

FEB. 1975 75 CENTS

Popular Mechanics

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12 pages of fun in the NEW BOATS

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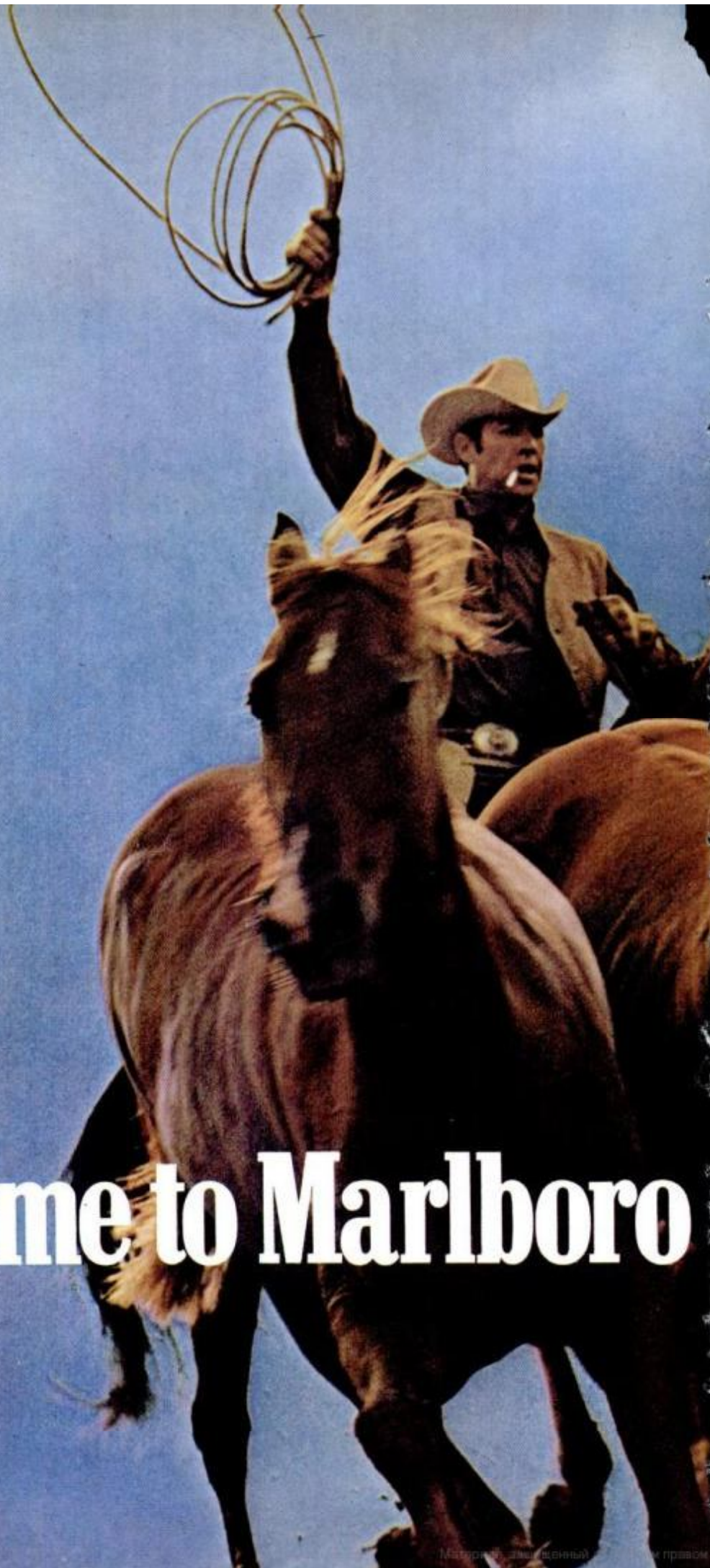
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Frisky new Dolphin family day-sailer





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Материал для взрослых. Продажа только по рецепту.



Country.

This One



X9HD-PT1-ET36

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

16 mg "tar," 1.1 mg nicotine av. per cigarette, FTC Report Oct. 74

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**SAVE ABOUT \$680
OPERATING COSTS.**

**'75 CHEVY
PICKUP VS.
COMPARABLE '74.***



1975 C10 Half-Ton 350 V8 Fleetside Pickup

Based on GM Proving Grounds mileage tests and extended maintenance intervals for Chevy's best-selling 1975 pickup—projected through 50,000 miles.

Chevy is serious about truck economy. For 1975, Chevrolet has made meaningful advances designed to lower the costs of operating this C10 Pickup. Based on GM Proving Grounds mileage tests and new extended maintenance intervals, projected through 50,000 miles of driving, savings in operating costs can be as much as \$680 compared to last year's comparably-equipped model.

Let's look at this specific model: the popular C10 Half-Ton V8 Pickup.*

This is Chevy's best-selling pickup and it offers outstanding potential for lower costs of operation. Projected savings based on GM Proving Grounds tests are shown in the box at right. These savings, of course, will vary depending on equipment, loads, operating conditions, driving habits and the price of gasoline.

More miles per gallon definitely helps lower the cost of ownership.

Comparing this 1975 Chevy C10 Half-Ton Pickup* with its 1974 counterpart in the GM Proving Grounds City/Suburban Driving Schedule, the '75 Half-Ton, using unleaded gasoline, showed about a 14% reduction in fuel consumption over the '74 model using leaded fuel. As detailed in the box at right, this would amount to net savings of \$343 in 50,000 miles. Again, these savings will vary depending on equipment, loads, operating conditions and the price of gasoline.

* VEHICLES AND TEST DESCRIPTION

Comparisons are based on the following 1975 Chevrolet Half-Ton Pickup and its comparable 1974 model: C10 350 2-barrel V8 Fleetside Pickup, 8-foot box, under 6,001 GVW, equipped to comply with Federal emission standards, with Turbo Hydra-matic 3-speed transmission, 3.40:1 axle ratio, and L78-15 tires. Mileage tests were conducted in the GM Proving Grounds City/Suburban Driving Schedule at average speeds of 24 mph with 1.6 stops per mile. Test averages from three production '75 models were compared with test averages from three production '74 models. Test weights were 4,649 pounds for the '75s and 4,570 pounds for the '74s.

NOTE: 350 V8 2-barrel not available in California.

New extended maintenance intervals help reduce operating costs.

Compare maintenance costs for the same two pickups. Following the Maintenance Schedule for recommended service, this '75 C10 Half-Ton Pickup, using unleaded fuel, could save about \$337 on parts, lubricants and labor over the comparable '74 model, using leaded fuel, projected through 50,000 miles of driving. That's because this new '75 C10 model has a catalytic converter and High Energy Ignition and needs fewer scheduled changes for spark plugs, oil, and filters, needs fewer chassis lubes, and has no points or ignition condensers to replace.

PROJECTED LOWER OPERATING COSTS DURING 50,000 MILES

1975 Half-Ton 350 V8 Fleetside Pickup*

Increased miles per gallon

As tested in GM Proving Grounds City/Suburban Driving Schedule, this 1975 Chevy C10, using unleaded fuel, shows about a 14% reduction in fuel consumption over a comparable '74 model using leaded fuel. That's 700 fewer gallons in 50,000 miles. Cost figures could vary, depending on the price of leaded and unleaded fuel in local areas; however, at a price of 56¢ per gallon for unleaded fuel, allowing a one cent per gallon increase over leaded fuel as permitted by Federal regulations, this would represent a net savings of . . .

\$343

Extended maintenance intervals

Chevy compared scheduled maintenance costs for both '75 and '74 Half-Ton models, using recommendations from the 1975 Chevrolet Truck Series 10-30 Light-Duty Emission System Maintenance Schedule, current list prices for parts, and a figure of \$11 an hour for labor. Actual figures in various specific localities could be higher or lower. Projected through 50,000 miles, the savings in parts, lubricants and labor for this '75 model could add up to . . .

\$337

TOTAL PROJECTED LOWER OPERATING COSTS DURING 50,000 MILES

\$680

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ON THE COVER

New to the '75 boat lineup is this Silverline Dolphin 17 day sailer with an Evinrude 4 on its transom. Photo: Errol Prince

WORTH WRITING FOR

Looking for more ideas and information? See page 174.

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®

FEBRUARY 1975 • Vol. 143 No. 2

INTERNATIONAL EDITIONS: Australia, Caribbean, Mexico, Southern Hemisphere

SPECIAL FEATURES:

Watch for these pacesetters in '75. They offer more speed, style, safety and comfort. Twelve-page boat section begins on page 88.

You can 'run whatcha brung' at the big-time racetracks when homegrown Gremlins, Vegas and Pintos vie with imported 'economy' sedans. Page 68.

First plug-in solar furnace for your home. Simple A-frame shed offers practical auxiliary sunpower for use with almost any home. Page 102.

You, too, can be a world record fisherman. All you need is patience, luck, skill and these tips from our experts. Page 81.

Divide and conquer with a freestanding wall. Easy to build without special tools, it can double the use of your youngsters' bedroom. Page 84.

Keep your choke working—automatically. Saturday Mechanic shows you how to care for your choke and enjoy all of its advantages. Page 107.

Present arms! Build this truly distinctive gun cabinet and show off six of your favorite firearms to best advantage. Page 120.



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**Tomorrow morning,
look at your double-edge.**

**If the razor says Gillette,
the blade should say Gillette.**



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So take a look tomorrow morning. Look at your razor. Look at your blade. Then look at your mirror.

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Gillette
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Stanley saws make hard work easy. Free plans prove it.



Which is the best Stanley saw for you? Go in and ask. Most stores selling quality tools have a lot to choose from.

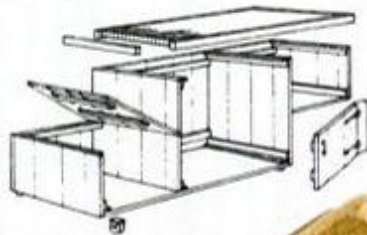
Get the plans set, too, for making a useful, mobile Outdoor Kitchen. (It stores your grill, charcoal, dishes, etc., has plenty of work space on its butcher-block top.) You'll have a good time building it over some long weekend. To order the plans, send name and address and 25¢ to cover postage, to Stanley Tools, Dept. B-M, New Britain, Conn. 06050.

How clean it cuts, and how much physical work it takes, tells you how good a saw you own. That's where Stanley saws come in. (And why not test one out on this easy-to-build Outdoor Kitchen?)

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STANLEY helps
you do things
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LETTERS

FROM READERS

One more in orbit

December *Science Worldwide* (page 34) stated there are 12 satellites surrounding the planet Jupiter.

However, it lately has been confirmed that there are actually 13 satellites orbiting that planet.

Jupiter XIII is moving around the planet in a 282-day orbit at a mean distance of 7.7 million miles, according to the calculations by Kaare Aksnes, Smithsonian Astrophysical Observatory.

Jupiter's 13th satellite was discovered by Charles T. Kowal at Hale Observatories on Sept. 14, 1974. It was confirmed on Oct. 16 and 17 with photographs made by Mr. Kowal at Hale Observatories.

DALE FIFE
HEMINGFORD, NEB.

Pi on his face

I noticed a mistake in Ivan Berger's article *Calculators Get Smaller, Smarter and Cheaper* (page 70, Dec. PM). He listed pi as 3.1415926654. It is actually 3.14159265358979323846264338327950288. . . . That extra "6" was extraneous.

BENJAMIN WOODBURY
RENSSELAER POLYTECHNIC INST.
TROY, N.Y.

You're the first reader to realize that our error was the typographical insertion of an extra "6." However, to put things in perspective, figuring the Earth's circumference (based on the 7926.41-mile diameter given in the World Almanac) with the correct 9-place value of pi gives a diameter of 24,901.55142066573 miles; our incorrect value gives an error of about 5/32 of an inch, or about 5 millimeters. Carrying it out to 10 places would increase your accuracy to within .0001 inch.

Readers who wish to figure out how much more accurate they'd get by using Mr. Woodbury's 35-place figure are welcome to.

I noticed a great deal of information was left out. The author completely left out Texas Instruments calculators.

A second item that was left out was nickel-cadmium batteries. A

third omission was light-emitting diodes as the display lights.

Maybe if your electronics editor would do a little more research, he could write better articles.

JOEL DUGUAY
CORINTH, N.Y.

The editor did research—he could list, offhand, about 15 names left out of the piece. But the point was not to mention brands, but to discuss the features common to many brands, the better to help you buy the one whose features suit your needs and pocket. Rechargeable batteries were mentioned on page 73. We judged the differences between light-emitting diodes and other self-illuminated displays less significant than that between the self-illuminated and the liquid-crystal types.

Fireplace furnace follow-up

I've received many calls and letters about the *Fireplace Furnace* (page 154, Oct. PM). It may be of help to some people if you would put my correct address: Old Orchard St., White Plains, N.Y. 10604. Also, I would appreciate anyone who writes to me to please include a stamped addressed envelope, and I will be more than happy to help.

As a point of information, I filled my oil tank Nov. 7, 1973 (550 gallons). I became concerned about it around Nov. 19, 1974, so I called my oilman and he told me I still had 221 gallons. He put in about 300 gallons at 36 cents per, for a total of \$113.40, which isn't too bad for a whole year of hot water.

Thanks again for a well-written article.

GENE FEENEY
WHITE PLAINS, N.Y.

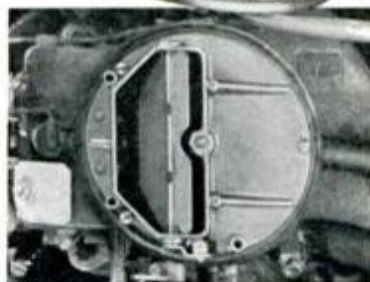
Big blast

In your article *How To Choose The Best Cartridge* (page 110, Dec. PM), you state: "For example, a standard hunting load of '3 $\frac{3}{4}$ —1 $\frac{1}{4}$ —6s' simply means 3 $\frac{3}{4}$ ounces of powder equivalent with 1 $\frac{1}{4}$ ounces of No. 6-size shot." If anyone is capable of

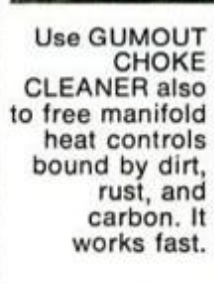
(Please turn to page 10)

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FEBRUARY 1975

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Model 12-P



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LETTERS

(Continued from page 9)

shooting a 12-gauge shotgun with 3 3/4 ounces of powder equivalent as the charge, then I would like to see him do it. What you mean, of course, is that 3 3/4 in reference to the powder charge in a shotgun shell equals the equivalent charge in drams of black powder, not ounces. Since an ounce is eight times as large as a dram, that does make a sizeable difference.

D.L. OSBORN
LT., U.S. NAVY
BELLMAWR, N.J.

Biwing Beauty's price

Thank you for the comprehensive article on Hiperbipe (*Breezy Biwing Beauty*, page 85, Nov. PM).

There was, however, one error: the selling price of a complete certified airplane. The article stated \$8500. This figure pertained to the actual materials cost only. A more accurate selling price is approximately \$25,000, when certified.

MARK SORRELL
SORRELL AVIATION
TENINO, WASH.

Konica's price and catalog

Correct list price of the Konica Auto-S3, 35-mm rangefinder camera (*New Little Konica Makes Even Daylight Flash Easy*, page 180, Nov. PM) is \$199.95, including case, strap and batteries, and it's supplied exclusively in black finish. The compact Konica X20 electronic flash unit described lists for \$49.95, also with case.

We'll gladly supply readers with a comprehensive Konica catalog and price list. Write Konica, Box 1060, Woodside, N.Y. 11377.

PETER M. ILDAU
VICE-PRESIDENT
KONICA CAMERA CO.

Another synthesizer

I've just read *Low-Cost Synthesizers* (page 126, Jan. '74 PM) and wanted to let you know of a new one by Maestro. It is designed to be used with most any electrical musical instrument and is listed at \$500. Also, where can I get information on the Paia kit-built synthesizer?

J.C. WHITLOCK
BAY VILLAGE, OHIO

You can reach Paia at Paia Electronics, Box 14359, Oklahoma City, Okla. 73114. ★★★

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Tom McCahill asks...

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A lot of learning for the money.

After carefully passing my eyeballs over NRI's new courses, I'm convinced that any guy who knows which end of a screwdriver is the handle can learn how to put his car in shape with this up-to-date training.

If you really want to put on the overalls and become a professional mechanic, they've got a Master Automotive Technician's Course that



has lessons in everything except splinting wooden spoke wheels. It's the best way I know to get into a real money-making career without laying out the family jewels.

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Tom McCahill

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- Sport tourers—the big bikes for '75
- Step-by-step tune-up for your power mower

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IMPORTS AND MOTORSPORTS

Gone racin'

Michigan's upper peninsula is usually the place for good, quiet fishing, but last November the roar of race cars took over. The Press On Regardless (P.O.R.), the United States' only international rally, saw cars from all over the world running flat out over 1100 miles of roads rippled and rutted like giant washboards. We previewed the rally (see *Drive It Into the Ground!* page 73, Nov. '74 PM). Of 64 starters, only 26 cars finished.

Among the finishers were all three of the Renault factory entries, grabbing first, third and sixth places. The winning Renault 17 Gordini, shown



here flying home, was driven by Jean-Luc Therier and Christian del Ferrier. As usual, there were plenty of penalty points in the scoring and they're always accompanied by protests. When it was all over, Fiat had second place and Lancia had the fourth slot.

A sweet successor

I had a good reason for missing the P.O.R. last November: I was still in Europe—visiting Fiat and Lancia. And there was a reason for the timing: Fiat has a brand new line of cars that will replace the 124 series, and Lancia is about to re-enter the U.S. market with a sedan and coupe.

The Fiat that goes on sale this spring will be known as the 131, even though, unlike other Fiats, it has a name. *Mirafiori* is not Italian for a savage animal, a hot wind that blows across the desert or even a racetrack. It's the name of the factory in Torino where the car is produced. The 131 Mirafiori has a range of 11 models, from standard to special, in two-door, four-door and station wagon versions. Following the usual practice

among European automakers, Fiat will send here only the top-of-the-line, or special, versions.

The 131 is a car for its time. That means in a time of skyrocketing manufacturing costs, it's easy to make; in a time of out-of-sight maintenance and repair bills, it's simple to service and easy to repair; and in a time of complex economic relationships among oil-producing and oil-consuming countries, it is economical to fuel.

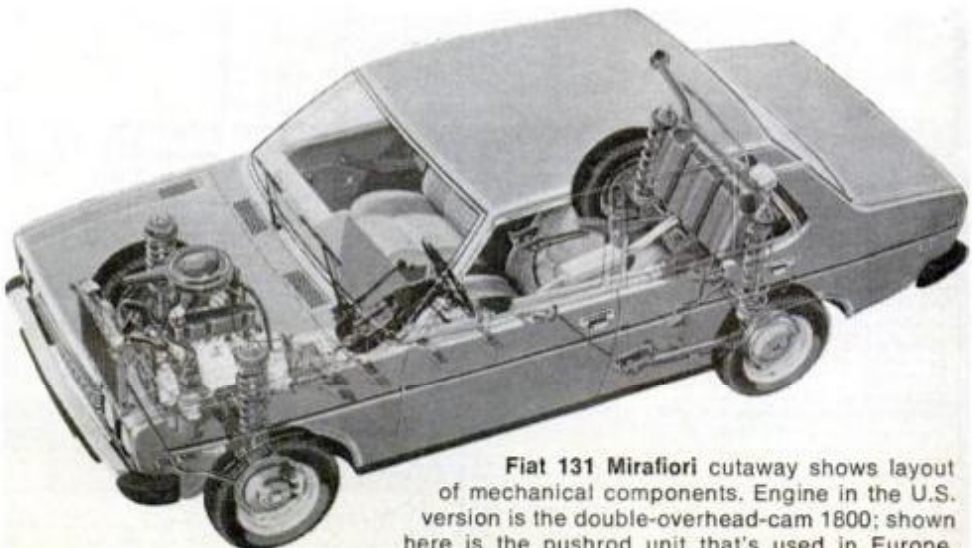
Simplicity and reliability, therefore, were the starting points for the 131 design. Layout is conventional front-engine/rear-wheel drive. Dimensions for all models are: wheelbase, 98.0 in.; length, 167.9 in.; width, 64.6 in. height, 55.5 in. Weight, depending on model and options, is between 2100 and 2400 pounds. Engine is the 1800-cc dohc that's used in the 124 sport models

which continue to be available. Transmission is five-speed with a GM three-speed automatic optional.

A short drive in the European version revealed one annoyance: the pedals are too close together, even for my size-nine-shod feet. Otherwise I was impressed: the handbrake is adjusted from the interior, which is very roomy and comfortable; a vinyl coating covers the entire underside of the car; electrical wiring is Teutonic in its orderliness, with a single control box accessible under the dash; three steel safety structures ring the passenger compartment; fuel tank (see below) is safely located; and performance and handling were up to expectation.

The only mystery at this writing is base price (\$4000?). It's needed to make a dollar-for-dollar judgment of the 131's value vs. the competition.

Next month: a look at Lancia. ★ ★ ★



Fiat 131 Mirafiori cutaway shows layout of mechanical components. Engine in the U.S. version is the double-overhead-cam 1800; shown here is the pushrod unit that's used in Europe.

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(See chart.)

Careers	New job openings each year*	Average straight-time hourly pay*
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Air Conditioning Heating & Refrigeration	20,000 + **	\$3.25-\$7.00
TV Service & Repair	5,250	\$3.50-\$6.50
Electrician	23,000	\$3.60-\$4.75+
Electronics Technician	10,000 + ***	\$3.50-\$5.45

*Source: 1972 U.S. Labor Dept. Report (covers 1970's)

**Excludes heating. Source: Refrigeration Service Engineers Society

***No exact figure available. Part of 30,000 yearly openings predicted in gov't report for science and engineering technicians.

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DETROIT LISTENING POST



BY ROBERT LUND

GM edict: No fat-cat cars

General Motors has set a goal of trimming 1000 pounds off each of its cars over the next three years. The company concedes it may not be possible to lop a half-ton off every car, but that's the try-for target. Reducing the weight of a car automatically improves gas mileage and cuts the cost of putting the pieces together, which could lead to lower prices or at least cut down on the size of future price hikes.

Ford dropping ceiling strap

Ford is going to get rid of the ceiling-mounted shoulder strap on its big cars. Probably on the lower priced cars too, but not immediately on the cheaper cars. The company has devised a shoulder strap mounted to the seat back that meets all government safety requirements. Seats in the big cars have the strength to permit attaching the strap to the seat back, but seats in the smaller cars will have to be beefed up before the strap can be moved to the new location.

Safety gear on the way out?

Some auto company chiefs are arguing with their own safety engineers over how much government equipment should be removed from cars, assuming the government gives permission to delete the gear. Not the seat-belt interlock system. That's dead. But some car producers would also like to do away with side-door beams, energy-absorbing bumpers and head restraints. To cut costs and prices. Safety engineers would retain door beams and bounce-back bumpers. But safety experts can only suggest. They don't have the final say-so.

Where are those new engines?

Hardly a week goes by that somebody in this country or overseas, in the auto industry or in government, doesn't announce the discovery of a new engine or a variation of an existing engine that will solve the pollution problem and give 20 to 30 miles to the gallon. Wankel, Stirling, tur-

bine, stratified charge, electric, steam, diesel and a thousand updatings of the standard piston engine. So what happens? Why are the engines so long coming? When will Detroit get off the dime and build one?

I've talked with engineers at the four Detroit companies and they all come up with the same reply. "All the alternate engines we've looked at have merit. The trouble is they are all short-term. They might do the job for '77 and '78 but not for '79 and beyond. We can't afford to tool for an engine that would have to be scrapped for something else in two years or five years. If we go to a new engine, we would have to get a minimum of 10 years out of it. We haven't seen anything promising that kind of durability so far."

GM dealers seek diesel import

Speaking of the diesel engine, Buick dealers handling Opel are trying to get GM to bring the diesel version of that car into the United States. GM is considering the idea, but the prospects aren't favorable. Diesel cars have never sold big here, the price would be high for a small car and GM would have to do some patch engineering to make the car conform with U.S. standards. Hungry as GM is to sell cars, that's a lot of nit-picking for the sake of pulling in a few thousand buyers.

Mileage claims to go legit

Car companies will have to stop playing hanky-panky with gas mileage claims next fall. The Federal Trade Commission is writing new rules stipulating how cars must be tested and results must be reported if car-makers want to mention mileage in their ads and promotion pieces.

There's already a standard test for measuring mileage. Worked out by the Environmental Protection Agency, it's equally fair or unfair to everybody, depending on your point of view. But EPA has no jurisdiction over advertising results from its test. If you want to run a 3000-pound car downhill against a dozen 6000-pound cars and then claim your car gives

better mileage than 12 cars made by rival companies, EPA can't remonstrate. FTC is going to put a stop to that nonsense.

Sales lag dooms future cars

Carmakers are suffering their worst case of down-and-outs since the depression. They don't like to admit it's that bad and try to draw parallels with 1958, year of the last big wipe-out. But 1958 was not as desperate a year. Cars that sold for \$2000 in '58 now list for \$3500 and up. In '58 you had to make a big down payment and have a good credit rating before a dealer or bank would let you pay for a car over 36 months. All you need now is bus fare to get to the dealership and you can stretch payments over 42 to 48 months.

In tough times, car firms have comforted themselves with the thought that they could always sell as many new cars as the number of old cars scrapped in a given year. That's the bottom line. But there have been weeks when new-car sales—figured on an annual basis—have fallen below the scrappage rate. This rate has been running around 8-million cars a year. Detroit will probably do better, because sales usually pick up in the spring and early summer. But it is shocked to discover sales can fall below the bottom line on a month-to-month basis.

In 1958 the companies continued to plan for 1959 and later cars. But cars planned for next year and 1977 are being cancelled or shelved until business improves. Station wagon versions of Ford's Granada and Monarch, expected as half-year models in '76, have been shoved forward to fall of 1977, and that's not firm. A small pickup Ford intended for next year has been put on an indefinite "hold." GM has delayed wagon versions of Chevrolet Monza, Oldsmobile Starfire and Buick Skyhawk. Chrysler is pulling in its horns on a new line of luxury compacts planned for next fall, reportedly whittling the line from four to two body styles. Only American Motors is not retrenching. In the works is a Pacer wagon as a half-year model for 1976 and a new car slightly smaller than Pacer for fall of 1977. ★★ ★

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

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ALL OUTDOORS

For sportsmen who can't schedule a trip down to warmer climates—or on to summer now in South America and the South Pacific—there is plenty of cooler action this month along the snowmobile and ski trails, ice-fishing lakes and hiking hills of Canada and the northlands.

Keeping comfortable outdoors this winter can be easier sometimes (certainly less expensive) than buying the energy for indoor heating. New cold-weather clothes, and new heating units to supplement them, stretch the outdoor sport seasons through all 12 months of the year.

But using anticold equipment can be critical. Any unprotected skin can freeze quickly when a wind-chill factor combines with subzero temperatures. Catalytic heaters, though a great improvement over open-flame models with their fire hazard and carbon monoxide threat, still use up oxygen. It is especially important that any heated sleeping enclosure allows some fresh air to get in.

Heater fuel

First, there were the car owners who considered trying campstove fuel in place of gasoline during last winter's shortage. It would work in an emergency, the Coleman Co. admitted, but since Coleman fuel contains none of the additives found in gasoline, continued use of the stove, lantern and heater fuel in your car could cause damage from burned pistons and valves from excessive heat, plus dieseling.

Now campers are wondering about use of the new unleaded gasolines in outdoor equipment. Again, Coleman advises against it. Though the lead has been left out, other addi-

tives and chemicals that help car performance can damage camping appliances. Coleman laboratory tests show these gas additives can clog generators on campstoves and lanterns, and coat the wicks of catalytic heaters. Use unleaded gas in an emergency, Coleman advises, but then go back to white, marine-type gasoline or the specially refined appliance fuels carried by camping suppliers.

Thin ice

Every winter an unfortunate number of skaters, snowmobilers, ice fishermen and cross-country skiers fall through ice breaks and soft spots. The Utah Division of Wildlife Resources recommends at least two inches of clear blue lake ice to support one person traveling on foot. Three-inch-thick ice can carry a group in single file. Seven-and-one-half inches is needed to keep your passenger car from swimming, 10 inches is recommended for a medium-size truck of about 3½ tons gross. Fishermen should reduce these values by about 15 percent for clear blue river ice. Slush ice rates only half the strength of blue ice. All these estimates are for moving loads.

Bass

Tournaments can stir up an argument with almost any group of fishermen, but there is no doubt that they are doing a lot for the sport. In order to keep fish alive until they can be weighed and returned to the lake, anglers have learned to land fish quickly. The long fight once considered "more sporting" has been found to lower survival rates. Electronic fish finders, once considered expensive toys, are now rated essential for the new art of structure fishing—the study of bottom conditions and contours that can tell where fish ought to be.

Put the latest in gear aboard the latest in fishing boats on a mystery lake that none of the 29 finalists have had a chance to scout in advance, and you have the annual Miller High Life Bass Masters Classic. Last fall's winner at Wheeler Lake in northern Alabama was Tommy Martin, a guide from Toledo Bend at Hemphill, Tex. But other high scorers during

the summer tournament circuit came in with low totals, and it appears that fishermen's luck is still a healthy part of the game.

Winner of Evinrude's Bass Buster Club national fish-off at Kissimmee, Fla., was Howard Cotten from Cross, S.C., with a two-day total of 29 pounds of large-mouths. His catch topped 22 other finalists.

Preparations

Inclement weather is an ideal time to clean and repair equipment, study manuals and travel guides, and catch up on mail-order catalogs and books you have saved for just such a time. Charts for boatmen and topographic maps for sportsmen ashore are particularly rewarding. Lists of maps for each of the 50 states plus American Samoa, Guam, Puerto Rico and the U.S. Virgin Islands are available free from U.S. Geological Survey Distribution offices such as the National Cartographic Information Center, USGS National Center, Reston, Va. 22092.

For gun collectors, some of the most appealing recent publications are the exact reprints of old gun company catalogs by the Personal Firearms Record Book Co., Box 201, Park Ridge, Ill. A duplicate of a Stevens pocket catalog of 1924, for \$2 postpaid, shows rifles, shotguns, pistols and telescopic sights for sale at prices (\$5.40 for a .22, \$11.50 for a shotgun) that could break your heart.

Park passports

Both the \$10 Golden Eagle and the free Golden Age Passports will be available at national parks again this year. [\(Please turn to page 24\)](#)



Bass Anglers Sportsman Society head Ray Scott, with outdoor editor McKeown (left) looks back on many fishing developments.



Bass fishermen still make like marathon racers at their tournament starts at dawn, but proper horsepower limits are enforced.

Precision cut helical gears — an outstanding feature — gives Royal Maroons the smoothest, quietest retrieving action anywhere, plus big shoulder "pull 'em in" power unsurpassed by any reel in the world.

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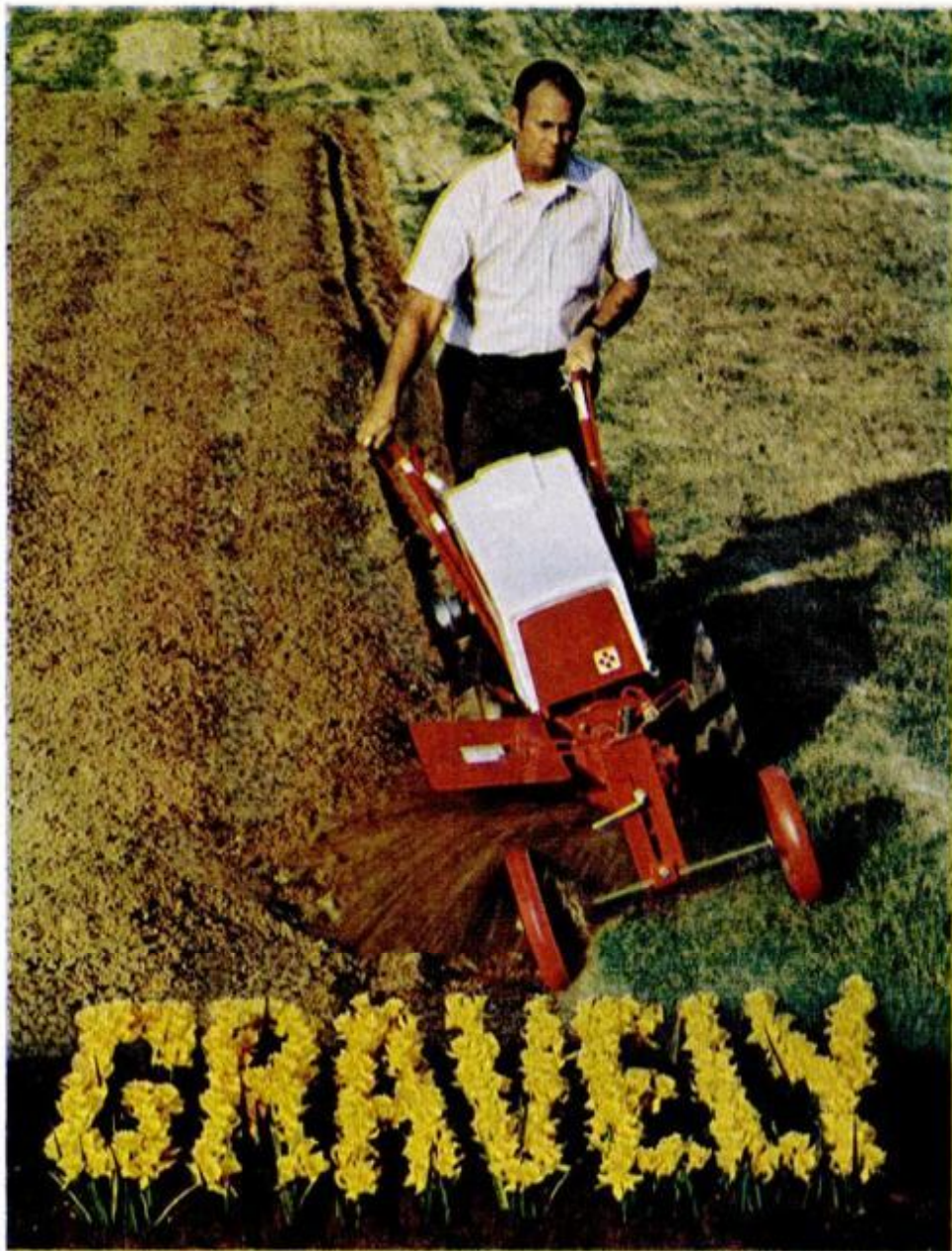
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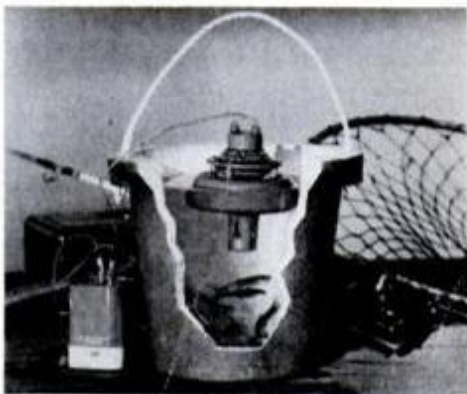
ALL OUTDOORS

(Continued from page 22)

For fishermen



Improving on inner tube, the Bass Buddy Fishing Float of polyethylene won't puncture, will support 300 pounds. It's \$50.



Aerator without air bubbles, the floating Mino-Mizer has spinning impeller that will "atomize" water. \$9.95 from Valley Tool.

Pistol grip for your fishing rod, the new molded rubber slip-on from Cotton Cordell, is \$1, charcoal black, and makes for easy casting.

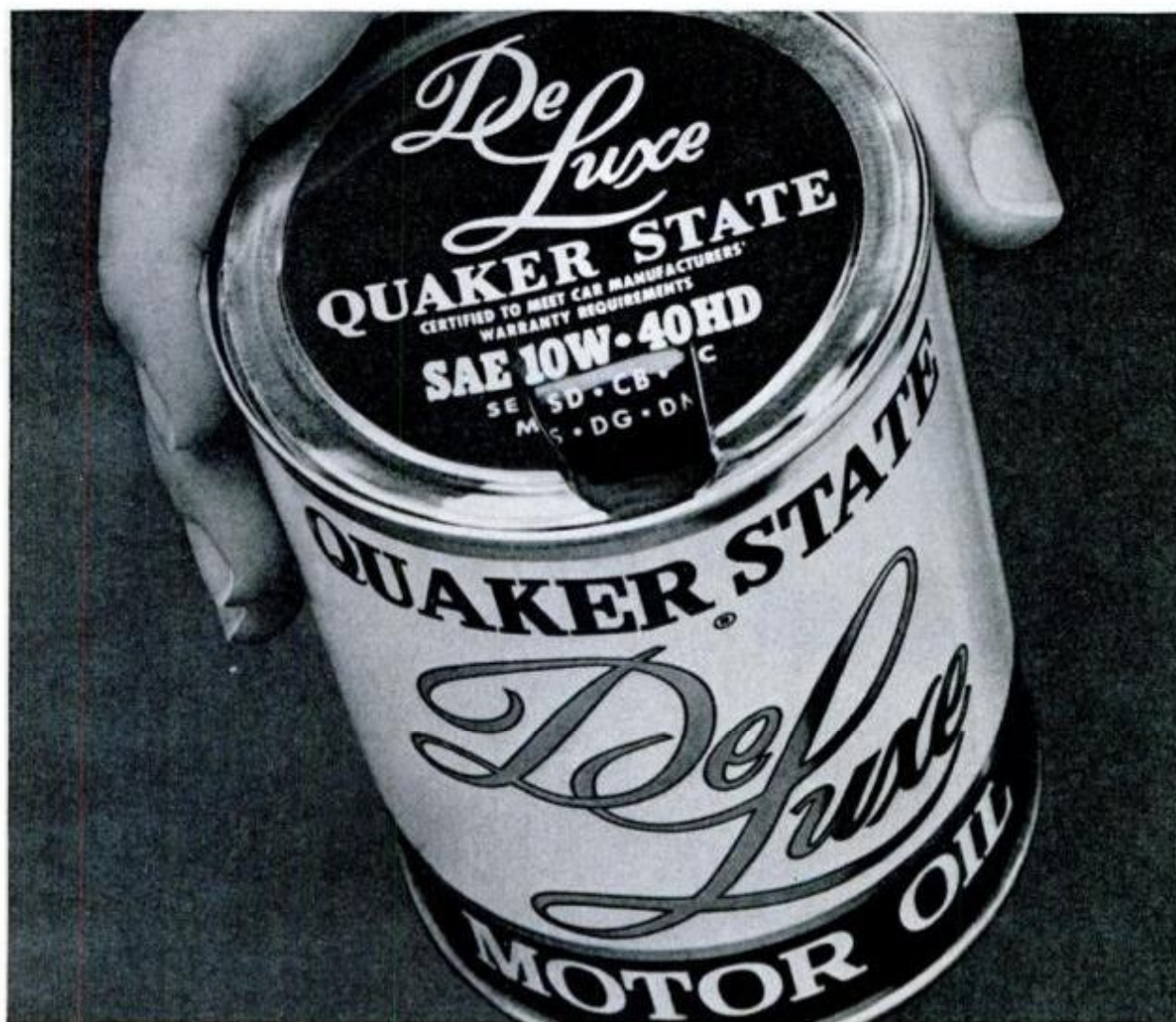


16 spinner baits can be hung up on the removable racks of new Plano 6500 tackle box; three wormproof trays have 20 slots.

(Please turn to page 30)

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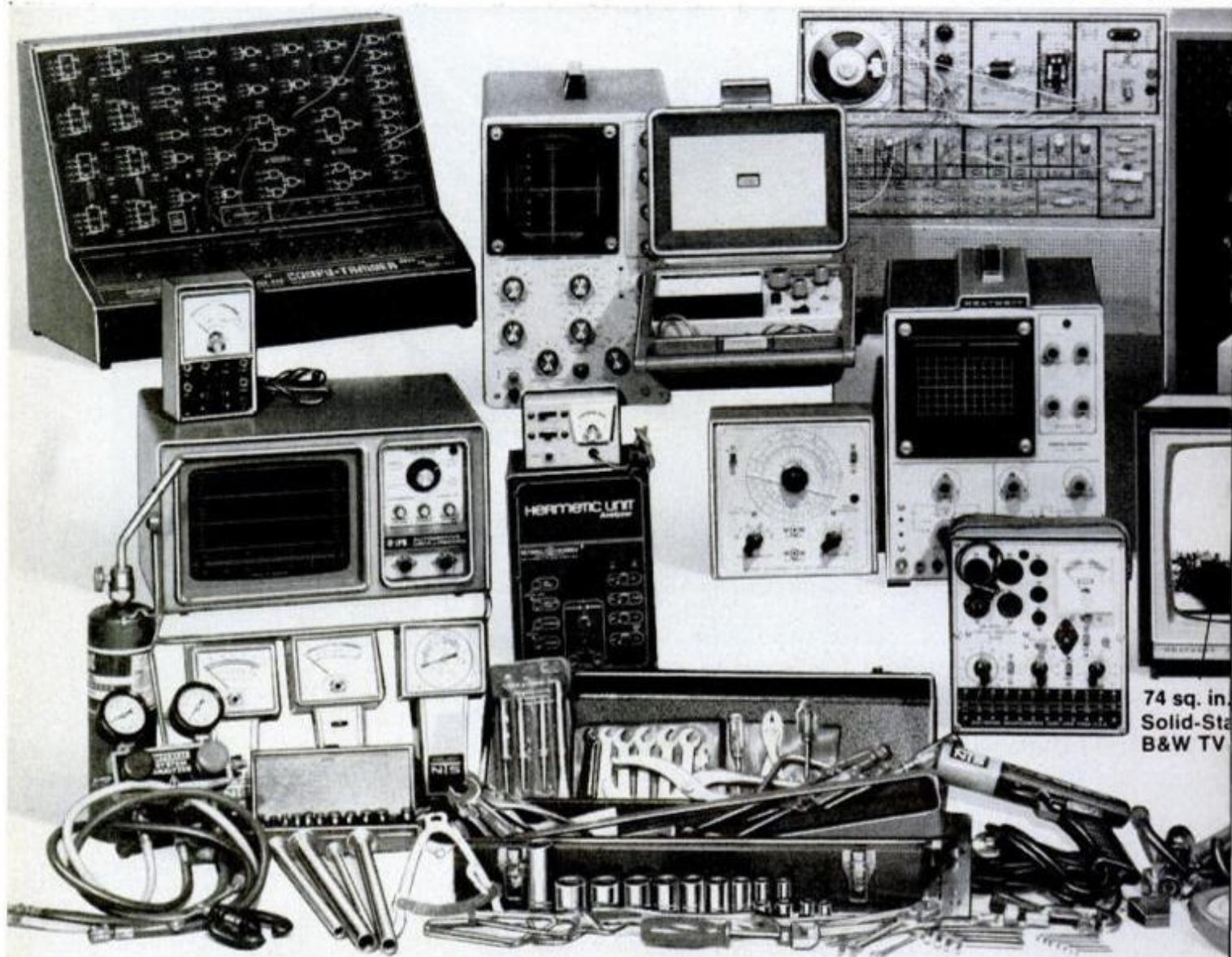
You can't buy a better oil than Quaker State. It's refined only from 100% Pennsylvania Grade Crude Oil. And it's fortified to neutralize acid, combat rust, and hold sludge and soot in suspension so they won't form engine deposits.

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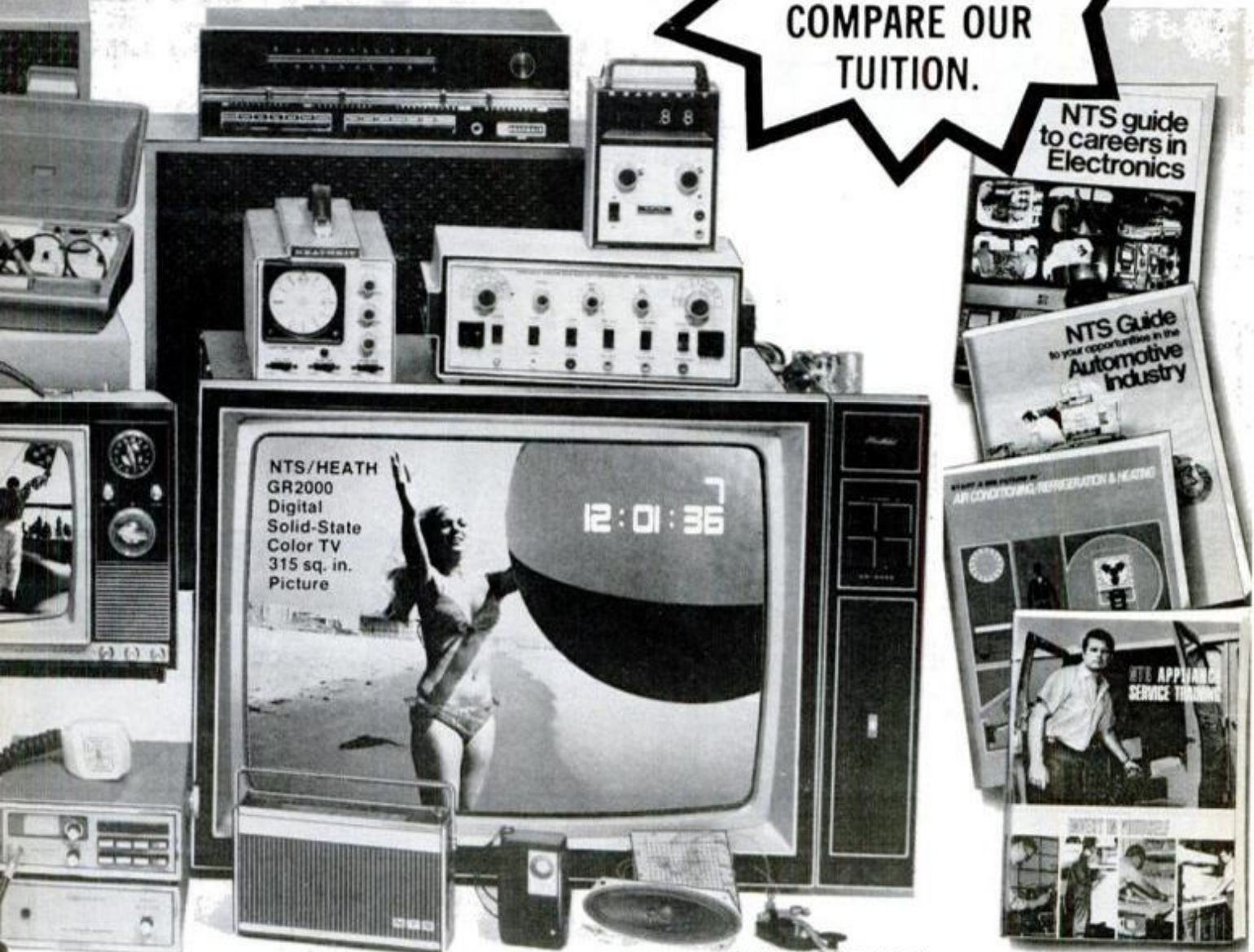
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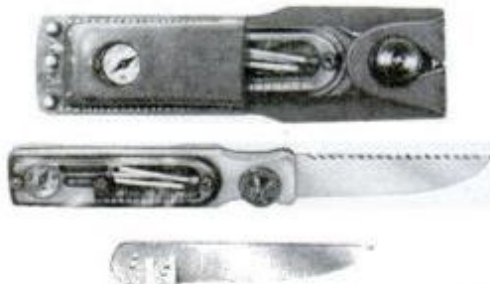
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ALL OUTDOORS

(Continued from page 24)

For shooters

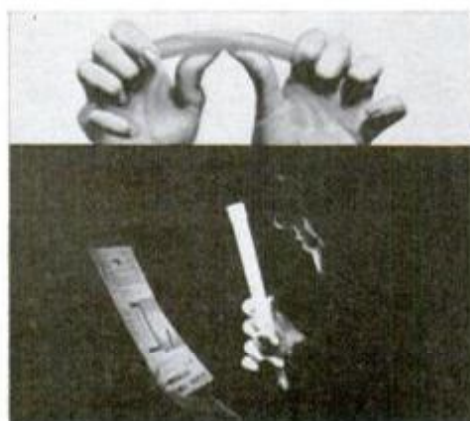
275 helpful views of old and new weapons, including numerous isometric drawings, are in the new Gun Digest Book of Exploded Firearms.



Survival knife with assorted aids inside, is \$10.45 postpaid from Simpson, Inc.; has two blades, matches, compass, hooks.



Working muzzleloaders, like Brown Bess, Continental, Harpers Ferry pistols, Minuteman rifle come in Ultra-Hi Products kits.



For emergency or compact convenience, the Liqui-Light, when bent to turn on, lasts three hours. Two for \$3.25 from Futura.

For boatmen



Fastest of offshore racers, 31-foot Little Cigarette holds 87-mph record, can now be ordered in pleasure boat model as well.



More torque for a trolling motor: The Ram-Glide Charger from Ram-Glas Products claims 32-pound thrust from this new 12/24-volt \$500 motor.



Offshore Deep-V fishing craft with Tunnel Drive that can come inshore to handle the shoals is Penn Yan's new 20-foot Bluefin.



Trailer boat that a mini-compact can pull, Clam from SPC Sales unfolds to change from storage compartment to 14-foot skiff.

(Please turn to page 128)

The "typical" American camper:

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he wants comfort
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Tilt-Wheel Steering
adjusts to all sizes.

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more comfortable.

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THE BICYCLE SHOP

Keep up the pressure

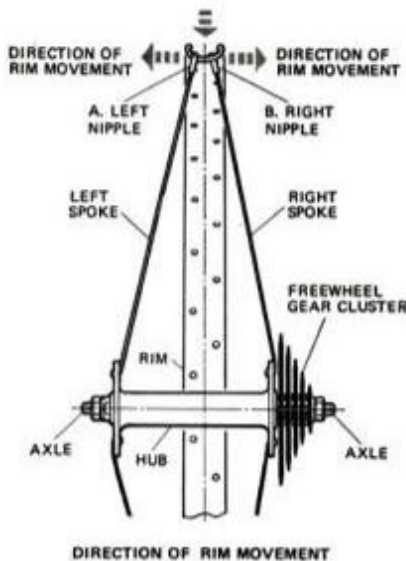
Why does a bicycle tire need more air pressure than an auto tire?—William McMann, New York.

Simply because auto tires are bigger, have more carcass and are stronger than bike tires, so they will support a load far better than comparatively flimsy bike tires. You should always keep bike tires up to maximum recommended pressure because the harder the tire the easier it rolls and the less prone it will be to flats caused by bruising. Fat balloon bike tires, for example, such as 26 x 2 1/8 in. size, need only 35 to 45 lbs. pressure, whereas skinny lightweight tubular tires can safely be inflated up to at least 100 p.s.i.

Round from square rims

How do you bend bicycle rims back into place?—Rich Thompson, Elizabeth, Pa.

If the rim is just out-of-true, either from side to side or out of round, follow these steps: Rotate the wheel until you find the untrue area. If the wheel is too far to the left,



tighten the spoke on the right to pull the wheel to the right. If this spoke is already too tight, loosen the spoke on the left. Repeat until side-to-side untrueness is removed. If the rim is too high (out of round), loosen the two spoke nipples at that point. If the rim is too low, tighten the two facing spoke nipples at that point.

Review *The Bicycle Shop* column on wheel truing (page 40, April '73), study the drawing shown here and see the section on wheel truing (page 449) in my book *The New Complete Book of Bicycling* (\$12.50, Simon & Schuster).

From one crank to another

I would like to install an alloy cotterless crankset. The Campagnolo line is too expensive for me. I am considering Stronglight. Can you tell the difference between Model 99 and Model 49 sets? I have also heard that Sugino cotterless are almost as good as Campagnolo. Is this true?—J. Peerson, Newark, N.J.

I agree that Campagnolo products are priced out of sight and that there are other products that cost much less and are just about as good. Stronglight cranks are excellent. Model 49 is available only as a dual chainring set, with teeth of 46, 48, 49, 50, 51, 52 and 53 teeth. Model 99 is available either as a dual or a triple chainset, with teeth from 28, 30, 32, 34, 36, 38, 40, 42, 44, 45 and by tooth up to 56 teeth. Chainrings between models are not interchangeable.

The Sugino five-pin chainset is excellent also. I prefer the Shimano Dura-Ace chainset, currently available as a dual chainring with 39 and 52 teeth or with the combination of 39 and 52 or 45 and 54 teeth. Shimano products are equal and in some instances better than Campy and cost about 25-30 percent less.

P.S., I have received a note recently from Don Wares of Wares Cycle Co., Inc., Milwaukee, that Campagnolo chainsets will accept Sugino and Saki-Ringo chainrings, which is great because Campy is not only expensive but often unavailable.

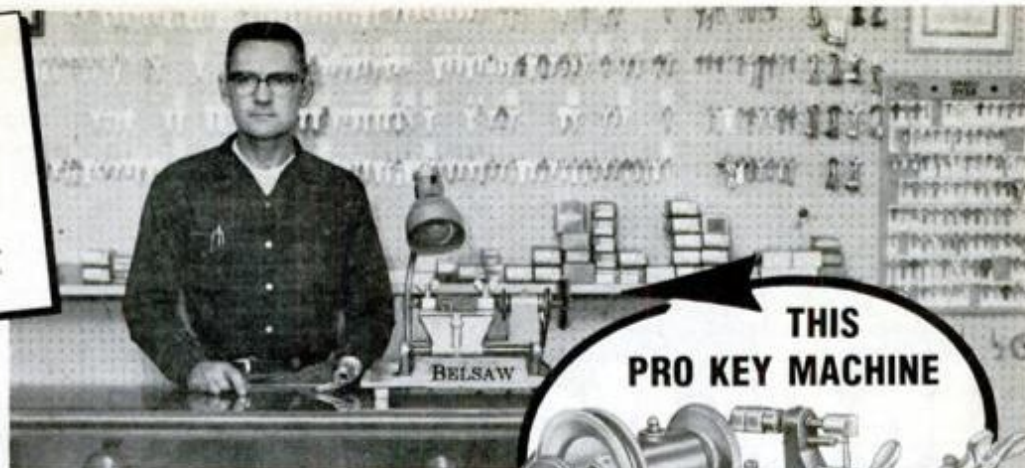
More about trikes

Your April '74 answer to "How to Ride a Tricycle" made me a little perturbed as I think your comments were biased and, frankly, not up-to-date. Any senior citizen reading this

(Please turn to page 34)

"War injuries left me severely handicapped, but I'm making a very good living in Locksmithing, thanks to your course. Word of mouth advertising has been enough to make my business a financial success from the start. Besides, I'm my own boss doing something I thoroughly enjoy."

says Glen Johnson,
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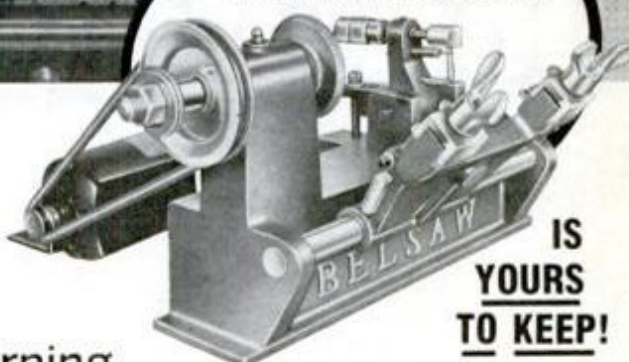
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Ed Boyle, Pittsburg, Penna.

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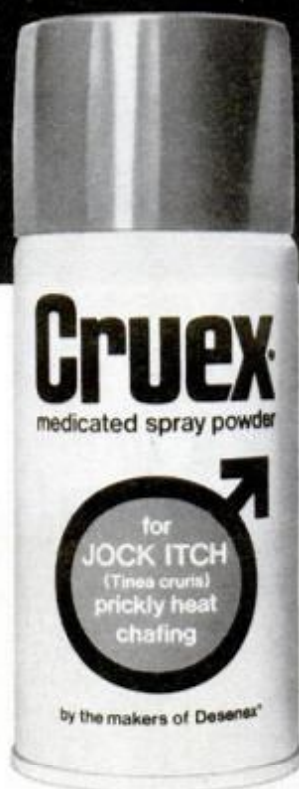
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THE BICYCLE SHOP

(Continued from page 32)

answer might be influenced to pass up the enjoyment of riding a trike. Granted, older models tip very easily. However, I now own a Villager 3 made by Alco Cycle Products, Inc., 451 Third St. S.E., Largo, Fla. I can put the front wheel at right angles with the back wheels and turn in a complete circle without tipping over. —Ann Van Arsdale, Venice, Fla.

You sent a copy of your letter to the Alco people, and of course I heard from them. I asked Alco to lend me one of their trikes so I could test it firsthand, but so far they have not done so. However, I can say, from checking the Villager 3 specs (photo) that this model, with its 20-inch



wheels, is low slung and close to the ground. It also has the saddle positioned almost over the rear axle. Given the small wheels and the rider's weight far to the rear of the trike, this model should be considerably less "tippy" than conventional trikes with 26-inch wheels and rider's weight further forward.

First step in racing

I would like to get into racing but can't find the headquarters of the Amateur Bicycle League of America. Letters to a previous address are returned.—Ignacio Gispert, Wilmington, Del.

