

NC

MAY 1983 \$1.50

Popular Mechanics

COMPLETE GUIDE:
How To Install
Any Telephone And
Add Extensions



MAKE YOUR CAR LAST FOREVER

'57 THUNDERBIRD
Still Showroom-New
After 26 Years
Of Watchful Care

SPECIAL 70-PAGE MANUAL

- Step-By-Step:**
- How To Beat Rust
 - Add 9 Never-Fail Parts For Years Of Troublefree Driving
 - ...And Much More!



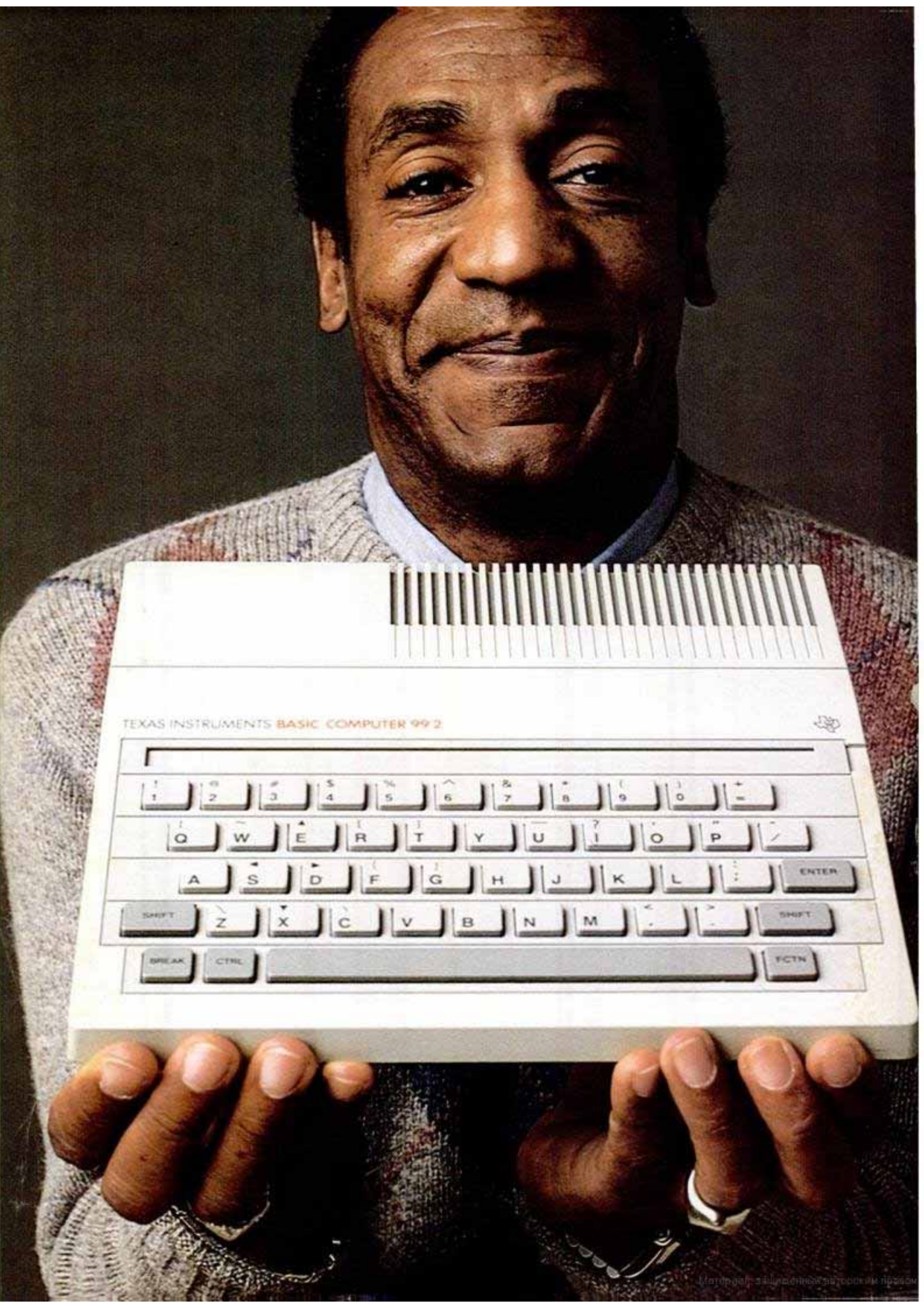
COMPLETE PLANS:
Build Our Heirloom
Victorian Sideboard

**18 New Cameras That
Put You On TV**

**SEA DRAMA: First Rescue By
Lifesaving Satellite**

**Expert Ways To Keep
Shop Tools In Tiptop Shape**





TEXAS INSTRUMENTS BASIC COMPUTER 99/2



TI's new Basic Computer. The one to start with and get smart with.

Under \$100. Meet the lowest priced, 16-bit computer available. A major breakthrough in computer technology.

Get ready. Get set.

Begin. Only the TI-99/2 Basic Computer with built-in TI BASIC has a plug-in solid state cartridge that teaches you, step by step, the basics of programming. And our operator's manual is clear and to the point. You learn quickly, because it doesn't assume you're an engineer.

A real computer.

Powerful 4K memory. Full-size, 48-key keyboard. Quality, flicker-free black and white display. With a choice of popular software applications.

Easily expandable.

When you're ready for more, plug in more memory (an additional 32K). Add a Wafertape™ Drive* or Cassette Program Recorder. Modem* for telecommunications. Printer*. And a plug-in cartridge that teaches you how to program in TI BASIC.

Money well-spent.

If you're wondering if this

is the right computer for you, touch the keyboard, look at the display, watch this powerful computer at work. Even compare it to the Timex Sinclair 1000™, the other computer under \$100. Convince yourself.

Start with a visit or call. Ask your local TI retailer to show you the best basic computer buy for your dollar. Or call us at (800) 858-4565.

Creating useful products
and services for you.

TEXAS 
INSTRUMENTS

This One



ZZ3X-C05-4WS3

Timex Sinclair 1000 is a trademark of the Timex Sinclair Corporation.

*Subject to FCC approval.



ITS ENGINEERING SO CLOSELY RESEMBLES A FINE WATCH, YOU'D EXPECT IT TO TICK.

Like a fine watch, a Mariner Outboard demonstrates an ingenious use of space. Every part that's not absolutely essential has been eliminated. This not only makes the motors more compact and exceptionally lightweight for the horsepower they deliver, but it also helps reduce maintenance.

And, if you could look inside each one, you'd see an attention to detail seldom found in an object too large to strap to your wrist. For example, CD ignition eliminates the

need for troublesome breaker points. Most models feature thru-prop exhaust for more speed and more efficiency. They're quieter, too.

All driveshafts, shiftshafts and propshafts are made of stainless steel to protect against saltwater corrosion and give you years of dependable, trouble-free performance.

In short, Mariner makes the most refined outboard motors in the world.

Yet, in our engineers' vocabulary, refined certainly does not mean docile. Open the throttle and you'll experience acceleration that's surprising

if not downright exhilarating.

In that respect, our motors are more like sports cars than watches. Efficient, yet exciting.

For a free catalog of Mariner Outboards from 2 to 200 horsepower, write Mariner, Dept. 83, 1939 Pioneer Road, Fond du Lac, WI 54935. In Canada, write Mariner, 1156 Dundas Highway East, Mississauga, Ontario, L4Y 2C2.

**MARINER.
BETTER IN THE
LONG RUN.**

 **MARINER[®]
OUTBOARDS**



Popular Mechanics®



ON THE COVER

Loving care by Harry M. Steele of Coral Gables, Fla., has kept this '57 Thunderbird in like-new condition for 26 years. You can do the same. PM shows you how in our big, 70-page Car Care Guide that begins on page 111.

—PM photo by Tom McCarthy

VOLUME 159 NUMBER 5

MAY 1983

INTERNATIONAL EDITIONS: CARIBBEAN, MEXICO, SOUTHERN HEMISPHERE

AUTOMOBILES AND BIKES

- Imports and Motorsports 10
- Detroit Listening Post 14
- Car Clinic 20
- PM Owners Report: Chevy Celebrity 54
- The PM Garage 65
- PM Owners Report: Ford Ranger 66
- Indy 500: Pacing the pack 88

SHOP AND CRAFTS

- The PM Workbench 28
- Hints from readers 53, 74, 75
- PM looks at workshop support table 76
- A craftsman's secrets for using the sander/grinder 98
- Build PM's Victorian sideboard 102
- Folk art that comes to life 105
- How to keep power tools in topnotch shape 106
- Workshop Minicourse: More about dowels 110

HOME AND YARD

- Homeowners' Clinic 24
- Appliance Clinic 30
- New Now for home and shop 34
- Make a reel for your mower cord 73

PM'S 1983 CAR CARE GUIDE

- 111 Cover
- 114 How the pros rebuild a car
- 120 High-tech parts: Keeping your car running forever
- 124 How to stop rust before it starts
- 129 How to fix a rusted trunk
- 130 How to repair a rusted battery tray
- 131 Restoring rusted headlight buckets
- 132 How to fix a rust hole
- 134 How to replace a rusted body panel
- 140 How to install an antichip strip
- 143 Waterproofing turn signals and brake lights
- 146 Rustproofing accessory brackets
- 148 How to soundproof your car
- 152 How to solder-splice and use heat-shrink tubing
- 158 Protecting a wiper motor
- 159 How to install silicone sparkplug wires
- 160 Protecting your coil, distributor and wiring harness
- 163 Troubleproofing headlight wiring
- 164 How to install a rubber antenna
- 166 How to install stainless-steel braided hose
- 168 Replacing vacuum hoses

79



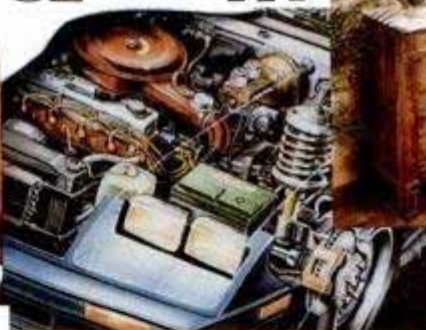
88



82



111



102



SCIENCE AND ENGINEERING

- Science Worldwide 26
- Rescue by a satellite 79
- The Brooklyn Bridge turns 100 84

ELECTRONICS, RADIO AND TV

- How to install your own phone 39
- PM Electronics Monitor 48
- PM Software Monitor 62
- Complete guide to video cameras 82
- Today's top tuners 96

PHOTOGRAPHY

- PM photo hints 44

BOATING AND OUTDOORS

- New pistols that shoot like rifles 92
- New look for fishing favorites 94

- 169 How to install an oil cooler
- 170 How to install a gauge panel
- 171 Retrofitting tires and wheels
- 172 Installing silicone brake fluid
- 174 How to seal weatherstripping
- 178 How to install sun shades
- 179 How to install a free-flow exhaust system
- 180 Replacing sheet-metal screws
- 181 Sources and suppliers
- 182 New car care products

EVERY MONTH

- 5 Editor's Notes
- 8 Letters to the Editor
- 209 Technology Update

WORTH WRITING FOR

- 153 Looking for more ideas and information?

POPULAR MECHANICS (ISSN 0032-4558) is published monthly by The Hearst Corporation, 224 West 57th Street, New York, N.Y. 10019, U.S.A. Subscription prices: United States and possessions, \$11.97 for one year, \$21.97 for two years. Canada and all other countries, add \$16.00 for each year. Second-class postage paid at New York, N.Y. and additional mailing offices. Authorized 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. © 1983 by The Hearst Corporation. All rights reserved. Printed in U.S.A. POSTMASTER: Please send address changes to Popular Mechanics, P.O. Box 10064, Des Moines, Iowa 50350.

SUBSCRIPTION SERVICE: Popular Mechanics Magazine will, upon receipt from its reader of a complete new or renewal subscription order, undertake fulfillment of that order so as to provide the first-copy delivery either to the Postal Service or alternate carriers within six to twelve weeks. If for some reason this cannot be done, you will be promptly notified of the issue date that will begin your subscription, with a request for any further instructions you may have concerning your order. Please address all such orders to us at Popular Mechanics, P.O. Box 10064, Des Moines, Iowa 50350. *Should you have any problem with your subscription, please write Joan Harris, Customer Service Department, Popular Mechanics, P.O. Box 10064, Des Moines, Iowa 50350. To assure quickest service, please enclose your mailing label when writing to us or renewing your subscription. *Renewal orders must be received at least eight weeks prior to expiration to assure continued service.

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



Popular Mechanics

Editor-in-Chief: John A. Linkletter
Executive Editor: Joe Oldham
Managing Editor: Bill Hartford
Design Director: Ira Herrick
Design Consultant: Eberhard Lütke

Special Editorial Features: Sheldon M. Gallager, editor
Automotive: Tony Assenza, editor; Michael Lamm (West Coast); Gary Witzenburg (Detroit)
Home and Shop: Harry Wicks, editor; Penelope Spangler, Michael Chotiner, Joseph Trulini, assistants
Boating, Outdoors and Travel: Wm. T. McKeown, editor
Electronics: Neil L. Shapiro, editor
Science: Dennis Eskow, editor
Editorial Production: Peter Easton, chief; John Bostonian Jr., art; Peter Francesconi, assistant
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.

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

Advertising Manager: Frank P. Camastro

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

Production Manager: Ronald Tuosto
Advertising Production: Patricia Woods; (212) 262-4800
Classified Sales Manager: Sophie Gronowicz; (212) 262-4825

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

POPULAR MECHANICS IS PUBLISHED MONTHLY by the Hearst Corporation, 959 Eighth Avenue, New York, N.Y. 10019. U.S.A. Frank A. Bennack Jr., President; Randolph A. Hearst, Chairman; Harrison A. Mitnick, Vice President and 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, Vice President and Resident Controller; William S. Campbell, Vice President, Director of Circulation; Daniel J. Coleman, Vice President for Popular Mechanics.

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

SAVE THIS AD TO SHOW FUTURE GENERATIONS HOW WE USED TO GLUE.

Once upon a time, gluing meant getting into a sticky situation. It meant messy mixing. Inhaling unhealthy fumes. Clamping. And very often waiting hours at a time for the glue to dry.

Thermogrip® brand Hot Glue Guns put an end to the days when gluing was a bother. They apply glue hot and neat. They give off no unpleasant odor. The glue dries in just one minute. And you never have to worry about mixing or clamping or waiting, again.

You can use Thermogrip brand Hot Glue Guns on almost anything—wood, paper, tile, cloth... almost any porous material. Whatever the job, from hobby projects to caulking to construction, there's a Thermogrip brand Hot Glue Gun and a Thermogrip brand Adhesive to do it.

Save yourself the bother other adhesives can cause you. With Thermogrip. And remember to save this ad. It may soon be the only reminder we have left of the way we used to glue.

Bostik
 CONSUMER DIVISION
 Reading, PA 19605 **EMHART**





EDITOR'S NOTES

John A. Siskel

So you think car care is a dull sort of business? Well, take a cue from our cover models and you can turn it into a social event (right).

But *dull* is not in Auto Editor Tony Assenza's vocabulary when he talks of car care. It's *neat*, he says in highest acclaim. Install a radio. Change shocks. Tune the engine. Do an entire *Car Care Guide* that really shows readers how to add years to a car's life. It's all neat. That enthusiasm, along with Tony's years of practical, hands-on experience, make this year's Guide (page 111) one of our best ever. You could get hooked!



Models Lynne Jefferson and Arek Andersen tend to car washing while PM's Assenza has his kind of fun.

Brooklyn Bridge. Just as San Francisco is everybody's home town and the Mississippi is our all-American river, the bridge is the nation's most cherished span. This month, it's having its 100th birthday.

Some said in 1883 that the bridge would not stand 10 years. Now engineers say it can easily last another 100. Every step in its building was an engineering achievement, as contributor Don Sayenga tells in this issue (page 84).

There was a significant design omission, points out John Wiedeman, president of the American Society of Civil Engineers. There's no place for a toll booth. So the old advice still stands: Don't buy the Brooklyn Bridge. You'll never get your money back.

PM



No space for a toll booth, Wiedeman tells me and Science Editor Dennis Eskow.

Travel with the Old Timer.

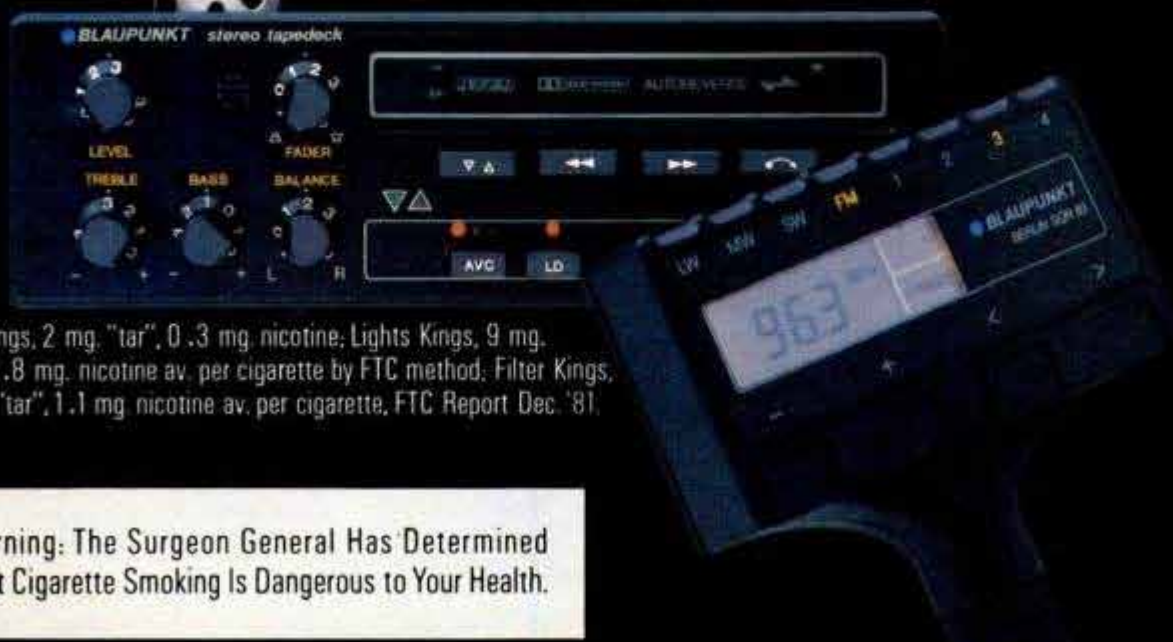


The Wrangler makes a great traveling companion. The high carbon Schrade + Steel® blades are completely rust resistant. Expertly made with over 100 hand operations. Also available with 3 blades. You're in good company with an Old Timer.

**OLD
SCHRADER
TIMER**

Write for your free Schrade Almanac to Schrade Cutlery Corp., Ellenville, N.Y. 12428-0590.

WIN A 146 M.P.H. FROM



Ultra Kings, 2 mg. "tar", 0.3 mg. nicotine; Lights Kings, 9 mg. "tar", 0.8 mg. nicotine av. per cigarette by FTC method; Filter Kings, 16 mg. "tar", 1.1 mg. nicotine av. per cigarette, FTC Report Dec. '81.

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

SOUND SYSTEM KOOL!



There's only one way to play it. Win this Porsche 928S equipped with Blaupunkt's best... all in one grand prize!

The Porsche is a masterpiece of power, performance and luxury...and comes complete with one of the world's most extraordinary sound systems—the Blaupunkt Berlin SQR (AM/FM Cassette).

5 SECOND PRIZES Blaupunkt Berlin SQR Auto Stereo Systems—the most superbly engineered systems from the world's most distinguished name in auto sound.

50 THIRD PRIZES Sony® WALKMAN®—WMF2 FM Stereo Cassette Recorders—the ultimate personal Sony®. Take your favorite sounds wherever you go!

OFFICIAL SWEEPSTAKES RULES

1. To enter, complete an Official Entry Blank or handprint your name, address, zip code and telephone number on a plain 3" x 5" piece of paper and mail to KOOL "146 M.P.H. Sound System" Sweepstakes, P.O. Box 3550, Libertyville, IL 60048. Winning entries must contain the correctly completed line "There's only one way to play it..." found on any KOOL ad or product display; using the official entry blank or the alternative entry form. **NO PURCHASE NECESSARY.**
2. Enter often, but each entry must be mailed separately. Entries must be postmarked by September 30, 1983, and received by October 15, 1983. No postcards, metered mail or mechanically reproduced entries will be eligible to win.
3. Winners will be determined by a random drawing by H. Olsen & Company, an independent judging organization whose decisions are final. The odds of winning will be determined by the total number of your entries and
4. the total number of entries received. Winners will be notified by mail. To obtain a list of winners, send a stamped, self-addressed envelope to KOOL Winner List, P.O. Box CC, Libertyville, IL 60048, between December 1, 1983 and December 31, 1983.
5. All prizes will be awarded. All prize winners must claim their prizes on or before November 30, 1983. No cash or any other substitution for prizes as offered will be allowed.
6. Only one prize per family. Prizes are not transferable prior to award. **LIABILITY FOR TAXES IS THE SOLE RESPONSIBILITY OF THE WINNERS.**
7. Sweepstakes is open to U.S. residents who are 21 years of age or older except employees and their families of Brown & Williamson Tobacco Corporation, its subsidiaries, affiliates, advertising/promotional/publicity agencies, and H. Olsen & Company. Void wherever prohibited or restricted by law. Proof of eligibility and age and publicity releases will be required.

OFFICIAL ENTRY BLANK

Fill in this line. (Correct answer found in this ad or on any KOOL ad or product display.)

There's only one way to play it... _____

Name _____ Age _____

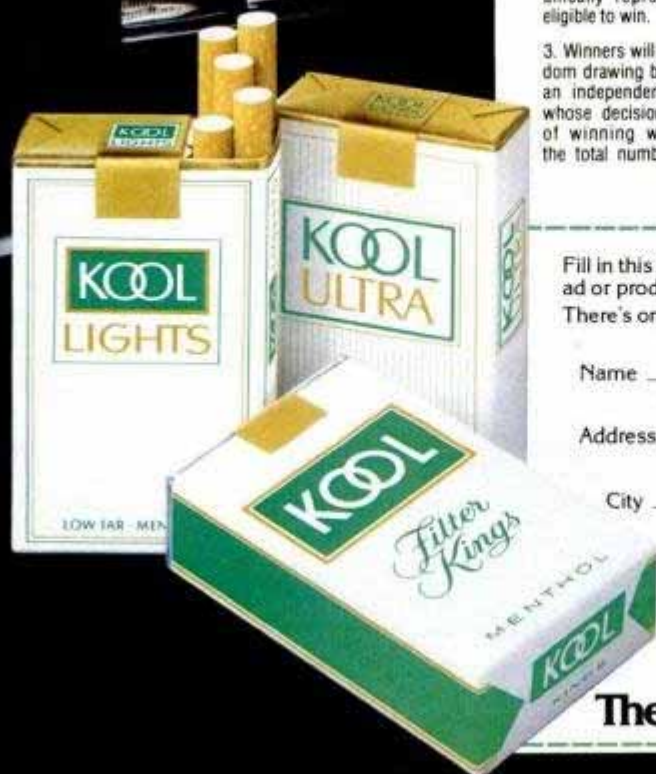
Address _____

City _____ State _____ Zip _____

Telephone Number (_____) _____

Mail to:
KOOL "146 M.P.H. Sound System" Sweepstakes
P.O. Box 3550, Libertyville, IL 60048

There's only one way to play it.



LETTERS TO THE EDITOR



Throwaway cars: Coming or here?

Your article *Coming Soon: The \$4,000 Throwaway Car* (page 92, Feb. '83) only illustrates further how far out of touch Detroit is with reality. To build a car more efficiently and still make it better—not worse—should be a natural product of industry evolution. Wake up, Detroit—you've only been at it since the turn of the century!

DANNY WONG
LOS ANGELES

Who would buy such a pile of junk? I

have a '71 Caddy, a '73 Olds and a '79 Rabbit. I cut the cost of cars by taking good care of them and driving them longer—not by buying a small, underpowered, plastic toy that will self-destruct in a few years.

PATRICK M. KIPPES
COLBY, KAN.

A disposable car? Detroit's been building those for years!

DELMAR J. SCOTT
MOLALLA, ORE.

for us and our children (now fully grown). I hope it may do the same for some other PM readers.

ALFRED C. WEBBER JR.
WILMINGTON, DEL.

It's good to know that PM projects can stand the test of time. For others who may be interested, photocopies of the original article are available for \$3.75 postpaid from Popular Mechanics, Box 1014, Radio City Station, New York, N.Y. 10101. For a more recent tree house design, see Build This Tree-top Hideaway For Your Youngsters, page 92, Aug. '80.

Nimrod not so nimble

I thoroughly enjoyed your article on antisubmarine warfare (*A Deadly Game Of Hide-And-Seek*, page 148, Feb. '83). But you erred in calling the Nimrod a carrier-based antisubmarine aircraft. The Nimrod is a military version of the big, four-engine British Comet jetliner—a craft hardly nimble enough to operate from a carrier deck. The carrier-based antisubmarine aircraft currently used by the U.S. Navy is the Lockheed S-3A Viking. As a former Viking acoustic sensor operator, I feel this fine plane should get some much-deserved recognition.

CARL A. SUTTON
MADISON, ALA.

Well, we were half right. The Nimrod is classed as an antisubmarine aircraft, but it operates from land bases, not carriers. The Viking is, indeed, a highly regarded, carrier-based, antisubmarine patrol plane.

Stellar ripoffs

A company recently offered to name a star after me for a \$35 fee. In your *Science Worldwide* column (page 8, Feb. '83), you said only the International Astronomical Union can give stars official names. Is there any way that a member of the general public can get a star named after him?

JAMES B. MAYTON
MONTGOMERY, ALA.

Science Editor Dennis Eskow replies: Sorry, no. Not only is the IAU the only

official star-naming body, but it rarely adopts proper names. Most newly discovered stars are given code numbers to make it easier to keep track of them. Only once in a blue moon is a star named after a person—and then only to honor a great astronomer.

PM's tree house, revisited

Your readers might like to see the tree house I built almost 20 years ago (photo below). You used it as the cover story in your June 1965 issue (*Build A Modern Tree House*, page 126).

We no longer own the property, but were in the neighborhood and noticed the tree house still standing in the backyard. It holds many pleasant memories



Nicely weathered after 18 years, the PM tree house looks as sturdy and attractive as it did on our cover back in 1965.

Dead Sea update

In your article on new revelations in the Dead Sea Scrolls (*Science Worldwide*, page 8, Feb. '83), you said an English translation of the scrolls would be out in March, but I haven't seen it. How can I get a copy?

CHARLES J. WITTMAN
DUBLIN, IND.

The English translation was published in Israel in March, but a U.S. publication date has not yet been announced. For further information, write to: Information Officer, Consulate General of Israel, 800 2nd Ave., New York, N.Y. 10017.

Misleading mpg?

We appreciate your observations on our Pontiac 6000 STE (*Does Twice The Price Mean Twice As Good?*, page 82, Feb. '83). We are concerned, however, that your fuel economy data are questionable. Our evaluations of the 6000 yielded an average of 22.5 mpg for a number of test cars. This is considerably higher than what you reported.

BRUCE MacDONALD
PONTIAC MOTOR DIV.
PONTIAC, MICH.

Auto Editor Tony Assenza replies: All the cars in our test were driven under the same conditions. Our mileage figures were a composite of both road and track trials. We agree that owners of the 6000 will see better mileage than we recorded because they won't be flying around a racetrack. PM

WIN \$100,000 IN SOLID GOLD



Canadian Club, one of Canada's great treasures, offers you a golden opportunity to win. The prize, \$100,000 in pure Canadian gold. Correctly answer the simple question posed on the official entry blank and send it in. If your entry is selected, you win. The 100 people who come in second will get a glittering prize of their own, a one-ounce Canadian Gold Maple Leaf Coin.

86.8 Proof. Blended Canadian Whisky. Imported in Bottle by Hiram Walker Importers Inc., Detroit, Mich. ©1983

Canadian Club Solid Gold Sweepstakes

OFFICIAL RULES 1. On entry form, or a 3" x 5" piece of paper, print your name, address, and zip code. Then answer the question with the information found on the label of any bottle of Canadian Club. If you do not own a bottle, visit your favorite restaurant or tavern, or go to any liquor store and you will find the information on any bottle of Canadian Club. Labels may also be obtained by sending a stamped, self-addressed envelope to Canadian Club Label Request, P.O. Box 601, Young America, MN 55399. (Washington State residents need not provide postage.) 2. **NO PROOF-OF-PURCHASE NECESSARY.** Enter as often as you wish. Each entry must be received no later than June 30, 1983. Sponsor not responsible for lost or delayed entries. 3. All prizewinners will be determined in a witnessed, random drawing from all correct entries. Drawing to be conducted on or about July 31, 1983, by Young America Corporation, an independent judging agency whose decisions are final. All 101 prizes, with an approximate value of \$132,500, will be awarded. Value of prizes depends on the market price of gold as of the date of purchase. One prize per individual or group. 4. Prizes are not transferable. The Grand Prize winner will receive \$100,000 in Gold Maple Leaf coins or cash (United States currency). 100 second prize winners will each receive one Gold Maple Leaf coin, approximate total value \$32,500. Taxes are the sole responsibility of winners. Winners will be notified by mail and will be required to sign an affidavit of eligibility and release. Winners to consent to use of their name and/or likeness for advertising and trade purposes without additional compensation. 5. Gold for prize awards will be purchased on or about August 31, 1983. 6. **ENTRANTS MUST BE OF LEGAL DRINKING AGE UNDER LAWS OF THEIR HOME STATE.** Open to all residents of the United States except employees and their families of Hiram Walker Inc., its representatives, its subsidiaries, its affiliates, its wholesalers, its advertising and promotional agencies and Young America Corporation Inc. Void in the following states: Iowa, Mississippi, Ohio, Oklahoma, Pennsylvania, Tennessee and Texas. All federal, state, and local laws apply. 7. A list of all prizewinners can be obtained after September 15, 1983, by sending a self-addressed, stamped envelope to Canadian Club Solid Gold Sweepstakes Winners, P.O. Box 4019, Young America, MN 55399.

OFFICIAL ENTRY

To enter, answer the question below. (The correct answer appears on the label of any bottle of Canadian Club.)

125 years ago, Hiram Walker created Canadian Club. In what Canadian village is this fine whisky distilled and bottled?

Answer: _____
Grand Prize—\$100,000 in Canadian Gold or Cash.
100 2nd Prizes: 1 Gold Maple Leaf Coin (1 troy oz.)
 Mail entries to:
 Canadian Club Solid Gold Sweepstakes
 P.O. Box 1422, Young America, MN 55394

Name _____
 (Please Print)
 Address _____
 City _____ State _____ Zip _____

Canadian Club.

"The Best In The House."

Материал, защищенный авторским правом

IMPORTS & MOTORSPORTS



Toyota to build next Chevette

Its miraculously long life is almost over. It never distinguished itself in any way, but it never disappointed its maker, either. It wasn't like some cars, embarrassing their manufacturers, getting them hauled into court and all.

The Chevette was the big GM story in the fall of '75. The 1976 Chevy Chevette was America's own minicar. GM had mobilized to compete with the imports with its own fuel-efficient little metric machine. It was the most basic subcompact when it was introduced and it never really changed much. But, amazingly, it will have survived for a model run of nine years. Next year, not being able to compete any longer, it will be laid to rest.

The Chevette's successor, even though it will roll out of a GM plant in Fremont, Calif., will be a Toyota—a version, it is speculated, of the all-new Corolla, a front-wheel-drive model. The new car, whatever it is or is called, will

be a very competitive, state-of-the-art subcompact, priced at about \$6,000, that will go to Chevrolet dealers. The recently signed agreement between GM and the Japanese manufacturer puts Toyota in charge of building it while GM watches to see how it's done.

Meanwhile, Toyota has a new entry



Toyota Camry, which replaces the Corona, starts at \$7,798 for the four-door (here) and \$8,048 for five-door hatch.

to take the place of the discontinued Corona. The 1983½ fwd Camry uses a two-liter Four transversely mounted, a configuration that's a first for Toyota here.

Futuristic speedster

The classic speedster was Porsche's old 356. Here, by no coincidence, is one for tomorrow. The inspiration for Eberhard Schulz's design came from the 10 years he spent as an engineer at Porsche.

The mid-engine Spyder, to be assembled at his Isdera works near Stuttgart, uses an engine derived from the VW GTI. Fast and topless—what a perfect car for a day in May!



Isdera Spyder uses Porsche parts, GTI-based engine for speed to match its style.

VW's power play

Volkswagen's laying on the cubes and running up the hp as it leaves the Beetle days further behind. Its biggest and



Second-generation Jetta concept shows all-new body with longer wheelbase.

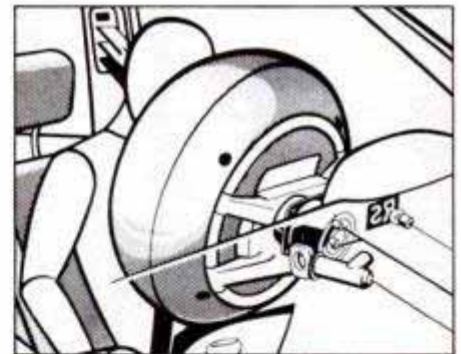
most powerful powerplant was just introduced for the Quantum: The 100-hp, five-cylinder, ohc, in-line engine displaces 2,144 cc. And the high-performance, 1.8-liter GTI Four made the Rabbit a whole new car last October. The 1.6-liter turbodiesel was also introduced at that time. The fourth new engine for '83 is a hot 82 hp: the 1.9-liter, water-cooled Flat Four designed just for the Vanagon. Next on VW's agenda is some new sheet metal for '84, starting with the Jetta.

High-buck bags

You have to be a damn fool to drive without using your car's seat belts (and we'll hear *no* excuses on this matter). We're all free to be fools, of course—except in those locales where the law says wear 'em.

If you do buckle up faithfully, whether because you're compelled to or because you prefer to *be* than *not to be*, you'll probably care little that Mercedes-Benz will be offering an air-bag option with some of its '84 models. It'll add about \$800 to the cost of the cars it's available on.

The M-B bag on the driver's side is triggered by frontal collisions of 12 mph or more, while on the passenger side an emergency tensioning retractor pulls slack out of the belt. The system, incidentally, is for *additional* protection;

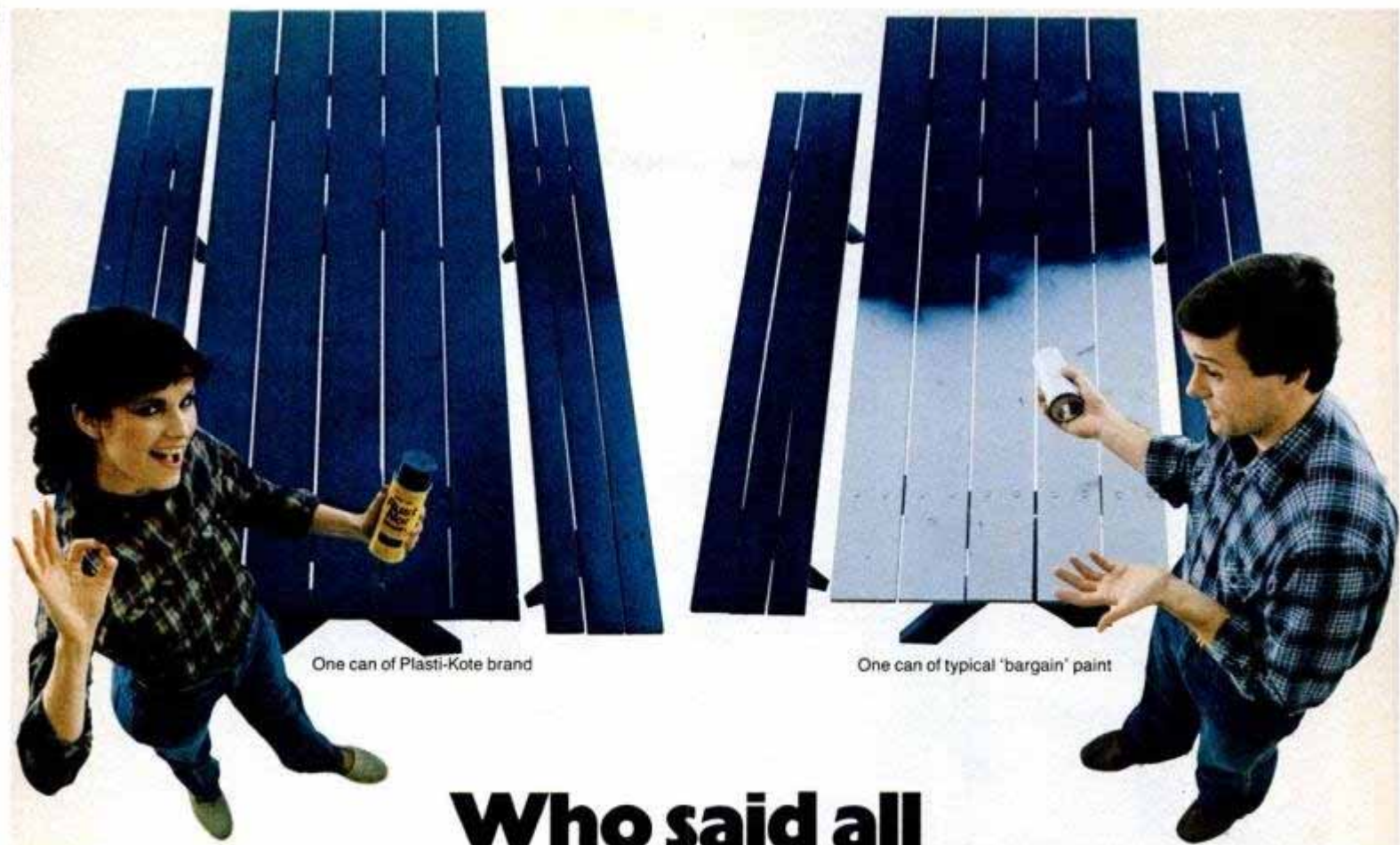


Mercedes air bag inflates in milliseconds to cushion driver in frontal collisions.

the cars will retain their usual lap/shoulder belts. So, for a price, Mercedes drivers will soon be safer than ever. That's nice. But remember, the rest of us need only our few cents worth of nylon webbing to avoid a body bag. **FM**



The \$800 bag is stored in steering wheel.



One can of Plasti-Kote brand

One can of typical 'bargain' paint

Who said all spray paints were created equal?

If you're from the 'I'll believe it when I see it' school, you just saw it. Plasti-Kote brand spray paint simply goes farther, lasts longer than the so-called bargain paints.

You get more coverage, and a tougher, longer-lasting finish with all Plasti-Kote paints. It stands to reason. We're the leader in automotive spray paints, where second-best finishes don't count.

Let's face it. The best part of painting is getting done. Get done faster, better, and stay done longer with Plasti-Kote. We make good paint. And that's the real bargain.



Left, no bargain in hiding power.

Right, Plasti-Kote makes painting jobs disappear a lot faster.

Left, no bargain in durability.

Right, Plasti-Kote's beautiful finish stands up to a lot more.



plasti-kote®

We go farther. We last longer.

1000 Lake Road, Medina, Ohio 44256

NISSAN. ONE HECK-OF- OF-A TRUCK!

NOW AT YOUR DATSUN DEALER.

A whole new line of trucks wearing a whole new name: Nissan. Check 'em out. You'll find the most powerful standard engine in its class. You'll find new roominess to seat two, three or four.

You'll find double-wall bed construction and brawny 5-speed overdrives. You'll find why more truckers drive Nissan-built compact pickups than any other.

And you'll agree: the newest Nissan is one heck-of-a-hunk-of-a truck.

ONE HUNK-OF-AN ENGINE. The most power of any standard engine in its class.

More than Toyota, Chevy S-10, Ford Ranger and everyone else.

- More horsepower: 103 hp @ 4800 RPM.



- More torque: 133 ft.-lbs. @ 2800 RPM.
- Exclusive NAPS-Z overhead-cam engine uses two sparkplugs per cylinder, crossflow hemihead and unique "fast-burn" design to give maximum operating efficiency, minimum pollution.
- 5-speed overdrive manual transmission standard—on all models for top fuel economy.

The most power of any standard 4-cylinder diesel.*

Nobody else has a 2.5-liter diesel this brawny.

- More horsepower: 70 hp @ 4000 RPM.

- More torque: 114 ft.-lbs. @ 2000 RPM.
- All new technology for rugged durability and superior performance.

ONE HECK-OF-A CAB. Seat 3 in a conventional cab, 4 in the King Cab.®

- More hiproom than Chevy S-10 or Toyota.
- More legroom than Ford Ranger, Chevy S-10 or Toyota.
- More headroom, and legroom, than in any Nissan-built truck ever.
- The original King Cab: up to nine cubic feet of extra inner space for safe storage and jump seats.
- Sliding rear window available. (Standard on Sport and XE).



The Sport Truck that lives up to its name.

- Unique grille and bumper designs: sleek in 2WD, rugged-looking in 4WD.
- Bucket seats with lateral support for extra comfort, control.
- Power-steering and Sun roof—standard.



- Full cloth upholstery on seats and doors; full carpeting.
- 3-spoke sports wheel.
- Full instrumentation, laid out for maximum visibility.
- AM/FM multiplex stereo—standard.
- Day/night antiglare mirror on all Deluxe and XE models.



*Normally aspirated. Available soon. ††Not available in Calif. and high-altitude areas.

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

© 1983 NISSAN MOTOR CORPORATION IN U.S.A.

A-HUNK-

ONE HECK-OF-A-HUNK- OF-A 4 X 4. On-demand 4-wheel drive.

- Shift from 2WD to 4WD High at the flick of a stick—without stopping.
- Missing from Toyota.
- Highest minimum ground clearance of any compact. Higher than Toyota, Chevy S-10, Ford Ranger.
- Wide clearance torsion-bar independent front suspension for a smooth, level ride.
- Tightest turning circle for maneuvering in tight offroad spots. Runs rings inside Chevy S-10, Ford Ranger, Toyota.
- Wide radial tires standard: P215/75 R X 15.

ONE HUNK-OF-A-BODY. Double-wall construction.

- Double steel walls (except MPG Standard). Not in Toyota.
- Tailgate lowers 90°, 180° or removes entirely to carry your load.



- Heavy-Duty Long Bed hauls a remarkable 2,050 lb. payload of cargo and passengers. More than Toyota, Chevy S-10, Ford Ranger and many full-size pickups.
- Bigger beds: Longer King Cab bed than Chevy S-10; longer and wider Long Bed than Ford Ranger.

ONE HECK-OF-A SAVER. Nissan MPG Standard.**

EST HWY **43** **31** EPA EST MPG **\$5,995***

** Use estimated mpg for comparison, with standard 5-speed. Actual mileage may differ depending on speed, trip length and weather. Hwy mileage will probably be less.

- Special 2-liter NAPS-Z engine** powers Nissan MPG Standard Truck to the highest truck gas mileage.
- Every Nissan truck gives you solid value for your money, with extra features at no extra cost.

NISSAN WE ARE DRIVEN DATSUN

NISSAN 4WD
KING CAB
29 **21****
EST EPA EST
HWY MPG





DETROIT LISTENING POST

GM A-car wagons coming

After a slow start last year, GM's excellent front-wheel-drive, mid-size, A-cars are beginning to really catch on with American car buyers. This fall there will be new incentives in Chevrolet, Pontiac, Oldsmobile and Buick showrooms: A-car station wagons. These will share the two-door and four-door sedan's 104.9-inch wheelbase and will be little different in overall length.

There'll be a choice of 2.5-liter, fuel-injected, four-cylinder, gas V6 or diesel V6 power and three-speed or four-speed overdrive automatic transmissions. In keeping with current General Motors philosophy, each will have its own specific look and character: basic Chevrolet Celebrity; sporty Pontiac 6000; traditional, family-style Olds Ciera and sophisticated, luxury Buick Century.

We have long considered the A-cars among the nicest-driving automobiles available anywhere, and these new wagon versions offer a logical size alternative between GM's smaller J-car wagons and the larger, heavier rear-drive Gs.



New GM wagons that are based on the excellent A-car platform will provide nearly as much cargo room as the standard, full-size wagons, but they will have trimmer exteriors along with fuel-efficient four- and six-cylinder engines.

Shows give peek at future

More than any year in recent memory, last winter's '83 auto shows offered wide-eyed visitors a glimpse into the automotive future, from 1984 to well beyond.

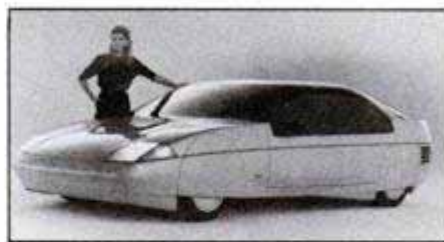
The philosophies of the Big Three differed substantially on how much and what to show, however. General Motors, conservative as always, took the attitude: "Show 'em what we've got to sell right now." With one exception (Buick), this made the GM car divisions' displays among the least exciting.

Ford Motor Co. proudly displayed its ultra-aerodynamic Probe IV design study, along with a Continental Concept 100 idea car that was very close in appearance to the real 1984 Lincoln Mark VII. Chrysler Corp. brazenly showed finished fiberglass models of its '84 G-24 sport coupes (due this fall) and a Mercedes-like two-seater luxury convertible that's likely to reach production in another couple of years.

Chevrolet's display highlighted the new aero-nosed Monte Carlo SS, which will be the basis for that division's NASCAR racers in '83, plus a stock S-10 pickup that successfully finished the 985-mile '82 Baja 1000 off-road race. Pontiac had on hand a replica of Richard Petty's NASCAR Grand Prix, a copy of the special Daytona 500 Trans Am pace car, and one of the show's most tasteless creations: a new-model 6000 sedan with a half-vinyl roof cap and opera windows (it worked in 1975, so let's do it again!).



A Mercedes-like Chrysler two-seater is only a definite maybe for production now.



Ford's superslick Probe IV is claimed to have the same Cd as a jet fighter (0.15).

The single exception to the generally boring GM displays was Buick's, which featured a fascinating electronic concept car called Questor. A sleek and very rounded open-top two-seater, it was developed in conjunction with GM Design Staff and the corporation's Delco Electronics Div. (For more on the Questor, see *Technology Update*, page 211.)

Ford's bullet-like Probe IV, fourth in the company's series of aerodynamic research cars and a theoretically practical (Please turn to page 16)

\$2
Rebate
34qt.

\$3
Rebate
25qt.

\$4
Rebate
48qt.

Here's a rebate that's tough to beat on some tough Igloo® ice chests.

Igloo ice chests are built tough to withstand a lot of beatings. And now, until June 15, their money-saving rebates make them a deal that's tough to beat.

Get a \$2, \$3 or \$4 rebate on Igloo ice chests.

To get your rebate: (1) Purchase a 25-, 34- or 48-Qt. ice chest between April 15–June 15, 1983. (2) Save your dated sales receipt (circle price). (3) As proof of purchase, clip the group product photograph from the warranty card packed inside each unit or the model number from the carton (include one for each product purchased). (4) Mail the dated sales receipt, proof of purchase and this coupon to: Igloo Rebate, Box PM199, El Paso, TX 79966. Reproductions of this coupon are not acceptable.

Rebate requests must be postmarked no later than June 30, 1983. Requests received after June 30 will be returned. Limit one rebate per product, family, group or organization. Failure to follow instructions will void rebate offer.

Allow 6–10 weeks to process your rebate request. Void where prohibited, taxed or restricted by law. Offer good only in U.S.A. Igloo Corp. will not honor a coupon redeemed by agencies, brokers, organizations or others who are not Igloo retail customers. © 1983 Igloo Corporation.

Check box for each Igloo ice chest purchased. \$_____ Total rebate expected.

\$2.00 on Igloo 34-Qt. Model 347, 348, 349, 857, 858, 859 \$3.00 on Igloo 25-Qt. Model 7, 8, 9

Complete the following: (please print clearly) \$4.00 on Igloo 48-Qt. Model 70, 80, 90

Name _____ Address _____

City _____ State _____ Zip _____

Purchased at _____



igloo
BUILT TO SURVIVE THE REAL WORLD.™

DETROIT LISTENING POST

(Continued from page 14)

cal four-passenger, five-door hatchback, has a claimed drag coefficient of just 0.15—which (Ford says) is roughly equivalent to that of a jet fighter plane! To achieve such unbelievably low wind resistance, Ford's aero engineers enclosed the car's underbody, covered its front wheels with flexible plastic skirts, mounted its radiator in the rear, and developed a front air dam that automatically lowers itself and an electronically controlled suspension that adjusts the car's attitude as speed increases.

Continental Concept 100 is an electronics showcase with what Ford believes is "the greatest array of functioning advanced electronics ever assembled in one vehicle." These features include satellite navigation, a remote convenience system, voice-command controls, keyless entry and ignition, cathode-ray-tube and liquid-crystal instrumentation, a Sonar Detection system (for parking and backing, not submarine tracking) four-wheel antiskid brakes, electronically controlled air

suspension, an entertainment system with front and rear controls linked by fiber-optic cables to a remote radio chassis, even an Intellivision video game in the rear compartment. This car is driveable, all its systems are functional—and its styling gives a preview of this fall's '84 Lincoln Mark VII.

Beside the G-24 sport coupes (now officially named Dodge Daytona and Chrysler Laser), the '83½ Shelby Dodge, a Dodge Charger road racing car and a customized Shelby Rampage "Street Fighter" sport truck, Chrysler showed off a terrific-looking two-seat Turbo roadster "to measure public interest in small specialty cars and evaluate production potential." It's based on a shortened LeBaron convertible platform, powered by the same turbocharged 2.2-liter four-cylinder engine that will be optional in the '84 Daytona and Laser, and sports a Mercedes 380 SLC-copy front end. Though Chrysler chairman Lee Iacocca has never been a two-seater fan, ecstatic reactions from nearly everyone who saw this little beauty indicate that it has an excellent chance of reaching production (in time to counter the proposed Buick and Cadillac sports cars).



Ziploc® Storage Bags help keep your backpacking equipment on the right trail. Ziploc Storage Bags are strong and easy to use. And their tough seal seals out the great outdoors to keep your gear dry.

You can pack hundreds of different things in Ziploc Storage Bags: matches, fresh change of clothes, first aid kit. Just about anything you can think of. And of course, there's no better way to store and carry food.

Next camping trip, let moisture and mildew take a hike. Use Ziploc Storage Bags. The Backpacker Pack.

ZIPLOC BAGS

*Trademark of The Dow Chemical Company.

Avanti no longer a secret

America's sixth largest—and least known—automaker, Avanti, recently purchased by Washington, D.C., real estate developer Stephen Blake, is fast moving out into the open. Blake has been displaying the sexy 2+2 Avanti at major auto shows and is holding press conferences across the country to publicize the car and his future plans.

For those who don't know, the Avanti was introduced to high acclaim in late 1962. Its mission was no less than to save the foundering Studebaker Corp., but the company folded its automaking operations anyway in 1964. A former Studebaker dealer named Nate Altman then bought the rights, the plant and all the equipment to produce it, and he and his heirs (he died in 1976) have done so, very profitably, for the past 19 years.

The company has kept a low profile throughout that time, hand-building fewer than 200 high-quality, \$30,000 Avantis per year and requiring most of its customers to travel to the ancient South Bend, Ind., plant to pick them up. Since taking over last October, however, Blake has been busy improving the plant's efficiency and upgrading the car itself, which has hardly changed in its 20-year history.

Stay tuned for more after I've visited the plant and driven the car. **PM**

Now! Enjoy a complete home shop at a substantial savings ...

in no more space than a bicycle!

Now you can own the woodworking tools you need to turn out precise, top-quality projects. And you don't need a large workshop area, because Shopsmith's space-slingy MARK V uses no more space than a bicycle!

Over a quarter-million American woodworkers have discovered the joys of woodworking the Shopsmith way — while becoming better woodworkers in the process.

You see, a man's work is only as good as his tools. And Shopsmith builds in the precision and quality you need to add the professional touches to your woodworking projects. In other words, you don't have to be a master craftsman to create impressive projects. But with patience, practice and a MARK V, you'll be hard-pressed to tell the difference.

You'll Save Money . . . We call the Shopsmith MARK V "the complete woodworking system". Why? Because this extremely versatile tool gives you the five basic woodworking functions — sawing, drilling, horizontal boring, lathe turning and sanding.

And all five functions are powered by one rugged, variable-

speed motor. That means you save money because it costs you lots less than five individual power tools. You also save a roomful of space!

But that's just the beginning. The Shopsmith system lets you add on quality accessories when you're ready, such as, molding, shaping, routing, dadoing, mortising, and more.

Use the MARK V to create custom hardwood furniture at half the price of retail, do household repairs, add a tool shed, or craft special toys for your children . . . the list is endless. You could even build your own house with it!

We can only begin to tell you the entire story with this ad. But we'll be happy to send you additional information about Shopsmith and the incredible MARK V. So fill in and mail the coupon below. It's **FREE**, so do it right away!



Shopsmith Inc.

The Home Workshop Company
750 Center Drive
Vandalia, Ohio 45377

Send in this coupon
or Call: **1-800-228-1066**
(in Nebraska 1-800-642-8788)

©Shopsmith, Inc. 1982

Quality Woodworking
Tools Made in U.S.A.

Send for your FREE fact kit and find out why... the Shopsmith MARK V is the tool to start with ... the system you grow with.



YES! Please send my FREE Information Kit on the Shopsmith MARK V, including the booklet, "How To Determine Your Best Power Tool Buy", PLUS all the details on how I can use the MARK V in my home for 30 days at no risk. Also enter my name for a FREE one-year subscription to **HANDS ON!**, the woodworking magazine. I understand this information is FREE and I am under no obligation.

Name _____
Address _____
City _____
State _____ Zip _____

Shopsmith, Inc.
The Home Workshop Company
750 Center Drive
Vandalia, Ohio 45377

Dept. 3606



Lynch mob

I'm ready to strangle my 1978 Chevrolet Malibu, which has a V6 200-cu.-in. engine. For over two years it has, on occasion, sputtered and lacked power on acceleration. Even flooring the gas pedal won't stop it from fluttering along at 20 to 30 mph. As luck would have it, the engine has acted normally when mechanics checked it out. But now we've got it. The other day it performed badly for my most recent mechanic, who found that three cylinders on the passenger side of the engine weren't firing. However, he can't figure out why. Can you tell us what to do?—Dennis J. Lynch, Jacksonville, N.Y.

Sure—replace the pickup coil in the High Energy Ignition (HEI) distributor. The pickup coil on this engine causes a little less voltage to be generated in the three cylinders on the right-hand side of the engine than on the left-hand side.

Thus, when something disrupts the voltage output, the three right-hand cylinders are affected while the left-hand three may not be. That "something" could be pickup coil susceptibility to excessive heat, cold or humidity. Or it could be a poor pickup coil connection or broken winding.

Whatever the case, the pickup coil is the key, so replace it.

P185/70R13s on the left and two of your P185/65R14s that may still be in good condition on the right. This would create a dangerous driving situation.

Rings have their fling

This letter concerns a 1980 Buick Skylark (2.8-liter engine) that I recently bought from a private party. The car is equipped with power steering. When the engine is first started, the steering wheel is hard to turn, but it frees itself after a few miles of driving.

I asked the previous owner about this and he said the car's been that way since it was new. He told me the dealer had said the condition is normal. My friend's Pontiac Phoenix is the same way, so I think maybe the dealer is right. Is he correct?—R.H. Thompson, Terre Haute, Ind.

No, he's not. The problem can be solved by replacing the four rack-and-pinion steering valve body rings with a new kit that carries part No. 7840573.

The rack-and-pinion steering valve
(Please turn to page 22)

Tire trauma

My 1981 Plymouth Reliant SE (Special Edition) came with a heavy-duty suspension system. Goodyear Ariva P185/65R14 tires were part of the package. I now need two new tires and find that Goodyear dealers are asking \$89 per tire. Too high, I figured, so I started shopping. It was a waste of time.

No other tire manufacturer makes a P185/65R14 tire, and I've been told that no other size tire will fit. Is this true?—Donald Geczi, East Brunswick, N.J.

Another size will fit, but I don't know if you'll want to use it.

K-cars have three designated tire sizes. The P185/65R14 (Goodyear Ariva) is designed to handle the heavier loads which can be carried by the higher-priced 1981 and 1982 Reliant and Aries SE models and the 1982 Chrysler LeBaron, Dodge 400 and station wagon. These have heavier suspensions. Other model K-cars, which use P185/70R13 or P175/R13 (sizes made by most tire manufacturers), have suspensions that can't carry the loads the others can handle.

You could buy four 13-inch rims and wheel covers, and four P185/70R13 tires for your SE model, but you will sacrifice the car's load-carrying ability. Braking and handling may also be affected.

What you should not do is substitute

another size 14-inch tire, since the fender housings will bottom against the tires on bounces.

Something else you should *not* do is use tires of one size on one side of the car and tires of another size on the other side of the car—for example, two

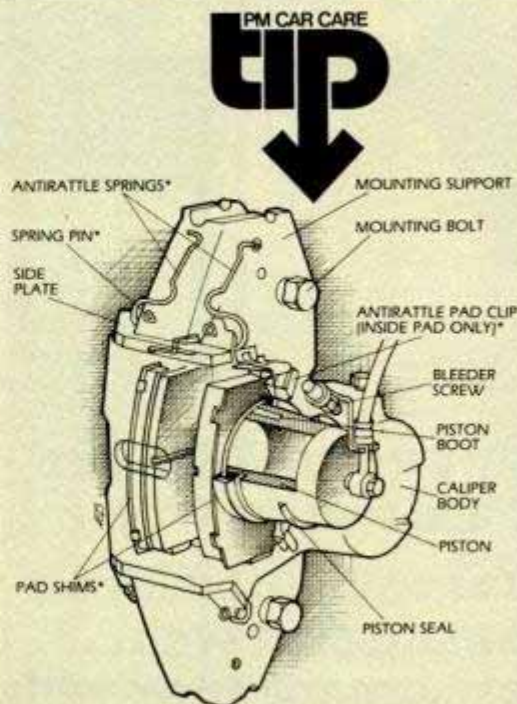
Like a stuck pig

Don't buy the story that disc brake squeal is a normal condition. It isn't.

A major reason for brake squeal is loose disc brake pads. If the brake pads aren't tight in the caliper, they will vibrate. If the frequency of the brake pad vibration is high enough, it will create a sound like a squeal.

The most reliable method of avoiding brake squeal from loose pads is the installation of new hold-down springs, clips and shims (if they are used) when replacing the disc brake pads. Hold-down springs, clips and shims are usually included in the replacement pad kit.

If there are no shims in the replacement kit and they are recommended by the pad manufacturer, you should spray adhesive on the backs of the disc brake pads to help deaden the sound.



*PARTS TO REPLACE WHEN INSTALLING NEW PADS TO AVOID SQUEAL (NOT ALL BRAKES HAVE ALL OF THESE)

Live the Legend



Dunlop Radial Rovers

Dunlop's heritage of quality, innovation and triumph is legendary . . . proven at the most grueling off-road race, the East African Safari Rally.

Since this race began in 1964, Dunlop has won an incredible 15 times!

We apply this racing technology to our light truck radials, so when you bolt on a set of Radial Rovers, you'll bring the legend to life on your pickup, van or 4x4.

Dunlop Radial Rovers . . . RV, Rib and Traction . . . let you tame the back roads with twin steel belts reinforced by belt guards for trailblazing strength and durability.

And whether you're clawing your way through the rough stuff, or breezing along the superhighway, Dunlop Radial Rovers deliver the smooth-rolling, sure-footed confidence that comes from riding on a legend.

And they do it all with the rugged styling of raised outline white letter sidewalls.

Ask your Dunlop dealer which Radial Rover fits your driving needs.

Backwoods, beach, or boulevard, live the legend with Dunlop Radial Rovers.

 **DUNLOP**
For the long run

Dunlop Tire & Rubber Corp., Buffalo NY 14240

CAR CLINIC

(Continued from page 20)

body rings presently in your system don't have sufficient resiliency to seal properly when they're cold. Therefore, not enough pressure builds up in the steering gear, and steering remains difficult until the rings "loosen up" and seal.

Incidentally, you may continue having a problem if the service technician forgets to flush the system to get rid of foreign matter before installing the new rings. It's worth it to remind him.

Keeping 'em rolling

I desperately need a new crankshaft pulley for a 1960 Oldsmobile, but no dealer, parts outlet or salvage yard around here has one. Please help.—Joseph R. Avignon, Bronx, N.Y.

I picked your letter because it echoes scores of others I get. I suggest that those who own older model vehicles for which they're having trouble getting parts buy a copy of *Hemmings' Vintage Auto Almanac*.

The latest edition contains over 3,000 entries of services and businesses throughout the country that specialize in older cars and pickup

trucks. Listings include parts and accessory supply outlets, dealers in old cars, restoration shops, salvage yards and sources for technical literature.

In your case, I found four companies that may have the crankshaft pulley you need.

Your best shot is to contact Lyle G. Nobles, R.D. Box 231, Bolivar, N.Y. 14715, (716) 928-1886. The listing describes this business as being engaged in the selling of engine parts for older models—"specializing in Oldsmobile."

To order *Hemmings' Vintage Auto Almanac*, send \$9.95 to Box 945R, Bennington, Vt. 05201.

Unknown connections

How do I adjust the ignition timing of a 2.3-liter engine in a 1980 Ford Pinto with manual transmission and no air conditioning? I've been trying to do it according to instructions on the decal in the engine compartment, which say to disconnect the module connector. But there are two connectors on my engine, and I've tried disconnecting one, then the other and finally both. In every case, the engine dies. What gives?—Don Nestor, Hinckley, Ill.

A wrong decal, that's what.

The ignition systems of 1980 2.3-

Recalcitrant reluctor



Call it what you will—a trigger wheel, reluctor, armature—it's a part of many electronic ignition systems (the HEI is an exception) that can cause an engine performance problem if it's damaged. So if you can't find the reason for hard starting or missing, inspect the reluctor. Replace one that's cracked or chipped.

If it looks okay, use a plastic feeler gauge to determine if the gap between the reluctor and pole piece is correctly set. Check your service manual or ask a dealership service manager for the recommended specification.



RELUCTOR (ALSO CALLED ARMATURE TRIGGER WHEEL)

The Dry Look holds today's look all day.



Available in pump or aerosol

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

The Dry Look.
12-hour holding power.

© The Gillette Co. 1983

LEADERS HAVE TASTE



Grenadiers reward the choosy smoker every way. Lean good looks. Rich aroma. Satisfying taste. A blend of five imported and domestic tobaccos, in light or dark natural wrapper, flavor-sealed in our Fresh Loc pack.



A&C GRENADIERS—THE TASTE LEADER

liter engines have either two or three connectors.

Engines that have three connectors have as part of a number embossed on the ignition module the digits 12A224. With this unit, the connector having yellow and black wires has to be disconnected to accurately time the ignition.

With your engine, you don't need to disconnect anything. To adjust the timing, place the transmission in NEUTRAL and bring the engine to operating temperature. Then disconnect the vacuum hose from the distributor vacuum advance connection and plug the hose opening. With the engine running at 850 rpm or less, adjust timing to 6° BTDC.

Whistling from Dixie

My 1979 Chevrolet Impala six-cylinder engine developed a persistent whistling noise when idling or running. Since I bought the car, I've had to have alternator diodes replaced twice. Now, the Chevy dealer tells me that the noise, which he calls magnetic whistle, is something I'll either have to learn to live with or get rid of by installing a new alternator. Can you tell me what's going on?—Herbert Beers, West Palm Beach, Fla.

This may be an example of a left-handed alternator having a right-handed mentality, or vice versa.

To find out what I mean, examine the alternator to determine in which direction the fins point. Now, let the engine idle and then check to see in exactly which direction the fan (pulley) rotates.

Is it turning in the direction opposite to the one in which the fins are pointing? If so, this would readily account for both the whistle and diode trouble.

If the fan and fins are in different directions, the amount of air needed by the diodes to stay cool is being curtailed. That's why diodes are burning out.

As for the whine or whistle, that has to do with the erratic movement of air over the backward fins.

In order to correct both the noise and diode problems, you should replace the alternator end cover with one that has fins which point in the same direction as the pulley rotates. **FM**

DO YOU HAVE A CAR PROBLEM?

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

SERVICE TIPS

■ A noise from the front suspension of a 1983 Aries, Reliant, LeBaron, Dodge 400 or Dodge 600 on severe turns or over bumps can be corrected. First, though, the noise has to be isolated to one of three areas. Technical service bulletin (TSB) 02-10-82 advises dealership mechanics how to do this and then how to make the repair.

■ If your late-model Buick-built 3.8-liter V6 engine is burning oil, you may have a valve stem seal problem or the intake manifold may not be sealing properly. The latter situation could allow oil to be drawn out of the galley through the intake ports and into the combustion chambers. If this is happening, replace the intake gasket and torque manifold bolts as instructed in the service manual. If oil consumption continues, have valve stem seals checked. They may have to be replaced.

■ A 1981-83 Ford Escort or Mercury Lynx may also have an oil-loss problem—this because of the RTV sealer used in production. It's not effective. So, if oil is seeping from around the rocker cover of your 1.6-liter engine, install a new cover gasket (part No. E3FZ-6584-A) according to the instructions in TSB 82-26.

HOMEOWNERS' CLINIC



Ventilation problems in the attic

The 2-ft.-wide eave of my house has to be painted every two or three years because stains that resemble mildew begin to appear. Would this be caused by the kind of wood, or do I have a ventilation problem?—James D. Webb, Neon, Ky.

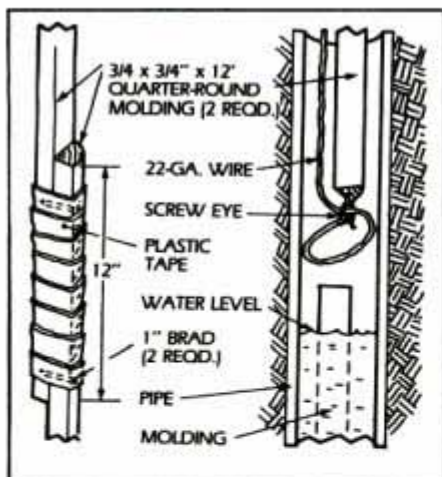
Jim, it does indeed appear that your

attic may not have adequate ventilation. If there are soffit vents, they might be covered with insulation. The minimum amount of free air ventilation should be $\frac{1}{150}$ of the ceiling area. For example, a 20 x 30 ft. house has a 600-sq.-ft. ceiling area. Minimum ventilation ($\frac{1}{150}$ of 600) is 4 sq. ft.

Going to the well

While trying to measure the depth of water in my well, I accidentally dropped a 9-ft. piece of molding down the 1½-in.-dia. well pipe of my summer home. From the top of the pipe to the water level it is 18 ft. I'm taking quite a kidding about this (with no solutions, however), and I'd like to get the molding out. Any ideas?—James Lindberg, New York

If you have the patience, I've got the solution. Fasten two 12-ft. sections of ¾-in. quarter-round molding together (see sketch). Tape them firmly after



A tool made of two pieces of quarter round taped together (detail, left), a screw eye and a wire loop at one end (detail, right) retrieves molding from pipe.

nailling them together. At one end install a screw eye, similar in size to the old hook and eye on screen doors. Use a 22-ga. soft wire to fashion a loop to snare the molding. This soft wire will hold its shape, but is ductile enough to pull through the screw eye.

Form the largest loop you can fit in

the pipe, and start fishing. If you can't use 12-ft. pieces, you may have to splice together shorter pieces. To play it safe, you may want to fasten a long piece of mason's line to the top of the probe.

Smoking stove

Like many other people, I installed a wood-burning stove in my trilevel house several years ago. It was recommended for the square footage of my house. However, from the start, smoke blew out through the door as soon as it was opened for stoking. We couldn't use the stove with the doors open at all. The shop where I purchased the stove recommended adding 2 ft. of chimney, which I did. The original installation had 6 ft. of single-wall pipe from the stove to the ceiling, then another 6 ft. of triple-wall pipe, topped with a traditional rain cap. Adding 2 ft. of pipe did nothing.

I also altered the rain cap and filled the spaces between the three layers of galvanized metal with vermiculite, as someone claimed circulating air drafts were prematurely cooling the stack fumes. This accomplished nothing.

Finally, I traded stoves. You guessed it, the new one smokes.

Now I have a beautiful new stove which heats the house wonderfully and efficiently, but we can't open the doors without smoking the place. Help! By the way, I am blind and receive PM in its braille edition. I read it cover to cover—three separate volumes—each month.—Robert Caron, Evans, Colo.

Robert, we thank you and take our hat off to you. You remind me of a special friend, also blind, who is an electrical engineer.

I checked your stove problem with

Dr. Tim Maxwell and lab director Tom Pruitt at the Woodburning Lab, Auburn University. Unfortunately, we came up with nothing definitive. There are several angles to consider, as the draft does not appear adequate.

Most coal stoves have recommended drafts. You can check this with a manometer; it should register .05 in. of water (this is taken in the flue).

The location of the stove in the house is important. If the stove is in the lower level of a trilevel, 14 ft. of chimney may not be enough. Large trees can interfere with your draft, causing high-pressure areas around the chimney. You could have air leaks in your house, causing air to rush out the cracks, creating a lower pressure around your stove.

Opening a window very slightly sometimes helps, but it must be on the pressure side of the house. Opening or closing doors on certain rooms can sometimes affect the air pressure in a house. In airtight homes, kitchen and bath exhaust fans can cause a down draft in the flue by reducing room air pressure.

Exhaust fan for painting

I'm building a small paint booth in my home to paint model cars. I want to exhaust the spray fumes outside. I need a fan that exhausts about 100 cu. ft. per min., and will discharge into a 3-in.-dia. duct.—Lawrence Nally, Pittsburgh

The closest I can come to a suggestion is one from W.W. Grainger Inc. (general office, 5959 West Howard St., Chicago, Ill. 60648). They have a tube axial fan (No. 4C659) that has a 12-in. diameter and moves 1300 cu. ft. per min. The fan with a drip-proof motor (No. 7F920) costs \$237.85; the fan with an explosion-proof motor (No. 7F922) is \$317. The company has distribution centers across the country. **PM**

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



With some mowers, the real trouble starts when the mower won't.

Let's face it, even the most dependable lawn mowers eventually need service. But if you own a John Deere, you've got something the other brands just can't offer. A John Deere dealer.

Not only does he have a large selection of parts already on hand, but anything he doesn't have, he can usually get within 24 hours through the FLASH™ computerized parts system. So you'll be out of the shop and back on your lawn in no time.

Of course, the way John Deere mowers are built, you probably won't be seeing him for quite some time.

The dependable 21-inch self-propelled model has a powerful 4-hp engine, self-charging electric start and a deep die-cast aluminum deck for efficient, uniform cuts. To save raking, there's a 2½-bushel bagging attachment that fills completely, even in damp mowing conditions. And with rear-wheel drive and large steel wheels, traction actually improves as the rear bag fills.

The deluxe 21-inch mower is also available in a push-type 3½-hp model with manual or electric start. Or you may prefer one of several push-type mowers with an 18- or 20-inch cutting width.

All are easy to start, built to last, and 100% factory checked. And all are equipped with a new safety system that stops both engine and blades if the operator leaves the controls.

For more information, or the name of your nearest dealer, call 800-447-9126 toll free (800-322-6796 in Illinois) or write John Deere, Dept. 62, Moline, Illinois 61265.



Nothing Runs Like a Deere®



SCIENCE WORLDWIDE



Researcher does a slow burn

Better fire extinguishers may soon be available thanks to the research efforts of Penn State chemist Jim Reuther. He created a "fluidized bed" apparatus to make the research possible. The bed is a glass cylinder through which a constant stream of gas moves chemical fire retardants at rates that can be adjusted with mind-boggling precision—down to grains per millisecond. Thus, Reuther can do something no researcher before him could do—determine exactly how much of a given retardant is needed for various types of fires.

His tabletop apparatus also includes a pair of metallic boxes that contain flames fed by any gas Reuther chooses, such as ordinary household air, methane gas or any other fire medium. With his lab setup, Reuther has confirmed and quantified something most householders already suspected. It takes just one pound of potassium bicarbonate to put out a fire that would need 500 pounds of water to do the same job.



Jim Reuther watches flame as apparatus feeds precise amount of substance being evaluated for use in fire extinguishers.

Spitballs and domes

If you listen to major league pitchers, very few have ever seen a spitball. The pitch is outlawed because it is almost impossible to hit and could slow baseball games to a near standstill. Curious as to how baseball players perceive their environment, I polled 75 big-leaguers, including 23 pitchers, before the start of this baseball season. Only three pitchers admitted ever having seen a spitball. (All players were promised anonymity.) Among the 52 non-pitchers, 39 said they had seen a spitball.

When it comes to stadiums, 46 of the players we talked to agreed that domes will enliven the game overall, even though five noted that Houston's Astrodome is tough on home-run hitters. Of course the Astrodome has the longest distance between home plate and the home run fence of any domed stadium in baseball.

Domes in Minnesota and Seattle, however, have calmed outfield winds so much that the baseball pops out of those stadiums for more home-run action.

Milky Way shake-up

Retired University of Arizona astronomer Bart J. Bok says the Milky Way—our sun's home galaxy—is beginning to show some unexpected bulge. Bok told a recent American Astronomical Society gathering that observations of the past 10 years indicate the Milky Way is probably three times wider than estimated in the 1970s and as much as six times more massive. Much of the added bulk, Bok says, probably comes from the recently discovered galactic corona, an envelope of dust that surrounds our galaxy.

Handle hands with care

If after working around the garage or shop all day your hands crack and even blister or bleed, you may be over-washing. Robert Warner, Mount Sinai School of Medicine (New York) professor, says men who work with paint, grease and oil generally use the wrong soaps and wash their hands too much. He suggests using superfatted soaps and limiting your hand-washing to no more than a couple of times a day.

Brits brook American trout

British sports fishermen have been talking about it for a number of years, and now British scientists have confirmed it. American trout are taking over streams once reserved for the brown-speckled native, *S. trutta*. The hardy American cousins are the rainbow trout (*S. gairdineri*) and brook trout (*S. fontinalis*). American trout grow faster in hatchery conditions and tolerate more hostile water environments, such as heat or low oxygen content. Surveying recent British scientific studies of the American invasion in *New Scientist*, researcher Stephen Mills also points out that American trout are better than the natives at surviving British winters.

Worms turn in sea cave

About the last thing a diver expects to find in an undersea cave is a stalactite—long projections that hang from the ceiling like icicles. They are formed by slowly dripping water, rich in calcium carbonate. A stalactite wouldn't be expected in the turbulence of the Caribbean. But it was in a submerged Caribbean cave off the coast of Belize (formerly British Honduras) that a diver



Pseudostalactites found in submerged cave are tubes made by sea worms.

recently found what looked like stalactites. A team at the Smithsonian National Museum of Natural History visited the cave last year and is heading back next month for further studies. Laboratory examination of what are now dubbed pseudostalactites show that they are tubes created by worms living on the cave roof about 15 feet below the water surface. How the undersea tubes are made is a question expected to be answered after next month's dive. **PM**



When the tournament's on the line, better fish Stren.[®]

You'd be the winner right now if only your line had held that big bass you hooked. Next time, improve your odds with dependable Stren, from DuPont.

Of all premium lines, only Stren has the best balance of properties you need to fight the fish every step of the way. And Stren stands up whether you're in heavy cover or around jagged rocks. That's why pros who use Stren win more money year after year than those who use all other lines combined. Be a winner and pick up a Pak of Stren, available in clear/blue, golden, and new clear.

Great fishing starts with Stren.



Material, защищенный авторским правом

THE PM WORKBENCH



For your workshop bookshelf

More and more manufacturers seem to be getting into the publishing business these days. Most, of course, want do-it-yourselfers (or homeowners in general) to become acquainted with their products so they will buy them.

The result is a plethora of very solid how-to reading at very little cost or, in many cases, for free. Here are a number of booklets and related materials that are worthwhile reading:

The American Rental Assn. has produced a series of folders, each explaining which tools can be rented for which tasks. For example, folder No. 1 discusses tools for working with concrete, No. 2 covers plumbing tools, and so on. The folders are free at all rental centers that are members of the American Rental Assn. You might be surprised at the number and variety of tools that are available to the one-time or occasional user.

Readers considering building a manufactured house will be interested in

Pre-Cut International Homes' color catalog, which shows more than 40 models to choose from. All of the homes are built using their exclusive Thermo-Lam wall system. To get their catalog, send \$5 to Phil Greger, Pre-Cut International Homes, Box 886-PM, Woodinville, Wash. 98072.

Living With The Sun, a booklet that describes the benefits of passive solar energy in home design, includes 50 full-color photographs of passive solar homes. To obtain a copy, send \$1 to PPG Industries Inc., 1 Gateway Center, 10 North, Dept. PM-583, Pittsburgh, Pa. 15222.

Another useful offering is a 22 x 34-in., all-in-one hand tool reference wall chart tailored for the professional, do-it-yourselfer and shop classroom. The well-illustrated chart pictures 86 different hand tools. It's \$1 postpaid from Hand Tools Institute, 25 North Broadway, Dept. PM-583, Tarrytown, N.Y. 10591.—H.W.

Woodburning revisited

Thanks to Dremel, Div. of Emerson Electric Co., 4915 21st St., Racine, Wis. 53406, I spent a couple of hours doing something I have not done in years—burning designs in wood. I can say without hesitation that it's as much fun as ever—perhaps even more fun.



Design is taped to the wood with carbon below, transferred using ballpoint pen.



The burning in then proceeds. You can pick from 12 designs that come with the Dremel kit or you can create your own.



Kit includes two hardwood slabs, directions, designs, sandpaper, carbon paper and woodburning tool with one point.

Nostalgic brace and bit

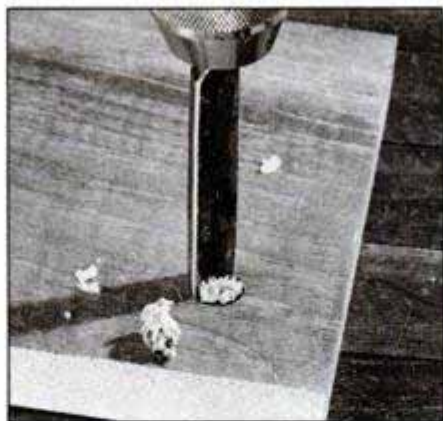
Like many woodworkers, I have secretly wished for an old-fashioned bit brace that I could use on projects in my own shop.

My dream was realized with this handsome and exact reproduction of a brace from another era. This nostalgic boring device is made of solid teak with brass bindings.

To make my occasional forays into yesterday's shop habits even more romantic, I have also added the spoon bit set, which consists of nine bits in a handy protective canvas carrying roll.



Conover Woodcraft's brace is authentic-looking replica of an old-fashioned tool.



Spoon bits are perfect for boring dowel plug holes. Old World craftsmen used them to bore chair legs for spindles.

The bit sizes are $\frac{3}{16}$, $\frac{3}{8}$, $\frac{7}{16}$, $\frac{1}{2}$, $\frac{9}{16}$, $1\frac{1}{16}$, $\frac{3}{4}$ and 1 in. in diameter, and one bung reamer.

The bit brace (No. C390) is priced at about \$90; the spoon bit set (No. C710) is approximately \$80. Both the brace and the spoon bit set are available from Conover Woodcraft Specialties Inc., 18125 Madison Rd., Parkman, Ohio 44080.—H.W.

thanks to this nifty kit. The kit comes complete as shown and you can start on a plaque as soon as you open the box. Accessory nibs are available at a nominal cost for those who want to be more precise. The kit (No. 1510) sells for \$59.95 at craftsman and artist stores and at hobby shops.—H.W.

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



68 GOLF

AIRCRAFT STRUCTURAL REPAIR

If you're interested in aviation maintenance, get off to a flying start as a "68 Golf." That's Army shorthand for a soldier responsible for keeping Army aircraft structurally sound. From the outside of a helicopter to the insides of a diesel engine, you can choose from over 300 career training areas. Qualify, and we'll guarantee your choice. Which means you can serve your country in the way that best suits your talents. So if it's not 68 Golf, it might be 62 Bravo.*

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

Construction Equipment Repair

For more information, call toll free, 800-421-4422. In California, 800-252-0011. Alaska & Hawaii, 800-423-2244.

APPLIANCE CLINIC



Oven stops after two hours

My nephew, the troubleshooter for my household, suggested that I write to you concerning my General Electric Americana range, model No. J797CIAV, serial No. DCZ 18035. The problem: After anything bakes for about two hours in the lower oven, the temperature knob light goes out. Then the "bake" oven set indicator knob light goes out. The oven stops heating completely. After a couple of hours have passed and the controls have been reset, the oven will function normally for a while. Then it goes out again. I am hoping you might help

locate the source of my problem.—Mrs. Emma Kuzma, Binghamton, N.Y.

It seems that all of the symptoms point to a damaged oven selector switch. Most likely contacts M and L1 on the switch are badly pitted, causing erratic contact during the bake cycle. When the switch opens, all power is cut off to the bake and oven indicator lights and to the transformer. You and your nephew might want to change the oven selector switch together. The part number is WB22X55. It is still available through General Electric service centers.

Washer: Unplug the washer and remove the rear access service cover. Disconnect the drain hoses at the pump. If the machine is equipped with a self-cleaning filter, remove the drain hoses from it also. Allow all the water to drain from the pump, hoses and tub. Disconnect the water fill hoses.

Dryer (gas and electric): Use a vacuum cleaner to remove any lint that may have accumulated in the filter or the exhaust duct in the dryer. *Note:* On a gas dryer, when disconnecting the gas supply from the dryer, cap the gas line tubing going into the dryer using a 3/8-in. black iron pipe cap.

Range (gas or electric): Clean it thoroughly. If you have a self-cleaning range, position the door-locking mechanism in the bake (open) position. Cap the gas line of a gas range using either 1/2- or 3/4-in. black iron pipe cap depending on the manifold pipe size.

Refrigerator: Clean the interior with a solution of baking soda and water. Clean the water collection pan under the refrigerator, if there is one. Spray the door gaskets with a silicone lubricant. The doors should be left ajar a few inches. You might try taping a piece of styrene foam between the door and the cabinet to keep it open. Most modern refrigerators close by magnetic seal, which can be pushed open easily from within. However, as a safety measure for curious children, tie a rope through the handle around the propped-open refrigerator so the styrene foam can't be pried loose easily.

To absorb moisture or odors in the refrigerator, use crumpled newspaper and baking soda on the shelves.

Electric shaver parts update

Following is the latest on the company supplying parts and service for electric shavers listed in *How To Repair An Electric Razor* (page 132, Feb. '83). The company is: Authorized Appliance Service, 290 Rte. 18, East Brunswick, N.J. 08816. **FM**

Repairing molded plastic

I have a Whirlpool refrigerator, Model EDT201ZK. I have a problem with the molded plastic door liner. The liner has broken at the point where the shelf rail that contains stored items is attached. The rail has simply pulled out of the liner. There is also another crack on another shelf. This makes the shelves unusable and reduces the storage capacity of the unit. I've been unable to find an adhesive or method of repairing the door adequately.—John W. McCoy, Sumter, S.C.

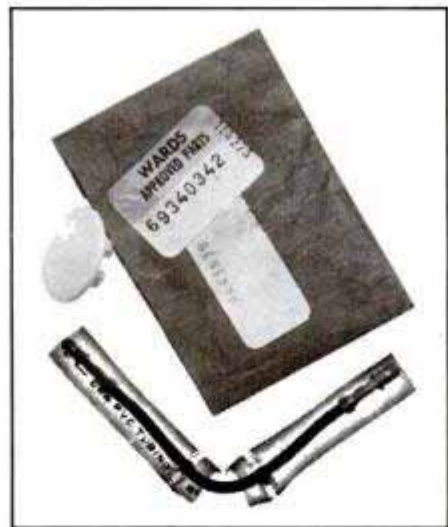
Unfortunately, I know of no satisfactory method of gluing your door liner. It is subject to both torsional and longitudinal stress; it also supports the door to a certain extent.

The only real way to correct your problem is to replace the entire inner door liner. The liner is available at any Whirlpool service or parts center. The part number is 482529. It's about \$58.

Refrigerator fan switches

I have received several letters concerning burned-out fan switches on Montgomery Ward side-by-side refrigerators. The manufacturer makes a fan switch elimination kit which can be used on 1974 and older refrigerator models. The kit eliminates the switch and lets the fan run constantly.

The kit contains a fine jumper wire and a cover for the hole in the breaker



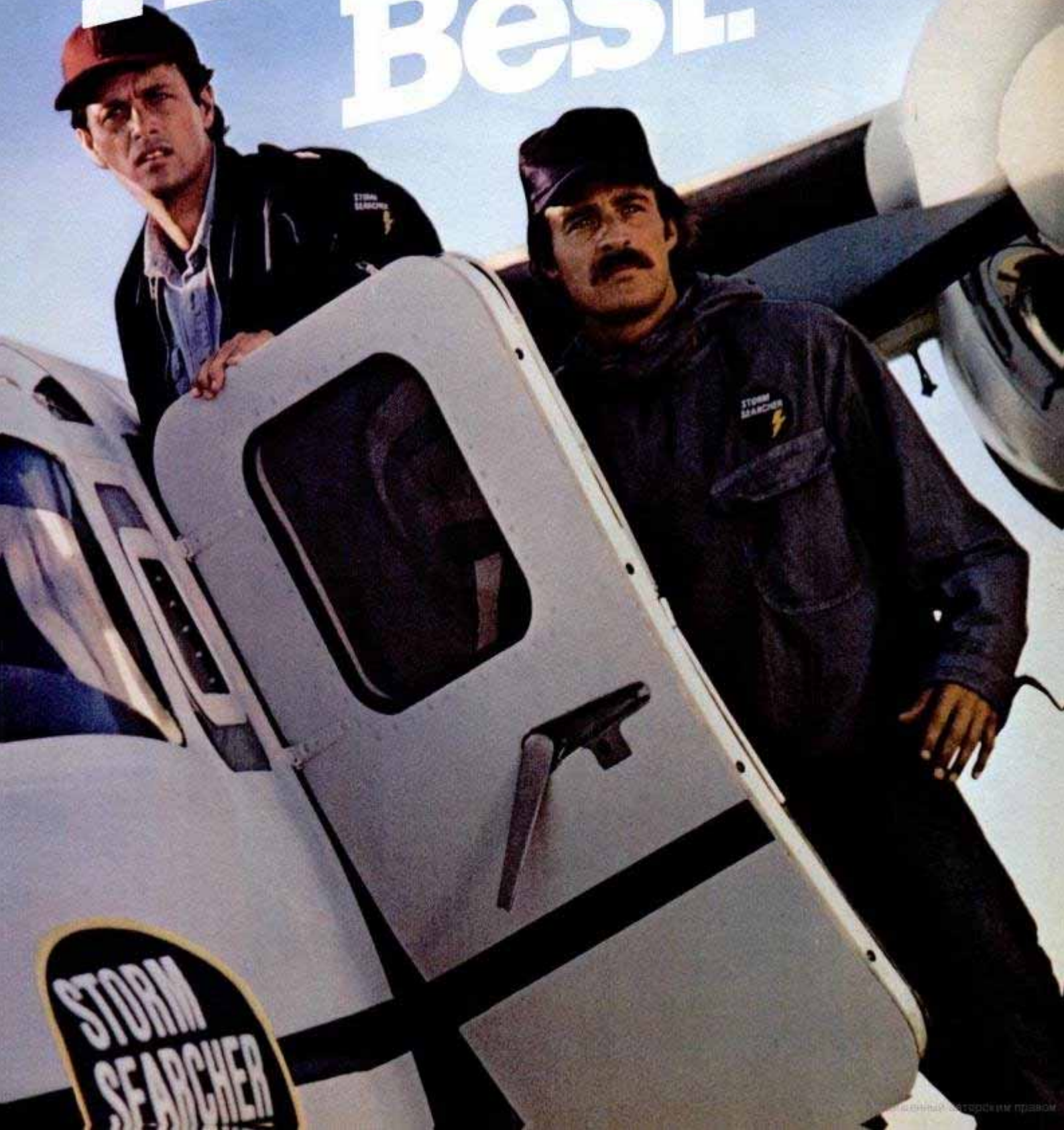
This fan switch eliminator kit contains a fine jumper wire and cover for the hole. trim. The part is No. 69340342; it can be ordered through any Montgomery Ward store or catalog for \$3.

Storing appliances

I am going to be overseas for three years and plan to put my washer, dryer, stove and refrigerator into storage. How should they be prepared?—Larry L. Cromer, Sumter, S.C.

Ideally, appliances should be stored in a cool, dry place to prevent any possibility of rust. Cover the appliances with a blanket or dropcloth to keep the dust off. *Caution:* Store appliances where children don't have access.

America's Best.



© 1997 Turner Broadcasting System, Inc. All rights reserved. www.turner.com

Winston. America's

LIGHTS: 9 mg. "tar", 0.7 mg. nicotine, LIGHTS 100's: 12 mg. "tar",
0.9 mg. nicotine, av. per cigarette by FTC method.

Materials

s Best.



Join the first team.
Reach for Winston.

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

Do-it-yourself prefinished parquet flooring



Now there's a hardwood parquet floor designed for do-it-yourself installation in high-traffic areas of your home such as foyers, hallways and game rooms.

Manufactured by Norwood, the flooring has a durable paste wax finish which the maker claims creates a low-maintenance, mar-resistant surface.

The $\frac{1}{16} \times 9\frac{1}{2} \times 11\frac{3}{8}$ -in. solid oak rectangles are installed just like vinyl floor tiles, using a mastic adhesive. The mastic is troweled onto concrete or a plywood subfloor, then the square-edged tiles are laid down.

Norwood parquet flooring comes in light and dark (shown) oak styles. The flooring is at home centers and lumberyards in 50-sq.-ft. bundles for \$1.89 per sq. ft. For the nearest dealer, write to Norandex Sales Co., 7400 Northfield Rd., Cleveland, Ohio 44146.

Once is enough



Red Devil's Onetime spackling compound is formulated to produce a finished, ready-to-paint surface in a single application. The manufacturer claims that Onetime won't shrink, crack or need sanding prior to painting. Onetime is especially helpful for large holes, which usually need a few applications. Onetime is at hardware and paint stores in $\frac{1}{2}$ -pint (\$2), pint (\$3.12), quart (\$5) and 1-gal. (\$13) containers. From Red Devil Inc., 2400 Vauxhall Rd., Union, N.J. 07083.

A golden lining

The Salton Goldfilter II automatic drip coffeemaker features a European discovery for delivering tastier coffee—a 24-karat gold-laminated filter basket. This unique filtering system requires no paper filters and is claimed to brew fine-flavored coffee.

The Goldfilter II, priced at

\$47.50, automatically brews from two to eight cups of coffee. A warmer plate maintains the temperature. The Goldfilter II is at gourmet shops and major department stores. For information, contact Joanna Cumberland, Salton Inc., 1260 Zerega Ave., Bronx, N.Y. 10462.



Textured wall coverings

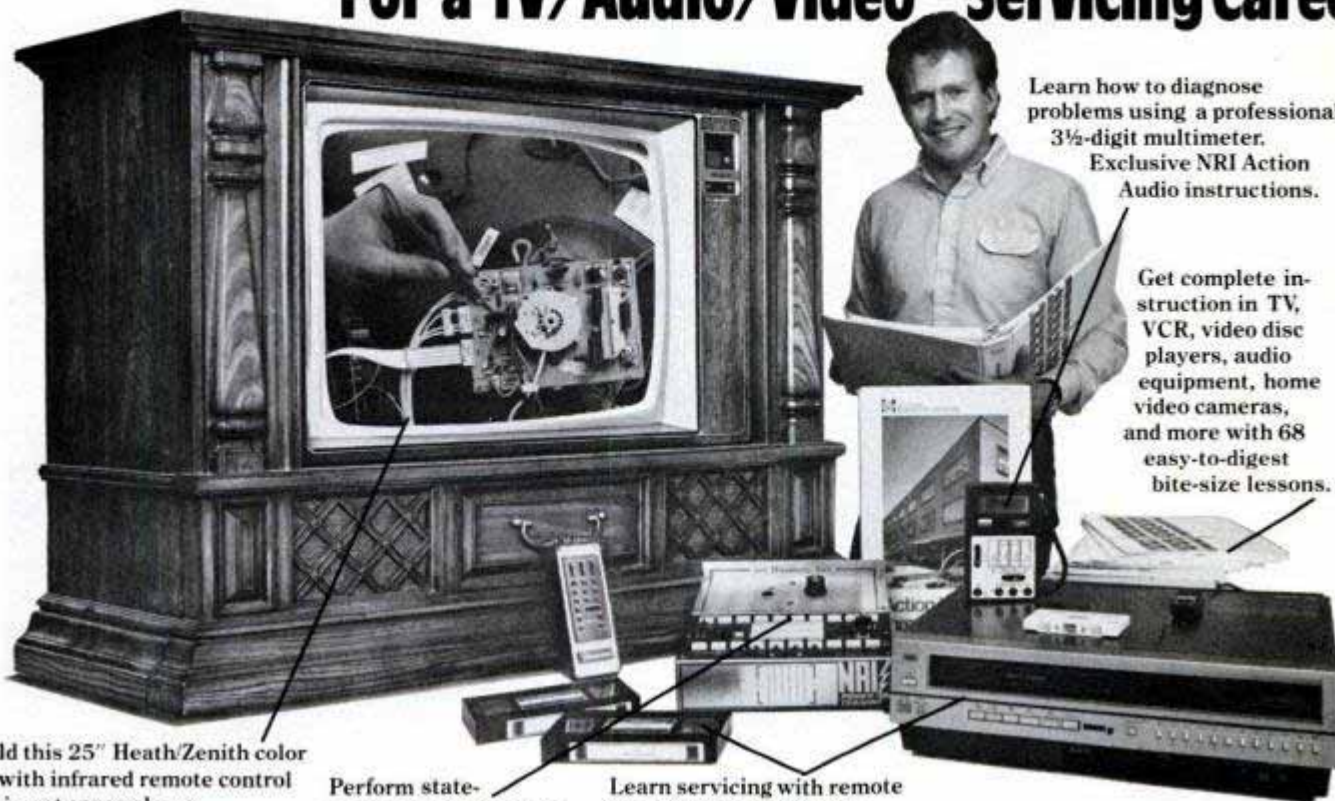


Columbus Coated Fabrics has introduced the Satinesque collection, a new line of fabric-backed vinyl wall coverings from Wall-Tex.

The Satinesque collection offers a wide selection of designs from oriental and Victorian to classic and contemporary. Textures range from sleek metallics to nubby tweeds, all in an array of new colors. The new wall coverings come in 156 patterns, making it easy to carry a color scheme from room to room. The wall coverings range in price from \$9.95 to \$21.95 per roll (27 in. wide \times 15 $\frac{1}{2}$ ft. long). For details, contact Columbus Coated Fabrics, 1280 North Grant Ave., Columbus, Ohio 43216.

PM

Only NRI Gives You This Kind of Training and Equipment. Only NRI Gives You So Much Professional Preparation For a TV/Audio/Video Servicing Career.



Learn how to diagnose problems using a professional 3½-digit multimeter. Exclusive NRI Action Audio instructions.

Get complete instruction in TV, VCR, video disc players, audio equipment, home video cameras, and more with 68 easy-to-digest bite-size lessons.

Build this 25" Heath/Zenith color TV with infrared remote control and in-set space phone.

Perform state-of-the-art experiments using your NRI Discovery Lab®.

Learn servicing with remote control videocassette recorder and NRI Action Video tapes.

Only NRI gives you so much of this kind of practical training with equipment you learn on and keep. Learn by doing. That's the way to make it interesting, that's the way to make it enjoyable, that's the way to get the hands-on experience and know-how you need.

Hands-On Training For Real Bench Experience and Priceless Confidence

You start with experiments and demonstrations on the unique NRI Discovery Lab. You learn basic circuit wiring and soldering techniques, and then quickly move on to more advanced concepts as you come to understand electronic theory, solid-state devices, digital systems, and microprocessors. You learn by actually building and observing the action of circuitry you'll be working with in real-life situations.

Exclusive NRI Training on Videotape

In addition to profusely illustrated lessons, you get NRI's Action Audio cassette to "talk" you through the use and operation of the professional digital multimeter you receive as part of your equipment. Even more exciting are your NRI Action Video cassettes . . . videotaped lessons that show you graphic presentations of electronic systems, vivid closeups of servicing techniques and professional "shortcuts" to study and replay as often as you want.

You Get a TV, VCR, DMM and More Equipment To Keep

You also build your own 25" Heath/Zenith color TV, a state-of-the-art unit that includes infrared remote control, a Time Control Programmer and the incredible Advanced Space Phone that lets you telephone from your chair. Using the videocassette recorder that's included as part of your training, you learn how to adjust, service and repair these fast-selling units. Your front-loading VCR features up to 6-hour recording capacity, remote control, and programmable touch-button tuning.

The digital multimeter you receive is a truly professional instrument you use in experiments throughout your course and as a key servicing tool on the job. Using it along with the NRI Discovery Lab, you'll learn how to measure voltage, current, and resistance and how to use it to diagnose all types of servicing problems.

Advanced Systems Demand Advanced Technicians for Service and Maintenance

The art of TV/Audio/Video servicing has taken quantum leaps into the future. Now, successful technicians must understand advanced concepts like digital control, electronic tuning, laser video discs, microprocessors and more. NRI gives you the training you need for success . . . state-of-the-art concepts and practical, hands-on experience working with the kind of equipment you'll encounter on the job.

7 Decades of Teaching Electronics Skills At Home

NRI is the oldest, largest, and most successful school of its kind in the world. It has pioneered and refined the teaching techniques that make learning at home the NRI way one of the most economical and effective methods ever conceived. You learn at your convenience as a class of one, backed by skilled NRI instructors and carefully designed lessons that take you a step at a time toward your goal. No time away from your job, no night school grind, no classroom pressures. Yet your training is thorough and complete, with a foundation of hands-on experience unequalled by any other training organization.

Send For Free Catalog Covering 12 Electronics Courses

Our 104-page catalog gives you all the details. In it, you'll find a summary description of every lesson and photos and specifications for every item of equipment included in your course. You'll also learn about other fascinating career opportunities in the world of electronics . . . Microcomputers, Industrial Electronics including robotics, Communications, and more.

Mail the postage-paid card today for your free copy. See how completely and how thoroughly NRI gets you started on your tomorrow today.



NRI SCHOOL OF ELECTRONICS
McGraw-Hill Continuing Education Center
3939 Wisconsin Avenue
Washington, DC 20016

VIC-20

(a real computer at the price of a toy)

\$134.⁰⁰

(when you buy 6 programs)

You get the Commodore VIC-20 computer for only \$134.00 when you buy 6 tape programs on sale for only \$59.00. These 6 programs list for \$100.00 to \$132.00. You can choose one of three packs: 6 games pack, 6 home finance pack, or 6 small business pack. The VIC-20 computer includes a full size 66 key typewriter professional keyboard, color command keys, upper/lower case, full screen editor, 16K level II microsoft basic, color, sound and music, real time, floating point decimal, easy to read self teaching instruction book, connects to any TV, includes console case.

33K COMMODORE VIC \$199.00 with 2 1/2 times more power

You get the VIC-20 computer plus we expand the total memory to 33,000 bytes to give you 2 1/2 times more programming power.

41K COMMODORE VIC \$249.00 with 4 times more power

49K COMMODORE VIC \$299.00 with 6 times more power

49K COMMODORE VIC PROFESSIONAL WORDPROCESSOR \$299.

You get the powerful VIC-20 computer with expanded memory — plus we add The Quick Brown Fox professional wordprocessor. This combination gives you a 49K professional wordprocessor. (80 column formatting and mailmerge \$100 extra).

TRACTION FRICTION PRINTER \$299.00

Comstar FIT deluxe line printer, prints 8 1/2 x 11 full size, single sheet, roll or fan fold paper, labels etc. 40, 66, 80, 132 columns. Impact dot matrix, bi-directional, 80 CPS.

80K MEMORY EXPANDER \$79.00

Sixslot — Switch selectable — Reset button — Ribbon cable. A must to get the most out of your VIC-20 computer.

VOICE SYNTHESIZER \$79.00

Makes your VIC-20 talk, VOTRAX based plus features found only in \$295 versions.

COMPUTER AND SOFTWARE SALE

COMMODORE 64

(more power than Apple II at half the price)

\$300.⁰⁰ FREE PROFESSIONAL SOFTWARE

(when you buy the Commodore-64 Computer for \$595.00)

You get the extra powerful Commodore-64 computer (64,000 bytes RAM plus 20,000 bytes ROM). Full size 66 key typewriter keyboard, 320 x 200 high resolution graphics, text is 40 columns by 25 lines. 1000 displayable characters, 8 moveable sprites, programmable synthesizer (4 wave forms, full ASDR). In addition to these features we give you FREE PROFESSIONAL SOFTWARE VALUED OVER \$300.00.

PROFESSIONAL WORDPROCESSING PACKAGE

This wordprocessor is specially designed for the Commodore-64 utilizing the latest techniques. Allows powerful text editing capabilities without long hours of orientation or training. Complete cursor and insert/delete key controls are used. Block movement and/or duplication, line insertion and/or deletion, automatic centering, margin settings, tab settings, copy, disk or tape handling, and all printer types. Up to 99 continuous pages of text can be output to the printer. List \$89.00.

COMPLETE DATABASE PACKAGE

A user friendly data base system that makes information easy to find and store. You can add, change, delete, and search for data. Print the information on a printer in any format desired. When combined with the word processor pack you have a powerful merge program that allows custom documents and personalized mailing lists. List \$89.00.

COMPLETE ACCOUNTING PACKAGE (Home or Small Business)

This general ledger program is perfect for small business as well as home. It utilizes a double entry bookkeeping system. You only need enter one transaction and the computer will handle the other. All accounts are user definable and will build for 1 year, resulting in a file of all transactions by account number, month and year to date. Each month a current month's transactions can be viewed at any time (99 accounts 187 entries per month). With this accounting program you will be able to monitor your financial growth as well as your expenses. List \$59.00.

COMMODORE-64 PROGRAMMERS REFERENCE GUIDE

This is the in-depth guide that goes into the heart of the 64. All aspects of the basic and machine language are covered. (A must for anyone wishing to program the Commodore-64). List \$20.95.

VIC20 PERSONAL COMPUTER

TOP 10 ARCADE GAMES

VIC-20 TAPE PROGRAM SALE!!

Rank	Name	Sale
1.	Super Paratrooper (Fantastic)	\$19.95
2.	Exterminator-Plus (Better than Centipede)	\$19.95
3.	Cricket (Better than Frogger)	\$19.95
4.	Snackman (Better than Pacman)	\$15.95
5.	Galactic Crossfire (you in the middle)	\$16.95
6.	Anti Matter Splatter (Nuclear Disaster)	\$19.95
7.	Bug Blast (Creepy)	\$16.95
8.	Bombs Away (Great)	\$15.95
9.	3-D Maze Escape	\$14.95
10.	Krazy Kong	\$14.95

BUY ANY FOUR — DEDUCT 10% MORE

VIC-20 PROGRAMMING AIDS!!

	Sale
• Introduction to basic programming (manual and tapes)	\$22.95
• Advanced basic programming (manual and tapes)	15.95
• Programmers reference manual (288 pages — you must have this!)	3.95
• Programmers easy reference card (tables-lists-drawings)	11.95
• VIC-20 Revealed (267 pages of VIC secrets)	24.95
• 6502 Machine Language Assembler	79.00
• 16K Programming cartridge (gives 400% more programming power — get \$24.95 16K adventure game free!)	

Commodore 64 Computer

PROFESSIONAL SOFTWARE

Name	Sale
word processing pack	\$69.00
complete Data Base pack (includes Mailmerge)	\$69.00
Electronic spreadsheet pack (like visical)	\$69.00
Accounting pack (personal & business)	\$49.00
Programmers Helper	\$59.00
Programming Reference guide	\$18.95
Basic Tutor	\$19.95
Typing Tutor	\$19.95

80 column BOARD

80 characters per line on the screen at one time. Includes word processing pack (list \$89.00), complete data base pack (list \$89.00), Electronic spreadsheet pack (list \$89.00). ALL FOR ONLY \$275.

We have over 300 Programs for
the Commodore 64 Computer
WE LOVE OUR CUSTOMERS

• LOWEST PRICES • 15 DAY FREE TRIAL • 90 DAY FREE REPLACEMENT WARRANTY
• BEST SERVICE IN U.S.A. • ONE DAY EXPRESS MAIL • OVER 500 PROGRAMS • FREE CATALOGS

Add \$10.00 for shipping, handling and insurance. Illinois residents please add 6% tax. Add \$20.00 for CANADA, PUERTO RICO, HAWAII orders. WE DO NOT EXPORT TO OTHER COUNTRIES.

Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail Canada orders must be in U.S. dollars.

PROTECTO ENTERPRIZES (WE LOVE OUR CUSTOMERS)

BOX 550, BARRINGTON, ILLINOIS 60010
Phone 312/382-5244 to order

How To Install Your Own Phone

If you have questions about how to install your own telephones, we've got the answers!

BY MARC STERN

Now that you can buy and install your own telephone, how do you go about it? Here are some of the most asked questions—and answers—about phones and their installation.

Q: What is a phone's Ringer Equivalency Number (REN) and why do I have to report it to the phone company?

A: The REN, which is in a new phone's operator's manual and/or on the phone itself, indicates the type of ringer circuit in the phone. For operation of its lines, the phone company must know

the type and number of phones you're using.

Q: Will all phones work on every line?

A: No, not all phones are the same. The phone system uses a form of frequency detection so a phone will ring. For "A" or residential service, the tone is 20 kHz. "B" or "C" service phones need a different tone and won't ring on an "A" line. Most people want the "A."

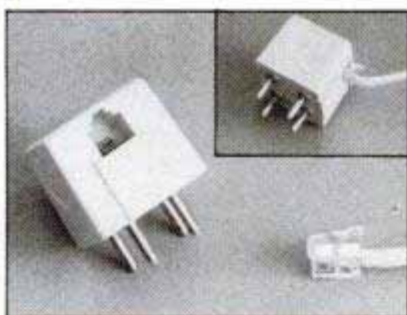
Q: Speaking of phone lines, I have heard that the more phones you install, the poorer the ser-

vice on the whole line, if all the phones are used at once. Is this true?

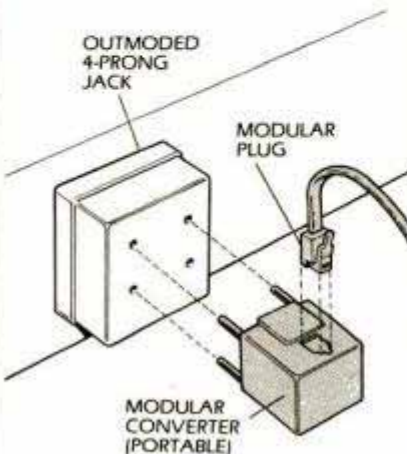
A: Yes. The phone company uses a system which supplies 48 volts and between 20 and 35 milliamperes of current, which provides excellent service for one phone. As you add extra phones to the line, you are dividing this current and voltage further and the quality of the service deteriorates. Usually, no more than six to seven phones may be in a house and plugged in at once.

Q: We often have many listeners on a conversation. Is there any

GOING MODULAR



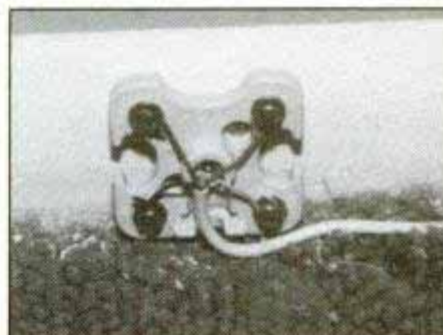
In order to convert a four-prong jack to one that will be able to accept a modular plug, it's necessary for you to buy a modular converter. The modular plug from the telephone will then be able to plug into the converter (below and inset above).



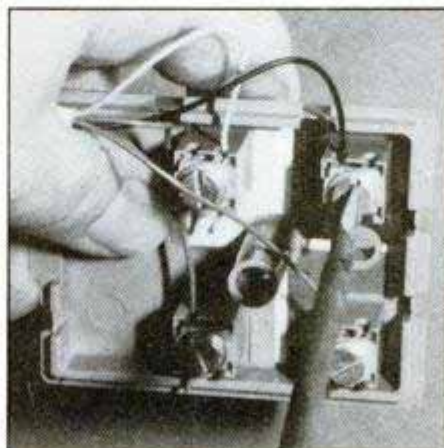
INSTALLING A MODULAR JACK



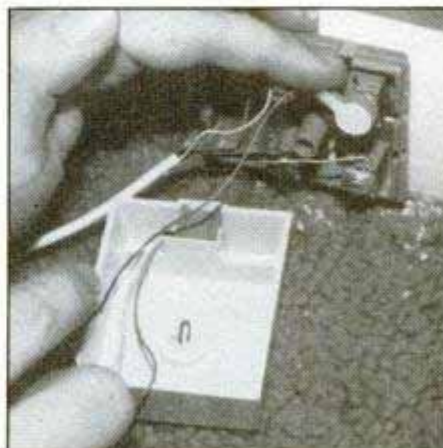
A terminal block (above) is found in older homes. It must be replaced with a modular jack. Once that replacement has been made, it's relatively easy to add your own phones.



Taking the top off the terminal block reveals color-coded wires. Carefully unscrew the terminals sufficiently to loosen wires, and then remove unit from your baseboard or wall.



Attach the modular jack's base to the wall and then attach the wires in the same color-coded manner as before. Tighten screws and see that wires do not short against each other.



Snap-fit the connections from the jack cover to the base terminals by simply following the color code. All that you have to do next is to attach the jack cover and you're finished with the job.

way to improve the quality of the phone service?

A: Yes. Install a speaker-type phone, which allows many listeners to hear a conversation. It should have an amplified output so all can hear the conversation. In this way, the phone line sees only one phone "off the hook" at a time and signal quality improves.

Going modular

Q: I've decided to modernize my home to accept the new modular plug phones. How can I convert them?

A: The phone company and many electronics and department stores sell conversion covers for the standard type 42A terminal block. A converter consists of a new cover containing a modular outlet and four color-coded, snap-on clips. These are snapped onto the terminal screws in the block, according to color, and the conversion cover is tightened down. That's all there is to it.

Q: But what is a Type 42A terminal block?

A: This is the old type of baseboard connector that a telephone has to be wired to. When you take off the cover, you will see four terminals with four different color wires attached. The placement of those colored wires is crucial because they are the key to proper phone hookup. For many years, the phone system has used color-coding as a way to simplify and speed installation.

As a result, when you are installing any conversion device, you must remember to match the colors of the wires to the proper terminals.

Q: And, what, specifically, is a modular plug?

A: It's little more than a snap-in plug with four conductors in the tip. It mates with a connector inside a modular jack or converter.

Q: Why did the phone company make the change to the modular plug in the first place?

A: According to the American Telephone Co. (ATC) it was the result of an FCC ruling which mandated standardization between the many phones on the market. The result is an easier plug to use.

Q: My house doesn't have terminal blocks; it has two types of phone outlets, four-pronged jacks and flush-mounted terminal blocks. Can I convert them?

A: Yes. It's easy to convert a four-pronged jack by using a modular converter. For the flush-mounted terminal, you'll need a flush-mounted modular jack converter. Simply remove the old jack, leaving the wires hanging free, and then install the new bracket and snap-on clips. When this is done, insert and fasten the new modular jack and reinstall the faceplate.

Q: I have a wall phone and would like to install a new, modular type of wall phone. Is there any way to do this?

A: Converting a wall phone outlet involves removing the old phone by sliding it up and away and then removing the old base plate. When this is done, simply remove the old outlet, leaving the wires hanging. Next, install the new bracket and attach the wires to the converter plate by their color code. When this is finished, tighten the converter into the bracket and attach the new base plate. After this is done, slide the new wall phone over the clips and the job's all done.

Q: Can I install a modular plug on an existing phone?

A: Yes, the phone company supplies a modular plug converter which will turn your nonmodular phone cable into a modular one. It requires that a four-wire cable be spliced according to included instructions, into the converter, which is then closed permanently.

Extending the wiring

Q: What is a network interface and how do I install phone wiring from it to other areas of my home?

A: The network interface contains a tiny integrated circuit which protects the phone network from harm by user-installed equipment. It is the demarcation point between the phone company's equipment and private home wiring. It's easy to install wiring beyond this point with a wire junction (see photo). Mount this device near the interface, so they can be connected by the short modular plug cord which is attached to the wire junction.

When this is done, determine the wiring paths for your home's new wiring and then run this wiring through the walls of your home to the areas where you are installing new phone outlets. After the wires are run, strip the outer covering off the ends of the various cables and expose the four conductors inside each cable. Leave the insulation on these thin wires and install them in the wire junction according to their color coding. After you replace the cover, your house is now all wired for phones. Older homes may simply have a terminal block instead of a network interface.

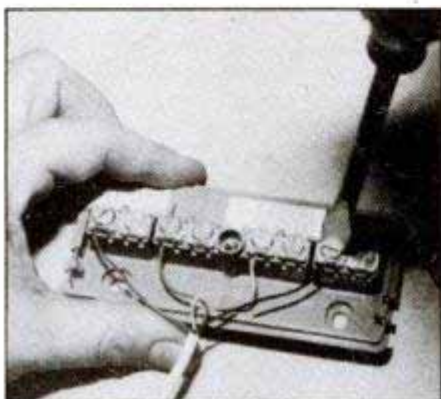
Q: Why should I run the wiring through the walls, instead of under the carpet or along the base-



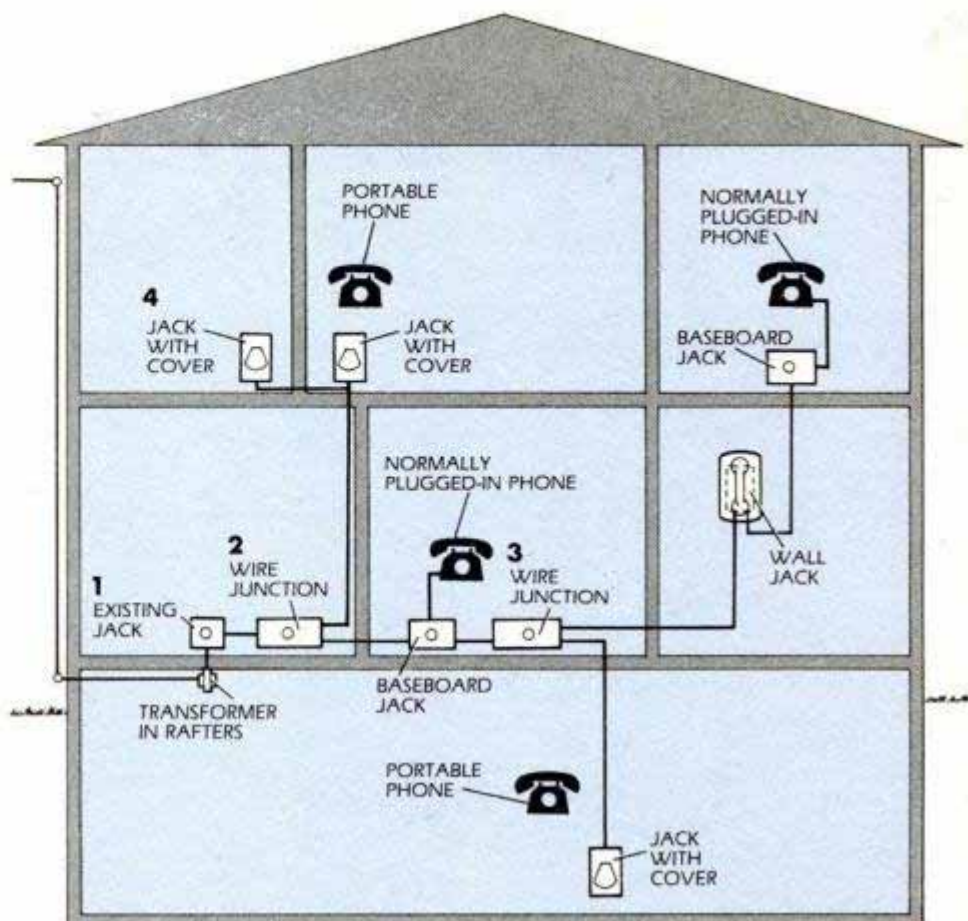
Adding a phone is easy if you use the right equipment. The portable modular converter just plugs into one of the older-style, four-prong jacks, and it can be moved from room to room. The permanent modular converter has four snap-on connections that attach to an existing base. Or you can install a completely new modular jack in place of your old four-prong jack. Once you've gone modular, it's simple to connect extra wiring for extensions. The modular wire junction will plug into a modular jack and allow you to run two additional phone lines. Wall phones can be hung on just about any surface using special baseplates. And you can even get modular jacks with built-in covers that keep the dust out of the connection points.

HOW TO EXTEND TELEPHONE SERVICE THROUGHOUT YOUR HOME

Here's how to install extra extension telephone lines in your home. We show (right) how incoming phone line goes to phone company's transformer and then to an existing jack or network interface (1). At this point you may have to convert the jack to a modular one, as detailed previously. Then connect a modular wire junction (2). One line from the junction may connect to a new jack and from there to another junction (3). Note how the junctions simplify the wiring. Some jacks will have phones normally plugged in. Other jacks (4) may have a phone carried between them. These jacks should be the covered type.



Color-coded wires and matching colors on a wire junction make it quite easy to install.



board? Also, what type of wire should I use?

A: It's best to use the phone company supplied, color-coded, four-conductor wire. This way, it's easy to make sure the wiring is correct. Running this wire behind the walls ensures maximum protection and prevents an unsightly tangle. Running it under the rug, on the other hand, means there's more chance for damage as people walk on it. Further, it can leave a ridge in the rug. Baseboard mounting is acceptable, provided you run the wire out of any potential walkways and it is secured to the baseboard with *insulated* staples.

Q: Is there a maximum distance I can run a wire from the network interface or junction box?

A: According to ATC, the maximum limit, before the line resistance and voltage loss become too great to run the phone, is about 250 feet.

Q: Are there any other cautions of which I should be aware?

A: According to the phone company, a person installing a phone should be sure the installation complies with local building regulations and the National Electrical Code. Avoid placing telephone wires in pipes, conduits or compartments containing other electrical wiring. Never place telephone wiring near bare power wires or lightning rods, antennas, transformers,

steam and hot water pipes or heating ducts.

