



How They've Made Magic For 15 Years

COMPLETE 60-PAGE GUIDE

# WOODWORKING

- PROJECTS TECHNIQUES
- •TOOLS •TRENDS
- **•PLUS MUCH MORE**

## SAVE YOUR DRIVER'S LICENSE!

We Test 11 Radar Detectors To Find Out Which Work And Which Don't

## DEEP DUTY WITH THE U.S. NAVY

Newest Diving Gear Lets Frogmen Go Deeper, Longer

## HOW WE BEAT

THE BAJA
Winning The
World's Most
Grueling Race

FANJET
POWERED
MODEL
PLANES
Ultimate
In Radio
Control
Flying



## **INSIDE THIS ISSUE**

- Complete Plans:
   4 Great Furniture
   Pieces For Your Home
- Working With
   Manufactured Panels



Guide To
 Mail-Order
 Hardware
 And Tool
 Catalogs



Taurus will often carry rear seat passengers, so they figure equally in the overall design: With wide, comfortable places for their feet; rear seat heat ducts; and if the rear seat passengers happen to be children, Taurus' child-proof rear door locks offer some peace of mind.

- ▶THOROUGH DESIGN. To carry a lot of cargo, the trunk is deep and commodious. To carry two bags of groceries, most models include an elasticized net to keep them upright. When it rains, Taurus has 20" wipers to clear the windshield. And for bright days, a secondary driver's visor, on most models, provides simultaneous front and side protection from the sun.
- MILEAGE POWERTRAIN WARRANTY.
  Ford's powertrain warranty covers you for three years with unlimited mileage. It's a combination unmatched by any other American manufacturer. Ford's warranty covers major powertrain components on all 1987 Ford cars. Limited warranty and certain deductibles apply. Also, participating Ford Dealers stand behind their customer paid work with a free Lifetime Service Guarantee. It's good for as long as you own your Ford car. Ask to see the Powertrain Warranty and the Service Guarantee when you visit your Ford Dealer.

►FORD. BEST-BUILT AMERICAN CARS...
SIX YEARS RUNNING. "Quality is Job 1."
In fact, for the past six consecutive years,
Ford quality has led all other American
car companies. This is based on an average
of owner-reported problems in the first
three months of service on '86 models,
and in a six month period on '81-'85 models
designed and built in North America.

## AND WHY IT PAYS OFF SO HANDSOMELY. FORD TAURUS.

Successful design anticipates the needs of the user. And the vision pays off in Taurus. Buy or lease one at your local Ford Dealer.

Have you driven a Ford...lately?



1. Follow instructions on the other side

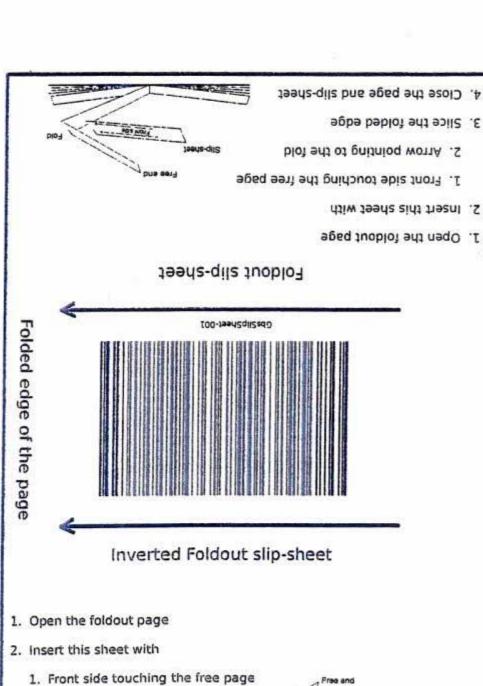
Back

aton-vaenduceno



Inverted Back

1. Follow instructions on the other side



2. Arrow pointing to the fold

4. Close the page and slip-sheet

3. Slice the folded edge

### FORD TAURUS SEDAN AND WAGON

Powertrain:

2.5L 4-cylinder EFI Front-wheel drive Transaxles: Auto CLC or 5-Speed Manual

3.0L V-6 Multiple Port Fuel

Injection

Front-wheel drive

Transaxle: Auto Overdrive

Facts and Figures:

Passenger Capacity: Sedan-Up to Six Wagon-Up to Eight with optional third seat Luggage Capacity: Sedan-17.0 cubic feet\*

Wagon-81.0 cubic feet\*

Major

Standard Equipment: The MT-5 (5-speed manual)

and GL include an electronic AM/FM stereo, 4-way front headrests, interval wipers, and many other standard features.

The LX (pictured) includes air conditioning, front seats with power lumbar supports, power windows/door locks, and much more.

All Wagons include a 60/40 split-folding second seat, two-way liftgate, and roof-mounted luggage rack.

Preferred Equipment; and Special Value Packages:

There are several Preferred Equipment Packages that combine the most popular options for up to hundreds of dollars less than the price of these options ordered individually. Plus, when you purchase a Taurus L, GL, or MT-5 with these packages and a 2.5L engine, certain options will be included at no extra charge. See your local Ford Dealer for details.

\*Based on EPA Cargo Volume Index.

Buckle up-Together we can save lives.



Taurus is dedicated to the principle that successful design anticipates the needs of the user.

The result of this vision is an automobile of innovative design which is not only handsome, but also makes a great deal of sense.

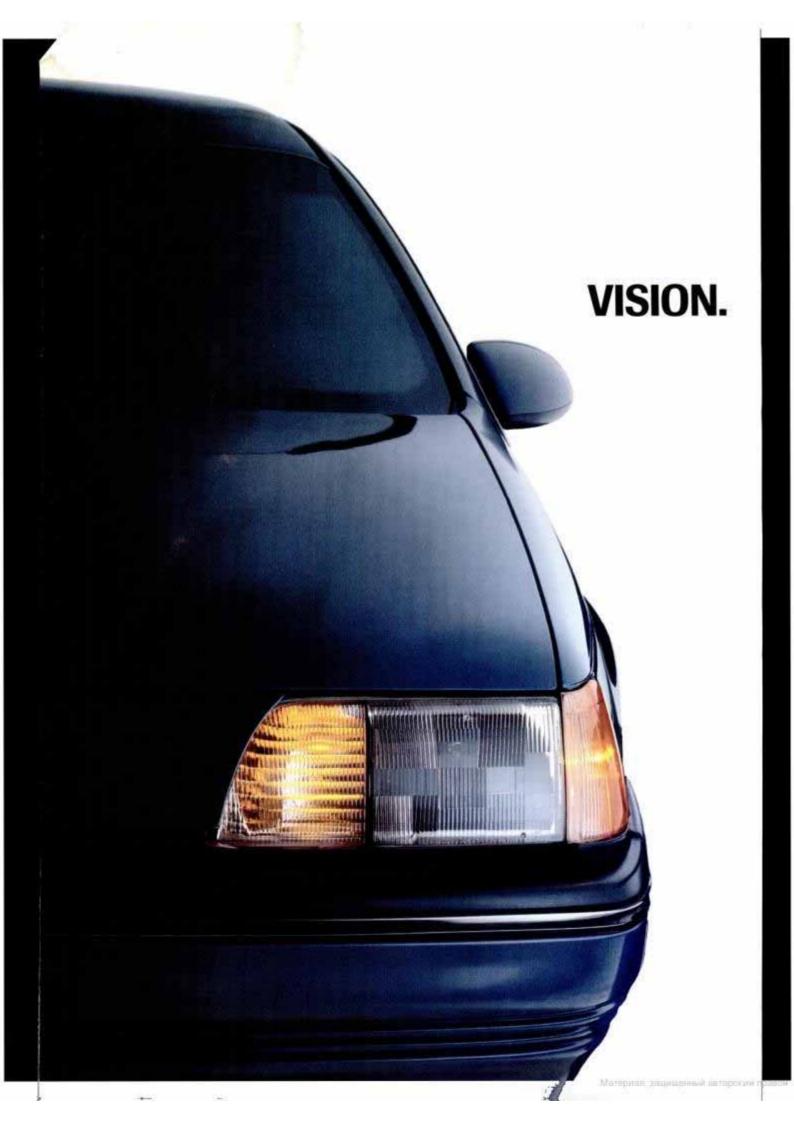
▶ EXTERIOR DESIGN. To the wind, Taurus presents a clean, almost unbroken surface. The headlamps, side windows, even the door handles lay flush to the body. While the effect is pleasing to the eye, it also pleases the ear by reducing interior wind noise.

The overall shape is designed to enhance Taurus' stability on the road. Even the underbody is shaped to reduce aerodynamic lift and channel cooling air to the engine compartment.

►INTERIOR DESIGN. Taurus seats are designed to satisfy two important criteria. One: For refreshing comfort during long drives. Two: For firm lateral support in turns.

Controls are placed and shaped so your hands can find and identify them easily (your eyes stay on the road). The steering wheel is sized, placed and designed to make it comfortable to grip. Even the safety belts are easy to fasten and adjust.







Ford

# Life Preserver.

Worn motor oil leaves bakedon deposits that reduce performance and strip years off your engine's useful life. That's why Mr. Goodwrench recommends regular oil changes with GM Goodwrench Motor Oil: The Life Preserver.

GM Goodwrench Motor Oil meets or exceeds all GM specifications for GM cars and light trucks. It reduces engine wear. Fights sludge buildup. And protects against rust.

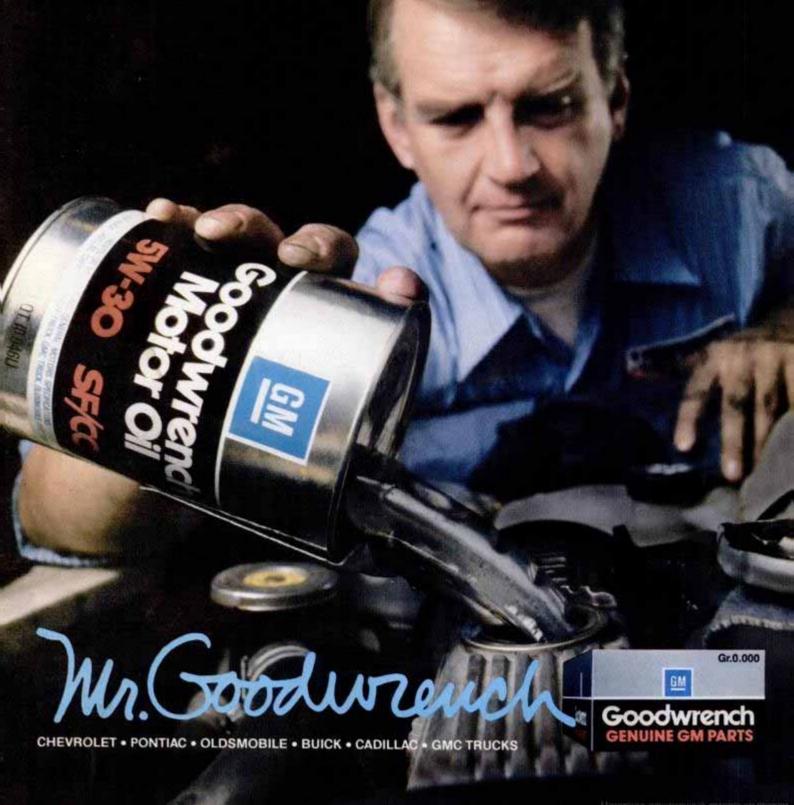
So next time you need an oil change, change to GM

Goodwrench Motor Oil.

No one knows your GM car better than Mr. Goodwrench. No one. Mr. Goodwrench also recommends GM oil filters. See your owner's manual for oil and



filter change intervals.



## Popular. Mechanics

NOVEMBER 1986

VOLUME 163 NO. 11



#### ON THE COVER

The line between craft and art has never been clear cut. Furniture can be both craft and art—the best of contemporary American designs are superbly crafted, and are good enough to display in museums. In our Woodworking Guide, which starts on page 85, read about where American furniture design is and how it got there. Then use our plans and techniques to build four beautiful furniture pieces.

—PM photo by Rosario Capotosto



67 Disney World



74 Speedy model planes



76 Radar detectors



80 Winning at the Baja 500

## DEPARTMENTS

- 4 Editor's Notes
- 7 Letters
- 10 Imports
- 12 Cycles
- 14 Appliance Clinic
- 19 Outdoors
- 22 Home Video
- 30 Car Clinic
- 38 Old House
  - Restoration

- 43 Homeowners'
  - Clinic
- 44 Computers
- 46 Electronics
- 53 Science
- 54 Audio
- 58 Inside Detroit
- 64 Photography
- 145 Tech Update
- 174 Time Machine

## WOODWORKING GUIDE

- 85 Cover
- 86 The Leading Edge

Read about what's happening with American furniture and the roots of its design.

92 Only Skin Deep Manufactured panels

Manufactured panels can look and work every bit as well as solid wood.

98 Shop Clamps You can never own

enough clamps.

Check out our sampling of 19 clamp models.

106 White Lightning

Build an inexpensive table with a white lacquer finish.

114 Working At Home

Our contemporary oak desk is designed for home use.

124 China Bound

Build our versatile mahogany sideboard.

134 Mailbox Tool Shop

Mail-order tool catalogs are a convenient way to buy woodworking supplies.

138 Workshop Wares

Here's the best of the new tools and shop accessories.

140 Paint And Plywood

Our high-style coffee table has an innovative finish.

## **AUTOMOBILES**

76 Radar Vs. Detectors

We use police radar guns to rank 11 top detectors.

80 The Tough Get Going

PM entered the Baja 500 and came out on top.

155 Saturday Mechanic

Fix your car's windows and door locks.

## AVIATION

## 74 Speed In Scale

These radio-controlled models can top 150 mph.

## MARITIME

### 71 Deep Dive

The U.S. Navy is diving deeper and working harder with the latest in undersea technology.

### ENGINEERING

### 67 Disney World: 15 Years Of Magic

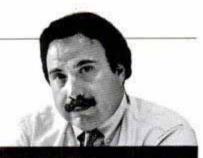
Disney World's magic continues to dazzle visitors. Read about the technology that makes it all happen.

## **TECHNOLOGY**

## 145 PM Technology Update

Here's the latest in space, electronics, transportation, engineering, robotics and the military.

## **Editor's** lotes



ow far will an editor go to get a story? If you're talking about the typical POPULAR MECHANICS editor, the answer is, to the ends of the Earth and to the depths of the ocean. This issue of PM is a perfect case in point. It's the quintessential example of editors going out and getting a story firsthand, and taking you, the reader, along for the ride. Recently, Outdoors Editor Tim Cole found himself at the U.S. Navy's Experimental Dive Unit in Panama City, Florida, donning the latest frogman gear and plunging into a murky tank filled with thousands of gallons of muddy water (page 71). A few weeks later, Cole was literally at the top of the world, skirting the Arctic Circle on a snowmobile to sample the latest in snowmobiles and coldweather gear (page 19). Then it was on to Baja California, Mexico, to join West Coast Editor Steve Parker in an assault on the famous Baja



PM editors will go the the ends of the Earth for a story. Or at least to Panama City, Florida (left); to Baja California (center); to the Arctic Circle (right) on a snowmobile . . .

500 (page 80), quite possibly the most grueling race in the world. Meanwhile, Science/Technology Editor Dennis Eskow flew to Great Britain to catch up on the latest at British Aerospace, the high-tech English company responsible for the supersonic Concorde and other innovative aircraft. Eskow then flew from London to Orlando, Florida, to get the up-to-now untold, behind-the-scenes story of how Disney engineers create all that magic at Disney World (page 67). October marks the theme park's 15th anniversary and, if you've ever been to Disney World, you'll know what we mean when we say there's magic there. . . . While all these peripatetic editors were traveling around the world to bring you the articles in this issue, our Home And Shop Department, headed by Steven Willson and ably assisted by Joe Truini, Roy Berendsohn and Lynne Abbate, stayed at home to produce our annual Woodworking Guide (page 85). Last year's



, and to an aircraft hangar outside London.

Woodworking Guide netted us a coveted National Magazine Award. The theme of this year's Guide is great American design. The lead story was written by noted design authority Wendell Castle. Then Willson and gang take over to bring you four beautiful furniture projects you can build yourself, plus a lot more. I think you'll agree that this year's Guide is the best yet. "Til next time.



Editor-In-Chief Joe Oldham

Managing Editor Bill Hartford

**Graphics Director** Bryan Canniff

Science/Technology Dennis Eskow, editor

Automotive

Wade A. Hoyt, SAE, editor Mike Allen, assistant editor Jim Dunne, Detroit editor Michael Lamm, Norman S. Mayersohn, Mort Schultz, Rich Taylor, contributing editors

**Home And Shop** 

Steven Willson, editor Joseph Truini, shop and tools editor Roy Berendsohn, assistant editor Norman Becker, Rosario Capotosto, Steve Toth, Bob Vila, contributing editors

Electronics/Photography

Stephen A. Booth, editor James B. Meigs, Ron Scibilia, Frank Vizard, contributing editors

Boating/Outdoors Timothy H. Cole, editor

West Coast Steve Parker, editor

**Editorial Production** 

Peter Francesconi, manager John Bostonian Jr., art Nancy Coggins, Deborah Frank, assistants

John Johanek, art director Alan Andresen, Ann Bennett, Diane DePasque, associate art directors

**Editorial Administration** 

Josephine Caronia, administrative assistant Barbara A. Novak, executive assistant

**Editorial Offices** 

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

SUBSCRIPTION SERVICE: Popular Mechanics Magazine will, upon receipt from its reader of a complete new or renewal subscription order, undertake fulfillment of that order so as to provide the first-copy delivery either to the Postal Service or alternate carriers within six to twelve weeks. If for some reason this cannot be done, you will be promptly notified of the issue date that will begin your subscription, with a request for any further instructions you may have concerning your order. Please address all such orders to us at Popular Mechanics, P.O. Box 10064, Des Moines, IA 50350 o Should you have any problem with your subscription, please write Joan Harris, Customer Service Department, Popular Mechanics, P.O. Box 10064, Des Moines, IA 50350 or call toll-free 1-800-247-5470; La residents call 1-800-532-1272. Please enclose your mailing label when writing to us or renewing your subscription of Renewal orders must be received at least eight weeks prior to expiration to assure continued service.

Use this address for subscription orders & inquires, POPU-LAR MECHANICS, P.O. Box 10064 Des Moines, Iowa 50350.



# PLAYERS LIGHTS 25's

free in every pack.

• I just came into a windfall.

25 of the finest for the price of 20

Kings: 10 mg "tar," 0.8 mg nicotine -

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

SURGEON GENERAL'S WARNING: Smoking Causes Lung Cancer, Heart Disease, Emphysema, And May Complicate Pregnancy.

Kings & 100's Regular and Menthol

Mfr's, suggested pricing based on full-price brands.

Материал, элирименной



271 Mayhill Street, Saddle Brook, NJ 07662 In Canada: Jardel Distributors, Inc., 6505 Metropolitan Blvd. East, Montreal H1P 1X9 Quebec Available at all leading Hardware, Home Center, and Discount Department Stores everywhere.



REMOVES VOCALS FROM RECORDS!
Now You can sing with the world's best bands!
The Thompson Vocal Eliminator can remove
most or virtually all of a lead vocal from a standard
stereo record and leave the background!
Write or call for a free brochure and demo record.

LT Sound, Dept. PM, P.O. Box 338, Mountain, GA 30086 (404) 493-1258

## LIVE

A monthly magazine with plans/instructions for steampowered machining projects. including locomotives you can ride!

\$26 per year (Check/M.O.) \$48 for 2 years Charge card, call anytime



800-824-7888 Operator 660 or write Live Steam, P.O. Box 629-C3 Traverse City, MI 49685 MONEY-BACK GUARANTEE

### **Publisher**

Daniel J. Coleman

## Advertising Director

Floyd Sembler

## National Sales Manager

**Bud Gilbert** 

## Advertising Offices

#### **New York**

224 West 57th St. New York, NY 10019 (212) 262-8824

#### Chicago

1 South Wacker Dr. Chicago, IL 60606 (312) 984-5190

#### Detroit

377 Fisher Rd. Grosse Pointe, MI 48230 (313) 881-3520

Los Angeles 3000 Ocean Park Blvd. Santa Monica, CA 90405 (213) 450-8881

#### **Direct Response Advertising**

Al Cohen 224 West 57th St. New York, NY 10019 (212) 262-4279

## Business Manager

Agnes P. Maillaro

## Marketing Director Edward Vaquero

## **Production Manager**

Lori Ellwood

## Advertising Production Patricia Woods

(212) 262-4800

## Classified Sales Manager

Sophie Gronowicz (212) 262-4825

## Reader Service Department

Gary Frederick, supervisor 224 West 57th St., New York, NY 10019 (212) 262-4292

Published by The Hearst Corporation: Frank A. Bennack Jr., President Randolph A. Hearst, Chairman sert C. Maurer, President, Magazines Division Richard E. Deems, Publishing Consultant

Richard E. Doerns, Publishing Consultant

POPULAR MECHANICS is published monthly by the
Hearst Corporation, 959 Eighth Avenue, New York, NY
10019, U.S.A. Frank A. Bennack Jr., President; Randolph
A. Hearst, Chairman; Harvey L. Lipton, Vice-President
and Secretary, Edwin A. Lewis, Vice-President and Treasurer. Hearst Magazines Division: Gilbert C. Maurer,
President; K. Robert Brink, Executive Vice-President;
George J. Green, Executive Vice-President; Mark F.
Miller, Executive Vice-President, General Manager; Raymond J. Petersen, Executive Vice-President; Thomas J.
Hughes, Vice-President & Resident Controller; Kenneth
A. Chester, Vice-President, Director of Circulation; Daniel
J. Coleman, Vice-President for Popular Mechanics.

INTERNATIONAL EDITIONS: CARIBBERAN MEXIC

## INTERNATIONAL EDITIONS: CARIBBEAN, MEXI-CO, SOUTHERN HEMISPHERE

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



**PM Projects Update** 

Your Mini-Indy racer caught my eye in 1975, but my only son at that time was just 2 years old. In 1978, when you published the Mini-Indy II story, I had two boys, ages 5 and 1 month. It was almost time to start building! I sent for Mini-Indy II plans four years ago and recently finished the kart. Now, drivers Mike and Chris are ages 13 and 8, respectively. The boys, and occasionally Mom and Dad, are having a blast with it.

DAVID J. RUSIN HOWELL, NJ I am a 14-year-old girl attending eighth grade at Fabius-Pomey High School in central New York state. I had to choose a project to build in my industrial arts class and selected the pie safe from your August '82 issue (page 90). I had never attempted anything as difficult before, but I was determined. I started it in January and completed it July 13 with the guidance of my teacher, David Hogan. You'll see that I did leave out the drawers at the top so I could finish the project in one term. Thank you for the idea.

NANCI PENOYER
FABIUS, NY

My garden cart has served me well in use and abuse and is still in good condition after nearly 10 years. My design has similarities with the carts you've published over the years, but mine has one helpful feature: The handles are curved to make it easier to push or pull the cart.

MAURICE J. MARTIN JENSEN BEACH, FL

Ever since I saw the Sea Knight 17-ft. plywood cruiser in your May '57 issue (page 164), I've wanted to build this Glen L. Witt design. But, between Air Force commitments overseas and the years just rolling by, I never got around to it-until recently. So now, almost 30 years later, USAF retired since 1970 and 70 years of age, I've got my Sea Knight. There's one "but" though: I built it to 1/4-scale from the excellent plans. Everything is exact and I've got it set up for radio control with a 7.5-cc model outboard engine. It looks like the real thing, especially with Ken (a Barbie doll) at the helm.

GEORGE KONSMO RANCHO CORDOVA, CA

PM projects do get built sooner or later and with or without modifications. The choice of the Mini-Indy racer (the original from Aug. '75, page 36, or Mini-Indy II from May '78, page 110) can be ordered directly from the designer: Stevenson Projects, P.O. Box 584, Del Mar, CA 92014. Each is \$8.

Plans for the pie safe and a garden cart (PM design from June '82, page 123) appear in our new Plans And Ideas booklet available by sending \$1.50 to POPULAR MECHANICS, Box 1014, Radio City Station, New York, NY 10101. The plans are \$4.95 each.

Plans and patterns for the Sea Knight (the full-size boat!) are still available for \$42 from Glen-L Marine Designs, 9152 Rosecrans, P.O. Box 756, Bellflower, CA 90706. Glen-L also offers Sea Knight frame kits (\$315) and plans for other boats.

## Ceiling fan tips

I enjoy your how-to articles, but as a licensed electrician, let me point out that a single-pole switch is not "safe to handle" and the power is not "truly off" when tested as you recommend in How To Install A Ceiling Fan (Aug. '86, page 121). When testing from terminal to terminal, voltage will only be indicated if the switch is in the OFF position and the bulb is in place and not burned out.

KEVIN SMITH BOSTON, MA

You're right, we should have followed the accepted practice of testing from the hot wire (black) to ground the only true way to test that power is off.

I've installed four ceiling fans in my house and several in homes of friends. For more strength with the fan you show, I usually drill out (No. 21 drill) and retap with a 10-32 tap. On flush or hugger types, on the one with flat bar, I drill a 1/4-in. hole 1 in, from each end for a panhead 3/16 × 3-in. toggle bolt. On the pie pan type, I put 3/16 toggles in the four extra 1/2in. holes, so the fan will never pull away from the outlet box. I always check the factory wiring connections, too; I've found several loose.

ROBERT J. KELLY MINNEAPOLIS, MN







Clockwise: colonial pie safe is the handiwork of 14-year-old Nanci Penoyer, who found it the perfect project for her industrial arts class. Garden cart from Maurice Martin uses curved handles which would improve PM cart projects. Quarter-scale Sea Knight built by George Konsmo is 52 in. long.

# Instant Fun. Just add people!

Tough'87 Ford Ranger Supercab.

Ford Ranger SuperCab.
With a powerful 2.9L V-6 and sporty STX trim, Rangers are out for a lot of fun!

There's only one ingredient needed to have a good time in a Ranger SuperCab—and that ingredient is you!

SuperCab gives you 22 cu. ft. of extra space behind the split-back front seat. And you can ride five with optional rear jump seats. This is one small truck that's looking for some bigtime fun!

## Port fuel-injected V-6.

This tough Ranger's got an advanced 2.9L V-6 with electronic port fuel injection. And it gives you the power of 140 horses\*—power to take you where you want to go! With the 5-speed manual transmission that's standard in all Rangers, you get a little pickup that just wants to have fun!

## The STX look.

Ranger SuperCab even looks like it's rarin' to go, with sporty STX flair. It's got extra-hot styling, including special accenting, sporty trim, tinted glass, black foldaway mirrors, black grille and bumpers, and deluxe wheel trim. And the inside is loaded, too—twin Captain's Chairs up front, plus an electronic AM/FM stereo radio!

### Super fun truck.

Best of all, when you climb aboard this roomy, stylish Ranger, you know right away that it's one tough truck-built fun tough.

You might even say it's tough not to have fun in a Ranger SuperCab STX!

service on '86 models, and in a six-month period on '81-'85 models



## Best-Built American Trucks six years running.

"Quality is Job 1."
In fact, for the past six consecutive years, Ford quality has led all other American automotive companies. This is based on an average of owner-reported problems in the first three months of

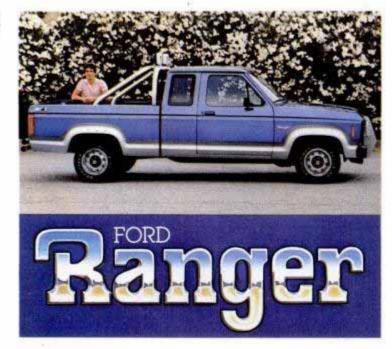
designed and built in North America.

## Lifetime Service Guarantee.

Participating Ford
Dealers stand behind
their customer-paid work,
in writing, with a <u>free</u>
Lifetime Service Guarantee good for as long as
you own your car or light
truck. Ask to see this
guarantee when you visit
your participating Ford
Dealer.

## Buckle up-together we can save lives.

\*Based on SAE Standard J1349. Optional light bar not for occupant safety.





**Imports** 

BY BILL HARTFORD

## Impromptu Pulsar



NX hatchback becomes sports wagon with different-shaped accessory lid (white line).

Nissan parts counters until

roof 's T-top panels lift out, but that's nothing new. What's radical is the hatchback, which comes unhinged and then lifts off completely. And then what do you do? Use your imagination: You can just drive around in a very open car, with your rear seat passengers taking the air (yes, there's a tight rear seat in the NX); you can make believe you're driving a sports pickup and bring home a balled and burlaped sapling; or you can hinge a soon-to-be-available cap, in place of the removable hatchback, to form a space capsule in back. The NX is on sale now, but the backpack accessory won't be at

early next year. So, you'll have a short wait before you can run the NX in its station wagon configuration. Nissan gets the credit for producing a vehicle with the versatility a lot of people have been waiting for. The credit for its design, however, goes to the U.S. team at Nissan Design International in La Jolla, California. And, speaking of design, may the original Pulsar rest in peace.

The new, fwd NX is built on a 95.7-in, wheelbase and The 3-door hatchback is an especially appealing addition to Nissan's 5-model Sentra lineup for '87.

is 166.5 in. long. With XE specs, it's powered by a 1.6liter, ohc, fuel-injected Four that's rated at 70 hp. The hot setup is the SE with 16 valves in the 1.6 engine and 113 hp. In the XE model, 5speed manual transmission is standard with 3-speed automatic an option. With the dual-overhead-cam SE, you get larger, alloy, directional wheels with low-profile 195/60R14 radials, rear stabilizer and front air dam. As either an XE or SE model, the standard-equipment

list is impressive—T-bar roof (with roof panels that stow under the rear floor), dual power mirrors, steel-belted radials, front discs, full wheel covers, power rack-and-pinion steering, AM/FM and more. Air conditioning is optional on the base sticker price, which at this writing hasn't been set, but expect a boost over the cost of last year's Pulsar.



## Tallyho!

Hunting for a new car in the \$6000 range is a challenge, but early next year VW will have its Fox in the field. That may make it a whole lot easier to choose a low-priced car, providing the Germanengineered, Brazilian-built Fox (derived from VW's Polo) has a quality edge on the competition—as did the



Coming: VW Fox In 2- and 4door sedans and 3-door wagon.

Beetle in the '50s when imports were beginning to be noticed in the land of "insolent chariots."

## More Mirage for your garage

The Mitsubishi Mirage 3-door hatchbacks are the best looking subcompacts on the road-and, if you're talking turbos, one of the fastest. But, up until now, it's been a 1-body style line. The new 4-door sedan for '87 is a smart, roomy car with formal roofline, resembling a scaled-down Galant. Like the hatchbacks, the new sedan is fwd, with a transversely mounted 1.5-li-



Mirage 4-door is new for '87.

ter, 68-hp Four providing the power. Standard transmission is a 5-speed manual, with 3-speed automatic a natural option for this family-oriented model.

## Ferrari with the fringe on top

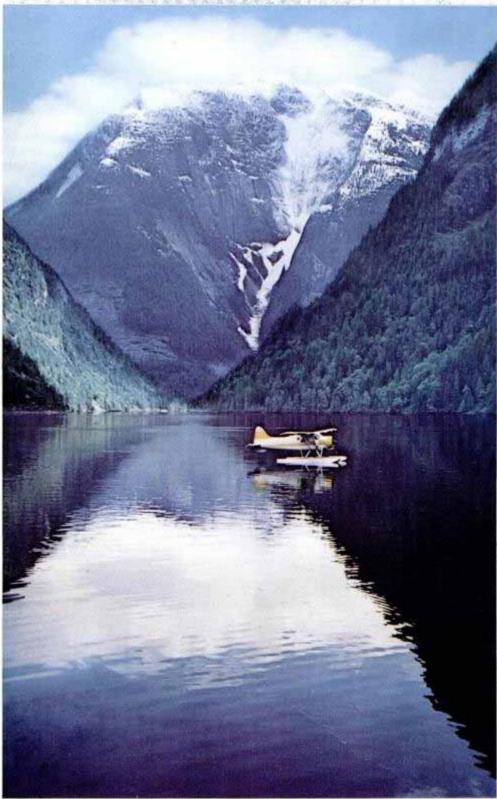


Ferrari 412 cabriolet with 315-hp V12 up front does 155 mph.

Some cars you never get over. Like the Ferrari Daytona Spyder. You don't have to have owned one, maybe never even have driven one. But the Daytona—the last front-engine, rear-drive V12 cabriolet that Ferrari made—is magic when it comes to getting otherwise reasonable men to part with

huge sums of money. Soon, there'll be a new front-engine V12 Ferrari convertible—the 412. It's one of several new models under development, and this one is scheduled for the U.S. line. The price will probably be closer to the \$103,000 Testarosa than the entry-level \$65,000 328 GTS.

## Queens Reach. A rugged place for a smooth taste to start.



WESTERN CANADA-

We found an opening between two peaks, then dropped down fast to the lake. It was the bluest water we'd ever seen, the smoothest too. So smooth, a ripple would have seemed like a wave.

All around us were walls of deep, green pine and mountains capped with the whitest snow, all reaching for the sky. Pure glacial magic.

They make Windsor Canadian from pure running glacial waters. And from the rich local rye. Even the crackling mountain air plays a part. Nature at her best. That's what makes Windsor, Canada's smoothest whisky.





# **Cycles**

## BY NORMAN MAYERSOHN

## **Breaking The Limit**

hen he was electronically clocked at 65.48 mph on a California public highway, instead of getting a citation Fred Markham was awarded the \$18,000 duPont Prize. Fred, you see, was piloting the world's first bicycle to officially exceed 65 mph, and it was the Interna-Human tional Powered Vehicles Assn. that did the timing. not the CHiPs

Markham's Gold Rush record bike may look more like

the Pod From Another Planet than your favorite Schwinn, but it does have two wheels and it is moved along solely by leg power. In fact, under the Kevlar aerodynamic shell, it's quite conventional. Based on the production model recumbent cycle sold by California's Easy Racers shop, its big differences from street-ridden bicycles are in aerodynamics-an incredible calculated Cd of .09-and an ex-Olympic sprint rider capable of pumping out 1 hp for 2minute stretches.

That's not to say that these 2-wheel hot-rodders haven't gone to great lengths to stack all of the record-setting conditions in their favor. First, they found an arrow-straight road at 7800 ft. altitude on a plateau east of the Sierra Nevada range, where the thin air



Gold Rush bike has tight canopy hatch.

would present less drag. But, since the rider would also be down on power in this rarefied atmosphere, they tube-fed him pure oxygen right up until he was seated in the bike and the canopy was duct-taped into place.

The chassis itself is an air-

craft aluminum replica of the chrome-moly steel recumbents built by Easy Racers shop owners Gardner Martin

and Nathan Dean. Pieces that couldn't be bought over the counter were made to order. The front tire, for example, is a bald slick, hand fashioned from a child-sized racing knobby and inflated to 150 psi for record-setting runs.

The body shell,

based on a German laminarflow airfoil design, has never seen the inside of a wind tunnel but has undergone trial-and-error tufting to keep the airstream smooth at the back end. Now shortened, it excels in reducing ground level turbulence, but Markham still compares the ride to an airplane that's just touched its wheels to the ground—wind gusts toss it around playfully.

The run for the duPont Prize was filled with anticipation, the tension heightened by nine days of waiting for the wind to drop below 3 mph as required by the rules of the prize committee. Finally, the team pushed off Markham in the gathering dusk of a calm High Sierra nightfall. One 62-mph warmup run, then an intense session with the oxygen bottle, and the Gold Rush was on its 2-mile run to glory. Pacing himself up to speed with 5- to rest 10-second Markham cranked up to 55 mph before taking a sucker punch from a side wind that put the scare of last autumn's 60-mph crash back in him. The fear passed rapidly



Aerodynamic shell is vulnerable to wind.

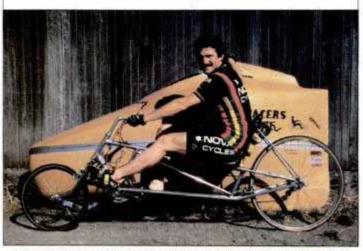
though, as he bore down on the pedals with better-thanever determination and flew through the 200-meter speed trap in 6.8 seconds for the speed record.

In return for the money and effort expended on the record chase, the Easy Racers shop owners hope to see an increase in the popularity of recumbents. Their coastal California shop (Easy Racers, Box 225, Freedom, CA 95019) sells \$995 steel-framed bikes and \$2900 aluminum racing models that they feel offer real advantages for riders who want to master 2-wheeling quickly and travel comfortably.

The Gold Rush bicycle itself has been taken out of action, and plans call for du-Pont to purchase the machine and donate it to the Smithsonian Institute's collection. A clone of the record bike has been assembled for competition at the Human Powered Vehicles meet.

The Gold Rush team won't be sitting around basking in limelight of their achievement, though. The plan: A longer 2-man version of the current bike which benefits from doubled horsepower with the same frontal area of 5 sq. ft. A course up at the 11,000-ft. level in the Colorado Rockies has already been scouted, and the calculator shows that the goal of approximately 73 mph is reachable.

Considering the obstacles this team has already overcome, you'd have to say that it'll only be a matter of time before they attain the Mach 0.1 goal, too.



Rider Fred Markham shows riding position under Kevlar shell.



Out here's where you find Redwood snuff. Made exclusively from Dark Fire tobacco, for a moist, rich taste. With freshness and flavor protected in a plastic can. So the next time you're up in the hills when the sun's goin' down, make it Redwood and you.

Redwood. A rich, dark fire tobacco for less.

& 1984 Helme Tibacco Cri.

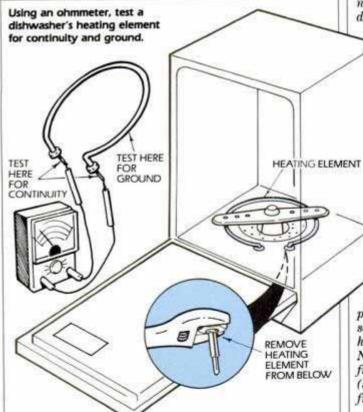
# Appliance Clinic

BY STEVE TOTH

## **Dishes Come Out Wet**

have a G.E. dishwasher, model No. GSD900-03, serial No. 710329B, that leaves the dishes wet. Is this something a do-it-yourselfer can fix?

R.C. STOLTZ TROY, OH ment, remove the lower dish rack. Close the door and set the selector switch to heat dry. Advance the timer to the dry position and activate the machine. Let it operate for 5 to 10 minutes, then open the



First, check if the pushbutton switch is on energy saving or heat dry. In the energy saving position, the heating element in the bottom of the tub is not energized and the dishes are dried by natural convection. When on heat dry, the element is energized for 30 minutes.

To check the heating ele-

door to check that the heating element is getting hot. Put the back of your hand near the element, but do not touch it! You should feel some heat. If you don't, the heater element may lack continuity or it may be "grounded." (The element has a conductive wire at its core, wrapped by insulation. Surrounding

both is a metal shield. If a break in the insulation allows the conductor to touch the shield, the element is grounded.) To check it, you'll need an ohmmeter.

Disconnect the power to the dishwasher and remove the lower access panel. Next, locate and remove the electrical leads going to the heating element. Check that they are not broken or burned. Now, set the meter to the R x 1 scale. Attach the meter probes to each of the heating element's terminals. The meter's needle should show continuity by moving to the right. If it doesn't, replace the heating element.

Next, set the meter to the R x 100 scale. Place one meter probe on a heating element terminal and the other on the metal shield. If the needle moves upward, it indicates the element is

grounded and must be replaced.

To replace the element, remove the locking nuts on the underside of the tub. Then, open the door and remove the two brackets holding the element to the bottom of the tub. Lift the element out of the machine and install the new one.

If the element tests okay, check the fuses in the fuse box under the tub. Remove the fuse box and test the fuses for continuity. If any test as blown, re-

any test as blown, replace them with fuses of the same size and rating. The heating element kit is part No. WD5X57 (\$36). The fuses are part No. WD6X206 (\$2.75). Both are available from a G.E. service center.

## **Needs parts list**

I have a washing machine, model No. LNC-6417, a dry-er, model No. 7364/8364, and a gas range, model No. 2665, all from Montgomery Ward. I would like the parts list and service manuals for these appliances. I have written to Wards, but have received only a "What to do if" (before you call the serviceman)

sheet. How do I get the service manuals for these machines? JAMES GUARINO ALDEN, NY

The parts list and repair manuals can be obtained by contacting Montgomery Ward Parts Distribution Center, 5750 McDermott Dr., Berkeley, IL 60163; 1-800-323-1965. The service manuals, which cost about \$5, usually have parts lists in them. For technical assistance, write Montgomery Ward, Product Service, 4-N 535 West Chicago Ave., Chicago, IL 60607.

## **Cooktop parts**

We have a Frigidaire cooktop and oven, model No. 42015344. When something goes wrong, we are told that we can't buy parts for it. Can you give us an address to write to for new elements?

> JOANNA DEIGHTON NORMAN, AR

I contacted Frigidaire and they told me there are parts available for your range, which was manufactured between 1961 and 1963.

The part number for the 6in. element is 6590804, the part number for the 8-in. element is 6590805, and the speed heat burner is part No. 659183. They cost about \$30 each and can be ordered from any Frigidaire parts distributor in your area.

## Info source

For those of you with older Sears appliances who have had little luck obtaining a parts list or wiring diagram from your local store, there is a national source for such information. Write: Sears-Roebuck and Co., Manager National Customer Relations, Dept. 731A, Chicago, IL 60684. Include the model and serial numbers of your appliance.

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

## One more thing to consider before you buy any compact tractor



## Plus-50% off on Extended Service Protection

Now there are even more reasons to buy a Ford compact tractor. From July 14 to November 30, 1986, participating dealers can arrange low 53/4% ANNUAL PERCENTAGE RATE FINANCING for qualified buyers. You can save 50% on an extended service protection plan that stretches your service protection to three years or 2,500 hours, whichBut there's more to consider when you're buying a Ford compact tractor.

Ideal for gardening. Small tractors don't come any better than the 13 to 38-horsepower\* Ford compact diesels. Seven quality 1000 Series tractors—models 1110, 1210, 1310, 1510, 1710, 1910 and 2110.

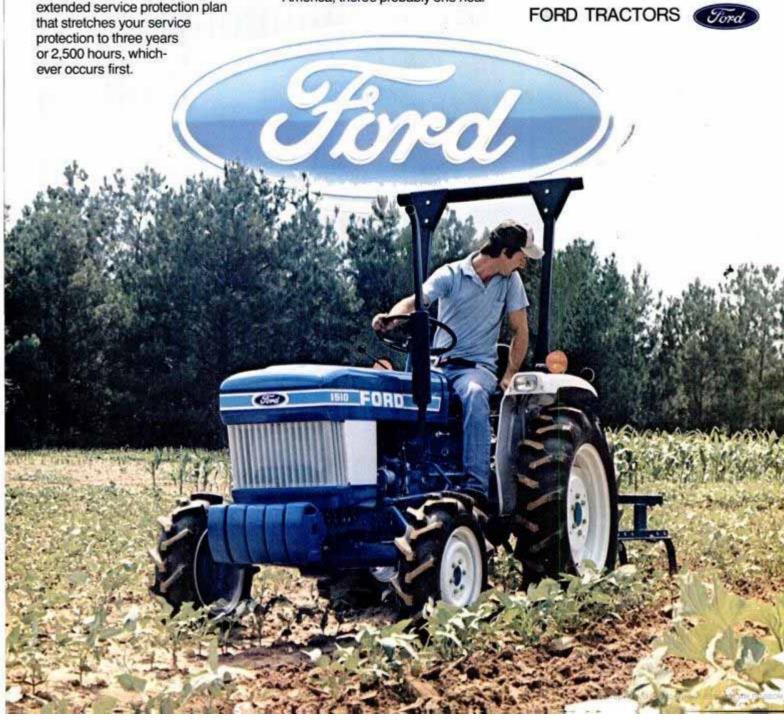
Strong dealer support. With 1,400 Ford Tractor dealers in North America, there's probably one near

you. A full-time tractor dealer, experienced in meeting the needs of serious gardeners, farmers and contractors.

Now there are more reasons than ever to consider Ford before you buy a compact tractor.

\*Gross engine horsepower

Is your tractor built as well as a Ford?



# ANYTIME.

## THE NEW DODGE POWER RAM 50

ALL NEW. IMPORTED FOR DODGE. BUILT BY MITSUBISHI MOTORS CORPORATION. AND RE-ENGINEERED BUMPER TO BUMPER. Take it anywhere you want. Anywhere. Because the new Power Ram 50 has undergone some powerful changes. And it's ready for just about anything. OFF-ROAD POWER. If you're power hungry, you've com to the right place. This 4x4 has the biggest 4-cylinder engine you can find in a pickup." A hefty 2.6 liters.



# ANYPLACE.

## OFF-ROAD PROTECTION.

Power Ram 50 is built to take it. With protective skid plates for the engine, front suspension, and transfer case. And to help with the uphill battles, we improved our standard 5-speed. smooth RiDING. There's also a double wishbone type front suspension to smooth out the bumps. And if all that sounds good, how about an available stereo system with 25 watts-per-channel, cassette, 4 speakers, graphic

equalizer, the works. Buy or

lease the new four-wheel drive Power Ram 50. It's ready whenever you are.



DIVISION OF CHRYSLER MOTORS

DODGE IMPORT TRUCKS. WE'RE GOING PLAC







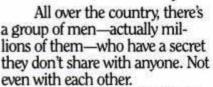




15

## **PICTURE** YOURSELF

## with a little less gray, a lot less, or none at all.



Their secret? That nobody knows they're using Grecian® Formula 16® to gradually take away as much gray—or as little as you look perfectly natural all the they want to lose, without anybody knowing. That's their secret.

They do it with a clear liquid, as easy to use as a hair tonic. Here on this page you can see the undoctored photographs of the hair taken day-by-day as one of these Grecian users gradually took care of that older look.

Note in the photos around the page how the change each day seems like no change at all. But compare #1 (when he began) with #18. The nearly invisible dayto-day changes have eliminated the gray and created a younger looking man.

You can do it too. Not necessarily the way this Grecian user did. You may have more or less gray to start with. And you may want to end up with more-or less. You're in control. A lot of Grecian users leave a little gray on the sides.

The important thing is that time. The return of your own natural looking color each day over a period of weeks is so imperceptible, not even your friends can tell you're using Grecian. Unless, of course, you tell them yourself.

You'll be glad to know you won't have trouble finding Grecian. It's available wherever men's toiletries are sold. That's because millions of men quietly demand it.

Free trial offer. For a trial package send \$1.00 for postage & handling to Grecian, Suite 0155Q, Del Rio, TX 78847-0155. Specify liquid or cream. Limit one per family. Offer ends 12/31/86.

## GRECIAN® FORMULA 16®













## **Outdoors**



BY TIM COLE

## Snowmobiling In Paradise



Ski-Doos ride the barren expanse of the Icelandic Interior.

ot one to pussyfoot when there was a schedule to keep, our guide Ingolfur ("Ingy") Gudlangsson found the shortest route back to the rest of our party. He goosed his Ski-Doo Formula Plus, climbed from the bottom of the dormant volcano we were exploring to the crater rim, then blazed Evel Knievel-style around the inside of this bowl-shaped cauldron, once seething with lava and noxious gas. He found an exit with enough snow and we kicked out like surfers off Maui, scooting down the outside of the cone and across a lava field before catching up with the rest of the group.

It was a fitting and altogether stylish introduction to Iceland, land of fire and ice. But, it didn't end there. Ingy led 20 of us on a fantastic voyage aboard Bombardier's latest products—over congealed sheets of lava and hard-packed glaciers, across frozen lakes and around igneous extrusions, through ice canyons and over snow domes, past hot springs and, finally, skyward to one of the highest peaks of the Icelandic interior. Around every turn we found snowscapes of such jagged, heart-swelling beauty that it left us groping for superlatives.

The objective of the trip was 3-fold: To ride and evaluate the hottest sleds in the Ski-Doo lineup, to check out the snowmobiling potential in this curious country and to evaluate cold-weather boots and gloves for upcoming columns. We accomplished all three with logistical support from Ski-Doo and Icelandair, discovering that it's possible to enjoy snowmobiling above the treeline without suffering the vexations of high altitude. There isn't much vegetation on a rock-strewn island that brushes the Arctic Circle.

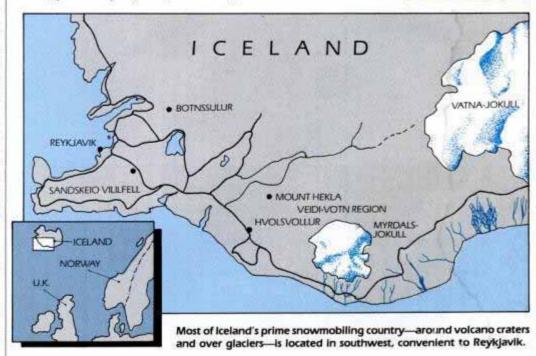
We concentrated on three areas, each with subtle variations in terrain. Veidi-Votn, 150 miles east of Reykjavik, turned out to be as barren as the moon, pocked with volcano craters and deep, trout-filled lakes. At one point, we found a 100° hot spring and went for a swim during a blizzard. Sandskeio Vililfell, or Blue Mountain, is Reykjavik's principal winter playland. Here's where we found perfectly formed volcano craters to romp around in, and 10-story ice walls to climb.

Botnssulur, northeast of Reykjavik, offered a splendid view of Iceland's glaciated topography, interrupted by geyser plumes spewing forth on the horizon. We climbed to a warming hut cradled in a snow bowl, venturing just high enough to touch the clouds.

The Ski-Doos represented the Canadian snowmobile maker's basic line for '86-'87-from the workhorse Scandic utility sled to the Formula MX and the highpowered Formula Plus, capable of an off-the-shelf top end of around 105 mph. (And when you're clinging to the side of a volcanic escarpment, you tend to be grateful for all that extra power.) Smooth, beefy, independent front suspension and hightravel rear suspension, the big news in snowmobiling the past couple of years, was a welcome innovation in this kind of rugged environment. Durable, oil-injected engines delivered hop-on-and-go reliability-hardly a surprise, but it was a nice feeling far from base camp as the sun went down and fog rolled in.

Dedicated snowmobilers will have their chance at this unusual winter playground between January and April. Icelandair has arranged regular 8-day excursions departing from Chicago and

(Please turn to page 20)



Матариал, защещенный ватомыми п

## Be Your Own Boss ...IN <u>Your</u> <u>own</u> <u>Busines</u>

Hundreds we've trained have succeeded in this fascinating and highly profitable profession ....

..YOU Can Do It, Too!



"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



"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

Before enrolling 1 checked other courses and also asked for advice from several of the professional locksmiths in my area They all said Foley-Belsaw was tops and be the most versatile Key Machine. "I always wanted to have my own business and now I do. thanks to Foley-Belsaw David Fairbrother—Dave's Locksmith Service Milwaukee, Wisconsin 53209

Work Part Time, Full Time — Right at Home.

Included With Your Locksmith Training

BURGLAR ALARM and BECURITY BYSTEMS training. Covers

all phases of

Burglar, Hold-Up and Fire Alarm

servicing and in-stallation. This

valuable and

timely instruction includes all special tools and supplies. ONLY Foley-Belsaw offers such extensive training in this

rapidly expanding field as a part of your Locksmith training.

**ADVANCED Locksmithing!** How to change combinations, in-stall and service Safe, Vault and Bank Safe-Deposit Box locks. You'll find it fascinating and high-

**ALL SPECIAL TOOLS AND** 

**EQUIPMENT INCLUDED!** 

No Extra

Cost!

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!

Make Up to \$26.00 an Hour — even while learning! Train FAST at Home!

You're "in business" ready to earn \$10 to \$26.00 an hour a few days after you begin Foley-Belsaw's short-cut training. Take advantage of today's unprecedented opportunities in locksmithing for year-round EXTRA IN-COME in spare time — or fulltime in a high-profit business of your own. Hundreds we've trained have done 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 the KEEP THE MONEY COMING IN! Ideal for retirement — good jobs, too.

### SEND FOR EXCITING FACTS-No Obligation

Discover what's in Locksmithing for you - how Foley-Belsaw's master-locksmith-approved training can give you the skill you can depend on to EARN MORE — ENJOY LIFE MORE.

PRO KEY MACHINE YOURS TO KEEP!

30-DAY This Pro Key Machine can YOURS FREE alone add up to \$200 a month to your income ... and it won't cost you a pen-

ny extra with your training. Find out all about it!

Just fill in and mail coupon below (or send post-card) to receive full information and details by DO IT TODAY!

no risk TRIAL! FACTS TODAY!



FOLEY-BELSAW INSTITUTE 11834 Field Bldg., Kansas City, Mo. 64111

#### is NO OBLIGATION NO SALESMAN Will Call—ever! and Ihere

RUSH COUPON TODAY FOR THIS FACT-FILLED

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 30-Day NO RISK Trial Offer!



FOLEYBELSAW INSTITUTE, 11034 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		

copy today!

City

### **OUTDOORS**

(Continued from page 19)

New York. The \$899 fare (which includes air travel, accommodation and sleds) opens the door to glacier climbing outside the village of Husafell, a daylong trek to Thingvollir-the Icelandic National Park outside Reykjavik-and a jaunt up Mount Esja.

With abundant, virgin snow, relatively mild temperatures (kept that way by the close proximity of the Gulf Stream), and soul-jarring scenery, Iceland may offer the American snowmobiler the winter side of paradise.

Contact Icelandair, 85 West Algonquin Rd., Suite 375, Arlington Heights, IL 60005; (312) 956-6110.

## Folding trailer

A utility trailer can be a godsend for Saturday cleanup projects or for towing essential household items like bikes, ATVs and snowmobiles. But, they tend to take up space when not in use. So, under the heading of smart ideas, we find the \$649 Tow & Stow, a 120-pound aluminum trailer that can be adapted to haul just about anything.

Each of two wheels on each side has its own axle. This revolutionary design departure allows Tow & Stow to be condensed to a manageable size. Remove three steel bolts and the unit folds to a compact 15 in. x 2 ft. x 12 ft. Primary construction consists of 11/2 x 3-in. rectangular aluminum tubing. Aluminum corner plates fasten the tubing together at critical end junctions. Four-ply, 8-in. rim, tubeless tires support the rig. Options include a plywood platform for transporting jet skis and sleds, stakeboards for hauling household effects, or aluminum channels that accept motorcycle wheels. Spring suspension for each wheel is also available. Towing capacity is 850 pounds.

If you've got a lot to haul, but limited space to store a trailer in, the Tow & Stow may work for you. Contact Patent Products, P.O. Box 2706, San Anselmo, CA 94960.



Foldable Tow & Stow (top) transforms into a stakeside utility trailer (bottom).



Now Available With Your Choice of 81/2-Foot Dish or New 101/2-Foot Dish

Radio Shack's satellite TV system brings you over 100 channels of quality entertainment. Enjoy sports, movies and music videos with stereo sound, networks, super stations, kids' shows and much more. This complete block down conversion system includes instructions and an assembly guide on video cassette. Only \$1995 with 81/2-foot dish or \$2295 with 101/2-foot dish. Selected components available for upgrading existing systems. Credit plans available. Come in for details.

Dish Features
Wire Mesh
Design for

Rotatable Hub For Fast and Safe Assembly From the Ground, No Ladder Needed

Wind Loading

Precision Gear Motor Drive Provides Full 180° Coverage

Digital synthesized receiver provides automatic dish positioning and stereo sound tuning, outputs for TVs and TV monitors, stereo audio amp and descrambler.

Radio Shack The Technology Store

A DIVISION OF TANDY CORPORATION

Price applies at participating Radio Shack stores and dealers.

Heavy-Duty Mast With Built-in Bubble Level

Send He More Information to was in the sense of the sense

Alarmentas vanataminas autores da vena

## **Home Video**



BY JAMES B. MEIGS

## **Exploring With Video**







Camera robot (top right) explored the Titanic, 2 miles deep.

he quality gap between the video equipment professionals use and the type of gear available to us home shooters is getting smaller all the time. Want proof? Take a good look at the startling video images Dr. Robert Ballard and his team of scientists brought back last summer from the submerged decks of the Titanic. They were recorded with the same image-pickup technology employed some of Sony's home video camcorders.

These color images of the sunken liner were broadcast soon after the expedition -sponsored by the Woods Hole Oceanographic Institution-returned to port in late July. If you'd like a more in-depth look, watch for the television documentary on the trip (also available on videocassette from Vestron in February).

Dr. Ballard and his team chose Sony's CCD (chargecoupled device) image sensors for their deep-sea video cameras. This is the same image sensor used in Sony's 8mm camera/recorders—the Handycam, CCD-V8 and the brand-new CCD-V110. Unlike the vacuum-tube pickups used in many videocameras, the CCD is a solidstate chip, thus nearly immune to the effects of cold, vibration and stray magnetism.

Ballard and his crew made 11 dives to the Titanic in the famous deep-sea submers-

ible Alvin. The sub had one videocamera, mounted on a movable arm in tandem with a film camera for still images. But the real imaging firepower of the expedition was the experimental underwater robot Jason Jr.

Jason Jr., or J.J. as the crew affec-

tionately referred to it, carried its own pair of video and still cameras. While Ballard submariner another would "park" Alvin on the Titanic's deck-a delicate operation in the 11/2-knot current that flows over the wreck-Jason Jr. was dispatched to investigate the ship close up. The robot fed its video images back to Alvin over a 250-ft. tether. An operator aboard Alvin watched the pictures on a small Sony Watchman flatscreen TV while controlling the robot's movements with a joystick controller.

Dr. Ballard, who described Jason Jr. as a "swimming eyeball," explained that it allowed the Alvin to explore parts of the Titanic that were too confined or too dangerous for the manned sub to venture. Besides extending the vision of the scientists aboard Alvin, the TV images from both Jason Jr.'s and Alvin's cameras were recorded on professional 3/4-in. Sony VCRs and an 8mm VCR mounted aboard Alvin.

At the Washington, D.C. press conference where I viewed the preliminary results of the taping expedition, Ballard remarked that he was quite happy with the picture detail and low-light performance of the CCD videocameras.

Jason Jr. and Alvin), the pictures were colorful and perfectly clear. They showed almost no trace of the video "noise" or graininess that often plagues video images shot in low light. And even though the CCD chip used in the cameras was a 250,000pixel model (a picture detail rating far surpassed by some of the newest professional CCDs), the tapes showed excellent picture detail, right down to the ripples of rust that cover the entire wreck.

"What we want to do next is to move beyond CCD TV images and move to CCD still cameras," Dr. Ballard said. "Our biggest frustration was having to wait for 10 hours to get the film developed from our Nikons." If future Alvin expeditions were all electronic, both for still and moving images, it would allow instant access to any picture.

Dr. Ballard compared exploring the wreck of the Titanic close up-without ever getting an overall view because of the ship's vast size and the prevailing darkness —to "standing next to a Sequoia tree in the dark with a

flashlight-about all you can say is 'nice bark.' "

Actually, even though the explorers weren't able to

(Please turn to page 27)



"Light my Lucky." LIGHTS ONLY Smg. TAR SURGEON GENERAL'S WARNING: Quitting Smoking Now Greatly Reduces Serious Risks to Your Health. Lights: 8 mg. "tar", 8.7 mg. nicotine av. per cigarette by FTC method.

# ELECTRONIC



# FUN INJECTION



There's new performance under the hood of every big Chevy Pickup. You turn the key, tap the pedal. And take off.

## NEW FUEL-INJECTED POWER.

Power you can feel. Electronically fuelinjected power standard on every



gasoline engine in
every Chevy Pickup.
And when you match
the available fuelinjected V8 thunder
with 4-wheel drive,

you're ready to reach new heights of pure flat-out fun.

## TAKE OFF WITH 350 V8 POWER.

The 350 V8's now available in every full-size Chevy, including 10 Series.

And now fuel-injected up to 210 HP and 300 lbs.-ft. of torque. To get you started quick. And move you out even quicker.

## HAUL YOUR FUN WITH YOU.

Big Chevy 4x4s can haul full-size payloads. And take you places you wouldn't dare in lesser trucks.

But why not leave your bikes and friends at home and make it just you and your big, tough Chevy 4x4? And not let anything slow you down.

The new fuel-injected Chevy 4x4s.

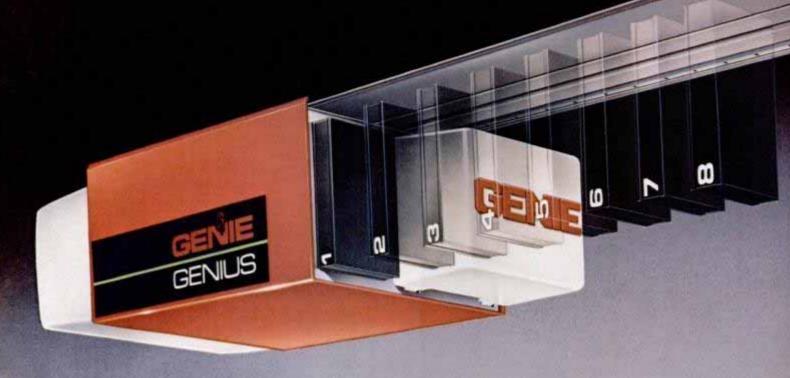
Waiting to inject a little fun into your life.





Let's get it together... buckle up.

# GENIE INTRODUCES THE GENIUS. IT PERFORMS UP TO 9 FUNCTIONS. ONLY ONE OF WHICH IS OPENING THE GARAGE DOOR.



**FUNCTION 1:** 



VARIABLE LIGHT TIMER Determine how long the Genius' Work Light stays lit, from 2½ to 10 min-

**FUNCTION 2:** 



SECURITY/ VACATION LOCK Make it impossible for anyone to operate your garage door while you're away.

**FUNCTION 3:** 



MONITOR/ CONTROL Monitor whether your garage door is open or closed, even operate it from inside your house.

IN-HOUSE

**FUNCTION 4:** 



MOVING DOOR ALERT Warn others when the door is in operation, with flashing lights and audible alarm.

**FUNCTION 5:** 



INDEPENDENT LIGHTCONTROL Turn on and off the Genius' Work Lights from a convenient wall switch, even when door is not in operation.

**FUNCTION 6:** 



INFRARED SAFETY REVERSE Infrared beam senses an obstacle and reverses door automatically before contact is made.

**FUNCTION 7:** 



ENTRY SYSTEM Allow your family (even the kids) to operate door without transmitter or key, with limited access code you select.

KEYLESS

FUNCTION 8:



IN-HOUSE LIGHT CONTROL Operate any light in your house from up to 500 away with the Genius' Remote Controller.

REMOTE

The new Genie\* Genius\* is the first garage door opener smart enough to do so much more than open a door. That's because it's the first garage door opener with an electronic brain.

And the first that lets you determine precisely what functions you want it to perform simply by plugging in one or more of the Genius' exclusive "Electronic Brain Cells" you see in the illustration above.

You'll know how advanced the Genius is the moment you pick up its unique 3-button Remote Controller. Use it to operate multiple Genie garage door openers or a Genie Remote Gate Opener.

> your house from up to 500 feet away with the optional Remote In-House Light Control Brain Cell. The Genius is even smart enough to be easier to install than any other garage door opener, thanks to Genie's

It can even turn on the lights in

opener, thanks to Genie's exclusive Trac-Drive" System.

And where do you

find the world's most intelligent garage door opener? Only at any hardware, discount store or home center smart enough to sell Genie.



What'll they think of next?

Philips Home Products, Inc. A North American Philips Company.

#### HOME VIDEO

(Continued from page 22)

take any shots of the entire ship at once, with the help of Jason Jr. they were able to make a very complete survey. The mass of photographic and video information the expedition brought back from the sea floor will be studied for years-and possibly provide answers to some of the most vexing questions about the sinking.

## Camcorder update

The choices available to anyone interested in buying a camcorder (combination video camera/recorder) just keep growing. Recently Minolta announced that, rather than take sides in the bitter dispute between backers of the 8mm video format and the compact VHS camcorder technology dubbed VHS-C, it will make both types of camcorders. In fact, the respected camera maker will offer three types, since it already makes a full-size VHS model.

The company's new 8mm camcorder (model CR-8000S) is particularly impressive. Weighing in at just over 3



#### Minolta's 8mm camcorder weighs 3 pounds.

pounds (without battery), it can play back movies either in its own electronic viewfinder or via a connected TV set. It also features a 6X zoom lens and an MOS (metal-oxide semiconductor) solid-state image pickup-a plus for durability and low-light performance.

Minolta's new VHS-C model is no slouch, either. Although a little heavier than the 8mm (about 4.3 pounds without battery) it uses the convenient VHS-C mini VHS cassette. In an adapter configured like a normal VHS cassette, the tiny tape can play in any VHS VCR. Of course, the camcorder itself also includes playback, as well as a 6X zoom lens, autofocus and other common camcorder features.

Another impressive newcomer in the 8mm field is Sony's new CCD-V110, the most full-featured 8mm camcorder to date. Watch this space for a thorough hands-on workout.

## HI-TECH SALES, LTD.

STATE OF THE ART PRODUCTS

## 1000 WATT CAMPING GENERATOR



- 1000 WATT CONTINUOUS POWER
- 120 DUPLEX RECEPTACLE
- D.C. BATTERY CHARGING WITH LIGHT & CABLES
- SHUT-OFF SWITCH LIGHTWEIGHT-

### GENERATOR



- 4000 WATT CONTINUOUS POWER 129/240 VOLT DUPLEX RECEPTACLES
- CIRCUIT BREAKER
   PROTECTED
   CONVENIENT
   CARRYING HANDLE

RETAIL \$94900

#### STANDARD FEATURES ON BOTH GENERATORS

- ower for Furnace, Sump Pumps, Appliances, Tools Power Fallures, etc. (To Rated Value)
- Nationwide Service—1 yr. Limited Warranty 4 Cycle Briggs & Stratton Engine Spark Arrestor Lo-Tone Muffler AC and DC Circuit Breakers

- Quality Copper Windings
   Hi-Tech Engineering and Design
   Finest Quality, Factory New—Made in U.S.A.



- . NINE DRAWER LARGEST CAPACITY
- . EXCLUSIVE DRAWER LOCKING SYSTEM · WELDED HEAVY DUTY CHEST HANDLES
- . CONTINUOUS PIANO HINGED LID
- · SAFETY LOCK ARMS

RETAIL \*309\*\*

only \$14900

- FOUR LARGE DEEP DRAWERS
- EXTRA BULK STORAGE COMPARTMENT
- PATENTED LOCKING ARRANGEMENT DOUBLE WALLED CONSTRUCTION
- BALL BEARING CASTERS WIBRAKES

only \$19900

SAVE \$50 MORE

by ordering **CHEST & STAND** COMBINATION only

RETAIL \$72800

29800

#### STANDARD FEATURES ON BOTH CABINETS

- Heavy Gauge Quality Steel Welded Unibody
- Construction
- Multi-coat Red Baked **Enamel Finish**
- Designed for the Professional . Full Length Finger
  - Tip Drawer Pulls

    Hi-Tech Engineering & Design
  - actory Nev

TOLL FREE 1-800-334-5959 • IN ILLINOIS (312) 451-7550 CALL 24 HOURS A DAY-7 DAYS . SHIPPED FREIGHT COLLECT . ILL. RESIDENTS ADD 7% SALES TAX

P.O. BOX 1567 • BENSENVILLE, ILLINOIS 60106 VISA • MASTERCARD • AMERICAN EXPRESS

## **DIESEL POWER** THAT FEELS GOOD



- . THE ONLY TURBO SYSTEMS EMISSIONS LEGAL IN ALL 50 STATES
- UP TO 50% MORE HORSEPOWER
- 12 MONTH WARRANTY
- DEALERS NATIONWIDE
- YOUR POWER SOURCE "SINCE 1958"

Gale Banks Engineering 546 Duggan Avenue, Dept. 650 (818) 969-9605 Azusa, Ca. 91702



#### Increases Heat Output by 500%

\*Custom Fit to any Fireplace.

Easy to install.

Thermostatically

controlled, works automatically.

\*Super Efficient titanium stainless Heat Exchanger. No extras to buy \*No dangerous Creosote Buildup

And best of all you can enjoy your fireplace while saving on your heating bills because with Hearth-Aid II \* you don't need to sacrifice your fireplace's appearance or the delight of an open fire to be energy efficient

Works with: Wood, Coal, or Gas Logs For Free Information, Write or Call: Thermalite Dept. PM, 1124 Harpeth Industrial Ct. Franklin, TN 37064

Nationwide Toll Free: 1-800-742-HEAT We Specialize in Arches,

Corners, and Prefabs.





TRESSIBLE FORGE.

## Car Clınıc



## BY MORT SCHULTZ

## Doctor's Prescription

am a surgeon who treats burn patients, a devoted reader of your magazine, a mechanical engineer by training, and an auto mechanic by avocation.

Within the past five weeks, I've seen six patients who were severely burned while priming carburetors with gasoline. The chance of this happening is maximized by standing over the carburetor and pouring gasoline from a large container as someone in the car cranks the engine.

However, the chances of getting burned can be minimized by making sure spark and valve timing are set properly to reduce the possibility of a backfire. Pour a little gas into the carburetor, followed by cranking the engine as you stand clear. Repeat the process until the engine starts. Would you write a warning to readers?

> JESSE H. MEREDITH, M.D. WINSTON-SALEM, NC

You did it yourself, Doc. There's no need for me to add my 2 cents. Let's hope they're listening.

## Simpatico

Since it was new, the engine cooling fan in my 1985 Buick Century station wagon has been short-cycling when the air conditioner is on. It doesn't matter if the 3.8-liter engine is cold or warm-the fan comes on as soon as the air conditioner compressor goes on; it goes off when the compressor goes off; then on, off, on, off in time with the compressor.

All I'm able to get from the dealer is a blank stare. Please help me solve this problem.

> WALTER M. SWOOPE JR. PHILIPSBURG, PA

Present the following facts to your Buick dealer. Maybe seeing these will make him blink:

■ The cooling fan is designed to switch on when the compressor engages and switch off when the compressor turns off.

 If the fan cycles quickly, the compressor is also cycling quickly. What causes this? A low freon charge. Therefore, the dealer should charge the system and look for a freon leak.

## A chance to dream on

My 1981 Dodge Aries (2.2liter engine) has been a dream car, so now that it's giving signs of a letdown I really can't voice any complaint. The symptoms, which began soon after I had the timing belt replaced, include an upsurge in oil consumption and bluish exhaust smoke. What do you thinkengine overhaul?

> KEN MARSH SYRACUSE, NY

Don't be hasty, Ken. There may be a less expensive solution. Start by replacing the PCV valve and making sure the baffle on the vent module-located in the timing belt end of the valve cover—is pointing straight up. If the mechanic who replaced the timing belt disassembled this unit to remove the valve cover (thereby gaining better access to the timing belt cover) and reassembled it with the open end of the baffle pointing down, this is probably the reason for your headache. With the baffle facing down, oil is drawn into the crankcase ventilation system, which would account for both the oil loss and blue

If the baffle is positioned correctly and a new PCV valve doesn't help matters, it's time to make a compression test and a cylinder leakage test, which will establish

if piston rings are worn. An oil pressure test may detect other engine damage, such as worn or loose connecting rod bearings, worn or loose main bearings, worn camshaft bearings or worn crankshaft journals.

If these tests don't establish the cause of the trouble, check for damaged valve stem seals and worn valve

If all tests are negative, worn or sticking oil rings may be the culprit. If the two upper compression rings are okay, a bad oil ring won't show up on the compression or leakage tests.

## As time goes by

What's the status of the federal government's court case to force a recall of GM's Xbody cars for brake repair? The brakes in mine are about ready for work, and I'd like to know what GM is going to LT. COL. MICHAEL

> GALLAGHER TRAVIS AFB, CA

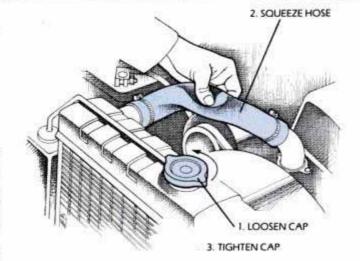
It's still in the court, where it's been for about three years, although a decision may be rendered by the time you read this. Whichever side loses, there's likely to be an appeal. Therefore, if your car needs brake work, I wouldn't wait. It may be a long time before a final judgment is made. In fact, your car might not even be in-

(Please turn to page 35)



## Stop underarm wetness

You usually have two choices when it comes to replacing coolant temperature sensors and small hoses: either drain the entire cooling system, or fumble around trying to get the part in while coolant runs down your arm. Karl Hacker of Castletown, New York, won a prize in Motor magazine's "Tricks of the Trade" contest with this tip: Loosen the radiator cap and collapse any large hose by squeezing it.



Then, tighten the cap and proceed with the job. If you work quickly, the partial

caused by the collapsed hose should keep most of the coolant in the system.

# THE HEHILOCK OF VALUE.



Same great taste in an exciting new pack.

SURGEON GENERAL'S WARNING: Cigarette Smoke Contains Carbon Monoxide.

9 mg. "tar", 0.7 mg. nicotine av. per cigarette by ETC method.

# 4.0 LITRE ONLY IN

Three of the toughest, most versatile vehicles on the road have just become the most powerful vehicles of their kind. They're Jeep Cherokee, Wagoneer and Comanche. And the source of their power is a brand-new optional engine called the *Power-Tech Six*.

This 4.0 litre 6-cylinder engine uses

sequential multi-point electronic fuel injection and a fast burn combustion chamber to deliver an incredible 173 horsepower and 220 foot-pounds of torque. That means Cherokee, Wagoneer and Comanche now have a larger engine displacement and more torque than any of their competition.

Opt for the Power-Tech Six in Cherokee, and



you've got power to spare. Along with a choice of two or four doors. Two shift-on-the-fly 4-wheel drive systems. Room for five. And plenty of cargo space.

Choose Wagoneer Limited with the Power-Tech Six and a Towing Package, and you can go just about anywhere, pulling just about anything. Wagoneer Limited offers four doors. Room for five. And a level of luxury you just don't expect from a 4x4.

Put our new 4.0 litre powerplant into Jeep Comanche and you've got a pickup that *means* pickup. It's available in the new shortbed or longbed model, in two-wheel or four-wheel drive. And all are available with a new 4-speed automatic transmission with overdrive.

So to all the new vehicles on the road that are trying hard to follow our lead, we say more power to vou.

You're going to need it.

Safety belts save lives.

Wagoneer Limited



Only In a Jeep 🖊



Have you guessed yet? It's all the musical sources in this incredible, top of the line, complete music system, backwards. And, if you think Mamfacttacdc is a mouthful, wait till you see all you get for just \$299. Wow!

By Drew Kaplan

It's party time. With a Mamfacttacdc, there's something for everyone. And, wait till you hear the sound.

This top of the line complete stereo system has more musical sources than any modular system I've seen. And, the sound from each source is breathtaking.

Let's explore all that it does on a musi-

cal source by source basis.

CD = Compact Disc Player. And it's not just any player. You can program up to 20 different selections in any order you desire. Wow, 20 memories!

You'll have Next Song and Previous Song. There's even Repeat so that you can have continuous music from 1 disc.

This CD even has a motorized front loading system. Its oversized display shows track number or running time, and, of course, program selections.



But, you've really got to hear a CD for yourself. The sound quality and clarity of the music is so awesome it makes the switch from 78s to LPs a non-event.

CA = Cassette Deck Times 2. There are twin high speed dubbing cassette decks. You can duplicate tapes at high speed or normal speed.

The decks are matched for flawless copies and there's even mike mixing. You'll love this feature if you sing.

Simply put a recorded tape in deck 'A' and copy it onto deck 'B' as usual. But, while you're copying, you can add your own vocal. Just plug in your mike and sing. You can be a single, a duet, a trio, or even a chorus by repeated recording.

Of course, you can make original tapes from any of this system's musical sources.

And, look at this. There's even sequential play, so you can play a cassette in one deck and when it's finished, the other deck will automatically start. You'll have twice the amount of uninterrupted music.

With these twin decks, you'll make great recordings and enjoy great sounding music from your cassettes.

TT = Belt Drive Turntable. It's a semiautomatic turntable with a hinged dust cover. A low mass tone arm and quality cartridge protect your cherished records while providing superb reproduction.

You can listen to LPs and 45s. There's automatic arm return. And, there's a cueing control for record protection and

easy track selection.

In a world gone CD crazy, if you're like me, you'll still want to listen to your record collection. And, this stable turntable should provide years of superb listening pleasure from your records.

FM/AM= FM stereo and great sounding AM are yours with the sensitive tuners in this system. A large slide rule dial makes it easy to find stations.

There's a built-in antenna or you can connect to an outside antenna. Just wait



till you hear your favorite stations locked in by these receivers.

#### MUCH MUCH MORE

There's a 5 band equalizer so that you can sculpture your sound just the way you want it. You can really 'detonate' the bass or high end for room filling sound.

And speaking of vibrant room filling sound, the matching 2-way speaker systems really pack a punch. Rich deep bass is produced by the woofers, and crystal clean highs by the tweeters.



Emerson had to use better than normal speakers in this system to handle the dramatic capabilities of the CD. You won't be disappointed with the full rich sound.

There's no volume knob because this system has an electronic volume bar. Just touch one end or the other.

And there's one more thing. There's a built-in clock timer. You can have this system shut itself off automatically. Or, you can have it turn itself on.

When it turns itself on, it can wake you with your favorite music, or if you've set it to record, it can record from the AM or FM radios. Wow, how neat.

It is 161/2" tall, 14" wide, and 13%" deep. Each speaker is 141/4" tall, 7" wide, and 934" deep. It's backed by Emerson's standard limited warranty

#### MAMFACTTACDC IN YOUR HOME RISK FREE

You'll be amazed at the sound. And you'll be thrilled by your choice of musical sources. It's an incredible system.

If you're not 100% satisfied, simply return it to DAK in its original box within 30 days for a courteous refund.

To order Emerson's Stereo System with 20 Program Capability CD Player, Dual High Speed Cassette Decks, Belt Drive Turntable, AM and FM Stereo, Speakers, Equalizer and Timer System risk free with your credit card, call toll free or send your check for DAK's breakthrough price of just \$299 (\$18 P&H). Order No. 4684. CA res add tax.

A lot of sources stuck together wouldn't mean much if they weren't top quality. Just wait till you hear how your favorite music sounds through this system.



Technical Information....1-800-272-3200 Any Other Inquiries.....1-800-423-2866 8200 Remmet Ave., Canoga Park, CA 91304

#### CAR CLINIC

(Continued from page 30)

volved. You don't mention its year. If it isn't a 1980 model, the court decision won't mean a thing to you. The government suit only applies to that year.

#### Double speak

Several magazines, including yours (PM Car Care Guide, May '86, page 183), have been illustrating a rotation pattern recently for radial tires that's different from the one I've seen for years. Instead of rotating tires from front to back and from back to front, keeping each tire on the same side of the vehicle, sketches I now see introduce a crisscross factor. What's the story?

MEL GOLDBERG SPRINGFIELD, MA

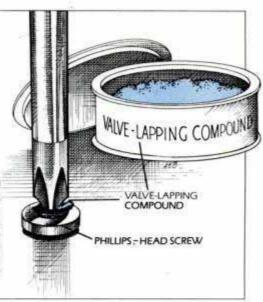
Double talk, Mel. I've gotten three different stories from three major tire manufacturers. One even told me in confidence that it doesn't matter a whole lot which rotation pattern you use as long as you rotate tires at the intervals recommended by your vehicle manufacturer. Generally, this is 6000 to 8000 miles for the first rotation of new tires and every 18,000 to 24,000 miles thereafter.



### Compounding a problem

Professional mechanic Vincent Westfall of Ripley, West Virginia, took home a prize from *Motor* magazine with this tip:

Next time you have trouble getting a grip on a Phillips-head screw, put a little dab of valve-lapping compound onto the tip of the screwdriver and try again. This will improve the bite of the screwdriver considerably.



#### Now hear this

Ignition interference is screwing up reception of the AM-FM stereo radio in my 1986 Ford Crown Victoria (5-liter engine). I've taken the car to the dealer several times, and all he does is lubricate the inside of the distributor cap and rotor with silicone compound. The service manager tells me this is what technical service bulletin (TSB) 85-21-8 advises. In other words, Ford doesn't

seem to have an answer to my problem. Is there a solution for this?

> ALTON V. SOUTHWICK CENTERVILLE, PA

There is now. Ask your dealer to clean all of the silicone out of the distributor cap and off the rotor. If static remains, install the newly designed rotor, part No. E6TZ-12200-F. Those of you getting static with other Ford engines should ask your dealer to



check Technical Service Bulletin 86-17 to see which new rotor will fit your distributor.

#### Led-fed now ded (sic)

We have a couple of great old cars we want to keep, but we're concerned about their future. They were designed to use leaded gas. One is a '64 Cadillac with a 10:1 compression ratio, the other is a '58 MGA intended to respond to higher rpm.

Cadillac Corp. has told me that the '64 must be operated on highly leaded gasoline-that it can't be modified to use unleaded or the very low-lead gas that's now available.

Bardahl Corp. has just come out with a product called Insted O' Lead that is added to gas at a ratio of 6 ounces to 20 gallons. The company claims it prevents valve burning and won't harm a catalytic converter if someone wants to use it in a newer car. It is also supposedly EPA registered.

My question: Is this for real?