You're starting with the right organization, anyway. The ABLA, the governing body of amateur bicycle racing in the United States, determines who goes to the Olympics. Current address is Box 669, Wall Street Station, New York, N.Y. 10005. ★★★

If you have any questions about bicycling send them to The Bicycle Shop, 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.

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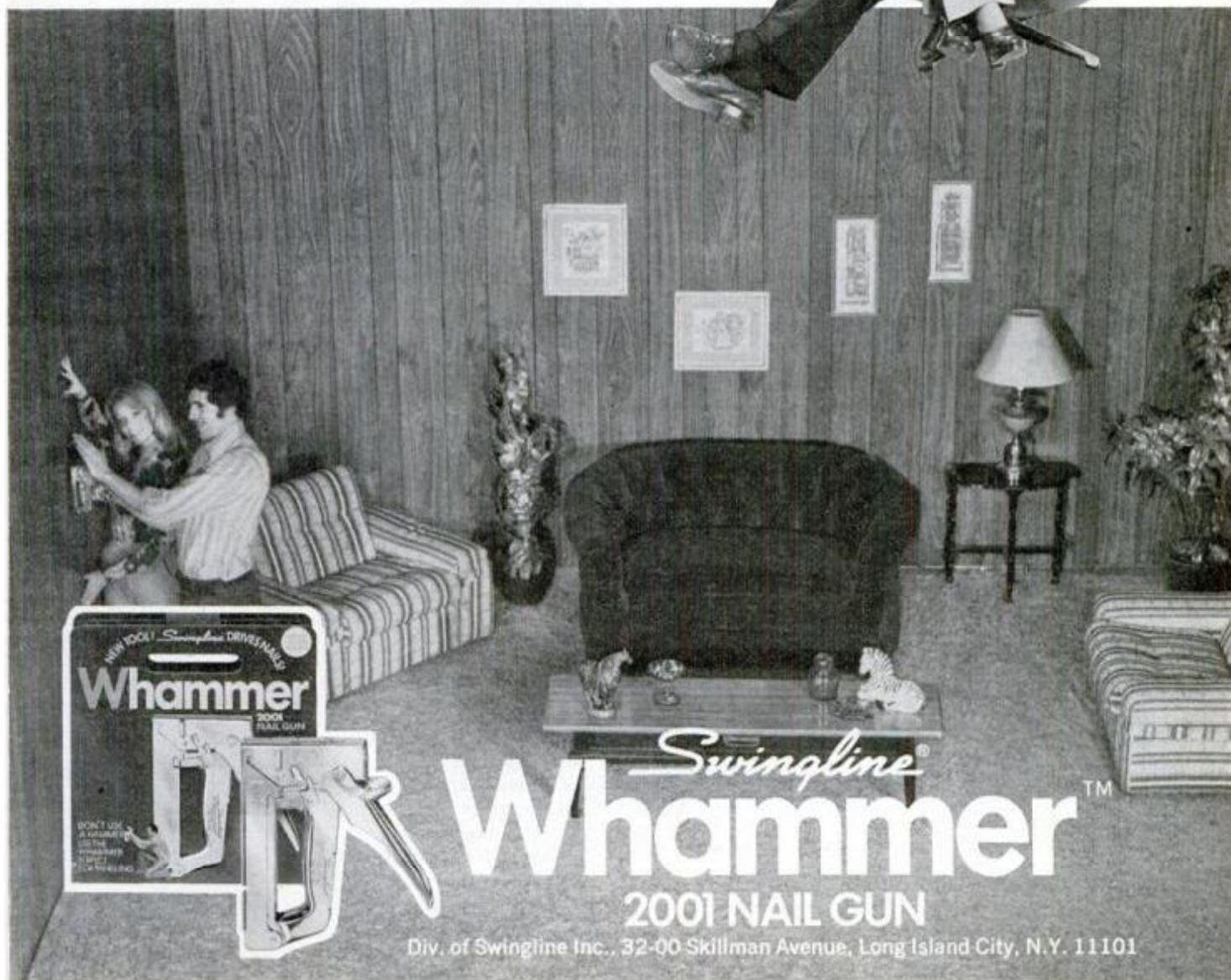
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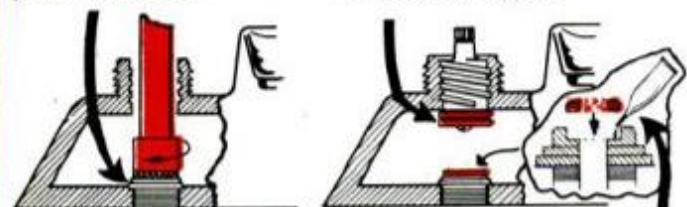


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\$300 macro-zoom lens is slick and sharp

by Lorraine McKeown



Spiratone 80-240-mm macro-zoom lens focuses down to 14½ inches—more than close enough for arm's-length shots like the one above (see result, left). Lens's built-in tripod mount revolves for vertical shots. Performance is good, price is \$295.

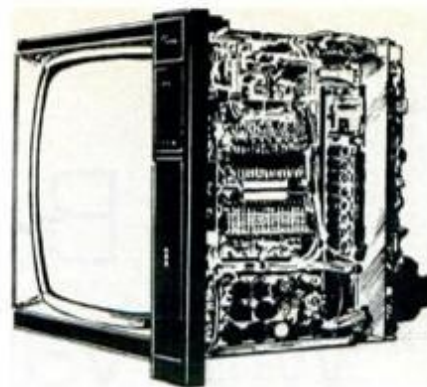
A bit over a year ago, macro-zoom telephoto lenses that could focus from here to the horizon were news. Today, the news is that Spiratone, noted for mail-order bargains, has one for \$295—the Sun 80-240-mm f/4.

The Sun proved easy to hand-hold, despite its 42-ounce weight; I found I could get reasonably sharp results at speeds as slow as 1/60 second. I found focusing and zooming with the closely spaced control rings easy—even when tracking fast-moving wildlife or children (is there a difference?). But the other photographer in my family found it less convenient than the single, turn-to-focus, push-to-zoom control ring he's used to.

We both found this an ideal outdoor lens. As you move in from the forest to the trees, to individual flowers, you just turn the focus ring till you're within seven feet of your subject. After that, turn the zoom ring to 240 mm, pull back the close-up lever, and focus with the zoom ring down to 14½ inches from the front of the lens, for an image that's one-fourth life size. Other macro zooms may focus closer, but we found this more than adequate—and the field was almost flat enough for highly demanding copy work, which came as a pleasant surprise.

The built-in, collapsible sunshade and the multi-coating on the lens elements kept flare, sun spots and color loss to a minimum, even shooting right into the sun. Not bad, Spiratone, not bad at all. ★ ★ ★

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There's only one way a student can (1) get the feel of commercial circuitry, (2) learn bench techniques while building a set from the "ground" up, (3) do over 25 "in-set" experiments, and (4) end up with a 25" diagonal solid-state color TV with console cabinet and all the modern features you'll find on sets you'll service. Nobody else can give you this combination of advantages because nobody else invested the time and money to design a set with learning in mind.

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enroll students by mail only. We pass the savings along to you in the form of low tuition fees, extras like a cabinet for the TV, a solid-state radio you learn on as you build, and actual instrument kits for servicing TVs . . . triggered sweep oscilloscope, integrated circuit TV pattern generator, and 3½ digit digital multimeter. You can pay hundreds of dollars more for a similar course and not get a nickel's worth more in training and equipment.

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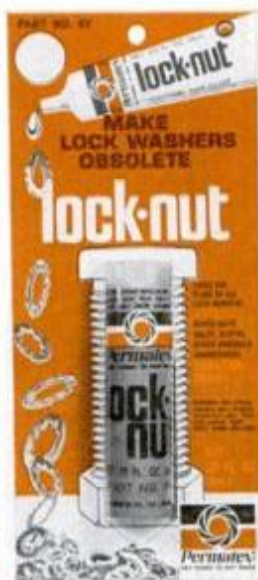
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When you go shopping for what you need, go where the pro goes. . . your full service automotive supply house. They have more of what you need than anyplace else in town. And they have a priceless commodity you won't find at a discount outlet. Knowledge and experience. That man behind the counter knows cars and what goes into them.

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NASCAR pros use Permatex products, too. See them at SPEED WEEKS, 1975, at Daytona International Speedway. If you'd like a couple of official Permatex decals for your machine, send us a stamped self-addressed envelope and two bits. We'll do the rest.

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WALL DETERGER

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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.

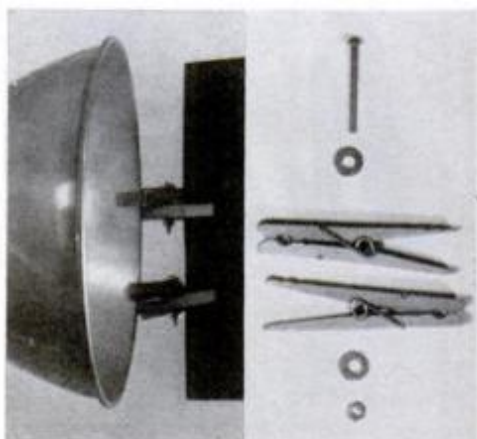
There are three easy-to-use Von Schrader machines. You need no special skills or education to operate them. (1) CARPET DETERGER®. Its performance cannot be duplicated by any other cleaning machine. (2) UPHOLSTERY DETERGER®. Using dry foam, cleans fabrics beautifully and safely. (3) WALL DETERGER®. Washes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

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PHOTO HINTS

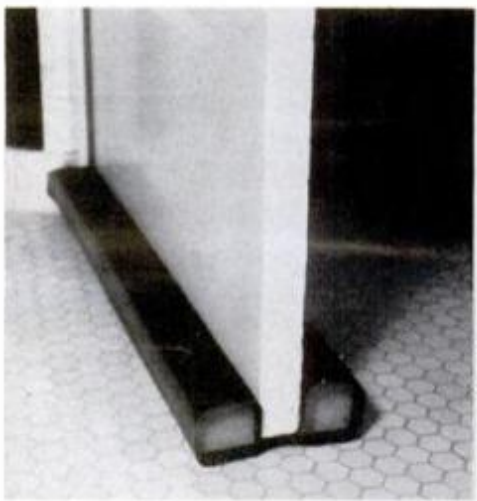
FROM READERS



Clothespins hold 'barn doors'

Two spring clothespins bolted together through their spring eyes make a good clip to attach "barn-door" light directors to floodlamps; use two per door for stability.


—Grace B. Weinstein, Los Angeles



Light shield for darkroom door

Getting rid of that light leak under the door can be a problem with a room used only temporarily for developing. I solved it with a scrap of cheap black plastic upholstery material and two chunks of plastic foam. Cut the material 20 inches long and 1 inch wider than the door; fold it lengthwise to overlap 1½ inches at the center, and run a double row of stitches, 1 inch apart, along the overlap. Insert a length of 2x2-inch foam (each an inch shorter than the door) into each pocket in the plastic, and slide the finished light shield under the door. The shield will slide easily over hard or carpeted floors.


—Charles H. Crabill Jr., Coronado, Calif.



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—Francis von Schrader, President

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for all-day, stall-free cutting. For maximum safety, the blade tilts away from the operator when cutting bevels and the like.

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Frankly, the best way to convince yourself this is the most saw for your money is to see what our competition has for the money.

So shop around. Compare features. See why we say, "Let the buyer be aware."



Rockwell International

For more information, write: Power Tool Division, Rockwell International, Suite 303, 3171 Directors Row, Memphis, Tenn. 38131.

HINTS

FROM READERS



More use from sabre-saw blade

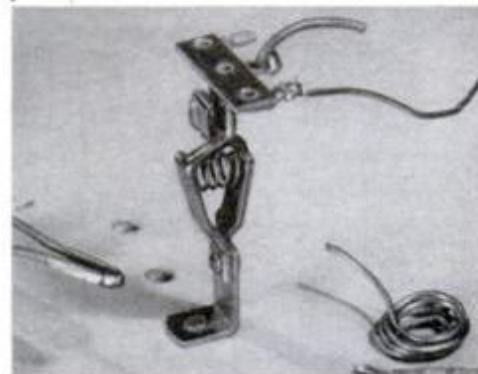
In normal use, only the short section of the sabre-saw blade that does the cutting becomes dull. To get cutting use from teeth below the worn portion, I bolt a piece of $\frac{3}{4}$ -in. plywood to the saw's shoe. To stretch the blade even farther, start with a $\frac{1}{4}$ -in. "sole" and move up to $\frac{1}{2}$ and then $\frac{3}{4}$ -in. thicknesses.

—Andrew Vena, Philadelphia



'Fix' book bindings for less wear

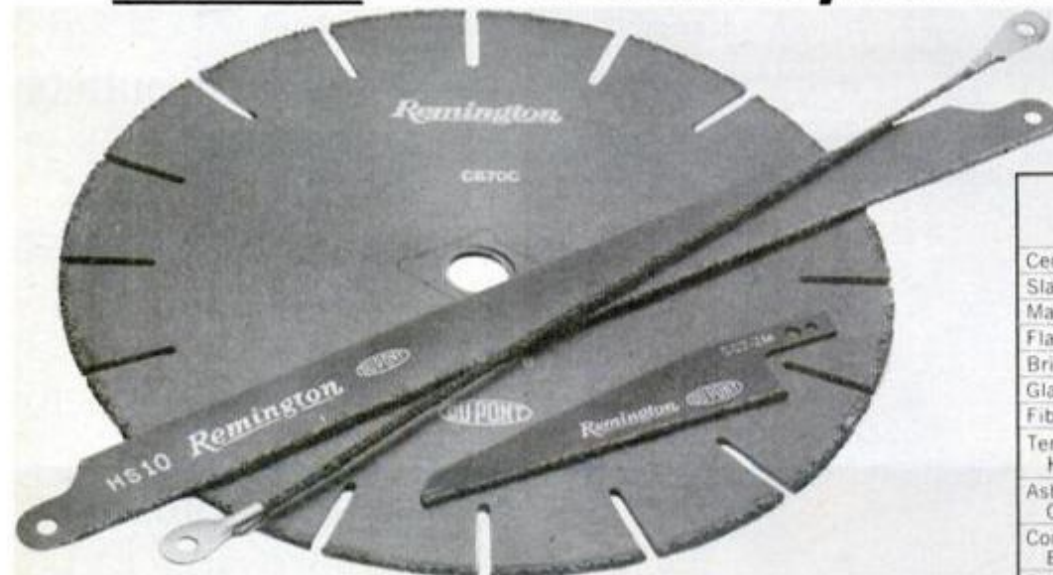
To keep bindings of frequently used reference books from fraying excessively, especially at the bottom where wear is greatest, I spray them annually with two coats of artist's clear fixative. Available at art supply and hobby shops, the fixative gives protection for just pennies per book. Either glossy or matte fix can be used.—M.J.O'Brien, Hallandale, Fla.



Shelf brackets on workbench

A few pin-type shelf brackets, used with $\frac{1}{4}$ -in. holes drilled at a number of locations in your workbench top, can be very handy. They serve, for example, as quickly removable planing stops (top photo). Brackets with battery clips fastened to them are convenient for holding small parts for soldering.—Mike McMullen, Santa Margarita, Calif.

True Grit. When ordinary blades can't cut it.



RECOMMENDED CUTTING APPLICATIONS FOR "GRIT-EDGE" BLADES

Material	Rod Saw	Hack-saw	Saber Saw	Circ. Saw
Ceramic Tile	X	X	X	
Slate	X	X	X	
Marble	X	X	X	
Flagstone	X	X		
Brick	X	X		
Glass	X	X		
Fiberglass	X	X	X	X
Tempered Hardboard			X	X
Asbestos Cement	X	X	X	X
Composition Board			X	X
Synthetic Marble	X	X	X	X
Plywood			X	X
Plaster			X	X
Counter Top Material	X	X	X	X
Hardwood Flooring			X	X
Stranded Cable	X	X		
Spring Steel	X	X		
Hardened Chain	X	X		
Stainless Steel	X	X	X*	
Tailpipe Bolts	X	X		
Cast Iron	X	X		

*requires coolant and variable speed machine.

GRIT-EDGE When ordinary blades can't do the job, Remington "Grit-Edge" blades take over. They take the tough out of tough jobs, saw through "unsawable" materials.

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Remington "Grit-Edge" blades are

available for Hacksaws, Saber Saws, Circular Saws, Bandsaws, and as a Rod Saw. The only thing ordinary about them is their low cost, which is a bargain considering their long life and the jobs they do.

For more information, see your hardware dealer or write: Grit-Edge Products, Dept. 835, Remington Arms Company, Inc., Bridgeport, Connecticut 06602.

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• H. D. B. writes: "It all started from an initial \$11.00 deposit on your kit. From your spare-time home business to \$62,000.00 last year I consider excellent progress. And, I am still growing. I've never been successful until you came along . . ."

• . . . and, E. H. T. now has five dealers working for him in order to supply all the stamps that were ordered as a result of an advertisement. He says, "Success is assured when you manufacture a commodity that everybody needs. There is no better way to build a business than manufacturing your own product."

• "If I could not get another Warner Rubber Stamp Shop, you couldn't beg, borrow or steal the one I have now," writes D. R. N. of California. "I am even getting business away from competitors because I do good work and give a guarantee."

• E. C. N. of Illinois has increased his retirement income by an average of \$100.00 per week. His customers are pleased with his service and he has expanded his services to surrounding communities.

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Find out how YOU can build, step-by-step, to BIG PROFITS . . . and PERSONAL INDEPENDENCE.

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Tempered-glass inserts make storm doors extra safe

Replacing ordinary glass in storm doors with safety glass is an increasing concern of homeowners aware of the injury potential if a child runs into the glass or an adult accidentally falls against it.

Although safety glass includes wire glass, laminated glass and rigid safety plastics, many homeowners prefer tempered glass because of its durability, scratch resistance, good appearance and high strength. Tempered glass is up to five times stronger than ordinary glass of the same thickness and withstands greater impact. If it should break, the glass crumbles into relatively small, blunt particles to reduce the chance of serious injury.

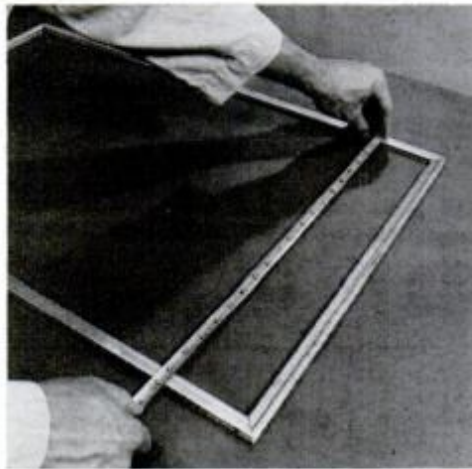
Because tempered glass cannot be cut, homeowners often had difficulty finding the proper-size replacement panel for their storm doors. A distributor would have to stock as many as 750 or more sizes of tempered glass to fit all storm-door makes and models.

PPG Industries recently introduced a tempered safety-glass replacement panel adaptable to most storm doors. It can be installed by the homeowner using ordinary tools in less than an hour.

The replacement panels are made in nine stock sizes of Herculite K tempered glass to fit more than 70 percent of storm doors now in use, and come with a wide plastic surround already bonded to the glass. The surround is like a mat framing a picture except that it is an integral part of the tempered glass. The plastic has score lines at $\frac{1}{8}$ -in. increments for easy cutting, and each edge can be trimmed up to $1\frac{1}{2}$ in. Replacement panel dimensions thus can be varied as much as 3 in., both in length and width.

Tempered-glass replacement panels currently are being produced in the following inch sizes: 18x26, 21x29, 21x32, 29x27, 29x30, 30x32, 27x38, 30x38 and 32x41. As an example of size flexibility, the 3-in. trim allows the 18x26-in. tempered-glass unit to accommodate, in $\frac{1}{8}$ in. increments, panel sizes as small as 15x23 in.

Panels are available through glass distributors and shops specializing in storm doors. A 30x32-in. tempered-glass panel, for example, which will fit a common 29x31-in. opening, runs about \$16. ★★★



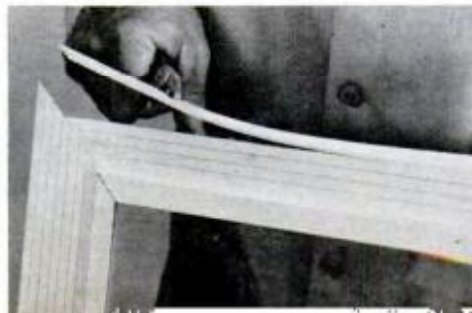
1. First, measure inside length and width of the old storm-door glass frame to determine overall size of the replacement.



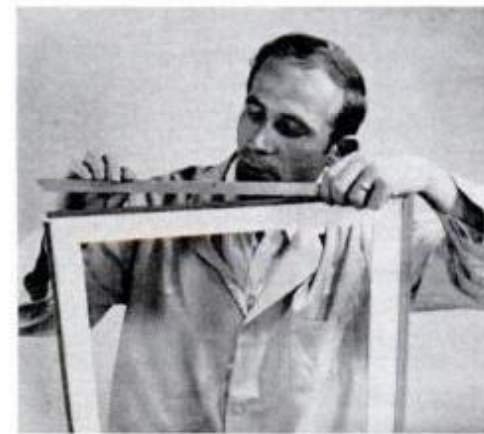
2. Remove metal frame from the old glass and save it by prying off metal clip found at each corner with a screwdriver blade.



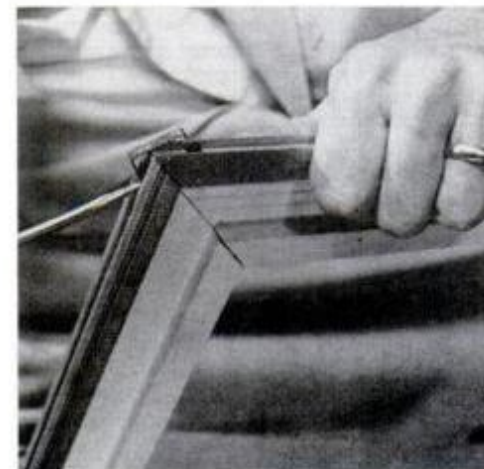
3. Use spaced $\frac{1}{8}$ -in. grooves in plastic frame bonded to edges of safety glass as guide lines for scoring with utility knife.



5. Reinstall the original rubber gasket that was taken from the old storm-door glass over edges of new plastic frame.



6. Replace sections of metal frame firmly over the gasket surrounding the plastic frame in same manner as originally held.



7. Lock the four metal frame sections together at the corners, as a final step, by reinsertion of the original clips.

4. Snap off the plastic with pliers by bending along knife score. You bend along the full length of the plastic score.

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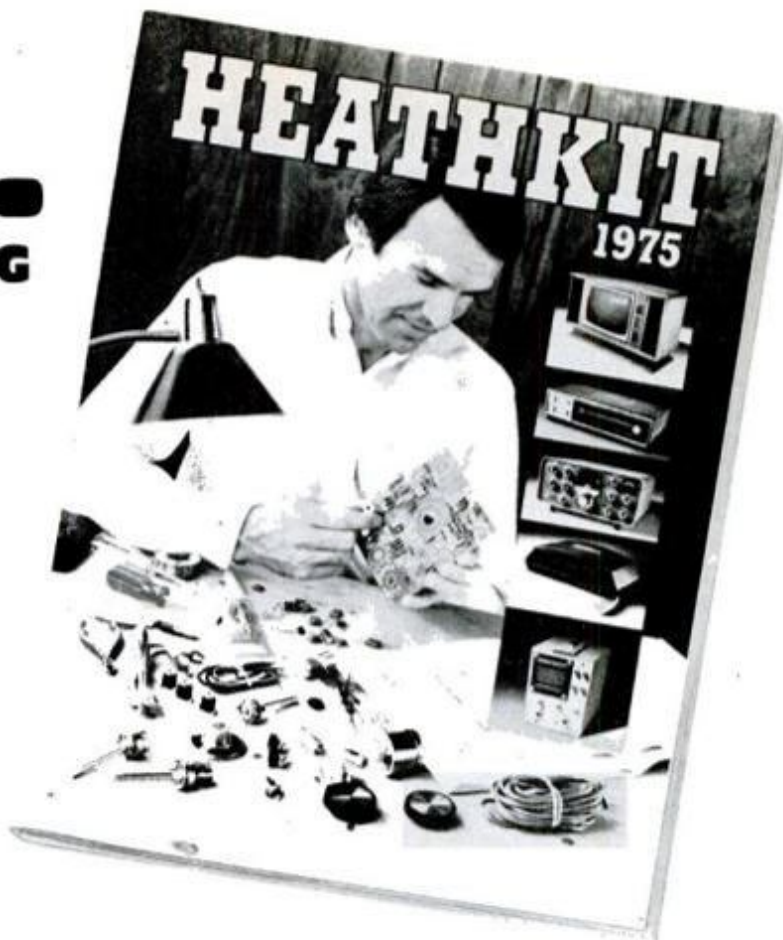
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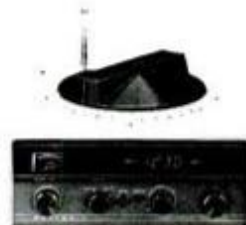
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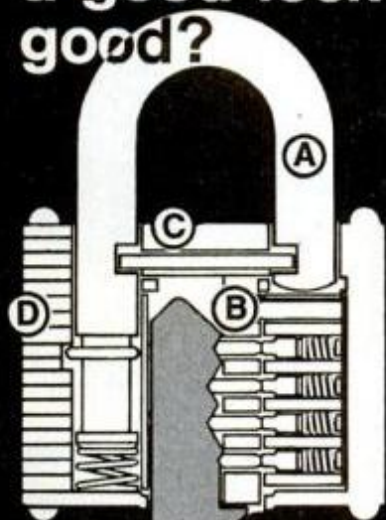
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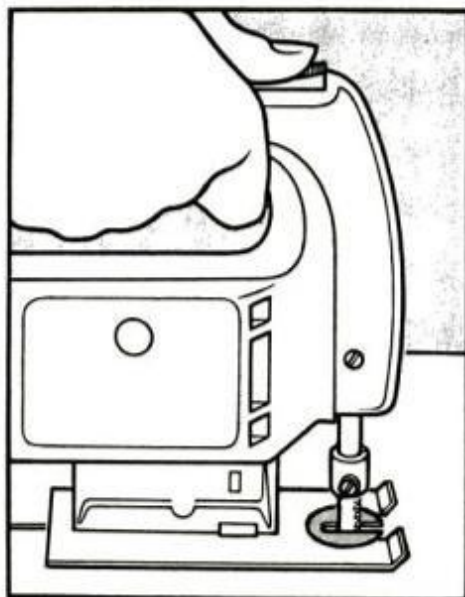
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QUESTIONS ANSWERED BY W. CLYDE LAMMEY



HOMEOWNERS' CLINIC



Cutting plywood

I have trouble cutting plywood with a sabre saw without chipping the edges, especially in 1/4 and 1/2-in. thicknesses. I like neat workmanship. Can you guide me?—Donald Asp, La Puente, Calif.

Use a fine-tooth (plywood) blade in the saw, and use a free-floating insert, as shown above, with it—get the one made for your saw. Keep the saw's shoe flat on the work and use a slow feeding pressure.

Fireplace reflector

I have gas logs in my fireplace and with the higher cost of heating, I'm thinking of installing a sheet-aluminum reflector back of the logs. Is this practical? Will it reflect more heat into the room?—H. Oakes, Lincoln, Neb.

If your fireplace is a conventional masonry type, it is lined with firebrick, which in itself is reflective. For this backing to be effective, it must be free of soot from burning wood or coal. Soot usually can be removed with a scrub brush and a strong detergent solution. If the backing is kept clean, there should be no need for a metal lining—but you may wish to experiment. To be effective, the metal must be kept clean and bright, and if you're ever going to use it with ordinary logs, it should be fitted so that you won't have to worry about it falling over

when burning logs roll. For units you can buy to get more heat from your fireplace, see *Fireplace Heat Savers*, page 174, Dec. '74 PM.

No match

Recently I filled small holes in a latex-painted wall. I used the same paint as that used originally, but the spot-painting is of slightly different color and it's glossy, not flat. Why is this, and how do I correct it without repainting the entire wall?—Barney Gill, Boston

It sounds as though you didn't seal the patches. The proper procedure is to sand the filled area, dust and apply a coat of shellac; then rub lightly with steel wool, dust again and apply the paint—which must be stirred thoroughly.

Leveling chair

I have an older chair that won't sit level—stable—on the floor. All four legs are turnings of such a design that I can't cut off the lower ends without altering the shape. Is there any other way to stabilize this chair?—Tom Smith, New Orleans

Place the chair on a surface you know is level and determine how much is to be cut off to stabilize the chair. If this is only a fraction of an inch, say 1/4 in., this much might be removed without altering the turning.

If more than this amount must be removed, then you might resort to a leg leveler, or glide. This gadget is fitted tightly into a hole drilled in the lower end of the short leg; when in place it permits adjustment of the length of the leg until the chair sits without any wobble on a level surface. When installing the leveler, be sure the hole is drilled concentrically. ★★★

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. HB5, Box 1014, New York, N.Y. 10019.

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



SCIENCE WORLDWIDE

Plasma for bearings, not blood

A new self-lubricating bearing material that can withstand temperatures up to 1650°F. has been developed at NASA's Lewis Research Center, Cleveland. It is a combination of metal, glass and calcium fluoride. The glass provides oxidation protection and the calcium fluoride provides high-temperature lubrication.

The photo below shows how both are applied by a plasma spraying technique. (A plasma, which contains many high-energy particles, is similar to a gas.) Parts made of the composite material have proved useful in such high-temperature applications as rod-end bearings and pivots for jet engine control systems, seals for automotive turbine regenerators, and piston rings for reciprocating compressors.



Seat belts stop ricochets

If you don't wear a seat belt while driving, you may be endangering more than just your own safety. According to a study by researchers at the University of Michigan, a significant number of auto-crash injuries are the result of collisions between unrestrained occupants of the same vehicle. Of some 4000 accident reports examined by the UM researchers, occupant-to-occupant collisions caused or aggravated injuries in 22 percent of the crashes where the car had more than one person in it.

"Not only are injuries produced by the direct impact of one occupant to another, but often such contact forces an occupant into or against some interior car structure," say the researchers.

For that bloated feeling

Recent research at Stanford University indicates that some people can't digest table sugar because of a hereditary deficiency of sucrase, an intestinal enzyme that breaks down sugar into products that can be assimilated by the body. If the enzyme isn't present, sugar remains in the intestine and by osmotic action draws water out of the tissues into the intestine, creating a bloated feeling and causing diarrhea.

One group of people in particular—the Eskimos—lacks the sugar-breaking enzyme.

How to see in dark

Looking like something that has debarked from a flying saucer, an Army man (below) tests night vision goggles at Fort Greely, Alaska, where winter nights are very dark (and very cold). Similar to the Starlight Scope used for night observation in Vietnam, the goggles detect infrared radiation.

These goggles were developed by ITT Corp. scientists, who are using the basic principle involved to aid victims of an eye disease that causes night blindness.



Training the handicapped



A carefully engineered chair, designed to teach handicapped tots to learn to use their muscles, is now in use in hospitals and special schools. It's used for children suffering from diseases like cerebral palsy and muscular dystrophy. The invention of Pat Mancino, a former teacher of brain-damaged children in New Haven, Conn., the chair has harnesses for the body, neck, feet and legs, enabling patients to sit upright. A counterbalanced pulley device permits the child with weak arm muscles to learn to feed himself. Gradually, as the tot gains strength and coordination, supports are eliminated until he is able to function on his own.

Search for resources

A cross-country checkerboard pattern of 7500 exploratory drill holes—20 miles apart and 3 miles deep—is urged as a first step in the systematic exploration and development of untapped U.S. mineral and fuel resources.

Originator of this elaborate plan is Dr. John D. Ridge of Pennsylvania State University, who estimates that the project would cost about \$3 billion. He thinks that "such a systematic program, combined with computerization of all resource data and nationalization of all mineral rights, could conceivably uncover an estimated \$750 billion worth of raw materials." ★ ★ ★

Photographed at Fisher Lake, Nova Scotia.



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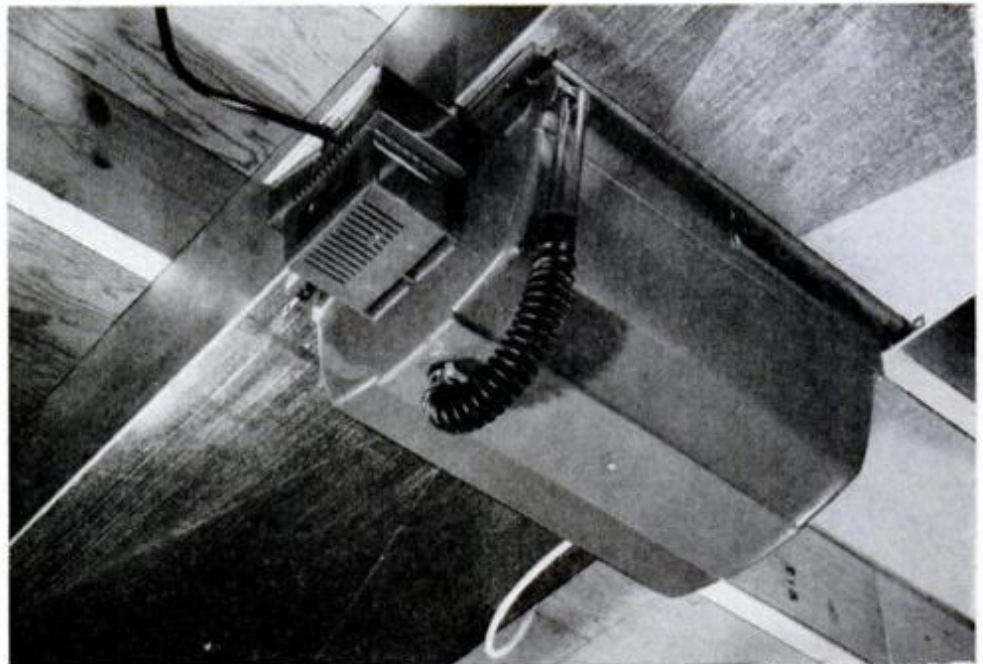
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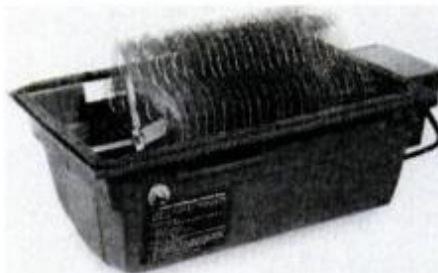
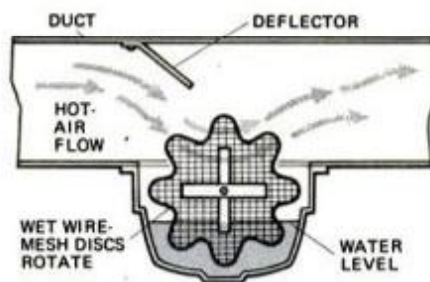
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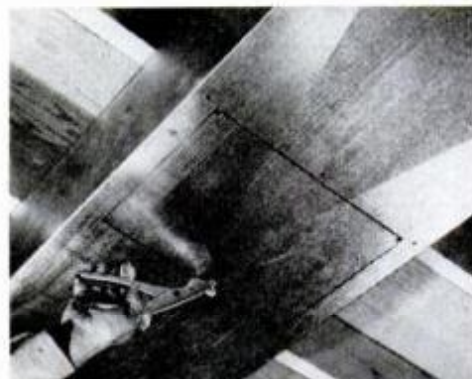
How to stay warmer by using less heat



Photos: Robert D. Borst



Humidifier handles furnace up to 200,000 B.T.U. output. "Sight glass" on the drain tube shows water level in the reservoir.



Best mounting position is across duct. Unit requires 10 3/4 x 14 3/4-in. opening.

When the air in your home is heated and no moisture is added, it becomes dry and actually makes you feel cool even though room temperature might be 80°F. The reason? Your body loses moisture fast when the air is dry, and when rapid evaporation takes place, it has a cooling effect.

That's why "wet" air tends to make you feel warm. With 30 to 40 percent relative humidity at 72°, you not only feel warmer at a lower temperature, but you save fuel. It is said that you can save 3 percent on your fuel bill for each degree the indoor temperature drops.

Thus, it pays a homeowner to add a power humidifier to his warm-air heating system. One of the easiest units to install and service is the Ultimatic, which mounts to the underside of a heat duct. It adds moisture to dry air as the air stream passes through 24 water-laden, wire-mesh discs which slowly rotate.

Hardened lime deposits can be removed annually from the polypropylene reservoir of Model 727 by mere flexing of the soft plastic. To install it, simply cut an opening in the underside of the duct, drill a few holes for the loops of wire mounting frame, connect the reservoir to a water pipe with plastic tubing and wire to furnace blower motor. Price is \$114.95. Ultimatic Products, Inc., 5300 North Otto St., Rosemont, Ill. 60018.—Wayne C. Leckey, Home and Shop Editor



Our new compacts work like they were raised on the farm.

Tough, rugged, dependable... year around. That's the kind of performance we've been building into farm tractors for over 60 years. And that's the way our lawn and garden tractors perform today.

These new 8 and 10 hp tractors aren't just big riding mowers. They're compact tractors with big tractor features. Like our pivoting front frame with the mower deck attached directly to axle, follows lawn contours without scalping.

Rugged 3-speed transmission—so grading, tilling, snow throwing and more are as easy as mowing. You can change most attachments without tools. Maintenance is easy too, thanks to our new flip-up hood. So is starting—it's electric.

But see for yourself how much our new compacts learned down on the farm. Stop at your A-C dealer. Or write 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.

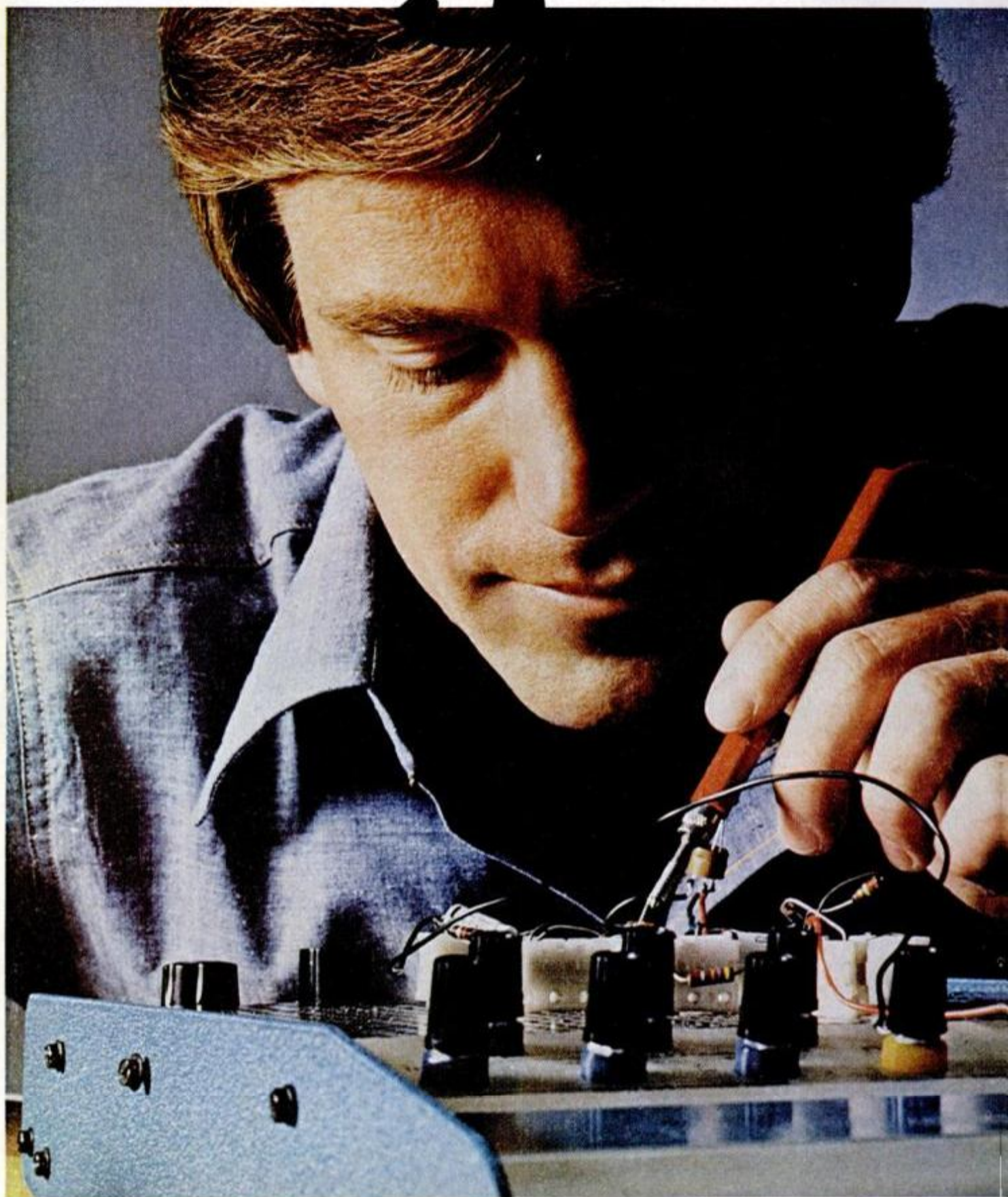
**BUILDING BIG ONES HAS MADE
OUR SMALL ONES BETTER**



ALLIS-CHALMERS
LAWN AND GARDEN EQUIPMENT

You gain new skills as an electronics troubleshooter in a fascinating learn-at-home program from Bell & Howell Schools. It includes building and experimenting with the new generation color TV.

go ex



Exploring.

If you're like most men, deep down inside there's still a bit of the boy who loved to go exploring... and who'd love to go again. Well, now you can.

Only this time you'll explore the expanding world of electronics... a world more fascinating than any you ever dreamed of as a boy.

Learn by exploring... Bell & Howell Schools offers an exciting way for you to gain new occupational skills in electronics.

Everybody enjoys learning something new, but why learn it the old way? Classes to go to. Lectures to sit through. And only a bunch of books to keep you interested.

Bell & Howell Schools' adventure in learning is a far cry from all that.

You can probe into electronics and learn exciting new occupational skills right in your own home, in your spare time. On whatever days and whatever hours you choose. So there's no need to give up your present job and paycheck just because you want to learn something new.

What's more, when you're exploring a field as fascinating as electronics, reading about it is just not enough. That's why throughout this program you'll get lots of "hands on" experience with some of today's latest electronic training tools.

You'll be stimulated for hours on end as you build, experiment and learn while using the latest ideas and techniques in this fascinating field.

As part of the program you'll actually learn to build and work with your own electronics laboratory. Using it to put many of today's most dynamic electronic discoveries to the test... including electronic miniaturization.

Among the things you'll discover is how the development of tiny integrated circuits has made possible an electronic calculator small enough to fit into a shirt pocket! And a wristwatch that flashes the time with the push of a button.

You'll investigate the concept of "logic circuits." An idea that has been with us for centuries but only in recent years put to use as the "brain" behind all the new digital consumer appliances we see today.

But more important than anything else is the new occupational skills you'll develop in electronics troubleshooting. While no assurance of income opportunities can be offered, you'll develop skills that could lead you in exciting new directions. Use your training:

1. To seek out a job in the electronics industry.
2. To upgrade your current job.
3. As a foundation for advanced programs in electronics.

You build and perform many exciting experiments with Bell & Howell's Electro-Lab? An exclusive electronics training system.

Using our successful step-by-step method,

you'll build:

1. A design console, for setting up and examining circuits.
2. A digital multimeter for measuring voltage, resistance and current (it displays its findings in big, clear numbers like a digital clock).
3. A solid-state "triggered sweep" oscilloscope—similar in principle to the kind used in hospital operating rooms to monitor heartbeats. You'll use it to monitor the "heartbeats" of tiny integrated circuits. The "triggered sweep" feature locks in signals for easier observation.

Step-by-step you'll build and experiment with Bell & Howell's new generation color TV—investigating digital 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. As you build it you'll probe into the technology behind all-electronic tuning. And into the digital circuitry of channel numbers that appear right on the screen! You'll also build in a remarkable on-the-screen digital clock, that flashes the time in hours, minutes and seconds. Your new skills will enable you to program a special automatic channel selector to skip over "dead" channels and go directly to the channels of your choice.

You'll also gain a better understanding of the exceptional color clarity of the Black Matrix picture tube, as well as a 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 skills that could put you ahead of the field in electronics know-how.

We try to give more personal attention than other learn-at-home programs.

1. Toll-free phone-in assistance. Should you ever run into a rough spot during the program, we'll be there to help. While many schools make you mail in your questions, we have a toll-free line for questions that can't wait.
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No electronics background needed.

What you really need is the thing you've never lost. A boy's love for exploring. Now you can go again, only this time learning new occupational skills all along the way.

Mail the postage-paid card today for more details, free!

Taken for vocational purposes, this program is approved by the state approval agency for Veterans' Benefits.

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Simulated TV picture, test pattern.

"Electro-Lab" is a registered trademark of the Bell & Howell Company.



BY MORT SCHULTZ

CAR CLINIC

Talk about torque

Before the 35,000-mile mark, the temperature gauge of my 1971 Datsun 1200 would level out between normal and hot, but there would be no loss of coolant. Then, the engine overheated, the head warped and coolant was pressured into the cylinders. I had the head resurfaced and torqued to 40 ft.-lb., added a six-bladed fan and installed a 180° thermostat. The trouble happened again 2000 miles later. Coolant once again pressured into the cylinders. What's wrong?—Ross Segroves, Torrance, Calif.

You may have overlooked an important maintenance procedure during the life of this car. The engine has an aluminum cylinder head that should be retorqued every 12,000 miles to 40-43 ft.-lb. If this is not done, the head will loosen gradually and eventually spring an external or internal leak. In your case, I think the leak is internal, because you are losing coolant to the cylinders. To verify a leak, remove the head and gas test it. This involves placing the head in a tank of heated water, removing it when it's warm and pouring gasoline through the ports. Gasoline will reveal the leak by seeping into cracks.

If the head is cracked, replace it with a new one, and this time don't forget to retorque it every 12,000 miles.

Seeing the light

How do you change the bulb in the automatic-shift quadrant on the steering column of a 1968 Ford Galaxy?—Fred Schrepfer, Massapequa Park, N.Y.

You have to pull the steering wheel. The bulb (No. 158) is positioned in the mast jacket down by the turn-signal switch.

Water spots

New oil in my 1971 Plymouth Scamp (318-cu.-in. engine) turns light gray in color and seems thinner soon after it's put in the crankcase. Why?—A. Franklin, San Lorenzo, Calif.

For one of two reasons. First, coolant may be leaking and mixing

with oil. Check the cooling system with a pressure gauge. If there is a loss of pressure and no external leak, an internal leak may exist. At that point, check the cylinder head for a bad gasket or crack.

Second, gasoline may be getting past rings. Perform a compression test. Compression below normal will verify the condition.

Missing fitting

My 1972 Chevrolet Blazer service manual states that the propeller-shaft centering ball at the transfer case end of the front propeller shaft should be lubricated every 24,000 miles with lubricant (GM 6031-M), and that a special grease-gun adapter (needle nose) is required. I can't find any place to apply the grease-gun adapter. Neither can my Chevy dealer! What now?—F. Geraets, Syracuse, N.Y.

Something is wrong. Maybe you overlooked the lube fitting, which is tough to spot because it lies inside the yoke. Perhaps your Blazer was equipped with the wrong part, which is unlikely. But if this did happen, you should have the correct one installed (part No. 386451).

In any event, the centering ball mechanism of that CV joint should be lubricated every 6000 miles—not 24,000 as the manual says—and even more often under severe operating conditions.

Noisy wipers

Since I bought my 1973 Cadillac, the windshield wipers noisily scrub against the windshield. Several trips to the dealer plus a \$9 set of new wipers have not solved the problem. Your advice would be appreciated.—John Adams, Grandbury, Tex.

What I'm about to tell you applies to 1971 and 1972 Caddys also. To fix the problem, support ramps have to be added to the rear edge of the shroud-top vent screen. This reduces pressure on the blades in the parked position and allows blades to park in a free position, eliminating much of the blade preset that is the source of the problem. New parts are available in a kit (part No. 968-8242).

After doing the modification, you should check the park position of both blades to be sure the arms are parking themselves as low as possible on the parking ramp at the rear edge of the shroud-top vent screen.

Off again, on again

My husband scolds me for not shutting off the air conditioner when I park the car. When he stops, he turns it off and doesn't put it on again until after the engine is started and running. I claim that leaving the air conditioner on doesn't harm anything. Who's right?—Alma Theis, Sugar Grove, Ill.

Both. It doesn't harm anything, but turning off all accessories is practicing good driving habits.

Check the crankshaft

I need help in determining the cause of an oil leak from the back of my 1974 Pinto's 2300 engine. The pan was replaced and the rear main oil seal changed twice. What now?—Nick Csucsai, North Olmsted, Ohio

Suggest the dealer pull the crankshaft and check it for out-of-roundness and damaged knurlings. If this keeps up, you'll be replacing oil seals 'til you put the Pinto to pasture.

Faulty front-end alignment

I've been driving for 23 years and have never before experienced the problem I have with my 1973 Ford LTD. The front-end alignment refuses to stay put. I've had the car worked on 11 times at three different garages. It has reached the point where it begins veering within a week of adjustment. I'm a salesman. Traveling over 30,000 miles a year with constant pressure on the steering wheel is tiring and aggravating. Please help.—James M. Vachon, Holyoke, Mass.

By this time one of those garages should be wise to the fact that there is a bad part in the front or rear. Up front, it might be a worn or bent strut arm that's throwing the alignment off. Any good mechanic who

(Please turn to page 62)

COOL'N EASY



If you like your smoking cool 'n easy, KOOL is for you. Its taste of extra coolness wipes out hot taste forever.

Like a cool 'n easy Swimobile by Chapel Industries? KOOL will be glad to send you one. It's like having a pet dolphin to tow you around. Propelled by twin water jets, it's fun for all. For towing the gang behind or for snorkelers. Weighs 86 lbs., 52" long, 36" wide, 18" high. Sold elsewhere for \$365.00, the Swimobile is yours for only \$299.95 and 10 labels from any style of KOOL.

SWIMOBILE OFFER! Special price covers delivery of Swimobile at right. Features: 5 HP air-cooled engine, and fiberglass hull. Allow 6-8 weeks delivery. Offer good thru 12/31/75 (or while supply lasts). Limited to U.S.A. Make certified check or money order payable to SWIMOBILE OFFER. Mail to Box 3000KS, Louisville, Ky. 40201.

Please send me _____ SWIMOBILE(S). For each one I enclose 10 KOOL labels (any style) plus \$299.95.



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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

CAR CLINIC

(Continued from page 60)

examines the car should be able to tell. If the front checks okay, he'll look in the rear. Maybe a radius arm is worn; this will permit the differential to slide and throw the car out of adjustment. Whatever, this is no longer a matter of simple adjustment, Jim. There is a bad part.

Call in the reserves

I have replaced a fuse protecting the electrical system in my 1973 Fiat 124 three times. Before long, it blows and the system cuts out. What kind of trouble do I have?—Robert Shapiro, Springfield, Ill.

Probably nothing more than an undersized fuse. The fuse originally placed in this car was an 8-ampere size. Those you have been using as replacements are probably 8-amp. fuses. They can't handle the load. Switch to a 16-amp. fuse and watch your problem vanish.

SERVICE TIPS

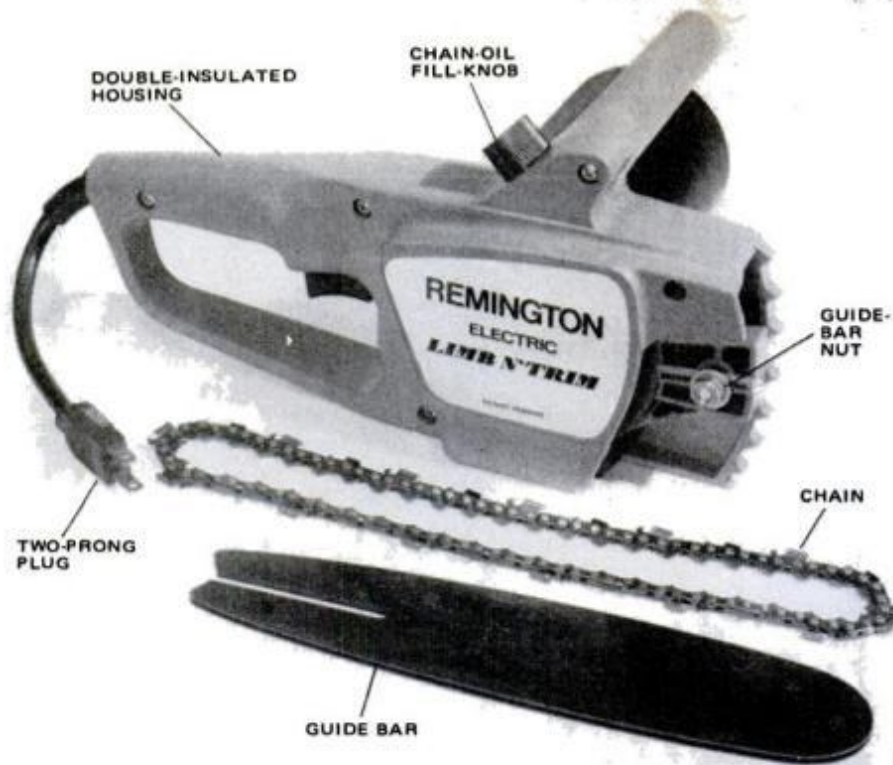
■ **"Hysteria."** Don't worry about a high-frequency noise that resembles the sound of a water faucet being slowly closed coming from your 1974 or 1975 Ford, Lincoln, Mercury or Ford truck with power steering. They have rotary-valve power-steering gears. A hiss is normal when the steering wheel is at the end of its travel or when it is turned slowly at standstill. But a loud hissing that is objectionable should lead you to investigate the valve's flexible coupling. It may be misaligned.

■ **Fuel saver.** Prolonged warm-up periods at idle aren't necessary. Driving at a speed not to exceed 30 mph as soon as possible after starting an engine will get you where you want to go on gasoline you would otherwise waste sitting still. Besides, slow-speed driving lets the engine warm up faster.

■ **Another money-saving tip.** Owners of 1974 Chrysler Corp. cars and trucks with 318-cu.-in. engines may be able to save more gasoline. If your engine is flooding, hard starting when warm and/or experiencing poor fuel economy, and it has a Carter 1¼-inch BBD carburetor, the cluster cap gaskets may have been reversed in production. This causes fuel to leak into the intake manifold. Service bulletins 14-18-74D (Dodge cars), 14-08-74T (Dodge trucks) and 14-17-74C (Chrysler and Plymouth) explain how to make repairs. Ask your dealer. ★★

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.



SHOP-TEST REPORT

Pint-sized chain saw

At first glance, this mini chain saw looks more like a toy than a tool. I found that looks can be deceiving, though—this tool is anything but a toy. Called Limb N'Trim Electric by its maker, Remington Chain Saws, it's priced under \$35.

Though not designed for all-day log-cutting sessions, the saw I used performed without a hitch recently on some typical do-it-yourself backyard chores. Mostly, I used it to slice small-diameter logs for firewood and to trim dead branches from several trees and bushes.

Powered by a 1¾-hp electric motor the tool runs considerably quieter than the gas-powered type. The noise level is about what you'd expect from a 7 or 8-in. portable circular saw.

The maker doesn't claim it to be a heavy-duty saw for big-tree felling and the like, but it does make quick work of around-the-yard light chores most homeowners will want such a tool for. It also provides a lightweight and quick-cutting saw for homeowners who tackle do-it-yourself building projects. Its 8-in. cutting capacity is sufficient to do a surprising number of jobs, and its weight is a comfortable-to-handle 6¾ pounds.

As most chain saws do, it comes with guide bar and chain unmounted. Assembly takes just minutes, and

then you simply plug in the tool and go to work. There are two musts when using this tool: A 50-ft. 16-gauge extension cord is the minimum size recommended. Second, you must oil the chain manually by depressing the oil-filler knob at least once before each cut.

I'd like to see that oil-filler knob relocated slightly. I found the repeated stretching of left thumb from support handle to it was a bit tiring. Admittedly, I'm splitting hairs over a minor point: At \$35, the Limb N'Trim is a dandy tool for anyone who wants a chain saw without having to shell out \$100 or more. But be realistic: Don't expect it to perform as its more expensive cousins do.

—Harry Wicks, Workshop Editor

SPECIFICATIONS

Limb N'Trim Electric Chain Saw

Weight: 6¾ lbs.
Guide bar length: 8 in.
Cutting capacity: 8 in.
Motor rating: 1¾ hp
Motor voltage: 115 v.a.c.
Cycles: 60
Alternator rating: 1500 watts
No-load sprocket speed: 4500 rpm
Price: \$34.95

Manual chain oiler, double-insulated housing.
Manufacturer: Remington Chain Saws, Desa Industries, Inc., Power Product Div., 25000 South Western Ave., Park Forest, Ill. 60466.

Seven & Snowbound.



When you get a snowfall that breaks all records, you ought to make a big thing of it. Like a snow sculpture.

All it takes is a little ingenuity, and lots of snow.

