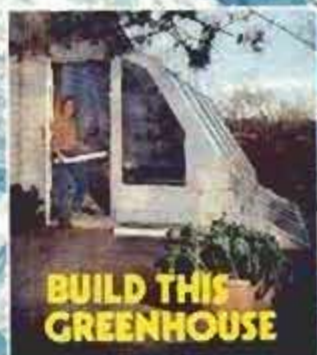


MARCH 1982 \$1.25

Popular Mechanics

INSIDE: 5 FULL
PLANS FOR
GARDEN
STRUCTURES

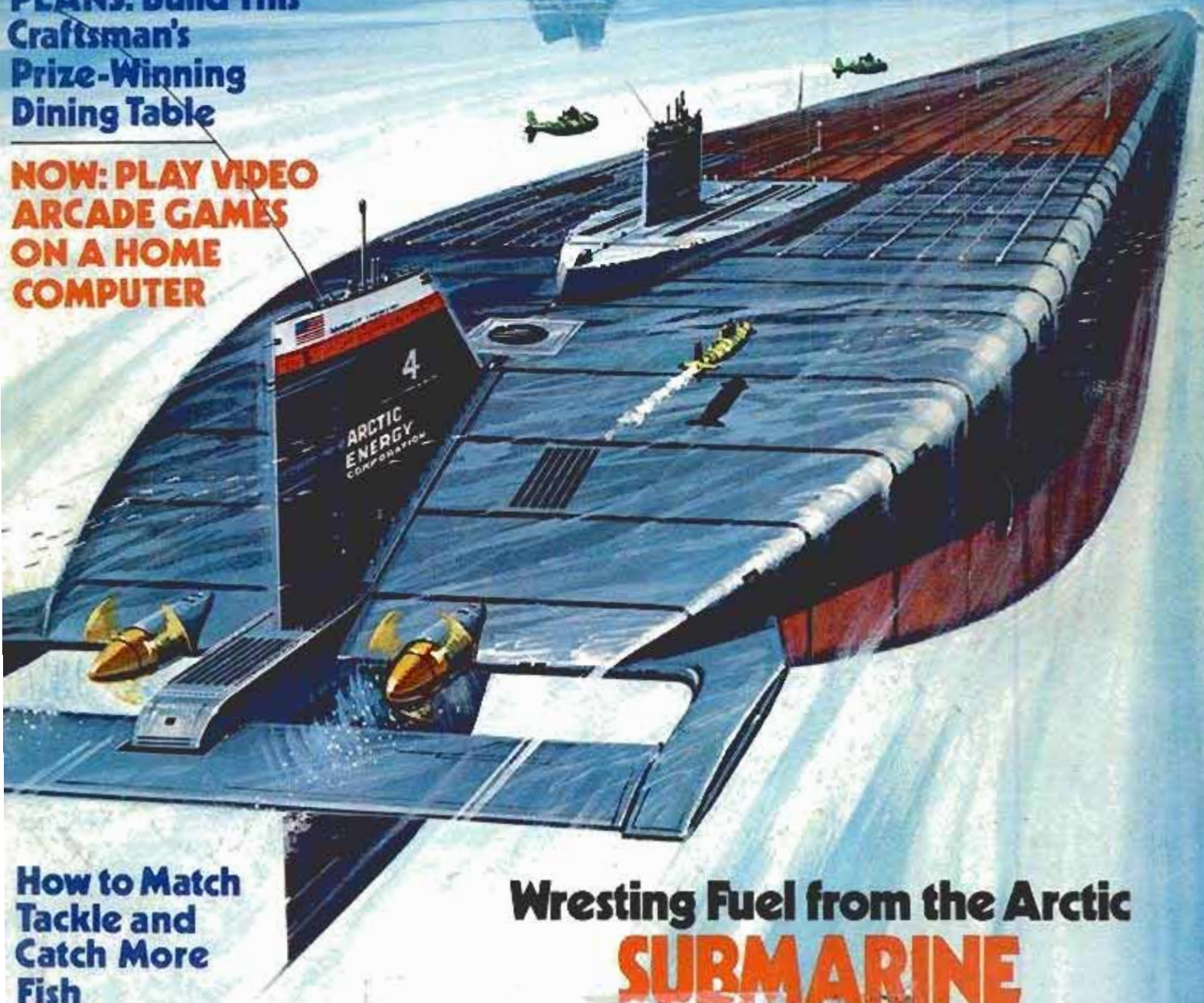


**BUILD THIS
GREENHOUSE**

**PM TESTS DETROIT'S
5 HOTTEST NEW
MUSCLE CARS**

**PLANS: Build This
Craftsman's
Prize-Winning
Dining Table**

**NOW: PLAY VIDEO
ARCADE GAMES
ON A HOME
COMPUTER**



**How to Match
Tackle and
Catch More
Fish**

Wresting Fuel from the Arctic

**SUBMARINE
SUPER TANKER**

**RAF JETS:
UPSIDE DOWN
100 FEET UP!**



Quality is Job 1

**“It all starts
here at
the Design
Center.”**

JACK TELNACK
Exec. Director, Design

Ford Motor Company's Design Center is where the shapes of tomorrow's new Ford, Lincoln and Mercury vehicles are conceived.

It is also where quality begins. No matter how attractive a new model might look, it must also be engineered so that every part goes together properly on the assembly line.

So our designers are responsible for following their creations right through the

manufacturing process to see that quality is maintained.

There's a new spirit at Ford Motor Company. And everyone is involved—from the man in the corner office to the people on the assembly line.

This dedication to quality is already paying off. Overall, a 25% year-to-year improvement in quality, as reported by our new car owners.

At Ford Motor Company,
Quality is Job 1.



Ford
Mercury
Lincoln
Ford Trucks

Sears Kenmore Gas Grill. Now you can enjoy barbecue meals without the barbecue mess.

**Save
\$100***

on this
Portable Kenmore
Gas Grill with
Redwood Shelf
now only
\$199.95**

Feb. 28 through March 27

Let Sears show you a way to quicker, cleaner and more convenient cookouts.

No more dirty hands from charcoal. No more lighter fluid. No more matches. Instead, a twist of the knob ignites the gas. Dual controls adjust the flame separately so you can cook at different temperatures on either half of the grill. And what a grill! A full 373 square inches of cooking area. Plus an 87 sq. in. warming rack.



In contrast to metal grids, our smooth porcelain enameled cooking grids are as easy to clean as your porcelain enameled cookware.

So save \$100 and start cooking out the clean and easy gas grill way.

Price includes redwood shelf, warming rack, grill head, portable base, lava briquettes, hose, fittings and 20 lb. LP tank (fuel not included).

**This advertised item is readily available
for sale as advertised.**

You can count on

*Minimum savings nationally.
**This price is \$100 off
regular separate prices.

Sears

Price and dates apply only to
continental United States.
Available in most Sears retail stores.

© Sears, Roebuck and Co. 1982



When a big one's on the line, better fish Stren.[®]

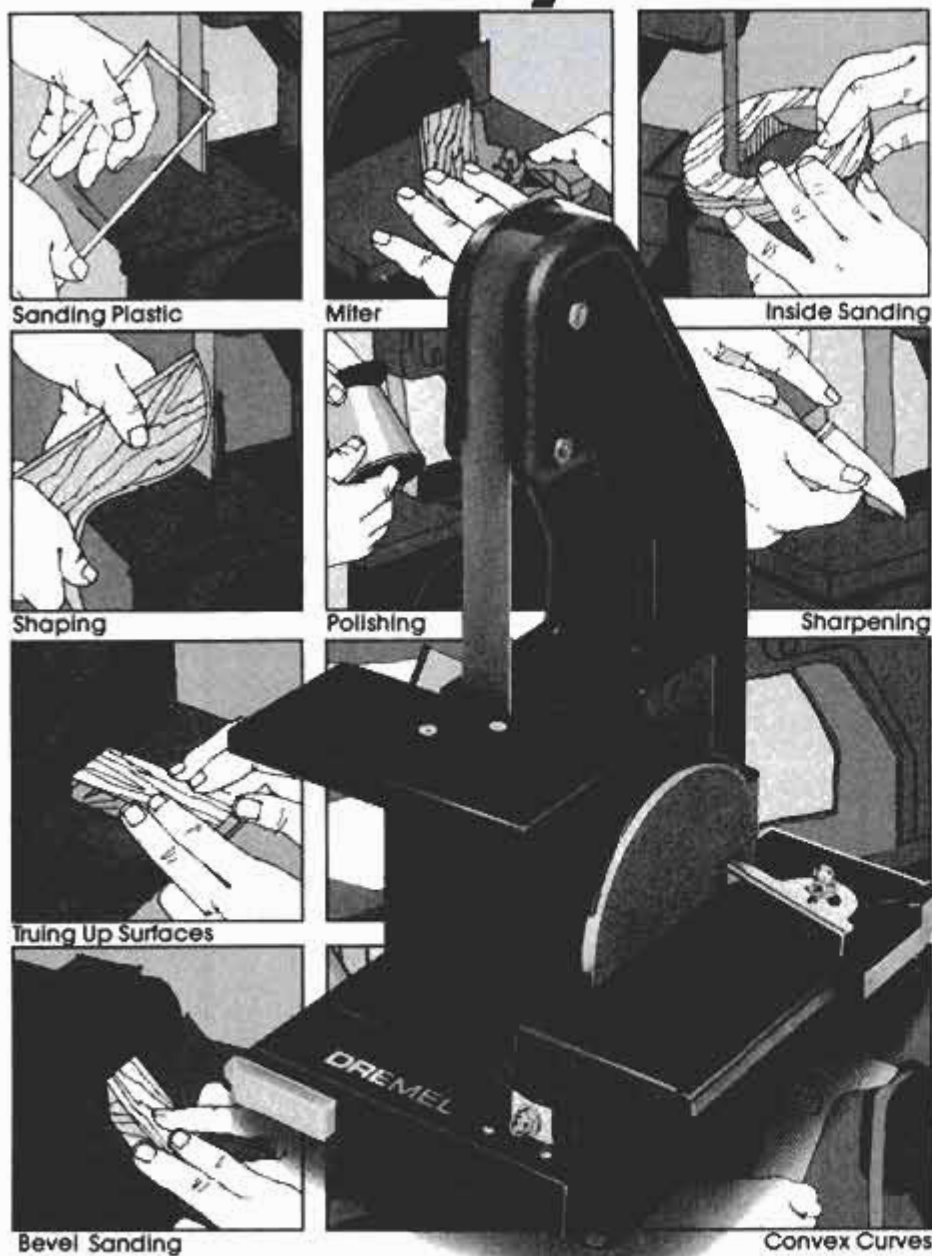
You had him. But your line couldn't hold him. And you lost your balance as well as your fish. Head for the tackle shop and pick up some Stren, the all-purpose line from DuPont.

Because Stren has the unique balance of properties you need for victory at sea. Stiffness to set the hook. Stretch to absorb the strike. And toughness to beat the fish at his own game, cast after easy cast. So fill your reel with the professional's choice and go after him again.

The best fishing is Stren fishing.



When there's no room for an ordinary tool.



The combination of a quiet-running, 5" disc sander and 1" wide x 30" long sanding belt makes this the most useful single power tool you'll ever own.

The disc handles rough sanding and shaping. The belt sander takes care of finishing, sharpening and polishing.

3" throat depth, easy belt adjustment makes inside sanding simple. Has a platen that provides a rigid sanding surface if you need it but removes for flexible belt sanding.

Great tool if you don't have a workshop. Great tool if you do. Available wherever fine power tools are sold.

Dremel, Division of Emerson Electric Co., Racine, WI 53406.

THE DREMEL[®] DISC-BELT SANDER

Popular Mechanics

Editor-in-Chief: John A. Linkletter
Executive Editor: Joe Oldham
Managing Editor: Bill Hartford
Art Director: Ira Herrick

Special Editorial Features: Sheldon M. Gallager, editor
Automotive: Tony Assenza, editor; Michael Lamm (West Coast); Gary Witzenburg (Detroit)
Home and Shop: Harry Wicks, editor; Penelope Spangler, Conrad M. Stowers, Steven Wilson, assistants
Boating, Outdoors and Travel: Wm. T. McKeown, editor
Electronics: Neil L. Shapiro, editor
Science: Dennis Eskow, editor
Editor at Large: Robin C. Nelson
Editorial Production: Peter Easton, chief; John Bostonian Jr., art; Shannon K. Kelley, Steven C. Fox, assistants
Art: Don Mannes, technical art director; Douglas Quinn, Alan Andresen, assistants

Special Publications: Clifford B. Hicks

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

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

Advertising Manager
 Frank P. Camastro

Advertising Offices:
New York: 224 West 57th St., New York, N.Y. 10019; (212) 262-7280
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 Advertising Manager: H. E. Kappel, (212) 262-4825

Published by The Hearst Corporation
President
 Frank A. Bennack Jr.
Chairman
 Randolph A. Hearst
Vice Chairman
 John R. Miller
President, Magazines Division
 Gilbert C. Maurer
Publisher, Popular Mechanics
 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, Treasurer; Harvey L. Lipton, Vice President and Secretary; Hearst Magazines Division: Gilbert C. Maurer, President; K. Robert Brink, Executive Vice President and General Manager; Raymond J. Petersen, Executive Vice President; Thomas J. Hughes, Resident Controller; William S. Campbell, Vice President, Director of Circulation.

The possible dream.

Follow your dream. To a hushed cove. A back country lake. Or a soft sea for an easy-does-it day.

Wherever your dreams lie, your Mercury® dealer can put you there with your own boat and motor. For less than you think.

Mercury's been building engines for over 40 years. Developing innovative technology. Testing and re-testing to give you an outboard you can count on. Again and again. So you can be assured of your investment. And your dream.

What's more, Mercury backs every engine with a year-long warranty on parts and labor. Honored at more than 6,000 dealers worldwide.

Go on. Follow your dream. And let your Mercury dealer help. After all, he knows anything is possible.

Mercury Marine
Fond du Lac, Wisconsin
Canada, Australia, Belgium

This One



1FHS-LPN-GJ9L

©1997 Mercury Marine

Nobody does it better.

Winsto

**This is your world.
This is your Winston.
Smooth. Rich.
Taste it all.**

KING: 15 mg. "tar", 1.1 mg. nicotine,
100's: 15 mg. "tar", 1.0 mg. nicotine, av. per cigarette by FTC method.

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

New
100's pack.

n



LETTERS TO THE EDITOR

Good old days in a Cub

A special tribute to John Lancaster for his article on the renowned Piper Cub (*The Plane That Taught America to Fly*, page 90, Dec. '81). Like probably thousands of older, ground-bound pilots, I dream of the good old days in a J-3 Cub.

I'm sure there would still be a ready market for a simple, forgiving machine without frills that just flies. I don't think hang gliders are the answer.

T. L. EVANS
ABBEVILLE, LA.

A fine article and well-deserved tribute to a famous aircraft. However, the military version you identified in a photo caption as a Piper L-4 is actually the Aeronca L-3, one of the Cub's two main competitors. The third member of the triumvirate, the L-2, was the Taylorcraft in civilian life and was designed by the same C. G. Taylor who designed the original Cub.

COL. ROBERT L. WICK JR.
CONFEDERATE AIR FORCE
ARLINGTON, TEX.

I question your statement that "four out of every five U.S. military pilots got their primary training in a J-3." I learned in a Taylorcraft, and most primary training was done in the Stearman, in both the Army and Navy.

R. G. SCHIFF
MISSOULA, MONT.

The Aeronca L-3 and Piper L-4 look almost identical, but we shouldn't have been fooled. It's true that the Stearman was widely used in primary training, but it was considered more advanced than the Cub. Many student pilots received their elementary training in Cubs and Taylorcraft before progressing to the Stearman.

Our figures pertained to the Cub's widespread use in this indoctrination role.

Zapped-again zeppelin

That "born-again zeppelin" (*PM Briefs*, page 65, Dec. '81) could be destroyed by a World War I Spad and a bagful of rocks. How would CDI's scientists like defending such a machine against modern jet fighters armed with missiles?

As a Boeing 727 captain, I am very much interested in innovation and

technical progress. As a taxpayer, I'd hate to see money spent on "born-again" zeppelins.

ALAN L. GROUT
KENT, WASH.

We agree it would stand little chance in a close-range fighter attack.

But the CDI scientists see its most important use as a surveillance platform in a peacekeeping role. Even as an airborne aircraft carrier, it wouldn't necessarily be more vulnerable to long-range missile attack than a slow-moving surface ship would be.

Abe would have liked them

Here's a picture (below) of my version of your Lincoln clock reproduction (*A Lincoln Legacy: Two Mantel Clocks You Can Build*, page 130, Feb. '81). I used the works from an



Reader McLeod's Lincoln clock reproduction (above), photographed with the issue of *PM* in which the plans appeared. Below: Reader Larzelere's three identical Lincoln clocks made for his three children.



old alarm clock, with a small mirror mounted in the door below the face. I'm very happy with the results.

MILLAR McLEOD
LASALLE, QUE.

I made three identical Lincoln clock reproductions (photo above) from your excellent plans. I presented the clocks to my three children for keepsakes. They have added sentimental meaning for me because I

used black walnut for the cases from an old tree in my own back yard.

WILLIAM E. LARZELERE
SENECA FALLS, N.Y.

We're glad you both liked the clock plans. For others who may be interested in the project, photocopies of the article are available for \$1.50 from Popular Mechanics, Box 1014, Radio City Station, New York, N.Y. 10101.

Still a close call

Your article *Hit or Miss? The Computers of Air Traffic Control* (page 96, Dec. '81) needs correction. The cutover from "Common I" control to TRACON control, at which I was present, occurred on January 10, 1981—over a month before the Argentinian airliner incident and not after it, as stated. Thankfully, we have had no major computer outages since that time.

MAURA E. McGRATH
SYSTEM SPECIALIST
NEW YORK TRACON

Your December cover was a disservice to this nation's professional airline pilots. The painting of a jumbo jet less than 300 feet above a city portrayed an isolated incident involving a foreign crew acting illegally and confused.

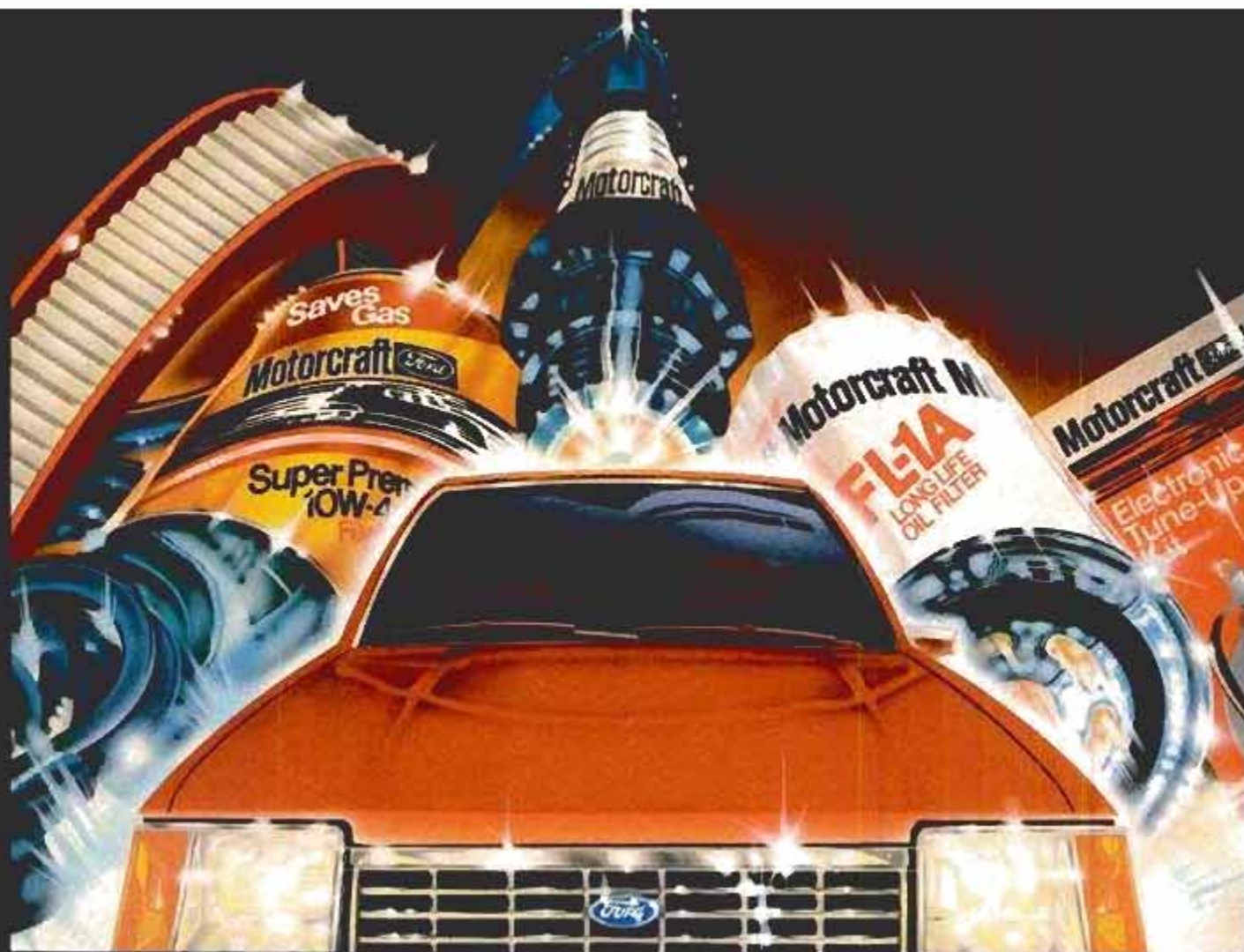
An airliner's pilots are at all times responsible for the operation and navigation of their plane. Air controllers do a fine job of providing separation between airliners, but they do not "fly" the aircraft from the ground. No pilot would allow himself to be "controlled" into the situation you depicted.

BARRY SYRETT
FIRST OFFICER, AMERICAN AIRLINES
RANCHO PALOS VERDES, CALIF.

It's true that the Argentinian airliner was under TRACON control at the time, but the incident occurred exactly as reported, according to the FAA. The air controllers we talked to agreed that any computer outage at a critical time must be considered "major."

Our cover intended no criticism of anyone. It accurately portrayed a near-crash situation that did occur, regardless of the circumstances. The outstanding safety record of this country's air crews speaks for itself in putting their competence beyond question.

PM



**GET UP TO \$9.50 BACK
ON MOTORCRAFT PRODUCTS, AND A CHANCE TO
WIN A NEW CAR TO USE THEM IN.**

Now get up to a total of \$9.50 in refunds on spark plugs, tune-up kits, air filters, oil filters, oil, and wire sets.

And to get even more, enter our "Win the World" Sweepstakes. Grand prize is a 1982 Ford Escort, plus a trip for two to a game of the '82 World Series, and \$5,000 cash. Or win one of our other world of prizes. A three-day, all-expense-paid trip for two to the 1982 World's Fair in Knoxville - plus \$2,000 cash. There's luxury handcrafted

luggage. Sport action binoculars. Digital travel clocks.

Refund and sweepstakes offer good through May 31, 1982. Details available from your participating Motorcraft retailer. **No purchase is necessary to enter the sweepstakes.**



To obtain an official sweepstakes entry form, send a self-addressed stamped envelope with your request to: "Win the World" Sweepstakes, P.O. Box 8804, Maple Plain, MN 55301. See official rules on entry form for details on sweepstakes.

Sweepstakes is void in Wisconsin and where prohibited by law. You must be 18 years of age or older to enter. Entries must be received by midnight, May 31, 1982.

...FOR SURE

MOTORCRAFT

PM ELECTRONICS MONITOR

Poet sees red

Dr. Edmund Skellings is the executive director of the International Institute for Creative Communications at Florida International University. He is also the official poet laureate of Florida. And he now holds one of the most unusual patents we've ever heard about.

Dr. Skellings's patent covers color coding on a CRT readout when used to impart information. And that's not as esoteric as it sounds.

Suppose you have a computer program in a classroom that prints out five sentences on the video monitor. All the nouns in each of the sentences are printed in red to draw attention to them; the rest of the words are in white. If that program were offered for sale, it would be a direct infringement of poet Skellings's patent.

"My father was an inventor," Skellings told us, "so I grew up realizing things could be patented."

So far, Skellings has licensed a number of businesses and programmers to use his method. Chief among the licensees is the Control Data Corp., a big name in big computers.

At first hearing, many of the people to whom we've mentioned Skellings's patent were amazed that such an idea could be patented. But though it may seem a widespread idea, it hadn't been used in computerdom before Skellings.

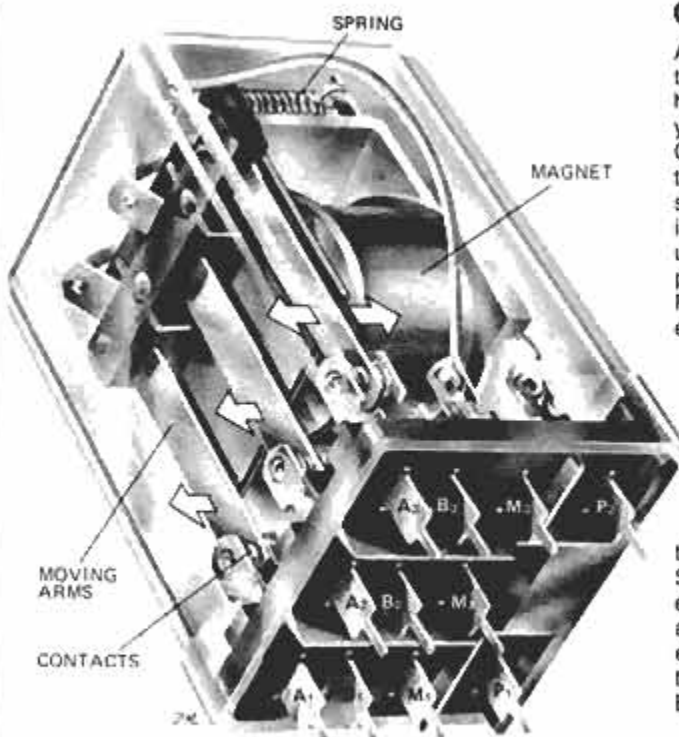
Similar patents do exist for color coding in the print medium. But because print media use primary colors (red, blue and yellow) in additive combinations, while computer screens use different primary colors (red, green and blue) in subtractive combinations, the courts ruled that color coding on computers was different than in print.

How many other ideas could be patented anew once applied to computing?

Disney wins

Law-abiding citizens who own video cassette recorders (VCRs) have been changed, by the magic of Walt Disney's studio (with an assist from Universal Studios), into, if not criminals, at least minor lawbreakers.

The most popular use for a VCR is called "time-shifting." This means that if a movie you want to see is on at 2:00 a.m., you record it automatically and then view it at a reasonable hour the next day. Or, if two great movies are on TV, you record one on the VCR's tuning section,



Clicking with relays

A relay, an electrically controlled switch, is one of the handiest devices to have in your electronics "junk box." Contacts on the bottom of the three-pole relay we show here can look confusing, but they're easy to figure out. When switching power is applied at contacts P1 and P2, the magnet is energized. This pulls the moving arms of the relay from the A1, A2 and A3 contacts to the B1, B2 and B3 contacts (a three-pole relay can switch three inputs simultaneously). The three inputs are connected to terminals M1, M2 and M3. So, with the switching power off, output is at A1, A2 and A3. When the relay is energized, output switches to contacts B1, B2 and B3.

while watching the other movie on your TV screen.

Well, Walt Disney and Universal Studios decided that all this home taping was hurting them in their corporate pocketbooks. Perhaps it was cutting theater attendance (although no one we spoke with could back that up with figures) or perhaps actors were losing out on some royalty payments.

They took Sony—a prime manufacturer of VCR technology—to court. And the courts decided in favor of the studios.

As of this writing, it's illegal to record movies off the air for your later enjoyment. But then again, according to Sony, the studios have said they won't press charges against individuals. So, you probably don't have to worry about the Disney thought police breaking down your door and axing your VCR to smithereens.

What you might have to worry about, according to Bill Baker, a Sony spokesman, is "a levy on each machine or a fee added to the cost of blank tape." These consumer add-on taxes would pay studios the money they figure they are losing.

Not surprisingly, Sony is appealing this decision. According to Baker, Sony intends to go to the Supreme Court, if necessary.

Meanwhile, what do you do with your VCR until the verdict is in?

"It's a funny situation," Baker

says, "but we're not advising people not to use them (VCRs)."

Tonight *Casablanca*, tomorrow *Jailhouse Rock*.

Pac-Man loses

As we mention in *New Arcade Action at Home* (see page 120) companies like Atari are beginning to sue other companies for bringing out arcade-style games similar in play and appearance to their own, popular arcade games.

Atari's *Pac-Man* is a happy little hockey-puck-shaped fellow who runs through a maze, gobbling ghosts. Magnavox's new *K.C. Munchken* home-video game features a whole family of gobbling cuties in a maze. Atari tried for a preliminary injunction to stop Magnavox from selling *Munchken*. No luck; a Chicago federal court judge told Atari to eat its heart out and denied the injunction. But Atari still intends to pursue its lawsuit. **PM**



The reason they live
so long in the city is
because they were born
on the farm.

Where we come from, work goes
down to dusk and equipment that isn't
built right falls apart in a hurry.

So even though our lawn tractors,
riders and walk-behind mowers may never see a
rutted wheat field, they still have some of the sturdiest
frames and wheel assemblies around.

You probably won't be cutting eighteen hours straight, either. But you can
understand the importance of having an engine that's synchro-balanced and
shielded to run quiet and smooth.

You see, building things that last is kind of an obsession with us. A drive
through farm country'll tell you that.

We want folks who buy John Deere products to appreciate 'em as much as we
do. And we figure the best way to do that is make sure they're going to have
them for an awful long time.

Nothing Runs Like a Deere®



For nearest dealer or for free folder call 800-447-5126
(Illinois, 800-322-6796) or write John Deere, Dept. 62, Moline, IL 61265.



Walk-behind
Mowers

Lawn
Tractor

Riding Mowers

Big savings on selected products through May 31 at participating John Deere dealers.

IMPORTS & MOTORSPORTS

Haute carture



Peugeot 604 Turbodiesel is supremely comfortable and elegant, but says so quietly.

I slipped into my Saturday best and was ready to roll. It was a two-car weekend: I had the keys to Peugeot's 604 Turbodiesel and Lincoln's '82 Continental. I bounced between the two for the day and by Sunday knew that I'd write my check for \$20,000 for the 604 before I'd part with \$26,000 for the Givenchy Continental. Not that I'm cheap, mind you. It's just that the Peugeot, well . . . fits better. A car's a driving suit and when you slip into it, you want to feel good and look good. The new Continental, despite its more compact size for '82, still feels like a suit of armor. Its inertia takes you where you don't want to go and every move has to be carefully planned in advance. Inside, it's all tucked and puffy.

In the 604, on the other hand, I felt like I was wearing a fine tailored suit: It lets you move with more grace than you thought you had. Even with its relatively tame powerplant, the 604 graciously does your bidding (and the turbodiesel Four can give you almost twice the fuel economy of the 5.0-liter V8 in the Continental). The superb all-independent suspension devours rough roads and takes you around fast curves without rumpling. This Peugeot is tailor-made, though: Fewer than 1,000 will be available this year.

It's up to Detroit to bring us the cars we want in numbers; they're

the masters of mass production, and can make all the cars we want, if we want them. American tastes are changing—maturing, if you will. Soon, Detroit might agree . . . and change its idea of how a luxury car should feel and fit.

Rollin' along

While we're figuring out how to get a second decade from our 10-year-old cars, other drivers are in showrooms, creating a sales boom for some models. As 1981 came to a close, the lucky manufacturers were reporting whopping gains in sales of cars from \$20,000 up to prices in six figures. The volume guys are the domestics, of course, with Cadillac, for example, selling over 210,000 cars for the year through November, a 7.8-percent increase over the previous year. But it's the imports that are logging the real big *percentage* gains. Jaguar is wowing drivers with its XJ6 and XJ-S and appealing to practical instincts with its new 24-month, 36,000-mile warranty. With sales of over 4,000 cars, Jag was up some 50 percent and looking at a record '82. Rolls-Royce, too, with an annual sale of around 1,000 cars here in '81, is up roughly 40 percent. The grabber for Rolls has been its new Silver Spirit, identical to the Silver Spur shown here except that it's the shorter-wheelbase "compact" of the line.



Rolls-Royce Silver Spur is stretch version of Silver Spirit, the "compact" buyers prefer.

One-man car

A quick switch to the other extreme in the world of automobiles brings us back to the Tokyo Motor Show, where this bubble car made its debut. This three-wheeler from Suzuki has front fenders about the size of fender flares on some sporty cars.

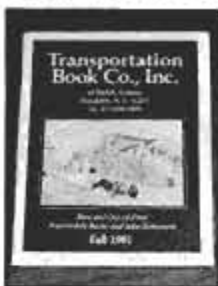


Three-wheel Suzuki is a capsule for one.

Yes, as a car it sure is impractical, but wouldn't you just love one?

Car lit

I can think of a couple of things in life that I spend more time reading, dreaming about and looking at pictures of, than doing. Driving cars is



Catalog is for lovers of wheels.

one of them. I'm glad so many artists, writers and photographers have captured so much of the world of cars, and that there's a Transportation Book Co. through whose catalog I can browse for some of the earliest books about cars (or, motor carriages in turn-of-the-century volumes), marque histories, racing and more. For the Spring '82 catalog, send \$3 to Transportation Book Co., 64 Eighth Ave., Brooklyn, N.Y. 11217.

PM



BY BILL HARTFORD

Not available in California.

© 1981 Toyota Motor Sales, U.S.A., Inc.

Shown with optional equipment.



OH
WHAT
A
FEELING!

THE 1982 TOYOTA DIESEL TRUCK

TOYOTA

YOU ONLY KNOW IT'S A DIESEL AT THE PUMP.

The Toyota Diesel Truck. It won't remind you it's a diesel when you start it on cold mornings. The dependable Toyota Diesel has two heavy duty batteries for extra cranking power! No other small diesel truck does.

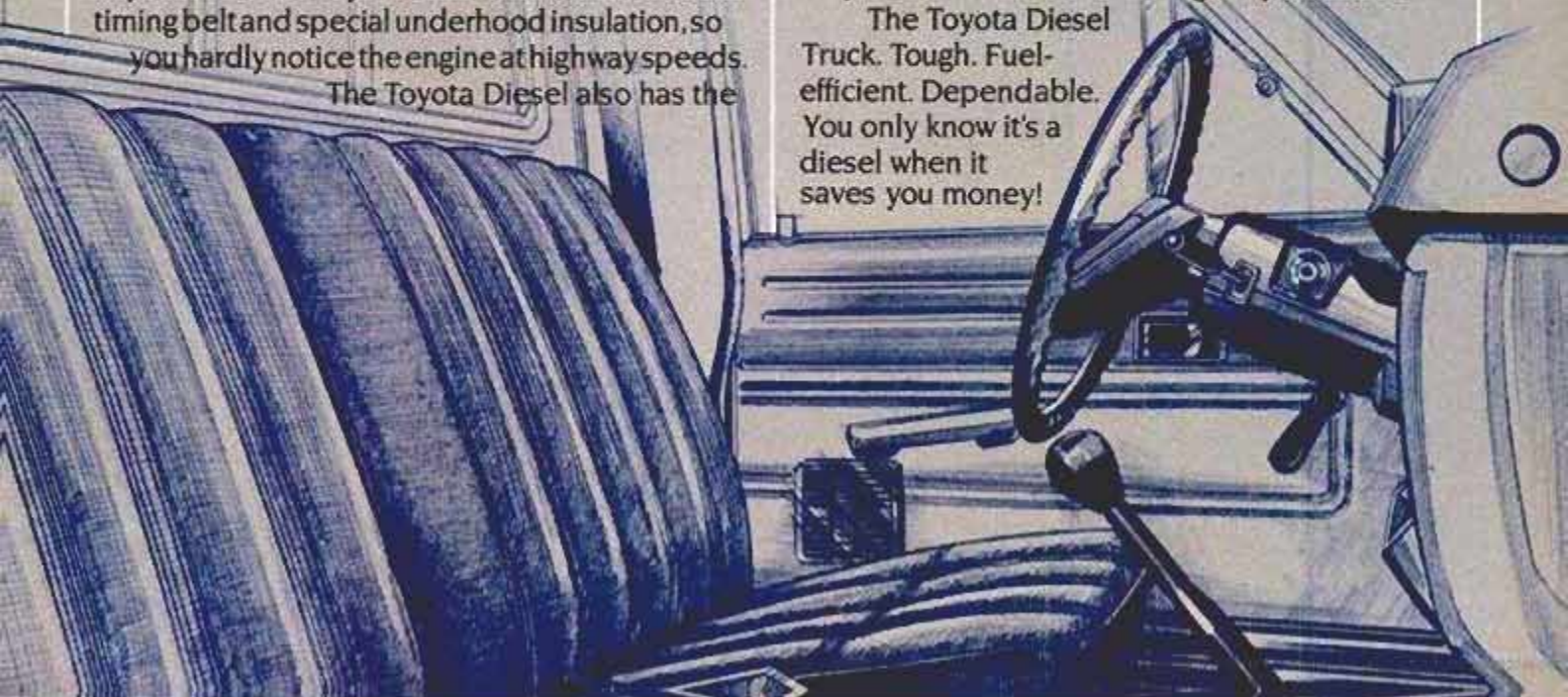
And you won't know it's a diesel by listening as you drive. The Toyota Diesel has a fabric/rubber timing belt and special underhood insulation, so you hardly notice the engine at highway speeds.

The Toyota Diesel also has the

features you want as standard equipment. Like a 5-speed overdrive transmission. A 7-foot cargo bed, not 6-foot like some. And a separate, rugged frame (like an 18-wheeler has) so Toyota's Diesel Truck carries a full 1100 pound payload.

The Toyota Diesel Truck. It's rated at 38 EPA Estimated Highway MPG, (31) EPA Estimated MPG. Remember: use this estimate for comparisons of other small trucks with manual transmissions. Your mileage may be different depending on speed, trip length and weather conditions. Actual highway mileage will probably be less than the EPA "Highway Estimate."

The Toyota Diesel Truck. Tough. Fuel-efficient. Dependable. You only know it's a diesel when it saves you money!



SCIENCE WORLDWIDE

'China Syndrome' fact /

In the high temperatures of a nuclear plant "meltdown" accident, atomic fuels give off vapors that may react with each other, with reactor parts or with water vapor in the cooling system. Do such reactions increase the heat, which may already be about 4,000° F in a meltdown? Do certain atomic fuels cause more dangerous reactions than others?

Nuclear physicists haven't had enough experience with plant meltdowns to give precise answers to these questions. But now, Sandia National Laboratories in New Mexico is using existing technology—a steam superheater—in a new way: to safely duplicate early meltdown conditions by producing dense steam inside a metallic cylinder where temperatures approach 2,000° F. Nonradioactive forms of such chemicals as iodine and cesium hydroxide are vaporized with electric heaters and mixed with dense steam inside a sealed chamber. When the steam/vapor mixture is at the proportion chosen by the experimenter, it's released into a "reaction chamber," where it can be observed for a period up to several hours.

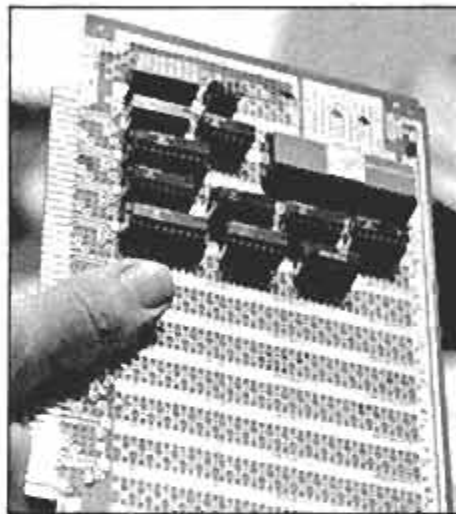


Superheater, being adjusted by Sandia's E. M. Eirick, simulates atomic meltdowns.

This way, the steam can be analyzed by spectroscopy to detect changes in the fuel. Also, scientists will be able to study the mixture after the chamber cools down and the steam condenses.

Petit brain monitor

Petit mal epilepsy is generally found in children who have as many as 100 seizures of a few seconds each per



Heart of portable brainwave monitor contains memory circuit to store petit mal patient's response to therapeutic drugs.

day. The telltale signs are frequent, brief losses of contact with the environment. Often, petit mal victims are written off as mere daydreamers.

After the illness is diagnosed, the victim goes through a battery of electroencephalograms (EEGs), taken along with varying dosages of drugs to determine how much anti-convulsive medicine is needed to allow the patient to lead a normal life.

Now, a University of Florida electrical-engineering team has designed a computer program and a compact device to take some of the misery out of postdiagnostic testing. The 4 by 6-inch, 1-pound device is worn on a belt. Two thin wires run from the nickel-cadmium battery-operated belt unit to a pair of sensors taped to the patient's head. The unit stores about as much information as a standard handheld calculator.

At the end of the day of wear, the user connects the device to a telephone with a special jack. Then, the data are transmitted by phone to a hospital computer, which processes the information and prepares a series of EEGs.

By using this device regularly for about two weeks, the young epileptic cuts down the number and duration of clinic visits. And the doctors can monitor the patient's response to drugs in a normal environment.

One potential problem: How does one keep a fairly active child from disconnecting or breaking the device? University of Florida engineering professor Jack Smith sug-

gests a straightforward approach: "You tell him that the alternative is a daily, lengthy visit to the clinic. It's just like wearing glasses."

Old yellow bites dust

Whiter, longer lasting dentures and crowns may sound like a television advertisement, but it's actually the claim for two chemical compounds discovered by a National Bureau of Standards (NBS) chemist.

On loan to the federal agency from the American Dental Assn. as part of a long-term research project, Harold Argentar has found that two compounds—part of a class known as "tertiary aromatic amines"—can harden acrylic dental materials quickly.

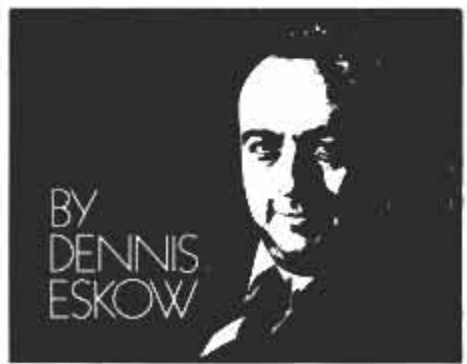
The substances provide greater mechanical strength and resistance to wear than previously used compounds. Other materials used to harden dental acrylics tend to yellow them slightly. But Argentar's compound, NBS reports, actually works to whiten the material.

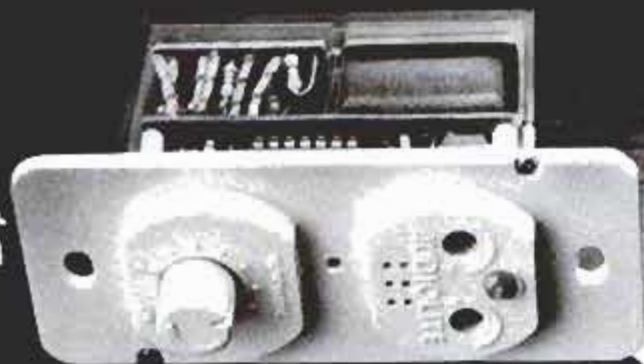
Space shine

Parts are starting to be assembled for the 1985 launch of America's space telescope. Perkin-Elmer has followed a 2½-year program of precision grinding and polishing of the 96-inch-diameter mirror with the application of submicroscopically thin coatings of protective aluminum and magnesium fluoride. (The mirror is smooth to better than one part in 120 million.)

Following completion of the mirror in December 1981, Perkin-Elmer went to work on mounting it on the tubular structure of the mirror housing. The space telescope is due to be shuttled into orbit in 1985.

The scope will give astronomers a glimpse of objects never before seen by earthbound telescopes, which suffer from atmospheric interference. **PM**





Wall plate not included.

NEWEST THIEF STOPPER. A LIGHT SWITCH WITH EARS.

Imagine entering a darkened room that lights up at the sound of your footsteps. A room that's also 'smart' enough to flick off lights when it's empty.

Imagine too, an intruder attempting to pry open your window at midnight. Suddenly, room lights are ablaze, frightening him off—and your home and family remain untouched.

And who's your fearless protector? A light switch named AudioLite.

An invention that offers security and remote convenience straight from the pages of science fiction.

A slave to your every move.

AudioLite is also a wall switch you never have to touch—because it's sound activated. It turns on lights the second someone enters a room and turns them off when they leave (works outside too—in driveways, patios, porches).

How much sound does it take? You can adjust AudioLite's sound sensor to precisely any level. At high sensitivity even the clicking of a key in a lock or the opening of a door will turn on the lights. You can also lower its sensitivity so an extremely loud verbal command or noise will be required. Or choose an infinite number of adjustments in between.

Once activated, lights remain on for the time duration you set, anywhere from 7 seconds to 7 minutes.

Don't worry about lights going off when you need them. Each time AudioLite hears a new sound, it resets and begins counting over—keeping lights on without interruption. For quiet read-

ing, simply use the manual On/Off override. Easily adjustable timer and sensitivity controls are recessed and child proof.

Save money in more ways than you'd think.

Hall lights usually left on for hours are now on only when you need them. Likewise bathrooms, closets, garages and patios. You'll find about half the light usage in such areas is saved—lowering your utility bill accordingly.

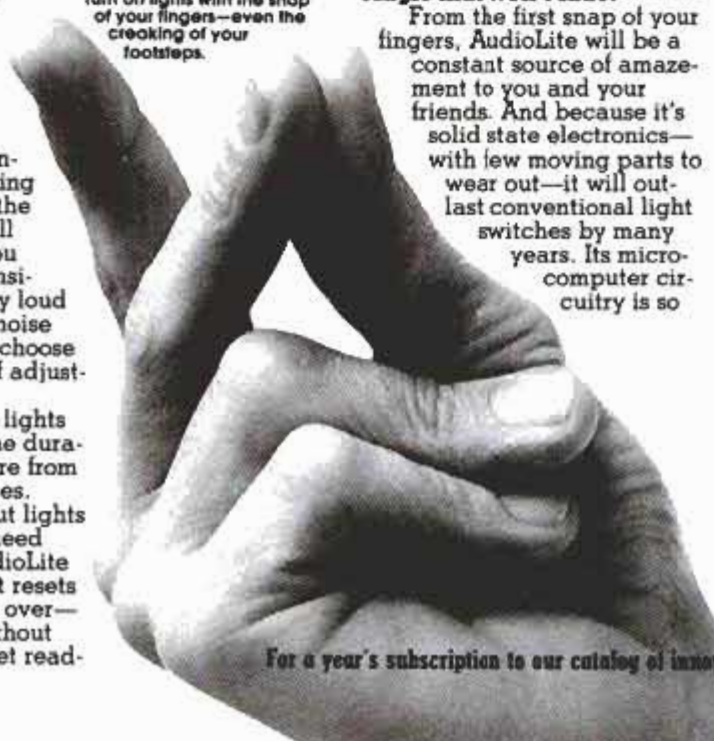
Because AudioLite is also a full range dimmer, you use exactly the amount of light you need—as well as extend bulb life by 15 times or more.

And you needn't turn AudioLite off during the day—a daylight-sensitive photocell assures no unnecessary lights get turned on during daytime hours.

Magic that won't fade.

From the first snap of your fingers, AudioLite will be a constant source of amazement to you and your friends. And because it's solid state electronics—with few moving parts to wear out—it will outlast conventional light switches by many years. Its micro-computer circuitry is so

Turn on lights with the snap of your fingers—even the creaking of your footsteps.



reliable there's a one year total replacement warranty: should anything go wrong, the manufacturer will send you a new one, free of charge. After a year, prompt service is available by mail—but it's unlikely you'll ever need it.

AudioLite replaces your present light switch in minutes. All you need is a screwdriver. Works with any incandescent bulb up to 300 watts.

As soon as you try one, you'll want to replace all your conventional wall switches with AudioLite. That's why there's a special price if you order four at a time—\$99. (For one only, the price is \$34.)

However, you may order four on trial. If not perfectly satisfied after trying one, return them all within 30 days for a prompt, courteous refund. You're protected by The Sharper Image guarantee of satisfaction.

Call now toll-free, and protect your home with this newest brainchild of remote control technology. Be among the first to own a light switch with ears, eyes and brains.

ORDER TOLL FREE.

1-800-227-3436

Credit card holders use our toll-free numbers. Or send a check. Order product #SM653 for the package of four: \$99 plus \$4.50 delivery. Order #SM652 for one: \$34 plus \$2.50 delivery. Add 6% sales tax in CA. And please mention this magazine.

800 227-3436

In California 800 622-0733
In Alaska and Hawaii 800 227-3826

THE SHARPER IMAGE™

755 Davis Street Dept. 8317
San Francisco, CA 94111
©1981 The Sharper Image

For a year's subscription to our catalog of innovative products, send a dollar with your address.

GUARDING YOUR ★ MILITARY EXPERIENCE

FRINGE BENEFITS

If you have experience in any branch of the Armed Forces, you could not only be earning a good extra income—but enjoying some valuable fringe benefits—while you hold one of the most important jobs in America. In an Army Guard unit close to home.

Here are some of the many fringe benefits you get for serving just two days a month and two weeks annual training each year (after an initial training period) in the Guard:

Free air travel: is available to you as a service member anywhere in the continental U.S., Alaska, Hawaii or Puerto Rico, on a space available basis.

Education Assistance: depending on the state in which you serve, you may be eligible for tuition aid, college loan repayment and other types of education assistance. Your local recruiter has complete details.

A bigger pension: you'll earn extra retirement credits, and you can start collecting your pension at age 60.

PX Privileges: up to 48 visits a year.

Low-cost life insurance: up to \$20,000 in coverage for just pennies a day.

You'll also be helping people in your community and state when natural disasters or other emergencies strike. We think you'll find that's the biggest "fringe benefit" of all.

Fringe benefits. Just one more reason to Guard your military experience in the Army National Guard.

To learn about other reasons—from cash bonuses to new skills—see your local recruiter, or call toll-free 800-638-7600.*

*In Hawaii: 737-5255; Puerto Rico: 723-4450; Virgin Islands (St. Croix): 773-6438; Maryland: 728-3388; in Alaska, consult local phone directory.

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



NOTES FROM THE EDITOR

John A. Sillitto

Craftsmanship. It's an appropriate word... a good, sturdy word that tells us things are done well. Even without such adjectives as "good" and "fine," the word carries its own meaning of a task completed with skill and with care. The creator, the craftsman, began with know-how and then worked with the aim of doing his best.

There have been times when all of us wondered what ever happened to craftsmanship. Examples of shoddy workmanship abound; they are too much with us to need listing in this space.

At worst, it may have seemed the Earth was being buried in an avalanche of trash.

It's still possible. But as the world moves into the decade of the '80s we are heartened to note a rising demand for quality in American life.

When we own something, we try to own the very best.

We are more discriminating in what we choose to eat or drive or live in or put into our homes. There's still bad stuff, of course, but the good, the well-designed, the long-lasting is becoming our first choice.

Here at PM, we've always known that our readers demand our best. When our cover picture has a particular appeal to craftsmen—last November's Scandinavian workbench, for example—you respond with enthusiasm. For one, you buy more magazines at your newsstands. You write letters. And you *build* it.

Look at the Duncan Phyfe table on page 140. Built by a high-school student, it was the grand prize winner in the 1981 Stanley Tools National Furniture Contest. As the accompanying article explains, such beautiful work is a tradition at that school—Everett (Massachusetts) Vocational High School. (And helping judge the Stanley contest is a tradition at PM. We've had our Home & Shop Editor on the panel for all 16 years of the competition.)

The Stanley contest is just one evidence that craftsmanship still flourishes. Have you been to crafts shows lately? Those we've attended feature exquisitely executed art objects, furniture and the like. An increasing number of home restorations are the work of people who learn what needs to be done—and then do it with care.

It's no surprise. Craftsmanship is part of our heritage. We should expect it. You can continue to expect it from PM.



Craftsman Joseph Iannuzzi (above) in the Everett High School shop with instructor Joseph Bognore. At left: PM's Harry Wicks and the president of Stanley, William L. Butts, admire prize winner.

New from NRI!

The first at-home training in videocassette recorder repair with exclusive videotaped lessons.

Learn Video/Audio Servicing... includes RCA state-of-the-art VCR, NRI Action Video lessons, plus full training in color TV and audio repair.

Now, you can learn the hottest, most wanted skill in home entertainment electronics... servicing and repairing videocassette recorders and video disc players. Well over 2 million units have already been sold and the demand is just starting! Already, qualified VCR technicians are in short supply... people are waiting up to a month for VCR repair. Good jobs at good pay are going begging. And NRI can get you in on the action with convenient and effective at-home training.

Choice of Specialized Training

NRI offers you three Master Courses in Video/Audio Servicing, each complete, each with equipment and training for the specialty you want. Each course thoroughly prepares you for color TV plus audio and video equipment. Then, you take the specialized hands-on training on the equipment you select.



Learn as you work with equipment you keep.

You can get specialized audio experience as you build your own AM/FM stereo system complete with speakers. Or gain real bench experience with hands-on TV training as you build a 25" (diagonal) fully-computerized, programmable color TV and professional test instruments. Or train with your own RCA videocassette recorder and NRI's exclusive Action Video servicing lessons on videotape.



State-of-the-Art VCR

This modern VCR features high-technology design with electronic pushbutton tuning, remote control, three recording speeds with up to 6-hour capacity, high-speed visual search, built-in clock/timer, memory rewind and audio dubbing capability. Direct drive motors and azimuth recording give outstanding picture reproduction.

It's yours to keep, as part of your training. You'll not only use it to learn operation and servicing techniques, but to play the absorbing NRI Action Video lessons that come as part of your specialized training. In word and picture, you'll learn theory, construction, and service procedures, see them explained in graphic closeups. And you get this unique training only with NRI!

Learn at Home at Your Convenience

No need to quit your job or tie up your evenings at night school. No time away from your family or expensive travel. NRI comes to you. You are a class of one, getting both theory and practical hands-on training backed up by our staff of experienced educators.

NRI the Pros' Choice

More than 65 years and a million and a half students later, NRI is still the first choice in home-study schools. A national survey of successful TV repairmen

shows that more than half have had home-study training, and among them, it's NRI 3 to 1 over any other school.

That's because you can't beat the training and you can't beat the value. Only NRI combines exclusive fast-track training techniques with modern state-of-the-art equipment to give you the skills you need for success quickly and easily. Only NRI offers such complete training with so many timely options for specialized bench experience. Send for our free catalog and get all the facts on these exciting Master Courses in Video/Audio servicing.

Free Catalog... No Salesman Will Call

Mail the postage-paid card today for your free copy of our 100-page look into tomorrow. It shows all the equipment you get, describes each lesson in detail. And it tells you about other important career opportunities in Microcomputers and Microprocessors, Digital and Communications Electronics, Electronic Design Technology, and more. Send today and get started on a big new future for yourself. If card has been removed, please write to us.



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

We'll give you tomorrow.

'82 RVs: A 22-mpg diesel's on the way



First prototype of what Winnebago hopes will be the van conversion of the future, the Centauri will have a Renault two-liter turbo-charged diesel and front-wheel drive.

Breakthrough improvements in performance are forecast for the new, lighter rigs.

by Bill McKeown RV EDITOR

There's little chance that you've seen the most interesting recreational vehicle to appear this spring—the Centauri—and small possibility that you will. Right now, it's a prototype that's likely to be kept under wraps for perhaps a year. Once in production, we will prepare a full test report if it is nearly as good as predicted.

While all RV makers are trying to move toward lighter, stronger chassis with less wind resistance, longer life, better handling characteristics and less need for fuel to move them, the breakthrough could be from Winnebago, again. The futuristic Centauri could start several trends, once it appears on the market in 1983. Target dates are for a few to be completed late this fall, and full production from the Forest City, Iowa, plant a year from now.

This conversion is based on a Renault van, and the power will come from the two-liter, turbo-charged diesel engine used in Renault's top-of-the-line, Model 30 sedan. The Winnebago Centauri prototype has front-wheel drive and steering more like a compact than a motor home, according to early reports. Unofficial fuel figures for this first-off model started with 20 mpg as the engine was breaking in, and

had passed an amazing (for an RV) 22 mpg after a few thousand miles. In Europe, the Renault 30 with this diesel is reported to have topped 41 mpg at 55 mph and averaged over 30 for highway and city driving combined. The Renault van, called the Traffic in Europe, has only been

available there. This Winne-Renault RV combo, looking something like PM's motor home of the future (page 72, July '77), will be one to watch.

Other RV manufacturers have also been active, and some expect better sales this year. A number of

(Please turn to page 193)



Fleetwood's New Pace Arrow, in six models from 26 to 33 feet, has aerodynamic front that's reported to reduce interior noise.



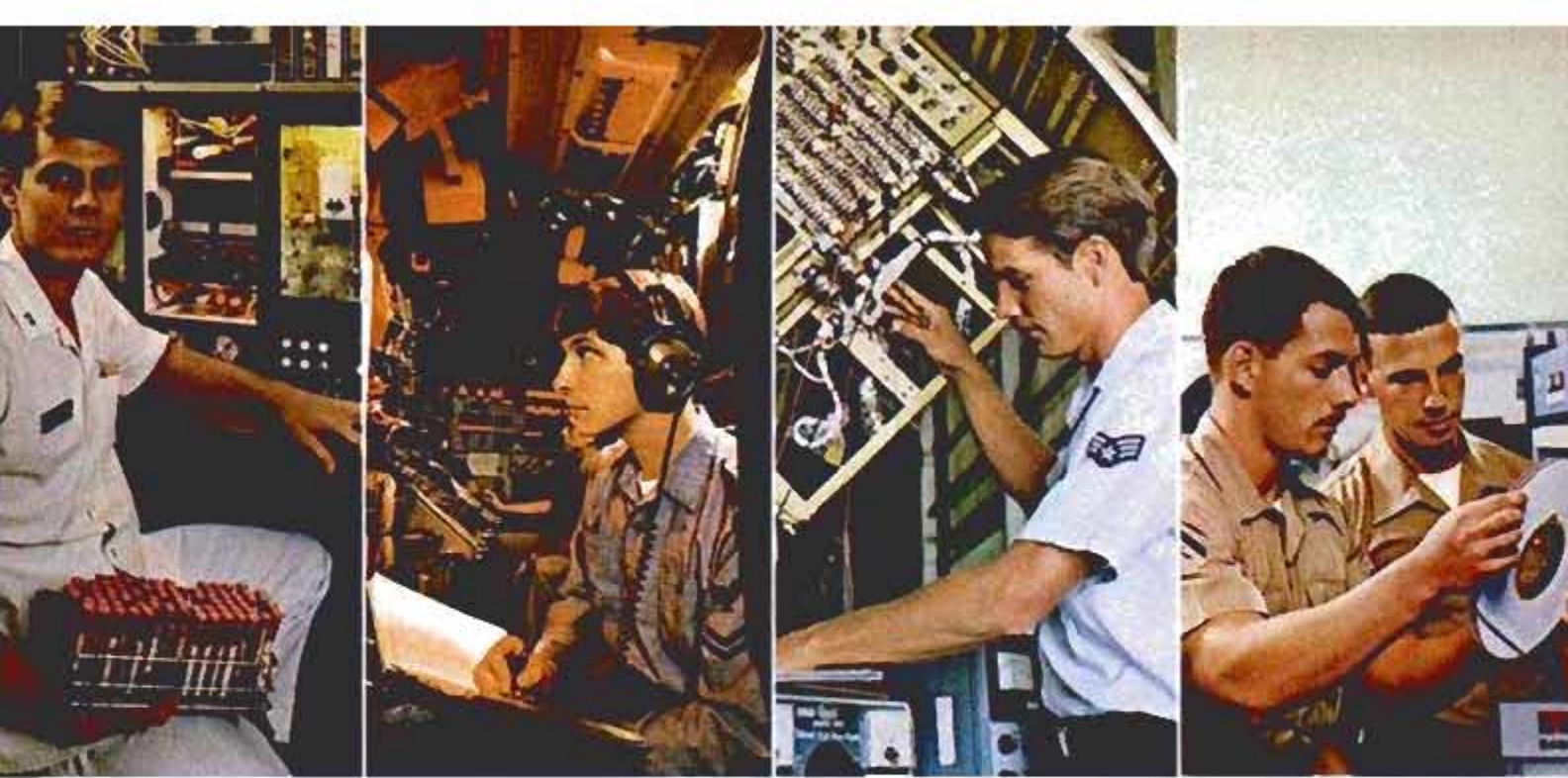
A mini-pickup can go camping with Coleman's Maverick folding camper. It opens to sleep four, with stove, sink, dinette, too.



Park models, as travel trailers like this 35-foot Normandy from Fan Coach are called, feature tip-out rooms and picture windows for extended campground vacations.



You're smart enough to graduate from high school. Are you smart enough to take advantage of these opportunities?



FIND YOUR OPPORTUNITY IN THE IT'S WHERE YOUNG PEOPLE

With school just about over, this is one of the most important times of your life. Should you get a job? Continue school? Do some traveling? Well, the Armed Forces won't claim to have all the answers, but we've got many of them.

BUILD YOUR FUTURE.

The Army, Navy, Air Force and Marines are looking for bright young people with an eye on the future, smart enough to have completed high school. We know how difficult starting out can be. So we've developed some very appealing programs.

Maybe your first interest is employment with a future. Does it always seem the jobs you want require experience? If you qualify, the Armed Forces have hundreds of jobs for you to choose from. And experience is not necessary. Many of these jobs carry over into civilian life. Like communications, data processing, mechanical skills. And you work with the latest and most modern equipment.

ADD TO YOUR EDUCATION.

The Armed Forces can help further a

young person's education. And they offer many ways to accomplish this: for instance, you can be educated while in the Service, receive training for a good job. While on active duty you might even take courses at a nearby university that could lead to a college degree.

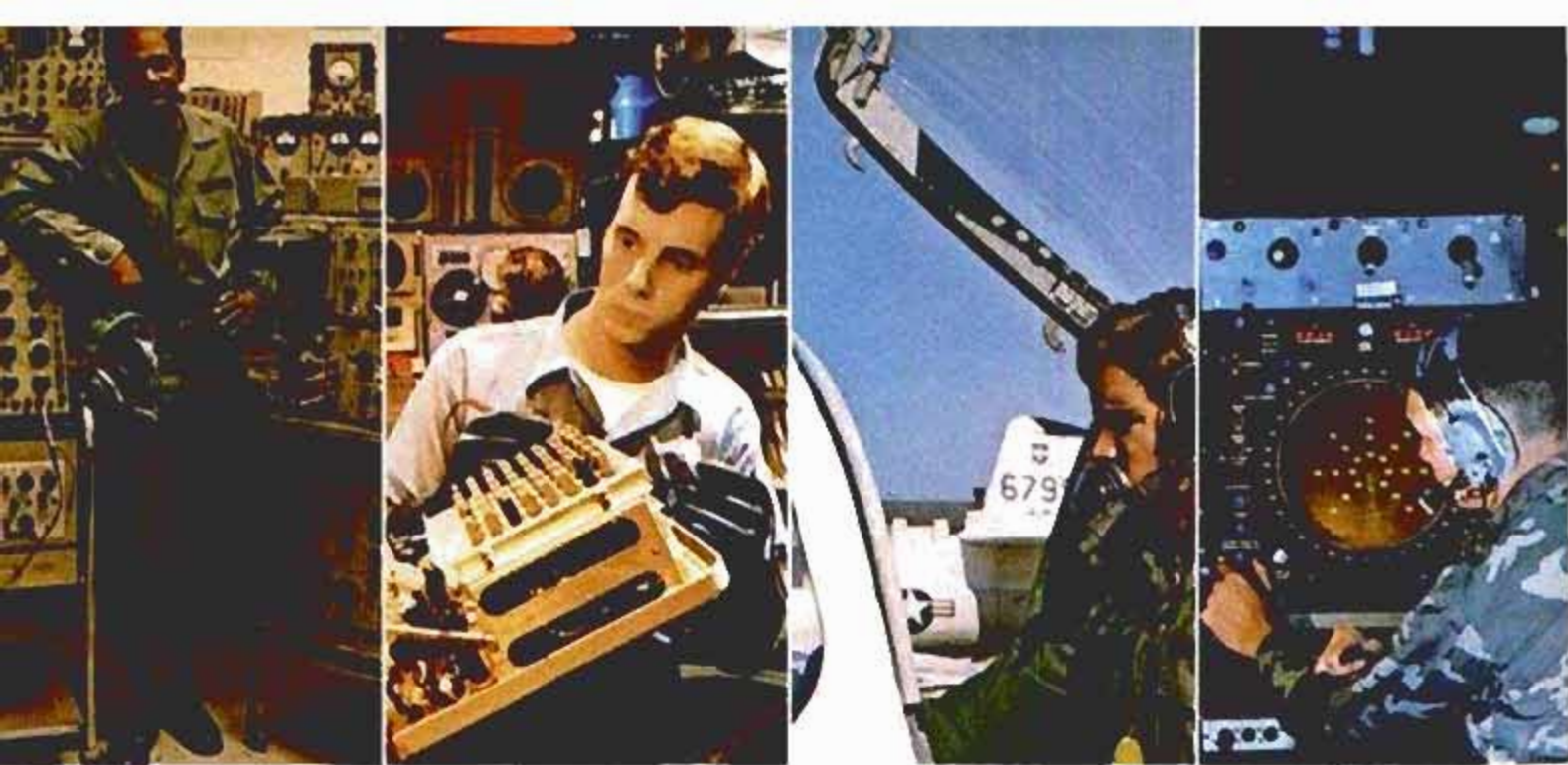
And did you know you could participate in a program that would even pay for a substantial part of your tuition for further education after the Service?

EARN GOOD PAY AND BENEFITS.

In the Armed Forces, you can earn responsibility most large companies would hardly ever entrust to a young person. The benefits are excellent. And the pay is higher than ever. More than \$550 a month to start. And the Services take care of your food, uniforms and housing, as well as your medical needs. You also earn 30 days of vacation with pay each year.

ENJOY ADVENTURE, EXCITEMENT, OPPORTUNITY.

What young person wouldn't be interested



ARMY, NAVY, AIR FORCE, MARINES. GET A GREAT START.

by the adventure, excitement and challenge of serving in the Army, Navy, Air Force and Marines? A place where you not only grow up, but grow better. A place to mature. A place that offers so many opportunities for advancement. A place to decide on what you want to do with your life. And for someone away from home for the first time, a place to have the time of your life, to travel further than you dreamed possible, to meet new and interesting people.

SERVE YOUR COUNTRY PROUDLY.

But whether in or out of uniform, whether at home or in a foreign land, you stand a little taller, walk a little prouder, handle yourself with a little more confidence...because you're serving your country and that's one of the finest things a person can do.

To find out more about the opportunities in the Services, talk with your local Armed Forces recruiter. Fill in the coupon below or write Armed Forces Opportunities, P.O. Box C 1776, Huntington Station, N.Y. 11746.

Mail to: **Armed Forces Opportunities**
P.O. Box C 1776
Huntington Station, New York 11746

Please send me, without obligation, facts about the Services I have checked. (Choose up to four Services.)

Army Navy Air Force Marines

Name _____
First Middle Initial Last

Address _____ Apt. # _____

City _____ State _____ Zip _____

Phone _____ School _____
Area Code

_____ In High School Now _____ High School Graduate

Birth Date _____ Month _____ Day _____ Year _____ Male _____ Female _____
7006

ARMY. NAVY. AIR FORCE. MARINES. IT'S A GREAT PLACE TO START.

Build PM's Undercover Auto Cop

A burglar alarm in disguise, this project works a double beat as a handy auto voltmeter.

by Jeff Sandler

The Popular Mechanics Undercover Auto Cop is a sophisticated alarm that sends thieves running, and it's also an auto voltmeter which makes sure your car's electrical system is humming along in perfect condition. Easy to build, everything is enclosed in an unobtrusive case you mount under the dash.

Who needs an auto alarm? . . . You do! Consider this: Somewhere in the country a car is stolen every 16 seconds.

It's easy to see the need for the alarm, but the voltmeter is just as valuable. More importantly, the voltmeter provides the disguise to hide the alarm.

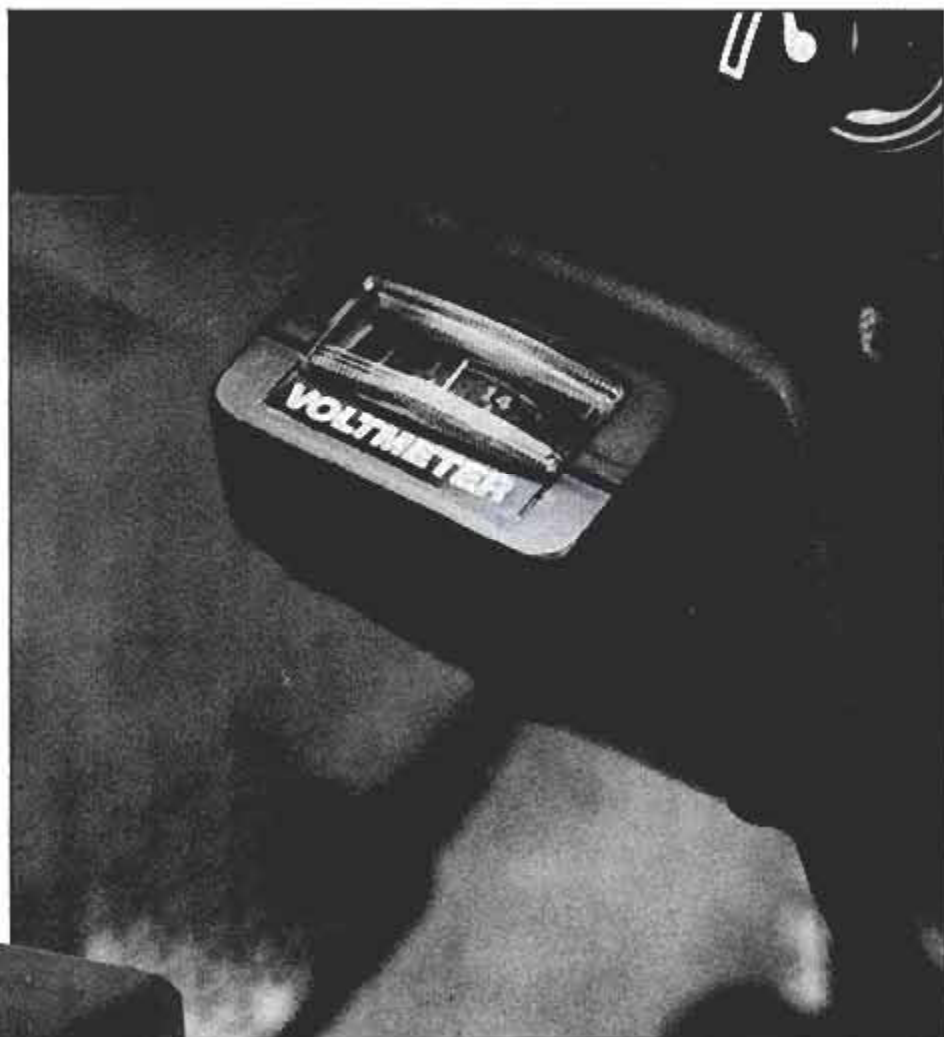
The trap is set

The thief doesn't know it, but he's being set up the moment he opens a door, trunk, or hood—or does anything else that causes electrical current to be drawn from the battery. Yet for 10 seconds, noth-

ing happens. Then, just about the time he's getting his tools ready to hammer out your ignition lock, there is a blast on the horn. Before he even has time to think what happened, it blasts again, and again, and again. The thief takes to his heels in a big hurry, and is long gone by the time the alarm shuts itself off in three minutes. Then the trap is renewed—because the alarm resets itself.

Carefree security

The alarm is completely automatic and the only attention it requires is that you disarm it within 10 seconds after you enter the car. There aren't any outdoor keyholes, special



This project is more than a voltmeter (above); it's also a very sophisticated car burglar alarm. You can build it from kit or plans.



Curved case (left) places the voltmeter scale in a comfortable reading position right under dash.

procedures, or combinations to remember.

There are two ways to disarm the Auto Cop—to tell it to “clam up, I'm not a thief!” Both ways involve connecting to the CUTOFF point detailed on the schematic and parts overlay (on page 26).

First, you can simply connect a s.p.s.t. switch so that one pole of the switch connects to CUTOFF, the other pole to +12 v.d.c. Hide the switch under the dash and you're set.

Or, get fancy. Any 12-volt input to the CUTOFF point on the circuit board will disarm the Auto Cop. So, use an existing switch on your dashboard. You could run a wire from the 12-volt side of your headlight switch to CUTOFF. Then, flicking your headlamps on would shut up the alarm. Any switch supplying 12 volts could be used.

You could also install both an exterior switch and a dashboard control to the CUTOFF connection point.

In this case, you would normally use the dashboard control. But if you wanted to let someone else drive your car—but didn't want to blow Auto Cop's cover—you would flick the hidden exterior switch to the CUTOFF, just leave it there, and the Auto Cop would be disabled.

The only thing you have to be careful of is not to select a control the thief might use inadvertently while in the process of stealing the car.

If you go the switch route, then momentarily closing the switch will disarm the alarm. Incidentally, there's no harm if you should forget to disarm—the horn will sound—but it is cut off immediately by disarming.

The moment you disarm the
(Please turn to page 26)



KING OF THE DIESELS

1982 DATSUN KING CAB™ DIESEL SQUEEZES FUEL, NOT PEOPLE.



With the price of oil today, you don't dare waste a single drop. Neither does the Datsun King Cab diesel. It gets better mileage than any gas-powered truck.

And while it's conserving fuel, the King Cab is comforting people - with more room than any compact diesel; enough room to recline the bucket seats for regal relaxation. Behind those buckets, up to 7.1 cubic feet of inner space for available jumpseats or safe cargo. (That's a comfort!) King Cab, Long Bed or Standard, you can't buy a better-built compact than Datsun.

They're made by Nissan Motor Company Ltd., the worldwide company who's driven to make it tough on the competition.

39 EPA EST HWY 33 EPA EST MPG

*EPA estimates for comparison. Actual mileage may differ depending on speed, trip length and weather. Highway mpg will probably be less.

FROM ONE TOUGH CUSTOMER TO ANOTHER.

DATSUN WE ARE DRIVEN

Product of NISSAN



© 1981 NMC-U.S.A.

1-800-333-3333

BUILD PM'S AUTO COP

(Continued from page 24)

alarm, the lights come on inside the case so you can read the voltmeter if you're riding at night. The reason they don't come on earlier is they might tip off the thief. The lights go out automatically after you leave the car to avoid draining the battery. However, since the voltmeter draws negligible current, it works all the time.

How it works

Whenever a door, trunk, or hood is opened, a light comes on. This causes a tiny, but sharp, voltage drop which the alarm senses. It begins the timing sequences that will sound the horn for three minutes after a 10-second delay.

If you don't have either hood or trunk lights and still want to protect these areas, you can buy inexpensive kits at any auto-parts store that will add them.

You can make the alarm even more formidable by adding an extra horn relay. Then you can make your headlights flash in synchronization with the honking horn. Actually, you aren't limited to headlights; you can use the relay to pulse whatever you want on and off.

In the circuit, PNP transistor QY senses the tiny voltage drop in the car. Gates IC1A and IC1B and the associated components give the 10-second delay. Gates IC1C and IC1D give the three-minute time the horn sounds. Gates IC2A and IC2B oscillate and this is what pulses the horn on and off at 1/2-second intervals. The remaining gates, IC2C and IC2D, disarm the alarm and make sure it remains disarmed for the time you are driving the car.

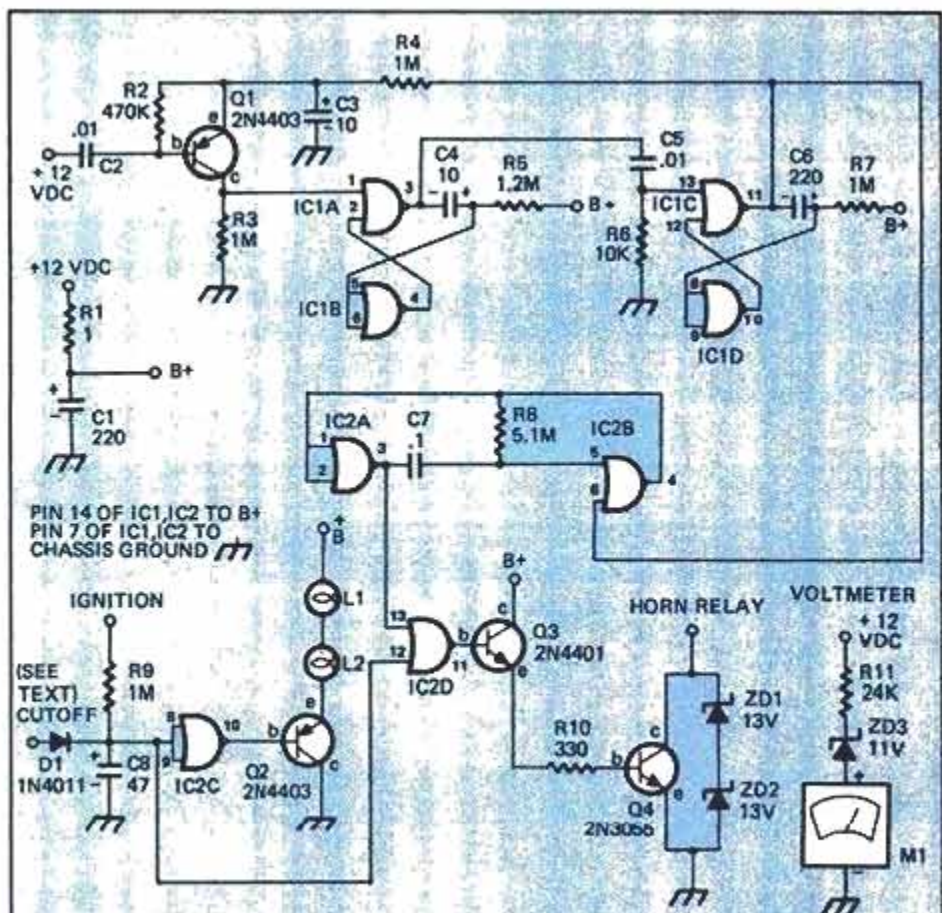
On duty

Assembly is easy if you etch or buy a printed circuit board (see parts list on page 28).

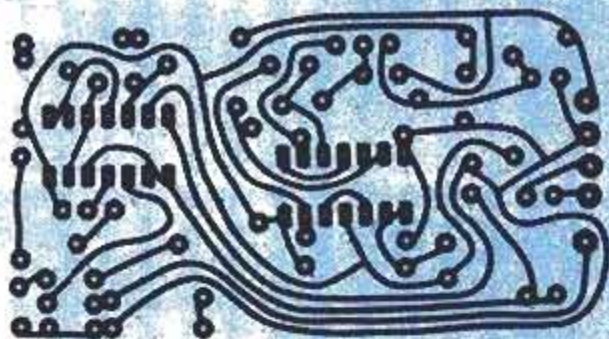
Wire the meter to the board with
(Please turn to page 28)



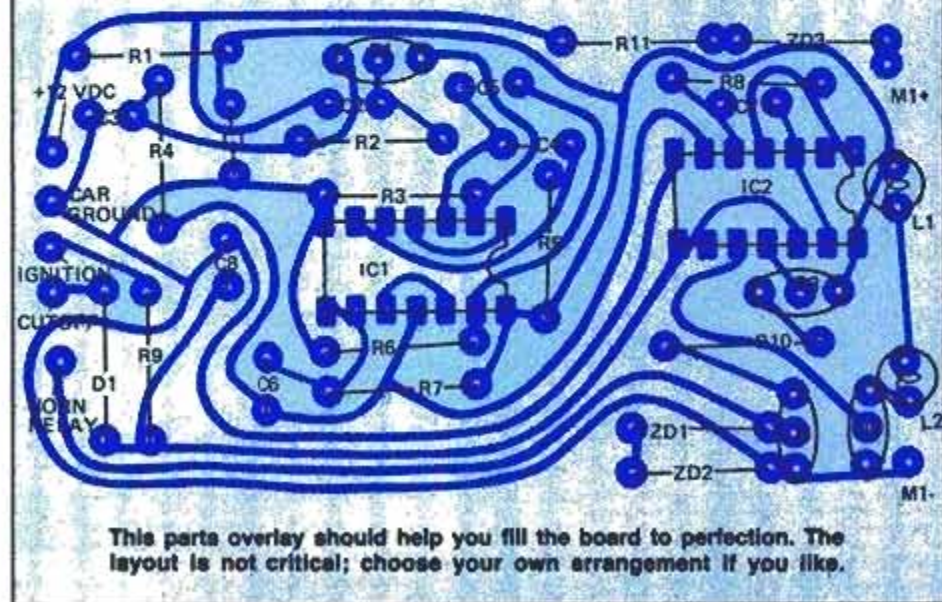
Comparing the board (left) with parts overlay (right) will help you in identifying the Auto Cop's parts. When you build, position lights behind meter so they shine through. Also, don't forget to check for correct polarity of C3, C8, the meter, IC1 and IC2.



Schematic diagram details the inner workings of circuit. Note that each section of each integrated circuit is drawn separately for clarity.



Here's a same-size printed-circuit-board template. Cut it from the magazine and you can use photographic means to manufacture board.



This parts overlay should help you fill the board to perfection. The layout is not critical; choose your own arrangement if you like.

WIN \$1000 A YEAR FOR LIFE IN CARVER TRIPP'S \$75,000 HOME IMPROVEMENT SWEEPSTAKES

\$1000 A YEAR FOR LIFE TOWARD HOME IMPROVEMENTS
... GUARANTEED \$50,000 MINIMUM ... AND BEAUTIFUL
MASTER-PIECES FURNITURE ... OVER A THOUSAND PRIZES

Grand Prize: \$1000 a year for life (guaranteed \$50,000 to you or your estate) for your annual home improvement expenses ... or \$10,000 cash.

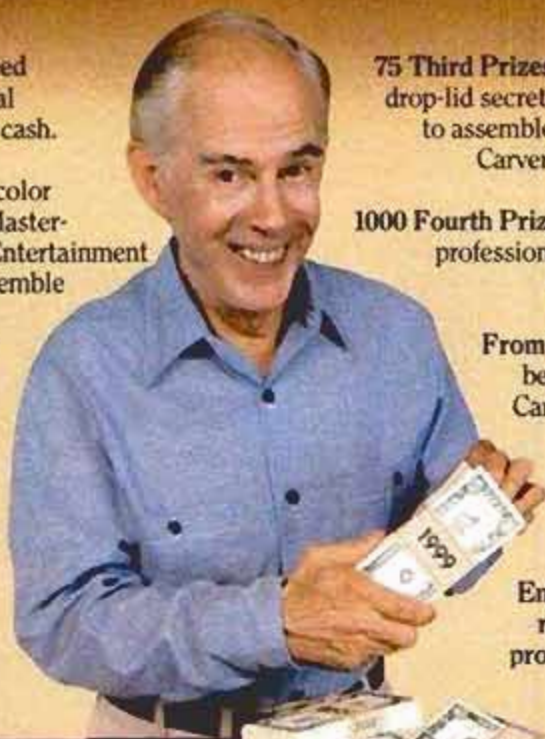


5 First Prizes: 19" color television set and Master-Pieces Audio "L" Entertainment Center, ready to assemble and finish, plus a selection of Carver Tripp products.



25 Second Prizes: Master-Pieces double-pedestal roll-top desk, ready to assemble and finish, and a selection of Carver Tripp products.

*Harry Morgan,
television star
and proud
do-it-yourselfer.*



75 Third Prizes: Master-Pieces drop-lid secretarial desk, ready to assemble and finish, plus Carver Tripp products.



1000 Fourth Prizes: Carver Tripp professional quality wood-finishing apron.

From Bare Wood to Rare Beauty: Even a raw beginner can achieve beautiful results with Carver Tripp wood stains and clear finishes. Quality products and helpful do-it-yourself information make it happen.

Enter now. It's as easy as getting beautiful results with Carver Tripp wood finishing products ... and Master-Pieces Furniture.



ENTER NOW. \$75,000 IN PRIZES.

Official Contest Rules

1. NO PURCHASE NECESSARY.
2. To enter, fill in the Official Entry Form, or on a 3" x 5" piece of paper, hand print or type your name, address and zip code. More entry blanks at your Carver Tripp dealer.
3. You may enter as often as you wish, but each entry must be mailed in a separate, hand-addressed or typed envelope for Carver Tripp "Home Improvement Sweepstakes," P.O. Box 1038, Dept. PM, Ridgely, MD 21660.
4. Entries must be received by May 1, 1982.
5. Winners will be selected in a random drawing on May 24, 1982, from all valid entries received, under the supervision of Marketing Corporation of America, whose decisions are final, and will be notified by mail. All prizes will be awarded. Grand Prize winner may elect to receive \$10,000 cash in lieu of \$1,000 a year for life. Prizes are non-transferable and no prize substitutions permitted. Only one prize per family. Mechanically reproduced entries are void. The odds of winning are determined by the number of entries received. Taxes, if any, are the sole responsibility of winners. Winners may be required to execute an affidavit of eligibility and release.
6. Sweepstakes open to U.S. residents of 18 years of age or older, except employees of Carver Tripp, its affiliates and subsidiaries, wholesalers and retailers, advertising and fulfillment agencies (and immediate families if any of the preceding). Void wherever prohibited, taxed or restricted by law. All federal, state and local laws and regulations apply.
7. For a list of major prize winners, send a separate, stamped, self-addressed envelope to Carver Tripp Winners, P.O. Box 1038, Ridgely, MD 21660.

Official Entry Form

Name _____

Address _____

City _____ State _____ Zip _____

\$5000 Bonus: Correctly complete the phrase below with the words from a Carver Tripp display, and we'll give you an extra \$5000 cash bonus if you're our Grand Prize winner.

To find the "phrase that pays," visit your local Carver Tripp dealer, or write to Carver Tripp, Dept. PM, P.O. Box 85063, San Diego, CA 92138.

"Carver Tripp's finest _____."

BUILD PM'S UNDERCOVER AUTO COP

(Continued from page 26)

an inch of hookup wire. Position the lights behind the meter. On the other end of the board, solder the wires that will hook into your car, and thread the free ends through a hole in the back of the case. Then you snap the cover on, and you're ready to take the Auto Cop out to your car.

There are only five connections that you have to make into the car's wiring: +12 volts, ignition, horn relay, ground and a lead from CUTOFF to an added switch or headlight switch, as discussed earlier. Generally, these are all readily available under the dash, and are very easy to hook into with solderless clamp-on connectors. With them, there's no need to splice into or damage your car's wiring.

The voltmeter section

The auto voltmeter is a very simple circuit, composed of only three parts: a meter (M1), a resistor (R11), and a zener diode (ZD3). The result of this combination displays voltages from 11 to 15 volts. Lower voltages rarely occur and are electronically eliminated by the zener diode.

Car voltage can vary by several volts. Analyze the ups and downs of the voltage, and you can diagnose almost any electrical-system problem you'll run into.

If your electrical system were operating properly, here's what you would see:

When you get in the car, the battery would have no electrical load on it; the voltage should be 12.3 to 12.8. When you crank the car, the tremendous current load drains the battery, and the meter falls to the left side of the scale.

Once the car starts, the alternator rapidly replaces the energy withdrawn from the battery, and the voltage rises to a recharging 13.8 to 14.6.

Yet, the voltage can only remain in this range if the voltage regulator is working properly and the power generated by the alternator is in exact balance with what is being used by the accessories. If not in balance, the difference has to be made up or absorbed by the battery, and the system voltage falls or rises respectively.

Problems to watch for

Here are some common malfunctions and the meter readings they cause:

■ **Battery won't hold a charge:** After the car is parked overnight, the volt-

age will fall to less than 12 volts.

■ **Weak battery or bad cables:** Normally, if you turned on the lights the voltage would fall 1/2 volt or so with the engine off. When the battery is weak, it isn't able to hold its voltage as steady and you get more than a one-volt drop.

■ **Slipping fan belt:** You're riding along the highway and turn on a moderate electrical load (headlights)—and then the voltage falls two or three volts. This is because the alternator is not able to supply the added power demands, due to the belt slipping. If you check the belt and you discover that it's tight, then the problem involves the alternator.

■ **Broken fan belt:** Meter falls rapidly below 11.5 volts, especially if there's a heavy electrical load. Stop the car immediately, because without a fan belt, your water pump isn't operating, and your car will overheat rapidly.

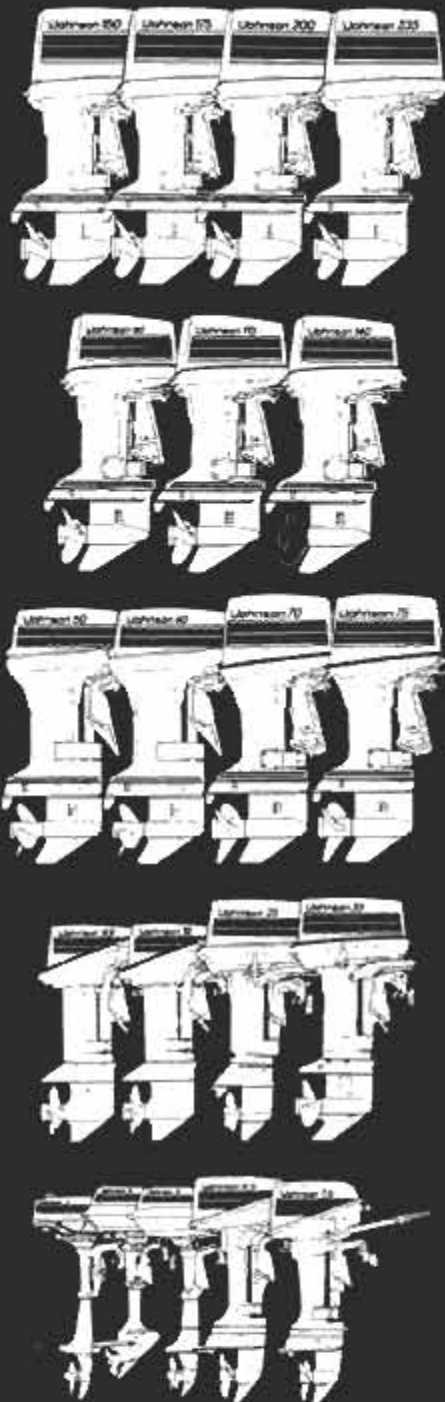
■ **Defective voltage regulator:** Unlike the slipping fan belt or defective alternator, the voltage doesn't vary much, but rather "gravitates" to the wrong levels.

■ **Checking jumper cables:** If you get stuck somewhere with a dead battery (voltage off the scale to the left), and someone gives you a jump, you can be sure that the connection is good when your meter comes back up into the 13.8 to 14.6-volt range. After the voltage is up there for a minute or so, and your battery has taken a bit of a charge, try cranking. **PM**

PARTS LIST—AUTO COP

- C1, C6—220- μ F electrolytic capacitor
- C2, C5—.01- μ F ceramic disc capacitor
- C3, C4—10- μ F electrolytic capacitor
- C7—1- μ F ceramic disc capacitor
- C8—47- μ F electrolytic capacitor
- D1—1N4011 diode
- IC1, IC2—CMOS IC 4001 or equivalent
- L1, L2—6-volt light bulb
- R1—1-ohm resistor, 1/4 watt
- R2—470K-ohm (470,000) resistor, 1/4 watt
- R3, R4, R7, R9—1M-ohm (1,000,000) resistor, 1/4 watt
- R5—1.2M-ohm (1,200,000) resistor, 1/4 watt
- R6—10K-ohm (10,000) resistor, 1/4 watt
- R8—5.1M-ohm (5,100,000) resistor, 1/4 watt
- R10—330-ohm resistor, 1/4 watt
- R11—24K-ohm (24,000) resistor, 1/4 watt
- Q1, Q2—2N4403 PNP transistor
- Q3—2N4401 NPN transistor
- Q4—2N3055 NPN transistor
- ZD1, ZD2—13-volt, 1-watt zener diode
- ZD3—11-volt, 400-mw. zener diode
- M1—200- μ A edge meter
- Misc.: Cabinet, snap-on terminals, wire, solder.

The following are available from Circuit Craft Inc., 10 Idell Rd., Valley Stream, N.Y. 11580: Complete kit including all parts and circuit board, \$19.95; assembled Auto Cop, \$27.95; circuit board alone, \$2.50. Prices include postage and handling.



FOR 1982, OUR 60TH ANNIVERSARY YEAR, JOHNSON OFFERS 60 MODELS FROM 2 TO 235 HP.

Johnson has superbly engineered outboards for fishing, skiing and cruising. Special models for sailboats and for commercial boats. Three new super-high thrust electric fishing motors, too. See your Johnson dealer for complete information. He's part of the Johnson dealership team that's made Johnson service and Johnson parts availability another reason Johnson leads the world.

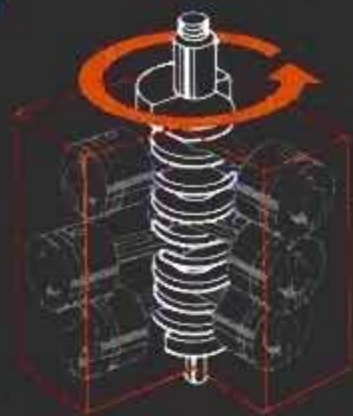


JOHNSON LEADS THE WORLD

**HIGH-TECH TORQUE
IS JUST ONE OF THE
REASONS**

Power-ported cylinders with pistons precisely designed to get the most out of each cubic inch of displacement. Heavy duty connecting rods. Combined with a full 90° V-block with short, rigid, balanced crankshaft, the result is high-torque V-4 and V-6 outboards. Torque

delivered quickly to get up on plane. Effortlessly to move heavy loads fast. Quiet, smooth torque engineered by Johnson. All Johnson® outboards are designed to give you power plus speed. One more reason why, throughout the world, more boaters run Johnson® outboards than any other brand.



Johnson
OUTBOARDS

A Product Group of **OMC** Outboard Marine Corporation
100 Sea-Horse Drive, Waukegan, IL 60085
© Outboard Marine Corporation 1982. All rights reserved.



The Lincoln AC/DC- Professional results at a do-it-yourself price.

Big brother to the AC-225-S. Easy to use. Easy to afford. The ideal welding tool for fabricating, maintenance, farm repair and construction, piping and hardsurfacing.

Gives you the choice of DC or AC and runs on single phase 230 volt power. Great for code quality welding with Fleetweld® 5P. Easier welding in all positions. Low range stability for thin metal where a smooth arc is essential. Ideal for Stainweld® low hydrogen,

non-ferrous and many other electrodes. Standard features include input plug and receptacle, electrode holder, work clamp and cable. Plus a free



"Welder's Guide" with illustrated instructions and tips to better welding.

Look for your Lincoln Electric Distributor in the Yellow Pages under "Welding Equipment and Supplies." Or write: The Lincoln Electric Company, Cleveland, Ohio 44117.

LINCOLN
ELECTRIC



Tougher than Polyurethane

More durable than spar varnish! New Helmsman Spar Urethane by Minwax is one *extra tough* finish. Originally formulated in England to withstand the worst conditions at sea, it has many uses indoors and out, from bar tops to boat decks.

Clear, in high or semi-gloss, Helmsman is a beautiful protective coating for bare wood or wood stained with Wood Finish by Minwax.

Discover how good it looks and how long it lasts. Send now for our free 22-page booklet, *Tips on Wood Finishing*.

FREE BOOKLET Dept. PM-32
Minwax Co., Clifton, NJ 07014

Name _____

Address _____

City _____

State _____

Zip _____

MINWAX

® Minwax is a registered trademark.

HINTS FROM READERS

Cork shields socket head



Socket-head screws on machine tools catch and hold debris, making it difficult to use a wrench. To prevent this, insert a cork in the socket. The cork will stay in place, but can be removed as needed.

—Walter E. Burton

Hand-grinder support



This support for a hand grinder frees your hands to perform other duties. Secure an angle brace in a vise and attach the grinder to the brace with two hose clamps.

—Ken Patterson

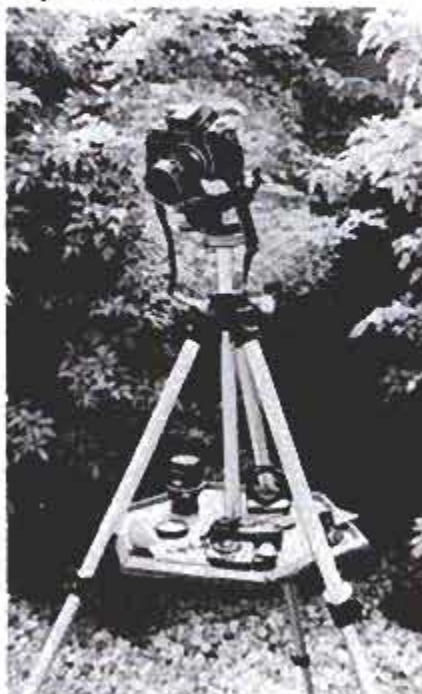
Bench-saw aid



When extending the rip fence of a bench saw beyond the table surface, thin stock can easily slip under the fence. To solve this problem, fasten a piece of scrap wood to the underside of the rip fence with a C-clamp. The wood will extend toward the table and act as a support for the stock being cut.—John F. Dinges

PHOTO HINTS

Top-drawer shelf



If you use a tripod for outdoor photos, you've probably noted two annoying problems: The tripod is often unstable and there's no place to put lenses and filters. Build a shelf with clip-on supports.—*Clint Meier*

Hang 'em cheap



Plastic laundry hooks cost less than \$2 per dozen. Use them in place of expensive equipment to air-dry resin-coated prints. You can hang them from towel racks, curtain rods or any other convenient spot.—*Kenn Oberrecht*

CUT IT—FRAME IT with **Hirsh** MITER MAKER and FRAME CLAMP

Accepts most circular saws from 7" to 8 1/2" (saw not included)



MITER MAKER makes perfect miter cuts with your portable circular saw

- Portable—set on work bench, counter, etc.
- Has 2 independent aluminum fences
 - Makes precise straight cuts
 - Makes precision miter cuts to any degree on the calibrated scales

Get fast, accurate, tight-fitting miter cuts using your circular saw. Just set aluminum fences to any angle, 90° to 45°, hold work piece against the fence, lower saw and cut. Molded structural gray base. Easily assembled. 9"H x 21"W x 16"D. Saw not included.



MAKES ALL THESE MITER CUTS: frames for pictures, windows, doors, decorative cabinet moldings; hexagons; octagons; straight cuts.

Miter Maker
Model TMM1

\$39⁹⁵

FRAME CLAMP—glue and clamp perfect frames every time



SELF-SQUARING—clamps 4 corners at one time—just turn the wing nut on center bolt

EASY TO SET-UP! Glue and clamp perfect frames each time. Turn one wing nut on threaded bolt in center, all 4 corners tighten evenly, at one time. Rugged extruded aluminum rails. Molded jaws fit into slots, adjust to frame size you need. folded size: 4"W x 1 1/4"H x 43 1/2"L. Easy to assemble with a screwdriver and pliers.

Jaws are reversible—for large or narrow frames



Adjusts from 5"x7" to 26"x30" & larger frames

Frame Clamp **\$15⁹⁵**
Model TPC1

BUY BOTH AND SAVE \$11.95—ONLY \$44⁹⁵

U.S. and foreign patents applied for. Made in U.S.A.

ORDER TODAY by Phone . . . or Mail Coupon!



