVER . . . THE MAN WHO MAKES THINGS WORK.** Only \$16.95. Send check to: PM Dept. HE281, Box 1014, Radio City Station, New York, NY 10101.

GARDENING & LAWN CARE

LEARN Gardening and Landscaping at home. Free booklet. Lifetime Career Schools, Dept. A818, 2251 Barry Avenue, Los Angeles, California 90054.

FLOWERS, PLANTS & NURSERY SUPPLIES

GROW Ginseng! \$50 Pound. Have Seeds, Roots. Goldenaeal. Full information. K. Collins, Viola, Iowa 52350

GRAFT Your Fruit Trees. Easy Method, No Bees Wax And String. Excellent Results. Send Self Addressed Stamped Envelope \$1.00 for Instructions: Rosed Co., Box 6094-PMG, Shawnee Mission, Kansas 66201

WINEMAKING & OTHER RECIPES

WINEMAKING-BEERMALTING-GASOLINOL. Free Supply Catalog. Yeast Equipment. Continental, Box 68016-PM, Indianapolis, Ind. 46268

25 RECIPES under 100 Calories. Nutritious. \$2.00. Box 783, Somersworth, NY 03878.

CONVERT Vodka into Liqueurs. Send \$2.00. - Box 116, Ramsey, Illinois 62080

TRADITIONAL Toppings - Fillings - Pudding Sauces, Tasty Treasures. \$3.00 SASE. "Recipes", Box 5072, Vancouver, Washington 98688

DELICIOUS STRING BEANS. FOR RECIPE SEND SELF ADDRESSED STAMPED ENVELOPE + \$2.00 TO: B & L ENTERPRISE, P.O. BOX 486, BUFFALO, NEW YORK 14205

CHINESE COOKING Hunan, Mandarin, Cantonese \$3.00. Chan, Box 57847, Webster, Texas 77598

MONTHLY Newsletter - \$2.00. SASE - "Just Cooking. Thanks," Box 440, Sioux Falls, S.D. 57101

CONVERT Inexpensive Vodka into Expensive Liqueurs. Complete instructions, \$3. Box 764, Minot, North Dakota 58701

COOKIES - 24 Delicious Recipes \$3.00! T & R Sales, Box 59147, Chicago, IL 60659

THE GREAT BARBECUE SAUCE BOOK - 90 Sauces, Marinades and Glazes. Husky Publications, 9837 Folsom, J-119(PM), Sacramento, CA 95827

AWARD WINNING COCONUT CUSTARD CREAM PIE. As Quick & Easy As Powdered Mixes - Blender Magic - All Natural Ingredients. A Real Taste Treat! Send \$2.00 To: Fuzzle Buddie Kitchens, P.O. Box C, Miami, Florida 33155

ORIENTAL RECIPES: Six best-selling menu items from Peter Ku's celebrated oriental restaurant. Includes special sauces and secret processes. \$3.95. SASE. Golden Wing Assoc., Dept. 1001, Box 450, Pelham, Alabama 35124

DELICIOUS APPLE CAKE recipe. \$1.00. Renaud, Dept. PM-2, P.O. Box 2074, Empire Plaza, Albany, NY 12220

BEEHIVE Winemakers, Free Catalog, Recipe. Fine ingredients, Equipment, Service. SPI, Box 784M, Chapel Hill, North Carolina 27514

WINEMAKERS-BEERMALTERS - Free Catalog - Fast Service - Large Selection: Kraus, Box 785OL, Independence, Missouri 64053.

WINE, Three Weeks; Beer, Two. Catalog, Supplies. Jim Dandy Sales, Box 30377PM, Cincinnati, Ohio 45230

BEER LOVERS - Brew your own. Delicious! Inexpensive! Free Catalog. Beer Gear, Box 25093M, Lansing, Michigan 48909

MAKE BEER, Wine, Liqueurs. Free Catalog. Baccharalis, Box 51, Central Village, Mass. 02790

FREE ENCYCLOPEDIA Winemaking, Beer-making, Supplies, Equipment, Ingredients. Vynox Industries, Box PM-7488, Rochester, New York 14615

BEER LOVERS - Distinctive Beer Better Recipe. Delicious! Perfect for Anything Fried. Family Restaurant Secret. \$2. SASE. Renko's Kitchen, Box 45A, Nanticoke, PA 18634

FISH CHOWDER Recipe! \$2.50. - Judy's Kitchen, P.O. Box 1152, Sandusky, Ohio 44870

FAMOUS - Pennsylvania Dutch Recipe Wet Bottom Shoo-fly Pie \$1.00, "15" Cake Baking "SECRETS" \$4.00 SASE. Hampton, R #1, Box 252A, Pine Grove, PA 17963

WOODSTOVE Cookerybook, \$4.00. Money back guarantee. Tulip Press, Box 2705-B, Truckee, CA 95734.