Before you fasten any wire to metal surfaces—siding, recreational vehicles or mobile homes—be sure that no hazardous voltages are present on the siding or other conducting surfaces. And, you must never run wiring between structures where it may be exposed to lightning. Further, avoid damp locations or any place where wiring would allow a person to use a telephone while in a bathtub, shower or swimming pool.

Never use telephone wire runs to support objects. Be sure that wire is enclosed in electrical tape to protect it when it runs across gratings or other rough metal objects.

When drilling through walls or floors be careful to avoid contact with concealed pipes, other electrical wiring or similar items. Also, you should avoid running wire to temporary structures or to any locations that are not easily accessible, or anywhere the wire will be subject to mechanical stress or pinching such as through door jambs or window sills.

Finally, keep wire runs as short as possible to avoid interference with your phone system and never splice one length of wire directly to another because it can cause interference on your line. Instead, use wire junctions or modular jacks for multiple connections.

Buying your own phones

Q: Do I have to notify the phone company about the type of phones I buy? If I do, what information do I give?

A: According to law, you must give the phone company (your local business office) the ringer equivalency number and FCC registration code of the phone.

Q: I called the phone company and they told me our system uses pulse dialing. What is it?

A: It's a type of service which is associated with rotary phones. Inside a



A wire stripper tool, available from the phone company, is a handy device. The tool, which has a built-in measuring scale, allows you to strip a multiconductor cable without damaging the wires. Afterward, you can use it for other jobs.

dial-type phone (called a rotary) there is a set of electromechanical contacts which turns the number dialed into a precisely timed sequence of electrical pulses. They are sent through the phone line to the central office where they are decoded.

Q: Can a pushbutton phone, like a Touch-Tone, be used on such a pulse system?

A: It depends. If you have a unit from the phone company (any Bell-brand unit) it will work correctly. And, if you have a phone which has a pulse/DTMF switch it, too, will work correctly in the pulse mode.

Q: What is "DTMF"?

A: It's Dual-Tone, Multi-Frequency phone service. With it, two tones are generated every time the buttons are pushed. These tones are translated into electronic equivalents and are sent through the system where they are decoded at the phone company's central office. A rotary phone will work on such a system because the system still recognizes pulse dialing.

Q: What type of phone should I buy?

A: With the wide variety available today, the choice is up to you, but we would think a desk or Trimline-type of electronic phone, capable of DTMF, is best from a long-range reliability standpoint.



Anyone who goes to purchase new telephones will find a tremendous assortment of styles readily available at many different outlets. Novelty phones such as Pac-Man (1) dress up a teen-ager's room; leather-clad Genie (2) offers

new materials for your decor; executive-style phones (3) look at home atop a busy desk; and a cordless portable phone (4) lets you roam. (Phones 1, 2 and 3 are from American Telecommunications Corp.; 4 is from Cobra Inc.)

Advanced capability phones may contain other features such as memory dialing, "hold," automatic dialing, redialing of a busy number and display of the time, date and cost of a call.

Q: Doesn't the phone company offer such special phones? If it

does, why should I buy a phone with such features?

A: Yes, the phone company does offer phones with features such as memory or "speed" dialing a list of phone numbers—or services such as call-waiting and call-forwarding—but all these are extra cost options on your monthly bill. In the long run, owning your own phone with these features will save money.

Q: I want to install a portable phone (cordless). Are there any special actions to take?

A: If your phone wiring is correctly installed, no special precautions are needed. All you do is plug in the base unit to an a.c. outlet and plug the modular jack into its receptacle. The base unit should be installed away from any fluorescent lighting or any type of electrical motor because you run the risk of picking up transformer hum on the phone's signal to the portable handset.

Q: Cordless phones seem convenient, but expensive. Can I get such convenience at a lower cost?

A: It depends on your needs. If you only need to receive calls remotely, there are cheaper models of cordless phones which do not have a dial on the remote handset. With these you can answer your phone from your back yard, for example, but cannot place calls.

Q: Will I need a special system to take advantage of these cordless phones?

A: A cordless phone may be used on any modular system. They require no special installation.

Q: When should I start?

A: There's no time like now!

PM



Personal Telecommunications On The Way

American Bell Consumer Products recently showed an exciting new concept in the area of home telephones—the Genesis "telesystem." The Genesis and Touch-A-Matic phones are the first products of this new company.

The modular telesystem allows for various units to be plugged into the basic phone to increase the services it offers. The Touch-A-Matic features such things as storing the last number dialed, automatic redial on busy, touch-sensitive keypad, color-coded emergency buttons and a 12-digit phone number memory.

Genesis adds to this with a plug-in, alphabetic keyboard (the right half of the phone pictured above).

The full-fledged Genesis system uses sophisticated, computer-style modules (one is shown in front of the phone) which can add more memory and functions. But the keyboard is what really makes the Genesis so exciting. Imagine banking from your home, ordering from a catalog and more. Whether these services will be available remains to be seen—but the Genesis telesystem is ready and waiting.—N.S.

WINDSOR'S TASTE BEATS V.O.!

Nationwide tests prove it.



Over 10,000 drinkers across the country have compared the taste of Imported Windsor Canadian to the taste of Seagram's V.O.

And they chose the mild, smooth taste of Windsor over V.O.—57% to 43%.

If you're a Windsor drinker, that will come as no surprise. But if you're not, try the taste of Windsor and find out for yourself why it's the Canadian that stands alone.

You can't beat the taste of Windsor. And you certainly can't beat the price.

WINDSOR 
ONE CANADIAN STANDS ALONE

Free from QUIKRETE®

... your answers for completing nearly any home concrete construction or repair project

...at your hardware, building supply or home center.

You can set posts, complete steps, sidewalks, walls, patios, other projects with free folders. Tools and supplies needed are listed with complete instructions.



Repair Concrete and Waterproof
with these easy to use do it yourself hero-makers.

Do it yourself with QUIKRETE

IT YOURSELF WITH QUIKRETE

Repair broken concrete, plug leaks in walls, set bolts, anchor railings. Free instruction sheets.



THE QUIKRETE COMPANIES • Atlanta, Georgia 30345

HEAVY DUTY SPLITTERS

More power per dollar

4 gallon hydraulic oil tank.

Hydraulic oil filter.

High speed demountable wheels.

Replaceable slide and wear plates.

Splits 25" logs.

Detent valve automatic return.

2 stage roller bearing pump.

Heavy duty rectangular tube frame.

Low profile 15-ton unit.

Now you can have all the power you need to shatter those stubborn hardwoods, knots and gnarls at a price that's a lot lower than the competition. Our splitters are made of the finest heavy duty components and are built tough to last. Compare our features. then compare price. You'll see some powerful reasons to buy Northern Hydraulics.

15 TON

High or Low profile, 24" stroke, 2 stage pump, high speed wheels, 5 H.P. 8" wedge, 6" tube frame

\$805

(detent valve optional)

15 TON

New Vertical Model
24" stroke, auto detent valve, high speed wheels

\$1095

24 TON

10 H.P. motor, 5" cyl., 24" stroke, 12" tires, auto detent valve, heavy duty H beam frame

\$1299

12-TON model available - \$749 • 24-TON high profile 30" stroke - \$1590
Send for a Splitter Brochure; or if building your own...send \$1.00 for low price parts catalog.

NORTHERN HYDRAULICS

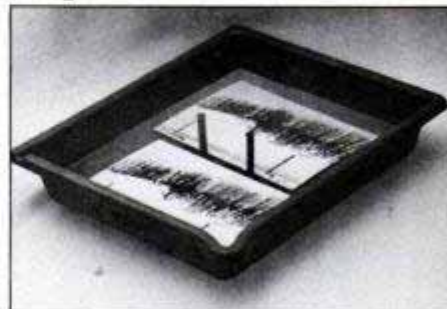
Dept. 90523, P.O. Box 1219, Burnsville, Minn 55337

(612) 894-8310

SALE ENDS 6/20/83

PM PHOTO HINTS

Tray divider



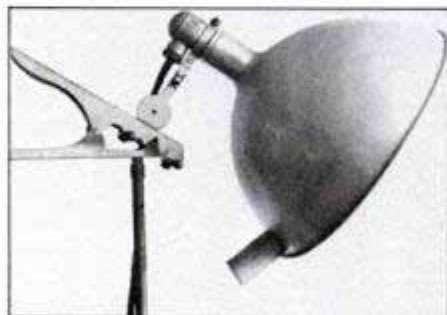
When toning or developing prints, it saves time to treat two at once. But, wet prints stick together. Suction-tipped darts from toy guns make excellent dividers to keep the prints separate and increase darkroom speed and efficiency.—A. Weber

Taming exposures



High-speed (ASA 400) film can provide great indoor shots, although beaches or snow can give overexposure. A neutral density filter reduces the light reaching the film without affecting the film's color rendition.—Robert Hertzberg

Cool it



A good way to cook your finger is to grab an aluminum reflector after the photoflood light heats up. Fasten a four-inch piece of dowel near rim of bowl, using a wood screw from inside.

—Robert Hertzberg



**IT DOESN'T TEAR UP THE NATION.
IT TEARS UP A STATE.**

AND WHO'S THERE TO HELP PUT IT ALL TOGETHER?



The Army National Guard of Kansas. Or Mississippi. Or wherever that emergency may be.

You see, the Guard is the military branch that's first to come to a state's rescue.

The Army Guard is trained as a partner of the Army in case of national defense. Then it puts that training to work to protect your state and community.

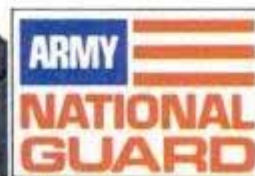
Won't you join us? Two days a month and two weeks annual training (after your initial training) lets you earn extra income and learn new skills while you protect everything that's close to you.

For more information, call your local Army Guard recruiter or call toll-free 800-638-7600.* And see if we can put it all together for you.

*In Hawaii: 737-5255; Puerto Rico: 723-4550;
Guam: 477-9957; Virgin Islands (St. Croix):
773-6438; New Jersey: 800-452-5794. In
Alaska consult your local phone directory.



**The Guard is
America at its best.**



AIPMTU™033NP

Материал, защищенный авторским правом



PM ELECTRONICS MONITOR

MTV adds a new dimension to music

To the crisp strains of a forceful, yet haunting, rock melody, a lissome girl slithers in a sinuous path across the deck of a sailboat as it races through crystal clear tropical waters. Body-painted in stripes of azure, green and muted gold which boldly outline her facial features, then swoop down to delineate her bikini-clad form, she moves like a dream, a phantasm from another dimension somehow called up by the magic of the music around her.

The song is *Rio*, the rock group is Duran, Duran and the medium is the most exciting new art form to hit entertainment TV since anyone ever loved Lucy. It's MTV, or Music Television Network. From its beginnings in 1981, MTV has grown from supplying approximately 300 cable TV companies

to being a video offering which reaches over 9.5 million subscribers on 1,300 cable affiliates.

Its growth has been little short of phenomenal—its programming is phenomenal. By adding pictures—video—to the music of today, the artists have evolved a new art form. Special effects, as well as imaginative themes, have allowed them to illustrate their ideas and add yet another communication link between artist and audience.

This is not the Rockettes.

Groups like Men At Work (on their video hit *Down Under*) cavort and sing their way out of one surrealistic setting into another, sort of like the Kingston Trio trapped in the Twilight Zone.

This is not a variety special.

"Is this music?" a few people exposed to MTV have been heard to

mumble. "Where are the instruments? They're not even mouthing the lyrics properly."

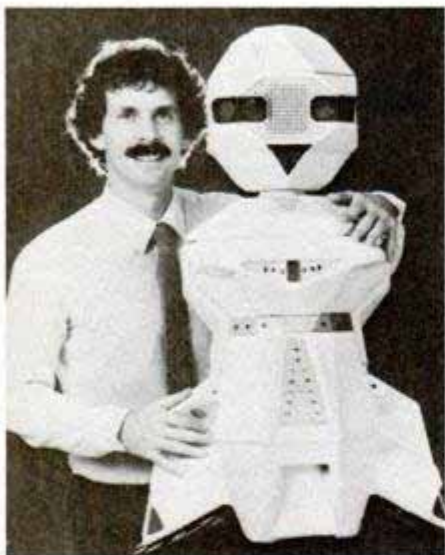
Back in the 1600s, I can imagine there were people who picked up the Gutenberg Bible and mumbled, "Is this a book? Where are the hand-lettered texts? Did a monk pen this?" MTV is as much the wave of the musical future as movable type was, in its first days, the beginning of modern book production.

Video is now an integral part of music. Already, many rock groups are releasing on videodisc as well as audio records. And it is not solely a rock phenomenon. The Nashville Network is on cable now, too. Can classical music be far behind?

Well, we'd like to examine this in more depth, but Joan Jett is on the tube singing *Crimson And Clover*, and we don't want to miss her taking a bite out of the tulip.

Robot wars heat up

More and more people are making robots for America's homes and busi-



B.O.B. (above) is the latest in new robot designs manufactured for homeowners.

nesses. Not the arms-only, totally-lacking-in-personality robots that man such things as automotive assembly lines: These robots want to be members of your family.

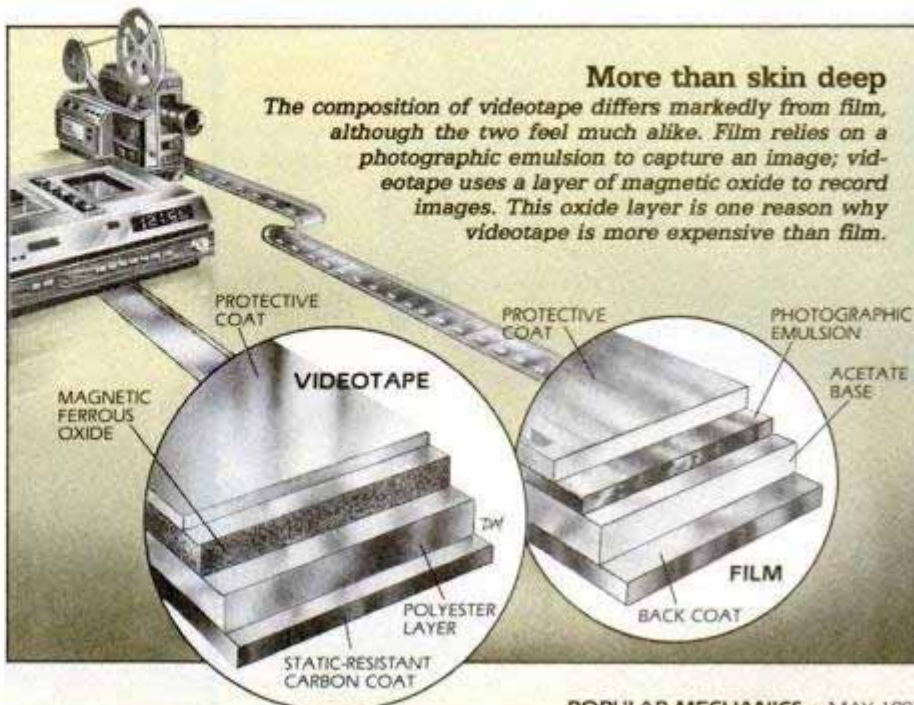
The latest (shown here) is B.O.B.

from Androbot Inc. His name stands for "Brains On Board" and his actions are programmed by the user by means of his three, 16-bit 8088 microprocessors. Besides the microprocessors, he also has two infrared scanners. This allows him to scan his environment and distinguish between living and inanimate objects (as long as your stove is off!).

B.O.B. is the latest offering in home Robotics. However, what can he really do for you?

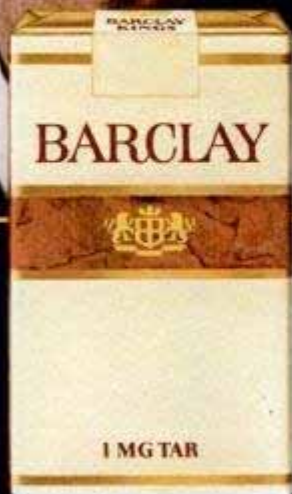
To quote from B.O.B.'s press release, "B.O.B. (at \$2,495) may walk up to a guest, crack a joke, sing a song, or quote the daily stock market totals." Mmmmmmm, sounds like an advertising salesman to us.

PM



Regular, 1 mg. "tar", 0.2 mg. nicotine
av. per cigarette, FTC Report Dec. '81.


© 1983 B&W T Co.



*99% tar free.*TM

The pleasure is back.
BARCLAY

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



**FORD IS THE WAGONMASTER.
AGAIN. AGAIN. AND AGAIN.**

Ford wagons. The best-selling wagon lineup in America.

The Wagonmaster tradition began at Ford over half a century ago with the original 1929 "Woody" wagon. And since 1949, a million more people have bought Ford wagons than any others.* Today Ford's '83 lineup offers the latest in innovative wagon technology.

New LTD. Reshaped. Refined.

The 1983 Ford LTD wagon. Reshaped and refined to be the most remarkable LTD wagon ever. It's smooth and aerodynamic on the outside. And inside, there's plenty of room to ride in quiet comfort.

FORD LTD

Get it together - Buckle up.

*Based on most recent R. L. Polk & Co. registrations.
†Based on EPA Cargo Volume Index. Comparison excludes other Ford Motor Company products.

FORD WAGONS

And, of course, there's lots of room for cargo, too. In fact, LTD has more cargo space than any American-built wagon in its class.

Ford Country Squire. Even empty, it's loaded with luxury.

Rich velour fabrics and supersoft vinyl, thick carpeting and warm woodtones create a quiet place to ride and relax. There's comfortable passenger room for eight with the Dual Facing Rear Seats option. Country Squire even has cargo space no other station wagon builder in America can match. And this year, the Country Squire can be equipped with a new heavy-duty trailer towing package that will tow up to 5,000 lbs.

Ford Escort. The best-selling* wagon in America, year after year.

For 1983, the Escort wagon features loads of new improvements, ranging from a deluxe sound insulation package to a fuel-conscious shift indicator light.

And the front-wheel drive Escort combines the use of high-strength low alloy steel with a unique CVH engine to give excellent fuel efficiency.

42

EST
EPA

29

EPA
EST
MPG

For comparison. Your mileage may differ depending on speed, distance and weather. Actual highway mileage lower.

Whether you buy or lease, see the new LTD, Ford Country Squire and Escort wagons at your Ford Dealer... the Wagonmaster.

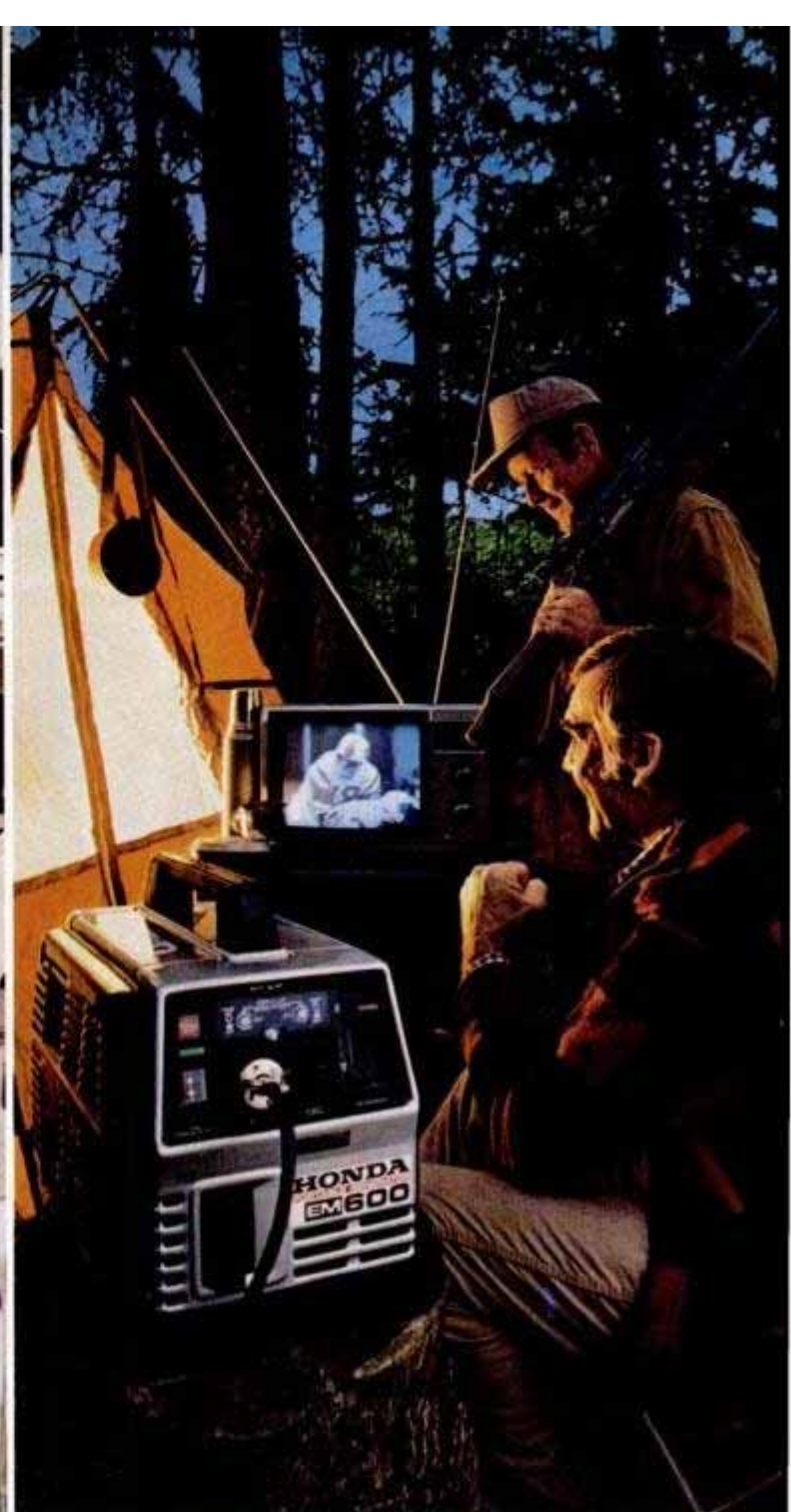
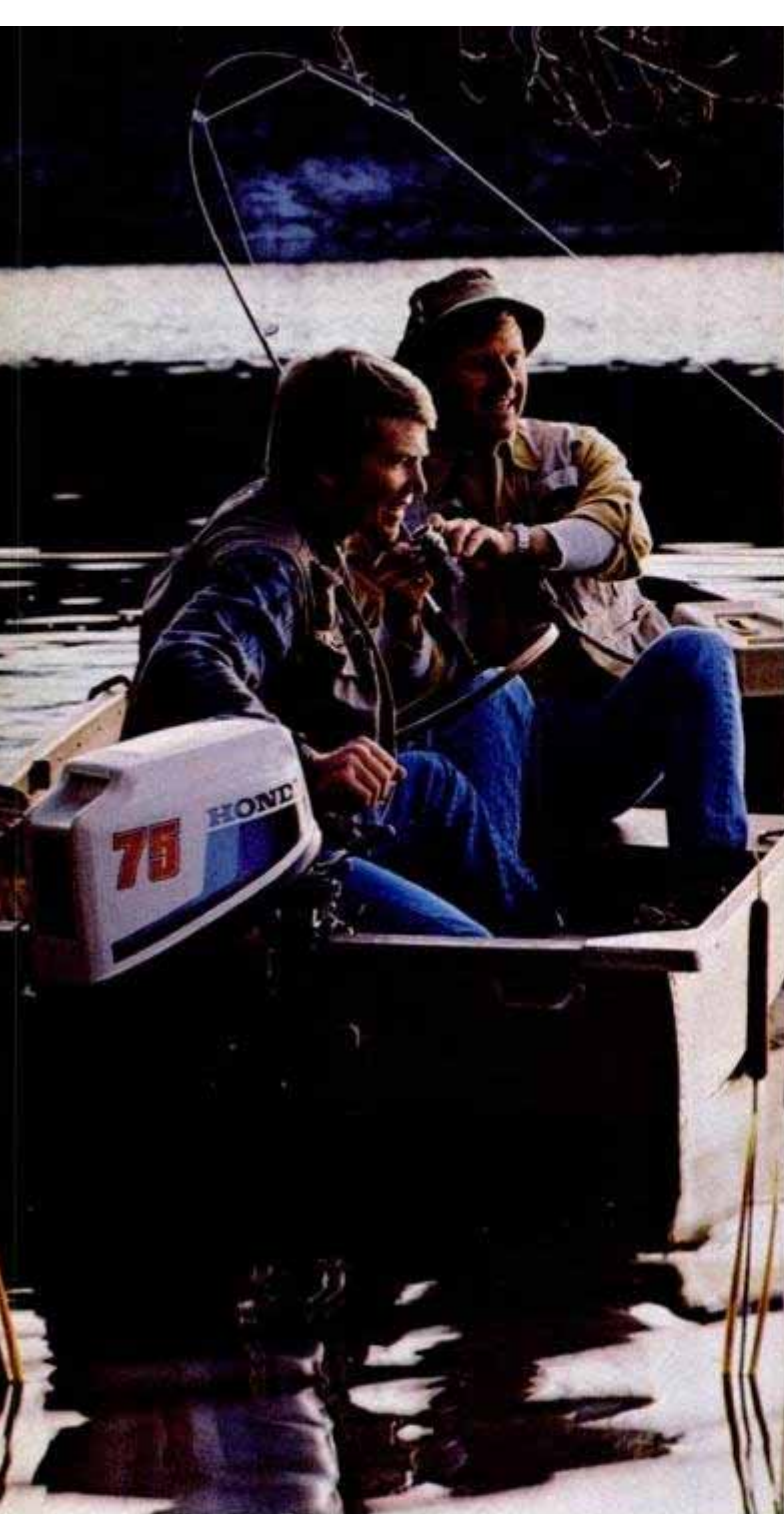


FORD COUNTRY SQUIRE

FORD ESCORT

HAVE YOU DRIVEN A FORD...LATELY?





MADE FOR FISH AND GAME.

Honda has some powerful traveling companions that won't disturb the peace and quiet of your camping or fishing trips. They're our generators and outboard engines.

Honda has a complete line of lightweight, portable generators from 500 to 800 watts. Each one is easy to operate and ideal for lighting up a campsite, charging the boat or RV battery, or powering small appliances.

They all feature an extremely quiet, reliable Honda four-stroke engine. An advanced Oil Alert™ that warns when the oil level gets too low.* An Automatic Decompression system and CD ignition for quick, easy starts. And a USDA approved spark arrestor muffler so they can even be used in National Parks.

Honda also makes the only 7.5 and 9.9 HP four-stroke outboard motors on the market.

Both offer smooth, very quiet operation and great fuel economy. A built-in 12-volt battery charging capability. CD Ignition for quick, reliable starts. And a high performance carburetor for quick acceleration and steady operation.

So if you're looking for great times in the great outdoors, don't leave home without Honda. Check your Yellow Pages for the Honda Generator and Outboard dealer nearest you.

*Except on EM500.

For optimum performance and safety, we recommend that you read the owner's manual before operating these units. ©1983 American Honda Motor Co., Inc.

IT'S A HONDA

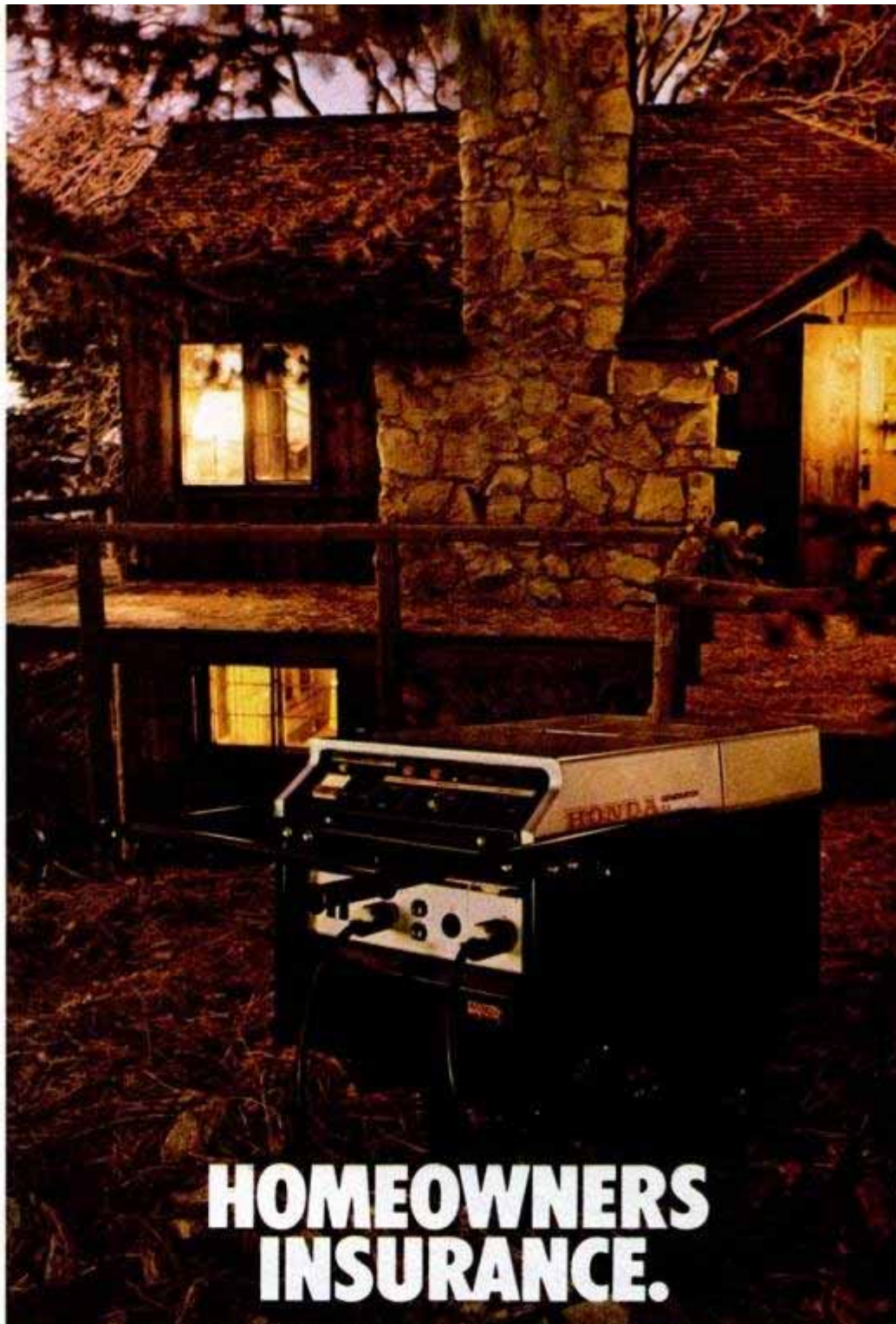
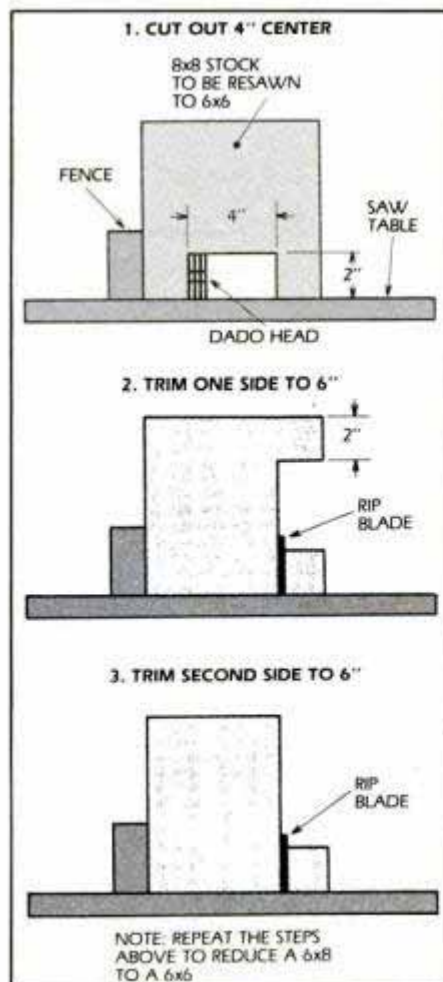
HINTS FROM READERS

Keeping the light

The flashlight in my car used to switch on accidentally, killing the batteries. I solved this problem by reversing the position of one of the batteries. Now, if the switch gets bumped on, the light fails to operate, thus saving the batteries.—Howard E. Moody

Reducing large timbers

Here's my technique for cutting actual size 8×8 timbers on a table saw: 1. Use a ½- or ¾-in.-wide dado head set 2 in. deep and cut out the timber's center section to within 2 in. of each side. 2. Install a rip blade, position the timber on its side and rip off the 2-in.-wide side runner. 3. Reposition the timber and rip off the remaining 2-in.-wide runner. The timber is now a 6×8. Repeat the steps to reduce it to a 6×6.—Jon Gullett



HOMEOWNERS INSURANCE.

If you're looking for a dependable power source, it's a good policy to keep Honda's EX5500 heavy duty generator around the house.

With 5500 watts, it's ideal for main or auxiliary power. Thanks to a specially designed OHC liquid-cooled engine, it runs so much more quietly than air-cooled generators with similar output, you'll have to hear it to believe it. And it consumes up to 30% less fuel and oil.

The EX5500 also gives you the most advanced features

found on a generator today. Including an Oil/Temperature Alert system that helps prevent damage. An Automatic Idle Control for increased economy. An Automatic Voltage Regulator for steady output. And a CD Ignition for quick, reliable starts.

So whether your home is miles away from power, or you just need a strong back-up, check into the Honda EX5500. Look for your nearest Honda Generator dealer in the Yellow Pages.

IT'S A HONDA

For optimum performance and safety we recommend that you read the owner's manual before operating your Honda Power Product. ©1983 American Honda Motor Co., Inc.

CHEVY CELEBRITY

"Glovebox is designed by someone who doesn't believe in gravity."

—TEXAS ENGINEER

"I can't even see the sparkplugs."

—MINNESOTA LABORER



"The paint is flawless, all panels line up and there are enough bolts to hold together."

—TEXAS OIL FOREMAN

"Make the front-seat armrest movable."

—WISCONSIN SCHOOLTEACHER

"It rides like a miniature Cadillac."

—CALIFORNIA CLUB MANAGER

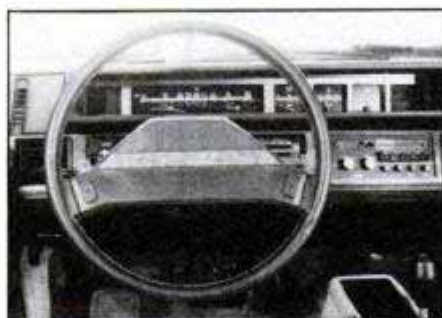
PM photos: Bill Ashe

Styling and economy are first rate and it's a quality pacesetter, too.

You can buy a stripped Celebrity, but only from the guy who stole and stripped it. Even the starkest Celebrity in your local Chevrolet showroom comes generously equipped: automatic transmission, power rack-and-pinion steering, power disc brakes, seat console with armrest, AM radio, front stabilizer bar, side-window defoggers and three dozen other standard touches. Each of them is calculated to put this newest mid-sized Chevrolet on a par with the best buys from Europe and Japan.

Chevrolet makes no bones about who's who and what's what in this very competitive core of the mid-size auto market.

The Celebrity boasts of 20 cu. ft. more total interior roominess than the



Interior design and comfort garnered high praise. Chevy managed to carve out exceptional amount of people room.

Datsun Maxima and 7 more than the Audi 5000. It has greater trunk space, say the ads, than even a Rolls-Royce—16 usable cu. ft.

The Celebrity borrows heavily from GM's X-car. It shares the Citation's basic platform, including its wheelbase, tread dimensions, and engines. Yet there's an awful lot that's not X-car—all the body panels, the suspension system, steering, engine and transaxle

mounts, and extensive sound-deadening insulation.

As in the X-car, Pontiac's injected Iron Duke Four comes standard, with a 2.8-liter, Chevy-built V6 optional. Most of our respondents opted for the V6, which delivers 112 hp against the Four's 92.

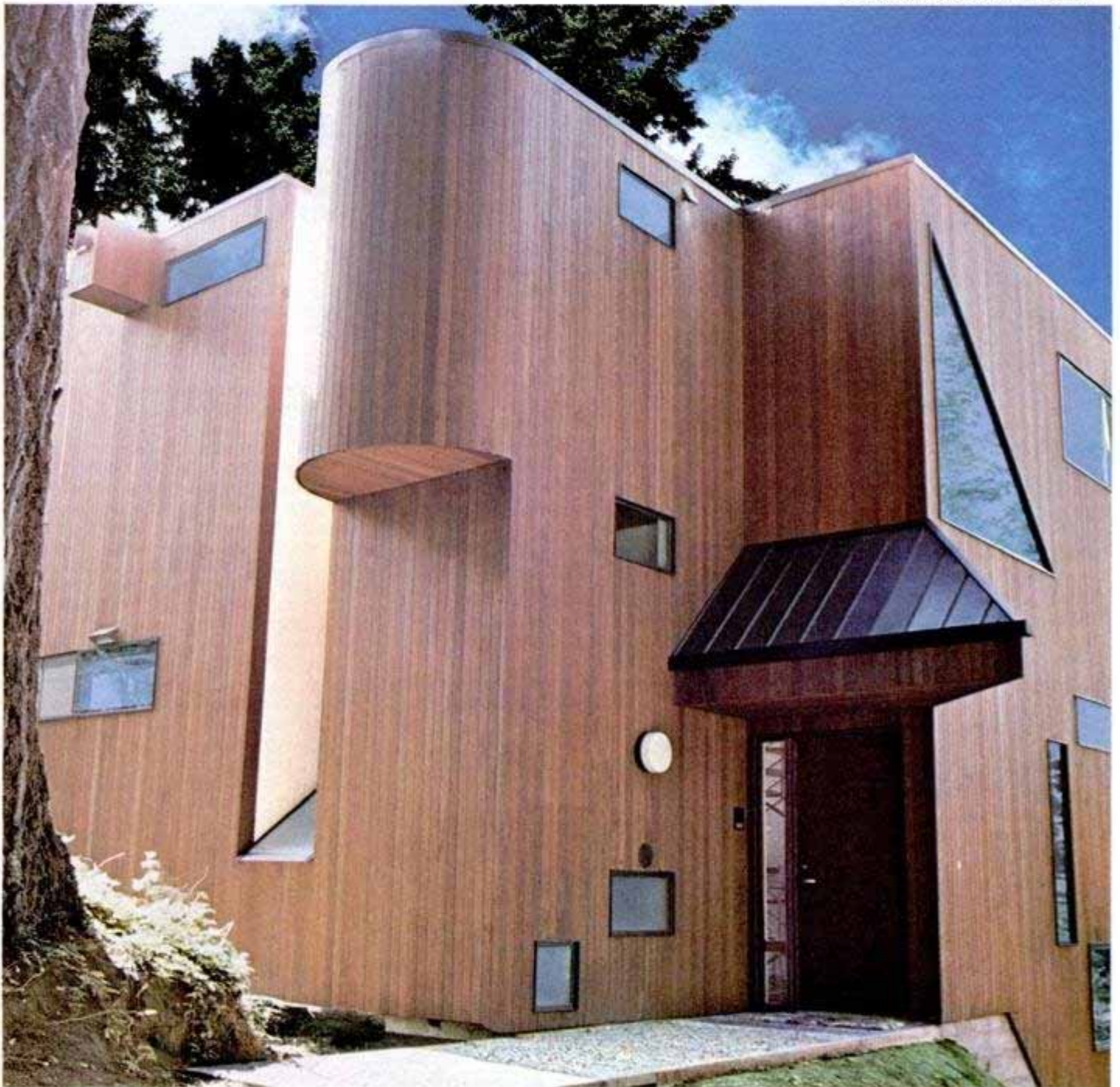
A NATIONWIDE SURVEY BASED ON 2,089,488 OWNER-DRIVEN MILES

There's also a 4.3-liter, Oldsmobile-supplied diesel V6 available that puts out 85 horses. Chevrolet had hoped to offer the diesel V6 at the Celeb's debut in Jan. '82, but due to start-of-production problems, the division finally got it going for 1983. Partly because of this late start, the diesel accounts for only 1.6 percent of the Celebrities in our sur-

(Please turn to page 56)

We've got the inside on outside protection.

Architect: Wendell Lovett, FAIA, Seattle, Washington



Inside every can of Olympic Stain are specially treated oils that penetrate wood to give strong protection outside. Inside every can is the knowledge and experience of over half a century. That's why Olympic protects the outside of more homes than any other stain.

And when you use Olympic outside, you'll feel a lot better inside.

OLYMPIC

Paints and Stains



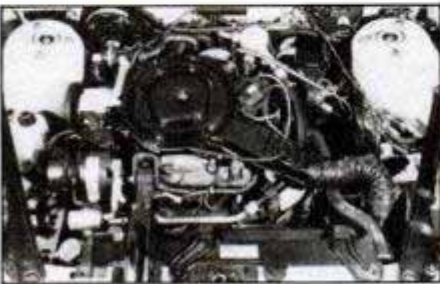
OWNERS REPORT: CELEBRITY

(Continued from page 54)

vey, and it's not figured into our mpg data at all.

Owners seemed pleased with their cars' fuel mileage. Economy ranked No. 1 as the Celebrity's best liked feature and came in second as a reason to buy. In our survey, the Celebrity's overall fuel economy averaged 3 to 5 mpg more with the Four than the gasoline V6. The EPA numbers for the Iron Duke are 24/39, comparable to the 25/33 reported by our respondents.

The Celebrity's \$8,059 base price puts this car within reach of most buy-



Four-cylinder owners complained of inadequate power. V6 owners had no such complaint and almost the same mpg.

ers of mid-sized, five-passenger autos. It's basically the same car, by the way, as the Pontiac 6000, Olds Cutlass Ciera and Buick Century. It also competes head-on with Chrysler's E-class, Dodge's 600ES, Ford's Fairmont-based sedans, the AMC Concord and the Renault 18i.

Yet, the Celebrity costs many thousands less than such European sport/luxury sedans as the BMW 528e, Volvo 760, Audi 5000 and so on. Most of the owners we surveyed paid around \$10,000, and several mentioned GM's 12.8 percent financing promotion as a purchasing goad.

According to the owners we surveyed, though, it was styling, not price or interest rates, that brought customers into Chevy dealerships initially.

"I fell in love with the Celebrity's new shape and design the first time I saw it," glowed a California club manager. The car rides like a miniature Cadillac; it seems to glide down the road. Acceleration is excellent and rear legroom is unbelievable."

An Illinois word processor put it this way: "I'm very impressed with my Celebrity. I find the performance [of the four-cylinder engine] more than satisfactory. Better than that, I'm getting 33 mpg in town! This car has given me no mechanical troubles at all and its ride is truly smooth for a smallish sedan."

A California medical technician: "The fuel-injected, four-cylinder engine has all the power I need. I drive a lot on mountain roads and the front-

wheel-drive Celebrity handles great. It's a small car but has lots of room inside; good ride and very quiet."

Nearly everyone conceded that the Celebrity excelled in the silence and smoothness of its ride. Where it didn't excel, though, was in negotiating harsh bumps and potholes. A Michigan die-maker wasn't alone when he grimaced, "The standard suspension seems to be very short on spring travel. The car bottoms out easily on rough roads."

Chevrolet does offer two heavier duty suspension options: RPO F40 (\$22) and F41 (\$41) for towing and sportier handling, respectively. But not too many owners have them.

Even so, a Wisconsin secretary represented the majority when she wrote, "I like the way the Celebrity rides and handles. It's very maneuverable—small-car maneuverability in a car that doesn't look or feel small."

Workmanship received commendable marks, too. Nearly 80 percent rated the Celebrity's workmanship and overall quality *good to excellent*. A Texas oil foreman pointed out, "Flawless paint, all panels line up and the car has enough bolts to hold itself together."

A Minnesota laborer commented, "The Celebrity keeps living up to my expectations in every way, including quality. But it's hard to work on. I can't even see the sparkplugs."

An Illinois electrician: "My car cost \$12,618 and here I am, stuck with a set of plastic wheelcovers." And a Nebraska weather officer concurred: "Acceptable workmanship, but there's an awful lot of plastic on this car."

When we asked about interior comfort, 8.3 percent of the drivers we interviewed mentioned the fixed center armrest on the Celebrity's standard interior. "I wish they'd make the front-



The wide, flat trunk has acres of space. This car can take a family and their luggage on vacation without a big fuel bill.

seat armrest movable," suggested a Wisconsin schoolteacher. As it is, all models except those with standard interior have movable armrests.

As for suggested changes, a Minnesota trucker would like a full bench seat up front, *without* the center armrest.

(Please turn to page 58)

ESCORT:

By now, just about everyone knows a radar detector needs *lots* of warning distance to be truly effective. And ESCORT* delivers. Over hills, around corners, and from behind. *Car and Driver* magazine, in their 1982 test, went so far as to say: "The ESCORT, a perennial favorite of these black-box comparisons, is still the best radar detector money can buy." But there's more to the story.

The Plot Thickens

About a year ago, *all* radar detectors began picking up a new type of radar signal that was as strong as some police radars. The rest of the radar detector industry dismissed these signals as unmarked patrol cars, radar intrusion alarms, or even overactive imaginations.

But something didn't add up. There were just too many of these new signals. And we had another clue. ESCORT's audio warning distinguishes between the two police radar bands: it "beeps" for X band, and "braps" for K band. These new radar signals simultaneously triggered *both* warnings, and that told us the signals couldn't be police radar. Tracking down a car emitting this signal revealed the actual source—a new type of imported radar detector had the side-effect of *transmitting* radar signals in both police radar bands. Hard to believe, but true.



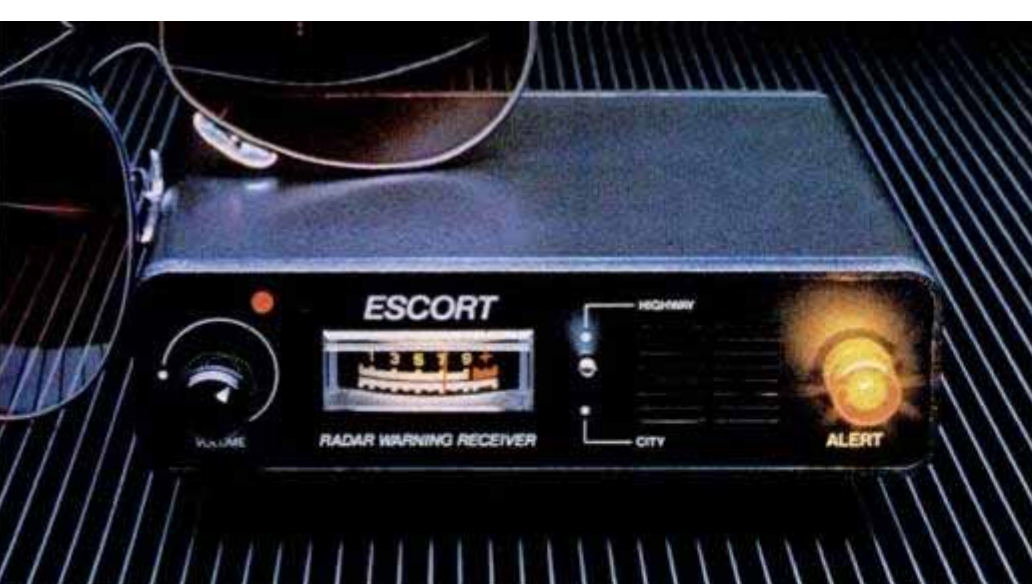
Our first step was to inform ESCORT owners of the situation. We composed a "Radar Bulletin" explaining the source of this new radar pollution and sent out 200,000 by first class mail. But this was only the beginning.

Mission Impossible?

On the surface, the problem seems unsolvable. The signals transmitted by these "radar polluters" are in the same bands as police radar, so it's impossible to detect one and ignore the other, right?

FOR ESCORT OWNERS ONLY:

As our ad above states, we've made another improvement. The new ST/O/P circuitry is a standard part of every ESCORT starting with serial number 400,000.



The Radar Defense Kit

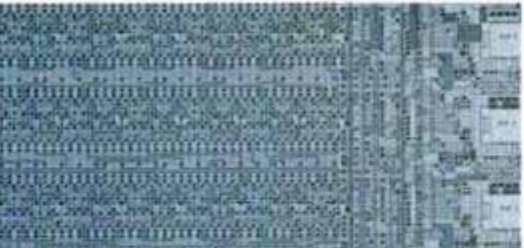
Radar Warning, No Riddles.

Not necessarily. Let's look at another type of technology to make a point. You can now buy an inexpensive device that will turn on the lights in your living room whenever you clap your hands. Or shout. Or drop a book. Or make any loud sound. At the other extreme, there are computerized devices available that don't merely sense sound, but can actually recognize sound patterns unique to specific spoken words. Some can even tell your voice from any other.

Why not apply this principle to radar detection? Instead of merely acknowledging the presence of any radar signal, a detector could look for a pattern in the signal and distinguish between "radar polluters" and actual police radar. And now ESCORT does just that.

Nothing But The Truth

The result of months of extensive engineering, ESCORT's new ST/O/P™ circuitry reduces alarms from "radar polluters" by over 95%. ST/O/P (Statistical Operations Processor) consists of a CMOS digital processor with built-in memory. When ESCORT receives an X or K band radar signal, ST/O/P recognizes patterns in the signal's amplitude/frequency/time characteristics, and uses these patterns to determine the signal's identity. All in 1/64 of a second.



If the signal is from a "polluting detector," ESCORT keeps quiet while maintaining its lookout for police radar. If the signal is police radar, ESCORT immediately alerts you. And unlike other detectors that keep you guessing, ESCORT's amber warning lamp, signal strength meter, and geiger-counter-like pulsing sounds ("beeps" or "braps") tell you everything you need to know. ESCORT has a lot to say, and we include a 33 1/3 RPM Radar Disc to make getting acquainted easier than ever. Play it on your stereo turntable and take a "test drive" with ESCORT as soon as you open the box.

Fully Equipped

ST/O/P digital circuitry is just the latest example of the continuous development of the ESCORT. We won't compromise on performance or features. Here's proof:

- Patented Digital Signal Processor
- Different Audio Alerts for X or K Band Radar
- Varactor-Tuned Gunn Oscillator tunes out false alarms
- Alert Lamp dims photoelectrically after dark
- 1/64 Second Response Time covers all radar
- City/Highway Switch filters out distractions
- Audio Pulse Rate accurately relates radar intensity
- Fully Adjustable Audio Volume
- Softly illuminated Signal Strength Meter
- L. E. D. Power-On Indicator
- Sturdy Extruded Aluminum Housing
- Inconspicuous size (1.5H x 5.25W x 5D)
- Power Cord Quick-Disconnect from back of unit
- Convenient Visor Clip or Hook and Loop Mounting
- Protective Molded Carrying Case
- Handy Cigar Lighter Power Connection
- Spare Fuse and Alert Lamp Bulb.



Take a stereo "test drive."

Critics' Corner

Car and Driver: "...All things considered, the ESCORT is the best piece of electronic protection on the market."
BMWCCA Roundel: "...The ESCORT is a highly sophisticated and sensitive detector that has been steadily improved over the years without changing those features that made it a success in the first place... In terms of what all it does, nothing else comes close."
Playboy: "...ESCORT radar detectors... (are) generally acknowledged to be the finest, most sensitive, most uncompromising effort at high technology in the field."
Autoweek: "...the consistent quality is remarkable."

Made In Cincinnati

If you want the best, there's no reason to look anywhere else. ESCORT is designed and manufactured under one roof, and sold to you factory direct.

Knowledgeable support and professional service are only a phone call or parcel delivery away. And you can try ESCORT at *no risk*. Open the box, play the Radar Disc, and install your ESCORT. Take 30 days to test it. If you're not absolutely satisfied, we'll refund your purchase and pay for the postage costs to return it. You can't lose. We also back ESCORT with a full one year limited warranty on both parts and labor. ESCORT will change radar for you forever. So order today.

Do It Today

Ordering an ESCORT is simple, by mail or by phone.

By Phone: Call us toll free. A member of our sales staff will be glad to answer any questions and take your order. (Please have your Visa or MasterCard at hand when you call).

CALL TOLL FREE . . . 800-543-1608
IN OHIO CALL 800-582-2696

By Mail: We'll need to know your name and street address, daytime phone number, and how many ESCORTs you want. Please enclose a check, money order, or the card number and expiration date from your Visa or MasterCard.



ESCORT (Includes Everything) . . . \$245.00
 Ohio residents add \$13.48 sales tax.

Speedy Delivery

If you order with a bank check, money order, credit card, or wire transfer, your order is processed for shipment immediately. Personal or company checks require an additional 18 days.

ESCORT

RADAR WARNING RECEIVER

Cincinnati Microwave
 Department 568
 One Microwave Plaza
 Cincinnati, Ohio 45242

Is ST/O/P adaptable to your present ESCORT? Well, yes and no. At S.N. 200,000, there was an internal redesign of ESCORT incorporating custom integrated circuitry, a precision quartz timebase, and a new integrated microwave mixer/antenna/Gunn oscillator. The new ST/O/P technology builds on this by signifi-

cantly expanding the digital logic and adding memory. As a result, older units (serial numbers less than 200,000) cannot be modified to incorporate ST/O/P technology. For those of you with ESCORTs from S.N. 200,000 to 399,999 we are presently developing procedures and

facilities to make adding the ST/O/P circuitry to your unit possible. The cost will be \$75, and details and special shipping instructions will be in our advertisement in the August '83 issue of this magazine. Sorry, but we won't be able to convert your unit until that announcement.

OWNERS REPORT: CELEBRITY

(Continued from page 56)

And a Massachusetts banker told us he'd appreciate a five-speed manual gearbox, even if he had to pay extra.

Several respondents said they wish Chevrolet had offered the Celebrity as a

station wagon—something Chevy hoped to do by 1983, but didn't make it. As you can see, a majority of owners had plenty of good things to say about the Celebrity. A New York attorney testified: "This Celebrity's handling is almost like a sports car. Yet there's room for five adults plus luggage, and

no one's cramped in the rear seat."

A Wisconsin roofing contractor: "I'm pleased with the Celebrity's quality, which is surprising after so many years of poor U.S. workmanship."

And an electrical engineer from Ohio summed it up by smiling, "It's the best car I've ever owned." **PM**

SUMMARY OF 1982-83 CHEVROLET CELEBRITY OWNERS REPORTS*									
Total miles driven	2,089,488	Styling	38.2	Comfort opinion (front seats):		Dealer service opinion:			
Average miles per gallon:		Ride	30.1	Excellent	60.4%	Excellent	30.9%		
OHV Four		Specific dislikes:		Good	36.7	Good	40.5		
In town	25.0	No complaints	27.1%	Average	2.1	Average	17.1		
On the highway	32.6	Not enough horsepower	7.8	Poor	0.9	Poor	11.5		
OHV V6		Poor workmanship	6.5	Comfort opinion (rear seats):		Number of vehicles owned:			
In town	21.9	Poor materials	5.9	Excellent	45.3%	This car only	48.1%		
On the highway	27.6	Rattles and noises	4.6	Good	47.5	Two cars	41.3		
Engine choices:		What changes would you like?		Average	6.3	Three cars	8.8		
OHV 2.5-liter Four	46.9%	No changes	14.2%	Poor	0.9	Four or more cars	1.8		
Gasoline 2.8-liter V6	51.9	Bigger glovebox	9.6	Had any mechanical trouble?		Makes of other cars owned:			
Diesel 4.3-liter V6	1.2	Movable center armrest	9.2	No	60.3%	Chevrolet	42.5%		
Body style:		Better materials	8.3	Yes	39.7	Ford	24.1		
Four-door sedan	76.5%	Firmer suspension system	6.3	What type of trouble?		Pontiac	8.6		
Two-door sedan	23.5	How much did you pay?		Air conditioner	15.6%	Oldsmobile	8.0		
Why did you choose this car?		Under \$8,500	8.1%	Transmission	14.8	Age distribution of owners:			
Styling	41.9%	\$8,501 to \$9,500	25.3	Power steering leaks	9.6	15-29 years	11.4%		
Economy	36.2	\$9,501 to \$10,500	39.3	Oil leaks	8.9	30-49 years	38.1		
Size	25.4	\$10,501 to \$11,500	18.9	Fuel induction	6.7	50-plus	50.4		
Front-wheel drive	22.8	\$11,501 to \$12,500	6.8	Electrical system	6.7	Would you buy another Chevrolet?			
Roominess	13.2	More than \$12,500	1.6	Brakes	6.7	Yes	87.6%		
Specific likes:		Workmanship opinion:		Dealer repairs satisfactory?		No	12.4		
Economy	52.4%	Excellent	26.8%	Yes	59.2%	Would you buy another Celebrity?			
Handling	45.8	Good	53.0	No	40.8	Yes	82.4%		
Comfort	40.1	Average	13.7			No	17.6		
		Poor	6.5						

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

There are two rechargeable lights in this picture.



The one that's still shining is Ready-Lite.

There are two well-known brands of rechargeable light. But the difference between them is like night and day. Ready-Lite shines more than 2½ hours on a single charge. The other light can't.

Ready-Lite stands on its own and swivels its beam to put light where you want it, and to leave your hands free. The other light doesn't.

Ready-Lite can switch from a wide beam to a narrow, focused beam. The other light can't.

And Ready-Lite will hang on to its power, ready for emergencies, even if you don't turn it on for months. The other light may not.

The other light can't match Ready-Lite.



READY-LITE™
From the makers of **First Alert®**

© 1983 Mobil Oil Corporation

\$1.50 Manufacturer Rebate
on purchase of 5 quarts of Mobil 1,
Super 10W-40, Special 10W-30 or Heavy Duty
motor oils. (May 1-June 4, 1983)

100% Synthetic Motor Oil
Saves you gas and oil changes



Mobil

If you're not using Mobil 1® you could be shortchanging your engine.

Mobil 1's unique molecular structure is the reason it lubricates better and helps protect engine parts better against friction and wear than conventional oil. So engines stay cleaner and run smoother.

Mobil 1's molecular structure is also the reason it saves gas compared to conventional oil, helps you start at 35°F below and takes you 25,000 miles* (or one year whichever comes first) between oil changes.

Start treating the inside of your car as well as you treat the outside. It doesn't take a lot of effort, just a little Mobil 1.

Add oil as needed. New car owners follow warranty instructions. Diesel owners follow manufacturer's instructions.

Mobil 1. The oil that saves you gas. And more.

**Treat the inside
of your car as well as you
treat the outside.**



Includes
Power Spray Kit,
\$30 value FREE!

CAMPBELL HAUSFELD® Power Pal Compressor combines powerful 1/2 HP motor with maintenance-free, oil-less 2-cylinder pump. Adjusts from 10 to 100 PSI at the twist of a dial. Lightweight, portable with 6' cord and 15' air hose. Buy now, get \$30.00 value Power Spray Kit FREE. MA4105

139⁹⁹



CHAMPION® Spark Plugs. Time to replace worn plugs for better gas mileage, smoother running engine. Regular plugs, ea **99¢**
Resistor-type, ea. **1.15**



All other Fram filters are on sale!

FRAM® Filter Values. Great savings that prevent sludge build-up and prolong your engine's life. Air filters. CA326/351/303/327 **3.99**
Oil filter. PH8A/25/30/43 **2.99**



Winning

Keep your car running in top form with these values, specially priced through June 4 only.

from more than 6,000 True Value Hardware Stores and Home Centers throughout 50 states. Look under "Hardware" in the Yellow Pages.



GUNK® Grease Cleaner removes grease and oil from barbecues, floors and lawn mowers. Just spray on and rinse off. 16-oz. FG1 **1.89**
Engine Brite. 16-oz. spray. EB1 **1.89**

UNION CARBIDE® Prestone® Sealer and Stop Leak helps stop cooling system seepage. 12-oz. AS121 **1.29**
Anti-Rust water pump lubricant protects seals. 12-oz. AS111 **1.29**



TEXACO® HAVOLINE Supreme all-weather motor oil protects engines at high and low temperatures. 10W40-Qt. 1814 **99¢**

VALVOLINE® Motor Oil for all-weather, heavy-duty engine protection against wear, rust and carbon. 10W40-Qt. 141 **99¢**

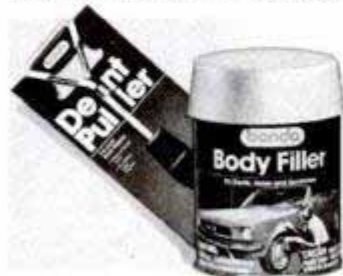
QUAKER STATE® Deluxe Motor Oil helps engine run smooth and efficiently. 10W40-Qt. **1.09**



GOLD EAGLE® Air & Repair Tire Inflator and Sealant with universal fit hose and valve. Ideal for cars, trucks, motorcycles, bicycles. Won't affect tire balance or wheel alignment. 12-oz. TIH **1.99**

TRI-FLOW® Aerosol Lubricant with Teflon reduces friction, shields metals against rust and corrosion, frees frozen mechanisms fast. 3 oz. 13000 **1.99**

ARMOR ALL® Protectant beautifies vinyl, rubber, plastic and leather. For home, car, boat. 16-oz. 10160 **4.99**
Cleaner for most surfaces. 16-oz. 30160 **1.89**



BONDO® Dent Puller reduces depth to bring dent closer to contour and save on plastic body filler. 953 **6.99**
Body Filler. 261-Pt **1.99**



WD-40® Lubricant penetrates instantly to free frozen metal parts, stop rust and corrosion. Stops squeaks. 9-oz. spray. 40011 **1.49**



STP® Foaming Engine Degreaser is the no-mess way to dissolve dirt and grime on your engine. 0921 **1.99**
Oil Treatment. 15-oz. 1015 **1.89**



LUBRIMATIC® Grease Gun has up to 10,000 lbs. working pressure to lubricate cars and trucks easily. 7090 **7.99**
14-oz. Grease Tube. 400. **1.19**



GENERAL ELECTRIC® Halogen Plus® Sealed Beam Headlights give more light from the same number of watts. Available in a wide range of either round or rectangular sizes. Easy to install yourself. Hi or low beam. H5006/H4001/H4656/H4651 Pair **7.99**
Hi/low combination. H6014/H6054 Pair **14.99**

BLAZER® Halogen Quartz Lamps penetrate fog, rain or snow. Wiring and switch included. Choice of amber or clear. 8841/43CD Pair, **24.99**

TRU-TEST® X-O Rust® seals out air and moisture, stops old rust from spreading and keeps new rust from forming. Qt. **4.98**
Convenient Spray. 16 fl. oz. **2.78**

Values



George Bignotti, master mechanic to a record number of six Indy winners...
"To take on the toughest competitors in the most grueling race demands superior strength and precision performance. That's why I use Master Mechanic® tools and accessories sold exclusively by True Value Hardware Stores and Home Centers."



MASTER MECHANIC® Tool Chests feature solid steel "strongbox" construction, enamel finish, smooth compound drawer glides, full-length hinge. With keyed cylinder locks. 6-drawer chest, lift out tray 15x26x13½" MM1806 **94.50**
3-drawer roller cabinet. 33½x26½x18" MM1903 **121.50**

MASTER MECHANIC® 10-Gal. Wet/Dry Vac picks up everything! Has a high performance by-pass motor for extra cleaning power. 30° angle motor housing prevents tipping, airflow control on curved wand adjusts suction. With tool set. MMP800-10 **62.99**

MASTER MECHANIC® Oxy-Propane Torch has 2 fuels, dual controls up to 5,000°. Cut, weld, braze and solder. Lightweight, portable. MMW5000 **32.99**

MASTER MECHANIC® 40-pc. Tap and Die Set with tempered steel edges cuts NC, NF, NPT threads. Tap and t-handle wrenches, thread gauge, etc. 442657 **44.99**

MASTER MECHANIC® 7" Diagonal Pliers forged from tough alloy tool steel. Cutter is electronically hardened. Forged rivet for precise fit. MM40-7C **6.99**

MASTER MECHANIC® 8-pc. Screwdriver Set handles all jobs with 5 slotted and 3 Phillips tips. Precision ground blades, high impact handles. TT8 **7.99**



LOCTITE® Rear View Mirror Adhesive permanently bonds mirror to windshield. 11067 **1.89**
Auto Trim Adhesive for emblems, moldings. 00215 **1.89**

5.99
-1.00 rebate
4.99 final cost



MEGUIAR'S® Fast Finish® gives car a long-lasting shine. 14-oz. paste, 18-oz. spray, or 16-oz. liquid. Each **5.99** less \$1 manufacturer rebate. A1814/19/16



TURTLE WAX® Polyshell® Sealant cleans, shines, protects in 1 step. 16-oz. liquid, 18-oz. spray, or 13-oz. paste. T560/70/65 Each **4.88**



DURACRAFT® Impact Driver easily loosens screws. ½" drive with 2 slotted, 2 Phillips bits and adapter in steel box. 2500 **4.29**

Because participating True Value Hardware Stores and Home Centers vary in size and merchandising policies, some may not stock all items shown. Prices may vary and are subject to change without notice. Prices expire June 4, 1983.

PM SOFTWARE MONITOR



An extremely powerful database runs on most computers



The *dBase II* lists contents of database (left) and designs format for one (right).

A program called *dBase II* from Ashton-Tate has impressed us as being the Rolls-Royce of computer databases. If you need a database which will do more than just keep your address book or a list of client numbers, this one's for you. It will do everything you've ever imagined a database would do.

Like other databases, it allows you to

define your own *fields* within a *record*. If your records are inventory readouts, for example, one field might be quantity on hand and another quantity on order. Or, if you have records concerning monthly bills, one field might be creditor's name and another amount owed and a third bills paid. A universal database like *dBase II* allows you

to keep track of virtually everything.

The *dBase II* will help you sort your information by multiple categories. And it will retrieve records by looking for whatever information to match up to that you might wish. Of course, it will print out a report complete with automatic calculations.

But *dBase II* is also a programming language—a database language. You can use its command file capability to write your own programs. These programs can save you many keystrokes during data entry—or guide a person who has never seen a computer in the operation of your home or office database. The command sets let you do such things as put menus (screenfuls) of choices onscreen, read information direct from disc and more.

At \$700, *dBase II* is not for the casual user. But if you need a serious database and have a CP/M-capable computer, this is a great way to go.—N.S.



Muppet madness

Nothing in the world delights kids more than a computer game that they can play by themselves. And this new *Mix And Match* game from Apple Computer and Children's Television Workshop is such a real pleasure.

Preschoolers use the game controls on the Apple to choose various parts of different, popular Muppets. They can make their own Muppets. We show Ernie's smiling face atop Big Bird's feet on Cookie Monster's torso (above). That's only one of the many hilarious cartoons that can be created by the preschooler. Even though \$50 is a heavy hit, the laughs make it worthwhile.—N.S.

The best in chess

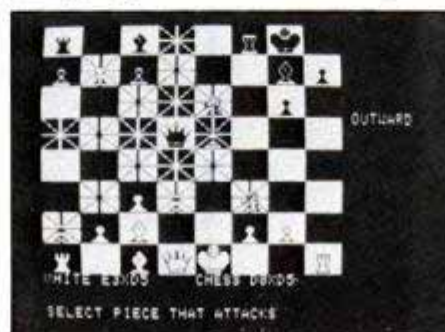
The game of chess has been programmed many times for just about every personal computer system. But this new program, *Chess* (\$69.95) from Odesta Software for the Apple II and Atari 800 machines, is the next best thing to playing a cunning human teacher.

The computer will do such things as give you advice, rate the present position, show what its plans are for the next few moves, store game positions on disc, rerun stored games like a chess "movie," show the squares a particular

unit is attacking, and call out what enemy pieces are attacking each of your men. It will even let you play three varieties of "blind" chess where the pieces are blank triangles instead of chessmen, or are hidden from view.

All of the options make playing a game with *Chess* more like having a conversation with a chess teacher than playing against a machine. In an article about chess programs and machines later in the year, *Chess* will be examined in detail. For now, let's just say that if you want the game of kings on your computer, this is a kingly version.—N.S.

Chess program shows attacked squares (left) and the computer's potential moves.

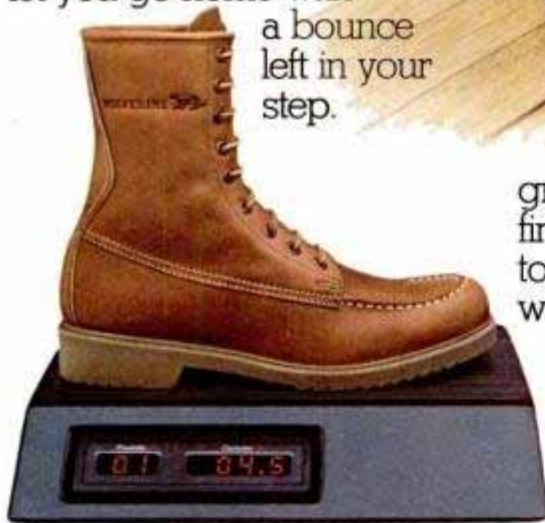


THE LIGHTER YOUR BOOTS THE LONGER YOU'LL LAST.

Take a load off
your feet.

Until now, the only way you could tell if your boot was tough enough to take a long hard day of work was to buy the heaviest boot you could find. It got the job done, but it also left you tired from your head to your toes. That's why we built a whole new line of heavy-duty, yet lightweight boots called *Work-Lites*™. Boots tough enough to take it, but comfortable enough to let you go home with

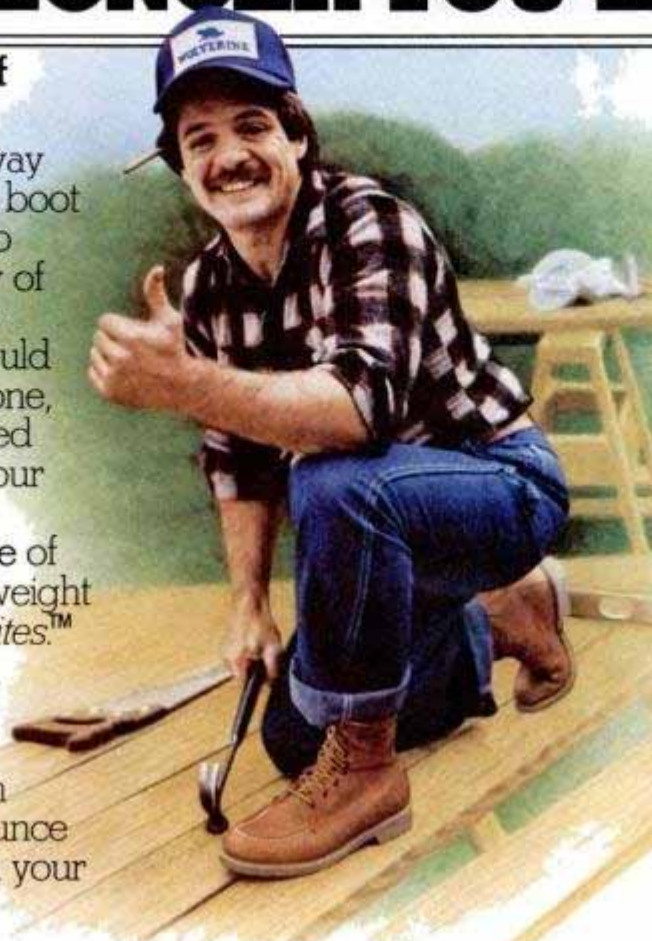
a bounce
left in your
step.



Electronic digital scale shows actual weight, accurate to 1/10 ounce.

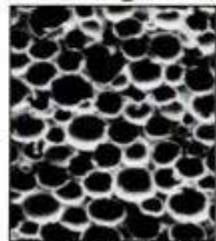
We couldn't make
them tougher, so we
made them lighter.

Our work boots have always been known for toughness. That's because we start with the finest, full



The sole difference
is comfort.

The microcellular composition of our sole material is what makes the difference. In a microscopic view, you can see that the material is permeated with airholes that lighten its weight while also helping to absorb shock. In effect, you're walking on a cushion of air. And, the result is a perfect combination of dependable toughness and incredible comfort.



Microscopic View

Boots that live up
to their name.

When you make boots for people who wear them to make their living, like we've been doing for over 75 years, you learn a thing or two.

You learn to make boots that look good, feel good, and last a good long time. And, you learn not to put your name on anything less.

grained cowhide we can find, and specially treat it to resist everything from water to acid.

We couldn't make them any tougher. So instead, we've made them a lot lighter by using the same super tough sole material we use in our heavy-duty hiking boots. These Powerthane™ soles are up to 55% lighter, and still give you all the abrasion resistance, slip resistance and long tread life you need.



WOLVERINE®
Boots &
Shoes

If you smoke...

you should know that many smokers who are looking for a cigarette that offers smoking pleasure and ultra low tar have made today's Carlton their No. 1 choice.

In fact, Carlton is America's most popular, best selling ultra low tar brand.

Latest U.S. Government Report—Carlton King, Menthol or Box 100's—**10 packs of Carlton have less tar than 1 pack of the following brands:**

	TAR mg/cg	NICOTINE mg/cg		TAR mg/cg	NICOTINE mg/cg
Kent	12	1.0	Kent 100's	14	1.2
Winston Lights	11	0.9	Winston Lights 100's	12	0.9
Marlboro	16	1.0	Benson & Hedges 100's	16	1.1
Salem	14	1.1	Parliament Lights 100's	12	0.9
Kool Milds	11	0.9	Salem 100's	15	1.1
Newport	16	1.2	Marlboro 100's	16	1.1
Carlton Kings	Less than	0.5	0.1		
Carlton Menthol	Less than	0.5	0.1	Carlton Box 100's	Less than 0.5 0.1



Box King—lowest of all brands—less than 0.01 mg. tar, 0.002 mg. nic.

Carlton is lowest.



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

Box: Less than 0.5 mg. "tar", 0.05 mg. nicotine; Soft Pack, Menthol and 100's Box: Less than 0.5 mg. "tar", 0.1 mg. nicotine; 100's Menthol: 3 mg. "tar", 0.3 mg. nicotine; 100's Soft Pack: 4 mg. "tar", 0.4 mg. nicotine av. per cigarette, FTC Report Dec. '81.

THE PM GARAGE



Packaged brakes

In a master stroke of clever packaging, Rally Manufacturing has just introduced a series of brake job kits that are designed specifically for the weekend mechanic.

The disc brake replacement kits come packaged in a plastic tray with a transparent top and include the pads, antisqueal compound, lubricant and pin boots—in short, everything you'll need to do a brake job except the hand tools.

Each kit is specifically designed for a particular car and model year and any unique part of that model is included. We did a brake job on a Mustang and the kit was faithful to its word in providing *everything* needed to do the job.

Brake job kits are available for most popular American and some import cars.

Prices vary according to application but are competitive with most boxed



Complete brake-job kit has everything you need to do job right the first time.

brake pads, considering the extras you get.

Rally Manufacturing is located at 8040 Northwest 33rd, Miami, Fla. 33122.—T.A.

Instant threads

Like a blind riveting tool, the Nutter lets you fasten parts when you can't reach behind a body panel to install a nut. But unlike the blind riveter, the Nutter uses a threaded rivet that accepts an ordinary machine screw, letting you as-



Rivet tool can install a threaded rivet as well as conventional blind rivets.

semble and disassemble your work. The Nutter, case and a good supply of threaded rivets in various sizes is \$39.99.

It's from DRI Industries, 11100 Hampshire Ave. S., Bloomington, Minn. 55438.—Bob Berger

Snow chain-ger



Chain storage box top doubles as installation ramp. It handles 2,000-pound load.

Last winter I solved my snow-chain storage and installation problem—with the Chains-Away combination storage box and installation ramp. The box can hold a pair of chains with room left over for gloves and hand tools. The top of the box is an installation ramp, too. It holds up to 2,000 pounds, suitable for most cars and pickup trucks. To install the chains, lay the cover and drive onto the cover/ramp. It's about \$15. Contact Wink Corp., 20630 56th Ave. W., Lynnwood, Wash. 98036.—Joel Breault

Little lantern, lots o' light

Though only a tad over six inches long, this fluorescent lantern is a potent performer, boasting an ultrawide 300° beam. That big splash of light came in handy one evening when I had to play hide-and-seek with a bolt I dropped while making some roadside repairs. Four AA cells provide power; I use rechargeable NiCds in mine. The lantern, minus batteries, is \$14.95 from Early Winters, 110 Prefontaine Place S., Seattle, Wash. 98104.

—Bob Berger



Design of powerful light has won it a permanent home in Museum of Modern Art.

A ripping yarn



Seat-patch kit can repair virtually any type and color of vinyl seat or top.

The next time you gash your car's seat, reach for the Magna-Weld vinyl repair kit. It comes with 20 jars of colored repair compound, a color-matching card, a heating element, grained sheets, a mold to duplicate the grain of your existing vinyl (if none of the sheets match), clear vinyl cleaner and clear instructions. The kit costs \$39.95 plus \$2.75 for shipping from Magna Sales Co., 2017 West Montrose Ave., Chicago, Ill. 60618.—Joel Breault

PM OWNERS REPORT: FORD RANGER

BY MICHAEL LAMM WEST COAST EDITOR

"I'm impressed with the ruggedness of the 2.0 engine."

NORTH CAROLINA FARMER

"It's built like a full-size pickup."

MINNESOTA ELECTRICAL TECHNICIAN

"I'd like more low-end power."

TENNESSEE BUS DRIVER

"Workers take great pride in assembly, no sloppiness."

IOWA SALESMAN



"It's hard to get into third gear."

KENTUCKY FACTORY WORKER

PM photos: Bill Ashe

Economy, compact size attracted owners, but the quality keeps them happy.

If you compare the Ranger's base price with that of Ford's least expensive full-sized pickup, the F-100, you'll discover the main reason people buy this little truck. Next, check what Chevrolet asks for the S-10 and that also helps clinch the deal.

The bare-bones Ranger stickers out at \$5,993. The F-100 goes for \$6,909, and the S-10 rolls out the door for \$6,343.

Add to that the fact that the Ranger gets up to 26.9 mpg on the highway (actual, not EPA) and you can see why economy ranks No. 1 with the Ford Ranger owners we surveyed from all parts of the country.

Second came size; third was styling. Ford calls the Ranger a mid-sized pickup. Yet the Ranger stands about three inches shorter than the Mazda-built Courier it replaced. The Ranger does look bigger than it is, more like a scaled-down version of Ford's F-series pickups. And true to the Ford truck tradition, the Ranger has twin-I-beam front suspension.

So there's no doubt that size, perceived or real, accounts for a good measure of the Ranger's appeal. So does its little brother, styling. But more significant than economy, size or styling is a trend the Ranger shows in this Owners Report—the trend back to American-made vehicles. This swing appears to involve not only the Ranger but a lot of recent U.S.-built cars. It's based on favorable quality comparisons between domestic and imported cars and trucks.

A NATIONWIDE SURVEY BASED ON 2,045,167 OWNER-DRIVEN MILES

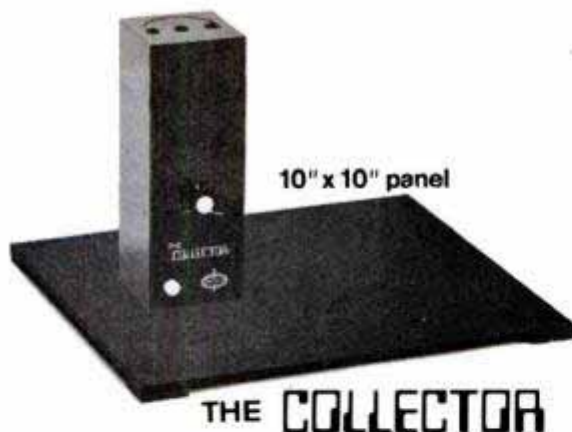
Judging by the owners who responded to our Ranger survey, Ford quality has taken a big upward jump in recent years. True quality in an American-made pickup certainly seems to have impressed a majority of the owners who have driven and researched vehicles from both sides of the Pacific.

For example, a Kansas military officer wrote on his questionnaire: "I've always wanted to buy American, but in the past there have been only foreign small pickups to choose from. After keeping an eye on the import market

(Please turn to page 69)

FRESH AIR BREAKTHROUGH!

AMERICA'S NEWEST AND MOST POWERFUL BIPOLAR IONIZING-PRECIPITATOR CLEANS YOUR AIR OF HARMFUL, IRRITATING POLLUTANTS BETTER THAN ANY OTHER ROOM IONIZER.



IF YOU WANT CLEAN FRESH AIR OR YOU'VE UNPLUGGED YOUR POPULAR FILTER-FAN UNIT BECAUSE IT DOESN'T WORK THEN READ THIS...

Is your indoor air fresh, clean and alive? Indoor air pollution is becoming a national health hazard. Energy efficient airtight buildings are stifled with stale polluted air which contains tobacco smoke, smoke and soot from fireplaces, heating systems and cooking appliances, as well as dust, pollen, viruses, and bacteria. Most of these pollutants are so small (under 5 microns) that they are not effectively removed by common small filter-fan units. Scientific tests show that these noisy toy-like devices which emit chemical "citrus" odors are no match for high-powered ionizers in thoroughly cleaning indoor air.

ANOTHER IMPORTANT DIFFERENCE

You know how fresh and vibrant the air feels right after a rainstorm, in the mountains, or near a waterfall. That clean, alive fresh air is rich in something important that is greatly depleted in our urban and indoor air. That missing element is negative ions, nature's own air cleaners. Many users experience great benefit from these amazing active ions, including feelings of aliveness, alertness and vitality similar to that experienced in the fresh mountain air. In addition, even hospitals use ionizers in some units.

Filter fan units do not emit negative ions. The COLLECTOR, by Zestron, creates trillions of these beneficial ions every second, while giving you the best performance, value and technology in air cleaning.

THE ZESTRON BREAKTHROUGH!

Most ionizers clean your air but leave an untidy deposit of pollutants on room and furniture surfaces near the ionizer. The COLLECTOR by Zestron takes ion technology a giant step forward by giving you super-powered ion output while depositing pollutants from your air on the collector panel. This easy to clean panel features a scientifically formulated surface that electrostatically attracts the vast majority of airborne pollutants to it rather than to the floor or walls near the ionizer. Other bipolar ionizers with porous collecting surfaces that absorb odors and unsightly grime are almost impossible to clean.

AMAZING DEMONSTRATION!

Unplug your COLLECTOR, place the ionizer unit and an ash tray on top of the panel. Place a lit cigarette in the ash tray and watch the smoke rise into the air. Now plug it in, and amaze yourself and friends as the smoke barely rises above the ash tray and then nose-dives onto the collector panel before it can enter the room air. This is accomplished entirely electronically with no moving parts! The COLLECTOR by Zestron is the only ionizer on the market that cleans the air powerfully enough to accomplish this test.

ADJUSTABLE OUTPUT

Some people prefer fewer ions at night. The COLLECTOR is the only adjustable bipolar ionizer that allows you to set the ion level to your personal preference.

THOUSANDS OF SATISFIED USERS

Don't you, your family and friends deserve the healthy clean fresh air that Zestron ionizers have brought to thousands of satisfied users? Users write: "I simply can not believe how much better I feel!" Dr. E.K., DDS—MA; "I smoke heavily and it has cleared the air as advertised" G.P.—WA; "I haven't taken the top off my nasal decongestant spray since using your product. I was previously a chronic user." G.S.—SD.

When you use your COLLECTOR, you'll quickly feel the difference it makes and smell the freshness in your air. You'll actually see the elimination of smoke and dust in your air!

SILICON VALLEY TECHNOLOGY

The COLLECTOR, incorporating years of high reliability design experience, is built with quality parts in the heart of Silicon Valley, USA, to give you years of trouble free service.

The COLLECTOR operates anywhere in your home or office for pennies a month and has nothing to wear-out or replace.

SUPERPOWER OUTPUT

The COLLECTOR by Zestron is the only bipolar collecting ionizer with superpower output. The thoroughness and speed of air cleaning increases with more ion output, and Zestron ionizers give you the highest output (without detectable ozone). Check the comparison chart below. Don't buy any ionizer not stating output using the industry standard of ions/cc/sec. at one meter.

IONIZER	ADVERTISED OUTPUT (1 m.) ions/cc/sec.	COLLECTOR
The COLLECTOR by Zestron	1,200,000	YES
JSA Bubble	not stated	YES
Aspen	not stated	YES
Orbit	not stated	YES
AirCarell	236,000	YES
Ion Fountain	540,000	NO
Ion Cloud	350,000	NO
Ionosphere	350,000	NO
Modulian	75,000	NO
Ion Breeze	not stated	NO

FREE ION DETECTOR

A FREE remote ion detector comes with each ZESTRON to verify and compare output. When you place the detector next to a ZESTRON and a competitive unit, you will see greatly reduced or no output from the competitive unit!

SATISFACTION GUARANTEED

Order a COLLECTOR now and try it in your home or office risk free for 30 days. If for any reason you are not satisfied, return the unit for a full refund including return postage. The COLLECTOR has a full one year warranty on both parts and labor excluding abuse.

ADDITIONAL DEALERSHIPS AVAILABLE

Reorders are pouring in, customers write: "We are enjoying the results of the first one and are ordering two more" Dr. J.B., M.C.—CA; "I'm a distributor for three other ion companies, and have to say I am extremely, extremely impressed." T.N.—CA.

ZESTRON, the leader in ion technology, has created a unique DEALERSHIP PROGRAM. Call or write for details on this RISK FREE OPPORTUNITY.

TO ORDER—CALL TOLL FREE 800-372-1200.

In Calif, 800-392-1200 or (408) 371-1200. Use your credit card or send check or money order to Zestron, Inc., Dept. PM5, 667 McGlincey Lane, Campbell, CA 95008. Add \$4.00 shipping and handling per unit. (Calif. residents add 6.5% tax.) Orders outside U.S. add 15% to unit cost. Order two at \$109.95 each. For additional quantity discounts, call Zestron, Inc.

This talking phone TELLS you in clear English what numbers you're dialing.

We'll Try to Describe Everything This Space-Age Phone Does In One Page of Small Type. It Won't Be Easy.



The Everything Phone is a handsome, contemporary ivory phone with a standard modular plus, ready to go.

It's as though someone said—
"Let's think of *everything* any telephone can do, and combine them into one fantastic instrument."

Someone did say that. This is it. We call it THE EVERYTHING PHONE because it does everything. It advances the science of phone communications by ten years, even in this age of wild changes and improvements.

For example—

This Phone Actually TALKS To You

The Everything Phone speaks to you in a warm, gentle voice. It never tells you wrong.

Touch the "Voice" switch and when you push a button, the phone tells you the number you've pushed. If you're working in dim light, you won't dial a wrong number, because your friendly phone voice repeats each digit immediately, as you dial it.

A Complete Phone Answering System

If you press the "Prefix" key, the "Clear" key, the Direct Memory Keys, or any of the other special function keys (more about these later), your Phone Voice tells you what you've pushed. If you get tired of company, you can shut off the voice; but it's like having a friend right inside your phone.

This feature takes some explaining.

In the bank of keys to the right of the dial pad are three marked M1, M2, and M3. M1 and M2 will tell a caller, when you're out, either when to call back or another number where you can be reached.

What about M3?

M3 makes any cassette recorder an answering device. Using the connector (supplied), your recorder can take messages up to the total length of any tape cassette. The Everything Phone turns the recorder on and off automatically when a call comes in.

So—you have your voice of 1) a message, in the phone's own voice, to call back at whatever hour you designate; 2) a message that you're out and can be reached at whatever number you designate; 3) an invitation to leave a message after the tone, with a capacity as long as the cassette—an hour or more.

Memory Keys Galore for Automatic Dialing

At the left of the numeric keypad are ten Direct Memory Keys. The key at the upper left is for MCI, Sprint, or other computer-code dialings. It holds the access number and your personal code number.

The other nine let you dial stored numbers, including long distance numbers, by pressing one key. You can inset a tab showing whose number is stored.

But you ain't see nothin' yet!

You actually can store up to 50 numbers of 20 digits each, using a two-number code. Example: if you already have 30 numbers in memory and you want to store 1-305-473-2044, punch in that number, use the "Store" key and "31", and you'll be able to dial that number in the future just by pressing "31".

Quality Speaker-Phone

Of Course The Everything Phone has one-way speaker-phone capability. Of course it's high quality sound.

Just press the "Speaker" button and you have a hands-free phone. A volume control gives you just the right amount of amplification.

Music on Hold: "Mute" Switch

You can put a caller on hold just by pressing the "Hold" key. What a pleasant surprise! Instead of dead sound, the person on hold hears a pleasant melody. (You'll hear it too, so you won't forget he's on hold.)

You have a "Mute" privacy button, and it couldn't be more convenient—it's right in the center of the modern hand-phone. Press that button, and although the other party won't be able to hear you, you'll still be able to hear him or her. Release the button and communications are normal again. (No tell-tale "click" when you press the Mute button.)

Here's a List of Other Built-in Benefits
Your Everything Phone is an electronic butler. It has—

— Automatic redial. Press this key and your phone will redial the last number you called either once (if the phone is off the cradle) or four times (if the phone is in the cradle).

Each key has a separate function. Each one talks to you, if you want it to. What a conversation piece The Everything Phone is!

— Pulse/Tone selector switch. In areas with rotary dialing only, slide the switch to "P". In areas with touch-tone, slide it to "T".

— Ringer off switch. You can turn off the pleasant "chirper" (it isn't a bell) when you don't want to be disturbed. A separate ringer l.e.d. light will alert you, if you're interested.

— Access pause key. For Sprint, MCI, and other code numbers, the Pause button gives you the proper gap between the original dialing and the time the system takes to answer with a tone. The Pause has other uses, too, but we just can't list all of them here.

— Secretarial aids. Open a little door and you have a memo pad to jot notes. For the numbers stored in automatic dialing memory, slide out the Directory Card, concealed under the phone unit.

— Battery backup. Two tiny, easily replaceable batteries keep your memory intact. A power failure, even one that lasts for months, won't wipe out what's stored in the memory.

Anything Else?

Probably. We ourselves haven't figured out all the phone assistance The Everything Phone can give you. But we do know this: *No other phone ever made has all the benefits and comforts this one has for you.*

**CAN YOU BELIEVE IT?
THE EVERYTHING PHONE
IS YOURS FOR JUST**

\$199.95

two for only \$189.95
(+ \$4.50 shipping each)

Order your EVERYTHING PHONE
by lifting your old-fashioned phone
and calling toll-free:

1-800-824-7888

Ask for Operator 551.

(In California: 1-800-852-7777)

Have your VISA or MasterCard handy.
Phones are manned seven days a week,
24 hours a day.

We Absolutely Guarantee!

The Everything Phone is a lot of fun, and it's the darnedest electronic instrument you ever owned. But if at any time during the first full month you own it you decide not to keep it, send it back and we'll refund every cent you paid.

Send check or money order, or charge card information (\$199.95 + \$4.50 shipping—
Total, \$204.45) to New Horizons, or call the toll-free number above.

The Everything Phone
is another electronic marvel from
NEW HORIZONS
Dept. PM5, 1 Penn Plaza, Suite 100
New York, N.Y. 10119

OWNERS REPORT: RANGER

(Continued from page 66)

for several years, it's my opinion that Ford has built a small truck that equals or surpasses the imports in every category.

A California brake and front-end mechanic said, "Ford really does an

outstanding job of putting this truck together."

A Texas store manager puts it this way: "I've owned Datsun pickups and wanted to buy another one, but my family gave me a lot of static about owning foreign cars. They asked me to look at the Ranger, which I did, and I really liked it. I'm most impressed with

its good quality, like the double-wall bed. This is a real truck, not a Tonka toy. Best of all, it's made by Uncle Sam!"

Well, not totally. Sorry to burst the bubble, but in fairness, the Ranger's 2.0-liter engine comes from Ford of Brazil, and the four- and five-speed

(Please turn to page 70)

SUMMARY OF 1982-83 FORD RANGER OWNERS REPORTS*

Total miles driven 2,045,167	Specific likes:	Good 44.0	Average 22.3
Average miles per gallon:	Economy 46.0%	Average 10.7	Poor 12.2
Four-speed manual	Styling 37.7	Poor 1.7	
In town 22.3	Handling 34.9		Number of vehicles owned:
On the highway 26.9	Comfort and ride 31.6		This car only 21.5%
Three-speed automatic	Size 18.6		Two cars 54.5
In town 18.6		Comfort opinion:	Three cars 18.9
On the highway 22.7		Excellent 47.6%	Four or more cars 4.2
Engine choices:	Specific dislikes:	Good 44.2	
Ohc 2.0-liter Four 31.5%	No complaints 23.8%	Average 7.7	Makes of other cars owned:
Ohc 2.3-liter Four 68.5	Disappointing mileage 17.3	Poor 0.4	Ford 44.8%
	Needs more horsepower 8.4		Chevrolet 14.8
Transmission choices:	Rattles and noises 6.5	Had any mechanical trouble?	Oldsmobile 13.7
Manual four-speed 76.3%	Price 5.1	No 57.9%	Plymouth 7.1
Automatic three-speed 21.9		Yes 42.1	Mercury 6.6
Manual five-speed 1.8	What changes would you like?		Buick 6.6
Drive train choices:	More horsepower 17.5%	What type of trouble?	
4x2 99.0%	No changes 17.0	Carburetor 27.6%	Age distribution of owners:
4x4 1.0	Better fuel mileage 10.0	Engine knock 13.3	15-29 years 24.5%
Why did you choose the Ranger?	Normal horn button 7.5	Uses oil 10.2	30-49 years 44.3
Economy 39.7%	Smoother shifter 5.5	Electrical 8.2	50-plus 31.1
Size 31.2		Engine diesels 7.1	
Styling 20.5	How much did you pay?	Dealer repairs satisfactory?	Would you buy another Ford?
Made in U.S. 15.6	Average \$7,997	Yes 56.7%	Yes 88.6%
Price 8.9	Range \$6,000-\$11,520	No 43.3	No 11.4
	Workmanship opinion:	Dealer service opinion:	Would you buy another Ranger?
	Excellent 43.6%	Excellent 26.4%	Yes 82.4%
		Good 39.1	No 17.6

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

Incredible
PRICE BREAKTHROUGH! NOW ONLY \$88⁰⁰ Complete

"Hot Line" PORTABLE REMOTE TELEPHONE

POWERFUL
700-Ft. Range!

Includes—

- "Home Base" Station
- Modern Cordless Phone

Don't run to
answer the phone—
Reach for your
"Hot Line"!

Ideal For:

- Busy Execs
- Homemakers
- Teen Talk
- Pool, Patio

Portable remote telephone lets you speak your mind from almost anywhere—even outdoors. No need to be "tied down" to a telephone—Just carry the remote unit along anywhere, up to a distance of 700 feet! Great for executives on the move, busy homemakers, teenagers. It works dependably indoors or out—Handy for garage, workshop, backyard barbecue, or relaxing at poolside.

The latest in modern electronics, built for years of trouble-free use. The cordless receiver has touch-tone keyboard, automatic redialing, low-battery indicator. Made to fit nicely in the hand, it measures 8½ inches long. The power station plugs into any standard phone outlet; has call switch, in-use indicator. Both units in attractive Beige with walnut-tone trim.

Top Quality ... Great Buy!

only \$88⁰⁰

Compare at \$125.00—\$150.00—
and more!

FULLY GUARANTEED—14 Day Free Trial!

If not 100% pleased, simply return within 14 days for full refund (except ship. & hdg.). Our policy is to process all orders promptly. Credit card orders are processed upon credit approval. Delays notified promptly. Shipment guaranteed within 60 days. You'll wonder how you ever got along without it!



KEYSTONE PRODUCTS, Hanover, PA 17331
Serving Satisfied Customers Since 1934



—SATISFACTION GUARANTEED—MAIL TODAY!

KEYSTONE PRODUCTS, Dept. HZ-3176
340 Poplar St., Hanover, PA 17331

Yes—Please rush my Remote Portable Telephone(s) (Z850032) as indicated below, on Full Money Back Guarantee.

- One complete Portable Phone—including the Cordless Receiver and Power Station—for only \$88.00 plus \$3.95 heavyweight shipping & handling.
- Save \$17.00—Order two Phones for just \$159.00 plus \$6.95 heavyweight shipping & handling.

Enclosed is \$_____ (PA res. add sales tax)

CHARGE TO MY: Diners Club VISA
 American Express MasterCard

Acct. No. _____

Exp. Date _____ (please print.)

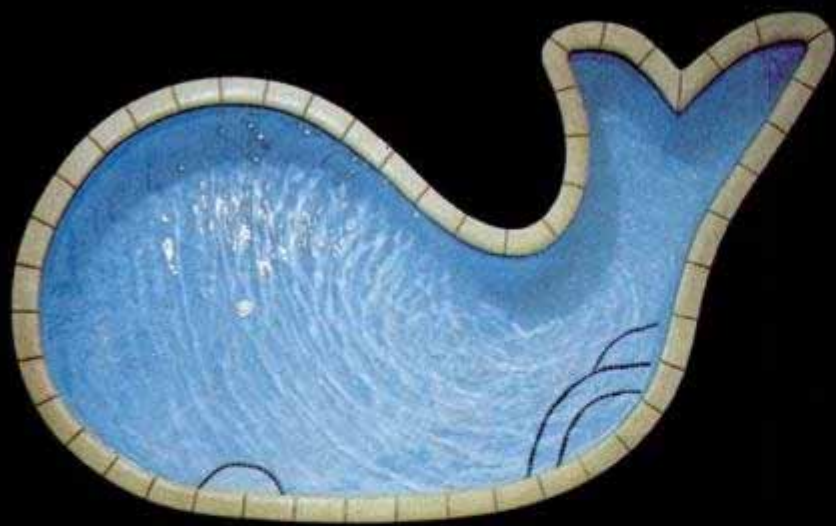
NAME _____

ADDRESS _____

CITY _____

STATE _____ ZIP _____

© H.H.I., 1983



"No matter what shape your pool's in, clean it automatically with Polaris Vac-Sweep."

Grace Dawson, San Diego



If your pool is being cleaned once a week, Mother Nature gets it dirty every day. It's time you discovered

America's #1 automatic pool cleaner. Polaris Vac-Sweep. Your pool will be cleaner, faster, seven days a week.

A cleaner pool, in just three hours or less.

Send for the independent test report which proved Polaris cleans three times better than the popular sweep-type cleaner, in both concrete and vinyl liner pools. In only half the time. You'll see a big difference in energy savings, too.

The only automatic cleaner that vacuums and sweeps the bottom and sides of your pool.

Polaris utilizes two special reusable vacuum bags —



one for leaves & rocks — one for sand — to suit your pool's dirt conditions, even without a bottom drain. You wouldn't clean a house by only sweeping, why compromise on your pool? **Cleaner, faster, automatically, even under a solar blanket.**

A pool cover or solar blanket keeps energy in, but it doesn't keep dirt out. The Polaris Vac-Sweep may remain under cover for occasional cleaning to eliminate permanent staining. Truly automatic cleaning also means you'll spend less time taking care of your pool.

Trade in your old cleaner and make a clean \$50.

If you're tired of your old-fashioned, booster pump sweep cleaner, you can trade it in on a new Polaris Vac-Sweep. You'll get \$50 cash direct from the factory. See your Polaris dealer for the brochure with specific details.

Polaris Vac-Sweep. It does a whale of a job in any shape pool.

Automatically.

Polaris
VAC-SWEEP

Happy pool owners have made us #1.

Take this ad to your local contractor or store for more information. Or, mail coupon today to Polaris Vac-Sweep, P.O. Box 1149, San Marcos, CA 92069 for a free copy of the independent laboratory test report, a copy of Nancy P. Brunning's "Swimming for Fitness," and \$50 trade-up information.

Name _____

Address _____

City _____ State _____ Zip _____

OWNERS REPORT: RANGER

(Continued from page 69)

manual transmissions are supplied by Ford's Japanese partner, Toyo Kogyo (Mazda). The pickup is, of course, assembled in the United States, and so are most components.

The Ranger enjoys a high workmanship score, with 87.6 percent of owners rating it good to excellent.

Two areas where the Ranger ran into flak were in engine power and fuel mileage. Our survey showed 17.3 percent of our owners were disappointed with their mpg figures, and 8.4 percent told us the truck needed more horses.

"The 2.3-liter engine with automatic needs more hill-climbing power and takes too long to get up to speed," wrote a California engineer. "Not only that, but I'm barely averaging 20 mpg combined city/highway. Of course, my Ranger has just about every accessory, and it's the long-wheelbase job. I should have waited for the V6." The V6 became available in mid-1983 along with the Ranger-based Bronco II.

A Georgia computer analyst adds, "Gas mileage isn't even close to the advertised 21/30 EPA mpg figures."

One constant aggravation—and this has applied to other Ford products as well—is the location of the horn switch.



Placing horn switch at the end of turn-signal stalk brought some complaints.

It's on the end of the turn-signal stalk. You push the stalk in, toward the column. This means you have to use your left hand to sound the horn and, as 7.5 percent of our respondents reminded us, that's a dangerous and, for many, an unexpected place for the horn.

Despite those few complaints, most Ranger owners expressed great satisfaction. A Colorado accountant said, "My 2.0 with four-speed has plenty of pep on the road and negotiates our mountains along with the best."

A New York shipping clerk added, "Good traction in mud and snow, and the Ranger has more power and load capacity than I expected from the small four-cylinder engine."

And a Florida educator commented, "I can't remember when I've been so happy with a new vehicle. I think Ford has a real winner."

FM

SAVE UP TO 15¢/GALLON

with Vara-Jection Electronic Water Injection from Edelbrock!

- ▶ Run Regular Gas, Not Supreme
- ▶ Tune Engine for Maximum MPG
- ▶ Increase Combustion Related Parts Life
- ▶ NEW! RV Water Transfer System and Digital On/Off Monitor Switch

Dollar savings! Knock and ping control! The benefits from Edelbrock's electronic water injection are needed by every driver. The Vara-Jection system allows use of regular gasoline by eliminating ping caused by lower grade fuel. Travel to Mexico and beyond, knowing accurate, solid-state electronics will deliver the exact amount of water needed to cool combustion temperatures and control damaging knock and ping from low octane fuel. It is a universal system for all, normally aspirated or turbo-charged engines.

Two new accessories broaden the system's capabilities. From a dash-mounted control box, our RV Water Transfer System starts and stops pumping from the RV's water holding tank to the VJ bottle, *while the vehicle is travelling!* An in-car On/Off Monitor Switch lets the driver activate his Vara-Jection and indicates pumping volume with a 10-step gradient light panel.

Drive smart this season. Let Edelbrock's Vara-Jection electronic water injection save you money and improve your driving experience.

FREE... our \$2 '83 catalog, price list & order blank to Popular Mechanics readers. Write to 411 Coral Circle, Dept. PM583, El Segundo, CA 90245. Products are available by mail from Edelbrock, starting at \$28.08, plus shipping & handling. Calif. residents add 6 1/2% tax. Vara-Jection is Calif. Resources Board Exempt on vehicles through 1980. C.A.R.B. - EO-D107



A NAME THAT PERFORMS

Be Adventurous!

Build PM's exciting new
diving scooter
SCUBA TOW SEL



Popular Mechanics is a publication of Hearst Magazines - a Division of THE HEARST CORPORATION

Whether you like adventurous scuba diving or just lazy snorkeling, this self-propelled water tow will make the going easier and more fun for the whole family. Using a single, tiny fishing motor, it whisks you along at about 3 mph for hours of leisurely sea adventure. You can use the scooter with or without scuba gear — an air tank adds to the fun and excitement, but it is not a must. You can also cruise along the surface, with just a mask and snorkel, watching the magical world of marine life passing by below you.

Complete plans for building PM's electric-powered diving scooter, including full-size cutting patterns and an illustrated instruction manual are \$10.75. Send your check or money order to **Popular Mechanics Dept. SEL, Box 1014, Radio City Station, New York, NY 10101.** Allow three to four weeks for delivery by third-class mail. If you prefer faster, first-class mail add 75 cents.

For more on water sports and home and shop plans include \$1.00 for PM's **PLANS AND IDEAS CATALOG.**

A Breath of Fresh Air

America's first negative ion generator plus 3-way filtering system . Cleans air of harmful pollutants and irritating pollen in your car, RV, or boat.



Have you ever walked deep in the forest and noticed how "soft" the air feels around you? Or how invigorated you feel when walking on a brisk breezy day. . . or right after a thunder storm, when you suddenly realize that it actually feels great to take a really deep breath? These pleasant experiences happen because of the abundant negative ions which are naturally present in the clean air.

It is the lack of negative ions that makes our air stale, and studies have shown that the lack of negative ions actually contributes to our feelings of irritability, restlessness, depression, and fatigue. Coupled with this, it is well documented that the air we breathe is so overladen with soot, smoke and dust, that city dwellers (even non-smokers) are prone to lung problems. And now, to make matters even worse, we have catalytic converters in our vehicles emitting hydrocarbon and acidic particles in the exhaust, so microscopically fine (1 micron or less), that a charcoal filter alone cannot rid the air we breathe of them.

A scientific breakthrough.

Recently, some ingenious scientists have created a marvelous device, which revitalizes the air we breathe . . . the negative ion generator. These ion generators recreate Mother Nature's own handiwork by emitting negative ions into our air, just as during a thunderstorm. Until now, these amazing ion generators have only been available for your home or office. But have you ever wished you had one while you have been in a car with a cigarette or cigar smoker, or behind a cloud of exhaust in a traffic jam, or just wanted a breath of fresh air? Of course there is always your air conditioner, but that only cools and re-circulates the same polluted air, over and over again.

We have found a wonderful unit, so compactly designed, that it actually replaces the overhead dome light in your car, RV or boat. Besides being a functional overhead light, it also provides you

with a negative ion generator, plus it filters the air in 3 important ways . . . and was made expressly for away-from-home travelers.

Eliminates smoke, pollen, and dust, plus it emits mother nature's own air cleaner.

Immediately after installing the IONAIRE, you will notice the difference.

You can actually see it working, devouring any smoke or exhaust into its 3-way filtering system. The air inside your vehicle will first be drawn into the pre-filtering system, which removes large visible pollutants. It then moves on through electrical dust precipitating electrodes, which remove smoke and dust particles down to 1/100th micron in size. Then the air flows on through the activated charcoal deodorizing filter that is honeycomb shaped to allow efficient air flow. Finally, the air reaches the negative ion generator. There tobacco smoke, pollen, pet or cooking odors, dust and exhausts are literally cleared away, and all that is left is fresh, clean air. Go ahead! Take a deep breath.

So easy to install - So wonderful to use.

The IONAIRE may be installed in your vehicle two ways. First, for those wanting total portability from vehicle to vehicle, we have included a cigarette lighter adaptor cord for instant use. Or, this compact (8.5x8.5x2.75 inch) unit can be installed in place of the dome light in your vehicle. It's so easy to install that a screwdriver and pliers are all the tools you will need. As a bonus, you will eliminate smoke haze on your windows and actually keep the inside of your vehicle cleaner. Its many convenient features include a 2-speed Hi/Low air control volume switch and an alarm

light that automatically informs you when the filters are dirty and need to be cleaned. It also includes a warning alarm system with a 5 second buzzer to remind you that you have left the IONAIRE on after turning off the ignition.



12 volt air purifier for your vehicle.

The IONAIRE is so compact and quiet that you'll hardly be aware it's working. However, you will notice and appreciate the fact that the air you are surrounded in is fresh and clean, and you'll arrive at your destination in a healthier frame of mind. You will want to put one in all of your vehicles!

Order your IONAIRE today, and when it comes, go ahead and try it. If you are not delighted with the freshness and purity of the filtered and ionized air, and the high quality of the unit, send it back within 30 days for a full refund. One year warranty.

ORDER TOLL FREE.

Fresh clean air can be just a phone call away. Order NO. 884106. Visa or Mastercard customers call TOLL FREE, or send a check or money order for \$159 per unit plus \$4.00 for delivery and handling. California residents add 6% sales tax.

800 854-8471

In Calif. 800 472-8456

I.D. RATHERBY

18480 Bandilier Circle, Dept. SB
Fountain Valley, CA 92708

Call for our free brochures of other products.

Make A Reel For Your Mower Cord

This reel is designed to gather and store an electric lawn mower's power cord. Simply drive the reel's spike into the ground, hook the plug end of the cord to the reel and crank the handle to retrieve the cord. The reel can hold 100 ft. of 2-16 cable.

Start by cutting all the pieces. Notice that one reel face has a cutout for the cord plug. Before assembling the reel, centerbore a $\frac{3}{16}$ -in.-dia. hole in each side piece to hold the spindles. Center-mount pipe flanges to the outside of the $\frac{1}{2}$ -in. \times 12-in.-dia. reel rims. The octagonal reel ends are then centered on the inside of the reel rims. The spindles are $\frac{1}{4}$ -in.-dia. \times 2-in. pipe nipples installed through the sides and threaded into the flanges. Assemble the unit with resorcinol glue and 6d hot-dipped, galvanized finishing nails.

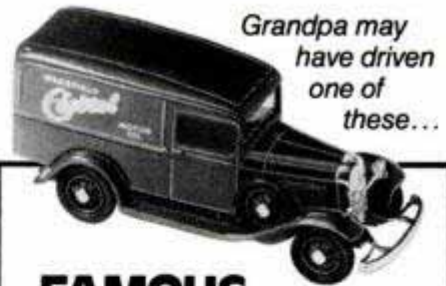
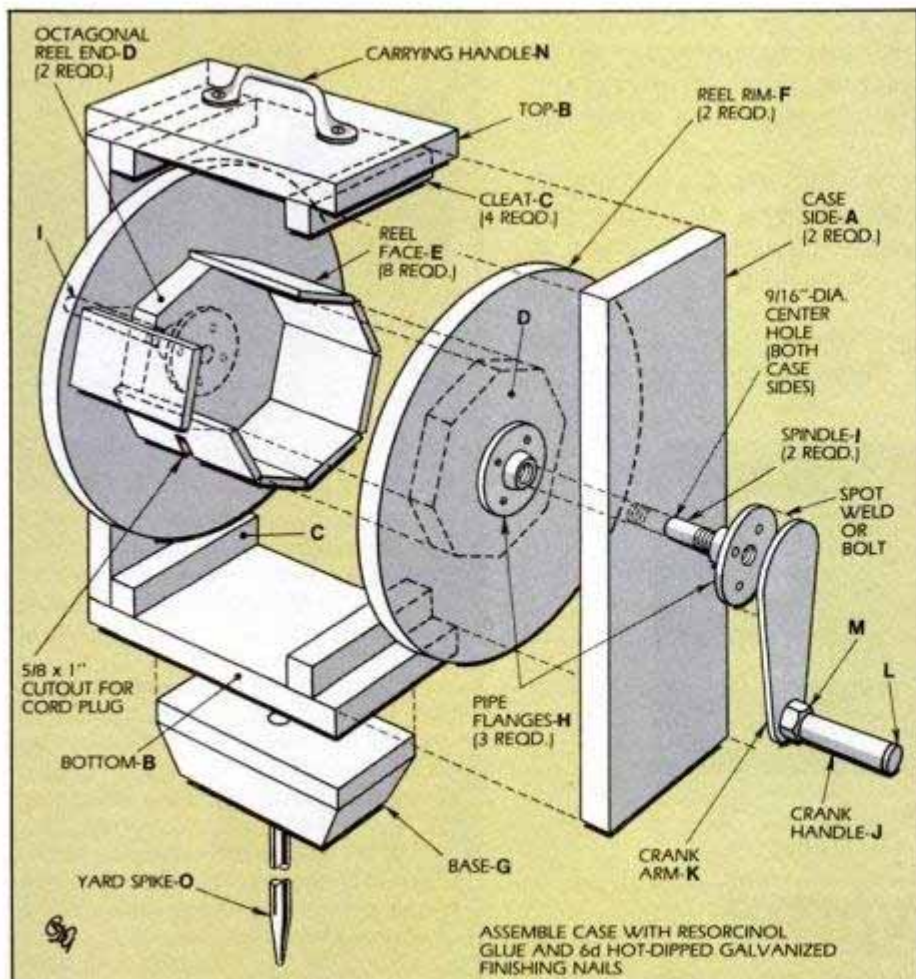
Thread another pipe flange onto one of the protruding spindles for mounting the handle. The crank arm, cut from $\frac{1}{8}$ -in.-thick strap iron, is welded or bolted to the outside flange. The crank handle is a carriage bolt in a pipe nipple (with its threaded ends cut off) mounted to the crank arm. Prior to handle assembly,

file the carriage bolt's square shaft section round to fit into the nipple sheath. There are two ways to mount the handle: 1. Weld a $\frac{3}{16}$ -in. hexnut to the crank arm and screw the handle into the nut (as shown). 2. Bore a $\frac{3}{16}$ -in.-dia. hole through the crank arm and thread the handle into a nut behind the arm. Complete the project with two coats of wood preservative.—Walter N. Fritts

MATERIALS LIST—CORD REEL

Key	No.	Size and description (use)
A	2	$\frac{3}{4} \times 4\frac{1}{2} \times 15$ " pine (case side)
B	2	$\frac{3}{4} \times 4\frac{1}{2} \times 7\frac{3}{4}$ " pine (top/bottom)
C	4	$\frac{3}{4} \times 1 \times 4\frac{3}{8}$ " pine (cleat)
D	2	$\frac{3}{4} \times 6$ "-dia. pine (octagonal reel end)
E	8	$\frac{1}{4} \times 2\frac{1}{4} \times 4$ " plywood (reel face)
F	2	$\frac{1}{2} \times 12$ "-dia. plywood (reel rim)
G	1	$3 \times 3 \times 6$ " pine (base)
H	3	$\frac{1}{4}$ "-dia. pipe flange
I	2	$\frac{1}{4}$ "-dia. \times 2" pipe nipples (spindle)
J	1	$\frac{1}{4}$ "-dia. \times 3" pipe nipple (crank handle)
K	1	$\frac{1}{8} \times 1\frac{1}{4} \times 4\frac{1}{2}$ " strap iron (crank arm)
L	1	$\frac{3}{16}$ "-dia. \times 2 $\frac{1}{2}$ " carriage bolt
M	1	$\frac{3}{16}$ " hexnut
N	1	Metal door handle
O	1	$\frac{3}{8}$ "-dia. \times 15" iron rod (yard spike)

Misc.: Resorcinol glue, 6d hot-dipped, galvanized finishing nails.



Grandpa may have driven one of these...

FAMOUS FORD TRUCKS

In 1933, Ford panel and pick-up trucks ruled the roads. And if grandpa drove one—for Castrol, Texaco, Mobiloil, or a host of other companies—it may well have been the original of one of the models pictured here.

SPECIAL INTRODUCTORY OFFER
Save over
40%



You take no risk. You must be completely satisfied or return purchase for full credit or refund.

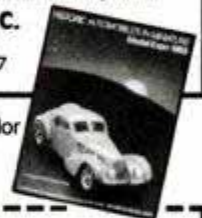
These diecast metal miniatures are imported from France—made by Elligor, one of the foremost producers of authentic automotive replicas. Each finely detailed truck is over 4" long, and comes in its own see-thru plastic showcase. They regularly retail for \$16.95. But you'll pay only \$9.95—save \$7 on each and every one—if you take advantage of our special introductory offer. Start your collection today!

Credit card holders call
TOLL-FREE
800-526-2598

9:00-5:00 Eastern Standard Time
In New Jersey, call 201-575-6253
Or use coupon below for check or money order.

MODEL EXPO, INC.
23 Just Road
Fairfield, N.J. 07007

FREE 16-page full color historic auto catalog with each order.



MODEL EXPO, INC. Dept. PM-53
23 Just Road, Fairfield, N.J. 07007

Please send me _____ Castrol (E1072)
@ \$9.95 ea.: _____ Texaco (E1069)
_____ Mobiloil (E1077)

My check or money order is enclosed for \$_____. (Add 1.50 per order for handling and insured delivery. New Jersey residents add 6% sales tax.)

Name _____
Address _____
City _____
State _____ Zip _____



The Husqvarna 50 Rancher cuts weekends down to size.

No matter how often a saw is used, it should have the same high standards of quality and performance that professionals demand. That's why the Husqvarna 50 Rancher is built to the same professional standards of all our chain saws.

Besides its easy-to-handle design and excellent power-to-weight ratio, the Husqvarna 50 Rancher features electronic ignition. An automatic oiler. An anti-vibration system. Plus a totally automatic, permanently adjusted inertia chain brake. Also, it's easy to start, and restart.

The Husqvarna 50 Rancher. Designed to make the non-professional work like a pro.

New Price Roll-Back. People have always been glad to pay for the high quality of a Husqvarna. But now, the prices have been rolled back, lower than they've been in years. So if you've ever considered owning a Husqvarna, now is the time to get one.

For the dealer nearest you, write Husqvarna, 224 Thorndale Avenue, Bensenville, Illinois 60106, or consult your Yellow Pages.

Free Offer

Get our unique safety helmet when you buy any new Husqvarna.

- Flexible flip-up visor.
- Special hearing protectors.
- A \$27.95 retail value.

Offer good thru May 31st from participating dealers.




Husqvarna
SWEDEN
The Chain Saw Professionals.

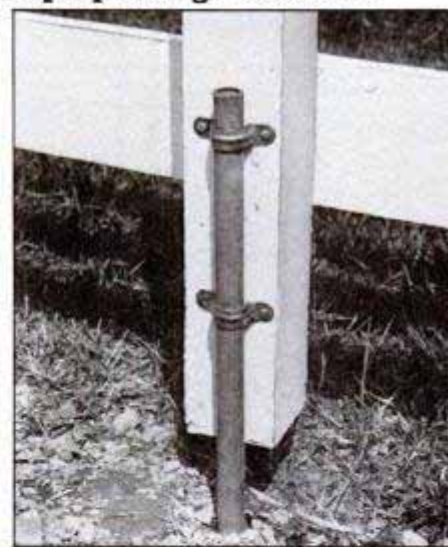
HINTS FROM READERS

Miterbox saver



A plastic miterbox, though inexpensive, is usually adequate for the average home workshopper. The big drawback is that the plastic base is weakened by the repetitive backsaw cuts. To save the box, install a 1/4-in.-thick piece of hardboard as shown. Replace this panel as required.—A. Weber

Pipe prolongs fence life



You can postpone replacing fence posts that have rotted below the ground but are still solid above. Drive a length of pipe into the ground alongside the post and secure it to the post with pipe brackets (clamps).