LES FARRELL ASHLAND, OR

According to Bardahl, it's for real. Company Vice-President David Pearce told me that Insted O' Lead is Bardahl Top Engine Oil, a product that's been on the market for years, into which a

new sodium-based chemistry has been mixed. The sodium-based formulation, which was developed by Lubrizoil Corp., performs the task that lead in gasoline used to perform—laying down a film around exhaust valves to prevent valve seat erosion in those engines that have soft seats.

I think I should point out that Insted O' Lead won't increase the octane rating of the fuel you use. Therefore, don't expect the product to eliminate a spark knock that's the result of an engine's appetite for greater octane. If your engine pings on regular unleaded gasoline to which you add Insted O'Lead, you will have to switch to premium unleaded gasoline.

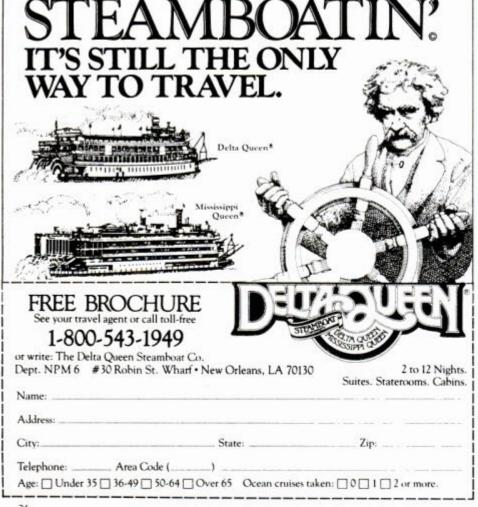
Pearce told me that Bardahl is expecting to market a new product, called Insted O' Lead Gold, which would contain an octane booster to raise the octane rating of gas two to seven points, perhaps making it possible to use regular. By the time you read this, Insted O' Lead and possibly Insted O' Lead Gold will be in auto supply stores nation-

#### DO YOU HAVE A CAR PROBLEM?

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

#### SERVICE TIPS

- The following states have or will have mandatory safety belt laws: CA, CT, FL, HI, IA, ID, IL, IN (beginning 7/1/87), KS, LA, MA, MD, MI, MN, MO, NC, NE, NJ, NM, NY, OH, OK (beginning 2/1/87), TN, TX, UT and WA-also D.C.
- Poor idle, surge and overall reduced engine performance accompanied by a CHECK ENGINE light that gives a trouble code 21 or 22 may affect a 1982-86 GM model with a 4-cylinder engine. Have a dealer determine if a new throttle-position sensor (part No. 17078274) and heat shield service kit (part No. 17111750) will clear up the condition.
- According to FoMoCo, chemicals used in making interior materials that cause film to develop on the interior glass are not a health hazard. There's no known way to prevent this film. However, "Windex has been found to be the best" way to remove it, says Ford.
- Harshness in shifting under light throttling and a clunk on the 2-3 upshift of a 1985-86 Nissan Maxima may be gotten rid of by installing a new governor and shift springs. TSB TM 86-014 explains.
- Chrysler TSB 18-33-86 relates that 1985-86 2.2-liter cold engine die-outs and acceleration sag that escape cure by applying usual repair procedures may benefit by having a new driveability package (part No. 4419409) installed, plus a new control module.



35X B	NOCL	<b>JLARS</b>
SEE TO 20 MILES	D	A
MILES		
A		
A	YH	7/_

**WORLD'S TINIFST** 

MIRACLE OF MICRO-TECHNOLOGY-Micro Spy-world's tiniest, mass-made binocular. Only 2x3 inches & under 2 ozs. Fits your hand, yet gives same high power & range as certain heavy binocu-

lars costing much more!

NEW & REVOLUTIONARY! Awarded Patent Pend. #2050 & British Reg. 981196 for outstanding engineering & construction. Microtek Nonprismatic Lenses pull in homes, buildings, people, mountains, etc. up to 20 MILES AWAY. Smooth Variable-Power Focusing and 9 other great features will amaze you. Study suspects & their secret

doings—without being seen!
■ GREAT FOR ALL SPORTS! Carry it in vest pocket for thrilling close-ups of baseball, football, boxing, horse & auto races, etc. Enjoy front-row seats from the bleachers. Also great for movies, plays & TV

-10 YEAR MONEY BACK GUARANTEE -If ever dissatisfied, return for refund of purchase price. Send only \$5 plus \$1 postage & handling for each binocular. LIMIT: No more than 3 per reader. Floridians: Add 5% tax. \$1986

ASTOR SCOTT INC., Dept. 550-N-SB

2425 Colee, Ft. Lauderdale, FL 33303

# Save Gas, Save Engine with "POLY"

The following introduces one of the most fully tested and proven gas saving, friction-reducing engine treatments ever to reach the market!

The Secret is "Poly"

"Poly" is short for polytetrafluoroethylene (TFE), the slipperiest substance known to man. (1981 Guiness Book of World Records). Petrolon Corporation, makers of Slick 50, invented a way to permanently bind this slippery chemical to your engine with one treatment. Just one quart of Slick 50 can reduce engine friction, increase gas mileage and horsepower and reduce engine operating temperature, causing your oil and engine to last longer. . . plus it reduces metal wear, defraying costly overhauls.

#### Years of Testing and Use **Have Proved it True!**

Slick 50 has been thoroughly tested in independent laboratories and out on the road:

The March/April 1982, p. 35 issue of "Consumer Digest" magazine stated, "Slick 50 does reduce engine heat and ordinary wear, and our informal tests indicate that it will improve gas mileage by about 2 or 3 miles per gallon."

One of the country's most respected research institutes reported applying a powerful ultrasonic cleaning process to a Slick 50 treated engine and were surprised at its permanence. "We actually expected the Petrolon Slick 50 TFE Resin coating to also be removed, but later found it was still there."

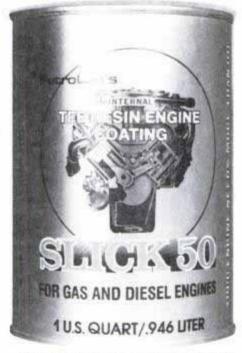
"Dune Buggies & Hot VWs" magazine April 1983 issue records the results of their one year testing of Slick 50. "We can indeed say scientifically that Slick 50 does work, and that it does reduce engine wear! . . . for the price of one treatment when compared to engine rebuild, we feel that you'd be money ahead using Slick 50."

The Federal Aviation Administration has fully accepted a similar product for aircraft-Slick 50 Aircraft Piston Engine Treatment (F.A.R. #33.49). This FAA endurance test simulated 1400 hours of engine use.

The power technology laboratory at a leading southwestern university stated, "Slick 50 does increase horsepower and decreases fuel consumption in tests done at the university."

The Space Shuttle Columbia uses the chemical "poly" in its gears and bearings because it is the only chemical lubricant which can withstand the heat and corrosive elements of space.

Perhaps most dramatic of all is a torture test overseen by the Automotive Services Council for Pennsylvania and shown on WTVE television. Three cars with 75,000 to 129,000 miles on them were treated with Slick 50. Six months later the oil was drained from each vehicle, and the cars driven without the oil plugs for about a half hour. The water temperature never rose and the engines sustained no apparent damage.



There isn't room here to tell you about the dozens of other tests proving that Slick 50 is everything we say. However, if you're still skeptical, send \$2.00 to cover printing and postage costs, and we'll send you detailed test results plus actual letters from users who report how Slick 50 saved their engines and saved them money!

#### It's Easy to Treat Your Engine

A few minutes before oil and filter change, add the engine flush you get free with each order to clean out the engine. Let the engine idle for 5 minutes. Then drain the oil, change the filter and add the proper amount of oil, less one quart. Add one quart of Slick 50, drive for 30 minutes, and leave it in the crankcase for at least 3,000 miles. As the engine operates, the oil carries the "poly" between the parts where it is burnished into the pores of the metal.

#### Only One Treatment Necessary

It's permanent, so you do it only once, not each time you change oil. One quart of Slick 50 will treat all standard 4, 6 and 8-cylinder gasoline and diesel engines.

#### **Works with Most Oils**

Slick 50 will work with all petroleumbased oils and all synthetics compatible with petroleum-based oils with the exception of graphite oils. However, once an engine is treated, you can go back to a graphite type if desired.

#### 4 Ways Slick 50 Saves You Money

Your actual percentages may vary depending on your driving, vehicle condition, weather and geographic location, but no matter what your conditions, Slick 50 can:

- 1. Increase mileage
- 2. Increase horsepower (small economy cars and large RV's really need this)

- 3. Reduce operating temperatures, thus increasing the lubrication and life of the oil and engine
- 4. Minimize or eliminate costly overhauls by reducing engine wear

Up to 90% of the engine wear on a car can be caused by lubrication starvation cars experience when first started before the oil begins to circulate. Slick 50 can eliminate this problem for less than the cost of two tanks of gas.

#### Slick 50 Will Not **Affect Your Warranty**

Slick 50 is suspended in an excellent grade of petroleum oil which meets or exceeds every manufacturer's engine warranty requirements. In addition, this oil carries an American Petroleum Institute service classification SF-CC-CD.

#### There's No Risk with **Our Money Back Guarantee**

Use Slick 50 for 3000 miles. If you don't notice an improvement in engine performance, return your invoice with a short note telling why, for a prompt full refund - no questions asked.

#### Profit from Selling Slick 50 Yourself

Here's an opportunity to make handsome profits. Having such solid test results from major institutions make Slick 50 easier to sell than many other products. Free dealership information is sent upon request.

For purchase or further information call toll-free 1-800-525-8624, ext. 11 (in California 1-800-233-9559) or send to: Progressive Energy Corporation, 255 South Bent Avenue, #B-1, Dept. PM116, San Marcos, California 92069.

and save n	ny engine — ck 50 at \$39	my car's perform rush me risk fre .95 + \$4.00 ship residents add 6% Sal	ee pping
	AND REPORT OF THE PERSON NAMED IN	g and handling for t \$39.95 each.	or my
☐ Check	☐ C.O.D.	☐ Visa/Master	Card
Card # _			_
Exp. Date			
Name			
Address Give street	address if pos	sible for UPS delive	ery)
City	St	ate Zip	_
_		DE	



Progressive Energy Corporation

255 South Bent Avenue, #B-1, Dept. PM116 San Marcos, California 92069 CALL NOW, TOLL FREE 1-800-525-8624, IN CALIFORNIA, TOLL FREE 1-800-233-9559. =1986 Progressive Energy Corp.

# Old House Restoration

BY BOB VILA

#### Sidestepping Pitfalls

Buying an older home for future renovation can be an exciting and rewarding experience. Aged brass doorknobs, ornately carved banisters, fine wall moldings, natural wood beams and trim, built-in cabinets and cozy bedroom alcoves are just a few of the features considered so attractive by many buyers.

Yet, along with their special charm and appealing style, older homes frequently possess an array of serious problems and limitations—many unapparent to the untrained eye. For example, new basement paint could be hiding persistent flooding. Heavy, fitted carpeting may be masking a rotting wooden floor. And behind that attractive wainscot may be thousands of wood-eating insects.

Buyers can also feel cheated v nen they discover that
local zoning and building ordinances prohibit them from
going ahead with the remodeling and improvements
planned at the time of the
purchase. As a potential
buyer of an older home, it's
imperative that you know
what you're getting into before making a commitment
you might regret.

A home is likely to be the

Contributing Editor Bob Vila is host of public television's "This Old House," funded by Owens-Corning Fiberglas. single biggest investment you'll ever make, so it makes good sense to know exactly what kinds of repair and maintenance costs to expect along with it. However, if you're like most prospective homeowners, you may lack the knowledge and expertise necessary to evaluate a home's structural and mechanical condition. Therefore, it's a good idea to hire a professional home inspector to tackle the job for you. He'll examine the structure and its mechanical systems from top to bottom, present his opinion on the physical state of the property and estimate how much it will cost to fix up.

This inspection should cover roofing, walls, ceilings, floors, windows, doors, foundations and basement slabs. An inspector will determine whether main structural components are sound, free from rot or insect damage, and strong enough to support the weight of the house.

An inspector will also look at the state of all exposed water and waste pipes and check faucets, drainage, water heaters and connections to appliances. He will evaluate the overall condition of the electrical system and determine whether the existing system is adequate for your current and future He'll examine grounding connections and exposed wiring, and assess overload protection.

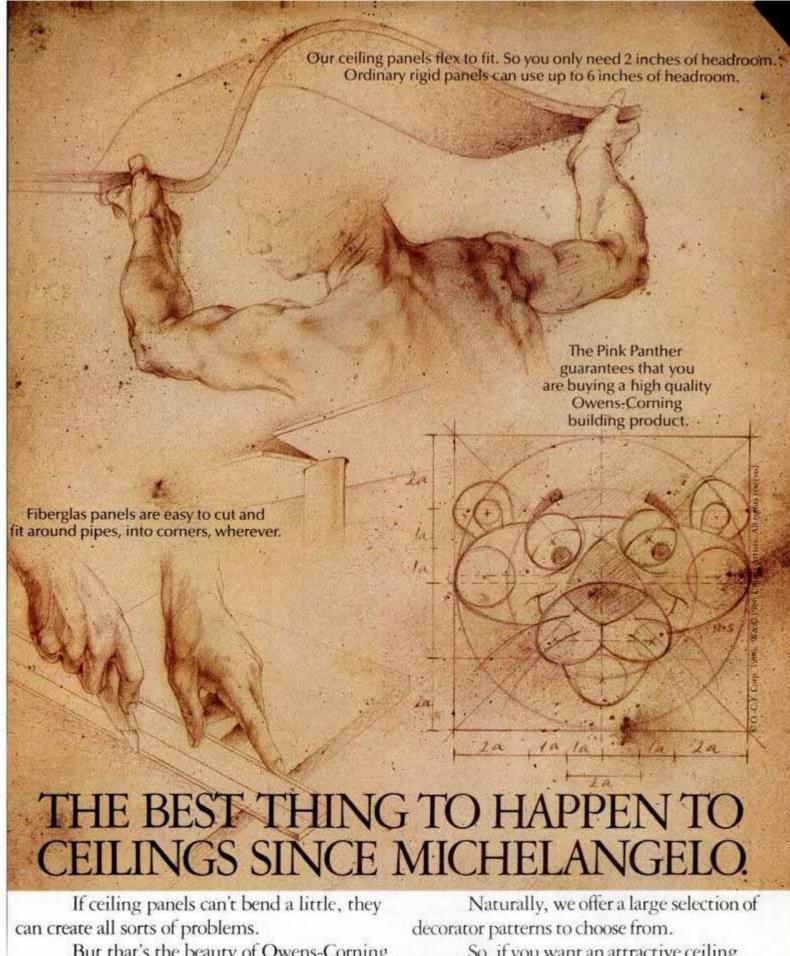
An inspector will check the operation and condition of the heating and cooling system and decide if supplemental equipment is needed. On a related subject, he will determine if the house is well insulated—especially in the walls, basement and attic where insufficient or improperly applied insulation could add substantially to fuel bills.

A home inspection typically costs one-tenth of 1 per-(Please turn to page 40)

#### Cost Estimates On Various Remodeling Jobs\*

JOB Description	COST	MATERIALS	CONTRACTORS
Room addition 12' × 16'	\$11,240	\$4518	\$6722
L-kitchen remodel 8' × 12'	11,140	6005	5135
Attic conversion 16' × 36'	9520	3867	5653
Water-heating system 1200 sq. ft. (includes boiler, plumbing, hardware, radiators)	8635	2910	5725
Single-car garage addition 12 × 22	7270	2970	4300
Straight-wall kitchen remodel 6'6" × 14"	6200	3280	2920
Full-bath remodel 7' × 8'	3450	1479	1971
Elevated L-deck 8" × 12", 8" × 16"	3320	1003	2317
Built-in fireplace	3010	1280	1730
Ground-level deck, 8° × 10°	1320	341	979
Brick veneer (with brick at \$140 per thousand, building paper, painted pine trim)	9.16 sq. ft.	2.29 sq. ft.	6.87 sq. ft.
Roofing, gable end roof, No. 1, 5' exposure cedar shingle (with painted aske trim, aluminum gut- er and downspouts, building paper, drip edge, soffit and fascia)	4.92 sq. ft.	1.98 sq. ft.	2.94 sq. ft.
Clapboard siding Grade A cedar ½" × 6" (with building paper, trim and paint)	4.51 sq. ft.	1.91 sq. ft.	2.60 sq. ft.
Painted lath and plaster (ceiling)	3.50 sq. ft.	.78 sq. ft.	2.72 sq. ft.
Painted lath and plaster with baseboard trim (wall)	3.40 sq. ft.	.89 sq. ft.	2.51 sq. ft.
Roofing, gable-end roof (same specifi- cations as cedar roof but with Class A asphalt shingles)	2.88 sq. ft.	.99 sq. ft.	1.89 sq. ft.
/2-in. painted drywall with baseboard trim (wall)	1.83 sq. ft.	.55 sq. ft.	1.28 sq. ft.
			and the second second

"This information is copyrighted by R.S. Means Co. Inc., 100 Construction Plaza, Kingston, MA. It is reproduced with permission from the Means Home Improvement Cost Guide. The data are based on information gathered annually from material suppliers, subcontractors and labor organizations. Though prepared during 1985, Means estimates the figures are usable until 1988.



But that's the beauty of Owens-Corning Fiberglas ceiling panels. Not only do they look great, they can do things ordinary rigid panels simply can't.

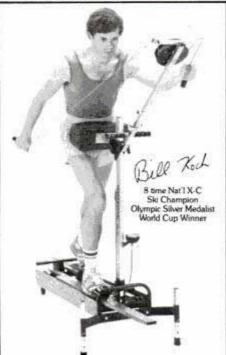
And they won't chip or break like rigid ceiling panels either.

So, if you want an attractive ceiling that's easy to install yet looks like it was put in by a pro, get Owens-Corning ceiling panels.

And create your own masterpiece.



WE PUT YOUR HOUSE IN THE PINK.



#### Scientific Study Ranks NordicTrack #1

In tests of exercise efficiency at a major university, NordicTrack burned more calories and provided greater aerobic workouts.

#### Rank of Exercise Efficiency

- 1. NordicTrack X-C Ski Exerciser
- 2. An Exercise Bike
- 3. A Rowing Machine
- 4. A Shuffle-Type Ski Exerciser

NordicTrack's higher oxygen usage test scores show that more muscle mass is involved in the exercise and more calories are being burned.

#### It's Only Logical that NordicTrack Would Get the Highest Scores

 because NordicTrack is more complete than an Exercise Bike.

Adds important upper body exercise. Provides more uniform leg muscle usage.

 because NordicTrack is more thorough than a Rowing Machine.

NordicTrack's resistance is proportioned according to the individual muscle strength—no major muscles are overstressed or under-worked.

 because NordicTrack has inertial resistance not available on a Shuffle-Type Ski Exerciser.

Other ski exercisers use less efficient frictional resistance with a resulting calisthenics-like feeling. NordicTrack's unique flywheel resistance for a life-like feeling of smoothness and continuity is matched only by real skiing.

Burns Up To 600 Calories per 20 Minute Workout

Free Brochure, Call

800-328-5888



141PM Jonathan Blvd. N., Chaska, MN 55318

#### OLD HOUSE RESTORATION

(Continued from page 38)

cent of the cost of the house, with a minimum charge of about \$150. However, keep in mind that you could save many times this figure if you are able to renegotiate the purchase price based on significant problems uncovered by an inspector.

To find a home inspector in your area, check the Yellow Pages of your telephone directory under "Building Inspections," or contact the American Society of Home Inspectors, 1010 Wisconsin Ave. NW, Suite 630, Washington, DC 20007; (202) 842-3096.

#### Location

The benefits of owning even a magnificent home can be greatly tarnished by a poor location. You'll probably want to be close to main roads, mass transit, good schools and shopping centers as well as be removed from major commercial sites and airports. In addition, you'll want to find a location where real estate values are rising or are likely to rise, in case you decide to sell the house in a few years.

Surrounding areas should be investigated as well. Make sure that a garbage dump, industrial park or other unwelcomed facility isn't planned for future construction on a parcel of undeveloped land in a nearby part of town.

To acquire needed information you can't find on your own, you may want to have a real estate appraiser develop a feasibility study of the prospective property. This report will examine such trends as property appreciation rates, population growth or decline, average income and employment base.

It may also examine street patterns, convenience to transportation systems, available stores, and educational and service establishments. Such social and economic characteristics as community organizations and density of population, degree of home ownership, and rent and income levels may be examined as well.

For assistance in finding a qualified appraiser, you should look in the Yellow Pages under "Real Estate Appraisers" or contact the American Institute of Real Estate Appraisers, 430 North Michigan Ave., Chicago, IL 60611-4088; (312) 329-8559.

#### Zoning and codes

Before buying an older home that you intend to remodel, find out whether your intended improvements will conform to local zoning ordinances and building codes. Zoning ordinances vary according to community. Sections pertaining to residential neighborhoods may regulate the occupancy of the prospective property. There may be a limit

on the number of unmarried or unrelated persons living in a dwelling. Often the height of buildings is regulated. An addition involving a second story may extend the roof crest above the allowable height limit.

Zoning ordinances determine the distance between the structure and surrounding property lines. The outside wall of an addition may come closer to the side lot boundary than is permitted. Or an addition to the front of the house may come too close to the street-side property line.

The zoning ordinances regulate the percentage of lot covered by a structure. A house with an addition may occupy a greater portion of the lot than permitted. Finally, some neighborhoods have historic designations which may complicate or preclude many types of remodeling.

Building codes are concerned with setting design and material standards for construction, including specifications for foundations, framing, electrical wiring and plumbing. In other words, the building codes state what you can and cannot do when erecting or remodeling a structure.

When adding on to an older home, strict application of the building code could require you to bring the entire house up to the present code. This is almost always the case if the cost of the addition totals more than half of the present market value of the house, excluding the lot.

You can usually obtain excerpts of the building regulations that apply to your situation by contacting the local building department.

#### Putting down a deposit

When you buy an older home, a deposit between 5 and 10 percent of the property's total purchase price is considered reasonable.

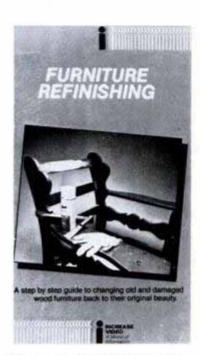
You should make sure this deposit is held by a real estate broker or your attorney and placed in an interest-bearing account, with interest going to you, the buyer, at settlement.

If you decide to make an offer before receiving your inspector's report, insist that the contract state that you may withdraw this offer and recover any deposit or earnest money should the inspection reveal anything in the house that you consider unsatisfactory. Also, include a provision stating that the plumbing, heating and electrical appliances must be in working order at the time of settlement.

If the seller refuses to sign the contract, you may want to reconsider the deal: Faults in these systems can be very expensive to correct.

# How-to videotapes Popular available from Mechanics

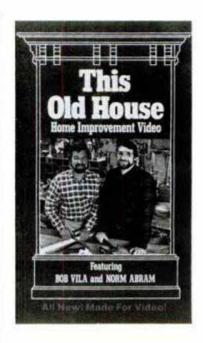
# See what you can do! —



Now you can take that old piece of furniture and make it look brand new. Furniture Refinishing helps you do an expert job by providing a first-hand look at the materials and techniques. You'll learn the three main steps of refinishing: stripping away the old finish and stain, preparing the wood for the new finish, and finally, applying the new stain and/or varnish finish. With the aid of this videotape, you can restore your old wood furniture, even cabinets, and bring out the glow of its original beauty. (VM-1003-\$29.95)



If you're new to doing your own auto repair or want the perfect gift for someone who just bought a car, this one-hour tape of 20 common repairs is for you. Last Chance Garage shows you ways to save money and do the job right, from oil and filter replacement to flushing a radiator to lubricating the suspension. All procedures are clearly explained and demonstrated, and a clever on-screen numbering system lets you quickly fast-forward to any topic. You'll even learn how to change your alternator and replace shock absorbers. (VM-1002-\$24.95)



Based on the award-winning public television series of the same name, This Old House shows you in 60 minutes how easily you can do home repairs. As on their television program, hosts Bob Vila, a regular PM contributor, and Norm Abram skillfully demonstrate projects you can do. The setting is a typical house in need of basic repairs and enhancements. Among the 14 topics: trimming a door, fixing a faucet, glazing a window and installing track lighting. Even advanced projects will seem easy. such as building a deck, installing a brick patio and refinishing a floor. With the cost of home repairs and improvements these days, you'll save a lot by doing them yourself. (VM-1001-\$24.95)

#### TO ORDER

Refer to each tape by its order number and send a check or money order to Popular Mechanics for the price indicated. Add \$2.50 per tape for postage and handling. Mail to Popular Mechanics, P.O. Box 1014, Radio City Station, New York, NY 10101.

Please specify VHS or Beta with your order. Allow four weeks for delivery. Returns accepted if tape is defective or box is unopened.

Popular Mechanics is a publication of Hearst Magazines, a Division of The Hearst Corporation © 1986 The Hearst Corporation. All rights reserved.



A new, extremely powerful, hi-potency Formula in the super 5.7 liter size. Ready for a mega-dose of excitement, Pontiac style?

5.7 liter size. Ready for a mega-dose of excitement, Pontiac style Ingredients include available 210 fuel-injected hp, WS6 performance suspension, Goodyear Eagle VR tires on 16" x 8" aluminum wheels, domed hood, rear spoiler, sport mirrors and full instrumentation. Giant-size 5.0 liter engine standard. Super-size 5.7 liter engine availability limited. See dealer for details.



Homeowners' Clinic

BY NORMAN BECKER, P. E.

#### **Wood Stove Clearance**

Now that the cooler months are here, some of you will be using woodburning stoves to take the chill out of the air. It's very important that proper clearances between the stove and combustibles (such as walls and furniture) be maintained in order to prevent fires caused by radiated heat.

Clearances for stoves that are UL listed can vary from a few inches to more than 50 in. These minimum clearances are displayed on a label attached to the stove,

For stoves that have not been tested and listed, the minimum clearances are generally defined by local codes. These clearances can often be reduced by covering combustible walls sheetmetal or a 31/2-in.-thick masonary wall. In either case, the material should be spaced 1 in, from the combustible surface. The space provides free air circulation, which makes the shield effective. Placing noncombustible material on combustible material affords little protection.

The floor below the stove should also be protected. If the stove bottom is 18 in. or

APPROVED 9" MINIMUM, THIMBLE 18" TO UNPROTECTED CEILING 9" MINIMUM. 18" TO STOVEPIPE UNPROTECTED WALL 12" WITH 3-1/2" MASONRY WALL OR SHEETMETAL. UNPROTECTED WALL FLOOR PROTECTION 28-GAUGE SHEETMETAL OR SHEETMETAL OVER " OF MASONRY

A woodburning stove must be installed with clearance between it and nearby combustibles. The amount of clearance depends on whether the stove has a UL listing and meets local code requirements. The amount of clearance can be reduced if nearby walls and floors are covered by a protective facing.

more above the floor, the floor can be protected with 24-gauge sheetmetal. If it's less than 18", then use 4" of hollow masonry, laid to allow air circulation through it, with 24-gauge sheetmetal placed on top of it.

The generally accepted clearances for unlisted stoves are shown in the illustration. For more information on clearances for wood stoves, chimneys, fireplaces and vents, write to: Woodheating Alliance, 1101 Connecticut Ave. NW, Suite 700, Washington, D.C. 20036; and National Fire Protection Assn., 1 Batterymarch Park, Quincy, MA 02269.

#### Air space specs

My house has a heating system with a metal chimney which runs up through the attic and terminates above the roof. Since the temperature of the chimney in the attic is not high enough to ignite wood, why is it necessary to have a 2-in. clearance between the chimney and the wood framing in the attic?

LEO KLEINKOPF

LIVINGSTON MANOR, NY

The ignition temperature of wood is defined as the temperature at which it begins to burn. Wood and other combustibles undergo a physical change when continually exposed to elevated temperatures. This reduces their ignition temperatures.

Wood normally begins to burn at about 400° to 600°. However, when it's continually exposed to temperatures between 150° and 250°, its ignition temperature can be as low as 200°.

The lowering of the ignition temperature of wood and other combustibles can take years to occur. When it does, should the wood's temperature coincide with its lowered ignition temperature, it will ignite and burn spontaneously. This is the basis for the clearance requirements in codes.

#### **Chalky bricks**

I'm writing to you about our brick home. We bricked it two years ago. Every now and then, a white chalky substance appears on it. We would like to know if there is something we can do about it. JAMES ANDERSON SHERIDAN, IN

The white substance is deposits of water-soluble salts called efflorescence. These salts may be contained in the bricks, the mortar or possibly the masonry behind the bricks. When efflorescence appears on a brick wall of relatively new construction. it's often the result of water absorbed by the bricks. The soluble salts dissolve in water (from rain, snow or ice) and are deposited on the brick surface when the water evaporates.

However, it's also possible that water is entering the wall through open joints or poor construction methods and has found a path to the

When there is a sufficient amount of water to dissolve the salts, there will be an efflorescence buildup on the wall surface. In this case, you should examine the wall and construction details for open joints and possible sources of moisture penetration. All open joints must be sealed and poor construction methods corrected.

Efflorescing salts will generally disappear of their own accord with normal weathering-especially when they are the result of absorbed water. However, you can remove the salts by dry-scrubbing with a stiff brush. Heavy accumulations or stubborn deposits may be removed by scrubbing with a solution of one part muriatic acid to 12 parts water. It is imperative that the wall be saturated with water before and after the solution is applied. PM

Do you have a home-maintenance or repair problem? Send it to Homeonemers' Clinic, Popular Mechanics, 224 West 57th St., New York, NY 10019. Letters cannot be answered individually, but problems of wide interest will be discussed in the column. For more home-repair and maintenance help, get PM's Home Care Guide, \$2.45 postpaid. Send your order(s) to Popular Mechanics, Box 1014, Radio City Station, New York, NY 10101.

CLEARANCE

# Computers



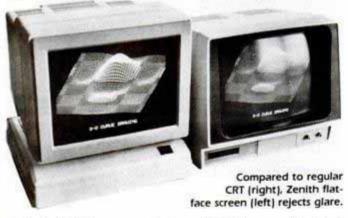
BY RON SCIBILIA

#### Window On The World

your personal computer, it's the TV-like video display that delivers the end result to your eyes. Now Zenith Electronics, the venerable TV manufacturer that has become a formidable competitor in the IBM-compatible computer market, has demonstrated some contrast ratio) compared to conventional displays.

The company adds that the new technology also eliminates "doming discoloration"—a phenomenon which occurs in today's CRTs when bright patches are displayed on the screen for a long period of time.

How does the new screen



technological improvements for computer screens.

Zenith promises considerably enhanced performance over the current cathode ray tubes (CRT) used for most TV's and computer monitors. In fact, the company touts its new design as the biggest breakthrough in display technology since the color picture tube itself. You can expect a 14-in. high-resolution display for computer use early next year—followed by broadcast TV receivers. Prices will be "attractive," Zenith says.

The new CRT, which Zenith dubs a "flat tension mask" design, offers up to 80 percent more brightness (or up to a 70 percent greater

work? Both conventional color CRTs and Zenith's FTM design employ a shadow mask, a thin metal sheet whose hundreds of thousands of perforations direct the beams from the tube's electron gun to the surface of the screen.

When the electron beams hit the screen, they excite the appropriate red, green and blue phosphors embedded in the glass, creating the video image we see.

A conventional CRT uses a curved shadow mask supported by a frame, and is suspended by springs inside the tube. As electron beams strike the typical shadow mask, it heats up and moves. That movement is the source of distortion in conventional display performance.

Zenith's shadow mask, by comparison, is stretched taut and held under tension

directly behind the tube's flat glass faceplate. Under most display conditions—even at much higher brightness levels than those which cause discolored images on conventional tubes—the mask remains flat and motionless.

Besides superior contrast and brightness, the FTM technology promises better color fidelity and improved resolution. Zenith says it can manufacture FTM monitor tubes with a 0.21-mm dot pitch-the distance between the center of a phosphor dot of one color to the center of another of the same hue. That compares to dot pitches of 0.31 mm on such highgrade monitors as IBM's Enhanced Color Display or NEC's MultiSync (designed for IBM's Enhanced Graphics Adapter). The result, Zenith says, would be better visibility with a 14-in. FTM monitor in normal office

Yet another benefit of the FTM design is its flat face. It's less susceptible to glare and reflection, because it doesn't reflect ambient light the way typical convex-faced tubes do. Flat, square-cornered displays also yield a more natural, undistorted appearance to on-screen text and graphics.

lighting than with a conven-

tional 19-in. CRT in a dimly

Modems to go

One of the primary purposes of portable computers is communication by telephone. Virtually all portable PCs either include a built-in modem or offer one as an add-in option. In many cases. though, today's laptop portables still sport 300 bit-per-second modems while the standard in telecommunications is 1200 bps.

There's no doubt that being able to transmit and receive data at 1200 bps makes onthe-go information transfer less time-consuming—and less expensive.



TravelComm 1200 modem can fit in a pocket.

Los Angeles-based Touch-Base Design might make data transfer a painless exercise for portable users with its TravelComm 1200 Portable Modem. This cigaret-pack-sized unit operates on a 9-volt battery, runs at either 1200 or 300 bps and interfaces with the telecommunications software already onboard many popular portables. The TravelComm 1200 should work effectively with most laptop PCs, including those marketed by Tandy, NEC and Hewlett-Packard.

The unit measures only 4 × 2.4 ×1 in. and weighs a mere 6.5 ounces, including its internal battery good for 20 to 30 hours of high-speed transmission. It costs \$299.

Operating the Travel-Comm 1200 is very simple. Let's take the Tandy laptop, for example. Once you've configured your ROM-based Telcom software for 1200 bps operation, you plug the



TravelComm 1200 directly into the computer's RS-232C serial port, and attach the modular telephone cable (TouchBase supplies a 6-ft, cable itself) from phone to modem.

The next step is to enter Telcom's "terminal" mode via function key, hit the return key a couple of times (once to turn the modem on, a second time to initialize the device for the desired transmission speed), then type the phone number you want to call through the unit's auto-dialer. That's it.

The modem automatically switches itself off to save battery power when you terminate the call. Tiny LEDs on the top of the unit indicate Call Progress, High Speed Mode and Carrier Detect.

#### On the road again

No one argues the utility of portable computers for go-anywhere writing or note-taking. Unfortunately, the small display screens found on many portables make editing difficult. Having a hard-copy printout of your work can be helpful for revision-on-the-road-and reassuring too.

Kodak subsidiary Diconix Inc. is trying to address this need, by unveiling a sleekly designed portable printer that can also double for light office use. The Diconix 150, which comes with a parallel interface, offers full emulation of both the IBM Proprinter and the Epson FX line, according to the supplier.

The \$479 unit uses ink-jet technology to keep operating sound levels low. It can print on single sheets or use continuous-feed computer paper, and produces near-letter-quality output at speeds of up to 150 characters per second in draft mode. The printer uses regular paper or ink-jet paper, and can also print transparencies and envelopes using special stock. It's also capable of printing material up to 11 in. wide in "landscape" mode—good for large spreadsheets—and can produce pie charts or bar graphs as well.

The Diconix 150 is roughly the size of a standard office dictionary. The unit measures 2 in. high  $\times$  6.5 in. deep  $\times$ 10.8 in. wide. The printer can run on AC current or on "C" size rechargeable batteries. Diconix says you can expect about 150 pages of printing per battery charge; recharging can be done overnight. The \$10 ink-jet cartridges are easily replaced, and good for about 500 pages of printing.

#### New Apple crop

As we go to press, word arrives that Apple Computer has developed a powerful new successor to its existing II series. It's called the Apple II G.S., runs earlier Apple software, and has astounding color-graphics capability. Watch this space for more news.

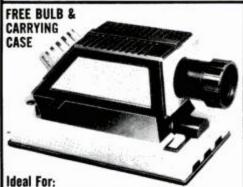
#### **POWERFUL REPEATER AIR PISTOL**

#### FIRES 100 BB's WITHOUT RELOADING!



#### CRAFT PROJECTOR ENLARGES Pictures, Patterns, Drawings UP TO 25X'S BIGGER!

Project: Prints, Plans, Photos, Stamps, Coins, & Gems In Natural Color — Onto Almost Any Surface: Wood, Wall, Screen, Paper, Fabric.



Woodworkers, Modelers, Arts & Crafts

This BRAND-NEW EPISCOPE PROJECTOR projects directly from snapshots, books, even solid objects like coins, mineral specimens, etc. Fine reflector and mirror system, Hi-intensity projection lens that enlarges images up to 16 feet square! Rugged two-tone body and base with cooling vents and "on-off" switch.

No. 4500A—Episcope Projector ..... EXTRA BULBS FOR YOUR PROJECTOR ONLY ....\$2.00

#### **GENUINE \$1 BILLS** WITH SANTA'S FACE ON FRONT



Real uncirculated bills negotiable anywhere in the U.S.A. or North Pole!

The most unique Christmas greeting we've ever seen! These are **real dollar bills** — with Santa's face on front. So beautifully done, you'd think it was done right at the mint! Yes, it's all legal and bills are still negotiable. Comes in a STEEL EN-GRAVED Christmas Currency Envelope. A very different stocking stuffer — a unique gift for different stocking stuffer anyone on the list.

No. 9219—Santa Bills ..... Save: 3 for 11.00 - Save More: 6 for 19.98

#### 'ROOSTER'



"Country Classic" . the Rooster Weathervane. Our full color version stands almost 3 FEET TALL and measures 171/2" across. Specially crafted for us with heavy-duty metal mounting hardware and weatherproof hi-impact materials. Easy to assemble hardware adapts to any angle roof. Attaches to porch, fence or mail box too. Can be mounted on pole (included) for your yard or garden . . makes a charming garden accent! And it really does work . . tells which way the wind is blow-Look at the price - now, that is a good old fashioned bargain!

No. 8143—Rooster Weathervane .....\$12.95

Foster-Trent 2345 Post Rd., Dept. 522 - K , Larchmont, NY 10538 RUSH the items ordered below on 30 DAY TRIAL — complete satisfaction GUARANTEED or my money back (except post. & hand.) my payment is enclosed including \$1.95 for post. & hand. (sorry no C.O.D.).

QUAN.	SIZE	ITEM NO.	DESCRIPTION	PR	ICE
				╀	H
		SHIPPING	& HANDLING	Ļ	
N	.Y. Resi		Add Sales Tax	Ļ	3.
		T	otal Enclosed	Г	Г

Print Name City

State

VISA & MASTERCARD PHONE ORDERS Call 914 - 834 - 7370 Between 9:30 - 4:30 Eastern TIME - Minimum Phone Order \$10

Zip

# **Electronics**



BY STEPHEN A. BOOTH

#### **Updates On The News**

n the fast-moving field of electronics, tomorrow's promise quickly becomes today's innovation. By the time an article reaches your eyes, there's often something new to report. For instance, take last month's article on IBM-compatible computers, Target: Big Blue (page 80). Shortly after we went to press, IBM adjusted its pricing downward to close the gap with its competitors. Specifically, the company didn't lower the PC's price, but now certain IBM options (long standard with other brands) are thrown in free.

That situation didn't last long. No sooner did IBM announce the change than Leading Edge, its lowest priced competitor at \$1495, cut \$200 from the Model D's sticker-while doubling its internal memory to 512 kilobytes. You can expect prices to plummet further in the coming months. Hyundai, the Korean conglomerate that markets a \$4995 subcompact car here, is entering the IBM-compatible computer field with a \$700 clone which, fully loaded, should still sell for below \$1000. It's called The Blue Chip, which is a joke of sorts in that IBM's corporate nickname is Big Blue, and the clone is supposed to be a chip off the old block. They're probably not laughing up at IBM headquarters. In fact, I'll bet we'll see some technological fireworks and sharp Yankee trading (read pricing) from Big Blue real soon.

Another area that's seen some action since we last reported is television (Futurevision, page 67, July '86). High Definition TV (HDTV) broadcasts might become reality sooner than later. In fact, experimental broadcasts are in the planning stage right now by the Advanced Television Systems Committee of the Electronic Industries Assn. in Washington, D.C. Mean-while, Lucitron of North-brook, Illinois, has shipped its first 35-in. flatscreen television to the U.S. Navy. But Vice President Alan Sobel tells me Lucitron won't have a color version of the 35incher this year. He says we jumped the gun about the 35in, color version in our July report (and points out that typographical gremlins altered the company name). Lucitron's latest plan is for a 48-in. diagonal flat color TV for 1988; already, 8-in. demo panels are up and running.



Experimental flat-panel color TV by Lucitron measures 8 in.

Another recent story in need of updating is electronic home controls. In House Intelligence (page 80, Aug. '86) author Martha Downing wrote that electronics industry committees were developing standards that would allow appliances, utilities, security systems and entertainment systems to talk to one another. Well, a standard has been proposed: General Electric's "Homenet" system, formerly called "Homeminder" and first reported by this magazine two years ago (Manage Your Home By Remote-Control TV, page 44, Nov. '84).

#### Here and now

Traveling often entails sacrifice in the form of making do without certain comforts and conveniences of home. Recently, I've come across two inexpensive electronics products that alleviate the suffering.

The first is a blessing to anyone who clocks lots of drive time in a car that lacks a cassette player. It's called Sound Sender (\$27), and lets you hook up a portable, headphone-type cassette or Compact Disc player to any car that has an FM radio and an electric cigaret lighter.

The Sound Sender, made by an East Hanover, New Jersey, company of the same name, plugs into your car's cigaret lighter and sends sound from the portable player to the car radio via the car's electrical wiring. At the other end of Sound Sender's wire is a male plug that fits in the headphone jack of your battery-powered portable player. There's nothing else to do except tune your radio to an unused frequency somewhere between 105 and 107 MHz, then just fiddle a dial on the Sound Sender 'til the music comes through loud and clear.

I've road-tested Sound Sender since July, under city, suburban and rural reception conditions. It performed wonderfully—even when connected to the most



Sound Sender plugs into car lighter, sends sound to radio.

inexpensive car radios (whose tuners occasionally drift from the "dead" channel setting and momentarily pick up a multipath-reflected "live" adjacent frequency, thereby cutting in on your portable's signal).

How does Sound Sender sound? It delivers excellent monaural, for really clean music or speech. That's right, monaural. That's because the product is aimed at the estimated 80 million vehicles—including rental and fleet cars—that have a mono radio/speaker setup. None-theless, it's a gem for anyone who spends lots of time on the road and who'd like to listen to books on cassette or



Calculator with memory stores credit balances.

instructional tapes. I listened to these and to music cassettes and CD's because in poor FM reception areas, I'd rather hear clean mono than dirty stereo.

(Please turn to page 48)



# 1987 Plans Catalog From

## Popular Mechanics

Hovercrafts, outdoor sheds, fine furniture, tool boxes. All this and more is within your reach when you order *Popular Mechanics'* new catalog of plans for 1987. Imagine building:

- a hovercraft that flies 70 miles per hour on land or water
- a wooden deck that makes your backyard ideal for entertainment and relaxation
- a rocking chair made from solid walnut and hand caned—a replica of the rocker used by President Lincoln!

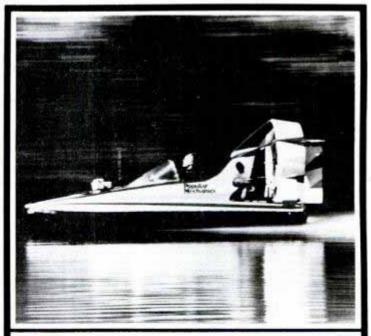
Hundreds of plans to choose from, many never offered before, and all complete with diagrams, instructions and materials lists.

Plus, you'll find an extensive selection of books and photocopied *Popular Mechanics*' articles that tell you how to sail, fix your car, dry out a wet basement, clean your VCR and much more.

So if you want to feel the pride of building something, become expert in a new hobby, do your own home and auto repairs, send for *Popular Mechanics*' 1987 catalog of plans. Mail a \$1.50 check or money order, along with your name and address, to:

Popular Mechanics 1987 Catalog Box 1014 Radio City Station New York, N.Y. 10101

Popular Mechanics is a publication of Hearst Magazines, a division of The Hearst Corporation. (£) 1986 The Hearst Corporation. All rights reserved.







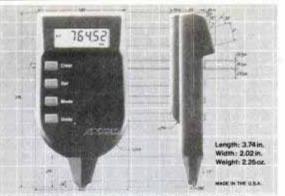
## NEW! PRECISION ELECTRONIC MEASURING SYSTEM.

ncorporating the latest scientific advances in lightsensing and microprocessor technology, ACCU-MEASURE™ will revolutionize the ways in which maps and charts are used and graphs and technical drawings are produced.

Now, millions of outdoor enthusiasts—backpackers, hikers, bicyclists, sailors, touring vacationers — who rarely travel that "straight and narrow path," can make important route and time calculations, simply and accurately.

Now, for professionals in the graphic arts, engineering and architecture, ACCU-MEASURE™ offers accuracy and program-mability found before only in expensive scientific instruments.

To order your ACCU-MEASURE™ CALL TOLL FREE 800-872-8787, ext. 190 or send a check or money order for just \$49.50 (add 6% tax for CA delivery). We will pay all shipping and handling charges! Please give order number # 8422.



Set scale and track route on a map or a dimension on a blueprint. Calculates automatically. ACCU-MEASURE™ is sculptured to fit in the p of your band and comes with a durable leatherette case for travel.

Program all map scales and their numerical equivalents (e.g. 18 cm = 60 km or ½ inch = 5 miles), to accurately iles), to accurately meare distances on any map or art used around the world.

 Measure straight or curved lines—in metric or standard units —with accuracy of ±0.02 inch.

■ Compute conversions of values across the full range of measuring systems and scales (inches → contimeters → foot → motors → miles → kilometers -> nautical miles).

Before the era of the integrated circuit, length and dis-tance calculations were made using protractors, bulky rulers, or mechanical gear-driven map measurers. Today Arian Instrument's new ACCU-MEASURE™ performs all measuring and converting functions with precision, plus offering you a

unique computer capability. For a brief introductory peri-od, you can order this lightweight precision measuring instrument direct from the manufacturer. Included is a 30 day money-back guarantee and a one year warranty.



1850 UNION ST., DEPT. C., SAN FRANCISCO, CA 94123

## 1/2 Million Bics Sold Daily



ot attiliated with Bic Corp

Patented

#### **NEW!** Bic Lighter **Vending Machines!**

Let America's 50,000,000 smokers line your pockets with money.

#### GROUND FLOOR OPPORTUNITY

to be the first in your area to own and operate a vending route. Placed next to all cigarette machines.

#### PART OR FULL TIME

- \* ALL CASH BUSINESS
- \* NO SELLING
- **★ 5 YEAR WARRANTY**
- \* NO EXPERIENCE NECESSARY
- \* INVESTMENT SECURED BY EQUIPMENT
- \* NATIONAL ADVERTISING
- \* FINANCING AVAILABLE O.A.C.

LIMITED WORLDWIDE DISTRIBUTORSHIPS

Call 24 hours for free brochure

1-800-722-4773 In California call (714) 894-1889

Vendgood Manufacturing Corp. 5011 Argosy, #5 • Huntington Beach, CA 92649

**ELECTRONICS** 

(Continued from page 46)

Sound Sender protrudes 2 in. from your cigaret lighter and, according to its maker, will fit in almost every car, with the exception of certain foreign makes, Ford Thunderbirds and LTDs. You'll find it in many department stores and auto parts chains. It's too good a thing to stay mono: I wouldn't be a bit surprised if a stereo version arrives next year. That would be a boon to budget-minded music lovers who could buy a car with the standard stereo radio, and to those of us worried about having an expensive system ripped off.

Another welcome traveling companion-even if you only travel as far as the supermarket—is Citizen's CBL-200 calculator. This \$16 solar-powered wonder is the size of two credit cards and can help you stay out of hock. How? Because its microprocessor memory can store and keep track of your checkbook balance, and up to two credit-card balances. A confidential password known only to you keeps others from calling up this information. Additionally, the CBL-200's standard arithmetic functions help you convert foreign currency values into your own when you're traveling overseas.

#### Back to the future

Not very far over the rainbow, some pleasant electronic innovations are abrewing. Their precise ETA is tough to fix, but I'd guess they'll make their debut in the coming new year.

 Television sets with stereo reception. amplifiers and loudspeakers are now commonplace. The next hat trick you can expect is built-in surround sound circuitry. In fact, Mitsubishi has just introduced such a creature, in Japan. It's called the Sound Square HG, boasts six loudspeakers and costs a steep \$1600. That buys you movie-theaterlike sound effects in your living room: You'll feel bullets whiz past your ears, jump when horror-movie cretins creep up behind you. These surround-sound effects will accompany TV broadcasts or complement movie cassettes you play on your VCR. Right now, you could go out and buy a separate surround-sound processor, or an audio amplifier/receiver with the circuitry built in. But the Mitsubishi system packages everything together in one box.

 Speaking of sound, the jukebox as we know it is about to change. Instead of 45 rpm black-vinyl singles, tomorrow's coin-eater will spin digital audio Compact Discs. Jukebox-maker Seeburg has just introduced its LaserMusic console: It holds 60 CDs-good for about 1000 selections. Don't ask the bartender for change: The new machine accepts only \$1 and \$5 bills.

POPULAR MECHANICS . NOVEMBER 1986



Catch the Excitement! Today, High-Tech Job Opportunities are Everywhere!

Now you can take control of your future with NRI's newest hands-on training and carve out your own place in today's electronics world. Select a new career field or start a business of your own. Now the choice is yours. And only NRI gets you where you're going with the *latest* professional instruments and test equipment you build and keep as you learn at home.

No other school of its kind has prepared so many people for successful careers in electronics. For over 70 years, NRI technical engineers and educators have demonstrated a unique ability to spot and anticipate the important technological trends, then develop state-of-the-art training that's prepared over 1.3 million ambitious people for successful careers in each new emerging field.

Now NRI presents three new state-of-the-art training opportunities in today's fastest growing electronics fields.

#### Build Your Own IBM-Compatible Computer as You Learn Digital Electronics Servicing.

A brand new course for an exciting new field...servicing computer peripherals (disk drives, printers, display terminals, modems, etc.) and the latest digital equipment found in industry today. Job opportunities for the trained digital technician have never been greater. It takes skilled personnel to keep today's digitally automated production lines and manufacturing equipment rolling. NRI trains you to be a high-demand digital technician or prepares you for your own independent service business.

As you learn, you'll get practical hands-on experience building your own 128K computer and disk drive. You'll also build, and learn to use and service, your own triggered-sweep oscilloscope, digital logic probe, and digital multimeter...instruments used by today's

DIGITAL ELECTRONICS SERVICING

Only NRI trains you for so many careers on the leading edge of today's electronics

wing revolution. experience at the trains you

electronics professionals.

You'll receive and learn to use NRI's specially developed diagnostic software programs that show you how to troubleshoot and service today's peripheral and digital equipment...another NRI "hands-on" exclusive. When you select NRI's training in Digital Electronics Servicing, you'll be preparing yourself to move into one of today's hottest careers!

#### Build an Operating Robot as You Learn Robotics and Industrial Control.

Already, advanced robotics systems are producing everything from electronic circuits to automobiles. By 1990, over 100,000 "smart" robots will be in use, creating over 30,000 new technical jobs.

NRI trains you to operate, program, service and troubleshoot industrial robots as you build your own remote controlled, programmable mobile robot. You get professional instruments and up-to-date training to prepare you to handle the technology that's changing the face of industry today.

#### Install and Troubleshoot Your Own Home Satellite TV Equipment as You Learn Satellite Electronics.

You've seen them in backyards, beside motels, atop office buildings, and in military installations— those sensitive dishes reaching out for TV programs, computer transmissions, data signals, and messages of all kinds from the growing number of satellites stationed 22,300 miles above the earth. Now NRI training can get you in on the ground floor of a new career

or even a business of your own in this exciting new growth field.

NRI trains you to service consumer TVRO systems, as well as the larger commercial and military equipment used to transmit and receive worldwide communications: news, weather, national security & defense transmissions and all types of voice, data and video signals.

Learn to install satellite systems...adjust, troubleshoot and repair dishes, amplifiers, converters, antennas and receivers. And get "hands-on"

experience as you install your own satellite TVRO system that will bring TV signals from around the world into your home.

#### Send for Free Catalog of High-Tech Career Opportunities.

Now you, too, can catch the excitement. Just send for your free copy of the 100-page NRI High-Tech Electronics Careers catalog. See the future open up for you as you explore exciting new opportunities for higher pay, advancement —even your own business. Review the complete descriptions of the training you get, the equipment that makes each opportunity come to life. Send today and get your start on tomorrow. If the card is missing, write to us.

#### School of Electronics

McGraw-Hill Continuing Education Center 3939 Wisconsin Avenue Washington, DC 20016 We'll Train You For Tomorrow.

# BIGGEST. WIDEST. STRONGEST.

ND FIRST! Here's the first truck ever to win the prestigious Industrial Design Excellence Award (IDEA). It's loaded with power. Loaded with performance. And all at our lowest sticker-price.

BIGGEST CARGO SPACE. Pack it up! With the most cargo volume of all leading compact trucks, it'll take all you can dish out. Double-wall bed construction means twin layers of steel insulate the sleek outside from whatever you throw inside. And there's more between-wheel-well space than any other pickup in its class. A full 3.4 feet for those wide loads.

WIDEST CAB. Size it up. Sit three across with the most hip room of all leading standard compact trucks. Nissan's roomiest cab ever was

designed around you. The enormous windshield

and side glass give you a commanding view. And there's more leg, shoulder, and head room than you ever thought possible.

STRONGEST ENGINE. Turn it on, it's made to perform. A 2.4-liter, fuel-injected engine sees to that. Twin-spark plugs and a hemi-head help crank out the most horsepower and torque of all the leading standard compact trucks. The 5-speed is standard.

Independent front suspension, steel-belted radials, and rear leaf springs combine to provide a smooth, easy ride without sacrificing payload. The rear brake's proportioning valve automatically adjusts to payload for improved braking under load. The Hardbody 4X2. Works tough. Plays rough. See your Nissan Dealer today.

FOR TOUGHNESS AND VALUE

## THE NAME IS NISSAN

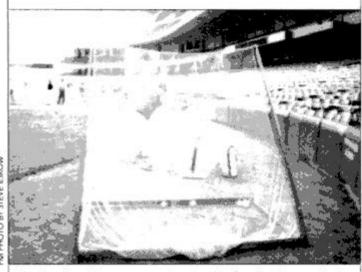


Science



BY DENNIS ESKOW

#### Strawberries In Winter



Yankee Dan Pasqua uses a tee to develop batting mechanics.

Sportswriter Red Smith used the familiar phrase about strawberries to describe the frustration a baseball fan feels in the off-season and to underlie his winter dreams.

Baseball players also think baseball in the winter months. It all has to do with the mechanics of the game, the physics of hitting and throwing, if you will.

Take Dan Pasqua, for instance, the Yankee outfielder who couldn't hit his weight in spring training, but who finished the season with a respectable batting average and home run output. Where is he spending his winter days?

"I come out to Yankee Stadium two or three times a week and work on hitting mechanics," he told us. Hitting mechanics involves positioning the arms and feet in such a way that all your body weight is moving into the baseball as you make contact with the bat.

We caught Pasqua during batting practice toward the end of the 1986 baseball season. He was hitting a baseball off a tee into a net on the sidelines. My son did that when he was 5 years old, too young for real pitching. Why would a grownup major-leaguer use a batting tee?

"However you swing the bat, the main thing is to make sure you do the same thing every time," he explained. "And I mean the same thing down to the smallest detail.

"The mechanics of hitting is a series of motions you can't think about," Pasqua says. "So you work on them in a step-by-step fashion with the tee. When you bat, it all becomes natural."

We'll be watching Pasqua's mechanics next year.

#### Amateur night

If you're a serious amateur astronomer, one who spends at least a few days a week observing the skies and taking photos of deep space objects, you'll be happy to know that NASA plans to let you have a shot at using the space telescope. The Hubble Space Telescope is to be launched into orbit by 1987. Its 94½-in. mirror will make it the largest telescope ever put in orbit.

"I look to amateur astronomers to ask refreshingly new questions and I expect they will make a real contribution to the advancement of astronomy," says Richard Giacconi, director of the Space Telescope Institute in Baltimore. The Institute has appointed a committee representing amateur astronomy groups to run the amateur phase of the project. Actual time on the telescope will be very slim. But some amateurs with sound proposals will be able to get on line. If you're interested, send a self-addressed, stamped envelope to: Science, POPULAR MECHANICS, 224 West 57 St., New York, NY 10019.

#### Fusion milestone

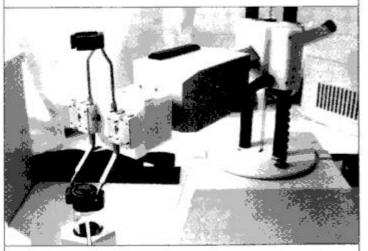
People keep telling me I'm an optimist to think we'll have a nuclear fusion power source by the next century. Let them talk. I have data to back me up. The Tokamak Fusion Test Reactor (TFTR) at Princeton University recently achieved a controllable temperature of 200 million degrees C, 10 times hotter than the center of the sun, where natural fusion energy is produced.

Eventually, the Tokamak reactor will be able to unite a deuterium nucleus with one of tritium. Both are forms of hydrogen. As the atoms unite, they produce a highly energetic free neutron and an atom of helium. This process promises to deliver more energy than is required to move the atoms together, making it a cheap energy source. The number of atoms involved in the reaction are so small that a large, uncontrolled explosion would be almost impossible. The main fuel source would be water that is widely available and very cheap. Will we have fusion by the year 2000? Watch this space.

#### Robot diet

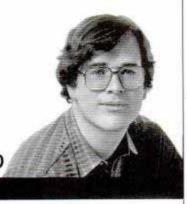
The United States Department of Agriculture is trying to determine how much of a particular vitamin is contained in any given food. Improved evaluating methods of vitamin content have sent USDA researchers back to the lab. But the testing pro-

cess involves thousands of samples that have to be chemically analyzed every hour. USDA is now using a 2-ft.-high tabletop robot to perform the basic chemical tests. The computer analysis of its work will soon produce a new recommended daily allowance table.



The USDA's new tabletop robot performs thousands of tests.

# Audio



BY FRANK VIZARD

#### Hi-Fi For The Holidays



Stacked deck: Alwa AD-A70 holds six cassettes for nonstop music.

his month we celebrate Thanksgiving, and before the turkey leftovers are memory, our thoughts turn to year-end holidays-the gift-giving season.

Audio equipment is always well-received. If you'd like to get a jump on the holiday shopping rush, consider these selections.

Audiophiles are used to a plethora of brand names in the market. But music lovers should be happy to hear that Acoustic Research, the renowned loudspeaker-maker, has resumed the design and marketing of electronic components. Specifically, AR now offers nine electronic items-a compact disc player, three receivers, three power amps, a preamplifier and tuner. These join a pair of top-shelf record turntables.

If the debut of AR electronics doesn't seem like news, then you probably haven't upgraded your audio system since the early 1970s, when Acoustic Research last sold electronics components.

A name that car audio lovers might remember is Altec Lansing. Years ago, the company's Voice Of The

Highway speakers were speakers available. The Altec Lansing brand was overshadowed for a while, but now the name is being revived by Sparkomatic Corp., longtime autosound supplier that recently acquired the

The Altec Lansing autosound line is comprised of a 6 x 9-in. 3-way speaker (\$250), a 6 x 9-in. 2-way speaker (\$200), a 6<sup>1</sup>/<sub>2</sub>-in. 2-way (\$150) and a 4-in. model (\$110). Prices are per pair. There's also a 5-model home speaker

among the few quality car rights to the brand.



line, priced from \$350 per pair for bookshelf-sized models to \$1500 for a pair of 46in. towers that house four drivers each.

Other nice novel boxes to put under the tree might include a combination compact disc player/cassette deck from Parasound.

This component is ideal if you want to expand a turntable-based system in a hurry. It also makes dubbing from a compact disc to a blank tape a very simple operation. The CDD-940 costs \$450-a bargain for a CD player and a cassette deck with Dolby HX Pro.

Another item of special interest is Sony's CDP-C10 compact disc changer. This home CD player is partners with Sony's Disc-Jockey CD auto-sound system in that they both use the same 10-disc magazine. Fea-

ble to other good quality CD players, but unlike single disc models, the programming possibilities are almost endless. List price is \$800, and each magazine costs \$20.

tures are compara-

Though the CDP-C10 al-

lows up to 10 hours of continuous play, nonstop music fans might be more intrigued by Aiwa's AD-A70 double cassette deck.

Dual auto-reverse decks have been around for a while, but Aiwa has extended continuous play to 221/2 hours when C-90 tapes are being used.

The AD-A70 is a dual-port deck, but it is the port on the left side that you'll find most interesting.

Deck 1, as Aiwa calls it, can hold up to five cassettes and play both sides of each tape without stopping. It can then repeat this process three times for a total of 221/2 hours in the case of C-90 tapes. You can also program



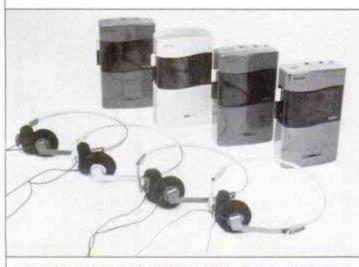
Parasound's combo CD player, tape deck.

Deck 1 to play up to 15 selections, in any order.

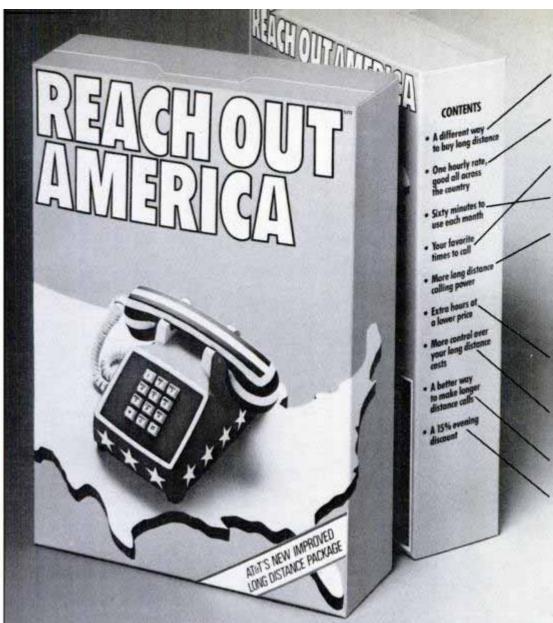
In the recording mode, Deck 1 allows for continuous operation with several tapes. In conjunction with a separate audio timer, you can record radio programs while you're away. The same programmability lets you record up to five different CDs or LPs, putting each one on a separate tape. Deck 2 can also be used for timer-activated recording or playback. List for the AD-A70 is \$595.

If Aiwa's new deck seems a marvel of the microprocessor age, then Dual's new CS-5000 record turntable (\$400) might represent a welcome return to a more leisurely era. Among this turntable's many features and attributes is its ability to play 78 rpm records-in addition to

(Please turn to page 56)



Headphone-stereo portables from Sharp come in four flavors.



- 1. Make direct-dialed AT&T Calls to any other state—and pay by the hour, not by the mile.
- 2. Call all across the U.S.A.—even to Alaska and Hawaii-for one hourly rate.
- 3. Call all day Saturday, Sunday till 5 p.m., and every night after 11 p.m.
- 4. Use your full hour, pay only \$10.15. Get a special bonus, too!
- 5. Make one 60-minute call...or as many as sixty 1-minute calls. Use your hour any way you like!



Call today for your free guide.

- 6. Talk for more than an hour. pay even less—just \$7.80 for extra weekend and night hours. Prorated, too.
- 7. Make your farther away calls weekends and nights-when you pay a flat hourly rate.
- 8. Keep track of the hours you talk, and keep track of your costs.
- 9. Enjoy a special bonus: 15% off calls made Sunday-Friday, 5-11 p.m.
- 10. Clip and mail the coupon below for your free guide, or call 1800 CALL ATT, ext. 389.

# **10 WAYS YOU COULD GET MORE FOR YOUR MONEY WITH THIS AT&T PACKAGE**

AT≥T'S REACH OUT " AMERICA PACKAGE GIVES YOU AN HOUR'S WORTH OF CALLS—ALL ACROSS THE COUNTRY—FOR A NEW LOW PRICE OF JUST \$10.15. BUT ONLY WHEN YOU ASK **FOR YOUR FREE GUIDE!** 

AT&T has packaged long distance for value. With "Reach Out" America...an innovative long distance package.

It's not for everyone. But if you're willing to spend \$10.15 each month," "Reach Out" America could be just right for youespecially when you make your out-of-state calls during our night and weekend calling periods.

You'll get an hour of weekend and night time, to make AT&T Calls to more faraway family and friends. To any other state. We've also packed in a special bonus for you: a 15% discount on your evening calls.

In fact, the more AT&T Long Distance calls you make, the farther you call, and the longer you talk...the better "Reach Out" America \*\* could be for you!

#### **GET YOUR FREE GUIDE TODAY!**

You could get a lot more for your money with our innovative

\*Plus a one-time \$10 order-processing charge when you sign up. Add 3% Federal excise tax and, where applicable, state surcharge. \*\*Not yet available in all areas. © 1986 AT&T

long distance plan-our free guide explains how. To get your copy, just use the coupon below today or call our toll free number: 1 800 CALL ATT, ext. 389



P.O. Box 418  YES! I'd  money. Send	like to discover how I ome my free guide, con	"Services issouri 64141-0176 could get more for my nplete with everything I ch Out" America plan.	
need to sign	up for the AT&T Rea	cit out America plans	
Name	up to the Area Rea	Date	
	up to the AT&T Kea	Date	



Dual CS-5000: turntable with 78 rpm speed.

the usual 33 and 45 speeds. For the record, it's the only reasonably priced 78-equipped turntable you can still buy today—the others cost twice as much, or are special-order items. Besides the novelty of 78-rpm operation, the CS-5000 justifies its price tag with superb belt-drive performance.

While these components represent some of the more technologically novel products now available, you also have the novelty of buying audio gear in a variety of colors. Silver and black have long dominated audio cosmetics, but it appears that some companies are taking a walk on the wild side—at least in portable stereo.

Sharp, for instance, offers its JC-F3 personal stereo player in royal blue, canary yellow, emerald green, white

and candy apple red.

There's still time before the holidays, so between now and then you might want to bone up on some audio basics. I can recommend *The New Sound Of Stereo* by Ivan Berger and Hans Fantel as a very good guide. Berger, a former electronics editor of this magazine, now is technical editor of *Audio* magazine. Fantel, audio and video columnist for *The New York Times*, has written extensively for POPULAR MECHANICS. The book is published by New American Library and costs \$12.95 in paper-



Primer on audio basics makes a good gift.

back. It'll double as a pretty good stocking-stuffer as well.

#### Alphabet soup

You might have noticed by now a 3letter combination of A's and D's on the back of many compact disc packages. And you've probably already figured out that A stands for analog and D means digital.

This code might give you the impression that although the compact disc is a digital format, some discs are more digital than others. You might conclude that these discs sound better.

This impression is correct, but the conclusion is only true some of the time. The 3-letter code is a system developed by the Society of Professional Audio Recording Studios (SPARS) and is designed to tell you the CD's recording history. This way, you can determine how much digital technology has been used in the making of the disc. The first letter indicates the type of tape recorder initially used to capture the music. The second letter tells how the music was mixed or edited. The third letter describes the mastering process.

The SPARS code makes it seem that buying a compact disc is like a 3-card version of poker, with three D's being the best hand. Unfortunately, DDD is

not always a winner.

Critics of the SPARS code rightly point out that many important aspects of the disc's recording history are not indicated. These include the number of microphones used and their placement, the number of recorder tracks fed by those microphones, and the level of signal processing used.

Two of these D's might be, in reality, jokers, since there is no way—short of auditioning the disc—to determine the relative skill of the recording and mix-

ing engineers

In short, the SPARS code is no guarantee of the disc's acoustic merit. At its best, digital recording can greatly enhance your appreciation of the music. But in other instances, you can only be comforted by the knowledge that the disc is virtually indestructable. To my ears, for example, there is little difference between the LP and CD versions of "Dirty Work," the latest Rolling Stones album. If there are any sonic differences, they don't justify the higher price of the CD.

Keep in mind that some of the best recordings ever were made on analog tape equipment. Artists such as Elvis Presley and Glenn Miller will never get the DDD straight flush because all their work was recorded in analog. An A on the box shouldn't be viewed like a D on a report card. Only your own ears can grade the result.

# HOW IT WORKS

With traffic radar and Rashid VRSS both transmitting on the same frequency (24.150 GHz), normal receiver technology can't tell one from the other. Even when you scrutinize K band with a digital spectrum analyzer, the two signals look alike (Figure 1).

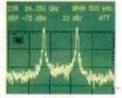
We needed a difference, even a subtle one, the electronic equivalent of a human fingerprint. Magnifying the scale 100 times was the key (Figure 2). The Rashid signal then looks like two separate traffic radars spaced slightly apart in frequency, each being switched on and off several thousand times a second.

#### Resisting the easy answer

Knowing this "fingerprint," it would have been possible—although not easy—to design a Rashid-recognizer circuit, and have it disable the detector's warning section whenever it spotted a Rashid.

Only one problem. With this system, you

wouldn't get a warning if radar were ever operating in the same vicinity as the Rashid. Statistically this would be a rare situation. But our engineers have no interest in 99 percent solutions.



RASHID Figure 2: An electronic close-up reveals two individual signals.

#### When the going gets tough...

The task then became monumental. We couldn't rely on a circuit that would disregard two K band signals close together, because they might be two radars. We couldn't ignore rapidly switched K band signals, because that would diminish protection on pulsed radar (the KR11) and "instant-on."

#### A whole new deal

The correct answer requires some pretty amazing "signal processing," to use the engineering term. The techniques are too complex to go into here, but as an analogy of the sophistication, imagine going to a family reunion with 4.3 million attendees, and being able to find your brother in about a tenth of a second.

Easy to say, but so hard to accomplish that our AFR (Alternating Frequency Rejection) circuitry couldn't be an add on. It had to be integrated into the basic detection scheme, which means extensive circuitry changes. And more paperwork for our patent department.



# Radar warning breakthrough #4 is now available from the same engineers who made #1, #2, and #3

Bad news for radar detectors. The FCC (Federal Communications Commission) has cleared the Rashid VRSS for operation on K band.

#### What's a Rashid VRSS?

The Rashid VRSS is a collision warning system using a radar beam to scan the vehicles path, much as a blind person uses a cane. It may reduce accidents, which is very good news.\*

#### Now for the bad news

Unfortunately, the Rashid transmits on K band, which is one of the two frequencies assigned to traffic radar. Rashid speaks a radar detector's language, you might say, and it can set off detectors over a mile away.

Faced with this problem, we could hope Rashid installations will be few. Or we could invent a solution.

#### Opportunity knocking

Actually, the choice was easier than it sounds, because our engineers are in the habit of inventing remarkable solutions. In fact, in the history of radar detection, only three advancements have qualified as genuine breakthroughs, and all three came from our engineers.

Back in 1978, they were first to adapt dualband superheterodyne technology to the problem of traffic radar. The result was ESCORT, now legendary for its performance.

In 1983, when a deluge of cheap imported detectors was found to be transmitting on radar frequency, our engineers came through again, this time with ST/O/P\*, a sophisticated circuit that could weed out these phony signals before they triggered an alarm.

Then in 1984, using SMDs (Surface Mounted Devices), micro-electronics originally intended for satellites, these same engineers designed the smallest detector ever. The result was PASSPORT, renowned for its convenience.

 For more information on Rashid VRSS collision warning system, see Popular Science, January 1986.

#### They said it couldn't be done

Now we're introducing breakthrough number four. In their cleverest innovation yet, our engineers have found a way to distinguish Rashid from all other K band signals. It's the electronic equivalent of finding the needle in a haystack. The AFR\* (Alternating Frequency Rejection) circuit isolates and neutralizes all Rashid signals, yet leaves the radar detection capability undiminished for your protection.

#### No waiting for the good stuff

When testing proved that AFR was 100 percent effective, we immediately incorporated it into ESCORT and PASSPORT. Our policy is to make running changes—not model changes—whenever a refinement is ready. That way our customers always get the latest science.

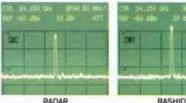


Figure 1: A digital spectrum analyzer scanning the entire width of K band can't see the difference between radar and Rashid.

AFR is fully automatic. There are no extra switches or lights. Nothing for you to bother about. The Rashid problem simply goes away.

Last year Road & Track called us "the industry leader in detector technology." We intend to keep earning our accolades.

#### We make shopping easy too

Call us toll free. We'll answer all your questions. If you decide to buy, we'll ship the next business day at our expense. For \$6.00 extra, Federal Express will deliver to you within two business days of shipment. If you're not completely satisfied within 30 days, return your purchase. We'll refund all your money, including return postage, no questions asked.

We specialize in breakthroughs. Can we make one for you?

#### **Order Today**

TOLL FREE ... 800-543-1608

(Phone M-F 8-11, Sat 9-5:30, Sun 10-5 EST)







By mail send to address below. All orders processed immediately. Prices slightly higher for Canadian shipments.



Pocket-Size Radar Protection \$295



The Classic of Radar Warning \$245 (Ohio Res. add \$13.48 tax)

Cincinnati Microwave Department 068N One Microwave Plaza Cincinnati, Ohio 45296-0100

c 1986 Cincinnati Microwave, Inc.

Cincinnati Microwave is committed to constant advancement in radar warning technology. But we don't believe in planned obsolescence. Therefore, we are working out a plan to offer upgrades for most pre-AFR models (PASSPORTs under number 550,000, and ESCORTs from 200,000 through 1,199,999). Since non-AFR units will require extensive modifications, new

procedures and facilities are being developed to ensure a quality conversion. For details and costs of this retrofitting program, see our ad in the January issue of this magazine.

# **Inside Detroit**



BY JIM DUNNE

#### Turbo is Too Much

Buick's street champion Regal Grand National coupe may be the last of its kind, at least for a couple of years. The intercooled, turbocharged V6 cranks out 245 hp to give it the lead among America's hottest performing musclecars, and enough acceleration to leave virtually any mid-price import sports car in the dust.

But all good things come to an end. Buick, when it drive once the Regal line is dropped, it would take a new, heavy-duty front-drive transmission to make the intercooled V6 work.

Buick officials remain slightly optimistic though. They claim that the Reatta sports car, or a special Le-Sabre coupe, would be the first front-drive car to get the Grand National engine when and if a transmission could be developed. As re-



The '88 Buick Regal will have front-drive Four; turbo V6 will go.

drops the Regal from its lineup next fall, will have no other chassis or transmission to handle the Grand National's awesome power. For one thing, it's not easy to build a front-wheel-drive chassis to control all that power. But more important right now is the fact that GM has no fwd transmission husky enough to stand up, either. Since Buick will be pure frontported earlier, if the powerful V6 could be installed in the Reatta, that car would become the quickest in the entire GM lineup, besting today's heavier V8-powered Corvettes. Come '88, though, the front-drive Regal will share a normally aspirated V6 with new Olds Cutlass and Pontiac Grand Prix, and perhaps a base 4cylinder. Sic transit gloria.

#### Rich and famous

They may not be now, but they will be when the Allante is parked in the garage. Those are the folks who Cadillac figures are the best bet to be the owners of its new 2seat "ultra-luxury" sports car. Here's the Allante owner profile according to Cadillac: Earns \$100,000-plus a year, is 40 to 55 years old, owns two or more cars now, wants a car to make a statement of his/her position in the community, could be male or female.

Whoever they are, they will need help getting that hardtop roof off. It weighs 60 pounds, and its bulk is difficult to handle from one side of the car. For two people, the 5-minute change from hardtop to convertible top is no problem. Just make certain there's a place to store the hardtop—it doesn't stow in the trunk.

#### Why fly?

Is Cadillac grandstanding when it flies Allante bodies from Pininfarina's factory in Turin, Italy, to Detroit? "No, it's a better deal for us all around," replies Cadillac General Manager John Grettenberger. "It's only a 12-hour shipment by air from Pininfarina's factory to our Hamtramck assembly plant. By ocean ship, the same trip would take 24 days. So we plan our schedules more closely."

Sergio Pininfarina points out that neither Turin nor Detroit is an ocean port, so the trip would involve ground-sea-ground transport, and schedules would be difficult to meet with all the transferring of cargo.

Both Grettenberger and Pininfarina agree that the most important advantage of shipping by air is quality. Experience shows that shipment by sea can be damaging to car bodies, while the air shipment delivers bodies practically damage-free. Both parties are mum when it comes to cost comparisons. But the time-saving and nodamage advantages of air transport are said to offset any lower price that surface shipment might offer.

#### Caprice will stay

The full-size Chevy will be built well into the next decade if GM's most recent plans prevail. The demand for the biggest car in Chevy's line continues, even though the car has not been changed substantially since 1976. Look for the Caprice to

get new sheetmetal and a slightly more rounded body in 1990, or just enough change to keep the car looking fresh. Word is that this rear-drive oldie holds first place in quality audits among Chevrolet sedans.

#### House divided

Teamwork between management and labor, not active distrust, is one ingredient needed to let U.S. carmakers compete with the imports.

That's the assessment of H. Ross Perot, the go-getter who created Electronic Data Systems and sold it to General Motors en route to amassing a fortune of perhaps \$2 billion.

The adversary roles between salaried and hourly workers at U.S. plants does not stand a chance against the tight teamwork of the foreign makers, especially those from Japan. Perot, who now is a GM director and is being touted as a possible chairman of the company, scoffs at long-established Detroit practices.

"It takes five years to develop a new car in this country," Perot says in the Wall Street Journal. "Heck, we won World War II in four years. This isn't a moon shot. It's just a car."

#### Ford's Allante

It's just a paper plan now, but Ford has drawn up a scheme for building a competitor for Cadillac's Allante. The 2-seat hardtop convertible would not be ready before the 1993 model year because Ford is backed up with projects for changing other cars in its lineup first.

But if the current plan is carried out, the Ford flagship will use a rear seat, and the chassis will be strengthened to support a convertible top. Unlike Allante, the Ford would be built here in the U.S., possibly assembled by one of the half dozen or so high production customizers that build special models, including convertibles, for the auto industry.

(Please turn to page 62)



# DO THESE LOOK LIKE TRUCKS TO YOU?

They certainly don't to increasing numbers of GMC truck buyers.

These discriminating drivers aren't buying just trucks; they're choosing versatile, upscale modes of transport. In other words, GMC trucks.

Since people who could afford just about any car are driving our trucks, we've stopped thinking of them as "just" trucks, too. So they're being produced with a new sense of pride and purpose.

#### DON'T LET OUR NAME FOOL YOU.

<u>GM</u>

Even though our name is still GMC Truck, many GMC trucks are hardly truck-like. Consider the Suburban. With its available seating for up to nine, wide choice of interior luxuries and awesome appetite

for luggage, it's certainly more of a limousine than a truck as trucks have been commonly perceived up to now.

#### TAKE THEM ANYWHERE.

In turn, our Safari is changing many people's perceptions of the van. Thanks to its well-crafted interiors and impeccable road manners, Safari is no mundane box on wheels. Then, there's the S-15 Jimmy. Maybe good looks can only take one so far but in our Jimmy's case that can mean from the

back country to the country club, in perfect comfort and style.

#### GET A CLOSER LOOK.

These GMC trucks may not look, ride or act like trucks. But for now, the only way to find them is by buckling up and visiting your nearest GMC Truck dealer. (Check the Yellow Pages, under "Truck" or "Automobile.") We're listed under both for increasingly obvious reasons.







#### INSIDE DETROIT

(Continued from page 58)

#### Eldorado ragtop

That's the way Cadillac plans to settle the convertible problem for the rich masses. No, the deVille convertible will not be produced. Instead, Cadillac will ship Eldorado coupe bodies to a customizer where they will be chopped down and outfitted with a fabric top.

No reason is given for choosing the Eldorado in place of the deVille, but the shorter wheelbase of the Eldorado works in its favor. It's easier to put the extra support convertibles require in the smaller car, and the end product is more rigid.

#### **AMC's Premier**

A luxury sedan that will compete with full-size Ford, Chrysler and GM cars will be introduced by American Motors late next year. The Premier is a slightly altered Renault 25 design. Along with the somewhat smaller Medallion, it will catapult AMC back into the mainstream of U.S. sedan competition for the first time in almost a decade.

The Premier's most distinguishing difference is the bustle trunk in place of the R25's rear hatch. Highly successful as Renault's flagship 4-door sedan since its introduction in Europe two years ago, the R25 has a 2-liter, 4-cylinder engine and a 2.6-liter V6 in its lineup. Suspension is independent on all four wheels. Top speed of the V6 is rated at 125 mph. AMC plans to build the Premier in Canada, but engines and transmissions will be imported from France.

#### No turbo for Quad Four

Oops, somebody goofed. GM's highly touted Quad Four engine, which will be introduced next year on Oldsmobile sedans, may not be built with a turbocharger for a long time. Problem is the engine could be too powerful. Olds insiders say that the 2.3-liter Four will develop 250 hp when turbocharged, and that is more thrust than any existing GM front-drive transmission can handle. By this time next year, Oldsmobile will only have front-drive cars, so the engine faces a stonewall future unless a new transmission is developed.

