

Popular Mechanics

75 CARS:

**DETROIT
BOUNCES
BACK** Page 101

**HEAT-SAVING
IDEAS:** Starts page 142

How your
fireplace
can heat your
whole house

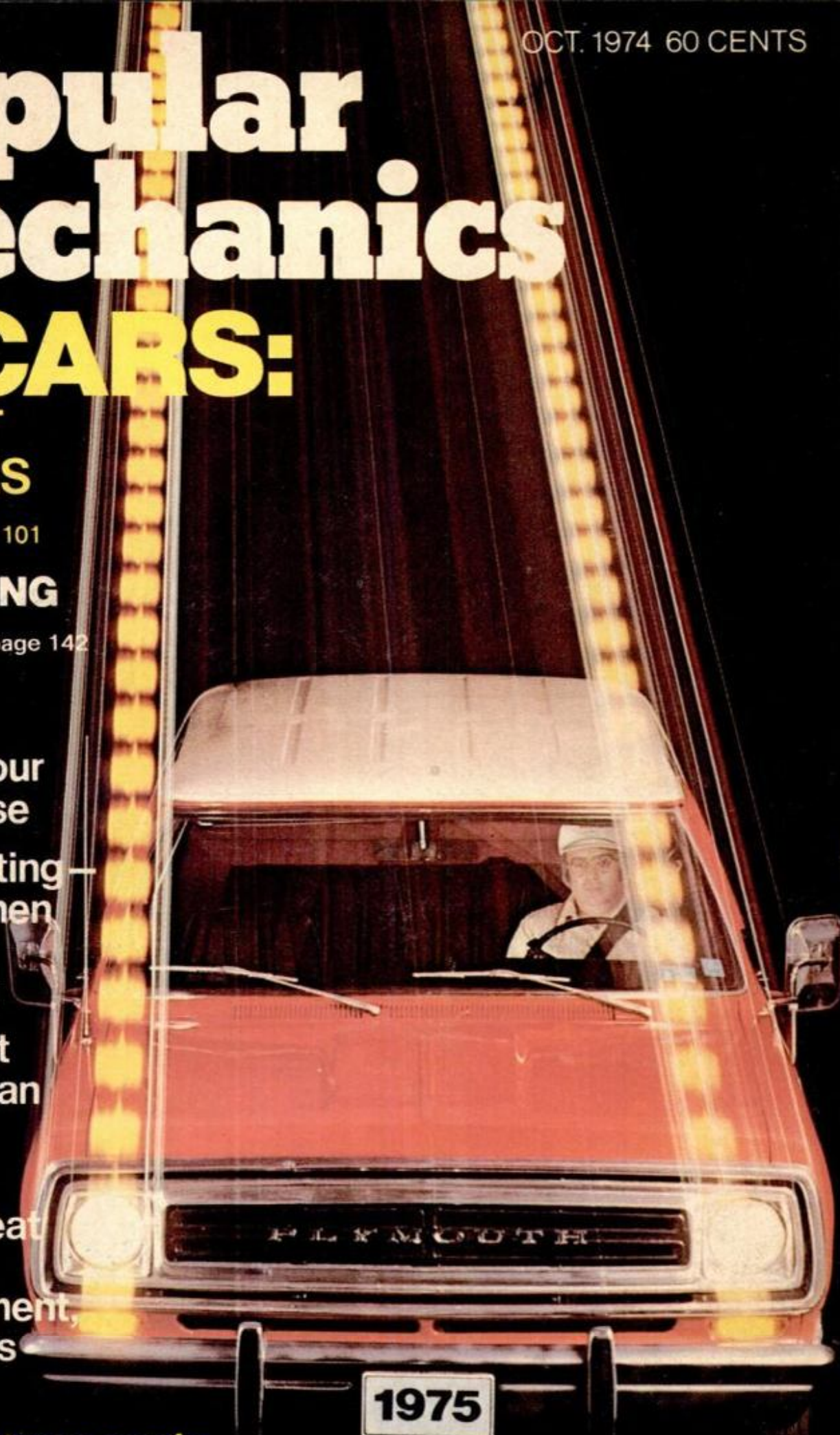
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you need it

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timer you can
make

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chimney heat
can warm
your basement,
cut fuel bills

**Start now:
Make Christmas cards
from your photos**

Page 80



1975

Trail Dusters and Ramchargers
with two-wheel drive
for the highway

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**Walt Garrison,
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A pinch is all it takes.**



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- 44** Imports and Motorsports
- 58** Detroit Listening Post
- 114** Kalamazoo isn't far from Detroit, but Checker is
- 116** Saturday Mechanic: How to prepare for winter

DETROIT '75: CARMAKERS' TURNAROUND YEAR

- 101, 106** Chrysler Corp.—Let 'em push buttons!
- 102, 108** General Motors Corp.—The end of 'bigger is better'
- 104, 110** Ford and Lincoln-Mercury—In search of the sensible car
- 105** American Motors Corp.—AMC polishes its petrol pinchers
- 112** Specifications and comparisons for all 1975 domestic model cars

HOME AND YARD

- 92** Your own fire engine—ready to roll anytime
- 142** Heat-saving ideas
 - 142** Zoned heating: Balanced comfort throughout your home
 - 148** Save fuel with this thermostat timer
 - 149** Three stunts to get more of the heat that's there
 - 150** How to keep your heating system efficient
 - 152** How to get more of the heat you're paying for
 - 154** Fireplace furnace: Heating your house instead of your chimney
- 158** How to build a hood for an oven over range
- 162** This once was a garage; now it's a guest house

SHOP AND CRAFTS

- 54, 70D, 70L, 160, 194** Hints from readers
- 70F** Rollaway 'workshop' for router and drill stand
- 77** Build this charming colonial trestle desk
- 157** A rip fence for your bandsaw

BOATING, OUTDOORS

- 48** Big fish from small boats
- 96** Waterway preview: Motors/boats for '75
- 138** Handloading: cheaper and better

SCIENCE, INVENTIONS

- 84** The bean that's making meat obsolete
- 130** How science plans to tap sun power from the sea
- 136** Ways to go that you've never seen before

PHOTOGRAPHY

- 14** Photo hints
- 80** Greeting cards from your own photos

ELECTRONICS, RADIO, TV

- 88** New in hi-fi
- 95** Feature-packed Akai is three tape decks in one

AVIATION

- 134** Homebuilt plane: It's not much to look at, but it gets you up there

EVERY MONTH

- | | |
|----------------------------|-----------------------------|
| 8 Letters | 40 Science Worldwide |
| 20 Appliance Clinic | 64 All Outdoors |
| 24 Car Clinic | 68 Homeowners Clinic |
| 30 The Bicycle Shop | 120 It's new NOW |



Your own fire engine — ready to roll **92**

Homebuilt plane for \$800! ... **134**



Greeting cards from your own photos **80**



Preview of '75 motors/boats **96**

Worth writing for: See page 70J

ON THE COVER: Trail Dusters and Ramchargers for 1975 now have two-wheel drive as well as four-wheel drive. *Streak-exposure photography by Ben Rose*

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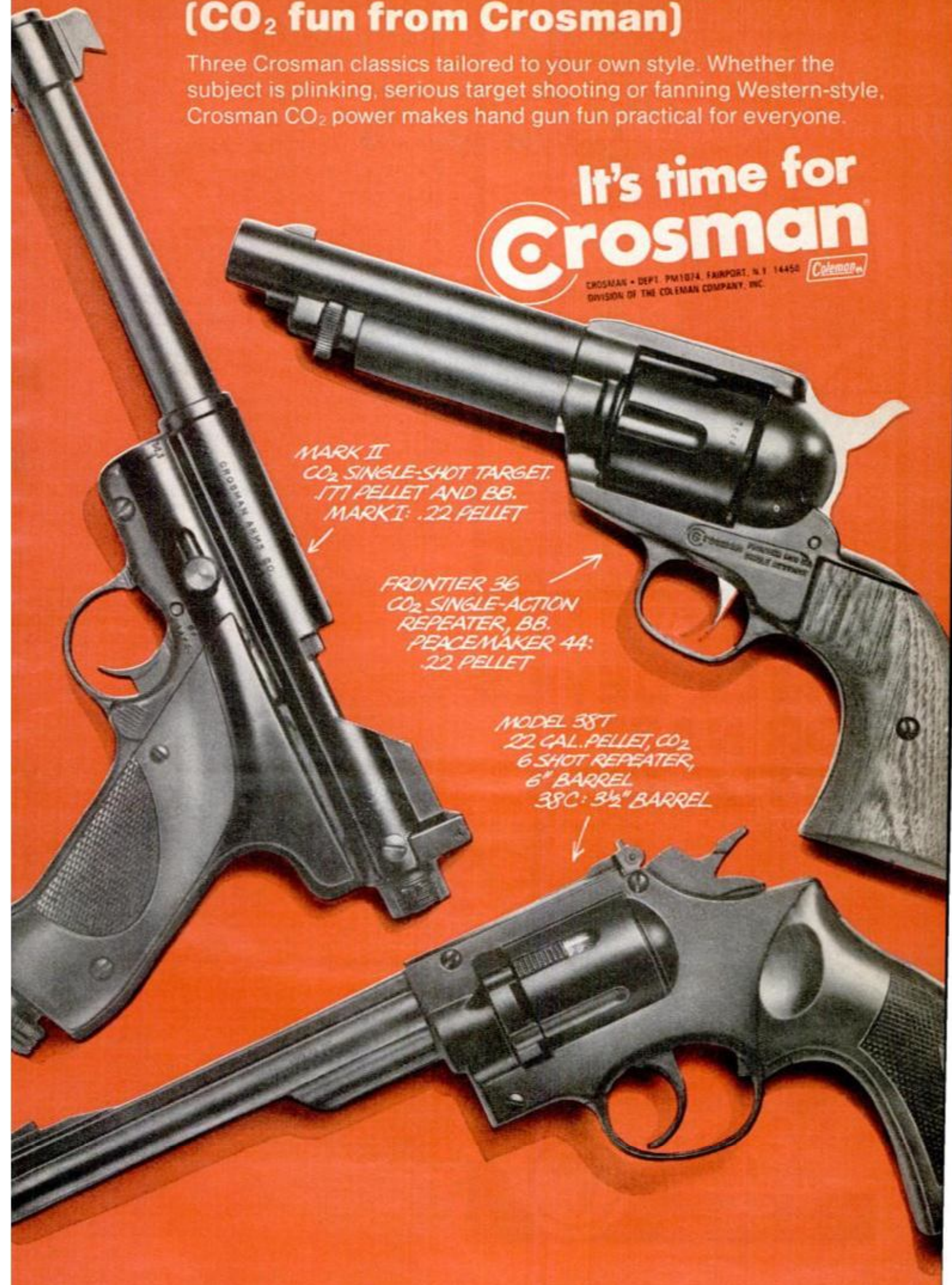
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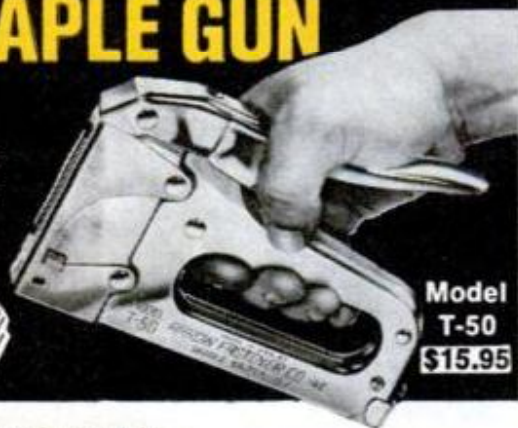
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LETTERS

TO THE EDITOR

Can you trust owners to be truthful?

I disagree with *Taking the Mystery Out of Miles Per Gallon* (page 100, July PM) when it states that the best way to establish mpg is to survey the owners. I don't think the owners are telling the truth. Naturally, if you're getting poor gas mileage, you have a tendency to stretch your mpg by a gallon or two. I should know because I own a Mazda and I'm embarrassed to tell people I get only 14 to 15 mpg.

Owners also have a tendency to check mileage on long nonstop trips; very seldom will an owner check mileage for city driving. Also I'm sure methods owners use to measure mpg are not always accurate.

MIAMI, FLA.

GLEN LUNDFIELD

Judging from the other things owners tell us about their new cars, we're quite sure they're telling the truth about mpg. We hear about all the troubles and shortcomings—often in fairly expletive-deleted-type language. There'd be no reason to hold back the true mileage figures; after all, it's mainly your brother-in-law or your neighbor you hate to tell about the lemon you bought. As for the accuracy of measuring techniques, it's quite possible they vary some from reader to reader, but we still think the Owners Report is the most practical way to get a country-wide assessment of how a particular model is doing.

We have owned a Mazda RX2 for almost two years. Early in our experience, we, too, were disappointed. My wife, who normally drives it, asked me to drive it for a while to see if I could get better results.

Having read up on the Mazda, I was intrigued with the statement that maximum economy was at 80 mph. This is quite contrary to piston-engine economy. I reasoned that the faster the rotors were going, the less gas was consumed—so I asked our local Mazda service manager if a Mazda should be driven differently, i.e. not shifted to the

(Please turn to page 10)

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LETTERS

(Continued from page 8)

next higher gear until rpm is above 4000. This is generally the opposite of the normal technique for piston cars. He said it should. I did for over a week, and I got better than 25 mpg. My wife is now following suit, and she is generally getting about 17 mpg for her normal use of the car—essentially short trips. The technique of keeping rpm above 3500 to 4000 regardless of road speed or traffic conditions seems to be paying off.
WINTER PARK, FLA. BRIG. GEN. C.D. LANG

More places to look for gold

In *Pan for Gold This Summer—Here's How and Where* (page 82, July PM) the author should have stressed that most placer gold deposits are found on bedrock. Digging down to bedrock can involve deep trenches. Novices should be warned about sides of trenches caving in and burying the digger. Old-timers selected places where the bedrock was closer to the surface to dig their trenches. In neglecting to name Montana,

he missed listing one of the big gold producers. Montana still produces a good tonnage of gold.

BUTTE, MONT.

AL HOOPER

Your article completely neglected the Yukon Territory of Canada. You mentioned the Forty-Mile River as a prospecting area; may I suggest that the only gold found in it was washed down from the Klondike area of the Yukon. You also failed to mention the north of British Columbia, especially the Atlin area. So as not to neglect the Whitehorse area, I've enclosed an article from the *Whitehorse Star* dated July 26, 1974. The pictures show a 20½-ounce nugget, which is thought to be the largest one found since the 1898 gold rush.

W. DOUGLAS SHERIDAN

WHITEHORSE, YUKON TERRITORY

In the nick of time

Thanks for the article *How to Keep Your Power Mower Purring* (page 78, July PM). It told me what the trouble was and how to fix it. My wife, however, requests that such

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an article be presented earlier in the year. Our lawn finally got mowed on the 30th of June for the first time, mainly because I said I would fix the mower as soon as the July issue arrived. It's a good thing you didn't wait another month or I really would have had problems.

BLAINE, WASH.

DONALD E. REDDICK

Your article did not discuss the problem I had. A friend suggested I check the magneto ground wire before removing the flywheel to check the magneto. It was loose, and when the problem was corrected, the mower worked fine.

The symptom of this problem is that the engine will start and then die out when you run over a bump. I scraped the wire and replaced it in its clip under the frame and behind the carburetor.

WHEATON, MD.

PATRICK H. MEADOWS

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DON SCHMOKER

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Not a tasty sight

I have been a reader of PM for at least 30 years and have been more and more disenchanted with your love affair with the environment-shattering RVs. However, your May cover story (*The 'Airplane' Beach House*, page 101) is in worst possible taste. You state: "Designed to have a minimum effect on the environment." That is the most ludicrous statement I've heard since the oilmen told us there was no danger of oil spills. Didn't you ever hear of visual en-

(Please turn to page 12)

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Send me your catalog and the name
of my nearest Herman dealer.

PM-BGL-4-10

LETTERS

(Continued from page 11)

vironment? Perhaps it could be camouflaged to look like the oil derricks or you could add plastic fronds to make it look like a palm tree.

SAN JOSE, CALIF.

R. D. HARMAN

Winter project

Here's a photo of a dollhouse I constructed last winter from plans in your December 1947 issue (*Christmas Dollhouse*, page



188). I made a few modifications, but the plans and instructions were very helpful. I have received many compliments on the project.

TERRE HAUTE, IND.

GILBERT S. CLUDER

RV homesteaders

Wow! What a brilliant idea, especially for those who have motor homes and want to settle down a few months, then pick up and travel (*RV Home Away From Home*, page 138, June PM).

Can I, who have no motor home, but I do have a piece of property in the Bahamas, get more information as to the cost of construction and materials used?

CORAM, N.Y.

EDWARD G. SKILLMAN

Our story is intended to be an idea-planter. Detailed plans should be drawn up for your site, in conformity with local building codes.

We enjoyed the article. We build a 28-foot luxury motor home for two, which is actually more spacious than most apartments. In addition, our 25-foot model has

become popular for vacationing families.

We would be pleased to assist anyone planning a cottage project or considering a motor home. We would like to contact others who have completed the "cottage" concept in an effort to organize a nonprofit newsletter. If your readers are interested, please have them contact me.

WESTAM CORP.

JOE D. KINGSLEY

BOX 15971

SECRETARY-TREASURER

SALT LAKE CITY, UTAH 84115

Where do you go for a black light?

I am very grateful for the kind of useful information in *Say Good-bye to Patio Bugs* (page 107, July PM). The author failed to tell what a black light is and where I can buy one for a bug trap.

KELSEYVILLE, CALIF.

NICHOLAS DEKISS

The ultraviolet or infrared light can usually be purchased at any well-stocked electrical store.

Hardest part: Finding the wheel

My father made this coffee table from plans in 'Glass-Top' Wagon-Wheel Table (page 182D, Feb. '71 PM). Dad made a few modifications, using a 30-inch wheel and cutting down the base. He also cut the Plexiglas



himself. He now has plans for matching end tables using smaller cart wheels. The most difficult part of the project was locating a suitable wheel, as actual construction time was minimal.

PLATTSBURGH, N.Y.

JOY A. DEMARSE

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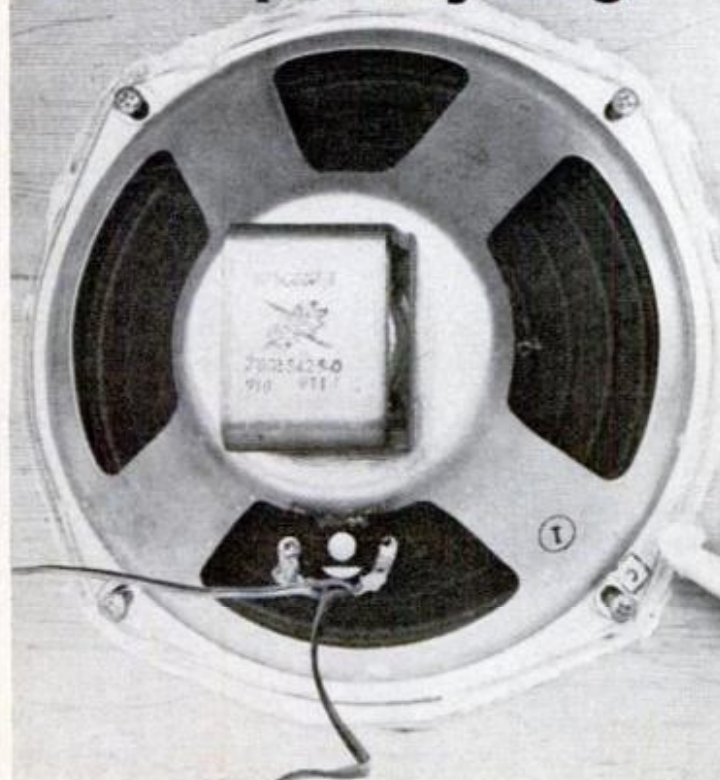


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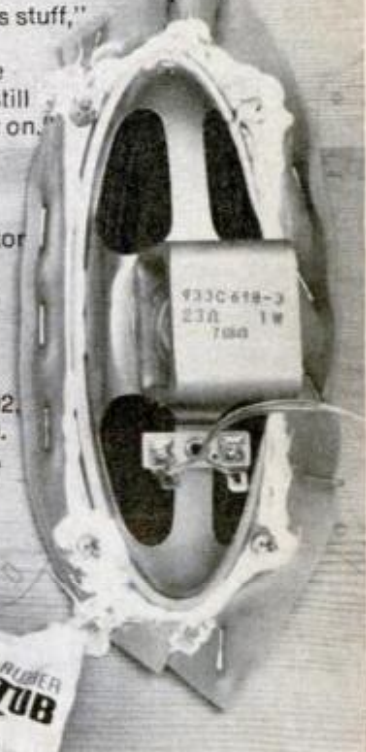


PHOTO HINTS

FROM READERS



How to detect—and fix a vignetting lens hood

Your lens hood should be matched as closely as possible to your lens's angle of view. Too wide a hood admits stray light that can cause flare (which, after all, is what you mount a lens hood to prevent); too narrow a hood darkens or "vignettes" the corners of your picture (an especially common problem with wide-angle lenses).

To check for vignetting, mount the hood, open your lens to its widest f-stop, lock the shutter open, and look through the lens from behind each corner of the film framing aperture in the back of the camera. Darkened areas in one or more corners indicate vignetting.

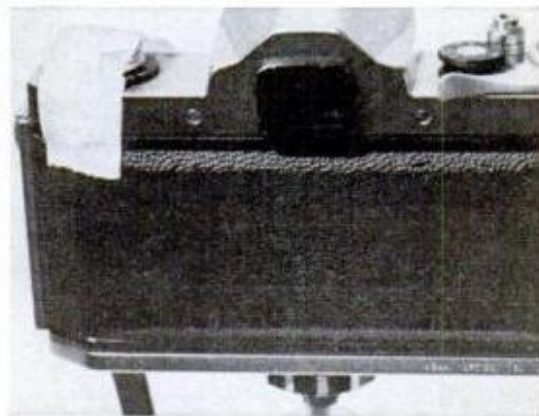
To cure it, hold a pencil against the hood's inner edge and move it back slowly until its sharp point disappears from view. Mark that spot, trim hood back to the mark with a hacksaw, then file smooth and repaint the edge black to prevent reflections.

—Roy H. Lauritzen, Salt Lake City

Tape helps make double exposures

Not all 35-mm cameras let you take deliberate double exposures; but those that do usually require that you hold down the rewind knob while winding the shutter for the second exposure. It helps if you draw up the slack film, then tape down the rewind knob *before* making the first exposure. Masking tape is fine for this purpose.

—Grace B. Weinstein, Los Angeles



Rubber sink stopper stops darkroom stains

A large, flat rubber sink stopper, like the one shown here, makes a good coaster to catch drops of developer that may run down the sides of your tank or beaker and stain your darkroom benchtop. (Regular coasters are far too small for this.) Look for a stopper with a flat top, as many have central humps which you must otherwise cut off.

—Ken Patterson, Regina, Sask.



Tape holds photo notebook handy

Keep a notebook for recording exposures, filters, locations and other picture-taking information handy by taping it to the top of your gadget bag. The notebook is always easy to find, and the bag's top makes a good, portable writing desk. When in a hurry, you can take notes without even taking the bag from your shoulder.

—Gary Cosand, San Bernardino, Cal.



Auto doorguard cushions neckstrap

The short, plastic strips sold in auto-supply stores as door-edge guards make good cushions for your camera neckstrap. Just insert the strap into the doorguard as shown, making sure the doorguard is centered on the strap and that the guard's cut area faces away from your neck. It will rest securely in position. Since the guards come in pairs, you'll have one for a friend, too, or for another camera.

—Grace B. Weinstein, Los Angeles

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APPLIANCE CLINIC

BY PAUL MANN

Dishwasher that sprays

Our Kitchenaid dishwasher has a problem. Normally, the machine's action is stopped by lifting the latch and lid, which interrupts the cycle. Action is resumed as soon as the lid is closed. But now the action continues until after I raise the lid about halfway. It gets quite messy. What can I do?—David Kates, New York

I won't tell you to change to bathing trunks before doing the dishes. I will tell you there is a rod that is activated when the lid is raised. This in turn activates a microswitch, which interrupts the cycle. The trouble is probably that the rod has slipped and is riding too high—it isn't activating the microswitch until the lid is in position to give you a shower. The rod is held by either a slip-spring nut or a bushing and setscrew. Find the rod (you will probably have to remove the back of the unit) and reset it.

Colder than cold

I have a strange problem with my General Electric refrigerator (model BJ 13S), purchased in 1959. This unit has a separate freezer drawer below the upper refrigerator compartment, with automatic defrost in the upper section only. Over the years, we have had a problem with liquids (milk in particular) turning to ice, and I also find ice on top of containers. The problem is prevalent during warm weather. The coils have been cleaned and the thermostat removed and recalibrated. Incidentally, I have always had to keep the unit on the warmest thermostat setting (1 or 2). A serviceman now tells me that the sealed unit should be replaced, because it isn't pulling the temperature down fast enough to shut the compressor off. What do you think?—I. Ludwin, Newton, Mass.

I think the man has a point. It appears the compressor has a malfunction that is resulting in low-capacity operation. This is keeping the compressor from reaching a temperature at which it is designed to shut

off. In warm weather, when the load on the compressor is greatest, the problem is magnified. Understand that although the compressor is keeping the temperature below freezing, the malfunction is keeping it from reaching its shutoff point—minus 5°F. for this model.

What can you do? There's a chance that foreign matter holding valve seats open is the root of the trouble. If this is the case, you can consider yourself lucky, because the solution is relatively inexpensive. Get a can of a formula called VI 64 from a GE parts counter. A special adapter is also needed; it is attached to a port on the compressor and the VI 64 is injected through it into the sealed system. If you aren't familiar with the procedure, leave the job to a professional.

If the VI 64 treatment fails to relieve the problem, the only remedy will be replacement of the compressor. This is expensive—it costs about \$150.

Flasher

The fluorescent lamp on our Frigidaire electric stove flashes intermittently when it's turned on. I've replaced the lamp and put in a new starter, but the problem continues. What do you think is wrong?—David Hotchkiss, Cedarburg, Wis.

Perhaps the contacts in the socket aren't making a good connection with the prongs of the lamp. The socket itself may be faulty or have a loose connection. You might also look for a loose wire in the lamp circuit.

Headache

I lent my Skil chain saw to a guy who returned it ruined. He probably didn't add oil to the gas. The piston and the sleeve in the cylinder head sell for \$48. Why can't I just buy a new sleeve insert and piston? Skil says that sleeves aren't made, but I figure if you tell me who makes the motor

(Please turn to page 22)

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And even quieter than before.

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APPLIANCE CLINIC

(Continued from page 20)

for the Skil chain saw, I could write that company.—John Deleske, Hudsonville, Mich.

It won't do you any good. The move that put Skil into the chain-saw business was the purchase of a Canada-based motor manufacturing company about five years ago. In other words, Skil makes its own motors, so the service department knows what it's talking about. No sleeve inserts are made as replacement parts, and you will either have to have an insert machined yourself or buy a new cylinder head.

Out, out spot!

What would suddenly cause black spots on clothes washed in a Whirlpool automatic clothes washer? Spots can be removed with spot cleaner, soap and hand rubbing. I took off and cleaned the agitator without success.—Edward W. Reese, West Covina, Calif.

I assume the machine was washing satisfactorily before spotting developed. This would rule out excessive iron, manganese and other impurities in water, which can cause spotting when water conditioning equipment in the house breaks down. I doubt that the agitator is the reason for the problem. Agitators are made of Bakelite or polypropylene, and breakdown of either material is unlikely. Let's also rule out the possibility that the spots are oil or grease—if they were petroleum-based, simple hand scrubbing would not remove them.

As far as I can see, that leaves two reasons for your trouble: use of too much bleach or too much fabric softener. An excessive amount of chlorine bleach may have caused the breakdown of a recirculating hose. If the hose has decomposed, recirculating water may be picking up hose particles and depositing them on clothes. If this is the case, the way to solve the problem is to replace the hose. Too much fabric softener in wash water won't dissolve. This can cause the formation of waxy-looking spots on clothes. Try reducing the amount of softener used. ★★★

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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 answered in this column.

TOM McCAHILL SAYS:

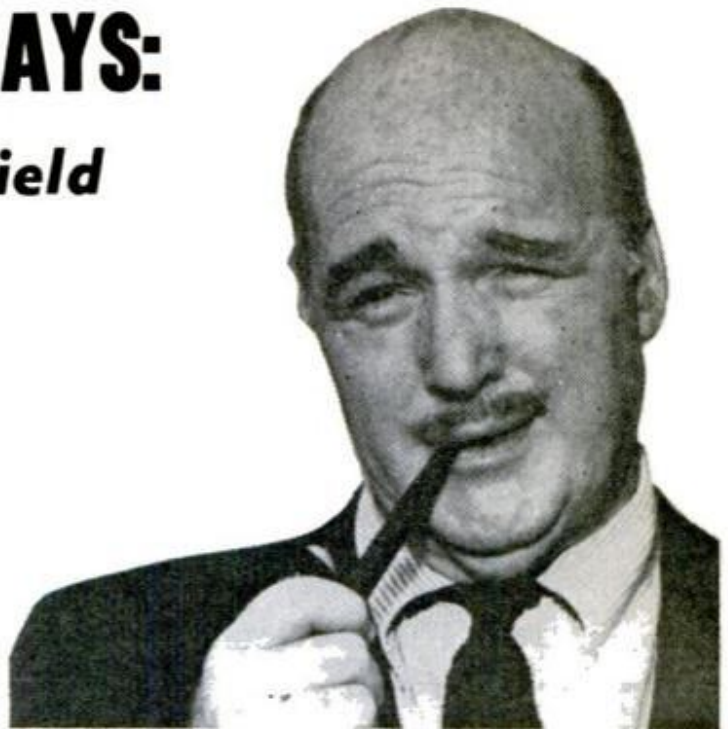
"The appliance repair field is so uncrowded it's almost lonely!"

Someone once said that if you build a better mousetrap, the world will beat a path to your door. In the home appliance business, a lot of enterprising companies have gotten rich peddling a list of handy electrical gadgets for the home longer than Wilt Chamberlain's arm. The trouble is, the dozen or more appliances in the average American home can go on the fritz, and men with the proper training to do repairs are as scarce as knee-length skirts on teen-agers.

Good Appliance Repairmen are a rare breed these days. Those with a little ambition are booked so solidly you can wait days to get somebody to fix a balky refrigerator or cantankerous toaster. Sometimes, you have to settle for a bum job from a guy who had no business calling himself an Appliance Repairman in the first place.

This brings me to my point. If you want to make money in a field that's begging for trained technicians, there's a fine, low-cost home-study plan available that teaches you how to handle every type of Appliance repair in detail—including refrigeration, air conditioners, and even small gas engines. The course was prepared by the instructors at National Radio Institute. This is the oldest and largest home-study school in the Electronics/Electrical fields with more than fifty years' experience training men like yourself for new careers or spare-time or full-time businesses of their own.

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you're equipped to service most Electrical Appliances. If you aren't making as much as \$4 to \$6 an hour in spare time fixing Appliances for friends and neighbors within a few months after enrolling, my name isn't McCahill.

The reason I'm no doubting Thomas, is because the staff at NRI is composed of experienced instructors who guide you through the course with more personal attention than you'd get in many classrooms. With the kind of help they give a student and the kind of course they have, you can be the man in demand in this field—even if you've never tried to rewire a plug, or got fed up with school at the 9th grade.

The best advice I can give you is to clip the coupon below and send for the NRI Appliance Training Catalog. It's free, and there's no obligation. NRI doesn't employ salesmen, so nobody will be knocking at your door. All it will cost you is a postage stamp. Take it from Uncle Tom, the Appliance Repair field needs good men. Now.

Tom McCahill

TOM McCAHILL

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CAR CLINIC

BY MORT SCHULTZ

Fox hunt

The front disc brakes of my 1973 Audi Fox emit a loud squeal. The dealer's service department states that this is a normal condition. Can this be so?—Lokey Johnson, Tulsa, Okla.

As PM reported in September (*Owners Report: Audi Fox*, page 100), the chief complaint about this car was squealing brakes. The problem has also been plaguing the Volkswagen Dasher, but now a solution is at hand. Brake pads having plastic-coated backs have been installed on new Foxes and Dashers leaving the factory since March 1974. They replace the metal-backed pads that cause the noise. The metal on the back of the pads comes into contact with the piston (inner pad) or floating frame (outer pad) when brakes are applied. A characteristic of the floating-caliper disc brake is a shudder of the caliper upon light brake pedal application. This movement causes the backings of the pads to reverberate against the metal piston and floating frame. The backs of the new pads are coated with a Teflonlike substance so noise is greatly reduced or eliminated entirely.

You can buy these new pads from Porsche-Audi dealers.

Blockbuster

I have a 1963 Chevy II Six, and I'm getting oil in the radiator. I tore the engine down to look for a crack, but could find none. The head gasket is okay, and the head itself is level. I added a block sealer, but that hasn't helped either. I'm at a loss and need some advice.—Edward Donovan, Mendota, Ill.

Is the substance oil or transmission fluid? If the latter, then the transmission oil cooler has probably sprung a leak and transmission fluid is mixing with coolant. Repair or replace the oil cooler.

But if the foreign substance in the radiator is really engine oil, then I think there is probably a crack in an oil gallery that is hidden from view. I know of no test that

will let you confirm this. The prognosis, if my diagnosis is correct, is not good. You will have to replace the engine. The least expensive way to go about this is to buy either a rebuilt engine or bare block. A bare block comes with pistons and rings, but you have to transfer all other parts from your present engine to the block.

Newer airconditioners

In the June '74 Car Clinic, you told Marvin Starzak that disconnecting his airconditioner drive belt won't save him too much gasoline, but there is another reason for not doing this. The compressor should be operated at regular intervals to keep seals lubricated. This should be done in winter as well as in summer. If seals are not lubricated, they will dry out and an expensive repair will become necessary. Naturally, if you disconnect the drive belt, you can't run the compressor.—Charles Chiney, Clinton, Ark.

You bring up a good point, but not every manufacturer now recommends periodic operation of the compressor. One should consult his owner's manual to determine whether this maintenance procedure is needed.

Vega oil loss

I have a 1972 Chevrolet Vega that is using approximately one quart of oil (SAE 10W-40) every 100 miles. Everything obvious has been looked into carefully, including compression (which is perfect), valve gaskets, pan gaskets and engine seals. I was told by my Chevrolet service department manager that he has five other Vegas with the same trouble, and he doesn't know what to do. The car has only 18,000 miles. Is there no hope?—T. Waskel, Niles, Ill.

Last May 28, Chevrolet sent a special letter to all dealer service departments cautioning them that some Vegas may have had

(Please turn to page 26)



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OCTOBER 1974

25

CAR CLINIC

(Continued from page 24)

their cylinder walls scored. It is this that has led to the drastic loss of oil. (This problem starts when the engine overheats from inadequate coolant level. The aluminum block is more sensitive to higher temperatures than is a cast-iron block.) Chevy told the dealers that the company will stand behind any engine suffering the condition, and that repairs needed to remedy the problem will be made free of charge to the customer up to the time that the car attains 50,000 miles.

Cold Cricket

I have had a cold-weather starting problem with my 1972 Cricket from day one. Tune-ups have been done, but they haven't helped much. Do you have any suggestions?—Sheldon Woods, Fond du Lac, Wis.

In addition to regular tune-ups, there are three maintenance services which are a must if you are to get good performance from your Cricket in cold weather. The first

service involves filling the carburetor damper with engine oil to $\frac{1}{4}$ -inch of the end of the bore in which the damper operates. If the damper is low on oil, you will experience flat-spot acceleration.

The second service, if your car has a single carburetor, is to adjust the air cleaner intake snorkel for winter conditions. Loosen the snorkel clamp screw and turn the tube so the W (for winter) mark is on line with the arrow on the intake snorkel body.

The final service involves turning the two-step position stop of the starter assembly to the "cold" start position. In this position the metering holes in the disc valve can supply the extra fuel required for starting at temperatures below -10°F . or if a cold starting problem exists.

Sound ideas

I have a problem with the stereo tape player in my 1974 Corvette. It is a Panasonic Quadrasonic eight-track, and it emits a loud whine that fluctuates with engine rpm. I connected three suppressors and a choke, the ground is a heavy solid wire connected



O.K., think.

Can you figure out what these parts do? See any relationship between them?

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Did you miss the answer by a mile? Maybe your talents lie in another direction. In accounting. In administration. In data processing, maybe. One thing for sure—you can de-

directly to the battery ground, and the hot wire goes directly to the FM stereo radio. Everything in the car is suppressed, including the FM radio, alternator, power windows and blower. Do you have any ideas? —Philip Lindner, Ridley Park, Pa.

The cause of the whine may be located in one of three places: the tape player, FM stereo radio system or Delcotron (alternator). To check the Delcotron first, disconnect the hot wire, start the engine and operate the tape player. If the whine is not apparent, look for a malfunction in the alternator, such as a weak rectifier.

If no whine is apparent when you play the FM stereo radio, but is only created when the tape player is operating, then the player is at fault. Most likely, it does not have adequate suppression or shielding despite all the suppressors connected. Finally, if the whine is also apparent when the FM stereo radio is operating, the fault is in that system.

SERVICE TIPS

■ **Ford dealers** have been told to install a carburetor electric-throttle solenoid position kit (No. D4PZ-9D544-B) on '74 Mustang IIs and Pintos with 2300-cc engines. It stops dieseling.

■ **1970-73 Buicks:** If you can't eliminate engine ping by using higher octane gasoline, examine the distributor-point cover. It may hang up on the distributor housing causing timing to advance as much as 10°. If the cover is catching, bend edges inward and round corners.

■ **Ford Motor Co.:** '71, '72 and '73 Mustangs and Cougars, and '74 Torinos and Montegos with 302-cu.-in. engines. If you get grunts and groans from power steering, the power-steering gear has probably been made by Saginaw Steering Gear Div. of General Motors. Ford wants you to use GM power-steering fluid in this system, but first the system must be flushed of old fluid. If the GM fluid doesn't stop the noise, have a new spool valve actuator assembly (part No. D1ZZ—No. 3812-B) installed. Dealers have been informed of this in article 616 of service bulletin 65. ★★ ★

GOT A PROBLEM WITH YOUR CAR? Ask Mort about it. Send your question to Car Clinic, Popular Mechanics, 224 West 57th St., New York, N.Y. 10019. Letters cannot be answered individually, but problems of general interest will be published in the column.

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B.

THE BICYCLE SHOP

BY EUGENE A. SLOANE

Is it a good frame?

Can you buy a good rugged-frame bicycle for around \$150, and if so, how can you tell if it is a good frame? Can I tell about the frame without asking the dealer?—Tom Potter, Hopewell Junction, N.Y.

Unless the bike has a decal on the tube—usually the seat tube—giving the metal specifications from which the frame was made, you will have to ask the dealer. He should have detailed specs on every bike he sells. He should at least know if the frame is low or high-carbon steel, or a mixture of steel and alloys such as chrome, manganese and the like. If the frame says Reynolds "531," Columbus, 4130, it should be a good frame. You want a frame made of steel that has a tensile strength after brazing of around 60,000 pounds per square inch. Frame should be seamless drawn steel, with mitered joints and forged steel lugs. Given today's high prices for quality bikes, I doubt you can buy a bike with costly steels, hand-brazed-up frameset and forged lugs for much under \$250.

How do you stop in wet weather?

Here at the engineering school of North Carolina State University we are developing a new braking system for bicycles that will work in both wet and dry weather. The present center-pull caliper brakes are basically ineffective when wet. We would appreciate your opinions and solutions for wet-weather braking systems for use on bicycles.—Derek A. Cotter, Raleigh, N.C.

Certainly a film of moisture between the brake pad and the rim flat will reduce stopping effectiveness of any brake. Cheap side-pull brakes (photo, right) are bad brakes when dry, and wet they are dangerous. Good side-pulls, like the Shimanos shown, are excellent, but lose about 50 percent brake effectiveness in wet weather. Good center-pulls (photo) work about as well as good side-pull brakes in all weather. Hy-

draulic disc brakes (photo) give much better wet-weather stopping power but are heavy and clumsy looking. Hydraulic caliper brakes (bottom photo) are best of all,

(Please turn to page 34)



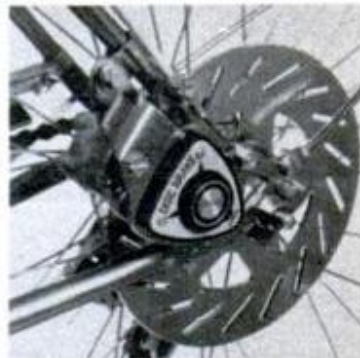
CHEAP SIDE-PULLS



SHIMANO SIDE-PULLS



GOOD CENTER-PULLS



HYDRAULIC DISCS



HYDRAULIC CALIPERS

**PURE QUALITY.
JUST LIKE ALWAYS.**



1975 CHEVELLE.

IT RUNS LEANER. IT RUNS CLEANER. IT SAVES YOU MONEY EVERY MILE.

The great advantage of the 1975 Chevelle is that it doesn't offer you just one great advantage. It offers you a combination of good things.

It is mid-size, so it's easy to drive and park.

It is mid-priced, with a strong reputation for value.

It is comfortable, with room for six adults.

Chevelle, in other words, is a sensible car for people with a wide range of needs and lifestyles, whether singles, couples, or families with children.

And for 1975, something especially significant: Now every Chevelle has a series of improvements we call the Chevrolet Efficiency System.

Using no-lead fuel, this new system is designed to help your 1975 Chevelle *run leaner*, with greater economy; *run cleaner*, with less exhaust pollutants; and *save you money every mile*, with new operating and maintenance efficiencies.

Improved fuel economy.

Every 1975 Chevelle with standard V8 or six-cylinder



engine is designed to give you improved fuel economy, thanks to the new Efficiency System, new engine tuning and easy-rolling GM-Specification steel-belted radial ply tires.

Surer starting.

Every Chevelle now has High Energy Ignition (HEI). It develops a spark that's up to 85% hotter than conventional systems develop, with no need for breaker points or ignition condenser.

This means you can approach your Chevelle with a new confidence on cold or wet mornings, and get efficient combustion at all speeds.



Faster warm-ups.

Chevelle's new Early Fuel Evaporation is designed to reduce stall and chugging when you first start out. EFE uses exhaust gases in a more sophisticated way to warm the incoming fuel-air mixture. This helps make warm-up not only faster, but smoother.



Chevelle Malibu Classic Coupe

Better performance.

Clearly, with hotter ignition, surer starts, faster warm-ups and better combustion, our 1975 Chevilles are designed to give you better performance than those of recent years.

And with catalytic converters now taking over the job of emission control, your Chevelle engine can go back to the job it does best: Delivering smooth, responsive, efficient performance.

Fewer and simpler tune-ups.

With High Energy Ignition, there are no points to replace, and there's no ignition condenser to replace. Spark plugs, instead of lasting 6,000 miles, should now last up to 22,500 miles.

Tune-ups, as we've known them, will be simpler and further apart.



More miles between oil changes and chassis lubes.

Remembering that time is money, consider the improvements offered in our 1975 Chevelle service recommendations.

Spark plugs—22,500 miles (6,000 miles in '74).

Oil—6 months or 7,500 miles (4 months or 6,000 miles in '74).

Oil filter—first 7,500 miles, every 15,000 miles thereafter (first 6,000 miles and every 12,000 miles in '74).

Chassis lube—6 months or 7,500 miles (4 months or 6,000 miles in '74).

All that and cleaner air.

With Chevelle's new catalytic converter, exhaust hydrocarbons are reduced 50% and carbon monoxides are reduced 46% from 1974 levels.

So now we can all breathe a little easier. And drive a little more efficiently.



We'll keep adding to your knowledge.

As you've seen, this is a serious ad, written to be as helpful as we can make it at announcement time. But it's far from the last word you'll hear about our new Chevrolet Efficiency System.

While the engineering facts we have at this writing support what we're telling you now, we'll be able to report more specific information as we get deeper into the model year.

As we expand our knowledge, we'll be able to expand yours.

We give you a wide choice.

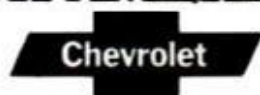
There's a complete family of coupes, sedans and wagons to choose from, all incorporating the new Chevrolet Efficiency System.

Malibu Classic, our most distinguished Chevelle. Malibu, the most economical Chevelle to buy. And three comfortable wagons.

We hope you'll see them soon at your Chevrolet dealer's.

Coupe, sedan or wagon, we want your 1975 Chevelle to be the most satisfying new car you ever brought home.

**CHEVROLET
MAKES SENSE
FOR AMERICA**



THE BICYCLE SHOP

(Continued from page 30)

give excellent stopping power in wet and dry weather, but are a bit heavier than ordinary center-pull caliper brakes and not as pretty. Both types of hydraulic brakes are Shimano. Cantilever center-pulls (drawing below) offer more leverage for stronger brake action but still don't work any better than conventional center-pulls. Drum brakes



CANTILEVER
CENTER-PULLS



DRUM BRAKES



AUXILIARY SAFETY LEVERS

(photo) are sealed against wet weather, work very well in all conditions, but are very heavy. Coaster brakes are also sealed from wetness but are heavy. So-called auxiliary safety levers (above) are actually dangerous in that they work okay for ordinary stops you can anticipate but due to cable stretch and shortness of arm travel will not stop you in an emergency nearly as fast as regular brake levers on the handlebars. Hope you come up with something light, effective and handsome, and inexpensive, that will stop a bike at 12 mph in 12 feet in wet weather.

Change five-speed to 10-speed?

I am thinking about converting my five-speed to a 10-speed. What would I need and how much will I have to invest? Are there any "locking" tire tube caps on the market?—Todd Harrison, Frederick, S.D.

I get a lot of questions about the possibility and practicality of changing one, three and five-speed bikes to 10-speeds. My answer is that it usually is not worth the time and money, because the one, three and five-speed bikes are going to wind up as the heavy, cumbersome bikes they started as, and the extra lower gear isn't really going to help all that much. It costs about \$35 minimum to switch a five to a 10-speed. You would need a longer axle to handle the double chainwheel instead of the single wheel; special bolts for the second chainwheel; the second wheel itself; a front derailleur; a front derailleur shift lever and cables; and a lot of know-how. I'd really rather see you spend the money on a better bike, one that's lighter and already 10-speed.

If you should want the old bike for utility use, but need bigger gears to make the hills, why not just switch the rear free-wheel to one with bigger gears? See the June '74 *Bicycle Shop* for instructions.

Can I shift the shifters?

Your December '72 Bike Shop (page 24) article talks about installing handlebar end shift levers. My bike has the shifts installed on the handlebar stem. Can I change to the bar end shifters?—Mike Klein, St. Claire Shores, Mich.

Sure you can, and I hope you do because if those shift levers stick up very high over the stem you could be badly hurt if you have an accident or otherwise stop so suddenly you are propelled over the handlebars, where the stem shift levers can tear at you as you hurtle over them. The bar end shifters come complete with the necessary longer shift cables and cable covers, and a fitting for the down tube to receive the cables.

How to get that wheel back on

Can you tell me how to replace a dewheeler on a 1968 bicycle? It has 24-inch wheels. I have a problem every time I get a flat. My bike is a five-speed.—Chester Matlosz, Elizabeth, N.J.

You seem to be able to get the wheel off but have trouble getting it back on again, past the derailleur (which is what you call

(Please turn to page 36)



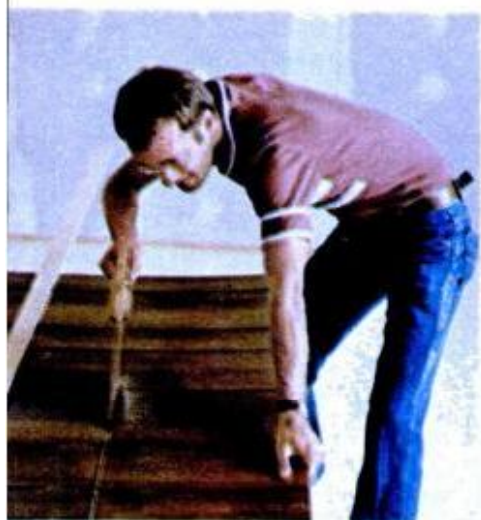
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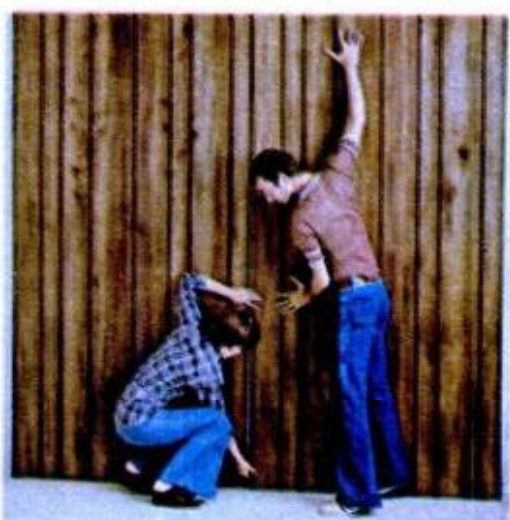
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THE BICYCLE SHOP

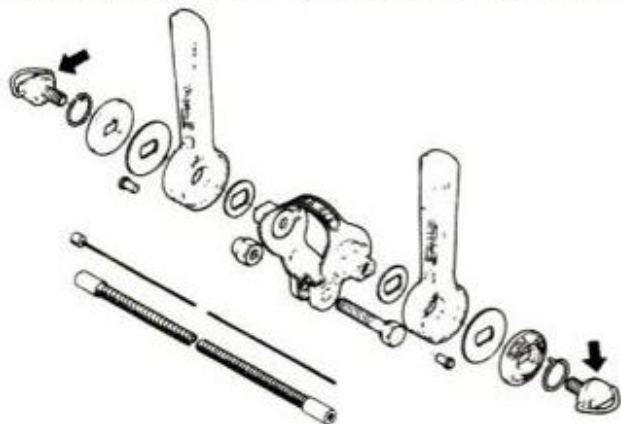
(Continued from page 34)

a dewheeler). It's a lot easier to get the wheel back on any derailleur-equipped bicycle if you first shift to the smallest rear gear, which puts the chain and derailleur where they are easier to maneuver back on. To remove the rear wheel, after shifting to the little gear, grasp and pull the derailleur cage or body backwards as far as it will go. This pulls the chain back off the gear and lets the wheel slip down and forward and out of the dropout. When reinstalling the wheel, do the same thing, pull the derailleur body back, make sure the chain is on the small gear, then pull the wheel up and back at the same time. It helps somewhat if you wiggle it a lot as you pull, the wheel, that is.

Shifty shifter

When the chain is on the high gear on the front derailleur the chain automatically comes back to the low gear. This is a brand-new bike. What is wrong?—Roberto Saint Malo, Republic of Panama.