Try carving out a giant snow goose. Or take a stab at Snow White and the Seven Dwarfs.

Just don't forget that other Seven, Seagram's 7 Crown.

On cold days, sip it hot in a steaming Seven n Cider. Or try a piping hot 7 Crown toddy, stirred with a cinnamon stick.

Either one will warm up your insides, no matter what it's like outside.

And both give you the friendly taste of Seagram's 7, the whiskey America likes best.



**Seagram's 7 Crown.
It's America's whiskey.**

SEAGRAM DISTILLERS CO., N. Y. C. AMERICAN WHISKEY—A BLEND. 80/86 PROOF.



Easier-than-ever plaster casting

Though plaster casting has been around a while, the latest casting plasters and molds make it easier than ever to turn out handsome figures. The reusable, flexible molds are called Flexo Mold by the manufacturer, Fibre Glass-Evercoat, Inc., 6600 Cornell Rd., Cincinnati, Ohio 45242. They are priced at \$2 and up. Like the casting plaster (\$1.50 for a 2½-lb. bag), they are available at hobby and department stores.

Figuring the plaster-to-water ratio is quick and easy. To do it, you simply fill the mold with water, then pour off approximately one-fourth of the water. The remaining three-quarters is then poured into the mixing bowl. Sift or sprinkle plaster onto this water until the plaster is barely covered with water. *Never dump the plaster into the water in a lump.*

After letting the plaster sit undisturbed for five minutes, stir the mixture gently. Pour the contents slowly—but steadily—into the supported mold. Important: As you pour, tap the mold side to release trapped air bubbles. After the plaster has hardened, the mold can be removed as shown. *Caution: Never dump unused plaster in a sink or toilet.* ★★★



Improved casting plasters take guesswork out of the hobby of casting. Flexible vinyl molds shown produce fine details, as in above figures.

Here's why we call...

Jeep
wrote
the
book
on
4-wheel
drive.



Cherokee is all Jeep—rugged, tough and able, in any 4-wheel drive situation.

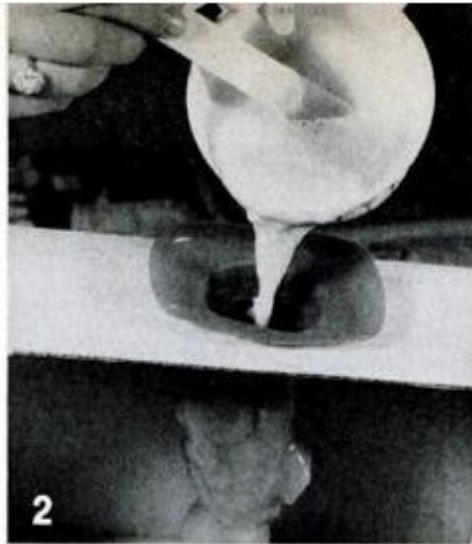
Cherokee is more!—Room and versatility! It's got 90 cu. feet of room, (the highest standard load carrying capacity in its weight class), to let you take every-



thing along without cramping your style, or your family.

Versatility! **Cherokee** performs like a wagon, hauling everything from groceries to paneling without handling like a truck.

Cherokee with famous



Successful plaster casting in five easy steps:

1. Cover your worktable with multiple thicknesses of newspaper; have all working materials at hand. Then make a support for your mold by cutting a hole in a cardboard container.
2. Mix plaster and water according to instructions and pour the mixture slowly and steadily into supported mold.
3. After plaster has set, remove mold from support and lubricate it with hand lotion or liquid dishwashing soap.
4. Grasping the mold flange, peel off mold.
5. Remove rough edges and irregularities with knife; smooth with an emery board.



Cherokee™ a Jeep-and-a-half



Jeep 4-wheel drive brings new control to bad weather driving. Add optional Quadra-Trac™, Jeep Corporation's automatic 4-wheel drive and you've got the secure feeling of super-traction on any road, in most any weather.

Jeep Cherokee, 4-wheel drive for the family man. That's why we call Cherokee a Jeep-and-a-half.

Jeep Cherokee

From a Subsidiary of
American Motors Corporation

APPLIANCE CLINIC

BY PAUL MANN



Worth a try

Lee Miles, manager of member services of the Refrigeration Service Engineers Society, has offered a better solution—if it works—to I. Ludwin's problem discussed in the October *Appliance Clinic*. Ludwin had complained that his Model BJ 13S General Electric refrigerator turns liquids to ice, especially in warm weather, and is simply running too cold. He was advised by a serviceman to replace the sealed unit because it wasn't pulling the temperature down fast enough to start the compressor. We suggested he first make sure that foreign matter wasn't holding compressor valve seats open.

Miles claims that the cause might be nothing more serious than a slight shortage of refrigerant. He reports this was a common condition with the BJ 13S.

"The fact that the problem 'is prevalent during warm weather' helps to point this out," Miles says. "In warm weather, more refrigerant is required to create higher condensing pressures and temperatures. This reduces the available liquid supply to cool the coil. Because the thermostat bulb is located at the outlet of the coil and because the temperature at this location is the last to pull down, the shortage of refrigerant will cause very slow pull-down. The increased pull-down time increases the compressor running time and lowers the box temperature too much."

Miles thinks that before he replaces the compressor, Ludwin should have the unit emptied, evacuated and recharged to the charge specified on the unit's rating plate.

Time for a new motor

A couple of service calls from authorized repairmen have failed to solve my KitchenAid dishwasher problem. The unit runs perfectly until the final rinse cycle begins, and then it stops dead. Here is what's been tried: a new timer, new pump, new water valve and an investigation for obstructions in the drain system. What now?—Bill Brandt, San Francisco

I think you had better prepare

yourself to buy a new motor. If the motor is defective, as I think, it may be operating until it overheats and the overload throws it off. Suggest this to a serviceman.

Try earmuffs?

I get a loud r-r-r-r-t and popping in every AM radio in my house that's turned on when my Frigidare 30-in. electric range is running. The burner switches are the continuous type that cycle on and off. The noise occurs when the switches make and break. The unit is about 1 year old. Can you help me?—George F. Wather, Admire, Kan.

I'm not sure. Some noise is considered normal, but if it's very loud it usually indicates that the switches have worn and are arcing badly. In this case, replacing the switches might help. But you say the range is only a year old. Unless the switches were faulty to begin with or are not properly wired, I doubt that they could have worn enough for this to happen. Anyhow, you should have the switches checked. If they're okay, you may just have to live with the nuisance.

More efficiency tips

In November we offered tips to help you reduce the cost of operating appliances. Here are more ideas, these in connection with the use of refrigerators and freezers:

1. Don't put hot food in the refrigerator or freezer. The unit will have to expend energy cooling it down—something that can be done for nothing by covering the food and allowing it to cool down to room temperature. It won't spoil.

2. Open and close refrigerator and freezer doors as quickly as possible. This will minimize the loss of cold air. The more cold air that has to be replenished, the more your unit will operate—and the more it will cost you.

3. Don't overfill the box. Efficient operation is possible only when you have provided good air circulation around food.

4. Get into the habit of checking

door seals occasionally. Close the door on a dollar bill. If you can pull it out without resistance, the seal is shot, and is costing you cold air, energy and money. Replace it.

5. Never place a refrigeration unit near a heat-producing appliance or in direct sunlight.

6. See that the unit (if not the self-defrosting type) is defrosted frequently. As frost builds up, efficiency is lost.

Soled out

The soleplate of our Mary Proctor steam iron is evidently clogged, since no steam comes out. I've tried to take the unit apart, but find no way of doing this. I have also tried to clean the holes out with detergent solution. Clue me, please. How do I do this job?—William Weiss, Forest Hills, N.Y.

To start, mix ½ cup of vinegar with ½ cup of water and run the mixture through the iron as if you were ironing—make steam with it, in other words. If this home remedy doesn't work, buy steam-iron cleaner from an appliance dealer and follow directions supplied. This very strong compound will usually clean out the soleplate. If neither method works, there is probably nothing you can do. Since you have found no way to take the iron apart, you may have the sealed model.

If you have a nonsealed model, the soleplate can be replaced for about \$7, but you can buy a new iron for little more than that.

Address help

I would like the address of the manufacturer of Sunbeam appliances, since I need a part for a skillet.—L.C. Claybrook, Eagle Rock, Va.

It's Sunbeam Appliance Co., 5400 West Roosevelt Rd., Chicago, Ill. 60610. ★★

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.

“Old Gold suits us just fine”



**Classic
Old Gold
Flavor**

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

© 1975 LORILLARD

Kings, 18 mg. "tar", 1.1 mg. nicotine; 100's,
21 mg. "tar", 1.4 mg. nicotine av. per cigarette,
FTC Report Oct. '74. Box, 17 mg. "tar", 1.2 mg. nicotine
av. per cigarette, by FTC method.



Photos: Irv Dolin

Jim McHenry really knows how to "wring out" a race car. His Datsun was under a couple feet of water on a new-car dealer's lot before he bought it—for a song. That was during the Pennsylvania floods of a couple seasons ago. To a mechanic and a race driver like Jim, it doesn't matter much that a shiny new car

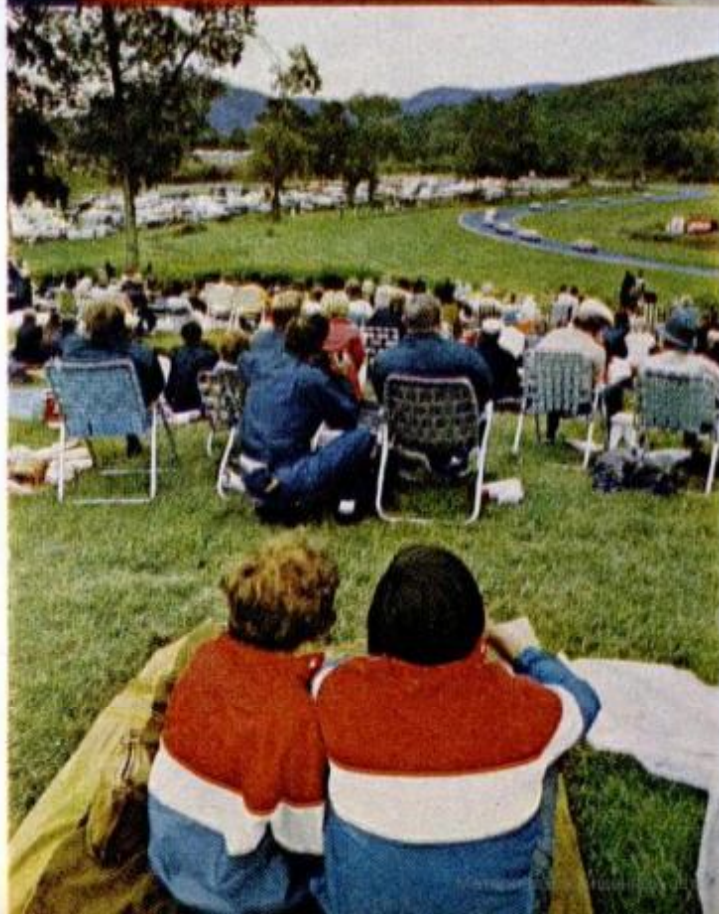
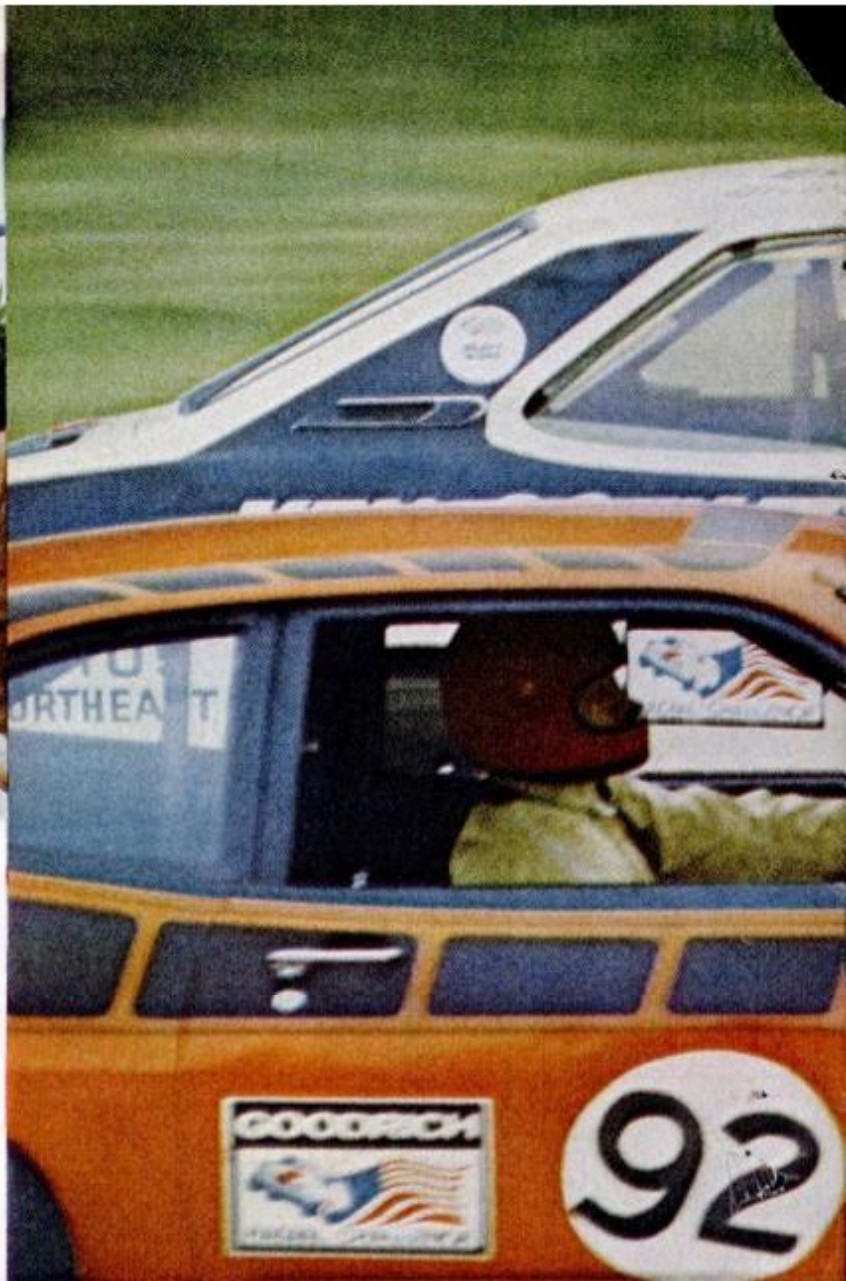
You can 'run whatcha brung!'

Ever see a Honda Civic on a racetrack before?

by Bill Hartford
AUTO EDITOR

has been "ruined" under a deluge of water and silt; he's going to strip it down and rebuild it anyway.

The No. 23 Datsun that Jim McHenry brought back to showroom stock condition is only one of the makes eligible to compete in the Goodrich Radial Challenge Series. The racing, sanctioned by the International Motor Sports Assn. (IMSA), is for small, stock sedans. The home-grown Gremlins, Pintos and Vegas run against Toyotas, Datsuns, Hondas, BMWs, Colts, Capris



At Lime Rock, Nick Craw, No. 64 BMW, collects kiss for his w'n. But George Alderman, below in No. 32 Gremlin, won series finale to become '74 champion, 79 points to Craw's 76! Other scenes: Bruce Cargill's No. 90 Colt side-by-side with Wes Schultz's No. 92 Pinto; spectators' good vantage; engine compartment and "office" of Pat Bedard's 00 Pinto; conscientious corner worker and, lo and behold, a Honda Civic!





and other imported "economy" sedans you're more used to seeing at the local gas pump filling up on a meager five bucks' worth.

The jump from pump to racetrack isn't far because the rules aim to keep these cars pretty much stock, except for safety modifications, of course. That goes for the tires, too. They're radials—designed for street use. In the early days of motor racing when you actually drove your racing machine to the track, you would "run whatcha brung." The new small stock cars could also be driven to the circuit—which means they're far from being exotica with engines that can't even run below a couple of thousand rpm. But it's often easier to use a trailer which can be loaded with parts, tires and so on.

Where to see 'em in '75

Goodrich Radial Challenge races

Feb. 1-2	Daytona, Fla.
March 22-23	Sebring, Fla.
April 19-20	Road Atlanta, Ga.
May 3-4	Laguna Seca, Calif.
May 10-11	Riverside, Calif.
May 24-26	Lime Rock, Conn.
June 7-8	Watkins Glen, N.Y.
June 14-15	Mosport, Ont.
July 19-20	Mid-America, Mo.
July 26-27	Road America, Wis.
Aug. 2-3	Charlotte, N.C.
Aug. 23-24	M'd-Ohio, Ohio
Nov. 29-30	Daytona, Fla.

To check schedules, write IMSA, Box 805, Fairfield, Conn. 06430.

Those rules, for some racers, are made to be broken. "Cheat neat" is what you do in big stakes, big stock-car racing—and you see if you can get away with it. It's not the same in IMSA racing. The intriguing thing here, though, is to observe how the sharp competitors take every advantage of the ways they can work within the rules to come up with a winning car.

A close look at Pat Bedard's Car and Driver Pinto, which won at Charlotte last August, reveals an example of a legal, but hot, setup. It's basic to road racing that the more



The jostling charge into Turn One after the start always gives race fans a suspense-filled few moments. Among the small stock cars competing in any race are (left, top to bottom) Vega, Capri, Gremlin, Pinto, Toyota and Datsun.

effective your brakes, the deeper you can go into a turn or corner before hauling down to a safe speed. The rules say that the Pinto has to run original equipment brakes, but they don't say you can't use the bigger brakes from the station wagon model on the racing sedan!

And the rules don't disallow using parts from later-model Pintos on earlier Pinto race cars; or running ducting from the grille to the front brakes for additional cooling; or using an oversize radiator in place of the original equipment. Naturally, the Pinto has all these modifications.

Any modification on a race car costs money, but in small stock-car racing it can be done on a sensible budget, with only a minimum of sponsorship. The popularity of grass-roots racing, or energy-crisis racing—as small stock-car racing has been called—is really on the upswing. There's a trend in all motor racing, in fact, to get back to basics—and that includes the pro series where stock-block formulas are being more seriously explored.

This season there'll be more small-car racing than ever before—almost a half dozen more events in the 1975 Radial Challenge alone. Part of the excitement of the Radial Challenge is what the many fans of Southern stock-car racing know so well: The thrill of seeing "your" car out there in competition with your "neighbor's." Of course, your Gremlin and your neighbor's Vega wouldn't stand a chance there—not without expert preparation—still, you can pretend.

In this form of run-whatcha-brung racing, the stockers are small, the purses are small; but so, too, are those five-dollar fill-ups. It's grass roots. You might call it the greening of stock-car racing. ★★★

Grandpa tours the States—on a Harley



On the road, Barney stowed butterfly net under duffel bag. A strong interest in ecology led him to letter "Free Garbage Inspection Service" on sides of bike's fairing. Above, Barney tests his lung-powered "melodica," used for making music and acquaintanceships at stops.

by Dick Barney

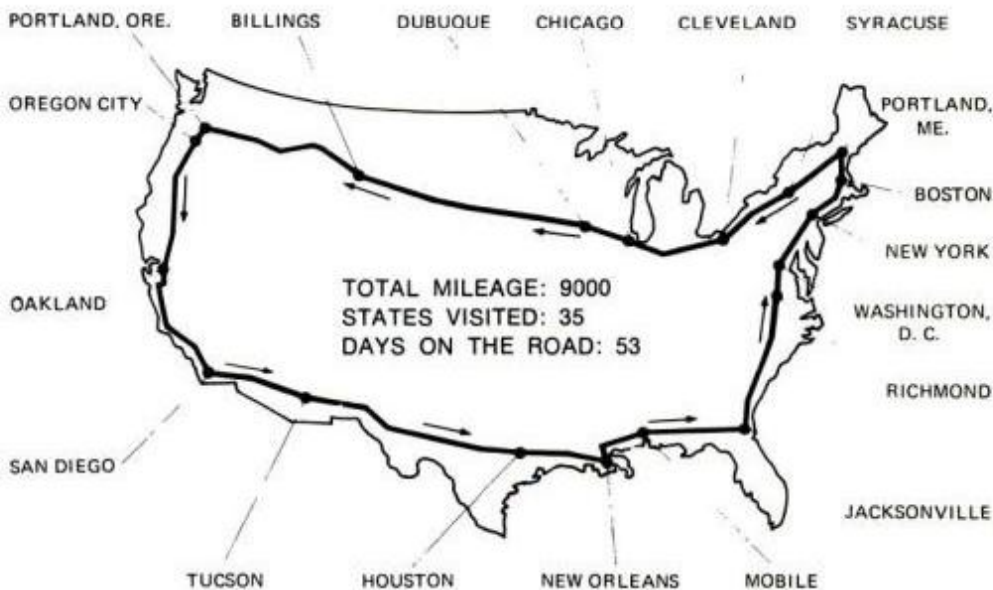
Friends said it more than once: "At 59, you should be old enough to know better."

Fortunately, I wasn't. Besides, once I'd announced my plans to tour the country on a motorcycle, my family let me know that if I backed out, they'd never let me forget it.

So I bought "Dobbin," an FLH-1200 Electra Glide Harley-Davidson, and set out from my home in Oregon City, Ore. In 53 days on the road, I covered 9000 miles and visited 35 states. I saw a lot—and learned a lot.

I'd owned a couple of Harleys back in the '30s. The trip brought back the long-remembered thrill of motorcycling—the feeling of the wind in my face and the exhilaration experienced in "banking" on turns. Motorcycling is as near as you can come to flying without leaving the ground.

People ask me if motorcycling isn't dangerous. Not if you ride scared. In a car, you can come through a skid unscathed so long as you have room to regain control before hitting something. But skid with just two wheels under you and you may have but a split second to



recover. Especially when you ride in the rain. Slow down in rain and stay off the center of the lane—the "drip strip" where water on the accumulated oil can create a hazard as slick as glare ice.

But maybe I'm making too big a deal of skids. During my six-week trip I never once went down on a wet road—and I traveled many a soggy mile.

If you do spill, you may not bruise more than your pride if you are properly dressed: heavy leather pants and jacket, and a padded helmet securely buckled. It's better if your "leathers" aren't black, for black riles some motorists. My jacket was bright yellow—good for visibil-

ity and for reflecting the hot sun. For pants, I compromised with a pair of cowboy-style buckskin chaps, with full-length zippers down the outside seams.

In a car, you can usually glance to either side to enjoy the scenery. Don't pass the time that way on a motorcycle—bikes can't be relied on to continue straight ahead if unattended. And it's safer to monitor the traffic around you with mirrors. The original ones on my machine had only a "spotlight" field of view and they were mounted so low that my arms blocked out much of the little view they afforded. I replaced them with a slightly convex pair, mount-

(Please turn to page 153)

Owner of a camera and music store in Oregon, Dick Barney previously toured the country in a modified 1916 Model T. See 8000 Miles in a Model T Camper, page 91, Aug. '72 PM.

Great sport planes that make great projects

The homebuilt aviation movement, despite fears of fuel and materials shortages, is still growing by leaps and bounds. Here's a sampling of some of the latest, most exciting beauties from a record-breaking crop.

by Sheldon M. Gallager
and Howard Levy

Photos: Howard Levy



First mini flying boat built from plans is this Taylor Coot-A constructed by Warren Eding of St. Louis. Hull is fiberglass over wood. The amphibious craft has 180-hp Franklin engine with pusher prop, giving it top speed of 141 mph. Wingspan is 36 feet; length, 26 feet. Wings and tail fold for trailering. Plans \$150 from Molt Taylor, Box 1171, Longview, Wash. 98632.

Flashy little red single-seater features swept-back high wing with differential aileron travel to help eliminate adverse yaw in banking. Called GE Special, it's powered by 65-hp VW engine, cruises at 120 mph, hits 150 max, lands at a gentle 54 mph, takes off in 250 feet, can be built for about \$3000. Plans \$50 from Glenn Beets, 4130 Mennes Ave., Riverside, Calif. 92509.





Retract-gear modification of Cavalier streamlines the sporty two-place ship, is work of Larry Burton of Klamath Falls, Ore. Engine is 125-hp Lycoming, giving max speed of 170 mph and 1000-f.p.m. climb rate. Wingspan is 27 feet; overall length, 21 feet. Plans for standard fixed-gear Cavalier are \$125, K&S Aircraft, 4263 Fortune Rd. S.E., Calgary 23, Alberta, Canada.



Two-seater version of Ken Rand's wood-and-plastic homebuilt is now available for those who enjoy companion flying. Like its single-place predecessor (page 89, March '73 PM), KR-2 features easy construction, low-cost VW power. Wingspan is 20½ feet; length, 14½ feet; cruise speed, 160; cost, \$2000. Plans \$45, Rand, 6171 Cornell Dr., Huntington Beach, Calif. 92647.



Easy to build, easy to fly and economical, new Pober Pixie, designed by Experimental Aircraft Assn. President Paul Poberezny, promises to become favorite of beginning pilot/builders. Powered by 60-hp VW engine, the little single-seater does 130 mph, lands at super-slow 30 mph, can fly out of a pea patch. Total cost: about \$2000. Plans \$30, Experimental Aircraft Assn., Box 229, Hales Corners, Wis. 53130.



Racer-styled speedster, the Lane-Turner T-40, comes in one and two-seat versions, can hit up to 200 mph on its 125-hp Lycoming engine. Wingspan is 23 feet, 8 inches; overall length, 19½ feet. Plans are \$65 for single-seater, \$100 for two-seater, from Gene L. Turner, 103 G St. S.W., Washington, D.C. 20024.



Canard-winged VariViggen, though now several years old, keeps winning awards for design excellence, is fast becoming one of most popular homebuilts. Nose canards add lift and control for spectacular maneuverability. Plans for 150-hp, 165-mph craft are \$51, Rutan Aircraft Factory, Box 656, Mojave, Calif. 93501.



Wingtip tanks carry large 144-gallon fuel supply for long-range cruising in this sleek, two-seater, T-tail Melmouth. A 210-hp Continental gives speeds up to 200 mph. Other features: electric flaps, aileron droop for added lift, high-altitude oxygen, stall-warning indicator. Designer Peter Garrison of Los Angeles, Calif., reports no plans yet but maybe in future.

All-wood Jurca Sirocco handles like a mini fighter, eliminates welding and machining required in most tubular-steel airframes. The tandem two-seater hits 185 mph and climbs 1500 f.p.m. on its 160-hp engine. Smooth-acting control surfaces incorporate mass balancers, even ball bearings in aileron pivots. Plans \$120 from Jurca Plans, 581 Helen St., Mount Morris, Mich. 48458.



IT'S NEW

NOW



Homebuilts take to the air in first precision aerobatic flying team

Zooming through the skies in perfect formation are three red streaks—the world's first civilian precision aerobatic team. Called the Red Devils, the group flies, of all things, a plane that originated as a homebuilt—the famous Pitts Special (see *World's Hottest Homebuilt*, page 122, Nov. '73 PM). The team consists of Charlie Hillard, Gene Soucy and Tom Poberezny, all top-ranking championship pilots. With only inches between their wingtips, they thrill air-show crowds across the nation with their almost unbelievable close-coordination maneuvers. Not everyone can fly like the Red Devils, but anyone can build his own Pitts from plans—an exciting prospect.

Bookrack 'grows' with your books

Perfect for a growing desk library, this modern expandable bookrack slides apart on telescoping rods to a maximum width of 24 inches. Rods are chrome-finished with clear-plastic end pieces. Price is \$18.50 postpaid from Innovations, 1736 East 17th St., Brooklyn, N.Y. 11229.

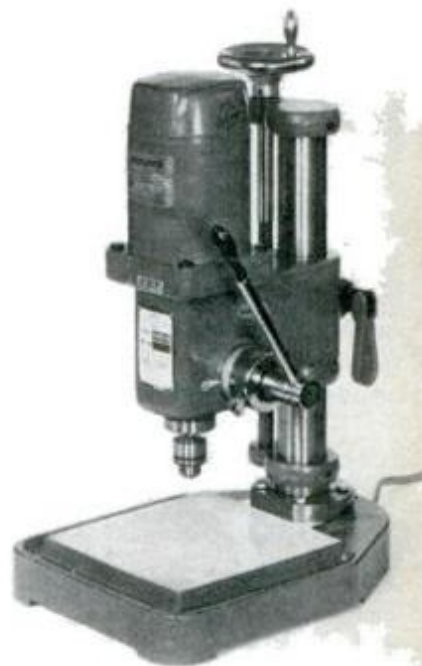


New for campers: All-purpose box trailer, easy-stow compact tent

Coleman, famous for its camping gear, has come up with two innovations—a versatile two-wheel utility trailer (far left, facing page) and a compact tent (near left) designed to give maximum living space and still be easily stowable for backpackers and small-car campers. The trailer lugs up to 1000 pounds and measures 60 inches long by 49 inches wide—the 49-inch width is significant. Coleman found most small utility trailers couldn't take 48-inch-wide plywood sheets—now its new model can. Accessories include hinged cover to double cargo space from 18 cu. ft. to 36, slip-in stake sides, canvas cover, spare wheel. The new tent, called Compact, comes in three models for sleeping two, three or four. Coleman Co., Wichita, Kans. 67201.

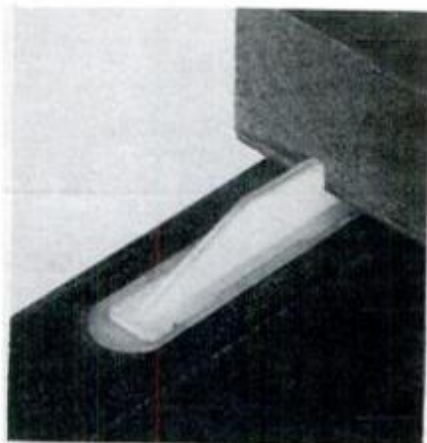
Motorbike built for two

Ever wonder how you learn to ride a motorcycle with no one along to teach you? Tom Ferraro, who runs Tom's Auto Driving School in Greenwich, Conn., fitted out a Honda with dual controls. The student sits in front, instructor in back. Instructor's controls can correct any mistake a student starts to make.



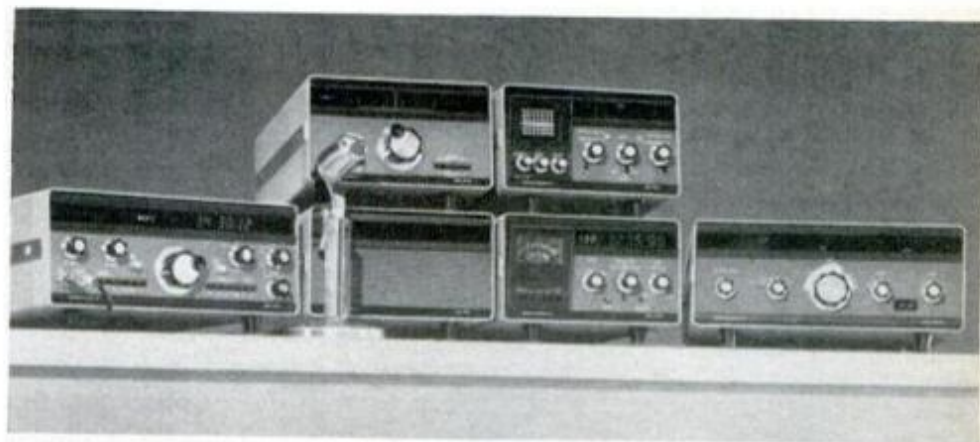
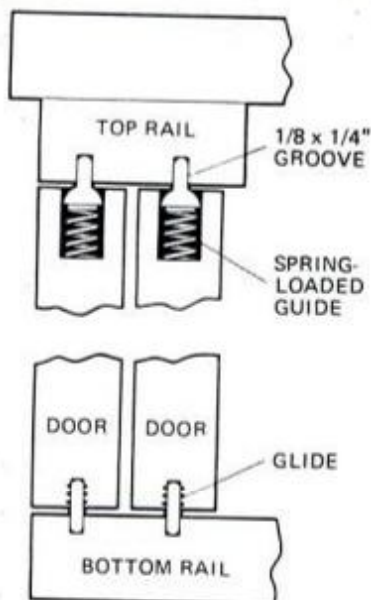
Mini drill press for precision work

Small but rugged and versatile, this precision drill press for delicate work, called the Jet-6, features a 12,000-rpm direct-drive motor, dial sleeve depth stop, worm and gear height adjustment, swinging head, cast column and extra-heavy base and table. Capacity of included chuck is 3/16 in.; swing is 7 in. Jet-6 drill press is \$370 from Equipment Importers, Inc., 1901 Jefferson Ave., Tacoma, Wash. 98402.



Built-in tracks for doors

With Rudy Door Guides and Glides, plain saw kerfs provide the upper and lower tracks for 3/4-in. bypassing cabinet doors. Spring-loaded guides fit flush in mortises in the tops of both doors to permit easy insertion and removal from tracks. Two-door pack is \$1.98 at hardware stores or from the manufacturer, Rudolph Industries, 196 East 25th St., Holland, Mich. 49423.



Kit-built components form complete ham radio system

Heath's latest lineup of kit-built ham radio gear is said to represent the most advanced coordinated amateur system ever conceived. Heart of the system is a highly sensitive transceiver with digital readout and provision for either fixed or mobile operation. The SB-104 is priced at \$669.95. Other kits include a station

monitor, the SB-614 for \$139.95; remote VFO, the SB-644 for \$119.95; and matching speaker, the SB-604 for \$29.95. A handy console combines five accessories: a one-minute digital ID timer, RF wattmeter, SWR bridge, hybrid phone patch, 24-hour clock; SB-634 console is \$179.95. Heath Co., Benton Harbor, Mich. 49022.



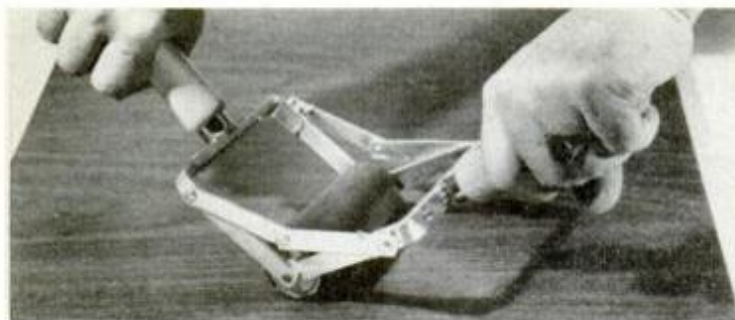
Powerful glue needs no clamping

Bonds stronger than wood in five minutes, without clamping, is the claim for this Glu-Bird White Glue. For indoor or outdoor use, the glue dries clear, won't clog sandpaper, is nontoxic, nonflammable. Bottles shown sell for 75 cents and \$1.25. Wilhold Glues, Inc., 8707 Miller Grove Dr., Santa Fe Springs, Calif. 90670.



Easy-tilt aid for heavy outboards requires no power

Even a pretty young gal can lift up a heavy outboard engine with Tempo's new Tilt-omatic aid, a manual device said to cost about one-fourth as much as more expensive power-tilt mechanisms. The device is a cylinder designed to replace one of the two standard shock absorbers installed in the motor mount (inset at left). Working on a "gas-spring" principle, the Tilt-omatic reduces normal lifting effort by about one-sixth. Four models fit recent Evinrude, Johnson and Chrysler engines from 65 to 135 hp, and others will soon be available for Mercury motors. \$59.95, Tempo Products Co., 6200 Cochran Rd., Cleveland, Ohio 44139.



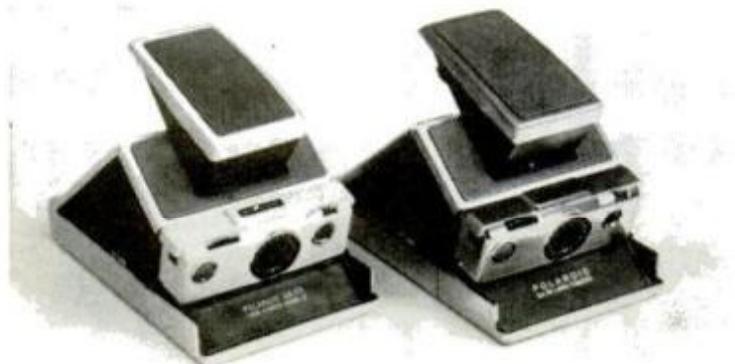
Two-hand roller for laminates

Double-handled roller 4 inches long lets you use body weight to apply an even pressure of over 100 pounds per square inch to plastic laminates, veneers, photo mounts; \$10.95 plus shipping from Brookstone Co., Peterborough, N.H. 03458.



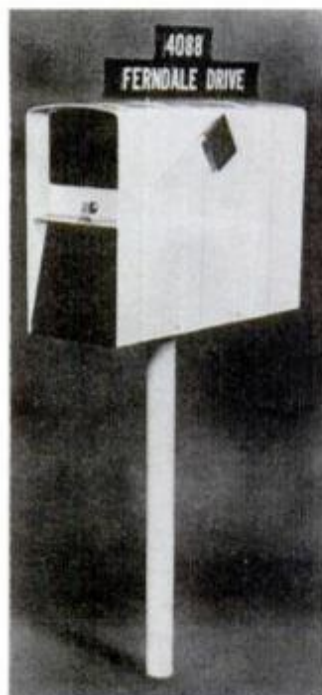
'International' hovercraft rally

Kicking up trails of sand, 18 ground-effect machines race on the beach at Calais, France, in what is said to be the world's first International Light Hovercraft Rally. Britain won—because only Britain entered.



Collapsible Polaroid now at collapsed price

Polaroid's folding SX-70 camera (see page 129, May '74 PM) still lists for \$180, but now there's a mechanically and optically identical SX-70 Model 2, in white plastic and acrylic fiber instead of the original leather and chrome, for \$30 less. Both spit out pictures instantly, develop them in minutes.



Security mailbox

Mail and small parcels deposited in upper compartment of this new mailbox are transferred automatically to locked lower compartment. Postal-approved box is white-enameled galvanized steel, has address brackets (up to 5 digits, 16 letters), keys, mount. \$59.95 plus shipping, Hammacher Schlemmer, 147 East 57th St., New York, N.Y. 10022.



Mapp-gas torch kit

Torch fueled with Mapp gas (an industrial fuel, methylacetylene and propadiene) gives a hotter flame than propane. It lets you do jobs not possible with propane, such as brazing, silver soldering, leading pipes and loosening rusted nuts and bolts. Kit from Sears includes torch assembly, two 16-oz. gas cylinders—one Mapp and one propane—spark lighter, spare flints and plastic case; \$19.50.



Remote control for TV

If you use an external antenna—roof-top or rabbit ear—with your TV, you can add this new remote on-off and channel changer that works anywhere within 25 feet of the set. Your set's power and antenna leads and your antenna connect to the box in the background; the control box in the foreground has a button for each VHF channel, an on-off switch and fine-tuning. \$100 from Jerrold.

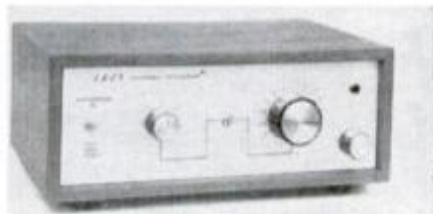
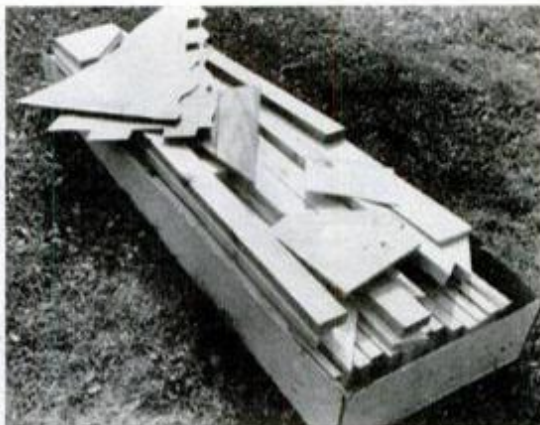


Revolutionary Rolleiflex

Rolleiflex's newest 2 1/4 x 2 1/4 single-lens reflex has electric-motor-powered shutter and aperture diaphragm in each lens, plus built-in motor drive that can shoot three pictures in two seconds. A computer circuit measures the light, sets the aperture and warns you if correct exposure can't be made at that shutter speed or if the batteries are getting low. Shutter speeds are 1/500 to 30 seconds, plus bulb.

Kit-built mini-barn

A good-looking storage building from a box—that's what's offered in the Jer Lil' Red Barn kit, which requires no special tools or skills for assembly. Building-supply dealer who delivers kit locally adds siding, shingles and nails to pre-cut and numbered frame and trim parts for a total package price of about \$300 for a structure 8x8x8 feet. Larger sizes are also available. For dealer's name, write Jer Manufacturing, Inc., Coopersville, Mich. 49404.

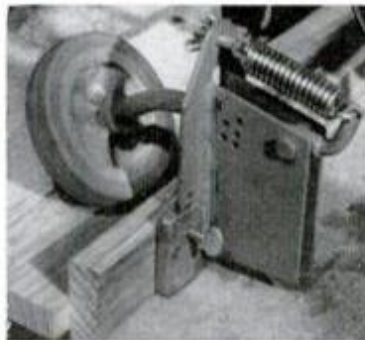


Organ key transposer

Ever want to play a piece in one key when it's written in another? Keyboard musicians have been looking for a simple way to do that since at least 1626. Now, if you have a Hammond organ, you can transpose keys with a new electronic key changer that also allows flat-sharp fine tuning and has a "pitch blend" knob for "developing new sounds." It sells for \$495 and is available from Electronic Systems and Components, Inc., 110 Summit Ave., Chatham, N.J. 07928.

Safety aid for ripping on power saws

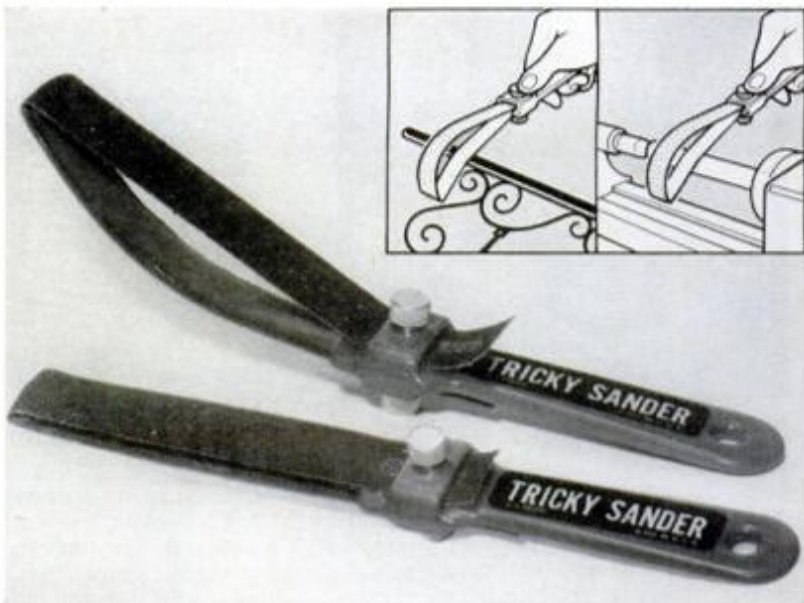
Spring-loaded, non-marring hold-down for radial-arm and table saws makes ripping safer and easier. Called Safe T Guide, it has two inclined-axis wheels. These force the workpiece against the rip fence to assure accuracy and easier-to-control rate of feed. Prices are \$30.95 for radial-arm saws, \$32.95 for table saws, postpaid, from Quadmatic Industries, Box 695, Conrad, Mont. 59425.





Hand sander adapts to contours and tight spots

Tricky Sander is used in either a straight or bowed position to sand lathe work and hard-to-reach spots. Abrasive cloth, secured by two thumbscrews, holds the spring-steel blade in a bent position. The sander comes with a supply of abrasive strips in three grits, also accepts standard rolls of emery cloth; \$4.49 postpaid from Nicol Tools, Inc., 1047 Raymond Ave., St. Paul, Minn. 55108.



Hip-hugging case

This Vivitar Enduro case is body-contoured, straps snugly to you so your hands are free for cycling or other activities. The rigid plastic shell (four colors available) and soft foam lining protect your gear. Movable pads let you customize to fit equipment. Holds a 35-mm camera, accessories. \$35. Ponder & Best, 1630 Stewart St., Santa Monica, Calif. 90406.



Pistol-packin' dune buggy

Police officers from the Los Angeles County Sheriff's Dept. are now riding around in dune buggies—but not for fun. The specially equipped buggies are used to patrol beaches and rugged back-country roads in the Malibu area that are inaccessible to conventional police cars. They have wide, low-pressure tires for traction in sand, emergency flashers, searchlight, siren and two-way radio.



Be a good skate —and sail, too

With this hand-held sail for skating, you can skim over the ice at breathtaking speeds. Made of aluminum tubing and nylon, it comes in two sizes: the Chief model, approximately 5 by 7 feet, for \$39.50; and the Super Chief model, approximately 6 by 9 feet, for \$49.50. Prices are postpaid and include assembly and sailing instructions. Available mail-order from Pontiac Skate Sail Co., Box 1225, Pontiac, Mich. 48053.



Handy record-care kit

Discwasher is a good record-cleaning system (we've tried it). Now there's this handsome Discorganizer that holds Discwasher pad, cleaner, spare spindles, cartridge. Discwasher is \$13; walnut Discorganizer, \$6. Discwasher, 909 University, Columbia, Mo. 65201.

Versatile hobby kit

Soldering kit for hobbyists includes lightweight, high-temperature soldering iron, rest, soldering-aid tool, solder, sponge, storage box and six tips for working with plastic, wood, cork and leather; \$11.95, Weller Div., The Cooper Group, Box 728, Apex, N.C. 27502.





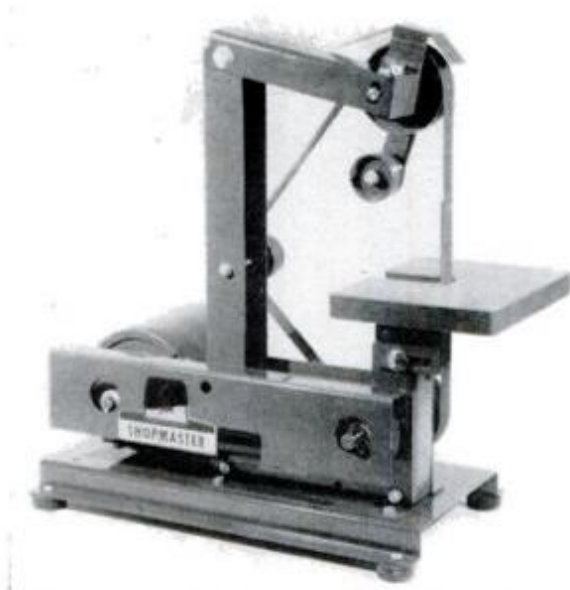
Roller carries paint in its handle

Koto-matic's handle is a plastic bottle that holds any pourable paint. Invert the unit and squeeze the bottle, then start rolling and paint will flow. Roller has all-purpose cotton sleeve, with 570 perforations in core for smooth, even application; 6-inch roller is \$5.98; 9-inch, \$8.98, plus \$1 postage and handling each, from Three Sons Unlimited, 245 East Gunhill Rd., Bronx, N.Y. 10467.



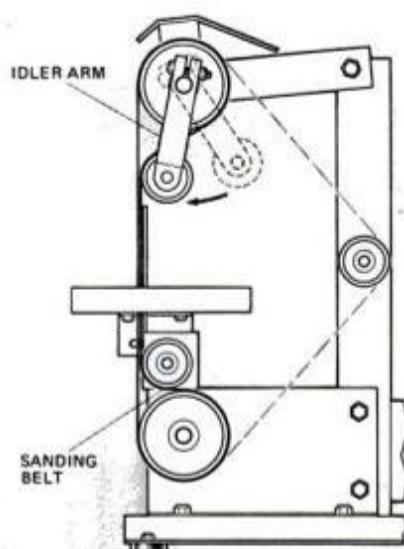
No-drilling door closer mounts on hinge

This low-cost door closer for either entry or interior doors is quickly installed without drilling holes—it mounts on the door's upper hinge pin. Said to work on almost any door, it's adjustable for door weight, has suggested retail price of \$5.95. Ajax Hardware Corp., 825 South Ajax Ave., City of Industry, Calif. 91749.



Strip sander/grinder performs functions of two tools

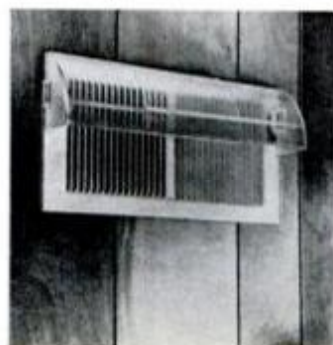
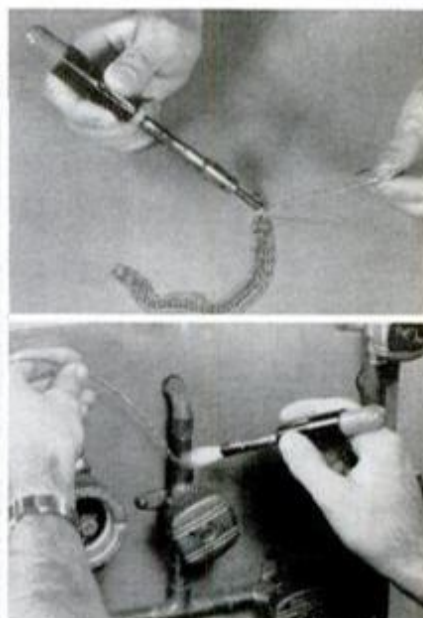
Versatile tool combines functions of wheel grinder and belt sander. Sharpens cutting edges of machine and hand tools, knives, scissors, mower blades. Does deburring of stampings and castings, internal and external grinding and sanding, polishing of flat and convex surfaces. Handles hard and soft



metals, wood and plastics. Its 1x42-inch sanding belt travels 2000 feet per minute. Driveshaft and tension wheel have prelubricated bearings. Belt guard at top for operator's safety. With 1/2-hp motor, \$74.95. Shopmaster, 1212 Chestnut Ave., Minneapolis, Minn. 55403.

Pocket-size butane torch for delicate work

Minitorch uses small butane cartridges to develop a 3500° F. pinpoint flame to do a variety of jobs on small objects or in tight places, including soldering, brazing, drying sparkplugs, jewelry work, softening putty, starting charcoal fires. Kit, with torch, soldering tip, solder, two cartridges, is priced at \$8; refill cartridges are available at \$2 for four. Walter Kidde & Co., Inc., 35 Farrand St., Bloomfield, N.J. 07003.



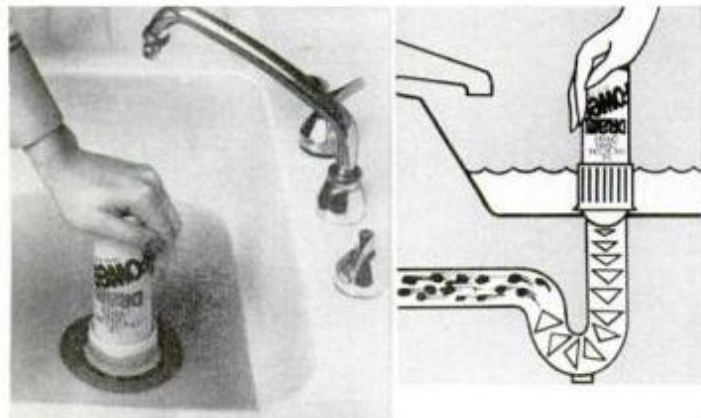
Warm-air deflectors

Register deflectors increase comfort by directing warm air into living areas. These, of clear polystyrene, attach to registers with permanent magnets; from \$2.50. Leigh Products, Inc., Coopersville, Mich. 49404.



Magnetic playing cards won't blow or spill

If you like to play cards outdoors in the wind or on the sundeck of a pitching yacht, you'll be happy to know there's now a magnetic set that won't blow or spill. The cards have a thin foil backing that holds them firmly in place against several magnets that are hidden inside a special playing board. Cards and board are available for \$12.95 at Hammacher-Schlemmer, 147 East 57th St., New York, N.Y. 10022.



Instant drain opener works without harsh chemicals

A drain opener that contains no caustic lye or acid, and is safe for sewers, cesspools and pipes, Drain Power uses the pressure of its propellant gas to force clogs out of drain traps immediately. Each container has enough capacity to clear up to five drains. A strong spring in the valve requires 30 lbs. pressure to operate, making the opener childproof. Won't damage porcelain or fittings; \$1.98. Glamorene Products Corp., 15 Entin Rd., Clifton, N.J. 07014.



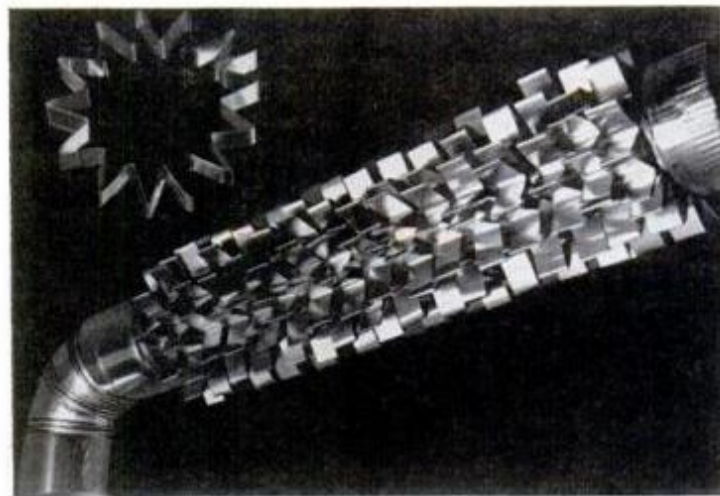
Rust preventive

By reacting chemically with rust itself, TruStang 7 forms an impermeable shield that prevents further corrosion. No sanding or scraping of surface is required. Price is \$3.25 for 7-ounce can. TruStang Co., 500 Highway 10, Ledgerwood, N.J. 07852.



Car sculpture kit

You don't even need a parts box to construct these two nuts-and-bolts antique-car sculptures—Whitman kit includes everything, even cement, enamel and brush. About \$6.50. Western Publishing Co., Inc., 1220 Mound Ave., Racine, Wis. 53404.



Slip-on fins save heat from flue pipe

Heat normally lost up the chimney is diverted into the room with these spring-type aluminum fins slipped around a metal flue pipe. The fuel-saving fins expand to fit all standard sizes of round flue pipe. A box of 16 converts any 24-inch length of pipe into a giant radiator. The fins work in any position, even around elbow bends. \$9.95 per box postpaid from Patented Mfg. Co., Bedford Rd., Lincoln, Mass. 01773.



Accordion bottles

Darkroom chemicals last longer in these new Air-Evac bottles because there's no air inside to oxidize them. As you use the chemicals up, you squeeze the accordion sides to eliminate air space, then recap. Falcon Safety Products, Mountainside, N.J.

You do not need expensive fishing tackle. You don't have to be an expert angler to win fishing fame—though it could help. An expensive yacht and professional crew would be nice, but are far from essential in a hunt for a world's title of your own this year. It is reassuring to know that record fish catches have been made by fishermen when they were standing on the shore, peering through holes in the ice and paddling leaky jonboats.

It would be a definite asset if you could arrange a hot line to Lady Luck, but should that be hard to swing there are still a lot of preparations that can improve your chances. The experts that I fish with are critically careful that they are ready if luck—and a lunker fish—should strike. Casting alongside or studying the methods of fishing perfectionists like Ted Williams, Curt Gowdy, John Wayne, Bing Crosby, Pam and Lee Marvin, Don Meredith, Jonathan Winters, Captain "Black Bart" Miller, I've noted their rules for angling success—the tips you'll need the most.

Remember, at this very moment, there are countless world-record-size fish swimming around, especially out in the depths of the oceans. All are greedily looking for a free meal, and *your* hook could be inside it. How can I be so sure the big ones are ready and waiting out there? I have proof. Every year commercial fishermen, who annually account for more than 90 percent of the worldwide fish catch, regularly report taking fish that are heavier than existing hook-and-line records.

Consider last summer. On July 26, a 1142-pound blue marlin was caught off Cape Hatteras, N.C. It was the first time in history that a marlin over 1000 pounds had been caught in the Atlantic Ocean, and persons close to big-game angling were astonished. Was it a solitary fish? Could it have been the grandfather of Atlantic blue marlin? In answer to these questions, another blue of over 1600 pounds was caught within days of the Hatteras landing. The 1600-pounder was taken off the West Coast of Africa by a commercial fisherman. It does not count as a record, but does prove that larger fish are waiting out there.

The trick is to put yourself on a collision course with a record-size fish and rig up with the proper-size tackle. And you don't need to look for one of those 1000-pounders. Do you realize your name could go into the record books if you could land a three-pound rock bass or green sunfish? A six-pound crappie or white bass from your local lake? In

You, too, can be a world record fisherman

Add your name to angling history by beating any record given here. All it takes is patience, luck, skill and tips from our experts.

by Jim Hardie

saltwater, take a nine-pound black sea bass, a 10-pound spotted sea trout or 19-pound cod on six-pound-test line or 14 other types of any weight on six-pound line with rod and reel and you'll be listed as a record holder.