Galvanized pipe is recommended for the longest lasting repair. But even galvanized pipe will crumble in two to three years in soil that is high in acid content. However, by using scrap pipe this is still a cost-effective technique.

In cold climates drive the pipe below the frost line to prevent it from lifting or heaving due to freezing. Paint pipe to minimize chance of ugly rust stains.

—David W. Roberts

HINTS FROM READERS

Hooks lengthen glue life



I have often found it difficult to reopen a tube of glue because the cap had become glued to the tube. I solved this problem by replacing the caps with standard cup hooks. Now, when I want to reuse a tube, I simply turn out the hook without any fuss or messy spills and the tight-fitting hooks help keep the glue fresh longer. The hooks also provide a convenient way to hang the tubes near my workbench.

—Howard E. Moody

Protective cover

I use large pieces of old carpeting as a protective cover on sections of my workbench. The padding protects my woodworking and plastic laminate projects from scratches and marks. The carpeting also prevents small items and tools from rolling off the workbench.—Lane Olinghouse

Ladder balance



To make it easier to carry a long ladder, determine its exact center and mark it with a stripe of brightly colored paint. Now you can immediately grasp the ladder at its midpoint and move it comfortably without the usual maneuvering for correct position.—A. Weber

The most versatile quartz digital ever!
The amazing new **CASIO**
CALCULATOR CHRONO
With the finger-touch face!

Unbelievably just **\$79.95**

Including 1 year warranty and 30 day money-back guarantee.

Announcing the **CASIO TC-500**, the calculator with looks of a dress digital but with full calculator capabilities. Not a bulky calculator watch but a dress digital computer with a totally flat keyboard that can be operated with your fingers. No buttons to chip, wear or catch on your sleeve. Yet it has full calculator capabilities (add, subtract, multiply, divide — chain calculations to 8 places).

A touch of a side button transforms the keyboard to your choice of stopwatch, countdown timer alarm, regular time or dual time. You also get 3 daily alarms, electronic calendar, military time, night-light, our 30-day money-back guarantee and CASIO's 1 year limited warranty. You won't find this chrome and stainless steel beauty in stores for months, even at prices much higher than ours. Order now and be delighted.

CREDIT CARD HOLDERS ORDER TOLL-FREE TODAY
To order your watch, call the toll-free number below, or send a check or money order for the total amount plus \$2.50 for the first watch, \$1.00 for each additional watch to cover shipping and insurance costs. For an additional \$2.00 we will ship your watch via U.P.S. air delivery. North Dakota residents add 3% tax.

800-437-4385
Dept. PM-5
107 Roberts St., Box 67
Fargo, ND 58107
Telephone (701) 232-9400

©1983 ON THE RUN

On The Run

EQUITY, AFFORDABILITY, NO DOWN PAYMENT, BELOW MARKET FINANCING, ALL UNDER ONE ROOF.

Own your own home for a lot less than you'd expect — with no down payment and interest-only monthly payments at below market financing during construction. Homes starting under \$20,000.

Choose from 50 floor plans, featuring quality, pre-cut materials and full selection of optional materials such as plumbing, heating, and electrical packages. You supply the labor. Build equity. Keep costs down.

Live under your own roof. Build equity. With no down payment. More than 20,000 families already have, the Miles way. You can too.



The Sundance

Miles Homes

DIVISION OF
Insitico

You're Miles ahead
with no down payment.

Yes! Send us more information on how we can own our own Miles home with no down payment and below market financing.

Mail to: Miles Homes®
4700 Nathan Lane, P.O. Box 9495
Minneapolis, MN 55440

Please check one:

- Free color brochure
 80 page, full color catalog.
(Please send \$3 check or money order.)

Name _____

Address _____

City _____

State _____ Zip _____

Phone (_____) _____

MPM7-0583

PM LOOKS AT...

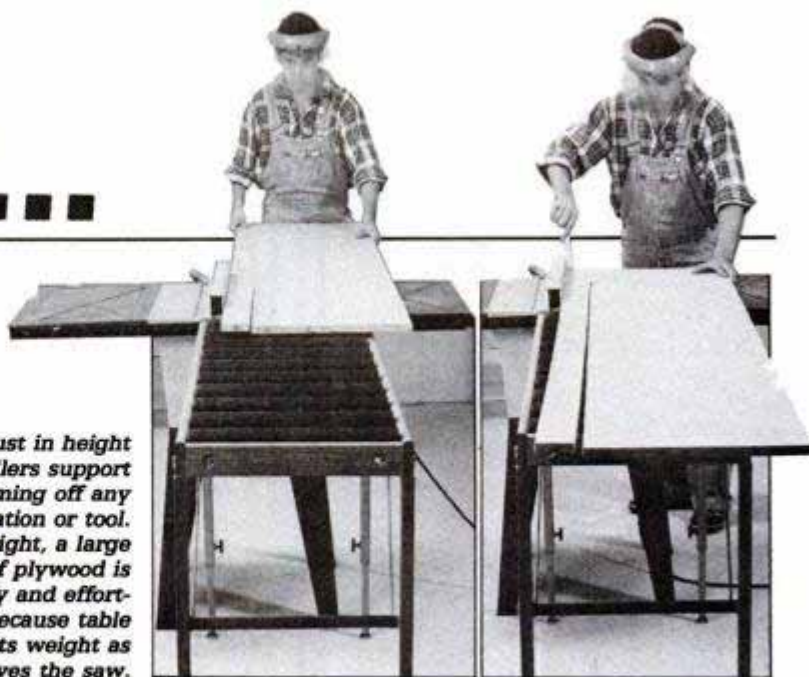
Workshop Support Table

If you're already into woodworking—or soon plan to be—you're probably well aware of the need for workpiece support when working with various stationary shop tools. Because I, like most home workshopers, generally work alone in my shop, I frequently find myself having to handle a 4×8-ft. sheet of plywood singlehandedly. The alternative is very often to lay large pieces of 2×3s straddling a pair of sawhorses and use portable power tools. But, rather than lose the advantage of stationary tool accuracy, workshopers frequently rig a support table to serve as a helper.

Now, you can buy a support table that will always be available for those difficult tasks. The table shown sells for

Legs adjust in height so rollers support work coming off any shop station or tool.

At right, a large piece of plywood is cut safely and effortlessly because table bears its weight as it leaves the saw.



a reasonable \$149.95. With built-in rollers and legs that can be adjusted from 27½ to 48 in., it provides a table that can be used for all kinds of workshop tasks. Besides the obvious—supporting work as it leaves the table saw

or jointer, for example—I get added mileage from mine with a lightweight tabletop that I built to cover the rollers. It's made of ¾" pine and I have used it as an assembly bench—with the legs set at their lowest height to spare my back the high lifting a workbench requires. But I have also adjusted it up to 38 in. to use it as a workbench.

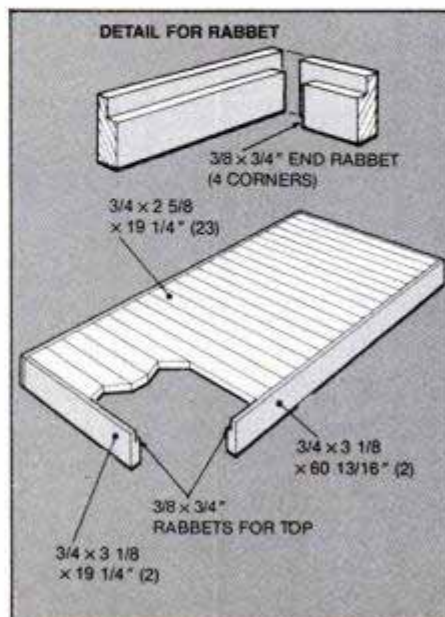
All in all, Supportable is a well-made product that deserves your attention. Bonus: Fold it up and hang it on a wall when you're done.—H.W.

SPECIFICATIONS—TABLE

No. of rollers: 10; length: 16 in.; diameter: 2½ in.
Table weight: 30 lbs.; length: 58½ in.; width: 17¾ in.; folded depth: 6 in.; adjustable height: 27½ to 48 in.
Price: \$149.95 plus shipping (varies from \$4.63 to \$15.25, depending upon zone)
Manufacturer: Turning Point, West Highway 16, Daventon, N.D. 58021



Legs are adjusted one at a time (above, left); knob locks each extender in place. Above, with legs set to suit planer height, support table bears workpiece weight. At left is homemade tabletop (see drawing at right) that author created to get even more use from support table. It's of ¾-in. pine.



Pride In Being One Of The Best Is Part Of The Navy Adventure.



You set out to learn a skill. You end up with a kind of pride you didn't know was possible. You're Navy-trained and now you know how it feels to be one of the best.

The Navy Adventure starts with a choice of over sixty career fields including advanced communications, micro-electronics, aviation, even nuclear power.

You choose. You train.

Then, on-the-job experience turns what you've learned into a skill you can call your own. But more than that, you've learned to take charge and lead. To motivate people to work together like a team.

You start out earning over \$550 a month plus housing, food, and special pay for sea duty. And as your skill and experience grow so does the pay. But the biggest

benefit is something money can't buy.

One day you feel yourself standing a little taller, straighter. You're proud of who you are, of what you can do, of being one of the best. And it feels great.

It's a part of the Navy Adventure you'll remember for the rest of your life. Call toll-free, 800-327-NAVY. Find out more about it.

Navy. It's Not Just A Job, It's An Adventure.

Marlboro

A close-up, profile photograph of a man with a mustache wearing a weathered cowboy hat and a yellow jacket. He is holding a Marlboro cigarette pack in his left hand and a lit cigarette in his right hand. The background is a soft-focus outdoor scene with a blue sky and a white structure.

© Philip Morris Inc. 1983

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

18 mg "tar," 1.0 mg nicotine av. per cigarette. FTC Report Dec '81



RESCUE BY A SATELLITE!

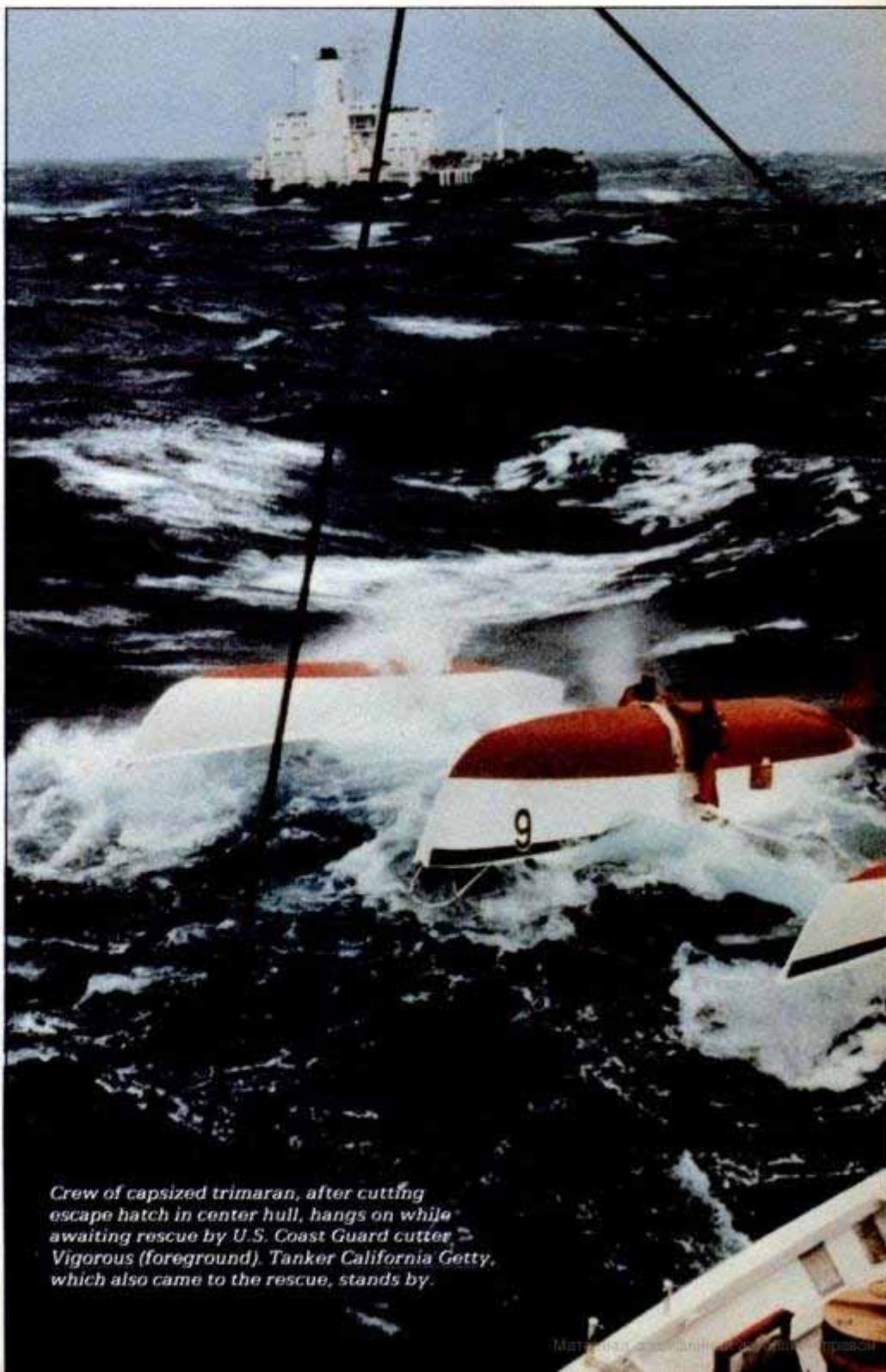
Crossing the Atlantic, the trimaran *Gonzo* capsized. But a Soviet satellite was listening for the cry of any troubled ships.

BY JACK SOMER

When Walter Greene and his two crewmen set out on a dangerous Atlantic voyage by trimaran, they were ready for almost anything. But they never dreamed their lives would depend on the power of a Russian satellite.

At about 0830, Sunday, Oct. 10, 1982, during a violent North Atlantic storm, the 50-foot trimaran *Gonzo* capsized in 30-foot seas some 300 miles east southeast of Cape Cod. Walter Greene, 38, a renowned sailor and *Gonzo's* designer/builder, was at the helm. When *Gonzo* flipped, Greene was thrown into the churning sea, under the massive but graceful hulls. He swam underwater and, after several attempts, reached one of the outer hulls, or *amas* as they're called, and surfaced. It took less than a minute, as Greene recalls, by which time his crew, Robert Goodman, 28, and Aneirin Williams, 22, who had been asleep inside the main hull, regained their balance.

The three companions were sailing from Portland, Me., to Dartmouth, England, then delivering *Gonzo* to St. Malo, France, where Greene was to start the quadrennial *Route du Rhum*, a 4,000-mile race to Guadeloupe for solo sailors. The storm had risen unexpectedly; ocean weather forecasts from the



Crew of capsized trimaran, after cutting escape hatch in center hull, hangs on while awaiting rescue by U.S. Coast Guard cutter *Vigorous* (foreground). Tanker *California Getty*, which also came to the rescue, stands by.

PM photo: Dale Holmes
PM art (overleaf): Ed Valigursky



TO SCOTT AFB

COSPAS

CANADIAN SEARCH PLANE

FROM SCOTT AFB

CUTTER VIGOROUS

EPIRB

9

Signal from Gonzo's Emergency Position Indicating Radio Beacon was picked up by COSPAS satellite, which relayed position to Scott Air Force Base in Illinois. A Canadian rescue plane also received the position. Scott AFB radioed Coast Guard, and cutter Vigorous responded. Coast Guard broadcast also was picked up by California Getty, first ship on the scene.



Coast Guard at Portsmouth, Va., and weather warnings from WWV, the Bureau of Standards time-tick station in Colorado, indicated no worse than 30-knot winds. But by Saturday evening, three days out, *Gonzo* was plunging into heavy seas and battling winds gusting to 50 knots.

Before dark, Greene elected to strip *Gonzo* of all sail, alter course to run before the easterly gale, and tow warps and sail bags to slow the boat and stabilize her steering. Still, she was unmanageable and nearly broached 10 times during the night. And during Greene's morning watch she surfed off a large wave at high speed and her starboard hull dug deep into the trough. The inertia instantly flipped her on her back. Unlike ballasted monohulls, which can right themselves when capsized, an upside down trimaran,

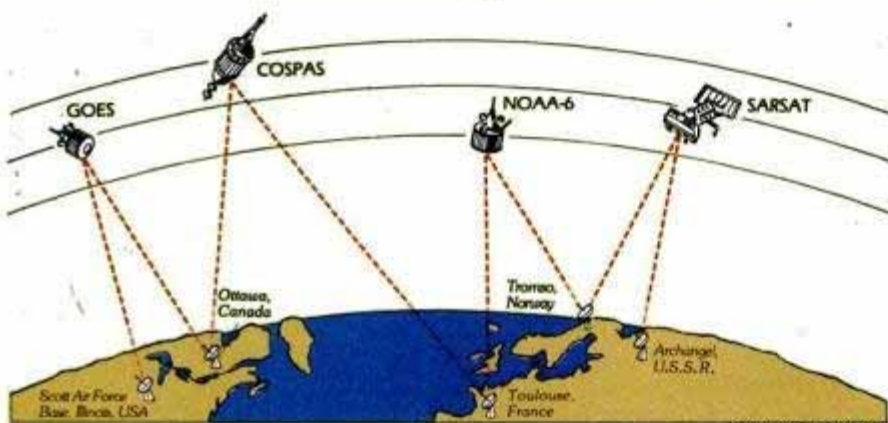
though it floats, is a helpless creature at the mercy of wind and wave.

Fortunately, Greene and his crew were not helpless creatures. Williams had, in fact, survived an earlier trimaran capsize, and Greene had sailed trimarans more than 40,000 miles. In less than half an hour the three donned survival suits to avoid hypothermia. Then Greene was passed a keyhole saw with which he cut away the wood around a porthole to make a hatch. Williams found and activated the yacht's EPIRB (Emergency Position Indicating Radio Beacon). Thus began one of the most remarkable rescues in marine history—the first ever in which a satellite played an instrumental role.

The EPIRB is a small radio that transmits a distress signal over 121.5 and 243.0 MHz (commercial and military

(Please turn to page 188)

Rescue By Satellite—How It Works



PM art: Ed Lipinski

distress signal into an actual location when picked up by one of the rescue satellites is done through Doppler-effect shifting of the radio frequency. As the satellite nears the beacon, the signal is received at a slightly higher frequency than it was actually transmitted; as the satellite flies away, the signal sounds as if it were at a slightly lower frequency than it really is. In its rescue of *Gonzo*, COSPAS provided five separate possible locations within less than 50 miles of one another based on signals received on different passes.

The satellites circle the earth in a relatively low orbit about every hour and a half, at speeds of 300 miles per minute. If a satellite's orbit were properly designed, a single vehicle could provide worldwide coverage—although any one location would be serviced for only several brief periods during each day. COSPAS did that job admirably. Now, since there is coverage from more than one satellite, the same area is monitored several dozen times a day.

Computers aboard satellites in the system record, store and play back to ground stations every two hours. But more advanced signal systems scheduled to be deployed during the next five years will decode telemetry signals which specify the type of vehicle, the craft's registration and ownership, and even the time and nature of the accident.

The system has worked in the most out-of-the-way places. When the yacht *Blue Jeans* lost engine power during a South Atlantic storm last year, her crew of seven waited for calm winds, then hoisted her sail and made for what appeared to be an anchored tanker in the little traveled spot. But the tanker turned out to be a long-abandoned and grounded vessel. At that time, COSPAS picked up the *Blue Jeans'* EPIRB beacon, and all aboard her were rescued within three days.

—James Oberg

Within a 30-day period late last year—after the rescue of the *Gonzo* crew—two downed planes and a yacht whose engines had died in a storm were located with "guidance from above." Twelve lives were saved. The agency was not supernatural, but man-made—a satellite rescue system.

A worldwide system, part of which is shown above, will, when complete, be made up of specialized satellites which pick up distress signals and transmit positions to ground bases. The first of these heavenly rescuers—Russia's COSPAS, launched early last year—did all the rescuing during 1982. But the French ARGOS transponder, which is aboard the GOES satellite, helped searchers find some troubled ships by giving generalized positions, placing them within 300 miles of an SOS. America's newly launched SARSAT (Search and Rescue Satellite, Aided Tracking) will be on line this year. SARSAT carries a Canadian-built transponder and French-built computer electronics and weighs only 65 pounds. It also serves as a weather satellite. The total cost to the United States has been estimated at \$29 million, with an approximately equal cost

split by Canada and France. Another U.S. satellite, NOAA-6, also will go up this year.

Ground stations are being installed in Alaska and California to cover most of North America. One is already in operation at Scott Air Force Base in Illinois. A Canadian station is located in Ottawa. The Soviets have a station in Archangel, while European stations are being set up in Toulouse, France, and Tromsø, Norway.

The satellites in the system are designed to pick up distress signals from beacons which automatically transmit an SOS if subjected to great shock (such as in an airplane crash). They also pick up signals from handheld transmitters called Emergency Position Indicating Radio Beacons (EPIRB).

The distress beacons are battery powered and generally transmit with a power of less than one watt so they will be effective for at least 48 hours. Rescue aircraft can also pick up the distress signals, but must be within 200 miles to detect the signal. Sometimes, when the beacon is snuggled amid rough terrain, it can be heard only from directly overhead.

The conversion of the received radio dis-

COMPLETE GUIDE TO VIDEO CAMERAS

They plug into any videotape deck and allow you to be your own movie director.

BY DAWN GORDON

If you're using your videotape recorder (VTR) just to watch movies on your TV set, you're missing the fun of being your own director and making your own video movies. With a video camera, you can record your family parties, business conferences—anything you might use an old-style film camera for. And you can record hours of material for a few dollars and not have to wait for processing before you see the results.

These cameras connect to both home and portable videotape decks. If you're using a portable VTR, the camera can go right along with you (getting its power

from the VTR's power pack slung on your shoulder). Or, attach the camera to a nonportable unit and record indoor events.

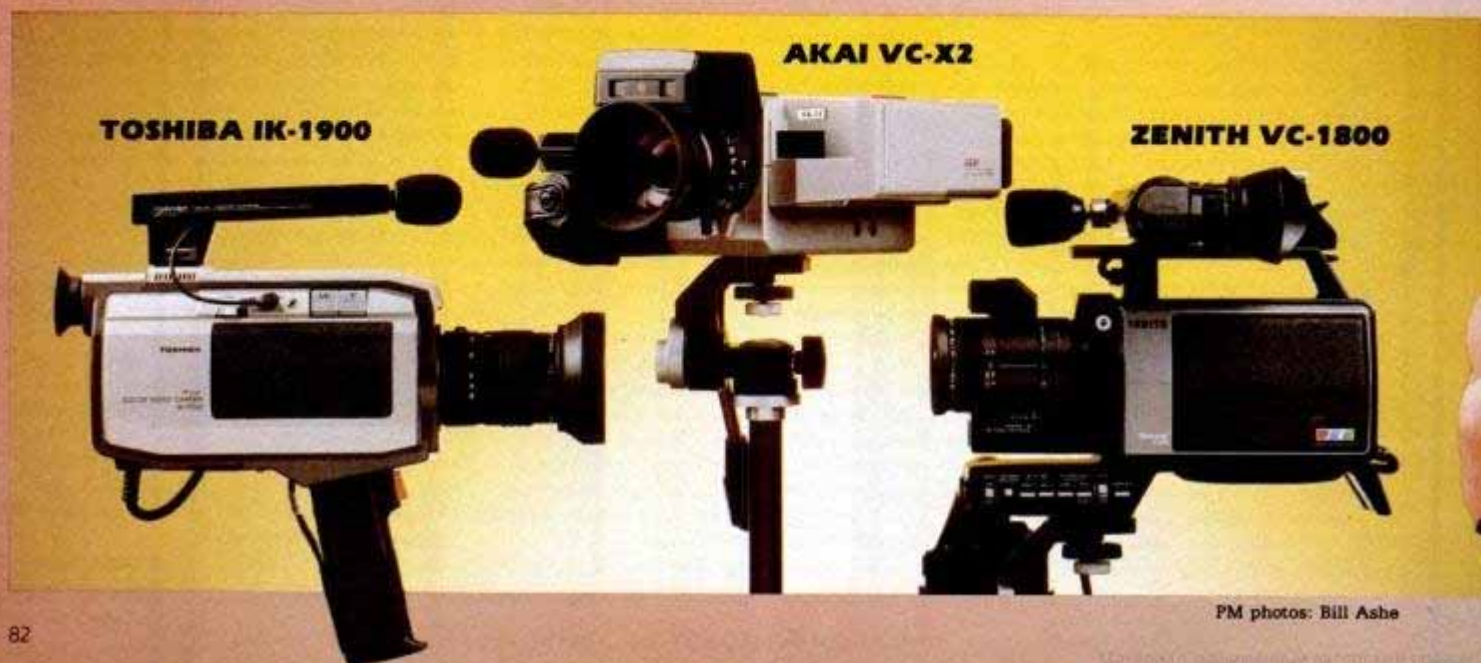
Always comparison shop when you're ready to add a camera to your video setup. We'll help you choose one with the features you need and at a price that makes sense. Our chart at the end of the story gives an all-inclusive comparison of cameras to consider.

The viewfinder

The most important feature is the viewfinder, and there are three types available: optical, through-the-lens and electronic. The optical variety is similar to a

(Please turn to page 184)

The wide-eyed world of video can be shaped to everyone's viewpoint with these new, easy-to-use cameras. Our model looks through the finder of the Hitachi VK-C2000, one of the first cameras to feature MOS technology (see text). The other cameras shown are representative of the many available, some of which include features such as auto-zoom, variable-speed zoom, auto-fade, auto-focus and character generators. The chart that follows tells which features go with what cameras and gives information on prices and specifications.



SHARP QC-70



GENERAL ELECTRIC 3035



SANYO VSC-450



HITACHI VK-C2000



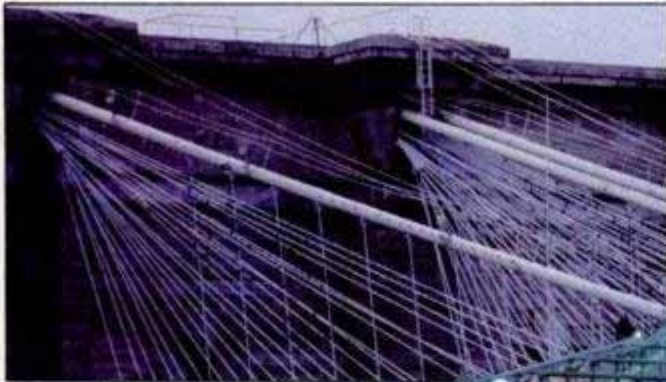
GREAT AMERICAN ACHIEVEMENTS

Stretching high across violent eddies of New York's East River, the Brooklyn Bridge—100 years old this month—stands as a monument to America's great age of invention. With every new stone and each new cable, the bridge broke ground in the field of civil engineering and managed to be called the "Eighth Wonder of the World"—even at a time when the electric light and the telephone were invented.

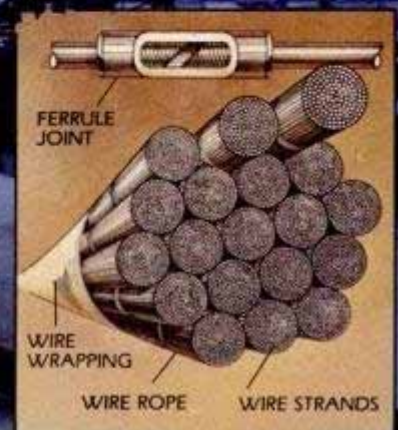
Much more than a monument, the bridge is sweet vindication for the visionary designer who died before the first caisson was sunk, and his son, who carried on with the 13-year building project, braving the bends, several political corruption investigations and charges from other engineers that his bridge wouldn't last 10 years. Today, civil engineers are so sure the bridge can easily go another hundred years that New York has earmarked \$100 million to make minor repairs—a paint job, replacement of some suspender cables, minor road resurfacing and the like—over the next 15 years.

When John Roebling, a German immigrant who had turned from farming to surveying to wire rope making and bridge-building,

Angled stays and vertical suspenders extend from towers and cables to the roadway, holding it taut.



Roebling's wire strands were joined along 100-foot sections with ferrule joints (right). Then 19 wire ropes, made up of 300 strands each, were wire-wrapped to form cables.

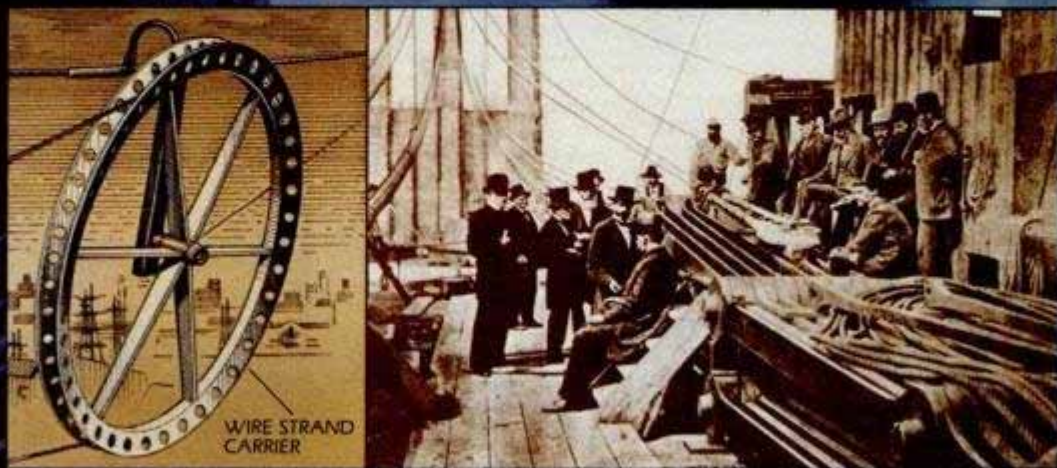


PM photo: Arthur Sudofsky

The Brooklyn Bridge Turns 100

The crowning achievement of 19th-century civil engineering, the Brooklyn Bridge remains in good enough shape to stand tall into the 21st century.

BY DON SAYENGA



Each of the wire strands was looped around the carrier (above, left) and then pulled to the tower, where the rope for the bridge was formed. The wire strands are seen at their Brooklyn anchorage (above, right), where engineers inspected the building materials.



Inside the work chambers under the caisson, crews of 30 to 40 men broke up riverbed around cutting edges to allow caisson and bridge tower to settle down to the bedrock.

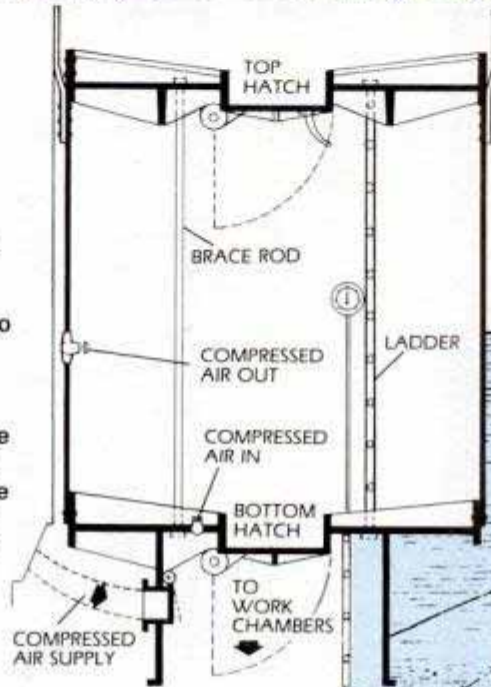
first conceived of the bridge, nothing that large had been tried in suspension bridges. Critics said it would take far too many tons of iron cable to hold up a roadway. To span 1,595 feet of river, while at the same time keeping the waterway clear for tall ships, the bridge roadway would have to be an impossible 119 feet high. It would need an approach road of more than a quarter mile on either side. It could never support the mass transit system envisioned by Roebling.

Newspapers charged the bridge idea was a "Grand Boondoggle," and the famed magazine *Scientific American* noted that a tunnel from Brooklyn to New York would do the same job at half the cost. But Roebling, who had built a smaller-scale suspension bridge in Cincinnati, promised prospective stockholders that the bridge would be "the greatest engineering work of the continent and of the age."

Under the auspices of a semiprivate corporation in which New York and Brooklyn were major shareholders but a small group of private citizens retained control, ground was broken for the Brooklyn tower in January 1870.

The elder Roebling, who slipped, fell and cut himself on the foot a week before construction was to begin, died of tetanus even before ground was broken.

His son, Col. Washington Roebling, a civil war hero, had worked almost constantly by his father's side and filled the great shoes so well that one day the younger Roebling would quip: "Long ago I ceased my endeavor to clear up the respective identities of myself and my father. Many people think I died in 1869."

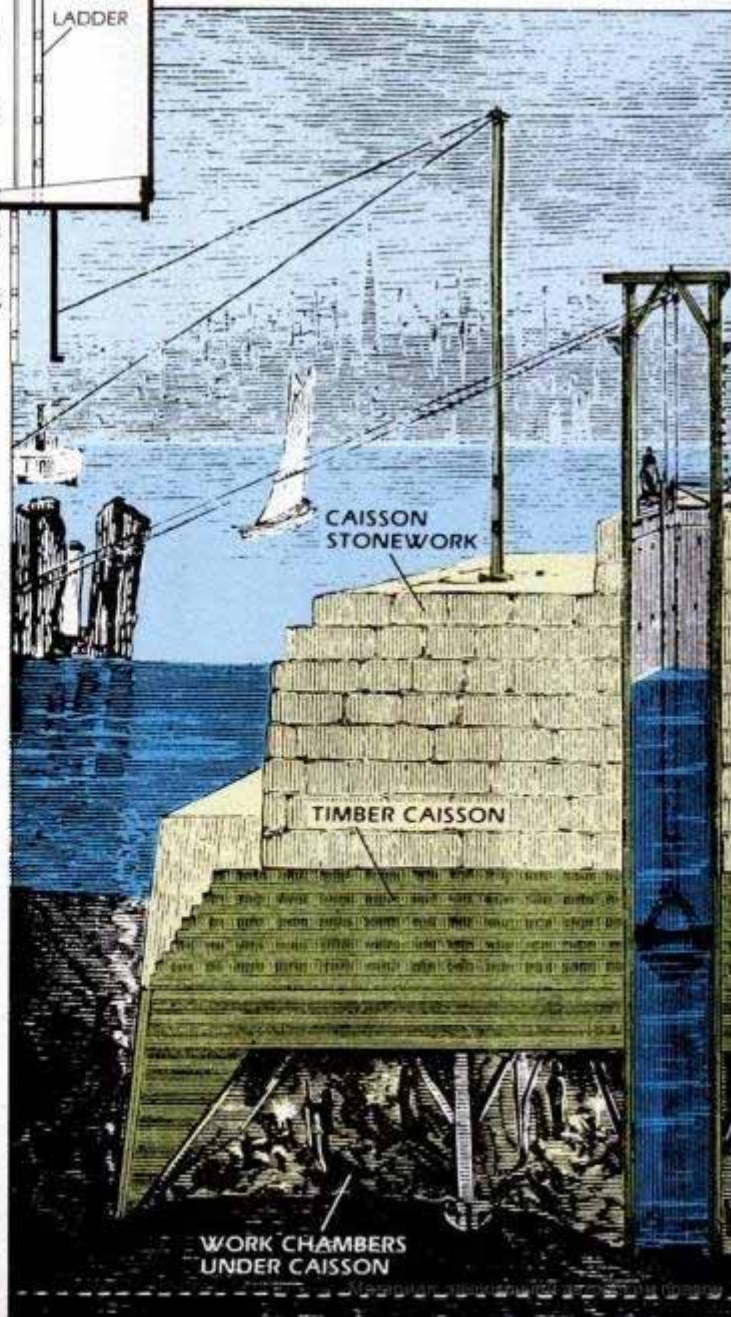


The 27,500-ton Brooklyn-side timber caisson with its stonework (right) would eventually bear the weight of the bridge tower. Men working under the caisson picked away at the riverbed to let the caisson cutting edges sink deeper. A clamshell scoop brought the diggings up to the surface through a water-filled tube designed to maintain air pressure in the work chambers. Men entered the caisson work chambers through an airlock, a cross-section of which is shown above. Workers entered through the top hatch, the airlock was pressurized and they went out the bottom hatch and down ladder.

Young Roebling's first challenge was to erect towers that would stand 276 feet above high water. First a caisson was built of extra-heavy, sap-rich pine on the Brooklyn side. (Critics said the caissons should be of iron, since pine would rot and suffer under the attack of river worms. But in a 1960 engineering study, it was noted that the wood was still heavy with sap and no worms had undermined it.)

The timber caisson had the shape of an enormous iron-clad 168 feet by 102 feet. Before the first stone was laid atop its roof, it weighed 3,000 tons. Launched like a ship slightly downriver from the bridge site, the caisson was pulled by tug. When her lines were cut, the huge wooden box bobbed up and down in the water for almost two months, as workers laid on extra courses of lumber and heavy stone imported from New Jersey and Connecticut.

The bridge caissons (another was

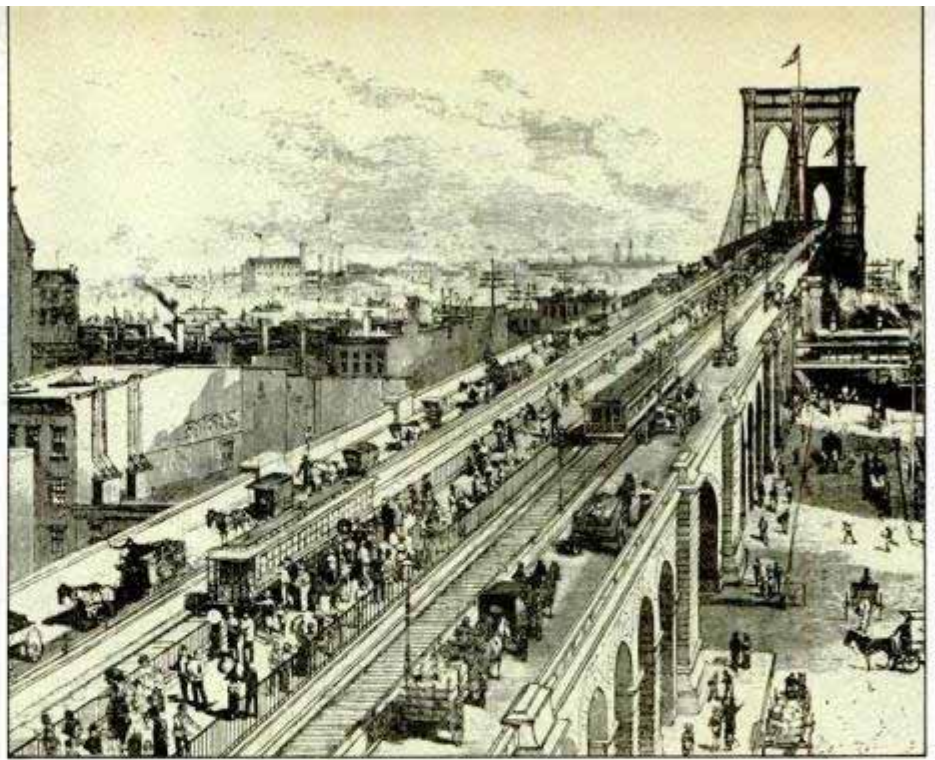


built on the Manhattan side) were giant cutting tools, with pointed edges, or skirts, that pressed into the riverbed as row upon row of stone was placed on top. They weighed 27,500 tons each. The caissons were also huge diving bells, with the cutting edges enclosing a hollow underneath that was divided into work chambers.

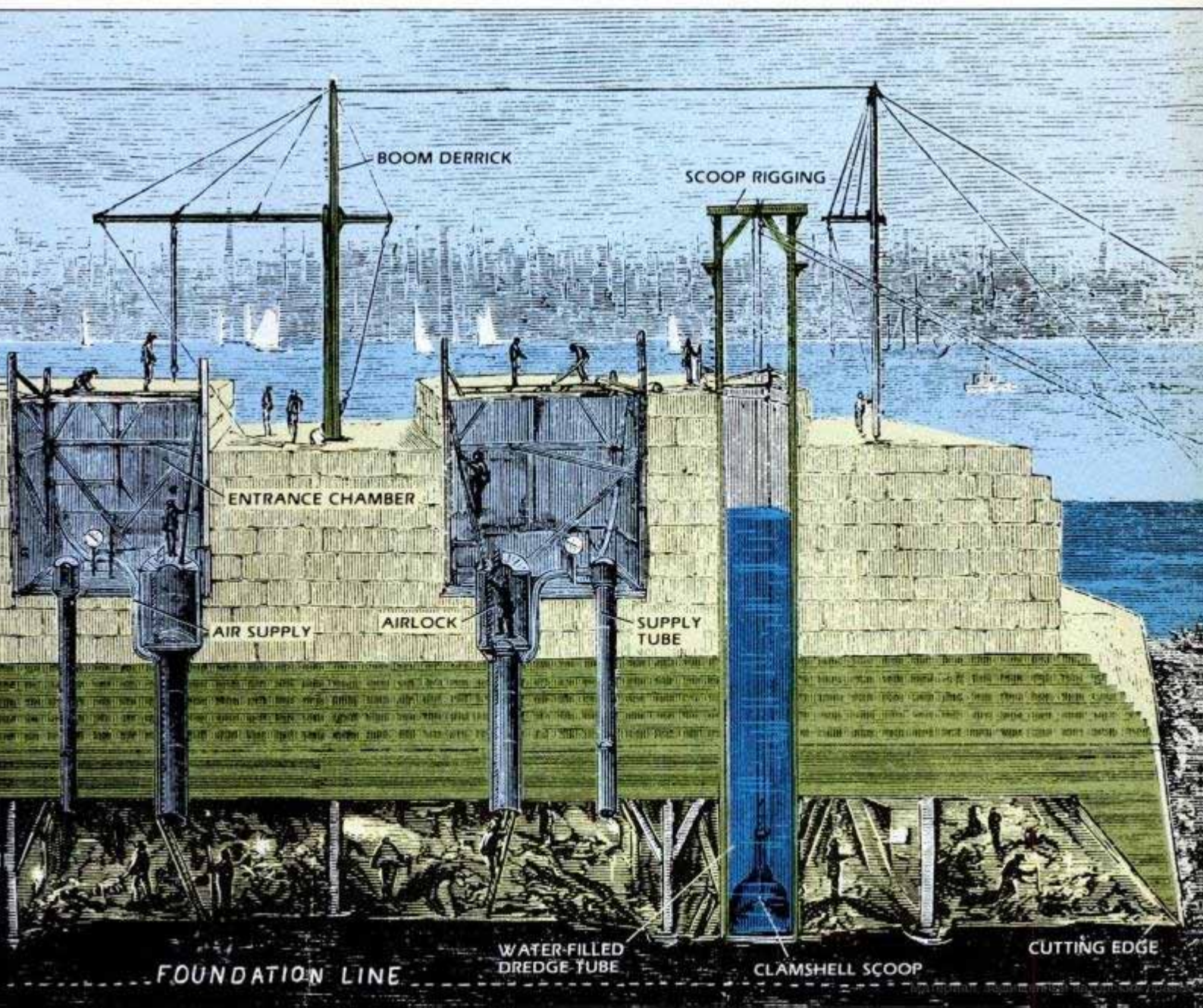
Men dug beneath caissons

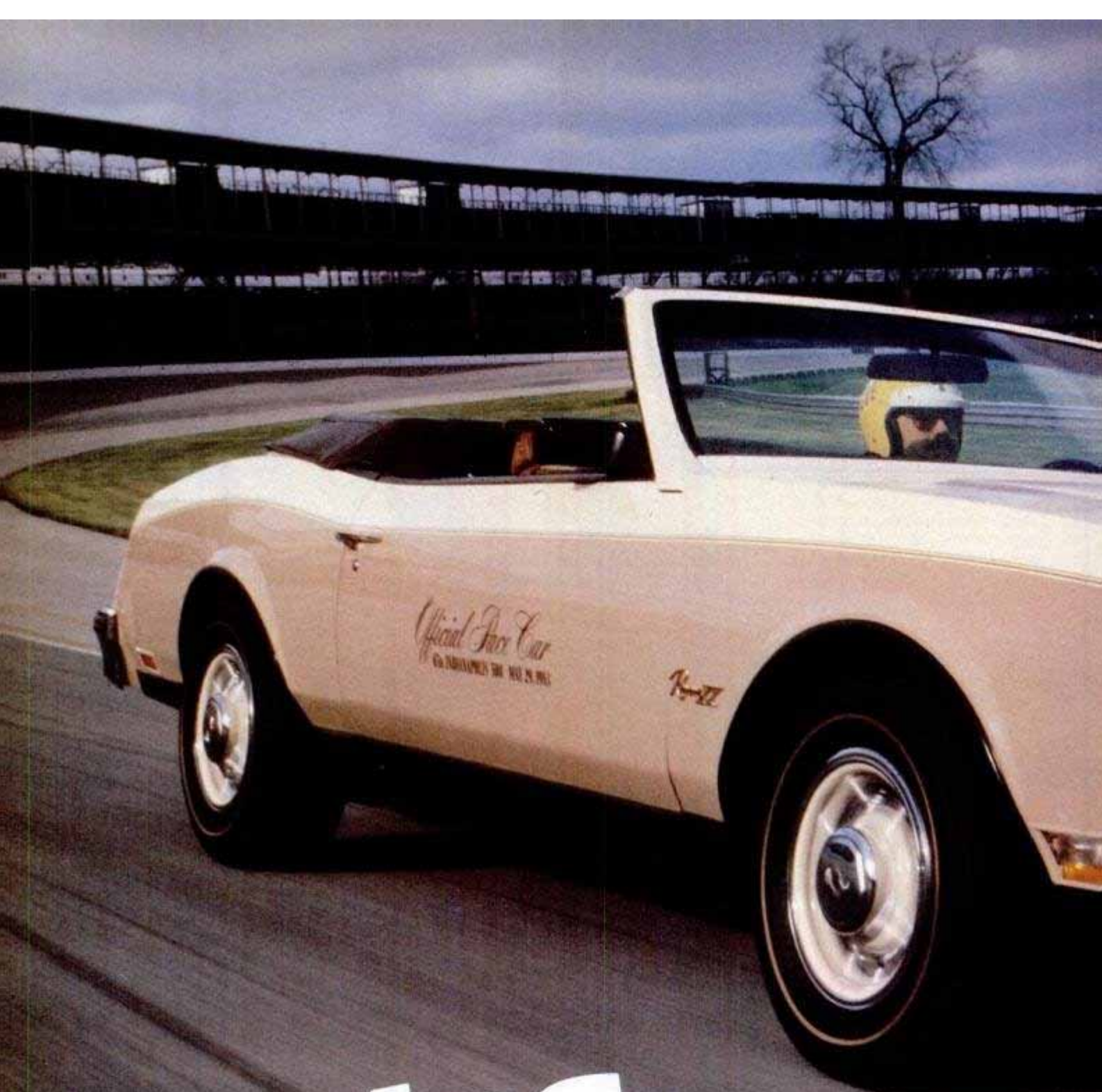
Going down into these chambers were various tubes. The dredge tube was filled with water to help keep the structure righted in deep water and against the pressure of the fast-flowing river. A thinner pipe carried compressed air into the work chambers at the caisson's bottom to overcome the increasing pressure as the box sunk toward bedrock. This allowed work crews of 30 to 40 men to work in each submerged caisson, digging away at the sand, rock and limestone beneath the river. The men went

(Please turn to page 193)



The first mass transit system on a suspension bridge crossed the Brooklyn Bridge in 1883. Stationary steam engines pulled a wire cable that hauled trains along tracks.



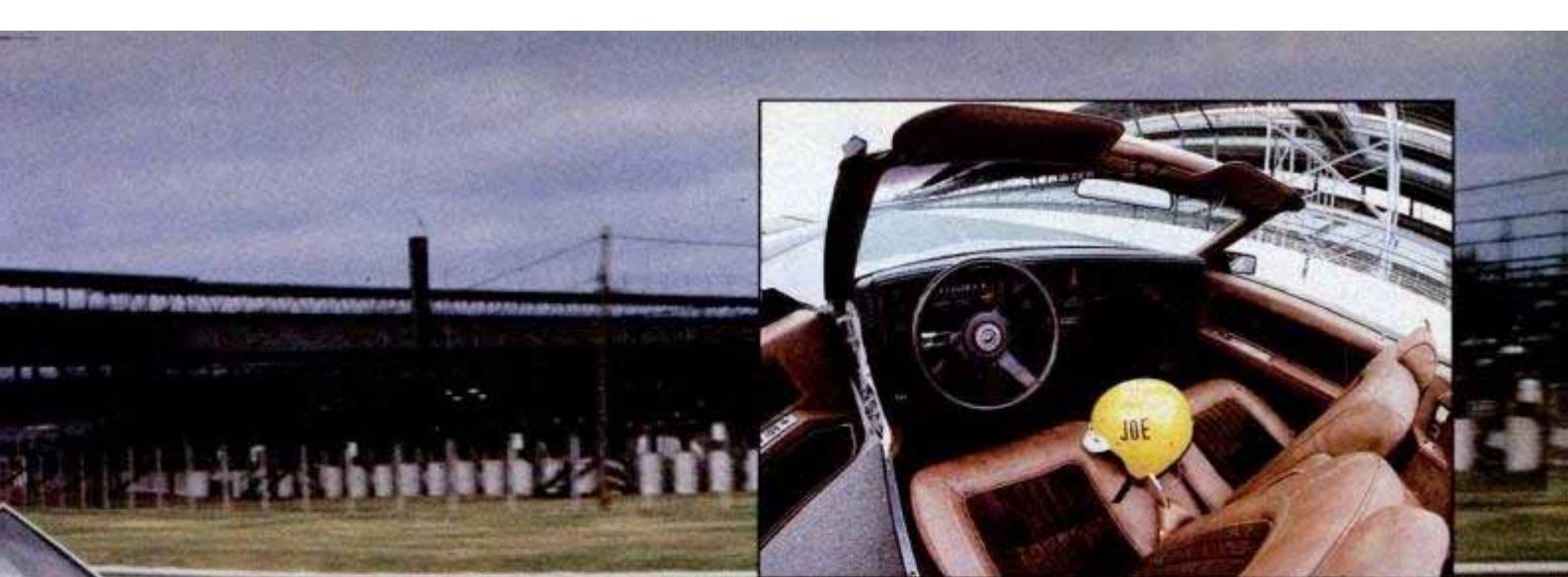


Pacing The Pack

DRIVING THE INDY 500 PACE CAR

You can't buy a twin-turbo 350-hp Buick Riviera convertible. But you can ride with us!

BY JOE OLDHAM
EXECUTIVE EDITOR



This will be Duke Nalon's office on May 29. Leather, suede and a \$900 steering wheel will help make his job more bearable.

PM photos: Ron McQueeney and Dan Francis

It's cold in Indianapolis in January. And at the Indianapolis Motor Speedway, it's even colder. The wind whips off turn four with the fury of 33 turbocharged, fuel-injected race cars ready to take the green flag.

But on this January morning, there are no race cars. There are no mechanics making last-minute valve-clearance adjustments, no crewmen taking final tire-pressure tests, no drivers donning their Nomex fireproof suits and no 400,000 fans screaming and cheering and singing "Back Home In Indiana."

In fact, on this bleak, overcast day, the Indianapolis Motor Speedway is deserted. The

stands are empty, the infield Snake Pit at turn one mute. Only the wind makes a sound, a shrill whistle, as it blasts down the front straight, past the thin strip of bricks that mark the starting line of the Greatest Spectacle in Sport.

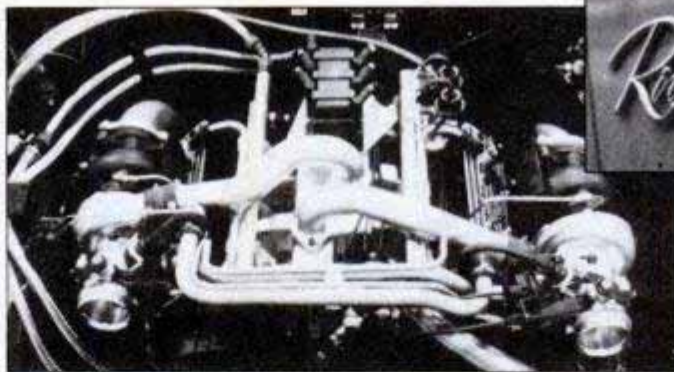
Just a solitary car sits on the starting line today. It's a very special Riviera convertible that will pace the pack at the start of this Memorial Day's 67th running of the famous Indianapolis 500.

And we are going to drive it.

It's a bit weird to see a convertible sitting around with its top down in the middle of winter in Indianapolis. But that rather bizarre sight

is only the first of a series of shocks to our sensory mechanisms on this day, mostly wrought by the guys at Buick Engineering who, we would learn, have managed to transform a rather sedate but classy cruiser into a snarling, fuel-injected, twin-turbocharged, computer-controlled, 350-hp, brute-force machine that has enough power to peel back your eyelids, compress your spine into the seat, and produce so much wheelspin that you'll think you're fighting it out with Don Garlits for top eliminator.

In fact, one of the problems during the development of the Riviera XX has been *too much* power. That's the word from George Claypole, the genius engineer in charge of putting the Riviera's monster engine together. Thanks to an adjustable turbocharger boost dial, you can literally tell the computer how much power you want—up to about 500!—and the en-



Riviera XX

The Riviera's engine is a symphony of polished alloy. The gold emblems signify that the pace car is a one-off special.

gine will make it, no questions asked. For race day, though, Claypole tells us that he'll dial in somewhere around 350.

"That should be adequate to get the job done," he says nonchalantly.

With so much power on tap at the twist of a dial, we're a little apprehensive as we climb into the plush leather- and suede-trimmed interior and buckle up. The handmade real

wood steering wheel is said to have cost \$900 alone, but we haven't been able to get anyone at Buick to confirm or deny this little bit of extravagance. Dennis "Duke" Nalon, the legendary driver of the brutish Novi race cars in the 1950s, who will actually drive this Riviera to pace the race on May 29, will be very pampered indeed.

We turn the key to start the engine, expecting to be buffeted by the mon-

A BRIEF HISTORY OF INDY PACE CARS

1911—STODDARD DAYTON



A Stoddard Dayton won the inaugural race at the Indianapolis Motor Speedway in 1909 (not a 500-miler), so it only seemed fitting when Speedway owner Carl G. Fisher decided to drive the Stoddard himself to pace the first official 500 in 1911. Since then, there have been 64 other pace cars, including this year's Buick Riviera convertible. But this is the 67th running of the 500, so why the discrepancy? Fisher liked the Stoddard Dayton so much that he used it as the pace car for the 1913 and 1914 races also. Most early pace cars, in fact, were makes that had either won a previous 500 or had distinguished themselves in some other

form of motor racing—marques like Stutz, Duesenberg and Packard.

It didn't take Detroit long to realize that there was a lot of glamorous ruboff value in being associated with the Indy 500. By the 1920s, building the Indy pace car was already a coveted prize among auto makers.

Up until 1979, the role of the pace car used to be largely ceremonial, but in 1979 the bunch-up rule took effect, and now the pace car plays a much more crucial role. Whenever a yellow caution light comes on, the pace car comes out and the race cars must bunch up behind it without actually

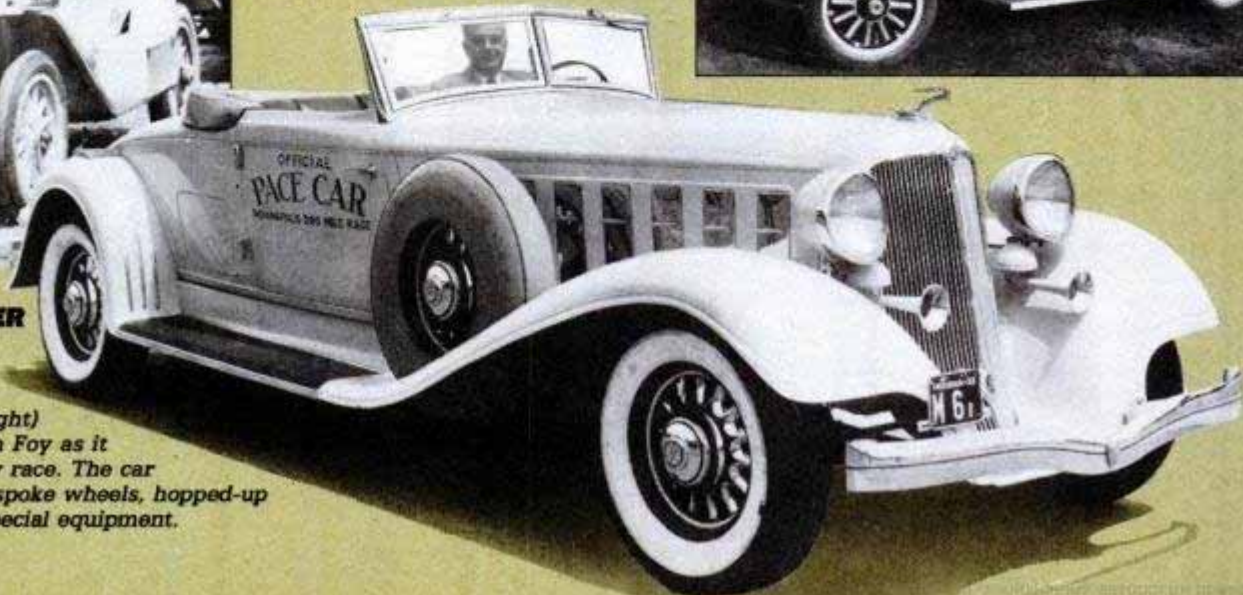
1925—RICKENBACKER

The first pace car, Stoddard Dayton (left), led 1911, '13 and '14 races. Driver was Carl G. Fisher, Speedway founder. Eddie Rickenbacker, aviator, carmaker, race driver, Speedway owner, drove his Vertical 8 (right) in '25.



1933—CHRYSLER

The big Chrysler LeBaron roadster (right) was driven by Byron Foy as it paced the 1933 Indy race. The car had special chrome spoke wheels, hopped-up engine, and other special equipment.



ster under the hood. Instead, the engine starts quickly with a single twist of the key and immediately settles into a very smooth 700-rpm idle. The only clue we have that there are 350 horses under the hood comes from the subdued but authoritative burble from the custom-fabricated exhaust system.

We drop the shift selector into DRIVE, our left foot still on the brake. Can an engine this smooth and quiet really pack 350 hp? We decide to find out.

Mashing our right foot flat to the floor, we simultaneously release the brake pedal with our left. In an instant, the front tires of this front-wheel-drive Riviera are spinning and smoking and howling. We let off. Too much throttle. Flooring it won't do with this baby. We stop, startled by the incredible power output of this 252-cu.-in., six-cylinder engine.

Try again. This time, let off the brake and bang on about three-quarters throttle. Again, the front tires are clawing at the pavement and sending off clouds of white smoke. Still too much. Hold the brake. Hit the throttle about halfway down. That's it. The big Riv is moving out now with just a slight touch of wheelspin. A perfect start. We're rolling about 50 feet now so let's punch it open.

Mash the throttle to the floor. The Riviera hunches down on its suspension and moves out now. There's no sensation of the turbochargers kicking in, no nothing, except a strong, insistent urge at the small of our back. It presses us back into the seat and keeps us there as long as we keep our foot down. After several seconds, we're traveling at an incredible rate of speed. Our peripheral vision shortens as things alongside the track whiz by in a blur. Still, we're pressed back

into the seat, the icy cold wind blasting past our face, numbing it, our helmet forced back against the headrest.

Let off a little and the pressure against our back eases. The speedometer is well past the peg off the end of the dial. Now we're more aware of what we're doing. We're past turn one and halfway into turn two. The VIP suites that hang from the top of the Speedway in turn two are silhouetted against the gray sky as we turn slightly left and dive down into turn two and onto the long back straight.

At 200 mph, Indy drivers will tell you that the back straight is bumpy. But here, now, at about 110 mph, it's just one long stretch of smooth concrete, the slight imperfections in the roadway soaked up with nary a whimper by suspension engineer Ray Smith's chassis modifications.

As turn three looms closer, we set up
(Please turn to page 192)

changing position. The pace car maintains control until the green comes on again.

Although there have been several snafus involving pace cars, only one was serious. In 1971, Indianapolis Dodge dealer Eldon Palmer was driving the Dodge Challenger pace car when he overshot the braking marker on the start lap, lost control and crashed into the photographer's stand, seriously injuring several people. Since then, all pace car drivers have been required to have racing and/or high-speed driving experience, which is a good rule since almost all recent pace cars have been virtually race cars themselves.—J.O.



1954—DODGE

Dodge was first firm to build replicas of pace car for sale to the public, producing 701 Royal 500s in '54. Real pace car (left) had dual-quad Hemi engine, special trim.

1969—CAMARO

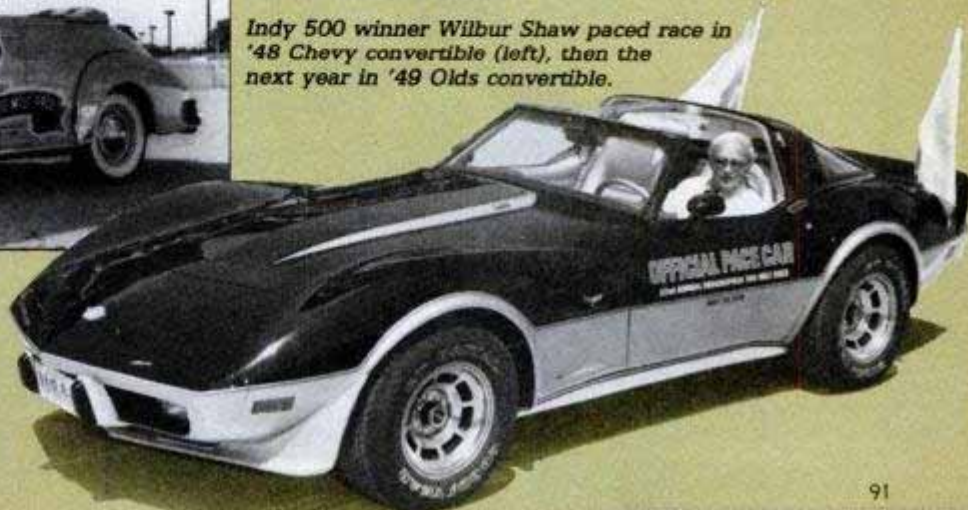
Chevrolet cashed in big on the 1969 Indy pace car promotion (right) when it built about 3,450 Rally Sport Pace Car replicas, which went on sale through dealers.



1948—CHEVROLET

Indy 500 winner Wilbur Shaw paced race in '48 Chevy convertible (left), then the next year in '49 Olds convertible.

The pace car that marked the beginning of a cult was the '78 Corvette special edition (right). Chevrolet built 6,500 replicas and the car became an instant collector's item.



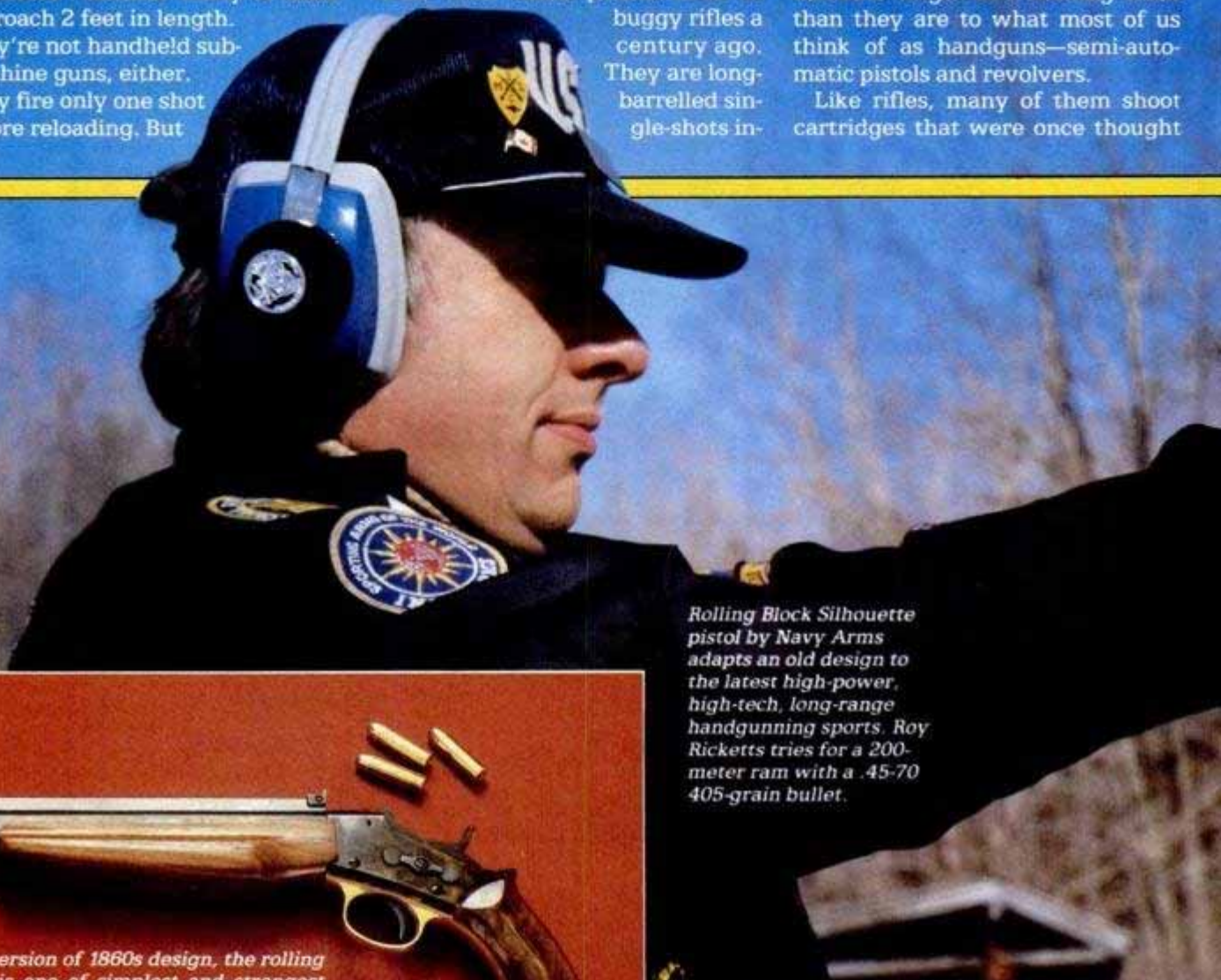
A new breed of high-technology handguns for superspecialized shooting has appeared in the land over the past few years. They're not supersmall or readily concealed—because many of them approach 2 feet in length. They're not handheld sub-machine guns, either. They fire only one shot before reloading. But

they can do things that few fast-firers can attempt. In fact, there is some question about whether they're really handguns at all.

These are the latest generation of what were called pocket rifles or buggy rifles a century ago. They are long-barrelled single-shots in-

tended for super accuracy and high power at ranges once thought impossible for a one-hand gun. Just like their muzzleloading ancestors, they are far more closely related to accurate target and hunting rifles than they are to what most of us think of as handguns—semi-automatic pistols and revolvers.

Like rifles, many of them shoot cartridges that were once thought



Rolling Block Silhouette pistol by Navy Arms adapts an old design to the latest high-power, high-tech, long-range handgunning sports. Roy Ricketts tries for a 200-meter ram with a .45-70 405-grain bullet.



New version of 1860s design, the rolling block is one of simplest and strongest single-shot actions. This Navy Arms Silhouette pistol is \$375 in .45-70.



PM photos: Frank Lusk, J.D. Jones Guns for photography, Navy Arms, Leslie Edelman Inc.

SSK converted this Remington XP-100 from .221 Jet to buffalo stompers like .358 Winchester, .45-70 or even .50-70 rifle calibers. Holes near muzzle (inset) are recoil arrester which helps keep kick from breaking your wrist.



of only as rifle cartridges. Calibers range from .22 Long Rifle rimfire up to and including .50-70 Government.

Everyone knows the ubiquitous .22, but the .50-70 has faded from the ken of most modern shooters. Collectors and black powder single-shot buffs recognize it as the first centerfire cartridge adopted by the U.S. Army for general issue in the

1866 Springfield Rifle. The .50—as gunwise shooters will recognize—is the caliber, nominally half an inch, but actually .512 plus or minus a few thousandths in the rifling grooves. The 70 refers to the powder charge—70 grains of black powder. The original bullet weighed 450 grains or a tad over an ounce of lead. It went out the muzzle at about 1,200 feet per second (f.p.s.).

This buffalo stomper probably killed larger numbers of the American Bison than the more famous Sharps. In a handgun, even a high-tech handgun weighing more than 5 pounds, it can be a real wrist-breaker if not handled right.

Most of the super single-shots, though, are chambered for either special, hand-loaded, wildcat car-

(Please turn to page 202)



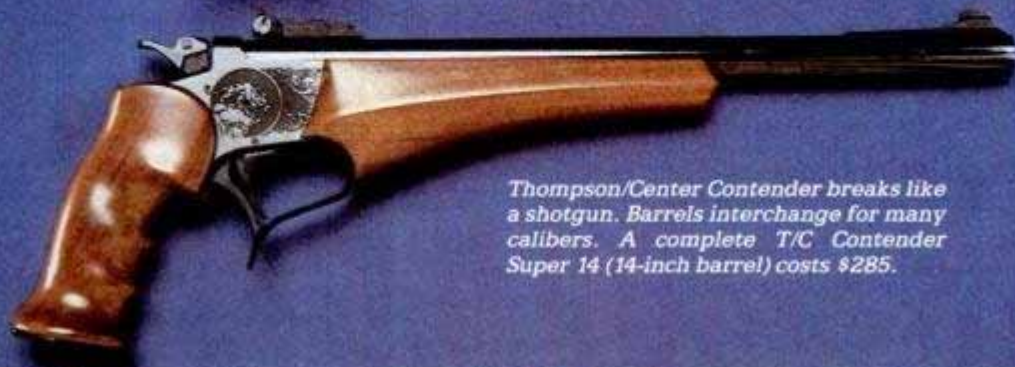
New Pistols That Shoot Like Rifles

Perfect for the sport of silhouette shooting, these pocket rifles get hits out to 300 yards.

BY ANGUS LAIDLAW



Stock Remington XP-100 bolt-action, single-shot pistol in .221 Remington Jet was originally for varmint hunting, but now comes in 7-mm for silhouette shooting.



Thompson/Center Contender breaks like a shotgun. Barrels interchange for many calibers. A complete T/C Contender Super 14 (14-inch barrel) costs \$285.

New Look For Fishing Favorites

The newest fishing boats don't have tri-hulls, squared-off bows, and flat bottoms banging across the waves. Seen from the side, a bass boat may look like a runabout and go fast enough to tow skiers or win a race. Notice a more pointed bow, higher sides and deeper-V hull for a smoother ride. Styling is slick and streamlined. Windshields have been added to deflect the wind at higher speeds and are raked aft.

The only tip-off from abeam may be a control console sticking up like a con-

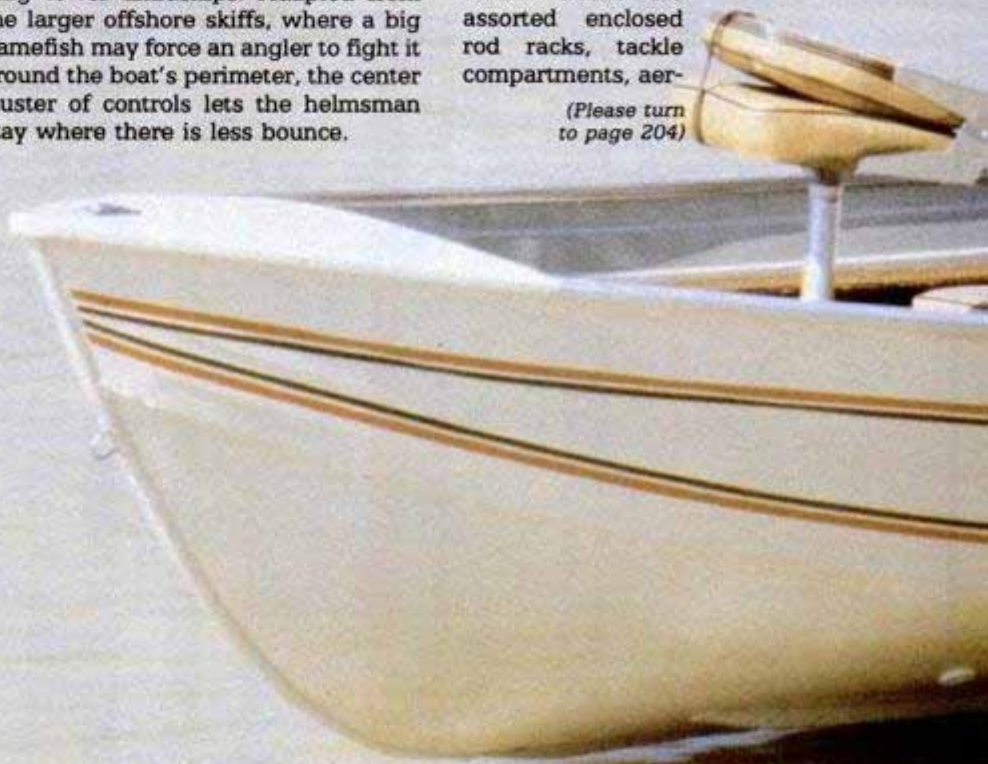
High-tech has come to the lowly skiffs for anglers: They're faster and safer.

BY BILL MCKEOWN BOATING EDITOR

ning tower amidships. Adapted from the larger offshore skiffs, where a big gamefish may force an angler to fight it around the boat's perimeter, the center cluster of controls lets the helmsman stay where there is less bounce.

Look down from a bridge, however, as the latest angling craft below head offshore, and you'll see interior layouts that leave no doubt about what their skippers have in mind. Foredecks are trimmed to make room for bowriding and casting. Level flooring and casting platforms provide a base for stand-up action. There are assorted enclosed rod racks, tackle compartments, aer-

(Please turn to page 204)



The light aluminum hull of a johnboat, the pointed bow of a runabout and the pedestal seats of a bass boat are combined in the Lund Pro-Angler to provide sportsmen with a multipurpose fish-chaser.

MFG is back in the boat business with the Adventurer Sport-14 that is produced from matched metal dies. This results in a uniform fiberglass hull that has a slick inside-outside finish.





For drift fishing (above) or powering on plane out to a favorite fishing hole, Fisher Marine's new SV 4 semi-vee bass hull is an aluminum, center-console model rated for 60-hp outboards. Generous freeboard keeps out spray, gives added safety.



New high-performance bass boat power



First look: Especially for the popular bass chasers, Johnson is introducing a GT V6 racing-type, 150-plus-hp motor. Evinrude will have similar XP-150-plus model.

Open bowrider foredeck of the Silverline Sport Scrambler (above, left) allows forward casting for fishermen, but the stylish speedster can be used to tow skiers, as well.

Styled like a runabout with raked windscreens and pointed bow, but mounting pedestal seats for fishermen, aluminum Fisher Sweet 16 Fishabout (left) is bass boat in disguise.

Today's Top Tuners

New, highly sophisticated tuners are making the case for separate components again, instead of tuner and amplifier together on one chassis.

BY CHRISTOPHER GREENLEAF

NAD 4150



Carver TX-11 has impressive FM stereo signal tracking; special circuit delivers noise-free stereo even in fringe areas. NAD 4150 also tracks FM signals with great precision, using a new Schotz circuit.

FM photo: Lou Jawitz

CARVER TX-11

Most of us are in the "deep fringe" of FM for at least a couple of the stations we tune in. Here are new tuners that reach farther, give more noise-free stereo at greater distances and—wonder of wonders—are relatively simple to operate.

An FM signal doesn't always occupy the same amount of space or bandwidth, and its strength fluctuates from moment to moment, so a few new models actually track the signal according to its status at any given instant. Others lock in very solidly on a station, far more accurately than was possible before. Still others feature very legible, accurate meters that give precise information of signal strength, on-center alignment and multipath conditions. The end result is a good reproduction of the signal the broadcaster sent out initially. These tuners are so good that they can

even show up bad broadcasting!

Here, with prices ranging from a high of \$1,145 to an affordable \$280, are our five terrific tuners.

Tandberg 3001

Tandberg has eliminated some of the last stumbling blocks in conventional analog tuning and given us a glimpse of future FM quality. Designed by the Norwegian firm's famous technical staff, the 3001 is nearly alone among analog (that is, nondigital) tuners in its ability to provide eight station presets and retain a conventional tuning dial. Using the memory button doesn't move the dial's pointer; rather, it shows the selected station's location on a separate meter which also functions as the tuner's signal-centering indicator. There's also a signal-strength meter with very accurate indexing from 3 microvolts all the way up to a whopping 3 volts.

The bandwidth the unit picks up can be switched between wide, normal and narrow, an unusual and welcome versatility.

FM stereo noise is tackled by gradually decreasing channel separation as the signal from the antenna worsens. This is an effective bit of circuitry that keeps the stereo as good as conditions up at the antenna will allow. Technical journals, in discussing the 3001, have stated that this tuner often exceeds the abilities of their equipment to measure its performance. Because Tandberg intended the 3001 for very critical ears, a number of radio stations use it to monitor their broadcast quality. It even has outputs for lab-quality equipment. There are also settings on the back for 25-, 50-, and 75-microsecond pre-emphasis, for European, Dolby B and standard U.S. broadcast sig-

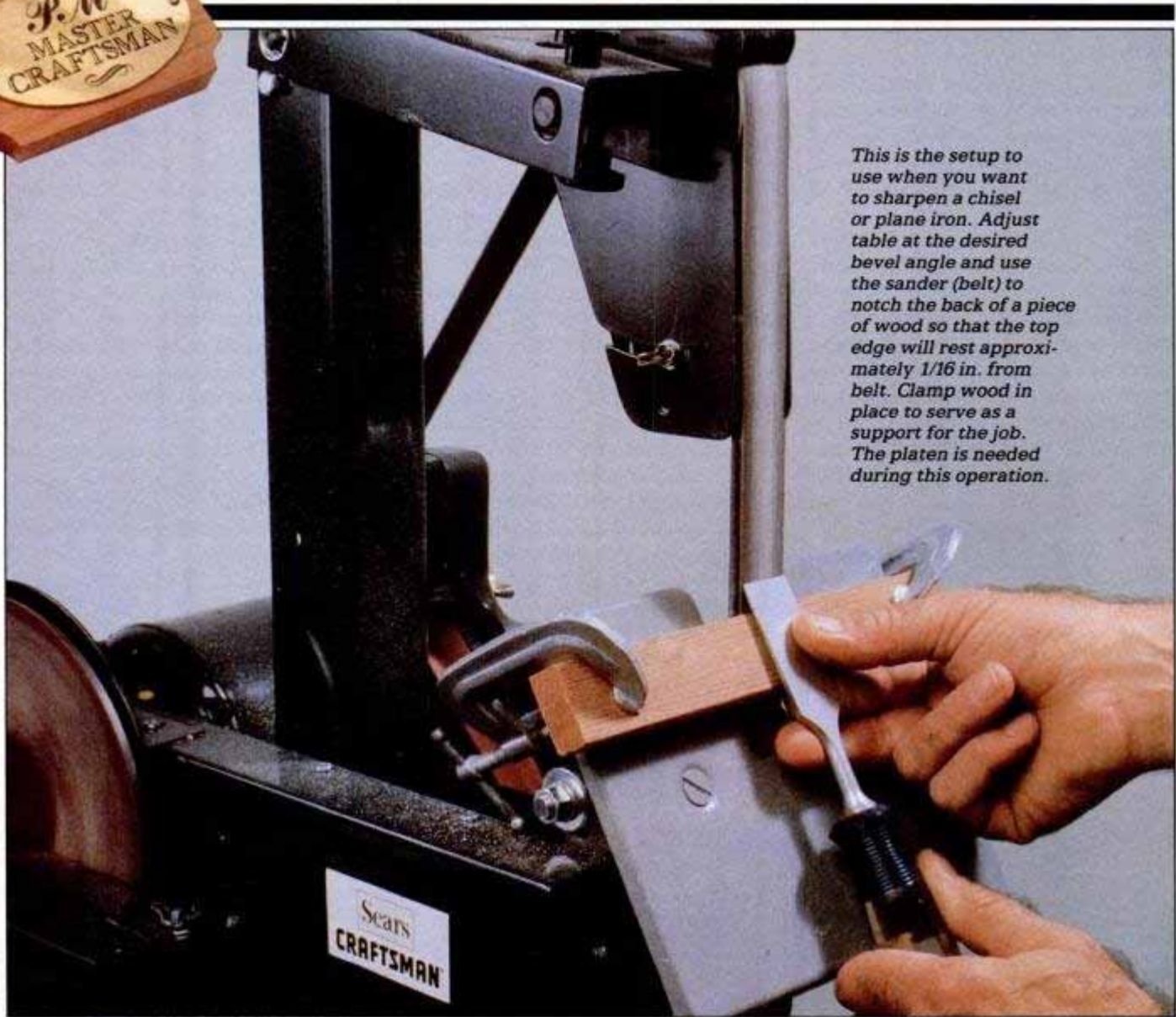
(Please turn to page 190)

ADCOM GFT-1A



Adcom GFT-1A has eight memory presets along with particularly quiet tuning. Tandberg 3001 uses conventional, analog dial along with eight separate, pushbutton memory presets.

TANDBERG 3001



This is the setup to use when you want to sharpen a chisel or plane iron. Adjust table at the desired bevel angle and use the sander (belt) to notch the back of a piece of wood so that the top edge will rest approximately 1/16 in. from belt. Clamp wood in place to serve as a support for the job. The platen is needed during this operation.

A Craftsman's Secrets For Using The Sander/Grinder

This little machine with its narrow abrasive belt is underrated by many, but you'll be amazed at all it does.

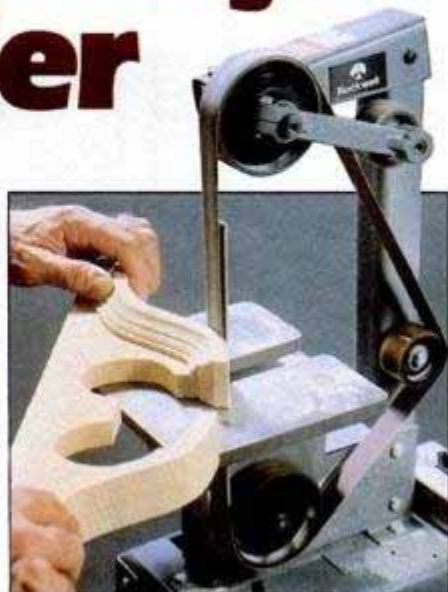
BY ROSARIO CAPOTOSTO PM photos by the author

The narrow-belt sander/grinder is a versatile little machine that's big on performance. With it, you can sand, grind, sharpen, deburr, finish, contour and polish almost any material.

The sander/grinder is no newcomer. It has been used widely in industrial shops for many years. Recently, however, the tool has been turning up in many home workshops and it is quickly

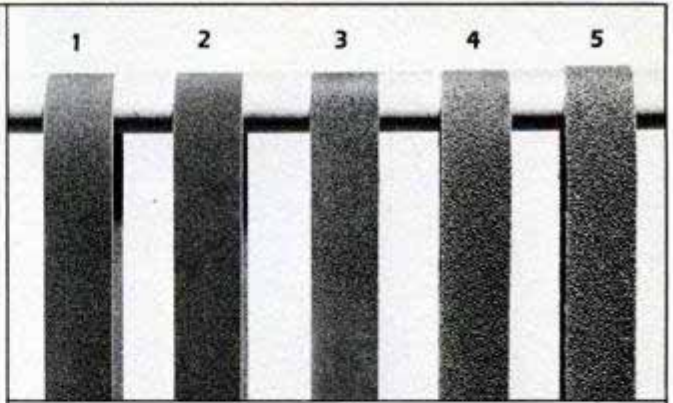
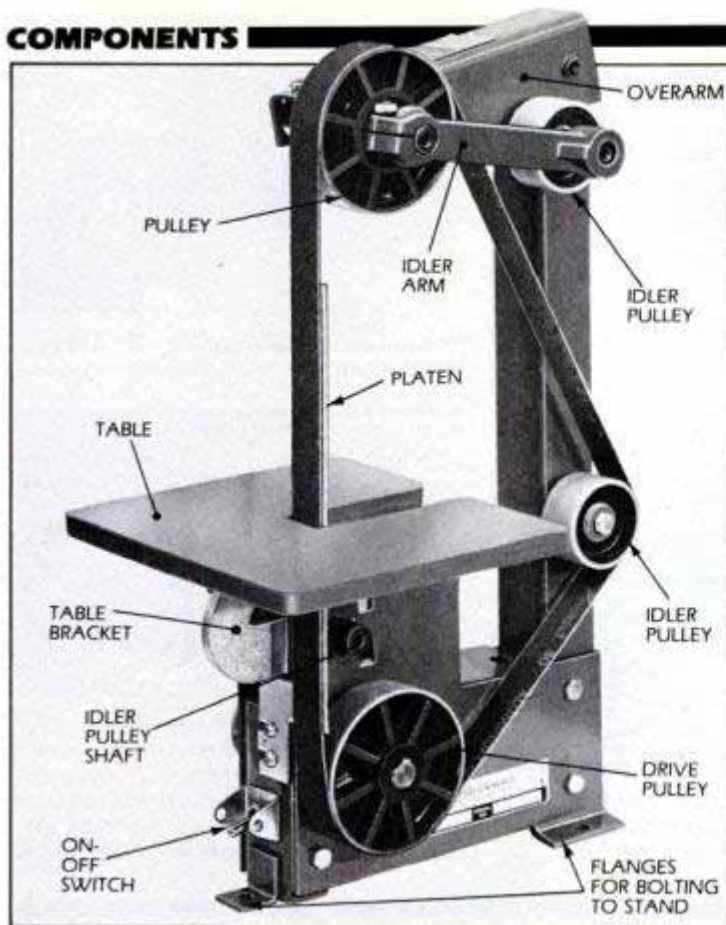
becoming the craftsman's favorite tool.

If you already own a sander/grinder, then you're aware of its capabilities. But some of the techniques and applications on the following pages may be new to you. If you're considering purchasing this unique machine, it will prove to be a valuable asset to your workshop because of its relatively low cost and its overall versatility.



Narrow belt easily removes saw blade marks while smoothing outside curve.

COMPONENTS



Most common belt grits: 1. 220 (very fine), 2. 150 (fine), 3. 120 (medium-fine), 4. 80 (medium), 5. 40 (coarse).

SPECIFICATIONS—SANDER/GRINDERS

	Rockwell	Craftsman	Dremel
Height (in.)	20½	21	15
Width (in.)	8½	9¾	10
Length (in.)	12	18	11
Belt size	1 × 42	1 × 42	1 × 30
Belt speed (f.p.m.)	4,000	3,000	2,700
Motor (110 v.a.c.)	½ hp.	½ hp.	Universal, 2 amp.

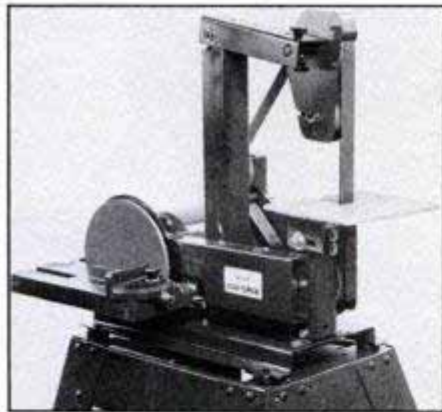
Rockwell (No. 31-351): 1-in.-wide flat platen and one sanding belt, \$223; metal stand, \$106. Rockwell International, Power Tool Div., 400 North Lexington Ave., Pittsburgh, Pa. 15208.

Craftsman (No. 9GT22612C): One 8-in.-dia. sanding disc, one sanding belt and miter gauge, \$189.99; steel leg set, \$49.99. Sears, Roebuck and Co., Sears Tower, Chicago, Ill. 60684.

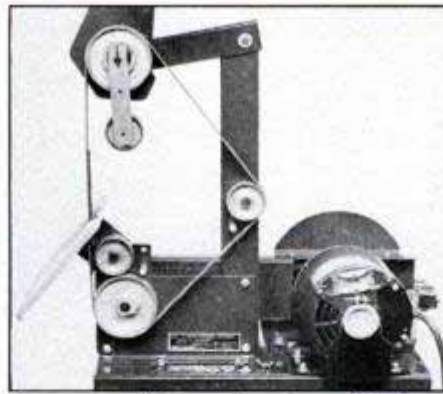
Dremel Disc-Belt Sander (No. 730): Two sanding belts, one 5-in.-dia. sanding disc and miter gauge, \$112.95. Dremel, Div. of Emerson Electric Co., 4915 21st St., Racine, Wis. 53406.

Rockwell's sander/grinder with its parts identified. Chart (above, right) gives technical data for the three machines shown.

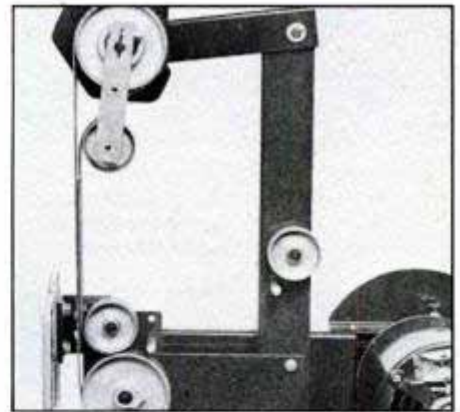
THREE SANDER/GRINDERS



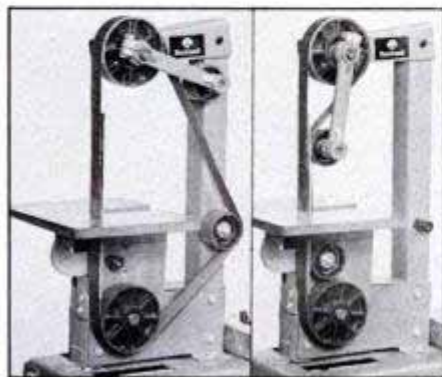
Craftsman's machine can be bench-mounted, or installed on stand as shown.



Craftsman with guards removed to show belt threaded for external sanding. The tilting worktable allows bevel work.



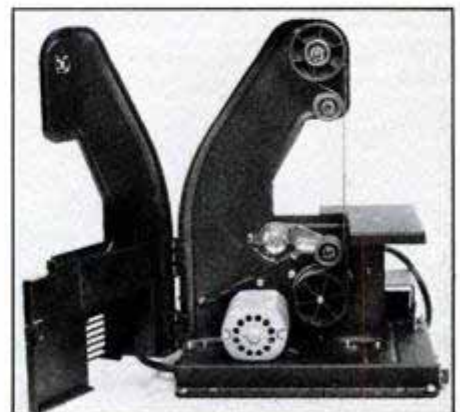
Belt is threaded for internal sanding. Remove the platen for contour sanding.



The Rockwell model is shown with the belt threaded for external sanding (left) and internal sanding (right). Notice that the idler pulley shifts forward.

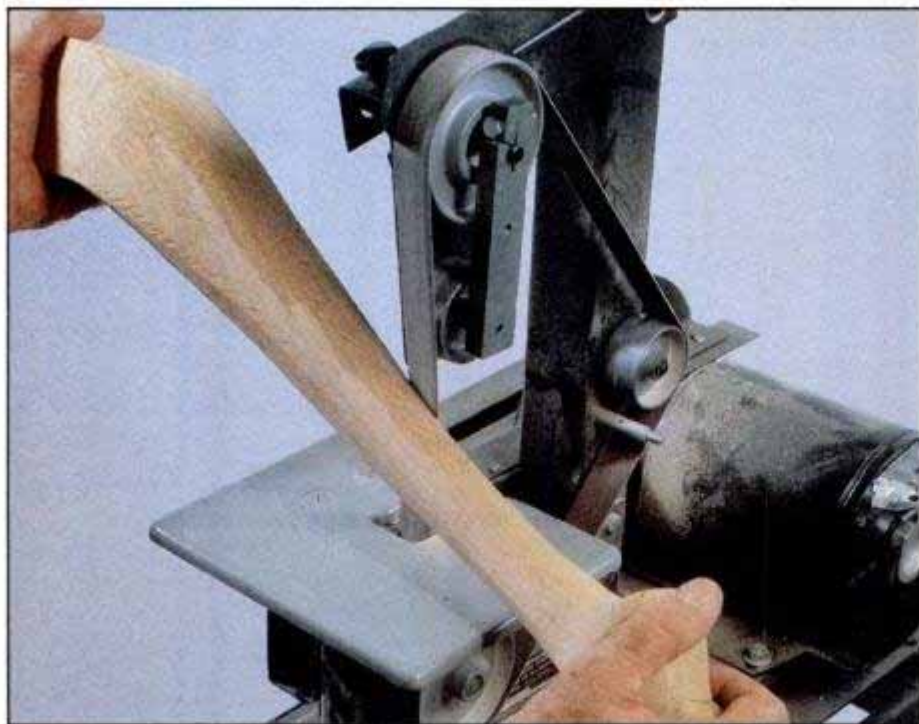


The lighter duty, benchtop Dremel disc-belt sander is a more compact tool than the Rockwell and Craftsman models.



The Dremel, with the platen removed, is now ready for internal contour sanding.

USING THE SANDER/GRINDER



Time-saving contour sanding is used to shape this table leg. With the platen removed, the flexible belt easily follows the shape of the leg. Use light pressure and steady motion to avoid cuts (ridges) as you move the workpiece across the belt.

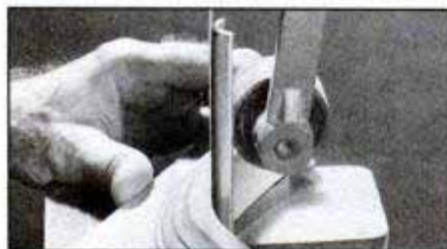


You can utilize the top pulley for shaping and for smoothing many inside curves.



Use a narrow strip of belt for sanding very small areas. Turn the belt inside out and slit it with a razor knife. Tear in one direction for a few inches, then in the other. Using this method will prevent the sanding belt from unraveling.

ABOUT BELTS AND PLATENS



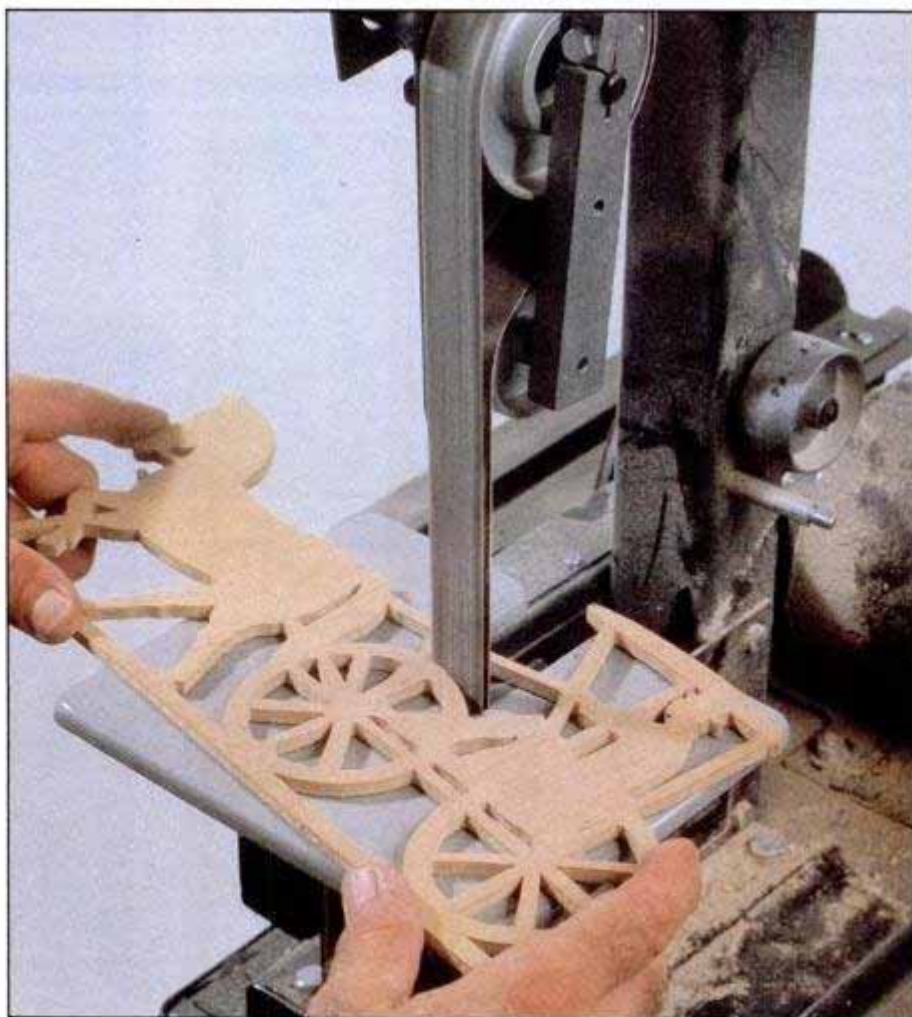
This convex platen is a Rockwell accessory for sanding inside curves. A curved wood block clamped to the other machine will serve the same purpose.



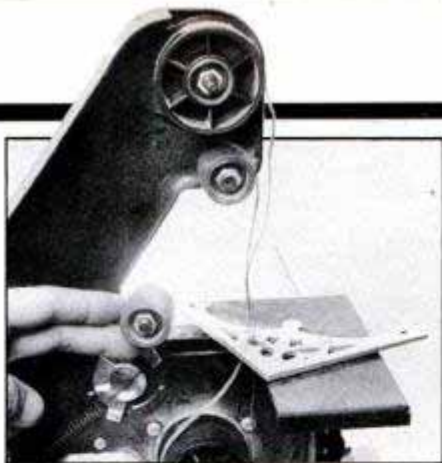
Thread the belt through the opening in the workpiece for internal sanding jobs.



Use the belt's thin edge for sanding in tight crevices and sharp corners. Remove the platen during this operation for greater access to the sanding belt.



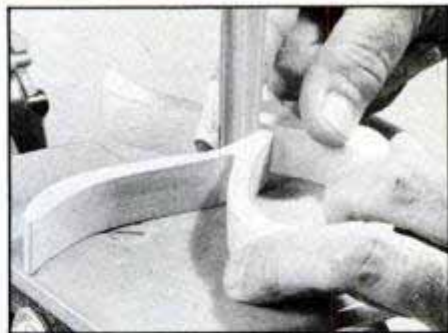
With the platen removed, the belt's flexibility is utilized for the internal sanding of circular shapes. The finer-grit belts are more flexible than the coarse belts.



Sanding small fretwork requires a narrow belt. Spring-tensioned idler arm is pushed forward to take up slack.



Apply a frosted finish to glassware by using an 80-grit (medium) belt and a felt chalk eraser as a back-up pad.



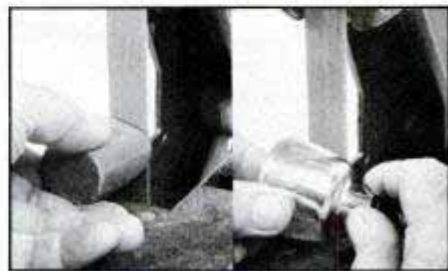
Use your finger to guide the belt into tight spots. Tape or adhesive bandage is wrapped around finger for protection.



For sanding the most intricate details, guide the narrow belt with a thin wood block. You can make custom-shaped blocks for sanding specific contours.

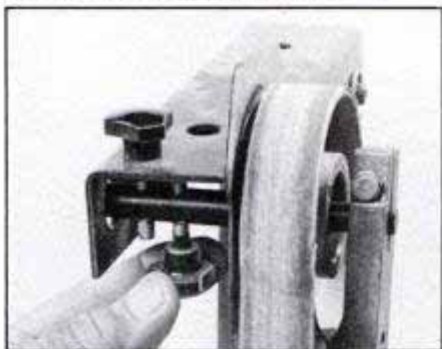


When grinding a nonferrous metal like aluminum, apply a low-melting-point grease to the belt to prevent clogging.

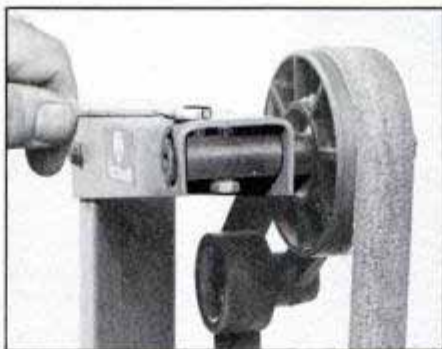


To polish metals, turn a worn belt inside out and apply a rouge compound (left). Light pressure produces a bright finish (right). Be sure belt is completely worn to prevent wear on the pulleys.

TRACKING THE BELT



Two belt tracking adjustment knobs are used to control right and left belt movement on the Craftsman model.



Control the belt on the Rockwell model with these two bolts. Turn bolts in opposite directions to adjust belt.



The belt tracking adjustment on the Dremel unit is located within the housing.

As a sander, this machine takes over where large, broad-belt sanders (both portable and stationary) leave off. The narrower belt can accurately sand intricate workpieces quickly, thus saving the hours it would take to sand the piece by hand.

As a grinder, it outperforms a conventional stone grinder by cutting and sharpening faster while operating at cooler temperatures. This minimizes the danger of drawing the temper (allowing the metal to become too hot, thus weakening it) when sharpening tools or during metalworking.

Shown here in various operations are three sander/grinders: Sears Craftsman, Rockwell and Dremel (called the Dremel disc/belt sander). All three performed admirably.

The Craftsman and Rockwell are about equal in size and capacity. Both models utilize 1 × 42-in. abrasive belts and have tilting worktables for bevel sanding and grinding.

The smaller, lighter duty Dremel uses a 1 × 30-in. belt. The Dremel model is designed for bench top use.

Both the Rockwell and Craftsman machines can be bench mounted or installed on accessory stands. Rockwell's metal stand (No. 50-510) can be purchased with or without retractable casters (No. 50-118). Craftsman's steel leg set (No. 9 GT 22239C) is equipped with rubber-padded leveling feet. A floor stand allows the sander/grinder to be more accessible when working on long or irregularly shaped pieces. Unless you are limited by workshop floor

space, you'll find this to be a wise investment.

Aluminum oxide abrasive belts are available for all three makes, ranging from a coarse 40 grit to an extra-fine 320 grit. In addition to the conventional abrasive belts, Rockwell offers a brushing/cleaning belt (No. 31-476) for removing rust, deburring metal or polishing glass, and a nonabrasive wool belt (No. 31-477) for high polishing of metals and sheet plastics.

All three machines operate using a 1-in.-wide flat platen (a rigid, metal plate used to back up the belt). Rockwell also offers a ½-in.-wide flat platen (No. 31-364) and a ½-in.-radius convex platen (No. 31-365).

Another Rockwell accessory is a 1 × [\(Please turn to page 194\)](#)

Our oak sideboard (often referred to as a server) came into being simply because my wife has maintained that one of the biggest needs in a dining room is an attractive place to store infrequently used items such as bowls, vases and large serving platters.

Since her preference was for a dark Victorian piece topped by marble, I opted for oak for this project, and I mixed stains to create exactly the hue desired. The stain mix is spelled out in the finishing section.

The server was inspired by a number of similar pieces observed and studied at antique shows, auctions and the like. Most of the originals that we found were about 90-percent oak, with poplar being used for the case back, drawers, sides, and so on. Some, of course, were constructed of mahogany.

To hold down the cost, we built ours

Build PM's Victorian Sideboard

Crafted in the PM Workshop, this oak beauty is easier to build than you may guess. For validity, we used a finish that makes the piece look hand-rubbed.

BY HARRY WICKS HOME AND SHOP EDITOR

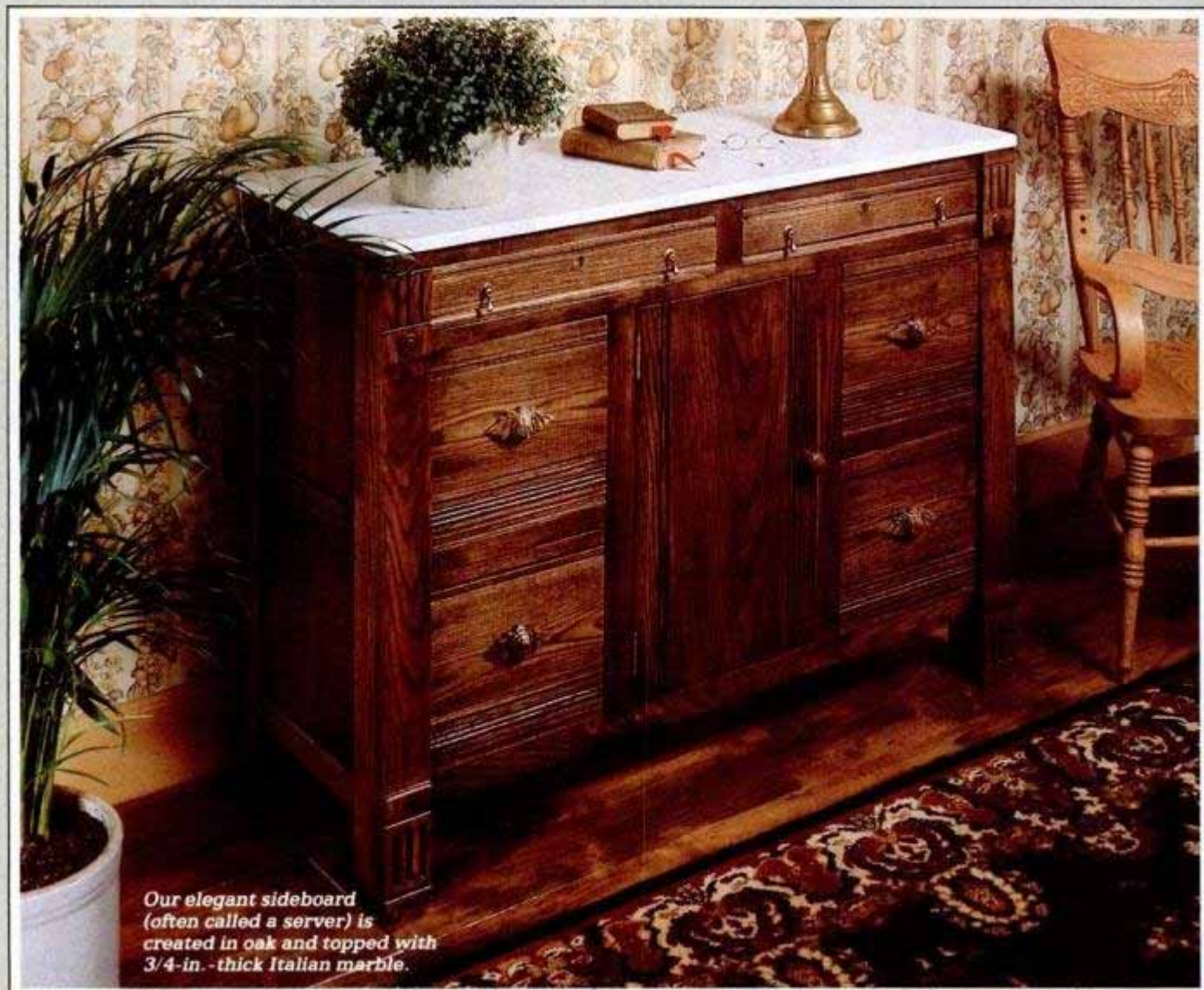
using solid oak for all exposed members. We economized by using 3/4-in. plywood for interior partitions, carcass floor, the back and drawers. Purists, if they prefer, can use oak throughout, but such construction will drive up the cost considerably.

Before you start building, locate the nearest source of marble and make a trip there to discuss the various types of marble and their costs.

We used a rich-looking, handsome Italian marble on the prototype; the 3/4-in.-thick slab—which was cut specially to fit the cabinet—cost \$150. The stone mason charged another \$40 to deliver the slab.

Once you know the marble you want, and its cost, you can start building your cabinet. *Do not* order the marble slab until you have finished building the cabinet. Once the carcass is assembled, you can measure the top and have the mason cut the slab to suit your piece exactly. Because of

Design, construction, photography: Harry Wicks
Wall covering: Apple Valley C5412, a strippable vinyl from Wall Tex Sampler Collection, Columbus Coated Fabrics, Div. Borden Chemical, Columbus, Ohio 43216



Our elegant sideboard (often called a server) is created in oak and topped with 3/4-in.-thick Italian marble.

the great chance of chipped corners, you do not want the marble to overhang the cabinet on any side. For the sake of appearance, neither do you want the marble set back from the edges.

Building the cabinet

Start by laminating the stock for the four legs. Rip the boards slightly overwidth and join them, using glue and clamps. While these are drying, you can lay out for and cut the rails for the end sections and front facing. Cut the parts slightly oversize at this stage and fit them neatly as you assemble each section.

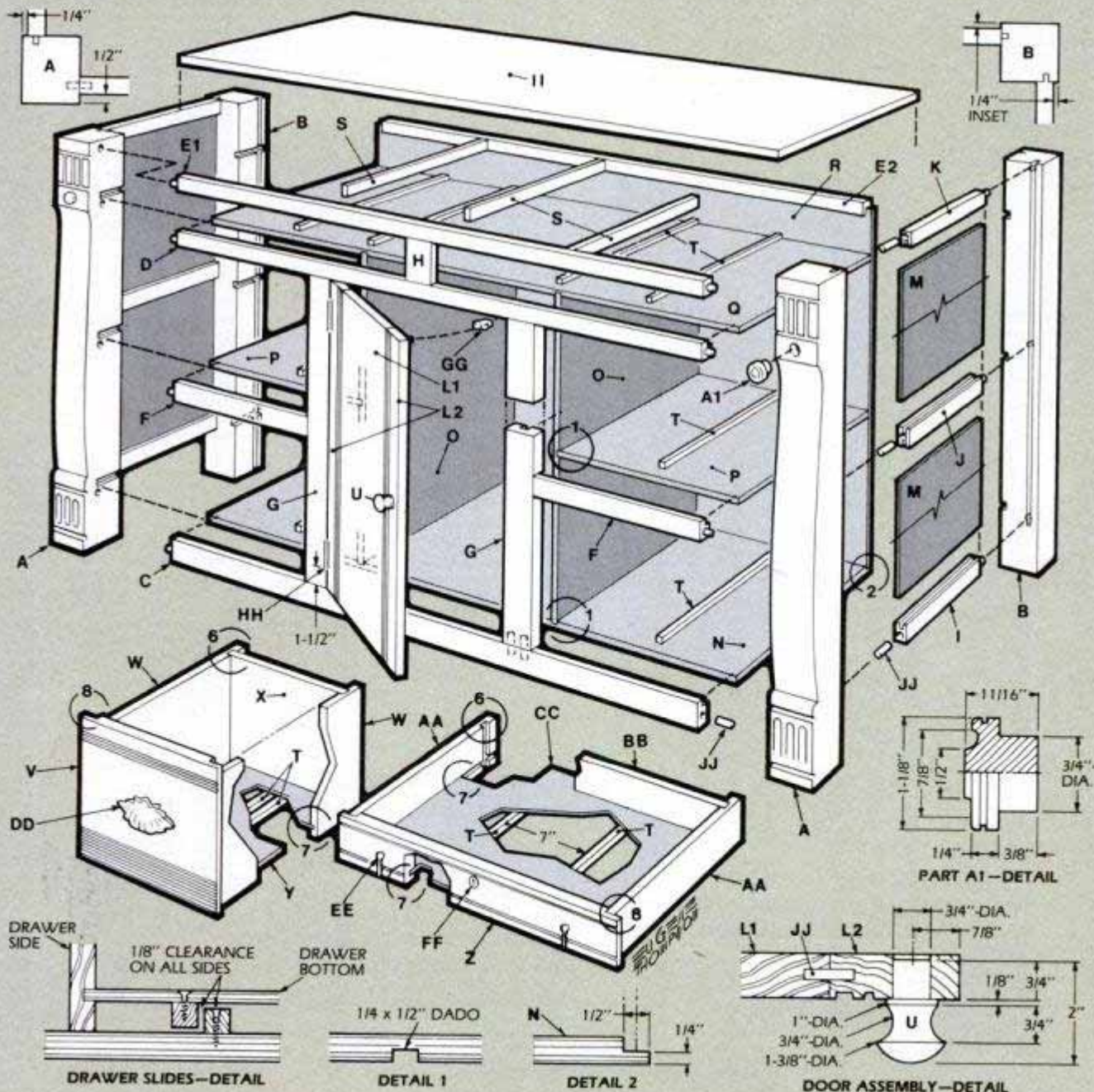
The next day, carefully



Chances are that you won't be able to buy 4x4 oak stock locally. Consequently, legs are made of glued-up 1-in. boards.

trim all four legs to the exact same size. Your best bet for avoiding a wobbly cabinet (caused by one leg being shorter than the others) is to first square one end on all four legs using the radial-arm saw. Then, set up a stop block and trim all the second ends, one after the other. For each leg, tightly butt the first-cut end against the stop and they will all be cut to identical length.

Using clamps and strips of wood, assemble a jig to hold the legs, one at a time, on your workbench. Using standard router procedures, set up the guides and stops for routing the vertical grooves at the top and bottom of each



leg. Do the stopped grooves using a core box bit.

The front faces of both front legs are shaped. To obtain the contour shown in the drawing, first make a pattern on $\frac{1}{4}$ -in. hardboard. When you're satisfied with the shape, transfer it to both front legs to serve as a guide for your shaping step.

Secure the first leg in your bench-top jig and start the shaping, using a sharp spoke shave, Surform rasp, block plane and belt sander. I found that using the 3 x 21-in. belt sander with 80-grit paper helped to speed up the task considerably. The shaping of the legs is the most time-consuming aspect of the entire project. So, settle in and accept the fact that you will be doing it for a spell.

Bore the holes at front to receive the decorative turned buttons. Turn the

buttons on your lathe, using oak from the same stock that is used for the carcass. The button tenons should be cut for a neat—not loose—fit in their mating holes. Apply glue sparingly and insert button tenons into holes; lay legs on their back sides and put a weight atop each button. Allow to dry overnight.

Next, make up the side (end) assemblies. Carefully lay out for the dados which will receive the drawer shelves. Notice that the latter do not butt tightly against the panels. Since the wells will be occupied by drawers, the shelves merely serve as a base for the drawers.

Assembling the cabinet

Assemble the cabinet as shown in the drawing. Dowels are used between rails and legs. And, since the piece will

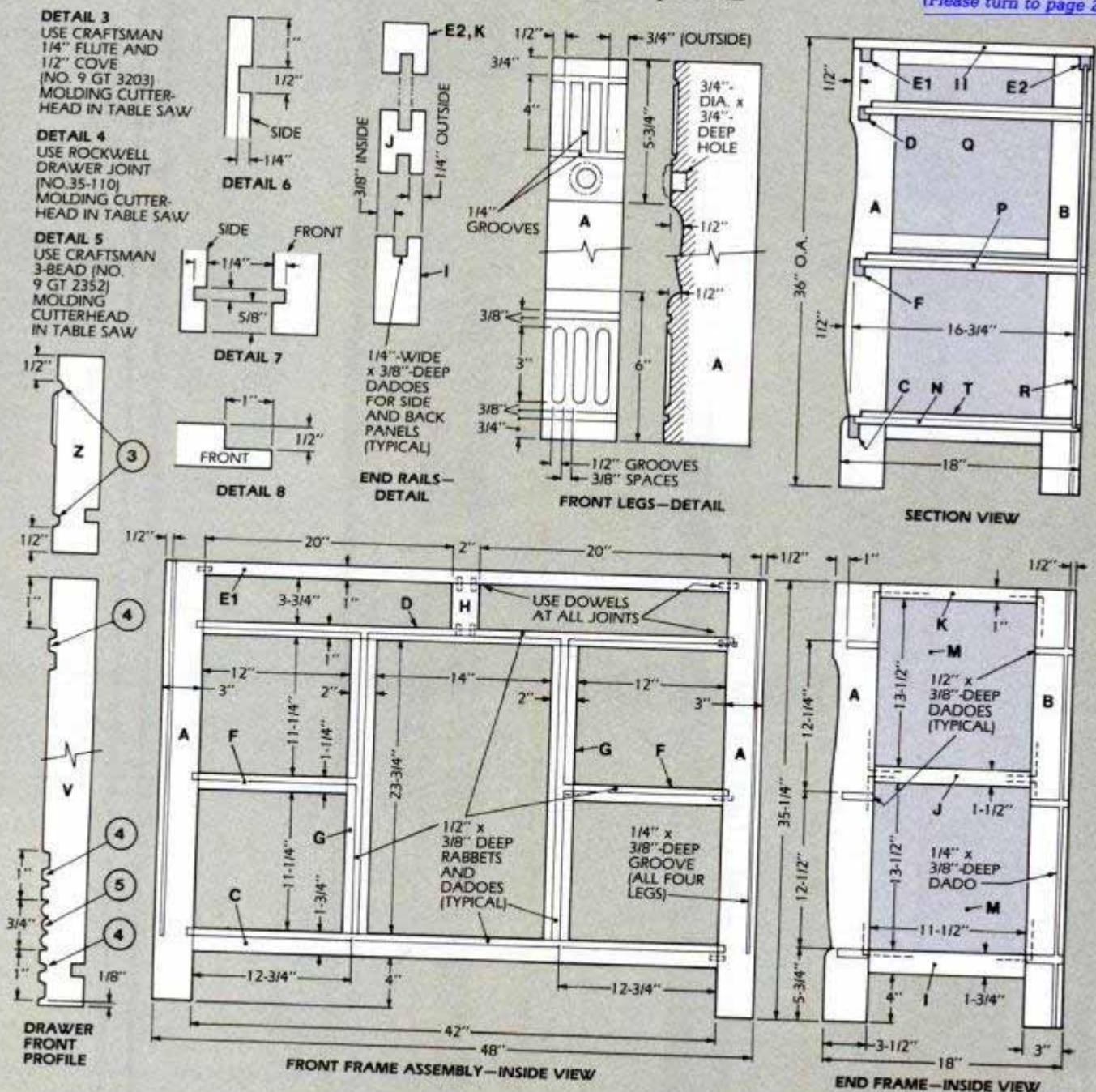
be topped by a marble slab, there is no need to install a top. However, do install the front-to-back pieces (S). These are needed to support the marble.

