

APRIL 1975 75 CENTS

Popular Mechanics

SPECIAL SECTION!
Spring Home
Improvement
Guide

■ PROJECTS
■ PLANS
■ IDEAS

30 FRESH WAYS TO SPRUCE UP YOUR HOME

- Add a deck for summer fun
- Create new indoor storage space
- Build one of these 3 sewing centers
- Make our fold-up patio table
- Design a gala basement playroom
- ...and much, much more!

CARS: Specs and best-buy tips
for all the '75 imports.
Plus: Cordoba Owners Report

High adventure in Alaska:
That pipeline gets rolling!

56 riding mowers that
make sport of yard care.
Extra: Tractor from a kit

10 best ways to trim down
and shape up for summer

Brilliant quad sound!
PM rates 9 new 4-channel
cartridges and picks the best

20 top fishing lures that
are out-catching 'em all

This add-on deck
features 3 great
ideas you can use
on any house. See
Home Ideas Guide



Introducing the first

You're looking at a unique-looking automobile.

It's called the Pacer.

And it looks different on the outside because it's different on the inside.

To begin with, the Pacer is wider than any other small car. So naturally, you get an unusual amount of room.

And since it's wider—and has a unique isolated suspension system—the Pacer also gives you an incredibly smooth and stable ride.

The hood of the Pacer looks the way

it does because it was designed for aerodynamic reasons. To reduce the wind resistance. So the engine doesn't have to work as hard at highway speeds. And so you wind up with better gas economy.

(The Pacer comes with AMC's proven 6-cylinder engine and a 22-gallon gas tank. Which means you get outstanding performance, excellent economy and long-distance driving range.)

With our doors we did something that borders on wizardry. We made the passenger



wide small car.

door even bigger than the driver's. So you can get in and out of the back that much easier. (We also gave the Pacer a hatchback so you can get your luggage in and out that much easier, too.)

This same ingenuity was also applied to Pacer's visibility. We wanted you to see as far as your eye can see. From our point

of view, that meant designing the car for better all-round vision. From your point of view, you'll be able to notice all the people noticing you.

A final point. The AMC Pacer, the wide small car, is covered by the wide coverage: AMC's exclusive BUYER PROTECTION PLAN.[™]

Everything about the Pacer—the look, the room, the ride, the doors, the visibility, our Plan—make it what it really is: Everything a small car never was.

AMC  PACER



This One



USTW-3KA-S4UY

The In

BALDEN CARTER VILES
INSURANCE

Introducing the

Now there's a new easy way to do all your insurance shopping: in just one place.

It's called The Insurance Store.[®] It saves you time. Often saves you money. And assures you the correct coverage.

An Entire Store Filled with Insurance.

At The Insurance Store, insurance is our main business. Not just a sideline.

So it's not sold from behind a counter that's hidden behind the power mowers and paint supplies.

Visit your nearest Insurance Store and you'll see wall-to-wall insurance.

In fact, with one stop, you can find every kind of insurance you need.

Special Departments for Special Needs.

Many Insurance Stores have even set

up special departments for all the different kinds of insurance they sell. Including homeowners, automobile, marine, health, life, theft, liability, bond, aviation, and business insurance.

Within each department, you'll find a wide variety of insurance policies.

So when it's time to choose the exact policy you need, you can select. You don't have to settle.

Your Choice of Leading Brands— including Continental Insurance.

At The Insurance Store, you'll also find a wide variety of insurance companies.

Some specialize in low price.

Others, in broader coverage.

But we at Continental Insurance offer a combination of both.

For example, consider our unique PCP Plan, the all-in-one plan.

It lets you combine separate policies on your home, your car, and yourself all into one neat little package that actually gives you more insurance coverage for your insurance dollar.

Why Pay More?

You don't have to know a lot about insurance when you shop at The Insurance Store. Because the people there do.



[®]CIC

Welcome to Insurance Store

The newest idea in insurance.

They're trained professionals. They can tell you if you have the right policy. Or not.

If you have too much coverage. Or too little.

And, quite often, by recommending the exact policy and coverage you need — they can save you money.

24-hour Service.

We service what we sell. Let's say you buy a Continental automobile policy. You automatically get 24-hour toll-free Dial-A-Claim Service. It's backed by over 1600 claims ad-



justers throughout the U.S. and Canada. So anytime, anywhere you need help, help is always nearby.

What's Best for You.

Each Insurance Store is owned and operated by an independent insurance agent.

Unlike agents for Allstate and State Farm, independent agents are beholden to no one insurance company, including Continental.

And so if the company with which they place your insurance doesn't do what's best for you, they're free to switch their business to another company which will.



That gives them tremendous leverage to use on your behalf. And use it they do.

Over 16,000 Locations to Serve You.

For the name and address of the agent who operates The Insurance Store nearest you, just see the Yellow Pages under Continental Insurance.

It's the fastest, easiest way to see who's minding the store.



Continental Insurance
featured at
The Insurance Store

AUTOMOBILES AND BIKES

- 28 Imports and Motorsports
- 60 Detroit Listening Post
- 70 '75 imported cars
- 84 PM Owners Report: Chrysler Cordoba
- 90 Bolt-ons for your bike
- 92 Spring checklist for your motorcycle
- 108 Saturday Mechanic: Quick care for your electronic ignition system

SPRING HOME IMPROVEMENT

- 111 Home Ideas Guide
- 113 Build a deck—it's the low-cost way to get more room
- 116 PM's stowaway patio furniture
- 120 Growing gracefully
- 124 Hideaways for kitchen and laundry
- 128 Big top in your basement
- 130 Sewing built-ins for any room
- 132 Extra storage is everywhere
- 134 Bathroom magazine rack
- 135 New modules for easy deck building
- 136 Folding shower door installs in 30 minutes
- 137 New products of special interest
- 141 Rubber-jointed ceramic tile: quick and easy
- 142 Scroll-cutting sabre saw
- 143 Rust remover you can use in your drill

HOME AND YARD

- 30 New protection for new homes
- 78 Let your mower do the yardwork
- 144 Troubleshooting your electric range

SHOP AND CRAFTS

- 56 Hints from readers
- 82 Three shop tools you can build for very little money
- 104 Drill-driven lathe handles light turnings
- 105 Car tune-up bench keeps tools handy

SCIENCE AND ENGINEERING

- 74 Big pipeline dream comes true at last!
- 101 Are you in shape for spring?

BOATING, OUTDOORS

- 63 PM picks the top 20 lures
- 83 No-gas, no-noise power boats

ELECTRONICS, RADIO, TV

- 66 Fabulous phono cartridges: Four channels and 50,000 Hz
- 69 Electronics: A look at the latest

PHOTOGRAPHY

- 58 Photo hints
- 106 Darkrooms for people who don't have darkrooms

AVIATION

- 87 The plane that makes anyone a pilot

ON THE COVER

Spacious redwood patio designed by John Matthais of San Rafael, Calif., for the home of Ernest Braun. Photo by owner. See page 113.

WORTH WAITING FOR

Looking for more ideas and information? See page 127.

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

Popular Mechanics®

APRIL 1975 • Vol. 143 No. 4

INTERNATIONAL EDITIONS: Australia, Caribbean, Mexico, Southern Hemisphere

SPECIAL FEATURES:

PM's Home Ideas Guide: 30 ways to improve your home, including new deck, basement playroom, indoor gardens and storage, and much more. Page 111.

'75 imported cars. PM's auto editors offer expert tips and a comprehensive chart listing specifications and comparisons for all the imports. Page 70.

PM's pick: The top 20 lures to catch the lunkers. Put these winners in your tackle box; they'll keep you in fish throughout the world. Page 63.

Fabulous phono cartridges for new four-channel "Quadradisc" records. PM tests nine of these new supercartridges and picks the best. Page 66.

Let your mower do the yardwork. A roundup of 50 versatile riders with their mulchers, grass baggers, utility carts and other accessories. Page 78.

Are you in shape for spring? New medical research offers training that's fun and will help keep you from being another hospital statistic. Page 101.



Page 87



Page 92

Page 116

EVERY MONTH

- | | |
|---------------------|-----------------------|
| 8 Science Worldwide | 42 Appliance Clinic |
| 17 Letters | 48 Homeowners' Clinic |
| 20 The Bicycle Shop | 50 All Outdoors |
| 38 Car Clinic | 94 It's New Now! |

POPULAR MECHANICS IS PUBLISHED MONTHLY by the Hearst Corporation, 224 West 57th Street, New York, N.Y. 10019, U.S.A. Single copy for the United States and Canada, 75 cents. Subscription prices: United States and Possessions, \$7.00 for one year, \$13.00 for two years; \$18.00 for three years. Canada, add \$2.00 for each year. All other countries, add \$5.00 for each year. When changing address, give old address as well as the new, with zip code, and allow six weeks for change to become effective. Second-class postage paid at New York, N.Y., and at additional mailing offices. Authorized as second-class mail by the Post Office Department, Ottawa, and for payment of postage in cash. Registered as second-class matter at the Post Office at Mexico, D.F., Mexico, June 20, 1950. © 1975 by The Hearst Corporation. All rights reserved. Printed in U.S.A. Mail all Postmaster notices of undeliverable copies to Popular Mechanics, P.O. Box 646, New York, N.Y. 10019.

Dodge gives you your wagon's worth.

Dodge Sportsman. The best-selling compact wagon in America.

Great fuel economy.

In recent EPA tests, Sportsman's 225 Slant Six went farther on a gallon than any other wagon. In stop-and-go city driving or out on the open road, you can count on Sportsman to go easy on the gas.

Less wagon weight.

Sportsman weighs less and carries more than any other wagon. So it's light enough to save on gas, yet roomy enough to heap in a host of extras.

Single rear door.

Sportsman's optional single rear door has a big panoramic rear window. No one else has it. (Standard are two swing-out doors.) What about getting in and out on the side? You can go with our swing-out doors. Or you can opt for one that slides.



Maxiwagon. (It's 15 people big.)

With its 18 extra inches of overall length, Maxiwagon is the biggest wagon on the road. So, it thinks nothing of carrying a crowd (without making anyone feel crowded).



Big standard fuel tank.

With a standard 23-gallon gas tank, Sportsman lets you take off for parts unknown without constantly taking time out for fill-ups. If you really want to fill 'er up, you can opt for our big 36-gallon tank.

Independent front suspension.

No one likes a bumpy ride. And Sportsman's independent front suspension is there to see that you don't get one. Even on the roughest roads, it soaks up every bump in sight. One wheel at a time.

Maneuverability.

Sportsman handles itself well in every situation. Curb to curb, its turning diameter is over three feet shorter than either Ford's or Chevy's.

Smaller standard tires.

Because Sportsman weighs less than any other wagon, it can go on smaller standard tires, too. Tires that could save you up to 40 bucks at replacement time.

AND HERE'S THE CLINCHER.

"For the first 12 months of use, any Chrysler Motors Corporation Dealer will fix, without charge for parts or labor, any part of our 1975 passenger cars we supply (except tires) which proves defective in normal use, regardless of mileage."

Of course, the owner is responsible for maintenance service such as changing filters and wiper blades.



NO. 1 FOR THE MONEY IS DODGE



SAKRETE®

Make something out of it!

Consider the man-hours you invest in your projects. Consider that SAKRETE Cement Mixes meet or exceed the standards of the American Society for Testing and Materials. Now guarantee your projects' lasting values by using ready-to-use SAKRETE Concrete, Sand or Mortar Mixes.



FREE . . . at your neighborhood SAKRETE dealer, our step-by-step instruction booklet featuring (20) select projects. Or, send 25¢ to cover handling to SAKRETE, P.O. Box 1071E, Cincinnati, Ohio 45201.

Insist on SAKRETE Concrete and Mortar Mixes
The brand the pros use.

SAKRETE is a registered trademark of SAKRETE, INC. © 1974



Popular Mechanics®

JOHN A. LINKLETTER
Editor

SHELDON M. GALLAGER
Executive Editor

DANIEL C. FALES
Managing Editor

WAYNE C. LECKEY
Home and Shop Editor

ALVIN KIETZ
Art Director

BILL HARTFORD
Automotive

JOHN F. PEARSON
Science and Engineering

WM. T. MCKEOWN
Boating and Outdoors

IVAN BERGER
Electronics and Photography

HARRY WICKS
Home Workshop

STEPHEN WALTON
Assistant, Home and Shop

MICHAEL LAMM
West Coast

ROBERT LUND
Detroit Automotive

GARRY WINTER
Copy Chief

RICHARD H. FUNK
Production

ALFREDO VEGA
Assistant, Production

DAVID KOMITAU
Assistant Art Director

IRA HERRICK
Assistant Art Director

DON L. MANNES
Assistant Art Director

ED MENTKEN
Assistant Art Director

CLIFFORD B. HICKS
Special Publications

LUDWIG ARONS
Special Projects

SOPHIE GRONOWICZ
Director, Bureau of Information

EVERETT JOHNSON
Cabinetmaker

DANIEL J. COLEMAN
Director of Advertising

ADVERTISING OFFICES: New York: 224 W. 57th St., 262-4282; Chicago: 520 N. Michigan Ave., 527-2400; Detroit: General Motors Bldg., TRinity 5-8711; Cleveland: 20310 Chagrin Blvd., Shaker Heights, Ohio, 283-7768; Los Angeles: 601 N. Vermont Ave., 666-6263.

JOHN A. REGINA
Advertising Production Manager

Published by The Hearst Corporation

FRANK MASSI
President

JOHN R. MILLER
Executive Vice President

RANDOLPH A. HEARST
Chairman

RICHARD E. DEEMS
President, Magazines Division

JOSEPH F. KERN
Publisher

POPULAR MECHANICS IS PUBLISHED MONTHLY by the Hearst Corporation, 224 West 57th Street, New York, N.Y. 10019, U.S.A., Frank Massi, President; John R. Miller, Executive Vice President; Randolph A. Hearst, Chairman; Harrison A. Mitnick, Treasurer; Harvey L. Lipton, Vice President and Secretary, Hearst Magazines Division; Richard E. Deems, President, Advertising; William S. Campbell, Vice President and General Manager; John F. D'Avolio, Vice President and Resident Controller; Albert A. Rachol, Vice President and Director of Circulation; Joseph F. Kern, Vice President for Popular Mechanics.

ADDRESS ALL EDITORIAL COMMUNICATIONS to 224 West 57th St., New York, N.Y. 10019. For additional sources of information on the articles and products in this issue, write to the Bureau of Information, Popular Mechanics, for free "Where-to-Find-It" List.

The no-compromise vacation. The only place you cut corners is on the cost.

We'd like to help you spend less money for your vacation this year. Without getting less vacation for your money.

So we've put together what's probably the most helpful vacation planning guide in America. It's full of facts about things you can do here. And you'll be surprised how many of them are free.

Even the Trip Kit is free. Just send us the coupon.

And find out how far your vacation dollar can take you.

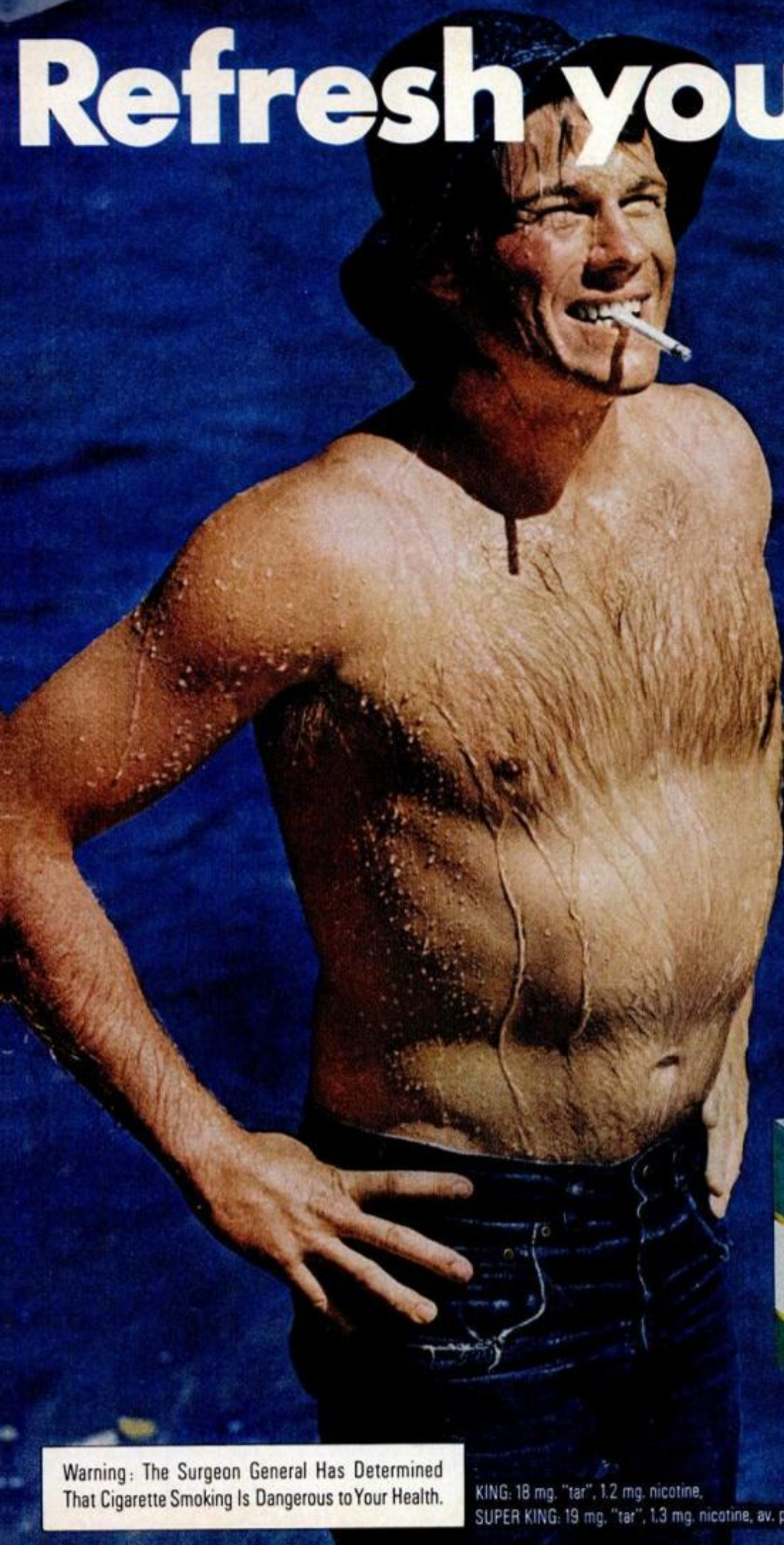


Name _____ Address _____
City _____ State _____ Zip _____

Free South Carolina Trip Kit

Mail to South Carolina Division of Tourism, Rooms 26, Box 78, Columbia, South Carolina 29202.

Refresh yourself.



Have a Salem.
Smooth, rich tobaccos
with refreshing mentholl
No hot, harsh taste.



King or Premium Length.

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

KING: 18 mg. "tar", 1.2 mg. nicotine,
SUPER KING: 19 mg. "tar", 1.3 mg. nicotine, av. per cigarette, FTC Report OCT. '74.

Материал, защищенный авторским правом



SCIENCE WORLDWIDE

Lasers for safety research

The extreme precision of the laser beam is being used by General Motors researchers to pinpoint the location of dummies used in safety tests at the GM Research Laboratories, Warren, Mich. The multiple exposure photo (below) shows actual low-power laser beams zapping targets located on the anthropomorphic dummy. The system makes it possible to achieve repeatable conditions and reduce variations that occur in test results.



GM researchers are engaged in a number of studies for the purpose of developing dummies with manlike responses for automotive crash testing.

School texts going metric

A survey of state education departments shows the swing to the metric system is accelerating, reports Dr. Betsy Ancker-Johnson, assistant secretary for science and technology, U.S. Department of Commerce. Virtually every state has under way some type of statewide activity related to teaching the metric system, Dr. Ancker-Johnson notes.

Some states plan to convert all textbooks to metric by 1976 or 1980, while others indicate they may be teaching metric as the principal measuring system by 1984. The Department of Commerce has published a

package of metric information designed as an aid for the teacher, student or businessman. It costs \$2 and is available from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

Ancient rocks in Minnesota

Rocks said to be 3.8 billion years old—the oldest thus far found on Earth—have been discovered in southwestern Minnesota, according to Dr. Carl E. Hedge, U.S. Geological Survey, and Dr. Samuel S. Goldich, Northern Illinois University. The ancient rocks—a granite gneiss—occur along the valley of the Minnesota River and are particularly well exposed near the town of Granite Falls, Minn. The two scientists used radioactive dating methods to determine the age of the rocks. Samples returned by Apollo astronauts indicate that lunar rocks are between 3.3 and 4.5 billions years old. Many scientists believe that the Earth and moon are about the same age—some 4.5 billion years old.

Corn strain resists borer

Corn with high resistance to two of its worst insect pests—the European corn borer and the sugar cane borer—has been discovered by Cornell University scientists. An exotic strain from Central America, the corn is said to be the first ever found with a built-in resistance to both types of borer. Cornell researchers say the strain "offers promise as a breeding line for incorporation of resistance into commercial varieties."

Gas ends bloom of youth

To some plants, aging is a gas—ethylene gas. The tasteless, odorless and colorless gas triggers the aging process in orchids, morning glories, apples and bananas, according to Michigan State University botanist Hans Kende.

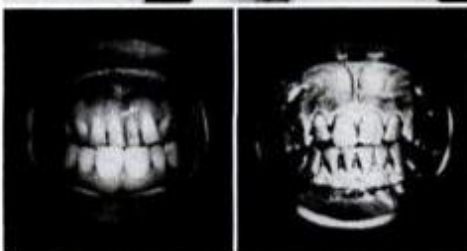
"Ethylene is the reason why one rotten apple can spoil a whole bushel," says Dr. Kende. "The bad apple produces ethylene, which triggers aging and more ethylene production in the other apples."

Goal of Dr. Kende's research is to

discover what happens within cells when they get old. He is studying the aging process in morning glories that open, grow old and die in a day. He has found that ethylene mixed with air in concentrations as low as one part per million is enough to accelerate flower aging by several hours. Dr. Kende believes his ultimate findings could have important implications for the food-processing industry.

Dental camera pinpoints plaque

An ultraviolet camera for detecting plaque on teeth has been developed by American and Canadian researchers at the State University of New York at Stony Brook. Plaque is a film of protein that causes decay through bacterial action. Normally invisible, it shows up as dark areas on teeth when hit with ultraviolet light. A small tube with a lens is inserted against patient's clenched teeth, and the image recorded on

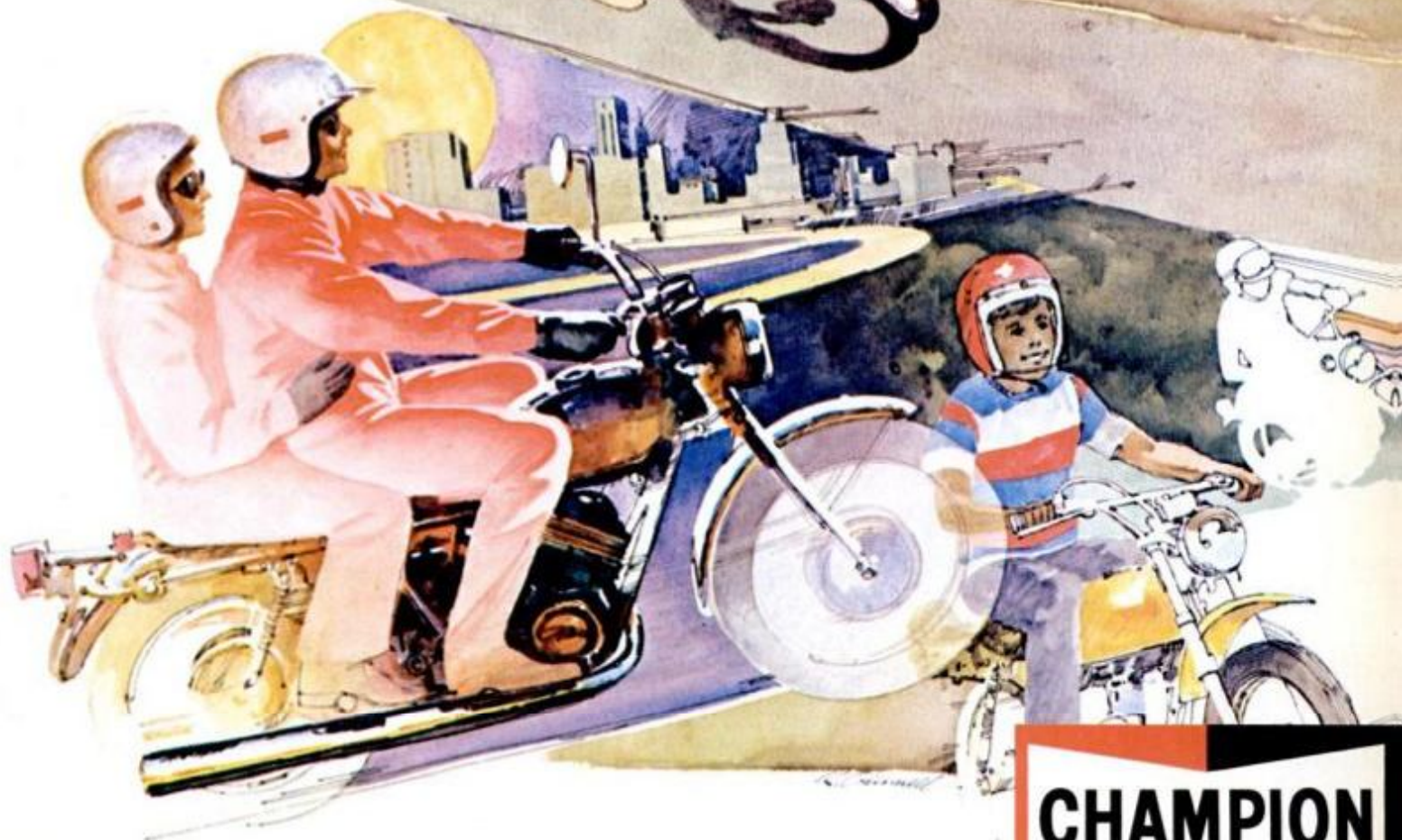
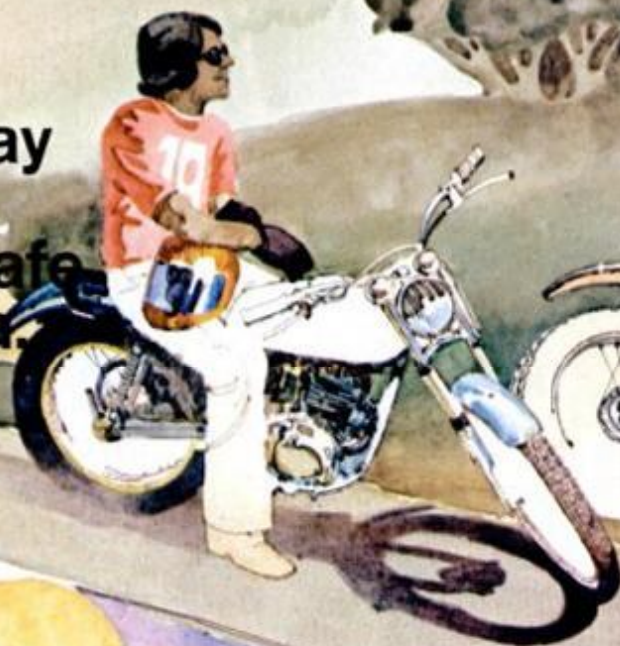


Polaroid film for inspection. Above, left photo was taken with normal light, right photo with ultraviolet light. ★★★

Riding

WITH CHAMPION®

Motorcycles are the fun way to go. Inexpensive to service and operate, they are the modern way of getting economical, safe transportation.



CHAMPION



What motorcycling will do for you... what you should do for motorcycling

Motorcycling has come of age. It offers the same freedom and exhilaration as ever, but a new dimension has been added: motorcycling is now recognized as safe, economical transportation.

Motorcycles are ridden by 18 million men, women and youngsters, with most of the cycles in the U.S. being licensed for street use. These are touring, commuting and enduro models.

Touring cycles—the largest machines with the most powerful engines—provide comfort and performance for long-distance, open highway traveling.

Commuting cycles may also be driven cross-country, but they are smaller and less powerful, being designed primarily for those seeking around-town transportation—traveling to and from school, work, shopping plazas or whatever.

Enduro models are dual-purpose machines. They are rugged enough for off-road use, but possess sufficient equipment and power to

make them legal for street and highway use.

By contrast, off-road ("dirt") bikes are stripped of equipment, such as lights, which preclude their licensing for road use. Designed for fun-riding on trails, in deserts and in competition, "dirt" bikes range in size from minicycles, which give youngsters and beginners the feel of off-road riding at safe and controlled speeds, to bikes that equal touring models in size and power.

Pound for pound, a motorcycle gives the most economical means of motorized transportation. The largest cycles average 56 miles per gallon, while the smallest average an incredible 110 miles per.

Most cyclists do their own minor maintenance, consult-

ing a trained technician at their dealer's when a job calls for a professional. Maintenance costs are easy to live with, but remember that neglect is the quickest way to kill a cycle. Service must be done! Data in this section can be very helpful—especially if mechanical troubles develop along the road. So keep this presentation in your bike's tool compartment.

What about motorcycle safety...the inevitable question. Over 60 percent of cycle-auto accidents are the fault of the car, but this is not the point. As the motorcycle has come of age, the cyclist has worked to prevent accidents. Witness the 100,000 youngsters now enrolled in high school motorcycle driver education courses nationwide who are being trained by accredited teachers who themselves are trained cyclists. Motorcycle "ed" is normally sponsored by a responsible agency, usually the police.

One unit of motorcycle "ed" deals with proper clothing, an important aspect of safety. Here's the kind of information that students are getting...





Helmets are a "must" for the driver and passenger. Most state laws require that cyclists wear them, but that's academic. Anyone riding a motorcycle who doesn't wear a helmet is foolish. The likelihood of serious injury in case of an accident is decreased 100-fold with one.

There are two general types of helmets. The helmet giving maximum protection is the total helmet, which covers the entire head, chin and mouth. It is often outfitted with a flip shield to also protect the entire face. Use a total helmet especially for off-road riding. For street cycling, the full coverage helmet that protects the entire head, but not the chin and mouth, will suffice.

Make sure your helmet fits correctly and is worn with a securely fastened chin strap. Select a helmet that gives you the most protection—those approved by the Snell Memorial Foundation, or meeting your state's specifications.

Eyes must also be protected, and devices must provide

maximum visibility. This precludes the use of windshields alone, which protects you from wind and insects, but doesn't keep dirt out of the eyes and may not protect you from flying stones. You can wear a full shield or goggles that...

- Offer a means of secure fastening, so they don't blow off.
- Are shatter-proof and free of scratches.



- Are adequately ventilated to prevent clouded vision.
- Have clear lenses if you are going to drive at night. Never wear dark or tinted lenses for night driving.

Other gear that protects you from injury—and from cold, wet and wind—are gloves, heavy footwear, jackets and pants.

Always wear leather gloves. However, they shouldn't be so heavy that they make gripping difficult. A good pair of gloves improves your grip and keeps hands from getting cold, tired and sore.

Knee-high boots that are water-resistant, padded for comfort and have crush-proof toe areas provide maximum protection and are especially recommended for off-road cycling. If these are not available, at least wear a pair of high-top boots or shoes that cover the ankles. Never ride on-street or off with bare feet or wearing sandals. You will be inviting injury.

Thick, tough jackets and pants keep out the cold, but more important, they help prevent injury. See to it that clothing offers freedom of movement and can be closed off at cuffs, collar and front to keep out weather. And it also helps if clothing is brightly colored so others can see you, especially at night.



How to take care of your motorcycle

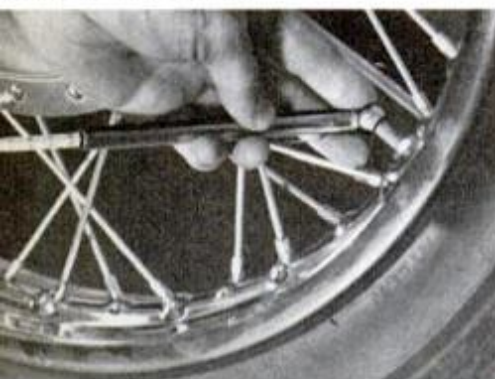
The surest way to guarantee that your motorcycle will provide efficient, safe operation is to form a close relationship between yourself and your dealer. You can take care of procedures you feel confident doing and leave the others to him. Here are 11 tasks you may want to perform. The presentation is not all-inclusive. Other jobs, such as changing engine oil, are covered in your owner's manual, which should be the final authority.



Adjust brake, clutch, and throttle cables, and keep aware of brake lining wear by checking the indicator. Have your dealer lubricate cables periodically.



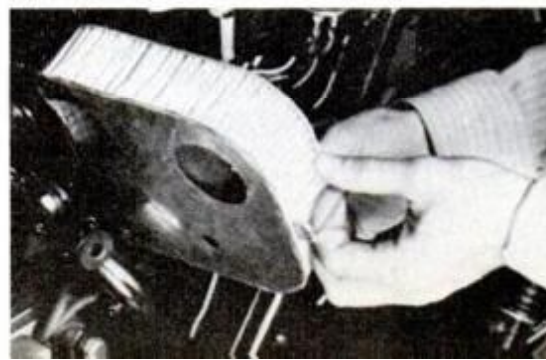
Push down on the handlebar and see that oil doesn't leak from the front fork. Oil should be changed periodically, a job you may want your dealer to do.



Keep tires alive by maintaining correct pressure. Don't take chances with worn or damaged rubber. Bad tires have been the cause of many serious accidents.

Service the air filter to maintain free air intake. Restrictions cause power loss, high gas consumption and fouled spark plugs.

Check battery regularly. Top with distilled water if necessary. Never add acid to the battery. Keep the terminals clean.

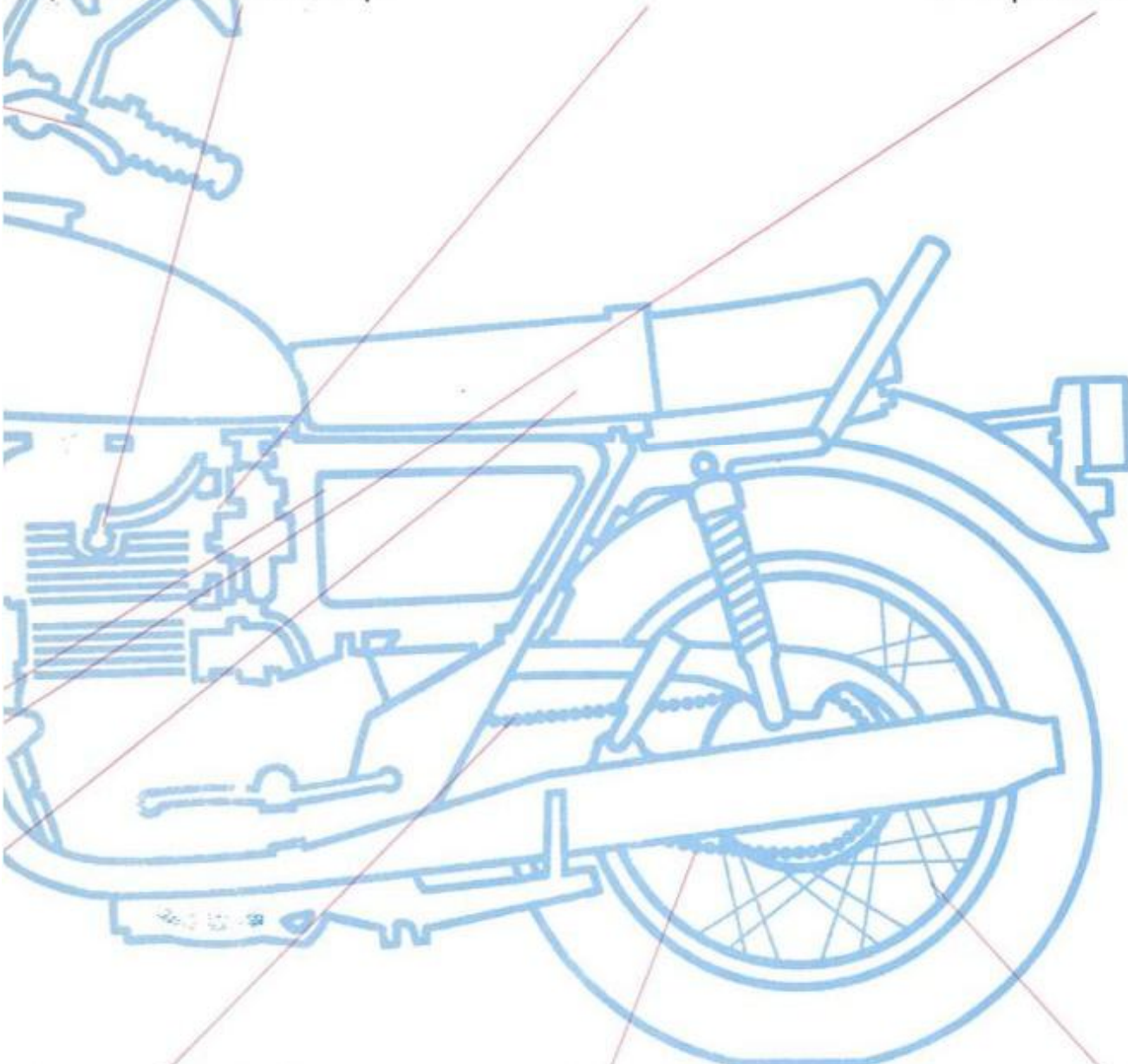




Service the spark plugs regularly. Inspect the firing ends for signs of engine problems. Worn plugs impair good performance. Replace them when necessary.

Clean out the fuel tap regularly to prevent water or sediment that accumulates from restricting the flow of fuel to the carburetors.

Tighten all body bolts and nuts before riding to prevent unnecessary vibration that can damage parts. See to it that all cotter pins are in place.



Your motorcycle should receive a general lubrication periodically, but the drive chain should be lubricated every time you ride.

A properly adjusted ($3/4''$ to $1''$ play) chain is needed for safe riding. Check it regularly and inspect sprockets for damage and wear, too.

Alternately tap and tighten spokes until they "ping." Your dealer should tighten them to specification when he has the cycle.



Spark plugs: the heart of your engine

CONDITIONS TO LOOK FOR



Nominal electrode wear and tan firing-end color... correct plug is being used.



Oil or carbon fouling indicates improper heat range or engine problem.



Bridging indicates excessive carbon in cylinder or use of improper motor oils and/or mixtures.



Aluminum deposits identify preignition... Serious problem! Check with dealer.

HOW TO SERVICE SPARK PLUGS



If plug isn't badly worn, wash it in solvent to remove deposits; let dry.

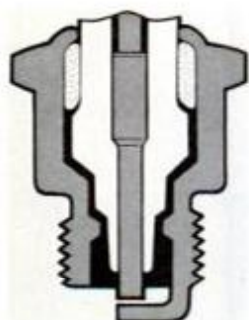


Carefully open side electrode and file until electrode surfaces are flat and edges are sharp.

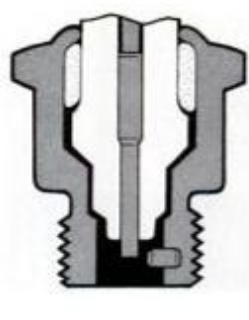


Gap electrodes to specification, resetting side electrode with a gap tool.

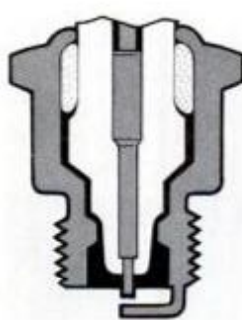
TYPES OF PLUGS THAT CHAMPION MAKES



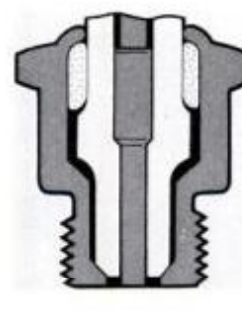
Standard design: long-mileage plug offering superior service with conventional ignition.



Retracted gap: recessed side electrode accommodates engines with long-stroking pistons.

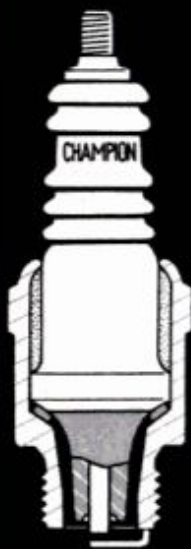


Gold Palladium: reduces starting and fouling problems, and provides longer service life.



Surface gap plug: specially designed to meet peak voltage output of CD ignition systems.

Picking the right spark plug for your engine



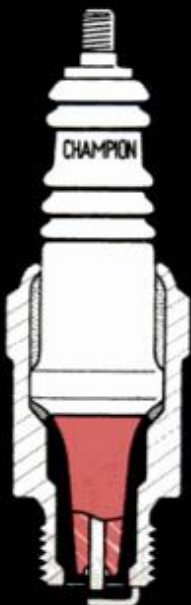
NORMAL

This is the spark plug the cycle maker suggests you begin with. Examine in few hundred miles — if insulator at tip looks burned white, switch to colder plug; if black, a hotter plug is required.



COLD

A cold type spark plug has a shorter insulator nose and is able to get rid of heat quickly. Colder spark plugs are used in cycles that must endure continuous high speed and heavy riding.



HOT

A hot type spark plug has a longer insulator nose and retains heat longer to burn away combustion deposits. Hotter plugs should be used in cycles that are ridden mainly at slow speeds or must experience prolonged periods of engine idling.

Begin with the normal Champion spark plug for your model that is shown here. If your inspection shows that a hotter or colder plug is needed, switch to the next one on the heat range scale. Your dealer has the necessary tables to enable you to find the exact plug your engine needs. **Consult with him also to determine the Champion plug to use if your motorcycle is not listed.**

Model • Champion Standard Spark Plug

BENELLI	
Sei 750	N-3-MC
Tornado 650	N-3-MC
Quattro 500 with 14mm heads	N-3-MC
Quattro 500 with 12mm heads	R-6-MC
Super Sport 250	N-3-MC
El Diablo, Phantom 250	N-3-MC
Sprite El Diablo 200	N-3-MC
Enduro 175	N-4-MC
El Diablo 125	N-3-MC
Panther 125	N-4-MC
Banshee 90	N-4-MC
Woods, Cougar, Harnet 65	N-4-MC
Monaco 50	N-4-MC
BMW	
R90/6 R90S	N-6Y-MC
R75/5, /6	N-7Y-MC
R60/5, /6	N-7Y-MC
R50/5	N-7Y-MC
BULTACO	
Astro 360	N-57R-MC
El Montadero 360	N-3-MC
El Bandido 360	N-2-MC
Sherpa T 350	N-12Y-MC
Astro 250	N-57R-MC
Metralia 250	N-3-MC
Alpina 250	N-12Y-MC
Pursang 200	N-57R-MC
Sherpa 175	N-57R-MC
Lobito 175	N-3-MC
Sherpa S 125	N-54R-MC
Lobito Mk III 125	N-3-MC
Alpina 125	N-3-MC
Tiron 100	L-86-MC
CZ	
Moto-Cross 400	L-87R-MC
Moto-Cross 360	L-57R-MC
Street 360	L-81-MC
Grand Prix 250	L-57R-MC
Enduro 250	L-81-MC
Trail 175	L-81-MC
Moto-Cross 125	L-57R-MC
Street 125	L-81-MC
Trail 90	L-81-MC
DUCATI	
750	L-81-MC
Desmo 450	L-81-MC
Scrambler 350	L-81-MC
Sebring 350	L-81-MC
Monza 250	L-81-MC
Gran T 200	L-78-MC
Silverstone S 175	L-78-MC
Monza Jr. 160	L-78-MC
Bronco 125	L-86-MC
125F3	L-57R-MC
Scrambler 100	L-86-MC
Mountaineer 100	L-78-MC
HODAKA	
Wombat 125	L-78-MC
Ace 100	J-4-MC
Ace 100MX	L-77J-MC
HONDA	
CB750	R-8-MC
CB550	R-10-MC
CB500	R-10-MC
All 450's	N-3-MC
CL360	N-3-MC
CB350	R-8-MC
CR250M	N-1-MC
MT250	N-3-MC
CB250	N-3-MC
XL250	R-8-MC
CB200	R-8-MC
CR125M	N-1MC
SL125	R-6-MC
MT125	N-3-MC
All 100's	R-6-MC
Super S90	P-7-MC

Model • Champion Standard Spark Plug

HONDA	
Trail 90	P-8Y-MC
ATC70	Z-10-MC
All 65's	Z-6-MC
C105	Z-8-MC
MR50	L-86-MC
Z50	Z-10-MC
HUSQVARNA	
450SB	N-3-MC
400 Moto-Cross	N-6Y-MC
400CR	N-3-MC
360 Enduro	N-4-MC
360 Moto-Cross	N-6Y-MC
250 Moto-Cross	N-6Y-MC
250 Enduro	N-2-MC
250CR	N-3-MC
125 Moto-Cross	N-2-MC
JAWA	
500DT	L-87R-MC
175 Street	L-86-MC
125 Street	L-86-MC
Trail 90	L-86-MC
KAWASAKI	
Z1	N-4-MC
All 650's	N-4-MC
HIR Roadracer	N-57R-MC
F12MX	L-77J-MC
KZ400	N-3-MC
Mach II-S2	L-78-MC
F5 Bighorn	UL-17V-MC
F4 Sidewinder	L-78-MC
F11	L-78-MC
250 MX	L-77J-MC
KX250	N-2-MC
175 Enduro	L-20V-MC
Super 150	L-81-MC
B series 125's	L-81-MC
F6 Enduro	L-78-MC
KX125	N-2-MC
C2TR	L-78-MC
G4 Trail Boss	L-78-MC
G31M Centurion	L-77J-MC
G3SS	L-81-MC
MT1 Dynamite	L-81-MC
MB1 Coyote	J-7J-MC
MAICO	
MC501	N-2-MC
MC400 1/2" reach	L-77J-MC
MC250 1/2" reach	L-77J-MC
MC250 3/4" reach	N-2-MC
MC125	L-77J-MC
MOTO GUZZI	
Eldorado V850	N-3-MC
Ambassador V750 1/2" reach	L-81-MC
Ambassador V750 3/4" reach	N-4-MC
Sport 750	N-2-MC
V700	N-3-MC
Sport 125	N-3-MC
Trail 125	N-1-MC
NORTON VILLIERS	
Commando 850	N-7Y-MC
Commando Fastback 750	N-7Y-MC
High Rider 750	N-6Y-MC
Mercury 650	N-4-MC
OSSA	
Yankee Enduro 500	N-60Y-MC
Pioneer Enduro 250	N-2-MC
American Enduro 250	N-2-MC
Sport America 250	N-3-MC
Trail 250	N-9Y-MC
American SCR 250	N-57R-MC
All 230's	N-3-MC
Pioneer 175	N-3-MC
American Enduro 175	N-60Y-MC
Stiletto 175	N-2-MC
Phantom 125	N-57R-MC

Model • Champion Standard Spark Plug

PENTON	
Mint 400	L-78-MC
Mint 250	L-78-MC
Jackpiner	L-78-MC
6-Day	L-78-MC
Berkshire	L-78-MC
PUCH	
MC250	N-3-MC
175TE	N-2-MC
175S	N-3-MC
125TE	N-2-MC
125S	N-3-MC
Trail 125	N-3-MC
50S	L-81-MC
RICHMAN	
Moto-Cross 250, 1/2" reach	L-57R-MC
Moto-Cross 250, 3/4" reach	N-57R-MC
Enduro 125	L-81-MC
ROCKFORD	
Taka	L-81-MC
Tora	J-6J-MC
SUZUKI	
GT750	N-4-MC
GT550	N-3-MC
TM400	N-3-MC
TS400	N-4-MC
GT380	N-3-MC
T350R	L-81-MC
TR250	E-55-MC
TS250	N-3-MC
TC200	L-78-MC
TS185	L-81-MC
GT185	L-86-MC
TI25	L-78-MC
RV125	L-81-MC
TM125	N-3-MC
TC120	L-78-MC
A100RT	E-59R-MC
TS100K, 1/2" reach	L-78-MC
TS100K, 3/4" reach	N-3-MC
TM100	N-3-MC
TS90 Honcho	L-81-MC
RV90	L-87Y-MC
TM75LMX	L-81-MC
AC50	L-78-MC
YAMAHA	
TX750	N-4-MC
TZ750	N-54R-MC
TX500	R-8-MC
SC500	N-3-MC
YZ360	N-2-MC
RD350	L-78-MC
TR2 Road Racer	N-57R-MC
TZ350	N-54R-MC
All YM305's	L-81-MC
DT250	N-3-MC
RD250	L-81-MC
TY250	N-4-MC
CS200 Street	L-77J-MC
DT175	N-3-MC
All YCS175's	L-78-MC
YA5 125	L-81-MC
TA125	N-54R-MC
YLT100 Moto-Cross	L-57R-MC
LT2 100	L-78-MC
Enduro 90 HT1	L-81-MC
GT1 80	L-86-MC
RD60	L-81-MC
ZUNDAPP:	
125 Moto-Cross	L-78-MC
GS125	L-77J-MC
MC125	L-77J-MC
Scrambler 100	L-78-MC
KS50	L-78-MC



The last word in Riding.

We saved the last page in our "Riding" booklet for the last word in premium motorcycle spark plugs: Champion *Gold Palladium* spark plugs. Compared to standard design plugs, they require much less voltage to fire. And they have specially designed firing ends to fight fouling deposits. All for faster, more dependable starts; smoother performance; long plug life.

Do they do the job? In 1974 alone, 13 world and national motorcycle

champions won their titles with premium performance Champion *Gold Palladium* spark plugs.

So remember: When it comes to spark plugs, for competition or pleasure, the last word in "Riding" is definitely the last word in motorcycle performance: Champion *Gold Palladium* spark plugs.



We've got your plug.

LETTERS

FROM READERS

Solar gimmick

I seriously feel the solar furnace you featured in your February 1975 issue (*First Plug-In Solar Furnace for Your Home*, page 102) is nothing more than a gimmick. I live 65 miles from Buffalo and, using your figures, could save about 26 percent of fuel. With a 26-percent-a-year saving, it would take 18 years to pay off the investment.

T. OWEN HULL
PITTSFORD, N.Y.

You're right that solar heating offers limited fuel savings in cold cloudy areas like Buffalo. However, the article did not state that such regions were ideal for its use—merely that they were examples of localities in which the furnace would still provide some auxiliary heating. Also, the 26-percent figure was for the smallest unit available. With larger models, estimated savings could run as high as 43 to 86 percent.

The article was very interesting. The use of air as a working fluid and stone as a storage medium has several attractive and practical advantages. Mr. Keyes states that "Water is a terrible storage medium. . ." The implication of such a statement could be misleading.

Using 30,000 BTUH as the heat loss for an average tight house in 30° to 35° F. weather, calculations show that it requires 36 tons of rock but only seven tons of water to store heat for a day. From a space standpoint, water is much more efficient by a factor approaching 4 to 1.

ROBERT ABRAMSON, P.E.
UPPER SADDLE RIVER, N.J.

Better than commercial units

I built the Scuba Tow (page 69, July '74) as close to your plans as pos-



sible. In testing in a YMCA swimming pool, it performed above and beyond my expectations. Its speed, power, and handling are, in my opinion, better than commercial units I have used. As you can see, I am very happy with this craft and I hope that you have every success with it.

HAROLD SNYDER
MONT CLARE, PA.

Other readers who would like to build the Scuba Tow can get the complete plans simply by sending \$7.95 to PM Scuba Tow, Box 1014 Radio City Station, New York, N.Y. 10019.

Not enough zip in the zap

I've been following the Uniform Product Code progress and welcomed your write-up (*How You'll Zip Through the Zap-Out Counter*, page 100, Feb. '75).

As a business person myself, I can well appreciate the advantages of accurate automated inventory controls. However, as a housewife-consumer, I deplore the lack of consideration afforded me.

You admit that "nobody is predicting that the new systems actually will lower food prices." Thus the consumer is being asked to underwrite greater profitability and efficiency for the grocer with questionable return. Labor and its costs seem to be the primary area in which savings can be expected.

Some proposals recommend shelf price tags. We've all seen how poorly such tags are placed and maintained for unit-pricing.

I don't need a tape that tells me the lane, the checker and the time of day I paid for my groceries. I don't need a tape that prints 32 characters for each item. I don't need to spend \$80, then sit down and leisurely read a beautifully detailed tape to find out, finally, what I paid for each item. I need the price on the item before I buy it.

Thanks, but no thanks.

LINDA CARTER MAKUCH
WILLINGTON HILL, CONN.

Your opinion is shared by others who have written in to complain that the system is designed to benefit the store, not the shopper. While this is largely true, the point of the article

(Please turn to page 18)

GUNK®

ENGINE CLEANER

ENGINE-BRITE, America's No. 1 engine cleaner. Spray it on, hose it off. Powerful, self-emulsifying degreaser.



TAR & BUG REMOVER

Especially formulated to dissolve tar spots and loosen bug deposits on autos, cycles, etc.

BRAKE AND ELECTRIC PARTS CLEANER

Degreases and flushes away oil residues and grime from brakes, oil lines and intricate mechanisms. No flash point.



GARAGE FLOOR AND MOWER CLEANER

A superior grade cleaner for removing grease and grime from concrete surfaces. Sprinkle on wet surface, scrub, soak, rinse.

"Cleaning Problems End with GUNK Solutions."

GUNK LABORATORIES, INC.
5829 W. 66th St., Chicago, Ill. 60638
DEMPSEY & STANLEY, INC. RADIATOR SPECIALTY CO.
Forest Park, Ill. 60130 Charlotte, N. C. 28237

The good jobs are in Air Conditioning, Refrigeration and Heating...NRI can teach you at home to qualify for a career in this fast growing industry!

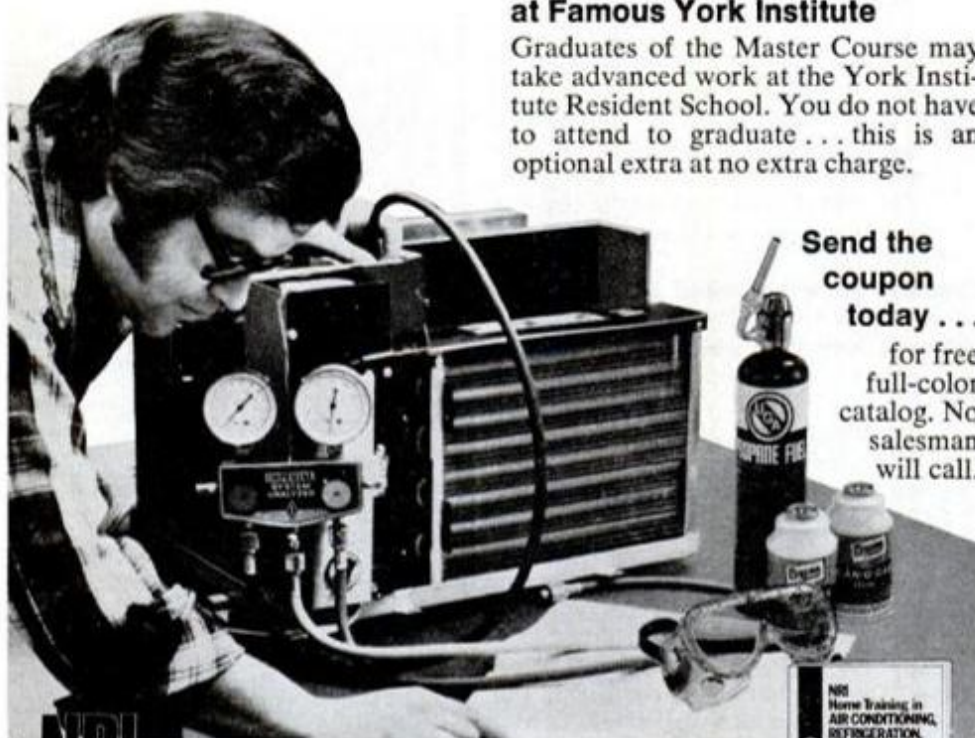
Climate control is the boom industry of the 70's, and the need for trained servicemen grows daily. NRI can give you that training, with its Air Conditioning, Refrigeration and Heating Courses. You study at home, in your spare time, with easy bite-size lessons that let you learn step-by-step.

Window Air Conditioner Kit comes with Course for Trouble Shooting.

You get a Circuit Demonstrator, Control Simulator, tubing and joint-making demonstrator, leak detector, system analyzer, and a window air conditioner unit for hands-on experiments. A complete package for practical training at home.

Optional Resident Training at Famous York Institute

Graduates of the Master Course may take advanced work at the York Institute Resident School. You do not have to attend to graduate... this is an optional extra at no extra charge.



Send the coupon today...

for free full-color catalog. No salesman will call.



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

513-045



Rush me the NRI Catalog checked below. I understand NO SALESMAN WILL CALL.

Air Conditioning and Refrigeration

Master Course in Air Conditioning, Refrigeration & Heating

Name _____ Age _____

Address _____ (Please Print)

City _____ State _____ Zip _____

Approved for career study under GI Bill. Check for facts.

Accredited Member National Home Study Council

LETTERS

(Continued from page 17)

was to acquaint readers with the complex and ingenious technology behind the strange gadgets they'll soon be seeing in supermarkets and will probably be wondering about. Also, there are some legitimate consumer advantages: You'll get through the checkout faster because the clerk has less to do, you won't have to watch the cash register like a hawk in fear of errors and, with improved inventory control, you're less likely to find your store out of your favorite brand of beans or applesauce. So it ain't all bad.

PM's new size helps

My compliments upon the change in format. Several students have commented that they like this better and that it is now easier to read the articles. And as a librarian, I would like for you to know that it is much easier to file and store back issues because it is the standard size of most magazines.

DRUCILLA JONES
LIBRARIAN

AVALON MIDDLE SCHOOL
MUSCLE SHOALS, ALA.

I enjoy your magazine, especially since it is bigger now. For those of us who work with angles and degrees, please check *Three Projects You'll Want To Make* (page 112, Jan. '75). In *Pier Curio Shelf*, the angle at the top left drawing should read $93\frac{1}{2}^\circ$. Also the angle in the left middle of the page should read $86\frac{1}{2}^\circ$ which would make it lean in $3\frac{1}{2}^\circ$.

LINTON COWART
VIDOR, TEX.

We said the new size would be easier to read—and it also seems the larger drawings make it easier for readers to catch our errors.

Okay—we told you so

If you will look into the November issue of PM back in 1966 you will find on page 142 a wonderful article entitled *Now We Are Mining Oil From Mountains* by Joseph N. Bell.

PM ought to be getting all the miles and miles of publicity that "I told you so nine years ago" entitles you to.

BERNARD B. SCOFIELD
BELLE HARBOR, N.Y.

The technique of recovering oil from shale is still being developed, but, unfortunately, is more expensive than, say, bringing in oil from Alaska's North Slope. (The oil deposits up there, of course, had not yet been discovered back in 1966). ★★

Isn't this too much tire to turn down?

1. The Proven Gas Saver This is the tire that earned the name *Gas Saver*. When run at steady highway speeds against our original equipment belted bias tire, it saved up to thirty miles per tankful, important savings at today's gas prices.

2. 7 Day Test Ride and Handling Warranty

We're so sure you'll like the smooth ride and quick, positive handling of the Steel Radial 500™ that you can buy them, drive on them for seven days, and get every cent back if there's anything you don't like. Does any other tire company offer you that?

3. 40,000 Mile Warranty

If the Steel Radial 500 doesn't give you 40,000 miles of normal passenger use on the same car, any Firestone Store or participating Dealer will give you a new one, charging you only for the mileage received plus Federal Excise Tax. A small service charge may be added.

4. New Water Squeezer Tread

Firestone's amazing new Water Squeezer Tread actually pushes water out the sides of the tread to help keep water from getting between the rubber and the road. And the big, wide, Steel Radial 500 footprint puts a lot of tread under you to help hold tight to wet pavement.*

5. Steel Between You and Tire Trouble

Two belts of steel cord under the new Water Squeezer Tread help protect your tires from chuckholes and roadjunk* that you can't always steer around. They also hold the tread firmly to cut down on "tire squirm" that causes wear.

*** Don't forget—the safety of your tires is also affected by air pressure, wear, load, and operating conditions.**



New Firestone 40,000 mile Steel Radial 500



THE BICYCLE SHOP

BY EUGENE A. SLOANE

Living with a click

Our derailleur-equipped bicycles have Sun Tour GT derailleurs. When we coast, our freewheel makes a "clicking" noise. I have been told I have to live with this noise.—W.E. Duff, Norman, Okla.

True, you have to live with a clicking sound from freewheels. The click is built into the freewheel, and without this sound you would have a rear gear cluster that would freewheel in both directions; i.e., your cranks would spin but the bike would stay still. The reason: freewheels have a set of pawls that permit you to pedal, but when you coast let the rear wheel "freewheel."

The clicking sound you hear is the noise of the pawls sliding over the inside pawl flats of the freewheel. Better freewheels have two sets of pawls, and hence are a little noisier. These pawls can "hang-up" if clogged

by a little dirt or thick oil, which is why you should only use very light oil (no. 5 SAE or lighter) to lubricate both sides of the freewheel, and clean the freewheel by dunking it in kerosene every few months.

If you get stuck on the road and can't remove the freewheel that's hung up, try pouring kerosene or gasoline (careful!) into it, tapping the freewheel to dislodge the particle and relubing. Don't get any solvent or oil on tire.

Unsafe stopper

I am having trouble stopping with the "safety" levers that came with my bicycle. These are the extra set of brake levers that are located under the handlebars. How do I adjust these levers so they will stop safely?—Al Black, New York.

Glad you put quotes around "safety" as I have. These extra levers



(photo) are anything but safe, and in fact are quite dangerous. They have much less travel distance than conventional brake levers, and can butt right up to the handlebars and still not pull caliper brakes tight enough to stop safely in an emergency. Trouble is you get used to using these "safety" levers because they're easier to reach, and you get by until you have to come to a panic stop and find you can't. These extra levers work reasonably well *only* if wheels

AquaBug

The 11 lb. Tranquilizer. Add water and say ahhhhhhhhhh!

AquaBug, the world's lightest outboard... still 11 pounds, still \$149.95. (Only the mighty have risen.) An AquaBug is 13 pounds lighter and \$70 less costly than Evinrude or Johnson's 24 pound, \$220 2 HP motors. More power per pound than any small outboard. (SuperBug excepted) an AquaBug is exactly what you need for a canoe, dink, inflatable, or small sailboat. AquaBug burns less fuel than any outboard, and runs from 7500 RPM's to a rock-steady 850 RPM's... a superb trolling motor. (And no \$40, 40 lb. battery!)

Our brochure has facts no other company publishes, such as fuel and thrust charts. Which, of course, are the two most vital things you'd want to know.

14995

SuperBug

Lighter than a 2, As fast as a 4!

Presenting a new triumph... SuperBug. Only 18 pounds, and \$199.95, it can match 4 HP motors for speed... and blow them out of the water on weight, price, and fuel consumption. SuperBug is 14 pounds lighter and \$135.00 less costly than OMC's 4 HP motors. *It even weighs and costs less than their 2 HP motors... and is 40% faster!*

It's got everything the obese outboards have, except the fat. Roller bearing smooth, built for ocean use, it's an astonishing outboard motor. Need more power than an AquaBug?... SuperBug just sailed into your life. (Especially if you sail... 2000 lb. boats are no problem.)

Send for our brochure. You owe it to yourself... and your back.

19995

AquaBug International, Inc.

Dep't. PM-54 P.O. Box #61, Lawrence, N. Y. 11559 (516) 536-8217

Name	To expedite delivery, send certified check, teller's check, or money order... or your Master Charge or BankAmericard number. N.Y. residents add tax.	<input type="checkbox"/> Master Charge #
Address	<input type="checkbox"/> BankAmericard #	<input type="checkbox"/> AquaBug... \$149.95, plus \$5 for postage, handling, and insurance.
City	<input type="checkbox"/> SuperBug... \$199.95, plus \$7 for postage, handling, and insurance.	
State	<input type="checkbox"/> Rush free Brochures	
Zip		

are true, if the brake block is no more than $\frac{1}{8}$ inch from the wheel rim (which can only be done if rim is straight).

Best way to "adjust" these hazardous levers is to remove them. Remove bolt on inside of lever (photo), remove washers and safety lever. Hacksaw off the lever axle flush with the brake housing, cut off about $\frac{3}{16}$ inch from axle bolt, reinstall the bolt. Or buy a shorter axle from bike shop. Use a brake hood over brakes for comfort when gripping brakes. You can buy hoods to fit your brakes from any good bike store.

Tubular vs wired-on tires

Are tubular tires, the kind that are sewn up all the way around their inside circumference, so very puncturable that a thorn would even puncture it? Can they be ridden on dirt roads? And where can I get the Corsa Strada or the new Japanese lightweight wired-on tires in my area?—Roman Kujdych, Vineland, N.J.

Tubular tires (photo above right) are generally lighter and thinner than wired-on tires, even the new "cheaters" or Corsa Strada tires you mention. However, some tubulars are more prone to puncture than others. For example, the $4\frac{1}{2}$ -ounce Vittoria Pistard Silk, designed for racing on

a concrete track, is extremely prone to puncture. At the other end of the scale, the 16-ounce D'Allesandro Worthy, used for training and for touring, is almost as impervious to flats as the light Corsa Strada wired-on tire. I have toured extensively on 9 and 10-ounce silk tubular tires with no problems. But I would not advise anyone but an experienced cyclist to do so.

For general touring I recommend the Corsa Strada or the Japanese



equivalent lightweight wired-on, which with tube weighs about 18 ounces, about 25 percent less than the conventional wired-on 27 x $1\frac{1}{4}$ -inch tire. You can buy the Corsa Strada at Raleigh dealers, the Japanese tire at any good bike store. Oh yes, a thorn can puncture any bike tire. If you plan to ride in Arizona, you will need special heavy thorn-resistant tubes.

Like a sack of potatoes

I would like to replace my 46-tooth front chainwheel with a three-speed transmission for wider gear ratios on my bike which is now equipped with a Sturmey-Archer three-speed hub. Can the SA hub take the extra load when the new unit is in low gear?—F. H. Mangelo, Baltimore.

Probably, but why bother? First, you will add at least five pounds of unneeded weight to an already heavy bicycle. Second, you will spend upwards of \$30 and several hours simply to make a heavy bike harder to pedal. Any gear ratio advantage would be largely offset by added weight. Heft a five-pound sack of sugar, potatoes or the like. Visualize that pressure as fingers in your belt pulling you back as you climb a hill. I suggest you sell your three-speed and get an inexpensive 10-speed.

Where can I get decals?

Where can I buy decals for my bicycle? I recently painted it, and I need to replace them.—Hector Garcia, Guadalajara, Jalisco, Mexico.

Unfortunately, most bike makers do not routinely make decals available. You can get Schwinn and Raleigh through dealers; for others you may have to write to the maker.

★★★

Here's how Bart Starr feels about his favorite chain saw...the STIHL 015 *Automatic*



Like most professionals I go for super performance and top quality in the products that I use. That's why I go for STIHL!

For my money, you just can't beat this little STIHL 015 Automatic . . . in power, or the super-value features that it offers.

Like—an automatic gear-driven bar & chain oiler that actually programs proper oil delivery ■ a dependable precision-made all bearing engine for longer life ■ a big multi-baffle muffler for quieter operation, and large metal and fan-cooled fuel & lubrication tanks (no plastic structural parts).

Visit your local STIHL dealer and ask him to show you what this little STIHL



015 automatic can do . . . and get a free autographed picture of me.

STIHL AMERICAN, INC.

107 BAUER DRIVE
OAKLAND, NEW JERSEY 07436



CARPET DETERGER



UPHOLSTERY DETERGER



WALL DETERGER

Use your SPARE TIME beat inflation with added income

You offer a service everybody needs . . . work part time or full time . . . own your equipment . . . keep all you earn . . . start with just a small investment . . . and we help you every step of the way!

Have your own money-making business and make the kind of income you probably thought impossible. You can when you clean carpeting or upholstery or walls with Von Schrader professional cleaning equipment. Every home, every building are potential customers. And every customer can become repeat business. The demand for on-location cleaning is growing so fast that how much you earn depends solely on just your time and effort.

Moreover, we help you every step of the way . . . just as we have helped thousands of others build money-making businesses for 40 years. Typical comments: "Cleaning is a very good business—have been most grateful for your advice and help. You have fine machines—can recommend them to anyone."—R. Herbst. "Never have we made this good a living and been so

content and happy."—N. Hanna. "Have all 3 machines and very pleased with each one."—C. Reiner. "You people sure helped me and I'll never forget it."—H. Kendall.

There are three easy-to-use Von Schrader machines. You need no special skills or education to operate them. (1) CARPET DETERGER®. Its performance cannot be duplicated by any other cleaning machine. (2) UPHOLSTERY DETERGER®. Using dry foam, cleans fabrics beautifully and safely. (3) WALL DETERGER®. Washes walls and ceilings 5 times faster than by hand—no dripping or streaking.

You can start with just one machine. Then, as your business keeps growing, you may want to add the other two and thus offer a complete cleaning service.

You pay no fees, royalties, sign no contracts. You own your equipment, the finest of its kind. Keep all you earn. And your investment is so small you may find it hard to believe. For complete information—without any obligation—send for booklet.



"Let me send you our free booklet that gives all the facts"

—Francis von Schrader, President

Read about the big demand for on-location cleaning, see why Von Schrader Detergers are the finest of their kind, how easy they are to operate. Learn how other men have become financially independent, how Von Schrader helps you every step of the way. Fill in the coupon and send for booklet. **Extra! Special Recorded Message included with booklet.** Listen as Francis von Schrader talks to you personally about your growing future using Von Schrader Detergers.



Take the 1st step Mail coupon

VON SCHRADER company

40 years of helping people earn good money
1045 Place, Racine, Wisconsin 53403
Please send complete information on Von Schrader Detergers. No salesman will call.

Name _____
Street _____
City _____
State _____ Zip _____

PAPERBACK BOOKS



From ENGLAND on tools and procedures you can use in your shop.

- FOUNDRYWORK FOR THE AMATEUR from patternmaking to building a furnace . . . \$2.50
- SECRETS OF SHIPS IN BOTTLES even one ship model in a light bulb . . . 2.50
- ELECTROPLATING FOR THE AMATEUR do a good job with almost no equipment . . . 3.00
- MAKING YOUR OWN GUITAR, BALALAIKA, and VIOLIN—woodworking projects . . . 3.50
- LATHE ACCESSORIES how to make and use them for very little money . . . 2.50

- MILLING IN THE LATHE including how to mill without attachments, cut gears . . . 4.00
 - BUILDING A STEAM ENGINE FROM CASTINGS like those casting sets in our catalog . . . 2.00
 - SOLDERING AND BRAZING from fixing the coffee pot to installing plumbing . . . 2.50
 - USING THE SMALL LATHE the metal lathe in your home shop, lots of ideas . . . 3.50
 - HOW TO WORK SHEET METAL with a minimum of equipment, some that you build . . . 4.00
- Our CRAFTSMANSHIP CATALOG—steam engines, tools, clocks, books—\$1.00—FREE if you order just 2 books from this ad.

CALDWELL INDUSTRIES
BOX 170 LULING,
TEXAS 78648

NEXT MONTH IN PM . . .

- Annual Car Care Guide—special 62-page section
- Fantastic cities in space
- Super Suez for supertankers
- Let the pros show you how to work with plywood paneling
- Mini outboards for maxi action
- Build a 762-mm lens for \$35
- 19 stereo switchers to handle your accessories

SUBSCRIPTION SERVICE: Mail all subscription orders, changes of address (with your latest label), and Postmaster notices of undeliverable copies to Popular Mechanics, P.O. Box 646, New York, N.Y. 10019. All other correspondence relating to your subscription: James Gable, Customer Service Department, Popular Mechanics, P.O. Box 1567, New York, N.Y. 10019. Please enclose your latest mailing label for quickest service when writing about your subscription.

Popular Mechanics

250 West 55th St., New York, N.Y. 10019
WPM5D1

YES! Please enter my subscription to POPULAR MECHANICS for:

- 1 year \$7.00 New
 2 years \$13.00 Renewal

Payment of \$_____ is enclosed.

Bill Me _____
initial here

Name _____ (please print)

Address _____

City _____ State _____ Zip _____

On new subscriptions, first copy will arrive in about 8 weeks.

(Above prices apply in U.S. & Possessions only. Canada add \$2 per year. All other countries add \$5 per year.)

CHANGING ADDRESS?

If you're planning to move, please let us know at least six weeks before changing your address. Attach current address label and fill in your name and your new address. This will serve to insure prompt service on your subscription.

Send old label with your name and new address to:
POPULAR MECHANICS, Subscription Dept.
Box No. 646, New York, N.Y. 10019

NAME _____ (Please print)

NEW ADDRESS _____

CITY _____ STATE _____ ZIP CODE _____



Will the real A.J. Foyt stand up,
and tell us why the S-K® brand
belongs on your hand tools?



Like father, like son! A.J. Foyt, Sr., (right) and Junior, both Great Ones, rely on S-K tools!

A.J. Foyt, Jr., one of the best ever . . . matching Champs in stockers, Europeans on roads, and hard chargers in Indy cars.

Great One, A.J. Foyt, Sr., is Junior's crew chief. Learning from Dad, A.J., Jr., at age 11, took cars apart and put them together. He is skilled in driving, tuning and designing cars. These Great Ones say proper tools are needed for the perfect job. Money rides on it.

You'll like S-K tools. They become extensions of your hands and brain. Use tools Great Ones use at work and home. Buy now and SAVE: at auto parts and hardware stores.



**SAVE \$34.10
over 54%
No. 4521-9**

21 Pc. 3/8" drive S-K Socket Set, 9 standard & 8 deep sockets, S-K ratchet, 2 extensions, universal joint. Steel case. If purchased separately, suggested user price would be \$63.08.

suggested user price **\$2898**

SAVE BIG MONEY ON S-K A.J. FOYT SPECIALS

**SAVE \$14.65
over 47%
No. 4915-9**



15 Pc. 1/4" drive S-K Socket Set. 11 sockets, spinner handle, S-K ratchet, 2 extensions. Steel case. If purchased separately, suggested user price would be \$30.63.

suggested user price **\$1598**



**SAVE
\$12.64
over 54%
No. 1707-9**

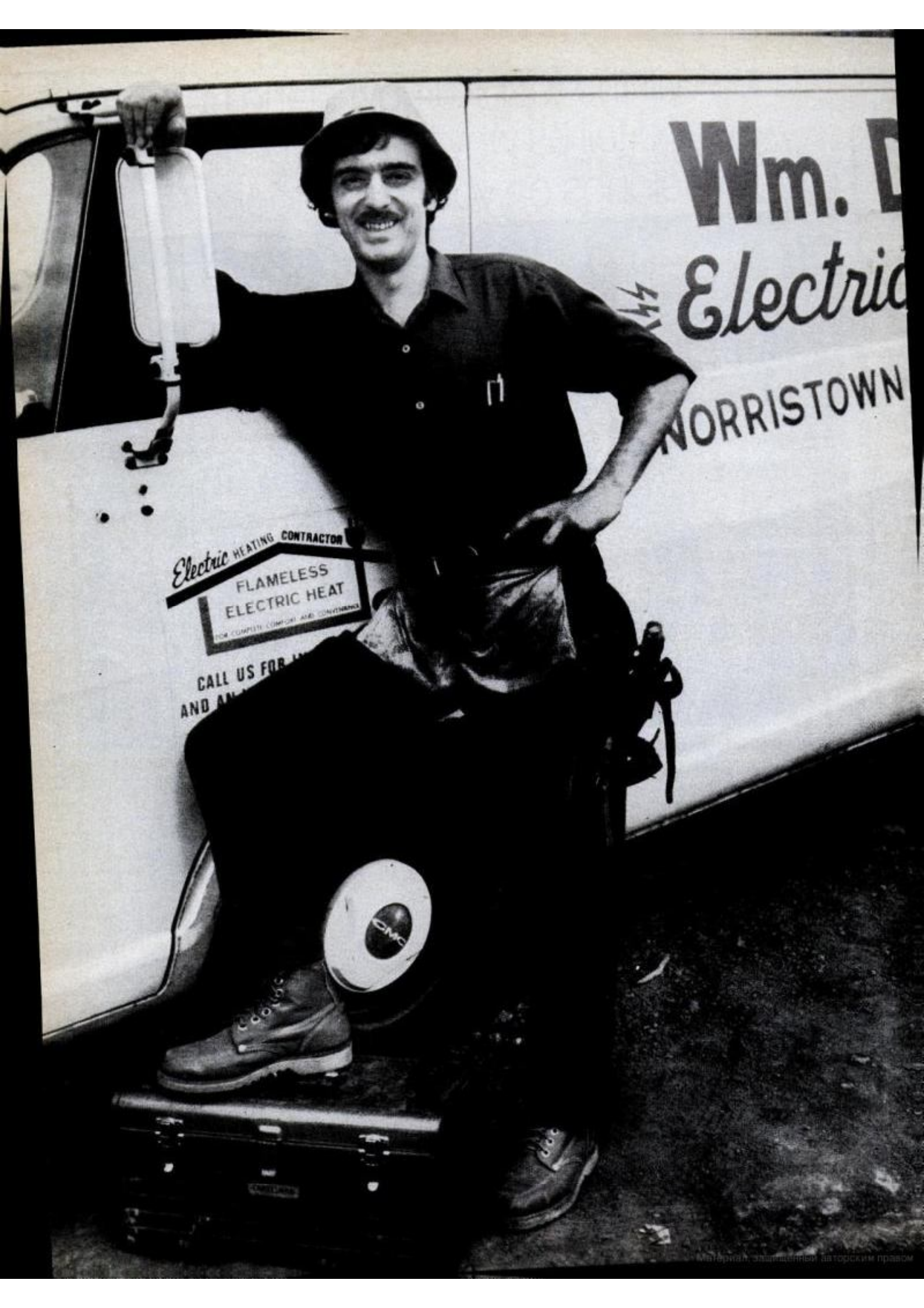
7 Pc. S-K Combination Wrench Set—1/4" thru 5/8". Vinyl pouch. If purchased separately, suggested user price would be \$23.23

suggested user price **\$1059**

GOLDEN WARRANTY

Our policy: Satisfaction guaranteed. If you are not completely satisfied with any S-K tool, simply return it to the point of purchase for a free replacement.





Wm. D.
Electric
NORRISTOWN

Electric HEATING CONTRACTOR
FLAMELESS
ELECTRIC HEAT
FOR COMPLETE COMFORT AND CONVENIENCE
CALL US FOR INFO
AND AN...

"Learn an honest trade," my old man used to say, "and you'll never have to knuckle under to any man."

(A TRUE STORY)

Bill De Medio of Conshohocken, Pa., has it made.

At 23, he's a licensed master electrician. The top of a trade where there aren't enough good men to go around.

But more important, Bill's his own boss and calls his own shots.

"I just went into my own business. And even before the sign on my truck was dry, I got my first big job.

"The contractor for a new group of houses asked me to do all the wiring. And there's bound to be a lot more work from him and other builders.

"If it wasn't for my ICS training as an electrician, I'd still be in some dead-end job—hating what I was doing, taking orders from everyone, and never getting any thanks for it.

"As a master electrician, you're the boss on the job—even when you're working for someone. You get respect, good money, and like my old man said, you don't have to take baloney from anyone."

The right combination for success

Bill De Medio has the right combination for success. He's in a growing field. And he has good training for it. You could, too.

Especially if you're interested in one of the fast-growing careers where ICS concentrates its training. Like Electrician. Engineering. Automotive Mechanic. TV Repair & Servicing. Drafting. Air Conditioning. (Check your choice on attached card.)

Ideal way to learn

As an ICS student, you study at home, on your own schedule. You waste no time traveling to and from class. And you never have to miss a paycheck.

At 23, Bill De Medio has more freedom, more security, and gets more respect than guys twice his age. (Photograph by Frank Cowan.)

But you're never alone. Skilled instructors are always ready to help you.

If you ever have doubts or problems or just want to talk to your instructor, you can call ICS from anywhere, Toll-free.

ICS training works

More than 8,500,000 men and women have turned to ICS for career training in the past 80 years.

Government agencies, unions and some of America's top corporations (including Ford, U.S. Steel, Mobil, Alcoa, Pan Am, GE, Motorola and RCA) use ICS courses in their own training programs.

Free demonstration lesson

If you want your job to give you more, (more money, more day-to-day satisfaction, and more future) send for our career guide booklet and free demonstration lesson.

Remember, it's your life. You might as well make the most of it. ©1973 ICS

ICS International Correspondence Schools
Scranton, Pennsylvania 18515

Please send me the Free Career Guidance Booklet and Free Demonstration Lesson for the field I have checked below. I understand I am under no obligation.

- | | |
|---|--|
| <input type="checkbox"/> Electrician | <input type="checkbox"/> Accountant |
| <input type="checkbox"/> Automotive Mechanics | <input type="checkbox"/> Business Management |
| <input type="checkbox"/> TV Service & Repair | <input type="checkbox"/> Drafting |
| <input type="checkbox"/> Airline/Travel Specialist | <input type="checkbox"/> Civil Engineering |
| <input type="checkbox"/> Airline Passenger Agent | <input type="checkbox"/> Interior Decorating |
| <input type="checkbox"/> Airline Cargo Agent | <input type="checkbox"/> Motel/Hotel Mgt. |
| <input type="checkbox"/> Architectural Drafting | <input type="checkbox"/> Restaurant/Club Mgt. |
| <input type="checkbox"/> Mechanical Engineering | <input type="checkbox"/> Income Tax Specialist |
| <input type="checkbox"/> Diesel/Truck Specialist | <input type="checkbox"/> FCC Licensing |
| <input type="checkbox"/> Transmission Specialist | <input type="checkbox"/> Engineering |
| <input type="checkbox"/> Electronics Technician | <input type="checkbox"/> ICS High School |
| <input type="checkbox"/> Data Processing Mgt. | <input type="checkbox"/> Diploma Program |
| <input type="checkbox"/> Air Conditioning & Refrigeration | <input type="checkbox"/> or Equivalency |

Check for special information, if age 16 or under. XA802C

Name _____ Age _____

Address _____

City _____

State _____ Zip _____

Canadian residents use this address for service from ICS Canadian, Ltd.
In Hawaii: 931 University Ave., Honolulu, Hawaii 96814.

(If card is missing, please fill in the coupon and mail it to: ICS, Scranton, Pennsylvania 18515.)



IMPORTS AND MOTORSPORTS



More 1975 models

The year got off to a slow start, but by now all the '75 imports should be in dealer showrooms. Some cars were not introduced in time to be included in our '75 Imported Cars feature that begins on page 70 of this issue. So this month's column—written closer to press time—will make the roundup complete.

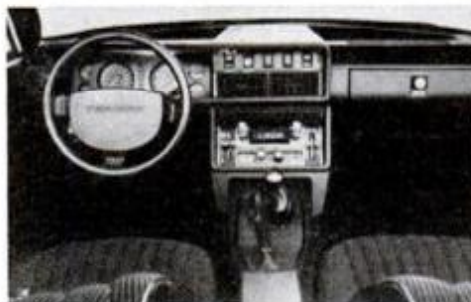
Triumph. Some purists wish British Leyland still made cars like the



TR7 wedge has high rear, low nose. Some jokingly call it "door-stop" styling.

TR2 and MGTC, but the traditional shapes of these sports cars have slowly evolved into the TR6 and MGB over the years. Now, with the introduction of the knife-nose TR7, wire wheels are gone forever.

The modern "wedge" is on an 85-inch wheelbase and is 164.5 inches overall. Height is 49.9 inches, width is 66.2 in. and turning circle is 29 feet. When I saw the car for the first time in Florida in January, I lost some of my ambivalence about its styling: it looks better in the metal than in pictures. It's a nicely scaled two-seater and it's carefully



TR7 interior is neat and well thought out.

assembled and finished. The roomy interior I found especially appealing.

Power is from the same two-liter, ohc, in-line Four used in the Dolomite Sprint (not imported here). It has more than enough punch for this size car, with 90 hp at 5000 rpm. The car does feel heavier than its 2300 pounds, however, mostly due to the steering effort required: I'd like to see power steering on this one. Still, you get hot-dog driving with fuel consumption in the 20 to 30-mpg range—that's like a free lunch. All you pay is \$5100. That, in case you haven't looked lately, puts you way ahead of the competition in dollars—and sense.

Aston Martin. The fate of the



'75 Aston Martin may be last of marque.

James Bondmobile still hangs in the balance—balance of the red and black on the books, that is. The British manufacturer may still be saved from bankruptcy. Some of the '75 V8s got into the country before the financial storm, and Rex Woodgate, who imports them, is optimis-



Subaru All Star is only 4wd station wagon.

tic about getting more of the \$32,000 cars. To get the latest information, write him at Aston Martin Lagonda, Inc., Box 358, King of Prussia, Pa. 19406.

Subaru. The six cars in Subaru's '75 model lineup are called Shooting Star, Evening Star, Super Star, Star Clipper, Star Cruiser and All Star, since Subaru is the Japanese name for the Pleiades group of six stars in the Taurus constellation. It all sounds a bit too cute, but the cars do have the guts to overcome their names.

Most intriguing of these cars is the



Mazda GTR is racy version of the RX-4.

All Star, which is the only four-wheel-drive station wagon you can buy.

Mazda. We found the RX-4 to be one of the hottest super coupes around (see *What, No Altimeter?* page 96, July '74), so it was natural for Mazda to give it a racy appearance. The result is the GTR—kind of a Wankel version of the late, great GTO. ★★★

You can make a lot of money as a locksmith






by learning at home from nationally accredited Locksmithing Institute.

we do.



LOCKSMITHING INSTITUTE

Division of Technical Home Study Schools, Dept. 1110-045
Little Falls, N.J. 07424
Licensed by State of N.J.
State Approved Diploma.
Accredited Member, National Home Study Council.
Approved for Veteran Training.

 <p>Keith Hamill Toronto, Canada "Have seen other Locksmith courses but none compared to yours. Have a successful mobile service of my own . . . earn between \$2000-\$3000 per month."</p>	 <p>Peter H. Rood Torrance, Calif. "School and instructor were excellent. Really gave me incentive . . . to perfect all I learned to date. Earned \$1500 spare time doing odd jobs."</p>	 <p>James D. Soule West Chester, Pa. "Course was excellent. Am sure I couldn't have learned as much and as fast in an apprenticeship program . . . was thorough and no short cuts."</p>	 <p>Edward H. McInroy Honesdale, Pa. "First got interested in locksmithing as it is necessary for my job and lack of locksmiths in the area. Enjoyed study as well as practical training."</p>	 <p>George James Luzzi Norwood, N. J. "Earned \$1000 during training. The method of instruction, personalization to the individual and overall thoroughness are wonderful."</p>
---	--	---	--	---

Cut Out Ready-to-Mail Coupon. No Postage Stamp Needed.



Electric Key Machine included with course so you can make money quickly.



306 pieces of equipment, locks, picks, supplied for use with course.



State Approved Diploma, going into business help supplied.

Proof that you can enter the "neglected profession" of locksmithing, where the shortage of trained personnel is critical, through the "learn at home" training of famed Locksmithing Institute, can be demonstrated by the words of graduate David W. Smith, Scottsdale, Ariz.:

"I found the Locksmithing Institute course a very fascinating one and ideally suited for home study. My instructor made me feel that he was taking a personal interest in my progress."

Or by the words of John R. Tiffany, El Paso, Tex.:

"All the lessons were well chosen and presented. The Institute provided, not only the supplies to work with, but also the information on how to set up a business. Without reservation, I highly recommend the Locksmithing Institute's training program to those interested in learning this craft."

Send your name today! We will mail our big book of facts plus sample lesson pages. Learn how you can be making spare time money on preliminary jobs within six weeks. No obligation, no salesman will call. Dept. 1110-045

Name _____

Address _____

City _____ State & Zip _____

Check here if eligible for Veterans Benefits

DO NOT CUT BUT FOLD HERE—Seal.

POSTAGE WILL BE PAID BY
LOCKSMITHING INSTITUTE
Div. TECHNICAL HOME STUDY SCHOOLS
Little Falls, New Jersey 07424

BUSINESS REPLY MAIL
No Postage Stamp Necessary if Mailed in the United States



First Class
Permit Number 137
Little Falls, N. J.

New protection for new homes



The next home you buy may have something extra—a 10-year warranty against structural defects.

by Stephen Walton
ASSISTANT EDITOR,
HOME AND SHOP

Builders have something new to use to boost their new-home sales—and to keep you happy after you've bought. Its origins go back farther than today's slow market, but it could be just what is needed to start the turnaround, and it may be just what you've been waiting for.

It's a new kind of buyer protection called Home Owners Warranty (HOW). It's new—having been available for less than a year now. It's inexpensive for the peace of mind it can give—and it can even pay for itself. It's offered now in many areas, and should be available throughout the United States, in not too many years. It eliminates the risk of getting stuck with a shoddily built house. It works like this:

When you buy a home, HOW coverage is included in what you pay, at the rate of \$2 per \$1000 purchase price (minimum \$50). For a \$39,000 house, that's \$78, and you pay it only once. Actually, you may not be pay-

ing for it at all. It may be paying you, in effect, since at least one mortgage lending institution (and others may follow its lead) is offering interest-rate reductions of $\frac{1}{8}$ to $\frac{1}{4}$ of 1 percent on HOW homes. For that \$39,000 house, a $\frac{1}{4}$ -percent reduction would save you \$97.50 in interest payments, \$19.50 more than the cost of HOW coverage, *the first year alone*. Subsequent savings are pure gravy, of course.

Mortgage lenders like HOW for the same reason you're likely to—it means the house is a better bet. Protection begins when you take title or occupy the house (whichever happens first) and continues for 10 full years. It's transferable, too, so it can become a selling point for you if you move before 10 years are up.

Okay, but what's covered? The first year, the builder warrants that materials and construction in your home meet approved standards for your area. These standards are

usually based on local building codes, but in any event must be approved by national HOW. They deal with structural, mechanical, plumbing and electrical systems as well as quality standards. This first year's warranty, of course, also covers your home against structural defects.

Additionally, your builder will fulfill the terms of warranties issued by manufacturers of appliances, fixtures and equipment when the manufacturers cannot or will not fulfill them themselves (this protection is, however, limited in time to the duration of the manufacturers' warranties). Coverage includes the operation of plumbing, heating, cooling and electrical systems, with the limitation that components carrying manufacturers' warranties of less than one year are covered only for their own warranty periods.

In the second year, your builder warrants the overall performance of systems, except when problems result from the failure of individual components. Coverage still includes defects caused by work that does not comply with approved standards—this could include faulty work, for example, on piping, septic tanks, wiring, ductwork or refrigerant lines. If structural defects show up during the second year, they, too, are covered.

In the third through tenth years, coverage is limited to structural defects and is provided by HOW's insurance carrier, not your builder. That's great, you say, but what if my builder goes broke—as they sometimes do—before the third year. Doesn't that leave me high and dry?

No, it doesn't. One of the provisions of HOW's national insurance plan is that the insurance company takes over your builder's responsibilities if he can't or won't fulfill them during those first two years.

All right, but what's a structural defect and what isn't? The Home Owners Warranty Corp. puts it this way: "A Major Construction Defect is defined as actual damage to the load-bearing portion of the home, including damage due to subsidence [sinking], expansion or lateral movement of the soil (excluding movement caused by flood and earthquake)—which affects its load-bearing function and which vitally affects or is imminently likely to affect use of the home for residential purposes."

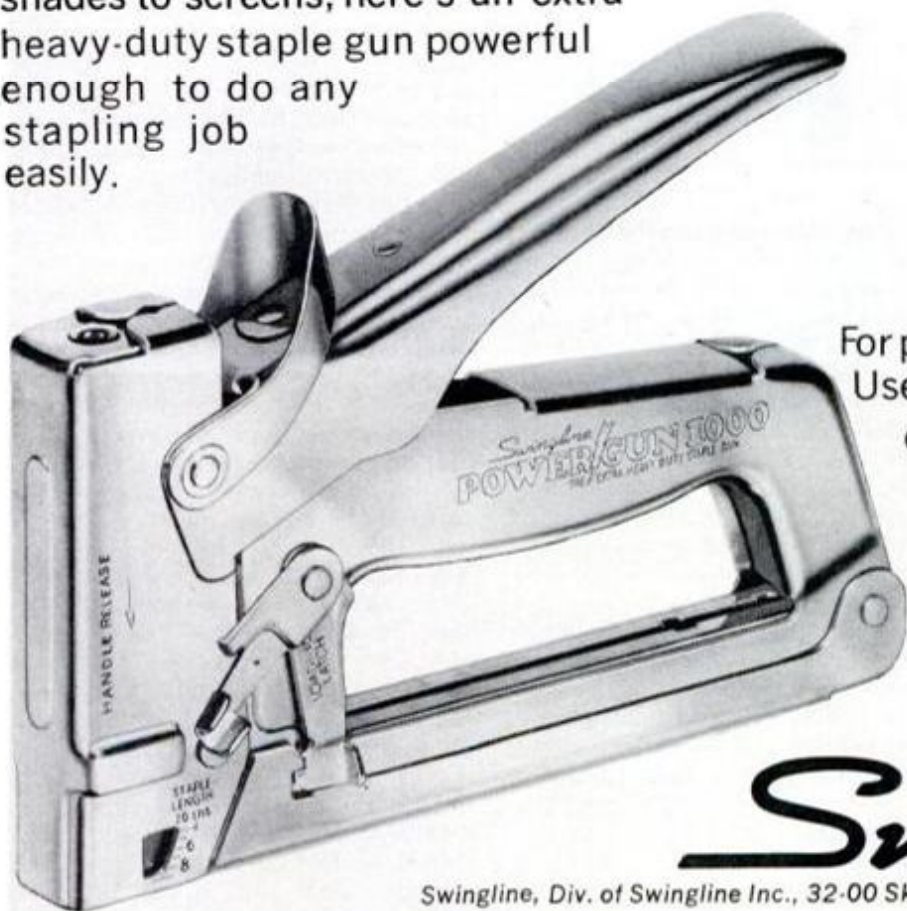
Got that? HOW Corp., in its consumer information booklet, goes on to cite as examples damage to structural elements of the home due to:

- Subsidence caused by ground movement.
- Subsidence caused by faulty work-

(Please turn to page 32)

Powergun™ 1000 even drives into hardwood oak!

From insulation to ceiling tile, upholstery to fencing, shades to screens, here's an extra heavy-duty staple gun powerful enough to do any stapling job easily.



For professional or do-it-yourselfer!
Uses 5 staple sizes. Sold separately
or as a kit with staples plus wire,
shade, screen attachments.
Handsome carrying cases, too.
The Powergun 1000 staple gun
does it all. Try it!

Swingline®

Swingline, Div. of Swingline Inc., 32-00 Skillman Avenue, Long Island City, N.Y. 11101

Great for lawn & garden projects. See your dealer for free greenhouse plans, or write to us:



Greenhouse



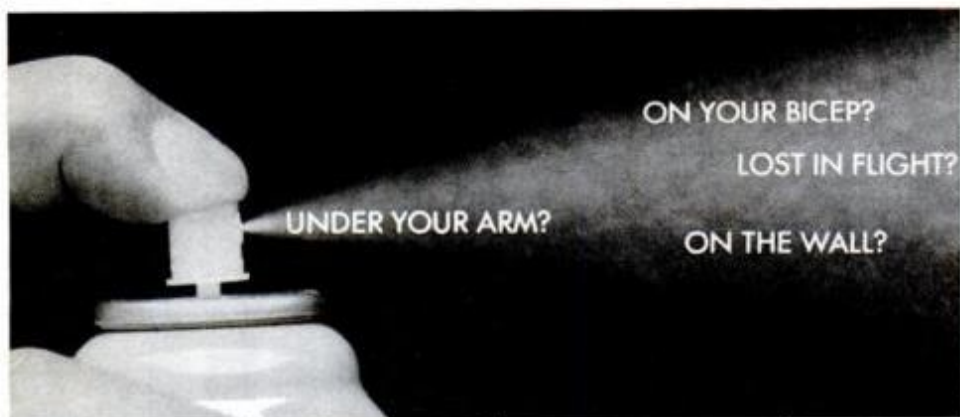
Screens



Fencing



Furniture



Where did your last can of aerosol deodorant go?

Propellant makes up a large part of aerosol deodorants. Mennen Speed Stick* is a solid deodorant that applies evenly, exactly where you want it. So it lasts a lot longer.

Get off your can. Get on the stick.



NEW PROTECTION FOR HOMES

(Continued from page 30)

manship; e.g., building on badly compacted fill.

- Subsidence caused by bad soil conditions; i.e., weak or compressible soils, or expansive soils.
- Failure of beams, lintels, load-bearing walls or other superstructural elements.
- Excessive deflection or collapse of suspended floors.
- Inadequate structural roof members.