Some record fish caught by women are larger than those landed by men, and women have more open spots on the books where no fish of a certain class has been caught with specified weights of line. A little family study before a fishing trip could really pay off.



Author Hardie, Miami authority, took local snook, trout while record-chasing.

Among the distinguished organizations which keep tabs on record catches are the International Gamefish Assn., 3000 East Las Olas Blvd., Fort Lauderdale, Fla. 33316, for saltwater; Field & Stream magazine, 383 Madison Ave., New York, N.Y. 10017, for freshwater totals; Salt Water Fly Rodders of America, Box 304, Cape May Court House, N.J. 08210; and the International Spin Fishing Assn., Box 81, Downey, Calif. 90241.

These deserve your support; they can provide latest record tabulations and the entry rules for qualifying a lunker fish.

You may have heard the old saw that 10 percent of the fishermen catch 90 percent of the fish. Add to this the equally old saying that expert anglers catch their fish before they leave home. Both of these I believe, and the advice is born out by my experts. They all recommend careful homework first. This includes study and selection of the spots where the biggest ones are likely to live, plus the time of year when it will be best to travel there. Then you must determine if you have the correct tackle—and technique. Next comes reading and rereading of entry rules and current records.

As my experts point out, you have to be completely prepared, if possible, when your great break comes along. Here are sample questions for which you need all the answers in order to qualify for that world's record:

Must you use a leader for the type of fish you're stalking?

Are treble hooks legal?

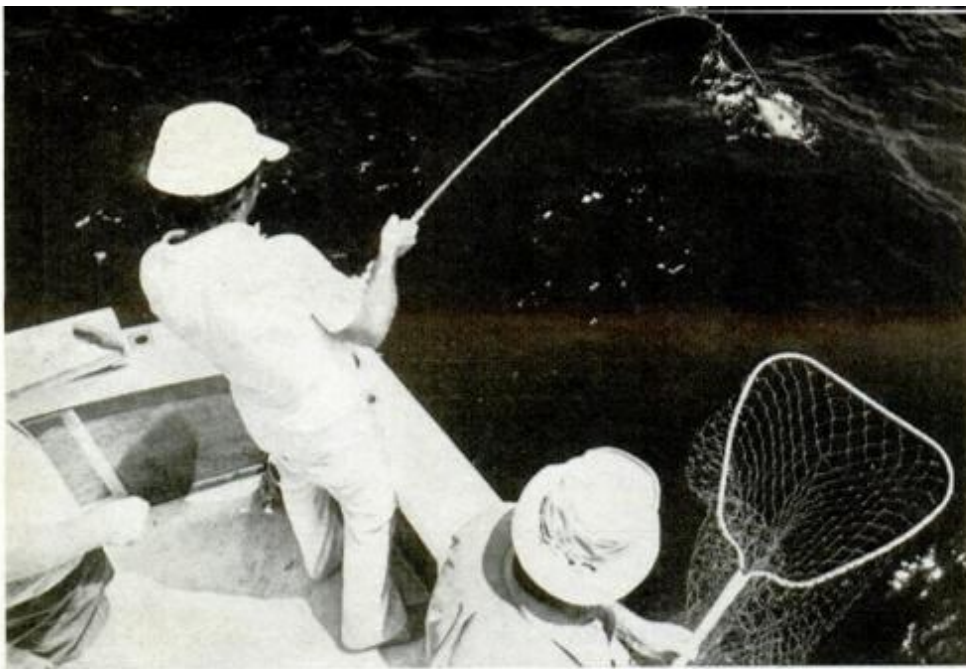
Is there a limit on the size gaff you can use?

What scales may be used to weigh a potential record catch?

Must you submit a photograph of the catch?

What length of line sample must you send in?

These are typical of a few of the



Heavy tackle isn't necessary. World titleholder Jim Lopez, shown landing a tuna off Bermuda, has 16 ocean flyrod records.

requirements to make an acceptable entry for record consideration. Each organization spells out strict rules which they follow to the letter.

Studying the existing records will reveal a lot. You will discover that 15 percent of the top catches are made during the month of May. June and August are good months, too, accounting for 11.6 percent of the top catches. On the other hand, December has been a terrible time, with this month claiming only two percent of the world records. This can give you another clue in planning your campaign.

The gaps in our International Game Fish Assn. chart of saltwater records for men offer obvious opportunities (and the open records for women are even greater). Biggest difficulty in topping an existing record is finding a fish of record size. Hooking and landing the fish are second and third in order of difficulty.

Some of the record vacancies carry minimum acceptable weights—that can border on the ridiculous. For example, no bonefish has been entered in the 130-pound-line class. The minimum acceptable weight is 19 pounds, a very tough fish to find, and catching it on 130-pound test line would be like going after a mosquito with a shotgun.

There is also a very real possibility that you might fumble your golden opportunity with a technical

FRESHWATER RECORDS

SPECIES	Lb.-Oz.	Where Caught	When
BASS, Largemouth	22-4	Montgomery Lake, Ga.	June 2, 1932
BASS, Redeye	6-½	Hallawakee Creek, Ala.	Mar. 24, 1967
BASS, Rock	2-2	Mille Coquin Lake, Mich.	Aug. 13, 1971
BASS, Smallmouth	11-15	Dale Hollow Lake, Ky.	July 9, 1955
BASS, Spotted	8-10½	Smith Lake, Ala.	Feb. 25, 1972
BASS, White	5-5	Ferguson Lake, Calif.	Mar. 8, 1972
BASS, Yellow	2-2	Lake Monona, Wis.	Jan. 18, 1972
BLUEGILL	4-12	Ketona Lake, Ala.	Apr. 9, 1950
BOWFIN	19-12	Lake Marion, S.C.	Nov. 5, 1972
BUFFALO, Bigmouth	36-8	Cedar River, Iowa	Sept. 19, 1973
BUFFALO, Smallmouth	22-½	Barbwell Creek, Wis.	May 25, 1973
BULLHEAD, Black	8	Lake Waccabuc, N.Y.	Aug. 1, 1951
CARP	55-5	Clearwater Lake, Minn.	July 10, 1952
CATFISH, Blue	97	Missouri River, S.D.	Sept. 16, 1959
CATFISH, Channel	58	Santee-Cooper Res., S.C.	July 7, 1964
CATFISH, Flathead	76	Piedmont Lake, Ohio	July 12, 1972
CHAR, Arctic		(Record being reviewed)	
CRAPPIE, Black	5	Santee-Cooper Res., S.C.	Mar. 15, 1957
CRAPPIE, White	5-3	Enid Dam, Miss.	July 31, 1957
DOLLY VARDEN	32	L. Pend Oreille, Idaho	Oct. 27, 1949
DRUM, Freshwater	54-8	Nickajack Lake, Tenn.	Apr. 20, 1972
GAR, Alligator	279	Rio Grande River, Tex.	Dec. 2, 1951
GAR, Longnose	50-5	Trinity River, Tex.	July 30, 1954
GRAYLING, Arctic		(Record being reviewed)	
MUSKELLUNGE	69-15	St. Lawrence River, N.Y.	Sept. 22, 1957
PERCH, White	4-12	Messalonskee Lake, Me.	June 4, 1949
PERCH, Yellow	4-3½	Bordentown, N.J.	May 1865
PICKEREL, Chain	9-6	Homerville, Ga.	Feb. 17, 1961
PIKE, Northern	46-2	Sacandaga Res., N.Y.	Sept. 15, 1940
SALMON, Atlantic	79-2	Tana River, Norway	1928
SALMON, Chinook	92	Skeena River, B.C.	July 19, 1959
SALMON, Landlocked	22-8	Sebago Lake, Me.	Aug. 1, 1907
SALMON, Coho or Silver	31	Cowichan Bay, B.C.	Oct. 11, 1947
SAUGER	8-12	Lake Sakakawea, N.D.	Oct. 6, 1971
SHAD, American	9-2	Enfield, Conn.	Apr. 28, 1973
STURGEON, White	360	Snake River, Idaho	Apr. 24, 1956
SUNFISH, Green	2	Salem, Ill.	May 15, 1972
SUNFISH, Redear	4-8	Chase City, Va.	June 19, 1970
TROUT, Brook	14-8	Nipigon River, Ont.	July 1916
TROUT, Brown	39-8	Loch Awe, Scotland	1866
TROUT, Cutthroat	41	Pyramid Lake, Nev.	Dec. 1925
TROUT, Golden	11	Cook's Lake, Wyo.	Aug. 5, 1948
TROUT, Lake		(Record being reviewed)	
TROUT, Rainbow, Steelhead or Kamloops	42-2	Bell Island, Alaska	June 22, 1970
TROUT, Sunapee	11-8	Lake Sunapee, N.H.	Aug. 1, 1954
WALLEYE	25	Old Hickory Lake, Tenn.	Aug. 1, 1960
WARMOUTH	1-13	Cumberland County, Ill.	May 22, 1971
WHITEFISH, Lake	12-9	Great Slave L., N.W.T.	July 28, 1972
WHITEFISH, Mountain	5	Athabasca R., Alta.	June 3, 1963

Big weight records are hard to top. Virgil Price caught this 1067-pound black marlin in Australia, 492 pounds below record.



Material, защищенный авторским правом

Small hulls offer more big-boat features



Pick outboard or outdrive power: Some models like Cruisers 21-foot Bonanzas (above) can handle 230 hp with V-type hulls.

The look of speed is part of new runabout styling. Droop snoot deck and wrapped wind-screen of Hydrostream Viper are examples.



Convertible sunlounger seats, walkway to open foredeck are popular. Rally Bowrider 17 (above) with I/O has blue denim cockpit.



Watch for these pacesetters in '75

You can choose more speed, style, comfort and performance when the new models are launched this spring.

by Bill McKeown
BOATING EDITOR

Pick almost any new pleasure boat this year and it's likely to be better. Power craft will have the small placard giving maximum recommended horsepower and carrying capacity. Sailboats will be outfitted with improved flotation. Look under the gunwales of both power and sail hulls and you're likely to see foam to keep the craft upright in case it capsizes or swamps. Boat companies are getting the word that buyers want higher performance from hulls that are safer, easier riding, maintenance-free. And the Coast Guard is now keeping a close eye on construction, and requiring recall and repair if dangerous defects show up.

The boat you finally choose will offer extras in activities as well. Properly powered, many larger fishing models can also tow water skiers. Add the canvas top and



foul. Records are kept in 6, 12, 20, 30, 50, 80 and 130-pound-test classes. Your line must test at or below the line class you enter or you can expect a hasty rejection slip. When you purchase a spool of fishing line it may be marked "20 Pound Test Line."

What the manufacturer may have meant is that the line will not test below 20 pounds breaking strength. It could actually test to 23 or more, and disqualify you for a 20-pound class record.

To play it safe in a record attempt, it's a good idea to buy a line marked below the class you plan to enter. For instance, buy 17 or 15-pound test if you plan to compete in the 20-pound line class.

Another way you can play it safe is to purchase line labeled "Tournament Test." You pay a premium price, but the line is supposed to test below its stated strength.

Our choices of the top 50 records to tackle, shown on the chart, have been made for saltwater because ocean fish are usually heavier and more plentiful. Hot spots I have fished with my experts, and favor, include Baja California, Hawaii, Central America and my home waters of Southern Florida. Offshore with Dandy Don Meredith out of Hotel Cabo San Lucas at Baja, we stalked oversize roosterfish where Bing Crosby boated an 18-pound rainbow runner on 12-pound class line for a world record that still stands.

Distinguished, dedicated fishermen in their own right, Jonathan Winters and Lee and Pam Marvin are often found working Baja waters. Last year Pam caught a record 191-pound Allison tuna at Kona, Hawaii, fishing with famed Captain "Black Bart" Miller. In 1973 she landed a world record 607-pound marlin on 80-test line and their 11-year-old daughter, Kelly, took a non-record 196-pounder.

John "Duke" Wayne, from whom I've picked up many tips, fishes the Pacific off Acapulco as intensively as he chases movie desperadoes. During a week in Panama, we jointly bagged a wide variety of lunker fighters.

Ted Williams practiced for many years to polish his casting techniques with the same concentration he used on the diamond. While talking to you, he's likely to take out fishhooks and file their points to an even keener sharpness.

TV's Curt Gowdy takes his own advice and practices his fly-casting for bonefish in saltwater and trout inland at every opportunity. It is a humbling experience. Gowdy ex-

SALTWATER RECORDS

SPECIES	(Line test) 6-lb.	12-lb.	20-lb.	30-lb.	50-lb.	80-lb.	130-lb.
ALBACORE	27	39	40	63	69	69	74
AMBERJACK	18	80	101	149	132	142	133
BARRACUDA	26	49	60	70	83	67	—
GIANT SEA BASS	—	112	425	388	557	563	514
WHITE SEA BASS	—	65	72	83	77	74	—
CHANNEL BASS	25	72	64	90	83	—	—
BLACK SEA BASS	3	5	6	5	8	—	—
STRIPED BASS	38	61	67	63	72	—	—
BLACKFISH (TAUTOG)	38	12	21	21	20	—	—
BLUEFISH	18	24	23	22	31	22	—
BONEFISH	12	16	14	19	17	18	—
BONITO (SKIPJACK)	21	23	32	33	39	38	38
COBIA	45	70	91	100	110	90	—
COD	19	55	98	81	80	—	—
DOLPHIN	46	59	64	65	85	77	72
BLACK DRUM	52	89	88	92	109	—	—
FLOUNDER	7	20	30	22	21	—	—
JEWFISH	—	349	343	430	369	680	396
MACKEREL (KINGFISH)	44	52	77	75	78	—	76
BLACK MARLIN	—	309	381	816	1124	1218	1560
BLUE MARLIN	—	448	430	484	666	845	810
PAC. BLUE MARLIN	—	—	220	438	663	916	1100
STRIPED MARLIN	205	250	338	261	365	415	394
WHITE MARLIN	—	103	128	130	159	—	—
PERMIT	38	50	50	41	47	34	38
POLLACK	17	36	33	40	43	—	—
RAINBOW RUNNER	6	18	25	25	28	28	30
ROOSTERFISH	29	50	85	114	80	90	100
ATLANTIC SAILFISH	62	94	108	116	123	—	—
PACIFIC SAILFISH	110	159	158	198	192	198	221
SPOTTED SEA TROUT	9	14	13	15	15	—	—
BLUE SHARK	111	312	218	350	371	410	341
MAKO SHARK	91	261	347	854	690	820	1061
TIGER SHARK	—	—	341	494	1018	1305	1780
PORBEAGLE SHARK	—	66	180	191	388	430	300
THRESHER SHARK	—	92	113	227	421	501	600
WHITE SHARK	—	96	1068	1053	1876	2344	2664
SNOOK (ROBALO)	17	37	41	43	40	37	—
SWORDFISH	106	120	183	204	444	530	1182
TANGUIQUE	43	53	78	73	78	81	—
TARPON	71	170	188	283	242	218	210
YELLOWFIN TUNA	33	145	153	187	240	296	308
ATL. BIG-EYE TUNA	—	—	—	—	321	198	295
PAC. BIG-EYE TUNA	—	32	108	163	280	332	435
BLACKFIN TUNA	29	29	31	38	36	—	—
BLUEFIN TUNA	—	56	114	172	640	881	1120
WAHOO	28	74	115	98	124	139	149
WEAKFISH	10	10	11	10	—	19	—
YELLOWTAIL	38	65	74	88	111	108	89

Weights are to nearest full pound below record.
Bold face indicates existing records which offer best opportunity to be broken.

plains. "That fish doesn't know who is topside and doesn't care. Who you are has nothing to do with fishing success or lack of it."

When summarized, these experts' tips may sound extreme, but they are record-seeking fundamentals that can make the difference between a famous catch and a sad fish story.

■ Keep your reel filled with *fresh* line. If the line gets a workout on a trip, either reverse it or put on new line. Some perfectionists spool-up new line every time out.

■ Hone hooks to razor-sharpness before *every* fishing trip.

■ Retie *every* knot in your tackle before every fishing trip.

■ Keep reels super-clean, well oiled, and make certain drag is silk-smooth. Some experts have gone to Teflon systems for smoothness.

■ Closely check reel seat, guides, tip of rod before every trip. Worn or loose guides can doom a record attempt.

■ Make certain spinning tackle reel roller has no corrosion, turns freely.

Finally, always check your catch if you suspect record possibilities. Almost every season I get a frantic call like, "Is 9 pounds 14 ounces really the sea trout record on six-pound-test line? I got a 10-pounder yesterday, but we had it for dinner last night!" ★★



Divide and conquer with a freestanding wall

Get more from available space: This easy-to-build wall doubles the use of your youngsters' bedroom.

by Harry Wicks
WORKSHOP EDITOR

A perfect "space-doubler" for youngsters sharing the same bedroom, this freestanding wall clearly draws the line between activity and sleeping areas. Gone will be the nightly squabbles over the right time for lights out—and your role as arbiter, happily, will be vastly diminished.

You needn't be a master carpenter nor own any special tools to test your do-it-yourself skills on this project. The wall consists of a 2x4 framework covered on one side with plasterboard and wallpaper, and on the other side with a durable 1/4-in. plywood paneling chosen from U.S. Plywood's Weldwood Prefinished line.



A sophisticated, bright bedroom becomes more functional when space is divided into logical-use areas. Here, wall facing study-play area is clad with a durable prefinished plywood paneling (top); the opposite side (above) is wallpapered to match bedspread and draperies.

WALLPAPER, TO MATCH BEDSPREAD

OUTSIDE CORNER GUARD

CLAMSHELL MOLDING

3/8" PLASTERBOARD

2x4 CLEAT (BLOCKING) INSTALLED FOR MOUNTING LAMP

DISTANCE FROM TOP TO SUIT

WALL LAMP OPTIONAL (2 REQ'D. IF USED)

MIDPOINT BLOCKING FOR RIGIDITY

2 x 4

7' OR TO SUIT

Art: Peter Trojan

2-3/4" NO. 8 F.H. SCREW (6 REQ'D.) INTO WALL STUDS

3/4" PLYWOOD PANEL (SIZED TO SUIT BED)

3/4" PLYWOOD

2-3/4" NO. 8 FH SCREW

SPACER WASHERS

2-1/4" NO. 8 FH SCREW (MIN. 2 INTO EACH LEG)

WALL

BED LEG

5' OR TO SUIT

2-3/4" NO. 8 F.H. SCREW (6 REQ'D.) INTO WALL STUDS

16" O.C.

1/4" PANELING (U.S. PLYWOOD'S WELDWOOD)

CLAMSHELL BASE

As in conventional housebuilding, the easiest way to build the wall is to assemble it flat on the floor. To prevent the wall from racking (going out of square), the plywood paneling should be applied to one side while the wall is still in the horizontal position. The wall can then be tilted upright and held with diagonal braces while the plasterboard and wallpaper are applied to the second side.

There are two slight differences between this wall and the walls of your house. First, it is *not* fastened to the floor; you will not be tied down to one furniture-layout scheme. Instead, a piece of 3/4-in. plywood, which is attached inconspicuously to the bed frame, is in turn screw-fastened to the wall (see inset above).

The second important thing to keep in mind is that the wall stops short of ceiling height by about one foot. If it did not, the resulting look would be wall rather than divider. Before starting construction, make

certain you measure bedroom floor-to-ceiling height and scale your divider to it (as well as scaling the divider width to bed width).

The wall facing the active area is more likely to receive some punishment from lively youngsters. Thus, it is clad with the same plywood paneling used on the walls. Paneling here also gives a feeling of continuity—that the wall is an integral part of the room. Lacking such coordination, it might suffer the look of an afterthought.

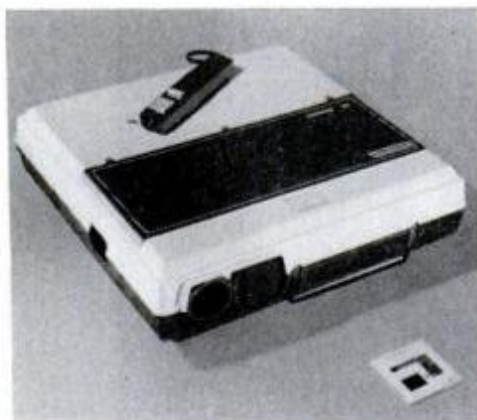
The second side is covered with 3/8-in. plasterboard. Joints and dimpled nailheads are hidden with two applications of joint compound and the wall is finished with wallpaper to match bedspread and draperies. Conventional molding at top, base and corners supply the finishing touches. If desired, battery-powered pin-up lamps can be installed on the divider over the bed as shown above.

★★★

Pocket Instamatic slide fans get the world's zippiest projector—and more

by Ivan Berger
PHOTOGRAPHY EDITOR

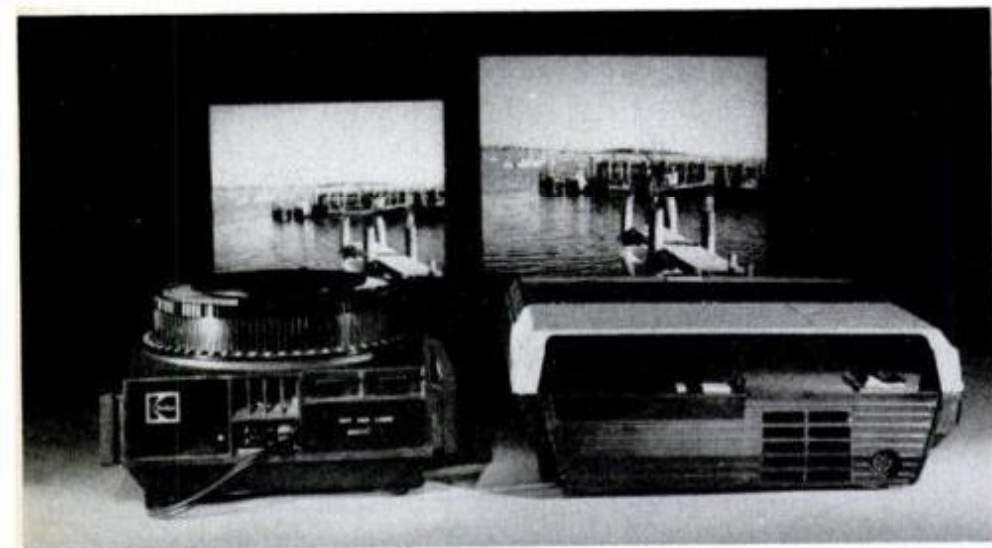
"Almost like movies," said a friend as she watched my slides pop on and off the screen at a machine-gun-like four frames a second. How did I do it? With the new \$150 Hanimex Rondette 110 projector that loads like a machine gun and has belts holding 40, 80 or 120 slides each. But the real advantage, to me, wasn't the rapid-fire pace but Ron-



Sleek appearance of new Hanimex projector goes with even slicker operation.



Slides flipped in and out of the gate quickly for our camera to catch them the act. Complete 80-slide belt can projected in 20 seconds, with almost dark screen time between slides.

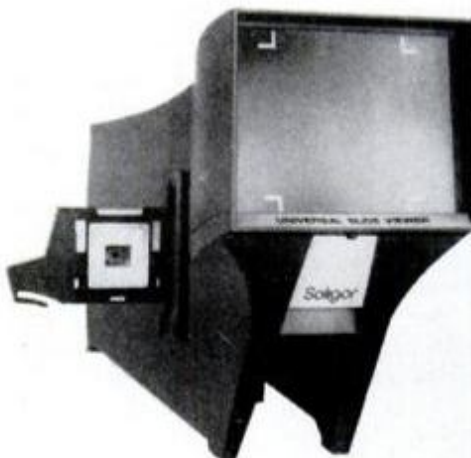


Hanimex projector (right) gives a noticeably bigger image than the Kodak 110, but the Kodak image is a bit brighter, sharper and has a more natural, cooler color.

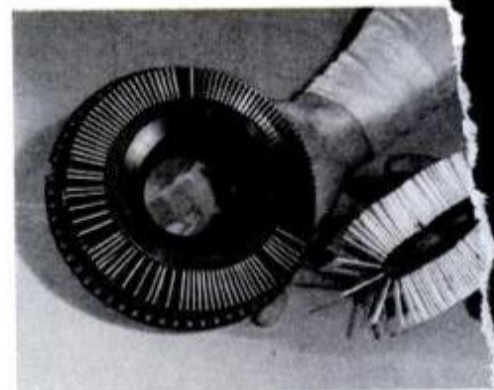
dette's almost instantaneous transition from one slide to the next—a mere blink, not a blackout. The action's so fast we couldn't photograph the blur of a moving slide as it slid into the projector's light path.

Mechanically, we liked it a lot better than its main rival, Kodak's Pocket Carousel (above). Optically, though, Carousel had the edge. The Rondette lens's shorter focal length projects a bigger image, but it's not as sharp as the Carousel image, even when the Kodak projector is moved back far enough to equalize the two image sizes. (The Rondette image was also noticeably dimmer and warmer colored, but that could have been a defect in the projection bulb.)

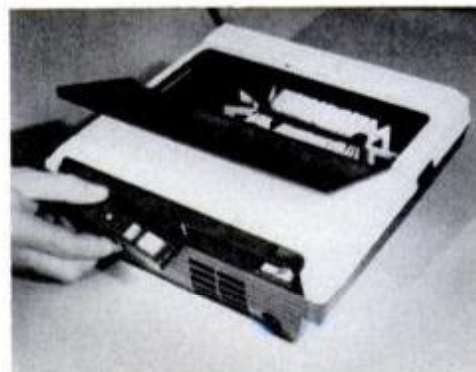
The belts store more compactly than the Pocket Carousel trays and come in three capacities to the Carousel's one (140 slides). Each slide must be inserted in a clip on the belt—taking more time and effort



New Soligor table-viewer takes 110 slides in 2x2 mounts or adapters; will also show center of 35-mm slides, costs \$30.



Small as it is, Kodak's Pocket Carousel tray dwarfs the Rondette's belt.



Control panel nestles in projector or pulls out for remote use; switch at right controls lamp only, while fan stays on.

than tray loading but once loaded, it never leaves the belt, so slide jamming should be impossible, even if the slide is warped or bent.

The Rondette takes slides only in the small, 30x30-mm Pocket Instamatic 110 format, and so far no 110 camera can shoot as fast as the Rondette can project. But if you have a 35-mm camera with a motor drive, Kodak's Rochester lab will now duplicate 35-mm slides (cropped about 26 percent to match the squarer 110 format) in the 110 size.

You can also get 30x30 mounts for Minox or Minolta subminiature slides, and a variety of custom-cropping mounts from Heindl Masks-'N'Mounts (see *Trim the Fat From Your Vacation Slide Shows*, page 124, Dec. '74 PM).

Samigon has a new, battery-operated hand viewer for 30x30-mm slides, too; the \$8.25 Itorex 110 (below). It's designed to hold a plastic "stick" of 12 or 20 slides; originally, Kodak returned 110 slides on such a stick, but it no longer does; one stick is provided with the viewer, though. The thumb wheel below the eyepiece moves the slides.

Pocket Instamatic slides can also come back from the lab in standard 2x2 mounts (the small and large mounts are shown in front of the Rondette in the upper left picture facing page), and Soligor has a table viewer for them. It will also take 35-mm slides, but will show only the central portion of the 35-mm image.

And if all you have is a regular 35-mm projector, National Color Labs in Seattle will now make 35-mm slides from 110 Kodacolor II negatives. ★ ★ ★



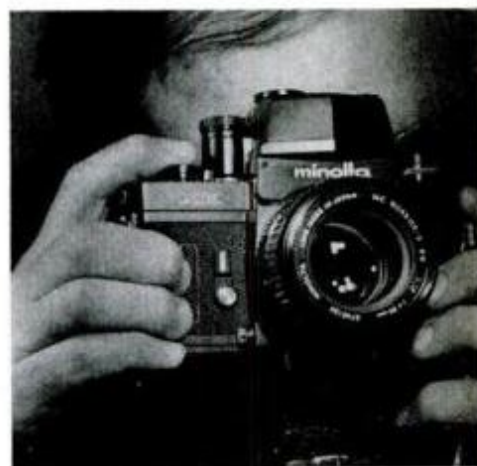
Samigon battery-operated hand viewer takes "sticks" of 110 slides. But the sticks are hard to get now. (See text).

Electronic XK: Minolta's first 'convertible'

"Convertible" top lets you use a metered prism finder (on camera) or (left to right), un-metered prism, folding waist-level hood, magnifying "chimney" finders. Screens are also interchangeable (below).



Squeeze-on meter switch under my fingers (right) will be loved by some photographers, but not all (see text). Miss it, and you can mess up your picture.



The XK, Minolta's new entry in the supercamera sweepstakes, has a "convertible" top, so you can mount any of the four viewfinders above, with your choice of nine finder screens. It's the first camera to combine that feature with an electronically-controlled shutter.

Why electronic control? It's more reliable and accurate, proponents say, than conventional spring timing systems; it's more adaptable to electric-eye, meter-controlled operation, and it permits a broad, continuous range of shutter speeds (let the light level rise a hair, and the Minolta XK can reset itself from, say, 1/547 to 1/565 second, or anywhere between 4 and 1/2000 seconds).

You can also set the shutter manually in steps from 1/2000 to 16 seconds, with the meter operating

in a match-needle mode, or with one of the nonmetered finders.

In manual or auto modes, I found the meter (which uses Minolta's Contrast Light Compensation [CLC] system for accuracy in high-contrast situations), perfectly accurate in a wide range of lighting situations. I especially liked it for available light, where its auto exposure let me shoot without squinting at a dimly visible needle, and the continuously variable shutter let me shoot at 1/20 instead of forcing me to use a shakier 1/15.

My only gripe was the meter switch. Some hands will fall naturally on it when shooting, but mine don't. And whenever you try to shoot on "Auto" with the meter off, the shutter stays open for 30 seconds—a sure way for you to miss a picture. —I.B.



For offshore racing or inshore action, the trend to larger high-performance runabouts is producing speedy models like Chris-Craft's new 8-Metre (above) that double for competition or sport.

Water-jet power has also become a popular option. Wriedt Maverick 19 (near right) has MerCruiser Jet.

The Grady-White Hatteras Overnighter (center) is 20-foot outboard with a unique walkaround console cabin that allows angler to fight fish in self-bailing cockpit or follow walkway forward around cabin.

Biggest of runabouts (far right) is Century Venturer 28 with aft, midship cockpits and three cabin bunks.



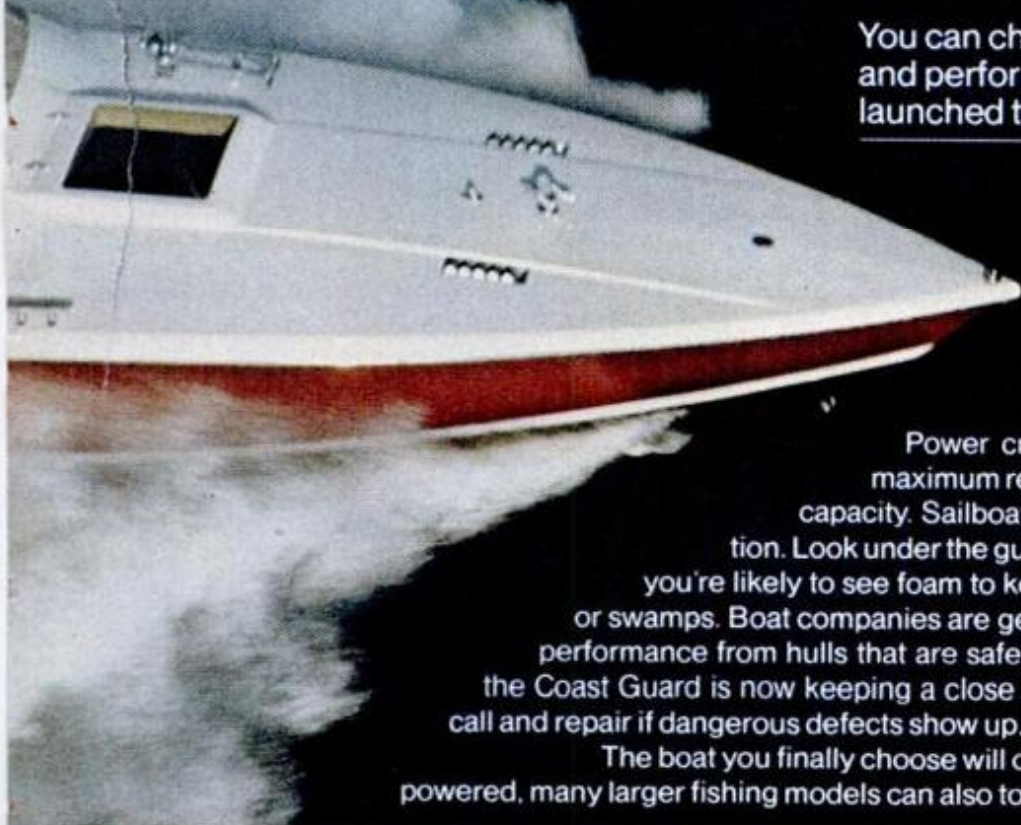
Watch for these pacesetters in '75

You can choose more speed, style, comfort and performance when the new models are launched this spring.

by Bill McKeown
BOATING EDITOR

Pick almost any new pleasure boat this year and it's likely to be better. Power craft will have the small placard giving maximum recommended horsepower and carrying capacity. Sailboats will be outfitted with improved flotation. Look under the gunwales of both power and sail hulls and you're likely to see foam to keep the craft upright in case it capsizes or swamps. Boat companies are getting the word that buyers want higher performance from hulls that are safer, easier riding, maintenance-free. And the Coast Guard is now keeping a close eye on construction, and requiring recall and repair if dangerous defects show up.

The boat you finally choose will offer extras in activities as well. Properly powered, many larger fishing models can also tow water skiers. Add the canvas top and



Small hulls offer more big-boat features



Pick outboard or outdrive power: Some models like Cruisers' 21-foot Bonanzas (above) can handle 230 hp with V-type hulls.

The look of speed is part of new runabout styling. Droop snoot deck and wrapped wind-screen of Hydrostream Viper are examples.



Convertible sunlounger seats, walkway to open foredeck are popular. Rally Bowrider 17 (above) with I/O has blue denim cockpit.





Sea Ray Amberjack offers a swim platform.



Fiberglass Pro Line Pro 16 has dory lines.



Chris-Craft's fisherman mounts tuna tower.



Chrysler Commando 23 fishes well offshore.



Scat-Craft Weekender 24, cuddy forward.

optional side curtains and your open skiff becomes an overnighter. The same arrangements, enclosing the cockpit of a cruiser with a full cabin or cuddy forward, can upgrade a two-sleeper into one that bunks four or more once the cockpit is tented-in. More kinds of action or better performance or both, hopefully using less fuel as well, is the name of the boating game this year.

If it's speed you're after, there are a number of sporty new runabouts. Look for wraparound windshields, reverse-slant screens to deflect the slipstream, or none at all—to give you a real blast of breeze in your face and the sensation of getting there in a hurry. Speeds to 50 mph are available, and should be plenty.

Traveling so close to the water, the feeling of going fast is increased, but the fun can turn to punishment in rough chop. Pick the speedboat with the skimming-dish hull if you can count on flat water where you use it. If you'll be pulling skiers or sliding over shoals, consider the advantages of water-jet power without a spinning propeller.

Offshore where the waves lump up, you can still have speed—but at a price. For the cost of a couple sports cars, there are now "pleasure boat" models of the marathon machines that approach 100 mph in flat going but can also deep-V their way through and over bumpy seas at 60. Don Aronow's custom Cigarettes lead the way in this league. Now Chris-Craft and others are getting into, the act with copies of the big offshore machines but with slightly less sophisticated (and lower cost) power. If you want to join the deep-water crash-helmet crowd or break into the expensive game of ocean racing, these new production models are the way to go.

This year we'll be seeing developments for closed-course racing hulls moving over into stock hulls as well. MonArk has previewed a tunnel-bottomed bass boat, Wellcraft has more Air Slot models, and the tri-hull trend is showing up in fishing boats and cruisers as well as runabouts. The best boat for your particular waters? Take a good look at what is popular locally. That can help keep you from getting stuck with a type that is perfect for a placid pond, but may pound your teeth out when you open it up in average sea conditions outside your harbor.

Many of this year's boats look as if they are better made, and there are quick checks you can make before even going afloat. Figure how you are going to step aboard and then give that windshield you're likely to grip a good pull. If it feels firm and

doesn't cut your hand with sharp edges, that's a good beginning. Next, look around for the additional hand holds and grab rails you, and particularly your passengers who won't have a steering wheel to hang on to, are going to need. Safety rails around the cockpit also do much to keep smaller members of your family aboard.

Let's also encourage right here the overdue trend to permanent swimming platforms, transom steps and fixed boarding ladders. The freeboard of a high-sided boat keeps out waves but also anyone trying to climb back on board. While you can use the anti-cavitation plate of an outboard or sterndrive as an emergency step if the engine is shut off, there's still a chance of a cut from a propeller blade. Better to pick a boat that has permanent steps or the swing down arrangement like that on some Glasstron models. This basic safety and convenience aid has been neglected too long.

So has comfort for the fisherman who sits long hours while waiting for underwater action. This year

The switch from wood to low-maintenance fiberglass, marine aluminum and ABS plastic is almost complete this year . . .

most bass-boat improvements are inside, with pedestal chairs that can rise or rock and are padded for pleasant lounging whether the fish bite or not. Figure, however, how to rig a convertible navy top for sun and rain protection. Few bass boats offer this as standard equipment, although the slightly bigger bonefish and offshore skiffs usually provide this option.

The switch from wood to low-maintenance fiberglass, marine aluminum and ABS plastic is almost complete this year for most types of standard production craft. Some are now combining materials. Delhi's Guardian 12 fishing boat uses an aluminum outer hull mated with a smooth ABS inner cockpit. Lighter weight and even easier upkeep is claimed.

After several years of many open-cockpit powercraft, there is also a move back to the cuddy shelter or full cabin forward with bunks, plus head and galley that help extend cruising possibilities and full family appeal. Usually held to an eight-foot beam so they can be trailered without

More cabins are coming . . .

a special permit, the little power and sail cruisers are ranging up to 26 feet in length with bunks for as many as five friendly people plus additional sack space on the cockpit floorboards. Flying bridges are now often an option on these larger models; some offshore open sports-fishermen of the same size are also adding light tuna towers.

Trailing is becoming a way of life and added action for many power and sail skippers, but too often the purchase of a trailer is an after-thought with any money left over. Recently, an engineering study has shown, however, that the strains and punishment a hull receives are likely to be much more severe ashore aboard a trailer on a rough road than experienced on the water.

Sailboats are increasing in popularity, thanks in part to the energy shortage, and to makers like Reinell, Bayliner, Silverline and Slikker which are among the firms starting or increasing sail production. Cartop single-hull and catamaran sailing models are also booming.

It is estimated this year that nearly 50,000,000 people will be spending over \$4 billion for the fun of going afloat. The new boats available should please nearly all of them. ★★



Trojan calls its F-26 Express the "roomiest 26-footer afloat." Beam is over 10 feet; high sheer allows 6-foot 2-inch cabin headroom. It sleeps a family of four or five, comes with galley, dinette, shower, teak trim.



Capri Sport Cruiser 20 from Starcraft can switch from day runabout to an overnight cruiser with convertible dinette in cabin.



Steury's 23-foot T523 is another tri-hull with 1/0 power that sleeps four. A forward cockpit with guard rail adds safety.



V26 Americana, a 40-mph deep-V cabin cruiser by Stamas, comes in hardtop, flying bridge models. Shelter cabin is open for southern fishing; bunks forward sleep two.



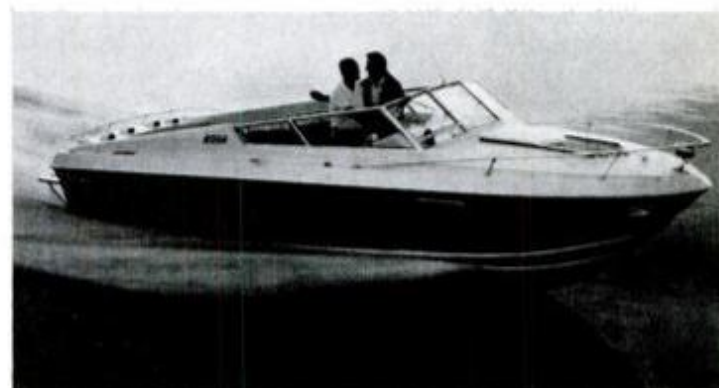
Canvas curtains can turn a runabout into an overnighter. The new Fiberform Bimini 17-footer converts to sleep four with the addition of navy top and "covered wagon" cockpit curtains.



With no shortage of wind for power, more builders are launching new sailboats. Silverline will have the Dolphin Senior 14½, Dolphin 17 (center and on this month's cover) and cuddy 17C.



Stage II, 20½-footer from Kona Boats, is a high-styled day-cruiser jet with reverse windshield, stainless bow rail, bucket seats, side-wrap bench for six, stereo, icebox and delta-V hull.



Nova 1975 Off-shore is newest of Wellcraft's 24-foot, 8-inch deluxe speedsters that deliver runabout performance with cabin accommodations for two. Engines up to twin 245s are offered.



Family Four from Vinga Marin in Sweden is power cruiser (top) or motor-sailer with mast stepped. Three sleep in forward cabin, two aft of cockpit.



Crusader II, latest 23½-footer from AMF Crestliner, starts with a Wynne-designed deep-V offshore hull, a cabin to sleep two or seat six, full galley, enclosed head, optional hardtop, camper curtains.

Speedy skiffs for finding fish

The bass-boat boom is hooking more anglers with performance and safety, convenience and comfort.

by Bill McKeown

Any craft that can take its owner out where the black largemouths are rates the title "bass boat." But over the last five years, the special-purpose hull that has developed has come a long way from the heavy, leaky wooden rowboats that for centuries seemed good enough.

A typical model is 14 to 18 feet overall, uses outboard motor power, has low sides and uncluttered gunwales that hide flotation foam underneath to keep the hull afloat and upright if a big wash should slop

aboard. Bottom shape is likely to be a variation of the tri-hull with three keel lines instead of one, and ability to stay fairly level if an angler stands up to boat a fish.

Equipment aboard, in addition to the gear required by law, may include a throttle and shift quadrant and stick steering or a wheel and control console. Pedestal chairs are a bass boat trademark and can be plain or very fancy, but in some states it is illegal to sit in them until you've finished the fast run out to the fishing grounds. Bass boat motors were once the largest that you could afford, but now the fishing tournaments have led the way in outlawing more power than your hull is rated for.

Other reforms in which groups like the Bass Anglers Sportsman Society have led include use of aerated fish wells to keep the catch alive until it can be weighed and returned

to the lake, life jackets worn by anglers, and an emergency shutoff switch that kills the engine if the driver should be thrown overboard.

A good bass-boat design should not be as hard riding at speed over chop as a flat-bottomed drifter jonboat. It should be light enough to trailer easily, require limited maintenance, be easy to steer and maneuver, and ideally have lockable compartments where your gear can get safe and dry storage.

Admittedly, the standard bass boat is not an offshore craft, shouldn't be fished in open coastal and lake waters, is not a cargo lighter to be overloaded with supplies and passengers or a racing runabout to flash around the lake. It's not ideal for bonefish or big gamesters, boat camping or cruising. But for stalking the wily largemouth bass lunger, nothing nearly as good has come along so far. ★★★



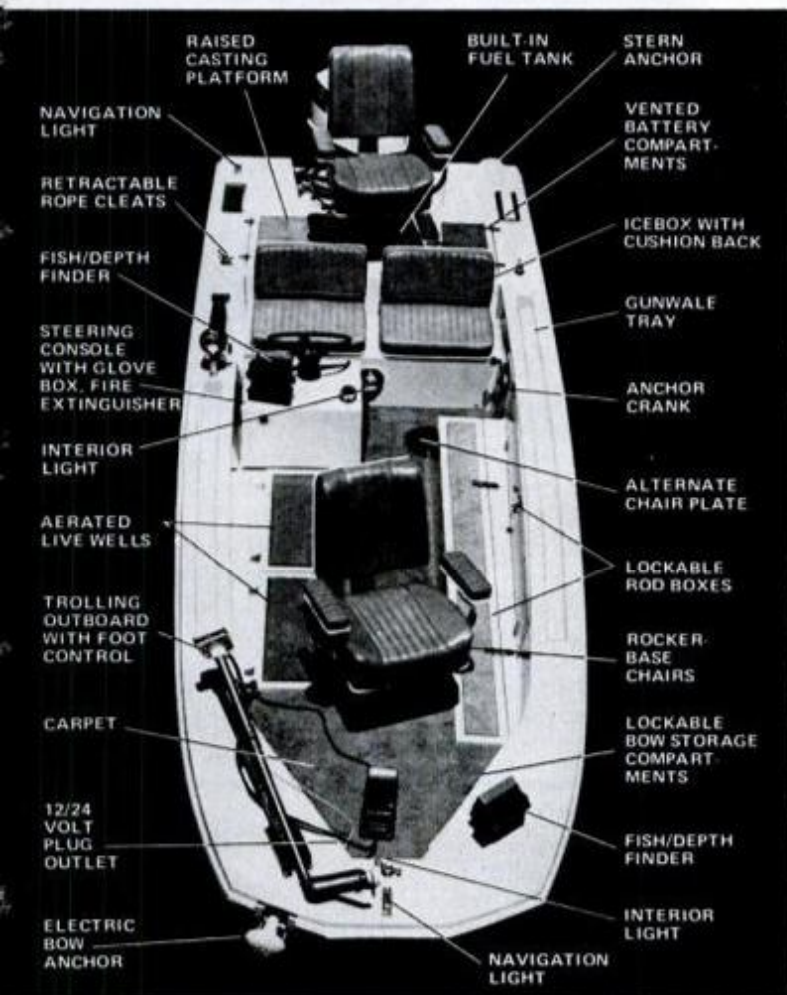
Sporty styling has come to fish searching with models like MFG's new Super Bass 15, a stable-riding fiberglass hull that's rated for 85 hp and fitted with live-fish wells, carpets and lockable gear-storage compartments.

For under \$700, an angler can buy a basic bass boat. Ouachita's 16B (right) is \$668 with foam flotation. It comes in five colors with steering console as extra option. Other light aluminum models include 15-footer and basic 14B model priced at \$419.16.

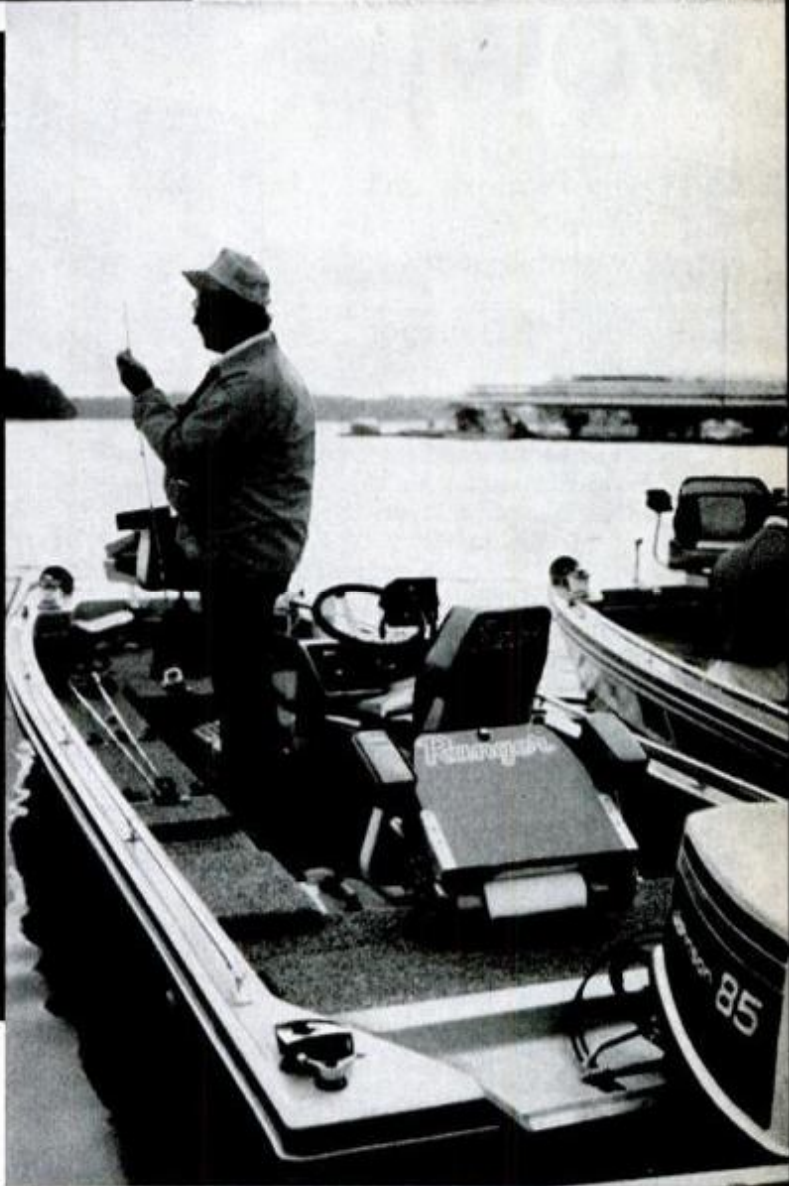




Added durability of ABS molded plastic is claimed for Shakespeare's 14 and 12-foot tri-hulls and semi-vee WonderCraft. Inner foam core between ABS skins gives full flotation. Weight is reported lower than fiberglass, aluminum.



- RAISED CASTING PLATFORM
- BUILT-IN FUEL TANK
- STERN ANCHOR
- NAVIGATION LIGHT
- VENTED BATTERY COMPARTMENTS
- RETRACTABLE ROPE CLEATS
- ICEBOX WITH CUSHION BACK
- FISH/DEPTH FINDER
- GUNWALE TRAY
- STEERING CONSOLE WITH GLOVE BOX, FIRE EXTINGUISHER
- ANCHOR CRANK
- INTERIOR LIGHT
- ALTERNATE CHAIR PLATE
- AERATED LIVE WELLS
- LOCKABLE ROD BOXES
- TROLLING OUTBOARD WITH FOOT CONTROL
- ROCKER-BASE CHAIRS
- CARPET
- LOCKABLE BOW STORAGE COMPARTMENTS
- 12/24 VOLT PLUG OUTLET
- FISH/DEPTH FINDER
- ELECTRIC BOW ANCHOR
- NAVIGATION LIGHT



Add-on gear that the well-equipped bass boat can wear could sink an angler's boat budget. But Ouachita 16-foot Contender, above, shows only tournament essentials.

Capable of speeds over 50 mph with a 70-hp outboard, and rated for up to 95 hp by the builder, the 16-foot Killer is claimed by Marquis Boats to be the world's fastest.

World series of bass fishing, Miller High Life Bass Masters Classic used 29 Ranger 16-footers with identical power, equipment worth \$7000 each. High point fisherman of year, Bill Dance (above) rigs up before daybreak for tournament start.



70 mph in a jet— the word is WOW!

A PM editor reports on a wild ride with Mercury's hot, new propless drive.

by Sheldon M. Gallager
EXECUTIVE EDITOR

Slipping confidently into the cockpit, I casually shoved the control handle forward, putting on my best air of professional competence. Nothing happened. Trying hard to look nonchalant, I jabbed at several other controls—still nothing.

I was test-driving Mercury's newest MerCruiser Jet 400, a water-propulsion system powered by a whopping 375-hp inboard V8 capable of speeds up to 70 mph. My boat was



an Avenger 185, a trim, sporty 17½-foot runabout with luxury styling and the latest in instrumentation. It was very impressive. Everything about it was impressive—except that it just wouldn't go. I began to sweat profusely.

The dock attendant checking me out was very patient. He waited a few minutes, then politely pointed to something under my right foot. "That's the accelerator on the floor,"

he said. "The hand lever by your side is the shift."

I pretended I knew it was there all the time, but inwardly I was appalled. I imagined what it would be like trying to maintain even pressure on a jiggling foot pedal while bouncing over whitecaps at 70 mph. My confidence sagged a few points, but I smiled bravely, waved a cheery goodbye and tromped down hard on the accelerator. I figured the jet drive

Power from new packages

by Bill McKeown

To push your boat along faster this year, you can clamp to your stern that oversize eggbeater (called the outboard) or add the transom unit that looks like the leg of a kicking mule (but is named I/O for inboard/outboard or stern drive). Then there's the nozzle that squirts water out back—the jet drive—or the conventional inboard that turns a propeller out of sight beneath the hull. Of course, you can borrow from aviation for a propeller above the transom to skim your airboat along, or a jet to blast out

back. But pure jet and turbine powerplants currently are proving too expensive to buy, too exotic to install—but maybe someday. Meanwhile, if you want to really save on gas, you can do without it with the little electric jobs that mount up front and pull your boat along.

This year about 25 makers are producing inboard and stern-drive packages, using gasoline or diesel fuel, and nearly 20 turning out jet jobs. All claim efficient performance—more power, less fuel consumption or both. Unlike outboards, the inboards are shore-side engines that are equipped with add-ons converting them to marine use. Several manufacturers are offering do-it-yourself kits to "marinize" auto engines.

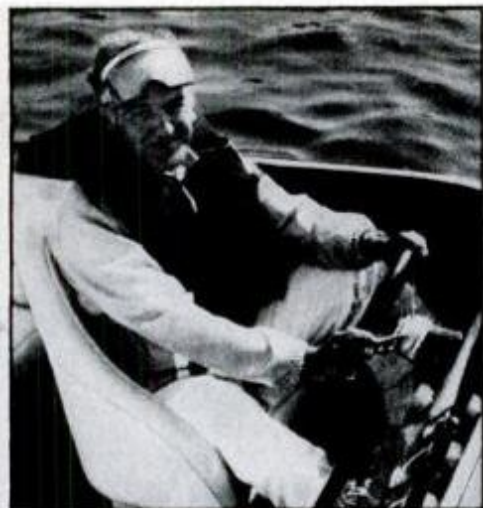
Biggest power news this year is the growth of water jets. Outboard Marine with its OMC line, Chrysler and now Mercury all supply jets, as do a number of other engine and boat builders.

For shallow-water operation and maneuvering around swimmers and water skiers, the jets provide advantages claimed to offset their slight

loss of efficiency compared to prop propulsion.

Best bet for the jet-boat fan is to buy the unit ready-made rather than try home installation. Proper balancing through engine placement and thrust angle is important. Some models now offer trim adjustments that help level the ride with various loads. Most important for the jet shopper is the test drive. Popularity for this form of power is a direct result of steering improvements. Now, with most models, you can aim your jet boat where you want it to go, even at slow docking speeds. And the models with squirrely steering feel so dangerous at high speed that you are likely to play it safe, slow down, get back to shore and buy a different brand.

Among standard inboard brands, Chrysler will offer horsepower selections from 155 to 375. OMC engines run from 120 to 245 hp for stern drives, to 260 for inboards plus a 290 for jet drives. Mercury power options start at 120 and climb to 395 hp for the new MerCruiser Tempest—a special for production offshore racers. A



Author at controls prepares for test drive of 70-mph MerCruiser Jet. Note two-hand grip on wheel—welcome high-speed safety feature made possible by foot accelerator.

would be mushy and need a lot of power to get going.

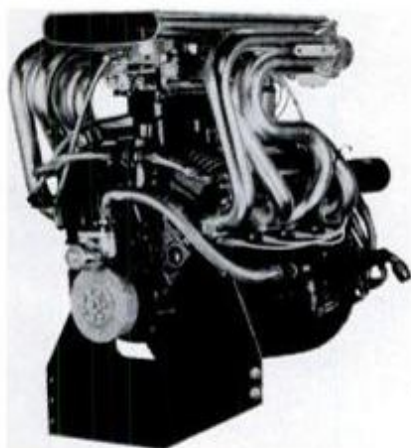
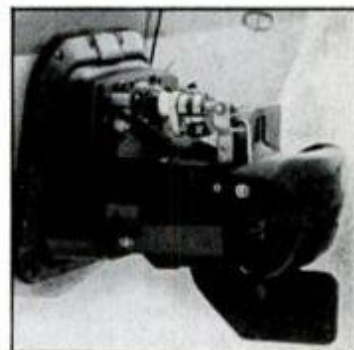
Mistake No. 2. The jet drive is *not* mushy. We shot away like a scared rabbit, not exactly in the direction I had intended. The last thing I heard from the dock was a voice shouting: "Don't forget there's a 10-mile-an-hour speed restriction until you clear the harbor."

Yipes! I had barely left the dock and was already up to 30 mph, ca-

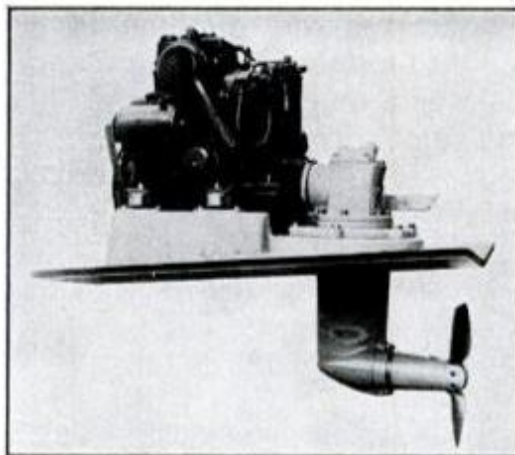
reening around the harbor like a drunk staggering home in the dark. A nearby police boat eyed me suspiciously—another idiot trying to show off. I soon had other troubles. We were in San Diego Bay, a big naval base. I suddenly found myself trying to thread the jet precariously through hulking gray destroyers and flattops at anchor. I could see sailors on the decks frantically waving me off—they thought I was playing!