Once the cabinet is assembled, you can take measurements and build the drawers and door. Mark a number in an inconspicuous spot in each well and use the numbers on drawer backs to ensure that each is returned to its proper position in the cabinet.

All hardware on the cabinet is purchased. You can buy the hinges locally, but for authenticity, we found it was necessary to order the wooden and pendant pulls, knobs and key escutcheon plates from a couple of different sources. For your convenience, the suppliers are given in the materials list.

Do as the professionals do and get

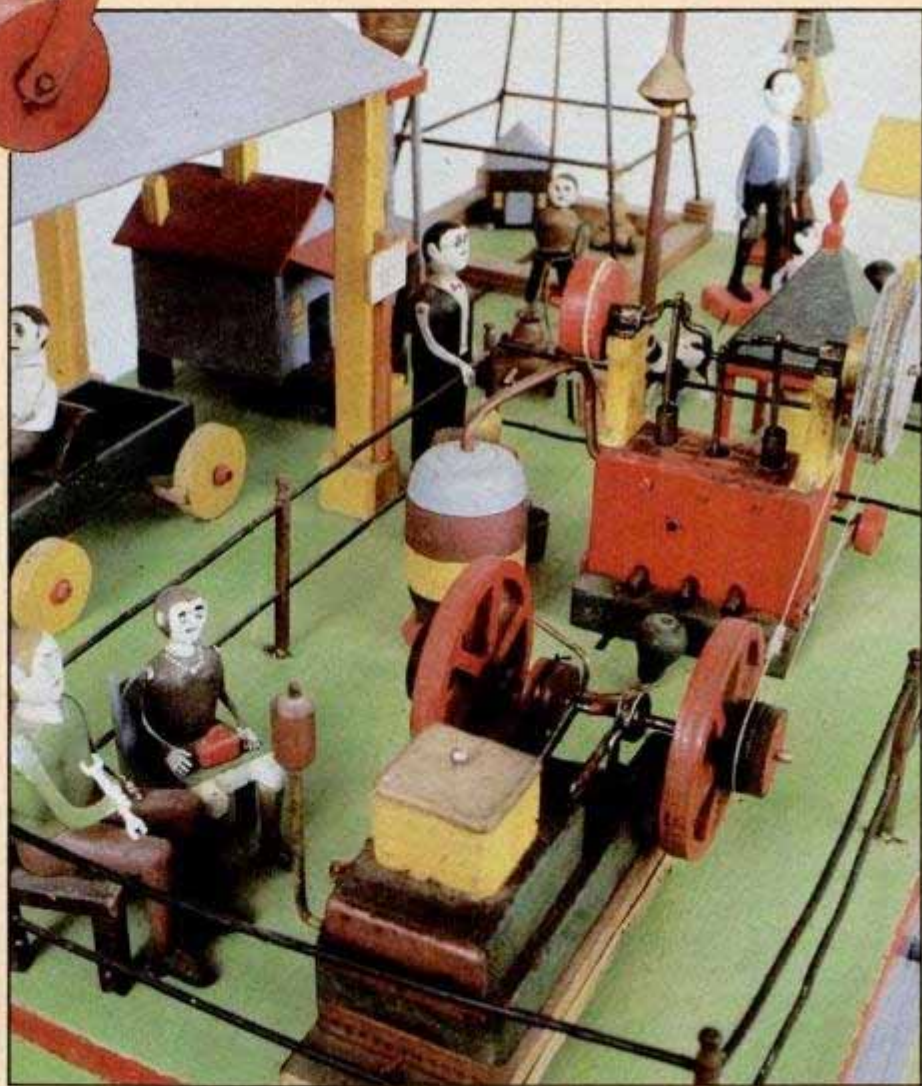
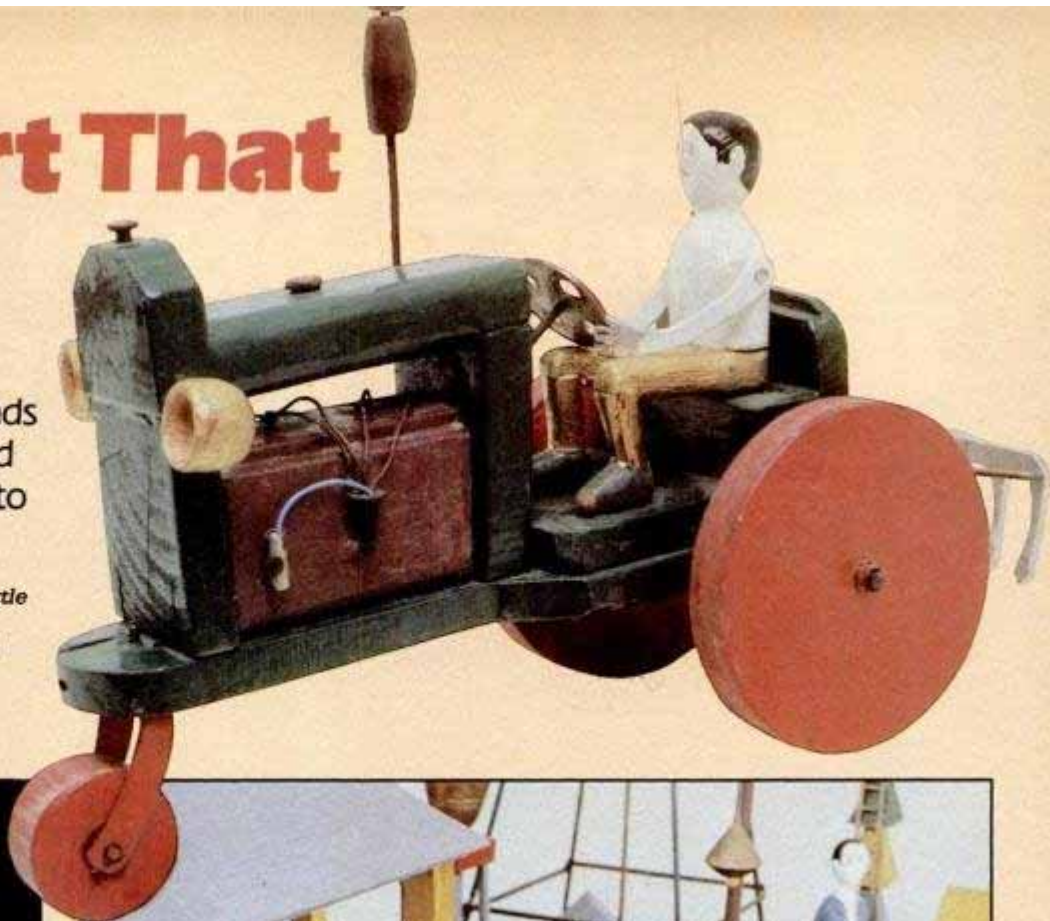
(Please turn to page 203)



Folk Art That Comes To Life

A native Georgian blends his woodcarving skill and his interest in machines to create this primitive art.

Below: Carlton Garrett works on "Little Yellow Car"; colored wheels spin in "Machinery"; "Hospital" is Garrett's first work. Right: "Diesel Tractor" is from a series of farm equipment; "Waterworks" depicts a rural scene.



In a small back-yard building within view of his kitchen window, Carlton Garrett works in wood to recreate scenes of his past.

This old-timer not only saws and carves wood, but draws on his knowledge of mechanics to animate his work in very clever ways so that things are

not as they seem. Garrett's pieces depict scenes of rural Georgia and folk heroes. The figures in his work are animated by a motorized system boxed in below. Hand-carved wooden gears, cams, shafts and pulleys connected by strong cord bring his carvings to life. Often music accompanies the action.

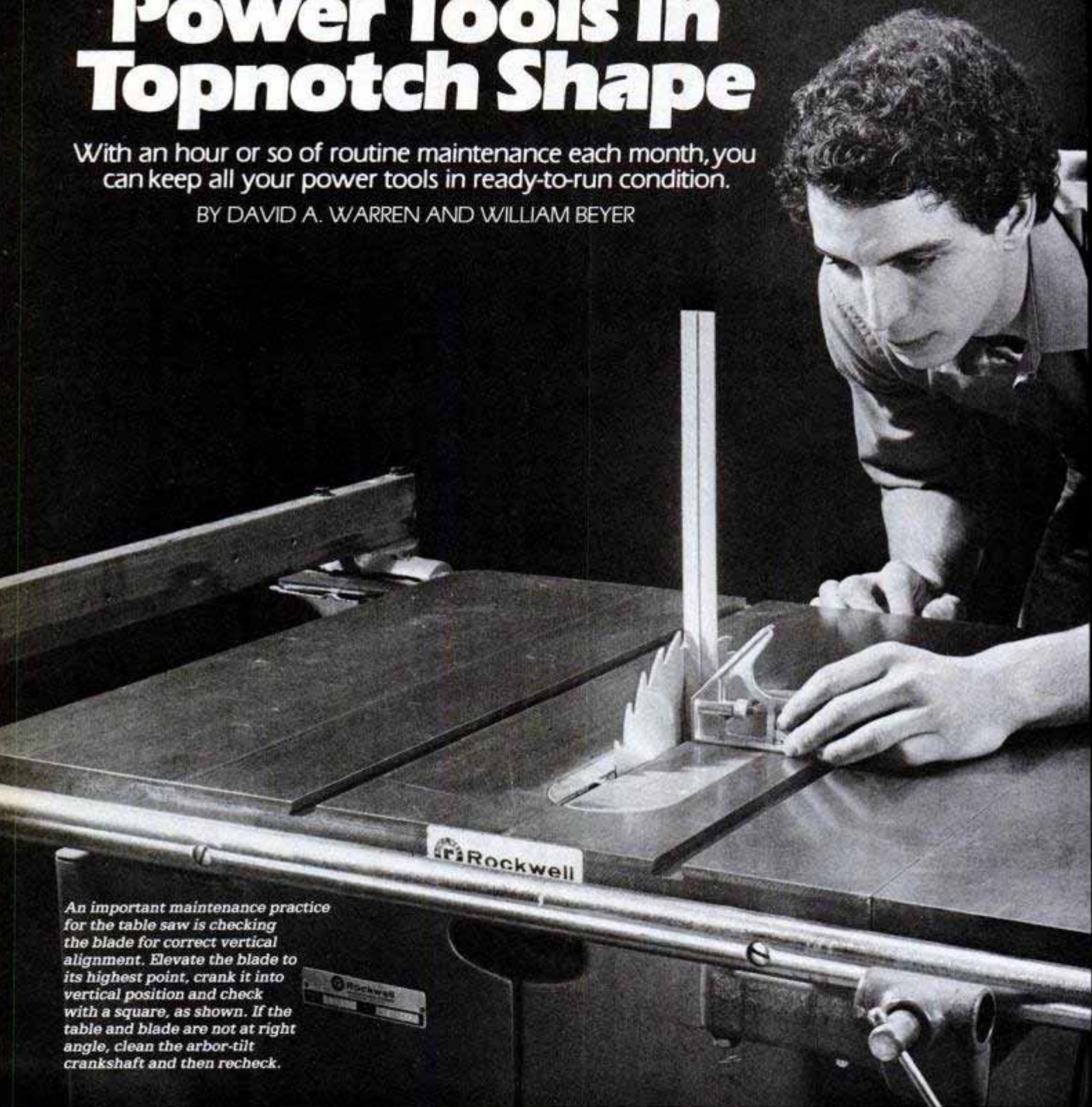
"It's a wonder I wasn't killed many times," says the 83-year-old Garrett, recalling his childhood. Dangerous though it must have been, Garrett had the good fortune to have been born and raised near a water mill. He was fascinated by all the cogs and flywheels

(Please turn to page 206)

How To Keep Power Tools In Topnotch Shape

With an hour or so of routine maintenance each month, you can keep all your power tools in ready-to-run condition.

BY DAVID A. WARREN AND WILLIAM BEYER



An important maintenance practice for the table saw is checking the blade for correct vertical alignment. Elevate the blade to its highest point, crank it into vertical position and check with a square, as shown. If the table and blade are not at right angle, clean the arbor-tilt crankshaft and then recheck.

To perform well, power tools must be maintained well. Following a routine maintenance program will prolong the useful life of your tools and help to ensure efficiency in your work.

The owner's manual for a given tool

is the most important maintenance guide, since it gives specific directions based on the design features of that tool. You should keep all of your owner's manuals on file in your shop.

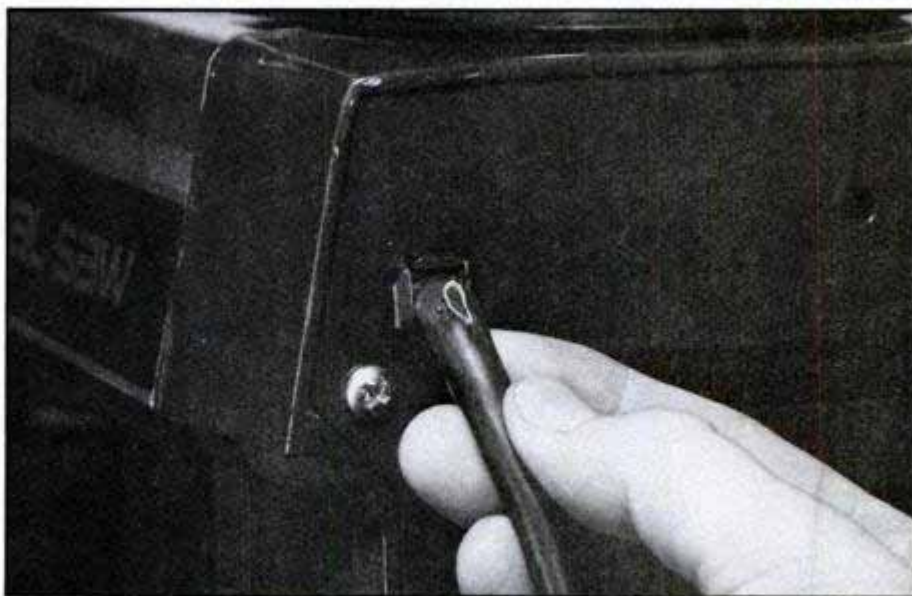
In our captioned photos, we have compiled a general guide to the peri-

odic inspection, routine cleaning and regular lubrication techniques critical to proper maintenance. We've also zeroed in on specific problems to look

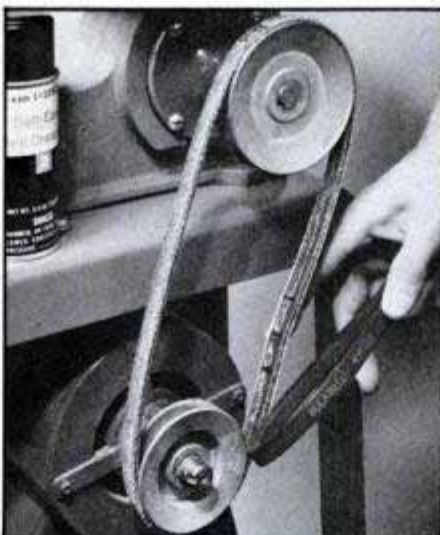
Lead photo: Rosario Capotosto
How-to photos: Matt Doherty

General Approach To Power Tool Maintenance

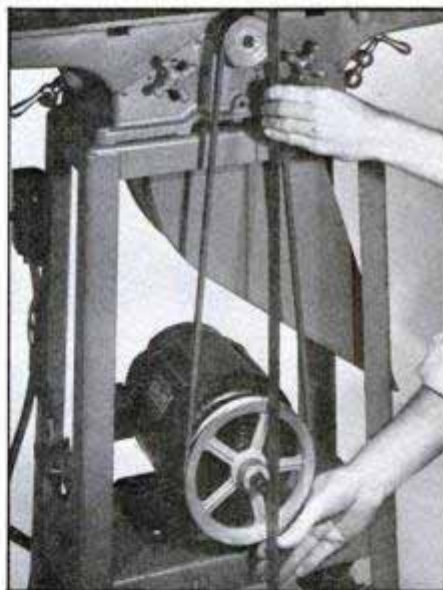
PERIODIC INSPECTIONS



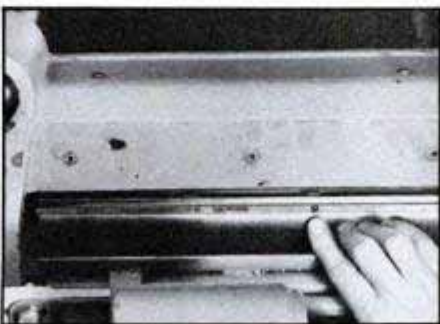
Inspect power cords for fraying, especially at stress points near the ends. Also check the condition of plugs. Replace all frayed wires and plugs that have loose prongs.



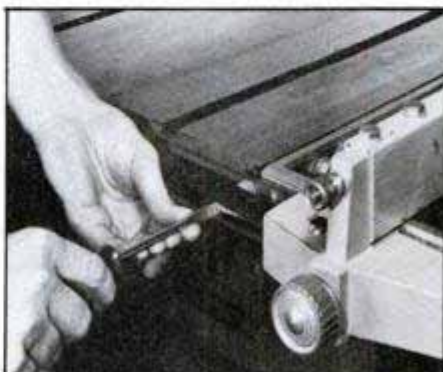
Check condition of V-belts and replace if badly worn. Premature wear and belt slippage are symptoms of incorrect belt tension. Adjust belts so they're just tight enough to turn without slipping.



Using a straightedge, check drive wheels for alignment. Misaligned wheels will cause belt damage and strain motor.



Examine cutting edges for nicks, flaws and dullness. Poorly maintained (dull) knives and blades overwork motors and lower work quality. This planer knife needs to be ground and resharpened.



Test and tighten all screws, nuts and bolts that may have loosened from vibration. Replace stripped fasteners.

for and correct with most of the common shop tools.

For safety, disconnect tools from the power source before making any adjustments. Clean up any lubricant spills immediately. Wear gloves for protection when cleaning sharp blades. **FM**

ROUTINE CLEANING



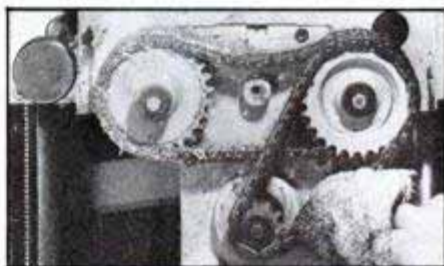
Clear dust from air intakes. The best way is to blow it out with compressed air. If you don't have a compressor, get an aerosol can (such as Dust-off) at a camera shop.



Brush or blow dust from tools' nooks and crannies. With tool vibration, dust acts abrasively, causing undue wear.

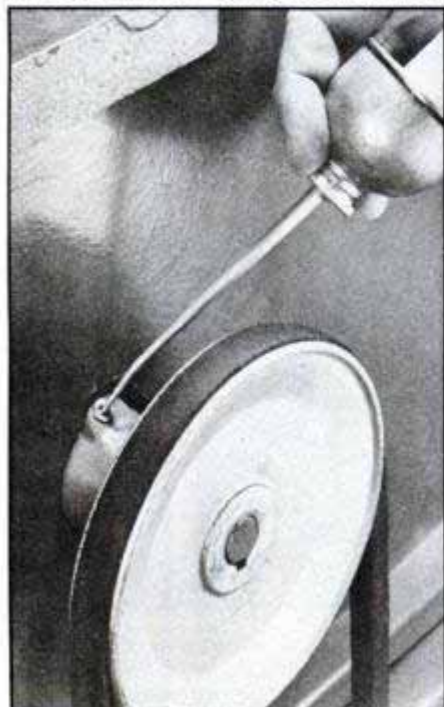


Clean pitch and burn residue from blades with mineral spirits. Wear gloves to clean sharp edges like this jointer knife.

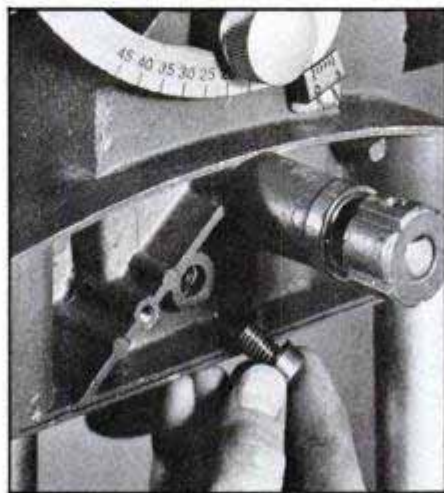


Clean chain drives with a solvent such as trichloroethylene, then lubricate the chain with WD-40 or light oil.

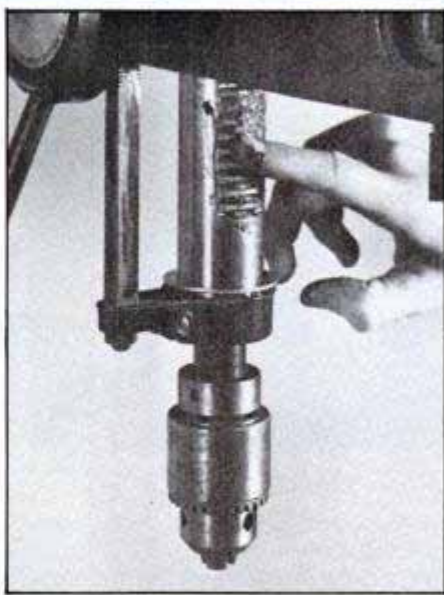
REGULAR LUBRICATION



Squirt a few drops of light machine oil into oiling holes (left) to lubricate bearings that are sealed against dust.



Many older tools have oil reservoirs that should be checked every five operating hours and topped off. Drain oil every 100 hours and refill with clean oil.



Gears, such as the rack gear on this drill press quill, should be cleaned with solvent. Then, the gears should be coated thinly with axle grease.



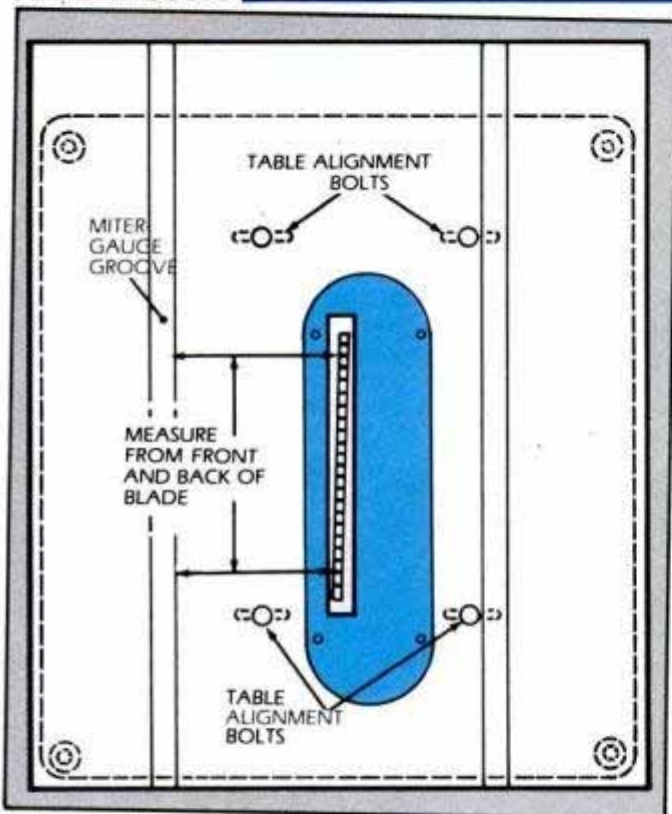
Rub a thin coat of light machine oil over metal surfaces to fill pores and prevent rust. If you find patches of rust, rub them clean with fine steel wool before oiling.



Lubricate surfaces such as this table saw top and fence that come in contact with work with WD-40. Don't use oil; it stains wood. Dirt can become impacted in a wax coating.

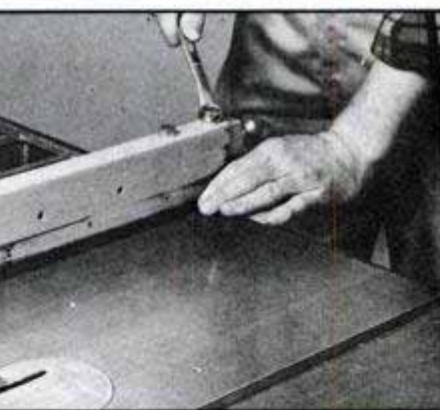
Specific Maintenance Checks For Common Shop Tools

TABLE SAW



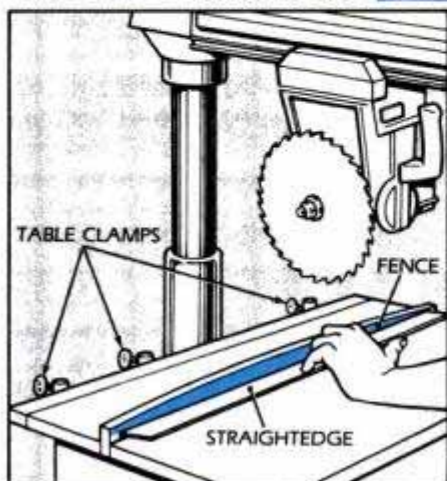
Check table-blade alignment as shown above. If adjustment is needed, look for alignment bolts on the underside of table.

Check miter gauge (right) by using a square to find the relation of the back-stop to the miter gauge slot. When they're at 90°, reset the pointer on the miter scale to 0.

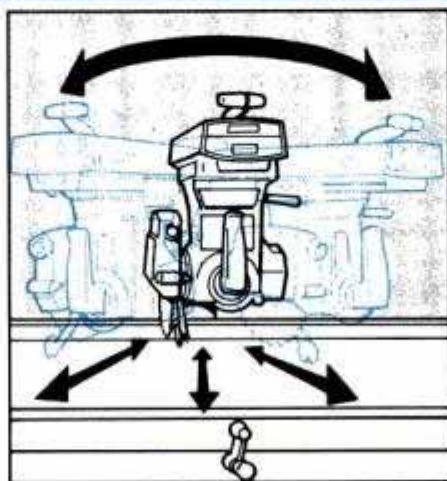


Set fence parallel to miter gauge groove (above) using bolts atop fence. Reset rip guide pointer (inset) for accuracy.

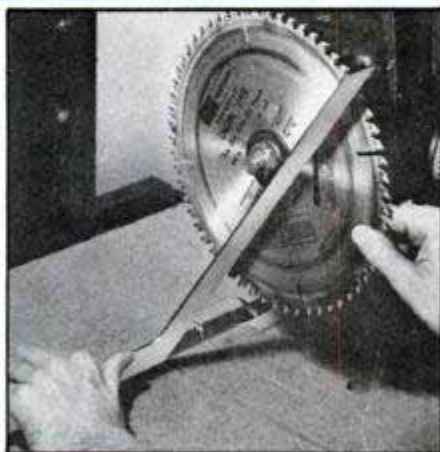
RADIAL ARM SAW



Check fence for straightness and replace if necessary. On some models, clamps can be tightened to straighten bowing.



Set arm at various angles, move motor carriage along track. If blade doesn't touch table at all points, level table.



Use square to check for "toe-in"—blade not parallel to line of cut. Correct with adjustments to carriage rollers.

(Please turn to page 196)

WORKSHOP MINICOURSE



More about dowels

Last month I discussed some of the basics of working with dowels. As I thought about this month's column, I realized that the entire doweling process is actually composed of a great number of "basic" steps. In other words, it's difficult, if not impossible, to define where the basics stop—and sophisticated joinery starts.

The simplest method of all for locating centers, for dowel holes on a mating board, is to use dowel centers (not shown). These little hat-like configurations are machined in the diameters to suit the most popularly used dowel sizes. To use them, you spot the dowel holes in the first board using ruler and pencil, and bore the holes. Then, you insert the dowel centers in the just-bored holes (with their nail-like points projecting out), align the mating board and press the two together. The pointy centers transfer the hole locations rather accurately so the dowel holes can be bored in the second board.

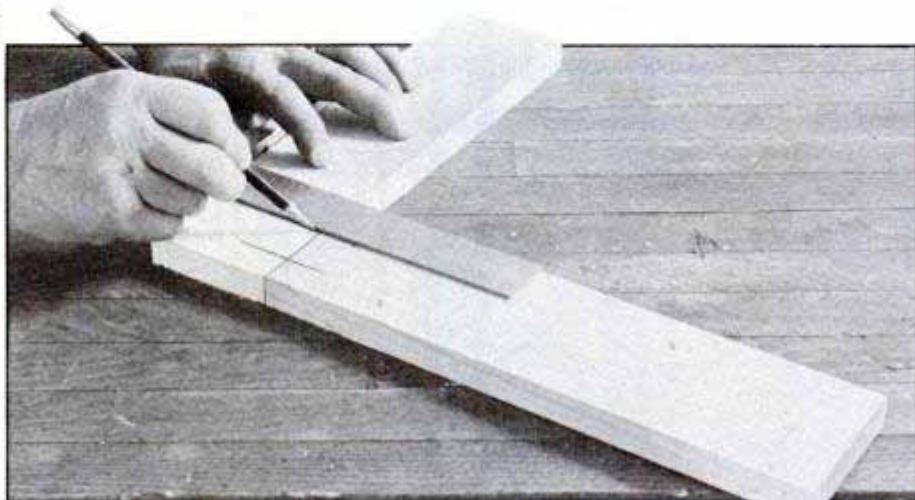
However, if you plan to do any serious furniture building, treat yourself to a reliable doweling jig. There are several types available, and many are first rate. Though I have used four different types of doweling jigs over the years, my "old reliable" is the jig shown. It's manufactured by General Hardware Mfg. Co., 80 White St., New York, N.Y., 10013. It is available at all well-stocked hardware stores and lumberyards. And, good instructions for using it are packaged with the tool.

When you work with a jig, you must first scribe match lines across the board face, as shown in the top photo at right. Make certain you always line up the jig from the same side of both boards; that way, if your guide (drum) is slightly off—that is, not centered exactly on the workpiece edge—the difference will be the same for both boards and they will still join without any problems.

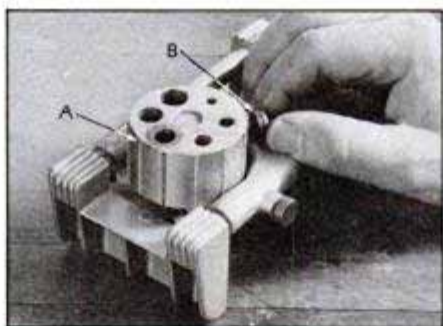
Several important points:

- Never use too much glue—always work with a scant amount.

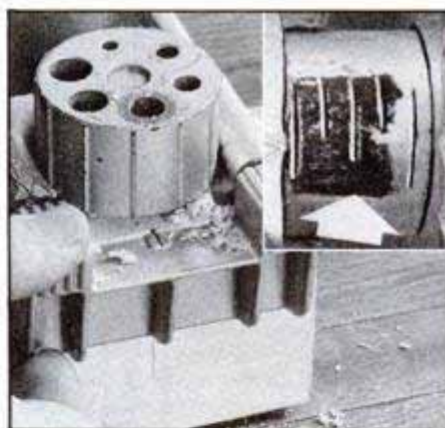
- Keep glue away from board edges. This practice, coupled with the right amount of glue, ensures well-joined boards with little or no glue squeeze-out.



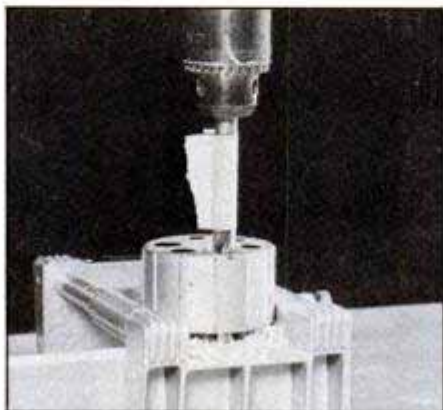
1 Boards to be joined with dowels are aligned, then marked carefully using a square and sharp pencil across the joint. On hardwoods use an awl for this marking step.



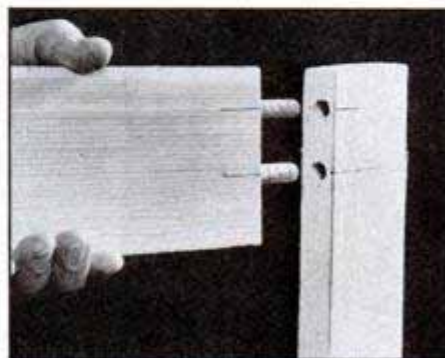
2 This is author's favorite doweling jig. First step is to rotate head or drill guide (A) so correct size bit can be used. Here, because $\frac{3}{4}$ -in. stock will be joined with $\frac{3}{8}$ -in. dowels, we use a $\frac{3}{8}$ -in.-dia. bit. When $\frac{3}{8}$ -in. guide hole is aligned, secure drum by tightening nut (B).



3 Next, drum is moved to position $\frac{3}{8}$ -in.-dia. hole at center of $\frac{3}{4}$ -in. stock. Increments are in $\frac{1}{16}$ in. (arrow).



4 Use either a brad or spur-point bit to do the boring. Affix a masking tape flag on bit to ensure correct depth.

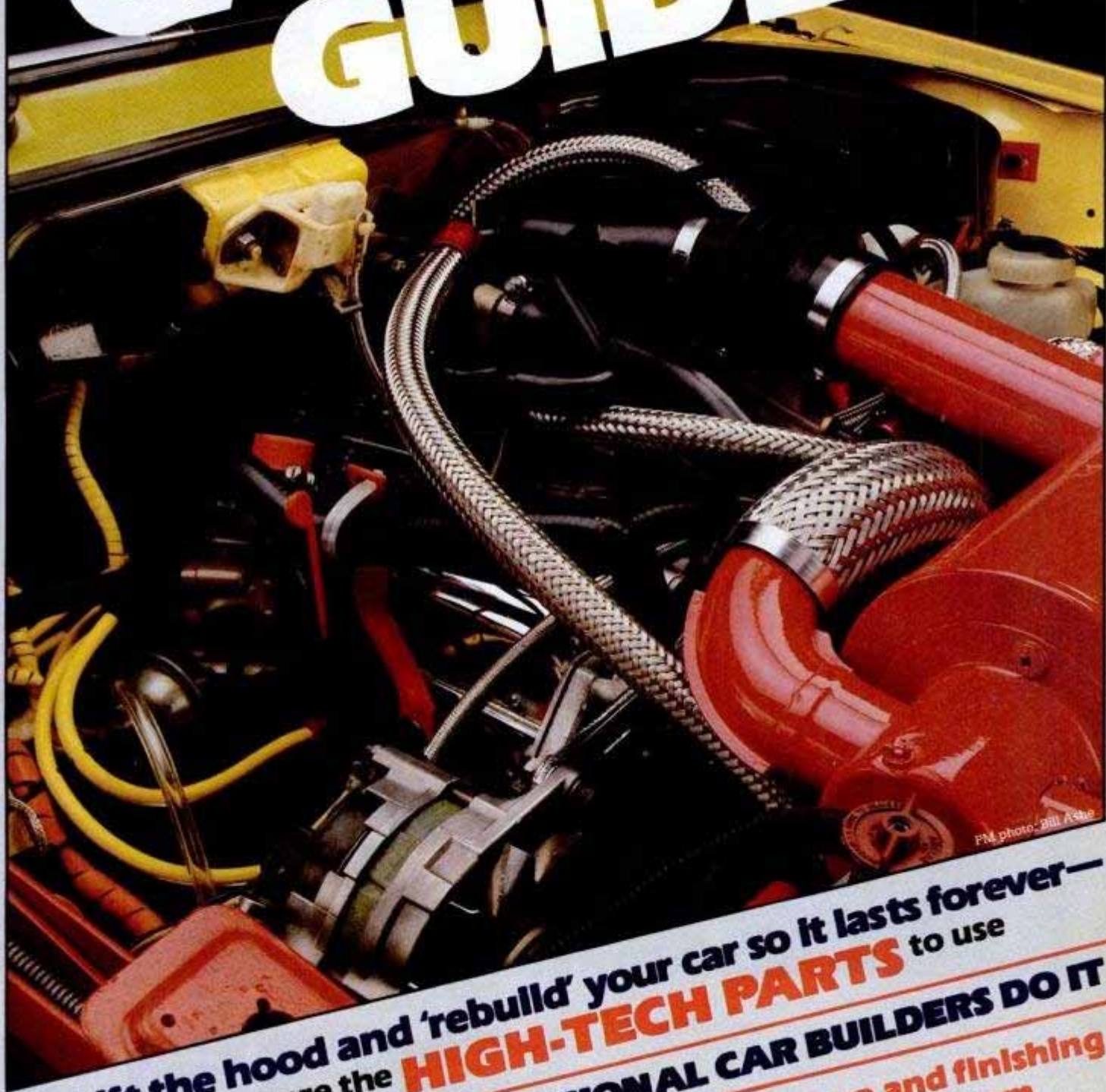


5 Repeat hole-drilling procedure on mating piece. Then test parts for fit without glue. For final assembly, join parts with scant amount of glue on dowels. Clamp assembly overnight.

Popular
Mechanics

'83

CAR CARE GUIDE

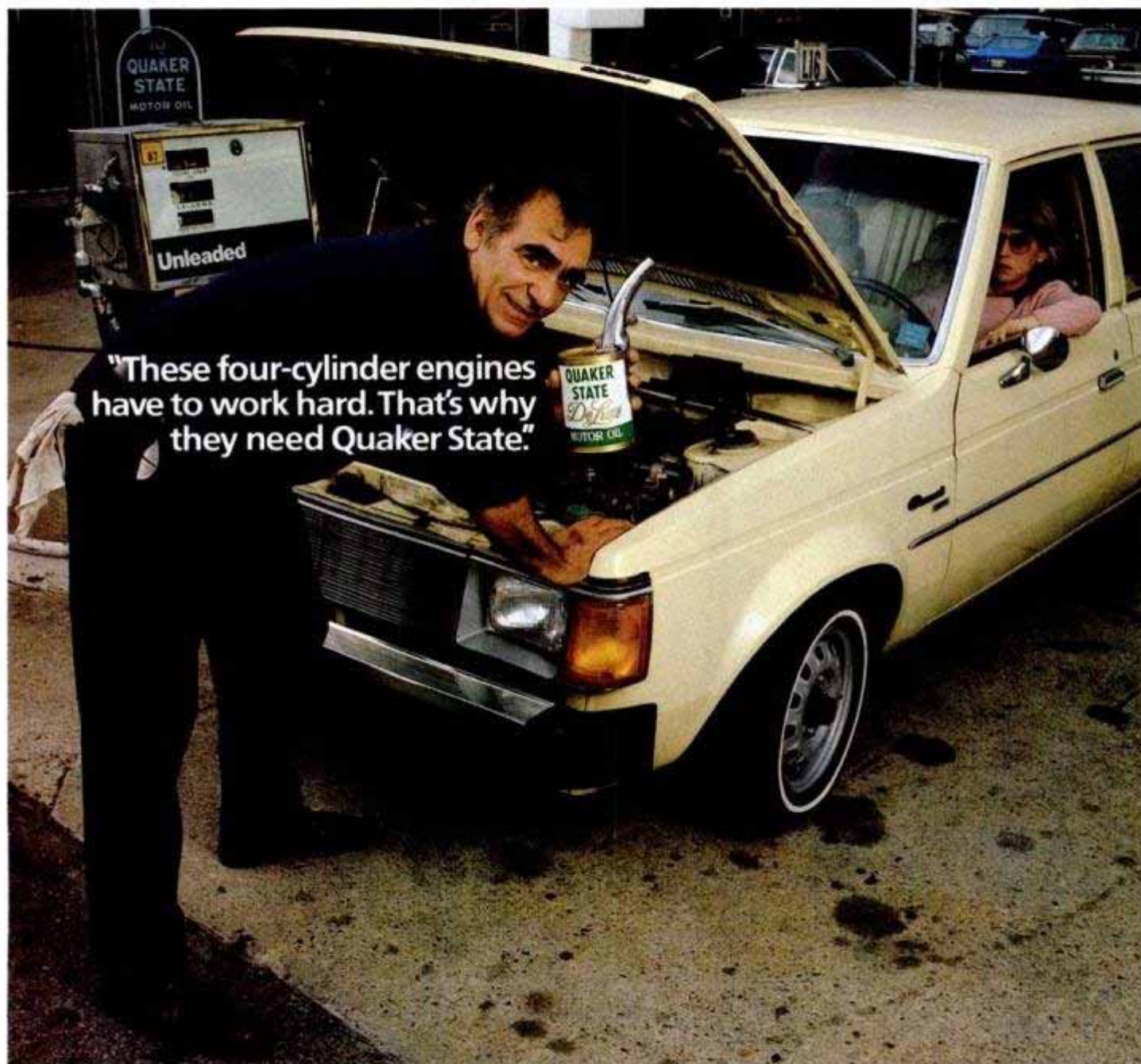


PM photo: Bill Aker

Lift the hood and 'rebuild' your car so it lasts forever—
Here are the **HIGH-TECH PARTS** to use

HOW THE PROFESSIONAL CAR BUILDERS DO IT
Plus: Rust-fighting, fix-up and finishing
tips to keep your car from
growing old

"Today, you need an oil this good."



"These four-cylinder engines have to work hard. That's why they need Quaker State."

Small engines deliver good gas mileage. But to give you the kind of performance you want, they have to work extra hard. They need Quaker State quality. These Quaker State motor oils are made exclusively from Pennsylvania Grade Crude Oil. They offer quality protection for any kind of car—old or new, big or small. Quaker State. It's so good, it's America's best selling motor oil.

Quaker State



CAR CARE GUIDE



Cover: Immaculate redo of engine box in LeCar.



CONTENTS

HOW THE PROS REBUILD A CAR



HIGH-TECH PARTS

The Secret To Keeping Your Car Running Forever

BODY

- How to stop rust before it starts
- How to fix a rusted trunk
- How to repair a rusted battery tray
- Restoring rusted headlight buckets
- How to fix a rust hole
- How to replace a rusted body panel
- How to install an antichip strip
- Waterproofing turn signals and brake lights
- Rustproofing accessory brackets
- How to soundproof your car

ELECTRICAL

- How to solder-splice and use heat-shrink tubing
- Protecting a wiper motor
- How to install silicone sparkplug wires
- Protecting your coil, distributor and wiring harness

Troubleshooting headlight wiring

How to install a rubber antenna

ENGINE

- How to install stainless-steel braided hose
- How to install an oil cooler
- How to install a gauge panel
- Replacing vacuum hoses

SUSPENSION AND BRAKES

- Retrofitting tires and wheels
- Installing silicone brake fluid

INTERIOR

- How to seal weatherstripping
- How to install sun shades

EXHAUST

- How to install a free-flow exhaust system
- Replacing sheet-metal screws

Sources and Suppliers
New Car Care Products

MAKES THINGS WORK BETTER!

BELT-EASE® BELT DRESSING

Long lasting, crystal clear, clean belt dressing gives extra traction and life to automotive V-belts and all drive belts on appliances, blowers, snowmobiles, and power equipment. 5.5-oz. aerosol.



LOCK-EASE® GRAPHITED LOCK FLUID

Keeps all locks working smoothly year 'round. Seals out moisture, protects against freezing and rust. Frees frozen and stuck locks. 3.5-oz. aerosol with snorkel; 3.4 oz. can.



LITH-EASE® WHITE LITHIUM GREASE

An all weather grease for auto, farm, marine and shop use. Preferred because of its superior film strength plus water and heat resistance. LITH-EASE provides excellent lubrication and rust protection. 16-oz. aerosol; 1-lb. tub; 1¼-oz. tube.



Available wherever fine automotive and hardware products are sold.



American Grease Stick Co.
Muskegon, Michigan 49443

Car Care Guide produced by PM Auto Dept. Guide designed by Don Mannes. PM Photos: Peter Tenzer. Car Care Guide Cover Photo: Bill Ashe. Illustrations: Jeff Mangiat.

How The Pros Rebuild A Car

Most of them are racing mechanics, some are racing drivers; almost all are graduate engineers or designers. Their shops tend to be large, lined with expensive machine tools and brightly lighted. A couple of assistants clad in immaculate overalls confer quietly over a brand-new car with its guts exposed, while two or three more exotics wait to be similarly disassembled. The phones ring incessantly with calls from suppliers and customers.

This is the seductive world of the Supertuners, men who can take almost any mass-produced car and—for a

price—turn it into something special. Typically, they specialize in one brand of car—Porsche, BMW, Ferrari at the pricey end, Camaro, Volkswagen, Datsun at more affordable levels. What they do is “narrow its focus”: improve the handling, the acceleration, the comfort, the appearance, the reliability.

These Supertuners are emphatically *not* building “race cars for the street.” Racing can teach you about performance and aerodynamics and durability, but a balanced, real-world passenger car is a much more difficult package to develop. In the end, what separates a

Supertuner from a racer is that he can make a production car more exciting to own, without destroying its usefulness as transportation.

Probably the best Supertuner in the world is a soft-spoken marketing genius named Rainer Buchmann. Buchmann is a far-sighted internationalist, given to throw-away lines like “I don’t hire anybody who’s not fluent in at least three languages.” His B+B Auto Exklusiv is located in Frankfurt, West Germany, but his well-heeled clientele spreads all over the world.

Buchmann’s conversation is sprin-



TURBO CAMARO
Bill Mitchell



This Camaro reworked by Bill Mitchell has a turbocharged 350-cu.-in. V8 (inset) totally new suspension, Minilite magnesium wheels and aerodynamic body work based on Penske/IROC cars. Rainer Buchmann, who heads B+B, carved this Porsche 928 into a convertible. The \$100,000 rebuild has a beefed-up chassis, Recaro interior and state-of-the-art, onboard computer system.



PORSCHE 928
B + B Auto Exklusiv



kled with thoughts about "lifestyle" and "total design for living," and in eight years he's progressed from a two-man shop behind a Frankfurt filling station to a 40-man industrial complex working on some 400 cars per year. He's even talking about a second shop, to be located in Newport Beach, Calif.

B+B's products range from a one-off complete car—the Cw 311—to a matching perfume/cigaret lighter/electronic ignition key set distributed by Pierre Cardin. He's developing his own variable-displacement engine—a first step to building a limited-production B+B car—and doing design work for Volkswagen and other European automakers.

But the heart of B+B is Porsche conversions for private customers. Most popular is a 928 Convertible, which adds 80,000 DM (about \$40,000) to an already exalted price. As with all of Buchmann's cars, the attention to detail



POLO CARAT
B + B Auto Exklusiv



TURBO CORVETTE
Duntov

**PORSCHE 930
KREMER
ACI**



Kremer's Group 5-S conversion is a Porsche 911SC with blueprinted engine, racing suspension and fiberglass body work. B+B's Polo Carat (top) was built for Volkswagen. It includes fiberglass bodywork, digital instrumentation and remote-control burglar alarm and ignition switch. Duntov's turbo Corvette has been turned into a convertible, given new fiberglass bodywork and a new interior with digital instrumentation.

Holley

BRAND Economaster NO PREVIOUS OWNERS



When you bolt on an *Economaster*[®] brand carburetor from Holley,[®] you bolt on the best value for your dollar. New carburetor efficiency and proven reliability. And that's something you can't always say about a "hope-for-the-best" rebuilt.

An *Economaster* carburetor costs much less than many original equipment replacement carburetors, too. Yet it delivers improved performance and driveability in

spades. Many models can also restore your original fuel economy — sometimes even surpass it!*

And *Economaster* carbs are designed for easy installation.

Remember: *Economaster* carbs have had no previous owners — and that means no little performance surprises. Not a bad reason for you to always specify a fresh-from-the-factory *Economaster* carburetor for your engine. Holley Replacement Parts Division, 11955 E. Nine Mile Road, Warren, Michigan 48090.

* Actual fuel economy may vary due to application, engine and driving conditions, engine modifiers and driving habits.
* Registered Trademark

**Holley
Makes Fuel Efficient**

Holley
Replacement Parts Division

Colt Industries



CAR CARE GUIDE '83

is uncanny. The Porsche's chassis is completely reworked to handle the trauma of having the coupe top cut off. The body is brought up to B+B, rather than Porsche, standards before being repainted. Recaro upholsters seats in B+B's own cloth and a resident electronics expert fits each interior with a dazzling array of micro-chip gear.

For \$100,000, Rainer Buchmann is really selling *style*, not convertible Porsches. His ultimate goal, he confides, is to provide his select customers with not only a car, but clothing, furniture, consumer electronics and hous-



LAMBORGHINI COUNTACH *ACI*
Lamborghini Countach is federalized and bespoiled by ACI. It's powered by a fuel-injected, 12-cylinder engine.

ing—a total environment—all designed by Rainer Buchmann and built to his impeccable standards. His associations with Pierre Cardin, Lanvin and Paris Vogue are just a beginning.

At the other end of the marketplace is Bill Mitchell of Special Vehicle Developments in Cheshire, Conn. When we first met Mitchell in 1978, he was fixing up Firebirds in his basement garage. Nowadays, this former GM suspension engineer and racing driver has a spacious shop where he and his assistants turn out 100 cars a year for a largely word-of-mouth clientele.

Not surprisingly, Mitchell concentrates on GM suspension work. He changes the geometry for crisper road feel and straighter tracking, fits special-valved Koni shocks built to his own



PORSCHE TARGA
B+B Auto Exklusiv

B+B literally guts the 928 and rebuilds the car from scratch to create one of these conversions.

specifications and ultralight tires and wheels to minimize unsprung weight. And it works. A Mitchellized Z-28 or Trans Am feels as solid as a Mercedes; his GM X-cars will run rings around a BMW 320i.

Mitchell also specializes in turbocharging the Chevrolet small-block V8, in either gasoline or diesel form. And despite their Racemark interiors, fancy sound systems and ground-scraping air dams, his cars have an understated competence about them, very different from the flashy, expensive look favored by Rainer Buchmann.

Bill Mitchell is also surprisingly reasonable. Compared to a \$100,000 B+B Porsche, his \$15,000 turbocharged Camaro is a bargain—especially since it delivers surprisingly similar performance, with enviable reliability and genuine style.

One of our favorite Supertuners fits somewhere between the beautiful people of B+B and the straightforward performers of Bill Mitchell. He's Brian Morrow of San Jose, Calif., who builds Scarabs. What's a Scarab? Well, Morrow takes a brand-new Datsun 280 ZX, and disassembles it. He beefs up the

chassis, then puts in a completely new suspension system, bigger disc brakes and a turbocharged Chevrolet V8.

To cover wider tires, Morrow flares the fenders; to allow room for the V8, he scoops the hood; to blend it all together, he applies his own special paint job. The final touch is a whole new interior, more in keeping with what has become a very fast, quite expensive piece of machinery.

Depending on how elaborately you get carried away, a Scarab will set you back \$10,000 to \$15,000—above the price of a new Datsun, of course. On the other hand, this 425-hp coupe will run away and hide from Corvettes, Porsches and the like, and has proven to be remarkably durable. Morrow has built hundreds of these cars over the past decade, and he has the whole thing down to a science.

There are a couple of dozen American Supertuners, all told, each with his own specialty. Reeves Calloway is a demon with VW Rabbits, especially those with turbochargers. Bob Sharp is the acknowledged Datsun expert, Dick Guldstrand knows more about high-performance Corvettes than any man

DATSUN 280Z *Scarab*

Re-powered by a Chevy small-block V8, Datsun 280Z performs awesomely after Scarab gets through with it.



Remember Traditional Maintenance

There's a lot of glamour in professional car building, but even the pros don't forget the routine work. And high-technology retrofit parts notwithstanding, the traditional maintenance procedures are still an important part of any durability and reliability program.

The maintenance schedule below is our advice on how to keep your car on the road and out of the shop. Like the *Car Care Guide* that follows it's a little bit of overkill, but according to the many readers who have put anywhere from 165,000 to 200,000 miles on their particular car, it's a schedule that works. We've based this schedule on their experience.

You'll notice that this schedule is broken down by time rather than mileage, and doesn't give specific oil change intervals. That's because the mileage you put on your car in a year won't be the same as your neighbor's. The guideline you follow should still be the hallowed 3,000-mile interval. Yes, we know all about the new cars and their extended oil change and filter change interval, but if you read the fine print it still comes down to 3,000 miles. In most cases where a 7,500-mile oil change is recommended, the fine print includes "except in dusty driving conditions, frequent short trips, stop and go city driving, driving in heavy traffic in extremely cold or extremely warm temperatures, etc."

When you get through reading the exceptions, you'll realize that the only people who can take advantage of the 7,500-mile oil change are those few lucky individuals who pull out of their driveway in the morning, cruise at 55 mph on a traffic-free highway for an hour at a 69° F. ambient temperature. The point is, you'll never go wrong by sticking to 3,000-mile oil and filter change. Yes, the filter, too.

In the schedule you'll also notice we mention waxing a car only twice a year. That's the minimum. Washing a car is another matter entirely. Wash it as often as you can. Mild detergent and water, lots of it, can only do your car good. Depending on where you live, you might have to take extra precautions. Some parts of the country (Michigan Cancer, Monterey Road Rot) are notorious for their appetite for sheet metal. Our first section in the Guide deals specifically with how to rustproof your car.

A vehicle log book can be as elaborate or as simple as you like. We've met owners who keep a log the size of a phone book complete with their annual chassis dyno charts and distributor curve plots. You needn't be that detailed. A small notebook with a record of service performed and oil change history should be enough.

PM's MAINTENANCE SCHEDULE

Weekly—½ hour

- Check oil level.
- Check transmission fluid level.
- Check coolant level.
- Check brake fluid level.
- Check windshield wiper fluid level.
- Check hoses and belts.
- Check battery electrolyte level (in unsealed batteries; check eye color in sealed batteries).
- Check tire pressure, tread condition.

Monthly—2 hours

- Make all weekly checks plus:
- Lubricate all hinges, seat runners and so on.
- Lubricate carburetor linkage.
- Make coolant hydrometer test.
- Make battery specific gravity test.
- Lube ball joints (if applicable).
- Check sparkplug condition and gap.
- Check distributor cap and rotor.
- Check fuel filter.
- Check air filter and housing.
- Check air cleaner thermostat.
- Check vacuum hoses for cracks.
- Check weatherstripping, trim and moldings.
- Vacuum and shampoo carpets.
- Treat vinyl or leather.

Twice a year—5 hours

- Reverse flush cooling system.
- Pressure-test cooling system and radiator cap.
- Grease wheel bearings.
- Check brake pads for wear.
- Bleed the brakes.
- Change automatic transmission fluid.
- Make a compression test.
- Check engine timing and adjust if necessary.
- Remove, clean and load-test the battery.
- Test sparkplug wires for resistance.
- Inspect suspension bushings.
- Bounce-test shock absorbers (struts).
- Rotate tires (if applicable).
- Have wheel alignment checked.
- Check clutch, brake and accelerator pedals for free play.
- Inspect exhaust system for rust, loose hangers. Check condition of undercoat.
- Degrease or steam clean engine compartment.
- Wash and wax the body.

If you total up the time we estimate for these procedures, it comes to 60 hours a year. That sounds like a lot. But if you break it down into a half hour per week and two hours per month, it's a manageable number. You'll find also, that once the weekly and monthly checks become routine, you'll be able to breeze through them. The more familiar you are with your car, the easier it will be to spot possible problems.

alive, Richard Gordon is the Volvo man, partners Allen Hardy and Hans Beck are the source of quick BMWs.

Interestingly, all the successful Supertuners follow pretty much the same formula, no matter which passenger car they're improving. The suspension and brakes inevitably need beefing up. Tires get wider and stickier, an air dam grows beneath the front bumper. The interior sprouts Recaro seats, a leather-wrapped steering wheel, an expensive sound system and a sophisticated on-board computer. The turbocharger is their favorite way of adding horsepower, which usually means a thorough reworking of everything between the radiator and the gearbox.

There's a common thread running through here. Every Supertuner uses the best components he can find—BBS wheels, Recaro seats, Koni shocks, Aeroquip stainless-steel hoses—and if he can't find what he needs, he'll make it from scratch. They all seem to start with the chassis and fine-tune that before they dump in 500 hp. And they're on top of the newest technology in aerodynamics, electronics and radial tires.

If there's a path to Supertunerdom, it's paved with details.

These pros rebuild cars to earn a living. The rebuild you do on your own car—detailed in the pages that follow—will enable you to take more pride in your set of wheels and help you get many more years of service from it. **PM**

WELL-KNOWN SUPERTUNERS

- American Custom, 5035 Alexis Rd., Sylvania, Ohio 43560
- Amerispec, 86 Mill Plain Rd., Danbury, Conn. 06810
- B + B Auto Exklusiv, Orberstrasse 6, 6000, Frankfurt-am-Main 61, West Germany
- Bob Sharp Datsun, Route 7, Georgetown, Conn. 06829
- Calloway Turbo Systems, High St., Old Lyme, Conn. 06371
- FAZA, 2438 South Ridgewood, Daytona, Fla. 32019
- GMP, Box 240008, Charlotte, N.C. 28224
- Guldstrand Enterprises, 11924 West Jefferson, Culver City, Calif. 90230
- Hardy and Beck, 1799 Fourth St., Berkeley, Calif. 94710
- Herman + Miller, 250 Route 46, Parsippany, N.J. 07054
- Holbert Racing, 1425 Easton Rd., Warrington, Pa. 18976
- Huffaker Engineering, 1290 Holm Rd., Petaluma, Calif. 94952
- IPD, 2762 Northeast Broadway, Portland, Ore. 97232
- Kuruss Motor Works, Box 633, Pleasant Valley, N.Y. 12569
- Miller and Norburn, 2002 East Feabody, Durham, N.C. 27703
- R and A Applied Arts, 701 Riverside Ave., Lyndhurst, N.J. 07071
- Scarab, Box 9217, San Jose, Calif. 95157
- Special Vehicle Developments, 337 Blacks Rd., Cheshire, Conn. 06410
- Turbotek, 87 Elm St., Cohasset, Mass. 02025

The Dayton Thorobreds are with you...

mile after mile.

With a full stable of famous Thorobred radials... including the steel-belted Blue Ribbon, the all-season Quadra and the wide track Daytona. Great radials for virtually every car and light truck on the road.

From coast to coast, our national dealer network is over 3,000 strong, to provide you full service and support. Check the Yellow Pages for the dealer nearest you and ask him about our written mileage warranties that help protect you and your investment.

Down the road, Dayton's Thorobreds give you the long mileage, handling and traction you need, mile, after mile, after mile...

Dayton



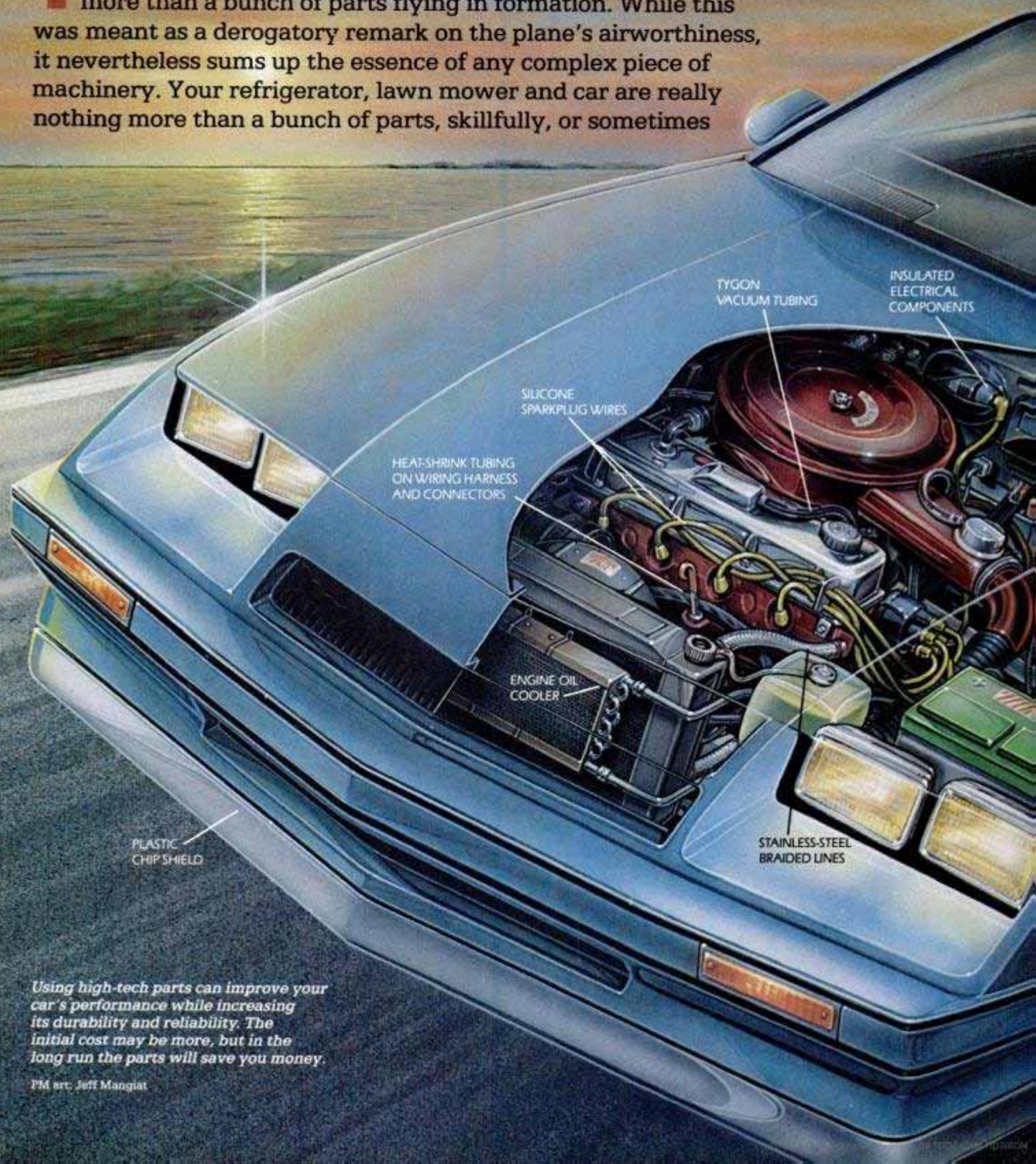
TIRES

P.O. Box 81073 AMF
Cleveland, Ohio 44181

HIGH-TECH PARTS

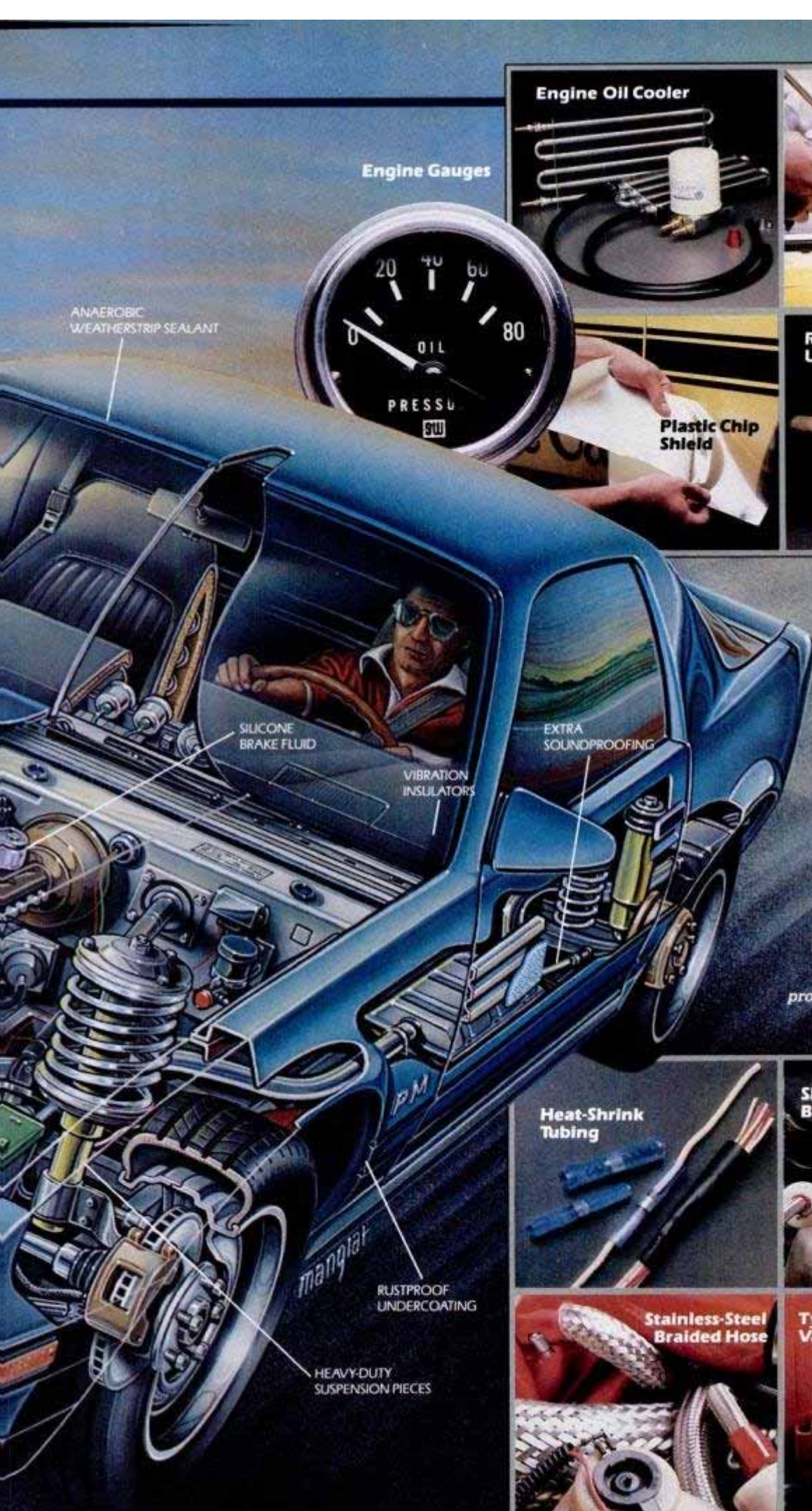
THE SECRET TO KEEPING YOUR CAR RUNNING FOREVER

They used to say of the old Jenny biplane that it was nothing more than a bunch of parts flying in formation. While this was meant as a derogatory remark on the plane's airworthiness, it nevertheless sums up the essence of any complex piece of machinery. Your refrigerator, lawn mower and car are really nothing more than a bunch of parts, skillfully, or sometimes



Using high-tech parts can improve your car's performance while increasing its durability and reliability. The initial cost may be more, but in the long run the parts will save you money.

PM art: Jeff Mangiat



Engine Gauges



ANAEROBIC WEATHERSTRIP SEALANT

Engine Oil Cooler



Weatherstrip Adhesive



Plastic Chip Shield



Rustproof Undercoating



SILICONE BRAKE FLUID

EXTRA SOUNDPROOFING

VIBRATION INSULATORS

If you focus on your car's most critical maintenance and reliability areas, you can prevent major problems from ever happening. The nine items pictured will handle about 80 percent of a car's most frequent problems. With the exception of the stainless-steel braided lines, all of these products are inexpensive and easy to install in your car.

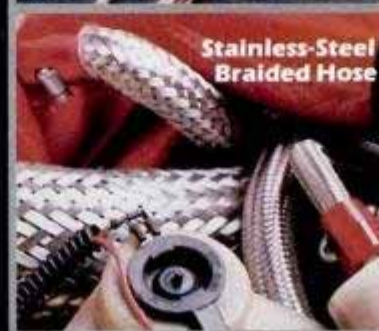
Heat-Shrink Tubing



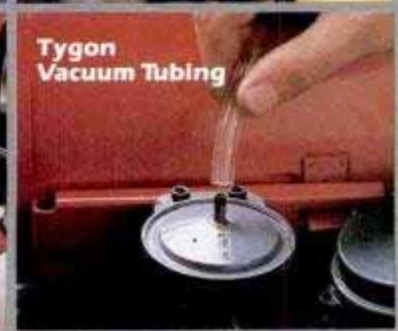
Silicone Brake Fluid



Stainless-Steel Braided Hose



Tygon Vacuum Tubing



RUSTPROOF UNDERCOATING

HEAVY-DUTY SUSPENSION PIECES



**FASTER THAN A FLUSHED QUAIL.
MORE POWERFUL THAN A GIANT MUSKIE.
ABLE TO LEAP RUSHING STREAMS IN A SINGLE BOUND.
TOO BAD IT WON'T START.**

Why put featherweight parts in a heavy-weight machine? This fishing season look for this sign at participating stations, garages and NAPA stores. And keep your beast of a machine running super strong with tough NAPA parts. Or your fishing trip could come to a standstill.



Check Your Yellow Pages

(Continued from page 120)

not so skillfully, crafted to accomplish a certain design goal.

The key word here is parts. And it's the parts, and their relative weaknesses or strength, that determine your car's reliability and durability.

We have quite an ambitious goal in this year's Guide. Some of the parts mentioned are unfamiliar to most of you and, we would say, to most professional mechanics, as well.

What we've done is analyze every system of an automobile to come up with a way of preventing a failure which experience tells us will, in time, occur. If we couldn't find an answer in the conventional auto industry and aftermarket, we searched farther afield to other, unrelated, industries.

The solder-sleeve connectors and adhesive-line, heat-shrink tubing, for instance, had never been used in an auto application before. Until we got hold of them, these items were restricted to more esoteric uses, like wiring up the Lunar Lander and NASA's Space Shuttle.

The same goes for the Tygon tubing. This item has been used extensively in the chemical, food processing and medical fields. It remains pliable and resists cracking in temperatures ranging from -100° F. to 400° F.

The big guys can't do it

You might legitimately ask why the car companies can't do this. Why can't they make cars that last indefinitely and save you a lot of trouble and expense? The answer is simply economics. They could and would, if you were willing to pay a lot more for a car than you do now.

Take a radiator hose, for example. As it comes installed out of the factory, it will give you a "reasonable" service life. It will cost the maker a hypothetical 50 cents to buy and install. When its service life is over, it will cost you a few dollars to replace and everybody's happy. For a maker to try and double that "reasonable" service life it might cost him, say, another 20 cents. But that seemingly small extra investment by a maker, when multiplied millions of times, will quickly boost the price of a car beyond competitive market business. The car may last forever, but no one would buy it to appreciate it.

Realistically, as a car owner, you're in a better position than a manufacturer to optimize a car's systems. By investing wisely in quality replacement parts after the original parts wear out, you literally could have a car that you could pass down to your great-grandchildren.

Before you embark on any durability program, analyze your car and all its systems. Different models are prone to different reliability problems and not everything in the Guide will apply to all cars. The areas we've picked out for examination and improvement, however, seem to be the most universal.

Rust, for instance, is a problem everyone faces eventually. Yet, it's one of the cheapest and easiest to cure.

Your best guide to sorting out the critical problem areas is your previous

experience with cars. For instance, have you ever known the paint on an air cleaner housing not to flake off? Or a vacuum line that didn't get hard and crack? Or rocker panels that didn't get shot-peened by road debris?

Racers call it bulletproofing. Build a race car, drive it hard until something breaks, fix it and make it better, then drive it more. In passenger cars, we all know what will fail. And bulletproofing those parts we know will fail is what this *Car Care Guide* is all about. **PM**

LONG TERM INVESTMENT THAT PAYS OFF NOW

Right from the start, they'll help you do the job easier, faster, better. Years from now, they'll still be giving you like-new efficiency. Tools by CHANNELLOCK. Precision made by specialists who've been forging only the best for almost a century. Send for free catalog. Channellock, Inc., Meadville, Pa. 16335

Tools by

CHANNELLOCK

For you who want the best.



'83 CAR CARE GUIDE



Total rustproofing can be a one-weekend home garage project. Metal primer and a rustproofing compound are all you will need. Removable fenders (right) make it easier.



How To Stop Rust Before It Starts

Rust is your car's single biggest enemy. It's a silent killer that can frustrate all the meticulous care you devote to engine and mechanical maintenance. The problem with rust is that by the time the first telltale brown bubbles begin to break through the paint, it's too late. Rust already has a firm hold on the body.

Professional rustproofers will not touch a car that's older than three

months. They know that even in that short a time out of the showroom, rust has already begun to form, and all the rustproofing they spray on top of it won't stop the advance of the body cancer.

But whether your car is brand new or half a decade old, you can stop galloping rust. All it takes is time, elbow grease and some really inexpensive materials.

The first step is to find where rust lives. You'll usually find it where water has a place to enter and puddle up. Look in the bottom of the trunk, inside the doors, at the rocker panels, inside fenders, beneath the carpeting on the floorpan and around the battery. You'll also find it behind trim, body moldings and around windshield and rear glass moldings.

Once you've identified where the



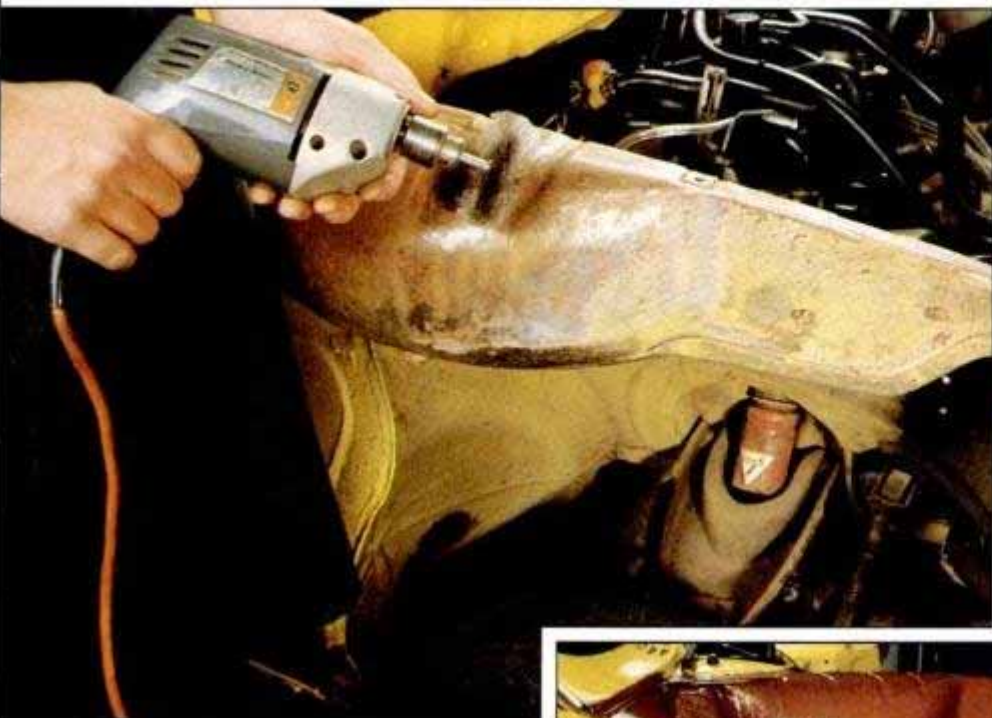
Rust forms where water collects, as here between the fender and body. After three winters, this car was ready for repair.



Loose scale can be removed quickly with a gasket scraper. Get off as much as you can before going to the wire brush.



The wire brush will usually be enough to get down to the bare metal. It will reach places the gasket scraper can't get.



A wire brush chucked into a power drill does job quickly. However, it blows a lot of dust around, so wear a mask if you plan on using this method. When you see a shiny metal surface you know you've cleared out all the rust.



Degrease surface with good solvent (top). Once surface is dry and clean, apply two coats of red metal primer (above). When primer is dry (left), you apply top coat of thick rustproofing material.



rust is, you'll need a gasket scraper, a stiff wire brush and a round wire brush chucked into an electric drill.

Get off as much of the loose rust and scale as you can with the scraper. Then use the hand wire brush to get down as far as you can to the metal. This will usually be enough to get to bare metal, but there are some areas you can't reach with the brush. For those spots you'll have to use the power drill to get down to bare metal.

Work a small area at a time and make sure you get all the rust. Also make sure you can finish the job the day you start. Leaving bare metal untreated for any length of time—even overnight—will only start the rust process once again.

Once you've got a nice, clean area of bare metal, wash it down with a rag and a trichloroethane degreaser. This will leave a clean, grease-free surface and will allow the first coat of red metal primer, such as Rust-Oleum, to bond properly. The lead has been taken out of red lead oxide, but its successor is just as good. Two coats of red primer

will be enough. Give the first coat a half hour to dry before applying the second coat. Make sure you leave no patches of bare metal. This will defeat your effort.

Rust-free painted surfaces near the rusted areas you're working on don't need to be treated with the red metal primer; the rustproofing material will be enough. However, you should clean the surface as much as possible with

the degreaser. This is especially critical in areas that tend to collect lots of grime, like the inside of fenders. Surface dirt and grime will only create a barrier between the painted surface and the rustproofing material you'll be applying.

Once you have the painted surfaces clean and the bare metal surfaces painted with red primer, it's time for

(Please turn to page 127)



Drain holes in doors are prone to clogging. Use the spray-type rustproof coating with the extension nozzle for treating hollow, inaccessible body cavities.

INTRODUCING THE ALL NEW TRIM-SIZE

FORD BRONCO II



IT'S A BRAND NEW KICK!!



30 city **(20)** hwy EPA
EST. MPG

Use for comparison. Mileage may differ depending on speed, distance and weather. Actual highway mileage less.

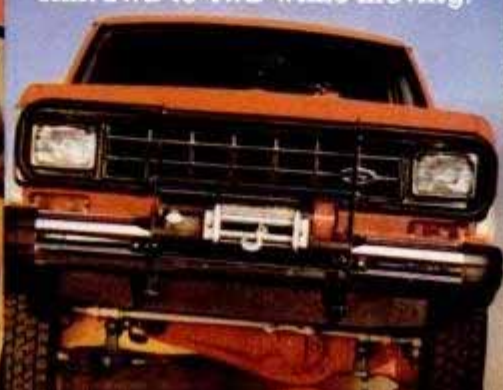
FORD



Trim new 4-wheeler seats four, has split fold-down rear seats for extra cargo. Easy to park, fun to drive, it's a brand-new kick — on the road and off!



Built Ford tough with husky frame, Twin-Traction Beam suspension. Optional auto-lock hubs when engaged can shift 2WD to 4WD while moving.



V-6 engine standard, a V-6 with power S-10 Blazer can't match. And Bronco II turns in less space than S-10. The perfect size for 4-wheeling!



Get it together — buckle up!

CAR CARE GUIDE

HOW TO STOP RUST

(Continued from page 125)

the rustproofing. The kind of rustproofing we used comes in two forms: spray-on and brush-on. It's called Car 'N Farm (see Sources for address) and it was specifically made for at-home application. We chose it because it comes in large, economical containers.

The spray-on variety is available in aerosol bottles with 19 inches of tubing and a four-direction nozzle. The brush-on comes in quart and gallon sizes.

For large, flat areas the brush application is best. The aerosol is made for squirting inside inaccessible body cavities, such as the inside of rocker panels. To use the spray, drill a hole in the metal and insert the tubing as far as it will go. Press the discharge nozzle and slowly draw the tube out of the hole. The four-direction nozzle will cover a 360° area.

The number of holes you'll have to drill will depend on the length of the panel you need to fill. Keep in mind that the hole you drilled is now nice and raw and is subject to rusting. To prevent that, use a small brush and red primer to coat the raw metal hole, then coat the primer with a generous dollop of the brush-on rustproofing. Once that's done, get some rubber plugs, at a local auto parts store or directly from Car 'N Farm, and plug the hole.

Bear in mind that this rustproofing material will never dry completely. It does its job by staying moist, repelling water and sticking to the surface onto which it's applied. Therefore, it isn't a good idea to use the rustproofing material in some areas, like the trunk or the engine side of the fenders.

Inside the doors

At the bottom of every door you'll find several holes stamped or drilled into the metal. These are drain holes, and they allow any water that got past the window weatherstripping to drain out. Many times these holes will be clogged. This allows water to puddle up at the bottom of the doors and rust will form. One reason the holes get clogged is that they are usually too small to do much good. We've had good luck by drilling out the hole by 25 percent and then using a punch slightly larger than the new hole's diameter to punch a bevel to promote better drainage.

As we mentioned earlier, if you see rust down there, wire-brush it off, apply red metal primer and top it off with liberal amounts of rustproofing. Make sure you pay special attention to coating that fresh hole you drilled in the

metal. But be careful not to plug the hole with the rustproofing material.

If you decide to turn the job over to a professional rustproofing, there are a few things to keep in mind.

The first thing you should do is ask for a copy of the guarantee. Read it carefully. Many rustproofers will only guarantee their work if you return the car to them once a year, at a specific date, for a touchup rustproofing job. Some will charge you for this touchup, others won't. They will also stipulate that if the car isn't brought in at a specific date, your guarantee will be void. Make sure that the guarantee gives

you sufficient leeway on the touchup.

Guarantees will invariably state that you'll get your money back if the car rusts. Not good enough. The \$150 back on a rust-out that costs \$400 to fix won't do you much good. Make sure the guarantee states that the rustproofing will fix or replace any body panels damaged by rust at no charge. If a rustproofing won't make that guarantee, it's not worth your money.

Lastly, don't trust just any old rustproofing. Your best bet is to go with large, national chains. If one local outlet goes out of business, any other outlet must honor the guarantee. **FM**

**A trigger-squeeze breeze
in the hands of the
handy homemaker!**



**A powerful, useful tool
in the hands of the
home handyman!**



ARROW
ELECTRO-MATIC

Model ET-50 ELECTRIC STAPLE GUN

**It's TRIGGER-FAST!
Just plug in... and SHOOT!**

Just plug it into standard house current... and you're ready to fire staples as fast as you can squeeze its feathertouch trigger!

With her lightweight, trigger-fast Arrow ET-50 Electro-Matic, the handy homemaker will breeze effortlessly through scores of light decorating and repair chores... trimming a kitchen shelf, lining a closet, mending a torn screen or covering a headboard

And, the Arrow ET-50 Electro-Matic is a fastening tool with the heavy duty staple-driving power the home handyman needs for putting up ceiling tile, installing insulation, applying weatherstripping, etc.

Uses Arrow No. T-50 staples exclusively, in 6 sizes: 1/4", 5/16", 3/8", 1/2", 9/16" and Ceiltile.

Available at all leading Hardware,
Home Center & Discount
Department Stores everywhere.

ARROW FASTENER COMPANY, INC.

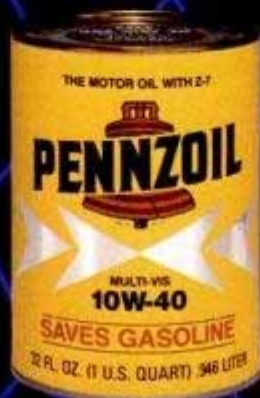
271 Mayhill Street, Saddle Brook, N. J. 07662



A state-of-the-art racecar. A state-of-the-art motor oil.

The powerful Pennzoil-Penske Indy car is a marvel of advanced automotive design. Over 10,000 parts go into it—600 into the engine alone. All state-of-the-art. All built for reliability.

It takes the skill of Rick Mears, Indy car champ, to handle it. And when his engine's turning over 10,000 RPMs... he needs a motor oil engineered for reliability. Pennzoil... for tough engine protection.



Pennzoil makes motor oil for all kinds of cars. As car engines have become more complex, Pennzoil has kept up-to-date with their new demanding requirements. So you get the "today" protection *your* car needs.

Pennzoil quality means protection you can rely on.

Protection you can rely on.

How To Fix A Rusted Trunk

As your car ages, the weatherstripping will deteriorate and allow water to seep through. In the trunk, you usually don't notice the seepage until rust begins to form. Rust in the trunk doesn't always come from seepage. Opening the trunk in the rain or snow will allow water to enter and settle in the shallowest areas. And since most people don't really pay much attention to cleaning out their trunk, that standing water will eventually begin the rust process.

The solution, obviously, is prevention. Make sure the weatherstripping is intact and clean up any water that accumulates in the trunk. If rust has already begun to form, the procedure for removing it is very similar to that for removing rust in fender and rocker panels, except in this case you don't want to spray or brush on the thick brown goop that you put under the fenders.

As with the inner fenders, scrape and wire-brush all the rust off the surface. Get the surface down to bare metal and coat it with the red metal primer. In this case, too much is never enough. Let the primer ooze into all the cavities and let it dry thoroughly.

Once it's dry, apply the top coat. Since the trunk doesn't have to be as visually pleasing as exterior body panels, you don't necessarily have to paint it with an air gun and auto body paint. We got excellent results using a spray can of enamel; or you can use lacquer. For a really super paint job you can use Plasti-Kote (see Sources for address). It's a little more expensive than most over-the-counter spray paints, but worth it. **PM**

A high-quality spray paint will do a good job on the trunk; no need to go to the trouble of a spray gun and auto body paint.

One can will do a small trunk. In temperatures below 40° F., warm the can in hot water before starting.



Before you apply paint to the trunk of your car, mask off everything you don't want coated. Make certain that the surface that you are painting is dry and free of oil.



Water infiltration on this car was a direct result of a small leak in the vehicle's weatherstripping. The water settled in the hollows (above, left) and also directly below the leak on the wheel well (left). After cleaning off the rust, you should apply a metal primer and let it ooze into all of the car's cavities (above).



A nonoil-based primer gives protective coating and a good base for the top coat applied later. For a super finish, use a sandable primer.

The battery tray is probably one of the most abused metal pieces of any car. Not only is it subject to the same corrosion as other metal pieces, but it's also subjected to battery acid.

Remove the battery and inspect the tray and the surrounding area. If you find rust, get out the brushes and scraper and go to it. If the tray is beyond restoration, you'll need to get a new one. If the tray is welded to the car, have a body shop cut off the old tray and weld in a new one.

Unlike the inner fender or the trunk we covered in the previous pages, the battery tray and the surrounding inner fender area should be painted with the same type and color paint as the rest of the engine box.

Over-the-counter touch-up spray paint won't do for this job. The best solution is to apply a top coat of quality auto paint.

Professional body shops tackle a job like this with a detail gun. This is like a miniature version of a standard spray gun and needs a supply of compressed air to shoot the paint.

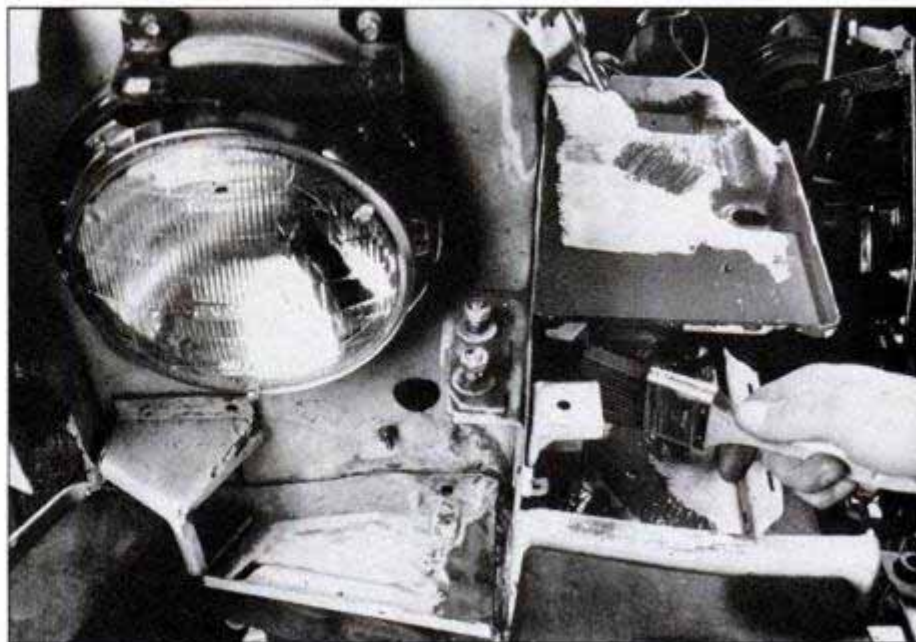
You can get everything you need from a tool rental outfit, but if you plan on detailing the rest of the engine box or need to use small-scale spray equipment, the Stewart-Warner detail gun Model 7821 is a good bet. It's fairly cheap (\$100), light and has all the fine adjustments of full-sized spray guns.

Before you use it on a car, test the pattern and paint density on a piece of scrap metal or cardboard.

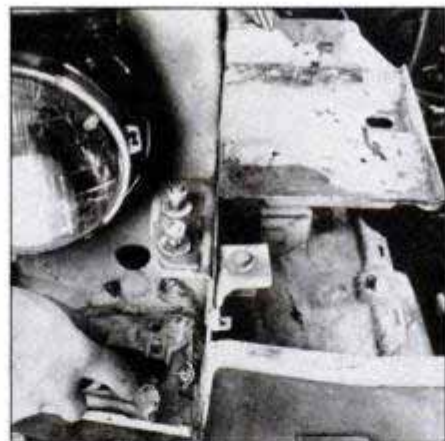
Whenever you use any kind of spray-paint equipment, wear a respirator.

Before installing the battery, check the hold-downs and make sure they're in good shape. If they're rusted or corroded, clean them and paint them with the gun.

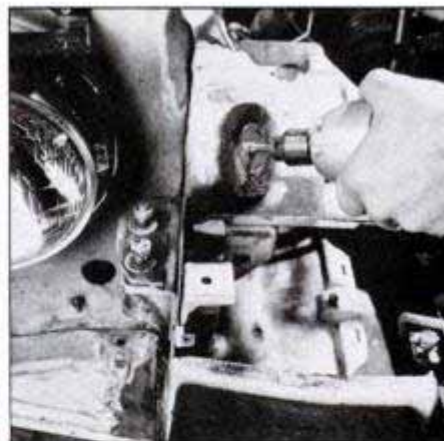
If the battery tray has a solid floor you might want to drill some holes in the bottom to drain away any water that might accumulate. If you want, you can install a rubber mat in the bottom of the tray. Use ribbed rubber for drainage. The mat also acts as a bumper between the battery and the metal. **PM**



How To Repair A Rusted Battery Tray



Rust and battery acid made a mess of this battery tray and area around it. Dismantle as much as you can before scaling.



A wire brush used on power drill makes quick work of removing the rust. Wipe off any dust and degrease before painting.



A detail gun can be zeroed in to cover particularly small areas (left). Mask off the sections that you don't want painted. When the paint dries, install a rubber mat (above) to isolate the battery.

Restoring Rusted Headlight Buckets

Headlight buckets take a beating. They get to the salt spray, road grime and flying pebbles first.

To restore the buckets, dismantle the entire headlight assembly. Start at the exterior and remove the headlight bezel. Bezels are usually held in place by Phillips-head screws. Next remove the retaining screws and disconnect the tension springs that hold the headlamp in place for aiming.

If you haven't done any service on the assembly for a long time you'll find that the screws have rusted in place and are frozen. These Phillips-head screws are easily stripped if frozen so if you can't easily remove them, spray or brush on some penetrating fluid. We used Silikroil, a silicone-based fluid made by Kano Laboratories (see Sources for address). It's not expensive, but it's hard to find in local stores.

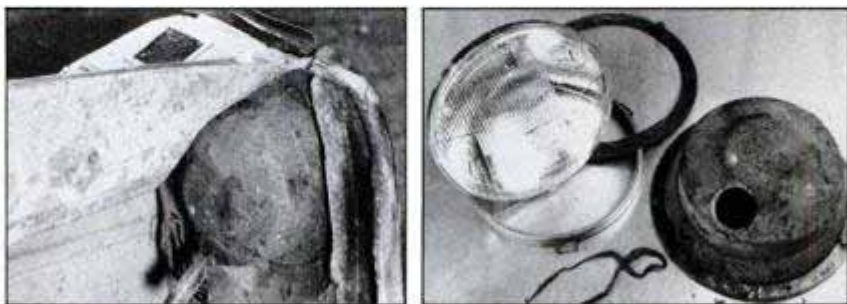
Scrape and wire-brush the bucket inside and out. Paint it with two coats of primer and give it a top coat. Plasti-Kote is good for a finish coat.

Next, inspect the rubber grommet which seals the hole that passes the headlamp wire from the harness. The hole for the wire should be just small enough to pass the wire through it. If the hole is enlarged or ripped, as it usually is,

you can replace the grommet or repair it with Silastic 732 RTV Adhesive/Sealant or 3M Silicone Super Sealant. Both are room-temperature-vulcanizing rubber which dries to a tough, rubbery solid. It's available from Ain Plastics (see Sources). Before you reinstall the grommet, coat its mating surface and the bucket with this sealant.

Next, check the springs for tension, check the rubber gasket and repair with sealant if it needs it.

If the screwheads are stripped, replace the screws with grade-8 hex-head or socket-head screws. **PM**

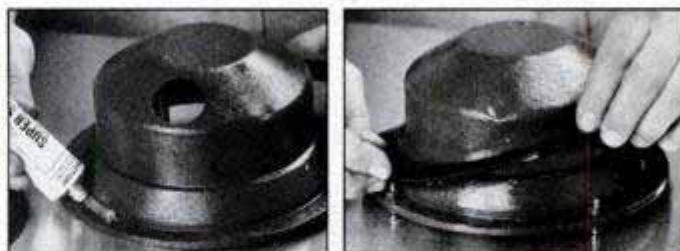


If a headlight bucket is left to rot away, it will not only be expensive to replace, but will also wind up posing a safety hazard. It's wisest to take the time to dismantle the entire assembly and carefully inspect the parts.

Clamp the bucket in a vise and remove all rust with wire brush.



After cleaning and degreasing, lay all of the parts flat. Spray on a couple of coats of primer and finish coat.



Reassemble the parts and apply bead of silicone sealant to the rubber gaskets and grommet at the rear of the bucket. Before installing the lamp, check the plug. If it shows corrosion, brush it off with soft-bristled wire brush. Replace screws if they're rusted or stripped



How To Fix A Rust Hole



One of the easiest ways we found to fix a rust hole is with a dimple-making tool. It's a simple, C-clamp-based device, patented and available only from West River Industries (see Sources). The dimple-making tool allows the first-time body worker to make a really professional-looking repair.

The first step in the repair process is to cut away the jagged ends of the rust hole. Then make dimples 2 inches apart and 1 inch in from the edge of the hole by using the dimple-making device. Center-punch and drill $\frac{3}{32}$ -in. holes into the center of the dimples. The holes must be centered so the screws will be flush with the metal.

Make a tape handle on an appropriately sized piece of galvanized furnace ductwork and place it in the hole. Hold the metal firmly and mark it through the holes with a felt marker. Remove the metal and drill $\frac{3}{32}$ -in. holes into the marks. Don't remove the tape handle.

Put the metal patch back in the hole and fasten it with No. 6 panhead Type A sheet-metal screws. As you tighten the screws, the patch will be drawn toward the body. When you've finished attaching the screws, use a straight-edge to make sure none of the screwheads protrude above the sheet metal.

Next, apply body filler, sand it down to the body surface, primer and paint. We'll cover the specifics of that operation when we talk about body panels in the following section. **PM**



Make dimples around the perimeter of the hole with tool. Space them 2 inches apart and an inch in from the edge.



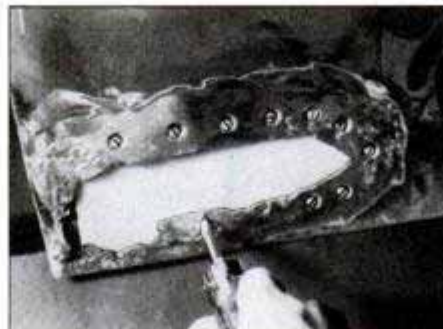
Drill $\frac{3}{32}$ -in. holes into the center of the dimples. Make sure holes are centered or screws won't be flush with the metal.



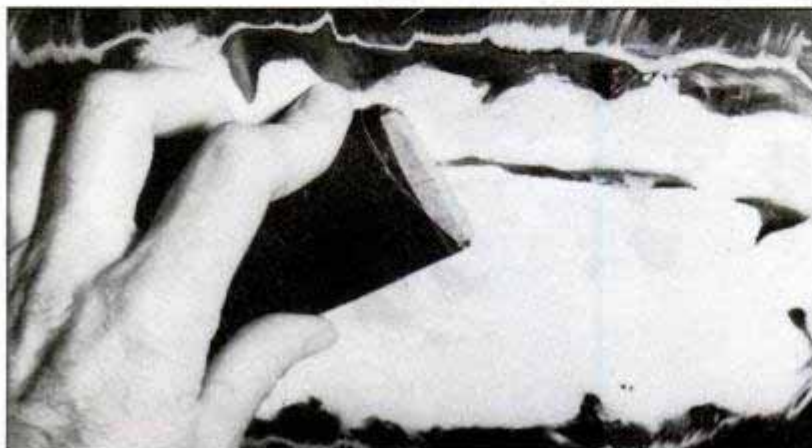
Insert the metal patch and mark it for the holes with a felt marker. Hold the patch steady while you're doing this.

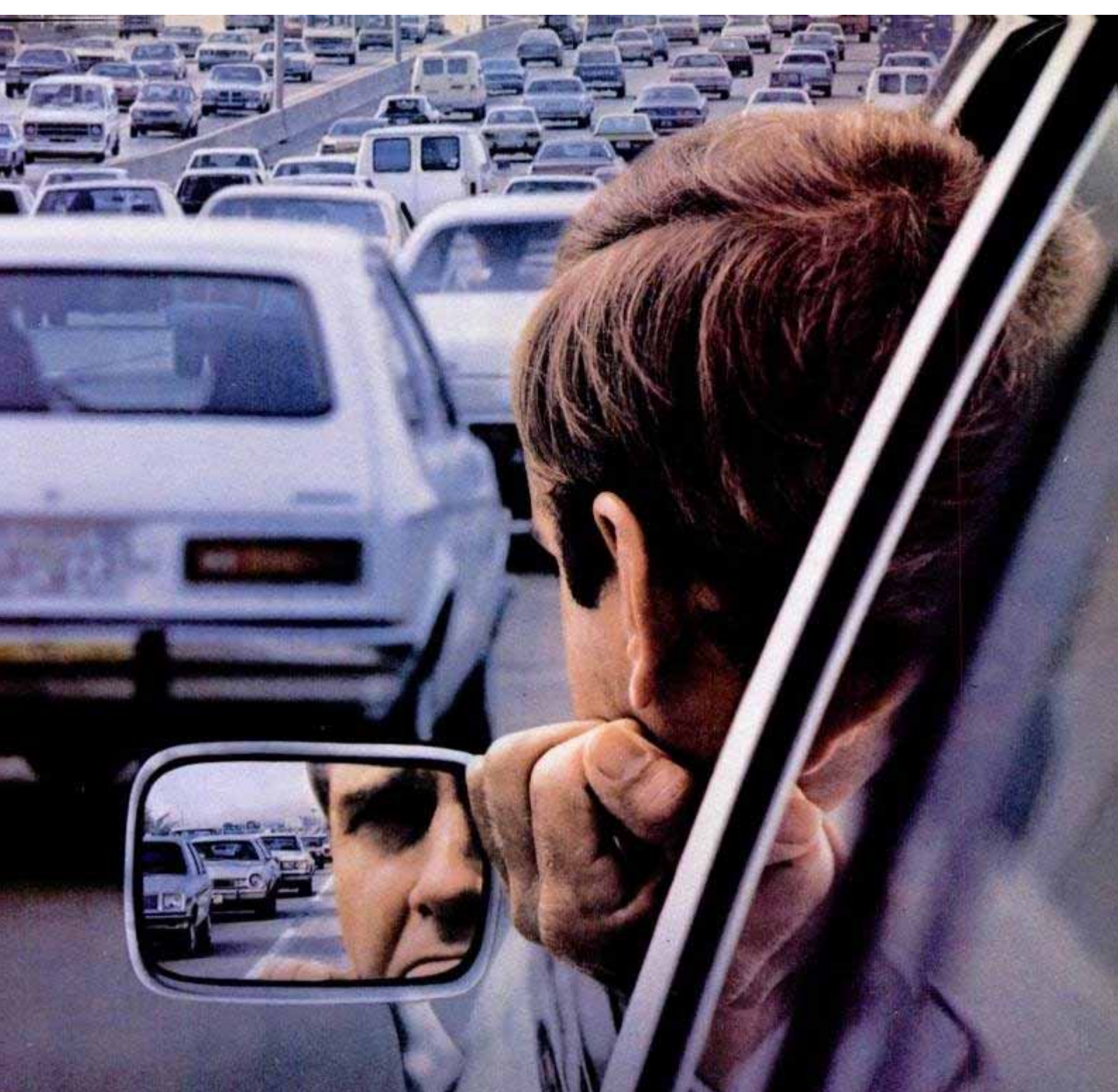


Drill $\frac{3}{32}$ -in. holes in the marks. Use a low speed and don't let the drill bit wander on the metal patch. Keep the handle on.



Install the sheet-metal screws and make sure that the screwheads are flush with or below the level of the body panel. Use a straightedge to check for this. Cover the hole with body filler, then sand the spot and prime and paint the repair.





IF TRAFFIC IS TORTURE ON YOU, IMAGINE WHAT IT'S DOING TO YOUR ENGINE.

These days, it's murder out there on your engine. Driving is rougher, traffic is tougher, and your engine is running hotter than ever.

That's why you need a motor oil that's built to take the heat. You need Gulfpride®. The oil that contains an extreme pressure additive that protects your engine even under the most severe driving conditions.

The special ingredient in Gulfpride coats critical engine parts with multiple layers of protection. To cool the heat and prevent engine friction, even in the worst stop-and-go traffic.

So the next time you change your oil, change to the oil that can take a lot of torture.

Today's Gulfpride.
It's tough in traffic.



Now you can get a \$2.00 rebate with 5 quarts of any grade. For details, look for Gulfpride displays at participating retailers.



Tune Up Time?



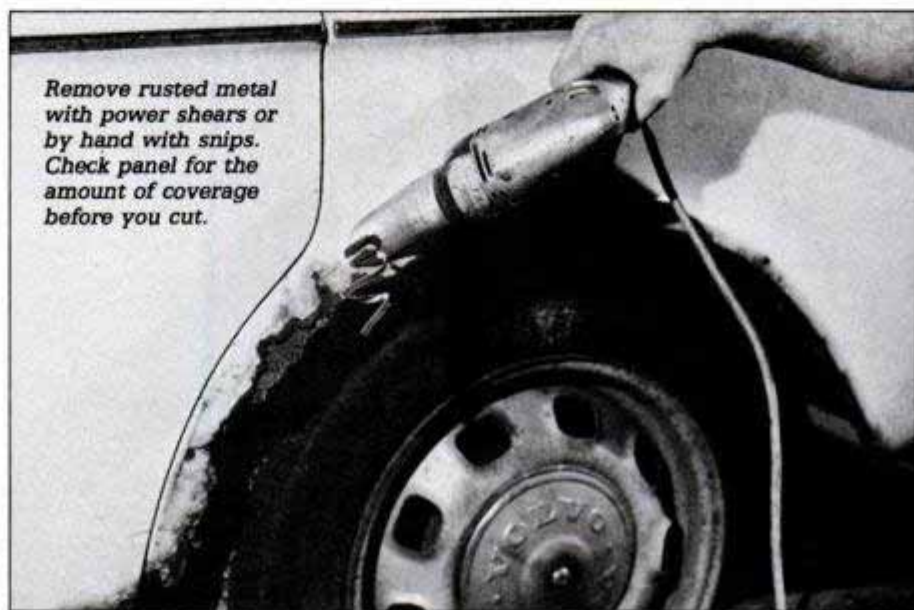
This could be the only tool you need.



At your local auto parts store

'83 CAR CARE GUIDE **BODY**

How To Replace A Rusted Body Panel



Remove rusted metal with power shears or by hand with snips. Check panel for the amount of coverage before you cut.

Splitter Parts Sale



2-Stage Cast Iron Gear Pumps

Supplies 11 GPM @ 650 PSI until more pressure is needed. Then kicks down to lower GPM and up to 2500 PSI. Right hand rotation, can direct couple to 5 HP or larger engine.

3600 max RPM, 12 Lbs \$98
13.6 GPM, use 5 HP \$135
16 GPM, use 8 plus HP \$156
22 GPM, use 10 plus HP \$245

4-Way Control Valve

Built-in relief valve, 3/4" in-out ports, 1/2" cylinder ports. Item 2010



..... \$42
Has pressure sensitive detent, on return stroke you don't have to hold handle. Item 2020. \$56

Double-Acting Cylinders — Tie Rod

4x24" 1-1/2" shaft, 68 Lbs \$116
4x24" stroke, 1-1/3" rod welded Tee. Can UPS 132
4x24" stroke, 2" rod. Heavy Duty 75 Lbs 137
5x24" stroke, 2" rod, 100 Lbs 204
4x24" 1-3/2" shaft, 71 Lbs 130



New Gas Engines Horizontal Shaft

5 HP Tecumseh or Briggs recoil start, 3/4" shaft \$132
8 HP Tecumseh, recoil start,

1" shaft 183
10 HP Tecumseh, recoil start, 1" shaft 220
10 HP Tecumseh, 1" shaft, electrical start 265
Vertical shaft engines available

Heavy duty 15-1/2 ton LOG SPLITTER, complete \$805

Send \$1 for 72 page DISCOUNT CATALOG. Or \$6 for "Splitter Design/Fact Booklet" and catalog.

Sale ends 6/20/83

Northern Hydraulics
Dept. 90513, P.O. Box 1219
Burnsville, Minnesota 55337
612-894-8310

Replacing a large body panel such as a rusted fender arch is a challenging job. The tools needed aren't found in everybody's toolbox, so if you do have an adventurous, how-to spirit, you'll have to rent them.

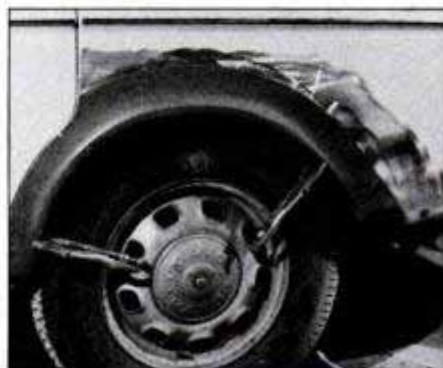
The indispensable tools are a gas welding rig with bronze brazing rods; power circular grinder; riveting tool and rivets; a picking hammer; two locking pliers; 24-, 100- and 220-grit sanding paper; body filler; glazing putty; and primer. This covers it for actually doing the patch on the fender. If you want to try your hand at painting it as well, you'll need a spray gun, paint and an air compressor.

If you've got the kind of damage pictured on all four fenders, it may be worthwhile to rent the tools and try it yourself. If it's just one fender, it might be more economical to turn the job over to a pro.

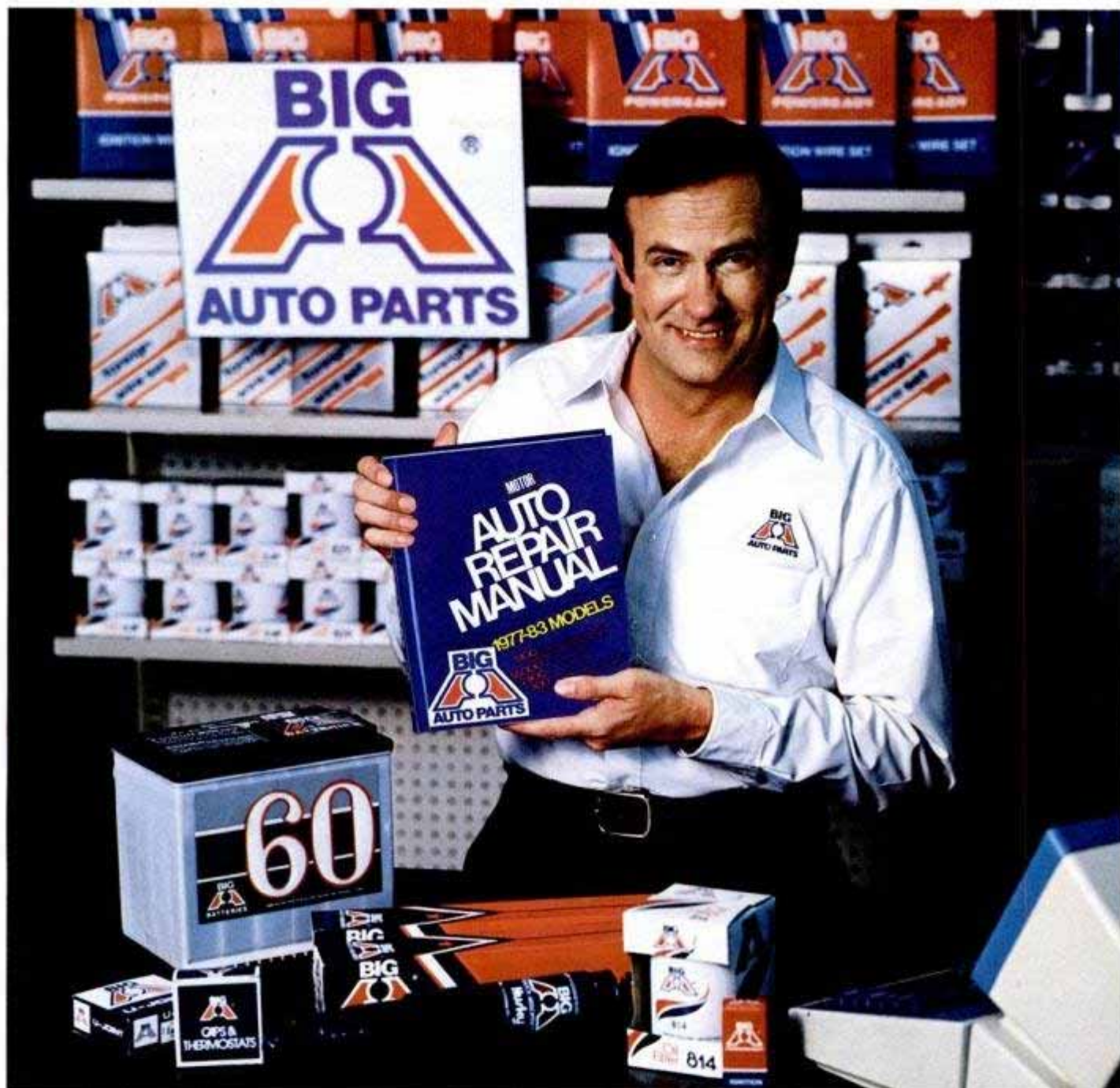
The first step is to determine the extent of rust damage and find a replacement panel to patch it. Tabco is virtually the only firm around that will
(Please turn to page 137)



With 24-grit paper on a power grinder, remove all the paint around the rust. Grind until you expose bare metal.



Attach the replacement panel on the car with locking pliers. Make sure it aligns before you drill and rivet.



Keep your car running letter-perfect with a Big Offer from Big A.

GET MOTOR'S NEWEST AUTO REPAIR MANUAL FOR ONLY \$5.00.

It pays to do it yourself. And now it pays big. Because when you make any \$20.00 purchase at a participating Big A Auto Parts store, we'll give you MOTOR's newest Auto Repair Manual for \$5.00. A \$21.00 professional manual in do-it-yourself terms for only \$5.00. Plus, each manual has money-saving coupons inside good towards future pur-

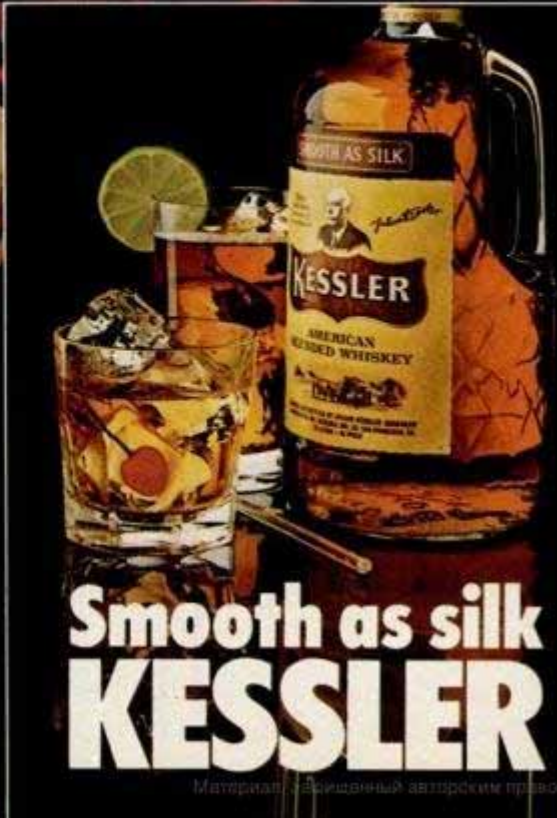
chases at participating Big A stores. But hurry, supplies are limited.

So whether you drive an American car, an import, a truck or an early model car, Big A has the professional manual that will be a big help to you. And the quality parts that will make a big difference in your car's performance. Just look in the Yellow Pages for your nearest Big A Auto Parts store. And you'll see why it pays to start at the Letter A!



Earning a buck is hard. Enjoying it shouldn't be.

You work just as hard to pick up a spare as you do on your job. It's worth it. Especially when the last frame is finished—and the first Kessler is poured. Because Kessler's a smooth, easy whiskey—as smooth as silk. And Kessler's a smooth, easy whiskey on the pocketbook, too.



© 1982 JULIUS KESSLER CO., LAWRENCEBURG, IND. BLENDED WHISKEY 80 PROOF 72% GRAIN NEUTRAL SPIRITS

Smooth as silk
KESSLER

Материал защищенный авторским правом

ship you replacement panels that you select from their catalog (see Sources). Hold the panel over the rusted area and determine how much of the existing panel you'll need to cut away. A power nibbler makes short work of this, but metalworking snips will do as good a job.

Attach a 24-grit paper to the power grinder and grind off all the paint along the perimeter of the rusted area. Make sure you expose bare metal. Put the replacement panel over the damaged area and secure it in place with locking pliers. Make sure you've got a flush fit all around with proper alignment in the



Braze the replacement panel in place with a gas welder and a bronze rod. Don't hold flame on one spot for too long or the metal may become warped.



If the replacement panel is aligned properly, drill holes every 4 in. around the perimeter and install the rivets.

front and rear at the bottom of the bodywork.

Drill holes along the entire perimeter of the panel. The hole size is determined by the length of the rivet you'll have to install to hold the panel to the body. Holes should be drilled about 4 in. apart and 1/2 in. from the edge of the panel. Install the rivets. If the panel is properly aligned, the rivets will force the panel flush to the body.

Once the rivets are installed, you're ready to braze the panel in place. Brazing is just like welding except you use much lower heat, to prevent metal stretch and buckling, and you use a bronze rod. If you've never done this before, practice on scrap pieces first.

Don't braze the entire perimeter at once. Place a few spot welds at either end of the panel and two in the center. Once the panel is tacked in four spots, begin at the front and weld a line about 6 in. Stop and go to the other end and do the same, gradually working your way toward the middle. Don't hold the flame in any one area for too long. This will cause the metal to warp.

With a new piece of 24-grit in the grinder, grind away all paint for an area 6 in. up from the panel and grind the weld bead smooth.

Body filler is a two-part material—



With a picking hammer, gently bang down high spots and remove any slag (above, left). Grind down high spots on weld bead (above) and remove rest of paint from around panel. Mix body filler and apply thin, even layers (left).



With a power sander or a hand sanding block, sand down the body filler. The edges of the filler should be very, very thin and blend almost inconspicuously with paint at the border.

COMPARE FEL-PRO IMPORT CAR GASKET SETS.

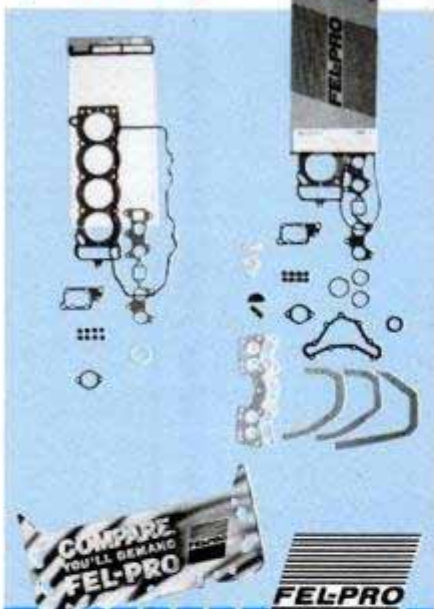
**A Little More Money.
A Lot More Value.**

Less expensive gasket sets most often contain only bare basic parts—with quality to match.

FEL-PRO SETS INCLUDE:

- PermaTorque® *no-retorque* head gaskets
- Premium material valve stem seals required for today's hot running engines
- All the parts—no time wasted looking for missing sealing parts
- Plus time-saving installation tips

Do the job right, do it once, and do it fast—buy where Fel-Pro sealing parts are sold.



FREE! The complete Import Car Gasket Set story from the #1 gasket manufacturer.

Mail To: Fel-Pro Incorporated
7450 N. McCormick Blvd.
Box C 1103 Dept. PM-583
Skokie, Illinois 60076

Name _____
Address _____
City _____
State _____ Zip _____

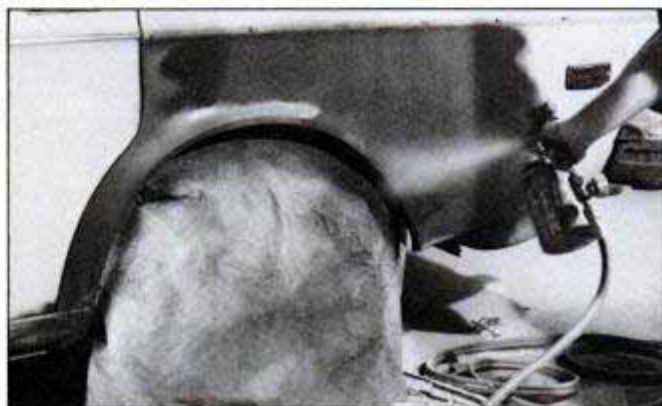
CAR CARE GUIDE

BODY



*Sanding the filler is critical. You're sculpting contours of the bodywork. Feather-
edging in some spots is so thin it shows bare metal beneath.*

Mask everything that doesn't get painted and spray primer on patch. When dry, apply glazing putty, wet sand and paint.