HOW Corp. gives these examples of problems that would not be considered structural defects—but that could be covered under first-year materials and workmanship provisions:

- Plastering, wall tiling, flooring and other finishes.
- Drains and services.
- Wet rot in window frames, doors, door frames and other millwork.
- Leaking roof and gutters.
- External items; e.g., boundary walls, retaining walls not necessary for structural stability of the home.
- Dampness in floors and walls.

What happens when a defect does appear? In the first and second years, you notify your builder in writing, and he corrects it. Sure, but what if

you and he disagree as to the validity of your complaint? Then either you or he may ask the local Home Owners Warranty council—the group that runs the HOW program in your area—to act as mediator, meeting with you and your builder to try to reach an understanding that will resolve the problem. The party requesting conciliation is required to put up a \$25 deposit. This sum is intended to prevent frivolous and nuisance complaints (which could increase the cost of HOW for future home buyers) and is refunded if the complaint is found to have substantial merit.

If conciliation fails to solve the problem, there's a further step—binding arbitration by the American Arbitration Assn., which has adopted rules especially for HOW use. The Home Warranty Agreement you and your builder sign stipulates that you both will recognize the arbitrator's judgment as final, and the arbitration procedure is faster and cheaper than going to court. It requires that the complaining party post a \$75 fee, all or part of which may be refunded, depending on the case's merits.

If an arbitrator rules against your builder but he fails to comply with the ruling within 60 days, the local HOW council will have the defects

fixed through the HOW insurance carrier—and the builder may be thrown out of the program.

If you can't reach your builder and suspect he's gone out of business, you notify the local HOW council in writing. It will investigate and have the defect corrected through the insurance company. In this case, there is a \$50 deductible—you pay the first \$50 of the total cost of claims during this two-year period.

After the second year, your builder is not involved. If a structural defect appears, you notify the local council, it investigates and, if the claim is valid, has the defect corrected, with the insurance company paying the cost. If you disagree with the decision on your claim's validity, you can go to arbitration—binding on the council and the insurer.

What are your obligations as a buyer of a HOW home? Very few. As explained in the Home Warranty Agreement, you must "keep and maintain the Home in good repair and condition," meet manufacturers' warranty conditions (except those concerning installation—they're up to the builder) and report defects promptly in writing. Signing the agreement does not take away any rights you have under the law, and you and your builder can still make any other contracts that will not alter his warranty obligations. And, as noted earlier, if anything is left of the 10 years when you sell your home, it is transferable to the next owner.

Dollar-value of claims is limited to the original selling price of the home. "Home" is very much the right word, by the way, because coverage is not confined to single-family houses—town houses and condominiums up to four stories tall are eligible. Coverage for high-rise condominiums will probably be offered soon.

What may be the most surprising thing to some about HOW is that it started with the builders themselves, not with the government or consumer activists. If it works as it's supposed to—and it looks as though it will—it will be an outstanding example of the kind of industry self-regulation that's often given lip-service but rarely becomes reality. Initiative for HOW came from the National Assn. of Home Builders, which had been watching with interest a similar program in Great Britain that proved extremely successful—now covering more than 99 percent of new homes built there.

NAHB set up Home Owners Warranty Corp., American Bankers Insurance Co. of Florida was chosen as the insurance carrier, and the first HOW-covered home was sold last

August. As of Feb. 1, 1975, more than 5000 homes were enrolled in the plan.

"We wanted to come up with a program that would be of real benefit to the consumer, and at the same time be very workable for the builder," says John W. Biasucci, HOW Corp. president. He explains that HOW is meant to be much more than a public-relations gesture or a way to boost people's willingness to buy during a difficult period. "We're trying to raise the general practices and standards in the housing industry itself to the highest professional level that we can. We recognize that there are homes that are not perfect, but we can still try to have the highest level of customer satisfaction, given that this is the most important purchase most people make."

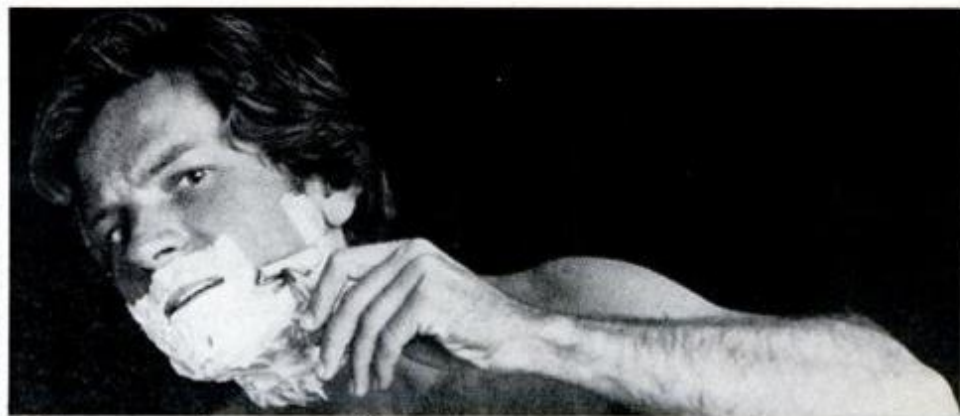
An additional goal of the HOW program, Biasucci says, is "trying to develop dialogue between buyers and builders with the conciliation-arbitration process. Many problems are the result of not having brought things out on the table and talked them out."

Although HOW is NAHB's creation, participation is not limited to NAHB-member builders. "It had to be open to be effective," Biasucci says. Builders who wish to join the program are admitted or refused by the local councils on the basis of ethical conduct, financial responsibility and quality of their work. Those who are refused may appeal their cases to the national HOW organization. Registration is only for a year at a time, so that each builder is given an annual review.

With anticipated growth and increasing consumer awareness of HOW, Biasucci sees it improving competition among builders, "in the sense that a builder's willingness to back his product will become very visible, and builders not willing to back their product will be at a competitive disadvantage. They will have to drop out of the way or change their ways. If you're in this program, you've got to measure up. If you're not in it, consumers are going to start asking why."

The question of on-site inspections will be "up to the local councils," according to Quentin Wells, HOW Corp's vice-president of operations. "If they decide that the code inspection is adequate and thorough, they may have very few spot checks. If the code is not being enforced or if there is no code, then inspections will be done by HOW." Inspectors, Wells says, will be drawn from a panel used by the Veterans Administration.

Biasucci notes that HOW "could lead to the enactment of codes in areas that don't have them." This is



Naming it was easy.

Mennen Sof' Stroke® Shave Cream has Lanomen® (a lanolin derivative). It lubricates your skin, so your razor shaves your whiskers without irritation.

Sof' Stroke.®



not the only spinoff benefit likely to come from the program. "We're going to have a vast data source that's never been obtained before in the housing market," he adds. "We will get a lot of information on the defects that show up, and perhaps on products or systems that have higher defect rates than others."

This leads to the possibility of cooperation with makers of materials fixtures and appliances. "By having builders join together to improve their own industry, we think we will find manufacturers who will want to work with us. We want to be broader

than just the warranty of the builder—we're interested in the warranties that go with the house."

With no lack of optimism, Biasucci says he expects HOW to match the success of its British model, without the help that program got when mortgage lenders made it mandatory and Parliament gave it official backing. HOW has, however, been endorsed by Virginia H. Knauer, the President's special assistant for consumer affairs, and banks and savings and loan associations are looking with greater favor on buyers of HOW homes than on buyers of unbacked houses.

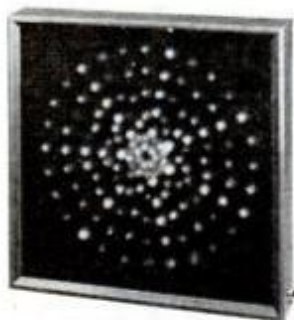
The entire program seems to be thoroughly thought out, containing nothing to make the potential buyer anything but confident. Even the standard HOW documents are reassuring—there's no fine print, and the language is unusually clear for legalese. With insurance-commission approval granted in 28 states and with more on the way, it shouldn't be long before an active national program is a reality. Meanwhile, there's evidence that there must be something to it—the HOW builders are selling homes. For more information, write HOW Corp., National Housing Center, 15th and M Sts. N.W., Washington, D.C. 20005. ★★

Green lights for HOW

As of Feb. 6, 1975, the following states had given the clearance needed for HOW's insurance coverage to be offered:

Alabama	Missouri
Alaska	Montana
California	Nevada
Colorado	New Hampshire
Delaware	New Mexico
Florida	New York
Georgia	North Dakota
Hawaii	Oregon
Indiana	Pennsylvania
Iowa	South Dakota
Kentucky	Tennessee
Louisiana	Virginia
Maine	Washington
Minnesota	Wisconsin

exciting new projects for '75



NEW Heathkit Color Organ

"Kaleidoscopic" light show you hang on a wall. 4 filters separate sound into 4 bands; each controls 35 brilliantly colored lights — red for bass, blue for low midrange, green for upper midrange, amber for treble — 140 lights in all, pulsating in time to music of your hi-fi. Wide 25 db dynamic range; great for any type of music. Walnut-grain vinyl-clad case, 23" x 23" x 4 1/2". On/off/sensitivity control.

Kit TD-1006 79.95*



NEW Portable Digital Multimeter

Professional performance at a budget price. 26 ranges resolve voltages to 100 μ V, currents to 100 nA, measures AC & DC current up to 2 A, resistance from 100 to 1000K ohms. Big, bright 3 1/2-digit readout with automatic over-range & polarity indications. Built-in reference standards for easy field calibration. With rechargeable batteries & AC line cord.

Kit IM-2202 179.95*



NEW DC-10MHz Oscilloscope

A great scope—a great value! Perfect for TV servicing. 10 mV vertical input sensitivity, time bases from 200 ms/cm to 200 ns/cm, internal or external digital triggering, two input channels. Mu-metal shielded tube with 8x10 cm graticule.

Kit IO-4530 299.95*



NEW 40 kV Metered Probe

Ideal for high-voltage TV measurements—up to 40 kV with \pm 3% accuracy. On/off switch.

Kit IM-5210 17.95*
Assembled SM-5210 ... 24.95*



NEW Emergency Car Strobe Light

Highly visible amber flash warns other drivers when your car stalls or breaks down. Non-marring magnetic base, 12" cord, plug fits cigarette lighter. For 12 VDC.

Kit GD-1026 29.95*



NEW Windshield Wiper Delay

Provides exactly the wiper speed you need for safe driving in any weather, from light mist to heavy rain. Works with most 12 VDC positive or negative ground cars.

Kit CH-1068 14.95*



NEW AM/FM Digital Clock Radio

Electronic digital clock with standby battery power to keep time (without display) during power interruptions, electronic "beep" alarm with adjustable volume, 5 μ V FM sensitivity, quality sound. Less batteries.

Kit GR-1075 129.95*



GR-500

Simulated TV pictures

GR-400

GR-300

15, 17 & 19" (diagonal) Color TVs with On-Screen Digital Readout

Advanced Heath engineering and outstanding picture quality. All feature on-screen channel readout & optional plug-in clock modules. In-line picture tubes with slotted shadow masks provide exceptionally bright, sharp pictures. In the GR-400 and 500, black matrix tubes improve contrast. And here's something new—static toroid yoke & magnet assemblies never require convergence & fixed LC filters eliminate instrument IF alignment. GR-300 & 400 come with walnut veneer cabinets; cabinets for the GR-500 start at \$39.95.*

Kit GR-300 (15" diag.), with cabinet 449.95*
Kit GR-400 (17" diag.), with cabinet 489.95*
Kit GR-500 (19" diag.), less cabinet 499.95*
Kit GRA-2000-1, Digital Clock Module 29.95*



GR-2000

Simulated TV picture

Highly Acclaimed GR-2000 Digital-Design Color TV

The set that brought TV into the digital age—and still one of the finest made. Tuning is totally digital solid-state & the channel number appears right on the big, 25" (diagonal) screen. The optional clock module also displays the time on the screen. For the ultimate in convenience, add the optional wireless remote control. Can be custom mounted; optional cabinets start at \$119.95*.

Kit GR-2000, less cabinet 669.95*
Kit GRA-2000-1, Digital Clock Module 29.95*

at traditional Heathkit savings

There are 350 more in the new FREE Heathkit catalog!

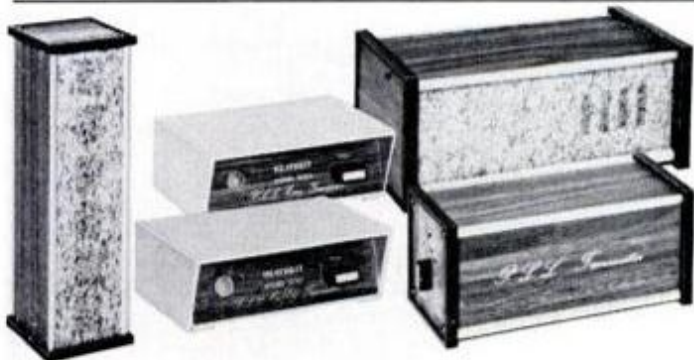
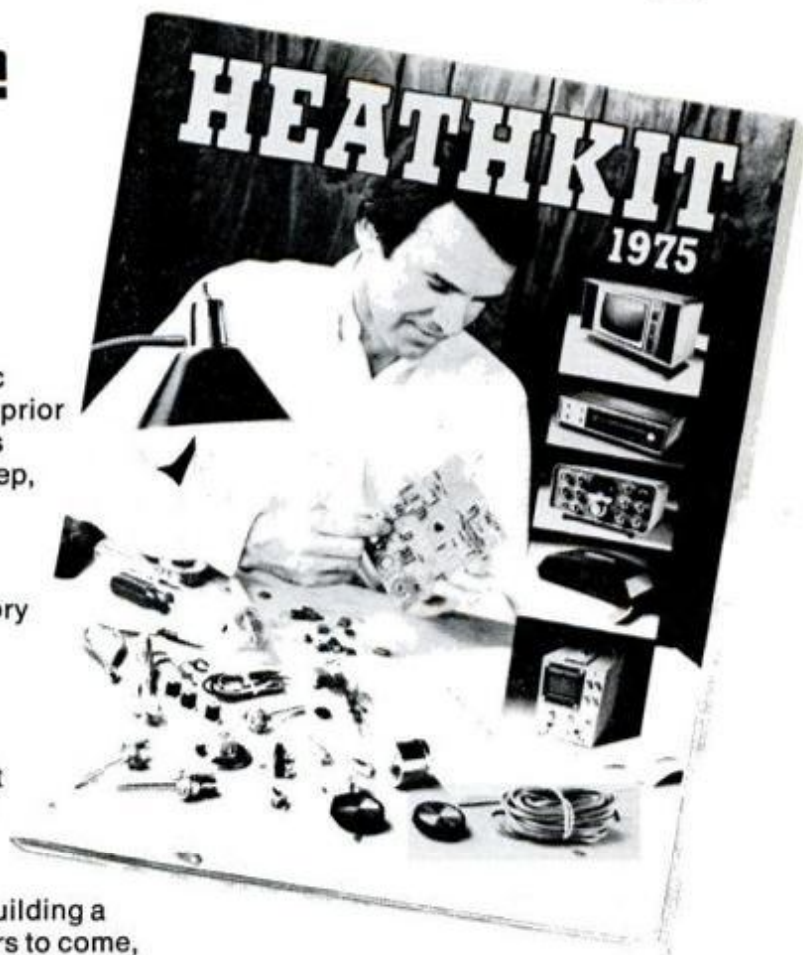
Who can build our kits? Anybody!

For over 27 years we've made superb electronic equipment that anyone can build—even with no prior knowledge of electronics or kit building. Famous Heathkit assembly manuals guide you step by step, showing you exactly what to do—even how to solder like a pro.

And we back every Heathkit purchase with people. Expert technical consultants at the factory and trained service personnel from coast to coast are ready to help every step of the way. Thousands of Heath customers will tell you—we won't let you fail!

When you're finished, you'll own one of the finest products available—kit or assembled. But don't take our word for it, independent reviewers consistently praise their quality.

You'll enjoy the satisfaction—and savings—of building a useful product with your own hands. And for years to come, you'll enjoy its unexcelled quality and performance. Build it yourself—with a little help from Heath.



NEW Heathkit/Delta Home Security System

Everything you need for a complete home security system. Remote detectors connect to Central Processor through your home's electrical wiring. Inputs for ultrasonic intrusion detector, heat & smoke detectors plus "panic button" & remote on/off switch. Central Processor features built-in speaker; output for an external speaker. Sounds alarm during power failure.

Your free 1975 Heathkit Catalog describes the world's largest selection of electronic kits. You'll find kits for every interest, every age, every budget. Choose from digital-design color TVs, stereo and 4-channel hi-fi components, fishing and boating electronics, model radio-control equipment, amateur radio kits, digital clocks, weather instruments, shortwave and digital clock radios, treasure finders, automotive tune-up tools, service instruments, and educational kits. See why you get more for your money when you build it yourself—send for your free copy today.



NEW Valu-System Stereo & 4-Channel Components

Budget-priced systems with component-quality sound. Pick your own system—an AM/FM stereo receiver, \$139.95*; an AM/FM stereo receiver with 8-track player, \$179.95*; a 4-channel 8-track player, \$169.95* or a 4-channel AM/FM receiver with 8-track player, \$239.95*. Add speakers (just \$34.95* per pair) and our \$44.95 ceramic changer, and you get our 5% system discount. A whole stereo system (shown above) starts at just \$208.86*. See them in the new Heathkit Catalog.

Heath Company
Dept. 17-04
Benton Harbor, Michigan 49022

HEATH
Schlumberger

Name _____

Address _____

City _____ State _____ Zip _____

PRICES & SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
*MAIL ORDER PRICES; F.O.B. FACTORY.

CL-561



BY MORT SCHULTZ

CAR CLINIC

Vega oil loss

In the October, 1974, *Car Clinic*, I advised Vega owners experiencing a drastic loss of oil because of cylinder-wall scoring that a special letter from Chevrolet to dealers had said that Chevy would stand behind all repairs on Vegas having less than 50,000 miles. Some readers wrote and said that their dealers had told them I was all wet. Based on the experience of the following reader, I would say that the reverse is true:

"I had just about given up on my 1971 Vega with 47,000 miles, which had been using almost as much oil as gasoline since the 20,000-mile mark, when I read the October issue. I took the article to my Chevy dealer. The first man I spoke with told me that you didn't know what you were talking about, and that my car had no warranty coverage after 12,000 miles. I then spoke to the service manager and told him I would take the conflict right to GM and let them resolve it. With that, he admitted that he had received the special letter you had spoken about, and I was told that he would install a new engine in my car at no charge. I don't know how to thank PM enough, but you can bet I will be a subscriber for the rest of my life."—Max C. Douglas, Lake Park, Fla.

Thanks, Max. The rest of you Vega owners who have met stubborn dealers—hang in there.

Bowlegged Pinto

My 1974 Pinto Squire station wagon (2300-cc engine) has 10,000 miles and a waddling problem. When I apply the brake hard, the left front brake grabs before the right front, pulling the car to the left, and I also get a shimmy up through the steering wheel. When I apply the brake gently, all I get is the steering-wheel shimmy. What do you say is wrong?—Mike Schuh, Everett, Wash.

I say that the disc-brake rotors have probably developed nonuniform thicknesses. Both should be checked with a micrometer. The variation should not exceed .0005 in., and the thickness of each rotor should not be less than the minimum safe thickness shown on the rotor. If rotors

still meet these qualifications, but are not uniform, they may be made uniform by cutting them on a disc-brake lathe.

Afraid to sit

The plastic along the seam of the driver's seat in my 1969 Rambler two-door is splitting. Nothing I use holds, and no store we've gone to has covers. The car must last me for two more years. Please help.—H.T. Frost, Milwaukee

American Motors doesn't make covers, and a few telephone calls to stores in my area failed to reveal a company that does. The only thing I can suggest is that you take the car to an automobile seat cover-top upholstery shop and ask to have a patch fashioned and sewn on. But if you must have a set of seat covers, I'm sure that the shop could make them for you.

Tire topics

I know I shouldn't use radial tires on a car with conventional tires. But: (1) can steel-belted radials be used on the same car with cord-belted radials; (2) can belted-bias tires be used on the same car with plain bias tires?—J. Elwood Long, Oley, Pa.

"Yes" to both questions. You can use steel-belted and cord-belted radials on the same car, and belted-bias and plain bias on the same car. However, for maximum stability, see to it that the same kind of tire is used on the same axle. For example, use steel-belted radials on the front axle and cord-belted radials on the rear, or vice versa. Use belted-bias on the front axle and plain bias on the rear, or vice versa.

Searching high and low

I have a 1971 Volkswagen Squareback with fuel injection. I rely on a vacuum gauge when doing tune-ups, but I can't find a place to hook up my gauge. Local dealers haven't been able to help. Can you?—Gordon H. Williams, North Miami, Fla.

Place a "Tee" connector in the

pressure-sensor vacuum line and attach your vacuum gauge. The pressure sensor is on the left-hand side of the engine compartment near the coil.

Or, if the engine is warm, find the auxiliary air regulator, which is bolted to the crankcase right near the distributor. Disconnect the vacuum line that goes to the intake manifold at the air regulator and plug the vacuum gauge into its end.

Face lift

My 1971 Ford LTD is a classy car, except for the vinyl top. My son took the car to a car wash, and they used hot wax on it. Since then, the top has been a mess. It looks chalky white. Is there anything I can use to clean it?—J.M. Praitte, Bridgeport, Pa.

Go to a Ford dealer and buy a can of Ford's Vinyl Hardtop Cleaner and Reconditioner (part No. C8AZ-19F-5353B). Apply the product with a soft-bristle brush to restore the vinyl's top coat and prevent further discoloration. Do not use a household scouring powder or a hard scrub brush; these would destroy the top coat.

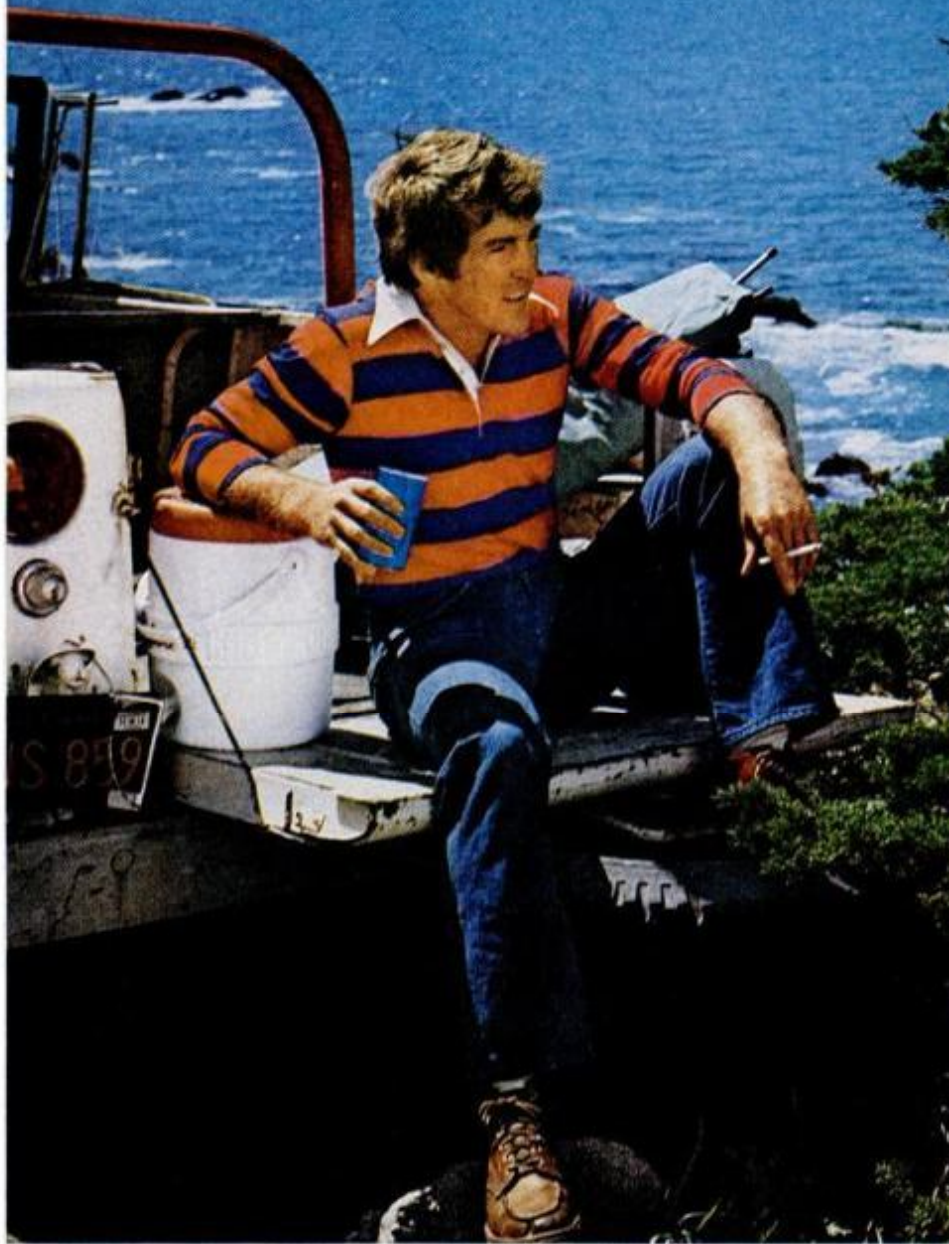
Cop-out

My 1974 Pontiac Luxury LeMans constantly stalls and/or hesitates when the engine is cold. This has happened while I'm trying to get into the flow of traffic, even when the car is warmed up for five minutes. My dealer has had the car seven times and now tells me the condition is normal and nothing can be done to fix it. His reason: "All the pollution-control equipment." If he is right, I regret ever buying the car.—Gary Taibbi, Sound Beach, N.Y.

Your trouble could stem from one of several problems. None are related to emissions control equipment, but all can be checked by a good diagnostician. You may have a faulty accelerator pump in the carburetor, the choke may need readjustment, the float level may need adjustment to specification or the fast idle may be releasing too soon. Don't fall for the

(Please turn to page 40)

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



Start fresh with Belair.

Just the right touch of menthol.

Double-duty Cooler. This 2-gallon insulated Igloo Jug keeps refreshments cold, and is sturdy enough to sit on. Yours for free B&W coupons, the valuable extra on every pack of Belair.

To see over 1000 gifts, write for your free Gift Catalog:
Box 12, Louisville, Ky. 40201.



Kings, 16 mg. "tar," 1.1 mg. nicotine; Longs, 17 mg. "tar,"
1.2 mg. nicotine, av. per cigarette, FTC Report Oct. '74

Itching,
chafing,
rash,
excessive perspiration,
irritation,
in the groin area,
could be
Jock Itch

Whether you're suffering from the bothersome symptoms, or Jock Itch (*Tinea cruris*), you should be using Cruex® Medicated Spray-On Powder.

Cruex provides fast relief. It soothes itchy, inflamed skin. Absorbs perspiration. Helps cushion against further irritation. And, because it's medicated, Cruex is strong enough to help prevent the fungal infection that can develop when these annoying symptoms are improperly treated.

Since Cruex is a spray-on powder: it penetrates into hard-to-reach places . . . you avoid the messiness of creams, ointments, and powders . . . and you eliminate the pain of rubbing, dabbing, or smearing on to sore, inflamed skin.

Get relief—fast. Avoid embarrassing itch, too. With Cruex. Soothing, cooling Cruex.

Cruex

Guaranteed to work, or your money back from the manufacturer.



CAR CLINIC

(Continued from page 38)

bull about it being the fault of air-pollution equipment. That just is not so, and if the dealer can't satisfy you, get him to call the Pontiac regional zone office and get a factory field representative out to you. I have a no-nonsense message that came direct from Pontiac regarding your problem:

"This owner's problem *can* be corrected."

SERVICE TIPS

■ **Code for better service.** A code of responsible automotive servicing practices has been adopted by the National Institute for Automotive Service Excellence, which is urging that it be adopted widely by service organizations "to assure high standards in automotive service and repairs."

We publish the code here, so that you will know what to expect from your mechanic if he adopts its provisions:

1. Customers should be offered an estimate of cost in advance of services to be rendered.

2. Customers should be promptly notified if service appointments or completion promises cannot be kept.

3. Repairs should be authorized in writing by the customer except when other arrangements have been made to the customer's satisfaction. Prior to commencement of repair, customers should be given the opportunity to request an inspection of the removed parts.

4. A written, itemized invoice for all parts, labor, and any other charges should be given and explained to the customer upon completion of the work. This invoice should clearly identify any parts which are used or remanufactured.

5. Customers should be provided with a written copy of any guarantee covering repair services.

6. Appropriate customer records of services performed and materials used should be maintained by the service company for at least one year.

7. Service employee pay plans should not be such as to work to the detriment of the customer.

8. Service businesses should make reasonable provisions to protect the customer's property while it is in their custody.

9. Service businesses should have stated policies and procedures for customer relations and any complaints should receive full and fair reconciliation.

10. Service businesses should cooperate with customer protection agencies to pursue satisfactory resolution of customer inquiries. ★ ★ ★

GOT A PROBLEM WITH YOUR CAR?

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

Gabriel Striders® take the shock out of buying shock absorbers. Buy 3. Get 1 free.

Now, you can save 25% on the shock absorbers *Road & Track* magazine declared "overall winner" of all shocks tested on a 1974 Corvette – Gabriel Striders. Just buy 3 Striders, and you'll get the 4th one free.

New Striders can save wear on your car's tires, front end and suspension parts. They're lifetime guaranteed,* and can be adjusted to three different ride settings – "Regular," "Firm" or "Extra Firm." So, you get a ride that's just right for your car and the way you drive.

And now, you can get it at a price that's just right for you, too.

Roger Miller
Gabriel's TV spokesman

Gabriel®

King of the Road.

*Maremont guarantees Gabriel Striders shock absorbers against defects and wear out for as long as you own your car. Present proof of purchase to dealer for replacement. Cost of removal and installation not included.

SAVE 25% ON SHOCK ABSORBERS.

Buy 3 Gabriel Striders get 1 free!

Roger Miller

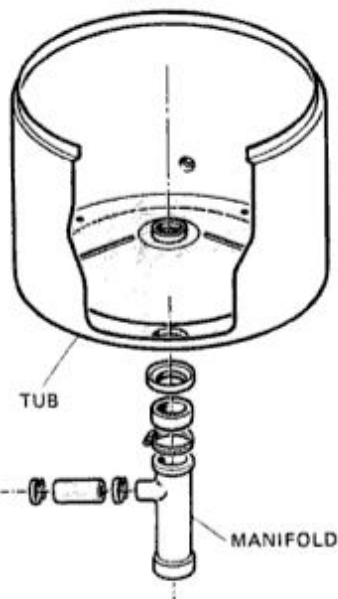
LIFETIME GUARANTEE
OFFER ENDS MAY 31, 1975

Look for the Gabriel "Buy 3-Get 1 Free!" sign where you service your car. Offer ends May 31, 1975.

Offer good in U.S.A. only.

APPLIANCE CLINIC

BY PAUL MANN



Washer perplexity

My 1960 RCA Whirlpool Imperial clothes washer (Model W6104700) poses a problem. Water drains properly after the wash cycle, but the water that enters the tub during the spin cycle remains after the cycle has been completed. I find the tub partially filled with water? Why is this?—M.P. DeCruyenaere, Santa Ana, Calif.

It's a matter of pressure. With the tub full of water, enough pressure is being exerted during the drain period after the wash cycle to overcome the obstruction I think may be in the manifold (also called the pump guard).

The manifold is a pipe approximately 8 in. long, usually made of plastic, on the bottom of the tub. Water is pumped through it from the tub to the drain line. In time, it can be plugged with lint and small objects like coins and pins, so that water will not flow out unless it has pressure behind it. Water injected into the tub for the spin cycle produces little pressure, apparently not enough to overcome the manifold obstruction, because its quantity is only four quarts (four one-quart spray rinses). With insufficient pressure to overcome the obstacle, water remains in the tub.

If my diagnosis is correct, the situation calls for disconnecting and cleaning out the manifold. Turn off the water and disconnect power. You will probably have to tilt the ma-

chine to get at the manifold connections. The illustration at the left should help.

Pooped out

I have a rechargeable electric toothbrush that has run down. Does the battery ever get so bad that it will not take a charge? If so, how long does it usually last? Is it possible to get a refill or must I buy a whole new appliance?—Wesley L. Adams, Laconia, N.H.

Batteries do in time fail and aren't capable of taking a charge. I've seen some units that have been running 10 years and others that had to be replaced after one year. There is no refill battery. You have to replace the appliance or the power handle, depending on the model, because these are sealed and their integrity should not be violated.

Most electric toothbrush manufacturers have an exchange policy allowing you to buy a new unit at a relatively low price.

Possibly your problem may not be caused by a bad battery but by a malfunctioning charging base—but I'd say the odds against this are 100 to 1.

Deicing a dehumidifier

I have a 20-gallon Sears dehumidifier in my basement that I try to keep set on "normal." But the coils ice over. Yet when I set the unit midway between "normal" and "off," no ice forms. What's wrong?—Robert N. Goldsmith, Bellefontaine, Ohio.

Probably nothing. When coils ice over, it usually means that the temperature in the part of the house where the dehumidifier is located is too low for the humidistat setting. A dehumidifier will not run at higher settings without coils icing, if the temperature is below 70° F. At lower settings, the unit is shut off for longer periods of time, allowing coils to defrost.

Obviously, you have to find the setting best suited to temperature in the basement; it will probably vary with the season. In summer, when you're more likely to need a dehu-

midifier, basement temperature may exceed 70°F., so the setting can be adjusted for longer running.

Fitful dishwasher

My Hotpoint dishwasher, Model 20DA35E, is giving me fits. It pumps in water intermittently only for two or three seconds at a time, and will not move to the next setting in the cycle. I checked the timer and the points look good. The motor works. Can you help?—K.C. Wu, Westminster, Calif.

You cannot determine the condition of a timer just by looking at it, and from your description I would have to say the timer is probably at fault. But let's do some checking to be sure.

An incoming-water problem of this kind can be caused by a malfunctioning water solenoid, bad pressure switch or bad timer. I suspect the timer because of your cycling problem, but to be certain remove the bottom access panel and place a voltmeter across the terminals of the water solenoid. Turn the unit on. The voltmeter should show power and the solenoid should allow water to be pumped in for from 60 to 90 seconds. If water is shut off sooner but power is not interrupted, the solenoid is faulty.

If power is interrupted, suspect the pressure switch or timer. The switch keeps the unit from being overfilled; it includes a rubber diaphragm that can eventually get stiff and make the water act strangely. If the meter shows a power interruption, replace the pressure switch; you can't be sure it has gone bad, but it's cheaper than the timer. You'll find it in a metal housing about the size of a 50-cent piece in the bottom of the tub.

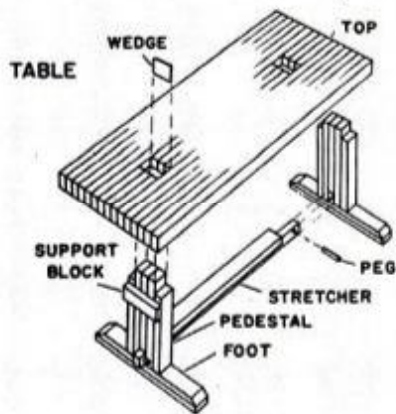
If the unit still fails to operate as it should, replace the timer—it's the only thing left. ★★★

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

Stanley gives you more of a hammer. Free plans prove it.

Is a hammer just a hammer? No way! Take this butcher-block table for instance, where you've got a lot of 8 penny nails to drive in. Your arm will tell you, right away, that you'd better use a quality hammer – a Stanley.

You see, Stanley makes hammers with better balance and heft. Which means you're able to drive those nails in fast and easy. And on the mark. And you



won't end up with a tired, shaky arm or a sore, tingling grip.

Along with a better design, Stanley gives its hammers a rim tempered face. That's a feature no other hammer



has. In case you strike a foul blow, there's less chance of a steel chip to fly up at you. (Of course, you should always wear safety glasses anytime you use any striking tool.)

Find a store with a good tool department, you'll find Stanley hammers. Look at them.

help you do things right.

As for the butcher-block table and benches, you can put them together for around \$60 in materials.

Many Stanley



Heft them. You'll see that Stanley packs a lot of quality into its hammers. Quality you know will

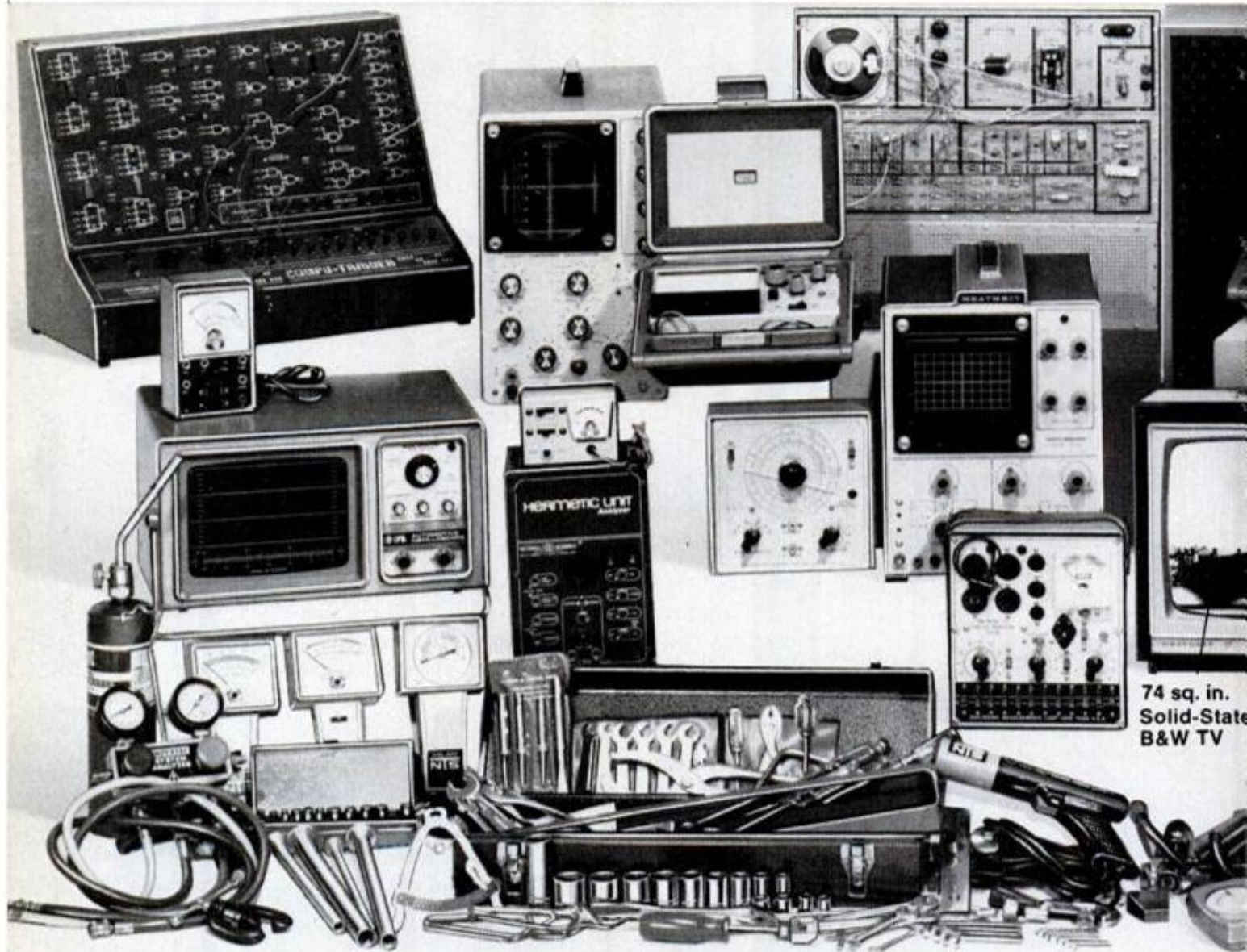


dealers now offer this plan *free* when you buy a Stanley hammer. Or send your name, address and 25¢ to cover plan postage, to Stanley Tools, Dept. TM, New Britain, Conn. 06050.

STANLEY helps
you do things
right.

The better the training the better you'll

Send for one of these **FREE** Illustrated



74 sq. in.
Solid-State
B&W TV

Build and keep some of the finest technical equipment made when you train with an NTS Project-Method home study course. And it's usually the same type of equipment you'll meet in the field and use on the job. It will help you acquire first-hand experience and skill — help prepare you better for a variety of exciting technical careers:

ELECTRONICS DIVISION: Courses include professional equipment like 5" solid-state oscilloscope, transistor and tube-tester, vector monitor scope, 74 sq. in. B&W TV, and solid-state stereo AM-FM multiplex receiver, speakers. Color TV courses feature advanced NTS/HEATH DIGITAL GR-2000 Color TV with silent varactor diode tuning; digital read-out channel selection (with optional digital clock), big 315 sq. in. screen.

MECHANICS DIVISION: Learn engine diagnostics, motor overhaul, transmissions, automotive maintenance. Courses include 9 in. solid-state automotive oscilloscope, testers, tools, mechanic's steel tool box, & more.

AIR CONDITIONING, REFRIGERATION/HEATING DIVISION: Learn servicing of commercial, industrial and residential heating and cooling equipment. Courses include hermetic unit analyzer, leak detector, charging testing-purging manifold set, tools and more.

HOME APPLIANCES DIVISION: Courses cover repair and maintenance of washers, dryers, ranges, smaller appliances. Equipment includes NTS Circuit-Trainer and professional multimeter.

and the equipment be equipped.

Career Guides:

COMPARE OUR
KITS AND LESSONS.
COMPARE OUR
TUITION.



(Simulated TV Reception)

LOWER TUITION FOR YOU: We employ no salesmen, pay no commissions. You receive all home-study information by mail only. Make your own decision, your own comparisons. Send card today or write for illustrated catalog in field of your choice, all details.

NO OBLIGATION. NO SALESMAN WILL CALL.

APPROVED FOR VETERAN TRAINING
Get facts on new 2-year extension.

NATIONAL TECHNICAL SCHOOLS

TECHNICAL-TRADE TRAINING SINCE 1905
Resident and Home-Study Schools
4000 So. Figueroa St., Los Angeles, Calif. 90037

NATIONAL TECHNICAL SCHOOLS
4000 South Figueroa St., Los Angeles, Calif. 90037
Please send FREE Color Catalog and Sample Lesson.
NO OBLIGATION. NO SALESMAN WILL CALL.

Dept. 201-045

- Electronics Division
 Mechanics Division
 Air Conditioning/Refrigeration/Heating Division
 Home Appliances Division

NAME _____ AGE _____

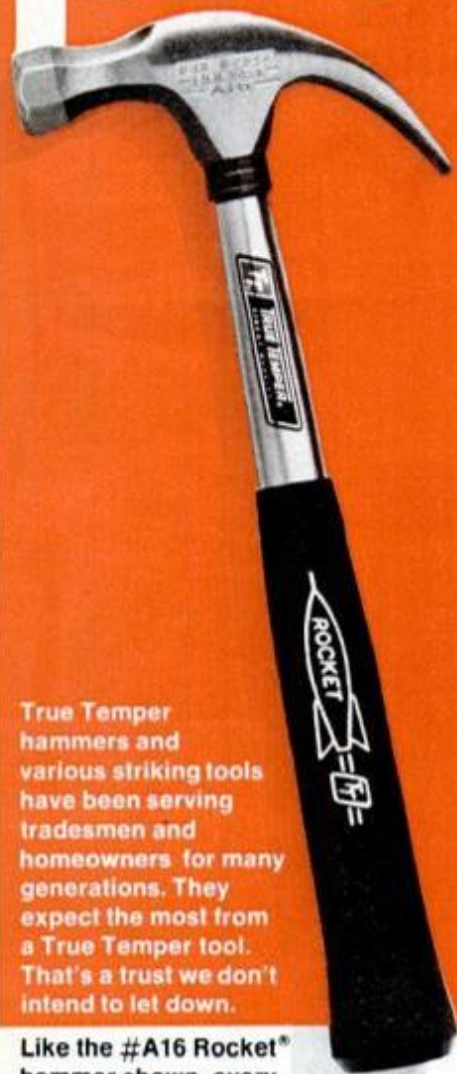
ADDRESS _____

CITY _____ STATE _____

Please fill in Zip Code for fast service _____

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

the pro



True Temper hammers and various striking tools have been serving tradesmen and homeowners for many generations. They expect the most from a True Temper tool. That's a trust we don't intend to let down.

Like the #A16 Rocket® hammer shown, every True Temper tool offers built-in quality, proper swing-weight balance and comfortable grip.

One more thing. Professionals and homeowners alike should remember to wear safety glasses and follow good safety procedure whatever the job, whatever the tool you're using. That way, you'll be around to build bigger and better things, for some time to come.

TRUE TEMPER
An Allegheny Ludlum Industries Company

QUESTIONS ANSWERED BY W. CLYDE LAMMEY



HOMEOWNERS' CLINIC

Covering a bathroom wall

I want to paper my bathroom floor to ceiling on four walls and from tile to ceiling over the shower stall. The bath is small; 3 feet wide and only 8 feet the long way, with an 8-foot ceiling. Now I'm told that paper will make so small a room look even smaller and will deteriorate quickly. What do you say?—Mrs. J. N. Carney, Lincoln, Neb.

I tend to agree with your advisers—especially where a small-figured, busy pattern is concerned—but this is not to say that paper should not be used. Judging from the size of the room, I think it would be better to paper only three walls and paint the wall above the shower, or perhaps paper just one wall.

Your wall-coverings dealer will recommend the type of coated paper or fabric to use. Wash, rinse and dry the walls thoroughly before you apply it.

Paint tubs if you must

Can I paint my basement laundry tubs, inside and out? If I can, what paint should I use?—Miles Proctor, New York.

You can paint them, but wouldn't a thorough cleaning do as well? Laundry tubs are virtually impregnated with soapy residues, and preparing them for painting will take some cleaning—repeated scrubbing with a strong detergent solution. If you must paint, do a really thorough cleaning job first. Otherwise, there's no way.

Epoxy enamel is the only finish you can expect to last under such adverse conditions, and I'd recommend the aerosol type. Wear rubber gloves when cleaning and a painter's respirator when spraying, and be sure to turn off all gas pilot lights (furnace, water heater, dryer) first.

Accelerated oxidizing

I have a jardiniere which I'm told is copper, and I'd like to color it that greenish verdigris, as I believe it's called. How can I do this in a hurry, without waiting for it to form

naturally?—Hal Worden, Sioux City, Iowa.

If the jardiniere has value as an antique, I'd leave it as it is. If not, you can get something approaching natural coloring using a mild oxalic-acid solution. Clean the copper, then make a solution by dropping a couple of average-size oxalic-acid crystals into a gallon of water in a ceramic container.

Caution: Don't pour water on the crystals. Wear rubber gloves and eye protection. Use a cotton swab to apply the solution. After half an hour to an hour, rinse with clear water. When the metal is dry, the color should be uniform if you've been careful not to skip any areas.

Closed vs. open sump

I have a minor water problem in my basement and my plumber proposes to install a closed sump; that is, a tile set on, or in, a concrete bottom. He says an open-bottom sump will cause the pump to run almost continuously. What is your opinion?—M. Wheeler, Cleveland.

Your plumber is better able to advise you than I, at such long range. He is thinking, no doubt, that the water table in your locality varies, perhaps with the seasons, but may seldom be entirely below the level of the proposed sump. If the sump has the open bottom and is on a gravel or sand stratum, your pump would tend to run more or less continuously.

I must assume, of course, that only storm water will enter the sump—that is, water seeping to subsurface levels. In the type of installation proposed, the pump would operate only when water seeping into the basement enters the sump.

In dry periods, the sump must be kept clean by occasional flushing; it should be tightly covered. ★★★

Do you have a home maintenance or repair problem? Send it to Homeowners Clinic, Popular Mechanics, 224 West 57th St., New York, N.Y. 10019. Letters cannot be answered individually, but problems of wide interest will be discussed in this column. For more home repair and maintenance help, get PM's Home Care Guide, \$4.45 postpaid. Send orders to PM, Dept. HD5, Box 1014, New York, N.Y. 10019.

Because hot taste comes
in more than one size,
extra coolness comes
in more than one size.
Come all the way up to KOOL.



KINGS



SUPER LONGS

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

Kings & Longs, 17 mg. "tar," 1.3 mg. nicotine, av. per cigarette, FTC Report Oct. '74

Материал, защищенный авторским правом

ALL OUTDOORS

WITH BILL McKEOWN



Swifter sails

For a lot of sailors, like this one, who have tried to trim and tune just a little more zing out of a Sunfish, it's good news that AMF Alcott is now offering an optional Marconi rig. Available for the smaller Minifish as well, the conversion includes a sleeved loose-footed 75-square-foot sail using three battens, black anodized two-piece mast, four-part main sheet that secures with a cam cleat (a real improvement over holding with your teeth). You also get sophisticated



AMF Minifish and Sunfish take speed rigs.

bigger-boat niceties like outhaul, Cunningham downhaul, vang, mid-boom connection for the main sheet and a deck traveler as well. You can make like a Finn, Laser, or Force 5 skipper for about \$325 for the new sail rig.

But there's also an extra that most sleeve sailjobs don't have. With both Minifish and Sunfish Marconi conversions, the unstayed mast fits up through the luff slot of the sail. To put up and, especially, to take down the sail, however, you don't have to unstep your mast. The sail can be raised and lowered with a halyard—no need for a panic session at dockside, offshore if a squall comes up, or if you take a knockdown and want to

lower sail while you right the boat again. This way it's easier (and less embarrassing) to handle.

The Sunfish is the largest one-design class there is, and our prediction is that you'll soon be seeing a lot of these conversion rigs around.

Getting the lead out

While more pressure is being put on duck hunters along some flyways to use steel rather than lead shot to cut down lead poisoning of ducks that eat spent pellets, Winchester-Western, leader in lead-versus-steel shot studies, reports encouraging results with sintered pellets. This Canadian development compresses powdered lead and steel together.

The result is a load much less toxic than lead but with long range and less possibility of barrel damage than with steel.

Winchester and other companies make both lead pellet and steel pellet shotgun shells; it's just a matter of determining the best answer to a problem. Sintered shot may be a good compromise. We'll keep you posted on developments.

Getting the lead in

Graphite, that is; the "lead" in lead pencils. Graphite's carbon fibers have been found to offer more strength and lighter weight. They also have an ability to dampen out needless vibrations when bonded into the shaft for a golf club, fishing rod or tennis racket.

Shakespeare, with its Graflite rods, and Fenwick, offering HMG



Trabert racket joins graphite rods, clubs.

(high modulus graphite) rods have been leaders in this new field. With prices up to \$150 a rod, they won't be the choice for all of us, but they provide remarkable action. That all-around perfectionist sportman Ted Williams tells me he is impressed with models he has tested, though as yet no rod carries his name in the Sears line.

Guarantees graphite products now carry indicate that makers are overcoming a rumored tendency of graphite shafts to become brittle with age. Now, if someone could just bring down the price of graphite gear—and everything else. . . .

Gearing up

One way to land that lunger more quickly is to reel the line in faster, and we're seeing new bait-casting rigs that can buzz a lure across the surface so fast a bass will simply strike for spite.



Daiwa Millionaire sports 5-to-1 gear ratio.

Garcia has announced a big game Ambassador trolling reel with quick takedown design for easy maintenance, lever-shift drag control and 3.4-to-1 retrieve ratio. From Sears, the Ted Williams M/540 line-leader features 3.56-to-1 retrieve. Heddon's latest, the Mark 3200 Free Spool, is reported to get a cast out farthest by releasing both gear train and level wind, and then get it back fast with a 4.1-to-1 ratio. And the Daiwa High Speed Millionaire 5H and 3H claim fast retrieve honors at a geared up rate of five spins of the reel for one crank of the handle.

Recall to shore

Many people have read about the recall of defective cars but don't know there is a similar program for

(Please turn to page 52)

Evinrude 75

It does a lot of things- very, very efficiently.



Once in a generation, a motor comes along that seems to do everything right. The Evinrude 75 (with its companion 70) is such a motor.

Probably no motor ever made has such a wide, wide range of efficient use.

It's small enough and light enough for fast 15-16 footers. Big enough for many 18-20 footers. Strong enough to push a barge, or tow a tournament-class skier at tournament speed. Fast enough to set records in its class. Smooth enough to troll by the hour at dead slow speed.

No motor we know of surpasses its economy,

horsepower for horsepower, boat for boat, mile for mile.

The Evinrude 75 is the original loop-charged Evinrude. The first with pulse-tuned exhaust, pressure-backed piston rings, pressure-temperature controlled cooling, and breakerless solid-state ignition and solid-state generation. And this year, it introduces Finger-Tip tilting.

It develops its 75 horsepower from just 49.6 cubic inches of displacement, which says something for its efficiency.

Evinrude 75. The performance motor with saving ways.

EVINRUDE 
DIVISION OF OUTBOARD MARINE CORP
first in outboards

... here Today!

"IGNITION OF THE FUTURE" ALLISON "OPTO-ELECTRIC"

★ **The BEST...the ULTIMATE...
of ALL the Ignition Systems!**

● (We challenge ANYONE
to dispute this Fact).



● **Never wears out or needs any Maintenance!**



● **Does more than Pay for itself in
GAS SAVINGS**

...it gives you **Maximum Power**
with continuous **PEAK PERFORMANCE**

...while reducing **Maintenance**
and **Operating Costs!**



● The Allison OPTO-ELECTRIC System eliminates the Points and Condenser, replacing them with an OPTO-ELECTRONIC TRIGGER, using a Light-Emitting Diode and Photo Transistor. As there are NO moving parts in rubbing contact...Timing adjustments are PERMANENT. The only "TRUE" Electronic Ignition...that you can buy for under \$100.

● Gives 40-Times more Timing Accuracy than ANY system using "Mechanical" Breaker-Points! UNLIMITED RPM! "Electronically-Controlled" DWELL automatically supplies HIGHEST Performance at both Low and High speeds. Spark strength does not fall off at high RPM. POSITIVE SPARK helps eliminate "Misfire" for faster acceleration and improved Engine Performance! Smoother running (No timing fluctuation as with Magnetic Units). Easier Starting under any condition! Sparkplugs LAST 3 to 10-Times LONGER.

All SOLID-STATE Components. UNAFFECTED By Temperature, Moisture, or Vibration! Highest grade materials Guarantee you solid, Dependable Performance.

★ **Perfect Timing and Dwell never change.**

Pays for itself! Eliminates Ignition Tune-Ups forever! "INFINITE LIFE"...Once installed...Never needs replacing.

● **PERFECT TIMING INCREASES** Engine Efficiency and Gas Mileage. **SAVES Precious Fuel!** Allison gives you **MAXIMUM** Engine Efficiency 100% of the time...and that's the name of the game for **BETTER** Gas Mileage and Economy.



★ **PROVEN RELIABILITY!**

Dyno Tested up to 15,000 RPM.

Road and Race Proven.

(Opto-Electric Systems won at
INDY Two years in a row!)

● **QUICK AND EASY INSTALLATION**

★ If you want the BEST, and SAVE! This is IT!

● **ORDER with CONFIDENCE...**

SATISFACTION GUARANTEED!

1-YEAR FACTORY WARRANTY.

Only \$49.95
COMPLETE.

● As you can see, you're not taking any chances at all...Send your Order Today.

State Make, Year, Engine Size. (Calif. Res. add Tax).
● (So New...it's Sold ONLY FROM FACTORY DIRECT).

You may use your **MASTER CHARGE** or **BANKAMERICARD**.
Send us (1) Your Number, (2) Interbank No., (3) Exp. Date.

● Before buying any other Type ignition system...

Send Postcard for our FREE BROCHURE.

★ If you have already installed a C-D ignition system,
Modernize and Increase its Efficiency...

CONVERT YOUR "C-D" UNIT TO BREAKERLESS!
Opto-Electric "TRIGGER UNIT"...Only \$34.95

● Our BEST Salesmen are the owners
and users of our ALLISON System!



**ALLISON
AUTOMOTIVE COMPANY**

1269-X, East EDNA PL., COVINA, CAL. 91722

ALL OUTDOORS

(Continued from page 50)

boats administered by the Coast Guard. Automotive problems get plenty of coverage in the papers, but pleasure-craft corrections do not find their way into print.

Fortunately, according to the Coast Guard, the corrections required so far are mostly minor and have been taken care of quickly by the manufacturers involved. The most frequent complaint has been the lack of horsepower, maximum weight and persons-capacity certification and the small plaque that is supposed to be mounted somewhere on the boat to give you these specifications. Insufficient flotation has also been charged against some models. A few outboard motors have needed stronger throttle return springs and other small replacements.

Boat and motor makers have been quick to notify owners, if possible, and make the necessary repairs. Many boatmen, however, fail to fill out warranty cards when they buy a boat or motor, or register with the builder when they get a used model. Manufacturers want to protect their reputations with prompt adjustments, but there isn't much they can do when they can't locate the products.

If you suspect you have a defect problem, or hear a report that your boat or motor model is included in a recall campaign, the Coast Guard tells me you can get information by writing Dept. GBBC/3, U.S. Coast Guard, Washington, D.C. 20590.

Travel trends

Taking a trip, and sometimes camping along the way, looks like a popular and inexpensive way to vacation on a budget this year. A recent survey by Kampgrounds of America, the big KOA camp chain, indicates that three-quarters of the people they questioned will spend at least two weeks camping this year, although many of them will spend weekends near home.

Bargain group trips are available through American Youth Hostels, Delaplane, Va. 22025, and not all of them are aboard a bicycle. They also have backpack hiking, train, floatboat and station-wagon tours in this country and abroad, and "youth," they explain means young at heart. A free booklet, *Highroad to Adventure*, is available on request. Hostels have recently been established in several national parks.

Learning a sport skill while traveling is another way to go. Sailing and mountaineering are popular ex-

amples. Graduates of the Offshore Sailing School, headquartered at 820 Second Ave., New York, can join the Sail Away Club at the same address and take part in group cruises. Recent ones have included Greece and the Virgin Islands. Individuals and families can hike the mountains around Vail, Colo., this summer by contacting the National Hiking and Ski Touring Assn., Box 7421, Colorado Springs, Colo.

Practical preservers

No life preserver or PFD ("personal flotation device" as the Coast Guard insists on calling them) is going to do you any good if you don't wear it when you need it. So a trend we particularly applaud is the introduc-



Gentex preserver has flotation in comfort.

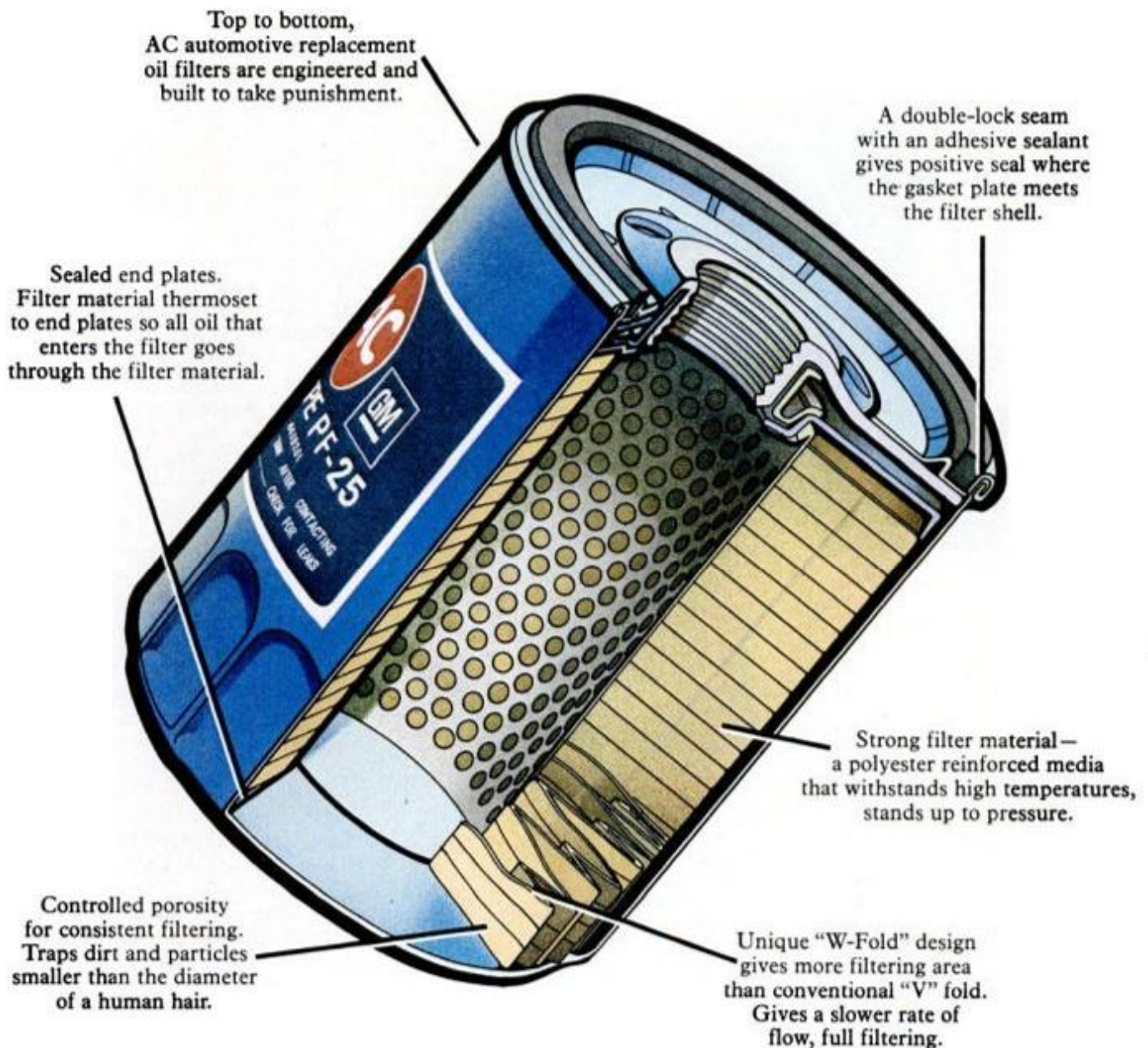
tion of more windbreaker-type jackets that have flotation inside and are finally receiving Coast Guard approval.

Good looking and loose enough for active sports, the jackets are made primarily for sailors, but are equally useful for fishermen, waterfowl hunters and anyone who will be around the water. They are now available in a variety of colors, including international orange and camouflaged hunter olive.

These jackets are quite expensive—about \$40 to \$60 for the ones we've seen. But that really isn't much to pay when one could keep you afloat and alive. Stearns, Gentex (shown here), America's Cup, MidShip from MidWest and a number of other

(Please turn to page 54)

Have an engine worth protecting? Look into an AC Oil Filter.



Why AC Oil Filters? Because we build a lot of engine protection into our compact blue cans.

And while we're on the subject of engine protection, we might offer this thought. You may be making fewer and shorter trips these days to conserve fuel. Unfortunately that can keep your engine from getting hot enough to burn off the condensation that forms in your crankcase. Condensation that when mixed with certain contaminants can form acid that can rob you of protection. So as recommended in your

owner's manual, when it comes to changing your oil and oil filter it's wise to think months, not just miles.

And remember all the good things an AC Oil Filter gives you to help protect your investment.



AC-Delco
Division of General Motors Corporation

AC-DELCO DIVISION OF GENERAL MOTORS CORPORATION

If You like to Work with
Your Hands . . . You Can
Earn \$5 To \$8 an Hour

In Your Spare Time
In A Profitable

SAW

Sharpening
Business
of Your Own

No Experience Needed

Every Community Needs Service.
Turn your spare hours in the evening or weekends into extra dollars, this proven practical way—start your own money-making sharpening business—No selling or canvassing—No experience required. You can do it automatically with Foley Sharpening equipment.

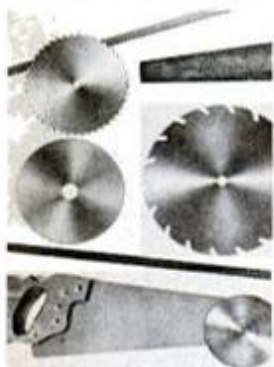


SHARPEN ALL TYPES OF SAWS

You can sharpen combination (rip and crosscut) circular saws, band saws, hand saws, crosscut circular saws—and do a perfect job every time without experience or special training. The precision Foley Filer does it for you automatically! A complete repair shop in one machine!

Set up in your basement or garage, work your own hours in your own way and earn big spare-time profits.

Foley also makes a complete line of Carbide Grinders for sharpening all types of Carbide Tipped Saw Blades.



**Foley Will
Finance You**

Start this profitable business with very little money. No franchise fees. Foley will help finance you. You can start earning cash as soon as your Foley equipment arrives.

Foley

FOLEY MANUFACTURING CO.
416-5 Foley Bldg., Minneapolis, Minn. 55418

Rush information to me. I understand there's no obligation.

Name _____

Address _____

City _____ State _____ Zip _____

ALL OUTDOORS

(Continued from page 52)

companies now manufacture them. I prefer an oversize model that allows room for a heavy sweater underneath, and that has a pocket to hold one of the new little waterproof emergency strobe marker lights. Honeywell is pricing its new Strobolite at about \$20, and there are several additional makes around to choose from.

Tent tips

The latest development in tents is toward fire-retardant fabrics. Some states already are requiring this feature, and many of the bargain tents we'll see for sale this year will be old models that are being unloaded because they don't have this feature. The chemicals necessary for fire-retarding tend to make tent fabric stiffer, heavier and more expensive—and these are factors which have slowed down the introduction of safer cloth.

Fire-retardant materials will still catch fire if held in a flame, but most campers know enough to keep the campfire, lantern and campstove well away from the tent. Youngsters don't however, and their tents particularly must be fire-retardant and have the rear exit that White Stag is introducing in some of its models. And the kids, of course, must be supervised to see that they don't try lighting candles or toasting marshmallows inside.

Equally important, but badly overlooked, is the fact that some synthetic fabrics and plastics are practically airtight. Usually, these are used with small backpack tents that only have room for one or two people. But if tents made with these fabrics are tightly closed up while several campers are inside during a cold or off-season outing, particularly with a "safe" catalytic heater inside as well, all of the oxygen could be used up and the occupants could suffocate before morning. The catalytics don't give off carbon monoxide, true, but they, and campers, consume oxygen.

A bad camping accident is likely to occur sometime to remind outdoorsmen of the importance of adequate ventilation.

Preview

Outdoors came indoors at the Astro-dome in Houston early this year, and we spotted a number of interesting new items at this annual National Sporting Goods Assn. preview of products for sport-shop dealers.

Gear that looked particularly good

we will be testing for in-use reports in a month or so. Meanwhile, here is a quick roundup of equipment new and different.

For underwater action, Shakespeare has announced the Scuba-Drive, an electric motor pack that fits on a diver's air tank to provide him with up to three miles an hour of subsurface speed. A hand-held Submobile tow pack will also be offered. The Farallon Multi-Tissue Decomputer is one of the new instruments that now can warn a diver when he is approaching the need for decompression. And AMF Swimaster has introduced the Aqualume I, a compact strobe light for underwater photography.

Archery and black powder muzzle loading are two sports that are experiencing a rapid growth. Commemorative replicas of old-time guns are being offered by a number of manufacturers.

Colt now has brought back single-action classics such as the Buntline Special with its 12-inch barrel and the percussion Dragoon and 1851 Navy.

Thompson/Center Arms, of Rochester, N.H., has a single-shot Contender pistol that is designed to take 23 interchangeable barrels, ranging from .22 up to .44 magnum with a choke arrangement for firing hot shot cartridges with a pattern which is equivalent to that of a .410 shot shell.

Or squeeze the grip of a Smith & Wesson or Colt fitted with a \$100 Nite-Site from Triple K Manufacturing in San Diego and a button is pressed that makes the sights suddenly glow in the dark.

Easier on the environment than scrounging for firewood around a campsite, the new tiny packstoves from a number of makers—Paulin, Gerry, Mountain Products, Zebco, Trailblazer, Optimus and others—use convenient and compact LP gas containers for fuel.

Want more action, even after completing an all-day hike? From your specially fitted shoulder bag you can take out a new Moonlighter Frisbee from Wham-O that will glow in the dark.

To pay for all the new gear that's now available, you might need a gold mine, and even finding that is easier, too. From Garrett Electronics, Garland, Tex., you can order its new plastic "Gravity Trap" gold pan for \$3.95. It has ridges on the side called "built-in riffles" that are supposed to quickly pan out any nuggets that happen to be lying around. ★★★

Man-Size

ECONOMY TRACTOR

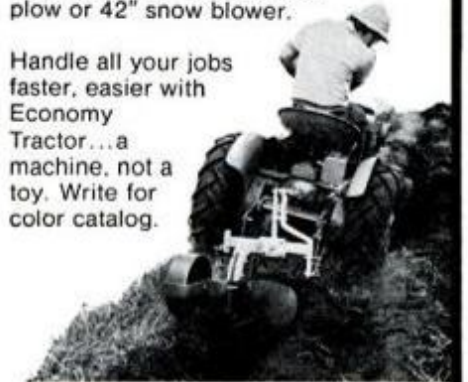
No-nonsense power for the busy gardener

Hop on the seat of an Economy Tractor. Give it the once-over. It's bigger than ordinary garden tractors. No frills. Simple down-to-earth design that's easy to maintain.

Now drive it . . . a tractor that's as rugged as the job is tough. Extra weight and traction for more push-and-pull power. Automotive all-gear drive converts nearly 100% horsepower to pure work-power . . . gets more work done per gallon of gas.

Carve-out new seed beds with 12" plow or 32" tiller. Plant. Cultivate. Fertilize. A 3-point hitch gives you quick change and precise control of implements. Mow 2 to 3 acres of lawn per hour with 60" rotary mower. Move dirt and gravel with the whopping 48" x 18" angling dozer blade. Clear up to 16" of snow with plow or 42" snow blower.

Handle all your jobs faster, easier with Economy Tractor . . . a machine, not a toy. Write for color catalog.



ECONOMY TRACTOR

1005 K-4 Anoka Avenue
Waukesha, Wis. 53186








GARAGE DOOR OPERATOR

RADIO CONTROLLED

\$99⁹⁵!

• RADIO CONTROLLED from car transmitter or wall switch • SAFETY night and day, year 'round • SECURITY door locks tight when closed • CONVENIENCE in-car control any weather • LIGHTING garage lights automatically • VERSATILE fits all lifting type wood, metal or fiberglass doors, sectional and 1-piece • EASY HOME INSTALLATION in just 2-3 hours • SAVE up to 50% direct factory purchase and PP or UPS home delivery • GUARANTEED one year • FREE brochure

HELPMATE EQUIPMENT CO., Box 217PM, Baroda, MI 49101 (616 - 422 - 2311)

STOP DRIPPING FAUCETS FOREVER



U.S. Patent
No. 3755876

With Stainless Steel

Guaranteed to work on any conventional faucet or we'll refund every penny.

If you want to permanently stop a leaking faucet, just changing the washer is not the answer (ask any plumber). Conventional faucet valve seats are made from brass and will corrode, pit and wear out. This is the cause of 90% of all faucet leaks! Replacing the washer may work temporarily, but only until it is again chewed up by the bad valve seat. With over 100 different sizes and thread combinations, replacing the valve seat can be both difficult and expensive — and you still end up with a brass seat — only to start the corrosion cycle again.



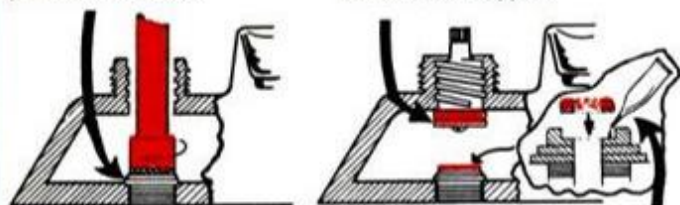
NO PLUMBER — NO SPECIAL TOOLS — NO SPECIAL SKILLS

With our VULCAN UNIVERSAL FAUCET RESEATING KIT you can stop this sort of leak FOREVER. You get 8 universal valve seats made of high grade surgical stainless steel — the same 304SL stainless steel used in atomic reactors and submarines. Because of their strength and resistance to corrosion, we offer a no-time-limit money back guarantee. The installation tool which comes with the kit insures that the seats will fit perfectly any faucet that uses washers — because the Vulcan stainless seat mounts right in your old seat (you don't remove it).

These seats come with 8 matching non-expanding universal mated washers made of Delrin® — a material so tough it is used in making gears. With these washers you also end the annoyance of old fashion rubber washers that swell and cut off your hot water — usually right in the middle of washing your hands or during a shower.

HOW OUR KIT WORKS: A special hand tool cuts groove in your old faucet seat.

Delrin® washer is universal. Does not need to fill up washer holder. Does not need side support.



Surgical stainless steel seat held in groove with space age adhesive sealant.

If you follow the simple do-it-yourself illustrated instructions that are included with your kit, you can hardly go wrong. You can repair any standard faucet that uses a washer and seat — no matter what brand or age.

THE VULCAN KIT CONTAINS: 8 stainless seats, 8 mated Delrin® washers, installation tool, adhesive sealant, illustrated instructions and an Unconditional No-time-limit Money Back Guarantee. The price of the kit—enough to repair 8 single faucets is only \$7.45 PPD.

MAIL THIS NO-RISK COUPON TODAY
Kits Mailed Same Day Order Received

VULCAN Mfg. Co., Box 33-Dept. PM 70 Grand Valley, CO 81635

Please rush me _____ Vulcan Universal Faucet Reseating Kit(s). \$7.45 each PPD.

Please rush me _____ doz. extra seats & matching washers \$5.40 Per doz. sets (includes 2 adhesives), PPD.

Enclosed is check or money order for \$ _____. I understand that my money will be immediately refunded if I am not 100% satisfied with the kit.

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

ATTENTION: Apt. House Managers, Plumbers, Motel & Hotel Men:

Send us a couple of old seats: we'll mount two Vulcan seats FREE as a demonstration.

Used in Thousands of U.S. Homes & Businesses

HINTS

FROM READERS

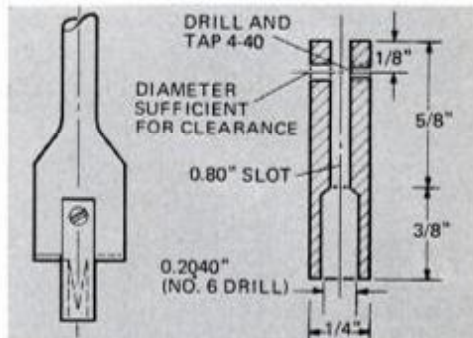


Easy enlarging of existing holes in sheet metal

The safest, easiest way to enlarge existing holes in thin sheet metal is with a tapered reamer, not a drill. It leaves the holes round and smooth; the slight taper of hole is usually not noticeable.—*Federico Strasser, Santiago, Chile*

Guide lets spade bits perform extra functions

A spade bit, used in a drill press with the pilot shown, cuts perfect holes in soft, thin materials like aluminum and brass, can also do counterboring and spot-facing. Drill a 1/4-in.-dia. hole through metal and backup, then use the bit operated at low speed.—*Hallan E. Goldstine, Port Jefferson, N.Y.*



Supply shelves on card table made possible by perforated board

A 2x2-ft. square of perforated hardboard, lashed with wire to the legs of a card table used as a drawing table, will keep the board uncluttered as it accepts hooks and shelves on both sides. Three sides of the table could receive this treatment.—*Grace B. Weinstein, Los Angeles, Calif.*



Don't let the high cost of living
cut into your vacation plans...

Take a **Coleman**

Great Outdoors Vacation



To get the vacation values of the year, check in with your Coleman dealer. For the price of one week's worth of motels and meals, you can have your own "Coleman Resort" going for you.

With a big weather-resistant, flame-resistant Coleman tent as your cabin. The easy-care comfort of washable sleeping bags. A cold-hugging Coleman cooler and jug. And the famous Coleman lantern and Coleman stove that you'll find on almost every campsite.

And having your own "Coleman Resort" means a lot more than one vacation. Because that red Coleman label on a product assures you of value that **lasts**. Coleman builds products that keep on going. Trip after trip. Year after year.

Take your family on a Coleman Great Outdoors Vacation . . . and you'll be saving on vacations for years to come. That's the value of Coleman.

For your best vacation values . . . start with your Coleman dealer.

Coleman 75th Anniversary Vacation Special

Look for this offer at your participating Coleman dealer.



44 Qt. Metal Cooler, matching 1-Gal. Jug inside.

New! Coleman "CAMPSENSE"—A guide for the most economical way to take a great vacation. Forty eight pages teeming with tips. Send \$1.00 to Coleman CampSense, Box 1762, Wichita, Kansas 67201 . . . or see your participating Coleman Dealer.



WICHITA, KANSAS

PHOTO HINTS

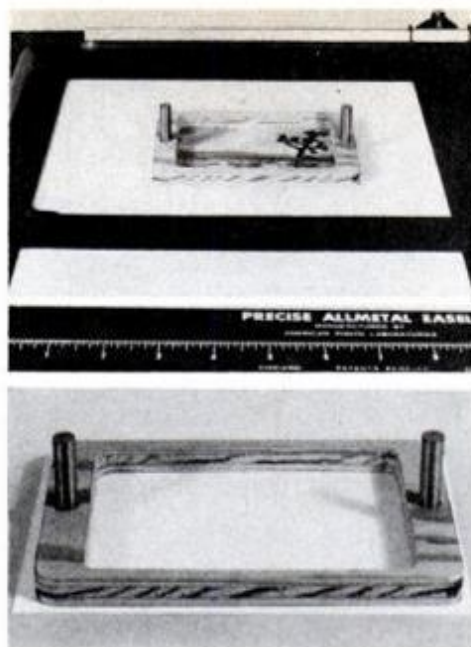
FROM READERS



String safeguards safelight

If you use your bathroom as a darkroom, sooner or later the weight of your safelight may break your ceiling light fixture. So tape a loop of string around your safelight and hook the string over the fixture's shade screw. This extra support will keep the light fixture from bending or breaking.

—J.D. Maxwell, Vancouver, Wash.



Keeping test prints flat

It's always a good idea to make a small test print of the most important areas of a picture before wasting a large sheet of enlarging paper. Holding the small test print flat in the middle of a steel easel is easy with this simple gadget. It's merely a frame of plywood or several cardboard layers glued together, held down with magnets inserted in the

ends. Size of frame depends on the size of your test sheets—I made mine $3\frac{3}{8} \times 4$ inches. It's especially handy for color-print papers which must be placed on the easel in total darkness; even in the dark, it's easy to find the frame, tip up one edge, and slide the paper under it.

—Phillip Duclos, Mira Loma, Calif.



Pipe cleaners stop drips

Developer, fixer and other chemicals won't drip down your glass graduates to contaminate or mar your darkroom if you wrap a pipe cleaner (or two cleaners twisted end to end) around the glass to catch the drips.

—J.D. Maxwell, Vancouver, Wash.

The little Pocket that's quick as a wink.



The Pocket 40 is a clever little camera. In bright sunlight, its $1/225$ -second shutter speed can give you beautiful stop-action pictures. Its $f/8$, 3-element lens focuses as close as 3 feet.

Its CdS electric eye and automatic exposure control give you the right exposure for the right picture. It's less than \$73 for all that. Other Pockets start from less than \$25.

Prices are subject to change without notice.



Kodak pocket Instamatic® cameras.





GLIDE AWAY TAILGATE.



AVAILABLE SPORT CLOTH INTERIOR.



CHEVROLET CAPRICE ESTATE.

CAPRICE ESTATE: PRACTICALITY PLUS LOWER MAINTENANCE COSTS.

Caprice Estate is clearly Chevrolet's finest wagon, offering room, comfort and style to help make family chores or recreational excursions more pleasurable. Power steering and brakes, an automatic transmission, and steel-belted radials are standard.

But in the '75 Caprice Estate with standard 400-4 V8 engine, there is also an important savings story to consider: lower recommended maintenance costs.

\$348 lower maintenance costs.

Let's compare our '74 and '75 models over a 50,000-mile period.

While parts and labor costs will vary throughout the country, we've used current list prices for parts and a figure of \$11 an hour for labor and found this: If you follow the Owner's Manual for recommended service, a 1975 Caprice Estate with 400-4 V8 using unleaded fuel could save you nearly \$350 in parts, lubricants and labor over a '74 model using leaded fuel.

Family-size comfort.

There's a satisfaction that comes with giving your family the finest. And Caprice Estate is Chevrolet's finest blend of wagon practicality and tasteful styling.

Outside there's opaque "Mozambique" vinyl wood-grain paneling.

And inside, automatic dome and courtesy lamp switches at all doors.

There's a special sound insulation package that includes roof padding over the cargo area and a thick underhood insulation blanket.

The available sport cloth interior in classic herringbone tweed (shown above) is a no-cost option.

Practicality wagon families like.

There are many Chevrolet wagon features you and your family will like.

The Glide-Away tailgate helps make loading easy, even in tight quarters. You don't even have to unhitch when unloading if you're trailering.

There's storage space behind the forward-facing third seat on 3-seat models. And the rear seats flip down easily from the right rear door.

Caprice Estate, part of the full line from Chevrolet, America's Family Station Wagon Builder.

**CHEVROLET
MAKES SENSE
FOR AMERICA**



DETROIT LISTENING POST



BY ROBERT LUND

More small cars from GM

If GM can swing it, there will be two new small cars in dealer showrooms this year. One home-grown, one from Japan. GM has put its mini Chevrolet on a crash basis and as of the time this issue of PM went to press, chances of the car coming out in October were about 50-50.

The import is virtually a sure thing. It's the GM-Isuzu and is in production now. It's just a matter of turning out enough cars to begin volume shipments to the United States. Named Gemini, the car should start arriving at U.S. ports in August or September, just in time for the new model season. If there are enough cars to go around, Olds and Buick dealers are expected to get equal dubs at selling Gemini. But if supplies aren't adequate to cover both dealer groups, Buick is favored to get first crack.

How big is small?

GM competitors can hardly wait to get a gander at the mini Chev. Not to see what it looks like, but to put a tape measure to it. With all cars coming down in size, the other companies would like to know GM's new definition of big, medium and small before resizing their cars. They already know GM's new definition of big. It's the smaller Cadillac. Once they have the measurements of the mini, they can make a pretty accurate guess at how much GM will lop off its medium-sizers.

One group of GM mediums, the X-body cars—Nova, Omega, Ventura and Apollo—will get new sheet metal in the 1978 models, so they will be out in the fall of 1977.

GM, Ford eyeing no-frill cars

At least two auto companies, GM and Ford, have faced up to the fact they have priced a lot of people out of the new-car market. All that stuff about added value and content (translation: making accessories standard instead of optional), and how it takes the average wage-earner fewer paydays to purchase a '75 than it took to buy a '65 may sound good,

but those pitches never sold a nickel's worth of automobile.

GM and Ford are taking a serious look at producing basic-transportation, no-frill cars that could be sold for \$3000 or less. This would be a significant step back pricewise.

All the companies advertise '75 cars for under \$3000. But don't try to buy one. They don't exist. By the time you add tax, freight, dealer prep and a few other surprises buried in the small type, the price is over \$3000. Loaded jobs are over \$4000. What GM and Ford are after is a set of wheels you could drive out of any showroom in the continental United States for no more than three grand.

GM just (late February) took the first step and made some standard equipment optional in order to lower the base price of some models. By newsstand time, Ford (and maybe other makers) likely will have followed "price-leader" GM.

Long preview for Chrysler

You may have to wait as long as six months to see all of Chrysler's '76 cars. Here's the plan as of now: Most cars will come out in September. Changes will be minimal. Two months later, about November, the company will bring out a new Valiant/Dart under new names. New names because the present cars will be continued virtually unchanged from '75 versions. So there will be a new Valiant/Dart along with an old Valiant/Dart; the same thing Ford did with Maverick and its successor, Granada. Initially, the new Valiant/Dart will be limited to a two-door. Come next spring, a year from now, the two-door will be supplemented by a four-door and/or wagon. The wagon is still a question mark. The company is working on it, but not at a pace that would indicate it is pegged for early production.

Wankel remains on back burner

Chances of GM putting a rotary in a production car in the next few years are just about zilch. Even if pollution rules are relaxed, there are other problems with the Wankel en-

gine—at least the GM version. Fuel economy is only fair versus a piston engine and GM says there's still a lot of R & D work to be done in the areas of reliability, servicing and mass-production.

Air bag still a good bet

When are we going to get air bags? The talk right now is about bags being dropped. Carmakers say the crash cushions would cost \$250 to \$300—figures Detroit can document—and with the auto biz as bum as it is, they aren't about to sock on another increase. The government sympathizes with the industry and has softened its stance—not so far as to say, "Forget it, fellas," but it isn't applying pressure the way it used to.

Everybody—car companies included—agrees bags are a good idea. The hang-up is price. Detroit is stalling for time to get the price down and to improve reliability of the device. Say two years, three years. A source at GM, who would be called on the carpet if we used his name, says GM has put \$80 million into development of the air bag. Given another couple years and \$10 million more to put in the project, he thinks GM could install a front-seat bag in every car for just under \$100.

Packard fan foiled again

This is the time for auto shows and there's been a gang of them the past few weeks. I have a weird friend, name of Clarke Crandall, who is hooked on going to auto shows. But not to look at cars—he never gets much beyond the entrance.

Crandall's favorite car was, is and always will be Packard. He looks like a guy who would drive a Packard. Tall, distinguished and with a magnificent handlebar mustache. When Crandall goes to a show, he immediately seeks out someone of authority. "Kindly direct me to the Packard exhibit," he intones with a straight face, no indication that he is kidding. Man in charge takes a few seconds to recover and explain there is no Packard exhibit. Crandall registers surprise, does an about-face and departs. It's a funny bit. ★★

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



Full flavor to match
the best of times.

RALEIGH



This Swiss made Stop watch by Zodiac times the action to 1/10 of a second. Yours for free B&W coupons, the valuable extra on every pack of Raleigh.

To see over 1000 gifts, write for your free Gift Catalog: Box 12, Louisville, Ky. 40201.

Filter Kings, 15 mg. "tar," 1.0 mg. nicotine; Longs, 17 mg. "tar," 1.1 mg. nicotine, av. per cigarette, FTC Report Oct. '74

A collection of antique Grenadier Guardsman
brass and pewter insignia.



Traditionally smooth. Untraditionally priced.

You can buy a more expensive Canadian, but not a smoother one.

Windsor. A rare breed of Canadian.

PM'S PICK: The top 20 lures to catch the lunkers

These tackle-box winners could keep you in fish around the world.

by Buck Rogers and
Bill McKeown OUTDOORS EDITOR

Making a selection like this is nearly as dangerous as judging a small town's beautiful-baby contest. Someone's bound to be unhappy because we left out his favorite. We know an Argentine fishing guide, for instance, who's going to throw his hat in the air because we didn't list his old reliable trout lure. We expect a letter from at least one vociferous Canadian camp operator, and then there's a Texas fishing friend who probably won't speak to us for a year. But whether we're talking about "wimmin" or anglers, there's no way to please 'em all. Our selection here, however, ought to just about guarantee you good results almost anywhere in the world.

Our choices are based on experience stalking a wide variety of fish around the globe, plus recommendations from hundreds of other fishing authorities. Included among our lures are spinners, jigs, surface lures, spoons, shallow runners, deep runners, wobblers, wigglers and jerk baits—indeed a versatile collection. Among them are half-a-dozen best bass baits, several deadly trout lures, north-woods favorites for pike and walleye, hot smallmouth lures, artificials for panfish and lures that also take tarpon, snook and barracuda.

Wherever you go, for whatever species you fish, this selection of artificials should provide at least one lure which will do the trick. To aid in checking advantages of these individual lures and assist you later in filling a few voids in your tackle box, we have separated the group into functional categories.

Bass specials

We have a special category for these two lures because the largemouth is the most popular game fish in the United States. Sooner or later every angler will get acquainted with this species.

■ **Plastic worm:** Since the dawn of angling history, the night crawler has been the most effective bait a fisherman could string on a hook. It was only a question of time before

someone brought out an artificial worm, and Nick Creme did so in 1949. Since then, the plastic worm has become No. 1 bass lure. Most bass fishermen use it more than all others combined; many fish nothing else. Today, rigged and unrigged worms are made by a number of reputable companies. To prepare your own, impale a 5/0 hook in an eight-inch worm, bring the barb out 1/2 inch behind the head and draw the worm up around the hook's shank. Most anglers turn the barb and bury it in the worm to make it weedless. For casting weight, attach a bullet-shaped slip sinker to the leader.

When fishing, cast the worm out and let it settle to the bottom. With your rod tip high, reel in slowly and crawl the worm back over the bottom. When a bass picks it up, strike. If you miss repeatedly, use a delayed strike. Experiment. Worm fishing is a science that takes practice.

■ **Spinnerbait:** Another hot bass lure is a safety-pin device with lead body, hook and skirt on one wire and one or more spinner blades on the other. This weedless lure can be fished through heavy cover. Some anglers buzz it across shallows with the blade raising a water hump. Others work it over the bottom like a plastic worm. This relatively new bait, made by several firms, has earned a spot in most professional bassers' tackle boxes. The one we have selected for our color photo of life-size lures is the Bass Hog by Storm Manufacturing of Norman, Okla.

Topside teasers

The greatest thrill of angling is the surface strike. We always start with surface lures and only reluctantly change to underwater performers. Our three surface selections are an unbeatable combination; each is a great lure in its own right.

■ **Chugger:** We're not sure that this lure was in James Heddon's collection when he started the company in 1900, but it certainly gained fame shortly thereafter. This is a popper-type lure which does nothing on straight retrieve but performs a variety of tricks in the hands of an experienced angler. Chug it in water-scooping surface explosions, wiggle



Famous fisherman Rogers, proudly displaying an Amazon tucanare, joined the editors in naming the best baits.

it gently in one place, make it "walk the dog" in the frantic manner of an escaping fish. All these Chugger tricks tantalize bass, tease tarpon and produce strikes from every gamefish which will rise to a surface meal. This bait comes in a wide selection of patterns and colors, and is available almost everywhere.

■ **Jitterbug:** Made by the Fred Arbogast Co. of Akron, Ohio, this could be the most popular surface lure in angling history. Retrieved in a normal manner, it slowly crawls across the surface, gurgling and flinging spray. Worked as a surface popper, it responds to rod tip action like something alive. It takes bass, is one of the better surface lures for pike, and the smaller models are deadly for big trout at night. To take big bass in midsummer, go Jitterbugging in the shallows of your local lake late at night with the black 5/8-ounce model.

■ **Injured Minnow:** This famous lure with propellers fore and aft is made by Creek Chub Bait Co. of Garrett, Ind. Extremely versatile, it works well when the water is calm, and on a wind or rain-ruffled surface it's probably the best surface lure we know. It's a quality bait made of wood in various sizes, colors, finishes. Fish it along weed beds for bass and

(Color photos of 20 lures on the next two pages; text continues on page 151)

PM picks the



Mann's Lil' George



Creek Chub Injured Minnow



Bomber



Heddon's Chugger



Lazy Ike



Normark Rapala



Helin Flatfish



Sheldon's Mepps Spinner



Arbogast Jitterbug

Top 20 lures



L&S Mirrolure



Cordell Big O



Johnson Silver Minnow



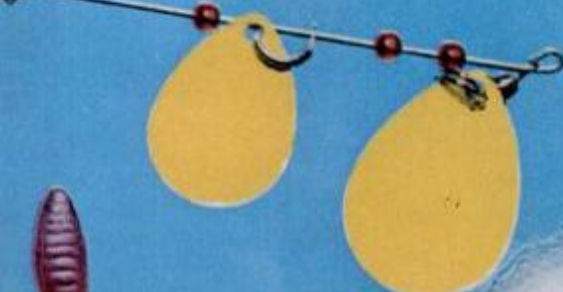
Burke Jig-A-Do



Storm Bass Hog Spinnerbait



Plastic R&D Rebel



Zebco Doll Fly



Heddon's Sonar



Creme Plastic Worm



Garcia Abu Reflex

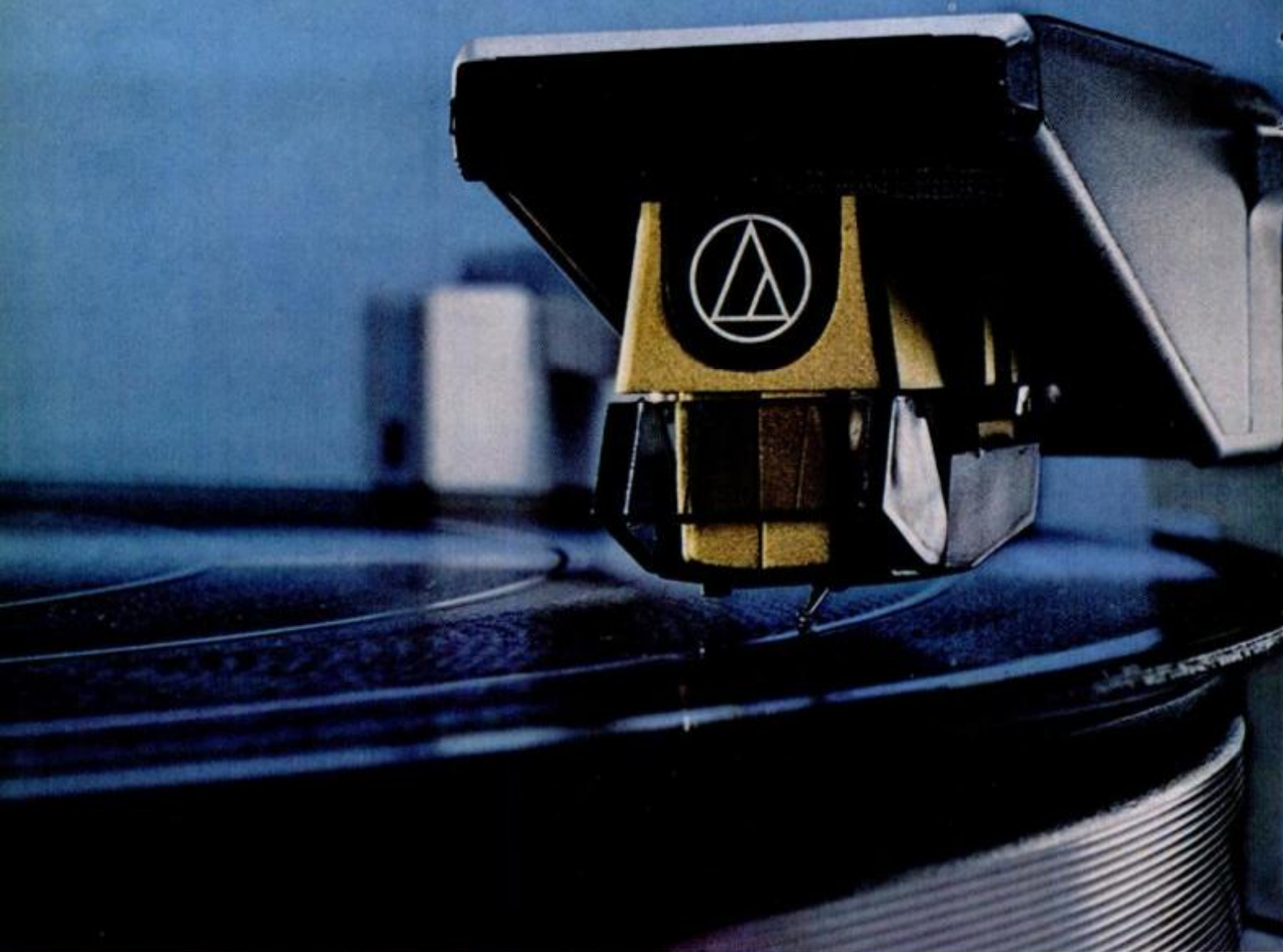


Eppinger Dardevle

Fabulous phono cartridges: 4 channels and 50,000 Hz.

PM tests cartridges you need
to play the new
4-channel Quadradiscs

by Hans Fantel



Audio-Technica AT20SL

Photo: Benn Mitchell

The new four-channel records are causing a revolution in phonograph cartridge design. Just a few years ago, only exceptional phono cartridges could "read" recorded frequencies as high as 20,000 Hz—the average limit of good human hearing—and only exceptional records went that high.

Now, frequencies you can't hear—up to 50,000 Hz—are becoming common on some records, and the super-cartridges to pick up those frequencies are coming in a flood.

But why use frequencies you can't hear?

On the new four-channel "Quadradisc" records re-

corded with the CD-4 system (page 102, Sept. '72), these frequencies carry the different signals that eventually are used to sort out the front-channel signals from the rear ones. Matrix four-channel records (using the SQ or QS systems) encode their rear-channel signals differently, without high-frequency carriers—and without as much front-to-rear separation, either. And stereo discs, of course, with no rear channels, also need no carriers.

The cartridges tested for this report are among the first available for playing this new kind of disc—and they give superb results on stereo, as well. But, fine as

they are, they're also expensive: The nine models we tested (see chart, overleaf), range in price from \$65 to \$175, with a median price just under \$100 (though the one we liked best didn't cost that much).