Right then I learned two things about this jet—it's all-mighty powerful and, without proper handling, can tend to have a mind of its own. The Mercury representative had tried to warn me. "She takes a little getting used to," he had said—a masterpiece of understatement. The trouble is, at low speeds, a jet—most any jet—has a tendency to steer sluggishly because

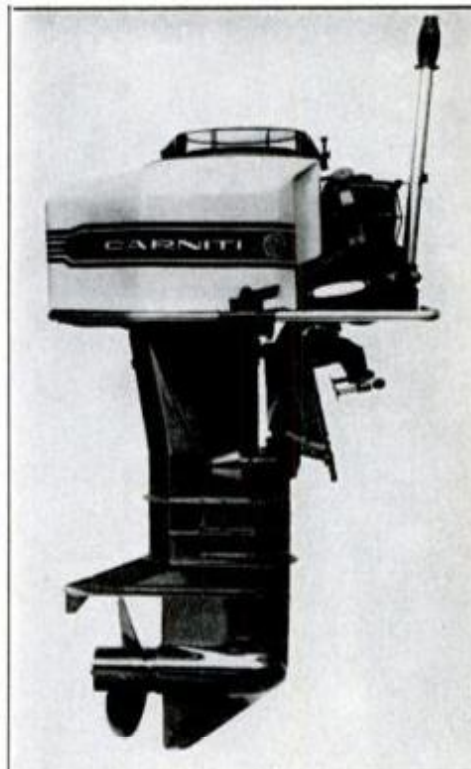
New jet drive offers highly sophisticated steering and braking. Added rudder swings farther and faster than jet to provide "amplified" steering. Curved reversing gate (raised, near right) is lowered over jet (far right) to deflect water forward for backing and braking.



Located high for easy access are starter, ignition, on Super Dominator Black Widow 450-hp, 350-cu.-in. Janisch/Sirois mill.



Sailboat specialty, Volvo Penta's I/O unit mounts easily through the keel with power from a 14-hp gas or 10-hp diesel engine.



Recognize this kicker? Probably not; the diesel model, available with 6, 10 or 16 hp, is just being introduced from Italy.

new Mercury 65S outboard has also just been announced for competition. Kiekhaefer Aeromarine will have 600-horse racing inboards, and Holman-Moody claims 700.

Volvo Penta gas, kerosene and diesel engines rate 10 to 356 hp, and this year it has also introduced a line of nine outboards with 3.5 to 75 horses inside.

So which brand is best? An experienced boatman is likely to pick the make with the most helpful and accommodating local dealer. Which kind of power is safest? That's hard to say, but recent Coast Guard figures show the power from the muscles of a careless paddler in a canoe are most likely to get him into trouble. ★★★



New silicone adhesive sealants, like Dow Corning's Silastic, can join, waterproof, bed hardware, seal joints, form gaskets, plug leaks, dampen vibration, patch cracks.

Anchor line handling is easier with Startek Anchor-Krank; saltwater model is \$45. A 60-lb. anchor and any line length can be handled. Unit lifts off for storage.



Many accessories that were optional extras on a small boat just a few years ago—life preservers, lights, anchor and line, bailer—are now required by state and federal laws. Others—emergency flares, first-aid kit, compass charts, boarding ladder and a radio to receive weather reports—may not be rated essential, but are strongly recommended.

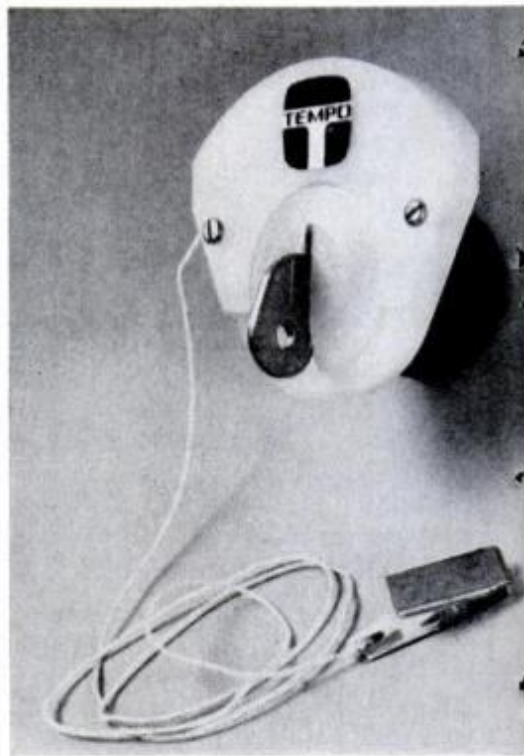
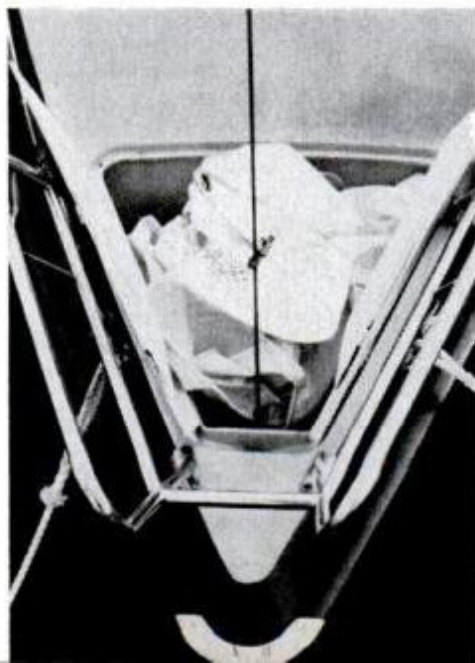
Every boatman should figure how to climb back in if he should fall overboard. Every year fatalities result from boats with no grab rails, boarding steps or hand holds to help someone in the water climb up slippery topsides. And for powerboats, there is also the ignition kill switch which *PM* was the first to recommend. Several makes are now available to shut off the engine if the helmsman falls overboard.

Electronic aids like gas-fume detectors, radiotelephones, auto-pilots and radar are coming down in size (and slightly in price) for smaller pleasure craft. This year there's more good gear around than any boat could carry.—*Bill McKeown*

Gadgets to help you go

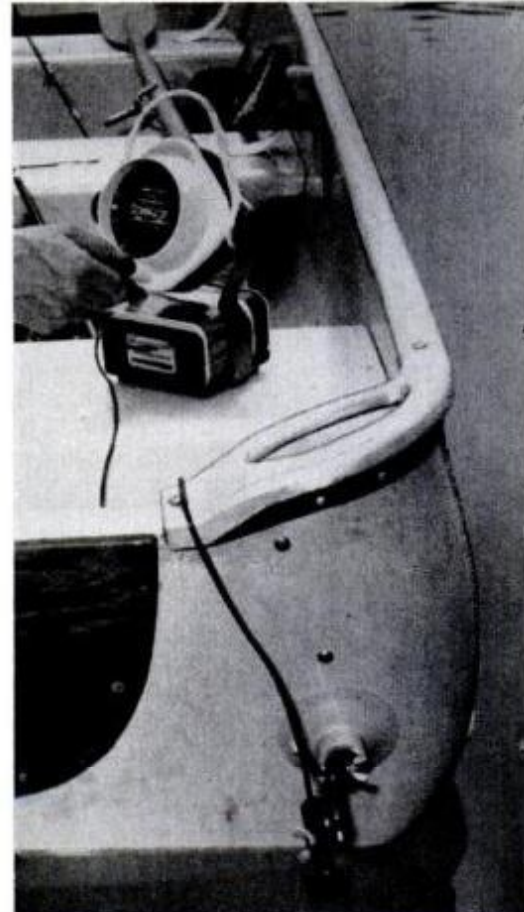
Add-on gear, gilchickies, accessories and refinements can add to the ease of maintenance, performance and safety of your boat.

Forepeak storage bin that allows jib or a genoa to remain hanked to forestay, this clever convenience is found on 32-foot Swedish Maxi 95 sloops by Pelle Petterson.



Mechanical so it won't corrode or short out offshore, Tempo's Quick Kill ignition safety switch, \$6.95, mounts with switch locknut in minutes, fits outboards, 1/Os.

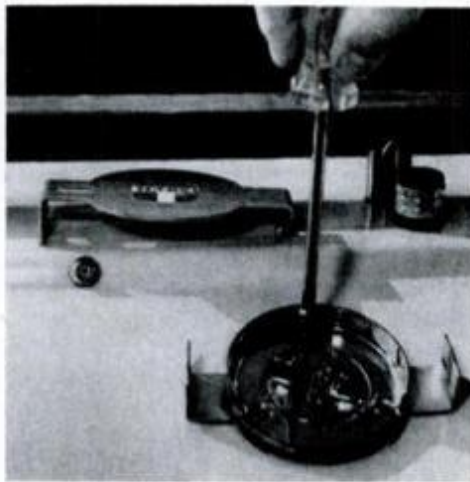
Portable fish and depth finder for easy carrying, Shakespeare DF-3 Scanmaster runs off 12-volt or two 6-volt batteries, reads to 100 feet, can be deckmounted.





For bass boat seats particularly, the new Balcar Power Pedestal adjusts from 14½ to 20 inches with touch of the handle, provides smooth swivel, shock-absorbed ride.

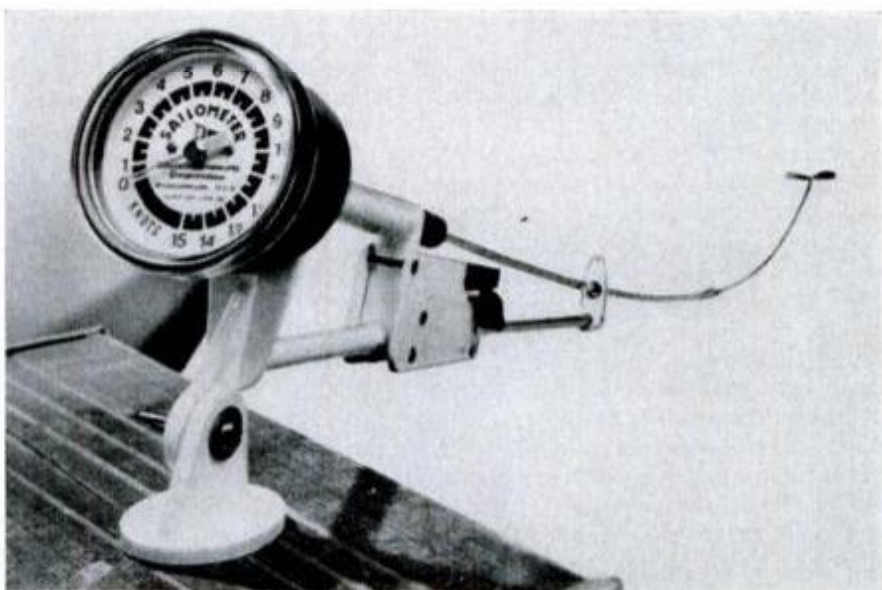
Trailing big boats on single-tongue-type trailers is much easier with Tow Leveler hitch with bolt-on crossbar and snap-up bracket assembly from Valley Tow-Rite.



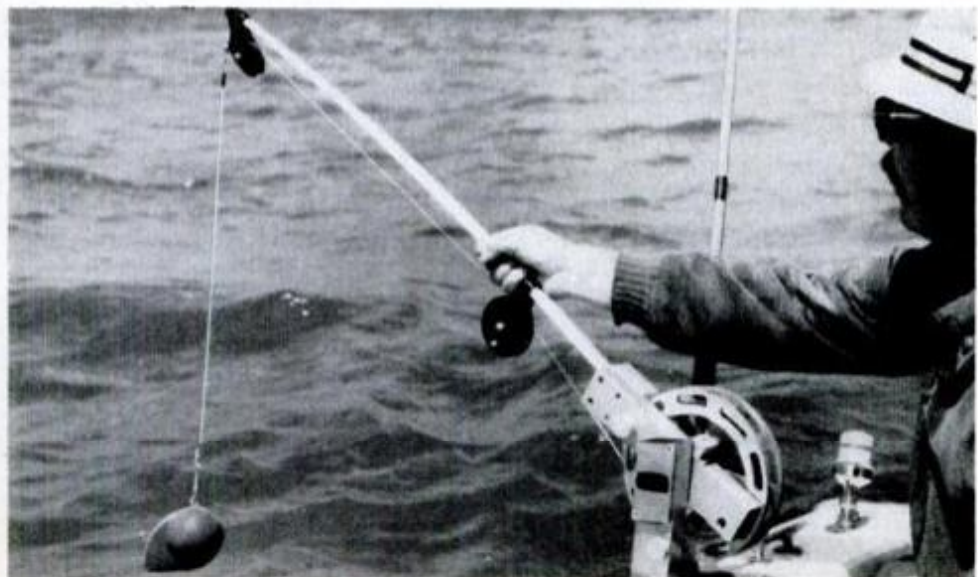
Locking up your fuel supply is simple with Tempo Gas Guard, \$4. Installs quickly under deck plate of standard 1½-inch fuel fill; top plate can be removed underway.



Automatic steering system for tiller sailboats, the Isotack can keep boat on constant wind heading or compass course for two weeks on 12-volt battery. Unit is \$598.



A sailboat speedometer said to be sensitive to .2 of a knot, the Davis Instrument Sailometer can be stern-mounted with no through-hull fittings. "Sound trim" clicks give skipper speed changes without his looking at meter. \$49.95.



For deep fish, you have to get the lure down. Big Jon Downriggers are now available in both standard and electric models with 200 or 300 feet of stainless wire, fiberglass rods in various lengths and swivel or pivot upright for vertical storage.

How you'll zip through the zap-out counter

Speed and accuracy at the supermarket checkout are promised by automated laser-beam systems.

by Tom Mahoney

You may have noticed them already—a block of dark lines of varying thickness about the size of a large postage stamp printed on the bottom or side of the cans, bottles and packages you pluck off supermarket shelves. There is a number to the left and usually 10 numbers at the bottom of the bars. About 80 billion items will be thus marked this year.

The combinations of lines and numbers, which will be different for every size and type of product, are symbols of the new Universal Product Code. They herald an end to the biggest headache in food shopping—the long waits and mistakes at the checkout counter as a clerk punches into a cash register the 8000 to 10,000 items carried by most supermarkets, each of which has had to be price-stamped by other clerks.

What the new signs on the packages mean is that the days of all this clacking and stamping and the delays, mistakes and costs they cause are numbered. Electronic equipment will tot your groceries swiftly, silently and unerringly. It is the most revolutionary development in retailing since the advent of self-service more than 50 years ago.

"Nothing will have more impact on the future of food distribution," the Super Market Institute wrote its members recently, "than the Universal Product Code and the electronic checkout." The advances also will affect accounting and advertising and already are creating work for printers and package designers.

While variations are possible, the new systems when fully operational will work like this. Items will not be priced, but each will have one of the new code symbols put on either by the manufacturer or the store. Manufacturers are now delivering half their products coded and will increase this to about 80 percent this year. Some perishable, variable-weight items will have to be coded in the store. Prices will be posted over the items and also programmed into a computer.

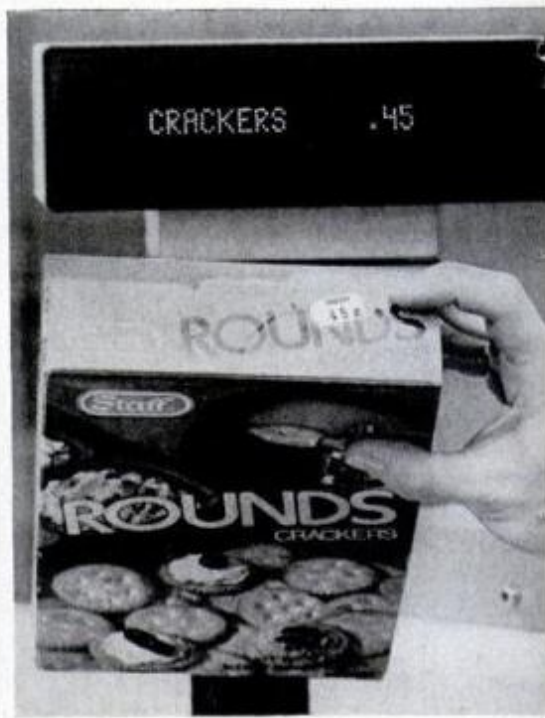
You will take your purchases to the checkout counter as usual, but the checker will "read" the code symbol on each of your items by pulling it over a glass slot where a laser beam does the scanning or by passing a hand-held wand over the symbol. Each "reading" looks up the item and its price in the computer, flashes both on a console visible to both clerk and customer and prints them on your sales slip.

In one system, there is a "beep" as each code symbol is accurately scanned. In another, a "beep" indicates that it was not scanned and the checker should try again. In both, the customer sees far more information on the console and on the sales slip than with the old electro-mechanical registers. While these identify prices as only "gro" for groceries, "mt" for meat and "pro" for produce, the new electronic registers can print out 18 to 32 characters per item. This permits identification by name and often by brand. Some electronic registers now being tested in Montreal are printing in French as well as in English!

Your slip also identifies the lane, the checker, notes the time of day of your purchase, the amount you tendered and your change. Best of all, you are on your way in about 45 percent less time than it takes now. The checker has handled your purchases with less physical and mental effort than formerly. The supermarket has reduced costs and has better inventory information than ever before.

This is important. With most supermarkets earning a profit of less than one percent of sales, the boy to whom you give a 25-cent tip for carrying \$20 worth of groceries to your car makes more out of the transaction than the store. Many studies show the electronic systems can improve profits. When prices rise or fall, only the computer and the shelf marking need to be changed—not a figure on every package.

"The UPC number, even without scanning, offers the opportunity for



administrative savings," says Dr. Willard R. Bishop Jr., Super Market Institute director of research. "When the UPC symbol and scanning are introduced, the changes are even more significant. Checkout productivity will improve. Buyers will know the exact sales of each item. Profitability in departments will be easier to measure and control. Merchandising executives will be able to determine more easily the effectiveness of various ads and promotional programs."

But with costs of all kinds soaring lately (candy bars once a nickel are now a quarter), nobody is predicting that the new systems actually will lower food prices, only that stores



Vertical bars of Universal Product Code are read by scanner as clerk passes item over window (far left). Each product has its own combination of bars. Under bars, the first five numbers identify the manufacturer; the second five, the item. Visual display (lower left) identifies product and price as item is passed over scanner. The new register tape provides more information than do tapes from standard registers. IBM checkout system is shown here.



ton Public Market in Stoughton, Mass., began a nine checkstand test of Data General's system. By spring, A & P and most other major chains will have completed tests or have them under way.

An installation costs about \$15,000 per checkout stand, but a store has to have several, including a spare. It is also well to have an emergency generator in event of power failure. Savings may be great enough to pay for equipment in three or four years. Some equipment may be rented and it is also possible to add an installation, step by step, starting with electronic registers and delaying scanners until more merchandise is coded. In the fixed scanner made by Spectra-Physics, Inc., for several manufacturers, an electric motor whirls small mirrors at 4000 rpm to reflect a laser beam against the code symbol.

"Currently, systems sell for \$85,000 to \$120,000," explains John F. Ineson, a Singer executive. "Careful calculation of the benefits shows that a store must have sales of \$2 million per year to generate savings sufficient to pay for the system. There are about 16,000 out of a total of over 200,000 food stores with this volume. These 16,000 stores do almost 50 percent of total food sales.

"The market will probably develop slowly for the next two years and grow explosively in 1977 and 1978, once all testing is completed and operating procedures are shaken down. The food industry may invest over \$3 billion in scanner systems in the next six years."

Universal Product Code and the electronic checkout system are the result of remarkable cooperation in the grocery industry and of advances in counting-device systems.

A special committee was formed in 1970 to determine if the industry should have a code and, if so, what kind. Food manufacturers and distributors were represented.

"We determined that we must come up with a single code-numbering system for the entire grocery industry," recalls Robert A. Stringer,

(Please turn to page 146)

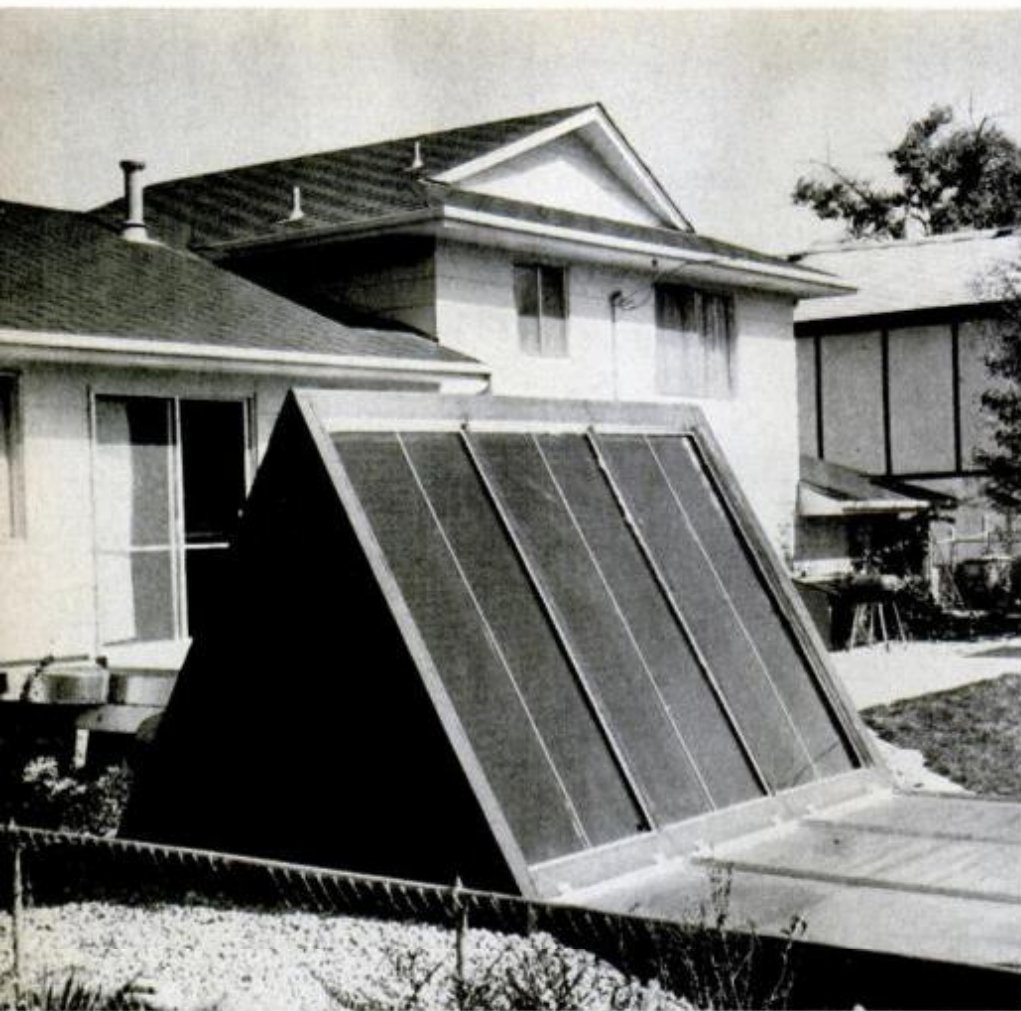
with them can cut expenses, reduce checkout fraud, operate more efficiently and be in a better position to keep prices down than a competitor with the present type of checkout.

While there had been store tests of various symbols earlier, it was not until 1973 that the grocery industry adopted the bar symbol of the Universal Product Code. With a demonstration on Feb. 26, 1974, Finast Big Buy on Route 30 in Framingham, Mass., claims to be the first to introduce it to customers.

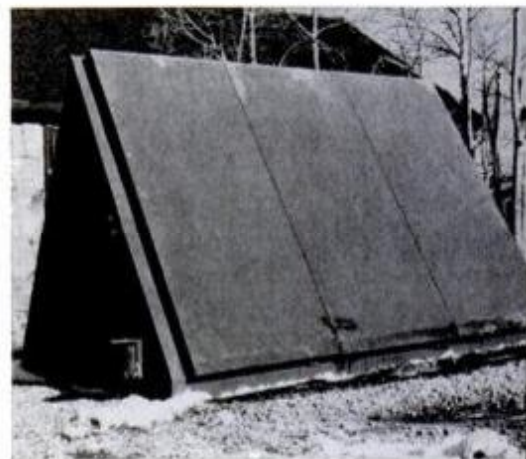
Eighteen manufacturers, including Singer, National Cash Register and International Business Ma-

chines, showed new checkout equipment at the Super Market Institute convention in Dallas last May. Eight demonstrated scanners. A Marsh supermarket in Troy, Ohio, already equipped with electronic registers, on June 26 began a test of the NCR scanning system with all of its six checkout lanes automated.

Steinberg's, Ltd., Canada's second largest supermarket chain, began a test of IBM's scanning equipment last August at a Montreal store where sales slips are in both French and English. In the same month another IBM installation went into service at a big Pathmark store in South Plainfield, N.J., and a Brock-



Solar "shed" can be placed anywhere in back yard, need not be built into house. Hinged reflector panels fold up (above) to protect glass-faced collectors when not in use in summer (below). Test unit here is strictly utilitarian, could be styled to look like toolshed, playhouse, mini barn, garage or other small outbuilding.



FIRST PLUG-IN SOLAR FURNACE FOR YOUR HOME

There's been a lot of talk about solar heating, but this simple little A-frame 'shed' may become the first to offer practical auxiliary sunpower for use with almost any home, old or new.

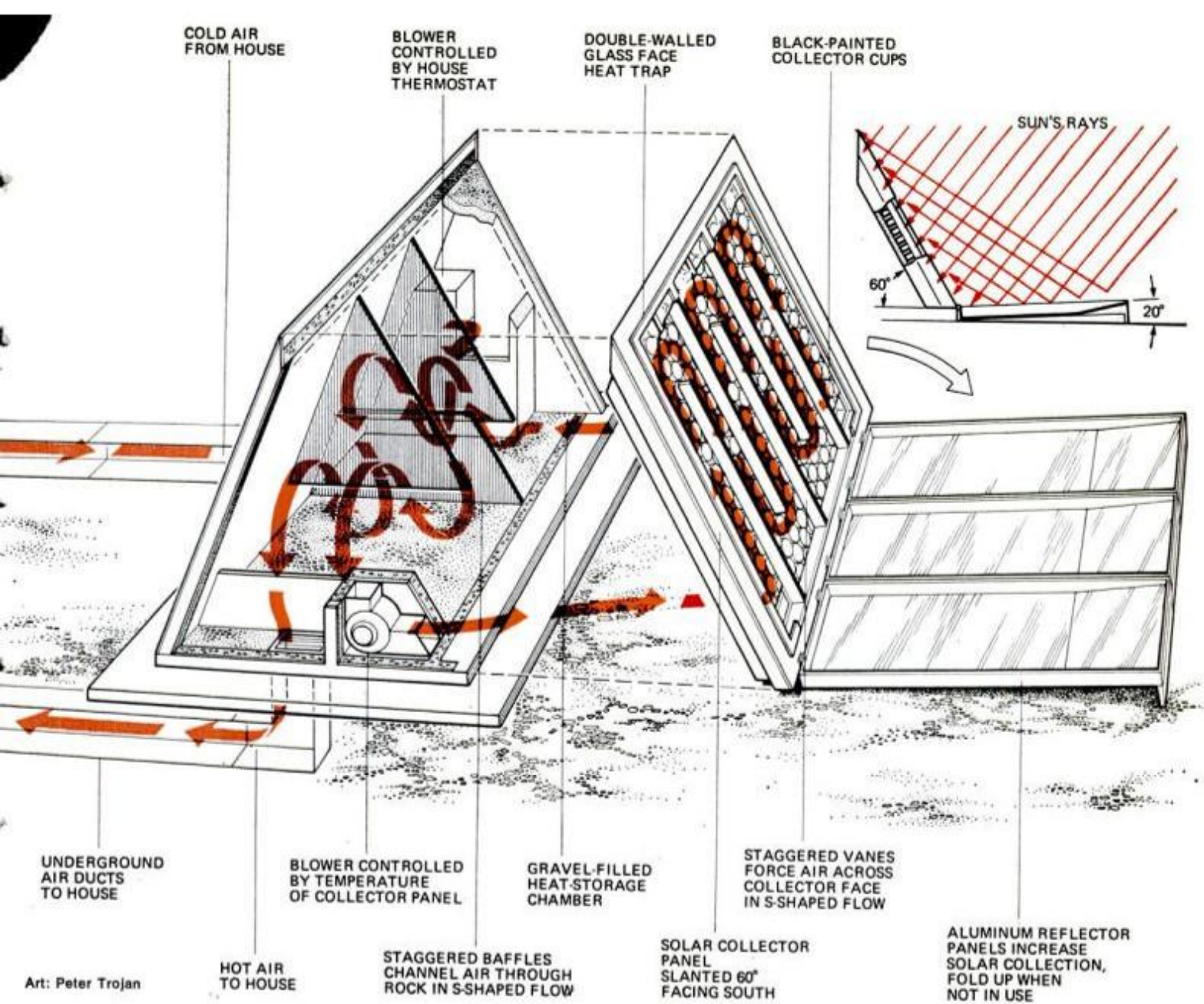
by James M. Liston

The first for-real solar furnace that you can virtually plug into your home—almost any home—may be here soon. A small A-frame structure no bigger than a garden-tool shed, the furnace is designed to stand unobtrusively in your back yard, piping heat to the house through underground ducts. It won't supply your home's total heating needs—it isn't intended to do that. What it *will* do is function as an auxiliary heater, cutting your fuel bills 50 percent or more in many areas and up to 90 percent in some. In these days of critical energy shortages and rising fuel costs, a heating system that will do this much is big—and welcome—news.

The back-yard furnace was conceived by International Solarthermics Corp., a research and development firm based in the tiny mountain village of Nederland, Colo., high up in the snow-capped Rockies about 50

miles northwest of Denver. Though they're literally up in the clouds, the group, headed by John Keyes, takes a very down-to-earth approach to solar energy. Its aim has been to produce a practical, low-cost furnace that can be hooked to the average home with little modification of existing equipment. Until now, most solar-energy developments—and there are many under way—have been exotic, costly experimental prototypes, still largely unproven.

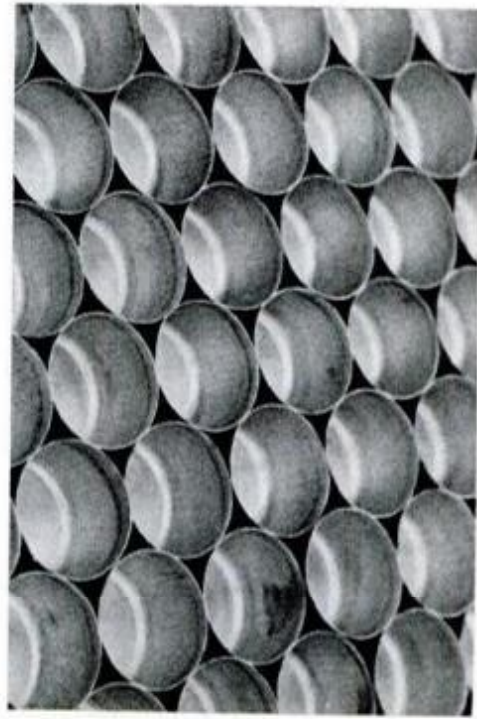
But the Solarthermics concept is so basically simple it could be put into use today. Keyes readily admits it may not be the only or final answer to solar heating, but points out that it works and could start taking some of the burden off hard-pressed energy sources right now. The company does not plan to manufacture the furnace itself, but will sell manufacturing rights to major furnace makers. How soon the units will be



on the market is not yet known, but Keyes believes they could be available for the coming heating season next fall.

John Keyes is even visualizing do-it-yourself kits that could be homeowner-installed at substantial savings. In any case, the units will be "off-the-shelf" hardware, ready for assembly and hookup in as little as a day.

The big advantage of the backyard furnace is that it's a separate, freestanding unit. It need not be built into the house or the house around it. It can be placed anywhere in the yard so long as there is an open, unshaded southern exposure within 75 feet of the house. This means it can be used equally well with old or new construction, and the architecture need not be especially designed to accommodate it—your home won't suddenly be transformed into a "greenhouse" with large ex-



Secret of solar collector's high output in small area lies in closely spaced aluminum cups (left) behind glass face. Cups, about a third the size of a beer can, trap radiation, causing it to bounce around inside rims instead of being reflected away as in flat-plate collectors. This vastly reduces energy loss, increases heat absorption. How Solarthermics system works is shown above. Air blown across cupped collector picks up heat, then circulates through gravel-filled A-frame structure to transfer heat to rock. Rock acts as heat-storage "tank," stays hot for days. To warm house, second airflow through rock picks up stored heat, carries it to living quarters through underground duct. Cooled air from house then returns to rock chamber for reheating and cycle repeats.

panes of glass on walls and roof, as is the case with many other solar-collector systems.

Basically, the A-frame furnace consists of a solar-collector panel on the south side slanted 60° to the sun. The collector is faced with a double wall of glass and traps solar heat in much the same way as a greenhouse does—by letting solar radiation stream in, then preventing it from getting back out. There are three sizes planned—the Model 96, Model 128 and Model 160.

Model numbers refer to the area of the collector face. Thus the Model 96—12 feet long by 8 feet high at the peak—has 96 square feet of collector area. Most solar energy is captured by direct sunlight falling on the collector's face, but mirror-like aluminum panels that swing down to rest on the ground reflect more sunlight into the collector to increase its efficiency. The space behind the collector inside the A-frame furnace serves as a huge heat-storage chamber or "tank."

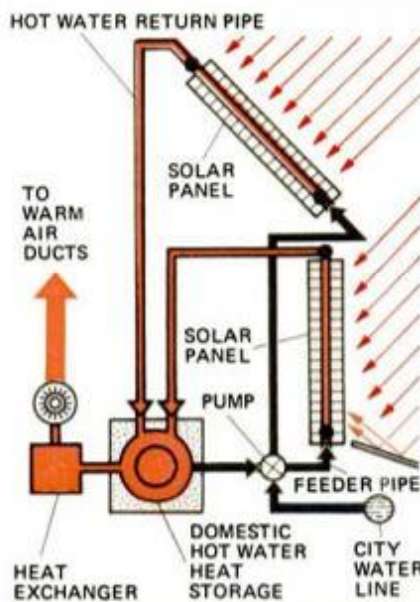
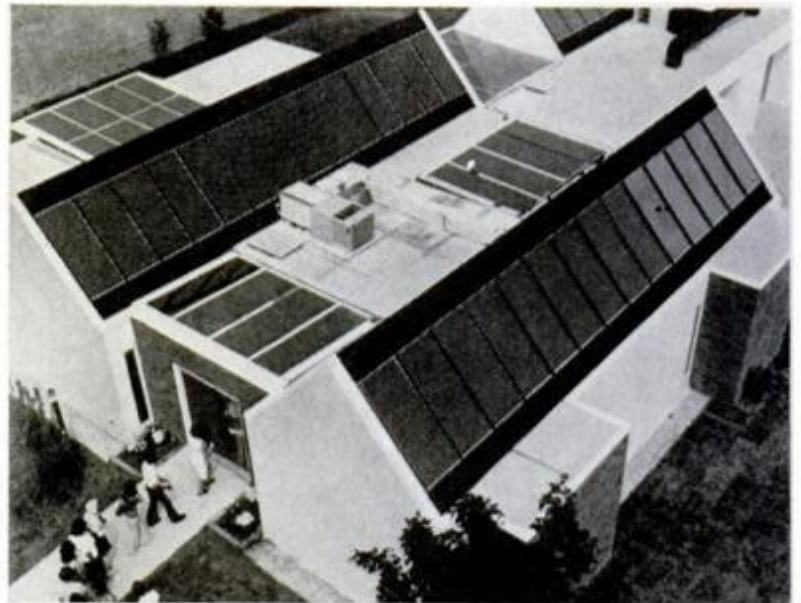
Rock used to store heat

Up to this point, the solar collector functions much like many others—but now comes the clever part. In conceiving the system, Keyes came up with two significant departures from conventional collector design. Most solar collectors use water as the heat-transfer and/or heat-storage medium. Keyes uses air for heat transfer and rock for storage. Also, most other solar collectors are of what is called the "flat plate" type—a flat, black-painted surface, usually embedded with water or other liquid-circulating coils to absorb heat. Being flat, this type of collector allows a certain amount of incoming solar radiation to be reflected away, causing heat loss.

Keyes solved this problem by adding a series of vertical vanes in the form of closely spaced aluminum cups painted black and bonded to the face of the collector. The cups, each about the size of the bottom third of a beer can, increase the effective surface area of the collector and act as hundreds of tiny heat traps. Shortwave solar radiation "bounces" around inside each cup and is caught and absorbed instead of being reflected away. There are 1872 cups in the smallest Model 96 unit. They so vastly multiply the collector's efficiency that this relatively small unit can capture as much heat energy as much larger, less efficient collectors.

There are two fans in the unit. One is used to create a high-pressure airstream that "washes" the heat from the collector cups and carries it to the storage area. The other fan

Other solar-heating developments



BEFORE

moves heat from the storage chamber to the plenum chamber of the house furnace. Keyes uses air because it's a more economical heat transport than water—an air system doesn't require antifreeze to keep it from freezing in winter, and air leaks don't cause serious damage as water leaks could. Air-duct "plumbing" is simple and cheap.

The A-frame's heat-storage area is filled with ordinary washed river gravel averaging $\frac{3}{4}$ to $1\frac{1}{2}$ inches in size—readily available and inexpensive. "Water is a terrible storage medium," says Keyes. But rock is a very good medium; it gives up its heat slowly."

As proof, Keyes suggests an experiment: Take a pint of water and a one-pound rock and heat them in an oven to 180° F. Take them out, wait an hour and you'll find the water cold and the rock still hot. The 10 cubic yards of gravel in the A-frame

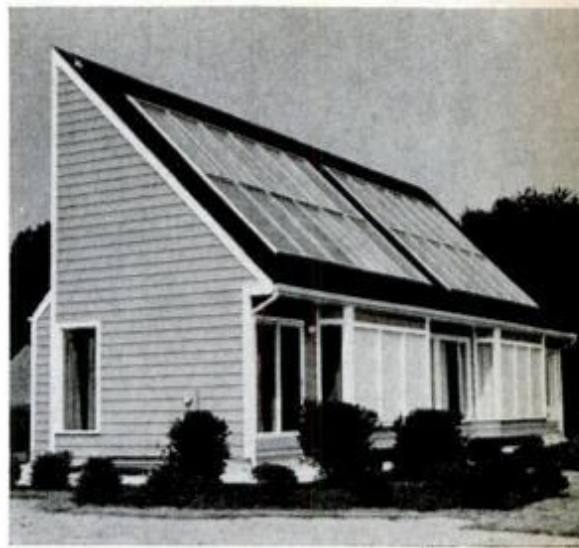
(about 25,000 pounds) stores heat so well the furnace can continue to operate over a period of four to five sunless days, losing only a few degrees of heat each day.

The airstream that washes across the collector becomes a hot blast that blows through the gravel storage area. Baffles force it to take an S-shaped path that thoroughly distributes the heat. When called for by the house thermostat, stored heat travels through insulated ducts to the house where it is distributed by the house furnace's blower. If the heat stored in the solar furnace drops below 75° F., the house furnace is automatically turned on. The collector fan operates only if the temperature at the aluminum cups is greater—by a preset number of degrees—than the temperature of the gravel. This prevents blowing "cold" air into the storage area.

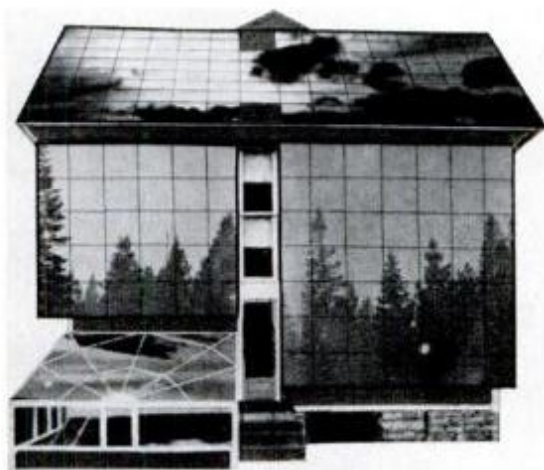
The back-yard furnace does not re-



Solar roof panels, pioneered by PPG Industries, are being tested in demonstration house in Columbus, Ohio (facing page). Each glass-faced panel, about 3 by 6 feet (near left), has coils through which a special heat-absorbing liquid flows to heat exchanger that, in turn, heats water for home use. The hot water provides domestic supply and space heating. System can be reversed for summer cooling. PPG panels will be commercially available soon. Test house is joint venture of Ohio State University and the Homewood Corp.



Sharply slanted roof on this experimental University of Delaware house contains cadmium sulfide cells that convert solar energy directly into electrical energy. Electricity, stored in batteries, then powers conventional home appliances. At same time, air blown across back side of roof collectors absorbs solar heat, then is circulated through hot-air ducts to supply house heat. In summer, a heat pump is used to provide airconditioning. While one of most sophisticated systems, its practicality is currently limited by high cost of solar cells.



AFTER

Proving even an old house can be converted to solar heat, University of Minnesota remodeled rear of early three-story structure (facing page) with water-filled glass collector panels (near left). As seen in diagram (far left), water pumped through collectors picks up solar heat, then flows into storage tank. From there, part supplies domestic hot water, part heats air through a heat exchanger to warm the house through ducts.

quire a foundation. It's simply placed on a 10-by-14 foot polystyrene foam base pad 6 inches thick, wrapped in a plastic vapor barrier. Cost of operation is limited to the two belt-driven ½-hp blowers. At current power rates, it amounts to \$1.67 a month. Maintenance consists of checking the fan belts and oiling the blower motors once a year and changing the cold-air return filters three times a year.

At present, the back-yard furnace is designed for use with forced-air heating systems, though with the addition of finned-coil heat exchangers it could be adapted for use with hot-water systems as well. However, since the majority of homes in the U.S. are heated by forced air anyway, Keyes thinks the system should have wide application.

Exactly how much heat the furnace will deliver depends, of course, on your location, climate and—most im-

portantly—the average number of sunny days you get a year. Good sunlight is more critical than temperature. The furnace will operate perfectly well in freezing weather so long as the sun shines—that's the key. In the so-called "sun belt" areas across middle America, the furnace is capable of supplying up to 90 percent of the heating needs of a typical three-bedroom, two-bath, 2000-square-foot house.

In other areas, the amounts vary widely. For example, the smallest unit, Model 96, will supply the average house with 82 percent of its heating needs in Atlanta, Ga.; 72 percent in Oklahoma City; 63 percent in Nashville, Tenn.; 51 percent in Kansas City; 44 percent in Philadelphia; 43 percent in Denver; 42 percent in Lincoln, Neb.; 39 percent in Boston; 35 percent in Seattle; 34 percent in Chicago; 33 percent in Hartford, Conn.; 26 percent in Buf-

falo; 25 percent in Green Bay, Wis., and 20 percent in Burlington, Vt.

These figures, remember, are for the smallest unit. By going to each next larger size, you increase heating output by about 15 to 30 percent. Thus, by using the largest unit, it's possible to obtain 57 to 58 percent of your heating needs even in such northern chilly areas as Seattle, Portland, Ore., and Chicago.

While exact prices can't be established until manufacturers get into production, estimated costs are about \$4500 for Model 96, \$5400 for Model 128 and \$6300 for Model 160. These include installation. Install-your-own kits could cut the price by \$1000 to \$1500 on each unit. You can obtain more information, including tables showing precisely how the furnace can be expected to perform in your particular location, by writing Solarthermics and requesting its *Solar*

(Please turn to page 147)

FIRST-HAND REPORT:

Driving AMC's brand-new Pacer

by Michael Lamm
WEST COAST EDITOR



Comparative Specifications

	Pacer	Vega/Monza	Mustang II	Mark IV
Wheelbase (in.)	100.0	97.0	96.2	120.4
Overall length (in.)	171.5	175.4/179.3	175.0	228.1
Overall width (in.)	77.0	65.4	70.2	79.8
Front legroom (in.)	42.0	43.5/42.9	41.8	42.0
Rear legroom (in.)	35.0	29.6/29.9	27.7	35.9
Luggage cap. (cu. ft.)	35.0	18.9/28.9	28.1	14.4
Gas tank cap. (gals.)	22.0	16.0/18.5	13.0	26.5
Curb weight (lbs.)	2995	2495/2763	2752	5353
Smallest engine (c.i.d.)	6/232	4/140	4/140	V8/460
Largest engine (c.i.d.)	6/258	V8/262	V6/171	V8/460
Net horsepower range	N.A.	78-110	83-97	194-206

You step inside—without stopping—through extra wide but surprisingly manageable doors. The passenger's door is four inches longer than the driver's, and both doors *tilt outward* at the top as they open. They're hinged so their own weight makes opening and closing easier.

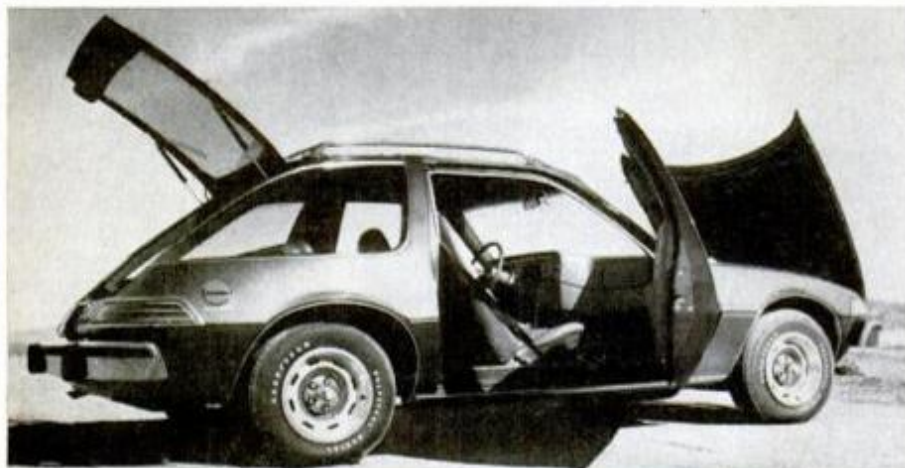
That's only one of the thoughtful touches that distinguish AMC's strikingly futuristic new Pacer. I discovered others as I prepared to test-drive the Pacer for *PM*, one of the first automotive editors given an opportunity to try it personally. The car stands nearly two feet wider than tall. This gives its four passengers more room to move around and stretch out—more than in many full-sized American cars. You don't get the crowded feeling of so many minis.

Dick Teague, whose job it was to style the Pacer, says he initially planned the car around two basic elements: 1) the doors and 2) a set of four overly generous seating bucks. He was told by AMC's product planners and he subsequently told his own staff to settle into the seating bucks and leave plenty of room to get comfortable. This meant widening the front and rear tread, and stretching out the passenger compartment to cover every available centimeter between the engine and 22-gallon gas tank.

Note, though, that this is a four-place car. It's not built for six. It would hold six if it weren't for the large driveshaft hump. AMC's product vice president, Gerry Meyers, told me that a rotary engine would help get rid of the hump (presumably with front-wheel drive), and in

(Please turn to page 148)

Pacer opens wide, both for luggage at the tailgate and for passengers at the door. From any angle, Pacer displays lots of glass.



How to keep your choke working—automatically

You can enjoy all the advantages of an automatic choke only if you check it periodically and maintain it properly.

by Mort Schultz

An automatic choke can fool you. An inoperative choke, costing but pennies to fix, can produce symptoms that might lead you on a wild-goose chase. A hard-starting engine, one that stalls or uses excessive fuel, may trick you into doing a major tune-up. So check the choke first.

How a choke works

Every carburetor has a choke valve designed to close over the throat when a cold engine is started. This reduces the air influx to the cylinders and enriches the fuel mixture.

If the choke valve didn't close, the mixture would be too lean and ignition couldn't occur. A "normal" fuel mixture is too lean for starting a cold engine because gasoline condenses on cold manifold and cylinder walls as it enters the system. What's available for ignition is not rich enough to burn. But once an engine starts, the fuel mixture would be too rich if the choke valve remained closed. Cylinders would flood and the engine stall. So chokes are designed to crack open at once and continue to open as an engine gets warmer. If the valve stuck partly open, the engine would probably run, but fuel would be wasted.

Automatic vs manual chokes

Most choke plates open automatically. You close one by pressing the accelerator pedal to the floor once. It opens as the engine heats up.

But a couple of foreign carmakers believe in a manually operated choke valve. The driver controls it by pulling and pushing a knob on the dash. A cable connects the knob to the valve. Few problems result with manual chokes. Dirt may cause a choke valve to bind and physical damage, such as a kinked or bent choke

valve, could occur, but manual chokes are mostly troublefree.

Many drivers bothered by automatic-choke problems have converted to manual systems. Conversion kits at \$6 to \$9 are available from automotive parts and supply dealers. But conversion is a cop-out. Automatic chokes are reliable and usually need only occasional care, but you must know how to maintain them.

How to find the choke valve

Testing choke operation if hard starting, stalling or excessive fuel consumption occurs is a simple examination. With engine cold, preferably on a cold day, remove the carburetor air-cleaner assembly and look down the carburetor throat as someone presses and releases the accelerator pedal. The valve should close fully over the carburetor. If it doesn't, the trouble is:

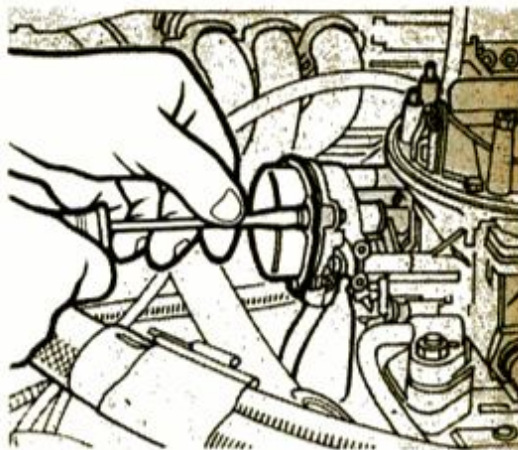
1. Binding choke linkage.
2. Binding choke valve.
3. Improperly adjusted choke.
4. Bad thermostatic coil spring.

Start the engine. The choke valve should crack open immediately. If it doesn't open slightly when the engine starts, the trouble is:

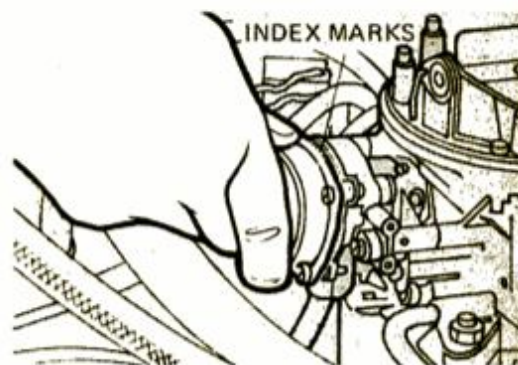
1. Inoperative choke piston in carburetors having choke pistons.
2. Inoperative or improperly adjusted vacuum diaphragm unit in carbs with a vacuum diaphragm or a leaky or disconnected vacuum line.

You can watch it work

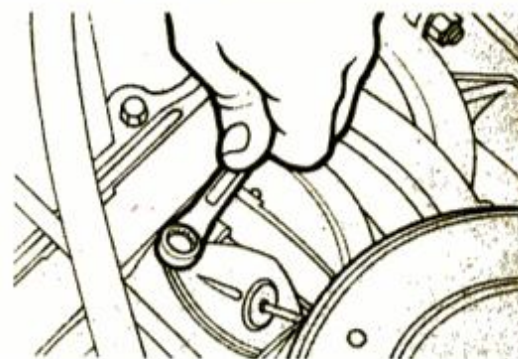
Let the engine run. The choke valve should be in wide-open position when engine temperature reaches normal range. In many 1973 and later models, the valve should reach this position 1 to 1½ minutes after the engine starts. These chokes have electric-assist units that provide for positive, prompt opening of choke



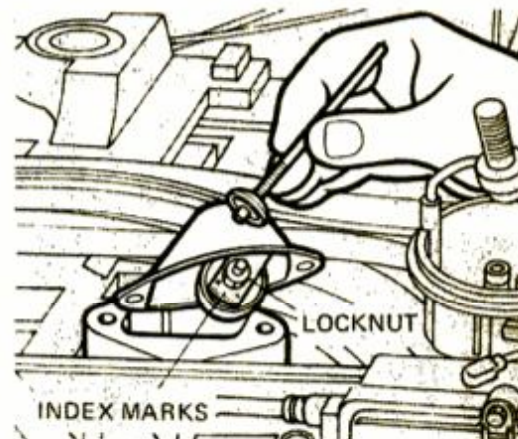
Automatic choke of stove-controlled type has thermostatic spring in a housing on carburetor body. To adjust it, you loosen cover and turn in rich or lean direction.

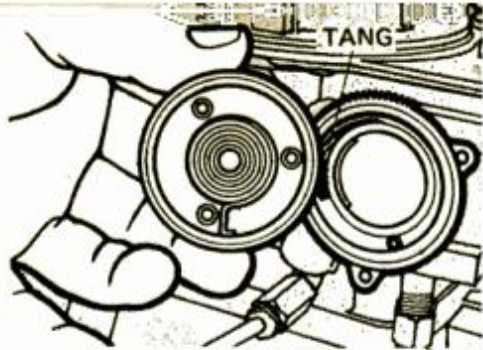


Stove-controlled-type automatic choke has rich/lean marks on cover. Turn control toward "rich" to add tension on thermostatic spring; keep valve closed longer.

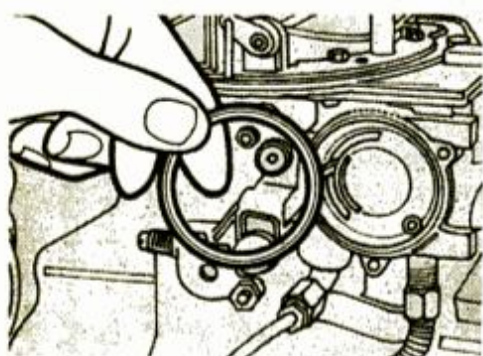


Manifold-controlled-type choke must be removed from its well in the manifold crossover before it can be adjusted. After it is lifted out of the well, as shown below, this type of automatic choke is adjusted as follows: loosen locknut and turn wheel to specified index mark.

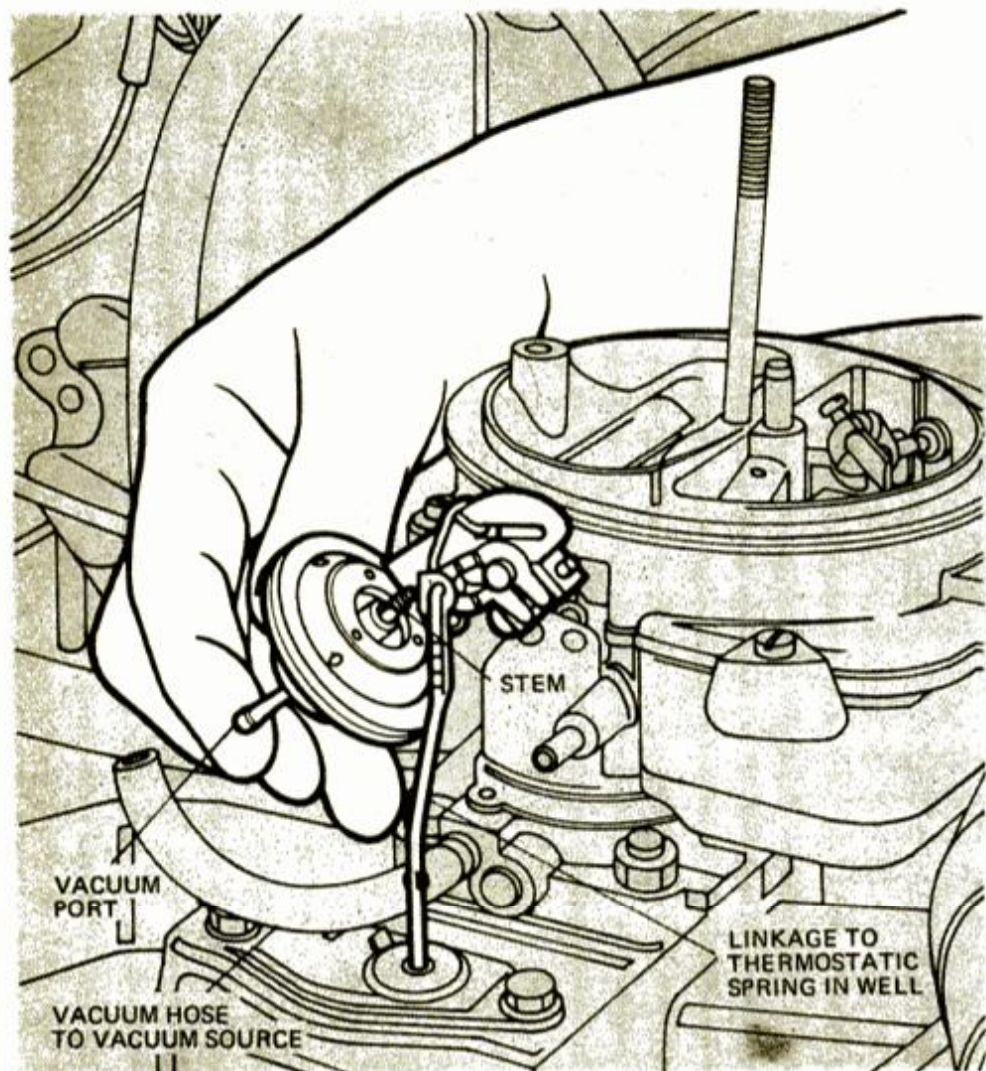




Thermostatic spring is mounted in the cover of the stove-controlled-type automatic choke. When replacing the spring, make sure the new one fits properly in the cover and that the control tang slides into the spring as it should.