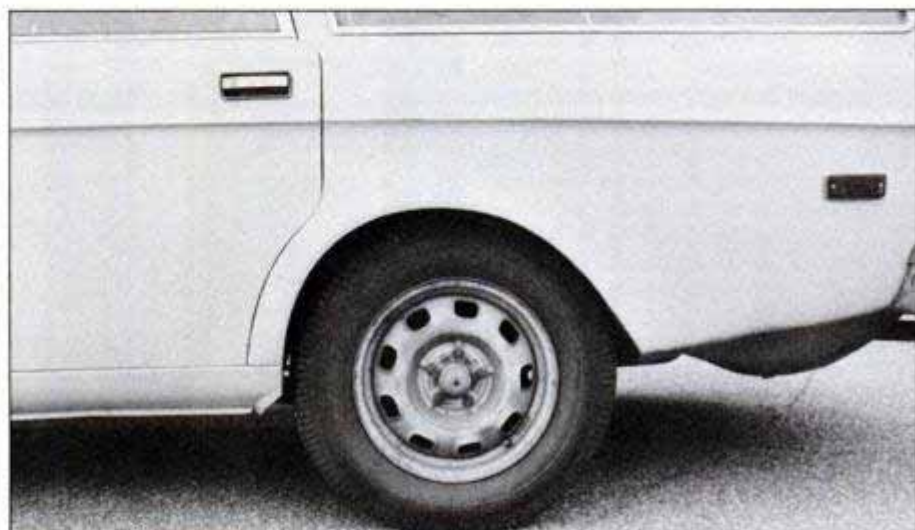


the filler and a hardener, usually of different colors. Mix the two according to the directions. Apply the body filler in thin, even coats. The filler will begin to harden within 15 minutes, so work quickly.

With 100-grit paper, power sand or hand sand the filler, removing all the ridges and contouring the filler to match the original contours of the car's body. At the border where the filler meets the paint, you'll have to feather-

edge the filler, reaching the point where you can't feel the difference in buildup between the filler and the paint with your fingers.

Prime the panel, apply the glazing putty that comes with the body filler and wet sand the putty with 220-grit paper. Hold a sponge above the paper and let a stream of water wash over the paper as you sand. Let the panel dry, clean off dust and spray paint patch with matching paint. **PM**



When the repair job is finished, the body panel should look like the original work. Note that the new paint on the panel has been blended with the original finish.

RUSTOUT REPAIR

With Polycel 500 Body Filler Base



Polycel 500 expands to more than twice its dispensed volume to fill, strengthen and soundproof rustouts. Polycel 500 provides a solid base for conventional plastic body fillers. One 14 oz. can expands to fill approximately 1/3 cu. ft. Clip and order yours today.

CONSUMER SALES CO.

6917 Valjean Ave., Van Nuys, CA 91406

Send _____ can(s) of Polycel 500 @ \$9.95 ea. plus \$2.00 shipping and handling. I am enclosing check, money order, or using Visa or M.C. No C.O.D.s. Allow 6-8 wks. delivery. Calif. residents add 6% sales tax.

Name _____

Street _____ Apt. _____

City _____ State _____ Zip _____

VISA or MasterCard # _____ Exp. Date _____

CONSUMER SALES CO.

6917 Valjean Ave., Van Nuys, CA. 91406

A space age polish that removes and prevents pitting!



MONEY BACK GUARANTEE!

MET-ALL aluminum polish. Cleans, polishes, waxes and protects in one application. Safe, fast, easy to use.

MET-ALL shines aluminum and all other metals to a mirror-like finish. Great for home, auto, marine and aviation use. Tested and approved by the three largest producers of aluminum.

MET-ALL. Removes the dullness, not the metal.

Ask your retailer or write to:
DARS MET-ALL INDUSTRIES, INC.
29-00 Review Ave., Long Island City,
NY 11101 (212) 937-3535

CAR CARE GUIDE **'83** BODY

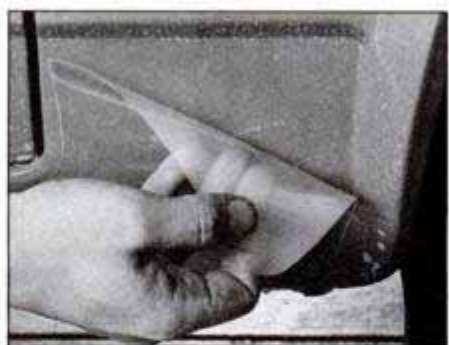
How To Install An Antichip Strip



Look what happens to the area behind the wheels (left) after years of road abuse. To protect this area, install plastic antichip strip. Tape the strip to the area and trace the outline with a washable marker (below). Spray a solution of water, alcohol and a drop of detergent onto the area. Peel off the backing paper and apply the plastic film.

Paint chipping on rocker panels and doors caused by road debris and flying stones can be a problem. If your car didn't come with rubber molding along the bottom use a new product called 3M Urethane Film (see Sources).

The adhesive-backed, abrasion-resistant film is thick, pliable and nearly invisible. It can be painted or left as is. Tape the film and its paper backing to the body. With a washable felt marker, trace the outline of the area you're covering on the film. Remove the film and cut out your pattern. Fill a window-washing spray bottle with a solution of 75 percent water and 25 percent isopropyl alcohol. 3M recommends that you add one drop of dishwashing detergent to make the installation easier. Wet the area, peel off 2 or 3 in. of film from paper backing and attach to the body. Slowly pull backing off. **FM**



Once the film is on, position it where you want it and squeeze out the water and any air bubbles with a hard rubber squeegee. When installed, the plastic is virtually invisible. It will take years of wear before you have to replace the film.

HANDLING HIGH-ENERGY EXPERIMENTS IS NO TASK FOR A WEAK SPARK PLUG.



Motorcraft

EXCEEDS THE NEED

Ironically, this experimental performance car uses a standard Motorcraft spark plug dedicated to fuel efficiency. But to remain frugal, these plugs must survive surges that could reach twice the voltage normally produced by conventional engines—including yours. Plugs capable of surviving surges to 38,000 volts: Motorcraft Extended Tip. As you drive, Motorcraft Extended Tip plugs relentlessly burn away power-blocking carbon deposits



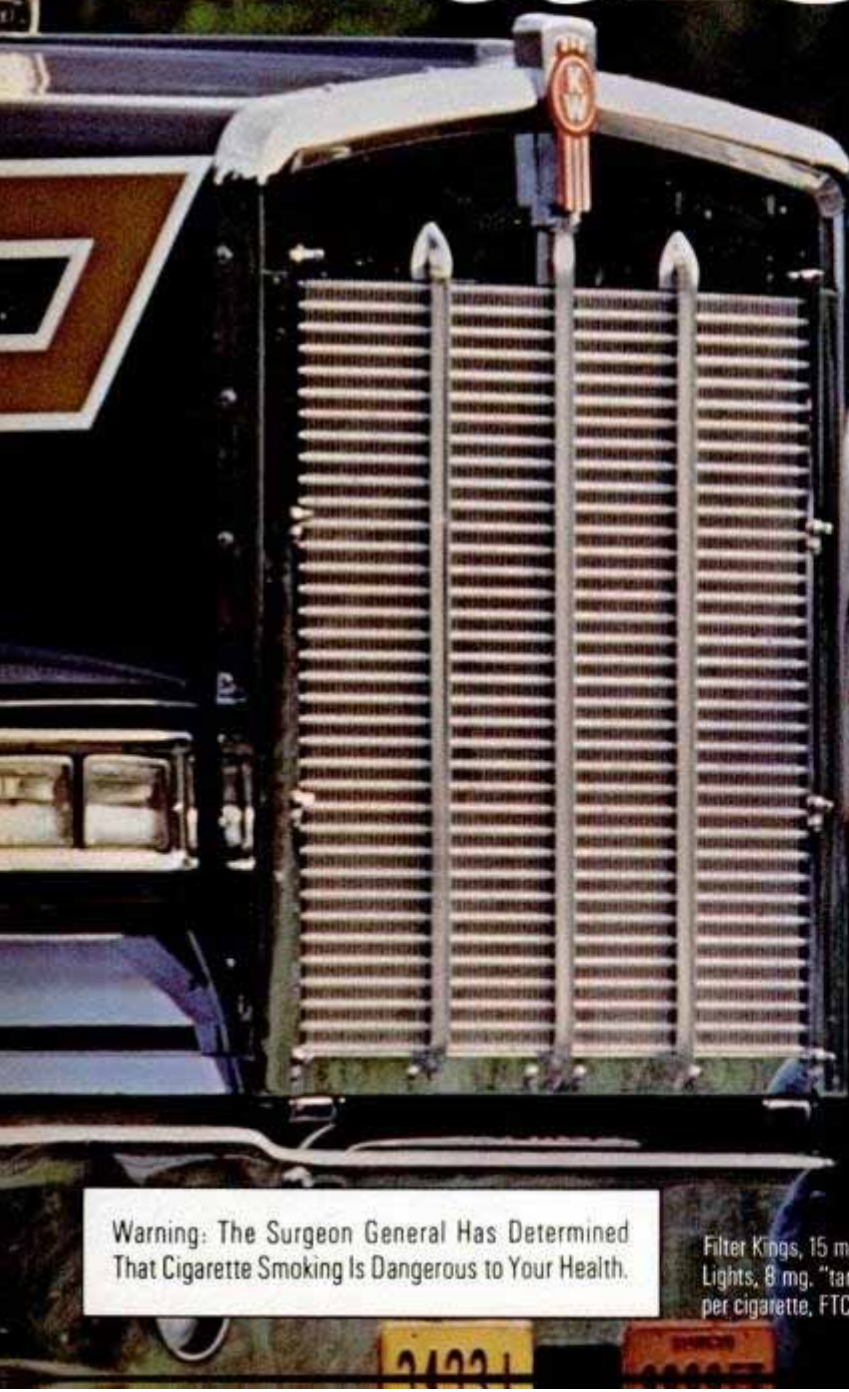
from their electrodes. Thus allowing a cleaner path for the spark to ignite precious fuel mixtures. That means less wasted gasoline in any properly tuned normally driven automobile — no matter how advanced. Motorcraft Extended Tip Spark Plugs. Engineered to eliminate fuel-thieving sooty carbon, without eliminating themselves in the process. Motorcraft. Quality parts for all makes of cars. *Get it together — buckle up.*



Take the
road to flavor.



Raleigh



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

Filter Kings, 15 mg. "tar", 1.0 mg. nicotine,
Lights, 8 mg. "tar", 0.7 mg. nicotine av.
per cigarette, FTC Report Dec. '81.

© 1983 B&W T Co.

Waterproofing Turn Signals And Brake Lights

Turn signals and brake lights are particularly prone to water infiltration and corrosion. Considering their location, it's no surprise. We're sure everyone has seen or experienced taillights flooded with water.

The cure to these problems isn't difficult or expensive. Installation and removal methods and materials vary from car to car, but the following is representative of some of the problems and solutions.

Inspect all the turn signals by removing and disassembling them. Fastening methods are usually Phillips-head screws driven into sheet metal or plastic molding.

Inspect the gasket for corrosion and cuts. If these are defective they can be repaired with Silastic (see *Restoring Rusted Headlight Buckets*). Check the housing, which contains the lamp socket, and look for rust or corrosion. The interior of the housing is usually bright plastic or metal. In either case, restore them if they're intact but dirty.

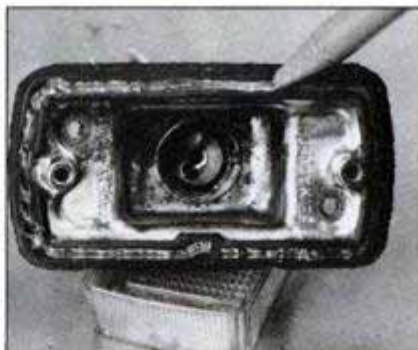
With a small drill and wire brush (we used a Dremel tool), remove rust and scale from the housing and the lamp socket. Make sure you don't remove too much metal from the socket or the bulb won't sit tightly in the socket.

Metal can be made to shine again by carefully using a wire brush. Bright plastic with the metallic shine gone can't be made to shine again. But you can glue some aluminum foil to the back of the housings.

If the gaskets are leaking, they need some help. Apply Silastic at the mating surfaces of the gaskets and the lens and the housings. Assemble the parts and let the Silastic dry. It usually takes 24 hours at room temperature to cure fully. After it's dried, disassemble the unit and check to see that you haven't left any gaps or voids. When the Silastic is fully cured, it will act as a gasket within a gasket and make the unit invulnerable to water seepage.

When you install the bulb, squirt some light lubricant like WD-40 into the socket. This will prevent further oxidization of the metal.

At the back of the assembly, where



Water penetration has nearly ruined this turn signal. Repair the damage by removing the rust. A small power tool works well (far left). To prevent further penetration, apply a bead of silicone sealant around the rubber gasket (left).

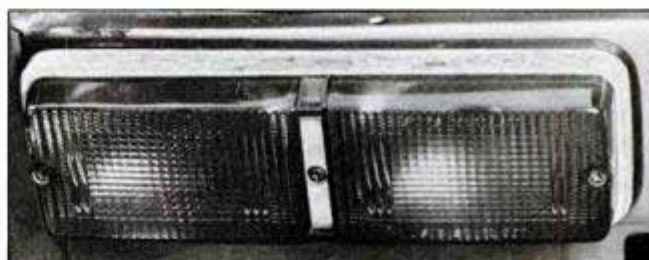


Heat-shrink tubing is used to close off the hole at the back of the rubber boot. You should use a heat gun, not a match.



To ensure watertight fit, add a bead of silicone sealant to the back of housing at the mating surface of the gasket.

Bright plastic can't be repaired, but you can paint it black with a good-quality spray paint. Sand off the residual bright plastic and then mask the assembly.



WE'LL PAY YOU \$1.00 TO STOP LEAKING ON YOUR GARAGE FLOOR.



America, you're leaking. In your garage, on your driveways and all over the road.

Now through June 30, 1983, we'll pay you \$1.00 to buy Wynn's® Engine Stop-Leak and Wynn's Transmission Treatment.



They'll help rejuvenate seals and o-rings, help quiet your engine down, get you running smoother. And help stop the leaks.

Get all the details at participating stores. Then clean up those embarrassing puddles.

WYNN'S FRICTION PROOFING SUPPLY, INC.
2600 E. Nutwood Avenue Fullerton, Ca. 92631



Flat or semigloss black will give the best appearance. Let the paint dry between coats and apply two coats to the trim.



If the surface has been sanded and prepared properly, the final result should be a flat, even coat of paint.

the wire enters, you'll usually find a rubber boot or a grommet.

Boots are usually molded with a tiny nipple through which the wire passes. To protect this entry from water, cut off a 2-in. section of TAT heat-shrinking tubing (see *How To Solder-Splice And Use Heat-Shrink Tubing*) and make certain that the tubing overlaps the nipples.

Some older cars, before the advent of Euro blackout trim, came equipped with exterior bright plastic bezels and surrounds. With time, the bright plastic wore off due to the sandblasting effect of road grime and pebbles. Instead of replacing the entire unit with a new one, you should consider painting it flat black.

Mask off the area with tape and, using a very fine grit sandpaper, such as 200, sand off the remaining bright plastic. Get it down to the natural plastic, blow off the grit and paint. **FM**



To prevent further oxidation inside lens housing, apply thin, even coat of lightweight oil. Wipe off the excess.

Free Deluxe Canopy with a new Coleman® Camping Trailer



A retail value of up to \$129.95, this free, self-storing vinyl canopy makes your new Coleman® trailer an even greater value.

- Sets up quickly and easily.
- Adds up to 70 sq. ft. of living area.
- Protects you from the sun and rain.
- Provides a fully protected living area when combined with Coleman's screened-room option.

See this attractive, matching canopy along with all the new '83 Camping Trailers at your local Coleman Dealer today. (He's in the yellow pages.)

Offer starts April 1, 1983; only at participating dealers while promotional supplies last. Applies to all new Coleman models except Jamestown™, Jamestown™ Ltd. and Columbia™.



A BRIGHT REPUTATION FOR QUALITY FOR OVER 82 YEARS.



Send for your free 1983 Coleman Camping Trailer Brochure today.

Mail to Dept. PM, The Coleman Company, Inc., Camping Trailer Division, Somerset, PA 15501

Name _____
Address _____
City _____ State _____ Zip _____
Phone _____

©Copyright 1983 The Coleman Company, Inc.

SONIC TURBO

Rated The Best Muffler On The Market Today!

In a recent comparative testing of all turbo mufflers on the market today, **Sonic-Turbo**, from American Exhaust Industries, was rated the most efficient. Not by just a little... but by a whopping 31% over its nearest competitor! The tests, performed by Super Chevy magazine clearly showed **Sonic-Turbo** to be the most efficient muffler on the market today.

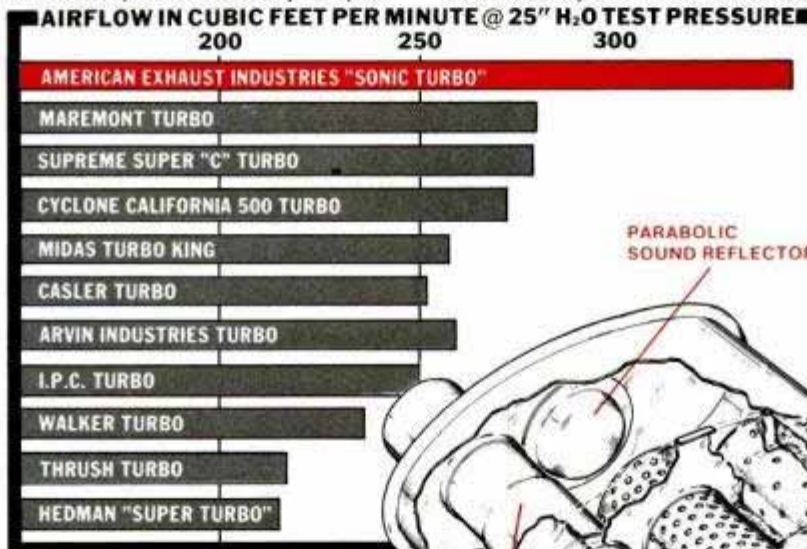
You can expect a significant increase in performance and fuel economy by merely replacing your stock (or other aftermarket) mufflers with high efficiency **Sonic-Turbos**. Through eliminating power-robbing exhaust backpressure your engine will breathe easier. It's as simple as that.

You should also know that this extra performance is not gained at the expense of increased noise. Quite the contrary. Because of **Sonic-Turbo's** exclusive "Parabolic Sound Reflectors" offensive sound waves are cancelled out. All that remains is a deep, powerful

sound that won't peg dB meters... and doesn't have the "whoosh" of a stocker! Only **Sonic-Turbo** mufflers have the unique Parabolic Sound Reflectors (pat. pend.).

There are many other features that set **Sonic-Turbo** mufflers apart from the rest of the pack, including

precision formed pass tubes, cores with varying perforation densities, Pyrex 1200° thermal packing and a double wrapped galvanized steel case. Clearly, **Sonic-Turbo** can out-perform and out-last any muffler of its type on the market today.



- I'm interested in learning more about Sonic-Turbo mufflers. Please send me a **FREE** 6-page reprint of the Super Chevy Turbo Muffler article and complete pricing information.
- I've added \$2 so you can send me a copy of the latest Cyclone or BlackJack (circle one) catalog and appropriate Gen. Trade pricing.

Name _____

Address _____

City _____

State _____ Zip _____

Type car _____ Year _____

send to: AMERICAN INDUSTRIES
7040 Lankershim Blvd., Dept. E305
North Hollywood, CA 91605

Products may be ordered direct from American Industries at prevailing Gen. Trade prices plus \$15 shipping and handling. CA residents add 8.5% tax.

Manufactured by American Industries Exclusively For:



Rustproofing Accessory Brackets



SMALL ENGINES WORK HARDER THAN LARGER ONES

Yes, 4 cylinder engines work harder than 8 cylinder engines to travel the same distance. When the 4 and 8 cylinder engines have both traveled 10,000 miles, the 4 cylinder engine has worked the equivalent of nearly 20,000 miles. They also run hotter — tending to shorten the life of your oil by creating varnish, gum and sludge.

All this means more wear and tear on your smaller 4 cylinder engine. It needs more care and attention. A quart of RISLONE with each oil and filter change will help get rid of those deposits that rob your engine's efficiency and smoothness. Clean engines run better, longer and more economically than dirty ones.

Use RISLONE at oil change time or when you're down a quart.

Get the big, yellow, red and black QUART can of RISLONE at discount stores, retail auto chains, and parts stores everywhere.



FREE: 32 page LUBE TIPS booklet. Information, ideas and discussion about problems, performance and lubrication. Send self-addressed, stamped envelope 4½ x 6½ or larger.

THE SHALER CO.

Waupun, WI 53983

In Canada: Warren Packaging Co., Ltd.
Scarborough, Ontario, M1R 4G2



Different brackets will require different types of protection. The one exposed to the most severe abuse should be chrome plated. The rest can be painted or encapsulated in plastic.

Accessory brackets in the engine box are as prone to rusting and deterioration as any exterior body panel. The three solutions that we've found work the best are painting with a high-quality paint, encapsulating in a thick plastic material and chroming.

Before painting any bracket, wire-brush it to bare metal, apply a coat of primer and two finish coats.

Coating with Plasti-Dip (See PDI in Sources) is a little trickier. Wire brush the bracket and degrease it. Then, very slowly dip the part in the can. If you dip it or remove it too quickly, air bubbles will form and you'll have to do it over. If ambient temperature is below 60°F., the plastic will get lumpy. You'll need to heat it in a pan of warm water. If it's too lumpy from being on a shelf too long, thin it with mineral spirits.

Chroming is the best, but most expensive, solution. Save that for parts that have to live near very hot engine pieces. Local chrome shops are often reluctant to do small jobs, but an excellent mail-order plating service exists (see Brown's Plating Service in Sources). Send them your pieces and they'll send you a written estimate of the job and expected delivery date. You can then okay the job.

If you find a local chrome shop, make sure you specify triple chrome plating. In this process, the metal is first hand-polished, then a layer of base metal is plated, it is polished again, another layer of base metal is plated, then polished again and finally chrome plated. **PM**



A bench grinder with a wire wheel will quickly get to bare metal. When spray painting (below), apply thin coats.



Dip clean, grease-free brackets slowly into can of plastic. Let metal soak in the solution. If the plastic is too thick, warm it or thin it with mineral spirits.

Now You CAN Afford One!

**FULL
5 YEAR
WARRANTY**

Complete statement included with product, or you can write for advance FREE copy to:
D.R.I. Industries, Inc.
Dept. PM-563A
11100 Hampshire Avenue, South
Bloomington, MN 55438

Plus, order now and get
3 Free Gifts
just for ordering.

* A \$4.99-value heavy-canvas Shop Apron * 2 solid-brass body padlocks * A special Surprise Free Gift

All 3—yours to keep, whether or not you keep your Tool-Locker.

***Double-slide Safety Drawers.**
Support more weight and prevent spills. Drawers lock automatically when cover is closed.

*** Bolt latches and center padlock hasp on chest.**
Padlock hasp on cabinet door. Total security and safety.

*** 3 large capacity drawers**
(Inside dimensions: 16 1/4" W. x 2 1/4" H. x 8 3/4" D.) and
a big top storage tray (Inside dimensions: 18 1/4" W. x 2 3/4" H. x 9 1/4" D.)

*** Soft-foam Drawer Liners.**
Protects tools and tool chest.

*** Cabinet top has 1/4" lip on sides and back.** Keeps tool box in its place.

*** Side-handle/cord holder...** for neat storage of electrical cords.

*** Adjustable, sturdy shelf in cabinet.** Handy hanger holes and hooks on inside of door.

*** Large Capacity.**
Tool Chest: 19" W. x 12 3/4" H. x 9 1/2" D. (Over 1.3 cubic feet of storage space.)
Cabinet: 18 3/4" W. x 24 1/2" H. x 11" D. (Over 3 cubic feet of storage space.)

* Height of combined units over 3 feet, 3 7/8 inches.

*** Four steel ball bearing swivel casters...** smooth-rolling, solid rubber wheels.

Tools and supplies not included.
Imported from Taiwan and Korea

© Copyright 1983 D.R.I. Industries, Inc.

™ Tool-Locker is a trademark of D.R.I. Industries, Inc.

The Tool-Locker™

Tool Organizing System

A heavy-duty portable tool chest plus roll-about cabinet—both for a price you'd expect to pay for one piece alone!

FANTASTIC!! BOTH PIECES JUST

\$59.99

plus \$9.90 shipping and handling

Similar units sell for well over \$100!!

How do we do it? Volume Purchasing...plus direct shipping. Both add up to big, never-before-heard-of savings!

You don't have to be a professional to know how important it is to keep your tools clean, safe and dry...to have them organized, right with you.

Now you don't have to make a big investment to enjoy that efficiency, to have a truly quality, heavy-duty all-steel organizer!

Over 4 cubic feet of storage capacity...plus special features you'd normally find only on the most expensive systems. **This is not a cheaply-made unit! It's quality through-out!**

Try the Tool-Locker™ FREE of risk, FREE of obligation to keep it!

Then you'll know why this Tool-Locker comes complete with a **FULL 5-YEAR WARRANTY**. Why D.R.I. backs it even further with a **100% Guarantee of Satisfaction**. If you're anything less than 100% satisfied, just send your Tool-Locker back for a full refund, including shipping and handling charges.

ORDER TODAY...IT'S EASY!

Fill in order form & send with check, money order, company purchase order or credit card information.

Credit card customers can also call our

24-Hour Toll-Free Order Number:

800-228-5000 (In Nebraska 800-642-8777).

D.R.I. Industries! We've introduced the Nut & Bolt Shop®, the 4-Wheel Wonder® and dozens of other high-quality, unique handyman products. Over 2 million satisfied customers.

11579

SPECIAL OFFER COUPON

MAG 64

Try it FREE of obligation to keep it!

If not totally satisfied, you can return your order for a complete refund, including shipping and handling.

Make remittance payable to and send to:
D.R.I. Industries, Inc., Dept. PM-563A 11100 Hampshire Ave. So., Bloomington, MN 55438

INDICATE ORDER METHOD OF PAYMENT _____ Tool-Locker(s) @ \$59.99 plus \$9.90 shipping and handling for each. (00008000)

CHECK (✓) I have enclosed my check or money order for the full amount. (MN residents add 6% sales tax.)
METHOD OF PAYMENT I have enclosed my company purchase order (this card MUST accompany ALL purchase orders).
PAYMENT Charge it to: VISA MasterCard American Express Diners Club Carte Blanche

Card No. _____ Exp. Date ____/____/____

PLEASE PRINT NAME _____ Signature X _____
(Need to sign only if charging order)
Mr. _____
Mrs. _____
Miss _____

ADDRESS _____ Street & Number _____
CITY _____ STATE _____ ZIP _____

How To Soundproof Your Car

The letters we get about noisy cars indicate that the biggest problem is how to prevent noise intrusion from big body panels like hoods, doors, trunk lids and side panels.

Today's newer cars have little, if any, soundproofing in the doors, hood and trunk lids. In an effort to save weight and money, sound insulation packages are reserved for the options list. In the case of low-priced, super-economy cars, soundproofing isn't even an option.

One workable solution we found is the installation of dense foam rubber. This is the type of foam that lines camera and electronic equipment cases. It has a curvy, hills-and-valleys configuration and comes in a variety of sheet sizes. The foam sheets come in double layers, with the hills and valleys interlocking. A 4x8-ft. double sheet cost us \$21. That comes to 64 sq. ft., enough to do two entire minicars or one full-size four-door sedan.

You don't have to remove the hood to install the foam. We removed it only to make our photography easier.

Foam thickness varies and you'll have to determine the clearance between the hood and the highest point of the mechanicals in the engine box. You can do this by attaching a lump of clay to the highest point on the engine and closing the hood. The clay will be mashed down to the thickness of the foam you need to use.

Your foam supplier will give you a spec sheet on the foam you buy if you ask for it. We used foam that resists temperatures up to 220° F. Your foam should resist heat at least that well.

Clean the inside of the hood with a degreaser such as Trichloroethane 1,1,1. Remove any rust or acid deposits that might have gotten on the hood from the battery. Prime the area if you scrape. If you're really fussy about appearance, you can repaint the inside of the hood with body color paint. We only had rust on the welded-on stiffening ribs, so we scraped it and didn't repaint the primer.

Cut the foam to the approximate shape of the area to be covered. Then apply liberal amounts of 3M Super Sili-



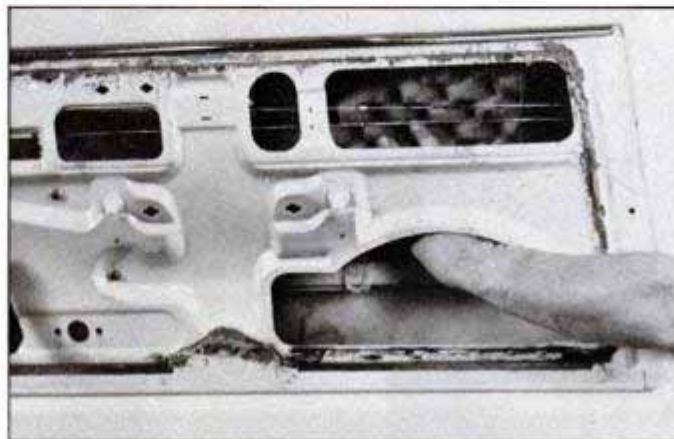
Dense foam rubber sheets that are glued to the bulkheads in your car will cut down on the noise level of the vehicle. The foam should resist heat up to at least 220° F. You may find it necessary to reroute speaker or harness wires.



Apply glue to the foam as well as to car's metal surfaces. Let the glue get tacky before installing the foam sheet.



In areas hidden by trim panels, expanding foam urethane provides temperature and sound insulation. Use it sparingly.



Test-fit the foam panels and operate the lock mechanisms and window winders before the final gluing. Make sure the foam doesn't interfere with any of these.

ENGINE REBUILDERS SWEAR BY US. NOT AT US.

When an engine needs a major overhaul, a lot of mechanics take it straight to Chet Staron.

He runs what a lot of people say is the best engine rebuilding service in the business.

But even he admits he occasionally makes a mistake.

"Some years ago, when we rebuilt an engine, we didn't worry too much about the oil filter we put in.

After all, an oil filter is an oil filter, right?

So we put in a cheap brand.

Boy, were we wrong.

We had problems with leaking gaskets.

Problems with contaminants.

Problems with engines that blew up.

And, even bigger problems with the mechanics who brought us the engines in the first place.

So, we thought, maybe it was worth paying the little extra it took to buy Fram.

Boy, were we right.

We haven't had an oil filter problem since."

If you have a car, take a tip from Chet.

Next time you change your oil, spend the few cents extra it takes to buy a Fram filter.

After all, isn't it better to spend a little more now? Instead of a lot later?



Chet Staron, President,
Top Line Automotive Engineering, Chicago.

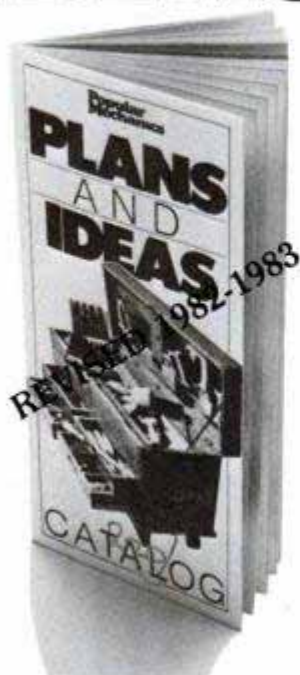


Fram and Autolite are Bendix Companies
Fram Corporation, Providence, Rhode Island 02916

SMART IDEAS

'83 CAR CARE GUIDE

BODY



If you're looking for ideas to save time and money — while enjoying what you're doing — send away for PM's catalog immediately.

We have plans for shop tools, boats, storage houses, campers. Scuba tow, ACV, log splitter, air compressor. Smart ideas in furniture! Also dollhouses! Projects the whole family can enjoy.

And best of all — we offer a special and unique service — photocopies of past PM articles. What's more, we tell you the year the projects were published. It may be as early as a 1902 glider to a most recent 1981 solar garden shed. You'll have fun just browsing through the approximately 900 different plans and projects. You'll find our GREAT WORKSHOP series listed. Also our SHOP MINI-COURSES. Timely energy-saving ideas! You'll see it all in our new POPULAR MECHANICS PLANS AND IDEAS CATALOG.

Price \$1.00

NEW EDITION
order today!

Send Your Name and Address with Check or Money Order to Popular Mechanics, Box 1014, Radio City Station, New York, N.Y. 10101

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



Before installing foam under the hood (left), check for clearance with engine parts. Foam shouldn't come in contact with engine pieces. To prepare the surface for adhesive, degrease or paint as necessary. Because of rust and acid deposits on the stiffening ribs (below), this hood needed repainting. The masked-off area, however, was still in good condition.

cone Adhesive/Sealant to the metal and the foam. Wait a few minutes before bonding the foam. This lets the adhesive get slightly tacky.

After the glue has dried, use a razor to finish cutting the foam. If you have engine timing or emissions specifications labels glued to the hood, you can either try to remove them and transfer them to an inner fender, or do as we did, leave a hole in the foam to keep the specs visible.

You can apply the same techniques for soundproofing the trunk lid and the trunk wall. The inside of door and body panels can also be soundproofed.

When you're working with a door you need to be more careful and precise than with a hood. Make sure the foam won't interfere with lock and window-winding mechanisms.

Don't install the foam right to the bottom of the door. Leave a gap of an inch to two. If there is leakage in the future, this will allow water to drain out of the drain holes.

In rear panels with fixed glass, you can use the foam sheets coupled with Geocel Expanding Foam Sealant. This sealant comes in 12-oz. bottles; won't give off any toxic fumes, which is important in a closed car; and is fire resistant up to 250° F. One inch has an R value of 5.

Don't be overenthusiastic using the Geocel. Not only does it expand as it comes out of the spray can, but it expands as it cures, a process that takes several hours. If you've applied too much of the foam sealant, wait until it cures and trim the excess.

Geocel foam sealant is available locally in hardware and home improvement centers or directly from Geocel or from Ain Plastics (see Sources). **PM**



Rough-cut the foam sections and test-fit. Apply the adhesive, install, and trim the foam after the adhesive has dried.

Shoulda Had-a HAYDEN



This Family's Transmission Failed!

The same scene is repeated thousands of times every day.

Why? Because today's downsized cars run hotter due to emission controls, smaller engines and higher RPMs. Heat problems develop when you carry extra passengers . . . extra baggage . . . drive in stop-and-go traffic . . . drive on ice or snow . . . drive in hot temperatures . . . climb steep grades . . . and do towing.

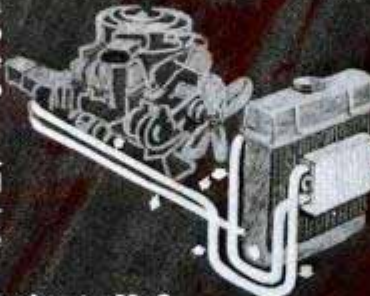
Could My Transmission Fail? Yes. Over 12 million transmissions failed last year*. Nine out of ten transmissions and engine failures can be traced to overheating.

How Do I Prevent It From Happening to Me? A small investment now in a Hayden oil cooler can double the life of your car's transmission and engine. Remember, every 20°F drop in oil tem-

perature doubles oil and equipment life. Transmissions repairs run \$400 to \$1200.

Can I Install A Hayden Oil Cooler Myself?

Yes. If you can change the oil in your car, you can make the installation yourself in a half hour using Hayden's patented Quik-Mount and Quick Connect. Complete illustrated installation instructions come packaged with every oil cooler.



Where Do I Buy One? See your local auto parts store, automotive chain store, RV dealer, mechanic or installer today and ask for Hayden oil cooling protection. The car's life you save may be your own.

Send today for free product brochure to discover What's-A-Hayden.

*Courtesy ATRA (Automatic Transmission Rebuilders Association).

 **HAYDEN** INC.

1531 Pomona Road, P.O. Box 848, Corona, CA 91720

Hayden Trans-Cooler prices start as low as \$29.95. To receive direct ordering information call toll free outside CA 1-800-854-4757 or (714) 735-4900.

Listen for us on CBS RADIO NETWORK

How To Solder-Splice And Use Heat-Shrink Tubing

According to the letters we receive addressed to *Car Clinic* and the phone calls we get every day, electrical problems seem to be the most aggravating kind of all to fix. Oil leaks, fouled plugs and rust are easy to spot and fix, but "invisible" electricity still stumps a lot of people.

The following section will not cure all your electrical problems, but it will go a long way toward assuring you that your wires, grounds, contacts and connectors are giving the juice a clear, unobstructed path.

First the good news. Technological fallout from the aerospace industry has had a beneficial impact on cars. Aerodynamics, plastic composites, lightweight metals and computer-aided design and analysis have found their way into cars already in your driveway. But Solder-Sleeve splices and TAT (Thermofit Adhesive Tubing) are not yet used. We're the first to show you how to use these new wonders.

The bad news is that you can't find them at your local hardware store or your local anything. Up to now the only place you could find them was on the Lunar Lander, the Space Shuttle and the F-16. However, by special arrangement with the manufacturer—and it took some arm-twisting—PM readers can get some of these hyper-technoid goodies by mail. We'll tell you how later. First, let's get to using it.

Solder-Sleeve is the patented trademark of Raychem Corp. for a heat-shrinkable plastic tube which has a small ring of solder. Using it is easy.

Strip the ends of the two wires you need to splice. Grab the appropriately sized Solder-Sleeve connector and insert a wire in each end so they overlap, making sure the solder ring is placed smack in the middle of the overlapping wires. Apply heat from a heat gun and watch it go to work.

The tubing will shrink on either end of the solder ring first. The solder ring will then melt and flow onto the wires, soldering them together.

It takes 125° F. to melt the solder, so a conventional hair dryer won't work. You'll need a heat gun, the kind used in



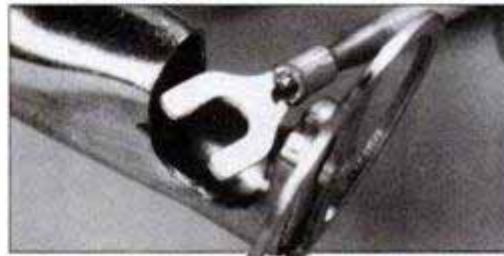
High-output heat gun and some special tips are all you'll need. Shown are some that are available from the tubing maker.



Solder-Sleeve comes in a variety of sizes that fits any automotive application. To install, strip the wires and insert them into the tube. Make sure the wires overlap and that the solder ring is located in the middle of the overlapped wires.



Heat from the gun will shrink the tube (above) and a few seconds later will melt the solder (above, right). It does as good a job as soldering iron, but it's neater. To solder a wire to a connector (right), apply just enough heat to shrink the tube. Then tilt connector downward and apply heat directly to it. The heat will pull the solder into the connector.



WORTH WRITING FOR

LOOKING FOR IDEAS ON CAR CARE, HOME HINTS, TOOLS, FISHING AND MORE? CHECK THESE LISTINGS. THEN USE THE COUPON BELOW.

682 Ping Free

The new patented Reg Rite valve controls engine hesitation, surging and ping. Simple installation. Information package. \$1.00 (Refundable with purchase)

683 Lube Tips

An informative 32-page booklet from the Shaler Company provides information and tips about problems, performance and lubrication of today's automobile. Also includes product information. Free

684 Tools For Traveling

Color brochures from I.D. Ratherby illustrate many 12-volt tools that are perfect for your car, boat, RV, or airplane. Included is a unique 12-volt workshop-in-a-suitcase that can go with you anywhere. Free

685 Let Your Finger Do The Searching

With an automatic/programmable scanner, a simple tap of your finger gives computer access to frequencies used by your local police, fire, emergency and weather service. Full color brochure from Regency Electronics. Free

686 Tire Info To Keep You Rolling

Vinyl document holder for your glove compartment contains tire care information and product literature on T/A High Tech Radials. From BFGoodrich. \$1.00

687 Unfoillable Oil

Quaker State offers an information booklet to help you select the right automotive motor oil. Explains how different operating conditions and driving situations require different motor oils. Free

688 Take The Wheel To Your Future

northAmerican Van Lines offers the opportunity to take control of your future. Run your own business as an owner/operator. Investment required. Complete information kit. Free

689 Keeping Diesels Happy

Tips on keeping your diesel car, pickup or van in tip-top running condition. Describes diesel operation and proper fuel and lubrication selection. From Kendall. Free

690 Power Of A Personal Computer

Four-color brochure describes the Commodore 64, offering computer power at half the price. Includes descriptions, comparisons and specifications. Plus program information and add-on features. Free

691 Knock No More

Brochure from Carter highlights their Engine Knock Eliminator, an automatic knock suppression system that can protect your engine and save you gas dollars. Includes application and installation information. Free

692 Auto Electronic Systems Manual

Step-by-step instructions for troubleshooting all the domestic electronic ignition systems and engine controls. It's all in a new 36-page service manual from Fram/Autolite. Plus detailed charts and wiring diagrams. \$2.95

693 Dealing With A Clean Deck

Dust, pollutants and other impurities can interfere with your enjoyment of your home entertainment system. Brochure describes cleaning products for records, audio cassette decks and video cassette recorders. From Allsop. Free

694 The Cool Solution

9 out of 10 transmission failures are caused by overheating. A brochure from Integrity Transmission Coolers explores the advantages of an automatic transmission cooling pan. Free

695 The Reel Fishing Story

The 1983 84-page, full-color catalog from Daiwa features a full line of fishing tackle. Included is the Daiwa Tackle Selector© to help you perfectly match Daiwa rods and reels to the kinds of fish you want to catch. Free

696 You Could Be Racing!

The excitement of big-time racing on a mini budget. Information on "Karting" includes engines, parts, history, and associations. Also listing of over 500 tracks and discount prices direct from the original "Bug" Kart factory . . . K & P Mfg. \$3.00

697 Down Under

1983 catalog shows a complete line of sportfishing sonar products and hints on how to choose the right equipment. From Lowrance, an industry leader for over 25 years. Free

698 Make Your Car A Nicer Place To Drive

136-page full-color buyer's guide from Cal Custom features a full range of auto parts and accessories for 1983. Includes engine and wheel accessories, gauges, mirrors, auxiliary lights and more. \$1.00

699 Power Plus

Test result package from Edelbrock shows how your V8 can come alive with Performer Products. Increase both torque and fuel efficiency. Free

700 Tools, Tools And More Tools

All 196 pages of the U.S. General Supply catalog are filled with over 6,000 name brand tools and handyman supplies. Discounted prices too! \$1.00 (Refundable on first order).

701 Control Moisture Inexpensively

Hub States offers a booklet describing "Damp Out"SM a new chemical dehumidifier. Attracts moisture from the air. Works continuously for 12 months to two years. Free

702 Home Improvement Help

188-page catalog from Scotty's offers over 9,000 low cost home improvement and building supply products. Everything you need for home handiwork. \$2.00

703 Don't Be Bugged!

Informative brochure highlights the development of Muskol, a full strength DEET insect repellent. Muskol repels mosquitoes, black flies, chiggers, ticks and gnats. Free

704 Let The Sun Shine In

"Greenhouse and Solarium Buyers Guide and Planner" tells you what you should know about energy-saving home additions. Filled with ideas and pictures illustrating these living and growing spaces. From Lord & Burnham. \$2.00

705 Catalog Of The Unusual

New, fun-filled 1983 catalog of 1600 hard to get novelties. Includes outdoor items, hobbies, sports, science, electronics, models, gadgets, and much more. From Johnson Smith Co. 10¢

706 Car Care . . . At Your Fingertips

If you drive a car, you need POPULAR MECHANICS' MASTER KEYS TO CAR CARE. This information-packed series of illustrated brochures contains step-by-step instructions to help you maintain your car and keep it looking like new. Convenient size makes this valuable guide the handiest tool in your car care kit. Only \$4.95

Popular Mechanics 5/83
Box 1718, Sandusky, Ohio 44870

This Coupon Expires July 31, 1983

Please see that I receive the items checked below

<input type="checkbox"/> 682 \$1.00	<input type="checkbox"/> 687	<input type="checkbox"/> 692 \$2.95	<input type="checkbox"/> 697	<input type="checkbox"/> 702 \$2.00	Total money for priced items \$ _____
<input type="checkbox"/> 683	<input type="checkbox"/> 688	<input type="checkbox"/> 693	<input type="checkbox"/> 698 \$1.00	<input type="checkbox"/> 703	
<input type="checkbox"/> 684	<input type="checkbox"/> 689	<input type="checkbox"/> 694	<input type="checkbox"/> 699	<input type="checkbox"/> 704 \$2.00	Service Charge \$ _____50
<input type="checkbox"/> 685	<input type="checkbox"/> 690	<input type="checkbox"/> 695	<input type="checkbox"/> 700 \$1.00	<input type="checkbox"/> 705 10¢	Total money enclosed \$ _____
<input type="checkbox"/> 686 \$1.00	<input type="checkbox"/> 691	<input type="checkbox"/> 696 \$3.00	<input type="checkbox"/> 701	<input type="checkbox"/> 706 \$4.95	Total items requested _____

Name (Please Print) _____

Address _____

Town _____ State _____ Zip Code _____

(Please send cash, check or money order made out to POPULAR MECHANICS. No stamps, please.)

Note: Popular Mechanics processes your requests for the above information and forwards these inquiries to the organization making the offer. Each company mails the material directly. Your order will be on its way to you within 90 days.

various construction jobs, to make the Solder-Sleeve work. To solder a wire to a connector, you follow the same procedure, except you apply heat to the connector, not the Solder-Sleeve.

Slip the Solder-Sleeve over the wire, slip the wire into the connector and place the solder ring between the exposed wire and the connector. Heat the Solder-Sleeve just to the point of shrinking the plastic. Then place the connector in front of the heat gun and hold the wire slightly higher than the connector. This will heat the connector, melt the solder and draw the solder into the connector.

In one operation you'll have a soldered connection which is insulated and sealed tight to water, road grime, grease and lubricants. The Solder-Sleeve will remain resistant to impact brittleness down to -131°F . and fire resistant to 257°F .

Solder-Sleeve, by the way, happens to be the only splicing procedure NASA allows on the Space Shuttle.

Heat-shrink tubing has been around for quite a while, and, like everything else, there's the good stuff and the not so good. Thermofit Adhesive Tubing is the best. Unlike conventional heat-shrink tubing, TAT has an adhesive coating on the inside. When the tube is heated and shrunk, the adhesive melts over the wire's insulation and cools to a semirigid state. This gives whatever it's covering environmental protection as well as mechanical strain-relief. In other words, if you were to pull on the wire, you'd be applying stress to the insulation and the heat-shrink, not directly to the electrical connection.

This tubing is designed for continuous use in temperatures ranging from -67°F . to 230°F . At 250°F . it will begin to soften up a bit and the adhesive will begin to flow. However, it would take a direct flame to get it to deteriorate. And even then the material will vaporize rather than melt and burn like conventional PVC (Polyvinyl Chloride) heat shrink. Furthermore, PVC tubing will release toxic gases, which you don't want in case of a fire in your dashboard.

The material in TAT is a selectively cross-linked, dual-wall Polyolefin. On the molecular level this looks like a suspension bridge, with the horizontal cables and roadway selectively linked to vertical cables. The vertical cross-links are what give this tubing its durable qualities.

Using TAT is even easier than using the Solder-Sleeve splices. Cut it to size, slip it over whatever you want to pro-



The recommended method for insulating a Y-type connection is to use the heat gun to shrink two legs of the Y, which have been fitted with the appropriately sized tubing.



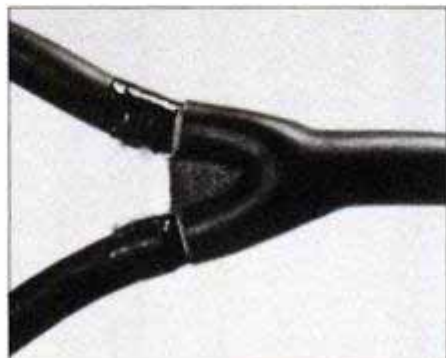
Slip a third piece over the "trunk" and overlap the two previous pieces of tubing by at least $\frac{1}{4}$ in. Apply heat.



While the tubing is still soft from heat, spread the legs and crimp the tubing in the middle with needle-nose pliers.

tect, and apply heat from the heat gun. Since it shrinks to half its size, use a size twice as large as the wire or wires you need to protect.

If you need to protect a Y-type of splice or connection, you can do it in three steps (see the photos above).



Hold the needle-nose pliers to the tubing until the adhesive has cooled and dried.

The only possible disadvantage to using heat-shrink tubing is the need to cut it apart to get to the middle of a bundle of wires. However, the other side of the coin is the fact that the need to get to a failed wire will probably be eliminated simply because you've insulated it with the tubing. The probability of a failure will be almost zero.

If you ever do need to get to wires, you can remove just a section of heat-shrink tubing and simply slip on another length to make a patch.

As we mentioned earlier, Raychem will make these products available to PM readers. Write to Raychem Corp., Devices Div., 300 Constitution Drive, Menlo Park, Calif. 94025, Attn.: Popular Mechanics Car Care Guide.

They'll send you free of charge a complete product description, specifications sheet, prices and ordering instructions. **PM**

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

SOFT PACK 100's FILTER, MENTHOL: 2 mg. "tar", 0.2 mg. nicotine av. per cigarette by FTC method.

Competitive tar levels reflect either the Dec. '81 FTC Report or FTC method.

NOW. THE LOWEST OF ALL BRANDS.

© 1982 R. J. REYNOLDS TOBACCO CO.

8 mg

5 mg

4 mg

5 mg

6 mg

7 mg



We've got your number.

NOW

THE LOWEST

CONFIRMED BY THE LATEST U.S. GOV'T. REPORT ON TAR



S-660. More fire

**For the first time ever,
tires built for the street
beat tires built for racing
to grab a major pro class win
at the 24 Hours of Daytona.**





from Firestone.

Talk about making history fast. Fresh out of the chute, in its American debut and first race ever, Firestone's European designed and produced S-660 radial did what no other street tire has ever done before. Grab the checkered flag in a major pro class at the 24 Hours of Daytona. The toughest Daytona ever, as torrential rains red flagged the race for the first time in its 21 years, and as over 60% of the field packed it in along the way.

But wet or dry, the S-660, modified only by shaving to racing depth, ran like a champ all the way. Speeds over 160 mph, over 2,000 total miles,

with no tire failures of any kind — making it a number one finish in class and 12th overall for Dave Kent's RX7 Mazda and the racing team of Lee Mueller, Terry Visger, and Hugh McDonough. And leaving a lot of tires built just for racing behind. That's real proof of performance from a tire you can buy.

The S-660. European H-speed rated. More fire from Firestone. Check it out at your Firestone retailer along with Firestone's full line of specialty and performance tires. At Firestone, we build radials competition tough. And the proof is in performance.



Firestone
OUR PROOF
IS IN PERFORMANCE.

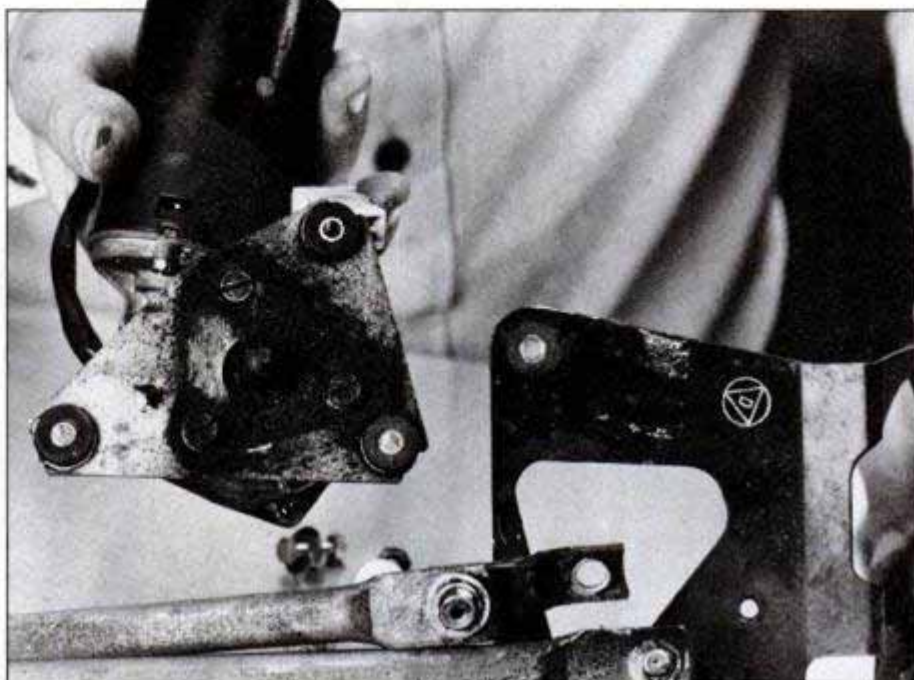
Protecting A Wiper Motor

Electro-mechanical components like a wiper motor are subject to the mechanical wear of the moving parts as well as contamination on contacts that can cripple the component. The following is a guide to what can be done to protect power windows, power seats, wiper motors, pop-up headlight mechanisms and other power components.

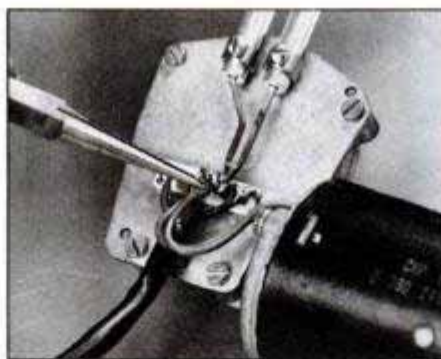
First, inspect the entire mechanism for wear and contamination. Clean off all dirt with a degreaser or Electric-Motor Kleen (see CRC in Sources) if the motor needs tidying up. If wires are cracking or brittle, remove them and replace them with fresh wires of the same gauge. In our case, we found the lack of a gasket in the motor housing allowed grime to enter the motor. We made a gasket using 3M pliable gasket material.

Lubricate all the moving parts with lithium grease or a wet Teflon lubricant (Ain Plastics). Teflon is neater than grease and doesn't attract dirt as easily. Uninsulated, exposed electrical connections can be potted with Flexane room-temperature-curing urethane. Depending on the ratio of hardener to resin, it will cure to a durometer hardness between 74 to 90. For this application, softer durometer hardness is better.

When you reassemble the unit, apply a locking compound (Loctite) to all fasteners. This will prevent their backing out. Clean and resolder connectors if necessary and protect the wiring bundle with heat-shrink tubing. **FM**



This wiper motor assembly was headed for imminent failure. It was suffering from grime, corroded electrical connectors and loss of lubricant in the moving parts.



Old, corroded electrical wires should be removed and new wires of the correct gauge should be soldered back in place.



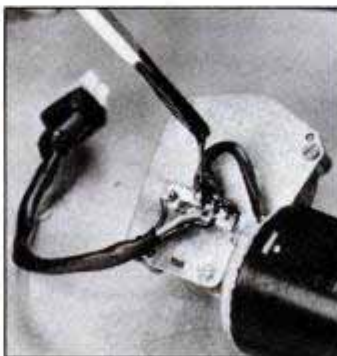
This electric motor housing didn't have a gasket. The poor seal let in dirt. A gasket was made with gasket material.



Corroded spade lugs in connector should be cleaned with wire brush. If it is necessary, resolder the wires.



Mix only enough urethane for job at hand. Read instructions carefully so that you mix the proper ratio of catalyst.



Dip exposed electrical connections in urethane, then let it dry completely before handling the assembly.



Use a locking compound on fasteners when reassembling unit. Vibration can cause fasteners to work loose.

How To Install Silicone Sparkplug Wires

Because of their location, the amount of heat they must tolerate and the work they do, sparkplug wires are subject to a lot of deterioration. They lose their effectiveness, but that's not visible. They look alright, but they could be arcing or not providing a strong enough spark to do the job. Your first indication of this is a loss of performance and an increase in fuel consumption.

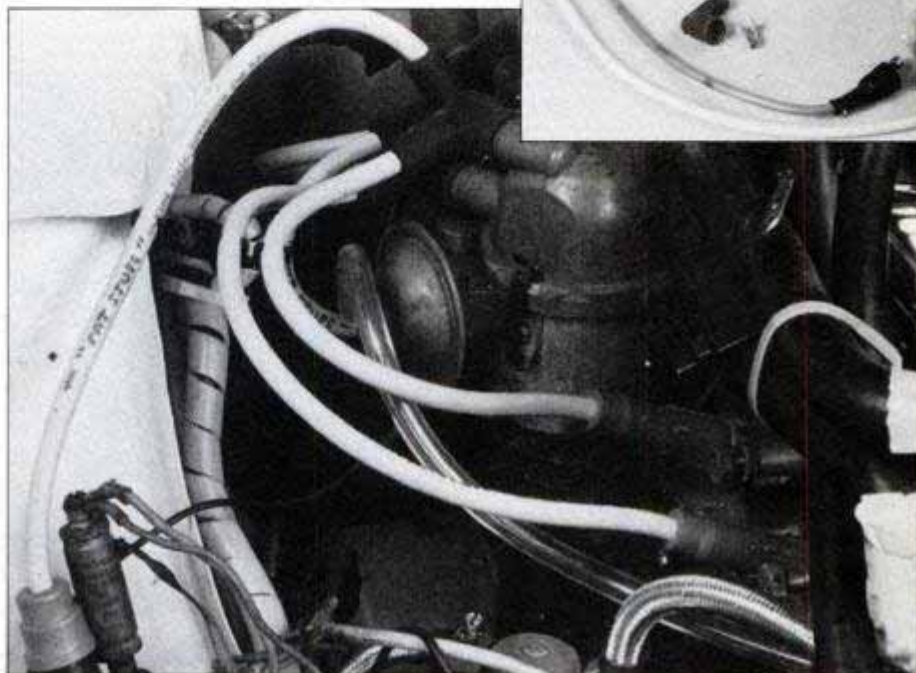
Silicone-insulated sparkplug wires are superior to conventional wires because they resist heat and cold better and remain pliable and brittle-free at these temperature extremes. They last two to three times longer than conventional wires.

Installing a set of silicone wires is no harder than installing conventional plug wires. In most cases, you can buy ready-made sets for your car. If not, you can cut them to size by buying a bulk roll with enough boots and tips.

The most delicate operation is removing the insulation, while not cutting any of the wire strands. To do a good job, make a few practice cuts before attempting to do the entire set. Remove only one old plug wire one at a time and use it as a guide for cutting the silicone wire to the correct length.

Cut off a half inch of insulation and bend the wire back over the insulation. Then slide the terminal connector over the bent back wire and crimp the connector gently with a pliers. Don't crimp it completely with the pliers. With your set is a crimping tool made specifically for this job. Clamp the lower end of the tool into a vise, place the wire and connector in the tool and, with the other half of the tool, crimp the connector tightly by hitting gently with a hammer. The crimping part of the connector should crimp tightly around the insulation and the mating surface of the connector should be flush against the bent-back wire.

When ordering a bulk set like this, specify the right boot and connector angle for your car. Check your needs before buying. We used Accel Fat Stuff Silicone wire. Accel is the most available source for this type of wire. **FM**



A silicone sparkplug wire set will last longer than original-equipment sparkplug wires because wires stay pliable and brittle-free at extreme hot and cold temperatures.



With a sharp knife, slice off about a half inch of insulation. Don't cut any strands of wire while trimming.



Bend the wire back over the insulation and gently crimp the connector over the wire with a pair of pliers.



Start by placing the lower half of the crimping tool in a vise and then insert the connector carefully into the tool.



Place the second half of the tool over the connector and tap the crimp in place with a few light blows of a hammer.

**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. ©Copyright 1982 U.S. Optics™



Only \$7.95

World Famous Pilot's Glasses

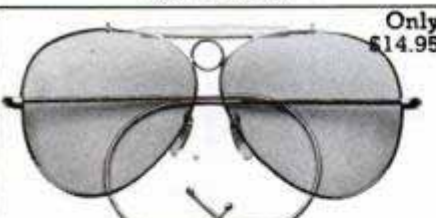
These precision flight glasses are now available to the public for only \$7.95. If you could buy them elsewhere, they'd probably cost you over \$20.00. #20P available in gold or silver frame. A \$20.00 value only \$7.95. Two pairs for \$14.00.



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 your U.S. Optics™ sunglasses, send check or money order to U.S. Optics,™ Dept. 510, 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 _____

Credit card orders may call 1-404-252-0703.

Visa or Master Charge # _____ Exp. Date _____

Name _____

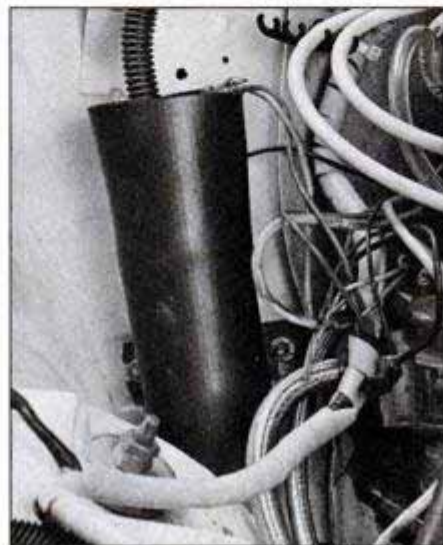
Address _____

City _____ State _____ Zip _____

FREE case with each pair.

'83 CAR CARE GUIDE ELECTRICAL

Protecting Your Coil, Distributor And Wiring Harness



Foam Neoprene boot installed around the coil will keep it dry, and dirt, engine and road grime off it. Note the coil wire is protected with Convolex tubing.



To make a boot, lay the coil on a sheet of foam, cut it to size and install snaps (above). Leave a notch in the boot to clear the coil-mounting bracket.



In the past few years some of the more expensive Japanese cars have been using neoprene boots on the coil and distributor. This is an excellent idea. You can make your own from small sheets of 1/8-in. neoprene (Ain Plastics) and a snap fastener installation kit.

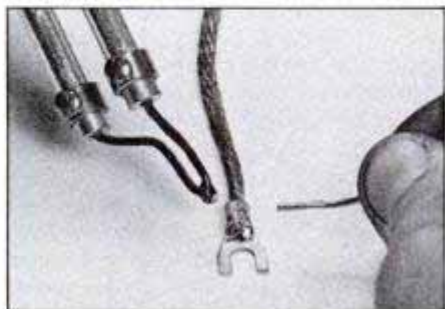
Remove the coil and distributor cap, place them on a sheet of neoprene and cut it to size. You'll need to make relief notches to clear the plug wires (distributor) and mounting bracket on the coil. Sparkplug wires should be sheathed

with Convolex tubing (Raychem). Protect the wiring harness with spiral wrap (Ain Plastics) or Convolex.

Large ground cables for batteries should be mounted with a stainless-steel fastener. Smaller diameter corroded ground wires should be replaced with copper ground straps. These are at most electrical hardware suppliers or motor rebuilders. Custom fabricate them with good-quality lugs (Vaco) and insulate with heat-shrink tubing. **FM**



This battery ground cable is protected with spiral wrap, installed with stainless.



Small ground straps should be of copper, soldered to connector and heat shrunk.

NOTICE!

FROM THE MOTOR POOL



MARINE SURPLUS SALE!



BRAND NEW CAR, JEEP & TRUCK ACCESSORIES

(still in original cases) to be offered to the public starting midnight, tonight!

Starting midnight tonight—Marine Surplus Depot will accept orders directly from the public for the following motor pool parts and accessories, so long as limited supply holds out. Items being released at this time are:

STORMPROOF, HEAVY-DUTY CAR, JEEP & TRUCK TARPS

A "Portable Garage"—each is a huge 25' x 12' constructed of heavy gauge, high density polyethylene with 8 reinforced grommets to insure tie-down protection from rain, sleet, snow, dust, dirt or salt spray. Guaranteed stormproof, waterproof, rotproof, mildewproof . . . strong enough to withstand ocean storms . . . big enough to cover any car, jeep, station wagon, pick up truck or van. Also great to protect boats, motorcycles, machinery, firewood, barbecues and lawn furniture. LIMIT: 5 per address. #101 Only \$8 each.

MARINE NIGHT DRIVING GLASSES

Cuts out headlight glare-blinding sun—even lets you drive through fog or snow with night owl vision! Special lenses make dim, hazy objects suddenly appear movie-screen clear. A must for every glove compartment. LIMIT: 3 per address. #102 Only \$9 a pair.

GIANT (OVER 7 FEET LONG) SHIPS HAMMOCKS

FOR RELAXING—SUN BATHING—OR PLAIN, OLD 'BACKYARD SNOOZING' SIMPLY HOOK ONTO TREE . . . POLE . . . FENCE . . . OR SIDE OF HOUSE AND GENTLY SWAY BACK AND FORTH LIKE A BABY ROCKING IN A CARRIAGE. LONGER AND WIDER THAN A KING-SIZE BED . . . SOFT AND GENTLE AS SLEEPING ON A CLOUD! Constructed of heavy-duty shipworthy nylon . . . easily supports 3 children—an average-size couple—or a football player of up to 350 pounds! When not in use, folds down to the size of a face towel . . . for easy storage in a drawer or car's glove compartment. Fully weatherproof . . . salt-spray resistant . . . built to withstand even heavy ocean conditions. Once up, no need to ever take down. Ideal for home, (indoors or out) . . . for camping, picnicking, beach—for deck of private boat—or to keep in trunk of car for use at any time, any occasion. FULL SATISFACTION GUARANTEED, or purchase price refunded at any time. But they are going fast; to make sure you do not miss out on this 'direct-from-the-depot' sale, ACT NOW! LIMIT 5 per address. #112 Only \$9.

MECHANICS 107-PIECE TOOL SET

Ideal for home, car, truck, boat, aircraft! Each of these mechanic-quality, "Motor-Pool" type socket wrench and tool sets is a complete outfit—a shop itself with just the tool ready for just about any repair job that comes along. Designed to last a lifetime for cars, trucks, farm equipment, diesel engines, gas engines . . . 107 pieces all stored in their original, heavy-duty metal, fitted carrying case. 7-Pc. screwdriver & tool set. 4-Pc. cold chisel set. 5-Pc. open end wrench set. 14-Pc. drill bit set & case. 1 metal carrying case. 1 reversible ratchet. 18-Pc. ignition wrench set. 1 screwdriver/tool handle. 15-Pc. hexagon set. 9-Pc. "L" handles for socket drives. 1 drive socket adapter. 6-Pc. nut drive set. 23-Pc. assorted size drive & socket set. 1 drive & socket set holder. 1 vinyl case socket wrench holder . . . 107-Pc. set. LIMIT: 3 per address. #104 Only \$19.95.

PILOTS FOLDING SUNGLASSES

Designed of high quality precision engineering . . . features aviator styling . . . fine, gradient lenses designed to protect against ultra-violet radiation . . . precision corrected for true 20/20 clarity . . . fog resistant . . . comes in black zippered softer than suede case to protect your folding aviator glasses when not wearing them. Demand at this unbelievable price is simply crazy! LIMIT: 5 per address. #105 Only \$9.95.

POWER-WINCH LIFTER LIFT A FULL TON WITH JUST 2 FINGERS!

Marine Seaman's Power-Hoist . . . small enough to fit in glove compartment . . . strong enough to lift 2,000 pounds—or tow a car out of a ditch—as easy as you reel in a fishline! Simply hook or strap one end of this MARINE SUPER POWER HOIST to any crate . . . outboard motor . . . freight . . . furniture . . . logs . . . fencing . . . construction material . . . even a car engine . . . ANY LOAD WHATSOEVER . . . and just simply wind away with just 2 fingers! Built in system of synchro ratio-gears and pulleys does all the heavy lifting for you. Makes pounds feel like ounces! Comes with 65 feet of power lift cable; double grip safety hooks, heavy duty welded rings; lifetime rustproof rollers and rustproof cadmium housing. Wide variety of civilian uses: for car towing, lifting, moving, machine shop work, fencing, boating, camping, etc. LIMIT: 3 per address. #106 Only \$9.

MARINE PORTABLE AIR-PUMP COMPRESSOR—WITH BUILT-IN GAUGE. SIMPLY STEP ON THE POWER-PEDAL . . .

HUGE CYLINDER AND RAM-JET PISTON deliver up to 100 lbs. pressure instantly! Like having a service station air hose on call all the time. Inflates: auto, truck, bike and motorcycle tires. Air mattresses, rafts, beach toys . . . footballs, basketballs, balloons. Comes with mounted calibrated, precision pressure gauge with big sweep hand indicator needle for easy read-out. Also features flexible 24-inch air hose . . . airtight, automatic lock tire clamp PLUS free set of nozzles and valves to fit all inflatables. Lightweight . . . folds down to size of small auto-jack. Shipped in original carrying case. No car or home should be without one. LIMIT: 3 per address. #107 Only \$12.

SURPLUS COTTON TOWELS

Ideal for home, ship, garage, car, boat, beach and picnic too! All brand new . . . never used—still in original cases! Same type as sold in stores for up to 5 times this 'Direct From The Depot' price! Heavy Duty, Super Absorbent, 100% fully woven white cotton towels for only \$9 per case (comes packed 12 to the case). Each is ideal for all your cleaning needs around the home, in rec room or shop, to keep in car, take on boat, or use at the beach on picnics, camping or hunting! Completely machine washable . . . shrinkproof . . . these big, 22" x 14" thirsty towels spread out to over 300 sq. inches!—bigger than a large-size newspaper page! Super strong and super absorbent, they are recommended for all sorts of civilian heavy-duty and handyman clean up uses. Guaranteed for 5 years even under toughest conditions and repeated washing. OR free replacement at any time. A wonderful opportunity to stock up and store away for future use while still available at this incredible price. LIMIT: 10 cases per address. #108 Only \$9 per case (12 towels to the case)

Mail No-Risk Coupon Today

MARINE SURPLUS DEPOT, Dept. NTCH-4
Box 9300, Port Washington, NY 11050

Please RUSH me the following Marine Surplus Depot item(s) indicated below. If I am not completely thrilled and delighted I may return within 14 days for a full refund (less postage and handling, of course).

QTY	ITEM #	DESCRIPTION	UNIT PRICE	POSTAGE HANDLING	TOTAL PRICE
	101	Portable Garage Tarps	\$8	\$2	
	102	Night Driving Glasses	\$9	\$1	
	112	Giant Ships Hammocks	\$9	\$2	
	104	107 Piece Tool Set	\$19.95	\$3.00	
	105	Folding Sunglasses	\$9.95	\$1	
	106	Power Winch Lifter	\$9	\$2.00	
	107	Portable Air Pump	\$12	\$3	
	108	Cotton Towels	\$9 case	\$2	

CHARGE TO (Minimum \$15) VISA MasterCard TOTAL ORDERED \$
 No C.O.D.'s please Exp. NY residents add sales tax \$
 Credit Card # _____ Date _____ TOTAL ENCLOSED \$
 NAME _____
 ADDRESS _____
 CITY _____ STATE _____ ZIP _____

Clean-Scrubbed Mountain-Fresh Air—All the Time!

Clean Ace Yanks the Dirt, Dust, and Smoke Right Out of the Air... Then Literally Manufacturers New Clean Air.

CLEAN ACE isn't just an improvement on the old ionizers or filters. It's the result of totally new technology.

This Air Cleaner uses only 14 watts of power. It's whisper-quiet. It's compact and attractive.

But under its good-looking exterior thrums a mighty, powerful, industrial-strength heart. As it gathers the dust and pollution in the room, it disinfects and cleans the air, actually replacing dirty air with ozone-clean fresh air.

Kills Air-Borne Germs and Mites

The CLEAN ACE Air Cleaner has a built-in ultraviolet light. This special lamp radiates on two separate wavelengths.

The first, lower wavelength converts the oxygen molecules in the air to ozone, destroying odors as though a hammer is smashing the offending molecules.

The second, high wavelength kills not only germs but also the tiny "mites" that can be so irritating (and socially unacceptable). You might notice an immediate **decrease** in the number of runny noses and colds. It's no accident.

Will you Actually Feel Better?

We think you'll feel better because the air will be so pleasant and refreshing to breathe. Many, many people report the disappearance of their tiredness and general irritation when the air is properly ionized.

An opinion is one thing; a fact is another. The ability of the CLEAN ACE to kill germs and airborne pests is a **fact**. The feeling of well-being you get from fresh ozone is a **fact**. The oxidizing effect ozone has on bad-smell molecules is a **fact**.

Of course the CLEAN ACE is absolutely safe. The special ultraviolet quartz-glass tube doesn't transmit the high-range rays that can redden the skin. The unit plugs into any wall outlet, and because it "creates" fresh air you don't have to open a window.

Unbelievable POWER

The home-size Model 8200 CLEAN ACE is 11" wide, 7½" high, 5" deep. It weighs only a couple of pounds. It makes no noise.



The home-size CLEAN ACE Model 8200 cleans the air in an average room in about 10 minutes.

Can you believe it will clean the air in an average room in about 10 minutes? Can you believe it works with every window shut and the heater or air conditioner on? Can you believe you'll be able to see the ugly black particles from your room the CLEAN ACE has trapped in its super-efficient filter?

You'd better believe it.

You don't assemble anything. We'll include a descriptive booklet, but there's nothing to learn: just press the "On" button and let it run.

END EMBARRASSMENT FOREVER!

If someone is bedridden, somehow odors start to accumulate. Never again!

If even two or three people smoke at a party, the air is blue with smoke. Never again!

If you have a meeting in your office or conference room, after a while the air is heavy, even foul. Never again!

If you're cooking, the aroma of fish, shrimp, lamb, and many vegetables seems to hang there forever, gradually changing from "aroma" to "smell." Never again!

Now—

A CLEAN ACE for Your Car!

The Model 1000 mounts under the dashboard or sits on the seat. Plug it into the cigarette lighter, and smog, pollution, grime, and stale air never will touch you.

What a difference clean air will make when you're driving around town or when you're stuck bumper-to-bumper in rush hour traffic, where normally you'd be inhaling the carbon monoxide from the exhaust of the car in front of you!

If someone is a smoker, instead of driving around with smarting, burning eyes, turn on your CLEAN ACE Model 1000 and forget that cigarette or cigar is lit.

COMFORT IS AS NEAR AS A PHONE CALL

We've seen old-fashioned air cleaners which lack the space-age technology of the CLEAN ACE, selling for up to \$245. New Horizons is a direct-factory source, and you'll be able to own this **high-powered** air cleaner for far less than you'd expect to pay in a store—if they had it.

Here's how to order:

The powerful home-size CLEAN ACE Model 8200 is yours for just **\$139.95**, plus \$4.50 for shipping.

The powerful automobile-size CLEAN ACE Model 1000 is yours for just **\$119.95**, plus \$4.50 for shipping.

Send check, money order, or credit card information (VISA or MasterCard) and we'll ship your CLEAN ACE Air Cleaner immediately.

We Absolutely Guarantee!

After you have your CLEAN ACE, plug it in and use it for up to a full month. If for any reason you don't want to keep it, send it back for a full refund, no questions asked.

Home-Size CLEAN ACE,

Model 8200 — **\$139.95**

Car-Size CLEAN ACE,

Model 1000 — **\$119.95**

add \$4.50 per total order for shipping

For instant service, if you have a VISA or MasterCard, call toll-free 24 hours a day, seven days a week:

1-800-824-7888

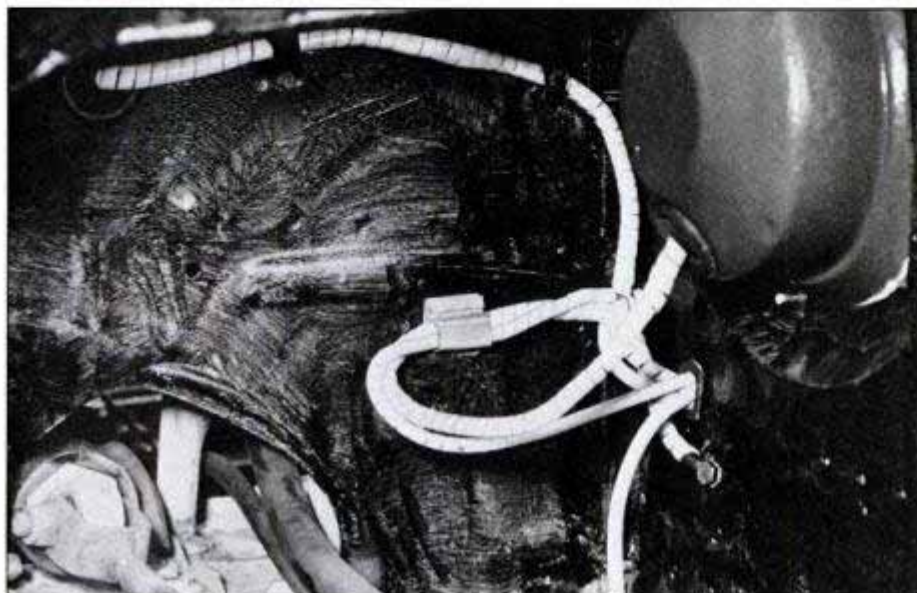
Ask for Operator 551.
(in California: 1-800-852-7777)

The CLEAN ACE is another electronic marvel from

NEW HORIZONS

DEPT. PMS, 1 Penn Plaza, Suite 100
New York, NY 10119

Troubleshooting Headlight Wiring



Although this section deals with headlight wiring, use it as a guide to do the rest of your electrical system. The first step is to remove connectors from their plugs and solder the wires to the connectors. They usually only come crimped from the factory. The entire length of the wire up to the connector should then be heat shrunk. If there is a bundle of wires, use a plastic tie (check Vaco Products in Source list) to keep them together.

If the wires are exposed to the elements and subject to road abrasion, you can take the added precaution of using spiral-wrap plastic sheathing (Ain Plastics) or Convolex tubing (Raychem) to shield the harness.

If there is slack in the wiring, pull it out of the way of moving mechanical pieces and secure the slack with clips (Vaco). These clips are a one-piece, molded-plastic design with locking ribs which allow you to open the clip in case you need to move the wires out of the way to service the area.

When you mount the clip, use a nut and bolt instead of a sheet-metal screw. Screws inevitably work loose and fatigue the metal when you repeatedly retorqued them. Bolts with Nylock washers are the best bet. **FM**



Soldered, wire-tied, heat-shrunk, spiral-wrapped and firmly clipped, these headlight wires are invulnerable to anything you and road can dish out. After this, they're maintenance-free for life. Connectors (left) should be removed and soldered, then installed in the plug and heat shrunk. Plastic wire tie is added to provide extra strain-relief.



To keep dangling wires clear of mechanicals, drill a hole and install a clip. It's best to use a nut and bolt, not a screw.

WORLD'S FINEST FLASHLIGHT

VERIKAM \$29⁹⁵
(Lifetime Guarantee) ANY SIZE PPD



This could be the last FLASHLIGHT you'll ever buy!
Money-Back Guarantee

- From spotlight to floodlight with just a twist of the wrist
- Cringed throughout for maximum water resistance
- Shatter proof beam lens and reflector
- Totally sealed, self-cleaning, quiet, button switch
- Blue-anodized, aircraft-grade aluminum
- Serial numbered for positive identification
- Spare bulb in the tailcap of every D-cell flashlight
- Available in 2 cell thru 6 cell (C or D)

Spotlight or Floodlight
Just 1/4 Turn

Color Brochure \$1/Flashlight \$29⁹⁵ any size p.p.c. Money Order Only
(All orders shipped within 24 hours)
Send to: NATIONAL FLASHLIGHT P.O. Box 771218 - D Houston, TX 77272

THE COMPLETE CAR CATALOG



JUST PUBLISHED FROM AUTOMOTIVE PUBLISHERS, INC.!!!

Never has there been such a useful collection of information for the automotive enthusiast. Parts and accessory sources, special services, clubs, and magazines are listed for practically every car from the Model A Ford to the exotic Lamborghini Countach.

This source book provides an easy to read reference to over 4,000 catalogs, services, magazines and organizations from around the world. A wealth of information, well organized, with index and cross references for every category.

It includes the most complete Buyers Guide of kit cars, kits for cars, custom automobiles and electric vehicles ever compiled! Over 400 vehicles and kits are each pictured with the address of the mfr., phone no., complete description and specifications.

THIS BOOK IS A MUST FOR THE AUTOMOTIVE ENTHUSIAST! Whether your chariot is American, an import, a classic or kit car you will find this book indispensable! Not only does it list kit and custom vehicles found no where else; it also gives instant access to those hard-to-find parts, accessories and services otherwise unobtainable!

• 8-1/2 x 11 size • Over 400 pages

AUTOMOTIVE PUBLISHERS, INC.
P.O. Box 12763 PMS, Gainesville, FL 32604
Please send me promptly _____ copy(ies) of Automotive Publisher's new release, *The Complete Car Catalog*, I enclose \$12.95* per copy plus \$1.75 shipping & handling.

Name _____

Address _____

City _____ State _____ Zip _____

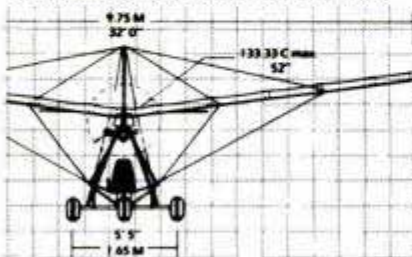
* Money back guarantee if not completely satisfied
© 1982 Automotive Publishers, Inc.

The Legend . . .



QUICKSILVER MX
THE ORIGINAL

The Eipper Aircraft Quicksilver is the one that started it all . . . it's the original . . . a legend. Over the last eleven years the Quicksilver has become the most



widely imitated aircraft design in the ultralight industry. Why? Because it is the best!

Today the engineering excellence of the Quicksilver MX represents the result of constant research and development of the Quicksilver over those past 11 years. The stable flight maneuverability of the MX, its precision engineered aircraft aluminum airframe, and three-axis flight controls make it the finest, most docile, entry level ultralight made in the world.

Don't settle for an unproven, poorly made imitation. Buy the best. Buy the original and be a part



of the Legend . . . Quicksilver MX.

Contact your nearest Eipper Aircraft dealer for complete details* or send \$4 for a complete brochure package.

Eipper
aircraft inc.

World's Largest Manufacturer of Ultralight Aircraft

1080-M Linda Vista Dr., San Marcos, CA 92069
(619) 744-1514 Telex: 499-0565

*No F.A.A. pilot license required. Special dealer flight training required. Quicksilver MX available as a kit or dealer assembled.

'83 CAR CARE GUIDE ELECTRICAL

How To Install A Rubber Antenna

Commercial communications equipment, like the kind used by police departments, have used rubber antennas for years. But the product is now available for cars, thanks to a Swiss firm which introduced the new line this year. The advantages of this kind of antenna are obvious. They'll never rust and can't be bent or broken.

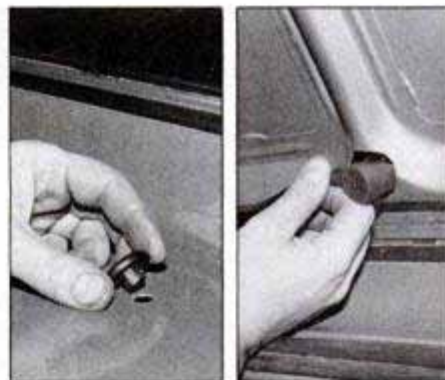
You can install a rubber antenna in your existing antenna mount. This is a straight swap installation. Due to their design, however, it's possible for you to install them on virtually any sheet-metal surface.

Spot the hole with a centerpunch and drill a 1/16-in. pilot hole. Drill the mounting hole with a 1/2-in. hole saw or body punch. File down the rough edges with a second cut file. Protect the raw hole with red primer and install the base of the antenna with the hardware provided in the kit. Attach the lead to your radio or CB. The antennas are already calibrated for either AM/FM reception or CB. Specify the particular kind you need before you make your purchase.

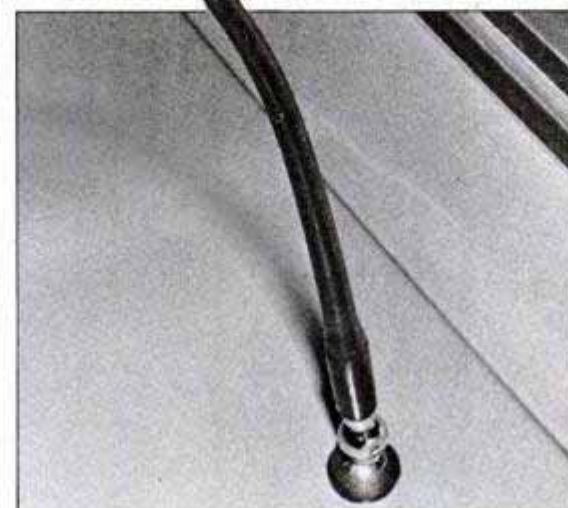
The antennas, from Fomo Products (Spycher & Beck Div., Box 4261, Akron, Ohio 44321), come in a variety of side mounts or flat-



Spot the hole with a centerpunch and drill a 1/16-in. pilot hole (above, left). Drill a 1/2-in. hole with a hole cutter (above, right). Deburr jagged edges with a file and coat edges with metal primer.



Install mounting base and fasten it with the nut and lock-washer provided in the installation kit (above, left). Attach antenna lead and rubber insulation boot and run it to radio or CB (above, right).



Once it is installed on your car, rubber antenna should last for years. It won't rust or break.

surface straight mounts and will cover just about any application. The rubber material in the antenna won't become brittle in cold weather. It's so flexible, in fact, that you can actually tie the antenna in a knot and still manage to get decent reception.

Mass distribution is just getting under way, so local auto stores may not have them yet.

Your best bet is to write to the main distributor and order direct, or ask where the antennas are available locally. Final pricing wasn't firm at press time, but they should cost about \$10 each. **PM**

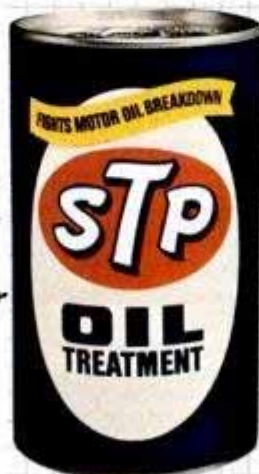


STP[®] Oil Treatment fights motor oil breakdown.

Parts of your car's engine can reach 450 degrees Fahrenheit after only 10 miles of driving. This kind of intense engine heat weakens your oil's vital protective properties. That's motor oil breakdown.

STP Oil Treatment fights motor oil breakdown. Here's how:

STP scientists specially formulated STP Oil Treatment to strengthen your oil's high



temperature performance properties. To put extra lubricants and antiwear agents to work... just where they're needed. STP contains a special chemical additive, ZDDP, that helps reduce engine wear, oil oxidation, bearing corrosion and engine sludge. Whenever you change or add oil, get STP Oil Treatment and fight motor oil breakdown.

Depend on STP proven performance. 

©1983 STP Corporation, an ESMARK Company, Boca Raton, Florida 33431

Carol Extension Cords: for people who are hungry for power.



Get all the power you can handle. With Carol 2 and 3 conductor cords in 25', 50' and 100' lengths. And with Carol's complete line of household and appliance cords, UL listed extension cords, trouble lights and 3-outlet Powr-Center® extensions.

Join the growing army of people who rely on Carol electrical and automotive products for power. Look for the Carol name at your local retail outlet. Carol Cable Company, Inc., Pawtucket, RI 02862; Los Angeles, CA 90058.



CAROL

It's never been easier to change your own oil.



At last, an oil change pump that's totally portable, plus easy and convenient to use! The new Power Max 12V oil changer can be used at home, at the dock, or at the airport — anywhere you want to change your dirty oil and not have to get under the engine. It is small in size, measuring only 4" x 3½" x 6½", weighs only 2 lbs, yet has the power to pump 2 quarts per minute. Plugs onto any 12V marine or car battery and comes with a 47" power cord.

A tough plastic case houses a rotary pump specifically designed to pump oil. You get a 43" reinforced braided suction hose, the dipstick suction tube, a 63" output hose, and other needed fittings. Simply insert the suction probe into the dipstick tube, and with a flip of the switch you'll be able to say good-

bye to dirty oil — a most important preventive maintenance step. Comes with a one year warranty and our 30 day no risk trial period. You must be satisfied or your money back.

ORDER TOLL FREE.

Truly a professional unit, available only by mail. Order NO. 884007. Visa and MasterCard holders call TOLL FREE or send a check or money order for \$49.95 plus \$3.00 delivery and handling. California residents add 6% sales tax.

800 854-8471

In Calif. 800 472-8456

I. D. RATHERBY

18480 Bandilier Circle, Dept. SB
Fountain Valley, CA 92708

Call for our free brochures of other products.

CAR CARE GUIDE '83

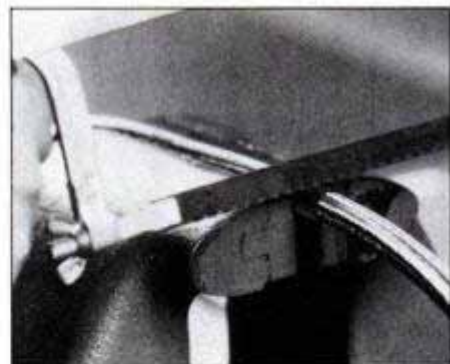
How To Install Stainless-Steel Braided Hose

Stainless-steel braided hose has long been the standard for the aircraft industry and the hose of choice for any serious race team.

It has outstanding pressure and abrasion resistance and the synthetic material doesn't soften or become brittle at either end of the temperature spectrum.



Before cutting the hose, wrap it with electrical tape or duct tape. This keeps the steel from fraying while you cut.



Clamp the hose loosely in a vise if you're cutting it with a hacksaw. Use a fine-toothed hacksaw to minimize fraying.

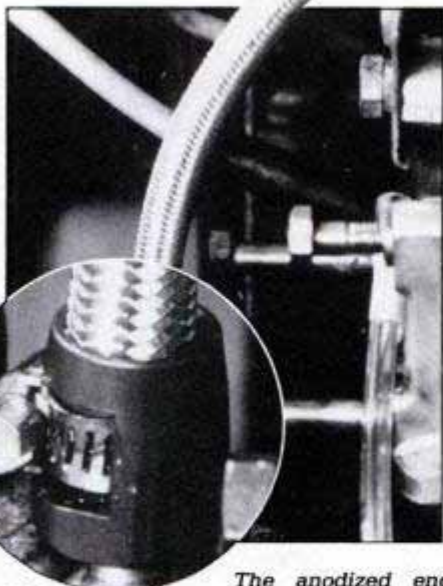
Depending on connector fittings and diameter, the hose will withstand pressure up to 2,000 p.s.i. without fatiguing.

In a passenger car application, this hose is stressed so lightly that it will last virtually the life of the car. Once it has been installed, it can be ignored, except for checking clamp tension. The hose itself will never decay.

To replace a conventional hose with stainless braid, cut it to size with an abrasive cutoff wheel or a very fine-toothed hacksaw.

Before you cut, wrap a piece of duct

STOP THE KNOCKS, SAVE AT THE PUMP.



The anodized end fitting contains a conventional worm screw hose clamp. This is perfectly adequate for virtually all street cars.

tape or electrical tape around the tube to keep the strands of stainless steel from fraying.

No special fitting needed

Racers and aircraft applications use a special—and expensive—threaded fitting to attach the hose. You won't need to. A low-cost clamp with an anodized aluminum fitting is all you need. Slip this fitting and clamp over the head of the hose and install it.

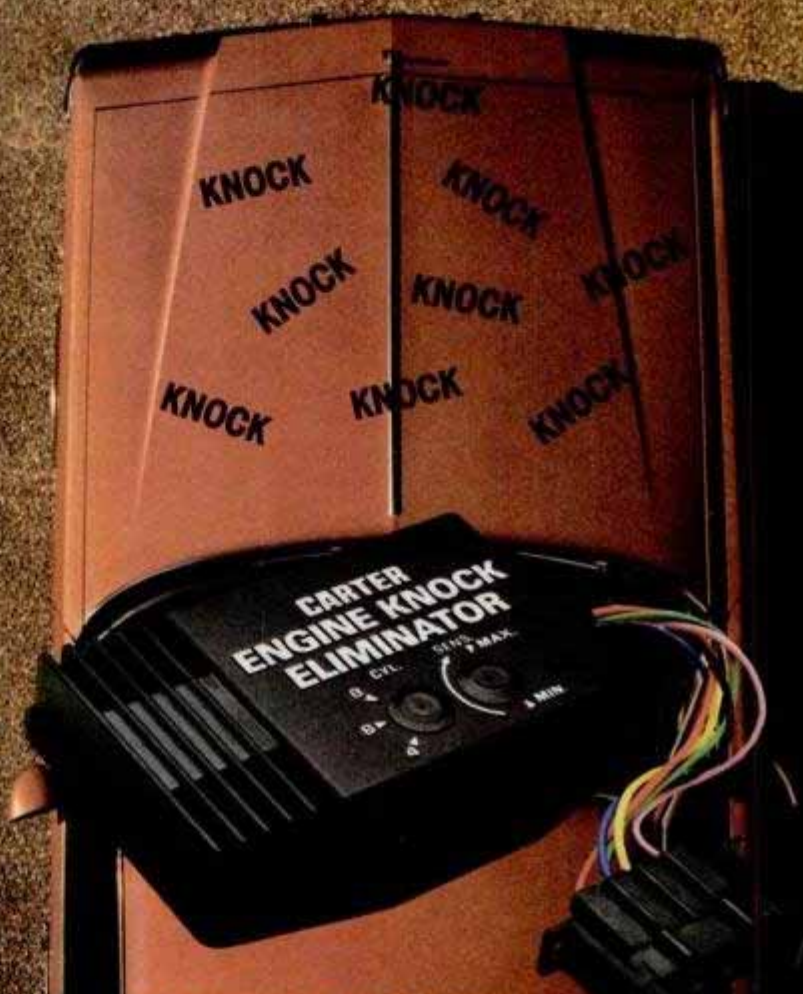
We used Earl's stainless-steel braided hose and fittings, but several others market a similar product (see Sources). Local hot rod shops carry a variety of hoses and fittings.

For any given diameter, stainless hose is stiffer than synthetic rubber hose and, therefore, will not bend as easily.

When you replace the rubber hose, don't use it as a guide for the length of the stainless hose except in a straight run application. The stainless will have to be cut longer. Test the length before you cut. **PM**



Install the aluminum end fitting and attach the hose. Tighten the clamp the way you would a normal hose clamp.



Here's the easy way to stop annoying and damaging engine knocks without switching to high-priced premium fuels.

Meet the Carter Engine Knock Eliminator™. This electronic whiz senses an engine knock and then temporarily retards the spark to stop it. You can install the unit yourself using ordinary hand tools. Fully guaranteed, it comes complete with installation instructions in both English and Spanish for most domestic and import gasoline engine cars.

Eliminating telltale knocks protects your engine from excessive wear and damage. Best of all, the more you drive the sooner the Carter EKE pays for itself at the pump. Look for it in automotive departments near you, or return the attached coupon for free detailed information. Waiting will only cost you money.

Carter Automotive Division, 9666 Olive Street Rd.
St. Louis, MO 63132 Attn: I. Murphy

Name _____
Address _____
City _____ State _____ Zip _____

© 1982 by ACF Industries, Inc.

CARTER

PM

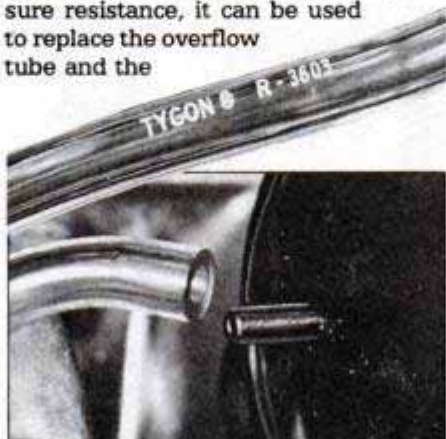
Replacing Vacuum Hoses

With the proliferation of vacuum hoses in today's cars, the chances for vacuum-related malfunctions or performance problems increase. Often, what may seem to be a major problem turns out to be nothing more than a few loose or cracked vacuum hoses. Heat, cold and fuel and lubricant contamination conspire to crack conventional vacuum hoses and you only know it when a problem occurs.

You can prevent vacuum leaks by replacing the existing vacuum hoses with Tygon tubing made by Norton and sold by Ain Plastics (see Sources).

Tygon tubing has been used extensively in chemical plants, sewage-treatment facilities and refineries. The main advantages are that the tubing remains pliable and crack-resistant in high and low temperature extremes, and will

shrug off oil and lubricant contamination and ozone deterioration. And, because it also has excellent pressure resistance, it can be used to replace the overflow tube and the



High-quality Tygon tubing can be used to replace all the vacuum lines of your car as well as the radiator overflow tube and windshield washer tubes.

windshield washer tubes. When you retrofit this tubing, remove one line of existing tubing at a time and install the Tygon. If you remove everything at once you'll never remember how to replace the maze of vacuum lines in most cars.

Ain Plastics will send you a catalog listing all the tubing sizes and performance characteristics. Tygon comes in a variety of inside and outside diameters and various wall thickness, so before you order, measure these three dimensions of your vacuum hoses.

When installing this tubing you'll want a snug fit on the connectors.

Also, make sure you make sharp, vertical cuts in the tubing. A bevel or "bologna cut" on the end of the tube might cause a leak and prevent proper seating of the tubing. The best tool for making the cuts is a new, single-edged razor blade.

FM

Kendall Super DSL.
The first motor oil formulated exclusively for automobile diesel engines.

Super DSL's diesel-tough friction fighters and rugged anti-thickening agents stand up to higher diesel compression and hotter diesel temperatures while they help your diesel start on cold mornings.

Next time you change oil on your diesel van, pickup or car change to Kendall Super DSL.

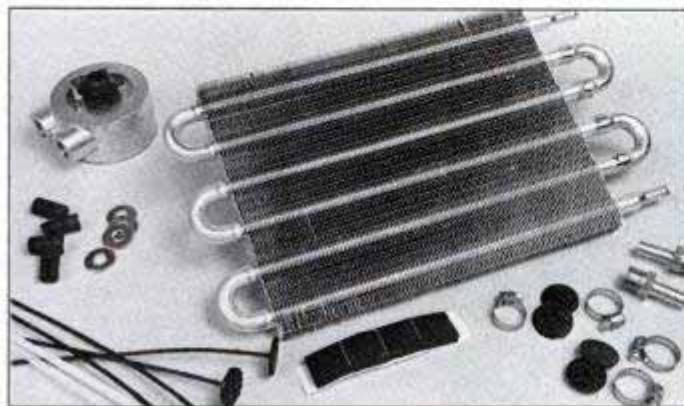
Free from Kendall: A pamphlet with tips on diesel maintenance. Write Kendall Refining Co. Bradford, PA 16701, Attn: Advertising Dept.

Kendall

KENDALL REFINING CO.
Div. of Witco Chemical Corporation
Bradford, PA 16701



How To Install An Oil Cooler



Good oil cooler kits come complete with all you'll need for the job. Before ordering, specify the type of car, engine size and type of driving you'll be doing. For severe off-road, towing or high-performance use, you may need larger capacity unit.

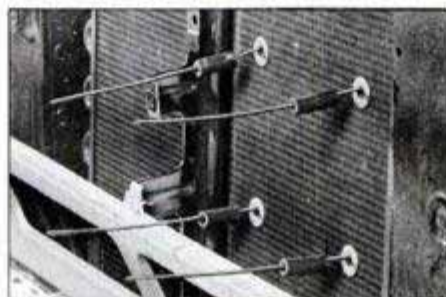
Installing an oil cooler is one of the biggest favors you can do for your engine. It works just like a radiator, passing oil through metal tubes which are interwoven through a patch of cooling fins. An oil cooler reduces the temperature of the oil (which keeps it from breaking down) and extracts the maximum lubrication potential.

The cooler is very easy to install. Most oil cooler kits, like the Hayden unit we used, come with a complete installation package and a variety of adapters and fittings to adjust to most cars.

The first step is to remove the oil filter and install the sandwich adapter on the oil filter fitting on the engine block. Smear the gaskets of the adapter with oil before screwing it in place. The filter is then attached to the adapter.

The hose fittings should be put on the adapter before installing it on the engine block. Wrap the threads of the fittings with thread tape first to ensure a tight seal. Attach the oil lines with hose clamps and run them to the radiator.

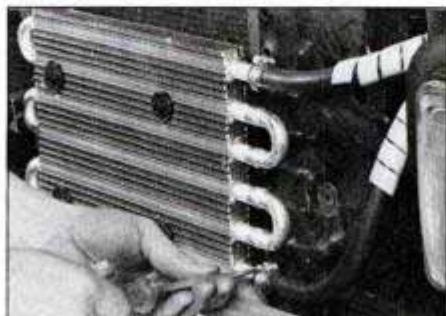
The oil cooler is attached directly to the radiator by using knobbed nylon ties and locking collars. Thread the ties through the radiator, then thread them through the oil cooler and push the locking collars tightly against the oil cooler. Cut off the excess nylon ties. Attach the oil lines, check that all fittings are tight and start the engine. Make sure there are no oil leaks. If tightening doesn't stop the leaks, check your work for mistakes. **PM**



Nylon ties are threaded through the radiator. In this case, we needed to use extra washers and spacers for clearance.



Wrap adapter fittings with thread tape before installing them on engine block. This will ensure a leak-tight seal.



Nylon ties are threaded through the oil cooler and locking collars are pulled tight. Cut any excess off the ties.

NEW!
ADJUSTABLE VACUUM ADVANCE KIT!

Increases Power, Economy, Helps Stop Engine "Ping"!

Here's a new way to tailor your car's ignition system to your specific driving requirements... Crane Cams' new Adjustable Vacuum Advance Kit for GM "HEI" and breaker-point distributors (Delco-Remy).

This new kit allows you to actually tailor the rate of advance with a specially designed, adjustable vacuum diaphragm canister that installs in place of the stock unit. It's not only easy to install, but yields increased power, responsiveness, and fuel efficiency, plus helps stop engine "ping" (detonation) due to incorrect advance "curve."

For General Motors "HEI" systems through 1980 and all pre-HEI Delco-Remy "window type" point distributors.

*Not legal for sale or use in California on pollution controlled motor vehicles.

CRANE Cams CC268A
P.O. Box 160, Hallandale, FL 33009

THE GAGE CAR MANUFACTURERS LEFT OUT

Plug-In Volt-i-Cator Checks Car Batteries, Regulators, Alternators, & Charging Systems, and tells if your car needs a tune-up.

The easy to read Volt-i-Cator warns you before trouble disables you or return within 10 days for full refund. Just \$19.95 includes postage and handling. Made in U.S.A.

Send to: **Be-Sure**
P.O. Box 500 • Painesville, Ohio 44077

Check or Money Order PM-5-83

Name _____
Address _____
City _____ Zip _____

SPORT TRIKES, LTD. INTRODUCES:

... Two new and exciting recumbent trikes that everyone can afford. Extremely comfortable, fun transportation. Easy to assemble or build. Comes in single or two-seater styles. Fun for the whole family.

Brochure: \$2.00
Road Test Report: \$1.00
Single-Seater Plans: \$7.50
Two-Seater Plans: \$8.50
Please specify TR-1 or TR-2 when ordering.

Sport Trikes, Ltd.
P. O. Box 867 Dept. PM
Kanab, Utah 84741

How To Install A Gauge Panel

BURRO Fiberglass Travel Trailer Kit
Build Yourself! Save Gas



TRAILER FOR THE '80's—Burro Travel Trailer kit sleeps four. Under 1,000 lbs. Fiberglass. Ready to tow. Finish interior only. Write Burro PMS 14143, 21st Avenue North, Plymouth, MN 55441. For full color catalog send \$3.00 to cover handling. Rental Opportunities

CLOCK COMPONENTS



Battery, Pendulum, Chime Quartz, Urgos, Hermie, Grandmother, Grandfather, Westminster, Triple Chime, Key Winds, Bell Chimes, Bim-Bam, 400 Day, Weather Instruments, Music Box Movements, Clock Kits, Metal, Bezel, Paper Dials, Case Hardware, Brass & Plastic Numbers & Markers. Hundreds of items. Quantity Prices. Send \$2.00 for 75 Page Catalog. Refunded on \$20.00 Order.

NEWPORT ENTERPRISES INC. Dept. P.S.
2313 W. Burbank Blvd., Burbank, Calif. 91506

BUILD YOUR OWN RUGGED AMPHIBIOUS VEHICLE



- Carries two men and gear across land or water to those hard to reach lakes, rivers, or campsites.
- Never get your feet wet again.
- Simple proven method.
- Inexpensive to build.
- Build for fun or profit.

• Only standard hand tools are needed.
• All materials can be purchased at your local hardware and shops. © 1983

Anyone can build from step by step fully illustrated plans: Send \$9.95 to:
Amphibious Enterprises Co.
P.O. Box 355 Newark, Ohio 43065

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 \$19.95
Dy. Inc. Avail.

Super Powerful Wireless Mic

10 times more powerful than other mics. Transmits up to 1/4 mile to any FM radio. Easy to assemble kit. 15V battery (not incl.)
Call (305) 725-1000 or send \$19.95+ \$1.00 shipping per item to USI Corp., P.O. Box PM-2052, Melbourne, FL 32901. COD's accept. For catalog of transmitters, voice scramblers and other specialty items, enclose \$2.00 to USI Corp.

ONE-MAN Sawmill

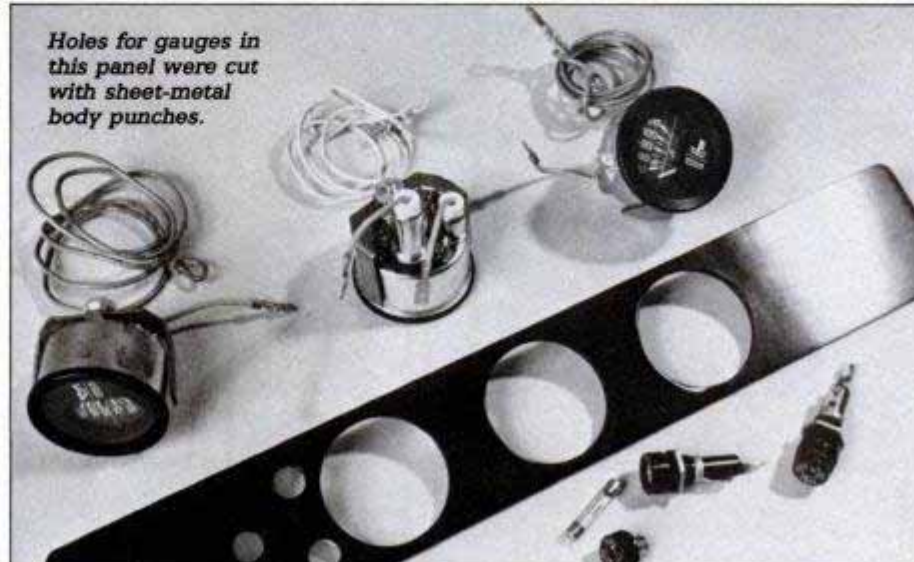
The Only ONE-MAN PORTABLE SAWMILL
Of Its Kind In The World

Don't let inflated lumber prices stop your important building projects. The Sawmill goes right to the trees and turns out smooth, true-cut lumber... even beginners get excellent results. Just one man (no crew needed) can easily cut enough on weekends to save hundreds of dollars over high lumberyard prices. Use as little as 25 horsepower. Factory-direct selling keeps price low, and convenient time payments may be arranged.

Rush coupon today for Free Booklet "How To Saw Lumber."

Foley-Belsaw Co., 30166 Field Bldg., Kansas City, MO 64111
Please send Free Booklet with full details. No obligation, and no salesman is to call. © 1983

Name _____
Address _____
City-State _____ Zip _____



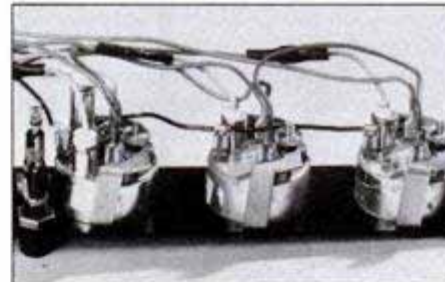
Holes for gauges in this panel were cut with sheet-metal body punches.

For decades, automakers have been reluctant to install real gauges on dashboards. Instead, idiot lights have been used. In recent years, gauges have begun to show up more, however.

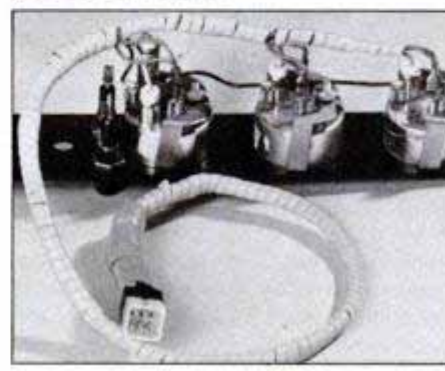
You can install a custom-made dash panel, as we did, or save some money by using premade panels from manufacturers such as Stewart-Warner. These panels are usually installed above or below the dashboard.

In either case, the installation of the gauges is similar. The working parts of a gauge unit are the sending unit and the gauge itself. The sending unit is installed in the existing fitting of the warning light sending unit. In most cases the old unit is removed and the sending unit for the new gauge is installed. This is a straight swap operation. The gauge is then hooked up to the sending unit by a wire. Two other wires, a hot lead and a ground wire, are then connected to the gauge. The hot lead should be a switched source that's activated with the ignition system.

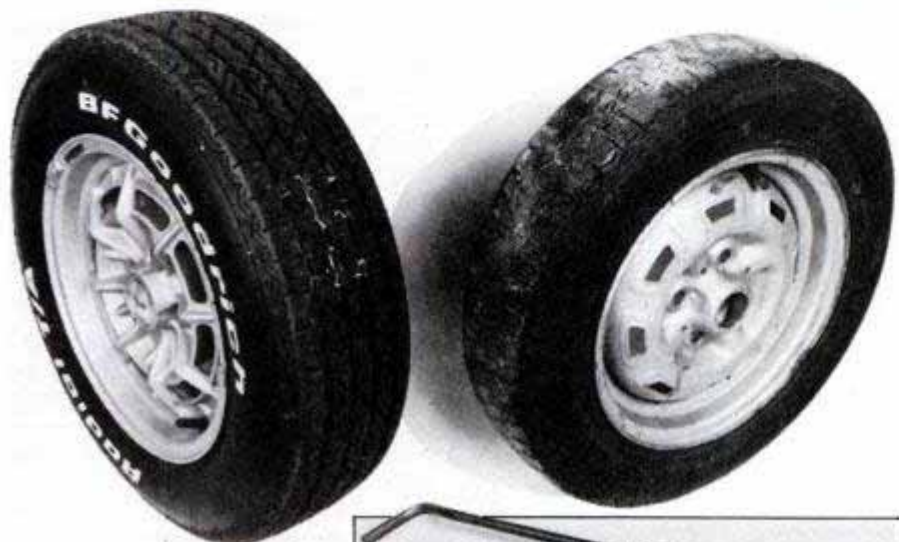
Whenever you add any form of wiring to a car, always add a fuse to the circuit. If you're installing more than one gauge, use a common ground and common hot wire for all of them. A Moldex-type plug lets you remove the package as a unit. **FM**



In a multigauge panel, use a common hot lead and ground wire (above) to reduce bulk. When wiring is completed, insulate the bundle with heat-shrink tubing (left). Solder all connections. For access, use auto harness plug (below).



Retrofitting Tires And Wheels



Wider replacement tires can aid your car's handling. Aftermarket tire (above, left) is contrasted with original-equipment tire (above, right). Antiroll-bar kits (right) come with good bushing, hardware.



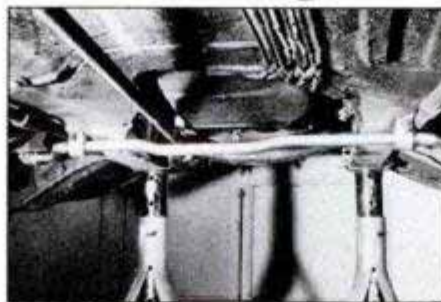
Ugrading your car's suspension by retrofitting bigger tires and wheels and installing antiroll bars will definitely improve your car's performance and safety.

A wider wheel on the car will also marginally improve the treadlife due to the fact that the car's load is more evenly distributed across a wider footprint. The wider footprint will make your car hold the road better and, in most cases, stop quicker.

Well-tuned antiroll bars, also called stabilizer bars, that are designed in concert with a larger tire, can completely transform a car's handling. You might sacrifice something in ride quality, but the car will be easier to handle.

Just how much larger to go in tire size and stabilizer bar size is a matter of specifically tuning those items to your car. Suspension-tuning firms (see *How The Pros Rebuild A Car*, page 117) have done a lot of research and can suggest a specific make and size of tire and bar for some cars.

Before you make any kind of suspen-



Most antiroll-bar installations are simple. Bar is mounted to the body and the ends are bolted to control arms.

sion modification, make sure your existing suspension is in good shape. Check the shocks and the condition of ball joints and suspension bushings. If they're worn or in marginal condition, the added load imposed by bigger tires and antiroll bars will hasten their demise. At worst they might cause a failure. In any event, marginal components won't let you derive the maximum benefits of the new pieces.

Suspension-tuning information is now available from some manufacturers. Chrysler, Ford, Chevy, Buick and Pontiac all have performance divisions that will outline the steps necessary to fine-tune your suspension. **PM**

FOR BIG PAY AND JOB SECURITY LEARN MEAT CUTTING



Train for a bright, secure future in the meat business. Become a professional meat cutter in eight short weeks at Toledo, with America's leading instructors. Our 60th year. Thousands of successful graduates. Many have profitable markets of their own!

Diploma awarded. Job help. Time payment plan available. G.I. accepted. Send now for our big, illustrated FREE catalog. No obligation.

NATIONAL SCHOOL OF MEAT CUTTING
Dept. 50-O, 33 N. Superior, Toledo, Ohio 43604
Ohio State Board of School and College Reg. #71-02-01977

WHAT'S HE DOING!

Making a Concrete Flower Pot! ... and SO CAN YOU!

Make and sell your own Ornamental Concrete items. Rush \$5.00 for Book about Aluminum Molds with prices and production trade secrets direct from world's largest mold manufacturer. Over 350 designs to select from.

Send \$5.00 **CONCRETE MACHINERY COMPANY**
Today To ➔ P. O. BOX A99 - HICKORY, N. C. 28601



Gas to Electric Conversion Kit

GAS LAMP BURNS \$72 TO \$120 OF GAS PER YEAR. OUR CONVERSION KIT OPERATES ON 1/2 THE COST OF GAS. Easy to install 2-bulb fixture duplicates the charm and increases the light output of any gas light. Includes automatic On At-Dusk - Off At-Dawn photo electric control. Available in 12 volt or 115 volt.

FOR MORE INFO WRITE:

Gaslight Conversions, Inc.

1039 CHARLES AVE. ST., PAUL, MN 55104

BUILD YOUR OWN JET HELICOPTER EASY TO FLY—INEXPENSIVE TO BUILD!



- Carries one person-plus
- Simple hand-tool assembly
- Uses low-cost fuel

Plans—completely illustrated: \$9.00

The HELICOPTER HOBBYBOOK

Includes Plans for building a piston-engine-powered Helicopter (illus.): \$8.00.



BOTH ABOVE BOOKS: only \$14.00

HELICRAFT, Inc.

P.O. Box 16488

Baltimore, MD 21217

LEARN CLOCK REPAIR

EARN BIG MONEY • WORK AT HOME • BE YOUR OWN BOSS FOR DETAILS SEND \$1.00 TO



NATIONAL CLOCKMAKERS INSTITUTE

P.O. BOX 448, LEWISTOWN, PA. 17044



RECONDITION JUNK AUTOMOTIVE BATTERIES

Make BIG MONEY with your own spare time home business! Huge demand creates immediate income. No experience necessary - easy instructions. ACT NOW! Rush name and address for FREE FACTS. J&M, Dept. 3, Battle Ground, WA 98604



WHOLESALE SATELLITE TV

Best Prices On Quality Equipment TOTAL VIDEO P.O. Box 516 Bainbridge, GA 912-246-6790 800-841-8506 For authorized TV reception only Call and Compare

Installing Silicone Brake Fluid

Silicone brake fluid has been around for years, but until recently, has been found only in limited areas and in limited supply. Now, however, General Electric and other mass merchandisers have finally gotten around to selling this good stuff to the average car owner.

It used to be that you could find it only in U.S. Armed Forces and U.S. Postal Service vehicles. Those two groups converted completely to silicone brake fluid because of its superior water-resistant properties and high boiling point.

Conventional glycol-based brake fluid absorbs water quickly. That's why the labels always tell you to quickly cap a newly opened container of brake fluid and then store it only in a dry, warm area.

Glycol-based fluid can ab-



Silicone brake fluid is compatible with all existing brake systems and will extend the life of all your brake-system parts.



STOP VEHICLE HESITATION

NEW REG-RITE® Controls:

- Engine Hesitation • Surging
- Engine Pinging

Common engine running problems such as hesitation and surging can be eliminated within minutes with a REG-RITE EGR (Exhaust Gas Recirculation) Vacuum Control Regulator. REG-RITE also smooths out cruise control fluctuation, installs without tools in minutes.

U.S. Patent No. 4,351,303

Available for vehicles 1973 & newer, domestic & imports.

Please send _____ REG-RITE® valve(s) at \$19.95 each to:

Name _____

Address _____

City _____ State _____ Zip _____

Vehicle Make _____ Vehicle Year _____

Visa/Master Charge: No: _____ Exp. Date _____

Check Money Order Visa Master Charge

Minnesota resident add tax

\$19.95 Includes Postage & Handling (Canada: \$24.95)



DEALERS SPECIALTY WAREHOUSE

203 W. 78th St., Bloomington, MN 55420 (612) 881-3318
or Check Your Local Parts Store



RALLYE GRIP™

Kamei Rallye Grip Steering Wheel Covers—elegant, racy, good looking and comfortable.

Rallye Grip steering wheel covers are made of porotherm,™ a deep grained—leather-like surface. Rallye Grip provides great gripability—a luxurious feel—warm in winter—cool in summer . . . will not soil.

Covers all standard steering wheels up to 16½" in diameter.

Rallye Grip—practical luxury that's affordable.

ACT NOW . . . Send \$2.00 for colorful catalog, jacket emblem and decals to KAMEI, INC., Auto Extras, P.O. Box 426 North Haven, CT 06473

NAME _____
STREET _____
CITY _____ STATE _____ ZIP _____
DEPT. PMS



SUSPENSION AND BRAKES



To install silicone fluid, purge the brake system of existing glycol fluid and refill.

sorb up to 7-percent water by volume. What this means to you is the presence of water in your brake lines and cylinders, which eventually promotes rust and increases wear. Silicone brake fluid will absorb only 2/10 of 1-percent water. Glycol fluid will actually absorb water right through the rubber brake lines.