So, should you now rush out and buy one of these supercartridges? The answer is yes—if you're setting up for CD-4 four-channel records now, or if you plan to switch your system to CD-4 in the near future and now need a new cartridge anyway. You might also consider one if you plan to buy CD-4 records now, to prevent the wear that a stereo stylus, which can't move fast enough to follow the high-frequency carrier modulations, will inflict on them. CD-4 records can theoretically be played quadratically after even 100 playings with a stereo cartridge, but how well depends on the carrier-

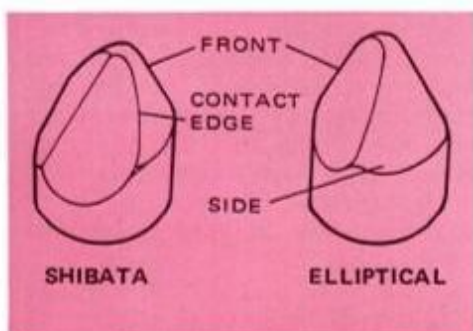
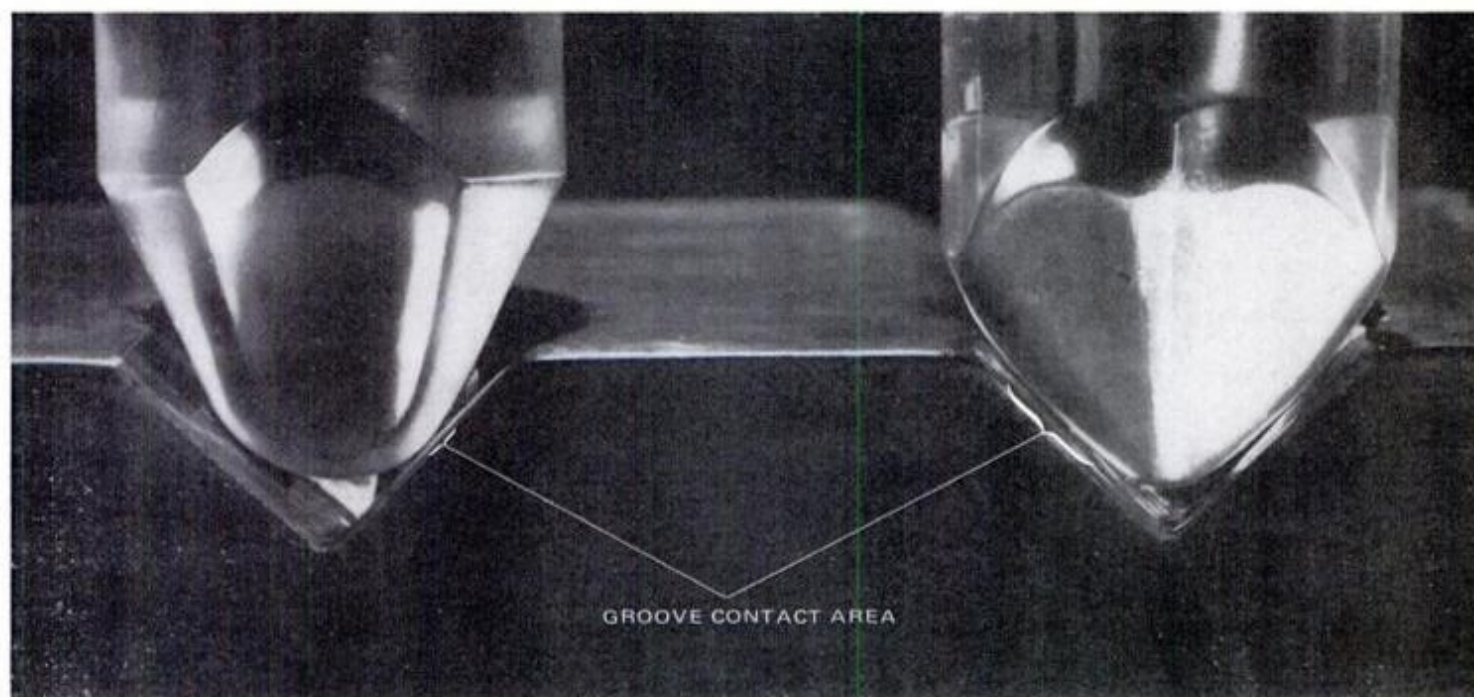
frequency response of the CD-4 cartridge and the sensitivity of the demodulator used to convert the cartridge's two output signals into four. Noise may increase and rear-channel separation decrease noticeably.

And if all you want is the best possible stereo sound, you should definitely consider the top CD-4 cartridges along with the top stereo models for sheer sound quality.

All this talk of "carriers" and "demodulators" is clearer if we explain how CD-4 works. Where matrix quadrasonic discs (like SQ and QS) mix both rear channels into each of the front channels, relying on minute differences in signal timing as clues for their eventual decoding into four signals again, CD-4 Quadradiscs are "discrete"—that is, they each contain four distinct signals, two on each wall of the groove.

That's where the demodulator comes in. This device strips the rear-channel audio information from the high-frequency carrier, transposes it back down into the audible range, then either adds it to the already audible front-rear sum signal to get a front channel, or subtracts it from the sum to get the rear-channel signal.

Such demodulators are built into many of the latest four-channel amplifiers and receivers (and a few turntables), but "outboard" demodulators to connect between your turntable and amplifier or receiver are also widely available. In some cases, you may need special, low-capacity cables between your turntable and demodulator to avoid carrier-frequency losses; but these are built into many modern turntables, and are often supplied with CD-4 demodula-



Multiradial styli like Shibata (above, left) or B&O's Pramanik (at right in photo) have smaller contact radii at the sides to trace Quadradiscs' tiny carrier modulations, but larger contact areas to allow higher tracking forces (see text).

One of these signals is an audible sum of front and rear channels (left-front plus left-rear on one side of the groove, right-front plus right-rear on the other).

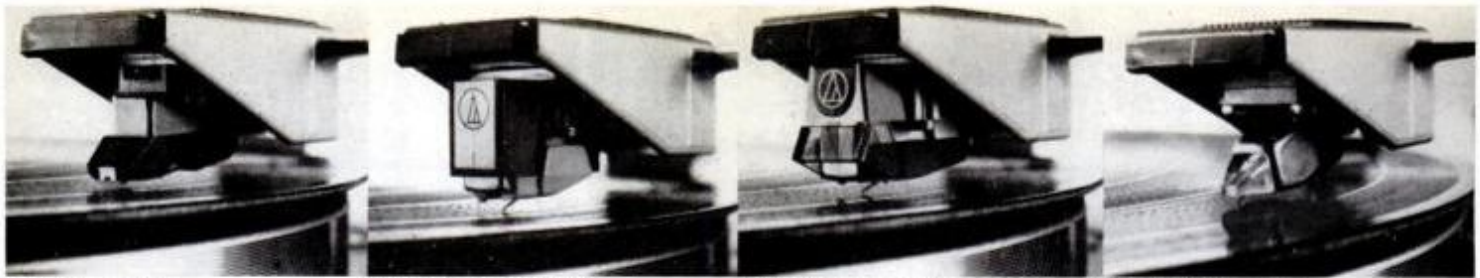
Each groove wall contains, in addition to its front-plus-rear sum, a front-minus-rear difference signal—but you can't hear it. Using a trick invented years ago by telephone engineers to carry several conversations simultaneously on the same wire, CD-4 engineers superimpose the difference signals on a 30,000-Hz "carrier" frequency. In effect, the rear-channel difference information rides piggyback on the high-frequency carrier, far above the audible range. That's why the cartridge must respond to such high frequencies; add 15-kHz audio to the 30-kHz carrier to get a 45-kHz overall range.

tors or the components containing them.

CD-4 cartridges differ from the normal stereo models in their stylus shapes as well as in their frequency response curves. Unlike conventional stereo styli, which are either conical or oval, CD-4 styli take the shape of a three-sided, inverted pyramid with rounded edges.

Most such styli are called "Shibata" types, after their Japanese inventor, but other names (and slightly different shapes) also exist: "Pramanik," after the Bang & Olufsen stylus's designer, and "Quadrilateral" for the Pickering and Stanton design. Empire calls its version "four-dimensional."

Whatever you call it, this stylus tip is designed to present both a sharper radius (the better to trace the car-

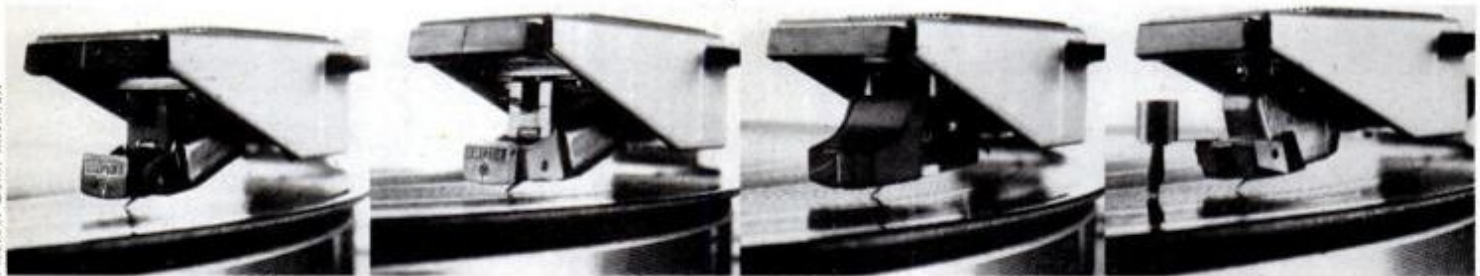


ADC Super-XLM

Audio-Technica AT12S

Audio-Technica AT15S

Bang & Olufsen 6000



Empire 4000D/I

Empire 4000D/III

Panasonic 450C-II

Pickering UV-15/2400-Q

Photos: Benn Mitchell

Make and Model	Frequency Response Deviation in db		Recommended Tracking Force Range	Optimum Tracking Force	Trackability in cm/sec.			Price
	Audio Range 20 Hz-20 kHz	Carrier Range 10-50 kHz			Low	Middle	High	
ADC Super XLM	±4	+0, -23	0.5-1.25	1.0	19	31.5	24	\$75
Audio-Technica AT12S	±3	+0, -6	1.25-2.0	1.75	19	25	19	65
Audio-Technica AT15S	±2.5	+5, -4	1.5-2.0	1.6	19	20	19	100
Audio-Technica AT20SL	±3	+0, -9	1.5-2.00	1.6	24	25	19	175
Bang & Olufsen 6000	±3	+0, -20	0.7-1.5	1.2	19	25	24	85
Empire 4000D/III	±3	+1, -6	0.25-1.25	1.2	24	31.5	24	150
Empire 4000D/I	±3	+1, -7	0.75-2.0	1.4	19	31.5	19	85
Panasonic 450C-II	(see text)	(see text)	1.5-2.5	2.3	24	31.5	19	65
Pickering UV-15/2400-Q	±3	+2, -8	1.5-2.5	2.0	19	25	19	125

rier's ultrafine groove wiggles) and a broader contact area that permits the use of higher tracking forces without increased record wear. (The reason wear doesn't increase is that a greater force, when spread over a broader area, results in the same pressure; and it's pressure, not force, that does the damage.) Of course, the tiny, pyramidal facets of the stylus tip have to be ground very precisely, and the diamond tip oriented with extreme accuracy to the stylus shank, difficult processes which largely account for these cartridges' high cost.

Our tests were similar to those we ran in our earlier report on medium-priced stereo cartridges (page 132, Aug. '74), but with three differences: First the cartridges were mounted in two new Philips 209 automatic turntables (page 91, Oct. '74) with low-capacitance cables that would not diminish the cartridges' carrier-frequency response. To obtain more precise frequency-response measurements, we used a Justi-Meter graphic

recorder, then translated the curves it printed into the numerical values shown on our test chart. And we used different frequency-response test records (a Bruel & Kjaer for the 20-20,000-Hz. audio range and JVC for the 10,000-50,000-Hz upper-frequency range) instead of the single test records we used previously.

Since all the cartridges exhibited some response out to 50,000 Hz, and since all, naturally, went out to 20 kHz, we expressed frequency response in decibels as deviations from linear ("flat") response over each of the two ranges we measured.

As might be expected, the deviations were greater in the carrier range, where any response at all is harder to achieve. Again unsurprisingly, the dips in the carrier-frequency curves were far more prominent than the frequency peaks.

But flat frequency response at carrier frequencies, while desirable, is less important than in the audio range. Low carrier output does not

mean a loss of audible frequency response, but an increase in background noise when listening quadraphonically to a CD-4 disc; switch the demodulator to stereo, and the noise diminishes, while the frequency balance remains unchanged. However, once you're engrossed in the dramatic impact of the four-channel effect, the slight increase in background noise rarely interferes with your enjoyment of the music, being noticeable only in very quiet passages.

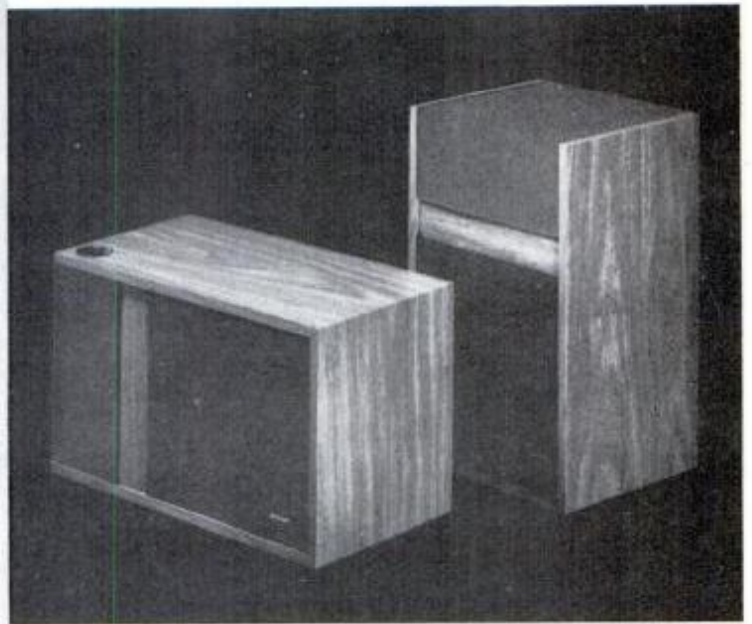
In addition to the frequency-response tests, we also conducted tests for optimum tracking force and "trackability." Both these figures will vary with the tone arm in which the cartridge is mounted—one reason manufacturers list a range of recommended tracking forces. (Sharp-eyed readers may notice that we got different trackability figures for the Audio-Technica AT12S this time than we did in our Aug. 1974, tests us-

(Please turn to page 162)

Electronics: a look at the latest



More versatility for calculators: Printing calculators are slow; display models leave no record, but Casio's new C-100P (far left) has a fast display, plus printer you can switch on when you need it. For hand calculators with display alone, often hard to read on desks, the \$3 Calconverter stand helps; it folds to fit in your pocket, too.



New speakers: Tweeter of Bose 301 (above and far right) angles to direct some sound at you, bounce the rest off nearby walls or ceilings. No wall near? Then turn the knob so the built-in vane (above) reflects the sounds where you want them. For the lowest notes (at the highest prices), Hegeman sub-woofer (right) plays deep tones from 100 Hz to below 16 Hz, some of which you may not have known were there. Sound is very clean; price is \$960 plus cost of an amp to drive it.



"Idiot light" makes this turntable smarter. Like many new turntables, Toshiba's direct-drive 510 has variable-speed pitch control, plus a strobe dial to show fast or slow running. What are new are three lights in front that tell you quickly whether it's running fast, slow or on speed.

'75 IMPORTED CARS

by Bill Hartford,
AUTO EDITOR
and Michael Lamm,
WEST COAST EDITOR



Volkswagen Rabbit is the best value for '75. Two and four-door hatchback models combine performance, economy and prac-

ticality in stylish package. Scirocco (silver, red models, left) is a sporty and more expensive version of the Rabbit.

Most imported cars have a beauty *under* the skin—in their engineering, economy and quality—that makes them exciting to live with. And a bonus is that some of them even have pretty faces!

The most important new import for 1975 is the Volkswagen Rabbit. So we'll start with VW and then discuss the other imported cars in alphabetical order.

Volkswagen. The 1800-pound Rabbit is a mechanical masterpiece from Wolfsburg. Its ohc Four gets it up to 60 mph in about 12 seconds—giving it the edge on some V8 subcompacts. Fuel economy, rated by the EPA at 38 mpg on the highway, was 43 mpg in our mileage test, and that was with driver and two adult passengers. Its hatchback design provides 24.7 cubic

feet of luggage capacity with the rear seat folded.

VW did have a little design help. It consulted with Giorgetto Giugiaro's Ital Design Studio of Turin. What it got was the greatest possible amount of usable interior space into the smallest possible outer shell—and an exterior with some style. To keep down wind noise and to help with fuel-saving streamlining, extensive wind-tunnel tests were run. Jigsaw

Dodge Colt Carousel hardtop is one of five models, now with five-speed manual.



puzzle fans will appreciate how the rear seat, gas tank, spare tire, muffler and rear suspension are all fitted together. Likewise the powerplant, front-wheel drive (fwd), drive train and front suspension.

The Rabbit contains some major components adapted directly from the Audi Fox/VW Dasher, introduced in 1974. The Dasher's engine, front suspension and fwd arrangement, electrical system and heating-vent system are taken into the Rabbit without change. The trans-axle is the same, too, but the differential uses spur gears rather than bevels.

The engine (and this applies, of course, to the Dasher, too) is a 1471-cc, in-line Four set crosswise up front for fwd. Servicing is easy because the entire ignition system

MG Midget is an even better buy for '75. The 1½-liter engine is used and the four-speed gearbox is all synchromesh for the first time. We like the 5-mph bumper treatment up front: could you have thought of a better way?



faces forward. The Zenith two-stage carb is behind the head, but it's still easy to get at. The engine is relatively simple to remove, and it comes out *with* the transaxle—in fact, you can't take out one without the other. There's plenty of room around the engine for good serviceability, even with airconditioning.

The Rabbit uses buckets up front and a bench in back, with deep foot wells and a fairly flat floor, so there's ample room for four and even for five. Behind the rear seat is a large and cleverly conceived luggage locker, accessible through the rear liftgate. There's an upper parcel shelf—a wooden board—that's hinged at the front and comes up automatically with the liftgate when two lift straps are attached. Detaching the lift straps means the parcel shelf remains in place. Or this shelf can be removed entirely, giving a very deep well for luggage or cargo. In addition, the rear seat folds flat for bulky items. So there's really as much room here as in the deck of a full-sized American station wagon.

The Rabbit's main body section consists of a rugged, welded-up structure, but the front fenders, hood and grille may be replaced by unbolting. Front and rear body areas contain crash-crush sheet-metal elements that help absorb impact.

Like the Dasher, the Rabbit uses McPherson-strut front suspension and unequal axle shafts with twin constant-velocity joints on each. Front disc brakes are standard. Steering is by rack and pinion, with a double-jointed safety steering column.

Rear suspension is unique to the Rabbit. It's very light and simple. Two trailing arms go back from a central, transverse, T-section torsion bar that runs across underneath the gas tank. Wheels are located by the trailing arms but also use high-riding coils that enclose the rear shocks.

If both wheels hit a bump at the same time, the transverse torsion bar isn't activated; all springing is taken by the coils. But if only one wheel hits a bump, it activates the torsion bar. In hard cornering, the torsion bar also acts as a stabilizer, helping to keep rear tires firmly on the ground.

The Rabbit comes in two and four-door versions; its sporty sister, the Scirocco, as a two-door. The Scirocco is to the Rabbit what the discontinued Karmann-Ghia was to the Beetle: a sports model sharing the same engine, drive train and mechanicals.

The Dasher remains virtually unchanged from 1974, but a hatchback coupe has been added (no picture available yet). There are minor improvements in door locks and disc brakes. The VW security blanket warranty continues, as does plug-in electronic diagnosis for all VWs.

For the Beetle and La Grande Bug, changes are minor and aimed mostly at smog certification: electronic fuel injection, with horsepower and torque up slightly. The 1975 Beetle also has a better heater and a lighter clutch. Outwardly, it's identifiable by a single exhaust pipe and a slight bustle bulge under the back bumper to cover the catalytic converter.

Alfa Romeo. The Alfa line is essentially unchanged for '75 since later in the year the new Alfetta GT and sedan will be introduced here (see *Imports and Motorsports*, page 36, Nov. '74).

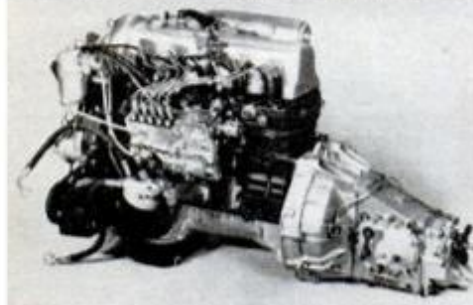
Audi. Both the Fox and the 100LS go to fuel injection this year, and the Fox gets a slightly larger (1588-cc vs. 1471-cc in 1974) engine. Horsepower is up in both cars, as is fuel mileage, and Audis need catalytic converters only in California.

Austin. The Marina continues fairly unchanged for '75—except for a little bonus: Price has been rolled back \$400, making it less than \$2500—which is hard to beat!



Fiat 131 wagons (top) replace those in discontinued 124 series. For more on the new models see *Imports and Motorsports*, page 14, Feb. '75.

Lancia Beta sedans and coupes (above) are all new entries in the American market. Long a prestigious marque in Europe, the cars will be marketed here by the Fiat dealer network, whose mechanics will be familiar with the 1.8-liter dohc Fiat Four used in both models. The front-wheel-drive and all-around independent suspension features are suited to hard, acrobatic driving as we found out in Italy. The sedan is especially roomy and comfortable, but doesn't approach the coupe's exciting styling, which extends to the interior layout, too, as shown above. If you can get away with the coupe's 2+2 seating, it's the clear choice of the two.



Mercedes-Benz 300D is the hottest diesel on the road. The three-liter, five-cylinder powerplant moves this sedan as you would expect a luxury car to move. The "world's most expensive economy car" (\$12,000, 31 mpg), also has simplified starting and shutdown—everything operated by the key.

BMW gets a brand-new, medium-sized line, the 530i. This luxurious, sporty four-door fits between the four-cylinder 2002 series and the six-cylinder 3.0 Si.

The 530i borrows the 3.0 Si's ohc, in-line Six—a three-liter engine whose sophistication includes hemispherical combustion chambers with a crossflow head and electronic fuel injection. The drive train is conventional: engine up front, drive wheels out back, but the car uses a deDion live axle with high-mounted coils all around. The spring perches incorporate foam-cell polyurethane pads that compress some 80 percent to help cushion hard jolts.

The 530i's unit body has crush sections front and rear, integrated rollbars, and catch hooks to keep the hood from flying open in a crash. Thin greenhouse pillars keep visibility at a maximum.

Luxurious interior appointments include a quartz-crystal clock, infinitely adjustable reclining seats, and

SPECIFICATIONS AND COMPARISONS

Car—Series: Models	Body Style	Wheel-base (in.)	Overall Length (in.)	Overall Width (in.)	Engine* (cubic centimeters, in-line Four except as noted)	1975 Changes (not federally regulated)
ALFA ROMEO						
2000 Berlina	4-dr.	101.1	167.9	61.6	2000	Refinements
2000 GT Veloce	2-dr. coupe	92.5	167.9	64.2	2000	Refinements
2000 Spider Veloce	2-dr. roadster	88.6	167.9	64.2	2000	Refinements
AUDI						
Fox	2-dr., 4-dr. sedan	97.2	172.0	64.7	1588 fwd	Refinements, fuel injection
100LS	2-dr., 4-dr. sedan	105.3	187.2	69.0	1871 fwd	Refinements, fuel injection
AUSTIN						
Marina	2-dr., 2-dr. GT, 4-dr.	96.0	169.0	64.8	1798	Unchanged
BMW						
2002, 2002ti	2-dr. sedan	98.4	176.0	62.6	1990	Refinements
530i	4-dr. sedan	103.8	189.9	67.2	2985-6	All-new car
3.0 Si	4-dr. sedan	106.0	195.0	68.9	2985-6	Refinements
CAPRI II						
2300, 2800	2-dr. hatchback	100.8	174.8	66.9	2300, 2800-V6	Restyled, larger base engine
DATSUN						
B-210	2-dr., 4-dr. sedan, hatchback	92.1	163.0	60.8	1397	Larger engine
PL-710	2-dr., 4-dr. sedan, 2-dr. hdtp., wagon	96.5	171.7	62.2	1952	Larger engine, radial tires, bigger brakes
PL-610	2-dr. sedan, 4-dr. sedan, wagon	98.4	175.0	63.0	1952	
260Z	2-dr. hatchback	90.7	173.2	64.2	2754-6	Larger engine, fuel injection
280Z	2+2	102.6	185.4	65.0	2754-6	
DODGE						
Colt	2-dr. coupe, 2-dr. hdtp., GT, 4-dr.	95.3	171.1	63.6	1600, 2000	Five-speed transmission
FERRARI						
Dino 308 GT4	2+2 coupe	100.4	169.3	71.0	2926-V8	All-new car
FIAT						
128	2-dr. sport coupe	87.5	156.4	61.4	1290 fwd	Refinements
	2-dr. & 4-dr. sedan, wagon	96.4	158.6	62.6		
124	Sport coupe	95.3	172.4	65.8	1756	Refinements
	Sport convertible	89.8	163.1	63.5		
131	2-dr. & 4-dr. sedan, wagon	98.0	169.4	64.2	1756	New model replaces sedans and wagon
X 1/9	Mid-engine roadster	86.7	153.5	61.8	1290	Unchanged
HONDA						
Civic	2-dr. sedan, hatchback	86.6	146.9	59.3	1237 fwd	Refinements
Civic CVCC	2-dr. sedan, hatchback	86.6	150.0	59.3	1488 fwd	New stratified-change-engine model
JAGUAR						
XJ6L, XJ12L	4-dr. sedan	112.8	198.8	69.7	4235-6, 5343-V12	Refinements
E-Type V12	2+2 coupe, roadster	105.0	189.6	66.1	5343-V12	Refinements
JENSEN						
Jensen-Healey	2-dr. roadster	92.0	161.9	63.2	1973	Refinements
Interceptor Mark III	2-dr. coupe & convertible	105.0	186.0	69.0	7200-V8 (Chrysler 440)	Refinements
LAMBORGHINI						
Jarama	2+2 coupe	93.7	176.6	71.7	3929-V12	All-new car
Espada	2-dr. coupe	104.3	186.5	73.2	3929-V12	All-new car
Urraco	Mid-engine coupe	96.5	167.3	69.3	2463-V8	All-new car
LANCIA						
Beta	2-dr. coupe	92.5	157.1	65.0	1756 fwd	All-new car
	4-dr. sedan	100.0	168.8	66.5	1756 fwd	All-new car
LOTUS						
Elite	2-dr. hatchback	97.8	179.5	71.0	1973	Unchanged since 1974½ introduction
Europa	Mid-engine sports car	92.0	157.3	64.5	1600	Unchanged
MASERATI						
Bora	Mid-engine coupe	102.3	177.0	69.6	4930-V8	Unchanged
Merak	Mid-engine coupe	102.3	177.8	69.6	2965-V6	All-new car
Khamsin GT	2+2 coupe	100.3	173.0	71.0	4930-V8	All-new car

*Not all engines available in all models

fwd, front-wheel drive

4wd, four-wheel drive

power steering. The 530i and 3.0 Si use four-wheel disc brakes, and all BMWs are available with optional automatic transmissions.

Capri. The new Capri II hatchback (see *Imports and Motorsports*, page 14, Jan. '75) has a bigger base engine (2300 cc vs. 2000 cc last year). This ohc Four continues with the four-speed manual transmission as standard equipment.

The V6 version (2800 cc) is available optionally and includes heavy-duty driveline components. There are three Capri II trim levels for 1975: standard, Decor Group and Ghia.

Datsun. The B-210 pushrod engine goes to 1400 cc this year as against 1300 cc last, and the PL-710 now uses the 610 engine, up 200 cc. Everything else stays pretty pat. The 260Z and new 280Z come in two and

OF ALL IMPORTED 1975 CARS

Car— Series: Models	Body Style	Wheel- base (in.)	Overall Length (in.)	Overall Width (in.)	Engine* (cubic centi- meters, in-line Four except as noted)	1975 Changes (not federally regulated)
MAZDA 808	2-dr. coupe, 4-dr. sedan, wagon	91.0	168.0	63.0	1586	Unchanged
RX-3	2-dr. coupe, 4-dr. sedan, wagon	91.0	168.0	63.0	1146-2-rotor	Refinements
RX-4	2-dr. hdt. coupe, 4-dr. sedan, wagon	99.0	179.0	66.0	1308-2-rotor	Refinements
MERCEDES-BENZ 230, 240D 3000	4-dr. sedan 4-dr. sedan	108.3 108.3	195.5 195.5	69.7 69.7	2300-gasoline, diesel 3000-5-diesel	Refinements New 5-cyl. model
280, 280C 280S, 450SE, SEL	4-dr. sedan, coupe 4-dr. sedan	108.3 112.6	195.5 205.5	67.7 73.6	2746-6 2746-6, 4500-V8	Refinements 280S new model, refinements
450SL, SLC	2-dr. coupe/roadster 2+2 coupe	96.9 111.0	182.3 196.4	70.5 70.5	4500-V8 4500-V8	Refinements Refinements Refinements
MG Midget	2-dr. roadster	80.0	141.0	54.9	1491	Larger engine, syn- chromesh trans. Refinements
MGB, MGB/GT	2-dr. rdstr., hatchbk.	91.0	159.5	59.9	1798	Refinements
OPEL Manta, 1900	2-dr. coupe, sedan, wagon	95.7	176.1	64.3	1900	Refinements, fuel injection
PEUGEOT 504	4-dr. sedan wagon	108.0 114.0	182.4 194.4	66.7 66.7	1971-gasoline, 2112-diesel	Refinements
PORSCHE 914 911S, Carrera	Mid-engine roadster 2+2 coupe, Targa	96.5 89.4	164.4 168.9	65.0 63.4	1795, 1971-flat 4 2687-flat 6	Refinements Refinements
RENAULT 12, 12L, 12TL	4-dr. sedan, wagon	96.0	174.0	64.5	1647-fwd	Higher horsepower, refinements
15TL	2-dr. coupe	96.0	172.0	64.0	1647-fwd	Higher horsepower, refinements
17TL, Gordini	2-dr. coupe, coupe convertible	96.0	172.0	64.0	1647-fwd	Higher horsepower, refinements
ROLLS-ROYCE Silver Shadow, Corniche	4-dr. sedan, 2-dr. sedan, convertible	119.5	207.5	71.0	6750-V8	Refinements
SAAB 99LE, EMS, WagonBack	2-dr., 4-dr. sedan, hatchback	97.8	174.0	66.5	1985-fwd	Refinements
SUBARU Star series	2-dr., 4-dr. sedan, wagon, coupe	96.6	164.4	59.2	1360-flat 4-fwd	Refinements, 4wd wagon, auto. trans.
TOYOTA Corolla 1600, SR-5 Corona RT, SR-5 Celica ST, GT Mark II	2 & 4-dr. sedans, wagon, hardtop 2 & 4-dr. sedans, 2-dr. hdt., wagon 2-dr. hdt. coupe 2-dr. hdt., 4-dr. sedan, wagon	93.3 98.4 95.5 101.7	165.2 173.2 171.5 182.1	61.8 63.4 63.4 64.4	1588 2189 2189 2563-6	Restyled, more models Bigger ohc hemi- engine Refinements, 5- speed GT Refinements
TRIUMPH Spitfire 1500 TR6 TR7	2-dr. roadster 2-dr. roadster 2-dr. coupe	83.0 88.0 85.0	156.3 162.0 164.5	58.5 58.0 66.2	1493 2498-6 1988	Refinements Unchanged All-new car
TVR 2500M	2-dr. coupe	90.0	164.0	64.0	2498	Unchanged
VOLKSWAGEN Beetle La Grande Bug Rabbit Scirocco The Thing Dasher	2-dr. sedan 2-dr. sedan, convert. 2-dr., 4-dr. hatchbk. 2-dr. hatchback sport coupe 4-dr. utility vehicle 2-dr., 4-dr. sedan, wagon, 2-dr. hatchbk.	94.5 94.5 94.5 94.5 94.5 97.2	163.4 155.3 155.7 148.8 172.8	61.0 63.4 64.0 64.6 63.0	1584-flat 4 1471-fwd 1471-fwd 1584-flat 4 1471-fwd	Fuel-injection All-new car All-new car Unchanged New hatchback model
VOLVO 240 series 164	2-dr., 4-dr. sedans, wagon 4-dr. sedan	104.0 107.0	192.0 192.0	67.1 67.1	1986 2978-6	New suspension, steering, refine- ments Refinements



Toyota Corolla is restyled, has five-speed transmission and transistorized ignition.



Volvo 240 Series (242 two-door, 244 four-door and 245 five-door wagon) gets major front-end improvement in suspension, steering and appearance, with all redesign based on findings in Volvo's experimental safety vehicle (ESV) program.

rear-window defogger, reclining front buckets, mag-like wheels, rack-and-pinion steering, radial tires, extensive rustproofing, and crash-crush front and rear body sections.

The Fiat 124 coupe and convertible, the 128 series and the sporty X1/9 roadster are virtually unchanged.

Honda introduces its clean-air engine, the stratified-charge CVCC, plus a sport package that includes a five-speed gearbox, fancy wheels, and two-tone upholstery.

The CVCC engine is a four-cylinder unit, and to understand it, you have to realize that there are basically two ways to clean up the exhaust of an internal-combustion engine: 1) hang on catalytic converters or other afterburners or, 2) run the engine with an extremely lean (oxygen-rich) fuel mixture. Honda's stratified-charge engine does the latter and thereby doesn't need any other smog equipment.

The CVCC engine has a small pre-combustion chamber, with its own valve and intake port, off to one side of each combustion chamber. The normal intake system draws a very lean mixture into the cylinder. Then, at the same time, the tiny precombustion chamber gets a small, relatively rich charge of fuel through its own separate valve and intake port. The sparkplug rests in the pre-

(Please turn to page 172)

four-seater versions, use a slightly bigger Six with fuel injection and six more horses.

Dodge Colt. The top-line GT sports hardtop is now called the Carousel. It has fancy exterior trim, a denim vinyl interior, and a five-speed overdrive transmission. The five-speed will become optional in Colt sedans and wagons later this year.

Ferrari. Ferrari will concentrate

on importing only one series in 1975—the Dino 308 GT4. This mid-engined fastback replaces last year's Dino 246 GTS, the Daytona, and the 365 GTC/4.

Fiat. Big news from Fiat this year is the 131 series, which replaces the 124 sedans and wagon.

Among the 131's standard items are five-speed overdrive transmission, tilt steering wheel, tach, tinted glass,

Big pipe dream comes true at last!

Work is finally under way on the long-awaited Alaskan pipeline—an incredible engineering feat across 800 miles of fearsome Arctic wilderness.

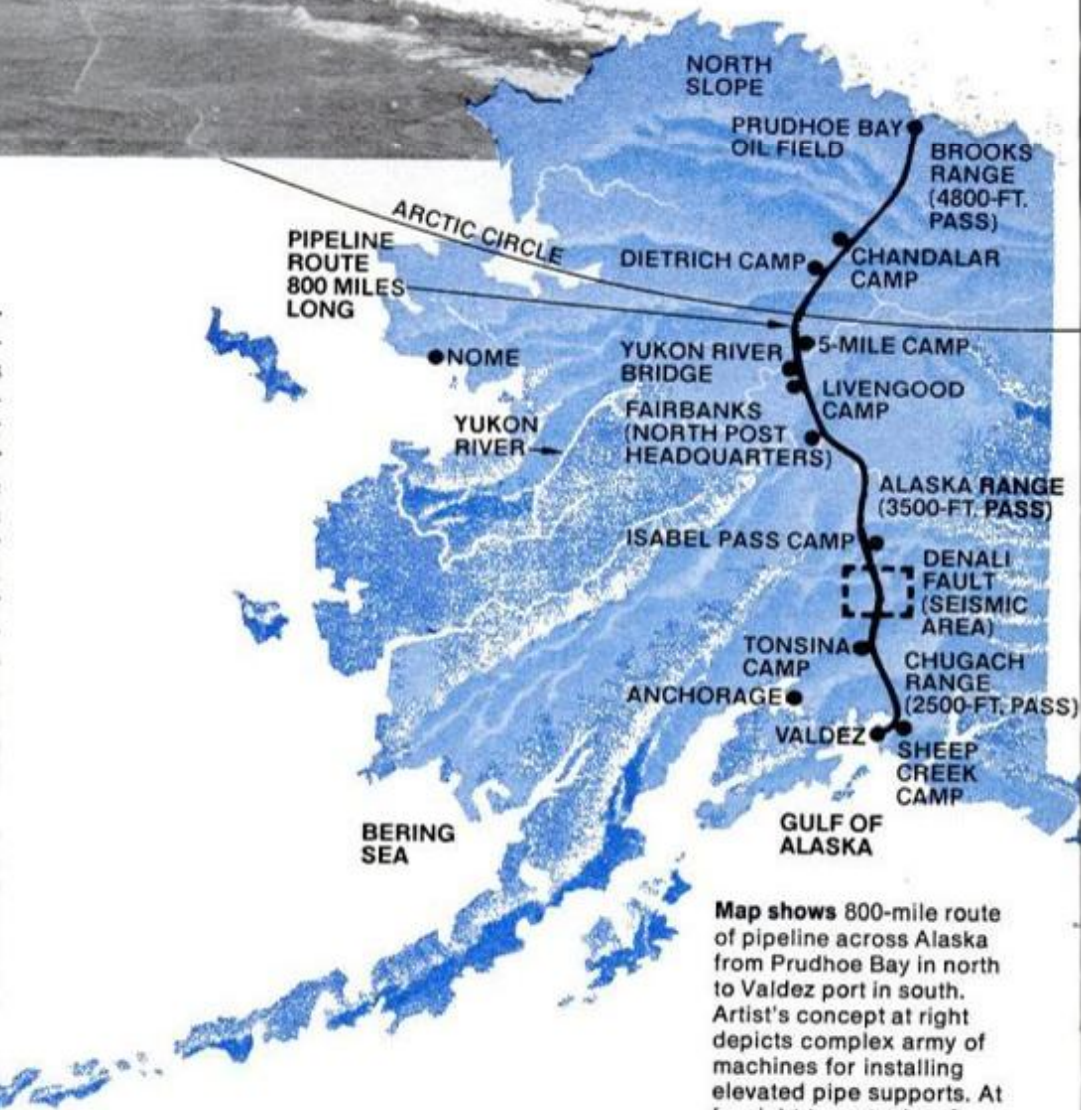


by Norman Sklarewitz

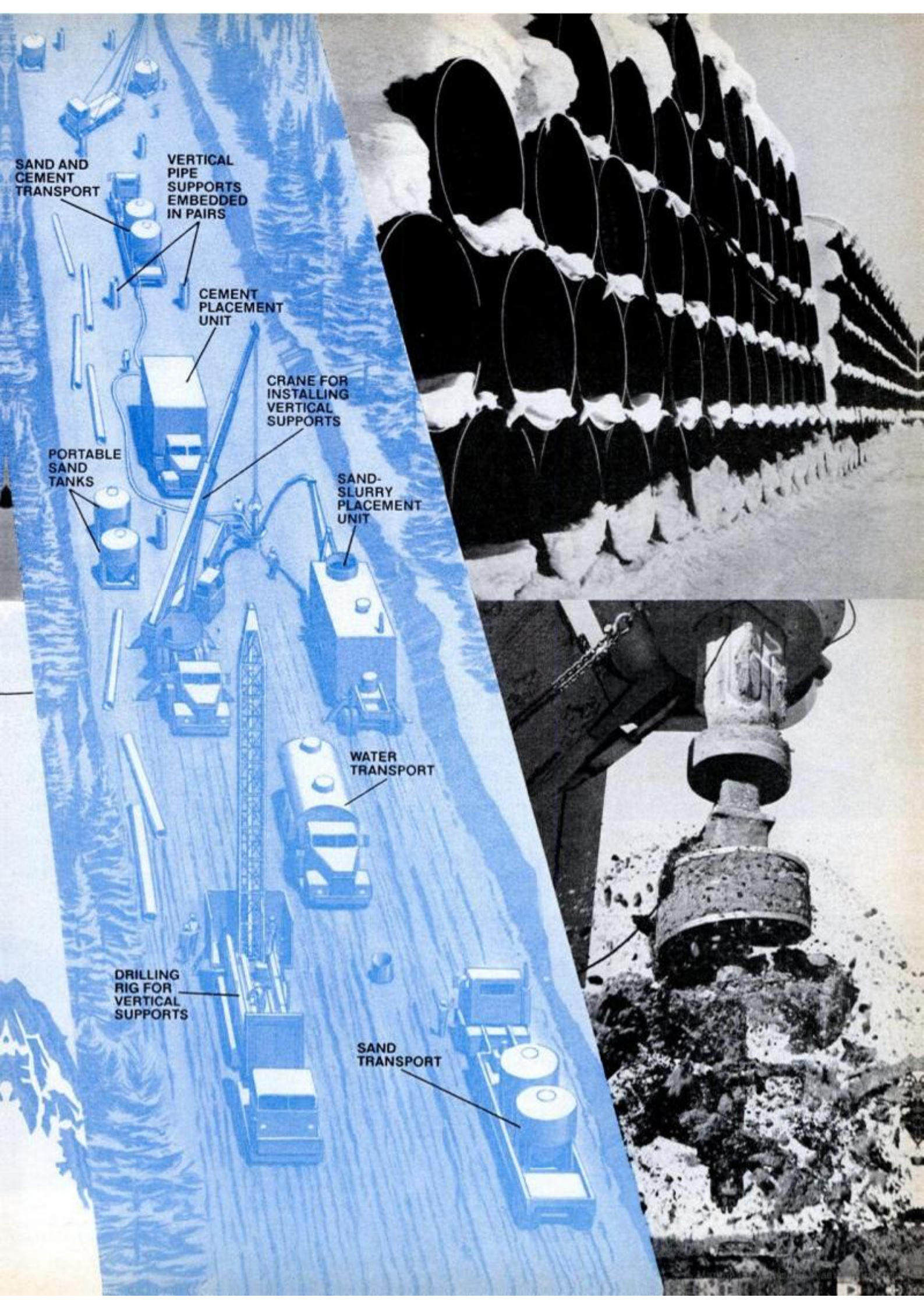
Art: Adolph Brotman

On the rim of the Arctic's Beaufort Sea the crackling-cold silence of a once-deserted wilderness is now being shattered by thundering new sounds. Giant drilling machines grind two-foot-diameter auger bits 36 feet down into the frozen ground, spewing ice, earth and rock skyward in a spectacular shower. An army of strangely garbed men and science-fiction-like monster machines lumbers slowly and ponderously along behind the drilling rigs—the beginning of a trek that will cover nearly 800 miles of rugged Arctic wasteland and represent one of the most fantastic engineering adventures in history.

The much-talked-about, long-awaited, bitterly fought-over Alaskan pipeline is finally beginning to become a reality. The holes now being drilled are for mammoth support columns that will elevate the pipeline above the Arctic tundra for much of its 798-mile run from Alaska's North Slope southward to the sea. While crews are drilling these first holes in the north, another army of men and machines some 300 miles to the south is busy sinking piers into the ice-laden Yukon River for a half-mile-long bridge that will



Map shows 800-mile route of pipeline across Alaska from Prudhoe Bay in north to Valdez port in south. Artist's concept at right depicts complex army of machines for installing elevated pipe supports. At far right top, stacks of snow-draped pipe sections stretch almost as far as eye can see. At lower right, 24-inch auger bit drills holes at foot a minute.



SAND AND CEMENT TRANSPORT

VERTICAL PIPE SUPPORTS EMBEDDED IN PAIRS

CEMENT PLACEMENT UNIT

CRANE FOR INSTALLING VERTICAL SUPPORTS

PORTABLE SAND TANKS

SAND-SLURRY PLACEMENT UNIT

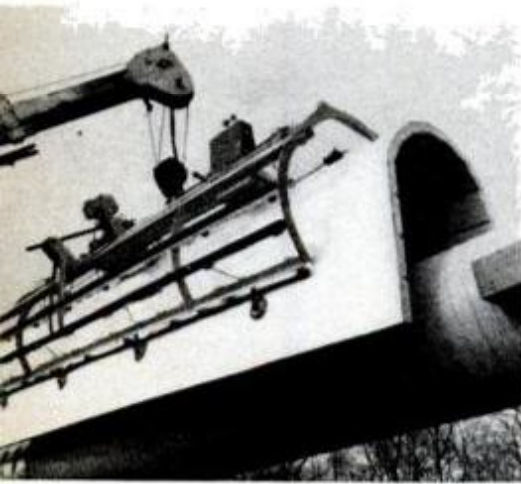
WATER TRANSPORT

DRILLING RIG FOR VERTICAL SUPPORTS

SAND TRANSPORT



Giant mobile crane lowers 60-foot length of 18-inch pipe into ground in first stage of erecting elevated pipeline supports.



Insulating shell is clamped around outside of pipe in one operation with this special clawlike device on end of derrick boom.



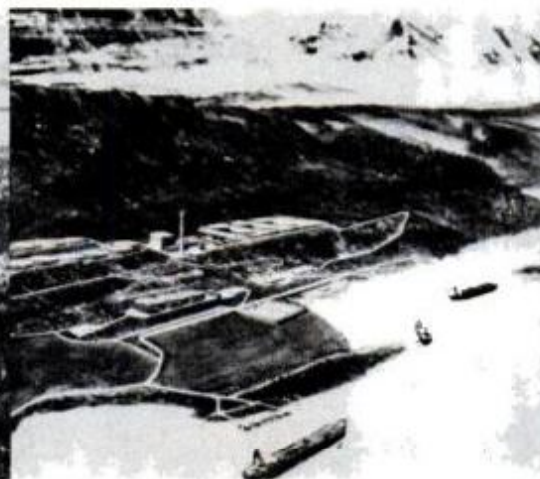
Aerial view shows service road bulldozed through trackless regions of the Arctic to carry machinery to construction sites.

carry the pipeline over the water.

Another 300 miles farther south, at the end of a picture-postcard fjord emptying into Prince William Sound, still another army is converting the once-tiny, tranquil town of Valdez on the coast into the North Country's biggest and most elaborate port terminal. Its original population of 1000 has already tripled and is about to double again. When work is completed on the port, Valdez will be capable of transferring two million barrels of oil a day from the pipeline to the bellies of 35 104,000-ton tankers that will ferry the precious petroleum to refineries in Washington State and California.

What's happening in Alaska today began in 1968 when Atlantic Richfield and Exxon drilled their 11th and "last-shot" exploratory oil well at Prudhoe Bay—and came in with a 2300-barrel-a-day bonanza (the average U.S. well produces 14 barrels a day). Later strikes indicate a field with recoverable reserves of nine billion barrels of oil. Some geologists think there may be additional 20 to 40-million-barrel reserves. If this proves out, the North Slope will be the world's largest oil field.

The pipeline to tap it is not only acknowledged to be the biggest, most formidable civilian construction job ever undertaken, but it will also be the most expensive. The original estimated cost was put at \$900 million. Now rampaging inflation, ecological pressures and incredible engineering problems imposed by the hostile Arctic environment have run the expected tab up to nearly \$6 billion before anticipated completion in 1977. During that time, some 30,000 people will have been hired to maintain a work force of 14,000 to 16,000 in peak construction periods. More than 35 million man-hours of work on the pipeline are scheduled for this year alone.



Huge port terminal at Valdez, when finished, will transfer two million barrels of oil a day to tankers for shipment south.

While employment possibilities might seem plentiful, adventurous job-seekers are warned to stay away unless they have a firm commitment of work. For one reason, much of the work force is being recruited from local Alaskans, and the big pipe rush is already on. There are simply no accommodations left for anyone "floating loose."

Since no single corporation could swing such an enterprise alone, a consortium of eight oil companies formed the Alyeska Pipeline Service Co. to design, build and operate the 800-mile system. From headquarters at North Post, a former Army base near Fairbanks, Alyeska oversees operations of its two major contractors—Bechtel, Inc. for road and pipeline, and Fluor Alaska, Inc., for pumping stations and port terminal. Under these Goliaths are dozens of smaller subcontractors and even more sub-subcontractors numbering into the hundreds.

Anyone interested in exploring employment possibilities on the pipeline is advised to write the Alyeska Pipeline Service Co., 1835 South Bragaw, Anchorage, Alaska 99504. Request a booklet, *The Truth About Pipeline Jobs in Alaska*, and a list of current contracting firms.

To give some idea of the staggering size and problems involved, the pipeline and its service road will have to cross three mountain ranges—one through a 4800-foot-high pass in the Brooks Range—70 major rivers and three active earthquake-prone seismic faults. Winter temperatures range down to 68° F. below zero, and the nights are nearly 24 hours long for months at a time. Such extreme cold can shatter brittle metal at a tap and quickly sap the strength of men. Touch a piece of metal with a bare hand and the two will freeze together instantly. For this reason, metal doorknobs on con-



Dwarfed by mighty Gulkana Glacier at Isabel Pass in Alaska Range is one of many construction camps along pipeline route.

struction-camp buildings are taped over. One uninitiated carpenter made the mistake of popping a handful of nails into his mouth at 50 below. He spent some time in sickbay waiting for the spikes to warm enough to be removed without tearing out the inside of his mouth.

So vast is the job that just the preparation work alone took more than a year before the first hole could be drilled. First came a string of 19 construction camps—each a self-contained base with life-support systems nearly as elaborate as those for a moon colony. Huge C-130 cargo planes, landing on makeshift runways of snow and ice, brought in food, machinery, building materials and other supplies. What couldn't be flown in had to be hauled overland in tracked vehicles, often operating precariously in unknown terrain or heavy, blinding snow. Forty inches of ice will support a normal highway load—if you keep your trucks spread out. On at least one occasion, two D-9 skidders learned this the hard way. They pulled alongside each other for a chat on four-foot ice, and both broke through into the water. Luckily, the drivers jumped clear in time, and later the Cats were recovered.

With base camps completed, an access road for pipe-laying equipment had to be bulldozed through country where no roads ever existed before. There were no dependable maps, and no way of keeping the Cats on a predetermined trail. Ingenuity was the name of the game. One Cat driver got lost in the mountains and radioed for help. The enterprising bush pilot who went out to look for him took along a 50-mile roll of string. When the pilot spotted the Cat, he started reeling out the string as he headed back to base. All the driver had to do was follow the string home. The resulting road north of the Yukon

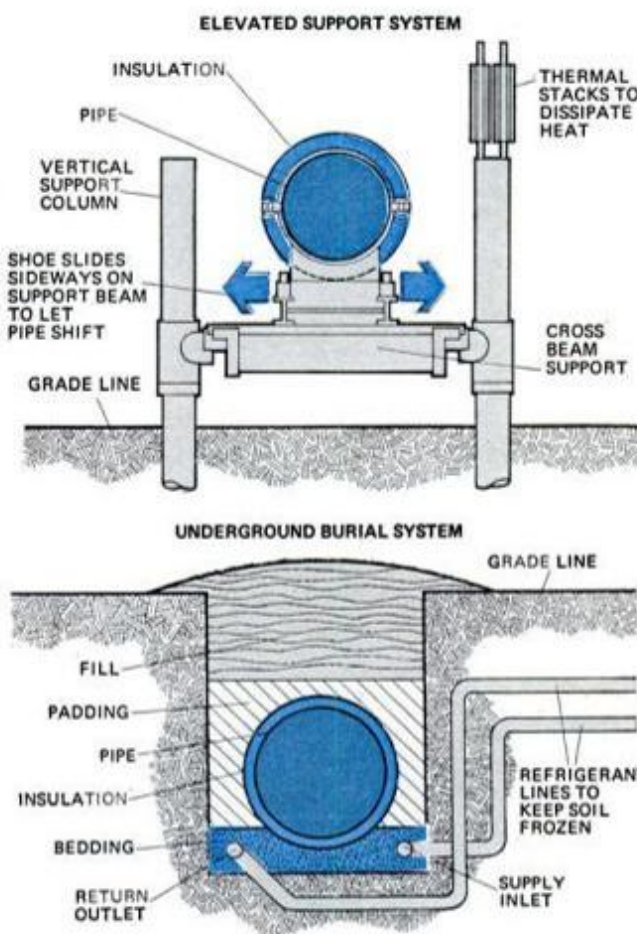
is the first ever to cross the Arctic Circle in Alaska.

Survival on the pipeline is something no one takes lightly. Newly arriving workers in recreational winter gear, such as snowmobile and ski suits, find they're practically undressed. Vapor-barrier boots, thermal underwear, insulated coveralls, hoods, face masks, waterproof waders and down parkas are basic necessities for staying alive. Even the protective hardhat helmets must be wool-lined for warmth. Camp bulletin boards carry notices warning about the dangers of hypothermia—"a rapid, progressive mental and physical collapse" that results from

exposure to cold, wind and exhaustion.

Helicopter pilots carry survival kits at all times, no matter how short the trip. The possibility of being caught in a sudden Arctic "white-out" is an ever present danger. This is a polar phenomenon that occurs when an overcast sky reflects the white of the snow, and ground and sky blend into a single, featureless blur. There is no visible horizon line—nothing to guide a pilot—and the only solution is to get down fast. One downed crew, stranded for two weeks in subzero weather, built an igloo and with food and candles managed to survive. Body heat and a single

(Please turn to page 176)



Two methods of installing pipeline are shown at left. Where permafrost prevents underground burial due to melting problems from oil's heat, pipe will be elevated on pairs of columns spaced 60 feet apart, with freely sliding shoes on cross beams to permit pipe to shift. Where pipe must be buried to preserve environment, cooling coils under it will keep ground from melting. Where soil is unfrozen, pipe can be buried without coils—the simplest, cheapest way. Author Norman Sklarewitz visited construction sites in Alaska for PM to bring readers this first-hand report.



Looking like rock, this exposed permafrost is actually frozen earth underlying much of northern Alaska to 2000 feet deep.



Working under tentlike plastic shelters to protect them from the intense Arctic cold, welders join sections of steel pipe.

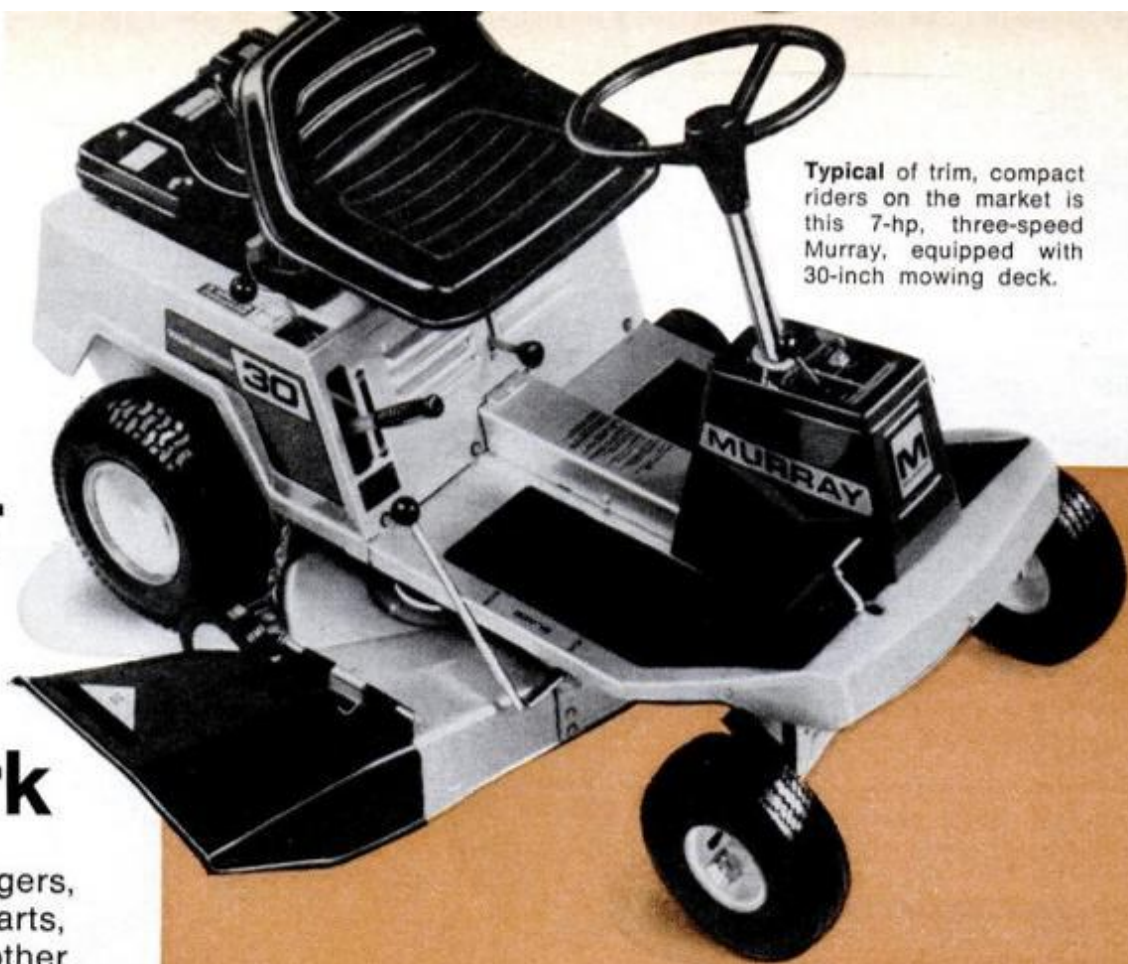


Air-inflated structure, named "Beluga" after whale it resembles, is used as temporary construction building at many sites.

Let your mower do the yardwork

Mulchers, grass baggers, lawn rollers, utility carts, snow throwers and other accessories make the 1975 riders versatile performers.

by Glenn Hensley



Typical of trim, compact riders on the market is this 7-hp, three-speed Murray, equipped with 30-inch mowing deck.

There was a time when the riding mower fulfilled its owner's expectations if it did a fair cutting job—not leaving too many bare scalps in its wake—and didn't stall too often. But a lot more is expected of today's machines.

New work-saving attachments add to the usefulness of the '75 riders. Among the many makes on the market you'll find all these included as options: leaf mulchers, snow blades, snow throwers, lawn sweepers, utility carts, lawn rollers, power sprayers, aerators, side-mounted grass hoppers, grass baggers, lawn vacuums, rotary spreader-seeders and dump carts.

If you acquire just a few add-ons, say a leaf mulcher, snow blade and dump cart, you'll find your mower is no longer a "lazy" machine, sitting idly in the garage between lawn mowings.

Of course, moving up to a rider will cost a few bucks. You can expect to pay from a minimum of \$450 to more than \$1000 for the basic mower. Attachments can run the bill up to whatever limit you set. But



A 6-hp engine provides ample power for Massey-Ferguson's new MF 626 mower. It has 26-inch cutter, adjustable up to height of 3¼ inches.



Rear-mounted grass catcher on John Deere Model 68 (above) makes it easy to trim around trees, near fences.

Toro offers line of accessory equipment for its three riders. All have mowers that cut a 25-inch swath.



A 500-pound-capacity cart is available as accessory for the John Deere riders. It has high-flotation tires.

The Wheel Horse A-65 (right) is an electric, powered by three 12-volt batteries. Unit has on-board charger.



Simplicity's 8-hp rider can be equipped with a five-bushel-capacity collection hopper for grass clippings or leaves.

Make/Model	HP	Engine location	Starting	Cutting width (inches)
Allis-Chalmers	405	Rear	Recoil	26
	508	Rear	Electric	30
AMF	1294	Rear	Recoil	26
	1291	Rear	Electric	30
	1292	Rear	Electric	30
	1260	Front	Recoil	26
	1261	Front	Electric	32
	1282	Front	Electric	36
	1281	Front	Electric	36
1288	10	Front	Electric	42
Ariens	830DE	Rear	Electric	30
	830E	Rear	Electric	30
	830R	Rear	Recoil	30 and 38
	630R	Rear	Recoil	30
	726E	Rear	Electric	26
	726R	Rear	Recoil	26
526R	5	Rear	Recoil	26
Bolens	828	Rear	Recoil	28
	829	Rear	Electric	28
Homelite	RE-5	Rear	Recoil	26
	RE-30	Rear	Recoil	30
	RE-8E	Rear	Electric	30
Huffy	H520	Front	Recoil	24
	H260	Front	Recoil	26
	H270	Front	Electric	26
	H350	Front	Recoil	32
	H360	Front	Electric	32
John Deere	66	Rear	Electric	30
	68	Rear	Electric	30 or 34
	90	Electric	-	34
Massey-Ferguson	MF626	Rear	Recoil	28
	MF832	Rear	Recoil	32
Murray	5-2053	Rear	Recoil	25
	5-2513	Rear	Recoil	25
	5-3013	Rear	Recoil	30
	5-3033	Rear	Electric	30
	5-3043	Rear	Recoil	30
	5-3063	Rear	Electric	30
	5-3233	Rear	Electric	32
Simplicity	3005	Rear	Rewind manual	26
	3008-2	Rear	Recoil	30
	3008-J	Rear	Electric	30
	3008	Front	Electric	36
Toro	56022	Rear	Recoil	25
	56027	Rear	Electric	25
	56033	Rear	Electric	25
Wheel Horse	A-80-R	Front	Recoil	32
	A-80-E	Front	Electric	32
	A-60	Electric	-	32
	A-65	Electric	-	36
	A-50	Rear	Electric	26
White	R-50	Rear	Recoil	26
	R-80	Rear	Electric	34
	T-800	Front	Electric	26
Yard-Man	3700	Rear	Recoil	25
	3720	Rear	Recoil	25
	3730	Rear	Electric	25
	3760	Rear	Recoil	32
	3770	Rear	Electric	32

the greatly increased usefulness of a rider with attachments generally makes the investment worthwhile.

Riding mowers are recommended for lawns larger than half an acre—a lawn smaller than that can be handled comfortably with a walk-behind machine.

If you are ready for a rider, here are some buying tips from Paul H. Silliman, a lawn and garden authority with the Homelite Co.:

■ If you insist on a lawn with a manicured look, make sure the mower has pneumatic tires. Semipneumatic and hard-rubber tires can leave ridges and tire impressions in a smooth lawn.

■ Be sure that the height of the mower pan can be adjusted from the operator's seat. Unless your lawn is as flat as a billiard table, different sections will require different cutting heights. It's a nuisance to have to

Accessories speed lawn clean-up chores



High-volume grass catcher, attached to any of three Homelite mowers, holds five bushels—about 75 pounds—of clippings.



Two standard 20-gallon garbage bags hold clippings collected in the Grass Bagger, which fits most mowers in Ariens line.

John Deere Electric 90 can be equipped with snow blade. Other accessories available include lawn sweeper and dump cart.



dismount each time you have to adjust the cutting height.

- Check size of the mower's gas tank, which can vary from two to five quarts in capacity. Tank size governs a machine's running time. (Remember, it can be dangerous to refuel a hot or running engine.)

- Be sure that the mower has a cutting width adequate for your lawn. Riding mowers are available with blades that cut widths from 25 to 36 inches. The bigger the blade, the shorter the cutting time.

- It's useful to have a mower with several forward speeds. You use a slow speed for thick grass and the faster speeds for well-manicured lawns.

In addition to greater versatility, the 1975 mowers are safer to use. Many machines are equipped with improved brakes, better-shielded engines and have gas-filler pipes located so that fuel won't spill on a hot muffler. Some machines have a pressure switch in the seat to kill the engine if the operator dismounts while the cutter is still engaged.

Safety standards for the industry are the concern of the Outdoor Power Equipment Institute in Washington, D.C. The Institute's seal—triangular in shape and bearing the letters OPEI—will be found on all machines approved for safety by the Institute. The seal assures the buyer that a model of the mower he purchases has been thoroughly tested by an independent lab.

In one test, nails are injected into the path of the blade while the engine is turning at full speed and the

mower is encircled by a marked wall to check angle of discharge. A low trajectory of the nails—or other potential projectiles you may run over while mowing—indicates a measure of protection against the danger of flying objects.

In another test, a probe resembling the human foot is inserted into the discharge chute. If the blade makes contact with the probe, the mower fails.

Structural integrity is tested by suddenly injecting a steel rod into the path of the blade of a mower running at full speed. There can be no failure that would be hazardous to operator or bystander.

The safety standard also requires a limited blade stopping time—with in seven seconds—and a splash shield



The Bolens 828 has interlocking safety switches hooked up to ignition, seat and brake. It's powered by 8-hp engine.

Yard-Man grass catcher has 75-pound capacity, can be used with any of three riding mowers in the company's line.





When the rear bagger on Toro rider (left) is filled, all you do is lift dump lever and unit discharges from the bottom. The bagger has a capacity of 3¾ bushels.

Drain gas, disconnect the battery, and this Homelite rider is set for storage in garage for the winter. The 8-hp machine takes up nine square feet of floor space.



or deflector to keep spilled gasoline from the muffler area.

Since outdoor power equipment is a source of noise pollution, OPEI standards restrict walk-behind mow-

ers to 92 decibels and riding mowers to 95.

Check for all these points when you shop for a mower. The list of machines included with this article

is not intended to be complete. Because of space limitations, some makes were omitted. In any event, the list should convince you of one thing: Your choice is wide. ★★★

You can build your own garden tractor from a kit

Why do some men choose to build a garden tractor from a kit? After assembling the 10-hp, gear-driven Heald Yard Bronc, I'd say a good-enough reason would be *for the fun of it*. The big thrill comes when you roll her out under her own power.

By doing the work yourself, you get a tractor of better than average quality for \$599.95. The heavy-gauge welded frame is completely rust-proofed and all parts are heavily plated. What's more, it's *your* tractor; you know what needs lubrication, how to make adjustments and how to install replacement parts when necessary.

The engine is shipped bolted to the frame. You merely hook up ignition wires and carburetor linkage. You work from a construction manual

Heald Yard Bronc is assembled in 113 steps. Author felt experience of building made him better able to service machine.



that's numbered to correspond to an illustrated assembly sheet.

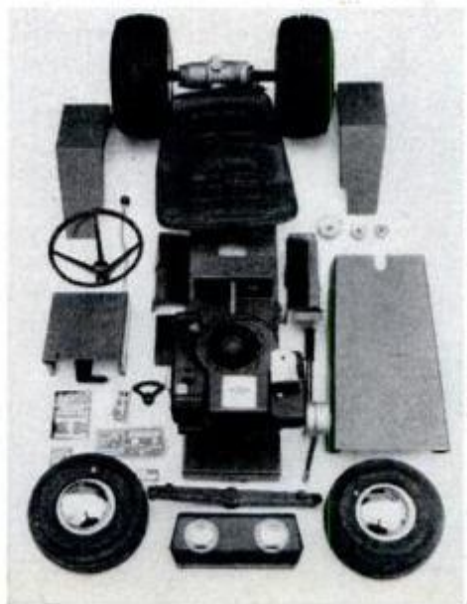
How long does the job take? It has been done in 10 man-hours, but I suspect that record was set by fellows at the factory who'd done it a dozen times. I took about 48 hours.

The tools needed for the job are pliers, screwdriver, Allen wrenches, a set of open-end or box wrenches, and a socket set with extension. We also recommend a soldering gun and snap-ring pliers.

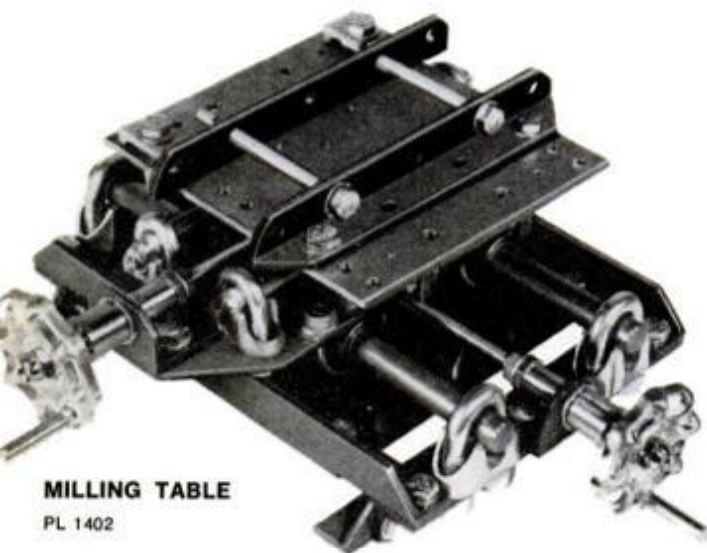
The 10-hp engine has plenty of power for the 36-inch, three-bladed rotary mower, the 36-inch snow-thrasher and the 42-inch dozer blade

that are Yard Bronc accessories. The tractor has one design fault that's obvious when you're seated with your right foot on the brake-clutch pedal and the left on the footrest. Both legs rub against sharp metal. The right against the PTO clutch segment; the left against the lift lever segment. Both need to be padded to prevent bruised shins.

But when you build your own tractor it's your baby—so you're quick to overlook its faults and make much of its good qualities. It's that way with the Yard Bronc from Kits by Heald, Box 1148, Benton Harbor, Mich. 49022.—*Jim Liston*.



Three shop tools you can build for very little money



MILLING TABLE
PL 1402

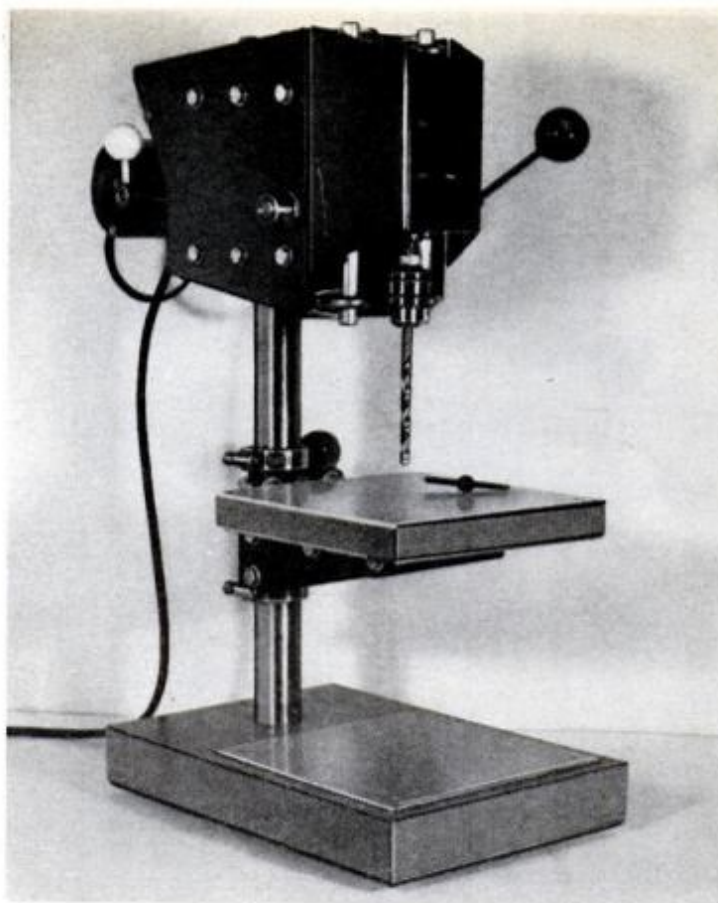
An ideal machine for model builders, electronic hobbyists and camera buffs. Built entirely of parts found in hardware, hobby and plumbing supply stores, this tool costs about \$30 to build from scratch.

BORING MACHINE
PL 1400

Since its appearance in Aug. '74, scores of readers have requested how-to-build plans for this pedal-operated horizontal boring machine. Now plans are available.



BORING MACHINE: Charles Kastl
DRILL PRESS AND MILLING TABLE: Richard F. Cutler



DRILL PRESS PL 1401

Drill press features a ball-bearing spindle, large adjustable worktable and good torque for drilling up to its 1/4-in. capacity. All parts are obtainable from hardware and hobby shops. Cost to build is about \$70.

In these days of soaring prices and eroding dollars, PM's editors are pleased to present three great shop machines that you can build yourself. The prototype tools shown on this page were created at costs of one-third to half the price of what their commercial counterparts currently sell for. Though they're admittedly not projects for beginners, anyone who has the time, inclination and skills can create all three tools at very big savings.

The boring machine is offered as a result of reader interest. Since the tool's appearance in PM in August '74 (see *A Modern Workshop in the Old West*, page 154), scores of letters asking for how-to-build plans have been received. We contacted Charles Kastl of Phoenix, Ariz., who designed and built the machine, and asked him if he would prepare the plans so that our readers could duplicate his setup. Those plans are now being offered for the first time.

His fellow Arizonian, Dick Cutler, did the drawings for the milling table and drill press after building the prototypes shown. Cutler says that "for pure pride of accomplishment, few things match the feeling you get when using a good tool that you've built yourself."

PM's editors would add: For a satisfied feeling when building a shop project, there are few things that match working from a clear set of plans. To order your set or sets see below. ★★

PM PLANS OFFER

Each set of plans includes detailed drawings, separate instruction sheets and materials list. Price is \$6.95 per set or, three sets for \$15.85 (postpaid in both cases). Make certain you specify plan number when ordering. Checks and money orders should be made payable to Popular Mechanics and mailed to PM Plans Library, Dept. D5, Box 1014, Radio City, N.Y. 10019. Please allow two or three weeks for delivery.

No-gas, no-noise power boats

An underwater electric fan can remove sound, smell and fuel costs from your boating.

by William and Ellen Hartley

Boating without buying gasoline—that's the special appeal of craft that cruise silently away from the Branson Boat Co. of Port Salerno, Fla. Glide along for up to 100 miles with one of its 24-foot catamarans before you need to pull over, plug in and recharge again.

Norm Branson, an ultrasonic specialist with General Electric in Schenectady, N.Y., built his first electric boat during the 1940s. "I fixed a marine battery in a wooden boat," Branson remembers, "and used an ordinary permanent magnet motor. It wasn't much for a design, but it would fit any skiff and was great for trolling the local lakes."

Years later in the early 1960s when Branson settled on a quiet Florida bay called Manatee Pocket, he went back to his old hobby and started designing and building electric boats again, using narrow fiberglass displacement hulls. By 1972, he found other people wanted to buy his custom-built craft and started selling his 18-foot Electra.

The two heavy-duty marine batteries powering the Electra-18 are housed in a box keel and give the boat unusual stability with their combined weight of 400 pounds as ballast. They deliver 272 ampere hours at 24 volts, and will drive the $\frac{3}{4}$ -hp permanent magnet motor, also mounted in the keel, for about 30 miles at 5 mph. A solid-state speed control slows the boat to less than 1 mph, and Electra can extend its range up to about 12 hours at 3 mph before recharging from any 115-volt, 60-cycle outlet. The Electra-18 has a five-foot, six-inch beam, draft of one foot, weighs approximately 1100 pounds with bat-



Gliding along without fumes or vibration, Branson Boat Co.'s Electra-30 (above) can cruise 50 miles at 5 knots, 200 at 3. Electra-18 (right) has 36-mile range.

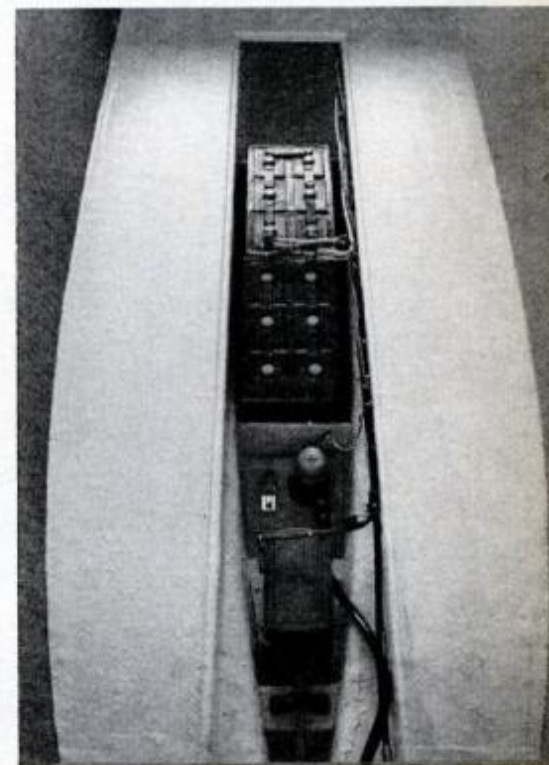


teries, costs about \$8000 built to order and ready to go.

Norm Branson has also designed 24 and 30-foot Electra models, an electric canoe, and an impressive 24-foot Electra-Cat with propellers in each of the twin catamaran hulls, providing a range of 30 miles at 6 mph, or 100 miles at 4. At some future date, Branson has considered marketing the catamaran molded hulls and electrical components as a kit.

Though originally designed for the quiet cruising and trolling of sheltered lakes and streams, Branson's Electra-30 has proved seaworthy in open saltwater as well. Anyone with mechanical ability, Branson believes, could build an electric boat, but it has taken him years to find the electric switches, components and accessories that can stand up to the corrosion and electrolysis caused by salt air and saltwater. His heavy-duty bronze propellers and rudders are sheltered in the long keel, and motor and batteries are protected by automatic bilge pumps, but any iron bearings, fastenings and electrical connections would be susceptible to rust.

Electric boats are not a new invention. The Electric Launch Co. (ELCO) built 55 in 1892 for the Chicago World's Columbian Exposition, and Duffield Marine in Costa Mesa, Calif., is another source for them today. The Morgans and Vanderbilts used to consider electrics the perfect family picnic boat. It looks as if they're still right. ★ ★ ★



Power-packed keel of Electras provides both push and ballast. Batteries at top, automatic bilge pump plus switch, electric permanent magnet motor, shaft, fit neatly.

PM OWNERS REPORT: CHRYSLER CORDOBA

How well has Chrysler packaged prestige in its small and stylish new car?

A nationwide survey based on 1,000,000 owner-driven miles

by Michael Lamm WEST COAST EDITOR

The quality of the car is just fantastic.

Incompletely assembled

My real complaints are with the dealer.



I think it's overpriced.

Workmanship is just beautiful inside and out.

No mechanical trouble not yet, but I'm waiting!

It's less roomy but then it's a sportier car than a family car.

I feel good in it

This car was bought on impulse; had I driven it more, I'm sure I would not have bought it.

You'd be right in calling it a small Chrysler, but it's by no means a small car. If anything, it's an intermediate, sharing the 115-inch wheelbase of Dodge's Charger and Coronet and Plymouth's Fury.

Chrysler sales people have an interesting theory that goes something like this: They feel that small-car owners move up to intermediates as their families grow. Owners of large cars trade down to intermediates as the price of gasoline goes up. So eventually everyone drives an intermediate. Which is part of the reason Chrysler decided to bring out a nameplate in that category.

The Cordoba shares its body, panel for panel, with the 1975 Dodge Charger. Except for trim and interior differences—plus about \$150 more on its showroom sticker—the Cordoba is the Charger (or vice-versa). It's hard for most people, even auto buffs, to tell the difference without reading the nameplate. As it happens, both cars use the same engines, power trains and mechanical components. Engine choice includes V8s of 318, 360, and 400 cu. in., the 360 two-barrel being standard with a 2.45 rear-axle ratio.

What do owners think of their new Cordobas? Our summary chart (page 86) gives the consensus. We queried 1000 Cordoba owners, and the following comments, representing over a million miles of driving, give a fair cross section of responses.

A 27-year-old Roanoke schoolteacher notes, "I wasn't going to trade cars until I saw the Cordoba. I'm completely satisfied. Ride, silence, handling, looks and styling are all great, and performance is much better than I expected. The only trouble so far was a defective cruise control. The dealer lent me a new car to use while they were fixing mine, and my Cordoba was ready when they promised it."

Writes a New Jersey postmaster: "Have owned Chrysler cars since 1955, and I wanted an intermediate this time. It has more power than the Granada, which I also tried. I find that the Cordoba's power steering does not function as easily as our 1967 Chrysler's. But that might be remedied at our first servicing. I especially like the way the Cordoba holds the road at all speeds. It rides smoothly and quietly, but most of all it's a beautiful-looking car."

Here's a Texas rancher: "I was sold by the Cordoba's styling and traditional Chrysler quality. However, I feel the workmanship on this car is poor. The digital clock had to be changed three times. I also had problems with

It's the dealer who has to make right all things that were made wrong at the factory.

The latest word game is naming the new "small" cars. Next month, "international in size" joins the list to "define" the new "small" Cadillac.

Many owners hadn't realized the Cordoba/Charger similarity, and weren't too happy when they found out.

Chrysler's move to a smaller car is partly in anticipation of Cadillac's intermediate.

Most owners like Cordoba's performance. Ironically, "economy" 318 V8 option gets same mileage as standard 360.

The rotten egg smell sounds funny but is deadly serious. Sulfate emissions from catalytic converters may be a health hazard. The Environmental Protection Agency (EPA) is investigating.

door alignment, steering-wheel alignment, trim alignment, wind noise, poor sealing in the muffler, a torn front seat, water in the parking light, speedometer noise, and a few other things. I repaired some of these items myself, and I had to touch up the trim where the dealer scratched it while installing the clock. If I were buying a car today, I'd get an Eldorado. The Cordoba is comfortable, but the rear seat needs to be larger, and factory quality control plus dealer service needs improving."

From a New York electrician, "Our Cordoba serves both as family transportation and as a drive-to-work car for my wife and myself. I drive it primarily on a 25-mile round trip plus short runs in town. I firmly believe that the intermediate-sized car is large enough for any purpose. This car gives us that size plus true luxury for traveling. Its predecessor was a 1973 Plymouth Road Runner 318. The Cordoba equals the Road Runner in gas mileage—20 mpg on trips and 16-17 mpg around town. It's better riding and in roadability. I rate workmanship as good to excellent, and I've done business with the same agency many years. They've always given prompt service, even on warranty, and have allowed good trade-in value."

Then the following comments by a 21-year-old copy machine company employee in Webster, N.Y.: "Looks and elegance sold me the car, and the only problem in 3480 miles was too high an idle speed, which the dealer adjusted in a few minutes. This dealer is tops—better than the MG and Olds dealers I've dealt with before. I'm sold on the looks—very sleek—and the power: zero to 80 mph in about 15 seconds. No kidding, it handles like a sports car. Only two complaints: The catalytic converter smells like rotten eggs, and my floor shifter isn't locking in park. Workmanship is of the highest quality."

A 33-year-old Michigan broadcaster puts it this way. "I looked, drove it, and loved everything about it. I might add that I wasn't in the market for a new car. This one, for its size, has the quality of a much bigger car, and the elegance. I had Lincolns for 10 years, and this car rides just as nicely, but quieter. All it needs is more legroom and headroom in the back seat."

A Kansas City attorney, not so pleased, said, "I had thought that by buying a smaller car I would save on gasoline, but this one uses more. The engine has diesel since new, and when it does, it puts out a terrible odor. I've

had it back many times, but the dealer cannot seem to fix it. I also find both front and rear seats uncomfortable, especially with so little room in back."

Counters an Illinois sheet-metal technician: "I was surprised at the Cordoba's ride. It gives a soft, smooth ride without that jelly-bowl feeling so many other luxury cars have. The solid

Cordoba owners tell about their cars on facing page. From top left (clockwise) are remarks from the following: Indiana warehouseman, Illinois union representative, Kansas clerk, Michigan farmer, Illinois letter carrier, Alabama race driver and maintenance superintendent, New York man, Michigan sales vice president, New Jersey teacher.





Fuel economy for the 318 and 360-cu.-in. V8 engines is almost the same, averaging about 15 mpg.

suspension and 15-inch radial tires are a terrific asset. And the split front bench seat we chose, with the folding central armrest, affords plenty of room for six passengers."

An Illinois computer operator: "Handles and performs very well, with good gas mileage—up to 19 mpg. I've had more double-takes, compliments and comments on how beautiful and different this car is! The only thing I'd like to see changed is the hideaway wipers. They're a hazard and should be eliminated from all cars."

A Virginia textile mill manager confesses, "I think all American cars are good, so I buy strictly for looks. The Cordoba combines good appearance, a solid ride and good gas mileage. The only thing wrong is the pickup, which is probably remedied by the 400-c.i.d. engine (mine is the 360 two-barrel). But you can't have it both ways."

"People say it's a nice car but overpriced," observes a Chicago salesman, "but I disagree. I feel Chrysler has, for the first time, offered an intermediate with as much style and class as a \$12,000 auto. I'm glad the price is a little high—that way I can maintain a certain kind of individuality. I used to drive a Cadillac Sedan de Ville, but I'll never buy another one, because it seems everyone has one."

From a Massachusetts salesman: "It needs a bigger trunk. I put samples back there, and there's not enough room. What I especially like

Lots of praise for Cordoba's combination of good ride and fleet-footed handling.

Most owners know that the back seat is for short trips or kids only.

He doesn't mind the price so long as he doesn't meet himself at every red light.

Trunk space would be better if the spare tire could be better located.



Cordoba trunk came in for much criticism from the owners: it's too small and spare gets in the way.

about the Cordoba is that it looks so good. It also holds the road well when taking curves, and it's a solid all-around car."

And a Wisconsin librarian whispers, "We used to have a Lincoln Mark III; couldn't see paying \$12,000 for a new one; liked the Cordoba's interior especially. It's not quite the car the Lincoln was—little flaws in the paint and slightly wavy side metal. But very comfortable in front and comfortable enough in back. Still, the trunk doesn't fit well, nor the hood."

Suggests a Phoenix computer analyst: "I would like disc brakes front and rear; also the spare could be repositioned for better space utilization. I bought the car on the basis of looks plus Chrysler's reputation for engineering. Mechanically the quality is very good, but the paint and vinyl top need some touching up. Comfort in the front seat is on a par with my previous Olds 98, and the back seat isn't bad for shorter trips. If Chrysler would only learn that excellent design must be executed beyond the engine and running gear."

Finally, a parting pat on the back from a Jersey materials specialist. "Chrysler's warranty is the best to date and covered my Cordoba's cracked brake drum. More than that, though, I believe the Cordoba is the best car to come out in 50 years, bar none. Other makers should look over the Cordoba so they, too, can learn how to make great cars." ★ ★ ★

Summary of 1975 Chrysler Cordoba Owners Reports*

Total miles driven 1,191,561

Average miles per gallon:
 318-cu.-in. V8: Local driving . . . 13.7
 Long trips 16.9
 360-cu.-in. V8: Local driving . . . 13.5
 Long trips 17.2
 400-cu.-in. V8: Local driving . . . 11.9
 Long trips 15.1

Engines:
 318-cu.-in. V8 21.3%
 360-cu.-in. V8 70.5
 400-cu.-in. V8 8.2

Why the Cordoba?
 Styling 78.8%
 Size 14.9
 Past experience 7.8
 Handling 6.9
 Economy 6.6

Specific likes:
 Styling 69.3%

Handling 48.4
 Comfort 32.0
 Economy 22.0
 Performance 10.6

Specific dislikes:
 Trunk too small 14.5%
 Poor gas mileage 11.7
 Workmanship 9.1
 Dealer service 8.8
 Not enough headroom 6.3
 Not enough legroom 6.3

What changes would you like?
 Bigger trunk 20.1%
 More legroom 13.5
 More headroom 8.0
 Better workmanship 6.2
 Tilt steering wheel 5.9

Number of vehicles owned:
 Cordoba only 47.5%
 Two cars 40.5

Three cars 8.5
 Four or more cars 3.5
Other cars owned:
 Plymouth 21.0%
 Chevrolet 18.2
 Dodge 14.2
 Chrysler 13.1
 Ford 8.6
 Volkswagen 6.8

Comfort opinion:
 Good to excellent 79.7%
 Average to poor 15.2

Workmanship opinion:
 Good to excellent 70.4%
 Average to poor 26.9

Dealer service opinion:
 Good to excellent 77.1%
 Average to poor 22.9

Had any mechanical trouble?
 No 56.9%
 Yes 43.1

Type of trouble:
 Electrical 17.0%
 Carburetion 11.6
 Oil leaks 6.1
 Transmission 5.4
 Speedometer cable 5.4

Did you repair it yourself?
 No 98.6%
 Yes 1.4%

Dealer repairs satisfactory?
 Yes 66.4%
 No 33.6

Age distribution of owners:
 15-29 years 31.6%
 30-49 years 43.0
 50-plus 25.2

Would you buy another Cordoba?
 Yes 83.8%
 No 16.2

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

The plane that makes anyone a pilot

by Sheldon M. Gallager
EXECUTIVE EDITOR

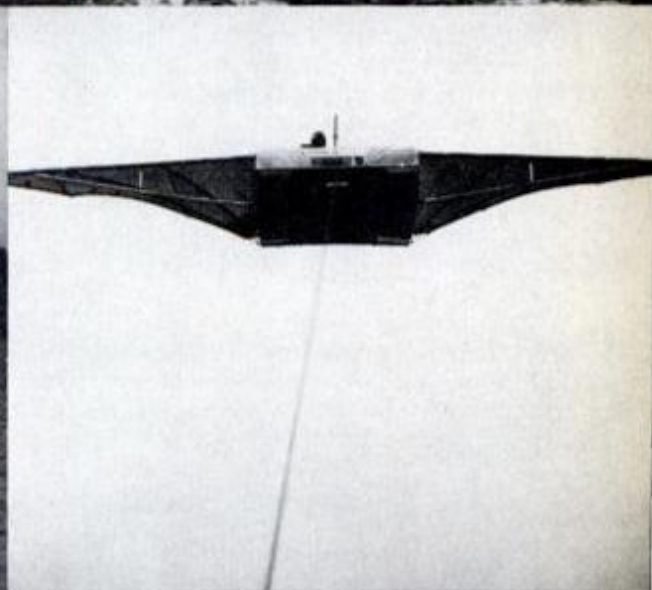
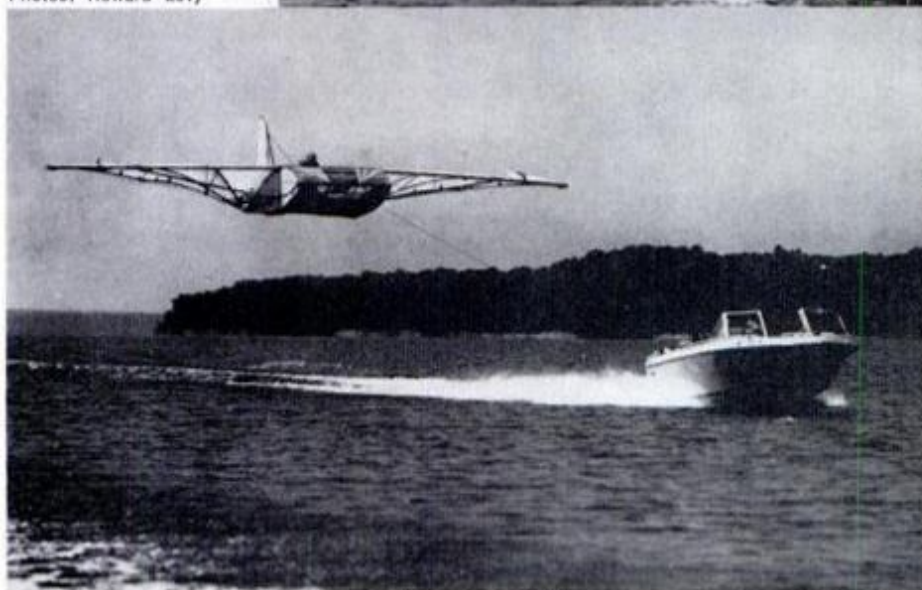
PM tests a homebuilt glider you can legally fly without a license. All you need is a towboat for fabulous fun.

There was a roaring rush of water as the twin floats pounded over a slight chop. I was sitting in a small cockpit between the floats only inches above the surface and could feel the slap of waves against the underside of the fuselage. It was scary. As my speed increased, a sense of apprehension began to creep over me—was I an idiot trying to fly something I hadn't even seen before?

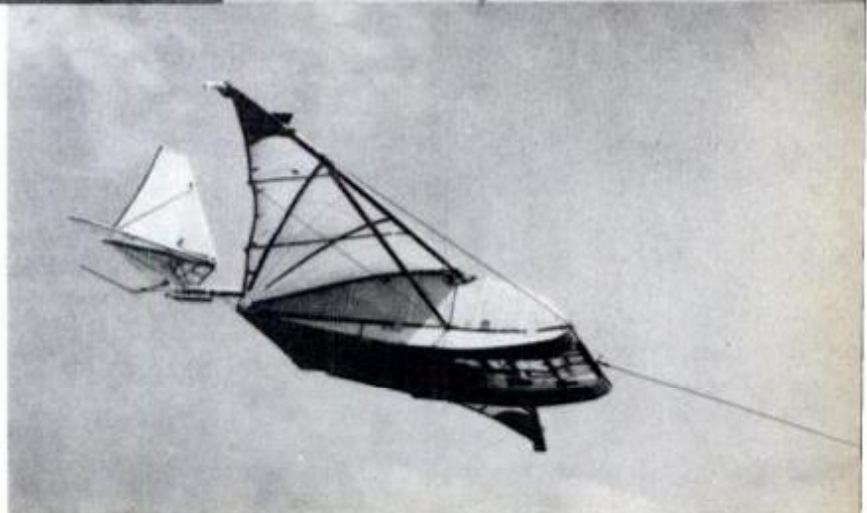
It was now or never. I hauled back cautiously on the control stick and then it happened—one of the most exciting experiences of my life. The nose came up, the rush of water died away and there was a strange, eerie silence. Looking down at the rapidly receding water, I suddenly realized I was airborne. Flying. Actually *fly-*



Photos: Howard Levy



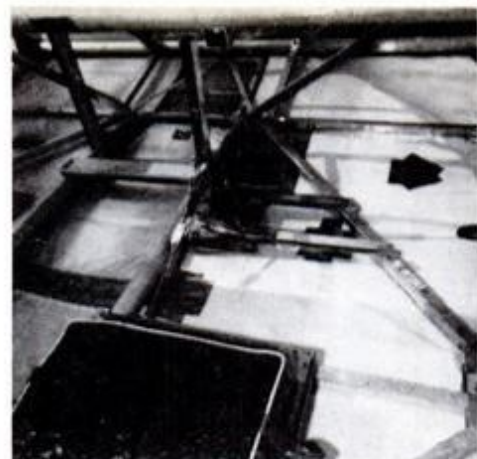
Author in first test flight above proves that even an inexperienced pilot can handle the Sea Sprite tow glider with surprising ease. Lift-off (top photo) begins at about 25 mph. As boat speed increases, ship climbs rapidly to an altitude of 50 to 60 feet (center, right), then swings smartly off in a gentle banking turn (lower right). Ideal cruising speed is between 35 and 40 mph, though you can have plenty of fun and action at lower speeds with towboats of moderate power.





With wings and tail folded, glider can be easily trailered to and from water. Note teardrop shape of fuselage—itsself an airfoil for good aerodynamic characteristics.

Simple one-piece tail pivots up and down as unit, functioning as elevator without need for separate elevator panels. Vertical stabilizer is fixed, having no rudder.



Cockpit view shows single, centered control stick just ahead of seat cushion. It moves sideways for aileron control, forward and backward for elevator control.

ing! Alone in the air by myself for the first time. The sensation was almost unbelievable.

The craft I was flight-testing for PM represents a brand-new concept in water sports—a small, one-man glider designed to be towed behind a speedboat. Called the Sea Sprite, it's the brainchild of aircraft designer Thomas H. Purcell of Raleigh, N. C. What's intriguing about it is that, under FAA rules, it can be legally flown without a pilot's license so long as you remain attached to your towboat and stay below 200 feet. Thus anyone can enjoy the fun and thrills of flying without a license and at relatively little cost. You can build the Sea Sprite from Tom's plans for about \$400.

That anyone can fly it is what I was there to prove—or try to. I've had some copilot experience in engined craft, but have never flown

solo or even been in a glider. So as far as this particular bird was concerned, I qualified as a genuine novice. I could tell Tom agreed because he had his fingers crossed as I climbed in the cockpit and he may have been mumbling a silent prayer. I was flying his prototype—the only one he had. We had already wasted two days waiting for decent weather with a hired chase plane standing by for aerial photography. So the stage was set for what could be a very costly misadventure if anything went wrong. The old butterflies-in-the-stomach were working overtime.

Back upstairs, I was gloating over my successful takeoff when it suddenly occurred to me that what goes up must come down. It was time for my first landing, and that earlier apprehension began to return. I tried to remember everything Tom had told me: Don't dive her or you'll come in

too fast; don't pull up too sharply or you may stall out; don't drop a wing near the water or it may dig in and snap off.