CALL TOLL-FREE

800-621-5800

Illinois residents Call

800-972-5858

24 hours a day
7 days a week!

Available in Continental U.S.A. only

Professional Workshop Products

Dept. PM3 8051 Central Park Ave., Skokie, IL 60076

Please rush the following Hirsh products. My satisfaction fully guaranteed or I may return in 15 days for refund.

Qty.

TMM1. Miter Maker. \$39.95 + \$4.00 shipping & handling.

TPC1. Frame Clamp. \$15.95 + \$2.00 shipping & handling.

Save \$11.95. Buy both units above. \$44.95 + \$5.00 shipping and handling. (Illinois residents add appropriate sales tax.)

Check or money order enclosed for \$ _____ (No C.O.D.'s)

Charge to my: Visa MasterCard American Express

Card # _____ Expiration Date _____

Name _____

Address _____

City _____ State _____ Zip _____

Signature _____ Telephone _____

SAVE! BUY BOTH!

DATSUN 810 MAXIMA

"The mirrors turned funny colors and cracked."

VIRGINIA ARMY OFFICER



"Well built, but there's more plastic than I like."

IOWA COLLEGE ADMINISTRATOR

"This car could use more headroom."

RHODE ISLAND PURCHASING MANAGER

"The ride is great, the handling excellent."

NEW YORK DRESS MANUFACTURER

"Both my Maximas run rough during cold idle."

ILLINOIS REAL ESTATE SALESMAN

Well built, luxurious and a bargain at the price.

Of all the cars brought in from Japan, the Datsun Maxima most resembles a riddle wrapped in an enigma. Ask anyone knowledgeable about cars and he'll tell you that the Maxima's quality and value stand absolutely unquestioned.

But as good a deal as the Maxima is, it's virtually an insider's secret. To the public at large, the Maxima still remains a mystery. Max who? Who ever heard of it? Very few drivers know a Maxima when they see one, and even fewer give it a serious thought when shopping for a new car.

Which seems a shame, because if it's such a good deal, how come everyone's not rushing out to buy one? I can't explain it, and yet that's



The complex array of gadgets is virtually all standard equipment on the Maxima.

the situation as I see it: the Datsun (Nissan) Maxima, along with perhaps the Toyota Cressida, represents the best kept automotive secret this side of the rising sun: sleepers both.

Well, all that might change soon, because the people who know the

Maxima most intimately are about to share its secrets with us. We buttonholed 1,000 Datsun 810 Maxima owners—mostly those with late 1981 models, but also a sprinkling of '82s (no diesels, though)—and asked them to fill out our traditional Owners Report questionnaire.

They replied with considerable en-

A NATIONWIDE SURVEY
BASED ON 2,976,621
OWNER-DRIVEN MILES

thusiasm (they're the last to insist that the Maxima be kept a secret), and we thought that for this report we'd forsake the usual format of examining a car's specific details and just let 10 individual Maxima

(Please turn to page 64)

Sears goes nose to nose with the leading competitor.



Us.

The Sears Craftsman 20-HP Full Featured Garden Tractor gives you all this:

- Smooth-operating hydrostatic transmission
- 20-HP twin-cylinder engine
- Hydraulic lift for controlling attachments
- Optional front and rear P.T.O. (Power Take Off)
- Pinion and gear steering; 2 turns lock to lock

But the Sears Craftsman also has all these other important features:

- Gives you an average of 10% more horsepower at the drawbar than they do... More power where you need it.
- Sure stopping... because the hydro control returns to neutral as soon as you hit the brake.
- A 3-way seat that adjusts to your height, your weight and your driving angle as well.
- Three models: 18, 20 and the most powerful gas-powered garden tractor you can buy, 24-HP.
- **Only \$4,499.** About \$697 less than the leading competitor, based on an October 1981 market survey.*

© Sears, Roebuck and Co. 1982
Available at most Sears retail stores.
Prices apply only to the continental United States.

*Based on the average negotiated price for a 19.9-HP tractor in an 8-market survey of 23 dealers. Prices vary by dealer.



Them.

The comparable model of the leading competitor's garden tractor gives you all this:

- Smooth-operating hydrostatic transmission
- 19.9-HP twin-cylinder engine
- Hydraulic lift for controlling attachments
- Standard front P.T.O. Optional rear P.T.O. (Power Take Off)
- Power steering; 2¾ turns lock to lock

I want to know more about the complete line of Sears Craftsman Full Featured Garden Tractors. Send me the facts. Mail to: FF Tractor, Sears, Roebuck and Co., Sears Tower, BSC 20-04, Chicago, IL 60684.

My Name _____

Address _____

City _____ County _____

State _____ Zip _____ Area Code/Phone _____

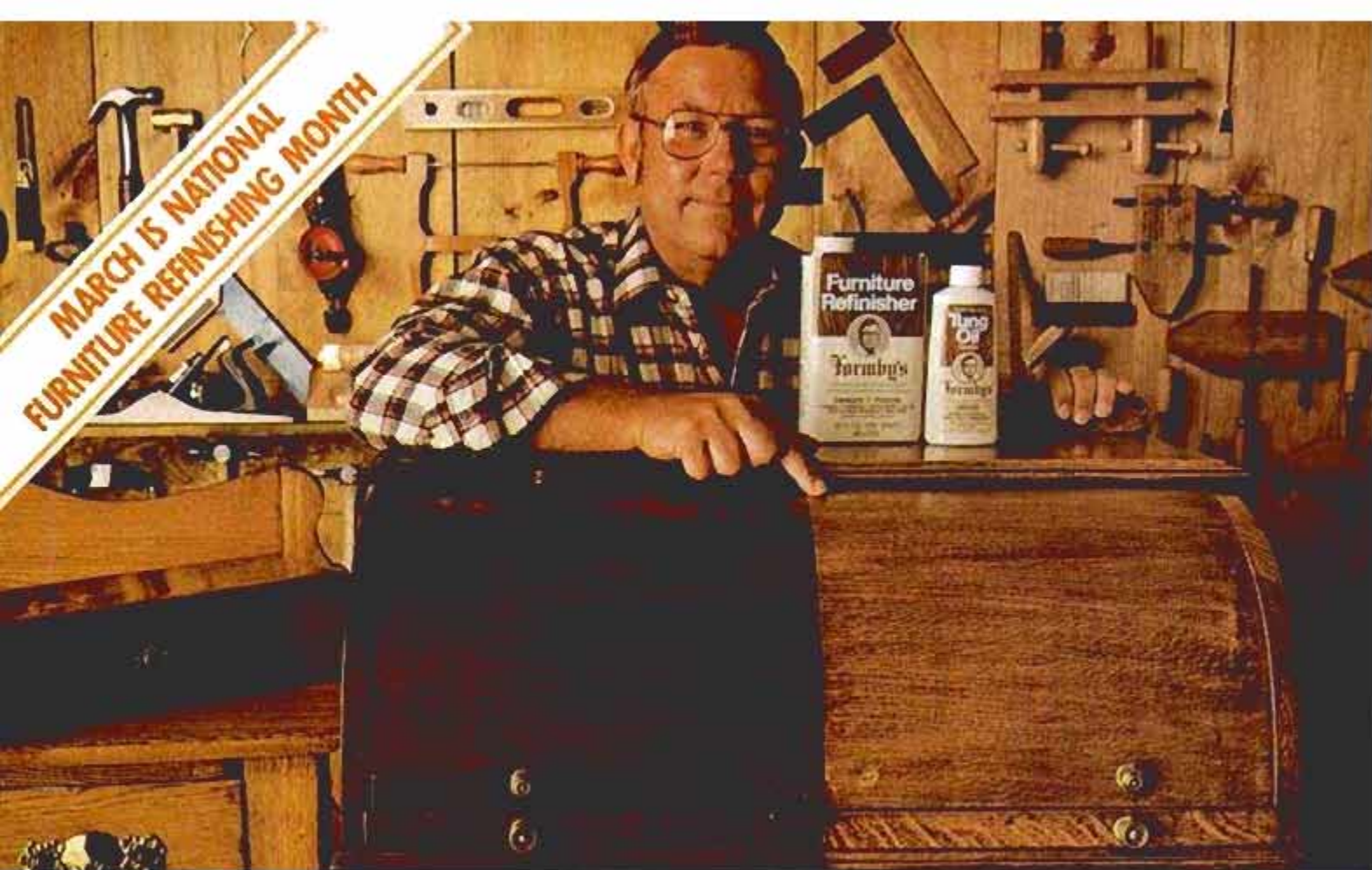
Sears store closest to me _____

For power and performance
You can count on

Sears

PM32

MARCH IS NATIONAL
FURNITURE REFINISHING MONTH



“You won't believe you did it. But you did!”

—Homer Formby
3rd generation antique refinisher

Refinishing furniture used to mean stripping. A messy, time-consuming chore.

Homer Formby has changed all that.

With Homer Formby's products, you'll *never strip again*.

Imagine a system so simple, refinishing isn't a drudgery, but an exciting project.

Imagine a system so foolproof, even your very first project looks professionally refinished in just half a day.

Refinishing.

From start to finish.

Pour some Furniture Refinisher into a metal tin, and dip your steel wool. (Use Formby's steel wool, because it's low in abrasion and oil content.) Now rub over a very small portion of your piece. There's no need to rub hard! Very

quickly, you'll see the old discolored varnish, lacquer and shellac melt away.

And the Furniture Refinisher does not raise the grain or destroy the patina, the way strippers do.

With Formby's, you're actually reaching back in time to the original finish by removing years of accumulated gunk.

After you've refinished, go over the piece one more time with clean Refinisher. By rubbing with the grain, you'll remove any streaks or lap marks.

Now go over the piece with dry steel wool, to prepare the surface for Tung Oil.

Formby's Tung Oil seals your furniture, because it actually penetrates the wood. Ordinary varnish merely sits on top. So when you hand-rub Formby's Tung Oil, you're not only repeating a centuries-old tradition, you're also protecting that beautiful refinishing job.

And that's all there is to it! No sanding, scraping or wood-filling.

Somewhere in your house is a piece of furniture you've never given a second thought. But underneath that beat-up exterior is a finish you can bring back to life.

And now is a great time to get started, because it's National Furniture Refinishing Month. To celebrate, many of our dealers have a sale on Formby's Refinisher. So don't delay. Remember, you've got a prize right under your eyes.

For a free copy of Formby's Furniture Fact Book, including tips on refinishing, staining and furniture care, write to **Homer Formby, P.O. Box 647, Olive Branch, Mississippi 38654.**

©1980 Formby's Inc.



Formby's®

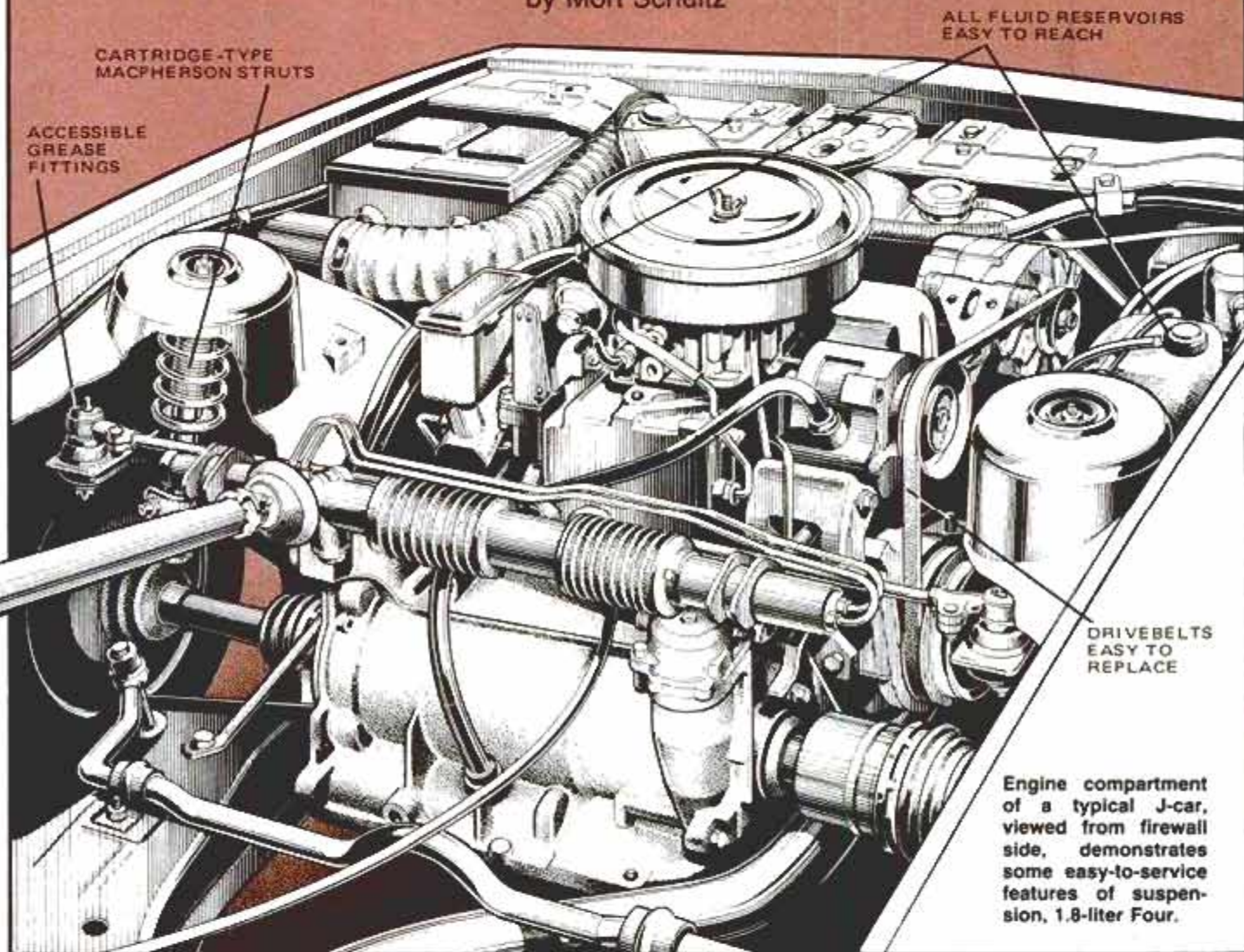
No one knows wood, as good.

Formby's is a registered trademark of Formby's Inc.

FORMBY'S PRODUCTS ARE AVAILABLE AT BETTER PAINT, HARDWARE, HOME CENTERS AND DEPARTMENT STORES.

SERVICING GM's J-CAR

by Mort Schultz



Are GM's new J-cars as easy to service as GM claims? To find out, we spent a few days at the Service Research Center in Warren, Mich.

As you know, the J-cars are the Chevy Cavalier, Pontiac J-2000, Buick Skyhawk and Olds Firenza. Other than the names and a few trim and optional features, all the J-cars are mechanically identical. They all have the same transverse-mounted, 1.8-liter, four-cylinder ohv L-4 engine with the two-stage Rochester Varajet carburetor. Almost all specifications are the same.

The only mechanical differences come about because of optional equipment. For example, airconditioning is an option, except on the Cimarron. With the Caddy J, you get

air, whether you want it or not. Power steering, too, is an option—but again, not with Cimarron. The only item that is optional in all J models is automatic transaxle.

Now, what about serviceability? The J-car has something to please Saturday mechanics at three levels of expertise, as follows:

1. If you're at level 1, where all you want to do is maintain fluid levels, the J-car provides better access to reservoirs than any car we know, including the Chrysler K-car and Ford Escort/Lynx.

2. If you're at level 2, you can change the oil and oil filter, replace sparkplugs, adjust belts, lubricate the chassis and do all other maintenance services. In some respects, the J-car is easier to work on than

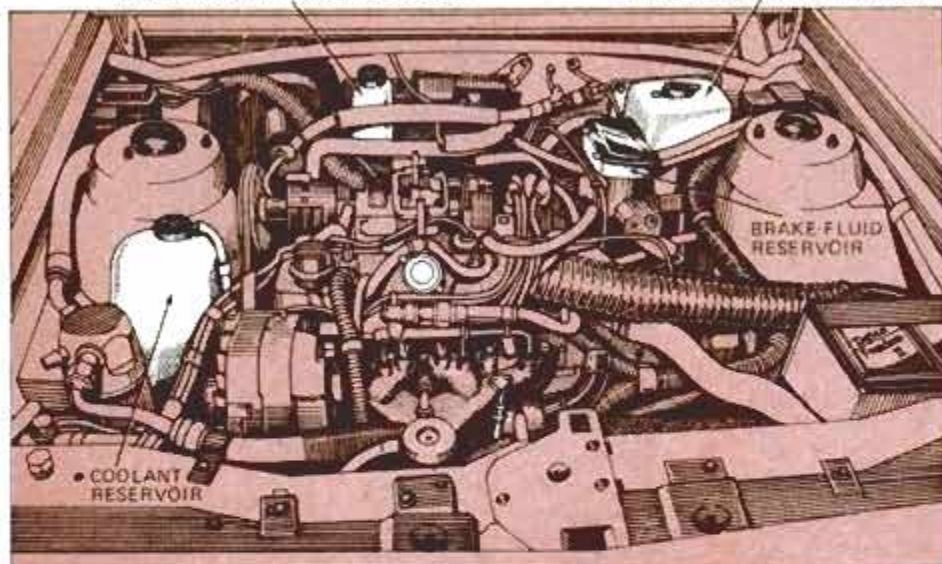
other makes of front-wheel-drive cars, but in other respects, it's a bit more difficult.

3. People on level 3 like challenges, and the J-car gives them some. Making certain repairs could be impossible, unless you know the ins and outs which we'll describe.

Checking fluid levels

To check power steering, brake fluid, coolant and windshield-washer solvent levels, just look through the clear plastic reservoirs holding the fluids. Marks on the reservoirs reveal fluid level.

The power steering setup is unique. The translucent pump reservoir is remote from the pump itself, which is mounted low on the engine. This makes checking and



All fluid reservoirs are made of see-through plastic, easily visible and accessible.

adding fluid child's play. You don't have to use a long filler neck to pour fluid into the reservoir. You don't even need a short-spout funnel, if you pour fluid carefully.

With the J-car, as with other cars, use fluids called for by the manufacturer. For the power steering, use GM power steering fluid No. 1050017, or an equivalent, when replenishing fluid. To replenish brake fluid, use Delco Supreme II, or an equivalent fluid conforming to DOT Standard 3 (marked on the can).

If you have to add coolant, use a mixture (50/50 will suffice in most areas) of water and an ethylene-glycol-base antifreeze conforming to GM specification 1899M.

Whenever you remove a filler cap from a reservoir, first wipe the area clean to keep dirt from accidentally falling into the fluid.

Lots of dipsticks

The engine-oil dipstick and oil-filler hole in the J-car can't be missed. They're positioned practically in the center of the engine in full view.

When you have to add engine oil, note that the filler hole is canted forward, making it easy to spill oil if you aren't careful. If oil does spill, it will run on sparkplug cables and, possibly, on the exhaust manifold. Be sure to wipe up spills to prevent damage to cables and possible fire.

Replenish oil when the level drops to the ADD mark on the dipstick. Use only oil designated API SF, SF/CC or SF/CD.

The automatic transaxle on J-cars has a dipstick, as you'd expect, but the manual transaxle also has a dipstick, which is, as far as we know, a first.

The reason for the manual-transaxle dipstick is to help J-car owners

remember to check the manual transaxle fluid level and to make it easy. It eliminates the need for getting beneath the vehicle and unscrewing a plug on the transaxle case.

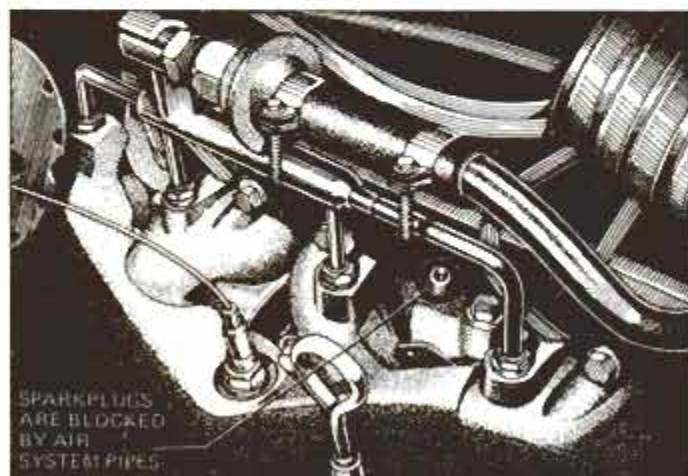
Check the fluid level when the transaxle is cold. Use Dexron II automatic transmission fluid in both manual and automatic trannies.

Level 2 services

As you'll see when you scan the list of scheduled maintenance services in the J-car owner's manual, intervals between services are getting longer and longer. For example, unless a problem occurs, you can replace sparkplugs, time the ignition, drain and clean the cooling system, replace the positive-crankcase-ventilation (PCV) valve and readjust the exhaust-gas-recirculation (EGR) system every 30,000 miles. Replace the air cleaner and PCV filter every 50,000 miles.

There are other tasks to do more often. They include changing oil and oil filter, lubricating the chassis and checking brakes and tires.

The following level 2 procedures



Reaching sparkplugs is a chore (left). You'll need short extension and flexible adapter.

To replace cartridge on MacPherson strut, cut along score line with a utility knife (near right), and cut open the strut with a pipe cutter. Replacement cartridge and a hardware kit are available from any GM dealers. New cartridge slides in (far right).

will be made considerably easier with our tips.

If you change engine oil every 7,500 miles, GM recommends replacing the oil filter every other oil change. However, replace the filter with the oil during the car's first oil change. If you change oil once a year, assuming you drive only 7,500 miles or less in 12 months, GM suggests you replace the filter at the same time. Both oil and filter should be replaced every 3,000 miles or three months, if the car is driven in dusty areas, pulls a trailer, engages in long or frequent periods of idling or is consistently driven four miles or less in freezing weather.

Replacing the oil filter is a pain—especially if you don't have facilities to lift the car. The same wrench (Kent-Moore tool No. J-29142) and procedure I described in *Servicing Detroit's Front-Wheel-Drive Generation: The X-Cars, K-Cars and Escort Lynx* (page 35, Mar. '81), relative to replacing the oil filter in an X-body car, should be used. The tool is priced at \$4.75. (Kent-Moore tools may be obtained from Kent-Moore Tool Div., 29784 Little Mack, Roseville, Mich. 48066.)

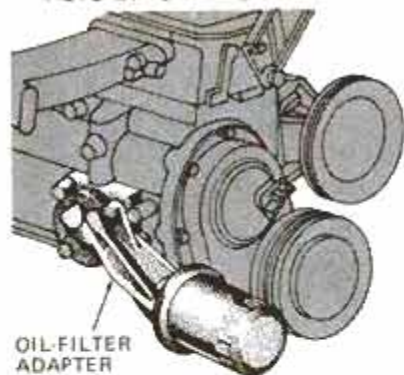
Speaking of tools, GM has carried over its full hood-swing-back feature from the X-body to the J-car. The hood is held straight up at a 90° angle to the engine compartment, making access to any area possible. A special hood prop rod (Kent-Moore tool No. J-29779) is available for \$5.75.

Access to sparkplugs is blocked somewhat by the pipes of the air-injection system. It is difficult to remove these plugs with an ordinary, straight-in sparkplug wrench. Use a 6- or 8-inch extension and 3/4-inch flexible socket.

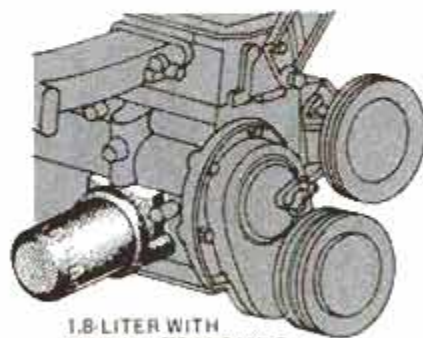
Plugs have tapered seats and don't use gaskets. The normal heat range sparkplug for the J-car is AC R42TS, or equivalent.

Getting to the distributor hold-down nut in order to time ignition is

1.8-LITER WITH
AUTOMATIC TRANSAXLE



OIL-FILTER
ADAPTER



1.8-LITER WITH
MANUAL TRANSAXLE

Placement of the oil filter in either a manual or automatic transaxle-equipped car is shown above. To replace a filter, you'll need a special oil-filter tool.

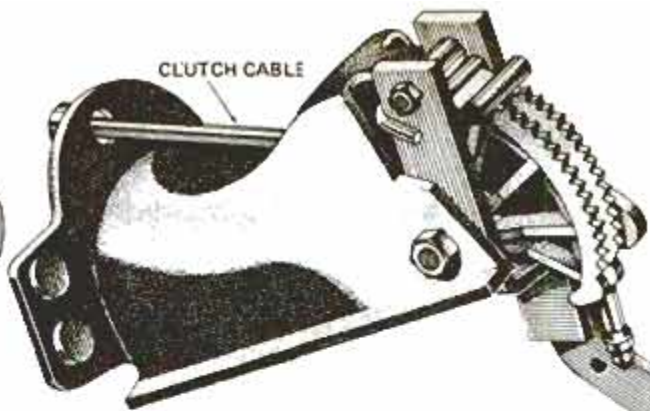
made a lot easier with a special distributor wrench (Kent-Moore tool No. 29828). It is priced at \$17.25. The wrench is offset 90° on each end, which allows you to maneuver down the back side of the distributor, near the firewall, where the clamp nut is located.

The timing notch for No. 1 cylinder is located on the front section of the crankshaft pulley. The pointer is on the front cover.

You may spot a second timing mark on the center section of the pulley. This one is 180° from the first one. You can use either mark to adjust timing, which should be done according to instructions on the vehicle emission-control information label.

To make adjustments that require

CLUTCH CABLE



Clutch cable free-play adjustment is made by pulling up clutch pedal and pushing it all the way to floor.

PULL PEDAL UP



the use of a tachometer, don't look for a TACH terminal in the distributor cap of the J-car. Unlike most other GM cars with High Energy Ignition (HEI) systems, there is no TACH terminal in the cap. Instead, find the harness near the brake booster, and you'll see a white lead sticking up. You should tap your tachometer into this.

If your J-car is equipped with a tachometer in the instrument panel, but you have to use a remote tach to make an adjustment, you'll find the tach lead in the same spot. However, it is attached to the dash tach connector. You have to disconnect the two to connect a tach to the terminal.

A swing-down fuse block on the left side of the steering column is a great feature. To replace a fuse, turn the cover wingnut 90°. This causes the fuse block to release and drop down vertically, exposing fuses. The connector next to the fuse block triggers the Computer Command Control and allows you to diagnose engine problems.

You can open the radiator drain cock from above to drain coolant.

The J-car could have as many as five belt-driven assemblies, with the actual number dependent on the presence of options. These assemblies are the alternator, water pump, air-injection pump, power-steering pump and airconditioning compressor.

All belts, except the airconditioning compressor belt, are adjusted

from above. Access holes are provided for making adjustment, so the job is easy.

The alternator and water pump use a common belt. If your car has power steering, it shares a belt with the air-injection pump.

And then there's the belt for the airconditioner compressor. To adjust this belt, you have to get under the car. Use the square access hole to pull back on the compressor and take up tension.

The clutch of a J-car with a manual transaxle is self-adjusting. Pull the clutch pedal up as much as possible. Then, press the pedal slowly toward the floor. This procedure removes play from the clutch cable.

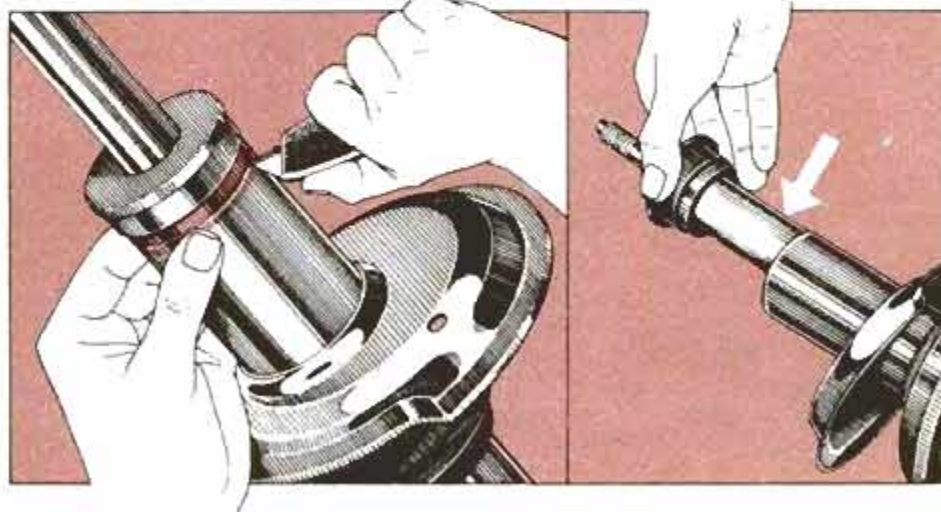
There is no scheduled maintenance requirement for the J-car fuel filter, which is a departure from past GM policy. The filter may be kept in service forever, unless a fuel-starvation condition occurs. Then, the filter should be replaced on the chance that it's clogged.

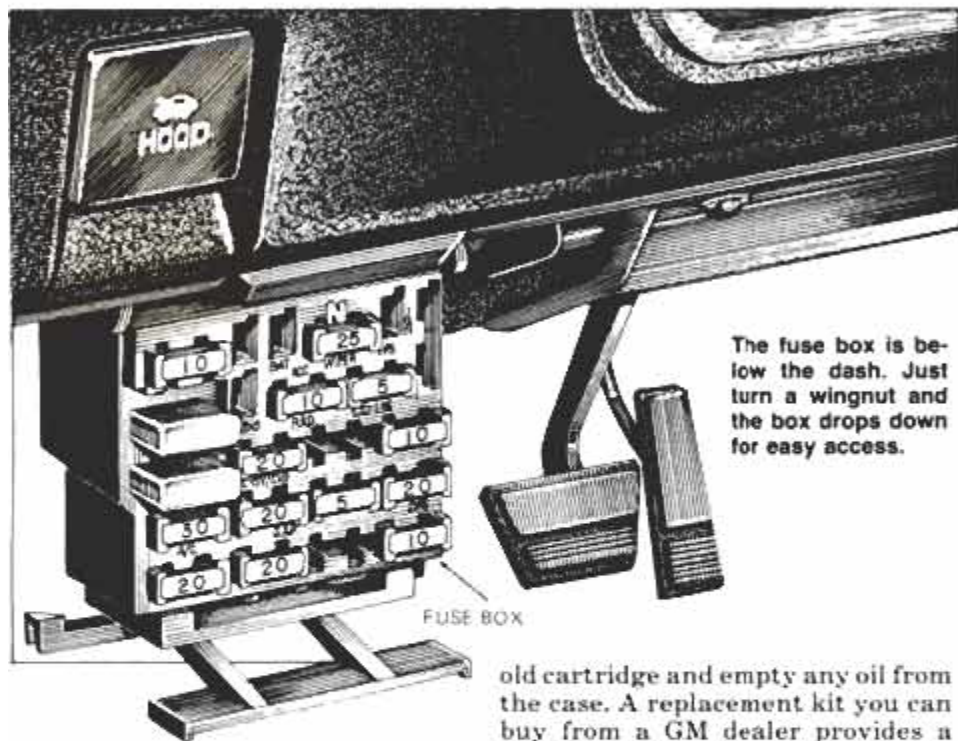
The fuel filter in a J-car is the same type GM has used for many years. It's inside the carburetor fuel inlet.

To make the task as easy as possible, use a flare-nut wrench to break loose and disconnect the fuel line at the fuel-inlet nut. Then, using a regular open-end wrench, remove the fuel-inlet nut.

When the fuel-inlet nut is removed, take the fuel filter out of the carburetor. Keep the spring that's behind the filter in place and install a new filter. Place a new gasket on the fuel-inlet nut and fuel-line connector. Run the engine and check the area for leaks. If gasoline leaks from the fuel-line connector or fuel-inlet nut, tighten the part more.

Replacing the carburetor air-cleaner assembly is no problem until you have to push tubing back onto air-cleaner housing fittings. Tubing is rigid and resists installation, so let me give you a hint: Withdraw the oil





The fuse box is below the dash. Just turn a wingnut and the box drops down for easy access.

dipstick, run a clean finger along the dipstick to gather up some oil and rub the oil on the fittings. Tubing will now slide easily onto fittings.

Level 3 maintenance

You will find the following information useful when you're making repairs to those parts of a J-car that will probably need attention during the car's life.

The High Energy Ignition (HEI) system in the J-car has an externally mounted coil. If you have to replace this coil, you will find it under the intake manifold. The job is difficult, so follow this recommended procedure:

1. **Raise the car**—this job is done from underneath.
2. **Remove the fuel pump.**
3. **Remove the bracket blocking the coil** and remove the hex-head stud to which the bracket is attached.
4. **Remove the electrical leads from the coil once the coil is unblocked.**
5. **Loosen, but don't remove, the two bolts holding the coil.** Both ends of the coil bracket are slotted, so you can slide the coil off the retaining bolts without removing the bolts.

The MacPherson struts may look as if they have to be replaced when they fail, because strut cases look sealed. But looks are deceiving. Only cartridges inside the cases have to be replaced.

When you remove a strut from the car and take off the spring, notice the score line on the top part of the case. If you cut along this line, first with a utility knife and then with a pipe cutter, you'll be able to open the case.

When the case is open, remove the

old cartridge and empty any oil from the case. A replacement kit you can buy from a GM dealer provides a new cartridge, a top nut (which has been threaded at the factory, to screw into the top of the case) and a flaring tool.

Use the flaring tool to straighten the edge of the case, which may have been made uneven by the opening operation. Place the flaring tool in the top of the case and tap it with a hammer until the tool rests evenly in the case. Remove the tool. Install the cartridge. Then, screw the top nut into the case and tighten.

Two different disc-brake assemblies are available for J-cars. They are not interchangeable.

One type of disc is solid, while the other is vented. The vented disc is larger and uses a different caliper than the solid disc. The important point to remember is to replace a solid disc with a solid disc and a vented disc with a vented disc.

Speaking of brakes, the J-car has an electric vacuum pump under the leading edge of the left fender.

The pump provides vacuum to brakes when engine-load conditions cause engine vacuum to drop below 12½ inches of mercury. Thus, ample vacuum is always available to keep braking power at a maximum level.

Noises that the pump makes are normal. These include clicking when the ignition key is turned on, and a 10-second buzzing when the engine vacuum falls and the pump starts operating.

Testing and working on the J-car starter motor is a true delight. It is more readily accessible than starter motors in most cars.

To remove the starter from a J-car, disconnect the battery negative cable and raise the car. Remove

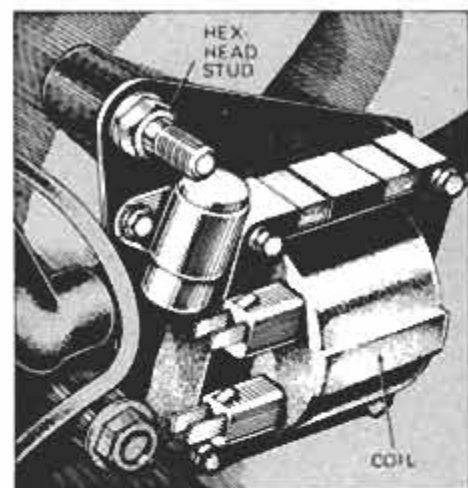
wires and the battery cable from the solenoid. Unscrew the fasteners holding the starter to the rear brace. If the car has airconditioning, loosen the compressor support rod and swing it out of the way. Now, remove the bolts which hold the starter to the engine and take out the starter.

Another job that level 3 Saturday mechanics will find simple to do in the J-car is removing defective valve lifters. This is a dog of a task in most other cars. With the J-car, however, you don't have to remove the intake manifold—or even rocker arms and guides, although doing so makes removing lifters an even easier task.

Once the valve cover is removed, lifters are accessible. They are seated in the block to the side of the cylinder head.

Insert valve lifter remover and installer tool (Kent-Moore tool No. J-29834, which costs \$14) down the valve lifter slot in the cylinder head and push down on the tool. Pushing causes two small arms to extend from the bottom of the tool. These arms grip the valve lifter and allow you to pull the lifter up and out.

To install a valve lifter, coat the end of it with MolyKote. Then, grasp it with the lifter remover and installer tool and push it into the block until it seats properly. Relieve pressure on the tool to release it.



Ignition coil becomes accessible after car is jacked up and fuel pump and bracket (attached to hex head stud) are removed.

Here's one final tip that could save you a lot of grief: If you lift the car and intend to remove any heavy rear-end component, support the front end of the vehicle by placing a stand under the radiator car support. The engine-transaxle combination places a great deal of weight up front. If you upset the balance, you could find the car taking a nose dive.

35 Ways To Help You Qualify For A Job That Pays More Money!

FREE CAREER FACTS ABOUT DIPLOMAS AND COLLEGE DEGREES



Send for free facts and color brochure to find out what career training in the field of your choice might do for you—no obligation to buy anything now or ever.

Now at home in your spare time, you can train for a money-making career... even get a college degree if you want... to help you get a better job. Find out everything you need to know about any one of these 35 career programs—with no obligation to buy anything, now or ever, and no salesman will call. Just check the one program that interests you most. You will receive free facts, color brochure and information on employment opportunities in the field you choose. Mail coupon today and see how easy it is to train at home for a great new career or advancement on your present job.

ICS and NACS are the Home-Study Divisions of National Education Corporation which also trains over 20,000 students a year in more than 50 resident schools from border to border and coast to coast. ICS and NACS are both accredited members of the National Home Study Council.

Accredited Member Home Study Council

**NO OBLIGATION
NO SALESMAN
WILL CALL**



MAIL POSTAGE-PAID REPLY CARD FOR FREE FACTS

35 WAYS TO HELP YOU QUALIFY FOR A JOB THAT PAYS MORE MONEY!

Open Book Exams... Adult Training

Your diploma or college degree is given to you for what you learn—not what you memorize. We send lessons and training material to your home. You decide when you are ready to take each "Open Book" exam. Then mail it to your instructor. Graded papers are returned to you with comments when needed to tell you how to correct your wrong answers. "Open Book" exams have proven so successful for adults, they are now used in many colleges. Our graduates tell us they like our method of independent study because it's so convenient and easy to do. You choose your own study hours in the privacy of your own home. You move ahead one step at a time, as fast or as slow as you want. And every Diploma or College Degree is fully accredited.

An Ideal Way to Learn

You waste no time travelling to and from class. And you never have to miss a paycheck. Skilled instructors are ready to help you at any time.

You get the same high-quality training that ICS has been known for since 1891... the same kind of training program that's offered by giant companies to their employees... corporations like Union Carbide, International Paper, 3M, Bethlehem Steel, United States Steel, etc. And note that if

you wish, ICS will keep your employer informed of your progress if you feel it can help you toward a better job, or an increase in salary.

No one can promise success but if you want more security, more day-to-day satisfaction and more of a future, send for free facts and the color brochure of your choice. There is no obligation and no salesman will call.

Could a Career Diploma Help You Earn \$25,000 to \$100,000 More in Your Lifetime?

Compare your present salary with the amount of money you could be making in any one of the careers listed below. Electricians average \$11.25 an hour, auto mechanics over \$8.00 an hour. And it's not only the money, but the fun of working in a job you like.

Could a College Degree Be Worth Thousands of Dollars to You?

A two-year degree that gives you an Associate in Specialized Business or in Specialized Technology could make a giant difference in your lifetime earnings compared to the average earnings of a high school graduate. Check the degree or career course you are most interested in and mail the postage-paid reply card today!

APPLIANCE CLINIC

QUESTIONS ANSWERED

Freezeless valves

I have two Woodford Model 14 freezeless water valves that were installed in my house in 1964. They have developed slight leaks. However, when I tried to change the seat washer, I couldn't remove the stem after removing the packing nut and packing. My local plumbing company, which installed them originally, no longer carries these valves. The company did say, though, that the stems should back out. Is the configuration of these valves different from others?—Dean Beavers, Poughkeepsie, Wash.

A representative for Woodford assures us that these stems should back out in the same way as their short-stemmed cousins. Don't forget that you're working with a longer stem, and that the stem itself may be twisting slightly. Try putting tension on the wrench and rapping it slightly with a mallet to break the stem's grip.

If you can't locate a supplier of Woodford Model 14 valves, write to the Woodford Manufacturing Co., Box 10328, Des Moines, Iowa 50306, for the name of the dealer nearest you.

Soggy washer

I own a General Electric washer Model WWA5600VBLWH. The washer has two wash cycles: one for permanent press and the other for regular wash. Occasionally, the machine will stop midway through the cycle. On the permanent-press cycle, it stops at the last rinse point and on the regular cycle, it stops at the "soak" point. If the selector knob is moved past these points, the washer completes the cycle. The machine was checked by a GE serviceman and, of course, it worked fine. What could cause an intermittent problem like this?—Jeffrey B. Morgan, Sicklerville, N.J.

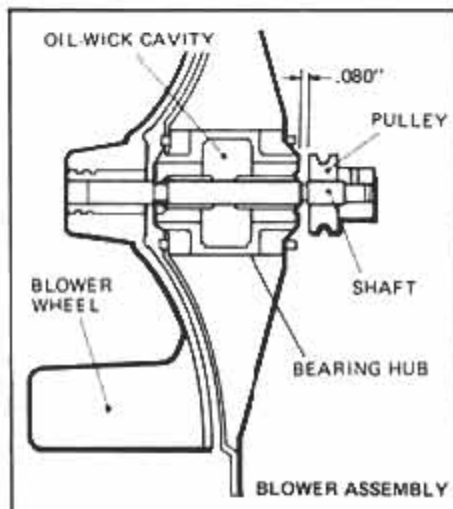
Probably the printed-circuit board inside the timer is at fault. We suggest calling back the GE serviceman and having him check terminals five and six on the printed-circuit switches. To replace the circuit board, you must disassemble the entire timer assembly.

If you would like to tackle the job yourself, order the printed-circuit board, as well as the GE step-by-step repair manual for your washer. The repair manual has easy-to-follow instructions, as well as pictures to show you how to disassemble the timer. The part number for the man-

ual is WX10X54 (\$6.95 plus tax). The printed-circuit board is part No. WH11X84 (\$14.45 plus tax). Add \$2.50 for shipping. They both can be ordered from General Electric Co., Box 566, Warehouse Point, Conn. 06088.

Wheel doesn't roll

I own a Sears dryer model No. 110-6118822. The blower wheel freezes and then the belts break. Three belts have broken so far. I used wheel-bearing grease to lubricate the bronze bushing, but with no luck. What could be the problem?—B. LoRusso, Roslyn Heights, N.Y.



Worn bearing surface of the blower assembly allows the lubricant to congeal, causing the blower shaft to slow down. Then the belt becomes heated and eventually breaks.

Your dryer has given you 20 years of service (that particular model is 20 years old.) Sounds as if it's time to replace the blower assembly. It appears that the bearing surface has worn and the lubricant has congealed. This makes a gum which causes the blower shaft to seize or turn slowly, causing the belt to heat and break.

The blower assembly includes a prelubricated bearing, blower shaft and blower wheel. The part is No. 239361; it costs approximately \$15, plus tax, through a Sears service center or your local appliance-parts distributor.

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

Before installing the new blower assembly, check the distance between the pulley and the bearing hub. The clearance should be .080 in. This clearance will prevent the pulley from coming in contact with the bearing while the blower is on.

Coffeemaker hot line

We recently heard from North American Systems, which makes Mr. Coffee. The manufacturer explained that all Mr. Coffee coffeemakers come with explicit operating instructions. In some instances, it may be economical and practical for readers to make their own repairs; however, it could cause problems they may not be aware of.

There are over 400 authorized service centers throughout the country. North American Systems recommends that you not tamper with the machine, but take it to a service center, instead. If you have any questions, call North American Systems on its toll-free number: 800-321-0370.

Drip dry

We own a Sears Compact Lady Kenmore washer, Model 110-74690600, serial No. J60693237. After the second or third load of clothes, it doesn't spin all the water out. Every successive load gets the same treatment. Sometimes I have to put the machine through the spin cycle two or three times to drain the water. What can we do?—Mrs. Jan Schonely, Gilbertsville, Pa.

Sounds as if your problem may be in one of several areas. There is a possibility that the basket clutch assembly may need adjustment or that the drain pump may be worn or clogged with lint. To get at the clutch or pump, you must raise the entire wraparound cabinet.

I suggest that you have a technician check the machine to determine what parts are at fault. **PM**



Right Connections for Good Times



For whatever you tow, for whatever you drive, U-HAUL HITCH WORLDSM has everything for your towing needs.

COMPLETE LINE OF HITCHES

Hitches for cars, trucks and motor homes. Regular and heavy-duty hitches. Weight-distributing hitches. Also custom fabrication for older or unique vehicles.

COMPLETE LINE OF TOWING ACCESSORIES

Brake and sway controls, electrical connectors, transmission coolers, tow bars, ball mounts, mirrors, suspension aids, and more.

FAST PROFESSIONAL INSTALLATION

Over 1,100 fully-equipped locations in the U.S. and Canada. Open seven days a week, year 'round. Let our professionals install your hitch while you wait.

FULL WARRANTY

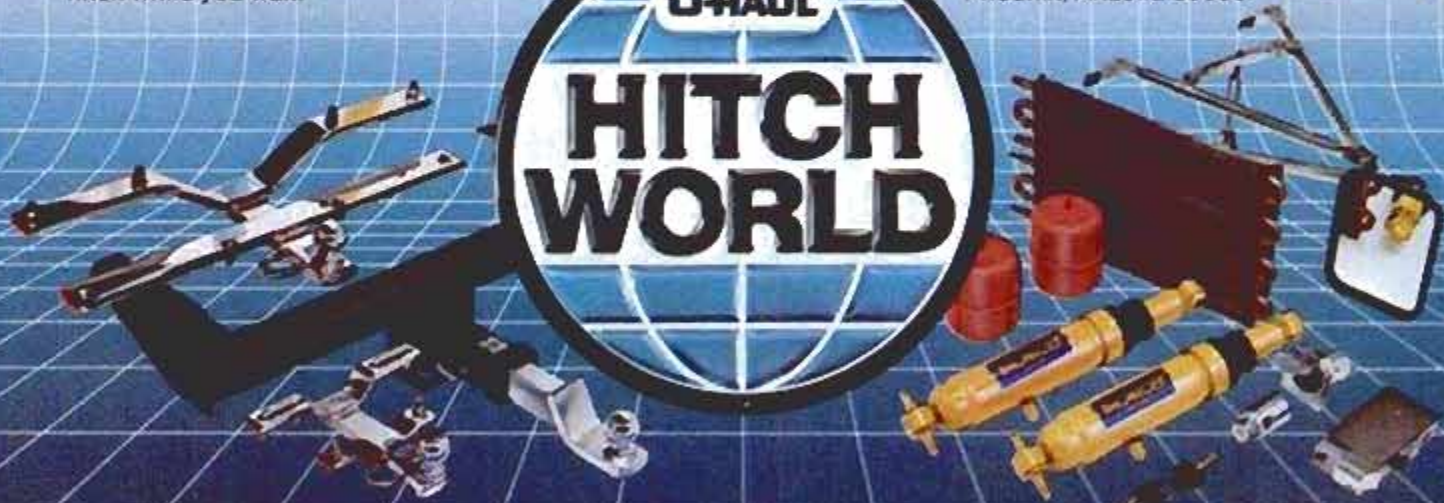
HITCH WORLD custom hitches are warranted for as long as you own your vehicle. Defects in materials, workmanship or installation will be repaired or replaced at no additional cost at any of our 1,100 locations.

RV & TRAILER SERVICE & REPAIRS

Spring and winter checkups. Mechanical, electrical and body repairs.

So for convenience, full service and safety, connect with the experts. U-HAUL[®] has over 35 years experience in trailer towing. Find HITCH WORLD at a nearby U-HAUL Moving Center or in the Yellow Pages under Trailer Hitches or RV Repair.

Write for FREE HITCH GUIDE:
HITCH WORLD, Dept. P,
P.O. Box 21503,
Phoenix, Arizona 85036



COMPLETE TRAILER TOWING SYSTEMS

Join the winning team. We're hiring experienced hitch fabricators and RV repairmen. Call Don Noel, 1-800-528-0463.

Yanmar Shuttle Power Shift... Eases your workaday world.

The big tractor features that Yanmar builds into their tractors make a world of difference. A world of operating ease and convenience. A world of dependable diesel power and performance.

Shuttle Power Shift.

And look where the shift is mounted. Right on the steering column for easy fingertip control. It lets you shift on the go without clutching.

You get the ease of automatic without the 25 or 30% power loss of hydraulic or hydrostatic type transmissions. You save time. You save effort. Your workaday world becomes more productive. More rewarding.



Live PTO (Power Take-Off)

With a regular PTO, your attachment is not driven unless your tractor is moving. That means uneven work until your tractor gets up to operating speed. Yanmar's 2-speed Live PTO keeps your attachments moving at full power even when your tractor slows down or stops. You get consistent work and sure going through the toughest spots.

Versatility

Yanmar offers you a wide variety of performance proven implements and equipment. Yanmar's 3 point Hitch and built-in hydraulics handle mounted equipment with ease. So from tilling to plowing, from mowing to loading, there's nothing you can't do with a rugged, reliable Yanmar Diesel Tractor.

Financing, and more

Your Yanmar dealer is prepared to help you with financing, leasing or rental arrangements. And our

nationwide dealer parts and service network assures prompt attention to your needs.

Test Drive You'll probably find we're just down the road from your place. Come on in and sit down in the driver's seat of a Yanmar. Once you discover all the big tractor features, all the fuel-squeezing diesel economy and all that quiet, hard-working diesel power, you'll know why we say... "Yanmar makes a world of difference".



Tractors and Implements.
A World of Difference.

Nationwide
Parts & Service



CAR CLINIC

SOLUTIONS
FOR MECHANICAL
HEADACHES

BY
MORT SCHULTZ



Braining for Brian

The dealer can't seem to fix a problem I'm having with the Hondamatic transmission in my 1979 Accord. The transmission often slips. In addition, transmission fluid leaks from an undetermined spot. I sure hope you can figure this one out, because it causes the kind of random excitement I don't need.—Brian L. Zwetzig, Los Gatos, Calif.

Don't despair, Brian. Many Honda owners have been, and still are, in the same boat. The most common reason for the slipping problem is the shop manual. Instructions it gives on adjusting the transmission shift cable are incorrect. Honda issued service bulletin 80-006 (March 1980) to straighten out the situation. The bulletin is entitled, "Hondamatic Shift Cable Adjustment."

If you wish to do this job yourself, here's how to go about it:

1. Remove the center console.
2. Shift the transmission into REVERSE.
3. Remove the lock clip and retaining pin from the end of the control cable.
4. Check that the hole in the end of the control cable is lined up with the hole in the selector lever. *These holes must match up.*
5. Reinsert the lock clip and retaining pin.
6. Notice the locknut holding the cable to the adjusting mechanism. Loosen the locknut and turn the adjusting mechanism one complete turn counterclockwise. This should give the cable 2-mm ($\frac{1}{16}$ -in.) free play.
7. Tighten the locknut securely.

The leaking problem, an unrelated condition, is frequently caused when the driveshaft is removed from the car. Perhaps this was done by someone attempting to repair the transmission. If the shaft isn't inserted all the way so its snap ring engages the groove in the transmission, the shaft will "float" from the transmission and fluid will leak. Other reasons for fluid leaking are a damaged

input shaft seal and a damaged torque converter O-ring.

'Reel' solution

My 1979 Plymouth Horizon has only 19,000 miles, but it uses enough oil to delight a sheik. For example, in 2,400 miles I've had to add six quarts. My dealer told me many Chrysler Corp. and VW owners have the same problem, since Horizon and Omni are equipped with the 1.7-liter VW engine. The solution he offers is to buy oil by the case and add a quart every two weeks. What do you say?—Gary Reel, Canfield, Ohio

It's not a solution. If you want the real McCoy, replace the valve seals in the engine with the new, improved seal issued by Chrysler to stop oil consumption. Tell your dealer he can get a package of the new seals by using part No. 4186331.

Ping-Pong ball

In June, you told Bill Lewis how to fix an oil leak in his 1978 Dodge Colt. I have the same problem with my 1978 Plymouth Sapporo, and I thought I had found the answer when I read your column. The two cars have the same engine. However, my Plymouth dealer says the part num-

Bear facts

Tom Fudall at Bear sent us this tip concerning coating battery cable terminals to prevent corrosion. Silicone compound, which is generally called "grease" by most people (although it's not a grease at all) is being used by auto manufacturers on parts of electronic ignition systems to improve insulation and prevent heat damage.

"One very good use for silicone not mentioned before, as far as I know, is as a protective coating for battery cable terminals," Tom says. "After terminals and battery connections have been cleaned and terminals are reattached and tightened, a coating of silicone on terminals will work better to prevent new corrosion than anything else that I have found so far" (Editor's Note: Make sure that you apply a thin coating of silicone to terminals.)

Silicone compounds made by General Electric and Dow Corning are available in most hardware and auto-parts-supply stores. There are different varieties, but GE-623, 527 or 628, or Dow Corning 111 will work.

ber (MD034007) you gave for the cure-all aluminum check ball to stop the leak is invalid. Could there have been a typographical error?—Robert M. Tubbs, Tupelo, Miss.

Nope. The part number is a good one. However, the information may not yet have trickled down to the dealerships. Chrysler parts depots presently have about 4,890 of the aluminum check balls in stock, so tell your dealer to order the part using the number we gave. You'll get it.

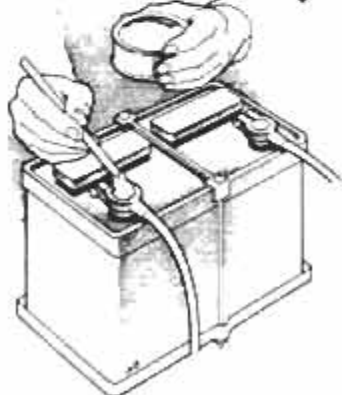
HEI lie

I'm really in a bind. I have a 1978 Chevrolet Malibu with the 305-cu.-in. V8 engine and High Energy Ignition (HEI) system. The car has only 10,000 miles on it, but I've had to replace the module in the ignition system three times. When a module fails, the engine won't start on occasion or, if running, will stall and be hard starting. I live in a rural area, far from help, so I have to carry spare modules for an emergency. These modules cost \$42.50 each, so this nonsense is getting really expensive. Has GM developed a better module that dealers up here don't know about?—Martin Halpert, Ticonderoga, N.Y.

About the same time your letter arrived I received others concerning the same problem. One was from Bernard Shaw of Hillsdale, Mich., who owns a 1978 Chevrolet Impala. Another was from Col. L.J. Evans of Bonita Springs, Fla., who owns a 1978 Cadillac Coupe De Ville.

Every GM car with an HEI system can experience the condition you describe. However, rarely is the module to blame. Tests by GM of modules it receives from the field that are thought to be bad have proven that only one-tenth of one

(Please turn to page 46)



CAR CLINIC

(Continued from page 45)

percent are actually shot. In most cases, the cause of failure is dirty and/or loose module-to-pickup coil terminal connections. If you get rid of the dirt and tighten connections, you can probably restore the module to perfect condition.

Each GM division has issued a service bulletin explaining how to do this. In the case of Chevrolet, the bulletin is 78-1-59. However, since you are not near a dealer, I'm going to outline how to restore a module.

1. Remove the distributor cap and rotor.

2. Remove the module from the distributor.

3. Using emery cloth or a wire brush, clean the module terminals to get rid of oxide film.

4. If there is a connector body on the green and white pickup coil wires, remove it.

5. Inspect the pickup coil wire terminals. If terminals are loose where they connect to the wires, recrimp them. If this doesn't tighten things up, use a small soldering iron to melt the existing solder and to add new solder, if necessary. Be careful that heat from the iron doesn't damage

wire insulation and that solder doesn't run under terminals.

6. Using needle-nosed pliers, squeeze the side rails of that part of each pickup coil wire terminal which attaches to the module. This will assure a tight fit when you reconnect the pickup coil wires.

7. Before you reinstall the module, apply a thin coat of petroleum jelly to each module terminal. This will help prevent oxidation. Also, apply a thin coat of silicone heat transfer

grease to the base of the module. You can buy silicone heat transfer grease from a GM dealer using AC-Delco part No. D-1920.

8. Reinstall the module and connect leads. Check for good metal-to-metal contact between terminals.

Fresh!

My 1981 Buick Century is the laughing stock of our car pool. When the boys who ride with me see a pretty girl walking down the avenue, they

PM CAR CARE



Buried deep in the engine compartment of most cars built since 1973 is a canister full of charcoal. It's the heart of a closed system that prevents carburetor and fuel-tank gasoline vapors from entering the atmosphere.



Hey, down there!

"So what?" you ask. Just that this system can cause problems you won't be able to solve unless you're aware of the system's existence. These conditions include gasoline smell, increased fuel consumption, rough idling, poor low-speed performance and a collapsed fuel tank. If any of these problems crop up, check to see that vacuum hoses attached to the canister are in good condition and that the canister itself hasn't cracked.

If the canister has been neglected, a filter in its base may have to be replaced. If there is no filter, the whole canister may need changing. Normal life of charcoal in a nonfilter canister is 50,000 miles. Other things that can go wrong with this system can usually be uncovered with a pressure test.

Know your exact MPG instantly!

...with the new DIXCO.

Gas Guide™

At last, the first affordable instrument that displays accurate, true miles-per-gallon information for your best fuel economy. The Dixco Gas Guide measures the actual gas flow into the carburetor through the use of the electronic TURBO FLOW fuel sensor. True, exact M.P.G. is displayed at the 2 most common driving speeds...**35** CITY and **55** HIGHWAY.

Once the driver is accustomed to the regular readings at 35 and 55 M.P.H., he will find that he can quickly estimate M.P.G. at other speeds as well as gallons used per hour.

- ★ You can control and improve your driving techniques.
- ★ Increase gas mileage with the use of the Gas Guide.
- ★ Prove claims of advertised brands of gas and oils.
- ★ Detect engine performance malfunctions.
- ★ As easy to install as a fuel filter.
- ★ "Hints for Gas Saving" booklet included.

SAVE GAS & MONEY...
with the DIXCO Gas Guide.



AVAILABLE AT LEADING
AUTOMOTIVE OUTLETS everywhere

DIXSON, INC. Automotive Div.
P.O. Box 1449 • Grand Junction, CO 81502

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

tell me to step on the brake pedal. When I do, the car gives out a high-pitched whistle. Help.—Joseph Rossi, Madison, Wis.

The offending member is the high-pressure, power-steering pipe between the Hydro-boost unit and the power-steering gear. The Hydro-boost unit uses hydraulic fluid pressure provided by the power-steering pump to operate both the power-brake booster and power-steering gear. Under pressure, some original equipment Hydro-boost power-steering pipes are leaking (and whistling) at fittings. In some cars, it occurs when the wheel is turned.

Put a stifle on the whistle by having the Hydro-boost high-pressure hose replaced with a newly designed hose that has part No. 7839511. Regal owners who have the same whistling problem need the same hose as you. Riviera owners use hose No. 7837182. Owners of all other 1981 Buick models having the Hydro-boost unit (this excludes Skylark) need hose 7833357.

Bringing in the heavy artillery

I'm engaged in combat with my Plymouth dealer, and he's about to outflank me unless I get reinforcements. The controversy centers

around the tendency my 1981 Reliant has of occasionally jumping out of gear as I ease my foot off the accelerator pedal. My dealer has driven the car several times. He says it doesn't happen for him. Can you help me?—Paul Burdick, Fresno, Calif.

All the help you need is contained in service bulletin 21-09-81 (8/8/81). It says, "The condition (transaxle jumping out of gear) may be experienced intermittently and may not be easily detected on a road test."

To fix the trouble, your dealer should replace the gearshift blocker and gearshift selector with a new, improved gearshift blocker (part No. 4269363) and gearshift selector (part No. 4269080). If the transmission keeps jumping out of third gear, the 3-4 synchronizer assembly must be replaced with a new assembly (part No. 4269388).

Service bulletin 21-09-81 also applies to the 1981 Dodge Aries and Omni, and the 1981 Plymouth Horizon with manual A-460 transaxle.

GOT A PROBLEM WITH YOUR CAR?

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

SERVICE TIPS

■ Ford Motor Co. says that clunking noises which occur in 1981 Escort/Lynx models when braking are probably caused by spiral grooves developing on rotor surfaces. Service bulletin 80-25-3 explains how to remove grooves by hand-sanding rotors with garnet 100 A or aluminum oxide 150 J medium-grit paper. To do the job, raise the front of the car, take off wheels, start the engine and place the transmission into low gear. Hold sandpaper against rotors as they revolve.

■ If you have one of 85,659 1979 Toyota Hi-Lux pickup trucks, listen closely. If there's a vibration/shimmy in the front suspension and steering, get the car to a dealer before the condition causes you to lose control. The dealer will install a brand-new steering damper free of charge to eliminate this potentially hazardous condition.

■ New exhaust gas recirculation (EGR) valves issued by Chrysler should clear up an engine surge at steady road speeds in second and third gear in your 1981 K-car or Omni/Horizon. The repair applies to cars with 2.2-liter four-cylinder engines and manual transmissions. Ask your dealer to consult service bulletin 25-07-81 (7/13/81).

■ At present, the oil filter for the 1.8-liter diesel engine in a Chevy Chevette has no AC part number, only a Chevy number (94217272). Buy filters from a Chevy dealer to get the correct one.

HOMEOWNERS' CLINIC

QUESTIONS ANSWERED

Water ring stain

I inadvertently left a flower pot on an oiled solid walnut table. The moisture left a dark ring, which appears to be mold, on the table. Light sanding doesn't remove it. Can you recommend a suitable method of removing the discoloration?—M. Dixon, Rancho Palos Verdes, Calif.

The experts list several possible remedies: First, try dabbing at the surface with a cloth dipped in nondegreasing household ammonia. But be advised that too much rubbing or too much ammonia may harm the finish. Second, place a warm iron on a towel over the discolored spot. Sometimes this will "lift" the moisture. Make sure that the iron doesn't get too hot or doesn't stand in one place too long.

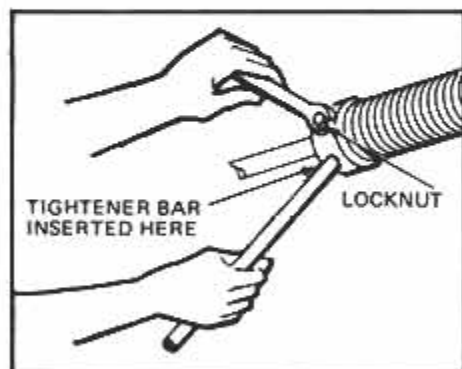
If these simple methods don't work, make a paste of rottenstone and boiled linseed oil; rub it on the spot in the direction of the grain. Wipe off the excess paste with a clean cloth, moistened with linseed oil. Repeat the procedure if required.

More on garage-door adjustment

Below is a revised drawing for adjusting a single-spring torsion assembly on a garage door. (See "Garage-Door Adjustment," *Homeowners' Clinic*, page 42, Dec. '81.)

Never adjust the single-spring torsion assembly until a rod at least 12 in. long is inserted in the hole in the collar; the bar holds the tension prior to releasing the locknut.

To make the adjustment on this type of spring, you must close—and lock—the door. Note: This can be a very dangerous procedure. Make

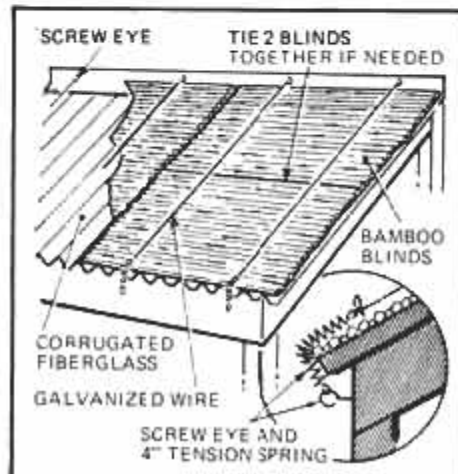


To adjust the torsion spring on a garage door, close and lock the door. Insert a tightener bar to maintain proper spring tension, then loosen the locknut with a wrench, prior to tightening the spring tension. Finally, retighten the locknut.

certain the bar is firmly in place and you're strong enough to hold the bar against the torsion of the spring. If you doubt your ability, let a pro do it; check your classified directory under "Doors, Garage."

Cooling a hot porch

My screened-in porch has a translucent, ribbed fiberglass roof. When the sun is not too hot (late in the evening and early in the morning), we can eat dinner and breakfast out there. We



Bamboo or plastic blinds, stretched over a fiberglass roof, will keep the area under it cooler on warm, sunny days.

would like to use the porch during the middle of the day for lunch, reading or relaxing. Is there any way to stretch canvas under the rafters of the 13 x 18-ft. porch to cool it during the middle of the day, yet be able to remove the canvas for the winter months, when we'd appreciate the warmth? I can't afford a contractor, but I'm pretty handy. Do you have any practical and economical solution?—Clyde Allard, Amarillo, Tex.

You should stretch the cover over the roof to shade it. This also prevents the heat from collecting on the roof underside. Either bamboo or plastic porch blinds make excellent sun filters for this purpose (see drawing).

Remove the cord and pulleys from the blinds, as they won't be needed.

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

To achieve the required length, you may have to tie two blinds together. I've overlapped the edges of the blinds about 8 in. and held them in place against high winds with No. 16 galvanized wire, fastened to screw eyes in both the house and front edge of the roof. I suggest placing the wires about 1 ft. from the edges of the blinds. A 4-in. tension spring will keep the wire taut.

In winter, merely release the tension on the spring, undo the wires and roll up the blinds for storage. You can leave the springs and wires in place until next summer.

Drinkable gear puller

In "Frozen Faucet Handle" (*Homeowners' Clinic*, page 46, Oct. '81), we mentioned that gear pullers may be rented to remove faucet handles. Although I haven't tried it, Allan G. Hooper, Butte, Mont., says that a few drops of a cola will dissolve the soap and grease, allowing the handle to be lifted off. Allan also says that many brands of cola also remove rust. Thanks for the tip, Allan. Since I'm counting my calories, I hope that they don't take the "secret ingredient" out of my diet soda.

Molding floor

My house was built on a concrete slab in the days before polyethylene vapor barriers. Although there appears to be good drainage away from the house, moisture accumulates under the rug and mold forms. Can I place the polyethylene on top of the slab to stop mold formation?—J.R. Herzog, Smethport, Pa.

Remove the carpet and pad along with the baseboard. Install a minimum thickness of 4-mil polyethylene on the floor, allowing it to overlap the walls by at least 1 in. When you replace the molding, you'll seal the carpet against moisture. Lap all the polyethylene joints at least 6 in. and take care not to puncture them. **PM**



"THEY WON'T BELIEVE YOU DID IT YOURSELF CEILINGS."



EASY TO CUT

Owens-Corning *Fiberglas*® Ceiling Panels cut easily and precisely with a standard utility knife. What's more, they don't chip or break like rigid panels.

EASY TO HANDLE

Even though Fiberglas panels are more durable, they weigh only one-third as much as rigid panels.

So you won't wear yourself down putting them up.

EASY TO INSTALL

Once your grid is up, Fiberglas panels simply flex into place... as close as 2 inches from your old ceiling! For more information, write B.E.E. Meeks, Owens-Corning Fiberglas Corp., Fiberglas Tower, Toledo, Ohio 43659.

**ONLY FROM
OWENS-CORNING**

OWENS-CORNING
FIBERGLAS
1888 WAKY 33

© O.C.E. Corp. 1982

ON SALE
FEB. 27 TO MARCH 14 AT
PARTICIPATING
DEALERS.

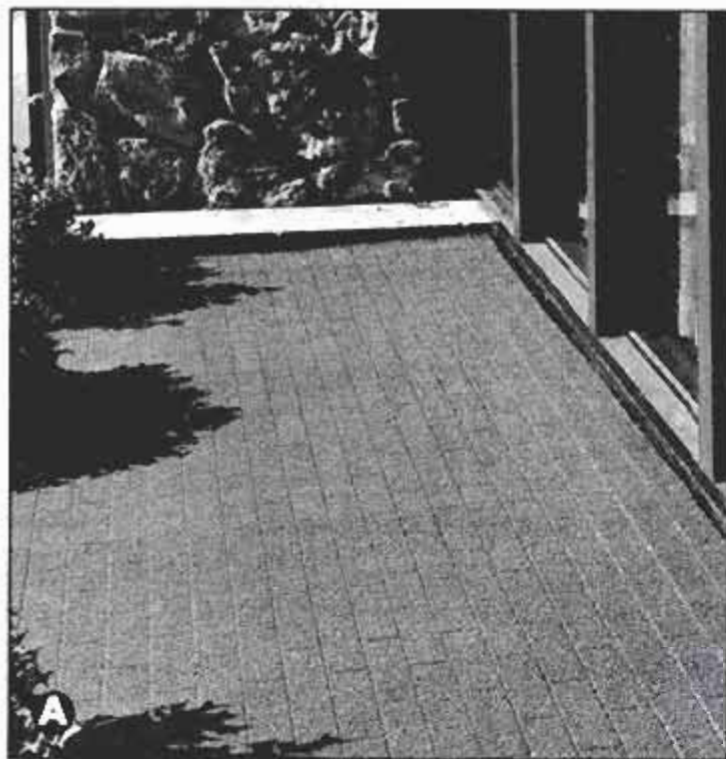
There are times
when only the best will do.



Canadian Club
"The Best In The House"®

6 Years Old. Imported in Bottle from Canada by Hiram Walker Importers Inc., Detroit, Mich. 86.8 Proof. Blended Canadian Whiskey. © 1992

NEW NOW for home and shop

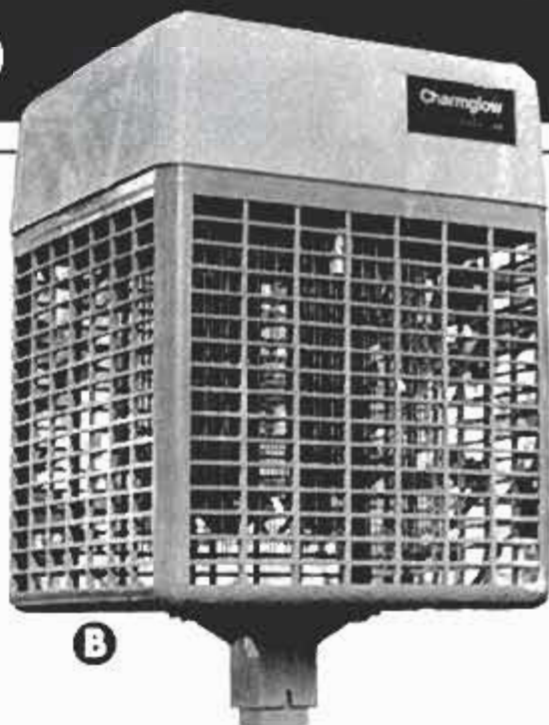


A Courtyard is one of 44 different kinds of instant turf flooring made by Instant Turf Industries Inc., Box 748, Dalton, Ga. 30720. This synthetic material can be applied indoors or outdoors, using appropriate adhesive. According to the maker, it's ideal for greenhouse applications. It costs \$5 to \$8 per sq. yd. at home centers and carpeting stores.

B A new, UL-listed residential bug killer—Model 8305—has been introduced by Charmglow Products, Box 127, Bristol, Wis. 53104. According to the maker, this unit attracts mosquitoes, gnats, moths and other flying pests from a one-acre area, using two 50-watt black-light bulbs; it kills them on a 5,000-volt grid. It measures 12 x 12 x 18 in. and costs \$169.95 at home and garden centers. An optional steel mounting pole is \$29.95.

C Three new, whole-house attic fans have been introduced by Emerson Environmental Products, 8400 Pershall Rd., Hazelwood, Mo. 63042: a 390-watt, 24-in. fan for a 1,200-sq.-ft. house; a 575-watt, 30-in. unit for a 1,700-sq.-ft. house; and a 650-watt, 36-in. unit for a 2,300-sq.-ft. house. Available at home centers, and designed for do-it-yourself installation, they're \$169.90, \$182.90 and \$201.90, respectively.

D The Corian 821 is a new, top-mounting sink that measures 7¼ x 17¼ x 20¼-in. wide. It is available in cameo white, dawn beige and olive mist with faucet holes either 4 or 8 in. apart. Made by DuPont Co., Wilmington, Del. 19898, the unit costs about \$110 at plumbing-supply houses. Two other sinks, Model 810 and Model 820, are available in the same colors, at the same price. Both have oval basins.



Why stay home? 3-Wheel to **INDEPENDENCE**

For
FREE CATALOG,
call toll free
1-800-257-7955

Put mobility and fun in your life with this new electric 3-wheeler. So easy to handle — you control on, off, forward, reverse, starting, steering, speed and braking with **JUST ONE HAND!**



With CYCLE CHAIR, you can go where you want, when you want. You won't be stuck at home; you won't be dependent on others. Go to — and through — the store. Visit friends. Make new friends. Ride with others.

CYCLE CHAIR is a very affordable, completely electric, rear drive 3-wheeler. It's a perfect means of getting around for senior citizens, the handicapped, or anyone who needs safe, reliable transportation!

Owners Love CYCLE CHAIR

"I call it my 'Freedom Cycle' — I go where I want and when I want. I no longer have to depend on others."

Donald Meikle, 57, Miami FL

"My neurologist was so pleased with my CYCLE CHAIR that he wrote a prescription to my insurance company to cover part of its cost."

Ray D. McMullen, 70, Eugene, OR

"I use it while gardening — the grandchildren love to ride along with grandpa."

Paul Fuhrman, 67, Beaver Springs, PA

"Being handicapped since birth prevented me from riding a bike or walking long distances. Now with CYCLE CHAIR, I can go bicycle riding with my sister instead of staying home. I can even beat her up hills because I don't have to pedal!"

Maria Weigand, 13, Lebanon, NJ



Free color catalog and special free Spring gift offer!

Just return the coupon to CYCLE CHAIR, 591 Mantua Blvd., Sewell, N.J. 08080. For extra fast "express service" on your free color catalog and special free Spring gift offer, call...

Toll-free 1-800-257-7955 (in N.J., 800-232-6550)

Ten day trial • Money-back guarantee

CYCLE CHAIR

Tax deductible as a medical expense when prescribed by a doctor.

Return This Coupon!

YES! Send me my FREE COLOR CATALOG, and special free Spring gift offer for CYCLE CHAIR, other 3-wheelers and electric bike motors.

Send to: Department 479, CYCLE CHAIR, 591 Mantua Blvd., Sewell, N.J. 08080

Name _____
Address _____
City _____
State _____ Zip _____
Phone () _____

HINTS FROM READERS

Gopher be gone



Here's a good way to keep gophers away from your plant's roots. After you dig a hole in the ground, line it with 1-in. chicken wire before positioning the plant.

—Alan W. Farrant

Minimize garbage odor



Minimize the odor of garbage that emanates from a trash can. Pour 1 in. of any brand of commercial cat-box filler, such as Kitty Litter, into the bottom of the can.—S. Parker

Cotter-key substitute

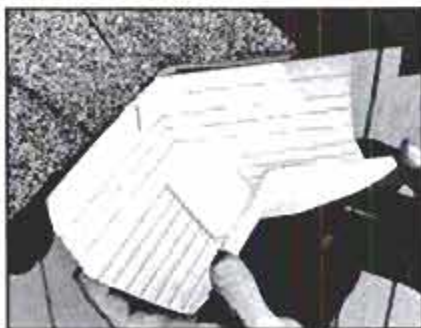
The next time you must secure a shaft, nut or other item onto some piece of machinery, try using a large safety pin. It is far handier than a cotter key and will last longer than several keys, which must be bent every time they're used.—Henry E. Leabo

HINTS FROM READERS

Vinyl gutter corners



Join mitered pieces of vinyl gutter, such as Raingo, with Genova's two-part cement or any other solvent cement.



Custom corner fits a 135° roof angle.

To make a custom gutter corner, miter two pieces of vinyl gutter and solvent-weld them using plenty of solvent cement. Join the pieces and hold them with masking tape. Then connect the corner to adjacent guttering with slip-joints for a customized fit.

—J. Frawley

Safety pin holds parts



Add several large-size safety pins to your toolbox or workbench. You can use them to hold washers, rings, nuts and other small items that have holes. Make sure that you don't overload a pin or it will become difficult to open and close.—Walter E. Burton

LET THINGS SLIDE.

Anytime you're looking for a greaseless solution to a sticky situation, this is it.

Union Carbide's Silicone Spray Lubricant keeps windows and drawers from sticking, keeps locks from locking up, keeps your car's electric system from getting wet, and more. No wonder it's called the Ungreasy Unsticker.



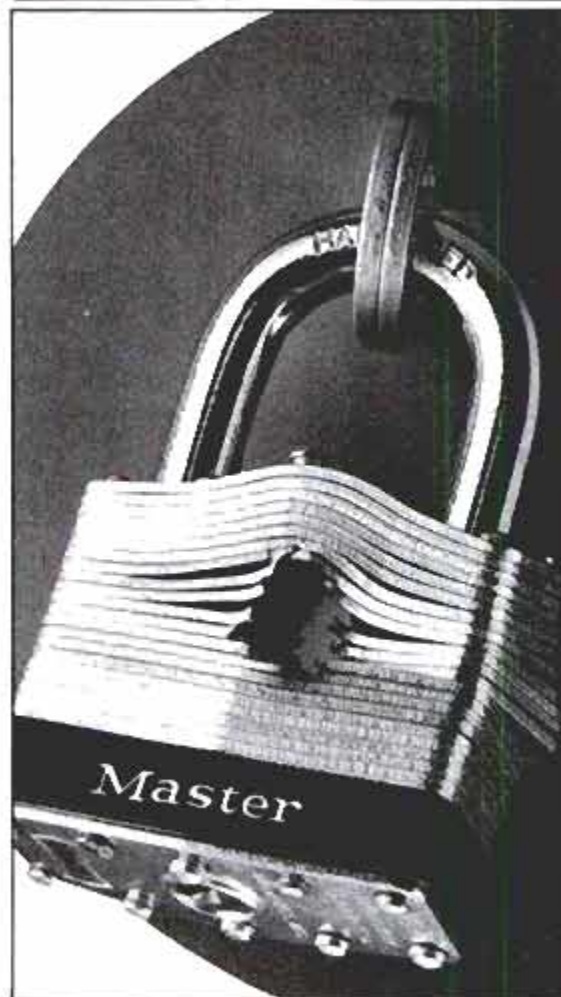
UNION CARBIDE IS A REGISTERED TRADEMARK OF UNION CARBIDE CORPORATION, DANBURY, CT 06817.

TOUGH UNDER FIRE.

A high-powered rifle blasts a half-inch hole clear through a Master lock, and it still holds tight! A dramatic test of strength filmed for TV.

There's a Master lock for most anything worth keeping. Even special locks for trailers, guns, bikes and skis.

Now, who makes locks that can take a beating? Master Lock, sure as shootin'.



 **Master**
Lock Company
MILWAUKEE, WI 53210

PM WORKBENCH

PM EXAMINES PRODUCTS AND SERVICES

Water-base enamel paints



New water-base enamel paint has gloss and hardness which is similar to that of solvent-base oil paint.

A new line of latex, high-gloss enamel paints now offer the gloss and hardness of oil-base products, while still allowing the easy cleanup of water-base paints. They can be used on all interior and exterior surfaces with a drying time similar to oil-base paint.

They dry to the touch in just eight hours, can be recoated the second day and require two days for complete drying. Available in half-pints (\$2.42), quarts (\$7.03) and gallons (\$21.97) at paint stores, they're manufactured by PPG Industries Inc., 1 Gateway Center, Pittsburgh, Pa. 15222.—S.W.

Quick-setting wall repair

Dents, holes and cracks in drywall, plaster and masonry (both interior and exterior) can be easily repaired with 3M's wall-repair compound. Its rapid drying time allows painting shortly after application and eliminates the sagging which is so common with slow-drying compounds. It



Wall repair compound dries within several hours, allows quick sanding and painting.

can also be feathered to a zero edge, thus making it nearly undetectable after you have finished your painting.

The product is sold in half-pints (\$2.25), pints (\$3.35), quarts (\$4.75) and gallons (\$15.45) at hardware stores and home centers.

—Rosario Capotosto

Hot stuff



This fast-heating gun makes it a snap to soften and remove broken tile. Tool comes with cushioned stand that lets you rest tool on floor while it's on. This frees both hands for work, when needed.

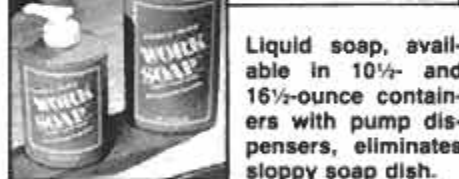


At some time or other, every serious do-it-yourselfer has a need for a flameless heater. Such a tool can be used to strip paint and varnish, soften floor tiles—or to warm high-pressure plastic laminates for bending to a radius. The model No. 499 Heat Gun from Master Appliance Corp., 2420 18th St., Racine, Wis. 53403, has a die-cast aluminum housing, high-speed universal motor, three-way switch and a heavy-duty 8-ft.-long cord.

The gun performed well on a recent floor installation and a cabinet laminating job, thus earning a permanent spot in my workshop. It costs \$87.50 at hardware stores and home centers.—H.W.

All washed up

The biggest gain from putting liquid soap, rather than bar soap on your sink is that you eliminate the messy soap dish immediately. This product, manufactured by Minnetonka Inc., Box 1A, Minnetonka, Minn. 55343, is sold at supermarkets and home centers in two sizes—10½ and



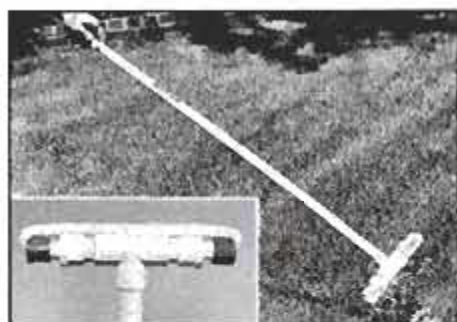
Liquid soap, available in 10½- and 16½-ounce containers with pump dispensers, eliminates sloppy soap dish.

16½ ounces—for \$1.99 and \$2.99, respectively.

The plastic bottles are equipped with handy pump-type dispensers, and the heavy-duty soap is neither harsh nor gritty. It's absolutely perfect for an end-of-shop-session cleanup.—H.W.

A wetter way

The Liquid Hoe provides a novel and convenient way to control weeds. Just fill its handle with herbicide and touch the tool's wick to the plant leaves or weeds you want killed. There is no spray drift or splashing that can damage neighboring plants.



Herbicide applicator is of PVC plastic. Weed killer flows from 50-in.-long hollow handle into 10-in.-wide wick at base.

It's available from Tate Equipment Inc., 624 Ithaca Rd., Horseheads, N.Y. 14845, for \$24.50 post-paid. Included are complete directions on using and mixing herbicides.—Rosario Capotosto

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

Here the lowest. There the lowest. Everywhere the lowest. **Who's really the lowest?**

All these different brands of cigarettes, each claiming to be the lowest in tar.

Just who are you supposed to believe?

Well, we say, why should a tar-conscious smoker have to put up with this kind of confusion?

Why should you have to do research in order to find out if

you can trust the "lowest" tar claims of your cigarette?

So we've done the research for you. We've assembled the tar level numbers of all the leading cigarettes that say they're the lowest.

And the results are right here in the chart below - which can light up the situation before you light up another cigarette.

See for yourself what's what. (And what isn't.)

Numbers don't lie.

And they prove there's only one Ultra Lowest Tar™ brand - **Now.**



Box

Box 100s

**NUMBERS DON'T LIE.
NO CIGARETTE, IN ANY SIZE,
IS LOWER IN TAR THAN NOW.**

	80's box	85's soft pack	100's box	100's soft pack
NOW	Less than 0.01mg	1mg	Less than 0.01mg	2mg
CARLTON	Less than 0.01mg	1mg*	1mg	5mg
CAMBRIDGE	Less than 0.1mg	1mg	—	4mg
BARCLAY	1mg	1mg	—	3mg

All tar numbers are av. per cigarette by FTC method, except the one asterisk (*) which is av. per cigarette by FTC Report May '81

NOW

The Lowest

The lowest in tar of all brands.

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

BOX, BOX 100's: Less than 0.01 mg. "tar", 0.001 mg. nicotine, SOFT PACK 85's FILTER, MENTHOL: 1 mg. "tar", 0.1 mg. nicotine, SOFT PACK 100's FILTER, MENTHOL: 2 mg. "tar", 0.2 mg. nicotine, av. per cigarette by FTC method.

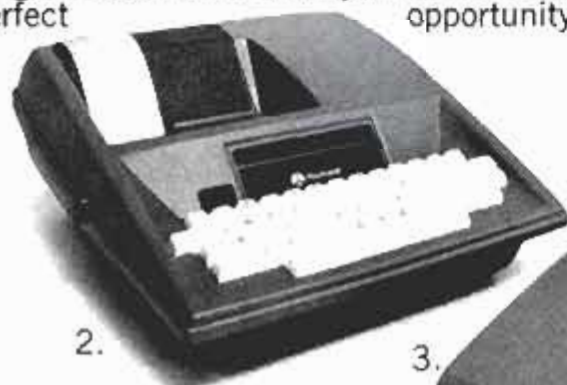
EQUIPMENT AND TRAINING NO OTHER SCHOOL CAN MATCH!

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

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

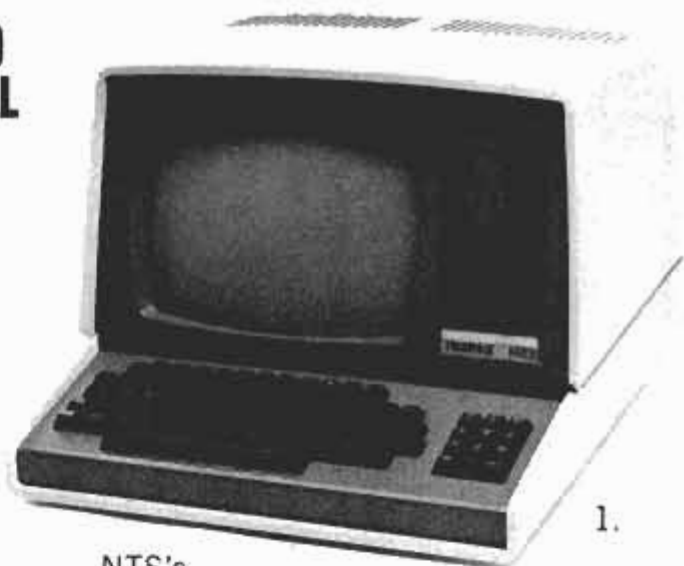
For example, we offer you three different programs in the booming microprocessor field. And each includes one of today's sophisticated microcomputer models for you to assemble and keep.

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



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

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



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

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

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

HOME ENTERTAINMENT ELECTRONICS

NTS has many different electronics programs to choose from. One of our most popular is Color TV



Simulated TV Reception

Servicing—and it's no wonder. You build and keep an NTS/HEATH 25 inch (diagonal) digital color TV as part of your training. Choose Communications and you'll train on an NTS/HEATH 2-meter FM transceiver that you'll also build and keep.

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



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



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

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



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

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

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

**NTS NATIONAL
TECHNICAL
SCHOOLS**

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

NATIONAL TECHNICAL SCHOOLS Dept. 201-032

4000 South Figueroa Street, Los Angeles, CA 90037

Please send FREE color catalog on course checked below

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

Name _____ Age _____

Address _____

Apt. _____ City _____

State _____ Zip _____

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

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

DETROIT LISTENING POST

AMC future cars

Like Ford's Escort and Chrysler's K, AMC's Renault-designed, transverse-engine, front-wheel-drive small car (entering production in Kenosha, Wis., this summer for a September introduction, possibly as the Renault American) will be the basis for several models to come, including a slightly larger Concord replacement scheduled for the mid-'80s.

These cars will lean heavily on Renault power train pieces, meaning that AMC's coming 2.5-liter, four-cylinder engine is planned for use exclusively in future rear-drive cars and Jeep vehicles.

On a recent trip to France, we drove the European version of this car, known there as the Renault 9, and found it a boxy but attractive small sedan with good pep, ride, handling and interior packaging. If U.S. emissions gear doesn't rob too much of the power, it should be a winner here, as well.

We drove both the 1200-cc and 1400-cc versions of the 9 and they were both surprisingly equal in performance. The engines in both configurations use the bottom end of the current R5 engine, but the top end has been changed to allow better breathing and more efficient combustion control.

The handling is also quite good and is an excellent middle ground between the traditionally soft and billowy French suspensions and the firmer, more precise suspensions of German cars. In that sense, the 9 feels like the offspring of a mating between an R5 and a Rabbit—and that certainly isn't a bad combination at all.

One unique feature is the Monotrace seat pedestal. This lets the seat move fore and aft and also allows it to be rocked to adjust the seat-bottom angle. The seat runners are very close together, saving a lot of space, and give rear-seat passengers a good amount of room for their feet. It's an excellent engineering solution to an age-old problem—the kind that makes you wonder why no one ever thought of it before.

We also drove a Fuego sport coupe (arriving here next month), turbocharged and diesel versions of the 18 (18i here) and a 30 sedan (Renault's largest car) equipped with a turbocharged diesel. All were impressive, especially the turbo 18, significant



The front-wheel-drive Renault 9 will be built by AMC in Kenosha, Wis., using tooling from French automaker. Car has yet to be named; it is set for September introduction.

since its 1.6-liter blown engine will power a U.S. Fuego Turbo. The 18 diesel is also U.S.-bound, beginning in June.

Renault is No. 1 in auto sales in Europe, and currently the only manufacturer worldwide offering turbocharging on both gas and diesel engines in passenger cars. Certainly the French connection is a godsend for AMC, which plans to offer Renault-built diesels in all its future cars and Jeeps.

Look also for downsized and much lighter Jeeps in about a year—not only CJs, but also new Cherokees and Wagoneers that should achieve as much as 25 mpg in the EPA city test with the new 2.5-liter Four and more efficient drive trains.

'83 Corvette

Detroit spies have unearthed a wealth of details on the long-awaited 1983 Corvette.

First, as we've reported here before, the shape is less curvy and "voluptuous," more wedge-shaped and highly aerodynamic, but styling retains a strong Corvette flavor. This means twin air intakes in the low nose, four round taillamps and a subtle, integrated spoiler in back.

Pop-up headlamp units remain, but each houses one large, rectangular lamp instead of twin round ones. There's a gas strut-supported glass hatch for access to a much more useful rear cargo area, and a full-width, removable "Targa" roof panel replaces the old T-hatches. Word is that the entire nose section tilts forward for service (remember Triumph's Spitfire?).

Inside, the new Corvette at long last gets properly contoured, reclining bucket seats, with six-way power

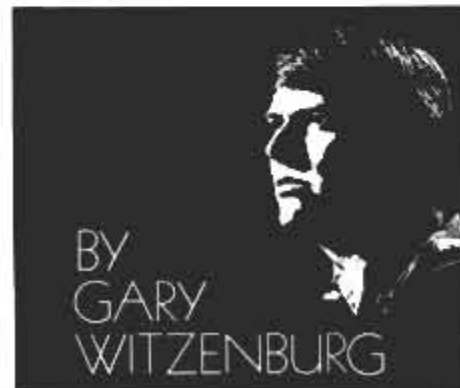
adjusters and, probably, the '82 Camaro's multiadjustable buckets as options. The instrument panel lights up like a video game with LED graphic and digital gauges throughout.

The all-new chassis features traditional upper and lower A-arms, but a very untraditional fiberglass-reinforced plastic transverse leaf spring in front; four trailing links, a transverse link and another plastic leaf in back. Extensive use of lightweight materials includes aluminum hubs, suspension links, A-arms, disc brake calipers (front and rear) and rack-and-pinion steering.

The engine is a refined version of this year's 200-hp, 5.7-liter V8 with dual electronic throttle-body fuel injectors on a cross-ram (Chevy calls it Crossfire) manifold. But unlike this year, a new Doug Nash-designed four-speed manual transmission with electronically-controlled overdrive will be standard, automatic optional.

Wheelbase is 96 inches, down two from the current 98, base curb weight is around the 3,000-pound mark, and speculation is that the

(Please turn to page 62)



3-passenger seating,
standard.

Tinted glass,
standard.

14.8 gallon fuel tank
for long range:
562 EPA estimated
highway miles.

Swing-out
side vent
windows,
standard.

Intermittent
windshield wipers,
standard.



Steel-belted
radial tires,
standard.

5-speed
overdrive transmission,
standard.

It's hard to believe this is the lowest-priced truck sold in America.

1982 Mazda B2000 Sundowner
\$5895*

You can believe it. The Mazda B2000 Sundowner is today's lowest-priced truck. Yet it comes with an astounding number of standard features, including a 5-speed and steel-belted radials.

Not one of these features is available on Toyota's or Datsun's lowest-priced truck, each of which costs hundreds more.

Just one look inside the cab and you'll see more of the Mazda B2000's exceptional



value. There you'll find a three-passenger seat detailed in textured vinyl. New instrumentation with electronic check panel. And handsomely trimmed door panels complete with armrests.

You can also believe this

truck is built to haul a heavy payload—1400 pounds of it. Even so, its 2-litre, 4-cylinder engine delivers outstanding fuel economy.

38

27

EST. hwy. mpg. EST. city.

If you still find it all a little hard to believe, we invite you to visit your Mazda dealer for a close-up look at the B2000 Sundowner.

Seeing is believing.

MAZDA

The more you look,
the more you like.

*Manufacturer's suggested retail price for B2000 Sundowner Shortbed. Actual prices set by dealers. Taxes, license, freight, options and other dealer charges extra. Prices may change without notice. Availability at dealers of vehicles with specific features may vary. **1982 EPA estimates for comparison purposes for B2000 Sundowner Shortbed. Your mileage may vary with trip length, speed and weather. Actual highway mileage will probably be less. Calif. 36 Est. Hwy. mpg. 26 Est. city.

DETROIT LISTENING POST

(Continued from page 60)

new car should do 0 to 60 in seven seconds or less while returning EPA-rated economy of near 20 mpg. Look for a \$20,000-plus price tag.

Delays, delays, delays

It takes money—a lot of it—to develop new vehicles and put them into production. But, as long as sales are sluggish, Detroit's cash-flow problems will continue to force delays in getting important new products to market. This is why GM says it may

take an additional two years to complete its \$40 billion downsizing program that would have replaced its large, rear-drive B-cars with smaller, more fuel-efficient fwd family cars by 1984.

Apparently, the all-new, high-tech, fwd luxury C-cars are still on schedule. They'll supersede the Olds 98, Buick Electra and Cadillac DeVille in spring '83, but the old rear-drive B-cars (Impala/Caprice, 88, LeSabre) and G-cars (Chevy Malibu and Monte Carlo, Pontiac Bonneville Model G and Grand Prix, Olds Cutlass and Cutlass Supreme and

Buick Regal) will be around at least another two or three years. The G wagons, however, will be dropped next year when wagon versions of the new fwd A-cars (Celebrity, 6000, Cutlass Ciera, Century) are introduced.

Unfortunately, the ancient and outclassed (but cheap) subcompact T-cars (Chevette, T1000) will not be replaced until '86 or even '87 as GM continues to concentrate on the mid-to-upper market and ignores the bottom. Along these lines, there may be stretched A-cars by '84 or '85 if demand seems strong enough.

A decision on whether or not to "go" with the eagerly anticipated mid-engine Pontiac sports (whoops, "economy") P-car should come sometime next month. Word is that design and engineering work are well along, and it all depends on how solvent the company is come spring. We can only hope—and emphasize again how important this exciting little beauty is to the youthful new image Pontiac is trying to achieve. Are you listening, GM?

More delays

Woe is us, and them, for Chrysler has delayed its turbocharged sport coupes (Porsche-looking competitors for Camaro, Firebird, Mustang, Capri, Supra, 200-SX, et. al.) and its wonderful minivan, both fwd K-based, for about six months. With luck and a more healthy market, these important new entries should hit the showrooms in fall 1983 and early 1984, respectively. Introduction of fwd personal luxury (Cordoba/Mirada replacements) scheduled for spring 1984 is now uncertain. And Ford has put off its downsized, fwd LTD/Marquis replacements originally scheduled for mid-1985 to at least the '86 model year.

More convertibles

With Chrysler now on the market with its LeBaron and Dodge 400 convertibles, with Ford hoping to launch a soft-top Mustang in time for this summer's good weather and GM's Buick Div. rushing a Riviera ragtop into production, both Chevrolet and Pontiac are taking a good, hard look at the apparently revived interest in open-air cars.

Both had convertible J-cars on display at early-winter auto shows to gauge public reaction, and Chevy distributed photos of the top-down Cavalier to the press—emphasizing that it was an idea car only, and that there are no immediate plans to produce it for sale. Except for some really ugly wheel covers trying to look like expensive alloy wheels, it looks pretty good, too!

PM

Give Your Working Hand The Help It Deserves

help from tools that feel right, work right, save time. Tools that stay on the job year after year. Tools precision made of drop forged, fine polished, high grade steel. That give you quality in every detail (at no premium in price). Tools by CHANNELLOCK. Be sure THAT trade name is on the tools you buy.

CHANNELLOCK

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



It comes to grips with almost any condition.



Goodyear's all-season, all-terrain, all-position Wrangler Radial.

Rain, mud, sun or snow. Wrangler All-Season Radial helps you drive through almost any weather.

Its tread and construction give you the traction characteristics of a mud-snow tire.

The fact is, Goodyear Wrangler Radials were developed and proved in off-road racing. Through deep mud and sand, over sharp rocks.

And, unlike some tires of its type, Wrangler Radial has a tread computer-designed for

quiet highway driving.

Wrangler Radial also has steel-belted construction. With the greater strength, flatter footprint, longer tread life, and slightly better fuel economy of radials over bias-ply tires.

So put your truck on the radial that comes to grips with almost any condition. The all-season tire that's identical to the one we race.

Goodyear's all-season, all-terrain, all-position Wrangler Radial.



GOODYEAR
QUALITY AND INNOVATION

PM OWNERS REPORT: MAXIMA

(Continued from page 32)

owners express their full opinions.

First, then, here are the opinions of a 36-year-old Florida orthodontist. "We shopped around," he says, "and I still feel that the Maxima sedan is the greatest possible small luxury sedan available for a family of five. I particularly like the car's styling, its comfort, roominess, and six-cylinder power. Then, too, it's a bargain when you compare it with some of the German models like BMW and the little Mercedes. We also own a 1979 Datsun 280ZX 2+2, and both these cars show good quality inside and out. The only problem I've encountered with the Maxima in 12,000 miles is a loose ground wire that caused a fuel-injector malfunction."

Next, we come to the comments of an Iowa college administrator, aged 47. "The things that sold me on the car were a combination of styling, the fact that the Maxima comes fully loaded, Datsun's reputation as the



Even without a hat on, tallish drivers complained about not enough headroom.

manufacturer of good cars, and a very attractive price.

"I do my own servicing," he continues, "and have had the car back to the dealer only once in 12,300 miles. That was to stop a vibration in the windshield trim. I found service excellent, and the car seems very well put together. Yet it has more plastic than I like, and the trunk carpet is chintzy.

"In terms of praise," he goes on, "I especially like the Maxima's styling. It's the sharpest looking four-door around. Performance and handling come next. The car has excellent road-holding characteristics. Of things Datsun might do differently to improve the car: move the ash-tray out from under the air outlet; also the cruise control switch is inconvenient—too low. But I'd have

What the Cimarron should have been

The Maxima is the kind of car that makes me lose all objectivity. So, I'll tell you up front that I think this car is just flat terrific. But, I'm not alone in that sentiment. The owners we surveyed said the same thing and so does anybody who spends five minutes with the car.