Gaskets used in choke covers need periodic replacement. Defective gasket lets carbon build up in choke housing. Vacuum chambers are used with some automatic chokes (below). They must be checked for leaks (see text for procedure).



valves, reducing the time rich fuel mixtures are burned. This lowers exhaust emissions. If the choke valve does not open wide, the trouble is:

1. Binding choke valve.
2. Damaged heat tube.
3. Inoperative electric-assist units, where used.

Types of automatic chokes

Before repairing, identify the basic choke system your carburetor uses. Likely it is a stove choke-control or manifold choke-control design. The stove control has the thermostatic coil spring in a housing on the carburetor body. If you see a round, black (usually) cover attached by screws to a metal housing, you have a stove control. If no such device is on the carburetor, you have manifold control. To check, trace the long choke linkage attached to the choke valve. It will probably run into a housing on the exhaust manifold crossover. The thermostatic spring is inside.

Choke valve doesn't close

Buy a can of carburetor-cleaning solvent, lacquer thinner or denatured alcohol. Soak an old toothbrush in solvent, clean choke linkage.

Inspect linkage. Normally this is

bent. If it appears unusually bent or obviously damaged, replace it.

How to use solvents

Using the solvent-dipped toothbrush, clean the choke valve, especially its pivot points. This is easier to do with a spray can of choke-valve cleaner. You aim the solvent directly onto pivots. Examine the choke valve. It shouldn't be nicked or bent. A damaged valve should be replaced. *Caution:* Do not lubricate linkage and choke valve. Oil attracts dirt and will cause the choke valve to bind.

To adjust stove-controlled chokes, loosen screw on the choke housing cover and turn cover to the index mark specified in service data.

A manifold choke control is adjusted by removing the thermostatic coil spring from the manifold crossover. Loosen the cover screws and lift the coil from the well in the manifold. Then loosen the locknut holding the spring and turn the wheel on which the spring rests until index mark is in position specified by the manufacturer.

If the adjustment isn't satisfactory, replace the thermostatic spring. It has probably lost tension.

Check for air leaks

On a stove-controlled unit look inside the choke housing for carbon; this may impede spring operation. The carbon is due to air leaking into the housing through two spots. The exhaust-cover gasket may be damaged, so replace it. The heat tube extending from exhaust source to choke housing may have cracked or developed holes. If so, replace it.

Choke valve won't crack open

Look at the carburetor near top of the air horn. If a vacuum chamber is attached to the choke valve by the linkage, the valve cracks open slightly when the engine starts due to the pull of engine vacuum.

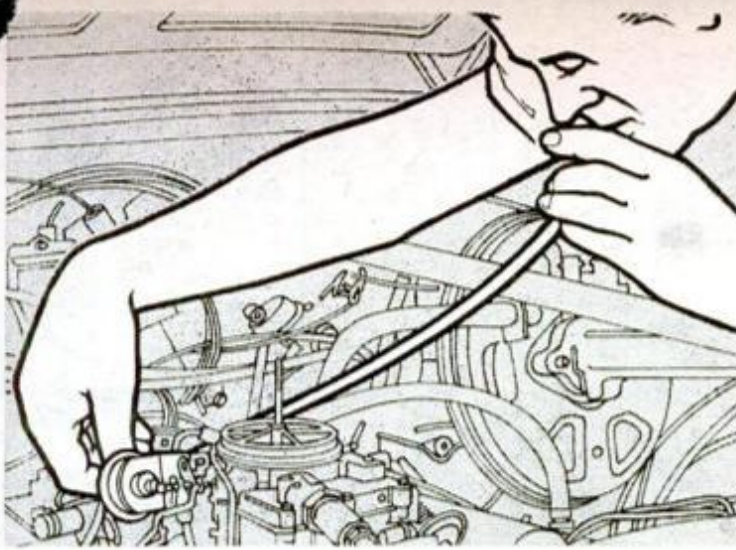
If there is no vacuum chamber (also called vacuum break), the choke plate opens slightly when the engine starts due to a choke piston that overcomes thermostatic spring tension. The piston is reached through the stove-control housing.

Vacuum breaks and pistons

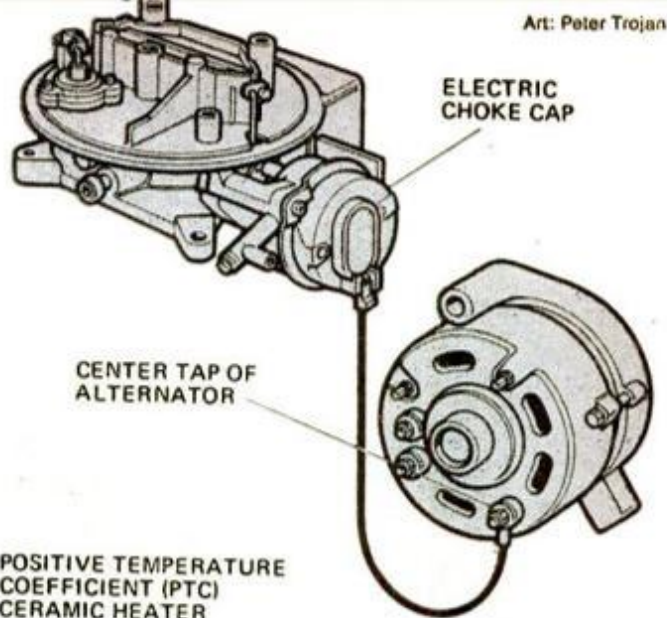
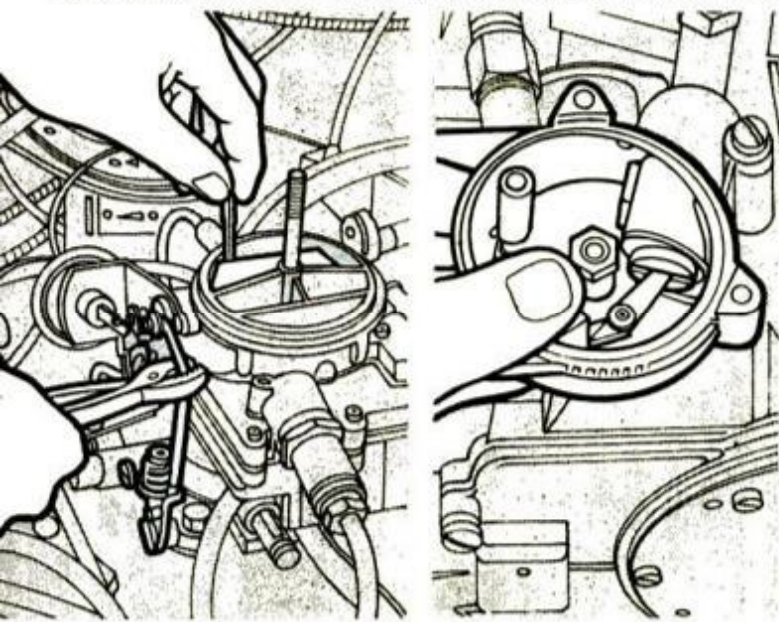
Pistons are used mainly in stove-controlled units. Manifold units usually have vacuum breaks. Some stove-controlled units use a vacuum break—not a piston.

How to test a vacuum unit

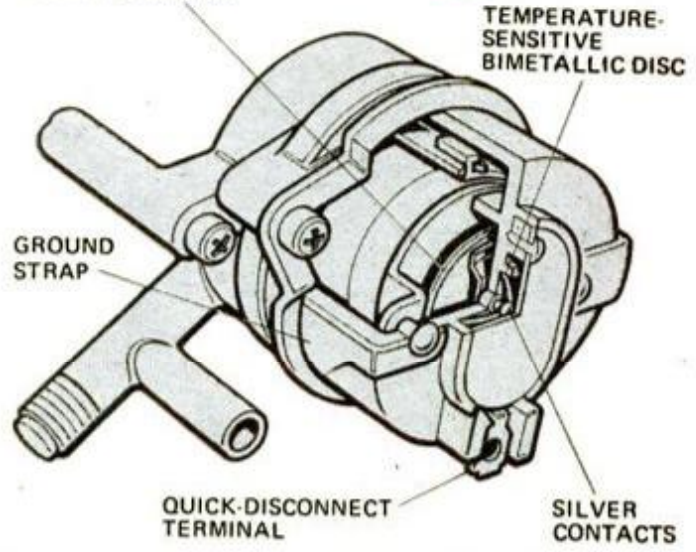
If your choke has a vacuum unit, check vacuum source by disconnecting hose from the unit. Start engine and put your finger firmly over open



Make vacuum-break check by applying vacuum (above). Choke plate should stay closed but crack slightly as if engine had just started. Adjustment is made by bending linkage (below left). Choke piston must move freely (below right); check cleanliness.



ELECTRIC CHOKE CAP
CENTER TAP OF ALTERNATOR
POSITIVE TEMPERATURE COEFFICIENT (PTC) CERAMIC HEATER



TEMPERATURE-SENSITIVE BIMETALLIC DISC
GROUND STRAP
QUICK-DISCONNECT TERMINAL
SILVER CONTACTS
Electric-assisted choke as used by Ford is shown at top. It operates on current from the alternator. Inside the choke cap, as shown above, are all of the components. If one of these parts should fail, the entire assembly must be replaced.

end of hose. If you don't feel a strong pull, check hose for damage. Also ream out vacuum port on other end of the hose.

Test the vacuum unit with vacuum line disconnected at the unit. Depress and hold the stem of the diaphragm; put your finger firmly over vacuum opening. Now release stem and watch it closely. It should not move more than 1/16 inch in 10 seconds. If it does, the diaphragm inside the vacuum chamber is leaking, so replace the chamber.

Check the specs

The amount the vacuum unit allows the choke valve to open should be set to specification. If the break is too restricted, the engine may flood. If it is too wide, the fuel mixture will lean out too much with an engine cold, causing a stall. Check service data for the specification. When adjusting it, apply vacuum to the vacuum chamber by drawing in by mouth on a vacuum hose con-

nected to the vacuum port. Be sure the engine is cold.

Vacuum should allow the choke valve to set itself to spec. To check, insert specified size of gauge between edge of the choke valve and air-horn wall. If adjustment is needed, the linkage rod from the vacuum unit is normally rebent at the bend.

How to test a piston

If your choke has a piston, disassemble choke housing to reach the piston. Move piston up and down. If it binds, take it out of the cylinder. Clean piston and cylinder with a solvent.

Types of electric assists

Electric-assist units come in two types. One unit used by Ford, for example, has all parts (thermostatic spring, temperature-sensing switch and a ceramic positive temperature coefficient heater) in the choke cap. The alternator supplies current to

the switch. The system is grounded through a strap connected to the carburetor.

At under-hood temperatures below 60° F., the switch is open. No current gets through to the heater, and the spring operates as if there were no electric assist. At 60° F. and above, the switch closes and current is applied to the heater. As it gets hot, the spring loses tension, and the choke plate opens faster.

Using the test light

Disconnect the electric lead at the choke-cap terminal and connect a 12-volt test light in series with ground. Start the engine. The light should glow at all times. If not, the alternator lead or ground is defective. Place light in series with the terminal on the choke and alternator lead. If it does not glow, replace entire choke-cap assembly.

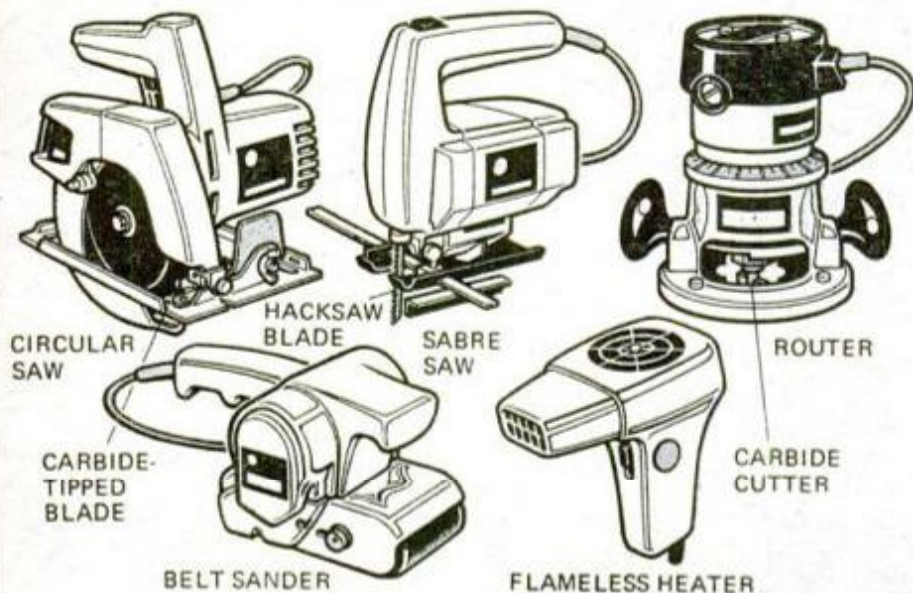
The electric-assist choke used by Chrysler is different, but also can be checked with a test light. ★★

How to apply plastic laminate

HAND TOOLS YOU WILL NEED



POWER TOOLS THAT MAKE THE JOB EASIER



If you've shied away from resurfacing a worn kitchen countertop—or tackling any project that calls for working with plastic laminates—because you felt that applying laminated plastics was beyond your skills, take heart. With average handyman skills, a measure of common sense and the know-how shown on these pages, you'll find that applying laminated plastics can, indeed, be a do-it-yourself project.

In broad terms, working with laminates involves four operations: cutting, spreading the adhesive, bonding, and trimming and finishing. On these pages, we show you how to do all four steps, no matter what tools you may have.

Some basic points to keep in mind:

- Be sure all surfaces are clean. If necessary, dust both core stock and back side of laminate, then wipe surfaces with a rag soaked with lacquer thinner.

- Fill all voids in core surface and edges with rock-hard putty or Plastic Wood. Cut out entirely any large void and glue in a piece of pine.

- Recommended materials for use as core stock are plywood and particle-board. Many pros favor the latter because it's less likely to have voids and thus usually requires less preparation time.

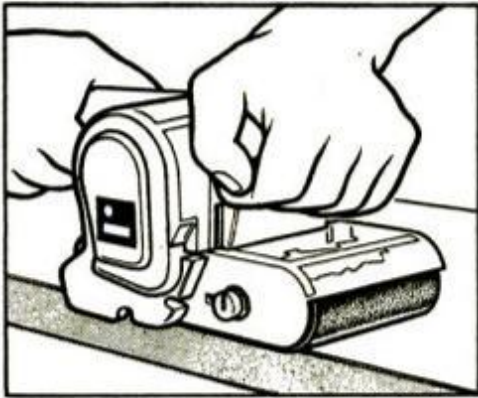
- Applying plastic laminate over a finished surface is not recommended, but occasionally such a bonding will "take." Still, if you want to laminate over a finish, it would be advisable to remove that finish first so that the contact cement will be applied to bare wood.

- Plastic laminate can be applied over old worn plastic laminate if you take precautions. First, test the existing laminate for looseness. It *must be well-adhered*. Then sand its surface thoroughly for good bonding.

- Adhesives. Some contact cements are flammable, and some aren't. If you're using the flammable type, work only in a well-ventilated room and make certain there are no open flames or sparks around. If you're working over a finished floor, protect it with a dropcloth.

- Cutting. Particles of laminate are certain to fly about as the material is cut with power saw or router. *Make it a rule to always wear safety goggles when cutting the material.*

Preparing core stock



The importance of core stock being clean, smooth and free of voids cannot be overstressed. The quickest way to get such a surface is to use a belt sander. Lacking this tool, you can use a finishing sander, or sandpaper wrapped around a block of wood and arm power.

In the above illustration, a belt sander is shown being used to make certain that the top edge of the applied laminate self-edge is perfectly flush with the core top surface. If it isn't, an imperfect glue line between the top piece of laminate and the self-edge is almost inevitable. Such separations are called delaminations. If you use the belt sander to smooth this edge, be sure to keep it moving in order



to prevent any chance of "dishing" along the edge.

The quickest method of filling voids (above) is by pushing in a quality wood filler. Left unchecked, voids can come back to "haunt" the project builder. Since the router cutter-guide follows the core edge when trimming, it will follow any unfilled void to cause an indent in the trimmed laminate. Large voids under new laminate can cause cracks or chips in the plastic if it's bumped by a heavy object.

Since most commercial fillers shrink as they dry, plan on two passes with putty knife and filler. When filler dries, thoroughly sand the entire surface and dust off.

About contact cement

Apply contact cement to the core material as quickly and evenly as possible. Unlike most glues, contact cement must be "dry" before bonding the mating parts. Do not use your fingers to test for dryness; use method shown in drawings 4 and 5 below; natural oils from your skin can make the adhesive ineffective.

Always read the manufacturer's instructions on the can label before starting. There are several types of cements available and proper use varies slightly from one maker to the next. The key point is the working time that the adhesive allows: Working time is the period of time after application of adhesive when effective bonding can be achieved. Some contact cements have a greater working time than others; you should know just how much time you have to complete the job.

If too much time is allowed to pass between cement "ready" time and bonding, both the core material and the laminate should be recoated with contact cement. For best results, do not use contact cement at temperatures lower than 70° F. If the air is dry, so much the better; contact cements dry faster when moisture content in the air is low.

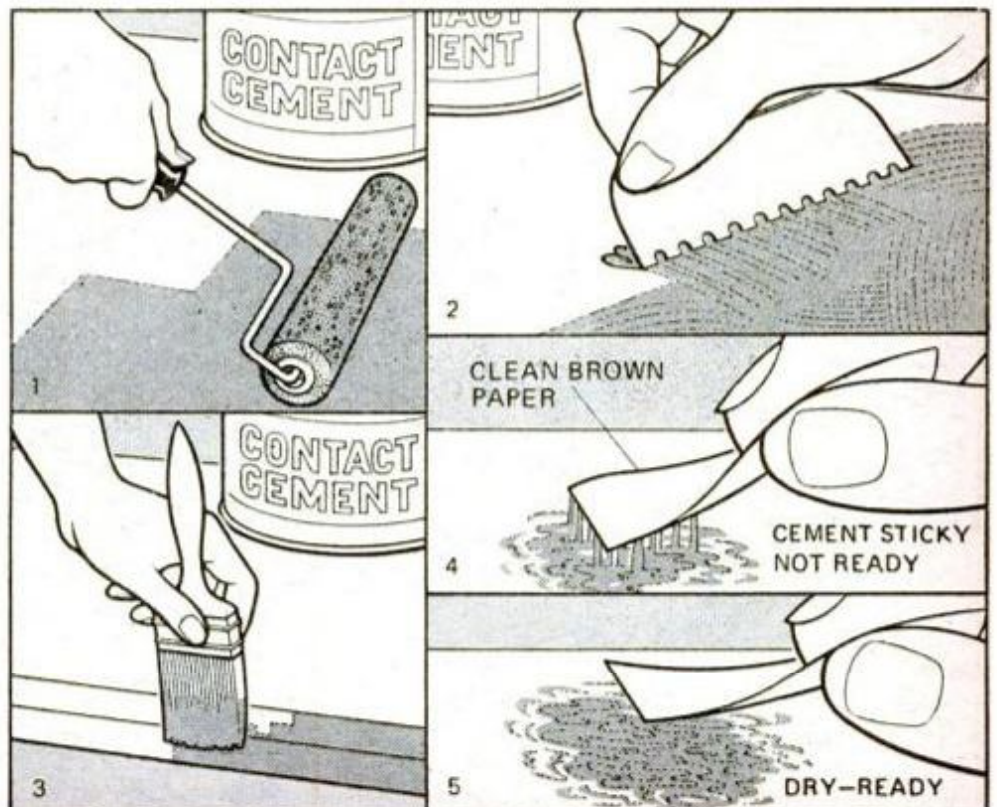
When the job is finished, tightly seal can and store in a safe place with other flammable materials. (Away from high heat and exposure to direct sunlight.)

Applying adhesive

There are three ways to apply contact cement. The paint-roller technique shown in drawing 1 is easiest, quickest and best. But make certain you use the right roller cover: Texfab by EZPaint Corp. applies the adhesive evenly, does not deposit lint on the sticky surface. Drawing 2 illustrates the notched-spreader technique. At one time, contact cement makers gave these away with adhesive purchases; now it is hard to buy one. You can, however, use the edge of a serrated trowel with 1/32 to 1/16-in. notches to do the job. Simply pour a puddle of cement on the surface and spread.

Small areas or strips of self-edge are best coated using a small, clean paintbrush. Though some advocate an animal-hair brush, these do have a tendency to lose bristles. A nylon brush works fine, and a used, stiff one can be rejuvenated for use again with an overnight soaking in contact cement.

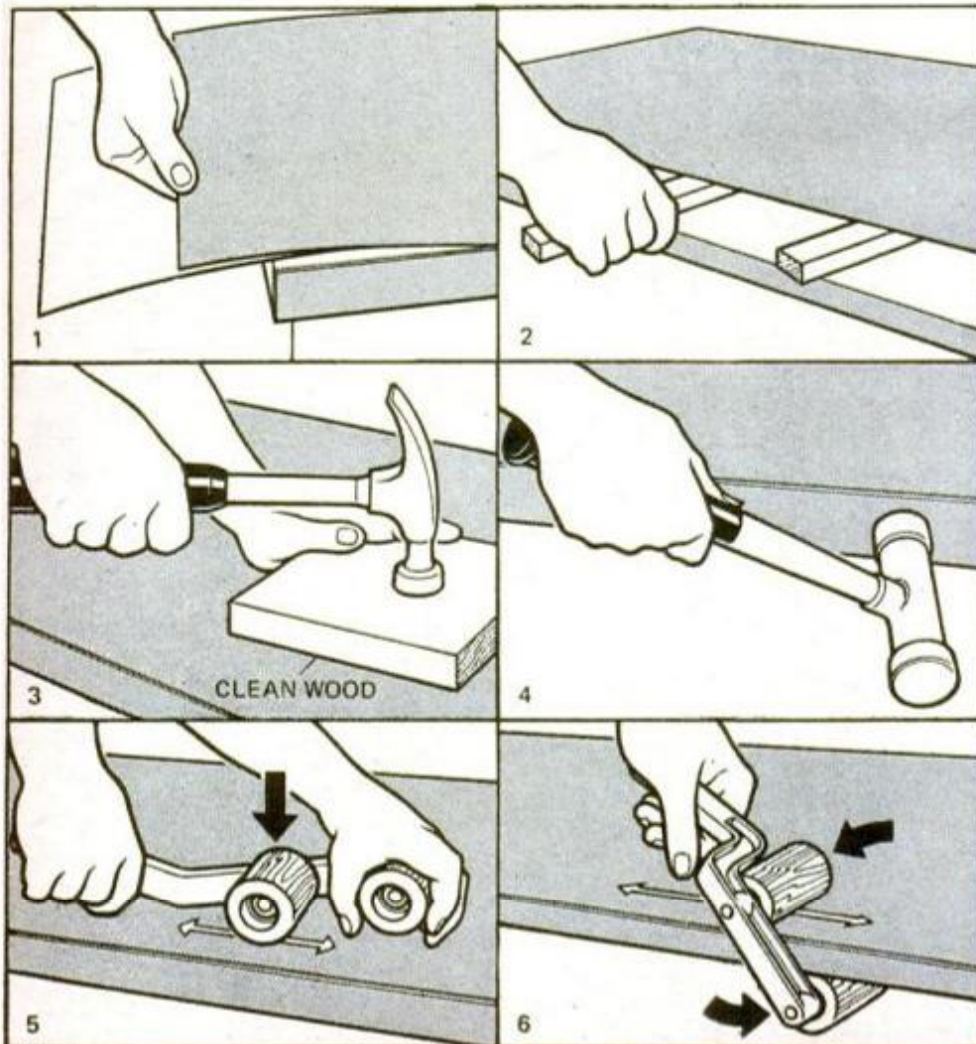
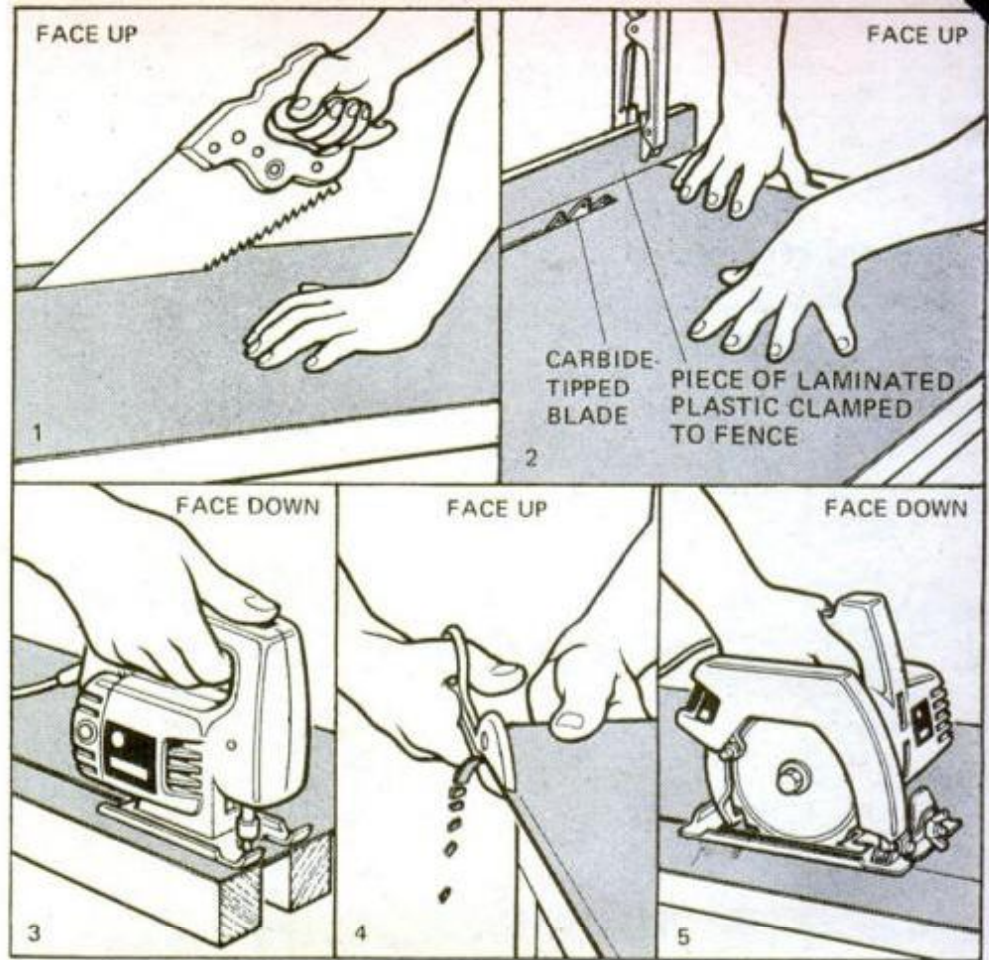
To test coated surfaces for readiness, lightly touch adhesive with a piece of brown (kraft) paper. When cement does not stick to paper (5), the surfaces are ready to be bonded.



Cutting laminates

The trickiest part of cutting is making certain that the piece is well supported while the cutting takes place. Damage will occur if the laminate is allowed to "chatter" while the cutting tool's teeth slice the material. Since the surface (decorative) material can be easily chipped off, it should always face the cutting edge of the tool as shown at right.

For example, when using a fine-tooth crosscut handsaw, face the decorative side up (because the saw cuts on the downstroke and cleans the kerf on the upstroke). On a table saw (2), use a carbide-tipped blade, clamp a strip of laminate to the fence to prevent the piece being cut from slipping beneath the fence; cut with good side up. With a sabre saw, use a fine-tooth hacksaw blade—and the sabre-saw shoe insert—while the laminate is well supported on each side of the cutting line. The easiest method is to use a pair of 2x4s across sawhorses positioned below the laminate to straddle and parallel the cutting line. Cut it with face side down. In No. 4, use laminate shears to nip off a narrow section before bonding. Shears can be tedious to use, but are best for notches and the like. With a portable circular saw (5), cut the laminate decorative side down on adequate supports. Use a carbide-tipped blade set to just clear the laminate thickness; thus cutting slightly into the wood support used below.



Bonding laminate

When adhesive has dried, it is necessary to keep apart the surfaces to be bonded until desired. Many do-it-yourselfers use a large sheet of brown (kraft) paper to achieve this (1). This method does work, but because the paper can be stubborn to slide out, it often is difficult to keep laminate correctly aligned over core. A better method is shown in No. 2. Here, 3/4-in. sticks (or dowels) are spaced about 12 in. apart. Laminate is positioned over the core and sticks are slipped out one at a time. All edges of the laminate should be checked to assure overhang before removing the first stick. Once the bonding process starts, work rapidly—sliding out sticks and pressing laminate into contact with the core material.

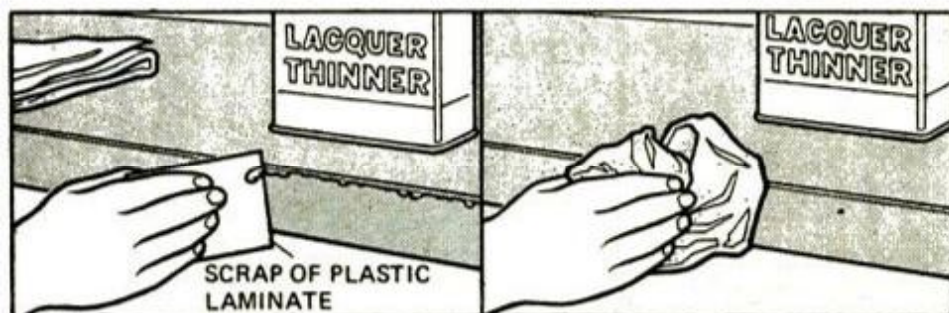
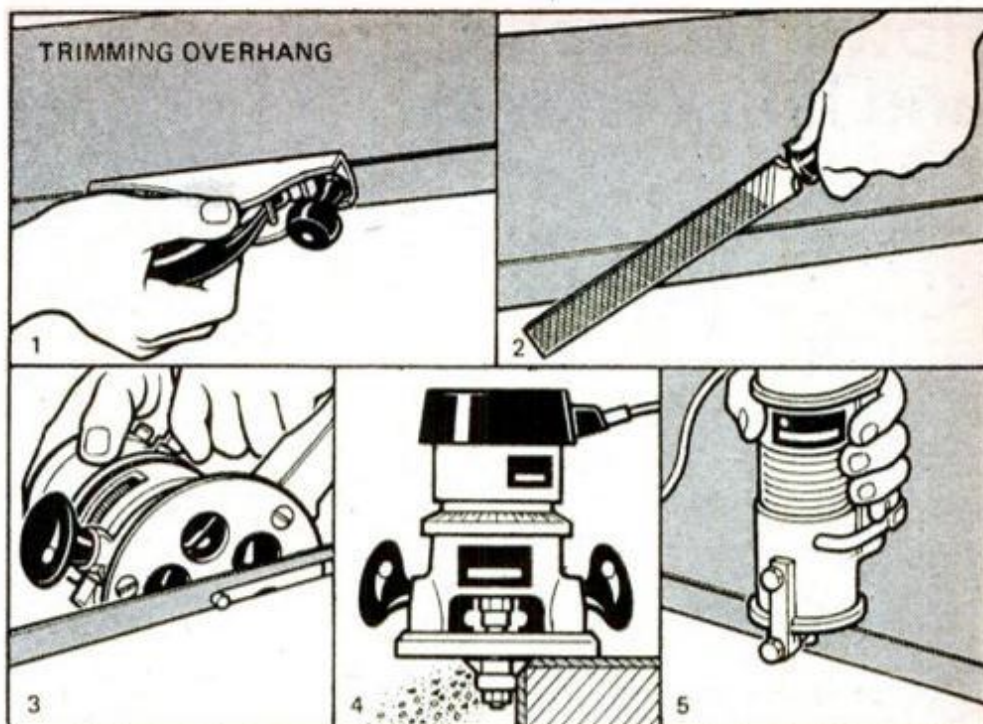
When the entire sheet of laminate is in contact with the core, immediately apply pressure to its surface. Most laminates need only momentary pressure, but don't mistake momentary for light. You can apply pressure by any of the four methods shown in drawings 3 through 6. In No. 3, it is by sliding a block of hardwood about and tapping with a hammer. In No. 4, a soft-face mallet is used to apply pressure to a self-edge strip. The double roller in Nos. 5 and 6 applies the best possible pressure—if you use laminates often, you should invest in one. In the meantime, an ordinary rolling pin does an acceptable job of applying pressure. Apply pressure working outward from the center. If the job is done properly, it is not necessary to clamp the workpiece.

Trimming laminate overhang

Since almost all pieces of laminate are cut slightly oversize (larger than the core stock), trimming is usually necessary after bonding. Lacking power tools, you can use a block plane. To avoid gouges, extend the plane iron no more than 1/16th in. Remove excess laminate as close as possible to the core (1); finish trimming with a large, smooth file (2). When filing, remove material on push stroke only.

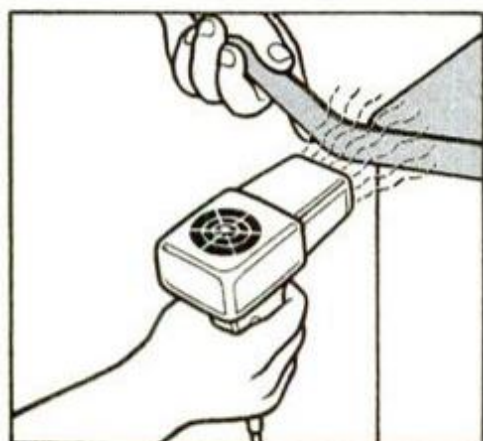
But power is the easiest way to go. No. 3 shows a router with a carbide straight cutter trimming self-edge. Cutter guide rides the core surface to establish the trimming line. In No. 4, the top piece has been applied and trimmed with a straight cutter; chuck a carbide bevel cutter in router to dress the edge. Laminate trimmer (5) does straight or bevel trimming with one adjustable cutter.

Clean and lubricate bits with pilots after each use to prevent "freezing." Where nonpilot bits are used, apply petroleum jelly to laminate self-edge to prevent cutter scorch marks.



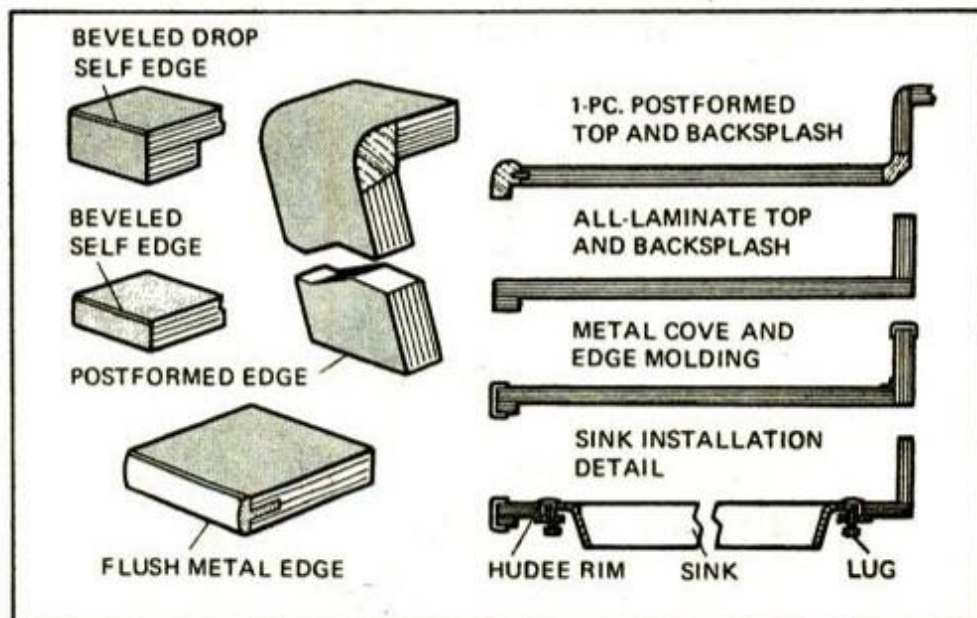
Job cleanup

Never use metal tools to scrape excess adhesive from laminate surface. Instead, use a piece of scrap laminate and a rag soaked with lacquer thinner (or contact-cement solvent). Avoid excessive use of solvent. If it penetrates glue line, it will cause delamination. Soften the adhesive with some solvent, scrape with laminate scrap and wipe clean with dry cloth.



Turning a corner

Conventional plastic laminates have limited flexibility (bend radius). But they can be bent safely around a 7-in. radius at room temperature; tighter if both laminate and core stock are heated. Typical heating instruments are an iron, hair dryer and flameless heater (shown above). Apply two coats of contact cement to the core edge and one coat to the laminate strip. Starting at one end, contact strip to core and work your way toward the bend. When it is reached, heat strip and core and slowly bend strip into contact; hold momentarily. Wear heavy gloves to protect hands from heated surfaces.



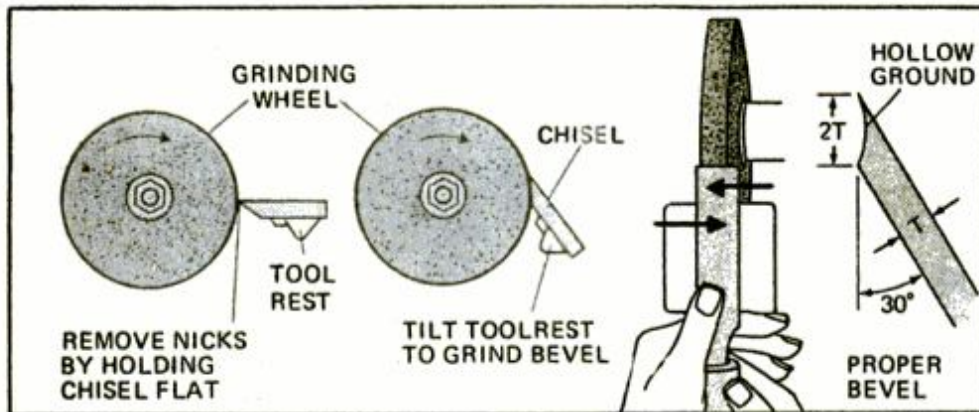
Tips about countertops

Typical kitchen countertop treatments are shown above: The postformed type should be done by pros; do-it-yourselfers can safely tackle the standard type with either metal or self-edging. The latter is better looking and generally preferred.

There are two types of self-edge; one has a thickened edge with 3/4-in. square

pine or plywood fastened to underside of the countertop using glue and annular-threaded nails. Since the router cutter rides the strip when trimming the self-edge bottom, set, fill and sand smooth all nailheads. A backsplash is set in caulk and permanently attached with 1 3/4-in. wood screws. ★★★

How to sharpen and hone chisels



Proper bevel is important

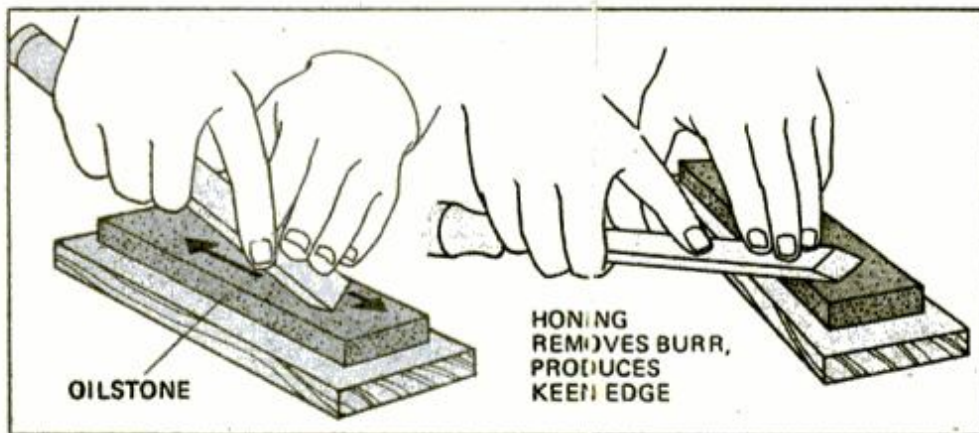
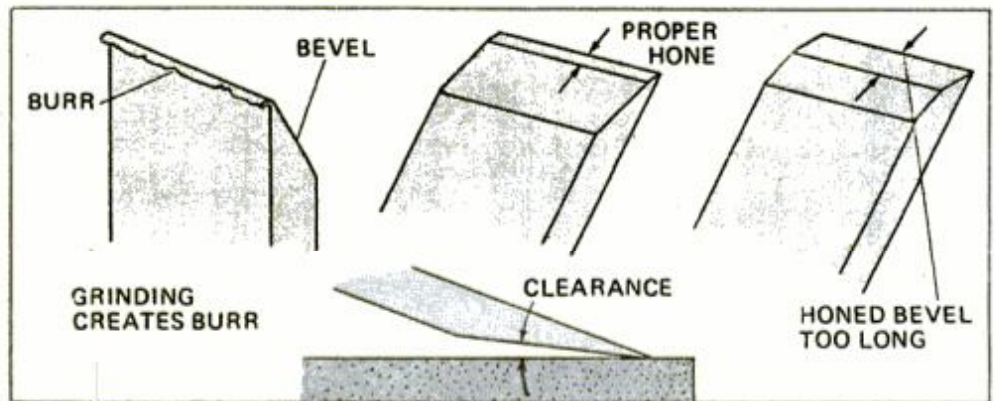
A finely honed chisel is a joy to use whether you're setting a hinge, paring a tenon or forming a mortise. Keeping chisels sharp requires simple know-how, a bench grinder, oilstone and honing oil.

If there are nicks in the cutting edge, remove them by setting the grinder's toolrest horizontally to the wheel and passing the blade squarely across the face. To prevent overheating, dip the chisel in water frequently. To hollow-grind the bevel, set the toolrest at a 30° angle—a 30° bevel stands up best in hardwood; use a 20° bevel for softwoods.

Honing adds secondary bevel

Grinding forms a slight burr at the very edge of the bevel which is removed by honing the chisel on an oilstone. Honing not only removes the burr but actually adds a second bevel. Here it is important that the honed bevel be no more than 1/16 in. wide the full width of the blade.

Normally a chisel can be honed a number of times to restore its keen edge without your having to regrind it, but when the honed edge becomes too long after repeated honings, the edge should be reground, then rehoned to re-establish the perfect cutting edge.



The right way to hone

While grinding produces the necessary bevel, honing produces the actual cutting edge. Use either an aluminum oxide or silicone carbide oilstone and plenty of light oil. Hold chisel diagonally with the heel of the bevel slightly above the stone's surface. Bear down with both hands and stroke the edge back and forth several times. Then turn the chisel over and stroke the back of the tool while you hold it flat as shown at the left.

Repeat these steps two or three times until burr is removed. Keep stone flooded with oil so metal particles will float off stone and not be embedded in its surface.

Test for sharpness

Make your final honing strokes light and deft, alternating with a single stroke front and back to remove the slightest remaining burr. The best test you can make to determine the sharpness of the edge is to touch it against your thumbnail; the edge should "bite" the nail, not merely glide over it.

When an oilstone wasn't handy on the job, old-timers used the trick of stropping a chisel on the heel of their palm. Done frequently as the chisel was being used, it was like stropping a razor on leather—oil in the hand serves to lubricate and maintain a keen edge. Take care when you follow this practice and stroke the beveled edge off your hand in one direction only as arrows indicate. ★ ★ ★



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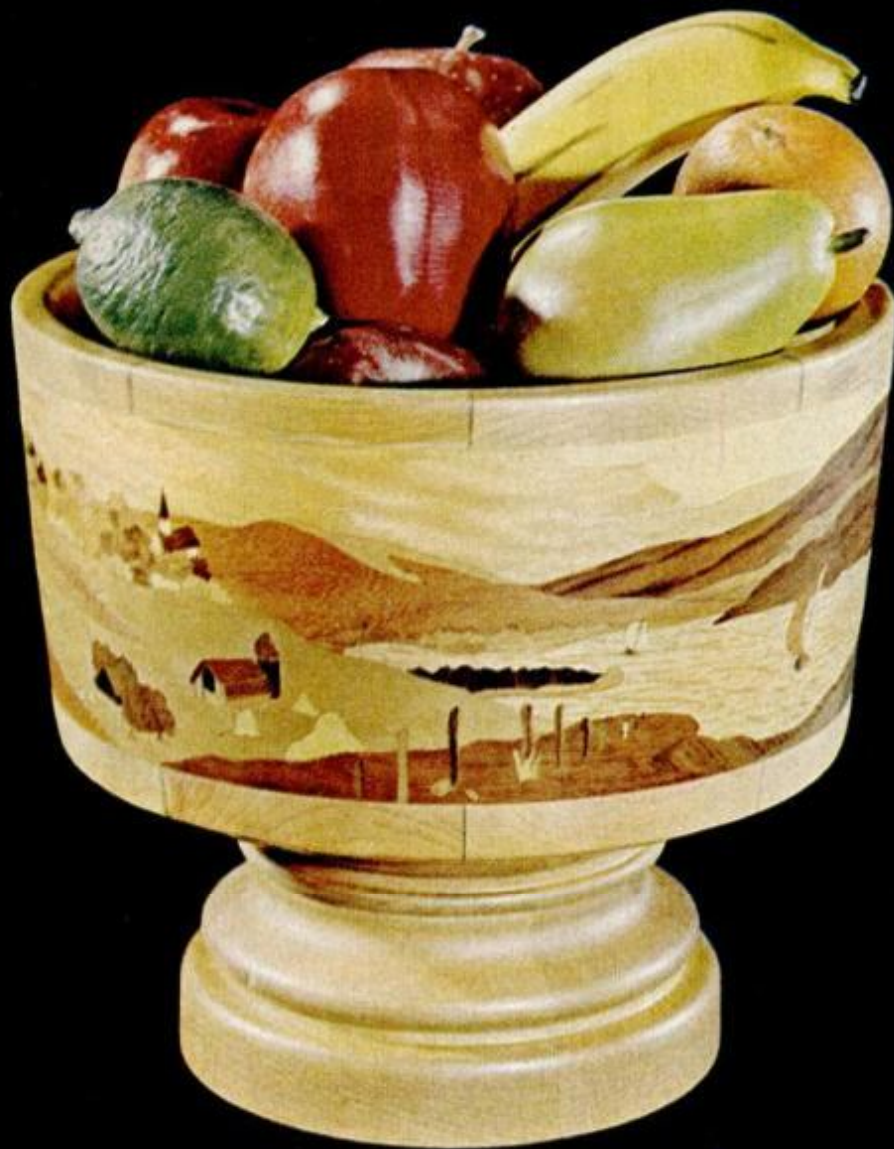
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Color photo: Robert D. Borst

Inlaid bowl displays your craftsmanship

by Dr. John C. Mayne

"Painting" a rolling landscape in wood on a flat surface is challenging, but it's twice as intriguing when the landscape is inlaid on a curved surface, such as the side of this turned fruit bowl.

Turning the bowl from a glued-up maple block is a fairly simple lathe job done with the work attached to the faceplate. To receive the inlay, you turn a $\frac{1}{8}$ -in.-deep recess in the side of the bowl.

You can create the panoramic scene shown below with a free actual-size pattern available on request to Home and Shop Editor, Popular Mechanics, 224 West 57 St., New York, N.Y. 10019. Enclose a self-addressed, stamped envelope. From this master pattern you can trace five additional patterns required.

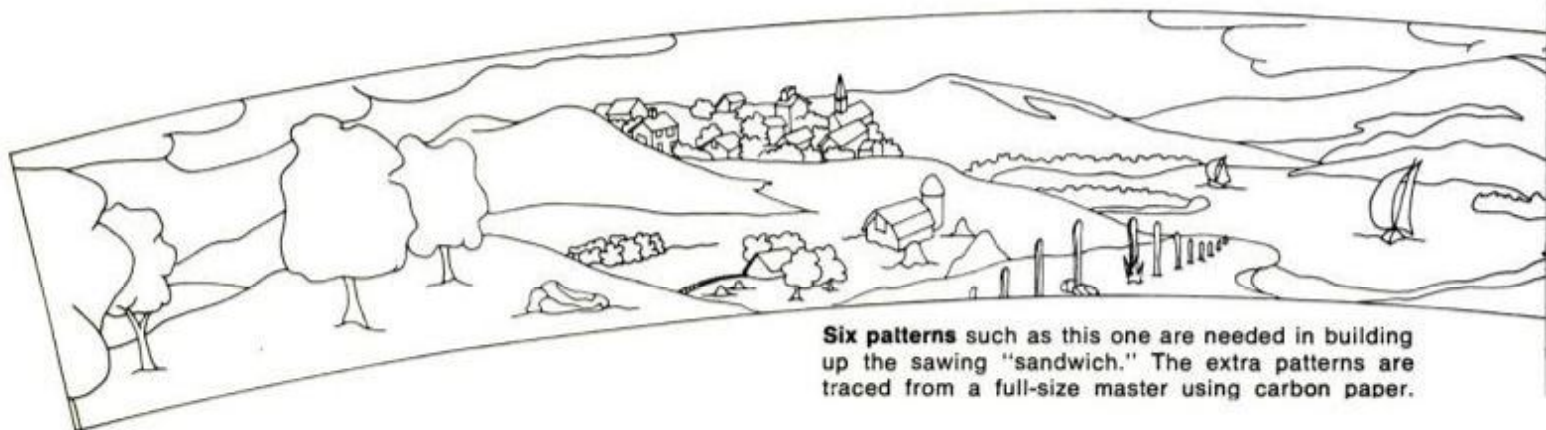
You jigsaw the complete picture when patterns and various $\frac{1}{32}$ -in.-thick veneers are assembled like a many-layered sandwich. In this sandwich, you superimpose all six patterns on top of each other and staple them together along an edge to make a "booklet" about 32 in. long.

Cut oversize pieces of veneer to cover each part of the scene and rubber-cement them to the patterns, sticking as many pieces to each individual pattern as you can without overlapping. Add pieces to the patterns until every area is covered.

Now, starting with the last page of the booklet, apply rubber cement to the veneer and to the back of the sixth pattern. When cement is dry, bring the two surfaces together, starting at the stapled edge. Smooth pattern to avoid wrinkles. Cement each veneer layer to the preceding pattern this way. The top one becomes the sawing pattern.

As you jigsaw pieces with jewelers' blades, the sandwich remains an integral unit, but later on you can separate the various layers easily to pick out parts of the picture.

When you have jigsawed all parts, remove the "picture puzzle" from the sandwich and assemble it loosely on lightweight cardboard. Coat both cardboard and face side of the pic-



Six patterns such as this one are needed in building up the sawing "sandwich." The extra patterns are traced from a full-size master using carbon paper.

re parts lightly with rubber cement, let dry, then stick pieces to the cardboard as close together as you can. This reverses picture direction and places parts face down.

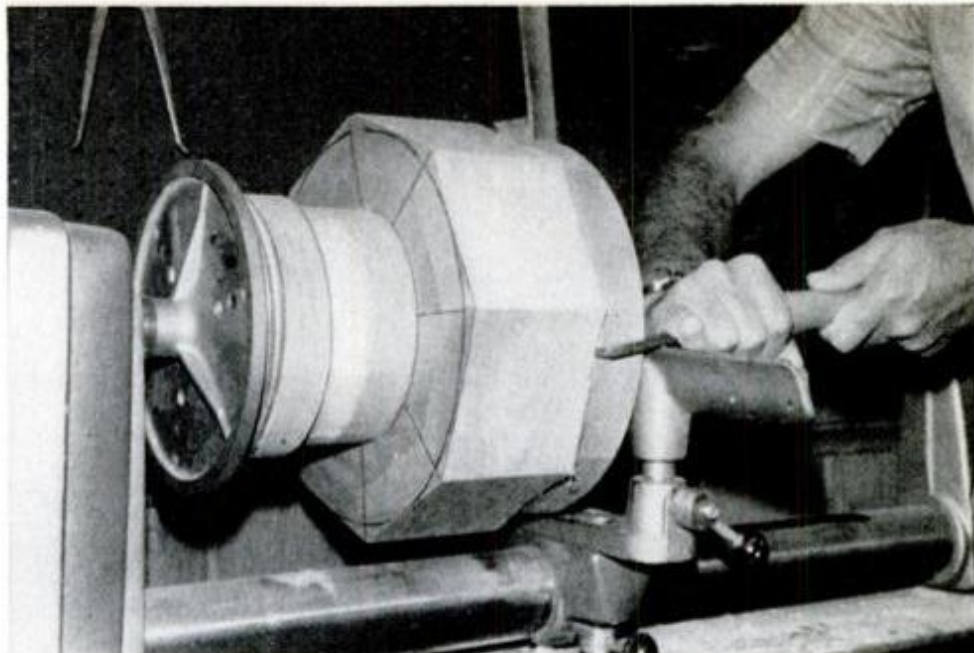
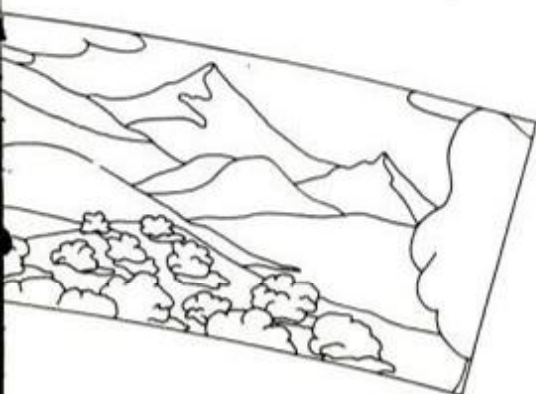
Now rub off all cement from top side of the picture and follow with a light sanding. Then add an even coat of white glue and apply kraft paper (brown grocery bag) to the glue-coated surface. Cover this paper with several sheets of wax paper and clamp the whole thing between two pieces of $\frac{3}{4}$ -in. plywood. When glue dries, all parts will be bonded. Then peel off the cardboard.

While the bowl is still attached to the faceplate, wrap a sheet of paper snugly around the bowl and mark the very edges of the recess for exact length, width and curvature. Rub cement the paper and face side of picture, let dry and stick the two together. Then cut picture a fraction to the outside of pencil lines and sand edges to exact width of the recess.

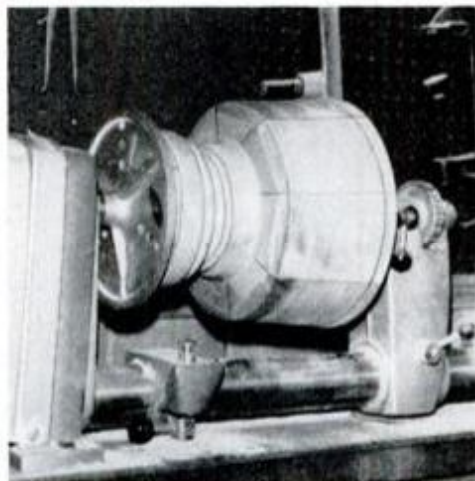
The bowl recess should be almost $\frac{1}{16}$ -in. deeper than the veneer thickness so the picture will be slightly below the surface. Glue and clamp the picture into the recess using a piece of $\frac{1}{8}$ -in. plywood cut $\frac{1}{8}$ in. shorter and $\frac{1}{8}$ in. narrower. To start this job, apply white glue to the end of the picture about 1 in. and begin holding it in place with C-clamps, first loosely while checking it for fit. After one end is secured, apply glue to the back of the picture a few inches at a time and clamp as you go. Wipe off any glue that oozes out.

The picture is complete except for a large tree partially cut but not glued. Make an exact paper pattern for it directly from the picture, trace left side of tree, cut carefully and glue in place. Complete the bowl by carefully turning down the outside even with the inlaid picture. With lathe turned off, go over the picture lightly with very fine sandpaper.