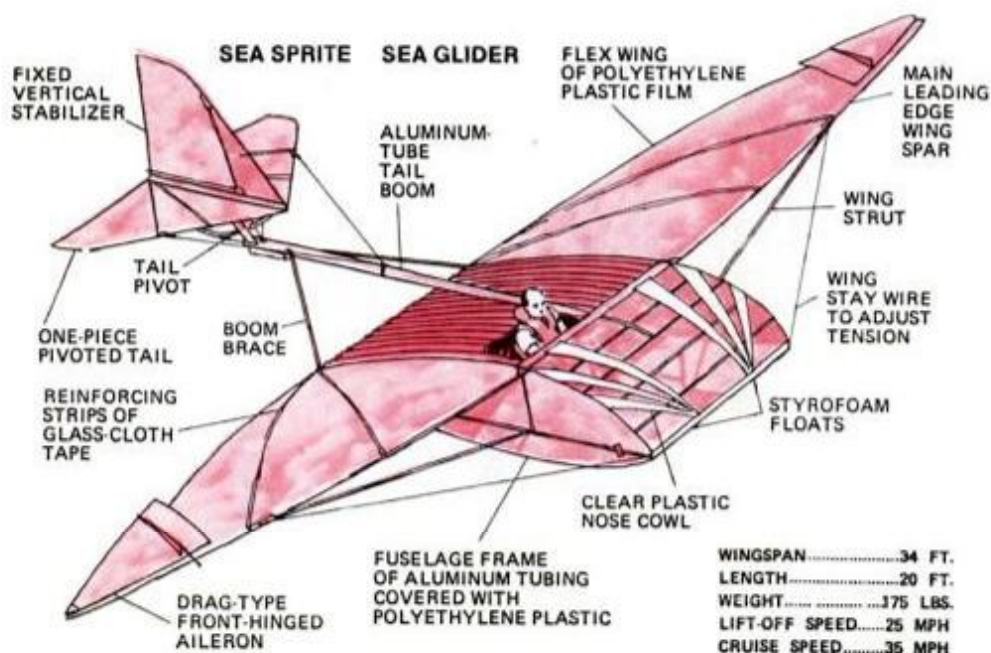
I eased the nose down and signaled the towboat to reduce speed. The water started coming up—a little fast, I thought—but the approach was smooth and felt good. I was right on target until the last minute when a gusty crosswind caught the craft and swung her sideways. I was crabbing, with no time or altitude left to straighten out. For a moment, I had a fearful vision of what might happen when the floats hit the water at an angle. Would they dig in and flip me? To my surprise, the glider settled gently into the water and immediately swiveled around to track perfectly behind the towboat.

Later, Tom explained he had deliberately designed it to be self-tracking, knowing that pilots would occasionally get caught in a crab landing. This is just one of several features that make the Sea Sprite safe, easy and fun to fly.

Basically, the craft consists of a tubular aluminum framework covered with a "skin" of polyethylene plastic film. This makes it surprisingly light for its size—only 175 pounds. Overall length is 20 feet, the wingspan 34. The fuselage section is supported on floats carved from Styrofoam blocks. The wings are flexible and are merely pieces of polyethylene attached to leading-edge spars with their trailing edges held taut by stay wires. At rest they droop, but in flight they billow out and fill with air, providing tremendous lift—like an umbrella caught in a stiff wind. Wings and tail fold for easy trailering of the craft to and from water.

Several clever touches keep con-

(Please turn to page 154)





Ready for test flight, author checks out glider's controls. Correct trim adjustment and stay-wire tension are important for proper lift, stability and easy handling.

Wingtip allerons work on "drag" principle. As one is raised, it causes wing on its side to slow slightly because of air resistance, forcing ship to bank that way.



Weighing only 175 pounds, glider is readily carried into and out of water by two persons. Air view below, shot from plane, shows what it's like to soar 60 feet high.





Air horn by Marchal, \$33.



Dashboard by Accessory Distributors, \$33.

Aluminum rear sprocket by Circle Industries, \$13.



Bolt-ons for your bike

By Bill Hartford AUTO EDITOR

Run up the revs and lay it into the next sweeping bend. You've got fuel for 200 more miles, a fork to soak up the shocks and you're looking good! There's more to your machine than they ever saw at the factory. You may have thought your showroom stock motorcycle was pretty exciting, but when you add these accessories, you'll have a bike that'll really give you a run for your money.

Comfort, appearance, performance and safety accessories are available at all motorcycle dealers and from outfitters like Outrider Accessories, Inc., where we assembled those shown here.

See what a few fine touches can do to increase your riding pleasure. ★★★

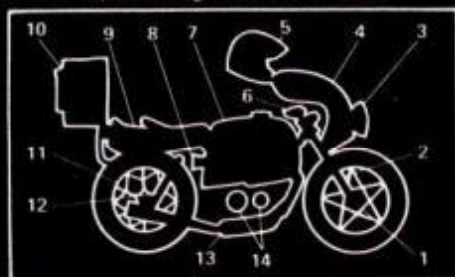
Photos: Ben Rose
Producer: Irv Dolin

1. Cast magnesium "star mag" wheel by Yamaha, \$110.
2. Road-race forks by Ceriani, \$180.
3. Quartz-halogen headlight by Marchal, \$25.
4. Quarter cafe fairing by Read-Titan, \$75.
5. Don't forget a helmet: Arai RX-7, \$60.
6. Clip-on handlebars, grips, levers by Tommaselli, \$56.
7. Touring tank by Read-Titan, \$90.
8. Velocity stack by Beck-Arnley, \$5.
9. Touring saddle by Custom Contour Seats, \$180.
10. Rider rack by Whitco, \$50.
11. Cast magnesium "snowflake" wheel by Kimtab, \$155.
12. Shocks by Ceriani, \$50 pair.
13. Exhaust system by Bassani, \$140.
14. Decorative clutch, points and dyno covers replace originals, \$10 to \$25.

Foot pegs by Accessory Distributors, \$12 pair.

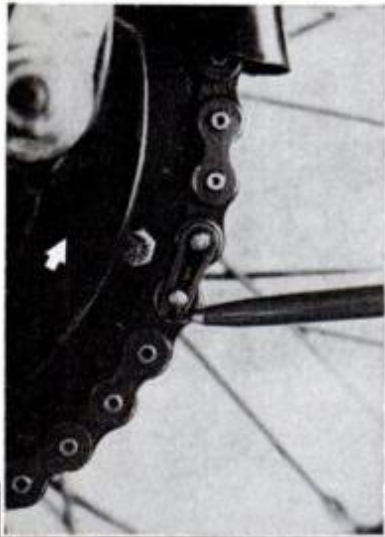


Case-hardened chain, Campbell, \$30, and padlock by American Lock, \$35.

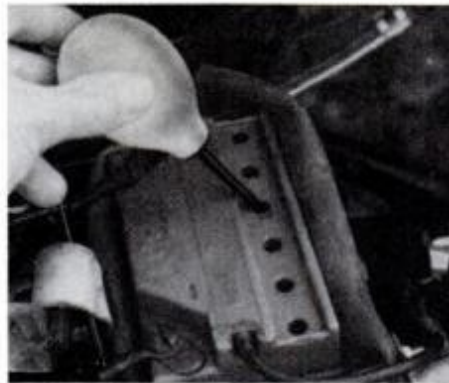


Spring checklist for your motorcycle

by William Hampton



Spring clip on master link should have open end trailing (arrow shows direction of chain travel).



Top off battery with distilled water, wrap old inner tube around it to absorb riding vibrations.



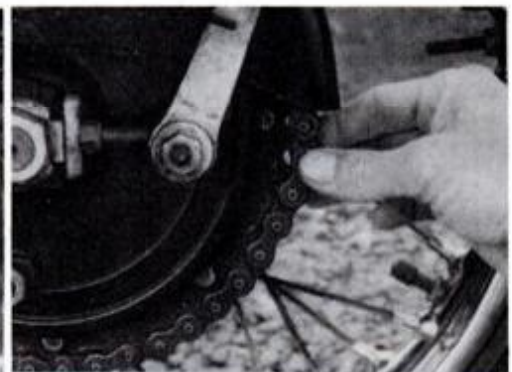
Drain oil from engine after it's at operating temperature. Paper-towel tube prevents splashing.



Chain tension is checked midway between engine and rear sprocket.



When lubricating chain with nozzled applicator, place tip against the sprocket so oil runs down to the linkplates.



Chain wear can be checked quickly by pulling the chain off the rear sprocket teeth at the axle level.

A thorough cleaning and polishing of your motorcycle is usually a springtime labor of love—and like love it comes naturally. But for the tougher nut-and-bolt adjustments, you need a checklist. Here's a list which, if followed like a road map, will assure your making all the necessary checks. Working from front to back, there are six major areas with subassemblies, which should command your attention.

☐ Start at the front-wheel assembly. Check air pressure of the tire. Look for breaks in tread and side walls. How about spokes? Tighten loose ones.

Grasp the front wheel with both hands and shake it to detect worn or loose wheel bearings.

Take a wrench to the axle or axle-cap nuts to make sure they're tight. Fender braces tight? Check these, too.

With your bike on the centerstand, squat down in front of the wheel and shake the fork legs forward and backward. Any play in the fork-leg bushings and/or steering-head bearings will be noticeable.

If a drum brake is fitted, make sure the cable from the handlebar lever is securely attached to the brake's cam lever. If it's a disc brake, make sure the hose and line connections are tight.

☐ Now check out the handlebar assembly. Lubricate the cables to the clutch, front brake and throttle. For convenience, use one of the injector-type lubricators. Use the clutch cable adjuster so that about 1/8-inch of cable is exposed near the end of the handlebar lever before the clutch plates start to separate.

Adjust front-brake cable (drum brake) so that the hand lever moves about a third of its travel before the

brake bites. Make sure the throttle cable doesn't bind.

If you're sitting on the seat, you can determine play in the steering-head bearings another way: Apply the front brake and place the fingertips of your left hand over the gap between the steering head and the bearing cap. Now rock the bike forward and backward. If there's any excess play, you'll feel it with your fingertips. If you have to tighten up the bearing cap, don't overdo it; the fork should turn easily from side to side.

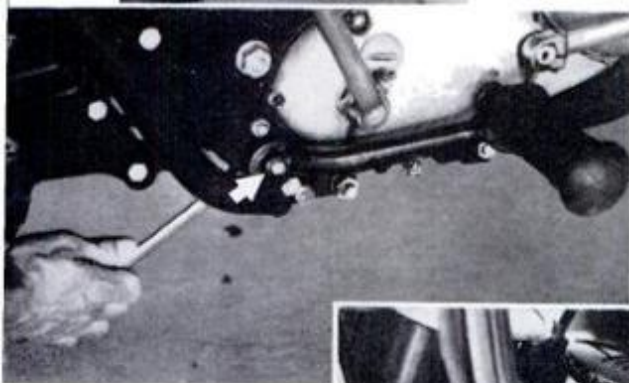
Check the wiring harness where it goes around the steering head. Inspect all lights, switches, wiring and snap connectors.

☐ Check your battery, too. Unless you've been running your bike, an inactive battery discharges quickly. If it needs a boost, use low-ampere charging (1-3 amps.).



Control-lever screw should be tightened so that lever has minimum sideplay without binding when it's squeezed. As lever is squeezed back, check for frayed cable strands at cable-end fitting.

Rear-wheel alignment can be checked by measuring distance from axle to swing-arm pivot on both sides of the motorcycle.



Footrest mountings must be tight. Check all of them periodically.

Steering-head worn or loose bearings can be detected by placing fingers over gap between bearing cap and steering head. Apply front brake, rock bike and feel play at gap (arrow).



Wheel-bearing wear and wear of swing-arm bushings can be detected by grasping the rear wheel on both sides and shaking it.



Play in fork-leg bushings and/or steering-head bearings can be detected by shaking fork legs.

Drain the gas tank and carburetor. If the bike has sat around awhile, the carburetor may need cleaning.

Check out the various nuts and bolts in the engine area. Pay particular attention to the engine mounts, head stay and upper-frame tube. If they're loose, they'll really give your bike the shakes.

Be sure to use a torque wrench on the alloy cylinder head. Don't overlook the footrest mounts.

Drain the main oil supply and replenish with fresh oil. The same goes for the gearbox and primary chain-case reservoirs, if your bike has them. You might change oil in fork legs, too. Don't overlook grease fittings.

Inspect the rear wheel/tire assembly the same as you did the front wheel/tire. If you shake the rear wheel hard enough, you'll also be able to tell if the swing-arm bushings are worn. Adjust and lubricate.

Chain play (up and down movement) is determined midway between the gearbox and rear-wheel sprockets, at the chain's point of maximum tension. If both tires are on the ground, roll the bike backward or forward until the point of maximum tension can be found. With your weight on the seat, allow at least $\frac{3}{4}$ -inch play. If the bike is on the centerstand so the rear wheel is off the ground, allow about $1\frac{1}{4}$ to $1\frac{1}{2}$ -inch play. With weight off the rear tire, the chain "relaxes" more, so allowance must be made. When adjusting the chain, turn each wheel adjuster an equal number of turns or "flats."

Lubrication: A dry chain wears faster and robs power from the engine. A few tips about lubrication: Never apply the lube onto the middle areas of the rollers; it'll never do any good there. Instead apply it to the edges of the linkplates, so it can find

its way down into the areas between the pins/bushings/rollers.

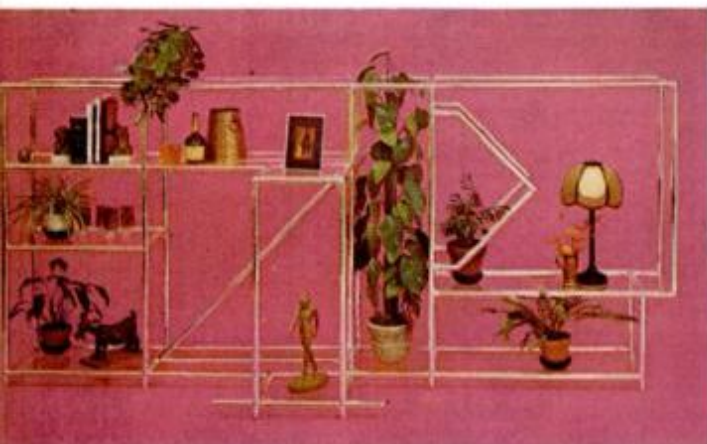
An adequately lubricated chain also absorbs shock, helping to make the bike run more smoothly.

You can quickly test for chain wear by grasping the chain at axle height and pulling it off the sprocket teeth. If it lifts off more than two-thirds the height of the teeth, replace it.

Look at the rear-wheel sprocket. If its teeth are hooked, pointed or, worse yet, worn to nubs, replace the sprocket. The gearbox sprocket will fare worse than the rear-wheel sprocket, because it's the driving member. It's usually a good idea to replace both sprockets together.

Moreover, never run a new chain with worn sprockets and vice versa.

Don't forget to tune the carburetor, set the ignition timing and adjust the valves to complete the spring-time check of your machine. ★★★



Swank furniture from slip-together tubing

Virtually any shape you want can be made with this slip-together tubing that looks like metal but is really metallized plastic. It can be cut easily and joined with matching connectors to form contemporary supports for shelves, tables, other furniture. Mirron 1¼-inch tubing comes in 4-foot lengths in chrome, gold, brass and five colors. For nearest dealer, write Thermoplastic Processes, Valley Rd., Stirling, N.J. 07980.

New water-sport thrills: Seagoing 'motorcycle' skims waves at 40 mph

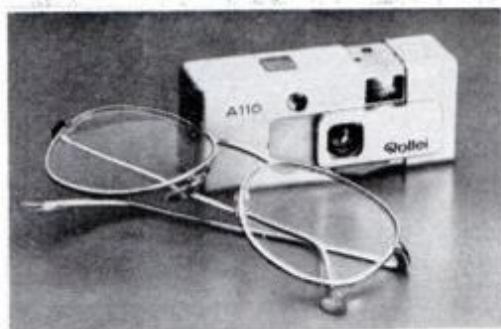
Riding the waves on a seagoing bucking bronco may become a wild new water sport if this Hydrobike catches on. Handling more like a waterborne motorcycle than conventional speedboat, the unusual craft is designed to take outboard engines from 15 to 25 hp and is capable of speeds up to 40 mph. While machines of this type aren't new in concept, this one sports a special feature—as speed increases, it rises almost completely out of the water, supported on hydrofoil "wings" near the stern. The foils permit higher top speeds as well as smoother riding even in choppy water since the hull doesn't touch the surface. They also make possible exciting climbing, diving and banking maneuvers. The Hydrobike was developed by aerospace engineer William Peschel of Venice, Calif. He hopes to put it on the market soon for about \$650 without engine.



Bike bags from kits save money, are fun

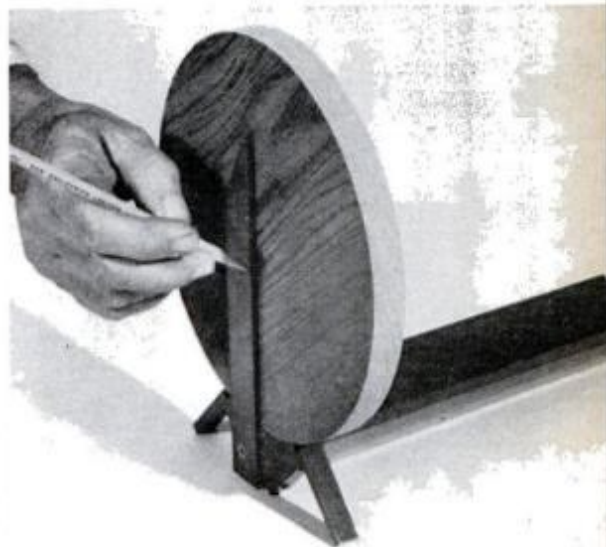
You can save up to half the cost of bike bags with these colorful kits you assemble. Kits include pre-cut material, straps, zippers, fittings, thread—everything but the sewing machine. Kits of 7½-oz. water-proof urethane-coated nylon are seat bag, about \$5.50; handlebar bag, about \$8; panniers, about \$16; in orange or green. Frostline Kits, 452 Burbank St., Broomfield, Colo. 80020. This cyclist wears ready-made Cool Gear Gran Sport shirt, \$11.75 from Jacobs Corp., 5735 Arapahoe Ave., Boulder, Colo. 80303.





Cradle finds centers of rounds, squares fast

Quick, accurate center location for both square and round turning stock is provided by Spider Centering Cradle. Trough of all-metal cradle works like combination square with a centering head: Draw or scribe line along blade, turn workpiece and draw second line. Intersection marks center. Handles squares from 1/4 to 10 inches, rounds 1/4 to 11-inch diameter; \$22.50 ppd. from Turn-O-Carve Tool Co., Box 8315, Tampa, Fla. 33604.



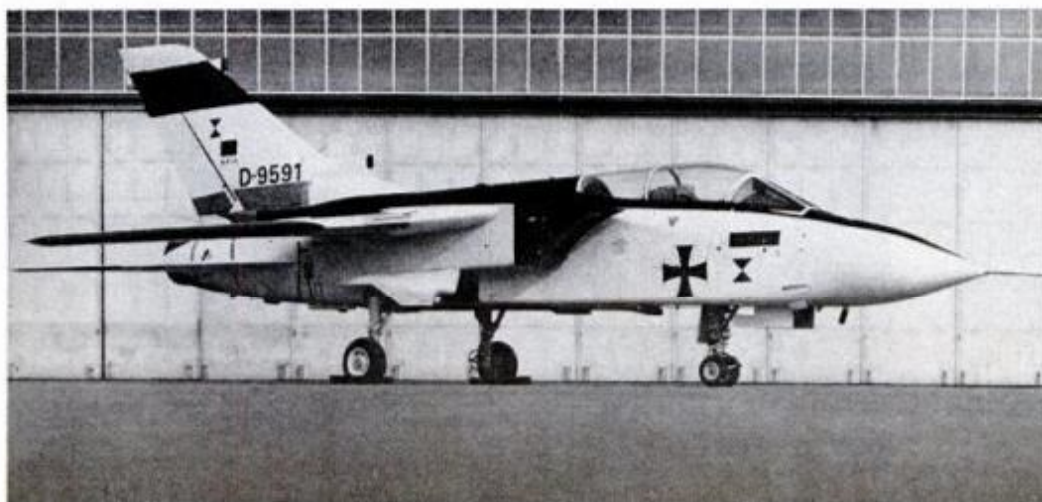
Roomy luggage carrier for two-wheel shopping or touring

Big enough for two full grocery bags, this king-size bike luggage carrier is handy for shopping chores as well as touring. Called Companier, it's molded of rigid yellow polyethylene, waterproof, lockable, theftproof. \$34.95, Perry-Scott Products, Inc., 11333 Roosevelt Way N.E., Seattle, Wash. 98125.



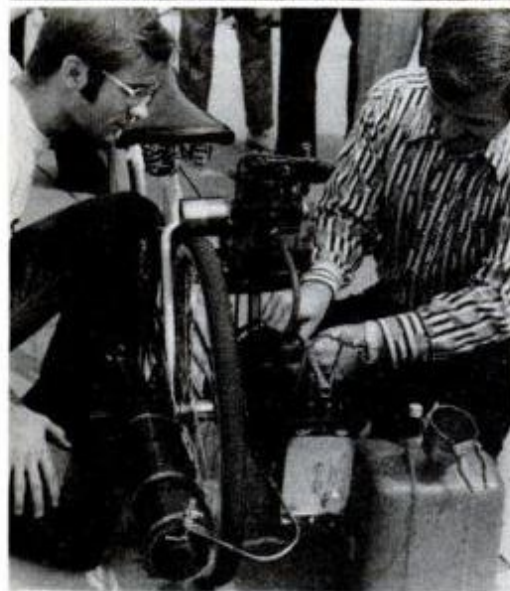
Pocket 110 cameras deserve (and get) a brighter, closer look

As cameramakers get more accustomed to the 110 pocket-cartridge format, their designs grow more sophisticated. For example: Keystone's Pocket-Matic 303 (top) has close-up lens for shots from 3 to 5 feet; Canon's 110 ED (bottom) has rangefinder focusing from 7 1/2 inches to infinity and an f/2 lens—and can print the date on a corner of each picture. Rollei's A110 (center), the smallest, collapses further between shots; electric eye works on flash, too.



Germany builds its first fighter since World War II

Germany finally has a fighter it can call its own—at least partly its own. The jet displaying the Imperial cross was jointly developed by German, British and Italian interests and will be adopted by all three nations in a program designed to standardize Western European military hardware. Up until now, the revitalized German Luftwaffe has been purchasing foreign aircraft, such as U.S. Lockheed Starfighters.



Steam power beats pedal power any day

Steam power is showing up on a lot of experimental vehicles these days, so why not on a bicycle? Students at Illinois Institute of Technology decided to try the idea as an engineering project and came up with this unusual steam-driven two-wheeler that does up to 20 mph. Boiler is located on left side of rear wheel, water tank and condenser on right side. Propane is used to heat the water (the students figured a wood-burning bike might be a bit too cumbersome).

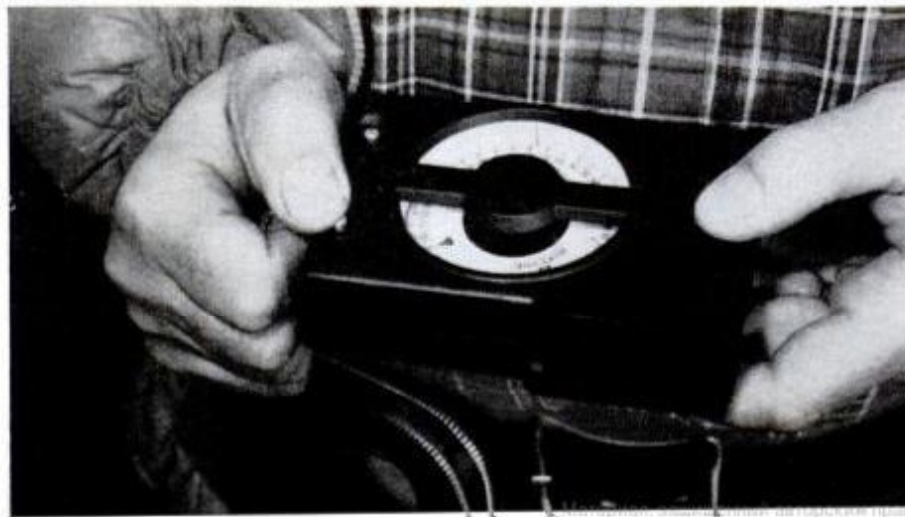
Do-it-yourself repair kit for leaky flush valves

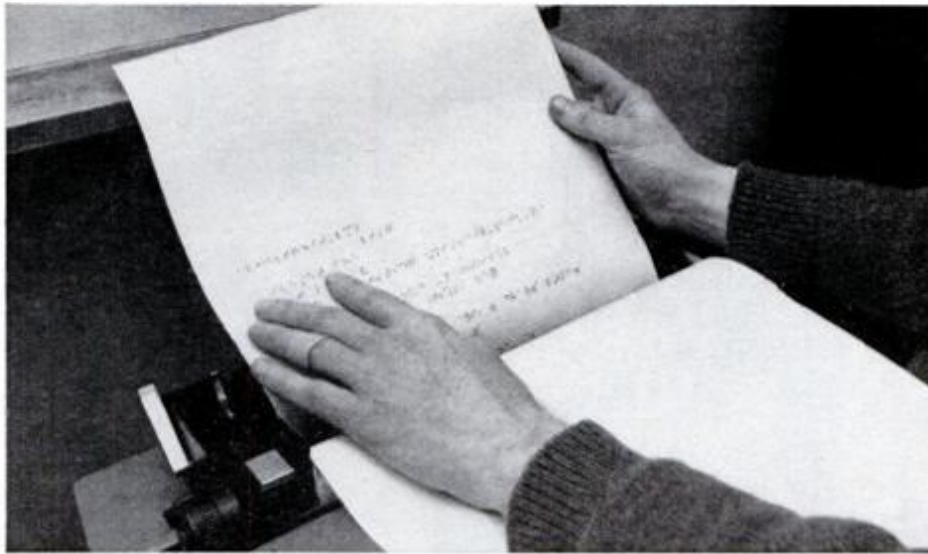
Fluidmaster Flusher Fixer Kit eliminates water waste and noise produced by a worn or misaligned toilet-tank flush valve. Kit replaces the old tank ball or flapper, and includes a new stainless-steel seat (fits conventional 2-inch assemblies) that's permanently aligned with the new flapper. Ball chain to replace old lift wire or chain is also in kit, as is sealant that cures in water. Flusher Fixer installs without removal of tank. Under \$5. Fluidmaster, Inc., 1800 Via Burton, Anaheim, Calif. 92707.



No excuse for getting lost: Locking compass now makes it simple to take sight bearings

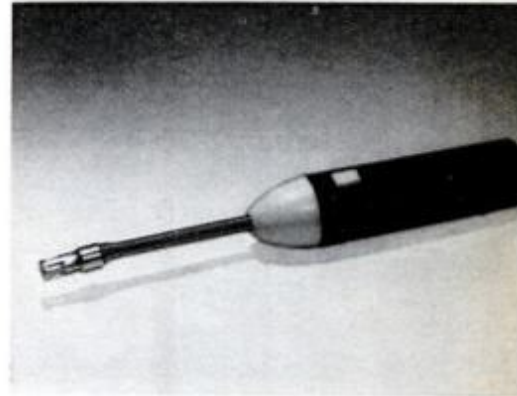
Taking compass bearings is easy and accurate with this new sighting instrument because you don't have to line up a distant object and try to read the direction at the same time on a moving, jiggling compass card. You sight the object through a viewfinder, then release a button that locks the card at that setting. For hunters, campers, boatmen and other outdoorsmen, it has built-in illumination for night use. \$69.50, E. S. Ritchie & Sons, Pembroke, Mass. 02359.





Two new aids for the blind: Braille computers, braille maps

Computers do many remarkable things, but the one at top goes a step farther than most—it provides print-outs in braille that, along with a braille keyboard, permits blind persons to become computer programmers. Even more astonishing: It was developed by a blind engineer, Tony Brown, of Melbourne, Australia. Lower photo shows new plastic road maps in relief with braille markings for the blind to follow when walking. British Industrial Plastics, Box 11, Tat Bank Rd., Warley, England.



You don't need a match with this battery-run gas igniter

Matchless Gas lighter uses a replaceable glow-coil filament, similar to those installed in many appliances, to ignite natural gas, propane or any other flammable gas. Works anywhere, even in wind and rain. Long neck makes over lighting easy. Maker says coil cannot burn user or start fires. Takes two C batteries. \$2.98 postpaid (batteries not included) from Lanzi Enterprise of America, 108 Stephens Pl., Staten Island, N.Y. 10306.

Tape measures get larger and smaller

Stanley Tools offers the first tape rule with a blade 1 inch wide—and a miniature that's always handy because it's on a key chain. The big Powerlock, with a 25-foot blade, will span openings up to 7 feet without buckling. Yellow Mylar-coated blade has stud markings every 16 inches. Case has power return, thumb lock and belt clip; \$10.25 suggested list price. Key tape miniature has ¼-inch blade 3 feet long; \$2.79 suggested retail. Stanley Tools, The Stanley Works, 195 Lake St., New Britain, Conn. 06050.



Security lockset for exterior doors

Although it's installed without mortising, like a fast-set lock, this lockset offers extra security with its hard-to-pick, 7-pin tubular-key cylinder. Dead-latch tab on night latch prevents defeat with credit cards. Interior knob has locking button, but is always free for emergency exit. \$23.95 list in brass or bronze, \$25.35 in chrome, from locksmiths, hardware and building-supply dealers. S. Parker Hardware Mfg. Co., 27 Ludlow St., New York, N.Y. 10002.





One finger tunes new TV sets

No more knob-spinning to tune these new TV sets. Zenith (top) lets you run a slide control to any of 14 preselected UHF and VHF channels. MGA's mode (center) has individual buttons for each of its 14 preselected channels. And Magnavox's STAR tuning system (bottom) lets you push numbered buttons to dial 82 channels as you would on a pushbutton phone.

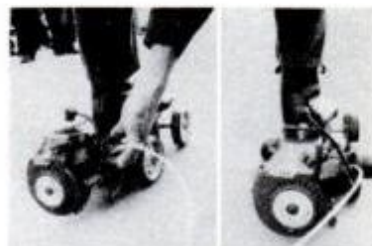
Wonder of wonders: A new, cheap pocket radio that works—silently

There's nothing at all sensational about this little pocket radio from RCA—except that it works surprisingly well. It looks good, too, in beige with brown leather-like trim. Because it works only with a permanently attached earphone, it won't bother anybody else around. And best of all, the price is just \$5.



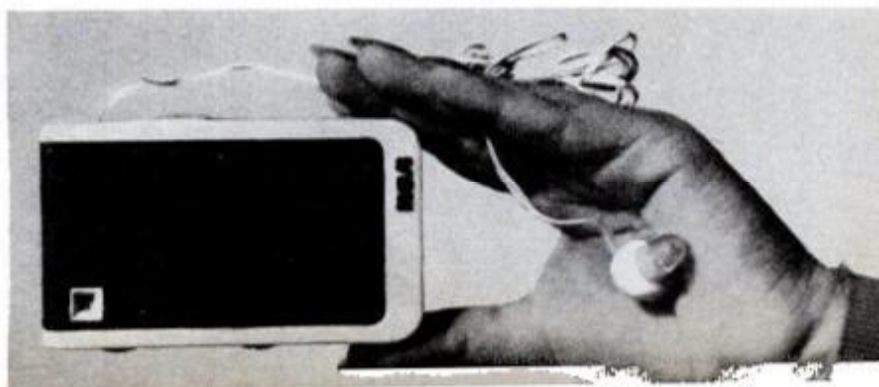
Portable low-voltage pool light for safe, easy underwater illumination

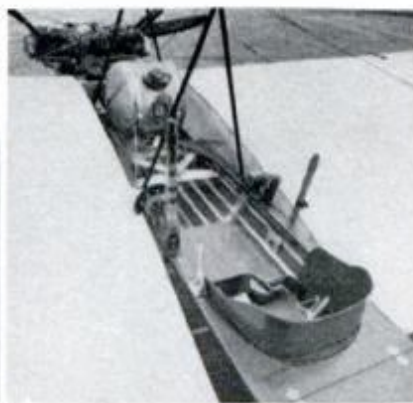
Dramatic lighting for swimming pools can be had safely and easily with this portable power pack and low-voltage submersible lamp. The rechargeable pack provides 12-volt current for four hours of continuous use—enough for a full evening of swimming. You then recharge it overnight from a wall outlet and it's ready for the next night's use. Built-in safety features prevent overcharging and make it impossible to use the pack while still plugged into a 117-volt source. The sealed-beam lamp hangs from the edge of the pool and can light an area up to 20 by 40 feet. The pack can also power portable TVs, radios and other 12-volt appliances. Called Aqualite, it's \$119.95 from N. A. Taylor Co., Gloversville, N. Y. 12078.



Fast feet: 45 mph on motorized roller skates!

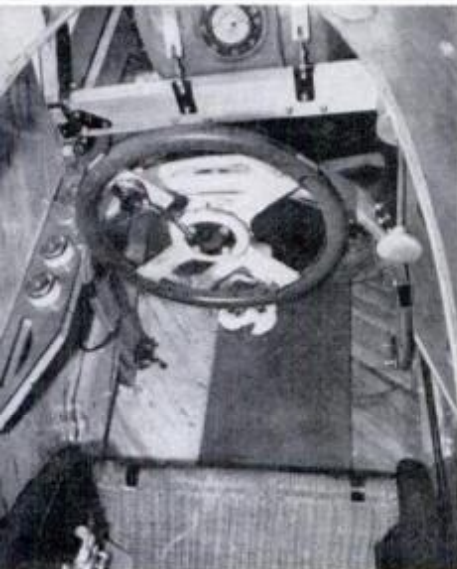
One way to beat the high cost of transportation is on foot—but motorized feet are even better. These gasoline-driven roller skates get their inventor, Bob Naranto, around town at speeds up to 45 mph at 50 miles to the gallon. Each skate is powered by a 1-hp engine and has clutch, brake and throttle controls.





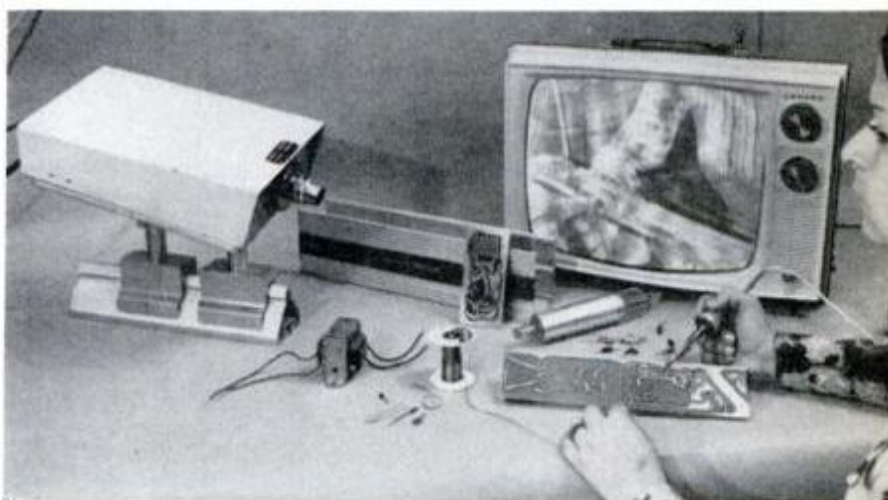
Early birds of aviation: Two antique copies of famous firsts

Recreating old aircraft is becoming a popular hobby, but few builders go as far back into early aviation as famous antique restorer Cole Palen did for the two ancient replicas shown here. At top is a 1910 Hanriot; at bottom a 1912 Deperdussin, both of French origin. Both are scratch-built copies since none of the originals exist to restore. The Hanriot has no ailerons and uses "wing warping" for banking. It has two control sticks—a warping lever that moves sideways and a fore-and-aft for elevator (you had to be pretty well coordinated to fly this baby). Cruising speed is a brisk—for those days—50 mph. The more sophisticated Deperdussin—first plane to exceed 100 mph—sports a "modern" wheel-type control column, is powered by a 160-hp Gnome rotary. Original set three speed records in 1913-14.



Recharging stations for electric motorbikes keep power up, fuel costs down

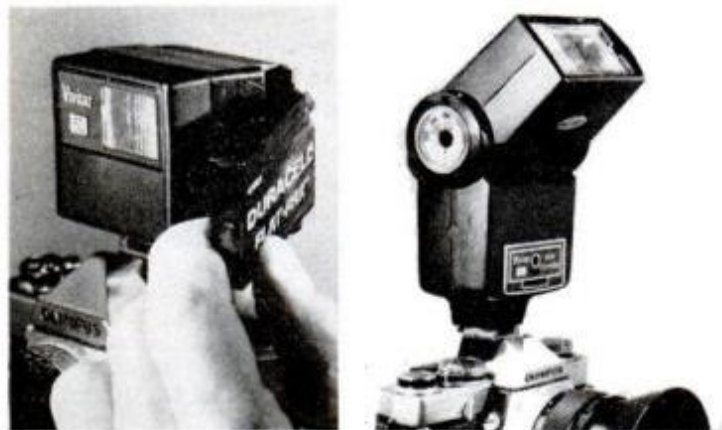
To extend the useful range of electric motorbikes, the Danes have come up with roadside recharging stations designed for commuters. You park at work in the morning, plug your bike into an outlet, and it's fully recharged and ready for the trip home at night. The stations, each able to handle six bikes, are now being tested in Odense, Denmark.



Be the first kid on your block to build your own laser TV transmission set

Here's absolutely the latest word in electronic kits: a helium-neon laser system for transmitting video images. The Metrologic PE-500 kit makes a low-power, helium-neon laser that can be modulated with TV information from a TV camera or videotape machine, and a photodetector that can pick up the laser beams and demodulate it to recreate the original black-and-white TV picture from up to 150 feet away. You can use the system as a burglar alarm, or laser alone for making holograms or demonstrating optical principles. It's \$150 from Metrologic, 143 Harding, Bellmawr, N.J. 08030.

NOW



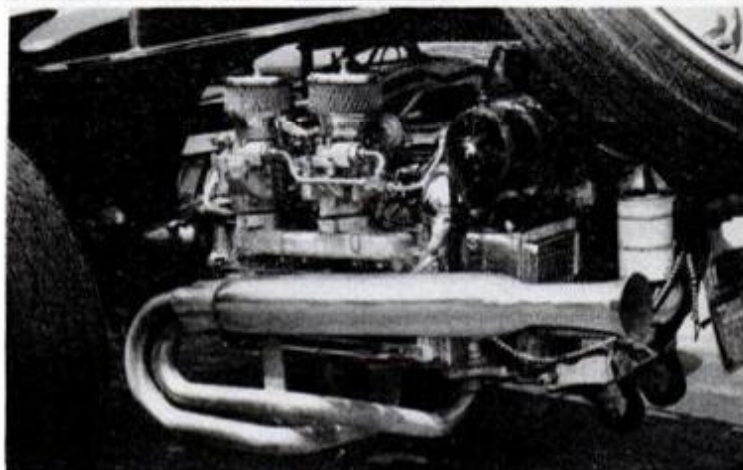
Flashes of inspiration from Vivitar: Tiny take-along and handy bounce-flash

Vivitar's tiny Model 50 flash is too small and light to ever leave behind, gets up to 200 flashes from the 6-volt Flatpack battery shown (left), has a K25 guide number of 22, costs \$12. But it's nonautomatic and fits hot-shoe cameras only. Vivitar 272 with bounce-tilt head is an automatic flash with a range of 3 f-stops, thyristor circuit for longer battery life, K25 guide number of 50; costs \$90.



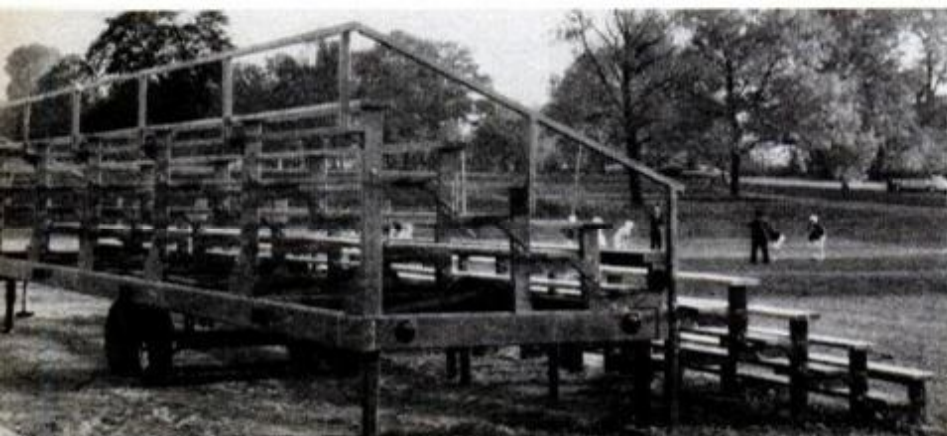
Magnetic inserts hold nuts, bolts in sockets

A 6 or 12-point socket set becomes a lot handier with Magnaserts—magnetic inserts that will hold nuts and bolts within the sockets. Made of pliable magnetic plastic, they can be inserted or removed at any time. Set of 10 covers sizes from 7/16 to 1 inch. \$2.98 suggested retail. Automated Industries & Associates, Inc., 2221 Arbor Blvd., Dayton, Ohio 45439.



Wild hybrid: Half car, half motorcycle—and you can even buy one like it for yourself

Hitch a motorcycle front end to an old Corvair rear end and you have a Tri-Vair. California mechanic Leonard Collins wanted the excitement of a motorcycle with the safety of a three-wheeler and thus came up with the unusual hybrid. It does wheelstands (top) and has small extra wheels under the engine (bottom) to keep it from dragging on the ground during lift-offs. The machine has attracted so much attention that Collins is now in business making copies for others. Prices go from \$1900 to \$2600 depending on options. To order yours, write Collins Garage, 301½ West California St., Ontario, Calif.



Instant grandstand rolls in on wheels, folds out for use

Mounted on wheels, these mobile bleachers roll in behind a truck, fold out like an accordion and are ready for use in minutes. Called Porta Bleachers, they're made for temporary use at carnivals, bazaars, parades, civic ceremonies and similar occasions where permanent grandstands would be too costly or impractical. Each 40-foot section seats 260, is about \$4750. Porta Bleachers, 26350 John Rd., Madison Heights, Mich. 48071.

Are you in shape for spring?

New medical research shows a physical checkup plus some simple exercises now can change outdoor sport from an endurance test into healthy fun.

by Jack Galub



Stress test is uphill work as treadmill's angle is increased. Charles Perschetz, of Cardio-Metrics, demonstrates during EKG.



Aerobic ability of blood to feed oxygen to muscles is studied with breathing apparatus during bicycle exercising exam.

"Every weekend, outdoorsmen are in here with wrenched knees, sore backs, sprained ankles," complained the emergency room nurse. "Our cardiac team keeps working overtime. If people would take time to get into shape before they go out, much of what we're doing wouldn't be necessary."

But this year can be different. By starting a training program now, you can be in good enough condition to cut down the chance of becoming another hospital statistic.

Conditioning for the field has three key targets: improved cardiovascular fitness, increased flexibility and agility, and specific muscle strength. Sounds complicated? Some 60 years of fitness medical research show that if you're now in fairly good shape you can start rounding into condition at the end of a month or so. If you've grown fat and flabby over the winter, you may need six to eight weeks.

Stamina—that ability to hike 10 miles or more without feeling completely exhausted—depends on your heart and your respiratory system's ability to supply oxygen to the more than 600 muscles in your body, particularly when you are backpacking up a hill or heading into the wind. Fortunately, the heart is an endurance muscle. The more regularly it is exercised with fast walking, jogging, bicycling or swimming, the better it works under stress. Hearts that aren't adapted to regular exercise peak out too quickly. Like a detuned car engine, they can develop an irregular rhythm. Sometimes they grind to a halt.

The most effective way to check your cardiovascular system today is the stress test. You ride a special stationary bicycle or climb an electrically driven treadmill that can be tilted into an ever-steepening hill. Your heart's reaction is recorded on

electrocardiograph (EKG) tape and monitored by a cardiologist on an oscilloscope. You'll also breathe into an electronic apparatus that determines your body's ability to feed oxygen to your muscles. The stress test may also detect heart problems which could cause sudden death unless treated. These tests are now given in some hospital exercise centers or by such licensed groups as Cardio-Metrics, Inc., New York City, which specialize in the testing and prescription of conditioning programs for cardiacs and noncardiacs alike.

Interval training, a sophisticated walk-jog formula, is usually prescribed to ease an outdoorsman into a conditioning program. Each session is divided into warm-up, stimulus, cool down, with the stimulus making the heart work to build up fitness. Extensive research indicates that 75 to 85 percent of your age-related maximum heart rate (see table) must be reached for a planned length of time for cardiovascular improvement. During your sessions, you

MAXIMUM WORK RATE

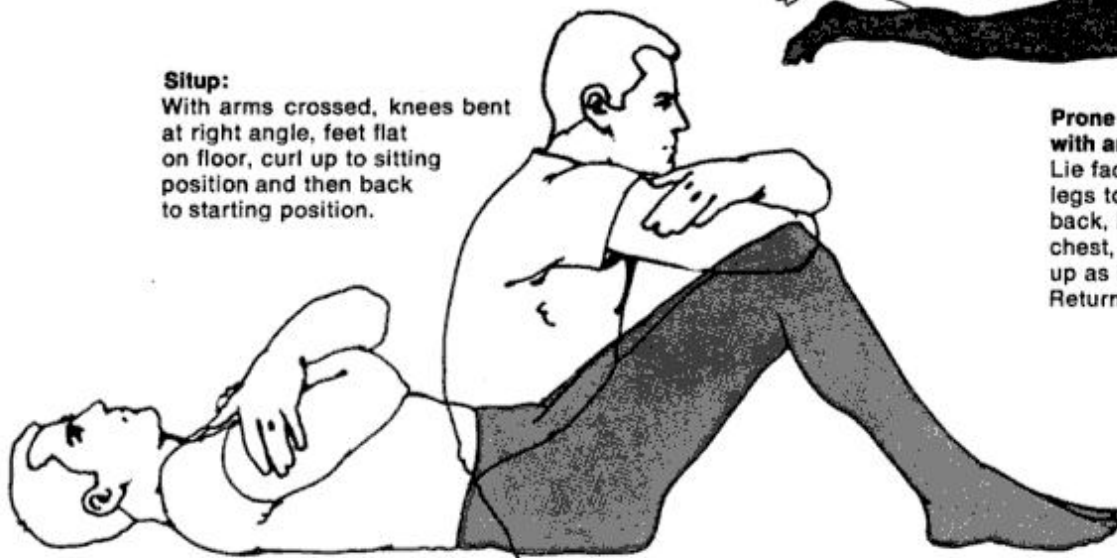
For training to be most effective, a workout pulse rate at 75 to 85 percent of maximum efficient heartbeat is recommended. But moderation is vital: Check with your doctor and ease into training.

Age	Maximum pulse/heart rate	85%
20	200	170
22	198	168
24	196	166
26	194	164
28	192	163
30	190	161
32	189	160
34	187	158
36	186	158
38	184	156
40	182	154
45	179	152
50	175	148
55	171	145

FOR BACKPACKING

Situp:

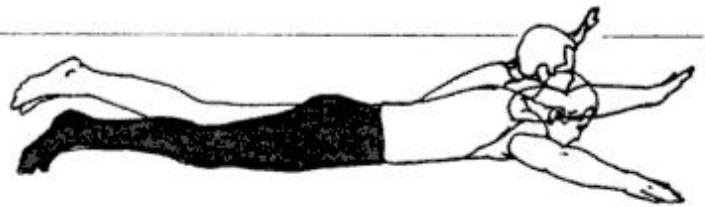
With arms crossed, knees bent at right angle, feet flat on floor, curl up to sitting position and then back to starting position.



Prone arch

with arms extended:

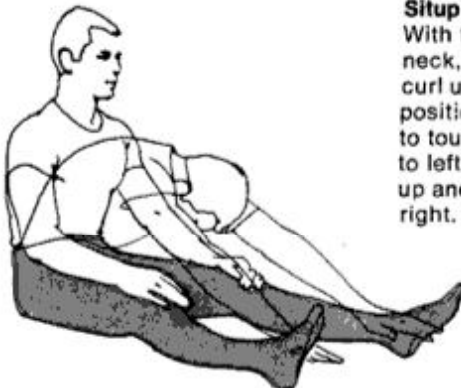
Lie face down with legs together. Arch back, bringing arms, chest, head and legs up as high as possible. Return to start.



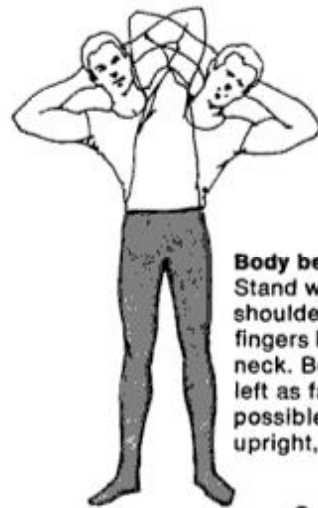
FOR CANOEING

Situp:

With fingers laced behind neck, feet one foot apart, curl up to a sitting position and turn left to touch right elbow to left knee. Then up and to the right.

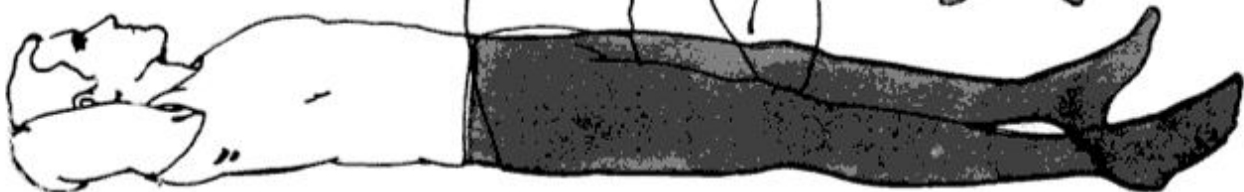


Sitting strength starts with hands on knees. Reach forward as far as possible.



Body bender:

Stand with feet shoulder-width apart, fingers laced behind neck. Bend sideways left as far as possible, back upright, then right.



monitor your pulse regularly for five seconds (and then multiply by 12 for pulse rate) to make sure you are not overworking or underworking your heart.

If there are no testing facilities near you—and an exam by your doctor assures you of a good cardiac profile—you can develop your own shaping-up program. If your profile is poor—a history of heart disease in your family, high blood pressure, overweight, too much smoking—a complete physical checkup and consultation with your doctor is essential before you start.

Begin easily—you're not out for the Olympics or your local ball club. Jogging takes a slow short stride, done from the heels forward rather

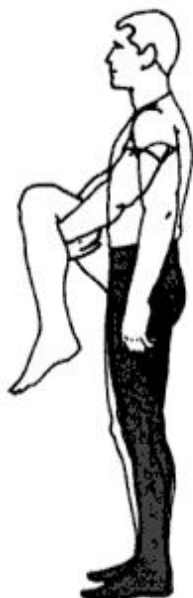
than on the balls of the feet. First try jogging 50 paces and walking 50 for 10 or 15 minutes. As your wind builds up, you can walk less. You may find yourself slow-jogging a quarter mile in two weeks, half a mile in a month. With no park or track nearby, you can jog around the block or from room to room at home. Instead of elevators, take the stairs—two at a time.

For the flexibility and agility you'll need while hiking and climbing, practice walking on the outsides of your feet and then the insides with your ankles turned in. These exercises are awkward and difficult at first, but a few minutes every other day will stretch and strengthen muscles, tendons and ligaments.

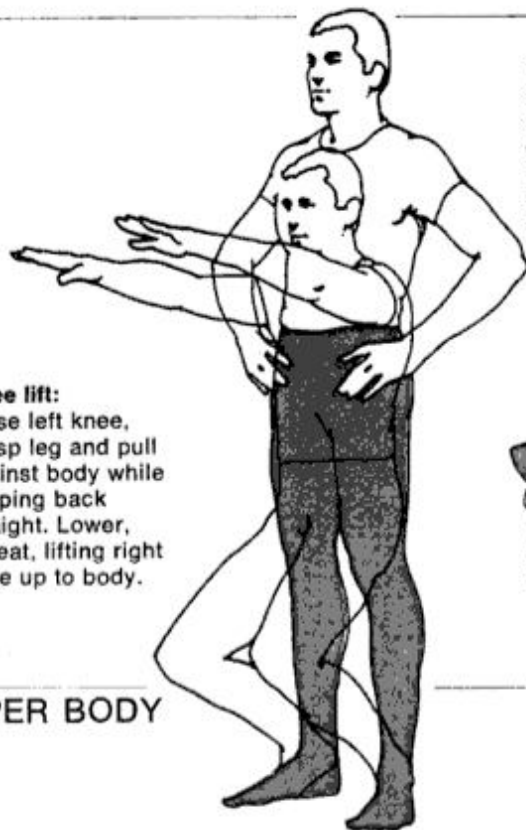
Next, imitate a basketball guard or boxer with feet apart, knees slightly bent. Bob, weave and pivot on the balls of your feet, followed by jumps several inches off the floor. For the lower back and hip joints you will use canoeing and climbing, bend your knees until you can put your palms on the floor. Then try straightening your legs while pulling in your abdominal muscles. Two or three stomach contractions held for five to 10 seconds are enough for each exercise session.

Push-ups should be added to your every-other-day routine. Starting flat on the floor, push up to full arm extension and then lower with body straight until your chest touches the floor. Most people at first aren't able

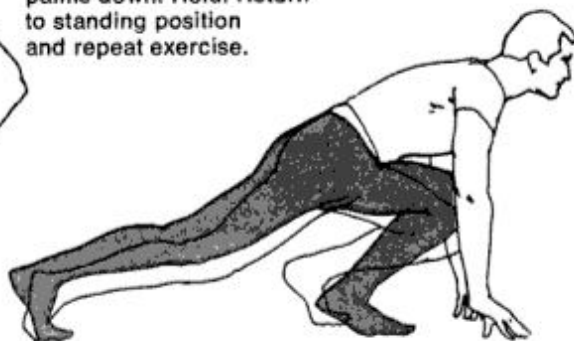
FOR CLIMBING



Knee lift:
Raise left knee, grasp leg and pull against body while keeping back straight. Lower, repeat, lifting right knee up to body.

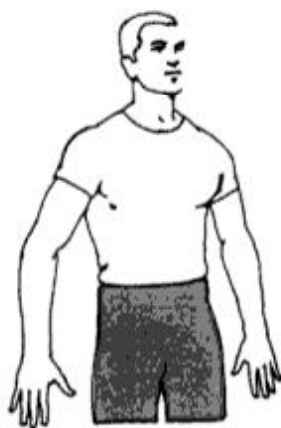


Half knee bend:
Stand erect, hands on hips. Bend knees halfway while extending arms forward, palms down. Hold. Return to standing position and repeat exercise.



Sprinter starts with fingers forward on floor, left leg back. Reverse legs in bouncing movement.

FOR ARMS AND UPPER BODY



Upper body isometrics can start with push back on wall.

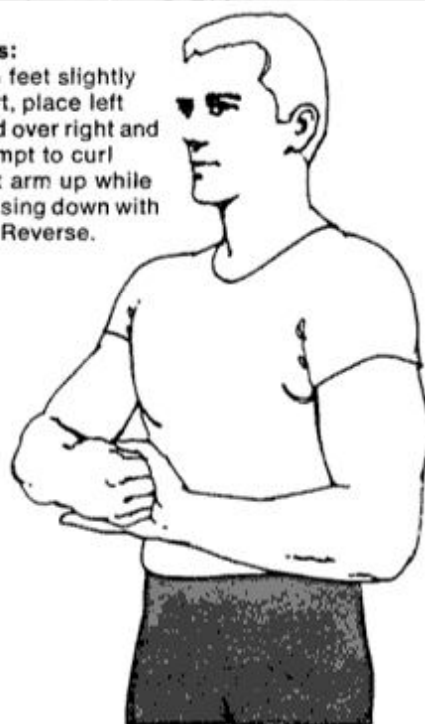


Next face wall and push, again keeping arms straight.



Standing in doorway press outward with backs of hands.

Arms:
With feet slightly apart, place left hand over right and attempt to curl right arm up while pressing down with left. Reverse.



Art: Harry Borgman

to do more than one or two properly without cheating by bending the body.

To develop specific muscle groups, work out with equipment you'll be using and the exercises shown here. If you backpack, wear it weekends on short fast hikes. If you usually carry 20 pounds of gear, double it to 40 for practice. Use your heavy field shoes for early hikes but not for jogging; that requires training shoes. If you want to jog with more load, wrap on ankle weights after you have completed the third or fourth week of workouts.

For canoe training, rig a paddle with weighted rope and pulley mounted on the wall and practice several minutes every day. You'll be

strengthening paddling muscles and toughening your hands, as well, for those long hours on the lake later in the season.

The easiest way to strengthen the upper muscles you'll be using when rock climbing is to actually climb. A school gym, if available, usually has a vertical rope plus the horizontal ladder to swing along. For simple but effective workouts, rig a store-bought chinning bar in a doorway at home and practice doing pull-ups.

The number of pull-ups you can complete should gradually grow as your strength develops.

The isotonic exercises—those in which muscles are actively flexed, compressed and stretched—and the

isometric strength builders—where muscles pull or push against stationary objects or against each other—are both represented in the exercises selected here for outdoorsmen. They should be practiced as shown for best results.

When you're practicing isometrics, breathe naturally. Usually three or four contractions, held for five to 10 seconds, are needed to make the exercises work. Do not hold your breath as that tends to build up internal pressures.

Once you've learned these easy ways to get yourself in shape, go back to them when your outdoor activities taper off next fall. The payoff is in good health and active sport all year long. ★★★

Drill-driven 'lathe' handles light turnings

by Walter E. Burton

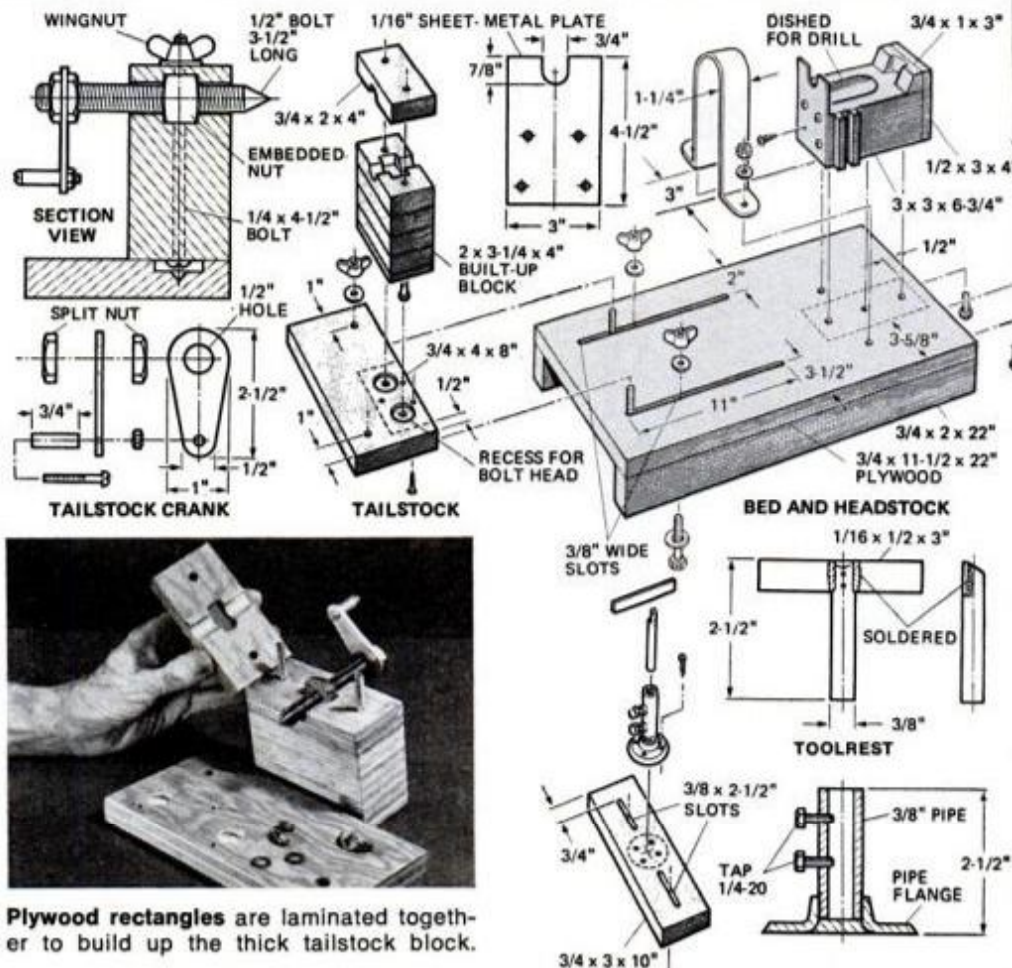
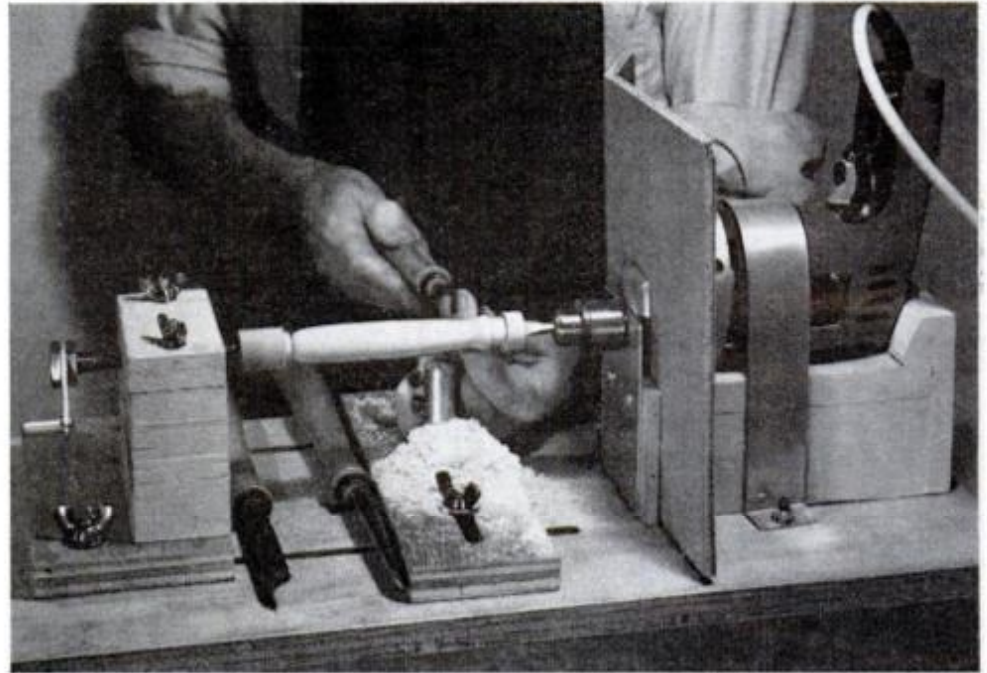
Here's still another use for your portable electric drill—as the powered headstock of a light-duty lathe for filing, drilling, sanding, wire-brushing and polishing.

The lathe shown was built to suit Black & Decker's Model No. 7050 variable-speed, reversible drill. It can be locked at any speed in either direction for continuous running. The lathe, designed for turning small wood knobs and tool handles, also can serve to shape soft metal with hand tools.

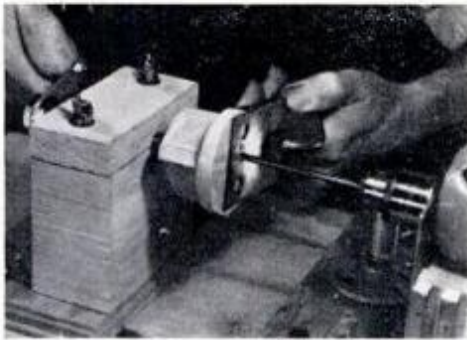
Cut the bed out of $\frac{3}{4}$ -in. plywood as shown in the drawing below; you can form the two slots in it with a $\frac{3}{8}$ -in. wood bit and keyhole saw. To make the drill stand or platform (shown in the same drawing), you need a $6\frac{3}{4}$ -in. block of 3x3 wood and some $\frac{3}{4}$ -in. wood scraps. Chisel a shallow depression in the top to accommodate a ridge on the inverted drill housing and to permit the flat part of the housing to rest squarely against the wood.

Shape a felt-padded, $\frac{1}{16}$ -in. sheet-metal plate as shown and attach it to one end of the platform with round-head screws. Place a wood block on top of the platform; at the other end, notch it to follow the contour of your drill handle. When this block is altered until there is no end play of the drill housing between block and sheet metal, glue the block in position and back it up with a $\frac{1}{2}$ x 3 x 4-in. piece of plywood glued and nailed to the platform. You are now ready to fasten the platform to the lathe bed and install the aluminum "strap" that encircles the drill housing on the two $\frac{1}{4}$ -in. bolts projecting up beside the platform.

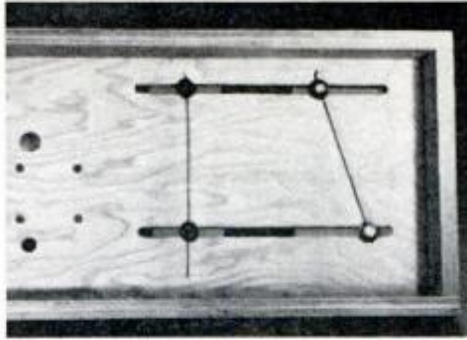
The toolrest is similar to a conventional rest system on a wood-turning lathe. Make it as shown on this page and mount it with screws on top of the base. Drill two holes in the side of the toolpost with a No. 7 bit and tap them for $\frac{1}{4}$ -20 setscrews to hold the T in the position desired. Make the T from a $\frac{3}{8}$ -in. headless bolt and a crossbar. Notch the bolt end to receive the bar, then rivet and solder the bar in place.



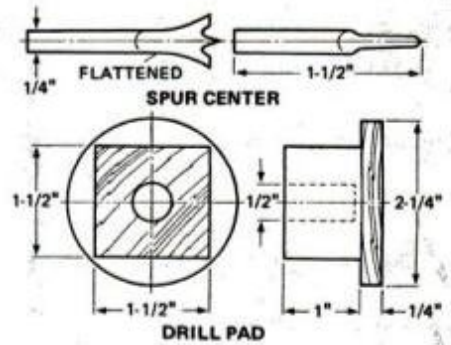
Plywood rectangles are laminated together to build up the thick tailstock block.



Drill pad supports steel plate against bit while tailstock screw is turned.



Crosswires through bolt heads on underside of base keep the heads from turning.



The tailstock with center consists of a built-up wood block mounted on a plywood base; equipped with a headless bolt pointed 60° at one end and crank at the other (see drawing on facing page). The crank is a simple metal arm clamped between two nuts (made by splitting a standard nut), with a tubular handle.

Clamp toolrest and tailstock bases to the bed with 3/8-16 bolts running through slots in the bed and toolrest base. Make bolt holes in the tailstock base slightly oversize to permit a cross adjustment to align tailstock center with the drill chuck.

To prevent bolts from turning when wingnuts are loosened, drill a diametrical hole through the center of each bolthead to receive sections of coathanger wire. Fit the wires loosely to keep bolts from turning, yet allow them to shift along the slots. Wires should extend about 1/4 in. past each bolthead at maximum bolt separation.

To mount work between centers, make a spur center for the drill chuck from 1/4-in. steel rod. Heat the rod end cherry-red, hammer flat and file notches to form a center point and spurs.

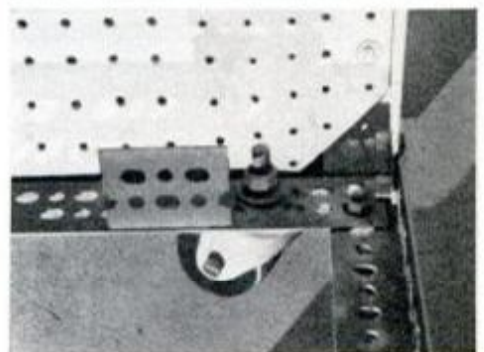
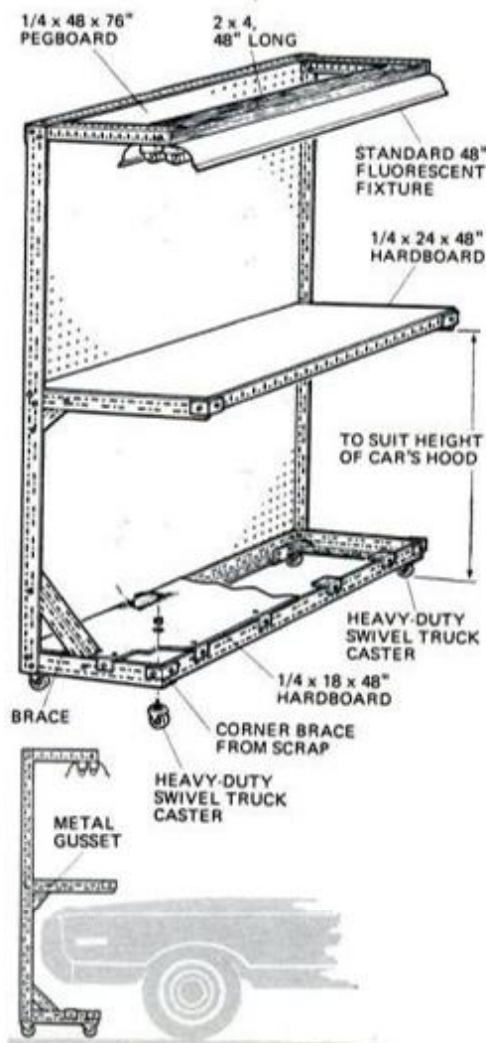
When turning knobs, I found some end play in the drill spindle that could cause the tool to dig into the work. To discourage this, adjust the tailstock spindle until its point presses against the workpiece. No center hole is made—the spindle merely acts as a steadying finger.

To reduce dust sucked into the drill, install a 10-in.-square cardboard baffle on the drill platform (lead photo, facing page). Notch this baffle to slip over the drill and engage grooves formed by 1/4-in.-square wood strips you can nail to sides of the platform. ★ ★ ★

Car tune-up bench keeps tools handy

Any time you can have your tools within arm's reach the job goes twice as fast. It's particularly true when you're tuning your car's engine—the fender just doesn't offer a big enough "counter" for all the automotive tools you'll be using. That's when you'll find this rolling tool panel and bench extra handy, for it can be wheeled right up to where you're working, whether indoors or out. What's more, the bench is designed to take up no more than 5 in. of space when parked at the end of the garage because the car's hood nests neatly under its cantilevered counter.

The bench bolts together like an Erector set when you make it of slotted metal angle. A sheet of 1/4-in. perforated hardboard for a tool panel lets you hang an array of tools both above and below the counter. A standard 48-in.-long two-lamp fluorescent fixture fits perfectly at the top where it is screwed to a 2x4 cross member. The tool counter is bolted to the slotted framework at a height that clears the car hood and is braced, as is the base platform, with pieces of slotted angle. The base platform provides storage for heavy items like a toolbox and spare battery which add stability to the bench.—Pack Bryan



Heavy-duty, ball-bearing casters make it easy to roll tool-panel bench anywhere.

Darkrooms for people

by Elbert Lawton

In most homes, finding space for a permanent darkroom is very difficult, but borrowing space for a few hours is easy. When you must borrow space, the trick is not to lose half your time setting up and taking down. Portable darkroom equipment and a work plan are what you need.

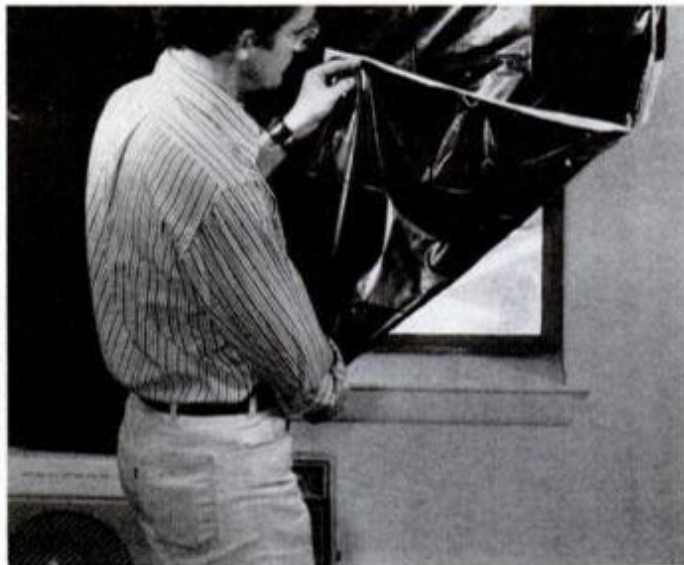
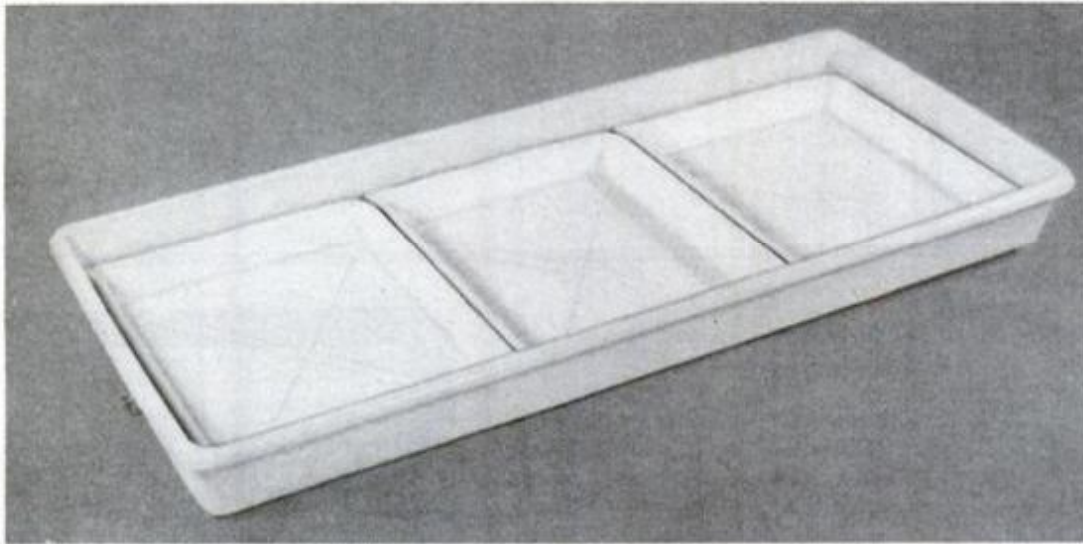
The first rule is to keep everything simple. Buy and use only the essentials—"time-saving" luxuries will seem a lot less luxurious if the time saved is then spent in moving them from place to place. Using just the essentials doesn't mean you can't do as good work as the guy with a

permanent setup. However, it does mean that you can't count on quite as many prints per evening without cutting quality.

The second rule is to compartmentalize your work. It simply isn't practical to drag out and set up *everything* each time you have a free hour or two to work.

It's better to break your darkroom work down into separate stages, each served by its own equipment and supplies. I divide my darkroom work into four such stages: chemical mixing; film processing; printing and print processing; and print drying,

Need a sink? Brooks Porta Sink (near right) holds three trays (16x20 in \$99 model, 11x14 in \$59 one), rests on table. Richards Tray-Rak (far right) holds three trays, step-fashion; costs \$11 to \$16.



Temporary darkroom tactics include the use of a plastic basin (above) to carry each night's equipment to your workroom, using it next as a temperature-control bath as shown and finally using it as a washer; darkening of windows (above right) with plastic lawn bags; use of changing bag (lower right) for loading film-developing tanks.



who don't have darkrooms

spotting and mounting. Limit yourself to one stage per work session (with the possible exception of the mixing stage), and you'll get a lot more done than if you try to do everything at once.

Chemical preparation takes little space and can be done in full room light. You can usually mix your chemicals the night you plan to use them, especially if you go to pre-mixed or liquid chemicals. Many powdered chemicals are supposed to be mixed at temperatures much higher than the standard 68°F. processing temperature. Mix them before dinner, and they'll be down to room temperature by the time you're ready for work.

I prefer one-shot developers that are discarded after use to the kind you replenish. They're fresh each time—important when you do only occasional darkroom work.

Your equipment for this stage should include a quart graduate for measuring and mixing, a two-ounce graduate for adding replenisher (if you use it), a long-stem bar mixing spoon or mixing paddle, a funnel, a thermometer and plastic bottles. Some chemicals, which age more slowly (such as fixer and hypo eliminator), can be mixed more economically and conveniently in gallon quantities—especially fixer, which goes fast. If you do mix a gallon, divide it into quart bottles—the chemicals in the unopened bottles will last even longer, and you'll have less weight to lug around. If you can, use separate graduates and paddles for mixing developer and fixer; otherwise, wash extra-carefully between chemicals to keep one from contaminating the other.

The best place to do your mixing is the kitchen sink. And to carry your chemicals and equipment from storage to the sink and back, use a plastic dishpan—it will come in handy again in the next stage.

Developing film requires just a little additional equipment: a daylight-type developing tank, film reels, a changing bag, scissors, a length of hose (optional) from a bathroom hair-sprayer attachment, and (if you use 35-mm film) either a cassette opener or bottle-cap opener. The

basic chemicals you'll need are film developer, stop bath (optional) and fixer. To speed up your processing, you can use rapid fixer instead of the regular "hypo" type and a hypo neutralizer between fixing and washing to reduce washing time. Dip your film in wetting agent to speed up drying a bit and reduce the formation of water spots.

Use a changing bag as a "darkroom." It's just big enough to hold the film, tank and reels. You can load the tank at your convenience.

When developing, your plastic dishpan can serve double duty as a carry-all to bring your paraphernalia to the kitchen sink and as a water jacket. Filled with water at 68°F., it will bring all the chemicals and the tank to the correct temperature and hold them there.

The best way to wash the film is to use a faucet-attached hose to direct a strong jet of water (still at 68°F.) through the center of the reels down to the bottom of the tank, where it will flush impurities away. Some tanks come with hose assemblies, but the hair-spray hose mentioned earlier will work with many tanks.

Printing takes a bit more equipment: developer and stop-bath tray at least as big as the largest prints you'll make, a larger tray for the fixing bath; tongs to agitate prints and carry them from one tray to another; and another deep plastic basin drilled with holes to serve as a washer.

You'll also need an enlarger and lenses for it. Unless you're sure you'll be shooting just 35-mm or 126 Instamatic photos for the rest of your life, it pays to buy the 35-mm-to-120 size—it won't be much more expensive. Look for one that can be easily disassembled for compact storage, but that is still of quality construction. The quality of your enlarger will directly affect the quality of your prints; this is no place to save money.

You'll need enlarging lenses, too: a 2-inch lens for 35 mm, or a 3-inch for 120 negatives. If you're trying to print both sizes but can only afford one lens at first, use a 3-inch lens, and attach a close-up lens to its front when you need bigger enlargements.

In enlarging easels, your best bet is the kind with calibrated, adjustable masking bands that let you use different paper sizes or crop your borders to precisely match the shape of your image (not all photos look best in precise 8x10 proportions).

Look for one whose masking bands are supported on all four sides, not flopping in the air when you raise them to insert the paper. Begin with an 8x10-size easel; even after making bigger enlargements, you'll find this size easier to use with smaller prints.

The only essential accessory left is a safelight. Enlarging timers, paper safes and focusing magnifiers are useful, but you can do without them at first. Count seconds aloud (say "one-hippopotamus, two-hippopotamus . . ." to space the seconds properly) or watch the kitchen clock's sweep second hand; remove paper sheets one at a time from the box, placing your body as a shield between the open box and the safelight; and check focus with a conventional magnifier.

Once you have all your printing equipment, where and how should you set it up? For the "where," you have several choices: A basement location near the utility sink will minimize disruption of your family's life, provided the location is comfortable and free of dust. The kitchen is the next best bet because of its deep sink and its countertop space—but you'll have to wait till the dishes are washed, and teach everyone to knock before coming in. The bathroom is least preferable, since its sink is too small, its tub too low, and you'll frequently have to stop to admit other family members.

A sink isn't really needed till the final wash, though, so you can set up in a dry room—pick one with lots of space, few windows and low family traffic—just by adding another dishpan full of water to hold the prints till you can take a batch of them outside for washing.

Whatever room you pick, make sure it has a sturdy table or counter that won't shake under your enlarger. Keep your "dry" operations (enlarging and paper storage) separate from your wet ones (developing, stop bath and fixing), either on opposite sides of the room or with a partition between them.

All that's left is darkness—and you need that only for enlarging. For daylight processing, cover the windows with large, black plastic trash bags from the supermarket, the red-

(Please turn to page 166)

Quick care for your electronic ignition system

by Mort Schultz

Electronic ignition has arrived. Chrysler made the system standard, starting with its 1972 models. Ford followed in 1974, and General Motors and American Motors in 1975.

How it works

Although there are variations among different types of systems, all electronic ignition units have eliminated the distributor cam, breaker points and condenser of conventional ignition systems.

A reluctor or timer core, which rotates with the distributor shaft, replaces the cam. It has a "tooth" for each cylinder. A reluctor in the distributor of an eight-cylinder engine, therefore, has eight teeth.

Right next to the reluctor, but not touching it, is a pickup unit which consists of a permanent magnet and a coil wound around a pole. As a tooth of the reluctor passes the pickup unit, magnetism increases, which induces a positive voltage at one of the coil terminals.

This voltage triggers the circuitry in the electronic control unit, causing a break in the ignition coil's primary circuit. What happens then is the same as what happens in a conventional ignition system when distributor points open: The magnetic field in the ignition coil collapses, inducing high-tension current in the secondary circuit. Current is transmitted to the individual sparkplug through the rotor, distributor cap and sparkplug cable.

Advantages of EI

Here are some of the advantages of electronic ignition systems:

- Since there are no breaker points, there are no point problems to hinder engine operation, such as point erosion.
- Dwell angle is no longer a factor. Dwell angle is the distance in degrees that the cam of a conventional distributor rotates when points are

closed. It goes out of adjustment, because the cam and point block rub against one another and wear down. But no parts of an electronic ignition distributor rub against one another.

■ Since dwell angle affects ignition timing, checking timing as often as you've been doing becomes unnecessary. In fact, the whole concept of ignition system tune-up is radically changed. Tune-ups are simpler and don't have to be done as often.

Tuning electronic ignition need not be done any more often than you need to clean or change sparkplugs.

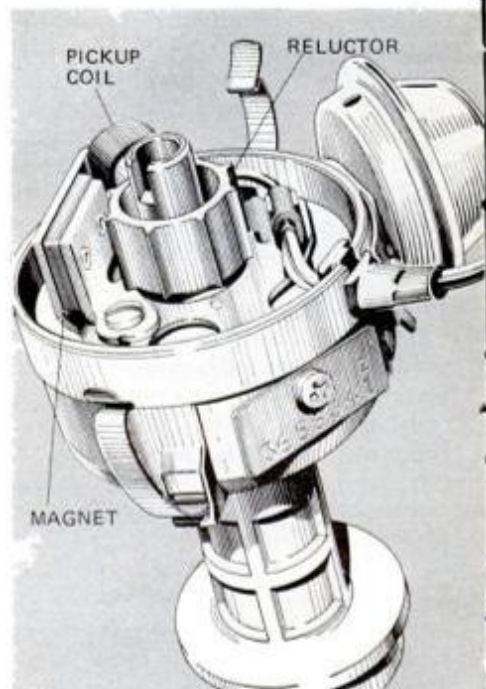
AMC and Chrysler claim that the plugs in their cars can last as long as 30,000 miles; GM says 22,500 miles; and Ford, 20,000 miles.

It's not service-free

Too many people may get the idea that an electronic ignition system requires no service and can never fail, neither of which is true.

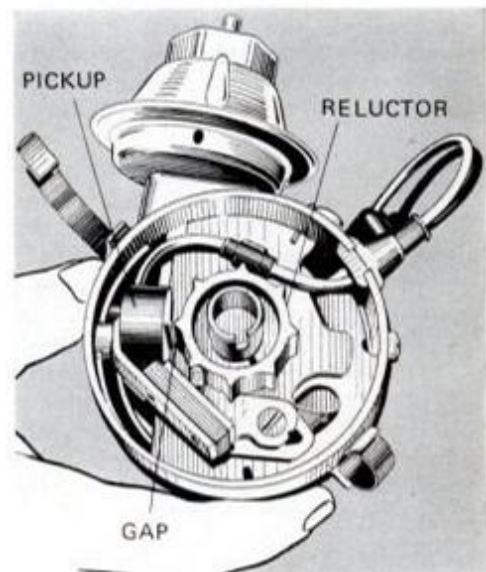
What you have to do every 20,000 to 30,000 miles, depending on the manufacturer's recommendation, is so easy that you can practically do it in your sleep. But it must be done. Otherwise the engine will fail to start or will start running rough. Make these checks:

- As mentioned, replace sparkplugs, but also remove the distributor cap and inspect the rotor for cracks and burned areas on the metal strip. Replace the rotor if it's damaged.
- Inspect the distributor cap by wiping it clean with a dry rag. Look for cracks, corroded terminals and carbon tracks. Replace a damaged cap.
- Replace high-tension wires if insulation is brittle or frayed, but the preferred way of checking wires is to test them for excessive resistance with an ohmmeter.
- If wires exceed the resistance values shown in the table on the facing page they should be replaced (replace



Distributor used with typical electronic ignition system looks like conventional unit. The difference is inside: Reluctor and pickup coil are the make-and-break components. They do the job of the cam and breaker points in a conventional ignition system.

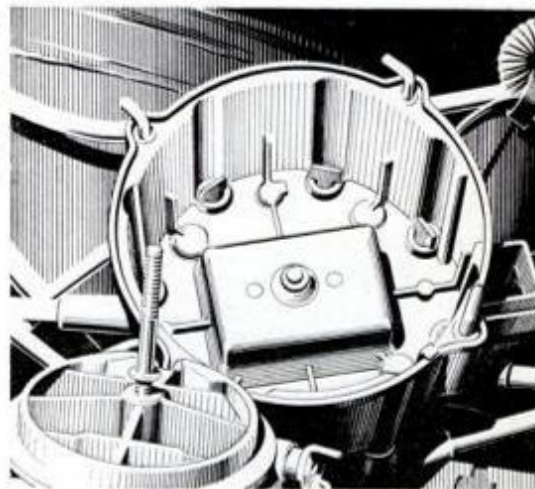
Point gap in a conventional system has its equivalent in an electronic ignition system in the gap between pickup and reluctor. The reluctor teeth pass very close to the pickup but they never touch it.



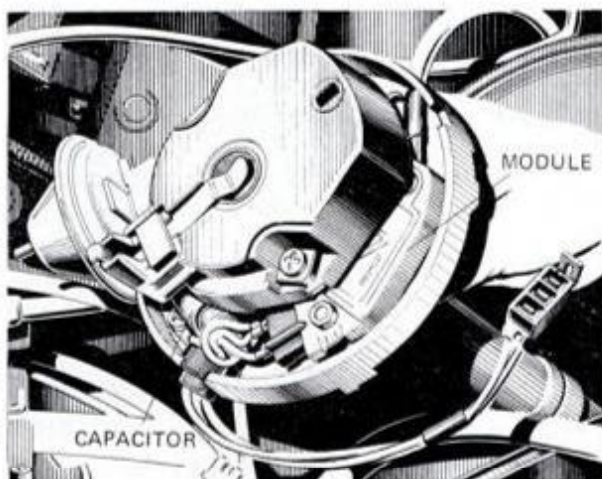


1975 General Motors cars use the distributor shown here in their electronic ignition systems. It's much larger than other makers' because it houses more components.

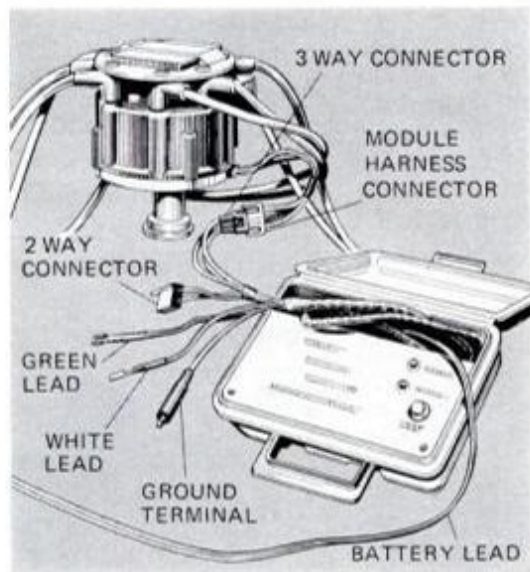
Inside distributor cap of the GM electronic ignition system (called HEI, for high-energy ignition) is the rectangular-shaped ignition coil. Not molded into the cap, it can be removed and replaced separately if necessary.



The large rotor takes up most of the space inside distributor body of the GM HEI system. Also inside is the module or electronic control unit and a capacitor. It is not part of the ignition operating circuitry, but functions as a noise suppressor for the radio.



Length of wire (in inches)	Maximum resistance (in ohms)
up to 15	10,000
15-25	15,000
25-35	20,000
over 35	25,000



Special test instrument built by General Motors for use with HEI system checks on all functions. It connects to module harness and gives go/no-go readings. See text for further discussion of test instruments.

wires as a set—if one shows excessive resistance, replace them all).

■ Finally, check ignition timing—the same way as you've been doing it for conventional ignition.

Suppose an engine with electronic ignition becomes hard-starting or begins running rough at all speeds. (If it runs rough only at idle, the ignition is not at fault. The problem may be located in the ignition system, which should be tested.

Special test equipment

Troubleshooting electronic ignition is as easy as troubleshooting conventional ignition, especially the GM and Chrysler systems, with a special tester giving read-outs on a test panel to show a "go" or "no-go" condition.

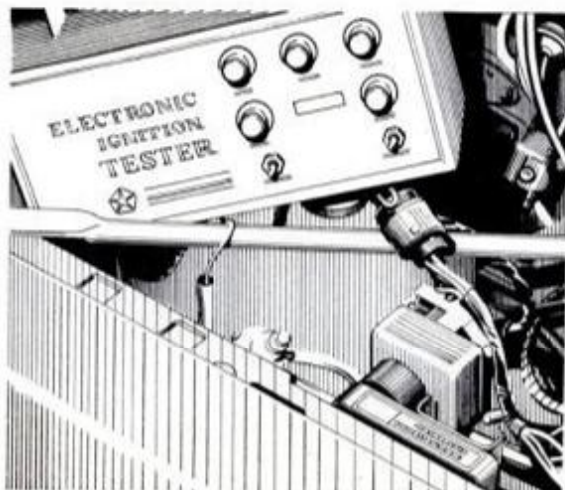
The GM electronic ignition system, called High Energy Ignition (HEI), is uniquely different from Chrysler's, Ford's and AMC's. All components, including the ignition coil and electronic control module, are built right in the distributor.

Testing HEI the easy, modern way requires the HEI tester (J-24642) which the maker, Kent-Moore, says will be sold directly to the public.

When this was written, the HEI tester cost \$65, plus shipping. If you're interested, write Kent-Moore Tool Div., 1501 South Jackson St., Jackson, Mich. 49203.

The special tester used to trouble-

In the Chrysler system, the electronic ignition tester plugs into the electronic control unit. It tests the primary circuit, auxiliary ballast resistor circuit, pickup circuit, ignition input voltage, control unit, ignition coil.

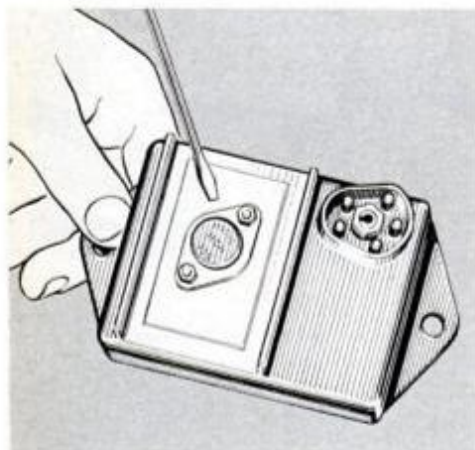


shoot the Chrysler electronic ignition system (C-4166-A) costs \$75.50, plus shipping. It can be ordered from Miller Special Tools, 32615 Park Lane, Garden City, Mich. 48135.

Testing with these meters is quite simple. Generally, you hook the tester into the control-unit wiring harness and make most tests in this one position.

Using simple meters

However, you do not need a special tester. If you have a sensitive dc



Switching transistor in the Chrysler electronic ignition system is mounted on the control unit. Don't touch it when the ignition is on—you'll get a jolt.

voltmeter and ohmmeter, you can test any electronic ignition system. Ford and AMC units make no provision as yet for special testers—just an ohmmeter and voltmeter.

Each of the four systems—GM's, Chrysler's, Ford's and AMC's—is tested in a different way, and we don't have the space to discuss each here. However, special testers come with complete instructions. If you use a voltmeter/ohmmeter, you must have a service manual for your car, which outlines the procedure.

Do not try troubleshooting an electronic ignition system without instructions. There are many pitfalls, and a wrong connection can result in a burned-out system.

In servicing the various systems, I found there are several obstacles to avoid that aren't necessarily mentioned in instructions. You should be aware of the following if you decide to service your car's electronic ignition system:

Service tips:

1. You can get an overall indication of electronic-ignition functioning in every system except GM's by disconnecting the high-tension wire from the center tower of the distributor and holding its end about 1/4 inch from a ground. Crank the

engine. A fat blue spark arcing the gap between the wire and ground indicates a solidly performing system. Use insulated pliers to grasp the wire. The bare-handed method may give you a stiff jolt.

Caution: With a conventional ignition system you can pull a sparkplug wire from a plug when making this kind of spark-intensity test. But don't do it with electronic ignition. Depending upon the system, if you hold the wrong wire to ground it can result in damage because of internal arcing in the distributor.

2. Be careful around the switching transistor: It receives pulses from the pickup coil. It's "hot" and can set you on your tail if you touch it when the ignition is on.

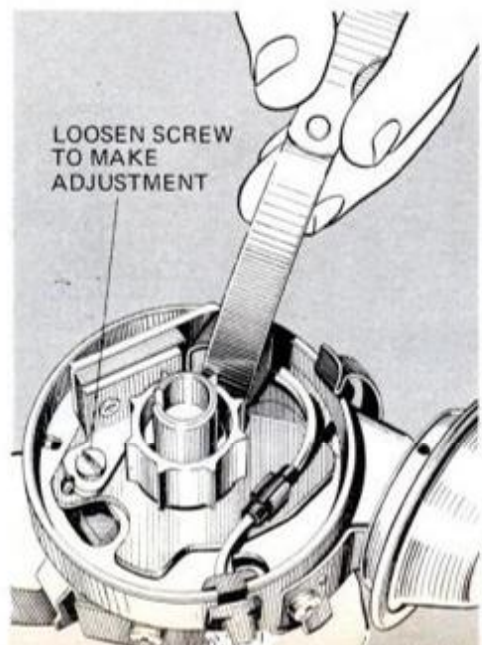
3. When you remove the distributor of the HEI system, you'll see what looks like a condenser, but don't think they made a mistake at the factory and equipped your unit with a conventional ignition-system part. It's a capacitor which is not a component of the ignition system. It functions as a noise suppressor for the radio.

4. If the engine is hard-starting after a pickup unit has been replaced, suspect that the air gap between the reluctor and pickup coil was not set properly. The gap must not be set with a magnetic feeler gauge. An erroneous setting will be obtained because of the constant magnetic field surrounding the coil. Use a non-magnetic feeler, preferably one made of plastic.

5. Be careful around the pickup coil. Its wires are very delicate and can easily split.

6. A hairline crack in the pickup
(Please turn to page 150)

Setting gap between the reluctor and the pickup should be done precisely, following specs for car. Do not use magnetic (metal) feeler gauge; use plastic one.



Home Improvement Is Just A Page Away

That's right!

Beginning on the page at right Popular Mechanics has brought together the plans, the projects, and the ideas that will help you improve your home in many ways.

It's the third annual Home Ideas Guide featuring everything from decorating your basement to step-by-step indoor garden instructions . . . from how to tile to adding on beautiful decks . . . from great yard furniture you can build to home sewing centers your family will love you for. It's a storehouse, magazine-within-a-magazine of home ideas and home improvement hints that belongs in every home.

To make it easy for you to save this guide, we've made it a completely self-contained unit. Here's how to remove it from the rest of the magazine for easy reference.



- 1 Bend the magazine's pages away from the Guide's front cover.
- 2 Now, bend the magazine's back pages away from the Guide's last page. (Fig. 1)
- 3 Pull the Guide out. (Fig. 2)
- 4 Staple, or hole-punch the Guide.
- 5 Keep it for handy reference.

Home Ideas Guide

30 ways
to spruce up
your home

- Decks for summer fun
- Benches and planters
- Fold-up patio table
- Living indoor gardens
- Washer and dryer hideaways
- 'Big Top' basement playroom
- Extra room in the attic
- Dual-purpose bathroom rack
- Wall desks for homework
- Clever sewing centers
- Accordion shower door
- Exciting remodeling products



Roofscape by Bird.

A beautiful way to raise your property value this year.

These days, your home is one of the best investments around. And one of the best ways to make it grow beautifully is with a new Bird Architect® 70 roofscape.

The value of an Architect 70 roof is tough to beat. Its deep, irregular shadow lines give the richness of wood shake shingles. But it's actually today's heavyweight asphalt. That means it won't rot, warp, or burn like wood. And it will save money in the long run.

Architect 70 offers more than superior resistance to wind, weather, and fire. It helps you improve your landscape, too. We call it Roofscape because its warm, textured earthtones are in harmony with the sky, trees, and terrain . . . blending with everything from formal shrubbery to rugged wilderness.