#### **New Cutlass Supreme**

Olds' version of GM's W-car line will be a 4-place coupe that replaces the present Cutlass Supreme. It will mean a major change next fall for the topselling Olds badge. Fwd, unit-body construction, and perhaps a 4-cylinder base engine are all first-time features in this car. Styling will identify the new Cutlass Supreme as an Olds, to set it apart from its sisters, Grand Prix and Regal. Look for a rounded front end similar to the Toronado, a wide and slanted C post, and a small solid rectangle in the center of the grille—part of the current Olds styling trademark.

#### Next for Chrysler

Last of the older design cars to be changed at Chrysler will be the full-size Fifth Avenue. It is slated for a front-drive changeover next year, and its introduction will mark the first time in its history that Chrysler has not built a rear-drive sedan. Styling will be formal, but will follow the aerodynamic trends seen in Ford's Taurus. Only 4-doors will be produced initially, one for Chrysler, the other for Dodge.

#### We're hard on cars

How often should you change your oil and filter? Carmakers say every 7500 miles is okay for "normal" driving, 3000 to 5000 miles for "severe" service. A survey of mechanics by Allied Automotive—the people who make Fram filters—shows that the pros prefer the shorter intervals. Allied says 80 percent of U.S. drivers fall into automaker's "severe" category: long trips at high speed, stop-and-go city driving, trailer towing or dusty roads.

# To stop wasting energy, press here.

Only the Hunter Programmable Thermostat has a feature that'll help you manage your heating costs every day of the month. It's called an Energy Monitor.

At the touch of a button, it displays the amount of energy you've used today, yesterday, this week and last week. So you can start controlling your energy usage immediately and save up to 35% on your heating and cooling bills.

OF SATE OF SET O

In fact, our thermostat saves so much, so quickly, it pays for itself in just a few months in most homes.

And installing one takes only a screwdriver and about 30 minutes.

For a free brochure about America's #1 selling electronic programmable thermostat, write us at 2500 Frisco Ave., P.O. Box 14775, Memphis, TN 38114. Or call (901) 745-9222 for your nearest Hunter retailer.

Needless to say, you won't be wasting your energy.

Hunter Fan Company • Building The Best For Over 100 Years.

Ceiling Fans • Air Conditioners • Thermostats • De-Humidifiers • Humidifiers

# **New Home Security Device Stops Burglars**

Introducing the best bargain in low cost home security! Now you can protect your home and family in minutes.

#### **Better Than Burglar Alarms**

Law enforcement officials will tell you a dark house is like an invitation to a burglar, and that leaving your lights on when you are away from home is one of the best ways to make it look occupied. But leaving the lights on all the time costs money and rarely fools the professional criminal.

#### Let AudioLites Guard Your Home

AudioLites turn ordinary lights into sound activated security systems. If anyone even approaches your home, Audio-Lite sensors pick up the sound and flood your yard with light, room lights come on instantly and intruders are frightened away.

#### Never Stumble in a **Dark Room Again**

Unlighted rooms, stairways and outdoor areas are often hazardous due to inconvenient or hard to reach light switches. AudioLites light your way the minute they hear you coming. Just imagine the safety and convenience of having your driveway light up the moment your car approaches.

#### **AudioLites Work Anywhere**

Each AudioLite can be adjusted to turn on at varying sound levels. With a small screwdriver, you set the amount of sound needed to activate the lights . . . anything from a whisper to a loud shout. Lights are timed to stay on up to two minutes. Each new sound triggers the internal timer and begins a new countdown. So lights stay on while you're in a room and go off automatically when you leave. For quiet activities, AudioLite has a manual on-off switch.

#### 30 Day Money-back Guarantee

Solid state construction and quality craftsmanship means no wear and tear on parts. AudioLites are UL listed and come with a ONE YEAR REPLACEMENT WARRANTY. Try our AudioLites for 30 days, risk free. You'll wonder how you ever lived without them. If you don't agree that they add security, safety and convenience to your home, just return them for a prompt full refund.

#### Free Shipping and a \$20 Savings When You Order 4 or More!

To give you total home protection, you'll want more than one AudioLite. Order 4 or more AudioLites and enjoy our extra discounted price of just \$19.95 each. That means a package of 4 is just \$79.80. YOU SAVE \$20!



Protects your home and family. Stops burglars by turning on lights before they break in.

#### Extra Bonus — Order Today!

And, if you order today we'll include eight FREE Burglar Alarm Warning Stickers for your windows and doors, with any order of 4 or more. A \$3.95 value.

#### Easy Ordering Over Our Toll-Free Line

Order today by calling: 1-800-525-8624 (In CA 1-800-233-9559). Or, send to Progressive Energy Corp., 255 So. Bent Ave, #B-1, Dept. PM116, San Marcos, CA 92069.

YES, I want to start enjoying the security, safety and convenience of AudioLites today. If in 30 days, I am not fully satisfied, I can return my AudioLites for a prompt refund.

☐ Please send me AudioLite(s) at \$24.95 each. (Include \$2.50 shipping for 1, \$3.50 shipping for 2 or 3.) California residents add 6%

I want to SAVE \$20 and get FREE SHIPPING. Please send me 4 or more at \$19.95 each - along with my FREE BONUS.

3 models: (order any combination)

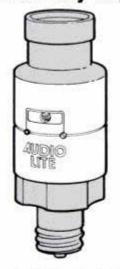
Plug	(s) Socket(s)	Switch(s)
☐ Check	☐ MasterCard/Vis	sa 🗆 C.O.D.
Card #		
Exp. Date_		
Name		
Address		
City	State	Zip



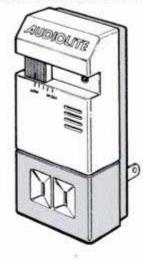
#### Progressive Energy Corporation

255 So. Bent Ave., #B-1, Dept. PM116 San Marcos, CA 92069 TOLL FREE 1-800-525-8624. In CA 1-800-233-9559 1986 Progressive Energy Corp.

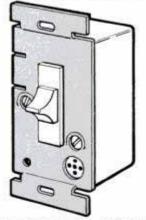
#### Three Easy Ways to Protect Your Home in Minutes



The AudioLite Socket is as easy to use as screwing in a light bulb. This is the AudioLite created for outside walkways. Works with up to 150 watts.



The AudioLite Plug plugs into any standard outlet and is designed to be used on interior room lamps. Any room with a lamp can be sound acflood lamps, driveways and tivated. The plug is portable and can be used anywhere. Works with up to 300 watts.



The AudioLite Switch turns on ceiling lights. It's terrific for dark stairways, hallways, entry ways, basements and garages. It installs quickly and easily in place of your present light switch using just a screwdriver. It takes only a few minutes, even for a novice. Works with up to 200 watts. (incandescent)

# **Photography**



BY STEPHEN A. BOOTH

#### **Shooting From The Hip**



Contoured handgrip on Canon Sure Shot Supreme makes for comfortable shooting. Data back (below) records date, time.

In the beginning there was the Sure Shot, one of the first automatic-focusing 35mm compacts that let you concentrate on the picture instead of the camera. Now, the Sure Shot is in its third generation, and the new point-and-shooter is called the Sure Shot Supreme. It incorporates some physical and electronic design innovations that truly let you fire from the hip.

The first thing you'll notice about the Supreme is its unique contoured shape. The tough, molded plastic body has the soft, rounded lines of a Porsche. This, and its curved, nonslip rubberized handgrip, demonstrate the family relation between the Sure Shot Supreme and Canon's top-of-the-line T90 programmed SLR camera.

It's that contoured grip that makes the Supreme a real hip-shooter. You can confidently hold, aim and fire with one hand. I learned that firsthand during boat outings this summer, when sea conditions warranted a tight grip on the boat.

This singlehanded ap-

proach to photography is assisted by the Supreme's in-

ternal lens cover: The cover

opens with the press of a

button, much like a springloaded clasp knife. Another aid to quick-draw snapshooting is the Sure Shot's contoured and fitted hip-holster carrying case.

Of course, none of this trick shooting would be possible without the Supreme's infrared autofocus system. In fact, the improved imagedetector lets the 38mm f/2.8 lens focus to within 22 in. You need not worry about activating the electronic flash: It switches on automatically when the camera's computerized exposure system detects the possibility of underexposure. The same light metering system automatically detects a backsituation-when lighting your subject is posed against a bright background. In this case, the Sure Shot Supreme automatically fires its flash to fill-light your subject and thereby prevent silhouetting. If silhouetting is a special effect you're trying to achieve, you can turn off the auto-flash feature.

Because the Sure Shot Supreme's powerplant is a 6volt lithium battery, you should be able to take about 1200 pictures—including 400 with flash—before you change the battery.

Besides the flash, autofocusing and metering systems, the lithium battery operates Sure Shot Supreme's automatic film advance and rewind motors.

It also powers the built-in data back on the more expensive Sure Shot Supreme Quartz Date model (\$329. compared to \$301 for the standard Supreme). The Quartz Date version lets you record time, date or other information on the lower right-hand corner of your photograph. Additionally, the data back displays the date you loaded film into the camera. The Sure Shot Supremes have DX automatic film-speed sensing for ASA 50, 100, 200, 400, 800 and 1600 films.

Finally, there's a thoughtful touch built into the Sure Shot Supreme that deserves praise—but you'll have to turn the camera upside down to see it. It's an ingenious "tilt" knob that lets you angle the camera up to 16° for self-timer photos when you don't have a tripod. This novel design elevates the Supreme from single-handed to hands-off photography.

If the new Sure Shot Supremes look like candidates for holiday gift-giving, but your year-end cash is tight, you can finance the purchase under Canon's new credit card program. The 20-month financing applies to all Canon products.

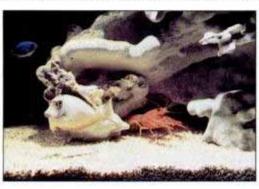
#### PM Photo Album—Tips For Better Pictures

Home aquariums provide a wealth of photo opportunities. But fish move quickly, and require fast shutter speeds for crisp pictures.

High-wattage photo floods used with tungstentype films work fine, but these lights might spook the fish and overheat the water, too. Electronic flash is better: It will freeze subject movement, cause little disturbance, and let you use daylight-balanced film.

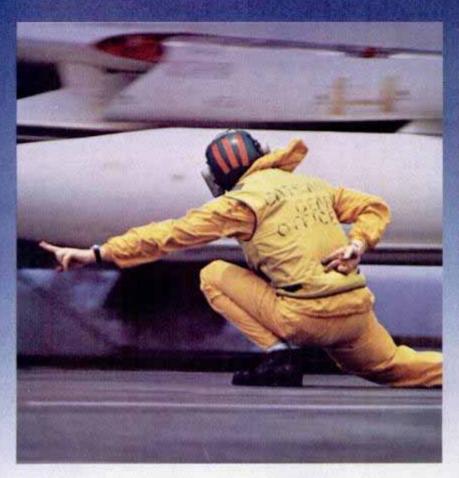
A single electronic flash held just above the water minimizes unwanted reflections off the fishtank glass, and creates a realistic sunlit look. All you

need is a flash extension cord. If your camera doesn't have through-the-lens flash metering, set the flash to manual and check the exposure table to set the proper f/stop for your flash-to-subject distance. Cover the flash with paper if its output is too high, or use film with a slower ASA speed. Before shooting, clean the tank glass inside and out. Darken the room to minimize reflections. Keep the lens parallel to the tank glass. If the fish swims out of focus, limit its movement with a sheet of clear glass inserted in the tank.—Armand Ensanian





# THE EXPERIENCE LASTS A LIFETIME.



Things happen fast in the Navy. And with more than sixty career fields to choose from, you get a choice that will give you a headstart on the rest of your life.

From the beginning you get training and on-the-job experience with some of the most advanced equipment in the world. And travel that will take you places you've only dreamed of. Hong Kong. Naples. Bangkok. Rio de Janeiro.

But, whether you're seeing the world in a guided missile cruiser, a nuclear submarine or on one of the world's largest aircraft carriers, you'll be seeing your future develop today.

Get a start on your tomorrow today. See your local recruiter or call toll-free 800-327-NAVY.



# TOYOTA 1 TON

#### DOUBLE DUTY

1 Ton gives you the option of a 5000-lb. towing capacity\* with a combined GVWR of 8500 lbs. Those are big truck loads by any standards.



# ONE TOUGH ONE TON!

Toyota's 1 Ton out-muscles even the mid-size trucks when it comes to payload at 2655 lbs.\*\* It's big-job tough, with special heavy-duty components throughout; front and rear suspension, rear axle, and load floor are all extra rugged. The bed is long and strong, with double-wall construction.

An optional automatic transmission with column shift makes for roomy 3-across seating.

LOOKING OUT FOR YOU HAS MADE TOYOTA #1.



#### COME TO POWER

1 Ton has the muscle, 116 hp from a 24 liter electronically fuel-injected engine with plenty of low-end torque to get the big loads moving.



With menual transmission optional towing capacity upgrade and 5000-lb, weight-carrying frame-industed class III tow hitch.

Including occupants, equipment and cargo.

\$\insertminus 1980 \text{Toyota Motor Sales, U.S.A., Inc.}\$

COULD ASK TOYOTA
FOR ANYTHING
MORE!

Get More From Life ... Buckle Up!

Missanura samundulum messayuw mad



You feel the excitement. You see the magic. But what you don't see is the sophisticated technology that makes it all happen.

BY DENNIS ESKOW, Science/Technology Editor Photos from Walt Disney World

he name Walt Disney conjures up images of talking animals, magic kingdoms, witches, sorcerer's apprentices and other such fantasy. Enter Walt Disney World during the 15th anniversary of the nation's most popular theme park system and you'll get plenty of the

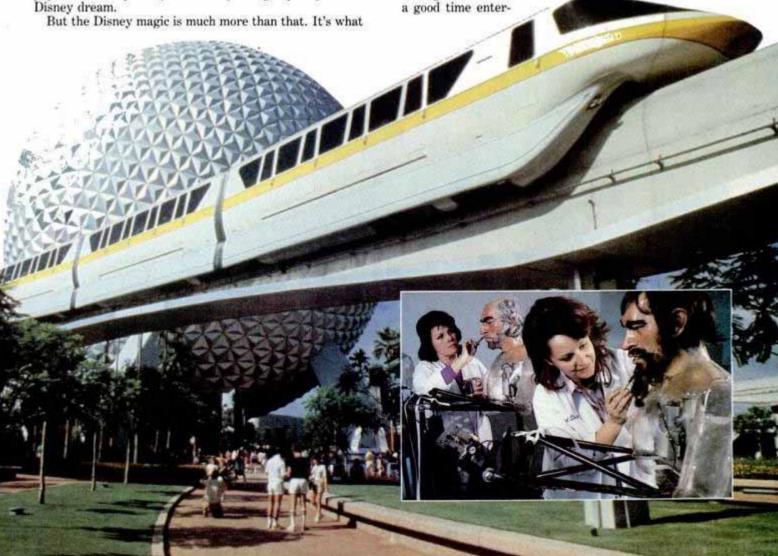
Disney dream.

Walt Disney talked with Donald Duck (above), but his dream park was no cartoon. Its advanced monorall system (below) and highly detailed androids (inset) are very high tech.

you don't see when you enter the sensory excitement of Epcot Center and the Magic Kingdom. It's technology that runs ahead of the rest of the entertainment world-and even much of the industrial world-that makes the magic happen. The magicians are pros whose job descriptions are so unusual that the Disney empire had to create a name for them; Imagineers. That's what it's all about, a blend of pure imagination and plain old engineering.

"The philosophy is so fabulous, it's like making a motion picture," says Jim Verity, manager of Show Quality Standards at the Orlando, Florida, park. While Verity and his

colleagues seem to have



taining over 20 million visitors a year, the comparison with a motion picture may be understated. Disney World is an innovation factory where:

The nation's first fully operational, totally computerized monorail system carries thousands of passengers an hour with uncanny efficiency.

A pioneering Universe of Energy pavilion theater shunts 2000 customers an hour through a multimedia sensory experience that includes a moving auditorium and a pair of huge people-moving turntables that ride on air.

Advanced entertainment androids (Disney calls them Audio-Animatronics) are programmed to make random movements, creating a stunning imitation of real life people and animals.

A planned Norway Pavilion will allow visitors to ride Viking ships through raging thunder and lightning.

■ A high-tech communications system—the first to use fiber-optics in commercial operation—transmits telephone calls and computer data.

Disney employs more microchips, lasers, robots, computers and high-tech







Technician puts android through its paces before installation (top). In the lab (above) every detail is hydraulically run to make stunningly real figures (left).

light systems per square foot of fun than any amusement park. The numbers are kept close to the vest, but the expenditures are said to be in the tens of millions of dollars per year, not unlike the budgets of small suburban communities surrounding the showplace in central Florida.

"We are entertainers, but as importantly, we are people-movers," says Tony Altobelli, a Disney spokesman. "Anyone can put on a show. Getting the people in and out has to be part of the show, too. It has to be a pleasant experience."

That's what you'd have to call a ride on the Mark IV Monorail System. It's the primary transportation system to get you around the interior of the 43-square-mile park. I've travelled the entire system a dozen times and never waited more than 15 minutes to get from one place to another, even when the park was most jammed.

Each metal and composite train carries 250 passengers, a grand total for the whole system estimated at 80,000 passengers every day of the year. The trains travel on wheels that hug an elevated beamway's single power rail. It supplies the juice to an induction motor system controlled primarily by a human driver. Signals are computerized and the drivers move along at a rhythm dictated from computer-central in Epcot, the adult theme park 3 miles from the kids' favorite, The Magic Kingdom. The drivers have never had an accident and probably never will, since the computer monitoring is designed to stop the car if the driver cannot.

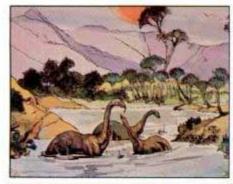
The Mark IV system picks up passengers at the Magic Kingdom, Epcot Center, visitor parking and from the lobbies of two hotels located between the parks. This system has lately given birth to other transportation advances, notably the open and driverless WEDway (WED stands for Walter Elias Disney) People-Mover.

If you can't get to Disney World, you

can find a WEDway People-Mover in Texas at the Houston Intercontinental Airport. And, Japanese transportation officials have been looking at WEDway systems for possible use at the Tokyo Airport.

On the quiet monorail ride from the hotel to Epcot, you get a panoramic view of all Disney has to offer. And then you get off at the entrance, where the 1-million-pound, 180-ft.-high dimpled anodized aluminum golf ball that is Spaceship Earth signals you have arrived. My host, Tony Altobelli, and I took a few sharp turns away from that familiar exhibit to tour Exxon's Universe of Energy. Here, Disney has pulled out all the stops in people-moving and entertainment technology.

The 38-minute trip through the energy pavilion includes three movies and a ride through time that lets you brush up against what seem like real dinosaurs. A trip through the history and prehistory of energy gathering may not sound interesting, but the show turns







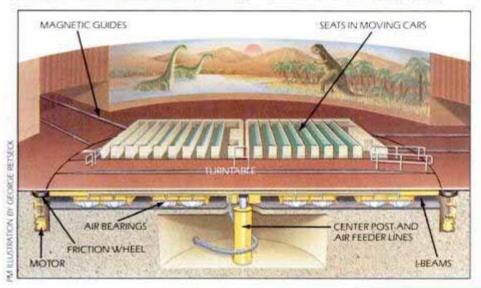
Disney imagineers created concept of the Epcot energy pavilion (top left) shown in operation (above). Moving theater seats (left) ride on air on turntable (below).

and 30,550 pounds with a full load. When the theater is full, nearly 200,000 pounds press against the floor.

The cars are driven on steerable wheels at about 2 ft, per second (1.36 mph) by a 6-hp electric motor powered by eight 12-volt batteries. These are recharged twice during each show by inductive power couplings built into part of the theater floor. Steering is done by computer. As the car moves along a magnetic wire tape, its onboard computer talks to a show computer stationed at another part of the building. The computers keep the moving seats on an appointed route.

Most guests are too busy gasping at the evolving show to notice the technology beneath its surface.

The show takes place in the round, and the 200,000 pounds of passengers and vehicles sit atop a turntable. The steel frame of the turntable is carpeted and, when the guests go home, pivots



out to be a razzle-dazzle experience thanks to the wealth of technologies employed to put it on.

At the center of the Universe of Energy experience is the art and science of people-moving. About 600 people enter the building at a time. In the reception area, you are treated to a multimedia show on a 14- by 90-ft, projection surface made up of 100 solid triangular elements. Towering flames, cascading waterfalls and thundering jet aircraft tremble across the screen as a narrator gives you an introduction to the world of energy. The show is brief and awesome, and then doors open beneath the screen. You walk into a room with projection screens running more than 200° around.

In the room, 600 guests are whisked by Disney personnel to their seats in one of six computerized, wire-guided, self-propelled vehicles that serve as a moving auditorium. The 97-seat cars are aluminum framed with plastic cladding, They weigh 16,150 pounds empty Norway Exhibit opens in 1988. It takes guests on a Viking boat ride through a realistic electrical storm. Models and concept art were done by Disney Imagineering.







Computer center controls a wide variety of Epcot functions, such as Communicore reservation service (below) that allows guests to reserve hotel and restaurant space on 2-way TV system.



on a centerpost and rests on a series of I-beams. During the show, air compressed at the Disney World private utility station is fed into dozens of rubber-bladder-like "air bearings" beneath the turntable floor. Air is also bled out of the bearings and is forced into the spaces between I-beams at dozens of locations. All this air lifts the turntable 3/4-in. off the floor. The table is turned at an imperceptible rate by a pair of friction wheels, basically small automotive tires powered by electric motors. "You could turn the whole affair by hand if you wanted to," says Dave Harbaugh of Disney Imagineering. "The turntable is basically floating on air."

On the way to the second theater, you pass through a dense forest where the Audio-Animatronic dinosaurs blink their eyes, raise their heads, swallow the flora of a bygone time and grunt and groan in bone-chilling realism. Unknown to the guests, a steel door descends quietly into the floor on hydraulic jacks, letting the cars pass into the theater, then rising again to cut off all sound between the rooms.

Harbaugh, a systems engineer, says when they were completing the energy pavilion he went inside for an inspection. He entered the circular theater, and his crew raised the 10-ft.-high steel door behind him to demonstrate its quiet efficiency.

"After a few seconds, I was convinced it worked fine and I called out for the crew to lower the door again so I could get out," Harbaugh recalls. "Nothing happened, so I shouted at the top of my lungs. Still, nothing happened. So I banged on the door with my fists. After about 10 minutes of this, I realized that no one could hear me. So I made my way out of the building through an emergency exit."

In the second theater, you see another movie that covers modern energy developments at a fast-pace on a 220° screen that displays a spectacular 65-mm film to the accompaniment of Dolbyized quad sound.



All this for 38 minutes worth of entertainment. But it's just a small taste of what to expect in visiting the numerous technological amusements of Epcot, not to mention the equally numer-"worlds" within the Magic Kingdom. Wherever we went, it seemed, we were greeted by innovation, not the least of which were the ubiquitous androids. To get the real story behind these wonders, we had to travel to the headquarters of Disney Imagineering, a stone's throw from Hollywood, but a world apart from anything you've ever seen.

Disney Imagineering is the Bell Laboratories of theme parks. It is housed inside one of those boxy, low-lying buildings that seem to ooze research. The corridors of the building are lined with pencil sketches, color renderings and completed oil paintings that depict attractions of the past and future for Disney World and Disneyland in Anaheim, California.

Bright-looking artisans and technicians stand in the hallways with sketches and blueprints unfurled, chattering on like a NASA team preparing for a launch. Meeting rooms are brimming with groups of animated figures you just know are human. The people working here are the grownup kids who are never quite satisfied with the final product. They have, in fact, rebuilt several Disney attractions over the years after figuring out new ways to make fun-seekers ooh and ah.

"This is primarily an idea factory," says spokesman Paul Goldman as he leads you into a cavernous model-making room where imagineers work on various elements of a scale-model Epcot Center the size of an 18-hole miniature golf course.

In one corner of the room, production designer Paul Torrigino is etching fine lines into a wooden model of the Norway showcase, scheduled to open in 1988. You can see how passengers will board a miniature Viking ship traveling through a water flume over a course that takes them through the history of Norway right up to the present in the midst of a North Sea oil field.

"The big problem is the lightning," explains special effects designer Jim Mulder. "We want the guests to be right in the middle of it, but we want them to be safe." They toyed with the idea of creating realistic lightning with a friction generator, but there was no way to guarantee guest safety. Now they are working on a series of effects, possibly including lasers, to give you the thrill of a lifetime.

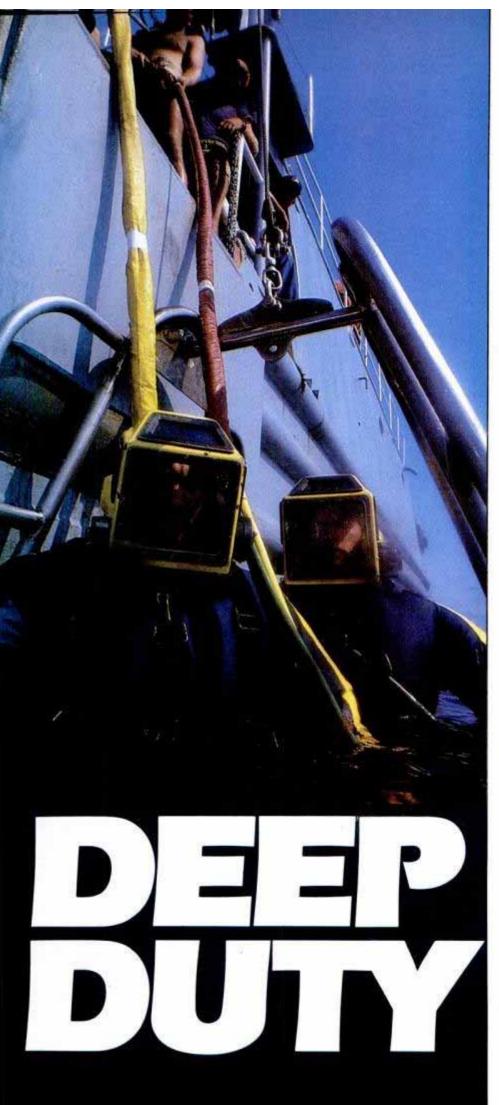
Creating people

In another Imagineering salon, Stan Abrahamson is working with machinists, electricians, plastic molding workers and animators to create new Audio-Animatronics. To build them with the flexible movements of a human being, these imagineers create a hollow, soft plastic body and then carefully insert rotary and linear actuators that make random movements hydraulically. Once skin and a costume are placed over the body, the android looks like a slightly stiffened living being.

At that point, the Audio-Animatronic is hooked up to a computer that is programmed to make the plastic move with a lifelike fluidity under the hydraulic power. A switch is turned on and the lips of the android move softly. A close look sends a shudder down your spine. As the android speaks, its cheeks pucker slightly, just as they would with a living person. When its hand moves, the skin crinkles just a bit.

"It's a creative process that needs an engineer's mind," Dave Harbaugh says. "When someone on the team conceives an idea, it's as if a lot of parts of one brain are moving into action. There's the creative part that draws the concepts. There's the engineer who explains how each movement will work. There's the technician who has to build the thing in the end. But all the pieces fall together very well."

Back at Disney World, we thought about just how well the pieces fall together. The unseen computer rooms. The hydraulics beneath the skin of androids. The sights and sounds of a magical world. It's all been made possible by a unique kind of technology that has even found a place in the real world outside. That's Disney World's 15th anniversary present to all of us.



The U.S. Navy is diving deeper and working harder with the latest in undersea technology.

BY TIM COLE, Outdoors Editor Photos by Brian Wolff

reen diver, walk forward and step off the stage." The instructions from divemaster Jack DeLauter traveled by intercom down my air-supply line from the dive training ship on the surface 50 ft. above, and rang inside the Mark 12 diving hat fastened to the neck ring on my dry suit.

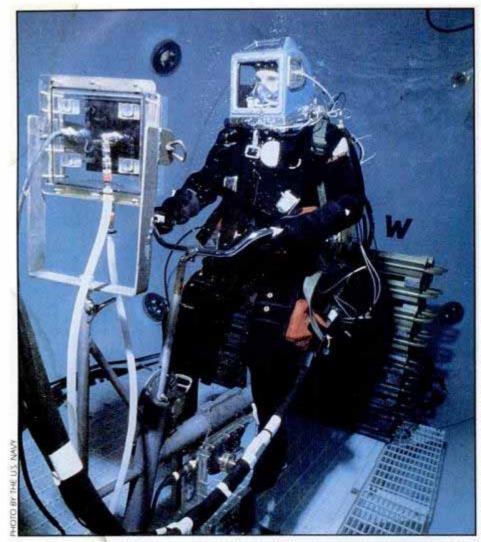
"Okay, green diver," I replied, and took my first tentative steps across the aluminum platform used to lower me and my partner, red diver Lot Christensen, to the murky harbor bottom. A weighted boot slid over the edge into the pea green and puce, and I strode into the gloom right behind it, kicking up so much turbid goo that it completely blocked the faint light that remained from a beautiful Florida morning.

Blackness—complete, utter, absolute—filled my helmet, eliminating such intimate features as the diffuser bar that fed me air, the intercom mike that connected me to the men at the compressor pumps topside, and even the nose on my face (which I've gotten sort of used to).

So this, I thought, is the typical workshop environment of the U.S. Navy diver. Bleak, unforgiving, dangerous-but somehow electrified by the dual demands of work and sheer survival. It's a world of touch and instinct, when the through-bolts on a pipe gasket need replacing in the mud 100 ft. down; a world of hiss, boil and blinding white light, when cutting tools must eat through multiple layers of plate steel; and a world of cooperation and trust, when big jobs-like removing a 900-pound propeller nut from an aircraft carrier-demand a most unusual collaboration of brains and brawn.

As Cmdr. John D. M. Hamilton, head of the Navy's Experimental Dive Unit, says, "These guys are the unsung heroes. They are humpin' it seven days a week in ship's husbandry saving the taxpayer's money and making sure our ships are prepared to go into battle." You'll also find Navy divers performing in the world's deepest oceans, developing sophisticated gear for clandestine underwater missions—or carrying out grim tasks like recovering the remains of the Space Shuttle *Challenger*.

The simple, durable Mark 12 diving system (left) is the new look in Navy dive technology for work from 0 to 300 ft.





The Mark 14 saturation diving system (left) is intended for work in extreme depths. It's being tested here in the hyperbaric complex of the Navy's Ocean Simulation Facility. Mark 14 divers breath a mix of helium and oxygen for up to 30 days, living in a pressurized chamber onboard ship and traveling from the surface to the work site in a pressurized transfer capsule. The Mark 1 (above) is a surface supply helmet that incorporates a demand regulator. It's for mid-depth work from 0 to 190 ft. but can be adapted to light-duty helium/oxygen diving.

To accomplish a multitude of underwater requirements at various depths, the Navy has moved into the fast lane, progressing far beyond the old copper-hat Mark V diving system used just a decade ago (and still favored by a few sponge fishermen), to specialized gear appropriate for various levels. The objective is always the same: To keep a diver working longer, easier and more safely than ever before. The Navy begins the task by defining the mission.

From 0 to 1000 ft., considered diving's working limit, men train in saturation, or "sat," diving techniques using the Mark 14 system, the Navy's latest deep-dive innovation. Divers breath a mixed gas of helium and oxygen. The actual diving suit and helmet is adapted from the tried-andtrue Mark 12 system.

In terms of sheer complexity, though, a Mark 14 dive is the next closest thing to a moon shot. Divers enter a chamber onboard ship, where they are introduced to the mixed gas environment and pressurized. When they're ready to dive, they enter a diving capsule, called a PTC, which is also pressurized to working depth, and are lowered to the work site. They come and go from the surface to the bottom inside the bell under constant pressure, breathing mixed gas, for as long as two weeks, which eliminates lengthy decompression obligations between dives.

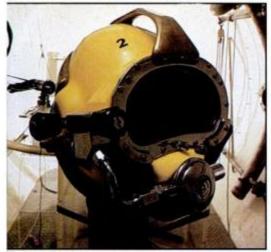
The system is used for heavy work at extreme depths—like recovering the safe of the sunken Andrea Doria. The pressurized JIM suit—which divers "wear" dry to extreme depths—is finding use in some commercial applications. The operator uses claws at the end of manipulator arms to perform tasks, and while the JIM suit reduces some of the hazards of sat diving, it also has some significant limita-

tions. "A claw doesn't have a thumb that closes to grip objects underwater, and an inability to perform a simple movement like that can severely limit JIM suit's effectiveness," says Lt. Cmdr. John Devlin, executive officer of the Navy's Experimental Dive Unit.

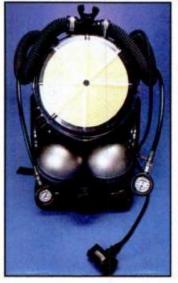
The Mark 12 system is the Navy's mainstay for work on ship bottoms—limiting costly dry-dock time. Normally used from 0 to 60 ft., the system consists of a 39-pound helmet, an inner dry suit, a weighted 1-piece outer garment that resists chafe, lead-filled galoshes and a "jocking harness" that keeps the helmet balanced and tight against the body. The diffuser bar inside the hat runs just under your nose and feeds air to the lungs. Brass control valves on the outside of the "hat" control the air feed and venting.

A working depth of 190 ft. is not considered unusual for the Mark 12. But the Mark 12 can also be converted for mixed gas work with the addition of a recirculator backpack and other modifications. Working depth for this system is 300 ft., with a potential maximum of 380 ft. The "wet hat" Mark 1, with faceplate, nose cavity and nonrigid wetsuittype helmet, and the commercial Super Light 17 diving helmet, are also seeing a lot of use in the 0- to 300-ft. range.

The advantages of "surface supply" gear like the Mark 12 and the new Mark 14, with air or mixed gas fed to the diver by umbilical, are abundantly clear. A diver wearing scuba gear can remain at 190 ft. for only five minutes; a surface supply diver using the Mark 12 can remain at that depth for an hour, and perform gargantuan tasks with the help of specialized hydraulic tools. Shoulder-fired "stud guns" ram fasteners through half-inch steel, propelled by .30-.06 rifle cartridges. "Jetting" tools clean mud off objects with a force









Clockwise from left, contemporary underwater tools include a high-powered "stud gun" (bottom) for fastening steel plate, hydraulic impact wrench (top left) for cleaning ship hulls, jetting tool (top right) for clearing mud and hydraulic cable cutter (lower right). The popular Super Light 17 (above left) is considered the commercial equivalent of the Navy Mark 12 helmet. The Mark 16 rebreather (above) being developed for the Navy's combat swimmer community has a large canister filled with CO2 absorbent and two smaller canisters filled with O2 and air or helium. Developments at the Navy's Experimental Dive Unit include a unique wrist-worn decompression computer (above right). A Navy recompression chamber (right) can cure both the bends and altitude sickness.



of water. Hydraulic bolt cutters and hydraulic chisels cut, scrape and rend metal, clearing debris, constructing platforms, cleaning hull bottoms, replacing sonar domes.

From 0 to 50 ft., Navy divers are confronted with a mission that's shallow but no less dangerous. The near-surface depths are where the Navy's "combat swimmers" work—recovering unexploded ordnance, clearing mines or assaulting contested beachheads.

Closed-circuit recirculators, or "rebreathers," are the ultimate in combat swimmer technology, and the Mark 16 rebreather is on the cutting edge. The Mark 16, unlike the previous Mark 15, is nonmagnetic and virtually silent to foil metallic and acoustic detonation devices on underwater mines. And the advantage of recirculating air is obvious: Combat swimmers can advance on positions without revealing their location with exhaust bubbles.

All this technology is useless unless men and women are trained to make it work. That's where the Navy's Diving and Salvage Training Center comes in at the Coastal Systems Command in Panama City, Florida. Led by Capt. Perry S. Benson and his able exec, Lt. Cmdr. Dave Ashley, instructors convey the art and science of underwater "ops," and have set diving standards for both commercial divers and sport divers around the world.

The Dive Training Center works closely with the Navy's Experimental Dive Unit (EDU), also located in Panama City. Researchers test commercially available dive gear to measure its suitability for Navy use, and develop diving apparatus for special missions. EDU is also equipped with an Ocean Simulation Facility, which contains a 3-story hyperbaric chamber that duplicates the pressures divers

might encounter as deep as 1200 ft. Divers breath mixed gas and remain in the chamber for almost a month, "diving" daily in a wet chamber situated below the living accommodation. EDU has also recently completed development work on a wrist-mounted decompression computer for the combat swimmer community, and is testing the AGA dive mask using a unique machine that simulates human breathing physiology.

Personnel at EDU are in a unique position to view the future of manned operations beneath the sea. And as Cmdr. Hamilton sees it, emphasis on saturation diving to extreme depths will be redirected. Men in wetsuits will always be needed for truly demanding jobs, but explorations by robotic submersibles will gain favor, particularly with advances in claws and manipulator arms. The descent to the *Titanic* aboard a deep-diving mini-sub, and *Jason Jr.*'s televideo probe of the ship's inner spaces, clearly demonstrated the effectiveness of diving vehicles.

But it's the mid-depths where Navy divers do most of their work. The Mark 12 is simple and safe, and future use of the system will revolve around the way we design ships and how we work under water. Experiments are being completed to improve underwater welding techniques. Development is under way to create seawater hydraulic tools that eliminate pesky hydraulic fluids. And handholds for divers are being engineered into ship bottoms to make a diver's job easier.

Technology may permit Navy divers to go deeper, stay longer and work harder, but the great bulk of Navy diving will continue to be performed in that range from 0 to 60 ft., by a man swinging a pipe wrench—getting the job done.

## SPEED INSCALE

Give 20 pounds of plane 10 pounds of thrust and you've got a radio-controlled model that can break the 150-mph barrier.

#### TEXT AND PHOTOS BY FRANK FANELLI

hat happened to the propeller?" That's the first question. "Does it use a real jet engine?" We smile knowingly. A new type of aircraft has blasted into radiocontrolled modeling circles. It's big. It flies at speeds up to 150 mph. It's a ducted fan "jet."

We've gone beyond gluing sticks together. Now we have solid-state radio controls that feature up to 10 independent channels of operation that can be mixed, reversed and otherwise varied. But the heart of the model speed-demons is the ducted fan. It's a thrust device that relies on the same technology behind modern, high-bypass turbine engines.

The powerplant is a shrouded, multiblade fan. Behind it are sets of stators—aerodynamically shaped duct supports which straighten and direct the air in a thrust line. Two-cycle glow engines turn the fans that accelerate air to high velocity. Up to 12 pounds of thrust can be generated at 18,000 to 24,000 rpm.

The field has evolved over the past decade with a growing number of commercial kits available. The zenith of the competition comes on the wings of a company called Byron Originals, which introduced the largest of the fan units—a 6-in.-dia. rig—for scale jets. The Byron kits with their Byro Jet engines have become popular as trainers for newcomers to scale-model jet flying.

Back in the 1970s, the only engines capable of generating the rpm needed in fan-jets were unthrottled 0.40-cu.-in. racing engines. They put out a little more than 2 hp. It wasn't until design changes brought larger engines that the big fans emerged. The Byro Jet model from Byron used a 0.60-cu.-in. engine, spinning the fan at 18,000 rpm. Couple this with a large diameter fan and you get increased static thrust, which translates to the power you need

for bigger airframes. Look at the size of the fan-jet craft shown in the black and white photo on this page!

On a sunny summer afternoon, walk by many of the nation's remote play areas and you'll be able to hear the whine of the big fans.

Maybe you'll run into Mike Kulczyk, who built from scratch a beautiful Saab JA-37 Viggen out of wood. It includes retractable landing gear.

Or you might run into a team of Northrop engineers who fly Kfirs made by Jet Hangar Hobbies. The Northrop team performs exciting high-speed aerobatic formations. These powerful jets are covered with a heat-shrinkable adhesive known as MonoKote.

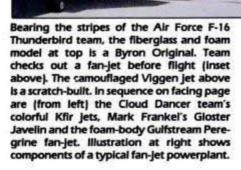
Another well-known fan-jet, scratchbuilt by Mark Frankel, is a scale model of Britain's Gloster Javelin. It flies on a pair of Byro Jet fans. The body is fiberglass, and the aircraft is highly maneuverable.

As with full-scale jets of the "real world," model jets are undergoing a revolution in airframe materials. Larry Short, a Canadian farmer, is currently working on an all-foam model of the Gulfstream Peregrine single-engine business jet. The real jet has been put on hold, but the model, finished with mylar EconoKote, is flying quite well. The fuselage consists of three foam blocks cut around forms then glued together.

Warbirds seem to be the future of fan-jet models. F-14s with functional swing wings, F-15 Eagles and large-scale F-20 Tigersharks are on several drawing boards. As the components rely more on real aviation materials, and as the powerplants increase thrust, the jet models will become faster and more maneuverable.

We can hear someone asking in the not-too-distant future, "Does it use a real jet engine?" And the answer one day just might be yes.



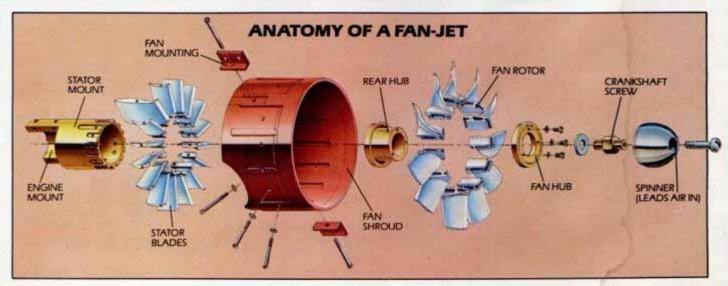












#### PM COMPARISON TEST

## RADARS

We use police radar guns to rank 11 top detectors.

BY RICH TAYLOR; Photos by Humphrey Sutton

tate and federal studies show that eight out of 10 drivers regularly exceed the legal speed limit. At the same time, police radar is more widespread than ever. Since 1981, the FCC has allowed police officers to operate radar under the same license as a 2-way radio—and there are now more than 2 million police radio licenses.

We figure that there are only two effective ways to protect yourself from radar citations. One is to drive 55 and be run off the road. The other is to keep up with traffic, buy a radar detector, and let the police stop the other guy.

The first radar detector was invented nearly 15 years ago by Dale Smith of Electrolert, not long after he'd invented one of the first police radar units and gotten trapped by his own device. In 1986, radar detectors are legal in every state except Connecticut, Virginia and the District of Columbia. Actually, under federal law, detectors should be legal in these states, too, but you don't want to be a test case.



## DETECTORS

The FCC assigns police radar two frequencies—10.525 GHz (X-band) and 24.150 GHz (K-band). Police radar works by transmitting a radio signal on one of these frequencies, receiving a reflected signal off your car, and then calculating speed by measuring the frequency shift in the reflected signal. This frequency shift is translated into a miles-per-hour reading of how fast your car is

moving toward or away from the transmitter. To get a true speed reading, the radar gun has to be aimed at you from a very shallow angle, nearly parallel to your direction of travel.

A radar detector is a simple superheterodyne radio receiver tuned to the police radar frequencies. It goes off when it picks up the signal. A major problem for radar and detector manufacturers



alike is that the FCC allows a number of other devices to operate on these and nearby frequencies, including garage door openers, burglar alarms and civilian walkie-talkies.

Most superhet detectors also emit interference signals of their own, signals that can be picked up by other detectors. One of the most important criteria for judging a radar detector is its lack of sensitivity to such false signals. At the same time, you want a detector with the sensitivity to pick up police radar far enough away to give you time to check your speedometer.

Most courts are reluctant to accept radar evidence without visual identification of the speeding car at a quartermile or less. In a straight line, then, if your detector can spot radar a mile away, you'll have all the time you need. More critical spots are around corners and over hills, where a police officer can nab you as you swing into his beam.

#### Performance counts

Radar detector engineers say that laboratory tests of detector sensitivity are interesting, but comparatively meaningless. What counts, they say, is performance out on the highway. To that end, we devised four standard tests of radar detector performance: around a corner, over a hill, straightline distance and sensitivity to interference.

To prevent detector-to-detector false signals, each detector was tested singly over the same terrain. Our radar units were tripod-mounted for consistency—a K-15 X-band from MPH Industries and a Kustom Signals K-band from Kustom Electronics Inc. Results of the individual tests are contained in the accompanying charts. We then combined the test results to come up with our overall performance ranking.

With the exception of the pint-size Passport, all the popular detectors in our test are roughly the same size, shape and weight. We avoided so-called "remote" or "hidden" detectors, which permanently mount the receiver behind the grille with a warning light under the dash, since they have less range than visor- or dash-mounted units. Most users appreciate the portability of 1-piece detectors that can be used in rental cars or switched from one family car to another.

Every detector incorporates some sort of signal-strength meter, a visual warning and an audible signal. Most also have a City/Highway switch to reduce sensitivity in areas of high interference. We judge them all acceptable in warning signal performance. We wouldn't choose one over another because the light is brighter, for example. As for styling, how much can you do with a black box?

Internally, most detectors are simi-

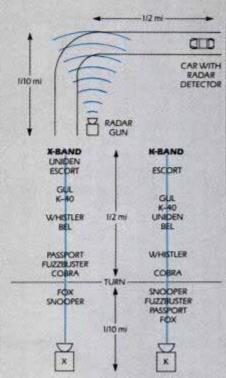
#### DETECTOR PERFORMANCE AROUND A CORNER



X- and K-band radar guns were clamped to tripods and used alternately to assure consistent performance during tests.

Probably the most common police radar setup is to shoot you as you come around a blind corner, turning into the beam. As you can see from the diagram, our total test area covered six-tenths of a mile, with the radar hidden around the corner and pointed 90° to the test car's original direction of travel. The detector would have to pick up signals that bounced off trees.

Amazingly, the Escort, Uniden, GUL and pointing at the radar K-40 were all able to sniff out the radar from detect it. Too late then!



nearly half a mile before the corner. The lowranked Fox, Snooper, Fuzzbuster and Passport had to be rounding the bend and pointing at the radar gun before they'd detect it. Too late then!

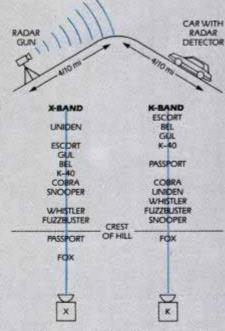
#### DETECTOR PERFORMANCE OVER A HILL



Radar Ready suction-cup mount and some Velcro ensured that each detector was mounted in the same position.

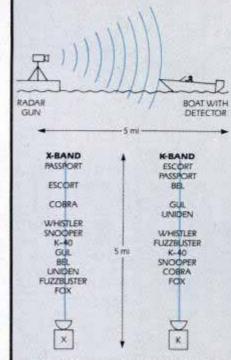
A common constabulary trick is to hide over the brow of a hill, with the radar gun pointing at the summit. Come unsuspectingly over the top, and "Gotcha!" All our detectors were so sensitive that we had to move our radar guns back four-tenths of a mile from the summit and, even then, the best detectors could find them from nearly a mile away, total distance. Again, the detectors were picking up "scatter"—radar signals reflected off trees, signs or other objects near the top of the hill. It seemed like magic, and was almost as much fun.

Once again, the Escort was the best



overall, followed by the GUL. The Uniden was terrific on X-band, mediocre on K-band. The poorest performer, the Fox, didn't detect the radar until it was over the brow of the hill, eyeball to eyeball with Smokey.

#### DETECTOR PERFORMANCE IN A STRAIGHT LINE



Since there are no straight and level roads several miles long in our part of the country, we tested each detector in a boat moving slowly away from the radar at the widest part of the Hudson River. Aiming diagonally across the Tappan Zee, we could get over 5 miles from the pier where the radar was set up. We measured the point at which each unit could no longer detect X-band and K-band radar. Radar tends to



Tappan Zee, the widest part of the Hudson River, gave us a flat surface miles long for maximum-range tests.

"skip" over water, giving it a longer range than over land. This gave us a broader measurement scale, with greater differentiation between detectors.

By far the best were the Escort and Passport from Cincinnati Microwave. Near our 5-mile limit they were still receiving strong signals on both bands. The least effective unit, the Fox Super Vixen II, had lost the scent after just two miles. lar; indeed, some are even built with components purchased from other detector companies, while others are the same unit "badge-engineered" with a differently styled case. All of them are built from solid-state components, making them as durable and reliable as your car radio or mobile phone.

With the exception of the premiumpriced Escort and Passport, which are sold only by direct mail, you should be able to find a substantial discount on any detector at discount electronic or car sound stores. The "going rate" seems to have little relationship to either list price or the performance of the unit. We'd suggest you shop around for the best deal on one of our higherranked units.

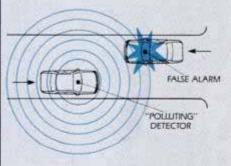
Because of the unit-to-unit interference problem, don't try to get tricky with dual detectors mounted fore and aft, or side by side. You'll actually get worse reception. Buy the single best detector you can afford, mount and adjust it according to the owner's manual, and head on down the highway.

You buy a radar detector to warn you of police radar in time to check your speed and slow down if necessary. But, even the best detector is not a license to speed, and you shouldn't expect it to be. Get going 25 or 30 mph over the limit and no detector is going to save you from a roadside conversation you'd rather not have. Most American drivers figure "10 over" the limit is guaranteed in the Bill of Rights; a good radar

(Please turn to page 150)

#### CAR-TO-CAR INTERFERENCE

#### ... TRIGGERS FALSE ALARMS IN:



"POLLUTING" DETECTOR	\# \$		Service Servic	\$ \$ \$	\$\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	10 mg	\$ 9		100 ON		55/4
BEL MICRO EYE	*	*	*	/ 4.3	*	*	*	*	*	*	/3
COBRA TRAPSHOOTER										*	
ESCORT	7114			- 87						*	
FOX VIXEN II			,		*						*
FUZZBUSTER				*				1 18		1	
GUL G-83S	*	*	*	*	*	*	*	*	*	*	
K-40 XK	*	*	*	*	*	*	*	*	*	*	
PASSPORT											
SNOOPER D-4000			DV.					lina)			null'
UNIDEN RD-55											
WHISTLER SPECTRUM					*	TV/III		100		-	1

major problem with some detectors is sensitivity to spurious emissions from other radar detectors, not to mention microwave transmitters of all sorts. We mounted a detector in each test car, then drove toward each other to see which detector produced false alarms from which others, in our experience, the easily disturbed detectors in this

test are also more prone to false alarms from other microwave radiation. Also, you're likely to ignore a detector that cries wolf every time you pass a bank with a microwave burglar alarm or a supermarket with motion-detecting door openers. That's just when Smokey will zap you!

By far the "dirtiest" detectors are the K-

40. BEL and GUL, which triggered false alarms from almost every other detector. The Fuzzbuster and Uniden are the most sensitive to false alarms. The least sensitive is the Whistler Spectrum, which gave out with a wolf whistle only for the Fox. And even that was a half-hearted "peep" not likely to be confused with a full-fledged alarm.

#### PM enters the Thunder Truck class and comes up aces in the grueling Baja 500.

BY TIM COLE, Outdoors Editor Photos by Rich Cox



Dave Shoppe/PM crew give thumbs up after a closely fought Baja win. Ford- and Goodyear-sponsored entry (right) takes a jump.

t looks like Dave Shoppe has got her in the groove. You can hear it in the syncopating roar of the NASCAR powerplant under the hood of his Ford F150 pickup, and see it in the dust streak that follows him out of the misty heart of Ensenada. You can feel it as the truck runs low and lean past ramshackle ranchitos and chicken farms, past washouts and "cross-grain," past cheering Mexican kids perched like sparrows on the fence rails. Somehow, you start to believe it as he blasts out of the draw into the white Baja sunshine, breaking for the high ground and hunting for victory with 490 torture-strewn miles to go.

For Shoppe in the Thunder Truck class, and offroad warriors piloting a wide assortment of buggies, mini pickups, dirt bikes and ATVs, it's the Baja 500 once again—an annual celebration of breakneck desert highballing. Like its 1000-mile cousin that runs each fall to La Paz, the Baja 500 is considered an all-star event for offroaders of all persuasions. The course follows a rough cloverleaf east out of Ensenada to Ojos Negros, cuts southwest to the Pacific near Colonet and Camalu. jogs east again across the spine of Baja to San Matias, then dips down to San Felipe on the sylvan Sea of Cortez. Here is the infamous "desert loop" of bonecrushing washboard sand and truck-killing boulders, a sustained 80-mile auto wreck that leaves drivers and codrivers feeling like tackle dummies at an NFL training camp.

From there, the course blazes northward through the sleepy intersection of Ville de Trinidad and arcs through the mountains before turning west for the sprint to the finish in downtown Ensenada.



## THE TOUGH



## GET GOING

Along the way, racers run a gauntlet of cactus, sagebrush and mesquite, encountering jagged, tire-shredding rocks, exuberant Mexican spectators swilling beer in the middle of the course, and the relentless winds of the Baja desert. Towering dust devils parade across the hard-packed dry lakes along the course—toying with even the biggest truck sailing along at 130 plus. Rattlesnakes and scorpions await the pit crews, some of whom predeploy into the desert with a 2-way radio, a sleeping bag and a gas can. Sweat and dust blind the eyes and choke the lungs.

For Dave Shoppe and his talented support team, Baja is both ordeal and adventure. POPULAR MECHANICS joined

For Dave Shoppe and his talented support team, Baja is both ordeal and adventure. POPULAR MECHANICS joined the Shoppe team this year for an inside look at a typical Baja entry. West Coast Editor Steve Parker traveled to Shoppe's headquarters in Hemet, California, to peer under the skin of Shoppe's Class 8 Baja racer. And I shared codriver responsibilities with Shoppe's faithful ally, Larry Maddox. It turned out to be the ride of a lifetime. Dave Shoppe marched to the winner's circle after nine hours of keen, intelligent driving. And codrivers and pit crew tasted the cool, clear elixir of a hard-fought Baja victory.

The road to triumph actually began back at the Shoppe Racing Team's Hemet garage, where the beefy Ford pickup was hand assembled. Shoppe estimates that it costs his Ford- and Goodyear-backed team around 200 manhours and \$20,000 to run a race like the Baja 500. Part of the expense is in preparing the truck—a meticulous and complex process performed by Darrell Jacques of D.J.'s Offroad Performance. The stepside ½-ton 2-wheel-drive pickup is stripped to the stock frame and its fiberglass F150 lookalike body panels are painted and festooned with stickers.

"The engine is an SVO 351 Windsor," says Jacques. "It has a lot of the same parts they're running in the NASCAR circuit, like the block, crank, heads and manifold. We run a Holley Double Pumper carb, Hooker headers and JE pistons. The transmission is basically a stock C-6 automatic with an Art Carr converter. It might sound complicated, but our basic philosophy is to keep it simple."

The special requirements of offroad racing place unusual demands on fluid delivery and cooling. The Shoppe team's truck like most of the trucks in Class 8, has transmission oil coolers in the bed. They're removed from harm's way, and they also add a little weight in the tail end. The Ford, which achieves a whopping 4 miles to the gallon, is equipped with a 40-gallon fuel cell. A 2½-gallon windshield washer reservoir and a 1-gallon water supply, tube-fed to the crew, are

added to the onboard fluids. Driver and codriver live and die offroad by the quality of their suspension. Shoppe's truck gets oversize 1-ton I-beams and radius arms up front. Leaf springs augmented by banks of 1:1, 14-in. Rancho shocks support the rear end. Tires are off-the-shelf Goodyear radial Wranglers.

Cabin layout reveals the creative side of D.J.'s offroad prep. Driver and codriver reside in a specially designed crash-resistant cage, locked in their highly adjustable Mastercraft seats with 5-point harnesses that have chafe-resistant pads in the shoulder area. Fuel system, spark brain and coil are led through the firewall to a position ahead of the codriver.

"We have two complete fuel systems from the cell to the carburetor, so if one fails, we flip a switch on a panel in the cab and we're racing again," says D.J. "The driver or codriver can almost rebuild or repair any part of the electrical or fluid delivery systems right from the cab."

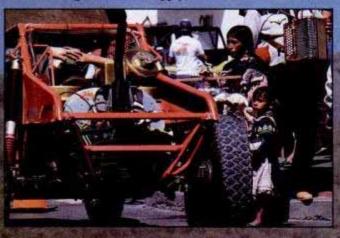
Comfort obviously takes a back seat to speed, but seemingly minor details count—like angling the steering wheel upward so Shoppe can rest his arms on flat sections of the course. Still, driver and codriver expect to absorb a considerable pounding, a harsh fact of offroad life.

"You've just got to take the abuse," says Shoppe, "and when it starts to hurt, you can't think about it." Indeed, he prefers to concentrate on the course, the competition and, most of all, his vehicle, during the race.

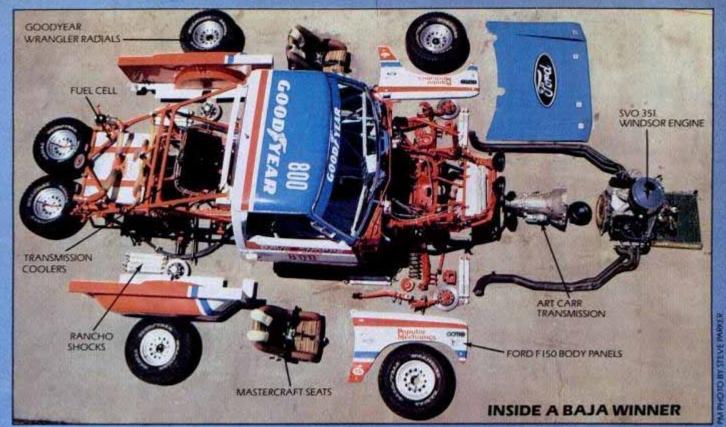
And what a race it is. Each vehicle is released from the start/finish line independently and timed through the 500-mile run. Shoppe likes to think of it as a series of drag races from obstacle to obstacle, so he sprints through the flat spots—frequently hitting the 130-mph high end—and pampers it through the rough spots, if you call an average speed of 60 mph through the hellacious bumps of the desert loop "pampering" it.

"That washboard is where you'll win the race," Shoppe says, "because there aren't too many trucks, and there aren't too many people, who can go fast through there." It's so bad, in fact, that stomach and chest muscles tighten involuntarily to try to keep your insides from moving. The shoulder harness pounds and pounds and pounds against your chest. Vision blurs in all this violent motion and your helmet-clad head knocks against the cage. Cactus thorns slap against the truck and float through the mesh in the side windows. Soon the cab fills with dust, prickers, rocks.

And when you think it's over, it isn't. But then there are those glorious flat pieces of the race







course, when the truck sails through the desert like a cruise missile. The engine winds out in a satisfying wail and the driver balances the imperatives of oil pressure, engine and transmission temp, speed, terrain and a lot of other drivers who also have their eye on the checkered flag.

Shoppe concedes quite a bit to the competition, principally the redoubtable Walker Evans, who drives a Dodge. Shoppe also acknowledges the skill and daring of Frank Vessels, who drove his Chevy to a second-place finish behind the Shoppe/PM team. It was nip and tuck, with Shoppe passing Vessels in the back desert country out of San Felipe. Thirty seconds, then 10, then 5 separated the two front-runners as they careened through the mountains—past Mexican families lumbering along in

their dilapidated sedans, past farm wagons on their way to market, past gun-toting Federales. Shoppe slammed his way through the arroyos and over the hillocks to the outskirts of Ensenada with Vessels right on his tail. The trucks hit the pavement and whined through the city to the flag, with Shoppe out in front by a truck length or two. He was right. He won the race out in the rough stuff of the desert loop.

And he was right about something else. The only thing that could top crossing the finish line first was the victory celebration afterward. But that's another story.



Baja flavor (left to right): A modified dune buggy sprints through the outback and presents a cultural distraction for Baja locals, an ATV hits the trail, a reconfigured VW chatters through a turn, and the Shoppe team makes a codriver swap.





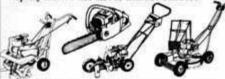
In just a short time, you can be ready to join one of the fastest growing industries in America... an industry where qualified men are making from \$25.00 to \$30.00 per hour... and that's just for labor. Parts, engines and accessories add even more to the profits.



Because the small engine industry has grown so quickly, an acute shortage of qualified Small Engine Professionals exists throughout the country. In fact, it's not unusual for a good small engine man to be three to four weeks behind in the summer and at least a week behind in the winter. When you see how many small engines are in use today, it's easy to understand why qualified men command such high prices as much as \$49.95 for a simple tune-up that takes less than an hour!

#### 65-million small engines are in service today!

That's right - there are over sixty-five 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 accredited and approved Foley-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.

#### 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.

#### 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 Foley-Belsaw Course.



Walter H. Strick

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

#### SEND FOR FREE FACTS!

You risk nothing by accepting this offer to find out how Foley-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!

#### FOLEY-BELSAW INSTITUTE of SMALL ENGINE REPAIR 51032 Field Bidg., Kansas City, MO. 64111

FOLEY-BELSAW INSTITUTE 51032 FIELD BUILDING

KANSAS CITY, MISSOURI 64111



You get all this Professional equipment with your

course, PLUS 4 H.P. Engine . . . ALL YOURS TO

BOOKLET!

Send TODAY

for this

fact-filled

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 30-Day NO RISK Trial

gives full details about	me the FREE booklet that it starting my own business in I understand there is no obligation will call.
Name	CONTRACTOR OF THE STATE OF THE
Address	
City	
State	Zip

The Roots Of American Furniture Design

Guides To Manufactured Panels And Workshop Clamps

Plans For

- ■White Lacquer Table
- Red Oak Desk
- Mahogany Sideboard
- Painted Coffee Table

Plus: A List Of Woodworking Supply Catalogs





Produced by the Home and Shop Dept. Designed by John Johanek



# Leading Edge

What's happening with the best contemporary American furniture and where it came from.

#### BY WENDELL CASTLE

The line between craft and art has never been as clear as some would like to believe, especially when it comes to furniture making. How can we honestly discriminate between the two? Does the difference lie with effort, inspiration or technique, or with what a piece will bring on the open market? In our view, the best contemporary furniture not only aspires to, but also obtains, the status of art.

Such pieces are inherently sculptural, even though they must accommodate the very real needs of the human body. And they are superbly crafted, combining material texture and finish in ways that resemble nothing so much as an

artist's palette. The debate, however, does continue both in academic circles and within the world of fine art.

We think the most informed opinions on these matters are bound to come from the players themselves, the people who actually do the work. To this end, we asked Wendell Castle, one of the foremost American furniture designers and builders, to comment on the state of the art-with a special focus on the roots of American design. We hope what follows will help cultivate a sense of furniture as both craft and art, and encourage all woodworkers to strive for more original designs in their own work.

he leading edge of American furniture most design is clearly seen in today's art furniture-those one of a kind, or limited edition, pieces built by designer craftsmen. These works are influenced by, and pay tribute to, a wide variety of different sources. Some of them are basically historical, while others touch on modern concerns such as minimalism and neoexpressionism.

In many ways, this variety of influence was spawned by our heritage. Because we are primarily descendants of displaced Europeans, we lack a sense of direct continuity with European traditions. In place of these, we borrow other influences

from the worlds of art, craft and industry to create what is commonly regarded as American style.

Whatever the particular antecedents, art furniture makers today are freer than ever before. They can incorporate, sometimes in a single piece, traditions as venerable as pure classicism with those that are basically iconoclastic, like pop. For instance, Scott Burton's marble seating arrangement in Manhattan's Equitable Tower is as classical as the Pines Of Rome, while San Francisco furniture maker Garry Knox Bennett irreverently combines massive and diminutive proportions and makes them all work. And, of course, Judy Kensley McKie's animal furniture is, at once, completely her own and yet inextricably linked

All these works and many more

to early Egyptian pieces.

Wendell Castle is director of The Wendell Castle School in Scottsville, New York, and is artist in residence at the School for American Craftsmen, Rochester Institute of Technology. His work is represented in the permanent collections of many museums, including the Metropolitan Museum of Art and the Museum of Modern Art.



Contemporary American furniture encompasses a wide range of design sensibilities. Two pieces by the author are shown here: Atlantis Chair (facing page) and Olympus Desk (above). Photos courtesy of The Gunlocke Co.

are aggressively original and represent highly personal design statements by the people who created them. Generally speaking, such artists are concerned with the conceptual content of the piece first, and only then with the technical skills necessary to execute it. This view necessarily excludes doing historical reproductions because they do not offer the challenge of original design.

Like many aspects of American life, contemporary furniture design exists in a pluralistic atmosphere. So many people are doing so many different things that to break this body of work into neat categories cannot be considered helpful in any serious way. But it is instructive to discuss the common heritage most designers share. By doing so, we can at least establish the departure point for their current work.

At the dawn of the 1900s, the American Industrial Revolution was beginning to mature and formerly creative individuals, like craftsmen and artisans, had become blue-collar workers. Cabinet makers, furniture makers, blacksmiths and more were being subsumed by the machinery of mass production. According to Lee Nordness, mass production by machine was becoming the main American aesthetic.

But, as is so often the case, this revolution was accompanied by a corresponding movement in the opposite direction. In the world of furniture building, this reaction took the form of the American Arts and Crafts Movement. According to David Cathers, furniture by Gustav Stickley and Elbert Hubbard's Roycroft Shops were a sharp rebuke to the deplorable working conditions and poor quality products that prevailed at the turn of the century.

At the same time, the English Arts and Crafts Movement was in full swing. Both the American and English versions were based on the same tenets of using high-quality materials and preserving a human dignity in the work process itself. These principles were articulated most clearly by John Ruskin and William Morris. There was, however, an important difference between the English and American schools of thought. The Morris ideal was truly reactionary. It called for a return to the materials and methods of building used in the pre-industrial age.

The Americans, on the other hand, were interested in exploring a more sophisticated use of industrial machines. Under the notable influence of Louis Comfort Tiffany, machines were used to produce countless beautifully designed and crafted objects. Tiffany was committed to employing the craftsman as the designer, not merely having him or her duplicate what was designed



Little White Desk With Clock And Lamp was designed and built by Garry Knox Bennett. Photo by Nicoli Zurek, courtesy of G.K. Bennett.

by someone else. In essence, this idea assumed the individual was master of the machine instead of its slave. Of course, what a few forward-looking people were doing was not embraced by the rest of the manufacturing world. In spite of Tiffany's crusades, by 1915 many studio crafts were considered extinct. This continued through the Depression and for years beyond.

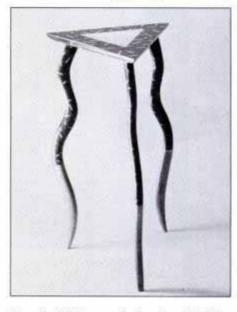
It should be noted that during these dormant years, high standards of workmanship did not disappear. It seems that craftsmanship has always been associated with personal pride and with the pride fostered by certain guilds and trade unions. But, the areas in which these standards remained high were not within the industrial environment.

In retrospect, it seems clear that virtuoso pieces-those with such high standards of craftsmanship that the piece is considered a work of art solely on the basis of its technical executiononly flourish in atmospheres that are not restricted by the compromising factors of time and money. As David Pye has observed, one of the highest priorities of the furniture business is to minimize the workmanship of risk. The idea is to minimize any manufacturing process in which human frailty can come into play. This is what industry is looking for. But it is worth noting that in the process, you eliminate the creativity of the person as well.

By not maintaining a solid tradition of the artisan or craftsman as designer, the field of furniture design was open to others. Architects, artists and designers all began to have influence. Architects, for example, have designed furniture for their buildings since the late 17th century. This stands to reason because after creating the space, and

therefore a demand for furnishings, who would be better suited to create complimentary pieces? In fact, architectural influences have been so strong it seems fair to say that most of the important production designs in this century have been by architects.

In this strength does lie a weakness, however. The aesthetics of architect-designed pieces tend to relate too closely to the technology and materials available at the time. Generally, an architect's training does not acquaint him or her with the full spectrum of technical and material possibilities that compose the palette of other designers. Artists, designers and craftsmen, on the other hand, are more familiar with these possibilities. But often, craftsmen have been trapped by a relatively



Dancing Table was designed and built by Bob Trotman. Photo courtesy of The Gallery of Applied Arts, New York, NY.



narrow, overly traditional approach.

Regardless of their relative strengths, over the years each of these groups have discovered the power of the furniture medium. It can provide such unlimited possibilities for personal and artistic expression, and, in the process, provide something that has a very real utility. This marriage of the aesthetic and functional is the major characteristic that separates furniture making from most of the other fine arts.

Of course, some symbiosis of architects, artists, designers and craftsmen did occur. European movements such as Art Deco, Dutch De Stijl, Russian constructivism and the famous Bauhaus school did encourage collaboration between different groups. And slowly the American furniture industry started to incorporate, into the product lines, the interdisciplinary philosophies of modern art. Artists, architects and craftsmen were hired to design updated pieces, resulting in many objects of exceptional beauty.

In essence, however, these pieces revealed some striking ironies. First, they ran contrary to the social origins of their inspiration because they were uniformly expensive. Second, they were inspired by urban life, and in 1925, 75 percent of all American consumers lived in rural settings. In 1928, Paul Frankl was compelled to write, "The home is a place that is still sacred and will not tolerate too many experiments or novelties." As a result, sales never matched the industry's enthusiasm for the products. By 1929, the onset of the Depression forced the industry to look toward the new field of industrial design for an answer to plummeting sales.

Streamlining was the response. The "fast" horizontal lines characteristic of this style were imitators of modern aircraft and automobiles, all of which were based on studies of aerodynamics. Many industries, including the production furniture business, found that they could increase sales of existing products, in some cases as much as 700 percent, by offering them in redesigned packages or by simply covering them with a modern skin. One example of this successful technique was the famous streamlined locomotive of the 1930s. In most cases, it was just a new shell over an old chassis. Of course, one major accomplishment of this period was that it made furniture more affordable. The joinery was less complicated and the fine detailing almost gone.

In the late 1930s, American designers such as Russell Wright and Norman Bel Geddes designed furniture for such well-known manufacturers as Heywood-Wakefield and Simmons. The spartan influences of the European In-



Sly Chair (above, with arm detail) was designed and built by Judy Kensley McKie. Photo courtesy of Judy Kensley McKie.

ternational Style were certainly being felt at this time, but the American designers were also influenced by feedback from the manufacturing industry. As a result, painted steel veneers, Bakelite and chromium-plated steel were some of the popular materials. These were appealing because of their low cost and ease of production.

In the best cases, the influences of manufacturing requirements on the individual designer produced stylish and functional pieces, most notably by Charles and Ray Eames and Eéro Saarinen. However, in the worst cases, this relationship resulted in products like the cheaply veneered throwaway furnishings common in the 1950s.

This widespread tendency toward inferior products has continued up to the present day. The contemporary American furniture industry has even fabricated entire furniture styles that are suited to mechanized production, but have no basis in reality. Where, for instance, did the French Provincial or Mediterranean styles ever exist outside the world of American advertising? With this in mind, it is by no means coincidental that the designer-craftsman movement resurfaced in the 1950s.

Today, there are many artist craftsmen designing and building beautiful objects that exist outside the commercial mainstream. Sam Maloof, George Nakashima, Judy Kensley McKie, Garry Knox Bennett and Bob Trotman are a few of the more outstanding examples. While these people and their work do not directly affect the world of industrial furniture, their influence is



certainly felt because they help establish the boundaries of contemporary furniture aesthetics. Recently, there have also been several examples of designer craftsmen collaborating with progressive furniture manufacturers. Michael Graves designs for Sunar/Hauserman and my limited editions for Gunlocke are but two examples.

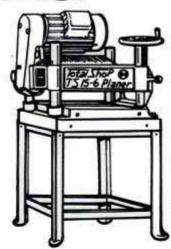
Furniture artists are also rejoining the mainstream of current movements in the art world. The designs of the 1950s that were revitalized in the 1980s by the Italian "Memphis" group are still reflected in the furniture of many contemporary craftsmen. And the influence of Post-Modernism is felt as well, with its reworking of classical design elements to create a break from, and humorous appreciation for, design motifs from the past.

The aesthetic parameters of the art furniture world are, of course, concerned with more than pure design. Fifteen years ago, any material other than wood, and any finish other than linseed oil, were viewed with suspicion. Now, painted and decorated finishes have resurfaced, and the use of multiple materials has re-emerged as craftsmanship has once again approached consummate levels. Animal hides, metals, sheet acrylics and catalytic lacquers are all put to use by the furniture builder. And sculptors have now embraced furniture as a legitimate vehicle for their more abstract form of communication. These days my work is viewed as sculpture just as readily as it's accepted as furniture. I have always considered it to be both.

## Total Shop 69°

## The Shape of Pride





TS 15-6 Planer

What can compare to the sense of pride you feel when you carefully shape a piece of wood into a timeless treasure? Total Shop understands that feeling because we're proud too, and we have the shape to prove it. Our Total Shop multi-purpose tool and TS 15-6 planer are machines with solid power, versatility and stamina.

Compare Total Shop with Shopsmith® and see for yourself. The Total Shop motor produces nearly 40% more power than the Shopsmith® machine and can be altered by the owner to 220V, this is unavailable with Shopsmith® And in more than 85% of the comparisons, the Shopsmith® machine was priced higher than the Total Shop machine.

Don't overlook the TS 15-6 planer, a rugged machine convertible to 220V by the owner, optional stand and dust collector available, available with 2HP or 5HP motor, and a full 15" x 6' board capacity. A proud addition to any shop.

Our 30 minute video demonstration tape (available in VHS or Beta) gives you a look at our products in action before you buy. Send for it now (with a \$20.00 refundable deposit) and you'll see what we've been boasting about. Now available for ALL multitool owners! (Total Shop, Shopsmith®, etc.) An informative 2½ hr. instructional video. No matter what multi-purpose tool you own, you'll learn more about its set-up, care, and operation. Order today for

> only \$49.95 (available in VHS or Beta).

Experience the Shape of Pride. Call

1-800-845-9356 (or in S.C. 288-4174)

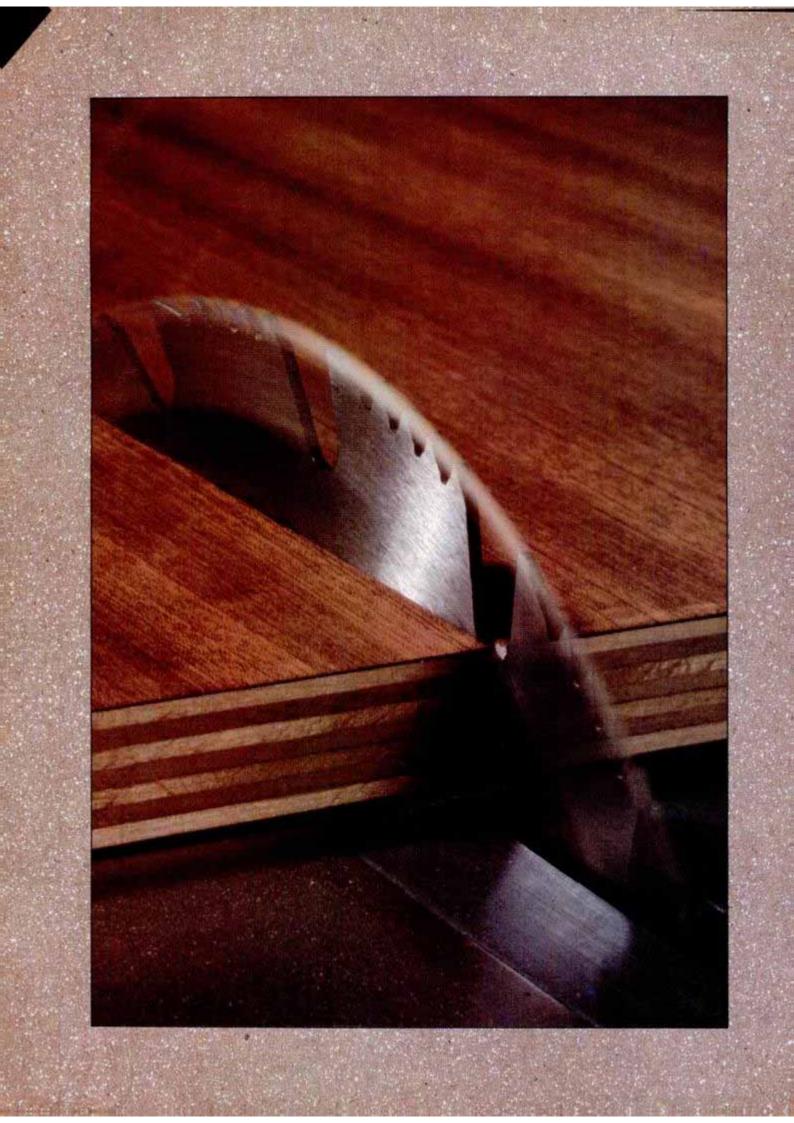
and we'll send you 11 additional reasons why Total Shop is a better buy than Shopsmith® plus our free information pride packet.

☐ YES! Please send me your free information pride packet, with 15 reasons Total Shop is the better buy. ☐ Multi-purpose tool ☐ TS 15-6 Planer	☐ YES! Please send me the 30 min. demonstration video, I have enclosed a \$20.00 refundable deposit. ☐ VHS ☐ Beta	YES! I have enclosed \$49.95 plus \$2.00 shp. & hdl. for the 2½ hr. instructional video on the set-up, care, and operation of my multi-purpose tool.  VHS  Beta	Dept. P P.O. Box 16297/Greenville, SC 29606  Name Address City
Call	000 045 0	or in S.C.	State/Zip

Toll Free

1-800-845-9356

or in S.C. 288-4174



## Only Skin Deep

The role of manufactured panels in the world of fine furniture building.

BY WILLIAM W. RICE; Photos by Rosario Capotosto

urniture pieces made from solid wood have always had a substantial look and feel. They seem to exude a sense of quality based on their building material alone. But, even on the best pieces, all you are seeing and feeling is the surface.

Under certain conditions, manufactured panels look and work every bit as well as solid wood. And they can save you a good bit of time and money, especially if you don't have a full-scale home workshop. For a good idea of the versatility of these panels, look at the furniture pieces that follow in this Guide. Each of them features the use of different manufactured panels in combination with various solid woods.

The use of panel products allows you to design and build cabinets and furniture that contain relatively large parts without the necessity of gluing together and surfacing many smaller pieces of solid wood. Besides the reduced work, panels often cost less than solid wood without sacrificing quality. In fact, the panel surface may be more attractive than glued-up solid stock. Often, its veneer face has less interruption in the grain pattern and provides more opportunities for accurate grain matching.

A manufactured panel is factory made and sold primarily through wholesalers to industrial furniture, cabinet or millwork shops. The same panel products are also sold over the counter at retail lumberyards, home centers and discount stores servicing builders and do-it-yourselfers. The manufacturing process varies depending on the type of panel made. For example, plywood panels are made by peeling or slicing a log into thin sheets—called veneers then drying, grading, removing defects and assembling the veneers with adhesive. The assembly is done in a press at pressures from 250 to 300 pounds per square inch and the grain of each veneer is aligned at right angles to the grain in adjacent veneers. There are always an odd number of plies, with the grain in the face and back plies usually running parallel to the length of the



William W. Rice is Professor of Wood Technology at the University of Massachusetts at Amherst.

Hardwood veneer plywood is a great building material for certain furniture components. It comes in a wide variety of face veneers including those above (from top): poplar, red oak, maple, birch, cherry, mahogany and walnut.

sheet. The grade of the plywood is determined by the quality of the veneer on the surfaces of the sheet.

Nonveneered panels such as flakeboard, waferboard, oriented-strand board (OSB) and particleboard are all made by chipping or grinding wood into small pieces, drying the chips, and mixing them with a small amount of adhesive to form a thick mat. This mat is then compressed to desired thickness in a heated press set at about 300° F and 350 psi. The difference in the various types of panels is based on the size of the chips and the way they are oriented in the mat. Particleboard is small, compressed particles, often in layers, but with no grain orientation. Oriented-strand board is made from strand-like particles arranged in layers with the grain in alternate layers at right angles to each other. Waferboard and flakeboard also consist of compressed particles, but they can be either randomly or directionally oriented. The basic difference between the two is the size and thickness of the particles, with flakeboard having the larger and thinner flakes, especially on the surface.

There are also some panels that are composites, that is, they have a particle or flake core with veneer faces and back. Another panel product that is not strictly in the composite category is overlaid plywood. In this case, resin-impregnated fiber faces, about .009 in. to .012 in. in thickness, are added to one or both sides of plywood and the product designated either high-density overlay (HDO) or medium-density overlay (MDO) depending on the characteristics of the overlay.

The major advantage plywood and most other panel products have over solid wood is the ability to span large areas-tabletops, door panels, countertops and so forth-in one piece. Another advantage is better dimensional stability, especially across the grain of the panel. The panels also feature reduced shrinking and swelling because the glued veneers or particles restrain movement caused by changes in air temperature and moisture. This is a great asset when making cabinet doors. Furthermore, panels can be face-nailed or screwed very close to the edge without splitting; and, when used for cabinet or case backs, they improve the structural integrity of the piece because they resist racking forces very well.

On the down side, panel products do not hold nails or screws well in their edges. And because of their construction, the edges must be covered if you want the panels to look like solid wood.