The gearshift lever has a wingnut or a locknut which keeps enough tension on the lever control to keep the derailleur it controls from moving. This is more of a problem on the rear derailleur since it is more spring-loaded than the front one, but either will move of its own accord, the front from the bigger to the smaller gear, the rear from the fifth or largest to the first or smallest gear. Keep the shift-lever locknut



tight enough to keep the lever from shifting by itself, but not so tight it's hard to shift. Drawing shows arrow pointing at the wing locknuts. This is a downtube shift-lever set, but other levers have them, whether on handlebar stem or at end of handlebars. ★★★

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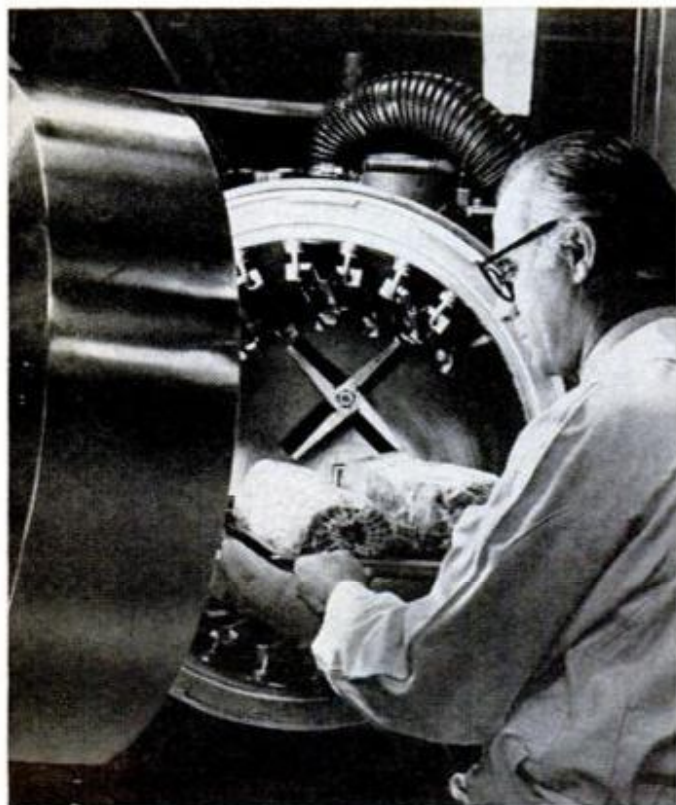
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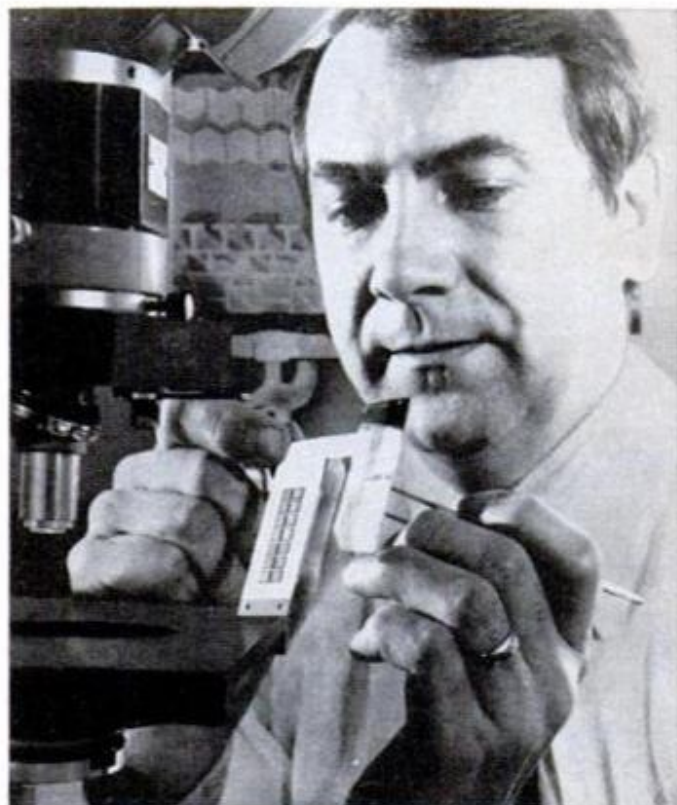
One way to cut meat costs

An "omni oven," a steam pressure cooker that also has infrared and microwave capabilities, has been developed for the Army by the Raytheon Co. The object is to cut meat shrinkage and produce tastier roasts for our servicemen. The oven has its own logic system that determines which cooking methods will be used, in what order and for how long. The microwaves cook quickly, infrared browns meat, and pressurized steam enables a roast to be cooked in a hot environment. Research and development may take as long as two years, so servicemen will have to bide their time before sinking their teeth into a succulent slice of omniroast.

Satellite still doing a job

Designed to last but a year, NASA's first Earth Resources Technology Satellite (ERTS-1) recently began its third year in orbit. It's still functioning well, according

to scientists, and continues to send back space images of the Earth. Some major accomplishments of ERTS-1 include the discovery of uncharted lakes in Bolivia, the detection of deeply buried fault lines in the United States, the mapping of the extensive 1973 flooding of the Mississippi River. The satellite's scanner records images in four different color bands: two in the visible part of the spectrum and two in the infrared part, just beyond the red light that the human eye can see.



Small package for a lot of data

A "magnetic bubble" memory with a storage capacity of 460,544 bits of information—a record among these small devices—has been developed by Bell Laboratories. Magnetic bubbles are stubby cylinders thinner than the size of human hair that are created in crystalline magnetic material by forces from an external field. They look like bub-

(Please turn to page 42)

New car? Old car? Which is harder on your motor oil?



The newest cars come with all the latest emission control systems, hot-running high compression engines, and, frequently, more heat-building power options. Most older cars have higher compression engines, and new usage patterns that can cause corrosion problems. Today you should specify your oil. By Service Classification. By SAE Number. By Brand.

New cars haven't made things easy for your motor oil. Added engine heat is why.

Because of emissions systems that result in increased engine operating temperatures.

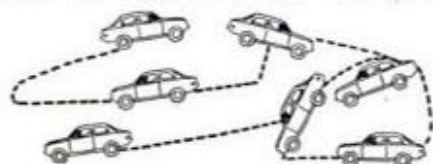
Because of leaner fuel mixtures that burn hotter.

And because of power options that add an extra heat burden.

Micro-thin film.

With your older cars, the conditions are different, but need equal consideration. Close tolerances in a high compression engine require a motor oil to do its job even when the film is squeezed micro-thin.

Now consider the need to conserve all forms of energy—and how



Americans are driving less for pleasure.

That means a lot of stop-and-go driving. And short trips with frequent stops. The "milk run" to the cleaners, the bank, the market isn't an ideal operating condition for most engines. Until your engine warms up, it burns fuel inefficiently. That wastes gas. And it does something else.

Dirt begins to hurt.

It can also load your oil with insolubles and varnish forming contaminants. Some of that is alright for any motor oil. But just think how much of your driving these days is the short-trip kind. Eventually that dirt can begin to hurt, putting a bigger burden on your motor oil than ever.

Not enough exercise.

If you're fortunate enough to have a choice of cars, it's the smaller one that's doing more of the work for you. Your big old car is staying home a lot more. And its engine is subject to the effects of moisture and acids that have condensed on cool engine parts, causing rust and corrosion. This can lead to an assortment of ailments that could reduce the useful life of the car.



stop-and-go.

Which is tougher?

In today's world, new cars and old cars both have their own ways of being tougher than ever on their motor oil.

What can you do about it? Change your oil more frequently. And ask for a quality brand that's fortified for the rigors of

An oil with a film strength that gives constant protection to close-fit metal surfaces when the engine's running. An oil with additives that neutralize acids and inhibit rusting when the engine is not running.

For new cars or old ones today, you have to insist on a premium quality motor oil. We think your choice should be Quaker State Motor Oil. For three reasons.

100% Pennsylvania.

One. It starts with premium quality base oils—100% Pennsylvania Grade.

Two. It's formulated by motor oil experts who have been making quality lubricants for over half a century.

Three. It's fortified with special additives to handle the adverse operating conditions we've talked about.

Quaker State believes these three reasons add up to why Quaker State Motor Oil provides superior protection for cars in today's driving world. This is why we're such a good friend to your car.

Ask for Quaker State—by name.



Quaker State your car to keep it running young.

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\$6.95



This steam engine kit is an ideal project for the coming winter. Pull that UNIMAT out of the closet and get some use out of it. This kit has all the parts you'll need including complete drawings and instructions. You can build it on your kitchen table. At only \$6.95, it makes a good answer to that approaching question, "What do you want for Christmas?"

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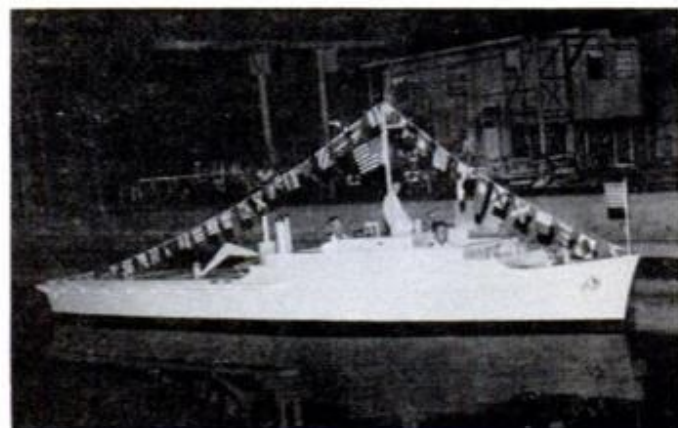
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Luling, Texas 78648

SCIENCE WORLDWIDE

(Continued from page 40)

bles when viewed from the top through a microscope. The bubbles can be created, erased, and moved about electronically to store and transport data in computers, minicalculators and telephone switching systems. The bubble pack held by researcher Paul C. Michaelis is designed for use in telephone switching systems.



First ship in miniature fleet

A new method to train Navy personnel in the handling of ships includes the use of one of the fleet's newer vessels—a sleek one-sixteenth scale model of an LPD 4 (Amphibious Transport Dock). Built of fiberglass and wood, the 35-foot, two-man boat is an exact duplicate of the full-sized, 570-foot LPD. It's equipped with instrumentation and controls for steering, propulsion and anchoring, and is powered by batteries. The model will be used for navigation exercises in a scaled-down harbor complete with channel buoys, anchorages and piers. The miniature harbor will be located in a 16-acre lake.

Dangerous laxatives on market

Mercury poisoning can be caused by some laxatives sold without a prescription, says a report in a recent issue of *Archives of Neurology*, a professional journal. These products contain mercurous chloride, commonly known as calomel.

Mercury poisoning is a serious illness, causing personality and physical changes, loss of memory, decline of intellect and tremors of the face and hands. It sometimes proves fatal. ★★★

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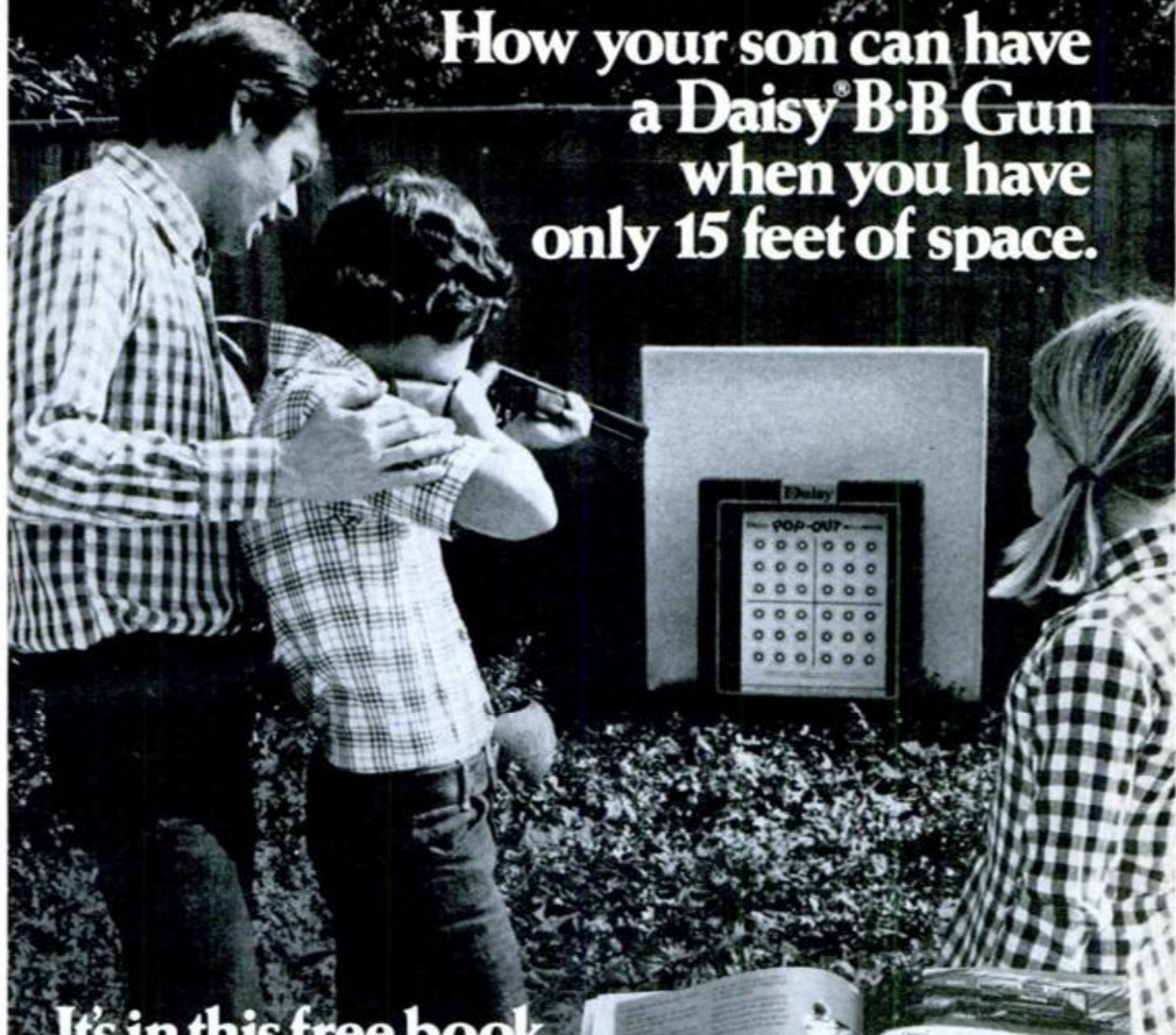
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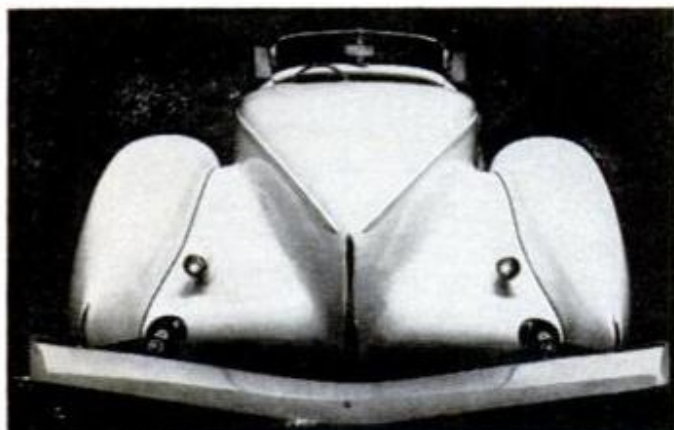
IMPORTS AND MOTORSPORTS

New time machine



The Romulus II Speedster is the most recent addition to the growing ranks of replicars—cars that are made to look just like the grand old automobiles of yesterday. The Romulus II is, of course, a double for the Auburn Boat-Tail Speedster of 1935—and does it sparkle! The impeccable construction of this \$19,000 replica is done by the Classic Car Co., Inc. of Palm Beach, Fla.—the same company that makes the Model A Roadster and Phaeton duplicates. The body is molded fiberglass and the drive train is 1974 Ford 302 V8 with automatic transmission and a Ford rear axle.

Features of the Romulus include: power



steering, brakes and windows; airconditioning; AM/FM with stereo tape; leather upholstery, carpeting, wire wheels and special golf bag compartment. It's fully instrumented and the convertible top drops down under a rear hinged panel.

Whooshful tinkering

It looks like an antique pedal car for kids, but the cigar-shaped car below is one of the world's first land-speed record cars—the first one to go over 100 kilometers per hour. In 1899, with Belgian Camille Jenatzy at the tiller, the electric-powered car went 108 kmh (65.79 mph) a record for three years.

The aluminum alloy body is on a semi-elliptically sprung chassis with two direct-drive electric motors at the rear wheels, and tires that were the fattest yet seen on an



automobile. The record run took place on the popular drag strip of the time—a stretch of smooth road just north of Paris. Land-speed-record attempts are now made where they've been made for the last 40 years, on the salt flats at Bonneville, Utah. And that brings us to the point of this whole thing: a new attempt to break the current record, which is 622.407 mph! That was set in 1970 in a rocket car driven by Gary Gabelich, who wants to top that and be the first man to *drive* faster than the speed of sound. At the altitude of the salt flats, that's about 740 mph. If he can go even faster in the rocket car he's preparing, so much the better. When? Hopefully within a year.

Speed for sale

It was designed for the World 250 Class, and introduced on European motorcycle road-racing circuits last year. The water-cooled, 250-cc Harley-Davidson RR-250 is now running in American Motorcycle Assn. events in the United States. The orange and

(Please turn to page 46)

Presenting the 84 mpg Volkswagen.



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IMPORTS AND MOTORSPORTS

(Continued from page 44)

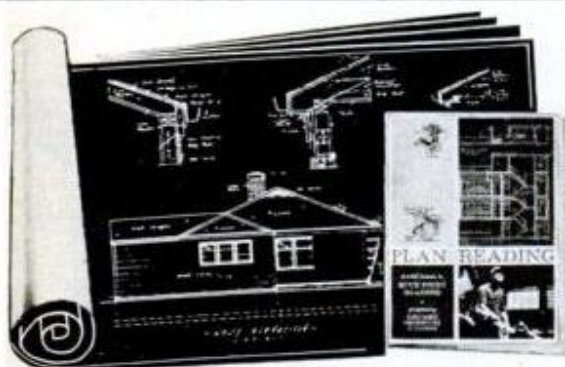
black machine, weighing a trim 230 pounds, immediately blitzed all competition at Loudon, N.H. (last three national championships of the season are Sept. 29, Sacramento,



Calif.; Oct. 5-6, Ontario, Calif.; and Oct. 12, Gardena, Calif.) If you want to road race (or set up your own cafe racer), the RR-250 is \$3395. H-D is at 3700 West Juneau Ave., Milwaukee, Wis.

How to pick up girls

Everyone is entitled to an opinion; British Leyland Motors really is serious about one. It thinks all cars should have pedestrian catchers. One it designed and built into its experimental safety car is shown doing the job here. The idea is to build cars with bumpers much lower than they are now, so that if you hit a pretty pedestrian she'll be scooped onto the hood of your car. To keep her from sliding off and getting away, a retainer bar snaps up. Interesting. But I think it's too much like the caveman dragging away a partner by the hair to be successful in modern courtship. ★★★



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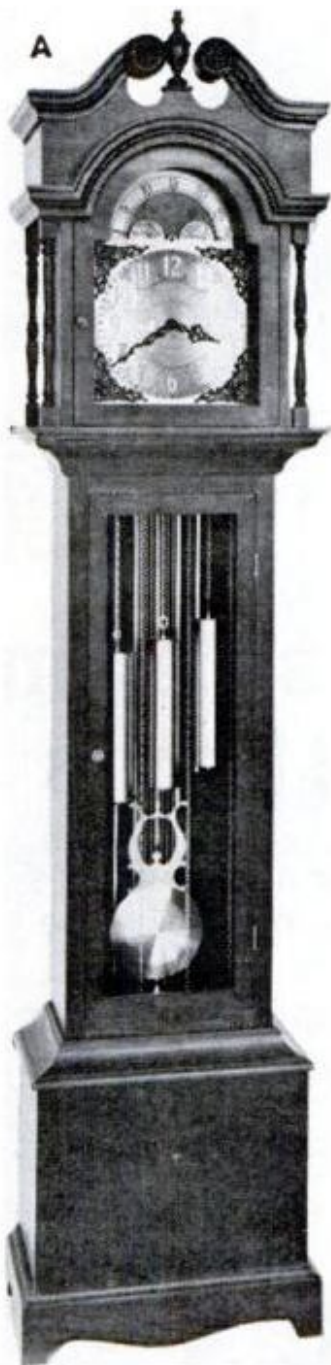
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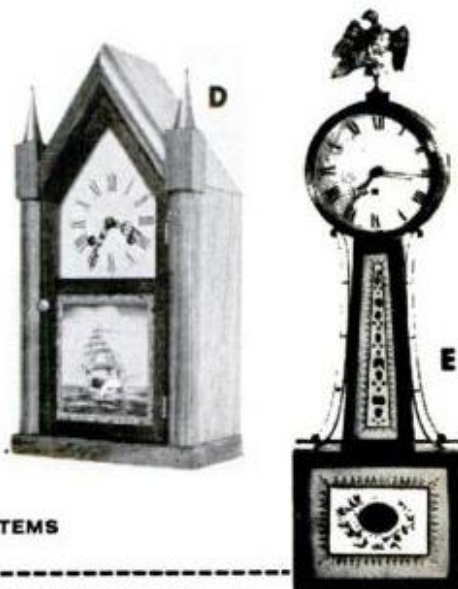
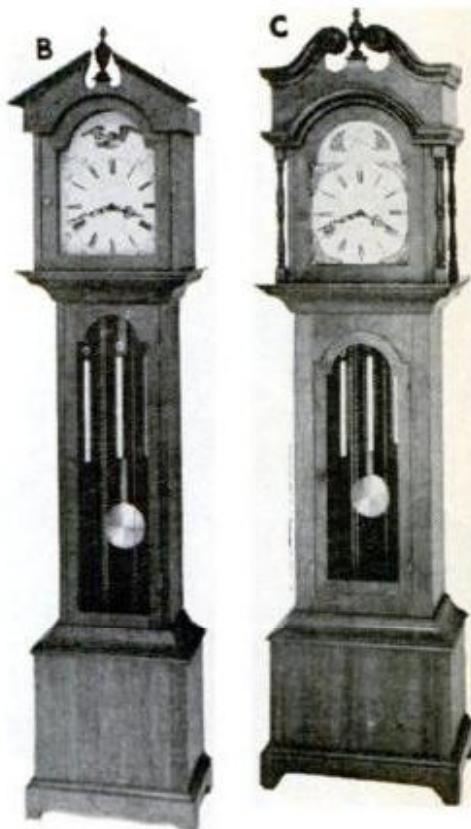
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A black and white illustration of a massive shark being hoisted out of the water by a small motorboat. The shark's mouth is wide open, showing rows of sharp teeth. The boat is small and crowded with two men, one of whom is using a long pole to assist in lifting the shark. The scene is set on a choppy sea with white-capped waves.

Big fish from small boats

No need for a millionaire's sportsfisherman—pick the right modern hull and you can catch gamefish bigger than your boat.

by Jess Nicotera

The line on our portside outrigger popped out of its pin, and a second later a howl from a 4/0 reel indicated something was streaking down with one of the four bunker baits we had been drifting.

"Keep moving, keep moving!" Bob Rochetta whispered to the unseen fish as I fastened the gimbaled rod holder around his waist. Setting the drag to strike position, he finished his slow count to 10, with the rod tip pointed toward the fish, whipped back with an upward sweep, and set the honed hook.

Bob could only watch as the yards of monofilament flashed off the reel into the water. When the run slowed he tightened up on the drag, putting on the pressure in hopes of turning the fish. There was a momentary pause as the big fish below our small hull and the angler in the boat both sized up the situation. Then, with the pure excitement that comes to a sportfisherman as he battles a trophy big game fish, Bob yelled, "Look out, he's coming up!"

Blasting straight out of the water, 250 pounds of angry mako shark, an incredible package of muscle and cartilage, shook his ferocious head and fell back with a crash that filled the clear air with rainbowed spray. Bob kept steady pressure on the rod and reel to counter the mako's sizzling runs. Twice more, wild leaps slowed the cobalt blue and white body of the mako as it thrashed into the air.

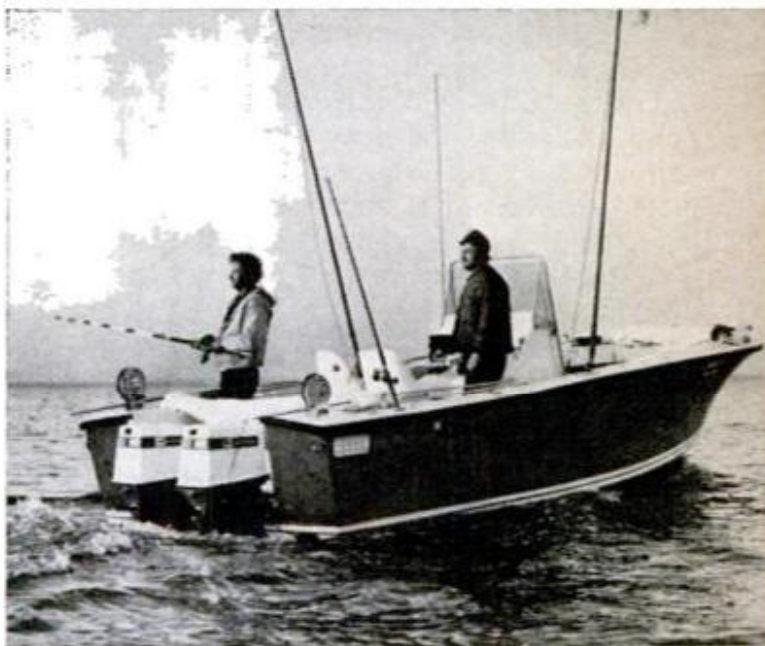
Fifteen minutes later the shark was alongside, hopping mad and thrashing. Jaws studded with crooked teeth snapped at everything in sight while cold sinister eyes watched our every move. I struck with the flying gaff and the big mako nearly wrenched the big hook from my hands before the release triggered. As we tail-roped the beast he flailed the water until his powerful tail was lifted clear of the water and he hung head-down from the bow cleat. Bob flopped into the helmsman's chair and massaged his knotted arm muscles while the mako continued to thrash against the bow of *Sea Hawk*, my 23-foot center console outboard.

"My first time out and I take a monster home. I thought only millionaires in big gold-plate fishing machines could find this kind of action," Bob admitted.

During the fast run back across 35 miles of the Atlantic to Moriches Inlet on Long Island, N.Y., Bob studied his big mako in amazement. On this first offshore trip

for him in a small boat, we had caught and released four sharks and were bringing back a trophy, well secured along the side. We'd had a lucky day, but the "mosquito fleet" of small offshore fishing craft—named for their size to sting ratio—had recruited another convert. As Bob summed it up, "With a small boat like this you can afford to be part of the big-time action, and you get a real feeling for the fish and the sea."

Today, thanks to the design of the seaworthy new fishing boats like my 23-foot center console open-decked Sea Craft out-



Trolling 30 miles offshore, the big-game, small-boat fisherman needs to be sure of both his boat and gear.

board, big-game fishing is no longer the private domain of those big plush sports-fishing rigs. For a price that doesn't require a second mortgage on the house, almost anyone anywhere in the country can outfit a craft in the 18 to 24-foot class that can be trailered to big-fish waters.

Boats in the "mosquito fleet" are designed for a single purpose—fishing. Their spartan layouts are planned to provide maximum angling space, whether you're casting to a spooky tarpon or trolling for giant tuna. Function, not extra comfort, is the overall theme with safety the second primary factor. Most well-engineered boats now employ full foam flotation, self-bailing cockpits, enough freeboard to put the cockpit coaming well above the water line, and hull designs capable of handling most seas an angler is likely to run into offshore on oceans and lakes or through short bay chop and inlets.

(Please turn to page 50)

BIG FISH FROM SMALL BOATS

(Continued from page 49)

And the variety of big game fish available to these boats is almost as endless as the sea itself. In the Florida Keys, I watched Capt. Cal Cochran pole a 22-footer across the flats to put sportsman Joe Garagiola into a tackle-busting tarpon. In northern Atlantic waters, Capt. Archie Jost found us action 60 miles out on a trip that produced bonita, dolphin and a chase after a pair of white marlin that gave us the slip. The day's action was topped off by a 4½-hour battle with a tiger shark we estimated to weigh in the 1000-pound league.

In the Gulf of Mexico, it's not unusual to find the mosquito fleet tied to stilts of an offshore oil rig where huge schools of red snappers have set up housekeeping. And if snappers aren't game enough, I've seen plenty of billfish cruising the warm waters of the Gulf within easy range of the center-console boats.

Great Lakes anglers are finding these fishing machines ideal for tracking down trophy coho salmon and trout. Here we troll as many as six lines, and the unencum-

bered open cockpits are ideally suited to keep things going smoothly when several fish are on and the action gets hot. Equally important, if the weather turns bad, these boats had the speed for a fast run back to a sheltered harbor.

West Coast fishermen in California, Oregon and Washington are equally successful in taking big fish from little boats. Tuna, billfish, shark and other Pacific gamesters are feeling the sting of the mosquitos.

Success in the sport requires equipment plus skills in fishing, seamanship and safety. You'll need to know how to handle a boat properly, when it's safe to head offshore and what to do when seas make up and weather threatens. First choice of equipment, of course, is proper boat and power.

Most boats in the mosquito fleet use outboard engines, though many are also now available with stern drive, inboard or water-jet installations. Outboards seem to lead because fishermen are familiar with their operation and maintenance, and find them easy to trailer. Horsepower can range from a single 50 up to a dual installation with a pair of 150-hp motors. One medium-range outboard may be ample and safe in the

Florida Keys where seas are seldom rough, while fishermen headed for the Great Lakes, Gulf or coastal ocean waters should consider the added power and safety of duals. I use a pair of Johnson 65s on my 23-footer.

Aboard, hardware such as cleats and grab handles will be positioned so that they will not abrade or foul line when a fish is on. Controls out of the way on the center console make it possible to play a fish all the way around a boat if outriggers are not in use. Fishing, navigation and communications aids are all important when this little boat goes offshore. A fish locator, ideally one with both flasher and graph readings, will take much of the guesswork out of locating the action. For our purposes, it should be capable of reading 60 fath-



Are you paying through the nose for aerosol deodorants?

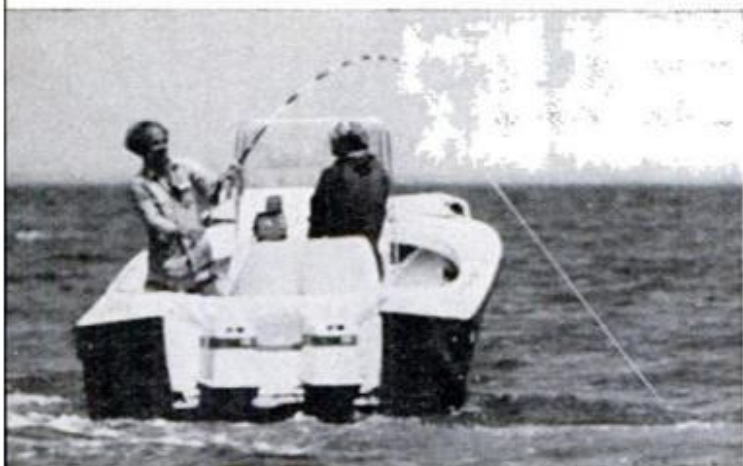
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oms or 360 feet. Scales should be easy to see, and lighted for nighttime use.

Surface and depth temperature gauges are another way to beat the guess-and-miss methods. They require little work to install and help monitor hot angling holes.



Hooked up, an offshore angler may be tied with thin line onto a record-sized tuna, marlin or tiger shark.

As the primary navigation tool, your compass should be a quality model. Lower priced units may look much the same but are likely to tumble in rougher open waters. Many anglers in smaller craft now take along a radio direction finder when heading out to sea. Loran, with its ability to pinpoint a fishing spot, is still very expensive, but is also beginning to appear on smaller boats as costs come down.

Communications gear should include a VHF radiotelephone. Many anglers also install a Citizens Band unit for conversations between boats, but the Coast Guard monitors only VHF frequencies so it is wise to go first with that rig for safety's sake.

Tackle depends a great deal on personal preference and the kind of game fish you are looking for. When heading out for a typical day of North Atlantic shark fishing, for example, I usually take along two 4/0 reels, two 6/0 reels, two 30-pound rods and two 50-pound rods, a flying gaff,

two straight gaffs, four tail ropes, a coil of wire leader material, an assortment of heavy-duty barrel and snap swivels, an assortment of shark hooks (8/0 to 12/0), two pairs of cotton gloves for handling wire leaders, two chum bags, wire cutters and crimping tool, Styrofoam or cork floats, a waist-style gimbaled fighting belt, shoulder harness, live or fresh dead bait and plenty of commercially available chum.

As standard equipment aboard, I use two 18-foot aluminum outriggers, compass, automatic bilge pump and spare hand pump, locator sounder, deep trolling down riggers and surface temperature monitor from Lowrance, emergency distress and first aid kits, 25-watt Unimetrics VHF-FM radiotelephone, 23-channel Linear Citizens Band radio, and five USCG approved personal flotation devices (as they now call life preservers). Underneath the SF-23 hull ashore is a heavy-duty trailer designed to take her deep-V shape and roll her to distant fishing waters.

And before launching I buy latest area charts and check navigation hazards with the local fishermen. The safe way is the best way. ★★★



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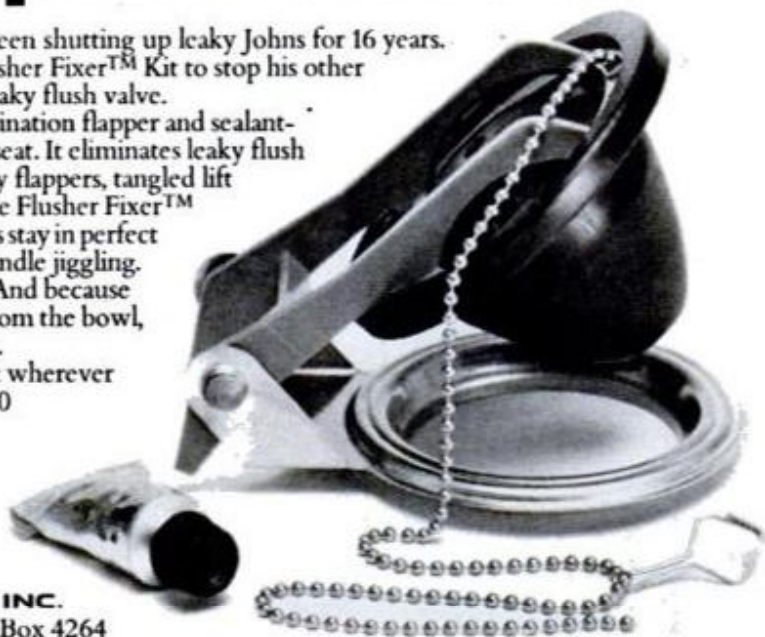
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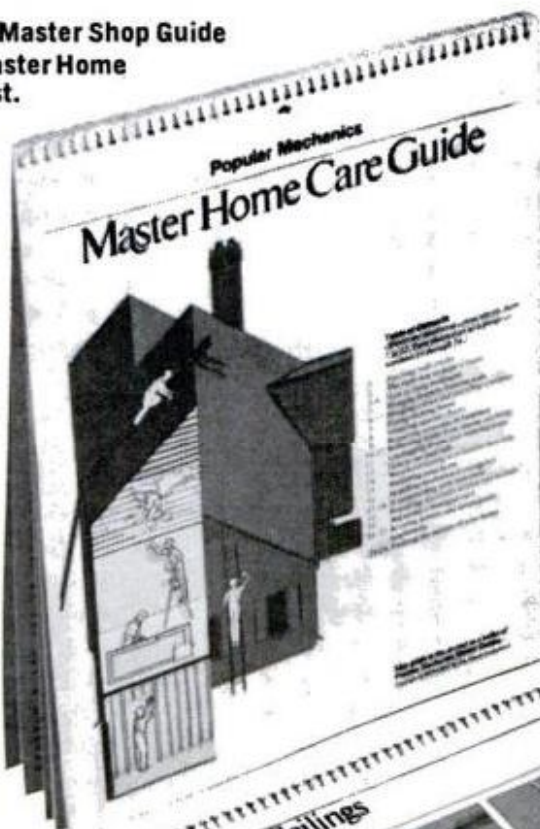
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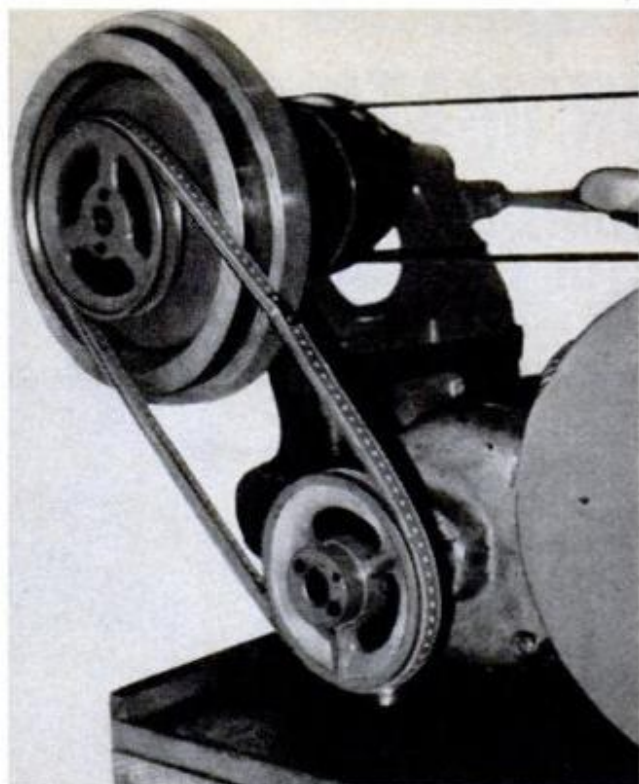
FROM READERS



Better bait can

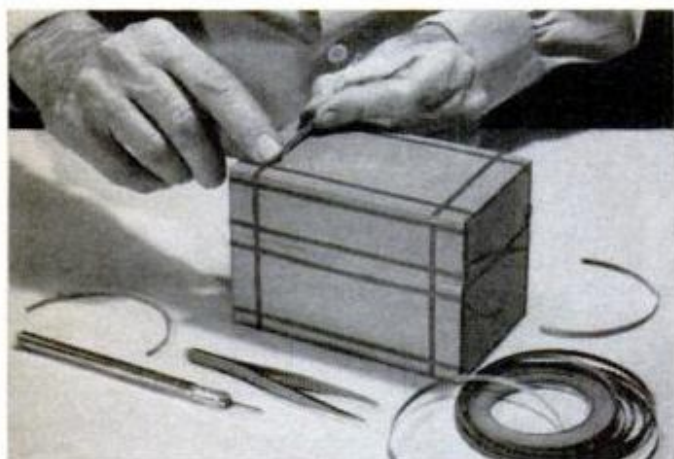
You get a worm every time without having to dig when you use a double-ended bait can like that I made from a coffee can. I removed both metal lids and replaced them with plastic lids. Since worms go to the bottom of any container, you just invert the can, remove one plastic lid and pick a worm from the top of the soil.

—Edward J. Kashmer, Osceola, Ind.



Increasing lathe speed

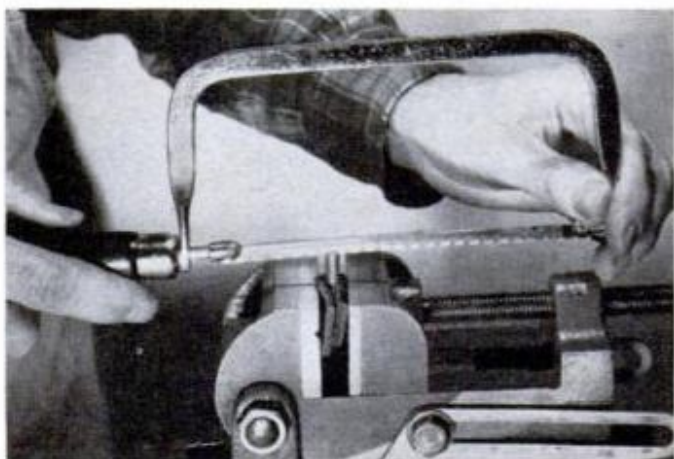
To raise the speed of my 9-in. metalworking lathe from 1270 rpm (slow for small-diameter work, polishing and wood turning) to 3800 rpm, I added an extra 5-in. V-pulley to motor and jackshaft pulleys. The pulley hubs were machined to fit over the projecting stub shafts, bolted to the face of existing pulleys and fitted with a V-belt cut to fit.—Carl A. Traub, Milwaukee



Decorating with pin-striping tape

Pin-striping tape, sold in auto-supply stores, can be used to decorate boxes, picture frames and small objects. The self-adhesive plastic tape is easily applied, can be formed in moderate curves. When a finish is to be used over tape, test its effect first on scrap.

—Burt Web, Skokie, Ill.



Setscrew source

The threaded portion of a bolt, slotted at one end, makes a setscrew for emergency use (it may be less resistant to wear than a hardened one). When sawing the slot, use a scrap of leather to protect threads from vise jaws. Bolt is finally cut to setscrew length.

—Walter E. Burton, Akron, Ohio

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CL-535

DETROIT LISTENING POST

More captive imports

You will be seeing a lot more little cars and trucks imported into the United States from Japan and Europe and sold under the banner of American automakers. The auto companies are worried about pricing themselves out of business with buyers who can't afford to spend more than \$2500 for a car. What with inflation and all the add-ons the government has ordered on automobiles, the carmakers have just about abandoned all hope of turning out a car for less than that figure.

Customers who can't afford Detroit prices can still buy used cars. But Detroit doesn't make anything on used cars. So the plan is to tie in with manufacturers of low-price cars in Japan, Germany, Spain and France and sell the imports in this country. All four domestic carmakers are trying to line up deals with car builders in Japan. Additionally, Ford is exploring the possibility of building a car in Spain for shipment into the United States and Chrysler is doing the same in France.

Pacer to come in three flavors

Pacer, the new compact coming from American Motors early next year, will be available only as a hatchback at the beginning of the run. But not for long. The company is working on two *crème de la crème* versions of the vehicle—a sports job and a lap-of-luxury model. These cars will sell in the \$4000 to \$4500 range.

GM developing two new Fours

Although GM says it looks for the big and medium cars to score a comeback from the pasting they took during the '74 model year, the company has several projects in the works to enable it to pump out more small cars if that's the way the ball bounces. For instance, GM has two additional four-cylin-

der engines under development. They aren't entirely new, because they have been used on GM cars made overseas. But the engines are being updated and modified for use on American cars GM is expected to bring out in 1976 and '77.

Another in-the-works project at GM calls for all full-size cars due for new bodies in 1976 ('77 models) to lose a minimum of 18 inches in length and possibly as much as 25 inches. The mid-size cars will also get the shrink treatment as they come up for new bodies. They will be 8 to 10 inches shorter than current cars.

Small Lincoln on the way

Ford is holding off on putting a scaled-down Lincoln in production until it can look over the competition car, the compact Cadillac coming in February. The littler Lincoln has been in the works more than a year and Ford hasn't felt any particular pressure to accelerate development of the car to try to beat Cadillac to the draw. Ford frequently plays back-in poker in countering new cars from GM. Letting GM go first and then following with a go-you-one-better than the GM original. So while all the basics of the subsize Lincoln have been nailed down, Ford won't freeze final details until it checks out the small Cadillac.

Gaslight dashboards?

Burroughs Corp., which makes computers and office equipment, is trying to interest the auto companies in a gas plasma instrument panel. The idea is that instead of using lighted dials and cutouts to supply information on the dashboard, a gas discharge tube could be used to do the job. Burroughs has rigged up a demonstration dashboard with gas plasma readouts on fuel supply, water, oil level and condition of the battery. The company says it would be easy to sup-

(Please turn to page 62)

He's just won \$25,000,
poured a bucket of champagne
over his head.
He's not going to follow all
that with a boring cigarette.



Viceroy has full-bodied
flavor that doesn't flatten
out. Always rich...always
smooth...always exciting.
Get a taste of Viceroy.
Get a taste of excitement.

Viceroy. Where excitement is now a taste.

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

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

The man who'd than a car.

He doesn't buy a truck like he buys a suit of clothes. He's not thinking of how it'll make him look when he gets into it.

It doesn't hurt that a Dodge looks so good. But what counts even more is the way it's built. Because this man shops with more than his eyes. He's got a nose for trucks, and a feel for trucks. Most of all, he's got a head for trucks.

And he uses them all when he buys his Dodge.

He opens up the hood and takes a long hard look inside. This man does a lot of his own work. And he wants to be sure he can get his hands on things.

Four-wheel drive. Good. Dodge is famous for that, has been since World War II. And this man can make good use of the four-wheel drive.

For one thing, there's rarely a day he does his driving all on a nice paved road. Some days, there's no road at all.

What about the stuff the truck is made of? You hear a man wonder out loud sometimes if they make trucks as tough as they used to. Is the metal still as thick? In a Dodge, it is. The same thick-gauge metal Dodge has used for years. Double wall construction, too. So if he ever dents the inside, it won't show on the outside.

He takes the measure of the payload. He'd better. A man who'd rather drive a truck than a car doesn't leave his wheels at some parking lot



rather drive a truck

all day. He works his truck like he works himself. He spends a big chunk of his day in it. He grows attached to it almost by the seat of his pants.

So it counts that the payload is big. It counts that Dodge has the only tailgate that comes off easily. Without a wrench.

Another thing. This man is rarely a desk jockey. If his truck doesn't work, neither does he.

So he finds a lot of comfort in the Electronic Ignition. What it does is very simple. It eliminates points and condenser.



That means fewer tune-ups and surer starts.

The man who'd rather drive a truck than a car has another rare characteristic: he doesn't head for the highway to get away from his kids. He likes to have them around.

And he'll always be a little bit grateful to Dodge for the Club Cab... so he doesn't have to squeeze the family out.

Next time you're in some spectacular part of this country, keep an eye out for him.



The man who'd rather drive a truck than a car. We're proud so many of them would rather drive a Dodge.



Dodge

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PICKUPS '75

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DETROIT LISTENING POST

(Continued from page 58)

ply additional information on the pollution-control system, tire pressure, miles attained per gallon of gas and the condition of components requiring periodic service.

GM seeking OK on daytime lights

GM is pressing the government for permission to install daytime running lights on its cars. Not on the '75s. But the next model year or the year after. GM says front running lights would more than double daytime visibility.


According to GM's figures, at 50 mph a driver can see an approaching car 1842 feet down the road. With lights, at the same speed, an oncoming car is visible from 3536 feet. GM has suggested hooking the daytime lights up to the ignition, so they would go on automatically when the car is started, then turn off automatically when night lights are turned on.

Hands off government gear

The great uncle in Washington has written a lot of laws covering cars over the past eight or nine years. Do this, don't do that. Up to now, all the legislation has been directed at the car companies and car dealers. But there's a bill working its way through Congress now that, if passed, will apply to everyone, Saturday mechanics included. The gist of it is that no one will be allowed to tamper with any device that has been installed on an automobile by decree of the federal government.

The carmakers and franchised dealers have always been prohibited from tinkering with government gear. But the law doesn't apply to car owners and nondealer mechanics—gas station guys and independent garages. If an individual or nondealer mechanic wants to disconnect the seat-belt interlock or pull the plug on the pollution control system, there's no federal law against it.

There hasn't been a great deal of this, despite what you may have read in the papers about "underground" mechanics doctoring cars to circumvent government-mandated equipment. But now Uncle hopes to close the loophole and put all the "fixers" out of business. ★★★



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HOMEOWNERS' CLINIC

BY W. CLYDE LAMMEY

Tacks are the answer

I have a four-drawer chest with two drawers that are difficult to slide in and out. These do not stick; they just squeak and slide hard in both directions. What's the remedy?—Mrs. R.N. Bush, Albany, N.Y.

If you empty one of these drawers and withdraw it entirely, you'll see a narrow guide strip at the center of the supporting frame. This mates with a grooved slide member attached to the bottom of the drawer. Buy a card of large-head thumbtacks—the ones with plated, slightly oval heads—and drive three of these, spaced equally, into each guide strip. Usually, I find this method better than paraffin or silicone sprays in easing large, heavily laden drawers.

Renegade roses

Two of my rose plantings didn't bloom this season as before, but produced only tiny white blooms, very unlike the originals. I cut them back in late fall so I could cover them with plant protectors. Can you tell me what I did wrong?—J. N. Smith, Northfield, Minn.

Assuming these were hybrids, I would guess that you cut off the grafted, hybrid portion of each of these plants. This causes the plants to "go wild," to revert to the original rootstock on which the grafts were made and to send up "sucker" growth on which the tiny white flowers appeared. If I'm correct, there's no saving the plants and they should be replaced. Be especially careful when you trim the new plantings not to cut below the bud union, or graft.

Cleaning brass plaque

I have a brass wall plaque with a raised design in the center: a team of horses and mowing machine. It looks old and dingy, and when I tried polishing it I had no success. Evidently it's coated with something. Can

you suggest some cleaning method to make it look like new?—M. Iler, Seattle

It's coated with metal lacquer, which must be removed with lacquer thinner, or reducer, to expose the brass. Apply the reducer with a soft cloth and wipe away the coating when it has been softened by the solvent. Then wash the plaque in soapy water, dry it, and use a polish made for brass. After polishing the plaque, rinse it in clean water and, after it is completely dry, apply a fresh coating of metal lacquer, making sure you cover all exposed surfaces.

Parting lamp

I have a table lamp with a brass base. The base seems to be coming apart in two or more pieces. The lamp turns on and off at the socket, but I'm afraid to use it. What holds the base together? On the underside, there appears to be a kind of fiber insert in the base, but nothing to tighten.—Mrs. Jack Kenne, Springfield, Ill.

Table lamps like the one you describe usually consist of several parts held together by a length of 1/8-in. electrical tubing. The socket is screwed to the top end, with the base assembled on the tube and the parts held securely in place by a hex nut turned onto the lower end of the tubing.

The fiber insert you mention is probably installed in the rolled edge of the base with a press fit and can be pried out. Do this carefully so that you do not damage the insert. Removing it should expose the nut, which can be tightened with a wrench or pliers. Examine the cord; if it appears worn or frayed at any point, have it replaced at your electrical shop. ★★

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. While letters cannot be answered individually, 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. HJ4, Box 1014, New York, N.Y. 10019.

Can you spot the Camel Filters smoker?

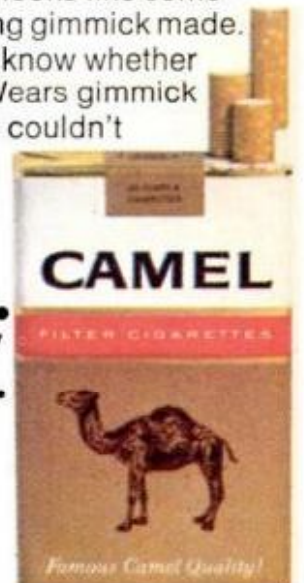


© 1974 R. J. Reynolds Tobacco Co.



Almost everyone at the corral today has a gimmick. Find the one who doesn't. **1.** No. He's Brandon Kowz. Gimmick: Rides tall in the saddle (ever since he sat on a branding iron). Smokes "Quick Draw" cigarettes—one draw and the taste is shot. **2.** No. He's Sid E. Slicker. Outfit is his gimmick: He looks like something that fell off a wedding cake. **3.** No. She's May Aiken Bach. Buys every camping gimmick made. Even her horse opens up into a sofa. Tried an orange-flavor cigarette, but didn't know whether to smoke it—or squeeze it into her drink. **4.** Nope. He's Harry Decamp Kunzler. Wears gimmick on back, especially during hunting season. Was later attacked by a moose—who couldn't read. **5.** Right. He goes back to nature to get away from the fads and gimmicks. Likes his cigarettes natural and honest, too. Camel Filters. No nonsense. All flavor. **6.** No. He's Tim Berwulf. Gimmick: "Expert" tracker. He once followed tracks into a cave—and shot a train.

Camel Filters.
They're not for everybody
 (but they could be for you).



19 mg. "tar," 1.3 mg. nicotine av. per cigarette, FTC Report MAR. '74.

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

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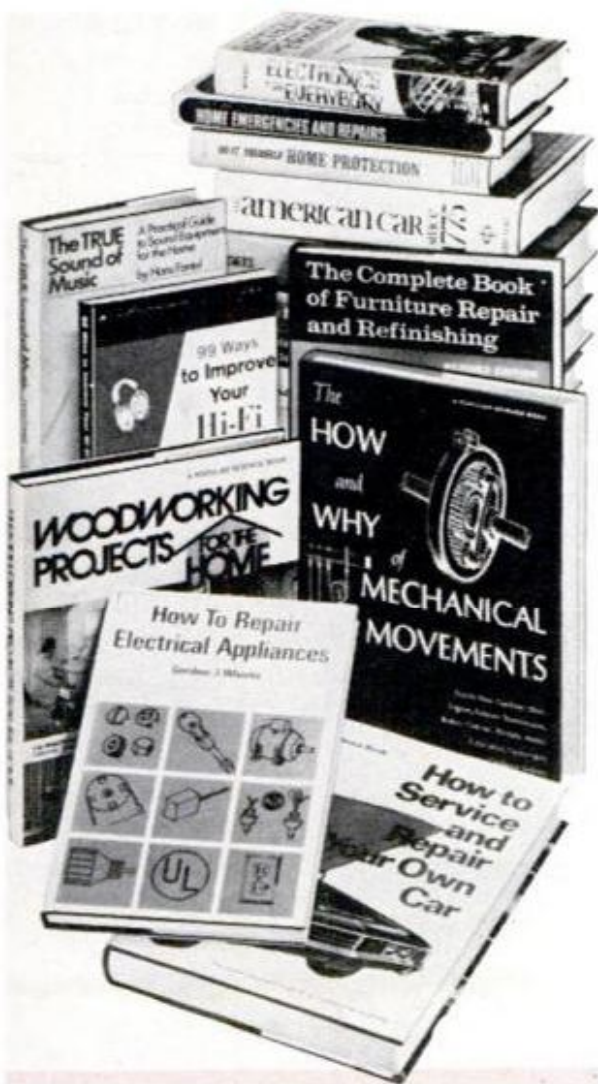
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ALL OUTDOORS

Try it—you'll like it

During a recent tour of the impressive Mossberg gun plant in North Haven, Conn., we had a chance to get the feel of a try-gun from the Pederson Custom Gun Div. It has a stock that can be adjusted for length, shape, pitch and height of comb to your measurements. Some Pederson dealers now have try-guns available and can fit you for a custom-made shotgun. The feeling is luxurious, though it's sad when you realize you're losing one more excuse for misses at trap or skeet.