Your Bird Roofscaper is in the Yellow Pages. Give him a call today for a free estimate. And if you'd like more reasons why "the best dressed homes wear Bird," mail in the coupon.

Bird & Son, inc.
E. Walpole, MA 02032

Popular Mechanics
April 1975

Enclosed is 50¢. Please send me your 32-page, idea packed booklet, "What You Should Know About Roofing and Siding Before You Build or Remodel."

Name _____

Street _____

City _____ County _____

State _____ Zip _____ Phone _____

Please send me free basic facts on Bird Solid Vinyl Siding. Bird Asphalt Shingles.
I'm thinking of building. remodeling.

*In honor of the Bicentennial, Bird is providing a matching grant program to non-profit organizations for restoration projects nationwide.





Build a deck— it's the low-cost way to get more room

by Harry Wicks
WORKSHOP EDITOR

Firmly entrenched as part of the American lifestyle, outdoor living can be as pleasant as you want to make it. Whether you attach a deck to your home to serve as a transition area from house to nature, to function as a sun trap, or to be an extension of indoor living, it is unquestionably the least expensive way to add more living space to what you already have.

In the past two decades patios and terraces have evolved from little more than drab slabs of concrete to the sophisticated-looking structure shown on these pages. Of multilevel design, it has many features you may want to adopt, whether your site is hilly or flat.

We've zeroed-in on three outstanding features: steps, planters and railing. How they're put together is shown on the following pages.



As if to prove the point that do-it-yourself construction isn't always as difficult as it may seem, the deck shown above—which is attached to a house parked on a hilly site in San Anselmo, Calif.—was built entirely by John Braun, age 18. An accomplished (and locally celebrated) ceramic potter, John noted that the project was a challenge "worth the effort considering the use that the family now gets from this outdoor room."

Ideal place for redwood

A multilevel deck makes sense because it reduces the amount of furniture you will need when entertaining a crowd—you simply scatter pillows and use the steps.

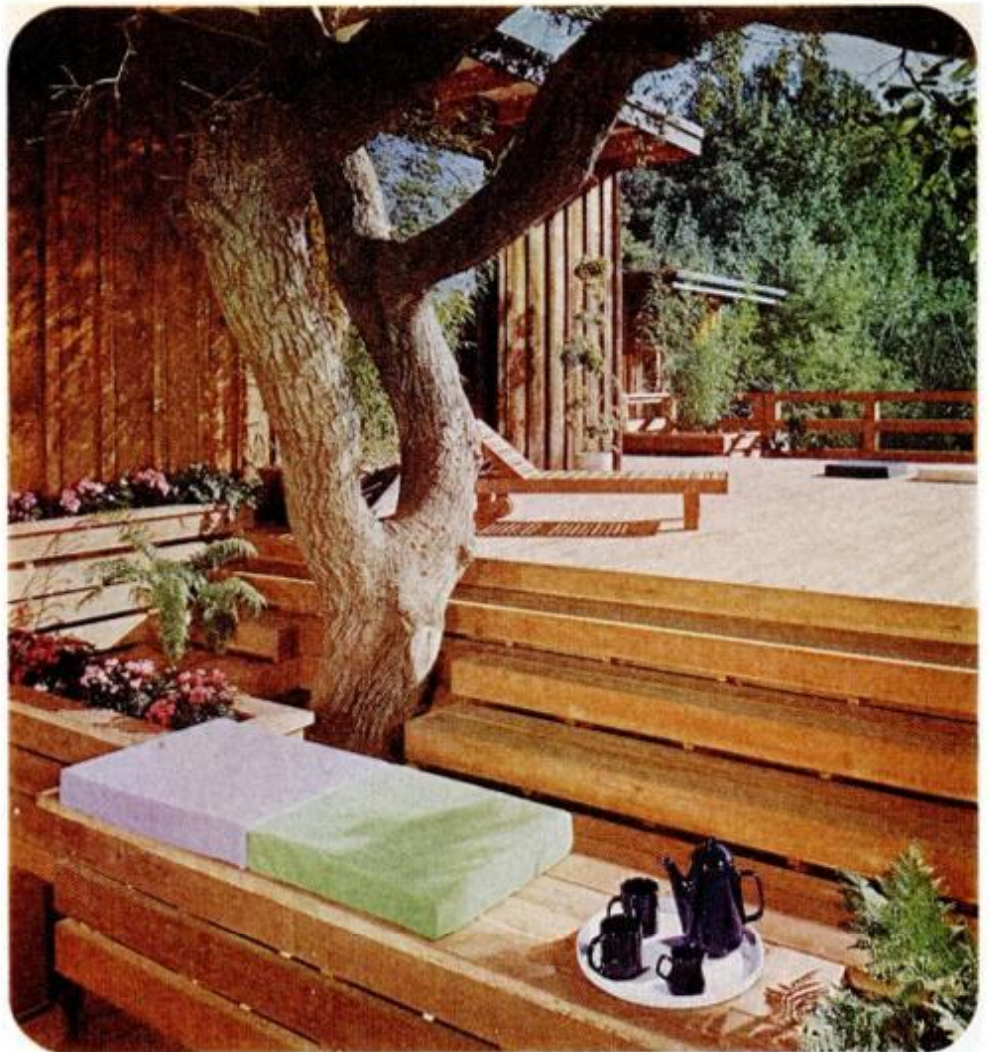
There are some basics you should be familiar with before taking on a deck project. For example, to get good appearance and high resistance to attack by insects and decay, you should consider using redwood throughout. And you can select from the lower-cost redwoods: Construction Heart is generally used for construction in or near the ground; Construction Common for decking and other off-the-ground members.

Fasteners

Make certain you use either stainless steel, aluminum alloy or hot-dipped galvanized nails and fasteners. These won't rust and cause ugly stains on the wood.

Finishes

Redwood gives freedom of choice



Big advantage gained with multilevel deck is that the need for a great deal of patio furniture is eliminated—you simply use the steps for extra seating. Handsome deck shown has levels requiring three steps (photo above) and two steps (below). How they were built is shown on facing page; redwood was used throughout.



Back view of architectural railing surrounding deck (right). Alternate posts are fashioned using three lengths of 2x6-in. material per post; posts in between are doubled-up. Since good deck construction calls for use of noncorrosive nails and fasteners, hefty galvanized bolts were used to secure railing to deck.

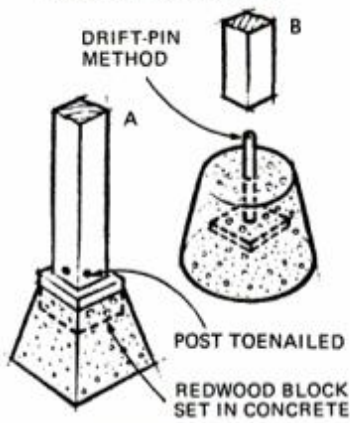


Front view of sturdy railing is what you see from deck (left). Redwood planks which sandwich the rails are held together with bolts, washers and nuts. Notice that no attempt was made to conceal the boltheads; by choice, the fastening hardware has been left exposed to serve as an interesting architectural detail.

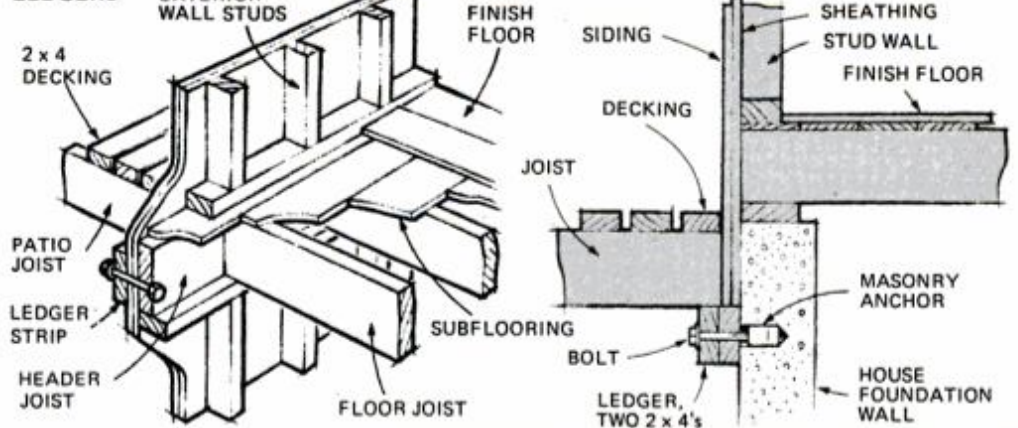


Simple, yet elegant, planters (above) are strategically located to divide levels. These are well-stocked with plants to provide lots of color and create mood-setting decor. Plants are not permanently installed in planters. Instead, potted plants sit upon 2x2 rails. This way, rainwater passes through instead of collecting.

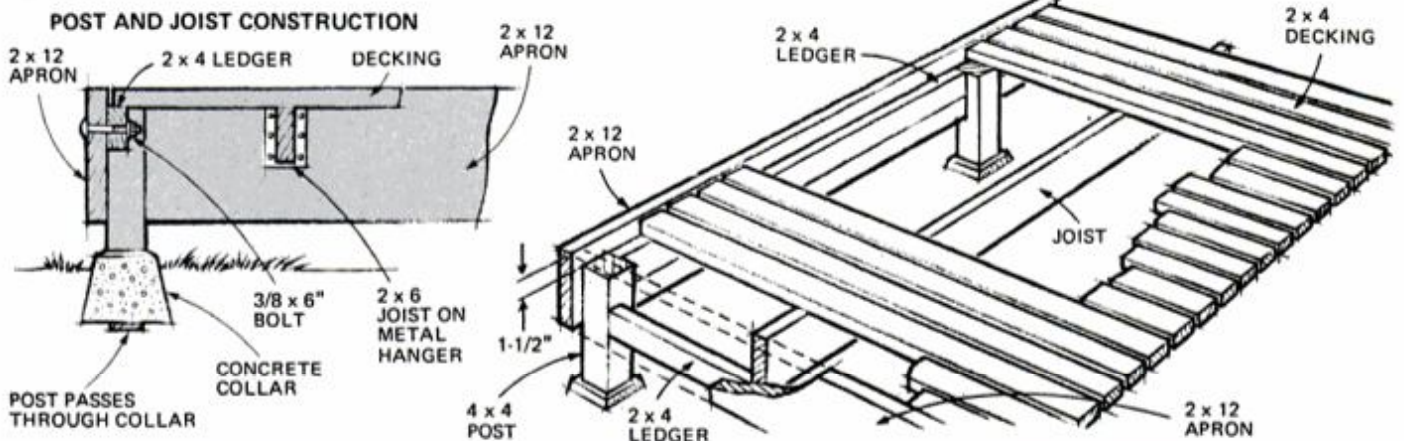
POST ATTACHMENTS



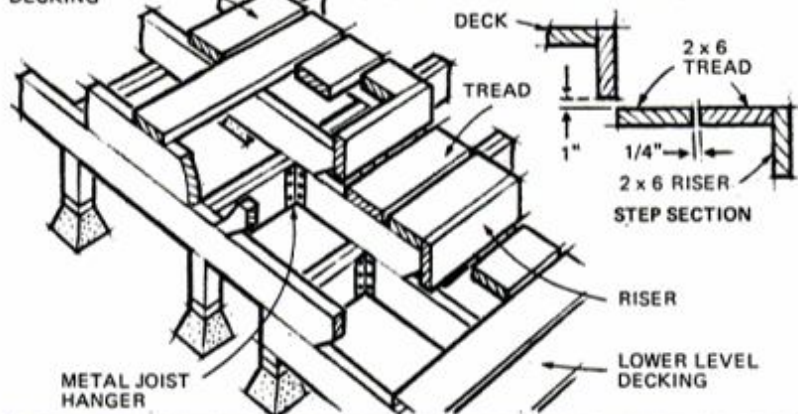
LEDGERS



POST AND JOIST CONSTRUCTION

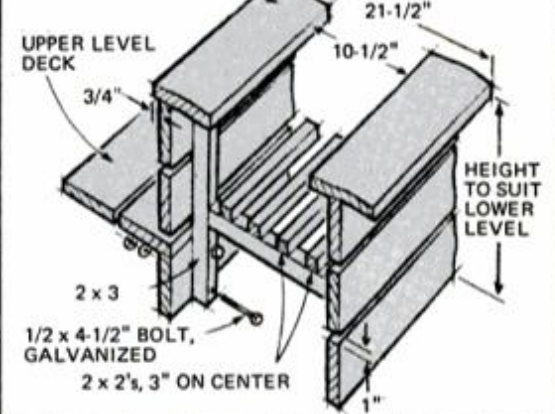


UPPER LEVEL DECKING

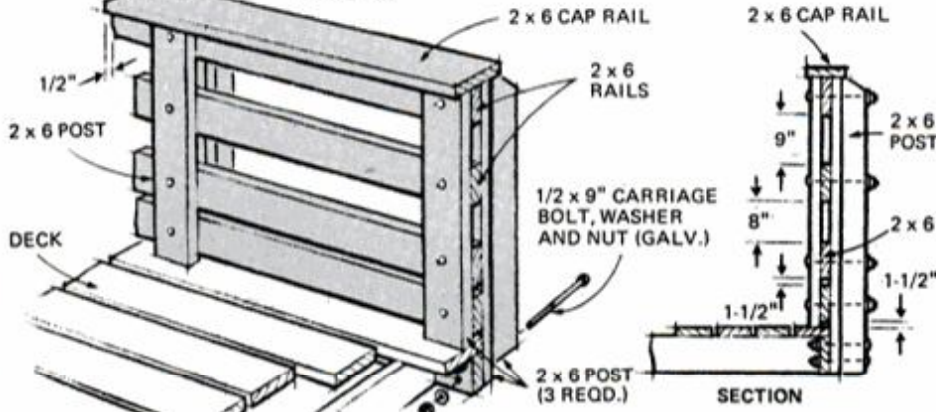


STEPS FOR MULTILEVEL DECK

PLANTER



RAILING



when you're picking a finish. Here's a quick rundown:

- A clear water-repellent finish is highly recommended. Easy to apply, it stabilizes wood color, retards weathering and reduces moisture effects.
- Bleach can be used to hasten a driftwood-gray effect similar to natural weathering.
- Pigmented stains won't completely hide the grain and they look more natural than paint.
- Varnishes aren't recommended; they deteriorate rapidly in outdoor use.



PM's stowaway for patio dining

Designed exclusively for PM, this unique table folds up for quick and easy storage.

by Wayne C. Leckey HOME AND SHOP EDITOR

It's great to have a big table out on your deck or patio for those pleasant summer-evening meals. But finding a place to store it is something else. Often it simply stays outdoors all year.

We tossed the storage problem at designer Tom Fung, well known for his unique designs, who came up with the ingenious folding table you see here. Eighteen pivot points make it possible to fold the table into an incredibly small space of 2x5 feet, which means you can park it in a garage or basement with room to spare.

We built the prototype, from long-lasting redwood for a material cost of about \$75. If you use No. 2 pine and paint it, it can be made for less. While it may look difficult, it's actually an

(Please turn to page 118)

PAINT ISN'T ALL IT'S CRACKED UP TO BE.

Consider these guaranteed alternatives...

If the exterior of your home is old paint, old stain, or unfinished new wood, we're talking right to you. Odds are you want the finish you put on to do two things: Look beautiful and stay that way. That's why, before you settle for house paint, we'd like you to think about these four guaranteed ways to do the job better.

Put on the Overcoat:

If you've got old paint, why add another layer to the problem? Instead of repainting, put on new Olympic Overcoat. Overcoat is a truly revolutionary new acrylic coating—like some paints—but so superior we refuse to even call it paint. Overcoat goes on easier than anything you've ever used. It covers almost any surface in a single coat and dries quickly to a beautiful flat finish that lasts and lasts.



Overcoat goes on easier than anything you've ever used. It covers almost any surface in a single coat and dries quickly to a beautiful flat finish that lasts and lasts.

It's guaranteed better than house paint!

You'll be amazed at the way Overcoat performs. Try it. If you're not convinced that Overcoat is better than house paint, return the remainder of your first gallon and any unopened cans, with receipt, to your dealer, and he'll refund your money.

For the mellow look.

To dress your home in mellow, rich color—use Olympic Solid Color Stain. Rich in pigment, Olympic Solid Color Stain covers beautifully without forming a thick film. Instead it penetrates the wood—lets it breathe—for lasting protection. We guarantee your money back (or provide replacement gallons at our option) if Olympic Stain ever cracks, peels or blisters.



Stain over old paint?

That's right. Thousands of homeowners have done it successfully—just as long as the surface is rough wood siding, shingles or shakes. A single coat is usually all it takes to achieve the mellow beauty you can only get with solid color stain.

Plus water clean-up.

If you'd like the stain effect and guarantee—plus water cleanup—your answer is new Olympic Acrylic Latex Solid Color Stain in the blue can.

For the ultimate beauty of wood.



Olympic Semi-Transparent Stain does the most beautiful thing you can do for new wood: It highlights the natural grain and texture, enhancing wood's appearance with soft color that weathers graciously. Rough or smooth siding, decks, fences, outdoor furniture—you name it—

if it's wood, nothing adds subtle beauty and lasting protection like Olympic Semi-Transparent Stain. It too is backed by the Olympic Stain guarantee.

Ask a pro.

For straight answers to any questions you have about finishing your home, see your Olympic dealer. Look for them in the Yellow Pages.

Olympic Stain. A division of COMERCO, INC.,
Dept. C, 1148 N.W. Leary Way, Seattle, WA 98107.

**Olympic Overcoat or Olympic Stain.
Guaranteed satisfaction you won't get with paint.**



PM's FOLD-UP PATIO TABLE

(Continued from page 116)

easy table to build, mainly because all the parts are of lumberyard size which you just cut to length.

The table is identical each side of a centerline. Each bench is alike, as is each scissor-folding leg. Spotting the seven pivot holes for each leg is done best by marking their locations on a sheet of plywood or wrapping paper and drilling the holes in the leg members to correspond. Round the ends of the members to a 1 3/4-in. radius and drill holes at the compass points. A good stunt to follow when rounding the ends and drilling the holes is to do two or more ends at one time by clamping the members together. This assures perfect alignment of the holes and makes for a neater job.

Cut parts C, to which the six table-

top members are attached, from 1 1/8-in.-thick stock and join them endwise with 5-in. strap hinges. Drill an additional hole in each hinge leaf for a second carriage bolt. Use wood turnbuttons to lock the tabletop in the open position; place them on the underside near the hinges, on opposite sides of the centerline. You can keep the bench legs from being kicked outward accidentally by use of king-size hooks and eyes, and draw up the carriage bolts holding the legs snugly so the legs do not swing freely. Place three large washers between leg members at each point where the benches attach, elsewhere, just one washer. Place washers under all nuts, of course.

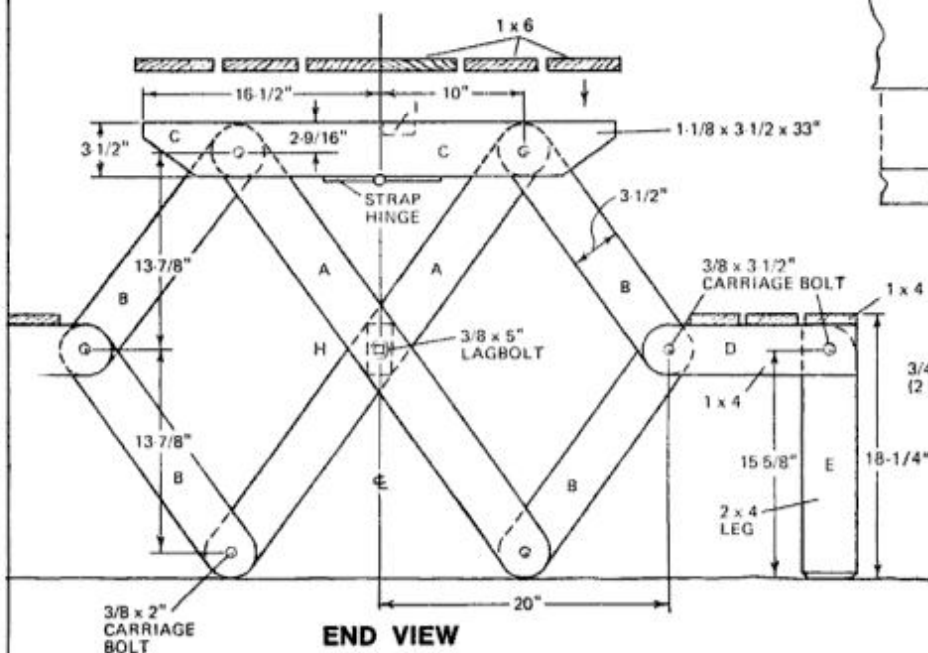
Brass flathead screws are best for fastening the seat and top boards since they won't rust; cadmium-plated are second best. You have a choice of leaving the screwheads

exposed or driving them in counter-bored holes and capping them with wood-screw plugs. Space all boards 1/4-in. apart except at the center. Your completed table can be finished with redwood stain or left as is to weather naturally. ★ ★ ★

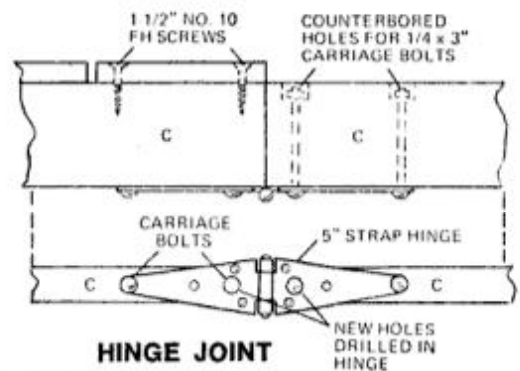
MATERIALS NEEDED (Redwood)

Key	Size	Amt.
A	3/4 x 3 1/2 x 38"	4
B	3/4 x 3 1/2 x 20 3/4"	8
C	1 1/8 x 3 1/2 x 16 1/2"	4
D	3/4 x 3 1/2 x 14 3/4"	8
E	1 1/2 x 3 1/2 x 17 1/2"	4
F	3/4 x 3 1/2 x 60"	6
G	3/4 x 5 1/2 x 60"	6
H	1 1/2 x 3 1/2 x 34 3/4"	1
I	3/4 x 1 3/4 x 10"	2
Hardware		
	1/4 x 3" carriage bolts	8
	1/4 x 3 1/2" carriage bolts	4
	1/4 x 2" carriage bolts	4
	1 1/4" No. 10 FH wood screws	2
	1 1/2" No. 10 FH wood screws	48
	1/4 x 6" hooks and eyes	4
	5" strap hinges	2
	Cadmium-plated washers	34

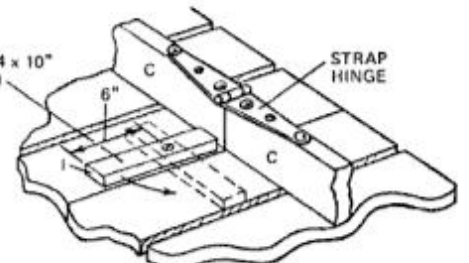
Construction details



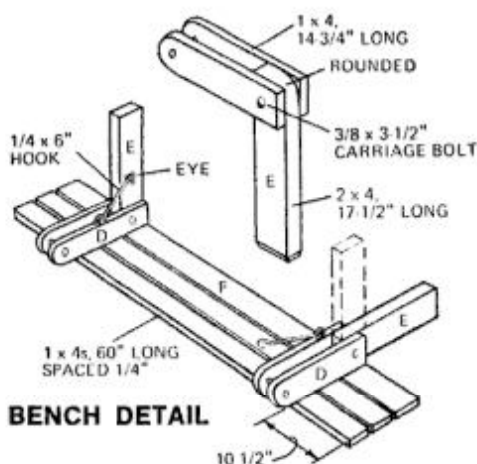
END VIEW



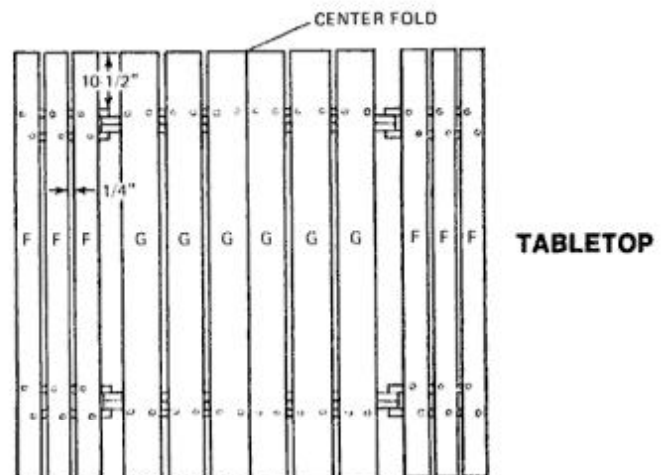
HINGE JOINT



TURNBUTTON DETAIL



BENCH DETAIL



TABLETOP

IT DRILLS IN WOOD, METAL,
PLASTIC. DRIVES SCREWS
IN, AND REVERSES TO TAKE
THEM OUT. CHISELS WOOD
TO MORTISE A DOOR. LIFTS
OLD TILE FROM THE FLOOR.
IT BORES IN CONCRETE OR
BRICK OR ROCK.



SKIL
XTRA-TOOL

Growing gracefully



Two lush indoor gardens—a living wall that blends with colonial decor and a contemporary plant stand. Plans for building both are on page 122; you can build either in a single weekend.

An individual potted plant adds an attractive touch to a room. But when you group several plants in an indoor garden, you'll create a luxuriant display of foliage that hints of spring—even when snowdrifts are piled outside the window.

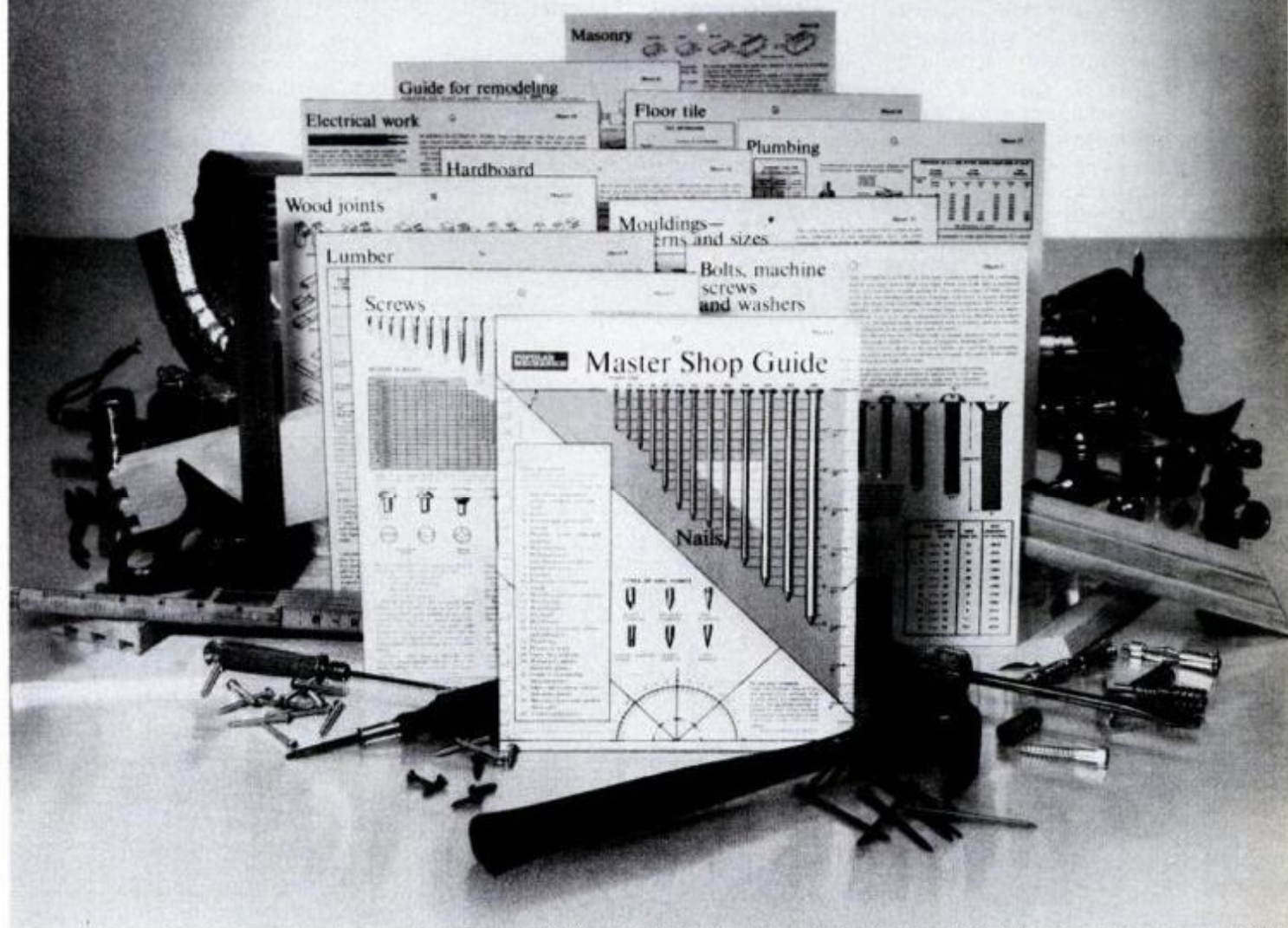
The arrangements shown are both practical and good-looking. They're designed to simplify daily plant care, and construction (detailed on the following page) has been kept simple. In addition, the structures protect the floor beneath the plants.

Place your indoor garden so plants get best exposure to light. If artificial light is needed, you can use a type specially designed for horticultural purposes. (Vita-Lite by Duro-Test Corp., North Bergen, N.J., is such a light; it emits the full spectrum of natural light plus the beneficial ultraviolet spectrum.)

(Please turn to page 122)



One of the most important tools you'll ever buy.



Why? Because MASTER SHOP GUIDE lays out everything you need to know, graphically and ready-to-use.

What? All about nails, screws, bolts, wall fasteners, drills, abrasives, lumber, plywood, gypsum, adhesives, paneling, shop math, stair construction, masonry, wood finishing, plumbing, pipe fittings, electrical work, gutters, concrete, remodeling measurements *plus* a built-in ruler, protractor, 45° tri-

angle and compass. *You'll use it in every job you tackle.*

How? Twelve hang-up, stand up boards. 24 surfaces of laminated-to-last wipe-clean plastic. 56 charts. *The fundamental workshop reference tool.*

Who? Chances are, your "shop-wise" neighbor already has one. Nearly two hundred thousand sets have already been purchased by Popular Mechanics readers and shop enthusiasts.

When? *Right away!* You can get your set in a few days by mailing this coupon along with your check or money order for \$4.49 postpaid.

PM Master Shop Guide, Dept. D-5,
Box 1014,
New York, N.Y. 10019

Please send me _____ set(s) of Popular Mechanics
MASTER SHOP GUIDE. I enclose \$4.49 postpaid.
Make checks payable to Popular Mechanics

Name _____

Address _____

City _____ State _____ Zip _____

HM Specialties

GROWING GRACEFULLY

(Continued from page 120)

Living wall

Constructed of $\frac{3}{4}$ -in. plywood with a 2x4 grid, this garden requires no elaborate joinery—all pieces are simply butt-joined.

Start by measuring the wall area and if necessary, adjust drawing dimensions. The unit's height is critical so make certain you measure carefully. The top can be flush with, or just a shade lower than, the window stool. If you build a taller unit, make certain you will be able to operate windows.

Assemble the wall unit using waterproof glue and screws. The wall unit is freestanding—unless the floor it rests on is badly out-of-level. If so, shim the unit plumb with wood shingles and use several screws through the unit's back into the wall

studs. The floor grid is of 2x4 stock. Each well is fitted with a sheet-metal box; joints are soldered to protect the floor below.

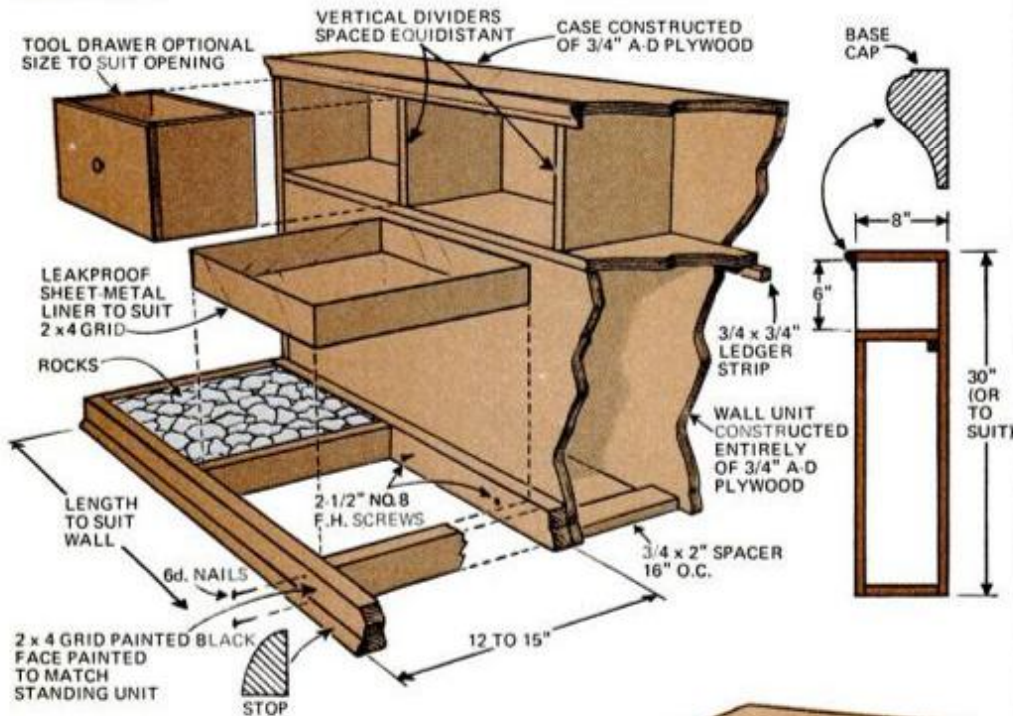
To finish, apply a coat of primer, allow to dry and paint with colors to suit. For looks, paint the grid interior black and use wall color on the face to coordinate with the wall unit.

Contemporary plant stand

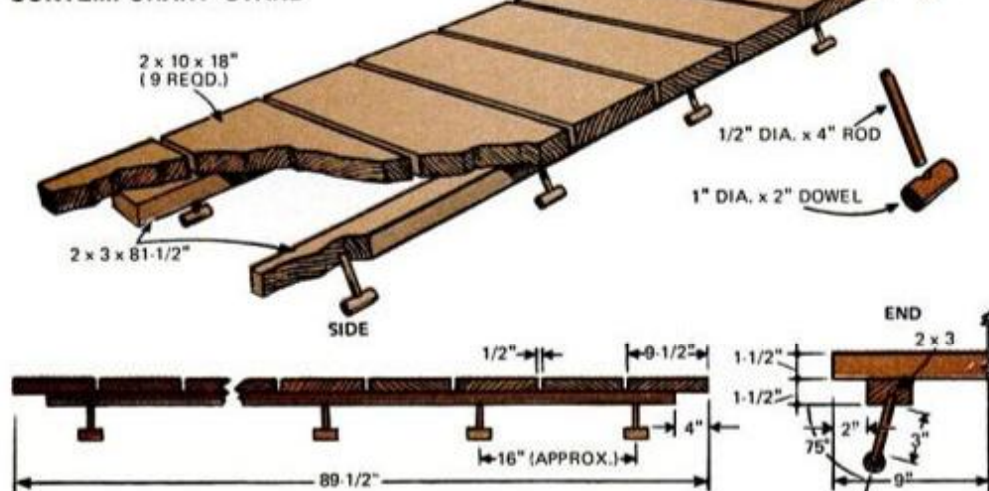
Simplicity is the word here. The unit consists of short lengths of 2x10 redwood fastened to a pair of 2x3s. The trickiest part is maintaining the angle for the holes which receive the dowel legs. If you lack know-how for setting up a drilling jig, simply make the legs perfectly vertical.

Finish the stand using clear waterproof sealer on the redwood. ★★

LIVING WALL



CONTEMPORARY STAND

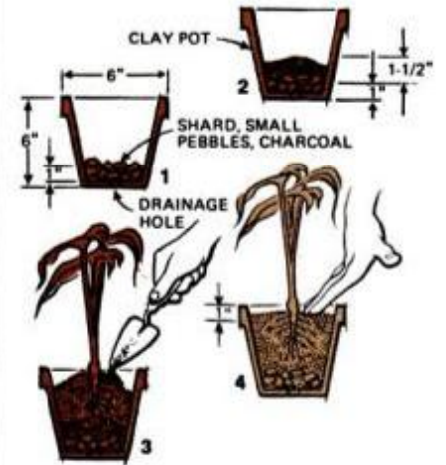


Tips for starting an indoor garden

Which plants to grow is basically a question of light source. Actually, you can grow practically any plant indoors, from roses and foliage to lush tropical varieties and cactus. It all depends on the quality of light. Do you have direct sunlight all day? Or is it partial or filtered sunlight? Or northern light? Or artificial light? Once you know the location of your indoor garden, you can select your plants using any good plant book giving a full list of light and temperature requirements.

Pots. Most indoor gardeners prefer clay pots, but you may want to pick up several ceramic jardinières for use as color and shape accents in your planting setup.

It's a good idea to buy correct-size clay saucers to go with the pots. Pick those that have a protective coating to prevent water from seeping through to plant stand or furniture.



Potting a plant. Use only a clean container to pot a plant. And a new clay pot should be soaked overnight in water to minimize the amount of moisture it will draw from planting. The sketch illustrates the four basic steps of potting: 1. Fit a piece of sherd (broken pot) over the drainage hole then add some porous stones. Toss in some pieces of charcoal, too, to keep the soil sweet. 2. Add a small mound of soil—about $1\frac{1}{2}$ in. deep. 3. Holding the plant in place, fill around it with soil. 4. Firm the soil around the stem, then eliminate any air spaces by striking the pot on the bench several times. Soil should be about 1 in. from top so there is room for watering.

Watering and feeding. When you water, do it thoroughly—add water until excess runs from the drainage hole. Water your plants in the morning because moisture lingering at night invites fungus disease.

Humidity. Since plants release moisture through their leaves, an occasional spraying with a fine water mist is helpful.—Harry Wicks, *Workshop Editor*.



Bolens Mulching Mower™ offers a new way to get rid of grass clippings.

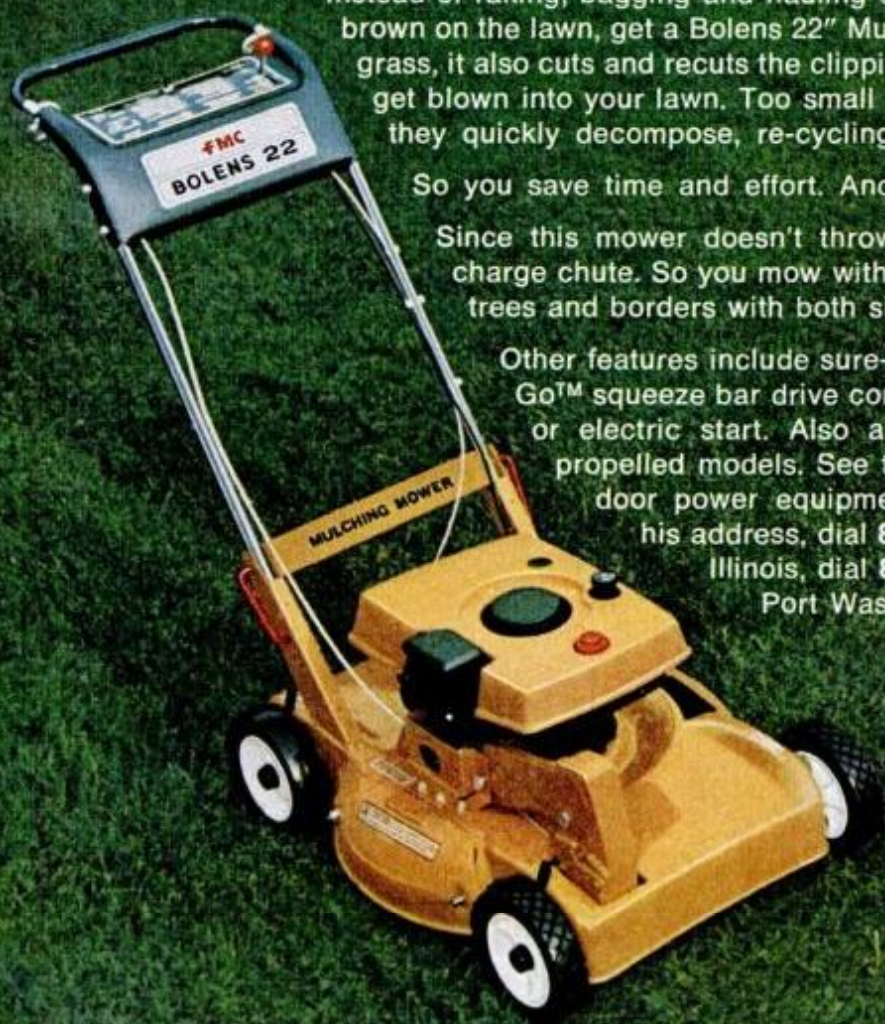
Don't have any.

Instead of raking, bagging and hauling clippings, or watching them turn brown on the lawn, get a Bolens 22" Mulching Mower. When it cuts your grass, it also cuts and recuts the clippings into tiny mulch particles that get blown into your lawn. Too small to contribute to thatch build-up, they quickly decompose, re-cycling nitrogen back into your lawn.

So you save time and effort. And save again on fertilizer costs.

Since this mower doesn't throw out clippings, there's no discharge chute. So you mow with greater safety. And trim around trees and borders with both sides of the mower.

Other features include sure-footed front wheel drive. Grip 'n Go™ squeeze bar drive control. And your choice of manual or electric start. Also available in 22" and 18" hand-propelled models. See the complete line of Bolens outdoor power equipment at your nearest dealer. For his address, dial 800-447-4700 toll free anytime (in Illinois, dial 800-322-4400). FMC Corporation, Port Washington, Wisconsin 53074.



FMC Consumer
Products

Hideaways for kitchen and laundry

Finding additional storage space in your kitchen and laundry is generally a game of "seek-and-hide." Presented here are several game-winning ideas—from Maytag, the "inner" space experts when it involves washers and dryers.

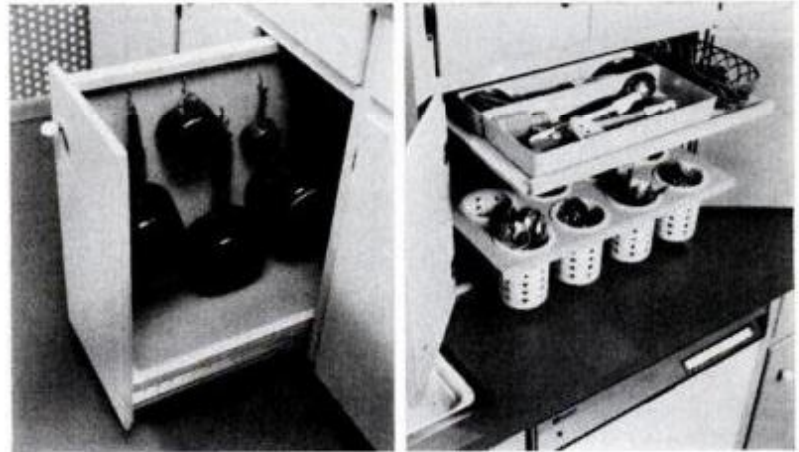
In the area between counter and cabinet and directly above the dishwasher, mini cabinets with slide-out shelves put unused space to great use. Incorporated into the existing upper cabinet, the extra cabinets house restaurant-type silverware canisters in a pull-out shelf to organize silver storage and make a short "trip" between dishwasher and cupboard. Canisters are available at restaurant-supply outlets.

In another example, pan storage takes on the ultimate in convenience when a base cabinet is customized with pegboard and hooks to create hanging space. Made to look like a door but to pull out like a drawer, the sliding unit makes the most of inches of space.

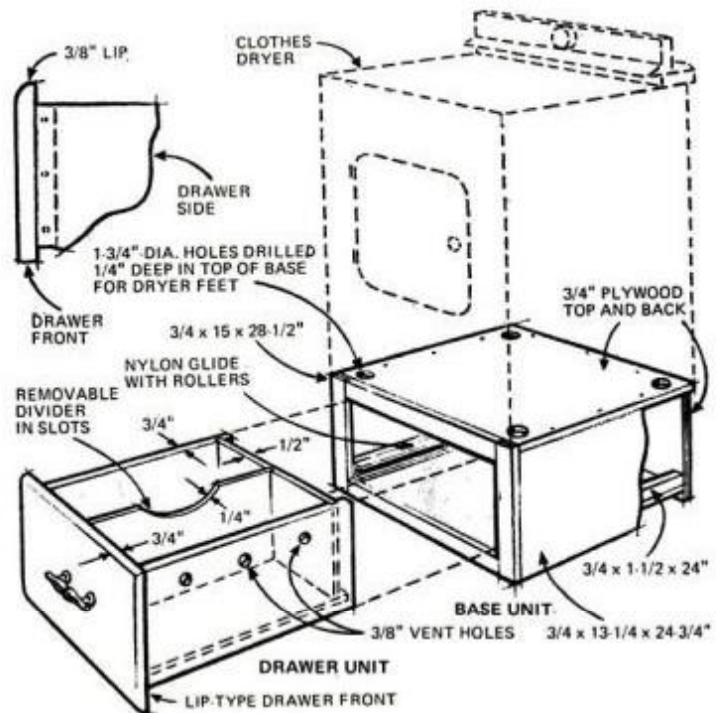
More lazy space that can be made to work for you is the area above a clothes dryer. Since a dryer does not have to sit on the floor, it makes sense to elevate it for two reasons. When placed



Pull-out shelves and bins close by dishwasher provide organized storage for pots, pans and silverware.



Elevated dryer rests on platform that has roomy storage drawer. Three tip-out bins alongside are for soiled clothes. Plan for making dryer platform is shown at right.



Adhesives for Sticklers.

Weldwood
Acoustical
Tile Adhesive

Weldwood
Drywall Stud
Adhesive

Weldwood
Wall Board
Adhesive

Weldwood
Ceramic Tile
Adhesive

Weldwood
Carpet Cement
(Regular and Peel-up)


Weldwood
Floor Tile
Cement

Weldwood
Paneling
Adhesives

Weldwood
Cove Base
Cement

Weldwood
Linoleum
Paste

For all the adhesives you need to do a professional job, stick with **Weldwood®**

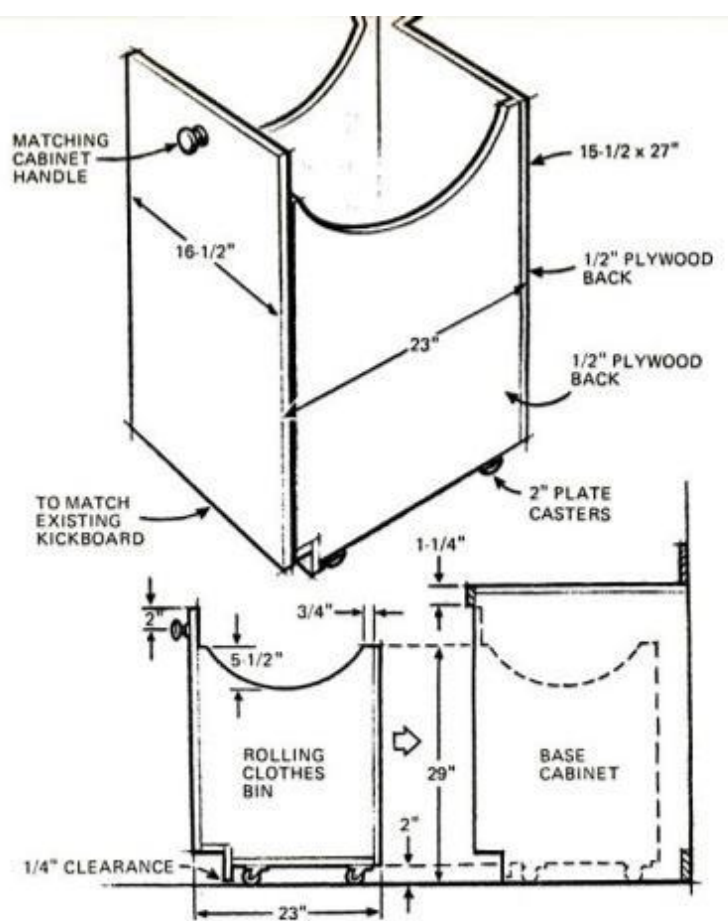
 Roberts Consolidated Industries
Subsidiary of Champion International

Материал, защищенный авторским правом

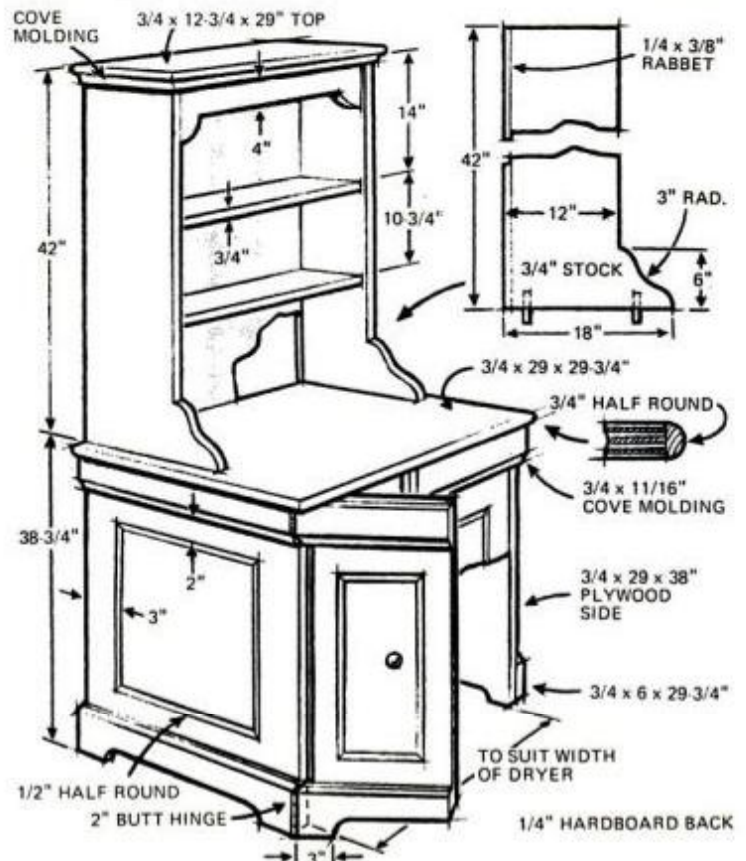


on a sturdy wood platform that's fitted with a drawer, you have a place for soiled clothes, and the dryer is up high where you can load and empty it without as much as bending a knee.

A roll-out bin that appears as just another cabinet when parked under a counter can make laundry chores a lot easier. You stash the soiled clothes in the bin as you collect them, then roll it back to the laundry room where color-coded sorting drawers are waiting to store the clothes until washtime.



When a kitchen is so small it even rules out a convertible dishwasher, there is no need to do without one—simply park it in the dining room in a “garage” that serves as an attractive hutch. When its doors are closed, no one would guess your dishwasher is inside. It's handy, too, for it can be loaded right at the dining table, then rolled to the kitchen and connected to the sink faucet. Plans for making this special cabinet are shown below. Plans for other clever spacemakers appear above and on the facing page. ★★★



LOOKING FOR IDEAS ON HUNTING, FISHING, CAMPING, BUILDING, TOOLS, ETC.? CHECK THESE LISTINGS, THEN USE THE COUPON BELOW.

WORTH WRITING FOR

358. Basement Magic

Here's the easy-to-follow plan for adding direct outside access to make your basement more useful, convenient and safe. It's all in a fully-diagrammed brochure from Bilco. Check it out! 10¢.

359. Heating and Cooling Money Saver!

Fiber glass insulation is easy to install and a *positive* fuel saver! Certaineed has a comprehensive booklet that will show you where and how to do-it-yourself. Free

360. Don't Burn It—Bag It

Amerind-MacKissic offers the latest information on their rugged "Mighty Mac" shredder-grinders. Find out how these heavy-duty machines make light work out of disposing of your garden waste. Free.

361. Straight Talk On Caulk

Macco answers caulking questions in a quick reference brochure which describes types of caulk and methods of applications. From Macco Adhesives. Free.

362. Tough But Nice To Look At

Step-by-step instructions on how to build planters, decorative screen block walls, flower bed edging, patio floors, seating walls, barbecues, pools, steps and walks with Sacrete Concrete and Mortar Mixes. 25¢.

363. Quite A Bit About Bits!

Irwin Auger Bit's "How To Select, Use and Care for Wood Bits" tells all there is to know. Recommended and Free.

364. Home Protection

Solid vinyl siding—the most nearly perfect building material ever produced by science. No painting, can't blister or peel, easily cleaned. Interested? There's free literature from GAF.

365. Outdoor Projects!

Five new plan folders just released by Z-Brick show you how to build outdoor barbecues, storage sheds, wishing wells, decorative walls and a variety of brick planters and benches! 50¢ for full set of 5 plans.

366. Redwood Decks Do It!

Adding a redwood deck to your home means adding rustic beauty and solid resale value to your property. California Redwood Association offers a full-color, do-it-yourself "deck guide" that will show you how. Photo-illustrated too! 50¢.

367. PM's Famous Master Shop Guide

One of the most important tools you'll ever own! Lays out everything you need to know about nails, screws, bolts, drills, adhesives, lumber, masonry, plumbing and electrical work, 24 stand-up, hang-up, wipe-clean laminated pages, 56 charts plus a built-in ruler, protractor and compass. Solid value at \$4.49.

368. Professional Results!

A photo-illustrated, step-by-step guide to natural wood finishing! Floors, furniture, antiques, exteriors, boats—*any wood surface* and this thirty-one page brochure shows you how. From McCloskey. 25¢.

369. Cabinet Carnival!

A do-it-yourself manual that doesn't quit until you've got beautiful kitchen cabinets exactly where you want them. From first step to finished cabinet—everything you'll need to know—including diagrams. From IXL Furniture Co. 35¢.

370. Bird Tells All!

"What You Should Know About Roofing and Siding Before You Build or Remodel", is a beautiful, 32-page booklet packed with ideas, money-saving consumer advice, and full-color illustrations. 50¢ from Bird & Son, Inc.

371. Stop Dripping Faucets!

Vulcan Manufacturing has a Universal Faucet Reseating Kit: 8 tough stainless seats, 8 indestructible mated Delrin washers, installation kit and instructions. Permanently repairs any faucet that uses washers. Information *with samples only* 50¢ (refunded with any order).

372. Economical "Solar" Room!

Learn how many home owners are using prefab aluminum greenhouses to add economical all-glass, energy-capturing rooms. Informative 24 page, full-color catalog illustrates hundreds of styles and sizes. Free from Lord & Burnham.

373. Pumper's Attention

For pumping water from cellar, irrigating your garden, draining sinks and laundry tubs, circulating coolants, spraying gardens, or just using a pump for any number of other purposes! A "How To Pump It Guide" in wall chart format tells you how with diagrams and step-by-step instructions. From Labawco Pumps Inc. 25¢.

374. Paneling Guide

"All About Wall Paneling" from U.S. Plywood is a full-color, photo-illustrated booklet that covers paneling from A to Z. Over 50 illustrations, installation diagrams, easy-to-follow directions and color charts. 50¢.

375. Fun, Flavor and Savings!

You can't miss having a bountiful vegetable garden with a fantastic, full-color brochure from True Temper. From frost dates to companion plants, from soil types to composting, salad gardening, herbs, fruits, beans—all diagrammed so anyone can take it from the ground to the table! 50¢.

376. Do your home fix-up jobs easier

Colorful brochure gives details on the complete line-up of DAP fixer products. DAP fixes metal, gutters, panels, wood, windows—just about everything. From DAP, Inc. Free.

377. Ceiling Tile!

For safe, secure ceiling tile installation! Arrow has the tools and the guidelines in a concise brochure. Check the literature out. 10¢.

378. Energy Savers

Cut your heating and cooling costs with efficient weather stripping on doors and windows. Free brochure from Macklenburg-Duncan describes various types and sizes available in wood, metal or aluminum to fit your exact needs.

379. Shut John Up!

Stop that leaking, weeping, jiggling, squeaking, whistling, toilet from driving you crazy with a photo-illustrated brochure from Fluidmaster, Inc. Free.

380. Let Genie Do It!

Concerned about your family opening the garage door alone at night or just fed up with climbing out of the car to struggle with a heavy garage door? Genie Automatic Garage Door Opener, an incredible safety and convenience system might be the answer. Literature 25¢ from Alliance.

Popular Mechanics 475
Box 1718, Sandusky, Ohio 44870

This Coupon Expires June 30, 1975

Please see that I receive the items checked below. I have enclosed 35¢ for the overall service charge, plus remittance for any priced items.

- | | | | | | |
|------------------------------------|------------------------------------|---------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| <input type="checkbox"/> 358 (10¢) | <input type="checkbox"/> 362 (25¢) | <input type="checkbox"/> 366 (50¢) | <input type="checkbox"/> 370 (50¢) | <input type="checkbox"/> 374 (50¢) | <input type="checkbox"/> 378 |
| <input type="checkbox"/> 359 | <input type="checkbox"/> 363 | <input type="checkbox"/> 367 (\$4.49) | <input type="checkbox"/> 371 (50¢) | <input type="checkbox"/> 375 (50¢) | <input type="checkbox"/> 379 |
| <input type="checkbox"/> 360 | <input type="checkbox"/> 364 | <input type="checkbox"/> 368 (25¢) | <input type="checkbox"/> 372 | <input type="checkbox"/> 376 | <input type="checkbox"/> 380 (25¢) |
| <input type="checkbox"/> 361 | <input type="checkbox"/> 365 (50¢) | <input type="checkbox"/> 369 (35¢) | <input type="checkbox"/> 373 (25¢) | <input type="checkbox"/> 377 (10¢) | |

Total items requested _____ Total money enclosed (including 35¢ service charge) _____

Name (Please Print) _____

Address _____

Town _____ State _____ Zip Code _____

(Please send cash, check or money order made out to POPULAR MECHANICS. No stamps, please.)

Note: Popular Mechanics processes your requests for the above information and forwards these inquiries to the organization making the offer. Each company mails the material directly. Please allow 4-6 weeks for delivery.

Big top in your basement



In days past, rumbling animals, tooting calliopes, brightly painted wagons and giant tents were all part of the scene when the circus came to town. But now, superdomes and concrete coliseums have replaced the tents, so there is little that remains of that part of the circus atmosphere.

The owners of this home wanted to recreate a reminder of pleasant days so they decided to use the circus as the theme for the family room in their basement. Under the guidance of a professional interior decorator, what had been just a storage area under the house soon was transformed into a room that promises good times.

Instead of hiding the foundation with conventionally framed and paneled walls, the finished room has bright patches of canvas stretched between and laced to vertical uprights. The latter are fastened to expander-type poles force-fit between floor and ceiling joists.

The tent-like illusion is enhanced by the colorful fabric suspended overhead on support wires stretched and fastened at opposite ends of the room. For added rigidity, short lengths of wires are fastened to joists at one end and to the support wires at the other end every 16 inches along the length of each support wire. You may have to shift these about so they do not interfere with placement of fabric over the support wires.

Using fabric on the ceiling is a practical way to finish a basement ceiling: Should the need arise to get at pipes or electrical wires that are suspended from or between the joists, you'll be able to do so with a minimum of effort and with no cost at all.

But, it was the attention given smaller details and extra touches that made the circus-theme come off successful. Those ideas used are original in concept and design; any or all of them can be duplicated by using imagination and care in their construction.



Circus theme creates an atmosphere of fun for children of all ages: accent ideas are both clever and original—stuffed animals romp in cages created by window treatment, a papier-mâché giraffe (fashioned on the Lally column) oversees all bar activity. The key to success when decorating with a theme—know when to stop adding such touches.



Whimsical clown-like robot in the center of the photo is simply a decorated house electric service panel. It was created by painting the conduit pipes and the box itself with bright colors and then adding a happy face. All details were carefully planned; the ceiling fixtures, for example, heighten the mood because globe shapes suggest balloons.

This circus came to town and stayed. As a result, good ideas abound in this family fun room. Wall and ceiling treatments are departures from the usual plywood paneling and square tiles. One-of-a-kind perky ideas make it all work. At left, the television set sits in a box painted and trimmed to duplicate the appearance of a traditional circus wagon. Foundation walls disappear behind strips of canvas laced to pole uprights. The tent-like look is assured by strips of fabric that are draped over wires securely fastened to the ceiling joists.



A tootling calliope on the stairwall serves to house a hi-fi mounted on a sliding shelf. Elephant collage on far wall is of 1/2-in. plywood; it was inspired by children's book illustration. Other eye-catchers—use of canvas instead of conventional balustrades, uncovered Lally column which pretends to be a tent pole.

Since mending is often done in connection with washing clothes, a logical place for a sewing built-in is the laundry room. Complete with portable machine and a pegboard wall to hold patterns and sewing essentials, plus a clock and phone, the built-in sewing nook at right is an idea from Maytag that makes good sense.

Three flush doors supported by four two-drawer file cabinets placed along a wall make a complete sewing center (below left). The file cabinets provide eight roomy storage drawers for yard goods and patterns galore, and the long counter gives all the room in the world to lay out and cut a pattern.

An unusual way to find space for a sewing center is in a spare bedroom closet (below, right). Folding doors cover the opening when you close up shop. ★ ★ ★

Sewing built-ins for any room



Built-in next to the washer, this tidy sewing center is handy for sewing a rip in Junior's jeans prior to tossing them in the machine. The "cabinet" located at the left of the sewing counter is the rolling clothes bin shown on page 126.

Home Ideas Guide

This sewing built-in was once a spare bedroom closet. Machine counter 30 in. high provides kneehole; shelves hold sewing supplies; folding doors hide all.



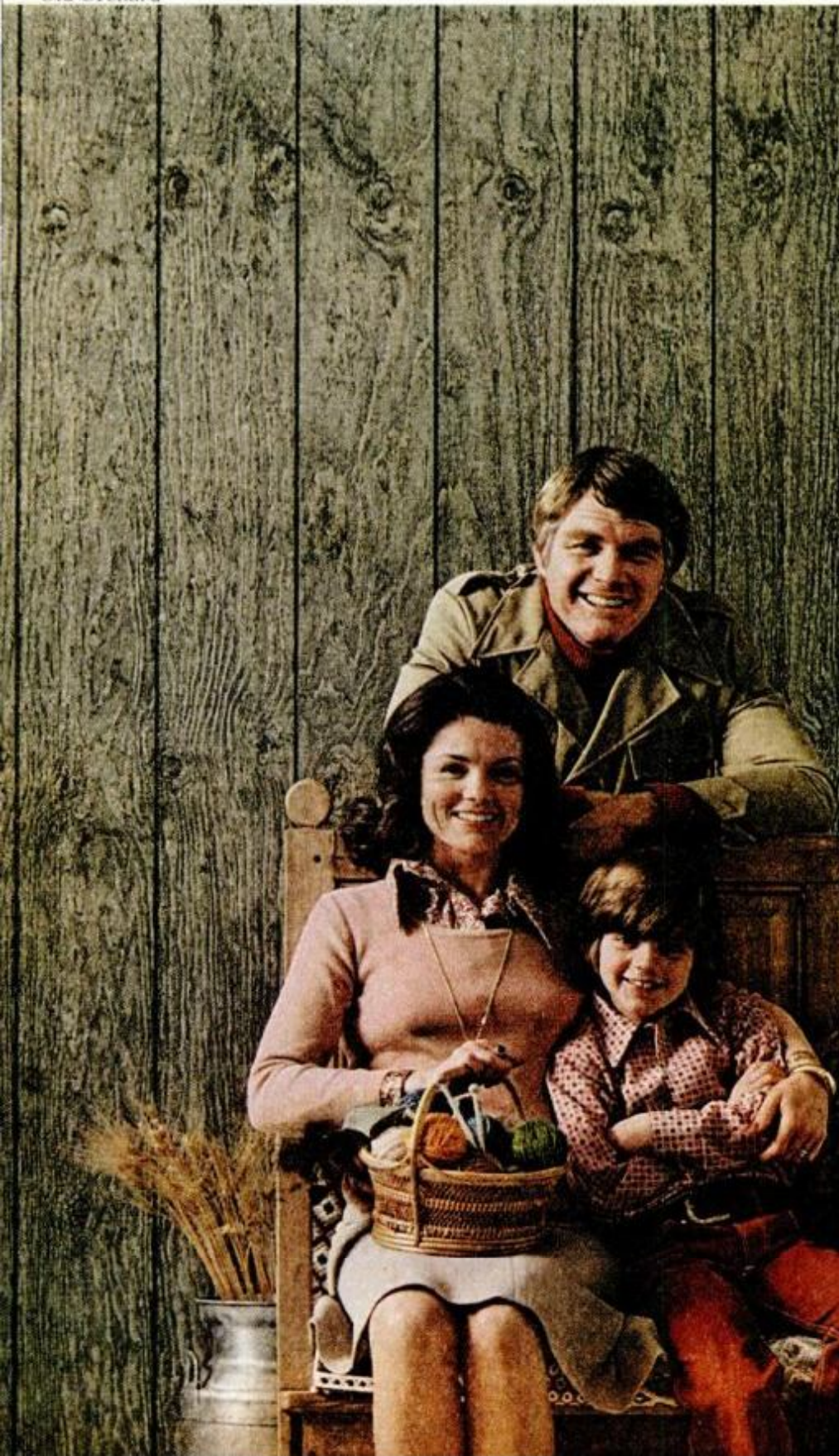
A quickie to rig is this "built-in." Counter is supported by common metal file cabinets. Kneeholes and chairs provide comfort at each sewing station.



"Country Place?"

It's the new Weldwood panel that makes us feel like we changed our address. Not just our walls."

Old Orchard



"We always wanted a country place. But we never dreamed we could afford one.

"Then we saw Country Place."

"It's the super new Weldwood® paneling with the weathered barn siding look. It even has knotholes!

"And it comes in seven colors. We picked Old Orchard. It's a subtle moss green. That goes with everything we have.

"It was easy to put up too. My husband used ordinary tools he has around the house. Installed it right over our old walls. And did it all over a weekend.

"All About Wall Paneling showed him how. It's a booklet we got with the paneling at our U.S. Plywood Dealer.

"Country Place. It doesn't cost that much. It's beautiful. It's built to last year-in, year-out. And that's terrific!"

You can see Country Place at your local U.S. Plywood Dealer. He's listed in the Yellow Pages under 'Paneling.'

Be sure to ask to see the new treatments on our classic Wayside Inr® and popular Candyland™ lines of paneling. And all the other Weldwood Panels.

While you're there, pick up a copy of All About Wall Paneling. Or send your name, address and 50¢ to U.S. Plywood, P. O. Box 61, New York, N. Y. 10046.



Potting Shed



Splitrail Brown



Salt Box



Hencote Red



Hunter's Moon



Smokehouse

Weldwood®
PANELING
from U.S. Plywood

It's like furniture for your walls.



U.S. Plywood
Champion International Corporation

Материал, защищенный авторским правом

Extra storage is everywhere



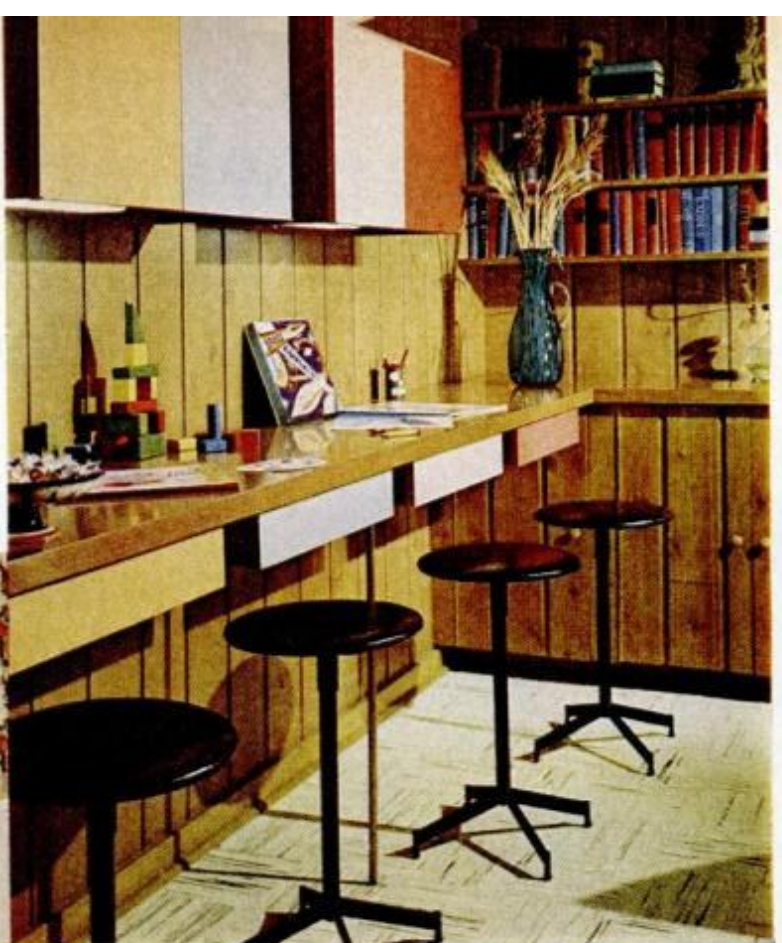
Occupying no more than 6 feet of space, this island clothes-sorting cabinet, with its many drawers, makes a perfect companion for any washer/dryer.

Wish you had more room to store things or to work in? Chances are you have the space but may not be aware of it. Three ideas shown here are good examples of how different areas of your home can be made to serve more efficiently.

As pictured above, a soiled-clothes-sorting cabinet alongside a washer and dryer can add a world of convenience and efficiency to a home laundry. The pretreatment sink doubles as a member of your laundry team and a cleanup area for messy fingers.

A wall-supported counter fitted with drawers and equipped with bar stools (upper right) provides a work/study area for the whole family. Each youngster can have his own "desk" for homework or craft activity. Mom will find it a great place to budget the family paycheck and plan menus.

An attic room's sloping walls offer storage opportunities galore using space "back under" to provide room on open shelves and in cubbyholes for countless items. Standard window shutters (right), hinged and held shut with magnetic catches, make attractive and inexpensive doors. ★★★



Solidly supported by protruding 2x4s anchored to wall studs, Formica-covered counter provides several study and play areas, each complete with drawer.



Low-bridge areas back under sloping roof of attic rooms are waiting to store countless items such as luggage, Christmas decorations, seasonal wearing apparel and the like.

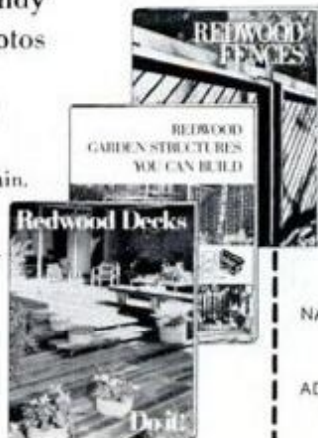
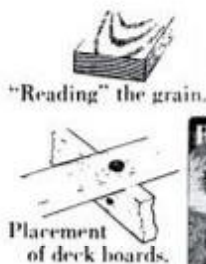
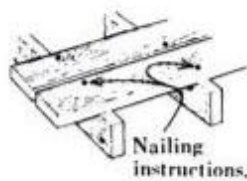
Garden Redwood.



You can build a deck like this for a lot less than you think!

Use the garden grades of California's luxury lumber. The knots and sapwood streaks that make garden redwood less expensive also give it a rustic look and texture ideal for outdoor use. Our handy Redwood Decks Kit features color photos

of dozens of deck and fence installations — schematic drawings of deckboard patterns you can use — and practical tips, like the ones shown here, on how to buy, handle and finish garden redwood for best results. Use the coupon to order your Kit.



California Redwood Association
617 Montgomery Street, San Francisco, CA 94111

I enclose \$1.00 for your REDWOOD DECKS Kit.

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

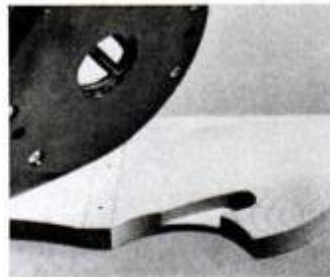
**CALIFORNIA
REDWOOD
ASSOCIATION**

Redwood — a renewable resource.

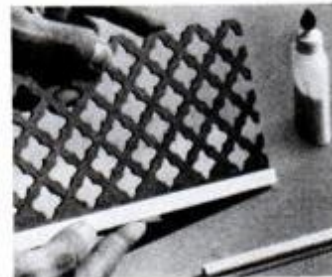
Bathroom magazine rack



A wall-mounted magazine rack for the bathroom keeps reading materials handy. This rack holds not only magazines but two rolls of toilet tissue on a removable rod. Both side members are scroll-cut at one time, then made right and left hand when forming slots for the paper-holder rod. If you plan to paint the rack in two colors, it is best to do so before installing filigree panels.—*Rosario Capotosto*



Open slots are formed with straight-shank router bit.



Slotted strips are glued to top edges of filigree parts.

Snapper is fast.



This means Snapper mowers combine outstanding design features that help you get through with the work of caring for your lawn faster, and easier.

Whatever size lawn you've got, we've got a Snapper to match it. With a Snapper you'll finish it beautifully. And fast.

SNAPPER

McDonough Power Equipment, Inc. Dept. PM, McDonough, Georgia 30253. A Fuqua Industry.
See your Yellow Pages or write for a free brochure. All Snapper mowers meet A.N.S.I. safety specifications.



Build it yourself!

You don't need masonry to build a barbecue, wishing well planter, storage shed, garden screen or planter boxes with lightweight, easy-to-use Z-Brick. Weatherproof and fireproof, Z-Brick will give your projects a professional look at a do-it-yourself price.

All you need are a few simple hand tools, plywood, a few cartons of Z-Brick, and our easy-to-follow plans.

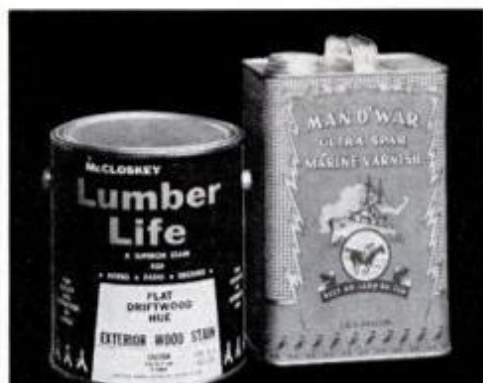
For a set of all five plans, send 50¢ to:
Z-BRICK Woodinville, WA 98072

Name _____

Address _____

City _____ State _____ Zip _____

Z-BRICK®



Two durable choices from McCloskey make caring for wood an easy job.

On a house, wood looks terrific. On a boat, it adds class. The trouble is the weather. Wood must be protected. Lumber Life Wood Stains for distinctive color and Man'O War Ultra Marine Varnish for vibrant, clear gloss, give that protection.

Lumber Life offers a choice of 12 rustic colors. All go on easily and penetrate deep into the wood to enhance the texture. Man'O War covers with a clear gloss finish that brings out the natural beauty of wood while protecting against almost anything the weather can do.

Lumber Life or Man'O War... color or clear. The choice is yours.

McCloskey Philadelphia, Pa.
Varnish Company Los Angeles, Cal.

Handy little Devils for nasty little jobs.

Patching... caulking... whatever the job, top-quality Red Devil tools and chemicals make it easy!



For patching holes and cracks, use a quality spackling compound like Red Devil ready-mixed Patch Paste® — and a Red Devil Putty Knife. Red Devil Putty Knives are so ruggedly built, you'll never need to replace one unless you lose it!



To seal cracks around tubs, sinks and showers, apply a bead of Red Devil Tub & Tile Caulk from its handy tube. Perfect for resetting loose tiles, too!

It's easy... with the Devil!

Red Devil

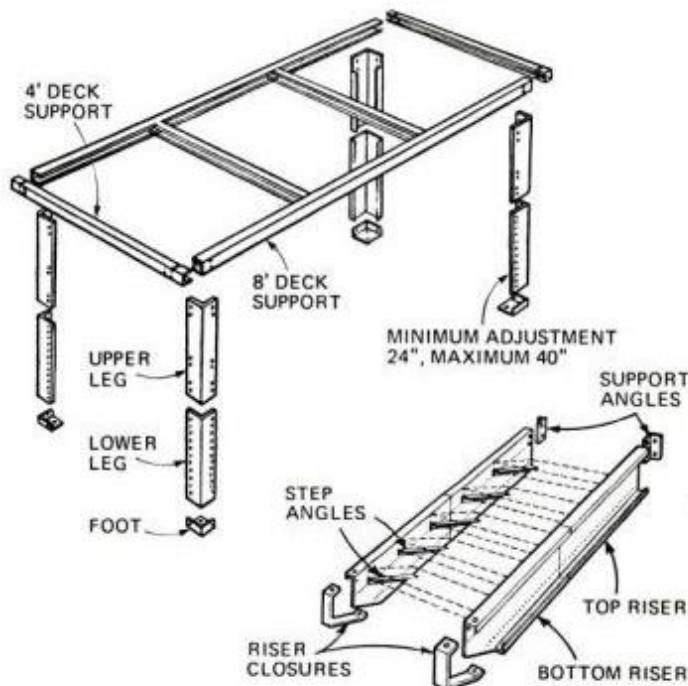


Red Devil Inc.
Union, N.J. 07083

New modules for easy deck building



While this deck is shown without railings, it is best for safety to add railings to yours. Note flexible arrangement this system permits.



There's an easy way to build a deck these days, thanks to a steel modular system that goes together like an Erector set. Each 4x8-ft. unit, complete with adjustable legs, can be bolted together end to end or side by side to make a platform of any

size and shape by simply adding as many individual units as you wish. How you cover the steel platform is up to you. You can top it with 4-ft. redwood planks laid checkerboard style, or with 3/4-in. exterior plywood and fitted with indoor-outdoor carpet.

Adjustable bolt-on steel stair stringers in this modular system can be attached anywhere. Stringers cost about \$42, 4x8 unit with legs about \$65. For more information write Mastic Corp., 131 South Taylor St., South Bend, Ind. 46624. ★★★

Folding shower door installs in 30 minutes

Folding door slides in tracks at top and bottom, making cleaning of tub and bathing of children easier because full access to tub is assured.



Though many believe that installation of a bathtub shower door is best left to professionals, the project is actually relatively simple—well within the skills of most home handy-men.

Besides its good looks, the door shown has a big advantage over its bypassing (sliding door) cousins. Unlike the latter, which screen off half the tub opening, this door stacks within 8 in. of the wall to give full tub access with the door in the open position.

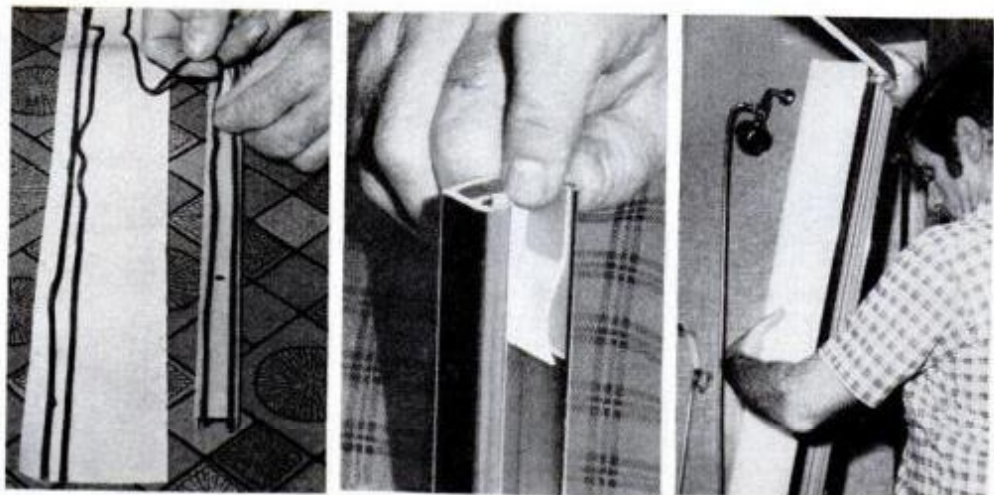
Installation goes quickly; instructions packed with the door are clearly written and well illustrated. The bottom track rests on the tub with beads of caulk beneath. When both verticals are screw-fastened to the walls, the bottom track is held immobile. The

top track engages the verticals and then the door—which comes pre-assembled—is placed in position.

The entire job will take anywhere from 30 minutes to one hour depending upon your skills. Top and bottom track, of course, must be cut to suit the tub length.—*Harry Wicks, Workshop Editor*

SPECIFICATIONS Folding Shower Door, Model BT

Sizes: To suit all major-make bathtubs
Available colors: 14
Frame colors: Gold or silver
Intermediate panel color: White only
Prices: Standard unit \$51 to \$90; custom units run higher
Manufacturer: Tub-Master Corp., 413 Virginia Dr., Orlando, Fla. 32803



Vertical frame members are waterproofed using caulk strips packed with doors. Strands must be placed without breaks.

Plastic clips (center photo) on both ends of header track serve as stops; preassembled door is then engaged in track.

Stop costly drafts around your doors!



energy savers

You can save up to 30% on home heating cost by properly sealing around your doors with M-D weatherproofing products. They come packaged, ready and easy to install.

M-D JAMB UP WEATHERSTRIP. Rigid, no rust aluminum with vinyl insert makes a tight seal around drafty doors.



M-D ALUMINUM THRESHOLDS.

Some with vinyl insert for perfect seal. Use with M-D door bottoms.

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

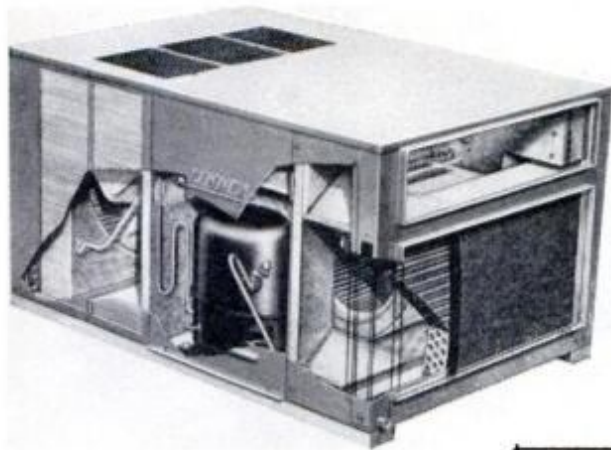
Ask for M-D by name.

Macklanburg-Duncan Co.

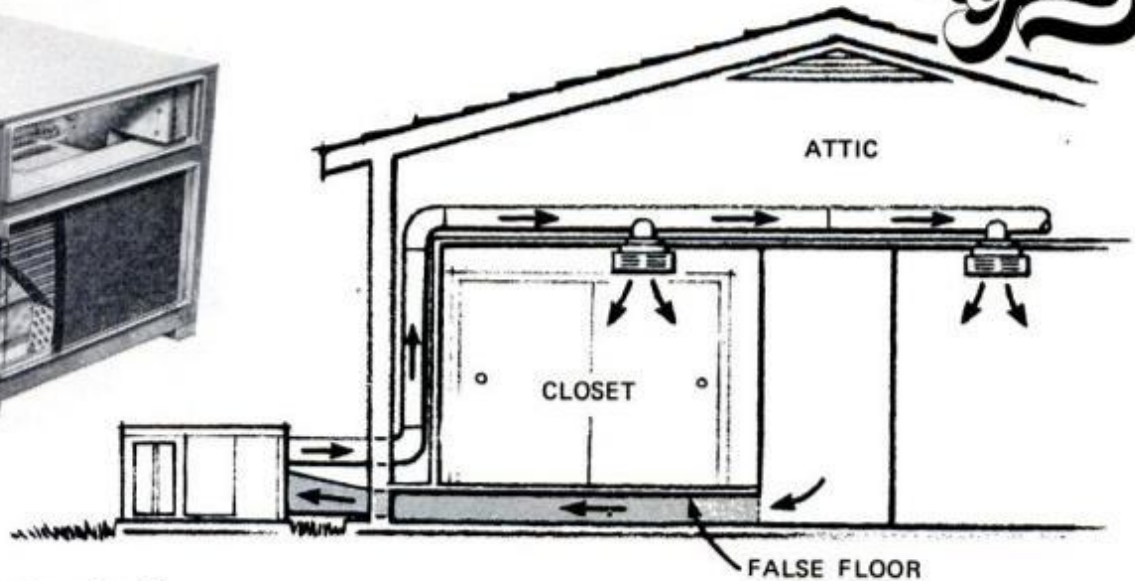
P. O. BOX 25188 OKLAHOMA CITY, OKLA. 73125

New products of special interest

*Home
Ideas
Guide*



Cutaway (above) shows the compressor in center of insulated compartment to deaden operating sound.



Year-round comfort in one compact unit

Ideal for slab-home installation, this new air conditioner for central cooling (with optional heating) makes it easy for anyone with a basement-less home to add year-round comfort with a compact all-in-one unit. Available in two to five-ton sizes (24,000 to

58,000 B.T.U.), the CHA9 unit, introduced by Lennox Industries, Marshalltown, Iowa, 50158 sits outdoors and has an over-and-under air-distribution system (rather than side by side) to speed duct connection. A typical use runs duct supply up the end of a

closet into attic to feed high sidewall diffusers. Return air duct goes to a false floor in the closet and air is pulled from a central hall, as shown above. See your Lennox dealer or write manufacturer for prices.

(Please turn to page 138)

SUPER CAULK™ Guaranteed for 20 Years

- Macco Acrylic Super Caulk will not lose adhesion, crack, bleed, stain or discolor
- Adheres to all common building materials
- May be painted within 30 minutes with oil base or latex paints
- Resists dirt pickup
- Easy to apply
- Hands and tools clean up quickly with soap and water
- For use inside or outside the home



Guarantee: Macco Adhesives guarantees that if Macco Acrylic Super Caulk is used as directed and fails within 20 years after application, Macco will replace an equal amount of material at no cost after inspection, and upon submission of proof of purchase to Macco. This guarantee applies to residential use only.

MACCO ACRYLIC SUPER CAULK.
IT'S CALLED SUPER FOR A REASON.

SCM MACCO ADHESIVES
SCM CORPORATION, WICKLIFFE, OHIO 44092

Nothing by
any other name
is even half
the same as

Spackle®



Unique — the painter's smoothing compound — first choice of the pro's — there's just one Spackle®. Works easiest, adheres to anything, dries fast, sands beautifully. Get it — and nothing but it — in the orange and blue can at paint and hardware stores.

the **muralo**® company inc.

Bayonne, N.J. 07002/Chicago/Los Angeles

Millions have
wanted it for years:
Rust Protection
Without
Scraping
or Sanding

IT'S HERE!

Now you can brush rust away with this amazing new patented product.



TRUSTAN™7 Rust Converter

All you do is brush Trustan "7" on the rusted surface, overnight it converts the rust into a blue/black impermeable shield eliminating the existing rust and protecting against future rusting. 7 oz. container will eliminate 50 sq. ft. of rust.

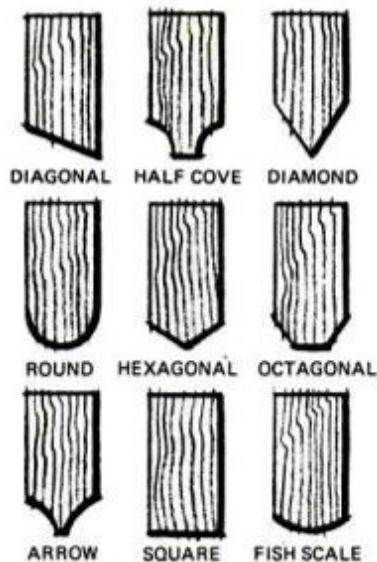
Send \$4.00 (Incld. Postage & Handling. New Jersey residents add 5% Sales Tax)

TO:
THOMAS PRODUCTS CO.

Dept. PM-1, Box 199
Succasunna, N.J. 07876

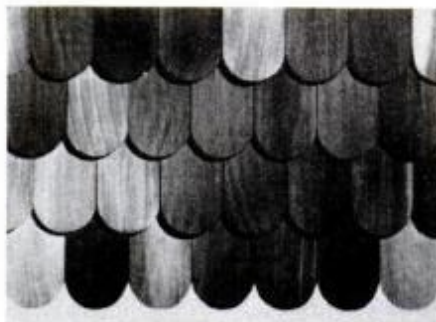
NEW PRODUCTS

(Continued from page 137)



Fancy house shingles

Artistic patterns of the past are offered by Shakertown Corp., Winlock, Wash. 98596, with its Fancy Butt Western red-cedar shingles. Nine attractive patterns give many texture possibilities for interiors and exteriors. Carton of 160 shingles covers about 33 sq. ft. Check dealer or Shakertown for prices.



Install-it-yourself opener

A planetary gear system replaces old belt drive in the new Genie radio-controlled garage-door opener, making it virtually wearproof. Exclusive quick-release handle disconnects instantly and reengages just as easily. Designed for do-it-yourself installation, Model 200RS comes with AC30 radio in single 3-ft. carton. \$139.95. Made by Alliance Mfg. Co., Alliance, Ohio 44601.

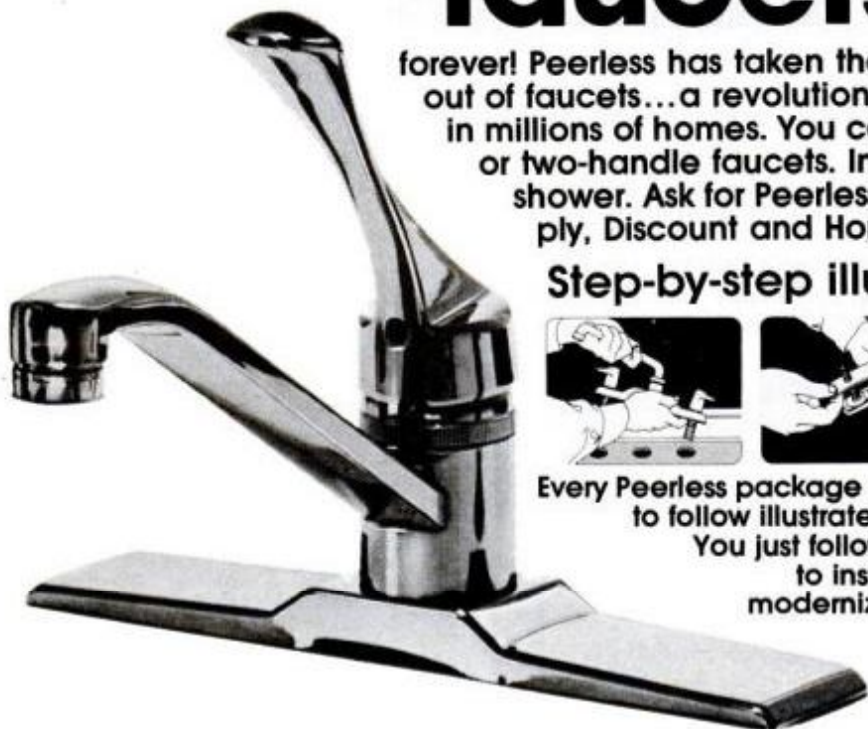
You can do it, too! Peerless WASHERLESS faucets

Do-it-yourself! Save a bundle! And do away with old-fashion washer headaches forever! Peerless has taken the troublesome compression washer out of faucets...a revolutionary design that has proven superior in millions of homes. You can do it with Peerless single-handle, or two-handle faucets. In the kitchen, bathroom sink, tub or shower. Ask for Peerless Faucets in Hardware, Building Supply, Discount and Home Center stores near you.

Step-by-step illustrated instructions



Every Peerless package contains easy to follow illustrated instructions. You just follow the pictures to install, save, and modernize your home.



**PEERLESS
FAUCET**



P.O. Box 31, Greensburg, Indiana
A Division of Masco Corporation.



Kit is shrink-packed on a 24x30-in. card with detailed illustrations and instructions printed on the back.



Dishwasher replacement kit

Replacement of an old built-in dishwasher with a new General Electric model is reduced to a simple task by a kit of parts that require no soldering and can be installed with only a screwdriver, wire cutters and an adjustable wrench. You get a length of rubber drain hose, hose clamps, copper tubing, brass tubing connectors, electrical solderless connectors and

a test light, plus detailed instructions and illustrations that take the handyman through 17 simple steps required to remove the old built-in appliance and install the new model. Dealer charges for the installation of a dishwasher range between \$40 and \$60. The replacement kit, which costs \$14.98 from GE, is available at appliance stores.



Cool it yourself

You can aircondition your home for as little as \$500 with a do-it-yourself kit you can install yourself with a few simple hand tools. Manufactured by the McGraw Edison Co., Albion, Mich., the kit includes all components: condensing unit, cooling coil, refrigerant tubing, automatic controls and accessories. The condensing unit sits outdoors while the cooling coil mounts in the plenum of a forced-air furnace. There is a wide selection of kits available; the cost will vary according to the size and type of your home.

Low-cost single-lever faucet

Called Aquamix, a low-cost kitchen-sink faucet by American-Standard features a single-lever control that lets you adjust water temperature and flow in one simple motion. Aerator spout turns 360° at base; spout head swivels 45° right or left to rinse any part of sink. Cartridge has two ceramic discs to adjust flow from a trickle to a blast. About \$23.

(Please turn to page 140)



Two more ways to be a hero in your own home!



Dress up a bathroom

It's easy with DAP Kwik-Seal® Tub & Tile Caulk. Makes a neat, white, watertight seal around tile, tubs, sinks, showers. Grouts tile. Caulks window and door frames. Stays flexible. Takes paint.



Keep your house snug

Seal-up cracks and joints inside and outside your home with DAP Latex Caulk. Keeps heat in—cold out. Guns easily, sets fast for painting in 2 hours. Won't stain, bleed or show through latex or any other paint.



DAP

The name people know best in home fix-up

DAP Inc., General Offices: Dayton, Ohio 45401
Subsidiary of Plough, Inc.

America's favorite
do-it-yourself tool
of 1001 uses!

ARROW T-50 HEAVY DUTY STAPLE GUN TACKER

SHOOTS A STAPLE
WHEREVER YOU'D
DRIVE A NAIL!



T-50
\$15.95

Uses T-50
Staples in 6 Sizes
from 1/4" to 9/16" and Ceiltile

This powerful Arrow all-purpose tacking tool automatically drives staples with one squeeze ease . . . into the hardest wood, plywood, composition board, Masonite, plastic — even soft metal! One-hand operation leaves other hand free. All-steel with chrome finish. Jam-proof.

**FASTER . . . BETTER . . . CHEAPER
FOR FASTENING**



INSULATION

CEILING TILE



WEATHERSTRIPPING

PLUS screens, window shades, valances, upholstery, closet linings, shelf trimmings, wires, rug paddings, wire fencing, wall decorations — and many more

AVAILABLE AT ALL THESE STORES:
Ace Hardware • American Hardware Stores • 84 Lumber • Grossman's • HWI Stores • K Marts • PRO Hardware Stores • PRO Mart Home Centers • Sentry Hardware Stores • True Value Hardware Stores • Western Auto Stores • Wickes Lumber • Woolco • Agway Stores
And all leading Hardware, Home Center & Discount Department Stores everywhere.

ARROW FASTENER COMPANY, INC.
271 Mayhill Street, Saddle Brook, N. J. 07663
The Standard of Excellence
By Which All Others Are Judged.

NEW PRODUCTS

(Continued from page 139)



Do-it-yourself parquet

Multiple plies of cross-grained oak bonded with waterproof glue produce this handsome Haddon Hall (Old English) laminated parquet flooring. Factory-finished and wire-brushed for antique look, the mellow-brown tile measures 1/2 x 12 x 12 in., has cotton mesh backing, is laid like any resilient tile floor. Bruce Flooring, Box 397, Memphis, Tenn. 38101.



'Waxable' wood-grain laminate

A "natural finish" wood grain that comes to life with a touch of spray wax is the newest in the Nevamar line of special-surface, high-pressure plastic laminates. In its nonwaxed state, the wood grain—Silvan Teak—looks like untreated and unfinished wood. Like real wood, however, it gains a lustrous shine when given a coat of spray wax. Exxon Chemical Co., Odenton, Md. 21113. ★ ★ ★

McCulloch Portable Generators.

Electric power
when you want it,
where you want it.



H-1500 1500 watt capacity, 68 lbs.,
115 volts, 60 cycles



H-2000 2000 watt capacity, 83 lbs.,
115 volts, 60 cycles



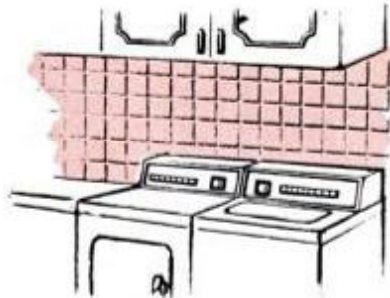
H-3000 3000 watt capacity, 129 lbs.,
115/230 volts, 60 cycles

This may be the year you'll need portable electric power more than ever before. And McCulloch generators, with only one moving part, are the most reliable you can buy—at the best values anywhere. Lightweight, and compact enough to fit in your car, too. McCulloch also makes the dependable lightweight, low-priced Mini Mac chain saws. So see your McCulloch Dealer in the Yellow Pages under "Generators" or "Saws."