From its four-wheel disc brakes to its cloth headliner the car just exudes quality. There's not a screw missing, not a panel out of place not a hint of overspray. Slip behind the wheel and you're met by a wonderfully complex, but well-orchestrated, array of instruments, dials, buttons, and switches. At first, it looks a little overwhelming, but you'll figure things out quickly enough.

Fire up the 2.4 liter, fuel-injected Six, grab first gear and let the torque pull you into traffic. It's no ball of fire off the line, 120 hp pushing 2,800 pounds, but it steps out briskly, thanks to well-spaced gear ratios in the five-

speed manual box. And once you're rolling, just listen to the quiet. And if you get bored with that, crank up the standard equipment brain-blaster stereo and surround yourself with non-distorted decibels.

And when the traffic thins out and the road gets twisty, this luxury car can get down to business. It doesn't have the lithe responses of an Audi or Scirocco, but won't throw you any surprises, either. You'll feel the limits soon enough to take the necessary actions.

For the price, the Maxima is one of the best bargains around. It has set the standard for downsized luxury motoring, something the Cimarron can't hope to claim, and at a price the Cimarron can't hope to beat.

A bad batch of rear-view mirrors and minor fuel-metering problems notwithstanding, the Maxima has created an enviable reputation for itself.—T.A.

no hesitation buying another Maxima; I love mine."

Now from a Texas airline pilot, aged 39. "I needed an economical station wagon and was able to turn a good deal on the Maxima. The air-conditioner didn't work when I got the car, and it was very difficult to start when the engine was cold—the fuel-injection system was set too lean [25.3 percent of our respondents mentioned hard starting of a cold engine]. The dealer behaved very courteously, though, and remedied both problems immediately.

"I find the Maxima a very well designed car," the pilot states, "and the only lapse in quality is a delamination of the outside rear-view mirrors [owners reported lots of bad mirrors; moisture apparently gets between the silvering and the glass and separates the two]. I'd like a different ratio for intermediate range in the automatic transmission and perhaps also a different axle ratio to give this wagon more punch off the line. Otherwise, though, it handles and rides well, is very roomy and comfortable, fairly economical, stylish looking, and has good stereo and ventilating systems. I'm sold on this Datsun."

A 35-year-old Virginia army officer: "The Maxima is absolutely the best car I've ever owned. I'd like to buy American, but I couldn't find anything with the quality, appearance, standard equipment and value for the money.

"Even so," this officer goes on, "the radio went out and took five months to replace. Also, the mirrors turned funny colors and cracked. But overall quality is excellent."

Now from a Rhode Island purchasing manager: "I bought my Maxima because a friend kept telling me about the 85,000 trouble-free miles he'd racked up on his 1977 Datsun

810; also because your West Coast editor had given the 1982 model such a good writeup in *Popular Mechanics*. Both were right. In 22,100 miles, I've yet to return to the dealer for more than routine service. The Maxima *could* use more horsepower, though, and more headroom."

A 45-year-old Louisiana vice president told us: "I'd owned a 280ZX, which became too small, yet I liked the car and the service I was getting from my Datsun dealer, so I bought this Maxima and now have 14,000 miles on it. No problems so far. Quality and workmanship are excellent when compared with American cars."



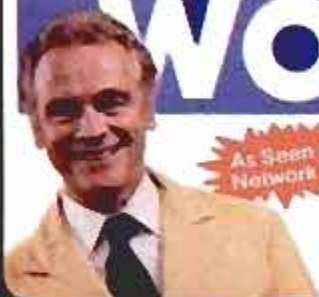
The 2.4-liter, fuel-injected Six is capable of pumping out 120 hp at 5,200 rpm.

These comments from a New York dress manufacturer, aged 44: "I had the big BMW before this and hated it. Nothing but trouble—constantly had mechanical difficulties. So I took the Maxima for a test drive and loved it—liked the looks and feel. The ride is great, handling excellent, gadgets practical, acceleration is fine, and I've had no problems except with the airconditioner compressor, which broke."

A 35-year-old Ohio police detective: "It's the most car for the money. All those options on an American

(Please turn to page 94)

GREAT ALL-AMERICAN WORKSHOP SALE®



As Seen on Network TV

Now... an Extravaganza of quality American-made products at local hardware/home center stores!

HOBBYCRAFTER Work Center and Vise by Black & Decker®

Leaves hands free to do lightweight projects, painting, crafts and soldering. 8" vise jaws open to 3". Pivots, swivels and tilts. Holds irregular and wedge shapes. Vinyl or metal jaw covers and alligator clips.

BUY NOW!
Includes FREE 14-piece X-ACTO® DOUBLE KNIFE SET



WISE-GRIP® Locking Pliers

Save now! 10" straight jaw pliers are great for clamping, twisting and pulling.

Save also on 7" curved jaw pliers with wire cutter. Both adjust easily to pliers action.



WISE-GRIP® the Original Locking Pliers.

S-K® TOOLS WRENCH OR SOCKET SET



Metric or Standard. Now, purchase a 7-piece S-K wrench set or an 11-piece S-K Socket Set and you get an 8-piece S-K Magnetic Screwdriver Set FREE!

\$1495 VALUE



FREE S-K MAGNETIC SCREWDRIVER SET

Buy a Lufkin® measuring tape and get a FREE 6' Tape.



It's free when you buy one of the most popular Lufkin Economy Tapes: ¾" by 16' & ¾" or 1" by 25' tapes

Buy a Weller® soldering iron and get FREE soldering accessories.



High-quality Soldering Iron Kit comes with FREE accessories. Durable and dependable.

Black & Decker® Circular Saw



When you buy the 2-HP Black & Decker 7¼" circular saw, with ball-bearing construction, we'll send you a Black & Decker Electric Stapler FREE on proof of purchase.



FREE ELECTRIC STAPLER

BERNZOMATIC®

Oxygen Tote Torch™ Kit with FREE Safety Goggles. For all those jobs around the house, yard and garage, get the BernzOmatic Tote Torch™ Kit. Now with FREE Safety Goggles.



\$695 VALUE

FREE SAFETY GOGGLES

6 woodworking secrets from master craftsmen

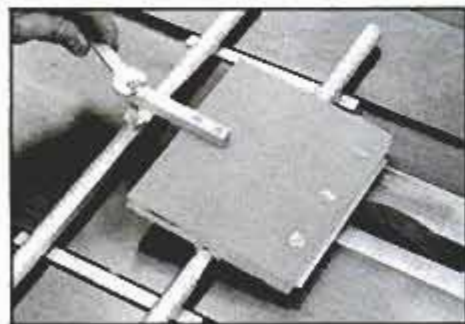
Finding a better way to do it is part of any workworker's fun. Here are a half-dozen super ideas that have worked for others.

Jointer blade sharpening jig

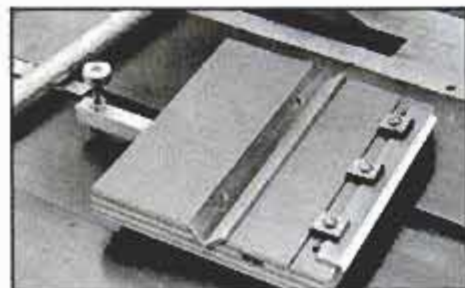
This jig consists of two parts—the base clamped to the saw table and the sliding blade holder. Dimensions are for a Sears 10-in. table saw with $\frac{3}{4}$ x $\frac{3}{4}$ -in. miter slots on 9-in. centers,

MATERIALS LIST—SHARPENING JIG

Key	No.	Size and description (use)
BASE		
A	2	$\frac{3}{4}$ "-dia. x 15" steel rod
B	2	$\frac{1}{2}$ x $\frac{1}{2}$ x 7" steel bar
C	4	10-32 x 1" fh machine screw
D	1	$\frac{1}{4}$ -20 x $\frac{1}{2}$ " hexhead machine screw
SLIDING BLADE HOLDER		
E	1	$\frac{3}{4}$ x 6 x 7" plywood
F	1	$\frac{3}{4}$ x $\frac{3}{4}$ x 7" aluminum angle
G	4	$\frac{1}{2}$ -4 fh wood screw
H	1	$\frac{1}{2}$ x $\frac{1}{2}$ x 4 $\frac{1}{2}$ " steel bar
I	1	$\frac{3}{4}$ "-dia. x $\frac{1}{4}$ " steel or brass rod
J	2	$\frac{1}{4}$ -20 nut
K	1	$\frac{1}{4}$ -20 x 2" threaded rod
L	2	$\frac{1}{4}$ -20 x $\frac{1}{4}$ " fh machine screw
M	3	10-24 Teenut
N	3	10-24 x 1" fh machine screw
O	3	Clamping clip (see detail)
P	2	$\frac{3}{16}$ "-dia. x 5 $\frac{1}{8}$ " steel rod (locator pin)



Adjust angle of the sharpening jig blade holder and lock it in position with nuts.



Holder, lying on its back, shows blade in position, secured with clamps, ready to be sharpened. Use only one grinding wheel with jig for consistent results.

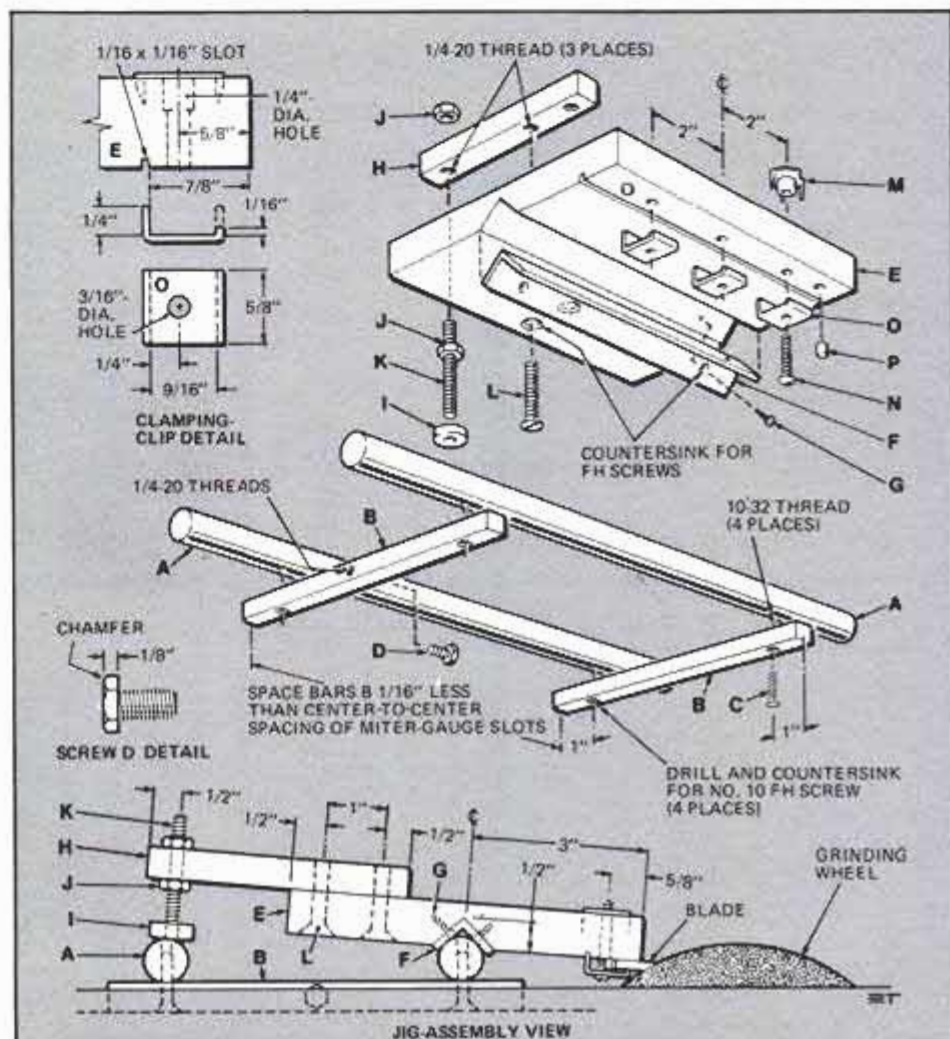
and 6 $\frac{1}{4}$ -in. jointer blades that are $\frac{1}{8}$ in. thick.

Drill the holes in the base rods and bars carefully to form a parallelogram. This assures alignment of the two round rods even if they're not exactly square with the bars. The spacing of the bars should be $\frac{1}{16}$ in. less than the center-to-center spacing of the two miter slots in the saw table. Clamp the base into the miter slots with screw D. Cut the head of this screw to a thickness of $\frac{1}{8}$ in. and chamfer it to prevent "traveling." Use a thin open-end wrench to tighten the screw.

The exact dimensions of the clamping clips aren't critical, but choose steel strips that resist bowing, yet are pliable enough to be bent into a "C". The long leg should be longer than the short leg by the thickness of the jointer blade plus the depth of the saw slot. Be sure holes for the Teenuts are located so the blade seats on the locator pins without contacting the screws.

Before grinding, check that the wheel just touches both ends of the blade. If not, file one of the locator pins till it does.—Walter N. Fritts

(Please turn to page 70)



Get into the booming field of solar technology.

Now NRI's Home Study Course in Air Conditioning, Refrigeration, and Heating Includes Training in Heat Pumps and Solar Energy Systems.

Prepare yourself for a whole new career in one of the fastest growing fields around. As energy needs continue to grow and energy sources become scarcer, the demand for skilled technicians will soar. NRI can get you started in this opportunity area, and you learn at home in your spare time, tailoring your training to your need with a choice of NRI's Basic or Master Courses.

Includes Professional Vacuum Pump and Tools

NRI training is practical training. Along with "bite-size" lessons in theory and practice, you get practical bench training. NRI's Master Course includes professional tools... a system analyzer, leak detector, tubing and joint tools, and more. Plus demonstration units that graphically bring principles to life for easy under-



standing. You even get a top-quality professional vacuum pump for troubleshooting experiments and use on the job.

Optional Post-Graduate Training at York Institute

Graduates of the Master Course are eligible for a concentrated week of resident training at the famous York Institute at no extra charge for tuition or training materials. Here, you'll work on advanced industrial equipment under the guidance of expert instructors. Only NRI includes this opportunity.

Send for Free Catalog, No Salesman Will Call

Use the postage-paid card to send for NRI's free catalog showing all the equipment and describing the complete course.

Over a million students have trained at home the NRI way. You can, too. If card has been removed, write to the address below.

Or check card for other growing fields

Small Engine Repair

There's plenty of opportunity for the man who can service power mowers, garden tractors, chain saws, outboards, mopeds and other small engines. Training includes professional tools and an actual 5 HP engine you keep, plus optional residence training at the Tecumseh Factory Service School at no extra charge.

Electrical Appliance Servicing

Good appliance people are hard to find. NRI trains you for your own full- or part-time business fixing everything from refrigerators to toasters. Includes professional tools and instruments.

Auto Repair and Servicing

A good mechanic can work just about anywhere he wants. NRI trains you at home from headlight to taillight with pro tools

included. Approved by Richard Petty, NRI automotive consultant.

Building Construction

Save up to 50% building your own home, get a better job, or even start your own contracting business. Covers everything from foundations to rafters with practical projects emphasizing energy-efficient construction.



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

We'll give you tomorrow.

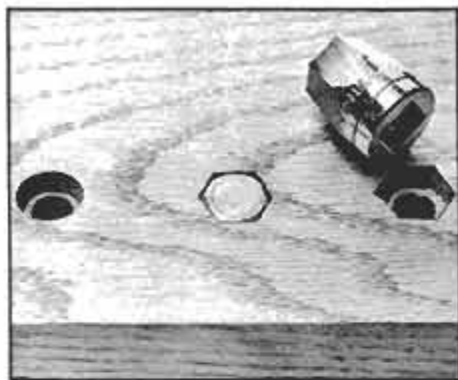
Hexagonal mortising 'chisel'

Hexagonal bolt heads set flush into a piece of woodwork add the professional "touch." But cutting close-fitting hexagonal mortises is painstaking and time consuming.

You can simplify the task by making a hexagonal mortising chisel. Grind a six-point wrench socket to a sharp edge on the outside, parallel to each of the six flats, as shown here.

To make a mortise, counterbore the bolt hole in the work to a depth equal to the thickness of the bolt head, and with a diameter equal to the distance across the chisel. Put a bolt through the socket chisel and the hole. Install the nut and washer below, then line up the chisel with sides tangent all around to the counterbore hole. Finger-tighten the nut, then tighten by wrench, making about $2\frac{1}{2}$ turns per $\frac{1}{8}$ -in. of bite.

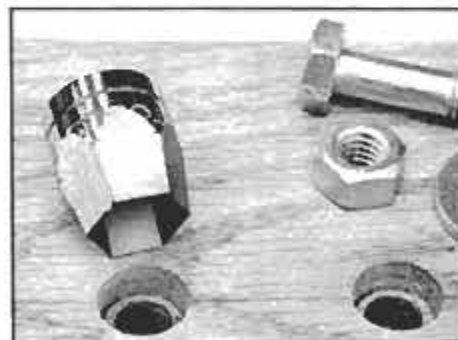
The socket should be a bit smaller than the bolt head. For example: 10-mm socket for a $\frac{1}{8}$ -in. bolt head; $\frac{1}{16}$ -in. socket for a $\frac{1}{2}$ -in. bolt head and so on.—David W. Carnell



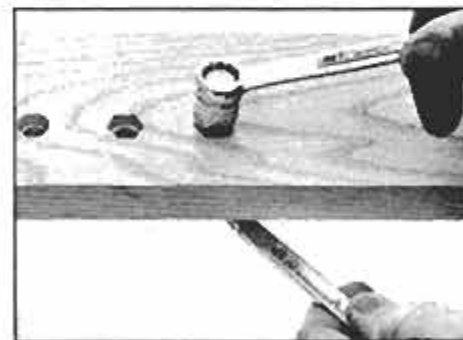
Countersink hole (left) is chiseled easily to hex shape on the right for a proper fit.



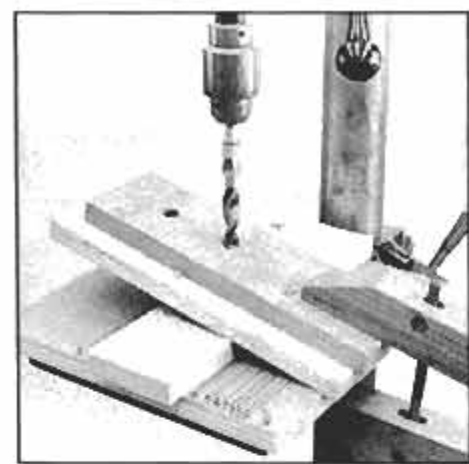
Use locking pliers to hold the socket head while grinding it to a hexagonal shape.



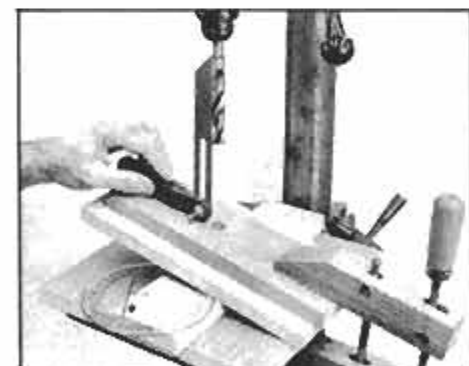
Close-up view of completed socket shows that grinding must bring perimeter down to a fine edge in middle of each side.



To use hex chisel, grip bolt head with altered socket, as shown. Add washer and nut below and tighten with two wrenches.



This is a typical setup for drilling at angles. Plywood under the workpiece is scrap. A handscrew holds the assembly together.



You may verify the angle of the workpiece and the bit with a T-bevel and protractor. Once verified, you can pencil in lines corresponding to frequently drilled angles.

Drilling angled holes

If you don't have a fully equipped drill press with a tilting table, try this technique for drilling at angles.

Using a fairly sophisticated calculator with trigonometric functions, we computed the chart shown below. The formula is based on the relationship of the lengths of two legs of a right triangle and the angle the

longer leg forms with the hypotenuse. Study photos to see how this relationship is used in the setup.

Square up a $\frac{3}{4}$ -in. piece of plywood about 12 in. on each side. Choose one side as the "working edge," and from this edge, measure a distance equal to the angle you want to bore, as given in the table on this page. At this point, use a carpenter's square to scribe a line across the board perfectly parallel to the working edge of the base piece. Along this line, place a 1×4 as shown in the photos. As a 1×4 is actually $\frac{3}{4}$ -in. thick, this is the measurement used to compute the values given in the table. Now, any workpiece clamped across the working edge of the base piece and the near edge of the 1×4 will be at the angle of the hole you wish to bore. Because you're working with angles, a handscrew is almost necessary for clamping your workpiece to the drill-press table and angle assembly. You can also slip a piece of scrap wood under your workpiece to avoid boring into your angle assembly.—Kathleen Mingi

TABLE OF COMPUTED ANGLES AND DISTANCES

Degrees	Distance (inches)	Equivalents
5	8.57	$8\frac{9}{16}$
6	7.14	$7\frac{9}{64}$
7	6.11	$7\frac{7}{64}$
8	5.34	$5\frac{11}{32}$
9	4.74	$4\frac{47}{64}$
10	4.25	$4\frac{1}{4}$
11	3.86	$3\frac{55}{64}$
12	3.53	$3\frac{17}{32}$
13	3.25	$3\frac{1}{4}$
14	3.01	$3\frac{1}{64}$
15	2.80	$2\frac{51}{64}$
16	2.62	$2\frac{5}{8}$
17	2.45	$2\frac{29}{64}$
18	2.31	$2\frac{5}{16}$
19	2.18	$2\frac{3}{16}$
20	2.06	$2\frac{1}{16}$
21	1.95	$1\frac{61}{64}$
22	1.86	$1\frac{55}{64}$
23	1.77	$1\frac{49}{64}$
24	1.68	$1\frac{11}{16}$
25	1.61	$1\frac{39}{64}$
26	1.54	$1\frac{35}{64}$
27	1.47	$1\frac{15}{32}$
28	1.41	$1\frac{13}{32}$
29	1.35	$1\frac{11}{32}$
30	1.30	$1\frac{5}{16}$

(Please turn to page 76)



V6 POWER WITH THE MILEAGE RATINGS OF A TOYOTA 4.

The new-size Chevy S-10's available 2.8 Liter V6. High quality and power with an economy plus gas mileage ratings even a 4-cylinder '82 Toyota pickup with a 5-speed transmission doesn't beat

FEDERAL		CALIFORNIA	
34	24	34	23

Use estimated MPG for comparisons. Your mileage may differ depending on speed, distance, weather. Mileage will be less in heavy city traffic. Actual highway mileage lower.

Some Chevrolet trucks are equipped with engines produced by other GM divisions, subsidiaries, or affiliated companies worldwide. See your dealer for details.



More leg room than any full-size pickup. More leg and head room than a Toyota or Datsun pickup.

With the available V6, S-10 has twice the towing power of the imports. The optional V6 and optional Heavy-Duty Towing Package let a properly equipped Chevy S-10 haul up to 4,000 lbs.,

including trailer and cargo. What's more, a Heavy-Duty Payload Option lets tough Chevy S-10 with V6 haul bigger payloads than many full-size pickups.

S-10's newest domestic competition doesn't offer a V6. And neither do the imports.

THERE'S NEVER BEEN A TRUCK LIKE IT BEFORE.



CHEVY IS THE POWER IN TRUCKS.

THE NEW-SIZE

CHEVY S-10

ALL OUTDOORS

Proving grounds for gear

You'd never spot them if you didn't know where to look. There are no signs, no arrows or billboards, but constructed along a channel behind the tropical resort of Fort Meyers Beach, Fla., are neat waterfront buildings, docks, hoists, and lines of boats on cradles where endurance testing for Sears, Roebuck's outdoor products go on every day of the year.

The mammoth company isn't trying to be especially secretive. Unlike the outboard motor makers with their hidden research and develop-



Unmarked but active, Sears' Florida test center checks gear in tropic conditions.

ment centers where each tries to outsmart the competition, Sears isn't hiding away its newest products. But with a crew of engineers recording nonstop data on the sunlight, heat, humidity, salt spray and immersion that destroy outdoor equipment, plus continuous performance trials offshore and on, this test base isn't set up for tourists.

Yet visitors would be amazed at the ends Sears goes to find out how and when and why a product will quit and fall apart. And this Florida facility is just a small branch of their main test center near Sears' headquarters in Chicago. "When something may be performing in the destructive climate of the tropics,"



Ted Williams, baseball and fishing great, grips test rod in famous batting stance.



New small gasoline and electric outboards are examined after extensive running tests.

Fort Meyers test manager Bob Williams, points out, "it gets sent down here."

The something may be a fishing rod or reel, a Gamefisher boat or trailer, a bicycle, go-cart, moped, lawn mower, boat cover, tackle box, outboard gas or electric motor, Die-Hard deep-cycle battery, marine hardware, mini-bike, above-ground swimming pool or a solar hot-water heater for it. Less obvious items are washing machines that run constantly on corrosive sub-surface water. And then there are 20,000 samples of exterior and marine paint that are analyzed regularly for chalking, flaking, chipping and fading.

Sears has two good reasons to



Will hull float upright when swamped as required? Test-tank sinking gives proof.

safeguard its reputation for quality, the engineers admit. One is that customers become loyal when they get more than their money's worth in performance and dependability. The other is that Sears sells in great quantity, stands behind its products, and couldn't afford the service costs if boats or bicycles, fishing reels or life jackets came flooding back to be fixed. And indoors and out, operating safety is a very basic requirement.

As a result, gasoline outboards are randomly selected and then sent out for 150 to 200 hours of starting, stop-

ping, idling, trolling, mid-range and full-throttle running. Gamefisher 1.75- and 3-hp models get special testing of their new centrifugal automatic clutch that allows moving from start and idle speeds to running forward by increasing the throttle without any need to shift gears. Electric motors get a 100-hour workout mounted in a center well of a 14-foot skiff that mounts linear and force gauges to measure the true thrust at various voltage levels. Sears has found the demand is for an electric with twist-grip tiller throttle, rather than a foot control.

Laboratory machines check the durability and operation of fishing reel gears and the critical smoothness of their drags, but the true test comes in the powerful hands of baseball and fishing perfectionist Ted Williams. For over 20 years, he has been design consultant and field tester of outdoor equipment for Sears, with help from top year-around fishing guides he has selected in the Florida Keys. The reputation Sears fishing tackle has earned is the result.

Some test results have been unusual. The tropic engineers discovered that a back-yard swimming pool, erected on a base of sand and lined with plastic, could have jungle grass piercing through the plastic and growing in the bottom water of the pool in several days. Heavy vinyl now cures that problem. And the greatest test for your boat? Strain gauges mounted all over a hull proved that the worst beating occurs ashore, as the craft bounces down the highway on an improperly fitted and adjusted trailer. Now trailers, and all other products sold, have benefited from tests before they reach the market.

Recently Sears has also introduced "flip books" at local stores to show the suitable tackle and gear that can be selected to match regional conditions afloat and afield. **PM**



A Job Important Enough To Become A Career Is Part Of The Navy Adventure.



Most guys go through job after job before they finally land one they can build into a career. In today's high-tech Navy, you can start with a job important enough to become a career.

Learning a valuable career skill is an important part of your Navy Adventure. And it starts when you choose the kind of job or technical training that's right for you. The Navy offers training in fields like electronics, computers, aviation mechanics—over 60

career areas in all.

Then the Navy gives you the training and experience you need to master the career skill you chose. In the Navy you use the most up-to-date equipment and methods in your field. In-school training and on-the-job experience can give you a level of technical skill and professionalism second to none.

Becoming the best at the job you want to do is important to your future, and important to the Navy. Because today's

Navy depends on modern equipment and the men and women who operate and maintain it.

And the modern Navy pays you like the skilled professional you are. You'll earn over \$550 a month, right away, with special pay for sea duty, and other benefits like food and housing, medical and dental care. That's good starting pay for any job, and in the Navy that job can be the start of a career.

Navy. It's Not Just A Job, It's An Adventure.

THE PM GARAGE

CAPSULE REPORTS ON NEW AUTO PRODUCTS

Electric fan

Engine-driven cooling fans are going the way of the dinosaur. Virtually every new front-wheel-drive car on the market comes with an electric fan, activated by a thermostatic sensor.

Hayden Inc. now has a kit that will retrofit the more efficient electric fan to your belt-driven fan system.

Engine performance and fuel



Electric fan replaces belt-driven fan; it reduces engine drag and boosts mileage.

economy should improve due to the reduced drag placed on the engine. Prices range from \$104 to \$122, depending upon applications. For more information contact Hayden Inc., 1531 Pomona Rd., Corona, Calif. 91720.—M.L.

Fast drain

Remote oil-drain pumps have been common on boat engines for years. Only recently has a system for automobiles been introduced.

Dev/Tec's Qwik-Drain system uses



Remote electric pump drains the engine crankcase with the simple push of a button.

a drain-pan fitting (which replaces your drain plug), an electric pump and intake and discharge hoses. Once the system is bolted in, all you do to change oil is press the button on the pump. Oil and sludge is pumped from the oilpan and out the discharge hose.

Prices range from \$66 to \$78 from Dev/Tec Research Inc., East 5805 Sharp, Spokane, Wash. 99206.

—Ralph deMasi

Oil absorber

Oil drips in the driveway are easily dealt with thanks to Mechanic's Brand Oil Absorber.

Besides keeping oil puddles under control, this sprinkle-it-on and sweep-it-up product has other household uses.

The manufacturer claims the product will absorb spills from carpets, serve as liner for the bottom of garbage cans and also act as a soil conditioner.



Oil absorber keeps your garage floor clean of the nuisance of dripping grease and oil.

The five-pound bag I tested cost \$1.50 at my local auto-parts store.

Now if I'd only get the leaky transmission in my van fixed, I wouldn't have to worry about oil puddles.

—Joel Breault

Foam filler

If you've got a rust hole to fill, Poly-cel 500 is the fastest and neatest way to do it.

Just spray it in, wait for it to expand and harden, then trim, sand and finish it. I've also used it to insu-

late, soundproof and eliminate vibrations in hollow body panels; it works really well in those applications.

The cost is \$9.95 for a 14-oz. can, and it's available at most auto-



Spray-on foam expands and hardens to fill in rust holes and it insulates, as well.

parts stores. To obtain additional information, contact W. R. Grace & Co., 62 Whittemore Ave., Cambridge, Mass. 02140.

—T.A.

Z-clocks

Datsun Z-car owners don't have much reason to complain about their cars—except maybe for the factory-supplied clocks. Those clocks have been known to fail with surprising regularity.

Now there's a replacement clock



Replacement clock fits in Z-car's clock housing, looks like original equipment.

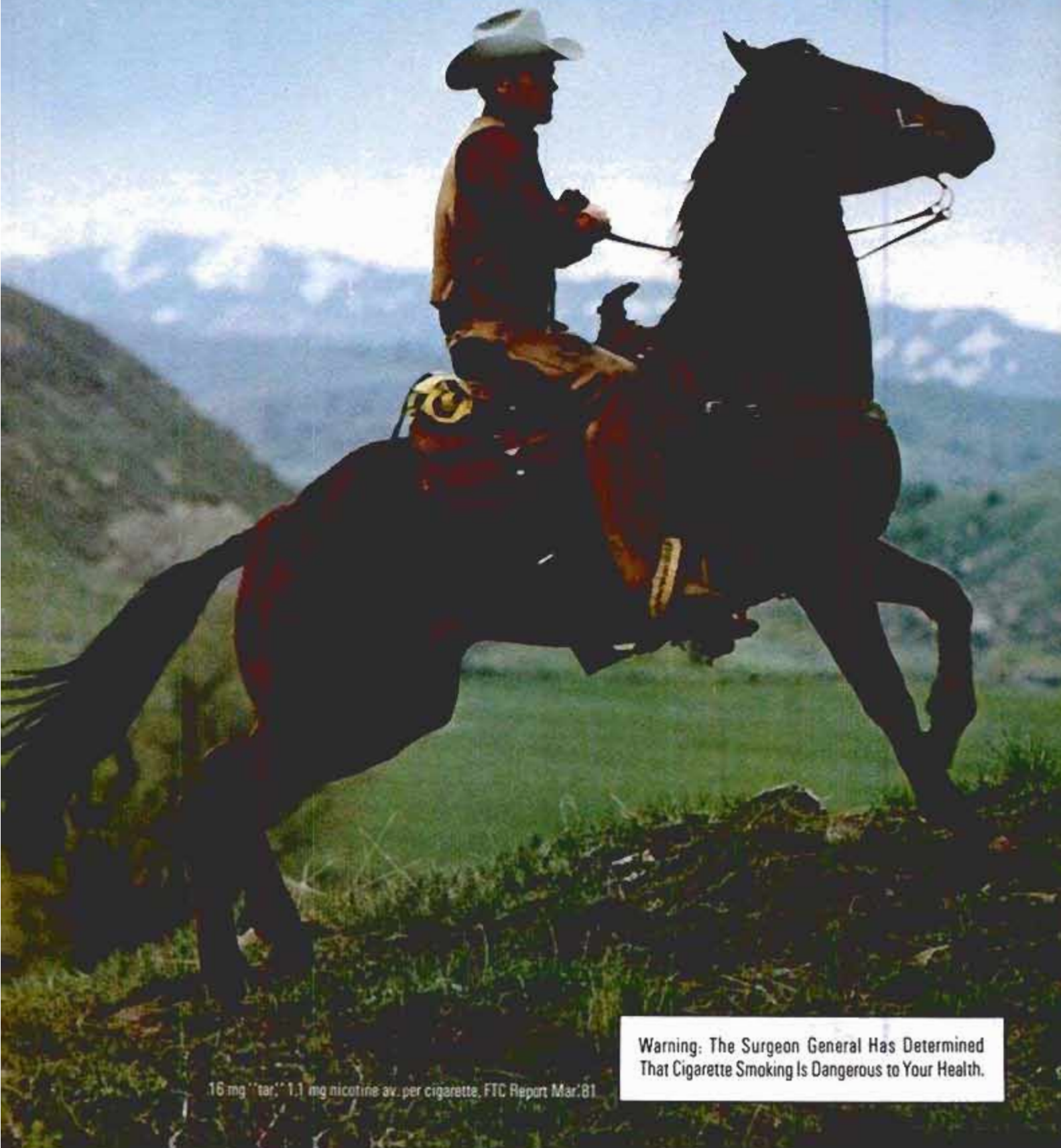
that's specifically engineered to fit in a Z-car's clock housing and looks like original equipment. It features LCD readout, quartz timing, elapsed time and date.

The price is \$69.95, plus \$2.50 handling charge, from Z-Time, Box 22559, San Diego, Calif. 92122.

—Joel Breault



Marlboro



16 mg "tar," 1.1 mg nicotine av. per cigarette, FTC Report Mar.'81

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



These drop-leaf tables keep work safely supported when sawing large boards alone.

Drop-leaf tables

Woodworkers spend a lot of time working alone in their shops. For many, such solitude is part of the enjoyment of shopwork. Being alone, however, is often a disadvantage when using power tools. Safety precautions require that you maintain as much free space around a power tool in operation as possible. In addition, workpieces must always be supported adequately.

The drop-leaf tables shown here are accessories to my radial-arm saw which help solve the problem of working alone. Not only do these

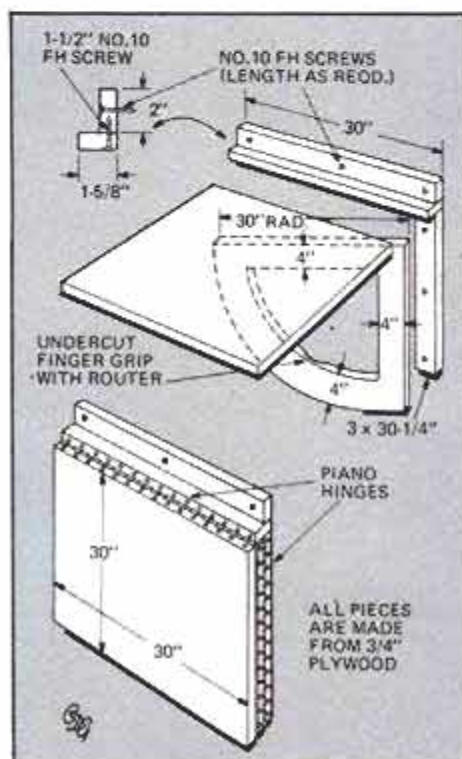
tables support long workpieces, but their drop-leaf design allows me to use the spaces adjacent to the saw for storage when the saw is not in use.

The tables are easy to build (see the drawing at right). The only critical consideration is clearance left by the support for the table hinge knuckle on the underneath side, if you need it. To obtain clearance, just drop the support and its hinge down on the wall-mounted support. Then add a furring strip in the middle of the underneath side of the table—where it will contact the support.

—Rosario Capotosto



When not in use, return tables to vertical position against wall; use the spaces flanking saw to store mobile power tools.



Turn this handsome vase from glued-up blocks using techniques explained here.

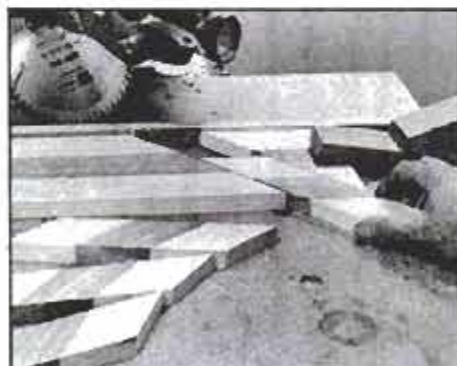
Turning squares

Here's a technique for gluing up wood to get a continuous checkerboard pattern. Select two types of wood with similar hardnesses (we used mahogany and poplar). Edge-glue three strips of stock. The width of each should be equal to one-half the thickness of the desired turning

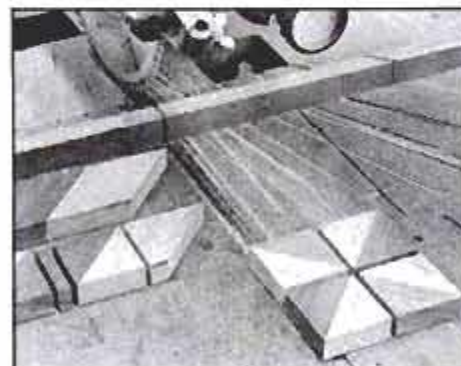
blank. Set your radial-arm saw to 45° and make miter cuts to get diagonal strips of the same width.

When all the angled strips are cut, reset the saw to 90° to make right-angle cuts. Cut each strip into two squares (or whatever your key dimension is). Do this by aligning the joint line between the light and dark

(Please turn to page 93)



Make 45° cuts across edge-glued stock. Use a stop to maintain the identical width in the diagonally cut pieces so that there will be equal squareness in each one.

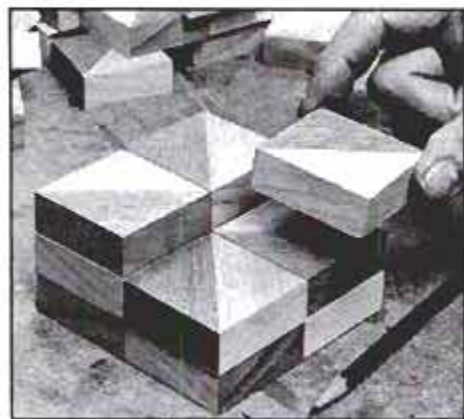


Reset your saw for 90°. Cut two squares from each diagonal piece, as shown at left. Now, begin stacking the square pieces according to the basic pattern at right.

(Continued from page 76)

wood to the kerf in the fence. Always make the cut in the waste area.

When all the two-color squares are cut, stack them carefully into four columns. Make sure that the colors alternate at the hub. Identify pieces by numbers and letters. One slip in gluing can ruin the project.—*John Opfer Jr. and Rosario Capotosto*



Continue stacking the squares, alternating each square in relation to the one below. Before gluing, you may want to number each square to avoid confusion.

Grinder/sander

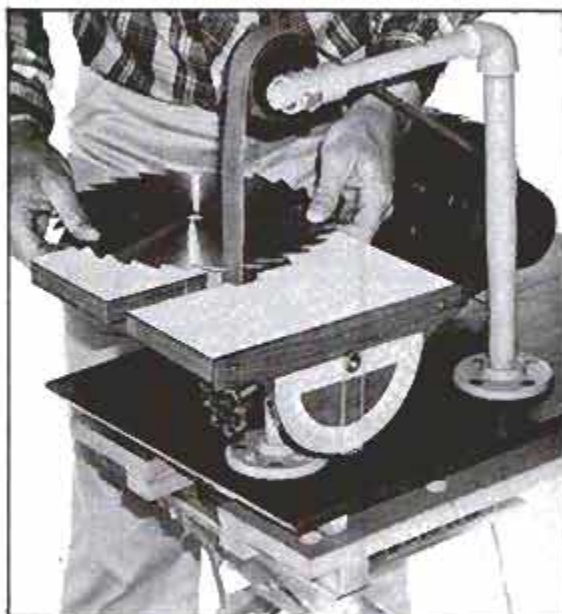
This handy shop and household grinder is easy to make, although it requires some welding. A glance at the drawing below will tell you that you probably already have most of the odds and ends you'll need to put it together.

A hinge-mounted motor supplies the belt tension. The motor may be 1/4, 1/2 or 3/4 hp with motor direction to carry the abrasive belt down through the tabletop. Crown-turn the idler pulleys 1/4 in. higher at center than at the edges. The drive pulley may be epoxied or otherwise fastened to the motor shaft.

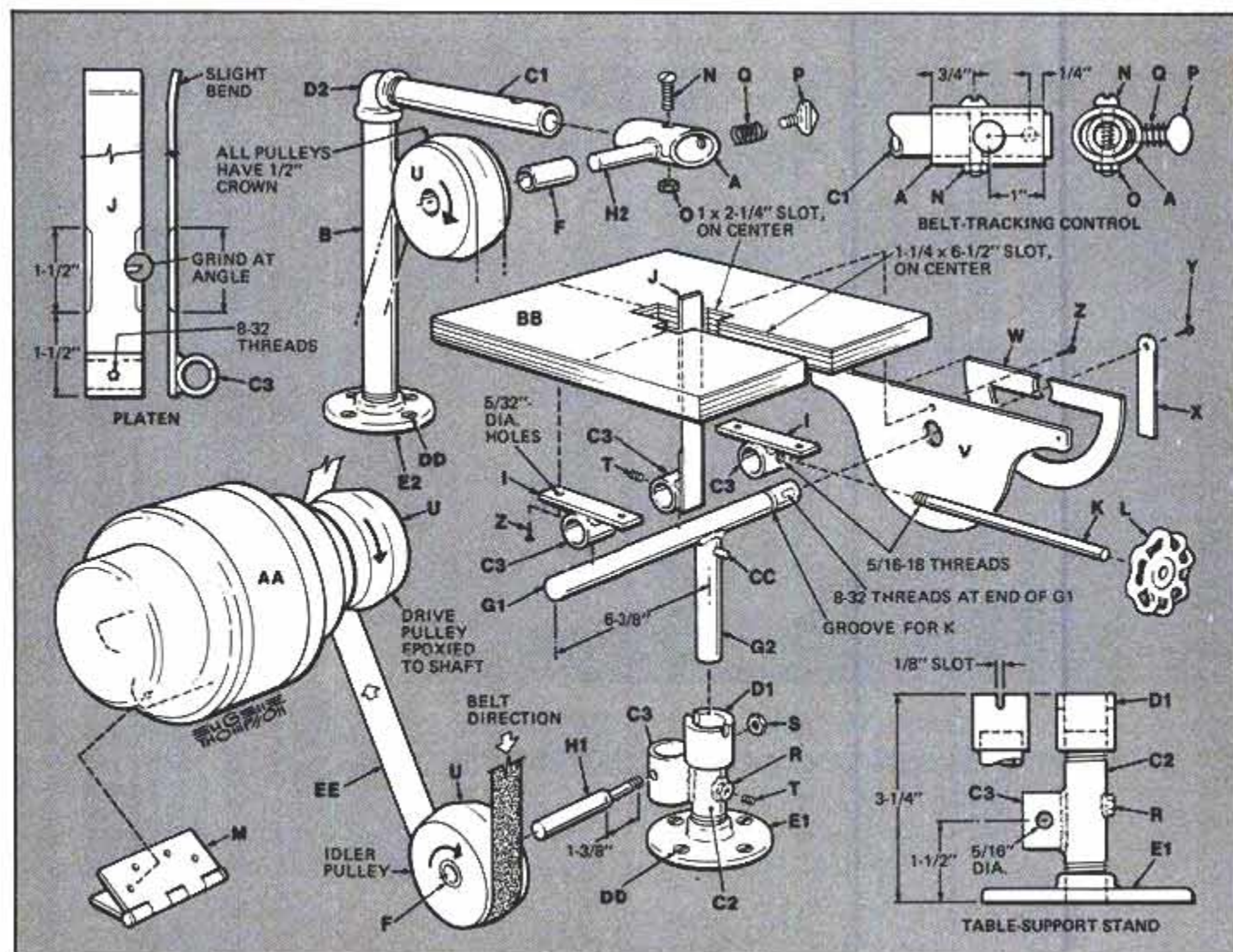
Obtain the flattened shape of the belt-tracking device (A) by pressing it in a heavy-duty vise. Use a scrap section of 1/2-in. pipe inside as a pressing guide. Use a 1/4-in. wing bolt threaded through this section to bear against pipe C1 and provide

sensitive and positive belt tracking. It will track the belt precisely over the platen or to either side. Thus, different sections of the belt may be

(Please turn to page 166)



Sharpen table-saw blades, kitchen cutlery, scissors, rotary mower blades and many other cutting instruments with this abrasive belt grinder.



PM OWNERS REPORT: MAXIMA

(Continued from page 64)

car would cost thousands more. Workmanship and past experience with Datsuns were major factors in my decision to buy the Maxima."

By way of contrast and balance, an Arizona retiree doesn't think all that much of his car. "Quality is better than most U.S. cars, but the Maxima needs better rear shocks. My car bottomed out over bumps, so

I replaced the shocks, which helped some. The car should also give better gas mileage. It's not what's advertised. I'm getting 22/25 mpg and am disappointed. The outside mirrors have been replaced three times—the silvering keeps separating from the glass.

"What I do like are the sensor panel on the dashboard, the voice that reminds me to turn off the lights and take my keys, the tape deck, remote levers for hatch and fuel door, the

rear washer/defroster and the delayed inside lights."

And finally, a 35-year-old hotel administrator from North Carolina: "The only complaint I can think of—and I have to try hard—is that the speedometer seems to be about 7 mph fast at 60 mph. Other than that, though, the dealer's a doll and the car's comfortable, spacious, good on gas and easy to handle. All that for an amazingly reasonable price. Who can ask for more?" **PM**

SUMMARY OF 1981 DATSUN 810 MAXIMA OWNERS REPORTS*

Total miles driven 2,976,621	Specific dislikes:	Average 8.9	Number of vehicles owned:
Average miles per gallon	No complaints 17.8%	Poor 1.7	810 Maxima only 26.3%
In town 21.1	Not enough headroom 14.2	Comfort opinion (rear seats):	Two cars 54.2
Long trips 26.0	Gas mileage below expectation 10.5	Excellent 24.8%	Three cars 17.4
Body style choices:	Cold starts 8.2	Good 46.5	Four or more cars 2.1
Basic 810 sedan 11.2%	Engine needs more power 6.8	Average 18.7	Makes of other cars owned:
810 Maxima sedan 63.6	What changes would you like?	Poor 10.0	Datsun 30.1%
Maxima wagon 25.2	More headroom 21.5%	Had any mechanical trouble?	Ford 11.0
Why did you choose the 810 Maxima?	No changes 9.8	No 64.2%	Chevrolet 10.4
Styling 41.6%	More legroom 7.9	Yes 35.8	Oldsmobile 9.8
Economy 25.5	Better fuel mileage 7.5	What type of trouble?	Cadillac 8.1
Price 19.0	More powerful engine 6.5	Hard cold starting 25.3%	Age distribution of owners:
Quality 11.7	Five-speed transmission 6.5	Air conditioner failure 16.9	15-29 years 10.5%
Comfort 10.8	Reposition power-window switches 6.5	Electrical 9.6	30-49 years 56.2
Specific likes:	Workmanship opinion:	Dealer repairs satisfactory?	50-plus 33.4
Styling 49.3%	Excellent 54.2%	Yes 57.7%	Would you buy another Datsun product?
Handling 39.5	Good 36.4	No 42.3	Yes 93.0%
Economy 33.2	Average 6.8	Dealer service opinion:	No 7.0
Comfort 32.3	Poor 2.5	Excellent 30.9%	Would you buy another 810 Maxima?
Performance 25.1	Comfort opinion (front seats):	Good 38.6	Yes 86.6%
	Excellent 52.3%	Average 19.7	No 13.4
	Good 37.0	Poor 10.8	

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

Get The Dry Look... and don't be a stiff.



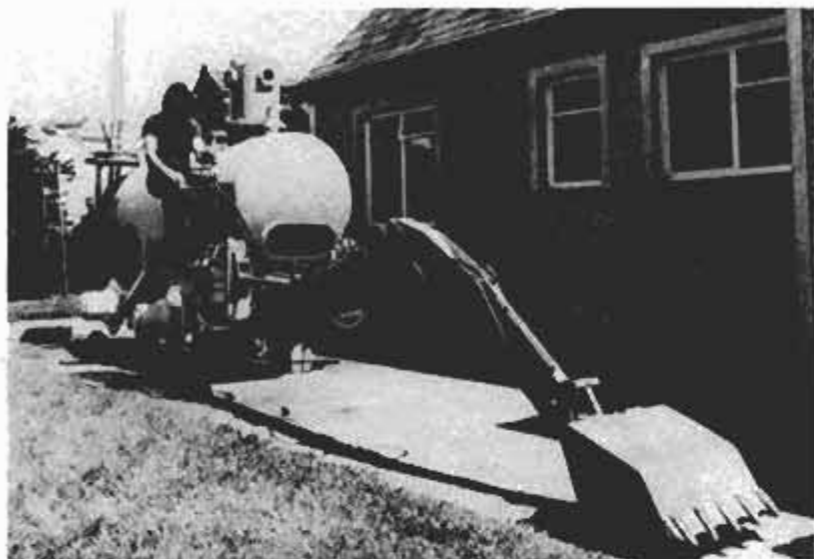
Get the hold that leaves hair feeling as soft and natural as it looks.

The Dry Look® gives you more than a great look. It leaves your hair feeling soft and natural, too — not too stiff. The Dry Look in pump spray or aerosol — with a formula that's right for your hair. Get The Dry Look...and don't be a stiff!



Available in pump or aerosol.

© The Gillette Company, 1981



PM's Whatsit

You'll note here Mr. Charles Force, from the small Cornish coastal town of Trancreek, England, astride his own creation, which is complete save for the tires. Can you divine what the six-ton apparatus is all about? If not, turn the page.

PM follow-up: Rocks and radioactivity

In a November 1980 PM article (*What Everyone Should Know About Radiation*, page 90) that put radiation hazards into perspective, terrestrial background radiation—from radioactive elements in rocks, soil, water, and so forth—was shown to account for 57 mill-rems of human exposure per year, about 28 percent of the total dose we receive from all sources. Much of this is attributable to radon gas, a naturally radioactive element usually associated with rocks like granite.

Unusually high concentrations of radon have been recorded on both coasts, in Maine and California, with interesting results.

At the University of Southern California, Dr. Charles Sammis is literally squeezing rocks in hydraulic presses to attempt to judge the effectiveness of radon release as a true earthquake precursor—a tool for accurate short-term prediction. It's long been suspected that radon is a warning signal of impending earthquake, and its high concentrations have been noted in soil and ground water testing sites spanning two-thirds the length of California.

A continent away, high concentrations of radon were found in up to 20 percent of wells studied in several locations by a University of Maine civil engineering professor. This prompted Dr. Jerry Lowry to submit a report to the state government detailing ways radon can be removed from well water. Radon can be transmitted through water pipes into the home, affecting air quality, says Lowry.

A commercial water-softening unit with the normal resin replaced with granular activated carbon (GAC method) will remove 80 percent or more of radon from water passed through it, according to tests funded by the Environmental Protection Agency. On a higher cost scale, a diffused aeration process in which clean air bubbles strip the gas from water in a tank is even more effective, but requires a compressor and more extensive installation.

Barreling right along

Moving full, 450-pound oil drums around is nobody's idea of fun, but here's an interesting aid. The circular steel frame is fitted with three nylon casters, each near a built-in jacking point; a special handle rotates the jacking block 90° and lifts the drum off the ground, ready to be wheeled away. Manufacturer is Tecaletit Garage Equipment Co. Ltd., Roborough Plymouth, Devon PL6 7BW, England. Unit is called the Portadrum.



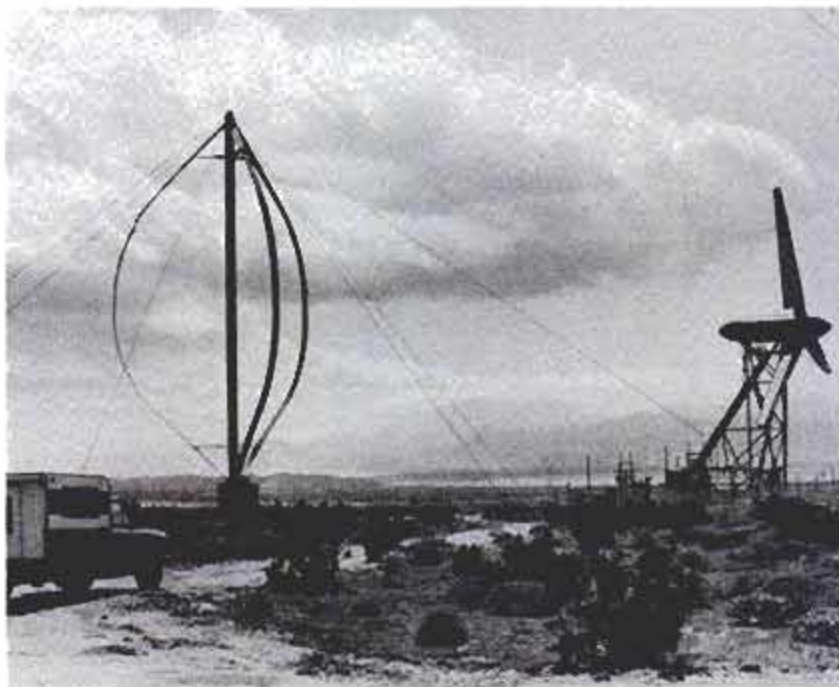


Whatsit revealed

Charlie calls it his "underwater motor-car," and he plans to go off and hunt treasure in it, hence the automatic digger on the front end. The float device protruding on top takes up to 200 feet of intake/exhaust (it's diesel-powered) hose to the surface; underwater endurance is up to 48 hours. Its main attribute? Underwater, it only weighs 1.5 tons.

Head to head

If you're driving on Interstate 10 near Palm Springs, Calif., you'd better be ready for this: Two wind machines are squared off in a mighty trial. The propeller type is 191 feet tall and hits a peak output of 3,000 kw of electricity in a 40-mph wind. Its rival, a Darrieus rotor, stands 123 feet high and puts out 500 kw in 35-mph winds. It's estimated that the larger machine could produce electricity to serve as many as 1,000 residences.



The trouble with transistors

Nearly 20 years ago, the first Telstar satellite went into orbit and promptly began to malfunction as though its semiconductor components were wearing out. Bell Labs scientists eventually figured out that the satellite was being affected by the Van Allen Belt, an intense band of high-energy particles trapped in the Earth's magnetic field at a height of 600 to 40,000 miles.

The satellite's transistors were actually being done in by radiation.

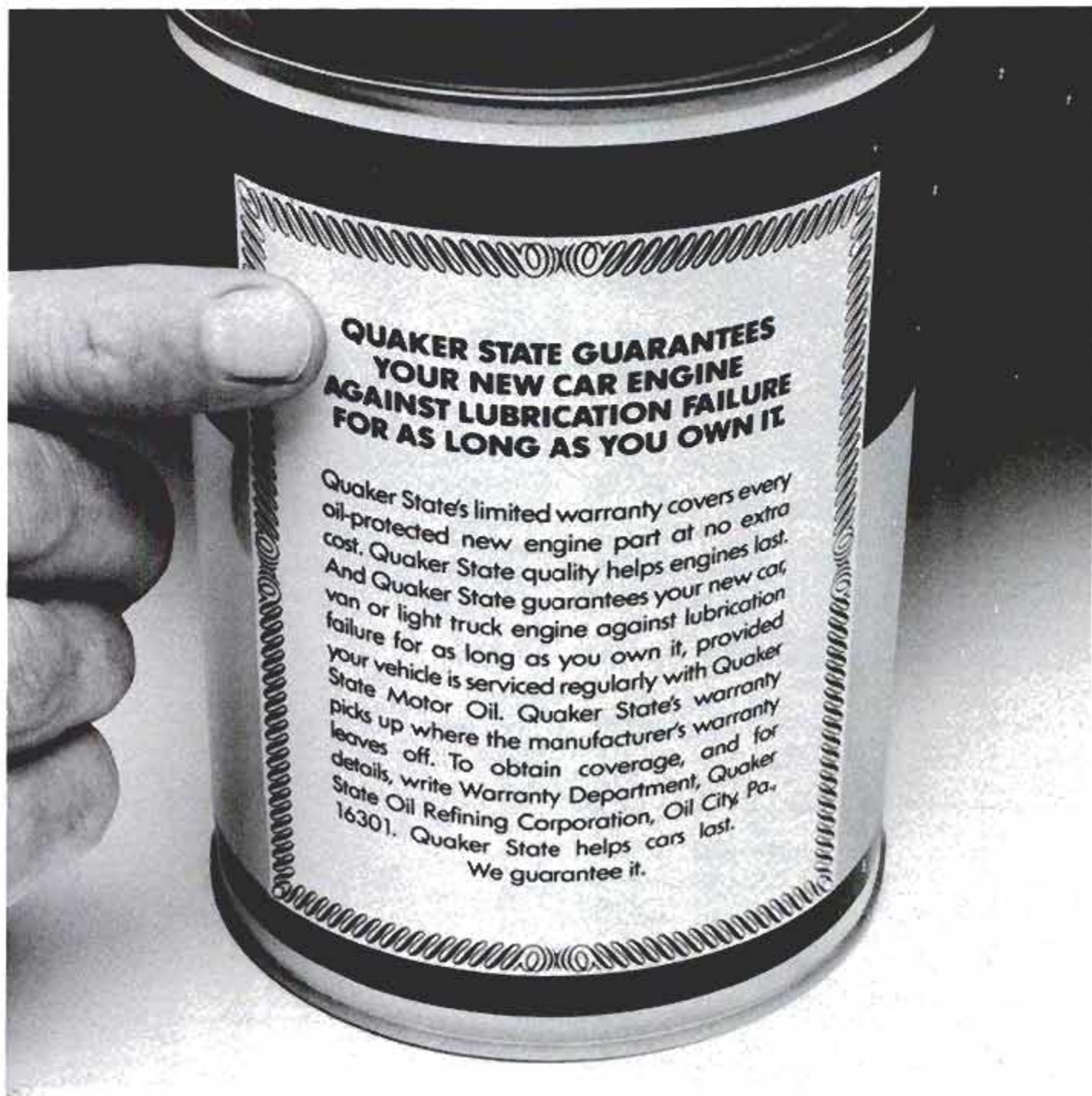
Since then, further research has shown that semiconductor materials can be both temporarily and permanently damaged by many kinds of radiation—gamma rays, X-rays and even the cosmic radiation that bombards us constantly. Recent studies by Dr. Mayrant Simons at North Carolina's Research Triangle Institute have indicated that both gallium arsenide and silicon dioxide can be altered by radiation. The former

is a promising new semiconductor material; the latter is often found as an insulator in microcircuitry.

Among the implications: worldwide data-processing chaos as the result of a large-scale release of nuclear radiation, whether intentional or accidental. Newer, more extensive integrated circuits are becoming increasingly vulnerable to damage from a single subatomic particle.

"If it were hit in just the right way," says Simons, "a memory cell of a very large-scale integrated array could have its stored data bit altered by a single high-energy particle."

Research continues into both the cataclysmic implications and possible shortfalls in the useful life of semiconductor devices exposed to plain, everyday radiation. Meanwhile, if you've saved an old tube radio around the house somewhere, *that's* the one to put in your fallout shelter.



**QUAKER STATE GUARANTEES
YOUR NEW CAR ENGINE
AGAINST LUBRICATION FAILURE
FOR AS LONG AS YOU OWN IT**

Quaker State's limited warranty covers every oil-protected new engine part at no extra cost. Quaker State quality helps engines last. And Quaker State guarantees your new car, van or light truck engine against lubrication failure for as long as you own it, provided your vehicle is serviced regularly with Quaker State Motor Oil. Quaker State's warranty picks up where the manufacturer's warranty leaves off. To obtain coverage, and for details, write Warranty Department, Quaker State Oil Refining Corporation, Oil City, Pa., 16301. Quaker State helps cars last. We guarantee it.

THEY PUT IT IN WRITING

How do you know how good a motor oil is? Once you put it in your engine, you can't touch it, you can't see it, you can't watch it work. Yet, you depend on its quality everytime you drive your car. Quaker State knows about quality.



They've been refining quality motor oil for over 60 years. And they have a new car engine warranty available—in writing—against lubrication failure for as long as you own it. Read about Quaker State's Lifetime Lubrication Warranty right on the can.

How can Quaker State offer a guarantee like this? Simple. They've been helping cars stay on the road 100,000 miles and more for years. They've got the record to prove it.

Even if you don't have a new car,

don't you want to use the only motor oil that offers a written guarantee? You'll find Quaker State at stores and service stations all over the country.

Whether you have one mile or hundreds of thousands of miles on your car, You'll be Stayin' on the Road with Quaker State.



STAYIN' ON THE ROAD WITH QUAKER STATE

How to get pure drinking water from the sun

by George Campbell

Here is an economical solution for people all over the country who are alarmed by the deteriorating quality of their domestic water.

This solar still, operating on the simple principles of evaporation and condensation, will remove all impurities from about one gallon of water a day.

Tap water enters the float-controlled supply tank, then flows to the evaporation pans. The sun heats the water to 150°F. or more. The resulting water vapor condenses on the glass top of the still, flows down the glass, then drips off a bead of silicone (see drawing) into a collecting trough. From there it goes to the storage tank, where it is aerated to counter the flat taste of distilled water. The process is automatic and needs little maintenance.

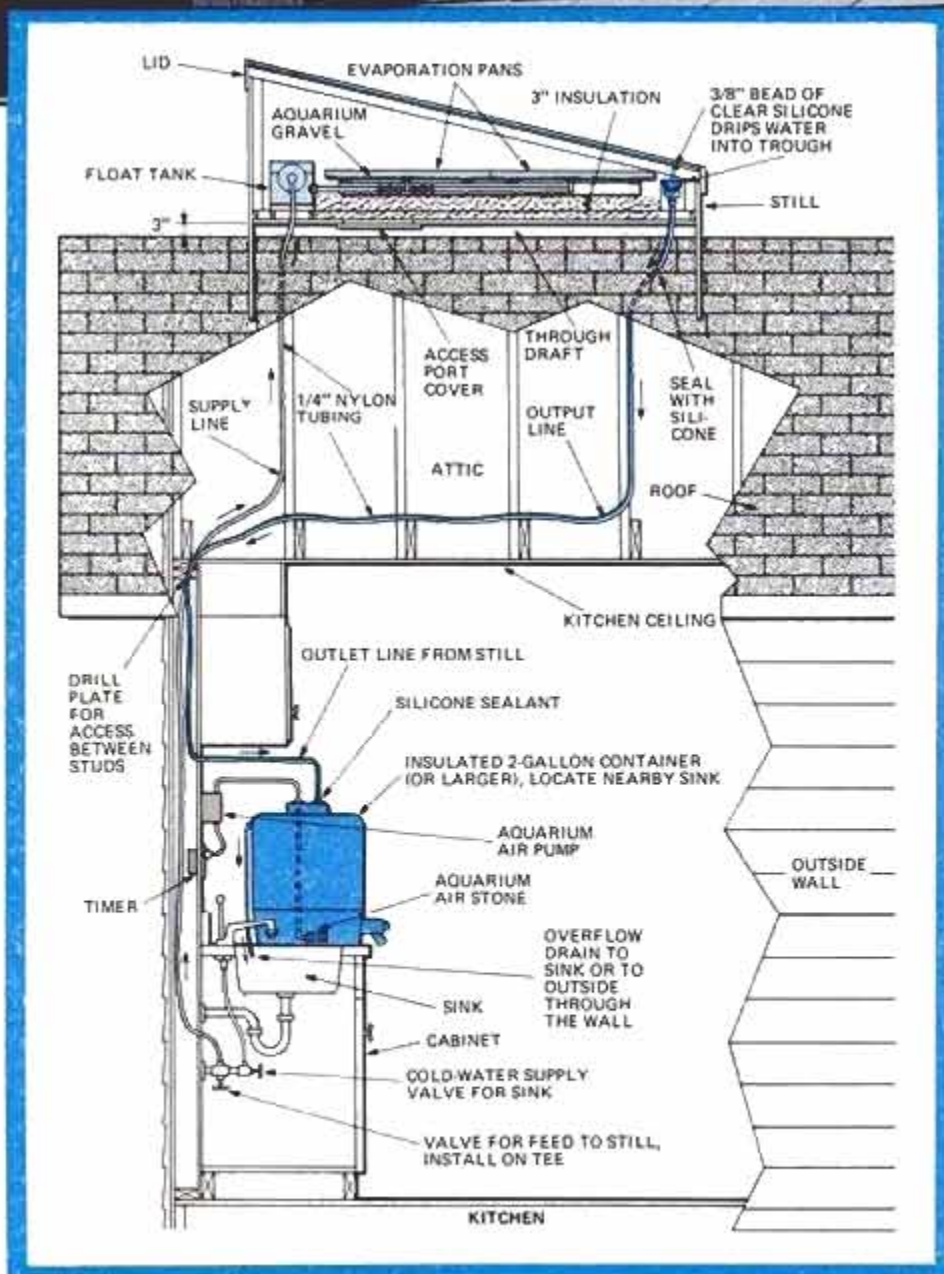
Build the still box first. It should face south and receive full sun. If it's necessary to mount the unit on the sloped surface of the roof, cut the back end (CC) 21 in. high and the front (BB) 6 in. high, plus whatever is required so that the pan supports will be level.

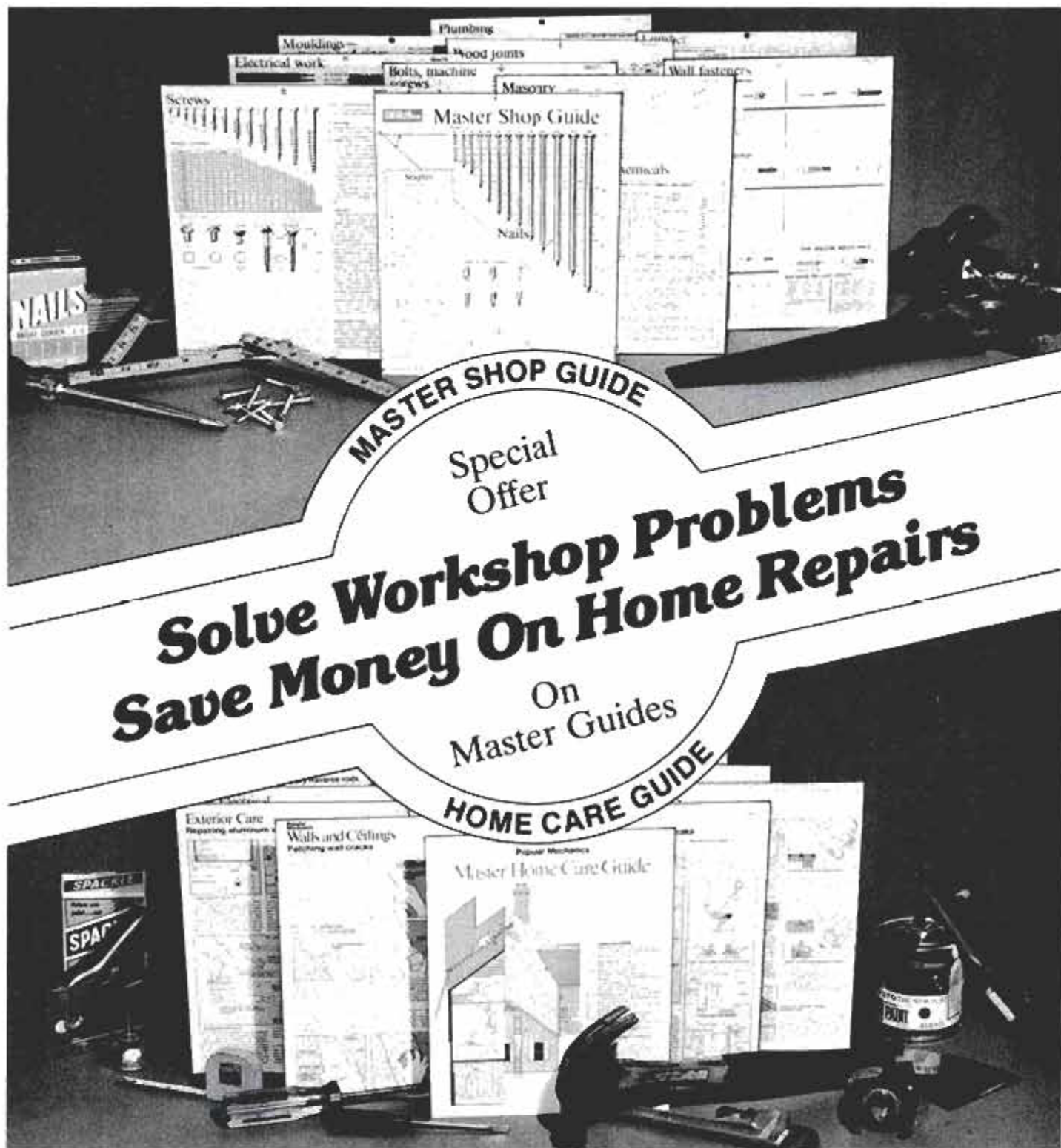
Bore holes for the supply and return lines in the plywood bottom (AA). Also bore two 1-in.-dia. weep holes, one at each end. Screen these to keep out insects.

Next, build the frame for the still's lid and a platform for the supply tank. Prime all wood components with top-quality wood primer, then apply two coats of high-quality exte-

(Please turn to page 106)

Heat from sun evaporates water from pans in still. Vapor then condenses on glass top, flows down incline and is collected.





**Solve Workshop Problems
Save Money On Home Repairs**
On
Master Guides

Take advantage of this special offer on Popular Mechanics' famous Master Guides.

The POPULAR MECHANICS MASTER SHOP GUIDE has helped hundreds of thousands of do-it-yourselfers solve workshop problems. We think it is one of the most important tools you'll ever buy.

The Shop Guide lays out everything you need to know, graphically and ready-to-use. All about nails, screws, bolts, wall fasteners, drills, abrasives, lumber, plywood, gypsum, adhesives, paneling, shop math, stair construction, masonry, wood finishing, plumbing, pipe fittings, electrical work, gutters,

concrete, remodeling measurements plus a built-in ruler, protractor, 45° triangle and compass.

The perfect companion to the Shop Guide is the POPULAR MECHANICS MASTER HOME CARE GUIDE. The Home Care Guide will enable you to tackle common home repair jobs like an expert. You'll be able to patch wall cracks, paint your house or apartment, hang wallpaper, hang drapery rods, hang a door and install a lockset, repair scratches in furniture and much more. The Guide also instructs you on methods of saving energy to help cut your fuel bills.

By using the coupon that appears on this page you can order both Guides for

\$7.95 postpaid. You'll save \$2.95 off the regular price. ORDER NOW! They also make great gifts.

PM MASTER GUIDE OFFER, Dept. 382
Box 1014, Radio City Station
New York, N.Y. 10101

Yes! Please send me the POPULAR MECHANICS MASTER GUIDES that I have indicated below:

___ Set(s) of both Guides at \$7.95 per set \$ _____
___ Home Care Guide(s) only at \$5.45
per Guide _____
___ Shop Guide(s) only at \$5.45 per Guide _____

TOTAL AMOUNT REMITTED \$ _____

Name _____

Address _____

City _____ Zip _____

Make check or money order payable to Popular Mechanics.

PM LOOKS AT

A SUPER PLANER AT HOME WORKSHOP PRICE



RC-33 planer from Rockwell surfaces stock up to 5.9 x 13 inches. And it's portable.

Trying out the newest tools is the fun part of my job. Thus, when the chance to work with Rockwell's RC-33 planer came along, I jumped at the opportunity.

There are several important points about this tool that make it particularly worthwhile:

■ **Capacity:** The planer can accept wood stock almost 6 in. thick by a full 13 in. wide.

■ **Weight:** Since it's less than 300 pounds, the tool is portable. Custom builders, for example, can haul the planer to remote job sites, because two men can heft it.

■ **Price:** Though it cuts with a tenacity similar to that of the heavy-weight I ordinarily use in my shop, this beauty is reasonably priced at under \$1,500.

Admittedly, this tool—and that price—are not for the once-in-a-while woodworker. But serious woodworking hobbyists, craftsmen and builders will recognize that a big-job planer, with Rockwell quality, is a buy at that price.

The big news is that this tool features a table that stays put. Unlike its predecessors, when you turn the elevation crank on the RC-33, the



Elevation crank is in extremely handy location for quick depth-of-cut changes. The scale (arrow) gives both metric and inch readings. Unlike its predecessors, this planer features a fixed table.

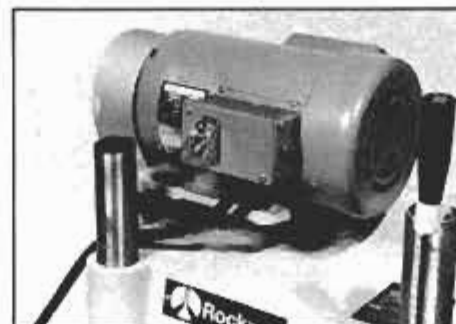


Once you've positioned the cutterhead for correct depth of cut, head is locked in position using this control knob.

head, containing in-and-out feed rollers and cutter knives, moves up or down while the table remains stationary.

What I like about this feature is that you can keep a roller table at a constant height to support long workpieces as they leave the table. No more raising or lowering the table each time the depth of cut is changed on the planer.

I didn't perform any clinical tests with the planer: I'm not interested in how much stock can be removed in a given time period. What counts is how the tool performs under job conditions—in this case, building



On-off switch faces operator; it's in full view and easy to reach throughout cutting.

PM projects in my workshop. The tool was used under the same set of circumstances that PM readers would use it.

What does matter is that the tool always removed the exact amount of material that I wanted planed. And because of the tool's ability to remove a scant amount, it's even possible to feed in a 1/8-in.-thick piece of stock and plane off an infinitesimal amount.

Though I didn't clock the tool, it did perform these tasks in a hurry. In fact, the planer works almost as fast when set to remove the maximum amount of stock (1/8 in.) as it does for minimal cuts.

Though ruggedly built with cast-iron construction, the tool handles as easily as if it were a lightweight. That's because the cutterhead and



You will need an outlet with this configuration in order to power the tool. The 2-hp-motor model requires 230 volts.

feed rolls raise and lower on four columns. As you turn the elevating handle, it turns four screws, one inside each column. Each revolution of the handwheel equals .155 in.

An extra you might want to buy is the steel stand (No. 50-315) shown. It's priced at \$62.40. Not shown, but also handy, are the shavings hood for use with a dust-collection system (\$89) and the retractable casters (\$48.85).—Harry Wicks, *Home and Shop Editor*

SPECIFICATIONS—PLANER

Model: RC-33 13-in. planer
 Motor: 2-hp, 230-v., single-phase (3-hp, 220-440 three-phase also available)
 Capacity: 5.9 in. thick by 13 in. wide
 Depth of cut: 3/16 in. maximum
 Length of unbutted stock: 10 in. minimum
 Cutterhead: 3 knives, 2.95-in. dia.; 4,500 rpm; 13,500 cuts per minute
 Feed rolls (in and out feed): 2-in. dia., solid
 Table: 27 in. wide by 27 in. deep by 26 in. high
 Weight: 260 lbs., Model 22-650; 295 lbs., Models 22-651, 22-655.
 Price: \$1,500
 Availability: At Rockwell distributors
 Manufacturer: Rockwell International, Power Tool Div., 400 North Lexington Ave., Pittsburgh, Pa. 15208

GREAT ALL-AMERICAN WORKSHOP SALE

NOW! AT THE GREATEST NAME IN HARDWARE.*



S-K TOOLS

7-piece wrench set, standard or metric, or 11-piece $\frac{3}{8}$ " drive socket set, standard or metric. Your choice.

\$29.99 #8207-82
FREE magnetic screw-driver set included (\$14.95 value).



BERNZOMATIC

Oxygen Tote Torch kit. Lets you weld, braze, cut and solder around the house and yard. Save \$11.01.

\$34.94 #OX-2500 GP
FREE welders' goggles included (\$6.95 value).

WISE GRIP

7" locking pliers with curved jaws and wire cutter. 10" Straight Jaw pliers. Your choice. Save \$2.92.

\$4.97 #7WR, #10R



LUFKIN

16' x $\frac{3}{4}$ " Power Tape Rule. Positive lock holds blade firmly. Save \$2.26.

\$6.33 #8316 GA

25' x $\frac{3}{4}$ " rule - \$7.66

(#8325 GA)

25' x 1" rule - \$9.88

(#8425 GA)

FREE 6' pee wee tape rule included (\$2.85 value).



BLACK & DECKER

2 H.P., $7\frac{1}{4}$ " circular saw. Ball bearing construction with upper and lower metal blade guards. Save \$20.23.

\$54.76 #7392

FREE Black & Decker #9700 electric staple gun included. (With coupon and proof of purchase sent to Black & Decker.)



*SERVISTAR

NEXT TO THE MAN WHO OWNS THE STORE,
IT'S THE GREATEST NAME IN HARDWARE.



SEE YOUR YELLOW PAGES FOR THE DEALER NEAREST YOU.

SALE ENDS
APR. 15, 1982

AT PARTICIPATING DEALERS

How to improve your pickup's mileage

Fill the back of a pickup truck with leaves raked off the lawn, and drive to the town dump. If it's more than a couple of miles away, you won't have to unload when you get there, because the box will have been scrubbed clean by the swirling of the air as you drive along. Logically, you'd figure that this swirling air must be creating aerodynamic drag at the same time it's depositing leaves all over the neighbors' yards. As we found out from some careful testing, that's an understatement.

In point of fact, the open bed of a pickup truck is about as unstreamlined as it's possible to be. What happens is this: The air flows up and over the hood and cab with just as good laminar adhesion as on any car. But once past the cab, there's nothing to which the air can cleave. So it begins to tumble and swirl. By the time it reaches the tailgate, it simply backs up like water behind a dam. It takes a lot of horsepower—and therefore, gasoline—to

force that air over the spillway. How much gasoline? Well, we wanted to find out for ourselves, so we started with a 1981 Isuzu pickup, long-wheelbase with a 7.5-foot bed. Other than fat tires, which lower the mileage slightly from stock, the running gear is just the way Isuzu built it. At a constant 60 mph, with an open, empty bed, our test pickup averaged precisely 25.70 mpg.

The first step was to install a tonneau cover. Now most pickup tonneaus snap onto studs screwed into the bodywork. The snaps rust, the holes in the truck rust and the tonneau—because the snaps are spaced every foot or so along the edges—eventually rips around the snaps. It also tends to sag, because fasteners every foot aren't close enough to pull it taut.

One solution is a tonneau made by Bestop (Box 318, Boulder, Colo. 80306). Their idea is absurdly simple. Instead of snaps, they use Velcro strips the full length of each side and across the back, which attach to Velcro on the underside of the tonneau cover. The self-sticking Velcro installs in a second along the edge of the bed, and can be removed without damage to the paint. It holds the tonneau down firmly along every inch of edge, can't rust or rip and releases with a gentle tug.

The Bestop tonneau is held across the front edge of an aluminum extrusion which needs three screws to hold it down, but that's still better than the dozens of holes required by the conventional tonneau. There are also two buckle straps, so the nylon-reinforced tonneau can be neatly rolled up and stored behind the cab, along the front edge of the bed.

Fitted with the Bestop tonneau cover, our Isuzu averaged an even 28.0 mpg at a constant 60 mph. That's an improvement of 2.3 mpg, or 8.95 percent. Bestop asks \$99.95 for the tonneau on our Longbed, and \$84.95 for a Shortbed. If you drive 10,000 miles per year in a truck which is as economical as our Isuzu, you'd save 32 gallons of gas each year by installing a tonneau. And if you're paying \$1.50 per gallon, you'd pay for the Longbed version in two years, the Shortbed version in 21 months.

We can't come up with a reason not to install a Bestop tonneau. The initial price is low, and it pays for itself in less than 20,000 miles of driving. It keeps anything in your pickup bed dry and hidden from prying eyes, yet it rolls up out of the way in a jiffy. It seems to be pretty durable, and an occasional squirting with Armorall is enough to make it shine.

Simply keeping the airflow from backing up behind the tailgate was enough to improve fuel economy 9 percent, but the airflow was still tumbling and swirling behind the cab. To really improve laminar adhesion all the way to the end of the vehicle for the most effective streamlining, we decided to see if a cap would do anything to improve mileage.

But not just any cap. It had to fit as tightly as possible behind the cab so that the airflow wouldn't

25.70



Driving with an empty bed is similar to towing a parachute behind you. It causes air drag and robs your car of good mileage.

28.0



With a tonneau cover, mileage improved by 9 percent. However, there's still some turbulence present behind the cab.

29.15



With a cap installed, the mileage improved by 13 percent. The air flows smoothly over the entire vehicle, thereby reducing drag.

(Please turn to page 104)

WHAT DO YOU SCORE ON THIS WOODWORKER'S TEST?

Find out and get a **FREE** one-year woodworking magazine subscription!

The test takes only a minute!

Just answer each question, total your score and enter it on the coupon. Then fill in your name and address and send it in to Shopsmith.

For your effort, you'll receive a **FREE** one-year subscription (\$6.00 value) to **HANDS ON!**, the national woodworking magazine full of how to home repair articles, project plans and other helpful tips.

So grab a pen or pencil and get started!

Circle A, B or C for each question:

1 How much experience have you had in woodworking, home repair and/or home maintenance?

- (A) Little or no experience
- (B) Some experience
- (C) Quite a bit of experience

2 Which phrase best describes your workshop?

- (A) A selection of hand tools and portable power tools
- (B) A table saw or radial arm saw, along with hand tools and portable power tools
- (C) A good selection of stationary and portable power tools, along with hand tools

3 How involved do you want to become with woodworking, home repair and/or home maintenance?

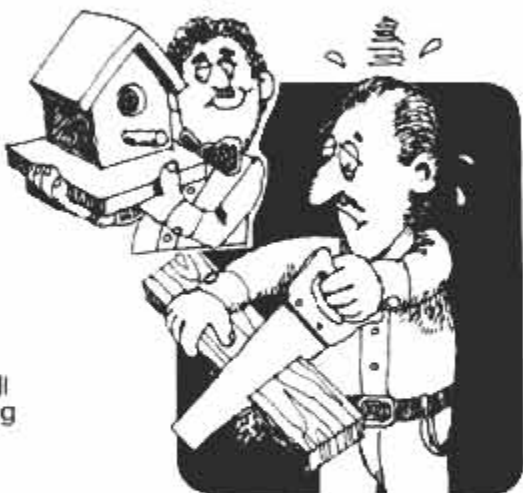
- (A) Not very involved
- (B) Moderately involved
- (C) Heavily involved

4 What's the likelihood that you'll buy some kind of woodworking tools within the next year?

- (A) Not likely
- (B) Somewhat likely
- (C) Highly likely

5 Which best describes you?

- (A) I do home repairs and maintenance only when it can't be done any other way
- (B) I do some woodworking and a variety of home repairs and maintenance
- (C) I'm primarily interested in fine craftsmanship woodworking



coupon to the Shopsmith address shown below.

Your first issue of **HANDS ON!** will arrive soon. And because you're interested in woodworking, we'll also send you a complimentary Information Kit about the Shopsmith MARK V, the complete home workshop anyone can use and enjoy.

The MARK V combines the five power tools you need most in one economical, space-saving unit.

It's the tool to start with... the system you grow with!

Mail the coupon today!



Shopsmith Inc.

The Home Workshop Company
750 Center Drive
Vandalia, Ohio 45377

©Shopsmith, Inc. 1981

My Test Score is _____.

On Question #5, I circled the letter _____. Please enter my name for a **FREE** one-year subscription to **HANDS ON!**, the national woodworking magazine (\$6.00 value). And send me a **FREE** Shopsmith MARK V Information Kit, including the helpful booklet "What To Look For When You Buy Power Tools." I understand I am under no obligation.

Name _____

Address _____

City _____

State _____

Zip _____

Send to:

Shopsmith Inc.

The Home Workshop Company
750 Center Drive
Vandalia, Ohio 45377

Dept. 357M

How to find your score:

It's easy! Give yourself nine points for each (A) you circled, six for each (B) and three for each (C). Then enter your total on the coupon, fill in the special blank about Question #5 and enter your name and address. Mail the

IMPROVE PICKUP'S MILEAGE

(Continued from page 102)

be disturbed as it went from the cab roof to the cap roof. It had to follow the cab contours as closely as possible, so there wouldn't be a wind-catching edge sticking out on the sides. It had to have as smooth a surface as possible and be lightweight.

After examining several models, we decided on a Topper, from Brahma of Texas (601 Parkway Dr., Grand Prairie, Tex. 75051). Molded of Rovel-capped ABS, our Longbed Topper weighs less than 100

pounds—half as much as a comparable fiberglass cap. It fits as tightly around the cab as possible and has a pleasantly aerodynamic look. It also comes with built-in sliding windows—complete with inside bug screens—and a locking rear liftgate. All windows are tempered safety glass, and all hardware is aluminum.

Perhaps best of all, the Topper is light enough that two people can easily lift it on and off the truck. It rides on a band of self-adhesive foam weatherstripping, and it can be clamped or screwed to the bed. For our extra-long version, we used

three clamps along each side, and one in the front.

Does the Topper improve fuel economy? Yes. From our open-bed baseline of 25.7 mpg, the Isuzu improved to an impressive 29.15 mpg with the Topper installed. That's a gain of 3.45 mpg, or 13.44 percent. Obviously, the improved laminar adhesion more than offsets the slightly increased weight.

Is it worth the expense? Well, that depends. If you went out and bought a camper top just to improve fuel economy, it would take you quite a while to get your money back. Our Brahma, for example, costs \$549, plus \$30 for the opera windows and \$45 for the sliding side windows. That totals \$624. Figured against our driving average of 10,000 miles per year, you'd save 46 gallons of gas each year. At \$1.50 per gallon, it would take you exactly nine years to pay for a Brahma Topper with the gas you'd save. Of course, the camper top field is huge and we haven't tested every top on the market. Payback periods vary on weight, price, design and mileage improvement.

On the other hand, if you want a cap for your truck because of the convenience and versatility it offers, but have been putting it off because you're afraid it might cut gas mileage, it doesn't. A cap definitely will improve fuel economy, and by a significant amount.

Obviously, if you can spend less for the Topper—and Brahmats are widely discounted by local dealers—or if you drive more than the national average—your payback period will be correspondingly quicker. And you'll get back most of the initial cost when you sell the truck, in any case.

The lesson is simple: well-designed tops and tonneau covers are cost-effective improvements you can make to a pickup truck.

Of course, many more modifications can be made to a pickup to improve mileage. In upcoming issues, the High-Mileage Files will test the value of water injection systems, alternate tire and wheel combinations, combustion catalysts, carburetors, manifolds, camshafts and a host of other devices.

The response to this series has been tremendous. Unfortunately, we don't have answers for all your questions. Testing mileage is time-consuming and right now we're only equipped to handle one item per month. Address letters to High-Mileage Files, Popular Mechanics, 224 West 57th St., New York, N.Y. 10019.

Produced by the PM Auto Dept.
Text: Rich Taylor

"We think these are the best pocket knives ever made."



You might expect the president of Buck Knives to say that! But Chuck Buck backs it up with very convincing facts when he talks about his new Mustang (left) and its slightly smaller brother, the Colt.

"Nobody can match the new non-rusting springs our engineers created just for this new series," he points out with obvious pride.

Bolsters are heavier and are made of stainless steel, as are the liners. Handle inserts are handsome birchwood, chemically treated for long-lasting natural woodgrain beauty.

"Best of all," Buck says, "all three blades are hollow-ground, made of high-chrome, high-carbon steel that really holds an edge."

The Mustang is 3 $\frac{3}{8}$ " long, closed; the Colt, 3 $\frac{1}{4}$ ".

Finally, shaking his head, Chuck Buck admits, "The only way you can appreciate them is to see them, heft them, check their blades."

Ask your favorite dealer to let you heft these two new beauties... from Buck, of course!



For free
Knife Know-How
booklet, write
Dept. PM-382,
P.O. Box 1267,
El Cajon, CA 92022

BUCK KNIVES

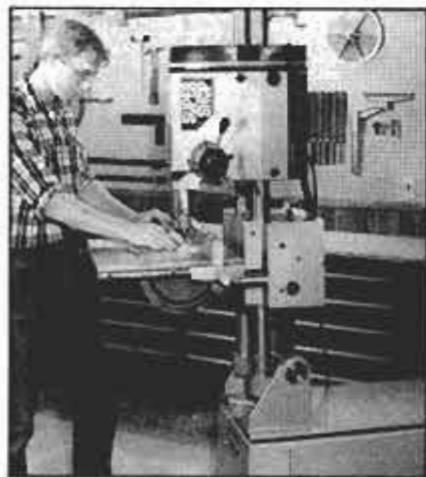
Famous for holding an edge!

PM LOOKS AT A NEW MULTIPURPOSE SHOP TOOL

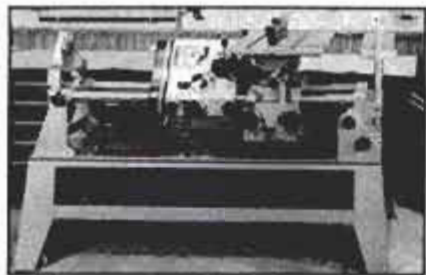
The Super Shop is a well-made multipurpose tool. Its 15-amp., 2½-hp motor produces speeds from 30 to 7,200 rpm, while converting normal household current (a.c.) to direct current (d.c.). Direct current—long preferred in industry—is more efficient.

With the head and carriage mounted on geared ways, the business end of the machine can be moved either manually or electrically by means of a small independent motor. Changeover is easier because a fast-acting collet and draw rod replace the conventional Allen-setscrew method of securing tools to the arbor.

The machine weighs 600 pounds and costs about \$3,000. For complete information write to Super Shop, 11000 Hampshire Ave. S., Bloomington, Minn. 55438.—David Warren



Head moves easily from vertical to horizontal because torsion spring in pivot end counterbalances weight of head.



Multipurpose tool includes table saw, disc sander, horizontal boring machine, lathe, shaper, fixed router, drill press.

PART TIME or FULL TIME SHARPENING BUSINESS!

YOU Can Earn Up To
\$800 An Hour
In
YOUR OWN

*No Selling, No Inventory...Year Round
Cash Profits and YOU Set The Hours!*

Yes, there's a lot of business waiting for the man who can sharpen saws, planer knives, jointer blades, wood chisels, scissors, axes and other garden, shop and home tools.

Belsaw SHARP-ALL does all these jobs quickly with precision and at a big profit for YOU. You can become Sharpening Headquarters for carpenters, builders, lumber yards, factories, home workshop hobbyists. And, you can start this Money-Making business for less than \$50.

FREE BOOK tells how to start your own sparetime business while you are still working at your regular job. People bring in their work and pay Cash—over 90c of every dollar you take in is cash profit.

*Does The Belsaw Pay?
YOU BET!*

**JOIN THESE SUCCESSFUL
SHARP-ALL OPERATORS—**

\$4,000 a Year

"Think the world of my SHARP-ALL. An now grossing about \$4,000 a year part time, and hope to expand shortly. Now doing work for the State of New York, Carrier Corp., and General Motors."
Lawrence Stevenson
E. Syracuse, New York 13057

Wanted to Retire

"I had dreamed of retiring for years, but was afraid to quit my salaried job. I had never used this type of equipment, but the SHARP-ALL was real easy to learn. I sharpened 30 blades my first week — without advertising at all. Now, for the first time in my life, I can say that I am content."
Farris Cornalio
Wallington, Texas 79085

\$536 an hour

"On Saturdays, my big day, I take in \$45 to \$65. Other days I average less, but I figure I make between \$5 to \$6 per hour... and sometimes more. I am presently enlarging my shop, and thank Belsaw and their fine equipment for making it possible."
V. G. Miller
Rahert, North Carolina 28388

Had to Quit His Job

"Bought my SHARP-ALL four years ago, and it has done everything (and more) than you said it would. I never sharpened a saw in my life, but when I had to quit my regular job, I knew I had to have something to do. Now I have more work than I can do — I have as many as 100 saws ahead of me at a time."
Frank Sartis
Grandview, Washington 98309

100% Disabled

"I was disabled by an accident while employed as an iron worker. They declared me 100% disabled and said I'd never work again. I don't think I could work for anyone else but I started my sharpening business part-time and now it's turned into a full-time job with more work than I can do."
Tampa, Florida 33614



Let Belsaw prove
**YOU can do it — 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. Send coupon or mail postcard for full details on our exclusive 30-Day Free Trial Offer!



Our Free Book tells how to start a profitable, lifetime home sharpening business, how we help you grow, how we'll finance you.

BELSAW SHARP-ALL CO.
712M Field Building
Kansas City, Mo. 64111

RUSH COUPON TODAY FOR FREE BOOK

No obligation... No salesman will call

BELSAW SHARP-ALL CO.
712M Field Building
Kansas City, Mo. 64111

Please send my FREE copy of your book
"Lifetime Security" and full details on
your 30-Day Free Trial Offer!

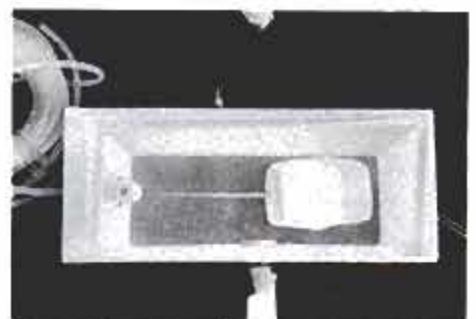
Name _____
Address _____
City _____ State _____ Zip _____



Make box for still of exterior-grade plywood. Use resorcinol glue at joints. Cut V-notch (see drawing) to suit roof pitch.



Use 1/2-in. PVC pipe to make feeder lines from the supply tank to the black evaporation pans. Use brass drains in the pans.



Supply tank, with float valve (Bobby Valve), controls water level in the still and is connected to cold-water supply.

DRINKING WATER FROM THE SUN

(Continued from page 98)

rior latex enamel. A dark color will improve efficiency. Be sure no exposed wood remains. Install fiberglass insulation after paint is dry.

Give the evaporation pans two coats of rust-resistant paint—such as Versaflex or Rust-O-Crylic enamels. These are nontoxic and adhere to galvanized surfaces. Plumb the system as shown in the drawings. A handsaw can be used to cut the trough in half (after assembly).

With help, take the unit up on the roof and position it where it will receive full sun, then make final connections.

If it's installed on a roof slope, attach a 2x4 cleat to the roof at the lower end of the still. Use lagscrews in the rafters and apply ample sealant at the holes. Run braided guy wires from the sides of the still to the eave. These will anchor the still. Install turnbuckles, but do not tighten yet.

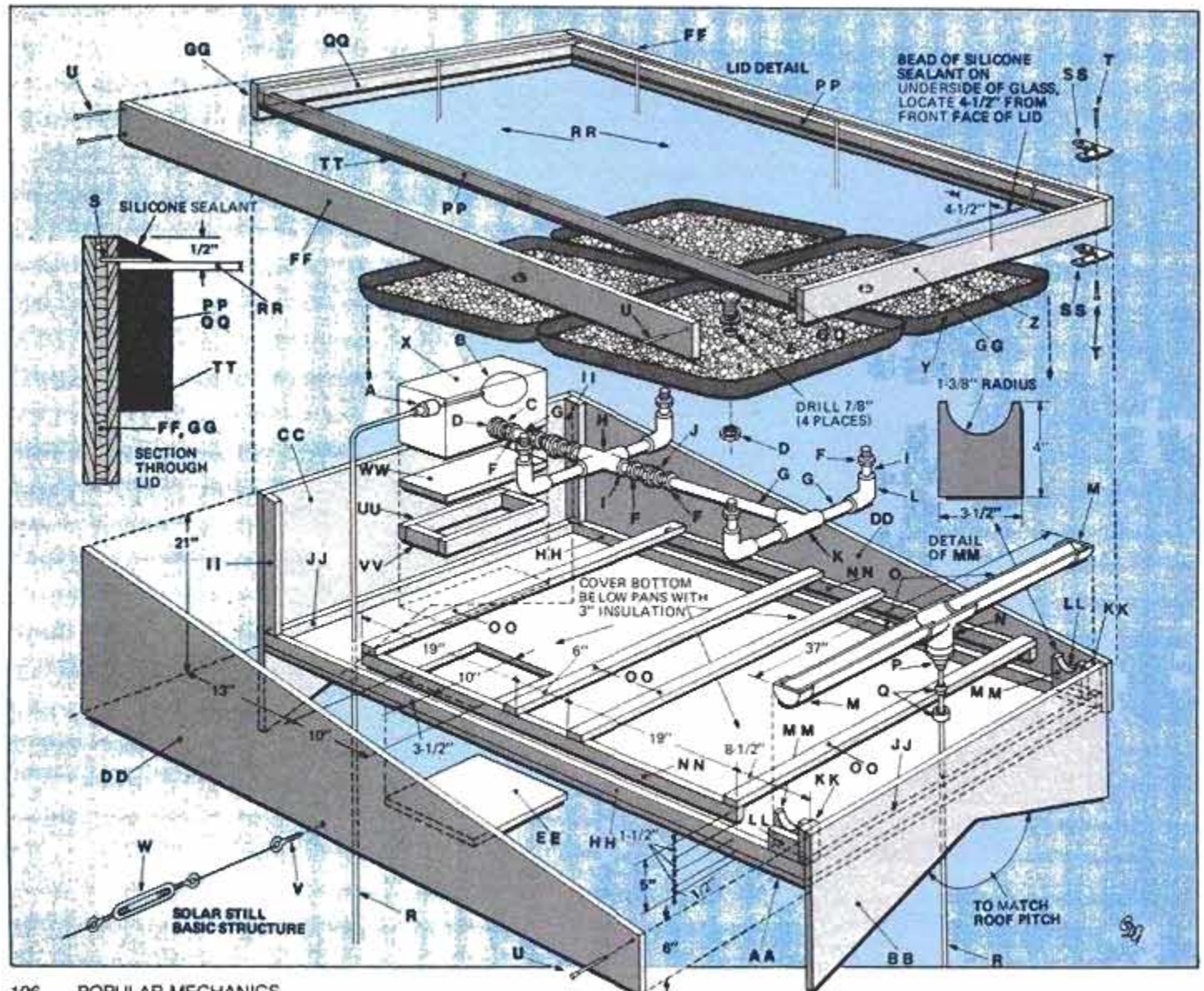
Run the supply-line tubing to a convenient water supply and con-

nect through a valve. The output line should not be connected to the storage tank at this time.