Using panels can mean significant materials savings for any woodworker. When cutting parts from random-width, random-length solid stock, waste can amount to 30 percent when Select and Better grades are used. The lower grades seldom yield more than 50 percent in usable footage. Because

panels come in stock sizes, generally 4 ft. × 8 ft., and have uniform quality, maximum yields can be 90 percent or more.

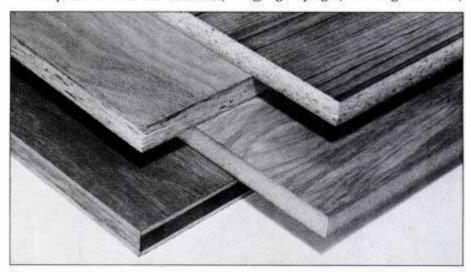
#### Different types

The types of panels available fall into two general categories: structural and non-structural. Structural panels are designed primarily for use in residential and light industrial construction as sheathing, subflooring and other components. Structural panels can be plywood, nonveneered particleboard, waferboard and composites. These panels are stamped with a performance rating designated by the American Plywood Assn. (APA). This stamp includes a code for the mill at which the panel was produced and information on thickness, exposure durability, span rating and veneer grades.

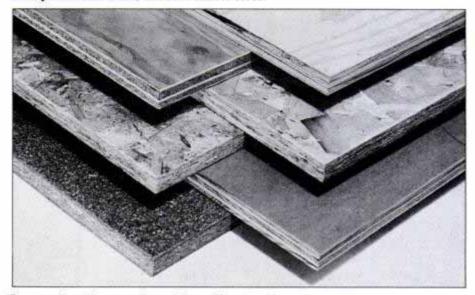
These panels are made from softwoods.

primarily Douglas fir and Southern yellow pine, and are graded by the quality of the veneers on the face and back. An A face denotes the veneer is free of defects such as knots, splits, holes and stain, although it may contain a limited number of patchessmall elliptical plugs-where defects have been removed. An A face is smooth and suitable for painting. B grade veneer permits some defects, including small knots, sander skips and slight torn grain, and may contain repairs in the form of patches. C and D veneer grades permit more defects. On any given panel, different grades can appear on the front and back; for example, A-C, A-D, B-D.

The standard panel size is 4 ft. wide × 8 ft. long by a thickness such as ¼ in., ¾ in., ½ in., 5% in. or ¾ in. Plywood is also made 1 in. and 1½ in. thick for heavy subflooring, highway signs, etc. Lengths of 10 ft.,



Hardwood veneer plywood is not only manufactured with different species of face veneers, but also with different core materials. These include veneer core (shown in the lead photo of this story) and (above, top to bottom) particleboard, waferboard, medium-density fiberboard (MDF) and solid lumber cores.



Structural panels, normally used for wall and roof sheathing, subflooring and underlayment purposes, also have a role to play in furniture building. They are less expensive than hardwood veneer panels and should be considered for parts that are not visible. A typical sampling includes (from top): AC exterior plywood, composite panel, waferboard, oriented-strand board (OSB), medium-density overlay (MDO) and particleboard.

man a said

Материал защишенных авторокогу правои

12 ft. and even 16 ft. can be obtained on special order. Standard construction for plywood is 3 ply for panels less than ½ in. thick and 5 plies or more for the thicker panels. Some imported panels (Finnish birch) may have as many as 11 plies. The additional veneers improve panel stiffness and load-bearing characteristics. For economy in manufacturing, almost all U.S.-made plywood is assembled with exterior, water-resistant glue even though the panels may be for interior use.

High-density and medium-density overlay panels are available in standard 4 × 8ft. sheets in thicknesses of ¾ in., ½ in. and ¾ in. High-density overlay panels are generally good two sides (G2S), while medium-density overlay is available as either good one side (G1S) or G2S. These panels are sold over the counter and could be of use to the home woodworker for signs, children's play equipment and so on. The overlays will take and hold a highquality finish.

Nonveneered structural panels are also found in the lumberyard under the generic names of waferboard, flakeboard and particleboard. These panels come in standard 4 × 8-ft. sheets either  $\frac{7}{16}$  in.,  $\frac{1}{2}$  in.,  $\frac{1}{8}$  in. or  $\frac{1}{4}$  in. thick. In many cases, woodworkers find it economically advantageous to use certain structural panels, especially in the hidden construction areas.

Hardwood veneer plywood is probably the most popular and best suited panel for cabinet parts and furniture. The standard panel size is  $4 \times 8$  ft. and is  $\frac{1}{4}$  in. or  $\frac{3}{4}$  in. thick. It comes in a wide variety of species. Natural birch is one of the most popular panels, with red oak a close second. These two species are available at most lumber-yards and home centers, and you can usually special-order the following: ash, cherry, maple, Philippine mahogany (lauan), African mahogany, teak, walnut and white oak.

It's possible to obtain some species in a particular grain pattern such as plain sliced, rotary cut, rift or quartered and ribbon stripe. Grain pattern is a result of the way the veneer was cut on the lathe or slicer. Identical species can yield remarkably different grain patterns depending on the cutting method used. If you want to buy a particular panel, ask your dealer if it's available in different cuts. Then, pick the one that is most pleasing to your eye.

Depending on your supplier, hardwood veneer panels are available with different cores. These cores are comprised of one of the following materials: veneer, solid lumber, medium-density fiberboard (MDF), particleboard or waferboard. All are very stable and will yield satisfactory results in furniture making or cabinet work. In terms of expense, lumber core is usually the highest with veneer core close behind followed by the rest.

The last item on our nonstructural panel list is particleboard. It is available in  $4\times8$ -ft. panels and % in., 1/2 in., 1/2 in., 1/2 in. and 1/4 in. thicknesses. The surfaces are sanded very smooth. You may want to try this low-cost panel when the project calls for large

#### **New Manufactured Panel**

High-quality hardwood trees have become harder to find. Naturally, this has increased costs for lumber and veneer in the higher quality grades. Recent research by the U.S. Forest Service and several universities has been directed toward ways to better utilize the lower quality trees, which comprise 70 percent of today's hardwood forests. An analysis of furniture part sizes revealed that more than 80 percent of the parts are less than 40 in. long.

A method has been devised, called System 6, for rapidly converting short logs from poor-quality, small-diameter trees to solid wood panels that are graded Clear One Face

or Better. These panels are made of wood that is kiln dried to 7-percent moisture then machined, edge-glued, content, trimmed to size and surfaced on two sides to specified thickness. They are called Standard Blanks, and their appearance (below) resembles butcher block panels. They have been introduced to industrial furniture and cabinet manufacturers and are currently available in some areas of the Midwest for the retail market. They come in a variety of lengths and widths. For more information, contact Charles J. Gatchell, Project Leader, USDA Forest Service, Box 152, Princeton, WV 24740.—W.W.R.



A section of System 6 panel features solid stock construction.





#### Planer Molder Saw

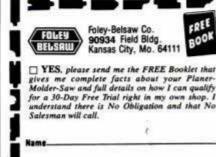
Three power tools in one — a real money-maker for you!

The Planer/Molder/Saw is a versatile piece of machinery. It turns out profitable precision molding, trim, flooring, furniture... in all popular patterns. Rips, planes, molds separately... or all at once. Used by individual home craftsman, cabinet and picture framing shops, lumber yards, contractors and carpenters.

Never before has there been a three-way, heavy-duty woodworker that does so many jobs for so little cost. Saws to width, planes to desired thickness, and molds to any choice of patterns. Cuts any molding pattern you desire. Provides trouble-free performance. And is so simple to operate even beginners can use it!

30-Day FREE Trial! SEND FOR NO OBLIGATION-NO SALESMAN WILL CALL

RUSH COUPON TODAY! FOLEY-BELSAW CO. 90934 FIELD BLDG. KANSAS CITY, MO. 64111



Address \_\_\_\_\_

### **WOODWORKER'S** Constantine'S

#### There are over 3,000 money saving reasons why woodworkers rely on Constantine.

3,000 woodwork items-to help you Build-Restore-Repair-Refinish! Over 200 different woods...150 veneers... 500 plans...cabinet hardware...

96 How-To Books...118 carving tools and chisels...76 inlay designs... and lots more for One-Stop, Right-Price Shopping without leaving home!

**CONSTANTINE** Est. 1812 2051N Eastchester Road Bronx, NY 10461

☐ Enclosed is \$1.00. Rush my
116 page, full color catalog.

lame				_
ddress.	_	-	State	Zin
	□мс	☐ AMEX.	☐ Exp. Date_	

MOCOWORKERS CATALOG

This industrial-quality tool saves hours of hard, tedious work. Removes paint, varnish, rust and grime from woods, metals, plastics, fiberglass and masonry -with no gouging and no burning! Flexible, flat-tipped steel blades follow contours and reach down into depressions. Just attach the Omni-Stripper to any household drill. In seconds you're ready for 101 stripping and scraping chores without dangerous, messy chemicals. The 3-in-1 kit includes



Limited Lifetime Warranty! PRICED-RITE TOOLS

CALL TOLL FREE 1-800-634-6330

1 -45



#### In Stock for Immed. Shipping or Pick-up. ONLY \$425 F.O.B. Broomall, PA for 3'6" diam. (hts. 8' 11/2" to 8' 91/2") Comparable savings on diams, from 4' to 7' Kits available to fit any floor-to-floor hts. Now! Showroom & Warehouse locations in: (714) 598-5766 Sarasota, FL (813) 923-1479 Houston, TX (713) 789-0648 Chicago, IL (312) 952-9010 6 The Iron Shop 1977, '82 People who've looked everywhere tell us there isn't another spiral stair around that touches our combination of price and quality of mate-rials and workmanship. We believe it! CALL OR WRITE FOR FREE BROCHURE: To: The Iron Shop, Dept. PM116. Box 128, 400 Reed Road. Broomail, Po. 19008 Our 1et (215) 544-7100 We accept MosterCard, VISA and AMEX

#### Woodworking Guide

areas, such as tops or side panels, that are to be covered with some decorative material, such as laminate or veneer.

Shop requirements

If you'd like to work with panels, you will need some space. Usually, lumberyards will not sell partial sheets or cut the full sheets you buy. So you must be prepared to maneuver 4 × 8-ft. material that is relatively heavy. Particleboard weighs about 42 pounds per cubic foot, or roughly 80 pounds for a 4-in., 4 × 8-ft. sheet. A full sheet of 3/4-in. -thick plywood will weigh from 50 to 60 pounds. Panel stock is no more difficult to cut than solid wood, though carbide-tipped saw blades and router bits will certainly stay sharp longer than high-speed steel. All the same shop safety rules apply in cutting and handling the panels: wear eye protection, avoid breathing sawdust-laden air, and be careful about splinters.

Of course, storing panels is sometimes a problem because of their size. If you have the space, flat storage is the best way. But, if you have to store the panels on edge, make sure they are as close to vertical as possible. Edge-stored panels can warp even if they are leaning at the slightest angle. Like all wood products, panels are susceptible to some shrinking and swelling with moisture loss or gain. Ideal storage conditions are 70° F and 40percent relative humidity-the same conditions that are best for your workshop and your home. The closer you can come to maintaining these conditions, the better your furniture will turn out.

When buying panels you should keep in mind several things: Hardwood veneer plywood is relatively expensive. By planning your project dimensions carefully, you can take advantage of the large expanse of the panel to produce the required parts with minimal waste. And, because a panel is the same quality all over, pieces left over from one project may be very useful on the next.

Also, consider the following: 1. Structural panels are cheaper than hardwood plywood, so use this material where you need the convenience of a panel, but not the decorative appearance. 2. Thin (1/4-in.) hardwood plywood panels cost half as much as 3/4-in. panels. Bonding thin plywood to 1/2-in.-thick C-C or C-D plywood results in a 3/4-in.-thick decorative panel that's good on one side. 3. If the piece will not show on both sides, purchase stock that is good on only one side. 4. Hardboard, 1/8 in. thick, makes excellent drawer bottoms, dust panels and case backs at less cost than hardwood plywood.

For more information on manufactured panels, write to: American Plywood Assn., P.O. Box 11700, Tacoma, WA 98411, and Hardwood Plywood Manufacturer's Assn., P.O. Box 2789, Reston, VA 22090.

# Now you can have Lifetime Security in a CASH business where you can easily make up to \$200.00 per day and more

Find out how ...

... send NOW for your &

#### FREE Lifetime Security Fact Kit

Your FREE Lifetime Security Fact Kit tells you how to make \$18.00 to \$30.00 an hour in your own Foley-Belsaw Full-Service Saw and Tool Sharpening Business. Your FREE Fact Kit explains how you can:

- be your own BOSS!
- work full time or part time, right at home.
- do work you enjoy and take pride in.
- operate a CASH business where 90¢ of every dollar you take in is clear cash profit.

And it is so easy to learn. Foley-Belsaw gives you all the facts and instructions. No previous experience or special training is necessary. All you need is the desire and ambition to be your own boss. Foley-Belsaw tells you everything you need to know to be successful.

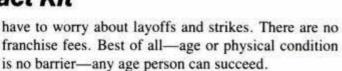
There's plenty of business where you live to keep you busy. It doesn't matter whether you live in a big city, small town or a small farm community.

You'll quickly be able to develop the skills necessary to earn a steady income. You'll be able to sharpen all types of saws, garden and shop tools for home, farm and industry.

Profits from your Foley-Belsaw Full-Service Sharpening Business can provide...

- ... CASH for future security or supplemental income
- ... CASH for travel, vacations, fishing trips
- ... CASH for the things you've always wanted!

And you'll be able to set your own hours and not



You can be like Steve Taylor of Brookville, Ohio, who told us:

"... the first year I grossed \$21,000.00."

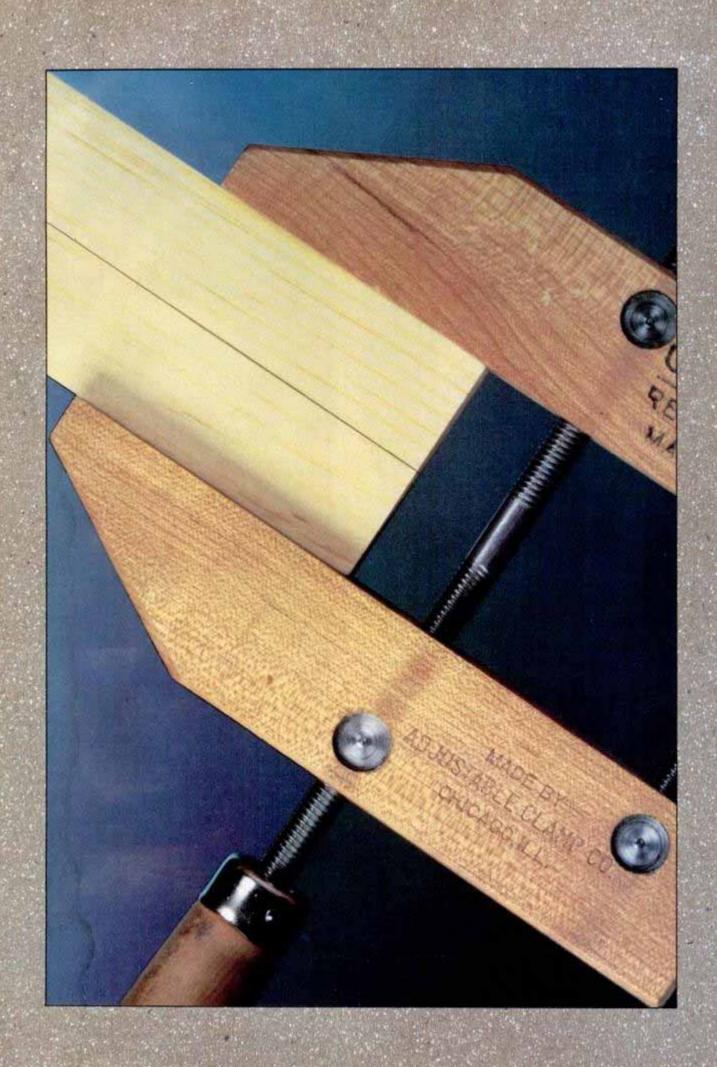
Or James B. Jones, of Albuquerque, NM who reported:

"This past summer my sales and service amounted to almost \$6,000.00 a month."

But you've got to get the FACTS before you can get started. So WRITE NOW for your FREE Lifetime Security Fact Kit. It's yours to keep with NO OBLIGATION. The Foley-Belsaw Company 20355 Field Building







## Shop Clamps

Here's a gripping tale whose cast of characters is a cornucopia of clamps.

BY JOSEPH TRUINI, Shop And Tools Editor

Il forms of do-ityourself work,
whether woodworking, metalworking,
modelmaking or
handicrafts, require
the use of some
type of clamp. When used properly,
clamps will improve the convenience,
safety and accuracy of any job. And,
I've never met a woodworker who
didn't believe in the old saying that you
can never own enough clamps.

The word clamp is generally used to describe any of a wide variety of workholding devices. Also, it's worth mentioning that in Great Britain, clamps are referred to as cramps.

Generally, clamps can be grouped into five categories: C-clamps, bar and pipe clamps, handscrews, band and web clamps, and specialty clamps. Specialty clamps are designed for assembling miter joints, picture frames and irregular-shaped workpieces. However, the patriarch of the clamp world is the old reliable C-clamp. Versatile, easy-to-use C-clamps are available in sizes ranging from 1 to 18 in. (maximum clamping capacity). Look for Cclamps with high-quality, heat-treated steel or iron frames. Avoid cheap, bargain-variety clamps made of inferior materials that will bend and twist under stress. Check that the screw runs smoothly and that the swivel pad,

while seated securely, pivots freely.

The kind of clamps you should own depends on the type of work you're doing. A basic starter group of clamps should include several C-clamps of various sizes, four 2-ft. and three 4-ft. bar or pipe clamps, two 8-in. handscrews, a web clamp, and a few 2-in. spring, or pinch, clamps. Then, add other clamps to this group as the work requires. Now, let's take a detailed look at the clamps shown.

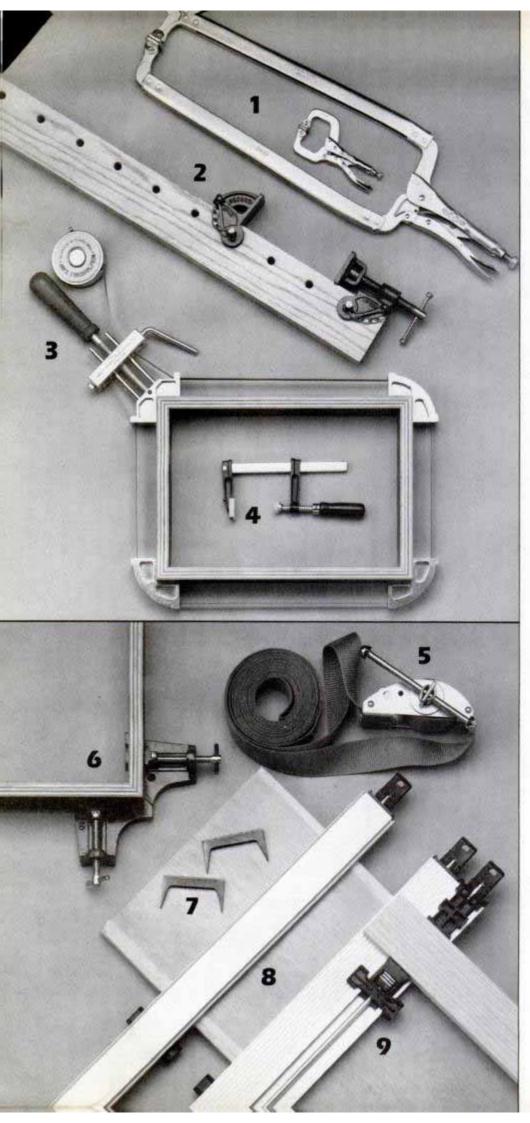
- Locking C-clamp—From the makers of the famous Vise-Grip locking pliers come these quick-locking C-clamps. Each clamp features a knurled adjustment knob, quick-release lever and swiveling clamp pads that protect the work's surface and permit gripping tapered pieces. Locking C-clamps are sold in hardware stores in 4- (\$9.90), 6-(\$10.90), 11- (\$17.40), 18- (\$24.40) and 24-in. (\$30.40) sizes. Contact Petersen Manufacturing, Box 337, DeWitt, NE 68341.
- 2. Clamp heads—Make bar clamps to virtually any length with this pair of clamping heads (\$23.75). The durable cast-iron heads fit onto any 1-in.-thick board. Bore a series of holes in the board to accommodate the %-in.-dia. steel pins that hold the heads in position. Each head has a 1%-in.-wide × 1%-in. clamping surface. Contact Frog Tools, 700 West Jackson Blvd., Chicago, IL 60606.
- Adjustable corner clamp— Tackle tough clamping jobs with this

versatile adjustable band corner clamp (\$37.05). The clamp uses four castaluminum corner blocks and a %-in.dia. steel band to assemble square, rectangular, triangular and round workpieces. Clamping capacity extends from 2% × 2% in. to 36 × 36 in. (or 12 ft. around). The band retracts onto a reel for neat storage. Contact Constantine's, 2050 Eastchester Rd., Bronx, NY 10461.

- 4. Quick-action clamps—Designed for quick, easy operation, this style clamp has become a workshop favorite. The lower jaw slides easily on a zinc-plated bar and locks securely in position under the slightest pressure. The cast-iron jaws come with protective plastic pads. Quick-action clamps are sold in seven sizes ranging from 5-in. capacity with a 2-in. depth (shown, \$7.95) to 20-in. capacity with a 5-in. depth (\$24.60). For information, contact Frog Tools, 700 West Jackson Blvd., Chicago, IL 60606.
- 5. Band clamp—For clamping round, oval and odd-shaped workpieces, nothing beats the simple band clamp. This clamp (\$23.50) features a 1½-in.-wide superstrong nylon band and steel ratchet mechanism. Simply turn the 6-in.-long handle to tighten the band. A 20-ft. clamping capacity handles oversized jobs easily. Contact Frog Tools, 700 West Jackson Blvd., Chicago, IL 60606.
- Corner clamp—Assemble miter and other 90° corner joints accurately

Photos: Brian Kosoff

Here are 19 clamp models, including the traditional handscrew (facing page), that would be valuable additions to your shop.



with this English-made corner "cramp" (\$27.50). Its design allows you to glue and nail the pieces together while they're clamped securely at 90°, Made of cast iron with precisely machined faces, the clamp will accept workpieces up to 2 in. wide. It can be screwed to a benchtop for added stability. Contact Frog Tools, 700 West Jackson Blvd., Chicago, IL 60606.

- 7. Pinch dogs—Don't be fooled by their simple design; pinch dogs are valuable, effective clamps designed for use in edge-joining boards. Hammer pinch dogs in the butt ends of two glued-up boards straddling the joint lines. The dogs will pull the glue-joint closed and prevent the boards from shifting. Pinch dogs are sold in pairs in five sizes ranging from 1 in. (\$8.25), to 3½ in. (\$15.30) wide. Contact Garrett Wade, 161 Avenue of the Americas, New York, NY 10013.
- 8. Clamp and tool guide—This unique, innovative tool is a combination bar clamp and straightedge guide. It consists of a ½ × ½ in. wide aluminum channel fitted with durable plastic jaws. To lock the clamp tight, press down the cam-action lever. The low-profile design provides an obstruction-free straightedge for guiding a router or circular saw. It can also be used as an auxiliary fence on a band saw, drill press and table saw. Available in 24- (\$25) and 50-in. (\$35) capacities. Contact Tru-Grip Clamps, Griset Industries, Box 10114, Santa Ana, CA 92711.
- 9. Back-to-back bench clamp—The same innovative design used in the clamp and tool guide (No. 8) is used in this clever bench clamp—only doubled. A bottom set of jaws locks the 3½-in.-wide clamp to a workbench, tabletop or saw horse. Then, use the upper jaws to grip the work. The low-profile design allows you to sand, plane, carve and rout without interference from the jaws. Available in two capacities: 18 in. (\$36) and 36 in. (\$43). Contact Tru-Grip Clamps, Griset Industries, Box 10114, Santa Ana, CA 92711.
- 10. Jet clamp—This bar clamp is part of the Jet Clamp System—an elaborate system that offers a wide variety of bars, jigs, attachments and adapters to handle nearly all clamping jobs. Unlike most bar clamps, both jaws of the Jet clamp can be positioned anywhere along the ½ × 1½-in.-wide steel bar. Two jaws with a 10-in. bar cost \$34.52. Bars come in 19½-(\$14.24), 39-(\$24.10) and 59-in. (\$33.55) lengths. Contact Sylvax Corp., 342 Madison Ave., New York, NY 10017.
- 11. Spring clamp with pivoting jaws—Each jaw of this clamp has 10 tiny teeth that grip and hold angled workpieces securely. The pivoting jaws are particularly helpful when assembling compound miter joints, irregular-shaped moldings and other tough-to-clamp joints. Maximum capacity is 3½ in. It costs \$6.95 (add \$2.50 handling per order) from The Woodworkers' Store, 21801 Industrial Blvd., Rogers, MN 55374.

# EVERY BUSINESS NEEDS AN IBM-PC WHO WANTS TO PAY IBM PRICESS FACTORY DIRECT FACTORY DIRECT

BASE P. Har

Compatible PC-XT

\$950.00 LEASE \$39

isk \$1399.00 LEASE \$56/MC

**Upon Approved Credit** 

Our PC-XT SUPER TURBO COMPUTER runs all the popular Business Programs, like Lotus 1, 2, 3, Word Perfect, Wordstar, dBase III, Homebase, Sidekick, and Flight Simulator. In addition to running the programs at the standard IBM clock speed of 4.77 Mhz, it also runs at 8 Mhz — almost twice as fast as IBM.

ACS has developed the fastest, most powerful XT and AT computers available today. We have also researched the numerous software programs available to automate your office. If you are considering buying a computer, call ACS. We can recommend the software and hardware system that will best solve your business needs.

#### HERE'S WHAT YOU GET

ACS-Turbo Mother Board 4.77/8.0 Mhz 640K of RAM Two 360K Floppy Drives Heavy Duty 135 Watt Power Supply Keyboard New "AT" Type with Large Enter Key Parallel Printer Port Monochrome Graphics Display Card High Resolution Mono Monitor with Swivel Base and Anti-Glare Screen

#### OPTIONS

20 MEG Hard Disk	\$449.00
20 MEG Tape Back-Up	\$595.00
Clock/Calendar	\$ 59.00
Internal Modem 300/1200 BAUD	\$199.00
Okidata 192 Printer	\$399.00

#### PROGRAMS INCLUDED

Included in the purchase price is MS-DOS, the standard IBM operating system. With our Hard Disk Computer, you also get HOMEBASE, a general purpose multi-function program to perform word processing, electronic filing, and data base management. HOMEBASE has a built-in calendar, with monthly, weekly, and daily scheduling. The Homebase Calculator lets you perform calculations on the monitor and the ability to print a paper tape if desired. HOMEBASE also includes a communication program with autodialer for communication with other computers (requires a modem).



5 YEAR WARRANTY AVAILABLE

#### **GUARANTEE & WARRANTY**

We guarantee you will be delighted with our ACS-Turbo Computer or return it within 30 days for a refund (less shipping charges). We warranty our Turbo Computer 100% Parts & Labor for 1 year. We believe our computer is even more reliable than IBM — that's why we're offering a five-year extended warranty for only \$30.00 a year. Order early for the holidays — delivery may take over 30 days.

#### **HOW TO ORDER**

Call us at (818) 889-1092. We have experienced salespeople to advise you with your computer requirements. Ask for our experts — ask for Department FD.

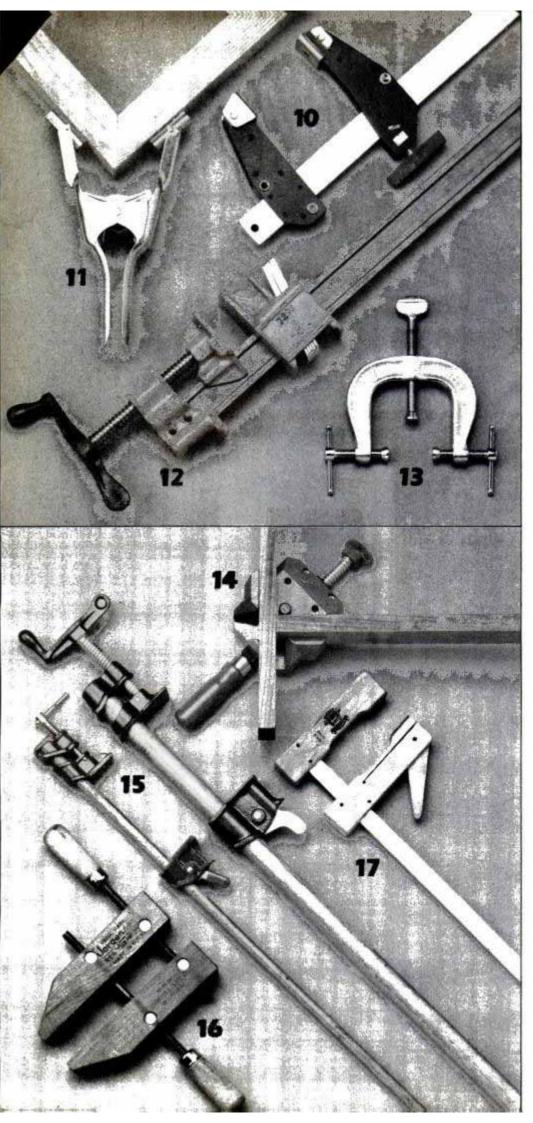
You can charge our ACS-Turbo Computer with a VISA or MasterCard. We also have a lease plan available for qualified businesses, with payments from 36 months to 60 months.

\*IBM is a registered trademark of International Business Machines.

DEALERS ACS

5311 Derry Avenue, Suite A, Agoura Hills, CA 91301

Phone: 818/889-1092 Fax: 818/889-5605 Telex: 299 353 POST UR EASY LINK Mailbox: 62941735 Telex: 5106018224 ACS AGRA HILLS UQ



- 12. Heavy duty-bar clamp—When a job calls for extreme clamping pressure, try this powerful bar clamp. Industrial-quality features include a heavy I-beam bar (7/16 × 1½ in. wide), large cast-iron jaws, 1/36-in.-dia. screw and a short-throw handle that permits 2-handed tightening. It's available in four capacities ranging from 24-(\$28.45) to 60-in. (\$36.35). Contact Constantine's, 2050 Eastchester Rd., Bronx, NY 10461.
- 13. 3-way edging clamp—Here's an indispensible tool used to apply and repair moldings, decorative trim and banding on the edge of a workpiece. The C-clamp design features a third screw that applies right-angle pressure to the edge. Adjust the two clamping screws to position the third screw for off-center pressure. Clamping capacity is 2½ in. It costs \$7.75 (add \$2.50 handling per order) from The Woodworkers' Store, 21801 Industrial Blvd., Rogers, MN 55374.
- 14. Angle-clamp—Clamp right-angle joints quickly and easily with this Germanmade tool (\$27.90). Assemble a variety of joints including miter, corner butt, T-joint, rabbet and dado. The plastic-coated metal jaws adjust automatically to accept pieces of varying thicknesses. Clamping capacity is 1½ in. for T-joints and up to 1¾ in. for miters. Contact Garrett Wade, 161 Avenue of the Americas, New York, NY 10013. Shipping charges are extra.
- 15. Pipe clamp fixtures—Make long-reaching pipe clamps economically with these iron clamp fixtures. The 2-part fixtures fit on standard black pipe that is commonly available at hardware stores. Capacity is limited only by pipe length. Shown are clamp fixtures for ¾- (\$10) and ¼-in.-dia. (\$7.50) pipe. Fixtures for ½-in.-dia. (\$8.50) pipe are also available. They're sold in the Sears Power And Hand Tools catalog and at Sears stores. Contact Sears, Sears Tower, Dept. 703-PM, Chicago, IL 60684.
- 16. Handscrew—No workshop is complete without a few of these traditional woodworking clamps. Handscrews have solid maple jaws and dual handles that allow you to apply tremendous pressure. Adjust the jaws to clamp tapered and offset workpieces. They're available from Garrett Wade, 161 Avenue of the Americas, New York, NY 10013, in six sizes ranging from a 6-in. jaw length with a 3-in. capacity (\$12.80) to a 16-in. jaw length with a 12-in. capacity (\$30.95). Shipping is extra.
- Here's an excellent tool for light- to medium-duty clamping. The white beech jaws with cork pads won't mar delicate work or veneers. The lower jaw slides easily on a galvanized steel bar. To lock the clamp tight, pull the wood cam lever located on the lower jaw. Available in four capacities ranging from 7¾ (\$8.20) to 23 in. (\$11.80). The jaw depth is 4 in. Contact Frog Tools, 700 West Jackson Blvd., Chicago, IL 60606.

# Why Are We Giving Away These Famous Nationally Advertised SWIFT 660/F™ Telescoping Spin Rods for only \$5?

As part of its Anniversary Publicity Campaign, a leading New York firm will distribute one million (1,000,000) of its most expensive spin rods—the Famous Nationally Advertised SWIFT-660/F Telescoping WhisperCast WhamRod —for the astonishing "Anniversary Price" of only \$5 each to the first one million persons who write to the company

address (below) before midnight, December 25, 1986.

This *original* Anniversary Ad must accompany your request. Copies or photostats are *not* acceptable.

These are the same famous SWIFT-660/F Telescoping WhisperCast WhamRods nationally advertised in leading media. A full standard 66 inches from base to tip, they spring to complete length in an eye-blinking 6/10ths of a second!... then telescope down to a mere 16 inches for easy storage in kit bag, glove compartment or attache case.

Crafted of aluminum, stainless steel and space-age fiberglass for extra strength and flexibility, they provide full response along the entire length of the rod, without "flat spots". And allow precise placement of small flies with a minimum of surface displacement.

Weighing a featherlight 3.75 ounces, they are the perfect ultralight rods for today's "compleat angler". Designed for casting powerfully over long distances, they're at home on virtually every lake, stream or waterway in America, and ideal for land-casting, general wading, and boat-fishing. Small wonder they are the fastest selling (and most expensive) spin rods ever offered by this giant multi-million-dollar New York firm.

Each rod is covered by the company's full one-year money-back guarantee. There is a limit of two (2) rods per address at this price. But if your order is mailed early enough (before Dec. 17) you may request up to five. These Famous Nationally Advertised SWIFT-660/F Telescoping WhisperCast WhamRods will *not* be sold at this price by the company in any store.

To order, mail this *original* printed ad (no copies or photostats) together with your name and address and \$5 for each rod. Add only \$2 shipping no matter how many rods you are requesting. (New York residents add sales tax.) Allow up to 6-8 weeks for shipment. *Make check payable to: RBM Ltd.* Mail to: RBM, FISHING ROD OFFER, Dept. 114-111, Box 1736, Hicksville, N.Y. 11802.

(R29380)

(R29980)

© 1986 RBM, Ltd., 1200 Shames Drive, Westbury, N.Y. 11590



If you are able to reply before Dec. 17, we'll give away the famous top-of-the-line SWIFT-660/F ZoomCast Spinning Reel with every rod you order for the astonishing

...for the astonishing price of just \$2 a reel. (And we'll even wind 250 feet of our best 6-lbtest monofilament line onto each reel!)

These nationally advertised reels perfectly match your rod in weight and balance, and give you fast "thumbs-off" (one-handed) casting over longer distances than you ever dreamed possible. You can cast even the lightest baits without backlash.

Compatible with virtually every plug or lure, the new high-speed gear ratio gives you fast "pop"-action, yet is powerful enough to reel in fish without "pumping". The new open-face design (and desirable skirted spool) eliminates friction and prevents tangles. The anti-reverse is "whisper" silent, and the Microdisc Surge-Free Drag System won't let your fish run away.

The most expensive reel sold by this huge firm, it is yours for only \$2 if you act before December 17. (R25166)



## **HOME REBUILDER**

BUY DIRECT, WE SELL DIRECT THAT SAVES YOU MONEY. &

#### STOCK & HIGH PERFORMANCE PARTS FOR THE SHOP & HOME REBUILDER

#### SB CHEVY DELUXE MASTER REBUILD KIT

OIL PUMP CANSHAFTS & LIFTERS (SONT PROTECTION)

Ballemannen Man Your Low Price

Cast \$244.00 Forgat \$299.00

**GENUINE BENDIX** 

**BRAKE SHOES** 

**GENUINE BENDIX** 

PREMIUM QUALITY

DISC BRAKE PADS

**GENUINE BENDIX** 

SEMI-METALLIC

FRICTION KING II

DISC BRAKE PADS

SWAY AWAY

Ground Control

Systems

Your Low \$99.00

Bars

Anti-Sway

> \$10.95

> \$24.95

bur Low

#### RAPID COOL **ELECTRIC FANS**



\$59.95

\$69.95

#### RAPID COOL **FAN CLUTCHES**



\$22.00 \$32.00 \$59.95

CRANE

DJUSTABLE VACUUM ADVANCE KITS

\$11.95

WEIAND MANIFOLD SPECIAL

PEN PLENIUM - RPM RANGE 2000 - 6000 - 7 7546 \$79.95 Small Blood

ISKY SUPER CAMS Bearing and the second

\$69.95

#### ON SALE SAVE OVER 50% HOLLEY WATER INJECTION KITS



SAVE OVER 50% \$19.95

HIGH QUALITY CHROME VALVE COVERS

1		_
	Price	per Pair
AMC 290-401 VB	19548	\$19.95
Buick 231 V6	19449	\$19.95
Chevy V6	19201	\$19.95
Chevy SB Short.	19196	\$19.95
Chevy SB Tall		\$19.99
Chevy SB Short		\$19.90
Cherry SB Tall		\$19.95
Mogar SB	19330	\$19.91
Mopar BB	19547	\$19.95
Ford SB	19331	\$19.95
Food Blatt.	-3330	(2) YE

0 3510-051M-400 18032 \$18.95 of 360-390-42819543 \$18.95 of 429-460 19542 \$18.95 turnomie VS 18544 \$18.95

#### AIR CLEANERS



#### HOLLEY PERFORMANCE CARBURETORS



UNIVERSAL VACUUM

accountry	4111
Manual Cho	rke ak
600 CFM # 1850	\$104.95
750 CFM # 3310	\$119.95
Electric Cho	ORM BAR
380 CFM # 8007	2154.95
600 CFM # 9634	5144.95
2 BARREL UNI	

950 CFM # 7448 \$116.95 950 CFM # 4413 \$106.95 DOUBLE PUMPERS HEVY SPREAD BORE

REPLACEMENTS

#### HOLLEY TRICK KITS

WEBBER POWER PLATE For HOLLEY 284 BL. CARBS

- \$69.95 \$78.50

#### PERFORMANCE FUEL PUMPS

#### ON SALE ACCEL® MALLORY

**Dual-Point Distributors** 

Mechanical Adva		1
Cherry VB1		ŧ
Ford 289-3021		. 4
Fort 36/C-35 W -400	25 \$54.95.	
Ford 429-460	\$54.95	
Mount 316-340-36	G \$54.95	
Moder 383-440*	\$54.95	

#### MALLORY UNILITE DISTRIBUTORS

#### **EDELBROCK** PERFORMER MANIFOLDS



AMC VE 70 Jp	2131	\$137.99
Buck 15 231 (79 oct	5486	\$126.50
Chevy V6 60" 2.8	1785-7	\$117,50
SB Chery	2101	\$85.95
88 Chevy ID Pt.I	2161	\$140.95
SR Moper	2176	\$139.95
Moper 440	2191	\$133.95
SB Feval	2121	\$134.95
Forts 35/W	2181	\$133.95
Ford 26 tm 400	2171	\$147.95
First 16/1C (2V)	2665	\$132.95
Ford 3610, (61)	2750	\$136.95
Ford 352 (trn. 428	2105	\$187.95
Fred 429-460	2186	\$145.95
Date 338 thru 433	3711	\$152.95
Portiac 151 4 Cyl		\$196,95
Printer VS	2156	\$107.95

**EDELBROCK** PERFORMER-PLUS CAMSHAFT KITS

INCLUDES CAMS & LIFTERS 

\$104.95 \$104.95 \$104.95 2133 5461

#### ADD-A-LEAF

FOR FRONT OR REAR SPRINGS FITS MOST DOMESTIC TRUCKS

#### ON SALE

#### ACCEL BREAKERLESS **ELECTRONIC IGNITION** DISTRIBUTORS

#### PERFORMANCE WIRES



SUPERCOILS 命作



OF SMALL BLOCK C BIG BLOCK CHEV

\$3. \$3.

\$3.65

\$2.45

#### BOOKS

SPECIAL FLEX-A-LITE STAINLESS STEEL FLEX FANS

8000 RPM . 5 BLADE \$10.95

\$24.95

HAYDEN SPECIAL 7-BLADE \$29.95

\$22.95

TRANSMISSION OIL COOLERS

\$19.95

\$29.95 Low Poor \$34.95

**ENGINE OIL COOLERS** 

HAYDEN

\$39.95 sear in a in Engine \$54,95

512.95 \*\*\*

\$18.95 exch

524.95 exch

#### MONROE SHOCK SPECIALS

#### MONROE VIP

RUCTION EXCEED ACTURERS SPECIFICA ALL ABLE FOR ALL U.S.

MONROE-MATIC

MONROE GAS-MATIC

MAGNUM 60

LOAD LEVELLERS VCREASES LOAD CAPACITY FOR U.S. ARS OR TRUCKS HEAVY DUTY SHOOK & SPRING COMBINATION OR FRONT & REAR APPLICATIONS

AIR SHOCKS INFLATES TO 150 IBS WITH VEHICAL LOADED FOR HAULING THOSE HEAVY LOADS FOR ALL U.S. CARS 4. 1

ELECTRIC RIDE CONTROL (DASHBOARD MOUNT) ADD \$84.95

#### **OEM REPLACEMENT IGNITION PARTS**

For Point-Type Ignition



\$6.95

VOLTAGE REGULATORS

TOP QUALITY ELECTRONIC TUNE-UP KITS IGNITION KITS

\$4.95 \$9.95

STARTER SOLENOIDS

**IGNITION COILS** 

YOUR ENGINE WITHOUT CHECKING OUR PRICES. DON'T REBUILD California residents: items in this ad are: Not legal for sale or use on pollution controlled motor vehicles in California. Legal in California only for racing vehicles which may not be used on highways

#### WE CARRY A COMPLETE LINE OF MECHANICAL ENGINE PARTS FOR ALL APPLICATIONS, STOCK REPLACEMENT, HI-PERFORMANCE & RACING.

MASTER KIT

\$583.00 \$674.00

\$459.00 \$519.00 \$479.00 \$549.00 \$499.00 \$529.00 \$494.00 \$669.00 \$109.00 \$669.00

\$408.00 \$504.00 \$459.00 \$526.00 \$509.00 \$579.00 \$509.00 \$579.00

\$509.00 \$572.00 \$549.00 \$588.00

\$344.00 \$458.00

\$609.00 \$598.00 of Pipular Sizes and Ratios, State Pittar

200-429-500 300--CHEV90LST 1656.00 1504.00 16420.256-789 1856.00 1504.00 16420.256-789 1856.00 1504.00 16420.256-789 1856.00 1859.00

21-200-200 \$495.00 \$495.00 21-200-200 302-350W

500 \$583.00

PISTONS & PINS PISTON ROBER

CADILLAC

0-198-225 0-316-340 1-383-413

OLDSMOBILE

00-425-455 OHTIAC 10-250





#### Four Kit Stages to Choose from ...

KIT A • Pistons & Pins KIT B • Pistons & Pins • Piston Ring Set KIT C • Pistons & Pins • Piston Ring Set • Con Rod Be-ings & Main Bearings KIT D • Pistons & Pins • Piston Ring Set • Con Rod Bearl & Main Bearings • Stock or Performance Camsl

MAKE / SIZE	CA	T PIS	TON K	ITS	FORGED PISTON KITS				
AMC			C	D	A	. 0	C	0	
199-232-258 387-290-904-327 343-360-401 390	76.00 116.00 116.00 116.00	93.00 139.00 139.00 129.00		295.00 295.00				299.00	
BUICK 231 V6 300-340-350 400-425-430-450	76.00 179.00 125.00	93.00 129.00 145.00		163,00 209,00 215,00	194.00	214.00		294.00	
CADILLAC 190429-472-500	193.00	711.00	243.06	-	-	-		_	
CHEVROLET 145-154 Corvar 194-230-250-290 216-2215 295-2803-327 305-307-390 396-400 402-427-454	65.00 66.00 66.00 64.00 64.00 64.00 76.00	84.00	114.00 114.00 114.00 124.00 124.00 154.00 164.00	154.00 154.00 154.00 154.00 164.00	139.00 213.00	134.00 134.00 156.00 159.00 233.00	189.06	294.0 295.0 295.0 295.0 293.0	
FORD 164-170-200-250 360-365-302-3574 3510-352-380 3572-360-352 425-460		84.00 96.00 114.00 176.00 124.00 124.00 136.00	124.00 139.30 149.30 154.00 154.00	194,00	119.00 129.00 169.00 159.00 279.00 179.00	159.00 189.00 159.00	164.00 189.00 219.00 189.00 189.00 229.00 239.00	276.8 266.8 229.8 366.9	
MOPAR 170-196-225 279-318-340-367 361-385-413 440	55.00 54.00 155.00 144.00	54.00 96.00 136.00 154.00	124.00	154.00 154.00 294.00 234.00	199.00	134.00 163.00 299.00 299.00	164.00 186.00 234.00 239.00	228.B	
OLDSMOBILE 330-360 394-400-425-485									
PONTIAC 200-250 201-309-600-655	95.00 119.00		114.30 186.90				164.00 258.00		

etons available in all Popular Sizes and Stock Compression filelios od 4. Man Bearing sizes of not standard. Cameruths are available and compression and compression of the compression and control of the compression of the

TRW FORGED FLAT TOP



\$119.95 **NEW TRW** 

**FUEL PUMPS** 



PERFORMANCE LIFTERS

\$36.95 \$39.95



SPECIAL ( Available Standard of Chevrolle! 283-327-350	HILOSO CAST
Chevrolet	440
283-327-350	\$149.00
454	\$279.00
Ford	
299-002	\$149.00
3610	\$169.00
390	\$159.00
Mepar	
318-340	\$163.00
383	\$209.00

PUSH RODS

\$36.95 \$39.95

HI-TORQUE STARTERS 50% more Torque than Q.E.M.

\$69.95

ON SALE SB CHEVY DELUX ENGINE REBUILD KIT

\$99.95

PISTON RINGS CL77 ROD BEARINGS CL77 MAIN BEARINGS

G CHAIN SET OTE BATH TUB INTAKE



NOW LOW PICE CAST FORGST PETONS FISTONS \$298.00 \$344.00 \$348.00 \$418.00 \$348.00 \$423.00 \$348.00 \$423.00

800 804CX 231 V9 300 340 380 400 401 425 \$303.00 \$384.00 \$349.00 \$424.00 \$423.00 \$494.00

250 \$299.00 \$339.00 \$299.00 \$354.00 \$379.00 \$389.00 \$329.00 \$369.00 \$334.00 \$568.00 \$384.00 \$469.00

DLDSMOBLE 400-425-485 NTIAC \$298.00 \$344.00

\$349.00 \$438.00 al Popuer Scan an Ratios Scan Report Sci

ON SALE

HI-PERFORMANCE DOUBLE ROLLER CHAIN

\$18.95

HIGH VOLUME \$24.95

AVAILABLE FOR MOST-MESTIC SCYL & VE ENDINES

ENGINE

OVERHAUL

SPECIAL

9990

DOUGO

PUMPS

#### Genuine CLEVITE BEARING Special

**Rod Bearings** 

Main Bearings

\$36.95

HI-PERFORMANCE TIMING CHAIN SETS

\$18.95 \$24.95

HI PERFORMANCE LONG SLOT

**ROCKER ARMS** SET

OF 16 550 9 \$96.0 ONTIAC

\$69.95 \$79.95 **GASKET SETS** 

Onop Your Low Price.

\$14.95 \$19.95

California residents: Items in this ad are. Not legal for sale or use on pollution controlled motor vehicles in California. Legal in California only for racing vehicles which may not be used on highways

SUPER STOCK ENGINE KIT

SHORT BLOCK KIT includes:

emanufactured for maximum • CRANKSHAFT Custom Go Rod And Math Journals, polished with oil holes shart • BEARINGS: No Quality

HEVROLET 27 50 (2 Best Marro) 50 (4 Best Marro) 00 (3 Best Marro) (7 454 (2 Best) ORD 98-302

TRW

WATER

小

**PAW T-SHIRTS & HATS** 

The Fabulous PAW Blown Motor Logo in 3 Colors on both Front &

Back of a Quality Hanes Beefy T Shirt. Available SM. M. L & XL.

PAW Hat with Logo — fits all sizes ONLY \$4.50

PUMPS CHEVROLET 81C-400-351M 29-460

State Your Size

LONG BLOCK KIT

CYLINDER HEADS: C LIFTERS: You

CHEVROLET 327 350 (2 Bott Marso 350 (4 Bott Marso 400 (2 Bott Marso 401 (2 Bott FORD 289 302

\$1350.00 \$1450.00

FLAT TOP PISTON SPECIALS \$99.00

ONLY \$6.50

\$99.0 ADD \$15.00





Get Our Giant New 1986 Catalog

**AUTOMETER** 

Autogage

Gauges

ENGINE STANDS

TRUNK MOUNT

BATTERY KITS

KONI

ADJUSTABLE

PERFORMANCE

\$49.95

\$29.95

Street Tachs

\$27.95

Stituert # 2371 fater Temperati mps: # 2386

Heavy Duty Star 750 lb. Capacity

\$59.95

Pro Stand 1000 to Capacity \$99.95

Bolt-on Drip Tray

\$29.95

849.95

FREE with an order from this advertisement or \$4.00.

P.A.W. MONEY BACK GUARANTEE
BUY WITH CONFIDENCE FROM P.A.W.: IF FOR ANY REASON YOU ARE NOT
SATISFIED WITH OUR PRODUCTS, JUST RETURN THEM WITHIN 90 DAYS
FROM DATE OF RECEIPT AND WE WILL REFUND YOUR MONEY.

NOTE: NO REFUND ON SHIPPING CHARGES. PRODUCTS MUST BE IN NEW AND UNUSED CONDITION IN ORIGINAL PACKAGE. INSTALLED ITEMS CAN-NOT BE REFUNDED. CALL 818-998-3641 FOR RETURN AUTHORIZATION.

> WE SHIP COD, NO DEPOSIT REQUIRED ON MOST ITEMS IN STOCK **WE ACCEPT MASTERCARD & VISA**



ECH LINE &



Monday thru Friday CUSTOMER SERVICE: For Return Information and Inquiries Regarding Previ-

ous Orders Call 818-998-3641

#### MAIL ORDER

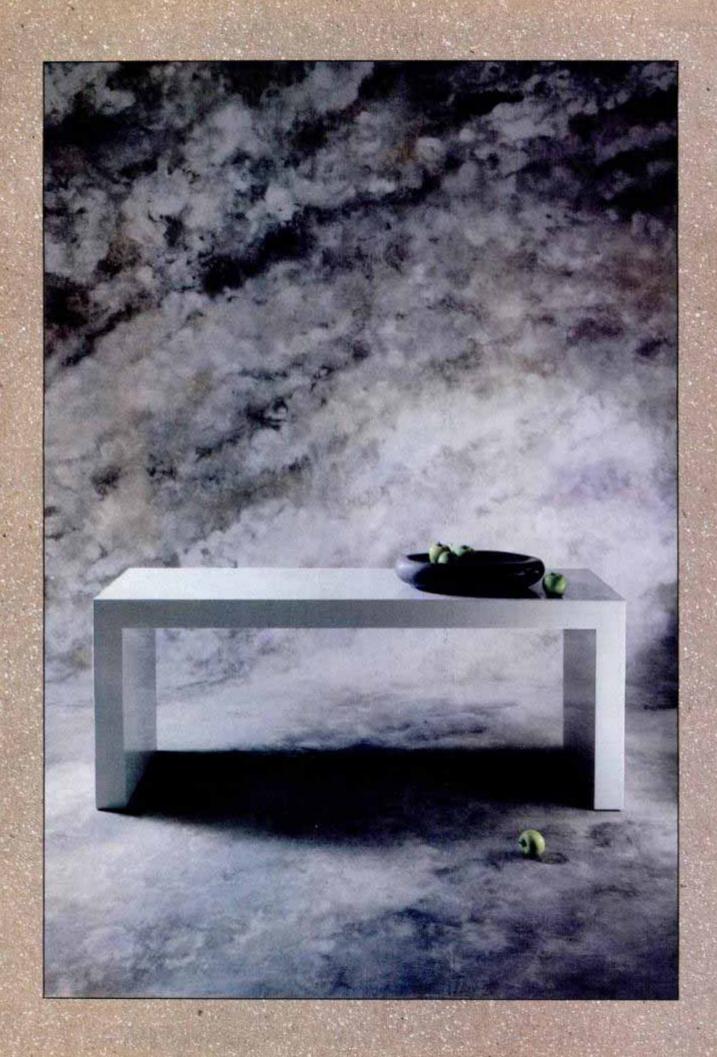
PERFORMANCE AUTOMOTIVE WHOLESALE, INC. 21122 Lassen Street, Chatsworth, CA 91311

HOW TO ORDER

State Make, Model, Year & Engine Size, Send at least 50% deposit by Cashiers Check or Money Order, no personal checks accepted or use your Mastercard or VISA. All Overseas & Canadian orders must be paid in full. No C.O.D. on truck freight shipments. C.O.D. on UPS only. All Engines & Master Kits must be paid in full. Customer responsible for all shipping charges.

Phone # ( ) Address City Make Madel .. NOTE: P.A.W. is not responsible for typographical errors in pricing or applications, including

YOUR LOW PRICE SEE IT, PHONE FOR



# White Lightning

A straightforward Parsons table with a brilliant white lacquer finish.

#### BY NEAL BARRETT

he clean, contemporary look of a highgloss lacquer finish is popping up every-where these days. Coffee tables, dining tables, platform beds and more, all seem to embrace this finish. Black is one of the favorite colors but, as consumer interest expands, a host of other colors is being used. We chose white for this table because we consider it the most neutral color of all. But the techniques shown here will stand up to any color you choose. When you combine this with the fact that the structure is made of medium-density fiberboard and poplar-two of the least expensive building materials around-you can easily end up with the best of two worlds: high style on a low budget.

#### Framework

Start construction by gluing up blocks of % poplar to a thickness of 2% in. Set aside until the glue dries. Then, using a table saw, rip the blocks to 2% x 2% in. for the center spacers and 2% x 5 in. for the two corner blocks. Cut to length.

On the table saw, rip the ¾-in.thick medium-density fiberboard (MDF) panels to width. Then, cut the miters on the ends of the outside leg and top panels, using a circular saw and straightedge guide. Be sure the saw is set to an accurate 45° angle. It is a good idea to check this angle by making a test cut on a piece of scrap beforehand.

Lay out the position of the spacer blocks on the inside surfaces of the inner leg panels and bottom panel as shown in the drawing. Beginning with one of the inner leg panels, glue and clamp the spacer blocks in place. Be careful to align the ends of each block with the edge of the panel. It's a good idea to use cauls—heavy hardwood clamping blocks—to distribute the clamping pressure equally over the panel.

Join the spacer blocks to the bottom panel in the same manner. When the glue has set, drill and countersink holes in the corner blocks for lagscrews. Next, attach the inner leg panels to the bottom panel using glue and the lagscrews. Use clamps to hold the parts in position while you tighten the lags.

Apply glue to the leg spacer blocks and clamp the outer leg panels in place. By driving two brads through the panels into the blocks, you can stabilize the panel so it won't slide when you tighten the clamps.

Next, glue and clamp the top panel in place. Be sure to place a temporary support board under the bottom panel to keep the weight of the clamps from causing the assembly to sag. Remove this support after the edge banding has been applied.

Rip 1/8-in.-thick poplar stock to 41/4 in. for the edge banding. These pieces are slightly wider than required so they can be trimmed absolutely flush after assembly. Next, cut the mitered ends on each piece. Apply the edge band to the top first. Spread glue on both the poplar and the panel edges. Then, clamp in place until the glue dries. Place scrap blocks of wood between the clamp jaws and edge banding to avoid marring the surfaces. Apply the banding to the leg assemblies, making sure that the miters fit precisely.

Next, lay the table on its side and using a router with a flush trimming bit, cut the edge banding flush to the panel surfaces. Advance the router slowly to avoid tearing out the grain of the edge banding. Fill brad holes or nicks with wood putty. Then, sand the entire table with 120-grit sandpaper.

The application of a high-gloss lacquer finish is labor intensive, but for those who persist, the results are spectacular. While there are lacquers available which can be applied by brush, the best procedure involves spray application.

Basically, the process involves maintaining a regular distance (usually 8 to 10 in.) between the gun and

COLOR PHOTO: J.R. ROST; BLACK-AND-WHITE PHOTOS: NEAL BARRETT; TECHNICAL ART: EUGENE THOMPSON; STYLIST: GABE HERRICK

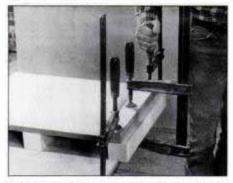
This inexpensive table, made of medium-density fiberboard and solid poplar, comes to life with a hand-rubbed white lacquer finish. Because of its simple lines, this piece should work well with just about any decor.



1 Cut the mitered ends of the top and leg panels using a circular saw and straightedge guide. Make a test cut in scrap first.

the work at all times. Your arm and body must move parallel to the worknot in an arc as is the natural tendency. Begin the spray path before it actually crosses the edge of the piece and continue holding the same path until you pass the far edge. Overlap half the preceeding path as you go. Begin with the bottom and inside leg surfaces, then spray the edges, outside leg surfaces and finally the top. Keep the gun moving constantly.

Since liquid lacquer is both extremely flammable and toxic, certain precau-



2 Glue and clamp spacer blocks to the inner leg panels. Note that top block must project 3/4 in. beyond top edge of panel.

3 Cut bottom to size, then fabricate spacer blocks. Glue and clamp corner blocks so they project 2 1/4 in. past ends.

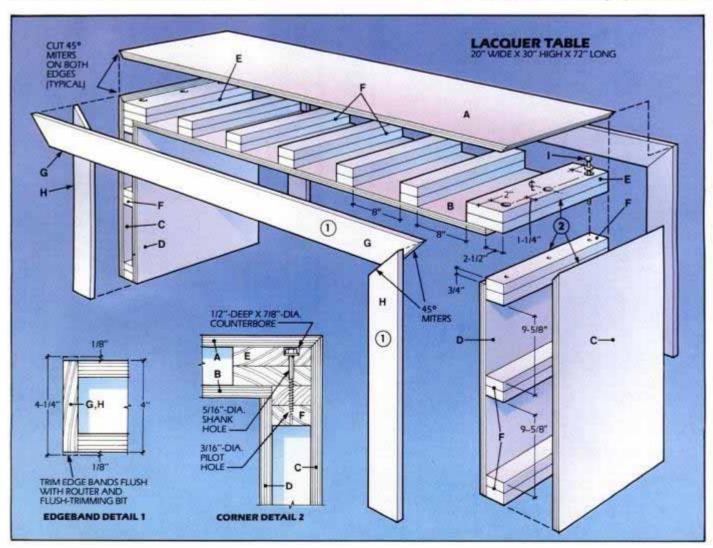
#### MATERIALS LIST-WHITE LACQUER TABLE

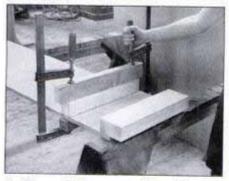
\*\*Dimension is slightly oversized to allow for

trimming to fit

tions must be taken. Proper ventilation, including an explosion-proof exhaust fan, is absolutely required, both during spraying and for approximately four hours afterward, since evaporation of the solvents continues for some time. All open flames in the area, including pilot lights, must be extinguished and a respirator must be worn. Also, avoid skin contact with the lacquer and thinner. Wear gloves that are resistant to these solvents.

Spraying is usually done with a professional air-driven spray outfit. How-

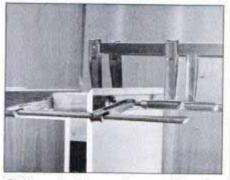




4 Glue and clamp remaining blocks to bottom panel. Use cauls—hardwood clamping blocks—to distribute pressure.



5 To join bottom panel to legs, first clamp parts together. Then, drive lagscrews through mating corner blocks.



6 Glue outer leg panel to assembly using clamps on each spacer block. Take special care on top for precise alignment.

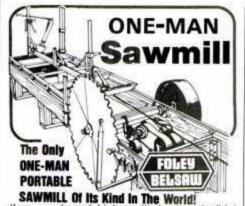
ever, a reasonable alternative to this expensive setup is an airless sprayer such as the Wagner Model W190. For less than \$200, you can have a spray gun system which will yield excellent results for a wide range of finishes.

(Note: All finishing supplies used on this table were manufactured by H. Behlen & Bros. They are available by mail from Wood Finishing Supply Co. Inc., 1267 Mary Dr., Macedon, NY 14502. All product numbers that follow refer to this manufacturer's line.)

Begin by vacuuming the table thoroughly. Wipe with a tack cloth, then start spraying the piece with white undercoat (B610-02457) thinned 50 percent with lacquer thinner (B611-06317). Plan on spraying at least three coats. Let each coat dry for one hour and sand



A GREAT WAY TO SERVE



If you need good, high-quality lumber, don't let inflated lumber prices stop your important building projects. The Foley-Belsaw goes right to the trees and turns out smooth, true-cut lum-ber... 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 elec-tric 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!



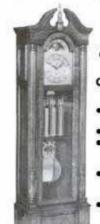
Foley-Belsaw Co. 30688 Field Building Kansas City, Mo. 64111

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

Name	
Address	
City-State	Zip



Do-It-Yourself Clock Kits



(including movement and dial)

#### Completely Assembled and Finished

- Solid 3/4" hardwoods: black walnut, cherry, oak
- Heirloom quality
- Solid brass West German chiming movements and dials
- · Easy to assemble kits or completely assembled and finished
- Money back guarantee

SEND \$1 FOR **COLOR CATALOG** 

# CLOCK COMPANY WORLD'S LARGEST MANUFACTURER OF GRANDFATHER CLOCKS

Dept. 2117, Emperor Industrial Park Fairhope, Alabama 36532 ● Phone 1-205-928-2316 I am interested in 
Do-It-Yourself Kits
Finished Clocks

140010	
Street	
City	
State	Zip

POPULAR MECHANICS . NOVEMBER 1986



### SUPER VALUES

PROTECTO ENTERPRIZES



# C-128 DOUBLE SIDED DISKS .44 ea.

100% Certified 5¼" floppy disks. Lifetime Warranty, automatic lint cleaning liner included. 1 Box of 10 \$4.90 List \$1.99 ea. SALE \$.44 ea.

#### VOICE SYNTHESIZER

Just plug it in and you can program words and sentences, adjust volume and pitch, make talking adventure games, sound action games and customized talkies! PLUS (\$19.95 value) TEXT TO SPEECH program included FREE. (Disk or Tape) List \$89.00 SALE \$39.95

#### VOICE COMMAND MODULE \$39.95 List \$80

The VCM is a speech recognition device that lets you give commands to your C-64 with your voice. List \$79.95 SALE \$39.95

## \$29.95 List \$99

Easier to use than dialing your telephone. Features on-line clock, dialing from keyboard, capture and display high resolution characters, and much more. Includes exclusive easy to use program for up and down loading to printer and disk drives. Best in U.S.A. List \$99.00 SALE \$29.95

#### 1200 BAUD MODEM \$79.95 List \$190

Same features as the above modem along with C-128 mode and 1200 Baud speed. List \$199.00 SALE \$79.95

#### SOFTWARE

		-	0.50		_	-	_	_			_		
ACCESS													
ACTION PAG	CK (D).											\$14	1,95
LEADER BO													
COURSES FO													
MACH 5 (C)													
MACH 128 (													
TENTH FRA	ME (D)											. 2	1.95
ACCOLADE													
ACE OF ACE	ES (D) .								٠.			\$15	1.95
DAM BUSTE	RS (D).											. 11	1.95
ACCOLADE	FOOTB	ALL (D	1									. 19	.95
FIGHT NIGH	IT (D) .									0		. 11	1.95
HARDBALL	(D)											. 11	1.95
LAW OF TH	E WEST	(D)										. 11	.95
KILLED UNT	TIL DEA	D (D)										. 15	.95
COSMI													
SUPER HUEY	II (D)											\$14	.95
TALLADEGA	(D)											. 12	.95
BEYOND FO	RBIDDE	N FORE	EST	(D)								. 14	.95

PRO GOLF BY TOM WEISKOPF (D)	
MR. TESTER (D)	5.95
MR. TESTER (D). PRINTERS LIB. 1 (D). PRINTERS LIB. 2 (D). DATABASE MGR./PLUS FOR C128 (D)	
DATABASE MGR./PLUS FOR C128 (D)	14.95
TASK FORCE (D)	4.95
PRINT SHOP (D)	\$27,95
PRINT SHOP (D). GRAPHICS LIB. 1,2 or 3 (D). COMPANION (D).	15.95
TOY SHOP (D)	39.95
TOY SHOP (D)	
GRAPHICS LIB. HOLIDAY ED. (D)	
COMMANDO (D)	
KUNG FU MASTER (D)	22.95
DATA SOFT	
BAKER STREET (D)	
MERCENARY (D) NEVER ENDING STORY (D)	
MIND PURSUIT (D)	
THEATRE EUROPE (D)	
DESIGNWARE BODY TRANSPARENT (D)	ene ea
BODY TRANSPARENT (D) EUROPEAN NATIONS & LOCATIONS (D) .	
STATES AND TRAITS (D)	19.95
HEART OF AFRICA (D)	
ONE ON ONE (D)	
MUSIC CONSTRUCTION (D)	9.95
RACING DESTRUCTION (D)	
CHESSMASTER (D)	26.95
BATTLEFRONT (D)	26.95
BI LIF CUID	
BARON (D) MILLIONAIRE (D)	
TYCOON (D)	16.95
EPYX	
CHAMPIONSHIP WRESTLING (D)	
FAST LOAD (C). MOVIE MONSTER (D).	
WINTER GAMES (D)	
WORLD KARATE (D)	
WORLD'S GREATEST FOOTBALL (D)	
COLOSSUS CHESS (D)	\$22.95
FRANKIE GOES TO HOLLYWOOD (D)	
FRANKIE GOES TO HOLLYWOOD (D) BATTLE OF BRITAIN/BATTLE OF MIDWA	Y (D)9.95
IWO JIMA/FAULKLANDS (D)	9.95
HI_TECH EXPRESSIONS	
CARD WARE (D)	57.95
HEART WARE (D)	
JINGLE DISK (D)	4.95
JINGLE DISK (D)	
FLIGHT SIMULATOR II (D)	\$31.95
FLIGHT SIMULATOR II (D)	
POOTBALL (D)BASEBALL (D)	
S.S.I.	
ROADWAR 2000 (D)	523.95
CETTYSPIIPC (D)	34 04
MECH BRIGADE (D)	35.95
U.S.A.A.F. (D)	
KAMPFGRUPPE (D)	35.95
HAYDEN	
SARGON II (D)	59.95
SAT VERBAL (D). SAT MATH (D). SAT PRATICE TEST (D).	14.95
SOFTSYNC	
ACCOUNTANT, INC. C128 (D)	\$39.95
DESK MANAGER (D)	
MODEL DIET (D)	18.95
TRIO C64 (D)	
SPINNAKER	
SPIMMAKER DELTA DRAWING (C)NUMBER TUMBLERS (C)	
SPINNAKER	

BEST SERVICE IN THE
U.S.A. • 90 DAY
REPLACEMENT
WARRANTY • ONE DAY
EXPRESS MAIL • 15 DAY
FREE TRIAL • OVER 500
PROGRAMS • A CUSTOMER
LIST OF OVER 3,000,000
LARGEST IN THE U.S.A.

#### CALL FOR FREE CATALOG WITH \$2.00 OFF COUPON!

#### SPECIAL BONUS COUPON

We pack a special software discount coupon with every Commodore 64 Computer, Disk Drive, Printer, or Monitor we sell! This coupon allows you to SAVE OVER \$250 off sale prices!

#### (EXAMPLES)

#### PROFESSIONAL SOFTWARE COMMODORE 64

Name	List	Sale	Coupon
Paper Clip	\$59.95	\$34.95	\$29.95
Consultant	\$59.95	\$34.95	\$29.95
Leader Board	\$39.95	\$22.95	\$21.95
The Print Shop	\$44.95	\$27.95	\$25.95
Bop 'N' Wrestle	\$39.95	\$19.95	\$18.95
Super Huey	\$19.95	\$12.95	\$11.95
Voice Command Module	\$79.95	\$39.95	\$34.95
Nine Princes in Amber	\$32.95	\$20.95	\$19.95
Super Bowl Sunday	\$35.00	\$19.95	\$17.95
Flip and File Disk Filer	\$24.95	\$14.95	\$12.95
Pro Joystick	\$19.95	\$12.95	\$10.00
Party Ware	\$19.95	\$14.95	\$ 9.95
Dust Cover	\$ 8.95	\$ 5.95	\$ 3.95
Financial Planner	\$49.95	\$29.95	\$25.95
Hardball	\$29.95	\$17.95	\$16.95
C64 Troubleshoot & Repair Guide	\$24.95	\$12.95	\$10.95

(See over 100 coupon items in our catalog.)

Write or Call for sample Special Software Coupon!

#### PHONE ORDERS

8 a.m. - 8 p.m. C.S.T. Weekdays 9 a.m. - 12 noon C.S.T. Saturdays

(312) 382-5244

Add \$3.00 for shipping, handling, and insurance, Illinois residents please add 61/4 % sales tax. Add \$6.00 for CANADA, PUERTO RICO, HAWAII, ALASKA, APO-FPO orders. All orders must be in U.S. Dollars. WE DO NOT EXPORT TO OTHER COUNTRIES EXCEPT CANADA. Enclose Cashier Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail. Prices & Availability subject to change without notice. Hardware shipping prices vary according to weight. Please call for amount.

VISA-MASTER CARD-C.O.D.

C.O.D. on phone orders only.

#### THE PROTECTO WARRANTY

All Protecto's products carry a minimum 90 day warranty. If anything fails within 90 days from the date of purchase, simply send your product to us via United Parcel Service prepaid. We will IMMEDIATELY send you a replacement at no charge via United Parcel Service prepaid. This warranty proves once again that We Love Our Customers.



#### SUPER DEALS (312) 382-5244 TO ORDER





#### COMMODORE 64 COMPUTER

\*You pay only \$99.00 for the Commodore 64 when you purchase a Pocket Writer 64 word processor for only \$39.95. List \$299.00 SALE \$99.00

> 1541 DISK DRIVE \$179.00 List \$249

To run all that software and add to the Double sided, single disk drive for the C-128 1541 disk drive. Runs all of the 3,000 plus pieces of software for the Commodore 64. List \$249.00 SALE \$179.00



#### COMMODORE 128 COMPUTER \$289.00 List \$399

modes. One for C-64 software, one for C-128 software, and one for CP/M business software. List \$399.00 SALE \$289.00

340K 1571 COMMODORE DISK DRIVE

prestige of your system, you'll want the allows you to use the C-128 mode plus CPM mode. 17 times faster than the 1541, and runs all the 1541 formats. List \$349.00 SALE \$259.00

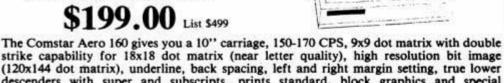
CALL BEFORE YOU ORDER: • OUR PRICES MAY BE LOWER & AND WE OFFER SPECIAL SYSTEM DEALS .

#### **BIG BLUE PRINTER** \$39.95



This is the affordable printer you have been waiting for! This 81/2" letter size, 80 column thermal printer features upper and lower case, underline, graphics, word processing, and much more. List \$199.00 SALE \$39.95

#### PREMIUM QUALITY 150-170 CPS COMSTAR **AERO 160 PRINTER**



descenders with super and subscripts, prints standard, block graphics and special characters. It gives you print quality and features found on printers costing twice as much! (Centronics Parrallel Interface) List \$499.00 SALE \$199.00

### 13" COLOR MONITOR

This premium quality monitor comes with speaker and audio hook up, High

lines, front panel controls and much more. Can also be used with VCR. One year warranty. List \$329.00 SALE \$139.95

#### TV TUNER \$49.95 List \$130

This tuner has dual UHF/VHF selector switches, mute, automatic fine tuning and computer/TV selector switches. Hook it up between your computer and monitor! Inputs included for 300 ohm, 75 ohm, and UHF. List \$129.95 SALE \$49.95

#### PRINTER/TYPEWRITER COMBINATION \$199.95 List \$299

Superb letter printer/typewriter combination, just a flick of the switch to interchange. Extra large carriage, typewriter keyboard, automatic margin control, compact, lightweight, drop in cassette ribbon! (90 day warranty) Centronics Parrallel Interface is built in. List 299.00 SALE \$199.95

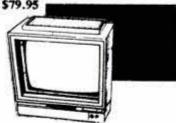
#### 10" COMSTAR 1000 PRINTER \$179.95 List \$349

This is one of the best values in the United States today. Print letters, documents, programs, and more at 100 characters per second or 20 cps in Near Letter quality mode. Some features are dot addressable graphics, adjustable tractor and friction feed, margin settings, pica, elite, condensed, italics, super & subscript, underline, bold, and double strike. List \$349.00 SALE \$179.95



12" 80 COLUMN MONITOR

Super High Resolution green screen monitor. 80 columns x 24 lines, easy to read, plus speaker for audio sound included. Fantastic value. List \$129.00 SALE \$79.95



#### 14" RGB & COMPOSITE **COLOR MONITOR**

Must be used to get 80 columns in color with

(RGB cable \$19.95) Add \$14.50 shipping. List \$399.00 SALE \$239.95

#### ATTENTION

**COMPUTER CLUBS • DEALERS** We offer big volume discounts! CALL TODAY

#### PROTECTO

We Love Our Customers 22292 N. Pepper Rd., Barrington, Illinois 60010 (312) 382-5244 to order

# If you love working with wood...

Wood Working

Fine Woodworking is the magazine you've been waiting for. A year's subscription brings you an incredible range of information—on joinery, turning, carving, finishing, machines, handtools and any of a hundred different woodworking specialties.

You'll find projects that teach new skills, demonstrations of tools and techniques, new ideas, old-world traditions, shop tests and some breathtaking examples of finished work. And we reserve at least one-quarter of each issue for our readers—a place where they can ask questions, air opinions and share jigs, tips and discoveries with each other.

If you'd like to join them, send for your subscription today. A year of Fine Woodworking (six issues) is just \$18, and we guarantee your satisfaction.

Write or call 1-800-243-7252.

tion (five more issues). If I'm not satisfied, I'll write "cancel" on my bill and owe nothing.

Name

Address

City

State

Zip

Bill me. 
Payment enclosed. 
MasterCard

VISA

Am. Ex.

Chg. Card #

Expiration Date

Signature

The Taunton Press, 63 So. Main St., Box 355-PWAG, Newtown, CT 06470

Yes, please send me the next issue and bill me just \$18 for a year's subscrip-



112

A bi-monthly magazine with plans/instructions for metal-working projects you can build. \$18.50 per year (Check/M.O.) With charge card – call toll-free anytime.

#### Machinist

800-824-7888 Operator 660 or write The Home Shop Machinist, Box 1810-C3 Traverse City MI 49685

MOMEY-BACK GUARANTEE

# HORTON BRASSES Nooks Hill Rd., P.O. Box 120PM Cromwell, CT 06416 Tele: (203) 635-4400 Mfrs. of Hardware for Antique Furniture for Over 50 Years Send \$2.00 for a Catalogue.

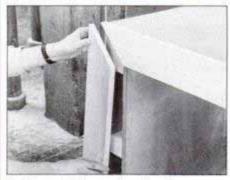
#### Woodworking Guide



7 Support bottom panel with temporary brace, then glue and clamp top panel in place. Use cauls to distribute pressure.



8 Cut edge banding to width. Using a table saw, cut miters on ends. Test saw adjustment on scrap before making final cuts.



9 Glue and clamp edge banding to top. Then, fit leg bands. Bands extend ½ in. beyond all surfaces, to be trimmed later.

lightly between coats with 320-grit sandpaper. Build up the coats until you have a smooth, flawless surface.

When satisfied with the base coat, begin applying the white gloss lacquer (B613-02757) thinned 30 percent with thinner. Apply in the same manner as the primer. Let the lacquer cure for four hours between coats. Again, sand lightly as required to smooth surface for next coat. Plan on two to four coats.

After letting the white lacquer cure for four hours, apply two or three coats of clear gloss Butyrate lacquer (B610-0357) thinned 50 percent. Again, wait four hours between coats, sanding lightly if necessary with 320-grit paper. Butyrate lacquer was used here because it is crystal clear. Let the finish

# Working At Home

A contemporary red oak desk designed for home use.

#### BY ROSARIO CAPOTOSTO, Contributing Editor

his handsome desk is sized just right to provide plenty of working room without sacrificing too much floor space. It's made with attractively figured, rotary-cut, red oak veneer plywood and ½ solid red oak stock. The use of the latter gives the illusion of solid wood construction and allows cutting large radius corners on all edges. Solid walnut banding between the panels adds an interesting accent and imparts a floating look to the desktop and sides.

Three fully extending drawers in the right pedestal provide lots of storage space with easy access. And the left pedestal features two sliding platforms. The lower one is for storing a typewriter and the upper one for supporting it at a comfortable working height. A gravity stop automatically drops behind the upper platform to prevent it from retracting when returning the carriage on



a manual machine. Additional storage space is available under the lower platform of the desk. The door of the typewriter compartment is made to resemble the right-hand drawer fronts and is hung with easy-to-install, self-closing, concealed hinges. Due to the moderate pressure required to operate the door and drawers, no pulls were needed. This preserved the desk's clean, contemporary lines.

#### Construction procedures

The construction of the desk is relatively simple, but it does require precise cutting of parts, careful dowel joinery and close attention to the drawing and materials list provided on the following pages. If you are willing to splice pieces together to form the desk partitions, you should be able to do the job by investing in only two 4 x 8-ft. sheets of red oak plywood. Otherwise, you'll need three sheets.

Note that the dimensions given in the materials list for the  $\frac{5}{4}$  hardwood stock are based on material that is surfaced-two-sides (S2S), which is normally  $1\frac{1}{16}$  in. thick. However, this dimension can sometimes vary (usually on the plus side) so check your stock carefully and either surface plane oversize stock, if you have the means, or alter the parts dimensions to suit.

Unless you have a factory-size table saw, the large plywood members will have to be cut with a portable circular saw. Work only with a sharp fine-tooth plywood blade and cut with the back of the panel facing up. Use an accurately positioned straight-edged board to guide the saw.

#### Walnut accent strips

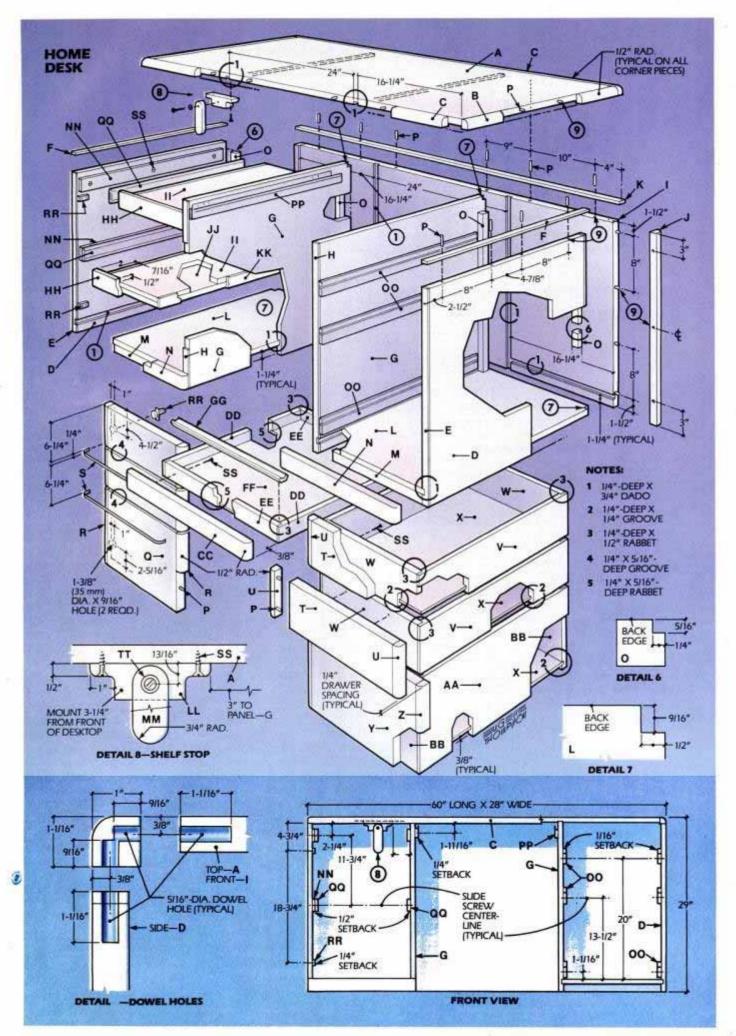
When the top, front, sides and partitions have been cut to size, rip ¼-in.-thick strips of walnut from ¼ walnut stock. This measures ½ in. and should be left oversize and trimmed flush to the plywood after it has been attached. Glue a walnut strip to the front and back edge of both side panels and a strip to the outside edge of each partition panel. Use two small brads to keep the pieces in alignment during clamping.