RVs to the rescue

One new way to plan ahead for the storms that come this time of year—and the power failures they occasionally cause—is to lo-

power, and with their self-contained bathrooms, kitchens and beds, could supply an immediate fleet of emergency vehicles.

Campground light

Recent studies show the nails driven in campground trees to hold lanterns plus the heat from the lanterns that scorches the trunk beneath the bark causes extensive damage. Yet simply suspending the lantern a few inches out from the trunk prevents the subsurface burn.

Coleman has come out with a new lantern hanger that is fastened to the tree with a chain that wraps loosely around it. The lantern is bracketed out, and the problem is effectively solved. A wire coathanger could be veed up at the bottom and used in the same way.



Your camper and their boat combine to make a rental Camp-A-Float houseboat at Crystal Springs Fishing



Village, Royal, Ark. The 12x38-foot craft cruises your RV at 12 mph on Lake Ouachita at bargain rates.

cate friends who have a large recreational vehicle. If their rig is big enough to have a generator, it can often provide quick emergency power for a home. Frequently, all that is necessary is enough current to keep the refrigerator from defrosting and the furnace going so the pipes don't freeze. As John Jasin of Family Motor Coach Assn. points out, generator-equipped motor homes could save the day after a disaster. Driving from home to home, they could provide

Coleman has also announced that its lantern mantles, a standard in the field, have been changed so that they no longer contain beryllium.

A rumor had gone around recently that that substance might be radioactive. Exhaustive tests of workers making the mantles over many years showed they experienced no ill effects, but the additive is now no longer used.

(Please turn to page 70)

QUICK
What's pink,
comes from
Permatex
and makes
you think
of Jelly? *

Well, here's
another one.

Introducing Permatex Naval Jelly.
It just may be the best rust dissolver
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to dissolve. Then, flush it away
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ALL OUTDOORS

(Continued from page 68)



Cycle Camper, from Yamaha Parts Distributors, Buena Park, Calif., neatly packages a tent, tent fly, stove, sleeping bag, cooking gear and fuel bottle, with room to spare for food and clothes inside a steel-framed vinyl zipper pack, and all for about \$200.

Cannondale's large Wilderness Series OP 60 pack uses an internal contour frame of weld-free aluminum that mounts the pack high and close to your back for best balance but allows flow of air across your back. For a narrower profile, remove side pockets and transfer them to back. Cross-country ski loops, tent and sleeping bag straps are supplied. Large model is \$67.50; two smaller sizes available.



Combination carbine from Clerke, this 2-in-1 model over-and-under is a 20-gauge shotgun or 30/30 rifle. The 6½-pound SR uses lever action for simultaneous breaking, shell extracting and cocking. Double trigger permits instant choice of barrel. It's \$195.

70 POPULAR MECHANICS



Instaflam is compact new stove requiring no match. Instead, a pushbutton causes a miniature magneto to spark and light butane cartridge gas. From Garcia's Camping Gaz stove and lantern division, the small unit packs easily with your camping gear.

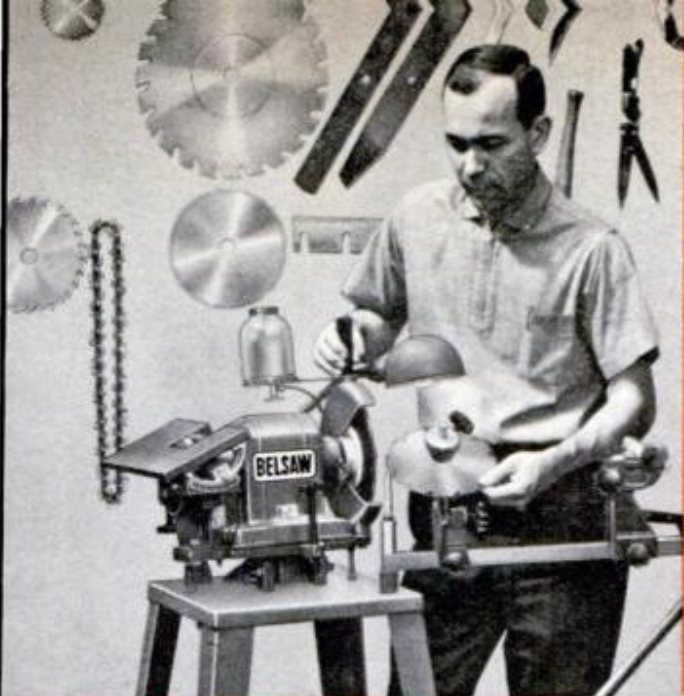


Squirrel Claw, a new climbing handle, fits around trees from 8 to 24 inches in diameter. Used with a climbing stand such as the Fox Squirrel, also from Georgia Archery & Sport, Athens, Ga., the \$12.25 climbing-aid handle can be adjusted in total darkness.



Wild-water canoe race winner in a number of recent events, the new Canadian 18½-footer has an asymmetrical hull design reported to be more responsive and dry in rough conditions. The 75-pound hull, from Moore Canoes, Indianapolis, is molded to deflect waves.

(Please turn to page 70B)



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ALL OUTDOORS

(Continued from page 70)

New under sail



Boat sections (above) look more like nesting bathtubs, but, at 38 pounds each, are easy to cartop, can form a luggage enclosure with one inverted over other, or ride on inflated pontoons (below) to become the 14-foot Gadfly, made by Cat Marine, Hermosa Beach, Calif.



Catamaran underway after only five minutes for assembly and inflation. cartop container is now a Gadfly runabout and can mount engines up to 7½ hp, carry four passengers. About \$600. Smaller 12-foot Fisherman carries two, four-hp outboard, is \$495.

Rigged for sailing, Gadfly can mount 65-square-foot catboat sail, with leeboards and a rudder added, for \$250. Or for faster performance, a 53-square-foot mainsail and a 47-foot jib provide a sloop rig (right) with aluminum spars that collapse into nine pieces for easy carrying. Sloop kit is \$380. Gadfly offers good-sized sailboat without trailering.



Looking for warmer weather products to add to its wintry Ski-Doo snowmobile line, Bombardier Ltd. in Canada is introducing a cat-rigged sailboat, the Invitation, joining fleet of newcomers that resemble the popular Laser. It is 15½ feet overall, has 5-foot beam, carries 90 square feet of sail on 22-foot, two-section aluminum mast. The fiberglass hull weighs 165 pounds. Invitation is \$1000.



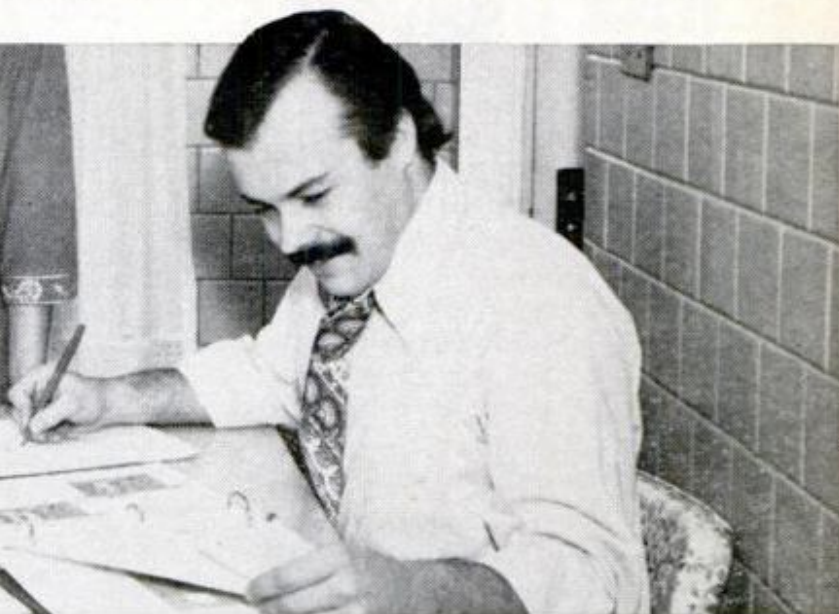
Force 5, new single handler from Alcott Div. of AMF (the Sailfish and Sunfish builder) mounts a big 90-square-foot, loose-footed sail on an unstayed mast. Designed for fine tuning and high performance sailing, she can be trimmed even while skipper is hiked out, with dual controls for outhaul, Cunningham, vang, sheet and traveler. She's 13 feet 10 inches, \$850.



AeroCraft canoes from marine division of Browning Arms are available in five models from 11 feet to the 17-foot Apache model shown above. All can mount the 45-square-foot lateen-rigged nylon sail, plus rudder, leeboards. Foam collar on gunnels aids flotation.



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"I wanted more. I'm married now and we have a beautiful baby girl. But, with shift-work I couldn't get to school, even if I could afford the thousand dollar tuition. And, I couldn't imagine going to class with a lot of guys younger than me.

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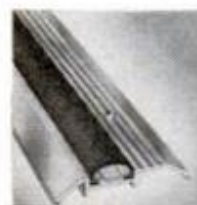
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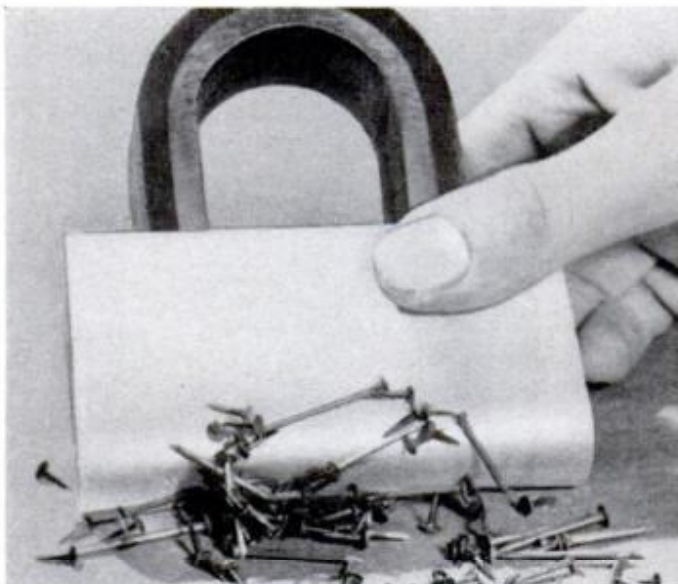
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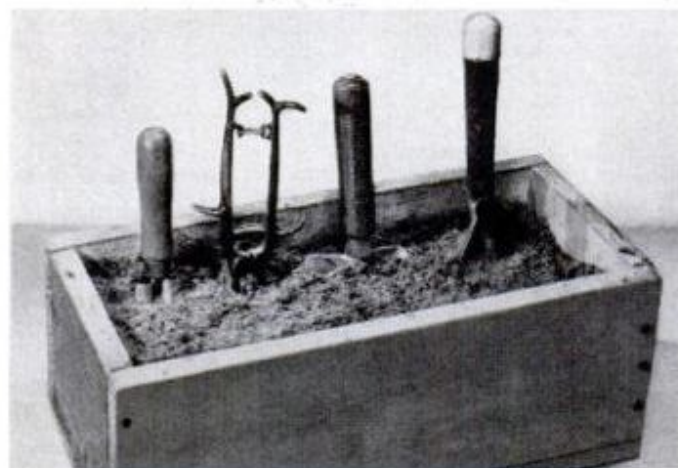
HINTS

FROM READERS



Trick speeds magnet pickup

Picking up small tacks with a magnet is no problem, but getting the pointed objects off often is. It's easy with a piece of thin paper folded over the poles—you can readily drop the items into container or waste basket.—*William Swallow, Brooklyn, N.Y.*



Rust-free, garden-tool storage

I keep my small steel garden tools from rusting between seasons by storing them in sand that has been well saturated with oil. The same method could be used for storing larger tools. The oil is wiped off before use.—*Victor Lamoy, Saranac Lake, N.Y.*



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Roll-away 'workshop' holds both router and drill stands

by Paul D. Fiebich



Steel router table, bolted to hinged shelf, converts portable router into a handy shaper. Table retracts and stores in cabinet when you wish to drill.

Wheels on rear legs let you roll this compact mini workshop to the job or stow it away in a corner—just the thing for a handyman with limited space.



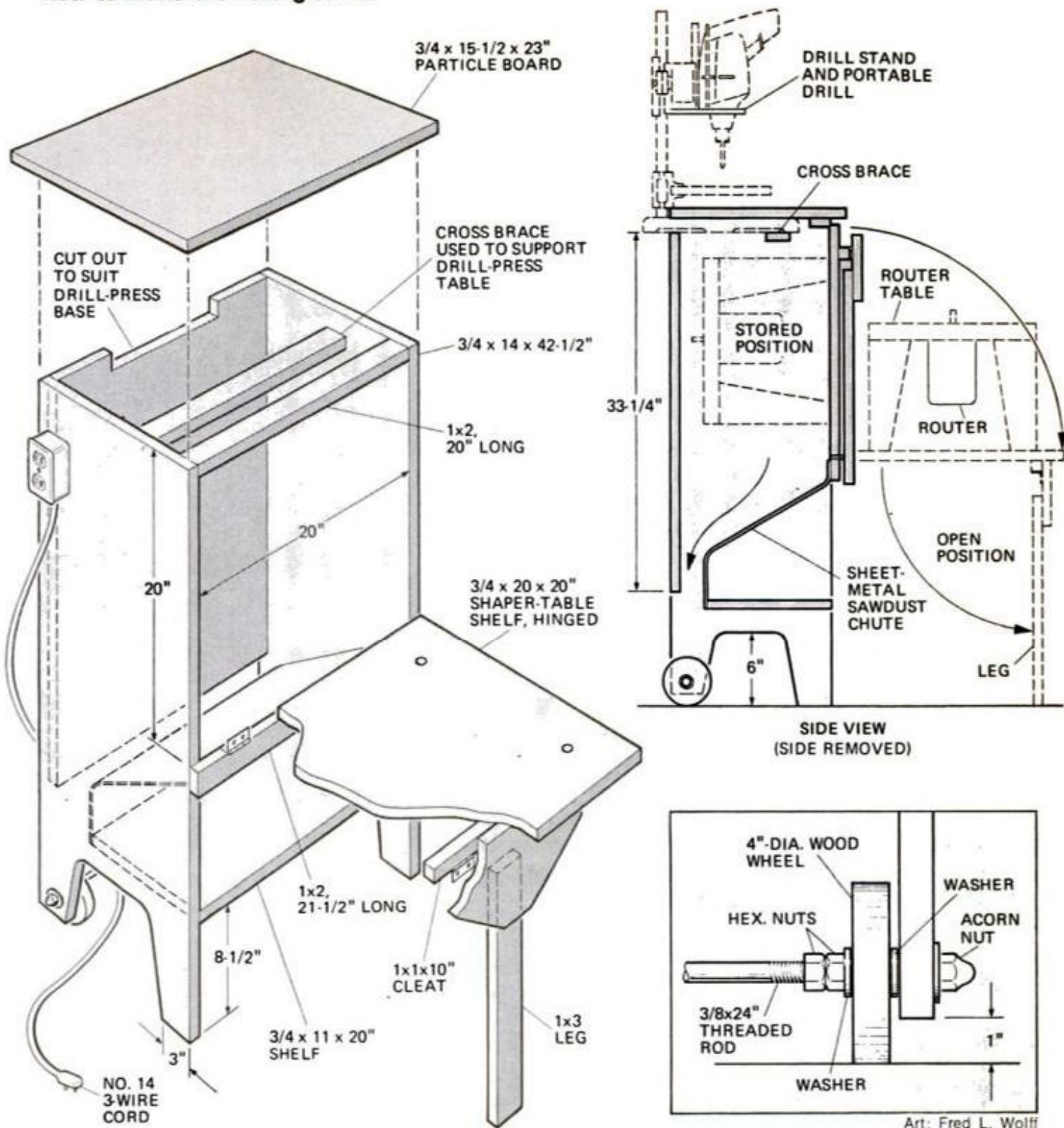
Designed so you can wheel it about like a hand truck, this compact tool cabinet provides a dandy place to mount a portable-drill stand and a portable router table. What's more, there is an open shelf below where you can store a sabre saw, circular saw and finishing sander. For the man whose "workshop" consists mainly of portable electric tools, you won't find a handier set-up anywhere.

Bolted to a shelf, the router table re-

tracts into the cabinet when the shelf and supporting leg are swung upward, and a built-in sheet-metal chute funnels wood chips from the router to a catch box at the rear. With the base of the drill stand anchored below the cabinet's top, the latter offers a king-size drill-press "table."

I designed the cabinet for my Shopmate drill, Sears drill stand and Sears router table, although it can be made to suit other makes of tools. While I used $\frac{3}{4}$ -in.-thick

How to make the rolling stand

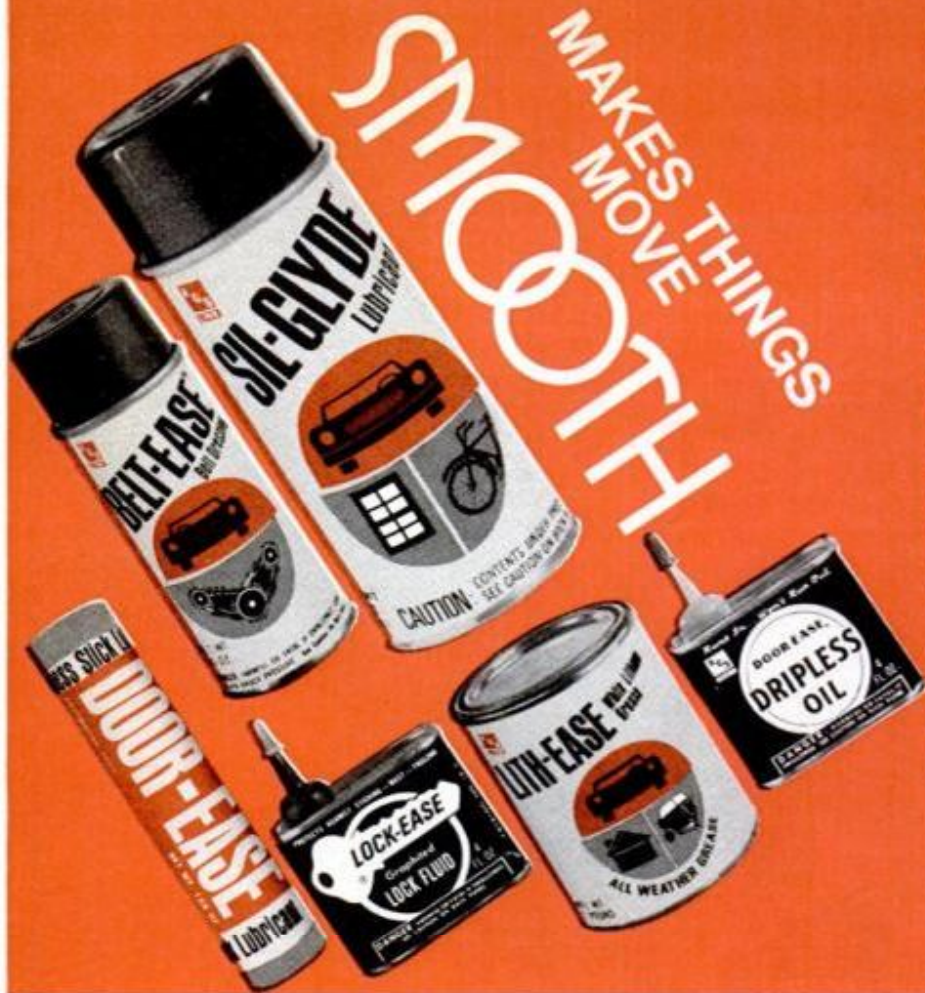


particle board, the cabinet can be made of fir plywood. Both ends of the cabinet are alike and are nailed to a 20 x 34 $\frac{1}{4}$ -in. back, an 11x20-in. bottom shelf and a 1x2 top rail 20 in. long. A second cross rail 20 in. down from the top supports the sheet-metal chute at the front. The 4-in. wheels and supporting $\frac{3}{8}$ -in. axle must be in place, of course, as side members are glued and nailed.

The supporting leg for the router-table shelf is hinged to a 1x1 cleat glued and

screwed to the front face of the shelf, then the shelf itself is hinged to the top edge of the 1x2 cross rail.

The side-view drawing shows how the base of the drill-press stand rests in a notch cut in the back panel and is bolted to a cross brace installed between the end members of the cabinet. A surface-mounted duplex receptacle on one side of the cabinet fitted with a 6-ft. cord provides a plug-in for each portable tool. ★★★



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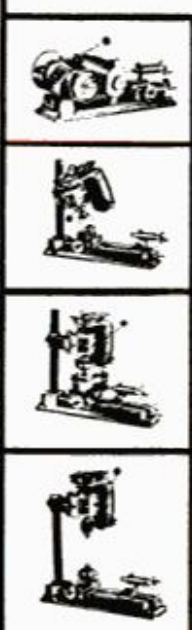
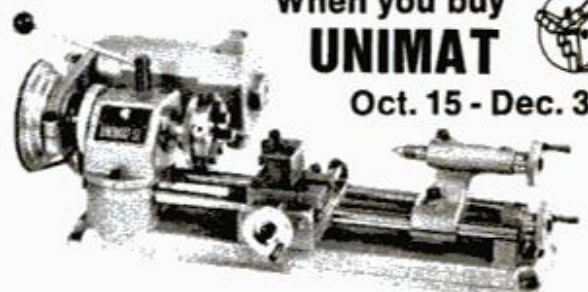
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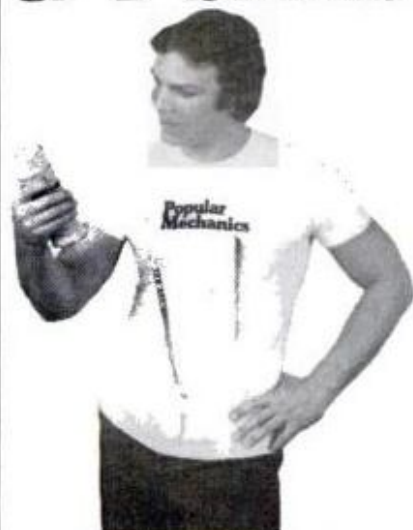
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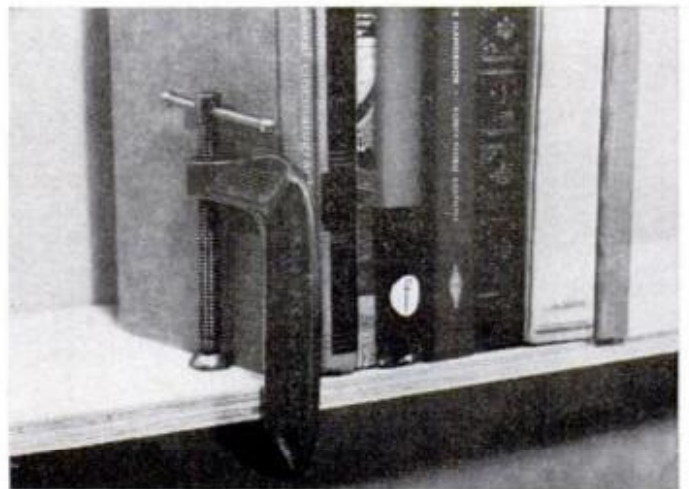
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—C. E. Banister, Pomona, Calif.



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Only NRI offers complete TV/Audio Servicing Courses from \$312 to \$995 . . . with easy budget terms also available. In the Master Course in color TV servicing, with its 25" diagonal solid-state color TV, you save as much as \$800 over other comparable courses. And you get a handsome TV cabinet at no extra charge!

NRI saves you money because we pay no salesmen, and we design our own kits and equipment. We pass that savings on to you.

Compare choices

NRI offers you not one but five courses to match your needs. The 65-lesson basic course costs as little as \$312. Or you can step up to a \$425

course that includes a 12" diagonal b&w TV. The 19" diagonal solid-state color TV course is \$695; the advanced color TV course for technicians (with the 19" TV) is \$535; and finally, the magnificent 25" diagonal solid-state color TV course, complete with console cabinet, oscilloscope, TV pattern generator, and digital multimeter for \$995.

Compare training

NRI maintains its own full-time staff of technical writers, editors, illustrators, development engineers and publications experts. The people who design the kits also design the lessons . . . so theory and practice go hand in hand. Along with each course, NRI provides bite-size, fully-illustrated lessons; personally graded tests; and the kind of person-to-person teaching that makes learning easier and faster.

Nearly one million students have enrolled with NRI. NRI graduates will tell you: you can pay more, but you can't buy better training.

Compare equipment

Don't just count kits. Count the experiments . . . compare the components. NRI has engineered the widest variety of electronic lab equipment ever designed for training at home. When you enroll in the Master Course in TV/Audio Servicing, you receive kits to build a solid-state, triggered sweep, service type 5" oscilloscope; color pattern generator; solid-state radio; and digital multimeter.

Send for the free NRI full-color electronics catalog. You'll find courses offered in TV/Audio Servicing, FCC License, Complete Communications Electronics, Marine and Aircraft Electronics, Mobile Communications, etc.

**Mail For FREE
NRI Catalog.**
No salesman will call.



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Ford and your Ford Dealer

Introducing two

Compare them with any

on any basis

Here are some facts on the new Fords to help you compare:

Look close at durability...

Over 200 sq. ft. of the 1975 Ford Styleside pickup's metal surface is galvanized to resist corrosion. Styleside pickup boxes are constructed with coved corners to reduce corrosion-breeding seams. A 4-coat painting process creates a durable protective finish.

There is double-strong construction in all these key areas:

- double quarter panels in cabs
- double cargo box sidewalls... double-walled tailgate
- double-wall doors
- double-wall fenders have built-in galvanized fender aprons
- double hood sections for strength

Result of Ford's high-durability engineering: *More than 92 out of every 100 Ford trucks built in the last 12 years are still on the job, according to figures furnished by the R. L. Polk & Co.*

Check ride and handling...

Ford's exclusive Twin-I-Beam front suspension is not the conventional car-type front end you find on many pickups. Ford's two forged I-beam axles give you real truck strength plus easy handling and smooth ride.

The Ford pickup is quiet because it's a Ford. Solidly engineered...carefully crafted.



Built-in air conditioning permits full legroom.



Coved box corners. Reduces corrosion.



Double-wall strength in key areas.



Gas tank is out of cab, inside frame.

Look close at economy...

New power with 6-cylinder economy is delivered by Ford's 300 Six, now standard in most models. Economy V-8 is Ford's 302, smallest V-8 in the industry.

- New solid-state ignition in Ford F-100's reduces scheduled maintenance.
- Radial tires offered on most models.
- New fuel monitor warning light "reads" the engine to let you know when you are not in the most economical driving range.
- Ford's high trade-in value is your ultimate payoff: used vehicle "blue books" show Ford pickups among the leaders in this important dollars-and-cents category.

And Ford pickup sticker prices are well under most mid-size cars. Feature for feature, dollar for dollar, Fords are a solid value for '75.

Free book helps you compare...

Ask your Ford Dealer for the new free book, "THE CLOSER YOU LOOK AT PICKUPS." Covers pickup quality, durability, operating economies, resale value.



New F-150 Ranger XLT with Regular Cab

invite you to look close...

new '75 Fords. other pickups you choose... you wish.



New Ranger XLT with SuperCab

New Family Duty SuperCab Pickup

Ford's 2-door SuperCab is roomy enough to seat a family of six. Options include a full-width foam rear seat or dual foam-padded jump seats, pictured at right.

SuperCab's rear floor measures 5½ ft. wide, over 2 ft. front to back. It holds up to 44 cu. ft. of extra cargo in the protected, lockable space behind the front seat.



Full-width seat folds flat like wagon for cargo.



Dual, foam jump seats fold out of way for cargo.



Easy entry to big cargo space from either side.

New Heavy Duty ½-Ton Pickups

New Ford F-150 Series...available with either regular or SuperCab...carry up to a ton of people and payload. They use either leaded or unleaded fuel.

Ford Cabs have 66 inches of shoulder room, seat three big men in comfort. Seat is full-foam, 7 inches deep. And even the regular cab has a storage space behind the seat.

Ford Pickup choice includes 4-wheel drive, Camper Specials to 10,000 lbs. GVW, trailer-towing GCW's to 18,500 lbs., 4-door crew cab models. Look close at all the '75 Ford pickups at your Ford Dealer's.

FORD SERIES	GVW RANGE	USABLE FUEL
F-100	4650-5700	Unleaded
F-150	6050	Unleaded or Leaded
F-250	6200-8100	Unleaded or Leaded
F-350	6600-10,000	Unleaded or Leaded

Look close...at your local Ford Dealer's.

FORD PICKUPS

FORD DIVISION 

Pickups shown are equipped with optional whitewall tires, rear bumper, radio; SuperCab has two-tone paint.



Coleman

A Coleman Stove.

Sturdy. Dependable. Sure-fire cooking power when and where you need it. Without fail. Because Coleman doesn't believe in cutting corners.

Take the rugged steel case. It's coated inside and out with baked-on enamel. Now that's hard to beat.

And the fuel tank. It's steel too. Then copper brazed so it can't rust or leak. Ever.

And the stainless steel burners. They'll never corrode or burn out. And they deliver over 25,000 BTU's of heat. That's more cooking power than you'll find on any other stove, anywhere.

Then there are the Coleman extras. Like a built-in pump. And an instant heat control. And folding wind baffles that keep drafts down, cooking efficiency up.

Like we said. Coleman doesn't believe in cutting corners. Our gas stoves prove it.

Ask someone who has one.

Greatest name in the great outdoors for lanterns, stoves, coolers, jugs, heaters, tents and sleeping bags.



Build this charming colonial trestle desk

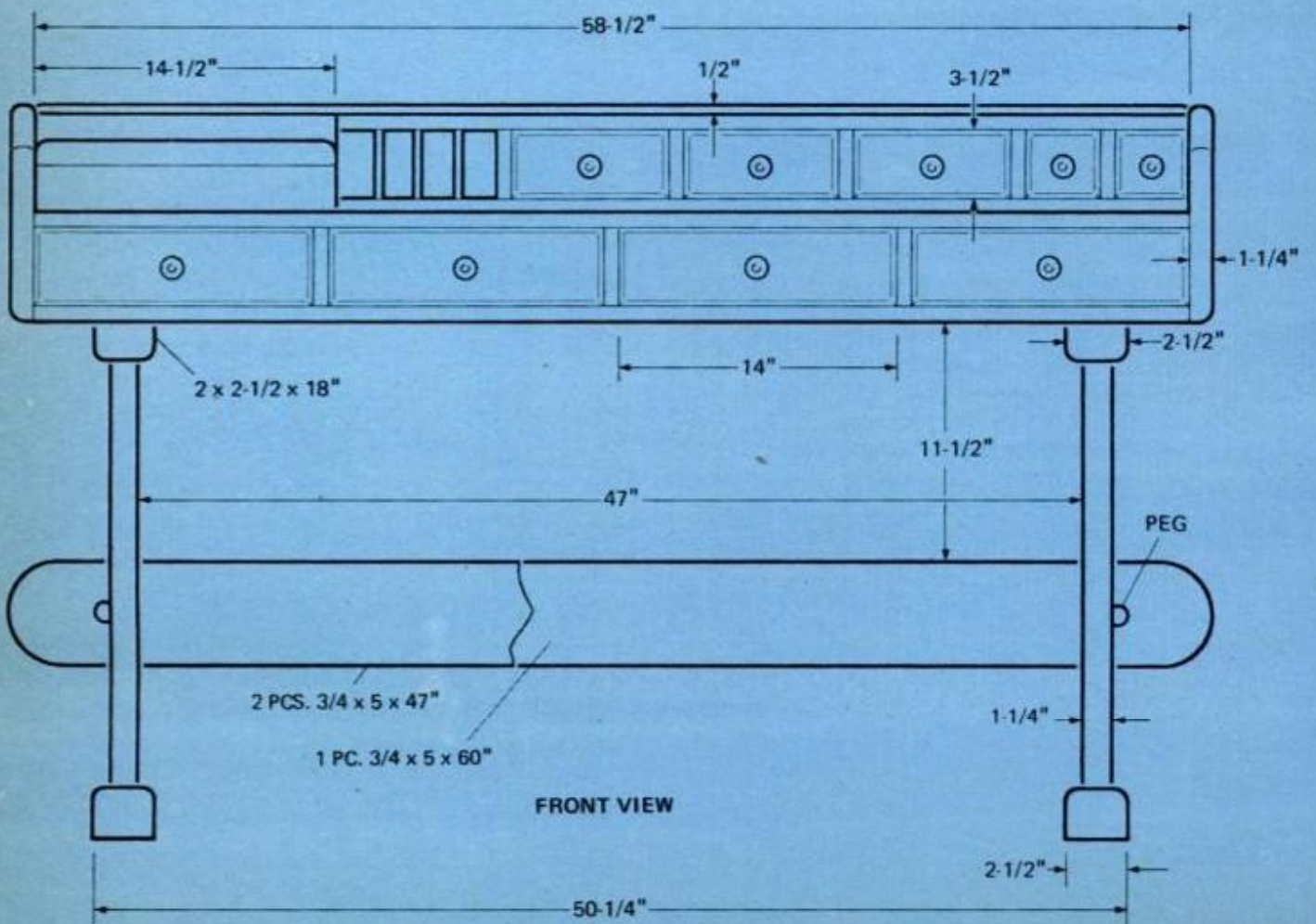
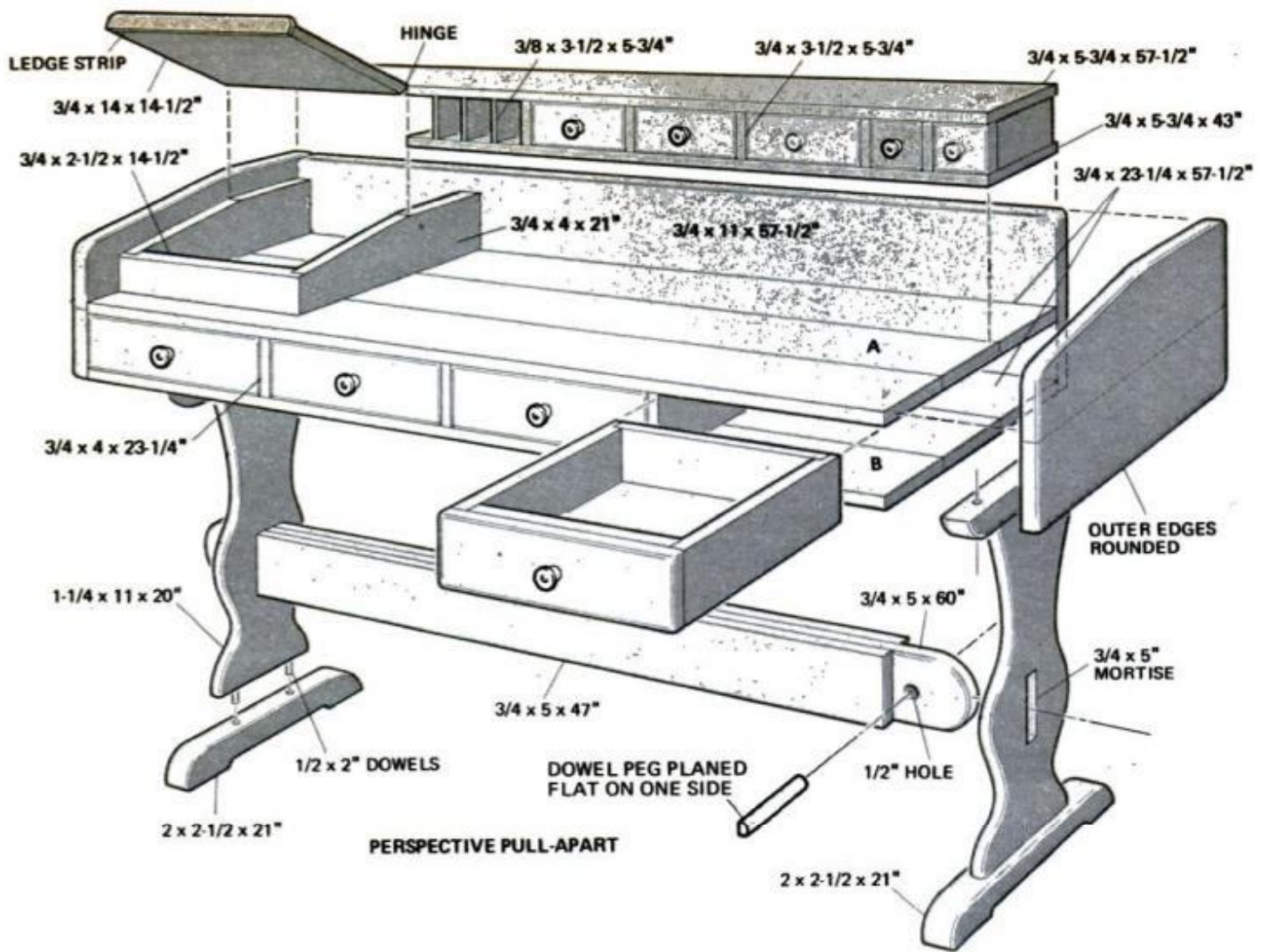
by Louis J. DiLullo

Color photo: Robert D. Borst



Because of its classic simplicity, this desk is easy to make—and just as easy to fit into almost any style of decorating. For casual correspondence or serious study, it's a handsome piece you'll be proud of.

Turn the page for complete plans and instructions for building it and for giving it an authentic finish.





Access to slant-top storage compartment at left side of desk is by its hinged writing surface, which lifts.

Here's an Early American reproduction that you and your family will treasure for years to come—a charming colonial trestle desk. I reproduced it in white pine for about \$60, but it has a market value of well over \$300.

To copy this fine period piece, start with parts A and B, the desk's top and bottom. Cut six boards $\frac{3}{4}$ x 8 x $57\frac{1}{2}$ in. Then glue, dowel and clamp them together edgewise to make two $\frac{3}{4}$ x 24 x $57\frac{1}{2}$ in. panels. When the glue dries, trim the panels to a finished width of $23\frac{1}{4}$ in.

Desk ends. Cut four pieces $5\frac{1}{2}$ x 24 in. from $1\frac{1}{4}$ -in. stock and glue them together to make two 11x24-in. boards, using bar clamps and dowel pins. Next, glue and dowel $\frac{5}{8}$ x $1\frac{1}{4}$ -in. pieces (end caps) to the ends of the glued-up end pieces to conceal the end grain. Now lay out the ends, following the shape and dimensions given. Cut to size and shape and round the four outer edges of each.

Assembly of top members. The narrow top shelf measures $\frac{3}{4}$ x $5\frac{3}{4}$ x $57\frac{1}{2}$ in. After a thorough sanding, position the top, bottom and shelf members against the ends and mark. Allow a 4-in. space between the three to accommodate drawers. Position the top member $\frac{1}{2}$ in. down from the top of the ends and $\frac{3}{4}$ in. from the rear to leave space for a $\frac{3}{4}$ -in. backboard. Next, drill and counterbore the ends for No. 10 x $1\frac{1}{2}$ -in. flat-head (fh) screws, spacing them evenly for attaching the top, shelf and bottom members. Use glue, drive the screws, plug the counterbored holes and sand.

Hinged-lid compartment. Cut the front piece $\frac{3}{4}$ x $2\frac{1}{2}$ x $14\frac{1}{2}$ in. and the two side members $\frac{3}{4}$ x 4 x 21 in. Preassemble the compartment, then install the members with glue and screws. The grain of the hinged lid should run crosswise or the same direction as the desktop grain. Here $\frac{3}{4}$ x 1-in. strips are added to the end-grain edges. Overall size of the lid should measure 14 x $14\frac{1}{2}$ in. including a $\frac{3}{8}$ x 1-in. strip added to the front edge. Attach the compartment's lid with a $1\frac{1}{16}$ -in.-wide piano hinge.

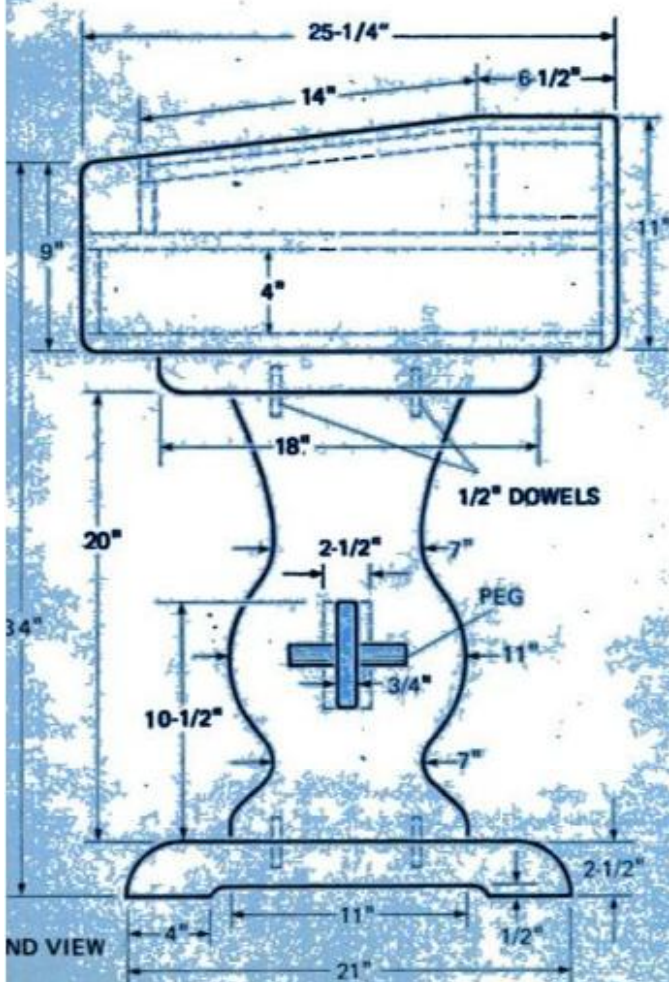
Drawer and envelope compartments. Cut the drawer separators 4 in. wide and glue them in place between the top and bottom members and between top and shelf. Make sure the separators are installed squarely and parallel, using glue and brads. Separators for envelope pigeon holes should be cut from $\frac{3}{8}$ -in. stock.

Drawers are made following simple rab-

(Please turn to page 173)

OCTOBER 1974 79

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Greeting cards from your own photos

Photo: Steve Fay Studio



Custom Christmas cards include your snapshots printed on commercial cards (center), in commercial folders (left), or in homemade folders like the red Afghan card above. Techniques on following pages are for black-and-white, can work for color, too.



Black-and-white cards are easy to make at home. For details on making those shown here, see text and illustrations on the next few pages. But if you want them for this Christmas, now's the time to start, before you get caught up in your Christmas shopping.

by Mark Fineman

Photos by the author

Would you like to send a truly unique card this year? Greeting cards which incorporate photographs are certainly that, and with a bit of care can be quite professional looking as well.

If making your own cards seems like too big a project to tackle, many commercial processors and photo and department stores offer services which combine your favorite prints or slides with a standardized holiday message. Most of the commercially composed cards are in color and vary in price from about 25 cents to 50 cents per card, depending upon their complexity. But cards you print yourself will undoubtedly cost less, and they can be made for all occasions.

Start with a good negative—one that requires no specialized printing techniques such as burning-in or dodging. Such tricks are too much trouble when you have to turn out cards by the dozen. The picture should have good contrast and be sharp, too.

Pick your envelopes as soon as you decide what type of card you want to make, since the envelope controls the size of the finished product. Most stationers stock envelopes in many different sizes and colors, but that won't help you if you've printed up a batch of cards for which no suitable envelopes are available. (Of course, you could always

make your own envelopes, or design a self-mailing card with a flap that folds over to protect the picture and to carry the stamps and mailing address.)

One of the simplest cards consists of a photograph mounted on a piece of cardboard with space for a handwritten greeting or message. Mounting can be a problem, however. Dry mounting tissue is best, but it's also time-consuming and requires a dry-mounting press for best results. Kodak mounting cement or 3M spray-mounting adhesive will work reasonably well but may present difficulties if the prints are wrin-



Personalized tree ornament is made from one high-contrast negative combining greetings, directions on how to cut and fold, eight triangular photos.

In-the-camera card-making short cuts

kled. I've even used plain old rubber cement; with this the print may separate from the board over time and the solvents may effect the clarity of the print, but if you know that the card will only be viewed for a short period of time (no more than a month or two), rubber cement may be your best bet. It's easy, it's cheap, and excess amounts can be rubbed off with the tip of a finger.

Art supply stores carry an array of mounting boards, and I have found that an ordinary card can be transformed into a dazzler by picking the right color or texture for the surrounding mount board. Silver matte board, which lends a rich elegant tone to even otherwise commonplace black-and-white photographs, is especially effective.

Some card designs require tricky dark-room work; but if you're not adept at this, or lack time, you can take a lot of shortcuts with your camera. A time-honored way is to combine members of your family and their greeting in one shot by posing them with a letter sign bearing the proper message or with a symbolic prop, such as a Christmas tree.

I discovered still another in-the-camera card technique under the strain of making birth announcements for one of my daughters. I had taken a roll of 120 film of mother and daughter in the hospital, expecting to enlarge one frame for a birth announcement. The contact sheet of negatives was so interesting, though (at least to me and to our relatives) that I sent out contact sheets of the entire, 12-exposure roll, instead, less one frame for which I substituted the baby's name, birth weight and arrival time.

With some careful planning the contact-sheet method also can be used to make several cards at once. By repeating the same sequence of pictures three or four times, (see photo at far right) a single proof sheet of 120 film will yield several multiple-picture "cards" which can be mounted or sent as-is, a considerable saving in darkroom time. And since this type of card doesn't require an enlarger, it's ideal for those just getting started in darkroom work.

You can also put four *enlargements* on a single sheet of paper. It saves surprising amounts of time and aggravation: no more cutting paper in the dim illumination of a safelight, no more shuffling tiny chips of



Adding a simple easel back turns flat prints into stand-up keepsakes. Easel can be oriented for horizontal or vertical photographs, as you require.

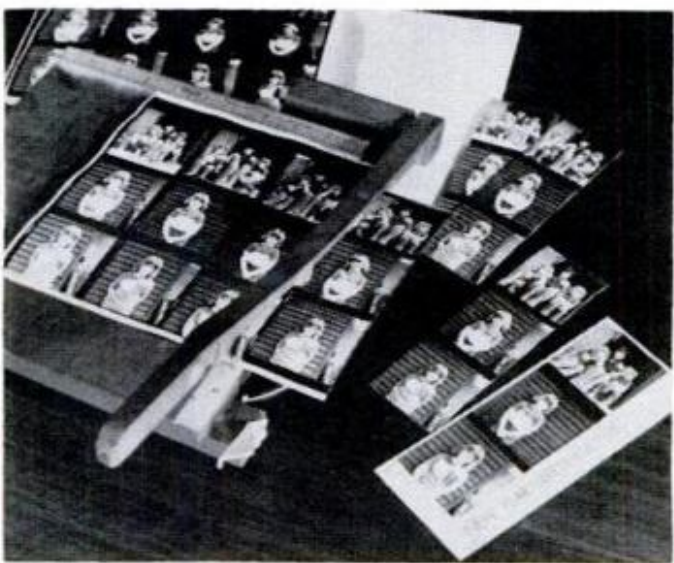
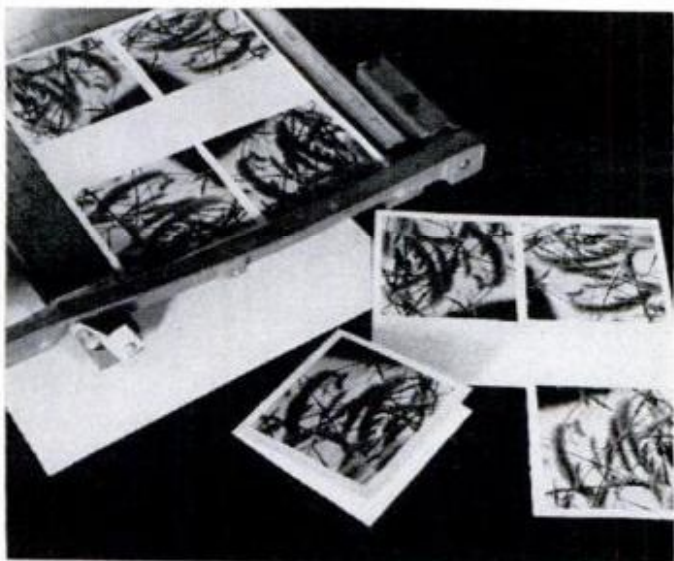


Combining greetings and photo on one negative for easy, one-step printing takes time in the beginning, saves it in the end. Here, greetings are lettered with Prestype onto high-contrast print (see text); reshooting on high-contrast film results in negative (above) from which you can make as many prints as you like.





For easy multiple printing, mask off all but one corner of your photo easel with opaque cardboard (above) so that cardboard swings up with the easel's masking frame. Insert paper for first exposure, then turn it 90° for each of three additional exposures. Now you can process the four prints as one, cutting them apart (below) once they've dried, and attaching them either to homemade greeting folders or to the commercial ones sold by camera stores and photofinishers.



Triple print was really made in camera. Author shot family together, then each daughter separately, repeated sequence four times to fill the roll, then contact-printed all four sequences at once. Each strip of three is mounted on a card for mailing. A self-timer would get you into the picture, too.

paper through the developer, stop-bath and fixer—instead, you just process one nice, big 8x10 for each four prints, then cut them apart in full room light when they're washed and dry.

Here's how: Make a simple mask (as shown at upper left) by cutting a 3½-inch square from one corner of an 11-inch square of heavy cardboard. Adjust the easel's masking bands (if it has them) for a 3½-inch square print, then tape the mask to the easel's hinged upper masking frame with black tape. Insert the 8x10 paper, make the first exposure, then rotate the paper 90° for the second exposure. Continue, rotating after each exposure, until all four corners have been exposed. Then process the sheet and cut apart the individual prints to mount on your cards.

There are a lot of other darkroom tricks you can use for greeting cards, limited only by your skill and imagination. But high contrast techniques are probably the most important for home cardmaking.

That's because photographs are continuous-tone, with many gray values between black and white, while your written or printed greeting message should be high contrast—pure black and white with no intermediate gray tones, like printing.

Prestype lettering, available from art-supply and some stationery stores, can be a big help here. If the picture you're using for your card has large, dark areas, you can print it through a clear acetate sheet the size of your final enlargement, with your message, in black Prestype, on the portion of the sheet overlaying the dark sections of your final print. The lettering will hold back the light, leaving unexposed "shadows" on the print which will stay white while the exposed areas around them develop and darken. The acetate must be at least as big as your final print, though, or its edge will leave a permanent shadow, too. And you must be very careful not to scratch the acetate or get it dusty, lest the scratches and dust "print," too.

If your negative is big enough, you can sandwich it with a Prestype message in smaller letters and enlarge the two together. However, the message may not be as clear a white, and sharpness may suffer.