Lay a small piece of screen over the openings in the evaporation pans, then spread a layer of black aquarium gravel over the surface of the pans. Since the evaporation of the water will deposit light-colored minerals in the pans, stir the black gravel periodically. This exposes a new surface and maintains the still's efficiency.

To prevent the growth of microor-

(Please turn to page 170)



**COMING
NEW**

Popular Mechanics FILE BOXES & SEPARATE INDEXES

No more untidy shelves or magazines stacked on top of each other.

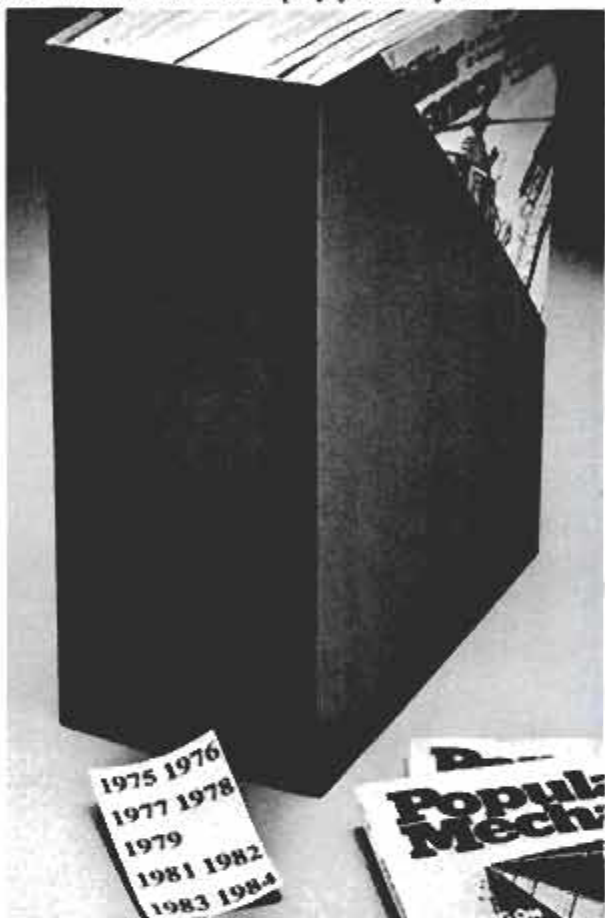
POPULAR MECHANICS FILE BOXES will help you keep your magazines and bookshelves trim and orderly. PM is now offering a sturdy glossy lacquered File Box to keep a year's supply of PM issues neatly together. The FILE BOX stands alone with all twelve issues intact! Line them up by year on your bookshelf and always have a wealth of do-it-yourself information at your fingertips.

With every order you will receive FREE self-adhesive labels covering the years 1975 through 1984. Peel off the year required and place on appropriate PM File Box. Turn the File Box any way you choose. Place the year on the side that's convenient for you. Expose all the magazines on the shelf, or keep the solid side in view. It's your choice! Either way you'll have a valuable, convenient and very attractive reference library.

Price for 1 File Box,
\$2.95

Price for 2 File Boxes,
\$2.75 each

Price for 3 or more
File Boxes, \$2.50 each



***PM Indexes
for the years
1975-1981
are here!***

Find the answers to your shop, home and car problems faster than ever. Thousands of entries cross-reference the articles that have appeared in PM over these years.

Broad category listings help you locate articles on home remodeling, boats, car maintenance, shop projects and many other subjects.

**ORDER BY YEAR! PRICE
for each index is \$2.25.**



SEND YOUR ORDER TODAY!

Make Check or Money Order Payable to Popular Mechanics

Please allow three to four weeks for delivery

POPULAR MECHANICS

Box 1014, Radio City Station, New York, NY 10101

machine with a mission

Ariens team of expert outdoor power equipment design engineers were faced with a difficult task. Their mission: to produce a front-engine riding mower that delivers more than superior lawn mowing performance. The result: Ariens Yard Tractor. Designed

for tough jobs including snow removal, garden tilling, and hauling heavy loads, the Ariens Yard Tractor is built to tackle almost any mission you assign it, with ease. Ariens Yard Tractors deliver a smooth, comfortable ride. Responsive geared steering lets you maneuver in and out of tight spaces. All controls are within convenient reach of the fully adjustable bucket seat. And you'll admire the remarkably even cut the Yard Tractor gives your lawn. Ariens has built the Yard Tractor to run dependably for years. Every design detail is engineered for durability. It's a machine made to take

on season after season of tough, demanding work.

Your Ariens Yard Tractor may not stand the test of time as long or as beautifully as this 16th century California mission. But with proper care and maintenance, it will go on performing all of your lawn, garden, and snow removal missions for years to come. See your Ariens dealer and test-ride an Ariens front-engine Yard Tractor today. For literature on Ariens Yard Tractors, write: Ariens Company, 655 West Ryan Street, Brillion, Wisconsin 54110.



A FAMILY OF FINE PRODUCTS FOR ALL SEASONS

Ariens

DETROIT PUTS MUSCLE BACK IN

Z28, Capri RS, Charger 2.2, TC3 Turismo, Regal Turbo:
Performance is back with a vengeance.

by Joe Oldham EXECUTIVE EDITOR



The trouble with all of us Americans is that we don't like to wait around. We're impatient. We want to get on with it. Now. And we're competitive, too. If we can get on with it quicker than the next guy, so much the better.

Since Henry Ford dropped the first high-performance engine into a car in 1903, cars have been a favorite way for Americans to express impatience. Who hasn't jammed his


Despite their four-cylinder engines, neither the Plymouth TC3 Turismo nor the Dodge Charger 2.2 embarrassed themselves. They couldn't match the acceleration of the V6- and V8-powered musclemobiles, but they weren't slugs either. And, they showed a couple of the more powerful machines the way home on the handling course.

foot down on the accelerator pedal to get away from a stoplight just a little bit quicker than the guy in the next car? And when you beat him out, you felt pretty good about it—right? A lot of us feel that it's our birthright to beat the next guy away from a stoplight.

Happily, our friends in Detroit have, over the years, catered to those baser instincts in us by supplying machinery capable of not only beating the guy next to you away from that stoplight, but blowing him into the weeds, as well. In fact, a whole generation of automobiles—the muscle



TC3 TURISMO



CAPRI RS



CHARGER 2.2

cars of the 1960s—existed for one reason: to blow the doors off anyone who came up against you at a stoplight.

With the combined blitz of the insurance, safety, emissions and energy crowd, muscle cars and performance just about dried up and went away during the '70s.

There were some vestiges left—Pontiac's Firebird Trans Am and Chevrolet's Corvette, to name a couple. But they were few and far between and the companies who made them seemed almost embarrassed to have them in their showroom lineup. It was almost antiso-

cial to drive one of these cars.

However, performance-oriented buyers didn't all go away. In fact, they held steady. The Trans Am became the biggest seller in the Firebird lineup despite the tripling of gas prices. The Corvette has sold out every year for the past decade. Some of the



REGAL SPORT COUPE

Muscle cars exist for one reason: to blow the doors off anyone who comes up against you at a stoplight.

automakers noticed. Chevrolet brought back a Z28 version of the Camaro in 1977. Buick introduced a turbocharged V6 engine in many of its car lines. Pontiac added a turbo to its Trans Am. And cars like the Datsun 280ZX Turbo, Mazda RX-7, and other performance-oriented imports continued to sell in droves.

And now it's 1982 and guess what? Performance is back. And back big.

Robert D. Lund, General Motors vice president and general manager of Chevrolet, perhaps said it best at a recent press conference.

"Now that fuel economy is a given, we're going to start building some real performance cars again, cars with excitement, cars with pizzazz."

In case you haven't heard, the '82 Camaro will be the pace car at the Indy 500 this year. And Chevy is looking for other venues to hype the performance virtues of its cars. Last year, Ford cranked up something called Special Vehicle Operations and imported Michael Kranefuss, Ford's European racing chief, to run it. Already, Ford Motorsports is making its presence felt in many areas of performance.

Chrysler, despite all its woes, continues its Direct Connection high-performance parts program, has already come up with several real performance packages for its cars and will have more in the future. Quiet, stolid Buick has a very active racing

parts program going and a couple of real surprises under the hood for anyone willing to look past the velour casket-option interiors of its cars.

Yes, performance is back. Which is good news for anyone who enjoys driving a car with some real punch under his right foot. Performance still isn't up to the tarmac-tearing levels of the late '60s when you could fry rear tires at will. But when was the last time you drove a truly exciting car that could burn rubber off the line and chirp the tires shifting into second gear? The cars in this test *all* could do that. And if you don't think it's a lot of fun to drive cars like this, then you'd better go back to that Isuzu diesel automatic you've been thinking about.

An added ingredient is tight, responsive, superb handling—something almost totally missing from the '60s muscle cars.

To get a handle on what's being offered down at your friendly new car dealerships, we rounded up a bunch of the new '82 performance cars and headed out to Milan Dragway in Milan, Mich., for a day of tire-shredding evaluation. The cars we requested from the manufacturers were a Chevrolet Z28 Camaro, a Mercury Capri RS 302HO, a Dodge Charger 2.2, a Plymouth TC3 Turismo, a Buick Regal Turbo Sport Coupe and a Pontiac Firebird Trans

Am. All but the Trans Am showed up. And after a day of thoroughly wringing out all these cars, we can tell you categorically that the fun is back in Detroit.

This wasn't a head-to-head test. We didn't formally pit one car against another, simply because the cars are different in concept from one another and would normally appeal to different buyers in different market segments. For instance, we can't see someone interested in a TC3 Turismo also considering a Buick Regal Turbo. But the thread of continuity here is that all these cars are advertised and hyped by their manufacturers as performance cars and, as such, they had to stand up to our rather rigorous scrutiny. And of course, the inevitable comparisons do crop up.

We've written about the features of these cars in our new-car reports in previous issues so we won't repeat all the details here. What we really wanted to be able to report was how quick they are.

Mercury Capri RS 302HO

We haven't formally tested a new '82 Corvette with its fuel-injected 350 engine as yet. But except for that one question mark, there's no doubt that any Capri (or its brother, the Ford Mustang) equipped with the new-for-'82 High Output 302 engine is the quickest car made in

PM photos. G Photographic



America this year. Acceleration of this car is, in a word, thrilling. Here's one car sold in 1982 that really *does* have the performance feel of a 1960s muscle car.

From a dead stop, dropping the clutch and flooring the throttle will produce wheelspin—lots of wheelspin. The wheelspin will not stop until you lift your right foot. At the same time you are experiencing this wheelspin, you'll be pinned back in your bucket seat, your eyelids peeled back from the G forces acting on your body. Some respite comes when you slamshift the four-speed into second gear. But the wheelspin will be there again if you make the gear change with any alacrity at all. And prepare to be pinned back again as soon as the tires bite. Top end in this car is just a headlong charge through the timing lights, with the engine screaming, the exhaust blasting, and your adrenaline pumping for all it's worth.

The engine is what makes this car. It's the same old 302 that has been around for a generation. But Ford engineers Larry Kobernik and Dan Rivard breathed new life into it this year with some new components that truly make a difference that you can feel when you punch it. A large-capacity dual-snorkled air cleaner, a larger 368 cu.-ft.-per-minute two-barrel carb, different valve-train pieces including a hotter camshaft with greater lift and duration, a big hairy free-flow exhaust system, a four-speed stick shift, and 3.08 rear axle ratio complete the HO package. With these changes, the engine is rated 157 hp at 4,200 rpm

and 240 ft.-lb. of torque at 2,400 rpm.

All this hardware translates into a car that will rush you up to 60 mph from a standing start in just 7.43 seconds. And that's with a driver and 225-pound yours truly aboard. Lop off the heavyweight timekeeper and you should be able to hit 60 in seven seconds flat. That, sports fans, is hauling the ashes.

Our standard quarter-mile clockings resulted in a best run of 15.94 seconds elapsed time at 86.70 mph. The limiting factor on all our acceleration runs was not engine power. It was controlling the wheelspin that resulted every time we punched open the throttle. The 195/65R390 Michelin TRX tires (a standard part of the Capri's RS package) are great for over-the-road handling, but didn't prove to be the hot ticket for traction under hard acceleration. Once they broke loose, there was hardly any chance of recovery. With better gripping tires, we have no qualms about predicting 15-second-flat quarter-mile ETs for this car with no other changes.

The RS package also includes special springs, shocks, stabilizer bars, axle location links to control unwanted movement of the rear axle, and special trim and ornamentation. This special equipment allowed our test RS to acquit itself nicely on our standard 1,000-foot slalom course, a test designed to give us a good idea of transient response in a car. A real-world example of a transient response might be an emergency evasive maneuver to avoid a collision. The Capri blasted through the

gates in 12.61 seconds on one run and backed it up with a 12.66. Quick, but not the best time of the day. In addition, the Capri exhibited quite a bit of body roll during its transients while negotiating the pylons. Our test driver, Detroit Editor Gary Witzenburg, reported that the Capri took a lot of work to get it to go that quickly through the course. He thought the steering was too slow, too, which didn't help.

The Capri RS 302HO is somewhat of a throwback, a '60s muscle car taken to a higher level of engineering development. It's a guts car with lots of tactile feel coming through the seat at you. Most women won't like this car. Most men will.

Chevrolet Camaro Z28

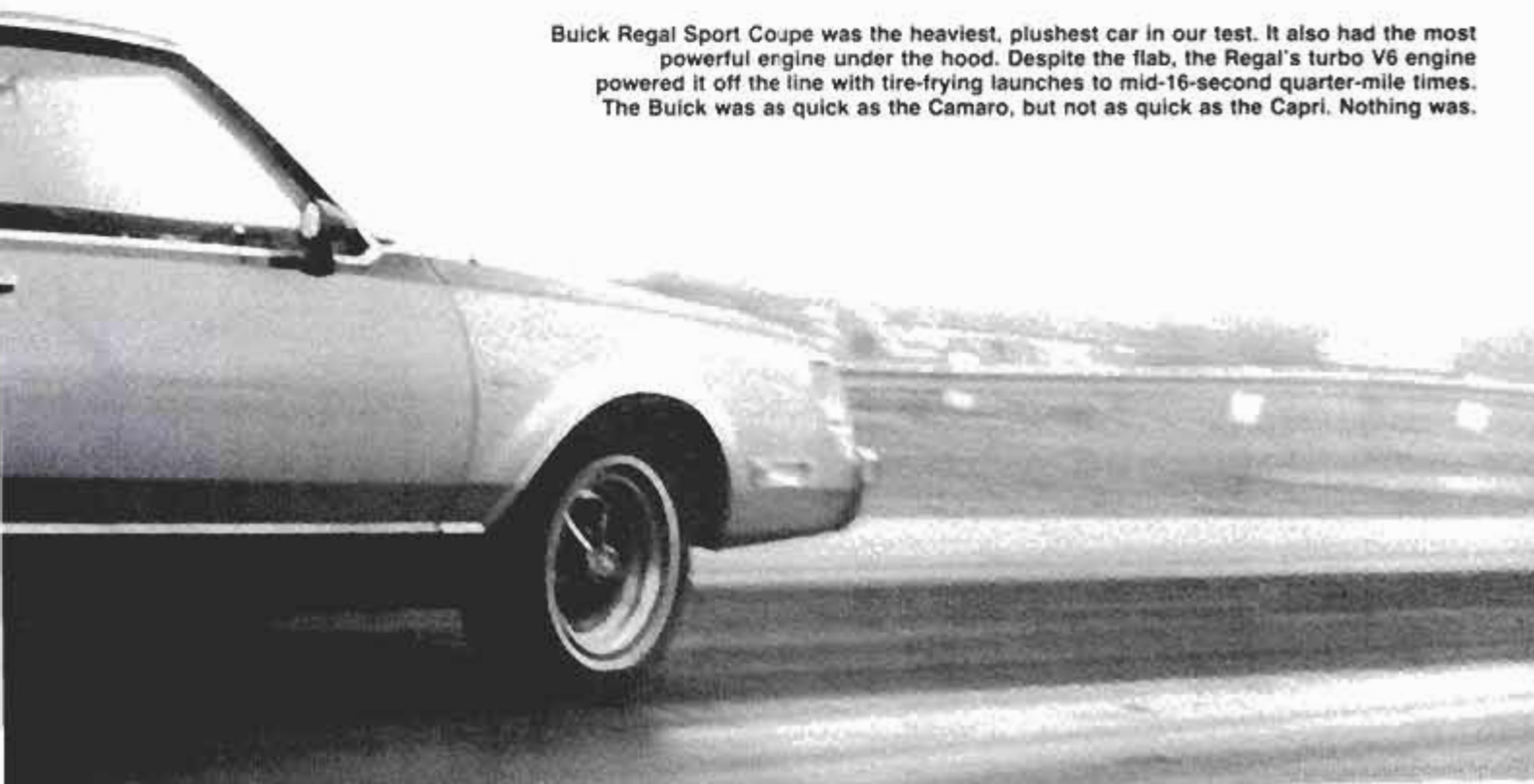
In last month's issue, we reported on the Camaro's world-class handling. But how does the Camaro's hairiest version, the twin crossram, fuel-injected 305 Z28, perform in a straight line?

Quite frankly, when we first drove the car at GM's Desert Proving Grounds last month in Mesa, Ariz., we thought it was a stone.

For a car to look like that, but perform rather lethargically, was an inexcusable error, in our opinion. Yes, the car could smoke its tires at will. But once the rear tires bit into the pavement and the wheelspin stopped, the car just didn't have that pin-you-to-the seat acceleration we thought it would. The reason was torque—or lack of it. The Camaro's 305-cu.-in. V8, coupled to a 2.94 rear axle ratio, simply did not

(Please turn to page 154)

Buick Regal Sport Coupe was the heaviest, plustest car in our test. It also had the most powerful engine under the hood. Despite the flab, the Regal's turbo V6 engine powered it off the line with tire-frying launches to mid-16-second quarter-mile times. The Buick was as quick as the Camaro, but not as quick as the Capri. Nothing was.





Hit the deck— here comes the RAF

Four decades after it won a war fought in the clouds, Britain's Royal Air Force clings to the treetops—at over 500 mph.

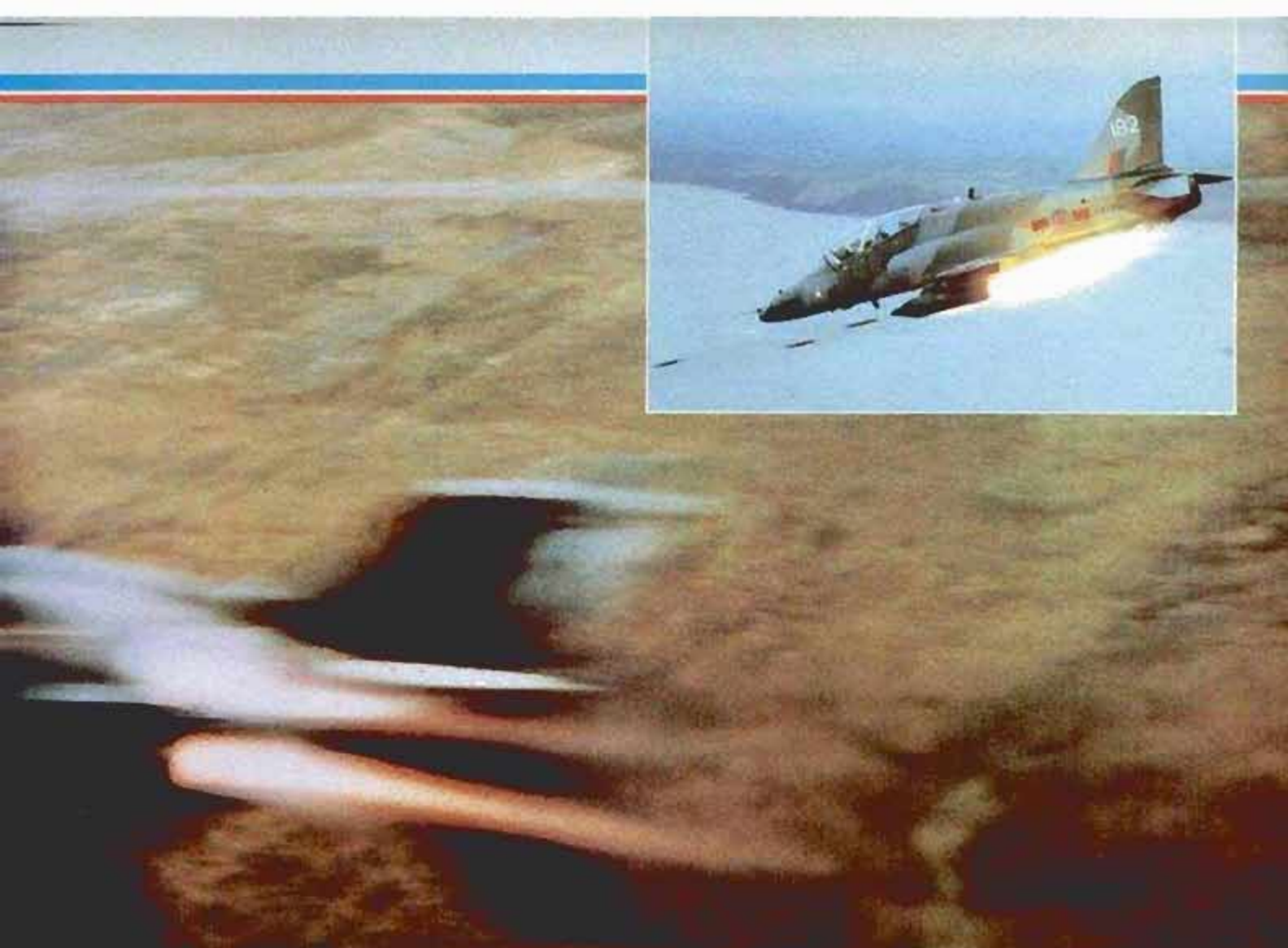
by Edwin Kiester Jr.

The plane comes screaming over the landscape, barely clearing the treetops and church steeples, hurtling along at almost 600 mph. Approaching a wooded ridge, the pilot rolls the jet over on its back without changing altitude and skims the ridge upside down. Then, he banks and parallels the peak a few feet from angry rocks and trees. Sheep scatter in a pasture below and motorists duck instinctively as the plane roars over a highway. The travelers' startled looks melt into

smiles as they catch sight of the insignia that for 40 years has symbolized dash and daring—the red, white and blue bull's-eye of Great Britain's Royal Air Force.

In the darkest days of World War II, the outnumbered pilots of the RAF flew into history by holding off the Nazi bombers in the Battle of Britain. Today, flying another generation of planes designed for what could be a far different kind of war, the RAF maintains that proud tradition. Modern aerial warfare relies

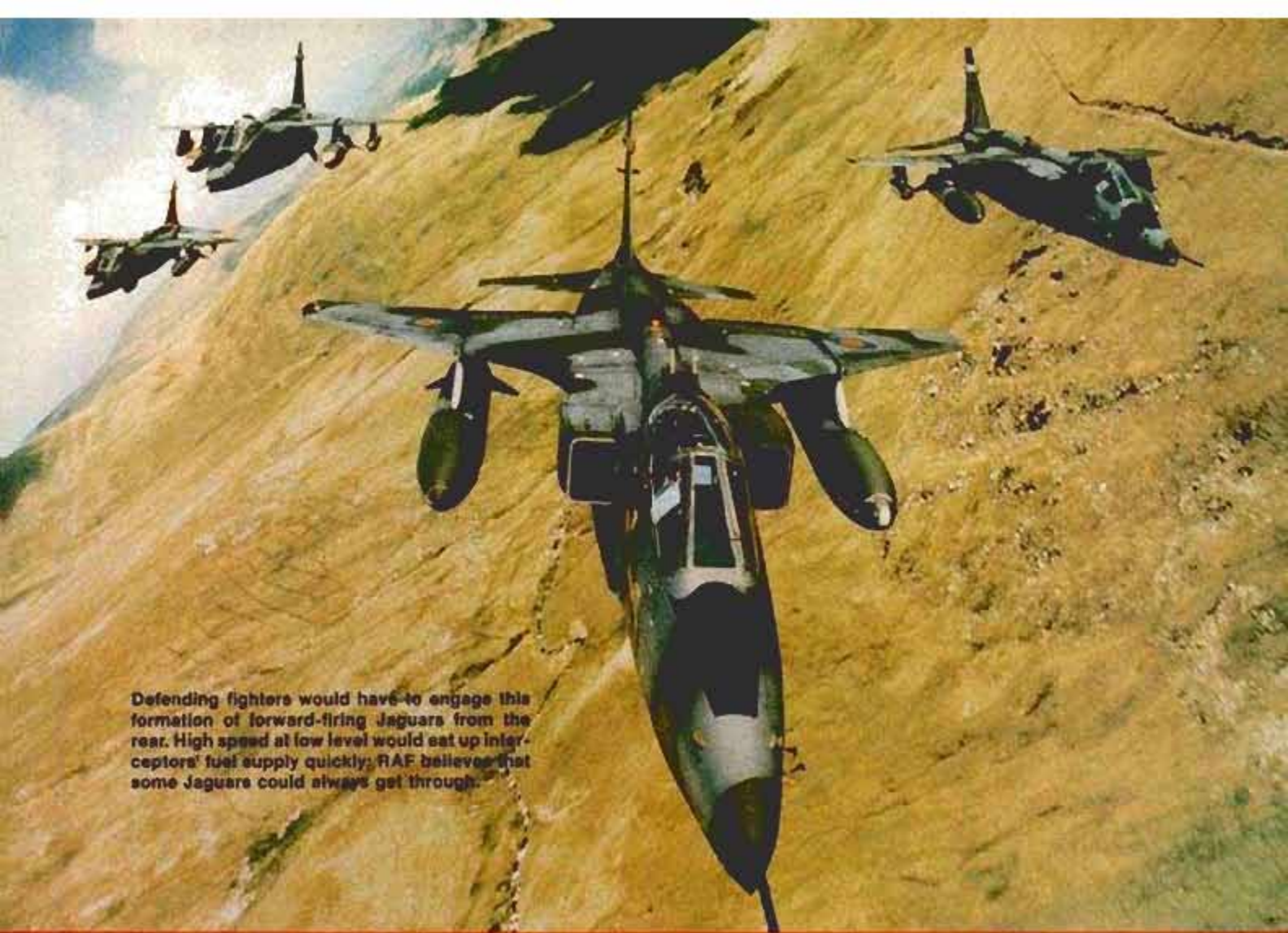




Photos courtesy of British Aerospace Inc., Rolls-Royce Ltd., British Information Services

Today's RAF: Jaguar attack aircraft (above) would meet Warsaw Pact forces head-on in event of NATO involvement in European conflict. Hawk (right) is used as advanced flight trainer and (top right) as weapons trainer. Panavia Tornado (below) is newest all-purpose craft. Wing Cmdr. Willison heads training unit.





Defending fighters would have to engage this formation of forward-firing Jaguars from the rear. High speed at low level would eat up interceptors' fuel supply quickly; RAF believed that some Jaguars could always get through.

Greatest low-level menace—birds

When it comes to combat, RAF pilots debate the greatest threat to low-level operations in terms of light flak or small-arms fire. But everybody agrees on the number one peacetime hazard: birdstrike. An island nation, Britain has its share of fair-sized seabirds, which don't recognize any higher

airspace jurisdiction. "When you hit a seagull, even a small one, at 600 miles per hour," says Air Commodore John Walker of the RAF, "you might as well be running into a cannon shell."

The problem is not endemic to Great Britain; tactical air forces around the world face a potential bird hazard every day. The U.S. Air Force counted more than 3,500 reports of birdstrike in a two-year period from 1978 to 1980, and the leader of its Thunderbirds aerobatic team was killed last September when his T-38 collided with seagulls while taking off from a lakefront airport in Cleveland.

A great majority of bird hits take place at an altitude below 1,000 feet. The RAF has restricted its own aerobatic team to a minimum altitude of 250 feet during public performances, primarily to lessen the odds of a birdstrike.

Keeping grassy areas unmowed near runways can lessen the possibility that seagulls will loiter around airfields. But so far, nobody has figured out how to dodge both enemy radar *and* birds at low level with 100-percent success.



Low-level view from Hawk's rear seat.

Hawk gives advanced flight trainees a full aerobatic workout—plus spins (below).





Forty years later: Iron Cross files formation with British bull's-eye in joint Luftwaffe/RAF training program for new Tornado pilots.

primarily on electronic sensing and automatic weaponry, but the RAF's battle tactics still stress eyeball-to-eyeball flying skill. In the RAF view, a war in the 1980s would be fought right on the rooftops of Europe. Flying very low and very fast, RAF attack squadrons would duck under the enemy radar cover, and blur past missile defenses before they could react, to hit enemy targets.

"If the RAF is to be successful in a war role," declares an official briefing statement, "tactics demand that our operations be kept fast and low."

"The philosophy is this," says Graham Hammond of RAF Strike Command headquarters, still housed in the rural countryside bunker where Air Chief Marshal Sir Arthur "Bomber" Harris once directed forays against Germany. "If you fly high enough, long enough, the enemy will always get you."

Indeed, the bulk of British combat air strength is designed to operate a few aircraft-lengths above the terrain. In the division of missions within the North Atlantic Treaty Organization (NATO), strategic (nuclear) strikes are the responsibility of the United States, while attack bombing, interception, maritime patrol and troop support are divided among the individual Allied air units, all integrated within a NATO command. RAF units are stationed primarily at forward positions in Germany, on antisubmarine patrol in Norway and at a string of bases in northeastern England and Scotland for aerial defense of the home islands and to back up forward units.

Apart from transports and other noncombatant craft, Phantom and Lightning fighters are the only planes intended for high-altitude use. Low-level aircraft include the long-range delta-winged Vulcan bomber; the shorter range Buccaneer, used for both land and sea tar-

gets; the single-seat Anglo-French Jaguar, a ground-support aircraft that, despite its relatively small size, can pack four tons of weapons; and the world's first operational vertical takeoff jet, the Harrier, which can operate from an urban tennis court.

The RAF is now phasing in an even newer low-level aircraft, the swing-wing Panavia Tornado, which will be used both as an attack bomber and a fighter. Modeled somewhat after the U.S. F-111, the Tornado is a joint project of the British, German and Italian air forces. The Tornado, like the F-111, carries terrain-following radar (TFR), allowing it to hug the ground with radar guidance, and full, all-weather attack capability. The first pilots from the three countries are now in training at a combined base in Leicestershire, and the first units will become operational later this year. By 1985,

the three countries will have 800 operational Tornados.

Officially, the RAF defines flying low and fast in terms of airspeed of Mach 0.8 (over 575 mph) and an altitude of 200 feet. Hair-raising as this sounds, pilots often regard these figures as a minimum, rather than a maximum.

"Operationally, we fly as low as we dare and as fast as we dare," says Air Commodore John R. Walker, air officer in charge of the Central Tactics and Trials Organization of Strike Command, whose office is charged with developing RAF combat plans. "As you increase altitude, the radar acquires you earlier, and the missile defenses pick you up quicker," Walker adds. "Thirty miles east of Hanover at 20,000 feet, you are vulnerable to many types of defense systems. But when you get down to 150 feet at 600 knots, the

(Please turn to page 145)



Low-flying RAF F-4 is practice target for British Army's latest ground-to-air system.

THE ICE ABOVE THE GIANT' BELOW

Can a steam-powered submarine, over a quarter-mile long, safely carry 60,000 tons of volatile liquid natural gas from Alaska to Europe at a profit? Its designers are betting it can.

by Robin Nelson

SATELLITE
NAV ANTENNA

SAIL (NAV AND
CONNING STATION)

CREW QUARTERS
IN THIS AREA

WOOD
DECKING

RUDDER

AFT DIVE PLANES

SUNAH
BEACONS

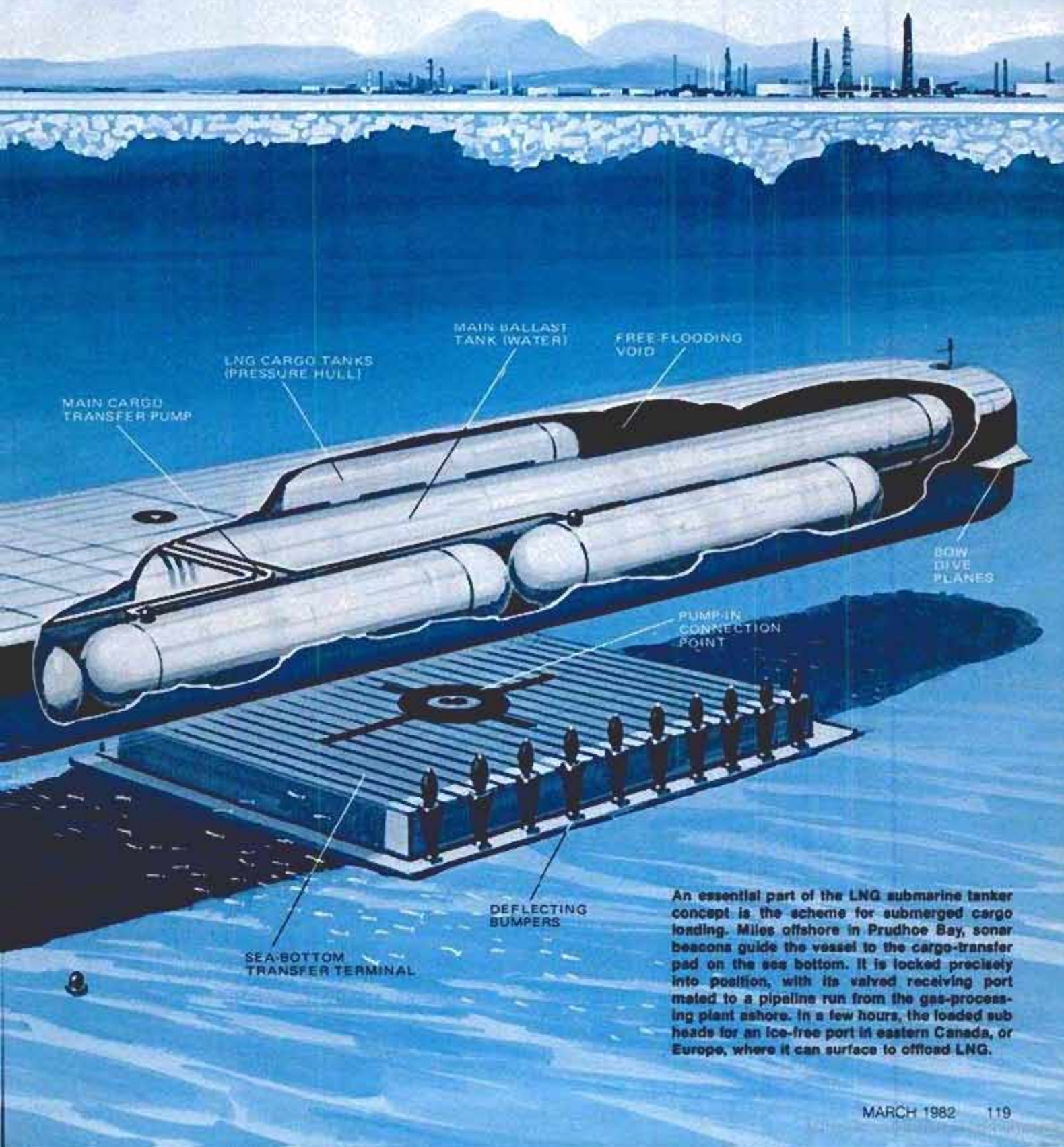


Like science fiction? Imagine a submarine with a hull 90 feet deep, and 140 feet wide for most of its length, which is, maybe, a little more than a quarter of a mile. Go completely wild and deck it with oak beams 10 by 10, sheathed in plywood. Then fill it with enough natural gas—compressed into a liquid for cryogenic storage at under

-260°F.—to incinerate a medium-sized city in one instantaneous fireball. Like it so far? Then put in a methane-fired boiler, or even a nuclear reactor, to charge a turbine with enough superheated steam to drive two massive screws. Now, navigate the whole thing from Alaska to eastern Canada or Europe under the Polar icecap!

If you find it hard to take, even as sci-fi, you'll be happy to know that it's an entirely down-to-earth, dead-serious proposal from a group of marine architects, engineers and planners who already have produced fleets of both nuclear submarines and liquid natural gas (LNG) ships—many in service for more

(Please turn to page 182)



An essential part of the LNG submarine tanker concept is the scheme for submerged cargo loading. Miles offshore in Prudhoe Bay, sonar beacons guide the vessel to the cargo-transfer pad on the sea bottom. It is locked precisely into position, with its valved receiving port mated to a pipeline run from the gas-processing plant ashore. In a few hours, the loaded sub heads for an ice-free port in eastern Canada, or Europe, where it can surface to offload LNG.



New arcade action at home

Video mania is sweeping the country as more people drop quarter after quarter into coin slots. Here's how to bring all that excitement into your home.

by Neil Shapiro ELECTRONICS EDITOR

Last year, more than 20 billion quarters were fed into the insatiable coin slots in this country's video arcades. The fast-moving, complicated, highly detailed games are better—and more popular—than ever before.

Most dyed-in-the-wool video connoisseurs scoff at the idea of home-video games—they just don't offer all the action and color of their expensive, arcade counterparts. But lately, things have been changing, thanks to the advent of the affordable home computer.

Many arcade games—from Space Invaders to Defender—



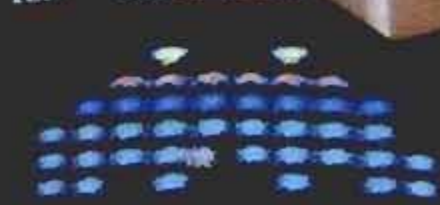
Arcade: **BERZERK**



Home: **CASTLE WOLFENSTEIN**



High Score



Arcade: **GALAXIAN**

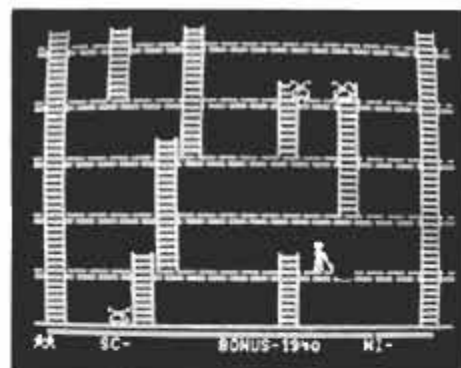
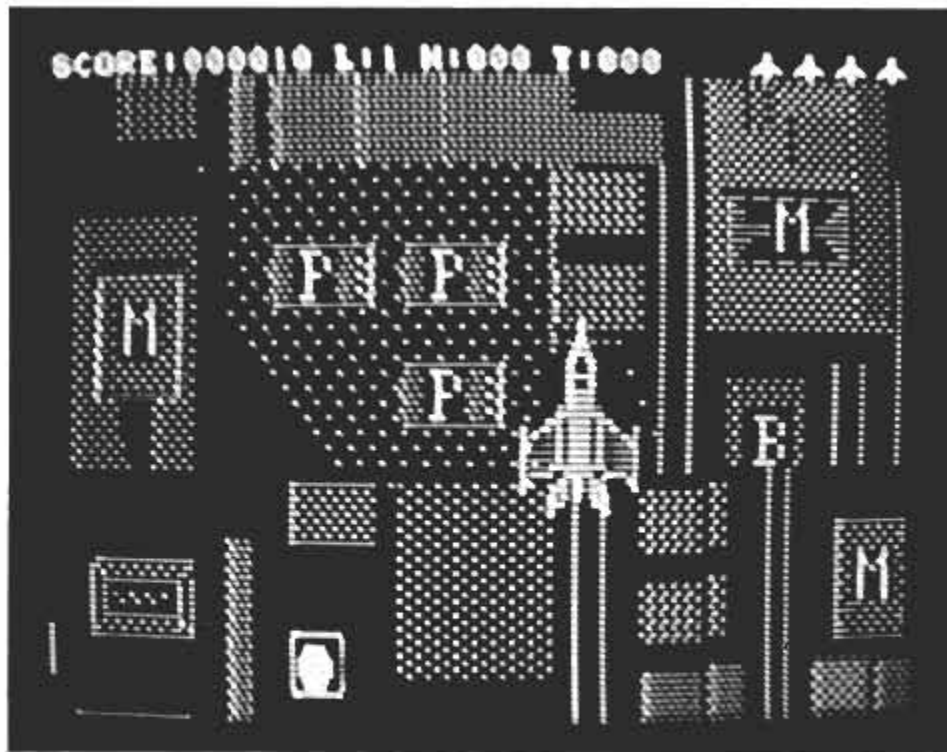
Defender (left) is one of the hottest new games in the video arcade. Home-video equivalent (below) is Gorgon from Sirius Software. Almost all the action and excitement is captured in this program designed for the Apple II. New computer programs now come closer than ever before to providing the special thrills of the arcade games. (Arcade shown is *Stationbreak* in New York City's Pennsylvania Station.)



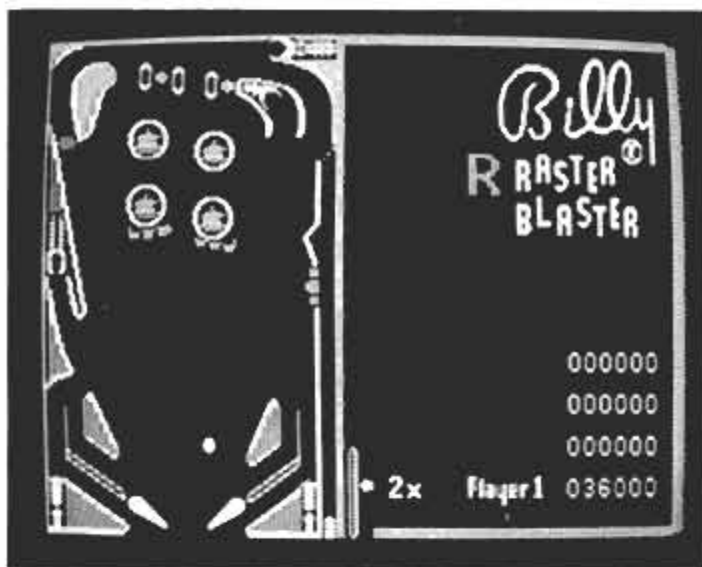
Popular arcade games are compared to similar home-video programs on the three pairs of screens shown below. *Castle Wolfenstein* is from Muse Inc., *Apple Rain* from Broderbund Software and *Pulsar II* from Sirius Software.

PM photos: Bill Aaha



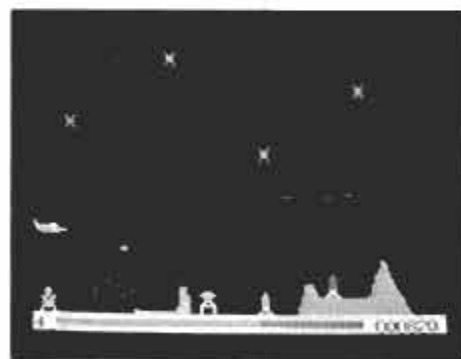


APPLE PANIC—This hilarious video game puts you in control of a little man surrounded by apple-shaped creatures that you try to exterminate (Broderbund).

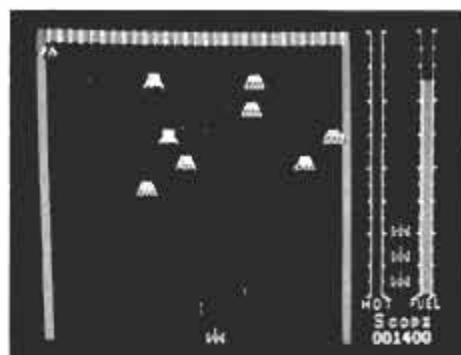


PHANTOMS 5—You are the bombardier in a jet aircraft in this simulation. Bombs drop in long arcs as the ground whizzes by below. Avoid anti-aircraft fire and you have a three-dimensional dogfight (Sirius Software).

RASTER BLASTER—In this full-circle switch, video games now mimic their pinball ancestors. This game has flippers, bumpers, rollovers, targets, sound effects, color—plus realistic animation (Budge Co.).



PEGASUS II—Drop bombs, fire machine guns and try to elude defenders in this high-action game. Terrain can be changed. It's like arcade's *Scramble* (On-Line Inc.).



THRESHOLD—There are 27 types of alien attackers in this game—but you probably won't "live" to see them all. It features excellent animation (On-Line Inc.).

have similar home models available as programs for the Apple II computer (and some on the Atari 800). These programs cost from \$20 to \$40 apiece. But, once you own them, they can be reused as often as you wish. Equipment costs are steep at first glance. A typical Apple II setup may run \$1,500 for the basic machine and a disc drive. But the video-arcade units cost tens of thousands of dollars each. So a \$2,000 investment can simulate more than a million dollars worth of arcade equipment—minus the coin slots!

Detail and action

Take a look at any arcade game's screen up close and then compare it to most home-video games. The difference is usually apparent.

The video-arcade game's picture is made up of very tiny picture dots

which are called "pixels." The home-video screen uses larger dots that result in more blocklike artwork. Further, the picture on the arcade-game screen is brighter and faster moving.

Most home-video games don't come close to duplicating arcade games in visual style or gaming technique. They just don't play the same.

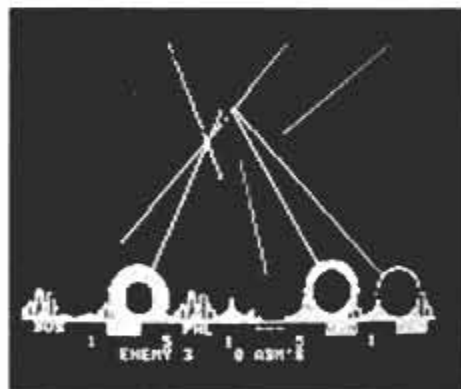
Enter the computer

A typical arcade-game console costs from \$15,000 to over \$25,000. It contains a color video monitor, user controls and a computer. An arcade game is a very sophisticated computer.

But it's had its wings clipped.

A computer operates on a program—a set of instructions which

(Please turn to page 156)

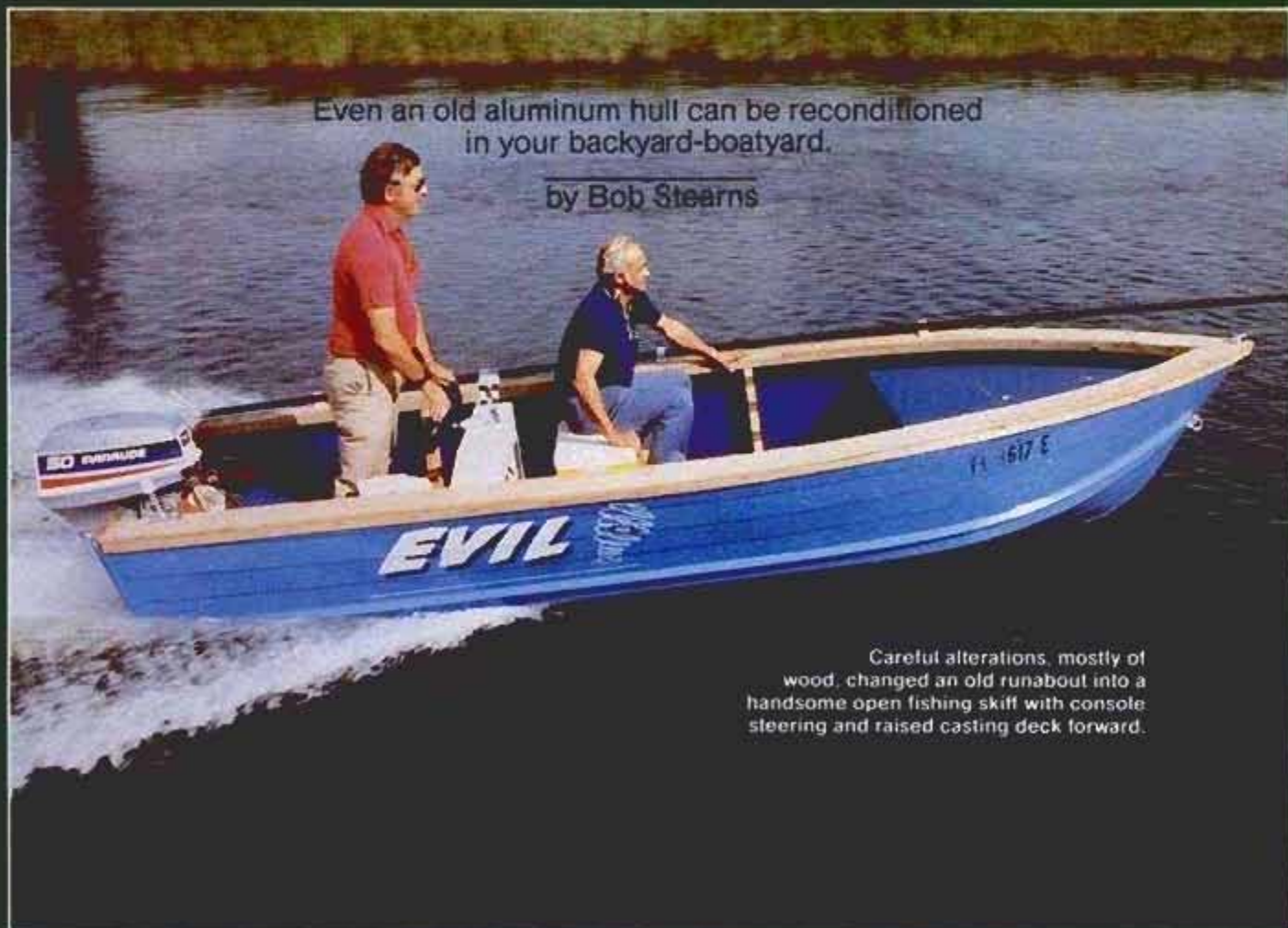


ABM—The initials stand for antiballistic missile and it's up to you to shoot down incoming ICBMs. It's like the arcade game *Missile Command* (Muse Software).

From banged up to beautiful

Even an old aluminum hull can be reconditioned in your backyard-boatyard.

by Bob Stearns



Careful alterations, mostly of wood, changed an old runabout into a handsome open fishing skiff with console steering and raised casting deck forward.

Fixing up a used boat is a great way to get around the cost of today's top-quality new ones, but working with a metal hull may scare you off. Fortunately, it scares a lot of would-be owners and you may find a good bargain as a result. Even a boat that looks far gone can be brought back to life, and you may find that many woodworking skills will help you rejuvenate a craft made of aluminum.

Ned Segar, a custom-fishing-rod builder in Miami, needed a first-class fishing machine to test some of his rods but didn't want to sink a lot of money in it. First he searched through local boatyards, but finally found just what he was looking for—a 16-foot aluminum hull that was still sound—in the back yard of a

(Please turn to page 104)



With old foredeck removed to strip craft to bare hull (above), new decking and gunwales returned stiffness and strength to the boat. Attwood marine hardware, Teleflex steering, Soldek carpet add to new look.



NEW SURVIVAL GEAR FOR

The most up-to-date outdoor equipment is capable of double

by Angus Laidlaw

A hurricane, blizzard, power failure or other disaster can take away civilization all of a sudden, even today, and put us in a life-or-death situation. Emergencies often arise with little warning, but fortunately there are a number of new ways to prepare for them in advance. Products developed for everything from backpacking to space exploration are being adapted for

household use, as homeowners store away supplies to see them through anything from a blackout to an earthquake.

Basic needs may include food, water, shelter and protection, communication and sanitary facilities. Most modern homes already have some survival gear on hand, although you don't call it that. Bath-tubs, buckets and plastic garbage cans can be washed out and used for emergency water storage. Refrigerators and food freezers keep their

cool much longer if packed full and kept closed. Add dry ice if you have time and if it's available. Warmth can be supplied with a fireplace, or camp heater. Even candles supply essential light and enough heat to warm some foods when the power goes out.

When it's cold outside, the important consideration is *keeping* warm; it's much easier to retain heat than to try to rewarm a home. The new outdoor sporting equipment—ski clothes, down vests, thermal under-



EMERGENCIES

duty indoors, as well.

wear, insulated boots, battery-heated socks and mittens—will all help. Recently developed synthetics such as Thinsulate, PolarGuard and Hollofil insulate clothing to help retain heat, and the metalized space blankets also retard heat loss. An outdoorsman's snow-country clothing makes for welcome indoor wear when the heat goes off.

Don't overlook your car outside, either, when electricity fails at home. As long as it isn't parked in a

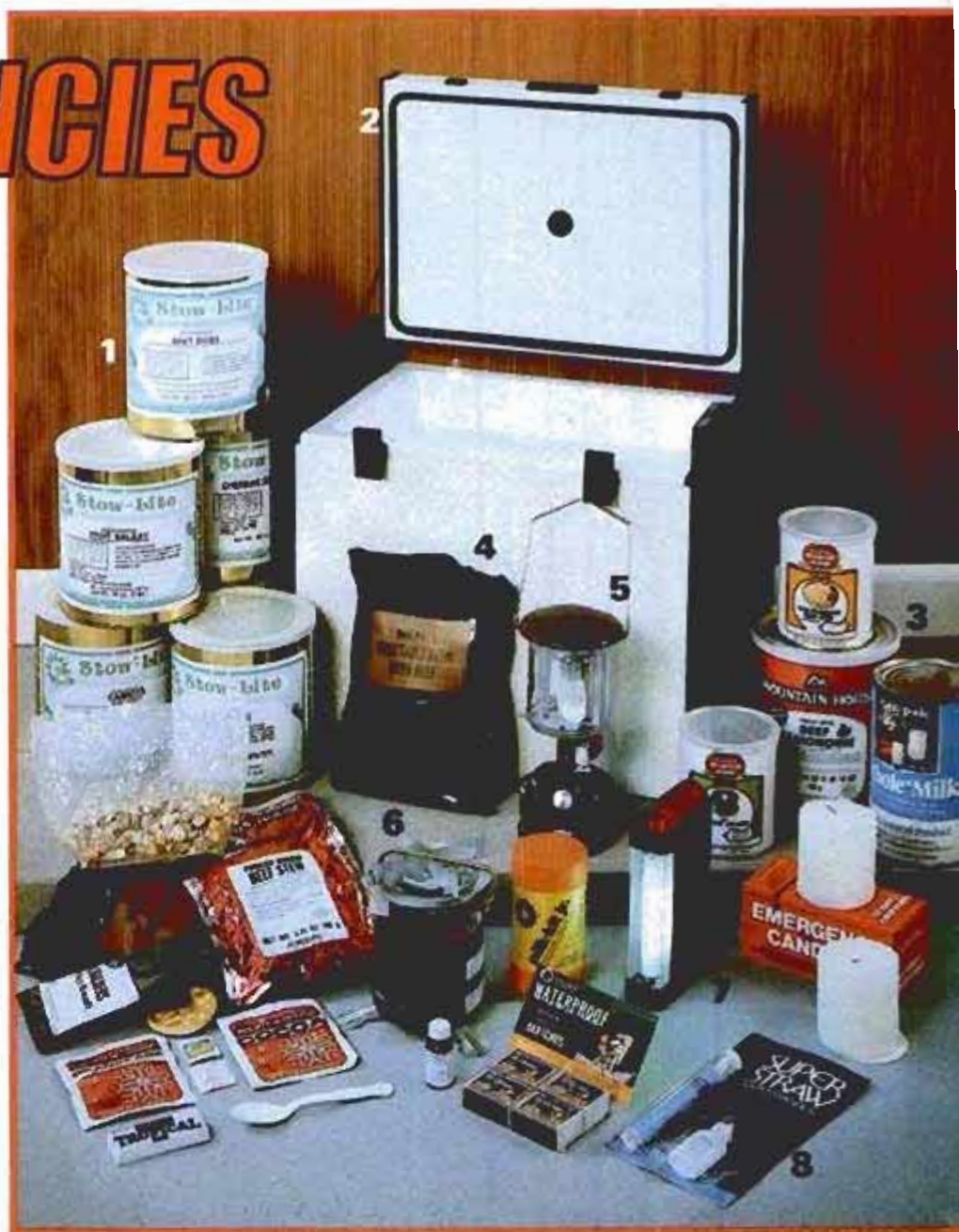
(Please turn to page 192)

New home-and-highway aids (left):

1. SOS rescue unit combines 10 tools; one can cut car metal.
2. Pak-Kit contains shelter tent, flare, matches, cord, tape, blade.
3. GE HELP! CB plugs into car cigaret lighter to transmit.
4. Combo strobe/fluorescent light from Yolinda International gives illumination or red-flash warning.

Storage supplies (right) include:

1. Dehydrated bulk foods from Stow-A-Way Industries.
2. BILan 25, a 12/115/220-volt refrigerator.
3. Canned milk.
4. Packaged meals.
5. Coleman Peak 1 mini-lantern.
6. Coleman backpack stove.
7. Waterproof matches and oversize candles.
8. Super Straw for water purification treatment.



Take-down guns to store for emergency include: 1. Charter Arms' new Explorer II .22 autoloader pistol with three interchangeable barrels. 2. The Charter AR-7 Explorer carbine .22 (assembled above) comes apart to fit barrel and receiver into waterproof stock. 3. Skachet is a knife-hammer-hatchet head.

PM photos: Steve Fay

Match your tackle for

Learning to mate the right reel to rod, rod to line and line to lure will net you bigger catches.

by Homer Circle



The most common fishing error usually is made when a fisherman buys his first outfit. He selects one rig, expects it to be the answer for all his fishing needs, and his catching suffers as a result. It's something like a farmer who looks to one vehicle for plowing fields, hauling supplies,

baling hay and taking the family to church on Sundays. It just doesn't work.

Trying to find one do-it-all fishing rig is much the same. The proper approach, instead, is to get the outfit which will do the best job of reaching and enticing the fish you plan to catch. Let's

more fish



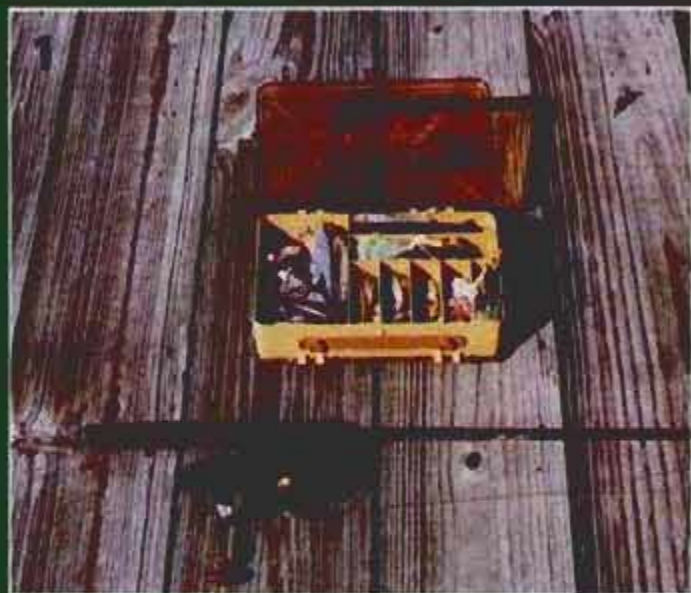
After picking one of the three rigs (at left) to handle the lunkers he's looking for, fishing ace Homer Circle wades in (above) to prove it's the combo to match the catch.

PM photos: Skip Gombert

break this down into three categories that will work for tyros and experienced fishermen alike.

This involves three different rigs, mainly because of the assorted sizes and habitats of the most popular fish species around the country. These are the smaller

(Please turn to page 189)



- 1** Open-face spinning reel is a favorite for medium-sized fish. Rod strength and action must match line and lure.
- 2** Bait-casting, revolving-spool reel takes some skill to handle, but it can fight fish of varying size and weight.
- 3** Spin-casting, closed-face reel may be easiest for young and beginning fishermen. It also is available as an ultra light.



Build this greenhouse with a cold frame and extend the growing season

Master gardener Dick Raymond shares the plans for his greenhouse/cold frame with PM readers.



You can sow the seeds for your vegetable garden early in the season inside this greenhouse. You can then harden the seedlings by moving them to the attached cold frame, before planting them outdoors when weather permits. The greenhouse/cold-frame combination lets you enjoy juicy red tomatoes, cucumbers, squash and other vegetables fresh from your garden much earlier than they usually ripen.

The combination structure allows master gardener Dick Raymond to start his planting season to ensure a good yield early—and throughout the planting season. The structure, built of readily available parts, can also be used to maintain flowering plants and lush foliage during the coldest winter months, when you'll

PHOTO: GEORGE ARZANA



Greenhouse/cold-frame addition is built of stock parts, except for window next to the door and a duplicate on opposite wall; these can be made by a glazier. Dick Raymond shows off seedlings in the cold frame (below) where they harden before outdoor planting.



be most grateful for the greenery.

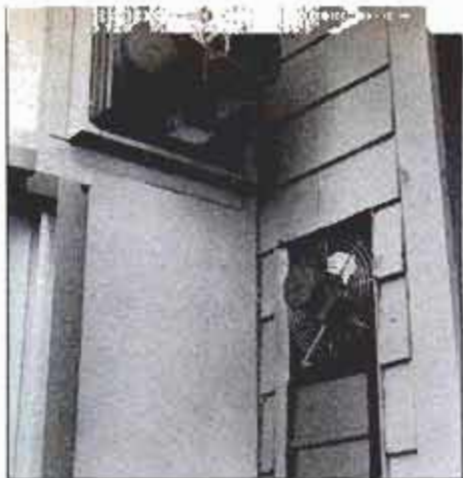
A system of thermostatically controlled exhaust fans vents air from the greenhouse to the house and outdoors. This provides the house with solar heat on sunny days and guards against the greenhouse overheating. These shutter-mounted exhaust fans are readily available; Dick used Dayton fans by W.W. Grainger Inc., 5959 Howard St., Chicago, Ill. 60648.

For good heat retention, the greenhouse is glazed with 1-in.-thick double-glazed, patio-door replacement panels. Those on the roof are pitched at an angle to gain maximum solar benefits in the winter

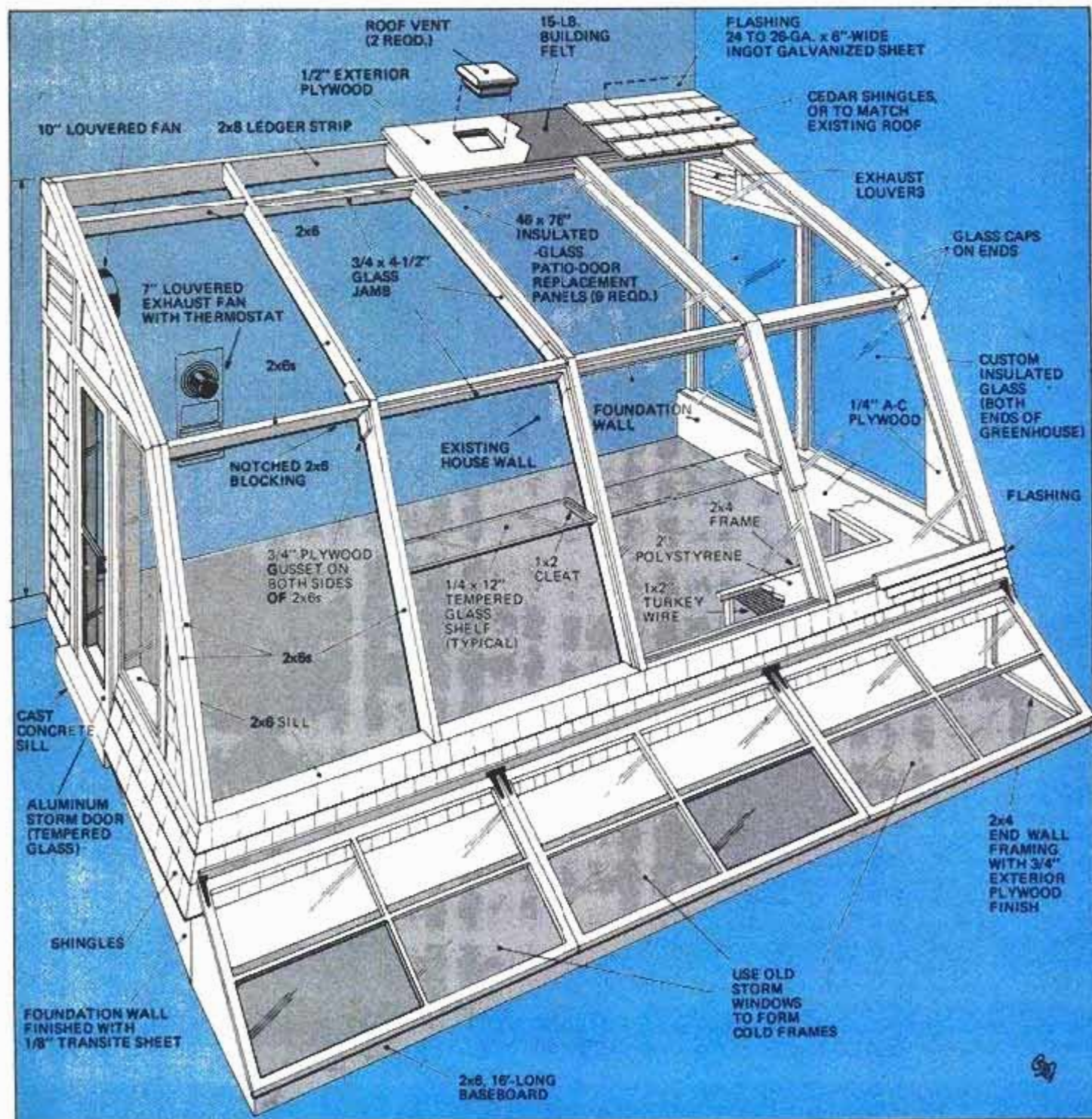
when the sun angle is low. The foundation is insulated with 2-in. Styrofoam as shown.

After determining the greenhouse location, lay out the exterior building lines using mason's line and pointed stakes; check corners for square. Determine the depth of the frostline for your area; it will be included with other necessary information in local building codes.

Excavate for the footings and foundation walls. You probably won't need forms to pour the footing. Simply dig a neat trench to required depth and width. The following foundation block wall is insulated, then covered by transite board.



Fan at left draws cool air in; stacked pair at right (bottom unit not visible in photo) are thermostatically controlled to move air from greenhouse to house on demand.





Corner detail of the greenhouse shows the sill plate, 2x6 stud and sheathing. The plant flats rest on removable ledges.



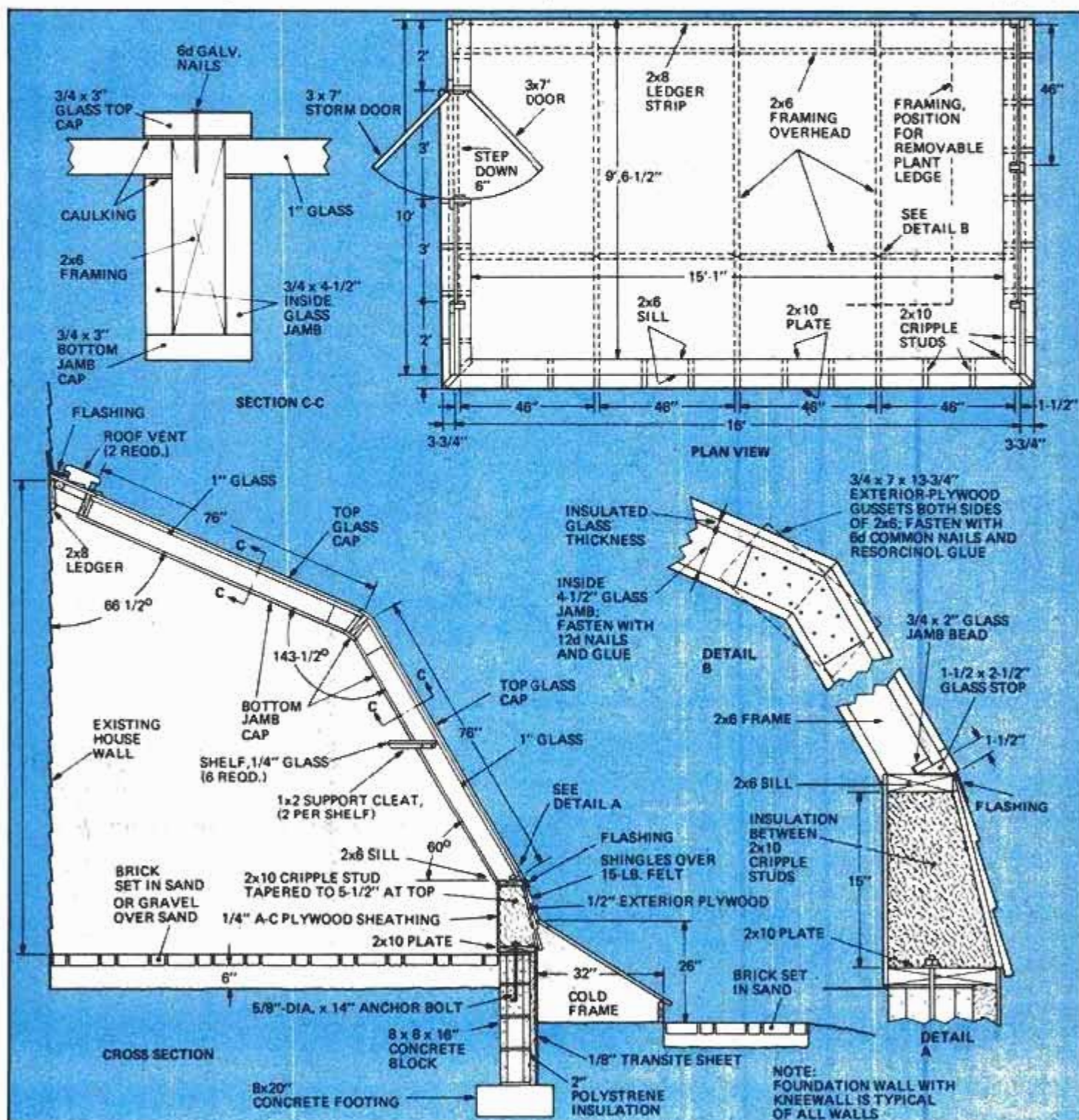
Double roof vents draw off warm air from the greenhouse by convection. Both are sealed in the winter to prevent heat loss.

The greenhouse floor consists of 6 in. of sand covered with 2 in. of gravel. If you prefer, install a brick-in-sand floor covering. Just make certain that the 6-in. layer of sand is well compacted at the correct elevation. The sill is sealed and anchored to the cement blocks.

The greenhouse is framed with 2x6s, using conventional framing methods. Later, the framing members are clad with 3/4-in. pine stock. Gaskets are used on both sides of all sidewall roof joints.

Since the roof pitch may vary from that shown, complete all of the framing before measuring the two open-

(Please turn to page 149)



1



Contained gardens—what a way to grow

From modest to fancy, these four structures define your garden area and add visual interest.

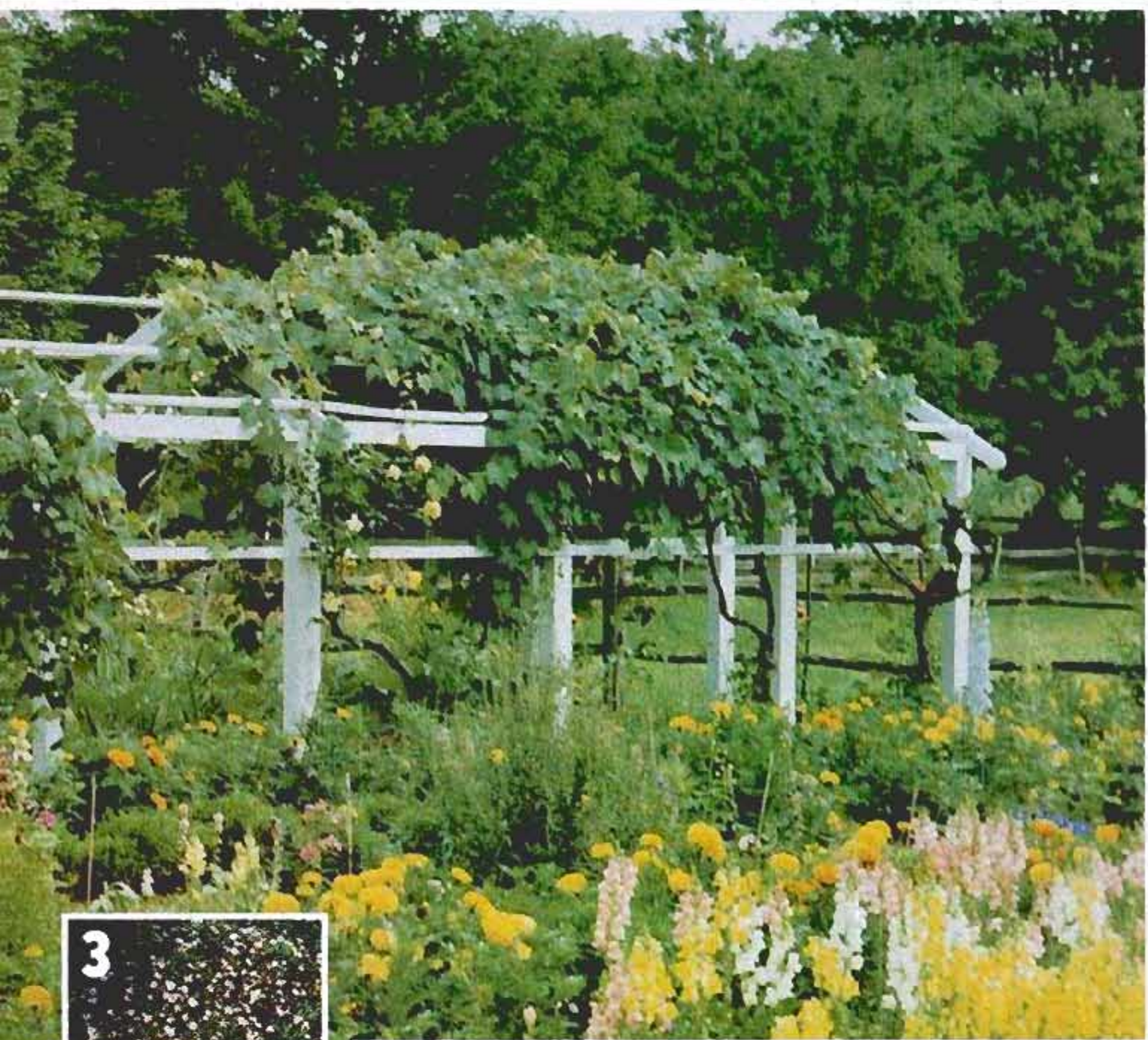
by Penelope A. Spangler
ASSISTANT HOME AND SHOP EDITOR

The arrival of warm spring weather gives us the opportunity to spend time outdoors, planning and planting gardens and getting the yard in shape for summer. We've selected four diverse outdoor garden structures that can contain your plantings to make them serve as focal points.

Our arbor (project No. 1) supports climbing vines and provides a shady

2



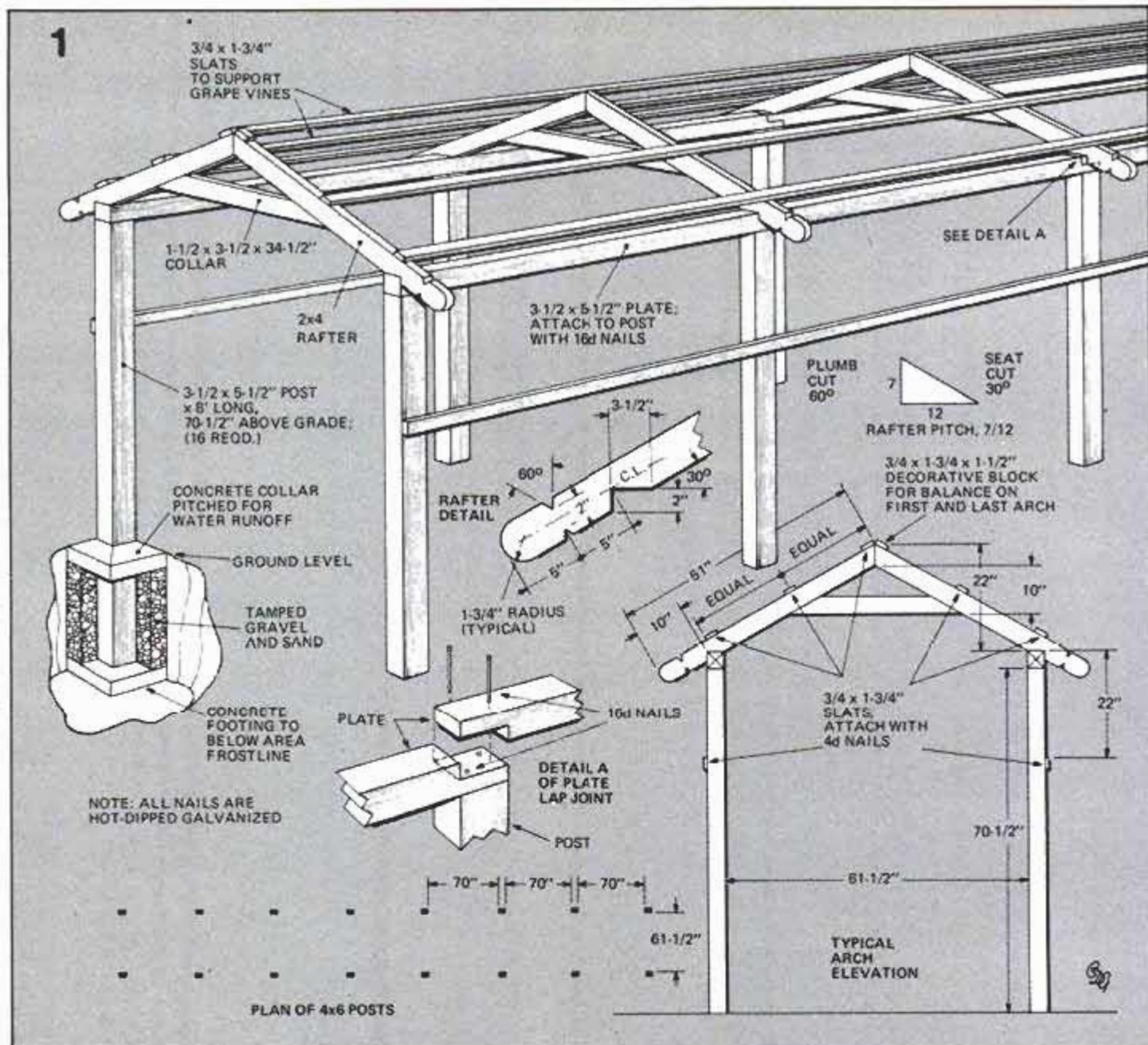


1 Small, yet grand, this arbor stands just 8 feet high.

2 Blooming window box adds color in and out-of-doors.

3 Logs or telephone poles are good edgers on a slope.

4 Railroad ties are used to frame raised planting beds of contemporary garden.



retreat for back-yard get-togethers. Window boxes are an all-time favorite; our redwood version (project No. 2) has a scalloped edge at the front. Telephone poles or treated logs installed on sloping land (project No. 3) serve to contain both plants and soil. Project No. 4 features railroad ties framing raised planting beds of enriched soil.

1 Arbor

Since this arbor stands just 8 ft. high at the ridge, if you grow grapes on it you can harvest them without the need for a ladder.

Because of its ability to resist damage from insects and earth, pressure-treated wood is the suggested material for building the arbor. Or you can use conventional

lumber and treat it with a commercial preservative. Follow the directions carefully if you choose this route. Allow the lumber to dry completely after such treatment, then finish it with a quality, water-base exterior paint.

Set the posts securely into the ground on concrete footings as shown in the drawing (above). Check each post with a spirit level to make certain it is plumb. Hold posts true using diagonal braces nailed to ground stakes, while you backfill the holes with crushed gravel. Finish up by pouring concrete collars with pitched shoulders for water runoff.

Join the top plates using lap joints (detail A). Attach the plates to the posts with 16d nails. Fasten the horizontal runners, one on each side of the arbor, to the posts with 4d common nails. (If vines are hefty, use 6d common nails.)

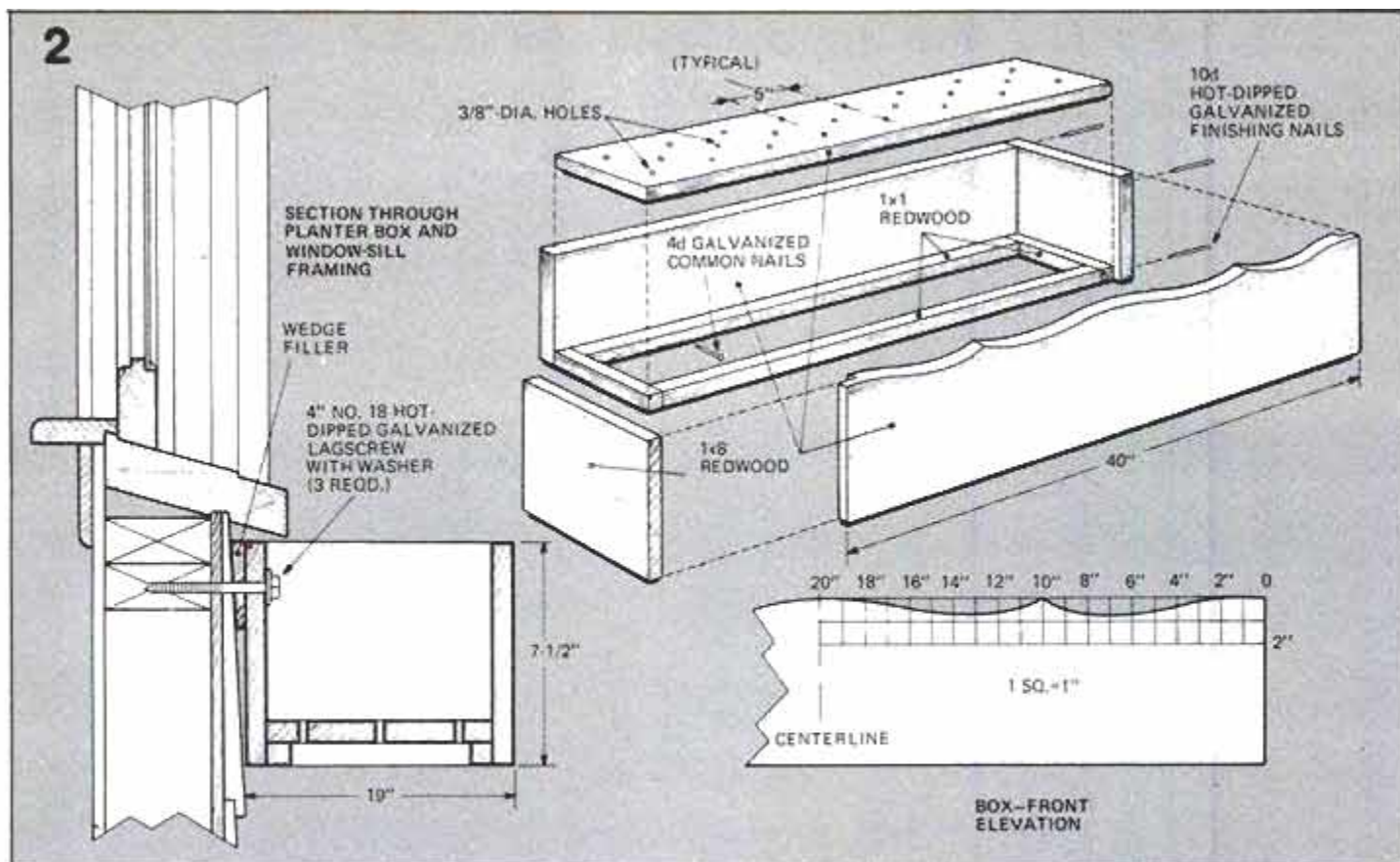
The rafters rise 7 in. vertically in each 12 in. of horizontal run ($7/12$ pitch). Lay the first rafter across a pair of sawhorses and lay out for the ridge and bird's-mouth cuts, using the drawing as your guide. Since these rafters will be exposed, make the cuts using either sabre or hand crosscut saw. Use the sabre saw to make the decorative tail cut.

Using the first rafter as a template, mark and cut the second rafter. Position the two rafters on the ground to check for fit and pitch. Adjust the cuts, if necessary.

Now, using the first-cut rafter as your template, mark all remaining rafters to be cut.

Repeat the procedure for the collar beams. Cut the first one and check it for fit on a pair of rafters. When you're satisfied with the length and cuts, you can use the first collar beam as the pattern for cut-

Photos: project No. 1: Molly Adams; projects Nos. 2-4 and log planter: Elvin MacDonald; technical art: Carl DeGroot



ting the remaining collar beams.

For the next part of the job, you will need a helper. Assemble all the rafter-collar beam units on the ground at one time. Then hoist them, one at a time, into position on the arbor top plates. Align each triangle carefully and, while one person holds it in place, the other should secure the unit to the top plates using 16d common nails (toenailed through rafter sides into the plates).

To prevent the triangular section from falling over—remember, at this stage it is held only by those nails at the plates—stand a temporary 2x4 brace alongside each unit and tack-nail it to one of the rafters near the ridge. The bottom end of the brace should be tack-nailed to a stake in the ground.

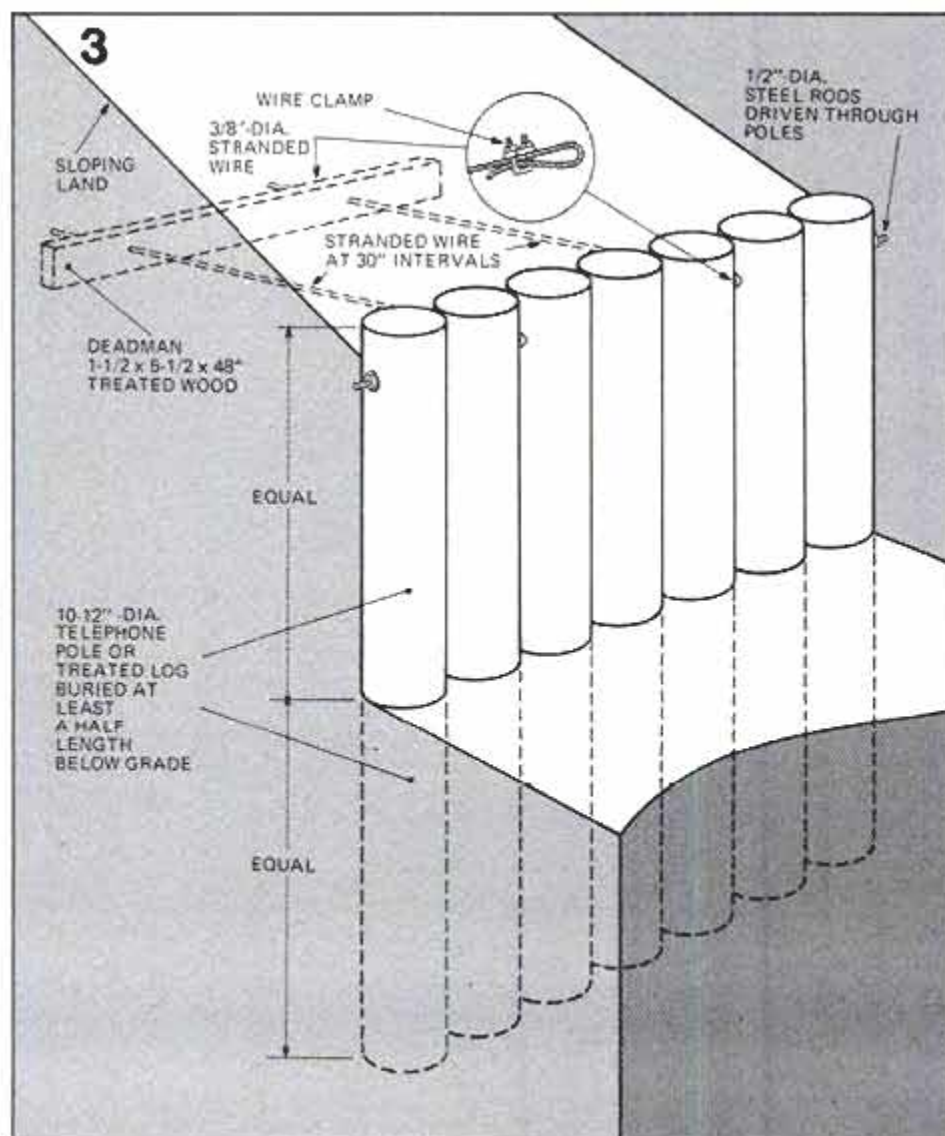
Once the vine-supporting slats are in place, the unit will be tied together and the temporary braces can be removed. Cut and fasten the arbor slats to the rafters with 4d nails (6d, if those vines are heavy) before positioning the arch. The slat members are just butted together; all such joints should be over a rafter.

2 Window box

This redwood window box is a super-easy project. Parts are simply butt-joined, except for the front, which has rabbetted ends to accept the sidepieces.

You can lower the cost of

(Please turn to page 184)



A master gardener's plan for a bountiful harvest—with very little work

Mulching, watering and pest-control systems mean practically no work for you.



LETTUCE
STRAWBERRIES
PEPPERS

Here's a tempting sampling of the harvest from my vegetable garden. Highlights include: giant two-pound tomatoes and ripe spaghetti squash, which are \$2.50 each at markets.

by Derek Fell

PM photos by the author

How would you like to grow a vegetable garden in which there are no weeds and no serious pest damage; where there is no digging after the first year and no manual watering? Yet, despite the minimal effort, the garden is highly productive, beginning early in the season.

I have tended such a garden the past three years. A system of mulching that utilizes black plastic prevents weeds from growing. After the first year's digging to make raised growing rows, I simply replenish the soil each year with compost. Instead of hosing or sprinkling, inexpensive drip irrigation makes watering automatic and effi-

cient. Organic pest controls keep pests away.

The garden shown is 15 x 41 ft. You can dig your own site in spring and divide it into 2-ft.-wide by 4-to-5-in.-high raised rows, with 1-ft.-wide walkways. To raise the rows, rake the soil from the walkways or use compost. Level them on top.

Midway at the garden edge lay two 150-ft. lengths of polyflex drip irrigation hose with 2-ft. emitter spacings, along the middle of the rows, in opposite directions, snaked up one row and down the next. Connect the two hoses to a water spigot with a Y-valve. Every inch of row can be watered in 30 minutes.

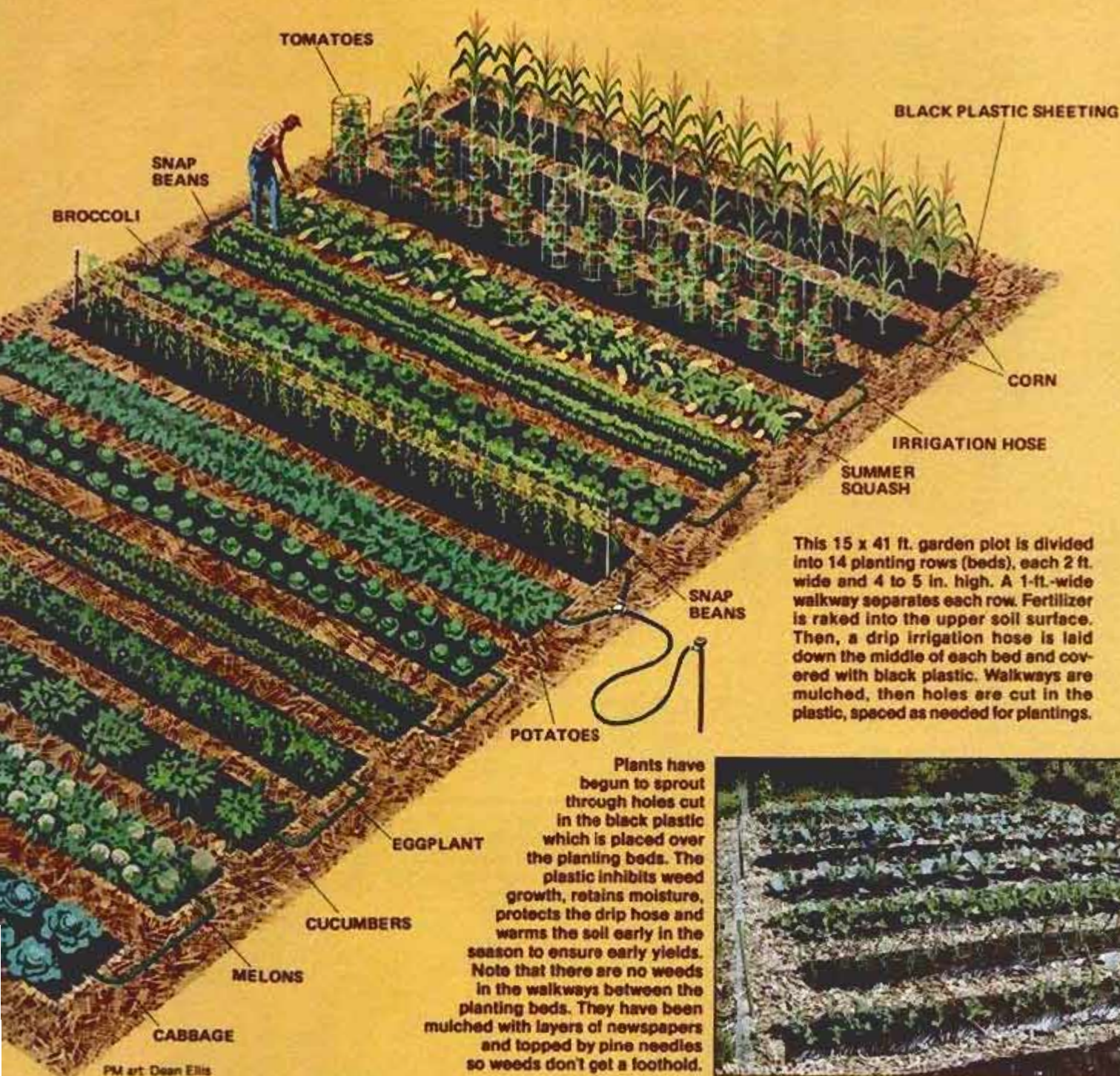
Next, cover the raised beds with 3-ft.-wide rolls of black plastic, leaving

a 1- to 2-in. lip along the walkway for soil anchorage. On the walkways place layers of newspapers, then pine needles, to form an impenetrable, attractive mulch. Cut holes in the plastic for seeds and transplants.

I leave the plastic in place all winter; it warms the soil early and prevents insects. In spring, replace the plastic after conditioning the soil.

To control pests, I use a rotenone-pyrethrum or a diatomaceous earth-pyrethrum mixture insecticide. Both are made from natural compounds that leave no residue. Apply insecticide early to keep pests at bay. Also,

Derek Fell is the author of *Vegetables—How to Select, Grow and Enjoy*, to be published this spring for \$8.95 postpaid by H. P. Books, Box 5367, Tucson, Ariz. 85703.



This 15 x 41 ft. garden plot is divided into 14 planting rows (beds), each 2 ft. wide and 4 to 5 in. high. A 1-ft.-wide walkway separates each row. Fertilizer is raked into the upper soil surface. Then, a drip irrigation hose is laid down the middle of each bed and covered with black plastic. Walkways are mulched, then holes are cut in the plastic, spaced as needed for plantings.

Plants have begun to sprout through holes cut in the black plastic which is placed over the planting beds. The plastic inhibits weed growth, retains moisture, protects the drip hose and warms the soil in the season to ensure early yields. Note that there are no weeds in the walkways between the planting beds. They have been mulched with layers of newspapers and topped by pine needles so weeds don't get a foothold.



Three garden rows (foreground) are already covered with plastic, and adjoining walkways are mulched. Drip irrigation hose is still visible in the remaining rows.

clean up dead vegetation in fall to prevent pests from wintering.

To maintain nutrient levels, I use compost with bone meal added. For tomatoes, peas and heavy feeders, I also use liquid fertilizer. **FM**

GARDEN EXPENSES, BASED ON THREE YEARS OF HARVESTS

Drip irrigation hose *	
30 ft., \$40 amortized over three years	\$13.33
Siamese shutoff valve, \$2.95 over three years	.98
Black polyethylene plastic, 1 1/2 mils x 3 ft. x 300 ft.	12.00
Granular fertilizer, 10-lb. bag	3.95
Foliar fertilizer, 1-lb. bag	4.25
Granulated limestone, 10-lb. bag	5.00
Tilling, \$20 over three years	6.67
Seeds	23.87
Quart sprayer, \$15.75 over three years	5.25
Tomato towers, \$21 over three years	7.00
Chicken-wire fence around entire garden, 120 ft., \$15 over three years	5.00
Total expenses per year:	\$87.30

* International Irrigation Systems, Box 160, 1555 Third Ave., Niagara Falls, N.Y. 14304

APPROXIMATE GARDEN YIELDS

Bed 1—Sweet corn, 50 ears @ 12¢/ear	\$ 6.00
Bed 2—Sweet corn, 50 ears @ 12¢/ear	6.00
Bed 3—Tomatoes, 200 lbs. @ 59¢/lb.	118.00
Bed 4—Summer squash, 190 lbs. @ 50¢/lb.	95.00
Bed 5—Snap beans, 36 lbs. @ 79¢/lb.	28.44
• Lettuce, 38 heads @ 79¢/head	30.02
Bed 6—Broccoli, 24 heads @ \$1.00/head	24.00
• Brussels sprouts, 72 pints @ 75¢/pint	54.00
Bed 7—Snap beans, 36 lbs. @ 79¢/lb.	28.44
• Snap peas, 25 lbs. @ 79¢/lb.	19.75
Bed 8—Potatoes, 86 lbs. @ 35¢/lb.	30.10
Bed 9—Lettuce, 38 heads @ 79¢/head	30.02
• Cauliflower, 24 heads @ \$1.00/head	24.00
Bed 10—Strawberries, 36 pints @ 90¢/pint	32.40
Bed 11—Peppers, 24 lbs. @ 50¢/lb.	12.00
Eggplant, 50 lbs. @ 50¢/lb.	25.00
Bed 12—Cucumbers, 84 @ 45¢ each	37.80
Bed 13—Cantaloupes, 42 @ \$1.00 each	42.00
Bed 14—Cabbage, 24 heads, 6 lbs each, 20¢/lb.	28.80
Chinese cabbage, 24 heads @ 79¢/head	18.96
Spaghetti squash (growing on fence) 35 at 5 lbs. each @ 50¢/lb.	87.50

TOTAL YIELD: \$775.23

EXPENSES: \$87.30

* Second Planting

PROFIT: \$687.93

New products for



The Rain Bird Model 15103 is an underground impulse sprinkler that can spray a full circle or any part of a circle in radii of 20 to 37 ft. According to the maker, such large coverage reduces the number of spray heads needed and the amount of trenching to be dug by as much as 45 percent. Because the sprinkler head pops up 3 in. when the water is turned on, this unit can be installed far enough below ground level to avoid damage from lawnmowers. Made by Rain Bird Sprinkler Manufacturing Corp., 7045 North Grand Ave., Glendora, Calif. 91740, it's available for \$19.95 at home and garden centers.

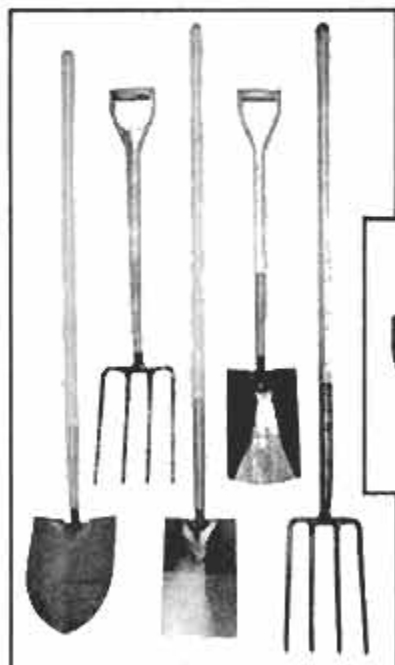


The Model 650 is a new, diesel-powered compact utility tractor made by Deere and Co., John Deere Rd., Moline, Ill. 61265. It has eight forward and two reverse speeds and 11.3-in. ground clearance. Its two-cylinder, water-cooled, 52.1-cu.-in. engine delivers 14.5 hp at the attachment's power takeoff. Dual brake pedals, 12-volt starting system and 6.2-gal. fuel capacity are standard; mechanical front-wheel drive and power steering are optional. The tractor lists for about \$5,700 at John Deere dealers.