Silicone fluid also has a higher boiling point than glycol fluid, 500° F. vs. 400° F. This means there will be better brake performance and superior fade resistance in repeated hard braking applications.

Using silicone fluid is as easy as using conventional brake fluid. Bleed the brakes completely of all the existing glycol fluid and then refill the reservoir. Keep bleeding until the system is completely filled with silicone brake fluid.

While silicone and glycol will mix, the best results, of course, are achieved when you have a 100-percent solution of silicone.

Although silicone is more expensive than glycol—about \$14 per quart—chances are that it will last for the life of the car.

Water in your brake fluid will naturally freeze in winter. This causes damage to your brake system and radically reduces braking efficiency if too much water is in the system. At worst, this could cause a real safety hazard. At best, it will wear out the components of your brake system prematurely.

One final bonus of silicone brake fluid: It won't eat your car's paint if you spill some on the body. Glycol fluid will destroy whatever paint it touches. **PM**

SAVE GAS!

PATENTED-TESTED-PROVEN

Copyright 1983 by FUJETT PRODUCTS CO., INC. ALL RIGHTS RESERVED

EPA TESTED:

Fugett Products Company estimates UP TO SEVERAL miles per gallon INCREASE in mileage can be obtained with TURBO-CARB (depending on engine design and condition). Our company ACTUAL ROAD TESTS on a 1973 Chevy Wagon indicated an average of 3 1/4 miles per gallon INCREASE, using a series of seven six-pound gallon cans of fuel, over the same stretch of Interstate (fuel used directly from can to prevent fuel tank error).

WASTED FUEL—WASTED ENGINE LIFE!

Scientifically Proven — UNBURNED FUEL is major cause of ENGINE WEAR and AIR POLLUTION, CAUSES CARBON BUILD-UP and OIL DILUTION, resulting in further loss of mileage and performance! FACT — ALL NORMAL COMBUSTION ENGINES WASTE FUEL! With perfect combustion there is NO NEED for pollution equipment.

Gasoline WILL NOT BURN unless VAPORIZED! ATOMIZATION is the KEY to VAPORIZING. A droplet of fuel .008 thousands in size, broken up into four micron size particles, has 10,000 times the surface area for absorbing heat!

CARBURETOR MANUALS state: Raising the carb UP helps the HEAT to RISE for longer fuel heat exposure, also helps to equalize the fuel mixture before making the turns in the intake manifold, as the throttle plates tend to direct the fuel down the side, causing unequal distribution. Turbo-Carb Props are designed for TURBULENCE to prevent stratification of the fuel and for IMPROVED MIXING. Turbo-Carb compensates for air restriction (due to the screen material) with an enlarged hollow chamber and larger screen area, NO moving parts to WEAR OUT or BURN OUT, and designed to prevent possible engine stalling from icing. JUDGED SAFE by the EPA, when properly installed. An occasional shot of carb cleaner on secondary barrels, JUDGED Adequate Maintenance. Mounting instructions, bolts and gaskets included. Turbo-Carb can be used with WATER INJECTION and TURBO-CHARGERS.

CUSTOMER COMMENTS (in letters on file)

- ★ On a '77 Chevy Van I was getting 15 mpg. It increased to 20 mpg. Performance improved, it took the "ping" out and the installation was easy.—Gene Glaze, IN
- ★ I am very pleased. It not only did what you said, but makes my motor on my Subaru wagon run MUCH smoother! A Real Gas Saver!—Roy Briskey, TN
- ★ It's hard for me to believe the results I'm getting on my '77 Ford LTD. I went from 10 to 13.8 mpg, about 50% highway and 60% city driving with a lot of idling. Again thanks for a superb product.—Phillip Sirote, New York



Turbo-Carb

PERFORMANCE-ECONOMY

CARS—TRUCKS
MOTORCYCLES—BOATS
FARM MACHINERY



MADE FOR AMERICAN AND FOREIGN VEHICLES

60 DAY—MONEY BACK GUARANTEE! LIFETIME—Material/Workmanship Defects

- ★ For a '76 Ford Granada, it increased our mileage about 4 M.P.G. Enclosed check for a 1981 Ford Pick-up.—Henry Lilly, MO
- ★ Turbo-Carb eliminated "ping" on my Harley-Davidson motorcycle, improved performance and mileage considerably.—James Lacy, IN
- ★ I burn 25 to 30% less gas on my '76 Ford F-150-351. I am ordering one for a friend.—LeRoy Morris, MA

Hundreds of customers have indicated satisfaction—Order Today! SATISFACTION GUARANTEED!

Turbo-Carb Kits are available on a limited basis!

Not Available: (4 Bolt) Single Barrel or (3 Bolt) Carbs. Also—(2) Barrel GM 1979-83 6 cy 250, AMC & GMC 1980-83 4 cy 151 & V6-173, 20 and 22R Toyota. (Prompt refunds if we don't stock your model.) Must have 1" hood clearance, 1 3/8" on spread bore and quadrajet. (NOT FOR SALE IN CAL.) U.S. Currency Only.

Dealers Needed				
SINGLE \$44.95	DOUBLE \$49.95	FOUR BARREL \$54.95	SPREAD BORE	
			Yes	No
YEAR	MAKE	MODEL	ENGINE	BARRELS
			Plus \$2.50 Postage and Handling	
PM583			Indiana Residents Add 5% Sales Tax	
TOTAL \$				
<input type="checkbox"/> Check <input type="checkbox"/> Money Order				
Name _____				
Address _____				
City _____ State _____ Zip _____				

FUJETT PRODUCTS CO., INC. • GASTON, IN 47342

GARAGE DOOR OPENERS

- Radio Controlled
- Buy Factory Direct and Save
- Thousands In Use • Free Brochure
- Easy Homeowner Installation
- Immediate Shipment by UPS or PP

HELMATE Equipment Co. Dept. PM583 Baroda, MI 49101

STILETTO PINTO-CONVERSION

Simple easy way to transform your Pinto or Bobcat into a sedan or wagon into a modern, highstyle sports car with a European flair! Can be assembled in less than eight hours, complete kit \$1995.00

Tremendous opportunity for salesman/builder. Send \$3.00 for complete information to: ANTONIQUE, Inc. of Lividham Prod. Inc. Dept. P.M. 5/3 P.O. Box 654 Thief River Falls, Minnesota 56701

BUY A WHOLESALE CAR COVER \$29.00

INCLUDES STORAGE BAG

FITS ALL SIZE CARS FROM AUSTIN HEALY SPRITE TO CADILLAC. ANY CAR FROM 1900 TO DATE.

SMALL	MEDIUM	LARGE
LENGTH-150"-170"	LENGTH-170"-190"	LENGTH-191"-225"
29.00	35.00	39.00

WATER RESISTANT AND REPELLENT

<ul style="list-style-type: none"> • MIRACLE NYLON TAFFETA CLOTH FABRIC • QUALITY CONSTRUCTION • DOUBLE SEAM • PLASTIC SEAM IN FRONT & BACK • DURABLE LIGHT WEIGHT • MACHINE WASHABLE 	<ul style="list-style-type: none"> • PROTECT YOUR CAR'S PAINT & VINYL TOP • METAL SHIM • RUBBER INTERIOR • PROTECT YOUR CAR FROM INDUSTRIAL POLLUTANTS • RASH & SNOW SLEET • ICE • DUST • SAND 	<p>CREDIT CARD ORDERS FOR FAST SHIPPING ONLY</p> <p>TOLL FREE</p> <p>NATIONWIDE</p> <p>800-421-5734</p> <p>CALIFORNIA 800-252-2295</p> <p>USA, M.C., A EXP.</p>
---	--	--

AVAILABLE FOR PICK-UP TRUCK

american wholesale arpaulin& over lg-nc

319 W. 17TH ST., LOS ANGELES, CA 90015

Get 'em clean with

Materialized, защищенный авторским правом

IT WORKS YOU DON'T

espree[®] is the NO-
SCRUB way to return
your expensive wheels
to their original beauty.

JUST SPRAY-ON HOSE OFF

Nothing Makes it Shine like
the espree[®] Wheel Care Line.
Wire & chrome Wheel Cleaner
Mag Wheel Cleaner & Polish

espree[®]

Easy Products, Inc.
Salt Lake City, Utah 84127

Available at fine retail stores everywhere

Copyright © 1983

CAR CARE GUIDE

INTERIOR

How To Seal Weather- stripping

Leaks around weatherstripping occur because the weatherstrip itself has deteriorated or because the adhesive bonding it to the body has dried out, preventing proper sealing.

In either case, the fix is quick and easy—just buy the right replacement weatherstripping and adhesive.

Remove the old rubber and dried adhesive and make sure you've got a clean surface for the bonding agent.



Silicone-based adhesives also are available in large sizes for use with a caulk gun for major restorations.



Although you can use the car immediately after the repair job, the silicone will take a full 24 hours to cure completely.

The best bonding agents we've found are the silicone-based sealers available through a number of companies (see 3M, Ain Plastics in Sources).

These adhesives perform a dual function. First, they act as a glue to hold the weatherstrip to the surface. Secondly, when they cure, they form a water barrier on their own. Silicone adhesives dry to a semirigid, rubbery state that has a some compliance and resiliency. In the cured state, it isn't as prone to separation and cracking as conventional adhesives. In this application they're superior even to the cyanoacrylate "super glues."

PM

Dress up your car with...

Rubber Queen[®] WOOLLY ONES[™]

Plush, sheepskin-look carpeted car mats to compliment your sheepskin seat covers.

One size will fit most intermediate compact subcompact and most import cars.

The deep pile sheepskin-like carpet is soil resistant and easy-to-clean.

An exclusive new retainer section is molded into the rubber backing to hold the mat firmly in place.

PLEASE TYPE OR PRINT

Rubber Queen 437 Cambridge Rd. Coshocton, Ohio 43812

Name _____

Address _____ City/State/Zip _____

Day Phone _____

M.C./Visa # _____ M.C. Interbank # _____

Signature _____ Front & Rear \$56.95 Twin Front Only \$39.95

Ohio residents add 5.5% sales tax Total _____

Checks and money orders accepted. No CODs. No foreign currency. Continental US only.

AIM HIGH

Reach for new horizons.

It's never easy. But reaching for new horizons is what aiming high is all about. Because to reach for new horizons you must have the vision to see things not only as they are, but as they could be. You must have the dedication to give the best you have. And you must have the courage to accept new challenges.

The history of the Air Force is a history of men and women reaching for new horizons, dedicating their vision and courage to make our nation great.

You can join us in our quest for new horizons. Our pay and benefits are better than ever, with opportunities for growth and challenge.

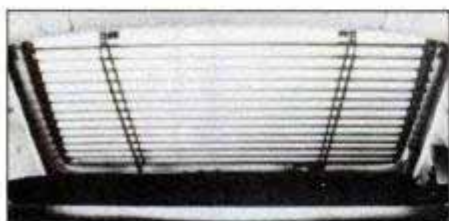
Aim High! Find out more. See your Air Force recruiter today or call toll free 1-800-423-USAF (in California 1-800-232-USAF). Better yet, mail in the card.

AIR FORCE

A great way of life.

How To Install Sun Shades

A sun shade will keep the sun from baking your interior and bleaching the upholstery. One of the best we've found is a powered unit that automatically opens and closes when you turn the car on and off. It's wired into the ignition. The vertical runners can be cut to fit



The shade is installed inside the rear glass, not outside like most louvers.

for height, and the horizontal blinds are adjustable to fit virtually any width rear glass or hatch area. A 12-volt d.c. motor

rotates the blinds 90° from closed to full open. This sun shade was designed by the engineering department at Birmingham University in England and it is made with high-quality materials



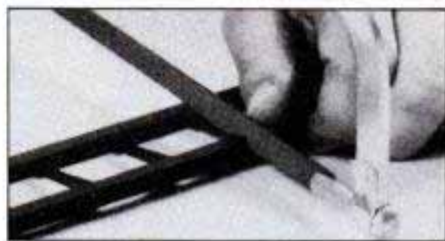
Horizontal blinds are individually adjustable and fit even a tapered glass area.

throughout. A manual override fine-tunes the pitch of the blinds.

The vertical runners are installed inside the rear glass on rough-knurled posts. The posts are bonded to the glass with a cyanoacrylate-based glue. Once

installed, the shades are sturdy and don't rattle or shake over rough roads and bumps.

Installation takes less than an hour and requires only a fine-toothed hacksaw and some hand tools for the electrical connections. While expensive (\$149), the unit seems well worth the price because of its quality construction and design. The sun shade is available from Steingall Assoc. (see Sources). **FM**



The vertical runners are cut to the correct length by using a fine-toothed hacksaw.

HELP FOR THOSE ON DESERTED AISLES.



When a store sells everything from cat food to cosmetics, you can get lost trying to find a simple hardware item.

And, too often, there's no help in sight.

But, at a Sentry Hardware store you'll get all the help you need. From people who know hardware and sell it everyday. It's our business.

Our people can save you time and trouble finding what you need. And very often, they can give you tips that will save you money.

So why go to stores where you feel helpless, when you can shop at a Sentry store.



Where hardware isn't a sideline.

Check the Yellow Pages under Hardware for the Sentry store nearest you. Sentry Hardware Corporation, Cleveland, Ohio 44113. Merchandise shown in this advertisement is available from participating dealers only. Offer expires May 31, 1983. All Sentry dealers own their own stores. They select their merchandise and set their own prices. There may be variations in products, available quantities and prices in individual stores.




TRUE TEMPER®
Dynalite® Shovel
(DLR) \$12.99



shop-vac®
6-Gallon
Wet/Dry Vacuum
(700-02-62) \$54.88



GB®
Tomato Tower®
18" wide by 48" high
(262015) \$3.39



STANLEY®
Powerlock® Rule
20' x 3/4"
(33-320 HW) \$7.99



Disston®
Handsaw
(D-23) \$11.99

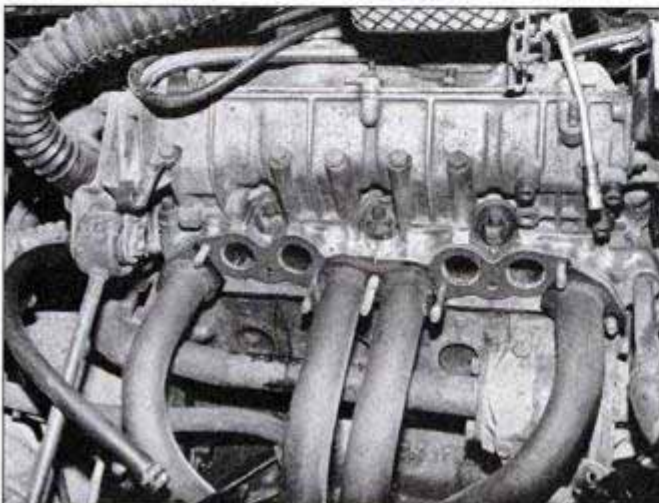


SKIL®
2-HP 7-1/4"
Circular Saw
(576) \$41.88



Warp's®
Easy-Grow
Weed Shield
(EC-50) \$2.66

How To Install A Free-Flow Exhaust System



This Faza unit installed in a Fiat has equal-length exhaust tubes and perfect alignment to the exhaust ports on the cylinder head (left). It needed no modifications and was installed in two hours. Any system you buy should provide same simple installation. Larger-than-stock collector, (below) was slotted and slightly enlarged to provide easy installation.

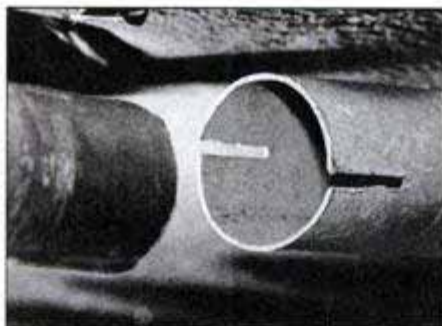
Most original equipment exhaust headers are simple "log" dump tubes. All the exhaust gases from the engine, or bank of cylinders, are dumped into a single log casting and discharged through a single collector. While this is economical for the manufacturer, it creates a certain amount of back-pressure for the engine and provides less than ideal exhaust gas scavenging.

A well-tuned, individual-runner header coupled with a low-back-pressure system will, in most cases, increase overall engine performance and increase mileage, as well.

In a Fiat test car we installed a Faza header and free-flow exhaust system and got a noticeable improvement in mid-range and top-end performance plus a .8-mpg improvement.

The time to install a system such as this is when your existing system needs replacement. There's no point in throwing out a usable exhaust system.

A well-designed system is custom-made for your make and model car and should be a straightforward remove and replace operation. The things to look for are exhaust runners of equal or



The low-back-pressure, twin exhaust resonator (above) bolts up to the existing hanger without any modifications at all.

near-equal length and a larger-than-stock collector pipe. Most good suppliers of exhaust systems such as Hooker, Cyclone and Faza perform dynamometer tuning of their units to make sure you get the most for your money.

Also, a good aftermarket unit should require no modifications or very few to the existing setup. **PM**

NOW! Get in on the PROFITS in SMALL ENGINE REPAIR

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

No doubt about it... as a small engine pro, you can cash in on the huge demand for qualified men in one of America's fastest growing industries. You'll be able to command top hourly rates of from \$10.00 to \$15.00 per hour — and that's just for labor.

Plenty of business waiting for qualified men. 65,000,000 Small Engines Are In Use Today!

That's the official count from the Engine Service Assn., and one-million new engines are being built each month. With Foley-Belsaw training, you can soon have the skill and knowledge to make top money servicing these engines.



Professional Tools and Equipment PLUS 4 hp Engine... All YOURS TO KEEP... All at No Extra Cost.

NO EXPERIENCE NECESSARY!

You don't need to be a 'born mechanic' or have any prior experience. Lessons are fully illustrated... so clear you can't go wrong, and with our famous 'learn-by-doing' method you get practical 'hands-on' experience.

Foley-Belsaw Institute • 80203 Field Bldg. Kansas City, Mo. 64111

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



NAME _____
 ADDRESS _____
 CITY _____
 STATE _____ ZIP _____

Microflame Gas Torches For Father's Day

Quality heating, soldering and silver-brazing tools for the hobbyist and craftsman...

Miniature Gas Torch

The original Microflame with the fine-point flame. Provides instantaneous and precise heat, only where it is needed.

Super Cub Torch

A mini-blowtorch small and light enough to fit in a pocket or purse, yet with its controlled and localized flame, still packs quite a punch.

Dragon Torch

The new and unique "flame action" lever, gives the user immediate hand held control of the high temperature flame.



... Designed for creative metal work as well as for minor repairs in the home, shop, office, lab or field.

Write for Details:

Microflame, Inc. Dept. PM
 3724 Oregon Ave. So.
 Minneapolis, MN 55426
 612/935-3777

MOVE 2½ GALLONS PER MINUTE BY HAND WITH

Palm Pump

Fluid transfer is no easy task. That's why having the right tool for the job is so important. PalmPump, from Milburn Stirling, uses space-age technology to put smooth, high-volume pumping at your fingertips — and all for a price of under \$30. PalmPump is the ideal tool for all automotive, marine, industrial and recreational applications where fast dependable pumping is required. Discover the difference the right tool can make in your fluid handling problems.

PalmPump features:

- 2.5 Gallons Per Minute Capacity
- Self Priming
- Reverse Flow Feature
- Tough Thermoplastic Construction

ORDER NOW!

Send \$29.95 in check or money order plus \$2.00 postage and handling. Visa and Mastercard accepted. Please allow 4-6 weeks delivery. If you are not completely satisfied, return PalmPump within 30 days for a full refund.

MilburnStirling



1840 Commerce, C-North, Boulder, Colorado 80301

Call Toll Free to order 1-800-638-1313

VISA MASTERCARD Account# _____



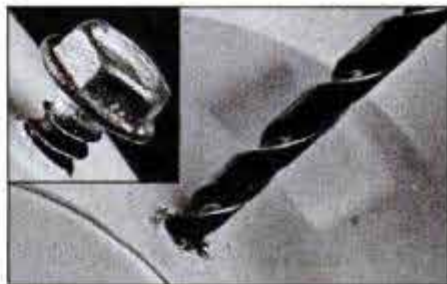
'83 CAR CARE GUIDE

EXHAUST

Replacing Sheet-Metal Screws

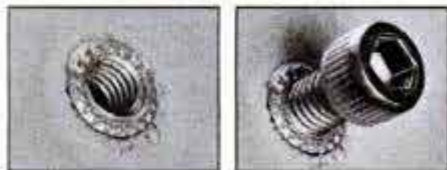
Sheet-metal screws are a cheap and dirty, but unavoidable, manufacturing copout. In some areas they promote rust and metal fatigue and should be replaced with Tric-Nut threaded inserts, (see Technical Fasteners in Sources).

These threaded inserts are installed by removing the screw, drilling a hole of a proper size for the threaded insert and installing the insert by means of a special installation tool.



To install insert, remove sheet-metal screw (inset) and drill correct-size hole. Hole size varies with insert size.

The inserts are two-part collars that slip into each other during installation and press-fit tightly into the drilled hole. They come in a variety of sizes. Use them wherever sheet-metal screws are used to hold brackets, electrical components or ground wires. **PM**



Place the insert in the tool and install it in the sheet metal (top). The insert is permanently installed (above, left) and will accept any type of threaded fastener, like a hex-head screw (above, right).



New, Cabinet Model TV PROJECTOR KIT

Includes: Tube Mounted Lens, Plans and Specifications

Special Offer \$49⁹⁵ Value...

NOW ONLY \$29⁹⁵

Turns your portable television set into a Big Screen T.V.

by placing a small portable T.V. inside the Cabinet behind the lens it will enlarge the picture to a Giant 5 ft. diagonal picture.

100% MONEY BACK GUARANTEE!

If for any reason you are not satisfied, just return the TV kit within 30-days for an IMMEDIATE REFUND, with no questions asked.

GENERAL MATERIAL COSTS: Build this Cabinet Model 5-foot BIG SCREEN TV with approximately \$40 worth of Common Particle Board, Screws, Nails, Hinges, Corner Braces. Then finish to your choice of paint, antique, formica, etc.

BUILD YOURSELF OR HAVE THE WORK DONE: Build in your home workshop or have a local cabinet shop build it for you. Either way, your cost can be up to \$2,000.00 less than the price most Big Screen TVs are selling for.

FREE . . . \$15.00 VALUE: Design plans nationally advertised and sold for \$15.00 included FREE with lens assembly.

\$20.00 VALUE COUPON

Florida Residents add 5% Sales Tax Offer By Mail Only

Matlock Industries, P.O. Box 11512, Clearwater, FL 33516

Please rush Big Screen TV System which includes Tube Mounted Lens Assembly and Cabinet Model design plans (\$49⁹⁵ Value). Enclosed please find \$29⁹⁵ plus \$3⁰⁰ shipping & handling... TOTAL \$32⁹⁵. Canadian Orders make payment in U.S. Dollars!

Enclosed Find \$_____ CASH CHECK MONEY ORDER — Personal or Company Check 3-4 weeks; Cashiers Check or Money Order 10-14 days

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

Sources And Suppliers

Accel Performance Ignition System, Box 142, Branford, Conn. 06406; Canada: 500 Carlingview Dr., Rexdale, Ont. M9W 5H1 (sparkplug wires).

Ain Plastics Inc., 249 East Sandford Blvd., Mount Vernon, N. Y. 10550 (plastics).

Brown's Plating Service, Box 534, Paducah, Ky. 42001 (chrome plating).

Cannon Industries Inc., 9067 Washington Blvd., Culver City, Calif. 90230 (headers, suspensions).

Car N' Farm, Yel Co., Box 186, North Lake, Wis. 53029 (rustproofing).

CRC Chemicals, 885 Louis Dr., Warminster, Pa. 18974 (solvent, lubricants, chemicals).

DRI Industries, 11100 Hampshire Ave. S., Bloomington, Minn. 55438 (standard fasteners).

Dynatron/Bondo Corp. 2160 Hills Ave. N.W., Atlanta, Ga. 30318 (filler).

Earl's Performance Products, 825 East Sepulveda, Carson, Calif. 90745 (stainless-steel braid, oil coolers).

Faza, 2538 South Ridgewood Ave., Daytona, Fla. 32019 (seats, exhaust systems, wheels, carbs, induction systems).

General Electric, Silicone Products Div., Waterford, N. Y. 12188 (silicone brake fluid).

Geocel Ltd., Box 398, Elkhart, Ind. 46515 (foam urethane).

Hayden Inc., 1531 Pomona Rd., Corona, Calif. 91720 (oil coolers, auxiliary fans).

Kano Laboratories, 1028 Thompson Lane, Nashville, Tenn. 37211 (degreaser, solvents, penetrating oil).

Loctite Corp., 4450 Cranwood Court, Cleveland, Ohio 44128 (locking compound).

PDI, 1458 West County Rd., St. Paul, Minn. 48018 (adhesives, bonding agents, gasket material, solvents).

Plasti-Kote Co. Inc., Box 708, 1000 Lake Rd., Medina, Ohio 44258 (paint, primers).

Rocket Industries, 9935 Beverly Blvd., Pico Rivera, Calif. 90660 (headers, wheels).

Russell Performance Products Inc., Box 6253, Carson, Calif. 90749 (stainless-steel braided hoses).

Steingall Assoc., 227 48th St., Newport Beach, Calif. 92663 (window shades).

Stewart-Warner Industries Inc., 1826 Diversey Parkway, Chicago, Ill. 60614 (gauges).

Tabco, 5250 Naiman Parkway, Box 39474, Cleveland, Ohio 44139 (replacement body panels).

Taylor Made Products, 3200 West Market

St., Akron, Ohio 44313 (chemicals, solvents, grease, light lubricants).

Technical Fasteners Inc., 402 Highland Street, Syracuse, N. Y. 13203 (Tric-Nuts, fasteners).

3M, 23923 Research Dr., Box 2600, Farmington, Mich. 48018 (adhesives,

bonding agents, gaskets, solvents).

Vaco Products Co., 1510 Skokie Blvd., Northbrook, Ill. 60026 (wiring harness brackets, plastic ties, connectors, bulk lugs).

West River Ind., 3514 Palmer Dr., Cleveland, Ohio 44116 (dimple tool). **PM**

THE EXHAUST SYSTEM FOR SOMEONE WHO NEVER REPLACED AN EXHAUST SYSTEM BEFORE.

Mufflow takes the fear out of replacing your muffler and tailpipe. (And saves you a bundle in the process.)

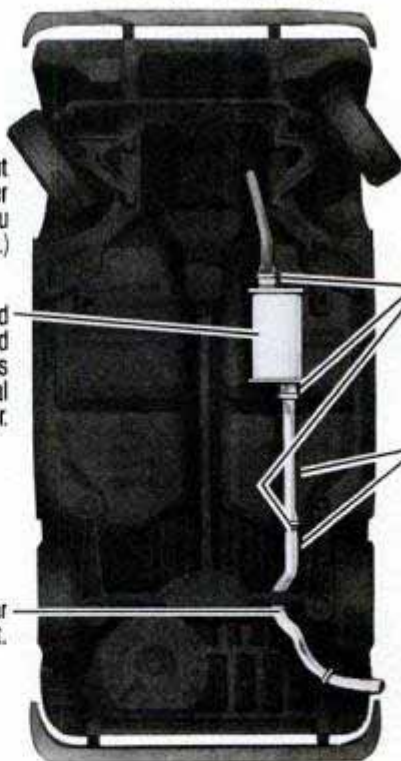
Heavy duty galvanized steel. Double wrapped construction meets or exceeds original equipment muffler.

Slips in place over rear axle without effort.

No special skills. No special tools. All hardware and easy instructions included.

Unique two piece Mufflow tailpipe also makes it easy to handle. Precision engineered so it's easy to install.

Fear not, Mufflow makes it easy.



For information contact: Thrush Inc., Marketing Dept., 172 Bethridge Rd., Rexdale, Ontario. M9W 5E2

OVER 3,000,000 INSTALLED

New Car Care Products

Battery cable saver

You can repair the last 6 in. of corroded battery cable near the battery without having to replace the entire cable. Once you cut out the corroded area, you just splice in a Quick Cable Saver to the good section of the cable.

The Cable Saver kit comes complete with terminal, 6 in. of new cable and either a brass or lead coupler. A special two-piece insulating sleeve slides over the splice to protect against corrosion and short circuits.

Cable Savers cost about \$6 to \$9 for the most popular sizes and they are available at automobile parts outlets in your area. They are manufactured by



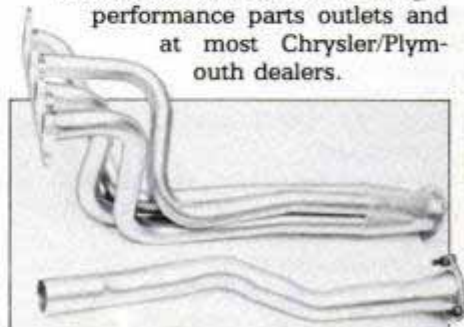
Battery cable ends allow you to splice a new length of cable to corroded section.

Belden Transportation Div., 2000 South Batavia Ave., Geneva, Ill. 60134.

Performance pipe

If you want more punch out of your Dodge Charger/024 or Plymouth Turismo/TC-3 cars equipped with the Chrysler 2.2-liter engine, Chrysler's Direct Connection performance program has a new high-performance exhaust header. The header, part No.

P4286580, costs \$232.38 at high-performance parts outlets and at most Chrysler/Plymouth dealers.



Tuned performance headers for Dodge Charger are sold at Chrysler dealers.

DRIVE A BARGAIN.

If you've been wanting to buy a driving computer or cruise control, now's the time.

Because right now Cal Custom is offering a \$5 rebate on each of these sophisticated products — the ZT-4 Driving Computer and the ZT-Cruise Control. They fit all domestic and foreign cars. And they're easy to install, so you can do it yourself. Both are great buys, too. Even before the \$5 rebate.

You'll find all the details wherever quality auto accessories are sold. This rebate offer expires July 31, 1983, so hurry. While you can still cash in on a real bargain.



\$5 REBATE on the ZT-4 Driving Computer. This 15 function trip information center will tell you exactly how much fuel you've used since you started your trip, or since your last fill-up. It accurately displays your speed, current MPG, average MPG and the time of day. It even converts from English to metric to imperial measurements. (Kit for electronic fuel injection available.)

\$5 REBATE on the ZT-Cruise Control. The ZT is more sophisticated than most original equipment cruise controls. After using the brake, a tap on the "resume" button will accelerate you smoothly back to your pre-determined speed. And you can adjust your chosen speed up or down by simply tapping another button. The coast resume button makes the ZT ideal for congested highway driving. The small command module can be easily mounted on the steering column, console or under the dash.

\$5 REBATE Send the top panel from the product box, proof of purchase, name and address to Cal Custom. A \$5 rebate check for each purchase will be sent directly from Cal Custom.



CAL CUSTOM
CARSON, CA 90745 / AN ALLEN GROUP CONSUMER AUTOMOTIVE COMPANY

We make cars a nicer place to drive.



Bump.



Beep, beep.



Easy Does It™ Body Filler.
The foolproof way to repair body damage.

Our unique two-color change system guides you step by step as you get the dents out. Without mistakes. Easy Does It dries fast and resists sagging. So give your car a professional repair job—without paying for one. From Loctite Corporation, makers of Loctite®, Duro™ and Permatex® fix-it products.



All the experience you need.™

© 1983 Loctite Corporation

Hose cutter



Hose-cutting pliers make quick work of slicing through rubber, plastic hoses.

To get a clean, razor-like slice through all kinds of rubber and plastic hose, you need a specialized hose cutter. The Canadian-made Anderle Hose Cutter uses Swedish steel cutting blades. The tool also cuts body side molding and stranded copper and steel wire, but not solid wire or sheet metal. The cutter costs \$19.95 and replacement blades are \$4.50. They're available from Mac Tools, Box 370, Washington Court House, Ohio 43160.

Power shears

A fast, convenient way to cut sheet metal, rigid plastic and other vinyl sheet materials is with the K-100 Portable Power Shears. It slices through metal as thick as 18-gauge at a rate of 180 in. per minute, and cuts plastic up to 3/32 in. thick. The shears weigh 5 pounds and cost approximately \$124. They're available from the Kett Tool Co., 5090 Madison Rd., Cincinnati, Ohio 45227.



Power shears will make clean, burr-free cuts in metal without warping the edges.

Engine analyzer



Digital hand-held engine analyzer will perform a variety of tests quickly.

For a really versatile and accurate hand-held engine analyzer, check out All-test's Model 3706 digital unit. The device tests tach, dwell, volts, ohms and amps on 2-, 4-, 6- and 8-cylinder and rotary engines; measures rpm on all ignition systems including GM's C-3 and C-4; and measures volts even on electronic modules in the newer cars. LED lights indicate a worn distributor cam or busing and defective alternator diode. The price is \$145 and it's available from All-test Inc., Dept. M-1, Box 65, Rolling Meadows, Ill. 60008. **FM**

Diesel fuel filter



Diesel fuel filter/water separator traps water in fuel before it reaches injector pump. The water drains from glass bowl.

Water in diesel fuel is the No. 1 cause of blown injector tips and injector-pump wear. Racor's Model 200 FG filter/water separator removes virtually all water from diesel fuel through centrifugal separation. It also removes solid contamination. The filter alone sells for \$80, and with a mounting kit is costs \$130. It's made by Racor Industries Inc., Box 3200, Modesto, Calif. 95353.

VIDEO CAMERAS

(Continued from page 82)

35 mm's rangefinder and can be found on the least expensive cameras. It gives a basic idea of the image area, but if you are planning to use a zoom lens, forget it. Optical finders are becoming less popular. You may find an older "bargain" camera featuring one, but, as our chart shows, they are not found on the newer models.

The next type, through-the-lens (or TTL), is based on the same principle as the 35-mm SLR—it allows you to see exactly what the lens sees. You can use

a zoom lens with this finder, and focusing becomes faster.

The last, and most sophisticated, finder is the electronic type. It can add about \$200 to the price of the camera, but it's worth the money. This finder is actually a miniature (1½-inch) black-and-white TV screen, and it shows you the exact picture that will appear, including contrast and brightness. Even more importantly, this finder allows you to play back recorded images directly from the VTR, so you can see immediately how your scene came out.

Some electronic finders can be

moved around, tilting in different directions when the need arises, and still others can be disconnected from the camera entirely for remote viewing.

Viewfinder information is also essential. The more data that is given the better. Most finders have LED indicators showing exposure information, battery usage, the VTR transport mode, color settings, and some even show the VTR tape counter, so you know exactly where you are on the tape.

The lens

The lens is your next consideration. As with film cameras, some video cameras have removable lenses and some models have fixed-mount lenses, while other models use a C-mount, which enable you to use 35-mm camera lenses.

Almost all lenses have zoom capability, and the more expensive models add single-, two- or variable-speed power zoom for a more professional effect. The zoom ratio will vary from camera to camera. The most popular ratio, 6X (6:1), is usually from 12 mm to 72 mm (about 45 mm to 260 mm in a 35-mm format). Other ratios you might encounter will be 4:1 or 8:1.

Lenses come in varying sizes. A lens with a larger aperture will admit more light than one with a smaller aperture, but it will also increase the price of the camera. Generally, an F1.4 lens will let in 25 percent more light than an F1.6, but the F1.4 may not be necessary unless you are planning to shoot in dim light.

Most mid- to high-priced cameras provide macro-focusing (the ability to focus to within inches of a subject) and auto-focus.

The iris

The amount of light falling on a video camera's imaging tube must be controlled for good picture quality. That's what the iris does, and there are two kinds: manual or automatic. Practically every camera has an automatic iris that sets the opening for a perfect exposure. Some feature automatic gain control (AGC), which averages these light readings. The least expensive cameras don't have a manual override, and the camera will make its own judgment no matter what the situation dictates. But there are times when this poses a problem.

Although the automatic iris can correct most lighting situations, there are some that it may not be able to handle. For instance, in backlighting, light coming from behind the subject can "fool" the auto iris into stopping down too far, thus darkening and obscuring detail from the picture. For this reason, you

(Please turn to page 186)



They're all easy to use and last for years.

They're caulks, fillers, and adhesives from DAP. You can count on them for quality and performance, just like professionals do. That's why DAP is the only brand I recommend.

In fact, for every household job, DAP gives you the widest selection.

Caulks. Trust DAP caulks for everything from weather-proofing around windows and doors to sealing around tubs and tile.

Fillers. DAP spackling, glazing, and wood-filler products are ideal for all your patch-up, seal-up, fix-up projects.

Adhesives. DAP adhesives ensure stronger than nail-tight bonds when installing panelling, furring, molding, flooring, carpeting and more.

So reach for top-quality DAP products. They're all easy to use and last for years. That's why more people trust DAP, and ask for it by name.

DAP®

Most trusted name in caulks, fillers & adhesives.

© 1983 DAP Inc. DAP is a trademark of DAP Inc., Dayton, Ohio 45401.

PM'S COMPLETE GUIDE TO VIDEO CAMERAS

Brand	Model	Price	Weight (lbs.)	Horizontal resolution (lines)	Sensitivity (lux)	Lens	Other features
Akai	VC-X1	\$995	5.3	270	50	F1.6 6× mpz*	Autofocus; two-speed zoom; autofade
	VC-X2	\$1,195	5.3	300	30	Same as above	Same as above
Canon	VC-10A	\$1,295	5.5	280	30	F1.6 6× mpz	Autofocus; variable zoom; autofade; character generator; interval timer
G.E.	3030	\$1,040	5.5	250	50	F1.6 6× mpz	Autofocus; adjustable finder; variable zoom
	3035	\$1,350	5.5	250	30	Same as above	Same as above, plus character generator
Hitachi	VK-C600	\$795	4.1	260	75	F1.6 6× mpz	Autofocus
	VK-C850	\$1,195	6.8	280	30	Same as above	Autofocus
	VK-C1000	\$1,595	3.8	280	100	Same as above	Autofocus
	VK-C2000	\$1,995	4.4	280	100	Same as above	Autofocus
JVC	GX-44U	\$770	2.6	270	70	F1.4 4× zoom	
	GX-78U	\$799	3.04	270	50	F1.3 6× mpz	Two-speed zoom; stereo audio
	GX-53U	\$895	2.7	270	30	F1.2 6× mpz	Stereo audio
	GX-59U	\$1,100	6.0	300	50	F1.6 6× mpz	Two-speed zoom; stereo audio; autofade
Magnavox	VR-8238	\$749	2.65	270	70	F1.4 4× zoom	
	VR-8269	\$1,399	6.0	250	30	F1.4 6× mpz	Autofocus; VCR transport control; variable-speed zoom; autofade
Panasonic	PK-756	\$1,050	5.5	250	50	F1.4 6× mpz	Fade control; autofocus; VCR transport control; character generator
	PK-802	\$1,095	5.1	270	40	Same as above	Variable-speed zoom; fade control; character generator; VCR transport control
	PK-805	\$1,200	7.0	240	50	Same as above	Two-speed zoom; autofocus; fade control; VCR transport control
	PK-956	\$1,295	5.5	250	30	Same as above	Same as PK-756
Pentax	PK-K030	\$1,095	3.5	250	60	F1.6 8× mpz	Fade control
	PK-K020	\$1,995	3.75	260	100	F1.4 6× mpz	Interchangeable lenses
Philco	VCC-099	\$749	2.65	270	70	F1.4 4× zoom	Rear-mounted mike
	VCC-112A	\$1,199	6.6	240	80	F1.4 6× mpz	Two-speed zoom; adjustable finder; autofade
Quasar	VK-743	\$1,350	5.75	240	30	F1.4 6× mpz	Autofocus; variable-speed zoom; adjustable finder; autofade
RCA	CC-012	\$895	3.3	NA	70	F1.4 6× mpz	
	CC-015	\$1,400	6.7	NA	30	Same as above	Autofocus; detachable finder; autofade; interval timer
Sanyo	VSC-450	\$599	4.4	250	100	F1.4 6× mpz	VCR transport control
Sears	53-812	\$939	4.18	250	75	F1.6 6× mz†	Rear microphone
	53-87	\$1,189	6.6	NA	50	F1.4 6× mpz	Fade control
	53-89	\$1,499	3.8	280	100	Same as above	Detachable handle
Sharp	QC-50	\$559	2.65	250	100	F1.6 2× zoom	Folding pistol grip
	QC-70	\$859	3.5	240	70	Macro zoom	Autofocus
	QC-40	\$1,099	6.17	240	100	F1.4 6× mpz	Autofocus
Sony	HVC-2400	\$1,200	6.3	300	35	F1.4 6× mpz	Detachable finder; autofade; record/review; positive/negative reverse
	HVC-2200	\$1,300	6.3	300	40	Same as above	Detachable viewfinder; autofade; record/review
Sylvania	VCC-114	\$749	2.65	270	100	1.4 4× zoom	
	VCC-116	\$1,299	5.7	NA	NA	F1.4 6× pz**	Autofocus; character generator; interval timer; autofade
Toshiba	IK-1900	\$899	4.4	260	50	F1.6 8× mpz	
	IK-1850	\$1,300	5.8	250	100	F1.4 6× mz†	Autofocus; interchangeable lenses
Zenith	VC-1200	\$750	3.7	NA	100	F1.8 3× mz	
	VC-1600	\$1,050	5.3	NA	40	F1.4 6× mpz	Detachable finder
	VC-1800	\$1,350	6.0	NA	30	Same as above	Autofocus; character generator; interval timer; two-speed zoom; autofade

*mpz: macro power zoom; †mz: macro zoom; **pz: power zoom. Note: All cameras have electronic viewfinders, except Sharp model Nos. QC-50 and

QC-70, and Toshiba model No. IK-1900, which have through-the-lens (TTL) viewfinders. NA: Not available.

VIDEO CAMERAS

(Continued from page 184)

need a manual override (called a back-light switch). Many cameras have back-lighting compensation (BLC). It is usually automatic.

Color

Proper light is not the only requirement for a good picture. Color balance and color temperature are equally important. Different light sources have different color temperatures. The color temperature of daylight has a bluish tint, incandescent (indoor) light has a

reddish tint and fluorescent light has a greenish hue. To compensate for this, the camera uses filters to change the color temperature.

Almost all cameras have a white balance control, which adjusts sensitivity to the three primary colors (red, blue and green) for perfect balance. The camera is aimed at a white card or surface, and indicators in the finder tell when it is set correctly. Mid- to high-priced models have an automatic white balance system, which is also used with a white surface, but instead of playing with color knobs you just touch a button and it is set automatically. The least

expensive cameras have preset white balance levels.

To adjust the color for a special effect, or to override the white balance setting, some cameras provide fine tuning color controls.

The microphone

Video cameras also have excellent audio capability. Most cameras come equipped with a condenser microphone, and many manufacturers have placed the mike in a telescoping boom mount so it can be extended toward the subject. This is important because the mike won't pick up breathing or the camera's zoom motor, which is possible with a body-mounted microphone. In addition, some cameras have a rear-mounted mike, which is good for narration. Some newer models have stereo capability when using two or more mikes, and mixing is also possible on the more expensive cameras. The camera should have an earphone jack.

Other features

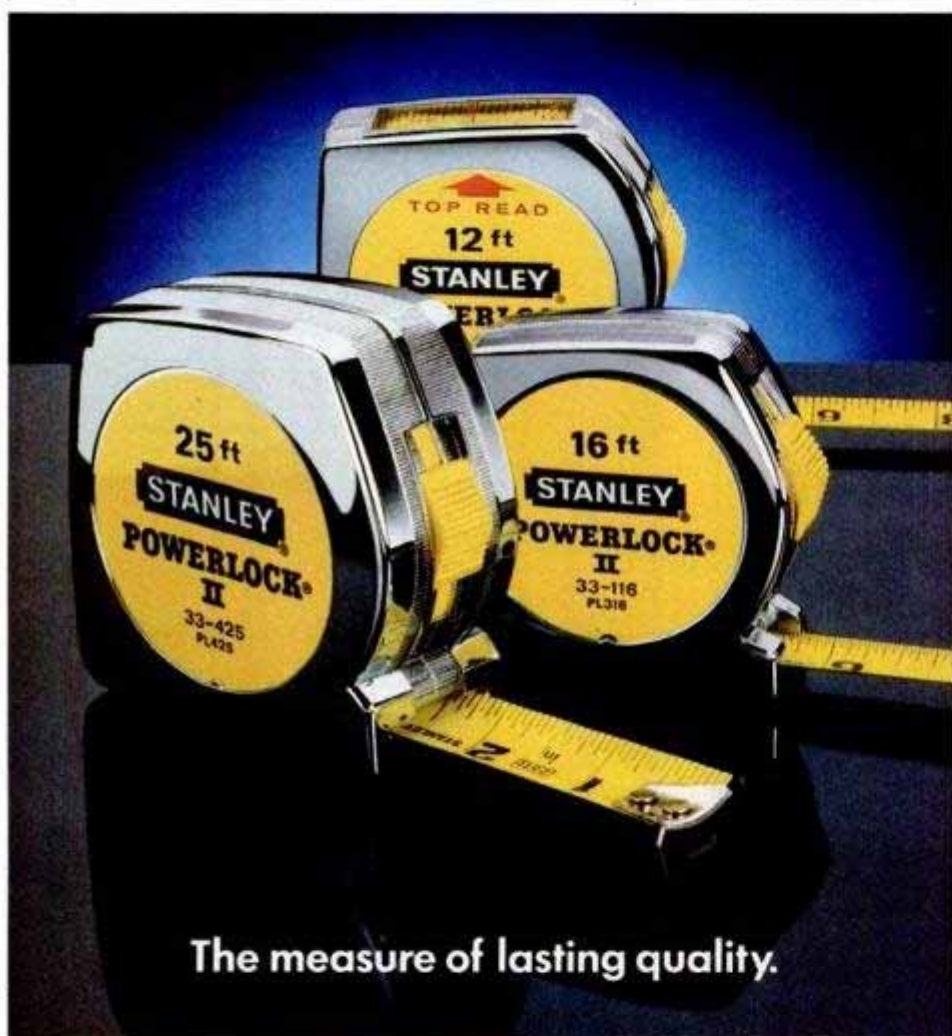
If you like a more professional look, many cameras provide a fade control, which allows you to move to and from a blank screen. It will either be automatic (motorized) or a ring that you rotate manually.

Another feature, auto-close, shuts the iris automatically when the camera is turned off or in the standby mode. This prevents costly tube burn-in, which occurs when the camera is pointed at a bright light.

If you want to make your own titles and credits for your home movie, one way is to write cards and place them in front of the lens. Another way is to buy a camera equipped with a character generator. This feature produces its own letters and numbers, and you can see them appear right in the electronic finder, superimposed over a scene you are shooting. Most cameras with this feature also include an interval timer. The timer is like a stopwatch, and elapsed seconds, minutes and hours can be superimposed over your scene of the Indianapolis 500.

If you are tired of constantly sending negatives out for enlarging, you may want to look at a new feature that some high-priced cameras provide. It's called positive/negative reverse, and it will (with an optional adapter) convert your negatives to positives for storage on videotape. Your slide collection can also be stored the same way.

If you like the idea of controlling your VTR transport functions (fast forward, rewind, slow motion and so on) right from the camera, you can, and the more expensive models will do it, provided you use a companion VTR from the same manufacturer. There are two major types of camera/VTR connectors



The measure of lasting quality.

When you buy a tape rule, you can be sure it will read inches and feet. But in many cases, that's all you can be sure of. Unless it's a Stanley Powerlock® tape rule.

Powerlock tapes are built with quality that lasts. They offer you features you can't find in ordinary locking tapes. A DuPont

Mylar® coated blade, for durability. A Tru-zero hook, for precision measuring. Easy-to-read blade graphics. And on some models, patented speed control brake cams, for decreased whiplash and longer tape life.

Stanley Powerlock tape rules are available in a wide range of lengths and widths.

For inside measurements, there's even a top-reading Powerlock rule—the only tape rule of its kind.

For twenty years, Powerlock tapes have been the *Badge of the Professional*,™ and with good reason. They don't just measure. They measure up.

STANLEY
helps you do things right

on the market: 14-pin and 10-pin. Even if the camera and VTR have the same connector, the match might still be off because the pins might have different assignments. Each manufacturer has its own way of doing things. And if the proper match is not made, you will lose VTR pause control and viewfinder information such as battery status. One way to solve the problem is to purchase both camera and VTR from the same manufacturer. Another way is to buy Porta Cam Adapters from Cable Works (\$90), available at any video store, which will link virtually any VCR/camera combination.

Specifications

Just like any TV, video cameras have specifications for differentiating the performance of various models. The first spec that you should look at is horizontal resolution. The average camera has 240 to 280 lines of resolution. The higher the figure the better. Next is the power-consumption rating. Most cameras require 4 to 10 watts, and the fewer the camera draws, the longer your VTR battery will last before it needs a recharge. Just about every camera has a standby switch that keeps the imaging tube warm while the camera draws only 1 to 3 watts.

The minimum light required is a specification that measures the camera's sensitivity. A camera that can go down to 30 lux is much more sensitive than a model which can only receive 100 lux. Some cameras automatically adjust for low-light situations. Others have a switch for low-light sensitivity.

The last, but not the least, specification to look at is weight. If the camera is light, you will be able to hold it comfortably for longer periods. Most cameras weigh between three and eight pounds, and it's a good idea to hold one for a while to judge whether it is right for you. The type of camera mount also contributes to user comfort. The pistol grip is vertical and extends from beneath the camera body, fine if the camera is light. Heavier models use a shoulder mount for added stability.

Finally, if you want to know the future trend in video camera technology, take a look at the new MOS (or CCD) cameras recently introduced. Replacing the conventional imaging tube (like Vidicons, Saticons and others) is an integrated silicon chip. The chip is composed of light-sensitive diodes and transistors, which reduce the size and weight of the camera. This new development also eliminates both tube burn-in and lag, and since they are tubeless, these cameras don't require a warm-up period; just turn them on and they're ready. But be forewarned: An MOS camera will set you back \$1,500 or more.

SEARCH NO MORE!

Now...Just about every kind, size and style of fastener—plus tools and organizers—all in one catalog!

Everything from common nuts and bolts to specialty o-rings and half-moon keys. Available in complete organized sets. All illustrated full size. All industrial quality. And all at a fraction of regular retail prices. Catalog shows how to select and use fasteners and parts, too! PLUS... installation and removal tools for fasteners and parts...and an unequalled selection of organizer cabinets and bins.

- No more time-consuming trips to hardware and parts stores!
- No more "making do" with damaged or worn parts—or something that's "close."
- No more leaving things in pieces while you hunt down a little part!
- No more less-than-professional repairs!
- No more frustrating searches!
- No more inferior quality hardware!
- NO MORE HIGH, "BUBBLE PACK" PRICES!

	U.S.S. WROUGHT WASHERS Steel, Zinc-Plated		WORM SCREW HOSE CLAMPS Stainless Steel		SCREW EYES Steel, Zinc-Plated
	CAP NUTS Steel		WALL ANCHORS Steel		PIN CLIPS Steel, Zinc-Plated
	RING TERMINALS Copper, Tin-Plated		CLEVIS PINS Steel, Zinc-Plated		SPACER BUSHINGS Steel
	CABLE CLAMPS Nylon		COMPRESSION SPRINGS Music Wire, Zinc-Plated		SNAP BUSHINGS High-Impact Plastic
	BLIND RIVETS All Steel		BUTT CONNECTORS Copper, Tin-Plated		DECORATIVE NAILS Steel, Brass-Plated
	HANGER HOOKS With Nails		CABLE TIES Nylon		COMMON RIVETS Aluminum
	CONCRETE HOOKS High-Impact Plastic		CAP SCREWS, Hex Head 18-8 Stainless Steel		FRAME HANGERS Saw Tooth
	EXTERNAL RETAINING RINGS Spring Steel		SOCKET HEAD CAP SCREWS Hardened Steel, Phosphate Coated		O-RINGS Neoprene Rubber
	MACHINE SCREWS, Grade 2 Steel, Zinc-Plated		CLOSED END CONNECTORS Copper, Tin-Plated		TINNERMAN NUTS Multi-Thread Steel
	SELF-TAPPING SCREWS, 18-8 Stainless Steel		GROMMETS Rubber		THREADED INSERTS Brass Alloy
	WING NUTS Die Cast Zinc		PLASTIC RIVETS High-Impact Plastic		ALLIGATOR CLIPS Solderless
	SPADE TERMINALS Copper, Tin-Plated		BUTTON SNAPS Brass, Nickel-Plated		MASONRY NAILS Hardened Steel
	WIRE & CABLE HOLDERS Nylon		SCREW HOOKS Steel, Zinc-Plated		WALL ANCHORS Tubular, Plastic
	STEM SNAPS Black Nylon		ROLL PINS Steel, Zinc-Plated		SNAP SPLICE CONNECTORS Plastic
	WALL ANCHORS Conical, Plastic		SPRINGS Steel, Zinc-Plated		STRAIN RELIEF BUSHINGS High-Impact Plastic
	COTTER PINS Steel, Zinc-Plated		COMMON NAILS Diamond Steel		



YOUR FREE CATALOG
NEW 1983 EDITION!

"AND THIS IS JUST A SAMPLING OF WHAT'S ACTUALLY IN THE CATALOG"

D.R.I. Industries, Inc., PM-5-83
11100 Hampshire Avenue South
Bloomington, MN 55438

TO RECEIVE YOUR FREE CATALOG, SIMPLY COMPLETE AND MAIL THIS COUPON TO:

D.R.I. Industries, Inc., PM-5-83
11100 Hampshire Avenue South
Bloomington, MN 55438

PLEASE PRINT

NAME MR. MRS. MISS First M.I. Last

ADDRESS Street & Number

City State Zip

**EARN UP TO
\$12 AN HOUR**

**IN YOUR OWN
SPARE
TIME or
FULL TIME**

SHARPENING BUSINESS!

**ON OUR
30-DAY
FREE
TRIAL
OFFER**

You risk nothing by accepting this offer to see how easily you can turn your spare time into big Cash Profits with your own Complete Sharpening Shop. No selling... no previous experience needed. Our famous Sharp-All and show-how instruction set you up to make \$200, \$500, \$700 a month CASH sharpening Saws, Knives, Scissors, Lawnmowers, Shop and Garden Tools... all cutting edges.



**LIFETIME
SECURITY**
with
**YOUR OWN
BUSINESS**

**FREE
BOOK!**
Gives
Full
Details

Send for all the facts! Our free Book tells how to start a profitable, lifetime home sharpening business, how we help you grow, how we'll finance you.

Send for FREE details — mail coupon below or postcard TODAY!
Foley Belshaw Co. 80179 Field Building, Kansas City, Mo. 64111

No Obligation... No Salesman Will Call

YES, FOLEY BELSHAW CO. 80179 FIELD BLDG., KANSAS CITY, MO. 64111
please send me the FREE BOOK that gives full details.

Name _____ Phone _____

Address _____

City/State _____ Zip _____

WATER WELL DRILL KIT



Drill a water well or a free-flowing spring in your backyard. Have all the pure, fresh water you want FREE! Easy to operate as your power lawn mower.

30,000 SOLD!

FOR FREE BROCHURE
**CALL TOLL-FREE
1-800-821-7700**

(Ask for Extension 788)
Call anytime including Sundays
OR WRITE TODAY!

DeepRock

788 Anderson Road
Opelika, Alabama 37802



©1983 DeepRock Mfg.

RESCUE BY A SATELLITE (Continued from page 81)

aviation frequencies, respectively). Under ideal circumstances, the EPIRB signal would be detected by an aircraft or ground station which would initiate a search and rescue sequence. In this case, however, it was not until 2123, (9:23 p.m.), about 12 hours later, that TWA Flight 904, bound from Kennedy International to Madrid, picked up *Gonzo's* signal. Perhaps the EPIRB did not function earlier, or the storm interfered with its transmission.

But unknown to anyone at this time, the signal was being picked up and stored by COSPAS, a Russian satellite.

Estimates 300 miles apart

Flight 904's crew made a quick and rough estimate, by direction finder, of the signal source's position. They then radioed the FAA's Oceanic Control Center at Islip, Long Island. About 28 minutes later, a second aircraft, which also picked up the EPIRB signal, radioed a position, but it was some 300 miles away from the first.

Oceanic Control immediately called the Coast Guard Rescue Coordinating Center (RCC) at Governor's Island, N.Y., which contacted its Boston counterpart to learn whether it was monitoring an EPIRB or weaker ELT (aircraft Emergency Locator Transmitter). The reply was neither.

New York RCC had been briefed on the existence of a new satellite rescue system, so they called the main base for the system, Scott Air Force Base, in Mascoutah, Ill. Scott would know if the fledgling SARSAT network was operational. SARSAT, the acronym for Search and Rescue Satellite-Aided Tracking, is an international experiment (involving the United States, Canada, France and the Soviet Union) to

develop a worldwide system for locating ELT/EPIRB signals through doppler analysis by low-altitude, polar orbiting satellites. At the time of *Gonzo's* capsizing, only one satellite, the Soviet COSPAS, was in place. When Scott learned of the capsizing, it called on COSPAS to dump any pertinent data from its onboard computer and, within 12 minutes, COSPAS gave five possible positions—taken during different passes over the trimaran—for *Gonzo's* lonely cry.

Water flows into hull

Meanwhile, Greene, Williams and Goodman waited. Because they had cut the first hole too low, water flowed freely in and out of the main hull. They stuffed the emergency liferaft (which they never intended to use) into the hole and cut another hole on the opposite (leeward) side of the hull as a hatch. They organized one-hour watches during which each man remained outside to look for ships while the others rested below, trying to sleep on boxes placed on the stern deck to keep them above the water. They settled down to watches and munched candy bars and oranges. No one had much desire to eat, though they had food for 30 days. At no time did they see a ship.

At 2212 hours Sunday, the Coast Guard Air Station at Elizabeth City, N.C., was briefed by RCC New York and advised to launch a C-130 search aircraft; they were given a position for *Gonzo* that was an average of the five provided by COSPAS. Unfortunately, the C-130 was quickly forced to return to base due to mechanical problems and was relaunched at 0130 Monday.

Three hours later, the C-130 picked up the *Gonzo's* EPIRB signal. The air-



The California Getty passed by *Gonzo* after a failed attempt at rescuing the trimaran.



In high winds, the cutter *Vigorous* moved closer to bring aboard the *Gonzo's* crew.

craft's automatic direction finder, however, malfunctioned and was of no use in localizing the signal. However, within two hours of further patrolling, using the COSPAS average position, the crew saw flares rising from *Gonzo's* inverted hulk. The actual position, determined by inertial navigation and loran, was Lat. 40°, 28 min., 6 sec. N by Long. 64° 2 min., 24 sec. W.

'All ships' message goes out

With *Gonzo's* position fixed, an immediate "all ships" message was broadcast from Portsmouth and Boston requesting positions of merchant vessels in the area. At 0710 the 870-foot tanker *California Getty* responded and voluntarily diverted her course to the *Gonzo*. A second vessel, the container-ship *American Ace*, also began steaming to the scene in 35-knot winds and 25-foot seas. The C-130 next dropped two datum marker buoys. The buoys transmit homing signals on 275.1 and 240.6 MHz and do not interfere with EPIRB signals. And the C-130 was advised by its home base that the 210-foot medium endurance cutter *Vigorous* was 85 miles due west of *Gonzo*. At this point, updated positions from COSPAS were radioed to *Vigorous* from Scott.

By now the C-130 was running low on fuel and requested that the Canadian Air Force dispatch a P-3 from its base at Greenwood, Nova Scotia, to continue coordinating the rescue. At 0958 hours Monday, the P-3—picking up the COSPAS data on its onboard computers—made visual contact with *Gonzo* and assumed the responsibility for vectoring the *Getty* to the correct position.

Tanker hits trimaran

The *Getty* arrived at 1230. Although the wind and sea were still up, her master made four difficult attempts, over the next hour and a quarter, to maneuver alongside *Gonzo*. But she failed, in 20-foot seas, even striking *Gonzo* twice and throwing the crew into the water. The *Getty* then stood off to windward, giving *Gonzo* some relief from the seas, and awaited the smaller, more maneuverable *Vigorous*. At 1410

the *Vigorous* reached the scene. Five crewmen, in wet suits, helmets and harnesses, were stationed at the fore-castle; a backup team remained nearby, similarly suited. The *Getty* was asked to take a position 300 to 500 yards to windward of the *Gonzo* to break the seas for the *Vigorous*. (A later Coast Guard report was to commend the *Getty's* master whose "efforts were indeed valiant.")

Meanwhile, the cutter's master, Cmdr. Kenneth Thompson, approached *Gonzo*. By bringing the *Vigorous's* bow to windward of *Gonzo*, then letting her drift, under control, to the helpless trimaran, he enabled his crew to pass heaving lines and horse collars for *Gonzo's* crew to put on, enter the water, and be pulled to safety. It took only five passes to bring Williams, Goodman and Greene aboard one at a time. At 1523 the rescue was complete.

Greene, Williams and Goodman were found to be in excellent condition, a tribute to their experience and preparedness. After 30 hours adrift, they suffered no ill effects, not even bruised egos—sometimes the sea just has to win.

Hazard to other ships

The trimaran rescue has left the world with one problem. At this writing, several ships have reported *Gonzo* adrift as she follows the North Atlantic currents toward the Azores and beyond. She has averaged about 300 miles per month—a bit slower than her best racing speed. Another trimaran, *Rennie*, abandoned south of the Azores, is also adrift. They may present a hazard to passing vessels. One trimaran, capsized in the Caribbean last fall, was shelled and sunk by the Venezuelan Navy as she was a hazard to navigation. And Phil Weld's *Gulf Streamer*, which he abandoned in the Atlantic after she capsized in 1976, was picked up by the *Nikolai Ananiev*, a Soviet freighter on her way to Lisbon. There *Gulf Streamer* was transferred to another Soviet ship bound for Odessa, where the trimaran is now being sailed by an anonymous member of the Odessa Yacht Club.

Perhaps she was advance payment for our use of COSPAS. **PM**

**DO YOU HAVE
WHAT IT TAKES
TO START AT
\$22,500⁰⁰**



**WITHOUT
A COLLEGE
DEGREE?**

Most Tulsa Welding School Grads Do!

In fact, the first paychecks for students who graduated in the first four months of 1981 and went to work welding... ranged from a low of \$793 to a high of \$6,846. This is a yearly salary range from \$9,516 to \$82,152. Worldwide construction and pipeline firms compete for our graduates. Full course is only 16 weeks (others as little as 10 weeks). There are more jobs open throughout the U.S. — and the world — than there are qualified welders.

Tulsa Welding School, established for over 30 years, is recognized for the quality of its graduates throughout the world. Do well at T.W.S. — work hard — and your income as a welder can be higher than many college graduates.

**TO TAKE COMMAND
OF YOUR FUTURE . . .**

Call Toll Free 1-800-331-2934

In Oklahoma, call (918) 587-6789

... OR FILL IN AND MAIL TODAY!

Admissions Director
Tulsa Welding School
P. O. Box 9829
Tulsa, OK 74157

PM5/83

We'll send you a complete course catalog plus job list and pay at which recent grads have gone to work.

NAME _____

ADDRESS _____

CITY _____ STATE _____

ZIP _____ PHONE (____) _____

Area Code
Accredited Member of Nat'l Assoc. of Trade and
Technical Schools. Approved for Veteran Training.

TODAY'S TOP TUNERS

(Continued from page 97)

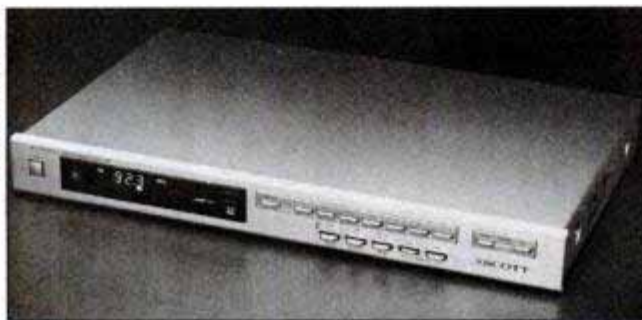
nals. And, there's even a voltage selector to use for other than U.S. voltages.

Though the Carver received stereo from farther away, the 3001 delivered by far the quietest FM performance we've ever heard from local and near-distant transmitters. We know that \$1,145 is a lot of money, but then the Tandberg 3001 is a lot of tuner.

Carver TX-11

No other tuner has been so anxiously awaited as this impressive design from Carver. It incorporates a signal-tracking capability that is similar to that of the NAD tuner, but also introduces Bob Carver's revolutionary stereo detector for FM. This circuit doesn't affect either AM or mono FM reception. Instead, it eliminates some traditional steps in the FM stereo decoding process. It substi-

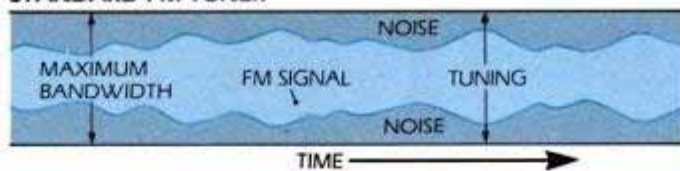
Affordable (\$280) and selective, the Scott 558T tested as a high performer. Capture ratio and selectivity compare well with higher priced tuners.



tutes its own interpretation of what that stereo signal ought to sound like. The circuit looks at the very clean mono FM signal for cues, and presents distinct outputs for your left and right channels. The stereo signal may vary slightly from what was actually broadcast, but the result is the stereo effect you want. The biggest benefit is the nearly complete elimination of hiss.

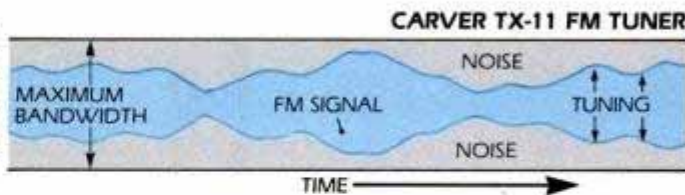
The circuitry is arranged so you can switch in three increasingly impressive degrees of quieting and clarification. Bob Carver felt that such an expanded FM range demanded yet another change or two: there is no mono switch and there are 16 FM memory preset buttons to store the locations of all those "new" stations. If a \$540 price tag doesn't scare you away, and if you like the idea of being able to receive

STANDARD FM TUNER



Standard tuning accepts noise as well as the FM signal. Such tuning takes in all of tuner's maximum bandwidth.

TX-11 adjusts its tuning bandwidth to the width of FM signal. This drastically reduces the amount of noise that's heard.



distant stereo stations, the TX-11 may be what you've been waiting for. A car stereo version is in the works.

Adcom GFT-1A

Because there are eight memory presets each for AM and FM stations, we anticipated that this tuner would pull in

ly and with excellent quieting. Like the Scott 558T, the 4150 is simple in appearance and straightforward to use. If your tuning is slightly off, a small arrow shows the direction in which you must adjust to be right on the proper frequency (FM only). A mute for FM quiets things as you tune the receiver and eliminates signals below a certain strength.

Scott 558T

The Scott has more performance than you'd expect of a tuner priced at \$280. This tuner is an excellent bet for a discriminating music lover in a city with FM multipath and dial-crowding problems. It sorts through the FM jungle very handily, to isolate a signal. Adjacent FM stations of comparable strength remain reliably separate and don't intrude on each other with this tuner.

When switched on, the modest high-blend (processing of highs to reduce noise) did not deliver spectacular quieting on distant FM stereo signals. However, the high-blend did work subtly, not obviously, which was welcome when we didn't want to be distracted from the music.

More reasons to buy

The decision to buy a separate tuner is a very personal one. If you are building a system from the ground up, a single unit combining amplifier and tuner—a receiver—is more cost effective and takes up just half as much of that hard-to-come-by shelf space for your stereo setup.

But a few of the new circuits within

more stations. It does, and quiet, firm tuning and effective elimination of any perceptible digital tuning noise make the GFT-1A a pleasure to use. Especially useful to those of us who raid the airwaves for music to put on tape was the *record calibration* button. If you turn it on, the tuner produces a steady tone that goes through your preamplifier and to a tape deck. You then set the deck's level for recording FM—any FM. As the owner's manual explains handily, there is a national FM broadcast level standard. Setting your deck once tells you where you'll get the best record levels for all FM stations.

NAD 4150

NAD's newest tuner gets its good performance from a Schotz circuit that enables it to track FM signals accurate-

SPECIFICATIONS—FIVE TOP TUNERS

Make	Model	Price	Bands	Presets (AM/FM)	AC-Off Memory Retention	75-Ohm "F" Connector	Stereo Hi-Blend Switch	Capture Ratio* (db)	Stacking Width (in.)
Scott	558T	\$280	AM/FM	7/7	1 day	No	Yes	1.2	17
NAD	4150	\$338	AM/FM	5/5	2 weeks	No	No	1.2	16½
Adcom	GFT-1A	\$375	AM/FM	8/8	None	Yes	Yes	1	19
Carver	TX-11	\$540	FM	**NA/16	None	No	Yes	1	17½
Tandberg	3001	\$1,145	FM	**NA/8	6 mo.-1 yr.	Similar	Yes	1	17½

Note: All tuners feature digital tuning and scanning, except the Tandberg, which is analog.

*Capture ratio is a tuner's ability to reject weaker of two stations on same frequency. The lower the capture ratio, the better.

**Not applicable.

these tuners are still available only in separate tuner format (the Carver, Adcom and Scott units in our article, for example). The Tandberg and NAD are available as receivers. Keep in mind, if your current amplifier or receiver has performed well from an amplification point of view, adding one of the separate new tuners is a cost-effective way of conquering your current reception difficulties without having to pay the extra expense of replacing an entire receiver unit.

More sources for sound

Today there are more sources for sound, too, so a separate tuner permits you to use preamplifiers and integrated amps with greater input and output flexibility than most receivers on the market can offer.

A typical receiver handles one phono input, one or two tape decks and an auxiliary input. A good preamp also accepts another phono, perhaps another tape deck and up to three auxiliaries. If you plan to add a video disc play, a VCR and a digital compact disc (CD) player, you can see where the extra inputs on your audio equipment will get filled up.

Then, too, with separate tuner and amplifier combinations, you can combine features of both that aren't in

receivers currently on the market. (Some combinations offer switching for three pairs of speakers and dubbing between three tape machines—try and match that with any receiver model by itself.)

On the back panels

The list of standard tuner connections is brief: stereo outputs and antenna connector(s). More recently, the manufacturers have shown signs of recognizing that the antenna is a major component in radio reception. Connection with a 300-ohm pair of screws is standard, but manufacturers are now adding push-insert-release terminals. These are the same as found on the backs of many amplifiers where the speakers are connected.

The best connector of all is the 75-ohm "F" coaxial screw-plug. It offers complete isolation from interference, multipath and miscellaneous signal leakages. It is also the fastest to connect, disconnect and reconnect, which it does in about two or three revolutions of its permanently attached ring nut. This is the connector you see on cable TV, some computers and most video tape machines. The F connector is far faster and a good deal less short-prone than the 75-ohm binding-post-and-clamp connector usually substituted for

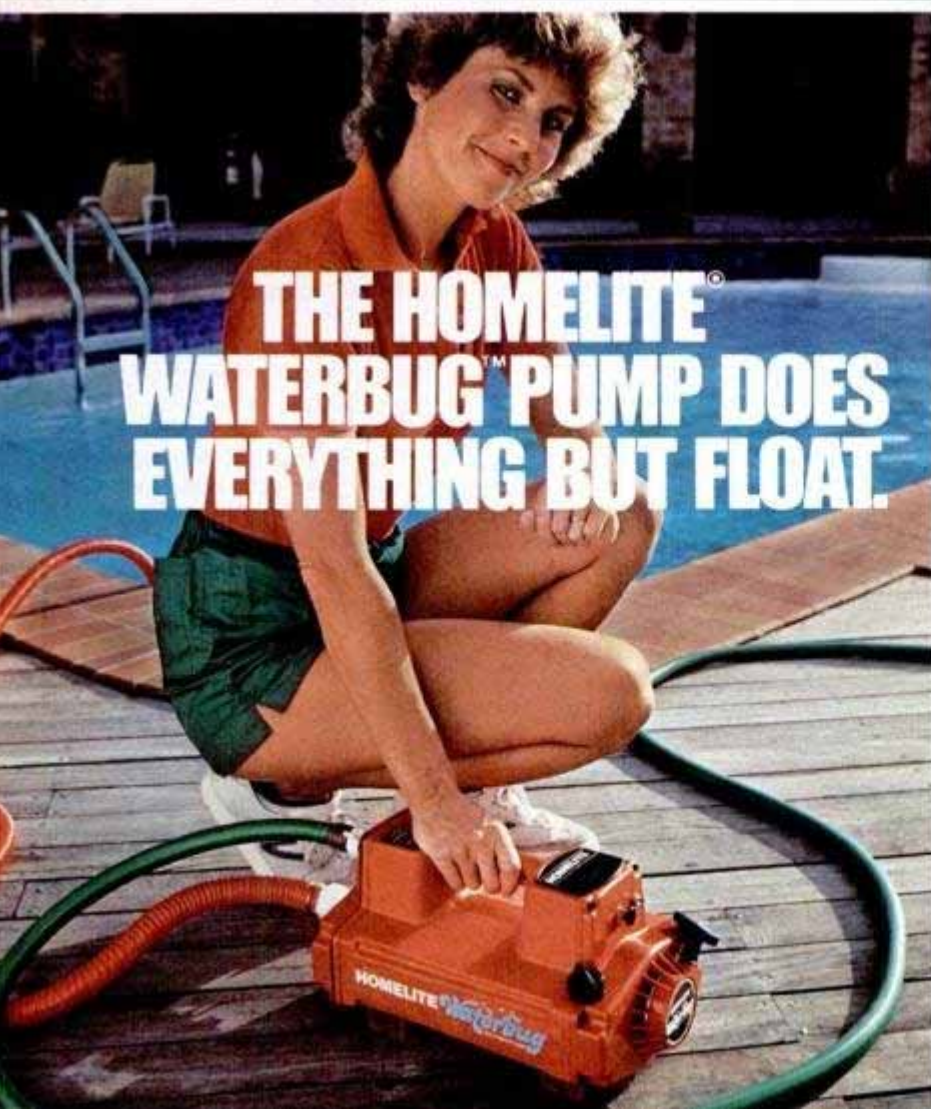
the real thing. Of the five tuners we examined, the Adcom has the F connector, while the Tandberg has a satisfactory European equivalent.

Other tuners

When we made our selection of five tuners for this article, it was not at all hard to find candidates. In fact, the choices were quite difficult—except for the absolutely unique Carver design, of course.

For example, three tuners in Sony's elegant ST-JS series matched three of the price levels we included—not to mention their obvious quality. The Tandberg wasn't the only costly tuner around, as we saw when we admired Revox's businesslike and versatile FM tuner/preamplifier, which goes for a mere \$2,399. Sansui's TU-S line has garnered praise from users who admire its excellent noise-quieting. Pioneer's revolutionary tuner design triples adjacent-channel selectivity and doubles stereo channel separation compared to what was thought possible before. It will be out in both tuner and receiver versions, but wasn't available when we did our listening.

Other manufacturers, too, are introducing separate tuners with specs that you should find are music to your ears. **FM**



OUR WATERBUG POOL TOY DOES JUST THE OPPOSITE.

Now our Waterbug multi-purpose pump comes with a special offer for the new inflatable Waterbug pool toy. This delightful toy is our way of reminding you that the Waterbug pump is not only great



for watering lawns, draining basements, and fighting fires—it's also the ultimate pool pump.

The gasoline-powered Waterbug pump weighs only 9 pounds. Yet it can pump an amazing 1,350 gallons per hour through a standard garden hose.

And best of all, with the Waterbug pump's low price you don't have to float a loan to buy one.

Look for the Waterbug Pool Toy offer at your Homelite dealer.

**NOBODY DOES THE JOB
AROUND THE HOME OR FARM LIKE
HOMELITE/JACOBSEN.**



HOMELITE/TEXTRON
Homelite Division of Textron Inc.

Материал, защищенный авторским правом

PACING THE PACK

(Continued from page 91)

to dive down into the lower part of the banking. It's strange, but here on this gray, overcast day in Indianapolis, the grass flanking the track is still bright green.

But here comes turn three. No time to think about grass. Dive left through the apex of the turn. Feel the suspension working, the tires clawing for traction. Crank in a little more left steering lock. We've got it now. Just hold it. Back off the throttle a little. The front tires are pushing.

Down the chute

Now through the apex and nail it down the short chute between turns three and four.

Here's where Duke Nalon will punch the throttle to the floor, accelerate through turn four and make a sharp left onto pit road the day of the race. We make a mental note to back off to 85 on our next lap to see how the car feels accelerating up to 120.

But we're just about at 120 mph now and here comes turn four. Turn left. Steady throttle. Back off just a hair. Keep control. Don't oversteer. Through the apex. *Punch it!*

There goes the pit road entrance. Now straighten out. Steady. On the front straight. Relax for a minute and let the long straightaway rush toward us in a blurring of the senses. Feel the speed, the wind, the machinery at our command. Enjoy it.

The strip of bricks at the starting line, the only remnant of the old Brickyard track, rushes up under the car and is gone in a flash.

And now here comes turn one, and we can do it all over again.

No ordinary Riviera

Clearly, this is no ordinary Riviera convertible. The Riviera XX is a highly specialized machine designed and built at Buick Engineering (their fourth pace car in recent years) under the direction of Ray Smith, overall Indy Pace Car Team coordinator; George Claypole, Pace Car Team project manager; and Ed Roelle, in charge of interior/exterior development.

You can't just walk into the Indy offices and tell them you want your new Bulgemobile to be the pace car for the race. Besides all the money you have to plunk down, there's the matter of how well your car performs.

There are definite performance criteria for an Indy 500 pace car. Don't forget that the pace car is out there in front of 33 snarling, charging race cars that are going about 150 mph when they take the green.

The pace car holds down the speed of

the pace lap to about 85 mph. As the cars enter turn four, the pace car must accelerate from 85 to about 120 mph and make a hasty exit onto the pit road, all the while making a hard left turn. By the time the race cars have left turn four and crossed the starting line, they're going about 150. And if you're in the pace car, you'd better be out of their way.

Highly modified

There aren't many production cars today that can accelerate from 85 to 120 in a few hundred feet through a turn. That's why almost all pace cars have been highly modified in both engine and suspension to do things that ordinary street cars cannot do.

This year's Riviera is no exception. Besides Buick, 10 divisions of General Motors contributed engineering, fabrication, design and over 1,000 special pieces of hardware to the project. The result of all the man-hours is a vehicle that is at the leading edge in so many areas of automotive engineering that it's difficult to even begin describing the various systems on the car.

For instance, the engine may well be the most technically sophisticated powerplant to ever find its way into a car. Any car. George Claypole started with a Stage II 4.1-liter V6 block right out of the Buick Heavy Duty Parts catalog. Also right out of the catalog were a set of Stage II cylinder heads, crankshaft, connecting rods, head gaskets and various other hardware.

Onboard computer

A digital onboard computer built by Delco Electronics controls all major engine functions and some minor ones, including the experimental electronic overlapping sequential port fuel injection system and the water/methanol injection system used to control detonation.

Twin 80-mm mass airflow sensors built by AC Spark Plug are linked to the computer to control the air/fuel mixture, and AC high-pressure, in-tank fuel pumps deliver the fuel. The computer also controls the distributorless coil ignition system, idle speed and turbocharger wastegates. The computer will even tell its designers what's wrong with the engine. It's programmed to self-diagnose 20 ailments. The radiator, built by Harrison, is a specially fabricated four-tube row unit with a high-density core. Helping cool the powerplant is a two-speed, 400-watt electric fan, computer controlled, of course.

High-tech electrical system

The electrical system is about as high tech as you can get. The ignition system consists of a computer-controlled three-

coil unit sitting atop the engine. The computer figures out when each coil should fire in relation to the piston stroke, and fires it. That's all. No distributor. No complications. This will probably be a production item soon on many GM cars. The battery is an experimental Freedom III from Delco with an incredible 1,100 cold-cranking amps—enough power to start a diesel locomotive if need be. Keeping the battery charged is a high-output 108-amp generator so small you'd think it was a 40-amp unit.

Twin turbocharger system

Capping it all off is a beautiful array of polished alloy tubing that makes up the twin turbocharger system.

"By using smaller T3 units," engine man Claypole says, "we cut the inertia way down and the turbine speeds up much more quickly, making power almost instantly. Thus, we have no turbo lag so common in single-turbo installations. And by using two turbos, we get the capacity we need to make as much horsepower as we want. Essentially, we've set it up as two three-cylinder turbocharged engines."

The computer calculates how much boost is needed in each gear to produce the programmed-in amount of horsepower desired. Hydraulic sensors in the transmission tell the computer what it needs to know. Then the computer varies the boost to the ideal setting in each gear.

It's been Ray Smith's unenviable job to get all this power generated by the engine to the ground.

Smith started with a basic T-Type Riviera suspension setup. That means higher spring, shock and stabilizer bar rates over a conventional Riviera suspension.

Modifications by Smith were few. He installed higher-rate front torsion bars. The rear stabilizer bar was increased in diameter from 22 mm to 26 mm, the front bar from 27 mm to 32 mm. The stabilizer bar link grommets were changed from rubber to harder polyurethane material to allow less flex. The steering gear was modified for more effort, and all the body mounts were changed to harder units.

High-speed tires

Goodyear came up with special P225/70HR15 high-speed Eagle GT tires just for this pace car. They're mounted on custom-made 15x7 wire wheels manufactured by Appliance Industries.

Putting all this four-wheeled high technology through its paces was admittedly a thrill. It's been a long time since we've felt such devastating power in a car. Now if they'd only build one just like it for production. **FM**

BROOKLYN BRIDGE

(Continued from page 87)

down through another tube—one with an airlock—and tools and supplies went down still another tube, also with an airlock.

Air pressure of up to 50 pounds had to be provided as the Brooklyn caisson sunk to depths of 44 feet and the Manhattan caisson went down just over 70 feet. (The Manhattan caisson never came to solid bedrock and was left standing in tightly packed sand. Studies show it hasn't moved a quarter of an inch in 100 years.)

Caisson workers removed matter from the riverbed and wheeled it out to buckets lowered into the equipment supply shaft or to excavations around the water shafts. Clamshell scoops lowered into the dredge tubes lifted out the crushed pieces of riverbed. The scoops were carried by pulleys hanging from hoists above the water level.

Since electric lights had not been invented at the time of the caisson construction, Roebling had to light the work area with candles and calcium lamps, known to the Broadway crowd as limelights. Better light was available from kerosene lamps, but in the oxygen-rich compressed air below, Roebling took no chances.

Not that he was able to avoid fire in the caissons. On Dec. 1, 1871, with the Brooklyn caisson sunk to near its final depth, a fire was discovered in a seam of the wooden ceiling in a work area. The blaze probably started slowly when a workman left a candle burning near an inside portion of the ceiling.

The hole made in the ceiling was just inches in diameter, but by the time anyone smelled smoke—a day after the fire started—firemen peering through the hole saw almost seven feet of smoldering wood. It was red hot.

Crews shot steam into the hole for half an hour, followed by streams of carbon dioxide. Nothing worked. Eventually, so much water was pumped into the hole that the water cascaded back out, and it seemed the fire was over. Unfortunately, the flames persisted and were discovered again several hours later near the roof. Over the next week, the caisson was flooded for two days, then pumped out. In all, it took two weeks to snuff the fire.

The fire damaged hundreds of square feet of wood, but it wasn't enough to affect the caisson. When it was pumped out, the structure was right and strong and showed no signs of buckling. Roebling had built it with four times more timber than necessary to perform the cutting-edge function,

and to serve as the bridge's foundation.

The two towers took almost six years to complete. The towers made the next innovative step in bridge construction possible: the making of the cables.

Roebling used steel instead of iron to make the cable, seeking to increase the cable's strength without appreciably increasing its weight. He also ran a continuous cable from shore to shore across the towers rather than linking them with iron eyebars.

To form the cables, Roebling designed the world's first on-site rope-spinning system. A rope going across the two towers and stretching from anchorage to anchorage conveyed a giant wheel pulled by stationary steam engines placed at the anchorages. Around the wheel the bridge crews looped a single strand of wire that would be run out about a mile from shore to shore, and up and over the towers. The wire played out of big drums 100 feet at a time. A pencil-thin strand of wire would be placed almost end-to-end with another strand. Then the two were connected inside a steel ferrule joint, which was clamped shut tightly against the wires.

Gripped in the teeth of the joint, the wire would play out and another was joined until about a mile of wire

(Please turn to page 195)



**THANKS TO HOMELITE/JACOBSEN
ENGINEERING, THE RMX™ RIDER WON'T
TAKE YOU FOR ONE.**

Responsive
rack and pinion
steering.

Quick, effortless
fingertip deck height
adjustment.

Optional rear catcher
—supports standard
trash can.

High vacuum through-the-deck
discharge system.

PACE COMMAND
drive control—
for simple "no hands"
shifting.

It's amazing how many riding mowers are little more than lawn mowers with seats.

The Jacobsen® RMX™ Riding Mower, on the other hand, is a heavy-duty mowing machine, engineered for years and years of trouble-free service. With advanced design features that are inexcusably absent on other riders—easy-to-use features that help you get the big jobs done in a hurry, and in comfort.

Like the unique optional rear catcher that supports any standard round trash can, so clippings can be conveniently discharged directly into your trash can liner. And the innovative through-the-deck discharge system that even picks up pine needles and leaves.

Compare the RMX with other riding mowers on the market. In fact, test drive it! You'll see why it's earned its reputation as the most machine for the money.

**NOBODY DOES THE JOB
AROUND THE HOME OR FARM LIKE
HOMELITE/JACOBSEN.**

**HOMELITE
JACOBSEN**

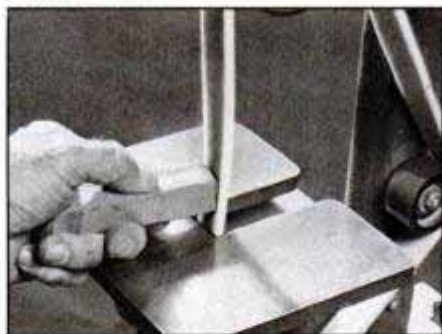
HOMELITE/TEXTRON
Homelite Division of Textron Inc.

Материал, защищенный авторским правом

POLISHING WITH A SANDER/GRINDER



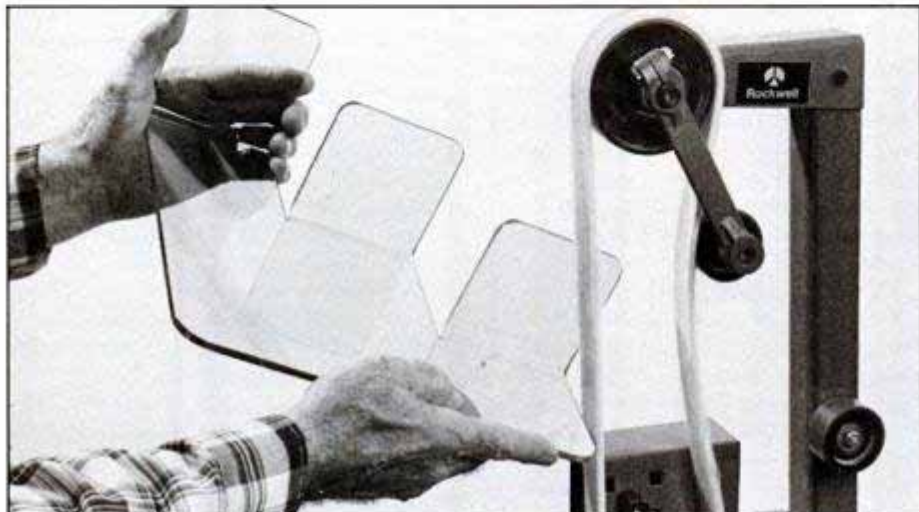
Rockwell accessories (clockwise from top): brushing/cleaning belt, nonabrasive belt, rouge, contact wheel, platens.



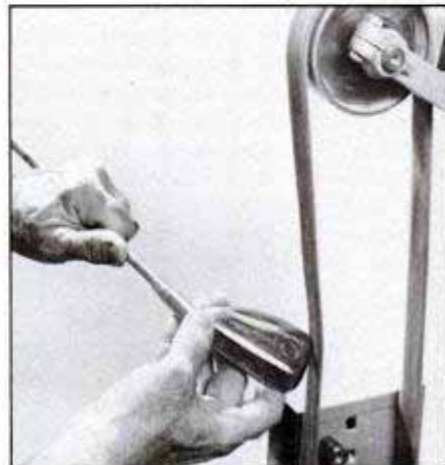
The conventional way to polish: Charge a nonabrasive wool belt with some rouge.



The brushing/cleaning belt—a nylon web impregnated with abrasives—can remove rust or clean plastics and glass.



The nonabrasive wool belt is used to polish sheet acrylic edges. The platen should be removed unless the edges are square. Remove the table for greater access to the belt. You should apply light pressure during polishing.



Use the brushing/cleaning belt to restore beat-up golf irons. Keep the belt flexible by not threading it around the idler pulley. Use extra fine sanding belts to restore wooden golf clubs.

OTHER SANDING AND GRINDING TRICKS



When you use Rockwell's contact wheel, position the machine to extreme right-hand side of bench for easy access.



Use the rubber contact wheel with a coarse belt for aggressive, fast stock removal, descaling and deburring.



The disc sanders available on the Dremel and Craftsman models are useful for sanding particularly small workpieces.



Obtaining precise angles is easily handled on the disc sander. The cast aluminum table with the miter gauge tilts to allow for bevel sanding and grinding.

SANDER/GRINDER

(Continued from page 101)

4-in.-diameter rubber contact wheel (No. 31-362) used for fast stock removal, rough finishing and for flash grinding on soft metals.

In addition to the sanding belt, the Dremel and Craftsman models feature a 5- and 8-in.-dia. disc sander, respectively. Both disc sanders are available with a tilting table and a miter gauge.

Applications and techniques

The sander/grinder can be used on a variety of materials, including wood, metal, aluminum, plastics, glass and rubber. The machine can easily sand and grind flat surfaces or contoured shapes of all sizes. Small-surface areas can be worked with precision by cutting a belt into a narrow 1/8-in.-wide strip.

Caution: Always wear safety glasses or a face shield when operating a sander/grinder regardless of the material or technique being used.

A major feature of this machine is its ability to sand internal cuts without the need of an access cut. To perform this operation, the belt is simply threaded through the opening in the workpiece, then remounted on the pulleys. **FM**

BROOKLYN BRIDGE

(Continued from page 193)

stretched the full length. Every 100 strands of wire were gathered together to form a piece of rope. Then 19 pieces of rope were laid atop one another in a special geometric pattern devised by Roebling. With this pattern, they fit so snugly that the ropes formed a cable that would last practically forever. The cables were then tightly wrapped with wire rope to protect them from the salt air above the river.

So it was that the longest wire cables made for a bridge—and the only ones fashioned from steel—were spun out at the site. The four cables from which the bridge deck would be suspended each weighed 1.7 million pounds. Each was an incredibly tight 15¾ inches thick, 3,500 feet long and wrapped with more than 200 miles of steel wire.

With his stone towers in place and cables set up by October 1878, Roebling could now add the two final touches that would impress engineers for generations to come. First was his super-rigid system of hanging the bridge deck with criss-crossed suspenders and stays. The suspenders ran vertically, with the stays radiating diagonally from the towers. The webwork they formed would break up a sus-

tained wind, but more importantly, the bridge wouldn't give under the pressure of a high wind. Despite the fact that many civil engineers criticized Roebling for building the roadway so stiffly, it has survived several bridges that followed the conventional wisdom and allowed the roadway some give.

Once the roadway was in place in April 1883, the last major undertaking—the mass transit system—was ready to build. The cable train system took just a few months to complete and carried its first passengers in September, five months after the roadbed was finished and four months after the bridge opened on May 24, 1883.

In the first year of service, the cars carried almost 10 million passengers. The cable system was removed in 1908 to make way for tracks from New York's subway system. That continued until 1941, when the train service was stopped in a war economy.

Today, the Brooklyn Bridge accommodates 100,000 cars a day on business days and no fewer than 60,000 on slow traffic days. It's a toll-free bridge owned entirely by the city. (While the bridge was under construction, a series of controversies centering on disclosures about bridge board member William "Boss" Tweed led to the cities of Brooklyn and New York buying up all

outstanding stock. During the months of transition several bogus shares are believed to have changed hands, leading to the now-famous jokes about selling the Brooklyn Bridge.)

The bridge, by most accounts, is considered to be in such good shape that a New York City official told a recent gathering of civil engineers that New York might consider selling the bridge to a private company. George Schoepfer, chief engineer of the city's Triborough Bridge Authority, which handles only toll roads, said, "With tolls it could be a great business for someone."

In this centennial year it did become possible to purchase a small chunk of the Brooklyn Bridge. The bridge centennial commission sold little chunks of limestone from the anchorages for \$10 a piece. Each chunk was less than a handful, but the money was to go to a good cause: refurbishing some of the run-down areas around the bridge.

When the Brooklyn Bridge opened in 1883, President Chester A. Arthur and Grover Cleveland (then Governor of New York) crossed it and led the festivities. This year, President Reagan is invited to the repeat of the opener. The party will include descendants of the Roeblings, 19th-century vintage ships and more fanfare than New York City has seen in some time. **FM**

**THE BLOWER ATTACHMENT
WE GIVE YOU FREE,
OTHER STRING TRIMMERS
DON'T OFFER AT ANY PRICE.**



With its free blower attachment, the Homelite® ST-120 string trimmer can be quickly converted into a powerful clean-up tool that blows away grass clippings and leaves with a big 100-mph wind velocity. Take the blower attachment off, and the ST-120 converts back into a rugged string trimmer featuring automatic string advance, a wide 20-inch cutting swath, and built-in



vibration isolation to reduce fatigue. What's more, all Homelite gasoline-powered string trimmers now come with the only 2-year warranty in the industry.

**NOBODY DOES THE JOB
AROUND THE
HOME OR FARM LIKE
HOMELITE/JACOBSEN.**

**HOMELITE
JACOBSEN**

The free blower attachment comes packaged with the ST-120 and is available for models ST-100 and ST-200 with this coupon.

HOMELITE TEXTRON
Homelite Division of Textron Inc.

FREE! HOMELITE® Power Blower Attachment
\$21.95 VALUE with proof of purchase and \$2 to cover postage & handling

To receive your FREE Power Blower Attachment, fill in your name, address and the serial number of your new ST-100 or ST-200 string trimmer on this coupon, and send it together with proof of purchase (sales receipt or register tape) and \$2.00 (check or money order only) to cover cost of postage & handling, to: The Homelite Power Blower Offer, P.O. Box 631, Newell, NC 28126.

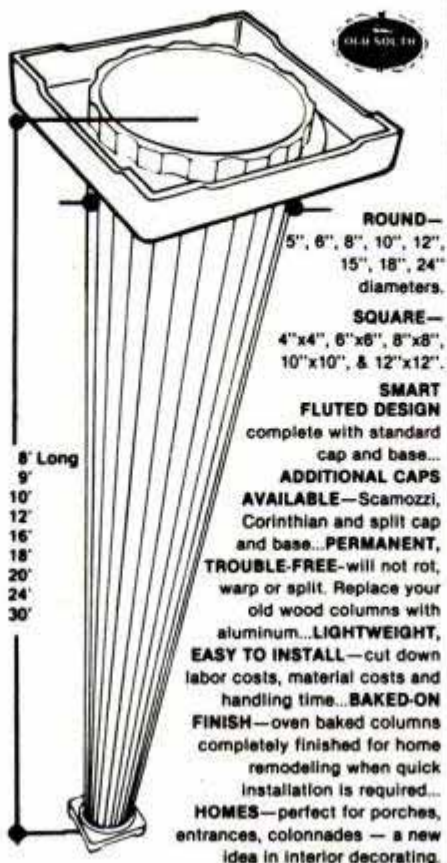
Name _____
Address _____ Apt _____
City _____ State ZIP _____
String Trimmer Serial Number _____

Limit 1 free blower attachment per address. Void where prohibited, licensed, restricted, or taxed. Employees of Homelite, Corson, licensed retailers and distributors are not eligible. Please allow 4-6 weeks for delivery. Coupons reproduced by mechanical means are not acceptable. Free blower attachment requests must be postmarked no later than expiration date, June 30, 1982.

OLD SOUTH COLUMNS IN EXTRUDED ALUMINUM CAN BE USED TO REPLACE ROTTING WOOD COLUMNS IN 8 EASY STEPS!

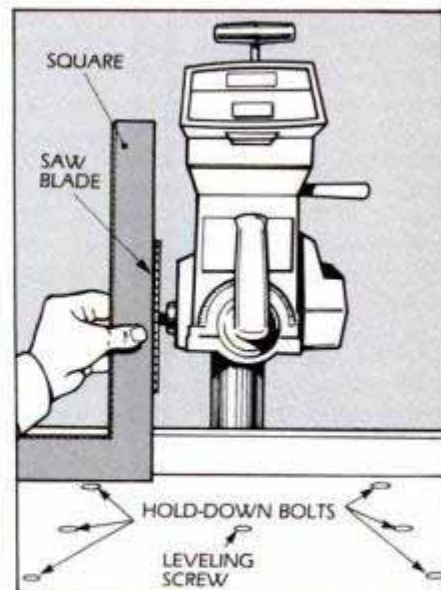
1. Call 1-800-841-8674 for literature and prices.
2. Study literature and price sheet to determine that aluminum columns are less expensive and easier to obtain than wood columns.
3. Sell spouse on all advantages of aluminum columns.
4. Call factory at same toll-free number and place order for columns to be shipped immediately from stock of 50,000. Use credit card or mail check.
5. Schedule Saturday morning do-it-yourself project.
6. Columns will arrive in approximately 10 days.
7. Arrange for moral support, 2 soft drinks, 1 can elbow grease, hammer, saw, level, and jack.
8. Follow directions and install columns on Saturday morning, eat lunch, then play golf with friends.

Moultrie Manufacturing Company
 Phone 800/841-8674 toll-free
 Moultrie, GA 31768



POWER TOOL MAINTENANCE

(Continued from page 109)



Adjust table level and true with hold-down bolts and leveling screw (if saw has one). Adjust the blade square to tabletop and reset the bevel index.



Square the arm to the fence with a framing square. Set miter scale to 0° when blade touches square edge at all points.



You should wipe the radial arm saw's tube column regularly with a clean cloth, then lubricate it with machine oil.

Quality Inflatable Boats for Under \$300!



Sea Eagles last for years, go almost anywhere and can be used fishing, sailing, camping, river running and yacht tending. • Write for FREE COLOR BROCHURE! Sea Eagle, Dept. PM35B, St. James, NY 11780.

Or phone: 516-724-8900.

SEA EAGLE

NEW!

24½ IN. 3-SPEED BAND SAW

30-DAY FREE TRIAL!



Now, a pro-size, band saw priced for the home shop! Big 24½-in. throat easily handles large scrollwork, complex curves, 4 x 8 sheets, 9-in. vertical cut makes it easy to resaw valuable hardwoods. Ball bearing construction. All-steel welded frame eliminates deflection. Includes motor, stand, rip fence, scroll table, full instructions. Easy Terms. Send for complete facts today!

WOODMASTER TOOLS DEPT. SP9, 2849 TERRACE, KANSAS CITY, MO 64108

More hauling ability for less money when you build Carl Heald's ¼-ton Hauler.



Go for parts or tools; Change combine shifts; check fields, livestock or warehouse; supervise crews; haul feed or seed. **Easy-to-build semi-kit, (6-8 hours assembly time) can save you up to \$1000.** Avoid mass production faults and cut maintenance. **Hauler features a 16 H.P., opposed twin cylinder or an 11 H.P., 4-cycle, Synchro-Balanced Briggs & Stratton electric start engine, forward and reverse gears and automatic transmission. Front shocks, double seat, wide tires smooth the ride. Dumping bed measures 44½"x40"x11". Hydraulic disc brakes with parking brake standard. 4-wheel models with cab also available. For FREE brochure call or write: TOLL FREE 1-800-253-1030, in Michigan call 516-849-3400.**

Carl Heald, Inc. Dept. NRN
 P.O. Box 1148, Benton Harbor, Michigan 49022

Carl Heald's Hauler
 Tons of toting help for farm, ranch, factory, construction



Keep pawls clean; points must be sharp.

BAND SAW



Clean the tires on band saw wheels with a stiff brush. If they're scored, dress surface with coarse sandpaper. If tires are overstretched, replace them.



Check blade tracking to be sure it rides at center of both wheels. If not, adjust tilt to get blade running correctly.

(Please turn to page 198)

MUST LIQUIDATE FAR BELOW DISTRIBUTOR COST! GENUINE TORO ELECTRIC Mower/Trimmer

Factory perfect! Discontinued series!

\$5,060,000 Inventory of
Last Year's TORO Models!

- Electrically operated! No gas. No engine problems!
- Mows AND trims flush up to walls, trees, fences!
- Cuts grass finely for mulch. No need for bagging!
- Unique twin revolving heads with FOUR flexible cutting lines to slice efficiently through grass!
- Cuts a 20" swath. Adjustable cutting height!
- Safer to use than any metal-bladed mower!
- Lightweight! Less than 35 lbs. Easy for senior citizens, women, young teens!
- Backed by TORO one year limited warranty! Service centers nationwide!



FOLDS DOWN COMPACTLY for transport in trunk of car or for hanging on garage wall.

TORO



Parts available for years to come, from Toro service centers nationwide.

Safety bar under handle. Release grip, engine stops.

For upright grasses. Not for creeping grasses such as Bermuda.

AUTOMATIC LINE FEED! Fingertip control for automatic feed of line. No bending or stooping.



120 VOLTS A.C. DOUBLE INSULATED



EASY START! Plug in cord and press a button. Simple, fast, sure starts every time.



2 CUTTING HEADS with 4 flexible lines revolving at 7500rpm. to slice cleanly through grass.

A genuine TORO mower... factory perfect... at FAR below distributor cost! What's the catch? Just this: These are last year's discontinued models. But they still carry TORO's normal One Year Limited Warranty! ELECTRIC MODEL! Easy pushbutton start with two heavy-duty motors for plenty of power.

UNIQUE TWIN SPIN HEADS! 7500 rpm. of spinning action turn the 4 flexible filament lines into highly effective cutting instruments.

LIGHTWEIGHT! Less than 35 lbs. No bulky, heavyweight gas engine to push around. Especially easy for seniors, women and young teens to handle, even on slopes and hills.

EDGE TRIMS, TOO! Mows, trims at the same time. Flexible cutting lines extend slightly beyond wheels on sides, so you can cut flush up to walls, fences, trees. Convenient!

MULCHES AS IT MOWS! Overlapping cutting areas of 4 flexible lines allow them to slice and reslice grass into fine clippings for mulch. Bagging is unnecessary.

ADJUSTABLE CUTTING HEIGHT! You can easily switch from 1½, 2¼ or 3 inch cutting heights.

EASY HANDLING! About as simple and easy to handle as self-propelled gas model, because of lightweight design. Big, easy-rolling wheels.

SAFER TO USE! Rapidly revolving cutting lines slice sharply through grass but do not have the dangerous solidity of hard, metal-blades.

SAFETY SHUTOFF! Release your hold on handlebar and engine stops. Starts again at touch of pushbutton.

There is NO finer name in mowers than TORO! Now YOU can get one at a sensationally low price!

So stop sweating, straining, fussing over heavyweight mowers with finicky engines that run out of gas. Take it easy! Get this lightweight, efficient TORO with pushbutton start.

Manufacturer's
Suggested Retail
\$229.95
OUT THEY GO AT

\$88

Price subject to change in 60 days. Offer void outside original 48 states.



Credit card members can order by phone, 24 hours a day, 7 days a week.

Toll-Free: 1-800-328-0609

If busy signal, or if no answer, call:
Toll-Free: 1-800-328-5727

In Minnesota, call: **1-800-742-5685**

C.O.M.B. Co.

ONE OF THE NATION'S LARGEST AUTHORIZED MAIL ORDER LIQUIDATORS OF CONSUMER PRODUCTS
6850 WAYZATA BLVD • MINNEAPOLIS, MN 55426

C.O.M.B. Co. / Liquidators Dept. B-997-4209
6850 Wayzata Boulevard / Minneapolis, Minn. 55426

Send _____ Toro Mower/Trimmer(s) at \$88 each plus \$18.75 each for shipping and handling. (Allow 2-3 weeks for delivery. Add 2-3 weeks extra if paid by check. Sorry, no C.O.D. orders.)

Minnesota residents add 6% state sales tax.

My check or money order is enclosed
Charge: Diners Club MasterCard® VISA Am. Exp.

Acct. No. _____ Exp. _____

PLEASE PRINT CLEARLY

Name _____

Address _____

City _____

State _____ ZIP _____

Phone _____

Sign here _____

Fabulous Folboting NOW

Avoid the risks and discomfort of flippy canoes, skimpy kayaks, wobbly inflatable rafts! NOW, you GLIDE securely in perfected Folbot, completely relaxed in EXCLUSIVE swivelback COMFORT. America's foremost small craft in various styles and colors from 1 to 4 seaters. GLIDE smoother, faster with EASIER lightweight double blades, efficient yacht smart sails, small motors. Perfect for nature study, scouting, float cruising, Supreme in White Water, Surf, Marsh and Sea. Most INEXPENSIVE in EASY PREFAB KITS or ready FACTORY BUILT, and travel smart FOLDING types to fit inside trunk or aircraft.

FOLBOT

Super Craft at BIG SAVINGS Easy PREFAB

Kits from \$182 or cartop FACTORY BUILT

from \$348 FOLDING from \$612

ideal Sail Rig \$279.

©

Smart Economic BASIC KITS
12 foot Single \$40
16 foot Double \$52
Big Sailer 16 foot \$61

FREE

Action Color Catalog With Facts & Figures

For rush inc. \$1 First Class Postage

Mail coupon or address

to: FOLBOT CORP.
P.O. Box 70877, PM583
Charleston, S.C. 29405

Print Name _____

Address _____

City _____ State _____ Zip Code _____

SWISS ARMY TYPE KNIFE

All purpose wonder knife. Red handle. Sturdy survival knife with 12 Stainless Steel

Blades, perfect for fishing, camping, work and play. Guaranteed 4.50 ea.

Add 50¢

Post & Handl

Westbury Sales P.O. Box 434, 373 Maple Ave. Westbury, N.Y. 11590 Dept. E-5-PM

CLOCK REPAIR PAYS

Let Your Workshop Earn You Money!

For full details on comprehensive home study Course, brochure, Course outline, repair charges, etc. Send \$1.00 to:

SCHOOL of CLOCK REPAIR

Squire Village
7 Cambridge Court, Rm. M
Toms River, New Jersey 08753

APPROVED FOR VETERANS

Approved by the Commissioner of Education, State of New Jersey

HYDRAULIC JACK REPAIRS

A Business of your own.

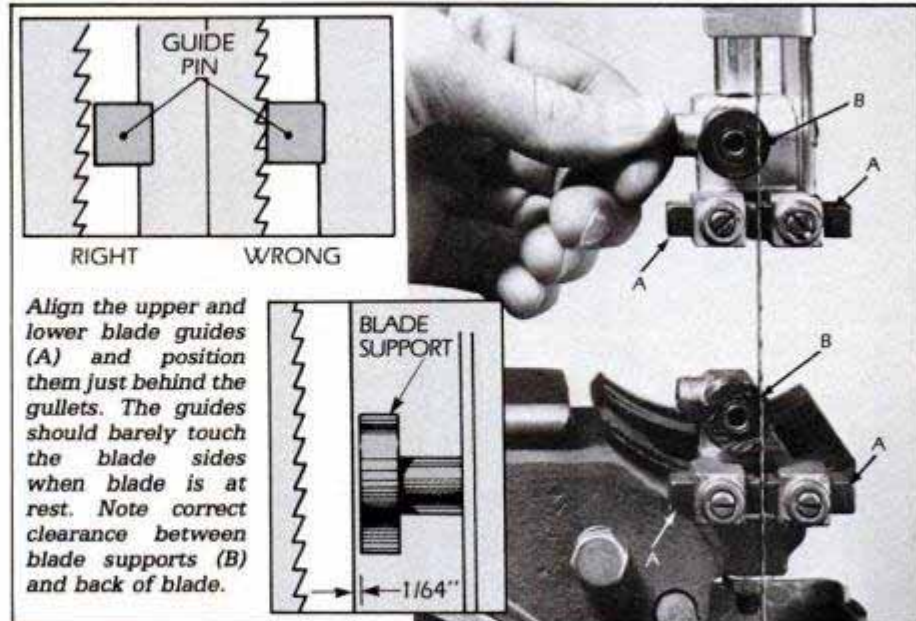
Earn while you learn at home. Millions of jacks in gas stations, trucking firms, etc. need servicing. We show you HOW. Start spare time in your basement or garage. Big opportunity for mechanics.

Write for folder No. PM5 and free bonus offer.

HYDRAULIC JACK INC.
P.O. BOX 18, ACCORD, NY 12404

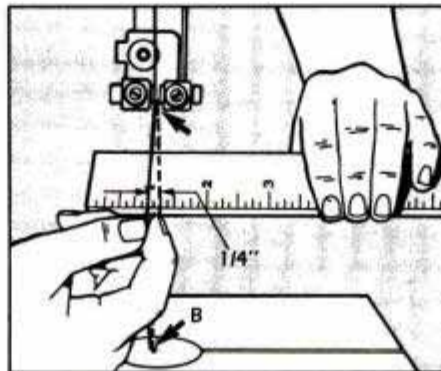
POWER TOOL MAINTENANCE

(Continued from page 197)



Align the upper and lower blade guides (A) and position them just behind the gullets. The guides should barely touch the blade sides when blade is at rest. Note correct clearance between blade supports (B) and back of blade.

JIGSAW



The band saw blade tension can vary for some types of shop work. For most woodworking, tension blade so that light pressure will deflect it about 1/4 in. between A and B (about a 6-in. run).



Keep blade guide and support correctly aligned to avoid frequent blade breakage.

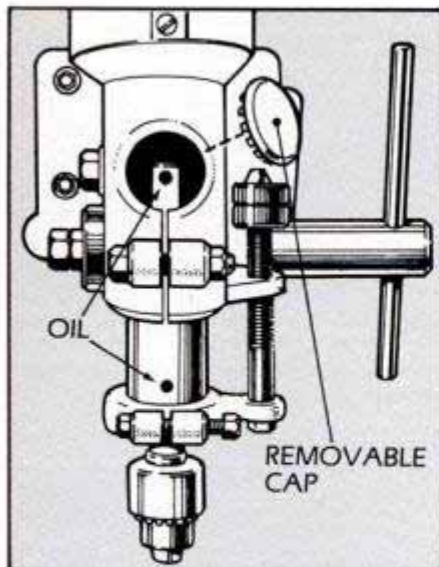
DRILL PRESS



Band-saw tables can flex at the blade-insertion slot at the front. Thus, many models are equipped with a leveling pin or screw. If yours has a pin-type adjustment, a few taps with a hammer should true the surface. Screw-type levelers must be turned to align the tabletop. After checking the table for trueness, check the relation of the table to the blade with a square. Reset the tilt indicator to 0 when they're at 90°.

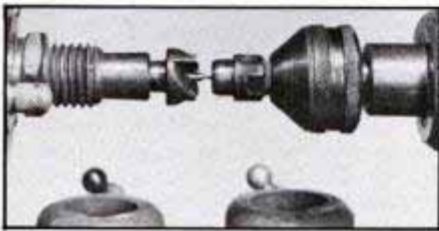


Lubricating a drill press regularly in the right places will keep the machine running properly for a very long time. At least two times a year, it is recommended that you take off the pulley housing and apply grease to the inside of the spindle pulley. You should be sure to clean out any dust or grit that may have worked its way inside the pulley housing.



Remove cover plate on the head and put a drop or two of oil in the holes indicated.

LATHE



Bring headstock and tailstock together; align centers. Adjust by using setscrews on either side of the tailstock.

PLANERS



Align infeed and outfeed tables with a straightedge. If the depth-of-cut index does not read "0," adjust it.



With depth-of-cut set at 0, check the knife alignment with a spider gauge. Adjust knives to just touch screw.

(Please turn to page 200)

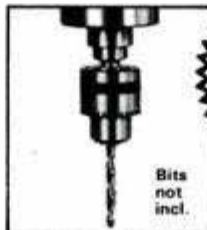
MUST LIQUIDATE AT HUGE PRICE REDUCTION! Extra-Heavy-Duty, Professional Milling Machine

FACTORY NEW! FACTORY PERFECT!

- 8 speeds from 90-1920 rpm. with changes of V-belt drive!
- Accuracy within 1/1000 inch!
- Powerful 1 hp. motor!
- 13mm chuck with milling head!
- 13mm chuck for boring!
- One year parts warranty!

Make no mistake! This is NO lightweight "sisy" model for amateurs! This is a BIG, SOLID, 374 pound heavyweight with plenty of "muscle" to power its way through hard and soft metals... with finely calibrated accuracy to within 1/1000th of an inch!

- 1 hp., single phase, capacitor-start, induction motor. 1720 rpm. 110V/14 amp AC. 220V/7 amp.
- Pivoting motor mount with adjustable belt tension and a locking device.
- R-8 Bridgeport collet arrangement enables you to use different types of milling heads and chucks for a variety of machining processes.



Bits not incl.

For boring, a heavy-duty, 13mm chuck made of hardened steel is included. Also included is a chuck key.



Manually operated, micrometer calibrated depth control for accuracy in milling or boring to within 1/1000 of an inch.

Two separate manual feed control wheels for left and right, fore and aft movement of bed. Micrometer calibration for accuracy to within 1/1000 of an inch.

**For
Milling
AND
Drilling!**

Micrometer calibrated! Tolerances to 1/1000 inch!

- 7" clearance from center of spindle to support column.
- Entire head assembly manually rotates 360° for easier placement of bulky work. Head locks in position when desired.
- Hand crank lever easily raises head for up to 10" working clearance.
- Adjustable 5" depth gauge, in 1/16" increments, for preliminary milling and boring, prior to final precision cuts.
- 20 1/2" x 6 1/4" bed has three T-grooves for securely mounting work to be done.
- Locking devices for left and right, fore and aft movement of bed to ensure closer degree of accuracy.
- Spring-loaded, bearing-sealed lubrication points on bed handwheels to keep out dirt, metal filings, etc.
- Heavy-gauge steel cover for belt/pulley box. Attaches securely with metal clips.
- Heavy-duty, machined aluminum pulleys with sealed bearings. Pulleys are adjustable for proper belt tension.
- Spindle head has sealed bearing.

PUBLIC NOTICE!

Finder's Fee Paid For Liquidation Inventories!

We are authorized liquidators of consumer products that must be quickly sold at drastic price reductions for reasons such as:

Overproduction. Last year's models. Economic recession. Out-of-season products. Bankruptcy or other financial problems. Order cancellations. Plant closings, etc.

If you know of any company with surplus inventories that must be quickly liquidated for cash, please us Toll-Free: 1-800-328-0609. Only products in perfect operating condition will be considered. We'll pay you a finder's fee based on a percentage of the total value of the sales contract. (Officers and sales reps of mfr. are ineligible for fee.)



Approx. size:
35 1/2" W x 35" H
x 34 1/2" D

Approx. weight:
374 lbs.

Compare at
\$1395.00

OUT THEY GO AT ONLY:

\$747

Offer void outside continental U.S. Be sure you have proper equipment to unload machine upon delivery.

C.O.M.B. Co. / Liquidators Dept. B-943-1048
6850 Wayzata Boulevard / Minneapolis, Minn. 55426

Ship Mill/Drill Machine(s) at \$747.00 each. I will pay shipping charge to the driver upon delivery. (Allow 4-5 weeks for delivery. Add 2-3 weeks extra if paid by check. Sorry, no C.O.D. orders.)

Minnesota residents add 6% state sales tax.
 My check or money order is enclosed.
Charge: MasterCard VISA Am. Ex. Diners Club

Acct. No. _____ Exp. _____

PLEASE PRINT CLEARLY

Name _____

Address _____

City _____

State _____ ZIP _____

Phone _____

Sign here _____
Rural Route Customer: If truck carriers do not normally deliver to your home, include a note with this order stating town address of nearest store, friend or truck terminal to ship to.



Includes Vise with Adjustable Vertical Angle

Steel jaw faces. Cold rolled steel screw. 2 1/2" jaw width; 1 1/2" jaw depth; 2 1/4" jaw opening.



Credit card members can order by phone. 24 hours a day, 7 days a week.

Toll-Free: 1-800-328-0609

If busy signal, or if no answer, call:

Toll-Free: 1-800-328-5727

In Minnesota, call: **1-800-742-5685**

C.O.M.B. Co.

ONE OF THE NATION'S LARGEST AUTHORIZED MAIL ORDER LIQUIDATORS OF CONSUMER PRODUCTS
6850 WAYZATA BLVD. • MINNEAPOLIS, MN 55426

DO IT YOURSELF..

Save Thousands of Dollars
Special Purchase... Act Now!



Complete Kit
\$2,597

America's
Largest Manufacturer &
Retailer Of On-Ground
Swimming Pools!

INGROUND POOL KIT...

14' x 28' OVAL

4' to 7' DEEP

GALVANIZED COPPER
BEARING STEEL WALLS

COMPLETE FILTRATION
SYSTEM

HEAVY DUTY
WINTERIZED LINER

IN-POOL LADDER

Complete Instructions

CALL TOLL FREE NO. FOR MORE INFORMATION

PLEASE SHIP KIT IMMEDIATELY

Enclosed Find: Money Order Check Visa Mastercard

I Understand Shipment is Freight Collect

HURRY! QUANTITY LIMITED!

CARD NO. _____ EXP. DATE _____

SIGNATURE _____

NAME _____

ADDRESS _____ PHONE _____

CITY _____ STATE _____ ZIP CODE _____

Kayak Mfg. Corp.: 5460 Transit Road Depew, New York 14043

CALL
TOLL
FREE **1-800-828-7838**

POWER TOOL MAINTENANCE

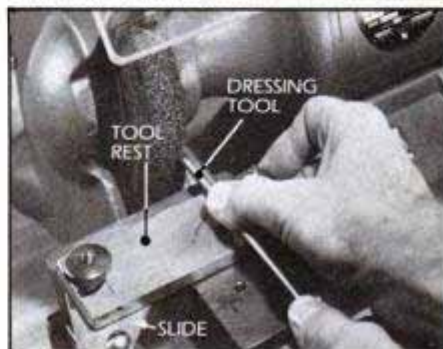
(Continued from page 199)

STATIONARY BELT SANDER



When changing belts or after about 10 hours of use, check drive shafts where indicated and remove any belt threads that may be wound around them.