You can also combine your photo and a

(Please turn to page 174)

The bean that's making meat obsolete

Scientists are finding new ways to use the soybean, a staple for thousands of years, in creating new foods for a hungry world.

by Franklynn Peterson

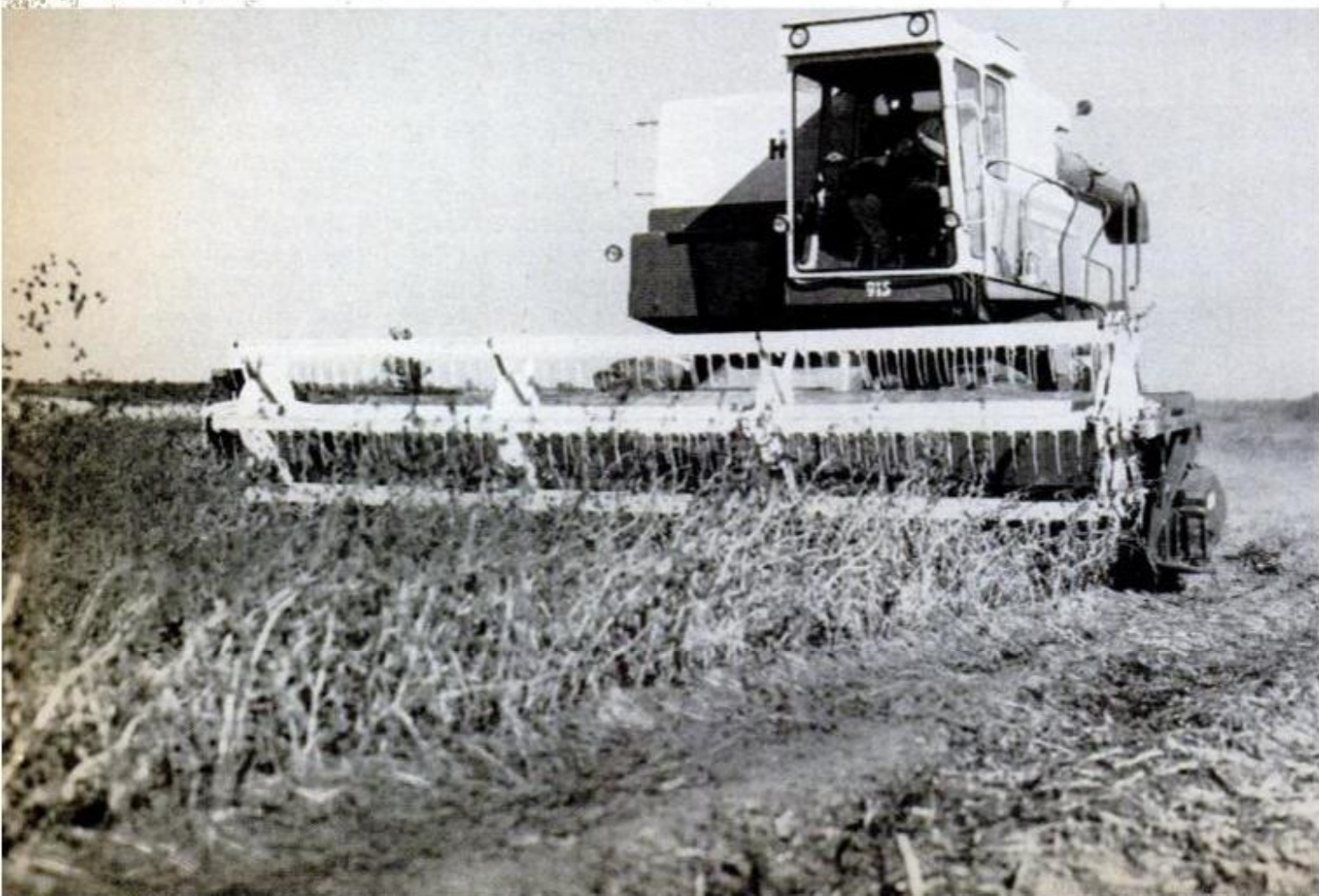
Soybeans, one of oldest crops grown by man, thrives in corn-growing areas like our Midwest. Last year, American farmers harvested 1.3 billion bushels.

Scientists are taking part in a gold rush, these days, fully as exciting as the 1849 rush to California. This time the quest is not gold dust but the protein and other valuables held in a hard nugget called the soybean.

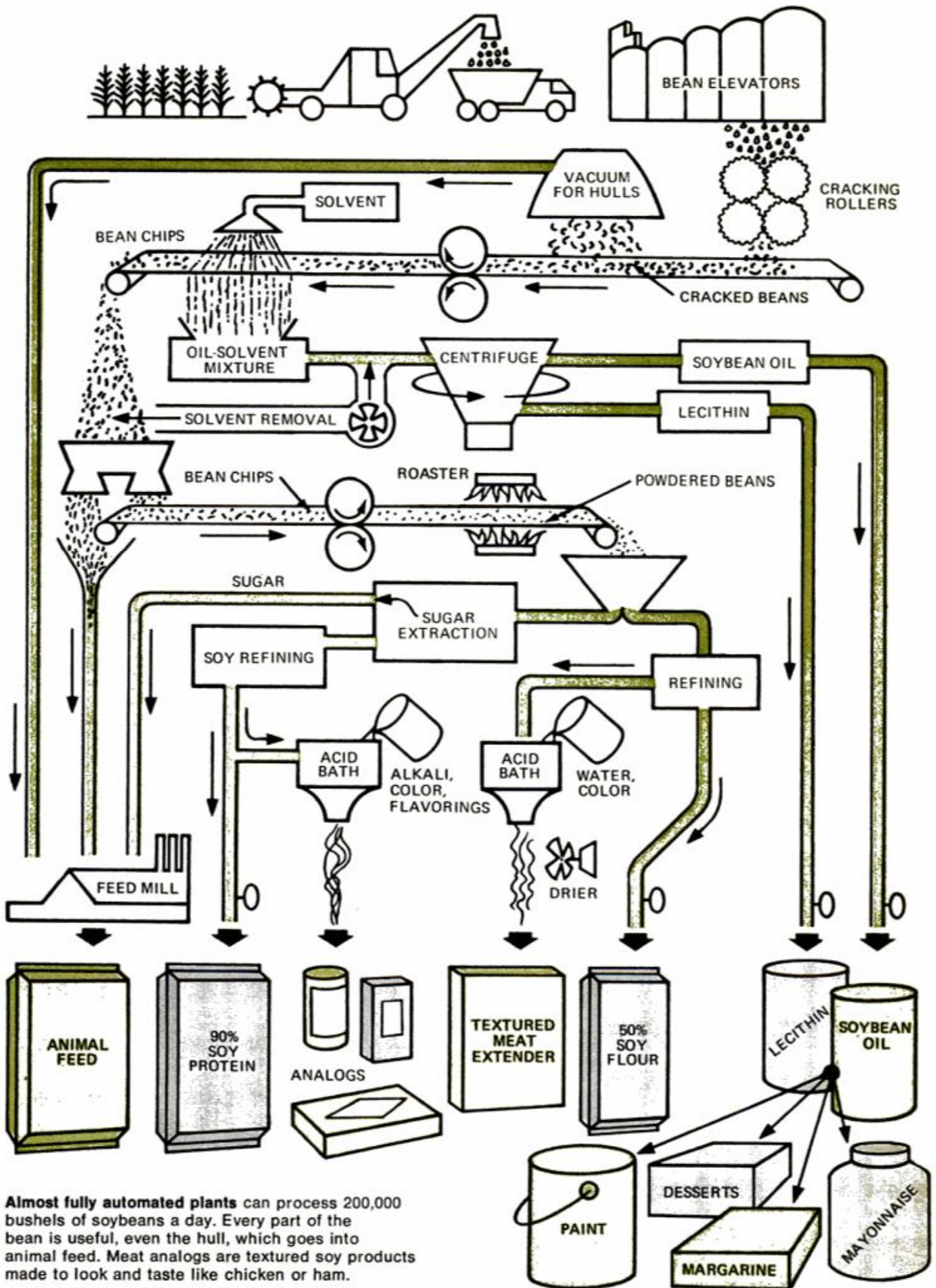
Soybeans were a food staple in China some 4000 years ago. But they remained an oddity in the United States until George Washington Carver, who tamed the peanut, discovered their great potential. Nature has packed the soybean with double the percentage of protein found in beef, three times the percentage found in eggs, and 11 times the percentage in whole fresh milk. Oil in soybeans is very low in cholesterol. So from the standpoint of nutritionists, the soybean is a near-perfect food.

Farmers regard the soybean as the nearly perfect crop. Soybean plants aren't fussy about how much water they get most of the year. And by simply spreading its leaves to the sunlight and going through a couple of chemical steps, the soybean plant takes nitrogen from the air and uses it to make protein. Crops such as corn, wheat and barley can't perform that trick; they have to get nitrogen from expensive fertilizers.

The United States lies in the ideal latitude zone to give the soybean its optimum growing conditions. Three quarters of the world's



When processing plant takes over



Almost fully automated plants can process 200,000 bushels of soybeans a day. Every part of the bean is useful, even the hull, which goes into animal feed. Meat analogs are textured soy products made to look and taste like chicken or ham.

A bean of many uses

crop is raised in the United States. Illinois alone grows more soybeans than any other major soybean-producing country, such as China, Brazil and Soviet Russia.

In a broad belt ranging from Minnesota to Mississippi, and Nebraska to New Jersey, bushy, low plants, each holding a dozen or so fuzzy, green pods, soak up the sun and rain from May through September. When nature's work is done and the plants have dried out, giant combines move through the fields to capture the half dozen or so pea-sized beans in each pod.

Trucks, trains and barges, often containing nothing but soybeans, head for the grain elevators and soybean processing plants. The almost fully automated plants in the soybean's capital city, Decatur, Ill., can process close to 200,000 bushels of soybeans a day. Memphis, Tenn., and Mankato, Minn., are also large processing centers.

At the mill, the tough little beans are crushed, roasted, treated with solvents and acids, centrifuged, powdered and otherwise altered and refined. No part of the bean is wasted. The final products range from soybean oil and other foods to agents used in paints and varnishes. When refined to an extreme degree, the bean becomes a white powder that's about 90 percent protein.

Every cell of the human body, whether skin, muscle, nerve, blood or bone, is composed of protein. New supplies have to be eaten every day to maintain good health.

A thick Kansas City steak is a great source of protein, but who can afford to eat one regularly? Market conditions aside, meat is relatively more expensive than vegetable protein because farmers have to feed several hundred pounds of protein to a steer in order to end up with 100 pounds of beef protein for dinner tables.

Around the world, less than 30 percent of all food protein comes from meat, poultry, eggs, fish and milk products. The rest is from vegetable sources. Nature packs the soybean with an almost perfect package of the eight essential amino acids that make up basic protein. If any one of the eight is missing, the body is unable to put the protein intake to its best use. Most cereal grains such as corn, rice, oats and wheat are quite deficient in an amino acid called lysine. Corn also lacks tryptophan and rice



All the foods shown—from pancakes to the burger—have been "beefed up" with soybean product. Shelled soybeans are seen in glass container at top of photo.

does not contain threonine in sufficient quantities. Meat is about the only protein source with a proper amino acid balance.

The soybean contains the amino acids deficient in cereal grains but doesn't have optimum quantities of another amino acid, methionine. By mixing soy flour with corn meal, wheat flour or nonfat dry milk, this is corrected. The result is a food with all the needed protein building blocks.

In their natural state, soybeans don't exactly excite the palate, tasting much like any other bean. Henry Ford, when he wasn't building Model T Fords and creating assem-

SOME COMPARATIVE COSTS

Source: Kansas State University (1973)

Protein Product	Per Pound of Food	Per Pound of Protein
Beef	\$0.75	\$4.20
Eggs	0.75	0.85
Yeast	0.30	0.67
Milk solids	0.16	0.44
Isolated soy protein	0.35	0.40
Wheat	0.30	0.38
70% protein soy flour	0.21	0.30
Wheat germ	0.08	0.27
50% protein soy flour	0.07	0.14

bly lines, tried to promote the soybean as a food. He held soybean banquets for the cream of society, hoping thereby to encourage meat-loving Americans to change their diets beanward. Henry, it turned out, was better at starting industrial—rather than diet—revolutions.

Vegetarian members among the Seventh Day Adventists experimented with soybean foods as early as the 1930s, hatching at least two commercially successful companies in the process. To this day, one of them markets 50 meat look-alikes made from soybeans. The other company once invited Fidel Castro to lunch at a church school in Cuba. "Best pork chops I ever ate," said the Premier as he wiped his beard. But the soybean "pork chops" had never even been close to a pig.

Soybeans began to come into their own as an important food source in the United States after the 1969 White House Conference on Food, Nutrition and Health. Experts at that meeting concluded that over a third of the people in this affluent country were surviving on faulty diets. To help overcome the problem, scientists developed new food technologies to provide low-cost but

highly nutritious foods for school-lunch programs, day-care centers, hospitals and other institutional feeding centers.

When highly refined, almost tasteless soy flour is mixed with tan food colors and moisture. Then it can be extruded into textured granules resembling hamburger. When dried, the granules can be stored on unrefrigerated shelves as long as cereal or flour. Just before using a soy protein meat-extender, a cook first blends the soy product with enough water to duplicate the moisture content of hamburger.

"We have been using textured soy protein in the Skokie (Ill.) schools for several years," says the director of a school food service. "In our first year, savings were about 10 cents a pound on the meat and soy combination compared to all meat. When you consider that we use 1000 to 1200 pounds a week, that's a considerable saving."

By carrying the soy protein technology one step further, scientists turned 90 percent soy protein into ersatz meat that can be eaten without blending it with the real thing. In a process very similar to rayon spinning, the soy protein is dissolved in an alkaline solution and forced through tiny

(Please turn to page 188)

Hill of beans partially obscures tall storage elevators in Illinois, which annually produces record crop.



The annual Consumer Electronics Show, though still a trade show for everything electronic from calculators to radios to TV sets, is becoming more and more a hi-fi show. Here's a sampling of some of the more interesting products that showed up this year, most of them due on dealer's shelves

New in hi-fi

by Christmas or by early next year, and a few of them perhaps available by the time you read this.

As always, the most technically interesting products are usually the most expensive; but despite the inflation which has affected hi-fi and all other prices, this year's innovations will probably show up in lower-priced models next year or the year after.

TAPE GOES MORE PROFESSIONAL



Cassette portables got serious with Nakamichi's 550 (above) with expanded-range peak-level meters, Dolby, plus stereo and center-blend mike inputs, for \$500. Sony's TC-142 (left), \$200, has a third monitor head, auto plus manual record-level control, servomotor drive: it signals *before* the tape ends.



Teac 7340 (right), for *really* serious recordists, is a 4-channel deck with a built-in, 8-input mixer that's also used to mix down the four recorded channels to stereo or mono. There's also "simul-sync" for correctly synchronized over-dubbing. For better recording-level control, there's a single master level pot controlling all four channels, and each channel has lights indicating low, mid and high-frequency peak levels. It's virtually a studio for \$2400.



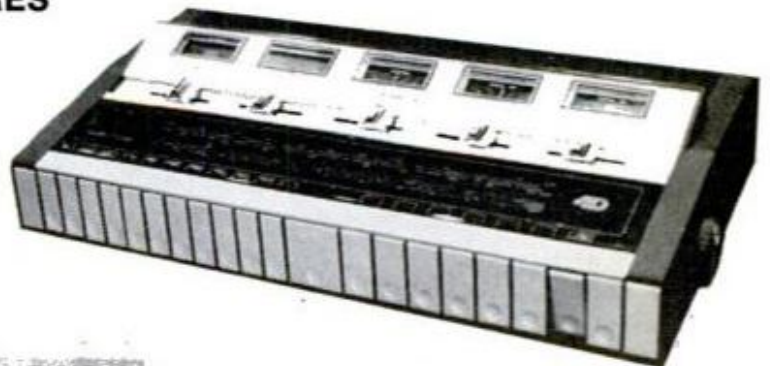


The trend in cassette decks is to front-loading models that can be stacked up with your other components. Sony's (right) is typical, with others shown by Concord, Kenwood, Pioneer, Technics and Uher; most with Dolby. Uher's also has a prism to show how much tape remains to be used, an optional plug-in 2x10-watt amplifier stage and a front-panel input-output socket. Sony TC-182AV (above) is a monophonic cassette deck with built-in slide-synchronizer. Accessories for the serious recordist include Sony parabolic mike and mixers (below), and Pioneer mixer (below, right).

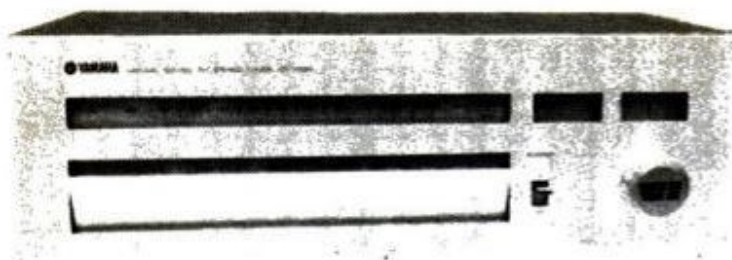


COMPONENTS GROW NEW FEATURES

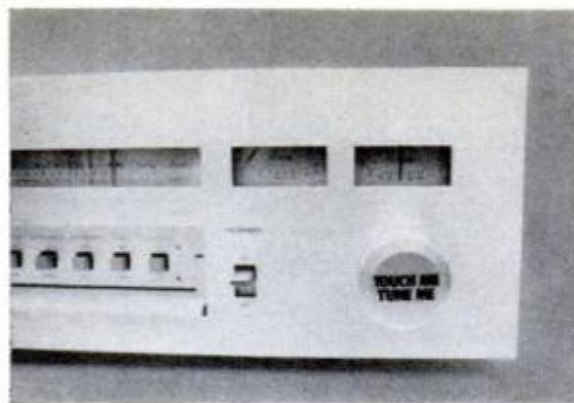
Grundig's new RTV-820 is unusually styled receiver with FM, AM and shortwave tuning, and switch buttons lined up across its front. Grundig's similar, but larger, RTV-120 develops 50 watts per channel; this is 11 watts.



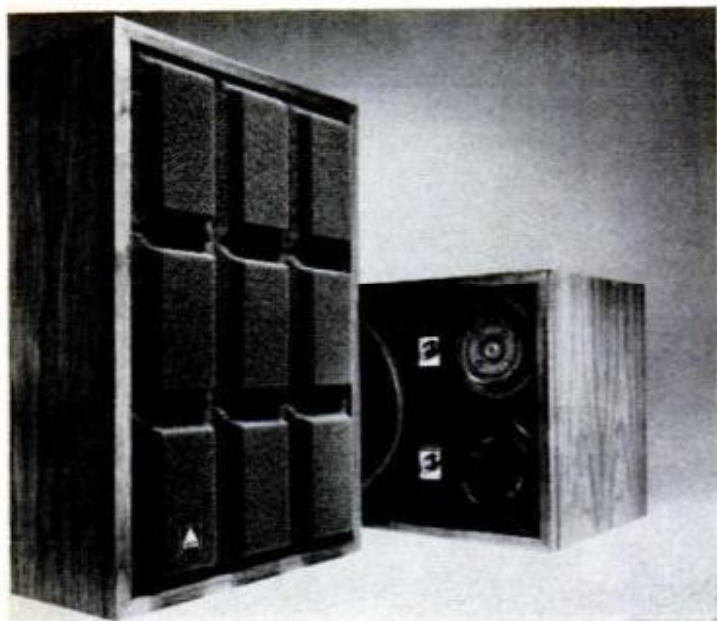
Dynakit's new preamplifier has dual tape monitors (plus one for external equalizers, four-channel adapters, etc.), speaker and power switching for Dynakit 400-watt amplifier, and even better sound than firm's older preamps.



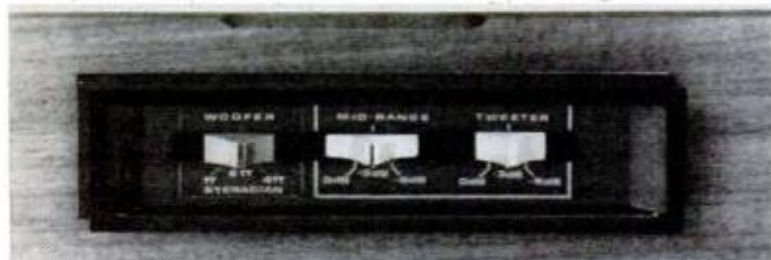
Yamaha's \$1200 tuner has meter indicating clearest—not just strongest—signal and a switch (behind hinged subpanel) for broad-band or narrow-band reception. AFC shuts off while you touch knob, for sharper tuning.



QUIET REFINEMENT IS THE KEY IN SPEAKERS



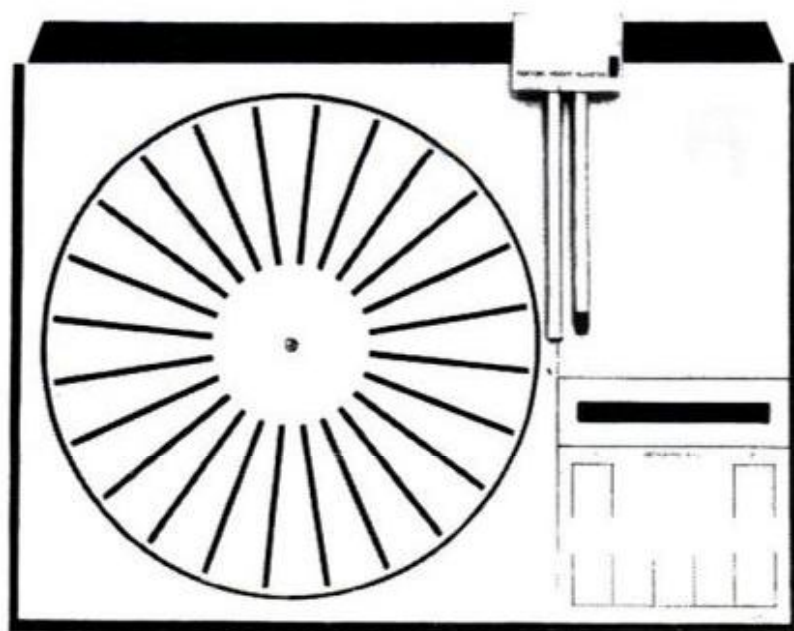
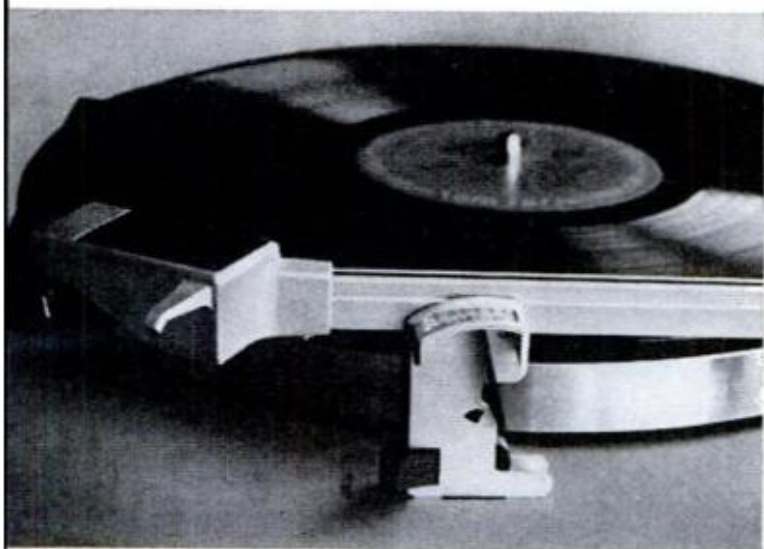
New speaker designs are more conventional than last year (see *Wild New Speakers*, page 122, Sept. PM). The major innovation in new Stark Designs line (above and above, right) is a tweeter angled in rotating cup so its aim can be changed easily. Acoustic Research emphasized its new Pi/one (right), basically an improved AR-3a. Its "environmental control" equalizer (below), behind a hinged front trim panel, corrects frequency response variations due to acoustics and speaker placement in room; equalizer and Pi/one's new mid-range and tweeter seem to have cured the AR-3a's mid-range dip. Price is \$329. AR also showed a smaller version of its unconventionally-shaped, \$600 LST, this new version selling for \$400.



TURNTABLES GET MORE SOPHISTICATED



Front-panel controls for start, stop and cueing may not seem super-sophisticated until you recall the last time you scratched a record by lifting the changer's dust cover to get at the controls. BSR has front-panel controls on three new models and pilot lights to remind you when they're turned on, and a built-in accessory tray with cover.



Really automatic turntables are the Philips GA-209 (above) and Bang & Olufsen Beogram 4002 (left). Both automatically select the correct speed according to the record you put on: 33-1/3 rpm for a 12-inch or 10-inch and 45 rpm for a 7-inch disc. Both have servocontrolled-drive motors for accurate speed without rumble and independent pitch control for each speed, plus separate motors for their tone arms (found also on some new Pioneer and Kenwood models) and, in the Philips, a third motor for cueing. Touching appropriate areas of the B&O's control corner raises or lowers arm and moves it quickly or slowly across record, its position indicated on a calibrated scale. The Philips's tone-arm rest (above, left) doubles as stylus pressure gauge. ★ ★ ★

Your own fire engine—ready to roll anytime

It can go practically anywhere to pump a 40-foot stream from the nearest lake or pool.

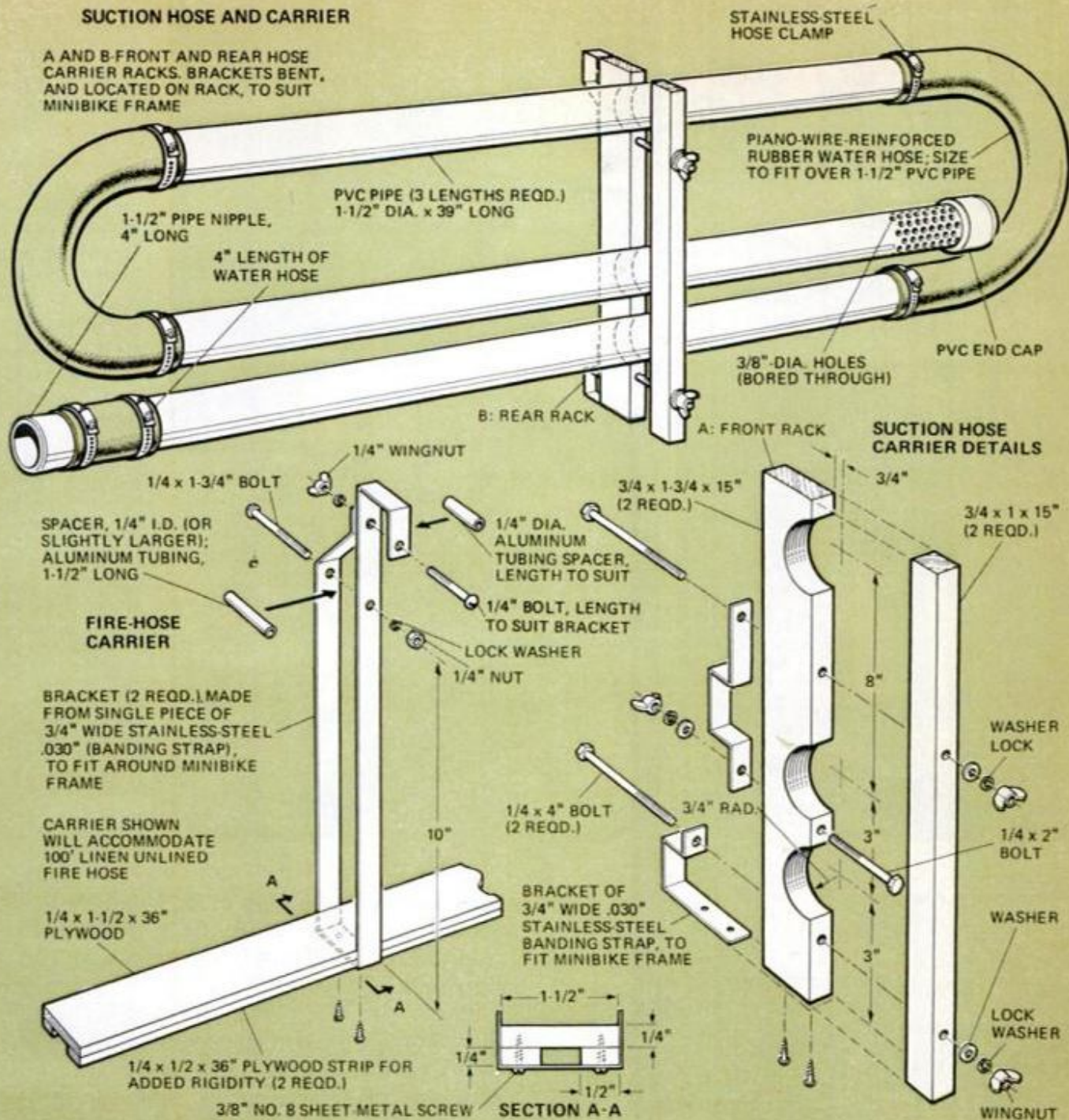
by Bruno Misevic



Agile mini pumper carries 100 ft. of unlined, linen fire hose, can wet the roof of a two-story house from ground level. On the scene, the drive belts are changed, throttle is wedged open.



SUCTION HOSE AND CARRIER



After a brush fire destroyed a dozen homes in our neighborhood, we recognized the need for a fire engine of our own, one that could keep pumping water onto roof or grass, even if municipal water pressure failed. The mini fire engine I rigged from a minibike has shown itself capable of handling many other pumping chores as well.

This miniature pumper is more versatile than a stationary pumping unit, since it can transport itself and a rider along almost any footpath, pass through narrow gates and even climb a very steep grade if the fireman dismounts and walks alongside. Al-

so, the fire engine is more likely to be run regularly and maintained better than a stationary pump.

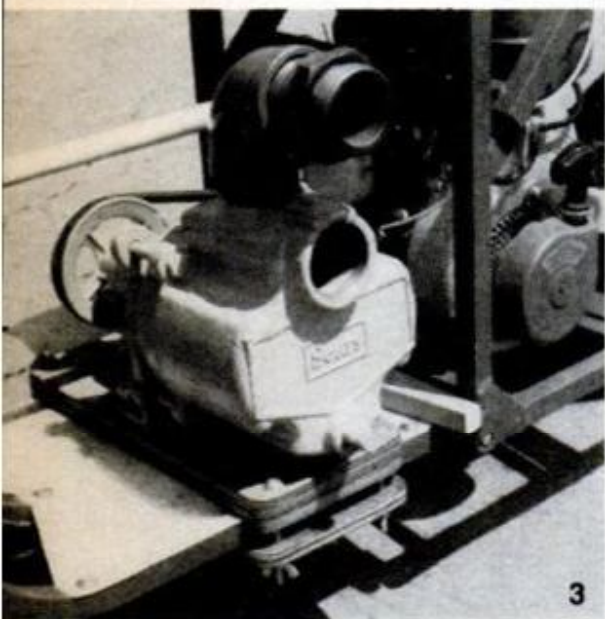
To be suitable for this use, a minibike must have a blower-cooled engine or it will overheat during stationary running at high rpm; for this reason, larger motorcycles would be impractical to convert. The mini fire engine as I rigged it is strictly for off-road use. Highway use would require a street-legal minibike to start with, and weight and balance of the added equipment would have to be safe at highway speeds. In any case, the bike's engine should pro-



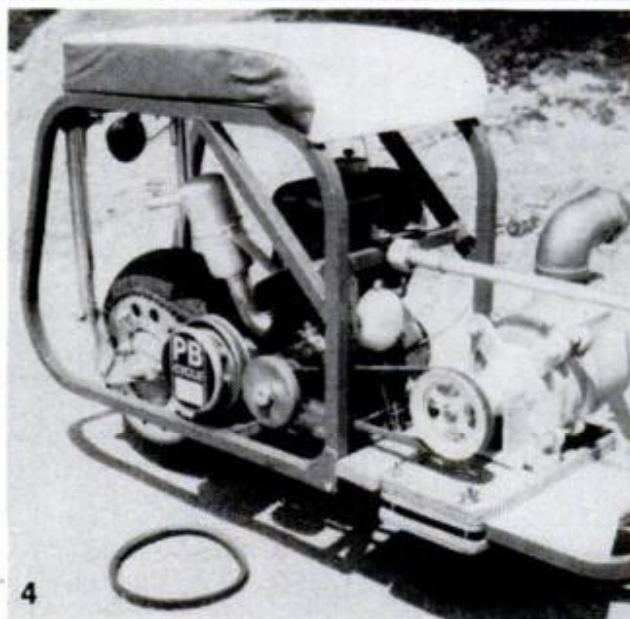
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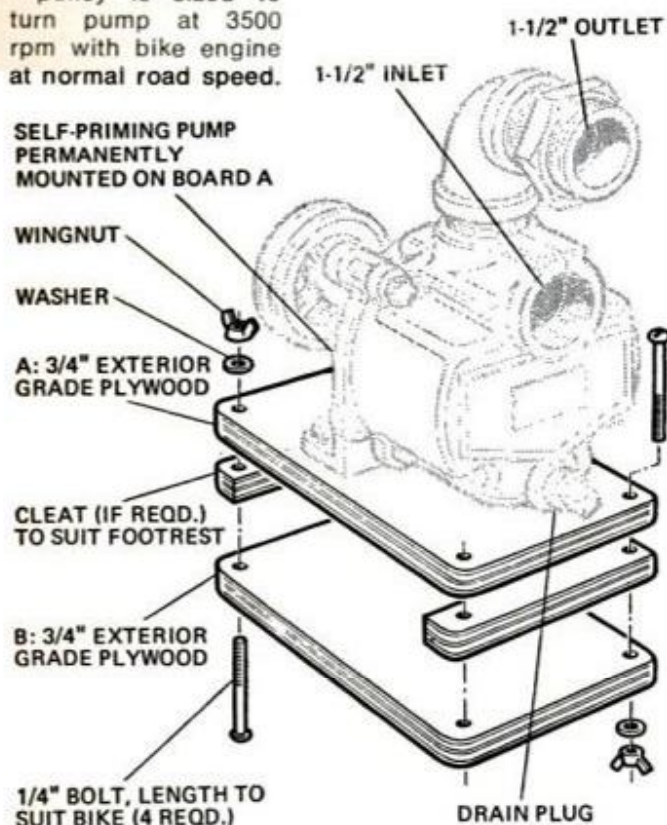
1. Fire-engine components are attached with wingnuts—so bike can still be used in original, stock form.

2. Suction-hose rack is shown partly assembled. Outer parts are removed when hose is taken off or put on bike.

3. Like other parts of fire-engine conversion, the pump pad is set up for quick mounting and removal.

4. Pump drive belt is longer than drive belt to wheel. Bike used is equipped with centrifugal clutch.

Pump-mount assembly
—pulley is sized to turn pump at 3500 rpm with bike engine at normal road speed.



duce at least 2 hp. The bike I used is a Fuji Go-Devil, a light (70 lbs.), nonlicensable model. For a different bike, some of the dimensions shown would have to be changed.

The pump is a Sears unit (42 KF 2606C) that delivers 35 gal. per minute at 5-ft. lift and 10-lb. discharge pressure with 1½-in.-diameter inlet and outlet. The suction line is schedule 40 thickness PVC pipe, with rubber-hose joints for flexing; these are reinforced with piano wire to prevent their collapse under suction. Holes at the line's end provide coarse filtering, but care should be taken not to pick up sand or dirt, which could damage the pump. Unlined linen fire hose is used at the outlet. If dried and repacked carefully, after use, the hose remains in good condition for some time. It does kink readily, and must be laid down in a wide radius and kept untwisted. Hose with obsolete fittings may be available and will work perfectly well. A ½-in. nozzle is best for delivering a high-speed stream.

Cost of parts and equipment added to the minibike was under \$100. ★★★

Feature-packed Akai is three tape decks in one— but it costs like three

by Ivan Berger
ELECTRONICS EDITOR



Light-up buttons show what Akai deck is doing; arrows (to left of head assembly) indicate tape travel direction. Pause switch reminder light (close-up, left) is very welcome.

Testing tape decks makes me unsatisfied. To satisfy me it would take a single deck combining the features of three: A four-channel deck for quadraphonic tapes; an auto-reversing deck for convenience in playing stereo tapes, and a deck with 10½-inch-reel capacity and a top speed of 15 inches per second, for serious recording.

So here's Akai's GX-400DSS, with every feature I'd asked for, plus a few I hadn't: "Quadra-sync" that lets performers hear previously recorded tracks in synchronization with new tracks they're recording; a "cue" switch that lets you hear what's on the tape in fast-forward or rewind. The tape drive uses dual capstans for smoother motion both ways. If you should leave the "pause" switch on, then wonder why the tape won't move, a warning light above the switch will eventually call your attention to it.

Even more important and encouraging are the specifications: Akai claims that frequency response is flat within ± 3 db.

from 20-26 kHz at 15 i.p.s., from 20-24k at 7½ i.p.s., and from 30-16k at 3¾ i.p.s. and that noise is down 52 db. Independent lab checks indicate Akai exceeds its specifications slightly at 15 i.p.s., but doesn't quite measure up at 3¾ and 7½, though it's still quite good at the latter speed.

So am I satisfied? Not quite. There's still an audible difference between input and output at 7½ i.p.s. The tape-motion control logic, making it virtually impossible to break tape, also delays 3 or 4 seconds (how interminable that can seem!) in starting the tape, even from a standstill. Input-output jacks in back are a bit hard to reach, especially since the 69-pound recorder is hard to move.

The price is \$1495—hardly surprising for a deck offering so much, but hardly cheap, either. But if you want a deck with absolutely everything, the Akai is a good one—and the only one around. ★★★

WATERWAY PREVIEW:

Motors / boats for '75

They're getting better without getting bigger next year, and going farther and faster for the same gas.

by Bill McKeown
BOATING EDITOR



That offshore race for more power won't end next spring. But makers of pleasure craft and engines are taking time to look at performance and economy to see how far they can extend your cruising range.

While exotic racing rigs are already squeezing more than 200 horses out of outboards, and learning lessons to pass along to production motors, the newest standard-powered boats in 1975 will also offer better ride, value and all the speed we can use.

Leader in clamp-on marine muscle comes again from Mercury. Next year's big one will once more provide 150 hp from the Merc 1500, and range down to a Mercury Model 45 rated at 4.5 horses.

Chrysler will have a racing outboard of 150 hp for special order plus 135 at the top of a line that goes down to 3.6.

Evinrude and Johnson again provide a wide selection from 2 up to 135 hp. Their new 75s offer optional higher compression



Plenty of power for open-air runabouts will be offered next year (at left) with outboard power from Evinrude's 50-hp Sizzler (top) 135-hp Strangler and 75-hp Hustler motors. Chrysler (above) tops out with 135 hp from its four-cylinder high-performance model with new sport engine cover. Mercury's biggest 1500 model on a new Starcraft (top right) pushes it with 150 compact horses. Fishermen, in luck (above), have 6 Johnson low-profile hp on their MirroCraft.

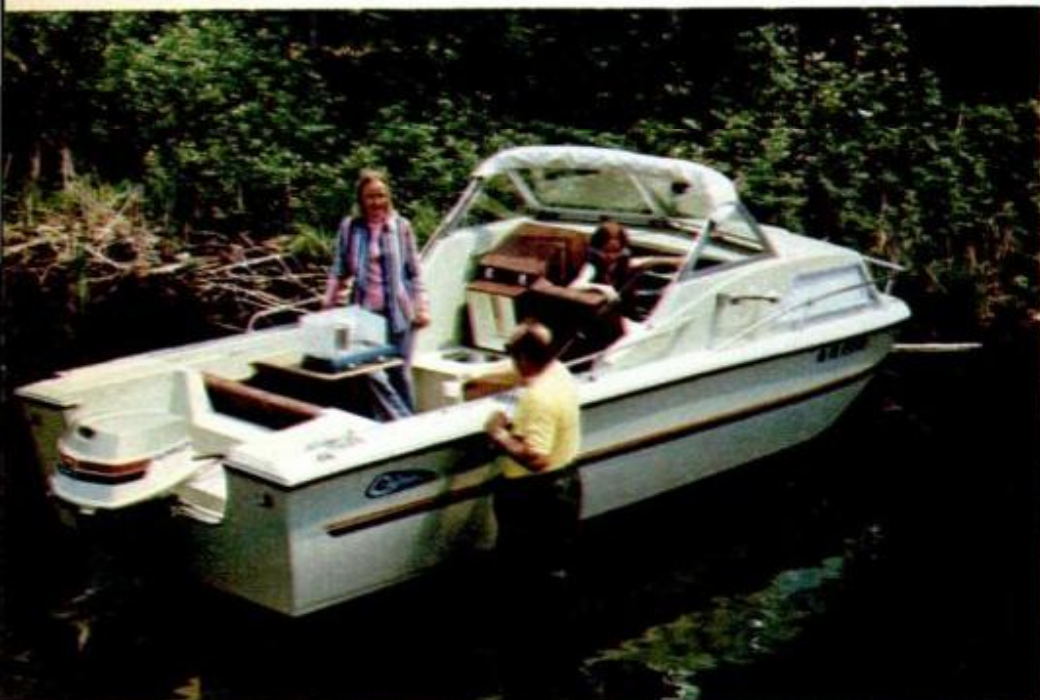
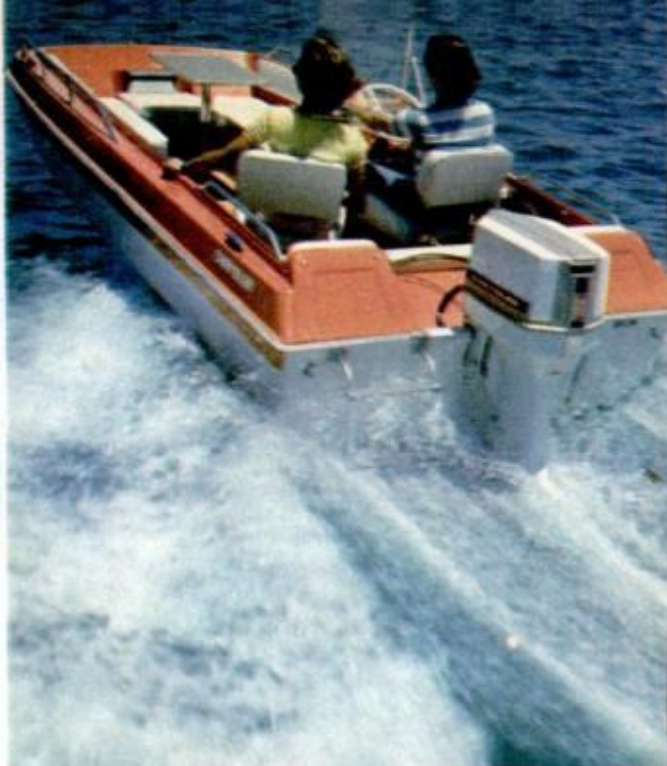
cylinder heads and special lower units for the speed buff and racer. Biggest models also have an improved shock absorber that makes hand tilt-up easier.

Eska outboards will now range from a new air-cooled 3 hp up to a water-cooled 15. Propeller design improvements and lower-unit-seal protection from mono fishing lines are among new features. More outboard motor refinements will be announced by manu-



World's fastest bass boat may be this 95-mph Triple C Apollo with JacuzziJet and a souped 455 Hardin Marine engine.

Funster is Chrysler's name for this new 16-foot model for next year powered with its 60-hp two-cylinder with CD ignition.



facturers in time for the winter boat shows. And look for accelerated growth of electric outboards as they increase voltage capacity and thrust power.

Boats from the big producers show ski-boat influence on runabouts. Little freeboard and no windshield give the look of speed. Bass boats will come in outboard, I/O and jet models. Starcraft's Bassmaster 16 will have a kit option for personal interior customizing. Glastron's Beau-Jack Super-Pro V-172 even mounts swivel fishing chairs with headrests.

Larger craft will continue a trend toward soft-riding deep-V hulls and a number of them will mount water-jets for power. Glastron/Carl-

Vacation Camper from Cruisers, with 115 Evinrude, lifts seats for galley, garages on trailer. New Glastron V-172 Super-Pro bass boat with 115 Merc power, even offers angler headrests.



Favorite for fishermen, MonArk will again offer its high-headroom model shelter for protected water action. Power is a new 40-hp Johnson.



Bass boats get flashy with metalflake finish, poly-turf carpet. This Baja Aeroglastics HLS-16 has Johnson 115 power, bait wells, rod lock box.

Raft boats like Skeeter Sweet Thing shown below, can plane off a group or tow water skiers with hefty motor like Evinrude 115-hp outboard.



Open foredeck models are getting streamlined and upholstered for added passenger capacity and comfort. Check Mate mounts silver Evinrude.





New center-console, open-fishing utilities like AMF Robalo with Johnson, and Merc-powered Boston Whaler Currituck with forward casting platform, can head offshore for game fish. More sporty is the new deep-V, Jim Wynne-designed Cobalt 19 mounting MerCruiser stern-drive power, a smooth rider for open water.

son CV-21 will have a swim platform over the jet in its 31-model line.

Trailing cuts mooring and storage costs, and Cruisers' Vacationer-Camper 19 folds the windshield for garaging. Starcraft's big new aluminum Chieftain Mark IV 22 I/O also trailers. Convenience will be in style afloat this coming year. ★★★

DETROIT '75

**Turnaround year for the automakers:
The new emphasis is on cars that are
not necessarily smaller, and certainly
no less luxurious, but engineered
to be lighter and more efficient.**

CHRYSLER CORP.

Chrysler Cordoba two-door pillared hardtop is an all-new entry in the intermediate-sized (114 to 118-inch wheelbase) luxury sweepstakes.

Dodge Ramcharger SE and **Plymouth Trail Duster** (see cover) are multipurpose vehicles now with two or four-wheel drive.



Chrysler story begins on page 106



Dodge Charger Special Edition is all new, and the emphasis is on luxury. Charger fans should find this SE Something Else!

The Chrysler-Plymouth and Dodge story begins on page 106

DETROIT '75

GENERAL MOTORS CORP.



Pontiac Grand Ville Brougham four-door hardtop in silver is at left, top. Red **Astre SJ** hatchback is Pontiac's version of Vega. **Chevelle Malibu Classic** wagon is one of six wagons in Chevy's intermediate line. **Caprice Classic** four-door is top of Chevy's full-size car line. **Buick Riviera**, below, is three and one-half inches shorter for '75 and the front end has been redesigned around the rectangular headlights.



POPULAR MECHANICS

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Omega hatchback coupe and Apollo sedan, right, show how extensively restyled are the N-O-V-A cars. Nova, Omega, Ventura and Apollo models, with features such as front disc brakes, steel-belted radials and refinements in chassis and interiors, now rival European luxury imports.

Chevrolet Monza 2+2 should tear up Mustang II's turf. Its styling goes beyond anything done by Detroit in a production car before. The swept beltline dominates the profile, and rectangular headlights set off the front end. New, small-block V8 of 262-cu.-in. displacement is optional and 140-cu.-in. (2.3 liter), overhead-cam, inline Four (from Vega) is standard. Buick and Oldsmobile versions of the car, the red Skyhawk and white Starfire, above, have slight trim changes and use new version of Buick's V6.



GM story begins on page 108

DETROIT '75

FORD AND LINCOLN-MERCURY



SuperCab pickup, with its full-width rear seat for three, is in full production. It's available on F-100, 150, 250 and 350s, in Custom, Ranger and XLT trim.

Mercury Monarch, like Ford Granada, is a luxury compact copied from Mercedes (and FoMoCo makes no secret about it). Wheelbase is same as four-door Maverick.

Mustang II Ghia gets new opera window, half-vinyl roof and 302 V8 power for '75. The "Silver Luxury" option, shown here, also includes a special interior.

Ford LTD Landau, top of the full-size Ford series, has slick, skinny B-pillar windows on two-door models, goes heavy on the filigrees and egg-crate appliques.



Ford and Lincoln-Mercury story begins on page 110

POPULAR MECHANICS

AMC polishes its petrol pinchers

Quietly, American Motors has refined its existing lineup; the knockout punch comes soon when AMC pounces with the Pacer.

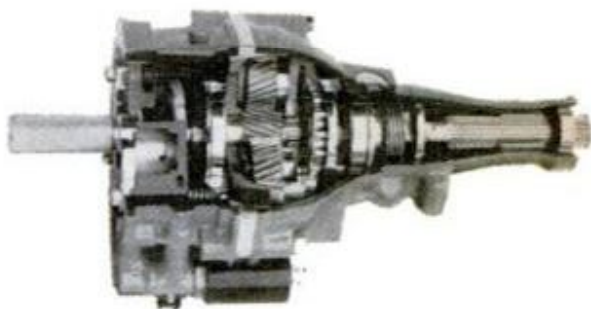
by Michael Lamm
WEST COAST EDITOR

AMERICAN MOTORS CORP.



Hornet Sportabout shows new grille and vinyl top. New touring package has better sound insulation and luxury trim.

Overdrive unit is available on Gremlins and Hornets with six-cylinder engines and manual transmissions. It's 0.714:1.



Say good-bye to AMC's Javelin Ponycar, its airconditioned Ambassador line and the big 401-c.i.d. V8. American Motors converted Javelin/Ambassador/401 manufacturing capacity to production of more smaller cars—Gremlins, Hornets and Matadors. AMC won't be living with fewer models for long: Its all-new mini, the Pacer, will be introduced within the next few months. The unique design shown in *Preview of the 1975 Cars* (page 90, Aug. '74 PM) should be the hottest entry in the mini-car sweepstakes.

Say hello to Laycock-de Normanville overdrive, optional in 1975 six-cylinder Hornets and Gremlins with manual transmissions. Say hi, too, to a new electronic ignition system standard on all 1975 AMC cars. Matadors get steel-belted radial tires as standard; so do X-package Hornets and Gremlins.

AMC's exterior styling is about the same as last year—just trim and grille changes in Hornet and Matador. The Matador coupe, all-new last year, is built on a 114-in. wheelbase, and the other Matadors, now AMC's

biggest cars, on 118-in. You can order the Matador coupe with three distinctive trim packages: Brougham, Cassini and X.

AMC's major 1975 changes lie underneath the skin. Most notable is the British-supplied overdrive. It's the Laycock-de Normanville J-Type as used in Triumphs, MGs and Volvos. It's an automatic overdrive that kicks in at 35 mph and drops out when you slow down to below 32 mph. Driver control includes a pushbutton on the end of the turn-signal stalk. There's also the usual accelerator kickdown for quick passing. The overdrive ratio is 0.714:1.

When we asked whether V8-engined AMC models and those with automatic might soon share the British overdrive, an AMC spokesman whispered, "Probably."

All 1975 AMC engines burn unleaded, regular-grade fuel. Engine choices include two Sixes and three V8s (see specs, page 112). All cars sold in California use catalytic converters to cut pollutants. Converters

(Please turn to page 176)

Let 'em push buttons!

Power options are proliferating, and even the compacts are not very valiantly resisting becoming imperial.

by Bill Hartford
AUTO EDITOR

CHRYSLER CORP.

Maybe it's just me. No . . . other people are tired of cars, too! Even the best of the passenger cars can be terribly boring. Yes, they do move around as many as a half dozen people at one time comfortably and conveniently, but what else can they do?

Maybe that's why a whole lot of folks are thinking twice before they automatically buy another car. There is an alternative: "Multipurpose" or "sports utility" seem rather dull names to give these exciting alternatives to the automobile.

The Plymouth and Dodge names work a whole lot better: Trail Duster and Ramcharger. They've got style and they've got guts. And for '75 they've got two-wheel drive, too—just for sports who don't plan to do the Continental Divide, or drive to the top of their neighborhood mountain, sans pavement. They can even go topless: You want to roll out your sleeping bag in the

back, count shooting stars and hear only the honking of geese, do it!