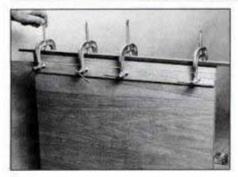
The best way to trim the walnut bands flush to the plywood is with a cabinet scraper. If you opt to use a block plane instead, be careful to avoid cutting into and through the veneer. When this is done cut the solid oak corners and top edging pieces to size. All these pieces—except for the back edging strip on the desktop—require dowel holes in two adjacent surfaces. Because of this, you must lay out and bore all dowel holes before you can assemble any part of the case. The proper positions are indicated on the drawing on page 116.

Bore the holes to depths that will allow ½-in, penetration in the solid wood and 1 in. in the plywood. Then cut

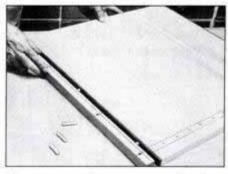
COLOR PHOTO: JR. ROST, BLACK-AND-WHITE PHOTOS: ROSARIO CAPOTOSTO: ART. EUGENE THOMPSON

Designed to have a contemporary form without sacrificing traditional function, this desk has a full drawer bank on the right, a pencil drawer in the middle, and a storage for a typewriter on the left.

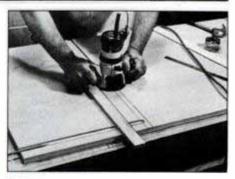




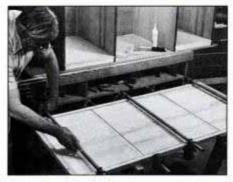
1 Cut side panels, partitions and desk front to size, then glue and clamp walnut accent strips to the proper edges.



2 Cut the desk front corners to size from solid stock. Bore dowel holes in all mating edges. Check for fit before joining.



3 Using a router and ¾-in. straight bit, rout all dadoes on back of front panel. Tack-nail a strip in place as a guide.



4 Cut partition dadoes in the top and bore the dowel holes in the edging before joining the two with glue and clamps.



5 Begin assembly by gluing the end panel to the desk front. Dowel pins should penetrate the corner piece just 1/2 in.



6 Apply glue to the dadoes in the front and end panels and to the edges of the base panel. Then, slide the base in place.

the dadoes in the bottom of the top panel to receive the partitions. Also cut the dadoes in the back of the front panel. Use a router with a 3/4-in. straight bit guided with a straight piece of wood tack-nailed to the surface of the panels.

Next, glue and clamp the edging and corners in place. Then, dry-assemble the side, partitions and front panel to check the fit. (Be sure to use slightly sanded dowel pins for this test, so you can get the case apart afterward.) While the parts are together, measure between the dadoes in the sides and partitions to get the exact dimension for cutting the base panels.

Assembly

The assembly of the case is done with the front panel lying face down on the workbench. Start with the side panel then add the base and follow with the partition, which will have to be tilted into position. Use glue and clamps as shown in photo No. 7 to close the joints. Repeat the procedure at the other end. While the glue is drying, you can add the inside corner reinforcing blocks and also the facing trim boards at the bottom of the pedestals.

After the clamps are removed, turn the case upright and glue and nail the walnut strips to the top edges of the front and side panels. Then, glue and clamp the solid edging to the top panel.

Next, position the top on the case and transfer the dowel hole locations from the top to the walnut strips on the case parts. Bore the holes.

For best results when gluing the top to

the case, use a dozen 36-in.-long bar or pipe clamps distributed equally around the perimeter. Keep in mind that you are trying to align 14 dowels with their holes, plus two partitions and their dadoes, so it's a good idea to get some help for this operation. When assembly is complete, cut a 1/2-in. radius on the entire top edge using a router and rounding-over bit.

#### Drawers and door

The drawers are made of 1/2-in.-thick poplar sides and 1/4-in.-thick lauan plywood bottoms. Cut the parts to size, then roundover both top corners of the drawer sides with a router and 3/16-in.-radius roundingover bit. This will reduce the chance of splinters when you use the drawers. Assemble the parts as shown in photo No. 13.

#### Key No. Size and description (use)

- %x 26 x 58" red oak plywood (top)
- C D
- 2 1x 17<sub>16</sub> x 25<sup>11</sup>/<sub>16</sub>" red oak plywood (side) 2 ½ x 25½ x 27<sup>11</sup>/<sub>16</sub>" red oak plywood (side) 4 ½ x ½ x 27<sup>11</sup>/<sub>16</sub>" walnut (edge band) 2 ½ x ½ x 25½" walnut (edge band) E
- G 2 1/4 x 261/16 x 281/2 red oak plywood (partition)
- H 2 1/4 x 1/4 x 281/2" walnut (edge band) 1 1/4 x 2711/16 x 58" red oak plywood (front 1
- panel) 2 1 x 11/16 x 2711/16" red oak (corner)
- 1/4 x 3/4 x 60" walnut (edge band) K 2 ½ x 17 x 26½ red oak plywood (base) 2 ½ x 1½ x 16½ pine (cleat)
- M N 2 11/16 x 2 x 18" red oak (facing)
- 0 4 1 x 1 x 24" pine (corner block) As reqd. % dia. x 11/2" hardwood dowel 1 11/16 x 16 x 257/16" red oak (door)

- MATERIALS LIST—HOME DESK 1 x 11/16 x 257/16" red oak (edge band) 2
- $\frac{1}{16}$  x  $\frac{1}{16}$  x 24" walnut (inlay)  $\frac{1}{16}$  x 6% x 16" red oak (drawer face) 2 T U  $1 \times 1\frac{1}{16} \times 6\frac{1}{16}$  red oak (edge band)
- 4 ½ x 6 x 24" poplar (drawer side) W 1/2 x 6 x 15" poplar (drawer front, back) 4
- X 3 1/4 x 15 x 231/2" plywood (drawer bottom)
- $1\frac{1}{16} \times 12\frac{7}{16} \times 18$ " red oak (drawer face)  $1 \times 1\frac{1}{16} \times 12\frac{7}{16}$ " red oak (edge band) 2 2 9 AA ½ x 11 x 24" poplar (drawer side)
- 2  $\frac{1}{2}$  x 11 x 15" poplar (drawer front, back)  $\frac{1}{16}$  x  $\frac{2}{16}$  x  $\frac{2}{16}$  x  $\frac{2}{16}$  red oak (drawer face) RR CC
- DD ½ x 2 x 24" poplar (drawer side) 1/2 x 2 x 221/2" poplar (drawer front, back) EE FF 1/4 x 22% x 23%" plywood (drawer
- bottom) <sup>11</sup>/<sub>16</sub> x 2% x 22" crown molding (tray) GG HH % x 21/4 x 151/4" red oak (platform face)
- % x 14½ x 24" red oak plywood (platform)

- IJ 2 1/4 x 141/2 x 24" plywood (platform doubler)
- 1/4 x 11/2 x 24" red oak (platform side) KK
- 11/16 x 11/2 x 5" red oak (gravity stop LL block)
- 1 ½ x 1½ x 5" red oak (gravity stop) 2 ½ x 1½ x 22" pine (slide cleat) MM NN
- \*OO 3 pr. 24" Grant No. 528 full-extension slide
- \*PP 1 pr. 24" Grant No. 511 extension slide \*QQ 2 pr. 22" Grant No. 4930 full-extension slide. \*\*RR 1 pr. Melpa No. 323050 self-closing, full
  - overlay, concealed hinge SS 22 1" No. 8 fh screws
  - 1 11/2" No. 10 rh screw with flat washer TT
    - \*If not available locally, Grant slides can be ordered from Armor Products, Box 445, East Northport, NY 11730.
  - \*\*To find nearest supplier, call toll-free Melpa Inc., High Point, NC, 1-800-334-1041.



 The first edge removes the bulk of water or winter snow.

 The second edge removes bugs, road film, dirt.

 The third edge squeegees the glass completely clean.

# 

We guarantee Tripledge Wiper Blades for as long as you own your car! No other wiper blade can offer this guarantee. If you are not completely satisfied you get your money back.

THE WORLD'S FIRST SYNTHETIC WIPER.

Tripledge blades are made from DuPont Nordel-the same material used in 50,000 mile radial tires. Tripledge wipers will never tear, crack, split, rot, dry out or stick. Not affected by ice, snow, blazing sun, smog or road chemicals.

EASY, DO-IT-YOURSELF INSTALLATION. Universal adapter snaps on; accepts

bayonet, hook, pin type applications.

CUSTOM FIT for virtually every U.S. and import car, van or truck.

AIR-FLO DESIGN. Blades won't lift in high winds, high speeds. 6 claws grip firmly, distribute pressure evenly.

PATENTED DESIGN.

Protected by U.S. Patent 4473919.

#### PRICE PER PAIR ONLY

Specify make, model, year of car.

#### CALL TOLL-FREE 1-800-847-0653

or send check, money-order or card number and expiration date of your Visa or MasterCard. Pennsylvania residents add 6% sales tax.



TRIPLEDGE WIPER CORP., P.O. BOX 369-F, Bensalem, PA 19020

☐ <b>YES!</b> Set Lifetime Wipers — the life of your car.	the only wiper G	pair of Tripledge UARANTEED fo	1 pr. 9.95 2 pr. 17.90 Save 2.00 3 pr. 25.85 Save 4.00 4 pr. 33.80 Save 6.00
Name			(Single Blades: \$4.98 ea.) Shipping \$1.95 first pair
Address			(Shipping 2nd, 3rd, & 4th pair, only \$1.00 each)
City	State	Zip	- Amt. Enclosed:
VISA/MC #			Exp. Date
Car #1: Year	Make	N	Model
Car #2: Year	Make	N	Model
Car #3: Year	Make	N	Model
Car #4: Year	Make		Model

#### Woodworking Guide



7 Glue and install the partition panel, then join the assembly with bar clamps. Be sure to check the assembly for square.



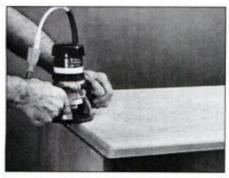
8 Once both pedestals are joined to the front, glue and nail the walnut strips to the top edge of the front and side panels.



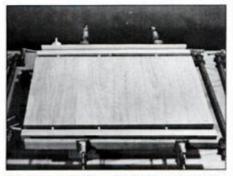
9 Glue and drive dowels before applying glue to entire edge. This yields more working time before glue dries.

The door and drawer fronts are made of 5/4 solid oak, edged on the sides to match the grain pattern at the front of the desk. Edge-join the stock with glue and clamps to form two blanks. When dry, glue and clamp the edging in place. After this dries, round-over the corners with a router and sand both blanks smooth. Cut the door to finish size and cut the drawer faces, in order, out of the second blank. This will ensure that the grain will be continuous across all the drawers.

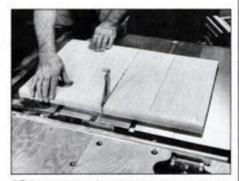
Next, use a router with a 1/4-in. straight bit to cut the grooves in the door to simulate the drawer fronts. Then, cut the walnut accent strips to size. They should be  $\frac{1}{4}$  in. wide  $\times \frac{1}{32}$  in. thick. First, cut a 1/32-in.-thick slice from 4/4 walnut stock.



10 Glue and clamp the top in place, then shape all edges with a router and rounding-over bit. Move router clockwise.



11 Glue up solid stock to form blanks for the door and drawer fronts. Then glue, dowel and clamp solid edging to sides.



12 Lay out the sizes for the drawer fronts on the blank, then cut them in order to ensure wood grain will align.

Then, tape it to a scrap board and cut through both to rip to width. This will prevent the piece from whipping and breaking. In order to bend the walnut strips around the small radii without breaking, presoak each end in a glass of hot water. Then, temporarily tape each strip in its groove. After it's dry, the strip will retain the shape. Apply a small bead of glue to the grooves, slide in the walnut, then clamp by forcing aluminum foil into the grooves above the strips.

Next, fabricate the typewriter platforms, then install all the extension slides. Carefully review the drawing to determine the precise location of all these slides, including the different setbacks required for the sliding typewriter platforms. As-

POPULAR MECHANICS . NOVEMBER 1986

#### GET THE EDGE!

MODEL #120 \$49.95 Handmade in Italy Side Opening 8 %" Brass Lined, Pearl Handle Blue, Green, Red, White, Black

MODEL #817 \$39.95

Gleaming Brass & Hardwood Brushed Stainless Blade Side Opening 71/2 Lever Hunter



MODEL #119 \$39.95 Genuine Stag w/Shot-Shell Puller Italian Made 71/2" Lever Side Opening

All Genuine, Automatic, And Completely Finished. Sold in Legal\* Kit Form



#### THE EDGE COMPANY PO BOX 826 BRATTLEBORO, VT 05301

**CALL TOLL FREE** 1-800-445-1021

Send for free catalog!! Hundreds of unique models in full color.

\*Attn. Collectors & Sportsmen: Though legal in parts form, in certain areas the completion of these kits may violate certain laws. Please check your area before ordering or assembling, as compliance with any such law is the purchaser's

The Edge Co., PO Box 826, Brattleboro, VT 05301 Before Ordering Call For Availability 800-445-1021 Dealer Prices On Request Please Ship The Following It Model # Qty Qty. Model # Qty. Model 4 Model # Qty. Model # Qty. Add \$1.50 Per Kit Shipping and Handling-Allow 10 Days Shipping ☐ Check or Money Order Enclosed Total S ☐ Visa/MasterCard #. Exp. Date □ C.O.D. Address City State I certify that I am over 21 years of age. Signature Not available where prohibited by law. Inquire about special military and police waivers and discounts.

Have all the pure, fresh water



you want FREE!

You can drill a water well in your backyard next weekend! Over 99,000

home water wells drilled this easy, low-cost way since 1962!



CALL TOLL-FREE -800-821-7700 (Ask for Operator 5133)

Or Clip Coupon and Mail Today!

<b>≟</b> eep	ROCK Anderson Road Opelika, Alabama 36802
Please mail you	ur FREE Brochure.
Print Name	

City/State/Zip 5133

#### 30 Ways to Help **You Qualify for** the Job You Want

Free Facts about Career Diplomas and Degrees

Now at home in your spare time, without any previous experience, you can train for a money-making career even get a Specialized

Associate Degree. Call or



send for free information on the career field that interests you most and how to train for it.

CALL TOLL

1-800-228-5300/PBSA6 CALL ANYTIME—24 hours a day. 7 days a week. No cost. No obligation. No salesman will visit

- OR MAIL COUPON TODAY International Correspondence Schools SINCE 1891 Dept. PBSA6, Scranton, PA 18515

Send free facts on how I can study at home for the career I have chosen. No obligation. No salesman will visit. CHECK ONE CAREER ONLY.

ASSOCIATE IN SPECIALIZED BUSINESS DEGREE PROGRAMS  Business Management Accounting Business Management with option in Marketing Business Management	ASSOCIATE IN SPECIALIZED TECHNOLOGY DEGREE PROGRAMS Mechanical Engineering Technology Civil Engineering Technology Electrical Engineering Technology
with option in Finance	Electronics Technology
CAREER DIPLO	MA PROGRAMS -
Computer Programming High School Catering Gourmet Cooking	Electrician Police Science Art

with option in Finance	Electronics Technology
CAREER DIPLOM	A PROGRAMS -
Computer Programming High School Catering Gournet Cooking Microcomputer Repair Auto Mechanics Bookkeeping Hotel Restaurant Management Diratting Aer Conditioning & Refrigeration Electronics	Electrician Police Science Art Small Business Management Wildlife Forestry Conservation Diesel Mechanics Gun Repair Motorcycle Repair Surveying & Mapping TV/VCR Repair Veternary Assistant Travel Agent
hese courses are offered by ICS and	North American Correspondence

Schools NAME ADDRESS

CITY/STATE/ZIP PHONE NO. (

#### FREE

GENEVA WOODWORKS
Specializing in hard-to-find,
difficult-to-make HARDWOOD
PARTS. LOWEST PRICES...



**ATALOG** 

Unique TOY PARTS • Plans and Kits Spindles • Candle Sticks • Finials Carved Wood Appliques • Dowels Shaker Pegs • Wood Knobs Tools • Finishing Supplies • And More!

#### **WOOD PROJECTS FOR FUN & PROFIT**

For Volume Pricing Write or Phone Today.

Name

Address

City, State, Zip

#### GENEVA WOODWORKS

PM116A LAKE GENEVA, WI 53147

1-414-248-3883

#### **Gun Cabinet**

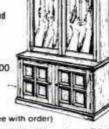
Full-Size Professional Plan

Keep up to eight guns displayed behind 2 locked glass doors of this handsome piece. The base storage section has two doors that lock separately. Make in any hardwood and finish to sult your decor. Makes a line Display or Curio Cabinet. Overall size: 373% wide and 73° high.

Send for Plan #320 \$11.75

CATALOG only \$2.00 (refundable) 180 diff. full-size

prof. furniture plans (catalog free with order)



FURNITURE DESIGNS, INC. Dept.PG116 1827 Elmdale Ave. Glenview. IL 60025 [312] 657-7526

#### Full Size Plans



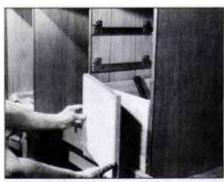
Children can ride BIG TRAIN by sitting on the box car. This is not the usual pull toy. The engine is 31" long and the box car and caboose are each 20" in length. A great toy! Plan No. 18009....\$12.50 Catalog...\$1.00 Check, M.O., Visa/MC....... (516) 462-6228

ARMOR, Dept. C, Box 445, E. Northport, NY 11731

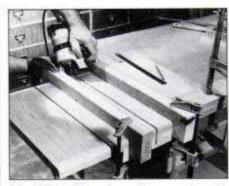
#### Woodworking Guide



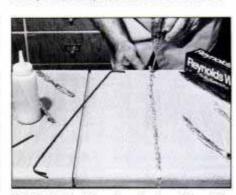
13 To assemble drawers, first join sides to back with glue and nails. Then, slide in bottom—without glue—and attach front.



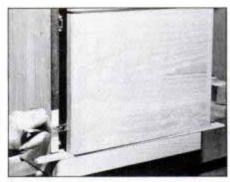
14 Once the drawers are installed, position the drawer face and check for fit. Trim, if needed, then attach to drawer.



15 This guide system allows you to easily cut grooves across the entire face of the door panel using a router and straight bit.



16 Cut thin strips of walnut, soak ends in water, and bend to shape. When dry, glue into grooves and hold with foil.



17 Support door, then mark location of hinge-mounting blocks. Use masking tape so mark will read better.



18 Attach mounting blocks to the side panel and hinges to the door. Then, slide hinges onto blocks and tighten screws.

semble and install the gravity stop, then temporarily install the sliding platforms and check for fit. When satisfied, remove the platforms for finishing. Install all the drawers on their appropriate slides and check each for proper fit. The slides allow for some adjustment in both dimensions. When satisfied with the drawer alignment, attach a drawer face to each front.

To do this, begin by driving two brads through the back of each drawer front at the precise locations for the screws used to join the two. Stop when the points project slightly through the front surface. Then, align the face over the drawer front and press it onto the brad points. Remove the face and find the registration points left by the brads. Remove the brads, then

bore screw clearance holes in the drawer front and pilot holes in the back of the face. Apply glue to both surfaces and join with screws. At this point it's a good idea to remove all drawers for the finishing process, then hang the door and sand the entire piece with 120-grit followed by 220-grit sandpaper. Remove all the dust.

For a tough, lasting finish that brings out the beauty of the wood, we used Deftoil Danish Oil Natural Finish. This is a tung oil-enriched urethane resin that penetrates deeply and hardens the wood fibers from within to provide maximum protection. The finish is remarkably easy to apply as there is no problem with dust, streaking or running. Two coats are applied and wiped, as instructed on the can label.

#### Popular Mechanics

The Excitement Is Building!

Catalog of Plans

Only \$1,50

From a tool box to a storage shed, a doll cradle to glass cabinets, our catalog has plans for you in these areas: • Fine Furniture • Storage Sheds • Kids' Stuff • For Your Workshop • Leisure Time • Outdoor Living

Plus, choose from hundreds of reprints and books on car care, home maintenance, boating and more. Send for your catalog today and experience the excitement that comes from building it yourself.

TO ORDER Send your name and address with check or money order, to: Popular Mechanics, Box 1014, Radio City Station, New York, N.Y. 10101.

Colonial Style Garage/Barn—Huge enough to hold two full-size cars in its two separate bays. The structure measures 24' x 26' with an additional 350 square feet on the second floor. A 4-foot recessed walkway along the side provides excellent space for wood and garden equipment, and a 3-foot overhang in front keeps snow from accumulating against the garage doors. Plans include an 8-page instruction manual and 4 blueprint-size layout sheets with: • Overall perspective • Basic wall building steps • Construction details for framing loft, floor, roof and end gables • Exterior finishing details and suggestions for alternate versions of the barn. Materials list included. (PL-1277—\$30.00. Each additional plan \$20.00 when purchased with first plan.)



Model Steam Tractor—Challenge of a lifetime! The famous J.I. Chase threshing machine steam tractor, 16 separate plans sheets plus instruction booklet. The finest detail work. Stacks firewood but burns alcohol. 9 separate gears in the transmission alone. What a thrill to see it huffing and puffing under its own power. (PL-1272—\$11.95)

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



Barn/Garden Shed—Combines roomy storage space for yard equipment with a pleasant area for gardening activities. Measures 12 ' x 16' and has an upper loft for about 380 square feet. Wide barn doors at one end allow you to roll in bulky equipment, and a sheltered alcove with a potting bench and storage for gardening supplies lets you work while shielded from sun or rain. (PL-1278—\$10.50; 2 plans for \$17.50)



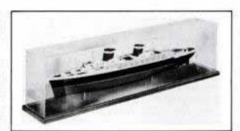
Stowaway Picnic Table—A clever one-piece design made from long-lasting redwood. After the picnic season, just fold it up for convenient indoor storage. Easy to build. (PL-1716—\$5.95)



Portable Ironing Center—Unscrews from the wall to move when you do. Plans feature a receptacle for the iron, a fluorescent light and storage space for all materials. The ironing board folds up behind louvered doors. (PM-1005—\$5.95)



Bookcase Wall—Turn your wall into a great display area for books and other items. Our bookcase goes from floor to ceiling with outof-sight storage space on the bottom. The five cabinets can be adjusted to any width to fit your wall. (PM-1008—\$5.95)



Model SS United States—The glorious, record breaking flagship of the U.S. Merchant Marine. Though now retired at Norfolk, VA, no passenger ship has ever approached her top speed. The professional quality model is described in detail on 3 full size blueprints. Over 2 ft. long of wood and metal. (PL-1200—\$9.95)



Adirondack Lawn Furniture—This traditional Adirondack furniture is as durable as it is attractive. Crafted of hardwood, each piece is carefully sanded, then assembled with waterresistant glue, sealed with wood preservative and painted—all to make them withstand the rigors of outdoor use. Plans and materials list. (PL-1751—\$5.95)

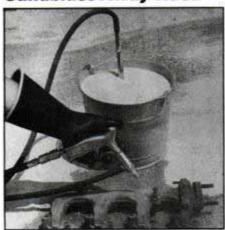


Redwood Patio Furniture—Six durable, lightweight and handsome pieces—barbecue cart, chaise, coffee table, telephone caddy, tray and planter. All are designed to withstand exposure to sun, heat and moisture and to be free of blemishes and warps. Build them for your backyard, patio, deck or sunroom. (PM-I0I3—\$6.95)



# Gastwood AUTO RESTORATION TOOLS

#### Sandblast Away Rust

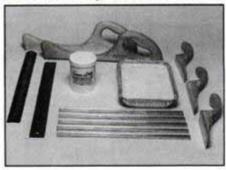


Our sandblaster is field proven (thousands in use) and priced right. This sandblaster gives you the ability to remove rust, scale, paint and corrosion in minutes. Also doubles as air gun/degreaser for cleaning parts.

The Eastwood sandblaster package includes all-metal power (same as used on our larger units), ten foot hose, 14" pickup tube, spare nozzle and complete instructions. Just attach to 1 HP compressor, insert pickup tube into sand or other abrasive and you're ready.

\$35.95 8532 Sandblast Gun ..... 8534 Sandblast Gun & Hood ...... \$49.95

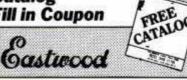
#### Basic Body Solder Kit



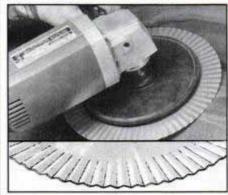
Everything you need to make real metal repairs on rusted areas. Includes 2 Paddles: 1 Flat, 1 Half-Round, 1 lb. Tin of Tallow; 1 lb. Tinning Butter; 5 Acid Brushes; 14" Flexible English Body File; File Holder, 4 Sticks Body Solder and FREE Copy of Auto Body Solder

6730 Basic Body Solder Kit ...... \$58.00 6400 Body Solder 1/2 lb. bar . . . . . . . . \$3.50

FREE! Eastwood Catalog Fill in Coupon



#### **Smooth Dented Body** Panels In Minutes



Just attach this 9", 18 gauge stainless steel disc to your heavy-duty body grinder and you'll level stretched metal to its original factorysmooth shape. The secret's in the unique blade that creates heat to shrink metal back into shape. It has a 34" arbor to fit standard grinders (maximum speed 8000 r.p.m.; 5000 r.p.m. ideal). 7001 Shrinking Disc ...... \$29.95

#### Cut Spotwelds In Seconds







Drill

Cuts top layer only

Remove spotwelds without cutting through the lower panel. 14" arbor has adjustable pilot to insure perfect cuts without damaging metal. Pilot pops out slug after cutting. Works on air and electric drills (900 r.p.m. max.) with 14" chuck. Use with sheetmetal up to 3/16". 3219 Spotweld Cutter ...... \$12.95 3220 Replacement Cutter . . . . . . . . . \$4.50

#### Auto Restoration Books



Here's a selection of the most popular restoration books in the Eastwood library. 6602 Key to Metal Bumping-how to use body 6600 Auto Restoration Tips and Techniques— A favorite reference book! . . . . . \$9.95

6645 Auto Body Solder-the Bible of body solder repair work ...... \$6.95 6601 Auto Body Repair-professional techniques explained ..... \$16.95

Remove Rust Without Harming Good Metal

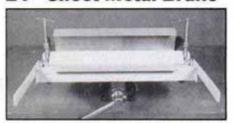


Oxi-Solv removes rust and corrosion fast on any metal. Just spray, dip, or brush on and see it work!! Oxi-Solv is nonflammable, non-toxic, non-caustic and odorless.

Extra bonus: After removing rust, Oxi-Solv gives a zinc phosphate coating to metal for better paint adhesion. Reusable.

3430 Oxi-Solv, 16 oz. ..... 3432 Oxi-Solv, 1 gallon ..... \$24.95

#### 24" Sheet Metal Brake



This is a heavy-duty auto shop brake for panel fabrication. Will form angles up to 90° in metal 24" wide with 18 gauge thickness. You can form narrower widths on heavier gauge metal. All welded steel construction with reinforcements to eliminate lifting and "bow". Mounts in any shop vise with a 2" opening and can be set up in minutes. Just insert metal, clamp holding bar in place, and lift handles. Produces a sharp, clean bend in steel and aluminum. Two 5" C-clamps required for use (not included). Weight 26 lbs. Minor assembly required. 

#### High Temp. Stainless Paint For Exhaust Systems



Our unique formula of corrosion resistant stainless steel leafing pigments bond to a metal surface to block out rust. Unaffected by the hot and cold cycles of automotive use, this coating will last for years.

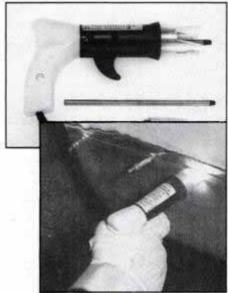
Easy to apply, just clean the part with a wire brush. No primer necessary. Can be brushed, air dries in 60 min., and cures in use to maintain its maximum hardness and durability. Complete instructions on can. 1 pt. can. 1256 High Temp. Stainless

Coating ...... \$12.95

TO ORDER CALL TOLL FREE 1-800-345-1178 IN PA. (215) 644-4412

# 6 astwood AUTO RESTORATION TOOLS

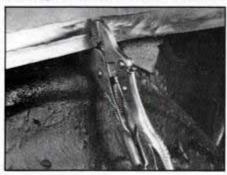
#### Spot Weld Perfectly In 6 Seconds



#### Converts an Arc Welder to a Spot Welder

It welds any steel between 18-26 gauge. (Auto body sheet metal is between 18 and 22 gauge). Ideal for welding replacement panels, floors, brackets, clips, braces, etc. Welds from one side so it can even do blind panels that ordinarily can't be spot welded. Comes with two pressure heads - four prong for control on flat areas and two prong for reaching into edge and recess work. Proper replacement electrodes available through Eastwood. Gun comes complete with connection wire, spare electrode, 2 pressure heads and complete instructions. Hook it to the electrode holder of your AC arc welder (set at 50 amps) and ground to car body. 4355 Spot Weld Gun ..... \$35.95 **4321** Package 10 electrodes . . . . . . **\$9.75 4343A** Powerpack for spotwelder . . . **\$119.00** (If you don't have an arc welder)

#### Flangers For Flush Welds



Offset Gives Smooth Lap Welds

Adjust tool to metal thickness, flange repair area and lay in patch panel. Lets you weld flush with body metal, which minimizes grinding and filling. Works in tight areas and on sharp curves. Perfect results with very little effort.

6286 Panel Flanger . . . . . . . . . . . \$29.95

Prices in this ad supercede those of previous Eastwood ads.

#### Convert Your Arc Welder For Mig-Like Results



Most arc welders have been designed for joining ¼" metal; our stitch welder attachment controls welding heat to produce smooth, even welds on body panels — limits distortion and burn-through.

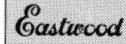
The current's directed through an electrical solenoid and diode circuit. The solenoid, which pulses thousands of times per minute, gives you normal welding amperage while allowing you to weld thin pieces. Although the arc never appears to break, the reciprocating electrode action pulls the electrode in and out of the weld puddle to limit welding heat.

Welding's easy: once you strike the selfstarting arc, lay the rod on the metal and let the machine do the work. Resulting bead is smooth and even, with slag coming off in large pieces. Easy to master with practice.

The stitch welder's five foot power cord attaches to any A.C. arc welder's electrode holder (must run at 80 amps or less). Uses arc welding rods up to 3/32" steel and stainless. Tool body cast aluminum with vinyl insulated grip for positive control Electrodes held with set screw and can be easily replaced. Designed for years of trouble-free service.

4369 Stitch Welder \$59.00
4372 Arc Welding Rods (2mm dia, 3 lb. pkg. approx 120 rods) designed with special flux for welding sheetmetal \$9.95
4343A Powerpack for stitch welder \$119.00
(If you don't have an arc welder)

#### FREE! Eastwood Catalog Fill In Coupon



# FREE CATALOG

#### Nibbler Cuts Sheetmetal Fast



Our nibbler cuts curves, straight lines — any shape you need. Leaves flat, no-distortion, burr-free finish. Uses less effort than ordinary snips. Chromed steel construction with cushioned vinyl grips. Heat-treated tool steel jaws. Cuts up to 18 gauge steel, 16 gauge aluminum. Jaws replace easily.

© 1986 Easthill Group Inc.

# TO ORDER CALL TOLL FREE 1-800-345-1178

IN PENNSYLVANIA: (215) 644-4412

#### 30 Day Money Back Guarantee

Send me the following	: Code #1C27PMB6
Item(s) #	\$
Item(s) #	\$
Item(s) #	
Item(s) #	
Item(s) #	s
Packing and Guarantee	ed Delivery Charge
\$1.00 to 20.00-\$3.50 40.0	01 to 50.00-\$4.95
\$20.01 to 30.00-\$3.95 50.0	il to 75.00-\$6.00
\$30.01 to 40.00-\$4,40 75.0	00 and up-\$6.50
☐ Send me your free catalog	TOTAL \$
□ VISA □ Mastercard	C.O.D. (Add \$2.75)
Credit Card	Expiration Date
☐ Check enclosed	(PA residents add 6% sales to
Name	
Address	
City	
State	Zip
The Fastwood Compan	NI .

147 Pennsylvania Ave., Box 296

Malvern, PA 19355



# China Bound

A striking mahogany sideboard for china, linens and silver.

#### BY NEAL BARRETT

sually, a sideboard is considered a companion piece to a dining room table. As such, people frequently purchase both as an ensemble, along with chairs and possibly a china cabinet. But this doesn't have to be the case, especially these days when so many people prefer an eclectic decorating style. Now it's not uncommon to see a pine wardrobe housing stereo equipment in the family room, or a Queen Anne reproduction end table next to an overstuffed contemporary sofa.

Because of this, we thought it worthwhile to build a sideboard with generous open storage space so the piece could be used in other rooms just as easily as the dining room. And in the process, we feature some high-class veneer work with some truly spectacular fiddleback mahogany veneer. As you can see, the basic design roots of this piece come from the Mission furniture style, but we hope our refinements have brought the piece into a more contemporary environment.

#### Stock preparation

Begin by preparing the solid stock. Cut pieces to rough size, and joint and thickness plane to specified dimension. Then, cut legs, stiles, rails and stretchers to finished size. Rip the top frame pieces and edge banding to width, leaving them to be cut to length later.

Cut the plywood pieces to rough size for the case bottom and partitions and back. Using glue and clamps, apply the edge banding to the front edge of the bottom and partitions. When the glue has dried, use a sharp plane to trim the edge banding flush to the surface of the panels. Then, cut all plywood parts to finished size.

Using a router with %-in. straight bit, cut the stopped dadoes in the bottom for case partitions. Use a sharp chisel to square the end of each dado. Next, use the band saw or sabre saw to cut the notch in partition tops for the front and rear stretchers. Then, cut the notches in the bottom front corner of the partitions so they will fit into their stopped dadoes. Complete the partitions by cutting the stopped dadoes for the horizontal drawer partition.

Next, cut the notches in bottom

panel and top stretchers to accommodate the legs, and cut the arc in the front edge of the top stretcher that serves as clearance for drawer access. Rout a rabbet in the case bottom to receive the back.

Clamp each rear leg between bench dogs and rout a stopped rabbet to receive the case back. Then, readjust the router, and use a ¼-in. straight bit and edge guide to cut the stopped dado in each leg. This groove will accommodate both the rails and the side panels. Also, cut the mortise in the legs for side stretchers by boring overlapping holes and squaring them with a chisel.

Install dado blades in a table saw and make these cuts: the panel grooves in the door rails and stiles; the panel grooves in the side rails; the spline grooves in the top frame member; and the spline grooves in the side rails.

Adjust the dado blades and cut the tenons on the ends of the side rails, side stretchers, bottom stretchers and door stiles. Complete the tenons by cutting the proper shoulders with a sharp backsaw. Then, use a router with a slotting bit to cut the spline grooves in the top panel, the bottom panel and the ends of the top stretchers. Sand all parts smooth with 120-grit sandpaper, then begin assembly.

Glue and clamp the case partitions to the horizontal drawer partition. When dry, glue and clamp the case bottom to

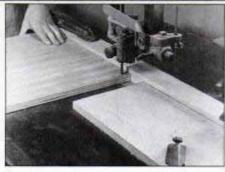


DESIGN. NEAL BARRETT, COLOR PHOTO: JR. ROST, BLACK-AND-WHITE PHOTOS. NEAL BARRETT, TECHNICAL ART: EUGENE THOMPSON.

Designed as a dining room sideboard, this versatile piece can also be outfitted for use as a dry bar. It features three roomy storage compartments and a large center drawer (above) for silver and other utensils.



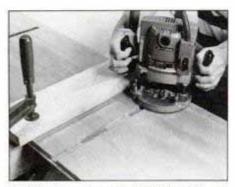
 Cut mahogany plywood to size for the bottom and interior case partitions. Glue and clamp edge banding in place.



2 Cut appropriate notches in bottom and partitions by hand or with a band saw. For latter, use stop block clamped to table.



3 Using a router and edge guide, cut a ¼ × ½-in. rabbet—for the case back—along the back edge of the bottom panel.



4 Using a router and straight guide, cut stopped dadoes in the bottom and partitions. Square dado ends with chisel.

the partitions and glue and screw the top stretchers in place. Check the assembly for square before you set it aside.

Now, you can begin veneering. As previously stated, we chose a fiddleback mahogany veneer for our project. Generally, veneers are sold in sheets from 1 ft. to 16 ft. long with the width changing depending on the species. The amount of veneer necessary for a given project will vary according to the lengths and widths available and the pattern you want to achieve. Probably the most common pattern is bookmatching, in which consecutive sheets of veneer are joined together sideby-side to form a mirror image of the grain pattern. This is the method used on this piece. Keep in mind that you must veneer both sides of the panel; therefore, we used a less expensive backing veneer that matched the density of the face veneer.

Begin by cutting the sheets to rough length using a utility knife and straightedge



5 Cut legs to size, then using router and guide, cut stopped groove in each leg. Groove accepts side rails and panels.

guide. Score the veneer twice and lift it to separate the pieces. Arrange a straightening jig by placing a flat panel with a straightedge at least as long as the veneer on the worktable. Place the two sheets of veneer you want to match on the panel, overhanging the straightedge by about 1/s in. Clamp a board over the veneers with its edge held back from the panel's straightedge. Use a router with a flush trimming bit to trim the edges.

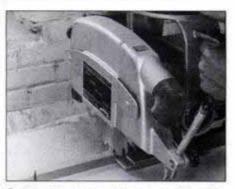
The veneer is temporarily joined together using preglued veneer tape, available at veneer suppliers. Wet the tape with a damp sponge. Hold the pieces in proper alignment and apply the tape as shown.

Cut the plywood for the veneered panel slightly oversized to allow for trimming after the veneer is applied. Keep in mind that these days most ¼-in.-thick plywood actually measures somewhere between ¾16 and ¾32 in. thick. Because of this, once our panels were veneered on both sides,

MATERIALS LIST-SIDEBOARD

HI

1 1/4 × 161/2 × 251/4" mahogany plywood



6 Cut all necessary tenons on side rails, case stretchers and door stiles using dado blades in a radial-arm or table saw.

they still fit in the ¼-in.-wide grooves that we specify. If you use full ¼-in.-thick plywood, increase the width of all case grooves and tenons. Also, be sure to orient the panels so that the grain on the plywood runs at 90° to the face veneer grain.

To apply the veneer, an adequate press must be constructed. Make top and bottom cauls of \( \frac{4}\)-in. flakeboard slightly larger than the panel size. Then, cut some slightly crowned battens as shown in photo No. 11; they will bear on the cauls and distribute the clamping pressure evenly.

Begin by covering the bottom caul with waxed paper and laying down the sheet of backer veneer over the paper. Using a small roller, spread glue over the entire surface of the plywood panel. Then, place the glued surface onto the veneer. Apply glue to the top side of the panel, and place the face veneer, taped side up, onto the

> (Text continues on page 130; technical art on page 129)

# Key No. Size and description (use) A1 2 1¾ × 1¾ × 35¾ mahogany (leg) A2 2 1¾ × 1¾ × 15¾ mahogany (leg) B1 2 ¾ × 1¾ × 15¾ mahogany (side rail) B2 2 ¼ × 1¾ × 15¾ mahogany (side rail) C 2 ¼ × 1¾ × 15¾ mahogany (side rail) C 3 ¼ × 1¼ × 15¾ mahogany (side stretcher) D 3 ¼ × 1¼ x 58½ mahogany (top stretcher) E1 1 ¼ × 4 × 58½ mahogany (top stretcher) E2 1 ¾ × 4 × 58½ mahogany (top stretcher) F1 1 ¼ × 17 × 58½ mahogany (top stretcher) F2 1 ¾ × 1 × 58½ mahogany (top stretcher) G1 2 ¾ × 16½ × 19½, mahogany (edge band) G2 2 ½ × ¾ × 19½, mahogany (edge band) G3 2 ½ × ¾ × 19½, mahogany (edge band)

	177	(partition)
H2	1	1/2 × 1/4 × 251/4" mahogany (edge band)
I	2	1/4 × 15½ × 17½" veneered plywood (side)
J	1	1/4 × 19%4 × 57½" mahogany plywood (back)
K1	1	$\% \times 12\% \times 55$ veneered MDF* (top)
K2	2	13/12 × 3 × 61" mahogany (side frame)
K3	2	$^{13}/_{16} \times 3 \times 18\%$ mahogany (end frame)
L	1 2 1	$1 \times 3 \times 24$ mahogany (drawer front)
M	2	1/2 × 3 × 161/2" mahogany (drawer side)
N	1	1/2 × 3 × 24" mahogany (drawer back)
0	1	1/4 × 16 × 231/2" mahogany plywood
		(drawer bottom)
P	8	$\frac{3}{4} \times 1\frac{3}{4} \times 16\frac{3}{4}$ mahogany (door stile)
P	4	% × 1% × 15% mahogany (side door rail)

_			
	R	4	¾ × 1¼ × 13" mahogany (middle
			door rail)
	S	2	$\frac{1}{4} \times 10\frac{1}{2} \times 16\frac{1}{4}$ veneered plywood
			(middle door panel)
	T	2	1/4 × 12% × 16% veneered plywood (side
			door panel)
	Ul	2	1/4 × 1 × 57" hardwood (spline)
	U2	2	$\frac{1}{4} \times 1 \times 14\frac{1}{2}$ hardwood (spline)
	VI	4	1/4 × 1 × 14½" hardwood (spline) 1/4 × ½ × 3" hardwood (spline)
	V2	2	14 × 14 × 141/2" hardwood (spline)
	W	8	% × 1%" No. L-37 knife hinge **
	W X Y Z	4	Colonial bronze No. 170 door pull **
	Y	Asre	eqd. '%" No. 5 rh screws
	Z	16	11/4" No. 8 fh screws
	* 1	MDF :	stands for medium-density fiberboard
			able from Larry and Faye Brusso, #3812
			Elizabeth, Pontiac, MI 48054, or George
			n, Box 144, Pittsford, NY 14534

Материал, защищенный автороким пра

Radio Controlled and Raring to Go!

You've left that red dune buggy eating your dust, and you've got your pedal to the metal down a rocky straightaway. Heading towards the deepest ditch you've ever seen. You only have ten seconds to wonder why you're doing this and then you're airborne, bracing yourself for a bone jarring crunch.

You land - those new shocks were worth every cent you paid - and dodge a tree, splash through an ocean of mud, slide across a gravel strewn grade, and start up the face of Suicide Hill. Halfway up the treacherously steep slope your wheels start to spin - you're losing your traction - and then those huge knobby tires catch, digging in and sending you up and over the top!

No, this isn't the finals of the Baja 1000. But it can be your own backyard, if you're ready for the excitement of Radio Controlled off-road racing. You can do things with a radio controlled car you've only dreamed of doing in your own car. And you can do them anywhere - on sand, rocks, mud and dirt, even at the beach. With your hands on the radio controls, RC cars will do exactly what you command - within the laws of physics and gravity, that is.

#### THE BIG BEAR

Start your racing career with the Big Bear Datsun, a competition crushing, foot stomping off-road pick-up truck from Tokyo Marui of Japan. With heavy duty spring suspension and a high riding, foot wide wheel base, the Big Bear eats rocks and two foot drops for breakfast. It's got gigantic semi-pneumatic tires with deep "v" shaped treads and a tough steel coil spring front bumper for those unavoidable obstacles.

#### YOU'RE DRIVER AND MECHANIC!

You'll get to know your Big Bear inside and out because you build it from a kit, with crystal clear instructions and exploded diagrams that make construction a snap. You'll install the 7 gear differential set and the high torque Mabuchi "Black" RS-480 engine. Don't worry about tune-ups and repairs, because building your car is on-the-job training as an RC mechanic, and changing an engine takes only a screwdriver.

#### AN "EVERYTHING-YOU-NEED" SPECIAL OFFER!

For the thrills and chills of a great sport, there's nothing like Radio Controlled off-road racing. We'll make it easy for you to get started. Our special offer includes everything you need to kick up a little dirt: Big Bear 1:12 scale off road pick-up kit (89.95 value). Two Channel Car Radio Control Set (\$59.95 value), Rechargeable NiCad Battery Pack (\$34.95 value), Universal Quick Charger for NiCad batteries (\$39.95 value) ... ALL FOR ONLY \$169.95!

To order your Big Bear, just fill out and mail the coupon. For fastest service on credit card orders, call:

800-228-2028 ext. 36

24 hours/day In Nebraska, call 800-642-8300, ext. 36

FREE with every order

Model Expo's full color Radio Control catalog filled with the most exciting RC Cars and Boats available anywhere.

Model Expo. Inc. 23 Just Road, Fairfield, NJ 07007



Big Bear Kit Alone - Length 143/4"/Width 12"/Height 91/2"/Scale 1:12 Tokyo Marui Kit No. M159RC4/Mfg. List Price \$89.95

#### Our Price \$79.95

Big Bear Special Introductory Package (Kit, Radio, Battery and Charger) Order No. M104 / Total Value \$224.80

MODEL EXPO, INC	. 23 Just Road	, Fairfield,	N.J. 07007
YES! I'm ready for to off-road Racing! Please seems Big Bear Special Interpretable Big Bear Kits (M159)	send me the fol roductory Paci	lowing: kages (M	104) at \$169.95 ea
My check or mon (Please add \$750 for shipping an			radd 6% sales tax.)
Charge my credit card:	☐ Mastercard	□ V/sa	☐ American Express
Account No.			Exp Date
Signature			
Name			
Address			
City			

#### Send me Burpee's free 1987 garden catalog!

It's packed with over 400 vegetables and 600 flowers-including new varieties and Burpee exclusives! Plus fruits, shrubs, garden aids, and more! Send for



Zip.

© W. Atlee Burgee Co. 1986

(If you ordered from Burpee in 1986, your new catalog will be sent to you automatically in January.)



#### BECAUSE OF STEERING WHEEL?

BLIP makes it easier. BLIP optically moves HI BEAM mward. Lets you see HI BEAM thru steering wheel. Fits Ford trucks 1980-86, F100-350 and Broncos.



Attractive. Attaches in a jiffy. No tools needed

Send \$6.95 check or money order, plus \$1.00 shipping and handling. Tennessee residents add \$0.54 tax. Allow 6-8 weeks for delivery.

Address

City/State/ZIP

Send To: BLIPCO BOX 1314 COOKEVILLE, TN 38503-1314

#### Buy Direct...And Save

from the original manufacturer



Repair parts and accessories for Atlas 6" and 12" lathes Atlas mills and drills

plus Craftsman Model 101.

Parts for Clausing lathes and drills, Colchester lathes, Edwards shears and presses, Jakobsen grinders and Burnerd chucks.

CALL or WRITE TODAY CLAUSING INDUSTRIAL SERVICE CENTER

P.O. Box 877 Goshen, IN 46526

Telephone 219-533-0371



THE SOURCE

7305 Boudinot Drive Springfield, VA 22150

FREE FREIGHT

US 800-452-9999 VA 800-468-1778



S RYOBI





\$359-

WITH EXTRA



SEND \$3.00 for CATALOG

#### Pay For Your Hobby!

With White's NEW Series 3 Metal Detectors

Sensitive detectors locate the

rare and valuable for fun and profit. \$99.95 & up! ! WHITE'S ELECTRONICS Dept. PA-6 Sweet Home, OR 97386

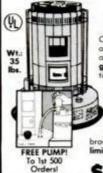
At Last a New Amazingly Simple

#### JET ENGINE

Build from easy to follow plans. Length 15°, Dia. 5½°, Wt. 15 lbs. Fuel: Gasoline or Kero. "Screaming Demon" develops 20 serious-minded hobbyists, students

"Screaming Demon" develops 20 H.P. serious-minded hobbyists, students: acier at arts classes. Make on 9" metal cutting students: acier at arts classes. Make on 9" metal cutting students are supported by drawings with or hotos. Frice \$10.00 No. C.O.D. 1510 268 St. P.O. Bez 1398 SANTA MONICA, CALIF. 9040 SAVOY SCIENTIFIC

#### Seasonal Savings for YOU . . . Top Quality Merchandise at LOW Prices!



Price in America:

#### 19,400 BTU Portable Kerosene Heater

Can be used as primary heat covering approx. 670 sq. ft.! Conveniently serves as supplementary heat and/or emergency heat source anywhere, any-

 Features:
 1.9 gol. tank. •18 hrs. continuous heat. •Battery powered, pushbutton ignition, uses 2 "D" batteries (not incl.). • Auto. shut-off control. • Fi-berglass wick. • Taupe & chocolate wn color. • 23"H x 18%"Dia. • 1 year limited warranty!

This is the BEST

Mfg. Retail: \$149.00 Order No. D2357-2250 Ship. & Hand.: \$10.50

Built for professional & home workshop applications. Makes wood cuts 3½" at 90° or 2-3/16" at 45°. 1½ HP

Saw

high torque motor for sure power - 3400 RPM. Heavy cast iron table mea-sures 231/4" x 15". 15" aluminum extension wings extend table to 30".

ing positive grip, rip fence included. • Miter gauge included. • Steel blade guard has viewng hole. • Uses 10" blade (not incl.). • 190 lbs.

Compare at \$599.00 Order No. D2240-2347 Shipped Frt. Collect

(on sheet of clean paper) the name & order no. o item(s) along with your name & address. Enclose a check or money order payable to Wholesale America, Inc. (be sure to add ship,/hand. char-Allow 1-2 wks. for delivery. Add 2-3 wks. for clear-ing of personal checks and/or frt. collect items.



Features: • Aluminum extension wings are die cast. • Dado insert plate included. • Self align-

TO PLACE AN ORDER please type or print clearly is). You can also charge to MasterCard or VISA. int the acct. no. & exp. date and sign your name.



 Heavy-duty steel front support system. •250 lbs. cap. •1/2" exterior grade plywood, weather-proofed. • 16" x 1.75 semi-pneumatic tires. • 2 sets of double steel bearings in each wheel. • Rust-proofed, metal parts. • Axle placement

& wheel design assure perfect balance. • Overall: 48"L x 26"W x 21%"H. • Assembly required.

Order No. D2264-1768 Shipping & Handling: \$12.00 Wholesale America. INC.

4777 Menard Drive, Eau Claire, WI 54703 For credit card orders or more information call



1-715-874-5000 1-800-826-3403

VISA"

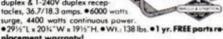


Great way to produce a full season's wood oly! Features: • Permanent hydraulic system. • Rated for 20,000 lbs. of splitting force. • Adjustable, steel frame. Accommodates logs from 12" to 24" long and 14" wide.
 Guide rail for accurate log travel.
 Dual-purpose handle.
 Measures (assembled): 471/"L x 20"W x 181/"H. • Wt.: 75 lbs. • One year warranty.

Order No. D2270-3208 Shipped Freight Collect

#### Electric Start 6000 Watt Generator

Never be without electrical power againt •8 HP Briggs & Stratton engine with electric start. •1-120V duplex & 1-240V duplex recep tacles, 36.7/18.3 amps. •6000 watts



Compare at \$1200.00 Order No. D2240-1034

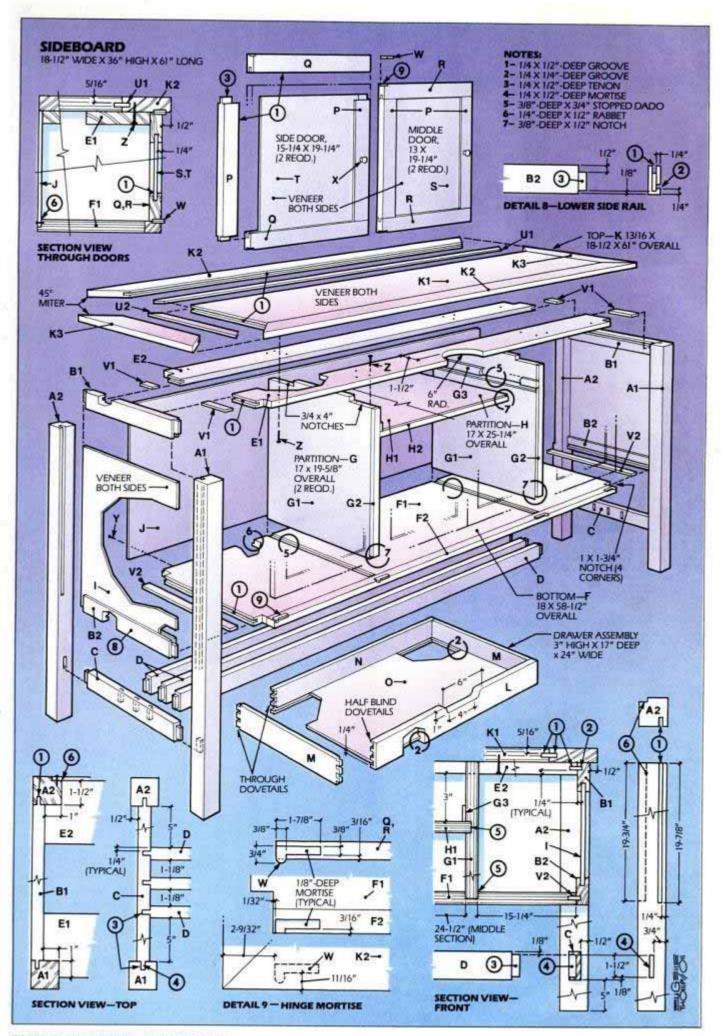
60 Hz

2500 Watt Generator..... Electric Start
8000 Watt Generator.....

Send \$1.00 for the latest Money-Saving Catalog from Wholesale Housewares at unbelieved LOW, LOW America!

#### 10 DAY NO HASSLE GUARANTEE

If you're not completely satisfied with your purchase, return it (prepaid) within 10 days for a FULL CASH REFUND (less shipping & handling). Returned product must be in original box and original condition.

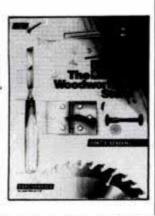




## WOODWORKERS' SOURCE

The New 1987 Catalog

114 pages of Veneers, Wood Parts, Specialty Hardware, Tools, Pulls, Finishing Supplies, Books, Kits, Plans and more new products.



☐ \$1.00 (3rd class ☐ \$2.00 (1st class)
d on first order
State Zip
֡֡֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜



21801 Industrial Blvd., Dept. 908 Rogers, MN 55374

### FOUR SAWS IN ONE.



CALL or WRITE:
Wen Products Inc.,
5810 Northwest Hwy. Chicago. IL 60631

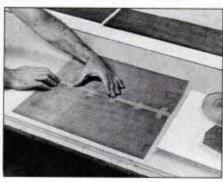
#### Woodworking Guide



7 Rails need edge groove for side panels, face groove for bottom and stretcher splines. Cut grooves with dado blades.



8 To cut veneer to length, score the sheet with a utility knife and straightedge guide. Lift sheet to separate.



9 To bookmatch two pieces of veneer, apply small pieces of veneer tape across the seam and a full piece along the seam.

plywood. Cover the veneer with waxed paper, followed by the upper caul. Place the battens under and over the assembly, then position the clamps. Start at the center of the panel and tighten the clamps, working toward the outside edges. Let the panel sit in the clamps at least four hours. Then, trim all panels to finished size.

#### Final assembly

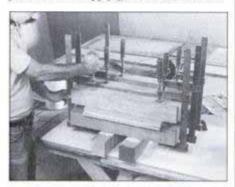
Use the router and slot cutter to cut the spline groove around the top panel and along the inside edges of the top frame pieces. Cut the mitered ends on the top frame members. Then, join them to the top panel with glue and splines, as shown. Use bar clamps to hold the joints tight.

Assemble each case side, applying glue only to the places where the rails and stretchers join the legs. Do not glue the side panels in place. They should simply

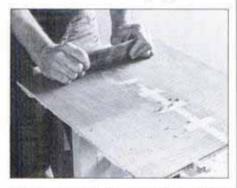
POPULAR MECHANICS . NOVEMBER 1986



10 When veneer is ready, cut core panel to size. Then, roll glue over surface of panel. Do not apply glue to the veneer.



11 Place veneer on top of core panel, then clamp in place. Use cauls and battens to ensure even clamping pressure.



12 Once glue is dry, remove panel from clamps and scrape the veneer off the surface using a sharp cabinet scraper.

float. Next, join the case side assemblies to the interior case assembly with glue, splines and clamps. At this point, attach the back to hold the case square. Attach the top by driving screws up through the top stretchers. Assemble the doors, again gluing only the mortise-and-tenon joints and leaving the panels loose. Construct the drawer, following the dimensions provided in the plans. Attach the mahogany drawer spacer to the partitions with glue and brads. Set and fill the brad heads.

Lay out the hinge location on the case bottom and top, then cut the mortises for each hinge and trim the doors to allow a uniform 1/16-in. space around the perimeter. Next, lay out and cut the hinge mortises on the top and bottom edges of each door. Attach one leaf of each top hinge to the door. Install its mating leaf on the underside of the case top. Then, attach

**POPULAR MECHANICS • NOVEMBER 1986** 



#### "I built my successful business in the kitchen remodeling industry."

Bridgeport, Conn.

"As a dealer for Facelifters", the national kitchen specialist, I was able to cash in on the growing billion-dollar kitchen remodeling industry.

The proven and unique Facelifters® product system is now available. And coupled with their marketing program, can help you every step of the way. I know, because I live it. And their franchise program will provide you with all the training, technical, and sales support you'll need.

If you've got desire and drive, you'll be able to grab your share of this booming industry...I did." Art Harris

Call or write for your FREE no obligation information packet: Facelifters, 83 North Lively Boulevard, Elk Grove, ILL 60007.

Toll Free 800-322-333

required, and where Facelitters may legally offer a franchise Facelifters is a member of International Franchise Association

From Europe ... The Ultimate in

Plank-on-frame Construction



World famous kits from Europe Large, magnificent replicas (many over 4 feet long!) with beautiful walnut and mahogany planking, fittings and details. exquisitely cast in bronze, brass and rare hardwoods. Large scale plans, step-bystep instructions, all materials included. VHS Video tape cassette on how to build also available.

> Send for 64-pg. full-color catalog. only \$1.00

#### MAIL THIS COUPON TODAY!

MODEL EXPO, INC. Dept. PM-116S 23 Just Road, Fairfield, N.J. 07007

Please send me a full color ship model catalog. \$1.00 is enclosed.

Name	
Address	
City	
State	Zip

#### E and/or EARN

nyle corporation The nation's largest manufacturer of dehumidification dry kilns now offers smaller systems to dry 300 to 10,000 board feet.

FOR INFORMATION 1-800-648-9200 NYLE CORPORATION Box 1107P, Bangor, Me. 04401 207-989-4335

#### CALIFORNIA REDWOOD **BURL CLOCK KITS**



MAKES A **GREAT GIFT** Do it yourself and save! Hand sand and finish as desired. Limited supply - 4 to 6 weeks delivery.

Kit includes redwood burl drilled for clock; quartz movement; hour, minute, second hands; numbers; instructions. Send check or m/o for \$39.75 (CA residents add 6% fax) plus \$6.25 shipping and handling to:

**OLD TOWN WOODWORKS** 

P.O. Box 1846, Lemon Grove, CA 92045 SEND FOR FREE FULL COLOR BROCHURE ON ALL REDWOOD BURL PRODUCTS

#### **Enlarge Project Designs**

Craft Projector is Simple! Fast! Accurate! Projects on to: Drawing, Graph & Tracing Paper, Wood,



Adjustable lens enlarges by fractions up to 27% times for the size you wish! Copy unlimited ideas for craft designs. Enlarge patterns, designs, portraits, still lifes, landscapes, photos, slides, designs on coins and jewelry. Projects in exact colors. Does not darnage original. Simple instructions. Uses household current and 60 watt bulb. Send \$19.95 plus \$1.95 shipping. 30 day money back guarantee. Norton, Dept. GT-68, Box 2012, New Rochelle, N.Y. 10802

#### AMAZING SCIENTIFIC AND ELECTRONIC DEVICES

LASERS, PHASERS for shock wave, weapons, burning cutting, holography, cloud writing and visible light beam-application, PLASMA TORNADO, FORCE FIELD, ION WIND, ION MOTORS, LIGHTNING GENERATION, TELSA COILS, ANTI-GRAVITY, MAGNETIC IMPILSE GUNS, INFRASONICS and ULTRASONIC DEVICES, SHOCK and STUN GUN PROFECTORS for personal protection SEE IN TOTAL DARKNESS, LONG RANGE VOICE TRANSMITTERS, DIRECTIONAL MICROPHONES, INTRUSION DETECTORS for security, SATILLITE TV, ENERGY and INSECT RODENT KILLIFES, REPELLORS for the home. SEND \$1.00 FOR CATALOG OF PLANS, KITS AND COMPELTED ITEMS TO

INFORMATION UNLIMITED BOX 716, DEPT M8 AMHERST, NH 03031

#### EARN UP TO **\$20.00 AN HOUR** BE YOUR OWN BOSS AS A. PROFESSIONAL UPHOLSTERER!

Over \$65 billion a year are spent by U.S. Consumers on Home Furnishings. Of the 86 million households, esti-mates indicate an average of over five pieces of furniture per household... that's 430 million pieces of furniture. And for a fraction of the cost of new furniture, the average American can have their old furniture restored to like-new condition by a Professional Upholsterer... someone like

Yes, you can learn all the short-cuts of professional upholstering and refinishing techniques in the comfort of your own home. The Foley-Belsaw system of "hands-on" trainown nome. The foley-below system of manus of that ing provides clear, step-by-step instructions in the use of tools and materials on actual furniture "kits". . all included with the course. . so you can earn as you learn. Turn your spare-time into Extra CASH restoring old cast-offs picked up for a few dollars, into beautiful furniture. worth hundreds of dollars anyone would be proud to own. For friends, relatives, neighbors ... even community busi-nesses; you'll find your skills as a Professional Upholsterer in demand. Your spare-time projects can easily lead to a profitable full-time business of your own. Go ahead! Send for our FREE Book Today! We'll rush you

Go anead! Send for our FHEE BOOK TODAY! We'll rush you all the details at no cost or obligation. Get the facts on our 30 Day FREE Trial Offer and find out how YOU can get started for as little as \$25.00. Write to:

FOLEY-BELSAW INSTITUTE OF UPHOLSTERY 80471 Field Building, Kansas City, MO 64111

NO OBLIGATION! NO SALESMAN WILL CALL!

FOLEY-BELSAW INSTITUTE OF UPHOLSTERY 80471 Field Bldg., Kansas City, MO 64111

NAME	AGE
ADDRESS	
CITY	
STATE	71P

Uncompromising quality and authenticity. Our Jaguar SS-100 replicar is a more affordable, and easier to build kit than you would believe! Front engine and VW models available.



N.Y. and CANADA — 716-684-1167

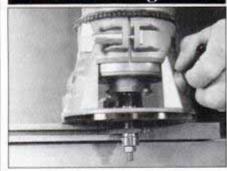
#### ANTIQUE & CLASSIC AUTOMOTIVE, INC. 100 Sonwil Drive, Dept. PM-1186, Buffalo, N.Y. 14225

I have enclosed \$1.00. Send me your complete, full color brochure.

□ VISA	☐ Diners Club		
NAMES OF STREET	TARROLLON CONTROL	Exp. Date	_
		- MODERNING	_
	UVISA	□ VISA □ Diners Club	Exp. Date

State .. Home Phone ( Bus. Phone (

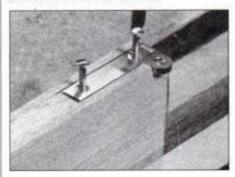
#### Woodworking Guide



13 Top frame members are joined to top panel with splines. Cut grooves in mating edges with a router and slotting cutter.



14 Cut miters on ends of top frame members using a miter box or table saw. Make precise cuts for tight joints.



15 Clamp each door in vise, then cut hinge mortises. Slide hinge in place, bore clearance holes and drive screws.

both leaves of each lower hinge to the case bottom. Lift each door into place and slide the post on the top hinge into its mating socket, then attach the bottom hinge to the bottom edge of the door.

Remove the doors and case back, then sand the case thoroughly with 220-grit sandpaper. We stained the case using McCloskey's Antique Cherry #938 Tungseal wood stain. Allow to dry overnight. To finish the piece, apply two coats of McCloskey's Heirloom Varnish, High Gloss #0092.

#### VENEER SOURCE LIST

Bob Morgan Woodworking Supplies, 1123 Bardstown Rd., Louisville, KY 40204
 Certainly Wood, 11753 Big Tree Rd., Rt. 20A, East Aurora, NY 14052

■ Constantine's, 2050 Eastchester Rd., Bronx, NY

 Craftsman Wood Service, 1735 West Cortland Ct., Addison, IL 60101 Wood Shed, 1807 Elmwood Ave., Buffalo, NY 14207

■ The Woodworker's Store, 21801 Industrial Blvd., Rogers, MN 55374

#### Why Are We Giving Away Famous Nationally Advertised™ DELTA-7™ Commando Knives™

for \$10?

As part of a nationwide publicity campaign, a leading New York firm will give away one million (1,000,000) of its most expensive field knives—the legendary DELTA-7" "Quick-Release" Commando Knife" for the astonishing price of only \$10 each to the first one million persons who return this publicity announcement to the company address (below) before Midnight, December 31, 1986.

This *original* publicity ad must accompany your request. No copies or photostats.

Not a copy, this is the genuine DELTA-7 Commando—the same famous "Quick-Release" field knife nationally advertised in leading media across America. Now, for the first time it's being made available to hunters, fisher-

men, scuba divers,

campers and outdoorsmen who seek the ultimate survival knife.

#### 8½ inches long and r-r-r-r-r-razor sharp!

If you had to describe the DELTA-7 in just one word, that word would have to be ... big! Each DELTA-7 is a whopping 8½ inches long—yet so perfectly balanced it cuts and thrusts like an extension of your own hand. Heft this beauty just once; you'll never want to put it down!

Each DELTA-7 double edge blade is entirely crafted from a single seamless shaft of 420 molecular stainless steel! Thick as a silver dollar at the spine, it's tough enough to split wood or shatter bone. Yet the edge is so wickedly sharp it slices thin as a whisper! Serrations at blade base give extra cutting power.

But best of all, DELTA-7's unique finger holes give you a grip of iron even with wet and greasy hands. From cleaning a fish ... to dressing a deer ... to fighting off sharks ... to hacking down a small tree—it's all child's play for the legendary DELTA-7 Commando Knife.

#### Instant "click-release" mechanism built into sheath

Click, Click—that quick! Thumb button on sheath instantly click-releases blade into palm of hand without a second's delay. To replace, simply press down on button. Blade automatically resheaths itself—and locks!—just as fast. Special speed straps (included) fasten sheath to arm, leg or boot for hands-free operation.

Little wonder that these are the fastest-selling (and most expensive) hunting/fishing/outdoor knives of their kind being offered by this multi-million dollar New York firm. These DELTA-7 Commando Knives will not be sold at this price by the company in any store. There is a limit of two (2) per address at this price, but if your request is mailed early enough (before Dec. 25) you

Thumb controlled Quick-Release Sheath locks blade in, straps to arm, leg or boot. Click, click—that quick! Press thumb button to activate instant "Quick-Release" mechanism built into sheath.

may order up to five. Every knife is covered by the company's full one-year money-back guarantee.

To order mail this *original* printed publicity announcement (no copies or photostats) together with your name and address and \$10 for each knife. Add only \$2 shipping per knife ordered. (New York residents add sales tax.) Allow up to 6-8 weeks for shipment. *Make check payable to RBM Ltd.* Mail to: RBM Commando Knife, Dept. 114-122, Box 1710, Hicksville, New York 11802. (R44770)

1986 RBM, Ltd., 1200 Shames Drive, Westbury, N.Y. 11590

#### **FREE GIFT**

Free "Trigger Blade" Sportsman's Knife

if you order your Delta-7 Commando Knife before December 25, 1986 Razor sharp blade of fine stainless steel locks open poc

automatically, can't close by accident. Over half-a-foot long when open; folds to pocket size when you press the trigger. Respond before Dec. 25, and it's yours to keep—FREE—even if you return your DELTA-7 Commando Knife for a refund.



# Mailbox Tool Shop

For millions, mail-order tool catalogs provide a convenient way to buy woodworking supplies at competitive prices.

BY JOSEPH TRUINI, Shop And Tools Editor

#### **Garrett Wade**

As you flip through the pages of a Garrett Wade catalog, you can't help but feel like a wide-eyed kid in a candy store. The 212-page catalog features hundreds of beautiful color photos and more than 2500 items. The catalog offers an extensive line of quality hand tools, finishing supplies, shop accessories, woodworking books and Japanese tools. Also offered: Swiss-made Inca stationary power tools (for which Garrett Wade is the U.S. distributor) and Porter-Cable portable power tools. The catalog's accompanying text provides valuable information on proper tool use and care. Send \$4 to Garrett Wade, 161 Avenue of the Americas, New York, NY 10013.

#### Woodworker's Supply

You shouldn't be fooled by its compact size. This 96page catalog is packed with tools, hardware and shop accessories. It has a fine selection of Delta, Ryobi and Porter-Cable



power tools. Choose from a full line of Freud saw blades, router and drill bits, shaper cutters and hand tools. Wooden toy plans, parts and kits are available to satisfy all skill levels. Also, an expanded hardware section offers European hinges, drawer slides and cabinet hardware. For a free catalog, contact Woodworker's Supply of New Mexico, 5604 Alameda NE, Albuquerque, NM 87113.



#### Constantine's

Established back in 1812, Constantine's is one of the most well-known and reputable mailorder companies. The 116-page catalog offers a wide variety of hand tools, hardware, finishing supplies



and furniture plans. However, Constantine's specializes in fine wood products—such as cabinet-grade hardwoods, lumber-core plywood, marquetry kits and, particularly, veneers. In fact, Constantine's claims to offer the world's largest selection of domestic, imported and exotic veneers. Send \$1 to Constantine's, 2050 Eastchester Rd., Bronx, NY 10461.

#### The Fine Tool Shops

In this case, you can tell a book by its cover. This full-color, 64-page catalog carries the finest tools for the serious woodworker, including Western and Japanese hand tools, finishing supplies and



portable power tools by AEG and Ryobi. It also offers some unique items such as workbenches made of African teak, small-scale tools for the miniaturist, handmade turn-of-the-century tools, and inflatable drum sanders for portable power tools. Rent a how-to videotape for \$10 per month. For a free catalog, contact The Fine Tool Shops, 20 Backus Ave., Danbury, CT 06810.

#### Sears Power & Handtools

This may well be the ultimate do-ityourself mail-order catalog. Celebrating concurrently its 100th anniversary and the 60th year of the Craftsman tool line, Sears offers its annual tool catalog with many



items not found in its retail stores. The 180-page catalog offers tools and accessories for the woodworker, carpenter, auto mechanic, electrician, plumber and welder. Sears has also just introduced a 48-page, 600-item catalog devoted entirely to woodworking. The catalogs are free by writing to Sears, Roebuck & Co., Sears Tower, Dept. 703-PM, Chicago, IL 60684.

#### Woodcraft

This full-color catalog offers 108 pages of quality hand tools, hardware, woodworking supplies and shop accessories. Woodcraft carries an extensive line of carving tools, measuring and marking



devices, and wood boring bits, jigs and accessories. For your shopping convenience, all of the catalog items are listed with postpaid (ppd.) prices—there's no need to add shipping and handling charges. Also, Woodcraft offers a sharpening service for new and used tools at a nominal cost. Send \$3 to Woodcraft, 41 Atlantic Ave., Box 4000, Woburn, MA 01888.

#### Cryder Creek Shoppe

Here's a catalog exclusively for woodturners. Its 38 pages contain turning tools of various sizes and styles, precision measuring tools, lathe chuck devices, duplicators and finishing supplies.



Cryder Creek carries round, square and bowl-stock turning blanks in a number of different sizes and wood species. Also available are turned spindles, how-to books and videotapes on woodturning, and kit supplies for turning a lamp, music box, coffee grinder and salt and pepper shakers. For a free catalog, contact Cryder Creek Wood Shoppe, 101 Commercial Ave., Whitesville, NY 14897.

#### Frog Tools

Every important hand tool that the serious woodworker needs—especially cabinetmakers, carvers and turners—is shown in this 110-page catalog. Offered is an impressive variety of hand tools



including saws, wood- and steel-body planes, turning chisels, sharpening equipment and carving knives. Frog Tools also carries a line of Germanmade workbenches to suit most budgets. All items are listed with postpaid prices so there aren't any additional shipping charges. Send \$2.50 to Frog Tools, 700 West Jackson Blvd., Chicago, IL 60606.

#### Wood Carvers Supply

As its title implies, this catalog specializes in wood carving tools and accessories. The 64-page catalog has nearly every tool that is available for wood carvers of all skill levels from novice to expert.



The items offered include full-size carving tools in various styles and sizes, microcarving sets, fishtail carvers, chip-carving knives, files, rifflers and rasps. The catalog also has a full line of sharpening stones, abrasives, woodturning chisels, woodburning sets and how-to books on carving. For a copy, send \$3 to Wood Carvers Supply, Box 8928, Norfolk, VA 23503.

#### The Woodworkers' Store

Here's a catalog that every cabinetmaker and furniture builder should have. Its 113 pages are filled with hundreds of color photos and illustrations of hardware, hand tools and finishing supplies. An exten-



sive line of hard-to-find hardware includes pullout swivel shelves, highchair and crib hardware, table extension slides, hinges of every description, and door and drawer slides. There's also a large selection of veneers, hardwoods and wood parts such as moldings, spindles and carved trim. To get a catalog, send \$2 to The Woodworkers' Store, 21801 Industrial Blvd., Rogers, MN 55374.

#### US General

Choose from an extensive line of woodworking, automotive, electrical, plumbing and pneumatic tools all at discounted prices. The 188page catalog carries a wide variety of quality hand tools



by Estwing, Stanley, S-K, Vise-Grip and other well-known manufacturers. Select from a full line of portable and stationary power tools by Black & Decker, Milwaukee, Makita, Delta and Porter-Cable. The catalog also offers small household appliances, calculators, telephones and watches. For a catalog, send \$1 to US General, 100 Commercial St., Plainview, NY 11803.

# Who at Hearst's 6 television and 7 radio stations comes up with the ideas that have made our broadcasting group renowned for programming excellence and community service?



Front row (L to R): 1 WBALTV, Malcolm Potter, vice president and general manager; 2 WBALAM, Katherine McQuay, executive producer; 3 WISN-AM/WLTQ-FM. Tom Lambert, operations manager; 4 WISN-AM/WLTQ-FM, Gretchen Ehlke, news director; 5 WISN-TV. Cindy Potteiger, broadcast technician. Rear, (L to R): 6 WHTX-FM, Scott Paulsen, afternoon air personality; 7 KMBC-TV. Bryan Busby, meteorologist; 8 WTAE-AM/WHTX-FM, Cheri Earl, account executive.

#### HEARST IS MORE THAN 135 BUSINESSES INCLUDING MAGAZINES, BROADCASTING, NEWSPAPERS, BOOKS, BUSINESS PUBLISHING AND CABLE COMMUNICATIONS.

MAGAZINES Colonial Homes • Connoisseur • Cosmopolitan • Country Living • Good Housekeeping • Harper's Bazaar • House Beautiful • Motor Boating & Sailing • Popular Mechanics • Redbook • Sports Afield • Town & Country • National Magazine Co., Ltd. (United Kingdom) • Magazine Distribution • Eastern News Distributors • Communications Data Services • International Circulation Distributors • Periodical Publishers Service Bureau BROADCASTING TV Stations • WBAL-TV, Baltimore, MD • WCVB-TV, Boston, MA • WDTN-TV, Dayton, Ohio • KMBC-TV, Kansas City, MO • WISN-TV, Milwaukee, WI • WTAE-TV, Pittsburgh, PA • Radio Stations • WBAL-AM, Baltimore, MD • WIYY-FM, Baltimore, MD • WISN-AM, Milwaukee, WI • WLTD-FM, Milwaukee, WI • WHTX-FM, Pittsburgh, PA • WAPA-AM, San Juan, Puerto Rico NEWSPAPERS Albany (NY) Knickerbocker News • Albany (NY) Times-Union • Beaumont (TX) Enterprise • Clearwater (FL) Sun • Edwardsville (IL) Intelligencer • Huron Daily Tribune, Bad Axe, MI • Laredo (TX) Morning Times • Los Angeles (CA) Herald Examiner • Midland (MI) Daily News • Midland (TX) Reporter-Telegram • Plainview (TX) Daily Herald • San Antonio (TX) Light • San Francisco (CA) Examiner • Seattle (WA) Post-Intelligencer • Weeklies in Michigan and Texas.



The reputation for excellence enjoyed by Hearst Broadcasting didn't just happen. People made it happen. People whose ideas and talents have resulted in an impressive list of outstanding achievements.

WCVB-TV, Boston, the newest member of Hearst Broadcasting, has received many prestigious honors, among them the 1985 Edward R. Murrow Award, for the best local news organization in the U.S.; WDTN-TV, Dayton, has helped 25,000 youngsters through its child identification campaign, Ident-A-Kid; and WIYY-FM, Baltimore, has won awards for focusing attention on the problem of teenage drinking. In fact, all the Hearst stations are making important contributions to their respective communities.

Throughout The Hearst Corporation, the innovative ideas of our people...all 12,000 of them working in more than 135 Hearst businesses ... have helped Hearst become one of the largest and, we think, one of the best communications companies in the world.

#### The Hearst Corporation

Clockwise from center: 9 WDTNTV. Sharon Fair, director, community and human resources; 10 WTAETV, Spencer Simon, cinematographer; 11 WCVBTV, Paul La Camera, vice president, programming and public affairs; 12 WIYYFM, Bob Lopez, morning news anchor; 13 WAPAAM, Rosita Guzmán, receptionist/traffic.

BOOKS/BUSINESS PUBLISHING Arbor House • Avon • Hearst Books • Hearst Marine Books • William Morrow & Co., Inc. • Fielding's Guides • Greenwillow • Morrow Junior Books • Lothrop, Lee & Shepard • Quill • American Druggist • American Druggist Blue Book • Diversion • Electronic Engineers Master Catalog • Electronic Products Magazine • Floor Covering Weekly • Industrial Machinery News • Integrated Circuits Master Catalog • Lens • Lens on Campus • Motor Books • Motor Crash Estimating Guide • Motor Magazine • NARP • Office World News • Today's Office CABLE COMMUNICATIONS Hearst Cablevision of California • Los Gatos, CA • Millar, CA • Newark, CA • Santa Clara, CA • Cable Programming Networks • Arts & Entertainment (a joint venture between Hearst/ABC Video Services and Viacom International) OTHER ACTIVITIES Cal Graphics • Hearst Advertising Service • Hearst Feature Service • Hearst Metrotone News • King Features Entertainment • Reader Mail, Inc.



# Workshop Wares

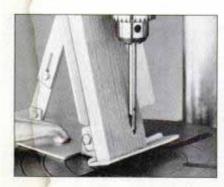
All the best of the new tools and shop accessories.

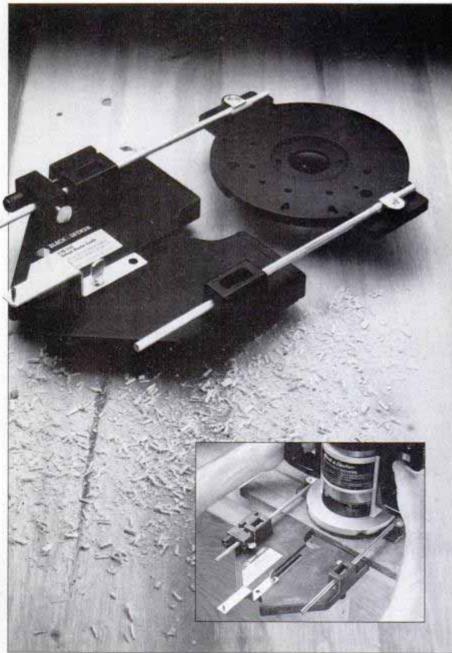
#### Versatile guide

Rout straight or circular grooves, rabbets and moldings or edge-joint lumber with this router guide (\$17.50). Remove the router's faceplate and screw the router to the high-impact plastic guide. The adjustable fence slides on two ¼-in.-dia. steel arms; fine setting is by an adjustment screw. The guide permits cutting 6 in. from an edge, and a built-in trammel point controls circular cuts. It fits most Black & Decker and Sears routers and is sold at hardware stores and home centers. Contact Black & Decker, 10 North Park Dr., Box 798, Hunt Valley, MD 21020.

#### A new angle

The Portalign drill guide (\$30) is designed for boring oblique angle pocket holes. Clamp the aluminum guide to the drill press table and adjust its back to the appropriate angle. It can handle stock from ½ to 2½ in. thick. A %-in.-dia. countersink bit with a replaceable center-pilot bit, a 6-in.-long Phillips drive bit, and 24 self-tapping screws are included. The drill guide is sold at hardware stores, home centers and by the Portalign Tool Corp., Box 80547, San Diego, CA 92138.