GRINDER



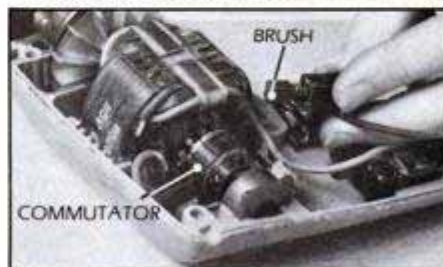
When grinding surface of wheel becomes rounded from wear, true it with a dressing tool. Keep toolrest and shield clean and the slide well lubricated.

COMPRESSOR



Replace air intake filter when clogged.

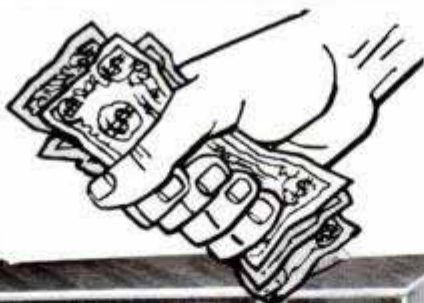
CHANGING BRUSHES ON PORTABLE POWER TOOLS



Sparks that are traveling all around the commutator indicate the power tool has worn brushes that will need to be changed. Cleaning your portable tools regularly will allow the brushes to slide freely in the holders without sticking.

Curtis Homes Assistance Money Plan

PUT THE CHAMP™ TO WORK FOR YOU!



Handy, ambitious people don't have to wait to afford a home. Curtis has the "CHAMP" credit plan to put homeownership within your reach NOW! Curtis provides the easy credit during construction. We do the heavy, difficult framing on your lot and foundation. You complete it with Curtis quality materials and simple step-by-step instructions.

THE "CHAMP" WORKS EIGHT WAYS FOR YOU!

- No down payment, no deposit.
- No bank qualifications at the start.
- Low monthly payments while building.
- Below market interest rates.
- Land may not have to be fully paid for.
- 6 month price guarantee.
- Build in city or country.
- Complete-it-yourself and save.

You, too, can join the Curtis family of new homeowners. For full details send coupon or call today.

There's a representative near you!
Call Toll Free: 1-800-228-6505
In Nebraska call: 1-800-642-9606 or
(612) 542-4300

Complete It Yourself

Curtis Homes

If you have desire... We have the trust!

Send me your FREE Homes Catalog
CURTIS HOMES, DEPT. PM-1
2201 Florida Ave. So., Minneapolis, MN 55426
(Please Print)

Name _____

Address _____

City _____ State _____ Zip _____

Phone() _____

We own land.
 Enclosed is \$1.00 for priority handling.

PM Craftsmen Talk About Their Favorite Power Tools And How They Care For Them



Banister

I purchased a new Rockwell/Delta Uni-saw in 1960, and it has proven to be all I want in a table saw. The machine is consistently and absolutely accurate. Maintenance is minimal—the table saw requires just occasional cleaning and lubrication of the elevation and arbor tilt cranks with WD-40, never grease.—C.E. "Doc" Banister



Burton

First among all my shop tools is my floor-type Delta drill press with a rotary table. And there is some sentiment involved—it helped to build Corsairs and Normandy invasion ships during WW II. To keep it running right, I clean away grit and chips after every use and oil the chuck two or three times a year.—Walter Burton



Capotosto

The universal movements and the variety of available accessories make the radial-arm saw invaluable in my shop. I'm fussy about precision joinery, and clear visibility of the cut is the radial saw's big plus. Maintenance is a matter of keep-

ing one step ahead. After 20 years of constant use, my Sears Craftsman 10-in. performs as it did when it was new. I check and reset indexes regularly.—Rosario Capotosto



Warren

My prize lathe dates back to the period when Milwaukee Delta merged with Rockwell—a label on the headstock reads "Delta," another on the tailstock, "Rockwell." My father bought it secondhand in the '50s. He cleaned it up and used it for several years before leaving it to me. I cherish it not only for sentimental reasons, but because to buy comparable quality today would be expensive. I replaced the bearings about eight years ago and keep the lathe in pristine condition with thorough cleaning after each use.—Dave Warren



Wicks

Once you're used to working with specialized shop tools, it's hard to pick a favorite. If I had to give up all but one, I'd keep my 14-in. Rockwell/Delta band saw. I learned my maintenance habits from my carpenter grandfather who wisely advised, "Never start today's work in yesterday's dirt." Besides general cleanup, this means attending to tools regularly. Before starting a project, I check out adjustments on all my tools.—Harry Wicks

Now! Make up to
\$12.00
PER
HOUR

In Your
Own Spare
or Fulltime



SHARPENING BUSINESS!

Now you can quickly turn spare time into handsome CASH profits! No selling or previous experience required. With this Complete Sharpening Shop, you can be your own boss, set your own hours! Customers come to you and pay you cash to sharpen saws, knives, chisels, scissors, garden tools... all cutting edges.

45-DAY FREE TRIAL!

Send today for free facts on our 45-Day Free Trial! See how our clear, illustrated instructions and proven design make it easy to start earning extra income right away! **Easy Terms!**

MAIL COUPON TODAY or:
Call Toll-Free 1 (800) 824-7888 Oper. 642

FREE INFORMATION KIT

FREE
FACTS

Woodmaster Tools, Dept. 45E, 2849 Terrace
Kansas City, Missouri 64108

Yes, please rush me free and without obligation your complete information KIT and details on your 45-Day Free Trial Offer.

Name _____

Address _____

City _____

State _____

Zip _____

Save 20%
YOUR CHOICE

\$ 99

SOLID OAK
SCHOOLHOUSE
OR
REGULATOR



Choose either one of these kits and build it in your leisure time. Kits contain all hardware and are pre-cut and sanded. Offer expires June 30, 1983. Write for FREE color catalog of grandfather, wall and mantel clocks.

Create a family heirloom

VIKING
CLOCK COMPANY

Major
credit
cards
honored

Phone 205/943-5081, Box 490
Dept. PM053, Foley, Alabama 36536

Finding Owner's Manuals For Vintage Power Tools

In many cases, owner's manuals for power tools up to 35 years old and older are still available. When there's no original, manufacturers often provide photocopies of the original, or copies of the engineer's original plans. Often, you can even obtain drawings of discontinued parts so you can make them or have them made. When writing for information, specify serial number and model of the tool.

Atlas tools: Clausing Service Center, 81 Eisenhower Drive S., Goshen, Ind. 46526.
Black & Decker (U.S.), Customer Service Dept., Box 564, Hampstead, Md. 21074 (information available for tools from 1918-present).
Delta tools (see Rockwell International).
DeWalt tools (see Black & Decker).
Milwaukee Electric Tool Corp., Service Dept., 13135 West Lisbon Rd., Brookfield, Wis. 53005 (manuals available for tools 1963-present).
Porter-Cable, Technical Service Dept., Box 2468, Jackson, Tenn. 38301.

Powermatic, Advertising Dept., Morrison Rd., McMinnville, Tenn. 37110 (information available for tools from 1920-present).
Rockwell stationary tools: Technical Publications Dept., Rockwell International, 400 North Lexington Ave., Pittsburgh, Pa. 15208.
Rockwell portable tools (see Porter-Cable).
Sears' Craftsman tools: Sears, Roebuck and Co., Customer Relations, Dept. 731-A, Sears Tower, Chicago, Ill. 60684 (information not available for all tools from all years).
Sioux Tools Inc., Catalog Dept., 2801 Floyd Blvd., Sioux City, Iowa 51102 (information available for tools from 1914-present).
Skil Corp., Service Dept., 4801 West Peterson Ave., Chicago, Ill. 60646 (manuals available up to five years after tool was discontinued, other information available for tools up to 30 years old).
South Bend Lathe, Customer Services, attn: Dean Hoffman, 500 West Sample St., South Bend, Ind. 46621 (manuals available from 1940-present).
Thor Power Tool Co., Rte. 9, Box 104-AA, Johnson City, Tenn. 37801 (manuals available from 1950-present, not all tools from all years).
Walker-Turner tools (see Rockwell International).



The easy step

Removing the paint and varnish... with versatile KWIK ALL-PURPOSE PAINT REMOVER

Remove all the paint and varnish on the job easily — and you're the boss! KWIK All-Purpose handily does the job for all kinds of wood and synthetic surfaces. Apply... then wash or scrape right off. The choice of professionals, yet so easy to handle. From America's paint-removing specialist. At your local paint or hardware dealer. If your dealer doesn't have KWIK, write: Chemical Products, P.O. Box 400, Aberdeen, Md. 21001.

So easy to handle you guide it with Just ONE HAND!



No Footprints!
No Wheelmarks!
No Struggle!

Tiller users, for heaven's sake, please don't buy nor put up any longer with any other make of Tiller without giving yourself a chance to find out about our wonderfully different and better kind of Tillers — with **POWER DRIVEN WHEELS** and with tines in the **REAR** instead of the **FRONT!** Please let us send you complete details, prices, "OFF-SEASON" SAVINGS, etc. Mail coupon below now to **TROY-BILT®** Roto Tillers, 102nd St. & 9th Ave., Troy, N.Y. 12180

© 1983 GARDEN WAY, INC.

TROY-BILT® Roto Tillers, Dept. A1752
102nd St. & 9th Ave., Troy, N.Y. 12180

Please send the whole wonderful story of TROY-BILT® Roto Tillers including prices and "OFF-SEASON" SAVINGS now in effect for a limited time.

(Please Print Clearly)

Name _____
Address _____
City _____
State _____ Zip _____

NEW PISTOLS

(Continued from page 93)

tridges which are not loaded commercially or for intermediate rifle loads like the .30-30 or .35 Remington. The .308 Winchester (7.62 NATO) full-length cartridge is considered a top load. More often, when the .308 case is used, it's shortened to about 1½ inches, making it very much a handloading item.

Why all this power in a handgun—even if it isn't really a true one-hand gun? Some are for hunting, but most are long-range, precision target guns used for metallic silhouette shooting.

In the Unlimited Class, these guns must knock down 50-pound rams at 200 meters to score. The competitor gets 1½ minutes per shot for five shots to make his hits—and must do it with iron sights. The challenge is so demanding and addictive (see *Silhouettes—Better Than Bull's-Eyes For Shooting*, page 84, Aug. '81) that the silhouette shooting game has spread across the country.

Many high-tech handguns are used for varmint shooting. Power isn't a consideration with these small targets, but accuracy is all-important.

Hit harder than rifles

All of these special, long-range one-shooters have long, heavy barrels. Most have target or telescopic sights. They can all hit small targets at impossibly long ranges for handguns. And, most hit harder than some rifles.

Action designs range from top-break like the old, single-barreled shotgun to left-side, bolt-action, single-shots. Even the ancient rolling block—originally produced by Remington in 1865—has been adapted by Navy Arms Co. to become a high-tech handgun.

Besides convenience, a left-hand bolt can be more accurate for right-hand shooters. If they don't have to change the grip while reloading, the next shot can be placed more accurately.

Calibers have changed a lot since the introduction of the first long-range, single-shot pistols. The XP-100 was originally chambered for a special cartridge—the .221 Remington Jet. Now, with 200-meter, 50-pound rams to knock down on the silhouette ranges, it's not powerful enough and many old .221 XPs have been rebarreled to take more powerful cartridges.

Since even mild loads can leak, shooting glasses are a must when firing any kind of a gun. Ear protection is also important when shooting high-intensity cartridges in 8-, 10-, or even 14-inch handgun barrels. They are *loud!*

Many of America's finest factories and custom gun makers are catering to the high-tech handgun market. Thompson/Center Arms Co. (Farmington Rd.,

Rochester, N.H. 03867) was first with the T/C Contender. This break-action single-shot has the advantage of offering interchangeable barrels so the same frame can have a mild .22 rimfire barrel, a bucking .44 Magnum or .35 Remington rifle tube.

Barrels interchange by removing the fore end and driving out a pivot pin. The changeover takes only a few minutes and means that one gun can handle many different cartridges or kinds of shooting. Complete guns sell for \$265 to \$285.

Remington Arms Co. Inc. (939 Barnum Ave., Box 1939, Bridgeport, Conn. 06601) introduced the first of the single-shot, bolt-action handguns, the XP-100. It's now available for the potent 7-mm Bench Rest cartridge—a handloading proposition for silhouette shooters. This costs \$359.95.

M-S Safari Arms (Box 23370, Phoenix, Ariz. 85062) offers the Unlimited and Ultimate bolt-action, single-shot models. Both can be had with either fiberglass or walnut stocks. The Unlimited costs \$495 and the Ultimate \$595.

Wichita Arms Co. (333 Lulu, Wichita, Kan. 67211) has bolt-action, single-shot pistols. Prices for the MK-40 Silhouette Pistol start at \$595 and range up to \$3,250 for the Wichita Classic Silhouette Pistol.

Navy Arms Co. (689 Bergen Blvd., Ridgefield, N.J. 07657) produces a special model of their rolling block pistol for silhouette shooting and big-game hunting. Calibers include .45-70, .44 Magnum and .357 Magnum. List price with iron sights is \$375.

Sterling Arms Co. Inc. (221 Grand St., Lockport, N.Y. 14094) makes a new break action single-shot called the X-Caliber, which is \$249.95.

Hand Cannons

One of the most innovative manufacturers is SSK Industries Inc. (Route 1, Della Dr., Bloomingdale, Ohio 43910), which specializes in barrels for T/C Contenders and custom work on bolt-action single-shots. Appropriately called Hand Cannons, custom Contender barrels ready to mount on your frame cost \$168.

Far less powerful, but equally expensive and perhaps even more sophisticated, are the competition pistols used for international match shooting. Most are automatics, many shooting the supermild .22 short cartridge because it is accurate and produces minimal recoil. For rapid fire or a moving target, these beat out all comers. They look even stranger than the high-power single shots and their looks are based on only a single criterion—performance. That's why these pistols are all so big, so heavy and so very expensive. They are the best we can build. **PM**

VICTORIAN SIDEBORD

(Continued from page 104)

most of your sanding out of the way before assembling the cabinet. The flat areas can be sanded to the 120-grit stage before assembly and the final touchup, with 150-grit paper, can take place after the cabinet is built.

Dust off the piece and apply the stain of your choice. On the original, we mixed 4 parts Danish Walnut with 1 part Contempo Mahogany, both from Carver Tripp. The stain should be applied to one area at a time and you should make every effort to keep the stain on each section for an identical length of time. Wipe off excess stain with a lint-free cloth and set aside to dry overnight.

Next day, smooth any raised "whiskers" using 180-grit paper with a light touch. Dust off and wipe with a tack cloth before applying the sealer.

The sealer coat I use is 3-lb. cut water-white shellac thinned 50 percent with denatured alcohol. Apply the shellac using a quality bristle brush. Allow sealer to dry overnight.

The next day, sand lightly—where needed—using 180-grit paper. Dust off and wipe with a tack cloth. Pour off a small amount of the varnish (a half-full 1-lb. coffee can is just about right) and

thin it 50 percent with turpentine (turps). Apply the varnish, making certain you finish by tipping off.

Allow the piece to dry at least 24 hours. Next day, apply the finish coat of varnish as it comes from the can. Pour off the amount that you think you will need. (It is never wise to use the large

container as your work container. Neither should you pour back any varnish that has been exposed to the air.)

We selected a varnish that gives a waxed, or hand-rubbed, look to the piece: Varmor Satin R-11 from Pratt and Lambert. Let the piece cure for about one week before using it. **PM**

MATERIALS LIST—VICTORIAN SIDEBORD

Key	No.	Size and description (use)		
BASE CABINET				
A	2	3 x 3 1/2 x 35 1/4" oak (front leg)	V	4 7/8 x 11 1/4 x 11 1/4" oak (front)
A1	2	1 1/8 x 1 1/8" dia. (rosette)	W	8 1/2 x 9 1/2 x 16 1/2" A/C plywood (sides)
B	2	3 x 3 x 35 1/4" oak (rear leg)	X	4 1/2 x 10 1/4 x 11 1/4" A/C plywood (back)
C	1	7/8 x 1 3/4 x 42" oak (bottom front rail)	Y	4 1/4 x 11 1/4 x 16 1/4" A/C plywood (bottom)
D	1	7/8 x 1 x 42" oak (lower front rail)	SHALLOW DRAWER (2 REQ'D.)	
E1	1	7/8 x 1 x 42" oak (upper front rail)	Z	2 7/8 x 3 3/4 x 19 7/8" oak (front)
E2	1	7/8 x 1 x 42" oak (upper back rail)	AA	4 1/2 x 3 1/2 x 16 1/4" A/C plywood (sides)
F	2	7/8 x 1 1/4 x 12" oak (front rail)	BB	2 1/2 x 2 1/2 x 18 3/4" A/C plywood (back)
G	2	7/8 x 2 x 23 1/4" oak (cabinet stile)	CC	2 1/4 x 16 1/4 x 18 3/4" A/C plywood (bottom)
H	1	7/8 x 2 x 3 3/4" oak (stile)	DD	4 Carved oak pull
I	2	7/8 x 1 3/4 x 11 1/2" oak (end rail)	EE	4 Pendant pulls
J	2	7/8 x 1 1/2 x 11 1/2" oak (end rail)	FF	2 False keyhole
K	2	7/8 x 1 x 11 1/2" oak (end rail)	GG	2 Double roller catch (Amerock No. 9714)
L1	1	3/4 x 8 7/8 x 23 3/4" oak (core panel)	HH	2 1 1/2 x 2 1/2" hinge
L2	2	7/8 x 2 1/2 x 23 3/4" oak (door stile)	II	1 3/4 x 18 x 48" Italian marble
M	4	3/4 x 12 1/4 x 14 1/4" oak plywood (end panels)	Misc.: 3/8-in.-dia. dowels; 100-, 120-, 150- and 180-grit sandpaper, carpenter's glue, tack cloth.	
N	1	1/2 x 16 7/8 x 42 3/4" A/C plywood (bottom)	Finishing materials: Stains: Danish Walnut and Contempo Mahogany, Carver Tripp, Box 2261, La Jolla, Calif., 92037. Varnish: Varmor Satin R-11, Pratt and Lambert Inc., Box 22, Buffalo, N.Y. 14204.	
O	2	1/2 x 16 3/8 x 24 1/4" A/C plywood (vertical dividers)	Hardware: 4 carved pulls (DD) B1204, 1 wooden knob (U) B1674, 4 pendant pulls (EE) E1426 from the Woodworkers' Store, 21801 Industrial Blvd., Rogers, Minn. 55374. Two circular escutcheons (FF) from Renovator's Supply, 745 Renovator's Park, Millers Falls, Mass. 01349 (product No. 20006).	
P	2	1/2 x 13 1/4 x 16 3/8" A/C plywood (shelf)		
Q	1	1/2 x 16 3/8 x 42 3/4" A/C plywood (top)		
R	1	1/4 x 28 1/8 x 42 3/4" A/C plywood (back)		
S	3	7/8 x 1 x 15 1/2" oak (cleats)		
T	20	1/2 x 1/2 x 15 1/2" maple (drawer slides)		
U	1	1 3/8" dia. x 2" (wood knob)		

Train at Home for One of These 31 Career Opportunities

SEND FOR FREE CAREER FACTS ABOUT DIPLOMAS OR DEGREES

If you want more money, more security and a better way of life, the decision to train for a better career could be the most important one you will ever make. And now you can train at home in your spare time for a diploma or even a degree to help you get a better job. This is the same kind of training program that has been used by nearly 2,000 American Corporations to train their employees... Union Carbide, Ford, DuPont and many others.

An Ideal Way to Learn

No need to change your daily routine or take time from your job or family. Learning is easy because everything is explained step by step with plenty of drawings, diagrams and photos. And like many colleges—all these courses use "open book" exams that let you refer to your texts and apply what you have learned. If you do have a question, your instructor is as close as your telephone. And all courses include necessary tools, instruments and materials... whatever you need for your training.



Or... Get Your Degree Without Attending College

Now without attending class, you can get your degree in business with a major in Marketing, Business Management, Accounting and Finance. Or get a technical degree in Civil, Mechanical or Electrical Engineering Technology or Electronics Technology. If you already have some college or if you have worked in the field, you may be entitled to advanced standing toward your degree.

Could a Career Diploma or a Degree Be Worth Thousands of Dollars to You?

Compare your present salary with the amount of money you could be making in any of the careers shown below. Training in a trade or earning an Associate Degree in Specialized Business or in Specialized Technology could make a giant difference in your lifetime earnings. But it's not the money alone... think of the security, satisfaction and the fun of working in a job you like. Get more information at no cost! Check the career you're most interested in and mail the coupon today. There's no obligation and no salesman will call.



International Correspondence Schools, Dept. PBS43
ICS CENTER, Scranton, Pennsylvania 18515

Please send me free facts, color brochure and full information on how I can study at home for the career I have chosen. I understand I am under no obligation and no salesman will call. **CHECK ONE BOX ONLY!**

BUSINESS ASSOCIATE DEGREE PROGRAMS

- Business Management
- Marketing
- Finance
- Accounting

TECHNICAL ASSOCIATE DEGREE PROGRAMS

- Civil Engineering Technology
- Mechanical Engineering Technology
- Electrical Engineering Technology
- Electronics Technology

CAREER DIPLOMA PROGRAMS

- High School
- Auto Mechanics
- Hotel/Restaurant Mgmt.
- Surveying & Mapping
- Drafting
- Air Conditioning & Refrigeration
- Travel Agent
- Wildlife/Forestry Conservation
- Art
- Police Sciences*
- Veterinary Assistant*
- Diesel Mechanics
- Electrician
- Small Business Mgmt.
- Electronics
- Computer Programming
- Appliance Servicing
- Income Tax Preparation*
- Van/Car and Truck Customizing*
- Gun Repair*
- Motorcycle Repair*
- Industrial Management
- Machine Shop

*These courses are offered by North American Correspondence Schools. ICS, North American Correspondence Schools and the Center for Degree Studies are divisions of National Education Corporation. They are Accredited Members of the National Home Study Council in Washington, D.C.

NAME _____ AGE _____
ADDRESS _____
CITY/STATE/ZIP _____

Mail coupon today for free facts and color brochure.

SEE 145 BOATS...^{NEW!} you can build from KITS

THE COMPLETE GUIDE TO BOAT KITS



Save 50% on your next boat!
GIANT BUYERS GUIDE
POWER & SAIL • 8 - 70FT
WOOD • STEEL • FIBERGLASS

From dinghies, daysailors, and runabouts, to ocean cruising sailboats, sportfishermen, and trawlers: **THE COMPLETE GUIDE TO BOAT KITS, BARE HULLS & CUSTOM BUILDERS** uncovers them all...dozens you've never seen before...all sell for a fraction of the factory-built cost!

THE GUIDE features over 300 photos; complete specs and prices; colorful, illustrated, in-depth articles; kit financing information; money-making and money-saving info; construction techniques and product reviews.

Save Even More! **BOATBUILDER** magazine keeps you abreast of the latest developments in design and construction, new kits, new plans, new products and techniques, tips, trials, and owner/builder interviews. Six BIG issues each year!

BONUS FREE!

The Complete BOAT PLAN Directory
Yours Free when you order THE GUIDE or BOATBUILDER magazine. Order both! Your satisfaction is guaranteed.

•30 Day Money-Back Guarantee•

OCEAN LOGIC, INC.
PO Box 1109
Department 64
W Palm Beach, FL 33402

Mail **BOAT KIT Guide**
and **BOAT PLAN Directory**
 \$10 (3rd Class - US Only)
 \$12 (RUSH DELIVERY)
 \$15 (Foreign - US Funds)
 Boatbuilder magazine \$15/yr

NAME _____
ADDRESS _____
CITY/STATE/ZIP _____
CARD# _____
EXP DATE _____ MasterCard VISA

Order **TOLL-FREE** Day or Night
MasterCard or VISA **REQUIRED**
CALL 1-800-327-8456 ext 236
(in Fla.) 1-800-432-2382 ext 236
Operator CANNOT answer questions-no CODs



MAKE MONEY

WITH YOUR OWN
MAGNATRAC
TRACTOR
KIT!



Bolt a **MAGNATRAC** Kit together and do odd jobs for extra cash. Thousands sold for loading, dozing and gardening.
• **CATALOG** of Kit constructor - and uses - \$1.00
• **ASSEMBLY MANUAL** - \$7.00 (refunded on any purchase)
STRUCK-KIT, Dept. PM53 Cedarburg, WI 53012

BEAUTIFUL WOOD FINISHES

Watco Danish Oils provide an elegant, extremely durable penetrating finish IN the wood, not ON it! Primes, seals, hardens, protects and beautifies in one fast, easy application.



Natural and Medium, Dark and Black Walnut colors for all woods. Write Watco-Dennis Corp., 1756-22nd St., Santa Monica, Calif. 90404, Dept. PM-53

MAKE CLOCKS

WITH BATTERY QUARTZ MOVEMENTS
FOR FUN & PROFIT!
KLOCKIT OFFERS WHOLESALE
PRICES FOR MOVEMENTS, DIALS
AND ACCESSORIES.



CALL TODAY
FOR NEW CATALOG
(414) 248-1150

KLOCKIT DEPT. PM53
P.O. BOX 629
LAKE GENEVA, WI 53147

FREE CATALOG

NEW! 3 IN 1
POWER-FEED
PLANER/MOLDER
JOINER

The first affordable shop
of its kind!

Now turn low cost rough
lumber into valuable finished
stock for grandfather clocks,
furniture, house-trim, picture
frames... sell to others. Molds all
popular patterns & custom designs.
Planes and joints without change-over.
Comes complete... ready to use.
30-DAY FREE TRIAL! Easy terms.

PLANER
FACTS
& PROFITS

FREE
INFORMATION KIT

CALL TOLL-FREE 1(800) 824-7888, Oper. 642

OR WRITE TO:
WOODMASTER TOOLS, INC.

2849 Terrace, Dept. PP22, Kansas City, MO 64108

FISHING FAVORITES

(Continued from page 94)

ated live-bait wells and stowage bins. Grab rails may edge the gunwales on some models, but navigation lights are recessed or removable, cleats and chocks are out of the way so they won't snag lines, and the most elaborate rigs have multiple depth finders and engine-tilt controls. A fisherman up forward can tip up his outboard on the



Rigged like a 40-footer, Grady-White's 22-foot Tournament Dual Console has a tuna tower, outriggers, Sea Drive.



Ranger's 622, an offshore 22-footer with deep-V hull, high freeboard, pulpit and console, takes twin 115-hp Mercs.



Flat floorboards and forward platform for casting make Sea Nymph JB-164 Bass Attacker a stable aluminum hull.

transom by remote control and swing down an electric trolling motor when he spots telltale flashes on his fish finder or markings on the recording graph—all without returning to the helm.

For fishing hulls under 25 feet, there is a recent trend toward marine alumi-

WOODWORKING MACHINES 5 in 1 Combination

WITH ELECTRIC MOTOR WHICH
DEVELOPS 3 HP.

- 34" LATHE
- 10" TABLE SAW
- 11 1/2" DISC SANDER
- 16 1/2" VERTICAL DRILL PRESS
- HORIZONTAL DRILL PRESS

REGULAR PRICE \$1,250
now only
\$ 999.



VERY IMPORTANT

The only machine built with:
A. ALL CAST IRON TABLES
B. HEAVY DUTY DESIGN
C. DEVELOPS 3 HP MOTOR
D. BUILT AS AN INDUSTRIAL MACHINE

ONE PLACE FOR ALL YOUR NEEDS...

CALL NOW!!! FOR FREE GIFT
Toll Free (1-800) 421-2467

IN CALIFORNIA CALL COLLECT (213) 549-0761
 VISA MASTERCARD MONEY ORDER

PLANT:

MASTER WOODCRAFT CO.
800 SPRUCE LAKE DRIVE • P.O. BOX 669
HARBOR CITY, CA 90710
(A Republic-Lagun Group)

Dealership Available

num. The light alloy can withstand salt-water corrosion, and the pared-down poundage makes smaller, more economical motors worthwhile. Planing speeds to 30 mph are possible with a 35-hp outboard on a 14- to 16-foot hull. And now stripped-down bass boats with minimal accessories come fully rigged and light enough to tow for several thousand dollars.

An example of cost savings comes from the Molded Fiber Glass Co., which



For open water downrigger fishing, the MR22OV by Starcraft has higher sides for its 22-foot deep-V hull, takes 240 hp.



Even smaller craft are now using optional inboard/outboard power, as in Forrest Wood's 19-foot Ranger 380 Chief.



For do-it-yourselfers, Sisu Boats, Dover, N.H., offers 22-foot Full Cry as a basic-hull kit for home finishing.

is re-entering the boat-building field. The firm's new MFG Adventurer Sport-14 bass boat will cost about \$2,100, and is light enough at 425 pounds to be launched from a tilt-bed trailer that need not be backed into the water. MFG estimates that factory-installed steering, pedestal seats, dealer-rigged 35-hp outboard, plus the trailer—ready to launch—should cost under \$5,000. This could be less than half the price of a similar bass boat several feet longer and with a large engine.

But as fishing craft get larger, skippers are favoring the softer ride of the deep-V hull over rough water. And for high performance with big bass rigs

and offshore skiffs, Johnson and Evinrude this year are introducing special GT and XP 150-hp outboards that have been adapted from racing models. Move up to the latest 20- to 30-foot sportsfishing utilities and all the refinements of the big gamefishing cruisers—tuna tower, outriggers, loran and autopilot—can be found. Canvas dodgers and cuddy covers turn these open-



Mako offshore line has added a 23-foot Walk-Around Cabin 238 that sleeps two, takes outboard power to 250 hp.



Open-cockpit Makos can now be rigged with tuna tower and tower controls, outriggers, downriggers, cuddy shelter.

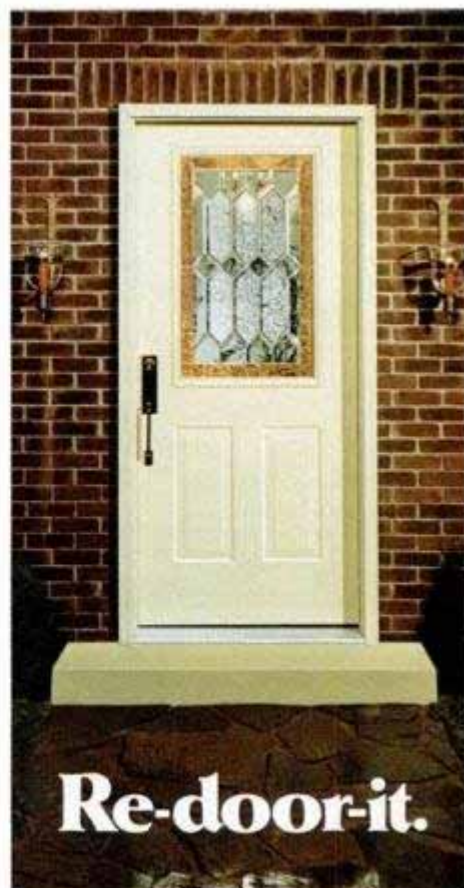


Runabout look makes Glastron's fiberglass HPV-16 into a bass boat with water-ski option, power up to 120 hp.



Over 25 years, Boston Whalers have grown from small open skiffs to fully rigged utilities like Newport 17.

cockpit craft into convertible cabin cruisers, and options of big dual outboards, Sea Drives, sterndrives or inboards give the latest models the speed to go far offshore, while high-tech hull designs make the runs safer and more comfortable. **PM**



Re-door-it.

Now's a great time to replace your old entry door with a beautiful, secure, energy-efficient Therma-Tru door. It's pre-hung, so you can install it yourself with ordinary tools. Complete step-by-step directions are included.

Or, if you prefer, your Therma-Tru Dealer can recommend someone to help with installation.

Therma-Tru doors feature self-sealing sills and door bottoms that virtually eliminate air and moisture infiltration, arctic weather stripping that seals like a refrigerator door, and our adjustable strike plates which enhance security and allow you to use the lock set or deadbolt of your choice.

Choose from more than 100 beautiful raised panel or deeply embossed doors, and many leaded, beveled glass designs.

THERMA-TRU®

The More Door
Division of LST Corporation

Free Brochures

To receive free copies of our new replacement door brochures, fill out this coupon and mail it to: Therma-Tru, Division of LST Corp., 4747 Holland Sylvania Road, Sylvania, Ohio 43560

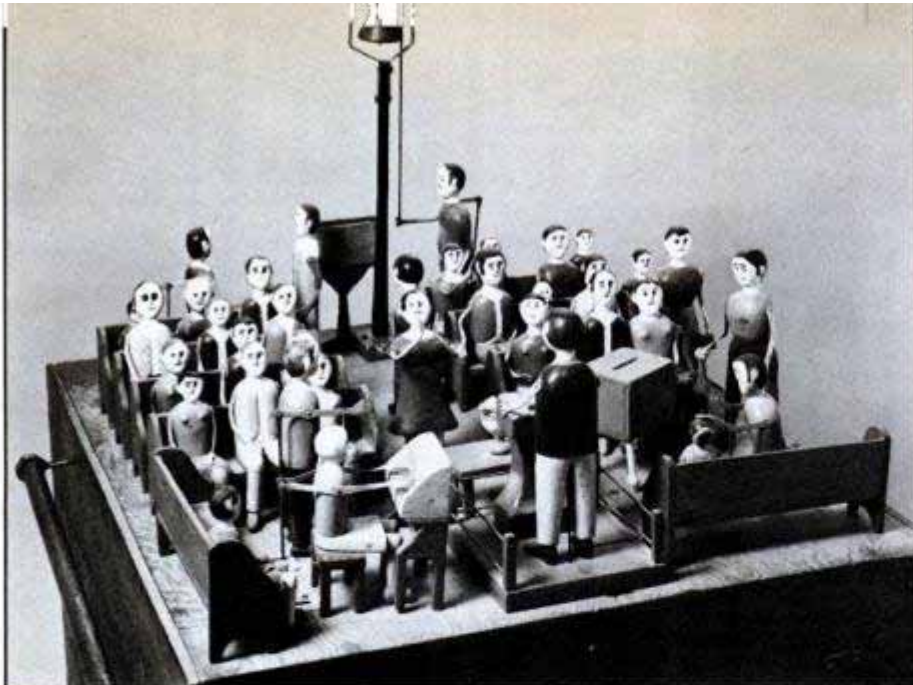


Name _____

Address _____

City _____

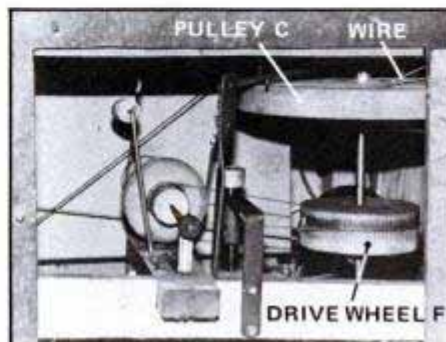
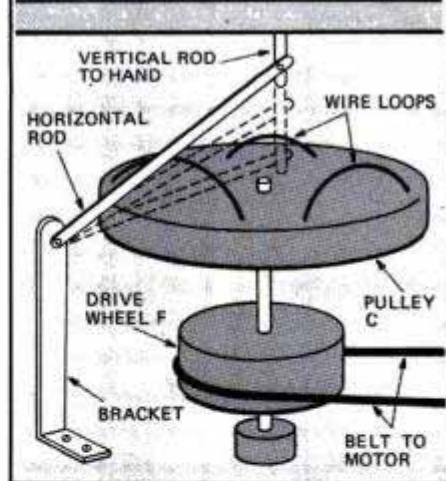
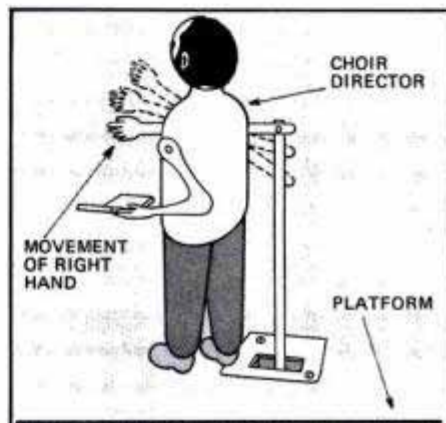
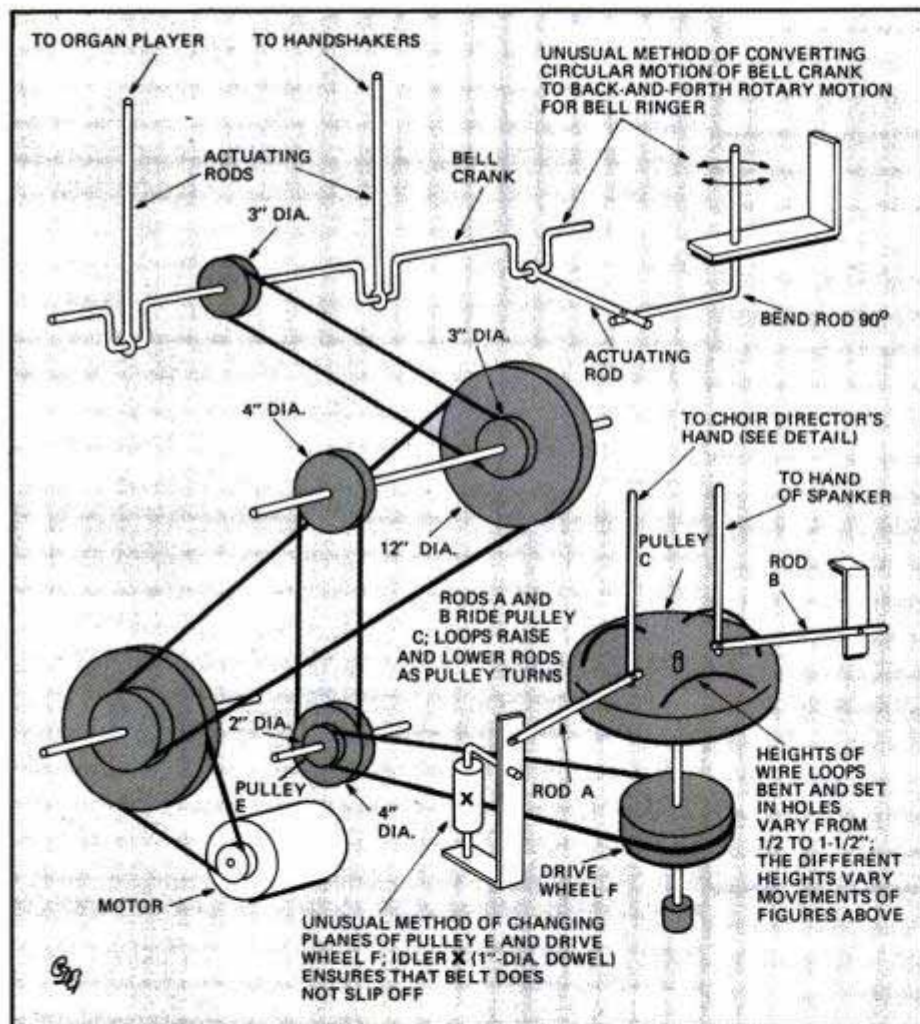
State _____ Zip _____



In "Mount Opel" a bell-ringer tolls a bell as friends shake hands in the background. In front, a child is spanked as a choir leader conducts. Below is the mechanical diagram.



Detail of "Mount Opel" shows the choir director; see mechanical detail (below).



Partial view inside "Mount Opel" reveals the mechanics for the choir director.

FOLK ART COMES TO LIFE

(Continued from page 105)

transmitting power to the job site, whether for milling grain or cutting lumber.

The seed of Carlton's mechanical ingenuity was planted in his childhood. However, experiences from his adult life have become the theme for several

of his pieces. Most of his working life was spent as a craftsman in furniture factories.

It just seems natural to Garrett that the two major interests of his life—mechanics and wood—should come together after he retired over 11 years ago.

At about that time, Garrett entered the hospital for a stomach operation,

and the doctor told him he would have to stay busy when he went home if he wanted to remain in good health. "As soon as I got home, I started whittling," Garrett says.

Carving from memory

Before long he had immortalized his visit to the hospital by carving from memory a detailed scene of his hospital room.

This first piece, called "Hospital," is the only one of his large tabletop pieces that is not animated.

While Garrett was carving the figures for "Hospital," he began thinking of ways to instill life into his work. It wasn't long before his love of mechanics and a good supply of old electric motors found their way into the carvings.

The next project was a church scene called "Mt. Opel." With the flick of a switch, the whole congregation comes alive to the music of "Little Brown Church in the Wildwood." The arm of the choir director waves, a bell-ringer tugs a rope, the preacher thumps the

pulpit, and the organist plays away.

At one point, Garrett became an ordained preacher; he carved the preacher in this work to represent himself.

Machinery is carver's theme

A progression was already at work in Garrett's thinking as machines became the focal point of his carvings—big machines, diesels, electric dynamos, drilling rigs, stamping arms and flying wheels. In a work called "Machinery,"

(Please turn to page 208)

Make your own whirly toy

When pushed along the ground, the colorful wheels and knobs of this whirly toy spin. The mechanics of the toy are deceptively simple. However, achieving proper balance on the toy requires experimenting.

Although an artisan's work can never be duplicated, you can build a similar toy by following the plans below. They are modified to utilize common shop materials.

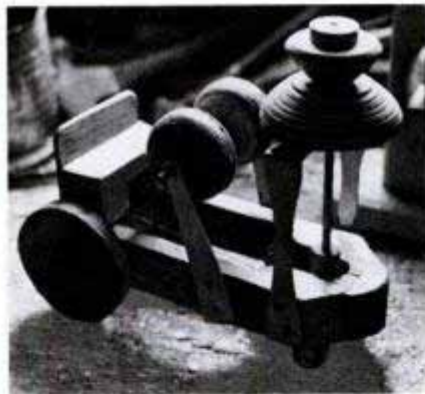
The base (A) is a 2x4 with its center portion removed to accommodate the mechanics of the toy. When the wheels turn, the rear pulley (B) turns to move the drive belt (I) and cause the top knobs (H) to turn. The lower drive belt, twisted in a figure-8, turns the front knob (J).

Cut the axle (C), shafts (G, K, O) and small wheel (N) out of dowel. Turn pulleys

(B,E,F.), knobs (H, J) and wheels (N) on a lathe or carve them to shape. Cut the metal brackets (L,M,P,Q) with a hacksaw and bore attachment holes as needed. Secure brackets (M,P) in a metalworking vise at

the bend line; bend between two pieces of hardwood.

Paint concentric circles in bright colors on the knobs and paint the other wood parts in bright colors before assembly.

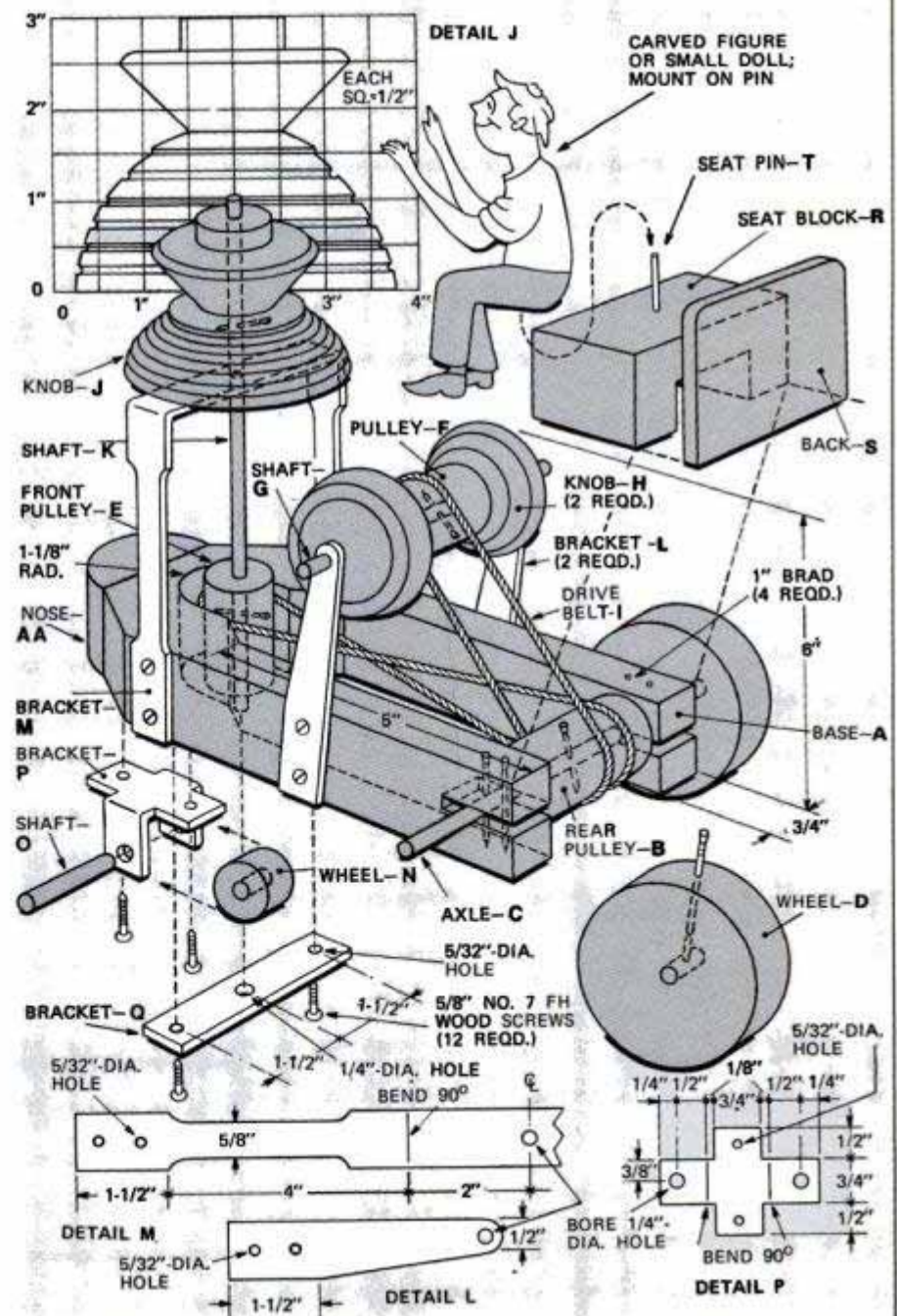


Wheels and knobs of the whirly toy turn as it is pushed along on the ground.

MATERIALS LIST—WHIRLY TOY

Key	No.	Size and description (use)
A	1	1½ × 3½ × 8" pine (base)
AA	1	2"-dia. × 1" × 1½" pine (nose)
B	1	1¼"-dia. × 2" pine (rear pulley)
C	1	¼"-dia. × 5" dowel (axle)
D	2	¾ × ¾"-dia. pine (wheels)
E	1	1"-dia. × 2" pine (front pulley)
F	1	1"-dia. × 2" pine (pulley)
G	1	¼"-dia. × 4" dowel (shaft)
H	2	¾ × 2½"-dia. pine (knobs)
I	2	20" drapery cords or twine (drive belts)
J	1	3 × 3½"-dia. (overall) pine (knob)
K	1	¼"-dia. × 10" dowel (shaft)
L	2	16-ga. × 1" × 4½" steel (bracket)
M	1	16-ga. × 1" × 15" steel (bracket)
N	1	¾ × ¾"-dia. dowel (wheel)
O	1	¼"-dia. × 1¼" dowel (shaft)
P	1	33-ga. × 2½" × 1¾" (bracket)
Q	1	33-ga. × ¾" × 3½" (bracket)
R	1	1½ × 1¾ × 3½" (seat block)
S	1	¼ × 2½ × 3½" (seat back)
T	1	2d nail with head cut off (seat pin)

Misc.: ¾", 1", 1½" and 1¾" brads; ⅝" No. 7 fh wood screws; prime coat and nontoxic paint.



Make up to \$12⁵⁰ an hour

Start your own money making business!

Be Your Own Boss!

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

YOU Can Do It Too!

BE A LOCKSMITH

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 booming crime. Yet there's only one Locksmith for every 17,000 people!

Train FAST at Home - Collect CASH PROFITS Right Away.

You're in business, ready to earn up to \$12⁵⁰ an hour a few days after you begin Foley-Belsaw's thorough training. Take advantage of today's unprecedented opportunities in locksmithing for your round **ESTIMATED** INCOME in spare time . . . or full time in a high-profit business of your own. Hundreds who've trained have done it! **Success Your Air Tools** plus professional Key Machine given you with course. These plus practical training and equipment plus simple, illustrated lessons plus expert supervision plus business-building guidance will enable you to **KEEP THE MONEY COMING** the ideal for retirement - good jobs too!

FREE BOOKLET!

"KEYS TO YOUR FUTURE"

Tells how you quickly train to be your own boss in a profitable sparetime or fulltime business of your own.

Send for your RUSH COUPON!

PRO KEY MACHINE YOURS TO KEEP!

The Pro Key Machine can show you up to \$200 a month in your spare time and it won't cost you a penny more with your training. Rush out all about it!

RUSH COUPON!

10-DAY NO RISK TRIAL!

FOLEY-BELSAW INSTITUTE
10205 Field Bldg.
Kansas City, MO. 64111

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

FREE! **FOLEY-BELSAW INSTITUTE**
10205 Field Bldg., Kansas City, Mo. 64111
Please rush **FREE** Book "Keys to your Future."

NAME _____

ADDRESS _____

CITY-STATE-ZIP _____

Planer Molder Saw

3 Power TOOLS in 1

Feed

Now you can use this ONE power-feed shop to turn rough lumber into moldings, trim, flooring, furniture - ALL popular patterns. RIP-PLANE-MOLD . . . separately or all at once with a single motor. Low Cost . . . You can own this power tool for only \$50 down.

30-Day FREE Trial! **SEND FOR EXCITING FACTS**
NO OBLIGATION-NO SALESMAN WILL CALL

RUSH COUPON TODAY!

FOLEY-BELSAW CO.
90230 FIELD BLDG.
KANSAS CITY, MO. 64111

FOLEY-BELSAW

Foley-Belsaw Co.
90230 Field Bldg.
Kansas City, Mo. 64111

YES Please send me complete facts about **PLANER-MOLDER-SAW** and details about 30-day trial offer.

Name _____

Address _____

City _____

State _____ Zip _____

FOLK ART COMES TO LIFE
(Continued from page 207)

Garrett wanted to see how many items he could get to run at the same time. When you throw the switch, it looks as if the whirling wheels themselves are pulling together to produce the power. Therein lies the secret of much of Garrett's work: The recipient of power appears to be the producer. The real power of "Machinery" and of his other works is hidden under the table. It is usually a discarded fan motor.

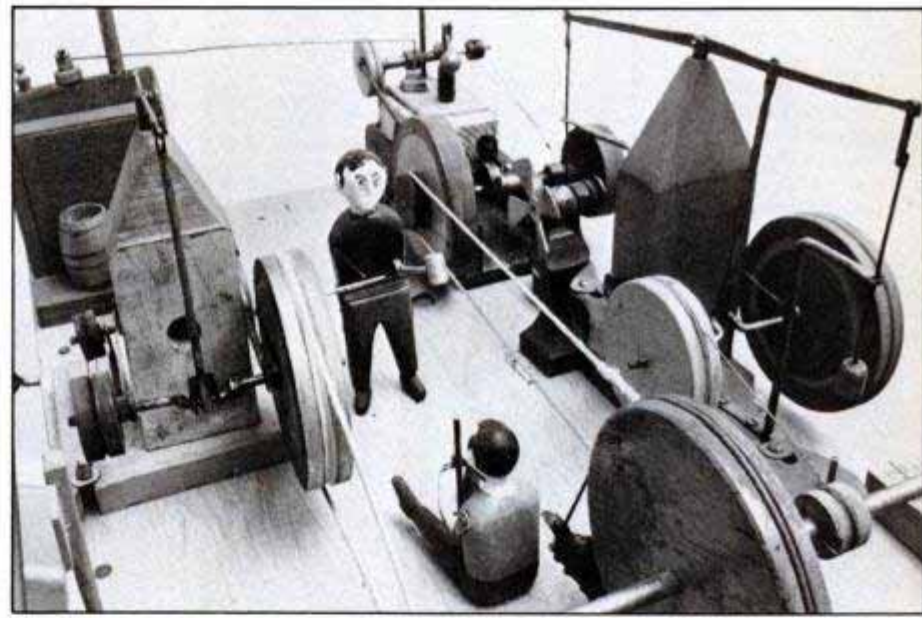
Besides his illusions as to the source of power, Garrett uses very simple devices to create movement in several different directions in a single work. In his "John Henry, the Steel Driving Man," power from the motor is transmitted all over the tabletop before it finally turns a flywheel on which a small, barely visible rod has been attached. It is this rod revolving on the wheel that rises and lifts the arm of

John Henry, then slips free, allowing the arm and hammer to fall. The piece illustrates the modern challenge of man against the machine.

Garrett's carvings richly portray everyday actions performed by his figures. In "Waterworks," for example, two workers are sitting together; one has a wrench in his hand, while his partner appears to be having lunch.

When Garrett is not busy planning a complicated multi-movement model, he spends his time carving figures and toys for the many children in his clan. The tractor at the beginning of this story, complete with sparkplug wire and a plow, is a striking example—one of a series of farm implements.

Miniature rocking horses are another Garrett specialty. His horses are about 6 in. high and have small riders atop them. Garrett's whimsical way with people carries over in his portrayal of the horses—many of them are painted with colorful polka dots.



The theme of manpower versus technology is seen in "John Henry." This man is one of Garrett's favorite folk heroes.



"Swing Around" is Garrett's most recent work. The brightly colored figures revolve while a cheery tune plays.

One of Garrett's smaller works is a pen of polka-dotted farm animals. More exotic-looking polka-dotted animals that resemble giraffes have also been in Garrett's domain. Animals with muzzles made of such items as pencil clips are also part of his menagerie.

Many of Garrett's works are now in the permanent collection of the High Museum of Art in Atlanta, Ga. For more information about the artist and his works, write to the Alexander Gallery, 3060 Pharr Court North, N.W., Atlanta, Ga. 30305.

Providing Garrett's works for photography: High Museum of Art, 1280 Peachtree St. N.E., Atlanta, Ga. 30309; Alexander Gallery, (address above). Mechanical consultant: John Gaynor. Research and story preparation: Michael Stowers

TECHNOLOGY UPDATE

AVIATION

The 'wrong-way' jet

A set of "wrong-way" forward-swept wings were mounted on Grumman's X-29 jet earlier this year, leaving the equally odd canard stabilizer and the standard jet engine the only major parts not yet installed. The X-29 is to make its first test flight within a year.

The forward sweep isn't a new idea—the Germans used it in World War II—but the X-29 is expected to make it a standard of design by the 1990s.

Forward-swept wings give a plane far more lift than standard rear-sweep types. They also provide more fuel economy. But that extra lift puts too much stress on the wings. To overcome it, the Germans made very heavy wings, which tended to add so much weight that all lift advantage was lost. But Grumman's X-29 uses graphite composite materials which make the wings both light and strong.



The Meteorological Condition Simulator can fog the pilot's glasses pixel by pixel.



Grumman's X-29 forward-swept-wing jet receives extra lift and fuel efficiency from the craft's odd configuration. A canard stabilizer is mounted forward of the wing.

Foggy notion

A pilot's skill is never challenged more than in soupy weather, which is what makes Instrument Flight Research's Meteorological Condition Simulator (MCS) so intriguing. It's designed to let a pilot train in foggy conditions while flying on a safe, clear day. He goes up with an instructor, who holds the microprocessor-based simulator. The pilot wears glasses wired to the simulator. He can see the instruments clearly, but his peripheral vision is fogged by the glasses to simulate conditions ranging from zero to one-mile visibility. The fogging of the glasses is caused in much the same way as numbers form on a digital watch—pixel by pixel.



JUMP TRAINER

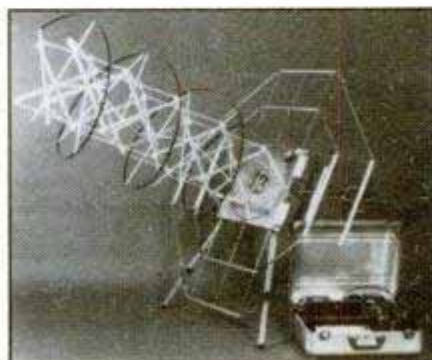
Marine Corps pilots who move from other types of aircraft to the Harrier II, which takes off vertically, are currently training on flight simulators. Now McDonnell Douglas has proposed a two-seat training version of the jet fighter. The Navy is expected to announce a decision later this year. The manufacturer says it could have the first trainer airborne by 1985.

COMMUNICATIONS

A case for communication

You're stranded deep in the wilds of Brazil with the nearest telephone a lifetime away. Yet within minutes you're in touch with civilization, calling for help—thanks to your luggage. It's NASA's new remote communications system, which fits into two suitcases. One holds a collapsible antenna, the other a transceiver and display terminal. Link it to a 12-volt battery, aim the antenna at

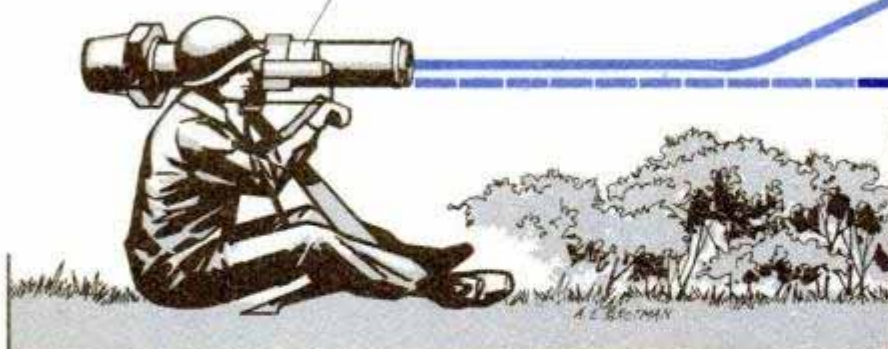
NASA's ATS-3 satellite, and you will quickly be typing out a message that takes minutes to fly across the world. NASA, which has tested the device using its tracking stations to receive the messages, says pilots of all aircraft will find it useful. The Coast Guard and Drug Enforcement Agency are also expected to put such a communications system on line.



Remote communications system has collapsible antenna that fits in a suitcase.

MILITARY

BILL MISSILE LAUNCHER



LINE OF SIGHT



Sneaky missile outwits tanks

This new antitank missile doesn't go where you aim it. As soon as it's fired from its bazooka-like launching tube, it zooms up about 3 feet above your line of sight and sails clear over an enemy tank.

An embarrassing miss? Not at all. When a proximity fuse in the missile's warhead senses the presence of a tank or other armored vehicle beneath it, an explosive charge is fired downward at a 30° angle, blasting the unsuspecting quarry from above.

Developed for the Swedish armed forces by Bofors Ordnance, the new missile is called BILL (for Bofors Infantry Light and Lethal). It's the

first in a series of so-called "top attack" weapons designed to take advantage of the long-known fact that huge battle tanks are much more vulnerable to fire from above than from the front. Frontal armor is very heavy—as much as 8 inches thick—in order to provide maximum protection from the usual head-on assault. On the other hand, the metal plating over the gun turret, engine compartment and other upper areas is relatively thin to save weight in places where enemy attack is not expected at all.

The downward-firing BILL thus strikes a tank at its weakest point,

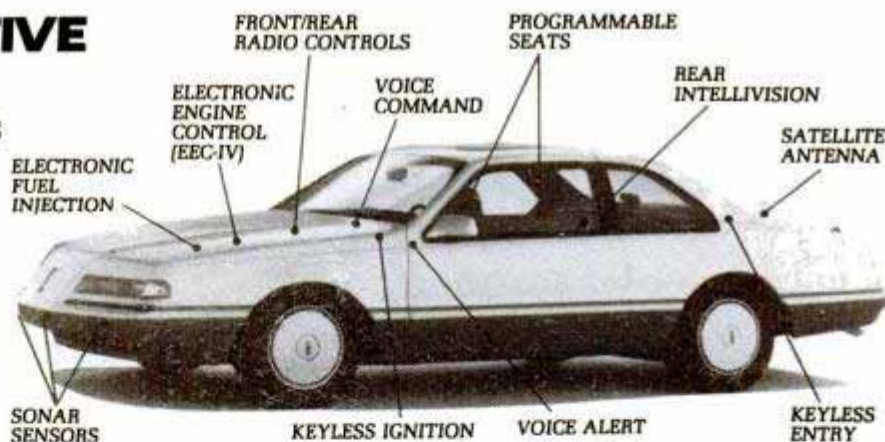
AUTOMOTIVE

Detroit wires new cars

American auto manufacturers have long been in love with electronics. But this year's entries at the auto shows are wired with more spectacular electronics than ever. Ford has dazzled crowds with its loaded Continental Concept 100. And GM is showing off its Buick Questor Electronic Concept Vehicle.

The Continental Concept 100 has a satellite antenna atop its trunk to pick up data from transit navigation satellites. Turn on a dashboard cathode ray tube (CRT) and you pick up the car's location on a map that shows arteries to key locations.

There are no keyholes on the two cars. Just punch up a five-digit code computerized keypad on the rear of either car to



Ford's Continental Concept 100 is loaded with a wide array of electronic equipment.

unlock the vehicles. Another five-digit keypad on the dashboard replaces the ignition key.

The Ford demo car has a voice alert to warn you of unlocked doors, low fuel and other problems. Or you can give voice commands to start or stop the car or turn on electronics.

In both cars, the fuel-injection is electronic, and so is overall control of carburetor and engine functions.

There are all kinds of touches for comfort, including electronically adjustable seats and a rear seat built-in

Intellivision game. And sonar sensors—both in the front and rear—pick up sudden obstructions, such as a child running onto the street, and rear dangers, such as another car's bumper that's too close for comfort during parallel parking.

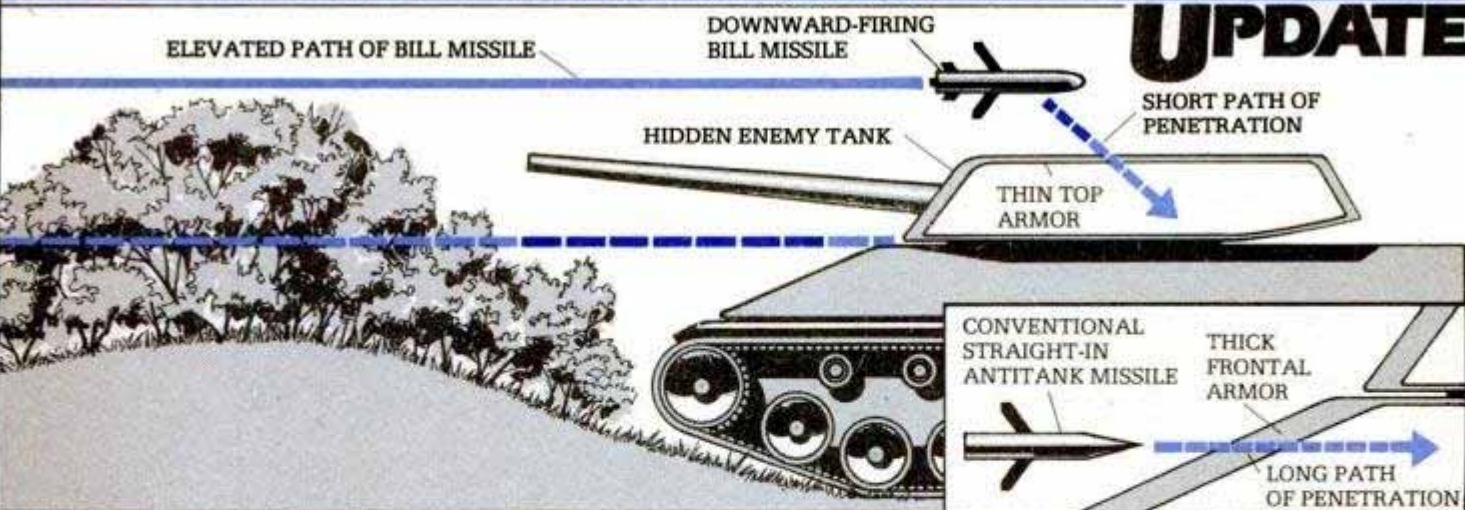
To start the electronics in the Buick, you turn on a laser switch that turns on the computer. The GM car contains all the standard buttons, including windshield wiper, horn, turn signal and others, on a pad built onto the steering column. A center console features an audio disc player and other comfort controls. Both cars are fully operational. Neither is for sale—just for demonstration.

Editor: Dennis Eskow
Contributors: Sheldon M. Gallager, Charles Reina, Ray Hamilton, Jack Grazier



Electronics in Buick Questor include computer screen (left), to pick up satellite maps, and column controls (right).

TECHNOLOGY UPDATE



virtually assuring an instant kill. It offers other advantages. To score a decisive hit with a conventional line-of-sight missile, a gunner must normally aim at the narrow slit between a tank's turret and its hull—a tough shot.

By direct contrast, the BILL's elevated flight path eliminates the need for precise aiming, allows the gunner to shoot from a low, protected position, and makes it possible to hit targets partially hidden behind brush or a hill. The gunner need aim only in the general direction of a tank and the missile will seek it out. Even if it strikes the front, its downward-angled charge has a much shorter path of penetration since it's more nearly perpendicular to the slope of the armor plate.

The missile weighs under 60 pounds, including launcher, is readily portable, requires only a two-man team to operate it and has a range of more than 2,000 yards.

Will the U.S. Army adopt the BILL? Probably not in its present form, but something like it is bound to come. Our closest equivalent, the Dragon missile, is liked because of its low cost and will be kept in service for a while, although it lacks top-attack capability and is believed to be ineffective against the latest Soviet T-72 and T-80 tanks. Several replacements for the Dragon are currently under study, however. They are expected to be of the top-attack type and could be even more deadly than the BILL.

SPACE

Sailing to the planets

The 5.4-million-cu.-ft. balloon, its clear plastic envelope glittering in the morning sun, rises slowly, bearing beneath her the nearly 250-pound hemispheric open gondola. The orange and white basket contains hundreds of tiny sensors and microcomputers, all taking measurements of the air around the gondola. About four hours after launch, the balloon and its payload hover about 97,000 ft. above the



Scientists examine electronic parts after Galileo's drop test.

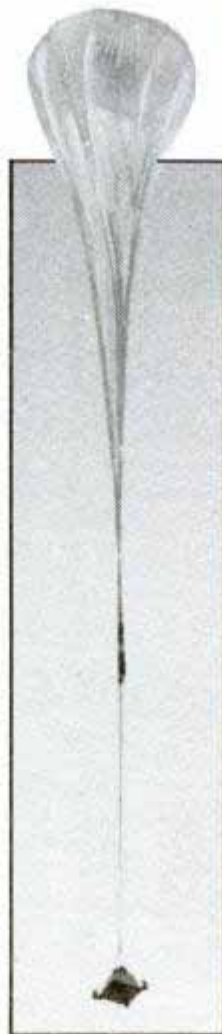
New Mexico desert. A command from a ground control radio activates a switch on high and the gondola is released from the balloon. Its sudden descent causes a parachute to pop out of its top and the fall is slowed to a graceful rate. So is marked another milestone in NASA's Galileo program to visit a moon of Jupiter later this decade (see *Technology Update*, "Testing By Jove!" page 196, Apr. '83). The test flight, conducted last January, let scientists from Jet Propulsion Labs and General Electric test the accuracy of on-board sensors

that provide readouts of air temperature, moisture, chemical content and other data. The January test expedition also marked the maiden voyage of the gondola itself, which will be parachuted onto one of Jupiter's moons sometime before the 1990s. The gondola will be dropped again later this year for more tests of the electronic equipment.

ENERGY

New class of glass

Pittsburgh Plate Glass this month is introducing an energy-conserving, coated glass called "Sungate." The coating lets the sun's short-wave rays come into the home while keeping inside the longer waves of heat. PPG borrowed the idea from its aircraft glass division, which has used the plastic-coated glass concept for years. The coating, applied in several layers in a vacuum chamber, cannot be washed off. PPG says the coating gives a double-glazed window the insulation value of a triple-glaze. And the glass looks perfectly clear.



The clear coating on PPG's Sungate glass keeps the longer waves of heat inside.

MILITARY

Raider's a Whaler of a boat

Gliding across the river, the 22-foot boat looks like a friendly old Boston Whaler, but those guns pointing from her gunwales fire something deadlier than harpoons. Ramo Inc. has taken the practically unsinkable Whaler hull and married it to MZHB, 12.7-mm machine guns—a marriage which *Jane's Defence Review* calls "an exciting example of synergism." The Raider is easily as maneuverable as any patrol craft in the free world, but it's much harder to knock out of the water. Made of lightweight fiberglass, the Raider can bomb along at 40 knots (and that's fully loaded with 6,500 pounds of men, machine guns, fuel, ammunition and radar). It's powered by twin Johnson 140-hp outboard engines.

Gunnery stations fore and aft are shielded with movable metal devices that run along a



The Raider combines the unsinkable hull of a Whaler with the firepower of 12.7-mm machine guns.

track so the gunner can aim in any direction. Between the two gun slots is a command station that houses a hydraulic steering system and various controls. The station can be outfitted with a radar tower and 600,000 candle-power spotlight for drug enforce-

ment or other patrols. The Raider, with a 120-gallon below-deck fuel tank, has a range of 250 nautical miles. And it even boasts fuel economy—the boat uses 16 gallons per hour at cruising speed and 23 gallons at top speed.

ULTRALIGHTS



Police ultralight patrols at 800 feet in Monterey Park, Calif.

Hang 'em high

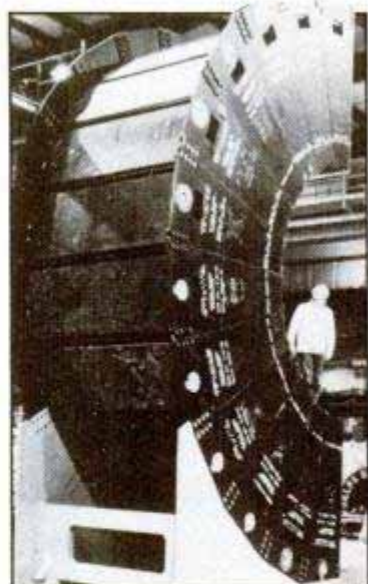
California criminals may one day receive ultralight sentences. That is, the police closing in on them may be flying ultralights. Right now the low-flying craft with their 30- to 35-hp pull-start engines are doing traffic patrol and recon duty in Monterey Park, Calif. You don't need a license to fly an ultralight, but the police are following the spirit of the law and using a licensed pilot.

The Monterey Park craft cost under \$9,000 to buy and less than \$7 an hour to operate. However, the ultralight's limitations include slow speed—35 mph tops—and limited clearance; it can't fly much higher than 800 feet. Still, the craft can land in a 75-foot strip, and that advantage has permitted Monterey Park to create four landing-takeoff sites around town. Several southern California fire watch patrols are also using ultralights to try to spot the many fires that plague residential areas.

INVENTION

The big doughnut

Purdue University engineers are putting together what is expected to be the world's largest nuclear particle detector. Designed for Fermilab in Batavia, Ill., the doughnut-shaped particle detector is composed of 48 wedge-shaped modules, each containing a section of the doughnut's detection system. Inside each wedge are 33 alternating layers of steel and semi-conducting composite material. When two subatomic particles collide inside any of the modules, the result is a change in the surface of one of the composite layers, something similar to what occurs when light hits a photographic plate. That's how physicists will record particle collisions. When finished, the ring, which is being moved module by module, will be four times more powerful than the ring used at the European atomic agency, where earlier this year scientists announced discovery of the elusive "W" particle which is responsible for some types of atomic radiation. When the Indiana doughnut is in place, it will search for smaller particles.



Atomic collisions can be measured in Purdue ring's 48 wedge modules.

NEXT MONTH IN PM

- **New family 'car':** We drive the first new minivan.
- **PM's Outdoor Living Guide:** Great yard projects and more.
- **Look what's in the suitcase:** Have computer, will travel.
- **Ultimate sailboarding with a hydrofoil attachment!**
- **Summer photo time:** Make your own prints from slides.

SUBSCRIPTION SERVICE: Popular Mechanics Magazine will, upon receipt from its reader of a complete new or renewal subscription order, undertake fulfillment of that order so as to provide the first-copy delivery to the Postal Service within six to twelve weeks. If for some reason this cannot be done, you will be promptly notified of the issue date that will begin your subscription, with a request for any further instructions you may have concerning your order. Please address all such orders to us at Popular Mechanics, P.O. Box 10064, Des Moines, Iowa 50350. Should you have any problem with your subscription, please write Joan Harris, Customer Service Department, Popular Mechanics, P.O. Box 10064, Des Moines, Iowa 50350. To assure quickest service, please enclose your mailing label when writing to us or when renewing your subscription. Renewal orders must be received at least eight weeks prior to expiration to assure continued service.

Popular Mechanics

P.O. Box 10060, Des Moines, Iowa 50350

YES!

Please enter my subscription to POPULAR MECHANICS for:

- 1 year \$11.97
 2 years \$21.97

Payment of \$_____ is enclosed.

Bill Me _____
Initial here

Name _____
(please print)

Address _____

City _____ State _____ Zip _____

Your first copy will be on its way to you in six to twelve weeks. Watch for it!

A publication of the Hearst Corporation.

Charge orders subject to publisher's acceptance.
 (Above prices apply in U.S. & Possessions only. Canadian and foreign prices upon request.)

CHANGING ADDRESS?

If you're planning to move, please let us know at least eight weeks before changing your address. Attach current address label and fill in your name and your new address. This will serve to insure prompt service on your subscription.

Send old label with your name and new address to:

POPULAR MECHANICS
 P.O. Box 10064, Des Moines, Iowa 50350
 or call toll-free: 800-247-5470
 State of Iowa residents call: 800-532-1272

NAME _____
(Please print)

NEW ADDRESS _____

CITY _____ STATE _____ ZIP CODE _____

EAGLE BELT BUCKLE



The American Eagle
 Symbol of Strength, Liberty, Power, and Pride.

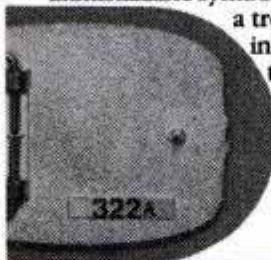
Individually Numbered & Electroplated in GENUINE 24-K GOLD

Our master craftsmen and artists have created an Eagle Belt Buckle which will be individually numbered, and electroplated with genuine 24-Karat Gold.

Permanent Registry

Each original owner will be permanently registered in our official archives, and a certificate of authenticity attesting to the Buckle's gold content will accompany each order. And, to further protect the integrity of this edition, the dies for this buckle will be destroyed at the end of the year, December 31, 1983.

Wear this authentic collector's buckle as a striking fashion accessory and unmistakable symbol of your love for your country. Then, hand it on to become a treasured heirloom as well. Your buckle will be sent to you in a specially designed presentation case and your satisfaction is assured by our unlimited money back guarantee.



Order Early For Lower Serial Numbers

Since registry numbers are assigned to each order as it is received, we strongly urge that you order promptly to receive the coveted lower numbers that are still available. LIMIT: FIVE (5).

International Mail, Dept. BZF-29
390 Pike Road, Huntingdon Valley, PA 19006
 Please send me American Eagle Belt Buckle(s) electroplated in genuine 24-karat Gold as indicated below:

- One Eagle Buckle only \$7.99 plus \$1.75 p&h.
 SAVE \$2! Two Buckles only \$14.99 plus \$2.25 p&h.
 SAVE \$6.70! Three Buckles only \$19.99 plus \$2.50 p&h.
 SAVE \$18! Limit of Five Buckles Just \$30 postpaid.

Enclosed is \$_____ (Pa. residents please add 6% sales tax)

CHARGE IT! Visa American Express
 Diner's Club MasterCard
 Exp. Date _____

Card No. _____

Signature _____

Name _____

Address _____

City _____

State _____ Zip _____

© 1983 International Mail

Be an ELECTRICIAN



MAINTENANCE CONTRACTOR CONSTRUCTION

Make more money! Check out Electrician's wages against the kind of money you make now!

TRAIN AT HOME IN SPARE TIME

Make extra money in spare time while you train for a full-time job. Do odd jobs for friends and neighbors. Save money doing your own electrical work. Learn everything from repairs and maintenance to complete electrical installations. No previous experience needed. Everything explained in easy-to-understand language with plenty of drawings, diagrams and photos. Tools, materials, test equipment included with course. Approved for Veterans and G.I.'s. Be ready to take almost any electrician licensing examination offered by state, city or county.

No cost, no obligation, no salesman will call!



MAIL COUPON TODAY!
Electrician School, Dept. P8043
ICS Center, Scranton, PA 18515



Rush free facts that tell how I can train at home to be an electrician.

NAME _____

ADDRESS _____

CITY/STATE/ZIP _____

Learn how to Program and Use PERSONAL COMPUTERS



Now at Home in Spare Time, you can learn everything you always wanted to know about personal computers. How to program in BASIC. How to understand and use BASIC commands. How to write and run your own programs. How to adapt existing software to your needs. **Complete Course Includes Your Own Computer** More than just another programming manual, this is a comprehensive home-study course written by experts. No need to quit your job or school. You learn everything right in your own home, without attending a single class! And to give you hands-on experience, we include your own computer—the Timex 1000 with 16k memory module—plus cassette recorder so you can save your programs on tape. **Send for Free Facts. Mail Coupon Today!**



COMPUTER TRAINING, Dept. P8043
Scranton, PA 18515

Name _____ Age _____

Address _____

City/State/Zip _____

SUPER BARGAIN SPECIALS!

Powerful Permanent Magnet Motor/Generator

ITEM 10-1023 **\$14.95**
Prepaid in Continental U.S.A.

With Bridge Rectifier **\$16.50**

• ITEM 10-1023 -- Runs on 12 to 120-v. AC or DC. (Rectifier req. for AC). Very powerful for its size. Torque 50 in./oz. at 6500-RPM. 5.5-amps. No load speed, as motor, 1,000 to 10,000-RPM. Reversible rotation. As generator, use wind, pedal, water power to produce 12-volts at 950-RPM, 24-volts at 2000-RPM. Ball bearing equipped. Shaft 15/32" diam., 2-3/4" long, threaded end. O'alt size 3" diam. x 7-1/4" including shaft. (3-1/2 lbs.) **Brand New**

Waterproof All-Steel .50 Cal. Ammo Boxes

ITEM 1-1038 **\$8.49**

Prepaid in Cont. U.S.A.



• ITEM 1-1038 -- Genuine U.S. Gov't. issue, heavy gauge steel ammo boxes. Not imported, lightweight copies. Tight sealing lid with rubber gasket. Waterproof protection for tools, camera gear, fishing tackle, valuables, ammo, important papers, etc. Carry handle folds flush. 11-3/4" x 7-1/4" x 6-1/8". (6 lbs.) **New Condition**



Send \$1.00 For 100 Page Equipment Catalog

(Your Can Order Direct From This Ad)

OUR TELEPHONE: (402) 474-4344



SURPLUS CENTER
Dept. PM-053 Lincoln, NE 68501

KOOL MATE - PORTABLE REFRIGERATOR/COOLER



For cars, vans, trucks, boats, planes, campers, tractors. Plugs into standard 12 volt cigarette lighter, fuseless. Reverse the switch and it heats. Ideal if you work from your vehicle. Excellent for camping or boating. 13-1/2 x 9-3/4 x 12". 1 year warranty. Operates on house current with our 110 volt converter. KM 881 Kool Mate \$109.95. KM 2 110 volt power converter (optional) Plus \$5.00 postage & Handling each. N.Y. add sales tax.

JRP Enterprises
5201 Clarendon Rd Rm 3A,
Brooklyn N.Y., 11203.

NEW ontek corp.
presents the **FOLDING SAWHORSE**

This new design folds for storage. Light yet durable, ideal for the work shop with limited space or apartment.

Send \$6.95 for assembly plans.
\$19.95 plus \$6.75 shipping and handling for complete unit.
Illinois residents please add 5% sales tax.

ONTEK CORP.
P.O. BOX 6769
ROCKFORD, IL 61125

NEW SHIPMENT JUST ARRIVED

Hardened Steel. For filing, drilling, milling, carving, routing any metal or wood. Cutting edges from 1/4" to 1", all shanks 1/4". Brand new in air tight G.I. packs.

32-Tool Set, G.I. cost \$295 ⁰⁰ now	129 ⁰⁰
14-Tool Set, G.I. cost \$126 ⁰⁰ now	119 ⁰⁰
Save Even More, Both Sets now	138 ⁰⁰
Two 138 Sets (Limited Time)	158 ⁰⁰

Money Back Guarantee. Add 13% for shipping. Texas orders add 5% tax. Export orders add 14%.
U.S. SURPLUS CENTER, Dept. 503
715 Camden, San Antonio, Texas 78215

DUNE-BUG

Complete plans & specs on how to build or buy - disc, prices on parts, kits, engines, & raw material.

Send \$3 for DUNE-BUG pkg to:
K & P Mfg.
Box 987 MS
Azusa, CA. 91702

Dealer Inquiries Invited

CARBIDE TIPPED 3/4" DOVETAIL 1/4" shank

Make beautiful drawers and decorative joints with this large bit. Over 100 cutters available, send \$1 (refundable with first order) for complete catalog. Satisfaction guaranteed. Visa, M/C.

\$12 (ppd)

H & S TOOL CO. 109 Minna St., Dept. 415
San Francisco, CA 94105-3796, (415) 567-7276

At Last a New Amazingly Simple GAS TURBINE JET ENGINE

Build from easy to follow plans. Length 18", Dia. 8 1/2", Wt. 15 lbs. Fuel: Gasoline or Kero. "Screaming Demon" develops 20 H.P. Ideal project for serious-minded hobbyists, students; scientific and industrial arts classes. Make on 9" metal cutting lathe with milling attachment. For use on small racing boats, model cars, etc. Full size assembly drawings with critical dimensions, bill of materials and photos. Price \$8.00. No. C.O.D. 1510 25th St., P.O. Box 1398
SAVOY SCIENTIFIC SANTA MONICA, CALIF. 90406

KILL THAT RUST!

With fantastic POR-15, the space-age product that stops rust for good. Just paint right over rust and watch it disappear! Dries to a rock-hard silver finish which won't shatter, crack or peel. Accepts all paints, can be sanded. 1 quart covers 96 sq ft. Fully guaranteed, easy and safe to use. Product information and directions with every quart. Visa and M/C ok.
\$21.95/QUART, \$71.00/GALLON, POSTAGE-PAID
STAN COLEMAN, INC. Dept. A, 320 South St. Bldg. 12A
Morristown, NJ 07960 800-528-0796

Build Yourself the Simple Life. For Less.



For many, log home living means a simpler, more economical way of life. If that's what you want, look to Lincoln Logs Ltd. We feature a lower total erected cost than comparable models from other major manufacturers.

Why? Because Lincoln Log homes are pre-engineered — not pre-cut or numbered, which adds to the cost of log homes and restricts freedom to customize or correct errors on-the-job.

Lincoln Log home packages are complete (you even get roof system, hardware and nails). And a wide range of options is available for you to add later, if you desire.

Write for your Lincoln Logs plans kit. Send your name, address and telephone number, with



check or money order for \$6.00, to the address below. Or call 800-833-2461 (in New York State call 518-494-2426). MasterCard and Visa accepted.

Exclusive Dealership Territories Available

Simple Log Home Living. For Less.
The Original Lincoln Logs Ltd.



16053 Riverside Drive
Chestertown, N.Y. 12817

© 1982, Lincoln Logs Ltd.

Solve your Hauling Problems

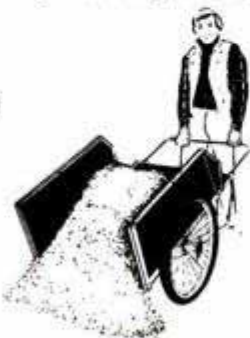


950 lb. Capacity

The Stowaway Folding Trailer

Hayes Garden Carts

2 Sizes Available



Standard Dump Front

Call Toll Free  1-800-243-8550
For Free Color Brochures



Hayes Equipment Corporation
P.O. Box 526 PM
Unionville, CT 06085

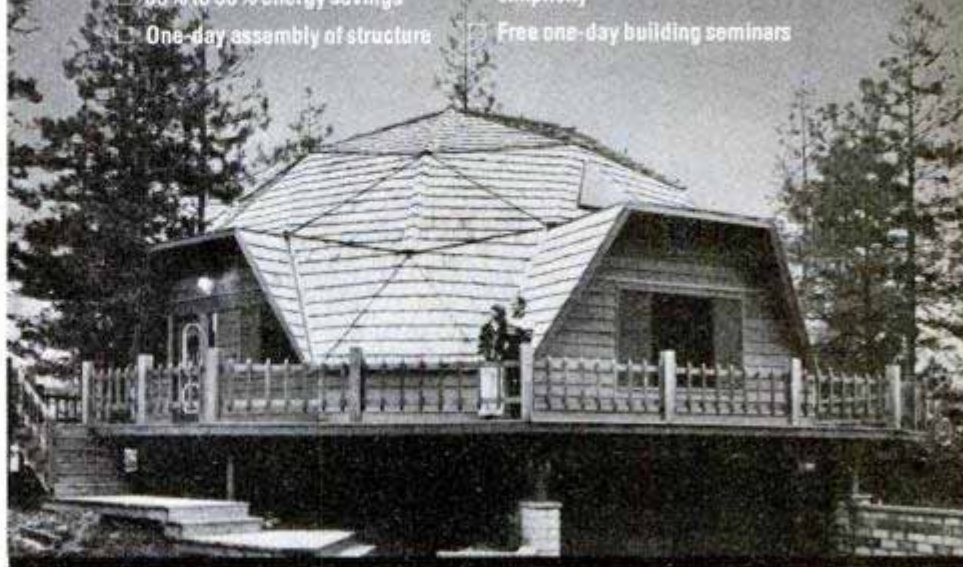
ESTABLISHED 1945

© 1982 HAYES

affordable housing...

the Cathedralite geodesic way...

- Substantial savings for the owner-builder
- 30% to 50% energy savings
- One-day assembly of structure
- Complies with uniform building code
- Unmatched quality, strength and design simplicity
- Free one-day building seminars



For more information:
Send \$6.00 for 40-page brochure and/or \$7.95 for geodesic plan book to: Cathedralite Domes, Inc.
P.O. Box 2490, White City, OR 97503
Telephone (800) 538-0782 • in Oregon (503) 826-7200
TELEX: 176070 CATHDOMES

 CATHEDRALITE

PMS

BUILD YOUR OWN PONTOON BOAT...



AND SAVE \$1000 OR MORE WITH EASY TO ASSEMBLE KITS.

- Economical, safe and practically indestructible. Ideal for family parties, fishing or swimming.
- 4 models to choose from, 17', 20', 21' and 24' lengths.
- Polyethylene pontoon sections are urethane foam filled. Retains buoyancy even if punctured. Highly resistant to abrasion and impact.
- pontoons are maintenance free, colorfast — never needs painting.
- Assembly requires no special tools or equipment. Takes only 12 to 16 hours to complete.
- All kit components are of galvanized steel or marine grade aluminum.
- Kit contains pontoons, frame, motor mount, helm station, steering, railing and hardware.
- Send \$2.00 for complete information.

CALL TOLL FREE

1-800-351-1363

In Texas call: 915-643-2517

ROTOCAST FLOTATION PRODUCTS
P.O. BOX 1059, DEPT. PM
BROWNWOOD, TEXAS 76801

GIANT CHESS SET



5' X 5' BOARD - 1 1/2' PIECES
KITS AND COMPLETE SETS AVAILABLE
PLANS ARE ACTUAL SIZE - TRACE ONTO YOUR WORK
OUR PLANS USE COMMON TOOLS FOUND IN MOST HOMES
USES EASY BUILDING TECHNIQUES
WRITE TO: HEFTWOOD COLLECTION
BOX 7000-898 DEPT. A
REDONDO BEACH, CA. 90277

- () ENCLOSED, \$8.00 FOR MY COMPLETE PLANS.
- () ENCLOSED, \$1.00 FOR MORE INFORMATION.

NAME

ADDRESS

CITY STATE ZIP

WOODWORKERS!

A magazine for both novice and veteran bringing you over 75 project plans per year...for building the best of Early American, Shaker, English, Contemporary furniture, clocks, toys, lamps, gifts and much more...

ALL FOR LESS THAN 20¢ PER PLAN

PLUS Regular articles on shop tips, jig-building, finishing techniques and money-making ideas.

1 YEAR (6 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)

The Woodworker's Journal

P.O. BOX 1629-315 NEW MILFORD, CT 06776

NAME

ADDRESS

CITY STATE ZIP

money back if you're not satisfied

FREE GOLF CATALOG



Austad's is your complete source for quality golf equipment at great prices. Our full color catalog features clubs, bags, shoes and hundreds of golf accessories; many available exclusively from Austad's. Send for yours today.

Austad's

Dept. 973, 4500 E. 10th St.
P.O. Box 1428,
Sioux Falls, SD 57101

or call toll free 1-800-843-6828 Ext. 973

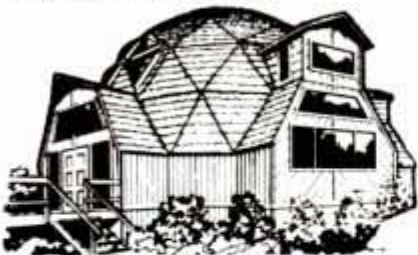
AMAZING SCIENTIFIC and ELECTRONIC DEVICES

PHASER shockwave and invisible FORCE FIELD generators. LASERS for weapons, cutting, burning, cloud writing, holography and special effects. NUCLEAR particle accelerators and detectors. PLASMA, ION, HIGH VOLTAGE, HIGH FREQUENCY TESLA COILS and LIGHTNING generators. TRANSMITTERS and CONTROL devices for security, telephones, intrusion detection, nature listening. PLUS PLUS INFRASONICS, ULTRASONICS, ENERGY, CHEMICAL and PERSONAL PROTECTION and SAFETY DEVICES. SEND \$1 for catalog of plans, kits and completed items to:

INFORMATION UNLIMITED, INC.

P.O. Box 716, Dept. M8
Amherst, N. H. 03031

Build this beautiful Dome Home by yourself!



Enjoy super affordable payments and low energy bills

Save up to 60% on building costs and up to 50% on utilities. Beautiful Monterey Domes geodesic home kits are extremely energy-efficient, unbelievably strong, earthquake resistant, and easy to assemble. No special tools or skills necessary. Our unique, patented building system makes home construction a reality for the novice.

Monterey Domes pre-cut, color-coded shell packages start at \$3995. Models up to 3,500 sq. ft.

Send for our exciting color Catalog & Plans Book — over 90 fact-filled pages of beautiful affordable homes.

Write today! Monterey Domes, Inc., 1760 Chicago Dept. AQ-5, Riverside, Calif. 92517

- Rush me your 90 page CATALOG & PLANS BOOK. Enclosed is \$6.00, postage included.
- Also send your ASSEMBLY MANUAL for an additional \$5.00.

NAME _____

ADDRESS _____

CITY, STATE, ZIP _____

Mail To: MONTEREY DOMES, INC.
1760 Chicago, Dept. AQ-5
Riverside, Calif. 92517



SAVE up to 90% GOVT. SURPLUS



Surplus and other bargains galore! Industrial, mfg., marine, aircraft, auto, hardware. A must for hobbyist, mechanic, handyman, outdoorsman. Our 38th Annual Catalog. Send \$1 today (deductible from first order of \$10 or more).

AIRBORNE SALES CO.
8501 Steller Dr., Dept. PM83
P.O. Box 2727, Culver City, CA 90230

Name _____
Address _____
City _____
State _____ Zip _____

Learn how to MAKE MONEY in DRAFTING

Train at home in spare time. No previous experience needed. Tools and materials included with course. No special talent required. We show you what to do, how to do it. **LEARN DRAFTING**

CALL TOLL FREE AT HOME!
1-800-228-2028 / EXT. 355
Dept. P8043
(Except in Nebraska call (402) 571-4900)

CALL ANYTIME — Operations to take your call 24 hours a day 7 days a week. No cost. No obligation. No salesman will call.

NORTH AMERICAN SCHOOL OF DRAFTING,
4400 Campus Dr., Dept. P8043, Newport Beach, CA 92660

HYDRO-RAT AIRBOAT

Speed 25 MPH, using stock Briggs & Stratton or Tecumseh engine. Simple construction, using common building materials. No welding, no fiberglass.

Info. booklet \$1, refundable on purchase of \$10 plans.

ROCKY MOUNTAIN AIRBOATS-P.O. Box 119-A, Morgan, Utah, 84050



HOME BEERMAKING



It's fun, easy, and economical to brew your own great-tasting beer at home. We feature an extensive line of the finest equipment, ingredients, books, and more. Send for **FREE CATALOG**. William's Brewing, Box 461-PM Oakland, CA 94604.

NON-GUNS!



That's right, these precision built replicas of famous firearms **CANNOT CHAMBER OR FIRE REAL AMMUNITION!** Made of machined metal. They look, feel and weigh same as the originals. **CAN BE DISASSEMBLED.** Over 30 sized, hand-finished parts. Comes fully assembled. Safe and perfect for display. **MONEY BACK GUARANTEE.** Send for **FREE CATALOG** of over 50 different models.

Model shown U.S. GOVT 45 AUTOMATIC. **CALL 1-800-228-2028** \$50.00 (275)

The COLLECTOR'S ARMOURY, Inc., Dept. PM
800 SLATERS LANE, ALEXANDRIA, VIRGINIA 22313

Find twice the treasure . . .

with a **WHITE'S ELECTRONIC MINERAL/METAL DETECTOR**

White's instruments detect rings, jewelry, coins, plus other valuables and it's profitable! Metal detecting is a hobby for the whole family to enjoy. Models from \$79.95. Covered by U.S. Patents.

FOR THE NEAREST WHITE'S DEALER AND A FREE CATALOG CALL TOLL FREE
1-800/547-8911

WHITE'S ELECTRONICS, INC. 1011 Pleasant Valley Rd., Sweet Home, OR 97388

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 SAUSAGEMAKER
177-6 Military Road • Buffalo, N.Y. 14207

LEARN 'THE DRAKE METHOD' YOUR CAR MADE SHOWROOM NEW!!!!!!

Step by step instructions by a professional
A simplified **BOOKLET** on how to recondition your car

ORDER YOURS TODAY - SEND ONLY \$4.95 !!!

Diamond Leasing Company
P.O. Box 955
Cuyahoga Falls, Ohio 44223

BUILD THIS BEAUTIFUL LAWN SWING

Designed for comfort and durability. All bottled for easy assembling, storage and maintenance.

Made from standard size lumber. Simple hand tool construction.

PATTERNS with instructions. Send money order \$8.00.

G. Savard,
Box 743, Copper Cliff,
Ontario, CANADA P0M 1N0

BUILD THIS TRAILER KIT

Bed 76" x 16". For personal Use or Resale. Heavy duty steel pre-cut. 7000 lb. axles. Guaranteed. Haul hay, cars, tractor, freight, etc. Send \$3.00 for brochure, marketing ideas, parts catalog etc.

TRAILER MAKER 1229 No. Jefferson
Bldg. C Mt. Pleasant, Texas 75455 Ph. 214-572-5092

THE BOSS LOG SPLITTER!

Only \$49.95 plus \$8 p. & h. for adaptable cone. or \$99.95 plus \$10 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

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 \$1.00 for catalog.

Kelsey Presses, Dept. 83-BE, Meriden, CT 06450

FOR AUTHORIZED TV RECEPTION ONLY

Satellite TV Price Breakthru!

Best Sat TV consumer/report manual available reveals lowest prices. Complete microwave receiving system, \$149. 10-ft. antenna, \$295. \$100 receiver. Latest 1983 easy-to-understand info on dozens of top rated sources, best prices on equipment, kits, plans, portable systems. 8 1/2 x 11" illustrated. \$9.98 each + \$1.50 ship. **Johnson Smith Co., Dept. 1005, Mt. Clemens, Mich. 48043.**

PUMPS BUY DIRECT AND SAVE

Draw • 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 1/2" in. 3/4" out. \$15.95

ADD \$2 pgs & hndng. Money back Guarantee.

LABAWCO, 80 Hwy 206, Belle Mead, N.J. 08502

HUMUNGUS! THAT'S WHAT THEY'LL SAY WHEN YOU GROW TOMATOES THE SIZE OF GRAPEFRUIT

GARDENING? NEW TILLER

SO GENTLE RUNS SINGLE HANDED WON'T BOUNCE OR JUMP

Weights 22 lbs. runs 8 hrs. on 1 gal. of fuel. Tills deep from 18 to 12 inches wide. Weeds fast from 12 to 2 inches wide.

Tills in rough stuff. Good sad Buster. Won't bounce.

ATCO'S REVOLUTIONARY NEW SYSTEM OF TILLAGE GIVES YOU GIANT PEPPERS, ONIONS, POTATOES AND CARROTS (ENDORSED BY DEPT. OF AGRICULTURE).

Gives you more power per pound than any other tiller... Built rugged for commercial use with 16 adjustments for operator comfort and better tillage... Warranted against defects for as long as you own it... Engine comes with lifetime service agreement... 30 day money back trial period. Send for brochure now, you might win a free tiller.

Not sold in stores free gardening guide

Write: Allentown Tiller Co., c/o Allentown Feed Co., Main Street, Allentown, New Jersey 08501 Dept. P

Name _____
Street _____
City _____
State _____ Zip _____

For rush delivery of literature call 201-530-9380 24 hrs a day.

Build your own air compressor from PM's plans



Once you have an air compressor in your home shop, you'll wonder how you ever got along without it. You can spray paint with it. You can inflate swimming gear, toys, auto and garden tractor tires. More important, you can sandblast parts and rivets in metal seams. You can blow-clean fine mechanisms and, with PM's unit you can vacuum pump your car's airconditioning system prior to adding Freon—something you can't do with most ordinary air compressors. Finally, this unit features a filter/water trap—which is an optional extra on most commercial air compressors.

PM AIR COMPRESSOR

You can do all these things with this versatile 1-hp compressor and, happily, you can build it for less than \$200. **PM**

Compressor evacuates car's airconditioning system prior to adding new refrigerant (far left). At left, routine inflation of tires saves trip to gas station.

HOW TO ORDER PLANS

Send check or money order for \$5.95 to Air Compressor, Popular Mechanics Plans Library, Box 1014, Radio City Station, New York, N.Y. 10101. Allow two to three weeks for delivery; for first-class mail send 75 cents extra.

Popular Mechanics is a publication of Hearst Magazines, a division of the Hearst Corporation.

Portable Steam Cleaner
Steam in 60 seconds

CLEAN:
Engines, Air Filters, Lawn Mowers.
3 year guarantee on fire box, coils. Uses liquid soap, propane fired. Weight 120 lbs. Auxiliary pump required on low water pressure.

WEDCO MFG. INC., Dept. M-14
940 West Broadway, Jackson, WY. 83001

CALL TOLL FREE NOW!

AMAZING VINYL REPAIR
—\$10 to \$20 in an hour!

Big earnings, repeat business. Car shops, homes, motels, restaurants, bars, etc. **FREE FACTS BY MAIL.**

Call toll free 1-800-621-6633 (Ill. 1-800-572-0444) or write VIP, 2021 Montrose, Dept. 182, Chicago, IL 60618

Learn ACCOUNTING at home

Learn about careers in Accounting, Bookkeeping, Tax Returns. Send for FREE "ACCOUNTING CAREER KIT" WITH COURSE

CALL TOLL-FREE 1-800-228-2028 / Ext. 350
Dept. P8043

(Except in Nebraska call (402) 571-4900/Ext. 350)

CALL ANYTIME—Operators to take your call 24 hours a day, 7 days a week. No cost. No obligation. No salesman will call.

FREE BOOK NORTH AMERICAN SCHOOL OF ACCOUNTING, Dept. P8043

Accredited Member: National Home Study Council • 4400 Campus Dr., Newport Beach, CA 92660

GET YOUR DEGREE IN ACCOUNTING!

LEARN AT HOME IN SPARE TIME

Get free facts. Thousands now studying for ASB degrees. Over 8½ million students enrolled in ICS since 1891. Fully accredited. Approved for G.I.'s and Veterans.

ICS Center for Degree Studies, Dept. P8043
ICS Accounting Center, Scranton, PA 18515

NOW BRASS BAR RAILS
For Your Home

and other solid brass bar accessories

Now you can have solid brass bar rails, standoffs, end caps, flanges, etc. for your home bar. The same quality as you see in the finest restaurants and pubs.

For Catalog send \$1.00 to:
MIDWEST CUSTOM BRASS
208 E. Main Street, Dept. PMSJ Round Lake Park, IL 60073

110 VOLT A.C. GENERATORS

Special price while they last. Up to 50% off. 60 cycles, 3000 watts. Wt. 27 pounds, 5" x 10", fanbelt driven from car or pickup. Operates T.V. all power tools. Over 18,000 in service. Guaranteed 6 months, ~~\$299.00~~. Special Price Now \$99.00, add \$9.50 for postage and handling per unit. Send for our free catalog. This is our 33rd year.

VIRDEN PERMA-BILT COMPANY, P.O. BOX 7180PM
2821 MAYS AVE., AMARILLO, TEXAS 79109
PHONE 806/352-2761.

FREE THE GREAT ELECTRONIC THINGS & IDEAS BOOK!

HUNDREDS OF UNUSUAL PARTS, GADGETS & IDEA ITEMS UNAVAILABLE IN STORES OR CATALOGS ANYWHERE! Bargain prices on everything! New items in every issue! Rush postcard for your copy!

ETCO ELECTRONICS
Dept. 323
Plattsburgh, N.Y. 12901.

PLANS AND INSTRUCTIONS FOR

Go Kart	\$2.50
Mini Bike	\$2.00
Mini car	\$3.00
1/2 Sail Boat	\$4.00
Front Traction Go-Kart with Gearless Differential	\$10.00
Mini Jeep	\$3.00
Fedal Boat	\$4.00
8 H.P. Tractor	\$10.00
Soap Box	\$3.00

Mini Vehicles Plan
Dept. C
Chazy, N.Y. 12921

CLASSIFIED ADVERTISEMENTS

Sophie Gronowicz, Classified Sales Manager

Rate: \$5.70 per word payable in advance each insertion. Minimum insertion ten words. Bold face capitalized words—\$1.00 per word additional (First word set in Bold Face at no extra charge, Zip Code Free.) The next available issue to place an advertisement in America's No. 1 Classified Section is JULY. The closing is MAY 5th.

Send remittance payable and order to Popular Mechanics, Classified Department, 224 West 57th Street, New York, New York 10019. Please indicate Heading under which ad is to appear. As a consumer service and in cooperation with our mail-order advertisers who use post office box addresses for their convenience in handling your order, Popular Mechanics maintains a register of such mail-order advertisers containing their complete names and street addresses.

Advertisers using P.O. Box number must furnish complete name and street address for our records. To avoid delay in the publication of your ad, please send descriptive materials with your request.

AUTOMOBILES

FREE GASOLINE Receive free and legal extra gas. Send \$3.95! M-S Engineering, P.O. Box 411, South Whitley, IN 46787

CARICATURES. Your Car, Full Color. Send Photo (Returned) With \$15.00 To: R. Moehr, 8140 Hettlerberg, Warren, MI 48093

ELECTRICAL DIAGNOSIS Personalized Help On Your Particular Vehicle. Shorts, Open Circuits, Lights, Gauges, Charging Systems, Starting. Any Other Electrical Device or Problem. Complete Schematic, Case Histories. Describe Problem, Make, Year, Model. Cars, Trucks, Vans. \$5.00 Guaranteed. Jerry's Auto Elect., 3586 Adams Ave., San Diego, CA. 92116.

SAVE GASOLINE!! Bypass pollution devices - - easily, reversibly! Posco (GB-5), LaGrangeville, NY 12540

HIGH Mileage Carburetors, Free Details. Box 89, Draper, Utah 84020-0589.

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 \$15.50 for 12 giant issues. Subscribe to the 'bible' of old car nuts today. Send to: Hemmings Motor News, Dept. 14D, Box 100, Bennington, Vermont 05201

SAVE YOUR ENGINE, STOP ENGINE KNOCKING AND PING with the amazing Carter Engine Knock Eliminator. Works automatically, easy to install, complete easy instructions. Works on U.S. and Import cars, trucks, 4x4's, RV's \$79.95 plus \$6.00 tax and shipping. Guaranteed! Sorry no diesels, rotary, odd-fire V6's or positive ground vehicles. AMMEC, P.O. Box 15178, St. Louis, MO. 63110

SUPERCARB! Fact! Fiction? Free Details! MPG-PM583, Box 2133, Sandusky, OH. 44870-7133.

CHILTON Domestic, and Import Repair, and tune-up guides. \$8.95 each. State car make, model, year. Include \$2.00 P. & H. Auto Manuals Co., 955 Greenacres Dr., Sheboygan Falls, WI 53085

CLYMAR Import car repair, and tune-up manuals. \$10.95 each. State car make, model, year. Include \$2.00 P. & H. Auto Manuals Co., 955 Greenacres Dr., Sheboygan Falls, WI 53085

200,000 Miles from your Car! Revealing Report FREE! CarSavers, 53 Vineyard Avenue, Highland, New York 12528

TRIKESTER—THREE Wheeled Two Place Side By Side, V-W Powered, 50 MPG. Semi-Enclosed Body, Simple Const. Information Pack. \$2.00, Plans \$25.00. P.O. Box 1942, Bonita Springs, Fla. 33923

V8-V4 Plans \$15.00. MCE, SE 141 Mill Creek, Shelton, WA. 98584

BUY JAPANESE CAR PARTS WHOLESAL! Example: DATSUN FENDERS \$58.00, ALTERNATORS \$29.98, BUMPERS \$43.00, GRILLES \$41.00. Similar savings other Japanese cars and trucks. 100's NEW parts in stock. Catalog \$3.00. JPM-Discount Auto Parts, Box 2247P, Joliet, IL 60436

INCREDIBLE Engine Protection Increases Gas Mileage. FREE Information. Petrolon Sales, M, 700 Clinton, Oak Park, IL 60304

INVALUABLE Booklet! INCREASE THE MONEY YOU RECEIVE when trading-in/selling your vehicle. \$4.95 + \$1.05 P/H. SATISFACTION GUARANTEED. AEO Enterprises, PO Box 218, Sherwood, OR. 97140. (Need details? SASE.)

STOP drive shaft vibration. Send \$11.95 for kit. DSB, P.O. Box 1808, Apply Valley, CA. 92307

FANTASTIC GAS MILEAGE!! - It's Easy! - Details FREE - DynaTek B5, 720 Jordan, Rockford, Illinois 61108

FREE Water Injection Plans! Government design, others! Almqist, GT5GA, Millford, Pennsylvania 18337.

REDUCED GASOLINE COSTS! Increase Mileage 30%-50%! Booklet \$3.00 (Refundable) Tells How. Absolutely Legal. Reid Enterprises, Box 103M, St. George, Utah 84770

"HIGH MILEAGE CARBURETORS, FACT OR FICTION?" Revealing 3,000 word report. \$2. Chaparral, Box 240-PM53, Simi Valley, CA. 93062

UNIQUE Do-it-yourself CONVERTIBLE. From a PLAIN hard-top to a SPORTY convertible for UNDER \$300.00. Send \$5.00 for pictures and details. Designer Graphics, P.O. Box 1405, Midlothian, Virginia 23113.

FRICITION STOPPING new POWERUP saves money, triples engine life, thousand uses: automotive, home, marine, industrial. Miracle lubricant, penetrant, anti-acid, concentrated, guaranteed. Sample and details \$8.00. POWERUP, Box 874, Provo, Utah 84601

87 MPG in CHRYSLER 400 CID HIGH MILEAGE CARBURETOR. Complete Working Plans. KNEISS, R2PM, Bowling Green, Missouri 63334

PROPANE/GASOLINE DUAL-FUELED AUTOMOBILE! Complete Plans, Instructions and Parts Sources for converting your car. \$10.00. RDA, Box 873, Concord, NC 28025

ELIMINATE PINGING with Edelbrock Varajection Water Injector \$69.96. RV Water Transfer System for Injector \$59.95. Add \$4.00 Postage and Handling Per Item. CA Residents add 6% Sales Tax. T.C. Distributing, Dept. PMM, 430 Fourth Ave., San Diego, CA 92101

ELECTRIC VEHICLES

EVER THOUGHT OF BUILDING AN ELECTRIC CAR? Complete Catalog of Parts and Theory. Send \$3.00 to: EVC, Box 25PM, Mechanicsburg, PA. 17055

AUTO SUPPLIES & EQUIPMENT

ALTERNATOR Generator Rebuilding Book. Price: Hedelund Engineering, Box 28024, Las Vegas, NV. 89126.

PARTS: Army Jeep and truck parts. Spare Parts & Equipment Co., P.O. Box 751, Lexington, Kentucky 40501-0751

DATSUN AND SAAB PARTS. Large Inventory. Priced to Save you Money. Our Twelfth Year in Mailorder Parts. Send \$2.00 for 152 Page Datsun Catalog, or our 1983 Saab Catalog. VISA, MC. Parts order line: 1-800-446-8958. Performance Cars, 9916P Jefferson Ave., Newport News, VA 23605.

TRIPLE Gas Mileage Possible!! Simple, Easy Modifications. Learn More; Send \$3.00. Kasie Publishers, 323 Franklin #804/K90, Chicago 60606-7096.

INCREDIBLE MPG Possible !! Write!! ESP-137, 377 Antenor, Pittsburgh, Penna. 15210

AUTOPOD Cargo Trailers, 40 Cu. Ft. Capacity, 800 LB. Load. Fiberglass Body, Steel Frame, Strong Aerodynamic Design. Factory Discount Prices. Free Brochure. The Winter Company, Box 245, Shawano, WI. 54168

TIRE Changer — Plans \$8. Parts, Complete Units Available. M-K3, 2520 Tryon Road, Ashtabula, Ohio 44004

HYDRAULIC ENGINE HOIST, BUILD YOUR OWN. LIFT ENGINES, MACHINERY, ECT. SEND \$8.00 FOR COMPLETE PLANS AND MATERIALS LIST, CHIPPEWA CRANE, P.O. BOX 106, BARBERTON, OHIO 44203

ALTERNATOR/STARTER Rebuilding Made Easy. Start without Capital. Details: Box 33, Buffalo, NY 14207

INTERMITTENT WIPER KIT for 77-80 Rabbit, easy installation, \$29.95. AID, Box 512, Little Ferry, N.J. 07643

ALARM, BACK-UP. Intermittent BEEP-BEEP. Installs 15 minutes to back-up light or switch. OSHA O.K. Forklifts, trucks, R.V.'s. SAMPLE \$9.83 to: Acorn Products, Dept. PM-2, Box 21485, Casa Corro Station, Concord, CA 94521. Dealers Wanted.

FINEST New Zealand lambkin seat covers for cars, vans, and R.V.'s, also decorator and infant rugs plus apparel. Free catalog: call 1-800-426-4626. Skinny's Down Under, P.O. Box 88067, Dept. PM4, Seattle, WA 98188.

MOBILE HOMES

"SKIRTING INSTALLED EASY with Skirting-Mates®." Free Brochure. Glacier, Box 8367, St. Paul, Minn. 55113

BARGAIN RIGS ARE AROUND — if you know what to look for, and where. Here are 25 check points to look for in a used RV. Photocopy is available Send for Plan R S 84 + \$1.00 to: Popular Mechanics, Box 1014, Radio City Station, New York, NY 10101

MOTORCYCLES, BICYCLES, MOTORSCOOTERS & SUPPLIES

YOUR Own Motorcycle Shop. 320 Page Book Tells How. \$15.95 Post Paid in USA. M.O. or Bank Cards Only. Two Wheel Horse, 956 So. Geary St., Albany, Ore. 97321

GO KART, MINI-BIKE, MOTORBIKE PARTS. Tires, Clutches, Motors and Complete Carts and Mini-Bikes at Discount Prices. 3 1/2 Hp. motors \$106, 5 Hp. \$130. Send \$1.00 for Booklet. Northern Hydraulics, P.O. Box 1219, Dept. 90503, Burnsville, MN 55337

GO KARTS, Minibikes, ATV's. Kits, Parts. Lowest Prices. Catalog \$2.00 Refundable. Kart World, Dept. C, 1488 Mentor Ave., Painesville, Ohio 44077

BICYCLE ENGINE, 175 MPG, 4.5 Lbs. \$49.95, Send \$1.00. Yost, RR1, Box 37, Sauk City, WI 53583

ENGINES, Lawnmowers, Motorbikes, Go-Karts. Catalog \$1.00. Lorenzo-Azusa, Danville, Ill. 61832

CLOSEOUT! 4-Stroke, Chain-Driven, Pedalable Motorbike plans. 9-page, Detailed. Now only \$1.75, Save. Slowped, Box 764, Columbia Falls, MT 59912

BICYCLE SUPPLIES. Free bargain catalog. BIKERY, P.O. Box 12039, Costa Mesa, CA. 92627

HANG GLIDING, AVIATION

CHOPPY ultralight single seat helicopter. Simplified construction motorcycle engine. Information \$3.00. Polynova, Box 670 "M", St. Remi, Quebec, Canada J0L 2L0

DESIGN Build Airplanes, Hang Gliders, Simplified Publications. Brochure 20¢. McCoy Aircraft, 12920 S. Figueroa, Los Angeles, CA 90061.

60 ULTRALIGHT AIRCRAFT PLANS! Illustrated Catalog \$5.00. Aerofun-M, Salida, CA 95368

"ON FINAL" 5th dimensional aviation art by Jim Dungey a stunning perspective from the left sent in beautiful color, the buffs delight!! 22x37 poster \$3.50 plus \$1.50 p/h. Check or Money Orders to: 5D Art, Box 474, Mt. Vernon, N.Y. 10550

ULTRALIGHT AIRCRAFT Proven Cross country capability. 80 hour kits. Dealership network with instruction. Color information pack \$5.00. Pterodactyl, Box 191PM, Watsonville, California 95076

HANGAR Construction Plans, Post Truss Designs, Send your Requirements and \$2 for Brochure of Stock Plans. Planex, Box 70081, St. Paul, Minnesota 55107

SPACE & ASTRONAUTS

ANTIGRAVITY Propulsion Device. Free Brochure! RDA, Box 873N, Concord, NC 28025

HOVERCRAFT

AERO-CAR Amazing Hovercraft built easily with ordinary tools. Lawnmower engine power. Carries one man plus. Hovers, flies forward, backward. Sideways over land/snow/water. Complete construction plans and brochure. \$9.95. Aero-Projects, Box 5118PM, Clinton, New Jersey 08809.

HOVERCRAFT Plan All Sizes. Catalog \$1.00. Universal Hovercraft, Box 281, Cordova, Illinois 61242

BOOMERANGS— INCREDIBLE RETURNS! You can do it. Exciting sport! Order FREE CATALOG today. BoomerangMan, 306 Park, Monroe, LA 71201

CB-RADIO, TV & HAM EQUIPMENT

POLICE Scanners, Bearcat, Regency, HPR, Box 19224, Denver, CO. 80219.

IMPROVE CB PERFORMANCE! Modification hardware, books, plans. Catalog \$2.00. CBC International, Box 31500M, Phoenix, AZ 85046

BEARCAT Scanners. Discounted. **CRYSTALS** \$2.75. **RADIO SALES**, 3462 Oakland, Oshkosh, Wis. 54901

CB RADIO Books, Kits, Modifications, Free Catalog. APS, POB 263PM, Newport, RI 02840

AMATEUR Television Converter Kits. Catalogue: \$2.00 (refundable). NDSOC, Box 12652, Dallas, Texas 75225.

ELECTRONICS

SATELLITE Receivers, LNA's, Antennas - Build And Save - Send Stamp For Details. MATCO Electronics, Box 3168B, Cadillac, MI 49601

GOVERNMENT Surplus receivers, transmitters, snooper-scoopers, parts. Catalog 25c. Meshna, Nahant, Mass. 01908.

BUILD Repair Electronic Devices. Work with over 120 Definitions, Schematics, Formulas. Demonstrates practical Design and Analysis methods. Color 2x3 ft. Electronics Reference Wall Chart \$9.98. Electronics Reference Inc., 318 Bay 11 St., Brooklyn, NY 11228

COMPUTERS

MAKE your computer pay its own way. Sample newsletter \$1. **COMPU-PROFIT**, Box 332PM4, Fairfax Station, VA 22039.

QUALITY SOFTWARE! Discount Price! Personal, Small Business. Information: \$2.00 SASE. Custom Compu Soft, 211 3rd St. SE, Watertown, SD 57201

TRS-80 COMPUTER DISCOUNTS. Lowest prices anywhere. Free price list. Radio Shack, 175B N. Delsea Dr., Vineland, NJ 08360. 800-257-0426.

BASIC programming. Instructional modules provide mathematics based problems for learning personal computer programming. Algebra sufficient. Details, sample module? \$3. CEP, Box 86, Emporia, KS 66801.

TI-99/4A owners. Send for free list of new and exciting low cost software. Dynamic, Box 124, Hicksville, N.Y. 11801

STEREO, CASSETTE TAPES, ETC.

RECORD-TAPES! Discounts to 73%; all labels; no purchase obligations; newsletters; discount dividend certificates; 100% guarantees. Free details. Discount Music Club, 650 Main St., P.O. Box 2000, Dept 1-0583, New Rochelle, New York 10801.

TV-VIDEO EQUIPMENT

NOTICE: USE OF CERTAIN ITEMS IN THIS CLASSIFICATION REQUIRES STATION AUTHORIZATION.

VIDEO MOVIES. Sold. Exchanged. Big catalogs—mail \$5.00. Tower, Dunkirk, MD 20754-0213

ELECTRONIC TV Antenna. This Electronic Miracle Turns Your Ordinary House Wiring System into a Super Power TV. Antenna Brings in every Channel Sharp and Clear. Instructions included. Only \$5.00. J.R. Wheeler Co., 91202, Cleveland, Ohio 44101

PAY TV Amateur TV RECEIVERS. 24 hour movies, specials, sports, etc. **GUARANTEED FINEST** models anywhere. **FREE** Brochure. Janik, 632 West Doran, Suite "A", Glendale, CA 91203. 213-956-5839.