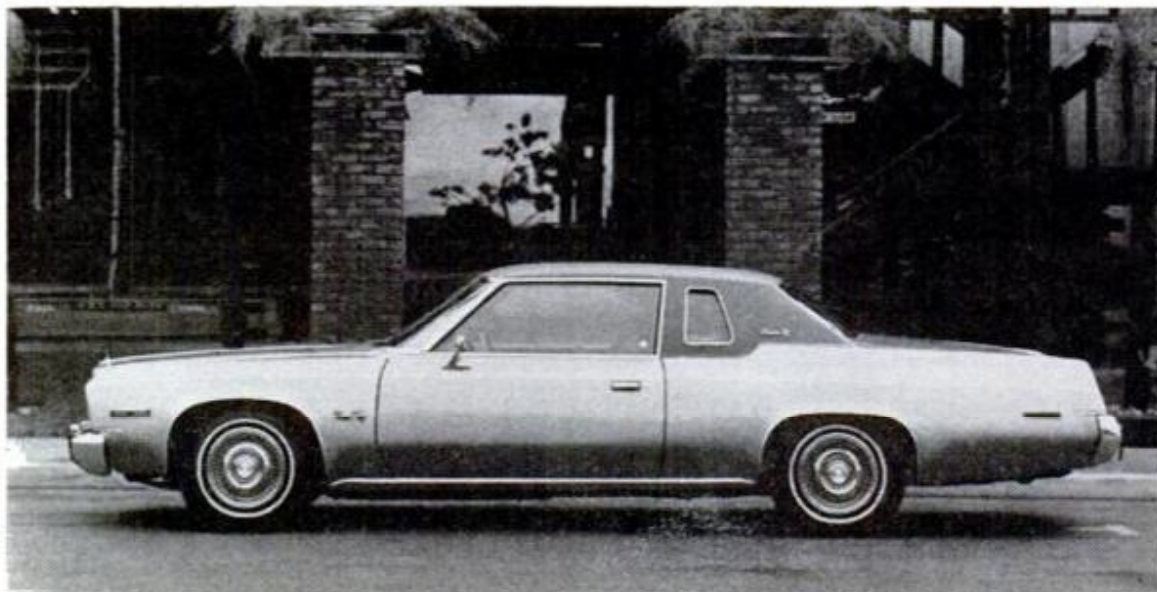
The Chrysler Corp. sports utility vehicles aren't the only game in town, of course. Cherokees and Blazers offer the great escape, too. But driving the new silver Ramcharger and Trail Duster all over Chrysler's Chelsea, Mich., Proving Grounds last June was fun; driving all those new cars was business! Better get back to it . . .

Dodge Dart and Plymouth Valiant. Compacts are taking a solid share of new car sales and the Valiant continues to lead all the others. Valiant and Dart have always been solid, no-nonsense cars designed to be reliable transportation and they've built a strong following. Still, I haven't heard any complaints about the increasing opulence being offered, especially in the Brougham and SE models! Among the new options is speed control—a positive aid in maintaining

(Please turn to page 176)



Charger SE, with its lowered beltline, landau roof and sunroof option is above. At right is the Gran Fury Brougham two-door hardtop. Radial tires are standard.



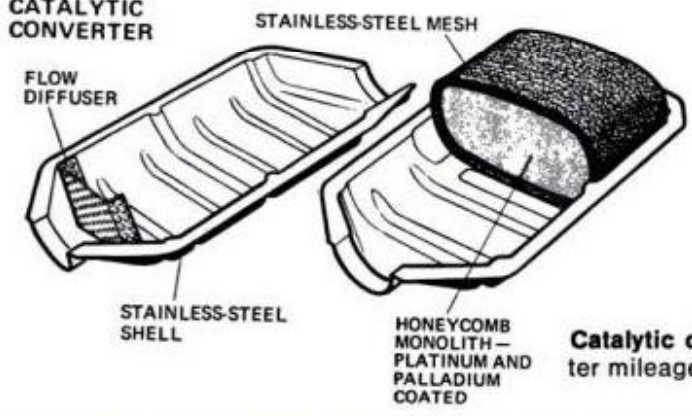


Dart Sport two-door coupe with sunroof is shown above. Stripes are part of one of the several slick decorator packages available.

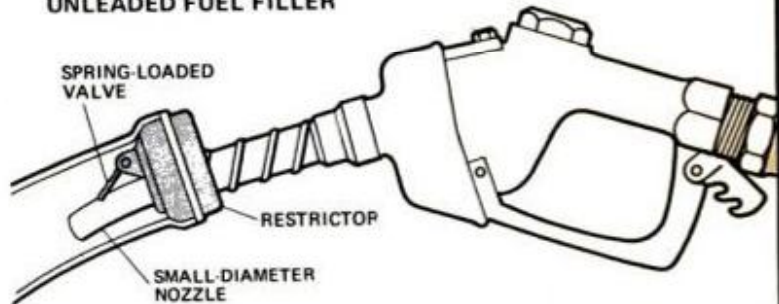
Newport Custom four-door sedan is shown at top left. It's one of 11 models in the Chrysler lineup for '75. The 400 V8 is standard engine.

Coronet Brougham two-door hardtop is at left. Chrysler's emphasis for '75 is on the intermediates; they're restyled and offer more options.

CATALYTIC CONVERTER

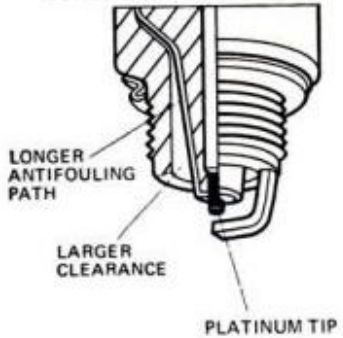


UNLEADED FUEL FILLER



Catalytic converter cuts emissions, allows engine retuning for better mileage. Restricted tank filler ensures only unleaded fuel is used.

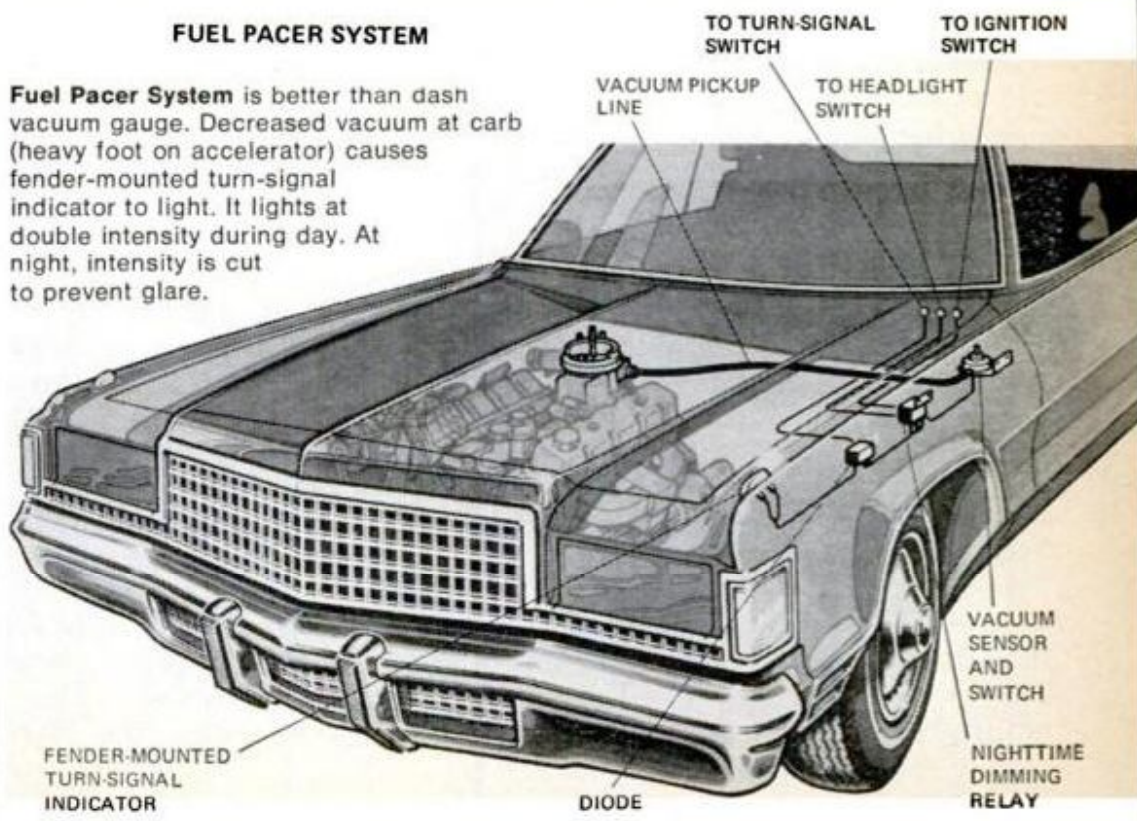
LONG-LIFE SPARKPLUG



Long-life features include sparkplugs guaranteed for 50,000 miles. New optional battery available on all models is also guaranteed for 50,000 miles, or five years. It has plastic case, heavy plates, rubber separators, greater electrolyte capacity.

FUEL PACER SYSTEM

Fuel Pacer System is better than dash vacuum gauge. Decreased vacuum at carb (heavy foot on accelerator) causes fender-mounted turn-signal indicator to light. It lights at double intensity during day. At night, intensity is cut to prevent glare.



DETROIT '75

The end of 'bigger is better'

When GM considers efficiency in car design as seriously as it controls cost—look out!

by Bill Hartford
AUTO EDITOR

GENERAL MOTORS CORP.



Chevrolet Nova LN four-door sedan is one of eight models in completely restyled line with more glass, redesigned chassis, standard front discs and steel-belted radial tires.

It was like a busman's holiday. After a long, hot day in July driving Chevrolet's many models, and noting all the changes for '75, I got back in the Nova LN (the LN stands for Luxury Nova). I set the air conditioner at a comfortable level and started around a closed-loop section of the Milford, Mich., Proving Grounds.

I was on an undulating road, marked with sweeping curves—no tight bends and hard corners that require braking. After going around once, the inside of the car was cool and comfortable, and I was coolly and comfortably doing 100-mph laps—about 100, that is. The speedometer pointer was off the end of the scale, marked "100" and "160" (160 for kilometers per hour).

Just before driving the LN, I had been around the same circuit in the Corvette (also with 350 engine) and the Monza 2+2. They were different: the Vette was fast, naturally, but you rather *rocketed* around.

The new 2+2 was just twitchy enough to keep you very alert—ready to make steering corrections if the car started slipping in one of the curves.

The LN was something else entirely. What a car! A four-door sedan of all things. I couldn't believe I was in a Nova: same name-plate as that bland, beige thing I was in a few days earlier—standard issue from Hertz, guaranteed to drive you to Dullsville and back, at the lowest dollars per day.

Here I was enjoying secure and steady laps, one after another, at over 100 mph . . . in a *Nova!*

How come?

Because the car has been completely transformed for '75. In its top trim, the Nova has the best features of the luxury European sedans it now rivals—down to the hub caps (I can't quite get with it and call them wheel covers). They're color-keyed to the body—just like Mercedes—and really are

not as tacky as they sound—they look good.

Functional comparisons, however, are more impressive and certainly more important. They run from the ground up: The redesigned chassis incorporates radial-tuned suspension and more effective body mounts for improved road isolation; front disc brakes are standard as are the steel-belted radials (the nice, fat 78-series); double-panel roof construction increases body structural integrity; the greenhouse is bigger; inside are reclining bucket seats, center console and very tastefully done trim and fabrics. Only two negatives: Armrests don't angle upward into a handle; they're completely horizontal. And the steering wheel is a bummer. A car like this should have a sportier wheel. Otherwise, the interior is very handsomely done. But best of all: It's quite a car to drive.

Other GM divisions have their versions of the Nova, too. Olds, the Omega; Pontiac, the Ventura; Buick, the Apollo. I didn't get a chance to drive them, but I'm sure they'd prove equally impressive—if not more so.

The new GM car for '75—called the Monza 2+2 in the Chevy line, the Skyhawk at Buick and the Starfire in the Olds line—is, like the Vega, built on a 97-inch wheelbase. The appeal of the car is in its styling *and* its practicality: the hatchback provides efficient access to the back of the car and the rear seat folds down; the standard four-cylinder engine provides the economy. The optional small-block V8 (262 cu. in., 4.3 liters) should provide an even better compromise between economy and performance.

The Monza/Starfire/Skyhawk cars are one of the GM lines using the new rectangular headlights. One of several across-the-

(Please turn to page 177)

Chevrolet Blazer K5 in new Scottsdale trim. It's available in open or hardtop models with two or four-wheel drive.



Oldsmobile Cutlass Supreme offers optional swivel seat and removable, reversible cushion.



GM fuel economy meter is engine vacuum gauge, with readout in the dashboard instrument panel.

DETROIT '75

In search of the sensible car

You haven't been paying attention if you didn't know Ford has been working hard to top the production run of the Model T by designing the right car at the right time at the right price.

by Robert Lund
DETROIT AUTO EDITOR

FORD AND LINCOLN-MERCURY

Run through the list of cars Ford has brought out over the past 25 years and you come up with four winners. Four imaginative, new-wave cars that set the pace for the rest of the industry. The first was the '49 Ford, credited with pulling the company out of a financial grave. Next was the '56 T-bird, then the '65 Mustang, and the '74 Mustang II.

On the record, Ford has never managed to bring out "discovery" cars two years in a row. There has always been a lag of eight or nine years between one forerunner-of-the-future car and the next. But Ford says it has another avant-courier car for 1975, right on the heels of Mustang II.

It's a double-feature car, meaning the company has pulled two cars off one body.



Pinto has 2.4-liter, four-cylinder engine, solid-state ignition and steel-belted radial tires as standard.



Maverick now has 250-cu.-in. Six standard. New options include power front-disc brakes and space-saver spare.



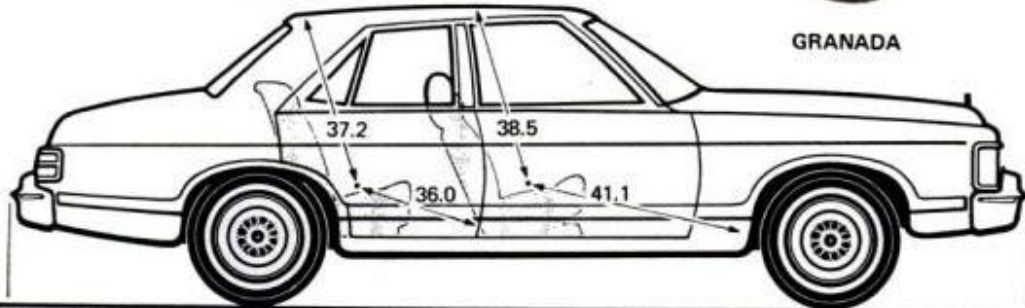
Elite is Ford's mid-sized luxury car. Available as a two-door hardtop only, it has 351 two-barrel standard.



Thunderbird has new luxury options and new safety options: Four-wheel disc brakes and "Sure Track."



GRANADA

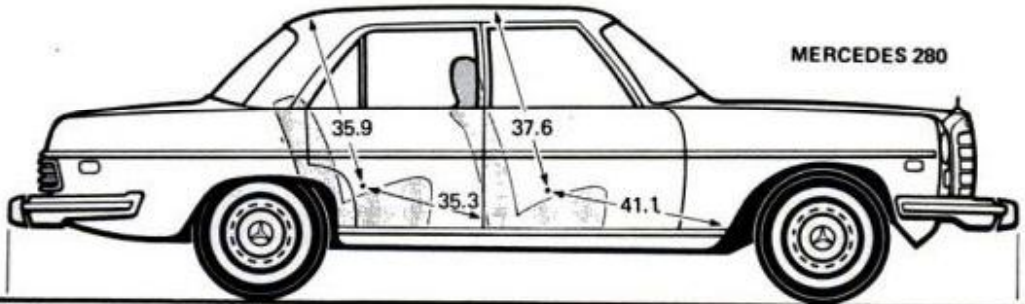


WEIGHT 3408 LBS.

109.9

197.7

MERCEDES 280



WEIGHT 3440 LBS.

108.3

195.5

Ford Granada four-door sedan is shown in a dimensional comparison with the Mercedes-Benz 280 (the Mercury Monarch varies only slightly from the Granada in some dimensions). Recognizing Mercedes' design efficiency, Ford used the 280 as a "reference vehicle" for its design work.

One's a Ford Granada, the other a Mercury named Monarch. Both units come in two and four-door versions.

On most basics—wheelbase (109.9), front/rear tread (58.5 and 57.7) and overall height (53.8)—the cars are identical. The Mercury is a little larger than the Ford on outside dimensions: 74 inches wide against 71.2 for the Ford, and 199.9 inches long versus 197.7 for the Ford. Appointments are richer in the Mercury and the cars have different grilles and taillamps to distinguish one from the other. Ford's 250 in-line Six is standard in both cars, which offer two V8s as optional engines.

Ford predicts Granada/Monarch "will set the style for American automobiles for the rest of this decade." If this comes true, the credit goes to . . . Mercedes.

Ford makes no bones of the fact that Granada/Monarch was copied from Mercedes—the square, box-shape of the passenger compartment and angular lines of the

hood and trunk. Square flat planes and lines, instead of curved surfaces. "Because Mercedes is recognized as a leader in design efficiency, that car became the reference vehicle," Ford frankly admits in its new-model spec book.

Ford's right that the time is right for more sensible cars—automobiles that combine good packaging for people with good gas mileage and that don't cost a month's pay to have serviced. But only time and the sales figures will tell whether Granada/Monarch rates as a milestone car.

Ford's benchmark car of last year, Mustang II, will come in an upgraded version for '75. The M-2 was not an inexpensive car and the extras added to the new top-of-the-line model, Mustang II Ghia, could push it way over \$5000. The Ghia has a vertical opera window behind the B post, a full or half vinyl roof and a 302-c.i.d. V8 engine. If you want to go first class plus, there's a special-

(Please turn to page 178)

OCTOBER 1974

111

SPECIFICATIONS AND COMPARISONS

Car— Series: Models, Options	Body Style	Wheel- base (in.)	Overall Length (in.)	Overall Width (in.)	Fuel tank capacity (gal.)	Engines in Model Series* (Cu. In.— V8 except as noted)	1975 Changes (Not federally regulated)
AMERICAN MOTORS CORP.							
American Motors Gremlin: Levi's, X, Rallye	2-dr. sedan	96.0	170.3	70.6	21.0	232-6, 258-6, 304	Refinements, electronic ignition, overdrive option
Hornet: Levi's, X, DL Rallye, Sportabout	2-dr. sedan, 3-dr. hatchback, 4-dr. sedan, 4-dr. wagon	108.0	187.0	71.1	17.0	232-6, 258-6, 304	Refinements, electronic ignition, overdrive option
Matador: X, Brougham, Cassini	2-dr. coupe, 2-dr. hdt., 4-dr. sedan, 2&3-seat wagons	114.0 to 118.0	209.3 to 216.0	77.4	24.5 †21.0	258-6, 304, 360	Refinements, electronic ignition, radial tires std., 401 V8 discontinued
CHRYSLER CORP.							
Dodge Dart: Swinger, Custom, Swinger Spe- cial, 360 Sport, Sport, Special Edition	2-dr. hdt., 2-dr. coupe, 4-dr. sedan	108.0 to 111.0	198.3 to 201.8	69.6 to 71.8	16.0	225-6, 318, 360	Refinements, improved 3-speed manual trans., new options
Charger Special Edition	2-dr. hdt.	115.0	213.6	76.3	25.5	318, 360, 400	Restyled, new options
Coronet: Coupe, Custom, Brougham, Crestwood	2-dr. coupe, 2-dr., hdt., 4-dr. sedan, 2&3-seat wagons	115.0 to 117.0	211.1 to 224.1	77.4 to 79.2	25.5 †21.0	225-6, 318, 360, 400	Restyled, new 2-dr. models, new options
Monaco: Royal Monaco, Royal Monaco Brougham	2-dr. hdt., 4-dr. hdt., 4-dr. sedan, 2&3-seat wagons	122.0 to 124.0	221.7 to 227.0	79.3	26.5 †24.0	318, 360, 400, 440	Refinements, radials standard, new options
Plymouth Valiant: Custom, Brougham, Scamp, Duster, Duster Custom, Duster 360	2-dr. coupe, 2-dr. hdt., 4-dr. sedan	108.0 to 111.0	194.1 to 197.6	71.0 to 71.8	16.0	225-6, 318, 360	Refinements, improved 3-speed, manual trans., new options
Fury: Road Runner, Cust- om, Custom Suburban, Sport	2-dr. hdt., 4-dr. sedan, 2&3-seat wagons	115.0 to 117.0	211.1 to 224.1	77.4 to 79.2	25.5 †21.0	225-6, 318, 360, 400	Restyled, new options (replaces Satellites)
Gran Fury: Custom, Suburban, Custom Suburban, Brougham, Sport Suburban	2-dr. hdt., 4-dr. hdt., 4-dr. sedan, 2&3-seat wagons	122.0 to 124.0	219.9 to 223.3	79.4 to 79.9	26.5 †24.0	318, 360, 400, 440	Refinements, new options (replaces Fury I, II, III)
Chrysler Cordoba	2-dr. hdt.	115.0	214.2	76.3	25.5	318, 360, 400	All-new car
Newport: Custom, Town and Country, New Yorker Brougham	2-dr. hdt., 4-dr. hdt., 4-dr. sedan, 2&3-seat wagons	124.0 to 125.1	224.7 to 225.1	79.4 to 79.7	26.5 †24.0	360, 400, 440	Refinements, new options
Imperial: Le Baron	2-dr. hdt., 4-dr. hdt.	124.0	231.0	79.7	25.0	440	Refinements, leveling control, new std. features
FORD MOTOR CO.							
Ford Pinto: Runabout	2-dr. sedan, 3-dr. hatchback, 2-dr. wagon	94.2	168.8 to 178.7	69.4 to 69.7	13.0 †14.0	140-4, 170.8-V6	Refinements, new standard engine, new std. features, new options
Mustang II: Ghia, Mach I	2-dr. hdt., 3-dr. fastback, 3-dr. 2-passenger	96.2	175.0	70.2	13.0 †16.5	140-4, 170.8-V6, 302	Refinements, V8 option, new standard features, new options
Granada: Ghia	2-dr. hdt., 4-dr. sedan	109.9	197.7	71.2	19.5	250-6, 302, 351	All-new car
Maverick: Grabber	2-dr. sedan, 4-dr. sedan	103.0 to 109.9	187.0 to 193.9	70.5	15.0	250-6, 302,	Refinements, new standard features, new options
Torino: Gran Torino, Brougham, Sport, Squire	2-dr. hdt., 4-dr. hdt., 2&3-seat wagons	114.0 to 118.0	213.1 to 220.7	79.0 to 79.3	26.5 †21.2	351, 400, 460	Refinements, new standard features, new options
Elite	2-dr. hdt.	114.0	216.1	78.6	26.5	351, 400, 460	New model
Ford LTD, Brougham, Laudau, Squire	2-dr. hdt., 4-dr. hdt., 2&3-seat wagons	121.0 to 122.0 †30.0	223.9 to 225.7	79.5 to 79.9	24.3 †32.3 †22.0 †30.0	351, 400, 460	Refinements, new standard features, new options
Thunderbird	2-dr. hdt.	120.4	225.8	79.7	26.5	460	Refinements, new standard features, new options
Lincoln-Mercury Comet: GT	2-dr. sedan, 4-dr. sedan	103.0 to 109.9	189.4 to 196.9	70.5	16.0	200-6, 250-6, 302	Refinements, new standard features, new options
Monarch: Ghia	2-dr. sedan, 4-dr. sedan	109.9	199.9	74.0	19.2	250-6, 302, 351	All-new car
Cougar: XR-7	2-dr. hdt.,	114.0	215.5	78.5	26.5	351, 400, 460	Refinements, new standard features, new options
Montego: MX, Brougham, Villager	2-dr. hdt., 4-dr. sedan, 2&3-seat wagons	114.0 to 118.0	215.5 to 224.4	78.6 to 79.6	26.5	351, 400, 460	Refinements, new standard features, new options
Mercury: Marquis, Brougham, Grand Marquis, Colony Park	2-dr. hdt., 4-dr. hdt., 2&3-seat wagons	124.0 †121.0	229.0 †227.0	79.6 †79.8	24.2 †21.0	400, 460	Refinements, new standard features, new options

FOR ALL 1975 DOMESTIC MODEL CARS

Car— Series: Models, Options	Body Style	Wheel- base (in.)	Overall Length (in.)	Overall Width (in.)	Fuel tank capacity (gal.)	Engines in Model Series* (Cu. In.— V8 except as noted)	1975 Changes (Not federally regulated)
Lincoln: Continental	2-dr. hdtpl., 4-dr. sedan	127.2	233.1	80.0	22.0	460	Refinements, new standard features, new options
Continental Mark IV	2-dr. hdtpl.	120.4	228.3	79.8	26.5	460	Refinements, new standard features, new options
GENERAL MOTORS CORP.							
Chevrolet Vega: LX, Estate, GT Estate, GT Sport	2-dr. coupe, 3-dr. hatchback, 2-dr. wagon, 2-dr. panel.	97.0	176.4	65.4	16.0	140-4	Refinements, new standard features, new options
Monza 2+2	2-dr. hatchback	97.0	179.3	65.4	18.5	140-4, 262	All-new car
Corvette	2-dr. coupe, 2-dr. convert.	98.0	185.2	69.0	18.0	350	Refinements, new standard features, new options
Camaro: LT, Z28	2-dr. sport coupe	108.0	195.4	74.4	21.0	250-6, 350	Refinements, new standard features, new options
Nova: Custom, LN, SS	2-dr. coupe, 3-dr. hatchback 4-dr. sedan	111.0	196.7	72.2	21.0	250-6, 262, 350	Restyled, new standard features, new options
Chevelle: Malibu, Classic, LaGuna Type S-3, El Camino	2-dr. hdtpl., 4-dr. sedan, sta. wagon, sedan pickup	112.0 to 116.0	205.3	76.6	22.0 §26.0	250-6, 350, 400, 454	Refinements, redesigned 250-6, new standard features, new options
Chevrolet: Bel Air, Impala, Caprice Classic, Estate Monte Carlo "S"	2-dr. coupe, con- vert., 4-dr. sedan, 2&3-seat wagons 2-dr. sport coupe	121.5 to 125.0 116.0	222.7 to 228.4 213.3	79.5	26.0 †22.0	350, 400, 454	Refinements, new standard features, new options
Pontiac Astre, S.J., Safari	3-dr. hatchback, 2-dr. wagon	97.0	175.9	65.4	16.0	140-4	New model
Firebird: Esprit, Formula, Trans Am	2-dr. sport coupe	108.0	196.0	73.0 to 73.4	20.2	350, 400,	Refinements, new standard features, new options
Ventura: Custom, SJ	2-dr. coupe, 3-dr. hatchback, 4-dr. sedan	111.0	199.6	72.5	20.5	250-6, 260, 350	Restyled, new standard features, new options
LeMans: Sport Coupe, Grand LeMans; Safari, Grand Am	2-dr. hdtpl., 4-dr. hdtpl., 2&3-seat wagons	112.0 to 116.0	208.0 to 215.7	77.0 to 77.9	21.8 †22.0 †25.0	350, 400, 455	Refinements, new standard features, new options
Catalina: Bonneville, Grand Ville Brougham, Safari, Grand Safari Grand Prix	2-dr. hdtpl., 4-dr. hdtpl. sedan, 4-dr. sedan, convert. 2-dr. hdtpl. coupe	124.0 to 127.0 116.0	226.0 to 231.3 217.5	79.6	25.8 †22.0	400, 455	Refinements, new standard features, new options
Buick Skyhawk Apollo: Skylark	2-dr. hatchback 2-dr. coupe, 3-dr. hatchback, 4-dr. sedan	97.0 111.0	179.3 200.3	65.4 69.9	18.5 21.0	231-V6 250-6, 231-V6, 260, 350	All-new car Refinements, new standard features, new options
Century: Custom, Regal, Special, Gran Sport	2-dr. coupe, 4-dr. sedan, 2&3-seat wagons	112.0 to 116.0	209.5 to 218.2	79.0	22.0	231-V6, 350	Refinements, new standard features, new options
LeSabre: Custom	2-dr. hdtpl., 4-dr. hdtpl., convert.	123.5	226.9	79.9	26.0	350, 455	Refinements, new standard features, new options
Electra: 225, Limited	2-dr. hdtpl., 4-dr. hdtpl., 2&3-seat wagons	127.0	231.8 to 233.4	79.9	26.0 †22.0	455	Refinements, new standard features, new options
Riviera: GS	2-dr. coupe	122.0	233.0	79.9	26.0	455	Refinements, new standard features, new options
Oldsmobile Starfire Omega: Salon	2-dr. hatchback 2-dr. coupe, 3-dr. hatchback, 4-dr. sedan	97.0 111.0	179.3 199.6	65.4 72.9	18.5 21.0	231-V6 250-6, 260, 350	All-new car Restyled, new standard features, new options
Cutlass: Salon, Supreme, Cruiser, Vista Cruiser	2-dr. coupe, 4-dr. sedan, 2&3-seat wagons	116.0	215.7 to 220.4	76.7 to 77.7	22.0	250-6, 260, 350 455	Refinements, new standard features, new options
Delta: 88, Royale, Custom Cruiser	2-dr. coupe, 4-dr. sedan, convert., 2&3-seat wagons	124.0 to 127.0	226.9 to 231.2	79.8 to 80.0	26.0 †22.0	350, 400, 455	Refinements, new standard features, new options
Ninety-Eight: Luxury, Regency	2-dr. hdtpl., 4-dr. hdtpl.	127.0	232.4	79.8	26.0	455	Refinements, new standard features, new options
Toronado: Custom, Brougham	2-dr. coupe	122.0	227.6	79.5	26.0	455	Refinements, new standard features, new options
Cadillac: Calais, DeVille Fleetwood: Brougham, Eldorado, 75 Sedan and Limousine	2&4-dr. hdtpl., 4-dr. sedan, convert., limousine	130.0 to 151.5	230.7 to 252.2	79.8	27.0	500	Refinements, new standard features, new options

*Not all engines available in all models

†Station-wagon models

‡Optional

§Pickup

†Grand Am

Kalamazoo isn't far from Detroit, but Checker is

If you want to make an end run around Detroit's annual model switching, consider the 'other' American car—the Checker Marathon, made in Kalamazoo, Mich.

By Michael Lamm
WEST COAST EDITOR

Checker Marathon four-door sedan is the 120-inch wheelbase model providing seating for eight. In addition to three-abreast seating in the front and rear benches, there are two fold-down jump seats just behind the front bench. They take up only a small part of the huge space provided for rear-seat legroom (it's for good reason that some people in American cities hail Checker cabs only!). As shown at far right, the interior of the Marathon is spartan, but much desirable equipment is standard: power front-disc brakes, power steering, automatic transmission, rear carpeting, heater/defroster and undercoating. In addition to the cavernous interior space, trunk of the 213.8-inch-long vehicle is huge.



Everyone knows Checker builds taxicabs. But not everyone knows that anyone can buy a Checker passenger car f.o.b. Kalamazoo, Mich. There are two models in Checker's Marathon line; both are four-door sedans but have different wheelbases.

What sets Checkers apart from conventional Detroit products (once you accept their 1953 styling) is their tremendous interior space. Checkers also enjoy a long-standing reputation for durability. Some people think of them as 20-year cars.

The sedans come on 120 and 129-inch wheelbases, and with optional jump seats in the back, they can carry eight and nine passengers, respectively. The 120-incher has two individual folding seats, and the extended sedan can be ordered with a split folding bench to carry three more riders.

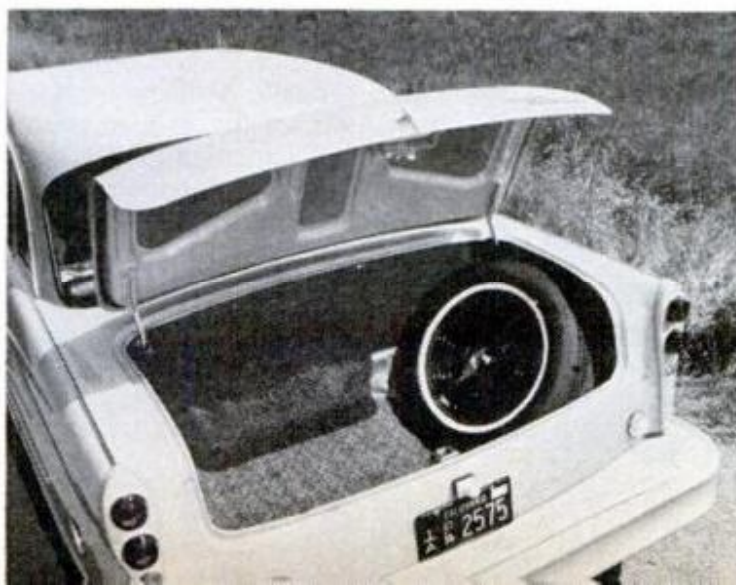
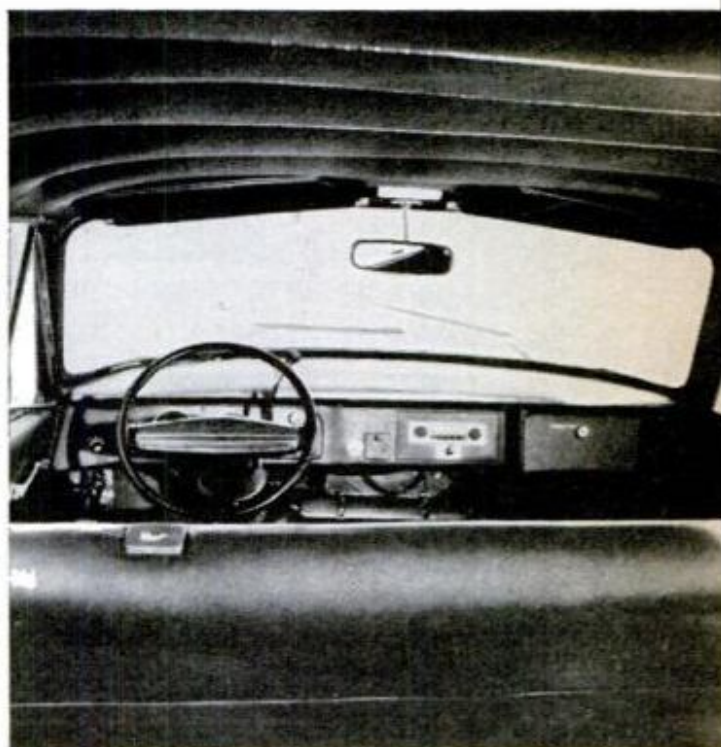
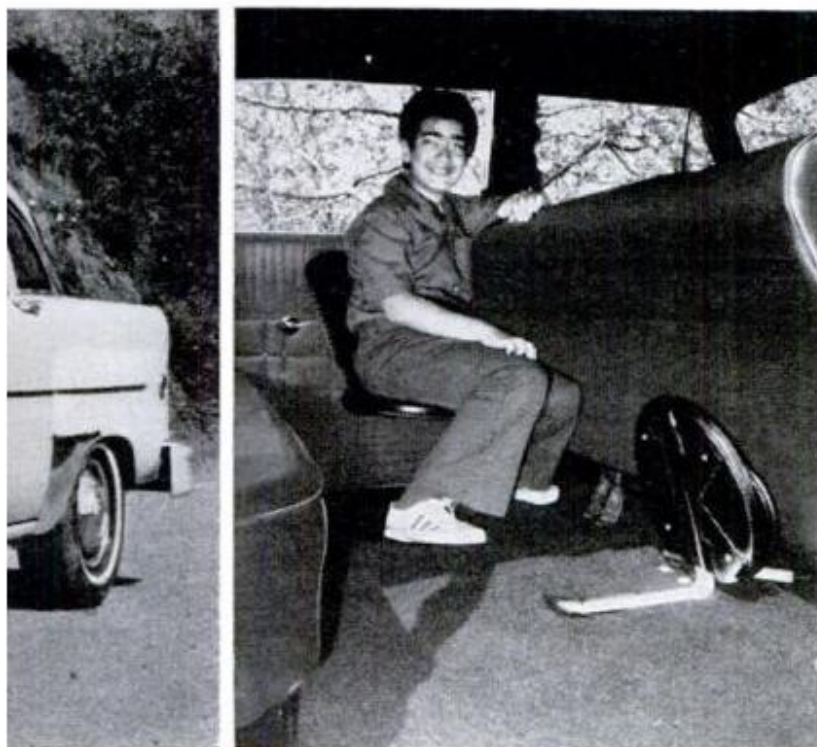
Checker now uses Chevrolet engines exclusively—the 250-c.i.d. Six and the 350-c.i.d. V8 with Turbo Hydra-Matic, front disc

brakes, power steering, heater, undercoating and rear carpeting standard.

I had a chance recently to drive and live with a 120-inch Marathon for three weeks. It had the Six, the only engine legal in California due to smog considerations (you can buy the V8, though, in other states). With the Six not broken in, mileage was 14.6 mpg overall, with 13.3 during all in-town driving and 17.7 on a 200-mile freeway trip. That's not bad for a 3839-pound car—the largest American sedan available with a Six. But I feel the V8 would deliver about the same gas mileage, because I had to drive the Six with the throttle wide open much of the time. It's not a sparkling performer so if you tow or order airconditioning, I think the V8 is a must.

Before I picked up the car, I had been hoping to report that here is a great nonsense car with *impeccable* workmanship

(Please turn to page 173)



Checker Marathon Specifications

Body styles: 6/8-passenger 4-door sedan on 120-in. wheelbase; 6/9-passenger sedan or 129-in. wb.

Engines: Chevrolet in-line ohv, 250-cu.-in. Six; 350-cu.-in. V8.

Dimensions—wheelbases: 120, 129 in.

Overall lengths: 204.8, 213.8 in.

Overall width: 76.0 in.

Overall height: 62.8 in.

Tread f/r: 64.5/63.4 in.

Curb weights: 3800 to 4200 lbs. depending on model.

Fuel-tank capacity: 21.5 gal.

How to prepare your car for winter

Data: Mort Schultz

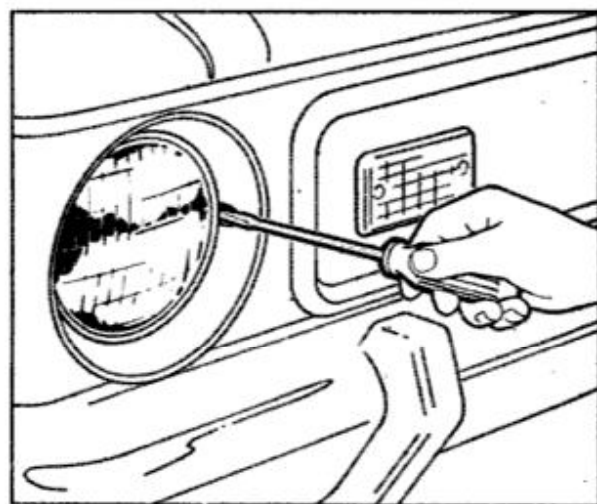
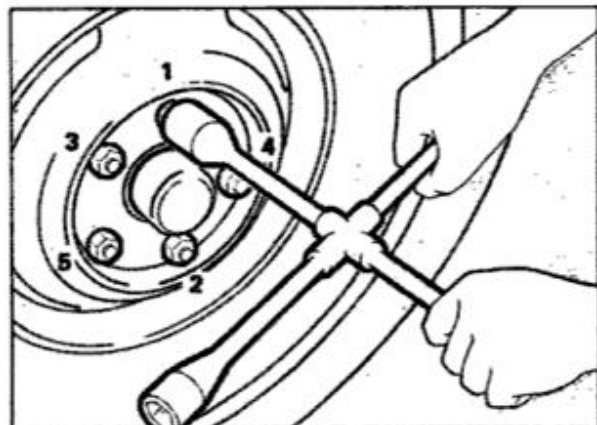
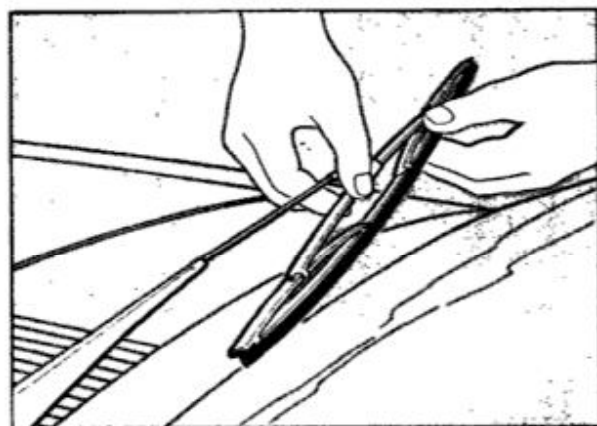
Don't wait until the middle of winter to prepare your car for cold weather. The American Automobile Assn. claims that more than 50 million U.S. motorists "May-day" the association for AAA service trucks to help them get their cars started when temperatures drop below freezing. This represents more than 45 percent of all AAA service calls, and is more than double the

rate of calls resulting from flat tires and almost triple the rate of motorists calling to get their stuck cars out of snow and mud.

Prewinter preparation will help you keep your car moving. It will also assure you that your car is safe to meet the foul-weather driving ahead. By doing the work yourself you will save \$30 to \$50 and can make sure that the job is done right.

TOOLS NEEDED

- Cooling-system hydrometer (inexpensive ball-type is adequate)
- Cooling-system thermometer rated to at least 212°F.
- Battery hydrometer
- Battery cable puller
- Battery carrier strap
- Battery terminal and post-cleaning tool
- Dwell/tachometer
- Stroboscopic timing light
- Ratchet wrench set with sparkplug socket
- Sparkplug-gapping tool
- Distributor breaker-point feeler gauge
- Ignition wrench set
- Ignition point file
- Assorted wrenches and pliers
- Phillips and straight-slotted screwdrivers



Safety first

- Check that headlights, parking lights, taillights, stoplights, side-marker lights, backup lights, direction signals and hazard warning flashers are working. Replace burned out bulbs.

- Replace windshield wiper blades (illustration, left) if rubber isn't firm and resilient or if blades streak glass.

- Check windshield-washer system. Fill reservoir with 1:1 solution of windshield washer fluid and water. Bend nozzles carefully so they squirt solution at top of the areas swept by blades.

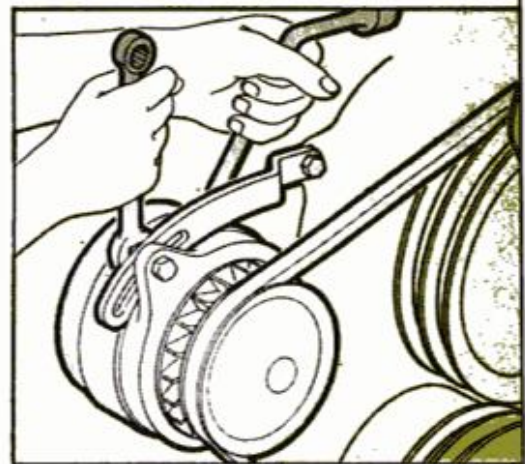
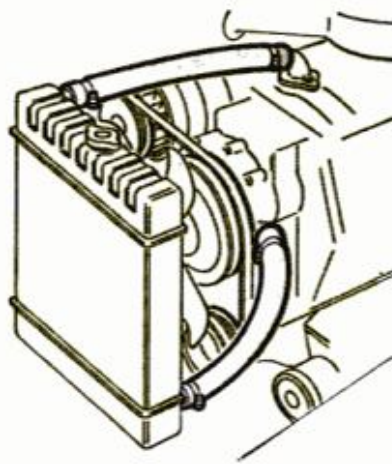
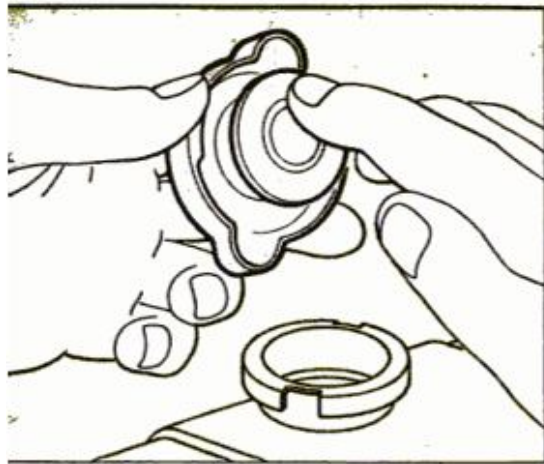
- Prepare snow tires. Check for cuts, safe tread and correct inflation. Check state laws concerning use of studs and dates. Mount snow tires following correct lug-tightening pattern (illustration left).

- Road test brakes. They must stop car evenly with no trace of pulling. Uneven braking can cause skidding on slippery roads.

- Check exhaust system for leaks.

- Adjust headlights to specification. Use adjusting screws or controls to aim beams horizontally and vertically. Adjustment screws are accessible either through bezel (illustration left) behind lights through engine compartment or when bezel is removed.

- Prepare a list of, and purchase aids you feel necessary for, your winter driving habits. For example: windshield ice scraper, aerosol deicers and defrosters, compact or fold-up shovel and emergency blanket.



Checking the cooling system

Test coolant with a cooling-system hydrometer. Its strength must be sufficient to protect your engine against the lowest anticipated temperature in your area. If coolant meets requirements but is more than two years old, replace it.

Check the rubber gasket on the radiator cap (above). If it is cracked or has lost pliability, or if the spring is not firm, replace the gasket and/or cap. Squeeze top and bottom radiator hoses (above), water-pump bypass hose (if there is one), and heater hoses. Replace hoses that show cracks or feel mushy.

Check water pump. Press the drive belt midway between the pulleys. It should give no more than $\frac{1}{4}$ to $\frac{1}{2}$ inch. To tighten the belt, loosen the alternator adjusting-arm bracket bolt and place a tire iron against the middle of the alternator housing (above). Exert pressure until the belt is taut. Tighten the bolt and recheck tension. Replace a cracked or glazed belt.

With the engine cold, insert a cooling-system thermometer into the radiator filler neck. Let the engine idle. The thermometer should reach 190° - 210° F. and stabilize. Squeeze the top radiator hose. You should feel coolant surging. If the thermometer never reaches this temperature range, replace the thermostat by draining the radiator to below the level of the top radiator hose and unbolting the thermostat housing. Replace the gasket if it is damaged.

If there has been a loss of coolant from the radiator during the last few months, inspect the cooling system for leaks with a cooling-system pressure tester. Fit tester to radiator filler neck and

pump its arm to place cooling system under pressure. Leaks will reveal themselves.

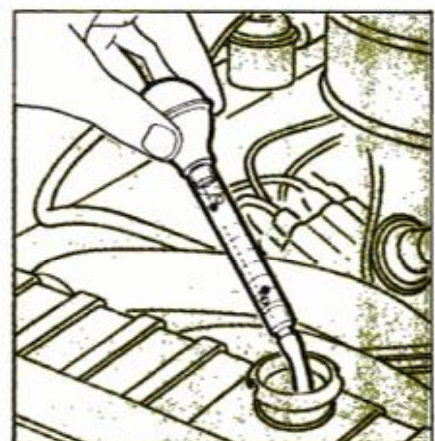
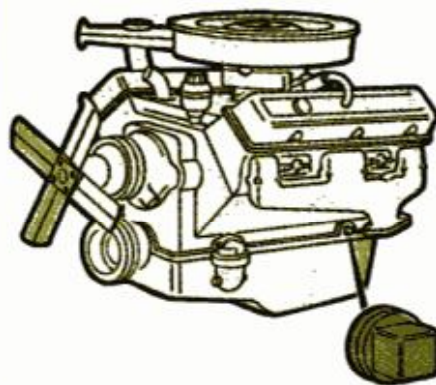
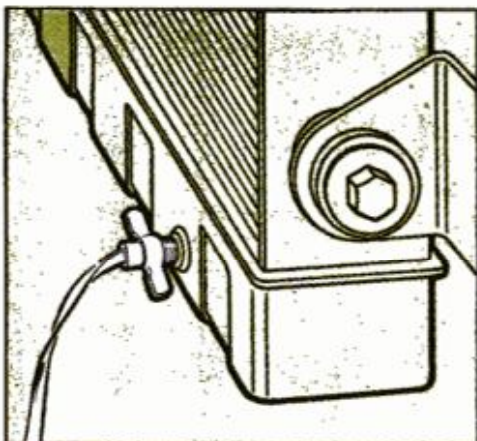
If ethylene glycol coolant is two years old, replace it. Remove the radiator cap and open the pet cock at the bottom of the radiator (below). Turn on heater controls and remove engine-block drain plug(s) (below). In-line engines have one drain plug; V8s have two, one on each side of the block. When coolant has drained off completely, tighten the pet cock and reinstall drain plug(s).

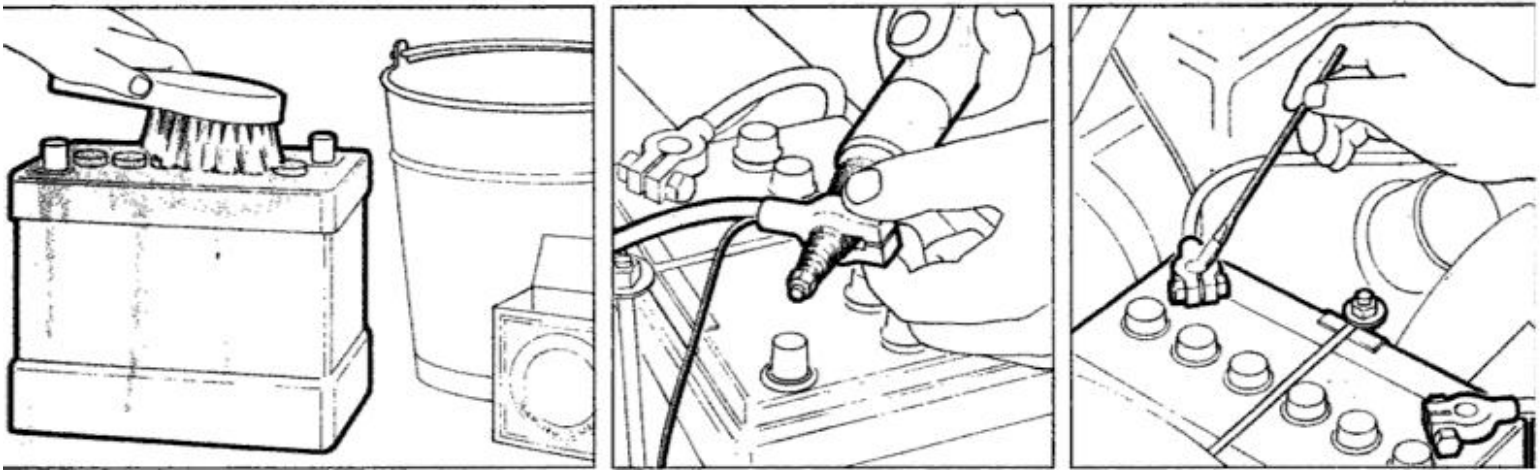
Fill radiator with plain water, add a can of fast-flush cleaning solvent and let engine idle 15 to 30 minutes (see instructions on the container). Turn off engine and again drain the system.

With the pet cock open and drain plug(s) removed, insert a garden hose into the radiator filler neck and turn it on to flush the cooling system. Reverse flushing is also desirable. As water is being injected into the radiator, start the engine and let idle for about five minutes. Then remove the hose, tighten the radiator pet cock and reinstall engine drain plug(s).

Pour a solution of high-quality ethylene glycol and water into the radiator. Adequate protection will be afforded to engines in most parts of the country by mixing a 50:50 solution, but if you live in a subzero climate consult your car owner's manual or instruction on the ethylene glycol container for correct mixture. Test coolant with hydrometer after it's in radiator (below).

Replace radiator-pressure cap, start engine and let it idle. Check for leaks at pet cock and drain plug(s). Continue to check system for leaks for a few days to ensure that all is well.





Cleaning the battery

It doesn't take much corrosion and dirt to prevent delivery of maximum current needed to start an engine in cold weather when maximum cranking power is required. Turn off the ignition switch and all accessories, and disconnect battery cables (ground cable first). Use a battery cable puller. Don't use screwdriver, hammer or pliers—you may damage the battery.