CROCKERY Party Recipes, \$2.50. Crockery, 3051 Bunch Way, Carson City, Nevada, 89701

CREAMY FRENCH ONION SOUP. Gourmet Style, Flaky Pie Crust everytime. Easy Tender Flank Steak - \$2.00. Beverly's Best, 4335 Paret Rd., Kelowna, British Columbia V1W 1S6

MEXICAN FOOD RECIPES - For Business or Home. Enchiladas, Homemade Tamales, Spanish Rice, Chili Con Carne - \$2.00. Each. Specially Consuelo's Kitchen's, 1110 Wayne, Round Rock, Texas 78684

MEAT PRICES got you down. Recipe and complete instructions for making homemade Italian Sausage. \$2.00. Salaroch, P.O. Box 555, East Syracuse, New York 13057

SURPRISE Your Friends on St. Patrick's Day with a Gift of Authentic Irish Soda Bread. Recipe \$1.00. - MURPHY, 28505 Siesta, Eugene, Oregon 97402.

FROSTING, Filling, Toppings, Quick, Easy, Scrumptious, 40 Recipes plus Variations. Send \$2.98. Recipes, Box 56, White Cloud, KS 66094

BEERLOVERS! Save \$1.00 every shtpack - Drink homemade. Free Handbook: Duane's, Department PM021C, 508 Canal, New York, New York 10013

FREE Specialist Beer-making Catalog/Newsletter. Beginner's HOME BEERMALTING Guidebook \$2.00. - William's Brewing, Box 461-M2, Oakland, California 94604

ONION SOUP: Genuine French Recipe. A must for any cook \$1.00. Box 19, Bergen, N.Y. 14416

WORLD'S Best Barbecue Sauce. Use on Most anything. 3.00. Sase. Basic, P.O. Box 2069, West Palm Beach, FL 33402

YANKEE RED-NECK FAVORITES, \$3.00. SASE. Adams, Box 1237, Nokomis, Fla., 33555

HOMEMADE DRINKS. Exciting recipes \$3.00. Gillett 5A-07, Box 1908, Pacoima, CA 91331.

BURGLAR ALARMS & HOME PROTECTION

BURGLAR ALARM. Protect most homes for \$30. Plans \$4.20. Multisystems, Box 80331, Baton Rouge, LA 70898.

FINEST Equipment! Save! **FREE CATALOG!** AAS, 186-B Oxmoor Road, Birmingham, AL 35209

WARNING Automatic Electronic Alarm System Decals Fools Burglars, 12 for \$5.00. H. L. LaSota, Box 1797, Gary, Indiana 46409

HOW To Safeguard Your Family . . . Home . . . Inexpensive . . . Easy - Free Proof! Guardian, P.O. Box 8635, Mobile, Ala. 36608

YOU Can Protect Your Home. Easy . . . Inexpensive . . . Free Details. Stanfield Associates, Box 2245-P2, San Rafael, Calif. 94912

BURGLAR ALARM LABELS Protect Your Home, Family and Auto. For 8 Labels Send \$4.00 to: The Home Front, P.O. Box 1041, Dover, DE 19901

AMERICA IS FOR SALE

The United States Map Company wishes to inform you that the whole country can be bought: We are offering you a huge mural map of the United States measuring *NINE HUNDRED AND TWENTY-FIVE SQUARE INCHES*, with leading cities, lakes, rivers, mountain ranges, national parks, forests and historic sites in breathtaking color, **FOR ONLY \$1!**

That's right, the entire country is yours for just a buck—a solitary simoleon, greenback, smacker, bofo, bean, eight-bit, frogskin, lettuce

leaf, shinplaster.

This magnificent mural map is a real eye-popper, ideal for an office, reception area, classroom, den, or child's room.

But there is a limit: only three maps to a customer.

To get your breathtaking Mural Map of the United States, just fill out the coupon below and mail it with payment to the address shown in the coupon.

We deliver this huge map right to your doorstep. You'll have the whole country right at your feet!



UNITED STATES MAP CO., BOX 7777, NEW YORK 10001

I enclose \$_____ for _____ HUGE mural maps of the United States—*NINE HUNDRED AND TWENTY-FIVE SQUARE INCHES EACH*—at the giveaway price of *ONLY \$1 EACH* + 65¢ shipping; total \$1.65. (Limit: three maps per customer, at a price of \$4.95.)

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

Add applicable sales tax. © U.S. Map Co. mcmlxxx. MPM

New Winston Ultra

The first ultra low tar built on taste.



Only **5 mg**



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

Easy Going Taste™
Ultra Low Tar

Super Sours begin with Seven.



For a super Whiskey Sour, start with the very special taste of Seagram's 7 Crown. Add 1½ oz. Seagram's 7 to the juice of one lemon and one tsp. of extra fine sugar. Shake, strain over ice and garnish with an orange slice and a cherry. A Seagram's 7 Sour is super! Enjoy our quality in moderation.

Seagram's 7 Crown
Where quality drinks begin.