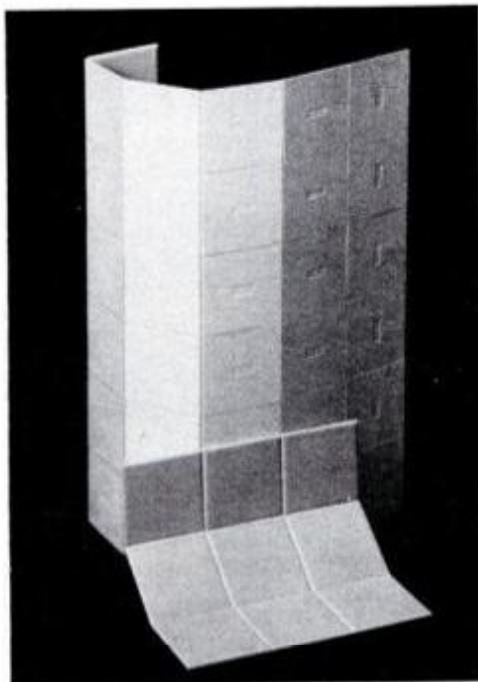


MCCULLOCH
CORPORATION
Los Angeles, California 90009

Rubber-jointed ceramic tile: quick and easy



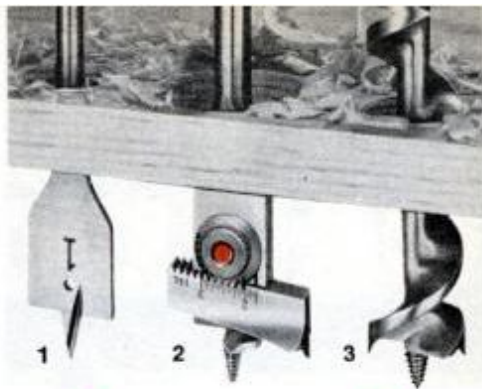
Preassembled 12-in.-sq. sheets go on fast. Joint spacing has already been set; you simply press the sheets firmly in the adhesive after butting their edges tightly together.



Six colors are available. Five 12x12-in. 9-tile sheets total \$9.45; eight tub-surround sheets of 49 tiles each, about \$100.

Do-it-yourselfers can now buy genuine ceramic tile in pregrouted sheets. American Olean Tile Co., Lansdale, Pa. 19446, is now offering two basic systems, both called Easy-Set, in which the tiles come mounted in sheets and joints are prefilled with a silicone rubber that stays permanently flexible. One system consists of 12x12-in. sheets of nine tiles each for walls, vanity tops, backsplashes and shower and tub surrounds. The second comprises a packaged tub surround of eight large sheets of 49 tiles each, plus cove.

With the tiles preassembled in easy-to-handle sheets, tiling goes fast with less mess. The sheets are cemented to the wall with a water-resistant mastic. Butting joints are filled with Dow Corning 734 sealant applied with a caulking gun. Joints are smoothed and excess sealant is removed with cheesecloth and denatured alcohol. Tile, adhesive and sealant, even a rentable tile cutter, are available at Sears.



3 easy ways to bore holes faster

- 1. Irwin Speedbor® "88" wood bit** for all electric drills. Spade-type head, exclusive hollow ground point. Starts fast, cuts fast. 17 sizes, 1/4" to 1 1/2", and sets.
- 2. Irwin No. 22 Micro-Dial® hand brace** expansive bit bores 35 standard holes, 7/8" to 3". Just dial your size. No. 21 bores 19 standard holes, 5/8" to 1 3/4".
- 3. Irwin 62T Solid Center hand brace bit.** Delivers double-cutter boring action. Medium-fast screw pitch. Balanced cutting head. 18 sizes, 1/4" to 1 1/2", and sets.

Every Irwin Wood Bit precision-engineered of finest tool steel, heat treated full length and machine-sharpened. They last, bore fast. Buy Irwin . . . buy the best.



Speedbor "88" Sets. 6 and 13-bit sets in metal storage rack.

Strait-Line® Chalk Line Reel Box 50 ft. & 100 ft. sizes

Popular-priced Irwin self-chalking aluminum alloy box. Easy action reel. Leak proof. Practically damage proof. Fits pocket or hand.



IRWIN every bit as good as the name
at Wilmington, Ohio 45177, since 1885

A Family Heirloom That's A True Bargain

Collecting back issues of Popular Mechanics has never been more worthwhile. Thousands of libraries and schools have extensive collections, many dating back to 1902, our first year.

An issue from the 20's or 30's is fascinating. You see a clear image of the era that vividly communicates the technology and quality of life perhaps better than any other periodical. Your collection of PM will become a family heirloom that will give the same joy of discovering the past to your grandchildren that a 1920's issue of PM gives to you.

The annual Index-Shelf Wrapper is an inexpensive aid to the serious collector of PM and one of the few true bargains in publishing. Take advantage of it.

Index-Wrappers are available for 1974. 3, 2 & 1 @ \$2.69 per year postpaid. Make check payable to "Popular Mechanics", specify years desired and mail with name and address to: PM INDEX, Box 1014, Radio City, N.Y. 10019

YOU CAN DO IT!

Install a Genie yourself and save.

Installation is easy when you follow the step by step instructions provided with every Genie unit. Five common household tools, a step-ladder, and a Saturday afternoon are all you need.

In just a few hours your family can enjoy the comfort and convenience of a Genie Automatic Garage Door Opener System... the system most people know and prefer.



1 Attach mounting bracket



2 Attach power unit to ceiling



3 Mount door arm



4 Connect radio receiver



5 Installer's complete



6 Genie's ready to enjoy

Thoroughly tested and UL listed. Solid state radio controls certified to comply with FCC regulations.

Genie

automatic garage door opener system by Alliance.

For a free Genie do-it-yourself brochure, mail this coupon today or visit your nearest Genie dealer. The ALLIANCE Manufacturing Co., Inc. Alliance, Ohio 44601 Dept. PM-4

Name _____

Address _____

City _____

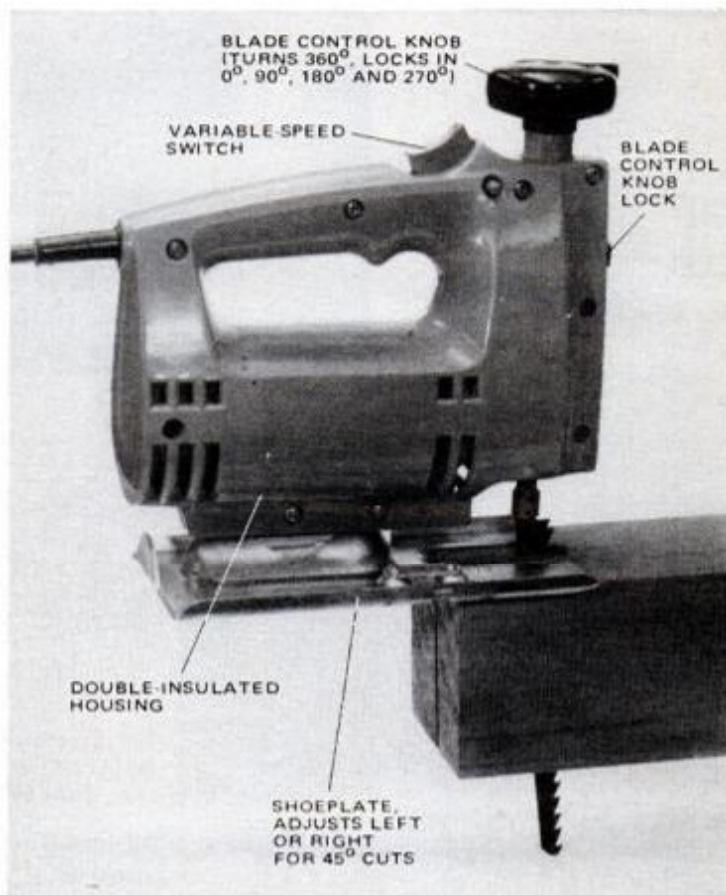
State _____ Zip _____

The ALLIANCE
Manufacturing Co., Inc., Alliance, Ohio 44601
A NORTH AMERICAN PHILIPS COMPANY

Maker of the famous Antenna Rotator... Alliance Tenna-Rotor®... "TV's Better Color Getter!"

SHOP-TEST REPORT

Scroll-cutting sabre saw

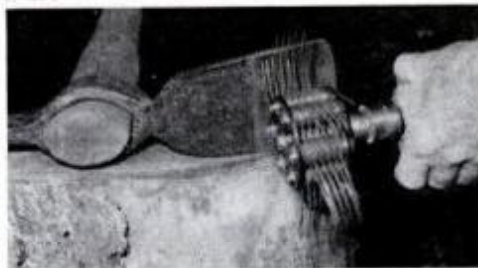
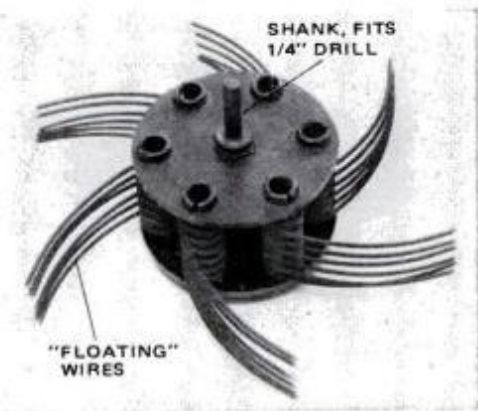


A couple of interesting features justify a shop test of Wen's Model 531 Scroller Sabre Saw, even though it's not spanking new. Most intriguing is the rotating blade controlled by a knob at the top. This is a good feature on tight turns—because you turn the blade only—but I found it a bit stubborn to work with and, at times, difficult to adjust. The tool's strong feature is its variable-speed range; slowing down the strokes-per-minute is what really lets you negotiate tricky cutting lines. The speed is controlled manually by varying pressure on a convenient, thumb-button switch. Conclusion: Try it in the store; if you like the tool's heft, it's a buy at \$40.—Harry Wicks, Workshop Editor

SPECIFICATIONS—Wen Model 531 Sabre Saw

Motor: 4-amp., 3/5 hp. Rated heavy duty by maker.
 Blade: Rotates 360°, can be locked in four positions—0°, 90°, 180° and 270°.
 Variable speed: 0 to 2800 strokes per minute. Locks in two speed positions—intermediate and full.
 Housing: Unbreakable, double-insulated, has lifetime guarantee.
 Bearings: Lifetime-lubricated bronze and needle bearings.
 Shoeplate: Adjusts right or left for 45° cutting.
 Price: \$39.95.
 Manufacturer: Wen Products, Inc., 5810 Northwest Hwy., Chicago, Ill. 60631.

Rust remover you can use in your drill



Despite odd looks, tool quickly proved to be an effective paint and rust remover.

Recently, was shown the strange-looking tool above and asked to try it and report my findings. My initial reaction was: "Spare me from paint removing—too much work!" But within 15 minutes, I realized that this tool does, in fact, make paint removing easier. Called Surface Remover, the device can be used in any 1/4-in. electric drill.

Though ungainly looking, the tool's floating wires do remove rust from metals rather effortlessly; the heavily oxidized pick-mattock shown was entirely cleaned of rust in about 30 minutes. I also tried the accessory on some thick, alligator siding paint which it removed efficiently, but I learned that the tool, if held in one spot too long, also damages the wood substrate. At \$10, it's a dandy aid for those who frequently have such removal tasks.

—Harry Wicks, Workshop Editor

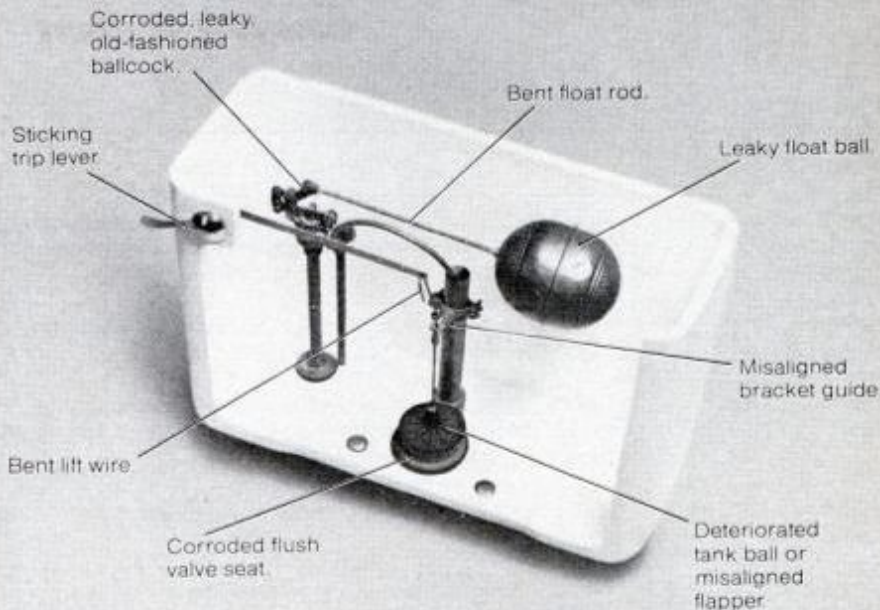
SPECIFICATIONS Surface Remover

Use: Attachment for any 1/4-in. electric drill
Tool rotation: Clockwise (when viewed from behind drill)

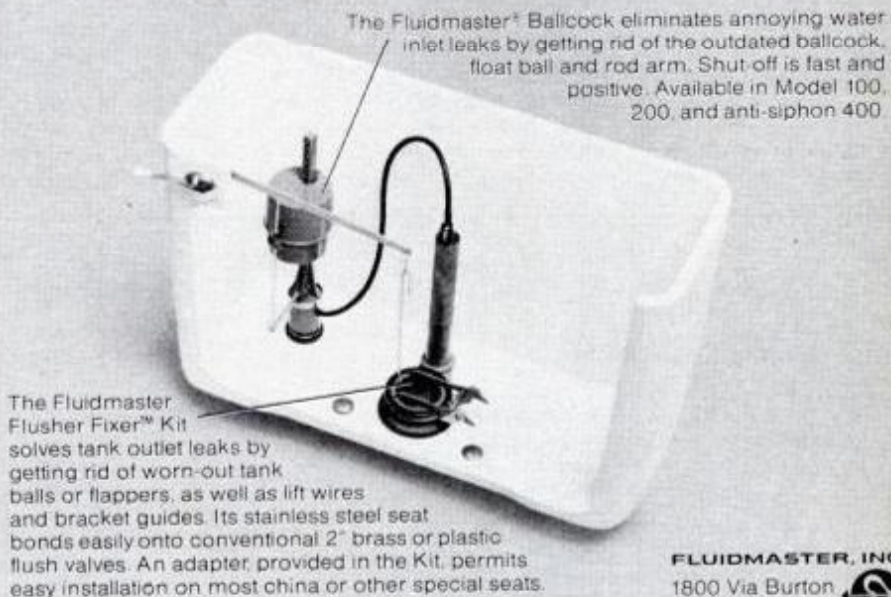
Recommended drill speeds: 1750 rpm—good
2000 rpm—better
2250 rpm—best
2500 rpm—maximum

Price: \$9.95 plus 50 cents for postage and handling
Manufacturer: The Thompson Tool Co., 1 East Lakeview Dr., Norwalk, Conn. 06850.

What makes Johnny run.



What makes Johnny stop.



Found wherever plumbing products are sold

FLUIDMASTER, INC.
1800 Via Burton
P.O. Box 4264
Anaheim, Calif. 92803

Credits for PM's Special Home Ideas Guide

Page 111: Illustration, Roy Grinnell.

Pages 113-115: Deck, photos, Ernest Braun; design, John Matthais for California Redwood Assn.

Pages 116 and 118: Design, Tom Fong; photos, Stephen Fay; cabinetry, Everett Johnson.

Pages 120 and 122: Living wall planter by Robert Dougherty for U.S. Gypsum Co.; contemporary planter by David Painter; photos, Hedrich-Blessing.

Pages 124 and 126: Design, Maytag Co., Newton, Iowa.

Pages 128-129: Basement ideas, architect Eugene Voita and designer Lucille Knoche, FIDI,

for the Canvas Awning Institute; photos, Hedrich-Blessing.

Page 130: Data, Ann Sukov, Ross and Lifson residences; photos, Les Turnau; laundry sewing nook by Maytag Co.

Page 132: Island clothes storage by Maytag Co.; wall desks, Ethel Samuels, decorator N.S.I.D.; photos, Hedrich-Blessing; attic storage, design, Norman Steenhof for U.S. Gypsum Co.; photos, Hedrich-Blessing.

Page 134: Photos, author Rosario Capatosto.

Page 136: Accordion shower door, lead photo, Tub-Master Corp.; how-to photos, Robert D. Borst.

How to troubleshoot your electric range

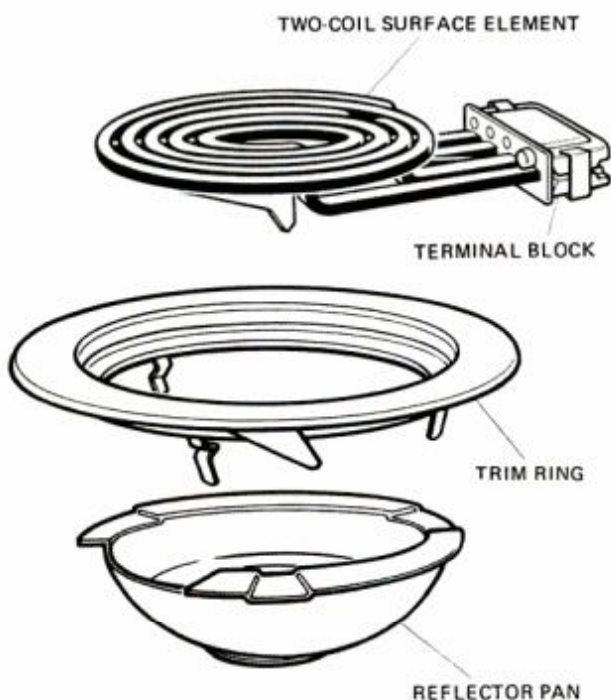
Oven does not heat

POSSIBLE CAUSES	WHAT TO TRY
1. Fuse blown or circuit breaker tripped.	Replace fuse or reset circuit breaker. If blowing or tripping is repeated, disconnect the power and check for shorts.
2. Automatic timer set improperly.	Make sure timer is in "manual" position for everyday cooking. Refer to manufacturer's instructions.
3. Automatic timer defective.	Check timer for defective motor or contacts (see clock-timer discussion on last page). If gears are bound or broken, repair or replace timer.
4. Selector switch set improperly.	Make sure that selector switch is set for type of cooking desired.
5. Thermostat defective.	Place voltmeter across thermostat input terminals; reading should be 230 v. Loosen bake element in oven and pull it forward a fraction of an inch to make terminals accessible; turn thermostat on and check voltage across bake-element terminals; reading should be 230 v. Otherwise, thermostat is defective and must be replaced. Check thermostat's broil operation the same way.
6. Element(s) defective.	Inspect bake and broil elements for breaks or cracks. Check elements one at a time as described above; if voltage is present but element does not heat, replace it.
7. Wires loose or shorted.	Disconnect power, check wiring for breaks or charring. Replace damaged wires. Be sure connections are tight.

Your electric range is one of the simplest appliances in the house—it's really just heating elements and their controls. Although it uses 230-v. power, it's no more difficult to troubleshoot than a 115-v. appliance, so long as you show the respect you always should for the potential danger of electricity. And while the controls used on ranges have become increasingly sophisticated over the years, their basic principles have not changed. Whether your range is free-standing, built-in or a cooktop, you can use the following charts to solve nearly any range problem you have.

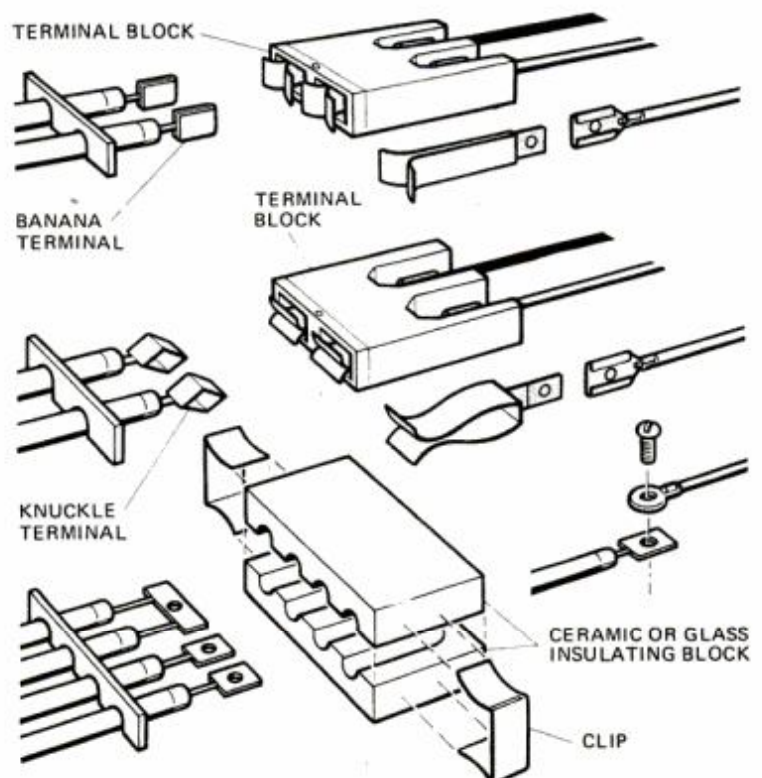
Most electric ranges have four surface elements, two large ones and two smaller ones. The large elements can have a wattage of 2100 to 2600 w., while smaller ones range from 1150 to 1500 w. Older surface elements consisted of an open coil of wire fitted into a ceramic block. Elements of this type are rarely seen today, except on hotplates, as they burn out easily. They have been replaced by hermetically sealed elements like the one shown below and to the left. This element has a Ni-

Surface-element assembly



Art: Peter Trojan

Surface-element connections



chrome resistance wire embedded in an insulating powder, usually magnesium oxide, housed in D-shaped stainless-steel tubing. The insulating powder keeps the resistance wire from touching the tubing sheath and causing a short or ground.

A surface element has either one or two resistance elements and two or four connections. For these connections, one of three types of terminal—banana, knuckle or screw-on—is used. These terminal types are shown on the preceding page. A terminal block used with the surface element provides a positive connection point between element and switch wiring. Terminal blocks are usually attached to the underside of the cooktop with a screw. Screw-on terminals have, instead of a terminal block, a glass or ceramic covering over terminal ends to prevent shorting. Problems that can arise with surface elements are shorting, breaks in Nichrome wire and pitted or corroded terminals; terminal blocks are also subject to corrosion and pitting, and to damage from internal arcing.

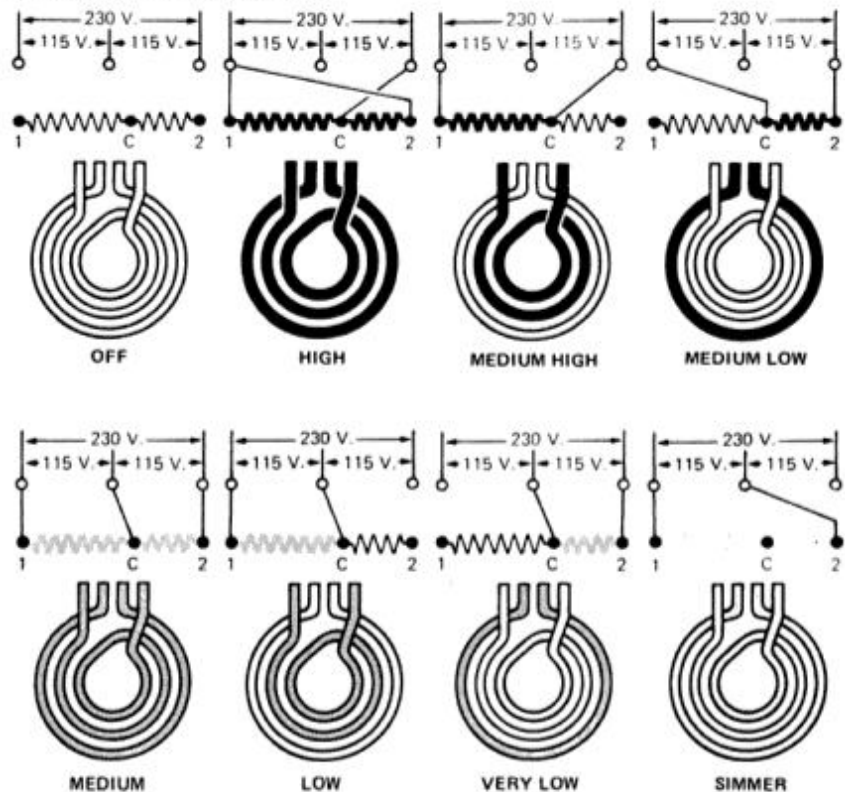
Surface switches are used to regulate the amount of heat produced by surface elements. The switches most commonly used are the step switch

Oven temperatures are uneven

Data: Ed Franzese

POSSIBLE CAUSES	WHAT TO TRY
1. Thermostat out of calibration.	Check oven temperature with an accurate mercury thermometer. Recalibrate thermostat according to the maker's instructions.
2. Door gaskets defective.	Open oven door and inspect sealing gaskets; replace any that are worn, cracked or flat.
3. Door fit uneven.	Check door alignment; if adjustment is needed, loosen door-hinge screws, realign door, then retighten the screws. Check door springs, too; adjust for equal tension if necessary.

Seven-heat switch operation



Caution: Be sure power is turned off before you handle components. Make all continuity tests with power off. Do not attempt to make live voltage checks unless you have experience with the use of test equipment. Use the maker's wiring diagram, and use only replacement parts that meet his specifications.

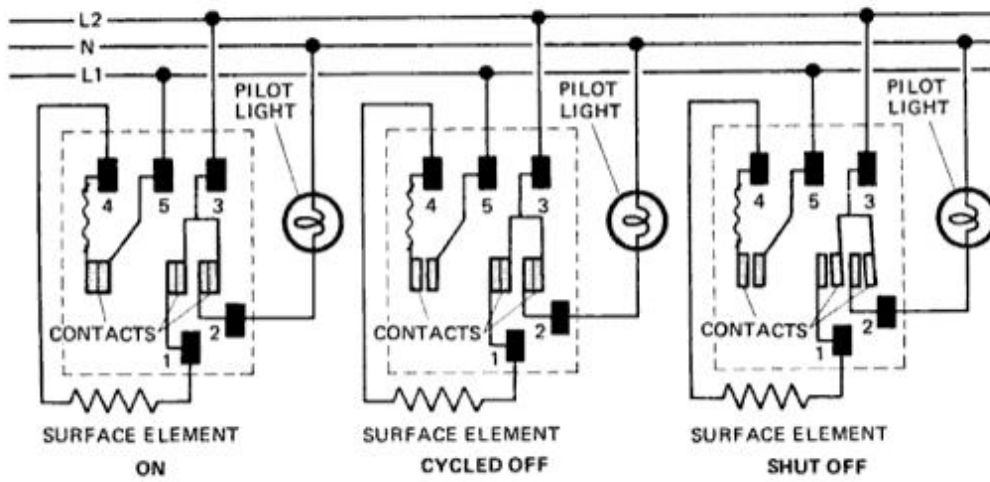
and the infinite-heat switch. The step type is a rotary or pushbutton switch that provides a choice of from five to seven different heats (wattages) by connecting the resistances in the surface element in parallel, in series, or singly to either 230-v. or 115-v. current. Typical wattages for a seven-heat switch could be 212, 287, 500, 850, 1150, 2000 and 3000. Operation of a seven-heat switch is shown schematically on this page.

The infinite-heat switch, which provides a continuous range of settings between "high" and "off," uses an internal bimetal strip, which is anchored at one end and has a switch contact at the other end. As current

(Please turn to page 146)

Oven does not shut off

POSSIBLE CAUSES	WHAT TO TRY
1. Thermostat defective.	Disconnect power, pull bake element (see first chart) and set thermostat in "off" position; reconnect power and check voltage across element terminals. If 230 v. is present, replace thermostat.
2. Automatic timer defective.	Set timer on "automatic," turn clock by hand until it clicks to the "off" position; there should now be no voltage to the thermostat. If there is voltage present, repair or replace the timer.



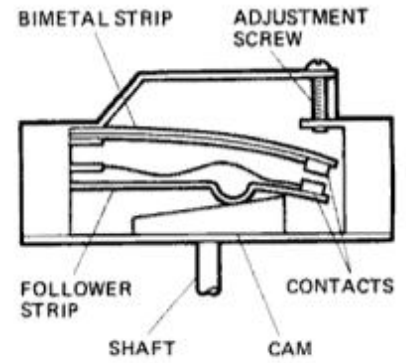
Timer does not operate properly

POSSIBLE CAUSES	WHAT TO TRY
1. Timer set incorrectly.	Refer to the manufacturer's instructions for correct settings.
2. Loose connection.	Disconnect power, tighten all loose connections, then reconnect power.
3. Motor defective.	Disconnect power, remove timer motor and test it directly with 115-v. power. If drive gear does not turn, replace the motor.
4. Blown fuse.	Inspect 15-amp. fuse behind control panel; replace if blown. If new fuse blows, disconnect power and check timer for shorts (see clock-timer discussion, page 149).
5. Gears worn, stripped or broken.	Inspect clock gears in timer; if any are visibly worn, broken or stripped, repair or replace timer. If gears are jammed, try to free them with silicone spray or a TV-tuner cleaner.
6. Contacts defective.	Make voltage checks on timer as explained on page 149.

Surface unit does not heat

POSSIBLE CAUSES	WHAT TO TRY
1. Fuse blown or circuit breaker.	Replace fuse or reset circuit breaker. If blowing or tripping is repeated, disconnect the power and check for shorts.
2. Connection loose or shorted.	Disconnect power, tighten any loose connections and replace any charred wiring, reconnect power.
3. Switch defective.	Place voltmeter across switch's input terminals (usually labeled L1 and L2); reading should be 230 v. Turn switch on and place voltmeter across output terminals (to surface element); reading should be 230 v. Replace switch if you do not get these readings.
4. Terminal block defective.	Disconnect power. Inspect inside of terminal block. If it is charred or broken, replace it. If it is pitted or dirty, try to clean it with a contact file; replace it if this cannot be done.
5. Surface element defective.	If element is the plug-in type, unplug it and then plug it into one of the sockets into which the element is known to work; if it does not heat there, replace it. If element is the screw-on type, pull it forward, turn switch on and place voltmeter across surface-element terminals; reading should be 230 v. If voltage is present and element does not heat, replace it. Any replacement element must be of same size and wattage as the original and have the same type of terminals.

Infinite-heat switch



ELECTRIC RANGE

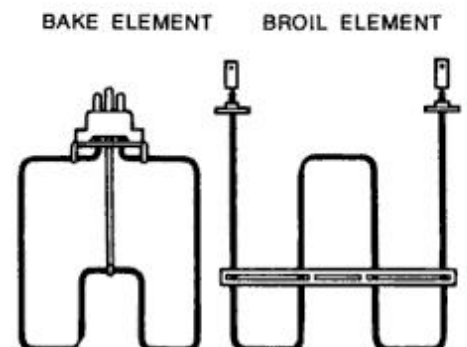
(Continued from page 145)

contact at the other. As current passes through the bimetal and heats it, it curls up and away from the cam-follower strip that carries the switch's other contact. The position of the cam determines how long the element will be on before the bending bimetal breaks contact and cycles the element off. In its extreme position—the "high" setting—the cam holds the contacts together without cycling; in other positions, it controls heat output by governing the time that current flows to the element.

Like surface switches, oven controls vary from manufacturer to manufacturer and model to model. Some ovens have only a thermostat, while others also have a selector switch and automatic clock. The selector switch is used where a range has more than one oven or there is more than one function for the thermostat to perform, or it can determine which oven elements are supplied with current and whether they are connected in series or in parallel.

The thermostat that regulates oven temperature has a fluid-filled sensing bulb, similar to the bulb at the end of a thermometer, suspended within the oven. Expansion of the fluid with increasing temperature activates a bellows in the thermostat that forces contacts apart, cutting off current to oven elements and cycling the oven off; reduced oven tempera-



(Please turn to page 147)



"DON'T TELL ME YOU CAN'T LOSE LBS. AND INCHES IN 5 DAYS!"

"I lost 3 3/4 inches off my waist, 5 1/2 pounds...and shaped up...IN ONLY 5 DAYS!" Richard Moss

(PHOTOS CERTIFIED UNRETOUCHED)

	BEFORE		AFTER 5 DAYS
WAIST 35 1/2 IN. WEIGHT 153 1/2 LBS.		WAIST 31 3/4 IN. WEIGHT 148 LBS.	

NO RIGID DIETING... NO COMPLICATED EXERCISES

Using this ingenious "5" Minute Total Body Shaper Plan for just 14 days has you starting to lose inches and pounds, adding muscle and vigor. Use it in the privacy of your own home. It has been used by athletes, businessmen...anyone wanting that muscular, athletic look fast. It's safe...Medically Approved...and Guaranteed!

Here are 6 reasons why this amazing plan can have you muscling and shaping up like Richard and.... look years slimmer...in 14 days.

1. It concentrates its trimming action on your fatty areas, particularly around the waist, that gives you that tired aging look. At the same time, it builds up your shoulders, chest, giving you that athletic look. Because it works most your body muscles at one time—not body part by body part—the Plan stimulates faster trimming action to help you start shaping up to a more youthful athletic body in 14 days.

2. Simple to use. No undressing. Attach it to any door knob, stretch out comfortably on the floor. Do one "5" Minute continuous rhythmic, enjoyable exercise, twice daily, whenever you have the time, even while watching T.V.

3. Designed to Trim Fatty Problem Areas. Choose from 4 different "5" Minute exercises, each created to help trim down the problem fatty deposit areas of your body in just 14 days.

4. No Rigid Dieting. We suggest you temporarily eat 20% less until you reach your normal weight, without giving up any of the foods you love — eat Ice Cream, Cakes, Pasta, whatever! (It's all in the guide.)

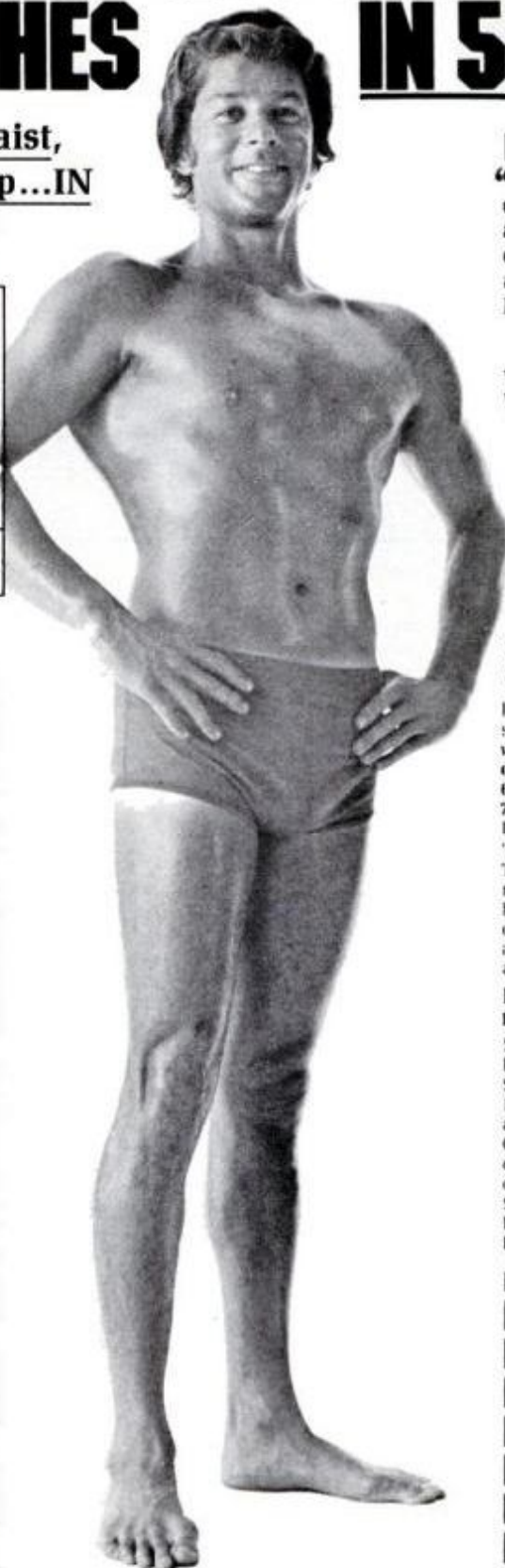
5. Safer and Saves Time. No more running to gyms for complicated, exhausting workouts that can strain you. This simple effective Plan, that you do at home...at your office...anywhere...leaves you refreshed.

6. Weighs only 10 Ounces. Fits any wallet size case. Stores anywhere. Travels with you so you never have to miss a trimming session. Remember, it's the daily sessions that trim you down, add muscle and keep you looking lean and strong.

IT'S FUN WITH RESULTS... "5" MINUTES AND OUT.

The Secret Why It Beats Fasting Alone, Making Your Figure Look Years Younger.

Fasting programs, when causing weight loss, unlike our plan usually burn off more active tissue (muscles) which can cause your skin to wrinkle, muscles to sag and create dragging fatigue. Our Plan increases active tissue growth — through the use of the "5" Minute exerciser — while concentrating greater fat loss by (exercise and temporary 20% food reduction) making you look years younger as you slim and trim. Within the first "5" minutes you use the exerciser, you start burning off fat, speeding up your metabolism to help burn up stored calories, releasing excess water. Helps curb your appetite without suppressants. Increases energy and well being. It's so simple and enjoyable a Plan to use, Pat. 3,858,874, © Joe Weider 1973



RICHARD MOSS TELLS US... Case #R-039

"I thought it would take weeks instead of days to trim down. I actually lost pounds and inches in 5 days without rigid dieting or complicated exercises. I can't imagine anything faster and simpler than the '5' Minute Body Shaper."

We guarantee you can stay with it remaining trim where you should and adding muscle where you need it—without regaining those inches and pounds. It can put an end to your "gain-and-weight-loss-cycle."

USE OUR "5" MINUTE TOTAL BODY SHAPER PLAN FOR 14 DAYS AND WE GUARANTEE YOU THESE RESULTS:

"You Will Lose Inches and Pounds. Improve Your Vitality, Energy, Fitness, Posture, Work Off Body Tensions, Feel and Look Better and Younger — All To Your Satisfaction Within 14 Days — Or Your \$9.95 Will Be Refunded."

Here's a sampling of what the customers who have shaped up on our Plan tell us happened to them while using the Plan: "I lost 25 pounds, 5 3/4 inches off my waist in 14 days," G. C. "Lost 32 pounds, 6 3/4 inches off my waist in 21 days," M. F. "I lost 7 pounds and 5 1/2 inches off my waistline in 9 days," L. S.

They were measured by experts before and after. The results verified, some notarized. Your results may vary depending on how overweight you are and how much time you devote to the exerciser. The customers quoted spent 5 to 10 minutes, twice daily and reduced their food intake — temporarily — by about 20%, but none gave up the foods they like.

EXPERTS AND CUSTOMERS AGREE:

It's the no-nonsense way to shape up fast!

START SHAPING UP NOW!

It's America's Most Successful Body Slimmer and Shaper. 600,000 customers have purchased our "5" Minute Plan to slim down — shape-up to build an athletic body fast. Results are proven and notarized. Our guarantee to you is in writing. Experts agree our plan works and works fast. Now, can you think of any reason for not ordering your "5" Minute Body Shaper Plan and start slimming where you should be slim, shaping up where you should be muscular? For a more athletic looking body start today.

SATISFACTION GUARANTEED!

See what our "5" Minute Total Body Shaper Plan can do for you in 14 days. If it does not start shaping you up...adding muscle to your body, return it within 14 days — in good condition — for your \$9.95 refund.



JOE WEIDER Dept. BR/D
"5" MINUTE BODY SHAPER PLAN
 Trainer of Champions since 1936
 21100 Erwin Street
 Woodland Hills, California 91364

Dear Joe: I want to lose inches and pounds. Your promise that I will look leaner and more muscular in just 14 days interests me. Please rush my "5" Minute Exerciser and Illustrated Guide.

I am enclosing \$9.95 plus \$1.00 (for shipping and handling). Calif. res. add 6% sales tax.
 Check, Money Order, Cash, \$.....
 Please allow 3 to 4 weeks delivery.

Name..... Age.....
 Address.....
 City.....
 State..... Zip.....

RESULTS THAT STAY

"3 months later, I'm firmer, slimmer and stronger than I was years ago. Finally broke the 'loss-and-weight-gain-cycle'."

Oven door drops down or pops open

POSSIBLE CAUSES	WHAT TO TRY
1. Door out of alignment.	Loosen door-hinge screws, realign door and retighten screws. Check to make sure range is level.
2. Hinge pin worn or loose.	Disassemble door, inspect hinge pins, replace them if worn or broken—an 8d nail can sometimes be used.
3. Hinge worn.	Hinge worn: replace hinge if edges are worn.
4. Spring broken.	Open door slightly. If it fails to spring closed or drops easily, a broken spring is likely. Inspect springs; if one is broken, replace both.
5. Roller bearing broken.	If door is hard to open or close, a bearing is broken. Replace both.

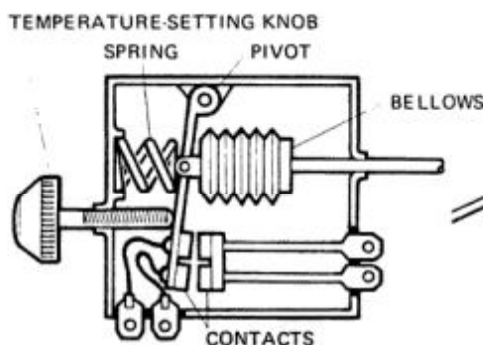
Oven drips water or sweats

POSSIBLE CAUSES	WHAT TO TRY
1. Oven preheated improperly.	Preheat oven with door open at first stop.
2. Oven temperature too high.	Use an accurate mercury thermometer to check on calibration of oven thermostat.
3. Door not sealing.	Check door alignment and condition of the door gaskets; realign door if necessary (see chart, "Oven temperatures are uneven," page 145). Replace any worn, cracked or flat gaskets.
4. Oven vent clogged.	Inspect oven vents for obstructions and clear them. If the oven uses a filter clean or replace it.

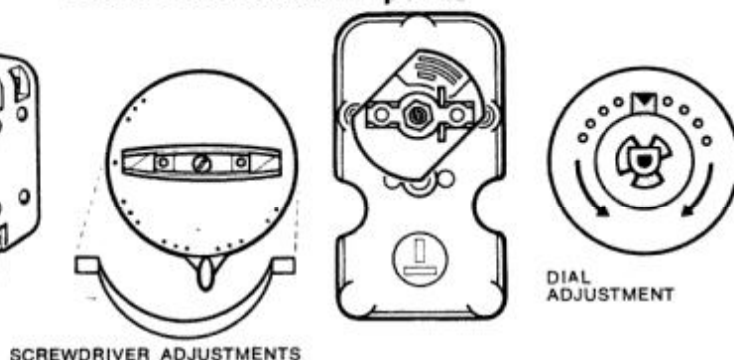
Oven lamp does not light

POSSIBLE CAUSES	WHAT TO TRY
1. Bulb loose or defective.	Tighten bulb in socket. If it still does not work, replace it with a new <i>appliance</i> bulb.
2. Switch defective.	Disconnect power, disconnect both leads to switch, place a continuity tester across both switch leads and turn on the switch. There should be a reading of continuity. Turn the switch off. There should be no reading. Replace the switch if you do not get correct readings.
3. Bad contact in socket.	Disconnect power and remove bulb from socket. With finger or blade of a small screwdriver, bend the center socket contact outward a fraction of an inch. Replace bulb and reconnect power.

Thermostat components



Thermostat calibration points

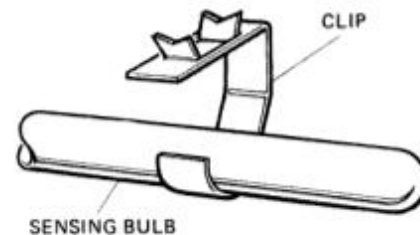


ELECTRIC RANGE

(Continued from page 146)

ture and contraction of fluid bring the contacts together again, cycling the oven back on. The thermostat's control knob varies tension between contacts, making it easier or harder for the bellows to force them apart.

Thermostat calibration can be checked by putting a mercury (not bimetal) thermometer in the oven and setting the thermostat at 400° F. Let the oven cycle three or four times, then check the temperature; if it is more than 15° F. above or below the thermostat setting, the thermo-



stat requires recalibration. Calibration instructions are usually stamped on the thermostat, but if none can be found, assume that a quarter turn equals 25° F. Turn the calibration screw in either direction, then observe the result. Check calibration annually, more often if the oven gets unusually heavy use. (A source of calibration thermometers for \$7.50 postpaid is Charles Connolly Distributing Co., 41 River Rd., North Arlington, N.J. 07032.)

Construction of oven elements is similar to that of surface elements. The broil element usually has two resistances, with a maximum of 3000 w; the bake element is a single resistance rated at about 2500 w. Elements are fastened to the oven's rear wall, but can usually be lowered or lifted slightly to permit cleaning around them.

A range clock may be fully automatic or nothing more than a clock with a buzzer timer. The fully automatic timer is connected to oven controls; timer tests are described on the next page.

Electric self-cleaning ovens use temperatures of 850° to 1000° F. to decompose oven soil. The process, called pyrolysis, leaves only a loose ash that is easily removed. The self-cleaning oven has more insulation, heavier body metal, larger and more durable controls and a number of safety features not needed on the ordinary oven.

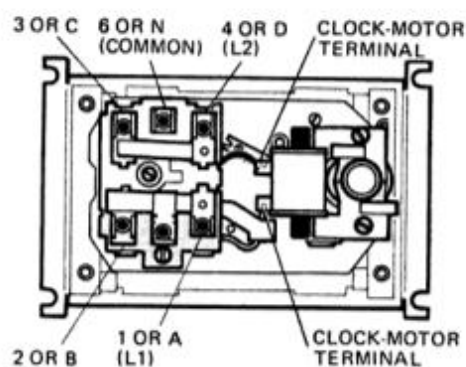
The cleaning cycle uses the oven thermostat, a bias circuit and door-locking circuit. The bias circuit lets the thermostat run in the higher temperature range required for pyrolysis. The door-locking circuit assures positive locking of the oven door at temperatures over 550° F. and keeps the cleaning cycle from starting if the door is not locked; this circuit is essential for safety, as an inrush of air mixing with carbonized soil at high temperature could cause an explosion.

The self-cleaning cycle also involves a cooling fan that circulates air in and around the oven liner and, usually, a smoke eliminator, a device that promotes the decomposition of smoke the same way the catalytic converter in a 1975 car's exhaust system promotes complete combustion of exhaust gases.

Setup sequence for cleaning and duration of cleaning vary among manufacturers, with some offering a choice of cleaning periods. The appearance of the soil remaining at the end of a cleaning cycle indicates cleaning effectiveness. If it is brown and soft, no cleaning has taken place; if it is dark brown, cleaning has been incomplete. Loose gray ash indicates complete cleaning.

Continuous-cleaning ovens require none of the extra circuits and safety devices self-cleaning ovens do. They differ from ordinary noncleaning ovens only in the porcelain with which they are lined. This is somewhat porous, and allows fat spatters to spread out and then decompose at normal cooking temperatures. ★★

Testing automatic timers: Motor: voltage across terminals 1 and 6 should be 115; if not, check for blown 15-amp. fuse behind panel; if fuse is good, see whether motor drive wheel is turning; if not, replace motor. Switch: voltage across 1 and 4 should be 230, as across 2 and 3 with timer set on manual and when timer has turned oven on in automatic operation. If these voltage readings are not obtained, the timer must be repaired or replaced.



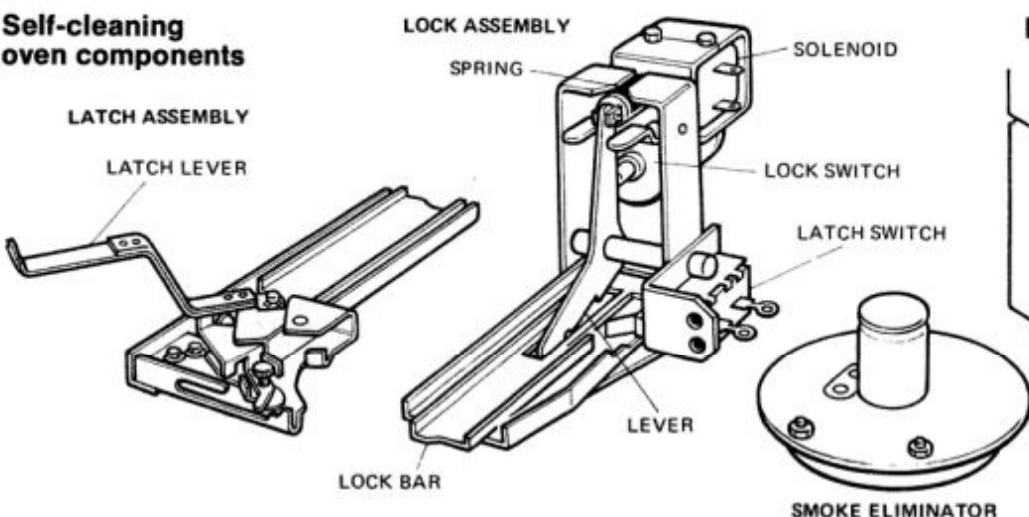
No heat for cleaning (self-cleaning ovens)

POSSIBLE CAUSES	WHAT TO TRY
1. Controls set improperly.	Refer to manufacturer's instructions for setting controls for cleaning cycle; after setting controls, wait a minute to determine whether they are working.
2. Fuse blown or circuit breaker tripped.	Replace fuse or reset circuit breaker; if blowing or tripping is repeated, disconnect the power, check for shorts.
3. Thermostat defective.	See chart "Oven does not heat" (page 144).
4. Door unlocked.	Inspect door for firm seat against oven, make sure latch is all the way over in locked position; if not, check both door and locking mechanism for alignment.

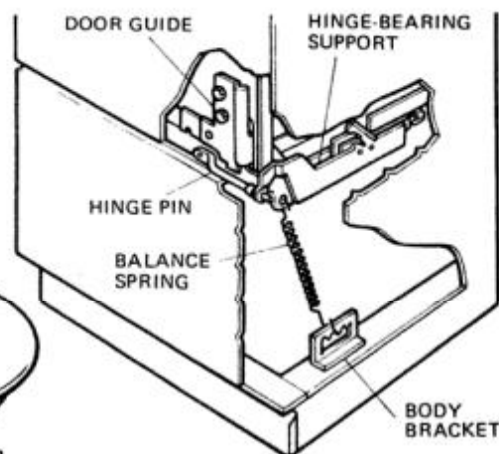
Cleaning is incomplete (self-cleaning ovens)

POSSIBLE CAUSES	WHAT TO TRY
1. Controls set improperly.	See chart above.
2. Cleaning time short.	See maker's instructions on length of cleaning time.
3. Oven elements defective.	See chart "Oven does not heat" (page 144).
4. Line voltage low.	Check voltage at terminal block at rear of range; it should be within 10 percent of 230 v. If it is lower than 207 v., call local power company.
5. Smoke eliminator defective.	Disconnect power, locate smoke eliminator and disconnect its leads; then place continuity tester across eliminator terminals. Replace eliminator if there is no reading or if there are visible breaks in its mesh screen.

Self-cleaning oven components



Door-hinge assembly



Planer Molder Saw

3 Power TOOLS in 1
Feed



Now you can use this ONE power-feed shop to turn rough lumber into moldings, trim, flooring, furniture—ALL popular patterns. RIP-PLANE-MOLD . . . separately or all at once with a single motor. Low Cost . . . You can own this power tool for only \$50 down.

30-Day FREE Trial! SEND FOR EXCITING FACTS
NO OBLIGATION—NO SALESMAN WILL CALL
RUSH COUPON BELSAW POWER TOOLS CO.
TODAY! 906A Field Bldg.
Kansas City, Mo. 64111

BELSAW POWER TOOLS
906A Field Bldg., Kansas City, Mo. 64111

YES Please send me complete facts about PLANER—MOLDER—SAW and details about 30-day trial offer.

Name _____
Address _____
City _____
State _____ Zip _____

ELECTRONIC IGNITION CARE

(Continued from page 110)

coil won't usually show up when you test the electronic ignition system. Hairline breaks widen under heat and can cause a running engine to stop. The engine will start when heat dissipates. If this is happening to you, suspect the pickup coil.

7. Use sparkplugs recommended by your automaker only. In many cases, sparkplug gap is much wider than before, and plugs have been designed with a longer side electrode. Trying to gap any other plug to specification will cause you to bend the side electrode to an extraordinarily wide angle, and lead to operational problems.

GM wants its sparkplugs gapped to either .060 or .080 inch, depending on the engine. Ford wants gap ranges from .034 to .054 inch, while Chrysler's comes in at .035 to .040 inch. AMC's setting is .033 to .037 inch.

8. Sparkplug cables are more delicate than before—they are made of a very pliable, soft material that withstands heat and carries high voltage better. Cables are easily scuffed and cut, so be very careful how you route them in the engine compartment. When removing cables from sparkplugs, it's more important than ever to twist and pull on the boot—not the cable.

9. Use an adapter between the No. 1 sparkplug and No. 1 sparkplug cable, and connect a timing light to the adapter when testing ignition timing. Do not pierce the sparkplug cable. High voltage will escape from the break in the cable to the nearest ground, resulting in misfire.

The only auto manufacturer making an electronic ignition system kit to replace the conventional ignition system in its cars is Chrysler. The kit contains a new distributor, electronic control unit, dual ballast resistor and wiring. You use the same ignition coil.

Kits for six-cylinder engines cost about \$75; for eight-cylinder engines, about \$70. They come with complete instructions.

The biggest problem when installing one of these kits is getting the distributor into the engine so splines mesh properly. Before removing the old distributor, set the rotor at top dead center and mark the direction the rotor is facing. The distributor is close enough to the firewall or fender so you can do this by placing a long, sharp-pointed tool along the rotor, and scribing a mark on the firewall. Pull out the distributor and install the electronic ignition unit so its rotor lines up perfectly with the scribed mark. ★ ★ ★

Help!

Flat tire! Here's emergency help. Just plug in 12-volt Auto-Flator in your car's lighter. In minutes tire is inflated. Also pumps boats, rafts, mattresses, pools, toys, etc. Only 6½" long. Delivers up to 60 lbs. pressure! Every vehicle should carry one. Only **\$32.95** complete (plus \$1.00 shipping). Guaranteed. Send check or M.O.



auto-flator.

Compressed Air From Car Lighter

W. R. BROWN CORPORATION
2773 N. Normandy Ave., Chicago, Ill. 60635

The "BOULDER MOUNTAIN" PARKA is a SEW-IT-YOURSELF KIT

for \$26.75 plus \$1.00 handling.

Our 1975 Spring Catalog is now available . . . send for your copy today, it's



FREE!

Holubar

Dept. 4-123C Box 7 Boulder, Colo. 80302

How to buy your new boat without going under.

Finance it at your credit union. You'll find their low annual percentage rate helps keep your family budget afloat. There's a minimum of red tape. Many times your signature is all that's required. At your credit union, you're more than a customer. You belong.

Join your credit union. It's where you belong.

For more information write to your state's Credit Union League or Credit Union Nat. Assoc., Inc., Dept. A, P. O. Box 431, Madison, WI 53701.



wonders with Wood Finish by Minwax



top it with Antique Oil
for a hard finish, soft lustre

their lairs. For them you need deep-running, wobbling lures.

■ **Flatfish:** This gang-hook creation, developed by the Helin Tackle Co. of Detroit in 1933, has been a favorite ever since. Its wobbling action cuts an eight-inch swath through the water and drives deep walleyes wild. Most people don't know the Flatfish is the most popular trout lure in South America. Called a "caiman" there, it annually takes more giant Andes trout than all other lures or flies combined. For trolling, not casting, it's fished with the line tied to the lure and a weight a foot ahead. A favorite is the U-20 in orange.

■ **Lazy Ike:** Extremely versatile underwater, the Lazy Ike was developed by Kautsky Sporting Goods in the early '40s and is now made by Lazy Ike Corp., Fort Dodge, Iowa. This

er is also excellent for walleye, smallmouth, muskie, pike off deep points, big trout and more. All the many colors and finishes take fish.

Big and deadly

■ **Rapala:** A slim-bodied Finnish creation distributed in North America by the Normark Corp. of Minneapolis, it's one of the great all-time fishing lures. When this balsa import appeared on the U.S. scene in 1962, it created a revolution. Bass, muskie, pike, trout, walleye, panfish all fell for it. Fishermen bought out the complete stocks of tackle shops and caught fish with wild abandon. Today the furor is over, but the Rapala in eight models and dozens of colors remains a great one. Several should be in your tackle box.

■ **Rebel:** Topnotch U.S. contender for honors the Rapala debut started, this fine one from Plastic Research & Development Corp., Fort Smith, Ark., is durable and deadly. Work floating models like surface lures or retrieve just under the surface. Sinkers and deep runners are equally effective. On one lake, Rebel took more trout one season than all other lures combined. Another time it proved most deadly of all peacock bass lures. Use it for bass, pike, muskie, all game fish—it's great.

■ **Big O:** When a hand-carved balsa model of this fat plug won a bass tournament a couple years ago, it became the hottest of lures and earned its place on this elite PM list. Manufactured by Cordell Tackle Co., Hot Springs, Ark., it now comes in four sizes, many colors. In Ontario we've had smallmouth bass eat it up, but also once caught more muskies on this fatso than on a dozen previous trips. And in the Amazon

(Please turn to page 153)

PM PICKS THE TOP 20 LURES

(Continued from page 63)

pike. Let it sit awhile before the retrieve—then brace for an explosion.

The spoon group

No collection would be complete without these two fine spoons. They compete with other lures under normal conditions and also perform special services that the others can't match.

■ **Dardevle:** Easily the most famous of fishing spoons, this old standby is made by the Lou J. Eppinger Co. of Dearborn, Mich. The red and white standard Dardevle, designed for muskie, pike and walleye, is a northwoods must. A fine casting lure, its tantalizing slow wobble makes it an ideal trolling lure also. But if we had to choose just one spoon, the Eppinger Copy Cat would have to be it. This hump-backed Dardevle operates at higher speeds, takes snook, tarpon, trout, bass and other fish as readily as pike and walleye. (Buck prefers the 3/8 ounce, and is never without a half dozen.)

■ **Silver Minnow:** As for weeds, this is the lure. Made by the Louis Johnson Co. of Highland Park, Ill., it started the story about the angler who made lures from his wife's teaspoons. Fish this streamlined silver spoon with a pork rind strip as far back in the brush as you can heave it. It's deadly for southern bass, pike, muskie or any game fish in heavy cover; add an eight-inch worm for deep water.

Deep and slow

Most lunkers are lazy. They let small energetic fish chase faster prey and wait for easy meals to pass



top it with Polyurethane
for a super hard bright finish

lure takes everything. We troll it for deep bass in winter and spring, and it's a first choice for northern smallmouth and walleye. Try it for open-water pike and muskie, through a stream riffle for smallmouth or big trout. Fishing the Amazon, a friend trailed one beside our dugout canoe and took a wild six-foot surubi catfish. Tops for trolling, you can also cast floater models back into the shallows.

■ **Bomber:** This is the original "crank bait." Made by Bomber Bait Co., Gainesville, Tex., it has been dredging bottoms of southern impoundments for over 25 years and catching lots of bass. Fish sloping banks with floaters, deeper points with others. To bring 'em out of the deep, add a slip sinker up front. Although a largemouth lure, the Bomb-

top it with Finishing Wax
for a deep sheen

FREE 16-PAGE BOOKLET
MINWAX CO., INC. dept. PM45
72 Oak Street, Clifton, N. J. 07014
Please send booklet "Tips on Wood Finishing" with color card.

Name _____
Address _____
City _____
State _____ Zip _____



Isn't Black Velvet smooth?

Just the thought of it can give you a good feeling.
Black Velvet® Canadian Whisky. The smooth Canadian.

BLACK VELVET® BLENDED CANADIAN WHISKY 80/86 PROOF. IMPORTED BY ©1974 HEUBLEIN, INC., HARTFORD, CONN

Материал, защищенный авторским правом

jungle, big dorado and peacock bass tear into our Big O. It's a winner.

The fast ones

Sometimes fish pass up old favorites, yawn at worms and jigs. Occasionally it takes a fast lure to trigger these lethargic ones into action.

■ **Sonar:** This glittering metallic mover made by James Heddon's Sons of Dowagiac, Mich., is a forward-weighted lure with a fast sound-producing wiggle that casts like a lead weight and can be fished at almost any depth. Each of three holes for the line produces a different action that's great for largemouth and stream-bred smallmouth alike. Smaller Sonars are hot for trout, and ever since this lure was introduced there have been dozens of imitations. None, though, have surpassed it.

■ **Mirrolure:** "Best jerk bait ever made," is how veteran snook fishermen describe this one from the L & S Bait Co. of Bradley, Ill. For a fast-moving lure for fresh or saltwater, this shiny sardine brings out the worst in game fish. Some strike it from hunger; others for spite when you give it little jerks with your rod and it darts like frightened bait. Choose from many colors and finishes for all inshore saltwater species, schooling bass, fast water trout.

Spinning lures

They do these well in Europe; one of these spinner favorites comes from Sweden, the other from France. Both rate top tackle-box billing.

■ **Abu Reflex Spinner:** Made by Abu of Sweden and distributed by Garcia of Teaneck, N. J., this one comes from two of the quality names in the business, and performs like it. A favorite for big Irish pike and Norwegian salmon, it also took a 17-pound brown trout recently to win the Abu G.B. International Contest. Over here it takes all types of trout, is effective for pike and largemouth, has a wide range of casting and spinning sizes, blade and body colors.

■ **Mepps Spinner:** When spinning was introduced here in the 1940s, this French spinning lure came along. Today, distributed by Sheldon's, Inc. of Antigo, Wis., it's known coast to coast as one of the finest trout lures. It's used as well for far north grayling, white water walleye, white bass, crappie, black bass, you name it. Keep the blade wet and moving.

Bottom bumpers

"If they're not on top, they're on the bottom," is the old adage; this lure group goes down and gets 'em.

■ **Doll Fly:** One of the world's best

known jigs, this teaser from the Zebco Doll Div. of the Brunswick Corp., Tulsa, Okla., will take bass off the bottom of impoundments or haul snapper up from southern seas. Use it for lake trout, salmon, walleye, crappie. Fish it slow or crank as fast as you can through schooling, feeding gamesters. You can cast the jig a country mile with any rig. It gets to the bottom fast, and you can bump it along with minimum risk of snagging. Doll Fly comes in many sizes: yellow and white are favorite colors.

■ **Jig-A-Doo:** Made by Burke Flexo-Products Co., Traverse City, Mich. this little tantalizer is a cross between a jig and an underwater action lure. Its plastic lip gives it a wiggle that needs no help from the angler.

GET THESE LETHAL LURES ON A HANDSOME, FULL-COLOR WALL CHART

PM Picks the Top 20 Lures has been reproduced on quality paper in a 24x20-inch full-color wall chart suitable for framing (or just pin it up); and perfect for family room, den or office. Give it as gifts to your favorite fishermen. Limited quantity. Order yours today. Send \$1.50 for each postpaid, along with your name and address to PM Lures, Box 1014, Radio City Station, New York, N.Y. 10019.

A trailer hook attached to the main hook makes it even more effective in nailing short strikes. Considered among the best lures for walleye and smallmouth. One once was taken away from the bass we were fishing for by three muskies. It works on the bonefish flats, murders surf-feeding snook, and is equally effective for tarpon. If there's a lure which can do almost everything, this little Jig-A-Doo might be it.

■ **Lil' George:** This heavy little spinner, made by Mann's Bait Co., Eufaula, Ala., is relatively new compared to most of our other selections, but has already made quite a name for itself among professional bass fishermen. It casts like a sinker, hits bottom faster than you can catch your breath and frequently induces strikes on the way down. You can jig it, bounce it down a rocky ledge, buzz it past a brush pile, work it in a swift current which will ruin the action of most other lures. It's a great bass lure that is also equally effective for walleye and white bass. Last year we fed some to northern pike and created a mild revolution in a certain northwoods fishing lodge. A few months ago we introduced Lil' George to half a dozen species of South American fish and again it was love at first sight. When things are tough, you're still not whipped. Send Lil' George. ★★

Now is the time to Road Test RISLONE

Engines get sluggish and noisy with miles and time. For 40 years RISLONE has been cleaning rings, valves and guides, oil screens and passages to make engines run better again.

That's the whole idea behind RISLONE. Treat the engine, not the oil. Dissolve and disperse the gums, varnish and sludge that alter tolerances, interfere with efficient operation. That's why RISLONE works, and how it promotes better compression, easier starting, cooler running and helps get more miles out of every gallon of gasoline.

And RISLONE is a super bargain on your auto retailer's shelf. The big quart can costs only a dime or two more than the mini-products. Saves a quart of oil too! So it's a treat for your engine and your pocket book. Road test RISLONE now!



RISLONE National Championship Racing Jacket . . . \$9.95 prepaid

Quality polyester & cotton wash/wear. RISLONE yellow with black & red emblems & stripes. S, M, L, XL. Send check or money order to: RISLONE Racing Jacket, The Shaler Company, Waupun, Wis. 53963.



THE SHALER CO.
Waupun, Wisconsin 53963
In Canada: Warren Packaging Co. Ltd. Scarborough, Ontario

TOOL BARGAINS OF THE MONTH BY

SCHLESINGER'S

DIAL CALIPERS

Measures inside, outside, depth & step readings. Dial graduated in .001" unbreakable, rust-proof, patented construction.

ONLY	MODEL	SCALES ON DIAL	RANGE
\$9.95	70D	.001"	5 1/2"
	80D	.01" AND 1/64"	5 1/2"
	80M	.1 MM	140 MM

Add \$1.00 UPS charges 3 for \$28.00 postpaid

MICROMETERS

0-1" .0001" with case, ratchet, carbide tipped, all deluxe features Swiss made. List \$26.50 your cost \$18.00

Metric model
0-25mm available \$15.95 Add \$1.00 UPS charges

MACHINE DIVIDED SATIN-CHROMED RULES

Type A: 10ths, 100ths, 32nds & 64ths. Flexible
Type B: 50ths, 100ths, 32nds & 64ths. Flexible
Type C: 8ths, 16ths, 32nds, 64ths. Flexible
Type D: 8ths, 16ths, 32nds, 64ths. Rigid
Type E: Millimetres & 1/2 Millimetres, 32nds & 64ths. Rigid
(Type E available in 6" only) others in 1 1/2', 1 1/4' & 2'.

Prices: 1/2'...\$3.50
1'... \$6.00; 1 1/2'...\$11.00 2'...\$15.00

Hi-Power MAGNETIC BASE with scriber

Model MB..... \$19.95
Buy 3-10% Off.
Buy 6-20% Off.
Buy 12-25% Off.

Dial Indicator for above 1/4" range in .001" only \$13.00
Add \$1.50 per base for UPS charges

H.S.S. DRILL SETS IN INDEXES TOP QUALITY U.S. Made

1-60 Only \$25.00
A-Z Only 30.00
1/16 - 1/2 by 64ths ... Only 33.00
All 3 Sets \$85.00
Add \$2.00 for UPS charges

DRILL PRESS VISES

2 1/2" Size \$14.95
3" Size ...\$19.95
2 1/2" Size Angle Vise same price as 3" vise.
UPS charge 2.00

MAGNIFIERS

Select working distance: 20", 14", 10", 8" or 6"
Special \$14.00
Add \$1.00 per magnifier for UPS charges

MULTIWRENCH

8 wrenches in 1! Tough, deep cut socket teeth.
You get all these sizes: 7/16, 1/2, 9/16, 5/8, 11/16, 3/4, 7/8, 15/16, 1" only \$5.95
Add \$1.00 for UPS charges

FILES SET OF 3 FILES TOP QUALITY - U.S. Gov't Specs. only \$2.95
Mill bastard: 6", 8" & 10" Add 50¢ for UPS charges
SEND \$1.00 FOR OUR HUGE CATALOG SCHLESINGER'S FOR TOOLS LTD.
1261 UTICA AVE., BROOKLYN, N.Y. 11203 (212) 241-7482

HOMEBUILT TOW GLIDER

(Continued from page 88)

struction and control simple. There are no rudder pedals to bother with because there's no rudder. The vertical stabilizer is fixed. There also are no elevator panels as such. The entire tail, mounted on the end of a boom, swings up and down on a single pivot to serve as an elevator for climbing and diving.

The ailerons are unique, too. Since there's no way to notch them into the flexible wings, they're actually mounted above the wings, hinged to the leading-edge spars out at the tips. Unlike conventional ailerons, they work on a "drag" principle. As you raise the aileron on the right wing, air resistance slows the wing on that side, swinging the ship into a right-hand bank. Raising the left aileron banks you to the left in the same manner. In this system, there is no "adverse yaw" effect and thus no need for a movable rudder as in conventional aircraft.

A single joystick is your only control. You move it backward to climb, forward to dive and side-to-side to steer. Virtually any speedboat powerful enough to pull water skiers can tow the glider. You need a speed of 20 to 25 mph for lift-off and 30 to 40 mph for cruising. Your towline can vary in length from 100 to 200 feet or more. The longer the line, the more freedom you will have for maneuvering independently of the towboat.

As with flying any aircraft, there are some cautions. The first and most critical is never—repeat never—attempt downwind landings or takeoffs. Always land and take off into the wind. The reason is to gain maximum lift at low speeds, assure good stability and control and eliminate any danger of stalling. Tom warned me about the importance of this, but I forgot about it in my excitement on one flight.

We were heading downwind and I decided to come in for a landing. That was a mistake. As my forward speed slowed, the following wind canceled out lift on the wings and I was in a stall. I yanked frantically back on the stick to try to hold her up, but it was too late. She plopped into the water with a shuddering smack and dug a wingtip into a wave. I could see Tom wince.

The towline is attached to the glider's nose by a quick-release catch with a trip lanyard leading into the cockpit. This is a safety measure. While you're not likely to need it, it's a good idea to keep one hand on

(Please turn to page 156)



FREE BLUEPRINTS and TRIAL LESSON

—for your greater success in Building

Beginners, craftsmen, even foremen and superintendents, have sent for these free blueprints and trial lesson in Plan Reading as a means of trying out Chicago Tech's home-study Builders training. Learn how you can master Plan Reading—Estimating—and the practical details of all types of construction in your spare time at home. Mail coupon below today—see how you, too can prepare for a better job—higher income, or start your own contracting business.

CHICAGO TECHNICAL COLLEGE/School for Builders
2000 S. Michigan Avenue, Chicago, Ill. 60616

CHICAGO TECHNICAL COLLEGE Dept. PM-45, 2000 S. Michigan Ave., Chicago, Ill. 60616

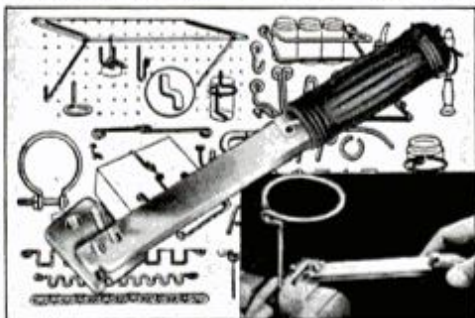
Veterans Check Here

Please mail me a Free Trial Lesson, Blueprints and Builders Catalog. I understand there is no obligation—no salesman will call.

NAME _____ AGE _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____

New Tool Works Wonders With Wire!

WIREFORMER



IT BENDS! IT CUTS! IT STRAIGHTENS!

WIREFORMER is a simple, precision made, vise-held tool of innumerable uses. Make your own peg board hooks, clamps, handles, braces, brackets, etc.—any shape you want. Forms an eye of 3-16" inside diameter (just right for any nail, screw, or bolt up to that size). Even uses coat hanger wire. No pliers needed. WIREFORMER does the work with the pressure of one finger. Straightens the wire if you make a mistake. Cuts the wire just where you want it. Forms any angle, arc or circle. Bends both right and left. Tool is case hardened, plated, with a plastic handle. Fits in your pocket. Complete instructions, illustrated brochure showing many things to make.

SOLD ONLY BY MAIL. MONEY BACK GUARANTEE. Five dollar bills will get you one, or send check or money order for just \$4.98

We pay postage and handling charges.

VINKEMULDER TOOL CO. Dept. PM-45
2223 Estelle Dr., S.E. Grand Rapids, Mich. 49506



*"When you say
Budweiser,
you've said it all!"*

BUDWEISER® • KING OF BEERS® • ANHEUSER-BUSCH, INC. • ST. LOUIS

RICHARD PETTY says:

"Want to really learn how to repair cars? Check out NRI home training"



Richard Petty, America's Winningest Stock Car Driver and NRI Automotive Consultant



You get all this equipment and more with the NRI Master Automatic Technician's Course... including NRI's exclusive Achievement Kit, and 70 profusely illustrated "bite-size" lesson texts.

"NRI provides the most up-to-date complete courses

in Auto Mechanics I've ever seen. I know the importance of a good mechanic, and the opportunities out there for trained men. That's why I'm glad to see home training like the two NRI courses. It's a lot of training for a very few bucks.

Save Gas... Save on Repair Bills. NRI's Tune-Up Course will teach any homeowner all he needs to know, quickly, with hands-on experience. The course includes 8 important service items, including a Dwell Tachometer, Volt Amp Tester, and Tune-Up Tool Kit.

Become a Professional Mechanic. NRI's Master Automatic Technician Course gives you the essential training and diagnostic equipment to be a real pro. You get 10 pieces of auto service equipment, including a Dwell Tachometer, AC Power Timing Light, Volt-Amp Tester, Ignition-Analyzer Scope and a complete set of tools.

Train with the Leaders—NRI & McGraw-Hill. No other school has NRI's experience in home training, or McGraw-Hill's background in continuing education. Mail the coupon and check what they have to offer." NRI AUTOMOTIVE DIVISION, 3939 Wisconsin Ave., Washington, D.C. 20016

**RUSH FOR FREE CATALOG
NO SALESMAN WILL CALL.**



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

946-045

Check below for your free Automotive Catalog. Or select one of the other courses instead.

AUTOMOTIVE MECHANICS COURSES

TV/Audio, Communications, and Computer Electronics Courses

Air Conditioning, Refrigeration, and Heating Courses

Name _____ Age _____

Address _____ (Please Print)

City _____ State _____ Zip _____

APPROVED FOR CAREER STUDY UNDER GI BILL. Check for details. ACCREDITED MEMBER NATIONAL HOME STUDY COUNCIL



HOMEBUILT TOW GLIDER

(Continued from page 154)

the lanyard at all times, while operating the control stick with your other hand. Should you encounter any situation where you find yourself getting out of control—such as a severe, sudden yaw or roll—immediately yank the release and cut loose. Without the pull of the boat, the ship will straighten out naturally and glide in for a safe landing. Remember, though, this is strictly an emergency procedure. Legally, you're required to remain in tow.

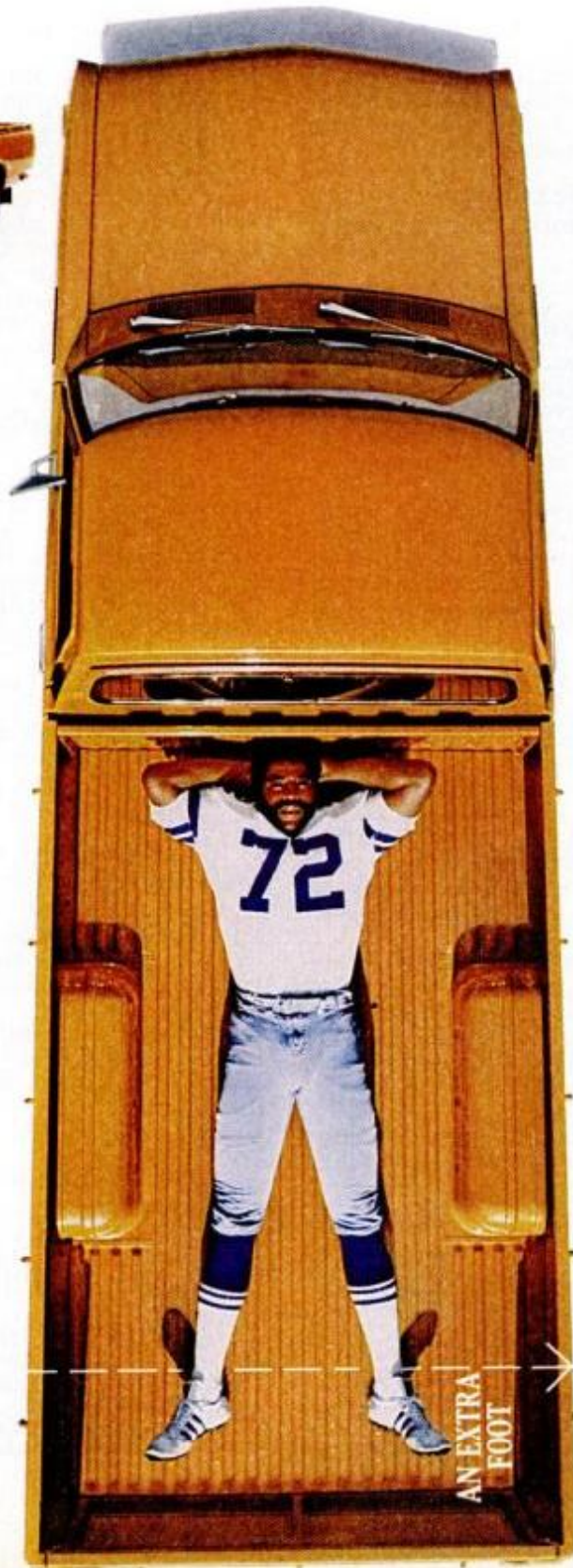
While I can truthfully report the Sea Sprite is easy to fly, I wouldn't recommend that anyone without flying knowledge just hop in and take off. It's wise to familiarize yourself with the basics of flying first. Many good pilot-instruction manuals are sold in bookstores. Read one. And when you try your first flight, start off easily and carefully. Practice takeoffs and landings a few feet off the water to get the feel of the craft. As you gain experience, you can progress to longer and higher flights. Don't try banking turns close to the water. That 34-foot wingspread is longer than it looks and could catch on the surface if you're too low. Stay within a reasonable altitude. I found 50 to 60 feet about maximum for safe, comfortable flight.

Good coordination between towboat and glider pilot is an absolute must. As in water skiing, it's essential to have an observer in the boat along with the driver. Work out a system of hand signals so you and your observer can communicate.

In building the craft, use only materials specified in the plans. Tubing must be of aircraft-grade quality. And while the polyethylene skin is tough, care must be taken to reinforce it against tears. For this reason, the wings are crisscrossed with strips of high-strength glass-cloth tape to act as rip stops. If a rip should start, it can't travel more than a few inches. Thus there's no danger of losing a wing in flight by having the plastic tear off.

Plans for building the Sea Sprite are \$14 from Thomas H. Purcell Jr., Flight Dynamics, Inc., Box 5070, State College Station, Raleigh, N.C. 27607. (NOTE: Because we have no control over the manner in which the Sea Sprite is built and flown, Popular Mechanics disclaims all responsibility for the quality, condition, design, workmanship, and materials of the glider built from these plans, and for its proper and safe functioning in use.) ★★★

We found a bed long enough for Too Tall Jones.



Introducing Datsun's 7 ft. Li'l Hustler Stretch.

Now you have a choice of two Datsun Pickups: one with the standard six foot bed, and this new Li'l Hustler Stretch with the extra long seven foot bed that gives you more room for business, sport and camping.

The football player relaxing on the seven foot bed is Too Tall Jones, 6'9" defensive end of the Dallas Cowboys. There's plenty of room, even for him.

Something else is bigger in this new Datsun Li'l Hustler Stretch. It has a larger more powerful 2000cc overhead cam engine that's easy on gasoline and very dependable, whether you prefer the 4-speed stick shift or the optional 3-speed automatic. Also you get torsion bar front suspension, rugged two-stage rear truck-type suspension and a beefier clutch.

The choice is yours: the six foot or the seven foot all-steel load bed. Either way you get the kind of Datsun over-engineering that keeps your operating costs down and profits up.

**Datsun Li'l Hustler—America's
#1 Selling Small Pickup.**

Datsun Saves

Build it yourself..

With a learn-at-home program as fascinating as home entertainment electronics, reading about it is just not enough!

Once you discover something that really fascinates you, no matter what it is, reading about it is just not enough. You want to be involved. You want firsthand experience.

That's exactly how Bell & Howell Schools' exciting learn-at-home program in electronics works. You learn by doing, experimenting, trying it yourself. That's why throughout this unique program you get practical "hands on" experience with some of today's latest electronics training tools.

Throughout your learning adventure with Bell & Howell Schools, the key word is build.

It doesn't matter if you've never had any training in electronics before. We start you off with the basics and help you work your way up one step at a time. As a matter of fact, with your very first lesson, you receive a special Lab Starter Kit to give you immediate working experience on equipment as you are picking up the fundamentals. It makes the learning process faster and certainly a lot more interesting.

You'll build and work with remarkable educational tools as you explore advances in electronics—"State-of-the-art" equipment that's being used today—and will be used tomorrow. So the skills and knowledge you will acquire will be useful for years to come.

You'll build your own electronics laboratory!

With Bell & Howell's Electro-Lab® electronic training system—theory comes to life. And you'll make it happen! In building each of these modern test instruments you'll get experience in wiring, soldering, assembling. Then you'll use the lab for testing, trouble-shooting and circuit analyzing.

First, the **design console**. After you assemble it, you'll be able to set up and examine circuits without having to solder them in place.

Next, you'll build a **digital multimeter**. This important instrument measures voltage, current and resistance, and displays its findings in big, clear numbers like on a digital clock.

Then comes the **solid-state "triggered sweep" oscilloscope** similar in principle to the kind used in hospitals to monitor heartbeats.

You'll use it to analyze tiny integrated circuits. The triggered sweep feature locks in signals for easier observation.

You'll actually build and work with the new generation color TV...investigating features you've probably never seen before!

This 25" diagonal color TV has digital features that are likely to appear on all TV's of the future. Features made possible by the applications of digital electronics to home entertainment.

You'll probe into the technology behind all-electronic tuning. And into the digital circuitry of channel numbers that appear on the screen! You'll build-in an on-the-screen digital clock and learn to program a special automatic channel selector that

goes directly to the channels of your choice.

You'll also better understand the exceptional color clarity of the Black Matrix picture tube, and gain working knowledge of "state-of-the-art" integrated circuitry and the 100% solid-state chassis.

After building and experimenting with this TV, you'll be equipped with the kinds of skills that could put you ahead in electronics know-how.

Once you've completed this program, your skills in electronic trouble-shooting could lead you in exciting new directions. While we cannot offer assurance of income opportunities you can use your training: to seek out a job in the electronics industry, to upgrade your current job, or as a foundation for advanced programs in electronics.

Building. Learning. Growing. Without missing a day of work or a single paycheck!

Because this is a home study program, you study at your convenience—without being a classroom captive. That means there'll be no conflicts with your job or other interests.

And even though you're on your own, we'll be there to help if you should ever run into a rough spot. Most schools make you mail in all your questions. We have a toll-free line you can call when you have a question that can't wait.

For even more personal attention, Bell & Howell Schools' "help sessions" are held in 50 major cities at various times throughout the year, where you can meet and talk with your instructors and fellow students.

A school's reputation can't be built on what it is going to do.

...but rather on what it has done and is doing right now. That's why Bell & Howell Schools' 43 years of experience in electronics home study is your best guarantee that our "hands-on" learning method really works.

Many thousands of people each year choose Bell & Howell Schools' home learning programs to start or further their electronics education. Discover this fascinating program in home entertainment electronics for yourself.

Mail in the postage-paid card for more details!

Taken for vocational purposes, this program is approved by the state approval agency for Veterans' Benefits.

If card has been detached, please write to:

An Electronics Home Study School

DEVRY INSTITUTE OF TECHNOLOGY

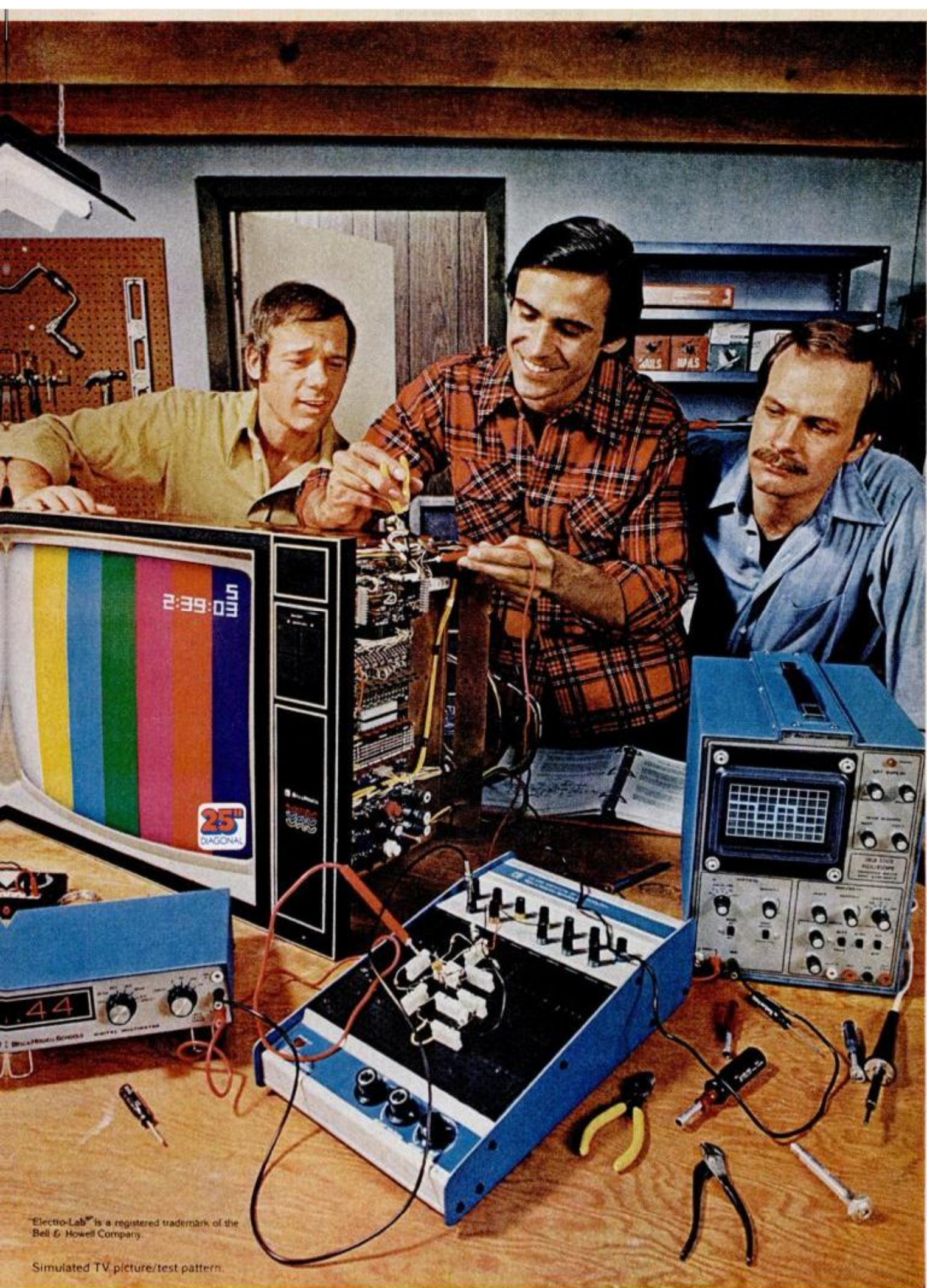
ONE OF THE



BELL & HOWELL SCHOOLS

4141 Belmont, Chicago, Illinois 60641

728/7



"Electro-Lab" is a registered trademark of the Bell & Howell Company.

Simulated TV picture/test pattern.

TOM McCAHILL SAYS:

“The appliance repair field is so uncrowded it's almost lonely!”



Someone once said that if you build a better mousetrap, the world will beat a path to your door. In the home appliance business, a lot of enterprising companies have gotten rich peddling a long list of handy electrical gadgets for the home. The trouble is, the two dozen or more appliances in the average American home can go on the fritz, and men with the proper training to do repairs are as scarce as plumbers on weekends.

Good Appliance Repairmen are a rare breed these days. Those with a little ambition are booked so solidly you can wait days to get somebody to fix a balky refrigerator or cantankerous toaster. Sometimes, you have to settle for a bum job from a guy who had no business calling himself an Appliance Repairman in the first place.

This brings me to my point. If you want to make money in a field that's begging for trained technicians, there's a fine, low-cost home-study plan available that teaches you how to handle every type of Appliance repair in detail—including refrigeration, air conditioners, and even small gas engines. The course was prepared by the instructors at National Radio Institute. This is the oldest and largest home-study school in the Electronics/Electrical fields with more than sixty years' experience training men like yourself for new careers or spare-time or full-time businesses of their own.

A few years ago, NRI recognized the increasing demand for trained Appliance Repairmen. They set about preparing well-illustrated, easy-to-understand lessons that teach you how to repair home, commercial and farm Appliances. NRI even added a professional Appliance

Tester that's included in their low tuition. With the Tester and a few basic tools you probably already have, you're equipped to service most Electrical Appliances. If you aren't making \$5 to \$7 an hour in spare time fixing Appliances for friends and neighbors within a few months after enrolling, my name isn't McCahill.

The reason I'm no doubting Thomas, is because the staff at NRI is composed of experienced instructors who guide you through the course with more personal attention than you'd get in many classrooms. With the kind of help they give a student and the kind of course they have, you can be the man in demand in this field—even if you've never rewired a plug, or got fed up with school at the 9th grade.

The best advice I can give you is to clip the coupon below and send for the NRI Appliance Training Catalog. It's free, and there's no obligation. NRI doesn't employ salesmen, so nobody will be knocking at your door. All it will cost you is a postage stamp. Take it from Uncle Tom, the Appliance Repair field needs good men. Now.

Tom McCahill

FABULOUS PHONO CARTRIDGES

(Continued from page 68)

ing a different turntable.) These figures should therefore be used only for relative comparisons among the cartridges we tested, not as absolute figures.

Contrary to common belief, the optimum tracking force is not the lowest force at which the stylus stays in the groove. Rather, it is the minimum force at which the stylus can track fairly loud signals without distortion. The lower the figure, the better the cartridge.

Trackability measures how loud a signal, in each of three frequency bands, the cartridge can trace without distortion. The louder the music, the wider the groove and the faster the stylus must move to follow it. Therefore, trackability figures are given in terms of the stylus's speed in centimeters per second (cm/sec.) as it traverses the loudest passage it can track cleanly in the low, middle and high audio ranges. As with our August tests, we used the Shure C/PEK-3 cartridge tester and audio Obstacle Course test records to make these determinations.

Technical measurements give valuable clues to a cartridge's quality, but they can't describe the tonal character it imparts to the music. The proof of this particular pudding lies in the listening. That's why we checked out each cartridge with different types of music: a symphonic score (Tchaikovsky's *Sixth Symphony*, RCA ARD1-0426), vocal music (Joni Mitchell, *Court and Spark*, Asylum EQ1001), and a brass and percussion group (Kurt Weill's *Kleine Dreigroschenmusik*, None-such H91281). After weeks of listening to test signals, this part of the test program was a pleasure. And the results showed one cartridge to be a clear standout, one below par, and the remaining seven to share a very similar—and very satisfactory—level of performance.

The standout was the B&O 6000, which played all types of music with an astounding combination of clarity and warmth of tone—two attributes rarely found together in one cartridge, but the B&O is a splendid exception. Its highs have brilliance without harshness, the bass has real depth and power without tubbiness, the strings are sweet yet transparent, the voices are natural, and the percussion has bite and impact to lift you right out of your chair. The B&O had the second sharpest drop-off in the carrier range, which our Panasonic demodulator

(Please turn to page 164)



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

600-045

APPROVED FOR VETERANS BENEFITS

Check for facts on GI Bill

OK—I want to see for myself. Send me the free book on Professional Appliance Servicing. No salesman will call.

Name _____ Age _____
(Please Print)

Address _____

City _____ State _____ Zip Code _____

ACCREDITED MEMBER NATIONAL HOME STUDY COUNCIL.



A brand new breed with extras fresh from the farm.

Building farm tractors for over 60 years has taught us a lot about building lawn and garden tractors. Like building them rugged. And matching power to the job.

That's why each of these 10, 12, 16 and 19-1/2 hp farm-tough tractors is more than just a lawn and garden tractor. One day it's mowing without scalping, another it's throwing snow, tilling a garden, grading a driveway.

Other features? Transmissions to match your exact power needs: Hydrostatic drive that lets you change from forward to reverse without clutching, a semi-automatic shuttle drive, a rugged 3-speed manual transmission. Flip-up hood and rear deck to allow easy access, easy maintenance. Starting? Electric of course.

Now it's time to stop at your dealer and see the new breed for yourself. Or send for our **free 36-page Wishbook**... with the complete 1975 Allis-Chalmers lawn and garden equipment lineup inside. Write Allis-Chalmers, Box 512, Milwaukee, Wisconsin 53201.

**BUILDING BIG ONES HAS MADE
OUR SMALL ONES BETTER**



ALLIS-CHALMERS
LAWN AND GARDEN EQUIPMENT

SEND FOR THIS CATALOG

100's of illustrations & 1000's of bargains in hydraulics, electrical, marine, automotive, hardware items... and more! A must for hobbyists, sportsmen, machinists, inventors, just about everybody! Airborne's 30th

Anniversary Surplus Guide is our best ever! Send 50c to cover postage & handling. In a hurry? Send \$1 for air-mail. Must include zip.

AIRBORNE SALES CO.

8501 Steller Dr. Dept. PM75
P.O. Box 2727
Culver City,
Ca. 90230

Satisfying customers since 1945.



SAVE UP TO 90% ON GOVT. SURPLUS

BUILD YOUR OWN CAMPER! SAVE UP TO 50%



SEND 25c FOR DETAILS

5th Wheel Plans.....	\$12.95
Cover basic frame, electric, plumbing, (general construction)	
Camper Plans.....	5.95
Pickup Cover.....	3.95
Travel Trailer.....	4.95
Econoline Type Van.....	4.95
Pass. Bus or Delivery Van.....	4.95

EQUIPMENT CATALOG

Send \$1.00 postage, handling (Refundable)

VIKING CAMPER SUPPLY INC.

99-8P Glenwood Ave.
Minneapolis, Minn. 55403
Please send _____ for which I enclose \$_____
NAME.....
ADDRESS.....
CITY.....
STATE.....ZIP.....

IT WORKS FOR ME—YOU! / I TURN 12¢ into \$1.50 in seconds— LET IT WORK FOR YOU! / LEARN HOW—after a few short hours!

"My Warner Engraver Shop paid for itself and gave me a healthy profit in the first six months..." B.G.



Since 1922, Warner has enabled thousands of men and women to establish a business of their own—to reap the benefits of

their own labor and have the personal satisfaction, and independence, that comes from operating a business of their own.

Now, a revolutionary new machine makes it possible for an Independent Business Man with no "PULL"... No Big Money to Invest... and, No Experience—to start a business of his own, at home in his spare time. Here's what J. H. of Pennsylvania says:

\$7,280.00 in 18 months for 1 to 1½ hours work an evening in my spare time—and without advertising. I know it would be bigger if I were not employed. Now it brings my family luxuries my present job does not afford.

Now you can get into this highly lucrative business, using your home as headquarters. No experience needed because we supply everything. The new Warner Success Program. "Engraving as a Profitable Business," is now ready for you. Send for your FREE illustrated brochure. No salesman will call. Send your name and address on the coupon or a postcard. Be first in your area to cash in on this ground floor opportunity. SEND NO MONEY

WARNER ELECTRIC CO., DEPT. E-2-ED
1512 Jarvis Ave., Chicago, Ill. 60626

Engraving Division, Dept. E-2-ED
1512 Jarvis Ave., Chicago, Ill. 60626
Please rush your free illustrated brochure to:

Name _____
Address _____
City, State, Zip _____



This VET Did It - and YOU Can Do It Too!

"War injuries left me badly handicapped, but now I'm a financial success as a Locksmith, thanks to your training. Besides, the work is fascinating. If I can do it anybody can." — Glen Johnson, Larned, Kan.

APPROVED Under GI Bill FOR VETERANS

Make Up to \$10 an Hour—even while learning!

Train FAST at Home! Be a LOCKSMITH!