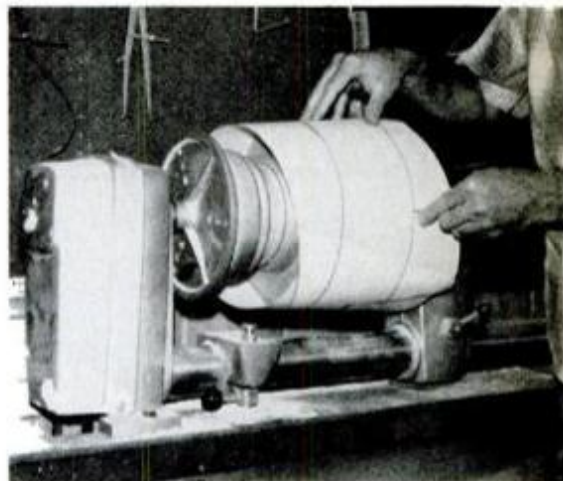
To bring out the beauty of the different woods in the panoramic scene, apply a coat of sanding sealer and two coats of clear satin-luster finish such as Wood-glo. ★★★



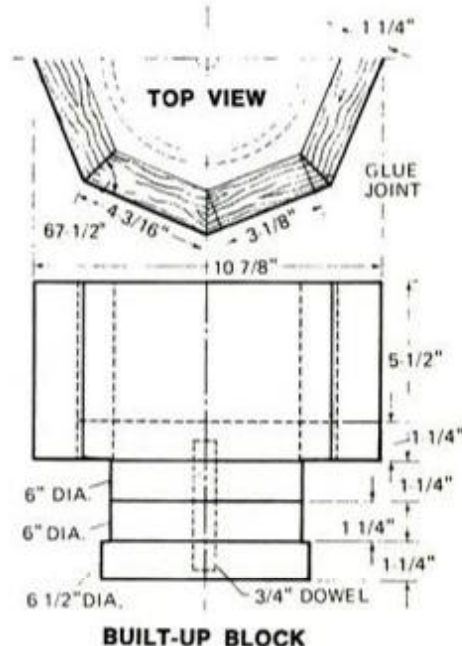
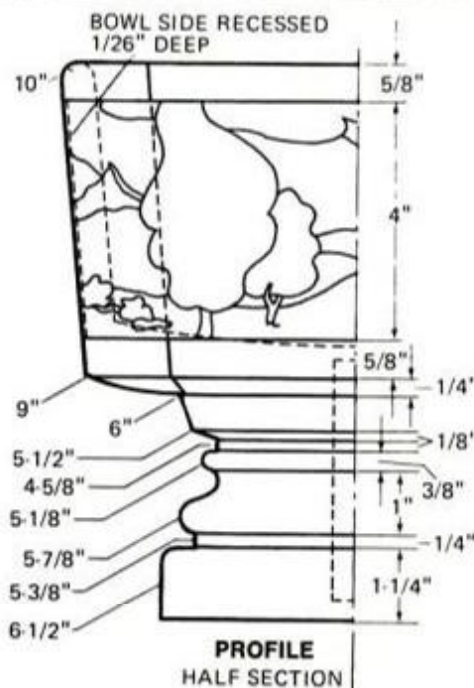
Glued-up bowl block is mounted on lathe faceplate, roughed to shape at medium speed.



Turn picture recess in side of bowl about $\frac{1}{16}$ in. deep so "picture puzzle" will be a bit below the surface when it's glued.



Make paper pattern of bowl recess directly from work to obtain exact width, length and curvature for marking picture to fit.



Art: Graphic Presentations

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Материал, защищенный авторским правом

Try grid-square exposure tests for better prints

by Eldon and Peggy Hauck

The usual way to find the right exposure in enlarging is "test-stripping": exposing each section of the print a different length of time to see which works best, but the trouble with test-stripping is that each strip covers not just a different exposure, but a different part of the subject, too. Our grid-test method doesn't have that problem—and it's quicker than test-stripping, too.

First, paint a grid of two-inch squares on your easel. When you project your negative, it helps you locate the area you want to make your tests on. That area should have the same average tonality as the

picture's point of interest, with a contrast range fairly typical of the picture as a whole.

Now cut a sheet of enlarging paper into two-inch squares, and set one square down on the test area you selected.

With the enlarger lens at its largest opening, expose the test square for about 10 seconds, or whatever exposure time you're used to. Now expose a second square for the same length of time, but with the lens closed down one stop. Continue, closing down the lens one stop each time you expose a new square, but keeping the enlarging time constant.

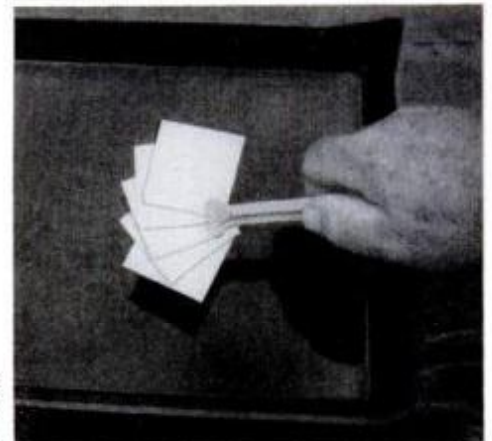
Now fan the test squares like a hand of cards, put them in your tongs, and process them together to ensure that all get equal development. After the stop bath examine them in white light.


You probably won't find a single test square with just the right exposure, but one that's just a trifle light, and one just a trifle dark. Using the f-stop that produced the lighter of the two almost-right exposures, make three more tests, increasing the exposure by one-fourth of the original time for each. In other words, if the right exposure was between 10 seconds at f/8 and 10 seconds at f/11, expose 13½, 15 and 17½ seconds at f/11. Total elapsed time for the series was 95 seconds; but conventional test-stripping, doubling exposure time instead of changing f-stops each time, would have taken 310 seconds.

The painted grid isn't an absolute necessity—it's just to help you lay each test square down on the same spot. Don't worry about its leaving a grid pattern reflected through the back of your prints—none of our prints show that problem. ★★★



Grid on easel (above right) shows you where to set paper squares to match position each time. Fanning squares like card hand (right) develops them alike.





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touch of
Black Velvet?



Black Velvet has something no other Canadian can touch. Feel it. Black Velvet[®] Canadian Whisky. The smooth Canadian.

BLACK VELVET[®] BLENDED CANADIAN WHISKY 80/86 PROOF IMPORTED BY © 1974 HEUBLEIN, INC., HARTFORD, CONN

Present arms!

Build this handsome showcase for six of your favorite guns. It'll look great in your den or playroom.

by Wayne C. Leckey
HOME AND SHOP EDITOR

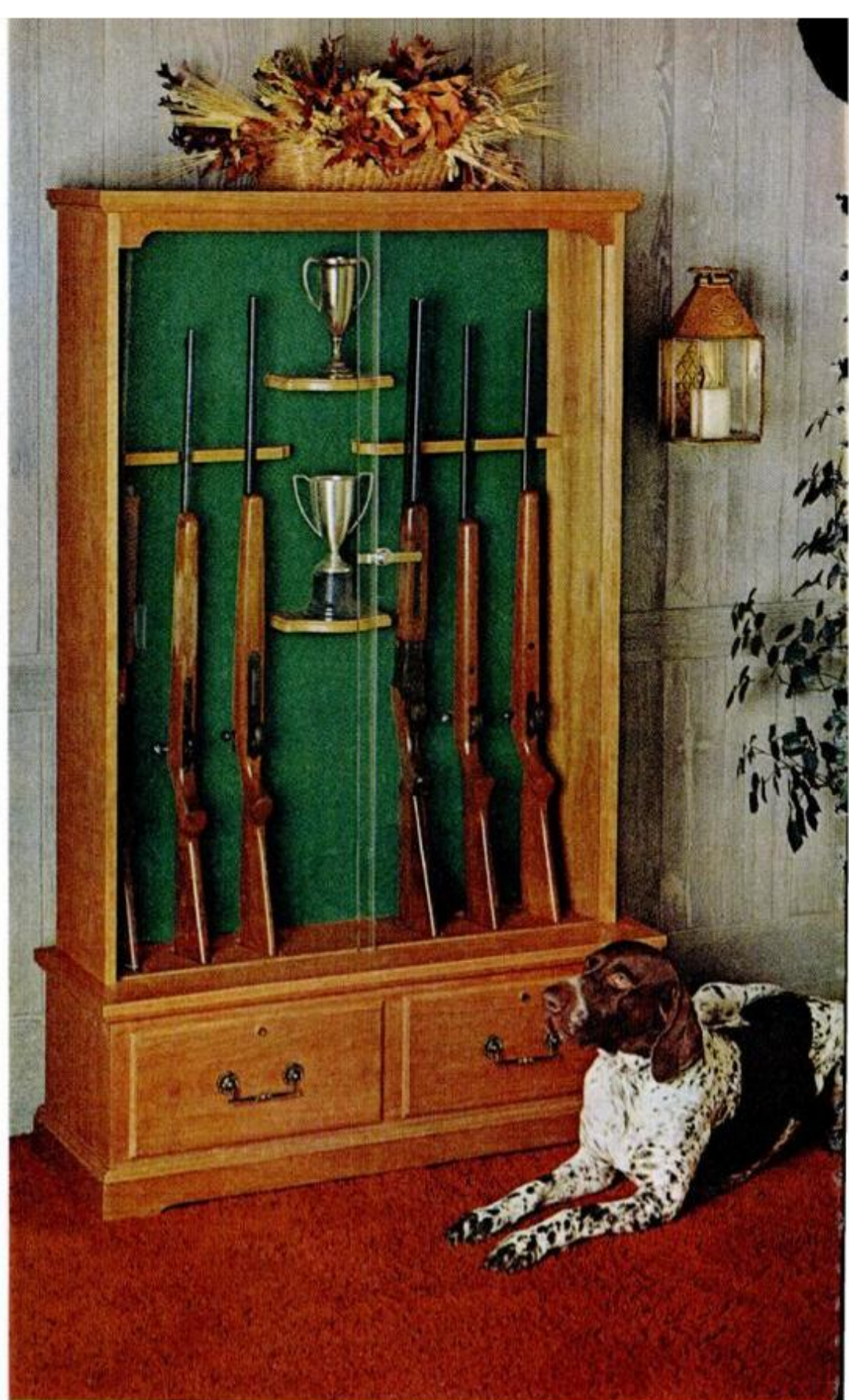


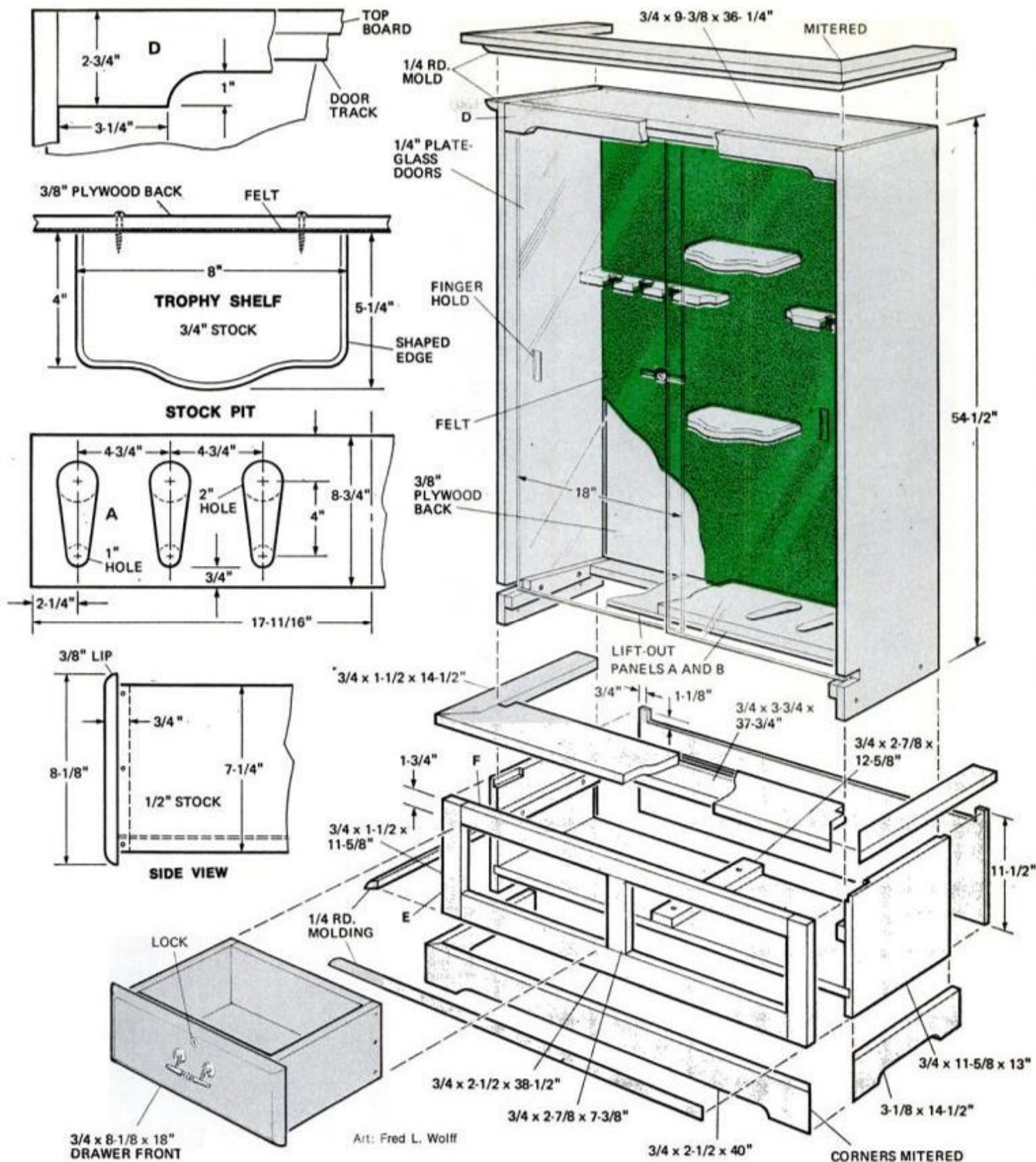
Photo: George Ratkai Firearms: Remington Arms and Winchester-Western

If hunting is your game and you're on your way to owning several guns, you'll want to do more than just lock them up between "safaris"—you'll want to show them off in a handsome dust-free showcase like this beauty. It's designed to hold six firearms behind sliding glass doors, but can be made to hold as many as

eight. And if you want to make the interior really glow, you can install a light at the top. There are shelves in the gun compartment for displaying trophies, and two drawers in the base hold all the ammo and gear that comes with owning a number of guns. Drawers and the glass doors are fitted with locks for safety.

The original cabinet was made of cherry, but you may like it better in knotty pine. We lined the stock pits and barrel racks with felt to protect the guns' finish, and found that guns and trophies stood out smartly against a green-felt background.

You build the cabinet as two separate units—the base, then the top.



To make the base, cut two ends $11\frac{5}{8} \times 13$ in. We cut them from veneer-face, lumber-core plywood and covered the front edges with wood tape, but they can be cut from solid stock if you wish.

Run $\frac{3}{8} \times \frac{3}{4}$ -in. dadoes on the inside faces $1\frac{3}{4}$ in. up from the bottom to house the ends of a $\frac{3}{4} \times 12\frac{5}{8} \times 37\frac{3}{4}$ -in. bottom shelf. Then

form a $\frac{3}{8} \times \frac{3}{8}$ -in. rabbet along rear edges of the pieces for a plywood back and cut a $\frac{3}{8} \times \frac{3}{4}$ -in. rabbet at the top front corners for a $\frac{3}{4} \times 3\frac{3}{4} \times 37\frac{3}{4}$ -in. spreader.

The bottom shelf can be fir plywood; the spreader, pine. Glue the shelf in the dadoes, and glue and nail the spreader in the top rabbets, flush with the front. Add the three pine

drawer cleats next, one to each side $9\frac{1}{8}$ in. up from the bottom shelf and a third to the bottom itself. Cut the five pieces for the front facing from solid stock and butt-join them with short $\frac{3}{8}$ -in. dowels. Assemble as a separate frame, making the length and width $11\frac{5}{8} \times 40$ in. Glue and clamp the facing in place;

(Please turn to page 124)

They satisfied then.

Chesterfield CIGARETTES



*You'll
agree*

— they satisfy

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

Filter King: 18 mg. "tar," 1.2 mg. nicotine; 101's: 19 mg. "tar,"
1.4 mg. nicotine Av. per cigarette by FTC Method

They satisfy now.



New Chesterfield Filters.

Back in 1922, Chesterfield had a reputation for great straight cigarettes.

Our promise then: They Satisfy.

Now, Chesterfield adds a filter cigarette, with its own rich, new filter blend.

A blend as full flavored as all our tobacco experience could make it.

Our promise now: They Satisfy.

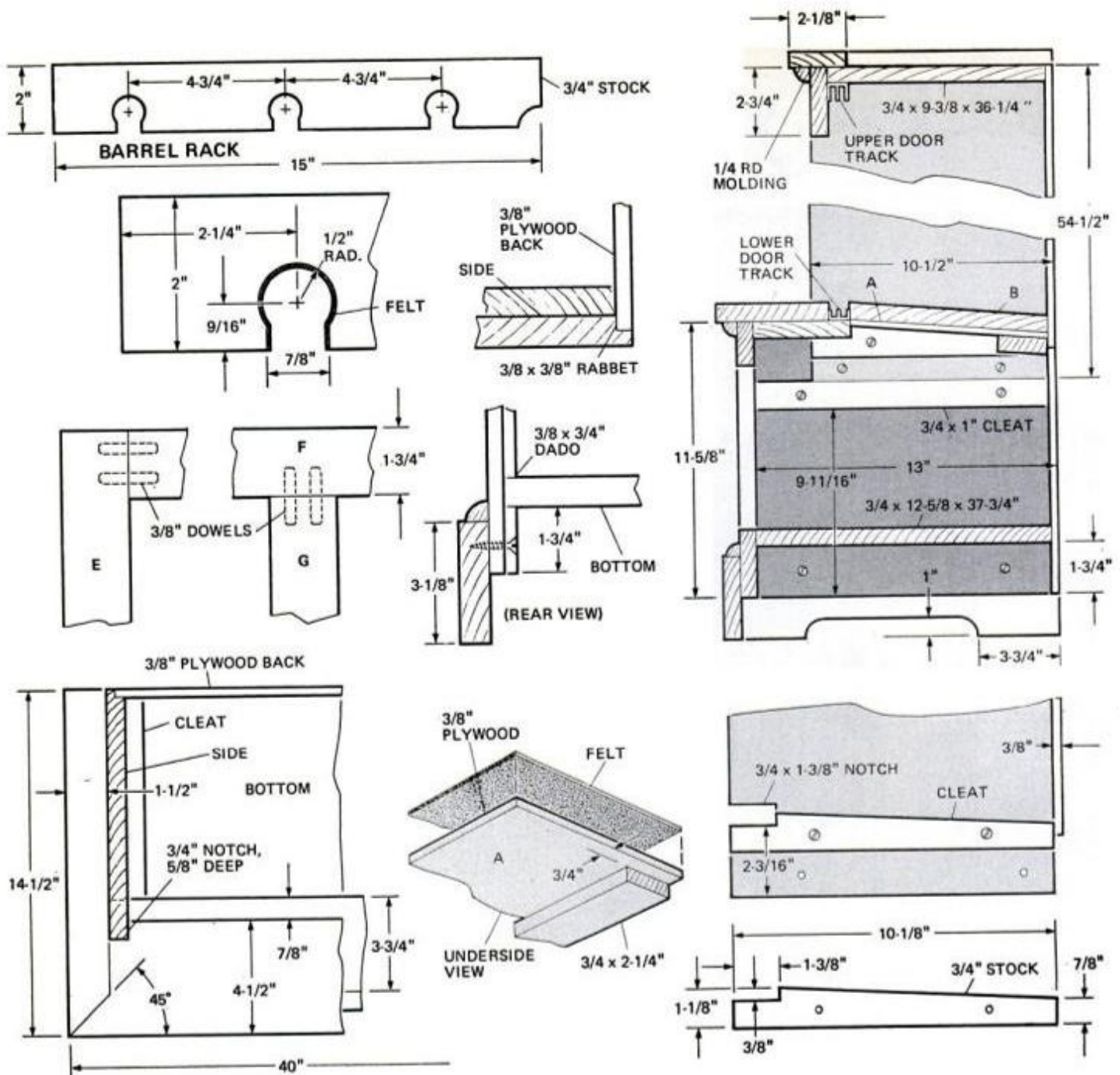
So no matter what you're smoking now, it's time to try new Chesterfield Filters.

GIANT POSTER OFFER

A full color 2' x 3' reproduction of the classic Chesterfield ad on the left is available in limited quantity. Send 2 Chesterfield Filter or 101's pack bottoms and 75 cents for postage and handling to: CHESTERFIELD POSTER OFFER #3
P.O. BOX 60-1944
Minneapolis, Minnesota 55401.

Offer void to persons under 21 years of age. Good in U.S. only, except where prohibited, licensed, taxed or restricted by law. Offer expires September 30, 1975. Allow 4 to 6 weeks for delivery.

They Satisfy



PRESENT ARMS!

(Continued from page 121)

can be used at points where they will later be covered with molding.

Next cut and assemble the three pieces which make up the mitered base. The latter laps the front and ends 1 1/4 in. and is glued from the front and screwed from the back.

The top of the base section is covered with a three-piece facing assembled as a separate unit. Notice the special way the front corners are mitered, also the 5/8 x 3/4-in. notches cut at corners to accommodate the upper gun compartment.

The top facing projects 3/8 in. at the front, 3/4 in. at the ends. Short nails up through the pine spreader are used, along with glue, to attach the facing across the front. Glue alone is used along the sides. Mitered lengths of 5/8-in. quarter-round mold-

ing are applied to the overhang and to top edges of the base pieces. Use small finishing nails here, set the heads, fill with a matching wood putty and sand when dry.

The two lip-type drawers are made to fit the openings. Use 3/4-in. solid stock for the fronts, 1/2-in. pine for the sides and backs and 1/4-in. hardboard for the drawer bottoms. Run a 3/8-in.-sq. rabbet along the top and bottom edges of the fronts, a 3/8 x 7/8-in. rabbet at the ends and a 1/8 x 3/8-in. groove 3/8 in. up from the bottom. Sides are attached to the drawer fronts by nailing into the shoulders of the rabbets. Round outer edges of the drawer fronts.

Each drawer is fitted with a lock. Those used in the original require a 9/16-in. hole, are installed from the back and secured with two small screws. The lock deadbolts fit 1/4-in.-deep mortises. Drop pulls are No.

V609-4A made by National Lock Co.

Now for the upper assembly. Cut the two sides 10 1/2 x 54 1/2 in., then run a 3/8 x 3/4-in. rabbet completely across the top edge, a 3/8-in.-sq. rabbet along the rear edges and a 3/4 x 1 3/8-in. notch at the front 2-3/16 in. up from the bottom. Notice that the back rabbets are cut away at the bottom for a distance of 2 in. Next cut two cleats to the shape shown and fasten one to each side member so its notched end is even with the bottom of the notch in the side member. The cleats support the stock-pit board and its supporting panel.

Cut the top board 3/4 x 9 3/8 x 36 1/4 in. from fir plywood and attach it to the sides by nailing it down into the top rabbets. Fill the voids at the front ends of the rabbets with wood blocks, then cover the front edges of the side members with wood ve-

(Please turn to page 126)



VEGA ESTATE

VEGA WAGON



VEGA LIFTGATE



VEGA ESTATE



VEGA. LOWEST PRICED U.S. WAGONS.

Vega wagon is a nice choice for economy car shoppers who aren't sure a small sedan will do.

At \$3079,* the Vega wagon is priced lower than any competitive American-made wagon. At \$3307,* the Vega Estate is priced lower than any competitive U.S. wagon with wood-grain vinyl side panels. And they offer good mileage and low maintenance costs for people who need economy plus room. *Manufacturer's Suggested Retail Prices, including available 140-2 engine at \$50.00 and dealer new vehicle preparation charge. Destination charges, state and local taxes are additional.

Gas mileage. Published EPA figures for a Vega wagon with available four-cylinder, 140-cubic-inch

2-barrel engine are 21 mpg in city driving, and 29

Based on EPA figures, no U.S. wagon gets better mileage.

mpg on the highway. No American wagon tested got better mileage.

About performance. High Energy Ignition gives you surer starts in any weather compared to conventional systems. And better engine firing after warm-up.

What you can save in maintenance.

Comparing the 1975 Vega wagon and the '74 model projected over four years of average driving (50,000 miles) points out some operating economies. 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 that a '75 Vega wagon using unleaded fuel could save about \$243 in parts, lubricants and labor over the '74 model with leaded fuel (if you follow the

Maintenance savings up to \$243.

Owner's Manual for recommended service).

There's plenty of choice in Vega.

It's definitely no take-it-or-leave-it wagon. To the basic Vega wagon you can add an available GT package with sport suspension, and sporty accessories. The Vega Estate, our "Little

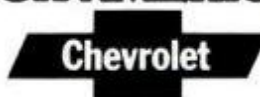
Woody," has simulated wood paneling down the sides and on the tailgate. The GT and Estate can also be combined.

Economy you can grow with.

Each version has seats for four plus room for cargo in back.

All give you 3-speed transmission standard, with 4-speed or automatic available. But what else would you expect? After all, Vega is part of the full line of wagons from Chevrolet, America's Family Station Wagon Builder.

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Accredited Member National Home Study Council

PRESENT ARMS!

(Continued from page 124)

near tape to hide the plies. Place a temporary brace across the bottom of the assembly to hold it square, then cut the back panel from 3/8-in. plywood; tack it in place temporarily.

The top apron fits between the side members, even with the front edges, and is glued and nailed to the plywood top. The cabinet is topped off with a flat mitered frame that overhangs 3/4 in. on three sides and is screwed in place from the top. Quarter-round molding completes it.

The plate-glass doors slide in 1/4-in. plastic tracks. Both are held in place with small flathead screws, the upper track (deeper of the two) being mounted behind the top apron, the bottom one being placed behind the flat ledge of the base.

You can now join both units together. Rest the upper one on the 3/4 x 1-in. cleats in the base and then slide the unit forward to engage the notches. When in place, the rear rabbets of both units will align and you can drive home the two screws on each side.

Cut, ground and polished, the 18-in.-wide, 3/16-in.-thick plate-glass doors will cost about \$40. They should be approximately 5/16 in. shorter in length than the distance from the bottom of one track to the bottom of the other so they will clear the bottom track when you lift the doors up into the top track and rest them in the bottom one. All four edges of the doors should be ground and polished, and have 5/8 x 3-in. half-round finger holds ground in the face side. For a ratchet showcase lock we picked one called Wonder Lock.

The cabinet back is installed last after it has been covered with felt and the barrel racks and trophy shelves attached with screws from the back. Place the racks 15 in. down from the top, the top shelf 11 in.

The lift-out stock pit board and the felt-covered panel it rests on merely rest on the slanting cleats. The top edges of the pit cutouts should be rounded with a router fitted with a corner-rounding bit.

If you used cherry, first apply a coat of sanding sealer (a clear lacquer) to the bare wood, let it dry four hours and sand lightly with very fine sandpaper. Next apply walnut oil stain, let it remain 10 minutes and wipe it off lightly with a soft cloth. Let this dry overnight and apply two coats of Wood-glo, sanding lightly between coats. The final rubbed-effect finish will look like that of a fine manufactured product. ★★ ★

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For accuracy, you get a sawdust blower and total line-of-sight visibility.

For safety, a telescoping blade guard and double insulation.

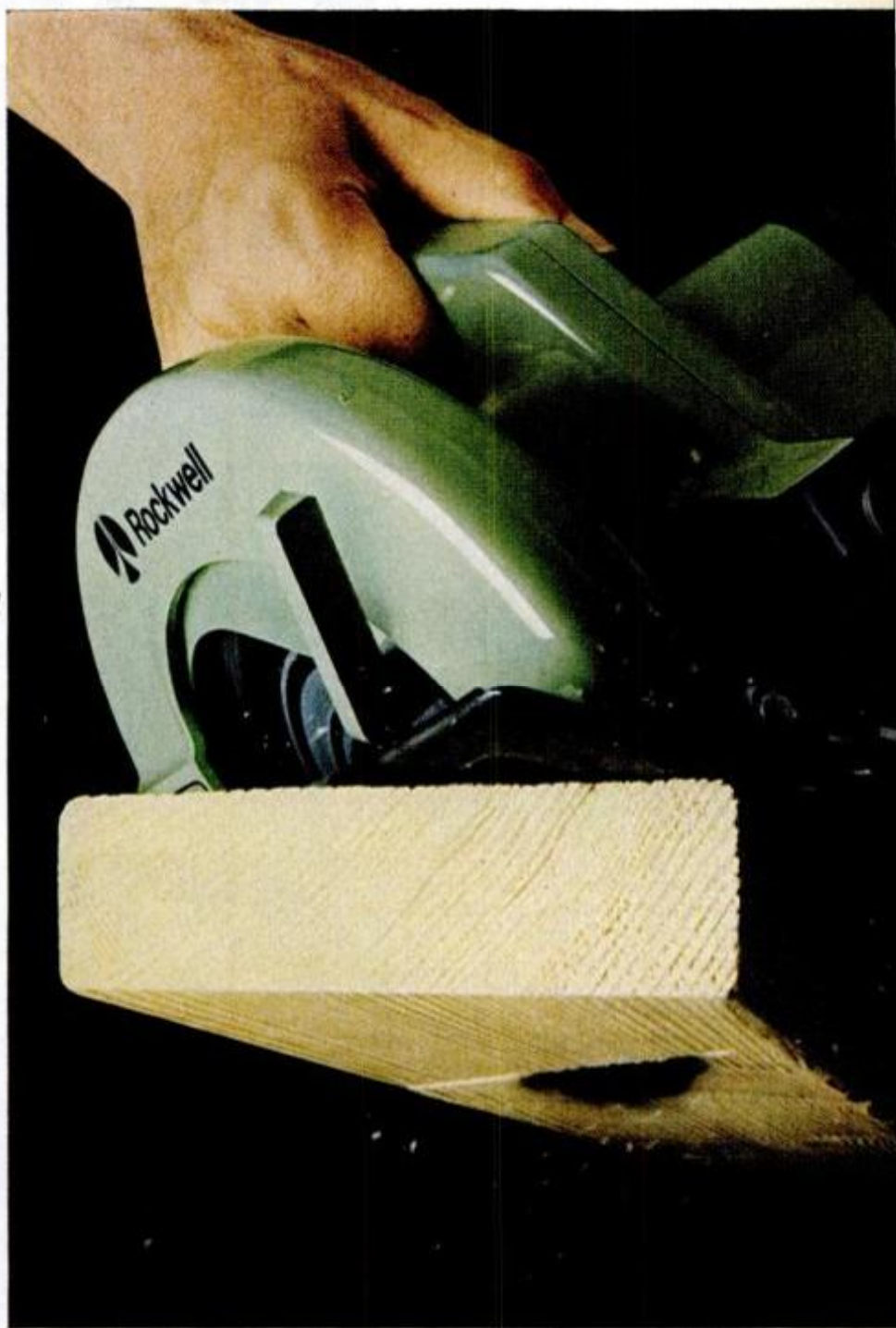
For \$29.99, the Model 4510 is yours.

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circular saw will be a lot like using the right circular saw.

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ADDRESS _____

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ALL OUTDOORS

(Continued from page 30)



Steel-belted waders (left) and hip boots (right) are guaranteed for 1000 miles of tough walking and wading by Gladding-South Bend Tackle Co. Soles have traction treads.



Pocket-size pack of protection, Boony Box has a compass, flint to start fire, whistle, mirror, adhesive, plastic sheet in box that floats; \$11.50 from Semj-Co., Durham, N.H.



Lures you can make yourself are available in kits by Worth Co., Stevens Point, Wis. Fly tying, jig tying, popper-tying and lure-making kits are \$6.50 up to \$13.25.



Klicker, a spoon lure that makes noise, is the latest Dardevle from Lou J. Eppinger. Small willow-leaf sonic spinners strike together to make sound; three weight sizes.



Newly designed propeller powers a new 12-v. electric trolling motor from Mercury. Large prop diameter plus reduction gear will give a reported 25 pounds of thrust.



Tank tie-down kit from OMC Accessories firmly anchors Evinrude and Johnson 3 and 6-gallon gas tanks. Kit prevents sliding and moisture buildup under tanks.



Rolling along off-season, or on packed snow, is possible with Bombardier's new Front Wheel Kit for single-ski Alpine Ski-Doo's. Conversion is reported easy and quick.



Frozen keyholes don't happen with new frost-free padlock. Moisture and dirt can't enter lock that opens with keyed magnet. Lock is \$7.15 from Weil Service Products, Chicago, Ill.

Us Tareyton smokers would rather fight than switch!

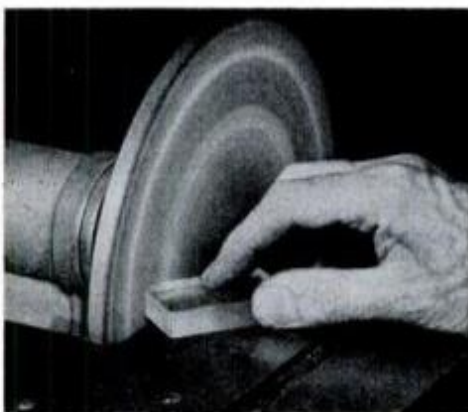


King Size: 20 mg. "tar", 1.3 mg. nicotine;
100 mm: 19 mg. "tar", 1.4 mg. nicotine; av. per cigarette, FTC Report Oct. '74.

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

HINTS

FROM READERS



Renewing sanding belts, discs

A small block of acrylic plastic, such as Plexiglas or Lucite, when passed lightly over a moving sanding disc or belt does a good job of removing embedded gum and pitch from the abrasive surface. Clogged sanding surfaces can be renewed this way several times before they will require replacement.

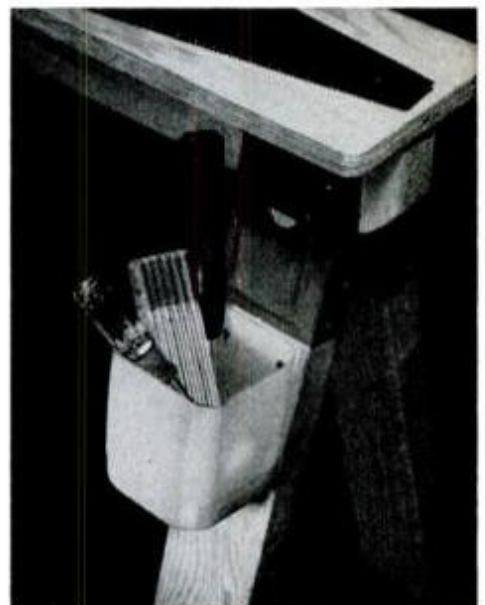
—H. Miller, Oroville, Calif.



Preventing drain-cleaner spills

When using caustic drain-cleaning agents, I like to avoid spilling them on chromed sink fittings. To keep these drain cleaners where they belong, I use a plastic funnel-and-hose combination. These are sold by auto-supply stores and large supermarkets for use in adding oil to automobile engines.

—Parry C. Yob, Fair Oaks, Calif.



Sawhorse-mounted tool pocket

A handy toolholder for a sawhorse consists of the lower portion of a ½-gal. plastic jug fastened to a leg with two roundhead woodscrews. Keyhole slots in the jug allow it to be slipped over screwheads for quick installation and removal. Bonus: The holder's soft plastic will not damage edges of cutting tools.

—Walter E. Burton, Akron, Ohio.

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056. HOW TO SERVICE & REPAIR YOUR OWN CAR by Richard Day. Even the inexperienced can troubleshoot costly repairs and save money. Retail: \$10.95.

062. POPULAR SCIENCE ILLUSTRATED ALMANAC FOR HOMEOWNERS by Robert P. Stevenson and Roy Doty. Exactly when and how to do all those indoor and outdoor chores that keep your home, yard, car in peak condition. Retail: \$8.95.

335. A CENTURY OF WONDERS by Ernest U. Heyn. Magnificent volume covering last 100 years of technological growth as seen in Popular Science. Retail: \$20.00.

341. HOW TO REPAIR ELECTRICAL APPLIANCES by Gershon J. Wheeler. Step-by-step instructions on how to fix in minutes without special experience or expensive tools. Retail: \$10.00.

383. WOOD FURNITURE FINISHING, REFINISHING, REPAIRING by James E. Brumbaugh. How to get beautiful, professional results in finishing, refinishing or repairing all kinds of wood furniture. Step-by-step instructions and over 200 clear-cut illustrations. Retail: \$6.95.

038. ELECTRONICS FOR EVERYBODY by Ronald Benrey. Illustrated how-to's of do-it-yourself electronics. Instructions for projects, all under \$15. Retail: \$7.95.

057. DO-IT-YOURSELF HOME PROTECTION by Ralph Treves. How to plan, choose, buy or build and install all home and car security systems. Retail: \$7.95.

1035. THE TRUE SOUND OF MUSIC by Hans Fantel and **99 WAYS TO IMPROVE YOUR HI-FI** by Len Buckwalter. How to find the perfect home sound system; and how to make it sound better. 2 books count as 1. Total retail: \$11.45.

075. HOW IT WORKS ILLUSTRATED by Rudolf F. Graf and George J. Whalen. Giant-size cutaway drawings and crystal-clear text give you instant understanding of everything from everyday tools and appliances to the latest in electronic calculators, microwave ovens, even Xerox machines. Retail: \$10.95.

2415. THE KITCHEN BOOK by Klaus Paradies. Up-to-the-minute kitchen plans, ideas, shortcuts, and space savers. Filled with surprising ideas . . . answers to every kitchen problem and question. Over 140 illustrations. Retail: \$10.95.

2200. THE HOMEOWNER'S COMPLETE GUIDE by Ralph Treves. Foundation to roof, front porch to backyard — everything you need to improve, repair and maintain your house easily and economically. Over 400 do-it-yourself, how-to photographs, drawings and diagrams. Retail: \$8.95.

664. THE ARENA OF LIFE by Loris and Margery Milne. Over 250 wild-life photos and fascinating text on ecology, explore interrelationships of living things. Retail: \$15.00.

330. GARDENING AND HOME LANDSCAPING by Jack Kramer. Build walls, furniture, greenhouse. Plant a flower bed. Put in a patio; much more. With easy-step diagrams, plans and charts. Retail: \$9.95.

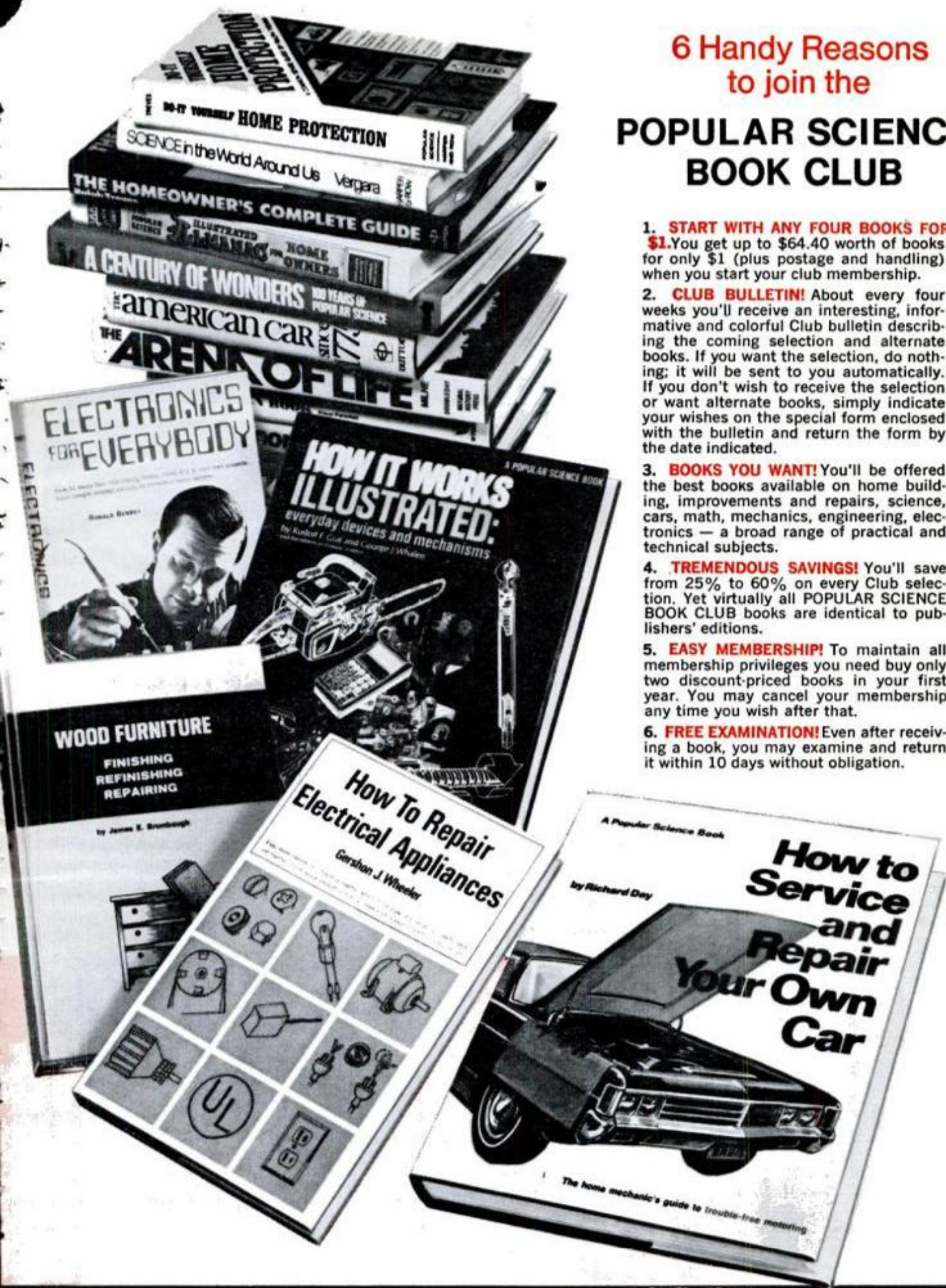
340. AMERICAN CAR SINCE 1775 by the editors of Automobile Quarterly. Lavish 500-page illustrated history of cars and trucks. Hundreds of rare photos. Retail: \$17.95.

363. SCIENCE IN THE WORLD AROUND US by William C. Vergara. Why do foods smell like they do? How does a seismograph work? These and hundreds of science questions are answered in easy-to-understand language. Illustrated. Retail: \$7.95.

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- 6. FREE EXAMINATION!** Even after receiving a book, you may examine and return it within 10 days without obligation.

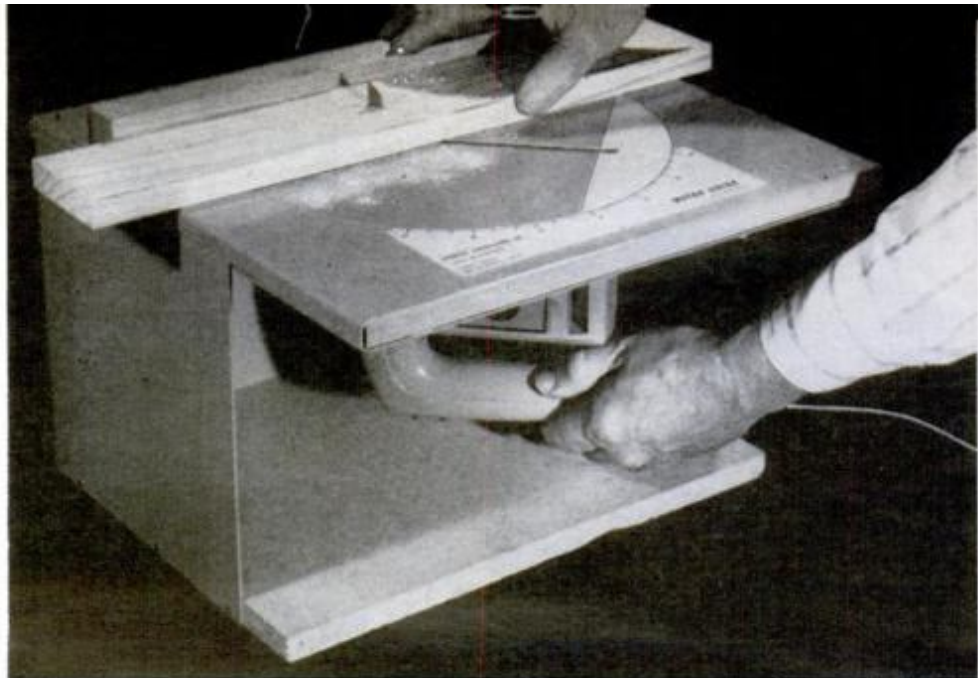


MAIL ATTACHED CARD TODAY or write to Popular Science Book Club 44 Hillside Avenue
Manhasset, N.Y. 11030

Sabre-saw miterbox

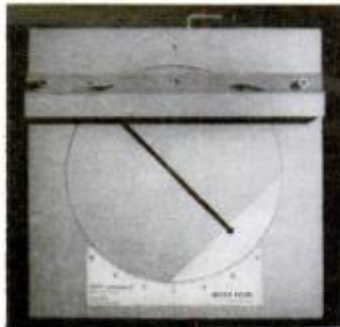
Your portable sabre saw, when inverted, serves as the cutting blade for a unique power miterbox. With a slightly modified soleplate, the saw travels along two parallel guide rails on the underside of a, slotted metal turntable. To cut a board or molding, you set and lock the turntable to the desired angle; then push the saw forward into the work hand-held against a wooden fence. Accuracy of the cuts surprised me. The miterbox will accommodate most sabre saws.

You can set the turntable from 90° to 45°. With the fence removed you have a jigsaw with a 15-in.-sq. table. To detach the saw for other work, you remove the blade and pull the saw from the guide rails. Called Miter Guide, the unit sells for \$39.50 (minus saw) from Marblithic Mfg. Inc., 3 Main St., Spring Valley, Ohio. 45370.—Wayne C. Leckey, Home and Shop Editor



Photos: Robert D. Borst

Sabre saw slides back and forth along guides attached to slotted turntable as shown in underside view, far right. Overhead view at right shows spring plunger pins in wooden fence that impale work to keep it from shifting.



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I have a rather long message for the readers of POPULAR MECHANICS

but if you are interested in fuel economy and performance I urge you to take time to read it.

Hello. My name is Frank Kirmss. I am president of APO of America. I have paid for this space in order to acquaint you with a product well known elsewhere in the world but relatively unknown here.

I am so convinced it will benefit you that I offer it on an unconditional money back if not satisfied basis. I will present some arguments in favor of it in this space, but I am not trying to "sell" you.

The product is the *Mk-II Vapor Injector*.

Our own research, independent evaluations by recognized laboratories, tests by automotive magazine editors and reports from owners all agree that it can improve fuel economy and increase horsepower in the 4-stroke, gasoline powered engine.

It is not mechanical, has no moving parts and requires service on an average of 4 times a year at a total annual cost of \$7.80.

Let's make one thing clear: I am not a struggling inventor battling against the giant corporations trying to get something off the ground. In fiscal 1973 APO's sales were \$38,000,000 in Japan alone. (*That's dollars, not Yen, by the way.*) My company was awarded the title "Exporter of the Year" by the Dallas Chamber of Commerce. In other words, I'm not attempting to put you on to a completely new gadget we *hope* will work.

The reason we have been so big in Japan is quite simple: Gasoline costs about \$2.00 a gallon. When we entered the Japanese market a few years ago you could buy all the Premium you wanted in many parts of the U.S. for under 30¢ a gallon, less if you watched for "Gas War" signs.

Frankly, I had no intention of even selling the Mk-II here. It's a tough market. Products in this category have often been misrepresented. Some "gas savers" are highly dubious, to say the least. And, as long as gas was plentiful and cheap, the general attitude was, "who needs it?"

With the recent energy crisis and now with zooming inflation, the picture has changed. Enough people are now concerned with what's happening to their automotive maintenance dollar to make up a sizeable group.

I believe the readers of this magazine are included. They obviously care enough about cars to inform themselves about them. Also, many have bought cars on the basis of better

economy or more performance for the amount of fuel consumed.

I also believe the readers of this magazine understand that fuel costs are not the only expenses in running a car. Tune-ups, sparkplugs and the eventual decarbonization and valve grinding must be counted in the total. If you *don't* tune-up, replace plugs and grind valves, performance becomes so poor that the cost is even greater. So, when I say that the Mk-II has been shown to reduce cylinder head carbon, prolong plug life and result in a cleaner running engine, you'll know that it can save you real money over a period of time.

Incidentally, this is not one of those ads which tell you everything except what the device is or how it works. *The Mk-II Vapor Injector fluid reservoir holds a mixture of petro-chemicals and water. It is connected to a vacuum source which permits the vaporized fluid to be drawn into the intake manifold with the fuel and air charge. A catalytic action of the fluid is believed to be responsible for producing a more complete combustion of the gasoline/air mixture thus delivering more power and more mileage.*

Many "fan" publications have reported favorably on the Mk-II including MOTOR TREND, ROAD TEST, WHEELS AFIELD, OFF ROAD and SCIENCE & MECHANICS. Also in the new HOT ROD YEARBOOK (No. 14), the editors document a remarkable gain of 24% in road horsepower on a 1967 Corvette using a Mk-II—from 96 hp to 120 hp @ 3000 rpm. These publications are responsible only to their readers, not to us. Reprints available on request.

But, I don't think you should wait. I think you should start getting more for your gasoline dollar right away.

Here's my money-back offer to car owners: Send me \$39.95 (check, money order or charge card authorization) plus tax if you live in Texas. A Mk-II for your car, together with a six month supply of Econo Mix, will be shipped from the branch nearest you.

Try it. If you aren't convinced it improves your performance and economy *return it in 30 days for a full refund*. I don't know what else I can do to eliminate any risk on your part except to say that our business reference is: International Dept., Republic National Bank, Dallas, Texas.

Let's hear from you.

Frank Kirmss

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Santa Ana, Calif. 92707

The Mark-II
VAPOR INJECTOR



FRANK, send me _____ MK-II Vapor Injector(s) at \$39.95 each. I enclose \$ _____ (please add state sales tax if you live in Texas). I understand I can return the unit(s) within 30 days for a full refund if I am not convinced.

FRANK: I would like to have more information and reprints before ordering.

(NAME)

(ADDRESS)

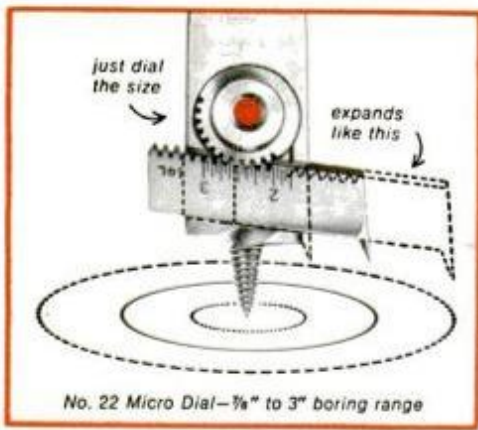
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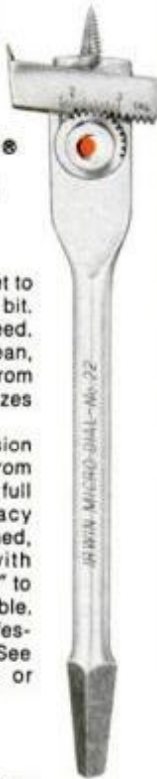


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Now: TV microscope for surgery

Microsurgery—operating with the aid of a microscope—is used primarily for eye operations, nerve surgery and vascular surgery. Physicians use stereo optical microscopes to view a very small operating area. Drawbacks are that the depth of field is shallow and, since the surgeon must keep his head in a fixed position, the procedure is very tiring.

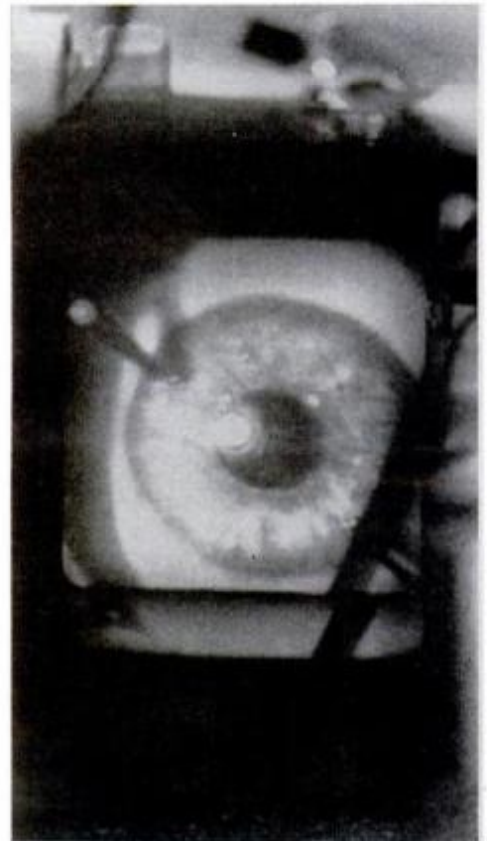
These problems are said to be eliminated by a microscope system that's the brainchild of Dr. John P. Beale Jr., an eye surgeon at the San Francisco Eye and Ear Hospital.

The system consists of a miniature color TV camera connected to a stereo-beam splitter that produces a 3-D image enlarged 16 times. The surgeon can observe the operative

site with his naked eye, view it through the optical microscope, or look above the microscope at the display on the stereo-TV monitor. A second TV screen, larger and wall-mounted, permits other members of the medical team to view the operation. A taping setup provides replays for review or teaching purposes.

The operating microscope has radically changed eye surgery in the past decade, according to Dr. Beale.

"It was only some five years ago," he notes, "that patients with cataracts remained in the hospital for about 10 days and could not return to work for three months. It is now possible to do cataract surgery on an outpatient basis and permit the patient immediate ambulation and activity." ★★★



His eyes on the small TV screen in front of him, Dr. John Beale (left, top) sits ready to operate. To prevent fatigue, the surgeon (left) uses supporting armrests. Except around eye area, the patient is fully covered. Above: Here is the magnified eye as seen by the surgeon on the TV screen.

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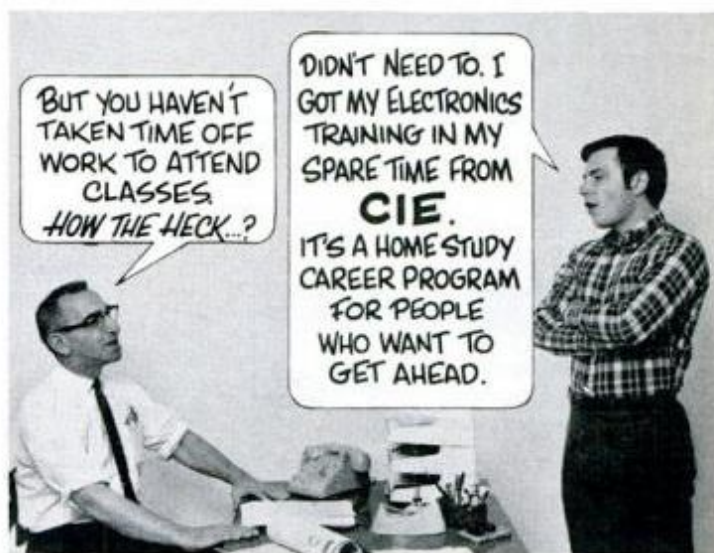
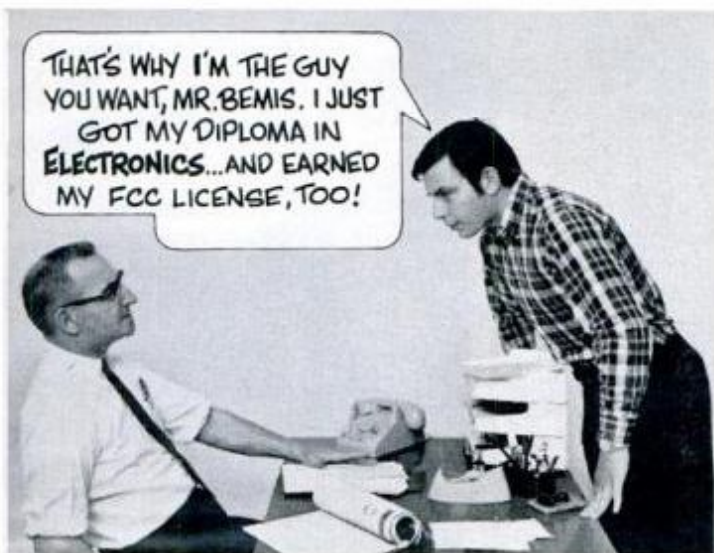
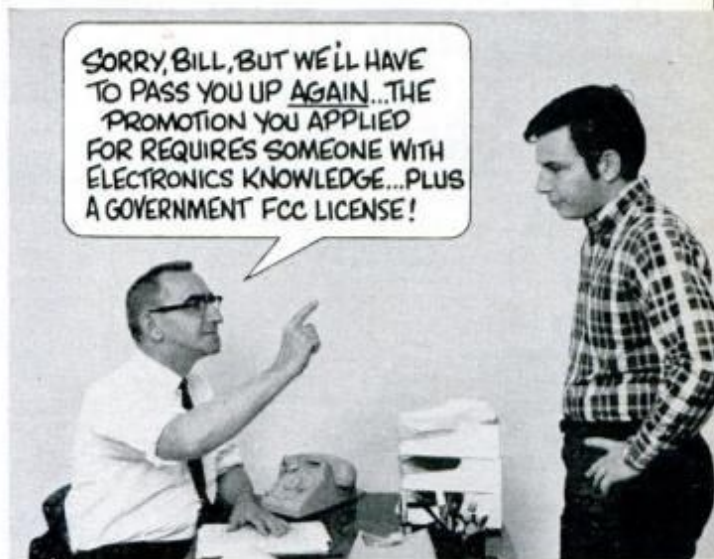
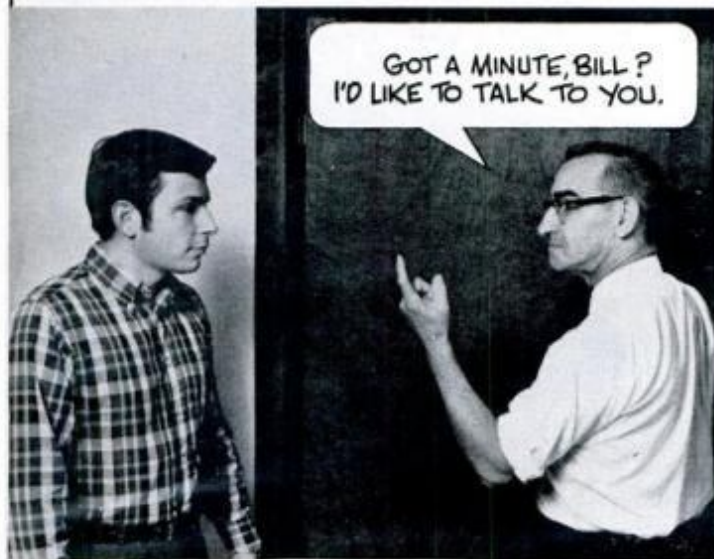
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PM SHOP TEST

Flameless paint peeler



Four items shown at left come in kit for about \$26. Head (above) operates on infrared-ray principle.