BOATS, OUTBOARDS, TRAILERS & KITS

EVINRUDE 1982 Bargains... all sizes... Scott McCulloch parts... \$2. handling... Electra Marine, 610 Merrick Road, Lynbrook, New York 11563

BOATKITS - PLANS - PATTERNS - FRAMEPACS - LARGEST CATALOG - 300 Designs 8'80" - Plywood - Fiberglass - Steel - Strip Planking - POWERBOATS - Inboards - Outboards - Cruisers - Sportfishers - Hydroplanes - Runabouts (KAYAKS CANOES - Large Selection - Plywood - Fiberglass) - SAILBOATS - Daysailers - Trailersailers - Multihulls - FIBERGLASS MATERIALS - Cloth - Resins - Foam - CATALOG \$2.00 - *Includes FREE Materials Brochure - Equipment - Rigging-sails - (Book "AMATEUR BOATBUILDING" - Fiberglass - Plywood - Wood/Epoxy - \$6.00). CLARKCRAFT, 16P Aqualane, Tonawanda, NY 14150

BOAT PLANS - Frame Kits - Patterns - Hundreds of designs - Wood - Fiberglass - Steel - Powerboats - Sailboats - Outboards - Canoes - Kayaks - Rowboats - Houseboats - Duckboats - Sportfishers. Easy, proven methods include instructions especially for amateurs to assure professional results. No Lifting! "Supplies" - Fasteners - Fiberglass - Resins - Glues - Books - Books. Send \$2.00 for Huge 144-page catalog or \$4.00 Airmail. Includes Free "Boatbuilding Supplies" brochure. **GLEN-L** Marine, 9152 Rosecrans, Box 756MP, Bellflower, CA 90706.

FIBERGLASS - RESINS - Foams - cloth - epoxies - mat - etc. Factory prices - **CATALOGUE** \$1.00 - (Book "COMPLETE FIBERGLASSING" \$6.00) - Clarkcraft, 16-P1 Aqualane, Tonawanda, NY 14150

BOAT KITS - 27 trailerable models - **POWER** and **SAIL** - 8'-30'. Molded fiberglass hulls and decks come factory assembled - you install factory supplied interior. Save half factory-built cost. No experience required. 48-page catalog - \$1.00. Luger, Dept. BC-83, 3800 West Highway 13, Burnsville, Minnesota 55337. 612-890-3000

BOATBUILDER'S PLANS, Patterns - Kayaks, Canoes, Sailboats, Pirogues, Fishing Boats, Duckboats, 40 models. Catalog 25c. Outdoor Sports, Box 871C, Brentwood, TN 37027

BOATERS Combination Trolling Leveling Fins, Fabricate Your Own Drawing \$3.00. James LaViolette, Il Cumberland, Sturgeon Bay, Wis 54235

CAMPING EQUIPMENT AND TENTS

KEROSENE Cookers, 5600BTU, \$24.95, 8900 BTU, \$39.95, Heater. 9500BTU, \$54.95. Satisfaction Guaranteed. API BETA, Inc. 1392 N. Kilian, Lake Park, Fla. 33403.

CATALOG with complete line of delicious, easy-to-prepare, lightweight, freeze-dry, recreational foods. For product/price list, send 25c to: Mountain House, P.O. Box 1066, Albany, OR 97321.

ATHLETIC AND BODY BUILDING COURSES

SECRETS Of Powerful Muscles. Guaranteed. Free Booklet. John Associates, Box 1172, New Braunfels, Texas 78130

BIGGER, More Powerful Muscles - faster!! Free Booklet! Universal, Box 6694A, Detroit, Michigan 48240

KUNG-FU Free Lessons. Send \$1.00 for Postage. McLisa, Box 1755, Dept. PM83E, Honolulu, Hawaii 96806

BATTERIES, GENERATORS

SENTRY Generators With/Without engine. Big discount. JJ Enterprises, Box 693, Oshkosh, WI 54902

BATTERY REBUILDING SCHOOL

TOOLS And Instructions \$326.00. Training available. Tested and proven method. Instructor has 32 years experience. Sun Battery Inc., 10415 U.S. 96, Sebring, FL 33870. (813-655-1314).

ENGINES, MOTORS, MAGNETS

TREMENDOUS DISCOUNTS on Small Engine **TOOLS**, **PARTS**, Accessories, Repair Manuals. Send \$1.00 for 8 page Catalogue. Midland Shop Specialties, Ashland, MO. 65010

REPAIR ELECTRIC MOTORS! **ILLUSTRATED INSTRUCTIONS!** Modequip, Box 7266, Kansas City, Missouri 64113

SMALL ENGINES Large Discounts. Send Stamped Business Envelope To: Engines, Box 166-PM, Ashland, MO. 65010

BUILD 1-hp versatile **AIR COMPRESSOR**. Maximum pressure 125 PSI. Send for Plan PL-1717 + \$5.95 to: **POPULAR MECHANICS**, Box 1014, Radio City Sta., New York, N.Y. 10101

TOOLS FOR SALE

40 PIECE Socket Set SAE & Metric \$12.00 prepaid. Johannsen, 1032 E. Baseline, San Bernardino, CA 92410

DISCOUNT TOOL Catalogue - \$1.00. Hoosier Distributing, 3009 Sample, South Bend, Indiana 46619

COMPLETE LINE of high quality, low-priced **CUTTING TOOLS**, **HOLDING FIXTURES**, **PRECISION INSTRUMENTS** AND **TOOLS**, **TOOL STEEL**, **PORTABLE ELECTRIC- AND AIR-TOOLS**, **HAND TOOLS** AND **MUCH MORE**. Most items delivered free. Send \$4.00 for 368 page 1983 catalog, refundable with first order. **KBC TOOLS**, P.O. Box 343, Sterling Heights, Michigan 48078

HOBIESTS! MINIATURISTS! All Metal Benchtop Power Tools. Send For Catalogue. Jermac Mfg., POB 2785, Springfield, IL 62708

TOOLS, TOOLS, TOOLS Our 152 page tool catalog contains everything from screwdrivers to milling machines, at incredibly low prices. Order our tool catalog for \$3.50, and we will refund \$4 when you order. **IMPARTS, LTD.**, 9330 Manchester Road, St. Louis, MO 63119. Toll-free (800) 325-9043. Mastercard/Visa.

MACHINERY, TOOLS & SUPPLIES

SHOPMATE, POWERHOUSE, MCGRAW EDISON, MANNING BOWMAN, VILLAGE BLACKSMITH electric tool repair parts. Deco Parts Service, Dept. P, 8122 Gravois, St. Louis, MO. 63123 (314)353-4900).

SILVO Hardware, 188 page Hand & Power Tool Catalog \$1.00. Dept PM3-5, 2205 Richmond St., Philadelphia, PA 19125

FREE Industrial Buyers catalog for home craftsman. Buy equipment at same **LOW** prices as large industrial plants. Turnkey, 36PO, Latchworth St, Buffalo, NY 14213

BANDSAW BLADES, Carbide Tipped Saws, Any Size, Free literature. King Saw, 6541 Tidewater Drive, Norfolk, Virginia 23509

1400 Catalogs Listed and Described. Sources for Everything Imaginable. \$4.00. Masterlog, Box 879-B, Fairfax, CA 94930.

SMALL FOUNDRY Furnaces, Supplies. Free literature. Pyramid Products, 3736 South 7th Avenue, Phoenix, Arizona 85041

LATHES —Unimat— Maximat — Sherline Enco. Catalog \$1.00. Shop Supplies \$1.00. Campbell, 2100D Selma Road, Springfield, OH 45505. (513) 322-8562.

STEEL, Aluminum, Brass—Sheet, Bar, Shop Supplies, Plans. Write: CEI, RR1, Box 183, Cameron, IL 61423.

MACHINISTS' aids, ideas, plans. \$5.00 for set. Innovations II, 3725 Auhua St., Honolulu, Hawaii 96816.

SOLVENT PARTS WASHER. Professional Style. Supplies. Kits. Free Literature. Diesel Systems, Box 1273, Arvada, Colo. 80001

BELSAW SHARP-ALL OWNERS - Save over 30% on name-brand wheels, files, belts & parts! Immediate shipment. **FREE CATALOG**. Woodmaster, Dept. H2 H, 2849 Terrace, Kansas City, MO 64108. (800) 821-8651.

BENCHTOP MACHINE TOOLS, Details Free. **NU-DESIGN**, Box 6344, Santa Ana, CA. 92706

BANDSAW MILL, 5-16 H.P., Build \$1000. Plans \$5.00. Literature \$2.00. Sado Constructors, 1397 New London Turnpike, Glastonbury, Conn. 06033

BRASS, Steel, Aluminum, Stainless, Acrylic, Nylon, Teflon. No minimum. Catalog \$1.00 (Refundable). **METALS**, Box 11204, Clayton, MO 63105

4" METAL Cutting Lathe \$83.50. Taig, 15048 Proctor, Industry, CA 91746

EMERGENCY REPAIR KIT Containing Large Assortment Of **HEAT-SHRINK TUBING** Aircraft **WIRE** High Temperature **FIBERGLASS** Insulation And **SILICONE** Tape For Car Appliances Solar, Instructions \$5.85. Flexsystems, Box 128, Harleysville, PA 19438

UPHOLSTERY, SEWING MACHINES

UPHOLSTERY Sewing Machines with Walking Feet, complete ready to use—only \$459.00. Thompson Model PW103-AGBP **AVAILABLE FROM YOUR LOCAL DEALER**, or order direct. (Master Charge-Visa). Datho Mfg., Inc., P.O. Box 12110, Lubbock, Texas 79452—Phone: (806) 744-8774

BLACKSMITH SUPPLIES

FORGES: gas, coal — hammers — tongs — anvils — anvil benches—all blacksmith supplies. Catalog \$2.00 (refunded first order) Mankel Blacksmith Shop, 7836 Cannonsburg, Cannonsburg, MI 49317.

WELDING, SOLDERING, PLATING

WELDING AND SAFETY: Everything to fit the Welders needs - major brands, at discount prices. Catalog \$1.00. City Welders Supply, 321 E. Highway 20, Michigan City, IN 46360.

ENERGY SAVING

HOW to save your home energy 225 ways. \$5.95, money back guarantee, save many times purchase price. Advanced Distributing, Box 1735PM, Salt Lake City, UT 84101.

CEILING FANS FAMOUS NAME BRANDS at wholesale. Catalog \$1 Write: Fans, P.O. Box 1311, Bonita Springs, Florida 33923.

SOLAR & ALTERNATE ENERGY

SOLAR CELLS .4V 4" diameter 1.5 amps \$5.25 each, 10 for \$50.00. 1.8 to 2 amps \$8.75 each plus shipping. Kenneth Foster, 1742 Dowd, St. Louis, Missouri 63136. 314-522-6667.

SOLAR AND ENERGY SAVING PRODUCTS CATALOG! Materials; Components; Complete System. 80 Pages, 18 Sections. Our 10th year! Order from one expert source—the country's largest energy saving mail order house! Call us at 603-666-8186 or send \$1.00 ppd. **SOLAR COMPONENTS CORPORATION**, Dept. M, P.O. Box 237, Manchester, NH 03105

SOLAR Kits, Windmill, Oil Pumper, Train, Helicopter, Bi-Plane, All Materials Needed Are Included Only \$24.95 ppd. or Write for Further Information. M and W Sales, P.O. Box 3-597, Dept. PM, Anchorage, AK 99501

SAVE Fuel Dollars - Solar Handbook Tells How - Satisfaction Guaranteed - \$10.95. Kriscott's, 603 Walnut, Crossett, AR 71635

HYDROGEN FUEL! Complete Electrolyzer and Auto Conversion Plans. Plus information on Safe Storage and Generating Hydrogen Free. Complete Package: \$10.00. RDA, Box 873, Concord, NC 28025

TRIPLE - glazed 10'x16' attached solar greenhouse. \$2000 complete. LESA - info. (\$1) - plans (\$10). FHAP, Box 122A, Sugar Grove, PA. 16350

WIND Generator, build your own for about \$300. Free information. Send 25¢ to cover postage: Wind Energy, PM, P.O. Box 841, Paradise, CA 95969

HOME HEATING, FUEL SAVERS

"LOG SPLITTER PLANS"

15 TON Push, 2 Speed Hydraulic, High Speed Running Gear, Professional Quality, \$10.00. Tangent Designs, Box 572, Pottstown, PA. 19464.

HOME CRAFTSMAN

SOLAR Hot Dog Cooker. Plans \$2.00. Box 8372-P, Ogden, Utah 84409

35 WOODEN TOY PATTERNS - Easy, Profitable - Cars, Trucks, Train, Airplanes, Earthmovers - \$5.00 - **FRANKS**, 1202P7 Second, Booneville, MS 38829

FREE catalog!...Veneers, wood toy parts/plans, lumber, books, furniture plans, cane, upholstery, Victorian hardware. Simplified veneering instructions included. Morgan, P01M01, 1123 Bardstown, Louisville, Kentucky 40204.

LARGE Selection of Plans. Furniture Designs, Loom, Spinning Wheel, Clocks, Dollhouses, Cradles, Toys, Alphabets, Bird Houses, Weather-vanes, Kites and More. Catalog 50¢. Craftplans Co., Rogers, Minnesota 55374

ANCIENT AEOLIAN WIND HARPS highly profitable. Easy to make. Increasing demand. Plans, instructions, markets, \$3.00. Lewis, Box 847, Simcoe, Ontario, Canada. N3Y 5B3.

BUILD GARDEN TRACTOR from used auto parts. Illustrated guide, \$7.00. Rock Creek Publishing, Dept. A1, Box 9812, Fresno, CA 93794.

OVER 75 PATTERNS! Enjoy making profitable wooden gifts, toys, household accessories. **PLUS** "Shop Secrets". Only \$5.00. Accents (P-53), Box 262, Danvers, MA 01923

UNFINISHED picture frame moulding. Factory closeout. 50% discount. 200 styles. Write: Japs, 126-PF Seventh North, Hopkins, MN 55343

MAKE TOYS- Plans, Kits- Hardwood Wheels, Parts, Dolls- Catalog \$1.00- Cherry Tree Toys, Belmont, Ohio 43718.

PLANS & Supplies for toys, clocks, furniture and accessories. Catalog \$1.00. Armor Products, Box 290, Dept. CT., Deer Park, NY 11729

WOODEN Toys Are Better. List Of Plans \$1.00 U.S. Currency Only. Woodbutchers Toys, Box 514, Leslie, Mich. 49251

CHANGE Color Of Vinyl Or Leather Upholstery. Easy, inexpensive. For information SASE TO: Clausen, P.O. Drawer 140-N, Fords, NJ 08863.

WORLD'S LARGEST CATALOG? Three pounds 704 pages. Every Tool, Supply, Machine Imaginable \$5.00. Refundable. McKilligan, PM-583, Johnson City, New York 13790

BATTERY CLOCK MOVEMENTS. Hands, Hardware, Finest Quality. Discount Prices. Catalog \$1.00. Refundable. Yankee, Box 26, Thompson, Connecticut 06277

WALNUT Lumber cabinet grade. Squares, Gunstock blanks, Veneer. Iowa-Missouri Walnut Co., Dept. M, Station A, Box 86, St. Joseph, MO 64503

FAVORITE WOOD TOYS, Patterns, Parts, Wheels, Catalog \$1. Toys And Joys, Box 628M, Lynden, Wash. 98264

FREE FULL-SIZE BOOKSHELF PATTERN when you send \$1.00 for Gifts/Accessories Pattern list. Wood World, Box 2833, Lake City, FL 32056.

NEW SUPER YARD WAGON, Air-Tired Beauty. Practical, Sturdy, Useful. Use As Work Wagon, or as coaster Wagon, Or Trailer. Kids Love It. Easy To Follow Plans, Materials List, And Sources For Materials—\$4.00 PPD. Designs By Dane, 33 Lorna Drive, Little Rock, AR 72205.

FOLD UP DRAFTING TABLE under \$30.00. Storage Space under 36x24 drawing board top. Folded 36x36x6. Plans \$5.00. Bowen Designs, 614 Warnke Rd., Michigan City, IN 46360

PLANS for concrete brick and block machines. Send \$10.00 to: Roxboro Engineering Ltd., 7080 Alexandra, suite 401 Montréal (Québec) Canada H3S 3J5

WHEELS, Toy Parts, Woodcraft Catalog: \$2.00. Larson Wood Manufacturing, P.O. Box 672PM, Park Rapids, MN. 56470

UNIQUE Durable Plastic Pipe Furniture—10 Plans \$10. Webb Design's, Box 3554B, Albuquerque, NM 87176

WINDMILL Plans For Decorative 9' Steel Pumping Mill. \$5.00. JR Designs, Box 266, Wilmot, WI 53192

MOST unique concept in woodworking projects. **CUSTOM** wall unit furniture plans to **YOUR SIZES** and **STYLE!** New ingenious idea, easy to follow, fun to build. Send \$1.00 for brochure. Custom Furniture Systems, Dept. C, 3901 Kline Ave., Reading, PA 19606.

BUILD UNIQUE TABLETOP SANDER inexpensively! 8" diameter x.4" high **DRUM**. Little construction time required. Plans-material list \$5.00. Goodwin Enterprises, Box 3002B, PM5, San Bernardino, CA 92413.

PLANS: Multi-size furniture; Details: 25¢. Flexiplan-HH, 48 Lowell, Westwood, NJ 07675

KIENZLE Quartz Clock Movements. (Battery operated). From \$4.80. Also accessories. Free price list. North American, Box 77-AEK, Fox River Grove, Illinois 60021.

MAKE Wooden Cradles, Wheelbarrows, Birdfeeders, Toys. Easy - Profitable! Illustrated Catalog - \$1.00 (Refundable). Keepsakes, Box 18733, Shreveport, LA. 71138

WOODEN Toys are Keepsakes! Toys - Rocking Horse - chairs much more. Catalog of Patterns \$1.00, Marco, Box 344584-M, Dallas, TX 75234.

AMAZING NEW TOOL makes painting **EASIER!** Paint Can and Brush Holder plus Opener. Only \$2.95. **FREE** Details. Order Today, Supply Limited. Cowart, Dept. AV53, 27007 Westwood, Spring, TX 77373.

CATALOG FULL-SIZE FURNITURE PLANS — \$2.00. Refunded with first order. Traditional, Early American, over 170! Furniture Designs, 1425 Sherman, Dept. CP-83, Evanston, Illinois 60201.

HEIRLOOM CRADLE: Beautifully Unique, Original Design, Plans \$5.00. Kindercraft, Box 191, Kaysville, Utah 84037

INCREDIBLE TIME MACHINE Venture to the exciting world of real craftsmanship! Build this fascinating timepiece. **FREE** information. Send SASE to: **SAGEWIND**, 773 S. Leyden, Denver, Colorado 80224.

CATALOG FURNITURE PLANS, plus sample plans \$1.00 (Refundable). Country, Contemporary. Sunnywood, Box 82, Norwood, PA 19074

UNIQUE DOLL HAUSE. Build in three hours. Take-apart design. No glue, nails, screws. Sturdy, attractive, inexpensive. Complete instructions, \$3.00. Ochs Enterprises, 1497 East Main, Ashland, OR 97520

SLICE With True Slice - Bread, Meat, Cheese, Build for Home or Sale. Plans \$3.00 Plus SASE. Kit \$8.00 plus \$2.00 Shipping and handling. Sportsman, P.O. Box 1574, Branson, MO 65616

BUILD IT YOURSELF --- Picnic Tables and Patio Furniture Plans --- Free Information. Han-D-Crafters, 12220-S4 Millhouse Court, Chesterfield, VA. 23832

WOODWORKERS, unique **RINGMASTER** creates hollow cylindrical projects (lamps, bowls, etc.) easily, repeatably. **PROFITABLY!** Dealerships also available. Brochure \$1.00. Ringmaster, Box 8527A, Orlando, FL 32856.

DUTCH WINDMILL Plans-Garden Decoration - 5' high. Send \$2.00 for Catalogue. Dutch Mills, Box 5838, Santa Barbara, CA 93108

CONSTRUCTION PLANS, BLUEPRINTS

HOW TO BUILD A BACKYARD BARN. New! Easy to follow plans. \$6.95 to: L'I Barns, Box 387-M15, Hartford City, IN. 47348

HOME BUILDING & REMODELING

FIRST TIME OFFERED. Detailed instructions to Build and Finance your own home. Also ways to acquire Real Estate. Send \$4.00 and save thousands. Satisfaction Guaranteed. Hendricks House, R3 Dept. 282PM, Spencer, IN 47460

OWN A NEW HOME in six months or less and save 40% of its cost! Free information. Housing, Box 744, Oregon City, Oregon 97045

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. 83E/PM, Box 391, Woodstock, IL 60098.

SHRINK TUBING-All sizes, Many colors. Wholesale Prices. Free Price List. Quality Manufacturing, P.O. Box 3085, La Mesa, Calif. 92041

AIR CONDITIONING

BEST AIR CONDITIONING AND HEATING Text and Reference Book Available, Twenty-Four Chapters, Over 1000 Pages of Valuable Information. Many Illustrations. \$32.50. Shanco Supply Co., Box 590212, Houston, Texas 77259-0212

HEAT PUMPS, CONDENSERS, EVAPORATORS, FURNACES, ETC. at Huge Discounts. Do It Yourself and Save Hundreds or Even Thousands of Dollars. Major Brands. Latest High Efficiency Equipment. Catalogue \$3.50. Shanco Supply Co., Box 590212, Houston, Texas 77259-0212

GEO THERMAL AIR-CONDITIONING. 10 times more efficient than electric. Complete plans, custom engineered. \$69.95. Geothermal Energy Associates, P.O. Box 32, Dept. 261, Maywood, N.J. 07607

EASY Service Manual \$5. Blue Publications, 1631 Calle Concordia, Tucson, 85704

HOW TO BUILD IN-A-ROOM AIR CONDITIONER. PM's Steps will show you how. A photocopy of this article is available Send for Plan RS-86 + \$1.00 to: Popular Mechanics, Box 1014, Radio City Station, New York, NY 10101

DO-IT-YOURSELF

CHROME ELECTROPLATING Without Equipment with **CHROME-TONE PLATING KIT!** Results: Bright, Durable, Rustproof \$15.95 Ppd. Judsonco, 321Z Charles, Cherokee, Iowa 51012

CESSPOOLS, Septic Tanks, Sewerage Systems. Back-up? Overflow? Slow Drainage? Don't snake, pump, or dig! Remedies. Preventive Maintenance. Get facts and save. Free Details. **SPINCO**, 365A West Franklin Avenue, West Berlin, N.J. 08091.

PROJECTION TV . . . Convert your TV to project 7 Foot picture . . . Results Comparable to \$2,500 projector . . . Total cost less than \$20.00 . . . **PLANS & LENS** \$17.50 . . . Illustrated Information **FREE** . . . Macrocombi, Washington Crossing, Pennsylvania 18977 Creditcard Orders 24Hrs. 1-215-736-3979.

UPHOLSTERING SUPPLIES \$1.00 for Prices. Variety Products, Box 566P, Lathrup Village, Mich. 48076-0566

REPAIR DAMAGED CONCRETE FLOORS, SIDEWALKS, DRIVEWAYS. Inexpensive ordinary materials available local suppliers. Booklet describing procedures \$4.00. **INFOSERV**, 11058 Westridge Rd., Elyria, OH. 44035

BELTSANDER-SAVE. Make your own. Write for details. Kathon Inc., 4801 Hunter Trail, Chattanooga, Tennessee 37415.

COMPLETE In-Ground Swimming Pool Kits From \$1595.00. Complete Acrylic Spas From \$1995.00. Free Brochure And Price Lists. Burnett, 4601 Bunkerhill, North Little Rock, Arkansas 72116

SURVIVE!!! — Three Dozen Controversial Survival Publications — Energy, Banking, Firearms, Medical. "AUTOMATIC TELLER MACHINES" (\$20.00), "GAS FO' ALL!" (\$16.00), "SURVIVAL GUNS & AMMO!" (\$16.00), . . . Super-Survival Brochure (\$1.00). **INTERVIEWED BY CBS "60 MINUTES"**. **WILLIAMS, MSEE**, P.O. Drawer 537M, Alamogordo, NM 88310

PLANTER Boxes, 10 Plans \$5.00. Ashmore, Box 771, Grass Valley, CA 95945

NEW! . . . REPAIR ANY TV . . . EASY. Write: Research, Box 517X, Brea, CA 92621

ELECTROPLATING. Complete amateur's textbook. All metals Electroplate metallic/nonmetallic items \$11.95. Details free. Tropic, Box 95-P4, Palm Bay, Florida 32905.

(Continued on next page)

DO-IT-YOURSELF

(Continued from preceding page)

1400 Catalogs Listed and Described. Sources for Everything Imaginable \$4.00. Masterlog, Box 879-F, Fairfax, CA 94930.

SAVE on parts for Lawnmowers, minibikes, Karts, Chainsaws, Small Engines. **THOUSANDS OF PARTS.** Send \$3.00 For Catalog. Sav-On-Parts, P.O. Box 231, Somerville, Mass. 02145

WATERBEDS! Plan And Accessory Catalogue \$1.00. Waterbeds, 1210A "Z" Street, Vancouver, Washington 98661

SILVER, Dead Batteries Contain It: You Can Reclaim It. \$5.00. Goldbond Ltd., Box 10669, Pittsburgh, PA. 15235

LEARN GLASS ETCHING Complete starter kit \$4.95/ppd. Guaranteed! Eastern Art Glass, Greenwood Ave., Box 341, Wyckoff, NJ 07481

HOW TO GO INTO BUSINESS AND SUCCEED. Free Literature, Write: PRS, Box 3145, Lavale, MD 21502

CARPENTERS! Flush nailing tool eliminates hammer tracks on finish work. Fits all finish nails. Send \$3 to: Blue Chip Enterprises, P.O. Box 699, Cannon Beach, Or. 97110

POTTERY KILNS, inexpensive, propane, plans \$5.00. Box 7497, Winter Haven, Florida 33883

RESILVER MIRRORS Easy Step By Step Instructions Send \$2.00. P.O. Box 2791, Olympia, Washington 98507

EASILY APPLIED LIFETIME LIQUID ROOFING. MECCO, 1664 Tchoupitoulas, New Orleans, 70130

BUILD YOUR OWN PVC pipe furniture, chair, chaise, end table, plans \$4.00. Creative Sales, Box 247M, South Milwaukee, WI. 53172

2"x4" FURNITURE. PRACTICAL, PROFITABLE AND FUN. Six Projects. 41 Page Manual. Photos And Instructions \$9.50, Illinois Residents \$9.98. A. B. L. Distributors, P.M., P.O. Box 1152, Jacksonville, Ill. 62651

SHOOTING gallery. Easily built. Table-size. Unique. **MOVING** targets rest **AUTOMATICALLY!** Indoors, outdoors. Copyrighted plans \$5.00. Guaranteed. Halmar, Box 86, Homestead, FL 33030

UTILITY Trailers: Build with inexpensive, used parts. Instruction, Diagrams - \$6. Trailers, P.O. Box 314, Chicopee, MA 01014

CEDAR PLANTERS, Hanging And Freestanding, Easily Assembled By Anyone, Inexpensive, Beautiful And Durable. SASE. Planters, Box M166, Cashmere, WA. 98815

TRIM Your Hair with **TRIMO,** Have Always Fresh Look - Neat Kept Hair. Holds Split Ends and Excess Length Tight for Snipping. \$5.95. Vanox Products, 106 Russell Avenue, Watertown, MA 02172.

HOMEOWNERS GUIDE TO PLUMBING step by step instructions, Diagrams, Photographs save on plumbing bills \$4.95. Carmie's, 1750 13th Ave. SW, Hickory, N.C. 28601

SCROLL SAW build from easy plans. Send \$4.95 to: Plans, Box 35, Indianola, Iowa 50125

TELEPHONE OWNERS MANUAL - Deregulation, Testing, Repair \$4.00. Hoss, 1020C E. Los Altos, Fresno, CA 93710

BUY ANYTHING BY MAIL!! 1600 catalogs on every subject imaginable. Directory \$4.00. Catalogs Galore, 7914-F Springfield Village, Springfield, VA 22152.

CHAIR CANING SUPPLIES - Cane Webbing, Rush, Splint, Rawhide, Cord Embossed Seats. Catalog \$1.00. (Refundable). The Caning Shop, 926 Gilman (PM), Berkeley, CA 94710

POOR Mans Energy Plans. . . . Wind . . . Wood . . . Solar. 5 for \$2.50. Solar Woodwinds, 452 Peninsula, Westwood, CA 96137.

AMAZING Plow Resistant Mail Post. Free Brochure. Write: Swingaway, Box 57, Mineola, New York 13116

CROSSBOW PISTOL. No Toy. Easy Home Construction. Plans \$3.00. Robert Silk, 835 Fahs St., York, Penna. 17404

PVC TYPE FURNITURE. The Moneymaking Opportunity For Prints And Prices. Send \$3.00 To: Easy Living Furniture, Box 238, Thorwood, NY 10594

"**LEARN**" How to get a professional looking refinish job on quality wood furniture. For easy to follow instructions, send \$2.98 to: "Refinishing", Box 2123, West Lafayette, IN 47906. "Thirty years experience".

MAKE GOOD LUMBER: Easily with Chain Saw. Free Brochure. Boyce Industries, 406 South Chester, Gastonia, NE 28052

MASTER TECHNICIAN SHOWS you how to **REPAIR** and **SERVICE AIR-CONDITIONING, REFRIGERATORS.** Simple, illustrated manual. **ORDER TODAY! MONEYBACK GUARANTEE.** \$10.00. Doves Inc., Box 771 B., Hammond, LA 70404

GOLFER'S; Backyard Driving Range. Build For Yourself, Sell For Profit. Every Golfer A Prospect. Plans \$5.00. Larson, Box 2354, Stn. R., Kelowna, B.C. V1X 6A5

ARTS & CRAFTS

"**GETTING** Started in Stained Glass" \$1.00. Whittmore, Box 2065T, Hanover, Mass. 02339.

CRAFT Jewelry Supplies. (Wholesale Catalog .25c). Roussels, 107-1630 Dow, Arlington, MA 02174

STAINED GLASS SUPPLIES Complete Catalog \$1.50 (refundable). Sunshine Glassworks, 785 Millersport, Dept. CT, Amherst, NY 14226

STAINED GLASS Catalogue-P. \$1.00. Supplies, Kits, Books, Tools, Glass. Saylescrafts, 171 Main, Nyack, N.Y. 10960

LEATHERCRAFT Supplies. Catalog \$1.00 (refundable). Craftet, 1909 75N, Sherman, TX 75090.

LEATHERCRAFT Catalog. Tools, Leather, Dyes, Dressings, Saddle Stamps, Buckles much more. Send \$2.00 (refundable with order) to: MacPherson Bros., P.O. Box 99442, San Francisco, Calif. 94109

101 Helpful Hints on Macrame Send \$3.00 To: Helpful Hints, Box 41216AA, Atlanta, GA 30331

WOODWORKERS - IDEAL GRADUATION GIFT. Instructions and patterns for making, playing, solving seven beautiful, handcrafted Pegman puzzle-games. \$5.00. Ellis Enterprises, P.O. Box 934, New Paltz, N.Y. 12561

CARTOONING, COMMERCIAL ARTS, SIGN PAINTING

MODERN Cartooning taught by mail. Write for free brochure. Cartoonerama—Box 263-3Q, Branford, Conn. 06405.

SIGN Painting — Easy method. Free catalogue. Kaufmann Company, Centertown, Missouri 65023

CARTOON for Fun and Money!!! Free booklet!!! Cartoons, Box 40614A, Detroit, Michigan 48240

35 LESSON cartooning course. Cartoonist's Magazine, both \$4.00. Hartman, Box 30367, Lincoln, Nebraska 68503-0367

LEARN Sign Painting! Highly Profitable! One-Stroke Technique! Write: Eureka Press, Box 931, Fitzgerald, Georgia 31750.

MODELS-CARS, SHIPS, TRAINS, PLANES ETC.

FIRING CIVIL WAR Model **CANNON** Plans: Catalog free. Green—PM-53, Box 892, Shalimar, Fla. 32579

BLIMPS 11 foot radio-controlled kits. Catalog \$1.00. Peck-Polymers, Box 2498-P, La Mesa, California 92041

RADIO CONTROL- Airplanes, Boats, Helicopters. Supplies. Big Discount Catalog \$5.00 (Refundable). Modelers Supply, Box 7185, Montgomery, AL 36107.

KITES, GAMES, PUZZLES, NOVELTIES

BOOMERANGS FROM AUSTRALIA. The Real Thing! Simple Instructions—Fun For Everybody! Only US \$9.85. Outback, P.O. Box 52, Stanley, Tasmania 7331, AUSTRALIA

MAGIC TRICKS, JOKES, VENTRILOQUISM

FREE! World's Leading Novelty Catalog. 1600 Jokes, Tricks, Science, Sports, Hobbies. Johnson-Smith, C-6013, Mt. Clemens, MI 48043

FREE! Illustrated Ventriloquism/Puppetry Catalog. Maher, Box 420PM, Littleton, Colorado 80160

"**BLIMEY.**" mystifying, know the unspoken. Card set \$3.50. Enkay Enterprises, P.O. Box 321, Englewood, Colorado. 80151.

200 Great Jokes, \$4.00. Jokes, 564 Raymond Drive, Sierra Vista, Arizona. 85635

HOBBIES AND COLLECTIONS

TIC-TOCK PAPER CLOCK Unique Clock Kit For All Ages \$14.95. **CRIFE,** 209 Viking, Brea, Calif. 92621

MILITARY Medals Catalogue 50c. Yearly Subscription \$4.50. Vernon, Box 387PM, Baldwin, NY 11510.

NAZI war souvenirs. **FREE** illustrated catalog. Delta, Box 31224PS, Honolulu, Hawaii 96820

WWII Warbirds, Underwater Photos, Lake Michigan \$10.00. National, Box 50347, Cicero, IL. 60650

TOY SOLDIER MOLDS. Make military, chess, medieval figures. Profitable - fun! Free information. Castings, P.O. Box 3482-PM, Longwood, FL 32750.

DECALS, EMBLEMS, PATCHES

PATCHES, Decals, Custom Made. Free Catalog - Emblems, Box 35, Tappan, New York 10983

SAVE Big. Buy Patches, Decals, Pins & Caps Factory Direct. Free Catalog, Free Pricing. Eastern Emblem Co., Box 828-PM, Union City, N.J. 07087

EMBROIDERED EMBLEMS - your design. Low minimum. Free brochure with prices. Southern Emblem, Box 8P, Toast, NC 27049

CUSTOM-Made Cloisonnes, Decals, Patches, Airmail Your Design, Quantity To: Shayes Emblems Service, P.O. Box 43-96, Taipei, Taiwan.

ANTIQUES, RELICS, INDIAN GOODS AND CURIOS

FREE List to Serious Collectors. 30,000 Indian Artifacts, Pots, Spears, Axes, Slate, Beadwork. Caddo Trading, Box 668, Murfreesboro, AR 71958

STAMP COLLECTING

50 YEARS Old fifteen different United States, over fifty years old—25c with approvals. Jaxon, Box C11-P, New Rochelle, New York 10804

SEND Only 25c for nice collection of U.S. Stamps including \$5.00 issue and scarce mint Sipex Souvenir Sheet. Attractive price lists of other beautiful stamps and collectors supplies included. Mystic Stamps, SS-1, Camden, New York 13316

FREE! Big Bargain Catalog - New Edition listing thousands of bargains including U.S. & B.N.A. stamps, packets, albums, accessories and supplies. Also fine stamps from our approval service. Buy only what you like. Return balance promptly. Thank you: Jamestown Stamp Co., Dept. E53PM, Jamestown, NY 14701

U.S. 25 Different mint including Souvenir Sheet \$1.00. **Free list.** Brooks, Box 62, Brooklyn, NY 11229

50 MINT or 200 used all different US \$1.00 approvals. Stamps, Box 1427PM, Bellflower, CA 90706

"**WHOLESALE**" U.S.—Foreign Pricelist and catalog Free! Everything Guaranteed. Schneider, Box 1240, Grand Rapids, Michigan 49501

FREE Gift With Quality Approvals. Chapmans, Box 487-G, Galesburg, Michigan 49053

GREAT Gift free with 1st purchase—fine United States approvals and want list service. Send .15c for handling. The Stamp Boutique, P.O. Box 456, Madison, NJ 07940

BREATHTAKING Beautiful. 50 Different mint Monaco pictorials commemoratives only \$1.50 with mint complete set approvals. Pagoda, Box 132P, Sidney, Ohio 45365.

PENNY! Approvals! Regardless catalogue! Kloster, 4164 52nd St., San Diego, Calif. 92105.

UNITED NATIONS 3 Complete Mint Sets 25c. Approvals. Cornetta, POB 1509-M, Lake Placid, Florida, 33852

50 DIFFERENT Old U.S. between 1861 and 1839 - \$1.00. Ed Roush, 423 Shepard, Mansfield, Ohio 44907.

OLD U.S. Stamps on Approval. Chester, Box 15355G, Philadelphia, PA 19111.

WORLD Wide Stamps mounted in books on approval 2c and up. **TRUST STAMP COMPANY,** P.O. Box 100-P, Jamaica, N.Y. 11435

FREE Surprise collection sent with approvals. Gould, 1784 Union, San Francisco, 94123.

100 Different U.S. 25c. Approvals. Bradley, Box 425P, Midlothian, VA 23113

BARGAIN 100 World-wide Stamps 25c. Quality Approvals. R. Parker, Box 143, West Brookfield, MA 01585

2,000,000 Stamps—150 Countries—2c Each. Belden, Box 4149, Dearborn, 48126

STUNNING! 100 BEAUTIFUL MINT PICTORIALS. All Different Only 25 Cents with Attractive Worldwide Approvals. **VANSTAM,** Dept. PM-583, P.O. Box 11272, Chicago, Illinois 60611

"**INVERTED ERROR**" + 100 Different United States, 50c with approvals. Luray, P.O. Box 7088, Silver Spring, MD 20907

50 TOPICALS 25c when requesting low priced approvals. Stewart Kent, Box 2398-H, Bellingham, WA 98227

PENNY Approvals. 1 - 2 - 3c. CK Stamps, 17902 Marklee Drive, Jamul, CA 92035

(Continued on next page)

STAMP COLLECTING

(Continued from preceding page)

FREE 100 Canada with request of World Wide Approvals. Briner's, P.O. Box 5607, San Mateo, Calif. 94402

FREE - U. S. Discant Catalogue. Shelton, Box 547B, North Miami, Fla. 33161.

ABSOLUTELY FREE- 50 different British Colonies **COMMEMORATIVES**. Approvals. Gobestamps, Box 690, Saco, ME 04072

COMPLETE set **FREE** when requesting worldwide approvals. Benat, P.O. Box 210244, Dallas, Texas, 75211

ISRAEL 15 Different 10c Approvals. Sam Chazen, Box 666, Delray Beach, Florida 33444

100 different, Foreign British Colonies 10c Plus Bargain Approvals. City Stamp Co., Box 216, Station "W", Toronto, Canada M6M 4Z2

CANADA Ten Late Commemoratives 10c Canadian Approvals. Harley Boardman, Little Valley, New York 14755

300 Different Worldwide Stamps 30c With Approvals. R.G. Sales, Box 1065, Jamaica, N.Y. 11431

75 WORLD WIDE STAMPS 50c Approvals. **EMERSON ENTERPRISES**, P.O. Box 937, New Britain, CT. 06050

FREE 1982 Disney Issue. Request Approvals. Alpaugh, Box 225, Highbridge, NJ 08829

200 Different Poland, Plus Beginner's Approvals, \$2.00. Fies, Box 155P, Baltimore, Ohio 43105.

35 DIFFERENT Old U.S. Revenue Stamps \$1.00. Winchester Stamps, Box 3592, Mansfield, Ohio 44907

200 Different Worldwide 25c. Quality Approvals. **LASHER**, Box 1443, Youngstown, Ohio 44501.

U.S. Stamp collectors regard **LOWELL P. DONALD** Company as **THE** source for better issues prior to year 1940. **BELOW WHOLESALE PRICES!** Send 20c for complete price list. Box 728, Rutland, Vermont 05701

MONEY Made In Stamp Collecting! Guide Shows How To Begin, Where To Buy, Sell. Send \$2.50 And \$1.00 PH To: Richdale Co., Dept PM1, 70 N. Central Ave., Ramsey, N.J. 07448. Satisfaction Guaranteed.

FREE U.S. Mint Set. Approvals. Hildebrand, Box 4867, Santa Clara, California 95054

U.S. 6 Commemorative plate blocks. \$1.00! Approvals. Gordon Davison, Contocook, NH 03229

COINS, TOKENS, CURRENCY

FREE: Worldwide Listing of Beautiful Collectors Currency. Tom Knebl, P.O.D. 3949, San Bernardino, Calif. 92413

PHOTOS & PHOTO SUPPLIES

GET THE MOST FROM YOUR CAMERA "20 Hints For Better Pictures" Send \$1.00 To: Johnson's Photo Co., P.O. Box 402, Davison, Michigan 48423

BARGAIN BOOK: Send 25c credited on \$5.00 order. **CENTRAL CAMERA CO.**, Dept. #3243, 230 So. Wabash Ave., Chicago, Ill. 60604; **PHOTOGRAPHIC HEADQUARTERS SINCE 1899.**

HOW TO COLOR AND PHOTO IMAGE METALS. Free Details. SASE. Miller, Box 7625H, St. Paul, Minn. 55119

BOOKS & PUBLICATIONS

CHART YOUR OWN FINANCIAL GOALS. Write: Grinland Enterprises, P.O. Box 13400, San Antonio, Texas 78213.

"**HOW** to Save on Postage Stamps." Free Details. Enolci, 5201/2d So. Berendo, Los Angeles, CA 90020

PUBLISHERS' OVERSTOCKS, BARGAIN BOOKS, 2,000 Titles, all Subjects! Free Catalog: Hamilton's, 98-51 Clapboard, Danbury, CT 06810

OUT-Of-Print Books Found. Send Wants. Booklook, 51 Maple Ave., Warwick, N.Y. 10990

1172 How to Build Your Own Underground House. 256 Pages, 128 Illustrations. Hardback \$11.95. Paperback \$6.95. Postage \$1.00. Broadway Technical Book Co., 1186 Broadway, New York, NY 10001

RAILROAD Lingo and other outrageous Language \$10.00 Postpaid. Martichia's, Box 18133, Ft. Worth, Texas 76118

LANDLORDS: Become more profitable. \$2.00. C.A. King, 2505 Topaz Drive, Boulder, Colorado, 80302.

HELP Yourself To Employment \$2.00. Box 4123, Riverside, 92504. CA. Tax Included.

WHOLESALE BOOKS- Directory of Sources. \$3.00. Bush House, Box 111, Drexel Hill, PA 19026.

DON'T GET STUNG! New publication explains the latest cons, schemes, scams, bunco, fraud. How they work; how to avoid them. Sample issue \$1. Sting Report, P.O. Box 1308, Point Pleasant, NJ 08742.

CAUSE OF CANCER And how to Prevent It. New Exciting Thought Provoking Theory by George R. Gantt Jr. Send \$3.50 to: Cause of Cancer, Box 120007, Arlington, Texas 76012. Satisfaction Guaranteed.

POPULAR MECHANICS "PLANS AND IDEAS" CATALOG #1700 — Over 900 ideas on workshop projects, plans for shop tools, storage houses, boats, furniture, toys — just about everything! Send \$1.00 to: **POPULAR MECHANICS P.O. BOX 1014, RADIO CITY STA., NEW YORK, N.Y. 10101**

PLAYS, SONGS, MANUSCRIPTS

POEMS, Songs Wanted. Free Recording/Publishing. Broadway Music Productions, Box 7438PM, Sarasota, FL 33578

MUSIC INSTRUCTIONS & INSTRUMENTS

FREE Catalog! Kits and Completed. Harpsichords, Hammered and Appalachian dulcimers, guitars, banjos, mandolins. Hughes Dulcimers, 4419 West Colfax, PM, Denver, Colo. 80204.

POEMS Set To Music. Nashville Music Productions, Box 40001-PM, Nashville, Tennessee 37204.

PIANOS, PLAYERS, PUMP ORGANS. Rebuild and repair. Catalog of "How-To" books, \$2.00 (refundable). Vestal Press, Vestal 11, New York 13850.

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, NY 10011

CATALOG for makers, repairers of stringed instruments. Imported tonewood, tools, parts, accessories, strings, cases. Fine European instruments and bows. Catalog \$1.00, includes 10% discount certificate. International Violin Company, Ltd., Dept. FQ, 4026 W. Belvedere Ave., Baltimore, Md. 21215.

AMAZE Your Friends! Transpose Instantly! Name Notes Any Chord in Seconds! Great New Harmony System. \$6.00 only. Rosefani Music, Box 172, Str. "O", Toronto, Canada M4B 2B0

VIOLIN, Guitar, Banjo, Mandolin Making Materials. Accessories, Books, Piano Tuning Kits, Catalog \$1.00. International Luthiers Supply, Box 15444, Tulsa, OK 74112

ELECTRIFY Player Pianos, Pump Organs Quickly. Inexpensively with Lee Silent Suction Units. Write: Lee Music, P.O. Box 308F, Culver, Oregon 97734

TUNE YOUR GUITAR like a professional. New "Vu-Pitch" Tuner with 6 precision reeds makes accurate tuning simple. Send \$10.95. JRP Enterprises, Rm. 3A, 5201 Clarendon Rd, Brooklyn, N.Y. 11203

SELF-IMPROVEMENT

FREE Interesting Catalog. Self improvement books. See Jay Gilts, 95 Heights Lane, Box 358-M5, Feasterville, PA 19047

EDUCATION & INSTRUCTIONS

WELDING TRAINING. Basic and Advanced for Major Processes—SMAW, GMAW, FCAW, GTAW, OAW, Pipe all processes. A non-profit school. Approved for eligible veterans. Accredited member NATTS. Approved Ohio 70-12-0064 HT. Write for school bulletin and course schedule. **HOBART SCHOOL OF WELDING TECHNOLOGY**, Box 83, Troy, Ohio 45373.

HELPED: Acts 8:17; Gal. 5:22; John 14:23. 1127 NE Fifth St., Ocala, FL 32670

PIANO TUNING PAYS - Piano tuning - Electronic organ servicing. Learned easily at home. Free booklet. Niles Bryant School, P.O. Box 20153, Sacramento, CA 95820

"**JET/GAS TURBINE CAREERS!**" Homestudy courses — theory, maintenance, overhaul — Established 1957. **AMERICAN JET SCHOOL**, Department PM-3, Darby, Montana 59829. (406) 349-2100

REISCH WORLD WIDE COLLEGE OF AUCTIONEERING, INC. World's Largest-48 Years. Term soon. Free Catalog. Approved for VA. Modern Auction Library "FREE" with enrollment. 515-423-5242 - Col. Gordon E. Taylor, P O Box 949, Dept. 19, Mason City, IA 50401

UNIVERSITY DEGREES BY MAIL Programs! Bachelors, Masters, Ph.D.'s . . . Free revealing details. Counseling, Box 317-PMS, Tustin, California 92680.

EXTENSION And Post-Graduate Awards in Philosophy, Art, Science, Botanic, Medicine, Homeopathy, Radionics, and others. 30 subjects Curricular free (airmail \$1.00 refundable). Registrar, Sussex College of Technology, Highfield, Daneshill, Sussex, England.

RADIESTHESIA, Radionics, Dowsing E.S.P. Courses and Equipment Illustrated Catalog \$1.00 (refundable) Established 27 years. Dept. PM/R, Bruce Copen, Highfield, Daneshill, Sussex, England RH17 7EX.

LEARN Asleep or awake. Records, tapes, equipment! Free catalog! Drawer PM-400, Rudoso, New Mexico 88345

AUTOSUGGESTION. Sleep-learning headquarters! Tapes, records, books. Gigantic catalog free. Research Association, Box 24PM, Olympia, Washington 98501.

DETECTIVE Profession, Easy home study; free tie-tack or lapel pin, certificate, future. Professional investigators Training School, Dept. CP, P.O. Box 41256, Los Angeles, CA 90041

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.

LEARN Sewing Machine repairing. A profitable Trade. Easy to learn. Free details. Sewing Center, 187 FR, Rochelle, GA 31079.

USED Courses! Books! Lists 25c. Smith's, 124 Marlborough, Salem, Massachusetts 01970

UNIVERSITY DEGREES BY SPECIAL EVALUATION OF EXISTING Job Experience, Education, Achievement. Fast, Inexpensive. Call (614-863-1791). Or Write: Box 13151-T5, Columbus, OH 43213

HIGH School at home, no classes. Diploma awarded Information Free, Phone Free Anytime 1-800-228-5600, or write: American School, Dept 30545, 850 E. 58th St., Chicago, IL 60637.

HANDLE YOUR OWN LEGAL AFFAIRS. Be a Paralegal. Accredited Attorney Instruction. Home Study. Free Catalog. Southern Career Institute, Drawer 53B-2158, Boca Raton, Florida 33427. (305) 368-2522.

COLLEGE DEGREES By Mail. Accredited Bachelors, Masters, Ph.D.'s. Free Facts Revealed. Careers-PM5, Box 45886, Tulsa, OK 74145.

FREE CATALOG—LEARN AUCTIONEERING! Full and partial scholarships available. Nashville Auction School, 233 E. Gaines St., Box 190, Department 2, Lawrenceburg, TN 38484

FREE 120 page Career Opportunities Guide - shows how to train at home for top paying jobs. Granton Institute, 263A Adelaide Street West, Toronto, Canada M5H 1Y3.

ACCREDITED College Degrees By Mail. Details. **GRADUATE REFERRAL SERVICE**, 3010 Santa Monica Blvd., Suite 173-PM, Santa Monica, CA 90404

PREPARE to better handle your business, political and social opportunities. The Blackstone School of Law has met the law training demand for almost a century. Information: 307 No. Michigan Ave., Chicago, IL 60601

PRIVATE DETECTIVE or FINGERPRINT TECHNICIAN training. Learn at home quickly and easily. Audio/visual aids, detective kits, badge, Diploma. Free Information. **GLOBAL SECURITY**, Box 191PM, Hanover, Mass 02339

MATH BASICS: Help your child practice Addition/carrying or Subtraction/borrowing. 50 page workbooks, answers, \$5.00 each: EM Lamb, 3360 Lincoln, Carlsbad, CA. 92008

DON'T DIE WITHOUT A WILL. Write your own. Attorney's complete instructions, forms. "**FREE BROCHURE**". Legal Publications, P.O. Box 28807M, St. Louis, Missouri 63123

SCORE HIGH! Win scholarships; paid industrial schooling; government jobs. Use guaranteed preparatory tests. Cramwell, Box 217, Norwell, Mass. 02061.

EMPLOYMENT INFORMATION

JOBS OVERSEAS . . . (Including Alaska). Free Details. Global Employment, Box 81933PM, San Diego, California 92138

AUSTRALIA - The World's 50,000 Jobs! Top pay. Transportation. Computerized reports \$2.00. Jobworld, Box 681E, Cypress, CA 90630.

JOBS: COLORADO, WYOMING, UTAH, IDAHO, MONTANA! Computerized newsletter with 200+ new jobs each week. Free details. **MOUNTAINWEST**, 925-PM Canyon, Logan, UT 84321.

FLORIDA EMPLOYMENT NEWSLETTER. Complete Sunshine State Coverage Weekly. Free Details. FEN, Box 845PM, Jupiter, Florida 33458

(Continued on next page)

EMPLOYMENT INFORMATION

(Continued from preceding page)

JOBS Overseas - Big money fast. \$20,000 to \$50,000 plus per year. Call 1-216-494-2900. Ext. 4561.

OVERSEAS JOBS \$20,000 to \$60,000 plus bonus. Doycorp, Personnel, Box 697-SZ, Pocatello, ID 83201

ROCKY MOUNTAIN EMPLOYMENT NEWSLETTER! Colorado, Idaho, Montana, Wyoming! Current openings - All occupations - greatest weekly selection! Free details: Intermountain-L, P.O. Drawer 809, Grand Lake, Colorado 80447-0809.

GOVERNMENT JOBS - Thousands of vacancies must be filled immediately. \$17,634.00 to \$50,112.00. Call: 716-842-6000. Ext. 3941.

UNEMPLOYED? No Nonsense Guide To Re-Employment details organized procedure to get a job. Third edition—prvgn. \$3.00 check or money order. BWB Industries, 602 Shorewood Dr., Shorewood, Ill. 60435.

RECESSION PROOF-THOUSANDS OF JOBS IN BUILDING MAINTENANCE. Full-part time, men-women. Facts, list employers \$5.00. YMO, Dept. B, P.O. Box 8283, Washington, DC 20024

WELDERS/FITTERS/ELECTRICIANS/PAINTERS Earn \$40,000 per/year as an INSPECTOR. Free details - Savoy Publications, P.O. Box 404, Marrero, LA 70073.

WORK Overseas \$20,000 - \$60,000 Opportunities! For Information Call 317-639-1712. Ext. 24.

JOBS: Texas, Arizona, New Mexico. Current openings. All occupations. Computerized weekly coverage. Free details: Southwest Classified, PO Box 121183A, Arlington, TX 76012.

PENPALS Help You Get Rich (Jobs, Property, Import/Export). Send \$2.00: Worldwide, Box 2505, Denver, Colorado 80201

SUNNY CALIFORNIA STATE JOBS! \$10-\$54,000. Secretarial, Construction, Technical, Recreation. Call for Guide, Directory, Newsletter. (916) 722-1111 Ext. PM.

CRUISE SHIP JOBS! \$14-\$28,000 Year. Caribbean Hawaii, World. Call Cruiseworld for Guide, Directory, Newsletter. (916) 973-1111 Ext. PM.

HELP WANTED

"BE A HANDYMAN." Beat The Recession Join Our National Organization, Keep The Profits. We Show You How. Free Details. "Homeowners Handyman," 791 W. Oakland Park Blvd., Fort Lauderdale, Florida 33311

AUSTRALIA WANTS YOU! Jobs! Big Pay! Transportation! Newest Handbook — \$2.00. **AUSTRALIAN INTERNATIONAL,** Box 19107-AE, WASHINGTON, DC 20036.

OVERSEAS Employment . . . \$20,000 - \$60,000+. Free Report! Employment, Box 19760-AE, Indianapolis, Indiana 46219.

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-5-FI, Fremont, Ohio 43420

PATENT AND DEVELOP Your Invention. Registered Patent Agent and Licensed Professional Engineer. Send for **FREE PATENT INFORMATION** Every Inventor Should Have. Richard L. Miller, Woolworth Building, 233 Broadway, Suite 3612-M, New York, N.Y. 10007. (212) 267-5252.

NONPROFIT Foundation helps inventors. Widest range of services. Free recording forms. Free evaluation. Affiliated Inventors Foundation, 501-B, Iowa, Colorado Springs, CO 80909

PROTECT Your Invention. Registered Patent Attorney. Many Years Experience, all Fields. Individual Inventor's Problems Given Special Consideration. Very Reasonable Charges. Write for Free Information. Paul H. Gallagher, 2530 Crawford Ave., Evanston, Illinois 60201

REGISTERED PATENT ATTORNEY Washington D.C. Suburb. Donald A. Kettlestrings, 414 Hungerford Drive, Rockville, Maryland 20850

PATENT IT ECONOMICALLY! Free Details. N. Raner, 2008 Fondulac, Richmond, VA 23229

PROTECT YOUR INVENTION. Registered Patent Attorney. **FREE** Preliminary Review Of Your Description. Box 392PM, Millwood, NY 10546

PATENT Your Invention Yourself! Instructions/Formal \$9.98. Retired Examiner, 7400, Washington, D.C. 20044

BASIC Tips. Details, \$1.00 and SASE. Practical, 4206 Hoffman, Woodbridge, Virginia 22193

FREE advice - Patent Office Registered Agent (202) 547-2789 nights, weekends.

PATENTWRITER—I PROGRAM FOR PERSONAL COMPUTERS. Save hundreds in legal fees. For information write to: Codeico Inc., 599 Mathilda, Suite 2101, Sunnyvale, California 94086; or call toll free 1-800-227-9600. In California call 408-773-9600.

GOVERNMENT Will Help You Start. Shows How To Turn Idea Into Money Making Invention. Latest Information Concerning Patents and Trademarks. How And Where To Market Your Invention. \$2.50. Tollin House, 1836 Georgian Terrace, Box 95325, Atlanta, Georgia 30347

INVENTIONS WANTED

LEARN how to offer your invention for sale or license. Free booklet outlines procedures, royalty rates, requirements. Kessler Sales Corporation, C-5-IW, Fremont, Ohio 43420

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 idea, call or write: **AMERICAN INVENTORS CORPORATION,** 82 Broad Street, Dept. PM, Westfield, MA 01086. (413) 737-5376. A Fee Based Marketing Company. Offices Coast to Coast.

EARN ROYALTIES. NUPRODUX INTERNATIONAL, 1377 K. NW 141, WASHINGTON, DC 20005

INVENTORS Free Information How To Sell - F-M Service, 7345 Harlem, Niles, Ill. 60648

INVENTIONS, ideas, new products wanted for presentation to industry and exhibition at national technology exposition. Call 1-800-528-6050. Arizona, 1-800-352-0458. Ext. 831. Or write: IMI-PM, 701 Smithfield, Pittsburgh, PA 15222.

REAL ESTATE & FARMS

NEW! FREE SUMMER '83 CATALOG! 5402 properties, 2073 pictures! Values in every type real estate, many owner financed! From 600 offices in 43 states! Get your **FREE** copy **NOW!** **STROUT REALTY,** Plaza Towers, Dept. 5800, Springfield, MO 65804. Call toll free: 1-800-641-4266. In Missouri call collect: (417)862-4402.

NEW . . . FREE CATALOG! Top real estate values coast to coast! Please specify type property and location desired. **UNITED FARM AGENCY,** 612-PM West 47th, Kansas City, MO. 64112.

CANADIAN Country Properties. Our 67th Year. Terms available. Moneyback guarantee. Catalog airmailed \$1.00. Dignam Corp., Ltd. Suite 496, 85 Bloor Street East, Toronto, Ontario, Canada M4W 1B5

PROPERTY And Lake Frontage from \$47 per acre. Investment Potential. Exchange Privilege. Catalogue \$1.00. Canadian Estate Land, Dept. 23C, 2411 Yonge St. #303, Toronto, Canada. M4P-2Z1. (416) 488-0444

FANTASTIC Missouri-Ozarks: Rolling Hills, Clear Streams, Grassy Meadows, Low Taxes. Free Brochure. Graven Realty, Inc., West Plains, Missouri 65775

CALIFORNIA. Acreage. Lots. \$40 down. \$40 monthly. Box 35291, Los Angeles, 90035.

SAVE MONEY, time, headaches. Learn what to ask and why. Country Property Buying Guide. \$5.95 to P. & J. Publishing, Box 7557, Bend, Oregon 97708

EXPORT-IMPORT

+2500 "Fast-Sellers." Free brochures! Allrightpro, Box 91309-B5, Cleveland, Ohio 44101

TAIWAN IMPORT BARGAINS Dozens of Firms, most Furnish Fine Catalogs \$5.00. Brim, P.O. Box 958, Springfield, Ohio 45501

BEGINNERS Start Export-Import Business! Informative Report \$2.00. Evans House, Holly Springs Road, Box 442, Etowah, N.C. 28729

PLASTIC BAGS

ALL Sizes. Buy Small Quantities. Free Catalog. SAKet, 6151-C Colbath, Van Nuys, Calif. 91401

HUNDREDS Of Sizes, Lowest Prices, Free Catalog. Action Plastics, 1460D 93rd Lane N.E., Minneapolis, Minn. 55434

BUY IT WHOLESALE

BELTS and Buckles. Complete line fast sellers, including trucks, motorcycles, wildlife, westerns etc. Big Profits. Complete dealer set up. Catalog \$1.00. Anchor Specialties, Box 3958-BPM, North Providence, RI 02911

400,000 BARGAINS Below Wholesale: Many Free! Liquidations . . . Closeouts . . . Job Lots . . . Single Samples. Free Details. Bargainhunters Opportunities, Box 730-A, Holland, Michigan 49423.

CLOSEOUT Jewelry 55¢ dozen. (Catalog 25¢). Roussels, 107-1631 Dow, Arlington, MA 02174

CLOSEOUTS! Discounts! Below wholesale! Freebies! Samples! DDN, Box 20152-PM, Ferndale, Michigan 48220.

EARN Money selling rings, jewelry, buckles, watches—buy direct. 130% below retail. Catalog \$1.00 (refundable). Anka-PM, Box 89, West Warwick, RI 02893.

FREE CATALOG! Chainsaw, Motorcycle, ATC, Snowmobile, Small Engine, Parts, Woodstoves, Splitters, Energy Items. Manufacturer's Supply, Box 157-PM4, Dorchester, WI 54425.

WORLDWIDE BARGAINS . . . Imports --- Dropship --- Closeouts --- Surplus --- Freebies --- (Stamped Envelope). Marnees, Box 1717PM, Highland, IND. 46322

CUBIC ZIRCONIA. Lowest Wholesale. Full Line. PBP Gifts, 9561 Corby, Omaha, NE 68134.

ADVERTISING AGENCIES, ADV. SERVICES, MAILING LISTS

"WRITING moneymaking classifieds!" - \$2.00. Cooke Limited, 56R Madsen, Beaconsfield, Quebec, H9W 4T7

RUBBER STAMPS

BARCO Type Founders. Type and Rubber Stamps catalogue. Mail \$1.00 refundable on first order. 237 S. Evergreen, Bensenville, 60106.

PRINTING PRESSES, RUBBER STAMP OUTFITS

TYPE Fonts. Hand Printing Presses, Supplies. 120 Pages. \$1.00 Deductible first order. Acme Type, 1720 N. Marshfield, Chicago, 60622

TYPE for printing. Catalog \$1.00/deductible 1st order. Quaker City Type, R.D. 3, Box 134, Honeybrook, PA 19344

MANUFACTURE Rubber Stamps. Regular and Pre-inked. Catalog 1-800-851-4945. Jackson, Brownsville Rd., S110, Mt. Vernon, IL 62864.

COMPLETE Rubber Stamp Outfits, Supplies. Same day shipment. Sign Engraving Machines, Wholesale Catalog \$1.00 Deductible. Star Stamp, 1720 N. Marshfield, Chicago, 60622

PRINTING AND SUPPLIES

1,000 Thermograph Business Cards. \$9.00. Catalog \$1.00. Printer, Box 81, Miami, Florida 33138.

1983-84 GRAPHIC ARTS CATALOG. 250 pages of printing presses, gold stamping presses, rubber stamp presses, wood type, foundry type, bookbinding equipment. The most complete catalog in U.S.A. Send \$5.00. American Printing Equipment & Supply, 42-25 Ninth St., Long Island City, NY 11101

THERMOGRAPHED Business Cards, Free Samples. BG, 2501 Sapling, Glenshaw, PA 15116

QUICK Copy Printing. Low Prices. Write: Nationwide, 614 North Main, Bloomington, Illinois 61701

THERMOGRAPHED Business cards, free samples. PJW, Box 134, Barberton, Ohio 44203.

QUALITY Printing Business Cards, Envelopes, Invoices, Stationery. Free Catalog. Dunn's Distributors, Box 21083, Lansing, MI 48909

BUSINESS-PERSONAL PRINTING Low Prices: G. Print, Inc., 1013 W. Fairfield, High Point, NC 27283

GIFT SHOPPING

BUY THREE, FOURTH FREE — Quality Gifts-Free Catalogs, Ultrassales, RCS Box 1233M, New York, N.Y. 10185

METAL LCD Watches from \$3.50. Send \$1.00 for catalog. CSC, Box 32593, Phoenix, AZ 85064

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. 958, Chicago, 60603.

PUBLIC SALE! Genuine diamond jewelry under \$10. Free brochure! Rush stamped, self-addressed envelope. A. Muckley, Dept. D, P.O. Box 501, Hartsville, OH 44632.

(Continued on next page)

CLOCKS, WATCHES, OLD GOLD, JEWELRY

(Continued from preceding page)

TAKE NO CHANCES. Deal with oldest, most reliable firm in old gold business. Established 1934. We buy Gold, Silver, Platinum, Diamonds. Highest Cash. Free Information. Rose Industries, 29-A East Madison, Chicago 60602

ANTIQUE POCKET WATCH REPAIR & RESTORATION. Quality work, reasonable prices. JOHNSON WATCH REPAIR (NAWCC, AWI), Box 121D, Kaenesburg, CO 80643. Ph. (303) 536-9235.

WATCH And Clock repairing books, tools, materials. Free Catalogs. North American, Box 77-AE, Fox River Grove, Illinois 60021

TOP PRICES PAID for Gold, Silver, Jewelry, Diamonds. Free information. Carats & Coins, Inc., P.O. Box 650816, Miami, Florida 33165

MECHANICAL Clock Kits For All Skills. Write: Classic Clocks, Inc., P.O. Box 16026, 5302 Trail Lake Drive, Fort Worth, Texas 76133. Tel. (817)292-7828.

GOLD

GOLDMINING Fortune!! Prospector's Secrets Reveal Locations . . . Techniques: Nationwide, Box 2131R14, Morristown, New Jersey 07960

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. 1, 900 South Arroyo Pkwy., Pasadena, California 91109

TREASURE FINDERS

TREASURE Hunters. Complete line. Electronic Detectors. Pendulums. Books. Hobby or profit. Free catalogue. Detectores, Apartado 7-905, 06700 Mexico.

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

SAVE up to 40% on new metal detectors. All major brands including White's and Garrett. FREE discount price list. Northwoods General Store, P.O. Box 9874PM5, Madison, WI 53715. (608) 274-4680.

PSYCHIC TOOLS- Pendulums, L-rods, Psionic Generators Brochure \$1. Dowser's Precision Supply, McCormick Bldg., Trinidad, Colo. 81082

PROFITABLE OCCUPATIONS

REPAIR Lawnmowers, thousands of parts and tools. Wholesale list 35¢. Ellwanger's, PO Box V, Port Jervis, NY 12771

PLASTERCRAFT . . . Profitable Home Business 3000 Molds Available. Details. Lynnette, 6251C Mentpark, Mentor, Ohio 44060.

MECHANICALLY INCLINED? ASSEMBLED ELECTRONIC DEVICES, YOUR HOME. KNOWLEDGE, EXPERIENCE NOT NECESSARY. SPARE/FULL TIME. NO INVESTMENT. FREE DETAILS WRITE: ELECTRONIC DEVELOPMENT LAB, BOX 1560PM, PINELLAS PARK, FL. 33565.

FREE Catalogs. Repair air conditioning Refrigeration. Tools, supplies, full instructions. Doolin, 2016 Canton, Dallas, Texas 75201.

FT. SMITH Auction School, Ft. Smith, Ark. 72903. Resident & Home study. Veteran Approved.

TECHNICAL WRITERS make big money! Free details. TekPubs, Box 2458-P, Oroville, CA 95965

PART time money, ten ways and sources. \$4.00. LB Service, Box 1022, Kingston, PA 18704.

THE AMERICAN JOB MARKET- How to Pick, Choose, and Survive. Free Details. Landcastle Publishing, P.O. Box 27573, Tempe, AZ 85282

LEARN Major Home APPLIANCE REPAIR Business. Informative Book \$19.95 ppd. J&R Developers, Box 1372A, Salina, Kansas 67401

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

SALESMEN-DISTRIBUTORS

SELL ELECTRONIC AUTO ACCESSORIES, Fast, Moving Items, Good Profit Margin. Free Information. H.W. Electronics RD2, Box 581, Red Lion, PA 17356

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 74th year. No investment or collections. Weekly commissions. Be your own boss. Full time potential. No experience necessary. Write to: Frank Buckley, NEWTON MFG. CO., Dept. APM5, Newton, Iowa 50208

SELL SENSATIONAL LOW-COST BURGLAR ALARM. Lightning seller. Exceptional margin. Samples for trial. Northwest Electric-PM-5, Box 1046, Mitchell, SD 57301.

AGENTS WANTED

HELP Needed Selling How-To Books, Profitable. SASE. E & B Enterprises, Box 311PM5, Silverdale, Washington 98383

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. H2706, 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 2EQ, N.Y. 10952.

\$700 Per month earnings possible filling out income tax forms at home or tax office during tax season. We show you how. Simple, quickly learned. Details mailed free. No salesmen. Hurry. Big Demand. Federated Tax, 2085 Montrose, Chicago, 60618.

PROJECTION TV . . . Make \$\$\$'s assembling Projectors . . . Easy . . . Results comparable to \$2,500 Projectors . . . Your total cost less than \$17.00 . . . **PLANS, LENS & Dealer Information \$15.50. Illustrated Information FREE . . .** Macrocomb, Washington Crossing, Pennsylvania 18977. Creditcard Orders 24Hrs. 215-736-2880.

VOLCANIC Eruptions of Money Thru Mailorder! Fortunes, Success Available Now! Details Free! Paladin, 164A Blackstone, Fresno, Calif 93701

QUICKEST House Signs. No Woodworking! 900% Profit. COMPLETE PLANS, \$1.00. Housigns, P.O. Box 27095, Seattle, WA. 98125

MAKE MONEY WOODWORKING - Easy profits making unusual gifts, toys, novelties. Free details. Williams, 32K Titus, Glen Cove, NY 11542

MAKE HOMEMADE BOOKLETS. I've earned \$187,000 with mine. Free information: Falcon, Box 548, Woodville, Texas 75979

\$10,000 CASH! 21 Days! FREE Details. Box 369R, Hillsboro, OR 97123

"BECOMING YOUR OWN BOSS"—29 MINUTE CASSETTE TAPE—\$5.00, POSTPAID! SATISFACTION OR REFUND!! HORIZONS, BOX 25-BA, STANWOOD, MICHIGAN 49346

10-DAY Free Trial Offer. Razor Sharp Surgical Steel Paring Knives. 5 year guarantee. Terrific Seller! Needed in Every Home, Restaurant. Low priced. Make Fast, Easy Sales, Profits. Distributors Wanted. Free Details. Sample Card of 4-\$3.00 Postpaid. Nu-Way Products, POB 11508, Tucson, AZ 85734.

OWN The Busiest Mailorder Company in Town! New Opportunity! Grand Slam System, 8033 Sunset Blvd., Suite 5006, Los Angeles, Calif. 90046

GOLD & SILVER. My book "How to Make a Living as a Precious Metal Dealer" gives Detailed Instructions on how to: Prepare & Weigh, Karat Test, Detect Fake Gold & Silver Plus many other Secrets of the Trade. Send \$12.95 to: Precious Metals, 4455 Torrance Blvd., Dept. PM401, Suite 230, Torrance, CA 90503

THOUSANDS HAVE AN IDEA BUT NEVER DEVELOP IT! Sell yours through mailorder. New book tells how. \$4.00. Satisfaction Guaranteed! XANDI, Dept. 101A, Box 25647, Tempe, AZ 85282.

SELL Mail Order Books. Low investment. Free Package. REYNOLDS, Box 740034, Houston, TX. 77274.

GUARANTEED - EXCELLENT - Income - Start - Immediately - At - Your - Home - Free Details - Write - Center, Box 66265B, Los Angeles, CA. 90066.

\$50,000 POSSIBLE!! FREELANCING Bathtub and Sink Refinishing FREE DETAILS!! Shepard, 4418 West 30th St., Los Angeles, CA. 90016

WANT Money? Try Selling Our Books. Free Information. Poindexterco, 1011 Trevor, Detroit, Michigan 48207

MAKE MILLIONS MANUFACTURING Batteries. Supplies Available. Everlast, Box 365, Bogota, NJ 07803.

ASSEMBLE PRODUCTS AT HOME. Many opportunities paying High Weekly Profits presently available without investment. Write: Businesses, 92B Brighton 11th, Brooklyn, New York 11235.

VINYL'S Where the money is! Professionally repair, refinish, recolor furniture, luggage, car tops. Quick, easy. Two small \$20 jobs a day earn you \$1,000 a month. Homes, cars, offices, restaurants, unlimited customers. Start earning after a few days practice. Sensational details free. VIP, 2007 Montrose, Chicago, 60618

MAKE WOOD TOYS FOR PROFIT. Toy parts, patterns wholesale. Lovebuilt Toys, PM-5, Tahoe City, CA 95730-5459

PIANO Tuning quickly learned with home study courses. Diploma granted. American Tuning School, 17050 Teller Drive, Morgan Hill, Calif. 95037.

PICTURE Framing—Profitable full or spare-time business. Easy to learn with handbook-course "Guide To Picture Framing Profits." \$3.00 Guaranteed. Free framing-supplies catalog included. Japs, 126-PM Seventh North, Hopkins, Minnesota 55343.

REPAIR HYDRAULIC JACKS — DETAILS FREE. WRITE: HYDRAULIC PARTS SUPPLY, BOX 4157, BROWNSVILLE, TEXAS 78520.

FREE BOOK 2042 Unique Proven Enterprises. Fabulous "unknowns." Second Inflation Income. HAYLINGS, Carlsbad, CA 92008

LEARN Sewing Machine Repairing. Men. Women. Lucrative Profits. Gresslin Correspondence School, Box 5104, Spencer, Iowa 51301.

\$480 Weekly. Home mailing program. Goodworld, Box 26233-R, Tamarac, Florida 33320

\$92.00 From Square Foot Plywood. (Huge Demand). Revealing Proof 25¢. (Refundable). Woodwin, Bridgewater, Mass. 02324

CONCRETE Block Machines: Catalog \$1.00. Route One, Box 95, Rapid City, South Dakota 57701

SELL Books By Mail. Free Dealership. Midwest, Box 44R2-PM, Shawano, Wis. 54166

GET RICH using OTHER PEOPLE'S MONEY!! Unique — amazing business!! Details FREE!! Finance Consultants, 5B-5, Billings, NY 12510

NEW Discovery in Battery Reconditioning . . . Eighteen Months Guarantee Means "Big Profits Fast." Electone, 7415 Gable Drive, Little Rock, AR 72205

I MADE \$40,000 Year by Mailorder! Helped others make money! Details 25¢. Torrey, Box 318YY, Ypsilanti, Michigan 48197.

CLIP newspaper items — \$2 - \$25 EACH!! FREE Report! Clippings-KB-5, Billings, NY 12510

LEARN The secrets of repairing junk batteries "Fabulous Profits." FIRST ESTABLISHED COURSE. Apex Engineering, 5454 Bolsa, Atascadero, Calif. 93422

MONEY SECRETS! Help People and businesses get money. Easy home business. Fantastic Profits. No Experience—Own Hours. Continuous Assistance. Free Details: DFC, Dept. 10-G-5, 1145 Reservoir Avenue, Cranston, Rhode Island, 02920

VENDING MACHINES. No selling. Routes earn amazing profits. "Big Catalogue FREE." Parkway Corporation, 1930 PMB Greenspring Drive, Timonium, Maryland 21093

ARAB BUSINESSMEN Have Money to Buy & Invest. Top Finders Fees Paid. Int. MiddleEast Assoc., 563PM1, 6291 Flaxman, Huntington Beach, CA 92846

GET RICH! Secret Law smashes debts—brings cash and credit!! Details FREE! WealthKt-WB-5, Billings, NY 12510

RECONDITION JUNK AUTOMOTIVE BATTERIES. Huge demand creates profitable home business! Free report. J&M, 771PM, Battle Ground, Washington 98604

\$1,000 Weekly Home Business Directory, Box 2019-PM, New York, New York 10163.

HUNDREDS Weekly Possible For Ten Hour Work Week!! Guaranteed Home Business . . . Start Immediately!! Free Information - AHV, Box 102B-A5, Kalaheo, Hawaii 96741

14K Gold, Sterling Silver Jewelry. Make 300% Profit. Catalog \$1.00 (Refundable). Courticco, 1634 Bogart, Bronx, NY 10462

(Continued on next page)

Материал, защищенный авторским правом

BUSINESS OPPORTUNITIES

(Continued from preceding page)

TAKE Catalog Orders. We drop-ship 2500 best-selling specialty products. Lowest below wholesale prices. Immediate delivery. Spectacular home business opportunity. Free Book. SMC, 6061 De Soto Ave., Dept. 20-29, Woodland Hills, CA 91365.

WOODWORKERS - IDEAL HOME BUSINESS. Free brochure! Pine Shop, West Peterboro, NH 03458

EASIEST business on earth. Make us prove it. Free details. Wealth Secrets, Box 15137M, Pinellas Park, FL 33565

TAKE PICTURES for profit. Photomoney, 14589K West 32nd, Golden, CO 80401.

YOU Can Make Money Wholesaling. Free Details. Brokerage, 109D Circle, Burns, Tenn. 37029

SELL Books By Mail. 400% profit. Literature Free. Paragon, 344PM, Cass Lake, Minnesota 56633

SECRETS behind successful products and ideas reveal how to find your fortune! Free information — Fortune Maker, 425PM3, Clayton, Denver, Colorado 80206

AERIAL PHOTOGRAPHY Business. Pilot, Non-Pilot. Profitable, Non-Competitive. Eastern Aerial, Box 9587J, Baltimore, MD. 21237

MAKE Big Money Repairing Windshields And Plate Glass! Earn up to \$50,000 yearly. Send for Valuable Free Report. Glas-Weld Systems, Box 87D, Hillsboro, OR 97123. 503-640-2278

START Profitable Business's at Home. Free Information. D. J. P., Rt. 1, Box 108A, Bruno, NE 68014

MANUFACTURE at Home! Huge Profits! Polishes . . . Cleaners . . . Disinfectants . . . Cosmetics. Professional Formulas. Free Details! Frontier, Box 44179, Tucson, Arizona 85733.

EASIEST BUSINESS ON EARTH! Home operated. Huge profits. Insider reveals secrets. **FREE DETAILS!** Beebe, Box 2005, A-583, Syracuse, New York 13220

CARPETLAYERS Earn To \$3000. Monthly. Easy Home Training. Big Demand. Free Catalog. Carpet Crafts, 390 Dawson Drive, Camarillo, California 93010

BUMPER STICKER PRINTING DEVICE. Cheap, Simple, Portable. Free Details. Bumper, POB 22791 (GE), Tampa, FL 33622

MAKE Rubber Stamps. Highly Profitable Business. Free Details. Stamper, POB 22809 (GE), Tampa, FL 33622.

SOLAR Heating learned quickly at home! Free information. Empire School, Box 1014S, Jupiter, Florida 33458

MAILORDER Opportunity! Start profitable home business without experience or capital. Write for free book, plus details. Mail Order Associates, Inc., Dept. 463, Montvale, NJ 07645.

MULTI-Level Marketing Package. Unusual Products found nowhere else! Experienced-established company! No inventory! KMC, Box 280PM, Broomfield, CO 80020.

MILLIONAIRES SECRETS! Free Information. SRH Publishing, P.O. Box 399B, Postville, Iowa 52162

OWN, new Mercedes-Benz, \$111.72 monthly, or BMW, \$74.35 monthly. . . . Guaranteed Method. . . . Write: JP Fox, Box 2655-S, Springfield, VA. 22152.

PIANO Tuning learned quickly at home! Free information. Empire School, box 1014 Jupiter, Florida 33458

EXCITING Multi-Level Opportunity. Details. D. Sadlock, 62 Cedar Hill, Belleville, N.J. 07109

EARN \$100. A DAY. Profitable Home Business. Details \$2. B&E Distributing, Box 404, Houston, Texas 77429

ALUMINUM SCRAP - Recycle - SELL FOR \$25.00 / POUND! Free Information: Industrial Scrap Yard, PM5, Box 127, Alexandria Bay, New York 13607

3,816 Money-making Opportunities! Free Information! Dynamic, Box 1306G, Stow, OH 44224

COPYRIGHT Plans!! Mine Earn Thousands! Free Details. Pencilprojects, Box 22756, Minneapolis, Minnesota 55422

50 HOME Business Opportunities! \$2.00, Kenoc, Box 412PM, Glendale, AZ. 85311

LANDSCAPE MAINTENANCE, CHEMICAL FERTILIZING SERVICE. Mine earns thousands, money never stops, others do work. EVERGREEN, Box 925P, Longview, TX. 75606.

IMPORT-MAILORDER Opportunity. Start Profitable Home Business without Capital. Experience unnecessary. **FREE INFORMATION.** Import Clearing House, Box 8006 B, Saddlebrook, NJ 07862

GET RICH WHILE WORKING AT HOME!! Start your own mailorder business! **FREE details! A-Z MAIL SALES, P.O. Box 71, Brookfield, WI. 53005**

EXTRA income giving away samples. Free Supplies. Pro-Tex, 214H Cherry, Norristown, PA 19401

MONEYMAKING HOME BUSINESS. Free details. Pelican Publishing, D-153 7305 Woodbine Avenue, Markham, Ont, L3R 3V7.

HOME Business. Book Sales. Big Profits. Send \$1.00. Dodge Publishing, Ft. Myers, Fla. 33906

MAKE MONEY REPAIRING HYDRAULIC EQUIPMENT—JACK INCLUDED — Free Details. Hydraulic Training Institute, 2840 Greeley, PM5, Erie, PA. 16506

1000% Profit Bronzing or Chinakoting Baby Shoes. Free Literature. NBSPPM, 398 Airport, Sebring, Fla. 33870—(813-655-0346)

MARKET YOUR NEW PRODUCT IDEA YOURSELF!! Free Information. R.T. Baum Publications, Box 7152, San Jose, Calif., 95150.

300 + Multi-Level Companies Summarized. Which is Best for You. Details and Sample Pages \$1.00. MLODPM, 3809G Coachlight Common, Lansing, MI 48910

SPARETIME Fortune! Pocket \$14.00 profit on \$19 patented motorist's necessity! Samples for trial! Almquist, GT5GB, Millford, Pennsylvania 18337.

NEW DETAILED REPORT! Tells How You can Make Big Money in Lawn Care, With Little or No Investment. Send \$3.00 to: Crosswinds Co., Box 97, Nixa, MO. 65714.

EARN \$20-\$30 AN HOUR. Unique New Process Repairs Burned And Damaged Countertops. Free Information. Countertop Repair Service of Austin, 12722 Burson Drive, Manchaca, TX 78652

SCREEN PRINT T-SHIRTS. Inexpensive kits. Free Details. "T-Printer," POB 23991(GC), Tampa, FL 33623.

101 BUSINESSES YOU CAN START & RUN WITH LESS THAN \$1000. A 240 page guideline, only \$3.95. MODAC, Box 26D, Seabrook, Maryland, 20706.

START Profitable Mail Order Business. No Experience Necessary. Instructions are Simple. Details \$1.00. Star Publishing Co., 2261 N. Main St., Dept. 4-02, Walnut Creek, CA. 94596

MAILING LISTS — How to Compile, Sell Profitably. \$3.00. Bush House, Box 111, Draxel Hill, PA 19026.

CASH For Grocery Receipts! Exciting, New, Business! Details, SASE. .Research-PM, POB 9140, Allentown, PA 18105

START Home Business. Amazing Opportunity! Experience Unnecessary! Global Merchandise, Dept. GM. RD#3, Box 53, Highland, New York 12528

FRANCHISE OPPORTUNITIES GUIDE. Don't miss opportunities in rapidly growing franchises. Guide lists hundreds of opportunities with capital needed in all major areas. \$5.85 to: Franchise Research, Inc., Box 8126, West Chester, Ohio 45069.

\$87,000 SELLING Information by mail, you would THINK is unheard of. I once did. Details. **INITIATIVE**, Box 10179, Alexandria, VA. 22310

HANDY WITH TOOLS? I'll show you How to Turn Your Skill into \$200 A DAY. No Experience Needed. Start Making Money The Same Day You Receive My Step By Step Instructions. Send \$10 to: MBS, 4949 Vir Mar, Fair Oaks, CA. 95628

PURE WATER. Important to everyone. Earn money selling inexpensive home water filters. Melsar, Box 233M, Thomaston, CT 06787.

WANTED: Profitable Home Business Opportunities. Send offers Homeworkers, 7250A Berea, Winston, Georgia 30187

INDEPENDENCE can be yours. Run profitable business from your own home. Details free. Thomson Engineering Consultants Ltd., 328 South Shore Drive, Room 21, Guernes Island, Washington 98221

NEW LUXURY CAR without cost! Write: AMCO 9, 1601 Main, Plainfield, IN 46168

UNEMPLOYED? UNDEREMPLOYED? Underpaid? I've made \$96,000/yr. Sell everything I produce. Helping others! Details: Opportunity, Box 8793A, Silver Spring, MD. 20907

\$40,000 ON 1/2 ACRE! New Hydroponics Inexpensive to Start, Maintain. Clean, Pleasant, Little Manual Labor. Free Information. Robin's, Box 1657, Brenham, TX. 77833.

SERIOUS AND CURIOUS: I WILL GROSS UP TO \$5,000.00 FROM THIS SMALL AD. SECRET YOURS \$2.00 WRITE: BIZ-SYSTEMS, STATION -A, BOX 9108MP, AUBURN, CA 95803

FREE! PROOF "How I Made \$265,000.00" with small classified Ads. Southlander-PM5, Box 7437R1, Sarasota, FL 33583.

HOLLOW Grind Scissors, Knives the Factory Way; Money-maker. Plans, Instructions \$10.00. Hanson, Box 1728, Payson, Arizona 85541

AMAZING Profits selling mailorder information! Free details - Newlife, Box 85041/C, Los Angeles, CA. 90072.

SUB-WHOLESALEERS URGENTLY NEEDED make 2 to 3 times your cost on hundreds of products. \$5 brings giant catalog, refundable on first order. **EDLIN ASSOCIATES, 15 WOOSTER STREET, SEYMOUR, CT 06483. ALSO, \$1** brings details on other moneymaking opportunities.

CASH FOR TRASH - Recycling Brings High Profits. Experts Tell You How. Where And What Goods To Recycle. No Nonsense Offer. **ALSO FREE SELF-EMPLOYMENT BONUS IDEA.** For Complete Booklet Send \$3.00 to: Box 2254, Rilton, NY 12471 -

GOLD! SILVER! FOR THE ASKING! (\$25,000 - \$50,000). Copper - \$100/Day. Shoestring Expenses. Free information. Recycler, Box 1657, Brenham, TX. 77833

NEW. Make \$15,000 to \$30,000 Monthly. Details \$1.00. Minnesota Publishers, Box 2348, Minneapolis, MN 55402

FANTASTIC Profits! Sell Books By mail. Details: Irines, Box 4552, El Paso, TX 79914

WHOLESALE PRODUCTS- No investment necessary. Sheffields, 166 Tanforan, Placentia, CA 92670.

"FINANCIAL FREEDOM Buying Foreclosures". **FREE** details. Send Stamp. LEWIS, Dept. P5, 2700 47th Avenue, Oakland, CA 94601

OUT OF WORK? NEED MONEY? \$1.00 booklet shows you how to start your own business through classified advertising. Popular Mechanics, Dept. KC, 224 W. 57th St., New York, NY 10019.

MONEYMAKING OPPORTUNITIES

UNIQUE Opportunity—Purchase Oil Gas Leases. Low investment, High Return. Ameraol, 365 Oakhurst Lane, Colorado Springs, Colorado 80906

FREE Details—The Seven Best Home Businesses. Money Resource Systems, 4930 Reeder Ave., Oxnard, CA 93033

FREE Money! Never Pay It Back! JADCO, Box 383, San Pedro, CA. 90731.

PRECIOUS METAL DEALER who turned \$10,000 into a \$8 Million business during the "GOLD RUSH" of 1979-80 describes the business. Learn from his experience how to deal profitably in precious metals in your area. Synopsis \$2.00 (refundable with purchase). LDI, P.O. Box 242, Myrtle Beach, SC 29578

SPARE time fortune in Vinyl Repair. Huge demand creates exceptional profits. We supply everything. Details free. VIP, 2062 Montrose, Chicago, 60618

GET RICH!! Secret law smashes debts — brings Cash, Credit! **FREE** report!! WealthKit-WBM-5, Billings, NY 12510

FANTASTIC earnings mailing from home!! Offer: Rush Stamped Addressed Envelope. Imperial, P-8 X17410, Fort Lauderdale, FL 33318

MAKE PVC PIPE FURNITURE. Begin profitable home business without experience! Free report. J&M, 771PF, Battle Ground, Washington 98604

EXCITING 10- \$25 HOURLY Income. Unusual opportunity making, assembling products at home. Merritt, Drawer 428P, Richardson, TX 75080

EARN \$2,000/month offering loans, starting part time. Prestigious opportunity. PFA, Box 84068P, Los Angeles, CA 90073

51 MOST POWERFUL MONEY MAKING TOOLS AVAILABLE SEND \$5.00 FOR COMPLETE PACKAGE. WRA, DEPT. PM5, P.O. BOX 1090, WESTMONT, IL 60559

700,000 BARGAINS, Mail Order, Home Businesses, Imports, Free Details: American Money-makers, Box 8356PM, Tampa, FL 33674

AMAZING new multilevel company! Earn thousands of dollars monthly with zero investment thru Adventures In Health. Free details. Mata, Box 710-M, Artesia, CA 90701

FREE INFORMATION, HOW-TO start home business breeding birds. Profit & Financial Security. No Experience. Marsh Farms, P.O. Box 7JK, Garden Grove, CA 92642.

TODAYS INVESTOR BULLETIN For the **SERIOUS WEALTH BUILDER** Details. 3154 S. Cherry Cir., Dept. PM, Mesa, AZ 85202

BUMPER STICKER PRINTING DEVICE. Cheap, Simple, Portable. Free details. Bumper, POB 22791 (GH), Tampa, FL 33622.

(Continued on next page)

MONEYMAKING OPPORTUNITIES

(Continued from preceding page)

FREE! Five Proven Money-making Methods! We Do It. You Can Too. Guaranteed. Only \$1.00 Shipping-Handling. Read Publishing, Box R171PM, 323/#904 Franklin Building South, Chicago, 60606-7096.

STOCK Certificates \$100 Mixed Cancelled Certificates \$25.00. Certif-Kats of Katonah Inc., Box 296PM, Cross River, NY 10518

REVEALING FACTS about mail order opportunities will save you money. Order "Factsheet" today, \$1.00. Realm Publications, P.O. Box 7683, Jacksonville, FL 32238

EASIEST BUSINESS ON EARTH. Free Information. Linden Books, 6111 South 520 East, Murray, Utah 84107

WORK AT HOME. Agents for Money Making Books Needed. Complete Details \$1.00. Dale Simmons, R.R.#1, Kell, Illinois 62853

MAKE CLOCKS at home for profit. Easy to learn, fun to do. Create your own designs. Full color catalog shows hundreds of items: movements, parts, tools, supplies. Lowest prices. \$2.00 pp, refunded with purchase. Selva Borel, PO Box 796X, Oakland, CA 94604.

403 Opportunities—Make Money at Home. Blake, Box 1172M, Hollywood, CA 90028

EARN Tutoring Children! Teaching Certificate, Procedures, \$2.00! Castle's, 19009-PM, Biscayne, Miami 33180.

MAKE TREMENDOUS PROFITS FROM SCRAP WOOD. B&V Crafts, 8981 Mahoning Ave., North Jackson, Ohio 44451

CANVASSERS WANTED. \$1,000 month average. No selling. Details, 234 Club, San Antonio, TX 78201.

GET RICH In The 1980's! Amazing Book Tells How. Free Details. Bonanza, PM5, Box 2177, Martinez, CA 94553

THE most Dynamic Books on Mail Order. Complete details **FREE.** Send today. Davis N, 7805 Lookingglass, Roseburg, OR 97470.

EXTRA CASH — You can earn it! Your **FREE** subscription to Opportunity Magazine shows you how with success stories of today's entrepreneurs. Write: Opportunity, Dept. 899, 6 N. Michigan, Chicago, 60602.

SECRETS of a fantastic Garage Sale. \$3.00 to: Robbins, Ark Publications, 1101-PM NE 4th Ave., Boca Raton, FL 33432

FREE . . . "Amazing Woodworking Profits" . . . Charlie Pollard, 27 Snowhill, Agincourt, Ontario, M1S 3T4

CASH FROM YOUR TRASH... BY MAIL! Over \$300.00 at home spare time possible with Money-maker's Guidebook: \$4.80 From: JFA Marketing, 1400 Renaissance-214P, Park Ridge, IL 60068.

SUMMER JOB. I earned over \$2700.00 last July part-time solving bat problems. Details \$2. Bay Area Bat Protection, P.O. Box 374 St. A, Sturgeon Bay, WI 54235

FREE MONEYMAKING PLAN! So easy its like MAGIC. Proven method unsurpassed by any other plan. Send today. P. McGinnis, Route 2, Box 485A, Palmyra, WI 53156

MAILORDER millionaire reveals money-making secrets! Start with small classified ads. Unlimited opportunities. Free exciting details: Davis, 7805N Lookingglass, Roseburg, Oregon 97470.

THOUSANDS Monthly Distributing New **FRICTION STOPPING POWERUP** Miracle Concentrated Oil Metal Conditioner. See Classified Automobile Ad. Vast Market Potential, Ground Floor Opportunity. Details Free. **POWERUP**, Box 874, Provo, Utah 84601

BIG MONEY FOR RECIPES \$1.25. Easyway, Box 399, Bullhead City, AZ 86430

FROM His Impressive \$225,000.00 English Tudor Castle, Roger Andrews Reveals, "How To Surpass The American Dream". Send \$10.00 Guaranteed. Andrews, Box 2020P, Sandusky, Ohio 44870

WIN Million Dollars Prize Money Weekly. Free Information. Eby, 323 Franklin, Suite 804/E-36, Chicago, IL 60606

VIDEOTAPING! Profits unlimited in developing videotaping service in your area. Start from your home. Detailed report \$9.95 to: Franklin Management Inc., P.O. Box 1604, Pontiac, MI 48056

MAKE 2000% PROFIT selling information by mail. Free details. Lovi Enterprises, Box 4421, Old San Juan Station, San Juan, PR 00905-4421

GET RICH! Secret law erases debts! Receive credit, cash. Details **FREE!** Financial, Box 1432 - ME, Upland, CA 91786.

RABBITS-CHINCHILLAS-FUR BEARING ANIMALS

\$1200 MONTHLY OR MORE Raising rabbits for us. Details \$1.00. Laboratory Animals, Box 2467, Grand Rapids, Michigan 49501

RAISE FUR BEARING ANIMALS Fox, Raccoon, Cougar Others. \$1.00 Color Photos Information. Hidden Valley Fur Farms, RR 1, Guttenberg, Iowa 52052. 319-252-1637

AMAZING Profits! \$10,000 Yearly Raising Rabbits for Wool and Breeding. Details—\$2.00. American Angora, Malta 12, Montana 59538.

RAISE RABBITS SUCCESSFULLY 68 Page Booklet Tells How. \$1.00. American Rabbit Assn., H1, P.O. Box 426, Bloomington, Illinois 61701

\$500-\$1000 Month Plan raising rabbits for us. Free details. White's Rabbitry, Box 1388PM, Hudson, Ohio 44236

GUARANTEED Income. \$10.00 (refundable) for literature. Chinchillas, Box 8294, Mesa, Arizona 85204.

PETS-BIRDS, CATS, HAMSTERS, ETC.

RACCOON, FOX, MINK, COUGAR. Send \$1.00 List Photos. Hidden Valley Fur Farms, Rt. 1, Guttenberg, Iowa 52052. 319-252-1637.

EARTHWORMS, LIVE BAIT

FREE Literature. Raise Fishworms, Crickets, Redworms—1000-\$8.95, 5000-\$42.50. Book on How and Where to Sell with Order. Carter Fishworms, Plains, GA. 31780.

OF INTEREST TO ALL

BARBEQUE Charcoal Starter. Safe. Fast. Simple. No Fluids/Electricity. Free Information. "Superstarter," P.O. Box 12645, Tucson, AZ 85711

SAVE money. Hundreds of honest, practical ways. Information sheets. Free details. Willow, 127 Holcolm, North York, Ont. M2N 2E1

FREE Promotional Albums, Concert Tickets, Stereos, etc. Information: Barry Publications, 477 82nd Street, Brooklyn, NY 11209

VACUUM Cleaners "Discount Prices" "New" Rainbow \$349.95, Kirby, Filter Queen, Compact, Details: ABC Vacuum Warehouse, 7021 Burnet - PM, Austin, Texas 78757

ALL IN ONE. Wallet For Checkbook and Credit Cards with Penwatch and Matching Calculator. Only \$10.95. Satisfaction Guaranteed. Ambassador Imp., Box 605, Mt. Kisco, NY 10549

FREE Information that'll Boost your Radio Reception Hundreds of Miles. Send SASE to: Veegee Varieties, Box 1203, Santa Maria, Calif. 93456.

YARD SALE KIT. Contains everything you need to make your sale a success. Send \$3.98 To: Fox Industries, Box 267, Peacedale, RI 02883.

MOVING TO ARIZONA? Complete details on jobs, where to live, weather, and much more. The Arizona Report. \$4.95. LandCastle Publishing, P.O. Box 27573, Tempe, AZ 85281

DISNEY artist shows you how to draw. First easy lesson **FREE!** Get started today! Bruce McIntyre-PM14, 3471 Crownsworth, Corona, CA 91720. (714) 953-7452.

RECEIVE \$75.00 in **FREE PRODUCTS** Details \$5.00. Alectronics, Box 1736, Dept. 103A, Orem, Utah 84057

SURVIVE NUCLEAR ATTACK! Send Stamp. **RADSADS**, P.O. Box 40-A, Castor, LA. 71016

FREE CATALOG! Privacy, Credit, Divorce, Employment, Tax Problems? Our books have the solutions. Write to: Eden Press, 11623 Slater, Box 8410-PG, Fountain Valley, CA 92708.

OF INTEREST TO WOMEN

QUILTING CAN BE A LOT MORE FUN And go twice as fast when done on a frame. This one comes apart for easy storage and you can make it in a weekend. Send for Plan PL-1718 + \$2.00 to: Popular Mechanics, Box 1014, Radio City Sta., N.Y. 10101

GOVERNMENT SURPLUS

1983 Surplus Army, Navy store 64 pages illustrated catalog. Send \$2.00. Ruvel, 3037 N. Clark, Dept. J-5, Chicago, IL 60657.

IS IT True you can buy jeeps for \$44 through the U.S. Government? Get the facts today! Call 312-742-1143. Ext. 7133.

J-E-E-P-S, T-R-U-C-K-S from \$30.00. Millions of items in Government Surplus: Typewriters, Boats, Clothing. Complete Directory On How And Where To Buy In Your Area - \$2.00. Surplus Bargains, Box 913-A, Holland, Michigan 49423.

GOVERNMENT SURPLUS ... JEEPS—AUTOMOBILES — \$30.00! 900,000 Bargains! Complete Information—Your Area. **GUARANTEED DIRECTORY** — \$2.00. **DISPOSAL**, Box 392ME, VALLEY FORGE, PENNSYLVANIA 19481

"GOVERNMENT SURPLUS" JEEPS \$30.00! 800,000 Items! Complete Information Your Area. **LARGEST OFFICIAL DIRECTORY.** \$2.00 (Guaranteed). **SURPLUS (A419)**, 4620 Wisconsin Northwest, WASHINGTON, D.C. 20016

WANT A \$44 JEEP? LAND FOR \$20 AN ACRE? CHEAP Houses and Boats? Call for Directory, Guide and Newsletter. (916) 722-1111 Ext. PM.

LOANS BY MAIL

BORROW \$25,000 "overnight." Any Purpose. Keep indefinitely! Free Report! Success Research, Box 19739-AR, Indianapolis, Indiana 46219.

MONEY Problems? Free Book describes Loans, Cash, Government Grants. Other benefits, available to individuals. Write: Associates, Box 98-A4, Brooklyn, New York 11235

BORROW 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-5, 1145 Reservoir Avenue, Cranston, Rhode Island 02920

CASH Loans—Borrow by Mail \$500.00 to \$25,000! Free details, Application! LTD-PM, Box 937, Ft. Lauderdale, FL 33302

BORROW \$100-\$100,000! Instant Reply! No Co-signers! Rush Stamped Envelope! Financial, Box 5487(P), Richardson, TX 75080

BORROW \$30,000 without interest! All eligible. Repay anytime. Free details! Infohouse-508PM, 533 Sutter, San Francisco, CA 94102.

DIVORCE

WINNING information, \$1.00. **MEN'S RIGHTS ASSOCIATION**, 189B, Forest Lake, MN 55025-0189

PERSONAL

BIBLE Questions answered. Stamped envelope. Bylon, 17167 Bentler, Detroit, Michigan 48219

COLLEGE DEGREES BY MAIL. Renowned Universities offer fully-accredited Bachelors, Masters, Ph.D.'s . . . Free revealing details. Counseling, Box 317-MP-5, Tustin, California 92680.

UNIVERSITY DEGREES BY SPECIAL EVALUATION of **EXISTING** Job Experience, Education, Achievement. Fast, inexpensive. Call (614-863-1791). Or Write: Box 13151-T5, Columbus, OH 43213

WANT financial independence? Tax advantages? Fulfilled dreams? Send \$2.00 to: The ICVD PSC#6, Box 7617, Lowry, AFB, CO. 80230

REMAILING SERVICE

CALIFORNIA CONFIDENTIAL from \$1.00. OMS, 4216 Bouquet Way, Sacramento, CA 95834

NATIONALLY known Mail Forwarding Service for travelers for 23 years. Write: NATO, Dept. PM, Box 1418, Sarasota, FL 33578.

REMAILING \$1.00 each. "Confidential Mailer", P.O.Box 6161, South Bend, Indiana 46660.

CONFIDENTIAL Mail Receiving/Forwarding. Mail Drop, Box 18039PM, Orlando, FL 32860

SASKATCHEWAN Remailing. Central, Box 101, Foam Lake, Saskatchewan, Canada S0A 1A0

UNLISTED ADDRESS. Discreet and confidential. Remail \$1.00 Single. Mail Forwarding Service, 8050 S. Main, Houston, Texas 77025

REMAILING 20c. Forwarding \$18.00 yearly. "Economail", Box 541, Ephrata, Washington 98823

CHICAGO Address? Call 800-621-7461 for information packet.

PRIVATE ADDRESS. Dependable and **EXPERIENCED.** Professional Mail Forwarding, Box 561A, Milton, Mass. 02186

DEPENDABLE Confidential Remailing. Washington, D.C. Suburb. HowTo, 2620 Kirklyn, Falls Church, VA 22043

(Continued on next page)

REMAILING SERVICE

(Continued from preceding page)

LOS ANGELES Remails - Confidential Receiving/Forwarding. Send Stamped Envelope, Free Brochure. Mail Headquarters, 18533-Z Burbank, Tarzana 91356

FREE DETAILS. Confidential Mail Forwarding/Receiving. **PACIFIC MAIL SERVICE**, Box 66487PM, Portland, OR 97266

FREE details. Receiving-Forwarding. Dependable Mail, 509 Yosemite, Fresno, CA 93728

CHEAP Charlie Says: "Save Money Now". Remails, Central, 430 Lakeside, North East, MD. 21901

CONFIDENTIAL New York Mailing Address. **NEWYORK EXPRESS**, 116-15 147 St., New York, N.Y. 11436

WEST Palm Beach Postmark. Confidential. \$1.00 each, stamped. Robbins, 1101 NE 4th Ave., Boca Raton, FL 33432

CONFIDENTIAL Remailing And Forwarding Services At \$6.00 Per Month Plus Postage. Remailing Services Alone At \$5.00 Each Stamped Envelope. Wilson Mail Forwarding Service, Box 112-M, Easthampton, Mass. 01027

MISCELLANEOUS

ROAD MAPS State Highway And Major Cities. Eastern U.S. And Central-Western U.S. \$1.00 Each Title. Eagle Map Supply, 14524 Blaine Ave., Posen, Ill. 60489

PHOTO ID. Sealed in plastic. All states, provinces. 24-hours. **GUARANTEED.** Send \$6.00 (2/\$10.00), photo, name, address, height, weight, hair, eyes, birthdate. **CARDINAL**, 2071-46 Emerson, Jacksonville, Florida 32207.

PHOTO IDENTIFICATION CARDS . . . Certificates . . . **GUARANTEED!!** Samples 25c . . . Basco, Box 3461-PM-83, Providence, R.I. 02909.

ORNAMENTAL Iron Designs. Book of 1600 beautiful practical designs for railings, columns, etc. Free Literature. Cunningham, Box 20005, Salt Lake City, Utah 84120-0005 — (3881 South 3200 West)

COLLEGE STUDENTS!—Improve your grades! — Research catalog—306 pages—10,278 topics—Rush \$1.00—Research, Box 25918K, Los Angeles, 90025. (213) 477-8226.

RECEIVE \$75.00 in FREE PRODUCTS Details \$50. Electronics, Box 1736, Dept. 103B, Orem, Utah 84057

BLACKJACK system. Win thousands. Foolproof method, really works. \$5.00. Box 562, Marblehead, MA. 01945.

WANTED MISCELLANEOUS

GOLD, Silver, Platinum, Mercury, Tantalum wanted. Ores assayed. Free circular. Wholesale Terminal, P.O. Box 191, Norwood, MA 02062.

SCRAP SILVER CONTACTS, FORKLIFT CONTACTS, Silver Solder, Sterling, Gold Plated. Robert Leszczak, 652 Myrtle St., Elizabeth, NJ 07202

FOR SALE-MISCELLANEOUS

SILVER FORK-TRUCK CONTACTS AND SILVER SOLDER CHEAP. Robert Leszczak, 652 Myrtle St., Elizabeth, NJ 07202

HEARING AIDS

HUGE SAVINGS Eliminate Dealer Markups. Free Trial. Batteries Wholesale. Terms Arranged. Call Toll Free 1-800-323-1212. Or Write: Lloyds-PMC, Rockford, IL 61110

SAVE \$200+. Name Brands. No Salesmen. Free Catalog. Dept. 132A, J & M, 329 N. 3rd, DeKalb, IL 60115.

MAIL ORDER buying saves half on hearing aids. Month's trial. Rea Company Inc., Box 364, Bridgeport, OH 43912

FREE HEARING AID CATALOG - Save 1/2 by mail! Write: "MoneySavers", 9530-PM-5, Langdon, Sepulveda, California 91343. **NOT** sold in California.

NEW All-in-the-ear Hearing Aids. Huge Savings. Batteries - other aids. Free catalog. No salesman. Rhodes, Dept. 132B, Brookport, Illinois 62910

TOBACCO

MAKE Pipes, Information: Pimo, Inc., P53, Box 59211, Chicago, Illinois 60659

BRIAR PIPE Make or repair your own. Photocopy of article shows you all the details. Send for Plan X-476-G + \$2.00 to: **POPULAR MECHANICS**, Box 1014, Radio City Sta., New York, N.Y. 10101

SCIENCE & CHEMISTRY

CHEMICALS Many exotics. Catalog \$2.00. CHON Chemical Co., Box 2296, Mansfield, Ohio 44905

LABORATORY Chemicals, Glassware—Apparatus, Catalogue \$1.00. Deluxe Scientific, 934 S. 13 Street, Manitowoc, Wisconsin 54220

ERUPTING Volcano Construction Kit \$11.75. **DINOSAUR CATALOG**, Box 546, Tallman, NY 10982

FORMULAS, PLANS, ETC.

ANY FORMULA \$10.00. Catalog \$1.00. J. Belfort, Box 568, Chicago, 60690

MONEYMAKING CHEMICAL FORMULAS — THOUSANDS! CATALOG \$3.00 (REFUNDABLE): GWA3, Box 193, Brookfield, Wisconsin 53005-0193

TRAVEL AND RESORTS

ROAM the world by freighter! Deluxe - Exotic - Inexpensive! TravTIPS Association, Box 188NB, Flushing, NY 11358

SPECIAL SERVICES

INFORMATION On anything. Ferguson Research Specialists, 60-15 Woodside, Woodside, New York 11377.

BETTER HEALTH

HEALTH Report. Proven Technique For Better Gums. Send \$5.00 To: Sheg Enterprises, P.O. Box 211, Branford, Conn. 06405

SMOKE No More!! Free details. Robbins, Ark Publications, 1101-PM NE 4th Ave., Boca Raton, FL 33432

FOR THE HOME

FUN DECK. Exciting Idea. \$1.95 Booklet. DAULAW, RFD Box 640, Heber, Utah 84032

GARDENING & LAWN CARE

"URN STAND" for Cemetery - Yard, Maintenance Free." Brochure. Glacier, Box 8367, St. Paul, Minn 55113

ELIMINATE JAPANESE BEETLES AND OTHER PESTS, Quickly, Easily, Economically. Guaranteed Method. \$4.00. Ma and Pa Enterprises, Route 227, Trumansburg, NY 14886

DANGO - Electric Drill starts Lawn Mower. Send \$7.95 for attachments. 700 West Main, Waxahachie, TX 75165

E-Z WATER SPRINKLER SYSTEM - Save Time, Money Putting in Sprinkler System for Lawns, Flowers, Shrubs. E-Z Water Sprinkler System is Designed To Cost 55% Less than your Average System. Send \$6.50 for Instructions to: E-Z Water Sprinkler System, P.O. Box 1, Port Elizabeth, N.J. 08348

GROW Huge Vegetables, Plants, Organically From Leaf Mold. For Information Send \$2 To: Organics, P.O. Box 2051, Boise, Idaho 83708

FLOWERS, PLANTS & NURSERY SUPPLIES

GROW GINSENG, Very Profitable. Have seeds, roots. Goldenseal. Complete information. K. Collins, Viola, Iowa 52350

RECIPES, COOKING, ETC.

MICROWAVE Recipes—\$2.98. Write: Micro, P.O. Box 61, Myrtle Point, OR 97458

HOW To Save Money While You Feed Your Family Better. \$3.00. P.O. Box 511, Benton, Arkansas 72015

GRANDMAS RECESSION RECIPES 10 Budget Stretching Home Style Meals \$3.00. Beau's, PMS, Box 42, Oak Creek, WI 53154

ITALIAN Sausage Recipe/Press Plans. \$4.95. Box 387, Green Valley, AZ. 85614

ORIGINAL Honey Fruit Dressing and Old New England Coffee Syrup Recipes. \$1.00, SASE, KC, 17 Ricketson, North Dartmouth, MA. 02747.

TIPS on buying meat that saves you money. \$2.00. P.O. Box 35939, Albuquerque, New Mexico, 87176-5939

GUIDE TO MICROWAVE COOKING Recipes For Appetizers, Soups, Main Dishes, Desserts, \$4.95. Gift World, 1225 Sullivan Drive, Freeport, Illinois 61032

SECRET REVEALED. 100-year-old carnival caramelcorn recipe. Easy, delicious, nonsticky. \$2.50. Ochs Enterprises, 1497 East Main, Ashland, OR 97520

OLD GERMAN RECIPES, Dill Pickles, Sauerkraut, No Chemicals. Send \$3.00. Recipes, Dept. 2-A, Box 566, Darby, Montana 59829

"VENISON Magic. Recipes And Tips: \$3.00. K&S, P.O. Box 2125, Kilgore, Texas 75662.

LEARN BAKER SECRET. Bake Professionally. Bakery Recipes Included. \$4.00. P.O. Box 98, Richmond, KY 40475

NEW Delicious-170 Recipes Guaranteed, \$2.25. J&J Enterprise, Route One, Box 149A, Ravenden, Arkansas 72459

EASY No-Bake Cookies Recipes Send \$2.50: Helpful Hints, Box 41216-B.B., Atlanta, GA 30331

50 PARTY Punch Recipes. Send \$3.95 To: Helpful Hints, Box 41216CC, Atlanta, GA 30331

FIVE Favorite Home Style Recipes. \$2.00. AVEC, 13632 Carroll, Tustin, California 92680

"HOT FUDGE SAUCE" Recipe \$2.00 and SASE to: Crest, Box 192, Vandalia, Ohio 45377.

WINEMAKING, BEERMAKING & OTHER RECIPES

WINEMAKING-BEERMAKING-GASOHOL. Free Supply Catalog. Yeast Equipment. Continental, Box 188PM, Casselberry, FL 32707

WINE From Concentrates. 80c Per Quart. Instructions \$3. R. Clark, 510 West 2nd St., Del Rio, Texas 78840

WINEMAKERS-BEERMAKERS— Free Catalog—Fast Service—Large Selection: Kraus, Box 7850-L, Independence, Missouri 64053.

BEER LOVERS — Brew your own. Delicious! Inexpensive! Free Catalog. Beer Gear, Box 25093M, Lansing, Michigan 48909

FREE BEERMAKING BOOK Plus Catalog. Finest Equipment, Ingredients. Fully Guaranteed. SPI, Box 784-M, Chapel Hill, NC 27514

FREE ENCYCLOPEDIA Winemaking, Beermaking, Supplies, Equipment Ingredients. Vynox, P.O. Box PM7498, Rochester, NY 14615

WINEMAKERS-BEERMAKERS Fresh Stocks, Fast Service, Free Catalog. O'Brien's, Box 284D, Wayne, IL 60184

WINEMAKERS-Beermakers: Free illustrated catalog of supplies. Semplex, Box 12276R, Minneapolis, Minnesota 55412-0276

BEER made from scratch. Send \$3.00 for "How to make it" and one excellent recipe. DAS Enterprises, P.O. Box-962, Palm Bay, Fla. 32905

LIQUOR recipes, Irish Cream, Kahlua, Brandy, Others. \$3.00 & SASE. P.O. Box 2589, White City, OR. 97501

MOONSHINE MAKING. Whiskey! Gin! Vodka! . . . PLUS Automobile Alcohol!! Homebrewing Manual, \$2.00 (refundable): Brewmaster, 723A Disston, Philadelphia, 19111

STRONG BEER - 5c a bottle. Free report, Milwaukee Brewmaster, 706 Twelfth Street, N.W., Dept. 101, Canton, OH. 44703.

FREE BEERMAKING CATALOG. Lowest prices. Homebrew, Box 158M, Haslett, Michigan 48840

LIKE BAILEYS IRISH? KAHLUA? Huge Savings. 11 Easy. Make At Home, Top Liquor Recipes. Thoughtful Gift, \$3.00. Ben Benczer, P.O. Box 338, Bayshore, New York 11706

BURGLAR ALARMS & HOME PROTECTION

DRIVEWAY Alarms - Free brochure - Paxton Enterprises, RR1, Fortville Ind. 46040

INEXPENSIVE SECURITY PROTECTION ALARMS That Work!! Home, Travelling, Auto, Personal. Free Brochure! Box 118PM5, Torrance, CA. 90507

STOP CROOKS COLD with New Chain Alarm. Details Free. Alarms, Box 738, Houston, MN 55943

PROTECT Loved Ones-Pocket Size Emergency Alarm With Light, Rape and Chain Alarms Available. \$6.95 each. Kin Company, 14641SP37, Forest, Ohio 45843

SUPERIOR SYSTEMS! Catalog 25c (Refundable). AAS, 414B Loma Square, Birmingham, AL 35218

HOME PROTECTION Burglar Alarm Warning Stickers Twelve for \$5.00. - Oakland, P.O. Box 7232, Westchester, Illinois 60153

NEW METRIX COMPUTER-MEMORY ELECTRONIC TELEPHONE

AS
LOW
AS

\$9

STARTING MIDNIGHT TONIGHT

International Telemetrix Co. will release new, advanced - electronics METRIX A-100 telephones to consumers at just \$10 each; three or more at just \$9 each. The METRIX A-100 is a

one-piece design unit with no cumbersome base, allowing unusual flexibility in both placement and use. Fitted with standard modular jack; requires no installation charges or monthly rental fees.

METRIX A-100 uses pushbutton dial system compatible with both Touch-Tone and rotary dial systems, saving consumers the additional monthly fee frequently charged for the convenience of pushbutton dialing. Other advanced features include: automatic redial which remembers a busy number and redials at the touch of a single button; "mute" switch for total conversational privacy; ringer control permitting you to "turn off" your phone when you do not wish to be disturbed. Even hangs itself up when placed down on any surface.

The METRIX A-100 will replace



any existing telephone and is also the perfect choice as an inexpensive "state of the art" extension phone for home or office.

You may order the METRIX A-100 by sending

your name and address, plus appropriate payment, to the address below. Single instrument is \$10, three or more at just \$9 each. (Limit: five to any one address.) An additional \$1.50 is requested per unit to help defray postage and handling costs. Price guaranteed only until June 20. Credit card orders will also be accepted; send name of card, account number, and expiration date on the same piece of paper as your name and address when ordering. Satisfaction guaranteed or return for prompt refund within 30 days. An additional 1-year full replacement guarantee will accompany each METRIX A-100 Computer Memory Electronic Telephone Unit. Mail your order to: INTERNATIONAL TELEMETRIX CO., Dept DTH-1511, 390 Pike Road, Huntingdon, Valley, PA 19006.

© 1983 International Telemetrix Company



Finishing third in the Baja 1000 was terrific. The way we did it was unbelievable.

The Baja.

A strip of land below the California-Mexico border. It can go from an elevation of 6,000 feet all the way down to sea level at the drop of a sombrero. Its terrain is made up of jagged rocks, sand washes, a dry lake bed, tide pools, mud, silt beds, you name it. If you're a snake or a lizard, it's paradise. If you're an automobile or truck, it's hell.

Yet it was on this God-forsaken strip of land that this year's most newsworthy accomplishment in the world of trucking took place.

The scene—the annual Pernod/Score Baja 1000. The accomplishment—the third place finish in the mini pick-up class of the absolutely unheralded entry of the Isuzu 4 x 4 pick-up. The only diesel entry in the entire race, and the first imported truck to finish the race.

An achievement that becomes somewhat heroic when one considers these facts. The



Baja 1000 is a prestigious race that most truck manufacturers usually enter at substantial cost with crews, drivers and multiple truck entries. The Isuzu 4 x 4 was a single entry, with only its driver and owner, Henry Simpson, his co-driver, John Comacho and a very small crew.

Not only that, all the other entries benefitted from highly modified racing engines and transmissions. While the Isuzu benefitted from years of engineering know-how and required only a stock diesel engine and stock transmission.

And we did all of this in the remarkable time of 28 hours. While vehicles finishing behind the Isuzu, or not finishing at all, included Chevy S-10, Mitsubishi, Datsun and Ford.

All of which goes to prove what a land of opportunity America truly is. Because after 60 years of proving how tough we are all over the world, we could prove it here, in only 28 hours.

**Tougher than the world's toughest roads.
Isuzu. Driving into your future.**

CAMEL

Where a man belongs.



Experience the Camel taste in Lights and Filters.

LIGHTS: 8 mg. "tar", 0.7 mg. nicotine av. per cigarette, FTC Report DEC '81.
FILTERS: 15 mg. "tar", 1.1 mg. nicotine av. per cigarette by FTC method.

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