If you enjoy fixing things, you're a "natural" to make hundreds of EXTRA DOLLARS a year in the fascinating business of Locksmithing. Rising crime has increased demand for service a thousandfold. Yet there's only one Locksmith for every 17,000 people!

COLLECT CASH PROFITS ALMOST AT ONCE!

You're "in business" ready to make \$5 to \$10 an hour a few days after you begin Belsaw's shortcut training. Easy, illustrated lessons complete with ALL practice equipment PLUS

- ALL TOOLS YOURS TO KEEP
- KEY MACHINE YOURS TO KEEP
- EXPERT PERSONAL ASSISTANCE
- BUSINESS-BUILDING HELP

enable you to get your share of this always-profitable business. Hundreds we've trained are doing it. So can YOU.

MAIL COUPON to discover how Locksmithing can keep the extra money coming in during spare time—or in your own full-time business. Ideal for retirement—good jobs, too.

BELSAW INSTITUTE, 106A Field Bldg.
Kansas City, Mo. 64111
Accredited Member NHSC. Approved for Veterans.

N. Hunt, Wilmington, Del.—"I make \$50 a week extra."

R. Davis, St. Louis, Mo.—"I cleared \$110 last Saturday."

Ed Boyle, Pittsburgh, Pa.—"My business going at top speed. I'm moving to bigger quarters."



FREE

MAIL THIS COUPON • NO SALESMAN WILL CALL

BELSAW INSTITUTE, 106A Field Bldg.
Kansas City, Mo. 64111
Rush FREE book, "Keys to your Future."



Name _____
Address _____
City _____ State _____ Zip _____
 Check here if eligible Veteran.

THIS DO-ALL PRO KEY MACHINE YOURS TO KEEP!



Can add \$25 to \$40 a week to your income... and doesn't cost you a penny extra!

FABULOUS PHONO CARTRIDGES

(Continued from page 162)

handled with only a slight increase in noise in CD-4 playback—again not bothersome, even on CD-4 discs that had previously been played a few times by stereo cartridges. But with other demodulators, it would pay to test before buying.

At the opposite end of our subjective rating was the Panasonic. It's by no means a bad cartridge, but in comparison with the others it seemed a bit muddy, with its highs sounding choked, and its lows lacking richness. It also had the highest optimum tracking force of the nine cartridges we tested. In trackability, though, it measured better than most at low and middle frequencies, and about average at the high end. All in all, not bad for one of the two cheapest models in our survey, even if we liked the sound of the other one (the Audio-Technica AT12S) better.

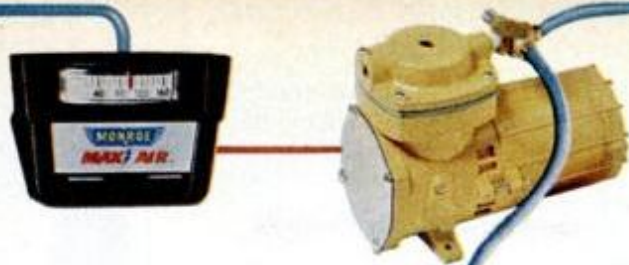
The Panasonic, unlike the others, requires a special d.c. power supply, (which is built into Panasonic and Technica demodulators). Since the Justi-Meter we used to measure frequency response has no such supply, we were unable to measure the Panasonic's response without building special adapters.

All the other cartridges sounded remarkably good. If none quite matched the remarkable quality of the B&O, some came close—particularly the Pickering UV-15/2400-Q—and we also liked Empire's 4000D/III, which gave an exciting sense of presence to the brass. We were impressed by the smoothly balanced and eminently musical sound of both the Audio-Technica AT20SL and AT15S. In fact, we could hear no difference between the two—no great surprise, considering that the AT20SL is just an AT15S hand-picked for its performance. In our samples, this showed up in flatter carrier-range response and higher low-frequency and mid-frequency trackability.

As for the Audio-Technica AT12S, it is a real bargain, differing from the more expensive models primarily in being just a little less shiny in its uppermost highs, but still sounding sweet, rich and clear. For anyone on a budget, the AT12S would be a fine initial choice. For stereo use, the ADC would be worth the extra \$10; but with the weakest carrier response of any cartridge tested, it should be checked with the demodulator you plan to use before you buy it.

All cartridges in this group are designed to work into a 100,000-ohm input, standard for all CD-4 demodu-

(Please turn to page 166)



Ride the air with push-button shock absorbers.



MONROE ANNOUNCES THE MAX-AIR® ELECTRIC RIDE CONTROL SYSTEM

A whole new system.
A press of a dash-mounted button keeps the car on the level no matter how much or how little is carried. An electric air pump (150 psi) automatically adjusts the Max-Air® air adjustable shock absorbers.

Infinitely adjustable.
The car is supported on an infinitely adjustable column of air. Extra muscle whenever needed for heavy loads or towing. At the push of a button. And all with a premium quality Monroe ride.

Blow up a tire.
The system includes an auxiliary hose to inflate tires, toys, etc. The Max-Air Electric Ride Control System. Now at a special introductory price. See your Monroe dealer for the whole story.



MONROE

Monroe Auto Equipment Company • Monroe, Mich.

Special offer for a limited time only!

See your nearby Monroe dealer to purchase a pair of Max-Air air adjustable shock absorbers, then fill out the coupon at the right and drop it in the mail along with your check. We will send you the piston-powered pump, control panel/air gauge, wiring, fittings, auxiliary hose and complete instructions for installation. All for just \$54.95. But you must act now. This offer is good for a limited time only. So hurry. Send in your check today. And ride the air.

Electric Pump Offer,
P.O. Box 115, Dayton, Ohio 45401

Please send me one Monroe Max-Air® Electric Air Pump, control panel/air gauge, wiring, auxiliary hose, fittings and complete instructions.

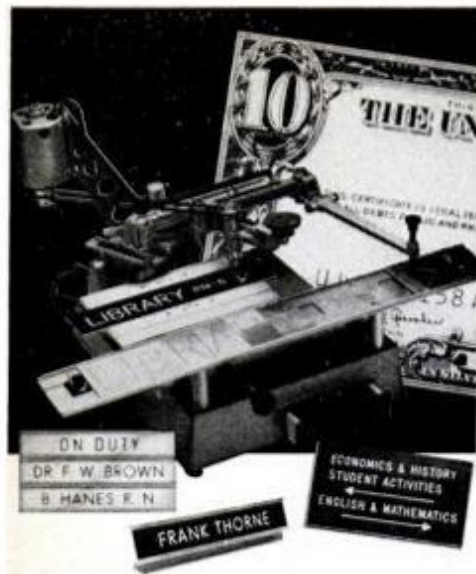
Enclosed is \$54.95 (check or money order payable to Electric Pump Offer).

NAME _____

ADDRESS _____

CITY _____

STATE _____ ZIP _____



engrave money (legally)

One dollar makes ten. Make profits up to ten times your cost—full or part time—right in your own home.

Engrave much needed nameplates, directories, signs, trophies, badges in plastic, metal and wood on the time-tested New Hermes Engravograph.

Simple to operate. It's tracer-guided. Engraving is a permanent business—not a fad—with small investment of less than \$450; money back guarantee. Trained representatives at your service.

Write for free illustrated catalog 10.

**new
hermes
engravograph**

20 Cooper Square, New York, N.Y. 10003
World's largest engraving machine manufacturer.

MAKES LOCKS WORK EASIER!



Provides maximum protection against freezing, sticking. Seals out moisture and dust from all locks.



WON'T RUN OUT All Purpose Oil

Penetrates, lubricates, rust proofs. Better to use on hinges, appliances, typewriters, guns, reels, bicycles.

AGS AMERICAN GREASE STICK CO.
Muskegon, Michigan 49443

FABULOUS PHONO CARTRIDGES

(Continued from page 162)

lators, but not for stereo amplifiers, which normally have 47,000-ohm inputs. Since some listeners may want to use these cartridges with stereo equipment, we also tested a sampling of them by playing them through a standard stereo setup. The partial impedance mismatch seemed to have no effect, though a direct A-B comparison might have made some subtle differences audible.

To sum up: Even if you just want good stereo sound, these cartridges (and, presumably, the many new models due on the market later this year) are well worth considering. And if you want to hear four-channel sound from CD-4 Quadradiscs, they're essential. ★★★

PORTABLE DARKROOMS

(Continued from page 109)

brown type will do for use at night.

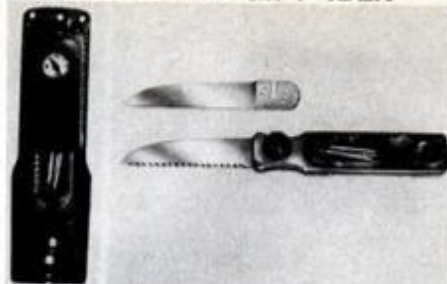
If the room has a door, make it light-tight with weatherstripping. If not, cover the open doorway with more plastic, overlapping and taping the bags together. Ventilation can be a problem; my kitchen fan handles the problem for me.

Print drying can be left to the day after your printing session. It won't hurt the prints to soak, though the water should be changed a few times. Squeeze an electric print-dryer into your budget if at all possible—it's the only way to make sure that the prints you've spent hours making will look as good when dry as they did wet. For matte prints, you'll get a far more smoothly finished, wrinkle-free surface than you could with a blotter; and with ferrotype tins, you'll get good glossy prints much faster than you would with plain air drying. The best size for your dryer of ferrotype tins is 16x20 inches. It's big enough to handle big prints and will let you dry four 8x10s at once.

For finishing touches, take the extra steps of spotting and mounting your prints. With just three bottles of spotting tone (in different densities) and a fine brush, you can render many dust spots and other imperfections invisible. For print-mounting, your best bet is to use one of the special adhesives sold in photo stores. Electric dry-mounting presses are bulky and expensive, and though a few hobbyists dry-mount successfully with a clothes iron, there's risk of damage to the print.

Useful mounting tools include a wallboard knife, a steel straightedge for trimming and a board with a weight on top to press the paper down for a blemish-free surface. ★★★

SURVIVAL KNIFE— EXCELLENT GIFT IDEA



The newest & most complete camping and hiking accessory available! Beginning campers, Boy Scouts, Hunters & Fishermen will find all important items necessary for survival in a wilderness environment in this Survival Knife. Contains two sharp 4" blades (one with sawing edge), thermometer, fishing hooks and line, waterproof matches, candle, level for camp & tent set-up, compass and whetstone. Compartment containing loose items is waterproof. Overall knife length 9". Includes leather carrying case. A quality item; your satisfaction guaranteed. \$16.95 ppd. (Pa. res. add sales tax).

DAWSON GIFT HOUSE

Dept B-1, 1329 6th Avenue Juniata, Altoona, Penna. 16601

MOLDS

for making
Ornamental Concrete
Items...



Book about Aluminum Molds with prices and production trade secrets direct from world's largest mold manufacturer.

SEND
\$3.00

CONCRETE MACHINERY COMPANY, INC.

P. O. BOX A99 - HICKORY, N. C. 28601

Costs Less to Use than Sandpaper Discs



SNAPS ON

SNAPS OFF

Will outlast conventional sandpaper discs 10 to 1. Nylon backing resists tearing and snagging. Can be cleaned in paint thinner and used over and over again. Proven by the aerospace industry for over 7 years. Power-Lock discs perform equally well on wood, fiberglass or metal.

MERIT ABRASIVE PRODUCTS, INC.
201 W. Manville, Compton, California 90224

ORDER POWER-LOCK STARTER KIT BY MAIL
PLK-5 5" diameter, 1 holder, 3 discs, assorted grits. For use on 1/4" drill \$7.30 value **\$4.75**
Extra discs, Fine, Med., or Coarse. \$1.99 pkg. of 4.
Add \$1.00 for postage and handling. Introductory price

FIX LAWN MOWERS FOR FUN & PROFIT

Fascinating new Handbook by F. Peterson gives you the knowledge skilled mechanics learn.

OVER 125 ILLUSTRATIONS show how to trouble shoot, repair carburetors, engines, balance and sharpen blades, etc. Exploded drawings are extensively used.

INSTRUCTIONS COVER reel, rotary and rider mowers, preventive and routine maintenance, how to identify brand names, where to obtain replacement parts. How to buy and use a lawn mower. Friends gladly pay \$10 to \$50 to fix their lawn mowers. Try the HANDBOOK OF LAWN MOWER REPAIR. Rush only \$5.95 plus 50¢ handling on 10-day money-back guarantee.

EMERSON BOOKS, INC. Dept. 188B
Buchanan, New York 10511

Loop-Charged 50. Tough on bass. Easy on gas.

You don't have to be a Bass Tourney Champ to take advantage of Johnson. Bass boats. Muskie rigs. You name it. A 50 hp Johnson has plenty of punch to get you off and running. Yet it's easy on gas.

Loop-Charging is one reason. Squeezes extra performance from your gas dollar by bringing in the new fuel charge and pushing out exhaust in one continuous power loop.

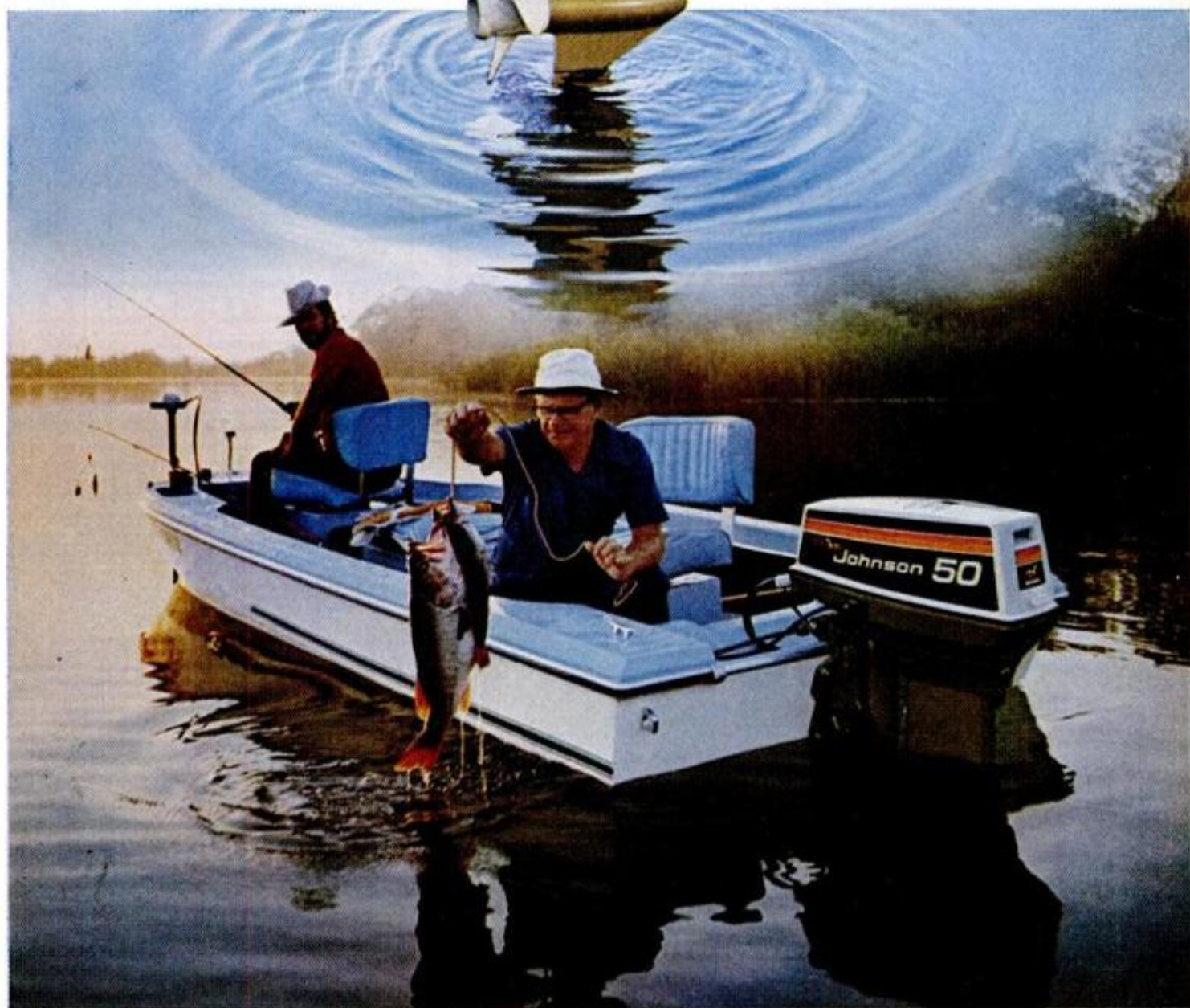
Our race-born exhaust tuning is another. Clears more exhaust from cylinders, then packs in more of the new fuel charge for more power on less gas.



Our patented Pressure-Back piston rings use combustion chamber pressure for a better seal. Means we can use two rings per cylinder instead of three. And this reduces friction, saves fuel, gives longer engine life.

Then there's MagFlash™ breakerless capacitor discharge ignition for fast, sure starting... smoother, gas-saving running. Plus thermostatic and pressure controlled cooling. Keeps engine warm at low speeds, cool at high speeds. Makes the best use of fuel. Gives longer engine life.

The Johnson 50 hp Looper. Just one of thirteen Johnson power choices... 2 to 135 hp. Plus four new high-thrust electric maneuvering motors. See them at your Johnson dealer. Or write for free catalog. Johnson Outboards, Division, Outboard Marine Corp., Sea-Horse Drive, Waukegan, IL 60085, Dept. PM-45.



Performance-engineered by the world leader  **Johnson** First in Dependability
OUTBOARDS

Where do the Pros get their training?

Almost half of successful TV servicemen have home study training and among them, it's NRI 2 to 1! A national survey*, performed by an Independent research organization, also showed that the pros named NRI most often as a recommended school and as the first choice by far among those who had taken home study courses from *any* school.

Why? Perhaps NRI's 60-year record with over a million students... the solid training and value built into every NRI course... and the designed-for-learning equipment originated by NRI are part of the answer. But send for your free NRI catalog and decide for yourself.

Training Geared for Success

NRI training is practical training... know-how aimed at giving you a real shot at a better job or a business of your own. You learn at home at your convenience with "bite-size" lessons that ease learning. Kits designed to give you practical bench experience also become professional instruments you'll use in your work.

Includes 25" Diagonal Color TV

As a part of NRI's Master Course in TV/Audio servicing, you build a big-screen solid state color TV with every modern feature for great reception. As you build it, you perform important experiments that demonstrate the action of the circuitry. And it comes



complete with console cabinet, an optional extra with other schools. Instruments include a 3½ digit precision digital multimeter, triggered sweep 5" oscilloscope, and integrated circuit TV pattern generator; all designed for training. There are courses costing far more that don't give as much.

Free Catalog . . . No Salesman Will Call

Choose from five different courses in TV/Audio servicing, depending upon your needs and budget. Or you can learn Computer Technology with a real programmable digital computer. Communications... Aircraft or Marine Electronics... Mobile Radio, and more. Send the postage-paid card for our free catalog showing details on all



NRI electronics courses. There's no obligation and you can see for yourself why the pros select NRI two to one! If card is missing, write to:

**Summary of survey results upon request.*



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

A word from Phyllis Diller: I use NAVAL JELLY® rust dissolver on everything we have that gets rusty. You just brush it on. Then wash it off. Rust is gone. Fang is getting a little rusty. I wonder if it would work on him.



© Woodhill 1975

For sale wherever fix-it products are sold.
Woodhill Chemical Sales Corp. Cleveland, Ohio 44128
World's Finest Fix-It Products

'75 IMPORTED CARS

(Continued from page 73)

combustion chamber and fires the rich mixture, which in turn fires the lean mixture in the normal combustion chamber. Result: normal power and drastically reduced combustion by-products.

The standard Civic for 1975 uses the previous 1200-cc engine and is, to all intents, identical to 1974 models. The CVCC, though, uses a 1500-cc powerplant and is three inches longer plus about 100 pounds heavier. Both drive the front wheels. There's a wagon coming, too.

Jaguar. The exciting Jaguar line continues into 1975 with refinements on the Six and V12 models.

Jensen. The Interceptor and Jensen-Healey models are virtually unchanged. Unchanged, too, in its incredible economy is the dohc, two-liter used in the roadster.

Lamborghini. Three Lambos are new to U.S. roads. They're terribly exotic, so consider yourself lucky if one passes by and you just catch a glimpse of it.

Lancia. The front-wheel-drive Beta sedan and coupe are real road-holders and should turn a lot of heads this spring. The coupe is clearly the most exciting of the new sport models (see pictures, page 71).

Lotus. Star of the Lotus line for '75 is the Elite M50, introduced last spring. A lovely, lithe four-seater, the Elite is unusual in many ways. It has a unitized fiberglass body with steel subframes and a 16-valve, dohc Four. This is the same engine supplied to the Jensen-Healey. A big wiper clears the entire, lightweight glass windshield.

Maserati. For future shock don't miss the new Khamsin.

Mazda has dropped the RX-2 and is now concentrating on the RX-3 and RX-4 rotaries. These and the conventional four-cylinder Series 808 are little changed for 1975. The rotaries keep their 50,000-mile/three-year engine warranty, and Mazda looks forward confidently to passing the stringent 1977 smog standards.

Mercedes-Benz. The five-cylinder diesel, dubbed the 300D, raised some eyebrows when first announced, but despite being the only Five in cardom, M-B assures us it's nothing radical. This engine—its basic design—is very similar to the four-cylinder 240D. M-B engineers figured it this way: "Since the individual cylinder volume of the 240D diesel engine, at 600 cc or 36.6 c.i.d., is considered the maximum for optimum combustion efficiency . . . the building of a larger four-cylinder engine was ruled out. And an in-line,

six-cylinder diesel was considered too large and heavy because of structural requirements. The solution was the addition of one more cylinder to the 240D engine. The 300D engine is about 68 pounds heavier than the 240D and roughly the same weight as the six-cylinder gasoline engine. It's a happy compromise of economy, performance and low emissions.

MG. The 1975 Midget has a bigger four-cylinder engine, an all-synchro (finally) four-speed transmission and a bumper inspired by British Leyland's ESV (experimental safety vehicle). The bumper's construction stretches polyurethane over a steel core. MGB gets a similar front bumper: We like it; purists will hate it.

Opel. The 1900-cc Opels get fuel injection for 1975. Buick dealers have a solid lineup, but we'd like to see GM bring in the 2100 D diesel sedan to expand the availability of diesel passenger cars in the U.S.

Peugeot. Subtle changes include squarer wheel cutouts and six more horses from gasoline-engined models (now 88 bhp). The power increase comes from upped compression, and this engine doesn't need a catalytic converter. The Peugeot diesel remains virtually unchanged.

Porsche. Not all that much new about Porsche's 25th anniversary models except for a slightly bigger engine in the 911 series (2687 cc vs. 2653 cc last year). Autograph collectors can opt for a limited-edition Silver Anniversary 911S Targa or Coupe fitted with custom interior and a personalized dash plaque.

Renault. All series adopt last year's Gordini crossflow hemihead, and the Gordini itself uses only the larger 1647-cc engine. Horsepower in the 12 and 15 series rises from 63 to 72, and the Gordini now has 89 bhp net. Series are otherwise basically unchanged, the sole major new option being power steering. The successful (in Europe) Renault 5 will be here late in '75 or early '76.

Rolls-Royce. No major change. It's hard to improve such a good thing.

Saab. Advanced engineering here includes front-wheel drive, an ohc slant Four, Bosch fuel injection, monocoque body, live rear axle, coil springs, four-wheel nine-inch disc brakes and a heated driver's seat. Automatic trans is optional, as are power steering and airconditioning.

Saab has three '75 models: the basic 99LE in two and four-door body styles; 99EMS, a sporty two-door with alloy wheels and racing trim; and the WagonBack. The Sonnett sports car has been discontinued.

Subaru. The new two-door hardtop, called Evening Star, is Subaru's

(Please turn to page 174)

TURBO BLAST

Get Up To 50,000 Miles
On Your Spark Plugs

- Cleans all types of plugs in seconds
- Requires no compressed air



- Supply of glass bead abrasive for cleaning 250 plugs. Additional beads available
- Rugged, long life without maintenance
- Powered by rugged 12,000 RPM 120V motor



NEW

JAYCRAFT CORP. DEPT. PM-4
760 North Marshall Ave., El Cajon, Calif. 92020

Name _____
Address _____
City _____ State _____ Zip _____

\$19⁹⁵

Plus \$1.55 for shipping and handling

SATISFACTION GUARANTEED or
your money refunded in 30 days
California Residents Add State Sales Tax

Chrysler: "The Great Getaway"



There's a certain kind of person who knows how to live.

He knows how to get just a little extra out of every precious moment. He can give the humdrum the slip because he has an eye for excitement. He looks for a boat that can skim the water at top speed and deliver the thrills. But he also knows value and quality. The Chrysler Conqueror 135 was made for him. 17 feet of solid action and specially designed for the Chrysler 135 outboard. But it takes all kinds and Chrysler has a boat for them all. Hydro-Vees, Runabouts, Cruisers, Bass Boats and Sailboats. And Chrysler doesn't spare the horses in providing outboard power—from 3.6 to 135 hp. See them at your Chrysler Crew dealers.



Two more ways to Getaway: Check your TV listing for Chrysler-sponsored "Fishin' Hole" and "Water World."



Chippit.

OUR TWO-MOUTHED GOAT CAN CHEW UP JUST ABOUT ANYTHING ... EVEN A 3" TREE LIMB.

Solve all your yard-debris problems with one 8 h.p. machine. Limbs and brush fed into its rear hopper are sliced into chips and neatly bagged. Leaves and vines placed in the other hopper are shredded into useful mulch or compost material.



For Further Information Contact
BILLY GOAT INDUSTRIES, INC.
P.O. Box 308, Lee's Summit, Mo. 64063

Name _____
Address _____
City _____
State _____ Zip _____

'75 IMPORTED CARS

(Continued from page 172)

sporty model for '75. The unique and utilitarian intro is the Super Star four-wheel-drive station wagon. It's a one-of-a-kind.

Toyota. Extensive facelifts in the Corolla line, a new 2.2-liter engine for the Corona/Celica, plus broader use of the five-speed transmission mark Toyota's 1975 offerings.

The Corolla has revised styling, more head and legroom, bigger gas tanks, and the five-speed o.d. trans available in all models except the base two-door. The 1200-cc engine is no longer offered—just the 1600 cc. The five-speed is standard in the sporty SR-5 hardtop.

Little visible change in the Corona Celica, but the 2.2-liter 20R engine has been redesigned for more power and a purer exhaust. It uses an aluminum crossflow hemihead and an overhead cam. This power unit needs no cat converter except in California. Last year's Electro Sensor Panel (ESP) is continued and is standard in Corona hardtops; optional in other models. This ESP monitors 11 vital service functions.

Triumph. The TR6 and Spitfire are unchanged. For the new TR7, see *Imports and Motorsports, page 28.*

TVR. Unchanged, still handbuilt by 75 Blackpudlians who turn out 450 of these roadable cars annually but this season hope to produce 600.

Volvo. The new 240s have a totally different front suspension, rack-and-pinion steering, plus other refinements. Available body styles in this series are 242 and 242GL two-door sedans, 244 and 244GL four-door, and 245 wagon. GL designates luxury equipment including leather seats, sunroof, tach, heated driver's seat, metallic paint, and a choice of automatic or o.d. transmissions.

The new 240's grille and bumper ensemble were inspired by Volvo's ESV. Its suspension uses McPherson struts up front and redesigned leaves with stabilizer bars around back. Smaller 14-inch radial tires are now standard on the 240s, and the four-wheel disc brakes have been improved. Seats and interiors are entirely new in this year, with see-through headrests.

The 164 series is little changed, but its seats have been redesigned for better vision and adjustability. It remains as Volvo's top offering, with many standard features: airconditioning, automatic or overdrive, power steering and brakes, leather upholstery, heated seat, electronic fuel injection, steel-belted radials, and power front windows. The cars are safer than ever. ★ ★ ★

FREE 116 page CATALOG

FREE FLOTATION TIRES & WHEELS

SAJA-PROVEN™ UNIQUE OFF ROAD CAMPING EQUIPMENT!

Most tire information you can trust plus 100's of things you've been looking for and some you've never seen!

SET OF 4 TIRES & SUPER WIDE CEPEK WHEELS only \$199.95

SEND TODAY INCLUDE ZIP CODE! FOREIGN CANADIAN & JOURNAL REQUESTS!

Dick CEPEK® 9201 CALIFORNIA AVE Dept. PM SOUTH GATE, CA 90280

© COPYRIGHT 1975 DICK CEPEK, INC.

BUY GOV'T SURPLUS SAVE TO 85%

FISH/WORM SHOOKER Call Dev't Box \$11.00 \$7.95	DIAL TELEPHONES #715-W WALL \$7.99 #715-DIXIE \$7.89	POCKET 20,000 OHM/VOLT 14-RANGE MULTIMETER Box \$18.95 \$13.95
---	---	--

SURPLUS CENTER PM-045 Lincoln, Nebraska Zip Code 68501

Print Your Own

Cards, Stationery, Advertising, labels, tickets, announcements, QSL cards, greeting, sympathy, prayer cards, etc. Save money. **Print for others, good profit.** Have home print shop. Pays for itself in a short time. Sold direct from factory. Easy rules sent. We supply everything. Send Zie for catalog. **KELSEY PRESSES** Meriden, Conn. 06450

MAIL THIS COUPON TODAY Kelsey Presses Dept. Meriden, Conn. 06450

I enclose Zie send big catalog and free samples.

Name _____
Address _____
City _____ State _____ Zip _____

DRAFTING PAYS BIG!

U.S. Labor Dept. says "42% more Draftsmen needed in next 10 years." Easy home-study plan guides you. Send for FREE "Drafting Career Kit." APPROVED FOR VETERANS.

ALL 3 FREE NAME _____ AGE _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

NORTH AMERICAN SCHOOL OF DRAFTING, Dept. PB035
Accredited National Home Study Council 4500 Campus Dr., Newport Beach, Calif. 92663

NOW — EASIER THAN EVER TO BUILD AND FLY YOUR OWN BENSEN

NASAD OF QUALITY

Use our New Material Packages to build your own one-man Gyro with a small set of hand tools. Time-proven parts available. NASAD approved building Plans \$35. Colorful Info Packet \$5 (Copter) or \$3 (Glider).

SEND \$5 OR \$3 **BENSEN AIRCRAFT CORP., Dept. PM45**
RDU Airport, P.O. Box 2746, Raleigh, N. C. 27602

NAME _____
ADDRESS _____

INTRODUCING A TOUGH NEW SUPER TOOL

ITS PURPOSE

Now there's *no need* to search for an inconvenient electrical outlet or set up a portable generating unit. Construction workers, fencing contractors, electricians, linemen and home owners will all benefit from the convenient Piston Drill™

ITS UTILITY

As common as the tasks of sawing and drilling are, it's amazing that it's taken this long for the Piston Drill™ to appear. Sawing tasks have been performed by a multitude of compact chain saws. Now it's time for a *completely portable drilling package*, comparable in size to the small chain saw, to take care of the drilling chores.

ITS USES

The *variable speed* Piston Drill™ is no heavier and no larger than a conventional ½" electric drill. In addition to its *cordless portability* it's designed to perform the *same* tasks. A 2" spade drill is as comfortable as a ¼" twist drill in the ½" heavy-duty Jacobs Chuck. Cut sheet metal with a hole saw, stir a gallon of paint, drill aerating holes in your lawn, or tap a maple tree.

ITS FEATURES

The Piston Drill™ uses a specially tuned engine which delivers maximum power at a *fuel saving* low r.p.m. The Piston Drill™ is easy to maintain, you can disassemble it in minutes with an adjustable wrench, screwdriver and pliers. In order to avoid today's costly labor charges the Piston Drill™ was designed to be serviced by its owner, and clear instructions make it easy.

The 24-Hr. Hotline parts service gets any needed replacement or warranty parts to you fast.

THE Piston Drill™



\$139

FACTORY DIRECT

Ariz. Residents Add 4% Sales Tax

RotorWay

PISTON POWERED PRODUCTS/A DIVISION OF

Enclose this coupon with your check or money order for \$139 and your Piston Drill™ will be sent postpaid.

PISTON POWERED PRODUCTS
Dept. D8/14805 S. Interstate 10
Tempe, Arizona 85281

Name _____

Address _____

City _____ State _____ Zip _____

Dealer's inquiries so specify

MAKE REAL MONEY! CUSTOMIZE VANS, TRUCKS, CARS

**BIG PROFIT
HOME
BUSINESS**

**EXTERIORS!
INTERIORS!**
Painting, Trim
Decals
Stenciling
Ports
Upholstery
Air-foils
Special
Fittings

• Learn at Home in Spare Time.
No previous experience
needed

**EXPERTS SHOW YOU WHAT TO DO
... HOW TO DO IT! Just One
Job Can Pay for Your Plan!**

**6 Big Kits
Included**

Start making real money fast—
even beginners! Few dollars for materials
brings hundreds \$\$\$\$ for job.
No need to quit school or job. Every-
thing explained step by step with
pictures, diagrams. No special talent
needed. We send tools, brushes,
kits for painting, upholstery, decals,
stenciling—all included at no extra
cost... show you how to paint, stencil,
put on giant full-color decals, install
custom tables, beds, curtains, one-way
glass, swivel seats, carpets, special
fittings to carry tools for plumbers,
carpenters, mechanics, locksmiths, etc.

HUGE DEMAND
Trailers, Boats,
Cycles, Campers,
Dune Buggies,
Snowmobiles



**How To
CASH IN NOW**
Customizing
Van, Truck,
Auto Exteriors
and Interiors!

SEND FOR FREE CAREER PLAN
Get facts without obligation. No salesman will
call. Cash in on new way to learn customizing.
Start now! Send for color brochure, full
information. **MAIL COUPON TODAY!**

Customizing Center, 4401 Birch Street,
Dept PB035, Newport Beach, CA 92663
Rush my FREE Customizing Career Plan
without obligation. No salesman will call.

NAME _____ AGE _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____

WHEN YOU WANT TO LOOK GOOD ON "THE FIRING LINE"

... it Makes Good Sense to Choose the
Air Gun that's a Pleasure to Shoot.

BENJAMIN'S NEW SUPER SINGLE SHOT AIR RIFLE

Proven, dependable. These words—more
than anything else we can say—tell you
what owners already know about this
Benjamin. Embodying qualities that made
its predecessor the dominant Hi-Compression
air rifle around, this beauty combines
improved accuracy and safety features
with reliable, hard-shooting performance
characteristics of our old favorite to
satisfy the keen desire of a shooter who
enjoys the competitive challenge of
target, plinking, small game hunting.
A product of Benjamin's sound workman-
ship and insistent use of high grade
materials, it's safe, quiet, lightweight, odorless.
Has adjustable power for all uses—indoors
or out. BB, 177 or 22. At
sporting goods dealers.



FREE CATALOG

BENJAMIN AIR RIFLE CO.
896 Marion St., St. Louis, Mo. 63104



BUILD THESE BEAUTIFUL CLOCKS

NOW AT BIG SAVINGS!

Send just \$1 for plans & instructions to
build choice of: (A) Grandfather, (B)
Steeple, (C) grandmother—plus infor-
mation-packed catalog of movements, dials,
parts & kits to build these & 16 other fine
clocks. All 3 plans—\$2.50. Catalog alone—
25¢.

MASON & SULLIVAN COMPANY
Dept. PM Osterville, Mass. 02655

BIG PIPE DREAM COMES TRUE! (Continued from page 77)

candle will keep an igloo warm
enough to support life, say these con-
fident, carefree adventurers, but it
takes a tough, hardy breed to brave
such hardships nonetheless.

Most men work what they call
"seven-tens"—seven days a week,
10 hours a day for a 13-week stretch,
then get a week off to go home or to
a nearby city for some fun—if
they're lucky enough to find trans-
portation. That's a rough work sched-
ule. In addition, the use of liquor on
the job is forbidden, and there is
little opportunity for contact with
the opposite sex since there are few
lady workers in the Arctic.

There are two compensations:
Both the pay and food are spectacu-
lar. Weekly checks of \$1000 or more
are not uncommon for skilled labor.
With overtime, some can net as much
as \$60,000 in a year. A typical camp
menu frequently includes such lux-
uries as steak and (not or) lobster.
That's living pretty good even if the
work is hard.

Two problems that make the pipe-
line such a difficult engineering
feat—aside from battling the fear-
some climate—are the delicate tundra
and permafrost underlying it. Before
work could even start on the supports
for the pipe, 6500 crewmen labored
through the long, cold Arctic night
to lay down a five-foot-thick work
pad of gravel 50 feet wide for the
entire length of the pipeline run.
The purpose of the pad is to protect
the fragile tundra from the immense
weight of heavy construction ma-
chinery.

The pipe itself consists of sections
40 feet long and four feet in diam-
eter. These are being welded together
in pairs. These giant 80-footers will
then be brought in on the gravel pad
—riding pyramid-style, three to a
load—on a special three-axled flat-
bed trailer. The vast trailer is self-
steering through a servomechanism
in the tractor cab so the rear end
automatically follows the tractor just
like the back of a long hook-and-lad-
der fire engine. The entire unit
stretches a colossal 95 feet over the
ground. It's just one of many mam-
moth, ingenious, exotic pieces of
equipment that must be rolled in on
the gravel pad.

Until the Yukon River bridge is
completed later this year, such mon-
sters will cross the half-mile of wa-
ter on an "ice bridge" engineers
build up by pumping layers of water
onto the surface until they have a
frozen strip 100 feet wide by six or
more feet deep—enough to support

the heaviest traffic. Huge hovercraft
are also being used to ferry construc-
tion equipment across the river.

Ironically, it's the permafrost that
gives engineers their greatest head-
aches. This is a layer of soil under-
lying the surface tundra that is
solidly and permanently frozen. In
the north, the permafrost may begin
a few inches below the surface and
extend to depths of 2000 feet. While
such a sturdy base might seem to
offer a firm foundation for pipeline
supports, just the reverse is true.
The problems come when it melts. Oil
that flows through the pipe arrives
extremely hot from the deep wells—
up to 145° F. Even in the intense
Arctic cold, heat generated by fric-
tion of the moving oil keeps it at a
relatively high temperature. The oil
will still be at 80° to 90° when it
reaches Valdez after traveling nearly
800 miles.

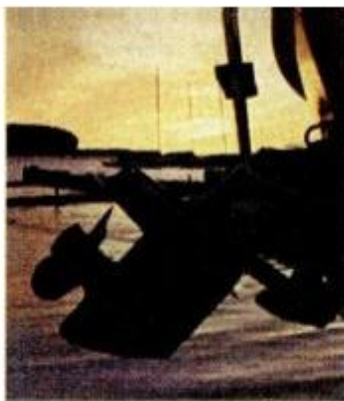
This heat plays havoc with the
permafrost. If the pipe were simply
buried bare in the ground, its
warmth would quickly melt the
permafrost, causing the line to shift,
sink and ultimately rupture. For this
reason, engineers elected to elevate
the pipe on tall support columns in
areas where underground burial
would be impossible. The columns,
made of 18-inch cold-temperature
steel pipe, average 50 to 60 feet in
length, with 36 feet sunk into the
permafrost. Pairs of these super pil-
ings will be planted every 60 feet
along the route. The pipe will be
supported on "floating" shoes sliding
sideways on cross members between
the columns. The shoes will permit
the pipe to move back and forth
freely to accommodate any slumping
or shifting of the permafrost. In
seismic zones where fault activity
may produce severe shifting, the pipe
can move as much as 19 feet hori-
zontally and 5 feet longitudinally
without danger of rupturing.

The pipe will also be laid out in a
zigzag pattern along the route to
compensate for normal expansion
and contraction under the climate's
extreme temperature changes. As the
metal shrinks, the pipe will stretch
out straighter; as it expands, it will
sort of accordion-pleat itself into a
Z shape to take up the slack.

Such incredible engineering is
what makes the pipeline project the
remarkable undertaking it is. And
that's just part of it. Even with the
elevated supports, heat will still be a
problem in some areas. Heat trans-
mitted from the pipe down through
the columns and into the permafrost
could cause melting and sink the sup-
ports. In these cases, a special heat-
dissipating system is installed in

(Please turn to page 178)

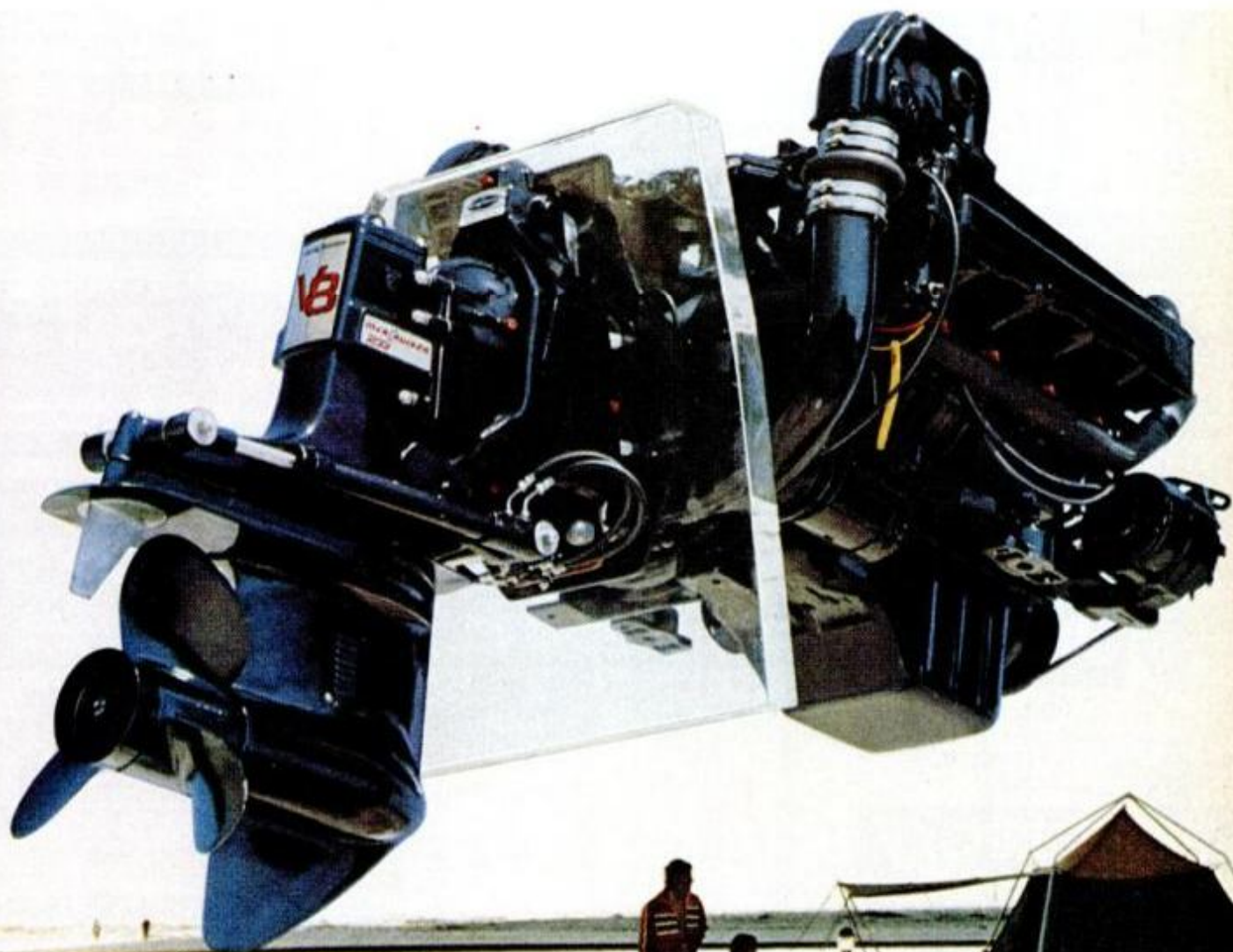
Top performance under varying load conditions. In any water condition. Better acceleration. Better fuel economy. Safer shallow-water running. Easy beaching and launching. More start-up snap for waterskiing. And a smoother ride. They're yours at the touch of a button with MerCruiser Power Trim. Standard on every MerCruiser stern drive.



An added plus is special valving that lets the Power Trim cylinders act as hydraulic shock absorbers. If you hit a submerged obstacle, the drive unit kicks up, slides over, returns to its original position. Damage is negligible or dramatically reduced.

Power Trim. Part of MerCruiser confidence. Another reason we outsell all other stern drives combined.

MerCruiser confidence. It starts with Power Trim.



MERCUISER
STERN DRIVE POWER

Full Power Lineup for 75" MerCruiser 120, 140, 165, 888, 233, 255, 280.
For nearest MerCruiser dealer, see the Yellow Pages under "Outboard Motors."



Mercury Marine/Division of Brunswick Corporation, Fond du Lac, Wisconsin/Canada/Australia/Belgium

Медицинский авторский пр.

BUILD YOUR OWN GRANDFATHER CLOCK

Save over 50% by building your own grandfather clock. Stately, straight-sided "AMERICAN CLASSIC" with beveled plate glass sides. Narrow waist designs: "SPIRIT OF '76" with finely sculptured crown and brass-tipped pillars; or easy to build, always popular "SPIRIT OF THE CENTURY." Our kits are Red-I-Kut, semi-assembled, hand-crafted of solid 3/4" kiln-dried mahogany, cherry or walnut. Tubular bell or Westminster rod chimes. Moving moon dials painted by our own artists, and our own original Goddess Diana or Lady Florentine pendulums. Gorgeous solid bronze dials with raised numerals and corners. Send \$2.50 for all three plans, plus description of kits and movements, as folks have for more than fifty years.

KUENPEL CHIME CLOCK WORKS & STUDIO
11108 Minnesota Blvd. P.M. 84. Excelsior, Mn. 55331

WE'VE GOT A DEAL YOU CAN'T REFUSE!

Make 200% profit selling the world's best storage system. Every home, factory, and business needs it! This easy-to-mount, rap and unbreakable jar. Send \$3.00 check or M.O. to receive a ten-mail demonstration kit of our Handy Dandy Storage System, our complete sales program, and our lowest direct factory prices.

WICKLIFFE INDUSTRIES
P.O. Box 286, PM 45
Wickliffe, Ohio 44092

Repair any watch

... LEARN AT HOME

Unique Repair System develops your watch repair skills step by step at home in spare time. No previous experience needed. Low tuition. Free sample lesson and full information.

CHICAGO SCHOOL OF WATCHMAKING
Dept. 145, Fox River Grove, Ill. 60021

LEARN MEAT CUTTING

Train quickly in 8 short weeks at Toledo for a bright future with security in the vital meat business. Big DAY, full-time job—home in spare time. No previous experience needed. Low tuition. Free sample lesson and full information. Diploma given. Job help. Thousands of successful graduates. OUR 2nd YEAR! Send NOW for big new illustrated FREE catalog. No obligation. G.I. approved. **NATIONAL SCHOOL OF MEAT CUTTING** Co. 01972
Dept. 50-T, Toledo, Ohio 43604

AAMCO® And You Can Make It!

The world's largest transmission chain is still growing strong after eleven years. Over 500 of our franchises located from coast to coast. New openings in some markets mean you too might qualify. For further information write:

AAMCO Transmissions, Dept. 48
408 E. Fourth St., Bridgeport, Pa. 19405

SURVEYING PAYS BIG

U.S. Labor Dept. reports "openings for 25,000 Surveyors next 10 years." Easy home-study plan makes you. Send for FREE "Surveying Career Kit" APPROVED FOR VETERANS.

Name _____ Age _____
Address _____
City _____ State _____ Zip _____

NORTH AMERICAN SCHOOL OF SURVEYING
4500 Campus Dr., Dept. P-0033, University Plaza, Newport Beach, CA 92663

GARDEN BIG!

Save hundreds by assembling 16 hp., big wheel tractor kit. 30 all-season attachments incl. tiller, plow, cultivator, loader. Send for "Big Job Tractor" CATALOG, 50c. Or "Build-it-yourself" PLANS, \$6 (refunded on any purchase).

Struck Corp., Dept. PM45T, Cedarburg, Wis. 53012.

PUMP DRAINS pools, cellars, laundry tubs IRRIGATES - CIRCULATES - SPRAYS

Heavy duty ball bearing pump. All metal, rust-proof Type XB. Stainless shaft. Use 1/4 HP or larger. 1 HP 1,200 GPH 60" high or 3,000 GPH 25" well. 5,200 GPH max. 1 1/4" in. 1" out. Belt or direct drive. \$17.95. Type P won't rust or clog. Bronze bearing. To 2,000 GPH. 1" in. 3/4" out. \$11.95. P'd cash with order. Money back guaranteed.

LABAWCO, Box 40, Belle Mead, N.J. 08502

BIG PIPE DREAM COMES TRUE!

(Continued from page 176)

each vertical support. The idea was adapted from a thermal control used in our Skylab space program. Liquid anhydrous ammonia, flowing up and down inside the columns in a continuous circuit, carries heat from the ground to the top and dissipates it to the air through finned radiators.

In other areas, engineers must resort to different tricks. In one region where the pipeline crosses a migration route for moose and caribou, the pipe will have to be buried underground to preserve the environment. To prevent the permafrost from thawing, refrigeration coils will be installed in the bedding under the pipe—that's how far engineers will have to go to avoid disrupting the environment and to assure a stable foundation for the line.

Laying the pipe will involve a seemingly endless parade of some of the weirdest-looking, most sophisticated machinery ever seen. Following the drilling rigs will come a towering mobile crane with a special jointed boom—like a human arm—to pick up the vertical columns and insert them in the holes. Behind this will roll a steady stream of equipment for cementing the columns in place, installing the cross members, hoisting the gigantic 80-foot pipe lengths onto the support shoes, making connections and, finally, clamping a thick insulating shell around the pipe. When finished, the line will contain 102,000 individual pipe sections.

Along the route, 12 pumping stations, with huge centrifugal pumps powered by 13,500-hp gas-turbine engines, will drive the oil up steep mountain slopes and across vast snow prairies at a speed of about 7 mph. A particle of oil will make the 800-mile trip from the North Slope to Valdez in four and a half days. An elaborate electronic flow-monitoring system combined with 93 motor-driven gate valves will permit almost instantaneous shutdown of the line to prevent oil spills from endangering the environment should the pipe rupture at any point. While not all ecologists agree, Alyeska experts believe the pipeline's environmental impact has been kept to a minimum. Though it will span Alaska, the narrow corridor of space it will occupy is roughly comparable to laying a piece of string across a basketball court—not much, say its proponents, considering the immensity of the job, its staggering cost and its ultimate value in these days of rapidly worsening fuel shortages. The big pipe dream is at last coming true. ★ ★ ★

Makes Household Oil Old-Fashioned

- Stops squeaks
- Protects metal
- Loosens rusted parts
- Frees sticky mechanisms

Aerosol **WD-40** lubricates as it cleans to protect metal

TRY A FREE SAMPLE
Send 25c to cover handling to:
WD-40, 1061 Cudahy Place, San Diego, CA 92110

MAKE UP TO \$12 AN HOUR AT HOME

Let Me Prove It To You FREE! I'll show you how Plastic Sealing and Laminating at home, spare time, can give you as much as \$12 each hour you operate. Table-top machine sets up anywhere. Easy. Fun. No experience needed. We furnish everything. We'll even help finance you. No house-to-house selling. Orders come by mail. Write for facts FREE. No salesman will call.

WARNER ELECTRIC, 1512 Jarvis, Dept. L-2-ED, Chicago, IL 60626

FIND BURIED TREASURE

Powerful electronic detector finds buried gold, silver coins, etc. Write or call for free catalog. Dealer inquiries invited.

Financing Available
Phone day - night (713) 682-2728
RELCO, Dept. DD 62
BOX 10839, HOUSTON, TEX. 77018

TIRES!

ALL FAMOUS BRANDS! AUTO TRUCK SPORT CAR FARM TRAILER

HEADQUARTERS FOR EVERY TYPE & SIZE AT REAL DOWN-TO-EARTH MONEY SAVING PRICES!

TREMENDOUS SAVINGS! LET US PROVE IT TO YOU... WRITE US TODAY!

Send for your FREE catalog!

RELIABLE TIRE CO. 1111 Chestnut St. Camden, N.J. 08103

TOOL CHESTS of the HIGHEST QUALITY for your PRECISION TOOLS..

GERSTNER TOOL CHESTS
Dept. D5 20 Cincinnati Street
Dayton, Ohio 45407

Send 25c for Catalog

EARN MONEY FAST!

REPAIR HYDRAULIC JACKS

Earn while you learn at home. Millions of jacks in gas and auto service stations, trucking firms, body shops, riggers, factories and farms need servicing... most of which you can learn to repair. We show you HOW. Start spare time in your basement or garage. Big opportunity for mechanics. ACT NOW! Write for folder No. PH 4 and free bonus offer.

HYDRAULIC JACK REPAIR MANUAL CO., INC.
G. P. O. BOX 3 • STATEN ISLAND, N. Y. 10314

Learn CUSTOM PICTURE FRAMING

For Fun Or Profit! Let Professionals show you the trade secrets of custom portrait and picture framing. It's a fascinating, satisfying craft—yet a Framers skills are worth \$8 to \$10 an hour or more! Start a clean, quiet business you can easily manage from home in part time —we'll show you how, help you every step. Write for complete details—no obligation and no salesman will call.

FREE FRAMING FACTS!

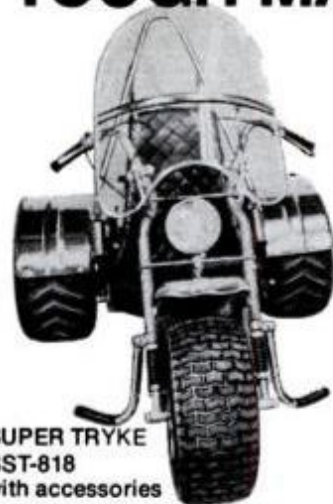
CREATIVE FRAMECRAFTERS, 1205 W. Barkley, Dept. QPM, Orange, CA 92666

Knowing the LAW

means MONEY to YOU. Today, it pays to know the "rules"—the LAW. Basic principles explained, illustrated by authoritative texts, study aids, self-tests, etc. (Not a correspondence course.) Send for interesting FREE booklet, "The People vs. YOU" and full details. No obligation.

BLACKSTONE SCHOOL OF LAW Dept. 54
209 N. Michigan Ave., Chicago, Ill. 60601

THREE WHEELS OR TWO—YOU MAKE ONE TOUGH MACHINE WITH A KIT FROM HEALD



**SUPER TRYKE
SST-818**
with accessories



**SUPER BRONC
VT-812**
with accessories

Go ahead! Take the rough road! Heald machines are built to get you where you want to go—through the swamp, over the "tough" hill, across loose, sandy beaches. Dependable? You bet! Because YOU build a Heald machine.

Heald machines come to you as a semi-kit. Engine is assembled and mounted on the sturdy 1" steel tubing frame, and wheels are mounted on rims, but from there you take over. Following the 22" x 34" instruction sheet, and using normal tools, you build a complete bike in just 8 hours, or tryke in just 10.

And when you've finished you've saved assembly costs by building a bike or tryke that will stand up to constant tough use.

Heald Trykes and Bikes are designed to rugged standards. Strong 1" steel tubing frames, 5 or 8 H.P. engines on Bikes and 8, 10, and 20 H.P. engines on Trykes, durable Comet torque converters (no shifting), and #40 roller chain final drive can handle the toughest demands. Thick padded foam seats, wide ATV tires, and complete suspension front and rear give you the comfort needed to ride all day. Accessories like tote rack, roll bar/tow plate, front ski, auxiliary gas tanks, and windshield let you tailor the bike to your needs.

All kits carry a full 90 day parts warranty. Your satisfaction is guaranteed. Heald Base Kit Models start at \$199.95, but whatever model you choose you'll get more bike with a Heald Super Kit.

BUILD YOUR OWN 10 H.P. LAWN AND GARDEN TRACTOR



Heald Yard Bronc offers a 10 H.P. Briggs & Stratton or an 8 H.P. Tecumseh engine, Peerless 4-speed transaxle, and solid 1/2" thick steel frame. Floating front axle; auto-type steering; wide tires; and padded, high-back seat add comfort. Accessories: snow thrower, mower deck, dozer blade. Base kits start at \$499.95. Build it yourself and SAVE. FREE ACCESSORY with your order. Write for details.

FREE OFFER FREE ski or safety helmet with your Tryke or Bike Order. No obligation. Send to HEALD, INC., Dept. P.O. Box 1148, Benton Harbor, MI 49022

Please send me free and without obligation your color brochure with information on how I can obtain a money-saving Heald Super Kit and ONE FREE ACCESSORY for Bronc or Tryke.

Name _____
(Please print)

Address _____

City _____ State _____ Zip _____

MAIL TO: HEALD, INC., Dept. PM54, P.O. Box 1148, Benton Harbor, MI 49022



**Does The Belsaw Pay?
YOU BET!**

**\$5-\$6
an hour**

**100%
Disabled**

**Wanted
to
Retire**

"On Saturdays, my big day, I take in \$45 to \$55. Other days I average less, but I figure I make between \$5 to \$6 per hour . . . and sometimes more. I am presently enlarging my shop, and thank BELSAW and their fine equipment for making it possible."

V. O. Miller Hubert, North Carolina 28539

"I was disabled by an accident while employed as an iron worker. They declared me 100% disabled and said I'd never work again. I don't think I could work for anyone else but I started my sharpening business part-time and now it's turned into a full-time job with more work than I can do."

Rex Stage Tampa, Florida 33614

"I had dreamed of retiring for years, but was afraid to quit my salaried job. I had never used this type of equipment, but the SHARP-ALL was real easy to learn. I sharpened 30 blades my first week — without advertising at all. Now, for the first time in my life, I can say that I am content."

Farris Cornelius Wellington, Texas 79095

**No Selling, No Inventory... Year Round
Cash Profits and YOU Set The Hours!**

**Makes Over \$60.00 EXTRA
a Week In His Spare Time
Sharpening Shop!**

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

DAVID SWANSON—Utica, Michigan



**Let Belsaw prove
YOU can do it, too! On our
30-DAY FREE TRIAL OFFER**

SEND FOR FREE FACTS! Our Free Book tells how to start a profitable, lifetime home sharpening business, how we help you grow, how we'll finance you.

You risk nothing by accepting this offer to see how easily you can turn your spare time into big Cash Profits with your own Complete Sharpening Shop. No selling . . . no previous experience needed. Our famous Sharp-All and show-how instruction set you up to make \$200, \$500, \$700 a month CASH sharpening Saws, Knives, Scissors, Lawnmowers, Shop and Garden Tools . . . all cutting edges.

**FIND OUT ALL ABOUT IT
No Obligation —
No Salesman Will Call
BELSAW SHARP-ALL CO.
716A Field Bldg.
Kansas City, Mo. 64111**

No Obligation . . . No Salesman Will Call

BELSAW SHARP-ALL CO. 716A Field Bldg., Kansas City, Mo. 64111
Send details of FREE TRIAL OFFER and Free Book "Lifetime Security"

NAME _____
Address _____
City _____ State _____ Zip _____



FREE BOOK
RUSH COUPON TODAY!

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

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

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

Tests by doctors on hundreds upon hundreds of patients showed this to be true in many cases. The medication the doctors used was *Preparation H*[®]—the same Preparation H you can get without a prescription. Ointment or suppositories.



For \$200 you can not only own a Rolls Royce, you can build it.

The most incredibly authentic car model kit by Pocher d'Italia reproduces in exact 1/8 scale the classic Rolls Royce Phantom II Sedan Coupe. 26 1/2" long. You build it with nuts, bolts and screws. No painting, no special tools needed. Doors, hood and trunk open. Steering, crankshaft, connecting rods, gears, fan, generator operate. Windows open. Headlights turn on. 2,199 separate parts of brass, stainless steel, copper, rubber and high impact plastic. For complete details

on this and 3 other classic car kits from \$100, send for free full-color brochure.

Deluxe Classics, Dept. PM-3
5900 Wilshire Boulevard, Suite 2760
Los Angeles, California 90036

Please send me your free full-color brochure.

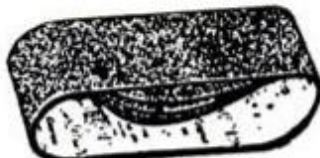
Name: _____
Address: _____
City: _____
State/Zip: _____

POCKET ROCKET
fold-up wrist slingshot
most powerful ever made
• Kills small game • Puts .44 ball thru 1/2" plank • Heft & balance of good pistol At your dealer or send \$4.95 to:
POCKET ROCKET, Dept.
P7, Timber Cove, Jenner, CA. 95450. (Add \$1.50 for extra heavy magnum hunting bands)

the Invader GT
is the buildable VW sports car kit. Write for free color brochure.
AUTOKIT
Department P4
Post Box 1073
Alameda, CA 94501

THE IDEAL JOB?
Many INVESTIGATOR-ADJUSTERS feel they have it. Interesting, challenging work, freedom, car expenses. Without obligation, find out if you can qualify by training at home. No salesman will call.
UNIVERSAL SCHOOL (homestudy)
Dept. 8110-045 Little Falls, NJ 07424.

SANDING BELTS



	Per Doz.		Per Doz.
1x42 Mead, etc.	\$5.25	4x21 1/2 Skil, etc.	8.45
2-17 1/2 Burgess	5.25	4x24 Wise	8.75
2x21 Porter Cable, etc.	5.25	4x27 Porter Cable, etc.	9.25
2 1/2 x21 5/16 Skil, etc.	5.75	4 1/2 x26 Skil, Thor, etc.	9.95
3x18 Wen, etc.	5.75	4x36 Hammond, etc.	10.95
3x21 Porter Cable, etc.	6.25	4x37-13 1/8 Atlas, etc.	10.95
3x23 1/2 Skil, Thor, etc.	6.25	4x52 1/2 Walker Turner	12.95
3x24 Porter Cable, etc.	6.25	4x54 Porter Cable, etc.	12.95
3x27 Porter Cable, etc.	6.25	6x48 Delta-Bears, etc.	17.95

1—All belts cloth backed.
2—Please specify for wood or metal.
3—Will Ship Assorted—Or Specify Grits.
4—**MONEY BACK GUARANTEE**
5—All other belt sizes available at lowest prices—Please inquire.
Include 85¢ for postage and handling. Send check or money order. DEALERS INQUIRIES INVITED.
JACKSON TOOL CORP., DEPT. HP
27-55 Jackson Ave., Long Island City, N.Y. 11101

inventors

...Manufacturers Need New Products

If you have an idea for a new product, or a way to make an old product better, contact us, "the idea people." We'll develop your idea, introduce it to industry, negotiate for cash sale or licensing.

Send for our FREE "Invention Kit." It has a special "Invention Record Form," an important brochure, "Your Invention—Its Development, Protection & Marketing," and a Directory of 500 Corporations Seeking New Products. You'll learn how ideas become a reality!



RAYMOND LEE ORGANIZATION
230 Park Ave. No., New York, N.Y. 10017

I'd like to find out how to take action on my idea. Send Free "Invention Kit No. A-12"

Name _____ Please Print
Address _____
City _____ State _____ Zip _____
SAN FRANCISCO LOS ANGELES TORONTO VANCOUVER DENVER CHICAGO



COIN MACHINE REPAIR AND MAINTENANCE TRAINING from the CITY ON THE SCENE where the BIG ACTION is and where the pro's are trained...

If you like to work with your hands, we can teach you a new skill with a solid future in one of the fastest growing trades in the world. Complete service

and repair of Slot Machines, Amusements, Arcades, Pinballs, Music and Vending.

Resident, Home Study, or combination courses available. For complete free information, RUSH COUPON TODAY.

Nevada Gaming Schools; 3135 Industrial Ave., Las Vegas, Nev. 89109. Send Free Info Without Obligation.

Name _____
Address _____
City _____
State _____ Zip Code _____

Many of our graduates are working in Nevada, foreign countries and on the fabulous cruise ships.

Popular BESTSELLING Mechanics GARDEN GUIDE



For the man who needs to master the art... fast! Superbly organized in famous "Master Guide" format. Dozens of tables, charts, and illustrations. Literally crammed with timely bonuses like vegetables, fruits, nuts and herbs, garden

pools and planting dates. Send for your copy today!

POPULAR MECHANICS, Box 1014 Dept. GG
Radio City, New York 10019

I am enclosing my check (or M.O.) in the amount of \$4.49. Please send me a copy of **Complete Gardening Guide**, postpaid.

Name _____
Address _____
City/State _____ Zip _____

H. M. SPECIALTIES

HANDCRAFT AN HEIRLOOM

In just a few hours... no special tools or skills required. Whichever Crown Kit you select... your family will enjoy for generations to come.



SOLID WALNUT MANTEL CLOCK KITS

All Crown Kits are Precut, Drilled and Sanded • Brass Finished Hardware and Overlays • Solid Brass Dials • Westminster Chiming & Striking Brass Movements • Exclusive 4-Jeweled Platform Escapements

Send 50¢ for Beautiful Color Catalog and bonus literature on all our fine Kits including Clocks, Tables, Gun Racks, Rocking Stools, Shelves and Accessories.



CLIP AND MAIL TODAY!
Crown of Fairhope

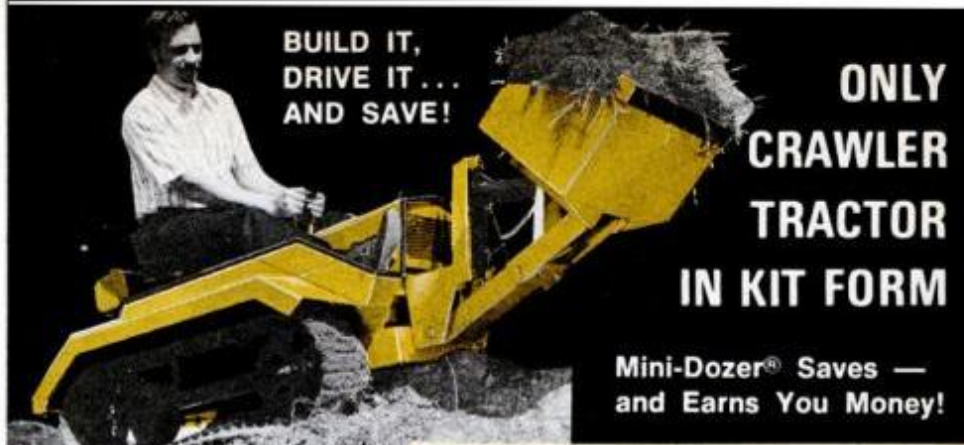
P.O. Drawer G-141, Fairhope, Alabama 36532

Please send me your beautiful Full-Color Catalog plus Bonus Literature on all your fine products. Enclosed is 50¢ to cover handling and postage. (please print)

Name _____
Address _____
City _____
State _____ Zip _____

VISIT OUR FACTORY SHOWROOM

DIRECT FROM FACTORY PRICES • SATISFACTION GUARANTEED



BUILD IT,
DRIVE IT...
AND SAVE!

ONLY
CRAWLER
TRACTOR
IN KIT FORM

Mini-Dozer® Saves —
and Earns You Money!



Buy complete dozer kit (shown below) factory direct. Avoid shoddy assembly line mistakes — assemble dozer yourself in a weekend. Have track traction and highly mobile power for serious gardening, dozing, brush cutting, etc. Your Mini-Dozer earns extra cash doing odd jobs — plowing, tilling, landscaping, lawn-care, snow removal, etc. OR, assemble dozer kit and resell for big profits. Take your choice of 7, 12 or 16 hp. engine and 30 attachments. YOU CANNOT BUY MORE WORKPOWER PER DOLLAR INVESTED! Ideal for rough terrain, wet conditions, construction projects. To our knowledge, of the thousands of Mini-Dozers sold, not one has ever been assembled without complete success. Mini-Dozer is fully warranted — the only small crawler tractor designed for sale in kit form.

Send today for CATALOG showing DOZER KIT construction and uses, 50¢. Complete PLANS for fabricating a dozer from local materials, \$6. (Refunded on any purchase.) Struck Corp., Dept. PM45, Cedarburg, Wis. 53012.

STRUCK KIT

The Bargain Hunter

OLD FASHION BRANDING IRON \$5.00
Plus 30¢ handling
YOUR CHOICE UP TO FIVE 3/8" COPPER LETTERS OR NUMBERS
ADDITIONAL LETTERS OR PUNCTUATIONS \$1.50 EACH

I. MILLER ENTERPRISES
BOX 772-M
MANCHESTER MO. 63011

GREAT GIFT

PLANS AND INSTRUCTIONS FOR

- Go Kart \$2.00
- Mini Bike \$2.00
- Mini Car \$3.00
- Pedal Boat \$4.00
- 12" Sail Boat \$4.00
- Snowmobile Sleigh \$3.00
- Mini Jeep \$3.00

Mini Vehicles Plans Dept.-C
Chary, N.Y. 12921

"LISTEN IN" TO POLICE-FIRE RADIO CALLS IN YOUR CAR!

WORKS with ANY CAR—Portable or HOME RADIO! Just PLUGS IN—No wiring—3 minute hookup, switches instantly from regular radio to ALL POLICE-FIRE-EMERGENCY-TAXI—STATE-GOV'T 2 way radio exist Works Everywhere—Anytime! Dual Band 36-49 & 150-175 MHz. (each \$8.00) and pay \$2.00 postman \$12.00 C/D post. size or send \$14.00 for PPN Del in USA. COMPLETE with Antenna and Plug in to use with ANY Home or Portable Radio! Full instructions—1 year Service Warranty—10 DAY MONEY BACK TRIAL—SOLD ONLY Direct from Factory—WESTERN RADIO DEPT. RPM-4 KEARNEY, NEBR. 68847

BLACKJACK PLAYERS

Use my unbeatable, quickly-learned system to earn over \$50.00 an HOUR in any casino. Play relaxed. No cards or charts to memorize, and IT WORKS!

• 30-DAY FREE HOME TRIAL •

You must be satisfied 100%. No obligation. Get a deck of cards and try it. You'll be amazed.

FREE DETAILS VIA AIRMAIL
MEL GRANT, Dept. 270
324 So. First Street Alhambra, CA 91802

BEST "LEARN-IT-YOURSELF" BOOKS

- Advanced Applications for Pocket Calculators 308 p., 275 ill. \$6.95
- Electrical Wiring & Lighting For Home & Office 204 p., 155 ill. \$7.95
- Radio Astronomy for the Amateur 252 p., 88 ill. \$6.95
- Amat. Filmmaker's Hdbk of Sound Sync/Scoring 210 p., 116 ill. \$8.95
- How to Train & Watchdog 224 p., 45 ill. \$6.95
- Modern Auto Tuneup/Emission Control Svce. 240 p., 135 ill. \$6.95
- Complete Handbook of Lawnmower Repair 434 p., 392 ill. \$9.95
- Installing & Servicing Electronic Protective Systems 252 p. \$7.95
- How to Repair Small Gasoline Engines 288 p., 124 ill. \$6.95
- Rapid TV Repair 224 p., 107 ill. \$7.95
- The Complete Auto Electric Handbook 210 p., 139 ill. \$6.95
- Auto Electronics Simplified 256 p., 202 ill. \$6.95
- Radio Control for Models 340 p., 417 ill. \$9.95
- Complete Handbook of Home Painting 210 p., 96 ill. \$7.95
- Complete Guide to Outboard Motor Serv./Repair 296 p., 226 ill. \$9.95
- Computer Technician's Handbook 480 p., over 400 ill. \$12.95
- How to Repair Home/Auto Air Conditioners 208 p., 100 ill. \$7.95
- Small Appliance Repair Guide - Vol. 2, 210 p., 119 ill. \$7.95
- How to Test Almost Everything Electronic 160 p., 114 ill. \$6.95
- Servicing Cassette & Cartridge Tape Players 294 p., 196 ill. \$9.95
- C/D Radio Operator's Guide 224 p., scores of ill. \$7.95
- 3 Channel Stereo From Source to Sound 2nd Ed. 252 p., 102 ill. \$7.95
- Professional Picture Framing for the Amateur 168 p., 138 ill. \$5.95
- Using Electronic Testers for Auto Tune-Up 252 p., 226 ill. \$7.95
- The Home Appliance Clinic 196 p., 43 ill. \$7.95
- Experimenting With Electronic Music 180 p., 103 ill. \$7.95
- Electronic Music Production 156 p., 79 ill. \$7.95
- The Complete FM 2-Way Radio Handbook 294 p., 111 ill. \$9.95

SEND NO MONEY! We'll invoice you on 10-DAY FREE TRIAL. Clip entire ad to order. 100% guaranteed—used by hundreds of thousands to learn. All hardbound books.

YAR BOOKS, Dept. PM-45 Blue Ridge Summit, Pa. 17214

PROTECT YOUR CHILD PROTECT YOUR VALUABLES

Stainless Steel Dog Tag, 26" Chain and Clip. Great for luggage—Cameras—Pets—Etc. Send Name, Address, Phone Number and \$2.00 for each Tag to:

Futura Enterprises
Dept. PMA
602 Syracuse Ave.
N. Massapequa N.Y. 11758

GATEWAY TO ADVENTURE
QUALITY CANOES SINCE '62

WOOD-CANVAS OR
MANY MODELS BOX BOAT
FREE CATALOG

Ph. 913-243-1313 CONCORDIA, KANSAS, 66001

SAVE TIME...
MAKE MONEY

SHARPEN SAWS...
YOURS AND OTHERS

Professional workmanship comes easy with this portable precision tool which gums, joints, and then sharpens all types of circular saw blades, including cut-off, rip and combination styles as well as carbide tipped, dado heads and blades. Indexer eliminates guess work, sharpens any angle of bevel on circular saws from 4" to 24" diameter. Write for your free copy of "THE SAW FILING MAGIC OF MICRO SHARP".

MARTIN ENGINEERING CO.
P.O. Box 337, Caledonia, Mich. 49316

DISCOUNT SALE \$9.95

AIR PISTOL \$7.95
(WITH FREE CAN OF PELLETS) PPD

IMPROVED MODEL. Built to last a Lifetime. Shoots both pellets and darts. This fine, well made .177 cal. German air pistol is just the ticket for target or varmints. Accurate. No CO2 cartridges to replace, either. Once in a lifetime bargain. Order several. Only \$7.95

Secret Leather Holster, \$2.95 pcd. • 600 Deluxe Pellets, \$2.40 pcd.
20 Deluxe .177 cal. Steel Darts, \$2.00 pcd.

AIR PISTOL, Dept. PM-4
4535 Huntington Dr. So., Los Angeles, Calif. 90032

IDEAL SHOP TOOL!

1" Quik-Sand

Popular Mechanics said: "Handiest Tool You Can Have in Your Shop"

It sands, grinds, polishes, sharpens. It's portable. Use with any 1/4 hp motor. Model 165. Factory direct special.

\$31.00 less motor

Other tools available, 2", 4", 6" sanders, power hacksaw.

ARCO MFG. CO. OF RACINE
1501 Clark St. Racine, Wisconsin 53403

EXTRA MONEY

'30 to '50

A DAY

Operate a community sharpening service with an investment of \$150. Work from your basement or garage. Our manual guides you in professional methods of grinding, of business promotion and in pricing your work.

- Hand Saws • Circular Saws • Knives • Chain Saws
- Scissors • Pinking Shears • Clipper Blades
- Planer and Dado Blades • Mower Blades

John Rodock says: "Thanks for shipping Model 331. It has paid for itself many times since I purchased it. Please send latest price list on grinding wheels."

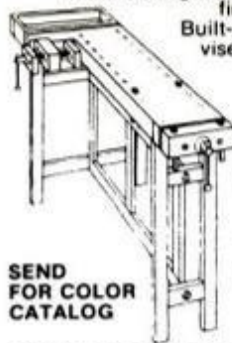
P.O. Box 216-A North Tonawanda, N.Y. 14120

TREYCO **START NOW...WRITE TODAY**



woodworking benches woodcrafting tools

Danish crafted SOLID Danish Beech woodworking benches ruggedly made and finished like fine furniture. Built-in vertical and horizontal vises and adjustable surface dogs hold any shape workpiece. Available in 49", 60" and 80" models. One even folds for easy storage.



HAND FORGED turning gouges, chisels and sculptor's gouges, carving tools, handsaws and uniquely styled woodscrew drivers from Europe's finest tool-makers. The best the world can offer.

SEND FOR COLOR CATALOG

Name _____
Address _____
City _____ State _____ Zip _____

LEICHTUNG & GALMITZ, INC.
5187 Mayfield Rd. Cleveland, Ohio 44124

AMAZING NEW ELECTRIC ARC WELDER \$14.99!

Twice as big-better-more power welds, brazes, solders, cuts all metals! Use any 110 volt home plug in! Multitheat. Build-repair, most anything for cars-factory-home. Complete ready to use with bit of steel, bronze, carbon welding rods—flux-eyesields—automatic arc torch, welding instructions—no experience needed!

SEND ONLY \$2.00 (cash, Ck, Mo.) and pay postman 27¢ for PP Del in USA. Lifetime burnout guarantee—10 day no new back free trial! Now, save and make money. Order yours today! Midway Welder Dept. KFM-4, Kearney, Nebr. 68647

MAKE TIFFANY-TYPE LAMPS

Revolutionary new method. Cartoon design printed on molded form, matching paper patterns, instructions. Many old designs.. At most stained glass dealers. Information:

H. L. WORDEN, Granger, WA 98932



"OUR FOUNDRYETTE" BLAST FURNACE
SINCE 1935
Hobbyists, Schools, Inventors, etc. Make your own castings of any metal from cast iron, down to lead and zinc. Available in sizes from 1 1/2 to 285 lbs. RED BRASS. Complete units furnished with all sizes. Send 25¢ for circular.

KANSAS CITY SPECIALTIES CO., INC.
Dept. P-4, P.O. Box 193, Middleton, Wisconsin 53562

MAKE . . . \$25 to 100 PER HOUR

BADGE-A-MINIT, a complete badge making system lets you make permanent metal pin back badges for fun or profit. Badge parts cost pennies, you sell slogan buttons for up to 75¢ each, photo buttons for up to \$2.50 ea. Get FREE illustrated money making plans by return mail, or send \$34.95 plus \$1.75 for shipping to **BADGE-A-MINIT**, Box 618, Dept. PM-48, La Salle, Illinois 61301

Money Back Guarantee

VENTRILOQUISM!

FREE INFORMATION!
Easy to learn in 60-90 days with our Home Study Course. **RESULTS ARE GUARANTEED!** Vent supplies include professionally handcrafted vent figures **FULL COLOR** dummy catalog: 50¢

MAHER: Box 420P; Littleton Colo 80120

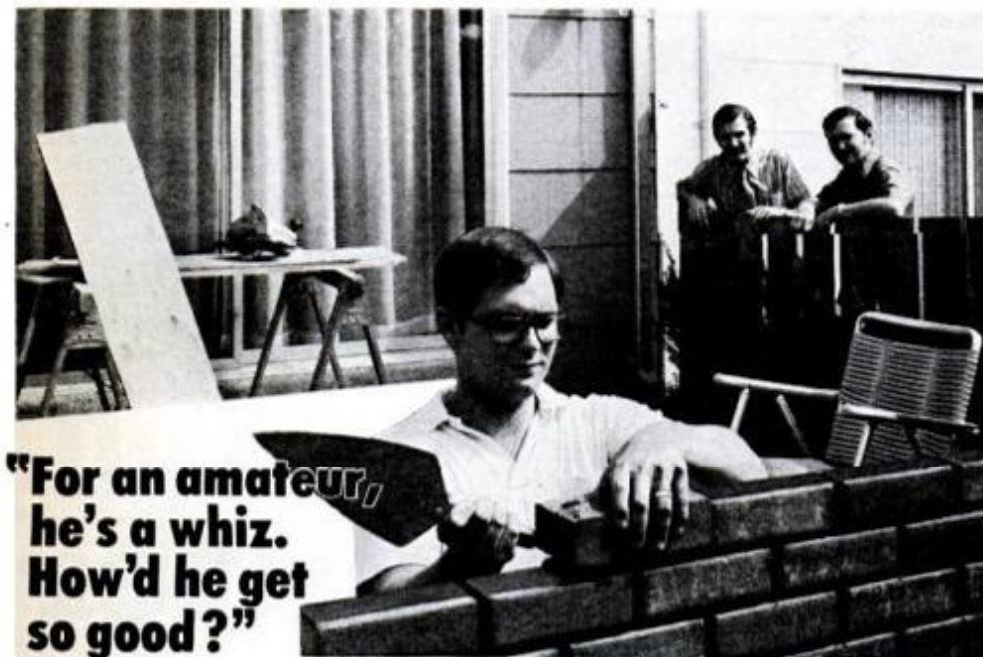
THROTTLE-SPEED CONTROL \$18.95 P. PD.
A quality manual speed control at the lowest prices. You can enjoy luxury driving and benefit from a terrific 15% saving on gas. Safe, system will not operate if electrical system or stoplights burnout. Just a touch of the illuminated switch turns it on. A touch of the brake pedal releases it. 45 min. installation time, out of the way on engine side firewall. Guaranteed. Fits all 12V. cars and trucks. Send to

PERFORMANCE
Box 129 Westport, Mass. 02790

PORTABLE STEAM CLEANER
Steam in 60 seconds

CLEAN:
Engines, Air Filters, Lawn mowers. 3 year guarantee on fire box, coils. Uses liquid soap, propane fired. Weight 120 lbs. Auxiliary pump required on low water pressure.

WEDCO MFG. INC., Dept. M-5,
Box D, Jackson, Wyo. 83001



"For an amateur, he's a whiz. How'd he get so good?"

Whatever practical skills you've been wanting to develop, Audel has comprehensive, step-by-step Guides to help you. They show you all the professional tricks of the trades

in clearly diagrammed and illustrated "how-to" steps. They can save for you, over and over. Here are four of Audel's many fields . . .



CARPENTERS AND BUILDERS LIBRARY
1490 pages of the latest information on modern construction in four volumes. They cover every phase of carpentry from foundations to finishing with easy-to-grasp, step-by-step instructions . . . all illustrated with thousands of diagrams, charts and photos. No. 23169 —4 Volumes—\$21.25



MASONS AND BUILDERS LIBRARY
Two illustrated volumes on the science of masonry and bricklaying. Packed with how-to information and directions, rules, processes, definitions, formulas, diagrams, tables, estimating. A complete and authentic trade reference library 752 pages. No. 23185 —2 Volumes —\$12.75



PLUMBERS AND PIPEFITTERS LIBRARY
A valuable 3-volume guide to the principles, methods and short cuts of modern plumbing. Tools, fittings, fixtures, installation, drainage, welding and much more are all covered in these fully illustrated, easy to understand volumes. No. 23155—3 Volumes—\$15.50



MACHINISTS LIBRARY
Three books covering the entire field—1216 profusely illustrated pages on practical fundamentals of basic machine shop operations, setup and operation of spot machines, down-to-earth data on toolmaking procedures, layouts, jigs and fixtures, etc. . . . equally valuable for beginners and experienced men alike. No. 23174—3 Volumes—\$19.50

MONEY BACK GUARANTEE

Send no money! We'll send you any Audel Guides for 10-day FREE EXAMINATION. If you keep them, you may use our easy payment plan. If not completely satisfied, return them for refund.

THEODORE AUDEL & CO.
Division of
Howard W. Sams & Co., Inc.
Indianapolis, Indiana 46206

SEND NO MONEY—10-day FREE EXAMINATION

Theodore Audel & Co.—Self Improvement Publishers since 1879
4300 West 62nd Street, Indianapolis, Indiana 46206

Please mail me for 10 days' FREE EXAMINATION the books I have checked at right. I agree to mail \$3 in 10 days for each set ordered and to further mail 1/2 of the purchase price 30 days later, with balance plus shipping costs to be mailed within another 30 days. I may return the books for refund if not completely satisfied.

Save shipping costs. Check here if you enclose full payment (plus sales tax, if any). We will pay postage charges. You have same return privilege.

Name _____
Address _____
City _____ State _____ Zip _____

23169
 23185
 23155
 23174

Small Engines Service Manual



New 10th Edition \$7.95

Send Check or Money order with order and we send postpaid.

TECHNICAL PUBLICATIONS Div., Dept. PM-475
1014 Wyandotte, Kansas City, Mo. 64105

THE ORIGINAL IMPORTED SWITCH-BLADE COMB with replaceable blades

9" overall length
5 1/4" closed
• FUN
• PRACTICAL
• GUARANTEED

Spring action comb snaps into place at push of button. Locks shut to avoid opening in pocket. Perfect for conversation piece and practical use. Replaceable comb blades 50 cents each. Money back if not completely satisfied.

Send \$4.75 plus 25c postage and handling to:
EXECUTEK
777 South Central Expressway
Richardson, Texas 75080

MILITARY STUFF

5000 Products - All New! Mini-Medals, Patches, Flares, Insignia, Fatigues, Rings, Boots-50 Pages! Send 50c (it's refunded on 1st order). **KEN NOLAN**, Foxhole 105, Irvine, Calif. 92705.

LUCKY SPLITTER ENDS WOOD SPLITTING DRUDGERY

New low cost COMPACT MODEL... for farmers, camps, cottagers. 10 ton ram, 2 cycles per min., splits logs 25" x 18". Carried in car trunk, placed up-right or hung for storage. For details write:
PIQUA ENGINEERING, INC., Dept. P, Box 605 Piqua, O. 45356

KARATE

JUDO-SAVATE
JIU-JITSU
THE GREATEST SELF-DEFENSE SYSTEM KNOWN TO MAN!

Learn-At-Home-Course reveals hundreds of deadly self-defense secrets, which will enable you to protect yourself from any attacker! Easy to learn! FREE COLORFUL BROCHURE REVEALS SELF-DEFENSE TECHNIQUES.

Send to: **UNIVERSAL, Dept. M**
BOX 39303 DETROIT, MICHIGAN 48239

FREE FREE

FREE! POWERFUL MUSCLES FAST!
Fantastic New Discoveries in the science of bodybuilding. Add inches of powerful muscles to arms, chest, shoulders and legs. Secrets on trimming the waist with ultra-modern methods—fast! Results Guaranteed! Send for free brochure!

Universal Bodybuilding Box 485 Dept. M
Dearborn, Michigan 48121

FREE book

2100 UNIQUE WAYS TO MAKE MONEY

People making BIG MONEY aren't telling how! Our Special Reports (3 Big Volumes) Reveal Everything!!

Start at home—full or part-time!

This is the World's Most Unique Money Book—and it's FREE! Send your name to:

SUCCESS INTERNATIONAL Dept. MM
26903 W. Eight Mile Road
Detroit, Michigan 48240

IMPORTED LOCK BLADE KNIFE

ONLY \$2.75 each

9" Overall Length
5" When Closed

- Opens instantly
- Sharp and Tough
- Stainless Steel Blade

Flips open instantly and locks automatically to prevent accidental closing. Razor sharp tough stainless steel blade for reliable use and hard, long service. Money back in 5 days if not satisfied. Send \$2.75 plus 25c to cover postage and handling.

WESTBURY SALES CO.
P.O. BOX 434, WESTBURY, N.Y. 11590
DEPT. L-4-PM

DRILL YOUR OWN WATERWELL

With this low-priced outfit you can drill your own water well at a cost of about 12¢ per foot! Also, this unit can be operated horizontally to drill free-flowing springs in hillsides. A big, fact-filled package and 24-page book "How To Drill Your Own Water Well" is just \$1.00 PPD. (Refundable) "WRITE TODAY"

DEEPROCK MFG. CO.
1001 Lafayette Pkwy., Opelika, Ala. 36801

CASH CARD
This very card pays you up to 50% of the \$\$\$ fees stores, shops & credit card firms are taking from your pocket! Get one free, just for trying Moneytree's complete money service. Free details—write:

MONEYTREE, Dept. 5, Kerrville, Texas 78028

WOODEN TOY CLASSICS
Build this 1804 Renault and five other classics! Stanley Steamer, Ford Quadricycle, Winton, Thomas and Mercer Raceabout from detailed wood-working plans. Cars measure 6 to 12 inches long. Free catalog with order.

\$2.00 PPD.
(Cal. residents add 12c sales tax)
Catalog of more than 50 wooden toy plans, kits, tool-making supplies, and ideas: 50c.

LOVE-BUILT Toys & Crafts
P.O. Box 443, Dept. PB4, Antioch, California 94509

SAVE ELECTRIC POWER!
Save up to 80% electrical power with this unique, inexpensive, portable, permanent and legal method applicable for shops, homes, factories, businesses, farms, sites. 100% Refund Guaranteed if not scientifically sound or if it employs gimmicks.

Information \$1.00

CONSUMERTRONICS CO.
P.O. Box 1399 Alamogordo, N.M. 88310

There are BIG profits in radiator repairs... and a BARBEE equipped shop will make them for you.



Radiator repair is big business. Cash in now on this rapidly growing field. Barbee offers a complete training course and expert counseling on financing. INVEST AS LITTLE AS \$1800 to \$3000

A Down Payment gets you started immediately. Use the coupon for free catalog.

THE BARBEE CO.
Box 323-PM, Louisville, Ky. 40201

Please send catalog and complete information on the Barbee Plan.

Name _____
Address _____
City _____ State _____ Zip _____

110 VOLT A.C. GENERATORS
60 cycles, 3000 watts. Wt. 27 pounds, 5"x10" Fanbelt driven from car or pickup. Operates T.V. All power tools. Over 13,000 in service. This is our 25th year. Guaranteed 6 months. \$115.50 Postpaid while supply lasts. Our X1200-watt generator needs no battery. Special price—\$95.00 Postpaid.

Virden Perma-Bilt, P.O. Box 7160 PM,
2821 Mays, Amarillo, Texas 79109

110 VOLT "PLUG-IN" YOUR TRUCK OR CAR!

Mounts Under Dash or Hood in 10 Minutes—Has On-On Sw.—Voltage Ind. Light! Up to 4000 Watts—110 Volt DC Power from car Alternator. Runs Carpenter - Farm - Builders - Tools - Lathes - Heaters - Drills - Saws. Starts Cars, Quik Charges - Welds - Brazes. Solders.

SEND ONLY \$2.00 (M.O.) and pay postman \$12.99 plus COD postage, or send \$14.99 for Paid Del. in USA. Complete Ready To Use With Speed Control—Full Instructions. One Year Service Warranty—10 Day Money Back Trial—Ideal for pickups—All Cars—Campers—Rush order.

WESTERN ELECTRONICS, Dept. PM-4, Kearney, Nebr. 68847

MILWAUKEE HEAT-BLO GUN

FAST FLAMELESS UP TO 1000°F.

Write for FREE Catalog

A model for every need ranging from 150° to 1000°F. without an open flame. Safe and easy to operate... fingertip control permits operator to aim heat at desired point. Temperature can be varied by air intake adjustment.

MILWAUKEE LOCK & MFG. CO.
3042 N. 37TH STREET • MILWAUKEE, WIS. 53209

SPARE TIME CASH. Sell famous Hanover Shoes. Samples, sales kit free. No experience needed. No age limit. Big commissions. Hanover Shoe, Dept. 1291, Hanover, Pa. 17331.

EARN MONEY From Telephone. Amazing Secret Revealed!! Complete Instructions. Rush \$3.00. The Quality House, Box 1051, Brockton, Mass. 02403.

\$2 NETS You \$100 or Money Back! Details Free! Ware's, Box 26070-CM, Phoenix, Arizona 85068.

\$700+ WEEKLY Possible!! Financial Breakthrough! Free Information, Aware, Box 1248-PM4, Pacifica, Calif. 94044.

MAKE MONEY Sell coin jewelry, Box 5847, Reno, Nev. 89503.

INDEPENDENCE. Wealth. Unlimited opportunities, details free—CARIBERNA, P.O. Box 614P, South Orange, New Jersey 07079.

ABANDONED SILVER—YOURS FOR TAKING! The only COMPLETE salvage method. Earns \$24,000 yearly. FREE PLAN: Silver Masters, Box 548, Woodville, Texas 75979.

NEED MONEY? MAKE MONEY AT HOME!! Moneybooks show you how! Two exciting catalogs, \$1.00 (refundable)! Moneybooks, Box 192-PM4, Griffith, Indiana 46319.

PROFITS Writing Short articles. Instruction book; markets, techniques, preparation. Guaranteed. \$3.00. Wesco, Box 891-A3, Michigan City, IN 46360.

37 WAYS TO MAKE MONEY WHEN YOU'RE OUT OF WORK SATISFACTION GUARANTEED. SEND 25¢ FOR HANDLING FULL FREE INFORMATION. C & B PRODUCTS, 500 Harrison St.-Apt. #1002 10-F, Syracuse, New York 13202.

SELL Men's Polyester Neckties. (Earn 3 times your Cost!!) Send \$2.50 for prepaid Sample and Details. Beau Geste Cravats, Dept. 1407, 183 St. Paul, Rochester, New York 14604.

MAKE MONEY AS AN INVENTOR. Booklet shows how to turn your ideas into profitable inventions. Send \$1.50. Country News Shop, Routes 37 and 39, New Fairfield, Conn. 06810, Dept. F.

\$31.80 DAILY. Easy Homework. No investment. Free Details: Selfaddressed Stamped Envelope: Sbiapo, 6311-812 Yucca, Los Angeles, Calif. 90028.

MEN/Women. Make Money at Home. Everything Supplied. Merchandise. Brazier House Of Gifts, 27675M Santa Clarita, Saugus, Calif. 91350.

MAILORDER—GUIDEBOOK FOR BEGINNERS—\$1.00, REFUNDABLE! BUSINESS INFORMATION SERVICE—! P.O. BOX 291, DEPT. A, BLOOMINGDALE, ILL. 60108.

MAKE MONEY WITH YOUR IDEAS. Booklet Shows How. \$1.50. Laugh 'N House, Inc., 6990 Lake Ellenor, Suite 122, Dept. PM-475, Orlando, Florida 32809.

ADDRESSERS Mailers Needed 50 Firms Listed. Information. 25¢, Stamped Addressed Envelope: Wuchte, RR3 Box 132-C, Kingston, New York 12401.

HOW To Make Money writing short paragraphs. Information free. Barrett, Dept. C-27-A, 6216 N. Clark, Chicago, 60660.

STUFF Envelopes \$500.00/Thousand. FREE Details Send Stamped Addressed Envelope. Mantor House, Dept. 8-P.M.6, MINOA, N.Y. 13116.

\$250/THOUSAND STUFFING ENVELOPES IMMEDIATELY EXPERIENCE UNNECESSARY FREE SUPPLIES Rush stamped envelope. JETCO, Rt3-38P4, New Sharon, Iowa 50207.

STUFF ENVELOPES. \$25.00 HUNDRED IMMEDIATE EARNINGS. SEND ADDRESSED, STAMPED ENVELOPE. PALMER-G, P.O. Box 20028, El Cajon, Calif. 92021.

VENDING Machines. No selling. Routes earn amazing profits. Big catalogue free. Parkway Corporation, 715PMM Ensor Street, Baltimore, Maryland 21202.

FREE—Easy Ways to make money selling exciting new products—Full—spare time. Send name, age for 5 months free subscription. Salesman's Opportunity Magazine, 1460 Hancock Center, Dept. 336, Chicago 60611.

WORLD'S Leading Contest Magazine, 50¢. Prize-winner, 1315 Central, St. Petersburg, Fla. 33705.

SWEEPSTAKES Contests. How to Win. Write for Free Information. General Contests, 1609-18 East 5th., Duluth, Minnesota 55812.

HORSEPLAYERS—Free!!!! How Turfwin Won \$300 Weekly. Guaranteed! Turfwin, Box 581 PM, Port Washington, NY 11050.

SELL Sensational Low-Cost Burglar Alarm. Exceptional Margin. Samples for trial, Northwest Electric, Ave. 927, Mitchell, South Dakota, 57301.

CLIP Newspaper Items. \$1.00-\$5.00 each. Details free. Walter, Box 1360-PA, Erie, Pa. 16512.

MAKE Big Money. We furnish everything. For details send self-addressed envelope. Enterprises, Box 4516-Z, Compton, Calif. 90224.

LEARN, EARN Mail Order from Home Spare Time. Been telling how since 1929. Facts, Stories, Sources, Thousand Offers, Complete Course in Mail Order. Sample Copy 50¢; Year \$12. Mail Trade Magazine, Box 1302, Springfield, IL 62705.

250/THOUSAND IMMEDIATELY, STUFFING ENVELOPES. Free Supplies, Send Stamped-Addressed Envelope, Henriksen, Box 6080, Minneapolis, Minn. 55406.

Details 50¢. Flyco, Box 946-P, Albany, Oregon 97321.

ADDRESSERS—Mailers—Homeworkers—Needed! 50 Firms Listed. Rush 25¢, Stamped, Addressed Envelope. Cannon Enterprises, Box 34057, Bethesda, Md. 20034.

MAKE Statuettes, novelties, imitation marble. Sell to stores or start gift shop. Free details. Marbleizing, 41 Waverton, St. Louis, Mo. 63124.

FREE SECRET BOOK "2042 Unique, Proven Enterprises." Largest successful collection! Fabulous "Little Knowns." Work home! Haylins-T-50, Carlsbad, Calif. 92008.

\$175.00 WEEKLY Correcting Pupils' Lessons! Samples, \$1.00! Castle's, 507-LP Fifth, NYC 10017.