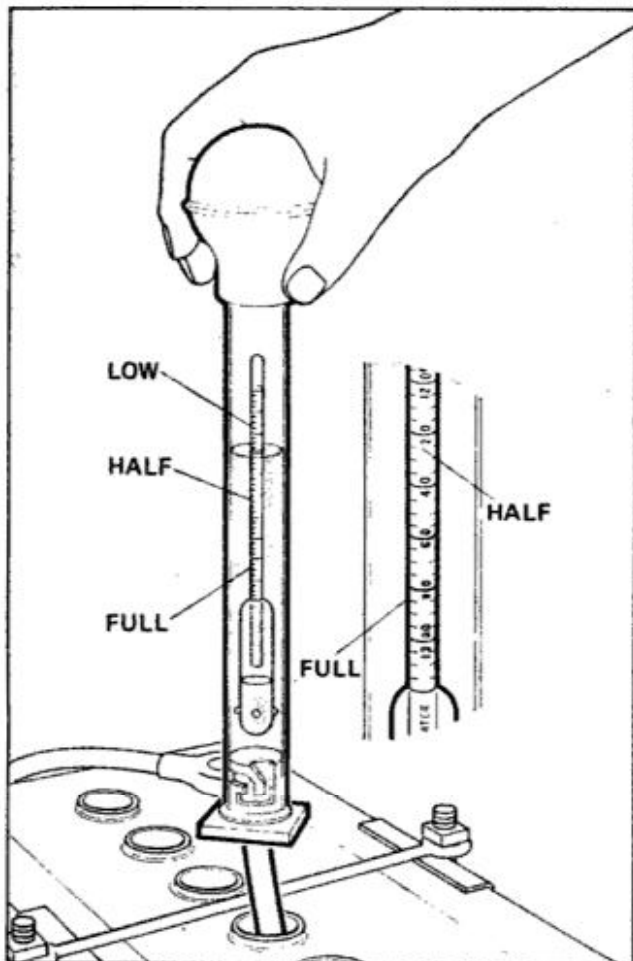
Take the battery from the car with a battery carrier strap and place it on a wooden plank. Tighten all vent caps and cover them with small strips of masking tape to keep cleaning solution from leaking through the vent holes into the battery and neutralizing the acid.

Mix a solution of baking soda and water, and wash the top, sides and bottom of the battery

(above). Then flush thoroughly with water. Repeat this cleaning procedure until a fresh application of solution no longer fizzes when applied. Clean the battery holder in the car in the same way.

Wipe battery cables with a dry rag. Replace the cables if internal wiring shows or if insulation is brittle and cracked. Clean terminals with a battery terminal cleaning tool until bright (above).

Place the battery back into the car and reconnect cables (positive cable first). Connections must be tight. Apply a thin coat of petroleum jelly to terminals and battery posts (above). Finally, bring battery water up to the rings in the bottom of the filler wells. Use drinking water or, better yet, distilled water or rainwater that you have caught in a plastic container.

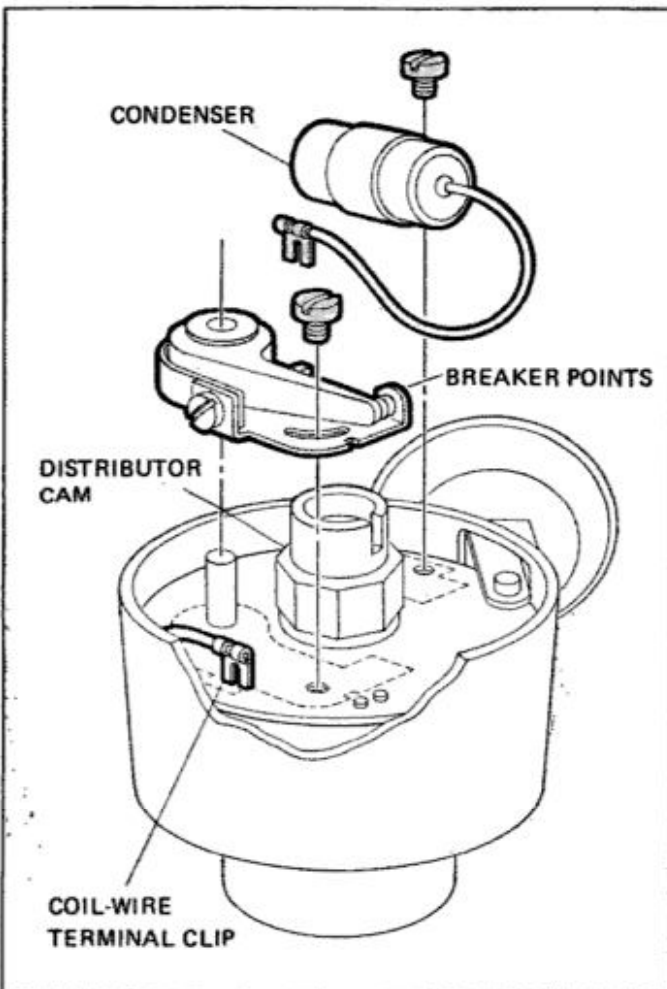
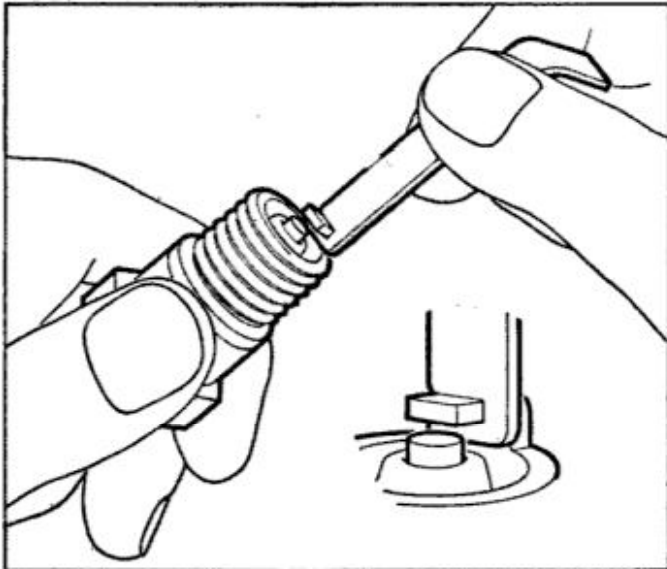
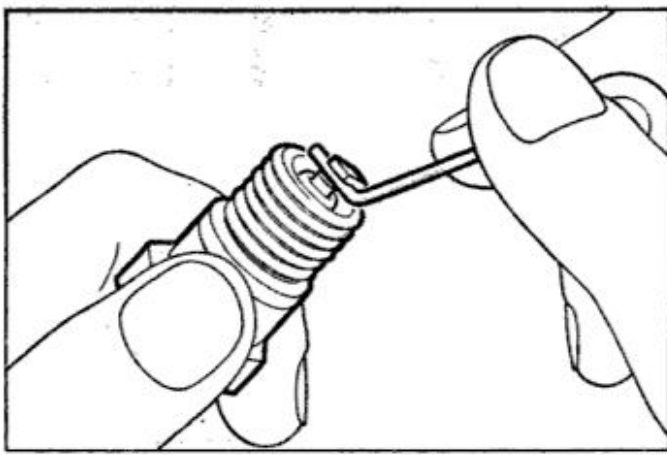


Testing the battery

A fully charged battery in winter is a must. That's because its capacity lowers as the temperature goes down. When the temperature drops to 32°F., your battery produces only 60 percent of its rated capacity. At 0°F., only 46 percent of capacity is available. Test the battery (but never immediately after adding water) one cell at a time by drawing electrolyte into a battery hydrometer (left). Note readings and return acid to the cell from which it was drawn.

It's generally not necessary, but for a very accurate reading, compensate for the temperature of electrolyte since specific gravity varies with temperature. Some hydrometers have built-in temperature correction scales. With others, you have to insert a thermometer into the battery's center cell, read the temperature and correct the reading.

A battery with a corrected average specific gravity reading of 1.250 or less should be charged. A fully charged battery has an average specific gravity reading of 1.260 or more.



Tuning the engine

An engine in a poor state of tune may start now, but won't when the temperature drops. A tune-up, which consists of the following, will assure that your engine always starts—even on coldest days.

Replace worn or damaged sparkplugs. Good sparkplugs can be cleaned by removing deposits from between electrodes with a wire brush and lightly filling electrodes with an ignition point file until square and bright. All sparkplugs, new or old, must be adjusted to specification, which can be obtained from the owner's manual or the tune-up decal mounted in the engine compartment. Bend the side electrode to gap plugs (left). They are adjusted properly when the specified gauge passes smoothly between electrodes with minimum resistance (left, top).

Examine distributor components (left). If breaker points are badly pitted or eroded, replace them. If points are still usable, clean them by passing the ignition point file between them once or twice; then wipe them with a cloth dampened in mineral spirits. Gap points to specification by inserting the proper-size feeler gauge between them. Slide gauge back and forth. You should feel slight friction. To adjust points, insert a screwdriver in notch or slot near the mounting screw, loosen screw and twist. Or insert an Allen wrench in the hole in adjustment screw and turn. It depends on the type of distributor.

Inspect distributor cap and rotor. Replace a cracked distributor cap or rotor and ignition wires that are damaged.

Connect the dwell/tachometer and set distributor point dwell—the distance in degrees that the distributor cam rotates while the points are closed. This specification appears on the tune-up decal in the engine compartment and is set by adjusting the distributor points. Slide up door on side of the distributor and insert an Allen wrench in the adjustment screw with the engine running. Or remove distributor cap to reset with the engine off. It depends on make and model of your car.

Check ignition timing. Connect timing light and sight timing marks. If timing has to be adjusted, loosen distributor and turn it until proper timing mark is brought into range with index pointer.

Clean or replace the carburetor air-cleaner element, lubricate the manifold heat-control valve and see that choke plate isn't binding. Clean choke plate pivots and linkage with choke-plate cleaner.

Set carburetor slow and fast-idle speeds. Slow idle is set by connecting tachometer and turning the slow-idle-speed screw or lug on the idle-stop solenoid until engine is running at specified speed. To set fast idle, locate the fast-idle screw, usually attached to the throttle lever, resting against a stepped cam. Rotate the cam until the screw rests on the highest or second highest cam step. Turn screw until tach shows specified fast-idle speed.

Be sure you have the right oil in your crankcase to meet the lowest anticipated temperature in your area. Above 0°F., you can use SAE 10W-30 or SAE 10W-40. Below 0°F., use SAE 5W-20 or SAE 5W-30; while using this oil you should avoid sustained high-speed driving. ★★★

IT'S NEW

NOW



Small fighter with a big sting

Newest fighter for the Air Force is this Northrop YF-17, said to weigh half as much as current operational fighters and be 50 percent more maneuverable in combat. The twin-jet, dual-finned craft features an unusual wing system having slim, slotted, sharply swept vanes ahead of the main wings (left below). These provide high lift with low drag at supersonic speeds up to 1500 mph. Leading and trailing-edge flaps are computer-controlled and operate automatically in flight. The YF-17 is one of two new prototypes—the other is General Dynamics' YF-16—aimed at revolutionizing fighter design with lighter weight, lower cost, greater maneuverability.

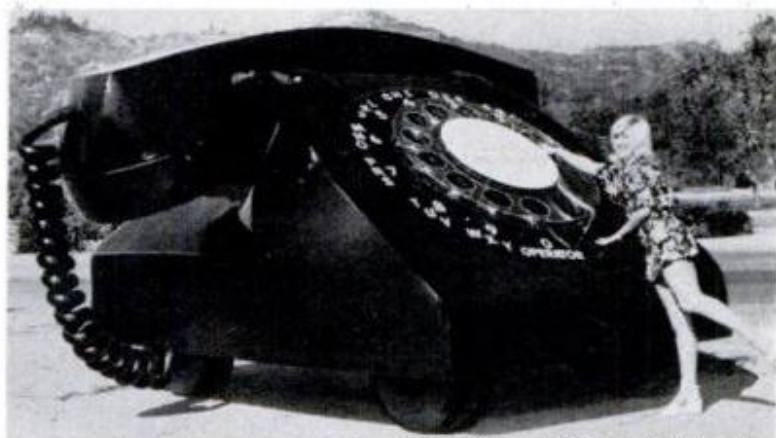


Cleaning gun's a real blast

The frocked gentleman at left isn't a doctor checking the lady's heartbeat. He's an art restorer at London's Victoria and Albert Museum, and he's removing grime from the marble statue with a new ultrahigh-speed cleaning "gun." The gun bombards the stone with a stream of tiny glass beads fired by a blast of nitrogen at 1400 mph. The scouring action is similar to sandblasting, but doesn't damage the precious sculpture.



THE LATEST PRODUCTS AND DEVELOPMENTS

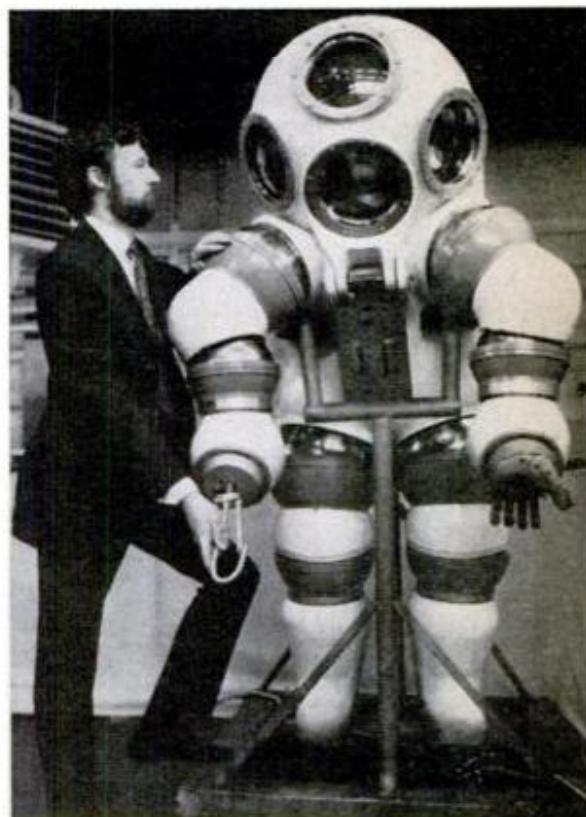


Big phone, small girl

It's either an awfully big telephone or an awfully tiny girl. Fortunately, it's the former. The 6-foot-wide, 7-foot-high, 1000-pound phone, made of wood and plastic on the chassis of a small foreign car, appears on a television commercial sponsored by General Telephone & Electronics Corp. The commercial points out that the telephone can help conserve gasoline: Dialing before driving can often determine whether the need for traveling is really essential.

Car jack—inflatable rubber bag

Novel car jack is simply a small rubber bag placed under the car and connected to the exhaust by a hose (below). Engine is turned on and bag is blown up within 30 seconds by exhaust gases so tire can be changed (bottom). Japanese-made Bull Bag is said to lift three tons approximately 2½ feet. One European distributor: Bull-Bag Vertrieb, Birkerstrasse 33, 8 Munich 19, Germany.



Diving suit ends decompression

This British-designed, semi-rigid diving suit keeps a diver at surface pressure so he can come up at any time without having to undergo long decompression stops. Suit is large enough to be worn by individuals of differing physiques, and has room inside for equipment storage. Internal controls govern hand and hook manipulators.



Fiberglass boats form car ferry

With four French-designed fiberglass boats, the maker claims you can provide your own ferry for your compact, lightweight car (above). The 25-pound boats, about 6¾ feet long, are said to stack and transport on the car roof (above, right). It is also claimed that the car wheels can be readily lifted into boats. Boats can be paddled or an outboard motor attached. The system was devised by France-Europe, 37 Blvd. Chanzy, Sedan, France 08204.



Belt warns of extreme changes in pollution, air and body temperatures

Futuristic-looking belt is made of stainless steel inlaid in silver and has five glass vials containing red liquid crystals that change to blue when there is a marked increase in the pollution level or a rapid rise in body or air temperature. The belt is made only on special order. For further information, contact the Museum of Contemporary Crafts of the American Crafts Council, 29 West 53rd St., New York, N.Y. 10019.



Portable hose crimper

Hose crimper has five die sets to crimp standard brass ferrules and secure fittings to rubber hoses of ¼-in. No. 1-braid through ¾-in. No. 2-braid sizes. Lever (above) controls crimping. Model 855 is portable or can be secured to workbench. For further details and price information, write Amflo Products, Inc., 1430 South Anaheim Blvd., Anaheim, Calif. 92805.





Two-way bike: Your choice of either pedal or electric power

Latest in bicycles is this self-propelled hybrid that offers both pedal power and electric assist. The idea: You can pedal over easy terrain, switch to electric propulsion for long-range touring or use a combination of both when the going gets tough. A twin-chain drive channels power to the rear wheel from the pedal cranks or a battery-run motor under the seat. Inventor is British industrial designer George Robbins.

Latest dishwasher is potwasher as well

A dishwasher that handily cleans even the most stubbornly encrusted pots—that's the Pot-scrubber II from GE. The new design has increased tub space, an adjustable upper rack for loading bulky items in lower rack and three spray arms (top, bottom and under the upper rack). Unit also has reversible-color door panels and special module for easy installation.



On land or sea, happiness is pedaling

Would you believe an amphibious exercise machine? Device can be used at home to exercise (left) or aquatically as a water bike (above). Transformation is done without separate bolts, nuts, screws. In water, machine is used with two inflatable air cushions and a propeller. Total weight is about 40 pounds. The manufacturer is St. Karasek & Co., 12-14 Neubaugasse, 1071 Vienna, Austria.

NOW

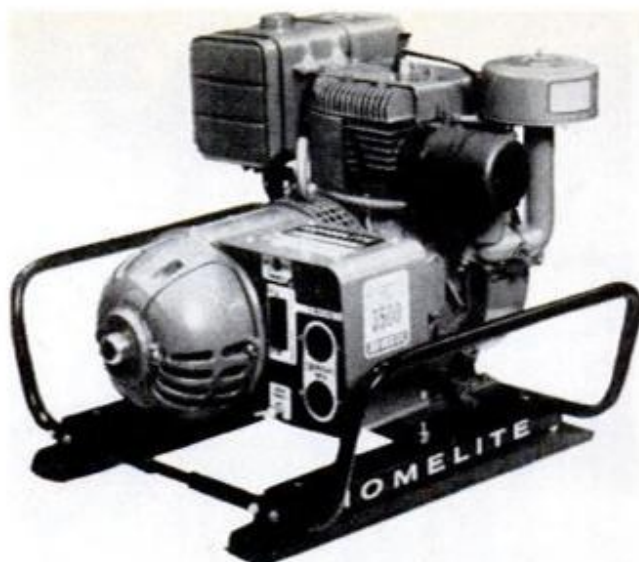
Versatile grinder and buffer

Twenty assorted burrs, brushes and grinding wheels come with this combination grinder-buffer (below). Flexible shaft is powered by unit's 1/15-hp motor. Electronic control provides speeds of 300 to 14,000 rpm for sharpening tools, grinding, buffing, carving and polishing wood, metal, leather, glass, stone, fiberboard. Kit No. 3272 is \$64.50 from Freedom Electric Co., a division of Blackstone Industries, Inc., Bethel, Conn. 06801.



Sawhorses are adjustable, foldable

Handy Horses fold up to less than 5-inch thickness for storage. Unfolded, they have elevator rails (below) that adjust from 22½ to 39 inches high. The rails have built-in calibrations to insure a level working surface. Wood sawhorses come unfinished with wall hanger and diagonal brace for stability when horses are raised and spread far apart. \$28.50 a pair from Croton Craft, 2 Memory Lane, Croton-on-Hudson, N.Y. 10520.



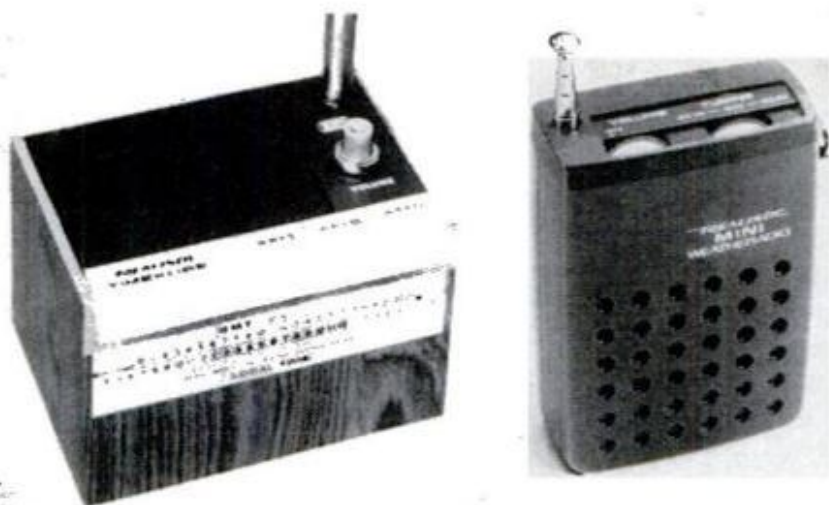
Generator has new safety features

New d.c. generator incorporates latest safety devices, including direct circuit breaker, to comply with National Electrical Code. All components are accessible from control box at side of unit. Model 119HY35-2B provides 3500 watts of 180-cycle power at 230 volts or 2500 watts of 115-volt d.c. It has an automatic idle control. Price, \$815. Homelite, Port Chester, N.Y.



Metal sawhorse folds for storage

Sears' Craftsman heavy-duty metal sawhorse is 29 inches high with bracing between legs and cross beam (above) for extra stability. Holes are provided in the cross beam for securing a board to make a utility table or workbench. Sawhorse folds into 2½ x 2¾ x 36-inch package (above, top) for compact storage. Available soon from Sears, Roebuck & Co.



Instant time and weather reports

The Realistic Timekube (above, left) gives pushbutton reception of National Bureau of Standards time signals broadcast each minute and accurate to within 20 billionths of a second per day. Sliding scale on front of unit converts this universal time to local time. The shirt-pocket-size Mini Weatheradio (above, right) tunes in the National Weather Service reports broadcast 24 hours a day in many parts of the country. Prices, \$49.95 and \$14.95, respectively, at Radio Shack stores.



Portable shock-protection unit

Portable/20, made by Pass & Seymour, Inc., Syracuse, N.Y. provides shock protection to user of portable electrical appliances and tools where permanent shock protection is missing. Four-outlet unit, little larger than a cigar box, is under five pounds, \$89 at electrical supply outlets.

Wind-propelled generator produces free electricity

Windmill generator starts charging in 7-mph-wind, has 15-amp. output in 23-mph wind; 6-foot propeller turns 200-watt plant. Air brake prevents overcharge in high wind. With 12-volt battery, the 10-foot-high unit (No. 19,189) gives steady 12-volt d.c. charge. Unit less battery is priced at \$425 postpaid; with an inverter attachment (\$125 to \$150 extra), it gives 115-v.a.c. use. Edmund Scientific Co., 101 East Gloucester Pike, Barrington, N.J. 08007.



Neck lamp lights close work

Pendant-Lamp is held by a nylon neck strap at front of body for illumination of close detail work. Adjustable shade over miniature fluorescent tube directs light, protects eyes. Lamp weighs 7½ ounces, has bottom switch. \$19.95. Aqua Survey & Instrument Co., 7041 Vine St., Cincinnati, Ohio 45216.

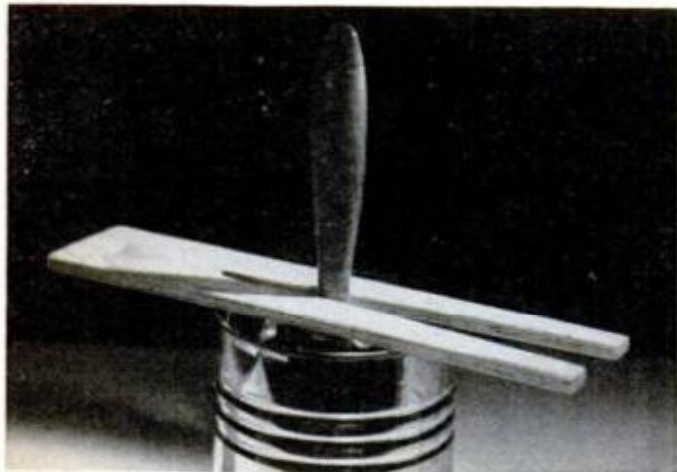
Newest hand grinder has speed dial

Variable-speed power tool (below, left) can be used to sand, drill, cut, polish or rout wood, metal, plastics, ceramics or glass with proper bit and speed selection. Moto-Tool has dial (below, right) for setting speed from 5000 to 25,000 rpm (about \$40 and \$50) or in kits (about \$50 and \$60). The kits contain more than 30 accessories. Dremel Mfg. Div., Emerson Electric Co., Box 518, Racine, Wis. 53401.



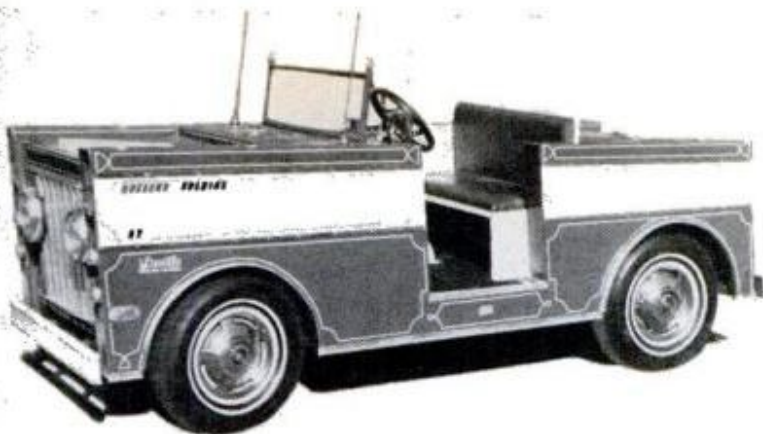
Handy paintbrush holder

Brushmate, a slotted device made of 1/4-in. cross-grained plywood and used across top of can (below), provides a convenient way to suspend a paintbrush in paint or solvent without bending or splaying the bristles. Set of three, \$1.25 ppd. from Brushmate Co., Box 463-AA, Warwick, N.Y. 10990.



Color printing at amateur prices

This low-cost color enlarger is said to produce professional-quality color prints at a price the amateur can afford. The Chromega B, patterned after the Super Chromega D professional model, takes negatives to 2 1/4 x 2 1/4, uses dichroic filters and has convenient color-coded filtration controls on front of the lamp-house. Prices start at \$299.50. Enlarger is also available as part of a complete color printing system (top photo), including electronic analyzer. Sold by Berkey, 25-20 Brooklyn-Queens Expressway West, Woodside, N.Y. 11377.

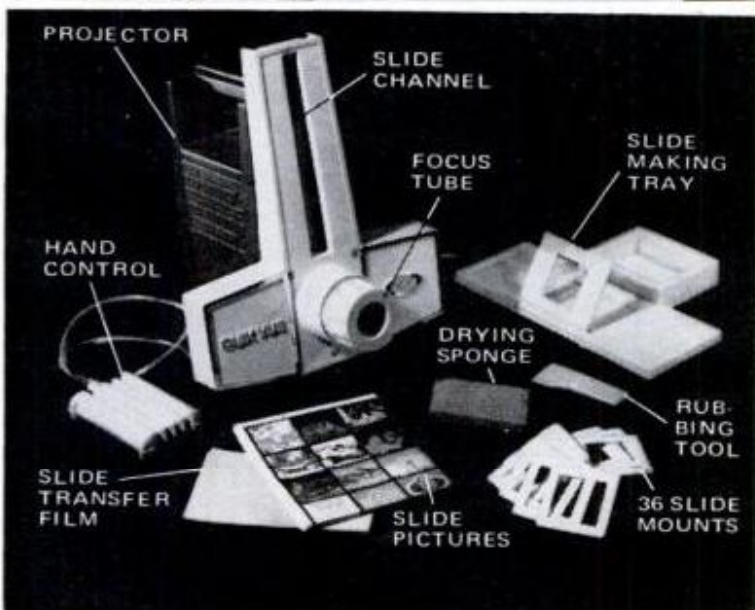


Homemade car carries golf gear

Vehicle with 10 storage compartments at left is a one-of-a-kind car built for carrying golf equipment by J. C. Linville, Chickasha, Okla. Powered by a 9-hp mower engine, the 10-foot-long car has 35 to 38-mph top speed. Except for a Chevy 2 rear end and automatic transmission, it was built by hand. Body is made of 20-gauge cold-rolled metal. Material cost: \$1000; time to build: 125 hours.

Slide projector for creative children

With this new toy, your child can make his own slides from glossy magazine pictures or use regular slides and show them on a battery-operated projector. Quik Vue Projector has a multislide changer that takes five slides at once and shows them in images up to five feet high. Bottom photo shows all items included in the slide-making kit. There are no plug-in electrical parts and no glass to break. Made by Ideal Toy Corp. and available at toy and department stores.



Chisel attachment for your electric drill

Your power drill can be even more versatile with this chisel attachment. Electricchisel cuts mortise and tenon joints, open dado joints and rabbet joints—to name a few. Ring around accessory tool (above) is adjustable with Allen wrench (comes with tool) for depth control. Inset shows configuration of cutting edges at tip of chisel. In 1/2 and 3/4-inch sizes, \$5.25 and \$5.50, respectively. Hardware stores stock this Stanley Tools attachment.

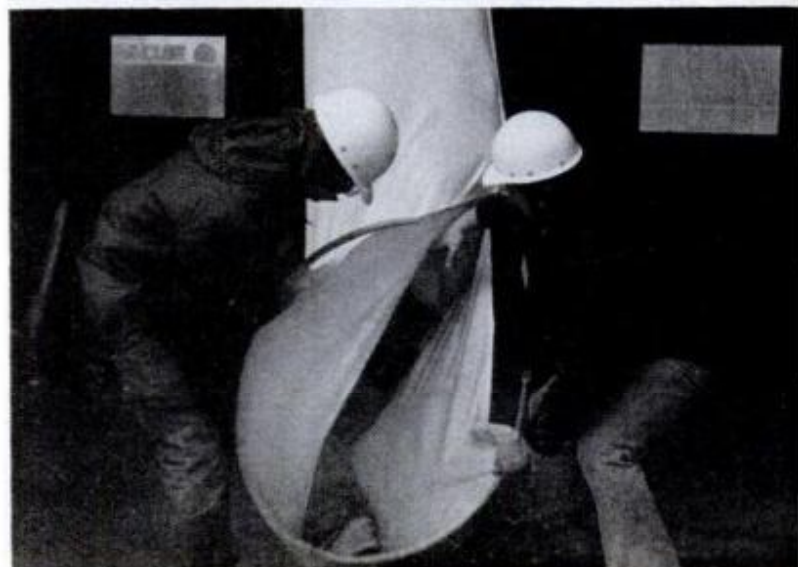


Radio intercom with burglar alarm

NuTone's latest in-a-wall AM/FM radio intercom includes a burglar alarm system that uses entry detector switches on doors and windows. If an intruder attempts entry, an alarm sounds indoors and through an outside speaker. The alarm also sounds if the system is accidentally turned off. The IM 323 SecuriCom also has jacks in the master station for record changer, 8-track player and fire-warning system. For prices, write NuTone, Madison and Red Bank Rds., Cincinnati, Ohio 45227.

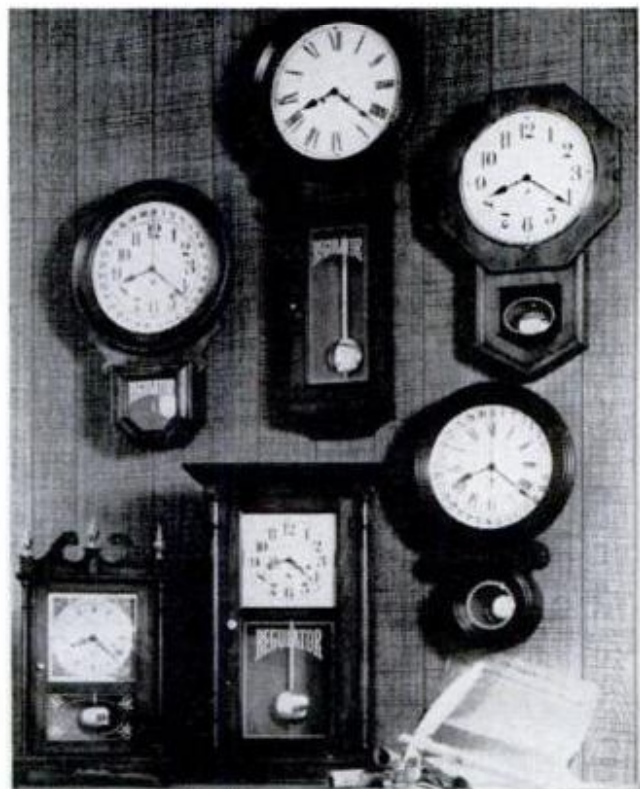
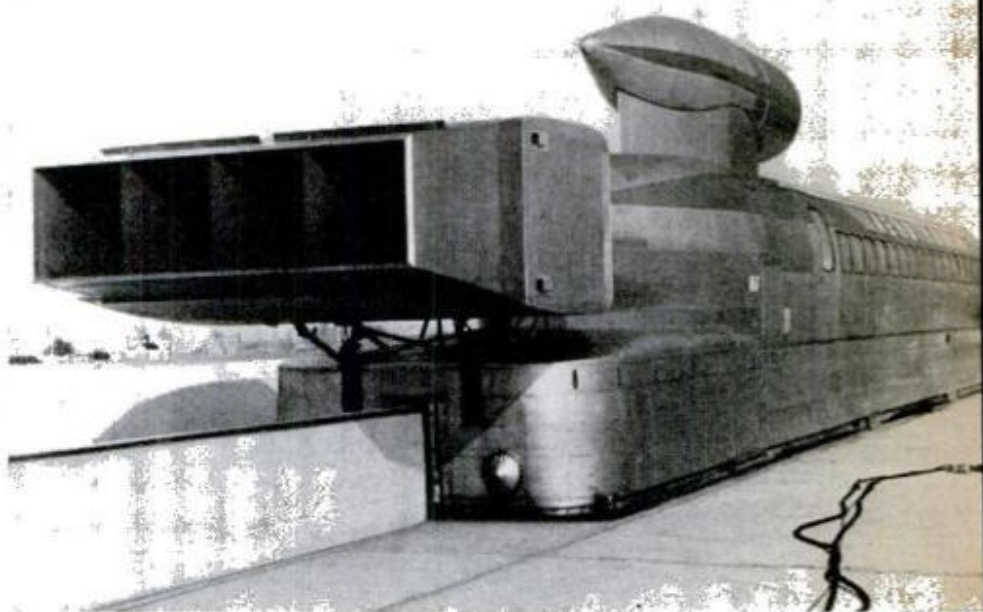
Far-out firefighting gear

Leave it to the young to come up with fresh, imaginative solutions to problems. At right are some of many new ideas for firefighting and rescue equipment offered by college engineering students at a recent demonstration sponsored by SCORE (Student Competitions on Relevant Engineering). At top, a self-propelled "robot fireman," by Kentucky University students, waddles fearlessly in to fight a fire all by itself. Iowa Staters' "Fire Cat" (second from top) is an ATV converted into a mini, one-man, go-anywhere fire truck for fighting fires in inaccessible places. Texas at Arlington students used space-age technology to develop new heat-resistant, astronaut-like firefighting suits (second from bottom) that have backpack air supplies for breathing and cooling. At bottom, Houston University students demonstrate an escape chute for getting people out of high-rise buildings too tall for ladders to reach.



Fast train 'flies low'

It may not look much like it, but it's a train—an updated version of France's famous high-speed Aero-train. Previous models of the single-car, 80-passenger train were propeller-driven, but this one has a powerful turbojet drive capable of whisking it along at speeds to 265 mph. The car straddles a single, centered rail to keep it on "track" at velocities approaching those of an airplane. Currently experimental, the Aero-train is expected ultimately to provide fast interurban passenger service between French cities.



Antique clock reproductions

Six handsome antique clocks (above) are reproductions of famous clocks originally made in the 19th century by well-known American clockmakers. Prices of the clocks in the Barwick Bicentennial Collection, which includes wall and mantel models, range from \$125 to \$275. For details, write Barwick Clocks, Div. of Howard Miller Clock Co., Zeeland, Mich. 49464.

Toy now—maybe the real thing later

The toy glider below embodies a brand-new concept in airfoil shapes patented by Dick Kline of Mount Vernon, N.Y., and Floyd Fogleman of Morris Plains, N.J. The wedge-shaped wing, said to have vastly improved antistall characteristics, may find use in jetliners and military aircraft. Meanwhile, the Sky-Ace play version, made by Milton Bradley, is about \$1.30 at toy stores.



How science plans to tap sun power from the sea

Our oceans are huge 'batteries' that store solar heat. Researchers are working on systems to convert that heat into electrical energy. Best of all, scientists say there'd be no pollution.

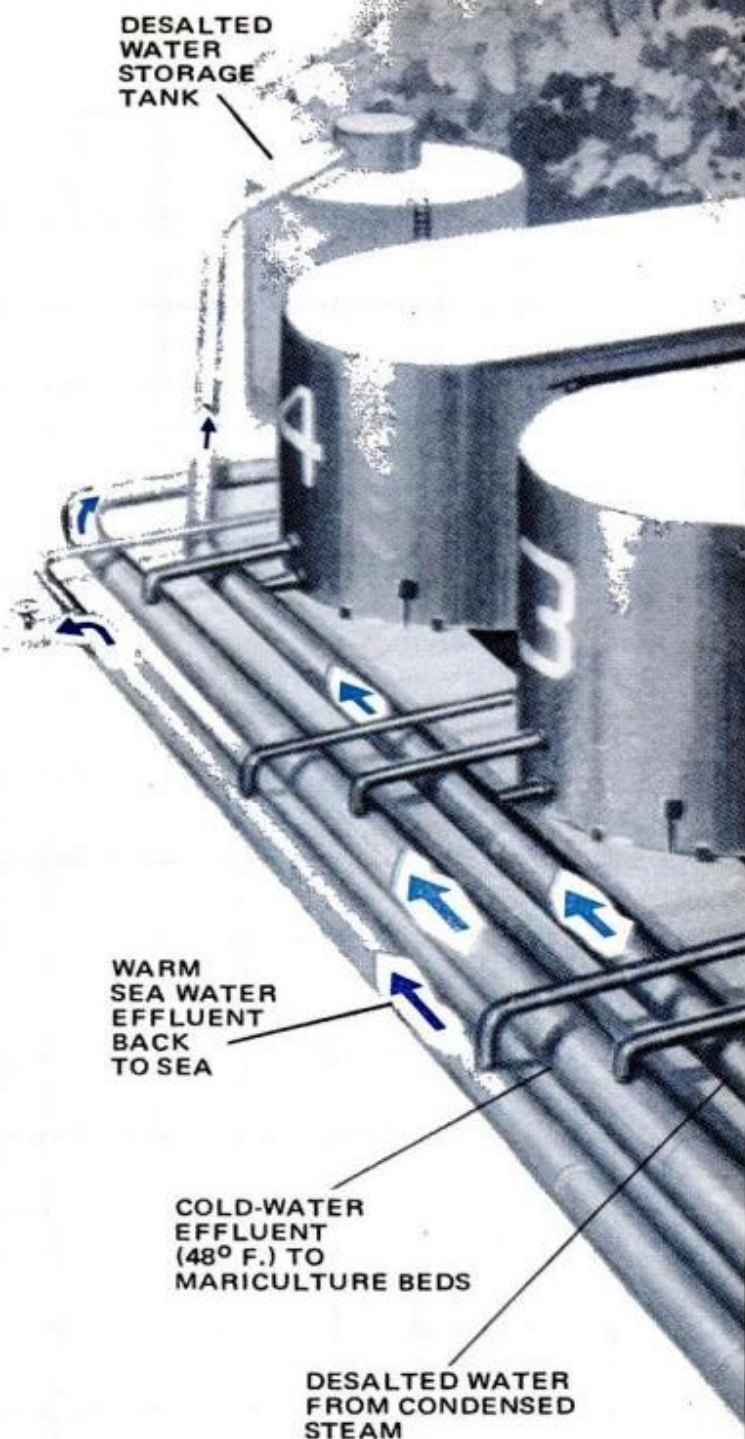
by Franklynn Peterson

Many scientists concerned with our energy problems say atomic power is not the long-term answer. They look instead to the ultimate source of energy in our universe—the sun. Though their proposals might have seemed visionary some years ago, they are regarded seriously today—seriously enough for the National Science Foundation to fund research studies.

Several groups of scientists now propose that we exploit sun power by tapping energy from the oceans. Oceanographers long have been fascinated by the fact that, throughout our oceans, surface waters have a temperature of about 80°F. while temperatures half a mile down hover close to the 40°F. mark.

Engineers and physicists look at such differences of temperature as thermal energy ripe for conversion to more convenient forms. That 40° difference represents the same "storehouse" of potential energy as a 350-foot waterfall. Harness the heat differential in the Gulf Stream as it flows through the Florida Straits between Miami and the Bahamas, say scientists, and you could produce enough electricity to equal the total now used in the United States.

The sun's rays warm the ocean's surface to near 80°F. well beyond the tropics. And deep seawater flows in chilly currents from the poles toward the tropics. There are many places on the globe where warm surface water and cold depths occur within only a few miles of land because of a steeply sloping



The Othmer system as it might appear installed on the shore of a Caribbean island. Some of the cold ocean water, used to condense the steam, would be used to grow shellfish in the big mariculture beds.

NET POWER:
10,000 KW.

MARICULTURE BEDS

CONDENSER UNIT

GENERATOR

BOILER UNIT

STEAM

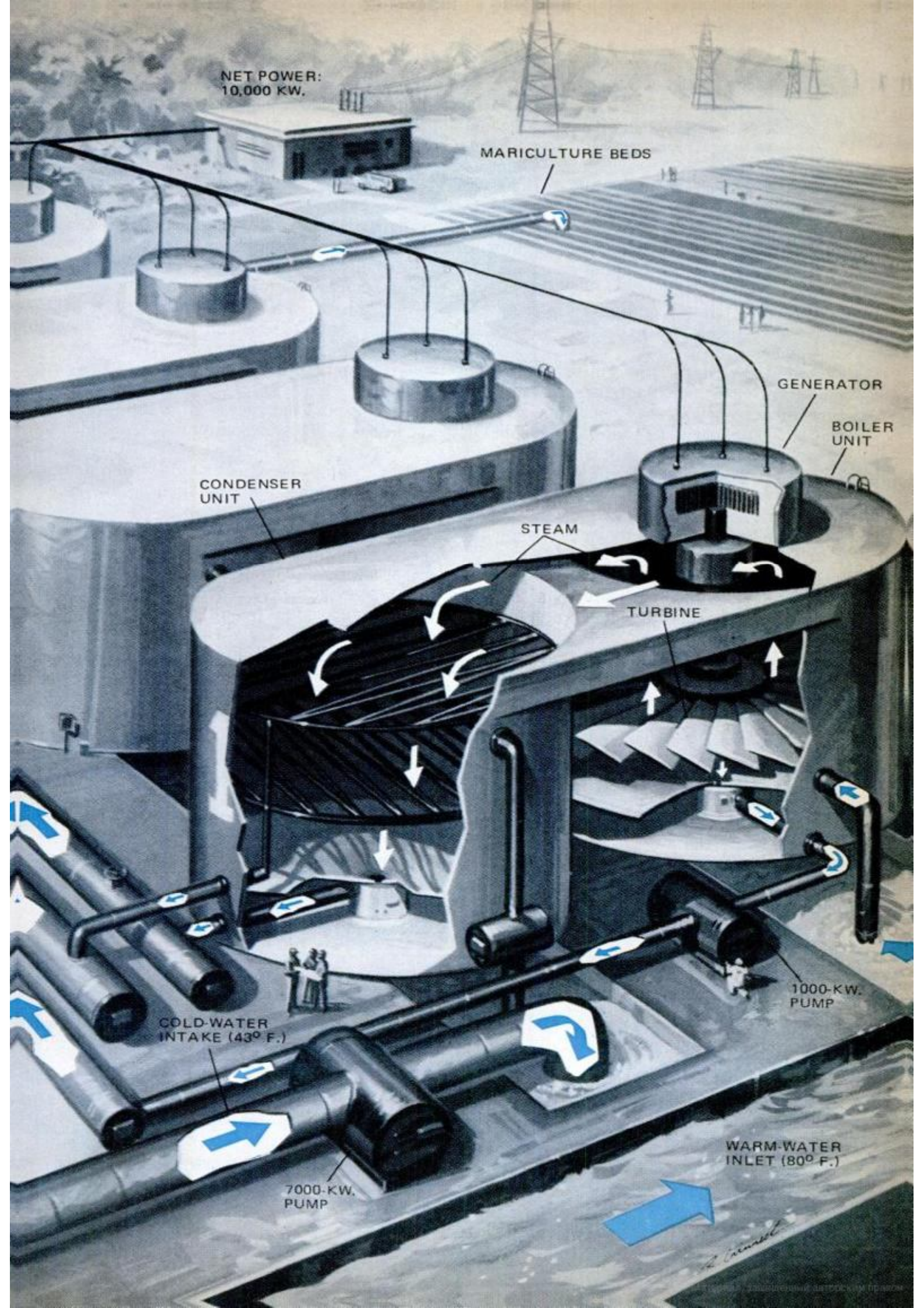
TURBINE

COLD-WATER INTAKE (43° F.)

1000-KW. PUMP

7000-KW. PUMP

WARM-WATER INLET (80° F.)



sea bottom. Many such places—including some Caribbean islands, the west coasts of North and South America and both coasts of Africa—would be ideal sites for thermal energy power stations.

Over 40 years ago, Frenchman Georges Claude developed a workable system by which he turned warm seawater into steam with a vacuum boiler system. Cold water from the sea bottom condensed the steam. Claude's steam-driven turbine generated 22 kilowatts of electric power at Matanzas Bay in Cuba. But the success was short-lived—a tropical storm destroyed the installation.

Claude had toured the United States in the 1920s to demonstrate his system and raise money for his venture. One student who sat entranced as Claude connected a demonstration model to hot and cold-water faucets was Donald Othmer, then a graduate student at the University of Michigan. Along with others, he cheered when Claude's apparatus produced sufficient energy to make a light bulb glow.

Dr. Othmer went on to become an innovative engineer in his own right. His name is on over 100 patents, and he is now distinguished professor of chemistry at the Polytechnic Institute of New York.

During the 1960s, when the need for new energy sources became more apparent, Dr. Othmer renewed his interest in the Claude process. When a business consortium with interests in the Caribbean wanted to build a new powerplant with desalinated seawater as a by-product, Dr. Othmer drew up a plan for using thermal energy to power a generator and distill water.

The Othmer design survived a feasibility study and engineers on the project expected to have a thermal powerplant by 1973. But

political changes on the island chosen for the site led businessmen to pull out, killing the project. Since then, Dr. Othmer has interested other investors in his thermal power plans, including a large Japanese electric generating equipment concern.

The concept of using the ocean's thermal energy isn't easy to grasp. It's hard to believe that 80° water can create enough steam to spin a turbine. Keep in mind that water boils at 212° F. only at sea level where the pressure is about 15 pounds per square inch (p.s.i.). In a household pressure cooker, the steam is trapped inside a kettle to create pressures of about 40 p.s.i., which keeps the water from boiling until at least 250° is reached.

Looking at the process from another angle, at the 0.36 p.s.i. vacuum inside a Claude-Othmer apparatus, water boils at 70° F. The boiling water becomes steam, the steam drives a turbine, and the turbine drives a generator.

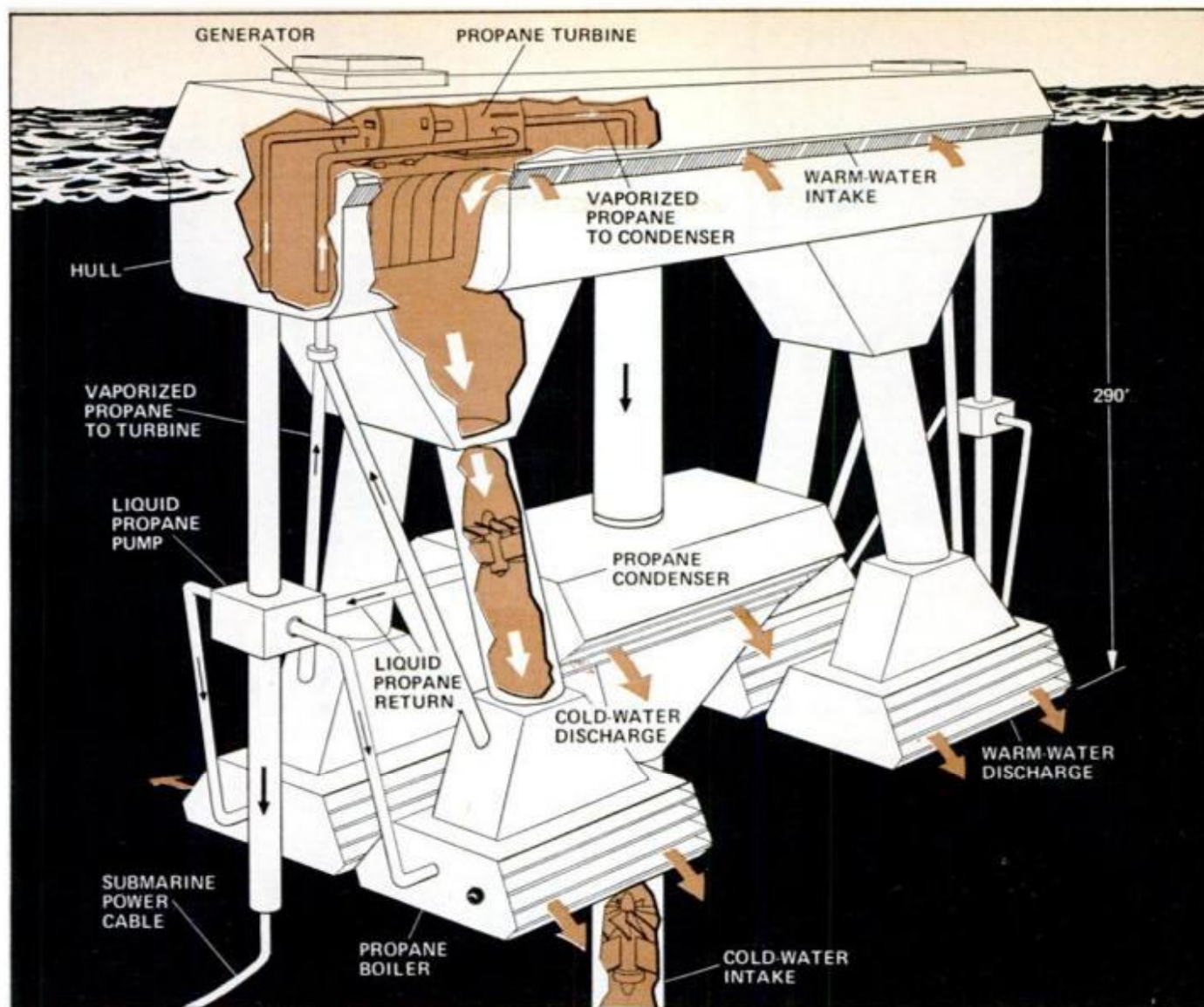
The huge plant conceived by Othmer would suck up about 200 million pounds of warm surface seawater every hour. In the 0.36 p.s.i. vacuum, about 1 percent of the water evaporates, resulting in 2 million pounds of steam. The steam passes through a 35-foot-wide horizontal turbine and then enters the condenser portion of the powerplant.

By the time steam reaches the condenser unit, its temperature is about 52° F. Water drawn up from 3200 feet beneath the Caribbean Sea is 43° F. and that chilly brine is circulated through the aluminum-brass condenser in Othmer's plant to cool the steam back into water, this time minus its salt content.

Since the boiler and condenser are part of a closed system, the resulting vacuum is

Black areas indicate regions where sea conditions are favorable for the operation of thermal systems.





The size of a football field, the Anderson unit is designed to float, with much of its bulk hundreds of feet

below the surface. Warm seawater would vaporize propane, and cold water from depths would condense it.

tremendous, making the process nearly self-sustaining. An external vacuum pump is needed mainly for start-ups.

Dr. Othmer estimates actual efficiency of his system about 2 percent of the potential thermal energy available. A typical high-pressure, high-temperature coal or oil-fired steam-turbine system operates at substantially more efficient levels, but rising fuel prices make the higher efficiency units less and less economical.

"Another consideration is that coal and oil are no longer being made by nature," says Dr. Othmer. "But the sun continues to warm the upper regions of the oceans, and the polar caps send currents of very cold water through the depths. Therefore our supply of thermal power would be continuously replenished."

A different thermal system is proposed by J. Hilbert Anderson. In contrast with Othmer's system—a shoreline installation that

has to draw cool water from several miles away at sea—Anderson has designed a floating powerplant.