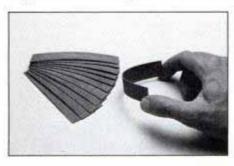
#### Work station

Store and carry an electric drill, drill bits, screwdrivers and other hand tools in this combination toolbox and portable power outlet. The Drill Tidy (\$25) has three large compartments and is designed to help you use a variety of power tools without constantly plugging and unplugging power cords. It has a 15-amp, push-to-reset circuit breaker, four 3-prong outlets, and a 15-ft. power cord. Made of rigid plastic, it weighs 2.5 lbs and measures 6½ in. deep × 9 in. wide × 13 in. high. It's sold at Sears, mass merchandisers and hardware stores. For more information, write Midland-Ross Corp., Electripak Div., Box 338, Pittsfield, NH 03263.



#### Flexible files

These abrasive strips fill the gap between sandpaper and files. They're made of flexible plastic with aluminum-oxide grit bonded to both surfaces. Only .04 in. thick, they can be bent to shape and reach areas

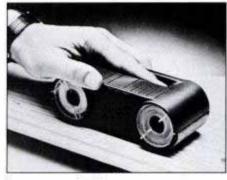


inaccessible to files. They stand up better than sandpaper because they're stiffer, but at the same time, they're flexible enough to work on curved surfaces. Use them for metal and woodworking. The oil and waterproof strips come in 120, 240 and 320 grit. They can be cut to shape with scissors. Each one measures % in. wide × 4% in. long. They're sold in packs of 12 for \$6.95 postpaid from Woodcraft Supply Corp., 41 Atlantic Ave., Box 4000, Woburn, MA 01888.

POPULAR MECHANICS . NOVEMBER 1986

#### Nonstop sander

With the David Cassette Sander (\$10), you don't have to take time-out from hand sanding to replace worn paper. A twist of the forward knob is all it takes to turn up fresh paper while the worn abrasive is wound on to the front spool. It comes with 6 ft. of 120-grit paper on a replaceable pop-



in cassette. Replacement cassettes are sold separately in 120, 80 and 50 grit (about \$2 each).

The sander measures 11/4 in. high × 21/4 in. wide × 5 in. long and weighs about 4 ounces. It's sold in hardware stores, home centers and through specialty tool catalogs. For details and more information, write Themans Inc., 5721-G Bayside Rd., Virginia Beach, VA 23455.

#### Tropical bench

This traditional cabinetmaker's workbench (\$310 postpaid) is made from the dense tropical hardwood Muninga.

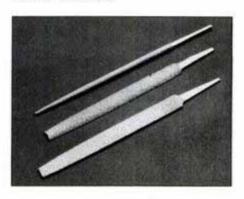
Measuring 16 in. wide  $\times$  34% in. high  $\times$  50 in. long, the 85-lb bench comes with two 8-in. vises (a front and a tail vise), a pair of wood bench dogs and four drawers, each measuring  $3\% \times 11\% \times 11\%$  in. The storage cabinet measures 12% in. deep  $\times$  19 in. wide  $\times$  19½ in. high.

The benchtop is treated with sealer and the 4-in.-wide tool trough that runs along its length has a ramp at one end for sweeping out wood shavings and sawdust. Easy, bolt-together assembly is required. This practical workbench is sold by the Fine Tool Shops, 20 Backus Ave., Danbury, CT 06810.



#### Finger savers

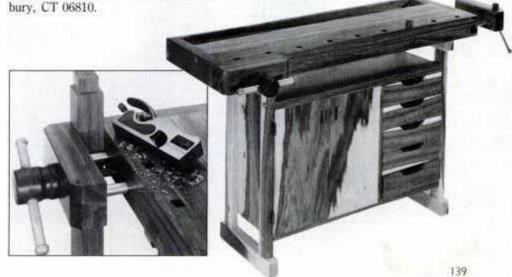
This safety kit (\$24.95 postpaid) can help you avoid machine-related injury in the workshop. Sold by Woodcraft Supply Corp., 41 Atlantic Ave., Box 4000, Woburn, MA 01888, it includes an adjustable featherboard, two nonslip 4 x 8-in. pushblocks and a 10-in. long pushstick. All parts are made of high-impact plastic that won't mar the workpiece.

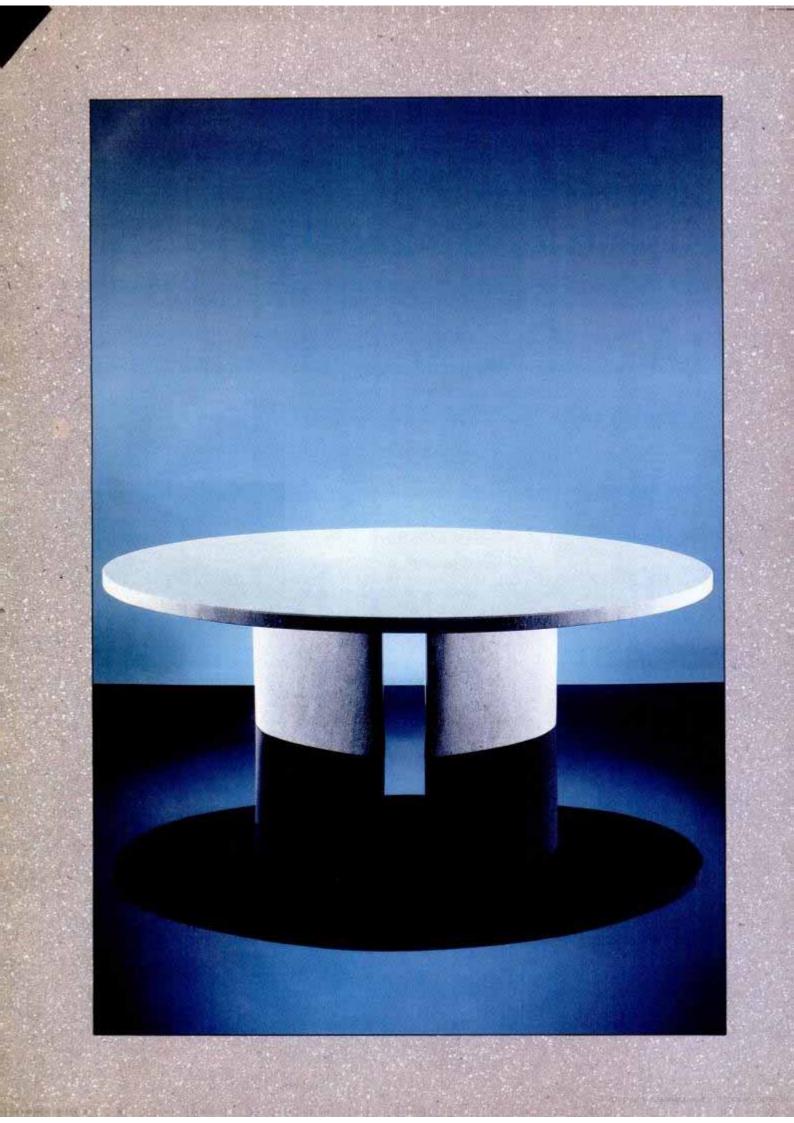


#### Gritty

You can use these 6-in. files in any direction and still get a clean cut, their distributor claims, because they cut with tungsten carbide particles bonded to the file's body. Wood fibers can be brushed or even burned out of the files without causing damage to the grit.

They come in round-taper, half-round and flat-mill configurations in 60 or 100 grit. They cost \$15 each postpaid from Woodcraft Supply Corp., 41 Atlantic Ave., Box 4000, Woburn, MA 01888.





# Paint And Plywood

A high-style coffee table with an innovative finish.

BY NEAL BARRETT

ne of the oldest traditions in wood finishing is that of faux finishes, or finishes that mimic other materials. For example, in picture framing and furniture making, gilding has been used to give wood the appearance of gold. And, in architectural woodwork, marblizing has long been used on mantles, columns and moldings to yield a stone-like finish.

As design trends have wound their spiral way through history, the use of these wood finishes has come in and out of fashion, but in the past few years, the world of furniture design has seen a renewed interest in these old ideas. Some novel, technologically advanced finishes have emerged in the consumer market that were first designed for industrial use. These make it a simple matter to create a granite-like appearance on a wooden base. We chose one of these materials, Plextone, as the finish for this coffee table.



The table is constructed of inexpensive materials. The top and leg caps are ¾-in,-thick and ½-in,-thick medium-density fiberboard (MDF). The staves for the pedestals are ¾-in,-thick poplar, and the curved surfaces of the pedestals are formed with ¼-in,-thick poplar bending plywood.

#### Cutting the stock

To begin, cut two blanks of ¾-in. MDF to rough size for the tabletop. Transfer the outline of the top onto one blank using our drawing as a guide. Use a sabre saw to cut the outline of the top, being careful to stay on the waste side of the line. Clamp the top to the worktable and use a belt sander to remove the saw marks and to refine the profile.

Place the second blank over the top and temporarily screw the two together using 1½-in. screws. Turn over the assembly, then using a router and flush trimming bit, cut the identical shape on the second piece. Unscrew the two pieces, then use a scriber or compass to mark a 2-in. parallel line around the edge of the second panel (see photo No. 3). Bore a blade clearance hole in the waste area, then use a sabre saw to make the cut. Sand the inside edge to remove the saw marks.

Spread glue on the top side of the support ring and position it over the inverted tabletop. Align the edges, then clamp firmly together until the glue sets. Scrape off any glue squeezeout before it hardens completely.

With the top still inverted, use a router and  $^3/_{16}$ -in.-rad. rounding-over bit to ease the inside edge of the bottom ring. Check that the outside edges of the top and ring are smooth all the way around. If necessary, use the belt sander to even out any irregularities. When satisfied, use a 45° chamfer bit and router to cut a  $^3/_{16}$ -in. chamfer around the bottom outside edge, then turn the top right side up and cut the same chamfer on the top edge.

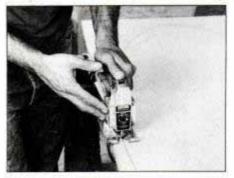
Cut four oversized blanks for the top and bottom leg caps from ¾-in. MDF. Using double-sided tape, stack these blanks together. Transfer the outline of the cap shape from our drawing onto the top blank. Then, using a band saw, carefully cut along the waste side of the line. With the four pieces still taped together, clamp the stack in a vise and smooth the outside edges with a belt sander. Lay out the position of the pedestal staves on the edges of the caps as shown in photo No. 6. Then separate the pieces.

Using ¾-in,-thick poplar stock, rip material for the staves to a width of 1¾ in. Crosscut to length using the table saw or radial-arm saw with a stop block clamped to the table to aid in making identical cuts.

Begin by attaching one leg cap to the staves with 2-in. No. 8 fh screws.

DESIGN: NEAL BARRETT, COLOR PHOTO: JR: ROST: BLACK-AND-WHITE PHOTOS: NEAL BARRETT; TECHNICAL ART: EUGENE THOMPSON

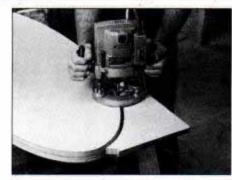
At first glance, this table looks like it's made of stone. But in fact, it's only fiberboard and plywood. The illusion is created by a cleverly designed paint that yields a heavily-textured and variegated surface.



I Transfer the tabletop outline from our drawing onto an oversized blank of fiberboard. Cut with a sabre saw and sand.

Countersink the heads flush with the surface of the cap. When positioning each stave, be sure that the face of the stave is as flush as possible to the edge of the cap. Because of the curve, there are places where corners of the staves will project beyond the edge of the cap. These will be planed flush after all the staves are installed. Turn over the pedestal and apply the other cap in the same manner, then complete the second pedestal.

Cut four pieces of bending plywood to rough size. For ease of installation, let the



2 Temporarily screw the top to another blank. Cut second panel to same profile using a router and flush trimming bit.



3 Using a scriber or compass, trace a line on the second panel 2 in. in from the perimeter. Cut out the interior waste.

#### MATERIALS LIST-COFFEE TABLE

Key No. Size and description (use)

A 1 ½ × 22 × 58½ MDF\* (top)

B 1 ¼ × 22 × 58½ MDF (support)

C 2 ½ × 15 × 15½ MDF (mounting)

platform)

4 ½ × 12 × 12½ MDF (leg cap)

2 ½ × 13 × 14½ MDF (leg end)

26 ¾ × 1½ × 13½ poplar (leg stave)

4 ½ × 16 × 31" poplar bending plywood

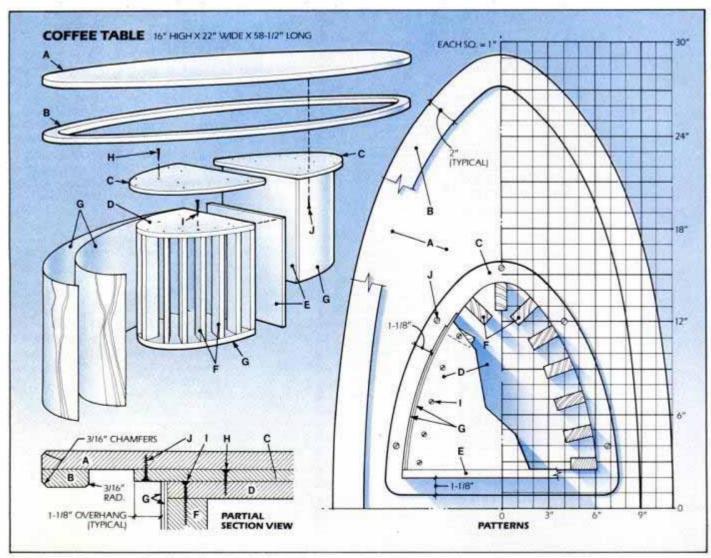
8 1½ No. 8 fb screws

52 2" No. 8 fh screws 10 1" No. 10 fh screws \*\* 6d: finishing nails

\*MDF stands for medium-density fiberboard \*As required

plywood overhang the pedestal frame on all sides while working. This excess can easily be trimmed flush later.

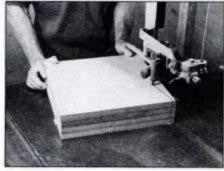
Starting at one end, apply glue to the first stave and the edges of the leg caps. Staple the end of one piece of plywood to the first stave and clamp it in place. Apply glue to the leg caps and to two or three staves at a time as you work around the pedestal. Continue stapling the plywood to the staves and caps as you go. When you reach the other end, again clamp the plywood edge to the stave until the glue



#### Woodworking Guide



4 Glue and clamp the top and support band together. Using a router, cut a 3/16-in. chamfer around the top and bottom.



5 Join blanks of fiberboard with doublefaced tape. Then, transfer pattern of leg caps onto stack and cut with band saw.



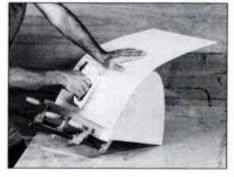
6 Sand all edges smooth. Then, using our drawing as a guide, lay out the position of pedestal staves on edges of leg caps.



7 Counterbore screw clearance holes, then join both leg caps to the stave ends using glue and 2-in. No. 8 fh screws.



8 Using a sharp block plane, contour the edges of all staves so they align perfectly with the profile of the leg caps.



9 Cut bending plywood to rough size, then glue and clamp to end stave. Apply glue to other staves and staple plywood.

dries. Apply a second layer of plywood over the first. Use glue liberally between the sheets, and plan on three or four staples in each stave. Let the assembly set until the glue is dry.

Use a Japanese dozuki saw or standard compass saw to trim the overhanging plywood flush on all sides. With a small screwdriver, carefully remove the staples from the outer sheet of plywood, trying to mar the surface as little as possible.

Next, cut the MDF to size for the flat sides of the pedestals. Use glue and 6d finish nails to attach these pieces. Because of the extreme density of the MDF, bore pilot holes for these nails. Fill the staple and nail holes with wood filler. Let the filler dry and sand smooth with 120-grit sandpaper. Cut the two mounting platforms to size and attach to the tops of the pedestals as shown. Allow the platforms to overhang the pedestals equally on all sides.

#### Finishing

Prime all surfaces with a good quality primer. We used Touraine Speedi-Seal Vinyl primer-sealer. Let dry overnight and scuff-sand with 320-grit sandpaper. Dust off thoroughly.

The finish used on the table is manufactured by Plextone Corp. of America, 2141 McCarter Hwy., Newark, NJ 07104. The color chosen is called Catalina White #1112 and is available in gallon cans from Plextone distributors around the country. Application is by spray, and while conventional spray equipment can certainly be used (35 to 40 pounds of pressure is recommended), the lack of such equipment need not prevent use of this product.



Warehouse Liquidators

## TECHNICAL BOOKS!

#### TESLA COIL SECRETS

Page through the private notebooks of a builder of lightning bolt generators! Incredible diagrams and secrets! Rare info! paperback.

#### ALTERNATOR SECRETS

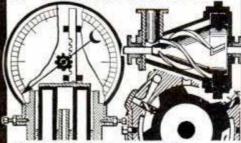
Get thousands of watts from common auto alternators! Run tools, lights, AC-DC appliances, charge batteries, do light arc welding and more! Jam-packed booklet! rder no. 80

#### RUN THREE PHASE MOTORS ON SINGLE PHASE POWER!

Learn three proven methods in use since the turn of the century! No motor rewinding! Easily done. Jam-packed booklet

Order no. 81

\$3.00



#### **CURIOUS MECHANICAL MOVEMENTS**

Explore a 1927 picture book of almost 1000 different mechanisms. Everything from unusual engines and acoustic telephones to mining devices and perpetual motion machines. Dynamite illustrations! Fascinating! Don't pass this up! 412 page paperback Order no. 4406 \$14.95

#### HISTORY OF PERPETUAL MOTION

Review man's attempt to build perpetual motion machines! From earliest types to the Keeley hoaxes! Well illustrated. Fascinating! 235 page paperback. Order no. 510

MELT METAL



#### CHARCOAL FOUNDRY

Convert a five gallon pail into a powerful furnace to melt aluminum, pot metal, brass. Convert scrap into ingots and machine parts. Best selling paperback! 1980 Order, no. 163

#### ORNAMENTAL METAL CASTING

Learn how you can cast decorative plaques, chess sets, banks, even fountains from scrap aluminum. Possible money maker! Best selling paperback! 1986 Order no. 4430

#### Giant How-to Catalog!

Discover rare, top-rate paperbacks, text-books, industrial references on all types of books, industrial references on all types of unusual how to: foundry, machine shop skills, engine repair, electronics, alternate energy, homesteading, survival skills, much more! Send \$1.00 (\$3.00 foreign airmail! for your copy of our latest catalog — filled with more great books than we can fit in this ad! Or request free catalog with any book ordered from this ad!

#### HOW TO ORDER

Send your name, address, a list of the books you want, the total book cost, plus 75¢ for the first book and 25¢ for each additional to cover shipping and handling. We accept checks and money orders. Or send VISA or MASTERCARD numbers with signature. IIlinois residents add 6% sales tax. All books are guaranteed! You may return any book within 7 days for refund. Your satisfaction is guaranteed! Order today!

## Lindsay Publications, Inc.

PO Box 12-XZ, Bradley IL 60915-0012

Send a catalog! I've enclosed \$1.00 (\$3.00 foreign airmail).

Send the books I've listed and a free catalog. I've enclosed 75¢ shipping for the first book and 25¢ for each additional.

Name	
Address	
	1.0 (4)

State\_

	-			A 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
636	474	2.6	1/20	.00	_
_\	Voo	YEL	Mr	21	-
tree \		-			
odels )	Portab	le Band	isaw M	ills	

City



-	BIIII D	A CLASSIC
4		dily available parts
The second		120" WB Roadster
	200	PLANS
100	100	include parts
1000	A.E.	sources & tools
ALC: UNIVERSITY OF	The state of the s	required.
40	40 page PLA!	NS BOOKLET \$9.00

C. Robson Box 360355 Melbourne, FL 32936

#### BUY ONE AND WE'LL MAKE YOU AN EXCLUSIVE DEALER

Zip

6-wheel drive ATV



Today!

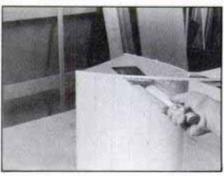
Amphibious 2 and 4 passenger models Call toll-free 1-800-255-2511

NY and Alaska 716-855-2226 Collect Canada toll-free 1-800-338-0012

Recreatives Industries, Inc. 60 Depot Street Buffalo, NY 14206

\*if the territory still is open

#### Woodworking Guide



10 After glue has dried, trim plywood flush to leg caps and end staves. Japanese dozuki saw works well; it has no spine.



11 Spray paint onto table using smooth, even strokes. Hold gun 8 to 10 in. off surface and keep it moving at all times.



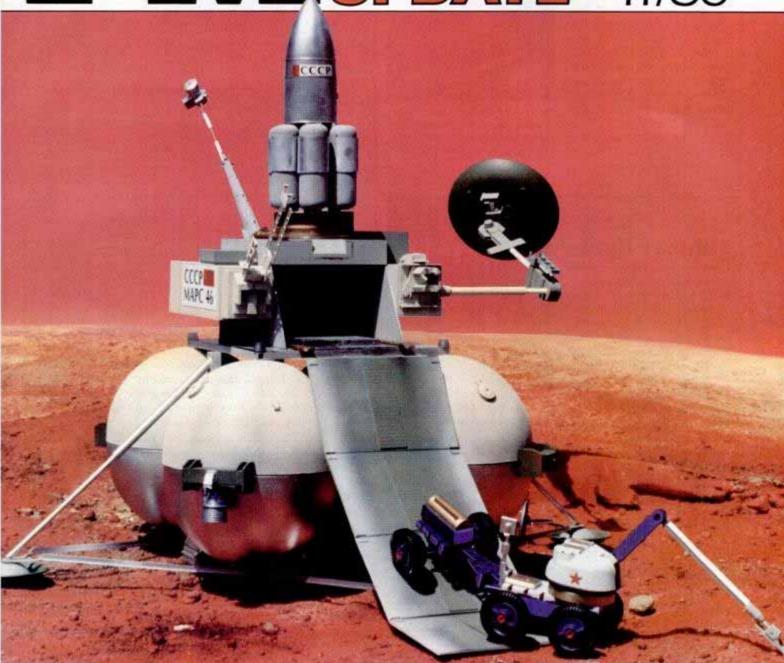
12 Join mounting platforms to legs with screws. Then, invert tabletop on padded surface and screw platforms in place.

Since it works best at low pressure, a spray attachment for a vacuum cleanerattached to the blower side of the motorcan be used with completely satisfactory results. We used a gun available from Kirby Vacuum Cleaners. In our testing, we found that a shop vacuum yielded slightly better results than a conventional home vacuum.

Mix the paint prior to use by "boxing" rather than stirring. This technique involves pouring the material back and forth between containers. Apply by spray in one complete coat, holding the gun 8 to 10 in. from the work. Be sure to wear a respirator and provide adequate ventilation for the work area. Let the coating dry overnight before handling. When dry, invert the top on a padded worktable and attach the pedestals, as shown in the plans. PM

**POPULAR MECHANICS • NOVEMBER 1986** 

# TECHNOLOGY UPDATE 11/86



### **Russians Plan Renewed Mars Exploration**

A merica's 1976 Viking landing on Mars was the last Earth-based visit to the red planet. The Viking took tens of thousands of pictures of Martian geological features and sent back reams of data on Martian atmosphere and soil. The consensus then was that

there is no intelligent life on Mars and there never has been. But there is a nagging sense in the astronomy community that Mars may support bacterial life and could support humans wearing spacesuits and mining for minerals found on Earth.

The next exploratory ven-

ture to Mars will be Russian. The Soviet Phobos project would be launched in 1988 and would set down an unmanned lander in 1989. The robot lander would take soil samples, place them on a rocket and send the rocket flying back to an unmanned mother ship that returns to

Earth by 1990, according to Planetary Society sources. The lander, shown in the concept art above, would remain on the Martian surface and broadcast to Earth.

Editor: Dennis Eskow Contributors: Robert Little, Ken Saunders, Mort Schultz, Steve Eskow, Jack Hamilton

## TECHNOLOGY UPDATE 11/86

#### **ENVIRONMENT**

#### Clean bus

The engine compartment of General Motors' Detroit Diesel Allison Division's newest bus is very clean. And it isn't a diesel. The methanol-powered piston engine is designed to reduce nitrous-oxide emissions by 20 percent. Buses using the methanol fuel are running in New York this year under the watchful eye of the EPA and environmental groups.



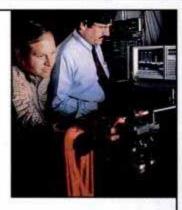
Methanol-fueled engine will provide power with sharply reduced emissions. Experimental bus (right) runs in New York.



#### **ELECTRONICS**

#### Thinner light

Using a new type of optical fiber, IBM scientists have found that they can "squeeze" the laser beam running through an optical cable. The method involves four light sources, three to cancel out leakage of light as a beam travels. The optical squeezing will improve the efficiency of advanced gyroscopes and helps pave the



way to an optical computer with high intelligence.

#### TRANSPORTATION

## An Ace in the hole

It weighs 36,000 pounds, moves at 30 mph, fords rivers at 3 mph and can withstand an air drop. Meet the Army's new Ace bulldozer, a machine designed for combat use, but also expected to be on the civilian market within five years. The vehicle's hydropneumatic suspension raises, lowers and tilts the



cab to position the large, shovel-like blade on sharp inclines and in tough corners. It should prove useful in remote forest areas.

#### SPECIAL REPORT

#### Halley report card

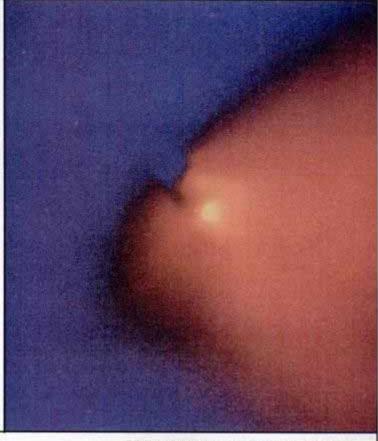
We reported last March (Chasing The Comet, page 82) that Russia, Japan and a European consortium were about to send spacecraft inside Halley's Comet. On Earth, thousands of amateur astronomers were photographing the once-in-a-lifetime event. All the probing and shooting has yielded reams of data only now being analyzed. By far the most successful probe was the European Giotti mission, which carried a multicolor camera to within 750 miles of the comet's head. First reports indicate that Halley is losing mass at a faster than expected rate. But it will make its next scheduled appearance in 75 years. The comet's head seems to contain more

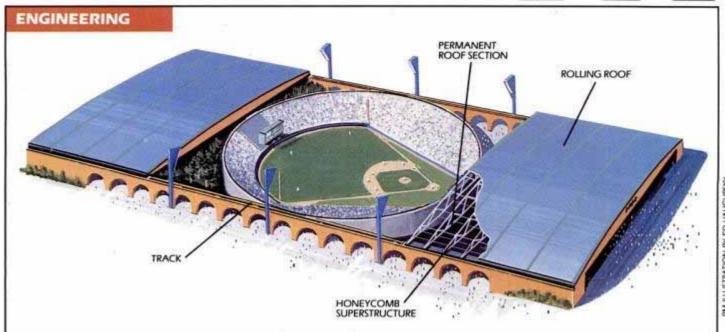


Image (inset) taken as Giotto approached to within 10,000 miles of the comet's head helped us count ice particles. Giotto multicolor image (right) showed ranges of reflectivity. Dark blue shows darkest areas, red the middle of light range and yellow the brightest areas.

ice than was initially expected, a factor that may support theories that comets were involved in the startup of life on Earth.

The Japanese Planet A and Planet B missions helped point Giotto in the right direction, but were





#### Pitching a new roof

Japanese engineers have developed a new design for a baseball stadium that will allow the game to be played inside or outside, depending on the weather.

It's actually quite fitting

that the idea originated with the Japanese, since they are baseball enthusiasts with teams in many cities. The new stadium design is for the Tokyo team in the Japanese major leagues, but it is expected to catch on in other cities in Japan and may eventually be the design for a stadium in New York.

The ballpark sits under a semitransparent metalized plastic roof riveted to a honeycomb aluminum superstructure on wheels. The lightweight roof can be moved along a set of steel tracks with an electric induction motor system. The roof

moves into place in 20 minutes, meaning most of the opening and closing would be done before game time. But even on an iffy day, the game could be played outdoors with only a 20-minute delay for a sudden rain. The stadium is scheduled for construction in 1990.

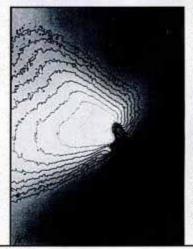


Giotto probe (above) carried ice particle protection and survived. Palomar observatory photo taken in March (top right) helped demonstrate Halley's loss of mass.



themselves failures in producing useful images. They were destroyed by ice in the comet. The Soviet twin Vega probes also were damaged considerably as they passed through the comet's tail. They sent back a few images that are still under study.

Giotto, whose anti-ice shields were designed by British Aerospace, managed to survive the encounter and is still hurtling through space around the sun for use in other space studies.





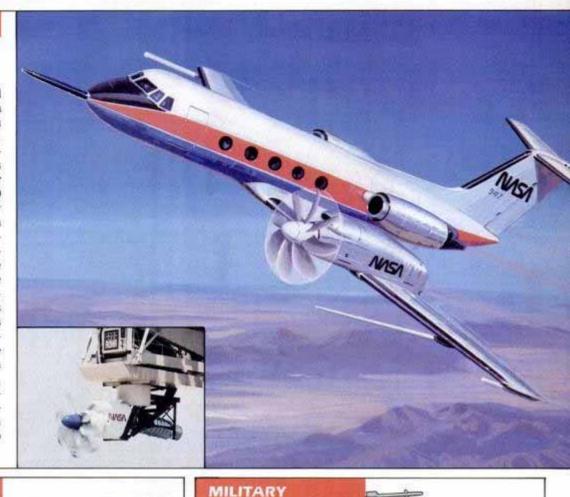
Giotto image (left) shows comet rippling in the solar wind. Amateur Dennis di Cicco captured Halley in April (above).

## DATE

#### AVIATION

#### Props take a new turn

Later this year NASA and Lockheed will start flying a modified jet aircraft with twin propfans on the wings. The propfan is a revolutionary propeller system that is expected to reduce airliner fuel consumption by up to 50 percent. Propfans, if they pass flight tests, could begin replacing jet engines on midsized airliners by the mid-1990s. Ground tests of the first propfan engine made earlier this year were successful. The engine's blades are swept back 37° at the tips for increased thrust. The design, accompanied by the use of eight blades rather than the traditional six for a prop. make it a highly efficient device. The ground tests (inset) showed that the system hangs together at top speeds.

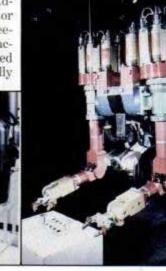


#### ROBOTICS

#### Robot for nuke fuel

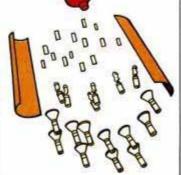
Humans may never have to work close to radioactive nuclear fuel thanks to a robot developed at Oak Ridge National Lab in Tennessee. The robot, controlled by a technician inside a computer center, has two "shoulders" and a pair of arms with hands and fingers. The gear-driven Advanced Servomanipulator has seven degrees of freedom. Packages of radioactive fuel can be lifted smoothly, gripped carefully

and rotated to a desired position. A sensory feedback system tells the controller when the arms, hands or fingers are in contact with an object, when they have a firm grip and how efficiently they are lifting. The system could be in place in plants across the nation by the end of the decade.



## Dropping more bombs The Air Force soon will be

experimenting with a Combined Effects Munition bomb developed under contract by Aerojet General. The main bomb system is gravity guided, opening at a preset altitude to shower a target with three types of munitions: munitions would be used to craft.



gravity bombs, laser-guided hit a complex target such as weapons and heat-seeking a field military installation munitions. The shower of containing tanks and air-

113333

### What's New at AMERICAN DESIGN COMPONENTS?

"The Source" of the electro-mechanical components for the hobbyist.

e warehouse 60,000 9" HI-RESOLUTION items at American Design Components - expensive, often hard-to-find components for sale at a fraction of their original cost!

You'll find every part you need - either brand new. or removed from equipment (RFE) in excellent condition. But quantities are limited. Order from this ad, or visit our retail showroom and find exactly what you need from the thousands of items on display.

Open Mon. - Sat., 9-5

#### THERE'S NO RISK.

With our full 90-day warranty, any purchase can be returned for any reason for full credit or refund

#### ADAM COMPUTER KIT! (Less printer & w/o cabinet)



Build it yourself from subassemblies. No wiring necessary (just plugs together). up diagram included. Includes: Keyboard, 1 cassette digital data drive, 2 game controllers, power supply, all memory boards, and one cassette. Is capable of running CP/M, has b processor. \$99.00 (complete) Item #7410

(TTL) VIDEO MONITOR



Orange phosphor. Originally used in portable computers. 12 VDC. Mfr — Phillips M24-308-LA/P Item #6811 \$19.95 New

115 CFM

**MUFFIN®** 

SPECIAL!

FAN

Mfr - CDC #9409T

Item #1893

5¼" DISK DRIVE

**FULL HEIGHT** 

96 TPI, DS/QUAD DENSITY

12/24 VDC " THIN MUFFIN-TYPE FAN

55/100 CFM, 8W, Can be mounted for blowing or exhaust. 5 plastic blades with feathered edges, aluminum housing. Brushless, ball-bearing type. Dimen.: 41% sq. x 1 deep Mfr — Centaur CUDC24K4-601

Item #8541

240 CFM MAJOR® FAN

tem #8827 \*Ttl. capac.

PC/XT

Stacked mounting.

Plugs right into your co

2 Tabor TC-500 3 % " disk drives.

Ttl. cap. 500K bytes unformatted.\*

"Til. capac. IBM unformatted w/ special software. Each unit supplied with two 3% " flexible diskettes.

\$169.00

115 VAC/60 Hz.; 3 amps. Low noise, high pressure/volume fan for cooling in tight places. Five plastic blades with feathered edges, aluminum housing. Ball bearing, ther-mally protected. Permanent split capacitor motor (cap. built in). Dim: 6 % "H x 5.92" W x 2"deep - Rotron #MR2B3

\$19.95 RFE Item #6301

DUAL 31/4" DISK DRIVE IBM FORMAT COMPATIBLE EXPANSION MODULE 314 " DISK DRIVE

TC-500 drivette. Single-sided. quad density apacity:

Unformatted-250/500K bytes\* Formatted-164K bytes. 80 track/140 TPI, based on 16 sectors. Will work with any 514 disk controller.

tem #8824 \*Total cap. 500K bytes with

SWIVEL PLATE

MOUNT CASTER SET

metal mounts. Can be used for shop equipment, engine stands, etc. Plate Dimen: 2½ " x 3¾ " Dim: 2¾ "dia. x 1¾ "W x 3½ "OAHt. Mfr - Bassick

set of 4 \$9.95 (used)

#### minum housing, central for blowing or exhaust. Dim.: 41% sq. × 1% deep. there #5345 \$5.95 RFE \$19.95 **55 RPM SATELLITE** BATTERIES **24 VDC** POSITIONING MOTOR Nicad POWER 12V @



115 VAC/60 Hz., 21W., 28A.,

3100 RPM; 5-blade model, alu-minum housing. Can be mounted

motor, 115V/60 Hz., 30 in /lb orque, 14W. Front flange mount OA Dim.: 314 "D x 5"L. Shaft: %"D x 1"L. Mfr — Matsushita or equiv

Item #5149 \$9 95 BEE

**POOL CIRCULATING** 

1/2 H.P. MOTOR &

PUMP ASSEMBLY

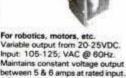
450 ma

Contains 10 AA cells. Recharge rate: 45 ma. 16-18 hours. Case with tab output connections.
Dim.: 21% "H x 1 % "W x 21% "L Dim.: 21/4 Mfr - GE 123233 or equiv.

Item #5443 \$9.95 Gel Cell 6V @ 9.5 AH

For use with model cars, trains, boats, planes, etc. Dim.: 5% "H x 41% "W x 21% "deep Item #7039 \$14.95

SUPPLY



AC fuse protection. Size: 4" x 8 ½" x 7 ½" Mfr — Acme PS59134 \$19.95 BEE Item #62

STEP UP-DOWN AUTO-TRANSFORMER 3.5 KVA



3.5 KVA with taps at: 100-115-120/200-208-220-230 & 240V Ideal for boosting low line volt-age, or for use in converting 115 to 230V and 230 to 115V Dim,: 7"H x 6"W x 5%" deep. Mfr. — Hyde #3575 trem #8006 \$69.00 New

### ADAM PRINTER



Complete, less top cover plate. Friction feed. Takes standard paper 8 % " x 11 " (Customer returns; tested

#### \$69.50 **ADAM ACCESSORIES**

#6641 \$9.95 #6642 \$14.95 Data Drive \$9.95 D.D. Power Supply **ASCII Keyboard** #6643 \$19.95 #7786 \$19.95

TIMERS—RELAYS—VOLTAGE REGULATORS—POWER SUPPLIES 1/2 H.P., 1725 RPM SHOP MOTOR



CCW rotation: 115 VAC/60 Hz 115 VAC/60 Hz/1; 30-40 GPM; 9.2 amps. Shaft: "s" dia. x 2 °L with "s" keyway slot.
Originally used as circulating pumps for pools — 12 dia. x 3 °H.

Mfr — GE #5KC47KR319AS Item #7418 \$39.95 New Item #5314 \$39.50 New

AIR COMPRESSOR

PUMPS - COMPRESSORS - BLOWERS - MOTORS - POTENTIOMETERS - COUNTERS



Produces up to 33 PSI. For air brush, paint spraying, tire & mat-tress inflation. 115VAC, 50/60 Hz. Capacitor-run motor, Dimen.: 4%" dia. x 8%" long Mfr — Thomas Industries \$29.95 RFE Item #64

1/4 HP, 14,000 RPM MOTOR w/Speed Control



115VAC/60 Hz. CW rotation tool & appliance duty. Ideal for use in high-speed drills. With speed control, can be used at variable speeds for mixing paints, etc. Shaft: %, " dia. x 1 % "L Dim.: 2 % " dia. x 3 % "L Mfr - Northland #72110

\$12.95 RFE Item #7430

MINIMUM

#### **VACUUM PUMP & MOTOR**



Usable for vacuum or pressure olication, 4 CFM/15 PSI max. 15" cont., 28" intermittent. Pump is directly coupled to a GE 1/3 HF 1625 RPM, 115 VAC, 50/60 Hz., single phase 3.8A motor. Thermally protected. Mounted on a metal base. Dim: 5% "W x 14%"L. Mfr-Gast 0040-V119 (oil-less) & GE

\$39.95 RFE

AMERICAN DESIGN COMPONENTS, 62 JOSEPH STREET, MOONACHIE, N.J. 07074 YES! Please send me the following items:

No.	How Many?	Description	Price	Total
1 222 0 5				
_				-
		and the state of t	Total	

FREE CATALOG of Canadian: \$3 plus P.O. cost. Charge only. electro-mechanical devices sent with

Sales Tax (N.J. residents only, please add 6% of total) ORDER TOTAL

☐ My check or money order is enclosed. ☐ Charge my credit card. ☐ Visa ☐ Master Card ☐ Amex Card No.	\$15. PM-116
Exp. Date	
Signature	
Telephone: Area Code Number	
Name	
Address	
City	
State	Zip
All inquising and from catalog apparets call 301.9	20.2710

For all phone orders, call TOLL-FREE 800-524-0809. In New Jersey, 201-939-2710.

### Make Clocks Easily!

#### Self-Adhesive Acrylic Dials



6" Bass Dial 740-043 Gold Numerals Blue. Green & White Center \$3.75 each

6" Owl Dial 740-042 Gold Numerals & Silver Glitter Owl \$3.75 each





5" Starburst Dial 740-041 Gold Glitter Numerals \$3.75 each

M88 Movement 2-3/16" Square 5/8" Thick Uses AA Cell \$6.50 each Includes Hands



#### COMPLETE KITS **SAVE 33%**

Your Choice of Above Dials . . . . \$3.75 M88 Movement . . . . 6.50 Catalog . . . . . . . . . . 1.00 Regular Price . . . . \$11.25

Special \$7.50

Add \$2.00 per order for postage and handling.



Catalog 786 — \$1. 50 pages of clock movements, dials, accessories, hands, tools, and more!





525 minimum charge card sale

BOX 14069-L CINTI., OH 45214 PHONE (513) 241-7073

#### RADAR VS. DETECTORS (Continued from page 79)

detector will give you that margin. Beyond that, you're on your own.

Since these tests were performed, several new models have been sent to us, including the \$130 Sparkomatic Road Alert 20 plus the mini \$300 Micro-Fox and \$330 Whistler Spectrum 2.

Because radar and detector performance can vary with the weather, the exact positioning of the units, and other factors, we thought it would be unfair to test these new models after the main group of detectors. However, in subjective over-the-road evaluations, the Spectrum 2 seemed to show the biggest improvement over the original model. though we cannot say how it would compare with the top-rated Escort. PM

SOURCES FOR RADAR DETECTORS
BEL Micro Eye XKR-LR, BEL-Tronics, Ltd., 2206 W.
Harry, Suite 10, Wichita, KN 76213
Cobra Trapshooter RD-3110, Dynascan Corp., 6460 W.
Corkand St., Chicago, IL 60635
Escort & Passport, Cincinnati Microwave, Inc., One Microwave Plaza, Cincinnati, OH 45242
Fuzzbuster Superhet, Electrofert, Inc., 4949 South 25-A.
Tipp City, OH 45371
GUL 83-S, GUL Industries Corp. 23978 Craftsman Rd., Calabasas, CA 91302
K-40 XK Superhet, K-40 Electronics, 1575 Executive Dr., Elgin, IL 60120

Radar Ready Mount, NOB Industries, P.O. Box 43444, Tueson, AZ 85733 Road Alert 20, Sparkomatic Corp., Route 6 in 209, Milford, PA 18337

per D-4000, Autotronics Inc., 833 Arapalio, Richardson,

Snooper D-4000, Autotronics Inc., 853 Arapallo, Richardson, TX 75081
 Super Fox Vixen II & Micro Fox, ComGen Technology, Inc., 4518 Taylorsville Rd., Dayton, OH 45424
 Uniden RD-55, Uniden Corp., 6345 Castleway Court, Indianapolis, IN 46250
 Whistler Spectrum & Spectrum 2, Controlonics Corp., Dynatech Co., 5 Lyberty Way, Westford, MA 01886

#### RADAR DETECTOR PERFORMANCE RANKING

X-BAND	K-BAND	OVERALL
ESCORT	ESCORT	1. ESCORT (\$245)
UNIDEN	GUL	2. GUL G-83S (\$260)
GUL	BEL.	3. BEL MICRO-EYE XKR-LR (\$300)
WHISTLER	K-40	4. UNIDEN RD-55 (\$190)
BEL	PASSPORT	5. WHISTLER SPECTRUM (\$270)
COBRA	UNIDEN	6. K-40 XK SUPERHET (\$300)
SNOOPER	WHISTLER	7. PASSPORT (\$295)
PASSPORT	COBRA	8. SNOOPER D-4000 (\$149)
K-40	FUZZBUSTER	9. COBRA TRAPSHOOTER RD-3110 (\$160)
FUZZBUSTER	SNOOPER	10. FUZZBUSTER SUPERHET (\$200)
FOX	FOX	11. SUPER FOX VIXEN II (\$230)

#### **HOW GOOD IS POLICE RADAR?**

Not as good as it should be. In April 1979, Judge Alfred Nesbitt presided over the famous Dade County, Florida, hearings to determine whether radar speed measuring devices were reliable and whether police officers were adequately trained to use them. After being shown houses "moving" at 40 mph and trees doing 80, Judge Nesbitt ruled "that the reliability of the radar speed measuring devices . . . has not been established beyond and to the exclusion of any reasonable doubt."

Despite this condemnation, police radar has not substantially changed since. The last technological breakthrough was "instant-on" K-band radar in 1978, and the only recent wrinkle is "same-lane" radar. "Same-lane" radar attempts to measure the speed of a car traveling in the same lane and same direction as the police cruiser. It is said to be even more prone to false readings than conventional units.

Around the same time that Judge Nesbitt held his hearing, the National Bureau of Standards and National Highway Traffic Safety Administration decided to establish standards for police radar. Specifications for police radar were finally published in 1982. Please note that the NBS standards are 'suggestions," not requirements. In theory, a police department should ensure that the radar they buy meets these standards. In practice, they tend to buy whatever they can get at the best discount.

As for operator training, there is no requirement from any federal agency. The FCC used to individually license radar operators, but police radar is now type-accepted by the FCC, and any state or local govern-ment with an FCC license for its radio communications system can operate radar.

Many states require radar-equipped officers to complete an operator course, but there is nothing in any law to stop a local municipality from buying a radar gun for well under \$1000, giving it to a deputy with no training, and letting him balance the town budget out on the Interstate.

Your right to use a radar detector is guaranteed by the Communications Act of 1934. This congressional act established the FCC, gave it control of all microwave transmissions, and stated that radio receivers should be uncontrolled. This "right to listen to the radio" has been a cornerstone of U.S. policy for 50 years. As far as the FCC is concerned, a radar detector is a radio receiver, and is specifically excluded from government control.

A radar jammer, on the other hand, is a radio transmitter. The FCC considers jammer use "malicious interference" with legitimate radio broadcasts-i.e., police radar. Jammer use is thus a federal offense, with penalties including, but not limited to, loss of any FCC licenses, a \$10,000 fine and criminal prosecution with a maximum sentence of one year in federal prison,-R.T.

# Complete Apple® Compatible Word Processing System Home • Business • Word Processing



## Look At All You Get For Only \$499.00

Laser 128 Apple Compatible Computer

Big Blue 8½" Letter Size 80 Column Printer

9" Samsung Green Screen Monitor

Magic Window He Word Processor

Magicalc Spreadsheet

magicale spicaasiicei

Magic Memory Data Base

Laser 128 Printer Interface

2 Rolls of Paper

Comparable Apple System (\$2495.00)

List Price \$499.00 199.00 129.95 150.00 150.00 60.00 19.95

Save \$700°°

1227.85 All 8 Pieces only '499°°

Magic Window He Word processing is easy and more efficient because of a simple-to-read menu system and editing commands. Many powerful features of professional quality programs and more. Supports virtually all major printer functions. Operates with most 80-column video cards or 40/70 column no-hardware modes.

Magicalc Rated as the best electronic market for with which spreadsheet on the Apple . The speed Magicalc solves number problems allows you to accurately analyze beforehand. Supports decisions RAM multiple cards most manufacturers in any combinations up to a full 512 K.

Magic Memory File anything, any way you want to: names, addresses, important numbers, dates and notes. Your information is organized simply, easy to maintain, and available instantly. Supports all popular printers and video cards.

Apple % is a registered trademark of Apple Computer Inc

Add \$30.00 for shipping, handling, and insurance. Illinois residents please add 6 is a sales tax. Add \$60.00 for CANADA. PUERTO RICO. HAWAII. ALASKA. APO-FPO orders. All orders must be in U. S. Dollars. WE DO NOT EXPORT TO OTHER COUNTRIES EXCEPT CANADA. Enclose Cashier Check. Maney Order or Personal Check. Allow 14 days for delivery. 2 to 7 days for phane orders. 1 day express mail. Prices & Availability subject to change without notice.

VISA - MASTER CARD - C.O.D.

C.O.D. on phone orders only.

## **Computer Direct**

We Love Our Customers 22292 N. Pepper Rd., Barrington, Illinois 60010

312/382-5050 to order

Материан, закращенный латерокий правом

### **Guard Your Family Against Old Man Winter With Chill Buster** indow Insulating S

#### Chill Buster I System

Creates insulating air pocket that protects you and your family from drafts and chills. Available in white or brown

Chill Buster I uses interlocking inside fastener strips that give windows a "finished" look. Simply snap film in place etween interlocks and shrink with hair dryer to form tight seal.

	40 IN. WIDE BY	50 IN, WIDE BY	60 IN, WIDE BY	All fo
25 Ft. long & 75 Ft. Fastener 50 Ft. long &	##-100 \$19.95	mF-200 \$22.95	#IF-300 \$24.95	De S
150 Ft. Fastener 75 Ft. long &	#IF-101 \$35.95	#IF-201 \$38.95	HIF-301 \$44.91	1
200 Ft. Fastener	#IF-102 \$49.95	#IF-202 \$52.95	#IF-302 \$67.95	1111/1/1/1/1

#### Chill Buster II System

Kit Contains Everything You Need!

Low-cost tape-on system installs in minutes with double-sided tape. No measuring, no cutting Chill Buster Systems give you added protection and comfort.

	40 IN. WIL	DEBY	50 IN. W	DE BY	60 IN. W	DE BY
25 Ft. long & 75 Ft. Tape 50 Ft. long &	#HW-101	\$ 9.95	#HW-201	\$10,95	#HW-301	\$11.95
150 Ft. Tape 75 Ft. long &	#HW-102	\$17.95	#HW-202	\$18.95	#HW-302	\$22.95
225 Ft. Tape	#HW-103	\$23.88	#HW-203	\$24.95	#HW-303	\$30.95
Patio Door/Picture \	Window Size -	7 Ft x 9 f	1 & 35 Ft of 1	ane - Stock	#PHW-100 C	ost \$6.95

Order Extra Supplies At Low-Cost In Any Quantity.

#### Interlocking Fasteners

Add Clean, Crisp Look To Insulated Windo

25 Feet Long	Stock #FS-101	Cost: \$ 5.50
50 Feet Long	Stock #FS-102	Cost \$ 9.95
75 Feet Long	Stock #FS-103	Cost \$14.90
100 Feet Long	Stock #FS-104	Cost: \$19.25



Made specially for window insulating systems Provides tight, durable bond to plastic window film. Fast, Easy Installation:

1/2" wide and 110 Ft. Long - Stock #T-101 Cost: \$3.95

Crystal Clear Heat Shrink Film

Top quality plastic film is specially designed for window insulating systems It's 100% clear, tough, inside, and durable with high tensile strength. Film shrinks to form tight seal with household hair dryer.



#### Order Enough To Insulate All Your Windows!

LGTH.	40 IN. WIDE BY	50 IN. WIDE BY	60 IN. WIDE BY	84 IN. WIDE BY
40 Ft	#PF-401 \$ 7.96	SPF-501 \$ 9.95	MPF-601 \$11.95	#PF-801 \$14.95
80 Ft	#PF-402 \$14.95	BPF-502 \$17.95	#PF-602 \$19.95	BPF-802 \$26.95
120 Ft	#PF-403 \$19.95	aPF-503 \$24.95	#PF-603 \$28.96	#PF-803 \$35.05

SHIPPING RATES AND PRICES — PLEASE NO C.O.D.'s								
Total for Merchandise	up to 10.00	10.01 15.00	15.01 20.00	20.01 30.00	30.01 35.00	35.01 45.00	45.01 99.00	OVER 100.00
Shpq & Del	2.50	2.75	3.00	3.25	3.50	3.75	4.75	6.75

OUR GUARANTEE: SHOULD YOU NOT FEEL SATISFIED, KEEP THE PORTION YOU HAVE INSTALLED AND RETURN THE UNUSED PORTION WITHIN 15 DAYS FOR A COMPLETE REFUND LESS POSTAGE AND

Energy Arsenal Dept. PM-11

107 Industrial Drive, Ivyland, PA 18974

Fasteners work with all heat shrink type films, come in 26" long easy cut strips. Selfadhesive back sticks to frames or trim. Available in white or brown, can be painted any color. No special skills or tools needed.

#### Send For Our Free Catalog

ORDER TOLL FREE: Call 1-800-325-2826 In PA Call: (215) 322-0363

6 Days a Week 8:30 am to 6:30 pm EST VISA - MASTERCARD (a minimum charge order is \$15.00)

Energy Arsenal Dept. PM-11 107 Industrial Dr., Ivyland, PA 18974

	STOCK #	COLOR	PRICE
Check	30.25 (0.10	1000000	
□M.O. □VISA			
□MC	Postage 8	Hendling	
	PA add 6%	Sales Tax	
EXP. DATE	101	AL ENCL	
CARD NO.			
SIGNATURE			
NAME			
ADDRESS			
CITYSTATEOP			

#### TELEPHONE LISTENING DEVICE



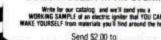
Record telephone conversations in your office s nects between any cas

\$19.95 EACH OF DE AM

Super Powerful FM TRANSMITTER ly times more powerful than other transmittens, stands up to 'ti mile to any FM rade -Easy to emble Kit - up to 54 Satteny (not not.) cutalog of Transmitters, Voice Scramblers and in specially items, enclose \$2,00 to USI Corp.

#### **BUILD YOUR OWN ROCKET MOTORS!**

- **40 POUNDS THRUST!**
- FIFTY CENTS EACH!
- **BUILD A DOZEN IN AN EVENING!**



Dept. PM:1 THE TELEFLITE CORPORATION. 11620 Kitching St., Sunnymead, Calif. 92388



#### POWER TOOLS

METAL PARTS KITS AT LOW **FACTORY DISCOUNT PRICES FOR** 

- +12-IN. BAND SAW
- 18-IN. BAND SAW
- .WOOD SHAPER
- .6-IN. BELT SANDER
- \*10-IN, TILT/ARBOR SAW

\$500 per

Plan

.LATHE/DRILL PRESS COMB. \$34.99 TO \$189.99 Easy to follow step-by-step plans. Photos. No machining, no welding. Build your own sturdy frame. Full scale patterns. 98,000 kits sold. Send \$6

for plans, brochure and prices or \$1 for brochure and prices. Order kits on Visa or MasterCard.

GILLIOM MFG., INC. MONEY BACK GUARANTEE 1700 Scherer Pkwy. Dept. PM611 St. Charles, Mo. 63303 Phone (314) 724-1812

#### 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 direct from world's largest mold manufacturer.

Over 350 designs to select from.

Send \$5.00 CONCRETE MACHINERY COMPANY

Today To > P. O. BOX A99 - HICKORY, N. C. 28601

## PAST 40

Troubled With Getting Up Hights Pains In Back, Hips, Legs Mervousness Tiredness

If you are disturbed by these symptoms, your troubles may be caused by glandular inflammation of your prostate. Methods that merely give temporary relief for this condition cannot be expected to

ary relief for this condition cannot be expected to remove the cause of your trouble. The Excelsior Institute Clinic, devoted to the NON-SURGICAL methods of treatment for diseases peculiar to older men, has a new FREE BOOK that tells how these troubles may be corrected. The NON-SURGICAL treatments described in this book require no surgery, hospitalization or long period of convalescence. Treatments take but a short time and the cost is reasonable. Write today. This book may prove of utmost importance to you. No obligation.

portance to you. No obligation.

Excelsior Institute Clinic, Dept. 128B

110 E. Broadway, Excelsior Springs, Mo. 64024



#### FREE Tool Catalog

Quality Products For Woodworkers

Send today for your FREE copy of our new colorful catalog. It's fully illustrated with the finest quality tools, supplies, books, components, hardware, and much more. Satisfaction Guaranteed. Write today for your FREE catalog.



WODCRAFT SUPPLY CORP. Dept. PM116 41 Atlantic Avenue, Box 4000

Woburn, Massachusetts 01888



#### BE A BOOKKEEPER

If you are bored with your present jo brand new skills in Bookkeeping and General Accounting could be for you. Learn at home. Full or part-time. Send name, address for free booklet.

COMMERCIAL TECHNICAL INSTITUTE, Dept. 110-116,

1500 Cardinal Dr., Little Falls, N.J. 07424 POPULAR MECHANICS • NOVEMBER 1986

#### METEORITES

From around the solar system, penuine meteorite specimens are available for the first time BUYING / SELLING / TRADING

ROBERT A. HAAG — METEORITE MAN Box 27527, Tucson, AZ 85726 Please send \$1.<sup>10</sup> for a full color catalog Refundable first order



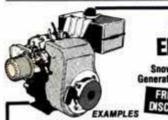
#### DENTAL MECHANIC



Learn at borge, in your spare time, to make Crowns, Plains, Bridgework, etc. Dental Mechanics are employed by Dentits, Dental Laboratories or open your own abop. full or spare time. FULL RQUIPMENT OF TOOLS AND MATERIALS INCLUDED WITH COURSE, Low tailties. Easy Terms. Write for FREE BOOK about this career that's not affected by automation.

THE McCARRIE SCHOOLS INC. 215-L09-9155 132 N, 12th St., Dept. PM 111 Phila., Pa. 19107

### LEARN CLOCK REPAIR NATIONAL OCKMAKERS INSTITUTE



#### SMALL **ENGINES**

Snowmobile parts, erators, and more

FREE CATALOG

EXAMPLES	ų
5HP Briggs Horizontal \$139.95	
8HP Tecumseh Horizontal \$199.95	
31/2 HP Tecumseh Vertical \$99.95	
8HP Tecumseh Vertical \$199.95	
4000 Watt Generator \$449.95	
2 to 18 HP Engines, 500 to 5000 watt	

Generators, all at Discount Prices SMALL ENGINE CITY 2612 Lyndale So. Dept. PM11 Minneapolis, MN 55408, 612/872-4288

#### MAILORDER BUYERS

Thousands of MAILORDER BUYERS LISTS are now available for IMMEDIATE USE! Computerized on Peel and Stick labels in ZIP CODE ORDER. GUARANTEED DELIVERABLE! For complete details RUSH SASE TO:

KEYRITE ENTERPRISES Dept. PM P. O. Box 71152 . Las Vegas, NV 89170-1152





#### HERNIA

FOR COMFORT!



APPLIANCES

BROOKS APPLIANCE COMPANY 301 East State St., Marshall, Mich. 49068

## HEAVY DUTY AIR TOOL AT BIG SAVINGS TO YOU

#### FACTORY NEW! FIRST QUALITY!

As authorized liquidators of consumer products, we sometimes run across special opportunities that are NOT genuine liquidations. And here is one of them! The U.S. importer of these industrial quality air tools was anxious to expand its market. We knew we could provide the big sales volumes they were looking for. But first, we thoroughly inspected the tools to assure top quality for our customers. Then we checked on the importer's service. It was efficient concerning warranty, parts and service. So we wrapped up the deal! And here it is! Outstanding values on exceptionally fine quality air tools. Get the ones you need or always wanted...at money-saving LOW prices!

#### ALL AIR TOOLS BACKED BY IMPORTER'S ONE YEAR WARRANTY!



#### 3/8" AIR RATCHET WRENCH

Sturdy, solid metal construction. Fast and easy to use on nuts and bolts. All ball bearing design. Variable speed throttle. Durable ratchet head supplies up to 50 lbs. torque. Positive socket retention. 4 CFM at 90 PSI. 150 RPM.

Mfr. List: \$69.99 



#### IMPACT WRENCH

Rugged, one-piece aluminum housing. Pistol-grip handle with contoured trigger throttle. Built-in air regulator. 4.5 CFM at 90 PSI. 6500 RPM. Four torque settings: 150, 195, 215, 230

Mfr. List: 571.00

Liquidation Price . . Item H-1850-7000-995 Ship, hand: \$3.00



#### GREASE GUN

Acute angle for easy access in hard-to-reach areas. Air vent valve. Three-way filling: from pump, suction of bulk lubricant, or cartridge load. Delivery at 1500-5000 PSI. 30-150 PSI air

Mfr. List: \$49.99 Liquidation Price . . . .

Hem H-1650-7001-241 Ship, d: \$3.00

and flat edges are desired. Adjust-

NIBBLER

AIR

able die guide for forward, back-ward, right or left. Cuts up to 1/16" steel; 5/64" aluminum. Alloy steel punch. 4 CFM at 90 PSI. 3500 RPM.

For metal cutting where precision

Mfr. List . . .

Liquidation Price . .

Item H-1650-7001-035 Ship, hand: \$4.00



24 hours a day, 7 days a week. V/SA

Toll-Free: 1-800-328-0609

C.O.M.B. Direct Marketing Corp. Item H-1650 1405 Xenium Lane N/Minneapolis, MN 55441-4494 1405 Xenium Lane N/Minneapolis, MN 55441-4494
Send\_\_\_3/8" Air Ratchet Wrench(es) Item H-1650-7001027 at \$25 each plus \$4 each for shipping, handling.
Send\_\_\_Grease Gun(s) Item H-1650-7001-241 at \$20
each plus \$3 each for shipping, handling.
Send\_\_\_Silver Touch Spray Gun(s) Item H-1650-7001076 at \$34 each plus \$5 each for shipping, handling.
Send\_\_\_Touch-Up Spray Gun(s) Item H-1650-7001-068
at \$24 each plus \$5 each for shipping, handling.

Send.....1/2" Impact Wrench(es) Item H-1650-7000-995 at \$26 each plus \$3 each for shipping, handling. Send \_\_Air Nibbler(s) Item H-1650-7001-035 at \$59 each plus \$4 each for shipping, handling.

(Minnesota residents add 6% sales tax. Sorry, no C.O.D.

My check or money order is enclosed. (No delays in processing orders paid by check, thanks to TeleCheck.)
 Charge: □ VISA\* □ MasterCard\* □ American Express\*

Acct. No.	Exp
PLEASE PRINT CLEARLY	- 0
Name	

City

State ZIP Sign Here



Dual action trigger for air only or air/paint. Adjust-able pattern. 4-6 CFM at 70-110 PSI. 1-qt. alumi-num canister. Dripless

Mfr. List . . . \$92,00

Liquidation \$7 Price . . . .

Item H-1650-7001-076 Ship, hand: \$5.00



#### TOUCH-UP **SPRAY GUN**

For shading, spotting. Self-cen-tering brass nozzle. Adjustable pattern. 8-oz. aluminum cup. 1.8mm orifice. 2.8 CFM at 30 PSI. 4 CFM at 50 PSI

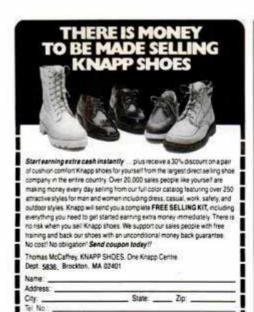
Mfr. List . . . . . 559.00

Liquidation Price



COMB Direct Marketing Corp.

**Authorized Liquidator** 1405 Xenium Lane North Minneapolis, Minnesota 55441-4494







BUILD A ROLLS ROYCE IN YOUR BACKYARD!
Or Stutz Bearcat, Ford T Jeep.
Mercedes SSK, Bugatti All 2/5Sc.
Kidmans Boston Buckboard 2/3Sc.
Kidmans Boston Buckboard 2/3Sc.
Welectric Bike and scrap parts. Concise plans.
One car \$12. Two \$20. Seven \$39. Brochure \$2p.p.
Kidmans, Box 1238 A. Marbiehead, Ma 01945

COLD WEATHER WON'T STOP YOU NOW!
INSTANT HEAT-SHOP-GARAGE-BARN
SUPER EFFICIENT PROPANE SPACE HEATER KIT
UP TO 100,000 BTU'S -- SIMPLE 10 MIN. ASSEMBLY
MOUNTS TO TOP OF 5 TO 10 GAL PROPANE TANK
QUICK
DELIVERY - UPS
CGShi OF

DX.360 - Graham, Wa 90338

## WONDER

#### At Just 20 lbs., What It Will Do Will Amaze You!



If your garden is less than an acre, you need a big, expensive tiller like you need rabbits. What you need is one small, precision machine that can do a variety of jobs in the garden and around the yard... quickly, easily, neatly and economically.

The exciting Mantis Tiller/Cultivator is changing the way Americans garden. It weighs just 20 pounds, so anyone can use it. It starts with a flick of the wrist... cuts through tough soils... turns on a dime... weeds in and around plants, between narrow rows and along fence lines... and runs all day on a gallon of gas! What's more, with its inexpensive attachments, it quickly becomes a furrower, lawn aerator or de-thatcher, a border edger, or a hedge trimmer!

#### 3-Week In-Your-Garden Trial

Best of all, you can try the Mantis —risk free! If you don't love it, simply return it for a full refund.

Mantis tines are guaranteed for life against ever breaking and its engine has a Lifetime Replacement Agreement!

And, for next 45 days, Mantis is on sale at the lowest price of the year!

°1986 MMC

Mantis Manufacturing Co.
1458 County Line Rd., Dept 3037
Huntingdon Valley, PA 19006
(215) 355-9700

Please send me information on the
revolutionary Mantis Tiller/Cultivator,
and the 3-WEEK TRIAL!

Name

Address

Zip

City

State



### Radial Arm Saw Positioner



All metal stop block converts radial arm saw into precision cutoff saw. Repeats exact cuts where accuracy counts for:

Cabinets — furniture — picture frames

Easy to adjust — remembers last cut. Attaches behind fence with one pan head screw. Can be mounted or removed in seconds. \$24.95 postpaid. Pa. residents add 6% tax

W.W. Manufacturing, Dept PM11 476 S. Norwood Ave. Newtown, PA 18940

#### Band Saw HOW-TO Brochure

Application, problem solving and safety tips brochure for band saw users. Also, complete catalog of band saw blades for metal and wood cutting. Send \$1.00 for postage and handling to:

The Olson Saw Company Bethel, CT 06801 PM





#### Portable Steam Cleaner

Steam in 60 seconds

CLEAN:
Engines, Air Filters, Lawn Mowers.
3-yr. guarantee on fire box, coils. Uses liquid soap, propane fired. Wt. 120 lbs. Auxil.
pump required on low water pressure.

WEDCO MFG. INC., Dept. M-17 P.O. Box D, 940 West Broadway, Jackson, Wyoming 83001

USE ZIP CODES WHEN ANSWERING ADS

## SATURDAY MECHANIC

## Fixing Windows And Door Locks

indows and door locks are a pain in the neck. Hidden behind the steel framework of the door, the complicated mechanisms that lock the door and raise the window are subjected to a lot of abuse. Force that frozen window; open that locked door by jabbing away at its insides with a Slim Jim. Sooner or later something inside goes "ka-chong," and little pieces fall to the bottom of the door.

#### BY PAUL STENQUIST

locks that don't lock are not among these. Why are they tough jobs? Because the inner door panel provides only limited access at best. But someone has to do it. And if you can do it yourself, you'll save some bucks.

Door pad removal

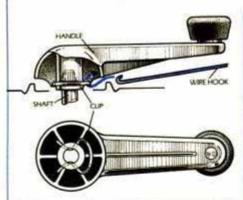
moisture barrier and, in some cases, the insulation pad. Removing the door pad is easy. Removing it without destroying it is a bit tougher. But, if you exercise normal care, you can do it.

the door's inner door pad along with the

If your car has power windows, begin by disconnecting the

fall to the bottom of the door. To gain even limited access to door lock Some auto repair jobs are fun. Reand window regulator mechaplacing window regulators and fixing nisms, you have to remove GLASS This J-car front door is typical of GM doors with single lift-arm door regulators. SEALING CHITSIDE power door locks and door-pad-mounted STRIP YLINDER inside locking knobs. POWER LOCK REGULATOR ASSEMBLY REGULATOR ASSEMBLY REGULATOR HANDLE CHANNEL

155



 There may be enough room to use a wire hook to remove the spring clip.

battery's negative cable. By doing so you can be sure that you won't accidentally activate the window motor while fishing around inside the door with your fingers.

Then, whether you have power windows or crank windows, raise the window on the door in question and tape it to the top of the door frame with heavyduty duct tape. The window must be in the raised position to replace a window regulator or repair door lock linkage rods. (An exception to this is when replacing a window regulator on Toyotas or Hondas.)

Taping the window glass in place ensures that it won't come slamming down on your fingers when you disengage the regulator or accidentally upset the window mechanism. On cars without an upper door frame, support the window in the up position by wedging rubber door stops between the glass and the top of the door.

With the window securely supported in the up position, study the door pad to figure out what holds it in place. Look for screws in lower corners of the pad. Remove the screws that secure the armrest pad to the armrest base or the armrest base to the door. The screws might be hidden behind plastic plugs that must be pulled out before the screws can be removed. On some cars the armrest is part of the door pad. If your car has power windows, remote mirror control levers, or door lock controls, they will have to be disengaged from the pad.

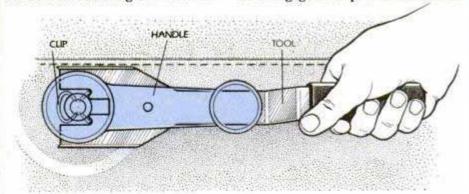
On some cars the remote-control mirfor bezel has a screw on its side that retains the cable. Loosen this screw and the cable will slip out of the bezel when you pull off the door pad. On others, particularly GM cars with the remote control mounted above the door pad, the bezel is attached to the door with a single screw on one end. The other end has a tab that fits into a slot on the door pad, and must be disengaged before the door pad can be removed.

Power window switches can usually be unplugged from the wiring harness once the switch cover plate has been removed. On GM cars with the switch mounted on a protruding "shelf," push down on the plastic cover while gently pulling out at the bottom.

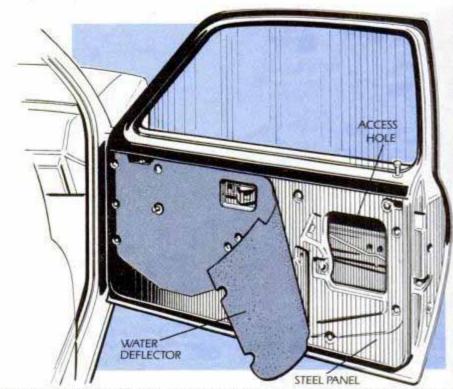
On cars with manual windows and/or large door handles, you'll have to disengage the retaining clips behind the handles to remove them. On some cars you can do this using a wire hook (see Fig. 1). This is the recommended procedure on Honda, but it won't work on every car because access to the back of the clip varies. On some cars the clip can be removed using two screwdriv-

ers—one pushing each end of the clip—but this is a real hassle and you might damage the door pad. Better to buy the special tool sold for this purpose. It's available for a couple of bucks from auto parts stores and is also useful for removing the trim pad fasteners.

To remove the window crank or door handle with the special tool, pull the handle away from the door as much as possible and look between handle and door pad to see which way the ends of the clip are pointing. Once you've determined this, slip the special tool behind the crank or handle so that the tool is flush with the base of the handle and its two prongs are aligned to push on the ends of the clip (Fig. 2). Push the tool in toward the center of the handle to disengage the clip. Once the tool has

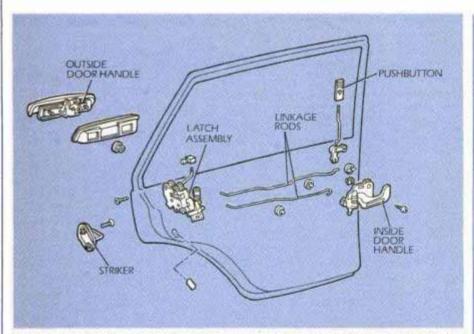


2 Or you may want to use this inexpensive special tool to remove the clip.



3 Remove the water deflector, by careful peeling, to allow access to the internal mechanisms of the door. Use tape or contact cement to reinstall the deflector.

### SATURDAY MECHANIC



Linkage rods can be dislodged easily by someone trying to open the door with a Slim Jim.

bottomed out, pull the handle away from the door pad.

If your car is equipped with door pull straps, or "coffin handles," pop the plastic covers off each end of the strap or bracket, then remove the screws that secure the strap or handle to door.

If your car is equipped with upright door lock buttons that pass through the door pad, unscrew them. On most cars with door lock knobs in the door pad, you must remove the screws that secure the remote-control handle bezel to the door to allow access to the back side of the lock knob. The bezel can't be fully removed until you've disengaged the lock knob. To do this, insert a small screwdriver blade behind each end of the lock knob and pry it away from the rod it's connected to. After the end of the rod is free of the knob, slide the knob forward to remove it.

Once you're sure all screws and accessories have been removed from the door pad, disengage the plastic retainers that secure the pad to the door. These cone-shaped fasteners with flexible edges are much easier to insert than disengage. If you simply pull the pad away from the door, you'll destroy the fasteners. The trick here is to disengage the fasteners from the door without breaking them or without pulling them out of the door pad.

Begin by pulling at an easily accessible edge of the pad until you locate one of the plastic fasteners. Then, using your door handle removal tool or a pair of needle-nose pliers, insert the tool between the inner door and the base of the fastener. Pull on both the edge of the door pad and the tool. A considerable amount of force may be required. Once the first clip is disengaged, continue around the edge of the door pad until all fasteners are free.

Under the door pad you'll find a water deflector and, on some cars, an insulator pad. These may be attached with more plastic fasteners. On some models, the water deflector may simply be taped in place. Sometimes the armrest bracket is bolted to the inner door over the water deflector. If this is the case, you'll have to remove the bracket before you can remove the deflector. Once the deflector has been removed, you'll see several access holes in the inner door panel (Fig. 3). To complete any of the following repairs you have to work through these access holes.

#### Lock mechanism

The most common door lock failures are those where the linkage rods that join the door lock levers and remote lock buttons to the door lock mechanism (Fig. 4) become disengaged. These linkage rods are easily detached when trying to open a door with a Slim Jim tool. In fact, if you suddenly discover that your inside door lock doesn't work, chances are good that someone recently tried to steal your car.

On most cars, these linkage rods are attached to the handles, knobs and actuating levers with spring clips.

Reconnecting the rods is easy enough, if you can see what you're doing. However, on most cars, the inner door panel gets in the way and visibility is limited to what you can see through the inner door panel access holes. If you can't find a position where you can see enough to reconnect a loose linkage rod, you might have to resort to a small mirror and a flashlight.

Most GM door lock linkage rods are secured with the type of spring clip shown in Fig. 5. To reinstall rods on cars with this type of clip, first reengage the spring clips on the lock levers. Then, line the rod up with the hole in the lock lever and spring clip and push it into place. You should feel it engage the spring clip. Test by pushing against the rod.

Ford uses several different types of clips. One, found on Escort, Lynx and EXP, supports the rod that joins the door latch inside handle to the lock mechanism. This retainer is inserted through the hole in the support bracket in such a way that it engages the link. The retainer is then turned to secure it.

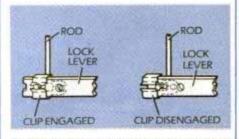
Other Ford rods use a simple spring clip that fits over the end of the rod, or a carburetor-type spring clip. This type of clip, found on Chrysler products as well, fits over the lever that the rod is attached to in such a way that the hole on each side of the clip aligns with the hole in the lever, sandwiching the lever within the clip. The other end of the clip then snaps over the rod.

### Removing window regulators

When frozen power or manual windows are forced, the teeth on the window regulator mechanism gear may strip. When this happens, the window just bumps up and down slightly when you attempt to raise it. The fix is a new regulator.

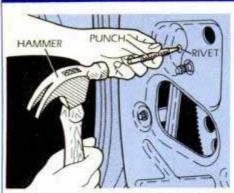
To replace a window regulator on cars with the common single lift-arm regulators (see lead illustration), make sure the window is taped securely in the up position. Then, using a drift and a hammer (Fig. 6), punch out the center pins of the regulator and motor attachment rivets. Drill out the rivets using a 1/4-in, drill bit and electric drill.

Once all the rivets have been re-



5 Typical GM linkage spring clip is disengaged by sliding sideways.

### SATURDAY MECHANIC



Punch out the center of the regulator rivets, and then drill the rest.

moved, the regulator can be pulled out through the access hole.

On Chryslers, simply disengage the regulator arm from the lift plate and remove the regulator assembly (Fig. 7). On GM cars with single lift-arm regulators (lead illustration) disengage the roller on the regulator lift arm from

the glass lift channel.

Many Ford products have a single lift-arm regulator that attaches to a run and bracket assembly below the window in a manner similar to the Chrysler regulator shown in Fig. 7. However, to remove the Ford regulator, you must unscrew the two nuts and washers that join the run and bracket assembly to the inner panel and door sill, after drilling out the regulator mounting rivets. Then, on Mark VII, Thunderbird, Cougar, Tempo or Topaz, slide the run tube up between the door belt and glass. Protect the glass with a piece of soft cloth tucked in between the run tube and glass.

On Escort, Lynx or EXP, slide the run and bracket rearward at the bottom. Finally, remove the window regulator arm slide/roller from the glass bracket C-channel and remove the regulator through the door access hole.

If your car has window regulators with double lift-arms (Fig. 8), you'll have to remove the inner panel cam bolts or rivets before you drill out the regulator attaching rivets. This type is found on some GM cars as well as Hondas and Toyotas. On the Japanese cars, the regulator mechanism is bolted to the glass and the glass must be lowered, unbolted and removed before the regulator is disengaged from the door panel.

On GM cars with the double lift-arm regulator, the regulator assembly can be removed from the door by sliding the regulator back and forth to disengage the balance arm and then lifting the arm from the glass cam. The inner panel cam bolts must be removed before you can lift the balance arm.

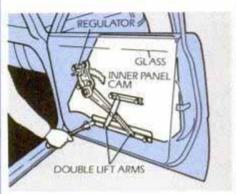
#### Installing new regulators

In most cases, a new regulator can be installed with bolts and nuts rather than rivets. But, this can be difficult as access is limited on some cars.

Your new regulator may come with U-clips that hold locknuts in place on the regulator while you install it. If so, attach the U-clips to the regulator at the rivet hole locations before attempting to install the regulator. Make sure the nuts are on the outboard side of the regulator backplate.

On GM cars with double lift-arm regulators, slide the balance and liftarm rollers into the lower sash channel cam on the glass. Then align the regulator, attaching nuts and clips with the holes in the inner door panel. Use ½-20 x ½-in. screws, or slightly shorter ones if necessary for clearance, and reattach the regulator to the door. Tighten the screws to 72 lb.-in. On Toyotas or Hondas with double lift-arm regulators, attach the regulator mechanism to the door panel, crank it to the full down position, and reinstall the window glass through the door frame opening.

If your car has single lift-arm regulators, attach the U-clips and nuts and locate the regulator in the inner door panel. Place the lift-arm roller in the glass sash channel. Align the regulator and secure with screws as above.

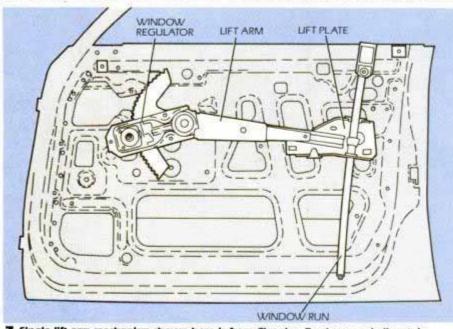


8 Toyotas and Hondas require that the glass be first lowered and removed.

On cars with electric windows, install the motor to the regulator with <sup>3</sup>/<sub>16</sub>-in. bolts and locking nuts. Connect the wires to the regulator before attaching the regulator to the door panel.

To install a new regulator in a Ford product with a regulator run tube assembly, attach U-clips and nuts as above and install the regulator through the door access hole, inserting the slide into the glass bracket C-channel. Then, slide the glass run tube assembly into position in the door and loosely install the run tube assembly fasteners. Install regulator mounting screws as above. On Fords with electric windows, the motor wiring can be connected after the regulator is mounted.

What's that you say? You can't control your nubs enough to install the new window regulator using screws, locknuts and U-clips? This is a difficult job at best, and a real horror on some cars. The solution is to rent a 1/4-in. blind rivet gun from a tool rental store. You'll also need 1/4-in. × 0.500-in. aluminum peel-type rivets. If the tool store doesn't have these rivets, you can buy them from a Chevrolet dealer as part No. 9436175. Then, while holding the regulator firmly in place, simply shoot a rivet into each mounting hole.



7 Single lift-arm mechanism shown here is from Chrysler. Ford uses a similar style.

Call 1-800-533-5545 today and . . .

On These Name Brand Parts, Tools & Equipment!



#### SUPER TOUGH **Heavy Duty Log Splitters**

\$789.00 16 Ton Model, #1134.....

New! 20 Ton Vertical, #1160...... \$834.00 24 Ton, Low Profile, #1142.....\$1329.00

\* Comes with 2-stage pumps, heavy duty slides & beams and large oil tanks.

#### Gas Engines Always the Lowest Prices And the Largest Selection!

One Year Warranty!



11/30/86

Horizontal SALE 5 Hp. Tecumseh %" shaft, #6051 .........\$139.95 5 Hp. Briggs, 4" shaft, #6052.....\$141.95 8 Hp. Tecumseh, cast iron sleeve, 6081.\$192.95 8 Hp. Briggs, 1" shaft, #6080......\$222.95 10 Hp. Tecumseh, cast iron sleeve, 6010 \$232.95 10 Hp. Tecumseh, elec. start, #60101...\$289.95 3-20 Hp. Horizontal & Vertical engines available at SUPER LOW DISCOUNT PRICES!



#### og Splitter Parts SALE 11 Gpm 2 Stage Pump, #1012...... \$89.95 13 Gpm 2 Stage Pump, #1053...... \$113.95 16 Gpm 2 Stage Pump, #1056...... \$126.95 22 Gpm 2 Stage Pump, #1017...... \$242.95 Standard 4-Way Control Valve, #2010 \$46.50 Auto Detent Valve, #2020...... \$50.95 4x24x2" Welded Cyl., #902424..... \$109.95 5x24x2" Tie Rod Cyl., #909524.... \$186.95 Much More in Stock at Low Discount Prices!

Heat Magnet

Clings to any magnetic iron or steel surface Provides heat for pipes. pumps, engine oil pans & many other uses. Ship Wt. 1 lb., List \$25.00.