A new, lightweight contractor's wheelbarrow, called the Tough N' Lite, is now available at hardware stores and home centers. Made by Kelley Manufacturing Co., Box 1317, Houston, Tex. 77001, it weighs 49 pounds and has a heaped capacity of 5.75 cu.ft. The tray is made of cross-linked polyethylene; the undercarriage is of heavy-gauge steel attached to 60-in.-long hardwood handles. With a 16-in.-dia. pneumatic tire mounted on ball-bearing hubs, the product sells for about \$130.



The Soil-Warming Cable is a 110-volt, waterproof electrical cable that keeps soil in transplanting flats at a constant temperature of 70° F. According to the maker, plants started and grown in warm soil will be more resilient when moved outdoors. The cables are sold in 12-, 24-, 36-, 48- and 60-ft. lengths for soil areas of 2, 4, 6, 8, and 10 sq. ft. (2 to 3 in. deep). They're \$8 to \$13 at home and garden centers or from the manufacturer: Easy-Heat Wirekraft, U.S. 20 E., New Carlisle, Ind. 46552.



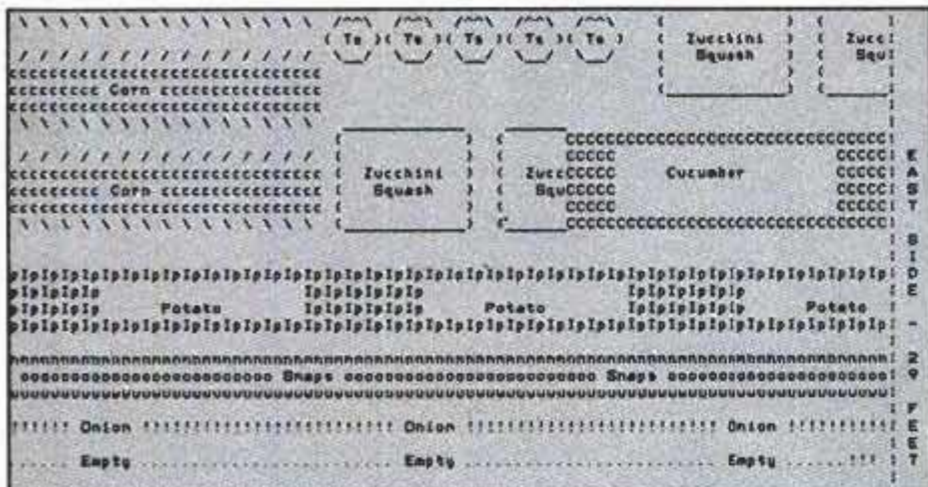
A wide range of quality lawn and garden tools is available from Smith and Hawken Tool Co., 68 Homer, Dept. P44, Palo Alto, Calif. 94301. Included are spades, rakes, hoes, shovels, pruners and more. All blades and forks are hand-forged from high-quality steel, then mounted on straight-grain ash handles (inset). The tools shown are (left to right): round-point shovel (\$26.95); heavy-duty fork (\$39.80); long-handled nursery spade (\$46); garden spade (\$32.80); and solid-strapped garden fork (\$46). For a catalog and complete price information, send \$1 to the above address.

lawn and garden

Haul-In-One is a 44-lb., collapsible garden cart and hand truck, rolled into one. It's made of 18-gauge steel and painted with red epoxy paint to resist corrosion. The frame measures 16 x 21½ x 42 in. when folded; when open, the 16-in.-wide bed extends to 23½ in. (The front upright frame shown in near-right photo is detachable.) The Haul-In-One can carry 400 pounds and is \$99 at hardware stores and home centers. It's by Black and Decker Inc., 515 Glebe Rd., Easton, Md. 21601.



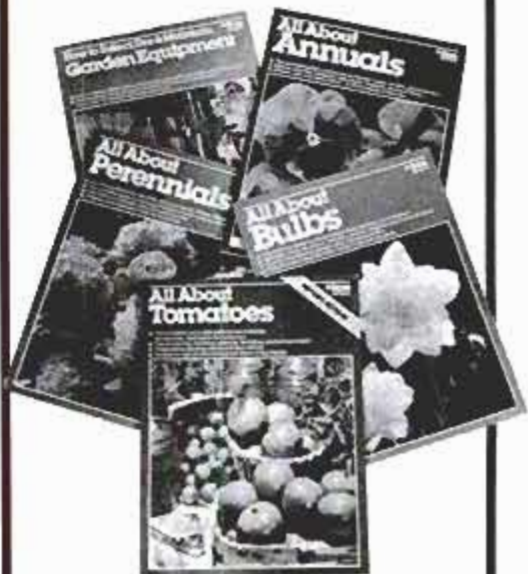
A self-propelled lawn vacuum and blower is now available in one machine made by The Yard-Man Co., Box 36900, Cleveland, Ohio 44136. Called the Duo-Flo Model 24687, this 5-hp unit has a 30-in. cleaning width and a 5.5-bushel bagging capacity. It rides on two 12-in.-dia. rear wheels and one 5-in.-dia. front caster. The machine costs about \$700 at home centers; a manual push model runs about \$100 less.



The Smarter Garden Plan is a computer analysis of garden organization and planting that is adapted to a specific gardener's area, climate and altitude. It's derived from a questionnaire on garden size and shape, soil type, weeding methods and desired vegetables. The plan gives a planting timetable and a computer graphic (above) that shows where to plant each vegetable in your plot. The analysis is \$3.95 from Northrup King Co., Box 1615, Dept. PM 382, Minneapolis, Minn. 55440. Write for free questionnaire.



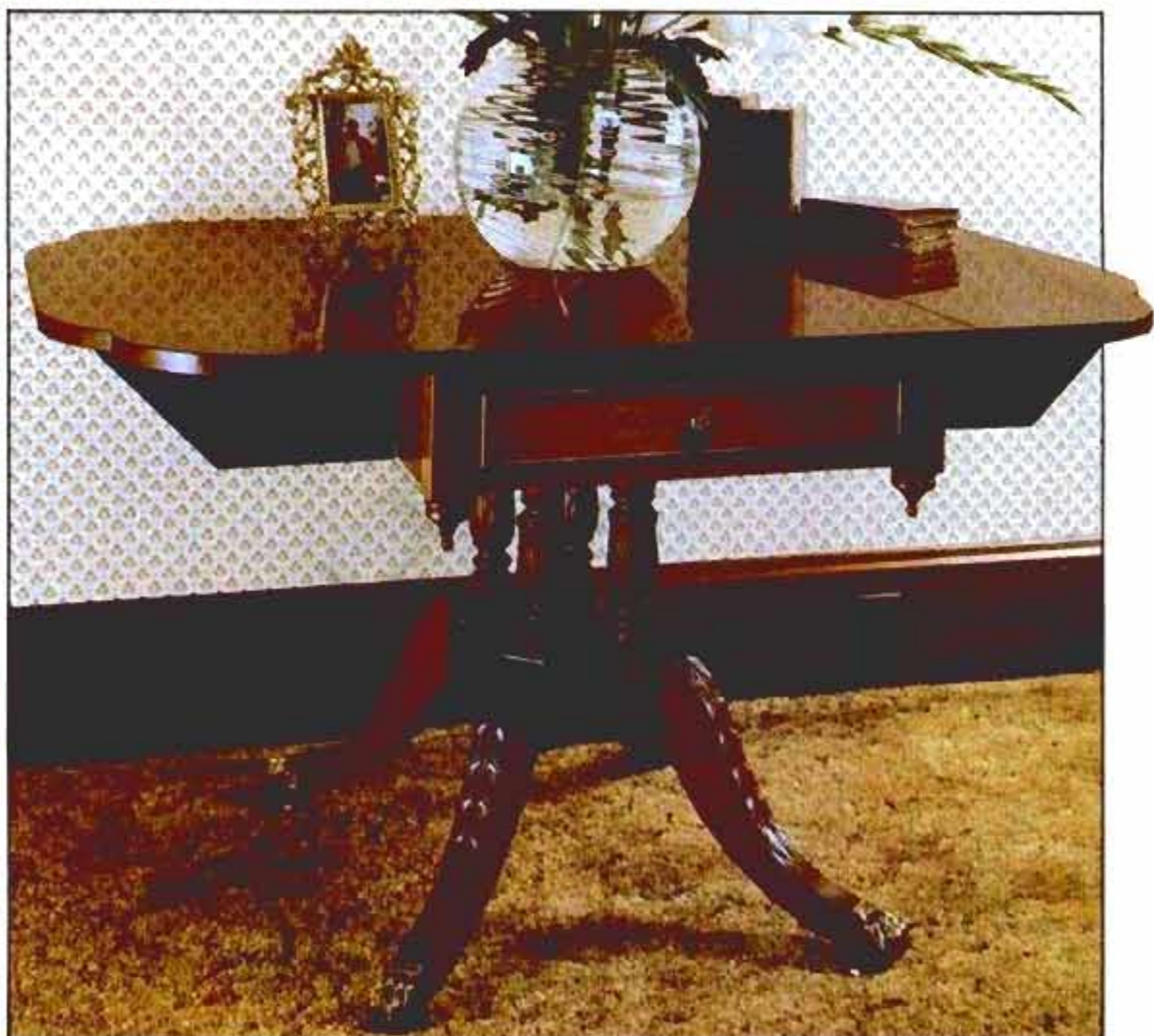
The Multi-Tote is a new, lightweight carryall made of polished aluminum and high-impact plastic. The upper bin measures 3½ x 11 x 13 in. and the waterproof drawer measures 3 x 11 x 13 in. The handles extend 12 in. above the bin and are equipped with a handle brace—so axes and mauls can be carried upright—and a handgrip for carrying comfort. The product weighs 2 pounds and, according to the manufacturer, its bright red and yellow coloring makes it easy to spot if you're in the woods or working in heavy brush. The tote costs about \$19.95 and is made by Namar Enterprises Inc., Box 81, Dept. PM 382 Concord, Ont. L4K 1B2. For information on the location of the nearest distributor, write directly to the manufacturer.



Five new books that cover a wide range of gardening concerns—from proper planting and cultivating of garden plants to care and maintenance of garden equipment—will be available this spring. Published by Ortho Books, Chevron Chemical Co., 575 Market St., San Francisco, Calif. 94105, the titles are *All About Bulbs*, *All About Annuals*, *All About Perennials*, *All About Tomatoes*, and *How to Select, Use and Maintain Garden Equipment*. Each book is \$5.95 at bookstores.

(Please turn to page 186)

A craftsman's prize-winning Duncan Phyfe table



Finely and lovingly handcrafted, this reproduction of a Duncan Phyfe drop-leaf table is the prize-winning product of 17-year-old woodworker Joseph Iannuzzi. Its solid African mahogany construction, attention to ornate detail and excellent craftsmanship reveal skills far beyond his years. The close-up photos at left and top left prove the point eloquently: 1. detail of leaves on leg; 2. columns between the base block and tabletop; 3. base block, also intricately carved; 4. hand-cut dovetail drawer joint. The elaborate table project took young craftsman Iannuzzi approximately four months to complete, from start to finish.

This beautiful reproduction was the grand prize winner in Stanley Tools' annual woodworking contest.

by Harry Wicks HOME AND SHOP EDITOR
and Steve Willson ASSISTANT HOME AND SHOP EDITOR

For the second time, *Popular Mechanics* is pleased to feature a project by one of the winners in the national contest sponsored by Stanley Tools, the well-known hand-tool manufacturing firm. The contest is designed for students in

grades 9 to 12. To enter, a student under the guidance of his or her woodworking instructor must design, build and finish a piece of fine furniture. In addition, each contestant is required to submit plans, along with a materials list and photographs of the finished project.

From these entries, finalists are selected and their entries are carefully crated and shipped to Stanley's national headquarters in New Britain, Conn., for final judging.

This time, the judges awarded the grand prize of \$2,000 in savings bonds to Joseph Iannuzzi, a 17-year-old senior at Everett (Mass.) Vocational High School. His craftsmanlike reproduction of a

Duncan Phyfe table reflects both his hard work and the dedication of his shop instructor. (For more details on the Everett curriculum, see *Everett Woodworking Program*, page 144.)

The table took Joseph approximately four months to complete. He took no shortcuts, adhering faithfully to the original that he was copying.

Following are the complete plans and building instructions for this fine piece of furniture.

Base block, legs and pedestals

Start by rough-cutting the stock. The African mahogany used on the original was rough-sawn on all surfaces and edges. If you use similar material, it must be dressed first. Once the stock is surfaced on all four sides, glue up the base block, tabletop, drop leaves and cross support and let them dry overnight. Remove all glue squeeze-out the next day with a sharp chisel or cabinet scraper. Don't wipe off the excess glue when it's still wet. This drives the glue into the wood grain, where it dries and seals the wood pores. If you're planning to stain the piece like the one shown, such glue-impregnated areas won't take the color the same way the adjacent wood does.

Use the grid on page 143 for reference, and cut the base block and legs to size and shape using a band saw. Next, cut the decorative leaf designs in all five pieces.

The two fluted carvings on the base block are tricky, because they're carved on separate panels, then glued into recesses cut in the ends of the base block. The idea is to avoid cutting these designs in the block's end grain which is difficult and unattractive.

Cut the base block recesses on a shaper and the fluted inserts on a band saw. (The appropriate arc is given on the drawing.) Carve the flutes by hand with a gouge and finish-sand the panels before gluing them in place. Then complete the base block by cutting the quarter-round step molding on the top edge with a shaper or router.

Next, turn the pedestals to size on a lathe using the grid for reference. Carve and finish-sand the leaf designs in each while it's still mounted in the lathe. You can stabilize the turning by clamping the headstock end of the pedestal to the lathe bed. Then turn the drop-leaf stops and set them aside.

Lay out the base-block dowel holes for the legs and pedestals, using the dimensions on the drawing. Position each leg and pedestal on the base block and trace their outlines. This will allow minor adjustment to the placement of the dowels, so the best appearance and fit can be assured. Then bore the dowel holes in all parts, taking care not to go through the legs when boring the upper dowel holes. Test-assemble all parts, but don't glue and clamp them together yet.

To begin making the table case, cut the pivot blocks and leaf supports to size and lay out the matching finger joints. Cut these joints with a band saw, then clamp each pair together and counterbore the pivot-pin clearance hole through both parts at one time. Glue, screw and clamp the pivot blocks to the case sides.

The pivot pin Joseph used was made by another student in the school's metalworking program. But you can easily fabricate one of your own by getting a long stovebolt or carriage bolt and cutting off its threaded

section. Then grind off part of the head, so the lip will conform to specifications.

Cut the remaining parts for the table case and the drawer frames to size and assemble them in the following manner (see drawing Detail 5):

- Join the sides and ends of both upper and lower drawer frames, using a mortise and tenon at each corner. Glue, clamp and let the frames dry overnight. Make certain assemblies are absolutely square when clamped.
- Cut an edge rabbet on both sides of each frame.
- Cut two grooves in each case side to receive the rabbeted drawer frames.
- Use a backsaw to cut off 1 1/4 in. from the outside corner of each drawer frame rabbet so the corner blocks can be doweled flush to the frame.
- Bore the four dowel holes in each corner block and the case sides and drawer frames.
- Assemble the case with glue and dowels and clamp overnight. Again, check for square.



Prize-winning craftsman Joseph Iannuzzi (left) at work with his shop teacher, Joseph Bognore, at Everett Vocational High School.

- Turn the finials to size on the lathe and carve a slight concave cup at the top of each. This ensures that the outside perimeter of the finial will meet the bottom of the corner block flush. Finish-sand the finials, then smear glue into the small depressions and press them onto the bottoms of the corner blocks. Twist each until the glue grips, then clamp lightly and allow to dry overnight.

Bore holes in the case sides for the drop-leaf stops and glue the stops into place.

Assembling the table

Begin assembly by gluing and doweled the legs to the base block. Two clamping blocks are needed—one that conforms to the shape of the upper side of the leg and one that conforms to the shape of the base-block side. Make these by tracing both the leg and the base block on similarly sized stock and cutting out the blocks on a band saw. Then clamp these blocks to the leg and the base block using small, soft wood blocks on the other end of the clamp, so the opposite sides of the leg and base block are not damaged during clamping.

To hold these small clamping blocks in place, fold a

ABOUT THE CONTEST

For information on this year's Stanley Tools Furniture Contest, write to Paul B. Muenzen, manager, Educational Marketing, Stanley Tools, 600 Myrtle St., New Britain, Conn. 06050.

piece of 150-grit sandpaper in half with the grit facing out and place it between the block and the workpiece. This prevents the clamping assembly from slipping on the curved surfaces, yet it won't damage the finished surfaces of the leg and the base block.

Next, locate the best position for your bar clamp, take off the clamping blocks and cut the necessary "flat pads" on each. Now each leg can be glued, doweled and clamped firmly in place. Allow each leg assembly to dry overnight.

Glue and dowel the pedestals to the base block and cross support, then clamp this whole assembly at once. Check the pedestals on several

sides with a square to make certain they're perpendicular.

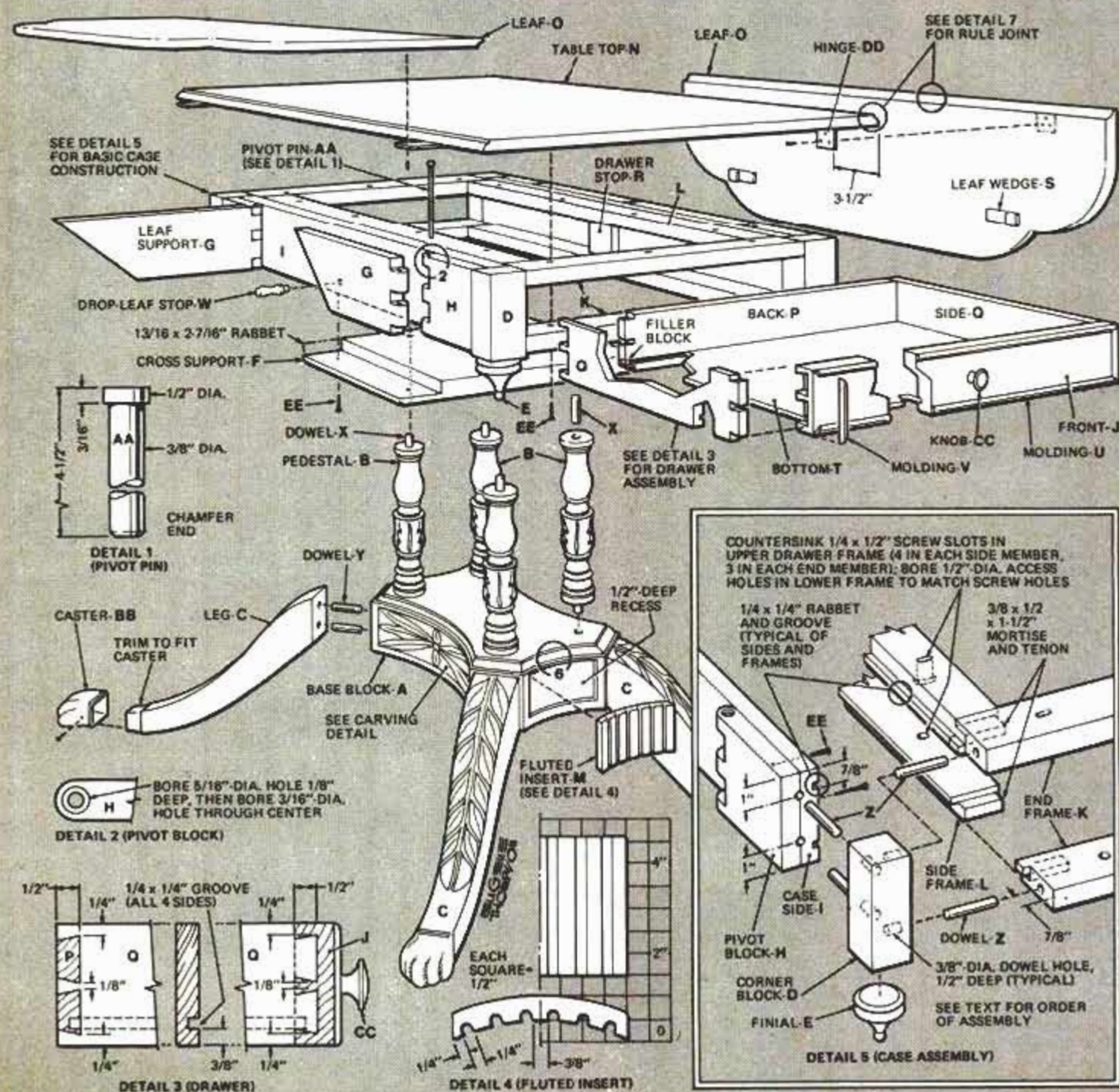
Cut the tabletop and drop leaves to the size and shape shown, then cut the rule joints on all three, using a router or shaper. Only the knuckles on the table hinges must be mortised into the top and leaves. The hinge leaves are simply screw-fastened to the underside surface.

Attach the table case to the underside of the tabletop, using screws turned in the middle of the slotted screw holes shown. These slots must run perpendicular to the grain direction of the tabletop, so when the top expands and contracts, the screws can move, reducing the chance of the top splitting. To turn these screws,

use an offset screwdriver or bore screwdriver-clearance holes in the lower drawer frame as shown.

Once the leaves, top and case are assembled, cut and fit the four small leaf wedges on the underside of the drop leaves and glue them in place. We have supplied dimensions for these parts based on the wedges used in the table shown, but your table will probably be different.

These wedges ensure that when the leaves are raised, the tabletop will be straight across. If your finger joints on the leaf supports and pivot blocks fit tightly and your pivot pin fits snugly as well, the leaf support on your table will be nearly perpendicular to the table case when



extended. Therefore, it will require a thinner block.

If you have children, you should install a small bullet catch in the wedge and top of the leaf support. If they accidentally bump into the support, the leaves won't fold up immediately.

Made-to-fit drawers

Before cutting and assembling the drawer parts, measure the opening in the table case to see if it matches the dimensions given in the drawing. If not, use the drawing as a guide and adjust the sizes of the drawer parts as needed.

Cut the drawer sides, fronts, and backs to size, then cut the dovetails

at the corners and the grooves in each member for the drawer bottoms. Assemble the drawer sides, backs and fronts with glue. Don't glue in the bottoms; these "float" in their grooves.

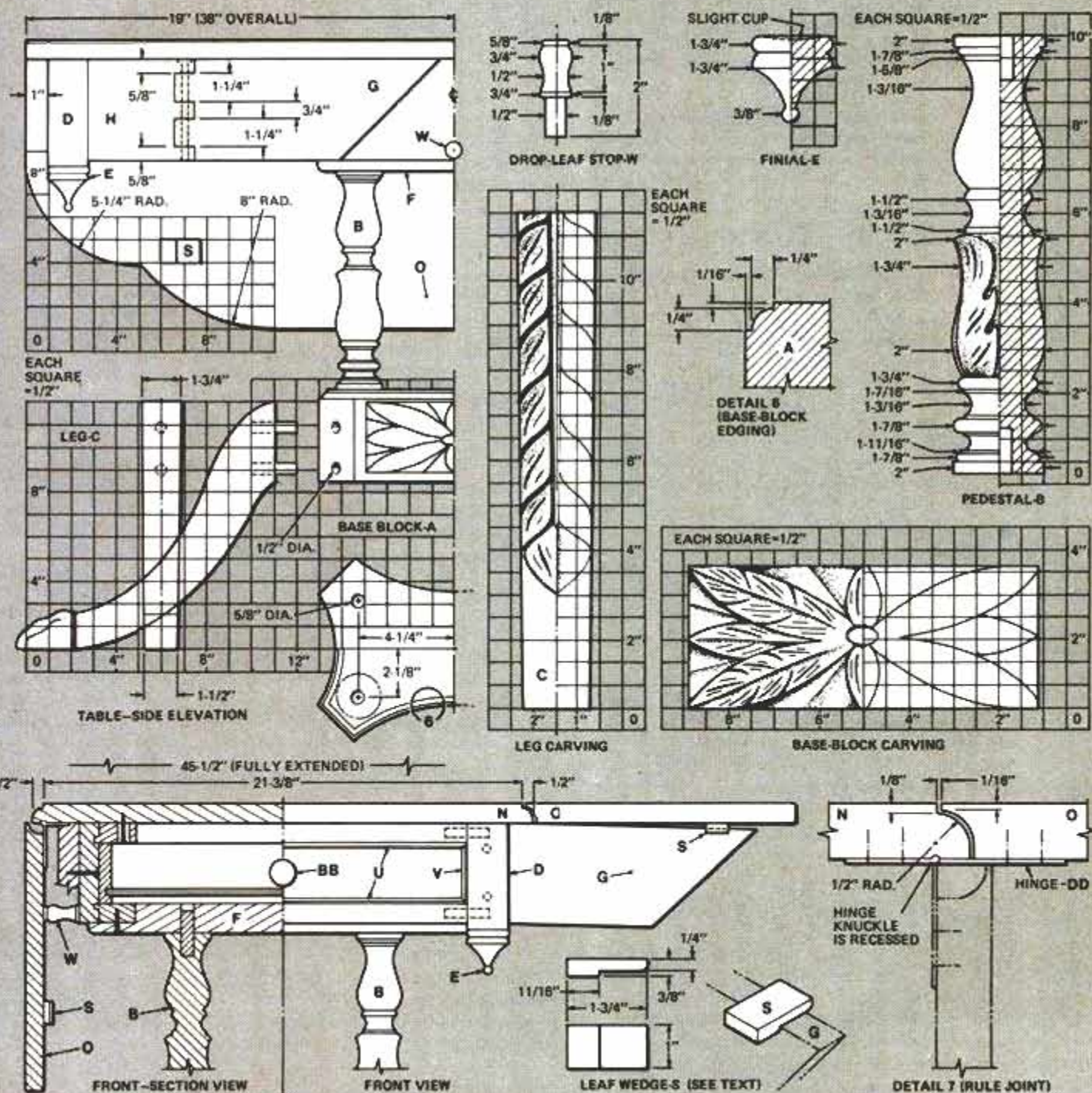
Complete the drawers by gluing and clamping the molding beads to the drawer fronts. The beads can be

J	2	$7/8 \times 2 3/4 \times 16 3/4$ " mahogany (drawer front)
K	4	$7/8 \times 2 1/4 \times 16 3/4$ " mahogany (end frame)
L	4	$7/8 \times 2 \times 32 1/2$ " mahogany (side frame)
M	2	$1 \times 3 1/8 \times 4$ " mahogany (fluted insert)
N	1	$1 3/16 \times 22 3/8 \times 38$ " mahogany (top)
O	2	$1 3/16 \times 12 \times 38$ " mahogany (leaf)
P	2	$1/2 \times 2 3/4 \times 16 3/4$ " mahogany (drawer back)
Q	4	$1/2 \times 2 3/4 \times 16$ " mahogany (drawer side)
R	2	$1/2 \times 2 3/4 \times 3 1/4$ " mahogany (drawer stop)
S	4	$3/8 \times 1 \times 1 3/4$ " mahogany (leaf wedge)
T	2	$1/4 \times 15 1/2 \times 15 1/8$ " tean plywood (drawer bottom)
U	4	$1/4 \times 1/4 \times 16 3/8$ " mahogany (bead)
V	4	$1/4 \times 1/4 \times 2 3/4$ " mahogany (bead)
W	2	$3/4$ "-dia. \times 2" mahogany (leaf stop)
X	8	$5/8$ "-dia. \times 2" dowel
Y	8	$1/2$ "-dia. \times 2" dowel
Z	16	$3/8$ "-dia. \times 2" dowel
AA	4	$3/8$ "-dia. \times $4 1/2$ " steel pivot pin with $3/16 \times 1/2$ "-dia. head
BB*	4	Faneul model No. 9011 cast socket and horn turned wheel
CC*	2	Faneul model No. 3005 1"-dia. drawer pull
DD*	4	Faneul model No. 12080 $1 1/2$ " table hinge
EE	26	$1 1/4$ " No. 10 fh screw

*Available from Faneul Furniture Hardware, 94-100 Peterborough St., Boston, Mass. 02215.

MATERIALS LIST—TABLE

Key	No.	Size and description (use)
A	1	$4 \times 8 \times 12$ " mahogany (base block)
B	4	$2 \times 2 \times 9 3/4$ " mahogany (pedestal)
C	4	$1 3/4 \times 10 1/4 \times 11$ " mahogany (leg)
D	4	$1 3/4 \times 1 3/4 \times 4 3/4$ " mahogany (corner block)
E	4	$1 3/4 \times 1 3/4 \times 1 7/8$ " mahogany (finial)
F	1	$1 1/8 \times 12 \times 17 1/4$ " mahogany (cross support)
G	4	$7/8 \times 4 1/2 \times 11 3/4$ " mahogany (leaf support)
H	4	$7/8 \times 4 1/2 \times 4 3/4$ " mahogany (pivot block)
I	2	$7/8 \times 4 1/2 \times 32 1/2$ " mahogany (case side)





Paul B. Muenzen, (far left), education marketing manager, Stanley Tools, discusses table with judges for 1981 Stanley Tools National Furniture Contest (left to right): Harry Wicks, PM Home and Shop Editor; Walter Winkler, cabinetmaker, Design Dept., Hitchcock Chair Co.; David M. Mordavsky, industrial arts consultant, Connecticut Dept. of Education's Bureau of Vocational Services, John E. Hillhouse, A.I.S.D., Interior Decorating Studio, G. Fox & Co; Herbert Siegel, director, New York City Board of Education Industrial Arts.

EVERETT WOODWORKING PROGRAM

Joseph Iannuzzi's woodworking abilities are the product of a remarkable program at Everett (Mass.) Vocational High School. It's conducted by two dedicated teachers, Joseph Bognore and Robert Spinel-la—who were both participants in the same program in their school days. They agree that all credit should go to their teacher—the originator of the teaching approach they use—Anthony Fortini.

This sense of tradition and continuity must be partly responsible for the considerable success the program has achieved. In recent years, Everett has produced two grand prize winners in the Stanley contest, as well as many other national and regional award winners.

The three-year course of study (grades 10 to 12) is centered around shop work. And what a shop it is! The 2,400-sq.-ft. area is packed with industrial-quality machinery. There are five table saws, four wood lathes, three band saws, four jigsaws, two jointers, seven various sanders, two veneer presses and more.

Each student is directed through a carefully thought-out sequence of seven projects—from a simple magazine rack to a double-drawer Queen Anne night stand. Each new project introduces a new challenge, yet forces the student to repeat things learned on the previous piece. Every project must be completed to the instructor's satisfac-

tion before the student can move onto the next.

The students progress at varying rates and, according to Joseph Bognore, who heads up the program, "there is little pressure on the individual student to keep pace with his classmates." He adds that he is "not teaching speed, but skill." Quality is what's important.

By the middle to the end of the second year (grade 11), most students begin projects of their own. Parents are encouraged to take part in the choice of projects and must approve each one before it is undertaken. This is required because the students must buy their own wood, finishing materials and hardware.

The school also tries to place the senior students in woodworking jobs in local industry, where they can gain firsthand experience going production work. Such students work one week at the job and attend school on alternate weeks. However, under this arrangement, the student's shopwork requirements are fulfilled on the job. Thus, his school time is exclusively devoted to academic pursuits.

Every effort is made to provide a balanced view of shopwork in this program. The proper use of sophisticated machinery is stressed, but hand-tool technique and the subtleties of fine finishing are also given their due. The result, as seen on these pages, is very impressive.—S.W.

cut on a larger piece of stock using a shaper or router, then ripped into molding strips on the table saw. Or they can be hand-planed.

Finishing the table

Install the casters on the table legs before you begin finishing. You'll need to file and sand them for a proper fit. When the casters are fitted, set them aside for later installation.

All preassembly sanding on this piece was done in an 80-, 100-, 150-grit progression. Because mahogany is an open-grained wood, its pores must be filled by brushing on a paste wood filler across the grain and letting it stand until it loses its shine. (Time can vary from 15 to 45 minutes.) Remove all excess wood filler with a coarse cloth such as burlap. Let the piece dry overnight, then sand with 180-grit paper.

Stain the piece with a light mahogany stain. If you prefer a darker look than that of the table shown, let the stain soak in for 30 minutes before wiping. For a very dark finish, add some walnut stain to the mahogany. Let the table dry for 24 hours after wiping.

If you own a compressor, spray on one coat of lacquer sealer and let it dry overnight. If not, seal the piece using 3-lb.-cut water-white shellac thinned 50 percent with denatured alcohol. Apply the shellac with a clean bristle brush. (Note: If you choose the shellac sealer, finish the piece with several coats of varnish and standard varnish application techniques. In this event, disregard the following lacquer instructions.)

For lacquer finish, use only one coat of sealer or you might end up with cracks in the finish. Sand the piece with 220-grit abrasive paper, brush off and wipe with a tack cloth. Spray on the lacquer, allow the piece to dry overnight and sand with 220-grit paper. Apply each ensuing coat of lacquer in the same manner. Four or five coats will do the trick. (Remember, it's better to apply many thin coats of lacquer than two or three thick coats.) And work in a well-ventilated area with no open flames or sparking electrical equipment. Wear goggles and a respirator mask.

Before the last coat is sprayed on, sand the entire table with 280-, then 300-, 360-, and, finally, 400-grit sandpaper. Then tack off. After the last coat is dry, hand-rub the entire table with a 4-0 steel-wool pad until the desired gloss is achieved. Finally, apply two coats of paste furniture wax (Butcher's wax) and buff. To complete the table, reinstall the casters and drawer pulls. **PM**

Start your own money making business!

Make up to \$12⁵⁰ an hour—
even while learning! *Train FAST
at home!*

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

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

Start Collecting CASH PROFITS Right Away

You're "in business" ready to earn up to \$12.50 an hour a few days after you begin Belsaw's shortcut training. Take advantage of today's unprecedented opportunities in Locksmithing for year-round EXTRA INCOME in-spare-time—or fulltime in a high-profit business of your own. Hundreds we've trained have done it. So can YOU! All tools plus professional Key Machine given you with course. These plus practice materials and equipment, plus simple, illustrated lessons, plus expert supervision, plus business-building guidance will enable you to KEEP THE MONEY COMING IN! Ideal for retirement—good jobs too.

SEND FOR EXCITING FACTS—No Obligation

Discover what's in Locksmithing for you—how Belsaw's Master-Locksmith-approved training can give you the skill you can depend on to EARN MORE—ENJOY LIFE MORE.

BE A LOCKSMITH!

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

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



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



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

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



... YOU Can Do It Too!

No Extra Cost! Included With Your Locksmith Training



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

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



Be Your Own Boss!

10-DAY NO RISK TRIAL!
Send for details!

THIS PRO KEY MACHINE IS YOURS TO KEEP!



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

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

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

RUSH COUPON!

ALL SPECIAL TOOLS AND EQUIPMENT INCLUDED!



BELSAW INSTITUTE

102M Field Bldg., Kansas City, Mo. 64111

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

RUSH COUPON TODAY FOR THIS FACT-FILLED

FREE BOOKLET!

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



Send for your copy today!

BELSAW INSTITUTE, 102M FIELD BUILDING KANSAS CITY, MISSOURI 64111

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

Name _____

Address _____

City _____

State _____

Zip _____

WOODWORKERS Do-it-Yourself CATALOG

with **20**
WOOD
SAMPLES



104 giant pages
—14 kinds cabinet
and furniture woods,
79 veneers in 3-ft. lengths,
19 flexible veneers to 36" wide x 8 ft., 11 fancy
burl & crotch, 54 sizes, kinds carving blocks, 76
assembled inlays, 72 lamp parts, 39 clamps, 118
carving tools & chisels, 73 wood picture kits, 500
plans, 96 how-to books, Pic. framing, carved
molding, period hardware, sliding, revolving
hdwe. Cane, reed, wood finishes, coffee mill kit,
clock parts, etc. Over 2,000 hard-to-find prod-
ucts in new Woodworker Catalog!

TEAR OUT AD. MAIL TODAY.
CONSTANTINE Est. 1812
2051 Eastchester Road, Bronx N.Y. 10461

- Enclosed \$1 for Catalog without samples.
- I prefer Catalog with 20 Wood Samples. \$2 enclosed. Send 20 wood veneers from around the world. Identified. Useful when matching, naming & ordering fine woods. Educational. \$1.50 refunded on first catalog order.

Name _____
Address _____
Zip _____

Do it yourself with



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

It really works.



Swing-wing Tornado is costliest fighter built in Europe, but it has high performance.

HIT THE DECK—HERE COMES THE RAF *(Continued from page 117)*

situation changes considerably."

As is generally known, modern defenses against air attack, on both sides of the Iron Curtain, center on the use of radar. But this system is less effective against planes flying so low that they are out of a direct line of sight. The curvature of the earth, contours of terrain, intervening structures and trees all scramble the return signals. Lacking early warning, missile defenses cannot react quickly enough against aircraft which will be just overhead and within range for only a few seconds. In some cases, the weapons can't achieve adequate trajectory when the target is at treetop level.

Airborne radar is not a complete answer, either. Interceptors carrying "look-down" radar have been used to track aircraft at a lower altitude, but their record has been spotty. "Noise" from ground echo and other interference makes positive identification of invading aircraft difficult. Both sides have attempted to overcome this problem by installing radar installations on high ground and the United States has developed the AWACs—the "ultimate radar on a pole," Walker calls it. It gives the United States a look-down and shoot-down capability which the Communist Bloc countries still lack.

Training RAF pilots to outwit the enemy defenses is no easy matter, however. "Flying low and fast is a skill difficult to acquire and one that requires constant practice," Commodore Walker says. Along the level, pastoral countryside adjoining the North Sea, local Britons have grown accustomed to the rumble and roar of RAF pilots endlessly rehearsing their tactics. According to Walker, more than 70 percent of a squadron's training time is devoted to defense-avoidance.

It is no exercise for the fainthearted. Strike Command is understandably reluctant to estimate the num-

ber of pilots killed in low-level training, and seeks to play down its dangers. "Losses are probably no greater than in air-to-air combat tactics, weapons training or aerobatics," Walker protests. Nonetheless, crashes occur frequently enough that they are now scarcely noticed. A fatal crash recently rated only two sentences in the London newspapers. During the same month, the RAF lost two other pilots, one of whom spun into a field, while the other caught a wing on the ground during combined U.S.-British "Red Flag" exercises at Nellis Air Force Base, Nev.

"Flying low-level still looks more dangerous than it is," Walker argues. "We are selective about our pilots and we inculcate into them that the danger lies in being casual or careless. The lower you fly, the more you have tunnel vision. At 100 feet, you must only look straight ahead, because the ground is the major threat. You let your wing-mate look for the enemy. The enemy may or may not kill you, but the ground is certain death."

Before an RAF pilot is assigned for low-level duty, he spends six months in an Operations Control Unit, learning every aspect of the plane he will be flying. Even though he is, by then, a fully qualified flier, washout rates at this stage are high; 13 percent of candidates never complete the OCU course. When he can fly the plane, he is schooled in its weapons systems, then assigned to his squadron for further training. He is seldom given full duty for another six months. "We train them down to 100 feet only under very careful supervision," Walker emphasizes.

Take the matter of flying over ridges in terrain (or, in heavily built-up Northern Europe, power lines and pylons). Normally, a pilot would approach the hill at right angles to the ridge line, pull the nose up to

clear it with plenty of room, then descend to assigned altitude on the other side. But simulated attack profiles have shown that this kind of "skylining" can expose the plane to a fatal dose of radar. Accordingly, Strike Command pilots learn to keep the nose low, approach the ridge at a slight angle, and roll over it with minimum increase in altitude, righting the plane on the far side. "It can be quite sporting," Walker smiles, indulging in a little RAF understatement. "Some of our pilots have actually wet themselves on the first pass."

Learning to use mountainous terrain as a screen calls for strong nerves. The pilot flies lower than the shielding peak itself, hugging the ridge line, always aware that another ridge may suddenly appear ahead in his flight path. Similarly, the pilot must learn to follow more gentle, rolling terrain in an undulating path, rather than remaining at a constant altitude.

Rewriting the script

In RAF movies on the *Late, Late Show*, the old Spitfires fought in tight formation, wingtip to wingtip, shepherded along by an all-wise squadron leader. Formation flying is still central to RAF tactics, but it is formation flying of a very different sort. RAF leaders recognize that once radar picks up one plane in a rigid formation, the others can be spotted easily, so the current philosophy calls for widespread formations without a precise pattern. Four- or eight-plane units fly at random distances and altitudes, often miles apart and screened from each other by intervening terrain. Yet each man remains responsible for protecting his wingmates. The technique places strong emphasis on individual decision-making, as well as strong leadership. "It's not something you can learn through a correspondence course," Walker says. "Forward visibility is what counts." Squadron leaders often take their men up in marginal conditions to fly "under the weather," then return them to an unfamiliar base, simulating conditions in which the home field might be inaccessible on return.

The newest area of RAF low-level training has been night operations, due to recent NATO-wide emphasis. The RAF recently opened a new night-training site in far northern Scotland, one of the least populated areas of the British Isles. Pilots train down to 100-foot altitude, four nights a week. A night bombing range is also being discussed. Flying just over the treetops in utter dark-

ness can be a terrifying experience at first, but pilots can be trained to see better at night than on a heavily overcast day, Walker says. They learn to rely on "moon bounce" off lakes and wet highways for navigation and to identify cities by the pattern of their lights.

For all the affection that the British population traditionally holds for its airmen, low-level training, with its inevitable bone-jarring, house-shaking noise, often brings conflict with civilians. Flights must be restricted to certain times and limited areas, with clearance for training missions issued on a day-by-day basis. Sometimes, pilots are not cleared to descend below 500 feet, lest they disrupt a cricket match or rugby game on the ground. In the sheep-raising areas of Britain, low-level fliers are completely grounded during the lambing season. Around the London suburbs, flights are taboo on weekends, when they would annoy golfers, tennis players and gardeners.

'Garden filled with aircraft'

The fliers sympathize with civilian complaints. "You have to realize that we have one-fourth the population of the United States in an area $\frac{1}{2}$ the size of Texas," Walker says. "Essentially, we are just a garden filled with aircraft. But there is nowhere else to go. West Germany is just as densely populated; Holland more densely populated yet. And you can't produce 20 tons of thrust quietly. We try to train as much as we can over the sea, but the conditions are simply not representative enough of what we would face in a real war."

Once a year, however, the RAF gets to practice low-level tactics in more isolated surroundings. At Nellis Air Force Base, Nev., more than 30 U.S. and RAF planes participate in the annual Red Flag exercises. There, squadrons from both countries devise and work out tactics for penetrating enemy defenses under wartime conditions, with their sorties rated and scored. These demonstrations have confirmed the value of RAF low-level strategy, Walker says.

But not all NATO air strategists agree. Belgian and Dutch air forces follow the British example, but the Americans and Germans do not. They prefer to fly at "medium" altitude, defined as above 250 feet. This fundamental difference in philosophy, according to the RAF, stems from America's "very nasty experience" in Vietnam, where light anti-aircraft, rifle and pistol fire and

(Please turn to page 148)

DIRECT FROM U.S. OPTICS QUALITY SUNGLASSES AT FACTORY PRICES

Each pair features: Impact resistant lenses • Handcrafted • Polished glass lenses • Hardened metal frames • No non-sense guarantee.
FREE—limited time only—deluxe velour lined case with each pair of glasses ordered (a \$3.00 value). Credit cards accepted. Dealer inquiries invited.
NOTICE: Don't be fooled by cheap imitations. These glasses are made exclusively for U.S. Optics®. To make sure you get the best, order now and if not completely satisfied return for refund within 30 days.



Only \$7.95

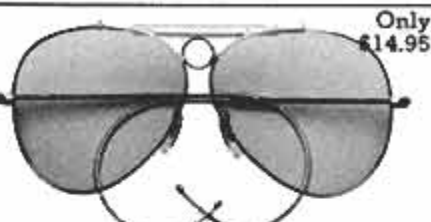
World Famous Pilot's Glasses

These precision flight glasses are now available to the public for only \$7.95. If you could buy them elsewhere, they'd probably cost you over \$20.00. #20P available in gold or silver frame. A \$20.00 value only \$7.95. Two pairs for \$14.00.



Only \$9.95

Aviator Teardrop Flight Glasses
Flexible cable temples #30A gold frame only. A \$30.00 value only \$9.95. 2 pairs for \$18.00.



Only \$14.95

Professional Driving & Shooting Glasses
Wide angle amber lens brightens visibility. #30D gold frame only. A \$30.00 value only \$14.95. 2 pairs for \$28.00.

To order send check or money order to U.S. Optics, Dept. 616, 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.

There's No Place Like Home...
to Start a **BUSINESS**
OF YOUR OWN!

FIND OUT HOW EASY IT IS!

If you've dreamed that someday you'd have a business of your own... this is your chance! There's no business like Mail Order... and no place to start like home. You need no previous experience. We guide you. Work part time or full time.

OR, CHOOSE ANY ONE OF 20 OTHER PROVEN WAYS TO MAKE MONEY.

Mail order isn't the only way to succeed. Thousands are making big money thru rack jobbing, business gifts, party plans, swap meets, etc.

We not only provide the plans and the merchandise, but every selling aid you'll ever need for whatever type of business you choose.



Nationally Advertised
FOOT PUMP (Inflates Anything!)
Retail Value - 14.95
Your Cost - 4.95
Your Profit - 10.00

SELL
MERCHANDISE
BY
MAIL!

MOST IMPORTANT OF ALL... We stock over 2,500 items of fast-selling merchandise you can buy at discounts of 55 to 85% off **RETAIL PRICES!**

Deluxe **CHAIN BURGLAR ALARM**
Retail Value - 5.95
Your Cost - 1.75
Your Profit - 4.20



GENUINE PORCELAIN EAGLE
Retail Value - \$14.95
Your Cost - \$4.80
Your Profit - \$10.15



SOLID BRASS BELT BUCKLE
Retail Value - \$4.95
Your Cost - \$1.60
Your Profit - \$3.35

Nationally Advertised
LOCK-BLADE POCKET KNIFE
Retail Value - \$5.95
Your Cost - \$1.70
Your Profit - \$4.25



YOUR FUTURE STARTS HERE! Mail this coupon for **FREE** book that tells you what you need to know about choosing a business of your own.

SMC SPECIALTY MERCHANDISE CORP., Dept. 309-15
8061 DeSoto Avenue, Woodland Hills, CA 91365

Rush me **FREE FACTS** on a business of my own!

NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____

FREE
COLOR CATALOG

Build Your Own
Grandfather Clock
Prices Starting Under

\$255

(including movement and dial)

- Do-it-yourself case kit, parts pre-cut
- Finished clocks
- Solid 3/4" hardwoods: black walnut, cherry, oak
- Heirloom quality
- Factory direct prices
- Solid brass West German chiming movements
- Money back guarantee
- Prompt shipment

MASTERCARD and VISA ACCEPTED

EMPEROR®
CLOCK COMPANY
WORLD'S LARGEST MANUFACTURER OF GRANDFATHER CLOCKS
Dept. 232 Emperor Industrial Park
Fairhope, Alabama 36532

Be an
ELECTRICIAN



• **CONSTRUCTION** • **MAINTENANCE**
• **CONTRACTOR**

Train at home in spare time

No previous experience needed. Experts show you what to do, how to do it...guide you step by step. Even before you're ready to go after a full-time job as an electrician, you could be making extra money doing odd jobs for friends and neighbors...and saving money on your own electrical work. Learn to specify and install wiring, operate and control motors and generators, use and maintain transformers and storage batteries.

You'll learn how to use electrical instruments, how to find short circuits, overloads and open wires. You'll be ready to take almost any electrician licensing examination. Because opportunities vary from time to time and from one part of the country to another, we encourage you to check on the job market in your area.

ELECTRICIANS average more than \$11.00 AN HOUR!

Don't count on getting into a union or earning union wages as soon as you graduate, but these figures from the U.S. Dept. of Labor Occupational Outlook Handbook show that electricians are among the highest paid construction workers. In 1978, wage rates in metropolitan areas for electricians averaged \$11.25 an hour after regular apprentice training program. Union wages were even higher.

Employment of construction electricians is expected to increase faster than the average for all occupations through the mid-1980's.

NO NEED TO QUIT YOUR JOB OR REGULAR SCHOOL

Everything is explained in easy-to-understand language with plenty of drawings, diagrams and photos. And you learn at your own pace...at home in spare time. No time wasted traveling to class. Consultants are as close as your telephone. No charge! Use our toll-free 24-hour home-study hotline as soon as you enroll!



Here are just a few of the subjects covered in your course.

Principles of Lighting, Heating, Air Conditioning, Conductors and Conduit—Electrical Wiring—Lighting Control—Transformers and Storage Batteries—Generators and Motors—Electrical Estimating...Plus much, much more.

You receive everything you need to get you off to a fast start!

Tools, materials, tester are all included with your course...plus the National Electrical Code—the "Electrician's Bible" that gives you all the requirements and do's and don'ts of proper electrical installations.

MAIL COUPON TODAY!
No cost, no obligation,
no salesman will call!



ICS ELECTRICIAN SCHOOL, Dept. PB022
ICS Center, Scranton, PA. 18515

Rush free facts that tell how I can train at home in spare time to be an electrician.

NAME _____ AGE _____
ADDRESS _____
CITY/STATE/ZIP _____

HERE COMES THE RAF

(Continued from page 147)

even strategically thrown rocks brought down numbers of low-flying planes. The U.S. Air Force, with superior numbers and more sophisticated electronic countermeasures, believes it's in a better position to take on enemy air defenses directly, rather than trying to avoid them and exposing pilots to other hazards.

In any case, Walker says, the philosophical gap is being bridged. The TFR-equipped Tornado will enable the RAF to operate at slightly higher altitude, out of reach of small arms. Moreover, the advantage of defense avoidance is being nibbled away slowly. Defenses in the Eastern European countries are not only becoming more advanced, but new layers are being added without the older versions being phased out; "if A doesn't get you, B will," Walker says. It's only a matter of time, NATO analysts say, until Warsaw Pact forces have the same look-down, shoot-down capability now monopolized by the Americans. When that occurs, the rationale for low-level flight may be negated.

Numbers, technology and men

Today, the Warsaw Pact countries have an aircraft numbers advantage of 2.4 to 1 over NATO. Although their technology lags behind in some areas, it is catching up fast. The Soviet Hind helicopter, used in Afghanistan, is the finest military helicopter in the world. It is generally conceded by air strategists that the three areas of comparison in air war are numbers, technology and men. One shouldn't take on an enemy unless one holds the upper hand in at least two, and preferably three, of these areas.

"We always conceded them the numbers," says Walker, who must analyze these principles in drafting RAF battle plans. "We believed we had the advantage in weaponry, but they have been building up their strength while we have stood still. That means we must retain our edge in men. That is not easy. We have been at peace for a long time.

"We are still seeking, and thank God, we still find, the type of guy who enjoys facing that 2.4-to-1 challenge, who is not afraid to take on the odds. We want the man with sheer, naked aggressiveness who will not back away from such a sporting contest. Mounting an attack at 100-foot altitude at eight miles a minute calls for just such a man. But that's what saved us in the past, and what could save us in the future."

ings for the custom insulated glass. The eight other glass areas utilize standard patio-door replacement panes.

Install the 1/4-in. pine jambs over the framing after the glass is in place and caulked. (In this design the interior jamb serves as the glass bead stops.) Important: Make certain the glass-wood joints are sealed, both inside and out, with caulking.

To make maximum use of the sunny space, you can install glass shelves as shown. Dick Raymond opted to install a 1/4 x 12 x 46-in. tempered glass shelf across each of the six vertical glass areas. Each is supported by two 1x2 cleats 14 in. long.

The greenhouse also contains portable plant ledges propped on cement blocks. The ledges are framed with 2x4s to which 1x2-in. turkey wire has been fastened with 2-in. heavy-duty staples. Two-in.-thick Styrofoam is placed over the frame to insulate transplanting flats.

Soil-warming cables are simply laid in place. The cables are from Easy-Heat Wirekraft, U.S. 20 East, New Carlisle, Ind. 46552.

The cold frame is constructed of

2x4 end walls sheathed with exterior plywood. A 2x6 board is installed between the end walls; used storm windows are hinged in place.

Potting bench

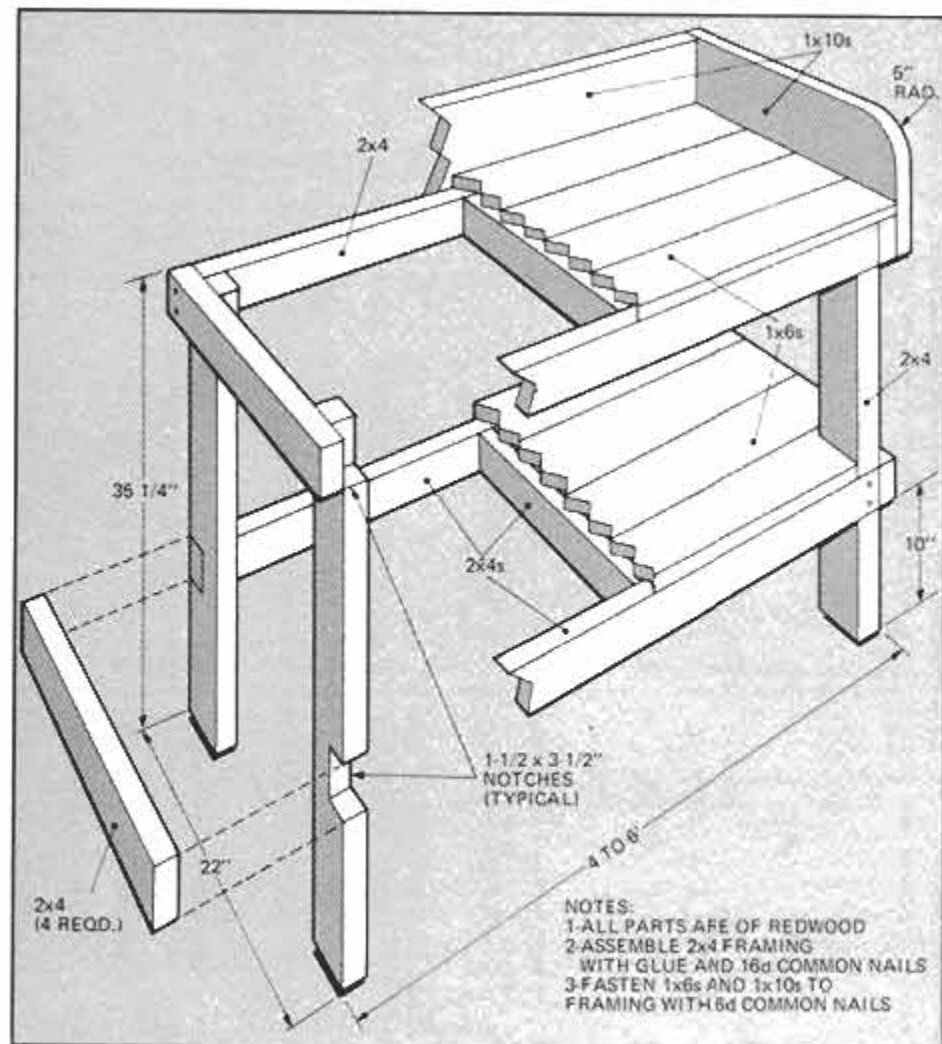
This sturdy redwood potting bench will give you and your family an indoor work center for growing and planting activities.

The work surface is a comfortable 35 1/4 in. from the floor. However, you may want to shorten it to suit the user's height. Its legs are notched to receive the stretchers and rails, and it can be assembled with common nails. But 1/4-in. carriage bolts, washers and nuts give a stronger bench.

Check the corners with a square before the glue dries. Wrack the unit square, if necessary, and tacknail diagonal strips from the legs to the top to hold it while the glue dries.

Before the glue dries, cut 1x6s to size for the shelf and benchtop. Attach with 6d common nails.

The splashboard is cut from 1x10 material. The sides and back are simply butt-joined at the corners. Round the ends on the sidepieces using a sabre or band saw; attach parts by 6d common nails and glue. **PM**



SUPER KNIFE SPECIAL

Compare Their Prices Anywhere

- 19" overall
- 15" edge
- steel blade
- canvas sheath

1 BUSHWHACKER

- 23" overall
- 18" edge
- steel blade
- canvas sheath

2 MACHETE

- 20" overall
- 18" edge
- steel blade
- canvas sheath

3 BOLO MACHETE

- 25" overall
- sawteeth on back

4 SAWTOOTH MACHETE

- wooden handle
- 15 1/2" overall
- 2 lbs.

5 HATCHET

- fiberglass handle
- 15 1/2" overall
- 1 1/2 lbs.

6 CAMP AXE

- 12" overall
- 7" edge
- steel blade
- sheath

7 COMBAT KNIFE

- 10 1/2" overall
- 5" edge
- steel blade
- sheath

8 MARINE KNIFE

- 9 1/2" overall
- 5" edge
- steel blade
- sawteeth on back
- sheath
- whetstone

9 SURVIVAL KNIFE

LIMITED TIME OFFER
ONLY \$6.95
 Each

Plus Postage:
 • 9 1/2" overall
 • 5" edge
 • steel blade
 • sawteeth on back
 • sheath
 • whetstone

Send \$2.00 for complete catalog. Catalog free with order. Please send me ___ knife(s) at the Limited Time Offer of \$6.95 each or \$6.00 each in quantities of 3 or more. Add \$1.50 postage for first knife and 50 cents for each additional knife. Make checks and money orders payable to TIFFIN INTERNATIONAL. Alabama residents add 6% sales tax.

Knives Available (Enter number(s) desired)

Quan.	Quan.	Quan.	Quan.
1 _____	3 _____	5 _____	7 _____
2 _____	4 _____	6 _____	8 _____
			9 _____

Name _____
 Address _____
 City _____ State _____ Zip _____
 VISA _____ MASTER CHARGE _____
 Exp. Date _____ Card Number _____
 Signature _____
 Mail to: TIFFIN INTERNATIONAL,
 P.O. Box 581, Dept. PM-3 Clanton, AL 35045.
 Dealer Inquiries Invited

WORKSHOP MINICOURSE

APPLYING A FINISH



Shellac, thinned 50 percent with denatured alcohol, is a good sealer. Never shake a can of shellac, and don't stir too vigorously or you'll wind up with air bubbles in your finish. It's best to apply shellac across the grain, as here, with overlapping strokes. The shellac is self-leveling.



After shellac covers a small area, use with-the-grain strokes to speed up the leveling process. Do this immediately.



A shellac brush is cleaned by swishing it about in denatured alcohol. Next, shake out excess alcohol and hang brush to dry.



Correct way to grip a varnish brush—like a pencil. No matter what size brush you work with, hold it in this manner.



Dip bristles into varnish so less than half the bristles' length is immersed. Gently wipe brush across lip to remove excess varnish, or tap it lightly against the inside of the can—if there is room.



Apply varnish using with-the-grain strokes, as shown here, on this sample piece of oak.

No matter how skilled a craftsman you are, if you put an inferior finish on your projects, your work will look amateurish.

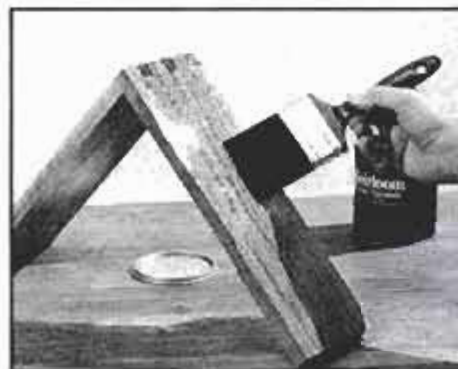
Many cabinetmakers and carpenters I have known dislike the finishing step. It must be the discomfort of working with the odors, because all the craftsmen that I've worked with have more than ample patience and know-how.

At any rate, to do justice to your projects, you should master a very basic system for getting a good-looking finish on the wood.

There are thick volumes on wood finishing, but if you stick to the basic methods shown on this page this month and last, you will be certain to produce results that are highly satisfactory.

Two additional tips (besides those in the photos):

- Invest in a photographic flood-lamp for your shop—the type that has a clamplike fitting. You should use the lamp with its beam pointed



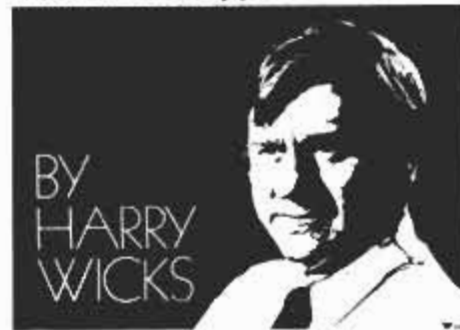
The next step is to level the varnish by using across-the-grain brush strokes.

at an angle to the surface that is being finished. Doing this will enable you to make sure there are no holidays (missed spots).

- Buy only high-quality bristle brushes for working with varnish. Clean your brush after each session—first in turpentine, then with cool, soapy water. Rinse the brush in clear, cold water and hang it to dry.



Finish by tipping off. For effective tipping off, the brush must be almost dry. Author uses a clean, lint-free rag to wipe brush after each and every pass on the finish.





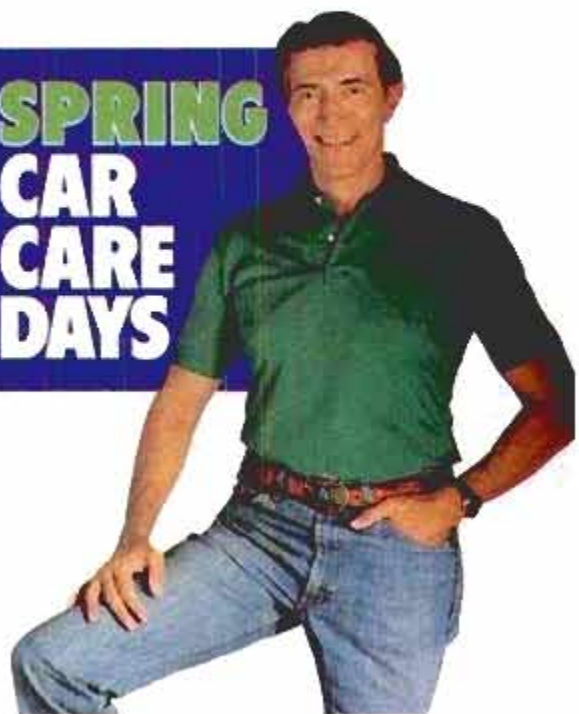
**IT TOOK YOUR BUMPS.
PROTECTED YOU FROM THE ELEMENTS.
AND GOT YOU OUT OF A FEW JAMS.**

NOW IT'S TIME TO SETTLE UP.

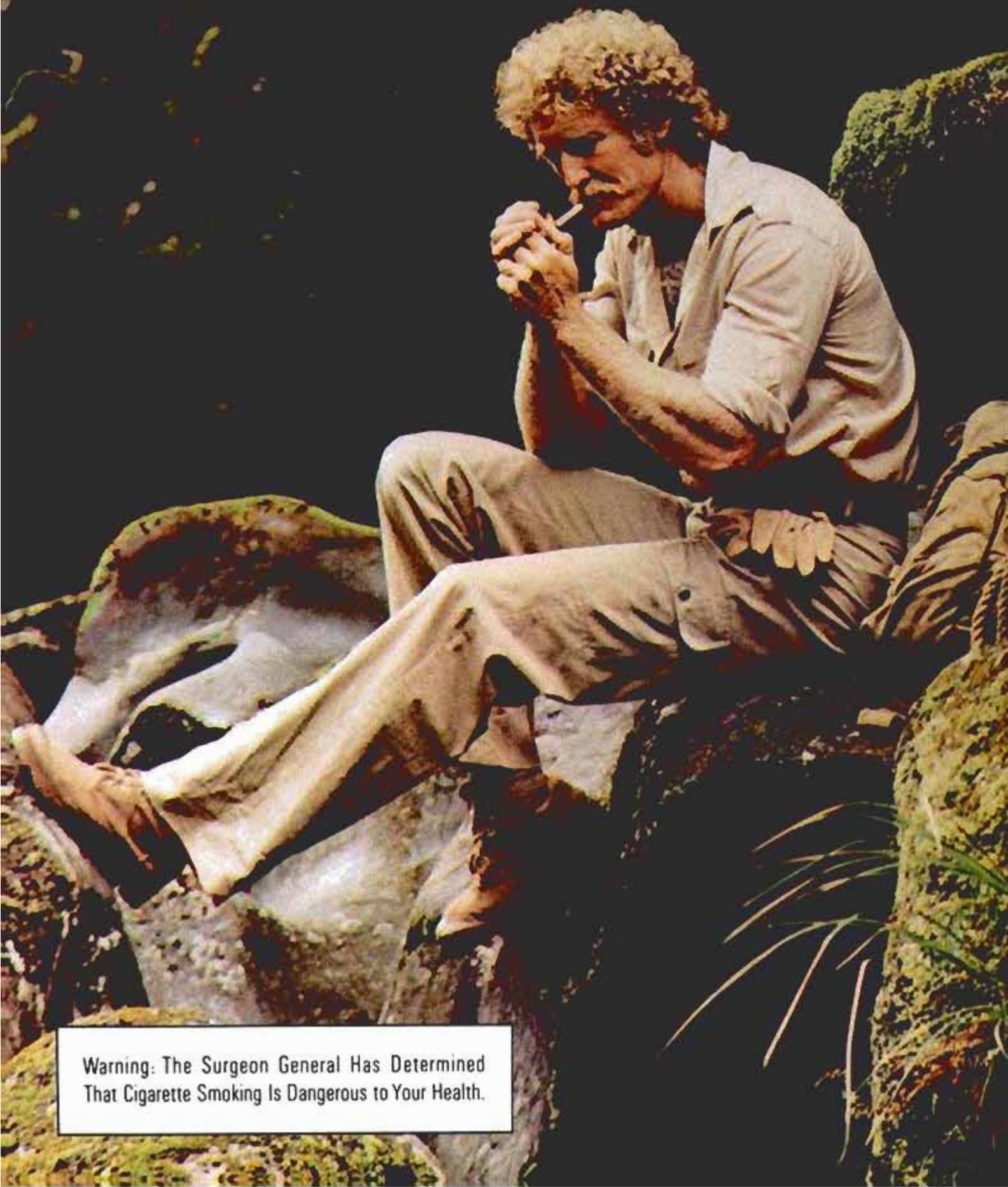
Your car took care of you. Now's the time to take care of it—during NAPA Spring Car Care Days. You'll find what you need for your domestic or import car at NAPA auto parts stores and participating garages and stations. Look for the NAPA Spring Car Care Days poster.

- And reward a clutch performer.

Check your Yellow Pages



LIGHTS: 8 mg. "tar", 0.8 mg. nicotine, FILTERS: 15 mg. "tar", 1.3 mg. nicotine, REGULAR: 20 mg. "tar", 1.5 mg. nicotine, av. per cigarette by FTC method.



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

CAMEL

Where a man belongs.



Experience the Camel taste in Regulars, Lights and Filters.

THE GREAT REFINISHING TEAM



ZIP-STRIP

Paint, Varnish and Stain Remover will quickly remove 5-6 coats of paint, varnish, lacquer, shellac, enamel, latex, urethane, polyurethane, and stain. ZIP-GUARD, a clear urethane wood finish is available in satin or gloss, eliminates waxing and resists alcohol, water, grease, oil and detergent. Excellent for use on cupboards, paneling, furniture and wood floors.

Write:

FREE-Zip-Refinishing Book
Star Bronze Co. Dept. PM
Box 568, Alliance, Ohio 44601

NEW SUNROOM



and PASSIVE SOLAR GREENHOUSE

- New System 3 - "Brookhaven" model
- Factory insulated triple glazing
- G.E. Lexan® Shatterproof Panels
- 40% Tax Credit & State Credits
- Lean-To, Free Stgd. & Window units
- Curved Eave, Bronze Tone Finish

COLOR CATALOG and TAX CREDIT GUIDE. Enclose \$1 for our catalog and price list, plus our guide to the latest federal and state passive solar tax credits and qualifications. All kits shipped Freight Prepaid. SAMPLE WINDOW KIT: Enclose \$5 for catalog and tax guide above, plus actual samples of greenhouse aluminum frames, G.E. Lexan® glazing, assembly manual and heating guide.



FOUR SEASONS GREENHOUSES

910 Route 110, Dept. PM-203
Farmingdale, N.Y. 11735
Phone: (516) 694-4400

Div. Four Seasons Solar Products, Corp.
(Custom Built & Standard Sizes)

DETROIT PUTS MUSCLE BACK IN (Continued from page 113)

produce the Gs or the acceleration times. Zero-to-60 runs took more than nine seconds. We complained to the Chevy engineers at the proving grounds and they said they'd look into it.

They have. Our test car at Milan had the newly standard 3.23 axle ratio and we can attest that it does make a big difference.

With the automatic transmission (no stick is available with the twin crossram V8), our 0-to-60 times came up in 8.77 seconds. Again, with two aboard. About 8.2 seconds would be right for a driver-only run. Our best quarter-mile time was 16.56 seconds at 83.10 mph.

Here, the limiting factor wasn't wheelspin, but rather simply one of engine power vs. weight plus an automatic transmission. The 305 in Z28 trim sports a higher 9.5-to-1 compression ratio and twin throttle body fuel injectors sitting outboard near the valve covers. The result is 165 hp at 4,200 and 240 ft.-lb. of torque at 2,400 rpm. One Chevy engineer at Mesa told us that the Z28 would be packing a full 350 fuel-injected cubes à la Corvette for 1983, which would make the Z28 the hottest car sold in America. This year, it'll have to settle for second hottest.

Through the twisty slalom run, our Z28 test car was taking second place to no one. Witzenburg sizzled through the course in just 11.42 seconds, easily the quickest time of the

day. He also ran an 11.47 to back it up. The Camaro cruised through flat and true, its quick steering allowing our test driver to concentrate on being smooth overall, not specifically when to turn the wheel for the next pylon. There's no question that the Z28 is the finest handling car built in America today.

Buick Regal Turbo Sport Coupe

Think of Buick and you think of upper-middle-class values and genteel suburban lifestyles. The fact is, Buick has always had a mean streak that manifested itself in some of the fastest, quickest, hairiest cars built in Detroit. Its GS-400 and GS-455 Stage I cars of the late '60s and early '70s were simply race cars detuned for the street. And their Ram Air 455 Stage II GSX was a race car, pure and simple.

The thing is, Buick doesn't make too big a deal out of its performance hardware. You have to be a hardcore Buick enthusiast to know about it.

So it is with the '82 Regal Sport Coupe. It's one of Detroit's better kept performance secrets. The Sport Coupe is the Regal in hot rod clothing. Exterior trim is kept to a minimum with just some lettering along the hood scoop to give the thing away. Under the hood, there's a turbocharged 3.8-liter, four-barrel V6 rated 175 hp at 3,800 rpm and 275 ft.-lb. of torque at 2,400 rpm. Changes to the package this year include a larger, higher-capacity turbocharger to

SPECIFICATIONS

	Buick Regal Sport Coupe	Chevrolet Camaro Z28	Dodge Charger 2.2	Mercury Capri RS	Plymouth TC3 Turismo
Price (as tested)	\$13,459	\$13,000 (estimated)	\$6,391	\$10,618	\$9,245
Engine	231-cu.-in. V6, turbocharged	305-cu.-in. V8, fuel-injected	135-cu.-in. I4	302-cu.-in. V8	135-cu.-in. I4
Horsepower	175 @ 4,000 rpm	165 @ 4,200 rpm	84 @ 4,800 rpm	157 @ 4,200 rpm	84 @ 4,800 rpm
Torque (ft.-lb. @ rpm)	275 @ 2,600	240 @ 2,400	111 @ 2,400	240 @ 2,400	111 @ 2,400
Transmission	3-speed automatic	3-speed automatic	4-speed manual	4-speed manual	4-speed manual
Final drive ratio	3.08	3.23	3.13	3.08	3.13
Suspension (front/rear)	Independent, SLA, coil springs, sway bar/rgd axle, 4 links, sway bar	Independent, modified MacPherson struts, sway bar/rgd axle, 4 links, sway bar torque arm	Independent, MacPherson struts, sway bar/rgd beam axle coil springs	Modified MacPherson struts, sway bar/rgd axle, 4 links, sway bar	Independent, MacPherson struts, sway bar/rgd beam axle coil springs
Tires/wheels	P205 70R14 radials, 14 x 7-in. wheels	P215 65R15 radials, 15 x 7-in. wheels	P195 60R14 radials, 14 x 6 1/2-in. wheels	P190 65R390 radials, 390 = 150-mm wheels	P195 60R14 radials, 14 x 15 1/2-in. wheels
Steering	Power-assisted recirculating ball	Power-assisted recirculating ball	Manual recirculating ball	Power-assisted rack and pinion	Power-assisted recirculating ball
Brakes	Disc front, drum rear, power assist	Disc front, drum rear, power assist	Disc front, drum rear, power assist	Disc front, drum rear, power assist	Disc front, drum rear, power assist
Wheelbase (in.)	108.1	101.0	96.5	100.4	96.6
Overall length (in.)	200.6	187.8	174.0	179.1	174.0
Curb weight (lbs.)	3,265	3,192	2,258	2,772	2,256

PERFORMANCE

0 to 60 mph (sec.)	9.40	8.77	10.88	7.43	11.23
1/4-mile acceleration (sec. @ mph)	16.56 @ 80.21	16.56 @ 83.10	17.52 @ 78.32	15.94 @ 86.70	17.49 @ 77.58
1,000-ft. slalom (sec.)	12.74	11.42	12.42	12.61	12.44
EPA mpg (city/highway)	18/25	15/24 (estimated)	26/41	17/28	26/41

increase output, a higher-capacity, more free-flowing exhaust system, and a 3.08 rear axle ratio to help multiply the torque.

The result is a car that moves out deceptively well despite its rather heavy 3,280 pounds of avoidupois. The Regal reached a best of 16.56 seconds in the quarter-mile at 80.21 mph before the transmission on our test car started to go away. With two aboard, 60 mph came up from a standing start in 9.4 seconds.

The Regal's handling through the slalom course was, we feel, exemplary for a car of this size and weight, although our test driver had to work hard to get such good times—a best of 12.74 seconds with two other runs in the 12s, as well.

The Regal Sport Coupe is, when all is said and done, still a Buick and all that implies. Its interior was far and away the plushiest of any of the cars tested, and its ride was the smoothest and quietest, too. That it could silently and smoothly glide up to the starting line of a drag strip, its stereo system going full blast, rev up, come smoking and screeching off the starting line to a 16-second ET, then crank itself through a 1,000-foot slalom within hundredths of a second of the Capri RS says much, we think, about the dual nature of this banker's hot rod.

Dodge Charger 2.2

You might be asking what a four-cylinder-powered car is doing in a performance-car test. The fact is, Chrysler has been touting the Charger 2.2 as its performance entry for about nine months. We wanted to see if it was a real performance car or just a performance car in the mind of some fanciful ad agency copywriter.

One trip through the quarter-mile and slalom and we were convinced. The Charger 2.2 surprised the hell out of us. No, it can't hold a candle to the big V8-powered cars on the drag strip. It just doesn't have the ponies. For instance, its best drag strip run was a 17.52 at 78.32 mph—or, more than a second slower than the Capri. So in that sense, it's a rolling stone. But through the slalom run, take a look at this time slip—12.42 seconds, with a 12.44 and a 12.96 to back it up. Quicker than the Capri!

Horsepower isn't everything. Still, there's no substitute for cubic inches. Ask any drag racer. The best 0-to-60 run for the Charger was a 10.88, again a lot slower than any of the larger-engined cars.

In case you're not familiar with the Charger 2.2 package, it's basically an Omni 024 that gets some engine recalibration to richen

things up, a stiffer 3.13 final drive ratio to give the car more off-the-line dig, and a big-capacity, free-flow exhaust system that not only dumps the exhaust in good form, but also sounds hairy. All this is coupled to a four-speed transmission and a handling suspension that includes 60-series Firestone HPR tires. It all works together quite nicely and you can smoke the tires off the line if you really rev up the 2.2 and let it happen. On the street, the car causes quite a stir with its big hood scoop and racing stripes, and it's definitely a funmobile. But it's just not in the big leagues of performance—yet. Of course, dropping in a dual-quad 426-cu.-in. Hemi engine would certainly cure that.

Plymouth TC3 Turismo

Take one Dodge Charger 2.2, delete all the exterior flash, hood scoops and decals, substitute some tasteful pinstriping, keep all the mechanicals intact and you have a TC3 Turismo.

Theoretically, a TC3 Turismo should perform identically to a Charger 2.2. Production tolerances being what they are, our test Turismo was marginally different in performance in all our tests, reaching 60 mph from a dig in 11.23 seconds and covering the quarter-mile with a best of 17.49 at 77.58 mph. It churned through the slalom run in 12.44 seconds despite having power steering, which the Charger 2.2 did not. Power steering is sometimes a hindrance in quick maneuvering because of the hydraulic drag that's inherent in a power-assisted steering system.

The TC3 could also light the tires off the line on our acceleration runs and we got a satisfying chirp out of the front tires on quick shifts to second. Again, it's a fun car but simply lacks the all-out power of a big, brutish V8.

So that's it. A representative sampling of performance, 1982 style. In this supposedly energy-conscious world, why is there a return to the seemingly anachronistic performance virtues of the '60s? A couple of reasons. First, people still like cars that are fun to drive. And a good performing car is a lot more fun than a dullard on four wheels. That has never changed. Second, all of these cars will deliver decent, if not excellent, fuel mileage. But none of them are the guzzling behemoths that reigned in 1969, and the EPA numbers are testimony to that.

Which all goes to prove that you can be a socially conscious member of today's changing world and have some fun, too.

BE YOUR OWN BOSS!

Start a MONEY-MAKING SMALL ENGINE REPAIR BUSINESS of YOUR OWN

Earn EXTRA CASH income working at home—SPAREtime or FULLtime

Small Engine Repair is A Wide Open Field

Over 65-Million small engines are in use today, and a million new units are being built each month. This means there's plenty of business and big profits available for qualified men who can service and repair them. Industry growth has been so fast that there is a shortage of small engine repair pros. That's why NOW is the time for you to get into this profitable field where you can command hourly rates equal to any other skilled craft. The sale of parts, engines and accessory items add even more profits... profits YOU earn and keep in YOUR pockets, not someone else's.

Start A Fulltime Business Or Work Spare Hours For Extra Cash Income

When you're the boss in a fulltime business of your own there's never a worry over strikes or layoffs, and you earn year round profits repairing chain saws, tillers, tractors, mowers, mini-bikes, power rakes, generators, snowmobiles, snowblowers and many more items. There is no huge investment for equipment, no expensive inventory. Work right out of your garage, basement or a spare room. Ideal for sparetime income too. In just evenings and weekends you can earn extra cash for a rainy-day or retirement fund, or use the extra money for the things you want NOW.

It's Easy To Learn—No Experience Needed

You can learn this craft at home in your spare hours with our time-tested "hands on" training methods. Age, education, minor handicaps are no barrier. You get latest text materials, special tools and 3 1/2 HP Briggs & Stratton engine, but that's not all. We also help you with detailed data on how to get started, where to get business, what to charge, where to get parts at wholesale... all the shortcuts and proven methods you will need to get your business off to a fast, profitable start.

Send TODAY For FREE Facts There is NO Obligation —NO Salesman Calls

Our FREE Information Kit tells how to quickly start your own business, how to grow and how you can inspect the Foley Small Engine Repair Course on our 15-Day NO RISK Trial Offer. Mail coupon (or send postcard) to:

**Foley Small Engine Repair
7832 Foley Building
Minneapolis, Minnesota 55418**



YOU GET THESE QUALITY TOOLS AND INSTRUCTIONS PLUS THIS 3 1/2 HP BRIGGS AND STRATTON ENGINE YOURS TO KEEP!



Foley Manufacturing Co.
7832 Foley Building
Minneapolis, Minn. 55418

RUSH COUPON TODAY!

YES, please send FREE Data Kit and full details on how I can start a profitable Small Engine Repair business of my own, and facts about Foley's exclusive 15-Day No Risk Trial Offer. No obligation. No salesman will call on me.

NAME _____
ADDRESS _____
CITY _____
STATE _____ ZIP _____



FREE BLUEPRINTS and TRIAL LESSON —for your greater success in Building

Beginners, craftsmen, even foremen and superintendents, have sent for these free blueprints and trial lesson in Plan Reading as a means of trying out Chicago Tech's home-study Builders training. Learn how you can master Plan Reading—Estimating—and the practical details of all types of construction in your spare time at home. Mail coupon below or phone TOLL FREE—see how you, too can prepare for a better job—higher income, or start your own contracting business.

• PHONE TOLL FREE (24 HRS.)
1-800-526-6050 Est. 810

CHICAGO TECH/School for Builders
1737 S. Michigan Avenue, Chicago, Ill. 60616

CHICAGO TECH/School for Builders Veterans
Dept. PM-32 1737 S. Michigan Ave., Check
Chicago, Ill. 60616 Here

Please mail me a Free Trial Lesson, Blueprints and Builders Catalog. I understand there is no obligation—no salesman will call.

NAME _____ AGE _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____

Underground Homes



- Plans For The Future** —
44 page book features full color artist's renditions of 26 new underground home designs. Includes floor plans, sketches of the different types of earth sheltered homes and a discussion of the most desirable sites and climates for building each type. Blueprints available. \$7.95 ppd.
- Earth Shelter Resource Guide** —
Where and how to find everything you want to know about earth shelter living — listing of books, magazines and articles plus names and addresses of earth shelter builders, contractors, architects and associations. 218 different sources of information. \$4.95 ppd.
- Earth Shelter Water Proofing** —
At last! A 44 page comprehensive guide. Details the need for total moisture control, points out where problems are most likely to occur and clearly explains and illustrates successful water proofing methods. Includes 36 illustrations and photos plus a reference guide of 32 manufacturers/suppliers of water proofing materials. \$6.95 ppd.
- Special Offer — Save 24%**
Order all three books (a \$19.85 value) for only \$14.95 ppd. — a \$4.90 savings.

Order Today! • Satisfaction Guaranteed

Underground Homes • Dept. PM3
700 Masonic Bldg. • Portsmouth, OH 45862

NEW ARCADE ACTION AT HOME

(Continued from page 122)



FALCONS—The aliens spin down—and change into vicious flying birds. Finally, the mother ship itself appears. It's similar to the arcade's *Phoenix* (Piccadilly Software).

tells it what to do. A program in the *Galaxian* arcade game tells that computer how to draw swooping squadrons of ornamental aliens. A program in the *Asteroids* console tells that computer how to draw and animate asteroids, ships and flying saucers.

But these arcade-game computers can accept only one program—the one built into them. This program is "burned in" on an integrated-circuit chip, soldered to the main printed-circuit board. A *Space Invaders* console will never suddenly start playing *Galaxian*.

On the other hand, a home computer, such as the Apple II or Atari 800, will accept any number of programs. Rather than having programs burned in, programs on a home computer are loaded in from disc. A floppy disc (which looks like a small record, encased in a plastic jacket) is inserted—jacket and all—into the slot of a disc drive.

The disc drive whirs and the program is read off the disc and stored in the computer's brain—specifically in the home-computer's random-access memory (RAM). This RAM is fully erasable and reusable.

After you're done with one program, just load in another one. The old one is simply erased from memory as the new one is read in.

Here comes the invasion

It wasn't long before programmers realized that some home computers could be programmed to display many of the same colorful, high-resolution, fast-moving effects for which the arcade games were becoming famous. But when the market was first developing, such high-level programming was beyond the technical expertise of most owners of the machines (specifically the Apple II). The speed and detail of the effects called for ultracomplexed

LYNCHBURG HARDWARE & GENERAL STORE

42 Main St., Lynchburg, TN 37352

JACK DANIEL'S FIELD TESTER SHIRT



These are just like the shirts old Wallace Beery used to wear. Of course, my shirts have the added feature of a "Jack Daniel's Old No. 7 Field Tester" in brown on the chest. Made of 50% cotton and the rest polyester, so they wash easy and keep their shape. Natural cotton color. Order by size—XS, S, M, L, XL. My \$15.00 price includes delivery.

Send check, money order or use American Express, Visa or MasterCard, including all numbers and signature. (Add 6% sales tax for TN delivery.) For a color catalog full of old Tennessee items and Jack Daniel's memorabilia, send \$1.00 to the above address. In continental U. S. of A. call 1-800-251-8600. Tennessee residents call 615-759-7184.

38%* INCREASE IN GAS MILEAGE WITH



Turbo-Carb

FUEL-SAVING VAPOR ENERGIZER
U.S. PATENT NO. 4,163,436

*CUSTOMERS REPORT!

- Up to 38% Increase
- 5 More Miles Per Gallon
- Improved Performance
- Smoother Running Engine
- Ping Eliminated
- Easy Installation

THINK OF IT! Even a 10% INCREASE would be like receiving 12 cents EXTRA GASOLINE per gallon that you buy at \$1.20 per gallon!

- * On a '77 Chevy Van I was getting 15 mpg. It increased to 20 mpg. My performance improved. It took the "ping" out and the metalion was easy. —Gene Stone, IN
- * It's hard for me to believe the results I'm getting on my '77 Ford LTD. I went from 12 to 13.8 mpg. about 50% highway and 60% city driving with a ton of riding. Again thanks for a superb product. —Philp Stone, NY
- * For a '78 Ford Granada, it increased my mileage about 4 mpg. Enclosed check for a 1981 Ford pick-up. —Henry Lilly, MO

60 DAY—MONEY BACK GUARANTEE!

Guaranteed (1) year against Material/Workmanship Defects

MADE FOR AMERICAN AND FOREIGN VEHICLES

Carburetor Risor — Atomizer — Turbo-Prop Mixer

No moving parts to wear out, or electrical parts to burn out. Mounts under carburetor. Mounting instructions, tools and gaskets included.

PLACE YOUR ORDER NOW! As there is a LIMITED SUPPLY. Order one for each vehicle! And Save! Postage and handling PAID with order of two or more TURBO-CARBS!

Not Available at: Both Single Barrel or (3) Barrel Carb. Also—Golf 1979-82 6 cy 25L AMC & GMC 1980-82 4 cy 151 & V6-173, 30 and 32R Toyota (4-cy) pickup vehicles. 7 cc 80's stock (your model) must have 1" hood clearance. 1" 38" on spread base and quadrant. (NOT FOR SALE IN CAL.)

Write For More Details — Details Invited

SINGLE \$29.95 — DOUBLE \$34.95 — FOUR BARREL \$39.95

YEAR	MAKE	MODEL	ENGINE SIZE

\$ _____ Plus \$2.00 Postage/Handling \$ _____
Ill. Residents add 4% Sales Tax \$ _____
TOTAL \$ _____

CHECK MONEY ORDER

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

© FUGETT PRODUCTS CO., INC. • GASTON, IN 47342

© Copyright 1981 by FUGETT PRODUCTS CO., INC. ALL RIGHTS RESERVED

programming. In fact, many computer-graphics capabilities were discovered by inventive programmers.

The first few video-arcade programs—for home computers—sold surprisingly well. The market began to snowball. And within two years, such games were among the most popular in the software market.

Up until recently, the Apple II computer, with its color display and high-resolution graphics, had this market almost to itself.

Now, the Atari 800 home computer is beginning to make inroads in the marketplace. A whole series of articles, written at a highly expert level, on programming the Atari 800's graphics have appeared in recent computer journals. With all this information now being "discovered" about the Atari 800 system, it's no surprise that the first arcade-style games for this computer are appearing. In all likelihood, there will be



SHADOWHAWK ONE—This game takes hours to play. It features 3-D ghost ships that dodge and twist in rapid, eye-fooling computer animation (*Horizon*).

hundreds more to come from the various software manufacturers.

Soon Commodore, too, with its new, and very affordable, VIC 20 computer, may be adapted to arcade action.

But as of this writing, programs for the Apple II—such as those described here—are the ones most readily available.

Arcade rumblings

As computers become cheaper, more people will be able to afford the type of systems needed to run these programs. Right now, an Apple II with disc drive and color display goes for about \$1,800. But, with an additional investment of less than \$500 in software, you could simulate more than \$300,000 worth of arcade-game consoles.

As home computers become more of a mass-market item, what's going to happen to all those quarters dropped in arcades?

Many arcade game manufacturer-

(Please turn to page 158)

BUY A BIKE ENGINE. EVEN IF IT ISN'T ONE OF OURS.

We think we make the best bike engine in the world. Certainly it's the best *selling* bike engine in the world. And now that our 1982 model has a *completely automatic transmission* for only \$189.95, our market share should increase. We would of course appreciate the opportunity to send you our free color catalog, which includes full facts and specs, a Product Report by the Auto Editor of *Popular Mechanics*, and two rather overwhelming testimonials from real people with real addresses.

We may persuade you to buy a BikeBug, or we may not. If not, we urge you to buy *any* bike engine, gas or electric, in light of the energy crunch, the escalating cost of fuel, and the probability of future shortages generated by greed or political blackmail, *any* bike engine is part of the solution.

That we think our **BIKEBUG AUTOMATIC** is the best bike engine does not mean that other bike engines are bad. Some are just better than others. Our catalog tells you what's important to look for in a bike engine, and points out problems other bike engines may have. In all honesty, there are reasons why *our* bike engine may not be best for you...and we tell you that too.

You owe it to yourself, not OPEC, to learn and be persuaded about the need for bike engines...ours or theirs.



AQUABUG INTERNATIONAL INC.

Dept. PM-23 103 Merrick Rd., Rockville Centre, N.Y. 11570 (516) 536-8217

Please Rush FREE Catalog!

Name _____

Address _____

City _____ State _____ Zip _____

2nd MOST IMPORTANT TOOL FOR EVERY WOODWORKING SHOP

VERSATILE
W&H
MOLDER-
PLANER

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

From \$449

- Master Charge
- VISA



FREE BROCHURE

WILLIAMS & HUSSEY MACHINE CORP.

Dept. 17, Millard, N. H. 03055
Toll-free 1-800-258-1380

SPORTSMAN FOLDING KNIVES



- Safety Lock Prevents Accidental Closing.
- Brass Bolsters And Brass Lined.
- Handmade Custom Features.
- Surgical Steel Blades.

\$6.95

\$4.95

\$3.95

BLACK BELT CASES

N-22 4" Closed \$1.25 Add 75¢ Handling Money
N-20 5" Closed \$1.25 Back Guarantee.
N-21 6" Closed \$1.50

WESTBURY SALES CO. DEPT. R-3-PM
373 Maple Avenue, Westbury, New York 11590

For every man who has ever wanted to build his own home. With his own two hands.

Now this dream can be a reality for you with a Lincoln Logs "STACK 'N BUILD" Log Home Package.



You build it yourself . . . and you don't have to be an architect. We supply all blueprints, plans and easy-to-follow instructions.

You don't have to be a structural engineer. Our log homes are designed and engineered for quick, easy construction in as little as 3 weeks.

You don't have to be a designer, but it helps to know what you want. Lincoln Logs will even assemble a custom log home package based on your interior or exterior configuration AT NO EXTRA COST.

You don't have to be a building contractor. We supply everything you need from the beautiful logs themselves, to all the hardware down to the very last nail.

You don't need a lot of fancy tools. Just what's probably in your tool box already and a power saw.

You *do* need your own two hands . . . and a little help from a good friend is always nice.

If you ever wanted to build your own home, then it's time for you to make your move to Lincoln Logs.

Send just \$5 for your complete Log Home Planning Kit to:

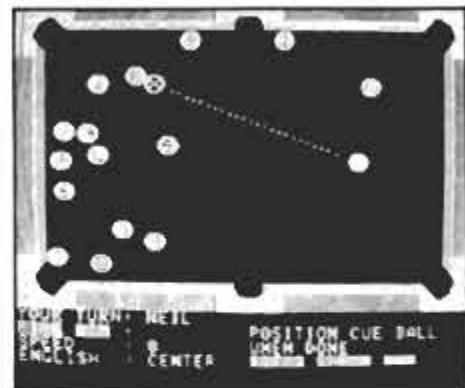


THE ORIGINAL
Lincoln Logs Ltd.

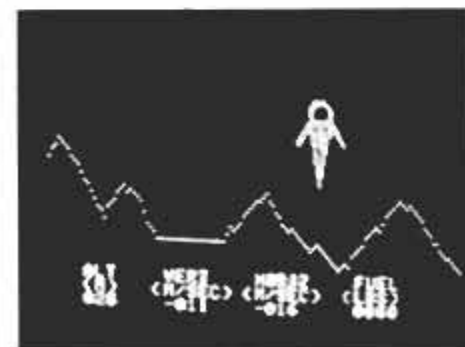
3 CHESTNUT ROAD,
CHESTERTOWN, N.Y. 12817

NEW ARCADE ACTION AT HOME

(Continued from page 157)



POOL 1.5—New home games can simulate other forms of recreation. In this pool game, angles of impact, English and rebounds are shown exactly in animation (I.D.S.I.).



TRANQUILITY BASE—The lunar-landing games were arcades' most popular before alien-combat games. Here's the best we've seen on a home computer (Stoneware).

These 3 BIG DRAFTING KITS included . . .

when you train
with us for a

WONDERFUL JOB IN DRAFTING!

Maybe you can find a job that pays better, but I don't think you'll ever find a job that gives you more satisfaction that you are making a big contribution to your community. This home-study plan was designed to help beginners get jobs with security and prestige as draftsmen. It's easy with our exclusive step-by-step instruction. Everything shown here is included with our course.

Graduation from this course does not insure that you will get a job. To find out how our graduates have done, send for our job placement record.

CALL TOLL-FREE
1-800-228-2028 / EXT. 200
DEPT. PB022
(except in Alaska call (408) 571-4800/EXT. 200)

CALL ANYTIME—Operators to take your call 24 hours a day, 7 days a week. No cost. No obligation. No salesman will call.

OR MAIL COUPON TODAY!

NORTH AMERICAN SCHOOL OF DRAFTING, Dept. PB022
4500 Campus Dr., Newport Beach, CA 92660

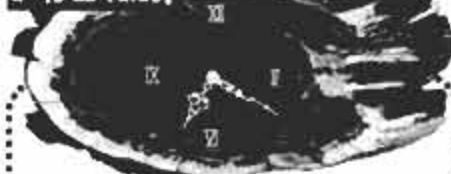
Rush "DRAFTING CAREER KIT," including folder, Aptitude Test & Drafting Instrument—ALL FREE!

NAME _____ AGE _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

a \$45.00 Value!



Finish this exciting CLOCK Yourself and Save!

Fun and easy . . . everything included.

- Cedar 'Burl' 14-17" x 1 1/4" thick, prerouted and predrilled, Easy to finish.
- Superb #756 quartz movement (West Germany's finest).
- Goldtone Serpentine Hands, elegant.
- Goldtone Roman Numerals, self-adhesive.
- Complete, easy-to-follow instructions.

Introductory price just **\$19.95***
plus \$2.50 shipping & handling, each quan.

Create your own clocks, order odd! #756 quartz movements! Accurate to 1 min. year. Runs up to 4 years on one 'C' battery. Goldtone hands incl. with this ad. Warranted full year. Only \$7.95* plus \$1.50 per order shipping & handling. quan. *Coo. residents add tax.

Please send me the merchandise checked above.

Total incl. _____ Ship. & hand. _____ Total _____

VISA/M.C. # _____

Exp. Date _____

Name _____

Address _____

City/State/Zip _____

CLOCK CRAFTERS

5605 NO. PETERSON AVE., SEDALIA, CO 80135
ATT: DEPT. K



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



BEAT INFLATION!

Cash in on the huge demand for small engine repair.

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

making business!

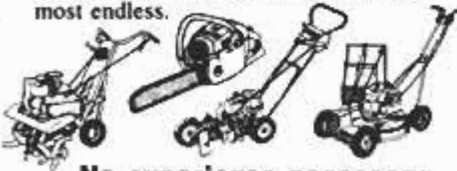
In just a short time, you can be ready to join one of the fastest growing industries in America...an industry where qualified men are making from \$10.00 to \$15.00 per hour...and that's just for labor. Parts, engines and accessories add even more to the profits.



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

46-million small engines are in service today!

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



No experience necessary.

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

You receive trade secrets and business plans.

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

Increased Income

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



Walter M. Strick Campbell, California

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

SEND FOR FREE FACTS!

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

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



BELSAW INSTITUTE OF SMALL ENGINE REPAIR

512M Field Bldg., Kansas City, MO. 64111

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

BELSAW INSTITUTE, 512M FIELD BUILDING
KANSAS CITY, MISSOURI 64111

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

Name _____

Address _____

City _____

State _____ Zip _____

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

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



Send TODAY for this fact-filled **FREE BOOKLET!**



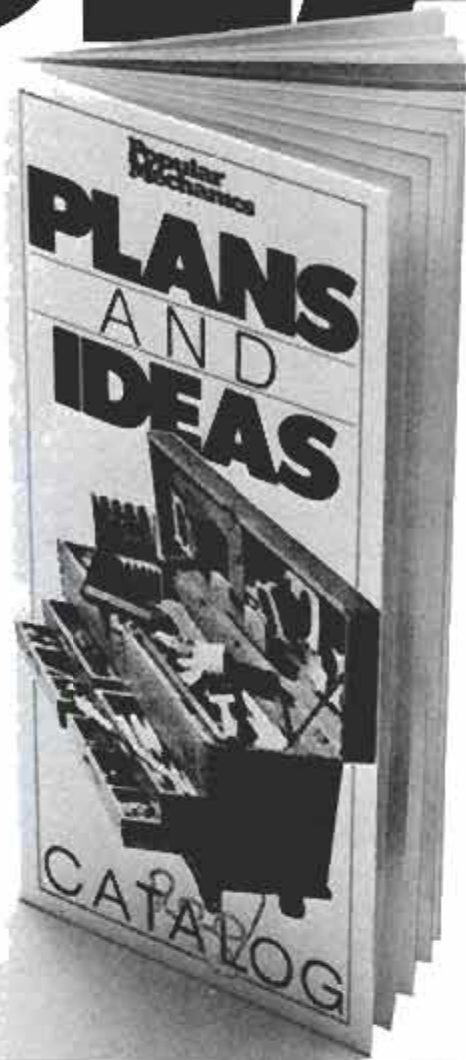
Tells how you quickly train to be your own boss in a profitable Sparetime or Fulltime business of your own PLUS complete details on our 10-Day NO RISK Trial Offer!

SMART IDEAS

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

SEND FOR YOUR CATALOG TODAY!