Anderson is an old hand at harnessing energy. As a chief engineer for the York Div., Borg-Warner Corp., he designed a line of centrifugal compressors. He became an engineering consultant in 1963, and in 1969 designed the vapor turbine and other parts of the Magmamax geothermal hot-water plant at Brady's Hot Springs, Nev. But for 12 years, Anderson and his son James Jr. have been concentrating on their own system for the harnessing of the ocean's thermal energy.

Like Prof. Othmer, Anderson encountered the work of Georges Claude before forming his own concepts. The Andersons think the high vacuums required by the Claude-Othmer process pose a problem. Says Anderson: "Using such low-pressure steam requires

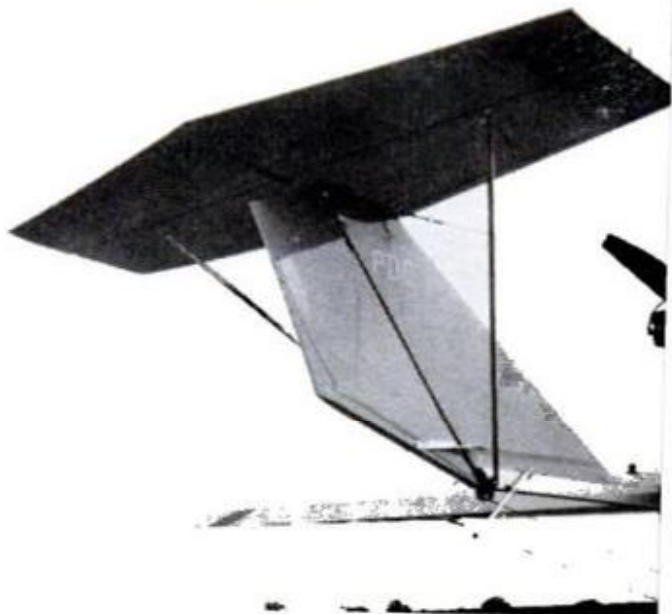
(Please turn to page 172)



It's not much to look at,



"Flying seat" may be a bit bare and drafty, but it's one of the quickest, cheapest ways to get airborne for the beginning pilot-builder. Photo at top of page shows Cessna-type drooped wingtips, added in latest version to improve lift and handling. Instrument panel (upper right) may not be very elaborate, but contains the basic necessities for flight—altimeter, airspeed indicator and engine tach. Unusual side-mounted control stick, located to right of seat, is handled something like a boat tiller. T-tail (lower right) is simple to construct, puts elevator up high in line of prop thrust for good control, stability.



It's called the PDQ-2, aptly named after the old expression "Pretty Darn Quick." And that's just what its designer, Wayne Ison, wanted—something quick, a simple fun plane, easy to build and fly, that would get the beginning pilot-builder off the ground without a lot of time, money and work. Little more than a flying seat with a pair of wings, boom-mounted tail and pusher prop, the PDQ-2 is admittedly a minimal aircraft, but it flies—and that's what counts. Ison knows it flies because he tested it out in the world's largest wind tunnel—the sky. He actually flew it in a snowfall so he could check the airflow over the wings by watching the patterns of swirling snowflakes.

The result is a ship you can build for less than \$600, including engine, if you start from scratch. But even better is the fact

If you want a fast way to get your airplane at minimum cost, here's one you can build for under \$800.

by Sheldon M. Gallager
and Howard Levy

Photos: Howard Levy

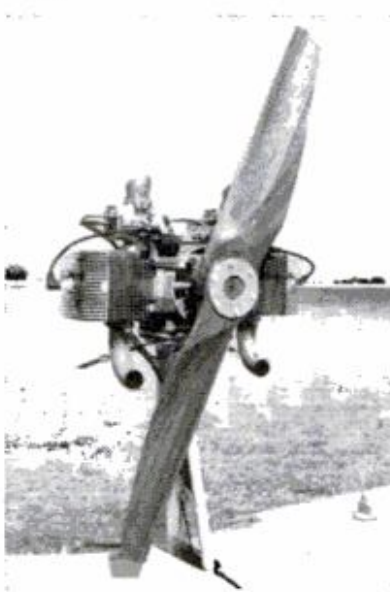
but it gets you up there

that the PDQ-2 is designed to make use of commercial ready-made parts kits. If you use such kits, the cost comes to about \$200 more, but the total is still under \$800. Average construction time runs six to eight months—a fraction of the three to four years most homebuilts take.

The PDQ-2's powerplant is a tiny 35-hp JLO snowmobile engine that gives the ship a brisk top speed of 80 mph and a rate of climb of 400 feet per minute. The "2" in PDQ-2's designation indicates it's Ison's second version. The first was designed to carry what Ison likes to think of as the "standard 170-pound pilot." But he quickly discovered that most of those wanting to fly it didn't come in standard pilot sizes but ran up into the 185 to 210-pound range—too much for the smaller PDQ-1 to lug.

To accommodate larger pilots, Ison lengthened the wingspan two feet from 16½ to 18½ feet and added Cessna-type drooping wingtips for extra lift. That did it. The increased lift not only supports heftier pilots but improves performance amazingly. The PDQ-2 can take off in 300 feet—the length of a football field—and set down in even less. Its stall speed is a near-hover 46 mph and its landing speed a tame 40 mph. Flying the PDQ-2 is simple and fun, says Ison, "once you get over the initial shock of seeing nothing below you but several thousand feet of air."

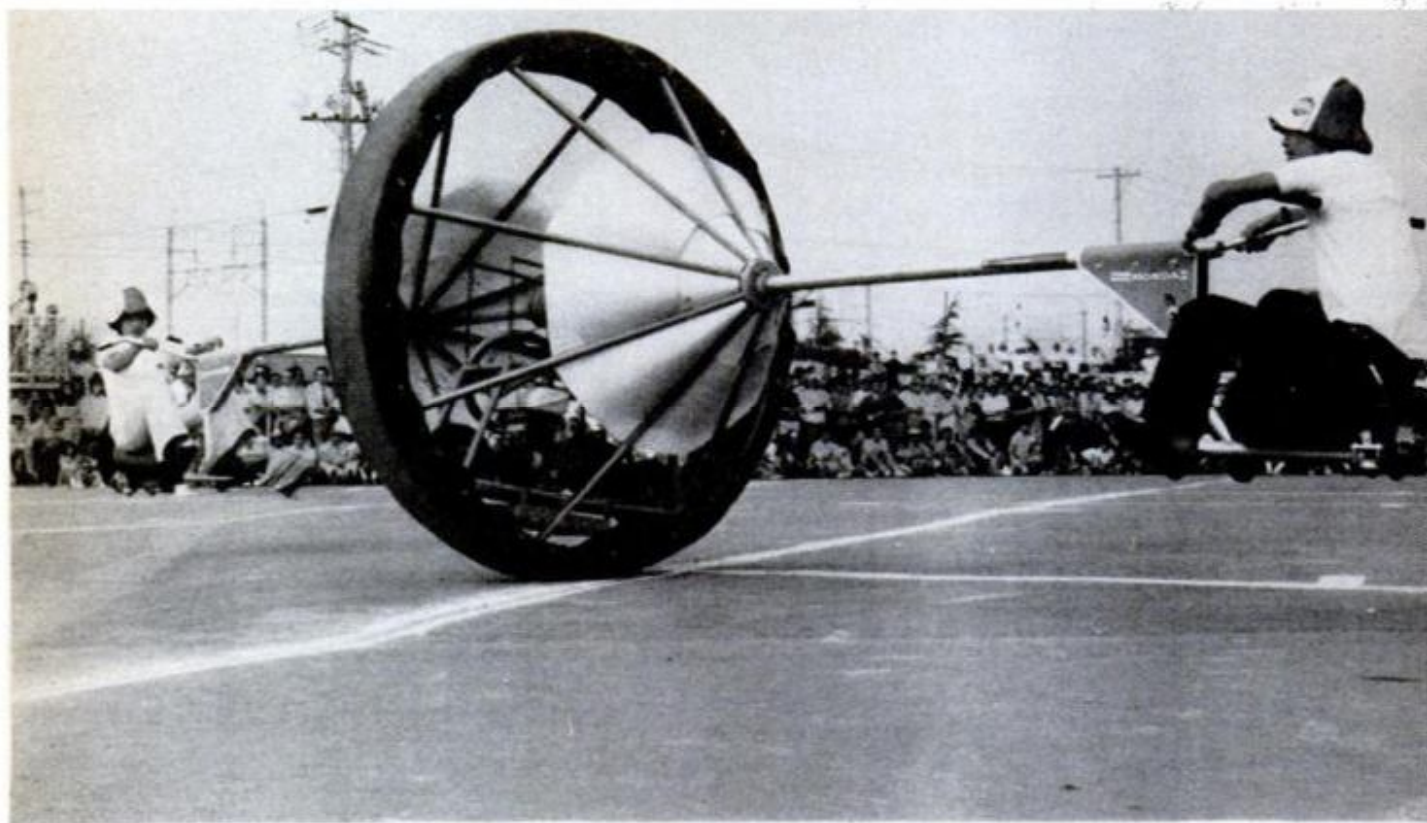
The PDQ-2 incorporates a number of de-



PDQ's pusher prop is powered by 35-hp JLO snowmobile engine mounted on a pylon above the wing. Horizontally opposed two-cylinder mill provides a cruising speed of 70 mph and a top of 80. "Fuel tank" is 6-gallon outboard type gas can slung under the wing, giving ship a range of 100 miles.

sign features aimed at simplifying construction. The wings are straight with a constant chord of 42 inches. The ailerons, instead of being notched in, run the entire length of the wings. The high-mounted T-tail is not only easy to construct but offers good stability and control. There are brakes on the main wheels and a simple side-mounted joystick that you work something like a boat tiller. Construction is a combination of aluminum tubing, spruce spars and foam plastic ribs, with a covering skin of Dynel. Overall length is 14 feet. Plans for the PDQ-2 are \$20 a set from Wayne Ison, 7 Alpine Lane, Elkhart, Ind. 46514. A basic information package is \$3. ★★★

Ways to go that you've never seen before



One-wheeled motorcycles, motorized sedan chairs and square-wheeled bicycles probably don't have much of a future on the transportation scene, but such bizarre machines do at least have their day in the annual All-Honda Idea Contest.

Each year, Honda employees submit suggestions for unusual forms of transportation (last year, 5001 ideas were offered) from which about 50 are chosen for construction. Honda helps finance the prototypes, and finally they're paraded in a suburb of Tokyo for public display and judging.

Typical of the entries is the Uni-Wheel Vehicle (above) that's powered by a 4.5-hp, 1700-cc engine which rolls the big wheel at slightly over 4 mph. It may take a while to get anywhere, but at least it's slow enough so that passengers can jump off if a car comes their way. ★★★



Motorized version of the ancient Japanese Kagoya sedan chair moves at a speed of 9.3 mph. Bamboo poles of the original chair were carried on men's shoulders so it swung from side to side as they walked. Offset axles of modern version produce the same motion.

Square-wheeler is almost as smooth as round-wheeler because small compensating wheel keeps frame at constant height above road.

The Rocker, powered by a motorcycle engine, moves along as it rocks back and forth. The machine weighs about 500 pounds.



Aero Spider is a "reverse hovercraft." The large fan creates a pressure differential, enabling the machine to cling to wall and move slowly.

One-wheel motorcycle goes 9.3 mph with 50-cc, two-stroke engine. Lead weight in base makes it stable; cycle weighs 441 pounds.

Couple Capsule enables two to "stroll" across water. Foot pedals rotate rings outside of capsule, which act as paddles.

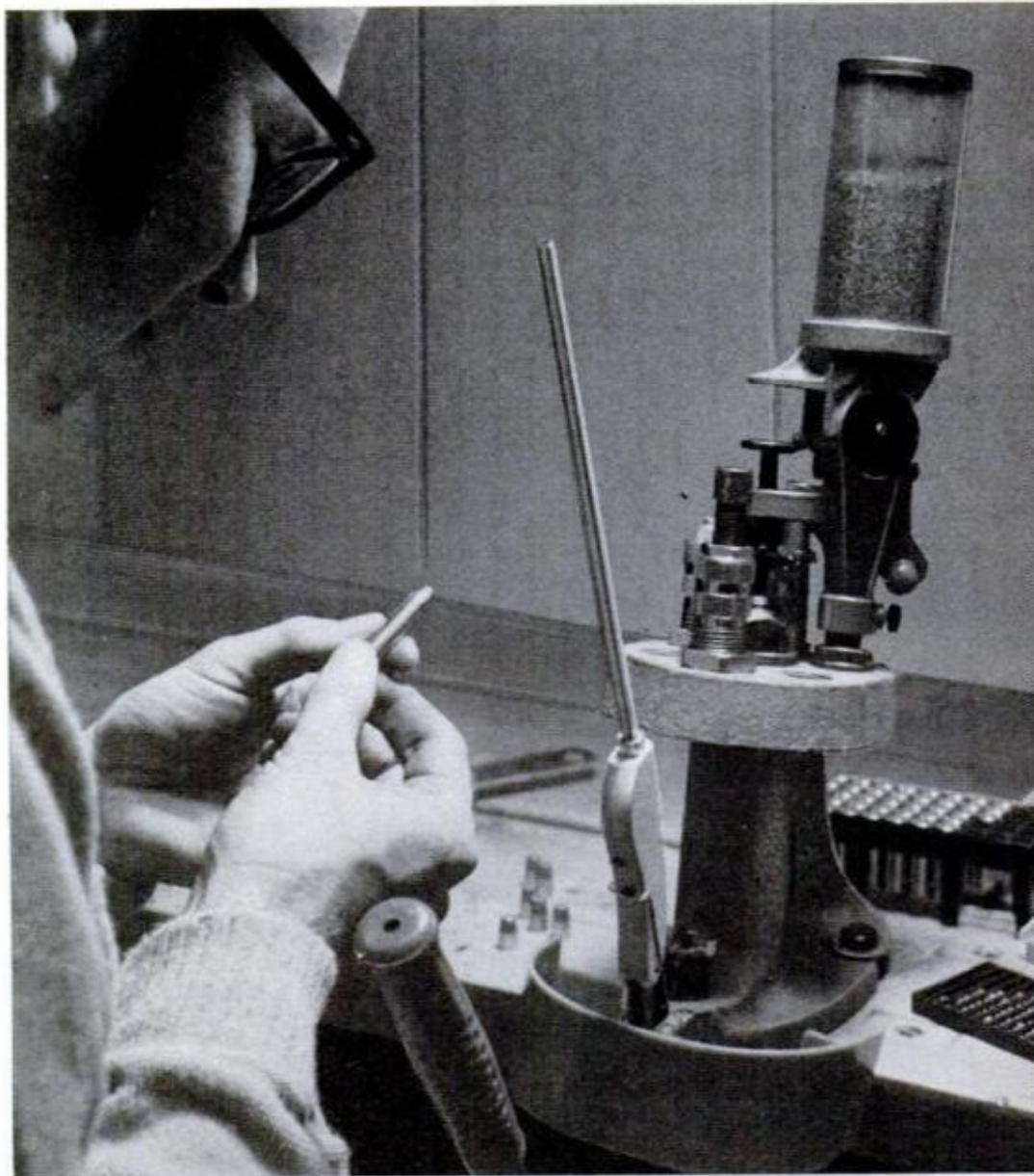


Handloading: cheaper and better

Easy, safe and worth the work?
Over 3 million shooters think so.

by Joe Kelleher

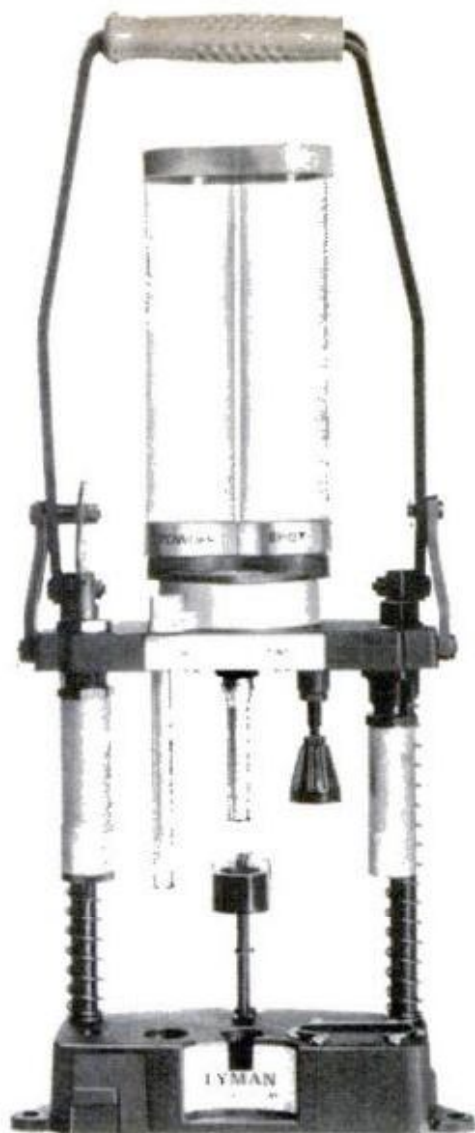
It's simple and satisfying say the shooters who have taken up the hobby. Within three hours, most beginners can start turning out good ammunition after an investment of about \$25. Later they can increase production with press like Lyman model used at right.



Back in the old days, before metallic cartridges, all shooters were handloaders. The muzzle-loading guns used then had to be reloaded after every shot with the separate components—bullet, powder and primer—that go into each modern cartridge. But for a variety of good reasons, over 3 mil-

lion of today's shooters are reloading their own cartridges.

Target shooters handload to get that extra margin of consistency that reduces shot groups to a minimum. Also, the serious target shooter can burn up a lot of ammo during practice. Handloading helps keep the



Shotgun shooters can go through a lot of shells at trap, skeet or in the field. This is new Lyman 100 SL press, \$80, adapts to 12 or 20-gauge reloading.

cost down, especially when shooting large-bore pistols and rifles. Hunters find that by handloading they can afford lots more practice rounds without bending their budget. The real payoff comes when you finally get that trophy buck in your sights during the once-a-year hunting trip most of us can nearly afford.

An additional advantage of reloading is that you can tailor ammunition to fit the job. With .30-06 cases using 41.0 grains of du Pont IMR 3031 behind a 180-grain jacketed bullet you get 2380 feet per second (f.p.s.) at the muzzle. This combo can be counted on to stop darn near anything you can hunt in the United States. Reloading the same cases with 47 grains of the same powder behind a 110-grain jacketed bullet produces a muzzle velocity of 2930 f.p.s. With the higher velocity and flatter trajectory of the lightweight bullet you can go after var-

mints and get some much-needed practice with the same rifle.

To the beginner this may sound complicated, but the manufacturers of reloading equipment and supplies have done everything to simplify the process. If you're smart enough to read the label on a box of ammo, you can learn to reload in a few hours. Hornady Manufacturing offers a free 27-minute training film to sportsmen's groups, *Joyce Hornady on Reloading and Bullet Accuracy*, that shows how to reload plus how variations affect accuracy, velocity and safety. Contact Hornady Manufacturing, Box 1848, Grand Island, Neb. 68801, to request a showing date.



How-to-reload manuals, pamphlets and booklets like these, many of them free, are available from dealers and manufacturers. In background is a Pacific chart.

For the beginner ready to get started and the expert as well, a bible for the art is *Lyman's Reloading Handbook*. It provides 300 pages of instructions, lists 8050 loads for rifle and pistol cartridges, muzzle-loading information and a reference section, all for \$4.95. Its step-by-step instructions are followed by a data section that lists powder charges, primers and bullet weights for more than 90 widely used cartridges ranging from the .22 Remington Jet to the .460 Weatherby Magnum.

The recent *Hornady Handbook, Volume II*, is another valuable reference. The 520-page guide includes extensively illustrated "how to reload" sections, thousands of loads for 94 pistol and rifle cartridges, and ballistic tables that include bullet drop charts

that can help a shooter zero-in a rifle at any range. It is also a bargain at \$4.95.

Many other pamphlets and booklets to help a shooter discover reloading are also available from dealers and manufacturers. Trap and skeet shooters will want the new Remington booklet on shotshell reloading. It's called *Tips on Better Reloading*, is available by writing for Reloading Booklet, Remington Arms Co., Bridgeport, Conn. 066062. And it's free.

Ten new ball powders that fill nearly all handloading needs have been introduced by Winchester-Western recently and are described in detail in a 52-page booklet, *Ball Powder Loading Data*. Because they flow

smoothly, ball powders can be metered or measured more precisely, and have earned a reputation for burning cooler and lengthening barrel life. Dealers and Winchester-Western, 275 Winchester Ave., New Haven, Conn. 06504, have the free booklet giving proper loads.

Now you have enough information to get started, though if you can watch a friend or dealer demonstrate as well, so much the better. Once you're infected with the handloading bug, your progress is rapid, predictable and thoroughly enjoyable. For the beginner who wants to try handloading at rock-bottom prices, a unit like the Target Model Loader from Lee Custom Engineering offers advantages. The compact system costs less than \$25 and includes everything needed to prepare shell cases, remove and install primers, measure powder charges and seat bullets. The hand-held Target Model is small enough to fit into a gadget bag or toolbox for use on the range. Another inexpensive hand-held reloading system is the Lyman 310 Tool that goes for around \$22 with one set of dies. While the 310 has been produced for more than 80 years, constant improvement in the resizing and bullet seating dies makes it possible to produce excellent reloads with this compact tool.

From basic reloading, using spent shells and store-bought bullets, you may progress to casting your own. A vast range of jacketed or lead bullets are available from Sierra Bullets, Speer, Hornady, Winchester-Western, Remington, Norma, Herters and others. But for additional economy and an extra challenge, casting comes next.

While plain lead bullets are fine for hand guns, a gas check is usually required when velocities reach 1500 f.p.s. A gas check is a small gliding metal cup that is crimped over the base of a cast bullet to protect it from the hot gases during firing. Lyman's



Reloading press, like this Pacific Tool model for pistol cartridges, can do full-length resizing and case forming. Under \$50 with set of dies and manual.

RELOADER'S CHECKLIST

Rifle—

1. Inspect the case.
2. Lubricate.
3. Eject spent primer, resize.
4. Seat new primer.
5. Add powder charge.
6. Seat new bullet.

Pistol—

1. Inspect case.
2. Lubricate.
3. Resize.
4. Eject spent primer, expand.
5. Seat new primer.
6. Add powder charge.
7. Seat new bullet, crimp.

Shotshell—

1. Inspect case.
2. Eject spent primer, resize.
3. Seat new primer.
4. Add powder charge.
5. Insert wad column.
6. Add shot charge.
7. Crimp case mouth.



Practically pocket size for on-the-range reloading, small sets like the model above don't provide speed or volume output, but offer a start for about \$25.

450 Bullet Sizer/Lubricator swages cast bullets to precise diameter, forces lubricant into grease grooves, and seats a gas check when required. Adding the gas check allows the reloader to use inexpensive cast bullets with magnum handgun loads or rifle cartridges with muzzle velocities up to 2200 f.p.s.

To select the best lead bullet for your gun, check the new *Cast Bullet Handbook* by Lyman, with its data on bullet alloys, lubricants and casting techniques as well as powders. And for a comprehensive roundup of techniques and equipment available, there is the fine \$5.95 *Handloader's Digest* by John T. Amber from Digest Books.

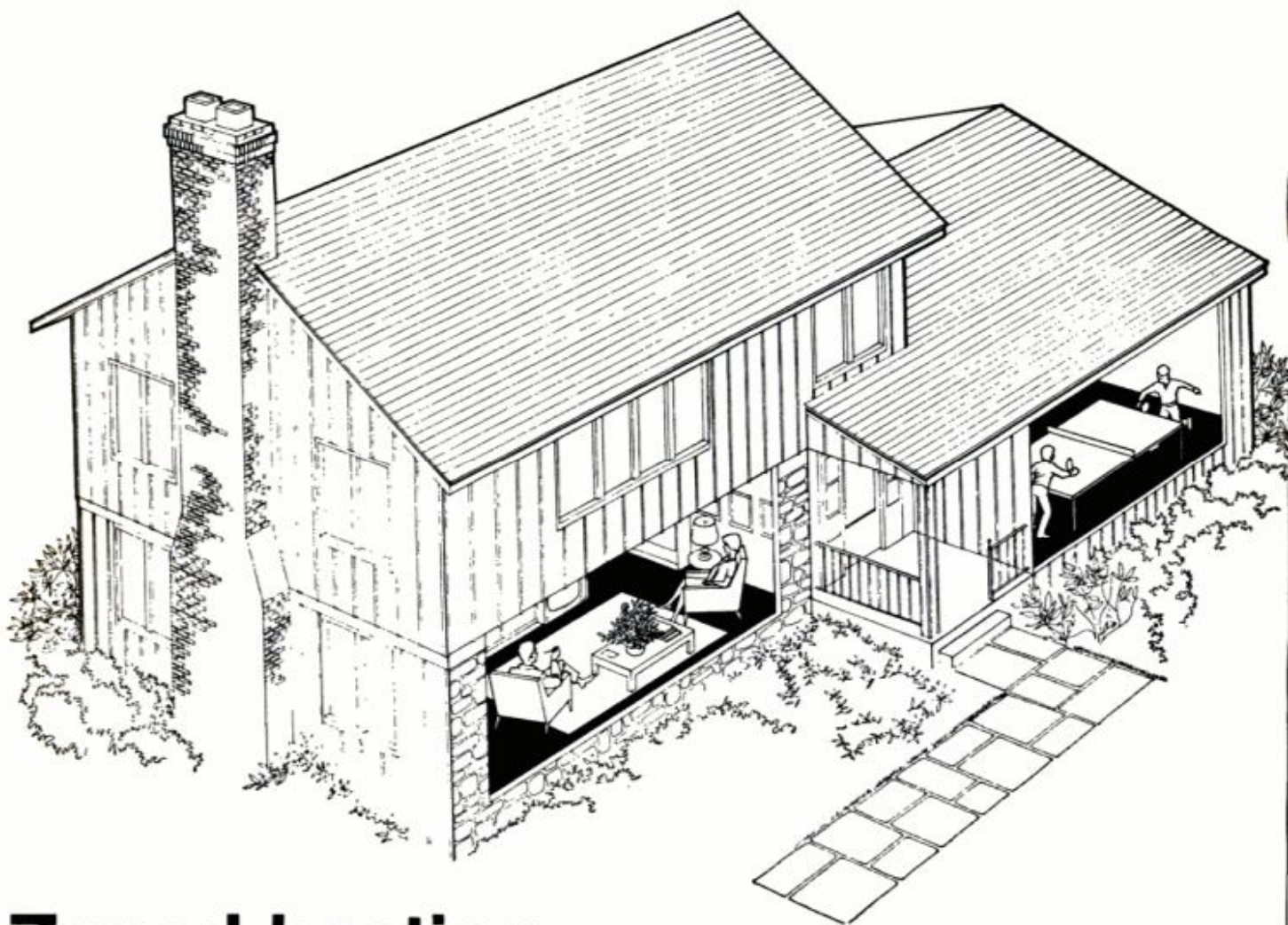
As you really get into handloading and start to appreciate how much minute variations in the weight of powder charges or bullets can affect accuracy, you'll start looking at scales. Volumetric measures speed up reloading, minimize powder spillage and throw a pretty consistent charge. But a scale should be used to check the charge

because equal volumes of different powders can have different weights. Lyman's new D-7 scale for \$23.50 has such features as magnetic damping and agate bearings. Accuracy of the D-7 is plus or minus one-tenth grain and the capacity is 505 grains.

If you think you've just about mastered the art of casting bullets, your scale can quickly deflate your ego. Select 10 of the best looking slugs and weigh them. You'll be surprised at the weight variations between seemingly identical slugs. When you are reloading for really tight target groups, weigh all your bullets and reject those that vary more than one-half grain from the average weight of 20 or 30 samples. Rejects go back into the lead pot for another run. When the number of rejects decrease you'll know your casting technique has improved—and so will your shot groups. That's when handloading really starts to pay off, and you may be saving up to 60 percent on your ammunition costs at the same time your scores go up. ★★★

HEAT- SAVING IDEAS

Cold, blustery weather is just around the corner. Unfortunately, when it arrives we can expect to start paying the highest rates ever to heat our homes. To help fight budget-busting fuel bills this winter, PM's editors have rounded up a collection of heat-saving ideas. If you get started on some changes now, you're sure to get more from your heating dollar this winter.



Zoned heating: Balanced comfort throughout your home

To make the most efficient use of your heating plant's output, zone your home to put warmth where needed, when needed.

What is zoned heating? It's a way of using your present heating plant more efficiently, so that you can warm up chilly rooms without turning the rest of the house into an oven. It's dynamic balancing, putting the heat where it's needed when it's needed. It's a way to make your house more comfortable, with savings on fuel bills as well.

How is zoned heating accomplished? By modifying the controls of your present system and adding separate thermostats for the zones into which you will divide the living space in your home.

What kind of house can be made more livable with zoned heating? Almost any kind.

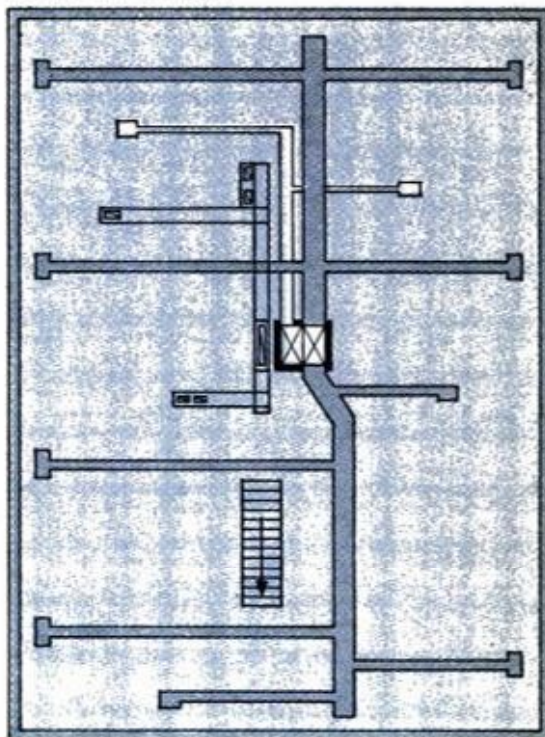
Variations in sun and wind intensify on different sides of a house create different heating needs in rooms on those sides, and these needs will be more extreme if your house is elongated or shaped like a T, L or U. Additionally, your family occupies different parts of the house at various times of day and night; fuel used to heat unoccupied space is wasted.

A thermostat in every room, as is practical with electric baseboard heat, would be ideal, but you can usually achieve even temperatures throughout the house by dividing it into two or three zones.

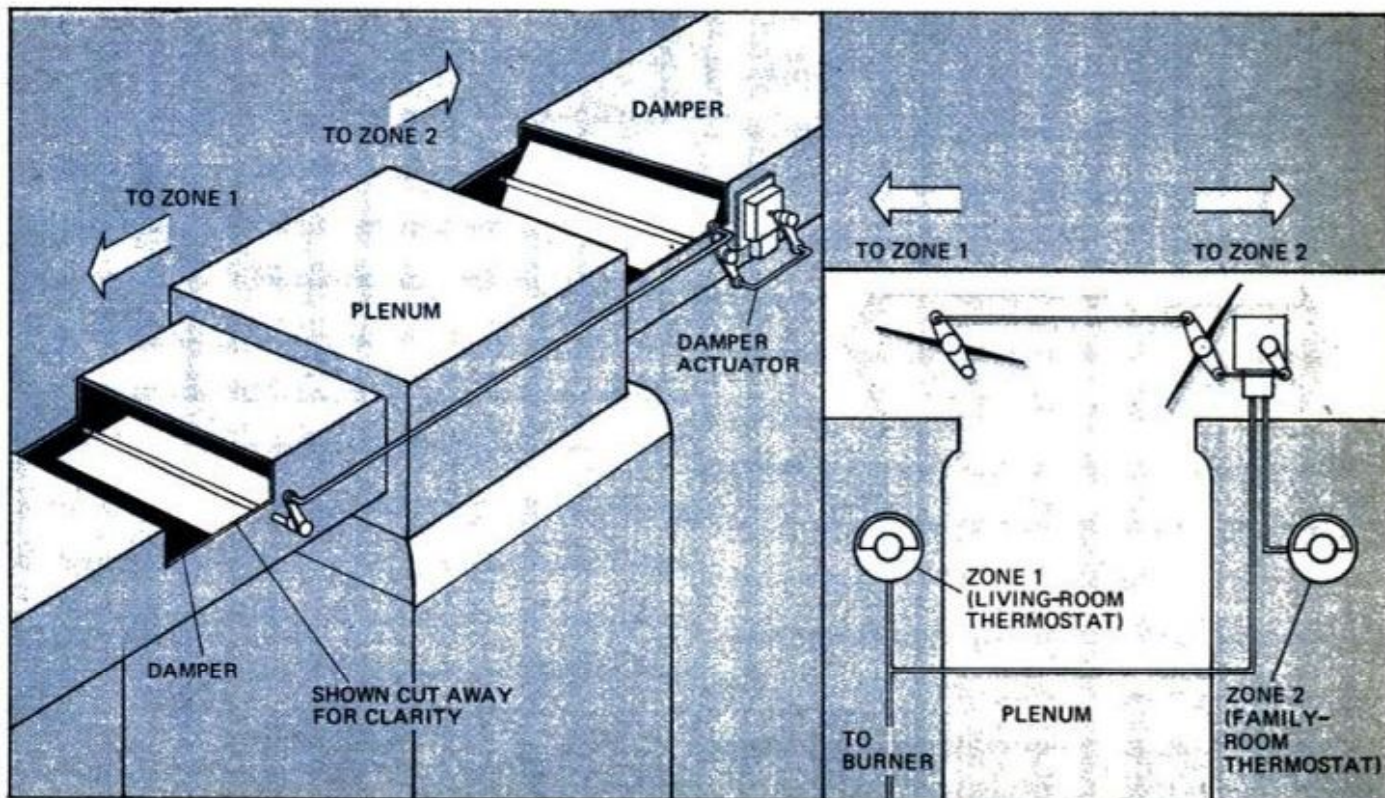
How do you determine which rooms fall into which zones? It's generally worth the money to get a professional's help with this step. He will use either an occupancy-load method or a geographic-orientation method (which usually means adding a separate zone for rooms with northern exposure) to find your house's zones, and will be able to tell you where the extra equipment needed should be installed.

There are three ways to go with zoned heating. Where the existing system is of the forced-air type, thermostat-governed dampers are installed in ducts, or a plenum splitter with damper controlled by a second thermostat installed at the furnace plenum. With hot-water systems, zone valves or extra circulators can be used. The third method, most extreme but practical in some

Art: Adolph Brotman



Second zone (white) has its own thermostat and supply duct running from the plenum.



Dampers installed in ducts near the plenum act to regulate the relative amounts of warm air sent to two zones.

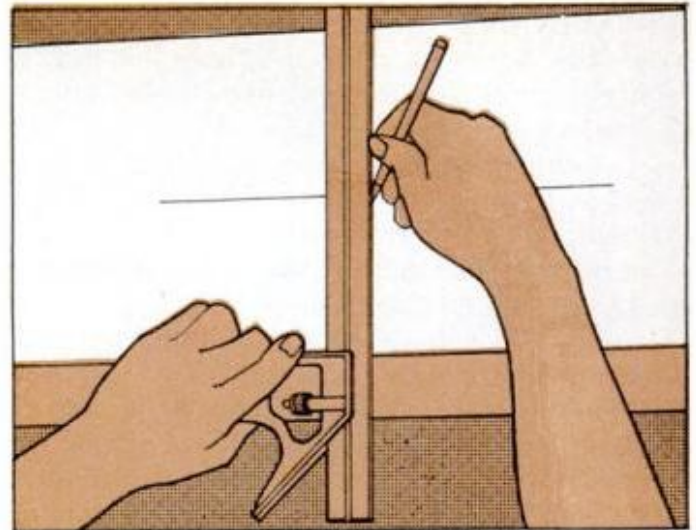
Some examples of zoned heating systems

cases. is the addition of a second heating plant. Except when the latter method is used, installation of zoning equipment should be possible for the do-it-yourselfer, but get professional advice first.

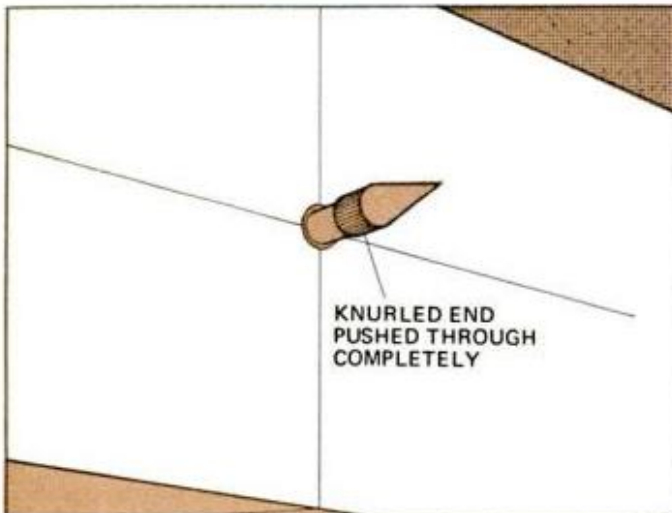
What will it cost? Damper-actuator systems have prices ranging from \$33 to \$113. Circulators for hot-water systems cost about \$60. And thermostats cost from \$7 to as much as \$50.

Here are some examples of how heating systems can be zoned:

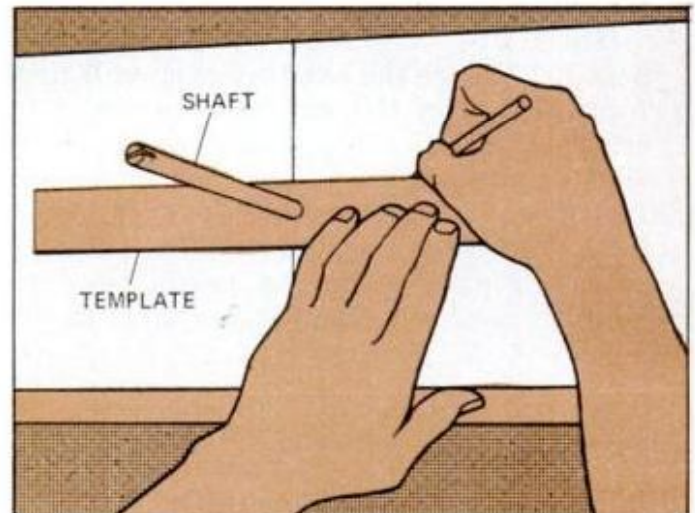
A basementless ranch house has living room and kitchen on one side, three bedrooms on the other and a forced-air heating plant in a central utility room. In this case, no additional ductwork is needed. Zoning requires



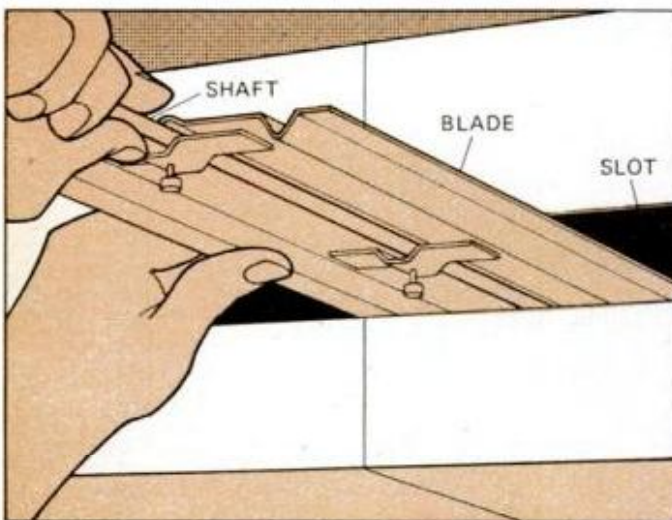
1. Begin by locating center of duct, front and back, where the zoning damper is to be installed.



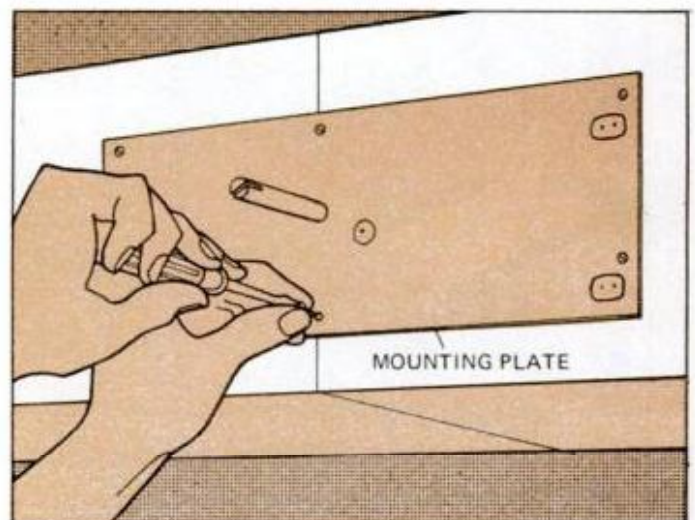
4. Test to see if shaft rotates freely after pushing its knurled end all the way through rear hole.



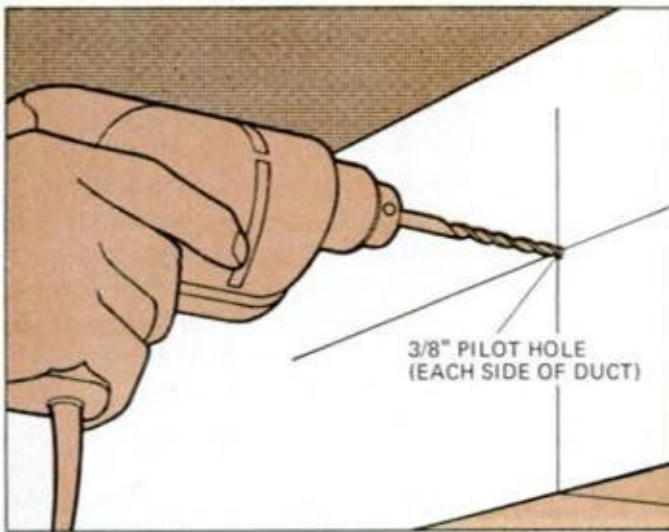
5. Slide template over shaft on front side of duct and carefully scribe its outline onto the duct.



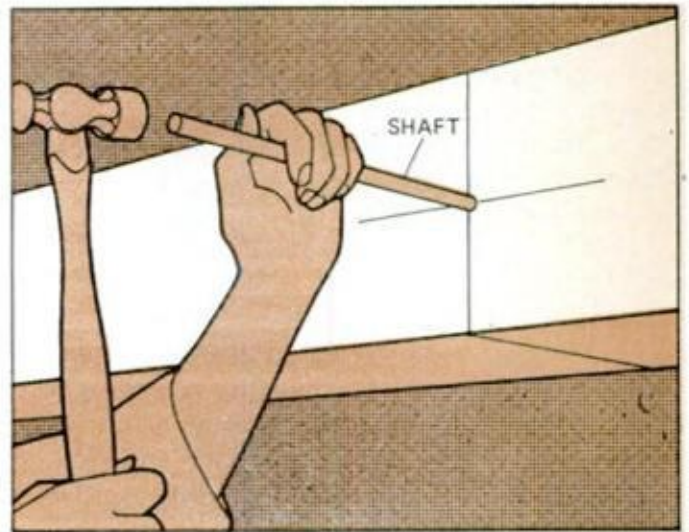
8. Fasten blade onto shaft and slip the assembly into duct, reinserting the shaft into the rear hole.



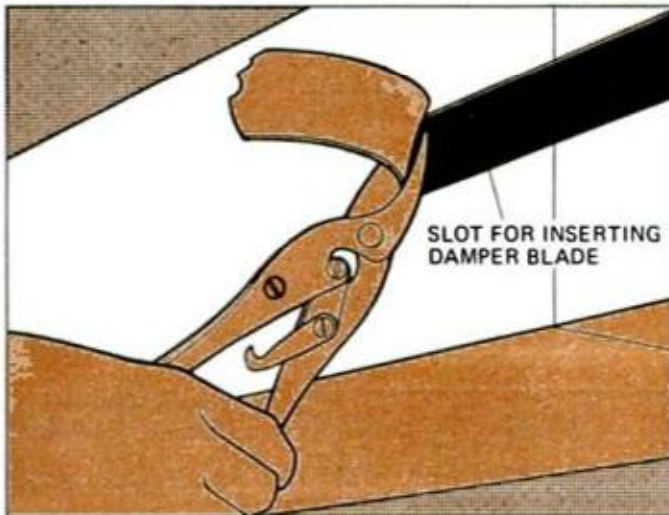
9. Slide mounting plate over the shaft and fasten the plate to the duct with sheet-metal screws.



2. Drill a $\frac{3}{8}$ -in.-diameter pilot hole through the center point on each side of the duct.



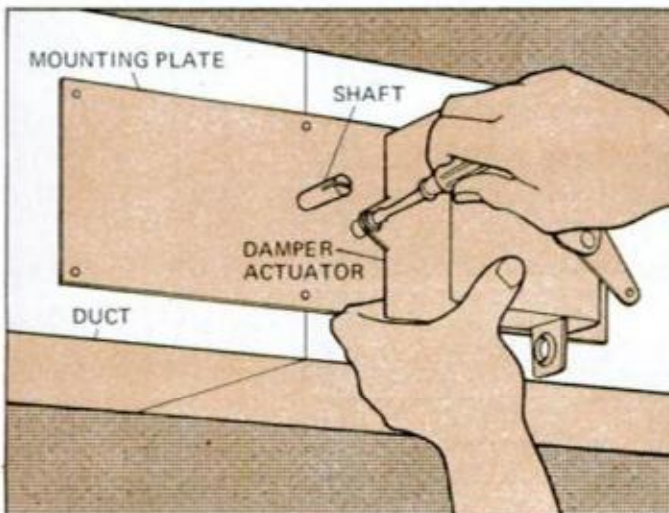
3. Drive the damper shaft through both of these holes from the front side of the duct.



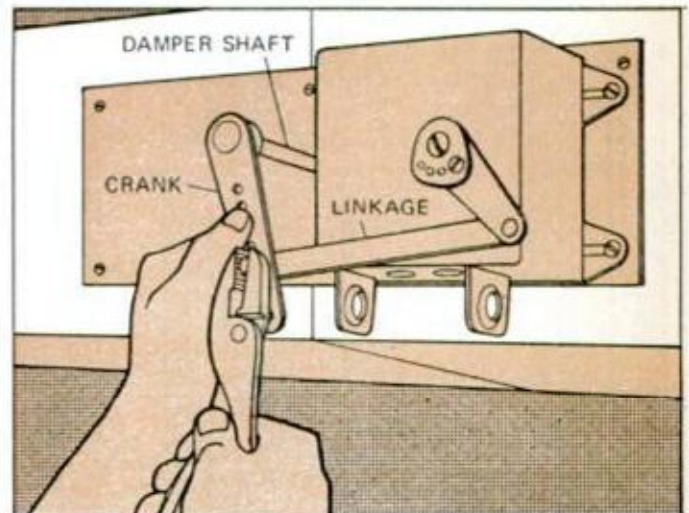
6. Cut slot for insertion of damper blade following template outline, after removing shaft from duct.



7. Trim the damper blade to duct width, allowing for a $\frac{1}{8}$ -in. clearance at each end.



10. Attach the damper actuator securely to the mounting plate using sheet-metal screws.



11. Adjust actuator linkage for desired heat flow and tighten the crank on the damper shaft.

Separate trunk ducts simplify zoning installation

no more than installing a splitter (a barrier in the plenum) if none is already there and two dampers. A living-room thermostat will operate the furnace and maintain temperature in living room and kitchen. A second thermostat in the sleeping area will control a single damper actuator to adjust settings of both dampers. Separate damper actuators could be used instead.

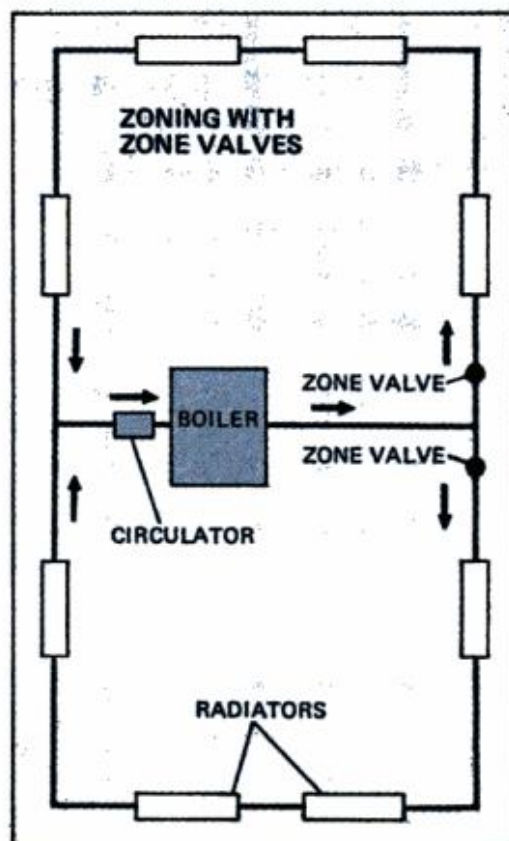
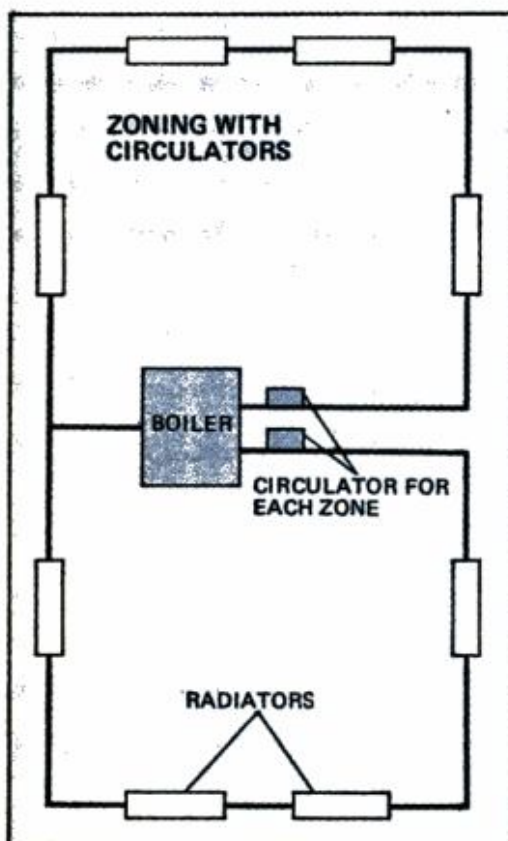
A more complex problem is that posed by a five-room house with a basement recreation room that needs heating. With a centrally located furnace, there could be two approaches. The less expensive way would be to use a single damper actuator and a splitter in the plenum to provide the means of installing a separate takeoff for the basement duct run. The alternative would be to install motorized dampers external to the furnace, one on either side, splitting the ground floor into two zones (living room and kitchen in one, bedrooms in the other). The basement could then be heated by overhead registers supplied by a duct in the basement ceiling, with airflow here controlled by a third motorized damper, installed in this duct near the furnace.

A larger installation turns out to be quite

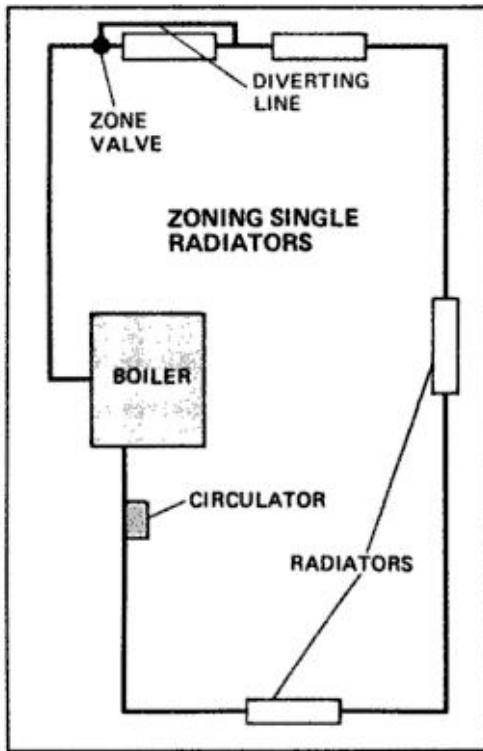
simple when air is supplied through separate trunk ducts to each area. In a seven-room, split-level house, the living room, dining room and kitchen might be supplied by one trunk, the four bedrooms by a second and the recreation room below them by a third. Zoning here is merely a matter of installing a damper in each trunk and adding two thermostats. In cases where zones are heated through branch ducts running off one or two trunks, new ductwork might be needed; but when the heating plant is centrally located, such complications are rare.