Item# 17101

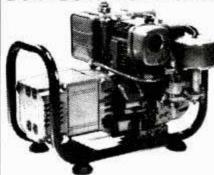
\$15.50

#### **Heavy Duty Tarp Sale** Our Tarps are TOUGH! Up to 12 Mil Thick, Not 6 Mil Like So Many Others

	Item#	Size	Sale
	1770	6' x 8'	\$ 2.69
	1771	8' x 10'	4.95
	1772	10' x 12'	5.95
	1773	12' x 16'	9.95
Strong rot, rust &	1774	12" x 20"	12.95
mildew proof poly-	1775	16' x 20"	19.95
ethylene tarps with	1776	20" × 30"	39.95
brass plated grom-	1777	30' x 40'	69.95
mets every 3 ft	1778	30' x 50'	89.95

Sizes list are cut size 1779 30' x 60' 99.95

#### Don't Be Without Power



Ideal for homeowners farmers contractors & vacationers 1 Year Warranty

Continuous Watt Rated! Sturdy Protective Cradle!

#### Generators

4000 Watt. 8 Hp. Briggs, 33 amps @ 120 V. 16.6 amps @ 240 volts List \$1009:00. Item# 16402

\$397.95 SALE! 4000 Watt, w/elec start List \$1143

SALE! \$485.00 5000 Watt. 11 Hp. Briggs, 42 amps

amps @ 240 volts. List \$1174.00. Item# 16404

\$599.00 SALE! 5000 Watt, w/elec start List \$1299\_Item# 16405

\$699.00

(1 Year Warranty on Above Generators)

#### INFRA-RED HEATERS

MR. HEAT-IR

STOVE

11,000 Btu, maintains constant heat output to 30" Adjustable Ship Wt. 6 lbs. List \$87.95.

\$39.95 Item# 1726... MR. DOUBLE HEAT-IR

Two burners, 6,000 to 24,000 Btu Adjustable Ship Wt. 14 lbs. List \$167.00

ttem# 1727.....\$89.95

(tanks not included)



## Dept. 64728

801 East Cliff Road, Box 1219, Burnsville, Mn 55337 Call our order dept. at 1-800-533-5545 In Mn call 612-894-8310

N.C. & S.C. residents. visit our Charlotte store!

Phone Orders

Prices Expire Monday-Thursday 8am-8:30pm Friday & Saturday 8am to 5:00pm

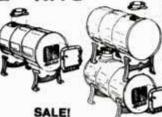
We Ship UPS, Bus or Truck







1 #15058, Wt. 32 lba, List \$49.95....\$19.95



KITS

**EVER WISH YOU** HAD THREE HANDS?

These little Handi-Klamps" give you that extra hand you need right when you need it.

They're nifty portable vices that use rubber pads to let you firmly clamp wood, paper, plastic, metal, cloth, whatever-without scratching or marring-all with the flick of a thumb.

They're ideal-

For holding patterns to wood, glass, cloth, while marking, cutting, drilling, sewing.

For model building to hold pieces tightly in place for gluing, welding and soldering.

For hanging drop cloths and canvas without fear of tearing.

And any fisherman who ties his own flies will instantly recognize Handi-Klamps as the perfect extra hand.

Handi-Klamps make an unusual, thoughtful gift for the handyman, hobbyist, sportsman, photographer and the like. You can't buy them in a store, but you can get them directly from us.

-	of two (same size) or \$ multiple sets. Price inc (Calif. res. add 6.5% se	ludes postage and handling. ales tax.) death [] 1-3/8" jaw death
į	Name:	A THE RESIDENCE OF THE
	Address:	Name of Particle
	City:	State:Zip:
-	Send check or money order. Allow 4-6 weeks for delivery	Zephyr Handi-Klamps Dept. PM 1 PO. Box 759 Inglewood, CA 90307

## ANY DOG

REHABILITATE DOGS: from Electric Shock-Shy, Quan-Shy CORRECTS

- Housesoing Dogsing TEACHES

- Unimpring Quan Shy Shy Shy Cornel of Innee!

- Unimpring Quan Shy Shy Shy Cornel of Innee!

- Oreasing Breasing Shy Shy Cornel of Shy Quantity Cornel of Shy Co

FREE catalog From \$25 to \$175

DOG-MASTER SYSTEMS 6116 Wilshire, Box 250, Agoura Hills, CA 91301 or Call (800) 824-7888 - Ask for operator 656 6116 Wilshire, Box 250, or Call (800) 824-7888 -

## BE A

You'll enjoy your work as a Locksmith because it is more fascinating than a hobby—and highly paid besides! You'll go on enjoying the fascinating work, year after year, in good times or bad because you'll be the man in demand in an evergrowing field offering big pay jobs, or big profits as your own boss. What more could you ask! Send for Free Booklet.

TRAIN AT HOME— EARN EXTRA \$55 RIGHT AWAY!

#### LOCKSMITHING INSTITUTE

Div. Commercial Technical Institute 1500 Cardinal Drive, Dept. 110-116, Little Falls, N.J. 07424

Name	- AND ROLL OF THE PARTY OF THE
Address	(Please Print)
City, State, Zip	

#### ULTIMATE RADAR MOUNT!

MIRADAR READYIII MOUNT, Featured in P.M.

End damage to dash • Eliminate inconvenient visor mount • Adjustable Plexiglas design custom fits any vehicle • Position at eye level for optimum visibility • Detector easily separates from mount for out-of-sight storage and portability • Two sizes to fit any detector • When ordering specify size E (Escort\* & all detectors over 3-½" wide) or size P (Passport\* & all detectors under 3-½" wide) Also state either A1 (auto, mini-van, mini-truck, motorcycles) or T1 full-size truck, van or RV) Mount \$19.95 •

#### IIIIRADAR READYIIII " COIL CORD

Neatly & conveniently powers your detector. Three adaptajacks custom fit most any detector. Fused end safeguards your detector. Stretches to over 5 ft. & returns to original size. Specify RC1. Coil cord \$14.95. If unavailable from your local dealer, order direct.

MONEY BACK GUARANTEE • All orders rushed out. • Send \$2 postage & handling per order. For 2-day delivery add \$2.00.

NOB INDUSTRIES, Box 43444-P, Tucson, AZ 85733 • 1250 E. Halcyon, Tucson, AZ 85719 Orders: 800-233-6666 (wait for tone, dial #, then 662) Inquiries & Dealers (602) 887-1470

## opular Jechanics LAN



Barn/Garden Shed Our well-designed yard building provides handsome storage for yard tools, hand tools, power equipment, gardening supplies and a gardening center for the whole family. It also has an upstairs loft! Dim.: 12 x 16 ft. Plans, instruction manual & material list. (1 plan: PL-1278-\$10.50) (2 plans: PL-1278A-\$17.50)

Send your name and address with check or money order payable to POPULAR MECHANICS. Mail to: Popular Mechanics, Box 1014 Radio City Station, New York, N.Y. 10101



BUILD A CLASSIC THIS BEAUTIFUL <sup>1</sup>O SCALE, PEDAL DRIVEN, MANOGANY, 1928 MERCEDES ROADSTER WILL GIVE RECOGNITION TO THE BUILDER AND BEING JOY TO THE LOVED ONES FOR SECRETATIONS. FULL SIZE PLANS INCL ASSEMBLY IN-STRUC 514 KIT ORCL WOOD, WHEELS, STEER ING & PEDAL MECHANISM \$149 plus \$18 shipp FULLY COMPLETED CAR \$1499 plus \$19 chipping SEND CHECK OR MONEY ORDER TO: PENGUIN PRODUCTS, BOX 3428, PROV., RI 02909

#### Mason & Sullivan The Clockbuilders Choice

Send \$2 to receive a one year subscription to our 56-page color clockbuilding supply catalog. Includes clock kits, dials, movements, weather instruments, hardware, tools, books, and accessories.



			_
NAME			
ADDRESS			
CITY	STATE	ZIP	

#### Mason & Sullivan

Fine Clockmakers Since 1947 Dept. 1201. W. Yarmouth, Cape Cod, MA 02673.

## Popular Mechanics

### **BOOKSTORE** OF HOW-TO INFORMATION

Auto Repair Manual '80-'86 Covers more than 1,900 domestic car models, with over

55,000 essential service specs and repair facts and 2,500 diagrams,

cutaways and quick-check spec charts. Updated section on fuel and ignition systems for the do-ityourselfer. Considered the "Bible" of auto repair and maintenance. (B-1906-\$21.50)

TO ORDER Send your name and address with check or money order to: Popular Mechanics, Box 1014, Radio City Station, New York, NY 10101. Please specify the proper "B" number.

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

© 1985 The Bearst Corporation. All rights reserved.



ing charts, tuneup specs for U.S. and import cars, and a glossary of car care terms. Includes sections on preventive maintenance, fuel, starting and cool-

ing systems, brakes, tires, and air conditioning. (B-1901-\$16.95)



Tuneup & Troubleshooting Newly revised with over 700 illustrations. Valuable information on tuning your engine, including spark plugs, breakerpoint ignitions, compression and vacuum service and lubrication. Specs on most U.S.

models and popular imports made between '80-'84. (B-1902-\$14.95)

Bodywork & Painting Color photos, diagrams and instructions tell you how to eliminate rust, fix dents, spray paint, repair grills and bumpers, keep interiors clean and bring out your car's lustrous shinewithout expensive



equipment. (B-1903- \$19.95; B-1903A (paper)-\$12.95)

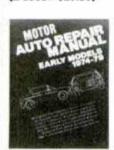


Imported Car Repair Manual '79-'85 Comprehensive information on cars by 28 foreign manufacturers. Over 1,300 pages. Covers all areas including cooling, electrical and exhaust systems. brakes, steering, sus-

pension, ignition and transmission. (B-1904-

Light Truck & Van Repair '79-'85 1,200 pages of information on AMC, Chrysler, General Motors and Ford trucks and vans. 2,000 illustrations plus step-by-step instructions for the tuneup and care of engines, brakes, suspension, and more.

(B-1905-\$27.50)



ing and transmission.



Auto Repair Manual '74-'79 A handy reference of facts gathered from over 300 factory manuals for domestic cars. More than 1,000 illustrations and data on such areas as electrical, fuel and cooling systems, suspension, brakes, steer-

(B-1907-\$22.00)



Boatkeeper Keep your boat ship shape. This book covers all areas of

maintenance, repair and improvement for both power and sailboats. Includes electrical systems, anchoring gear, tools, cabin comfort and sealants and adhesives. From the boating columns in Motor Boating and Sailing. (B-1909-\$17.95)

Boatman's Handbook A complete guide to such important boating topics as safety, seamanship, emergencies, weather and piloting. Plus you get listings of boating organizations, schools, regulations by state, sources for publications and

> documents and more. (B-1908-\$10.95)



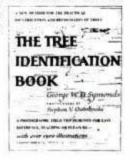
## The Guide to Self-Sufficiency

Guide to Self-Sufficiency Learn to be totally self-sufficient. Find

and prepare your own food, raise farm animals, brew beer, thatch a roof, create your own electricity, tan a hide and much more. Over 600 two-color illustrations and step-by-step instructions show you how. (B-1912-\$10.00)

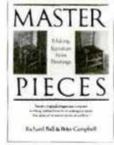
The Tree Identification Book Ever wonder about that tree in your front yard? Or what your oak table looked like before the wood was cut for lumber? This book, with over 1,500 illustrations, takes you on a nature walk to identify the shape,

leaves, bark, and branches of more than 100 trees. (B-1913-\$10.95)





of art to life by building the furniture they depict. This book has designs and complete instructions for re-



creating furniture that appears in 20 classic paintings-among them, Van Gogh's "Chair and Pipe" and Picasso's cubist "Still Life on a Sideboard." Beautiful color reproductions. (B-1910 -\$22.95)

PM Indexes for the years 1975-1985 are here!

ORDER BY YEAR! PRICE for each index is \$2.95.

# 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.

With every order you will receive FREE self-adhesive labels covering the years 1975 through 1986. Peel off the year required and place on appropriate PM File Box and you'll have a very valuable, convenient and attractive reference library.

1 File Box, \$2.95 2 File Boxes, \$2.75 each 3 or more File Boxes, \$2.50 each

#### PM Indexes for the years 1975-1985 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.

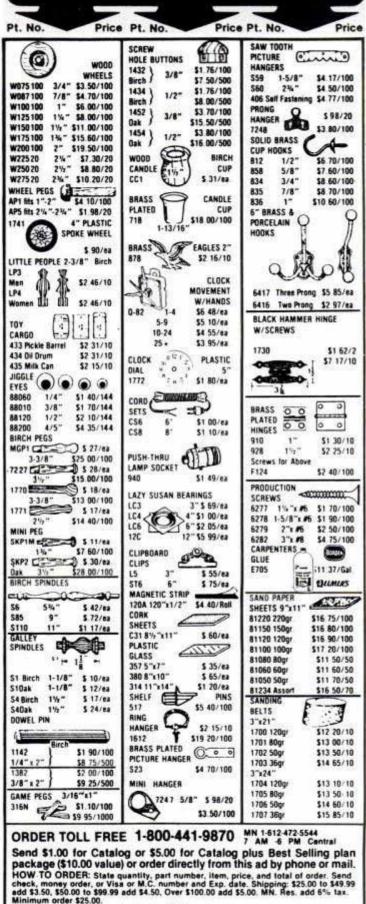
ORDER BY YEAR! Price for each index is \$2.95.

#### **POPULAR MECHANICS**

Box 1014, Radio City Station, New York, NY 10101

Popular Mechanics is a publication of Hearst Magazines, a Division of the Hearst Corporation

## WOODWORKERS HARDWARE WHOLESALE ORDER FORM



Please send me: Catalog \$1.00 Catalog and Plan Package \$5.00

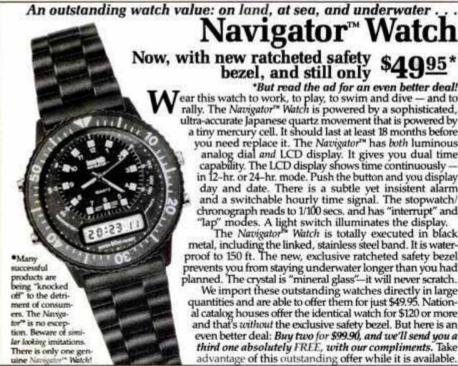
Print Name \_\_\_\_\_\_Phone # ( )\_\_\_\_\_\_\_

Address\_\_\_\_\_\_\_

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

MEISEL HARDWARE SPECIALTIES

Box 258 P 12 Mound, MN 55364



FOR FASTEST SERVICE, ORDER TOLL FREE (800) 431-9003 24 hours a day, 7 days a week

Please give order #1015B688. If you prefer, mail check or card authorization and expiration date. We need daytime phone for all orders and issuing bank for charge orders. We cannot ship without this information, UPS/insurance: \$5.95 for one Navigator\*\* Watch, \$6.95 for three. Add sales tax for CA delivery. You have 30-day return and one year warranty.

Navigator™ Watch Now, with new ratcheted safety \$4995 bezel, and still only

\*But read the ad for an even better deal! Vear this watch to work, to play, to swim and dive — and to rally. The Navigator Watch is powered by a sophisticated, ultra-accurate Japanese quartz movement that is powered by a tiny mercury cell. It should last at least 18 months before you need replace it. The Navigator\*\* has both luminous analog dial and LCD display. It gives you dual time capability. The LCD display shows time continuously — in 12-hr. or 24-hr. mode. Push the button and you display day and date. There is a subtle yet insistent alarm and a switchable hourly time signal. The stopwatch/ chronograph reads to 1/100 secs, and has "interrupt" and

"lap" modes. A light switch illuminates the display.

The Navigator" Watch is totally executed in black metal, including the linked, stainless steel band. It is water-proof to 150 ft. The new, exclusive ratcheted safety bezel prevents you from staying underwater longer than you had planned. The crystal is "mineral glass"-it will never scratch.

We import these outstanding watches directly in large quantities and are able to offer them for just \$49.95. National catalog houses offer the identical watch for \$120 or more, and that's without the exclusive safety bezel. But here is an even better deal: Buy two for \$99.90, and we'll send you a third one absolutely FREE, with our compliments. Take advantage of this outstanding offer while it is available.

> Note: For quantity orders (100+) with your company logo on the dial, call Mr. Gerard at (415) 543-6570 or write him at the address below.

131 Townsend Street, San Francisco, CA 94107



There's never been a towel dispenser designed absolutely to meet the needs of the handyman. Until Grab-a-Rag. Because Grab-a-Rag has a unique, unbreakable dispenser that can take a beating and last for years. And no moving parts that can jam or foul up. Yet it's easy to install. By your workbench, in the garage, in the dark room. Anywhere you work, it works. The tissues are top quality, tough, stronger than paper towels. More economical than rags. They absorb grime, grease and oil, no problem. Its one-towel-at-a-time operation means you cut wastage, and remaining towels stay clean inside the barrel. You get over 800

towels before a refill. And refilling is a snap.

Call Toll Free: 1-800-442-6199 in Mass. Or 1-800-227-1449 elsewhere.

Between 8 a.m. - 5 p.m. E.S.T. — — — — — — — — — —



Mail to: Jayco Enterprises Inc. 6 Kiddie Drive Avon, MA 02322

		on Grab-a-Rag. Please
		payable to Jayco Enter-
prises Inc.	for (number)	of Grab-a-Rag(s) at
	tal enclosed \$	Bill my card
	sterCard 🗌 Acct.#	
Exp. date _	(mo.)	(yr.)
Name		
Address		
City	State	7in

Satisfaction guaranteed or full refund. Please allow 3 weeks for delivery.



**Authorized Liquidator** 

#### GENERATORS



Now you can enjoy money-saving prices on these powerful energy sources. Manufacturer's overruns at FAR BELOW dealer cost! For camping, home emergency use or commercial use. Provides power for lights, sump pump, power tools, furnace, etc.

> Limited Factory Warranty. One-Year on Parts & Labor.

1,200 Watt Continuous Duty RECOIL START GASOLINE Compare At: \*695.00 . Item H-1511-5477-005 Ship, handling: \$18.50

2,500 Watt Continuous Duty RECOIL START GASOLINE Compare At: \$845.00 . .

Item H-1511-1043-314 Shipped freight collect

4,000 Watt Continuous Duty RECOIL START GASOLINE Compare At: 1925.00 . . .

Item H-1511-1043-355 Shipped freight collect

4,000 Watt Continuous Duty **ELEC. START GASOLINE** Compare At: '1100.00 .

Item H-1511-1043-371 Shipped freight collect

4,000 Watt Continuous Duty **MULTI-FUEL ELEC. START** Compare At: \$1195.00 . .

Item H-1511-1043-348 Shipped freight collect

Credit card cust	omers ca	n order by	phone,
24 hours a day, 7 days a week.	VISA	Manufact and	(M)408/71 (804)48

Toll-Free: 1-800-328-0609

Sales outside the 48 contiguous states are subject to special conditions. Please call or write to inquire.

C.O.M.B. Direct Marketing Corp. Item H-1511 1405 Xenium Lane N/Minneapolis, MN 55441-4494

Item No.	#	Item	Price	S/H
		-05-10	1	
(Minnesota residents orders.)		sales tax. S		

My check or money order is enclosed. (No delays in processing orders paid by check.)

Charge: ☐ VISA® ☐ MasterCard® ☐ American Express®

Acct. No. PLEASE PRINT CLEARLY	Ехр	_
Name		_
Address		
City		

Sign Here Direct Marketing Corp.

**Authorized Liquidator** 1405 Xenium Lane North Minneapolis, Minnesota 55441-4494

## CLASSIFIED ADVERTISEMENTS

Sophie Gronowicz, Classified Sales Manager Dorothy Nolan, Classified Service Manager Rate: \$6.70 per word payable in advance each insertion. Minimum insertion ten words. Bold face capitalized words—\$1.00 per word additional (First word set in Bold Face at no extra charge, Zip Code Free.) Centered Headlines in All Bold-Face Letters—\$45.00.

The next available issue to place an advertisement in America's No. 1 Classified Section is JANUARY. The closing is NOVEMBER 5th.

Send remittance payable and order to Popular Mechanics, Classified Department, 224 West 57th Street, New York, New York 10019.

Please indicate Heading under which ad is to appear. As a consumer service and in cooperation with our mail-order advertisers who use post office box addresses for their convenience in handling your order, Popular Mechanics maintains a register of such mail-order advertisers containing their complete names and street addresses.

Advertisers using P.O. Box number must furnish complete name and street address for our records.

To avoid delay in the publication of your ad, please send samples and descriptive materials with your request if your ad does not state clearly what is being offered.

#### PLEASE NOTE: WE HAVE 142 CLASSIFICATIONS TO CHOOSE FROM. FOR OUR LIST WRITE TO ADDRESS ABOVE AND REQUEST OUR ORDER FORM.

#### PUBLISHER'S MART BOOKS & PUBLICATIONS

PUBLISH your book! Join our successful authors. All subjects invited. Publicity, advertising, beautiful books. Send for fact-filled booklet and free manuscript report. Carlton Press, Dept. PM, 11 West 32 Street, New York 10001

TOP SECRET The Story of the invasion of Japan. The biggest invasion of all times. Who would have gone. What it would cost. From recently declassified documents. Devastating reading. Keepsake booklet. \$6.00. Ranger Publications, P.O. Box 1355, Dept. PM. Omaha. NE 68101

GET BIG SSS FROM YOUR AUTO ACCIDENT. New book on How To Settle Your Auto Accident Case without hiring a lawyer. Send \$15 to: Rugby Hall Books, Box 2699, 6660 Dobbin Road, Columbia, MD 21045. (301-381-2999) moneyback guarantee.

BIG DOLLARS! Learn CONSIGNMENT Business. \$15.95. O'Connell, Bethlehem, CT 06751-0123

JOIN WINNERS CIRCLE Free Brochure, R. L. Tucker Specialities, P.O. Box 241182, Indianapolis, IN 46224

STOP SMOKING PAINLESSLY! Guaranteed. \$5.00 Surprise Bonus Gift Included. Smoking-1, 1211 South University, Denver, Colorado 80210

COMPLAINER'S HANDBOOK \$3.00 refundable. 3D Press, Box 687, Broadway, VA 22815

GUARANTEED! STOP WASTING MONEY! Best terms nationwide on Mastercard/Visa! Send \$4.95 NOW! Credit Research, Box 14408, Arlington, TX 76094-1408

HOW TO OPERATE Exciting Business At Home On Shoestring-Free Details. CJC Publishing, 19A Roslyn Drive, Glen Head, New York 11545

WRITERS, PHOTOGRAPHERS, ARTISTS—Make Money in greeting cards. Send two 22c stamps: Greetings!, Box 521PM, Cleveland, Ohio 44107

GANAGOBIE 03-05, the Amazing Homebuilt Aircraft. On display EAA Museum. New detailed set of 24 plans. Designed to meet N.A.S.A.D. requirements. Information Brochure with Free Color Book on New Zealand: \$15.00 including air mail. Write to: A.R.D.C. of New Zealand, P.O. Box 4123, Palmerston North, New Zealand.

BE A FINANCIAL PLANNER. Prepare your Financial Plan and prepare others for a handsome fee. New book gives all details. Guaranteed Satisfaction. \$10.00 to: Financial Associates, P.O. Box 1044, Orem. Utah 84057

1001 Things Free; Guaranteed. Send \$2.00 to: Books, Dept. 11A, 6089 Kathie Ct., Ellenwood, GA 30049

CUT YOUR ENERGY BILL 30 TO 50%. Satisfaction Guaranteed. The Galaxy Co., Box 7051, Washington, D.C. 20032

PLUMBING illustrated home plumbing guide shows how to repair and build home plumbing systems. Send \$7.35 to; Best Gifts, 114-41 Queens Blvd., Suite 182, Forest Hills, New York 11375.

"DRIVING SELF DEFENSE" Learn the secrets of perfection. Discover how driving under any weather/road/traffic conditions can be pure joy and safe too. Over 100 pages of expert guidance, advice, tips. A must for every driver regardless of experience, an invaluable tool for all would-be drivers. The best gift for any family member or friend. Money back guarantee. Only \$10.00 (check, money order). Eitas Publishing Co. Inc., 47-21 41 Street, Dept. B, L.I.C., New York 1104 GAIN Wealth And Happiness. Fifteen Proven Formulas For Getting People To Say Yes To You And Your Product. Write: M & M Enterprises, 4248 Highland, Downers Grove, IL 60515

MAKE Money Now! Work Home! Book Reveals Secrets! \$2.00 Order Today! SASE. Choices, Box 739, Tomball, TX 77375.

OF ANCIENT SECRETS & MAGICAL HERBS...25 astonishing, often incredible items. Great new gift portfolio... Full money back guarantee... ALL for just \$9.95?! Neb One Ltd., Box 92176, Milwaukee, WI 53202

"THINK And Grow Rich" or "Your Subconscious Power" \$3.50 plus postage \$1.00 each. Send check. Johnson Enterprises, Bump Gate Road, Rt. 2 Box 6709, Pipe Creek, TX 78063

READ about starting a profitable business, \$10.00. Canadian funds. Send money order to: André Morin, 3725 Dupuis Ave., Apt. 17, Montreal, P.Q., H3T 1E5, Canada.

#### CATALOGS

LEATHERCRAFT CATALOG. 100 pages. Largest selection available of genuine leathers, tools, kits, books, supplies. Upholstery, utility leathers, garment leathers, suedes, exotics. Belt, wallet, moccasin kits and more. Send \$1.00 pstg/ftdlg to: Tandy Leather Company, P.O. Box 2934, Dept. PM1186C. Fort Worth, TX 76113.

BOOMERANGS—INCREDIBLE RETURNS! Unique Sport ... Today's Exciting Hobby! FREE 10th Anniversary Catalog. World's Best! BoomerangMan, 1806-1 N. Third, Monroe, LA 71201-4222

DETECTIVE SPECIAL. ELECTRONICS, BOOKS, WEAP-ONS, & MUCH MORE. SIXTY-FOUR GIANT PAGES ONLY \$25.5 GUARANTEED AMERICA'S BEST SELECTION OR DOUBLE YOUR MONEY BACK. HUNT-EX, BOX 12922, WINSTON-SALEM, NC 27117.

GADGETS and GIZMOS, order your catalog today! Send \$1.00 to: Hi-Tech Electronics, P.O. Box 1858, Hialeah, FL 33011

HARDWOOD SWINGS, HAMMOCKS, CHAIRS Catalog \$2.00. Arlene's, Box 73804, Puyallup, WA 98373

BUY KNIVES, CUTLERY ITEMS at wholesale. Save up to 60%, Huge Selection, Satisfaction Guaranteed, Fast Service. Catalog \$2.00 First Class. Smoky Mountain Knife Works, Box 714PM, Sevierville, TN 37862.

APPLIANCE PARTS Save Up To 50%, Free Catalog GE, Hotpoint, Whirtpool, Kenmore, Berube Appliance Parts, 506 Main Street, Van Buren, ME 04785

DEPRAVED Technologies, SPACE age gadgets, software Catalog \$3.00. Box 11487, Chattanooga, Tennessee 37401

FREE 72 page Full Color Seed and Nursery Catalog. Jung. Dept. 119, Randolph, WI 53957

TWO FREE GIFTS1 With Each Big. Color, Wholesale Catalog Ordered! \$3.00 Refundable. Quicksilver Marketing, 611-14 Eaglescrest Village, Roswell, GA 30076

SECURITY. Catalog of unique items. Valley Forge Sentry, P.O. Box 205, King of Prussia, PA 19406

FREE Catalog of Gifts. Knight. 1011 Birch, Morgan City. LA 70380

#### PORTER'S FREE PHOTOS/VIDEO CATALOG BEST IN THE INDUSTRY

OVER 4,000 products - Brand names, many unique and unusual Items, discount prices and Fast service. For your Free copy write: Porter's Camera Store, Inc., Box 628, Dept. PM, Cedar Falls, Iowa 50613 or phone: 1-800-553-2001. LOVE, Financial Success, Family Christmas Gifts. FREE Catalogs. Fain's Gift Shoppe, 213 Wedgewood Drive, Jamestown, N.C. 27282.

#### CHRISTMAS GIFT SHOPPING

CHRISTMAS GIFTS SHOP EARLY, Catalog \$1.00 Refundable First Purchase. T. Brown Co., 1040 SE. Oak St., Albany, OR 97321

GUIDE TO ANTIQUES 690 illustrated pages, 50,000 prices, a must for collectors \$12.96 to: Wainscott's Sales, Hwy. 227 pmc, New Liberty, Kentucky 40355. Satisfaction Guaranteed.

IDEAL GIFT - PERSONALIZED PLAYING CARDS - 2 Decks - \$16.95 Postpaid - Free Sample - Klein, 438 Albemarie, Cedarhurst, New York 11516

COLOR CATALOG, \$1.00, Refundable, Satisfaction Guaranteed, Distinctive Gifts, 3002 Duck River Ct., Midlothian, VA 23113

ANTIQUE GUIDE. Over 50.000 current prices. Fully litustrated. A must for antique shows and flea markets. \$10.95. The Mail Box, 1045 Savannah St., Toms River, NJ 08753

HAND MADE CIGARS Finest Imported Gift EUROCARIBE, P.O. Box 55-8746, Miami, FL 33255

WRIST FLAME Digital Watch With Refillable Butane Lighter, Free Details, Mountain Merchandising, P.O. Box 301, Caro, MI 48723.

SWISS COMPASS WATCH and Diver's watches. Free brochure: ProSpec, Dept. C62811, P.O. Box 1000, Kings Park, NY 11754

FREE GIFTS - HUGE DISCOUNTS - FAST SERVICE!

Personafized selection. For FREE INTRODUCTORY GIFT + Gift Catalog send \$2 to: Foster Mail Order Assoc., 1207 8 Avenue, Brooklyn, NY 11215

#### NO-RUN PANTYHOSE!

GUARANTEED 28 colors sheer \$3.99.\$4.69; Ultrasheer \$4.99.\$5.69. F. Fox, 511 Camelot, College Park, GA 30349

GERMAN-CRAFTED, SIX-IN-ONE SCREWDRIVER. Our most popular tool for the home handyperson - insulated, magnetic, bit locks instantly. Satisfaction guaranteed. Only \$18.95, shipping \$2.00. New Jersey/New York add Sales tax. Robert Mink Import-Export, Box 6437N, Fair Haven, New Jersey 07701.

SPECTACULAR SAVINGS UP TO 40%! Off purchases with our exclusive co-op membership! \$10,00. Over 3,000 items at wholesale! Satisfaction guaranteed! Everyday Enterprises, Dept. PM, 2904 South 13 Street, Milwaukee, WI 53215

CLASSIC 1910 BASEBALL CARD Genuine Turn-Of-Century Tobacco Issue. Mounted in Protective Plastic Holder. Baseball History Included. Great Christmas Gift! \$13.95 Postpaid. Satisfaction Guaranteed! 2 Weeks Delivery. Kalathakis, 41 N. Bergen Place, Freeport, New York 11520

SHOPPING made easy, good merchandise in time for christmas. Inquiries free. TERRY'S CORNER, 701 West Main St., Halls, TN 38040

IT'S EASY, You Save! Over 500 Gift Ideas. Free Catalog. Crossroads Gifts, 205 South Beaver, Oberlin, KS 67749

FREE NEW CATALOG. Joseph Gifts, Inc., Rt3, Box 192PM11, Fairfield Bay, AR 72088

FREE Gift Catalog. Riverside Gifts 28 Morwood Ln. H. St. Louis, MO 63141

GOLD GOLF TEES. 10 tees plated in 24K gold. Sent in pouch with your initials. A great gift. Specify initials. \$7.95. The Mail Box. 1045 Savannah St., Toms River, NJ 08753

(Continued on next page)
Материал, завищенным авторским правом

#### CHRISTMAS GIFT SHOPPING

(Continued from preceding page)

MAKE It A British Christmas! Free Catalogue. Cornish

COLORFUL PONCHOS, VESTS, VARIETY GIFTS! FREE BROCHURES! Midland Mail, 103/PM Godwin, Midland Park,

FREE color giftware catalog. Gifts By J&J, 21001 N.W. 27th Court, Carol City. Florida 33056

#### **AUTOMOBILES**

IS IT True You Can Buy Jeeps for \$44 through the U.S. government? Get the facts today! Call 1-312-742-1142 Ext. 7133

OLD CAR FANS - subscribe to HEMMINGS MOTOR NEWS, world's largest old car marketplace. Hemmings has over 500 pages of adseach month, crammed with thousands of old cars & parts for sale. Only \$16.75 for 12 giant issues. Subscribe to the "bible" of old car collectors today. Send to: Hemmings Motor News, Dept 6N18, Box 100, Bennington, Vermont 05201. Order Toll Free 1-800-228-2028 ext. within Nebraska dial 1-800-642-8300 Visa Mastercard Only.

FREE AUTOMOTIVE SECURITY CATALOG: Largest selection available. Do-It-Yourself. Pagers, alarms, hood locks, glass detectors. Allow 4 weeks. Immediate Delivery. Send \$1.00. Automotive Security Equipment, Dept. 2, P.O. Box 382, Plainview, New York 11803

MONEY for discarded auto part. Details: EssarPMcc, Box 962. Giendale, CA 91209

200 MPG CARBURETORS: FACT or FRAUD? Do they exist? Complete SPECIAL REPORT gives test results, diagrams, specifications. ORDER TODAY. Send \$6.00 to: TDC, Dept. 1186A, 304 San Miguel, St. Charles, Mo. 63303. UNCONDITIONAL MONEYBACK GUARANTEE.

FIND Automotive Electrical problems easy. Instructions \$5.00 plus \$1.00 shipping. Topic, Box 13262, Arlington, Tex. 76013. 10 day guarantee.

MUSICAL CAR HORN 80 Tunes Originally Sold For \$89.95 Now \$19.95 Shipping Included, Send Check, Money Order, Visa/MC Number & Expiration Date - T.C. TECH, Box 610807, Dallas, Texas 75261-0807

SPECIAL Report tells how to buy a car, drive it for a year, then sell it for more than you paid for it. Money back guarantee. Send \$5.00 to: Independence Press, Box 4995, Englewood, CO 80155

NEW CARS! \$50 to \$125 over dealer cost, Guaranteed! Instructions \$4.00. Informart, Box 2453, Owensboro, KY 42302

#### **AUTO SUPPLIES & EQUIPMENT**

ALTERNATOR Generator Rebuilding Book, Price Hedelund Engineering, Box 26024, Las Vegas, NV 89126.

PARTS: Army Jeep and truck parts. Spare Parts & Equipment Co., P.O. Box 751, Lexington, Kentucky 40587-

MICRON Ring Valve Job. Guaranteed while Driving \$14.95 two \$25.00 Postpaid. Harvoo, 1492 West Alameda Avenue, Denver, Colorado 80223

**NEW PRODUCT FROM EUROPE FOR MOTORISTS!** The ested "HOBI" Game Warning Device stops animals before they get in your path. For information call 1-800-772-8094

AUTO Mats, Buy Wholesale and Save. For Samples and Price List Send \$3.00 To: Leisure Accessories, P.O. Box 3033, Dalton, GA 30721-0033

AUTOMOTIVE air conditioning parts discount prices: Catalog \$2.00. Auto Air Supply, 832 W. Court, Seguin, Texas

COOL TRUCKIN - Sunbusters pre-cut window tinting kits. 714-786-5461. One Spring Buck, Irvine, California 92714

GET Maximum Battery Performance With Biolyte, Proven by researchers, independent laboratory studies and five years of field testing, Biolyte guarantees less maintenance and extended life, reduces heat thereby increasing safety and is corrosion free. With one-time application, get the future of battery technology . . . today! Send \$14.95 in check or money order to: BIOLITE, INC., P.O. Box 3565, Houston, Texas 77253-3565

ROADSIDE EMERGENCY SUIT. 1-pc yellow or 2-pc white coverall. Slip on for roadside auto repair or any messy project. Protects your clothing and could save your life. Sizes S-M or L-XL. Send CK or MO for \$11.95 plus \$1.00 P&H to: Brill West Specialties, Dept. PM116, 2010 NE 19th, Gresham, OR 97030. UNCONDITIONAL MONEY BACK

UNIVERSAL seals fit most miniature trolley jacks from Taiwan since 1980. \$15.00 includes oil, instructions, shipping. Hydraufic Service, 2005 Kentucky, Bellingham, Washington 98226

PRIMARY wire 100 ft. rolls 18 to 10, gage \$2.00 to \$8.00. Champ, 14901 1/2 Verdura Ave., Paramount, California 90723.

MOTALOY ring valve job while driving. Guaranteed. \$10.00, two \$18.00. Postpaid. Andris. Box 34081, San Francisco, CA 94134. Dept. A

NEW At Last, Important Information To Help Save Or Even Prevent Ring, Valve Job. Money Back Guarantee Rush \$3.98. Midwest, 11691AJF Long Street, Bowling Green, Ohio 43402

TUNE YOUR Own CAR At Home Using Our NEW VIDEO CASSETTES, No Experience Needed. Detailed Procedures Explained By Factory Trained Mechanics. INDIVIDUAL Tapes For Most Foreign And Domestic Cars MONEY BACK Guarantee \$39.95-\$49.95. 1-800-423-4551 extension 903.

#### **BICYCLES, SUPPLIES**

HI-TECH WAX LUBRICATING SPRAY, Ideal for bicycle chains, sail masts, guns, etc. Clean, dry, non-staining, corrosion protective, dirt resistant. LUBE-WAX 6 Ounce Aerosol \$6.95 Prepaid. Olympic, 22627 85th Pl. So., Kent, WA

#### **MOTORCYCLES, MOTORSCOOTERS &** SUPPLIES

GO KARTS, Minibikes. Atv's. Kits, Parts, Engines. Lowest rices. Largest Selection. 72 Page Catalog \$3.00. lefundable. Kart World, Dept. C., 1488 Mentor Ave., Refundable. Painesville, Ohio 44077

MINIBIKE Kits-\$49.00. Go-Karts, Frames, Engines, Wheels, Clutches, Tires, including AMF and Universal Moped Parts More Parts-Reduced Prices. 1986 Wholesale Catalog-\$2.00. Go-Karts & Kits, P.O. Box 548, Closter, NJ 07624-0548

#### AVIATION, HANG GLIDING

DESIGN-Build Airplanes, Hang Gliders Simplified publications brochure 25c. McCoy Aircraft, Suite 243, Box J. Manhattan Beach, CA 90266

WICKS AIRCRAFT SUPPLY Homebuilders Catalog \$5.00. Tubing, Composites, Hardware, 800-221-9425.

#### SPACE & ASTRONAUTS

NASA emblems, toys, gifts, collectibles. Catalog \$1.25. Refundable, Collector Trends, Box 361, Dayton, Ohio 45409

FREE Space Shuttle Catalog, patches, calendars, T-Shirts, caps. AMLA Enterprises, P.O. Box 2181, Merritt Island, FL

#### HOVERCRAFT

HOVERCRAFT Plans All Sizes. Catalog \$1.00. Universal Hovercraft, Box 281, Cordova, Illinois 61242

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. \$10.95. Aero-Projects, Box 5118PM, Clinton, New Jersey 08809.

HOVERCRAFT PLANS & PUBLICATIONS Catalog. \$1.00. sing Aero-Marine, P.O. Box 27655, Lansing, Michigan 48909

VW HOVERCRAFT Information \$10, Plans \$25. Neoteric, Box 2438, Melbourne, Australia, 3001

ADVANCED "Ultralight Hovercraft" unique controls, simple operation, quiet, versatile and safe, infopack \$6.00, Write: ULH, P.O. Box 478, Carleton Place, Ontario, Canada

#### CB'S, RADIO & HAM EQUIPMENT

POLICE Scanners, Bearcat, Regency, HPR, Box 19224, Denver, CO 80219

CB MODIFICATIONS! Frequencies, sliders, FM, amplifiers, books, kits, repairs, high-performance accessories. Catalog \$2. CBCI, Box 31500M, Phoenix, AZ 85046

CB MODIFICATIONS! Linear Planbook, Kits \$1.00 refundable. APS, POB 263, Newport, RI 02840, 401-846-5627

LINEAR AMP PLAN, \$5. Plan, 5838 Willowcrest Drive, Pinson, AL 35126.

#### **ELECTRONICS**

BUGGED? WIRETAPPED? Find fast Countermeasures equipment catalog \$1. Capri Electronics. Route 1P, Canon, GA 30520.

FREE Electronic Discount Journal, Major Name Brands. Henry's, 100 North Fourth, Newport, PA 17074-1105

ELECTRICITY From sound, kit \$5.00. Skye Groves, Box 14, 29 Oakford Ave., Richwood, WV 26261

#### **COMPUTERS & SOFTWARE**

TI-99/4A Software/Hardware bargains. Hard to find items. Huge selection. Fast Service. Free Catalog. Dynamic, Box 690, Hicksville, N.Y. 11801

IBM-PC Games. 40e each. SASE for list. ALT/CTRL. Software, 686 Longbrook Av., Stratford, CT 06497

#### CALCULATORS

FREE CALCULATOR c/o Box 3776, Vancouver, BC, V6B 3Z1. Send \$2 postage and handling.

#### STEREO, CASSETTE TAPES, ETC.

THOUSANDS OF OLDIES! Hard-to-find 45rpm hit records from the last 40 years including pop, country, rock and soul. Send \$2.00 for catalog to: American Pie. P.O. Box 66455, Dept. PM, Los Angeles, CA 90066

SANYO component system 100-watts amplifier, 5 band equalizer. AM/FM stereo digital turner 12 station pre-set. dual cassette deck with dolby and Hi-speed dubbing, turntable 3-way speakers, glass rack. \$549.90 Free Postage, sended to, C.A. Lewis, P.O. Box 395, N. Myrtle Beach, South Carolina, 29597

#### TV & VIDEO EQUIPMENT NOTICE: USE OF CERTAIN ITEMS IN THIS CLASSIFICATION REQUIRES STATION

AUTHORIZATION.

VIDEO MOVIES. Tremendous selection! Giant catalog \$3.00. Tower, Dunkirk, MD 20754-0213

RADAR DETECTORS-VCRs WHOLESALE, All brands, (No Escort/Passport), FREE Delivery, NO TAX. We're Video Specialists, check our prices! 1-800-344-7123

CABLE TV CONVERTERS. Guaranteed lowest prices in U.S. Jerrold, Hamlin, Zenith--many others! Lowest dealer pricest Orders shipped within 24 hours! MasterCard—Visa— C.O.D. accepted. Free catalog—call (800) 345-8927 only! Pacific Cable Co., Inc., 7325½ Reseda Blvd., #118, Reseda, CA 91335. All other information, call (818) 716-5914.

DISCOUNT CATV Converters/Decoders And Video Accessories. Free Information. Easy View, P.O. Box 221M, Arlington Heights, IL 60006. (312) 952-8504.

CABLE TV CONVERTERS. Scientific Atlantic. Jerrold. Oak, Zenith, Hamlin. Many others Visa & MC Accepted. Toll Free 1-800-826-7623. B&B Inc., 10517 Upton Circle, Bloomington, MN 55431

#### CAMPERS & TRAILERS—KITS, PLANS

BUILD YOUR OWN - Travel Trailer - Fifth Wheeler Motorhome - Camper - Pickup Cover - Plans - Patterns - Kits -Catalog \$1 - Glen-L. R-V's, 9152PM Rosecrans, Box 756. Bellflower, CA 90706.

RV BUYERS, OWNERS, SELLERS. Know it like expert. Details. RV Clinic. Box 407, Sandwich, IL 60548.

TRAILERS. Specify 16' tandem utility 16' car carrier or 10' tilt, Send \$7.50 for plans and materials list to: Tri-add, Rt#3 Box 325, Sullivan, IL 61951

TRAILER plans and parts. Utility, equipment, boat, auto, recreational, TRUCKBEDS, custom designing. Information \$2.00. Nalu Engineering, Box 803, LaConner, WA 98257.

#### BOATS, OUTBOARDS, TRAILERS, & KITS

BOAT KITS - PLANS - PATTERNS - FRAME KITS - 200 Designs - 40th year - 8'/80' - Plywood - Fiberglass - Steel -POWERBOATS - Cruisers - Houseboats - Hydroplanes -Runabouts - Duckboats (Canoes Kayaks) - SAILBOATS -Daysailers - Trailersailers - Multihulis - Supplies - Epoxies -Polyesters - Cloth - Foam - CATALOGUE \$3.00 (Airmail \$5.00) (Book Amateur Boatbuilding \$6.75) CLARKCRAFT, 16-P Aqualane, Tonawanda, NY 14150

BOAT Plans - Patterns - Kits - Hundreds of designs - 71/551 -Sailboats - Powerboats - Sportfishers - Houseboats - Rowboats - Duckboats - Bassboats - Canoes - Kayaks -Hydroplanes - Dories - Boatrailers - Simple construction - Proven instructions - Tremendous savings! Gigantic 160-page catalog \$3.00 (\$4.00 Airmail) - Includes Free "Boatbuilding Supplies" catalog - Fiberglass - Fastenings -Glues - Books Revolutionary "Poxygrip Poxyshield" manual \$2.00 Glen-L, 9152 Rosecrans, Box 756MP, Bellflower, CA 90706

#### BOATS, OUTBOARDS, TRAILERS, & KITS

(Continued from preceding page

BOAT KITS - SAIL 16'-30'. FIBERGLASS. Save half. Anyone can assemble. FREE 40 page catalog. LUGER, Dept. BC-116, P.O. Box 1398, St. Joseph, MO 64502, 1-800-BOAT KIT in MO: (816)233-5116.

EVINRUDES - NEW 1985 BARGAINS - TOP BRANDS . . . all sizes ... \$2.00 handling ... Scott McCulloch parts Electra Marine, 610 Merrick Road, Lynbrook, New York 11563

SEA Eagle Inflatable Boats, Motors. Color Catalog \$2.00 Refundable. World Products, Dept. B, 1488 Mentor Ave., Painesville, OH 44077

FIBERGLASS boat building materials call or write for FREE catalog 1-800-237-9511 or FI. residents 1-800-282-9298. Suncoast Fiberglass, 28800 Palm Beach Blvd., Fort Myers, FL 33901

#### ATHLETIC EQUIPMENT AND BODY **BUILDING COURSES**

BIGGER, More Powerful Muscles - faster!! Free Bookiet! Universal, Box 6694A, Detroit, Michigan 48240

KUNG-FU Free Lessons. Send \$1.00 for Postage. McLisa. Box 1755, Dept. PM86K, Honolulu, Hawaii 96806

MUSCLES start in 7 days-Guaranteed! Hercules, 2830 Gaffey, San Pedro, Calif. 90731.

FITNESS CHARTS, \$1.00 Catalog. CHARTS, 7124 North

#### FISHING, TACKLE, LURES

FREE Sinker Mold Catalog over 100 molds 25 shapes. Carmen's, Box 220PM, West Newton, PA 15089

#### **GUNS, DECOYS, HUNTING**

BEER CAN MORTAR Shoots beverage cans hundreds of feet. Great for shotgun practice. Plans \$5.00. PSIDAC, 7326 Atlantic, Portland, Oregon 97217

FREE 1986 Catalog: Gun Chaps, Hunting and Archery Accessories. Kane Products, Dept. PM, 5572 Brecksville Rd., Cleveland, OH 44131.

**BEEMAN HIGH POWER ADULT AIRGUNS. Fine Firearms.** Magnum Slingshot. Guaranteed best prices for the very finest. Unexcelled power yes, but more importantly: unequaled accuracy, trigger action, durability, owner pride. \$1 Lifetime Repair Policy. Mention code PMC for FREE Airgun Catalog/Firearm information. Add \$1 for fast nan, 47-PMC Paul, San Rafael, Calif. 94903. (415) 472-7121, 24 hours.

#### **BATTERY REBUILDING SCHOOL**

TECHNICAL breakthrough in battery chargers-uses 1/2 the electricity compared to old type. Technical breakthrough in carbon pile testers-no burnout! Moore Tool & Cover Company, 10415 US 98, Sebring, FL 33870. 813-655-1616

#### **ENGINES, MOTORS**

SMALL ENGINES Galore! Free Discount Catalog. Engines, Box 166P, Ashland, MO 65010.

NEW Lightweight 8H.P. Engines \$99.00. U.F.M., 922D Industrial Lodi Calif 95240

POWERFUL MECHANICAL MOTOR operates on steam or compressed air - inexpensive - no lubrication - make air tools, convert cars, trucks, machinery to hydraulics - generate electricity - plans - 20 pages - become energy INDEPEN-DENT NOW - \$11.00 moneyback guarantee. Vibro, 12416 North 28th Drive, 18-276, Phoenix, AZ 85029

#### **TOOLS FOR SALE**

BOLTS, SCREWS, TOOLS, WHOLESALE, DIRECT. ed. Catalog \$1.00 (Refundable). Camelot, Dept. 44, Box 65 Bristol Wisconsin 53104

PRE-CHRISTMAS Sale! Order our \$15.00 permanent mag net with 150 pounds holding power and get our \$5,00 magnet for an additional \$2.00. 60% savings. Order now! Magna-Tech, 220 North Pennsylvania, Hobart, IN 46342

QUALITY Upholstery Tools and Kits for Home and Auto. holesale. Free info. write: The Little Furniture Shop, 3339 Chester Grove Rd., Upper Marthoro, MD 20772

FREE Brochure. TOOLS, KITS, FASTENERS. Guaranteed. National Mart. Dept. 220, 1-800-222-6969. Florida: 305-888 AR66

#### **UPHOLSTERY SEWING MACHINES**

UPHOLSTERY Sewing Machines with Walking Feet. Complete ready to use-only \$498.00. Thompson Model PW200-AVAILABLE FROM YOUR LOCAL DEALER, or order direct (Master Charge-Visa). Datho Mfg. Inc., P.O. Box 12110, Lubbock, Texas 79452-Phone: (806) 744-6774

#### **MACHINERY, TOOLS & SUPPLIES**

4" METAL Cutting Lathe \$104.50. Taig, 15048 Proctor, Industry, CA 91746

BEST Prices, Woodworkers Machinery Catalog, Free. McKilligan, PMC86, Johnson City, N.Y. 13790

SMALL FOUNDRY Furnaces, Supplies. Free literature. Pyramid Products, 3736 South 7th Avenue, Phoenix, Arizona 85041

Monthly "SHARPENERS REPORT" Sharpening Guidebook, Angle Wall Chart, Free details. Skog Company, Dept. PM11, P.O. 22559, Minneapolis, MN 55422

STEEL, Auminum, Brass-Sheet, Bar, Shop Supplies. Plans. Write: CEI, RR1, Box 163, Cameron, IL 61423.

BANDSAW BLADES, Any Size, Free literature. King Saw, 6541 Tidewater Drive, Norfolk, Virginia 23509

LATHES, Mills, Tools. New catalogs \$1.00. Blue Ridge, Box 536V, Hurricane, WV 25526. 304-562-3538.

LATHES - INDUSTRIAL/HOBBY FROM \$279.00. METALS, SUPPLIES. LARGE CATALOG \$1.00. CAMPBELL TOOLS 31st YEAR, 2100-D SELMA RD., SPRINGFIELD, OHIO 45505. 1-513-322-8562

BANDSAW BLADES any size. Free Information. Suffolk Machinery, Suite 8, 16 Shore Road, Patchogue, NY 11772

SHARPEN knives, scissors, saws, etc. Earn big dollars! Minimum investment. Free details. Moon's, Inc., 2539 N. Ashland, Dept. 11, Chicago, IL 60614

METAL CASTING Supplies. Books, sands, parting. Free Brochure. Stoane, Box 571P, Coraopolis, PA 15108

NEW SMALL FOUNDRY! DO METALCASTING YOUR-SELF! BUILD FOR UNDER \$50! MONEY MAKING TIPS. RUSH \$9.95 NOW FOR COMPLETE PLANS! T. BURKE, P.O. BOX 328. WESTERVILLE, OHIO 43081

#### **ENERGY SAVING**

CALLAHAN CATALYTIC STOVE DAMPER \$29.00 prepaid, FREE brochure. CALLAHAN, 2210 Washington Street, Port Townsend, Washington 98368

HEAT Pump Owners. Easy Way To Increase Efficiency. Free Brochure. Cool-Save, 5622 Maxine Ct., Alexandria, Virginia 22310

FRESH AIR HEAT EXCHANGER. Outdoor air replaces stale home air. Advanced design using inexpensive materials and sturdy permanent aluminum core, minimizes heat loss and operating cost. Plans \$10 Postpaid. Dept. AB. Suite 203, 2828 East 51st Street, Tulsa, Okla. 74105

THERMAL SHUTTERS decorate, seal, insulate windows, patio doors. Nite-Tite, Box 747, Higganum, Ct. 06441

KEROSENE HEATER WICKS. Wicks for all makes and models. Visa & Master Card. For FAST DELIVERY Call Weekdays 9 to 5 only 419-468-1096.

DISCOVER THE SOLUTION FOR THE MOST OVER-LOOKED AREA OF WASTED ENERGY IN THE HOME. A patented insulating kit for the disappearing attic stairw For free information contact: Lavaco Industries, Inc., P.O. Box 423, Warminster, PA 18974, 1-800-323-0413

SAVE MONEY - Woodstove water heater. Complete plans by certified professional installer. \$3.00. Northern Free Energy, Rte. 1, Grove City, MN 56243

CUT HEATING COSTS 40%. Newly Patented Product For Forced Air Furnaces. Thousands Sold. Free Information. CVS, Box 676, Beltsville, MD 20705.

#### **SOLAR & ALTERNATE ENERGY**

SOLAR CELLS, BUILD YOUR OWN, CHEAP EASY. IN-STRUCTIONS \$4.95, INFO. \$1.00. HSC, P.O. BOX 116, **GARLAND, UTAH 84312** 

"ENERGY Systems" for the 80's—complete sourcebook. \$5,00co, Visa/MC/Check, Free Information! IPCPM, Box 649. North San Juan, CA 95960-(916) 292-3754.

SAVE ELECTRICITY! Large, double-door SIBIR gas refrigerators. Free details! Lehman's, Box 4112K, Kidron, Ohio

JOSEPH NEWMAN ENERGY MACHINE VIDEO TAPES -VHS OR BETA - SEND SASE FOR INFORMATION. HARTWELL VIDEO PRODUCTS, DEPT. L, P.O. BOX 10293, JEFFERSON, LA 70181.

SOLAR Photovoltaic Products, Bargains. Gil Electronics, Box 1628, Soquel, California 95073

CATALOG - SOLAR, HYDRO-ELECTRIC, WIND POWER Equipment, Over 350 Items, Send \$3.00 To: WESCO, P.O. Box 936, Redway, CA 95560

PHOTOVOLTAICS. Send \$1.00 for specialized catalog of huge selection of surplus cells / panels. Appalachian Solar, Box A, Millboro, Virginia 24460.

#### **HEATING, FUEL SAVERS**

VENTILATE house with pure oxygen from water and converted electricity. \$1 comprehensive manual and plan. Tumirane, P.O. Box 1545, Kalamazoo, MI 49005

#### HOME CRAFTSMAN

OVER 125 FULL SIZE PATTERNS! Create profitable wooden gifts, toys, household accessories ... more! Pat-terns PLUS "Shop Secrets" and brochure. Only \$7.00. Accents (P-116), Box 262, Danvers, MA 01923

WOODWORKERS, Hobbyists, 1987 catalog containing Chair Cane, Wooden Wheels, Lamp Parts, Tools, Finishing Materials, Hardware, Plans, etc. Send \$1.00 to: Barap Specialties, PM1186, 835 Bellows, Frankfort, MI 49635

MAKE WOODEN TOYS, whirligigs, classic autos, swing sets, doll houses, crafts, furniture with our plans, parts, kits, supplies. Color catalog subscription \$1. (614) 484-4363. Cherry Tree Toys, Belmont, Ohio 43718-0369

SANDPAPER 10¢. CABINET HARDWARE 18¢. MAGNET-IC CATCHES 18c. SAMPLES AND CATALOG \$2.00.
NOTHERN HARDWARE, 8251 BRIARCLIFF DR.,
HUNTINGTON BEACH, CA 92647. FULL MONEY BACK GUARANTEE.

WOODCRAFT PATTERNS, Windmills, Wishing Wells, Bird Houses, Feeders, Flying Duck, Pheasant, Outdoor Planters, Catalog \$1.00. Crafters, 11840 US. 27 North, DeWitt,

FAVORITE WOOD TOYS, Patterns, Parts, Wheels, Catalog \$1.00. Toys and Joys, Box 628M, Lynden, Wash. 96264

CATALOG FULL-SIZE FURNITURE PLANS - \$2.00 Refunded with first order. Traditional, Early American, over 180! Furniture Designs, 1827 Elmdale, Dept. CP-86, Glenview Illinois 60025

PROFITABLE WOODEN "COUNTRY CRAFTS". Made \$2,000 one weekend. 100 full size patterns and details only \$6.00. Hartville Woodcrafts-P116, 12355 Market, Hartville, OH 44632

WATERBED KIT. All you add is wood and water. Includes free flow mattress, heater liner, metal corner brackets, fill kit, \$68.50 Catalog \$1.00. SLEEPYTYME, 105 High Street, Union City, MI 4909

BATTERY CLOCK MOVEMENTS. Below wholesale prices. Best Quality. Catalog \$1.00 (refundable). Yankee, Box 26, Thompson, Connecticut 06277

LATHE ROUTER CIRCULAR SAW BLADE SHARPENER. Using your miniature or pencil type grinding carving motor or motor driven flexible shaft for woodworking hobby craftsman. Patented warranty, \$39.95 Visa M.C. M.O. Al's Mini Systems Inc., P.O. Box 8073, Flint, Michigan 48501

SAVE MONEY on STEAM ENGINE KITS. Fast delivery on quality American made power models. Free illustrated facts. P.M. Research Inc., Dept. 7, RD#2 Box 29, Wellsville, NY 14895

FLYING DUCK - Bandsaw project turns pennies into dollars. BIG seller. Plans \$6.00. Dudley Publications, 213. Ash, Taft, CA 93268

NATIVITY SCENE \$8.00, SANTA & REINDEER \$6.00. Full size jigsaw patterns. Easy to make. Prepaid to: MC Patterns, Box 319, Park Ridge, IL 60068.

WIDE selection of plans and patterns for woodworkers. Simple bird houses, toys, weathervanes, furniture, entertain-ment centers, computer desks, and much more. Catalog \$.50. Craftplan Co., Dept 958, Rogers, MN 55374

WOOD WHIRLIGIGS. Full size patterns, instructions. 13"22" Bee, Chipmunk, Dog, Coyote, Roadrunner, Cat, Songbird, Duck. \$3.00 each; any four, \$10.00; all eight, \$20.00. N. Skov, 3380 So. 4th Ave. #54, Yuma, AZ 85365

INGENIOUS! Build a TABLESAW bench for under \$25.00. STURDY! Plans \$5.00. Hal Engelstad, 3570 Hanley, Central Point, OR 97502.

MAKE PVC PIPE FURNITURE. Many Proven Plans. Profitle Home Business. Details Plus Color Brochure \$1.00 (Refundable). Casual, Box 208B, Tewksbury, MA. 01876

CHILDREN'S PLAYSCAPE plans \$5.00, includes swings, playhouse, etc. J. Parker, 105 Walnut Street, Mountain Park. GA 30075

#### HOME CRAFTSMAN

(Continued from preceding page)

WHIRLIGIGS list \$1.00. Hubs, cranks, plans. Rowboat. Delap, Box 1074, Waldport, OR 97394

UNIQUE Walnut Gifts On Home Lathe 5 Plans \$3.95. The Lathe Shop, Rt. 1, Box 30A, Newton, KS 67114

DOLL CRADLE — is a reproduction of an 18th century cradie. Ours is handcrafted of mellow pine with varnish finish. Any little girl will enjoy playing with this beautiful cradle. (1014 × 221/2) plans and material fist. (PL-1820-\$4.95). Send order to: Popular Mechanics, P.O. Box 1014, Radio City Station, New York, NY 10101

BOOKCASE WALL—A floor-to-ceiling bookcase with cabinet space on the bottom. Over 13 ft. long, but you can adjust shelf width to fit any wall. (PM-1008—\$5.95) Order from: Popular Mechanics, Box 1014, Radio City Station, New York, NY 10101

#### WOOD, WOODWORKING

50 FULL size patterns. Build toys, household accessories, wooden gifts for fun or profit. Only \$5.95. Creekmur's Custom Woods, Box 724P, Galesburg, IL 61401

CHERRY OAK, WALNUT, MAPLE Boards. Small Orders Our Specialty. Send \$1.00 for Listing (Refundable). Park Timber, P.O. Box 558P, Orchard Park, N.Y. 14127

WOODWORKERS! 839 handtools, supplies, patterns, woodturning, carving, toymaking, veneering, hardwoods, cane, dowels, more! Freud, 20% discounts. Catalog/free offers - \$1.00. Hurry! Morgan, P01M37, 1123 Berdstown, Louisville, Kentucky 40204.

WOODENTOY Parts, Patterns \$1.00 Catalog, WOODENTOY, Box 40344-PM11, Grand Junction, CO 81504

**BUILD** Those Delightful Reindeer WOODOFF And WOODINE. Full Size Plans \$8.00. Catalog \$1.00 Refundable. DOEMOCO, P.O. Box 6448, Louisville, Kentucky 40206

QUALITY hardwood miter box, \$15.95 PPD. Williams Wood, Rt. 2, Box 59, Princeton, NC 27569

CORNER HUTCH Plans, Complete instructions \$5.00. Creative Services, Box 4015, Evergreen, CO 80439

CARVE Shoes, Dogs, Birds. Complete Kits 70 Species Carving Wood, SASE For List: Wood, 3505 32 St. W., Bradenton, FL 33505

WOODEN TOYS - FURNITURE plans, kits, catalog \$1.00. Birite, P.O. Box 15356, Milwaukee, Wisconsin 53215-0356

ORIGINAL WOODEN TOY PLANS. Catalog \$1:00. Free Plan With First Order! Toycraft, 601PM11 East Main, Waynesboro, PA 17268

MACHINERY catalog, "The Best from the Far East" send \$3 and receive catalog on machinery from Taiwan. You will be on mailing list for two years. Bratton International, 1015 Commercial St., Tallahassee, Fla. 32316

#### PLANS, BLUEPRINTS, PROJECTS

LAP Swimmers/Woodworkers. Build your own pool/spa for tethered lap swimming or therapy. Free information about plans, parts, supplies or complete pool. New electronic purification. Aqua Motion, Inc., Box 11046, Boulder, CO 80301

NUCLEAR RADIATION? SURVIVE! Build detector with household materials. 13 pages detailed instructions \$5.00. Collectors, Drawer 215, Allentown, PA 18105

SQUIRREL PROOF BIRD FEEDER. Complete and detailed blueprint. Send \$3.50. M.B. Rudeen's, Dept. HK, 2317 Pond Ave., Maplewood, MN 55119

BLUEPRINTS. Home Furnishings, Gazebos, Brochure \$1.50. Wood Mill BluePrints, 717 West Union Hills #3-101A, Phoenix, Arizona 65027

SUBURBAN Mini-Barn 8'×10' with Loft—inexpensive, Sturdy, Simple—Detailed Plans, Instructions \$6.95 ppd. Alfred Otto Publishing, Box 690765E, Houston, Texas 77269

WATERSKI EQUIPMENT RACK PLANS \$7.95 ppd. 8839 S. 73rd E. Ave., Tulsa, Oklahoma 74133

GOLF SWING TRAINER Plans to build \$11.95. Jopell, Box 424, Blairsville, PA 15717

RUBBER Band Machine Gun Shoots 64 Rubber Bands In Six Seconds, Plans \$5.00. Plang, 6425 Rockshire St., Alexandria, VA 22310

PLANS—"30" Gallon Smoke House - \$2.00; LV. Lighting - \$3.00; Novel Roadside Stands - \$2.50; Catalog Sheet \$1.00; G. H. Croushore, Dept. 203, P.O. Box 6206, Linglestown, PA 17112

DOLL CRADLE For Christmas. Easy Plans \$3. Bullcraft, Dept. PM11, Box 292794, Davie, FL 33329

COMPUTER Generated Barn Plans. 10×12 With Loft And Windows. Minimum Waste, One Man Const. Photo \$2,00. Plans \$8.00. Plan Ahead, 1851 Hillcrest Ave., P.O. Box 852, Wilmington, OH 45177

CUPOLA plans, \$10.00. Mike, 1115 5th St. NE, Minneapolis, MN 55413.

INDY pedal car, full plans \$11.95. Graco, 4552S 5335W, Kearns, Utah 84118

WATERBED PLANS-SIMPLE INEXPENSIVE \$4. Box 1041, Mattoon, IL 61938

STEEL CUTTING SAW Heavy Duty, Single Phase. Complete Prints And Details \$10.00. Evco, 1315 Middlebury St., Elikhart, IN 46516.

"TRAILER RUNNING GEAR" 94-page component & parts guide, hundreds of illustrations. \$3.95 plus \$2.00 postage & handling: Trailer Depot, Box 21296, 2030 Cross St., Eugene OR 97402, Attn: Dan

#### FOR THE HOME

JARVISE Join the Under-The-Cupboard Appliance Crowd. Opens all screw on containers effortlessly \$8.50, P&H Paid. Guaranteed. Little Bear Enterprises, Box 2236, Napa, CA 94558

BE PREPARED for emergencies. Family First Aid Guide— Complete, yet concise for easy reference. Great gift idea. \$3.95. Order today! Gordons, 4119 Clarendon, Brooklyn, New York 11203

FREE ROOF You can have new aluminum shingle roof without cost. For How-To-Do-It Book and pattern shingle, send \$4.95 to: Mr. Shingles, Box 7493, Louisville, KY 40207

BETTER THAN SUMP PUMP Works Without Electricity Under Forty Dollars. Free Information. Lincoln, 1480 Marigold Drive, Cotorado 80221

#### **HOME BUILDING & REMODELING**

DESIGN Your Dream Home. Design Kit, Instructions, \$7.00 To: Spectrum, 4135 Citizen Cir., Austell, GA 30001

YOU CAN DRAW YOUR OWN HOUSE PLANS. Save hundreds. New book gives illustrated step by step instructions. Send \$9.95 to: James Co., Box 78047, Baton Rouge, LA 70837-8047

CLOSET ORGANIZERS - We Design - Inquire. Creative Dimensions, P.O. Box 81, Scottsville, NY 14546

FREE "Buying Country Property" with Purchase of "Timber Framing Facts" \$2.00. Woodworks, P.O. Box 540, Rayensdale, WA 98051

ORGANIZE YOUR CLOSETS Save Money! Double Usable Space! \$5.00 to: PAV, 342 N. Pennsylvania, Glendora, CA

#### **PLASTICS**

CASTOLITE Liquid Plastics. Crystal clear, colors. For casting, embedding, coating, fiberglassing; in industry, laboratories, craft work. Reproduce your designs with our Mold Materials. Catalog \$2.00. CASTOLITE, Dept. 86P/PM, Rox 391 Woodstock II 60098.

PLASTIC, ALL TYPES, SIZES, COLORS, SHEETS, RÓDS, TUBES. Custom fabrication. CATALOG one REFUNDABLE dollar. Quality and service GUARANTEED. ANDL Industries, 6180 Babcock, Palm Bay, Ft. 32909

#### DO IT YOURSELF

STOP NEIGHBOR'S LOUD STEREO, FASTI Simple instructions, inexpensive materials. Legal. \$9. Details, \$2. (refundable). BAILEY'S, 424 West Commonwealth, Fullerton, Calif. 92632

BELT BUCKLES for coins or stones, specialty buckles, jewelry mountings, cut stones, clock works. Wholesale catalog 25c. Eloxite Corp., 806½ 10th Street, Wheatland, Wyoming 82201

INSTALL YOUR OWN IN GROUND SWIMMING POOL for as low as \$1,995.00. Cheswick Pools, Rt. #28, Cheswick, PA 15024, 412-274-6400

4,321 Catalogs listed. Sources for Anything! \$5.00. Directory, Box 92452N, Atlanta, Georgia 30314

PROJECTION TV ... Convert your TV to project 7 Foot picture ... Results comparable to \$2,500 projectors ... Total Cost less than \$30 ... PLANS AND 8 LENS \$21.95 ... Illustrated information. FREE. Macrocoma-BC, Washington Crossing. Pennsylvania 18977. Creditcard Orders 24HRS. (215) 736-3979.

BUILD YOUR OWN SATELLITE DISH ANTENNA. Book Provides Pictures, Illustrations, Easy To Follow Instructions for 1012ft Dish Antenna. Send \$12.00, Power Gain Systems, Dept A, P.O. Box 2955, West Monroe, Louislana 71291.

WATERLESS TOILET! ENVIROLET SYSTEM requires NO WATER, NO CHEMICALS, NO SEPTIC TANK. Biological process uses small amount of electricity. Ideal for cottage, chalet, home, industry. Send \$1.00 for information to: SANCOR INDUSTRIES LTD., 140-30 Milner Ave., A-PM. Scarboro, Ontario Canada M15 3R3

FUEL oil heating-maintance, repairs, parts. Easy Instructions. Datails Free. Heating, Route 1, Box 96, Ford City. PA 16226

ELECTROPLATING. Complete Textbook. Electroplate Metallics/Nonmetallics. \$11.95. Details Free. Tropix, Palm Bay, FL 32906-0095

SELLING YOUR HOME? Why pay a real estate broker? Our inexpensive step-by-step manual and quality signs may save you thousands in fees. Don't fail needlessly! Send for information today. Resource Link, Dept-PM, Box 1735, Des. Moines, IA 50306

BUY WHOLESALE! Parts for Lawn, Garden Equipment. Small Engines, Chainsaws, Minibikes, Karts, More. Includes repair manuals, specialty tools. Send \$4.00 for 184 page catalog. Sav-On-Parts, P.O. Box 45231, Dept P., Somerville, MA 02145.

HANDYMAN Learn To Fix-Up Rental Houses - Big Profits -Extra Income - Ideal For Do It Yourselfers. Free Illustrated Booklet, Send \$1.00 Postage - Mr. Fixer, Box 3039, Redding, CA 96049

VIDEO INSTRUCTION SERIES. Learn woodworking. Home Improvement, Auto, Diesel Mechanics, Air Conditioning, Refrigeration, Crafts. Only \$9.95 EACH. Free Catalog. VTS, P.O. Box 1506, Dept. PM11, Spring, TX 77383.

#### **ARTS, CRAFTS, SUPPLIES**

STAINED GLASS SUPPLIES Complete Catalog \$2.00 (refundable). Sunshine Glassworks, 3690 Harlem, Dept CT, Buffalo, NY 14215

CLOCK WORKS. Wood clock blanks, rockhound supplies, belt buckles, cut stones, etc. Wholesale catalog 25¢. Eloxite Corp., 806½ 10th Street, Wheatland, Wyoming 82201

QUARTZ CLOCK MOVEMENTS FROM \$1.75. Epoxy resin \$16.00 gallon. Oak \$1.50 sq. ft. Components, cutouts and more! Catalog \$3.00 (credited). Steebar, P.O. Box 463(P), Andover, N.J. 07821-0463

STAINED GLASS SUPPLIES: EXCITING SUPER CATALOG-PM \$3.00. CORAN-SHOLES INDUSTRIES, 509 E. SECOND, BOSTON, MA 02127.

LEATHERCRAFT Supplies, tools, kits. Catalog \$1.00 (Refundable.) Crafter, Tombean, TX 75489-0778.

CLOCKMAKING supplies. Dreme! Tools. Catalog \$1.00 (refundable). Craftstar, Tombean, Tx. 75489-0778.

EASY HOLIDAY CRAFTS. \$3.75. Creative Conceptions, Box 440625, Aurora, Colorado 80044.

#### CARTOONING, COMMERCIAL ARTS, SIGN PAINTING

CARTOON for Fun and Money!!! Free Booklet!!! Cartoons, Box 40614A, Detroit, Michigan 48240

LEARN SIGN PAINTING, Cartooning, Pinstriping, Free Catalog, Kaufmann Company, Centertown, Missouri 65023

CARTOONING/Humor. Personal Tutoring. Cartoons Published. Graphics, 106 Wampum, Lake Kiowa, Texas 76240

FREE first lesson-learn pinstriping, fancy lettering, Postage \$1.50, Nutwood Graphics, 3940C West Pine, St. Louis, MO 63106

#### **MODELS, MODELS SUPPLIES**

FIRING CIVIL WAR 2" - NAPOLEAN Model CANNON PLANS, \$9.00: CATALOG \$1.00. Green-PM116, Box 892, Shalimar, FL 32579-0892

RADIO CONTROL Airplanes, Boats, Helicopters, Supplies. Big Discount Catalog \$5.00 (Refundable), Modelers Supply, Box 310P, Eclectic, AL 36024

"WORKING STEAM MODELS!" KITS or ASSEMBLED. Tractors, Locomotives, Limousine, Roadster, Truck Engines, Two Steam Books total 59 Color pages \$4.95 (Refundable). Colored Circular \$1.00 Christmas Specials! Diamond Enterprises, Dept. PM11, Box 537, Alexandria Bay, NY 13607. (613) 475-1771

#### TOYS, GAMES, KITES, PUZZLES, NOVELTIES

WOODEN TOYS FROM 2×4's Ten easy full-size patterns for durable Cars Trucks Boat Plane more! \$5.50. Armadiilo Toys, P.O. Box 690185, San Antonio, Texas 78269

CALLIOPE—Bring back those nostalgic circus sounds with a mini-calliope you build of pine, pipes and other at-hand materials. Perfect for your child or budding family musician. (PL-1830—\$4.95) Order from: Popular Mechanics, Box 1014, Radio City Sta., New York, NY 10101

#### MAGIC TRICKS, JOKES, VENTRILOQUISM

FREE! World's Leading Novelty Catalog. 1600 Jokes Tricks, Science, Sports, Hobbies, Johnson-Smith, F-01, Bradenton, Fla. 34203-3796

LEARN VENTRILOQUISM! Guaranteed Instruction Supplies, DUMMIES, Information Free! Maher, Box 420-PM, Littleton, Colorado 80160.

#### **HOBBIES & COLLECTIONS**

NAZI & Historical Military Collectibles. FREE catalog HMA, Box 1806PS, Lafayette, CA 94549.

MILITARY Medals Catalogue \$1.00. Subscription Yearly \$6.00. Vernon, Box 1387PM, N. Baldwin, NY 11510.

MINIATURE DOLLHOUSE FURNITURE. Free catalog. Stuart Ross Associates, 12328 68th Avenue, Allendale, Michigan 49401

#### **DECALS, EMBLEMS, PATCHES**

CUSTOM EMBROIDERED EMBLEMS, PINS, DECALS, e Catalog/Quotes. Rush Sketch. Stadri, 61P Jane, N.Y.C. 10014. (212) 929-2293

#### ANTIQUES, RELICS, INDIAN GOODS & CURIOS

INDIAN Relics List 50¢. Identification Guide Book \$11.44 Arrowhead Samples \$20.00. Secrist's, Deerfield, MO 64741

FREE List to Serious Collectors. 30,000 Indian Artifacts. Pots, Spears, Axes, Slate, Beadwork, Caddo Trading, Box 669, Murfreesboro, AR 71958

#### STAMP COLLECTING

50 YEARS Old fifteen different United States, over fifty years old-25¢ with approvals. Jaxon, Box C11-P, New Rochelle, New York 10804

45 DIFFERENT U.S. AIRMAILS, used \$2.00, mint \$15.00. Eberling, Box 2216, Neptune City, N.J. 07753

100 from 100 Countries - 25c. Approvals. Taylor - PM3, Box 1075, Calgary, Alberta T2P 2K4.

WORLD, 80 different, 25¢. Approvals. KSG, Box 651. Nelson, BC, Canada V1L 5R4

ISRAEL 15 Different 10c Approvals. Sam Chazen, Box 666. Delray Beach, Florida 33444

BREATHTAKING Beautiful. 50 Different mint Monaco pictorials commemoratives only \$1.50 with mint complete set approvals. Pagoda, Box 132P, Sidney, Ohio 45365.

FREE Surprise Collection with approvals. Gould, Box 2130, Petaluma, CA 94953

"WHOLESALE" U.S.-Foreign Pricelist and catalog Free. Everything Guaranteed. No Approvals. Schneider, Box 1240. Grand Rapids, Michigan 49501

50 DIFFERENT Old U.S. between 1861 and 1939 - \$1.00. Ed Roush, 423 Shepard, Mansfield, Ohio 44907.

FREE 25 World Wide Stamps Plus Free Catalogue With Over 2,000,000 Stamps. No Approvals. Jefferies, 28311 Franklin, C334, Southfield, Michigan 48034.

FREE Gift With First Purchase. U.S. Approvals And Want List Service. 20c for Handling. The Stamp Boutique, P.O. Box 456, Madison, N.J. 07940

BARGAIN 100 World-wide Stamps 25c. Quality Approvals. R. Parker, Box 143. West Brookfield, MA 01585

WORLD Wide Stamps mounted in books on approval 2c and up. TRUST STAMP COMPANY, P.O. Box 100-P. Jamaica, N.Y. 11435

100 Different U.S. 25c, Approvals. Bradley, Box 425P, Midlothian, VA 23113

200 DIFFERENT Canada \$1.00. Worldwide approvals. Quebephil, Box 68, St-Jerome, Canada J7Z 5T7

FREE 50 Canadian stamps with approval request. Briner's, P.O. Box 5607, San Mateo, California 94402

40 EUROPE 25c. approvals. BIRNELL, 2304 Hancock #9E. Austin, Texas 78756

FREE! 125 Different Foreign, \$10.00 Catalog Value. Approvals. Rick's, 520 South 23rd, Herrin, IL 62948.

U.S. 200 different commemoratives \$1.00! Approvals. Gordon Davison, 307M, Contoocook, N.H. 03229

"INVERTED ERROR" + 100 Different United States, 50c with approvals. Luray, P.O. Box 7088, Silver Spring, MD 20907

OLD U.S. stamps on approval. Sherman, Box 15355E, Philadelphia, PA 19111

BRITISH and foreign stamps in complete sets. Bode, Box 145W. Willowdale Ontario M2N 5S8

FANTASTICI STAMP COLLECTORS' MANUAL PLUS 100 WORLDWIDE STAMPS, \$1.00! Approvals. Barnes, P.O. Box 512, Adamsville, AL 35005

STAMPS FOR LESS! Great value worldwide offpaper stamp mixture just \$35.00 per pound! Order today. Jazco. Box 412, Worthington, OH 43085.

20 DIFFERENT MINT U.S. \$1.00: APPROVALS. O'BRAY, BOX 11794, PUEBLO, CO 81001

2,000,000 stamps 150 countries 2c each. Belden, Box 4149, Dearborn, 48126

BELOW MARKET prices. Intermediate, advanced collectors send 22¢ postage for price list U.S.A. issues prior to year 1940. Lowell P. Donald Company, Box 728, Rutland, Vermont 05701

FREE, U.S. Mint pictorial set complete. Mint approvals included. Hildebrand, Box 4867, Santa Clara, California 95054

CANADA, 100 different 25¢. Approvals, Julius Oroszky, P.O. Box 1-C, Sarnia, Ontario, Canada N7T-7H8.

FASCINATING AFRICA: \$6. Scott, only \$1. Viau, 39 Norgrove, D.D.O., Canada H98 2K2

FANTASTIC 300 Beautiful Stamps From Around The World Only \$1.00. Ask For Quality Stamps From Our Approval Service. Try Us Now. Richard Stamps, P.O. Box 237A, St. Lambert, Quebec, Canada J4P 3N8

AUSTRALIA 50 DIFFERENT BEAUTIFUL COMMEMORA-TIVES 10c, Approvals. Pence. POB 3041. Winchester, Virginia 22601

ONE! Two! Three! Cent Stamp Approvals, Regardless Catalog, Kloster, 4164 52nd St., San Diego, CA 92105

FREE 50 DIFFERENT U.S., when requesting approvals. Carmen, Box 6149-PM, San Mateo, CA 94403

SPECTACULAR! 300 Breathtaking Stamps from 25 Countries. Only \$1.00 with latest bargains and sensational approv als. StampsPlus+, D-MK6, Box 982F. Toronto, Canada M4Y

WORLDWIDE 100 Different Beauties, 25¢. Approvals. J.D. Michael, P.O. Box 2273, Martinez, CA 94553.

FREE Worldwide Packet. Penny approvals. Froehlich, Box 177DA, Pine River, WI 54965.

#### **CAMERAS & EQUIPMENT**

MONEY with your camera, booklet \$3.00. Rosser Enterprises, Rt. 7, Box 64, Florence, SC 29501

#### PLAYS, SONGS, MANUSCRIPTS

POEMS, Songs Wanted. Free Recording/Publishing Broadway Music Productions, Box 7438PM, Sarasota, FL 33578

SONGWRITERS NEEDED! Earn Money Writing Songs! Free Details! CRS Records, Box 814B, Lewiston, NY 14092

FREE SONGWRITING SUCCESS BOOK! Top Records. Box 23505PM, Nashville, TN 37202

#### MUSIC INSTRUCTIONS & INSTRUMENTS

ACCORDIONS, NEW, USED. Electric, electronic, Cordo voxs, concertinas, Button Boxes, Hohners We Buy, Sell. Trade, Exchange, Repair, Tune, 50 Years Experience, If Dealers unavailable. Call or Write for Brochures. Mastercard And Visa Accepted. CASTIGLIONE ACCORDION, 12644 E. 7 Mile, Detroit, MI 48205, 313-527-1595

PIANOS, PLAYERS, PUMP ORGANS. Rebuild and repair. "How-To" books, \$2.00 (refundable). Vestal Press. Vestal 11, New York 13850.