Photos: Robert D. Borst

Although both the shape and the method of operation of this tool reminded me of my familiar propane torch, I soon found Magna's 252-P flameless paint peeler to be superior—on certain jobs.

It works on the same principle as the catalytic heaters campers use. A platinum grid promotes combustion of propane without flame, but there's still plenty of heat. When you fire the tool, you wait about 30 seconds for the grid assembly to glow red. You then lower the gas feed until the flame disappears. When the unit is operated properly, no flame is visible.

The maker claims it will perform a number of operations better than the torch it is obviously intended to replace. It did all that's claimed for it when I used it to remove a thick layer of alligator paint from siding. I'd have to rate it as one of the best paint removers I've ever used: The safety this tool gives, coupled with the fact that the substrate isn't scorched when paint is burned off, has earned the Magna 252-P a permanent niche in my toolbox. (Note: Although the tool eliminates the danger of flame when used correctly, it still requires ventilation.)

But I had no luck when I tried to use it to soften a soldered connection on copper tubing. Here the old propane torch still excels.

—Harry Wicks, Workshop Editor



Tool does great job of softening putty; head must be held 1/2 in. away from glass.



Used properly, tool did an excellent job of softening putty for easy removal.

SPECIFICATIONS—Magna 252-P Paint Peeler

- Operates at 3000 B.T.U.s per hour.
- Six to eight hours burning time from standard 1-lb. disposable propane cylinder.
- Spring-loaded ball-check regulator valve.
- Filtered sintered bronze orifice in venturi to reduce clogging possibility.
- Head construction: Steel, nickel-plated; stainless-steel grids.
- Price: \$25.50 with tank, \$21.95 without tank.
- Manufacturer: International Magna Corp., 3188 West 32 St., Cleveland, Ohio 44109.

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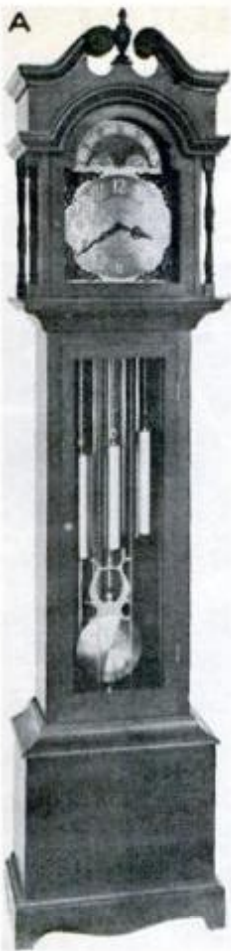
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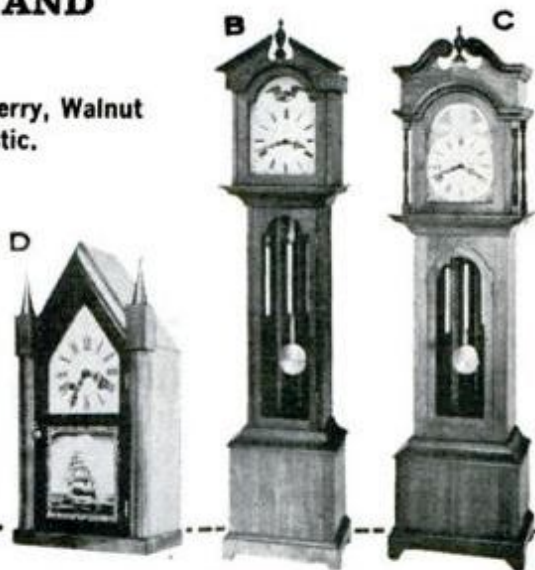
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Tom McCahill

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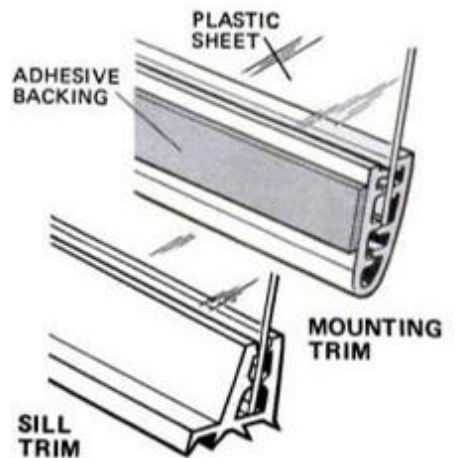
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Oct. 2, 1974

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"I started to see and feel results in the first 72 hours."

"I lost 13 lbs., 7 1/4 inches off my waist and really shaped up in 14 days - using the '5' Minute Body Shaper Plan."

James Chase tells us... Case #R-052

"I can't believe how fast it worked for me... without rigid dieting or complicated exercises, I started to lose inches and pounds in the first 3 days."

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1. It concentrates its slimming action on your fatty areas; waist, hips, upper thighs — that give you an aging look. Because it works most of your muscles gracefully—not body part by body part—the Plan stimulates faster slimming action, to help you start fashioning a more youthful looking figure in 14 days.
 2. Simple to use. No disrobing. Attach is 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 TV.
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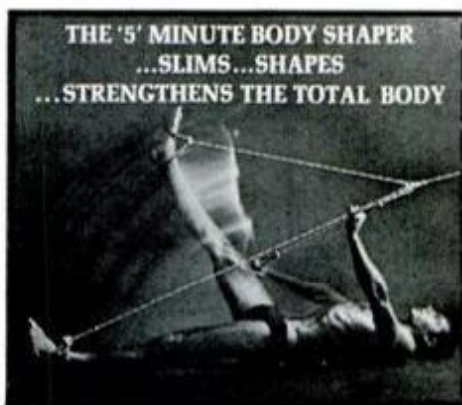
Here's a sampling of what the customers who have shaped up on our Plan tell us happened to them: "I lost 25 pounds, 5 1/4 inches off my waist in 14 days," G. C. "Lost 32 pounds, 6 3/8 inches off my waist in 21 days," M. F. "I lost 7 pounds and 5 1/4 inches off my waistline in 9 days," L. S.

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Hi-lo bandsaw drive

by R.S. Hedin

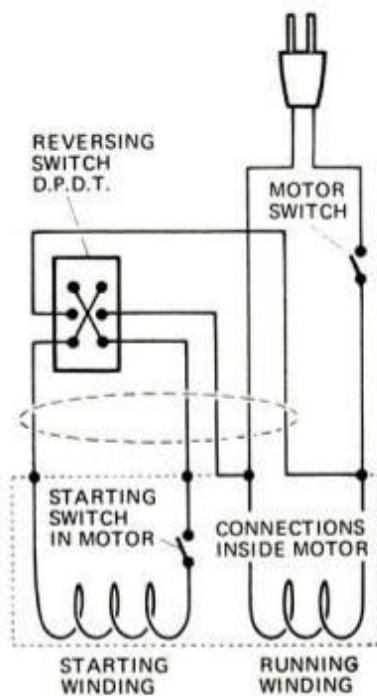
To cut metal on a wood-cutting bandsaw, you not only change to a metal-cutting blade, but you must slow down the machine by switching from a large to a small pulley on the motor.

I made this speed reducer for next to nothing from odds and ends I found in my junk box. Blade speed is normally reduced to a 38-to-1 ratio by a series of pulleys belted to one another. But with my compact high-low drive, pulley A drives pulley C by friction, gear style. Here a wood disc with a V-belt "tire" is mounted on a pivoting arm fitted with a screen-door spring. The spring keeps the tire in the V-groove of pulley A to provide a nonslip friction drive. To saw wood, the 12-in. bandsaw pulley is belted to motor pulley B to provide a 9-to-1 ratio. To saw metal, the bandsaw pulley is belted to a 2½-in. pulley attached to the face of the wood disc.

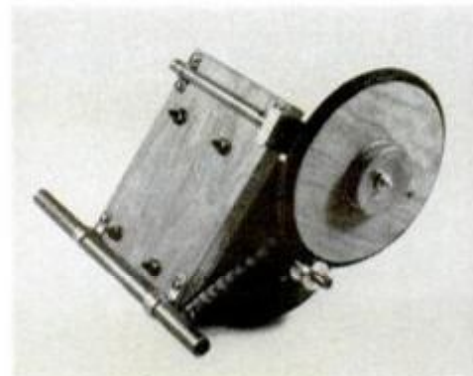
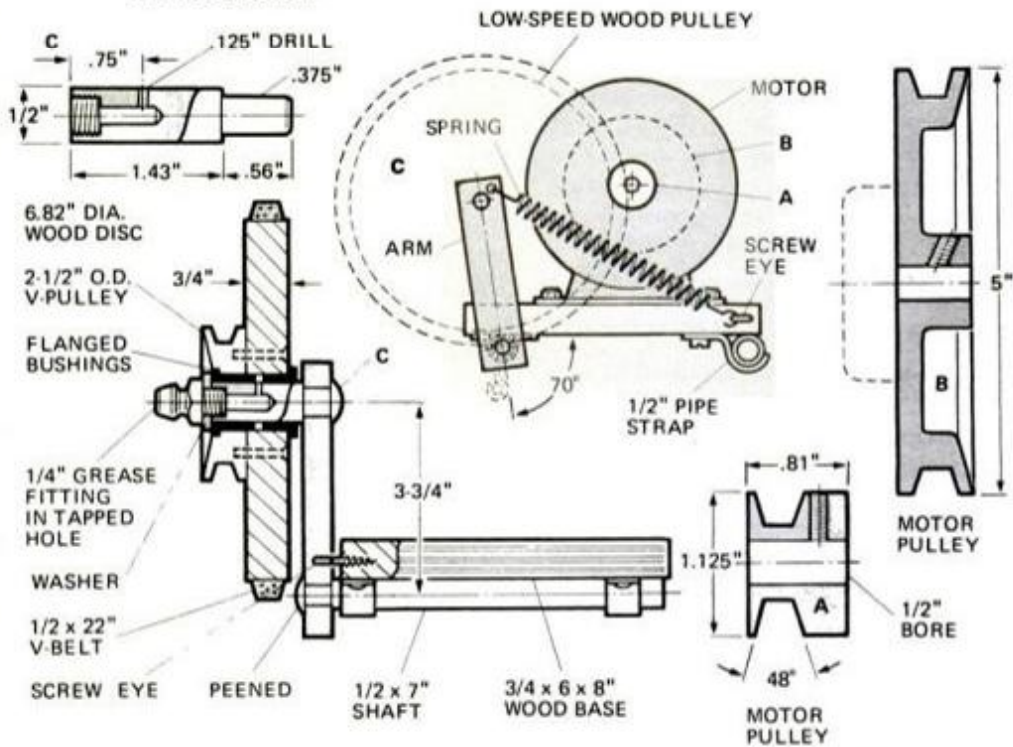
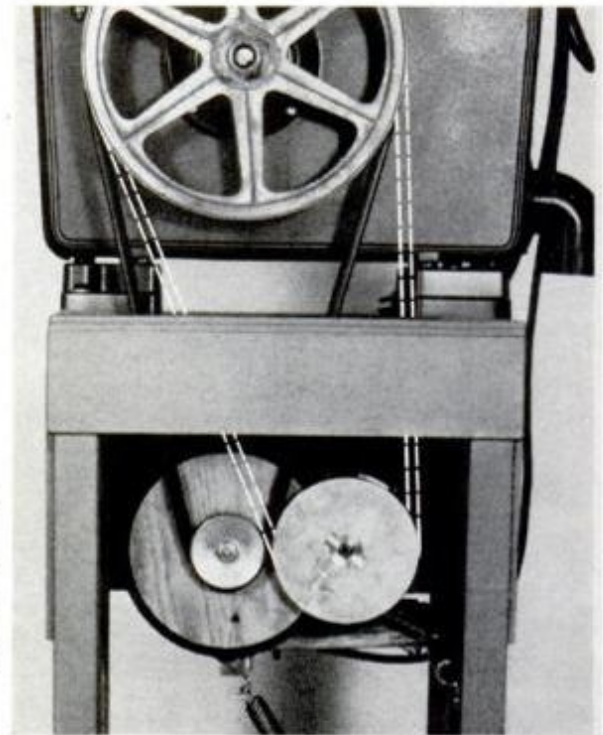
The V-belt tire must be mounted tightly on the wooden disc. Make the disc larger than final size, and gradually reduce its diameter until the belt can be stretched over the edge with a couple of screwdrivers. Smear some model airplane cement on the disc just before adding the belt.

The 5-in. motor pulley is belted to the saw pulley for the high-speed drive. In this position, a 60-in. belt is used. In the low-speed position, a 54-in. belt is used. Since the direction of rotation is reversed by the friction drive, the motor direction must be reversed to rotate the saw blade in the right direction. The wiring diagram shows how this is done. The reversing switch is located on the front side of the saw and the switch positions labeled HI and LO. In the lowspeed position, extra load is needed to tighten the 54-in. belt, either by using a spring hooked to the ½ x 1 x 5-in. arm or a weight hung from the drive base. Apply belt dressing to the sides of the running belt to gain extra friction and prevent slippage.

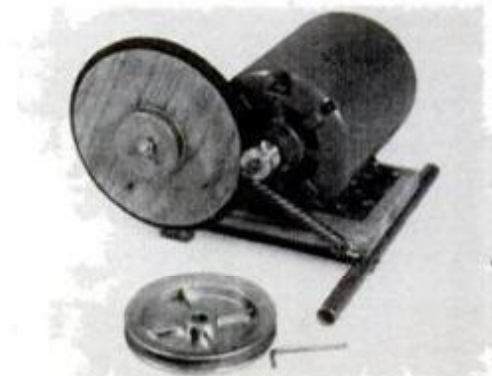
To saw steel, use a hardened blade. I found a ¼-in.-wide blade with 14 teeth to the inch to be a good general-purpose blade. You can have one made to the proper length by a machine-shop supply house. ★ ★ ★



WIRING DIAGRAM



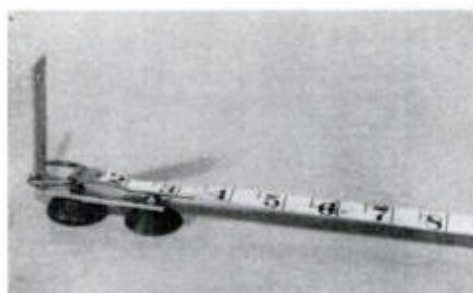
Platform hangs and swings on a conduit shaft that rests in pipe straps on saw.



Small pulley behind the large pulley on the motor drives wood disc gear fashion.

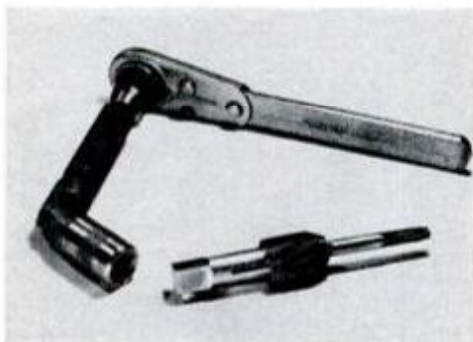
HINTS

FROM READERS



Measuring-tape anchor

Holding the end of a measuring tape securely where needed is easy with a clip that's made with two small suction cups attached to a 3-in. corner brace.—*Ken Patterson, Regina, Sask.*



Using tap wrench with socket set

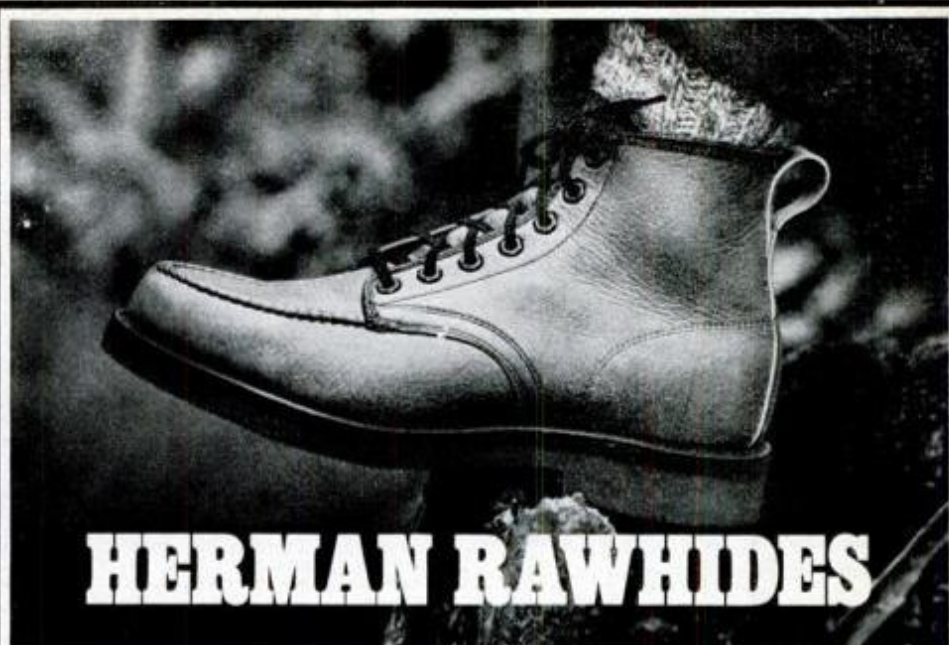
A useful modification of a T-handle tap wrench is to file or grind its shank to $\frac{3}{8}$ or $\frac{1}{2}$ in. square. With a female-to-female adapter, the wrench can be used with a socket set. In addition to taps, the wrench's chuck will also hold auger bits to permit boring in otherwise inaccessible places.—*Mike McMullen, Santa Margarita, Calif.*



Ring makes shade pull

When the pull cord breaks on a window shade, a 1-in. loose-leaf ring makes a good durable substitute for a finger pull.

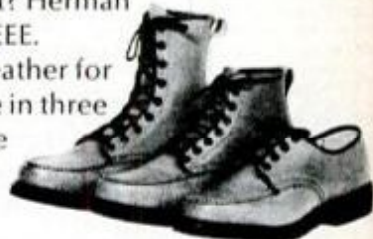
—*Grace B. Weinstein, Los Angeles*



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Tests by doctors on patients showed

while it gently relieved such pain, it also helped reduce swelling of these tissues.

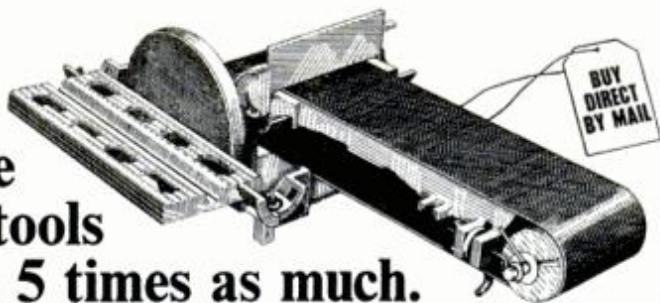
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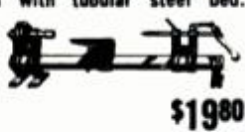
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(Continued from page 97)

ratio"—is an advantage over many earlier jet drives lacking such sophisticated control.

Still, even with this innovation, there's a special knack to operating a jet at low speeds. The trick is to use the engine rather than the wheel to turn the boat. Instead of heading into a turn under power, you first turn the wheel in the direction you want to go, then tap the accelerator for a quick burst of power. This kicks the stern around in the desired direction without forcing you to maintain a high speed for headway. It *does* take some "getting used to," but it works—I know; I learned the hard way.

Anxious to try some speed runs, I cleared the outer harbor marker and headed for open water only to find there was a nasty chop and a gusty crosswind. To top it off, the water was crisscrossed with rolling wakes from a steady parade of plush pleasure cruisers streaming in and out of the harbor—not the most ideal condition for speed-testing a small boat under full power. This could be rough.

I eased down on the accelerator—cautiously this time. The boat churned ahead, but seemed to be riding a bit too bow-high and dragging. Here's where I discovered the joys of Power Trim—an accessory found on many larger prop drives and standard equipment on this jet as well. It's a remotely controlled, electro-mechanical system that lets you adjust the angle of thrust for maximum efficiency under varying speed and water conditions. A handy dial on the panel gives you a visual indication of the angle of tilt at all times so you can see the setting at a glance. I pressed a rocker switch and instantly the nose came down, the hull leveled out and the acceleration rate increased astonishingly. The speedometer needle soared quickly past 30 . . . 40 . . . 50 . . . 60 . . . 65 . . . and was still climbing with my foot only partway down.

Skimming over white-frothed wave caps at 70 mph is like nothing you can imagine unless you've tried it—it's an experience all by itself. The water rushes past you at an incredible rate. Objects that appear distant one second are on top of you the next. The sensation of speed is completely different from that on land; 70 mph on water is both terrifying and exhilarating. Most of the time, you're semi-airborne—more out of the water than in—tail-riding on only a few inches of wetted stern area. It's not for the faint of heart, but it's fun.

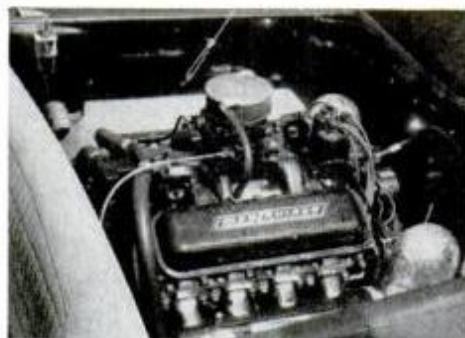
Handling rough water was not



Turns are smooth and skid-free. Hull is 17½-foot Avenger 185, a sweet performer.



Partially visible under steering wheel is unusual foot accelerator, freeing hands.



Those 375 horses give jet a mighty kick. Big 454-cu.-in. V8 winds up to 5000 rpm.

nearly so hard as I had expected once you overcome the natural instinct to slow down at every approaching wave. This merely drops your bow over the top of the wave, slamming you down hard into the following trough. I found I could maintain speed and skip from wave crest to wave crest, avoiding the hollows. The ride was bouncy but beautiful—almost like flying, which it almost is.

I boo-booed only once. Approaching a particularly menacing roller, I chickened out and cut the throttle. The bow dropped and the boat plowed smack into a brick wall of water instead of climbing over it. For a moment, I was glad Mercury officials had insisted I fasten my life jacket. But except for a thorough soaking—

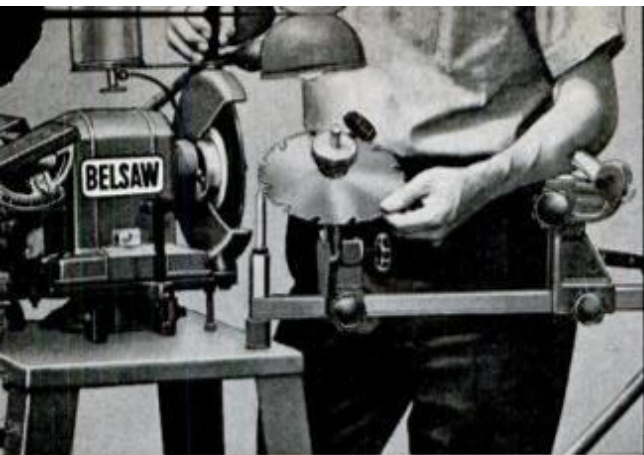
which dampened my pride more than me—there was no real danger or damage. I learned my lesson then about the importance of power in fighting some waves. If you don't roll over them, they'll roll over you.

High-speed turns were smooth, skid-free and easily controllable—and with a jet there's no worrying about an over-revving prop should you accidentally break the stern out of the water in a tight bank. I deliberately tried some really sharp cuts to see if there was any tendency to nose in or spin out. There wasn't—though, as with any fast boat, you have to be careful.

The Avenger, though somewhat small for this much power, proved rugged and seaworthy. And I take back all the doubts I had about that floor-mounted accelerator—it's a dream. Heavily weighted and well balanced, it was both stable and responsive. I had no trouble maintaining steady foot pressure even over teeth-jarring wave jumps. For me the foot throttle had several advantages over the conventional hand control. It not only more closely approximates the familiar, comfortable feel of auto driving, but—most importantly—it frees your hands for gripping the wheel—a welcome safety feature at mile-a-minute speeds.

I also discovered another pleasant surprise about the jet—it's a speedboat with power brakes. Because there's no geared transmission in the drive, it's possible to shift directly from forward into reverse—something you can't do on a prop job. As you pull back on the shift lever, a curved reversing gate drops down over the jet port, deflecting the water stream around the sides of the boat to the front. The result is like hitting the brakes in a panic car stop. At speed, it's actually possible to come to a complete halt in a boat length or two. While I don't recommend it as common practice (the effect is a bit unnerving), it's comforting to know you can do it if you have to. In normal use, the direct forward-to-reverse makes docking and other maneuvering in close quarters a breeze.

The MerCruiser Jet 400 is designed for use in jet-type hulls from 16 to 22 feet. Mercury doesn't plan to sell it by itself, but will offer it to boat makers for original-equipment installation. For this reason, price will vary from hull to hull and make to make. It won't be cheap—that's for sure. But for those who like their boating wild and hairy, yet smooth and reliable, the jet offers a tempting choice. It won me over in one ride—a ride I'll not soon forget. ★ ★ ★



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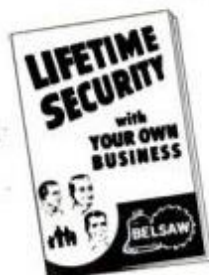
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KITS & PLANS

ZIPPING THROUGH CHECKOUTS

(Continued from page 101)

a General Foods vice-president who was a committee member. "We also decided that the symbol selected must be freely available so that equipment manufacturers, printers and others would be free to use it. In addition, it was our goal that the system and symbol should be compatible with other present or proposed codes."

The Universal Product Code is compatible with the Drug and Health Related products code of the Food and Drug Administration but not with a code that the National Retail Merchants Assn. wants if it can work out a standard merchandise ticket for department store items. In the meantime, Hanes Knitwear and L'Eggs have obtained UPC numbers for their supermarket-sold panty hose. Several magazines sold in supermarkets will have the code symbol on their covers. The smallest items

Equipment makers think the next step may be supermarket shopping without paying cash or writing a check.

coded so far are packages of Wrigley's chewing gum. There is a number for each flavor.

Many manufacturers are using their product numbers and code symbols on order blanks and shipping containers. Willard Bishop, the Super Market Institute researcher, believes that the development of the code has set a pattern for solving other grocery problems. "Similar opportunities," he says, "exist in standardization of shipping containers, railroad transportation and cooperative warehousing."

Equipment makers, especially NCR, Singer and Bunker Ramo, think the next step may be supermarket shopping without paying cash or writing a check. The usual credit cards are out because supermarket profit margins are so thin, but technology exists for the checkout clerk to shift the amount of your purchase electronically from your bank account to that of the store.

Two Hinky Dinky stores and the First Federal Savings and Loan Assn. are working toward this in Lincoln, Neb. "A customer," says John Dean, executive vice-president of the association, "will be able to go to the checkout, hand the clerk his paycheck, make his mortgage payment, pay his utility bill, pay for his groceries, put some money in his savings account and get some change." ★★★

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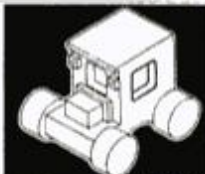
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SOLAR FURNACE FOR YOUR HOME

(Continued from page 105)

Furnace Handbook. Address queries to International Solarthermics Corp., Box 397, Nederland, Colo. 80466. The company will also help readers locate nearby dealers.

Two limitations of the system that Keyes readily acknowledges are its need for a clear, unobstructed southern exposure and the fact that its efficiency is based strongly on good home insulation. Keyes recommends at least 14 inches of insulation in the attic as well as conventional sidewall insulation, plus either storm sash or double-glazed windows. This means some homes may have to have added insulation in order to get maximum usefulness from the furnace. Its need for a sunny exposure also rules out its use in most urban areas where lots are small and tall surrounding buildings would block out the sun.

More solar-heat developments

Meanwhile, back at the drawing board, other solar-heating developments are proceeding down many paths. PPG Industries' solar-roof collector cells have gone directly from the laboratory to a 2700-square-foot, four-bedroom test house in Columbus, Ohio. If the collector cells prove out as expected, they will be offered as components for solar home-heating systems, and for supplementing a family's water-heating needs.

The University of Minnesota's School of Architecture has purchased an old hard-to-heat three-story frame home in St. Paul. The entire rear (south side) of the house has been glazed with solar collectors; the front is conventional—by way of proving old houses can use new tricks and not look out of place in the neighborhood.

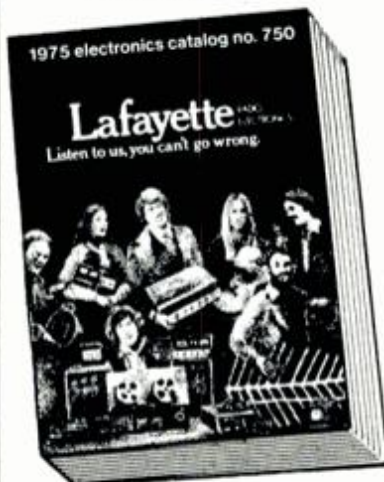
The University of Florida is getting test results from a typical stucco house in Gainesville, the roof of which is covered with solar collectors. The University of Delaware's solar house—possibly the most ambitious research program now under way—works on a completely different principle. It uses roof-mounted cadmium sulfide solar cells to convert sunpower directly into electrical power.

On a larger scale, Connecticut has announced plans, with federal backing, for a 20-unit residential housing development to be partially solar-heated near New Haven—first multi-family experiment of its kind.

But while solar research has been getting closer to home, the hard-pressed homeowner hasn't been able to get any heat out of it. Now the back-yard furnace promises at least a good start. ★★★

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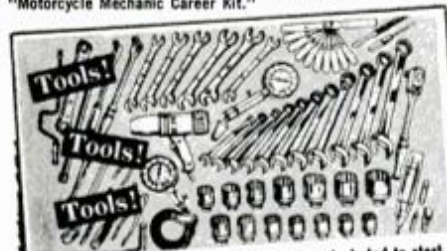
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DRIVING AMC'S NEW PACER

(Continued from page 106)

that case the Pacer would seat six.

For the moment, the Pacer uses AMC's proven overhead-valve in-line Six, either the 232 or 258-cu.-in. version. This engine delivers enough oomph to handle power steering (which the car needs due to the heavy block) and airconditioning. The Pacer offers manual and automatic transmissions plus the optional Laycock (British) overdrive. This o.d., by the way, engages only in high gear—a surprise to me, being used to the Warner o.d. which gives you the o.d. option in all forward gears. I'd like the Laycock to come with o.d. in all gears, too, so you could select any one of six forward gears to suit the driving situation precisely.

Driving the Pacer isn't anything like driving most small cars. Performance feels strong—certainly on a par with most V8s.

There's very little noise at speed, especially with the windows rolled up. Ride feels smooth, not choppy as in so many short-wheelbase cars. Rack-and-pinion steering, built by GM's Saginaw Div. and used with and without power, gives handling a feeling of precision. The car sticks well in turns, with hard cornering generally solid and predictable. The Pacer's tight turning radius makes parking easy, and my only complaint in this department is the size of the steering wheel—it's too big.

The flow-through fresh air system works pretty well. For those who hanker for a return to front quarter panes, they're available, albeit optionally. And the Pacer has more glass area than any American car on the road—a full 5615 square inches (as against 4145 in the 1975 Imperial). All that glass gives great visibility and no distortion! Careful tinting keeps the interior from baking on hot days.

AMC's Buyer Protection Plan applies to the Pacer. The car comes in 10 two-tone paint combinations and 15 solid colors. For those who would jazz up the Pacer, AMC's luxurious D/L decor group is available; also its sporty X package.

While the Pacer isn't being touted as a rival to either the Mustang II nor GM's sporty compacts (Monza, Skyhawk/Starfire), I think it definitely fits into that category. With its very modern styling, ample power, and generous interior, I personally feel it's more car than the others. Most likely, AMC will make a small V8 available in the Pacer before too long (as in the Gremlin), and that'll make it a very hard car to beat in any way.

★★★

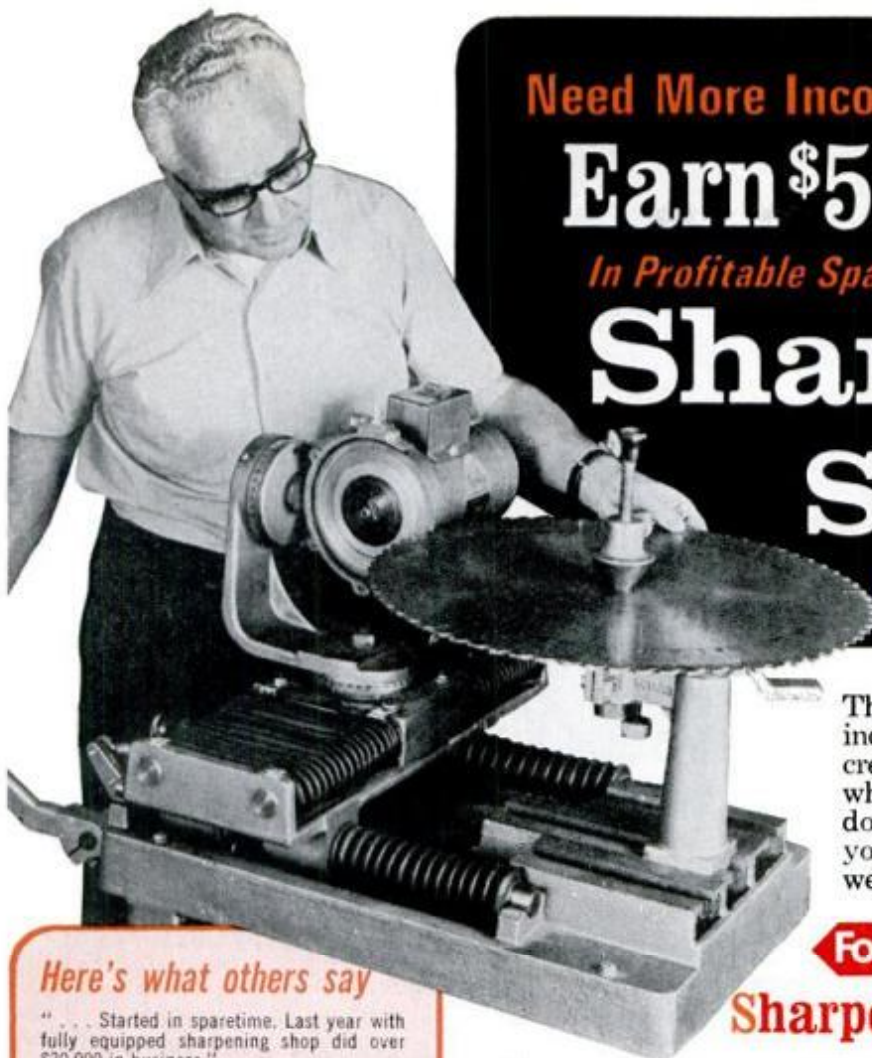
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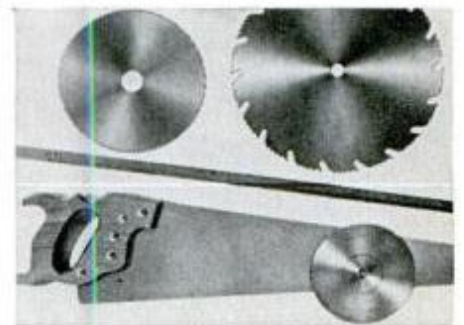
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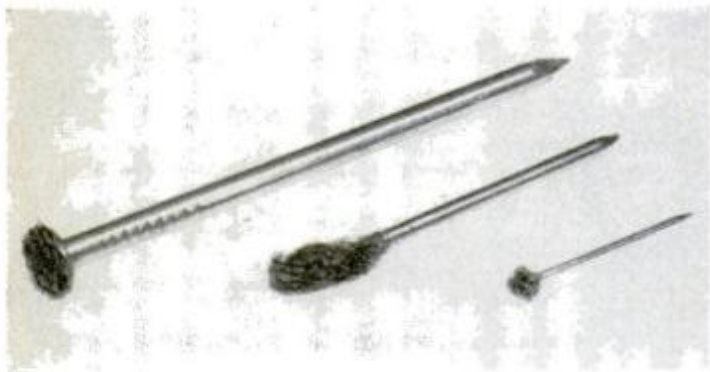
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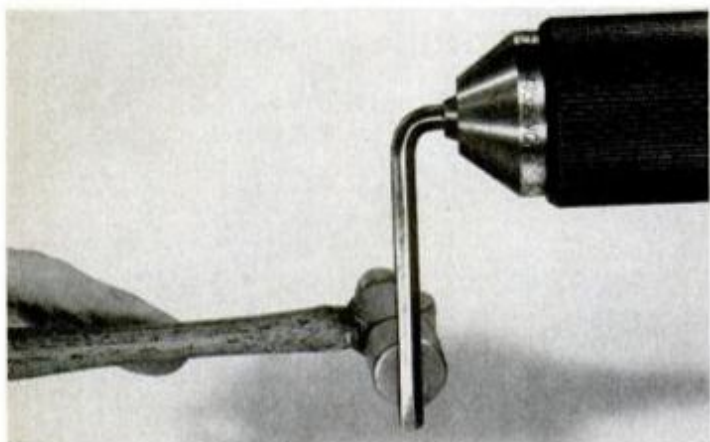
Swabs made from steel wool and nails

Next time you mix a batch of epoxy, use what's left over to attach steel wool to nails of varied sizes. You'll have metal swabs for tight spots on tools and sporting equipment.—*Donald MacChesney, Hudson, Mass.*



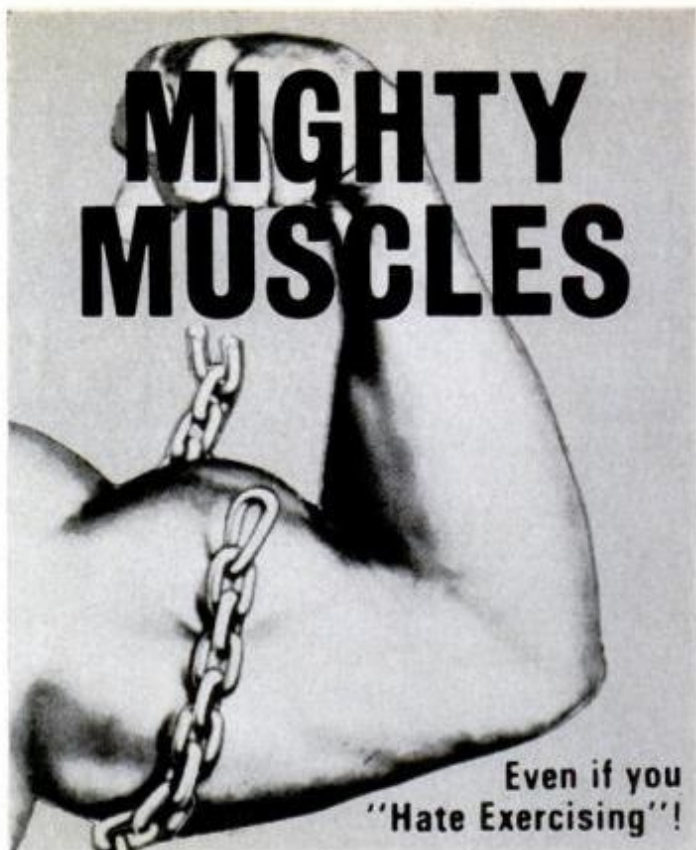
Discarded plugs make drawer pulls

For maximum convenience, even parts drawers in the shop should have pulls. They cost virtually nothing if they're old electrical plugs with prongs removed. The type shown works best. A bolt through the wire hole secures plug to drawer front.—*Harry Radzinsky, Charlotte, N.C.*



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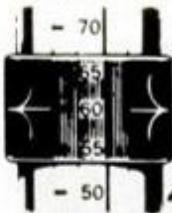
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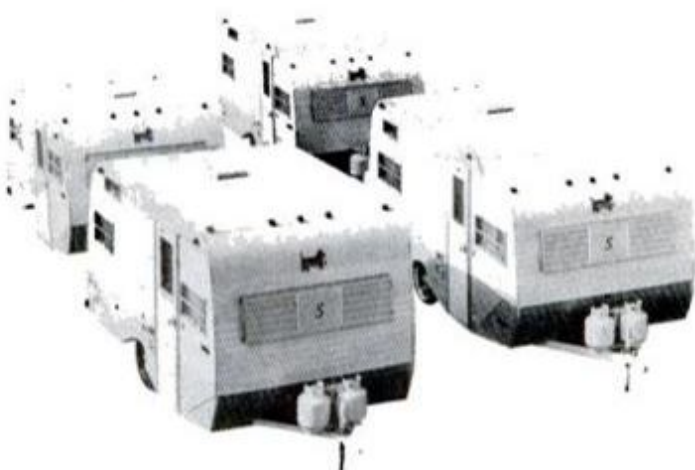
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(Continued from page 71)

ed as wide and as high as possible. Dobbin got high marks for reliability throughout the trip. There was only one power failure, a result of the coil bracket coming unstuck. A quick weld easily fixed that.

A second problem was no fault of the machine's. After topping a Minnesota hill, I discovered I could not close the throttle. No amount of force on the handlebar grip would slow me down. I had visions of the throttle butterfly having worked loose from its shaft, and the mounting screws being sucked into the engine. Since I was miles from a Harley dealer, I began to sweat. But I found the butterfly firmly in place. The only thing out of whack was the idle adjustment screw—it was set for a 60-mph "idle"!

But how did that happen? I had covered 7000 miles without trouble. Why should the screw now move more than three turns out of adjustment? How was it overcoming the tension of its holding spring?

Still puzzled, I adjusted the idle to normal and took off. But the screw went out of adjustment three times in the next 30 miles.

Then came a glimmer of light. Earlier that day I had stopped for an oil change, and I had remarked that my throttle seemed to be getting harder to work. The mechanic squirted oil on the lower end of the throttle control cable and hit everything else in the vicinity, including the idle screw.

It was the combination of lubrication and vibration that allowed the screw to move. After I removed the oil from the threads, the problem vanished. Moral: Never apply oil to any device that relies on friction to function.

The most exciting incident of the trip occurred near Walla Walla, in Washington's dry wheatlands. I spotted a grass fire, which I attempted to stomp out. But the fire spread too fast for me.

In my haste to escape, I lost my balance in attempting to climb a steep bank of loose gravel. The bike landed on its side—and soon gasoline began trickling from the filler cap, in the fire's path.

I couldn't right the 700-pound machine. So I swallowed my pride and flagged the first passing car. Luckily, its driver was willing and husky. In fact, most people are friendly and helpful. I think you'll find that to be true if you get the chance to see the country from the seat of a trusty bike. ★★

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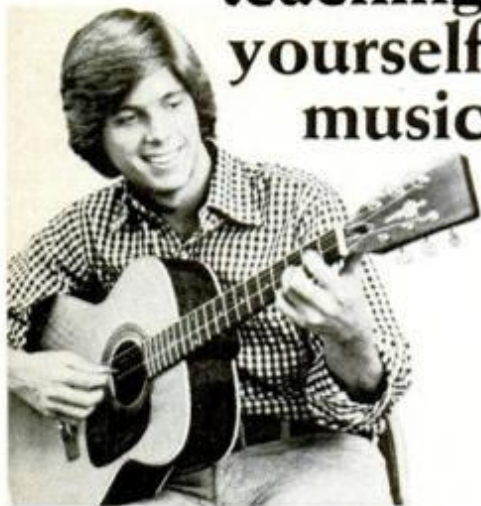
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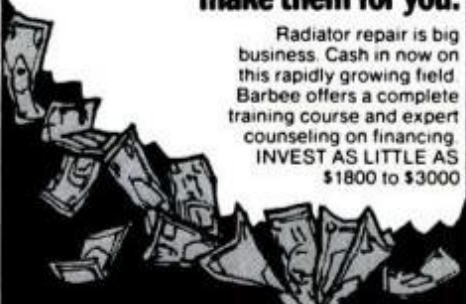


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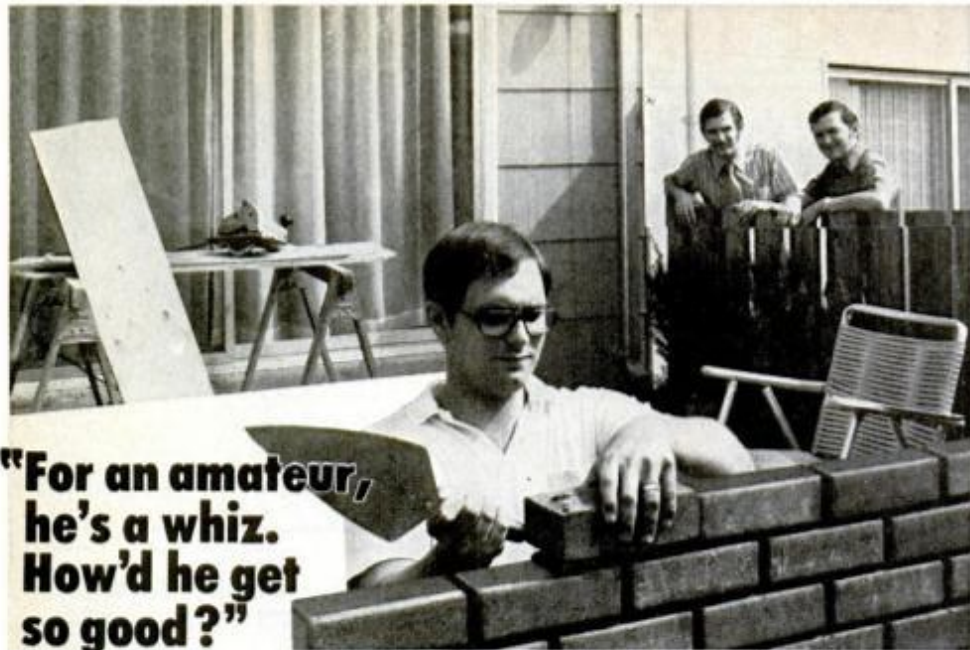
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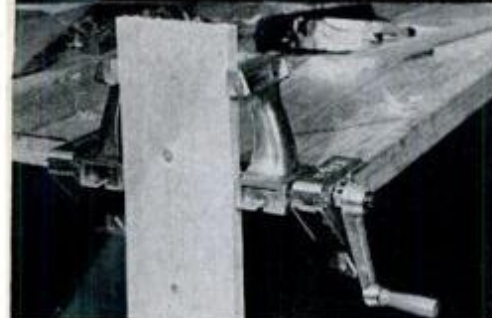
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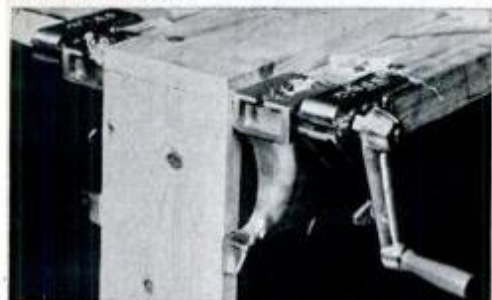
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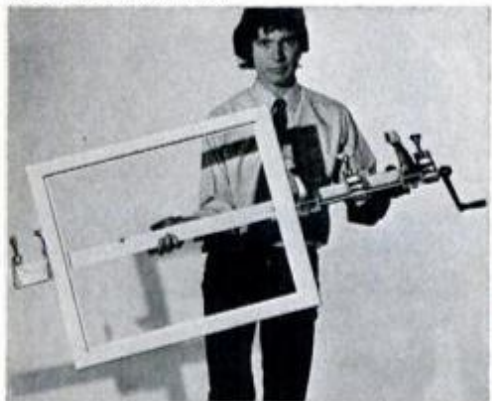
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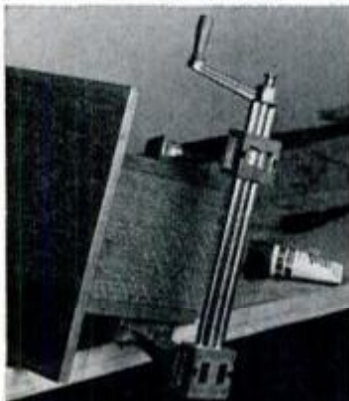
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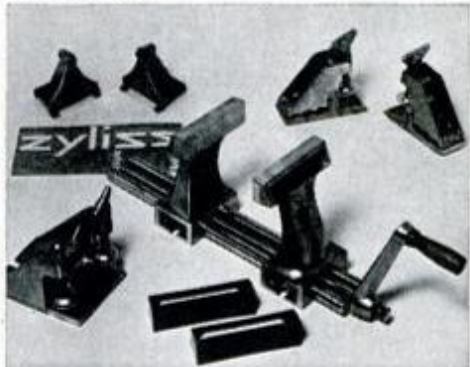


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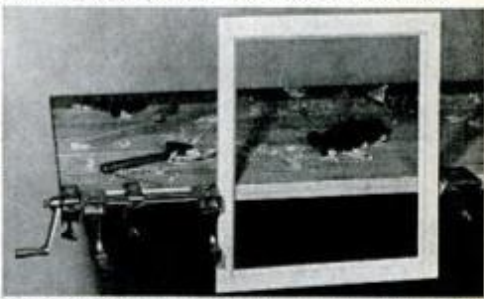
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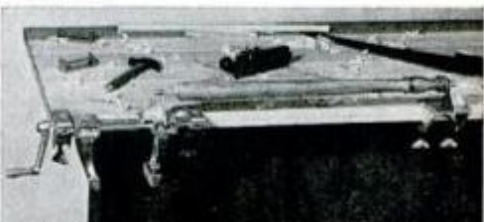
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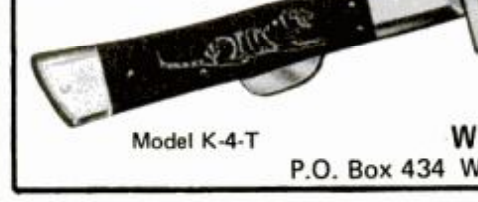
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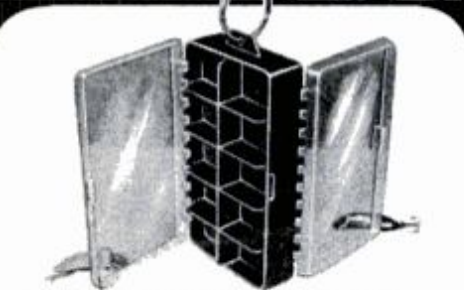
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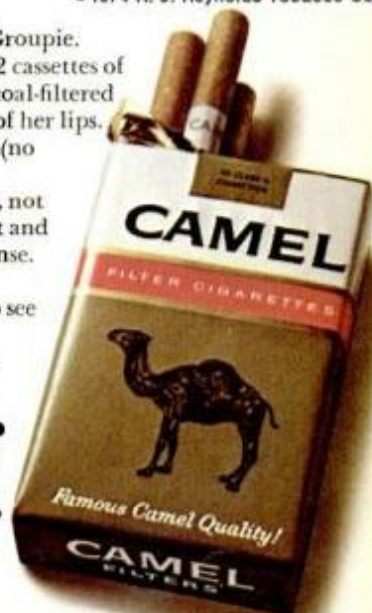
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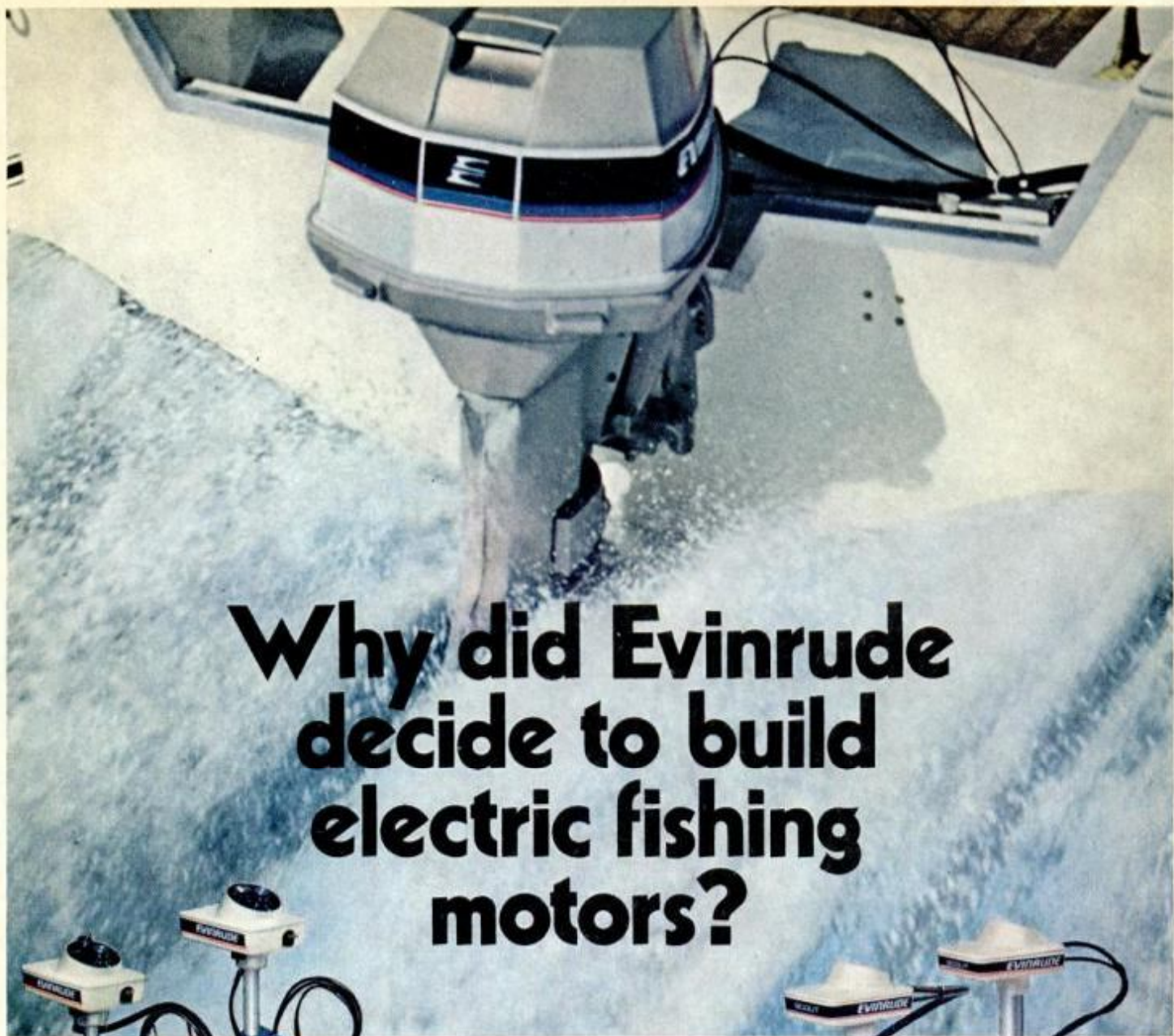
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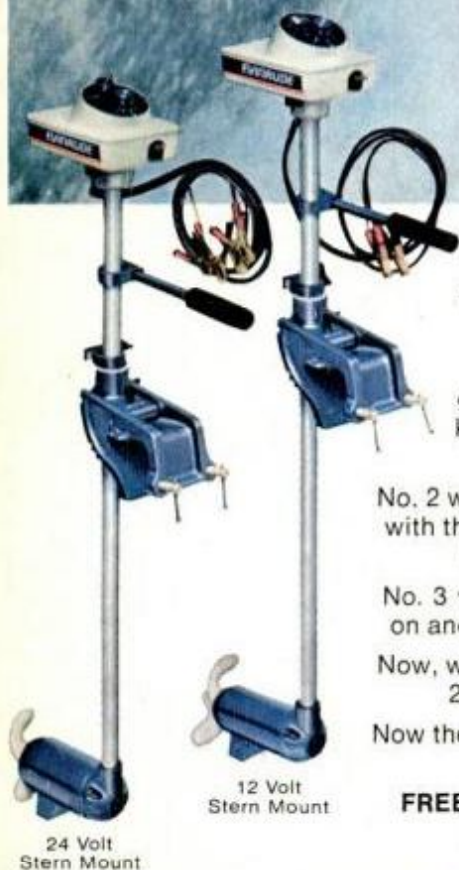
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