LEARN The secrets of repairing junk batteries. "Fabulous Profits" at home. Apex Engineering, 3100 Ramona, Atascadero, California 93422.

\$200.00 FROM Sheet 1/4" plywood (scrap). Details 35¢. Novelties, 610 So. 24th, Elwood, Indiana 46036.

FREE! LATEST DIRECTORY OF 500 CORPORATIONS SEEKING NEW PRODUCTS! If you have an idea for a new product—or a way to make an old product better, send for our FREE INVENTORS KIT NO. A-85. It gives vital information on developing and marketing your invention/idea for Cash/Royalty Sales to corporations nationwide. Raymond Lee Organization, 230 Park Avenue, New York, N.Y. 10017.

500,000 BARGAINS—3 Fabulous Catalogs Listing Amazing Below Wholesale Products For Home, Business—Many Free Items. Send 2.00: Bargainhunters, Box 730-PM2, Holland, Michigan 49423.

GET World's Biggest Wholesale Import Catalog. Write: World, Medina, Washington 98039.

WILL You actually (really & truly) address, stuff and mail 20 envelopes a day? Then don't let's mess around. Send \$3 and we'll show you how to make up to \$1,000 monthly and even much more. GUARANTEED! Contractual Arrangements. Habersham-Hall, Box 613-F, San Pedro, CA 90733.

\$60 PER Evening Addressing Envelopes. Homework Guaranteed. Free Details. Sterim, Box 23E, Sterling Heights, Mich. 48078.

ADDRESSERS—MAILERS—HOMEWORKERS NEED! 50 Firms Listed. Information: Rush 25¢, Stamped, Addressed Envelope. Dennis, 243 Glenn Ave., Canonsburg, Pa. 15317.

\$250 WEEKLY possible! mailorder beginners- Homeworkers. Information Send self addressed stamped envelope. Foster's-2M, 36 14th Avenue SW, Birmingham, Alabama 35211.

EARN AT HOME MAILING OUR CIRCULARS! EXPERIENCE UNNECESSARY! Send stamped addressed envelope. Wright, 949 Broadway, 602-PM, New York City 10010.

FREE WEALTH BOOK: "2100 Unique Ways To Make Money!" World's Biggest Collection of Home Businesses!! Success-M, 26903 West Eight Mile, Detroit, Michigan 48240.

MEN-Women. Make Money Part Time. No investment Necessary. Amrose, Box 8282MM, Richmond, Va. 23226.

EARN CASH Royalties for your ideas. Details \$1.00. Calcraff Publications, Box 20391, Charlotte, NC 28282.

ADDRESSERS - Mailers - Homeworkers Needed! 50 Firms Listed. Information: Rush 25¢, Stamped, Addressed Envelope. JOR Enterprises, Box 2204, Victoria, Texas 77901.

FREE Details! Win lifetime income from Dice, Roulette, Thoroughbred, Harness, Dog Racing. Guaranteed! Research, Box 551PM, Mincola, N.Y. 11501.

\$1,000 MONTHLY!! Stuffing Envelopes and Clipping Newspapers: Send Stamped Addressed Envelope . . . JOY, Box 936-C, Hyattsville, Maryland 20783.

\$1,000 MONTH Mailing Letters. Guaranteed. Free Details. Sandco, Ceres, Calif. 95307.

FOOTBALL FANS—Cash in an Enthusiastic Fans. Details \$1.00. VAB Enterprises, Box 6264, New Orleans, La. 70114.

GET RICH With secret law that smashes debts and brings you \$500 to \$2 million cash. Free Report! Credit (6A4), 333 North Michigan, Chicago 60601.

SPEEDOMETER REPAIR. Fascinating, Profitable! Free Brochure. Instrument Training School, Box 1361, Muskogee, Oklahoma 74401.

HOW to Play Winning Bingo, Send \$1.00. Tongpioneer, Box 3273, Santa Monica, Calif. 90403.

NEVER WON ANYTHING? Anyone can win Sweepstakes contests! Free details. Services, Box 644-PCD, Des Moines, Iowa 50303.

PERSONALIZED PHOTOSTAMPS Make High Profits! Mail Order. Complete literature package free. Photo Postmatic, East Providence, R.I. 02914.

EASY Homework Earnings Stuffing Envelopes for us. Details: Hughes, Route #1, Box 4-B3, Senoia, Georgia 30276.

EASY, Pleasant, Profitable Home Work. Full . . . Spare Time. Write: Work, 4667 Schwegler, Cass City, Mich. 48726.

START Right!! Establish fabulous mailorder business. Easy when you know how! Free details. Doonan Associates, Box 8144-M, Rochester, New York 14617.

STUFF ENVELOPES 500/THOUSAND! Send Stamped Addressed Envelope, Kelly's Korner, Dept. 41, Mattdale, New York 13211.

BEAT BLACKJACK! Easy! Amazing Method Yields Computer Proven Mathematical Edge. Unconditionally Guaranteed! For complete method mail \$3.00. Sheridan, Box 731-DM, North Hollywood, California 91603.

Fillers. Inquire: Goliath Publishers, Box 1073-PM, Arlington Heights, Illinois 60005.

CONTINUOUS Big Profits Mailing Your Own Baby Gift Catalogs to New Mothers. Complete instructions, sample catalog 25¢. Armstrong, Box 409PM, Kennett Square, Pa. 19348.

\$128.00 IN Sales from \$12.00 Material. New . . . different. Everything furnished. Write: Sales, 4667 Schwegler Rd., Cass City, Mich. 48726.

\$\$\$\$\$—202 Ways To Beat Inflation And Save Money —\$2.00. Millar, 5264PM, Walnut Creek, CA. 94596.

\$1000.00 MONTHLY!! Become our mailorder distributor. Everything supplied—circulars, mailing lists. Write: Enterprise, Box 129688, Newport News, VA 23601.

WOODWORKERS—Earn \$10.00 per Hour Constructing Projects for Craft and Consignment Shops. Guaranteed Instructions describe Projects and Selling Methods. \$3.00. Woodcraft Ideas, Box 193, New Middletown, Ohio 44442.

MAKE MONEY WITH YOUR CAMERA Report Tells How and Where ONLY \$1.00 plus \$.50 handling. Mildred Cameron, 5941 Cheshire Road, Naples, New York 14512.

ANYONE Can Win Sweepstakes Contests. Details \$1.00. Rubal Company, Box 385, Barre, VT. 05641.

BIG Money from SCRAP TIRES. No Cash Investment. Details \$2.00. Frank, 130 Highview, Nanuet, N.Y. 10954.

WORLD TRADE-IMPORT EXPORT-MAIL ORDER. Free color booklet. Refer to same heading listed under the Business Opportunities columns.

25 WAYS Executives Beat High Taxes. Details and Examples. \$1.00. E. P. Kahn Statistics, 516 Fifth Ave., New York, NY 10036.

HOMEWORKERS, Mailers Needed!! 50 Firms Listed! Send 25¢, Stamped, Addressed Envelope. S.C.S. Enterprises, 285 New Conley Road, Suite #2, Conley, Georgia 30027.

YOUR Name Placed with 200 seeking Stuffers, Addressers, Mailers. Save Postage. Compare Opportunities. \$2.00. MAC2A, 1133 Seventh Avenue, Sacramento, California 95818.

EARN EXTRA MONEY IN YOUR SPARE TIME mailing commission circulars. Rush stamped, self addressed number 10 envelope for free particulars to: Orozco, Box 5722, Fullerton, Ca. 92635.

WOULD You Like to Receive 100 Letters a Week, each Containing \$1.00? Plan Plus 6 Formulas for \$1.00. Ellis Enterprises. P.O. Box 8503-PM2, Capitol Heights, Maryland 20027.

GOLD! Where to Pan Throughout U.S.! Exciting details: Moran, 2 Van Buren, Scotia, New York 12302. Enclose Stamp.

HOMEWORKERS. Receive 1,000 letters monthly containing money. Setup \$1.00. (Refundable) Gem, B-21244A, Indianapolis, Ind. 46221.

LEASE Your Way to Oil Fortune. Government Lands 50¢ Acre. Profit Potential \$1,000,000. Details \$2.00. RJ, Box 822P, Hillside, IL 60162.

MAKE Extra Money. New Booklet Shows You How to Make Money in Your Spare Time—Without Working. \$1.00. Jan Dee And Associates, 7610 Penn Avenue South #218, Richfield, Minnesota 55423.

COLLECT COINS For Profit! How To Start. Where To Sell. Copyrighted Report Tells Unusual Way to Make Money in Coins! Send \$1.50. Heron Enterprises. Dept. GL-1. 88 Burwell, Little Falls, N.Y. 13365.

WIN CASH Prizes Solving Word Contests. Details: Send self-addressed stamped envelope. A&L Associates, Box 141-P, Newton, Mass. 02195.

MAKE Money Addressing Envelopes. Send stamped addressed envelope to: R. H. M. Productions, 11 Willard Avenue, Mt. Vernon, New York 10553.

MAIL Order!! Start Your Own "Exciting" Business!! Details Free. Dominik, 3747 Crestwood, Erie, Pa. 16510.

IT ROLLS, It Spins, It Turns On A Dime. Sell them to your Friends. Instructions included. Send \$1.00 each. Guaranteed. Recession Proof, Box 301, Station O, Toronto, Ontario, Canada M4A 2N9.

HORSEPLAYERS—Don't Pick Them—BEAT Them—Unlimited Earnings. Free details. Valmart, Dept. D101, 8 Pheasant Lane, North Easton, Mass. 02356.

MAKE BIG MONEY!!! Bargains—Worldwide Suppliers. Valuable List \$1.00. Bargains, Box 17992A4, Honolulu, Hawaii 96817.

EXTRA CASH. Earn Up To \$500/Month. Secrets Revealed. Free Supplies. Start Immediately. Send \$5.00: M&V Co., A45—330 Knollwood Ave., Douglaston, New York 11363.

EARN Money in Your Spare Time Stuffing and Addressing Envelopes from Home. FREE Information. Send stamped, self-addressed envelope. RUDERER, 98-25 Horace Harding Expwy, Rego Park, New York 11368.

HOW TO GET RICH . . . IN SPITE OF YOURSELF! New book reveals powerful secrets of: developing Winning Mental Attitude—mail-order opportunities—stocks—commodities—blackjack—horseracing—more! Free details! MMRC-PM4, Box 2814, San Bernardino, Calif. 92404.

\$800 MONTHLY—Addressing Envelopes. Details 25¢. Nasco, Box 14342-PA, Columbus, Ohio 43214.

MAILORDER TIPS! Straight Facts! \$5.95, Miller's P4M, 3838 Cannon, Austintown, Ohio 44515.

KEEP Your Mail Box stuffed with Money—Plan works like magic! \$1.00—Three Sons Unlimited, 245 East Gunhill, Bronx, 10467.

ARTS & CRAFTS

GLASS BLOWING Kits and Supplies—Literature Upon Request—Willis Glass, P.O. Box 3460, Anaheim, California 92803.

MAKE Figurines, plaques, lawn ornaments, Molds, plastercraft kits, liquid rubber. Sample and catalogue 25¢. Wooley Company, Box 29-B, Peoria, Illinois 61601.

"GETTING Started in Stained Glass" 25¢. Whittemore, Box 2065Y, Hanover, Mass. 02339.

LARGEST HANDICRAFTS SUPPLY DIRECTORY \$3.00. R.P.H. Manufacturing Co., 24 Winter Street, Stamford, Conn. 06905.

LEATHERCRAFT Catalog. Tools, Leather, Dyes, Dressings, Saddle Stamps, Buckles, much more. Send 25¢ to MacPherson Bros., P.O. Box 395, San Francisco, Calif. 94109.

DECORATE Anything! Over 80 Designs for Walls, Furniture, Cabinets, Floors. Easy, Inexpensive! Send now!! Pattern Catalogue, 25¢. "CREATE," 2908 E. Eastland M4, Tucson, Az. 85716.

LIQUID LATEX Paratol. 706-G compound for making rubber mold. Toughest, finest quality. Instructions. Money-back guarantee. Postpaid \$3.95 quart, \$12.00 gallon. TESTWORTH, 139 Commercial, Addison, Ill. 60101.

2 CLOWN Prints! "Handpainted Red Fluorescent Noses", "Artist Signed" \$1.00. Harris, Box 1567-A Portland, Oregon 97207.

TEENAGERS Make Your Own Chokers, Colorful Wooden Beads and Leather Laces. 2.50 Kit. J. W. Wolff, 358 Lawson Road, Westhill, Ontario, Canada M1C2J9.

PROFITABLE! Make beautiful Tiffany stained glass chandeliers! Simple instructions \$1.00. Cal's, Box 224M, Dearborn, Michigan 48121.

CAMERAS AND EQUIPMENT

FREE! FREE! BARGAIN BOOK. Central Camera Co., Dept. 3151, 230 S. Wabash, Chicago, Ill. 60604.

BARGAIN BOOK FREE—Jimsco Specialty, Dept. 7532, 30 E. Jackson Blvd., Chicago, Ill. 60604.

PHOTO & PHOTO SUPPLIES

DISCOUNTED 20%-40%. Kodak/GAF Fresh Dated film. Cameras. Free List. Universal, Box 272, Trumbull, Conn. 06611.

PHOTO FINISHING

CUSTOM PHOTO LAB, Pro Quality, Write—Communications 411, 1012 N. 3.d, Milwaukee, Wis. 53203.

COLOR SLIDES

GAF Color Slides 12,500 all Countries Catalog 25¢. Worldwide, 7427-M Wasburn, Minneapolis, Minn. 55423.

FREE 35MM Color Slide Encyclopedia. Same slides used in TV, national magazines. 126-pages individual listings. Write Wolfe Worldwide Films, Dept. 14-45, Los Angeles, Ca. 90025.

MOTION PICTURES & SOUND EQUIPMENT

175-FT. 8MM, CLASSIC SAMPLER . . . ONLY \$1.99. Highlights from heyday of the silents! Chaplin, Laurel & Hardy, Fairbanks, Keystone Kops, Gish, Pickford, Chaney, the first Indianapolis 500 and more. Order today . . . specify standard or super-8. Free catalog: 8MM, & 16MM, movies & 35MM, 2" x 2" color slides. Blackhawk Films, 1678 Eastin-Phelan Bldg., Davenport, Iowa 52808.

UNUSUAL Movie supplies. Free circular. Esor, 47th Holly, Kansas City, Missouri 64112.

8MM—SUPER 8—16MM MOVIES! Biggest Selection! Lowest Prices! Free Catalog! Cinema Eight, Box PM, Chester, Connecticut 06412.

SUPER 8MM, 16mm, 8mm silent and sound film classics. Free catalog. NILES, 1141PM Mishawaka, South Bend, Ind. 46615.

SUPER 8, 8mm, 16mm, 35mm, B&W and Color Film, Supplies, Processing Equipment. Send 25¢ for 84-page catalog refundable with order. Superior, 448 N. Wells, Chicago 60610.

COLUMBIA Home Movies - Free Catalog - G & G Films, Box 321, Syosset, N.Y. 11791.

RADIO, TV & HAM EQUIPMENT

HEAR POLICE/FIRE Dispatchers! Catalog shows Receivers, Directories of "confidential" channels. Send 10¢ stamp. Communications, Box 56-PM, Commack, New York 11725.

RADIO Tubes, 1924 to 1974. Preller T.V., Augusta, Ark., 72006, (501) 347-2281.

CANADIAN Catalogs—Giant Savings, Surplus, Clear-outs, Bankruptcy Stocks, Factory Deals. Rush \$1.00. Etco-PM, Box 741, Montreal "A".

GOVERNMENT Surplus receivers, transmitters,nooperscopes, parts. Catalog 25¢. Meshna, Nahant, Mass. 01908.

36¢ RADIO & TV Tubes. Free catalog. Cornell, 4213-17 University, San Diego, California 92105.

HIFI, TAPES, & RECORDS

FREE Catalog—Electronic Kits—Amplifiers—Pre-amplifiers—Psychedelic Strobos—SCA Adaptors—Color Organs—Digital Instruments—Guitar Amplifiers. FREE Subscriptions. SWTPC, Box PM32040, San Antonio, Texas 78284.

FREE Catalogues, 2000 hard to find unusual records. Rose's Records, Box 7216, Louisville, Ky. 40207.

OLDIES. 45RPM. Free Catalog. Corry's Record Shop, Box 166DE, Mason, Ohio 45040.

8-TRACK Fidelity Stereo Tapes. Any Top Rock, Oldies, Radio Shows, Humor, Party. \$3.50 you name it. List 50¢ (refundable). DiWan Company, Box 1302, Springfield, Il 62705.

GOLDEN Age Radio. Complete taped Shows. Box 25215-M, Portland, Oregon 97225.

SOUNDTRACK-Record-Albums, Mail-Auction, Free-List, Whalon, - 2321P Hill, Redondo Beach, California 90278.

CASSETTES. Labels. Free Samples. 638 Muskogee Avenue, Norfolk, Virginia 23509.

OLD Radio Programs. Thousands Available! Huge Catalog \$1.00! Radio Vault, Box 9032-Z, Wyoming, Michigan 49509.

"SATCHEM" on cassette tape—rare recordings of Louis Armstrong; 1928-1932. 18 selections—\$5.00. Free catalog. Wetzell's Cassettes, 523 DuBois, Barrington, N.J. 08007.

8-TRACK TAPES, Quality Guaranteed, distributors prices. Send \$2.00, SAZ Wholesale, Box 963, Pottsville, Penna. 17901.

MUSIC INSTRUCTIONS & INSTRUMENTS

ACCORDIONS—Famous makes. 40 models. 5 Day Home Trial. Easy terms. Trades. Free Catalogs! Money saving-Importer-to-You Price List. Write: Accordion Corporation, Dept. R, 5535 Belmont, Chicago 60641.

PLAY GUTBUCKET! Make a Hit at Parties. How to Make and Play Wash Tub String Bass. Easy. Send \$2.98. Allegro, Box AYP4, Denville, N.J. 07834.

FREE To Country Music Lovers. Write: Gift, Box 975-PM, Nashville, Tennessee 37202.

LEARN to Play Piano—Guitar—Accordion My Way. Write: Hall's, Box 181PM, Lynnwood, California 90262.

ACCORDIONS Manufacturing, 6846-P North, Chicago 60635. Concertinas - Chromatics - Heligons - Hohners - New - Used - Repairing - Wholesale Catalogs Free.

LEARN Banjo. 5-String Bluegrass. No music. Makes learning easy. Free details. Blaylock, Box 25-M, Marietta, Georgia 30060.

POEMS Wanted for songs. Nashville Music Productions, Box 40001-P, Nashville, Tennessee 37204.

WHOLESALE! Professional Guitars, PA Systems, Aftex Speakers, 240W RMS Amplifiers. Free Catalog. Carvin, Escondido, Calif. 92027.

GUITAR, Banjo, Violin, Mandolin Making Materials, Accessories, Books. Catalog 25¢. Guitar Center, Box 15444, Tulsa, Oklahoma 74115.

EASY to Play And Make. Quality Dulcimers, Banjos, Thumb Pianos, Instruments And Kits. Can Be Profitable Hobby. HERE, Inc. #P, 410 Cedar Avenue, Minneapolis, Minn. 55404.

VIOLIN And Guitar makers—send for latest Free Catalogue of woods & accessories. International Violin, PM1, 414 East Baltimore St., Baltimore, Md. 21202.

POEMS Songs wanted. Recording. Publishing guaranteed. Royalties. Radio-TV release. Broadway Music, Box 11647-PM, Sarasota, Fla. 33578.

PLAYER PIANOS; PUMP ORGANS—books: repair manuals. Catalog \$1.00, refundable first order. Vestal Press. Box 97, Vestal 11, NY 13850.

ACCORDION Top Brands. Cordovox, Buy direct. Tremendous discounts. Trades accepted. Free brochure PM. Accordion-O-Rama, 874 Broadway, N.Y.C. 10003.

STRINGS OUR SPECIALTY! Accessories, Books, Catalog 25¢. Stringking, M4 Box 5444, Lindenhill, Flushing, N.Y. 11354.

30% TO 50% DISCOUNT! Any Model: Guitar, Amp, Drum, Banjo, Dobro! Free Catalog! Warehouse P56, Box 11449, Fort Worth, Texas 76109.

WHOLESALE. Musical Instruments—Accessories. Allied, 573 Route 17, Paramus, New Jersey 07652.

LEARN To Play Piano in One Hour. Free Details. Correlation, Box 751-M, La Canada, Calif. 91011.

ELECTRIFY Player Pianos, Pump Organs Quickly, Inexpensively with Lee Silent Suction Units. Write: Lee Music, 525F Venezia Avenue, Venice, California 90291.

PIANO Tuning Made Easy. Manual and all necessary tools, only \$24.95. Ten-day moneyback guarantee. Details free. Stamm Industries, 471 W. South Blvd., Kalamazoo, MI 49006.

LEARN To Read Music Fast or Money Back. Free Brochure Tells How. ADAMS, Gilbert Plains, Man., Canada R01 0X0.

REPLACE Piano Ivories easily. Supplies and instructions, \$24.00. Information, \$1.00, refundable. Piano Repair, Box 2204, Melfort, Sask., Canada S0E 1A0.

KITS! Build Dulcimers, Guitars, Balalaikas, Kalimbas, Harps, Banjos, Mandolins. From \$2.95. Finished Dulcimers from \$23.95. Free Catalog. 8665 West 13th Avenue-PM, Denver, Colo. 80215.

NEW Method! Learn to Play Guitar, Easy! \$10.95 Complete KIT. Details 25¢ and stamped addressed envelope. Guitar, 4401 'T', Sacramento, CA 95819.

INSTANT FOLK GUITAR INSTRUCTION BOOK!! Learn To Play in 60 Minutes!! MONEYBACK GUARANTEE!! Send \$2.95. Glasure Enterprises, Box 1918B, Everett, Wash. 98201.

UP TO 60% Discount Name Brand Instruments. Catalog. Freeport Music, 455F. Route 110, Melville, N.Y. 11746.

EDUCATION & INSTRUCTIONS

WELDING TRAINING Basic and Advanced Training for Major Processes—Arc, Gas, Pipe, TIG, MIG, Plasma. Hobart, a non-profit school, is accredited member NATTS. Approved Ohio 70-12-0064 HT. Write for school bulletin and course schedule. HOBART SCHOOL OF WELDING TECHNOLOGY, Box 75, Troy, Ohio 45373.

COMPLETE YOUR HIGH SCHOOL at home in spare time. Texts furnished. No classes. Our diploma awarded. Our 78th year. Free Brochure. American School, Dept. X445, Drexel at 58th, Chicago 60637.

FCC LICENSE. 1st & 2nd Class. Electronics career courses by mail. G. I. Bill. FREE school catalog and info. School rep will try to call. Write CIE, Dept. KPM-01, 1776 East 17th St., Cleveland, OH 44114.

ACCOUNTING CAREER. Many make \$1,200 monthly. You start, only 20 lessons, \$5.00 each. Pay as you learn and earn. State approved. Certificate. Start by Mailing \$5.00 for first lesson. Jenkins, Box 571, Taft, California, 93268.

RADIESTHESIA, Radionics, Dowsing, E.S.P. Courses and Equipment. Illustrated Catalog \$1.00 (refundable). Established 27 years. Dept PM/RH Bruce Copen. Highfield, Danehill, Sussex, England RH17 7EX.

NOW! YOUR OWN BURGLAR/FIRE ALARM BUSINESS OR Alarm installation position through training at home. Great demand, rapidly expanding field. Full information by mail, no salesmen. Security Systems Management School (homestudy) Dept. 7310-045, Little Falls, N.J. 07424.

AUCTIONEERING, Resident or home Study Course. Free Catalog, Nashville Auction School, 1921 West End, Nashville, Tennessee 37203.

AUTOSUGGESTION. Sleep-learning headquarters! Tapes, records, books. Gigantic catalog free. Research Association, Box 24PM, Olympia, Washington 98501.

DETECTIVE—Training Course. American Detective Institute, Box 418-A, Fairfield, Alabama 35064.

RELIGIOUS VOCATION? Write: Church of Holy Light Inc., P.O. Box 4478, Pittsburgh, Pa. 15205.

USED Courses! Books! List 10¢. Smith's, 124 Marlborough, Salem, Massachusetts 01970.

OWN Collection agency. "Little Gold Mine!" Franklin Credit, Roanoke, Virginia 24004.

LEARN Flower Arranging and Floristry. Start business or hobby. Free information on home study course. Lifetime Career Schools, Dept. B-266, 2251 Barry Avenue, Los Angeles, California 90064.

PIANO Tuning quickly learned with home study course. Diploma granted. American Tuning School, 17050 Telfer Dr., Morgan Hill, California 95037.

DETECTIVE Profession. Easy home study; free tie-tack or lapel pin, certificate, future. GI approved. Professional Investigators. Box 41345, Dept. CP, Los Angeles, Calif. 90041.

LEARN Auctioneering. Term soon. Free Catalog. Reich World Wide College of Auctioneering, Inc., Box 949, Mason City, Iowa 50401.

AVIATION JOBS—Train at one of nation's largest aeronautics schools for pilot license, helicopter pilot, aviation technician, maintenance, power-plant, air-frame technician, aviation electronics or instrument technician. Indicate if eligible for G.I. Benefits. Write for Free "Career Kit". Spartan Airschool, International Airport, Dept. PBCC4, Tulsa, OK. 74151.

EARN ELECTRONICS DEGREE by correspondence. Free brochure. Grantham, 2004 Stoner, Los Angeles California 90025.

LEARN Sewing Machine Repairing. Men, Women Lucrative profits. Profession with bright future. Gresslin Correspondence School, Box 927, Spencer Iowa 51301.

PROBLEMS? There's an Answer! Free Home Study by Mail in the Torah or Confraternity New Testament. Please state your Religion. Lamplight Studies, Box 88-D, Brooklyn, New York 11229.

EXTENSION And Post-Graduate Awards in Philosophy Art, Sciences, Botanic Medicine, Homeopathy, Radionics and others. 30 subjects. Curricular free (airmail \$1.00 refundable). Registrar. Sussex College of Technology, Highfield, Danehill Sussex, England.

SURVEYING PAYS BIG!! United States Department of Labor reports "openings for 26,000 Surveyors in new ten years." Easy home-study plan guides you. Send for Free "Surveying Career Kit." North America School of Surveying, Dept. PBCC4, Newport Beach California 92663.

DETECTIVE Course. Free Information. Universal Detectives, Box 8180-F, Universal City, California 91608.

BARTENDING COURSE Professional/Home Use \$9.5 Money Back Guarantee. 701 N. Birch, Coquille, Ore. 97423.

PIANO Technology—Electronic organ servicing learned easily at home. G.I. Approved. Free bookie Niles Bryant School, Dept. P, 3631 Stockto Sacramento, California 95820.

FREE Book tells how you can learn camera repair and service. Home study or classroom. Write today National Camera, Dept. EAD, Englewood, Colorado 80110.

BEST JOB FOR YOU. Computerized analysis apt testing. Satisfaction guaranteed. Free details. W. Heidemann, 540 Clifford, Loves Park, Illinois 61111

CUSTOMIZE VANS, Trucks, cars. Learn big pro home business in spare time. Materials, tools included. Exteriors, interiors—painting, upholstery special fittings. FREE Career Plan, Customizing Center. PBC25, Newport, California 92663.

EDUCATION & INSTRUCTIONS

ORDINATIONS, Lifetime Church chartered 1887! Write! 708 Bragg, Monroe, North Carolina 28110.

LOVE THE OUTDOORS? Interested in living, working in parks, recreation areas? See if you can qualify, training at home. Important, respected, rewarding field. Details Free by mail, National School (homestudy), Dept. 9310-045, Little Falls, N.J. 07424.

WATCH REPAIRING. 35 Lesson Home Study Course. Free sample. Diploma awarded. Chicago School of Watchmaking, Dept. YQ, Fox River Grove, Illinois 60021.

FREE Lifetime Ordination. Become Chaplain Missionary. Bishop, Box 744, McKeesport, Pa. 15134.

ENTER Ministry. Sincerity Essential. Way, Box 4842, San Francisco, Cal. 94101.

GO METRIC! It's Easy With Booklet-Conversion Tables. Only \$1.00—Wilhelm, Box 5000-A, Greenville Station, Jersey City, N.J. 07305.

LEARN to fix typewriters and Office Machines. Many trained men needed. Make up to \$25 in one hour on overhaul. Learn at home in spare time. Facts Free. Send name. Typewriter Repair School (homestudy), Dept. 3310-045, Little Falls, N.J. 07424.

FINISH High School Fast at home, spare time. Earn accredited diploma. Texts, guidance provided. Tuition and academic credit for subjects already taken. Write—Franklin Academy, Dept. 11, 2660 Quincy Adams Dr., Herndon, Va. 22070.

EARN WHILE YOU LEARN at home in your spare time. Modern Gun Repair School and Modern Outdoor Equipment Repair School. Send for brochure, full facts. Dept. PMC, 4225 N. Brown Ave., Scottsdale, Arizona 85251.

TEST YOUR I.Q.!! Self-scoring Test Reveals I.Q. Quickly. 99.9% Accuracy!! Send \$2.50 today—Guaranteed!!! Testing Techniques, 837 Chafee, Suite 7B4, Augusta, Georgia 30904.

UNLOCK Your future. Become professional Locksmith by spare time homestudy. \$13 in an hour possible. All tools, equipment included. Facts Free. Send name. Locksmithing Institute (homestudy), Dept. 1310-045, Little Falls, N.J. 07424.

PARAPSYCHOLOGY. Complete Study Course, Certificate. Free Information. American Parapsychological Research Foundation, Box 5395-BB, Sherman Oaks, Calif. 91413.

SUCCESS Through Word Power! **BUILD** Your **VOCABULARY EFFORTLESSLY. FREE** Brochure. Write: Quality Design Corporation, 16 Crescent Avenue, Dover, New Hampshire 03820.

WALLPAPER! Instructions From Top Professional. Unavailable Elsewhere. Free Details, Roadrunner Publications, 7338 N. 29th Ave., Phoenix, Arizona 85021.

DEPRESSION Coming? Guaranteed Secret Forecasts! Proven Method! Used by Experts. Free Proof, Information. Databank, Box 7071, Erie, Pennsylvania 16510.

UPHOLSTERY Decorating. Free Booklet. Learn at home. Upholstery Decorating School. Dept. 5310-045, Little Falls, N.J. 07424.

BUILD Polehouse \$2500. Send \$2; No Mortgage Home, Rt. 3, Colfax, Wis. 54730.

USED Courses! Books Catalog 10¢. (Courses Bought). Lee Mountain, Pisgah, Alabama 35765.

LEARN Asleep or awake! Records, tapes, equipment! Free catalog! Drawer PM-400, Ruidoso, New Mexico 88345.

FOR INVENTORS

LEARN To Write Your OWN Patent Application—Market Your OWN Ideas. Worldwide Comprehensive Valuable Home Study Course. Information: IPD, 812 North Highland Avenue, Los Angeles, California 90038.

INVENTIONS Wanted immediately for promoting on cash or royalty. Patented, Un-Patented. Free booklet outlines royalty rates, requirements. Write Kessler Corporation, C-54-FI, Fremont, Ohio 43420.

PATENT Application Financing. Free patent search plan. Global Patent Division, 139-G Lake Merced Hill South, San Francisco, California 94132.

MR. INVENTOR: Manufacturers need inventions. For development assistance, patent searches, sales for cash or royalties, free "Proof of Invention" forms and other important information, write: Charles S. Prince, Invention Consultant, 509-A 5th Avenue, NYC, 10017.

INVENTORS—UNITED STATES PATENT OFFICE SEARCHES, PATENT DEVELOPMENT Engineering and MARKETING of your inventions, ideas with **MANUFACTURER CONTACTS.** Send for **FREE INVENTION CERTIFICATES** and Invention Information. Serving inventors since 1948. **GEORGE SPECTOR, LICENSED PROFESSIONAL ENGINEER—PATENT ENGINEER,** Former **UNITED STATES PATENT OFFICE EXAMINER—3615 Woolworth Building, New York, New York 10007.**

U.S. PATENT Office Searches, 234 Broadway, Room 3615, New York 10007. Free invention certificates.

INVENTORS: Your ideas and inventions (patented/unpatented) expertly searched, developed for commercial appeal and cash/royalty sales to manufacturers by professional Invention Developer with excellent record of experience. B. S. Industrial Engineering; United States Patent Office former Patent Examiner. United States Government former Patent Advisor. Second decade reliable service! Member: United States Council International Chamber Commerce. Free "Invention Record" and "Recommended Protection Procedure." Airmailed! Write: Raymond Lee, Invention Developer, 230P-Park Ave., New York, New York 10017.

194 POPULAR MECHANICS

FREE Pamphlet! "Tips on Safeguarding Your Invention." Write: United States Inventors Service Company, 501-P Thirteenth Street N.W., Washington, D.C. 20004.

ROYALTY Money Paid For Inventions. American Square Factory, Jamestown, N.C. 27282.

AUCTION: We Buy Ideas. For information send \$3.00 to: Box 8436, McConnell, AFB, Kansas 67721.

NEEDING Assistance? **INVENTION DEVELOPMENT FOUNDATION**, 155 Kent Street, Ottawa, Canada K1P5P3.

INVENTORS? Should You Market Your Product? Only 5 of 100 Succeed. Let Our Experts Determine Your Success Probability. Exclusive Invention Rating System. Rating \$15.00 each. Details free. American Technology Exchange, Suite 1202-EDP, 1006 Grand Avenue, Kansas City, Missouri 64106.

SEARCHES \$10.00 With Pat-Appraisal Report \$18.00. **EXTRAORDINARY** Guides; Selling Inventions \$5.90. Filing your Own Application \$12.50. Since 1940. Professional Engineer, Box 8001 JFK. P.O., Boston, Mass. 02114.

PATENT yourself, Laymans kit as low as \$195.00 to Patent Office. \$65.00 to file, 100.00 at patent Issue. 348 pages, proper procedure and forms. Save hundreds, make Millions. Send \$20.00 to Sunbrite Co., Box 926, Adelphi, Maryland 20783.

INVENTIONS WANTED

CASH-Royalties for patented, unpatented inventions. Global Marketing Service, 139-G Lake Merced Hill South, San Francisco, California 94132.

INVENTORS! Protect your Ideas! Free "Recommended Procedures." Washington Inventors Service, 422F Washington Building, District of Columbia 20005.

FREE! LATEST DIRECTORY OF 500 CORPORATIONS SEEKING NEW PRODUCTS! If you have an idea for a new product—or a way to make an old product better, send for our **FREE INVENTORS KIT NO. A-84.** It gives vital information on developing and marketing your invention/idea for Cash/Royalty Sales to corporations nationwide. Raymond Lee Organization, 230 Park Avenue, New York, N.Y. 10017.

INVENTIONS MARKETING Cash. Royalties **FREE INVENTION PROTECTION CERTIFICATES.** George Spector Manufacturers Representative, Woolworth Building, New York, N.Y. 10007.

INVENTIONS Needed immediately for manufacturers. For additional information write Kessler Corporation, C-54-IW, Fremont, Ohio 43420.

NEW Idea Show Coming! Spring-Fall Shows. All Inventions Welcome. Free Details. Application, No Obligation. Write: Paul Paulsen, Jr., 401 So. Columbia St., Frankfort, Ind. 46041.

HONGKONG Factory needs 10-15 New Products every month to satisfy their overseas Buyers. Keep the factories running. Particularly interested household items, toys, games, gadgets. Please send sketches or detailed explanation for evaluation and cash/royalty purchase. Hongkong Plastic & Metal Products Company, P.O. Box 9627, Kwun Tong, Hongkong.

INVENTIONS IDEAS WANTED Developed, Marketed by leading professional organization for Cash/Royalty sales. **FREE EXAMINATION and CONFIDENTIAL REPORT** of the Commercial Features of Your Patented/Unpatented Invention. **FREE COPY** "How to Safeguard and Market your Invention to Industry" Write or Call: **LAWRENCE PESKA ASSOCIATES,** Dept. C, 500 Fifth Ave., N.Y.C. 10036, (212)354-9696, 150 S. Wacker Dr., Chicago, Ill. 60606, (312)346-1172, 1 Biscayne Tower, 2 So. Biscayne Blvd., Miami, Florida 33131. (305)358-1366, 44 Montgomery St., San Francisco, Calif. 94164 (415)956-1212, 1888 Century Park East, Los Angeles, Calif. 90067 (213)552-2020.

MANUFACTURING

INVENTORS Ideas Developed. Research. Models. Manufacturing. Sales. Free Brochure. Since 1942. William Parker, Box 6305, Orlando, Fla. 32803.

BUYING & SELLING

HOW To Sell Your Own Home and Save Thousands! Professional Broker Reveals details on: Preparing, Advertising and Closing. Order Now, Only \$4.95! Enterprises 1M4, 55 Buckwheat, Portsmouth, R.I. 02871.

BUY IT WHOLESALE

WORLD'S Largest Wholesale Supply. 7853 American, European, Japanese wholesalers. Hongkong clothes. Rockbottom prices. Automobile discounts. Free Details. International Buyers, Box 16386-M, Portland, Oreg. 97233.

HEARING Aids, batteries, Wholesale. Catalog 25¢. Fiston, Box 1444, New Preston, Conn. 06777.

PLASTIC Bags, Film, Tubing. Wholesale Price List 20¢. Milvan, 7799 Enterprise, Newark, Calif. 94560.

400,000 BARGAINS Below Wholesale: Many Free! Liquidations . . . Closeouts . . . Job Lots . . . Single Samples. Free Details. Bargainhunters Opportunities, Box 730-A, Holland, Michigan 49423.

FREE Sales Kit—Earn Extra Income! Sell Metal Social Security Cards—Sample \$1.00—Your Name/Number. Three Sons Unlimited, 245 East Gunhill, Bronx, 10467.

BRONZE Zodiac Pendants—Size/Silver Dollar/24" Chain-Retail \$21.00-Sample \$10.00-Sell! Big Profits 6/\$51.00—12/\$78.00—State birthday/sign—Guaranteed. Three Sons Unlimited, 245 East Gunhill, Bronx 10467.

QUALITY business names, on gummed labels. \$15.00 per 1,000. Bradford Enterprise, P.O. Box 479, Dept B, Storrs, Conn. 06268.

EXPORT-IMPORT

HONG KONG Shoppers Club. Free Details. Mercantile Associates, Box 8372, Fountain Valley, California, 92708.

ORIGINAL Oil Paintings \$96 Dozen, Color Brochure 25¢. McDaniel, 3632 Topax, Claymont, Delaware 19703.

MAIL ORDER PRODUCTS. New Directory Lists Foreign Exporters. THOUSANDS of Suitable Items. \$3.00. Guaranteed. S. A. Stanley Co., 120 Chestnut Drive, Roslyn, New York 11576.

EXPORT Sales Leads from the U.S. Government, How and Where to Obtain, All Products, Worldwide. Send \$2.00 to: Export Sales Leads, Box 23763, Tampa, Fla. 33622.

FOR THE HOME

WALLPAPER! Instructions From Top Professional. Unavailable Elsewhere. Free Details, Roadrunner Publications, 7338 N. 29th Ave., Phoenix, Arizona 85021.

FREE! Illustrated Booklet, "20 Ways to Protect Your Home." Send 25¢ for Mailing. Preston Enterprises, Dept. PM-1, Box 495, GPO, Staten Island, New York 10314.

OF INTEREST TO ALL

AUSTRALIAN OPPORTUNITIES—SKILLED—UNSKILLED. DIRECTORY—PASSAGE—IMMIGRATION REQUIREMENTS. SUPERB HOME WINE AND CHAMPAGNE RECIPES. \$1.50 EACH, REFUND GUARANTEED. Ranger Publications, Box 6400, Baltimore, Maryland 21230.

FREE Things From Mfrs., and Co's., for More Information. Send stamped envelope, G. B. Vee, P.O. Box 278, Burlington, Mass. 01803.

TREMENDOUS PROFITS! Clipping Newspaper Items. Details 50¢. Diaz, Box 642-PM, Marlboro, Mass. 01752.

CRIME FIGHTERS! Police—Detectives—Investigators—Information—\$1.00 (Refundable) Don-Q, Box 548-PMO, Seattle, Wash. 98111.

\$500 MONTHLY Possible clipping items from your newspaper. Experience unnecessary. Details, send stamped addressed envelope, American, Excelsior Springs, Mo. 64024.

SCATTERED YOUR KEYS LATELY? Send \$1.00 for unbreakable Key Chain to: Dia-man Jim, Box 28027, Dallas, Tex 75228.

LOSING HAIR? BALDING? DANDRUFF? Doctor's Authentic, Copyrighted Booklet with proprietary offerings \$1.00. Dr. Shiffer Laboratories, Box 398 PM, Punta Gorda, Florida 33950.

HOMEWORKERS, Mailers Needed! 50 Firms Listed! Rush 50¢, stamped addressed envelope, Opportunity, P.O. Box 861, Brandon, Fla. 33511.

\$250/THOUSAND Immediately, Free Supplies. Rush Stamped, Addressed Envelope, Joseph A. Woztman, 3420 DeSota Rd., Cleve Hts., Ohio 44118.

BARBIE DOLL Furniture. Sturdy, hand made, Wood. Sofa, Chair set \$4.50. Bed \$1.50. Dresser \$5.00. Wardrobe closet \$2.50. Table, 2 chairs \$5.00. \$1.00 postage each item. Or plans for all \$2.00. Bevan Wood Products, Route 1, Box 224, Rexburg, Idaho 83440.

UNDERSTANDING Insurance Terms. New Report in Everyday English, Explains Types, Terms, Possibilities, Combinations. Check or Money Order for \$4.95 to: AllMar Reports, 6060 Sidley Rd., Thompson, Ohio 44086.

\$250/THOUSAND immediately, Free Supplies, Rush Stamped, Addressed Envelope, RLBP-4; P.O. Box 1202; Thibodaux, La. 70301.

OF INTEREST TO WOMEN

\$500 MONTHLY Possible clipping items from your newspaper. Experience unnecessary. Details, send stamped addressed envelope, American, Excelsior Springs, Mo. 64024.

EMBROIDERY IDEAS! Amazing New Booklet. Over 50 Trace on Patterns, Included are Designs for Animals, Flowers, Fruit and Numbers. (14) Full Pages. Easy to Follow Instructions. Send \$2.00 to: N & W Inc., P.O. Box 3148-A North Little Rock, Arkansas 72117.

ADDRESSERS-MAILERS-HOMEWORKERS Needed! Rush 25¢, Stamped, addressed envelope. JW Sales, R3-192, Neosho, Mo. 64850.

GIFT SHOPPING

FREE! Catalog of Fine Quality Gifts! National Products, Box 116, San Manuel 6, Arizona 85631.

FREE Gift Catalog; 120 Quality Products; Hewlyn, 122A Franklin Av South, Lynbrook, N.Y. 11563.

MINIATURE Charms—Trinkets—Toys. (3) **FREE** Samples. **TREASURE CHEST,** 9321 PGM Capeview Ave., Norfolk, Va. 23503.

FREE Catalog! **DISTINCTIVE GIFTS** by MAIL. Over 150 Different Items. J & K Products, Box PM4, 1434 Liberty, Alpha, N.J. 08865.

FREE! Gift Catalog Amazing Bonus. Generpel, Box 961, Lomita, Cal. 90717.

SEND FOR FREE Catalog—300 Unusual Gifts. Norman Enterprises, 7354 Biltmore Drive, Sarasota, Florida 33581.

FREE New Catalog! Dorco, D-16, 188 Arlington Street, Lawrence, Mass. 01841.

CLOCKS, WATCHES, OLD GOLD, JEWELRY

HIGHEST CASH Immediately for Old Gold, Jewelry, Gold Teeth, Watches, Diamonds, Spectacles, Silver, Platinum. Free Information. Rose Industries, 29-A East Madison, Chicago 60602.

JEWELRY

JEWELRY Sample \$10.00. AED, #303, 3100 S. Michigan, Chicago, Ill. 60616.

CLOCK Repairing Parts, Tools, Supplies. Catalog. \$1.25. G/M, 22627 Berdon, Woodland Hills, California 91364.

WATCH and Clock repairing books, tools, materials. Free catalogues. North American, Box 77-AD, Fox River Grove, Illinois 60021.

BUYING Jewelry, Precious Metals! Write: AMCO, Box 33009-PM, Charleston, S.C. 29407.

WANTED—Gold, silver, platinum (any form). Coins. Information Free. Wilmoth's, 345 South Glassell, Orange, CA 92666.

HEARING AIDS

HUGE SAVINGS. Eliminate dealer mark-ups. Free Trial. Batteries Wholesale. Terms arranged. Lloyds-PMC, Rockford, Ill. 61104.

HEARING Aids, Batteries, Discount Prices. Free Trial. Write: Rhodes, Brookport, Illinois 62910.

FREE HEARING AID CATALOG—Save by mail. Write: "MONEYSAVERS", 9530-PM-4, Langdon, Sepulveda, California 91343.

HEARING AID BATTERIES Largest Selection * * Lowest Prices Free Catalog * * Write * * WYATT, 501 Ivey Street, Grass Valley, Calif. 95945.

WHOLESALE Discounters! Famous Aids! Batteries! Repairs! AidMart, Drawer Z-2, St. Petersburg, Florida 33731.

HEARING Aids—Huge savings on tiny, all in the ear, eyeglass, behind the ear and body models. Free home trial. Low as \$10 monthly. Write for free catalog. Prestige, Dept. R-6, Box 10947, Houston, Texas 77018.

TOBACCO

HANDCARVED Meerchaum Pipes Wholesale Catalog. Nichols, Box 3144, Enid, Oklahoma 73701.

MEERSCHAUM Pipes—Free Catalog. Conner Imports, Box 9574-PM4, San Jose, Calif. 95157.

HAND Blended Pipe Tobaccos, Mild Rich Flavored, finest available. Send \$3.00 for Eleven Samples or write for Free Catalogue only. R.K. Williams Co. Ltd., Dept. P4, 6316 Winthrop Ave., Indianapolis, Indiana 46220.

SAVE 50%. Pipe Tobacco. Fresh Quality Blends. Samples, \$1.00. Morris, 5719 25th St. W., Bradenton, Fla. 33507.

SCIENCE & CHEMISTRY

SCIENCE EXPERIMENT KITS, for youngsters 8-14, information, Schulz & Son, Box 21484-B, Sacramento, CA 95821.

DISCOUNTED! Laboratory Chemicals, Glassware Apparatus. Catalog-50¢. Deluxe Scientific, 507 Huron, Manitowoc, Wisconsin 54220.

AMAZING! Scientific-Apparatus-Glassware-Chemicals. Catalog-50¢. Hagenow Laboratories, 507-A Huron Street, Manitowoc, Wisconsin 54220.

CATALOGUE Of Those Ver-ry Hard-To-Find Chemical Products, 500 How-To-Books, Laboratory Experiments, Supplies, Information. Special Attention to Beginners. Formulas Of Every Conceivable Mixture in Science and Industry. 75¢. Kenrus-C, Box 205, Staten Island, New York 10306.

FORMULAS, PLANS, ETC.

FREE ENERGY! Lists of Sources, Plans. 100 Entries \$2.00. Per, 15 Riverside, Saginaw, Mich. 48602.

CROSSCUTTER For Circular Saws, Precision Cutting Plastic, Wood Metal. Plans \$2.50. Crosscutter, MP, P.O. Box 134, Stn. D, Toronto M6P3J5, Canada

ANY Formula \$5.00. Catalog - Manufacturing Treatise \$1.00. Belfort, 192 N. Clark, Chicago 60601.

PLASTICS

CASTOLITE pours like water, hardens like glass without heat. Crystal clear, colors. Embos flowers, seashells, mementos, anything. Make fine gifts. Form flexible molds over patterns of any shape, size. Reproduce your own designs in plastics, candlewax, metal, plaster, cement. Free Brochure. Or send \$1.00 for illustrated Manual Catalog. Profitable. **CASTOLITE**, Dept. 75D/PM, Woodstock, Il. 60098.

PLASTIC LAMINATES. How to work with! You can turn out elegant finished products just by using hand or power tools. Resurface kitchen countertops. Correct countertop bubbles. Shows you laminating tricks you should know about. Photocopy of PM article. Price \$1.80. Send order to: Popular Mechanics, Dept. HE, Box 1014, Radio City, New York, N.Y. 10019.

TREASURE FINDERS

TIRED OF DIGGING UP TRASH? The All New "Coin-Shooter" Rejects Bottle Caps, Tin Foil, Nails and Shallow Trash. Detects Gold, Silver Coins and Jewelry. Free Literature. D-TEX ELECTRONICS, Box 451-U, Garland, Texas 75040.

POWERFUL Metrotech locator detect gold, silver, coins, relics. Moneyback guarantee, terms. Free information. Underground Explorations, Dept. A, Box 793, Menlo Park, California 94025.

FREE FACT-FILLED Catalog! World's largest selection! Metal detectors starting at \$79.50. Two year guarantee! Three factories, U.S.-Canada. 1,200 dealers—Service Centers nationwide. Finest instruments at any price! Budget terms. Dealer inquiries invited. Write: White's Electronics, Inc., Dept. PASR, 1011 Pleasant Valley Road, Sweet Home, Oregon 97386.

with ultra-sensitive directional locator. Send for free, informative pamphlet. Research Products, Box 13441-AMC, Tampa, Florida 33611.

FIND Buried treasure with patented metal detectors that distinguish metallic trash from treasure, have push button and automatic tuning, ground pickup eliminate feature, great range, etc. Free catalogue. Gardiner Electronics, Dept. 9, 4729 N. 7th Avenue, Phoenix, Arizona 85013.

DON'T DIG TRASH! Owners report our "Selectmatic" Detector best. Differentiates treasure faster; deeper. Patented against imitations. Treasure Electronics, Rt. 1, Box 56MM, Benton, La. 71006 CALL 318-965-0277.

DETECTOR Buying Hints; Treasure Hunting Tips; both \$1.00. FREE Catalog Ghost Town, Treasure Books. Slocum Books, Box 655A, Simi, Calif. 93065.

TREASURE FINDER Locates buried gold, silver, coins, treasures. 6 powerful models. Instant financing available. Write or call for free catalog. Phone (713) 682-2728 day or night. Dealer inquiries invited. Relco, Dept. AA21, Box 10839, Houston, Texas 77018.

GOLD

LARGE GOLD NUGGETS Panned from Goldbearing Streams: 3 for \$9.95, 10 for \$29.95. Excellent investment! Money Back Guarantee, Tannenbaum, Dept. MA, 6 Fiesta Court, Hewlett, New York 11557.

GOLD PROSPECTING GUIDE, Assay Gold, Find treasures. Free information. Dave Hunt, Rt. 1, Roosevelt, Utah 84066.

PRECIOUS STONES & MINERALS

GET Free catalog no serious rockhound, gem cutter, jewelry maker, hobbyist or craftsman can be without. Full of bargains, exclusive items, low prices from largest suppliers and authorities in the field. Free new catalog just off the press, yours for the asking. Write: Grieger's, Dept. C-12, 900 South Arroyo Pkwy., Pasadena, California 91105.

500 POLISHED Gemstones \$5.00. Tumblecraft, 5401 James North, Minneapolis, Minn. 55430.

PLASTIC Casting Supplies, Molds, Jewelry Mountings, Cut Stones. Wholesale Catalog 25¢. Eloxite, 806B 10th St., Wheatland, Wyo. 82201.

GOLD 10 Small nuggets panned from Oregon Streams \$1.00. Robert Brandt, Sweethome, OR 97386.

SYNTHETIC YAG DIAMONDS, Super Brilliant. Phillips, Box 126, Brady Lake, Ohio 44211.

CARTOONING, COMMERCIALARTS, SHOWCARD & SIGN PAINTING

MONEYMAKING 32 Cartoon Lessons—MANY "EXTRAS"! Only \$2.50. ABC Art, Box 89P, Woodmere, New York 11598.

LEARN Sign painting at home. Free Talent test. Ben Kerns, Box 812-PM, Greenville, S.C. 29601.

SIGN Painting—\$1000 per Month Part-Time. Free Catalogue. Kaufmann Supply, Centertown, Missouri 65023.

MODERN Cartooning taught by mail. Write for free brochure. Cartoonrama—Box 263-PMD, Branford, Conn. 06405.

COMPACT 23 lesson Cartoon Course and Cartoonist's Magazine. \$2.00. Hartman, Box 30367, Lincoln, Nebraska 68510.

FASCINATING Systems. Sign Painting-Cartooning. Straley, 1704 South Center, Springfield, Ohio 45506.

BUILD Illuminated Window SIGNS For Your Business. Plans \$3.00. NALPCO, Box 187-M, Cumberland, RI. 02864.

ADVERTISING AGENCIES, ADV. SERVICES MAILING LIST

ADVERTISING Ratebook leading newspapers, magazines. \$1.00. Chicago Advertising Agency, 28-E Jackson, Chicago 60604.

MAILING List, Most all kinds, \$10.00 per M, 500 Circulars mailed \$7.00. Dixmailers, King, NC 27021.

COMIC Classified Campaigns. Details, Samples \$1.00. Box 250, Ajax, Canada L1S 3C2.

RUBBER STAMPS

RICH Cherry Finish Three Line Address Stamp \$2.45 Postpaid. Stamps, 216 Edenfield, Azusa, CA. 91702.

CUSTOM Made Stamps. Free Catalog. ALLEGHENY, Box 14C, East McKeesport, PA 15035.

FREE catalog—Rubber Stamps—Signature Stamps—Business Cards. Youngers Stamp Shop, Princeton, Iowa 52768.

QUALITY RUBBER STAMPS 3 Lines \$2.50. Cloverleaf Service, Box 49, Selbyville, Del. 19975.

NOTARY Seals, Rubber Stamps, Wholesale. E. McCravy, Drawer Q, Columbia, SC 29250.

3-LINE Stamps, \$2.50, Signature Stamps, \$5.95. Tabco, Tomkins Cove, New York 10986.

OFFICE SUPPLIES

MAILORDER RECORDS Help get increased business! Complete 32 Page Record Book shows your inquires, orders, advertising, expense, etc. Only \$1.00. H. E. KAPPEL, POPULAR MECHANICS, DEPT. R, 224 WEST 57TH STREET, NEW YORK, N.Y. 10019.

BANKRUPT? Nonsense! Effortless Bookkeeping System, 2800 entries \$3.00; 5600 entries \$5.00. Tax Deductible. George Teacherson, 216 Jackson, Suite 612A, Chicago, Illinois 60606.

RUBBER STAMP OUTFITS

SIMPLE-X RUBBER STAMP PRESSES, Hydraulic operated, electrically heated. Sizes 5" x 8", 8" x 12", 10" x 15". Starting outfits. Orders for presses, supplies shipped day received. Send \$2.00 for Catalog and brochure. Custom Manufacturers, 2251-P N. Golden, Springfield, Mo. 65806.

PRINTING TYPE. 8 to 48 point. \$4.00 per font. Free list. Superior Lino, Box 12324, North Kansas City, Mo. 64116.

PRINTING MACHINES. Offset, Mimeograph, Typewriters, Composing, Machines, Dixgraph, King, North Carolina 27021.

NEW Catalog No. 13, 120 Pages, hand printing presses, type fonts, supplies. Send \$1.00 deductible first order. Acme Type, 732 Federal, Chicago, Illinois 60605.

RUBBER Stamp manufacturers supplies. Presses, starting outfits. Best prices, service. Catalog. Jackson Supply, Box 443A, Franklin Park, Ill. 60131.

SAME Day shipment on rubber stamp supplies. Revised wholesale price list No. 11 free. Star Stamp Supply, 732 Federal, Chicago, Ill. 60605.

PRINT YOUR OWN—Printing Presses, type, supplies direct from factory. Send 25¢ for catalog and samples to: Kelsey Co., DM, Meriden, Conn. 06450.

PRINTING Presses, type, Supplies Lists, 10¢. Turnbaugh Service, Mechanicsburg, Pennsylvania 17055.

RUBBER Stamp Presses, Starting Kits, Type, Supplies. Barco Type Founders, 237 S. Evergreen, Bensenville, Ill. 60106.

RUBBER Stamp Supplies; Starting Outfits. Martin, 1432 Major, Jefferson City, Mo. 65101.

PRINTING AND SUPPLIES

1000 EMBOSSED Business Cards \$5.75 Postpaid. Agents Wanted. Elco, 181-A, Sylvania, Ohio 43560.

CUSTOM PRINTING ON T-SHIRTS AND SWEAT SHIRTS. HILDEN'S, ONTONAGON, MICHIGAN 49953.

NOVELTY Business cards. Free sample. Empire-PM, 1916 Fifth, Sacramento, California 95814.

FREE Literature, Business Cards, Letterheads, Labels, Rubber Stamps. Geer's, 111 North Drive, Ottawa, Ohio 45875.

SHIPPING LABELS, gummed mailing, \$5.00 per 1,000 prepaid. Halderman's, Girard, Kansas 66743.

\$7.90 YOUR COPY Reverse of 1000, 8 1/2 x 11 Circulars, your copy black ink. Mailtrade, Box 1302, Springfield, IL 62705. Samples 20¢ stamps.

FREE Literature: Rubber Stamps, Books, Business Cards, Printing, Labels. Jordan's, 552 West O'Connor, Lima, Ohio 45801.

DISTINCTIVE Embossed Letterheads, Envelopes, Inexpensive. Postpaid. Universal, 226A, Myrtle, Scotch Plains, New Jersey 07076.

QUICK Copy Offset Printing. Free Introductory Offer, Nationwide Printing, 614 North Main, Bloomington, Illinois 61701.

EMBOSSED Business Cards \$6.10. Agents Wanted. Printers, Box 2426, Alderwood Manor, Va. 98036.

"**QUALITY** Stamps - 3 lines - \$2.50 - Business Cards - Labels - Free Catalog." Stamps, 1737 W. Coolidge, Phoenix, Az. 85015.

PRINTING: 100-\$3.00; 500-\$5.95. Free List. Parks, 1879 Dover, Wantagh, N.Y. 11793.

LABELS, Business Cards, Rubber Stamps, Printing. Free Literature. Monarch Press, Box 6716, Reno, Nevada 89503.

COMPLETE Commercial Printing & Rubber Stamp Services. Free Brochure. Aurora Graphics, P.O. Box 36A, Montgomery, Illinois 60538.

200 BUSINESS Letterheads, 200 envelopes! BOTH! \$9.00 Total! Halderman's, Girard, Kansas 66743.

GUMMED LABELS

1000 GUMMED Address Labels \$1.00. Walt's, Box 960A, South Bend, Indiana 46624.

1,000 GUMMED ADDRESS LABELS \$1.00. FREE LITERATURE, Acme, 1238 Voskamp, Pittsburgh, Pennsylvania 15212.

1000 GUMMED Address Labels \$1.00. Stovers, Box 23592-A, Tampa, Florida 33622.

"**1000"** ADDRESS Labels 75¢, 2000—\$1.25. Richard Daube-P, Box 3043, Falls Church, Virginia 22043.

REMAILING SERVICE

CONFIDENTIAL California Address—Personal—Business. Receiving—Forwarding. Remails, \$3.00 Month—\$25.00 Year. Jay Bee Remail Service, 2251 The Alameda, Suite 102, Santa Clara, California 95050.

YOUR Mail Received, Forwarded. Details Free Westcoast, 1323 Euclid Avenue, Bellingham, Wash. 98225.

TOLEDO, OHIO REMAILS 25¢, Monthly \$3.00. BENJY, Box 345, Toledo, Ohio 43691.

SASKATCHEWAN Canada and Montana Remailing 50¢ Each or Monthly. Clark, 411 Timmons, Scobey, Mont. 59263.

MIAMI 25¢. Letters mailed from 130 foreign cities. 300 U.S. cities. Marie, Box 1266, Miami, Florida 33134.

NEW YORK, New Jersey, Remails, 25¢, Fahay, Box 159, Matawan, N.J. 07747.

SECRET, Receiving—forwarding. Discreet and confidential. Remail 25¢ single. Mail Forwarding Service, 8050 S. Main, Houston, Texas 77025.

YOUR Mail Received-Forwarded. Hedgpath, 324-M South First, Alhambra, Calif. 91802.

LOUISVILLE, Derby City Remails 25¢. Grayce, Box 7232B, Louisville, Ky. 40207.

HAWAII Confidential Remailing 25¢. Bator, PO Box 8821-85, Honolulu, Hawaii 96815.

DEPENDABLE, Confidential, Free information. Harding, 642 LaBrook Drive, Richmond, Virginia 23225.

DEPENDABLE California Remails 25¢. \$3.00 Monthly. CFS, POB 59, Canyon, Calif. 94516.

CONFIDENTIAL New York Mail Address \$5.00 Month. Telephone service \$5.00 Remails 25¢. Call Director, 1540 Broadway, Suite 303, New York 10036 212-221-1246.

REMAIL from beautiful SANTA BARBARA, California 25¢. D. Foster, P.O. Box 13381, Santa Barbara, Calif. 93107.

LOS ANGELES Remails 25¢ Complete Service. RMS, Box 65845, Los Angeles, Cal. 90065.

CONCEAL Your Location; Use Our Address. Wright, BOX-2112, Asheville, NC 28802.

RECEIVING - Forwarding - Remailing - Single - Business. Walters, 229 E. Francis St., Ontario, Calif. 91761.

REPAIRS & SERVICING

8 TRACK Car Player; repair: \$10.00, trade your old one for new: \$24.00. Atco Electronics, 1170 Broadway, New York, N.Y. 10001.

SPECIAL SERVICES

INFORMATION On anything. Ferguson Research Specialists, 72-25 Woodside, Woodside, New York 11377.

BEST IDEAS MONTHLY. Newsletter of useful information for home, businesses, work and auto. New products, reports and plans. \$1.00. Best Ideas, Box 246, San Antonio, Texas 78291.

PROFITS FROM CLASSIFIED ADVERTISING! Booklet shows you how to start your own business with Classified Advertising. Only \$1.00 (Refundable with first order.) H. E. KAPPEL, POPULAR MECHANICS, DEPT. P, 224 WEST 57TH STREET, NEW YORK, N. Y. 10019.

BETTER HEALTH

ARTHRITIS, RHEUMATISM, ETC. AID ONLY \$1.98 Bio-Energiser, Amazingly simple, yet effective. Will last years. Satisfaction or 100% Refund. Order now, Or Write for free brochure. Vulcan, P.O. Box 1161B, Columbus, Ohio 43216.

MONEY SAVED when you learn How to Stop Smoking. Send check \$1.85 (California Residents \$1.96). Frankie and George, Box 12441, Fresno, California, 93777.

HOW To Stop Smoking!! Complete Guide!! Rush \$2.00—Paulamende-PM3, Box 2392, Hot Springs, Ark. 71901.

CURE YOUR HIGH BLOOD PRESSURE NOW! Send \$3.95. Results guaranteed or refund. Lincoln K. Inc., 2756 Manoa Road, Honolulu, Hawaii 96822.

STOP Smoking! Made Easy by Amazing 4-Step Method! Guaranteed Results! \$2.00. Books, Box 228-P, Hudson, Mich. 49247.

STOP SMOKING KIT New Miracle Invention. Send \$1.00. Justamer, 1039 Circle on Green, Worthington, Ohio 43085.

ASTHMA RUPTURE—I ENDED BOTH. Free Facts—Say Which. John Mortimer, Box 608, Victoria, B.C., Canada V8W 2P3.

LIVE longer!! Stop smoking. Feel better. You can quit! Booklet \$1.00. Feather, Box 137, Fort Collins, Colo. 80522.

STOP Smoking—Easy 4-step formula. Guaranteed—\$2.00. Bob's Engraving, R.R.1., Albert Lea, Minn. 56007.

WORLD'S Most Outspoken Publication. Natural Health, Healing, Organic Gardening. Free Copy. Provoker Press, St. Catharines 102, Ontario. L2R 7C9.

LOANS BY MAIL

BORROW By Mail! Up To \$3,000.00. Convenient Terms. State Licensed. Postal Finance, Dept. 17-04, 6018 Military Ave., Omaha, Nebraska 68104.

PERSONAL

DON'T Die without a will! Blank Will form protects your family. Only \$2—Order today! Mitchell Products, 2009 Sarazen Court, Orlando, Florida 32808.

HOW TO STOP SMOKING FAST! AMAZING RESULTS! Money back guarantee. Send \$1.00. J.C. Golden Co., Box 20096, Denver, Colorado 80220.

REDUCE DEBTS without gimmicks: Simple budget plan. Satisfaction or money back. Send \$3.00 to O.O.D.L.E.S., Box 9739, Balto., MD. 21204.

OUR Easy answer to tired, aching feet . . . Invigorating . . . Soothing . . . Relaxing New Twin Deluxe "Foot Massager," only \$16.00 each. Amour Gifts, 1709-A Preston, Saskatoon, Canada S7H 2V7.

DEATH Can Be Costly!! Protect Family with Legal Will Forms . . . \$3.00 Set!! Blair Agency, Box 5426, North Charleston, South Carolina, 29406.

I HELP Thousands Wipe Out Debts. Clear credit. Immediate relief to \$25,000. Free Details. Counselor-7, Kerrville, Texas 78028.

HOW TO STOP SMOKING Proven Method \$1.00 Guaranteed. G. Enterprises, 301-S Meridian, Alhambra, CA. 91801.

BECOME An ordained minister. Free ministerial credentials legalize your right to the title "Reverend." Write Church of Gospel Ministry, 486-PM Skyhill Court, Chula Vista, Calif. 92010.

PSORIASIS SUFFERERS: DISCOURAGED? Write for Free important information that is helping thousands. Pixacol, Box 29277-PM, Parma, Ohio 44129.

NEED Money—Debts Too Big? Consolidate Bills. "Quick-Cash" Emergency Loans Available. Helped Thousands since 1936. Free Application. Interstate, 28 E. Jackson, Suite 1204-X3, Chicago 60604.

INVESTIGATORS. Latest electronic Aids. Free Literature. Clifton, 11500-P NW 7th Ave., Miami, Florida 33168.

BIBLE Questions answered. Stamped envelope. Bylon, 17167 Bentler, Detroit, Michigan 48219.

ESCAPE From debts and bill collectors! Have AAA-1 credit everywhere. Free report reveals secret plan! Credit 4A4, 333 North Michigan, Chicago 60601.

\$300.00 WEEKLY Possible—Stuffing envelopes. Start immediately! Details, \$1.00, refundable. Royal-PM2, Box 36643, Los Angeles 90036.

RECORD Telephone Conversation automatically. Leave Recorder Unattended. Robert's, Box 49-PM4, Parkridge, Illinois 60068.

SECRET LOANS By Mail. Borrow \$100 to \$3000 for any good reason in absolute privacy. No interviews, no endorsers, no co-signers. Fast service. Write: Dial Finance, Dept. 3077, 340 S.W. Eighth Street, Des Moines, Iowa 50309.

STOP-OR REDUCE PROPERTY TAXES. Be President of your own Tax-exempt church or other non-profit corporation. **FINANCE YOUR DREAMS.** Get Foundation grants. Free details. **TOU-PM4**, 6311 Yucca, Hollywood, California 90028.

LOOK younger than your age, my secrets of health write for free information. "Secrets", P.O. Box 711, Metairie, Louisiana 70004.

STOP SMOKING! SURE! FAST! GUARANTEED! Free Details. C. B. Distributors, Box 30507, Seattle, Wa. 98103.

FREE!! Valuable Report "Selfstarting." Success techniques revealed. Helps you win desires. Write: Dunmore, Box 2112AB, Asheville, NC 28802.

ESP Readings! Free Information. Norma Stahl—O, RFD #1, Peterboro, N.H. 03458.

U.F.O. SPY CLUB, Tm. New amazing unique colorful poster. Your own personal membership card. Send only \$1.00 today. **U.F.O.**, PM4, Box 386, Searcy, Arkansas 72143.

HOW To Stop Smoking!! Complete Guide!! Guaranteed—\$2.00—Paula Mende-PM4, Box 2392, Hot Springs, Ark. 71901.

HOW TO STOP SERVICE STATIONS FROM CHEATING YOU! Booklet reveals secret schemes used to defraud you into spending unnecessary money. Save thousands! Send \$3.00, Morley Enterprises, Box 8564, Dept. PM-1, Ft. Lauderdale, Fla. 33310.

DON'T DIE without a Will. Legal Form Protects your Family. **BONUS** Booklet, "Planning Your Final Good-bye." Only \$2—Guaranteed. Tripp, 8113 N.W. 71st Avenue, Ft. Lauderdale, Florida 33319.

POWERFUL MESSAGE How protect your ailing Dollars from Accelerating Decline, four ways—free details. Associated Services, P.O. Box 3277-P, Catonsville, Maryland 21228.

STOP Smoking! Amazing. Guaranteed. \$1.00. R, Box 405, Leavenworth, Kansas 66048.

PROTECT Your Family. Blank Will Forms. \$2.00. Guaranteed. Butco, 1626 2 Ave., NYC 10028.

YOUR PRIVACY invaded by investigative agencies? 5,000 Word Report \$2.00. Allendorf, Box 824, Hays, Kansas 67601.

FIND NEW HOPE! Inspirational Verses. \$1.00. Directions, Box 184, Old Greenwich, Connecticut 06870.

FREE BIBLE COURSES. Christian Ministries, 302 Hornet Drive, Brunswick, Georgia 31520.

\$1.00 WILL—Legal in ALL States—Guaranteed! V. P. Segó, Dept. PM4, Box 556, Corpus Christi, Texas 78403.

HOW INTELLIGENT Are You? Self-Scoring Test Reveals I.Q. in 45 Minutes! Send \$3.00 today—Guaranteed!! Farrell's, 256 Naugatuck, Milford, Conn. 06460.

WHISKEY Slave? Steps to Recovery 5,000 word Guide \$2.00. Allendorf, Box 824, Hays, Kansas 67601.

BECOME MENTALLY SUPERIOR . . . powerful but simple techniques! Enjoy more: money—love—power self-worth! Only \$2.00! MMRC-PM4, Box 2814, San Bernardino, Calif. 92404.

WRITE Your Will Quick Easy. 4 Will Forms. Attorney's Instructions. \$2.00 Moneyback Guarantee. Marion, 2609PM7 Tilbury, Pittsburgh, PA. 15217.

NOW! EVERYONE CAN IMPROVE HIMSELF! Send for **FREE CATALOG** of more than 200 inexpensive books on self improvement to D. White, Dept. 145, 1007 East Monroe, Mt. Pleasant, Iowa 52641.

HEMORRHOIDS Cured. Information free. Young, Box 9542PM, Seattle, WA. 98109.

STOP SMOKING—GUARANTEED, or your money back. Send \$1.00. N. D. Phillips, P.O. Box 1152-A, Downey, Calif. 90240.

SOCIAL SECURITY PLATES

GOLD PLATED—SOLID ALUMINUM SOCIAL SECURITY PLATE \$1.50. \$2.00 WITH A BLACK OR RED CASE. SEND NUMBER AND NAME. COOK SALES, 7580-04TH PLACE, CROWN POINT, INDIANA 46307.

WANTED MISCELLANEOUS

MERCURY Gold, Silver, Platinum: Ores assayed. Wholesale Terminal, Norwood, Mass. 02062.

WINEMAKING & OTHER RECIPES

WINEMAKERS FREE ILLUSTRATED Supply catalog of yeast, equipment. Continental, Box 18223-PM, Indianapolis, Ind. 46218.

FUN 30-Day Wine Recipe. \$1.00. EE, Box 109, Williston, N. Dak. 58801.

BETTER Wines and Champagne. Kitchen Vessels used. Booklet \$3.98. J&L Place, Box 773, Tatum, Texas 75691.

HOMEMADE WINE—CHAMPAGNE—BEER! Delicious Recipes \$3.75. Cannon Enterprises, Box 34057, Bethesda, Md. 20034.

MAKE Wine and Champagne In Your Own Home with Standard Kitchen Utensils. For Instructions and Recipes, Send \$2.00 to: Ambler Enterprises, Box 26568; Dept. M-1, San Francisco, California 94126.

BEAT Inflation!!! Make Wine at Home for penny's a bottle. . . Using Kitchen Utensils! Send \$1.00 Now, for Booklet. C. J. Enterprises, P.O. Box 599, North Hollywood, California 91603.

WINEMAKING, Yogurt, Cheesemaking. Free catalog. Arboly, Box 663, West Columbia, S.C. 29169.

AMAZING!! Make delicious wine and champagne at home. Using everyday kitchen utensils. Complete instructions. Economical & easy. Send \$1.98 to R&G Distributors, Box 10836, Dept. A, Jackson, Miss. 39209.

WINEMAKER'S Supply Catalog—Free. Bacchanalia, 273 Riverside Ave., Westport, Conn. 06880.

WINEMAKER'S! Free Illustrated Catalogue of Quality Products. Brant's Wine Rack, Box 3256-PM, Orange, California 92665.

WINEMAKERS. Free illustrated catalog of yeasts, equipment. Semplex, Box 12276R, Minneapolis, Minn. 55412.

BEAT RISING COSTS, MAKE YOUR OWN Liqueurs, Wine, Champagne. Amazingly Easy, Guaranteed. Complete instructions. Free Details. C. Enterprises, Box 376M, Walnut Creek, Ca. 94596.

WINEMAKERS Free Informative Catalog, Yeast Equipment, Ingredients, **DANENBERGER'S**, Box 276-M, New Berlin, Ill. 62670.

NEW! . . . FREE CATALOG . . . 30 VARIETIES FRUIT & GRAPE CONCENTRATES . . . 100 WINE & LIQUEUR FLAVORS. Complete line of Winemaking Supplies. Kraus, Box 451-L, Nevada, Missouri 64772.

GOLDEN DYNAMITE. A Very Potent and Powerful Wine! Use Kitchen Utensils. Ingredients at grocers. Amazing Results! Recipe \$2.00. Stevens Enterprises, Box 3693-PM, Philadelphia, Pa. 19125.

"HOW to make delicious wine and champagne. Also free german beer recipe included \$2.00." Schwenke, Box 425, Minot, North Dakota 58701.

AMAZING!! How to Make Delicious Wine and Sparkling Champagne—at Home—only Pennies a Bottle—Complete Instructions—Easy Recipes. \$1.98. Guaranteed. O'Brien's Galleries, Box 34566-A, Parma, Ohio 44134.

PURE CORN WHISKEY—How it was made in the kitchen. Free information. David Owen, 248-C, Resaca, GA 30735.

WINEMAKERS. Make Delicious Wine and Champagne at Home. No Special Equipment Needed. Fantastic Taste!! Satisfaction Guaranteed. Send \$2.00. Combs, Box 12251, Cincinnati, Ohio 45212.

RECIPES To Make German Beer, Wine, and Champagne. No Special Equipment Needed. Free Details. The Robinson Company, 443 Encinitas Avenue, 92114 Dept. 14C.

MAKE Wine, champagne at home. Regular kitchen items only. Instructions-recipes. \$2.00. Free Beer recipes included. Guaranteed. Triumph Sales, Box 8541, Dept. A-1, Minneapolis, Minnesota 55404.

FREE—German Beer Recipe—With Purchase of Delicious Wine/Champagne Recipe booklet using Kitchen Utensils—Guaranteed \$2.00. Bob's Engraving, R.R.1., Albert Lea, Minn. 56007.

AMAZING: Your own Delicious Wine and Champagne made at Home. Recipes and Instructions. Also Delicious Beer Recipes. \$3.00. Dorraugh, 229 S. Diamond, Ravenna, Ohio 44266.

MAKE Delicious Wine-Champagne at Home. AMAZING Recipe Tells How—Use standard kitchen items. Guaranteed. Send \$1.00—Unlimited, Dept. PM-454, 8228 Wynne, Reseda, Calif. 91335.

AMAZING!! Make Wine & Champagne! No Special Equipment. Book Includes Recipes, Instructions. \$2.00. Guaranteed! Ideas Unlimited, Box 9301, SLC, Utah 84109.

DELICIOUS WINES AND CHAMPAGNE—Use Kitchen Utensils. Instructions guaranteed. Free Bonus. \$2.00. R, Box 405, Leavenworth, Kansas 66048.

WINE—AUTHENTIC FRENCH RECIPES. Strawberry, Cherry, Blackberry, Dandelion, Grape, and Others. Complete Instructions. \$2.00. Jay-Gee Enterprises, Box 3111, Youngstown, Ohio 44512.

DELICIOUS WINE AND CHAMPAGNE! HOMEMADE. PROVEN RECIPES USING STANDARD KITCHEN UTENSILS. GUARANTEED! ORDER TODAY! \$2.00. FREMONT SALES. BOX 222A, NEW YORK, NEW YORK 10463.

WINEMAKING & OTHER RECIPES

SPARKLING CHAMPAGNE AND WINE at home. No special equipment! Guaranteed. Absolutely delicious! \$2.00. R&M Books, Box 1107, South Pasadena, Cal. 91030.

MISCELLANEOUS

PERSONALITY DOLLAR BILLS. Genuine U.S. currency with photo of Nixon. Legal and negotiable. \$2.95 postpaid. Moore, Dept. P, 6840 South Sheridan, Littleton, Colorado 80123.

JOB FINDER. ACTION PLAN, resume instructions, examples. Beat the competition. Only \$5.00 guaranteed. Order now. Plan, Dept. D45, 3226 Los Prados, San Mateo, CA 94403.

RAZOR Blades, Discount Prices, Free Details, Elwick, Dept. 205, 230 Woods Lane, Somerdale, N.J. 08083.

EASY ANIMATION instructions, home movie cameras, \$2.00. Swank, 657E Willabar, Washington, Court House, Ohio 43160.

SAVE MONEY, Time For Your Loved Ones. Leave a Will. Two Blank Forms, Instruction Booklet. Only \$2.00. Kinsons, Box 309, Bedford, In. 47421.

WIN IN VEGAS! Craps and Roulette. Free Details. P W Products, Box 35271B, Houston, Texas 77035.

ANYONE CAN DRAW EXPERTLY. How? Stamped Envelope. Merlin Hiaring, Madison, S.D. 57042.

FREE Unbelievable Energy Saver Cloth Sample. Sparkles and Protects all Metalworks, Guns, Jewelry, Automobile, Appliances Many More. Trades Hawaii, Box 1741-Y1, Honolulu, Hawaii 96806.

BANKRUPTCY—Why worry? 4000 word booklet, simply written, answers questions about Bankruptcy. Also, how to avoid it. Any jobholder or small businessman can find relief. Send \$3.00. Solutions, P.O. Box 1031-B, Glendale, Arizona 85301.

SURVIVAL Food—Freeze Dried Storage, By the Case, Menu Planner and Price List—25¢. Hale Supply Company. (K-50), McDonald, Ohio 44437.

ORNAMENTAL Iron designs. Book of 1600 beautiful, practical designs for railings, columns, etc. Free literature. Cunningham, 3881 South 3200 West, Box 20005, Salt Lake City, Utah 84120.

BOOKS On antiques and their prices. Free circular!! P. Warman Publishers, Uniontown, Penna. 15401.

IDENTIFICATION CARDS. Send stamped self-addressed envelope for samples. NIPCOM, 727 North Main, Las Vegas, Nevada 89101.

WIN! Casino Games! Free Details! Xcito Games. 5715 N. Mozart, Chicago, Illinois 60659.

AMAZING Secrets Revealed Galliano, Kahlua type liquors, easily made. \$3.00. Jenco, 7525 Florence, Downey, Calif. 90240.

HEARING Aid batteries wholesale. Free list. Habs, Box 51, York, Penna. 17405.

PHOTOSTAMPS—Posters—For Samples—Send 10¢ Stamp to: Richard Daube-P. PM, Box 3043, Falls Church, Va. 22043.

NEED \$25,000.00 Loan By Mail? Unlimited Business Capital? Details \$1.00. Griffin, Box 826PM, Keystone, FL. 32656.

AMAZINGLY tasty wines and champagne made in your home . . . Recipes . . . easy to follow instructions. Send \$1.00 . . . Dale Co., Box N, Dept. 1D, Osseo, Minn., 55369.

BIRTH CERTIFICATES—Blank Forms—Replaces Lost Originals—Only \$1!! Guaranteed!! Helden Enterprises, 12335 82 Road, Dept. 1A2, Queens, N.Y. 11415.

ROLL Your own Cigarettes with American Blend or Menthol Tobacco. Cigarette Makers and papers available. For free Tobacco sample write Green River Tobacco, Box 1313M, Owensboro, Ky. 42301.

TATTOOING: Complete Inventory of Equipment and Supplies for Professional and Amateur. Transistor Driven Machines. Illustrated information. Paul's, Box 8073, LaCrescenta, California 91214.

LEGAL FORMS—Blank Drivers License and Birth Certificate. Send \$1.00 to: Ralco, Box 233, Lee, Mass. 01238.

SENSATIONAL!! Self-Correcting Typewriter Ribbon. Only \$3.50 Guaranteed! Specify Make and Model. Gramam Enterprises, Dept. 4P, 5751 Canellia Ave., North Hollywood, Calif. 91601.

MAKING WINE BEER & MERRY, 192 page book, 24 charts, Factual, easy to understand and enjoy. 86 Illustrations and Cartoons. \$3.75. BEVERAGES, Box 1004, Fostoria, Ohio 44830.

THE DAY YOU PLANT DOES MAKE A DIFFERENCE. New Research Reveals Which Days Are Best. Only \$2.00. Nelson Research, Box 1133PM, Branson, MO. 65616.

"HOW TO INFLUENCE ANYONE'S THOUGHTS IN 30 SECONDS" Reveals Powerful Secrets that's Worth Thousands. Men and Women Actually Obey your Desires Without Knowing it. 10 Day Guarantee. Rush \$2.00 to Unicorn, 7350 Nugget, PM4, Colorado Springs, Colo. 80911.

55 MPH = 88 Kilometers. U.S.A. going metric conversion chart \$2.00 each. 3 for \$5.00 to: Metric, P.O. Box 4091, (M4), Bartonville, Illinois 61607.

PHOTO I.D. Cards. Free Samples. Publications, Box 26062P, Los Angeles, Calif. 90026.

IRON ONS, BUMPER STICKERS Made to Order. Small orders preferred. Free Brochure. H. Bunyca, 7754 Emerson Rd., Hyattsville, Md. 20784.

ZIG ZAG HEADSHOP MAILORDER Catalog. Exciting New Items Every Month to get on our mailing list Send \$1.00. Lee's Specialties, Dept. A, Box 1407, Borger, Texas 79007.

LOSE Weight Permanent no dieting send for information or \$3.95, to: Wheatpm, 3311 S. Hooper Ave., Los Angeles, CA. 90011.

PENMANSHIP Corrector. Improve Poor Penmanship Quickly. Details Free. Thurmon, Box 824, Stinnett, Texas 79083.

NEVER Smoke Again! Proven Methods \$1.00. Ideas Unlimited, Box 9301, SLC, Utah 84109.

COW SKIN RUGS: Large—Beautiful! Black/White or Brown/White hair. \$69.95. Finest. Money back guarantee. Vincent Healy, Importer, 671-P Second Avenue, New York, New York 10016.

HOW intelligent are you? Self-scoring test reveals I.Q. in 45 minutes! Send \$2 today—guaranteed!! Tests, Dept. 4PM, Box 836, Joshua Tree, CA 92252.

ROACH-PROOF Your home for 80¢ yearly! Free details: Star, 5936 Silver Star, Orlando, Fla. 32808.

CLOCK MOVEMENTS—Battery, electric, grandfather, large selection for new and old clocks. Details 50¢. Clock Repair Center, Dept. 24, P.O. Box 65, Carle Place, N.Y. 11514.

YOU CAN STOP SMOKING!! Amazing method revealed. Guaranteed. Send \$2.00. Penwines, Box 588, Monroe, Louisiana 71201.

WILL Kit Forms, Asset List, Instructions, \$2.00. Futura, Dept. 2PM4, 602 Syracuse Ave., N. Massapequa, New York 11758.

BURGLAR ALARMS & HOME PROTECTION

DIALING Unit Automatically Calls Police. \$29.95. Free Literature. S&S Supply, Box 12375D, North Kansas City, Mo. 64116.

FREE Catalog On Burglar-Fire Alarm Equipment. Vancor Security Systems, Box 438, Boston, Mass. 02144.

LOCKSMITHING Supplies—Buyers Guide \$1.00. Despubs, Box 22005H, Phoenix, Arizona 85028.

FREE Catalog on Burglar-fire Alarm Equipment. Protecto Alarm Sales, Box 357-D, Birch Run, Michigan 48415.

CHAIN Burglar Alarm install on Windows or Doors. \$3.75. James E. Dow, Sr., P.O. Box 2342, S. Hackensack, N.J. 07606.

NEW, Patented, SNIB LOCK Keeps You Safe. Guaranteed. For Swing in Doors. Recommended by Police. \$4.50 postpaid. Snib Lock, Box 1508, Blaine, Wash. 98230.

FEAR BURGLARS? Feel Safe! Statistics Prove Protection Pays. How-Booklet—\$1.00. Merit, Box 83E, Falkner, Miss. 38629.

CHAIN LOCK ALARM Easy Installation, Heavy Duty Chain. \$5.95. SMOKE SIGNAL Detects Smoke, Gas, Harmful Invisible Fumes. Sounds Alarm. \$39.95. DAVENPORT'S MAIL ORDER SERVICE, P.O. BOX 14008, HOUSTON, TEXAS 77021.



THIS LABEL SAYS MORE

Popular Mechanics is far and away the acknowledged authority in the ever-expanding field of do-it-yourself activity. Our readers know the Popular Mechanics tradition of total involvement with leisure equipment, workshop accessories, tools, home and car care supplies—in virtually every area in which do-it-yourself products play a vital part. That's why, when you, the PM reader, see this Product Feature Mark on any product, anywhere, you know that product is a solid member of the growing family of products featured within the advertising pages of Popular Mechanics—a magazine devoted to serving the dedicated do-it-yourselfer for over 73 years.

NOW The Famous Hunting Knife You've Always Wanted, At A New LOW PRICE You Can Easily Afford!

*The G-96 Titan Folding Sportsman
Individually Hand-Crafted
Solid Brass Handle • Razor-Sharp
Molybdenum Steel Blade*

Sportsmen, hunters, fishermen, campers, collectors—here it is! The famous knife you've always dreamed of owning. From its distinctive silhouette to the tiniest detail of its manufacture, the G-96 Titan is the knife of a lifetime made for a lifetime of use. We guarantee it!

PRECISION-CRAFTED THROUGHOUT!

Just wait until you hold this beauty in your hands. Notice its heft—a rugged 5 oz. of precision-balanced craftsmanship. Notice the handle. It's solid brass all the way through, heavily inlaid with thick slabs of exotic Pacca wood—the miracle wood that resists moisture, heat, grease and food acids. See the gleaming blade, honed to such razor sharpness that you can almost hear the hiss as it zips through meat, bones fish, dresses game, even cuts kindling and tent stakes. Forged of high-carbon molybdenum steel, the G-96 Titan blade has been specially processed metallurgically to hold a keen edge even after many years of hardest use.

A joy to carry, the G-96 Titan is only 4½" long when folded. Yet open it up and you've got an 8½"-long wonder that beats the best belt sheath hunting knife you could ever hope to own. (The opening mechanism is as smooth as silk and holds the long blade locked firmly into place until you press the safety release in the handle for closing.)

A triumph of the knifemaker's art, the G-96 Titan is rugged and reliable, a lifetime investment for every outdoor sportsman and genuine collector's item. You'd expect to pay \$19.95 and even more for a knife of such uncompromising quality. Yet thanks to a very special purchase we can offer it now for the amazingly low price of \$14.95. (You'll never need to buy another.)

But remember, not every outdoorsman can own the G-96 Titan. Each one is individually hand-crafted and can never be in unlimited supply at this special low price. Avoid disappointment. Mail the coupon today. Satisfaction guaranteed or your money back.

**KNIFE
SHOWN
ACTUAL
SIZE**

LIFETIME GUARANTEE

The G-96 Titan is a hand-crafted precision instrument made of the finest materials available. It is unconditionally guaranteed in normal use against all manufacturing defects for the life of the purchaser, or simply return it to the manufacturer, postpaid, for repair or replacement free. What other knife dares to make such an ironclad guarantee!

- OVER 8½" LONG
- RAZOR-SHARP MOLYBDENUM STEEL BLADE
- SOLID BRASS HANDLE INLAID WITH PACCA WOOD
- LIFETIME GUARANTEE!

FREE TOP GRAIN COWHIDE PISTOL SHEATH HOLSTER

Send us your order within the next 10 days and we'll also include this rugged holster at no extra cost. Custom-made of extra-thick genuine cowhide, it's precision contoured to cradle your knife at your belt ready for instant use. Rivet-reinforced at points of extra stress and with a sturdy snap fastener to prevent loss or damage, this luxury cowhide sheath is yours FREE if you mail the coupon now!



**FITS
ON
BELT**

**SPECIAL
SAFETY LOCK**

**OPENS
SMOOTHLY
AND LOCKS
FIRMLY IN
POSITION**

**Guaranteed
For Life!**

**MAIL NO-RISK
COUPON TODAY!**

CROWN-CASTLE, LTD., Dept. TK-31

51 Bank Street, Stamford, Conn. 06901

Please send me the individually hand-crafted, precision G-96 Titan, lifetime guaranteed and with FREE genuine Western cowhide holster, for only \$14.95. My money back if not thrilled. (Please add 75¢ for postage and handling.)

Enclosed is \$ _____

Name _____

(Please PRINT Clearly)

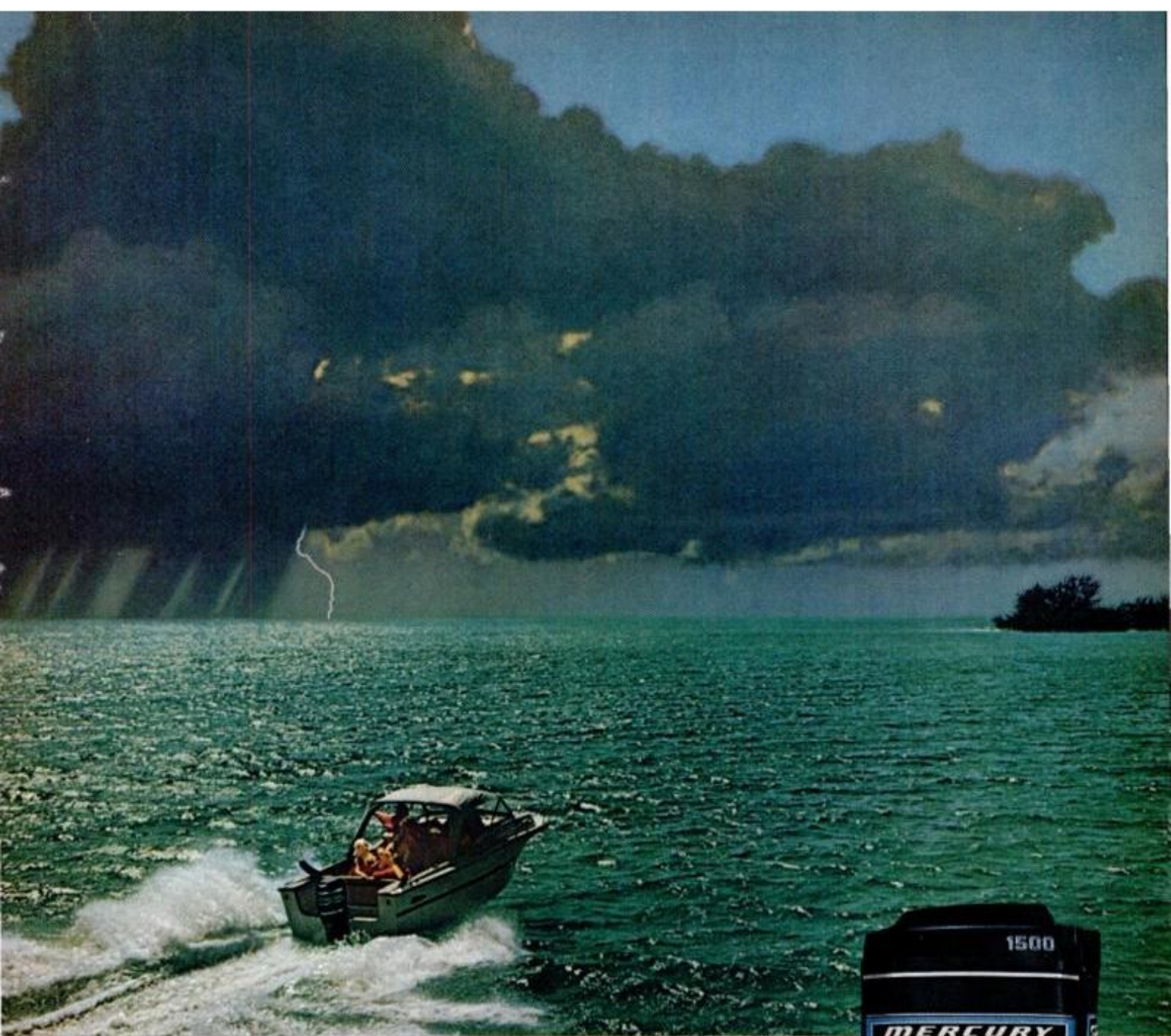
Address _____

City _____

State _____ Zip _____

SAVE MORE! Order two knives for just \$27.95 plus \$1 postage and handling. You'll never give a better gift to a fellow sportsman.

Conn. Residents Add 6% Sales Tax



**SURE POWER.
YOU REALLY
NEED IT HERE.**

**A MERC GETS
YOU HOME
IN A HURRY.**

With five miles to run for home port, and a heavy squall to race, you need an outboard that starts fast and runs smooth. You can count on your Merc to fire almost instantly. A super-hot, sealed-in ignition system on every 1975 model slams out more than one and a half times the jolt needed for a lightning start. Spark plugs stay clean for full power. No more tinkering with the carburetor to get home because of Mercury's fixed-jet carburetion. And when you hit an underwater obstacle, there's no shearpin to break. You don't lose power. You can depend on a Merc—every one from 4.5 to 150 hp—to give you trouble-free performance. See your Mercury dealer soon.

MERCURY. PERFORMANCE AND POWER YOU CAN DEPEND ON.



Mercury Marine/Division of Brunswick Corporation, Fond du Lac, Wisconsin/Canada/Australia/Belgium

Моторы и запасные части

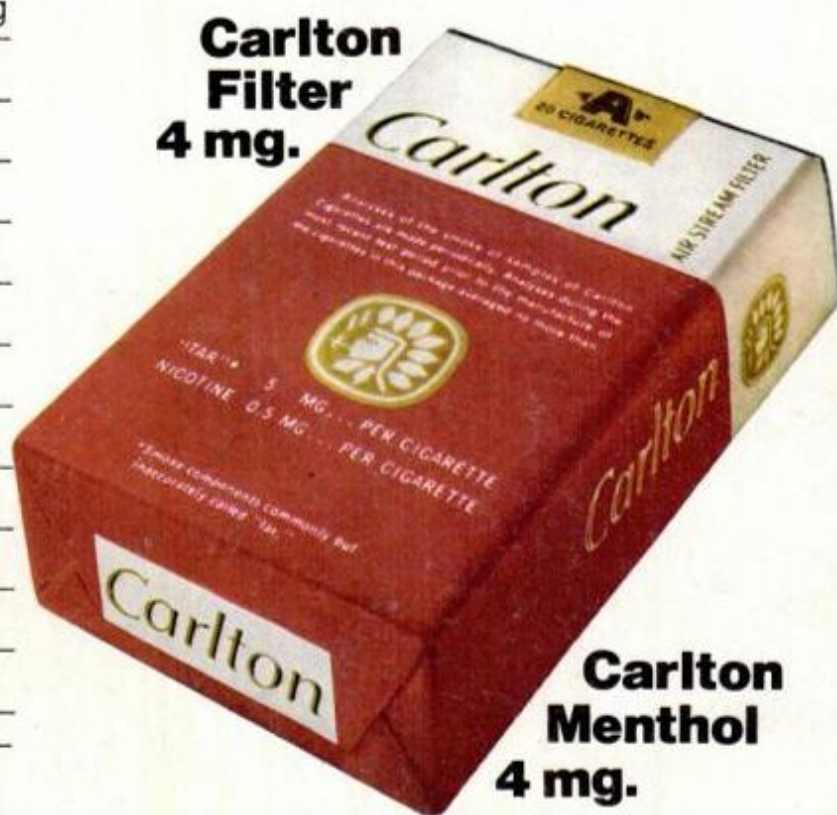
Of all filter kings tested:

Carlton is lowest.

Look at the latest U.S. Government figures for other brands that call themselves low in tar.

	tar, mg/cig	nicotine, mg/cig
Brand D (Filter)	14	1.0
Brand D (Menthol)	14	1.0
Brand K (Menthol)	14	0.9
Brand R (Filter)	14	0.9
Brand M (Filter)	12	0.9
Brand T (Menthol)	12	0.7
Brand T (Filter)	11	0.7
Brand V (Filter)	11	0.7
Brand V (Menthol)	11	0.8
Carlton Filter	4	0.3
Carlton Menthol	4	0.3

Carlton 70's (lowest of all brands)—
2 mg. "tar", 0.2 mg. nicotine



**Carlton
Filter
4 mg.**

**Carlton
Menthol
4 mg.**

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

Filter and Menthol: 4 mg. "tar", 0.3 mg. nicotine av. per cigarette, FTC Report Oct. '74.