VIOLIN, GUITAR, etc., making materials, accessories, books, Catalog, \$1.00. International Luthiers Supply, Box 580397, Tulsa, OK 74158

INTERNATIONAL VIOLIN COMPANY, Catalog for instrument makers, repairers. Imported tonewood, tools, varnishes, parts, accessories, strings, cases. European instruments, ws. Assemble yourself violin and guitar kits. Catalog \$1.00 includes 10% discount certificate. Dept. HL, 4026 W. Belvedere Ave., Baltimore, Md. 21215.

ACCORDION Top Brands, Cordovox, Buy Direct. Tremendous Discounts. Trades accepted. Free brochure. PM, Accordion-O-Rama, 16 West 19th Street, New York, NY 10011. Phone 212-675-9089.

GUITAR picks. FREE samples. Hartman Music, Ashe Street, West Jefferson, NC 28694

INSTRUMENT Kits! Build Appalachian and hammered dulcimers, banjos, mandolins; even harps, harpsichords. Free Catalog, PM Hughes, 4419 West Colfax, Denver, CO

#### SELF IMPROVEMENT

MAGNETISM Course on all human powers. Write: Box 26204, Encino, CA 91426.

HOW TO WIN FRIENDS AND INFLUENCE PEOPLE Attain Love, Power, Success. Send \$5.00. Adama, Box 5584, Cleveland, Ohio 44101

FREE DETAILS Reliable Reminder Service. P.O. Box 93421, Los Angeles, CA 90093

LEARN to sing! Naturally! Joyously! Free information. AAthmar, Ltd., 885 West End Ave., Suite 1-D, New York, New York 10025

SUCCESSFUL PEOPLE ACHIEVE THEIR GOALS! Be one of them! Free Details! Write: GOALSET, Dept 1116, P.O. Box 1651, Los Gatos, CA 95031,

FOR SMOKERS ONLY!! I have discovered the secret to finally breaking the smoking habit for good. It worked for me and it will work for you! To get your copy of "For Smokers Only", send \$8.00 to: MTS, Dept. AL, 3100 S, Rural Road, Suite #1, Tempe, Arizona 85282.

HOW TO Lose Weight the Gourmet Way! Diet Diary. \$5.00. P.O. Box 490, Soquel, CA 95073

#### **EDUCATION & INSTRUCTIONS**

SCHOOL of Bookkeeping/General Accounting. Start a new money making career in Bookkeeping. Earn more money. Learn at home. Write for a free booklet. Little Falls, N.J. 07424. Dept. 311-116.

UNIVERSITY DEGREES! Economical home study for Bachelor's, Master's, Doctorate, Prestigious faculty counsels for independent study and life experience credits. Free information - Richard Crews, M.D. (Harvard), President. Columbia Pacific University, 1415 Third St., Dept. 2E8N, San Rafael, CA 94901; Toll Free: 800/227-0119; California: 800/ 552-5522; or 415/459-1650.

LEARN UPHOLSTERING, Instructions-Supplies Catalog. Jim Dandy Sales, Box 30377, Cincinnati, Ohio 45230

TERMPAPER ASSISTANCE. 15,278 papers available! 306page catalog-rush \$2.00. Research, 11322 Idaho #206MK, Los Angeles, 90025. Toll Free Hotline: 800-351-0222 (California: 213-477-8226)

UNIVERSITY DEGREES By Mail. Accredited Bachelors, Masters, PhD's, Free Facts Revealed, Careers-PM11, Box 470886, Tulsa, OK 74147

LEARN Sewing Machine repairing. A profitable Trade. Easy to learn. Free details. Sewing Center, 187 FR, Rochelle, GA 31079

LOCKSMITHING, Universal School of Master., Correspondence and Shop Training, Box 214652PM, Sacramento, CA 95821

DETECTIVE training home-study program. Free information, Global, Box 191 PM, Hanover, Mass 02339

A UNIVERSITY DEGREE CAN UNLOCK YOUR EARNING POWER. Complete your B.A., M.A., PhD., or J.D.\* Credit for work/learning experience. No classroom attendance required. 'Registered with California Committee of Bar Examiners. KENSINGTON UNIVERSITY, 330 N. Glendale Ave., Glendale, CA 91206. In Calif. (800) 421-9115, ext. 84. Other States. (800) 423-2495, ext. 84.

FREE Catalog. Nashville Auction School, Box 190P. Lawrenceburg, TN 38464. Veteran Approved.

HIGH SCHOOL DIPLOMA AT HOME. NO CLASSES, LOW cost. Information Free, Call toll free 1-800-228-5600 or write: American School, Dept. #345, 850 E. 58th St., Chicago, IL. 60637

PIANO TUNING PAYS - Piano tuning - Electronic organ servicing, Learned easily at home. Free booklet. Niles Bryant School, P.O. Box 20153, Sacramento, CA 95820

RADIESTHESIA, Radionics, Dowsing E.S.P. Courses and quipment Illustrated Catalog \$1.00 (refundable) Equipment Established 27 years. Dept. PM/R. Bruce Copen, Highfield, Danehill, Sussex, England RH17 7EX.

EXTENSION And Post-Graduate Awards in Philosophy. Art, Science, Botanic, Medicine, Homeopathy, Radionics, and others. 30 subjects Curricular free (airmail \$1.00 refundable). Registrar, Sussex College of Technology, Highfield, Danehill, Sussex, England.

Sleep-learning AUTOSUGGESTION. headquarters? Tapes, records, books, Gigantic catalog free, Research Association, Box 24PM, Olympia, Washington 98501.

SUPER-INTELLIGENCE! Amazing results guaranteed! Info. EDEMP, Box 1462. Glendora, CA 91740

LOCKSMITHING. Free book. Locksmithing Institute, Dept. 310-116, Little Falls, N.J. 07424

NEED MONEY FOR COLLEGE, Scholarships are available. Write: Educational Services, Dept. H, 231 Central Ave., Fredonia, N.Y. 14063

#### **EDUCATION & INSTRUCTIONS**

(Continued from preceding page)

EARN MORE IN 90 DAYS. Free 1987 catalogue describes 200 success proven correspondence Diploma courses. Granton Institute, 263A Adelaide Street West, Toronto, Canada MSH 1Y3

SCHOLARSHIPS/GRANTS available but unused. Details FREE. Sharp, 7 Prospect Court, Brookfield, CT 06804

SCHOOL of Legal Investigation, Little Falls, N.J. 07424. Be a Legal Investigator. Set up your own business. Learn at home. Write for a free booklet. Dept. 310-116.

HOW TO SEND YOUR CHILDREN TO COLLEGE FREE! No income limit! Rush \$4.00 for report. AMAX Research, Box 59, Fairview, TN 37062

L-EARN Clock Repair, Enjoyable, lucrative. Free Details. School of Clock Repair, 6313 ComeAbout Way, P.O. Box 315, Awendaw, SC 29429

NEWSLETTER PUBLISHING: \$50,000 A YEAR: Complete course trains, experience unnecessary. Dax-3, Box 1051, Durham, NC 27702

SUPERLEARNING! Triple Learning Potentials With Music, The Effortless Way. HOW, 1633 Babcock, Suite 208, San Antonio, TX 78229

WORLDWIDE Home-Study Diploma Courses, Travel, Bar, Secretarial, Dog Grooming/Training, etc. Free Brochure. Rapid Results School, 322C-7305 Woodbine, Markham, Ont., Canada L3R 3V7

**DETECTIVE** Profession. Easy Home Study. Free lapel pin, certiflicate, future. Professional Investigator Training School, Dept. CP, P.O. Box 41256, Los Angeles, CA 90041

#### SCHOOLS

WORLD WIDE COLLEGE of Auctioneering, Inc. The original—50 yrs.—Worlds largest! Term soon. Approved for V.A. Free catalog. COL. GORDON E. TAYLOR, Box 949, Dept. 19, Mason City, IA 50401, 515-423-5242, Ext. 5242.

MERCHANT SEAMAN - School Room Board Tuition Paid. Send \$1.00 for handeling. 116 14 St. #C, Manhattan Beach. California 90266

#### **EMPLOYMENT INFORMATION**

OVERSEAS Jobs \$20,000 to \$60,000. Free information. Doycorp, Box 697SZ, Pocatello, ID 83201

JOBS, CRUISESHIPS, TUGS, SHIPS, RIVERBOATS, OIL-RIGS: Women-Men. Work month-Home month. USA + Overseas. Information \$3.00. Marine Employment, Box 207, Central, IN 47110

OBTAIN HIGH PAYING GOVERNMENT JOBS. Guidebook \$4.95. D-Amp Publications, 401A Amherst Avenue. Corapolis, PA 15108

#### **HELP WANTED**

AUSTRALIA WANTS YOU! Big Pay! Transportation!
Newest Employment Handbook—\$2.00. INTERNATIONAL,
Box 19107-AY, WASHINGTON, D.C. 20036.

OVERSEAS ... \$25,000 - \$65,000+. Free Report! Employment, Box 19760-AY, Indianapolis, IN 46219.

#### **FOR INVENTORS**

PATENT AND DEVELOP Your Invention. Registered Patent Agent and Licensed Professional Engineer. Send for FREE PATENT INFORMATION Every Inventor Should Have, Richard L. Miller, 12 Parkside Drive, Suite M, Dix Hills, NY 11746. (516) 499-4343

NONPROFIT Foundation helping inventors over 11 years. Free recording forms. Free evaluation. Affiliated Inventors Foundation, 501-B lowa, Colorado Springs, CO 80909, or call 1-800-525-5885.

INVENTORS! Can you patent and profit from your idea?
Call or write for your free information package. Over a decade of service. AMERICAN INVENTORS CORPORATION, 82 Broad Street, Dept. PM, Westfield, Massachusetts 01086. 1-800-338-5656. In Massachusetts or Canada call (413) 568-3753.

PATENT IT ECONOMICALLY! Free Details. Licensed since 1958. N. Raner, 2006 Fondulac, Richmond, VA 23229

INVENTORS: Learn how to submit your ideas to industry. Call free 1-800-528-6050, Canada 1-800-528-6060. X831.

REGISTERED PATENT ATTORNEY Washington, D.C. Suburb. Donald A. Kettlestrings, 414 Hungerford Drive, Rockville, Maryland 20850

REGISTERED PATENT ATTORNEY Reasonable rates, Edwin D. Schindler, 1523 East 4 Street, Brooklyn, NY 11230.

INVENTIONS Wanted! PATENTVESTMENTS INTERNATIONAL, 1050 Connecticut #300, Washington, DC 20036 INVENTORS: If you have an invention for sale or license, write for free booklet explaining how we can help you. Kessler Sales Corp., C-5-FI, Freemont, Ohio 43420

INVENTORS MANUAL \$3.00. Rosser Enterprises, Rt. 7, Box 64, Florence, SC 29501

SUCCESSFUL INVENTORS SECRETS (How to start) \$5.00. Four Inc., Box 38151, Houston, Texas 77238

INVENTION MODELS: We Specialize in the design and fabrication of working models for inventors. Write: FAIRFIELD ENGINEERING, Box 325. Voorheesville, N.Y. 12186

INVENTION Drawings By Professional Patent Draftsmen. Draftart, P.O. 72, Woodstock, Virginia 22664

#### INVENTIONS WANTED

INVENTION MARKETING. FREE INFORMATION. REPRESENTING MANUFACTURERS. Patmart. 77 Fulton. 26D, Financial District, New York, NY 10038

INVENTORS! Have an idea? Don't know what to do? Call AIM for free information kit. Toll Free 1-800-225-5800

LEARN how to offer your invention for sale or license. Free booklet outlines procedures, royalty rates, requirements. Kessler Sales Corporation, C-5-IW, Freemont, Ohio 43420

#### **REAL ESTATE & FARMS**

#### YOUR OWN FISH AND HUNT LAND LOW AS \$39 ACRE \$50 DOWN!

BEST areas for fish and game. Government report more fish and game per square mile. TITLE GUARANTEE. BUY-BACK GUARANTEE. Bought thru ESTATE LIQUIDATIONS across Canada. EASY PAYMENTS. Get your FREE catalog NOW! CANADIAN ESTATE LAND, Dept. PM1. 2411 Yonge Street, Suite 303, Toronto, Ontario M4P 2Z1 Phone any time 1-416-488-0444.

CALIFORNIA. Lots. Acreage. \$40 Down. \$40 Monthly. Box 35291, Los Angeles, 90035.

UNITED NATIONAL REAL ESTATE ... New FREE Catalog! Top real estate values coast to coast. Full Color Premier Properties section. UNITED ..., For every type of real estate! UNITED NATIONAL REAL ESTATE, 4700-PM Belleview, Kansas City, MO 64112

FREE REAL ESTATE CATALOGS. Midwest and Southeast Sun Belt States. Specify Property and Area Desired. Call or Write: COUNTRY NETWORK, Box 368PM, Gainesville, MO 65655, 417-679-4632.

EARN to \$10,000 month or more Buying Nationwide Real Estate at 30%-40% Below Market - consistantly. No competition. No license or experience necessary. Probate & Financially distressed property. No Cash Down/No Credit Necessary. Thousands of opportunities exist. 216-453-3000. Ext. K8081

LEARN how. Find and buy country property for enjoyment, profit. Techniques revealed by old broker who knows. Detailed report \$10.00. J. Smedley, HC 15483, Smithville, OK 74957

CANADIAN COUNTRY PROPERTIES. Acreages for recreation, development, farming, fishing, hunting, investment, minerals, etc. OUR 71ST YEAR. Terms available. Titles guaranteed. Catalog airmailed \$1.00. DIGNAM CORPORATION, Suite 496, 85 Bloor Street East, Toronto, Canada M4W 185.

#### **EXPORT-IMPORT**

IMPORT/export. How to, and sources. Kitco, Drawer 6266P, Kansas City, Kansas 66106

#### **BUY IT WHOLESALE**

VACUUM CLEANERS "Discount Prices" New Rainbow \$449.95, Kirby, Filter Queen, Panasonic, Royal, Oreck, Details: ABC Vacuum Warehouse, 6720 Burnet-PM, Austin. TX 78757

FREE 16 page PRINTING PRICE LIST, 1 to 5 colors, sheets to catalogs. Copen Press, 100 (PM) Berriman St., Brooklyn, N.Y. 11208.

BELTS, Buckles, Key Tags, Hat Tacs, Jewelry, More. Complete line fast sellers, Big Profits, Complete dealer set up. Color catalog \$1.00 (refundable). Anchor, Box 3958-PMR, North Providence, Bi 02911

CLOSEOUT Jewelry 55¢ dozen. (Catalog 25¢). Roussels. 107-1631 Dow, Arlington, MA 02174

400,000 BARGAINS Below Wholesale: Many Free! Liquidations... Closeouts....Job Lots... Single Samples. Free Details. Bargainhunters Opportunities, Box 730-A, Holland, Michigan 49424.

CLOSEOUTS! Discounts! Below Wholesale! Freebies! Information/stamp: DON, Box 20152K, Ferndale, Michigan 48220

WORLDWIDE BARGAINS . . . Imports - Dropship - Closeout - Surplus - Freebies - (Stamped Envelope). Marnees, Box 1717PM, Highland, Ind. 46322

NEW! Giant Catalog. 50% BELOW RETAIL. 3,000 Specialty Items. \$3.00 (refundable.) RAM Enterprises, 2010 Tenth Street Pl. N.W., Hickory, NC 28601

POCKETKNIVES—Swiss Army "Victorinox," Below Cost. Send SASE, Harbor-Drive, 2809 Bird Ave. 241P, Miami, FL 33133

4,947 Products, From Taiwan At Low Oriental Prices. MDM Enterprise, 37 Blueridge Rd., Lodi, N.J. 07644

EARN MONEY selling rings, jewelry, buckles, watches buy direct. 130% below retail. Catalog \$1.00 (refundable). Anka-PM, 90 Greenwich Ave., Warwick, BI 02886

#### ADVERTISING AGENCIES, ADV. SER. MAILING LISTS

QUALITY Mailing Lists SASE to: Welco Marketing, 7763 Treafeathen, Warren, Ohio 44484

FRESH, hot, responsive name lists of mailorder buyers. Most categories. Computerized in Zip Code Order. Peel and stock labels. Guaranteed deliverable! For Brochure Rush SASE or \$1.00 to: Direct Mail Order Co., 7755 E. Gelding Dr., Suite 104C, PM1, Scottsdale, AZ 85260.

FRESH hot responsive name lists of mailorder buyers. All categories. Computerized in zip code order. Peel and stick labels. GUARANTEED DELIVERABLE. For brochure rush SASE#10 to: Master Printers, P.O. Box 8462, Honolulu, HI 96830-0462

FREE Mailing List Consultation. Details. GOC-33P, Box 1107, Stuart, FL 33494. (305) 334-5205. 1-800-554-5478

OPPORTUNITY SEEKERS MLM NAMES. FREE SAMPLE. Venture-LP, Box 336. Riviera, AZ 86442

MAILING LISTS Reach the customers to aid your company's growth. Fresh responsive names in zip code order. Free brochure write: Rent-A-List, Box 56784M, Hayward, CA 94545

MAILORDER Buyers. Most Categories. Write: Hammond, Box 537, Brooklyn, NY 11233

MAILORDER BUYERS LIST. Available For Immediate Use!
Computerized on Peel And Stick Labels In Zip Code Order.
Guaranteed Deliverable! For Complete Details Send SASE
to: Mailorder List Unlimited, Allan Rummel, Route 1PM, Clay
Center, Kansas 67432.

MAILING LISTS THAT PRODUCE! FRESH, RESPONSIVE NAME LISTS OF PROVEN MAILORDER BUYERS. MOST CATEGORIES. COMPUTER SELECTED FROM EXTENSIVE, NATION-WIDE DATA BASE. PRINTED IN ZIP CODE ORDER ON PEEL AND STICK LABELS. GUARANTEED DELIVERABLE OR REPLACED 2 FOR 1. DETAILS: SUNBELT ENTERPRIZES, P.O. BOX 250, MISSOURI CITY, TEXAS 77459

FRESH opportunity buyers 1000/\$18. Listings Unlimited, RD3, Box 18, Millville, NJ 08332

FRESH HOT RESPONSIVE NAME LISTS of mailorder BUYERS. Most categories. Computerized in ZIP CODE ORDER. Peel and Stick Labels. GUARANTEED DELIVER-ABLE! For Details, Rush to: BUNTYN, 2129 Finley St., Jacksonville. Alabama 36265

NEW ACTIVE NAMES! MIXED STATES AVAILABLE! IM-MEDIATE SHIPMENT! Guaranteed - Responsive opportunity seekers on adhesive labels 500\\$25; 1000\\$40; 5000\\$175. Others. Advon, Drawer B2, Shelley, ID 83274. Visa\MC/AmEx 1-800-992-3866.

SUPERIOR Quality Opportunity Seekers. Proven Buyers, Pressure Sensitive Labels, 500 - \$18.00, 1000 - \$29.00. Marketing Unlimited, Box 5564, Augusta, Georgia 30906

PROFITABLE Computerized Mailing Lists. Guaranteed. JIMCO, Box 215, Brimfield, IL 61517

FRESH, HOT, RESPONSIVE NAME LISTS of mailorder BUYERS. Most categories Computerized in ZIP CODE OR-DER. Peel and stick labels. GUARANTEED DELIVERABLE For Brochure RUSH SASE to: THE MAIL LISTS FACTORY, Dept. PM. 320 N. Plymouth Blvd., Los Angeles, CA 90004

#### MAILORDER NAMES THAT REALLY PULL!!

FRESH, HOT, RESPONSIVE NAME LISTS of actual MAIL-ORDER BUYERS. Most categories. Computerized in ZIP CODE ORDER on PEEL/STICK labels. GUARANTEED DE LIVERABLE! For FREE details write: ALEX REGINATO, 1420 7th Ave. #2B, San Francisco, CA 94122.

#### **BUSINESS SERVICES**

ancorporate without legal fees! Free booklet tells how, includes forms. Call Harvard Business Services, now 800-345-CORP.

MONEY! Let Me Help You Make It! SASE To: Robbins, 1101 N.E. 4th Ave., Boca Raton, FL 33432

FRESH, HOT, RESPONSIVE "MAILING LISTS". For FREE brochure write to: Reymer Associates, Box 412, New Haven, CT 06513

#### **RUBBER STAMPS**

CUSTOM rubber stamps. Free catalog. Crispin's, Box 2533, Davenport, Iowa 52809-2533

#### **OFFICE SUPPLIES & EQUIPMENT**

SURPLUS Office Furniture Brochure \$1.00. P.O. Box 181. Ellicott City, MD 21043

#### PRINTING PRESSES, RUBBER STAMP OUTFITS

TYPE Fonts, Hand Printing Presses, Hot Stampers, Supplies. 120 Pages. \$2.00 Deductible first order. Acme Type, 1720 N. Marshfield, Chicago, 60622

MAKE rubber stamps—big profits. Complete supply and equipment catalog with instructions. \$1 deductible with order. Star Stamp Supply, 1720 N. Marshfield, Chicago 60622

BARCO Type Founders. Type and Rubber Stamps catalogue. Mail \$2.00 refundable on first order. 237 S. Evergreen, Bensenville, 60106

TYPE for printing. Catalog \$1.00/deductible 1st order. Quaker City Type, R.D. 3, Box 134, Honeybrook, PA 19344

#### PRINTING SUPPLIES

QUICK Copy Printing. Low Prices. Write: Nationwide, 614 North Main, Bloomington, Illinois 61701

DISTINCTIVE BUSINESS CARDS, FREE SAMPLES. Whitford Co., Box 134, Barberton, OH 44203

#### 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, 10 South Wabash, Dept. 358, Chicago, 60603

TAKE NO CHANCES. Deal with oldest, most reliable firm in old gold business. Established in 1934. We buy Gold, Silver, Platinum, Diamonds, Highest Cash. Free Information: Rose Industries, 29-A East Madison, Chicago 60602

CLOCKWORKS, wood clock blanks, rockhound supplies, belt buckles, cut stones, etc. Wholesale catalog 25¢. Eloxite Corp., 8061/2 10th Street, Wheatland, Wyoming 82201

QUALITY "LOOK ALIKE" Rolex, Piaget many models available. Year guarantee. Free info. MC, 7315 N. Oracle #105-300, Tucson, AZ 85704

CLOCK Repair Supply Catalog \$2.00. Timesavers, Box 469M, Algonquin, IL 60102

CLOCKS & quartz movements; hands, dials, etc. Automobile clocks. Quartz conversions for auto clocks. Instruments Services, 433 So. Arch St., Janesville, WI 53545. 1-800-558-2674; WIS 1-608-755-0993.

DESIGN YOUR OWN WATCH You can have anything printed on the dial even a picture. For information send \$2.00 to: Josue Rios, Box 6829, Hartford, CT 06106

ROLEX style watches \$10, tool sets \$5, survival knives \$3, wholesale catalog \$1. Powerhouse, 7500 Powers, Suite 160D, Jacksonville, Florida 32217-3839.

SWISS WATCH REPLICA. 100% Details! Satisfaction! #1 Wholesaler! ORDER. 213-305-8949.

#### SILVER

CASH in on electrical scrap silver. Free information. Don Fowler, Box-4401, Cleveland, TN 37311

#### TREASURE FINDERS

TREASURE—Locate quarter mile away with ultra sensitive locator—brochure free. Research Products, Box 270270-AMC, Tampa, Florida 33688

FIND old coins, jewelry, gold nuggets. New patented revolutionary device. Free catalog. Gardiner, 4729M N. 7th. Ave., Phoenix, AZ 85013

SAVE up to 40% on metal detectors. All major brands including White's and Garrett. FREE discount catalog. Northwoods General Store, Dept. DPM11, 1325 Greenway Cross, Madison, WI 53713, (608) 274-4680.

NEW DETECTOR FINDS "BB" SIZE GOLD NUGGETS SEVEN INCHES DEEP! Informative Booklet \$5. Literature Free! Wilson Electronics, 4415 Brookton, South Bend, IN 46614

#### PROFITABLE OCCUPATIONS

\$7,200 MONTHLY possible. How to start and operate your own profitable small excavation business. Minimum investment-maximum return. For details \$1.00 (refundable). AE Corp., P.O. Box 389, Lebanon, N.H. 03766.

FREE Brochures. Repair air conditioning, Refrigeration. Tools, Supplies, full instructions. Doolco, Inc., 11252 Goodnight, Dallas, TX 75229.

REPAIR lawnmowers thousands of parts and tools wholesale list 40¢. Eliwanger's, PM, P.O. Box V, Port Jervis, NY 12771

PLASTERCRAFT ... Profitable Home Business 3000 Molds Available. Details. Lynnette, 6251C Mentpark, Mentor, Ohio 44060.

FANTASTIC Income Potential, Start your own mail order business. Free Info. write: D&D Distributors, 3351 Chester Grove Rd., Upper Marlboro, MD 20772.

MAKE MONEY IN SPARE TIME. Earn Generous commissions as a subscription sales representative for leading magazines. For full details and instructions, send this ad with your name and address to: POPULAR MECHANICS, Dept. AB-M, 250 W. 55th St., New York, NY 10019

#### SALESMEN-DIST.

MAKE EXTRA MONEY DURING YOUR SPARE TIME! Earn weekly commissions showing our exciting line of Calendars, Pens and other popular Advertising Gifts. Prompt, personal service from AAA-1 firm. Our 77th year. No experience necessary. No investment or collections. Set your own hours. Full Time Potential! Write to: Kevin Peska, NEWTON MANUFACTURING COMPANY, Dept. DPMC11, Newton, lows 50208

#### **BUSINESS OPPORTUNITIES**

IMPORT-Export opportunity, profitable world-wide, mail order business from home, without capital. We ship plan for no risk examination. Experience unnecessary. Free Report. Mellinger. Dept. C270C. Woodland Hills. California 91367

GUARANTEED! \$1.00 Pound from "Junked" tires! (Stamp appreciated). LeValleys, Fountain, FL 32438

ARAB BUSINESSMEN have money to buy & invest. Top finders fees paid. IMEA, 1186PM1, Box 3574, Newport Beach, CA 92663.

START MONEYMAKING WOODCRAFT BUSINESS making "Easy - Quick" toys, gifts, novelties. Free details. WILLIAMS, 3600L San Sebastian, Tucson, AZ 85715

MAILORDER OPPORTUNITY: Start profitable home business without experience or capital. Write for free book, plus details. Mail Order Associates, Inc., Dept. 632, Montvale, NJ 07845.

"SECRET-LISTI!!!" of Banks offering Lowest Interest Rates and "SECURED" Credit Card institutions. \$4.95. Powers, 2138 Wooddale #12, Baton-Rouge, LA 70806

\$700 or more per week using your pickup truck part time. Free Details. KINGSTON, Dept5B, Oskaloosa, KS 66066-9028

FANTASTIC NEW MONEY PLAN. Home business for all ages. Free details: TAF ENTERPRISES, Box 24050, Canoga Park, CA 91306.

\$20,000 in YOUR BACKYARD! Grow profitable specialty crops. Free details. Homestead, Box 968AR, Friday Harbor, WA 98250

BE YOUR Own Boss! Have Your Own Business In Educational Services. For more information, please write to: SRS Services, Inc., Box 521, Brooklyn, N.Y. 11240

TV - MARKETING, Profitable Television Direct Response Mailorder, Manual \$10.00: Nothacker, Box 1251, Pearl River, LA 70452.

EARN Thousands! Home Mailing Program. Goodworld, Box 26233-R, Tamarac, FL 33320

\$40,000 ON 1/5 ACRE! New Hydroponics—Inexpensive, pleasant, practical! Free Information. Robin's, Box 1214, Franklin, TN 37065-1214

INCREASE Your Incomet Your own prestigious money business with nationwide lender network. Complete training, support. PFA, Box 697P, Dana Point, CA 92629, (714) 240-0405 Extension 100P.

GET RICH using OTHER PEOPLE'S MONEY!! Unique - amazing business!! Details FREE!! Finance/B, Box 4605, Margate, FL 33063

CLIP newspaper items—\$2 - \$25 EACH!! FREE Report! Clippings/B, Box 6109, Pompano, FL 33063

GET RICH!! Secret law smashes debts—brings Cash, Credit! FREE report!! WealthKit/B, Box 4036, Pompano, FL 33063

\$25,000 LOANS INTEREST FREE!! Secret Federal law WIPES OUT DEBTS!! Details FREE!! Moneywise/B, Box 26744. Tamarac, FL 33320

VINYL'S Where the money is! Professionally repair, refinish, recolor furniture, luggage, car tops. Quick, easy. Two small \$20 jobs a day earn you \$1,000 a month. Homes, cars, offices, restaurants, unlimited customers. Start earning after a few days practice. Sensational details free. VIP, 2007 Montrose, Chicago, 60618.

TAKE Catalog Orders. We drop-ship 2955 best selling specialty products. Lowest below wholesale prices. Immediate delivery. Spectacular home business opportunity. Free Book. SMC, 9401 De Soto Avenue, Dept. 20-71, Chatsworth, CA 91311-4991.

MAILORDER Books, 1,000% Profit Report. Selective, Box 1140, Clearwater, FL 33517

MAKE BIG MONEY REPAIRING WINDSHIELDS & Plate Glass! Up to \$60,000 yearly! Call TOLL-FREE for Valuable FREE report. 1-800-321-2597. Glas-Weld Systems, Box 5755D10, Bend, OR 97708.

\$1,000 weekly mailorder. Immediate opportunity. No obligation. Enterprise, 210 Welch-PM, Ames, IA 50010

ASSEMBLE PRODUCTS AT HOME. Many opportunities paying High Weekly Profits presently available without investment. Write: Businesses, 928 Brighton 11th, Brooklyn, New York 11235.

HIGH PROFITS WITH CUSTOM T-SHIRTS AND CAPS. Inexpensive, professional heat transfer machines. All supplies. PRESS MAGIC, P.O. Box 22809 (GC), Tampa, FL 33623

SCREEN PRINT T-SHIRTS. Inexpensive kits. Free Details "T-Printer," POB 23991 (GC), Tampa, FL 33623.

GOLD STAMPING MACHINES. Inexpensive. Quality. Large Imprint Area. Free details. Magic Systems, POB 24986 (GC), Tampa, FL 33623.

BUMPERSTICKER PRINTER. Cheap, Simple, Portable. Free Details. Bumper, POB 22791 (GC), Tampa, FL 33622. MAKE Rubber Stamps. Highly Profitable Business. Free

Details. Stamper, POB 22809 (GC), Tampa, FL 33622.

CONCRETE Block Machines: Catalog \$1.00. Route One,

Box 3740, Rapid City, South Dakota 57702-3740

REPAIR HYDRAULIC JACKS—DETAILS FREE. WRITE:

HYDRAULIC PARTS SUPPLY, BOX 4157, BROWNSVILLE, TEXAS 78520.

VENDING MACHINES. No selling. Routes earn amazing profits. "Big Catalogue FREE." Parkway Corporation, 1930 PMB Greenspring Drive, Timonium, Maryland 21093

LEARN Sewing Machine Repairing, Men, Women, Lucrative Profits. Gresslin Correspondence School, Box

5104, Spencer, lowa 51301.

MAKE MILLIONS MANUFACTURING BATTERIES!!!

Supplies available. Everlast, Box 365, Bogota, NJ 07603.

HUGE Profits! Reconditioning used car batteries. Secrets others don't tell. Stamp please. Battery Outlet, Box 3300,

Hickory, N.C. 28603.

PREPARE Tax Returns. Earn high fees, dignified work. Train at home. Accredited Program. National Tax Training School, Monsey, 2MT, New York 10952.

EARNINGS unlimited! Mail our burglar alarm advertisements from home! RBM Merchandising, Box 59314, Chicago, IL 60659

**LEARN MIRROR RESILVERING** free information. Silvercraft, Box 127, Lansdowne, PA 19050.

\$1,000 Weekly. Home Business Directory, Box 2019-PM, New York, New York 10163.

I MADE \$40,000 Year by Mailorder! Helped others make money! Details 25¢. Torrey, Box 318YY, Ypsilanti, Michigan 48197.

\$700 per month earnings possible preparing income tax returns at home or tax office. We show you how. Quickly learned. Details free. No salesmen. Federated Tax, 2065 Montrose, Chicago 60618.

FREE! Get listed. Receive (1000's) the Hottest Business Opportunities. Nonstop. Write: B/Assoc., Box 4222, Rockford, IL 61110

FANTASTIC EARNINGS!! Selling Books. Nation Marketing, 5A Elaine, Spring Valley, N.Y. 10977

RECYCLE METALS. NO, NOT BEER CANSI Easy \$458 weekly! Free information. Recycler, Box 1214, Franklin, TN 37065-1214

#### **BUSINESS OPPORTUNITIES**

(Continued from preceding page)

PROJECTION TV ... Make \$\$\$'s assembling Projectors ... Easy ... Results comparable to \$2,500 projectors ... Total cost less than \$30.00 ... PLANS, 8' LENS & Dealers information \$20.50 ... Illustrated information FREE ... Macrocoma-BCX, Washington Crossing, Pennsylvania 18977, Creditcard orders 24HRS. (215) 736-2880.

YOU'LL LOVE THE MONEY and the boss in your own wholesale business. Details. Thurber, 155 West Alpine, Stockton, CA 95204

START Your Own Big Money, Easy Home Book Business! Free Details. Rey, 12841 Hawthome Blvd. - #117D, Hawthorne, CA 90250

\$192.00 From Square Foot Plywood. (Huge Demand) Revealing Proof 50c. (Refundable). Woodwin, Bridgewater, Mass. 02324

SELL information. Stamped envelope brings details: INFOPM, Box 962, Glendale, CA 91209

MAKE HOMEMADE BOOKLETS. I've earned \$187,000 with mine. Free information, Falcon, P.O. Box 1039, Gatlinburg, TN 37738

NATIONAL BUSINESS NEWSLETTER- Monthly listing of business opportunities for small investors. \$25.00/Yr. ADS, P.O. Box 3614, Mansfield, Ohio 44907

SEIZED IN GOVERNMENT NARCOTICS RAID!! Automobiles ... Vans ... Boats ... Furniture ... Thousands other items. Buy Dirt Cheap—Resell for Big Profits! Free Information: Marcel, Box 7557-M, Monroe LA 71211

NEW OPPORTUNITY. Learn Telephone Service And Repair At Home. AVERAGE \$35.00/HOUR. Free Brochure. Setcomm., 2186-D Collins Blvd., Gullport, MS 39501

MAKE PVC FURNITURE. Turn your spare hours into \$31,200 yearly! Easy home assembly business. Write: PVC, 771PM, Battle Ground, Washington 98604

AMAZING FORTUNE hidden in "junked" batteries. Take it for pennies! 17 years Success Secrets yours now. Write: OwenCo, 771PM3, Battle Ground, Washington 98604

NEW discovery in battery reconditioning. Eighteen months guarantee means "Big Profits Fast"! Electone, 7415 Gable Dr., Little Rock, AR 72205

BIG income as independent sales representative. United Association Manufacturers' Representatives, Drawer 6266P, Kansas City, KS 66106

CARPET DYEING start your own business, complete package includes equipment, training & technical support. Free details. Professional Building Maintenance, 7005 Mohawk, San Diego, CA 92115. (619) 698-8586

MAKE \$240 Daily with Free tires/2 spare hours. 12 years Success Secrets now yours! Details: TireCo, 771PM, Battle Ground, Washington 98604

EXPLORE NEW MAILORDER Success Secrets. For 26 years I've helped others get rich. Now your turn! Write: Consultant, 771PM, Battle Ground, Washington 98604

ENJOY LIFETIME HOMEWORK. 48 years happy, easy, unique moneymaking. Now retiring! Free secret folio. PUBLICOS, Carlsbad, Calif. 92008

SELL Information by mail. Details - 22¢. Midwest, Box 44R2-PM, Shawano, Wis. 54166

MAILORDER! HUNDREDS WEEKLY! Home Business! No Experience! No Capital! Free Information, Infoco, Dept. PM10, 8638 Santa Clara, Dallas, TX 75218

\$2,000 FROM A 4-DAY WORK WEEK! Possible with this service offered to homeowners. Free details. Oakwood Publications, 5728 Upland Way, West Palm Beach, FL 33417

ACCOMPLISH Anything You Want In Life. Target, 7 Du Temple, Beauport, Québec, Canada G1E 428.

14,947 HONG KONG-TAIWAN Products Cheap. Small lots. Some samples free. Harbor, Box 1719PM11, Yuba City, CA 95992

ASSEMBLE wooden novelties at home. We pay \$232.88 weekly. No experience. SASE. Walpine, Box 660M, Pinellas Park, Fl. 34290-0660

\$1,000 WEEKLY Possible Bronzing Baby Shoes FREE BROCHURE SHOWS HOW. NBPM, 396 Airport, Sebring, FL 33870

BATHTUB REGLAZING, product sales, service and training. Call Unique Coatings Corp. (313) 538-8600.

FREE information on how you can achieve Financial Independence the proven way, Write today to: Longhurst & Associates, 210 Baronwood Court, Brampton, Ontario, Canada, L6V 3H9

REAL Success - Real Wealth - Proven Reliability - Consistent results. Free Details. H&J Associates, P.O. Box 635, Miller Place, New York 11764

\$100,000 YEARLY I I I Assemble "PROFESSIONAL" GIANT SCREEN PROJECTION TVs with lenses and screens utilized by SONY, ZENITH, SYLVANIA, and MAGNAVOX.

I. . Simple construction! . . . Illustrated information and complete parts catalog \$2.00 . . . Money back guarantee! . . . POLI-VISION, 187PM Cypress Street, Throop, PA 18512

HOW TO JOIN NEW AND EXCITING MULTI-LEVEL MAR-KETING PROGRAMS. Details Free. D.J. Enterprises, 1532P W. 257th St. #9, Harbor City. CA 90710

\$10,000.00+ Monthly possible recruiting multilevel distributors by mail. FREE details. Dickinson-PM1186, 313 Uncas, Milwaukee, Wisconsin 53207

HIGH Profits, Home Business. Free details. Nettco, 670-PM James, Walton, KY 41094

\$15 CAN MAKE YOU RICH! Proven easy way to build wealth. Free details or send \$15 for complete How To now! Premiere Books, Dept E, Box 5219, Winter Park, FL 32793.

\$20 PROFIT each sale! Coolmiser lowers air conditioning bills 10%. Regularly \$49.95, your cost as low as \$29.95. See full page ad in this magazine. Quantrol Instruments Corporation, 1310 McDuffie Suite-9U, Houston, TX 77019. Details SASE and \$1.

101 PROFITABLE BACKYARD cash crops, \$1500 month sparetime possible. Free details. Homestead, Box 988AR, Friday Harbor, WA 98250

MAKE HOMEMADE BOOKLETS. Money Never Stops! No Experience Necessary. FREE GUIDE. Anaquest, W9338 Oakland, Cambridge, WI 53523

GOING mail order businesses for sale. Relocatable Listing Service, Box 4293-GG, Wichita Falls, TX 76308.

FANTASTIC OPPORTUNITY! \$20,000.00 MONTHLY. DE-TAILS FREE! ÍPEC, 812 NASH, PM11, LOS ALTOS, CALI-FORNIA 94022

FREE DETAILS! . . . TREASURY OF HOME BUSINESS OPPORTUNITIES . . . ALLEN'S INFORMATION, RT. 2 BOX 90, MARION, KY 42064

FANTASTIC income opportunity. Multi level plan. No selling. Tallerico, 802 Saint James St., Pittsburgh, PA 15232

UNIQUE MONEY MAKERS!! Unusual Business ventures revealed! Details Free! Franklin Place, 13990 Valley View, PM, Red Bluff, CA 96080

\$2,000 weekly possible. Home business ventures. Free details. Profit, Box 24194-C, Minneapolis, Minnesota 55424-0194.

HUGE INCOME MONTHLY. Discover most profitable home business programs. Guaranteed earnings. Start immediately. Free details. Ideawise, Box 6206-LN, El Monte, CA 91734

BIG profits writing and publishing mailorder booklets. Free brochure. Publishing, Box 972, Orem, UT 84057.

NEW PUBLICATION - Secretive Methods Turn Debts Into Fast Profits. Atlas! Send \$9.95 to: "Rights", P.O. Box 82P, Vermilion, Ohio 44089

5,001 Moneymaking Opportunities! Free Catalog! Dynamics, Box 1306G, Stow, OH 44224.

START A SUPER PROFITABLE BUSINESS from scratch.
Free Subscription to Opportunity Magazine tells how, Write
Opportunity, Dept. 115, 6 N. Michigan, Chicago, IL 60602.

FREE Report: "Moneymaking Mailorder Facts." LaPacifica, Drawer 5877PM11, Bakersfield, CA 93388.

AMAZING details! How to run 7 different businesses from home! Choose business best for you. Guaranteed! \$15.00. Gerry Enterprises, Box 7542, Rego Park, NY 11374

GUARANTEED PROFITS! Birthday Reminder Calendar sells on sight. Calendars, Box 802P, Brigham City, Utah 84302

EARN \$1.000's! Home Mailing Program. RSB, Box 2659PM, Danbury, CT 06813

FREE! "HOME BUSINESS OPPORTUNITY DIGEST!" Metro, Box 7332, Hollywood, Florida 33021

UNLIMITED PROFIT POTENTIAL!! Easy, No-Risk, No Inventory New Multi-Level Fiction, Romance, Mystery Book Business. Free Details. Write: Prosperous, Box 9307-PM, Longview, Texas 75608.

HOMEMADE Money By Proven Sideline Business Success, Free Information, Telmar, 8651 Glenburney, Cincinnati, Ohio 45236

HOW TO GET RICH!! ... BOOK LOVERS ... NEW Business!! ... \$140,000+ Yearly Possible!! Details FREE!! JC Associates, 2713 Scapstone Drive, #A1116, Reston, VA 22091

\$25-\$400 Weekly! Home-operated mail-order marketing. Free details! Rush stamped envelope: United Mailers Association, Box 191309-PM51, San Diego, CA 92119. AMAZING profits!! 3,000 exciting items! Giant color catalog \$3.00 (refundable). Coletco, 29 Kenneth, Hartsdale, NY 10530

NEW INVENTION Multicolor Electronic Display, Free Details. Box 4152, Torrance, CA 90510

TOO POOR? Change that with a home business. Free details on seven do-it-yourself projects. Pleasant Valley Products, 357-5 Main, Pleasant Valley, VA 22848.

SELL 14K JEWELRY to friends, co-workers, relatives. Unlimited possibilities, high profits, 100% guaranteed. Direct from manufacturer. Low investment. Refundable. Samples and color catalog with over 1000 items starts you. For information call: 800-421-9693. In CA: 213-626-0559.

\$500 Monthly Work at Home Receive Money Daily. For Complete Set-up Send \$2.00 to: DLC Enterprises, P.O. Box 131, Four Lakes, WA 99014

NEW MULTILEVEL OPPORTUNITY! Get in on ground floor! Free Details for Large SASE. MDM Enterprises, Box 851375, Richardson, Texas 75085

\$500.00 INTEREST FREE LOAN INDEFINITELY Or Part Ownership in Corporation UNIQUE OFFER. Information \$1.00. RSB, P.O. Box 5011, Sioux City, IA 51102

ESCAPE the rat race. Join thousands making money at home. Seven proven plans. Free details. Pleasant Valley Products, 357-4 Main, Pleasant Valley, VA 22848

WOODWORKERS - turn \$4 material into \$39.95 - Details 25¢. Pine Shop, 897-3 Mammoth, Manchester, NH 03104

FREE DEALERSHIP - MAILING LIST CO-ORDINATOR. The Hog, 8048 Midcrown, Suite 321, San Antonio, TX 78218

START and operate your own Profitable Business at Home! Details \$1.00. SASE. JMS Enterprises, Dept. 103, 19609 CR 48, Rosharon, Texas 77583.

SHOESTRING Mailorder Profits Made Easy - Free Details. Financial Opportunity Center, Box 9000-473P, Carlsbad, CA 92008

STARTING A BUSINESS? Avoid Costly Pitfalls. Send \$5.00 for New Business Start-Up Checklist. Four Inc., Box 38151, Houston, Texas 77238

\$3,000 MONTHLY. Doing Business with Major Corporations. Venture-P, Alexandria, VA 22310

PROVEN home business opportunities. Details now. ROK, 1171 Cottonwood Hills Dr., Sandy, UT 84070

\$25.00 INVESTMENT can bring a lifetime income.

DREAMS FULFILLED Send \$2.00 for information and cassette tape: Dare Enterprises, 3039 Silverwood Drive,

Augusta, GA 30907

PIANO Tuning learned quickly at home. Free information. Empire School, Box 1014PM, Jupiter, FL 33468.

MULTI-Level Mailorder, Incredible Opportunity, Details: O'Neil-M, 10 Oak Lane, Suisun, CA 94585

NEW BUSINESS START UP KIT. Free Information. Four Inc., Box 38151, Houston, Texas 77238

FREE MLM BOOK!!! Multilevel Secrets! Matrixe, Box 3279, Idaho Spring, CO 80452

CURIOSITY CAN MAKE YOU MONEY. LET ME SHOW YOU HOW. Details \$2.00 (Refundable). Sure Profits, c/o Box 196, Pitt Meadows, B.C., VOM 1PO

ALUMINUM SCRAP — Recycle Yourself — MAKE \$25.00/ POUND! Free Information: Industrial-PM611, Box 127, Alexandria Bay, New York 13607

MULTILEVEL marketing produces 20% of American millionaires! Information, support, leads provided for hottest ground opportunities, 1-800-624-0894, X-649

NUWAY BUILDING—Make Durable building plastic easily. Waterproof. Fireproof. Attractive. Cheap. Start small. Bays Laboratory, 2086-2075 Drive, Cedaredge, CO 81413-9628

\$40-\$108/HOUR. Amazing breakthrough process restores Burned, Cut, Damaged Countertops WITHOUT REPLACE-MENT. 2 hours/day earn \$30,000/year. Millions of apartments, homes pay profits immediately! Free Information. RENEW. Box 19636. Portland. Oregon 97219.

EASY BUSINESS! Earn \$1,000's Weekly. Free Details. Write or send stamped addressed envelope. Toddco, Dept. PM, 4219 West Olive Ave., Burbank, CA 91505.

FREE!...TREASURY OF HOME BUSINESS OPPORTUNITIES ... MAILCO, BOX 34370, BARTLETT, TENNESSEE 38134-0370

FANTASTIC Business Opportunity, make money, be your own boss. Free details. Action Products Co., 2441 Ninth Avenue North, St. Petersburg, Florida 33713

FREE Dealership-Sell Mailing Lists! Complete Program Free! PCW, Box 1302PM, Valley Stream, NY 11582

ALL BUSINESS, MONEYMAKING OPPORTUNITY ADS this issue get your name. \$4.00 before Nov. 30. Mailquick, 4046 SR 309, Gallon, OH 44833

#### **BUSINESS OPPORTUNITIES**

(Continued from preceding page)

BE YOUR own Boss! Start your own Business! Free Information: Higgs, 176 Baker T, Huntsville, Alabama 35806

MAIL ORDER WANT TO BUY small going business. (305)

GET RICH! Selling Books By Mail . . . 400% Profit! Dealers Wanted. FREE Info. Premium, Box 1621-L, Spring, Texas 77383

EXTRA INCOME. Assemble products at home. No experience. Details. 1-813-545-8421. Ext. 698

HAD ENOUGH? ARE YOU JUST LIVING FOR FRIDAYS? I'LL HELP YOU EARN YOUR FORTUNE! WRITE NOW FOR FREE DETAILS. FOUR WINDS, 4271 NORTH FIRST, STE. 104. SAN JOSE, CA 95134

\$3,000.00 in 30 days ... Guaranteed! Free Communications-Pl, Box 2112, Asheville, NC 28802 Guaranteed! Free Report.

IDEAL Multilevel Concept. Matrix System requires \$25.00 month for bonus checks with 98% of downline purchasing each month. Branton, Rt.3, Box A-1 (54-A), Ashford, AL 36312

ULTIMATE HOME BUSINESS For The '80s Explosive Income Opportunity Company Car Program, Computer Sertter, Liftime Membership, For Information Send \$6.00 To Cover Postage And Handling To: Loiler Enterprises, Box 183, Pine Grove, CA 95665

ITS TRUE - "Relax & Get Rich" - Free Information, Marie Rich, Box D 62156, Tucson, AZ 85734

TREMENDOUS OPPORTUNITY The best plan I've ever seen for making money period. Free details: TWH Communications, 666 Lake Shore Dr., Suite 810, Chicago, IL 60611

HOW TO RETIRE EARLY! Sell information by mail. FREE details. Write today! Schreiber Publishing Co., 5309 Sevilla Court, Dept. 132, Whittier, CA 90601

FREE Information! 101 Easy Businesses! Start on a limited budget! Higgs, 176 Baker, Huntsville, Alabama 35806

MULTI-LEVEL MARKETING HOTLINE (Recording) 308-345-2250

GET RICH NOW! Quick! Easy! Foolproof! Free Details! Moneyplan, 6520 Selma, #32PB6, Los Angeles, CA 90028.

#### MONEYMAKING OPPORTUNITIES

"EASY MONEY" 22¢ stamp brings details. Losso, Box 290475, Fort Lauderdale, Fla 33329

GET RICH!! Secret law smashes debts-brings Cash, Credit! FREE report!! WealthKit/B, Box 4036, Pompano, FL

GOLD STAMPING MACHINES. Inexpensive. Large Imprint Area. Free details. Magic Systems, POB 24986 (GG), Tampa, FL 33623.

MAKE Rubber Stamps. Highly Profitable Business. Free Details. Stamper, POB 22809 (GG), Tampa, FL 33622

BUMPERSTICKER PRINTER. Cheap, Simple, Portable. Free Details. Bumper, POB 22791 (GG), Tampa, FL 33622.

FANTASTIC earnings mailing from home!! Offer: Rush Stamped Addressed Envelope. Imperial, P-8 X17410, Fort Lauderdale, FL 33318

ADVERTISE Free in 507 Magazines. \$5.00. Directory, Box 11N. Atlanta, Georgia 30301

SCREEN PRINT T-SHIRTS, inexpensive kits. Free Details. T-Printer," P.O. Box 23991 (GG), Tampa, FL 33623.

FREEDOM from financial worries, operate a profitable business at home. Free information. Jent, 52 East Elmwood Suite 17, Chicago Heights, Illinois 60411

FANTASTIC Moneymaking Opportunities! Step-by-Step Instructions, Guaranteed, Details FREE! HIS Enterprises. 2051 Fourteen Mile Road #1186PM, Sparta, MI 49345

WIN AT THE CASINO! Bet like the pros. Get the edge using ummarized stastistical data. Send \$5.00 today. "RUSSELL", P.O. Box 30118, Tuscon, AZ 85751-0118.

GENUINE MONEY MAKER, TRY it. You'll LIKE it. Free information. Hay's Corner, 185 Sells, Sparks, NV. 89431

MAKE MONEY WITH NEW HOMEWORK PLAN! Quick Success. Full/Part Time. GUARANTEED. Free Valuable Re-Custom Marketing, 6689 Orchard Lake, West Bloomfield, Michigan 48033

START Own Profitable Business!! Experts Reveal Mone making Secrets. 490 Ways. Free Details. NCN, Box 3334P, Pawtucket, RI 02861

OPPORTUNITIES GALORE! You choose. Stamp: DeClue, Box 14016, Sarasota, FL 34278

KEEP \$19.00 Every \$20.00 Sale Selling Information By Mail! Details 25c. Wilco, Postbox 17356PM, Montgomery, AL

STARTING YOUR OWN BUSINESS. FREE Subscription to Opportunity Magazine tells how. Write: Opportunity, Dept. 118, 6 N. Michigan Avenue, Chicago, IL 60602.

INCREASE YOUR INCOME in your spare time. Four money making programs. \$1.00. Westyork, Box 73, Dunbar,

"SUCCESS, Money, Power." Free literature send selfaddressed envelope. Heriee's Co., Box 27731, Tucson, Arizona 85726

GET Rich With Stocks! Learn How It's Done, \$5.00 To: E. William & Associates, 781 West Oakland Park Boulevard Suite 361. Fort Lauderdale, Florida 33311

WRITE short fillers for magazines. Professional guidance, market directories, inside secrets, writing assignments, criticism of your work, list of magazines and rates they pay. Ten lesson course, guaranteed. \$9.95 plus \$1.00 shippin RAM Enterprises, 2010 Tenth Street Pl. N.W., Hickory, NC

MAILORDER Buyers Lists that pull! For complete details SASE. Austin List, P.O. Box 693, Redan, GA 30074

EARN THOUSANDS At Home Simple Plan, FREE DE-TAILS, R. Venter, 111 Countryside, Longwood, FL 32779

WEALTH UNLIMITED, INC. Unlocking the best Kept Secret in the financial world YOU, Information and tape \$3.50 Elaine Niemeyer, Route 2, Box 130, Grant Park, IL 60940

FIVE MONEYMAKING REPORTS. Fantastic profits with "Government Surplus", "Coins", "Stamps", "Inventions" or "Real Estate". \$3.00 each. All five ONLY \$13.00. SATISFAC-TION GUARANTEED. Global House, Dept. PM11, 210 Highland Ave., P.O. Box 303, Moundsville, W. Va. 26041

GET RICH MAIL ORDER SECRETS! SASE, must! Foster. Dept. PM11B, 637 Circlewood Drive, Richmond, Virginia

IMPORT from Hong Kong, Taiwan, Singapore. Details free. Delvon, Box 853P1, Huntington, TX 75949

FREE Details. Earn 1000's with your own profitable busis at home. Great West Enterprises, P.O. Box 111381, Dept. PM, Aurora, Colorado 80011

MONEY From discarded tires! Details. Brownie, Box 53, Fishers, Indiana 46038

\$\$ BIG Commissions \$\$ at home/anywhere. No hassles. Send for Free Info. Dept. PM11, 3045 Waukegan, Simi Valley, CA 93063

**OPPORTUNITY** for **HUGE PROFITS** in your own business \$5.00. Four Inc., Box 38151, Houston, Texas 77238

HOUSE WIVES - need extra CASH clean - pleasant - easy write: Ocean Enterprises, Dept. Al, Box 3189, Yountville, CA 94599

EARN \$5,000 ANY WEEKEND! Amazing new syste akes it easy. No money needed. Skeptical? FREE PROOF. Write: Crossroads, Box 5097-C3, Babylon, NY 11707

\$25,000 WEEKLY! Instruction manual and starter kit \$10.00. B. Davis, POB 301311, Portland, OR 97230

SUPER Home Income!! Rush SASE!! Mitchell, Box 11453PM, Eugene, Oregon 97440

UP TO \$200,000 IN 24 HOURS, GUARANTEED PLANS, FREE DETAILS. Dept M, Box 4458, St. Paul, MN 55104

GET RICH!! Zero Investment. No Borrowing. Free Details! Money, 6520 Selma, #32PB6, Los Angeles, CA 90028.

INVEST \$30.00, make \$3,000! INDEFINITELY! FREE OF-FER! SHORTCUTS, POB 513, Elizabeth, NJ 07207-0513

HOW TO MAKE MONEY THROUGH CLASSIFIED AD VERTISING. Booklet shows you how to start your own busi ness with Classified Advertising. ONLY \$1.00 FOR BOOK-- (\$2.00 coupon refundable with first order). S.S. GRONOWICZ, POPULAR MECHANICS, DEPT. PMC1, 224 WEST 57TH ST., NEW YORK, NY 10019

#### **MAILORDER OPPORTUNITIES**

FINANCIAL FREEDOM can be yours. Sell your favorite RECIPE to thousands, for \$5.00 per copy. Send \$2.00; Spinners Of Creation, 2995 Woodside Rd., Ste. 400-340, Woodside, CA 94062.

GUARANTEED deliverable. Names that will respond to mailorder offers. All categories. SASE. D.P.K. Lists, 37 Oiibwa, Shelton, CT 06484

GOVERNMENT Surplus - Report \$3.00. 4899S Dudley F-6, Littleton, Colorado 80123

HAVE you a great idea, a fantastic plan or a very interesting project? Why not put them to work for you! Classified Adver tising can be of tremendous value in promoting all these things and more. Learn HOW TO MAKE MONEY THROUGH CLAS-SIFIED ADVERTISING by sending away for POPULAR MECHANICS PROFIT BOOK. Price \$1.00. Send to: PM Classified, 224 W. 57th St., New York, NY 10019

#### RABBITS-CHINCHILLAS-FUR BEARING ANIMALS

**GUARANTEED INCOME.** Raise Chinchillas. Send \$10.00 (refundable) to: Chinchillas, Dept. B, P.O. Box 7463, Mesa, Arizona 85206

#### OF INTEREST TO ALL

GET ORGANIZED "A Manual For Home Filing" \$12.95. Bow Press, Box 5, Dept. 21, Sonoma, CA 95476

FREE PRIVACY CATALOG. Cash income opportunities. Hiding assets. Secret loans. New identity. Eden, Box 8410-PC, Fountain Valley, CA 92728.

FREE Promotional Albums, Concert Tickets, Stereos, etc. Information: Barry Publications, 477 82nd Street, Brooklyn,

TELEPHONES sales—service (American made) write: Telephones, Box 6M, Simpson, PA 18407

RELAX ... AND GET RICH! See Details; Global Trade Enterprises, Box 114PM, Danville, IL 61834-0114

LEARN To Sharpen Chainsaws. Illustrated Booklet. \$4.00. Gregg, P.O. Box 1967, Willis, TX 77378

BEAUTIFUL Cypress Clocks. Deep Rich High Gloss Epoxy Finish. Accurate Quartz Movement \$39.95 PPD. Larry Ferguson, Rt. 2 Box 422, Nauvoo, AL 35578

REV UP YOUR SEX LIFE With Grandma's Ever Loving Recipes, \$5.00. Eaton, Box 8597, Palm Springs, CA 92263-8597

MEN-Thrill your lady: New No-Run Sheer Pantyhose! Also business opportunity. Unlimited market/profits. LSASE. Hosiery, Box 8272P, Durango, Colorado 81301.

BUGGED?? EAVESDROPPING now unbelievably wide spread! Free Info latest "Bug" Detection Equipment! 1-800-732-5000

PROFITABLE Hobby. Free samples: shows how new method teaches anyone. Watercolor Painting, in minutes. SASE. Duhamel, 205-70 Clipper Rd., Willowdale, Ontario, Canada M2J 4E3

#### OF INTEREST TO MEN

BEARD, MUSTACHE TRIMMER, \$14.95 Nose hair trimmer FREE! Guaranteed. Estrada Co., 11529 Davenrich, Dept. PMB. Santa Fe Springs, California 90670

#### LAW ENFORCEMENT

AT LAST! LAW ENFORCEMENT EXAMINATIONS MAN-UAL. EXTENSIVE STUDY MATERIAL. 200 QUESTIONS: ANSWERS. NO NONSENSE! YOU CAN PASS! \$10 TOTAL! CONSONANTS, Box 12615, Denver, CO 80212

#### **GOVERNMENT SURPLUS**

"GOVERNMENT SURPLUS" JEEPS \$30.00! 5,000,000 Items! Complete Information Your Area. 1987 OFFICIAL DIRECTORY, \$3.00 (Guaranteed), SURPLUS, (B145), 4620 Wisconsin Northwest, WASHINGTON, D.C. 20016

#### LOANS BY MAIL

MONEY Problems? Free Book describes Loans, Cash, Government Grants, Other benefits, available to individuals Write: Associates, Box 98-AX, Brooklyn, New York 11235

BORROW \$25,000 "overnight." Any purpose. Keep indefinitely! Free Report! Success Research, Box 19739-AY, Indianapolis, IN 46219.

LOANS by mail! Instant reply! Rush stamped addressed envelope: Marigold, Box 2030, Richardson, TX 75080.

QUICK Cash LOANS! Write: FICPA, P.O. Box 748. Pinconning, MI 48650

\$500-\$35,000 loans. Self Address Envelope. Prosper, P.O. Box 320-PM, Mount Sinai, N.Y. 11766

BORROW \$60,000 "overnight". Any Purpose! Keep indefinitely! Free details! Write: Martin, P.O. Box 45-M, Old Westbury, N.Y. 11568

NEED Money? Cash, Loans, Government Grants. 99% eligible-no investigation. KPA, Box 373PNM, Woodmere, New York 11598

VISA®/MASTERCARD®, Simple, Effective, Guaranteed Program. National Credit Network 1-800-626-8902

FREE MONEY! \$300,000,000 Giveaway. Grants. Never repay. Details \$1.00. Jakla, Box 3066PM11, Seminole, FL 33542

BORROW \$100,000, Prompt Action Guaranteed, Rush Stamped Envelope: Financing, Box 1015, Carlisle, PA 17013-6015

SIGNATURE LOANS-Confidential transactions handled entirely by mail. Details Free. NACC-PM11, Box 5399, Torrance, CA 90503

#### LOANS BY MAIL

(Continued from preceding page)

VISA® Obtained Easily! Free Details! Credit-PM986, Box 2298, Sandusky, OH 44870

FREE details. Get Credit Cards, Cash. Loans in Time for CHRISTMAS. Financial Consultants, 2415 Green, Urbana, IL 61801

VISAMASTERCARD Also Quick Loans. Refused Elsewhere? Try Us! National Finance, Box 35726, Richmond, Virginia 23235

VISA® Obtained Easily! Free Details! Credit-PM1186, Box 2298, Sandusky, OH 44870

BORROW \$500-\$40,000! On Signature. Without collateral. Keep indefinitely! Action R-11, 3660 Wilshire, Los Angeles,

#### DIVORCE

MEN'S RIGHTS WINNING Information \$2.00 ASSOCIATION, 17854 (Lyons), Forest Lake, MN 55025

#### PERSONAL

BIBLE Questions answered. Stamped envelope. Bylon, k7167 Bentler, Detroit, Michigan 48219

VIDEOTAPE (VHS) & BUDGET BOOK Teaches How Anyone Can Be Financially Independent. Learn professional money management, \$69.95 Mail check to: Dumac Studios. Inc., 143 Pondridge Rd., Libertyville, Illinois 60048.

#### REMAILING SERVICE

FREE Details! Postal Shoppe, 369 East 900 South, Salt Lake City, UT 84111

FREE Facts! Mail Store, P.O. Box 2523, Santa Barbara.

FREE Details. Forwarding. Remails \$1.00. Vaughn, Box 3191, Culver City, California 90231

TRUSTWORTHY forwarding. Stamped remails \$1.00. Diamond-H, Box 129A, Caddo, Texas 76029.

FREE Remailers List. Agents Needed. PS, Box 29656, San Antonio, Texas 78229

UNLISTED ADDRESS Discreet and confidential. Remail \$1.00 Single. Mail Forwarding Service, 8050 S. Main, Houston, Texas 77025

CONFIDENTIAL Mail Receiving/Forwarding. Mail Drop. Box 18039PM, Orlando, FL 32860

SECURITY. Confidentiality Details Warehouse, 6333 Pacific #508, Stockton, CA 95207

DEEP South Remailed Same Day Received Or Date You Specify. \$1.00. Box 26165, Birmingham, Alabama 35226

NORTH POLE remails, stamped \$1.00. Christmas is coming! Phillips, P.O. Box 55692, North Pole, Alaska 99705

INDONESIAN remails! Letter \$2.00, free Bali postcard, age, similar handwriting, \$2.00-QNE, Box 856KBY, Jakarta, Indonesia 12001.

FREE Information On Remail And Mass Mailing Services, Send SASE, P.O. Box 650164, Houston, TX 77065

SECRET MAILBOX. Free details: Private Postman, Box 87210P, San Diego, CA 92138

FREE PACKET/Remails, Flying Fingers Business Services, 4806X Stearns, Valrico, FL 33594

#### MISCELLANEOUS

FULL-AUTO Knives In Legal Kit Form. Collectors. Sportsmen-One Handed Operation Can Save Lives. Free Full Color Catalog: The Edge Company, P.O. Box 826, Brattleboro, VT 05301 or Call Toll Free 1-800-445-1021

THOUSAND FLAGS Lightweight, polyester, 36×60. U.S. Flag \$19.95. We also have STATE, ARMED FORCES, FOR-EIGN and RELIGION flags, and many more below wholesale. J. Hudson, 12571/2 So. Plymouth Blvd., Los Angeles, Cal.

"IMPORTANT INFORMATION!!" For All Credit Card Users \$3.00. 2138 Wooddale #12G, Baton Rouge, LA 70806

PROTECT YOUR VALUABLES! Mark them with SECURI-TY PEN TM invisible ink. Police identifiable under black light. \$3.49 Postpaid. ERKA Products, 104 Lakeland Drive, Raynoldsburg, Ohio 43068

#### WANTED MISCELLANEOUS

BUYING Tungsten Carbide, Tungsten, Molybdenum, Silver Solder, Silver Contacts, Gold, Platinum, 800-321-6914 Ohio 216-531-8333 collect.

GOLD, Silver, Platinum, Mercury, Tantalum. Samples Evaluated Free. Ore Assaying Service. Call Wholesale Terminal Toll Free: 1-800-932-1010.

SCRAP SILVER CONTACTS, FORKLIFT CONTACTS, Silver Solder, Sterling. Gold Plated. Robert Leszczak, 652 Myrtle St., Elizabeth, NJ 07202

CASH for old records! Priced, illustrated catalog. \$2.00 (refundable). Discollector, Box 32924(PM), San Antonio, TX 78216

#### FOR SALE MISCELLANEOUS

121/2 GAL. Steamex Carpet Cleaning Machine, fully reconditioned, \$795.00, Same Warranty as new. Jerry Breen, Breen Steamex, 421 N. Main, Monmouth, Illinois 61462. Phone 309-734-8088.

#### **HEARING AIDS**

HUGE SAVINGS Eliminate Dealer Markups. Free Trial, Batteries Wholesale, Terms Arranged, Call Toll Free 1-800-323-1212. Or Write: Lloyds-PMC, Rockford, IL 61110

FREE HEARING AID CATALOG- Save 1/2 by mail! Write: 9530PM-11, Langdon, California 91343.

#### TOBACCO

MAKE Pipes. Information: PIMO Inc., PN86, Box 59211, Chicago, Illinois 60659

BITELESS Pipe Tobaccos \$2.00 Samples. Gabé Imports. Box 741, Hays, KS 67601

DO YOU chew - smoke? Free Samples. Write. Fredco's, Dresden, Tennessee 38225

SMOKE A PIPE? Try BOURBON VANILLA tobacco. \$1.00 for sample and catalog. PIPE 'N TOBAC, Broadway Square Mall, Tyler, Texas 75703

#### SCIENCE & CHEMISTRY

FREE, SCIENTIFIC CATALOG. RJM Laboratories Inc. Presents its Latest Catalog Containing Scientific Laboratory Equipment And Supplies, Including A Complete Line of Specialty Laboratory Glassware, Write Today For Your FREE Catalog. RJM Laboratories Inc., P.O. Box 899, Santee, CA

1967 CATALOG, 200 pages. Chemistry, Biology, Physical & Earth Science, Nature, Dinosaurs and much more. Beginner to professional. \$2.00. Merrell Scientific, 1665 Buffalo Rd., Rochester, N.Y. 14624

LABORATORY CHEMICALS, GLASSWARE - APPARA-TUS. Established 1953 - Catalog \$1.00. HAGENOW LABORATORIES, 1302 Washington. MANITOWOC, WISCONSIN 54220

#### FORMULAS, PLANS, ETC.

MONEYMAKING CHEMICAL FORMULAS-THOUSANDS! CATALOG \$5.00 (REFUNDABLE): GWA3, Box 193, Brookfield, Wisconsin 53008-0193

ANY Formula \$10.00. Catalog \$2.00. J. Belfort, Box 568. Chicago, 60690

#### SPECIAL SERVICES

INFORMATION On anything. Ferguson Research Specialists, 60-15 Woodside, Woodside, New York 11377.

#### HERBS

GIANT Herb Catalog! - Free Samples! Send \$1. (Refundable), Penn Herb, 605P North Second, Philadelphia.

IMPROVE health, muscle tone, weight management with regenerative herbs, from SUNRIDER, Information \$3.00. Elaine Niemeyer An Independent Sunrider Distributor, Route 2, Box 130, Grant Park, IL 60940

#### **HEALTH, VITAMINS**

NEW LINSMOKING PROGRAM, WHO'S IN CONTROL? Unparalled in simplicity, this program was designed through smokers' actual experiences and has been made as painless as possible. With light-hearted and lively text, the unsmoking program actually lives with you in a friendly and open manner for 19 days. TAKE CONTROL NOW! For complete satisfaction guaranteed program send \$69.95 to: R+W Associates, 353 Rubkon St., Hustisford, WI 53034

WEIGHT Problem? Complete diet plan, menus, tasty recipes. Order today. \$3.00. Toni Rogers. 7035 PM S.W. 10th, Topeka, KS 66615

CONTROL YOUR DIET! DIET-N-DIARYTM is fantastic new concept for planning meals and counting calories. Includes Calorie Reference Book, Planning Sheets, Calendar, Wallet. \$9.95. Guaranteed! DIET-N-DIARY™, Box 447-PM1, Arlington Heights, Illinois 60006

#### RECIPES, COOKING, ETC.

SOMETHING SPECIAL, Recipes: Complete Thanksgiving Dinner Featuring Beef/Chestruit dressing: \$4.00 LSASE Ashley, Box 2283, LaGrange, IL 60525

BEER BREAD - Quick and delicious! Recipe \$1.00 SASE: Rustin Cheney, 812 Nash, Los Altos, CA 94022

10 DELICIOUS EGGPLANT RECIPES, \$2.00. P.O. Box 756, Boca Raton, Florida 33429

HOMEMADE pecan rolls, so delicious and easy you won't lieve it! Recipe \$2.00: Vicki, P.O. Box 172, Bluffton, IN 46714

24 OLDE ENGLISHE RECIPES \$5.00. Fosters, 56 Lowlands, Streetly, West Midlands, England, B74 3RA

OLD FASHIONED DARK FRUITCAKE, Recipe \$3.00. Rosser Enterprises, Rt. 7, Box 64, Florence, SC 29501

15 ABSOLUTELY Scrumptious European Recipes \$3.95. MT Enterprises, P.O. Box 680191, San Antonio, Texas 78268

POTATO RECIPE BOOK 101 scrumptious recipes \$5.95. The Vans Co., P.O. Box 443, Utica, NY 13502

EASY GOURMET RECIPES, Six, \$3.00. S. LeGette, 111 Countryside, Longwood, Florida 32779

USING WILD PLANTS DELICIOUSLY Softbound, send \$4.00. Gardner Publications, Drawer FF, Hot Springs.

DELICIOUS! Peanut Butter Pie. Sells well. \$2.50. Schrocks Enterprises, Route 2, Box 159, Arthur, IL 61911.

DAVE'S PRIZE WINNING TORPEDO CHILI recipe. Greek style. Guaranteed results. \$3.00. SASE. Chilico, P.O. Box 838A. Burlington, KY 41005

HOLIDAY SPECIAL NEW YORK'S ORIGINAL CHEESE-CAKE RECIPE; send \$2.00 to: Paula Henderson, 44 New Rd., Newburgh, NY 12550

CHINESE COOKERY, 43 excellent recipes, \$5.00. Carolyn's House of Gifts, 709 Mary Court, Fenton, MI 48430.

MICROWAVE Amaretto Cheesecake \$2.00. Recipes, P.O. Box 6644PM, Hilton Head, South Carolina 29938

AUTHENTIC TEXAS BARBEQUE SAUCE Three great recipes, \$3.00 SASE. Livestock Exchange Building, S. Blackwell Inc., 131 East Exchange, 100 H., Fort Worth, Texas

ITALIAN RECIPES BY LEONARDO. Authentic Lasagne \$3.00, Fettuccine Alfredo \$2.00, Clam Sauce Red And White \$3.00. All Four Only \$5.00. Four Winds, 4271 North First, Suite 104, San Jose, CA 95134

#### WINEMAKING, BEERMAKING, ETC.

WINEMAKING-BEERMAKING-GASOHOL, Free Supply Catalog. Yeast Equipment Continental, Box 188PM, Casselberry, FL 32707

**BEERMAKING - WINEMAKING** Catalog. Lowest Prices. BEERGEAR, Box 25093N. Lansing, Michigan 48909.

WINEMAKERS-BEERMAKERS - Free Catalog - Fast 7850-L. Service - Large Selection: Kraus, Box Independence, Missouri 64053

WINEMAKERS-BEERMAKERS: FREE ILLUSTRATED CATALOG OF SUPPLIES. SEMPLEX, BOX 12276R, MINNEAPOLIS, MINNESOTA 55412-0276

WINE/BEER MAKING Catalog: B&J Enterprises, 1845 South 19th, Springfield, Illinois 62703

WINEMAKERS-Beermakers Free Catalog, Low Prices. Free Recipes, Cellar-M. Box 33525, Seattle, WA 98133

BEERMAKERS ONLY! FREE Catalog/Newsletter. William's, Box 2195MX, San Leandro, CA 94577

MAKE QUALITY BEER, Wine. Free catalog. Village Store, Box C-51PM, Westport, MA 02790. WINEMAKERS-BEERMAKERS Fresh Stocks, Fast Ser-

vice, Free Catalog.O'Briens, Box 284D, Wayne, IL 60184 FREE catalogue, latest homebrewing equipment. New

World Enterprise, 308P Chapel Hills, Boone, NC 28607 SAVE! Make your favorite Liqueurs at home. 45 easy recipes. Send \$4.95 to: Kailu Co., Box 15315A, Milwaukee.

Wisconsin 53215

#### **BURGLAR ALARMS & HOME PROTECTION**

ALARMS Catalog: Complete Instructions And Parts. Home And Cars, CCTV, Telephone Equipment. Only \$1.00. P.O. Box 1504, Upland, CA 91786

ALARM Decals, Pkg. \$2.00. Mitchell's Signs, Box 146, Rustburg, Virginia 24588

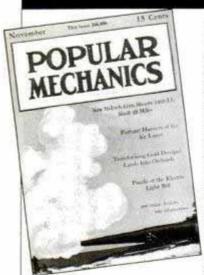
ALARM, Residential, Commercial, Auto, All Digital, Engineered Plans \$5.00. SMF Enterprises, 6 Wilders Grove, Kingston, NH 03848

CHAIN ALARM. Attached to doors or windows easily. Strong chain. Piercing alarm stops burglars, \$7.95. MO Enterprises, Box 4202, Overland Park, KS 66204

MAGNETIC LOCKS, \$7.35. Hill Imports, 69 E. Main, New Concord. Ohio 43762

## TIME MACHINE

75 YEARS AGO: November 1911



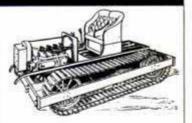
Huge gun with 20-mile range.

#### Gunsmoke

To defend the Panama Canal, America built a 16-in. gun that could fire a 1-ton shell 22 miles. On completion, the oversized breechloading rifle failed to fire and the shell was redesigned to slightly smaller dimensions. Even so, with a 576-pound charge, the gun threw a projectile weighing almost 2 tons about 20 miles. If the gun had been mounted in New York harbor, we estimated, it would be able to hit a target on Long Island. The gun weighed 130 tons. It was never fired in combat.

#### Snow cat

It had wooden treads, an automotive chassis and an internal-combustion engine. The vehicle (right) designed by Caterpillar Automobile was used to transport freight across snowbound portions of Alaska's vast Arctic wilderness. Each belt of the chain treads was 3 ft. wide. Each side of the vehicle had separate drive for turning. A tread projecting from the rear of the car helped steer it on hardpacked ice that dotted the tundras. It stayed in use through the late 1920s.



#### Braille typewriter

In 1911, a French company announced the invention of a new typewriter that wrote in Braille for the blind. It came with a device to help the blind user compare his copy with notes or with source material in Braille. It was a breakthrough in independence for the blind.

#### 50 YEARS AGO: November 1936

#### Streamlined lines

The streamlined train was coming into vogue. Canada had just started running its first streamlined diesel, but the United States had been using the new aerodynamic designs for a decade. The streamliner, while nominally faster than its predecessors, was really brought on line to attract passengers to a dwindling rail passenger business. The auto had been putting a dent in the trade. No one knew in 1936 that the airplane would eventually finish off the passenger-train industry.

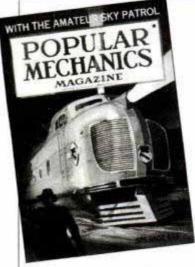


#### Weld done

New welding equipment made it possible to perform major engineering jobs onsite. Before 1936, such jobs had to be done in the shop, delaying production time.

#### Dry-cleaned coal

Coal was still a major energy source in 1936, and still a major pollutant. The standard way of processing coal involved water cleaning in a plant before delivery. But a new "dry cleaner" was introduced in 1936. The device was portable and ran on tracks. It processed up to 100 tons per day. The coal would be placed in the machine and an air and sand mixture would be poured over it like a liquid. The results were pure coal separated from slate and a cleaner fuel supply.



Canada entered streamlined era.

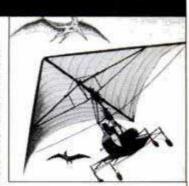
#### 25 YEARS AGO: November 1961

#### Wash it yourself

POPULAR MECHANICS designed a car wash system you could build yourself for under \$25 at the time. The materials used included aluminum tubing, a plain garden hose and sprinkler heads easily available for underground lawn-sprinkling systems. The entire affair could be assembled in minutes and came equipped with an automatic soap dispenser and other nifty features. We noted that the washer could be used as a fund-raising tool or to water down the kids on a hot day.

#### Pterodactyl

Test pilot Lou Everett tried out a new ultralight aircraft called Pterodactyl (right). Its nylon wing over an aluminum frame shadowed the single-seat open cockpit. It had a 100-hp engine and a push prop. The pilot used conventional stick and yoke control to fly the ungainly looking bird. The machine took off at 30 mph, making gentle turns as the overhead wing shifted position like an Arabic sail. The flex wing was designed to be used for combat infantry. It never came into use.



#### Football tips

Pro quarterback Norm Van Brocklin taught us how to watch the fast-paced action of a football team. His main tip: keep watching the quarterback.



Build-it-yourself car wash.

POPULAR MECHANICS (ISSN 0032-4558) is published monthly by The Hearst Corporation, 224 West 57th Street, New York, NY 10019, U.S.A. Subscription prices: United States and possessions, \$13.97 for one year, \$23.97 for two years. Canada and all other countries, aid \$16.00 for each year. Second-class postage paid at New York, NY, and additional mailing offices. Authorized second-class mailing-in-Canada privileges by Canada Post, Windsor, Ont. Registered as second-matter at the Post Office at Mexico D.F., Mexico, June 20, 1960, © 1986 by The Hearst Corporation. All rights reserved. Printed in U.S.A. POSTMASTER: Please send address changes to Popular Mechanics, P.O. Box 10064, Des Moines, IA 50050.



High-performance racing cars that generate about 600 horsepower demand tough, quality parts. So does your car. And Motorcraft spark plugs, filters, batteries and motor oil deliver top performance, out on the race course or on the highway. Because the technology used to develop Motorcraft racing parts is the same technology used to develop Motorcraft quality parts for your car or truck.

Motorcraft quality parts have been installed as original equipment in more than 35 million Ford, Mercury and Lincoln cars and Ford trucks and are engineered to meet the needs of all vehicle manufacturers. So no matter what kind of car or truck you own, there's only one logical choice. Motorcraft, of course—so you know you're getting reliable original equipment quality replacement parts. Race-proven parts. Trustworthy parts. Motorcraft from Ford. Quality parts for all makes of cars and trucks.

## **Motorcraft from Ford**

EXCEEDS THE NEED



Buckle up-together we can save lives.



## "Some windows are too cold."



North, south, winter, summer windows made with Sunglas

Heat Reflective glass work like transparent insulation to save you valuable energy dollars year-round.

Sunglas HR also helps reduce condensation and drafts to keep you more comfortable day and night no matter what the weather.

Sunglas HR is the insulator that really is a window. A high-tech glass that looks like old-fashioned clear glass, but actually reduces both heat loss and heat gain 65%\* by keeping radiant heat where you want it:

inside when it's cold — and outside when it's hot.



#### "Some windows are too hot."

In other words, with Sunglas HR your windows are never too hot, or too cold — but just right.

What's more, Sunglas HR also reduces the sun's harmful ultra-violet rays that cause premature fading of household fabrics.

"Versus single glazing. Based upon ¾" air space. Performance will change with the width of the air space. Sunglas HR is ideal for new homes and replacement windows, even for simple addon storm windows.

Sunglas HR also makes great energy sense for sunspaces. In fact, the larger your glass area, the more you need Sunglas HR.

Ask for Sunglas Heat Reflective glass from Ford Glass by name, because when it comes to glass that works 24 hours a day, 365 days a year, every year — Nobody outglasses Ford.

See your local window dealer or call 1-800-GLASS-HR for a free brochure.



Glass Division

Founded 1919. A division of Ford Motor Company.

"Windows made with Sunglas" Heat Reflective "glass are just right."