Send Your Name and Address with Check or Money Order to
Popular Mechanics, Box 1014, Radio City Station, New York, N.Y. 10101

TECH LINES

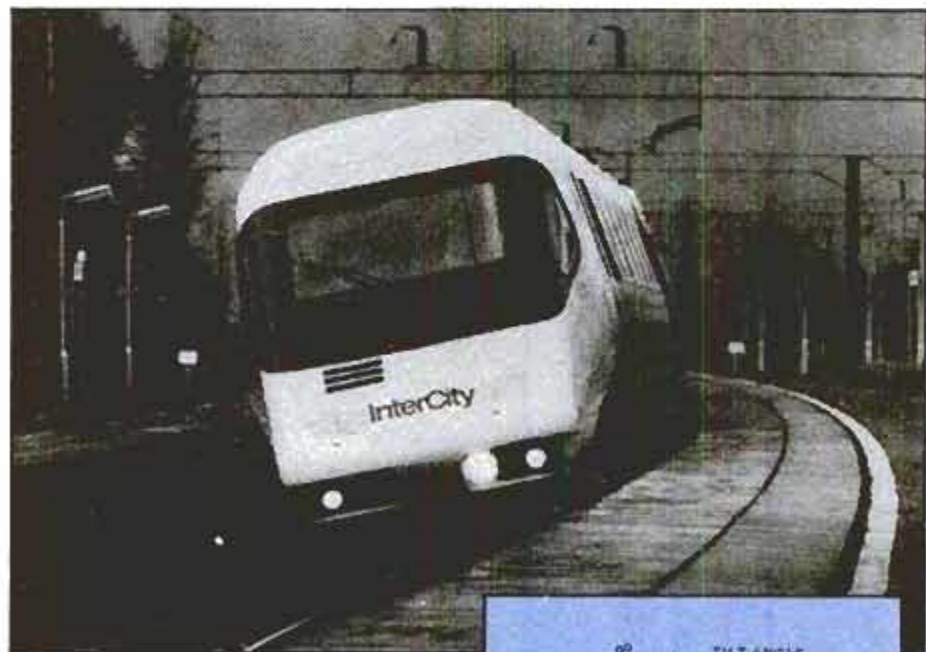
The great train rivalry

Transportation

Two of Europe's "trains of the future" are now making regular runs. The French TGV, in regular service at speeds up to 160 mph, and the prototype British ATP (regular service won't begin for another five years), have presented different solutions to the problem of achieving stability and economy at high rail speeds.

While both government-run train systems employ new technology in basic suspension and aerodynamic designs, each chose a divergent final step. The French chose to spend over \$1.5 billion to construct 250 miles of exclusive TGV roadbed with precisely canted tracks and no short-radius curves. The British say they were able to develop a train that will run nearly as fast (although some 15 to 20 mph slower in current operation) on existing—otherwise known as "Victorian"—tracks at a total cost of about 1/30 of what the French spent on roadbed alone.

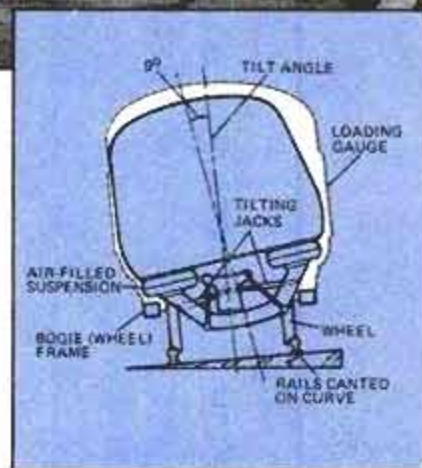
The ATP train tilts inward on curves as much as 9° from the perpendicular to the bogie (wheel) frame, which may also be canted by the track on sharp curves. The hydraulic actuators that tilt the train have been a source of concern, however. On the ATP's inaugural run last December, its return leg from London to Glasgow was marred by three



Britain's ATP train hits 125 mph on its inaugural run. Drawing (right) shows basics of automatic system which tilts cars into sharp curves. Design problems, malfunctions have stemmed from it.

emergency stops. When the tilt mechanism malfunctions, an automatic system locks the cars upright and pulls the emergency braking cord. Some passengers were shaken; the dining-car galley was a shambles. The apparent cause: a blown fuse.

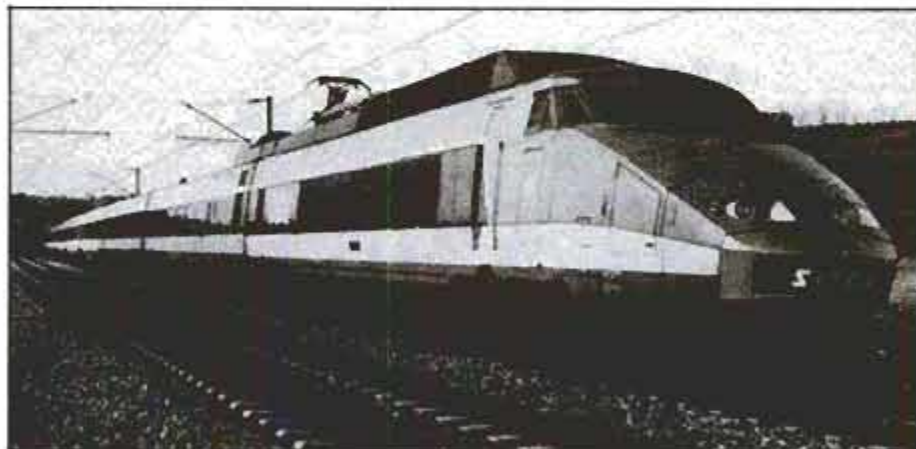
Also, at a full 9° tilt, the ATP slightly exceeds its "loading gauge" (see drawing). This is defined as the



space outside of which a train could make contact with objects along the right of way—or with another oncoming ATP—according to Britain's *New Scientist* magazine.

Meanwhile, the French claim they tried the tilting system first, and discarded it because it induced motion sickness. Their TGV has diverted 6,000 people per day from airlines (about 1,000) and highway travel onto the rails, according to government figures.

A slower, Canadian-designed tilt train (8° limit), has been under Amtrak evaluation in service between Boston and New York for over a year. Thus far, neither major incidents, nor further commitment, have been reported by Amtrak.



French TGV train at speed on new roadbed built for it alone. Its average occupancy rate at the end of 1981 was 68 percent—two years ahead of its planners' schedule.

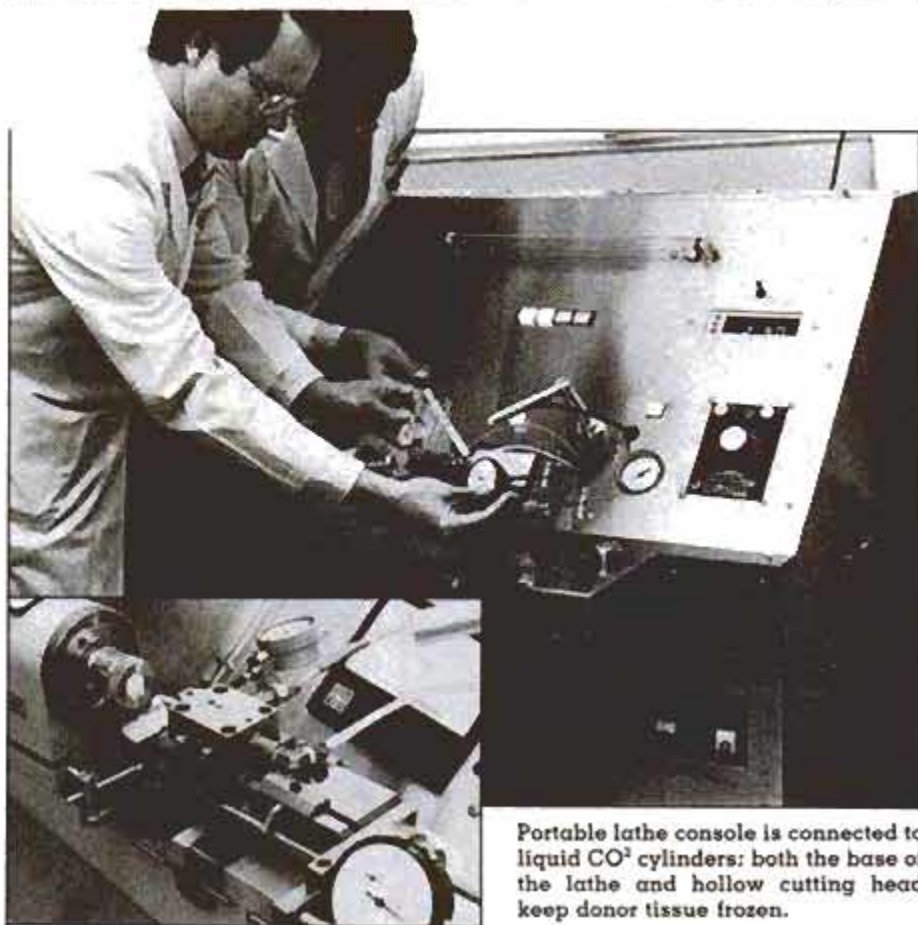
Medicine

New eyes from a lathe

Medical technology is not a field for the squeamish. It takes a steadfast stomach, as well as a keen imagination, to originate the idea of shaping actual human corneas into transplant lenses on a miniature lathe. Yet, such a procedure is now expected to help restore vision to cataract-surgery patients who are left with a condition called monocular aphakia. This problem requires a large refractive correction which often cannot be obtained with contact lenses or glasses.

The lathe, manufactured by Steinway Instrument Co. of San Diego, Calif., keeps corneal tissue frozen while it is cut into a properly contoured lens "button." Then, it can be positioned on the patient's eye and sutured into place.

The still-experimental lens-grinding procedure and surgery—called refractive keratoplasty—proceeds in four distinct steps: First, the outer layer of the patient's cornea is sliced off by a microelectrokeratome, an instrument resembling a tiny, motorized block plane. Then, a thin, transparent disc of corneal tissue from a donor is placed on the optical lathe's base and frozen immediately by liquid carbon dioxide, circulating



Portable lathe console is connected to liquid CO₂ cylinders; both the base of the lathe and hollow cutting head keep donor tissue frozen.

through the base of the instrument.

To determine what precise shape to cut the frozen tissue, the surgeon enters the degree of correction needed, the curve of the patient's cornea, its thickness and other data into a small computer. The required arcs are then dialed into the lathe. The actual cutting procedure, however, is

controlled manually by the surgeon.

The lathe's cutting edge, like the base, is hollow and charged with liquid carbon dioxide. This absorbs heat generated by the cutting process and helps keep the lens frozen. After being ground, a typical corneal lens may wind up slightly smaller than the diameter of a pencil eraser

Automotive

Mini-miser

Lately, there haven't been a surplus of opportunities to commend the British automobile industry for either marketing expertise or technical brilliance. Yet try they must, and at least one conversion of a Leyland Mini Metro by an outfit known as Butterfly Motor Corp. from Redditch, Worcestershire, looks like a winner.

The Metro 100L saloon, not exactly a gas eater, even in stock configuration, was modified by fit-

ting a special cylinder head and a plasma ignition system. The latter, which can be fitted to any car, provides a welding-type spark that enables a much leaner fuel/air mixture to be dependably and fully ignited.

The other major problem with superlean running—burned valves—appears to have been overcome by the addition of the modified cylinder head.

An independent research team studied the modified Metro for two months. At a constant speed of about 40 mph, the car recorded gasoline mileage of slightly over 70

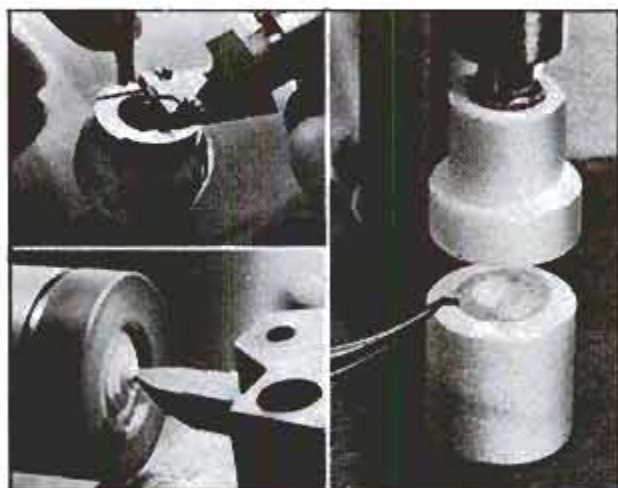
mpg. Running near 30 mph, the car was able to notch an impressive verified mileage of slightly over 100 mpg.

If the new, lean-burning

system is demonstrated to be transferable to a variety of vehicles, Britain might once again be back on the map, at least automotive-wise.



Modified Mini Metro workers use rickshaw to make a point.



Device called a microelectrokeratome is used to slice thin layer of cornea from donor eyeball (top left). Placed on lathe base and frozen (left, above), cornea is shaped, then checked (right) for .001-mm thickness. While a computer is used to determine final dimensions of new corneal lens, surgeon's hands guide the lathe.

and about as thick as two sheets of notebook paper.

The surgeon completes the procedure by creating a corneal "sandwich"—placing the newly shaped donor lens on the patient's eye, covering it with the slightly larger slice of the patient's own cornea (removed at the beginning of the operation) and suturing the two pieces in place. Rejection is not a problem, since cells in the donor tissue are killed by the extreme temperature.

Only a handful of optical lathes

are currently in use in this country. One, at Oregon Health Sciences University in Portland, has enabled Dr. Larry Rich to experiment with different surgical techniques on laboratory animals. The success of those studies has made it possible for Dr. Rich to perform nine of these procedures on human subjects.

Dr. Rich believes that as surgeons acquire greater skill in operating the lathe and as the surgical procedures become more commonplace, refractive keratoplasty will eventually be-

come an attractive treatment option for a variety of less serious refractive-sight problems, such as cases of severe nearsightedness, for example.

One resource Dr. Rich hopes to see developed is regional corneal "banks," where donated corneas could be preserved indefinitely at extremely low temperatures. Eye surgeons would then be able to order lenses, ground to an exact prescription, for insertion in their patients' eyes.

Making contacts

Millions of people who can be thankful that they'll never require corneal transplants are still fated to suffer from presbyopia, the age-related inelasticity of the eye's lens that inhibits focusing on close objects—as in reading.

Recently, Bausch & Lomb introduced the first soft contact lens in the United States that's capable of bifocal correction for near- or farsightedness and presbyopia. Hard contact lens materials tried as bifocals didn't work out—the extra "plus" lens segment required made them bulky and unwieldy. Bausch & Lomb estimates that some 5,000,000 Americans out of the approximately 34,000,000 candidates for spherical bifocal lenses can use the new, soft bifocals successfully.

The presbyopia-correcting segment of the lens takes advantage of the fact that most close work is accomplished with a slight downward movement of the eyeball. This movement is enough to shift the eye's lens into position behind the "plus" segment of the soft contact lens.

Clinical studies indicate that persons 40 to 55 years old will be prime candidates for the lens.



Military Arcade aces

As video games go, this has to be the ultimate: up to 12 players, divided into offense and defense. Four sit in fighter-plane cockpits inside 40-foot translucent domes; sky, ground and other aircraft are projected onto the dome, simulating realistic combat conditions. The remaining eight players "fly" TV consoles and are directed by intercept controllers. Thus do the fighters and interceptors do battle.

Atari can't touch it. Nei-

ther can we. It's a classified McDonnell Douglas combat simulator, set up by 60 computer experts, and now under U.S. Air Force test.



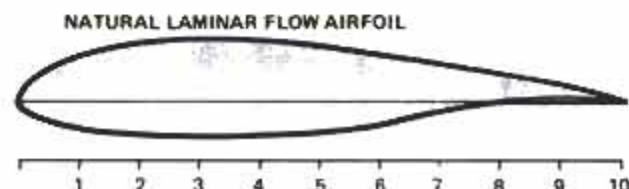
Dogfight in projector dome of a still-secret simulator.

Aviation Winging it

Natural laminar flow over an aircraft wing, unaided by vacuum (boundary layer control) or slot geometry, has been a goal of aerodynamicists for decades. Until the advent of composite-material surfaces, wing construction didn't permit

the needed smoothness that would allow air to adhere.

Now NASA thinks it has a design (drawing below) that will provide natural laminar flow up to Mach .6 (about 430 mph at sea level, less at altitude) on a composite-surface wing. Not surprisingly, it's a "supercritical" type—fairly thick, with the characteristic "hook" aft.



Marine

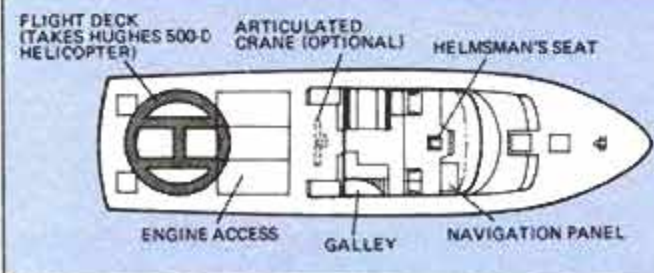
PT patrol—or bust

A St. Petersburg, Fla., company, appropriately known as PT Boats, is building an 85-foot, patrol-type craft, based somewhat on the lines and functional design of the against-all-odds craft that symbolized bravado in the Pacific 40 years ago. They're not doing it for reasons of nostalgia, however; the asking price for the prototype will be \$895,000.

The new twin-turbocharged-diesel craft, said to be capable of 35 knots or better, should appeal primarily to the U.S. Coast Guard, Customs Service and Drug Enforcement Agency. These organizations are trying unsuccessfully to curtail a massive influx of illegal substances—and immigrants—into this country via Florida waters.

One of the major reasons for the runaway smuggling syndrome, says PT Boats president Chris Petty, is that it's so easy. On the average, the Coast Guard fleet is more than 20 years old. The cutters that are capable of any speed are all over 200 feet long and unable to go up through reefs or into narrow coves after drug runners.

These relative rust-buckets are pitted against the newest Donzis, Cigarettes, Magnums and other hot, off-



Helicopter deck pad, twin turbodiesels as well as provisions for electronic navigation and detection gear are features of new PT craft. Deep-V hull has speed potential of 35 knots.

shore racing hulls, equipped with radar and drivers wearing night-vision equipment made to classified military specs. It's no contest, according to Petty.

The new PT concept would include an afterdeck pad to accommodate a small helicopter which could cruise at 160 mph (no enforcement vessel currently operating in Florida waters

can land a chopper). The copter and PT boat could work in tandem in search-and-bust operations. The fiberglass hull was designed by C. Raymond Hunt Assoc. of Boston, known for fast, deep-V type motorboats.

What's to keep a drug smuggler from buying a PT himself? Nothing—least of all the price.

Alternatives

Tilting windmill

Heirs of Don Quixote are threatening to sue Windgen Ltd., an Elgin, Ill., manufacturer of a new wind turbine that does its own tilting.

The basic problem is that wind machines capable of generating power in light winds tend to tear themselves apart in heavy ones. Windgen's W-1 begins electrical output in an 8-mph breeze, and the company claims it can sup-

ply the electrical needs of an average three-bedroom home in winds of 12 mph (not including heating). Maximum output is 4,000 watts at a wind velocity of about 20 mph.

The turbine tracks the wind 360° around its mast. When the wind velocity reaches 20 mph, negative lift produced by the stabilization vanes tilts the turbine up. This effectively feathers the blades in the windstream to protect the system from overspeeding. It automatically returns to operating position when the wind dies down.

The one-piece blade is made of laminated wood, triple-coated with fiber-



Windgen wind turbine in normal operating position (left) and tilted up in high wind: sliding weight damps the movement.

glass, to preclude any interference with local TV reception (a common problem with standard metal-

bladed wind machines). Windgen is located at 1265 Countryside Dr., Elgin, Ill. 60120.

CAP SCREWS, Hex Head
Grade 2 Steel, Zinc-Plated

U.S.S. WROUGHT WASHERS
Steel, Zinc-Plated

CAP NUTS
Steel

RING TERMINALS
Copper, Tin-Plated

CABLE CLAMPS
Nylon

BLIND RIVETS
All Steel

FINISHING NAILS
Steel

HOG RINGS
Copper Plated Wire

HANGER HOOKS
With Nails

CONCRETE HOOKS
High-Impact Plastic

EXTERNAL RETAINING RINGS
Spring Steel

MACHINE SCREWS, Grade 2 Steel, Zinc-Plated

SELF-TAPPING SCREWS, 18-8 Stainless Steel

WING NUTS
Die Cast Zinc

SPADE TERMINALS
Copper, Tin-Plated

WIRE & CABLE HOLDERS
Nylon

BLIND RIVETS
Aluminum

STEM SNAPS
Black Nylon

WIRE HOSE CLAMPS
Spring Steel

WALL ANCHORS
Conical, Plastic

COTTER PINS
Steel, Zinc-Plated

E-CLIPS
Carbon Spring Steel

HEX NUTS
Grade 2 Steel, Zinc-Plated

MACHINE SCREWS, 18-8 Stainless Steel

MALE DISCONNECTS
Copper, Tin-Plated

SOCKET HEAD SET SCREWS
Alloy Steel, Phosphate Coated

BUTT CONNECTORS
Copper, Tin-Plated

CABLE TIES
Nylon

RIVET BACK-UP WASHERS
All Steel

TACKS
Tempered Steel

WORM SCREW HOSE CLAMPS
Stainless Steel

WALL ANCHORS
Steel

CLEVIS PINS
Steel, Zinc-Plated

COMPRESSION SPRINGS
Music Wire, Zinc-Plated

"S" HOOKS
Steel, Zinc-Plated

CAP SCREWS, Hex Head 18-8 Stainless Steel

SOCKET HEAD CAP SCREWS
Hardened Steel, Phosphate Coated

CLOSED END CONNECTORS
Copper, Tin-Plated

GROMMETS
Rubber

PLASTIC RIVETS
High-Impact Plastic

BUTTON SNAPS
Brass, Nickel-Plated

FRAME HANGER WIRE
Steel

SCREW HOOKS
Steel, Zinc-Plated

ROLL PINS
Steel, Zinc-Plated

EXTENSION SPRINGS
Music Wire, Zinc-Plated

SPLIT-LOCK WASHERS
Grade 2 Steel, Zinc-Plated

FINISHING WASHERS
18-8 Stainless Steel

CASTLE NUTS
Steel, Zinc-Plated

OPEN/CLOSED BUSHINGS
High-Impact Plastic

THREADED RIVETS
Aluminum

COMMON RIVETS
Steel, Nickel-Plated

FRAME HANGERS
Pronged

SCREW EYES
Steel, Zinc-Plated

PIN CLIPS
Steel, Zinc-Plated

SPACER BUSHINGS
Steel

SELF-TAPPING SCREWS, Grade 2 Steel, Zinc Plated

COTTER PINS
18-8 Stainless Steel

SNAP CAPS SCREW COVERS
High-Impact, Molded Plastic

FEMALE DISCONNECTS
Copper, Tin-Plated

SNAP BUSHINGS
High-Impact Plastic

DECORATIVE NAILS
Steel, Brass-Plated

COMMON RIVETS
Aluminum

FRAME HANGERS
Saw Tooth

SHOULDER HOOKS
Solid Brass

HITCH PIN CLIPS
Spring Steel, Zinc-Plated

O-RINGS
Neoprene Rubber

WOOD SCREWS, Flat Head
Grade 2 Steel

TINNERMAN NUTS
Multi-Thread Steel

THREADED INSERTS
Brass Alloy

ALLIGATOR CLIPS
Softenerless

UNIVERSAL BUSHINGS
High-Impact Plastic

DECORATIVE NAILS
Steel, Chrome-Plated

GROMMETS
Brass

PLASTIC HOOKS
Adhesive Back

CUP HOOKS
Solid Brass

SQUARE KEYS
Steel, Unplated

CHRISTMAS TREE CLIPS
Nylon Copolymer

INTERNAL TOOTH LOCK WASHERS
Grade 2 Steel, Zinc Plated

TINNERMAN NUTS
Single Thread, Spring Steel

THREAD REPAIR INSERTS
Steel, Zinc-Plated

SNAP SPLICE CONNECTORS
Plastic

STRAIN RELIEF BUSHINGS
High-Impact Plastic

COMMON NAILS
Diamond Steel

COMMON SENSE FASTENERS
Steel, Chrome-Plated

CLOTH HOOKS
Adhesive Back

GATE HOOK & EYE
Steel, Zinc-Plated

HALF-MOON KEYS
Steel, Oil Coated

PUSH-PULL FASTENERS
Polycarbonate

CAP SCREWS, Hex Head
Grade 5 Steel, Zinc-Plated

NYLON INSERT LOCK NUTS
Zinc-Plated, Nylon Insert

WOOD BUNGS & BUTTONS
Hardwood Birch

ELECTRICAL WIRE
Copper, Thermoplastic Insulated

HOLE PLUGS
High-Impact Plastic

SINKER NAILS
Cement Coated

LIFT-THE-DOT-FASTENERS
Brass, Nickel-Plated

ONLY \$1.00
(refundable with first order)



SEARCH NO MORE!

NOW... Just about every kind, type, size and style of fastener and small part in one catalog!

Everything from common nuts and bolts to specialty o-rings and half-moon keys. Available in complete, organized sets... or individually in bulk lots. All illustrated full size. All industrial quality. And all at a fraction of normal prices. Catalog shows how to select and use fasteners and parts... PLUS... installation and removal tools for fasteners and parts... and an unequalled selection of organizer cabinets and bins.

- No more frustrating searches!
- 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 less-than-professional repairs!
- No more leaving things in pieces while you hunt down a little part!
- No more "drugstore" quality hardware!
- NO MORE HIGH, "BUBBLE PACK" PRICES!

D.R.I. Industries, Inc., Dept. PM382A
11100 Hampshire Avenue South
Bloomington, MN 55438

TO RECEIVE YOUR CATALOG, COMPLETE AND MAIL THIS COUPON WITH \$1.00 CHECK OR MONEY ORDER (refundable with first order) to:

D.R.I. Industries, Inc., Dept. PM382A
11100 Hampshire Avenue South
Bloomington, MN 55438

PLEASE PRINT

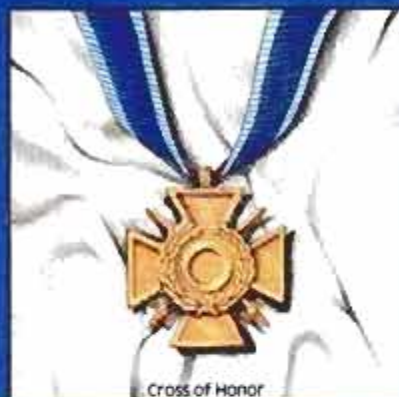
MR. MRS. MISS
NAME _____
First M.I. Last

ADDRESS _____
Street & Number

City State Zip

MAG-48

69615



Cross of Honor



Médaille Internationale



Sports Gold Medal



CARQUEST Qualified Counterman Patch

They're only as good as the people who earn them.

To become a CARQUEST Qualified Counterman may not be as tough as winning a gold medal, but it does have to be earned.

At a CARQUEST Auto Parts Store, the "I CAN HELP" patch assures you that your CARQUEST Qualified Counterman has received training and completed a professional training program.

In plain talk, that means just what the patch says. As an auto parts professional, your Qualified Counterman can help. With friendly, courteous service, and the right parts. And when you need it, even the right advice.

Whether you're an old hand at do-it-yourself auto repairs or just starting out, you'll find that the Right Price, the Right Parts and the Right Advice make "CARQUEST: the Right Place to buy auto parts". We're in the Yellow Pages.



AUTO PARTS STORES

CARQUEST: the Right Place to buy auto parts.

AT MOST LOCATIONS



AUTOMATIC GARAGE DOOR SYSTEM

- NO PLASTIC PARTS - ALL STEEL
- AUTOMATIC REVERSE
- 1/2 HORSEPOWER
- LIGHT TIME DELAY
- DIGITAL REMOTE CONTROLS
- SHIPPED UPS OR PARCEL POST
- UL & FCC APPROVED
- MADE IN U.S.A.

FREE INFORMATION

MOTORDOOR P.O. BOX 1565
NORTH WALES, PA 19454

Telephone Listening Device

Record telephone conversations in your office or home. Connects between your 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.

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-2062, Melbourne, FL 32901. COD's except. For catalog of transmitters, voice scramblers and other specialty items, enclose \$2.00 to USI Corp.

Each \$19.95
Diy Our Best

6 WOODWORKING SECRETS

(Continued from page 93)

exposed to prevent uneven wear. Make the 1-in. table slot wider in the center to accommodate such adjustments.

Before welding the leg (G2) to the rod (G1), drill and tap one end of the rod for a small screw to hold the protractor indicator. Turn a groove 1 1/4 in. from the tapped end for the locking rod. Taper-grind the threaded locking rod to fit in the groove.

When you assemble the grinder, allow the 5/8-in. rod to protrude about 1/16 in. through the protractor. Then, with the table locking rod in place in the groove, fasten the hanger to the table bottom.

The protractor may be a 6-in. school type. If it's clear plastic, spray the back side white, so that markings will stand out sharply. Glue the protractor to an oversize section of hardboard and drill a 3/8-in.-dia. hole through the center of the protractor center. Attach the 5/8-in. rod and screw-fasten to the tabletop edge. The protractor arm may be a strip of clear plastic, heavily scored on the back, or a sheet-metal pointer.

The table may be of 3/4-in. plywood or a plastic-covered sink-cutout section, as shown here. The abrasive belt may be 1 x 42 or 44 in. If not available locally, 1 x 44-in. belts may be obtained from Belsaw Machinery Co., 3251 Field Bldg., Kansas City, Mo. 64111, for about 90 cents each.

—William Waggoner

MATERIALS LIST—SANDER/GRINDER

Key	No.	Size and description (use)
A	1	1"-i.d. x 2" pipe
B	1	3/4"-i.d. x 11 1/4" pipe
C1	1	1/2"-i.d. x 8 1/2" pipe
C2	1	1/2"-i.d. x 3" pipe (ream to 5/8" i.d.)
C3	4	1/2" x 3" pipe (ream to 3/8" i.d.)
D1	1	1"-i.d. pipe (collar)
D2	1	1/2"-i.d. to 3/4"-i.d. reducing elbow
E1	1	1/2" pipe floor flange
E2	1	3/4" pipe floor flange
F	2	1/2"-i.d. x 5/8"-o.d. x 1 1/2" bushing
G1	1	5/8"-dia. x 10" steel rod
G2	1	5/8"-dia. x 3 3/4" steel rod
H1	1	1/2"-dia. x 4" steel shaft
H2	1	1/2"-dia. x 3" steel shaft
I	2	1/8" x 3/4" x 3" flat steel plate
J	1	1/8" x 1 x 6" flat steel backing plate
K	1	5/16"-dia. x 4" steel rod
L	1	Faucet handle
M	1	3 1/2" butt hinge
N	1	1/4-20 x 1 1/4" rh machine screw
O	1	1/4-20 nut
P	1	1/4-20 x 3/4" wing bolt
Q	1	5/16 x 1" compression spring
R	1	8-32 hex nut
S	1	3/16-18 hex nut
T	2	8-32 x 1/2" setscrew
U	3	1 1/2 x 2 3/4"-dia. hardwood pulleys
V	1	1/4" hardboard, approx. 6 x 10"
W	1	Protractor
X	1	1/8 x 3/8", length to fit (indicator)
Y	1	8-32 x 1/2" rh machine screw
Z	7	No. 8 rh wood screw
AA	1	Electric motor
BB	1	3/4 x 10 x 10" plywood
CC	1	1/8"-dia. x 1" steel pin
DD	8	1/4" Teenut and bolt
EE	1	Abrasive belt

Misc.: Welding materials, white paint (optional).

How to make your own drapery rings



Drapery rings are 1/4-in. slices of schedule 40 PVC pipe and No. 16 screw eyes.

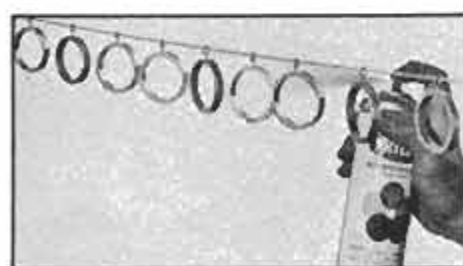
When the rings for our drapery hangers were lost during moving, new ones, at \$2.59 per pack, would have added up to over \$40. Instead, I made new rings by cutting 1/4-in. slices of 1 1/2-in. schedule 40 PVC pipe; it has thick walls to receive screw eyes. I predrilled pilot holes, attached screw eyes and painted the rings.—*Jack Langseder*



A band saw slices the pipe. Strip of masking tape on the table ensures that the slices are cut to the proper thickness.



After marking and drilling a 1/8-in. hole in the PVC, turn the screw eye until the point is flush with the inside wall.



Hang rings on a string so you can spray paint them quickly and easily all at once.

MAKE BIG MONEY get into a BIG profit business

★ WITHOUT ANY INVESTMENT ★ WITHOUT DOING THE WORK.

—passing the word around in your area about sensational

Pace SEAMLESS SPRAY

The Product and Process made for these "inflation" times

There's nothing more exciting to sell than a revolutionary idea that saves folks a lot of money. If it's already a proven concept, all the better. SEAMLESS SPRAY, our process for restoring old roofs is that kind of opportunity. It fills a vacuum created by the ridiculously high costs of new roofs, which the average plant, factory, school, hospital etc. no longer can afford. With SEAMLESS SPRAY, you sell them the product and process that is already working for people like General Motors, General Electric, American Airlines, Holiday Inns,

United States Steel, DuPont and hundreds more.

They make no investment beyond what they pay for the product. Their own men handle the SEAMLESS SPRAY application, which on the smallest jobs saves many thousands of dollars. On that minimum SEAMLESS SPRAY order, you make over \$1,000. Beautiful for the customer. And very satisfying for you, the man selling the process.



PAYS
\$1,000 OR MORE
for one average sale.

WE SHOW YOU WHAT TO DO, AND HOW TO CLOSE SALES EVERY STEP OF THE WAY.

With our plan, we take you every step of the way. Absolutely no experience is required. Men from all walks of life, as diverse as teachers and farm hands get into SEAMLESS SPRAY, making the big \$1,000 plus checks from their first week out.

Our "live Selling Kit comes to you

free, with a PERFORMANCE MANUAL which backs up every claim made by Pace, a Dun & Bradstreet AAA-1 company. To get all the facts write Pace Products, Inc. 81st & Indiana, Box #5036, Kansas City, Missouri 64132.

1 SALE PAID:

\$1,831.84
to
Gus Dethlefs



\$2,458.40
to
Ray Wells



\$1,866.21
to
John Napier



FREE!



Dick Rogers,
Pres. Pace
Products, Inc.

I'LL SHOW YOU HOW EASY IT IS TO MAKE \$1,000 A WEEK PART-TIME! FREE FACTS BY MAIL. NO SALESMAN WILL CALL. MAIL COUPON NOW.

Dick Rogers, President
PACE PRODUCTS, INC. Dept PM-382
81st & Indiana, Kansas City, MO. 64132

I'm not waiting another day. Please rush by mail all the facts about making big, spare-time money with Pace's four sensational one-coaters. No obligation. No salesman will call.

Name _____
Address _____
City _____ State _____ Zip _____

FREE QUIKRETE Concrete Project Instructions

at your hardware, building supply or home center.

DO IT YOURSELF directions for a wide range of projects using

QUIKRETE concrete, mortar and sand mixes.



THE QUIKRETE COS.
COLUMBUS, OHIO 43229

WALK SAFE with PHASER

— finest tear gas weapon on the American Market, available only from Sekure International. Powerful (wide blast) pressurized 15 foot spray, multi-shot, easy-to-use, refillable. Guaranteed 5 years! Just \$19.95 through this introductory offer. Order now. Or request further information.

Rush my PHASER only \$19.95 includes handling.
 Tell me more about PHASER. Pay by check, money order, credit card.



Name _____
Address _____
City _____ State _____ Zip _____

SEKURE INTERNATIONAL 2170 S.E. 17th St.
(Suite 307) Ft. Lauderdale, Florida 33316

Convert Your Drill Press Into a
Milling Drilling Machine



By attaching our Mill Table to your drill press you can perform facing, slotting, milling and drilling operations on almost any machinable material. The Mill Table allows precise positive movement of any workpiece in two directions relative to the drill press spindle, just like a full size milling machine. Adding our Swivel Vise - as shown above - lets you hold small or round parts and adds angle machining to the operations you can perform.

MILL TABLE - 17" x 5.5" work surface, aluminum construction, satin anodized finish, 11" long travel, 7" cross travel wt. 10#, \$69.95 + 3.00 S&H

SWIVEL VISE - 3" wide jaws, aluminum construction, satin anodized finish, wt. 7#, \$39.95 + 2.00 S&H

END MILLS - Four flute, HS steel, 1/8, 3/16 & 1/4" dia. available, any 3 for \$13.95 PPD.

Your satisfaction is guaranteed. If you are not 100% pleased with your purchase, you may return it for a full refund.

Michigan residents please add 4% sales tax.

M.J. LAWRENCE, INC. Dept. 203
P.O. BOX 118A, Washington, Michigan 48094
313-796-3586 VISA & MASTERCARD ACCEPTED



Order Today,
We Ship Today

**NOW
LUXURIOUS, HAND CRAFTED,
NEW ZEALAND LAMBSKIN
SEAT COVERS...**

Sizes to fit vans, RV's, trucks
plus all foreign and domestic cars.

For cozy warmth in winter, cool comfort in summer. Shearlings offers these handsome, expertly tailored seat covers direct from the Southland country of New Zealand - renowned for producing the finest lambskins in the world. They're long lasting, machine washable and constructed to maintain their tailored fit with Shearlings unique 6 point connector system. Available in 3 colors: Honey, Tan and Charcoal. Price \$59.95 single, matched pair \$119.00, plus shipping.

Two 24 hour numbers
Call Toll Free 1-800-426-4626
or Collect in WA, AK and HI
(206) 575-9128



VISA/MC Accepted • Request our Free Color Catalog
Shearlings of New Zealand™
P.O. Box 88067, Dept. PM-3, Seattle, WA 98188

168 POPULAR MECHANICS

Here's a brush cleaner that works for all paints

Most shopowners stock an array of expensive solvents for cleaning brushes after various finishing jobs. A common assortment might include turpentine or paint thinner for brushes used with oil-based paints, enamels and varnishes; methyl alcohol for shellac; lacquer thinner for lacquer; and acetone for polyester resins, such as those used when working with fiberglass.

There is one solvent, however, that can take over *all* brush-cleaning duties. To a chemist, it's known as methyl chloride. To everyone else, it's generally known as paint remover.

Purchase the stuff by the gallon at any hardware store. Sometimes you

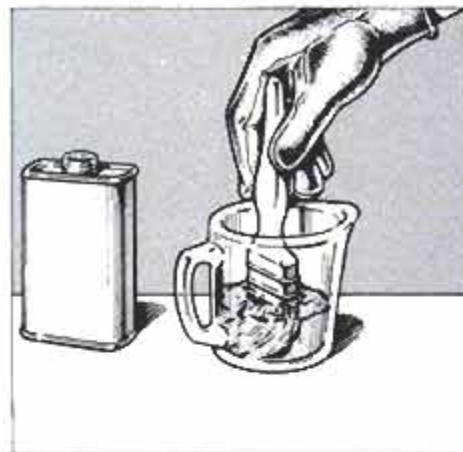
will see methylene written on the label instead of methyl chloride; it will work just the same. In paint remover, methyl chloride is combined with cellulose fillers to slow its evaporation, and a soap emulsifier which lets you rinse it off a brush with water.

A big plus is that it's not flammable, unlike most solvents. In fact, it's used in fire extinguishers. And it is one of the least toxic solvents. However, it should be used with good ventilation, since it displaces oxygen in the air as it evaporates. Also, wear rubber gloves and safety goggles.

Used as shown in the accompanying drawings, methyl chloride is an even better brush cleaner than the



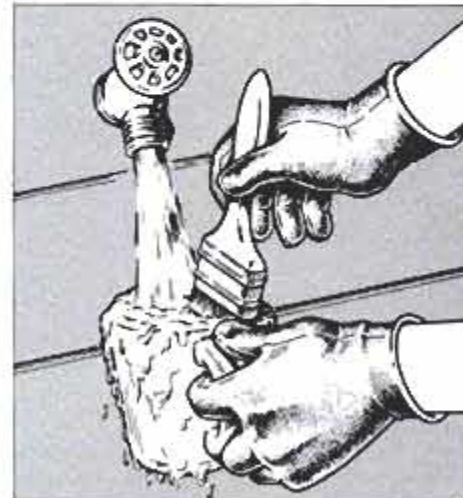
Pour 2 oz. of paint remover into a glass cup to clean an average 3-in.-wide brush. Wear gloves and safety goggles.



Flex bristles in paint remover until they're fully saturated. Work brush for several minutes to ensure thorough cleaning.



Wipe off as much paint and remover as possible against lip of cup. Then squeeze out bristles in a rag or wad of newspaper.



Rinse brush in cold water (right) in order to get off any remaining paint and remover.

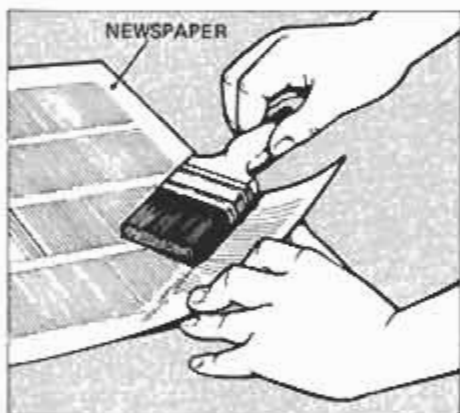
specialized solvents. The fact that paint remover emulsifies, as well as dilutes, enables it to remove even those binders which have hardened into a gummy mass that solvents are unable to penetrate.

Brushes used with latex or acrylic paints also leave dried, hard-to-remove residue that water and soap won't wash away. Treating the brush with paint remover is helpful in these cases, too.

Solvent cleaners are, of course,



Using an ordinary hair or wire comb, stroke wet bristles to remove any particles and to give the brush a good shape.



To store the brush until your next paint job, wrap it in newspaper, taking care not to distort the shape of the bristles.

still necessary for thinning, and for cleaning a brush that will be used a couple of hours later.

Conservation tip

A good tip for conserving solvent cleaners: Rinse the dirty brush in a small amount of solvent after squeezing out as much paint as possible into a rag, then pour the used solvent into a larger jar for which you have a cover. Pour another small measure of solvent into the small jar and give the brush a second rinse. Continue with as many rinses as are required to get the brush clean, saving the used solvent. The pigment will settle out of the solvent in the large jar after a few days. Pour it off into a clean container for reuse.—Harold W. Borns

WATER FROM YOUR OWN BACKYARD WELL!

Opelika, Alabama—What can you buy for a nickel and still get some change back? 500 gallons of water, that's what! As a matter of fact, the electricity to pump 500 gallons from your own backyard well costs only 3 or 4 cents!

With this reliable, convenient source of water you can supply your home, your garden, and with a water well heat pump you can even heat and cool your home for a fraction of the cost of conventional systems!

In the past, the cost of drilling a well made it uneconomical for anyone who could hook on to city water mains. However, as city water becomes much more expensive, backyard wells have become more and more popular. To hold the cost of drilling a well to an affordable level, an easy-to-use low-cost machine has been developed for the homeowner who wants to drill his own. Called the HYDRA-DRILL, it is already in use around the world, and an estimated 60,000 HYDRA-DRILL wells have been drilled to date.

The HYDRA-DRILL can drill to depths of 200 feet, which puts you within reach of most of the good fresh ground water in the world. The typical HYDRA-DRILL well can produce over 4,000 gallons of water each day—just compare that with the average U.S. family consumption of 500 gallons of water per day!

The HYDRA-DRILL is remarkably simple to operate. It is completely portable, and can be operated anywhere...even in places a truck-mounted drilling rig can't get. Yet it can drill most anything the big, truck-mounted rigs can drill, and drilling speeds range up to 40 feet per hour.

FOR FREE INFORMATION about the HYDRA-DRILL and how you can drill your own water well, send your name and address to: DeepRock



Mfg., 251 Anderson Road, Opelika, Alabama 36802. Better yet—call our toll-free number. Call anytime including Sundays.

TOLL FREE (800) 821-2280
(Ext. 251)

VISITORS WELCOME!

OR CLIP COUPON AND MAIL TODAY!

DeepRock

251 Anderson Rd.
Opelika, Alabama 36802

SINCE
1967

I want an economical dependable supply of good, pure water on my property. Please rush full information kit and prices by FIRST CLASS MAIL.

Print Name _____

Address _____

City _____

State _____

Zip _____

© 1981 DeepRock Mfg.

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 499 - HICKORY, N. C. 28601



NOW! PUT YOURSELF IN A FUN BUSINESS BY NEXT WEEK only \$19.95*

There is a constant demand for colorful, plastic-protected metal pin-back badges and buttons. YOU can provide badges to identify, amuse, instruct, promote, with the Badge-A-Minit System. Buttons, key chains, purse mirrors sell fast at shops, malls, fairs. Take orders from clubs, schools, churches, political candidates. Parts cost pennies, finished buttons sell for much more. Fun and profit for you creating badges while you can earn up to \$25 per hour. Write for your FREE new 64 page full color catalog. Or, send \$19.95 *(plus \$1.75 shipping, Illinois residents add \$1.00 sales tax). Starter Kit includes: die press, color coded dies, badge parts, complete instructions.

Badge-A-Minit, Ltd. Box 618 (Dept. FW02) LaSalle, IL 61301

A Profitable Family Cash Business

MINI DONUTS

On Weekends or
FULL TIME!



Earn \$200 On A Weekend

... with a free-standing or mobile Lif Orbit mini donut factory. Great family business for fun & profits. Part or Full time. Easy to operate and makes up to 1,250 mini donuts per hour. Make up to \$750 on a weekend at fairs, sports events and flea markets.

Financing Available

As little as 1/3 down and up to 12 months to pay based on credit acceptance



Free Booklet

The DONUT MAN

A Quantum Group Company
9851-13th Ave. No., Dept. 548
Minneapolis, Minnesota 55441

NEW! 3 IN 1

POWER-FEED

PLANER/MOLDER JOINTER

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.

FREE
INFORMATION KIT

CALL TOLL-FREE 1(800)227-1617, Ext. 489
In Calif. 1-800-722-3545, Ext. 489

OR WRITE TO:
WOODMASTER TOOLS, INC.
2849 Terrace, Dept. PP12, Kansas City, MO 64108

STAINED GLASS

Send \$1.99 for fascinating catalog of kits, tools, ideas, books and supplies.
BIG STARTER KIT
Only \$17.95 p.p.

WHITTEMORE,
BOX 2065EM, HANOVER, MASS. 02339

CAREER OPPORTUNITIES—Looking for a new job? A pay raise? A new career? No need to miss out on job opportunities—ask for your FREE copy of our new guidance book 'Career Opportunities' and learn how a home study course can help you get ahead. Check interest.

Accounting	Advertising	Business Administration	Business Law	Business Management	Business Writing
Child Development	Child Psychology	Child Welfare	Childcare	Childhood Education	Childhood Studies
Communications	Computer Science	Computer Systems	Computer Training	Computer Applications	Computer Programming
Construction	Construction Management	Construction Safety	Construction Law	Construction Economics	Construction Planning
Education	Education Administration	Education Policy	Education Research	Education Reform	Education Technology
Engineering	Engineering Design	Engineering Mathematics	Engineering Science	Engineering Systems	Engineering Technology
Finance	Finance Administration	Finance Law	Finance Management	Finance Planning	Finance Training
Healthcare	Healthcare Administration	Healthcare Law	Healthcare Management	Healthcare Planning	Healthcare Training
Human Resources	Human Resources Administration	Human Resources Law	Human Resources Management	Human Resources Planning	Human Resources Training
Information Systems	Information Systems Administration	Information Systems Law	Information Systems Management	Information Systems Planning	Information Systems Training
International Business	International Business Administration	International Business Law	International Business Management	International Business Planning	International Business Training
Journalism	Journalism Administration	Journalism Law	Journalism Management	Journalism Planning	Journalism Training
Law	Law Administration	Law Law	Law Management	Law Planning	Law Training
Marketing	Marketing Administration	Marketing Law	Marketing Management	Marketing Planning	Marketing Training
Mathematics	Mathematics Administration	Mathematics Law	Mathematics Management	Mathematics Planning	Mathematics Training
Music	Music Administration	Music Law	Music Management	Music Planning	Music Training
Natural Sciences	Natural Sciences Administration	Natural Sciences Law	Natural Sciences Management	Natural Sciences Planning	Natural Sciences Training
Physical Sciences	Physical Sciences Administration	Physical Sciences Law	Physical Sciences Management	Physical Sciences Planning	Physical Sciences Training
Public Administration	Public Administration Administration	Public Administration Law	Public Administration Management	Public Administration Planning	Public Administration Training
Public Health	Public Health Administration	Public Health Law	Public Health Management	Public Health Planning	Public Health Training
Public Policy	Public Policy Administration	Public Policy Law	Public Policy Management	Public Policy Planning	Public Policy Training
Public Safety	Public Safety Administration	Public Safety Law	Public Safety Management	Public Safety Planning	Public Safety Training
Public Service	Public Service Administration	Public Service Law	Public Service Management	Public Service Planning	Public Service Training
Public Works	Public Works Administration	Public Works Law	Public Works Management	Public Works Planning	Public Works Training
Real Estate	Real Estate Administration	Real Estate Law	Real Estate Management	Real Estate Planning	Real Estate Training
Religion	Religion Administration	Religion Law	Religion Management	Religion Planning	Religion Training
Science	Science Administration	Science Law	Science Management	Science Planning	Science Training
Social Sciences	Social Sciences Administration	Social Sciences Law	Social Sciences Management	Social Sciences Planning	Social Sciences Training
Social Work	Social Work Administration	Social Work Law	Social Work Management	Social Work Planning	Social Work Training
Statistics	Statistics Administration	Statistics Law	Statistics Management	Statistics Planning	Statistics Training
Teaching	Teaching Administration	Teaching Law	Teaching Management	Teaching Planning	Teaching Training
Technology	Technology Administration	Technology Law	Technology Management	Technology Planning	Technology Training
Theater	Theater Administration	Theater Law	Theater Management	Theater Planning	Theater Training
Visual Arts	Visual Arts Administration	Visual Arts Law	Visual Arts Management	Visual Arts Planning	Visual Arts Training
Writing	Writing Administration	Writing Law	Writing Management	Writing Planning	Writing Training

Write or phone for FREE 96 page Career Guide.
Granton Institute of Technology, 263 Adelaide St. W., Room M02
Toronto, Canada M5H 1Y3 1-(416) 977-1929
Name _____
Address _____

REPAIR CLOCKS

Home Study Course prepares you for
Good Income - Professional Status.
Free Details. No salesman will call.
Approved by Pa. Dept. of Education

NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____

CLOCKMAKERS INSTITUTE
P.O. BOX 449, LEWISTOWN, PA. 17044



DRINKING WATER FROM THE SUN

(Continued from page 106)

ganisms in the tank and pans, put a quarter pound of copper sulfate crystals in the supply tank.

When you're ready to activate the system, turn on the water supply. As the water begins to run into the evaporation pans, use shims to attain the final level of the unit. Adjust the water level in the pans by bending the shaft of the float valve (Bobby valve). The float should stop the flow when the water just covers the gravel. At this point, tighten the turnbuckles on the braided anchor wires.

Next, apply weatherstripping to the bottom of the glass-support cleats (PP and QQ). Put the lid with glass in place on the box and attach with wood screws. Water will begin to condense on the glass and drip off the silicone bead into the trough.

Let the still run for three days before collecting the distilled water for use. During this time, find a convenient location for the insulated picnic cooler that serves as a storage tank and install an overflow tube in it. Seal the points where the tubing passes through the walls of the cooler with clear silicone.

Run plastic tubing from the air pump, through the lid of the cooler,



Water purified by the solar still is ideal for drinking, as well as for cooking.

to the air stone and seal with silicone once again. Set the timer so that the air pump runs for about three hours in the evening.

Once the still has run for three days, pass the output line through the lid of the cooler; use silicone to seal the joint. Before use, let the cooler fill a day or two to provide a buffer supply of water.

Maintenance is simple. Check the water level for a few days and cor-

rect if necessary. About every three months, rake the black gravel lightly to expose a fresh surface. Replace gravel annually.

The output of your solar still will vary through the year, depending on weather conditions. In severe winter areas, shut the unit down to prevent freezing. If heavy snows are expected, protect the glass with plywood secured to the lid. **PM**

MATERIALS LIST—SOLAR STILL

Key	No.	Size and description (use)
A	1	Robert Bobby valve (float valve) with 1/4" tubing fitting
B	1	2"-dia. float (for Bobby valve)
C	5	Brass evaporative cooler drains
D	5	Brass evaporative cooler-drain locks
E	5	Evaporative cooler-drain rubber washers
F	9	1/2 x 1/2" PVC male pipe-thread adapters
G	1	1/2" x length to suit PVC pipe (feeder line)
H	1	1/2" PVC cross fitting
I	9	1/2" PVC nipples
J	2	1/2" galvanized unions
K	1	1/2" PVC tee
L	4	1/2" PVC elbows
M	2	2" PVC caps (collecting-trough ends)
N	1	2" PVC tee (collecting-trough drain)
O	1	2x36" PVC pipe (collecting trough)
P	1	1/2 x 2" PVC female pipe-thread reducer
Q	1	Compression fitting
R	*	1/4" nylon or soft copper tubing (supply and output tubing)
S	*	Glazier's points
T	*	No. 6 x 1" Phillips-head screws
U	*	3d galvanized box nails
V	4	1/4"-dia. screw eyes or eyebolts with washers and nuts
W	2	Turnbuckles
X	1	5x6x12" plastic ice-cube storage tray (float tank)
Y	4	1x17 1/2x23 1/2" galvanized automotive drip pan (evaporation pans)
Z	1	20 lbs. aquarium gravel
AA	1	1/2x37x63" exterior plywood (bottom)
BB	1	1/2 x 37" x height to suit (overall) exterior plywood (front support)
CC	1	1/2 x 37" x height to suit (overall) exterior plywood (back support)
DD	2	1/2 x 21x64" (overall) exterior plywood (sides)
EE	1	1/2 x 12x13" exterior plywood (access port cover)
FF	2	3/4 x 3 1/2 x 66" pine (sides of top)
GG	2	3/4 x 3 1/2 x 38 1/2" pine (front, back of top)
HH	2	3/4 x 1 1/2 x 63" pine (cleats)
II	2	3/4 x 1 1/2 x 19" (overall) pine (back cleats)
JJ	2	3/4 x 1 1/2 x 35 1/2" pine (front and back bottom cleats)
KK	2	3/4 x 1 1/2 x 4" pine (front supports)
LL	2	3/4 x 1 1/2 x 2 1/4" pine (filler block)
MM	2	3/4 x 3 1/2 x 4" pine (collecting-trough supports)
NN	2	3/4 x 1 1/2 x 44" pine (evaporation-pan supports)
OO	4	3/4 x 1 1/2 x 37" pine (evaporation-pan supports)
PP	2	3/4 x 1 1/2 x 63" pine (glass supports)
QQ	2	3/4 x 1 1/2 x 38 1/2" pine (glass supports)
RR	1	1/8 x 38 3/8 x 64 3/8" double-strength glass
SS	8	2" corner braces
TT	1	1/2" x 3/4" x 18" adhesive-backed foam weather-stripping
UU	2	3/4 x 1 1/2 x 12" pine (float-tank supports)
VV	2	3/4 x 1 1/2 x 3 1/4" pine (float-tank supports)
WW	1	3/4 x 5 1/4 x 12" pine (float-tank platform)

Misc.: 1/8" braided galvanized guy wire as reqd., 3" fiberglass batt insulation, silicone sealant, insulated 2-gal. container, timer, aquarium air pump, aquarium air stone, in-line valve.
*As required.

SHOPPING INFORMATION

The ice-cube tray (part X) is from Rubbermaid. It's model No. 2862 and is available at houseware stores that carry the Rubbermaid line.

The Robert Bobby Valve (part A) is Model RM-64 and is available at most True Value hardware stores and many other hardware outlets. If you have a problem locating one, write to Robert Manufacturing Co., Drawer A, 10667 Jersey Blvd., Cucamonga, Calif. 91730, for the nearest dealer. The automotive drip pans can be found at auto supply outlets.

"AFTER 2700 MILES, MY MARINER WAS ABOUT THE ONLY THING IN ONE PIECE."

Ken Heskestad, tankerman, New City, New York



like this one. These remarkable outboards from 2 to 200 hp are proving they really are better in the long run.

For a catalog write Mariner, Dept. PM5, 1939 Pioneer Road, Fond du Lac, WI 54935. Or call toll-free 800-558-9758. In Canada, write Mariner, 1156 Dundas Hwy., East Mississauga, Ontario L4Y 2C2.

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

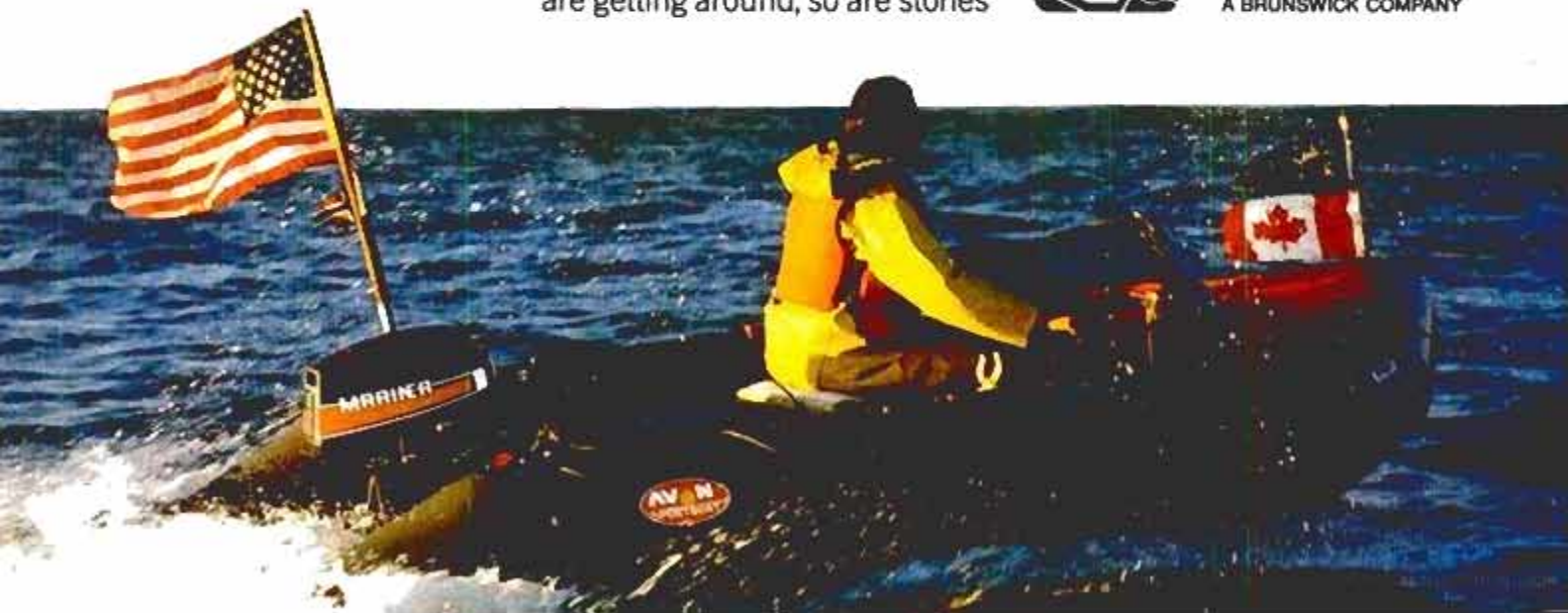
 **MARINER[®]**
OUTBOARDS
A BRUNSWICK COMPANY

It was mid-June when Ken Heskestad left the Seaweed Yacht Club in Stony Point, New York, to begin his odyssey in a little 12-foot Avon inflatable boat, powered by a Mariner 25 hp outboard.

Twenty-seven hundred bone-jarring miles, 23 locks, 2 punctures and 3 months later, Ken motored "Inflation 1" back up the Hudson River toward home.

Total maintenance for the trip: 3 spark plugs and a new prop to replace one that was destroyed when he ran aground in a fog. Ken says, "Someday, I'd like to retrace the old Viking route back to Bergen, Norway. Whatever it is, the outboard will be a Mariner."

Mariner outboards earned a reputation for outstanding performance on 4 continents before they ever came to North America. And as more of them are getting around, so are stories



The \$149⁹⁵ personal computer.

Introducing the Sinclair ZX81

If you're ever going to buy a personal computer, now is the time to do it.

The new Sinclair ZX81 is the most powerful, yet easy-to-use computer ever offered for anywhere near the price: only \$149.95* completely assembled.

Don't let the price fool you. The ZX81 has just about everything you could ask for in a personal computer.

A breakthrough in personal computers

The ZX81 is a major advance over the original Sinclair ZX80—the world's largest selling personal computer and the first for under \$200.

In fact, the ZX81's new 8K Extended BASIC offers features found only on computers costing two or three times as much.

Just look at what you get:

- Continuous display, including moving graphics
- Multi-dimensional string and numerical arrays

*Plus shipping and handling. Price includes connectors for TV and cassette, AC adaptor, and FREE manual.

- Mathematical and scientific functions accurate to 8 decimal places
- Unique one-touch entry of key words like PRINT, RUN and LIST
- Automatic syntax error detection and easy editing
- Randomize function useful for both games and serious applications
- Built-in interface for ZX Printer
- 1K of memory expandable to 16K

The ZX81 is also very convenient to use. It hooks up to any television set to produce a clear 32-column by 24-line display. And you can use a regular cassette recorder to store and recall programs by name.

If you already own a ZX80

The 8K Extended BASIC chip used in the ZX81 is available as a plug-in replacement for your ZX80 for only \$39.95, plus shipping and handling—complete with new key-board overlay and the ZX81 manual.

So in just a few minutes, with no special skills or tools required, you can upgrade your ZX80 to have all the powerful features of the ZX81. (You'll have everything except continuous display, but you can still use the PAUSE and SCROLL commands to get moving graphics.)

With the 8K BASIC chip, your ZX80 will also be equipped to use the ZX Printer and Sinclair software.

Order at no risk**

We'll give you 10 days to try out the ZX81. If you're not completely satisfied, just return it to Sinclair Research and we'll give you a full refund.

And if you have a problem with your ZX81, send it to Sinclair Research within 90 days and we'll repair or replace it at no charge.

**Does not apply to ZX81 kits.



NEW SOFTWARE: Sinclair has published pre-recorded programs on cassettes for your ZX81, or ZX80 with 8K BASIC. We're constantly coming out with new programs, so we'll send you our latest software catalog with your computer.



ZX PRINTER: The Sinclair ZX Printer will work with your ZX81, or ZX80 with 8K BASIC. It will be available in the near future and will cost less than \$100.



16K MEMORY MODULE: Like any powerful, full fledged computer, the ZX81 is expandable. Sinclair's 16K memory module plugs right onto the back of your ZX81 (or ZX80, with or without 8K BASIC). Cost is \$99.95, plus shipping and handling.



ZX81 MANUAL: The ZX81 comes with a comprehensive 164-page programming guide and operating manual designed for both beginners and experienced computer users. A \$10.95 value, it's yours free with the ZX81.

The \$99.⁹⁵ personal computer.

ZX81

Introducing the ZX81 kit

If you really want to save money, and you enjoy building electronic kits, you can order the ZX81 in kit form for the incredible price of just \$99.95* It's the same, full-featured computer, only you put it together yourself. We'll send complete, easy-to-follow instructions on how you can assemble your ZX81 in just a few hours. All you have to supply is the soldering iron.

How to order

Sinclair Research is the world's largest manufacturer of personal computers.

The ZX81 represents the latest technology in microelectronics, and it picks up right where the ZX80 left off. Thousands are selling every week.

We urge you to place your order for the new ZX81 today. The sooner you order, the sooner you can start enjoying your own computer.

To order, simply call our toll free number, and use your MasterCard or VISA.

To order by mail, please use the coupon. And send your check or money order. We regret that we cannot accept purchase orders or C.O.D.'s.

CALL 800-543-3000. Ask for operator # 509. In Ohio call 800-582-1364. In Canada call 513-729-4300. Ask for operator # 509. Phones open 24 hours a day, 7 days a week. Have your MasterCard or VISA ready.

These numbers are for orders only. For information, you must write to Sinclair Research Ltd., 2 Sinclair Plaza, Nashua, NH 03061.

sinclair

AD CODE 83PM

AD CODE	PRICE†	QTY.	AMOUNT
ZX81	\$149.95		
ZX81 Kit	99.95		
8K BASIC chip (for ZX80)	39.95		
16K Memory Module (for ZX81 or ZX80)	99.95		
Shipping and Handling	4.95		\$4.95

TOTAL

MAIL TO: Sinclair Research Ltd., One Sinclair Plaza, Nashua, NH 03061.

NAME _____

ADDRESS _____

CITY/STATE/ZIP _____

† U.S. Dollars

ISUZU I-MARK

"Maybe more room on the dash for a cassette player."

NORTH CAROLINA ELECTRICIAN

"Brake and clutch pedals should be further apart."

CALIFORNIA SECRETARY

"It handles well and feels like a heavier car."

FLORIDA ACCOUNTANT



"I like the diesel's quick-start feature."

TEXAS PUBLIC RELATIONS EXECUTIVE

"There's a vibration no one can seem to fix."

ARIZONA BUSINESSMAN

A little car that packs a great deal of appeal.

There's a lot to like about the Isuzu and very little to nitpick. That's what owners told us after they racked up nearly 2.5 million miles on their I-Mark coupes and sedans—gasoline-powered versions, as well as those with diesel engines (8.1 percent in our survey).

"The price was definitely right," beamed a Minnesota printer. Price brought them in and economy keeps them happy. Nearly half of our respondents listed price as their primary reason for buying the Isuzu.

"I bought my I-Mark coupe," stated a California student, "because it was the most car for the money. It's very economical and fun to drive; also well built, with a large trunk,



The zappy 1.8-liter diesel engine option provides very responsive performance.

good ride, full instrumentation, and it really performs. Quality is excellent, everything fits, and the car is well finished."

Quality, workmanship, standard equipment, comfort, styling and low maintenance all drew whistles and cheers from the great majority of owners. Here's a sampling of the I-Mark's most appreciated aspects.

"Great price on a roomy, high-

mpg, quality automobile," praised a California program support rep. "Being 6-4 and 260 pounds, I found that other cars offered a lot less interior space, particularly headroom, than I needed. This Isuzu LS coupe, though, really fills the bill."

A North Carolina employment counselor told us, "Last summer I

**A NATIONWIDE SURVEY
BASED ON 2,403,678
OWNER-DRIVEN MILES**

made a 3,000-mile trip to Canada and New England in my Isuzu automatic sedan. With the air conditioner running most of the time and considerable mountain driving, we averaged just over 31 mpg. Compared

(Please turn to page 176)

23K

PERSONAL COMPUTER

Only

\$239⁰⁰

Special Factory Sale Price



WHAT A SMART INVESTMENT!!!

- For Students and Schools
- Learn to program a computer
- Learn to operate a computer
- For Programmers & Teachers
- For Labs, Engineers, Etc.
- For Small Businesses
- For The Home Owner

PLUG IN EXPANSION

CHECK THESE FEATURES

It has color and sound with a powerful 6800 motorola microprocessor, 14,000 Bytes ROM with built in Basic, 9000 Bytes user RAM, Full 53 key professional typewriter keyboard, two 10 key numeric pads, two controllers. A high speed built in cassette that operates at 1200 baud. Loads and reads 4 times faster than other computers, has a speaker with volume control, built-in microphone jack and 3 digit counter. High resolution graphics are 256 x 192 (LIKE APPLE), text display is 16 lines 32 characters. It has 8 colors. Will accept TAPE, DISK OR PLUG IN CARTRIDGES. Includes an AC adapter, RF modulator and TV switch box. Owners manual and BASIC language book included. All this built into a beautiful black and white Console Case. Shipping carton measures 20" x 23" wide, 10" in depth, weighs only 20 pounds. A full-sized extra featured computer for only \$239.00.

WHY SUCH A LOW PRICE

Selling on a factory direct to customer basis, we save you the profit normally made by computer stores and distributors. You also save the cost of a computer monitor as this computer is FCC approved and designed to hook up to any TV antenna terminal. We are willing to take a small margin at the factory to develop volume that allows lowest cost operation.

COMPERATIVE LIST PRICES

Apple \$1125.00, T.I. \$625.00, Atari \$515.00, Ohio Scientific \$795.00, Radio Shack's TRS80 color that has only 4K RAM sells for \$499.00 with a cassette and controllers. Commodore VIC with only 5K RAM is \$395.00.

LOW COST PLUG IN EXPANSION

Building block interface with 4 plug in ports \$79.50. RS 232 cartridge \$79.50, telephone modem \$129.00. Best quality 80 column printed \$379.00. 8K RAM cartridge \$79.50. Floppy disk cartridge \$79.50. Floppy disk \$399.00. Tapes and cartridges \$9.95 to \$19.95.

AN INCOMPARABLE SCHOOL TEACHER

Prepare yourself for the future. You can learn to operate and program a computer for great job opportunities in the computer revolution. The built in Basic is a simplified Level II with a unique entry system of Basic command words. This basic includes integer and string arrays. Direct memory access PEEK and POKE. Direct statement execution, user definition functions, multi statement lines, editing, scrolling, file management, cursor and more. We sell a BASIC TUTOR program on tape to teach BASIC Programming. Machine language programs are available.

Since the computer can talk, play music and perform in color IT IS A PHENOMINAL TEACHER. You can now use the TV to EDUCATE not to frustrate your family. You will eliminate TV boredom with programs that challenge, stimulate and entertain you. Create your own programs or select from over 30 programs offered. IT IS A BRILLIANT MUSIC TEACHER. You can practice on the keyboard, select key and tempo, write a tune and record. It has a great color art program. You can improve your memory, math, spelling, vocabulary and sharpen your strategy skills. IT IS A GREAT TUTOR FOR YOUR KIDS.

USE FOR SMALL BUSINESS

Great for the do-it-yourself businessman. Just add the building block interface for \$79.50 and a 8K RAM cartridge for \$79.50. This will give you a 31K computer for only \$389.00. With a floppy disk you can write good sized programs for inventory, names list, accounts receivable, etc.

IT ALSO PLAYS GAMES

A total entertainment center with color, sound and music. There are Space Destroyer, Shooting Gallery, U.F.O., Bowling, Capture, Pinball, Blackout, Dungeon Hunt, Roulette, Keno, Slot Machine, Blackjack, Space Adventure, Boxing and Backgammon. Game controllers are included. Challenge the computer or another opponent. Each game gives family and friends hours of quality fun. These cartridges sell for \$9.95 and \$14.95. Why pay \$140.00 to \$295.00 for an electronic game with cartridges costing \$25.00 to \$50.00 that could end up in the closet when you can buy this powerful computer for only \$239.00?

SERVICE AND WARRANTY

If the unit fails because of defect of warranty within 90 days of purchase, it will be repaired at no cost for labor and parts. You just send the computer United Parcel prepaid to the service center designated and it will be sent back to you within 48 hours of receipt. United Parcel prepaid. The warranty is backed by APF, a major electronics manufacturer.

SPECIAL FACTORY SALE \$239.00

For \$239.00 you get the 23K APF IM-1 Computer that includes 14K ROM with Basic built in, 9K user RAM, Professional 53 Key-

board, Color, Sound, Two Controllers, Two 10 key numeric pads, High Speed Cassette, AC adapter, RF modulator, TV switch box, Owners Manual and BASIC Language Instruction Book.

SPECIAL FACTORY PACKAGE DEAL \$289.00

Everything you get for \$239.00 plus the BASIC TUTOR PROGRAM on two tape cassettes with manual to teach you BASIC language programming. Also you get the popular SPACE DESTROYERS PROGRAM. This package deal lists for over - \$670.00.

FREE TRIAL OFFER - RETURN WITHIN 15 DAYS - UNITED PARCEL PREPAID COMPLETE FOR REFUND OF PURCHASE PRICE

DON'T MISS THIS SALE - ORDER NOW

- Please send me the 23K APF IM-1 Computer for \$239.00
- Please send me the 23K APF IM-1 SPECIAL PACKAGE DEAL for \$289.00

We ship C.O.D. and honor Visa and Master Card.

Name _____

Address _____

City _____

State _____ Zip Code _____

VISA MASTER CARD C.O.D.

Credit Card No. _____

Expiration Date _____

Add \$15.00 for shipping, handling and Insurance. Illinois residents please add 6% tax. Add \$25.00 for CANADA, MEXICO, PUERTO RICO Airmail orders. WE DO NOT EXPORT TO OTHER COUNTRIES.

Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery (21 days for Personal Check orders), 7 days for phone orders. Canada and Mexico orders must be in U.S. dollars.

PROTECTO ENTERPRIZES

(FACTORY - DIRECT RELIABILITY)

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

10M1181

(Continued from page 174)

with other cars of the same size, the Isuzu's weight gives it a most comfortable ride. And yet, the engine is hefty enough for quick response in passing situations."

A retired New Jersey fire chief: "The price is so reasonable! I really like the sedan's styling, and most of the equipment that's optional in other cars is standard here in the Isuzu."

Isuzu offers the least expensive diesel available in this country, so we were anxious to hear from owners who'd had experience with that engine. Again, price and economy headed their list of initial buying goals. Our diesel owners, though, reported mpg tallies considerably lower than those posted by the EPA. Instead of the EPA's best figure of 41/51 mpg, our diesel respondents reported averaging 33.5/39.5 city/highway.

Of general comments by Isuzu diesel owners, here's a cross section:

"In 6,000 miles, I haven't been back to the dealer for anything," reported a Florida nurseryman. "What I particularly like is the diesel's quick starting, lack of noise and good acceleration."

A North Carolina polygraphist: "I'm getting 45 to 48 mpg on the highway, so I'm very pleased with my car's cost of operation—also, its workmanship. The only thing that bothers me is rim and tire width—the car needs a larger footprint. Then, too, instrument lighting causes glare in my line of vision."

A Texas insurance agent: "Diesel fuel across the border costs 17 cents a gallon, so I've been wanting a diesel, and I found one that looks great! It's a well made car, but needs a little more acceleration."

"You can't beat this diesel coupled with the good automatic transmission," smiled an Arizona businessman. "Isuzu has had a lot of experience with diesels. The car is well put together and solid, but a turbo-charger would help performance. My car has a vibration in the front end that no one can seem to fix. Three other local I-Mark owners have had the same problem."

A Texas accountant: "I'd expected better fuel mileage with the diesel engine. I'm getting 26 to 38 mpg town and country."

And a public relations consultant from the same state confided, "I especially like the diesel's prompt starting feature, its reasonable fuel mileage (I'm seeing 34 mpg tops) and its driving ease."

The few complaints we heard from

The mutt with the heart of a thoroughbred

Just for the record, it's pronounced ee-soo-zoo and in Japanese it means 50 bells. In true Japanese democratic fashion the name was selected from submissions made by the general public.

And it somehow seems highly appropriate that the name was selected by the will of the people, because the I-Mark is fundamentally an Everyman sort of car. There is no single outstanding quality that makes it stand out from the rabble of other low-priced scooters like Starlets, bottom-of-the-line Subarus and Chevettes. Yet, it's charming in its own dated way.

I drove the base coupe with the diesel engine option (\$6,799) and it felt very much like the Japanese cars that were made 10 years ago.

It has none of the refined manners of the comparably priced competition like the Civic, the versatility of on-demand 4x4 traction like the Subaru or even the zappy good looks of a Corolla sports coupe. What it does have is a functional, if lumpy-looking, body, a suspension that's made for work rather than play, an interior that looks like your kid brother put it together in shop class and an outstanding little diesel engine. The engine alone forgives most of the car's faults. It starts on the first try, even after sitting all night in 20° weather, it spins freely to its 5,000-rpm redline and provides very undiesel-like performance off the

line, as well as remarkable flexibility when you're sparring your way through heavy traffic.

The brakes are quite good for the day-to-day skirmishes with cabbies and militant bicycle riders, but heat up and fade a bit if you drive aggressively or demand too many panic stops in a row. The steering is heavy for any really quick road work, but it seems acceptably light if you're pedaling along at a relaxed canter.

Pedaling along and saving fuel is really what the I-Mark does best. The suspension doesn't inspire feats of daring on the freeway or on the back roads, but neither will it lull you with a soft ride. It's quite firm, in fact, with a hard ride that borders on harshness. It does however, feel like it's built for the long run. You get the impression the I-Mark will tolerate well the countless trips to the market, be loaded down with all manner of cargo and keep chugging along faithfully year after year no matter what sort of continual abuse you heap upon it.

It seems a fair enough trade. If you're willing to put up with a car that's nowhere near state-of-the-art technology, it will respond in kind. It won't dazzle you with brilliance, but as the Isuzu owners we talked to demonstrate, it will inspire a certain loyalty for its unpretentious nature and basic virtues. Everyman has his car.—T.A.

'Handles beautifully, good pickup on takeoff, very comfortable, easy to maintain.'

both diesel and gasoline Isuzu owners involved relatively minor things like temporary airconditioner failure, squealing brakes, rattles, squeaks and similar annoyances.

Nearly 70 percent of the owners we surveyed had never needed to go back to the dealer for any repairs at all, despite a one-year, 12,000-mile warranty on parts and labor plus a three-year warranty against body rustouts. Of the owners who needed service, almost 60 percent rated their dealers "good to excellent."

A few owners mentioned waits for parts, but others brought out the fact that since Buick had sold this

same car in the late '70s as the Opel Isuzu, they found a well trained pool of mechanics thoroughly familiar with their cars.

However, several owners did complain that dealers sometimes charged two or three times as much for items like oil filters as chain stores and filling stations.

On the topics of ride, handling and comfort, here are some representative comments:

From a Florida accountant: "The Isuzu handles very well and feels like a much heavier car on the road. Good acceleration and a silent ride."

A California marine electrician: "Handles beautifully, good pickup on takeoff, very comfortable, easy to maintain."

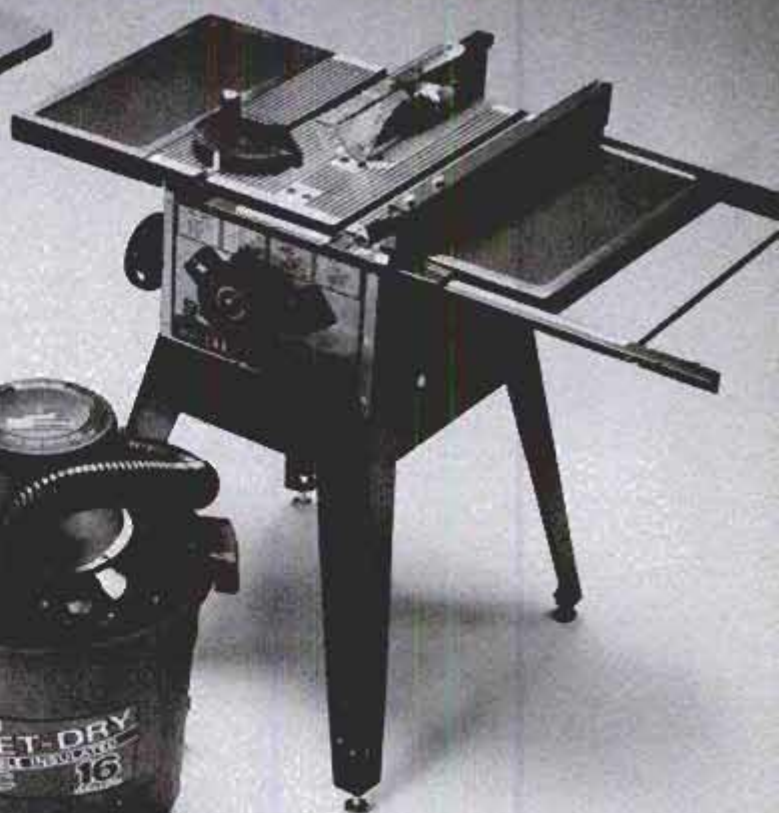
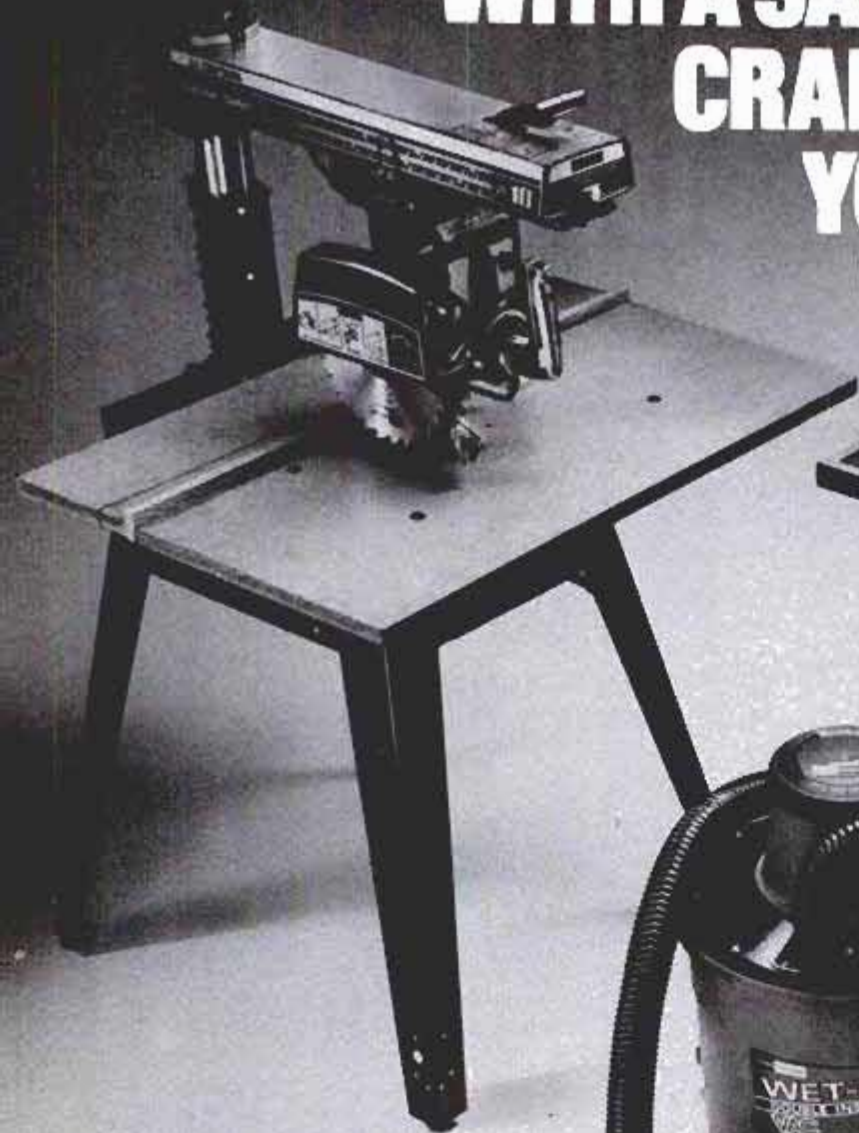
A Florida librarian: "It's an easy car to drive, very comfortable and the seats fit me well. I like the cloth upholstery and the fact that the console comes as standard equipment."

When we asked owners to recommend changes that might improve their Isuzus, 17.6 percent said none—leave the car the way it is. But some did have suggestions, which included the following:

"The brake and clutch pedals should be larger and farther apart," urged a California secretary. And a North Carolina electrician: "The instrument panel ought to have a big-

(Please turn to page 200)

**WITH A SALE LIKE THIS ON
CRAFTSMAN SAWS,
YOU'RE GOING TO
WANT THE VAC.**



NOW \$299⁹⁹

SAVE \$150 America's best-selling 10-in. radial saw.

(1977) It crosscuts up to 15½ inches wide, rips up to 26 inches, allows the versatility of accessories. A single lever arm control provides one-handed, one-step operation, and our largest bevel and miter scales mean fast, accurate set-ups. Powerful 1½-HP motor develops 2½-HP to handle the tough cuts. Leg set not included.

NOW \$99⁴⁷

SAVE \$62 Craftsman 16 gal. Wet-Dry Vac with accessories.

(17823) Power to pick up nails, gravel, or 13 gallons of water. Patented air-venting and exhaust system generates high speed air flow for both suction and blowing. High-impact polypropylene tank resists denting, peeling and rusting. Outfit includes 6-piece attachment kit and car nozzle. While quantities last. Savings based on regular separate prices.

NOW \$199⁹⁹

SAVE \$60 9-in. table saw outfit with miter gauge.

(24272) It rips up to 24 inches, cuts 2-inches deep at 90°. Both blade and motor tilt for bevel and miter cuts, rip fence self-aligns. Two steel extensions make total work area 37 x 20 inches. Direct-drive, capacitor-start, ball-bearing ¾-HP motor develops 1.6-HP. Aluminum miter gauge and steel leg set included.

ON SALE MARCH 7-20.

Minimum savings nationally.
Prices and dates apply only to the continental United States.



You can count on

Sears

© Sears, Roebuck and Co., 1982

What you can do to control gypsy moths

by Dr. Louis M. Vasvary



This gypsy moth caterpillar can eventually grow to be over 2 inches in length. Later the caterpillar will transform into a moth and will mate and lay eggs. Thus, the cycle repeats.

In recent years, gypsy moth caterpillars have wreaked havoc on thousands of acres of forests and shade trees, and have been plain nuisances to homeowners. We can control these pests. But to do so, it helps to know their history, life cycle and habits.

In 1869, gypsy moth eggs were purposefully imported near Medford, Mass., by a French scientist who hoped to cross gypsy moths with silkworm moths. Some caterpillars may have escaped, or some eggs may have spilled. Thus, today, gypsy moths are established pests.

The gypsy moth passes through four stages of development: egg, larva (caterpillar), pupa and adult (moth). But only the caterpillar stage defoliates trees. Eggs usually hatch in mid- to late April; then the tiny caterpillars climb as high as they can and drop on a fine strand of silk. If it's windy, they can be blown 10 to 20 miles.

Some of their favorite trees include the white oak group, red oak group, apple, ornamental flowering fruit trees and willow. Caterpillars feed on foliage from April to July.

The caterpillars grow up to 2½ in. long. You can identify them by pairs of colored warts along the tops of

their bodies. The first five pairs are blue and the last six are red.

Since eradicating gypsy moths is now impossible, we must utilize various control methods at the specific time each is most effective.

The first step toward control is to predict population for the coming year by counting egg masses in late fall or winter. Substantial defoliation can occur when there are 500 or more egg masses per acre.

Your county cooperative extension agent may have figures on this. However, if you make a count, use binoculars to see egg masses on tall trees. New egg masses are bright tan, rather than the dull, washed-out shade of the previous year's eggs. Since caterpillars are wind-blown, it's also important to know egg-mass density for nearby areas.

Applying insecticides

When egg-mass counts are high and epidemic conditions are imminent, insecticides are the only salvation against defoliation. To provide the best foliage protection using insecticides, you should apply them when the majority of caterpillars

are ¾ to 1 in. long. When this growth stage predominates, most caterpillars from surrounding areas have already arrived.

During this critical period, some foliage must be present to retain the insecticide. So, you don't want to spray too early, before foliage emerges, or too late, after trees have been defoliated. At this time, the majority of caterpillars are feeding in treetops. Therefore, aerial applications are more effective—and use



Female adult mates, lays eggs in a single mass, as shown here, and dies. Female moths, larger than males, can't fly.

Photo: Union Carbide Agricultural Products



To trap large gypsy moth caterpillars, tie an 18-in.-wide burlap strip around a tree trunk. When the insects lodge in the cool shelter, remove and destroy them.

less insecticide—than ground treatments. For effective treatment from the ground, sprays should be powerful enough to reach treetops.

Use only those insecticides reviewed and registered for gypsy moth control by the Environmental Protection Agency (EPA). Although controversy exists regarding insecticides for gypsy moth control, spraying substances is the *only* way

(Please turn to page 18)

Dr. Vasvary is an extension specialist in entomology at Cook College, Rutgers University, Livingston, N.J.

MEET OUR COMPETITION...



For years people who bought our ever popular Scorpion helicopter have asked our sales department the one question we just couldn't answer, "What's your competition?"

GOOD QUESTION. HARD ANSWER.

Fact is, for 12 years the Scorpion just had no competition. An able performer, designed for low cost, pure fun helicopter flying, there just wasn't a helicopter on the market that could even come close to it, especially in price.

NOW THERE IS. THE ROTORWAY EXEC.

Is it good competition? You bet! Economically priced, more cruise range, (50% more than the Scorpion). More climb power available with our much improved RW-145 engine. Custom built by RotorWay, this



power plant puts out 17 horses more and still retains the ability to use auto fuel. Increased usage of forged components keeps weight identical for better performance with no sacrifice in payload. In addition, the all new Exec is 30 mph faster than the Scorpion in cruise. The RotorWay Exec, everything a light helicopter should be.

Now you know how we stack up against ourselves. Impressive? Right! But there's more. Make a point to compare us to other piston powered helicopters that cost fifty thousand and up. The RotorWay Exec is in the running... speed, payload, styling.

Go ahead. Check us out. We're ready to show you just how affordable helicopter flying really is. Check out both our helicopters. Each does its job equally well. Check out our competition. All those helicopters costing thousands more, deserve at least a look. It will be worth it when you compare ours against theirs. Feature for feature, dollar for dollar, the RotorWay Scorpion and Exec, the two most competitive flying machines around.



Helicopter Tidbits

When landing an airplane without power, the pilot must select a large field and maintain an airspeed of 1.3 V_{SO} (usually above 50 mph) till touchdown. In a helicopter, power off autorotation allows you to land at zero forward speed and zero descent rate, making available a lot of emergency landing sites that just won't accommodate a fixed wing aircraft. If you've ever watched a bird flare and land on a wire, you get the picture. Learn lots more by sending for our info pack today!



Order our beautifully illustrated information package. We know that most pleasure flying has become just too expensive, until now!

That's exactly why we designed our helicopters to be affordable. Send for our exciting full color brochure to evaluate either the Scorpion or Exec. A step-by-step description of the RotorWay program and how you can be a part of this exciting evolution. Includes a 24" x 36" poster size view of all major components, 3 view drawing, autorotational information, pricing details and a special offer.

ORDER YOUR PACKAGE TODAY!

Credit card customers, to order package, Call Toll Free Now: 2PM3

U.S. 800-824-7888
California 800-852-7777 Alaska and Hawaii 800-824-7919 operator 169

Charge to MasterCard Visa Am Ex No _____ Exp date _____

Signature _____

Send me all the information on how I can afford my own RotorWay helicopter.

- EXEC and SCORPION information \$15.00 (\$35.00 foreign)
- EXEC only \$12.00 (\$25.00 foreign)
- SCORPION only \$12.00 (\$25.00 foreign)
- I've waited and wanted too long already

Have a salesman call me at _____

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

RotorWay AIRCRAFT INC. 14805 SO. INTERSTATE 10
TEMPE, ARIZONA 85284-9735, PHONE 602-961-1001

SECURE YOUR FUTURE AS A

LOCKSMITH

BE YOUR OWN BOSS

MANY STUDENTS EARN MORE THAN THE COST OF THE COURSE BEFORE COMPLETION

  **\$25 hr. EARNINGS NOT UNCOMMON**

FREE DETAILS OF THIS EXCITING, LUCRATIVE PROFESSION

WRITE TODAY:
UNIVERSAL SCHOOL OF
MASTER LOCKSMITHING
P.O. Box 214652
Sacramento, CA 95821

CORRESPONDENCE AND
SHOP TRAINING AVAILABLE

PM3-82

NAME _____
ADDRESS _____
CITY _____
STATE _____ ZIP _____
PHONE () _____ AGE _____

CONTROL GYPSY MOTHS

(Continued from page 178)

to prevent defoliation in an area containing many caterpillars. However, you should use other control methods during nonepidemic periods.

Insecticides and amounts for ground application are indicated in the chart below.

Of the materials listed below, carbaryl (Sevin) and *Bacillus thuringiensis* are registered for use on

lations of climbing caterpillars. Two such products are Tack-Trap and Stikem Special.

Parasites such as some species of wasps and flies, and predators such as mice and chipmunks, play a role in regulating gypsy moth populations. These controls become more effective at low levels of gypsy moths.

Pheromones are chemical substances secreted by animals which cause a specific reaction by a receiv-

INSECTICIDES

Material (Brand), Formulation	Amount for Hydraulic Application			Mist Blower 50 gal.
	100 gal.	3 gal.	1 gal.	
Acephate (Orthene) 75% soluble powder 15.6% liquid concentrate	2/3 lb. —	— 4 1/2 tablespoons	— 1 1/2 tablespoons	2/3 lb. —
Bacillus thuringiensis (a bacteria) (Dipel) (Dipel 4L) (Thuricide)	1 lb. 1 to 2 pts. 2 qts.	9 tablespoons 3 to 6 teaspoons 3 fl. oz.	3 tablespoons 1 to 2 teaspoons 1 fl. oz.	5 lb. 2 1/2 to 5 qts. 10 qts.
Bendiocarb (Ficam W or Turcam) 76% wettable powder	3 oz.	Application by commercial applicators		—
Carbaryl (Sevin) 50% wettable powder 4 flowable (4 lb./gal.) 80% sprayable	2 lb. 1 qt. 1 1/4 lb.	6 tablespoons 2 tablespoons 4 tablespoons	2 tablespoons 2 teaspoons 4 teaspoons	— 1 gal. 5 lb.
Phosmet (Imidan) 50% wettable powder	1 1/2 lb.	Application by commercial applicators		—
Methoxychlor 50 (Marlate)	2 to 3 lb.	6 tablespoons	2 tablespoons	—

Note: Be sure to follow all directions and safety precautions on the insecticide label.

most food crops. (See the product list at the end of the story.)

Other control methods

Some control methods useful during low populations of gypsy moths include egg-mass removal or treatment, and banding trees. You can destroy egg masses from August to mid-April by removing them with a penknife or putty knife. Scrape the egg masses into a can containing Clorox, or into an empty container which you can burn. Pick up all egg masses that fall to the ground.

You can also treat egg masses directly on the tree with a 1 to 2 mix of creosote to fuel oil. Apply mixture with a paintbrush and only cover egg masses, not the entire tree trunk. Wear gloves for protection.

Beginning in mid- to late May, burlap or cloth strips tied around tree trunks will capture some gypsy moth caterpillars. Cut the strips at least 18 in. wide and long enough to encircle the tree 4 ft. above ground level. Secure the material around the middle with string. Fold the upper edge of the strip down over the string to form a skirtlike band. Remove and kill captured caterpillars every day. Sometimes aluminum foil or thin plastic wrap secured around tree trunks will also stop caterpillars.

Sticky material applied to tree trunks will also intercept low popu-

ing animal of the same species. Synthetic sex pheromones have been formulated and used for confusing and trapping male moths. However, traps haven't provided successful control in moderate to high populations.

The best natural control of the gypsy moth is a virus which causes a "wilt" disease among caterpillars. Unfortunately, the disease works best when the pests have reached a high population density. However, it might be a good weapon for future control when we understand its process.

MANUFACTURERS— GYPSY MOTH INHIBITORS

Sticky materials applied to tree trunks
Tack-Trap: Ari, Lawn and Garden Div., Box 999, Griffin, Ga., 30224.

Tree Tanglefoot: The Tanglefoot Co., Tanglefoot Building, 314 Straight Ave. S.W., Grand Rapids, Mich. 49504.
Stikem Special: Michel and Pelton Laboratories, 5743 Landregan, Emeryville, Calif. 94608

Insecticides
Orthene: Chevron Chemical Co., Agricultural Pesticides Div., 575 Market St., San Francisco, Calif. 94105

Dipel and Dipel 4L: Abbot Laboratories, Chemical and Agricultural Products Div., 14th and Sheridan, D-95M, North Chicago, Ill. 60064

Thuricide: Sandoz Inc., Crop Protection, 460 Camino del Rio S., San Diego, Calif. 92108

Ficam W and Turcam: BFC Chemicals Inc., 4311 Lancaster Pike, Box 2867, Wilmington, Del. 19805

Sevin: Union Carbide Agricultural Products, Box 17610, Jacksonville, Fla. 32216

Imidan: Stauffer Chemical Co., Nyala Farm Rd., Westport, Conn. 06890

Marlate: E. I. duPont de Nemours and Co. Inc., 1007 Market St., Wilmington, Del. 19898

Synthetic pheromones
Zoecon Corp., 975 California Ave., Palo Alto, Calif. 94304
J.T. Baker Chemical Co., Phillipsburg, N.J. 08865

SKID STEER LOADER 4-WHEEL DRIVE!



CATALOG of Skid Steer Loader Kit construction and money making uses \$1.00
PLANS to "Build-it-yourself" \$7.00
MOVIE (Binn Color) of both Track and Wheel models in action \$9.50
DAHLCO Dept. PM32L Cedarburg, WI 53012

TURN ON A DIME MINI-SKAT LAWN TRACTOR



CATALOG of Mini-Skat Kit construction and uses \$1.00
ASSEMBLY MANUAL for Kit \$5.00
MOVIE (8mm Color) of Mini-Skat in action \$9.50
STRUCK KIT, Dept. PM32S Cedarburg, WI 53012

Your home workshop can PAY OFF BIG!



This One Low-Cost Power Tool—
SAWS to desired Width...
PLANES to desired Thickness...
MOLDS all popular Patterns...

—All at once or separately... **All By Power Feed!**

Try The
Belsaw In Your
Own Shop On Our
**30-DAY FREE
TRIAL OFFER**

Mail Coupon Below
For Complete
Details!

The Only Complete Workshop Tool Of Its Kind In The World!

From The Day It Arrives... the Belsaw will make and save you money. With shortages and inflation driving lumber prices sky-high, this versatile power tool easily pays for itself by quickly converting low cost rough lumber into high value finished stock. In just one pass turn out your quarter-round, door and window stop, casing, tongue-and-groove... all popular patterns. Other Belsaw operators are making cases for grandfather clocks, furniture, picture frames, fencing, bee hives, bed slats, surveying stakes... all kinds of millwork.

Built For Pros... Priced For Home Craftsmen... it is engineered and built to industrial standards, but factory-direct selling keeps the price low. Handles tough oak and walnut as easily as pine, and so simple to operate even beginners with no experience can use it.

**Start
Your Own
Business!
Earn Extra
Income
Right At
Home.**

With just this one low cost power-feed machine in a corner of your garage or basement, you're set up to supply lumberyards, cabinetmakers, carpenters, remodelers, contractors and hobbyists in your area with custom-planed lumber, trim, molding... ALL of their millwork requirements. You can supply picture molding to art shops, hardware and department stores, or sell direct to framing shops. All standard patterns are available from stock, or we'll custom grind a knife to your own special design or sample.

Does The Belsaw Pay? **YOU BET!**

READ WHAT OTHER BELSAW OWNERS SAY:

A Good Investment • Robert Sawyer, Roseburg, Oregon: "I believe that the Belsaw is the best investment I ever made. I've been a planer man for years and am now retired. The Belsaw has earned me over \$60,000 extra income in the past eleven years."

Pays For Itself • R. S. Clark, Springfield, Ohio: "I bought a batch of walnut in the rough, and after planing it on the Belsaw I figured out the money I had saved. It was enough to pay for two-thirds the cost of the Planer. It really does a good job."

More Than Expected • Stephen Schultz, Orangeville, Penna.: "This machine pays for itself by making money out of scrap boards. It is a very well built machine and I confess it is more than I expected for the price. It does everything you say it will."

... And Belsaw Is The Choice Of Professionals:

"I recommend Belsaw's Planer-Molder-Saw as the most useful shop tool that any craftsman could own. We use ours every day in the WORKBENCH model shop, and couldn't get along without it."

JAY HEDDEN—Editor of WORKBENCH Magazine

**You Take NO RISK! The Belsaw
Is Backed By Our Exclusive 100%**

Guarantee of Satisfaction:

- "Try the Belsaw in your own shop for a full 30-Days and put it to work for you. Give it a thorough test and make it prove that it can do everything we say it will use it just as much as you want. Then if you are not completely satisfied, just send it back and we'll return every penny you sent. And YOU are the sole judge! There are no questions asked... there are no fine print 'use' charges. Our flat guarantee is that YOU must be 100% satisfied or you get your money back."

**FREE
BOOKLET!**

Get FREE
Book with
facts and
full details
... RUSH COUPON TODAY!



**Just Mail Coupon ...
NO OBLIGATION and
NO SALESMAN Calls!**

**ACT NOW!
Coupon
Brings
Full Details!**

If coupon has been removed, just send postcard with name and address to:

BELSAW POWER TOOLS Co.
902M Field Building
Kansas City, MO 64111

BELSAW POWER TOOLS Co.
902M Field Building
Kansas City, Missouri 64111

YES, please send me the FREE Booklet that gives me complete facts about Belsaw's Planer-Molder-Saw and full details on how I can qualify for a 30-Day Free Trial right in my own shop. I understand there is No Obligation and that No salesman will call.

NOW YOU CAN
Turn Extra Time
Into
Extra Income!
BY THE POWER OF BELSAW!

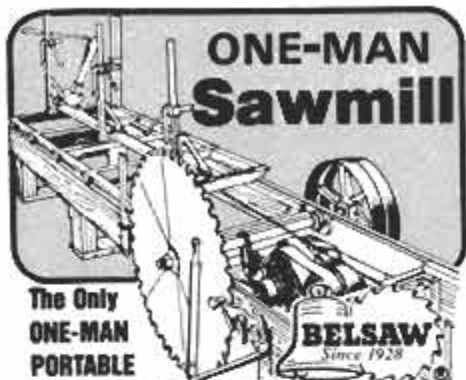


NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

ONE-MAN Sawmill



The Only
ONE-MAN
PORTABLE

SAWMILL of its Kind in The World!

If you need good, high-quality lumber, don't let inflated lumber prices stop your important building projects. The Belsaw goes right to the trees and turns out smooth, true-cut lumber... even beginners get excellent results. Just one man (no crew needed) can easily cut enough on weekends to save hundreds of dollars over high lumberyard prices. For power use tractor PTO or other low HP diesel or electric unit. Factory-direct selling keeps price low, and convenient time payments may be arranged.

Send for FREE BOOK! Just mail coupon below for "How To Saw Lumber" booklet and complete facts on the One-Man Sawmill. There is NO Obligation and NO Salesman Will Call on you. Do It TODAY!

FREE BOOK

BELSAW MACHINERY CO.
362M FIELD BUILDING
KANSAS CITY, MO 64111

Please send all facts and details in your FREE BOOK "How To Saw Lumber". I understand there is No Obligation and that No Salesman will call on me.

Name _____
Address _____
City-State _____ Zip _____

MORE SMILES PER MILE and more miles per gallon... over 200mpg!

MOTORIZED YOUR BIKE... Choose from two of the world's lightest, fastest, most reliable engines: 2-HP or 1.3-HP. Both install quickly with two bolts on almost any bike—even 10-speeds and BMX. Motorcycle-type clutch and throttle controls. Does not interfere with pedaling. Satisfaction guaranteed.

FOR FREE BROCHURE AND SPECIAL FACTORY REBATE OFFER CALL TOLL-FREE 1 800 821-7700

Ask for Ext. 10010
Call anytime,
including Sundays.
In Missouri call
1 800 892-7856,
ext. 10010
OR WRITE TODAY!

Bumble-Bike®

Dept. 10,
P.O. Box 1116
Havana, FL
32333
U.S. Patent
Pending



THE ICE ABOVE, GIANT BELOW

(Continued from page 119)

than a decade and all without major mishap. The proposal comes from the marine division of General Dynamics Corp. and is principally the work of its Electric Boat (submarines) and Quincy (LNG) Shipbuilding subsidiaries.

It is perhaps the most fascinating concept advanced as a solution to the major problem of the Alaskan North Slope: not how to produce oil or natural gas, but how to move the vast amounts already discovered to world markets.

Surface ships, according to a majority of experts, can't fight the ice year-round and do a reliable job. Although there are still some proponents of new ice-breaking tanker designs (primarily Canadian interests), the Esso S.S. Manhattan project is regarded, by most marine architects, as the final test of surface ships against Arctic ice—a test

believe the project will never be completed, although 1987 has been given as a target date.

By comparison, General Dynamics calls for a fleet of 17 submarine tankers, each costing about \$700 million to produce, plus another \$3 to \$4 billion in shore facilities. Reactor-powered versions of the sub LNG tanker design—the "nuke option"—would cost an additional \$25 million apiece to build. But, because of a speed advantage—15 knots versus 12 for the larger, heavier methane/liquid oxygen-fueled sub tanker—only 14 nuclear vessels would be required to deliver the same volume of gas at the specified rate.

Besides costing almost \$30 billion less than the projected pipeline, and being much preferred from an environmental standpoint, the submarine tanker offers the flexibility to react to marketing—which, in terms of petroleum, usually means "political"—conditions. For instance, the Reagan administration might be



Proposed submarine LNG tanker routes to ice-free ports in Canada or West Germany.

which has proven them to be economically unviable. Off Prudhoe Bay, Alaska, the Beaufort Sea not only freezes several feet thick, but the surface icepack is often thrust by wind and current into pressure ridges that build up like small mountain ranges.

Washington's favored solution has thus far taken the form of a proposed 4,800-mile pipeline, branching off in Canada to terminuses both in Chicago and San Francisco. It would be the largest private construction project ever undertaken, at an astronomical cost of \$43 billion, a portion of which would be federal subsidies—read "taxpayers"—put up in advance of construction. Even if financed, with environmentalist objections cast aside, some experts

able to talk West Germany out of finalizing a massive deal for Russian natural gas via pipeline if some means of supplying the Germans with Alaskan gas existed.

But current indications suggest that despite some obvious advantages, the submarine concept is regarded by both government and private sources of finance as too novel and untried.

Yet, the idea really isn't new. At General Dynamics, the idea goes back 13 years to a design for a submarine oil tanker. This slightly smaller sub—about 900 feet long, as opposed to 1,400 for the LNG version—would also have operated from Prudhoe Bay. Interestingly, even as pipelines today are being championed for long-distance Arctic

gas transmittal, the original submarine idea, for hauling crude oil, is the subject of renewed interest on the part of Canadian interests; it may yet be built.

Six cargo tanks

Liquid natural gas handling, of course, involves more critical systems than does transportation of heavier petroleum products. The LNG sub would have six separate, 340-foot-long cylindrical cargo tanks. Inside the steel pressure hull of each would be a layer of insulation identical to that lining the spherical tanks of LNG ships now operating: mechanically attached isocyanurate (foam) panels. This system has a designed boil-off rate of about 0.2 percent per day. An air-filled space between the insulation and the pressure hull would allow for inspection and repair access. The tank material inside the insulation would be nickel steel, built to withstand the extra pressure should malfunction prevent venting of boil-off gas.

A main, variable-ballast tank running down the center of the submarine would provide the necessary seawater ballast for submerged running with or without cargo (LNG tanks cannot be contaminated while deadheading). General Dynamics believes the general undersea operating routine would involve nothing outside the realm of current military submarine operations. A heavy array of electronic and sonar sensing instruments, however, would be necessary for the detection of undersea obstacles below, above and to all sides.

Operation at 600 feet

Arctic-sea ice-pressure ridges extend more deeply below the surface—as much as 150 feet—than they do above it, and would provide a primary navigational hazard. The tanker is designed to operate at a maximum depth of 600 feet. The pressure hulls would have a collapse depth of 1,000 feet. Normal cruise would probably be at about 300 feet, depending on available depth and presence of surface obstacles. It wouldn't pay to run deeper, since a "mid-water layer," extending from about 600 down to 3,000 feet in Arctic oceans, is actually warmer by several degrees than the 29°F surface layer and this would only work against the cryogenic cargo insulation. (Sudden or massive release of LNG into the much-warmer seawater might result in a spontaneous explosion—nobody is exactly sure.)

While there would be emergency hatches, compatible with rescue

submersibles, to provide escape for the crew of 30-plus, a grounding or complete power loss under heavy pack-ice would be dicey. Even the heaviest sea ice is always moving, however, and is frequently split open by wind and current into what are called leads or polynyas. These pools can be several hundred yards wide and a mile or more long. The open water would soon glaze over with thin ice, but the tanker could surface through it—the deck and upper hull protected by those 10-by-10 oak beams put there specifically for that purpose.

The nuclear-powered version of the tanker, while speedier and more economical to operate, would require some backup source of propulsion in the event the reactor had to be shut down for emergency reasons while the ship was submerged under ice.

General Dynamics engineers believe a storage-battery system could suffice, although an auxiliary diesel engine, fueled by LNG and liquid oxygen, might be preferable. Highly sophisticated sonar gear would locate a nearby polynya; once the ship were positioned below it, it would need no further auxiliary power to surface.

Stored compressed air would blow seawater ballast from the main tank, with no drastic effect on trim—although emergency surfacing would probably be undertaken in a bow-high mode.

It is estimated that a seabed cargo-transfer facility (illustration on page 118) would give individual tankers no more than a 24-hour turnaround time in Prudhoe Bay. The proposed fleet (17 non-nuclear or 14 reactor-powered) would have a cargo-lift capability of two billion cubic feet of natural gas per day—every day.

Prototype proof

It is apparent that the concept would require proof in prototype, even though its novelty lies primarily in the grand scale at which technology is applied, rather than totally new applications. Adding a nuclear reactor to the mix might be too much for most nervous bureaucrats to swallow—even though the methane-fired version would require a large liquid oxygen tank aboard. This would add bulk and weight and would require a liquid oxygen processing plant at the southern terminus of the tanker route.

There was a day when bold ventures had better than even chances. In that regard, the submarine tanker concept might have come along not before, but after, its time. **FM**

IT'S STILL FREE



That's right!
The new expanded CRUTCHFIELD Catalog is still free! 116 pages of photo filled pages of state of the art electronic masterpieces at low discount prices!



- Find out why CRUTCHFIELD offers the best value in personal computers
- Place and receive calls up to 700 feet with a cordless phone
- Learn about the new infrared controlled stereos
- Also Car Stereo, Security Systems, Electronic Gifts and Personal Stereos

Call or write now for your FREE catalog!

Use the coupon below or call toll free

800-446-1640

In Virginia call toll free 800-552-3961

Send me your FREE catalog by Third Class Mail

Rush me your FREE catalog! I'm enclosing \$1 for First Class Mail

Name _____

Address _____

City _____

State _____

Zip _____

CRUTCHFIELD

1 Crutchfield Park, Charlottesville, VA 22906
Department 0



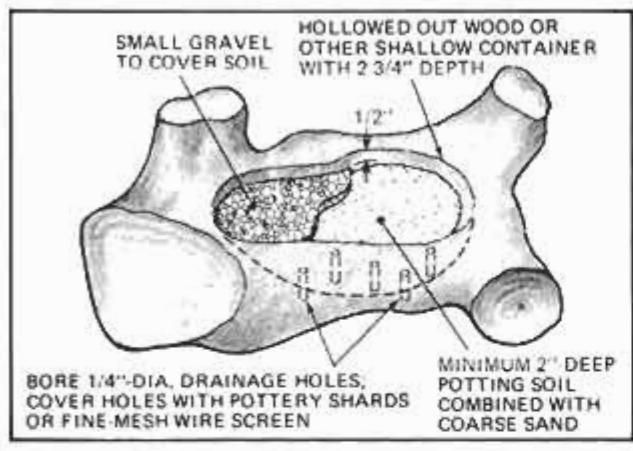
Planting cacti in small containers

Gnarled, burred, twiggy, knotted and generally craggy pieces of wood make ideal containers for cacti and succulents. The rough wood textures complement the often thorny, often tough-skinned cacti. Wood containers can also provide good drainage—a necessity for healthy succulents.

You don't need a large container for a cactus garden, as there are many miniature species. For example, some types of aloes and sedums (see photo) retain their miniature sizes so you can enjoy a cactus dish garden long after you plant it. As an extra bonus, many succulents are so hearty that they grow with little encouragement.

Cacti and succulents don't grow in pure sand—they require nutrition, and the soil should have good drainage. You

This small rustic-looking log container holds a variety of succulents such as star-shaped aloe, several types of lacy sedum and rose-shaped aeonium.



can grow them in a commercial planting mix to which you should add vermiculite and sharp sand to improve the drainage.

When you repot a cactus, gently remove the hard crust of soil from the container and loosen the roots very slightly. Place the cactus in the pot and add soil to within 1/2 in. of the rim. Give your dish garden several days before watering it sparingly.

CONTAINED GARDENS

(Continued from page 135)

materials by using construction-grade redwood.

However, since the box will be filled with earth and, thus, susceptible to decay and insect infestation, construction heart redwood is a better choice.

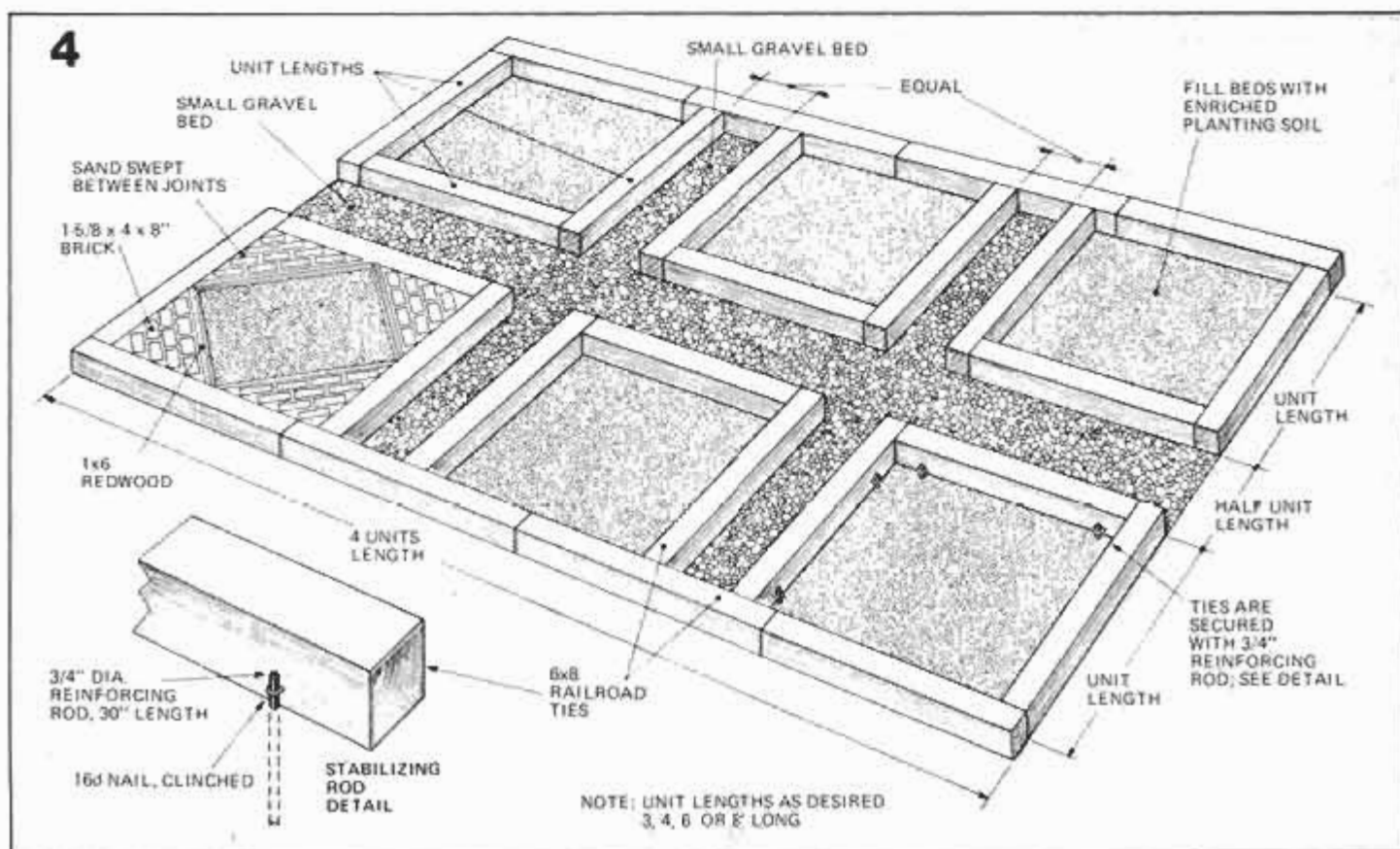
Cut parts to size, according to the drawing on page 135. Mark and bore drainage holes in the bottom piece. Next, cut the rabbets in the front-piece and test-fit the parts without glue.

To cut the scalloped edge along the top of the frontpiece, draw in a pencil grid lightly, using 1-in. squares as shown in the drawing. With squares in place, you can draw in the curves freehand.

Analyze your artwork critically, to make certain you like what you've drawn. Then, cut the edge, using a sabre saw and a relatively fine wood-cutting blade. Sand the shape, using a drum sander in your portable drill.

Assemble the box with the fasteners noted on the drawing in the following order: back cleat to back; side cleats to sides and back; front to sides. The bottom floats. For maximum strength, use resorcinol glue in the fixed joints.

Caution: Attach the window box securely in place. Locate the double plate (directly under the window's sill) and fasten the box; use 4-in. No.



18 hot-dipped, galvanized lagscrews with washers turned through the box, the siding and into the plate behind. Add wedges (wood shingles) between the box and the wall as needed to level the box.

3 Telephone-pole edgers

Weathered telephone poles sunk into sloping land contrast handsomely with blooming plants placed along the border.

Although telephone poles are difficult to buy in some areas, you can begin your search by calling the local utility company, or a landscape supply company.

A chain saw generally does a good job of cutting the poles to the lengths you'll need for this particular project.

To keep pole sections securely in place, it's a good idea to join them with 1/2-in.-dia. steel rods driven through holes bored in the poles with a 3/8-in. or larger drill.

As extra security on sloping ground, clamp one end of a length of wire around the steel rods between poles at 30-in. intervals. Then clamp the other end of the wire to a "dead man" buried farther up the slope. After positioning the poles, you should backfill the trench and then tamp the earth firmly in place to provide support.

4 Railroad-tie planting beds

This contemporary-looking garden is inspired by the age-old concept of intensive gardening, which is practiced in both Europe and the Orient.

The idea is to fill each bed with highly enriched planting soil and to plant it densely with chosen vegetables, herbs and flowers. The theory is that the dense plantings will crowd out most weeds.

There's a great amount of flexibility in the plan of this modular garden. You can begin on a modest scale, with two or more modules and then add additional ones as you need them, or as railroad ties become available.

The ties are secured in place by 30-in. lengths of 3/4-in.-dia. reinforcing rod, attached with 16d nails partially driven into the ties and clinched around the rods.

You'll find that the raised beds are more easily tended than conventional gardens. They also offer architectural interest, even in the dormant season.

For an added aesthetic effect, try positioning bricks in some of the modules. **FM**

FREE!

A Most Resourceful Tool For Your Workshop

The 120 page, full color Leichtung catalog is crammed with tools for woodworkers, metalworkers and hobbyists of all kinds.

We've got magnificent brass backed English saws; a broad selection of drill accessories; fabulous Danish workbenches; loads of super garden tools from around the world; specialty automotive tools and aids; house and patio "gotta haves" —and that's just for openers!

It's a fun catalog to flip through! Oh yes, it's also FREE! Just mail in the coupon and we'll speed your copy along. FREE offer expires JUNE 30, 1982. After June 30th, please send \$1.00

LEICHTUNG
"THE Workbench People"
4944 Commerce Parkway # 382PMI
Cleveland, Ohio 44128



Yes, please send me your 120 page, full color Leichtung catalog at no charge.

Name _____

Address _____

City _____

State _____ Zip _____

LEICHTUNG
"THE Workbench People"
4944 Commerce Parkway # 382PMI
Cleveland, Ohio 44128

Free!

Edmund Scientific Catalog



4,000 Unique Items

Astronomy, Microscopy, Biofeedback, Weather, Alternate Energy, Binoculars, Optics, Magnets, Magnifiers, Tools, Unique Lighting, Lab Equipment, and much more. Over 4,000 unique and fascinating products. Send for our FREE, colorful 1982 Edmund Scientific Catalog... Today!

Rush me your free catalog!

Name _____

Address _____

City _____

State _____ Zip _____

Clip And Mail Coupon Today To:
Edmund Scientific Co., Dept. 8211 H-06
Edscorp Bldg., Barrington, N.J. 08007
No. 3455 *1982 Edmund Scientific Co.

NORMARK Automotive Accessories



Factory Accessories for the Do-it-Yourselfer

Now you can add Power Windows, Power Door Locks, Delay Wiper Control, Lights-On Alarm, and many other exciting accessories to your domestic or imported car, truck, van or boat. Normark can even check your oil automatically with the Electronic Dipstick.

Rush my free full color catalog. In Canada & other countries include \$2.00 for airmail postage.

NORMARK
Manufacturing Corporation
P.O. Box 400408 Dept. PM3
Dallas, Texas 75240
(214) 654-1800 ©1981 NORMARK

Get your exercise— but don't overdo it!



FOR
FREE CATALOG
CALL TOLL-FREE
1-800-257-7955

PEDALPOWER . . . a great way to make your bike safer and more fun!

Riding a bike is great exercise. But pedaling when you're tired or traveling up hills can itself be a threat to your health. A PEDALPOWER Electric Drive System takes the health risk out of riding your bike and allows you to safely zip over hills, cruise effortlessly and feel really independent.

PEDALPOWER Electric Drive Systems fit all bikes and adult trikes. They're easy to install, use no gasoline and let you travel 100 miles for about 10¢.

- Starts instantly.
- Recharges overnight in any household outlet.
- Quick installation.
- Standard and deluxe models available.
- 10-day trial Money-back guarantee.
- Over 50,000 sold worldwide.
- Tax deductible when prescribed by a doctor.

Owners Love PEDALPOWER

"PEDALPOWER helps me get the exercise I need and want—it's a real delight."

B. Sorensen, Gainesville, GA

"PEDALPOWER is so cheap to operate, I wouldn't take double the price I paid for it. People don't know what they're missing—especially senior citizens."

L. Hannah, Moberly, MO

For a Free Color Catalog of PEDALPOWER Electric Drive Systems, CYCLE CHAIRS and other 3-Wheelers, return the coupon to PEDALPOWER, 591 Mantua Blvd., Sewell, NJ 08080. For faster action, call

Toll-Free

1-800-257-7955

(in N.J., 800-232-6550)

Return this coupon today!

PEDALPOWER, DEPT.
591 Mantua Blvd., Sewell, NJ 08080

Send me my Free Color Catalog.

Name _____

Address _____

City _____

State _____ Zip _____

Phone () _____

Showrooms in New Jersey, Texas and Florida

NEW PRODUCTS FOR LAWN AND GARDEN *(Continued from page 139)*

The Growmaker is a 14-cu.-ft.-capacity compost bin made of eight rolled steel panels, a sturdy base and a hinged lid. All parts are coated with aluminum-zinc alloy and green paint to reduce corrosion. Each panel can be raised separately to remove compost evenly. The 30-in.-diameter unit is 34 in. high, weighs 26 pounds and is priced at \$73.95 postpaid from Rotocrop Inc., 604 Aero Park, Doylestown, Pa. 18901.



The professional-model High Limb Chain Saw is a pruning saw designed for cutting high limbs without a ladder. The tool consists of a 4-ft. chain blade, two 25-ft. lengths of polypropylene rope and a 14-ounce sandbag weight. To operate, just attach the throwing weight to one rope end, toss over the tree limb and cut. It costs \$39.95 at hardware stores and from the manufacturer: Green Mountain Products, Muller Industrial Park, Norwalk, Conn. 06852.

Stone Bark is an earth-colored mulching material made of slate that's been altered to look like chips of wood bark. According to the manufacturer, it won't rot, fade, blow away or attract insects. A 45-pound, 1-cu.-ft. bag sells for \$4 at home and garden centers. If it's not available in your area, write to Old Dutch Materials Co., 350 Pfingsten Rd., Northbrook, Ill. 60062, for the nearest dealer.



You can steer this 16-hp, cast-iron lawn tractor with two hand-operated levers. To turn with a zero turning radius, push one lever and pull the other. The Mini-Skat comes in kit form, priced at \$2,000 plus f.o.b. postage Cedarburg; optional attachments: a dozer blade and snowblower from Struck Corp., Struck Lane, Cedarburg, Wis. 53012.

Hydroponic gardening is now available to homeowners through the Vegetron. Made from a series of 3-in.-diameter PVC tubes arranged in steps, the tubes are connected with hoses to a pump (a.c. current). This design provides plants with a controlled flow of water, oxygen and nutrients. According to the maker, the unit is easily assembled, and produces maximum yield if placed in a sunny spot with good air circulation. Price ranges from \$352 to \$664. A free information packet is available by writing to Geo. W. Park Seed Co. Inc., Box 31, Greenwood, S.C. 29647.



The HB-680 is a gasoline-powered blower/mister/sprayer that weighs 16.5 pounds and has a 2-gal. spray-tank capacity. It can drive spray up to 30 ft. horizontally and 20 ft. vertically, and it can blow air at the rate of 245 cu. ft. per minute. The unit has engine speed control and liquid volume control, mounted on the front handles, and easily accessible air filter, fuel filter and carburetor in the rear for adjustment or replacement. It sells for \$259.95 at HomeLite dealers and is made by HomeLite Div. of Textron Inc., Box 7047, Charlotte, N.C. 28217.

The Solo Model 581 rotary lawnmower has a 5-hp, liquid-cooled engine with a 2-quart fuel tank that allows up to four hours of uninterrupted cutting. According to the maker, its low-profile plastic housing cuts rust corrosion and engine noise. This 18-in. mower weighs 55 pounds. It's \$399 at garden centers and is made by Solo Inc., Box 5030, 5100 Chestnut Ave., Newport News, Va. 23605.



The Back-Saver is a gooseneck-handled lawn rake that reduces user fatigue. Its 48-in.-long, tubular-steel handle is connected to a 20-in.-wide head with 32 spring-steel teeth. It's 29 pounds, and \$9.95 at home and garden centers. Made by Rugg Manufacturing Co., Box 507, Greenfield, Mass. 01302.

(Please turn to page 188)

BEAT the HIGH COST of LIVING!

HERE IS A BEAUTIFUL WAY TO MAKE MONEY!

UPHOLSTERY BOOKLET MAILED FREE!

LEARN UPHOLSTERY AT HOME... restore old chairs, sofas to like-new condition! A clean, enjoyable way to put spare hours to profitable use. Old cast-offs picked up for dollars, worth hundreds when reupholstered. Fascinating home study course includes tools, kits, supplies. Earn as you learn—start your own business!

SEND FOR OUR FREE BOOK TODAY! YOU'LL GET A BIG ILLUSTRATED 24 PAGE BOOK ON UPHOLSTERY and the upholstery business and a sample lesson showing how the fabulously successful MUI system is taught. It costs you nothing to get the information and there's no obligation. No salesman will call.

Modern Upholstery Institute,
802M Field Bldg., Kansas City, Mo. 64111

GET STARTED NOW • MAIL THIS COUPON TODAY

Modern Upholstery Institute,
802M Field Bldg., Kansas City, Mo. 64111

Please mail me a copy of your book, "PROFESSIONAL UPHOLSTERY for Fun and Profit." I understand no one will call and there is no obligation.

Name _____ Age _____

Address _____

City _____ State _____ Zip _____

RECTAL ITCH?

NEW!

Effective Temporary Relief of Rectal Itching.

CONTAINS HYDROCORTISONE

CaldeCORT

RECTAL ITCH MEDICINE

HYDROCORTISONE (1:25) ointment NET WT 1/2 OZ. (15g)

New CaldeCORT[®] Rectal-Itch medicine with hydrocortisone, the anti-itch ingredient doctors prescribe most, brings prompt, soothing, temporary relief of external itch in anal areas. Greaseless, non-staining ointment.

CaldeCORT
RECTAL ITCH MEDICINE

©Pennwalt Corporation 1982

MARCH 1982 187

It's So Easy!

the whole family can

REPAIR OR MAKE CLOCKS

FOR FUN & EXTRA INCOME
With SUPER ACCURATE New Mini Quartz Movement Made In The U.S.A.! Two Year Guarantee. FREE HANDS! Other Quartz Movements, Dials, Numerals and Accessories also available at Super Low Prices!

Call Us Today!
414-248-1150

Or Send Your
Order To:



KLOCKIT

P.O. BOX 629, DEPT PM32

LAKE GENEVA, WISCONSIN 53147

Send for a Free 48 Page Catalog

VOLUME
DISCOUNTS



FREE CATALOG



Q-71 MINI-QUARTZ

For dials up to 1/4" thick

Super LOW Prices

1-4: \$6.50 ea. 10-24: \$5.40 ea.
5-9: \$6.00 ea. 25-49: \$4.95 ea.

Include \$2.50 for shipping
& Handling - Sent U.P.S.

S-200 Sweep - \$2.00 each
Red, Black, or Brass

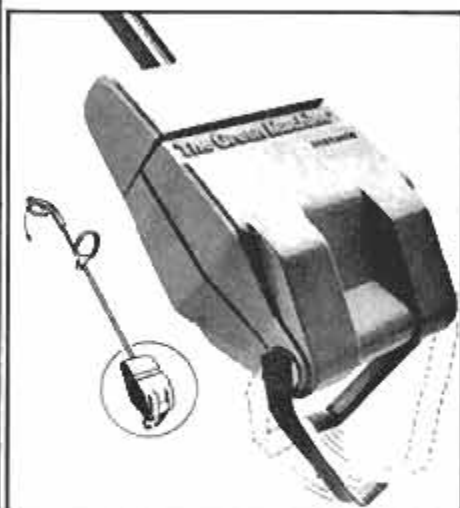
(You may include 75¢ for 1st class catalog mailing)

LAWN AND GARDEN PRODUCTS

(Continued from page 187)



The Bruiser II is a blow-molded plastic trash can with galvanized-metal lock handles that keep the cover securely in place. According to the Bruiser's manufacturer, the blow-molded construction can provide greater strength than injection molding. This allows the product to remain sturdy and durable in temperatures ranging from -20°F to +150°F. The 32-gal.-capacity can shown here sells for \$19.95 at hardware stores and home centers. It's manufactured by Fesco Div. of Cities Service Co., Box 626, Pittsburgh, Pa. 15230.



The Green Machine is a lightweight, electric cultivator with two double-edged, reciprocating, spring-steel cutting blades. According to the manufacturer, this motion eliminates the clogging that is common to circular-action cultivators. With a heavy-duty plastic housing, the unit is 52 in. long, weighs 11 pounds and sells for \$99.95 at home centers. It's made by HMC, 20710 Alameda St., Long Beach, Calif. 90810. **PM**

LEARN MEAT CUTTING



Train quickly in 8 short weeks at Toledo for a bright future with security in the vital meat business. Big pay, full-time jobs—HAVE A PROFITABLE MARKET OF YOUR OWN! Time payment plan available. Diploma given. Job help. Thousands of successful graduates. OUR 50th YEAR! Send NOW for a big new illustrated FREE catalog. No obligation. O.I. approved. NATIONAL SCHOOL OF MEAT CUTTING, No 71-02-01877, Dept. 50-2, 33 N. Superior, Toledo, Ohio 43604.

Natural! Cedar Energy Efficient! Affordable!

Pre-cut International Homes

Send \$5 for our all-new 1982 catalog

21704-87th S.E.

P.O. Box 97/Woodinville, WA 98072/(206) 668-8511

You asked for it!

Professionally streamline your workshop with SHADOW™ self adhesive tool profiles*

Organize your work area easily and professionally with these self-adhesive tool profiles.

Includes over 50 colorful pre-cut SHADOW™ tool profiles on durable peel-back vinyl, plus 2 blank sheets for customizing shapes for your special implements.

Applies instantly and permanently to pegboard, walls, or shelving for home, shop or garage use.

Allow 4 weeks for delivery.

Please send me _____ SHADOW™ adhesive tool profiles at \$8.95 plus \$1.00 postage and handling. Mass. residents add 5% sales tax.

Check or Money Order enclosed.

Charge my Master Card VISA

Account # _____ Exp. Date _____

Print: Name _____

Address _____

City _____

State _____ Zip _____

Phone _____



SHADOW INC.

Dept. PM 282
60 Brigham St.
Marlboro, MA 01752

©Shadow Inc. 1982
*Patent Pending

MATCH TACKLE FOR MORE FISH

(Continued from page 127)

panfishes, the intermediate sport fishes and the larger game fishes.

Panfishes include the bluegill and its many country cousins such as redear, pumpkinseed, rock bass, green, redbreast, and spotted fishes, plus bullhead, catfish, crappie, yellow perch and pickerel as well as small trout.

The intermediate fishes include largemouth, spotted, smallmouth, white and yellow basses, plus channel catfish, walleye, larger trout, white perch and larger pickerel.

The larger game fishes include muskellunge, northern pike, salmon, channel catfish, sturgeon, and many species of inshore saltwater fishes.

As you can guess, the lures needed to catch each group vary from tiny for panfishes to whoppers for the larger game fishes, and it's obvious that no one rig will properly cast such a wide range of lure weights. You can't cast a bluegill lure using a musky rig, and vice versa.

Then, in addition to selecting the properly matched rig for the fish you want to catch, you must also choose the method of casting that suits you best—spin-casting, spinning, bait casting, or fly fishing. Here are explanations and charts that show you how to pick matched components for the three sport-fish categories.

Spin casting

This is the most popular method of fishing because it is the simplest. It's especially recommended for a youngster or a beginner adult because spin-casting rigs come in youth and adult sizes.

The reel has an enclosed stationary spool with a center hole in the forward side of the cover through which the line runs during casting and retrieving. A thumbing lever on the back of the cover is depressed to

hold the line, then released to free the line when making a cast. After a little practice, anyone with normal coordination can cast with ease.

Spinning

This method uses the open-face spinning reel, which has a stationary spool with no enclosure. The line flows freely through a large gathering guide on a spinning rod during the cast and is picked up for feeding back onto the reel with a hook-shaped bail during the retrieve. Spinning is not quite as easy for a beginner to learn as the spin-casting method, but it is second in popularity.

Bait casting

This is the oldest and most difficult to master of all the methods. The reel is the problem because it takes skill to control it properly during the cast. Unlike spin-casting or spinning, the spool isn't fixed, but revolves rapidly as the lure pulls off line during the cast. If the caster has a dumb thumb that's not smart enough to yield line gradually during the cast, a miserable mess called backlash occurs as the reel's spool overspeeds.

Many modern bait-casting reels, however, now have a remarkable device that virtually wipes out this backlash when properly adjusted. It's called a centrifugal braking system. It's not difficult to operate and, once mastered, bait casting has an edge in casting accuracy and control of a fighting fish, in this fisherman's opinion.

Fly fishing

Devotees of the "long rod" admit it isn't for everyone, but anyone who stays with this method long enough to master it will unquestionably heighten the thrill of catching any size fish.

In fly casting, the line is heavy enough to carry out the tiny lure, or

(Please turn to page 190)

HOW TO MATCH YOUR FISHING RIG

SPIN CASTING				
Rod action	Reel size	Pound-test line	Lure weights	Fish
Ultralight	Mini-size	4 to 6	1/16 to 1/4 oz.	Panfishes
Light	Mid-size	6 to 10	1/4 to 3/8 oz.	Intermediate
Medium	Standard	10 to 15	3/8 to 1/2 oz.	Intermediate/Large
Heavy	Large	15 to 30	1/2 oz. and up	Large
SPINNING				
Ultralight	Mini-size	2 to 6	1/16 to 1/4 oz.	Panfishes
Light	Mid-size	4 to 8	1/16 to 1/4 oz.	Intermediate
Medium	Standard	6 to 12	1/4 to 3/8 oz.	Intermediate/Large
Heavy	Large	12 to 30	3/8 oz. and up	Large
BAIT CASTING				
Light	Mid-size	6 to 8	1/8 to 1/4 oz.	Panfishes
Light-medium	Standard	8 to 12	1/4 to 3/8 oz.	Intermediate
Medium	Standard	10 to 20	3/8 to 1/2 oz.	Intermediate/Large
Heavy	Service	20 to 30	1/2 oz. and up	Large

Victor's PORT-A-TORCH!

Proves you don't have to be big to be tough.



It cuts, welds, brazes, and solders. Perfect for hobby and craft use, it's ideal for home, farm and shop repairs. And it has plenty of capacity for tough industrial maintenance. With optional tips, it can weld 1/2" material or cut through more than 2" of steel.

Before you buy a portable outfit, see your Victor distributor. He'll show you why no other outfit even comes close.

Look in the Yellow Pages under Welding Equipment and Supplies or write Victor Equipment Co., Box 1007, Denton, Texas 76201 or call 817-566-2000.

WHEN YOU KNOW QUALITY, YOU'LL BUY VICTOR.

VICTOR

Now. The Sukii Super Steamer— Just \$419!

Now you can own the basic, most popular unit in America's premier line of portable steam cleaners — for just \$419.

ALL YOU NEED FOR FAST, EASY, THOROUGH CLEANING OF ENGINES AND MACHINERY.

For more information — or to order — CALL 1-800-528-7370 TOLL FREE — Or write — SUKII INTERNATIONAL P.O. Box 1653, Scottsdale, Arizona 85252



Gunter's Haul-All™

- Try it! makeshift trailers costing your own fully enclosed trailer is hardly available
- All aluminum shell
- Rugged steel frame
- Lightweight, but strong
- Airstream designed front end
- Cheap to build — less than \$900.00
- Three extendable support legs 2 rear 1 front
- Will haul anything — weedhoppers, camping gear, motorcycles, household goods, anything.
- 5' 6" wide - 5' 10" tall - 18' 2" long
- Simple and easy to construct with very detailed blue prints and construction manuals and layouts.

Complete price — \$50.00
TRAILERS BY GUNTER
P.O. Box 180
Port Neches, Texas 77651

The Worden System Antique Lamp Designs



Build Tiffany Style Lamps For Hobby & Profit At Most Stained Glass Dealers
BIG COLOR CATALOG \$1.00

H.L. Worden Co. dept. PM81
P.O. Box 519, 118 Main St.
Cranger, WA, 98932
Telephone 509-854-1557

C191/2 Baroque

FAMILY OF SEVEN CUTS HOT WATER BILLS IN HALF!

Tankless Heater Provides Endless Hot Water



The Hughson family
of Pennsylvania

The Hughson family just took 7 showers in a row — the 7th was as hot as the first — and they're saving hundreds on their hot water bills too.

Sound, Simple, Money-Saving Idea

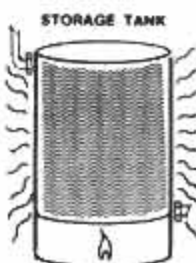
Did you know that much of the energy used to heat your basement tank of water is dissipated right through the walls of the tank itself and into your storage or crawl space area?

The Perfect Answer—New Thermar Tankless Instant Hot Water Heaters

If heat losses are created by the need to keep large volumes of water standing in a tank, why not eliminate the tank? And, that's just what Thermar has done. In its place we have developed a tiny, super powerful, instantaneous heating unit which ACTUALLY CREATES HOT WATER AS YOU USE IT. A micro-switch on the unit automatically turns on the moment hot water is needed. Then a continuous stream of delightful, sparkling hot water flows from the tap for shower or wash basin. IMAGINE — as much hot water as you want — produced in a never-ending stream as long as you need it.

The ordinary Tank-Type Hot Water Heater is the most "Energy Costly" appliance in your home. In this day of rising costs and energy consciousness, a new THERMAR TANKLESS INSTANT

HEATER should be considered by everyone interested in saving money and saving energy.



Storage tanks keep large volumes of water heated ... all the time. Tank cycles on and off 24 hrs. a day — even when you're away. Tank can also "run out" of heated water when needed.



Tankless design is small in size, doesn't store heated water — but creates it on demand. Uses no energy until you need hot water. Can produce 120 gallons and more an hour!

U.L. Listed Electric
and AGA Certified Gas Models
Thousands in Use Around the World

You'll recover the initial costs many times over in fuel savings as the years pass. And, you'll enjoy a lifetime of hot water — shower after shower after shower!

FOR RUSH DELIVERY OF FREE ENERGY CATALOG AND
FULL DETAILS USE COUPON BELOW OR CALL

1-800-547-5995

RUSH!

THERMAR

Johnson Power Tech
Melrose Square
Greenwich, CT 06830

FREE!

I would like to cut my hot water heating bills in half! Please RUSH your FREE catalog of THERMAR INSTANT, TANKLESS HEATERS. Include details of the absolutely unique 10 year guarantee and replacement plan. I understand that I am under no obligation to buy anything and no salesman will contact me.

Name _____

Address _____

City _____ State _____ Zip _____

PM0382

MATCH TACKLE FOR MORE FISH

(Continued from page 189)

fly, and the reel is not in motion during the final cast. At the end of the heavy line is a 6- to 9-foot monofilament leader which varies from about 2- to 30-pound test, depending upon the size of fish being sought. Our match rod-to-reel-to-line-to-lure charts are not applicable in the same way here. Instead, seek the advice of an experienced fly fisherman where you live.

Other gear

In addition to the casting rigs, you need additional equipment to properly fit out for trips afield. You will be fishing either afoot or afloat, and each way requires its own matched-up gear to make you a complete angler.

Afoot: This is how I began fishing in southern Ohio more than half a century ago, and the way I still get some of my biggest kicks. There's something about prowling the shores and shallows of a lake or stream that's special. Maybe it's getting in the water with the fish for hand-to-fin combat.

In summertime when waters are warm, it's common to see fishermen wading and fishing in old jeans and sneakers. Lures can be carried in a discarded pocketbook, with the lining removed, slung comfortably over your shoulder. Or a rucksack may be preferred because it's large enough to hold not only lures, tools, insecticide, and rain gear, but also a light lunch.

In waters too cold for comfort, insulated thigh boots or chest waders are recommended. You can wade out farther from shore to reach deeper holes, and cross over riffles to fish both shores of a stream without getting wet and cold.

Afloat: In a boat, you do cover a lot more water and reach places not possible to fish afoot. Chances of enlarging your catch increase and help justify the investment. Again, it is best to get the advice of another angler who knows the type of boat and motor suited for the area where you fish. For the first few trips, you might want to hire a guide and make notes not only on his equipment, but also where and how he fishes.

One final tackle tip: Beware of most bargains and closeouts in fishing gear. Remember that a good mechanic with bad tools is a poor mechanic. It's smart to shop around, but usually best to stay with the name brands that have withstood the tests of time. And what better time to shop around than right now?

PM

NO MORE
DEAD BATTERIES!

Check Your Car's Entire Electrical System in Seconds!

•Battery •Alternator •Regulator
•Carburetor •Ignition

CAR COMPUTER

The Only Accessory Detroit Left Out!

Have no more fears of being stranded because your car battery is dead. With our solid state Car Computer you can test the condition of your battery yourself, in seconds, at any time, even if you've never changed a flat tire. Simply plug this pocket-sized "brain" into your car's cigarette lighter and you'll get instant readout as to the condition of your entire electrical system; battery (weak or strong), alternator, regulator, carburetor and ignition. Major auto companies have computers in their repair shops for just this purpose. Now you can have your very own Analyzer, and it's all computerized with LED readouts. No mechanical parts to cause trouble. You never have to rely on unreliable mechanics again. With our Car Computer you know if you really do need a charge or a car battery; and you'll know it conveniently in advance. Stores compactly in your glove compartment. Ideal for cars, vans, campers, trucks.

© 1981 Consumer Technology, Inc.
2105 Lakeland Ave., Rontokoma, N.Y. 11779



ONLY
\$12.95!

**Fantastic 5-Year
Moneyback Guarantee (See Coupon)**

Amazing Electronic Brain Instant L.E.D. Readouts!

TechDirect Dept. TMM 207
2105 Lakeland Ave., Rontokoma, N.Y. 11779

Customers: Enclosed please find my check or money order for \$12.95 plus \$1.50 p&h (N.Y. & Ct. res. add sales tax). Please rush my Car Computer. I must be completely satisfied with the way it checks my car's entire electrical system for the next 5 years or I can return it for an immediate refund of my purchase price.

Name _____
Address _____
City _____
State _____ Zip _____
(Code #875)

Lose 4-6 inches of bulging fat BEFORE we cash your check!

Let the Shrink Wrap System reduce a combination of your waist and hips, NOW!

Let Us Take The Risk!

Use the Shrink Wrap System to reduce a combination of your waist and hips. **FAST!** Just fill out the coupon below and post-date your check for 30 days from today! You'll pay nothing now (not for 30 days), but we will send your Shrink Wrap System NOW! Try it. Use it. Watch inches disappear. If for any reason you are not delighted, send it back. We will return your check or money order, **UNCASHED!** Even if you send it back later, we'll still refund your purchase price. Over 153,000 satisfied customers make us bold enough to make this super guarantee!

That's right! 4-6 inches starting the very first day! Science has known about this principle for years. In fact, right now, professional and amateur athletes the world over are using it in their training programs. And many famous entertainers who have to trim down fast rely on this method. Now, you can use your body's own heat to melt away inches from your waist, your hips—anywhere!

Don't Hold Fat In... Lose It!

Plastics and elastics are merely flimsy imitations. Girdles just squeeze it in. But the Shrink Wrap System takes it off... fast! The belt is adjustable, so you can put isometrics to work toning loose muscle tissue whenever you want. And, our easy exercise program helps you shed unsightly inches even more rapidly.

If you want to go even further, your waistline, hips, and other problem areas will continue to shrink when you use the Shrink Wrap System to eat plans that won't leave you hungry. There's something for every lifestyle. You can use it as often as you need it to keep those inches off.

Shrink Wrap's strong quality construction has added benefits which give soothing, invigorating support to tired, tense back

muscles, while helping you trim away inches easily and comfortably. It's working right now for thousands of satisfied buyers and it can be working for you, if you order now!

Real People Lose Pounds and Inches!

Here are the impressive stories (all sworn and notarized) of a few outstanding users. Everyone may not do as well, but if they can do this well, just think how many pounds and inches you will lose quickly with the Shrink Wrap System!

Doug Fink of Asheville, North Carolina



"I LOST 6 INCHES IN 16 DAYS!"

"I've lost 5" from my waist and 6" from my hips over a 12 day period. My weight loss was 18 lbs."

Dr. J. Lee Briers of New Castle, Delaware

"I LOST 5 INCHES OFF MY WAIST & 5 INCHES OFF MY HIPS! I am amazed at the way Shrink-Wrap works. I'll recommend it to everyone!"

Helena Smith of Vandalia, Michigan

"I LOST 9 POUNDS & 4 INCHES OFF MY WAIST IN 2 WEEKS! It's just unbelievable that it took so little time and effort to produce such amazing results!"

Robert N. Nilsen of Mechanicsburg, Pennsylvania

Shrink Wrap System, Dept. BMM 207
20 Medford Ave., Patchogue, N.Y. 11772

Sirs: I have enclosed my check or m.o. Please rush me the Super Action Shrink Wrap System. If for any reason I am not satisfied, I'll return it within 30 days for a prompt refund of my purchase price, no questions asked! Check here if you want us to hold your check or m.o. uncashed for 30 days. (N.Y. & Ct. res. add sales tax.)

Waist size (Men's) _____ Waist size (Women's) _____
Rush 1 belt at \$19.99 plus \$1.50 p&h
(Save \$3) Rush 2 belts at \$37.99 plus \$2 p&h

Name _____
Address _____
City _____
State _____ Zip _____
 M.C. Visa Acct. # _____
Interbank # _____ Expr. _____
(#107)



© 1981 The New Body Boutique, Inc.
20 Medford Ave., Patchogue, N.Y. 11772

Call TOLL FREE!
24 hours a day - 7 days a week
1-800-228-2606
(In Nebraska call 1-800-542-8717)

A radio as small as a key!

To prove it, we'll attach it to a key chain, free!



Only
1/4" x 1 1/2" x 1 1/4"

Yes, a real radio with a miniaturized earphone so you can listen invisibly, almost anywhere... anytime. You receive the full range of A.M. stations so loud and clear, friends won't believe their ears! Comes with easy to replace 1.5v batteries. Only \$12.95!

TechDirect, Inc. Dept. WMM 207
2105 Lakeland Ave.,
Rontokoma, N.Y. 11779

Sirs: I have enclosed my check or m.o. for \$12.95 plus \$1.50 p&h. N.Y. & Ct. res. add sales tax. Please rush me my mini-radio which I may use for a full 30 days. If I am not totally satisfied, I may return it for a full refund.

(Save \$3) Rush me 2 radios at \$23.95 plus \$2 p&h.
Name _____
Address _____
City _____
State _____ Zip _____
(#876)

© 1981 Consumer Technology, Inc., 2105 Lakeland Ave., Rontokoma, N.Y. 11779

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 800-621-8633 (Ill. 800-572-0444) or Write VIP, 2021 Montrose, Dept. 181, Chicago, Ill. 60618

CLOCK COMPONENTS



Clock Movements, Battery, Quartz, Electric, Urges Grandmother, Grandfather, Westminster & Triple Chime, 6 Day Key Winds & Westminster, Bim Bams, Barometers, Metal, Bezel, Paper dials, Hands, Brass & Plastic Numbers & Markers. Hundreds of items. Quantity Prices. Send \$1.00 for 60 Page Catalog. Refunded on \$10.00 Order.

NEWPORT ENTERPRISES, INC. Dept. A
2313 West Burbank Blvd., Burbank, Calif. 91506

HYDRAULIC JACK REPAIRS

Earn While You Learn in Your Spare Time

Trained and qualified mechanics needed NOW to service cooperative hydraulic jacks. BIG opportunity for ambitious men. We show you HOW — in your basement or garage to earn spare time cash in an expanding industry. Don't wait. ACT NOW! Get the facts.

Write for folder No. PM3 and free bonus offer.

Hydraulic Jack Repair Manual Co., Inc.
P.O. BOX 39 STAMEN ISLAND, N.Y. 10214

GARAGE DOOR OPENERS

- Radio Controlled
- Buy Factory Direct and Save
- Thousands In Use
- Free Brochure
- Easy Homeowner Installation
- Immediate Shipment by UPS or PP

HELPMATE Equipment Co. Dept. PM382 Baroda, MI 49101

An ATLAS BODY? In 7 days

my method of DYNAMIC-TENSION starts giving results you can feel and your friends will notice. Big, useful muscles. Gain weight, if needed. Lose "pot belly." Send your name and address for 32-page book—FREE. CHARLES ATLAS, 49 West 23rd St., New York, N.Y. 10010 Dept. 8Q



EARN BIG COMMISSIONS

WORK FULL OR PART TIME!

Show big FREE SALES KIT featuring complete line low priced business printing and ad specialties to business people. Build profitable repeat business. Start now.

NATIONAL PRESS, INC.
Dept. A15 NORTH CHICAGO, ILLINOIS 60064

SATELLITE TV — SAVE THOUSANDS

Easily built high quality metal parabolic antenna. • Mount from hardware store materials. Less than \$200.00 and one week-end to complete. Our antenna will receive all satellites, all channels, all there! Our manual contains step-by-step plans, diagrams, pic tubes, among and more. Tells everything. Send \$19.95. U.S. funds today. Money back guarantee. Advanced Video Company 303 Firestone Ave. P.O. Box 74, Columbus, Ohio 44408

VISA or MasterCard accepted. \$5.00 deposit for C.O.D. orders.

We manufacture and sell high quality, low cost equipment.

PART-TIME CASH!

Assemble 16 h.p. Big Job Tractor Kit for your toughest jobs, then earn extra cash doing work for others. Factory-Direct savings! 30 Attachments — mower, plow, loader, backhoe, etc.

Catalog — \$1.00. Plans to "Build-it-yourself" — \$7.00 (Money refundable on any purchase).

STRUCK KIT, Dept. PM327 Cedarburg, Wis. 53012

NEW SURVIVAL GEAR

(Continued from page 125)

closed garage and the exhaust isn't blocked, you can sit in your car to warm up with the engine running, and listen to the car radio for disaster information. Better still, you can communicate your problems if you have a CB radio transmitter.

On the road

A well-stocked car trunk normally will have tire and motor-repair tools. In addition, consider the following: a tow cable and a coil of rope plus a lever-type winch, flares, reflectors, flashlight and hand spotlight, jumper cables, small camp stove, mess kit, ice chest with dehydrated



Generators, particularly mini-models like these Suzukis, can light up a blackout, but are compact to stow and light to carry.

food, waterproof matches and candles stowed inside, ground cloth, space blanket and army blanket, duct tape and wire, coveralls and rain gear, work gloves, first-aid kit, hatchet, and possibly, in cold climates, a sleeping bag. This may seem like an extensive list, but all the items should fit into an ice chest and duffel bag. Fortunately, weight isn't the problem it might be for a backpacker. In warm weather, a canteen, water jug, 12-volt portable refrigerator and possibly even a snake-bite kit might be added.

Some of these aids come prepackaged. The Pak Kit Jr., a 5 by 3-inch tubular container, holds waterproof matches, 8-foot tube tent, fire starter, nylon cord, dehydration tablets, emergency notes, razor blade and duct tape. It's under \$10 from Stow-A-Way Industries, 166 Cushing Highway, Cohasset, Mass. 02025, a major source for a wide variety of dehydrated foods and camping equipment items, as well as books on survival and self-sufficiency. Their catalog is \$2, refundable with the first purchase.

Ten tools in one six-pound holster is the claim for the SOS Rescue Unit from Essem Inc., Box 413, Ridgefield, Conn. 06877. A heavy-duty spade that can also become an ax, crowbar, saw, knife, hammer and metal cutter (among other uses), it's

employed like a can opener by fire, police and rescue units to cut into a car after an accident. Price is about \$225 for the professional model, and a home-and-sport unit is available, as well.

Especially for emergency communication, General Electric offers a HELP CB transceiver kit that has a magnet-based antenna and plugs into a cigaret lighter in the car for a quick call for assistance.

Spare lights always belong with the tools in the trunk, and now fluorescents with low battery drain, like the new little Safe-T-Lite from Yolinda International, Box 489, Yorba Linda, Calif. 92686, combine a white worklight with a flashing red strobe on top for under \$20.

At home

Many car accessories can be useful at a campground or in the house, of course, and much new survival gear will do double or triple duty outdoors, on the road or in the basement. Some foods, for example, can be stored without deteriorating, thanks to freeze drying and air-tight plastic wraps. Even whole milk, from Stow-A-Way and others, is being successfully sterilized and canned for long-term storage. Stow-A-Way's extensive food assortments



A hatchet or machete, like this Woodsman's Pal from Survival Equipment, Oley, Pa., can help clear branches after storm.

have been served up in outer space.

Some of the latest compact generators can light up the TV, start an oil burner, or power a portable refrigerator like the BiLan 25, a new unit with no moving parts and low current drain on 12, 115 or 220 volts. It's \$189 from Juhl Associates, Box 974, Elkhart, Ind. 46515.

Probably most compact of convenient stow-away guns are the Explorer II pistol and AR-7 take-apart floating rifle from Charter Arms, 430 Sniffens Lane, Stratford, Conn. 06497. Charter also has a new AR-7S with anticorrosion finish for boatmen. Tools to clear away fallen branches could include the Woodsman's Pal from the Survival Equipment Co., Oley, Pa. 19547, or the machetes by Tiffen International, Box 881, Clanton, Ala. 35045. PM

'82 RVs

(Continued from page 20)

new, ultrasmall compact trailers are headed for the market, with a mini-utility one-wheeler, called the Pack Horse I, announced by Coleman. The company also makes a Pack Horse II that comes in a kit, plus its Caboose made of Ram-X and the Versa-trailer that, with its camping kit, props up the top to sleep a couple of kids.



Warrior is Winnebago's line-leader in light-weight motor homes. The 22-footer can sleep four and nears 15-mpg economy.

Camping trailers for '82 will come from Starcraft, Coleman, Viking and a number of other tent-trailer makers, including Continental Industries, Davison, Mich., a source for the 310-pound Travlite that, with its 25-pound hitch weight, can hook up behind a motorcycle. Jayco, in Middlebury, Ind., with its new 475-pound JayTiki, has a clever unit that folds out and down to sleep four after being towed to the campsite by a subcompact. The Combi-Camp from Denmark is a similar tent-type



Aerodynamic restyling of front of Coachmen motor homes lowers wind resistance. Airconditioner, microwave are options.



Viking's 14-foot Mini Gasser camping tent trailers for compact towing sleep four and can come with galley, accessories.

that folds down and out, while from the Channel island of Guernsey, the Esterel, with solid sides, folds up and out from its tow package.

European camping is having a strong influence on American camping styles. Rigs suitable for the small cars, narrow streets, high fuel prices and crowded campgrounds of the continent are being adapted to the United States. Colorful tents with inside-room dividers and outside awning shelters are being carried aboard RVs to set up for the kids or mount alongside for added living space. Carefree of Colorado, in Broomfield, has introduced an Add-a-Room, made of Condura nylon. It attaches to the side of a travel trailer or motor home for a screened-in or curtained-in extra enclosure.

Slide-in camper bodies for the compact-size pickups are made in solid, fold-out and pop-top models. The new compact pickups like Ford's Ranger and Courier, Chevy's S-10 and the GMC S-15 should provide competition for the imports. Low-



Toga completes 10 years as one of most popular Fleetwoods. In five models from 20 to 26 feet, Model T has Ford chassis.

profile camp trailers and travel trailers that can raise the roof at a campsite are popular. New Paris Enterprises, New Paris, Ind., even has a Valor, 21-foot, fifth-wheel trailer with pop-up roof that lowers two feet for reduced wind drag when it's in tow.

Tiny travel trailers, again like those favored in Europe, are made by Burro, Trillium, Sun Lite and many others. Serro, with 25 years in the business, is introducing a little, 12½-foot, four-sleeper Scotty, a low-profile underslung 13 and a compact Scotty 13½.

Yellowstone, Coachmen, Skyline, Airstream, and the Fleetwood divisions all have updated travel trailers. The raised top-section that Bud Coons designed for his Diamond vans, and the dropped rear entry of the Champion Transvans now have many imitators.

Big park models with slide-out rooms and bay windows are featured by Heritage, Cree, Oak Park, Fan and other big-trailer builders. **PM**



The Quality Alternative to High-Cost Inflatable Boats!

Why pay \$600. to \$1000. or even more for an inflatable boat?

Sea Eagles pack small, last for years and cost \$110. — \$540.

Canoes, dinghies and motormount boats for fishing, river running, camping and yacht tending.

Sea Eagle 8, shown: • 9'7" x 4'6" • 31 lbs.
• Holds 4 adults • 3 hp capacity • Costs \$220.

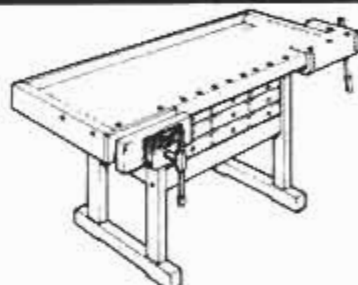
Write for our FREE brochure: Sea Eagle, Dept. PM3B, St. James, NY 11780

Or phone:

516-724-8900, 8:30 AM to 4:30 PM EST.

SEA EAGLE

WOODWORKERS!



This fine Cabinetmaker's Workbench is just one of the projects that have appeared in the past issues of

The Woodworker's Journal.

Whether you're a novice or a veteran woodworker, you'll enjoy the detailed drawings and instructions for building all types of practical projects including Early American and Contemporary furniture, toys, clocks, gifts, and much more.

In addition to plans, each issue contains shop-tips, money-making ideas, antique repair tips and cabinetmaking techniques.

Subscribe now to the project magazine that features 70 plans each year.

1 YEAR (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)

GUARANTEED: A full refund on all unmailed issues if not completely satisfied.

Send check or money order to
THE WOODWORKER'S JOURNAL, Dept. 13
P.O. Box 1629, 25 Town View Drive
New Milford, CT 06776

6 issues—\$12.00 12 issues—\$22.00

Name _____

Address _____

City _____ State _____ Zip _____

LOG SPLITTER PARTS



2-STAGE CAST IRON GEAR PUMPS

11 GPM at 650 PSI. Kicks down to lower GPM and 2500 PSI. Right hand rotation (direct couple). 3600 RPM max use with 5 HP or greater and 3 1/2" to 4 1/2" bore cylinder \$125
15 gal 2 stage, use 8- hp \$183
22 GPM use with 10HP or greater \$272



4-WAY CONTROL VALVES

Built-in relief valve. 1/2" in-out ports. 1/2" cylinder ports \$40

With pressure sensitive detent, hands free on return stroke \$50

DOUBLE-ACTING CYLINDERS



3 1/2" bore x 24" stroke x 1 1/4" rod \$115
4" bore x 24" stroke x 1 1/4" rod \$137
Welded type (can go UPS) \$150
4" bore x 24" stroke x 2" rod (Heavy Duty) \$204
5" bore x 24" stroke x 2" rod \$204



NEW ENGINES

5 HP Tecumseh or Briggs Recoil start 1/2" shaft \$125

6 H.P. Tecumseh \$143

CAST IRON SLEEVE ENGINES

8 HP Tecumseh Recoil start 1" shaft \$178
10 HP Tecumseh Recoil start 1" shaft \$202
10 HP Electric start \$246
Vertical shaft engines available. 3 1/2" to 1 1/2" HP
8 H.P. Briggs Vertical 1" shaft \$205
8 H.P. Tecumseh 1" shaft \$180

HEAVY DUTY LOG SPLITTERS

12 Ton \$738
15 1/2 Ton \$825
24 Ton \$1,335

HONDA GENERATOR

500 Watt, 115 Volt AC or 100 Watt, 12 Volt DC. Wt. 40 lbs.

On Sale \$319

Honda & other generators to 5000 watts available.



Send \$2.00 for discount Catalog on Valves, Cylinders, Hoses, Frames, Tanks, Wedges, Slides and Wheels, Engines, Go Kart parts, Splitters, Trailer parts, Generators. Or send \$6.00 for Catalog and Splitter Design Fact Book.

NORTHERN HYDRAULICS

P.O. Box 1221 Dept. PM
Burnsville, MN 55337 / (612)894-8310

FROM BANGED UP TO BEAUTIFUL

(Continued from page 123)

friend. For only \$100, he bought an old Starcraft aluminum runabout, built in the 1960s, and the rusty trailer it was sitting on.

Inspection before buying showed that, although it looked a wreck, the dents were minor and the hull was basically in sound shape. The paint job was completely shot from exposure to weather, but there were no



Dents in aluminum are smoothed out with careful peening and wooden backup block.



Loose rivets are drilled out and replaced with aluminum bolts, washers and nuts.

cracks, broken structural members or defects that would make the hull unsafe.

Gunwales, deck and interior flooring were damaged beyond salvation, however—hence the bargain price. Saltwater had rusted out the trailer, but Ned kept it as a cradle for moving the boat around while it was being rebuilt.

With the help of Don Wagner, a friend with sufficient woodworking experience for the project he had in mind, Ned quickly stripped the battered craft down to bare aluminum hull and ribs. Ned Segar's goal was to build a fishing machine with an

interior featuring a completely flat floor, an elevated casting platform at each end, and wide, flat gunwales with rod racks beneath for six rods on each side.

The casting platforms would be raised to a few inches below the gunwales, providing elevation for anglers fishing the South Florida flats for bonefish, or local fresh waters for bass. It would even be possible to add pedestal seats to those platforms, if desired, and convert the craft into a serious bass-fishing rig, since the basic layout would be similar to well-designed bass boats.

First came the transverse stringers for the new flooring. Pressure-treated 2x4s were obtained from a local lumberyard. These were carefully cut to size, end-notched to fit



Small holes are fixed with Pliobond-coated aluminum patches held with Pop rivets.



Pressure-treated 2x4s are notched to fit, secured with stainless self-tap screws.

over the existing aluminum ribs along the bottom, and anchored in place with self-tapping stainless-steel screws. It's important that the screws be exactly the right length to penetrate only the wood and ribs, but not the hull.

The flooring was 1/2-inch marine plywood. Ned said later that 1/2-inch ply would have probably been just as rigid since the stringers are barely a foot apart. Thinner plywood would have saved a little weight. Before the floor pieces were screwed in place, Ned poured in expanding



America's Quality Kits For Over 50 Years!

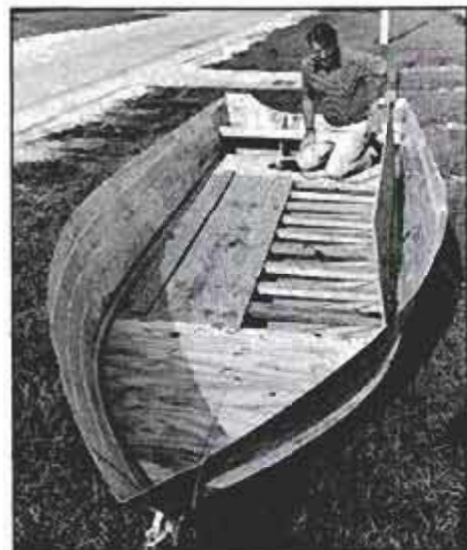
Build a grandfather clock hand-crafted, semi-assembled, by grandfathers in cherry, walnut, oak or mahogany. Kits include beveled glass, choose tubular bell or rod chime movements, with spun brass Lady Florentine or Goddess Diana Lyre pendulum. Hand painted moon wheels. Write for free descriptive literature.

Kuempel Chime Clock Works

Dept. 60721195 Minnetonka Blvd., Excelsior, MN 55331

polyfoam flotation. This is a two-part mix that comes in liquid form and expands into a light, rigid foam when the chemicals are combined. The cost of enough mix to fill the entire hull below the flooring was about \$100. Once the foam was hard, Ned and Don leveled the top of it with orbital sanders until it did not quite touch the plywood. This prevents the typical foam-squeak when the flooring is walked on.

There are a number of ways to build wide, flat gunwales on a hull of this type. Ned and Don first cut a 5-inch-wide piece of 1/2-inch plywood in the shape of the gunwale they wanted. Using 1 1/2-inch stainless screws, they anchored this cut-to-fit gunwale board to the inside upper edge of the hull. With these in place on both sides, each was covered with 1-inch-thick mahogany boards



Plywood flooring was fitted and expanding polyfoam poured in spaces under the floor.

screwed to the form. Gunwale edges were finished off with 1 1/2-inch mahogany strips inside and outside the hull.

(When I reconditioned my own skiff, I used 1x2 lumber with one gunwale strip inside the hull bolted through to another outside. Then, by adding one strip screwed and glued to the outside and four more inside, the result was a flat, 6-inch-wide serviceable gunwale that wasn't as attractive as Ned's but much quicker to build.)

Either system achieves hull rigidity. Without a strong gunwale system, neither aluminum nor fiberglass hulls would be strong enough to withstand the hard push of the outboard against the transom.

Once flooring and gunwales were completed and a few dents peened out of the topsides, Ned installed fore and aft casting platforms of 3/8-inch exterior ply braced with 2x4s. The platforms need 3/8- or 1/2-inch ply

so that heavy, closely spaced braces won't be necessary.

Instead of painting the interior, Segar chose a complete covering of lightweight blue carpet called Sofdek, made by General Tire & Rubber Co. Complete gunwale-to-gunwale installation required seven yards of the 6-foot-wide material, at \$14 per yard.

For quality fittings that could stand up to Florida's tropical weather, Ned chose Attwood hardware. Ideally, the nuts, bolts and washers used on an aluminum boat should also be of aluminum. It's a good idea to coat the washers (which should be used both inside and outside the hull) with a rubber cement such as Pliobond as an insulating barrier to prevent corrosion. Brass fastenings, of course, should never be used since the dissimilar metals and resulting



To support new gunwales, Segar anchors plywood base with stainless-steel screws.



Hatch in forward casting platform opens for storage of the Viking anchor and chain.

electrolytic action could cause corrosion.

The outside of the hull was refinished, after priming, with a two-part marine polyurethane paint for a glossy satin finish that compares well with a factory job. When he couldn't find an appropriate used trailer, Ned bought a new galvanized Shoreline with the support system fitted exactly to his hull. By choosing a 1-year-old, electric-start Evinrude 50 with low engine time, he saved another \$900. For engine controls, Segar used Teleflex's new aluminum drop-in, side-mounting, adjustable console and steering system, including an hour-meter and tach, plus Attwood's new electric

(Please turn to page 196)

3 OLD COINS



\$2.00

postpaid

1 INDIAN CENT
1 LIBERTY NICKEL
1 BUFFALO NICKEL

Immediate shipment of items rarely seen. Price list sent with order. Satisfaction guaranteed.

TIPSICO COIN CO.
P.O. Box 1128 PM
North Bend, OR 97459

"A heritage to 1937"

SHEET METAL WORKERS

TRIOK MULTI-PURPOSE

- SHEAR
- PRESS BRAKE
- SLIP ROLL
- ALL FUNCTIONS OPERATE SIMULTANEOUSLY

Special Buy before Dec. 31, 1981 & receive
FREE SHEAR-NOTCHER
Send for your FREE literature & Sheet Metalworker Bulletin

PACIFIC ONE CORPORATION
410 W. Pacific Coast Hwy. Suite K203
Newport Beach, CA 92663 (714) 645-5962

TILLER USERS...

Can your machine do all of this?

- ★ Handle with just ONE HAND.
- ★ EVENLY break, turn & till soil.
- ★ Shred vegetation without tangling.
- ★ Leave NO WHEELMARKS or FOOTPRINTS.

The TROY-BILT® ROTO TILLER-POWER COM-POSTER can do all this and more! That's why serious gardeners consider it the finest tiller available. See for yourself! For complete details, "OFF-SEASON" SAVINGS, and FREE 26-page booklet clip this and mail today to:



TROY-BILT® Tillers
102nd St. & Ninth Ave.,
Troy, N.Y. 12180

TROY-BILT® Roto Tiller-Power Composter
Dept. A1180
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 _____

A \$79.95 FLAME CUTTING MACHINE KIT

NOW YOU CAN BUILD YOUR OWN FLAME CUTTING MACHINE WITH SPARE POCKET CHANGE!

BESIDES OUR KIT & INSTRUCTIONS, YOU NEED ONLY THE FOLLOWING:

- AN OLD FORD WIPER MOTOR
- A TOY TRAIN TRANSFORMER
- \$20 WORTH OF STEEL & OTHER COMMON PARTS

Kit consists of a special replacement wiper motor shaft, tracing rotor, small motor parts, start-to-finish construction plans for both TORCHMATE and MINI-MATE, and full operating instructions.

Anyone with access to common shop tools can quickly fabricate their own precision flame cutting machine by following the simple instructions provided with this kit

CAPACITIES - Cuts shapes & circles to 18" & straight lines to 38". Maximum cutting depth depends on your torch. Tip height adjustment - 2"

OPERATION - Motorized tracing rotor is manually held against sheetmetal or wooden template edge. As rotor's sharp teeth cause it to "walk" around template edge, your torch duplicates shape in steel plate, below Magnetic Tracer, for use with steel templates, is available as an option.



OFFER ENDS APR 30, 1982

NAME _____

ADDRESS _____

PHONE (_____) _____

K&K EQUIPMENT

2313 S. Joyce St
Dept. PM-3
Arlington, VA 22202
(703) 548-7008

TELEPHONE CHARGE CARD ORDERS WELCOME
OR pay with check, money order or COD
(Add \$2.00 shipping & handling)

Orders sent via UPS Deliveries average two weeks.

ORDER FORM

At Last a New Amazingly Simple GAS TURBINE JET ENGINE

Build from easy to follow plans. Length 18", Dia. 3 1/2", Wt. 12 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 table with milling attachment. For use on small racing boats, midget cars, etc. Full size assembly drawings with critical dimensions, bill of materials and photos. Price \$6.00. No. C.G.S. 1510 24th St., Box 1398 SAVOY SCIENTIFIC SANTA MONICA, CALIF. 90406



ENDS WOOD SPLITTING DRUDGERY

New low cost COMPACT MODEL with trailer type wheels and hitch coupler for farmers, camps, cottagers, 10 ton ram, 2 cycles per min., splits logs 25" x 18". Also available for 8" wheels for trunk transport.



For details write:

Piqua Engineering, Inc., Dept. P, Box 605 Piqua, O. 45356

Extra Income! WITH A STRUCK-KIT CRAWLER!

Besides doing jobs around your own home, a **STRUCK-Kit Crawler Tractor** is a valuable money maker doing work for others. Its compact size and power allow it to do the higher paying specialty jobs! Over 30 Attachments for all your landscaping, gardening and dozing needs. Buy **Factory Direct** for greatest savings.



VALUABLE TAX SAVINGS now in effect!

Send Now to:

STRUCK KIT,	Dept. PM32	Cedarburg, Wis. 53012
<input type="checkbox"/> CATALOG of Tractor Kit construction and money making uses (specify Magnatrac 1000 or Mini-Dozer)	\$1.00	Both Catalogs
<input type="checkbox"/> PLANS for fabricating Tractor from local materials (specify Magnatrac 1000 or Mini-Dozer)	\$7.00	Both Plans
<input type="checkbox"/> BOOKLET of procedures for using small crawler equipment	\$3.50	
<input type="checkbox"/> MOVIE (Brim Color) of Tractor in action (specify Magnatrac 1000 or Mini-Dozer)	\$9.50	Both Movies
		(Money refundable on any purchase)



FROM BANGED UP TO BEAUTIFUL

(Continued from page 195)

systems monitor. The final result is a super fishing rig that could have cost \$8,000 if customized at a professional shop. Ned's cost was less than half that amount.

Boat and rusty trailer	\$100
New Shoreline trailer	425
Used Evinrude 50-hp	1,600
Exterior-grade plywood, mahogany planks, stainless-steel screws and bolts	270
Sofdek marine carpet	98



A special Attwood Electrical Systems Monitor on console gives battery condition.

Polyurethane paint	50
Two cleats, lift rings and pad eyes, plus hinges, hawse-pipe for anchor line (all Attwood marine-grade chrome-zinc or stainless steel)	107
Attwood deck searchlight	50
Attwood auto bilge pump and switch, navigation lights with three-way switch, two interior courtesy lights	138
Teleflex aluminum console with steering wheel	258
Teleflex hour meter	60
Attwood Viking anchor, chain	74
Attwood electrical monitor	45
Teleflex steering cable	84
Expanding polyfoam	100
Total	\$3,459

Subtracting the cost of the trailer and engine, the boat came to \$1,434 and could have been done for much less, of course, with a bare-bones approach. Ned estimated that it took 48 man-hours to strip the boat down to bare metal, and about 50 hours to construct the mahogany gunwales. (My laminated-strip gunwales required less than 20.) The flooring took four hours and the two casting platforms eight. Painting, carpet installation and mounting the console, hardware and the rest required another 12 hours. That's 122 hours for the job; two persons working together efficiently could probably do the same in about four busy weekends.

Was it worth the time and money? "You bet!" Ned Segar exclaims. "I got exactly what I wanted, customized to my needs, at less than half the price of a new rig."

GAS TO ELECTRIC



2 bulb fixture duplicates the charm and increases the light output of any existing double mantle gas-lamp. Kit includes on-at-dusk, off-at-dawn photo control, fixture, bulbs, detailed instructions. The "RELITE" kit is available in both 115 volts and 12 volts. Ask for the "RELITE" kit at your local hardware store or write for more information.

Dealers and retailers inquiries only, call 1-800-328-6564

Yardlighting Systems, Inc.

1039 Charles Ave., Dept. 45 • St. Paul, Minn. 55104

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 PM3 14143, 21st Avenue North, Plymouth, MN 55441. F or full color catalog send \$3.00 to cover postage and handling. Dealers Wanted

110 VOLT A.C. GENERATORS

60 cycles, 3000 watts, WT. 27 pounds, 5" x 10" Fanbell driven from car or pickup. Operates, T.V. All power tools. Over 17,000 in service. This is our 32nd year. Guaranteed 6 months, \$198.00. Our X1200-watt generator needs no battery. Special price \$189.00. Add \$8.50 for postage & handling, per unit. Send for our free catalog.

VIRDEN PERMA-BILT Box 7160 PM
2821 Mays, Amarillo, TX 79109
Phone: 806/352-2761

Power-Drill Operated LOG SPLITTER

Splits With 5-Ton Force
24" Logs • Up to 20" dia.

A must for wood stove owners. Steel structure frame and double-edge blade. Two-way splitting action is screw driven by your power drill. Use on saw horses or optional legs. Easy to move. Store inside.



FREE BROCHURE
Quix Corp.
Seymour, TN 37865
P.O. Box P

Satellite TV

We don't just sell information!
We Manufacture Hardware!

Our 94-page catalog and information book tell the whole story! Inexpensive dishes, high pro-feds, computer aiming software! Specs, kits and more! Send \$7.95 today!

24-hour C.O.D. Hotline • **SPACECOAST**
RESEARCH CORPORATION
Dept. G, P.O. Box 462, Melbourne, Fla. 32901
(305) 338-7800

PUMPS

BUY DIRECT AND SAVE

Heavy duty ball bearing pump. All metal, rust-proof Type XB. Stainless shaft. Use 1/4 HP or larger. 1 HP 1,200 GPH 60" high or 3,000 GPH 25" well. 5,200 GPH max. 1 1/4" in. 1" out. Belt or direct drive. \$21.95 Type P won't rust or clog. Bronze bearing. To 2,400 GPH 1" in. 3/4" out. \$15.95 Add \$2.00 postage & handling. Money back guarantee.
LABAWCO, 80 Hwy 206, Belle Mead, N.J. 08502

HOW TO BUILD A MORE POWERFUL BODY!!

Fantastic muscle pumping methods!

Universal
Box 8894, Dept. E
Detroit, Michigan 48240



MUSCLES

FREE BOOKLET!

HOW YOU CAN HAVE
• Wider Shoulders
• Trimmer Waist
• Powerful Chest
• Bigger Arms
YOU CAN:
• Gain Strength
• Lose Fat

You can have this incredible catalog of unusual technical books just for writing!

Discover hundreds of top quality manuals, paperbacks, textbooks, and industrial handbooks on lathes, inverters, wind power, water power, machine tools, foundry, steam engines, precious metals, methane, welders, homesteading, crafts, electronics, woodworking, blacksmithing, alternator secrets, three-phase motors, small business and much, much more! This is the most exciting technical mailorder bookstore ever!

- Learn how to build a furnace for less than \$10 that will melt aluminum cans and make castings using grocery store charcoal.
- Discover a brand new picture book of exotic lathes and milling machines from the 1880's.
- Convert any small car to electricity. Convert to LP gas, charcoal, wood, alcohol, hybrid-electric.
- Learn about a new book revealing the secrets of the iron melting cupola furnace!
- Discover incredible how-to books on how to build a precision metal lathe, shaper, milling machine, brake, and more!
- Superb collection of windpower books! Top rate line of foundry books. Lots of "how to."
- Top rate technical school textbooks on hydraulics
- Superb books on wood stoves, hydroponics, do-it-yourself patents, prospecting, simple radios, dome homes, watch repair, high mileage carbs, heat pumps, suppressed inventions and more!

This is not a book club! Just the best books from the best publishers. Buy only what you want, when you want. We supply quality. Write for a catalog, and see for yourself.

Catalog sent first class. Send 54¢ in stamps to cover postage (US & Can). Foreign airmail — \$2.00.

Discover the best technical bookstore by mail ever! Write for a catalog today!

Lindsay, PO Box 12-JM Bradley IL 60915-0012

Send your new catalog. I've enclosed 54¢ in stamps.

Name

Address

City

zip

state

SIZE-WISE MODEL 700 SELF ADJUSTING SOCKET WRENCH

Can replace 4 individual wrenches. Automatically adjusts from 1/4 to 7/16", simply press on bolt and turn. Ideal for shop or home. Rugged corrosion proofed mechanism and shock proof handle. U.S. made and patented.

\$7.95 ea.



Illinois residents add 2 1/2% tax

PROCESS ENGINEERING CORP

P.O. BOX 279 CRYSTAL LAKE, IL 60014

CHARGE TO Mastercharge Visa EXP. DATE

CARD NO. _____

(LIST ALL NUMBERS ON YOUR CARD)

NAME _____

ADDRESS _____

CITY/STATE/ZIP _____

FREE! WOODWORKER'S CATALOG

VENEERS, CHAIR CANE, FURNITURE PLANS, TOY PLANS & PARTS, WOODWORKER'S BOOKS, PICTURE MOLDINGS, UPHOLSTERY SUPPLIES, INLAYS, LATHE & CARVING TOOLS, SIMPLIFIED VENEERING INSTRUCTIONS INCLUDED. SAVE 25% ON FIRST ORDER. HURRY!

BOB MORGAN WOOD, DEPT. P6

1123 Bardstown Rd., Louisville, Ky. 40204

NO INVESTMENT! INSTANT INCOME!

Run your own profitable "shoe store" business from home in spare or full time. We give you — FREE — complete Starting Kit that makes you \$217.00 EXTRA each month for just 2 easy orders a day. You feature 350 fast-selling dress, sport, work shoe styles for men and women. Air-cushioned insoles, and 75 years of shoemaking craftsmanship! Sizes 4-16 — widths AA-EEEE. Draw on 500,000 pair stock. Earn prizes, bonuses, shoes for yourself. Rush postcard for your FREE Starting Kit today... Now!



MASON SHOE MFG. CO.,
Dept. H888
Chippewa Falls, WI
54729

SEND FOR OUR ILLUSTRATED DISCOUNT TOOL CATALOG

Shop at Home and Save

Modelers Hand and Power Tools Discounts for the Professional and Hobbyist



Fast Service
92 Pages

Send \$2.00

Coastal, Devon, Diamond, Dison, Dremel, Easydriver, Evans, General, Hot Stuff, Intermatic/Air, Jermac, K&S Engineering, Edlon, Merit, Microflame, Moody, Morris, Northwest Shortline, Pasche, Plastruct, Sandvik, Sherline, Swanson, Triumph, Wahl, X-Acto.

PATTY'S CORNER, INC.
P.O. BOX 8326 DEPT. PM HALEDON N.J. 07538

BE A CHIMNEY SWEEP

Your Own Business: A chimney sweep can clean a chimney with the August West System in one hour! Nationally the average charge is \$45.00

A Growing Need:

The energy crisis has resulted in a dramatic increase in wood burning. Wood smoke deposits flammable residue in chimneys. Regular cleaning is necessary to prevent fire damage.

The August West System: More sweeps use it than any other method in the country.

Send for our free booklet, or call 1-800-FREE any time and ask for "The August West Story."

800-243-5166

ask for extension 212. (In CT 228-0754)
August West Systems, Inc.
Box 603 - Dept. 2122
Westport, CT 06881



THE GREAT BOOK OF CATALOGS

HOW TO FIND ANYTHING BY MAIL

NEW FOR '82

Directory of over 2000 of the best mail order catalogs. Names, addresses, phones, what's in each catalog — 81 product categories, 176 big indexed pages. If not satisfied return it within 30 days for immediate refund.

ORDER NOW. Send \$9.95 check or Master Card/VISA no. and expiration date to:

PINKERTON MARKETING INC.
137 Oak Terrace, Box 8H, Lake Bluff, IL 60044

FREE BONUS If you order within the next fifteen days, we will send you absolutely FREE a two month subscription to "The Best to You by Mail," a fascinating monthly newsletter. Each issue brings you details on at least 20 new catalogs, special offers, unusual new items, bargains... and much more. **Send your order today!**

Build this beautiful Dome Home by yourself!



Enjoy super-low energy bills and house payments

Save up to 50% on utilities, and up to 60% on building costs. Beautiful Monterey Domes geodesic homes 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 color Catalog & Plan Book — 90 fact-filled pages of exciting, affordable homes. Sales representatives available for all 50 States. Write today!

GOVT. SURPLUS. SEND FOR CATALOG

Save up to 90%
Bargains in marine, aircraft, auto, hardware, industrial mfg., etc. A must for hobbyists, conservationists, mechanics, handymen, outdoorsmen. Send \$1 for great big catalog (deduct \$1 from first order of \$10 or more)

AIRBORNE SALES CO. Since 1945
8501 Steller Dr., Dept. PM82
P.O. Box 2727, Culver City, CA 90230

205 MILES PER GALLON

Receive C.N. Pogue's fantastic plans, patent & design on amazing carburetor that gives **documented 205 miles per gallon.** Includes Harold Schwartz's patents and designs on the construction of his carburetor claiming 200% increase in mileage. **BUILD ONE YOURSELF!** Send \$2.00 to:

H & L SCHWARTZ, INC.
930 California #206, Santa Monica, CA 90403

999 PICTURE PET HOBBY CATALOG \$1.00

MAKE YOUR OWN TRAPS-CAGES

Enjoy — Making them YOURSELF! **MAKE MONEY — Selling cages to others!**

2500 Cage Clamps, Clincher 17.95 prepaid

Everything - You Name It!

DEALERS WANTED for Stromberg Books, Feeders

Checks, Bantams, Ducklings, Geese, Turkeys, Gambards, Rat King Eggs, Swans, Pheasants, Canaries, Rabbits, Incubators, Poultry Feeders, Scales, Avian Equipment, Medications, Bait, Herbs, Cate Poultry Book \$3.95, Hatching Guide \$4.95

STROMBERG CHICKS & PETS UNLIMITED. Pine River 59 Minn. 56474

MANUAL TIRE CHANGER

Fix your own flat tires. Changer breaks head, demounts and mounts tire on rim. **\$199.00 ppd.**, satisfaction guaranteed. Call or write

WIKCO INDUSTRIES, INC.

#1 2 Box 154 308-872-5327
Broken Bow, Nebraska 68822

Rush me your 90 page CATALOG & PLANS BOOK. Enclosed is \$6.00, postage included.

Also send your ASSEMBLY MANUAL for an add'l \$5.00.

NAME _____

ADDRESS _____

CITY, STATE, ZIP _____

Mail To: **MONTEREY DOMES**
1855 Iowa, Dept. AQ-3
Riverside, Calif. 92517



Be a LOCKSMITH!

EARN WHILE YOU LEARN

Send for **FREE BOOK**

Big opportunities. Big profits. Earn quickly. Full or part time. Learn at home, it's easy. Do real jobs. All Tools — Materials Supplied. Lic. State of NJ — App'd for Veterans. Send Name and address for FREE book.

Locksmithing Institute, Dept. 110-632
Div. Technol of Home Study Sect. 7-1
Little Falls, N.J. 07424

SATELLITE TV

FANTASTIC 80 TV CHANNELS

Free Success

New antenna construction plans plus big 8x11 book loaded with wiring info, kits, LNAs and receivers at wholesale prices. Far better than cable TV! Enjoy crystal clear reception. Send \$9.95 today. Add \$2.00 for 1st class (air mail) or call our 24 hr. COD order line (305) 862-5068 Now.

Gibbs TV Electronics, P.O. Box 219-B, Maitland, FL 32751

WOOD TOYS Plans Parts Wheels

Armor Products Catalog \$1.50

Box 290 Deer Park, NY 11729 Dept. T.R

5 in 1 WOODWORKING MACHINE

- (BETTER THAN SHOPSMITH)
- 34" LATHE
 - 10" TABLE SAW
 - 11 1/2" DISC SANDER
 - 16 1/2" VERTICAL DRILL PRESS
 - HORIZONTAL DRILL PRESS



SAVE \$251. Today

Special offer good thru the 30th of the month.
ONLY \$999.

CALL NOW!!! (1-800) 421-2467
TOLL FREE INFORMATION
IN CALIFORNIA CALL COLLECT (213) 549-0761

VERY IMPORTANT

- The only machine built with:
- A. ALL CAST IRON TABLES
 - B. HEAVY DUTY DESIGN
 - C. 2 H.P. ELECTRIC MOTOR
 - D. BUILT AS AN INDUSTRIAL MACHINE

MAIL NOW!!!

WOOD MASTER

MASTER WOODCRAFT CO.
800 SPRUCE LAKE DRIVE • P.O. BOX 669
HARBOR CITY, CA 90710

YOUR NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

PHONE () _____

MY CHECK OR MONEY ORDER
 VISA
 MASTERCARD

ACCOUNT NO. _____ EXP. DATE _____



FRESH AIR ON DEMAND

Zestron Ionair IG-700 Generates Negative Ions By The Trillions

If you've been in the mountains lately, you know how air is **supposed** to smell.

And perhaps you've captured that clean, fresh, invigorating atmosphere after a thunderstorm, or while standing near a waterfall.

That clean fresh air you enjoyed was **rich in negative ions**. Nature's own air purifiers.

THE ZESTRON IG-700

Pollution and civilization destroy natural air ions. A ZESTRON ionizer recreates 40 Trillion of these ions every second. They clean the air of smoke, dust, solid pollutants, odors, bacteria and viruses which fall to the floor as dust.

A new solid-state pulse circuit breakthrough is used in the Zestron ionizer. This gives the greatest ion output (with no detectable ozone) at an extremely low price! Compare the performance and prices shown in the chart. The IG-700 clearly has the greatest ion output — yet sells at a remarkably low price.

ION GENERATOR COMPARISONS

IONIZER	Ions/cc./sec. (at 1 meter)	PRICE
ZESTRON IG-700	1,904,000	\$ 84.95
Ion Cloud XL	840,000	179.95
Energen 402B	550,000	149.70
Energair	438,000	79.95
Energair plus	430,000	59.95
Ion Fountain	430,000	99.95
Ion Cloud	350,000	79.95
Ionosphere	350,000	99.95
Modulian	75,000	85.00
AirCare	72,000	149.95
Omega 700	63,000	245.00
JS&A Air Bubble	???	89.95
Orbit	???	99.95

WHAT IT DOES

The high-powered output of the IG-700 provides more negative ion benefit for you. It cleans a larger room faster and more thoroughly than lower-powered units. Under ideal conditions, a 40 by 40 foot room can be cleaned by a single IG-700.

HOW THEY'RE BUILT

Don't let the IG-700's low price mislead you. The unit is of the highest

quality, designed by engineers with many years' experience in zero-defect spacecraft design. Every Zestron is built with quality parts and materials which operate at mere fractions of their maximum values, to give you years of trouble-free service.

New technology, developed by Zestron engineers, has opened the door to improved performance at a lower price. Zestron is the only company to bring price-performance technology to negative ion generators.

IG-700 SUPERIORITY

The IG-700 features adjustable output, which lets you set the output to your own preference. Some people prefer fewer ions at night, while a large smoke-filled room needs more ions than a small room with no smokers present.

The IG-700 has no moving parts and nothing to wear out or replace, unlike "perfume" filter-type air cleaners which require frequent replacement of expensive filters, and which emit no beneficial negative ions.

The IG-700 is a compact 2¼ by 2¼ by 6¼ inches. At 1.5 watts, it costs about 7 cents a month to run from standard house current.

The IG-700 features an operating-output level indicator that shows you the actual output level. Most competitive units simply indicate that the unit is plugged in.

FREE TEST DEVICE

A free passive remote ion detector is included with each ionizer. This handy little device gives you independent proof of operation, and permits comparison with other manufacturers' ionizers.

Place the detector first close to a Zestron ionizer, then close to a competitive unit. You will see far less ion output from the competitive ionizer — in some cases no activity at all!

Please study the facts and figures on this page, and then order your Zestron IG-700. Try it for 15 days in your home or office. We predict that you will be delighted with the fresher air and more stimulating atmosphere it provides.



If you are displeased for any reason, however, you may return your unit within 15 days, and we will promptly refund your full purchase price.

HOW TO ORDER

Send your name, complete mailing address, and phone number with your check or money order. Credit card holders (VISA, MasterCard, American Express, Diners Club, Carte Blanche) can speed delivery of their Zestron Ionair IG-700 by using our TOLL-FREE ordering number. We are offering this superbly engineered Negative Ion Generator for a limited time at the **low price of \$84.95** plus \$4.00 postage and handling. Price includes Remote Ion Detector and Owner's Manual.

ZESTRON IG-700 - \$84.95

Plus \$4.00 Postage and Handling
(Alabama residents, add \$3.40 tax)

CREDIT CARD ORDERS ONLY

Call TOLL-FREE Anytime

1-800-228-5600

Nebraska residents, call
1-800-642-8777

For other information: (205) 793-6876



**SATURN
MARKETING, INC.**

Department PM3
P. O. Drawer 159
Dothan, Alabama 36302

PM OWNERS REPORT: ISUZU

(Continued from page 176)

ger space for the radio so a cassette player can be installed."

A Texas telephone installer: "The simulated wood grain on the console started to bubble from last summer's heat. Also, with the remote trunk release inside the car, you can't leave the windows open on hot days."

Finally, a California financial ana-

lyst mentioned, "I wish Isuzu would come out with something more sporty. If they'd come out with a sports car, I'd definitely buy it." As it happens, Isuzu is seriously considering bringing its very handsome Ace of Clubs sport coupe into this country, and if the company can hold the line on price, it ought to be a best seller along the lines of the first Datsun 240Z.

When you consider the mild nature of these suggestions, plus the great

lack of owner complaints, you begin to realize what a thorough job Isuzu is doing building and marketing the I-Mark series. The majority of Isuzu dealers are still situated in the nation's sunbelt states, but the company is expanding each month.

An Alabama bookkeeper summed it up for most of the I-Mark owners we queried when he wrote on the back of his questionnaire, "I'm awfully satisfied!" He's in the majority. **PM**

SUMMARY OF 1982 ISUZU OWNERS REPORTS*

Total miles driven 2,403,678	Styling 35.5	Good 37.5	Average 28.6
Average miles per gallon:	Handling 33.1	Average 7.9	Poor 12.9
Gasoline engine	Comfort 26.1	Poor 3.2	
In town 25.9	Performance 20.4		
Long trips 33.1	Specific dislikes:	Comfort opinion (rear seats):	Number of vehicles owned:
Desel engine	No complaints 26.7%	Excellent 21.1%	Isuzu only 31.7%
In town 33.5	Disc brake squeal 10.4	Good 38.0	Two cars 52.4
Long trips 39.3	Noises and rattles 7.9	Average 28.5	Three cars 9.1
Engine choices:	Fuel mileage too low 7.1	Poor 12.4	Four or more cars 6.8
Four-cylinder gasoline 91.9%	Poor dealer service 6.2		
Four-cylinder diesel 8.1	What changes would you like?	Had any mechanical trouble?	Makes of other cars owned:
Transmission choices:	No changes 17.6%	No 68.5%	Chevrolet 24.4%
Manual five-speed 50.4%	More legroom 7.7	Yes 31.5	Ford 16.9
Automatic three-speed 49.6	Change seat shape 6.0		Oldsmobile 15.7
Body-style choices:	Better quality materials 4.3	What type of trouble?	Buick 9.3
Four-door sedan 63.2%	More space inside 3.9	Air conditioner 20.5%	Datsun 8.1
Two door coupe 36.8	Pedals too close together 3.9	Electrical 16.7	Pontiac 8.1
Why did you choose the Isuzu?	Workmanship opinion:	Brake squeal 16.7	
Price 45.8%	Excellent 61.6%	Transmission 14.1	Age distribution of owners:
Economy 39.4	Good 32.9	Vibrations at speed 7.7	15-29 years 26.3%
Styling 37.5	Average 4.3	Dealer repairs satisfactory?	30-49 years 31.3
Handling 8.4	Poor 1.2	Yes 54.3%	50-plus 32.3
Specific likes:	Comfort opinion (front seats):	No 45.7	Would you buy another Isuzu product?
Economy 52.7%	Excellent 51.4%	Dealer service opinion:	Yes 89.0%
		Excellent 24.6%	No 11.0
		Good 33.9	Would you buy another Isuzu I-Mark?
			Yes 86.6%
			No 13.4

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

MasterShop... cast iron tables make the difference!

MasterShop measures up to the toughest woodworking project with the accuracy of cast iron tables, like those used in industry—to give you results you can be proud of every time!

A complete home workshop in one easy to handle unit equips you to tackle almost any job. Converts in seconds to a powerful 10" table saw, 12" disc sander, 16½" drill press, 34" lathe and horizontal drilling machine—powered by a heavy duty 15 amp ball bearing motor. A variable speed range from 900 to 5400 RPM's allows the precise speed selection necessary for any operation.

Make your own furniture, remodel a room—build any project large or small. You can do it easily and professionally and save money too! Even beginners find themselves quickly achieving beautiful results on every project.

MasterShop is affordable—More value, quality and accuracy for substantially less money than other home workshop systems.

Send for free information or call today and learn why more and more people are turning to MasterShop to satisfy their home workshop needs.

MasterShop
MULTI-TOOL



FOR INFORMATION
CALL TOLL FREE
1-800-543-5620

In Ohio Call (513) 866-5300

For Free Information Package Mail to:

MasterShop Multi-Tool Division
ABCA, Inc. Dept. B203
3728 Benner Rd., Miamisburg, Ohio 45342

NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____

Low-Cost Gas Saver Now Marketed

PATENTED WATER/VAPOR INJECTOR HELPS ELIMINATE PING, HELPS REMOVE CARBON, INCREASES HORSEPOWER, EASILY INSTALLED, GUARANTEED

DENVER—The Copley News Service reported that a U. S. Patent has now been issued to Wm. Trevaskis, veteran electrical engineer, for his Vapor-Jet® water/vapor injector (Pat. #4,119,062).

Trevaskis has developed what can amount to a 15 cents per gallon "rebate" potential on gasoline by designing a low-cost injector for all domestic and foreign cars, vans, light trucks, and RVs.

People have noticed for years that their car runs better on a cool rainy day. Vapor-Jet® gives a constant rainy-day effect to the engine. The water injection principle was used during World War II to give combat aircraft increased power and speed.

Trevaskis' new Vapor-Jet® is one of the least expensive on the market (\$29.95 + \$3.00 shipping and handling) and can be easily installed even by a novice in 15 minutes.

The Vapor-Jet® has an unconditional 60-day guarantee. If for any reason you are not satisfied, you may return it within 60 days of the day you installed it for a \$29.95 refund.

How does the Vapor-Jet® System work?

Vapor-Jet® operates very simply with no moving parts to wear out. It uses engine vacuum to pull outside air through a reservoir containing a water/methanol mixture which is attached to the car under the hood. This causes the fluid to bubble and splash forming a mist of water droplets and vapor in the upper part of the reservoir. The mist is then drawn by vacuum through a hose which is connected to a manifold suction hose. The connection is made very simply by our patented injector nozzle which contains a regulator to allow the right amount of mist to pass into the combustion chamber.

Will Vapor-Jet® help eliminate engine ping and dieseling?

Yes. The introduction of this mist into the fuel mixture has a cooling effect that increases mixture density, extends the burning rate, and improves combustion efficiency. This has the same effect as increasing the octane of the gas which helps eliminate the engine-damaging ping that is a problem to many vehicles because of the low octane gas sold today. The mist also helps remove the mileage-destroying carbon from the spark plugs and cylinder walls and keeps it removed. All of these effects together with the fact that water, when it turns to steam, expands 1700 times (the principle used in the steam engine) gives your car more horsepower (SAE Bulletins #690018 and #215).

How much mileage increase is expected?

Mileage improvement may vary due to vehicle, driving habits, geographical area, and weather conditions—but we guarantee your satisfaction or your \$29.95 refunded, no questions asked.

Vapor-Jet® can improve your mileage in



three ways: First, moisture actually causes the gasoline to burn more efficiently.

Second, Vapor-Jet® also allows in many cases the possibility of spark advance without ping. This can also increase gas mileage.

Finally, by helping remove mileage-destroying carbon from spark plugs and cylinder walls, Vapor-Jet® helps restore and keep your car in fresh tune-up condition.

A recent study of about 3,000 cars by the U. S. Dept. of Transportation shows that a startling 70% of the spark plug sets examined were in poor enough condition to cause one or more of the following spark plug induced performance problems: High fuel consumption, miss firing, engine ping, surging, hard starting and/or stalling and an increase in hydrocarbon emissions. One reason for spark plug failure is fouled plugs caused by carbon or oil (DOT Report #PB301062).

If carbon is causing a problem with your spark plugs, certainly the carbon-removing feature of Vapor-Jet® has the potential to further increase your mileage. Also, the removal of carbon from your engine can potentially have a money-saving benefit of longer engine life.

Will Vapor-Jet® fit all cars, and is it easy to install?

Yes. The same kit fits all cars and contains everything needed. It will work on fuel injection, cars with superchargers, rotary engines, and catalytic converters. It will work with leaded and unleaded gas, gasohol, or propane burning cars. Simple installation instructions with a diagram are

included. Simply take an ice pick or drill and make a small hole through any intake manifold suction hose (i.e., PCV hose, etc.). Screw the injector nozzle into the hole. Mount the reservoir. Use the hose to connect the reservoir to the injector nozzle. **Can Vapor-Jet® damage my engine or cause rust?**

Absolutely not! Vapor-Jet® cools down the fuel air mixture giving a better burn and suppressing ping, thus extending your engine life. The mist that enters into the engine turns immediately into vapor. The excess exits out the exhaust similar to driving on a rainy day.

What is the purpose of the methanol V.I.M. (vapor injector mix)?

The reservoir measures 3½ × 5½ × 7½ inches and holds just under ½ gallon. A full reservoir should last 700 to 1,100 miles. Methanol (wood alcohol) is mixed with water mainly to prevent freezing and to aid in combustion efficiency. It is easily and cheaply found almost everywhere in the form of windshield washer solution.

For purchase or further information, write or call Progressive Energy Corp., 3148 S. York, Englewood, CO 80110, (303) 762-1385, or call toll free (800) 525-8624. Dealerships available. (Offer void in CA.)

Enclose \$29.95 + \$3.00 shipping and handling.

Check C.O.D. Visa Mastercard

Card No. _____ Exp. Date _____

Name _____

Address _____

60-day money-back guarantee

REVOLUTIONARY • RATCHET ACTION
SQUEEZE-WRENCH
 22 PIECE TOOL SYSTEM



GREAT GIFT IDEA!
 Only \$29.95

**SOCKET WRENCH • SCREWDRIVER
 ALLEN WRENCH**

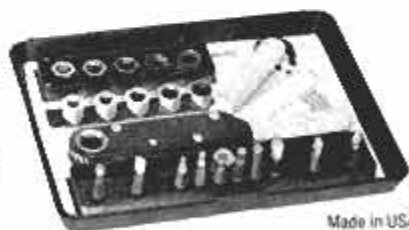
GETS INTO TIGHT SPOTS NO OTHER TOOL CAN...
 works where you can't even wiggle a standard wrench.
 Rugged carry kit makes it ideal for cars, RVs, boats
 and home use. **Not yet available in stores.**

22-Piece Carry Kit includes:

- SOCKETS: Standard 1/4" to 3/8"
 Metric 9mm to 14mm
- SCREWDRIVERS: 2 Slot
 ALLEN 2 Phillips
- WRENCHES: 1/8" to 1/2"



ELTON INDUSTRIES
 P.O. Box 2347
 Fullerton, CA 92633



Made in USA

ELTON INDUSTRIES, P.O. Box 2347, Fullerton, CA 92633

Please send me _____ Squeeze-Wrench Tool Kit(s) @ \$29.95 ea. + \$2.00 shipping (order 2 or more and we'll pay shipping). California residents add 6% sales tax. Total order = \$_____ Check enclosed (sorry no C.O.D. orders)

Charge VISA MasterCard Acct. # _____

Signature _____ Exp. Date _____

Name _____

Address _____

City/State/Zip _____

14 DAY MONEY BACK GUARANTEE

NEXT MONTH IN PM

- **PM road-tests Super Coupes.**
- **How astronomers will solve the universal riddles.**
- **Coast to coast on alcohol fuel.**
- **PM's great family room.**

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 **WBPM**
 my subscription to
 POPULAR MECHANICS for:

- 1 year \$9.97
- 2 years \$18.97

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. All other countries add \$8.00 per year).

CHANGING ADDRESS?

If you're planning to move, please let us know at least eight weeks before changing your address. Attach current address label and fill in your name and your new address. This will serve to insure prompt service on your subscription.

Send old label with your name
 and new address to:
POPULAR MECHANICS
 P.O. Box 10064, Des Moines, Iowa 50350

NAME _____ (Please print)

NEW ADDRESS _____

CITY _____ STATE _____ ZIP CODE _____

Men - Women! Make Money In Your Own Home Business!

**"I STARTED WITH \$100
 AND MADE MILLIONS
 IN MAIL ORDER"**

You can make a Mail Order Fortune much easier today. I want to help you but: If you are looking for a get-rich-quick-scheme... please turn the page. I did not get rich overnight. But I can tell you that within a short time in mail order I was making more money than any of my friends. The millions came later... and I owe every penny of it to mail order! If you are ambitious and willing to follow directions... I will help you get started on your way to mail order success!

YOUR HOME MAIL ORDER BUSINESS

Just a few hours a week parttime at the start! Then branch out into full time! Keep present income while adding welcome "second income." Use Mail Order profits for travel, savings, education, retirement. It's up to you.

I learned long ago the success secret in Mail Order is picking the right product. I reveal in my Free Course 3 tests your product must pass to be a Mail Order winner! I'll show how to make up simple little ads that bring in orders and cash. Everything I tell you is based on my own success. I know it works.

BUY BELOW WHOLESALE FOR BIGGEST PROFITS

Imports are great for Mail Order. I travel the world searching out new imports you can turn into quick profits. Start with 24,221 best selling imports. Deal in one or many. Buy Below Wholesale direct from overseas supplier. You keep all the profit. I will also

reveal my Drop Ship Plan that starts you with little or no product investment. Buy one at a time or in quantity.

1000's NEW PRODUCTS EVERY YEAR

With my Plan you get free Membership in International Traders. Vast world wide organization keeps you supplied with new products every month to sell by mail or other ways. Members also attend my personal seminars held in cities near you. Mail coupon for Course and home business report. No charge or obligation. No salesman will call! Find out what Mail Order holds for you!

FREE MAIL ORDER COURSE



B. L. MELLINGER,
 Famous World Trader,
 Internationally known
 Mail Order Expert.

I started in Mail Order a few years ago, part time in my garage. I had less than \$100. I discovered how to make Mail Order pay big. Today my business empire spans the globe... 1,253 acres of land, office buildings, warehouses. My Plan lets you use my experience to make a fast start in your own big profit home business.

FREE MAIL ORDER COURSE COUPON

The MELLINGER Co., Dept. R2253
 6100 Variel Avenue, Woodland Hills, CA 91367
 Send Free Mail Order Course... Show me how I can start a Mail Order/World Trade Business of my own. There is no obligation; no salesman will call.

Name _____
 Address _____
 City _____ State _____ Zip _____

Save 3 days, give ZIP for fast reply!

ACTUAL CUTS OUT GREEDY I.T. MEMBER STRIKES REPORTS MIDDLEMEN. "Can make IT RICH." "Followed your OF MAIL 80% more profit import advice and got a first ad ORDER ing merchandise. The Mail 4,000 mail orders came in. MONEY ing Plan gave me new I made \$12,000 this first home, new car, own store." try, without investment in MAKING!! Bill Thibodeau, Canada stock. L.M., Pennsylvania

INTERNATIONAL TRADERS

Build a HAHSA® — a safe, outdoor wood furnace that supplies your indoor heat and hot water.

Praised by energy experts, a proven way to cut heating costs down to as low as \$0.00
Now the readers of Popular Mechanics can get all the facts—fast.



The energy experts in the press agree. So do homeowners and do-it-yourselfers. A HAHSA may be the best answer to the sky high cost of heating your home.

Build a HAHSA and cut down your heat and hot water utility bills to as low as zero — yes, that's \$0.00. Many smart homeowners have. What's more, a HAHSA is a far better and safer investment than a wood or coal stove.

THE HAHSA BASICS

A HAHSA (*Heating and Heat Storage Apparatus*) is a wood burner located outside your house in its own little 8' x 10' block structure — a self-contained heating system connected to your house by 4 pipes buried underground.

Ideal for homes and stores, small office or factory buildings. Used all over the U.S.



WIDELY PRAISED

Feature articles in publications such as *The Mother Earth News*,

The Christian Science Monitor, *Popular Mechanics*, and *Handyman* have praised a HAHSA as safe, simple, practical, clean — and ingenious.

One secret of the HAHSA: It burns wood and paper, cardboard or scraps and stores heat until you need it, thanks to 18 tons of sand.

Chances are that it will pay for itself in 12 to 18 months. That's what users tell us. After that, it's like having a little gold mine in your backyard—year after year.

DON'T WAIT. FIND OUT

NOW WHY . . .

HAHSA IS 10 WAYS BETTER THAN A WOOD OR COAL STOVE



1. Safe. Unlike a stove, it's outside. No fear of fire, explosions or choking gases.

2. Clean. No smoke, dirt, ashes, termites or bugs inside your house.

3. Efficient. Uses less wood than a stove as well as paper, cardboard or scraps.

4. Stores Heat. Because a HAHSA is well insulated, it supplies heat for hours, even days, after the fire is out. Burn it only a few hours every other day in summer — yet your water always stays hot.

5. Healthy Heat. Not the dry, irritating, smoky heat of a wood or coal stove.

6. Versatile. A HAHSA can work with the solar system you have or plan to install.

7. Simple. The HAHSA ties in directly to your hot water radiators, hot water baseboard or hot air systems via a heat exchanger.

8. Long Lasting Performance. Every part of a HAHSA is custom designed, tested and proven in use.

9. You Can Do It Yourself. Our plans give you step by step instructions. The cost of all materials is about \$1600. Or you can save time and put your HAHSA to work faster by purchasing key parts from us.

10. Supplies Domestic Hot Water Year Round. Because the HAHSA is outside, it can be used during the warm months also — so it never stops saving you money!

We are licensing franchised dealers for HAHSA — a terrific business opportunity. Write or phone today.

START SAVING NOW

Don't delay. Mail the coupon now. Send \$1.00 for general information or \$20 for complete plans and everything you need to know to go HAHSA.

Call 717-388-6172.

To: HAHSA, Box 112-P
Falls, Pennsylvania 18615

I want to go HAHSA. Please send me:

- Complete plans, drawings, instructions, material cost lists, plus general information. \$20.00
 General information about HAHSA. \$1.00 to cover printing and mailing.
 My check or money order is enclosed.
 VISA or Master Charge
(Please print or type)

Exp. date _____ Interbank (MC) _____

Name _____

Address _____

City _____

State _____ Zip _____

The Curtis Affordables!

A NEW collection of practical, comfortable and energy efficient homes.

Don't make or break your plans for a new home until you have seen our new line of affordable homes. You'll like their looks ... and price.



YOU COMPLETE IT... SAVE \$1000's!

Curtis professional carpenters do the heavy, difficult framing on your lot and foundation. You finish it with Curtis materials and step-by-step instructions and save high professional labor costs.

AFFORDABLE FINANCING... TOO!

We make homeownership possible now!

- No big down payment/deposit.
- Below market interest rate.
- Land may not have to be fully paid for.
- First installment delayed until Fall 1982.*
- Long term mortgage money.

You, too, can join the Curtis family of new homeowners. For full details send coupon or call today. There's no obligation.

There's a representative near you! Call Toll Free: 1-800-358-9150

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 _____

County _____ Phone() _____

- I own or can get a lot.
 Enclosed is \$1.00 for priority handling.

Here's *all* you need to garden—and *more!*

A Small Wonder.

The Masport Home Gardener™

is so light and versatile you'll probably want to use it for most of your gardening chores. In fact, 79% of Masport owners we surveyed use their Home Gardeners at least every 2 weeks—not once or twice a year like most tillers! Here's why:

- **Lightweight.** One-third the weight of big rear-tine tillers, just 76 pounds. So, you can handle it easily. No extra muscle needed.
- **Tills, Cultivates, Weeds.** Just adjust the working head to fit the job.

Use it all season long—not just Spring and Fall.

- **Easy to Handle.** Anyone can use it—from older folks to youngsters. It's small and light so it won't bounce and shake you to death! Enjoy easy control.
- **Affordable.** Half to one-third the cost of big rear-tine tillers—with four times the uses!

For complete information, return this coupon or call 1-800-227-2864 (in California, 1-800-772-3589)



Send to: Masport America Inc.
Dept PM-23, 200 Gate 5 Rd.,
Sausalito, CA 94965

Name _____

Address _____

City _____

State _____

Zip _____

Phone() _____

©1982 Masport America Inc.

NEW

15½ Ton Vertical Log Splitter



Northern Hydraulics, the leading manufacturer of heavy duty log splitters, has added a 15½ ton vertical model to its product line. This versatile unit is capable of splitting logs both vertically and horizontally, and is equipped with 4"x24" cylinder, 5 hp motor, 2-stage pump, high-speed demountable wheels, auto detent valve, filter, strainer and heavy duty frame.

Low introduction price \$1190

Standard horizontal units are also available. Send for free splitter brochure or \$2 for complete parts catalog.

Northern Hydraulics

P.O. Box 1221, Dept. PM-V
Burnsville, MN 55337
612-894-8310

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 Dept. 323
Pittsburgh, N.Y. 15201

FACTORY DIRECT!

go cart

New plans reveal step by step details on how to build your own Go Cart! NEW welded Go Cart frame kits! FREE coupons!
RUSH \$3 for plans & Giant Catalogue to:
go cart Box 34304, Dept. PM: Omaha, Nebr. 681340010

"MAKER'S MARK" BRANDING TOOL

SEND FOR YOUR FREE INFO PAK! NO OBLIGATION

NOW! Brand your own name permanently on wood and leather hand-crafts! Simple to use. Long lasting U.L. approved electric handle. Brands full name. Guaranteed.

CRAFTMARK PRODUCTS, INC.
P.O. Box 6308-PM3 Marietta, GA 30065

Tufoil®

"A super-slick oil additive that works"*

*That's how Popular Mechanics magazine refers to Tufoil® in its January 1982 issue (p. 74). Tufoil, the super lubricant concentrate, is a new and highly advanced standard in engine lubrication. A technological breakthrough, Tufoil (pronounced tough-oil) is the *only* patented† and proven successful combination of oil and micro-miniature particles of PTFE. Commonly known as Teflon® or Fluon®, PTFE is the slipperiest substance known.

Tufoil Makes Oil Alone Obsolete

Coating all moving parts of your engine with a film of PTFE, Tufoil minimizes friction and metal-to-metal contact well beyond the capabilities of premium, synthetic, graphite or any type of motor oil.

Just a few *ounces* of Tufoil added to your favorite motor oil is better at reducing wear, increasing power, improving fuel economy and enhancing overall performance than *any* engine lubricant you can buy. All in all, new Tufoil cuts the cost of owning a car!

Satisfaction Guaranteed or Your Money Back

At a manufacturer's suggested list price of \$12.95, a little Tufoil goes a long way and pays for itself many times over.

Use Tufoil as directed and your car will *run better and last longer on less fuel!*

Next time you change your oil, really change it. Add Tufoil.



Look for Tufoil® where you buy automotive supplies.



Tufoil, One of a Complete Line of Revolutionary Lubricants For Every Consumer and Industrial Need

U.S. Patent No. 3,933,856 4,127,491 & 4,224,173
TUFOIL® is Reg. TM of Fluoramics Inc.
Teflon® is Reg. TM of DuPont
Fluon® is Reg. TM of ICI Americas

Special offer to Popular Mechanics Readers: Get new Tufoil® at a special introductory price of only \$9.99 per 8 oz. bottle. **This offer will absolutely not be repeated so act now.** Just complete the coupon below and forward with payment. Allow 3 weeks for delivery. For more information, return coupon with self-addressed stamped envelope or call 617-877-3060.

Please ship me _____ bottles of Tufoil at the special introductory price of \$9.99 per 8 oz. bottle.

Enclosed is my: Check for \$ _____ Money Order for \$ _____

Charge to my Master Card Visa

Account No. _____ Expiration Date _____ Amount \$ _____

Please send more information. My self-addressed stamped envelope is enclosed.

Flotech Inc., P.O. Box 718, Northampton, MA 01061

Name _____

Address _____

City _____ State _____ Zip _____

SEE 175 FULL SIZE SPORTS CARS

You Can Build at Home from Kits

For the low-price of an ordinary compact, you can own a full-size antique, classic or modern gull-wing sports car. Choose from over 175 exciting replicas including 50mpg roadsters to mid-engine V-8's. Manufacturers from all over the country offer these low-cost bolt-on body kits for easy home assembly. They're serious automobiles designed for power, economy and performance. And, all are made to sell for a fraction of their apparent value.



AUTO LOGIC PUBL.
P.O. Box 2073
Department PMC2
Wilmington, DE 19899

Mail **Kit Car Buyers Guide**
 \$10 (3rd Class—US only)
 \$12 (1st Class—US only)
 \$15 (Foreign—US funds)
 Kit Car Monthly \$11/year

Name _____
Address _____
City/State/Zip _____

Master Charge Visa Expire Date _____
Order **TOLL-FREE** Day or Night
Master Charge or Visa **REQUIRED!**
Operator **CANNOT** answer questions! No C.O.D.'s!
(800) 331-1000, Operator 066

Mailed immediately. Sold Only By Mail.

Here are just a few of the full-size kit cars you'll discover

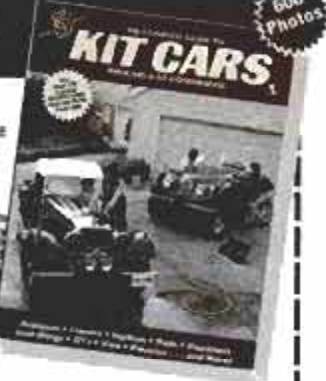
- Porsche
- T-Bird
- MG-TD
- Ferrari
- Pantera
- Mercedes
- Bugatti
- Jaguar
- Cobra
- Auburn
- Lamborghini... and more

Giant all-new 1982 Complete Guide to Kit Cars includes

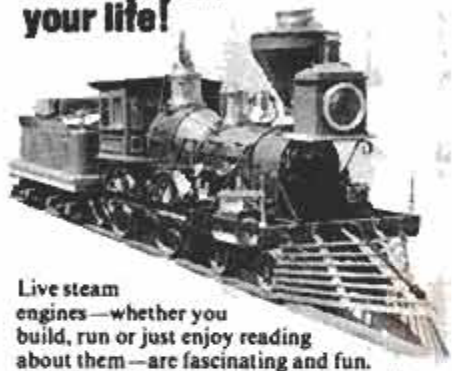
- Over 175 Kit Cars
- Front, Rear, Mid-Engine Kits
- Assembly Articles
- GT's, Gull-Wings, Electrics
- Do-it-Yourself Info
- Money Making & Saving Facts... more

Special 1/2 Price Bonus Offer!!! ... Kit Car Monthly ...
Features hundreds of used kit car bargains and new kit announcements (\$11/year). Order both, everyone does!

★ 30 Day Money Back Guarantee ★



A Hobby you can enjoy all your life!



Live steam engines—whether you build, run or just enjoy reading about them—are fascinating and fun. Live Steam Magazine brings you monthly articles on locomotive, marine, automotive, traction and stationary steam engines plus sources of kits, machine tools, tips and plans—all you need to renew an old interest or start a satisfying new hobby. Write or call today to get the next 12 great issues delivered to your home and discover the world of Live Steam! \$22.50 / year in USA.

LIVE STEAM INC.
P.O. Box 629/Dept. JR/Traverse City, MI 49684
CALL OPERATOR 35 TOLL FREE
800/824-7888 (800/852-7777 in California)
VISA AND MASTER CARD ACCEPTED

USE ZIP CODE WHEN ANSWERING ADS

2000 WATT DARRIEUS ROTATING AIRFOIL

Build the DARRIEUS Vertical Shaft Airfoil from simple parts and generate up to 2000 WATTS of Voltage Electricity! Newest concept in Windpower! Ideal for homes, farms, cottages. Offers high efficiency, even in low wind speed areas! Simple, Economical Construction. COMPLETE PLANS including charge circuit \$7.95.

GLENALE PRODUCTS, Dept. CD,
Box 358 Station D, Toronto, Ontario M5P 3J9

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

A SINGER'S DREAM!

REMOVES VOCAL FROM MOST STEREO DISCS

The Thompson Vocal Eliminator can actually remove most or virtually all of a solo vocalist from a standard stereo record and yet leave most of the background music untouched! Not an equalizer! We can prove it works over the phone. Write or call for a 24 page brochure and demo record.

Write to: **L.T. Sosner, Dept. FM, P.O. Box 338, Stone Mountain, GA 30086.** Phone (404) 493-1248. COST: \$295.00

LEARN TO BE A **DENTAL MECHANIC**

SECURITY PRESTIGE

Learn at home, in your spare time, to make Crowns, Plates, Bridgework, etc. Dental Mechanics are employed by Dentists, Dental Laboratories at open your own shop, full or spare time. FULL EQUIPMENT OF TOOLS AND MATERIALS INCLUDED WITH COURSE. Low tuition. Easy Terms. Write for FREE BOOK about this career that's not affected by automation.

THE McCARRIE SCHOOLS INC. 215-LOU-9155
132 N. 12th St., Dept. PM111 Phila., Pa. 19107

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

GARDENING? TRY AN AGCO FOR 2 WEEKS . . . YOUR MONEY BACK IF YOU FIND A TILLER YOU LIKE BETTER.

Tiller—Power Shovel

Works 8 hrs on 1 gallon of fuel
Weights 20 lbs.

Tills Deep

Weeds Fast

NOT SOLD IN STORES FREE BROCHURE WRITE TO:
AGCO PO Box 75, Southampton Pa. 18966 Dept. P

Name _____
Street _____
City _____
State _____ Zip _____
Call 215-947-8855 24 hrs a day Charge card orders accepted

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 \$59.95. Covered by U.S. Patents.

WHITE'S ELECTRONICS, INC. 1011 Pleasant Valley Rd., Sweet Home, OR 97386

In half the time

FOR THE NEAREST WHITE'S DEALER AND A FREE CATALOG CALL TOLL FREE
1-800/547-6911 PA-2

More hauling ability for less money when you build Carl Heald's 1/4-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 44 1/2"x40"x11". Hydraulic disc brakes with parking brake standard. 4-wheel models with cab also available. Many options. For FREE brochure send to:

Carl Heald, Inc. Dept. PM-23
P.O. Box 1148, Benton Harbor, MI 49022

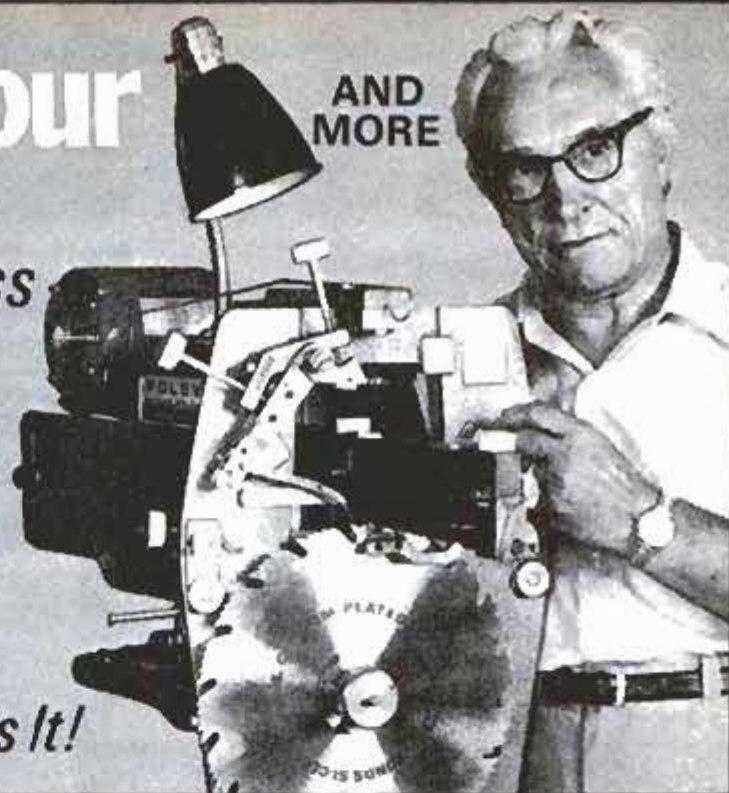
Tons of toting help for farm, ranch, factory, construction

Earn \$8 an Hour

In The Evening or on Weekends in a Business of your own!

Sharpening Saws & Tools

*For Industry and Homes!
Every Neighborhood Needs It!*



AND MORE

Sharpening is Big Business ... and Profitable Too!

Work part time, full time, right at home. No layoffs. No strikes.

This can be one of the most important decisions you ever make
Going into business for yourself can be the most exciting and rewarding decision you're likely to make in your lifetime.

Owning your own business brings you a sense of independence. You're the boss, setting your own work hours. Your own effort builds the business for yourself and your family. You can achieve great satisfaction and profits, if you choose and manage your business wisely. That's why so many men, just like you, are cashing in on the big profits to be made in this fast-growing service field.

The sharpening business allows you to get started with only a minimum investment, requiring little space and effort for a successful operation. It lets you build and expand as fast, or as slowly as you like. You pocket most of the money you take in, because there are exceptionally high profits with no investment in merchandise.

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

More sharpening businesses are needed every year

As original equipment continues to climb in cost, owners are becoming more concerned that the equipment be maintained so that it performs like new. This means more companies, contractors, carpenters and home owners are having their old saw blades and tools resharpened many times, where in the past, they would have replaced them with new blades or tools. This is where you can step in with the much needed service of sharpening saws and practically any kind of tool.

Read What These Foley Shop Owners Say:

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

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

William Wescott
Willoughby, Ohio 44094



Husband and wife have a going spare time shop

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

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

Victor Kosloski
Sturgis, Michigan 49091



This FREE BOOKLET has helped thousands

Thousands of good men have been inspired by this fact-filled book into making that first important step of starting their own business. It can be yours just for the asking. Right now, while this is still fresh in your mind, fill-in the coupon below. We will send your FREE copy of "Opportunities in a Sharpening Business of Your Own". There is absolutely no obligation and there are no franchise fees in starting your Foley Sharpening Business.

CLIP OUT AND MAIL THIS COUPON TODAY

If coupon has been removed, just send name and address to:

Foley Manufacturing Company
7102 Foley Building
Minneapolis, Minn. 55418
or call Toll Free 1-800-328-7140
(Except in Hawaii or Alaska)

Foley Manufacturing Company
7102 Foley Building
Minneapolis, Minn. 55418

Foley

YES, I would like to receive complete details about how I can easily start a profitable, Foley-equipped sharpening shop. Please rush me your FREE booklet, without any cost or obligation, that gives me full details on how I can quickly start my own business.

NAME _____

ADDRESS _____

CITY _____

STATE _____ **ZIP** _____

BUILD YOUR OWN BOAT

Join the thousands who build each year AND SAVE \$\$\$! GLEN-L's proven methods are especially intended for amateurs. Step-by-step pictorial and written instructions with material listings assure PROFESSIONAL RESULTS! HUGE 144-page catalog describes over 200 designs, 8' to 49'. Sail & power boats, boat trailers, boating books, AND MORE! Order catalog now and also receive FREE "BOATBUILDING SUPPLIES" brochure.



KITS · PLANS · PATTERNS



GLEN-L GLEN-L MARINE DESIGNS
9152 Rosecrans, Box 756T, Bellflower, CA 90706

- GLEN-L MARINE DESIGNS
9152 Rosecrans, Box 756T, Bellflower, CA 90706
- Rush GLEN-L catalogs @ \$2
- "BOATBUILDING WITH PLYWOOD" @ \$15.95 ppd
 - "INBOARD MOTOR INSTALLATIONS" @ \$14.95 ppd
 - "HOW TO FIBERGLASS BOATS" @ \$ 8.50 ppd
 - "HOW TO BUILD BOAT TRAILERS" @ \$ 6.50 ppd
 - "RIGGING SMALL SAILBOATS" @ \$ 6.50 ppd
 - "INBOARD HARDWARE CATALOG" @ \$ 2.00 ppd

NAME _____
STREET _____
CITY _____
STATE _____ ZIP _____

THE FUN MACHINES

... that work, too!



6 BIKE MODELS

- FUN TO BUILD!
- FUN TO RIDE!

These rugged off road vehicles are powered by 5 hp to 16 hp American-made engines. Engine is completely assembled, frame is welded and painted. You just bolt everything together and start riding. Kit priced from \$479.95 to \$1099.95 For a FREE color brochure with complete details, write today to:



7 TRYKE MODELS
SUPER TRYKE

Carl Heald, Inc. Dept. PM-32 P.O. Box 1148, Benton Harbor, MI 49022
From the largest Maker of Bike and Tryke Kits in the World — Carl Heald, Inc.

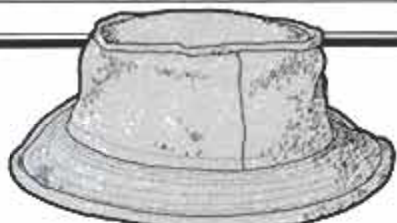


An Adult Hobby
Cast Your Own Metal Miniatures
Military, Medieval, And Chess Set Figures. Complete Casting Sets And Over 100 "Old Time" Toy Soldier Molds

Cast full round, detailed, 54mm figures. Special offer: Complete Starter Set, \$29.95. Includes electric stove, pouring ladle, Coldstream Guard mold, work gloves, casting metal and more. (Not recommended for children).

- Please send Complete Set, \$29.95 enclosed. PM
 Please send me more information on Castings.

NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____
Castings, P.O. Box 3482, Longwood, FL 32750



THICK 'N THIRSTY TOWELING HAT



100% cotton terry cloth beats summer heat 2 ways: Use it to wipe your perspiring brow or douse it in water, wring it out and wear to keep cool at golf, tennis, jogging and fishing. Colors: Navy Blue, Powder Blue, White, Yellow.

Sizes: S(6 1/2-6 7/8), M(7-7 1/8), L(7 1/8-7 3/8), XL (7 3/8-7 7/8), XXL(7 7/8-7 7/8). \$7.75 ppd.

Order Today! Money Back Guarantee!

Here is my check or money order for \$_____
(Add sales tax for shipment into CA, CO, D.C., IL, MA, MI, MN, PA, WA).
RUSH my #2002 Toweling Hat.

Size _____ Color _____
Name _____
Address _____
City _____
State _____ Zip _____

Send me your FREE outdoor catalog.

Eddie Bauer®

Dept. XPM, Fifth & Union, Seattle, WA 98124

SOLAR AIRSHIP 10 FEET LONG!



Flies on Sun Power
If you need sun light to fly this blimp, SCIENTIFIC DESIGN and SPACE AGE MATERIAL CAPTURE AND CONVERT SUN'S RAYS INTO KINETIC ENERGY so this GIANT AIRSHIP SOARS HUNDREDS OF FEET INTO THE SKY! Comes with 65-ft. nylon cord. Use additional line to fly higher and longer. Has gone to 30,000 feet in free flight! Nothing to do but inflate with air. Marimoth size never fails to attract attention and the inevitable question: HOW DOES IT FLY? Lasts indefinitely & can be flown over & over again. 2 ft. diameter imported from Italy. No risk money back guarantee. Price \$17.95 each, plus \$1.50 shipping. 2 for \$15.95 postpaid Johnson Smith Co., Dept. 1003, Mt. Clemens, Mich. 48043

SAVE UP TO 85%
GOV'T SURPLUS and NEW EQUIP'T



1/4 HP, 1725 RPM, REVERSIBLE,
115 V. UTILITY AC MOTOR
GENERAL ELECTRIC
Normal
Retail \$16.95
Over \$50.00 LINCOLN



100-Page Catalog
Send 60-Cents COIN or STAMPS 100's of BARGAINS
* Item #10-998 - Perfect for wide variety of moderate torque applications to fans, blowers, speed reducers, tools, pumps, etc. Supplied with reversible 3-1/2" diam. cast iron pulley for 3/8" V-belt. (Each diameter 1 1/2")
* Split phase, rated cast duty, reversible in electrical connection, thermal protection, NEMA 40 frame resistant to moisture. Size 9" x 6" x 3-1/2" (18 lbs.)

SURPLUS CENTER Lincoln, Nebraska Zip Code 68501

NEW

Portable Generator



New 500 watt Honda portable generator, \$319 C.O.D. or add \$12 for freight. 500-7000 watt Honda and Agronic H.O. generators in stock at low prices. Copper wound for long life. Send for free generator brochure or \$2 for complete parts catalog.

Northern Hydraulics
P.O. Box 1221, Dept. PMG
Burnsville, MN 55337 612-894-8310

Fresh on your Ears.



Speakerlab speakers feature recent technology like polypropylene woofers, Samarium cobalt leaf tweeters, edgeless box construction, passive radiators and ports. They're styled in slim oak veneer or rosewood Cleanseal® enclosures. Send for our FREE catalog and see our completely new line plus our huge offering of raw parts which now include musical instrument speakers and high-end car stereo speakers.

speakerlab

Dept. CPM23, 735 N. Northlake Way
Seattle, Washington 98103

POOL TABLES BUILD YOUR OWN

High quality Professional styling
Solid construction Low cost
Kits for special items available
Plans include drawings, instructions, templates, information brochure, etc.
Plans for 8ft ball return model \$5.95
Plans for 8ft deep pocket model \$5.95
Plans for both models \$9.95
All prices US currency. Brochure alone \$3.00
P.O. residents add \$2.00

TIERCRAFT, Dept. B, Box 8151, Erie, Pa. 16505

NOW BRASS BAR RAILS For Your Home

and other solid brass bar accessories
Now you can have solid brass bar rails, endstoffs, 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. P622 Round Lake Park, IL 60073

TRS-80 COMPUTER DISCOUNTS

- Low Discount Prices on All Computers, Printers and other RADIO SHACK TRS-80 Equipment
- Factory Direct • No Out-of-State Sales Tax
- Full RADIO SHACK Warranty • Best Prices Anywhere
- We Ship Nationwide • FREE DISCOUNT PRICE LIST

SCOTT TASSO
Radio Shack Associate Store

1758 N. DeSoto Drive, Vineland, N.J. 08360 609-691-7100

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-12
940 West Broadway, Jackson, WY. 83001

GIVE YOUR SINK SOME COLOR!

SENSATIONAL! Orbic 75 Kitchen Faucet

CHOICE OF 5 DECORATOR COLORS



Install it yourself in minutes!

One moving part. No washers, no springs means no drip, no leak. Made in U.S.A. of Celcon™ by Celanese. Works well—even in corrosive or hard water. Color adds beauty, lasts a lifetime. Installs quickly, easily from the top. No special tools or plumbing skills needed. Guaranteed performance for 5 years. Instructions included. Colors: Puppy Red, Avocado, Copperlone, Harvest Gold, White, Allow 3 weeks for delivery.

ORDER NOW

\$29.95
Add \$3.00 for shipping and handling

Money Order or check only. Sorry no C.O.D. Mass. Residents add 5% S.T.

WEBSTONE COMPANY, INC. DEPT. 16

Division of Goddard Industries, Inc.
38 Marlow St., Worcester, MA 01605



WEIGHT LIFTING EQUIPMENT

Complete catalog of over 90 items used by strong men, body builders and athletes to develop strength and muscles.

Send 35¢ today for your copy

WEIGHT LIFTING EQUIPMENT

P.O. Box 882 Holyoke, Ma. 01040

BUILD A JET HELICOPTER EASY TO FLY—INEXPENSIVE TO BUILD!

• Carries one person-plus
• Uses low-cost fuel
Plans—completely illustrated: \$9.00
HELICOPTER EXPERIMENTER'S HANDBOOK (many illustrations): \$5.00
PLANS and HANDBOOK: only \$12.00
HELICRAFT

P.O. Box 16488

Baltimore, MD 21217

LEARN BANDSAW BOX TECHNIQUE FOR FUN AND PROFIT

Make small unique bandsaw boxes from common lumber. Big demand in gift shops and craft fairs. Send \$10.00 for fully illustrated instruction booklet of 15 original designs (over 70 photos and illustrations)—or request free information. Satisfaction guaranteed. **BOX-ART, DEPT. B, BOX 125, CLARENDON HILLS, ILLINOIS 60514.**



THE HOME SHOP Machinist

THE HOME SHOP Machinist

A brand new bimonthly magazine for the serious amateur machinist and the small commercial or machine shop.

- Projects to build • New developments, approaches and products
- A forum for sharing ideas and information • A great new shop partner for you.

Subscription rates: (USA) \$16.00 per year, Canada and other countries \$18.50 (US dollars). VISA or Master card orders: Phone operator 660 Toll Free 800-824-7888 except California. In California 800-852-7777 or write

The Home Shop Machinist

% The Village Press, Inc.
Post Office Box 968
Traverse City, MI 49684

AMERICA'S 7 BEST POWER TOOL BUYS

1 **8" TILT ARBOR SAW**
8" tilt arbor saw
crosscuts, rips, mitres, cuts compound angles, dados, coves, moldings. Less blade. motor Rip fence for easy alignment \$6.50 add'l. Ball bearing model \$12.50 add'l. Takes 1/3 h.p. motor or larger. standard blades, attachments
22 lbs. l.o.b. factory **\$52.50**

2 **BELT SANDER**
Changes from horizontal to vertical in seconds
Precision heavy duty sander includes a 4" x 36" sanding belt. Uses 1/3 h.p. or larger motor V-pulley drive and multi-purpose drive spindle. Disc sander accessory, \$17.00 add'l. Mitre gauge, \$3.50 add'l. 18 lbs.
l.o.b. factory **\$52.00**

3 **4 FOOT WOOD LATHE**
12" swing industrial size 3 speed pulley
Does the job of \$150 unit. Tubular steel bed rails, screw action tail stock. Use any size motor 4" face plate \$4.50 30 lbs. l.o.b. factory **\$67.75**
DELUXE HEAVY DUTY LATHE
Double shrouded, lubricated for life ball bearings 30 lbs. l.o.b. factory **\$79.50**

4 **LONG BED WOOD LATHE**
55" version of the deluxe heavy duty lathe. Has ball bearing live center in tail stock and extra heavy bed tubes. 40 lbs. l.o.b. factory **\$94.00**
HIGH SPEED TURNING CHISELS { Set of 3 \$11.00
Set of 8, \$29.00

5 **JOINTER-PLANER**
4" x 22" Cast iron and steel, precision ground adjustable tables. For planing, joints, bevels. Cuts to 1/8" depth. Fence adjusts from 0° to 50°. Steel knives and dual guards. Use any motor. Precision ball bearing industrial model \$15.70 add'l. 19 lbs.
l.o.b. factory **\$63.30**

6 **1 TON ARBOR PRESS**
Many uses such as pressing bearings or shafts, controlled bending and riveting. Has a 4 position anvil and machined rack and pinion drive. Cast iron camel back frame for rigidity and strength. 3 1/4" depth of throat. 37 lbs. l.o.b. factory **\$64.95**

7 **HORIZONTAL-VERTICAL CUTTING BANDSAW**
Use any size motor
A vertical bandsaw and horizontal cut-off machine with automatic shut-off. Cast iron body, ball bearing blade guides, worm gear reduction, adjustable tension spring. 3 speeds. With stand and blade 1/2" x 64 1/2". 137 lbs.
l.o.b. factory **\$300.00**

These power tools have no chrome, embossed nameplates or any other useless extras—but they do the same job as tools costing 2 to 3 times the price! And their performance has been proven in the shops of literally millions of professionals and serious amateurs.

Don't be misled by AMT's low prices; these are quality tools. They are full scale, full speed and offer top performance and precision. There are good reasons why we are able to offer such values. Here is how we do it:

Engineered for simplicity: After years of engineering refinements, virtually all the fluffs have been eliminated in order to save you money. **Faster machining:** Specially designed automatic machining equipment cuts costs by cutting production time. **Standard parts:** Ordinary hardware items replace custom parts for enormous savings.

Volume: Our own foundry, our huge mass production facilities and our large buying power—all keep costs down. **Direct factory purchase:** You pocket the savings but we still offer our two terrific guarantees!

POWER SAW: Our tilt arbor saw comes completely assembled with ground cast iron table, safety guard, splitter and mitre gauge.

In addition you get a free set of cabinet base plans that show you how, with one sheet of 3/4" plywood, you can convert this saw into a floor model with a big 27" x 24" top. Cabinet rip fence only \$7.50 additional. And you can use your new saw to cut out the cabinet base!

BRAND NEW ELECTRIC MOTOR
Develops a full 1 h.p., 17 lbs. l.o.b. factory (purchased separately \$54.55) \$49.50

AMT OFFERS TWO GUARANTEES:

OUR 10-DAY MONEY BACK GUARANTEE
Try any of these power tools and compare it with any similar machine at any price. If not satisfied return it for prompt no questions asked refund! We pay the return shipping charges.

10 YEAR LIMITED WARRANTY
Any part or parts of these AMT power tools (except motor which carries a one year limited warranty), which becomes inoperative for any reason within 10 years after purchase date will be repaired or replaced by the factory with no charge to the purchaser other than postage.

AMERICAN MACHINE & TOOL CO., 4TH AND SPRING STS., ROYERSFORD, PENNSYLVANIA 19468

BUY DIRECT . . . USE THIS HANDY ORDER COUPON TODAY

AMT American Machine & Tool Co., Dept. PM32, Fourth & Spring Sts., Royersford, Pa. 19468
Please send me the units checked. Payment in full enclosed \$ _____ or \$5 deposit each item enclosed, balance C.O.D. I must be fully satisfied or will return unit within 10 days for full refund. No questions asked.

1 8" tilt arbor saw, \$52.50
 Standard rip fence, \$6.50
 Long cabinet rip fence, \$7.50
 Ball bearing spindle \$12.50

2 Belt sander, \$52.00
 Disc sander attachment \$17.00
 Mitre gauge for sander, \$3.50

3 12" swing, 4" lathe, \$67.75
 Deluxe ball bearing lathe \$79.50
 Face plate, \$4.50

4 Long bed wood lathe, \$94.00
 Face plate, \$4.50

Turning chisels for any lathe
 Set of 3, \$11.00
 Set of 8, \$29.00

5 Jointer-planer, \$63.30
 Ball bearing spindle, \$15.70

6 1 ton arbor press with four position anvil, \$64.95

7 Horizontal-vertical metal cutting bandsaw, \$300.00
General Electric Motors
 \$49.50 (with other item)
 \$54.55 (purchased separately)

Visit our Royersford factory showroom for these same low prices 4th and Spring Sts. From 9 to 4:30 on weekdays and 9 to 12 on Sat

NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____

CLASSIFIED ADVERTISEMENTS

Rate: \$5.25 per word payable in advance each insertion. Minimum insertion ten words. Bold face capitalized words—\$1.00 per word additional (First word set in Bold Face at no extra charge, Zip Code Free.) The next available issue to place an advertisement in America's No. 1 Classified Section is **MAY**. The closing is **MARCH 5th**.

Send remittance payable and order to Popular Mechanics, ATT.: Hildegard E. Kappel, Class. Adv., Mgr., 224 West 57th Street, New York, New York 10019. Please indicate Heading under which ad is to appear. As a consumer service and in cooperation with our mail-order advertisers who use post office box addresses for their convenience in handling your order, Popular Mechanics maintains a register of such mail-order advertisers containing their complete names and street addresses.

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

SAVE Gas, Eliminate Carbon, Water Injection System. \$12.95. Shipping \$3.00. Hydroject, 1870 East Pore Road, Everson, WA 98247

AMAZING MPG INCREASES!! Guaranteed. Free details. RLH Enterprises, Box 1991-A, Eugene, Oregon 97440

AUTOMOBILE RETUNING FOR MAXIMIZED ECONOMY. Simplified techniques increase MPG 50%+. **DETAILS FREE!** Technering, Box 1506, Princeton, NJ 08540. Telephone (201) 359-6046 (recording).

IS 200 MPG Possible? Write! MPG-PM382, Box 2133, Sandusky, OH 44870.

TRUTH about the many "Miracle Carburetor" ads and others. Free brochure from the National Car Drivers' Association. Send 2 stamps on a self-addressed envelope to: NCDAA, P.O. Box 1111, Tacoma, Wash. 98401

FREE CAR FOR 20 YEARS Save thousands. **1k Show** you its possible. "Free car for 20 years" booklet. I've been doing it for 20 years. Send \$7.95 to: Keith Richards, P.O. Box 961, Waterloo, Iowa 50704

SAVE GASOLINE! Bypass pollution devices -- easily, reversibly! Posco (IG-3), LaGrangeville, NY 12540

PROPANE-METHANE-NATURAL GAS Conversions. **CARS-TRUCKS-Build Yourself. THOUSANDS SATISFIED USERS!** Write: Fleming Engineering, KPM, Ramson, NY 13438

FOUND: THE LEGENDARY "200 MPG CARBURETOR." Mileage Documented. Complete "How-To" Secrets. Information, \$1.00 (Refundable). Morant's, P3, 1434 Argonne Blvd., Winston-Salem, NC 27107

10-30% MILEAGE INCREASE. No built, just facts. Complete details, inexpensive, **GUARANTEED.** \$8.95 to: **ENGINEC,** POB 9700, Long Beach, CA 90810

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 \$13.75 for 12 giant issues. Subscribe to the "Bible of old car nuts today. Send to: Hemmings Motor News, Dept. MP, Box 100, Burlington, Vermont 05201

2ND OPINION TESTS and PHOTOGRAPHS every item in this column every month. Also in-depth articles and research. March Issue-\$1. 2nd Opinion, Box 1095, Klamath Falls, Oregon 97601

FREE BROCHURES - Your own business \$\$\$, nationally recognized synthetic oil. Thalton, 2939 Winifred, Dept. A, Riverside, CA 92503

FIRST TIME EVER! Certified Autobody expert reveals his secret do-it-yourself rust proofing method! **FREE DETAILS:** White Cap Press, Box 3130, Courtenay, B.C. Canada V9N 5N4.

TRIBOLOGY WILL SAVE FUEL!! We sell **MOLYBDENUM** lubrication products to major industrial users. Now offering to general public. Send \$10.00 for engine treatment for 1 car or write: GDS Corp., Box 85, Morton, Illinois 61550.

INSTALL DIESEL in car, PU, RV for under \$1,000. Get 30 MPG. Overlooked source US diesels, 550+, 6 cylinders. Thousands cheaper than Perkins. Deutz or Murphy. Send Self Addressed Stamped Envelope for free info. Diesel, Dept., Box 1933, Walla Walla, WA 99362.

65 MPG? YES! Send SASE for free details. Beamer, P.O. Box 7426, St. Petersburg, FL 33734-7426

WATER Injector - Build Easily, Inexpensively!! Free Information - Stamped Envelope. U&I, Box 4873PM32, Boise, Idaho 83704.

BUILD YOUR OWN "200 MPG CARBURETOR!" Join 60,000 determined Americans. Factual Report reveals documented mileage, proven principles. Send \$1.00. Research-PMC, Box 184, Antioch, TN 37013

FREE! Water Injection Plans, Mileage Proof, Government Report. Almost Engineering, GTA3F, Milford, PA 18337

STOP RUNNING ON--DIESELING. Simple Method. No Mechanical Changes. \$1.00. Blair, Box 36637, Charlotte, NC 28236.

CONVERT, CUSTOMIZE ELECTRIC CARS! Engineered. Money-maker! Business Plan, \$1.00 (refundable). 3E, Box 19409CP, San Diego, CA 92119

2ND OPINION Tests and Photographs every item in this Column. Also in-Depth Articles and Research. March Issue (Eight 11-14 pages)-\$1. 2nd Opinion, Box 1095, Klamath Falls, OR 97601

MILEAGE: Fuel Pre-heater Plus Water Vapor. Instructions \$5.00. R & M Enterprises, 22804 Sunset Ridge Dr., Auburn, CA 95603

BE SURE Your Car Will Never Be Stolen. Free Details. Box 93864, Atlanta, 30318

SECRETS OF FANTASTIC GAS MILEAGE - Details **FREE!** - Avtek, Box 5202-A3, Rockford, Illinois 61125

SAVE \$ - Lease 1982 Autos for Less! **NO DOWN PAYMENT!** Lower Monthly Payments. Details - \$1 - SASE. **SCAC LEASING,** 84 Alpine Dr., Wayne, NJ 07470

ELECTRIC VEHICLES

CONTROLLERS - 450 AMP, 36 to 120 Volts. Ready To Install. Information \$2.00 Write: S.E.S., 16692 Michel Ave., Los Gatos, CA 95030

"ELECTRIC Car Motor \$495. Info \$2.50. Cenaco PM03, 523 W. Comm., Oklahoma City 73109

BUILD ELECTRIC BIKECARI! Modern Automotive Designed! Easily Built With Bicycle Parts Standard Materials! Plans \$7.95. Sportran Inc., Box 732C, Indian Rocks, Florida 33535

MIDGET CARS

BUILD "THE BUG" Your own personal sports car, completely different than anything else on the street! Engineered to make construction as simple as possible. Photocopy of article available as it appeared in Popular Mechanics past issues. Available for \$2.25. Send order to: Popular Mechanics, Box 1014, Dept. PMC3, Radio City Sta., New York, N.Y. 10101

AUTO SUPPLIES & EQUIPMENT

PARTS: Army Jeep and truck parts. Spare Parts & Equipment Co., P.O. Box 751, Lexington, Kentucky 40501-0751

NEW Book - 200 MPG Carburetors. \$10. Moneyback Guarantee. Free Information IAS, Route 1, Hitchcock, South Dakota 57348

ALTERNATOR Generator Rebuilding Book. Details. Hedlund Engineering, 7505 Barkentine, Las Vegas, Nevada 89128

ANTIQUE, Classic Automobile Parts. **NEW -** Used. Parts, P.O. Box 41414, Chicago, Illinois 60641-0414

CUSTOM DESIGN LICENSE PLATES. Make your car unique! Free Details. Lasate: 700 Berwyn, Berwyn, PA 19312

SAVE up to 20% on fuel bill. **GAS OR DIESEL FAA** accepted - use on Indy 500 races. T.F.E. Engine treatment last up to 50,000 miles. Reduces heat-wear-friction. Only \$29.95. Energy Resource Products Inc. R#2 Box 565, Alva, Fla. 33920

SUPERCARB!! - 150 MPG! - Patented - Details **FREE** - Dynatek 83, 720 Jordan, Rockford, Illinois 61108

SNOWMOBILES

MAKE YOUR OWN SNOWMOBILE. Propeller driven by a Continental aircraft engine. Drives over snow and ice. Becomes a self-contained trailer in 15 min. when necessary to transport snowmobile over dry highways. Buy a photocopy of article as it appeared in P.M. for \$1.25. Send orders to: Popular Mechanics, Dept. PMC3, Box 1014, Radio City Sta., New York, N.Y. 10101

MOTORCYCLES, BICYCLES, MOTORSCOOTERS & SUPPLIES

BICYCLE Trailer. Build For Fun Profit. Easy Wood Design. Plans \$10.00 Info. \$2.00. Practical Projects, P.O. Box 624, College Place, Wash. 99324

GO KARTS, Mini-Bikes, Assembled, Kits. Parts Catalog \$2.00. Kart World, Dept. C, 1488 Mentor Ave., Painesville, Ohio 44077

DISCOUNTS, 50% Off On Batteries. Exceptional Discounts On Other Parts and Accessories. 20% On All Kawasaki Parts. Buy Wholesale And Save! DFW Import Discount and Mailorder, 8585 Stemmons Suite 911 Dallas, TX 75247. Call Toll Free 1-800-627-7105, TX 214-224-8522.

HONDAS, \$25.00. Directory \$1.95 (refundable). Government Surplus, 443, Bend, Oregon 97701.

GO KART, MINI-BIKE, MOTORBIKE PARTS. Tires, Clutches, Motors and Complete Carts and Mini-Bikes at Discount Prices. 3 1/2 Hp motors \$106.50. 5 Hp. \$123. Send \$1.00 for Booklet. Northern Hydraulics, P.O. Box 1221, Dept. PM-MB, Burnsville, MN 55337

HANG GLIDING, AVIATION

DESIGN Build Airplanes, Hang Gliders. Simplified Publications. Brochure 20c. McCoy Aircraft, 12820 S. Figueroa, Los Angeles, CA 90061

CHOPPY Ultralight Single Seat Helicopter. Simplified Construction - Motorcycle Engine. Information \$3.00. Polynova, Box 670M, St. Remi-Naperville, Quebec, Canada J0L 2L0

SPORTSPLANES, MINI-HELICOPTERS, ULTRALIGHTS, HANGGLIDERS. Plans Kits Complete. 1, 2, & 4 Seat. Catalog \$5.00. LFP, Box 19826, Dept. A, Houston, Texas 77024

BUILD A "FLYING VOLKSWAGEN!" The Teenie Two an all-metal plane. It's a challenging project made from materials and parts that are readily available in any metal-products shop. Package includes a booklet of instructions plus the plan sheets. Price \$35.00. Send orders to: Popular Mechanics, Dept. PMC3, Box 1014, Radio City Sta., New York, N.Y. 10101

SPACE, ROCKETS & ASTRONAUTS

BOOMERANGS--INCREDIBLE RETURN! You can do it. Exciting! Order your Free catalog today. BoomerangMan, 306 Park, Monroe, Louisiana 71201

ANTIGRAVITY Propulsion Device. Free Brochure! RDA, Box 873N, Concord, NC 28025

HIGH-FLYING KYROCKETS! Safe, inexpensive. Home-made fuel. Easy instructions. \$3.00. Box 1470, Orem, Utah 84057

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 261, Cordova, Illinois 61242

NEOVA VW Hovercraft Kit-information \$8. Neotenc, Terre Haute, IN 47804

BARTLETT FLYING SAUCER Complete Plans and Supply Sources \$5.00. Write: Herb Bartlett, P.O. Box 156-M, Silverdale, WA 98383

SPECTRE -VW Hovercraft. Free information. Venture, 871A2 Moe, Avon, Ohio 44310

CB-RADIO & HAM EQUIPMENT

WHOLESALE Radar Detectors, Police Fire Scanner, CB Accessories - Whister Q1000 \$199.99; Q1000R Remote \$219.99; Fox Vixen \$209.99; SuperFox Remote \$224.99; Bearcat 300 \$336.99; Bearcat 100 \$295.99; plus \$3.00 Shipping-VISA MC COD-Free Catalogue-Scanner World, 10PM, New Scotland, Albany, NY 12208. (518)436-9606.

LINEAR PLANS, parts, other goodies. Free catalog, Super, Box 130-B2, Paradise, CA 95969

POLICE Scanners, Crystals, Antennas, CBs, Radar Detectors. HPR, Box 19224, Denver, CO 80219

LINEARS - Send Stamp for Details - MATCO Electronics, Box 316C Cadillac, MI 49601

SATELLITE TELEVISION Receive Over 100 Channels. **FREE** information. Satellite Television, Box 787A, LaVerne, CA 91708

BEARCAT Scanners. Discounted. **CRYSTALS** \$2.75. **RADIOSALES,** 3462 Oakland, Oshkosh, Wis. 54901

ELECTRONICS

MECHANICALLY INCLINED INDIVIDUALS! Assemble Electronic Devices in Your Home. Knowledge or Experience not necessary. Get Started in Spare Time. Turn your Spare or Full Time into Cash - No Investment - Write for Free Details: **ELECTRONIC DEVELOPMENT LAB, BOX 1560PM, PINELLAS PARK, FL 33565**

(Continued on next page)

FOR INVENTORS

(Continued from preceding page)

PROTECT Your Invention. Registered Patent Attorney. Many Years Experience. All Fields. Individual Inventor's Problems Given Special Consideration. Very Reasonable Charges. Write for Free Information. Paul H. Gallagher, 105 W. Adams, Chicago, Illinois 60603

REGISTERED PATENT ATTORNEY Washington D.C. Suburb. Donald A. Kettlestrings, 414 Hungerford Drive, Rockville, Maryland 20850

PATENT IT YOURSELF! Materials proper size, form, for filing with U.S. Patent Office. Copyright forms to guide you. PCM, Box 1491, Fremont, California 94538

PATENT IT ECONOMICALLY! Free Details. N. Riner 2008 Fondulac, Richmond, VA 23229

PATENT YOUR INVENTION YOURSELF! Inexpensively! Retired Examiner. 7400, Washington, D.C. 20044

MAKE MONEY INVENTING. Booklet reveals secrets, tells how. \$3.00 from: Novel Trends, PM3, Box 9305, Longview, TX 75606

DON'T BE CHEATED — Send \$20.00 for book, "Patents and Pitfalls" Martin Fruitman, Registered Patent Attorney, 130 East King, Lancaster, PA, 17602

INVENTORS: Free information on offering your invention for sale. Kessler Sales Corporation, C-5-F1, Fremont, Ohio 43420

INVENTORS Patent Your Invention. Free Initial Consultation. We are Registered by the U.S. Government. Victor J. Evans & Co., 4637 Eastern Ave., N.E., Washington, DC 20018. Since 1896.

INVENTIONS WANTED

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**, 59 Interstate Drive, Dept. PM, West Springfield, MA 01089. (413)737-5376. A Fee Based Marketing Company

INVENTIONS MARKETED! Cash Royalties! **FREE INVENTION PROTECTION CERTIFICATES.** George Spector Manufacturers Representatives, Woorworth Building, New York, N.Y. 10007.

MANUFACTURER SEEKING INVENTIONS. ADVANTEK INTERNATIONAL, 1100 17TH NW, WASHINGTON, DC 20036.

IDEAS, INVENTIONS, NEW PRODUCTS WANTED! **MARKETING ASSISTANCE** available to individuals, inventors, Universities, companies. Write for Kit-PM.

INVENTION MARKETING, INC.,
701 Smithfield Street
Pittsburgh, PA 15222

INVENTORS: If you have an invention for sale or license, write for free booklet explaining how we can help you. Kessler Sales Corp., C-5-1W, Fremont, Ohio 43420

REAL ESTATE & FARMS

FREE! Big Spring Catalog! Over 5,400 country properties described, pictured! Land, Farms, Homes, Businesses, Recreation. Retirement buys! Selected best throughout the U.S. Over 700 offices, 43 states All Across America! Yours **FREE** from the World's Largest! **STROUT REALTY, Inc.**, Plaza Towers, P.O. Box 4528 G.S., Dept. 5800, Springfield, MO 65804. Call Toll Free 1-800-641-4266.

FREE... SPRING 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.

OZARKS: Scenic, Peaceful, Clean Environment, information. Umbertower Realty, Box 15, Willow Springs, Missouri 65793. 417-469-2764.

MISSOURI Ozarks. Homesteads, Farms—Free Brochure—Graven Realty, Box HPM, Houston, MO 65483. (417) 967-4777

SELLING YOUR HOME? For instructions, tips and forms send \$5.75 to: Walco Productions, P.O. Box 6282, Olympia, Wash. 98502

BUY Real Estate. No Money Down. No Credit Check. News One, Box 23, Everett, WA 98206

HUNTING, FISHING PROPERTIES From \$47, to \$107, per acre in Canada! Send For **FREE CATALOG.** Investment potential, 2 year exchange privilege. Canadian Estate Land, Dept. 23C, 286 Lawrence Ave. W., Toronto, Ontario, Canada M5M 3A8 (416) 789-4536

EXPORT-IMPORT

+2500 "Fast-Sellers." Free Brochure! Balinghco, Box 91309-B3, Cleveland, Ohio 44101

PLASTIC BAGS

ALL Sizes. Buy Small Quantities. Free Catalog. SAKel 6151-C Colibat, Van Nuys, Calif. 91401

BUY IT WHOLESALE

BELOW Wholesale Clothing, Jewelry, Closeouts. Free List. Torrow Mac, P.O. Box 3333PM Anderson, SC 29624

BELTS and Buckles. Complete line fasteners, including truckers, motorcycles, widdle, westerns etc. Big Profits. Complete dealer set up. Catalog \$100. Anchor Specialties, Box 3958-BPM, North Providence, RI 02911

SAVE! FREE CATALOG! Motorcycle, Snowmobile, Small Engine Parts, Woodtoys, Log Splitters, Energy Items. Manufacturers Supply, Box 157-PM3, Dorchester, WI 54425

RINGS, JEWELRY Priced 100% Below Retail. Catalog \$1.00 (Refundable). Anapmt, 96 Washington, West Warwick, RI 02893

400,000 BARGAINS Below Wholesale. Many Free! Liquidations. Closeouts. Job Lots. Single Samples. Free Details. Bargainhunters Opportunities, Box 730-A, Highland, Michigan 49423

CLOSEOUT Jewelry 50c down (Catalog 25c). Rousseis, 107-1631 Dow, Arlington, MA 02174

CLOSEOUTS! Discounts! Below wholesale! Freebies! Samples! DDIN, Box 20152-PM, Ferndale, Michigan 48220

BATTERY CLOCK MOVEMENTS. Hands, Hardware. Finest quality. Discount prices. Catalog \$1.00 refundable. Yankee, Box 26, Thompson, Connecticut 06277

WORLDWIDE BARGAINS. Imports. Dropship. Closeouts. Freebies. Surplus. SASE. Marnees, Box 1717-FM, Highland, Indiana 46022

HEARING AIDS Batteries. Wholesale. Catalog 25c. Faton, Box 1444, New Preston, Conn. 06777

CLOSEOUT Bargains. Samples. Import Bargains. 1001 Things Free! Write: Morris, Box 777, Twin Falls, ID 83301

CLASSIFIED ADVERTISERS

GET Big Mail from Millions of Your Prospects. Your Choice 39 High Performance National Magazines. Free \$50.00 Savings Certificate mailed with Detailed Folder. Classified Inc., 676 St. Clair, Suite 1790Y, Chicago, 60611. For faster mail-action, phone E. Woody, Ad-Manager, (312) 337-3090

ADVERTISING AGENCIES, ADV. SERVICES MAILING LISTS

MAILORDER Advertisers. Expert assistance. Ratebook leading magazines, newspapers \$1.00. Chicago Advertising Agency, 28 E. Jackson, Chicago 60604

MAILORDER ADVERTISERS!! CLASSIFIED ADVERTISING CAN BE MOST PROFITABLE AND REWARDING. PROBLEM IS TO KNOW WHAT TO DO. WHAT NOT TO DO. COLUMBIA CAN HELP YOU WITH YOUR MAILORDER PROGRAM. OVER 20 YEARS CLASSIFIED ADVERTISING EXPERIENCE. KNOWLEDGE OF BEST PULLING PUBLICATIONS. EXPERT COPY SERVICE IS ALL YOURS AT NO INCREASE OVER PUBLISHER'S STANDARD RATES. CHANCES ARE YOU WILL SAVE MONEY. WRITE TODAY FOR FREE DETAILS PLUS YOUR FREE COPY OF "MAILORDER ADVERTISER'S RATE GUIDE". COLUMBIA ADVERTISING AGENCY, BOX 1285-PM-3, RICHMOND, INDIANA 47374

RUBBER STAMPS

BARCO Type Founders. Type and Rubber Stamps catalogue. Mail \$1.00 refundable on first order. 237 S. Evergreen, Bensenville, 60106

FREE Style Book. Eddie's Rubber Stamp, 3781 Menlo St., San Diego, CA 92105

SELL Rubber Stamps for us. 50% Discount. Hodgins, Box 597, Batavia, NY 14020

OFFICE SUPPLIES

HOW TO MAKE MONEY THROUGH CLASSIFIED ADVERTISING. Booklet shows you how to start your own business with Classified Advertising. **ONLY \$1.00 FOR BOOKLET** — (\$2.00 coupon refundable with first order). K.E. KAPPEL, POPULAR MECHANICS, DEPT. P, 224 WEST 57TH ST., NEW YORK, NY 10019

MULTIGRAPH, MIMEOGRAPH

NEED AN INEXPENSIVE COPY MACHINE. Make a dry printer yourself. Buy a photocopy of the plans as they appeared in P.M. Price 75c. Send orders to Popular Mechanics, Dept. PMC3, Box 1014, Radio City Sta., New York, N.Y. 10101

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

RUBBER Stamp supplies catalog Jackson Brownsville Road, 5-110 N. Vernon, Illinois 62664

COMPLETE Rubber Stamp Oufits, Supplies. Same day shipment. Sign Engraving Machines. Wholesale Catalog \$1.00 Deductible. Star Stamp, 1720 N. Marshfield, Chicago, 60622

PRINT YOUR OWN— Printing presses, type, supplies direct from factory. Send 25c for catalog and samples to: Kelsey Co., DM, Meriden, Conn. 06450

PRINTING AND SUPPLIES

THERMOGRAPHED BUSINESS CARDS \$10.99. Free Samples. BG 2501 Sapping, Glenshaw, PA 15116

QUICK Copy Printing, Low Prices. Write Nationwide, 614 North Main, Bloomington, Illinois 61701

LETTERHEADS, 2 Colors, w env. \$17.50. Low. 24 Post. Newfoundland, NJ 07435

QUALITY Printing! Lowest Prices. Shipped in Four Working Days. Write To: Print Press, Box 65P, Dublin, IN 47335

GUMMED LABELS

1,000 Deluxe Gummed Address Labels \$3.00. Free Literature. Acme 50 Tomoka, Pittsburgh, Pennsylvania 15229

1,000 Gummed Labels, \$3.00 4 Lines Maximum. Whitlock Printing, 11585 Northgate Trail, Roswell, GA 30075.

GIFT SHOPPING

FOR Home, Office and Workshop. Buy Swiss-Style Army Knife, E-ven Blades, \$19.95. Bargain Galaxy, Dept. 253, P.O. Box 29474, Denver, CO 80229-0474

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. 758, Chicago, 60603

WATCH And Clock repairing books, tools, materials. Free Catalogs. North American, Box 77-AP, Fox River Grove, Illinois 60021

TAKE NO CHANCES. Deal with oldest, most reliable firm in old gold business. Established 1934. We buy Gold, Silver, Platinum, Diamonds. Highest Cash. Free Information. Rose Industries, 25-A East Madison, Chicago 60602

CLOCKS - Cypress \$19.95, Walnut \$24.95, Oak \$23.95. Wholesale & Retail. Walter's Woodshop, Rt. 1, Spring Valley, ILL. 61362

GOLD

YOU CAN MAKE A FORTUNE in Gold and Silver. Money-back Guarantee \$3.95 — Update, Box 986, New Bern, NC 28560

PURE GOLD from Canada in glass vials \$8.95 no cheques. GOLD, Box 1079, Sault Ste Marie, Ont. Canada P6A 5N7

ELECTROPLATING With gold and silver! Easy to follow instructions! Photocopy of article as it appeared in a past issue of Popular Mechanics available for \$1.15. Send order to: PM, Dept. PMC3, Box 1014, Radio City Sta., New York, N.Y. 10101

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: Grangers, Dept. C-12, 900 South Arroyo Pkwy., Pasadena, California 91109

TREASURE FINDERS

FIND Lost coins, jewelry, buried treasure, gold nuggets, relics. New revolutionary patented detector analyzes objects, tremendous range, no ground pickup. Free catalog. Gardiner, 4729M N. 7th Ave., Phoenix, Arizona 85013

TREASURE—Locate quarter mile away with ultra sensitive locator - brochure free. Research Products, Box 270270 - AMC, Tampa, Florida 33688

GOLD, SILVER, coins, relics - Find with unique patented treasure finder units - None better, low prices: Free information, write: Techna, Dept. C3, 11900 Montana Avenue, El Paso, Texas 79935

PROFITABLE OCCUPATIONS

FREE Catalogs. Repair air conditioning Refrigeration. Tools, supplies. Full instructions. Doolin, 2016 Canton, Dallas, Texas 75207

FT. SMITH Auction School, Ft. Smith, Ark. 72903. Resident & Home study. Veteran Approved.

PLASTERCRAFT!!! Profitable home business. Moils available. Details: Lynette, 6251C Mentor Park, Mentor, Ohio 44060

TECHNICAL WRITERS make big money! Free details: Tex Pubs, Box 2458-P, Oroville, CA 95965

GOVERNMENT SURPLUS

(Continued from preceding page)

MOTORCYCLES — JEEPS — HELICOPTERS — AUTOMOBILES . . . GOVERNMENT SURPLUS DIRECTORY — MONEYBACK GUARANTEE — How, where—\$2.00. GS Information, Department 13, Federal Building, Box 3913, Springfield, Massachusetts 01101

J-E-P-S, C-A-R-S FROM \$35.00! — 700,000 ITEMS! — GOVERNMENT SURPLUS — MOST COMPREHENSIVE DIRECTORY AVAILABLE TELLS HOW, WHERE TO BUY — YOUR AREA — \$2 — MONEYBACK GUARANTEE — "SURPLUS INFORMATION SERVICES," BOX 3070-B3, SANTA BARBARA, CALIFORNIA 93105.

GOVERNMENT SURPLUS . . . Millions of items (including Jeeps) . . . low as 1¢ on dollar! Most complete Directory available — \$2.00 (guaranteed). DISPOSAL, Box 19107-AC, WASHINGTON, DC 20036.

GOVERNMENT LANDS FROM \$7.50 ACRE! Homesites, farming, vacationing, investment! "Land Buyer's Guide" plus nationwide listings — \$2.00. Lands, Box 19107-AC, Washington, DC 20036

"GOVERNMENT SURPLUS" JEEPS \$17.00! Buy Direct - Your Area. 900,000 Items! Largest OFFICIAL Directory. Including Government OIL LOTTERY Report. \$2.00 (Guaranteed). GOVERNMENT Reprints, Department A3, 4620 Wisconsin Northwest, WASHINGTON, D.C. 20016

LOANS BY MAIL

BORROW BY MAIL! \$1,000 - \$25,000. Bad credit? Refused elsewhere? Write: Worldwide, Box 27191-PM7, Atlanta, GA. 30317

QUICK CASH! Signature Loans! Write: Elite, Box 454-P, Lyndbrook, New York 11563.

MORTGAGE PROBLEMS? Book will help you keep your home without borrowing. Satisfaction guaranteed. Rush \$4.00. Western Research, Box 4276M, Ft. Mugu, CA 93042

BORROW By Mail! Free Details! MBG-PM382, Box 2298, Sandusky, OH 44870.

QUICK MAILLOANS! Free application rushed! Lenco, Box 724-B15, McMinnville, Oregon 97128

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 Home. National Company to assist every way possible. No Gimmicks! Free Details: DFC, Dept. 10-C-3, 1145 Reservoir Avenue, Cranston, Rhode Island 02920

BORROW \$25,000 "overnight." Any Purpose. Keep Indefinitely! Free Report! Success Research, Box 2907C-AO, Indianapolis, Indiana 46229.

MONEY Problems? Free Book describes Loans, Cash, Government Grants, Other benefits, available to individuals. Write: Associates, Box 98-A4, Brooklyn, New York 11235

BORROW \$30,000 without interest! All eligible. Repay anytime. Free details. Infohouse, Box 1004-PM3, New York, NY 10003.

BORROW \$1,000—\$5,000,000. Difficult loans arranged. Personal, business, venture capital. RESEARCH UNLIMITED, #300, Dayton, Washington 99328.

ARAB BUSINESSMEN Have Money to Buy & Invest. Top Finders Fees Paid. Int. MiddleEast Assoc., 382PM1, 8291 Flaxman, Huntington Beach, CA 92646

BORROW \$125,000 EVEN IF REFUSED ELSEWHERE! No gimmicks. IFC, Box 1146-PM3, Lawrenceville, Georgia 30246.

BORROW Cash Fast! Interest Free. For Details Send \$1.25. P.O. Box 3, Cresskill, N.J. 07626

BORROW BY MAIL! \$500.00-\$50,000.00 No collateral, Bad credit, No problem!!! Write: GELCO Financial Services, Box 34293B, Indianapolis, IN 46234

BORROW \$25,000 Without Interest. Credit Cards. Box 696PM, Norwalk, Connecticut 06856-0696

PERSONAL

BIBLE Questions answered. Stamped envelope. Bylon, 17167 Bentler, Detroit, Michigan 48219

COLLEGE DEGREES BY SPECIAL EVALUATION OF EXISTING Credits & Job Experience. Fast. (614) 863-1791. Write: Box 13151-T3, Columbus, Ohio 43213.

FINANCE YOUR DREAMS with Government and Foundation Grants. Details \$1.00. TOU-PM3, 432 PCH, Hermosa Beach, California 90254

COLLEGE DEGREES BY MAIL. Renowned Universities offer fully-accredited Bachelors, Masters, PH.D.'s . . . Free revealing details. Counseling, Box 317-MP-3, Tustin, California 92690.

SLEEPLESS NIGHTS cause IRRITABILITY and FATIGUE. Restful sleep guaranteed. No pills. No gimmicks. Send \$3.00 to: Slumber, PM, Box 1105, Ridgecrest, Ca. 93555

DIVORCE? Don't Lose! Literature, Attorneys. MEN'S RIGHTS ASSOCIATION, 169B, Forest Lake, MN 55025-0189

NEVER BE BROKE AGAIN! I'll tell you how! Easy! Guaranteed. Send \$1 plus Sase to: DAVENIG, Highbrook Rd, Bar Harbor, ME. 04509

BE SUCCESSFUL! Free mystical catalog tells how. Send \$2.00 (airmailing). Peter's, Box 1562, Manila, Philippines.

MUGGER Protection For Wife, Fiancee, Mother or Daughter. Hand Held Screamer Fits pocket or purse. Send \$3.00 To: Richmond Industries, P. O. Box 141, Fairwood, New Jersey 07023

VISA Or Mastercard without Credit Check. Request Card Details. Resard Company, Dept. C, Box 9667, Chattanooga, TN 37412

REMAILING SERVICE

DEPENDABLE, Confidential Remails - Forwarding, Postal Shoppe, 369 East 900 South, Salt Lake City, Utah 84111.

UNLISTED ADDRESS. Discreet and confidential. Remail \$1.00 Single. Mail Forwarding Service, 8050 S. Main, Houston, Texas 77025

FLORIDA REMAILS Receiving-Forwarding. Allen, 6326 Aultin Drive, Jacksonville, Florida 32210

CONFIDENTIAL MAIL and PHONE Calls Received and Forwarded Daily. Central, Box 369PM, Claymont, DE 19703

INTERNATIONAL Directory of Remailers \$10.00. IRFA, Box 1536M, Hilo, HI 96720-0332

HAVE A CANADIAN ADDRESS - Mail forwarded daily. For information Write: JAT, 155 Devonshire Avenue, London, Ontario, Canada N6C 2H9

KANSAS CITY REMAILS. Confidential Receiving—Forwarding. Heartland, Box 7243, Shawnee Mission, Kansas 66207

BERKSHIRE REMAILS. Discreet and Confidential. Custom Service, Box 1469, Pittsfield, Massachusetts 01201

MISCELLANEOUS

THE ANTICHRIST: Will you mistake him? Free booklet; Free Bible correspondence course. Christadelphians, Box 175B, Morrovia, CA 91016

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,** Box 5200-46, Jacksonville, Florida 32207.

PHOTO IDENTIFICATION CARDS . . . Certificates . . . GUARANTEED! Samples 25¢ . . . Basoco, Box 3461-PM-82, Providence, R.I. 02909.

COLLEGE STUDENTS!—Improve your grades! — Research catalog—306 pages—10,278 topics—Rush \$1.00 (Refundable!) — Research, Box 25918K, Los Angeles, 90025. (213) 477-8226.

IDENTIFICATION CARDS . . . CERTIFICATES . . . \$2 SELECTIONS. Samples 25¢. Documents, Box 5664-T, El Monte, Calif. 91731.

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)

QUALITY GIFTS—"DISCOUNTS"— Free Catalog—Send Stamp—Tra-Kel's A-4, 7 Shallcross Place, Middletown, DE 19709

TELEPHONE SUPERMARKET! All Phones and Accessories. Install Yourself & Save \$\$\$ - FREE CATALOG. The Phone Company, Dept. 301, 1472 Oddstad Drive, Redwood City, CA 94063

CUSTOM License Plates—your initials—car name, etc. durable plastic chrome frame—15 colors available \$13.50 delivered. Nigliaccio's, 3708 Oriole Lane, Rolling Meadows, Illinois 60008

TYPENRITERS, Cars, Tools, Tents, much more. Give-away prices. Complete buying information \$2.00. Guaranteed. P Enterprises, 152 Mendon, Blackstone, MA 01504

"BIBLICAL" LITERATURE. GLO, 11613 N. 31st Dr., Phoenix, AZ 85029. (Donation Appreciated).

WANTED MISCELLANEOUS

BUYING: Carbide, Moly, Stellite, Tantalum, Tungsten, Walker Metallurgical, Consumers, 14300 Ilena, Detroit, Mich 48238. 1-313-491-4700

HIGHEST PRICES PAID FOR OLD PAINTINGS. Armbuster, 1316 Fargo, Chicago, Illinois 60626

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 Leszczek, 652 Myrtle St., Elizabeth, NJ 07202

SWISS TYPE ARMY KNIFE \$8.95. Russell Gift Gallery, Dept. PM, Russell, Illinois 60075

HEARING AIDS

HUGE SAVINGS. Elnimate dealer mark-ups. Free Trial. Batteries Wholesale. Terms arranged. Loyds-PMC, Rockford, Illinois 61104

FREE HEARING AID CATALOG - Save 1/2 by mail! Write: "MoneySavers", 9530-PM3, Langdon, Sepulveda, California 91343. NOT sold in California.

SAVE Half by Buying Hearing Aids Direct. Month Trial. Res Company Inc., Box 364, Bridgeport, Ohio 43912

TOBACCO

MAKE Pipes, Information: Pimo, Inc., P32, Box 59211, Chicago, Illinois 60659

SCIENCE & CHEMISTRY

LASER HANDBOOK with burning, cutting, Ruby Reds, CO's **SCIENCE FAIR PROJECTS** complete with Plans, Books and Parts. Send \$4.00 to: Fanco, Dept. PM, Box 1902, Rochester, NH 03667

LABORATORY Chemicals, Glassware — Apparatus, Catalogue \$1.00. Deluxe Scientific, 934 S. 13 Street, Manitowish, Wisconsin 54220

TREASURE of genuine surplus optical parts and instruments. Send \$3 for catalogue. T.R. Inc., P.O. Box 65, Moores, N.Y. 12958

FORMULAS, PLANS, ETC.

HENLEY'S 20TH CENTURY BOOK of 10,000 Recipes, Formulas, and process for almost everything used in the home, farm, workshop, industry. Satisfaction guaranteed. Send \$15.00 to: Nile Inc., 14a Hughey Street, Nashua, N.H. 03060

ANY Formula \$10.00. Catalog - Treatise \$1.00. Belfort, Box 568, Chicago, 60690

SPECIAL SERVICES

INFORMATION On anything Ferguson Research Specialists, 60-15 Woodside, Woodside, New York 11377.

HOW TO MAKE MONEY THROUGH CLASSIFIED ADVERTISING. Booklet shows you how to start your own business with Classified Advertising. ONLY \$1.00 FOR BOOKLET — (\$2.00 coupon refundable with first order). H.E. KAPPEL, POPULAR MECHANICS, DEPT. P, 224 WEST 57TH ST., NEW YORK, NY 10019

BETTER HEALTH

BALDNESS Secret Chinese Therapy. Free Details: Korecki, RR2, Summerland, BC. V0H-1Z0

WATER Bacteria, Chlorine, Removed Instantly Anywhere, Free Information Distributorship Opportunity, Ostep Korecki, RR2, Summerland, B.C. V0H-1Z0

IMPROVE YOUR HEALTH! Find out how to live with stress. Order now! Send \$2.—Brian Hendrickson, R.D. 2, Box 89, New Ringgold, PA 17960

WILLARD WATER. Seen on 60 Minutes. Send Self-Addressed Stamped Envelope: RBA, 9406 Bataan, 3M, Minneapolis, MN 55434

FOR THE HOME

NEWEST EGG PEELER \$12.00—Write: Hanrahan Products, 7846 20th Ave., Kenosha, WI 53140

HOME Value. know your's. forms, instructions \$5.75. Appraisal Associates, Box 2460, Missoula, MT, 59806

SUSPENDED SEATING — Featuring Freedom and Comfort of Hanging Chairs, Swings, Toys. Brochure — Brandywine Designs, Box 2555V, Sioux City, IA 51106

POPULAR MECHANICS COMPLETE APPLIANCE REPAIR MANUAL. 320 pgs. Book provides easy-to-follow, non-technical text and pictures showing how to repair virtually any small or large household appliance from a hot comb to a gas furnace. Can save hundreds of dollars! Price \$8.95. Send orders to: Popular Mechanics, Dept. PMC3, Box 1575, Radio City Sta., New York, N.Y. 10101

REPAIRS AND SERVICING

POPULAR MECHANICS COMPLETE CAR REPAIR MANUAL. 328 pages. Simplified auto repair for the Saturday Mechanic. Down to earth text and illustrations. This book also tells what jobs can be handled and when to head for the repair shop. Price \$8.95. Send orders to: Popular Mechanics, Dept. PMC3, Box 1575, Radio City Sta., New York, N.Y. 10101

GARDENING & LAWN CARE

COMPOST Bin, Firewood Shed, Woodbox, Plans \$5.00. Hampshire, Plainwoods Road, Foster, RI 02825

(Continued on next page)

DEADLINE FOR ADS: Copy and Payment must be in by the 5th day of the 2nd preceding month for the issue in which the ad is to appear. See Head of Classified Section.

HOW TO COUNT WORDS: Name and address must be included in counting the number of Words in your ad. Each initial or number used counts as 1 word: H.E. Kappel, 224 West 57th Street, New York, New York 10019: 9 WORDS. Zip codes are not counted. Phone #: 2 Words. Symbols used as keys are charged for. City or State count as 1 word each: New Brunswick, New Jersey: 2 words. Abbreviations such as C.O.D., F.O.B., R.P.M., U.S.A., P.O., 5x7, 16mm are counted as 1 word. (P.O. Box 392 counted as 3 words) Webster's International Unabridged Dictionary will be used as our authority for spelling, compound words, Hyphenations, abbreviations, etc. Please make checks payable to **POPULAR MECHANICS**.

Only \$52.50 for 10 word minimum

\$5.25 each additional word

BOLD FACE CAPS add \$1 per word

(First Word: No Charge For Bold Face)

Remittance of \$ _____ is enclosed to cover _____ insertion(s) in the _____ issue(s). _____ Classification

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20
21	22	23	24
25	26	27	28
29	30	31	32

YOUR NAME _____ (PLEASE PRINT) PHONE: _____

FIRM (NAME IN AD) _____

YOUR ADDRESS _____

CITY _____ STATE _____ ZIP _____

DATE: _____ YOUR SIGNATURE _____

(PLEASE PRINT OR TYPE COPY * FOR ADDITIONAL WORDS ATTACH SEPARATE SHEET)

GARDENING & LAWN CARE

(Continued from preceding page)

NEW: More Vegetables from Small Low Cost, Organic Wonder Garden. Toll Free Method. \$5.00. ICS, Box 190-X, Summerfield, NC 27358.

LEARN Gardening and Landscaping at home. Free booklet. Lifetime Career Schools, Dept. A-988, 2251 Barry Avenue, Los Angeles, California 90064.

SAVE MONEY! Experience the satisfaction of growing your own vegetables. Easy to follow advice. Send \$2.75 for Vegetable Gardening for Beginners, to: Paul Rizzo, P.O. Box 1193PM, Gresham, OR 97030.

MOLE PROBLEMS? Choker Loop™ trap for safe, effective, humane eradication. Hand assembled, individually tested. Easy operation. \$12.95. Free brochures. Mole Control-PM, P.O. Box 1155, Kalamazoo, MI 49005

LAWN Care Tips - Fact filled brochure \$2.00 to: Duane Moll, 701 Hines Rd., Philadelphia, PA 19128

BUILD A WINDOW GREENHOUSE—Converting a window in your home to a mini-greenhouse amounts to little more than attaching a box-like plexiglass enclosure to the outside. The beauty is that you don't do a thing to the window other than add screws to the frame—the window stays intact. No drafts in winter, no need for caulking. For plans send \$2.95 to: Popular Mechanics, Dept. PMC3, Box 1014, Radio City Sta., New York, N.Y. 10101

FLOWERS, PLANTS & NURSERY SUPPLIES

GROW Ginseng. Very Profitable. Have Seeds, Roots, Goldenseal. Full Information, K. Collins, Viola, IA 52350

DECK or PATIO Planter Box. Plans \$3.00. Easy Patterns. 121 Maple St., Sparta, TN 38583

RECIPES, COOKING, ETC.

DOWN EAST FAVORITES 10 Recipes. \$2.00 SASE: Sue, Box 95, East Winthrop, Maine 04343

ORIGINAL Southern Salad Dressing Mix. \$1.00. Hinrichs, Box 204A, Yakima, Washington 98907

THRILL family and friends. 49 island recipes. \$4.00 now! Hawaiian Island Resources, Box 1079, Makawao, Hawaii 96768

SARMA, CROATION FAVORITE MEAL, Recipe \$2.00. Bec-Tec, 707 Alabama, League City, Texas 77573

FUDGE! Retired CandyMaker's 8 Recipes. \$3.00. Large SASE. Dept. Two, Box 806, Wallingford, CT, 06492

TANGY! French Dressing \$1.00 SASE. Dept One, Box 806, Wallingford, CT 06492

LIQUEURS Make them Yourself. Five Favorite Recipes, Including Kahlua \$3.95. Liqueurs, Route 1, Hannibal, New York 13074

TIRED OF PLAIN HAMBURGERS. Wake Up Your Taste Buds. Over 60 New and Old Recipes. \$4.00. J-J Associates, Box 275, Remington, IN 47977

PIZZA DOUGH SAUCES Recipes, Retired Pizzeria Owner will now share secrets. **BONUS** Sandwich Sauce Recipes. \$2.00 and SASE. DiPietro's, 6613 Brownsville Rd., Pittsburgh, PA 15236

WINEMAKING, BEERMAKING

WINEMAKING-BEERMAKING-GASOHOL. Free Supply Catalog. Yeast Equipment Continental, Box 68016-PM, Indianapolis, Ind. 46268

WINEMAKERS-BeerMakers: Free illustrated catalog of supplies. Semplex, Box 1227ER, Minneapolis, Minnesota 55412-0276

BEER-WINE, Why Buy? Make it yourself. Supplies. Catalog. Jim Dandy Sales, Box 30377PM, Cincinnati, Ohio 45230

FREE BEERMAKING BOOK Plus Catalog. Finest Equipment, Ingredients. Fully Guaranteed. SPI, Box 784-M, Chapel Hill, NC 27514

WINEMAKERS-BEERMAKERS— Free Catalog—Fast Service—Large Selection: Kraus, Box 7850L, Independence, Missouri 64053.

MAKE BEER, Wine, Liqueurs Free Catalog. Bacchanale, Box 51PM, Central Village, Mass. 02790

WINEMAKERS-BEERMAKERS Fresh Stocks. Fast Service, Free Catalog. O'Brien's, Box 24 D, Weyne, IL 60184

BEERMAKING SUPPLIES—Quality Selection, Free Price List. Brew It Yourself, Box 121, Freeport, IL 61032

BEERLOVERS! Brew American and European beer. Complete kits, Equipment, Supplies. **FREE** details. Duane Imports Inc., Department PM, P.O. Box C-500, Hershey, PA. 17033

BEER LOVERS— Brew your own. Delicious! Inexpensive! Free Catalog. Beer Gear, Box 25093M, Lansing, Michigan 48909

FREE Encyclopedia Winemaking Beermaking Supplies, Equipment, Ingredients. Send \$1.00 shipping, handling. Vynox, Box PM7498, Rochester, NY 14615

WINEMAKING/BEERMAKING Supplies, Equipment. Free Catalog. Wine Hobby, P.O. Box G-104, Greenwood, MA 01890.

WINEMAKERS/BEERMAKERS! Beginners/Advanced. Free Catalog. **AMAZING GRAPES.** 1131-A3 South 48th Street, Philadelphia, PA 19143.

BEERMAKERS! Free Specialist Catalog/Newsletter. Wilam's, Box 461M, Oakland, California 94604.

BEERMAKING, Winemaking Supplies. Free Price List. The Grape Hope, Dept PM, 2808 South Lyon, Sioux City, Iowa 51106.

"ALL ABOUT BEER" 16-Page Newspaper for Homebrewers Supply list. Send \$1. Fermenter's Cellar, 6938 Daney, Indianapolis, IN 46220

MOONSHINE! Whiskey, Gin, Vodkas. Homebrew Manual. \$2.00. 5133 Fairhill, Philadelphia, PA 19120-3195

BURGLAR ALARMS & HOME PROTECTION

FINEST Equipment! Save! **FREE CATALOG!** AAS, 186-B Oxmoor Road, Birmingham, AL 35209

STOP BURGLARS for under \$5. Booklet gives extensive details on home security. Guaranteed! 4 free security labels. Mail \$3 - Telco, P.O. Box 201A, Lockport, NY 14094.

AMAZING SECURITY PROTECTION Against Burglary, Fire, Rape. Free Literature. ABW, Box 6116P3, Chicago, IL 60680

Magazine Offers LIFETIME Subscriptions for \$7.95!!!

NEW YORK—Better Living, the nation's leading service monthly—devoted to home, garden, health, fitness, recreation, and personal finance—has stunned the publishing world by announcing Lifetime Subscriptions for just \$7.95, an unprecedented bargain.

Lifetime Subscriptions last for the remainder of a purchaser's lifetime. Other periodicals charge \$300 to \$500 for such subscriptions.

"This offer has been made possible," a Better Living spokesman said, "by today's astronomical interest rates.

"The interest alone on prepayment of a \$7.95 Lifetime Subscription now covers postage, our biggest cost in filling Better Living Subscriptions. Thus we can offer these Lifetime Subscriptions so cheaply.

"Consistent with our policy of passing along to subscribers economies we are able to effect, and maintaining Better Living's position as America's Number One Biggest Magazine Bargain, we're offering Lifetime Subscriptions at this GIVEAWAY price.

"This is one of the few instances we know of where a consumer actually benefits from today's stratospheric interest rates.

"We don't know how long we'll be able to continue this \$7.95 Lifetime offer. It all depends on how long interest rates stay high. Once they drop appreciably, this offer will automatically be withdrawn."

HOW TO ORDER

Readers who wish to accept this unprecedented offer should send their name and address with \$7.95 (check or money order, or Visa or Master Charge number) to: Lifetime Subscriptions, Dept. PM, Better Living, 251 W. 57th St., New York, NY 10019.

Better Living, circulated nationally, is America's most comprehensive service magazine, covering home design and decor, food, fishing, camping, the outdoors, travel, photography, gardening, cars, sports, boating, beauty, crafts, hobbies, health, fitness, product ratings, and other consumer affairs, leisure activities.

Typical of the kinds of wallet-fattening, useful articles in Better Living are:

Recession-Proof Jobs

Car "Econometers" Can Save Gas

The West Point Diet

A Consumer's Guide to Inflatable Boats

How to Collect Social Security from U.S. and Canada—SIMULTANEOUSLY

Investments that Outpace Inflation

Trout Flies Fit to Be Tied

New Computerized Combination Locks

High-Yield Vegetable Gardening

How to Get a Job as a Forest Ranger

Fill'er Up—With Propane?

Ski Camping: Winter's Newest Sport

How to Build a Super Intrusion Alarm

Second Night Free: 1,000 Hotels, Motels Offer an Incredible New Bonus

How to Travel and Get paid for It

Navy School: Photo Career Port of Entry

Interest in Electric Cars Is Surging

How to Exercise While Driving

Sidestepping the Hazards of Jogging

Fishermen Swarm to School

Ford Pins Hopes on Graphite Car

How to Stop Snoring

Night Glasses for Safer Driving

The Dollar-A-Day Diet: It Really Works

How to Select How-To Books

Silencing Apartment Noise

Bionic Bassing

What It Costs to Run Your Appliances

Buying a Boat as an Investment

Home Offices that Work

Lights *INSIDE* Your Camera

Growing Exotic Vegetables from Europe

House Remodeling: Adding an Energy-Efficient Room at the Top

Boat Camping

Canada, Where College Costs Half

How to Save \$300 a Year on Utility Bills

Logging Roads Open Up to Fishermen

Home Is Where You Find It: Converted Schoolhouse, Ferry, Ice House

Return of the Three-Wheel Car

Natural Look: Alternatives to the Lawn

Split Equity: Sell Your House, Keep It Too

Couples Who Divorce to Cut Taxes

Canoe Vacations: Strokes of Genius

35MM Autofocus: Taking a Sharp Look

Estate Planning: Protect Your Heirs from the Tax Collector

As you see, Better Living is an easy-to-follow instruction manual for building a better life. It can make your home more beautiful and comfortable, your family more fit and attractive, your leisure time more exciting and rewarding.

Celebrities and influential tastemakers whose opinions spark the pages of Better Living include:

Jack Anderson, Senator Howard Baker, Isaac Bashevis Singer, Lawrence Welk, Julia Child, Gay Talese, Bob Hope, Cleveland Amory, F. Lee Bailey, Henny Youngman, Helen Gurley Brown, Isaac Asimov, Charles Schulz, Andy Warhol, David Reuben, Ann Landers, Joyce Brothers, Rodney Dangerfield, Alice Cooper, Abigail Van Buren, Rex Reed, Flip Wilson, Senator George McGovern, Don Rickles, William Kunstler, Johnny Rutherford, Cale Yarborough, Bobby Allison, A.J. Foyt, Al Unser, Colonel Harland Sanders, Art Linkletter, Jackie Gleason, Liberace, Alistair Cooke, Dan Greenburg, Keir Dullea, Arthur Godfrey, Rocky Graziano, Arlene Francis, Benjamin Spock, MD, Pat Boone, Lucille Ball, Johnny Mathis, Dennis Weaver, Debbie Reynolds, Bob Newhart, Jack Palance, Victor Borge, Bill Cosby, Mario Andretti, Loretta Lynn, Merv Griffin, Robert Goulet, Carol Lawrence, Red Skelton, George Wallace, Bill Dana, Tom Smothers, Dick Smothers, Bob Guccione, Jim "Catfish" Hunter, Curt Gowdy, Billie Jean King, Ed McMahon, George Jessel, Howard Cosell, Reverend Ike, Jimmy Carter, Marie Osmond, Bill Blass, Barry Goldwater, Jr., Werner LeRoy, Della Reese, Monty Hall, Roberta Peters, Dick Clark, Huntington Hartford, Ed Asner, William Shatner, Paul Winchell, John Travolta, Cher, and George Burns.

Clearly, Better Living has it all: celebrities, money savvy, advice and information on enriching your life in every way.

NOW IT HAS A PRICE FOR LIFETIME SUBSCRIPTIONS—\$7.95!—THAT IS POSITIVELY DUMBFOUNDING, THAT IS LOWER THAN MANY MAGAZINES CHARGE FOR JUST ONE YEAR!

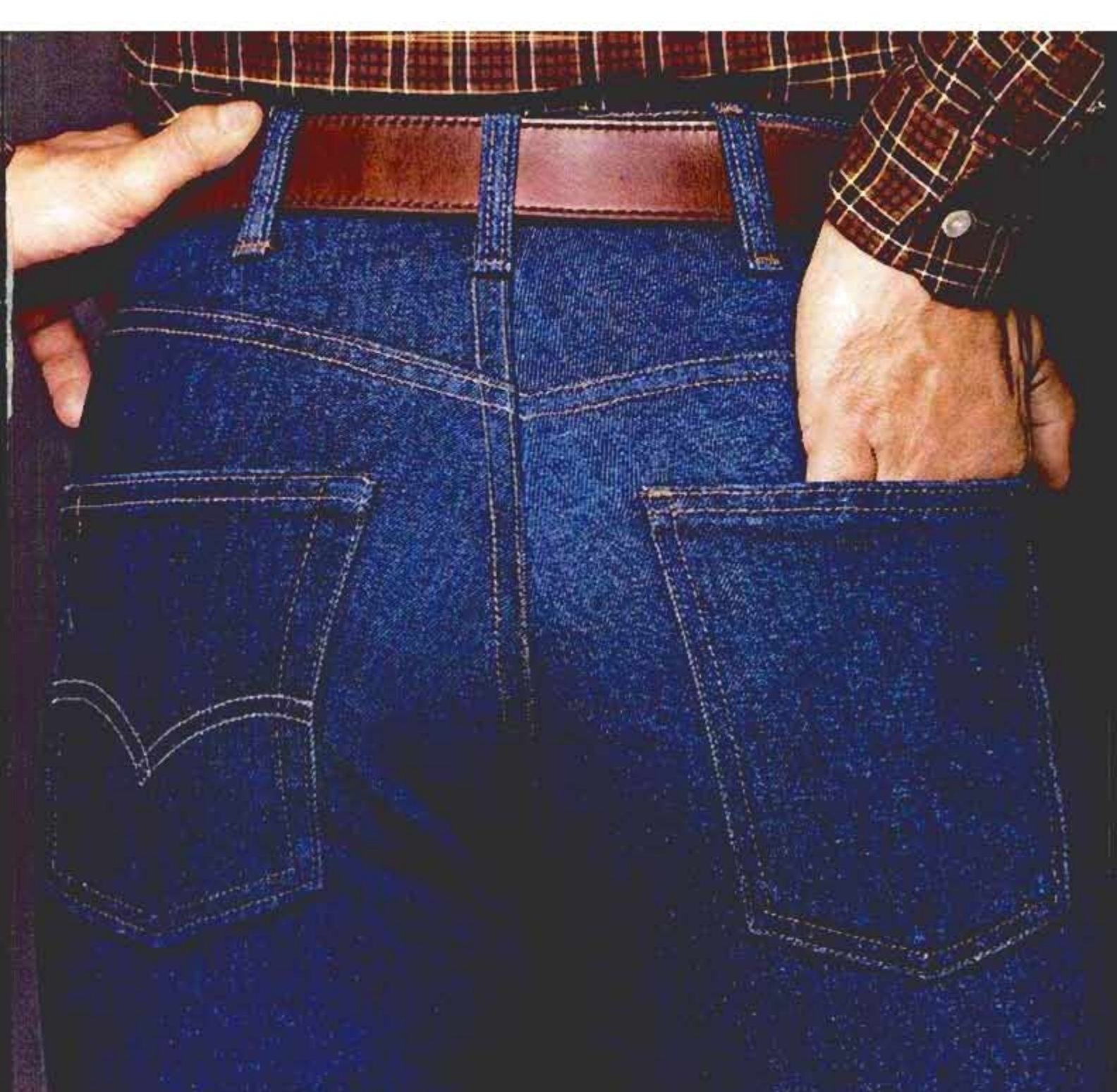
TO TAKE ADVANTAGE

To take advantage of this unprecedented offer, send your name and address with \$7.95 (check or money order, or Visa or Master Charge number) to: Lifetime Subscriptions, Dept. PM, Better Living, 251 W. 57th St., New York, NY 10019.

Limit: No more than two subscriptions per address, including gift subscriptions.

"When today's high interest rates drop appreciably, this offer will automatically be withdrawn," the Better Living spokesman said. "Those who have foresight and take advantage of it will be congratulating themselves all the rest of their lives."

© Better Living mcmbox



How to pick a pocket.

To prove a point, we stitched together half a pair of the best-selling jeans and half a pair of JCPenney Plain Pockets.

The point is, both feel great, fit great. They even look alike.

Till you look at the pockets. The best seller's have a little extra stitching. And that can cost you extra.

Plain Pockets only cost you \$13.50. Which pocket should you pick? It's as plain as the pocket on your pants.

Plain Pockets™ Jeans
only at
JCPenney

Prices higher in Alaska, Hawaii and Puerto Rico.
Also available through the JCPenney catalog.

There's only one way to play it.

No other ultra brings you a sensation this refreshing.
Even at 2 mg., Koool Ultra has taste
that outplays them all.



NEW KOOL ULTRA

Kings 2 mg.
100's 5 mg.



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

Kings, 2 mg. "tar", 0.3 mg. nicotine, 100's, 5 mg. "tar",
0.6 mg. nicotine av. per cigarette by FTC method.

©1988 B&W T Co.