There are two ways to zone a hot-water system. The more common one uses a single circulator, with hot water provided by the boiler through a common pipe. The hot-water flow is then divided to supply the different zones, the flow to each being controlled by a zone valve. These are installed near the branching point. A zoned system of this type is shown on page 147.

The second method substitutes circulators for zone valves and uses a separate hot-water supply pipe for each zone. Use of two circulators does produce more noise and requires more electricity than two zone valves.



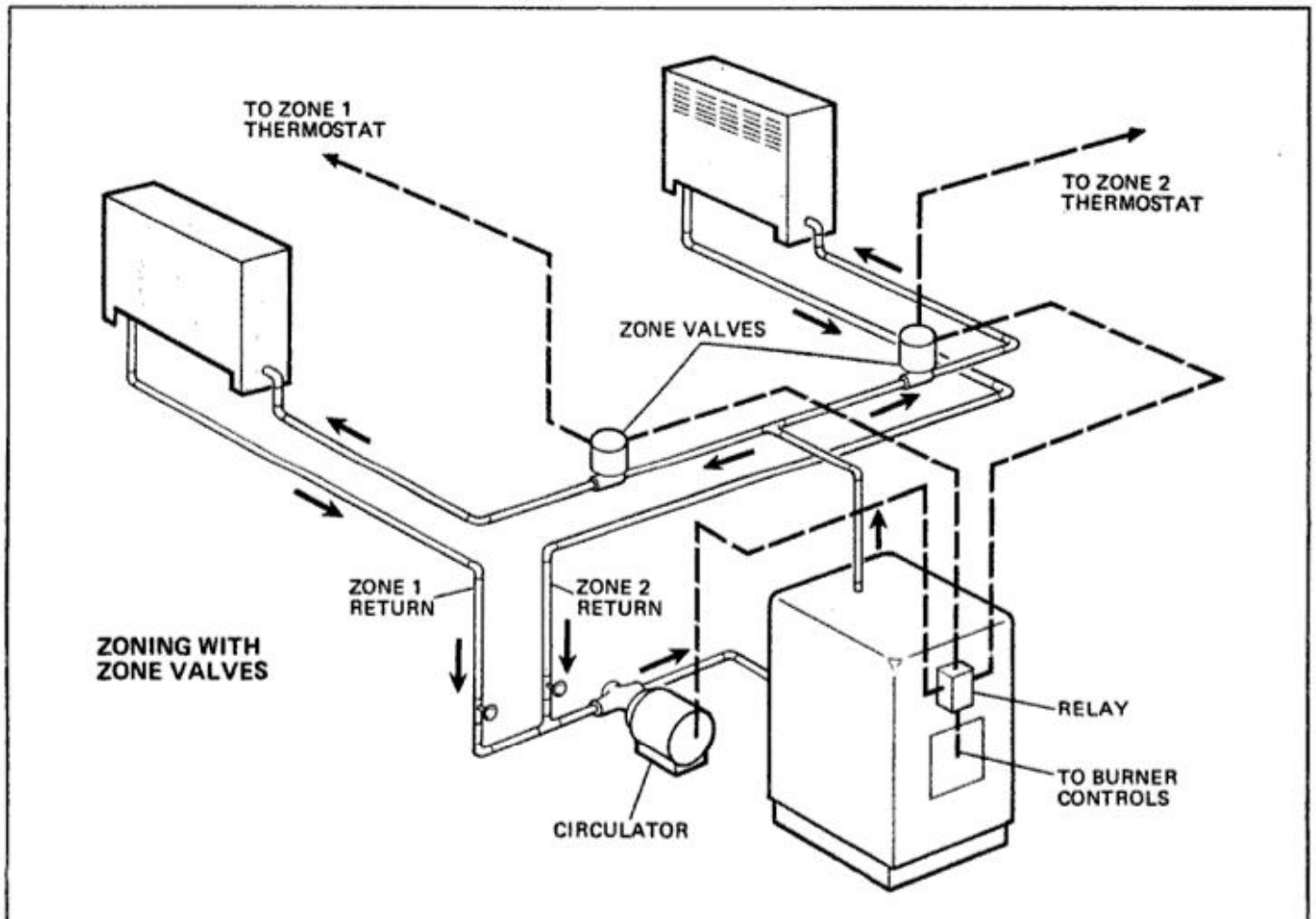
Hot-water systems can be zoned with either circulators or zone valves. Extra circulators will be noisier and use more power than the valves.



Thermostat-run valve on an individual radiator also provides a zoning action.

Hot-water systems in one-story houses are easy to zone when the boiler is located near the center of the basement, with each half of the house served by a separate set of pipes. Zoning is accomplished here by splicing a zone valve onto the boiler side of each circuit; the valves and their thermostats are connected to a relay that operates burner controls. The arrangement in a case like this is as shown at the bottom of the page.

A two-story house with hot-water heat presents a greater problem, because both floors will probably use the same set of supply pipes. To zone such a system, it would be necessary to install a separate set of feed and return pipes. You can, however, add zone controls to one or two single radiators to shut off the supply of hot water to them. These controls must not be inserted directly in the line or they will shut off the entire system; a diverting line must be provided wherever a zone valve is used to control an individual radiator. This method is set up as shown schematically at the left. ★★★



Save fuel with this thermostat timer

Designed by two men who work together at a power company, this homemade fuel-saver is, basically, two thermostats wired so one will control daytime settings and the other the night temperature. Its inventors say that if it is set to automatically lower the thermostat by 5° each night, it could save eight or nine percent of a home heating bill and pay for itself in months.

Inventors Morris Zuver and Matthew L. Bruce of Jackson, Mich., assembled the control using three basic items—a thermostat, 24-hour house timer and 115-v. relay. These can be purchased for about \$15, they say.

They decided to utilize a simple 24-hour timer (used for turning a lamp on and off) and small surplus relay from an electronic circuit (rated 115 v.). Coil and contact points capable of about a 600-milliampere carrying capacity were used to work with the timer to make it safe electrically and not harm the 24-v. furnace-control transformer. With two indicator lights wired into the circuit, and using the regular house thermostat

set at 73° F., the extra stat will maintain a night temperature of 60° F.

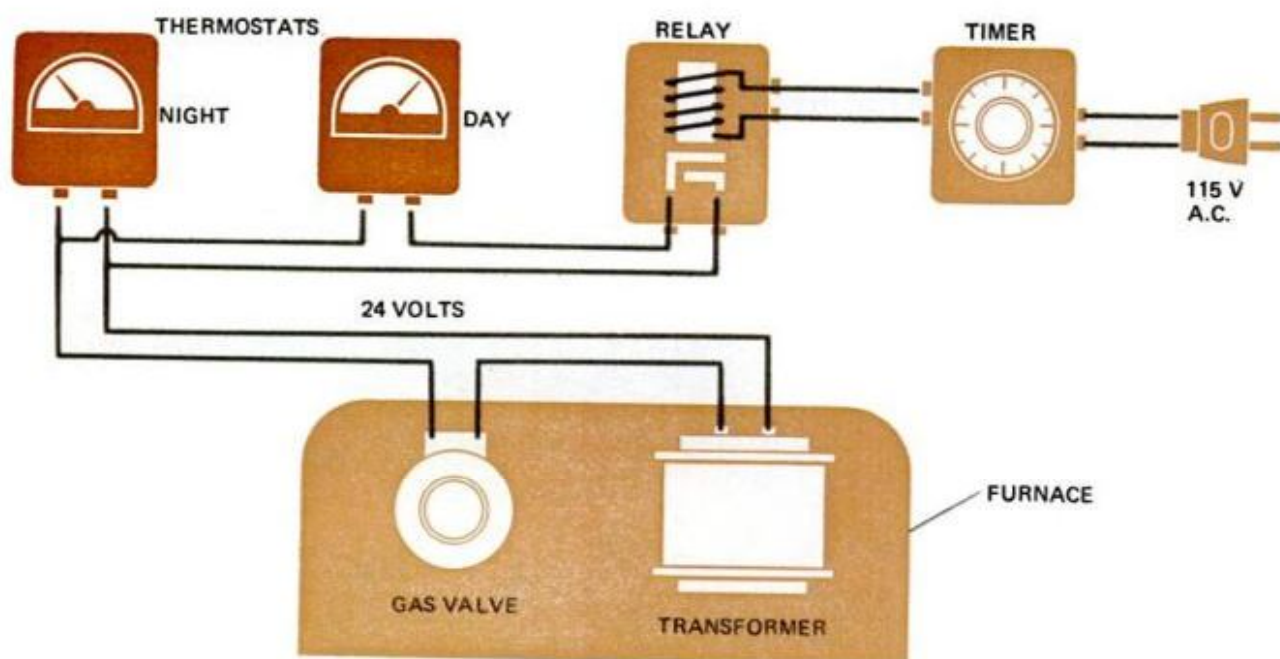
The timer-relay is connected in series with the daytime thermostat, and the nighttime thermostat is parallel to the load side of the relay. The nighttime thermostat is operative all the time in this manner. When the temperature is above 65° F., the contacts are open in this thermostat.

The nighttime thermostat is open all day because the day thermostat is operative and does the controlling when the timer reactivates it at 6:00 a.m. The house temperature being higher than the night setback temperature renders the night thermostat inoperative above 65° F. The system alternates between daytime thermostat for 16½ hours and nighttime thermostat for 7½ hours. The timer repeats itself daily.

If cooling is on the daytime thermostat, a higher summer daytime setting is needed for the system to operate correctly. Adjustment of a combination heating/cooling thermostat functions with the system.

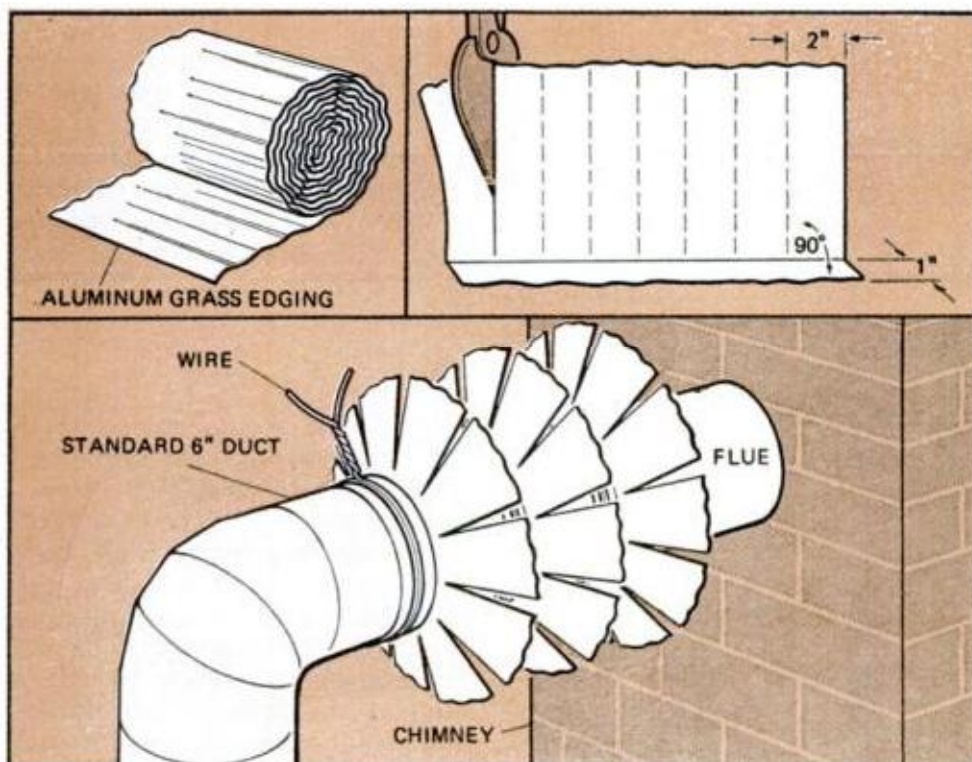
All materials should be available in your community. The placement of timer-relay-night thermostat can be camouflaged behind a floral arrangement on a table near the daytime thermostat. Almost-transparent 24-v. wires can be connected into the daytime thermostat to complete the circuit. ★★★

Timer-relay is connected in series with the daytime thermostat and night thermostat is parallel to the load side of the relay. Night thermostat operates all the time, but daytime stat dominates after 6:00 a.m.



Three stunts to get more of the heat that's there

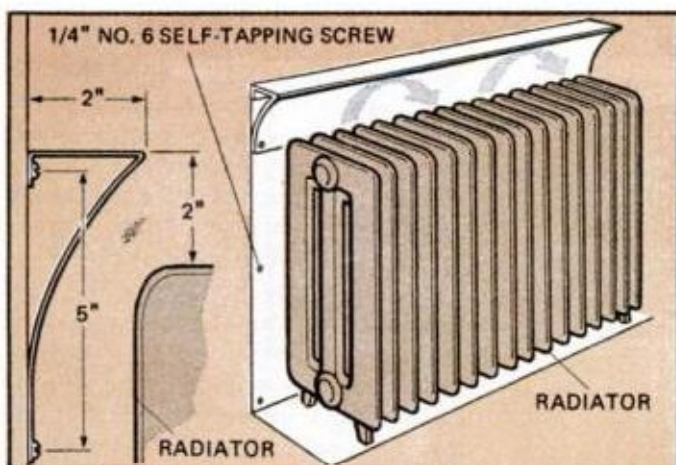
Your biggest incentive for checking out ways to cut your fuel bill is the price of the fuel itself. Heating bills are now higher than ever, and it's safe to say that we'll never again pay for fuel what we did as recently as last season. On this page are three common-sense ideas to help you stretch the heat you are paying for. Cost to duplicate them is low; heat savings should recoup the cash outlay in one heating season. ★★★



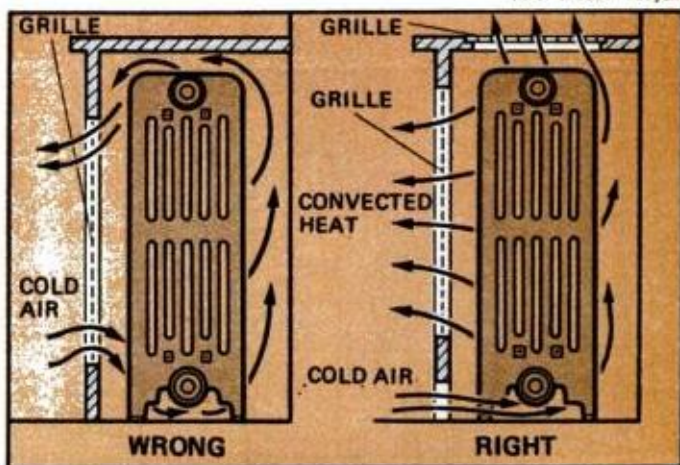
If you were foolhardy and put your hand on the stack pipe between furnace and chimney, you'd get a good idea of the amount of heat that escapes unused. To trap some of it, purchase a roll of aluminum lawn edging.

Cut aluminum edging in sections long enough to encircle stovepipe (find length using cardboard). Then bend down one side about an inch wide to form a collar. Using tin snips, cut the long side all around at 2 in. intervals.

Shape the collars around a tin can or pail about the size of the furnace pipe. Fit it snug to the latter and hold it secure with wire. Attach as many flanges as space allows; you'll be surprised how much convected heat you'll trap.



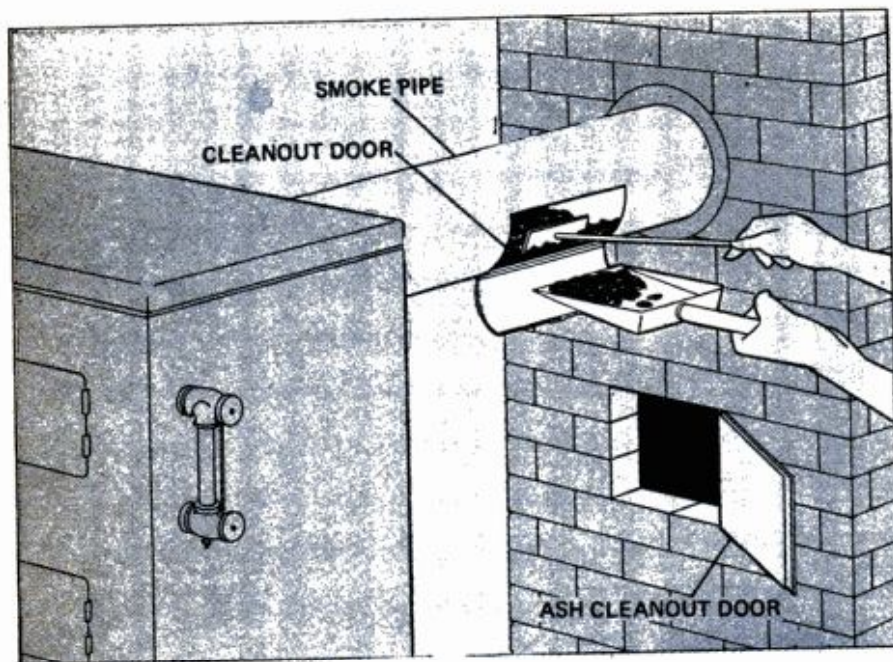
For efficiency, radiators are always positioned near areas of greatest heat loss—windows and doors. You can slow up the heat rise somewhat by securing sheet aluminum below and behind a radiator. By bending over the top slightly as shown, warmed air will travel into the room instead of directly upward.



Most will agree that a radiator is not the prettiest thing in a room; thus, many homeowners install covers to hide them. You should know that a cover does decrease a radiator's efficiency. But, if you must hide that radiator, make certain your cover is constructed to permit air flow as shown above.

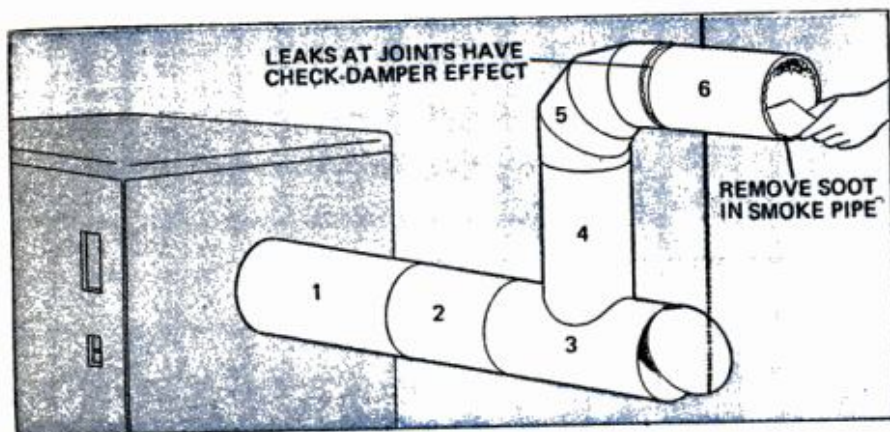
Art: Peter Trojan

What you can do to keep your heating system efficient

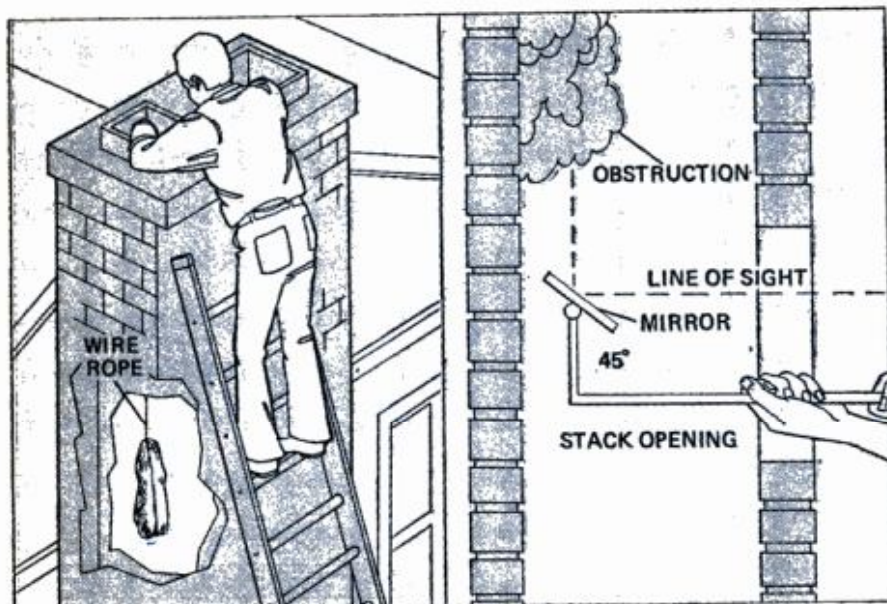


For efficiency, your furnace stack (smoke pipe between furnace and chimney flue) must be kept clean. Start of the heating season is also a good time to clean out the fireplace ashpit, where accumulations could interfere with furnace operation. Inspect the stack; holes are not worth patching—they show that it's time to replace the stack. Remove a worn-out stack by pulling it out gently (it should be press-fitted in place) and take it to a tinsmith for use as a pattern in assembling a new stack.

When the stack needs replacing or even just a cleaning, the best time to do it is before the start of the heating season, since the furnace must be shut down.

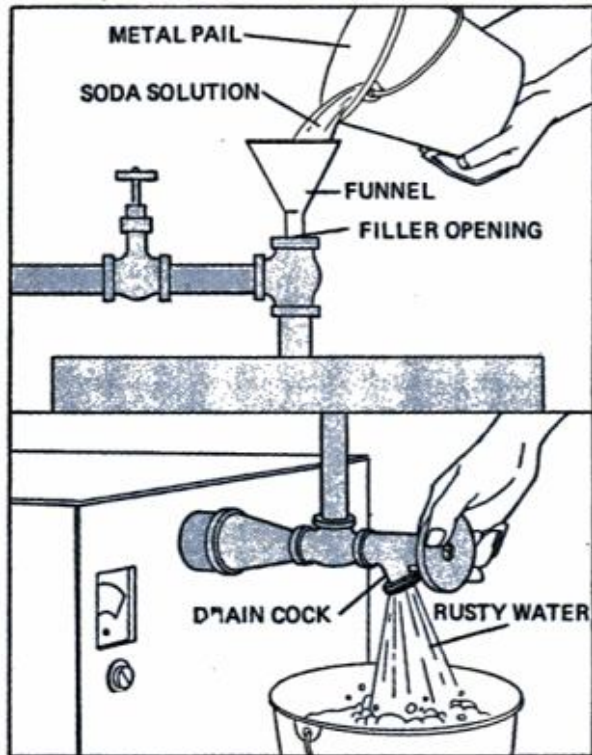


When removing sections of a stack for cleaning and inspection of the chimney flue, number sections to assure reassembly in correct order. A furnace stack must be not only clean but tight as well for most efficient operation—a loose joint between sections will act as a check damper to reduce draft to the burner. If careful realignment of joints fails to produce tight fit, use aluminum-colored fabric duct tape to seal them.

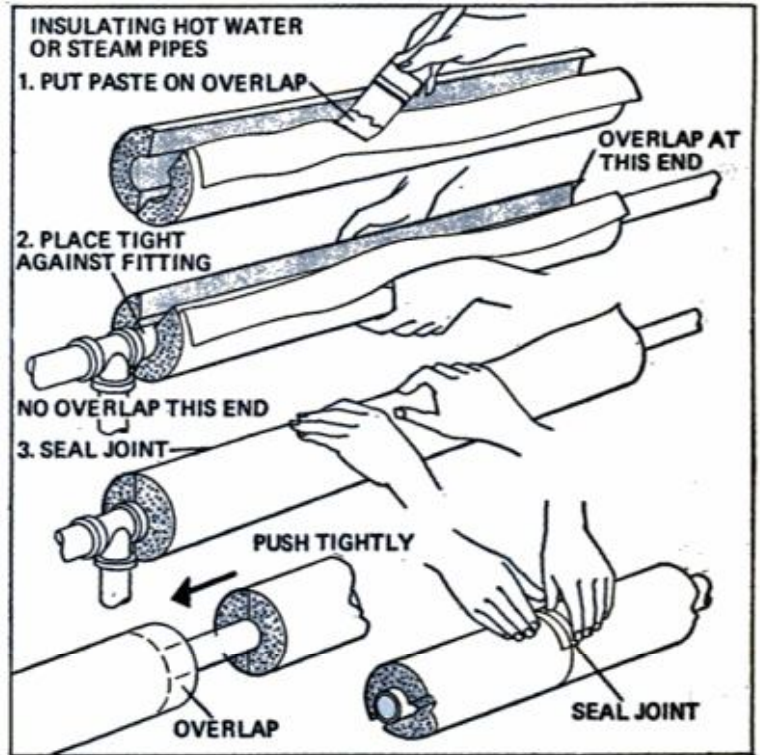


Summer storms may have deposited leaves and twigs in the chimney—and some birds prefer chimneys as nesting places. A chimney with little or no offset can be inspected from inside with an angled mirror. If daylight cannot be seen, the flue may be blocked. A blocked flue can be cleared with a tire chain wrapped in a burlap bag, lowered carefully from top. Before this operation is begun, the furnace stack should be removed from the chimney and the hole blocked off with a wad of dampened newspapers or rags. Clearing a chimney this way will usually produce a lot of soot and dirt, so wear a dust mask.

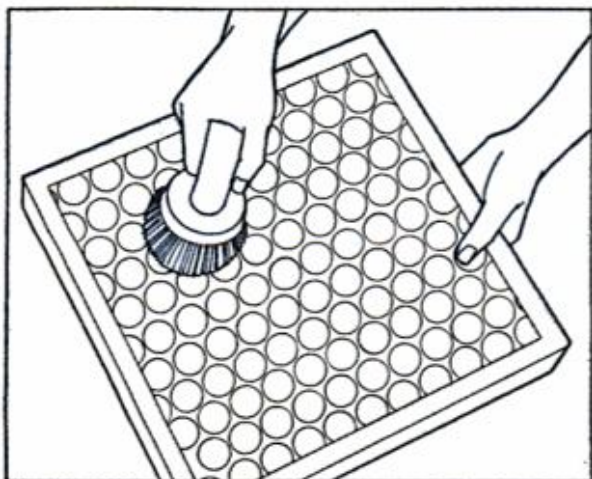
Art: Adolph Brotman



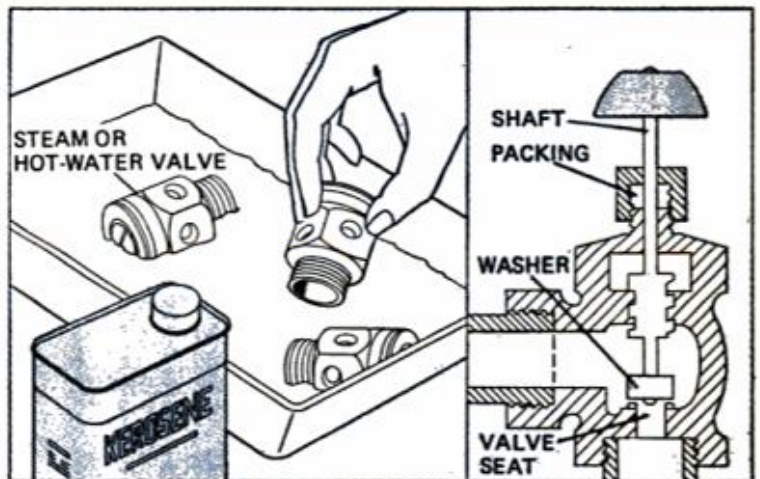
A boiler that has a clean-out (filler) opening can be cleaned with a soda solution. You can buy the cleaner in powder form from a plumbing supply house or use auto radiator cleaner. A hot-water system should be purged of rusty water at start of heating season, refilled with fresh water.



Steam and hot-water pipes, especially where they run through unheated spaces, should be insulated. Ready-made sections of pipe insulation are applied as shown above; lengths of slit urethane foam tubing are also available. Runs of warm-air duct through unoccupied spaces should also be insulated to cut losses; use wraparound batts taped in place.



Warm-air system filters should be cleaned regularly, replaced if of throw-away type. Fan blades should be kept free of lint; registers should be vacuumed with grilles removed. Ducts should be checked for leaks, sealed with tape. Keep blower motor and bearings lubricated; check belt tension.



Hot-water and steam radiator valves can be cleaned for the season with an overnight soak in kerosene or paint thinner. Loose shafts on steam valves (above, right) will allow steam to escape; repacking solves the problem. Hot-water valves should be bled of air at season start. With system running, press pin or turn screw to open, close as soon as water comes out.

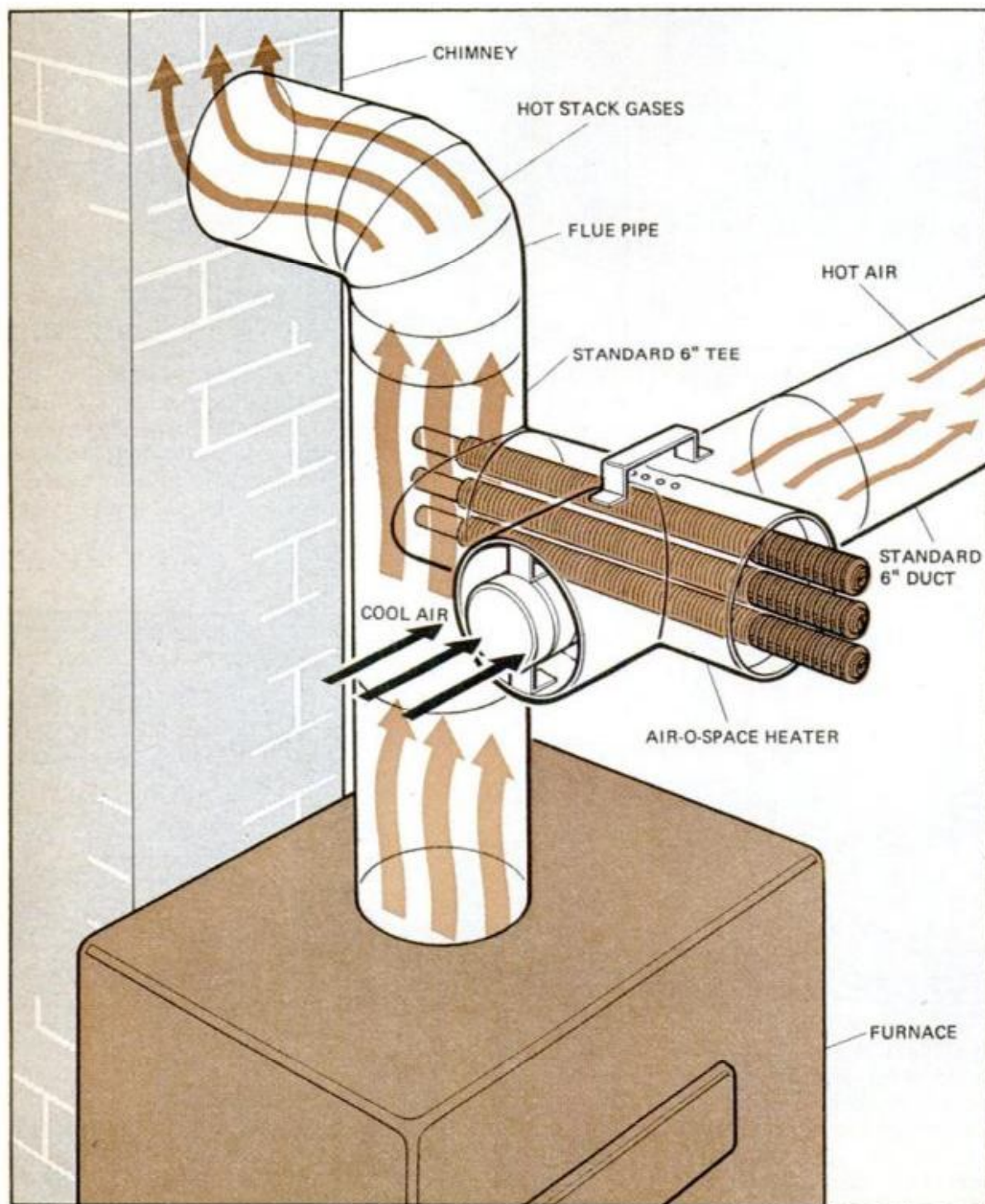
How to get more of the heat you're paying for

Probably the most effective heat-transfer device today is a "heat pipe." It can transport about 500 times the heat flux of the best solid conductors with a temperature drop of less than 3°F. per foot.

Taking this principle, Isothermics, Inc. (Dept. PM, Box 86, Augusta, N.J. 07822), has produced a heat pipe to use warmed air

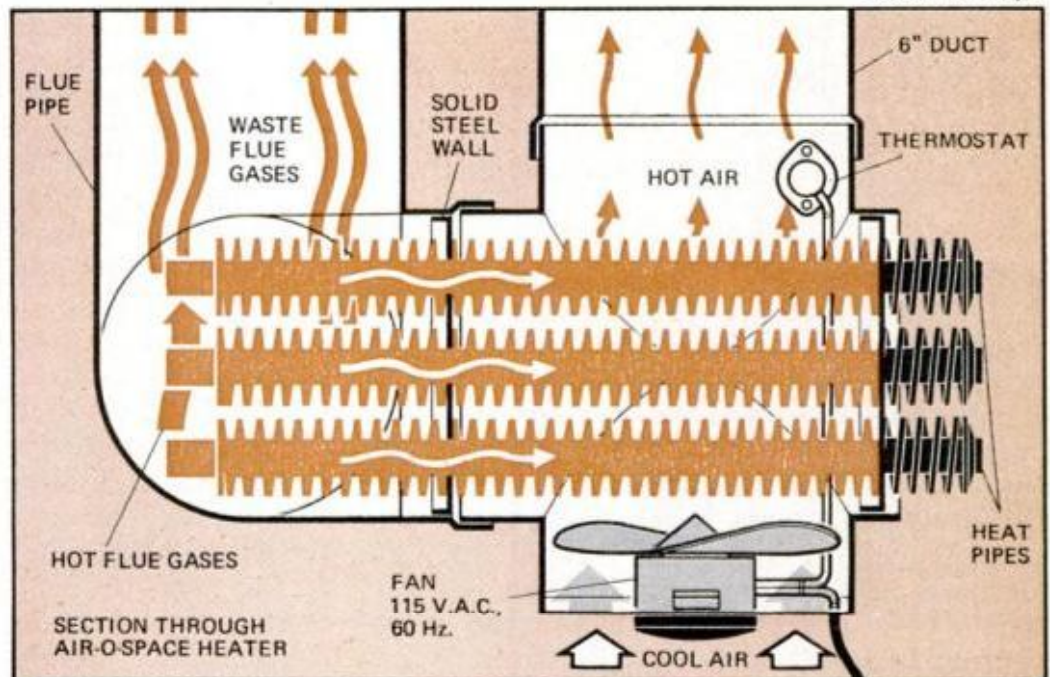
that otherwise escapes up the chimney in a home-heating system. Called Air-O-Space Heat Pipe, it can be installed by a do-it-yourselfer in about 15 minutes.

Broadly, a heat pipe closely resembles a simple steam heating system—the same boiling and condensing takes place. Condensate collects in the radiators for return

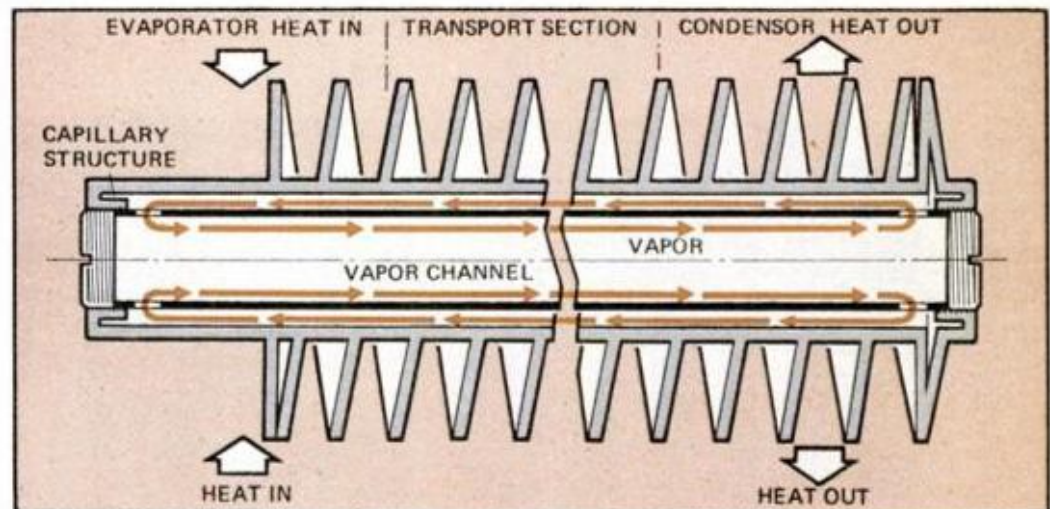


Art: Peter Trojan

Air-O-Space heater weighs 15 lbs., installs in 6, 7 or 8-in. duct in 15 minutes without aid of special tools. Air heated to approximately 200° F. moves through the duct at 100 c.f.m.



Heat pipe operates on same principle as a steam boiler. Because it is in a vacuum, liquid in pipe boils at low temperatures. The vapor travels to other end of tube where it cools, then condenses and gives off heat. Condensate is then pumped back to the evaporator section by capillary action of the wick.



to a boiler. But it is sealed in the heat pipe. Heat applied to the pipe will boil liquid in the vacuum inside at much lower temperatures. The liquid turns into vapor that expands, flows to the other end of the tube, then condenses and gives off heat. Condensate is then pumped back to the evaporator section by capillary action of the wick. The cycle repeats without pumps.

The self-contained heater is a fully automatic recovery system using heat pipes to reclaim heat from flue gases in a home system. Pipes extend into the flue where gases are present and occupy only 20 percent of the cross-sectional area in a 6-in. pipe.

(Flue-gas temperature ranges from 450° to 800° according to system efficiency.) While the pipe picks up some heat for transmission outside the stack, a solid-steel wall keeps the gas from escaping.

The Air-O-Space heater has a thermostat to activate a small duct fan which moves air over heat-transfer surface. You can use convectors up to 20 ft. long, including elbows, to direct heat saved from the stack area, if desired. As a result, a basement that has been hard to heat can be made comfortable; or you can duct heated air into the cold-air return on a warm-air system for distribution in upper levels. ★★★

Fireplace furnace: Heating your house

Piping hot water through a simple, ingenious fireplace grate warms the whole house, saves waste heat, virtually eliminates fuel-oil bills.

Gene Feeney heats his house on 10 gallons of fuel oil a year. When he tells friends this, they shake their heads in disbelief, but it's no put-on. PM editors personally checked out the system and—to everyone's amazement—it works just as he says it does. And Feeney's house is no tiny cabin, either. A large, seven-room, two-story wood-frame dwelling, it's located on Old Orchard St. in Harrison, N.Y. where chill winds blow across a hilltop and the snow gets up to a foot deep.

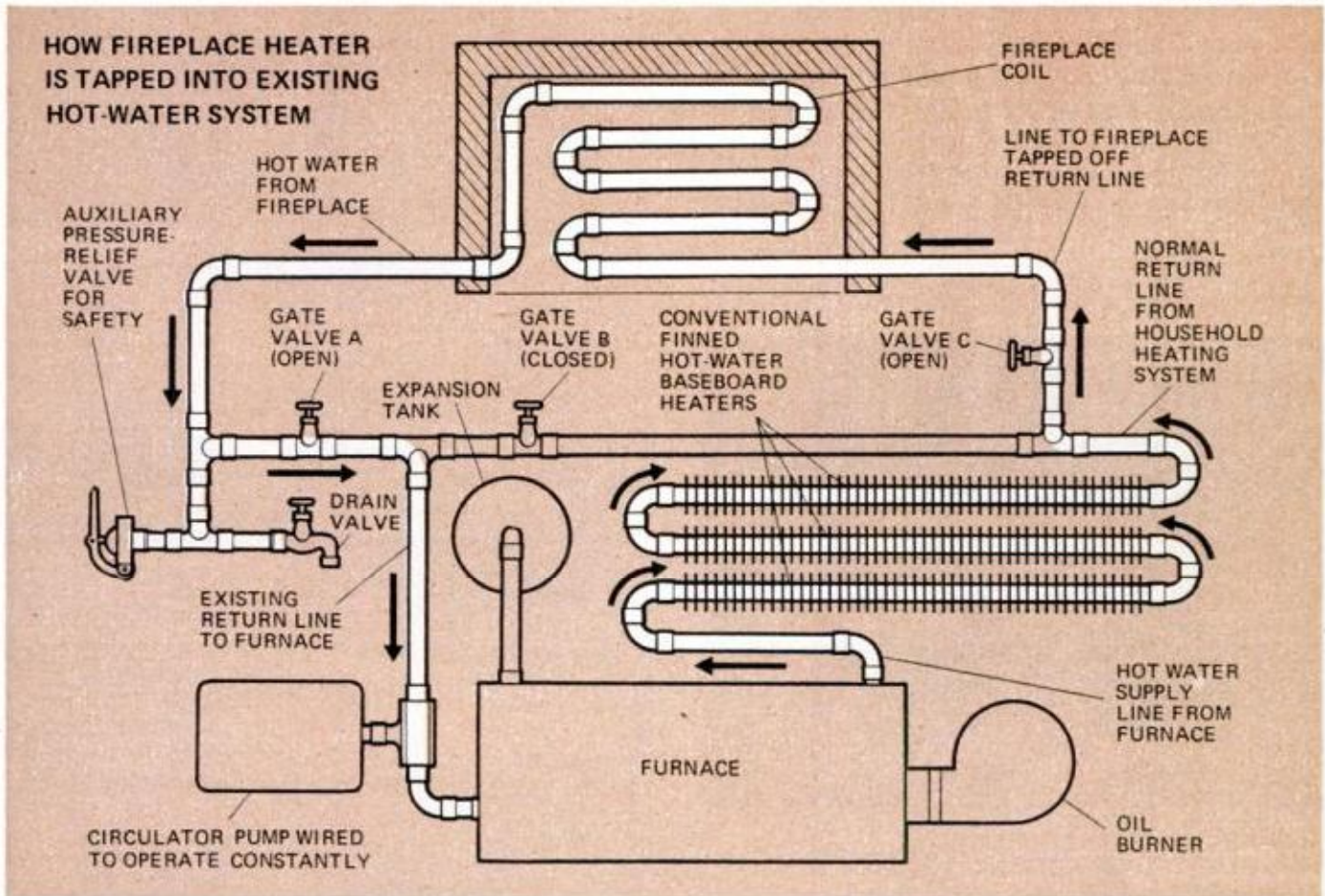
What Feeney has done is turn his fireplace into a furnace. Since he and his fam-

ily enjoy the comfort and cheer of fireside living, the fireplace is kept going most of the time anyway during cold winter evenings. Suddenly, he wondered: "Why let all that beautiful heat go up the chimney when it could be used to help heat the house?" In place of the usual firewood grate, he installed a coil made of ordinary $\frac{3}{4}$ -inch iron pipe. The coil, a simple series of hairpin bends, serves as a log support and heat collector. Water flowing through it picks up heat from the fire and is fed to the regular furnace circulator pump. From there, the heated water is circulated through conventional finned baseboard convectors to warm the entire house. Cooled water is piped back to the fireplace coil for reheating and the cycle is repeated—automatically as long as the circulator pump runs. The system keeps the Feeney house at a comfortable 70° to 72° F., upstairs and down, all winter long.



instead of your chimney

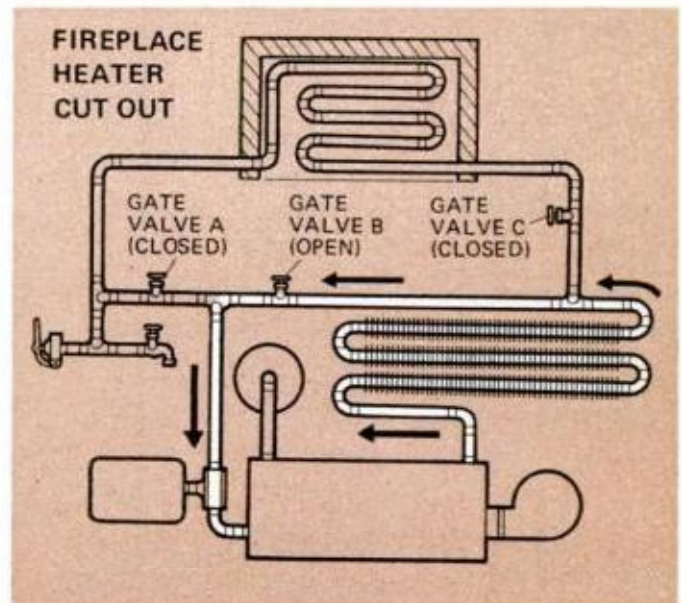
Art: Peter Trojan



Total cost: about \$30 for plumbing parts.

In effect, the fireplace heater is merely an auxiliary loop tapped into the return line from the baseboard convectors, as diagramed on this page. It can easily be adapted to any standard oil-fired hot-water system. Only two connections are required—from return line to inlet side of the fireplace coil and from the outlet side of the coil to the circulator pump. They are made with pipe tees and gate valves so the original return line is left intact.

The beauty of the system is that conventional oil-burner operation is in no way affected and continues to function normally whenever needed. The regular household thermostat is set to the desired temperature. If the fireplace heater fails to deliver enough heat to keep the house at this level, the oil burner automatically gives added heat as long as necessary. In Feeney's case, this occurred only three or four times all last winter. However, Feeney's domestic

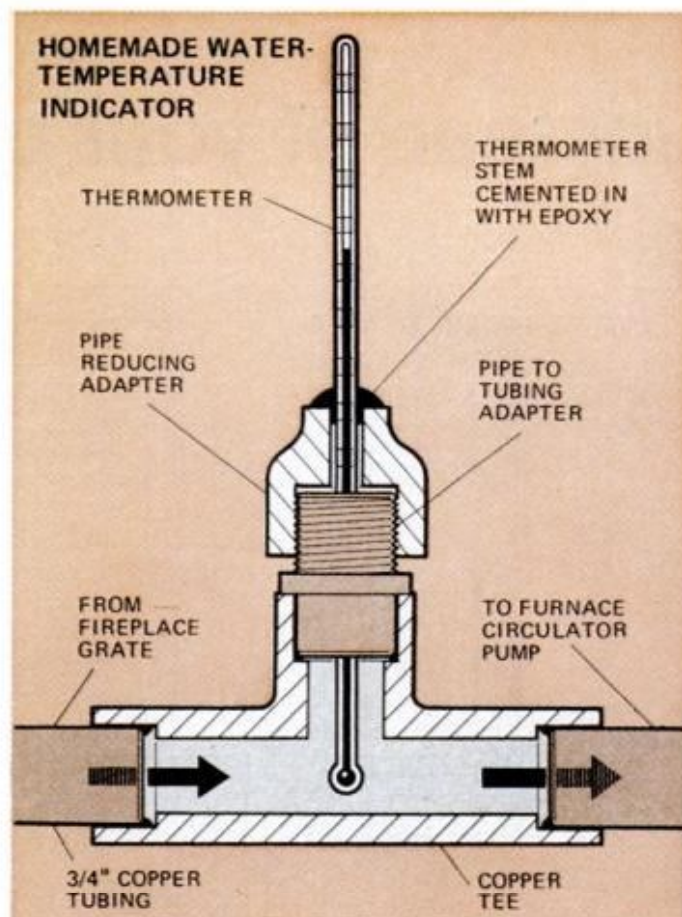


Diagrams above show how fireplace heater is basically just a loop connected into existing return line from room radiators. Furnace functions normally except that water flows through fireplace coil on way to circulator pump. Lower diagram shows how fireplace is cut out of system by turning only three gate valves.

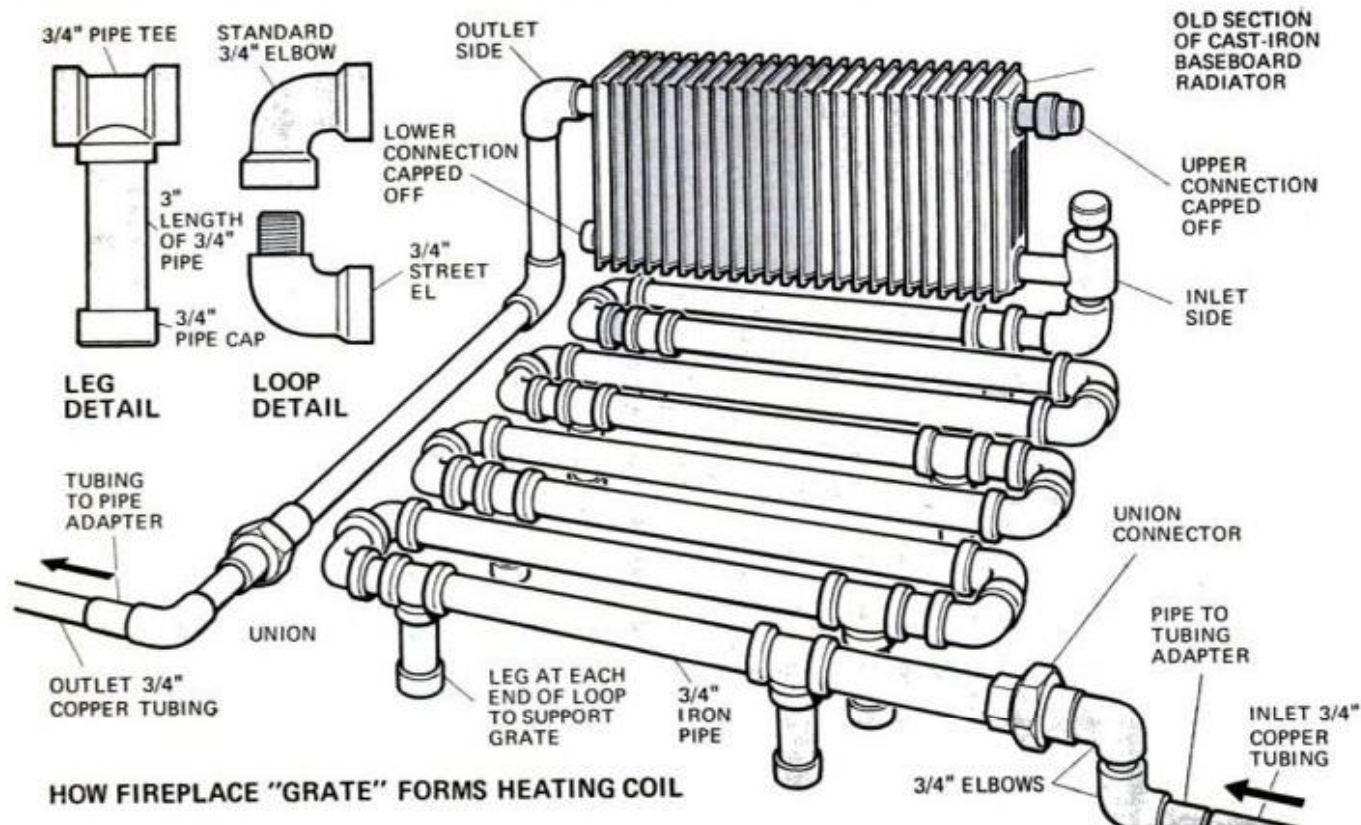
hot-water supply is separately fired. Those having a combined heating and domestic system would undoubtedly use more oil than Feeney does, but could still enjoy substantial savings in fuel.

Keeping the fireplace going is not as great a job as it may seem, says Feeney. He throws on a few logs during the evening, then banks the fire with a couple more before going to bed. This keeps the house warm throughout all but the coldest nights. In the morning, the fire is rebuilt and fed from time to time during the day by Feeney's wife while Gene is off at work. Since he cuts and splits his own firewood, an

(Please turn to page 175)



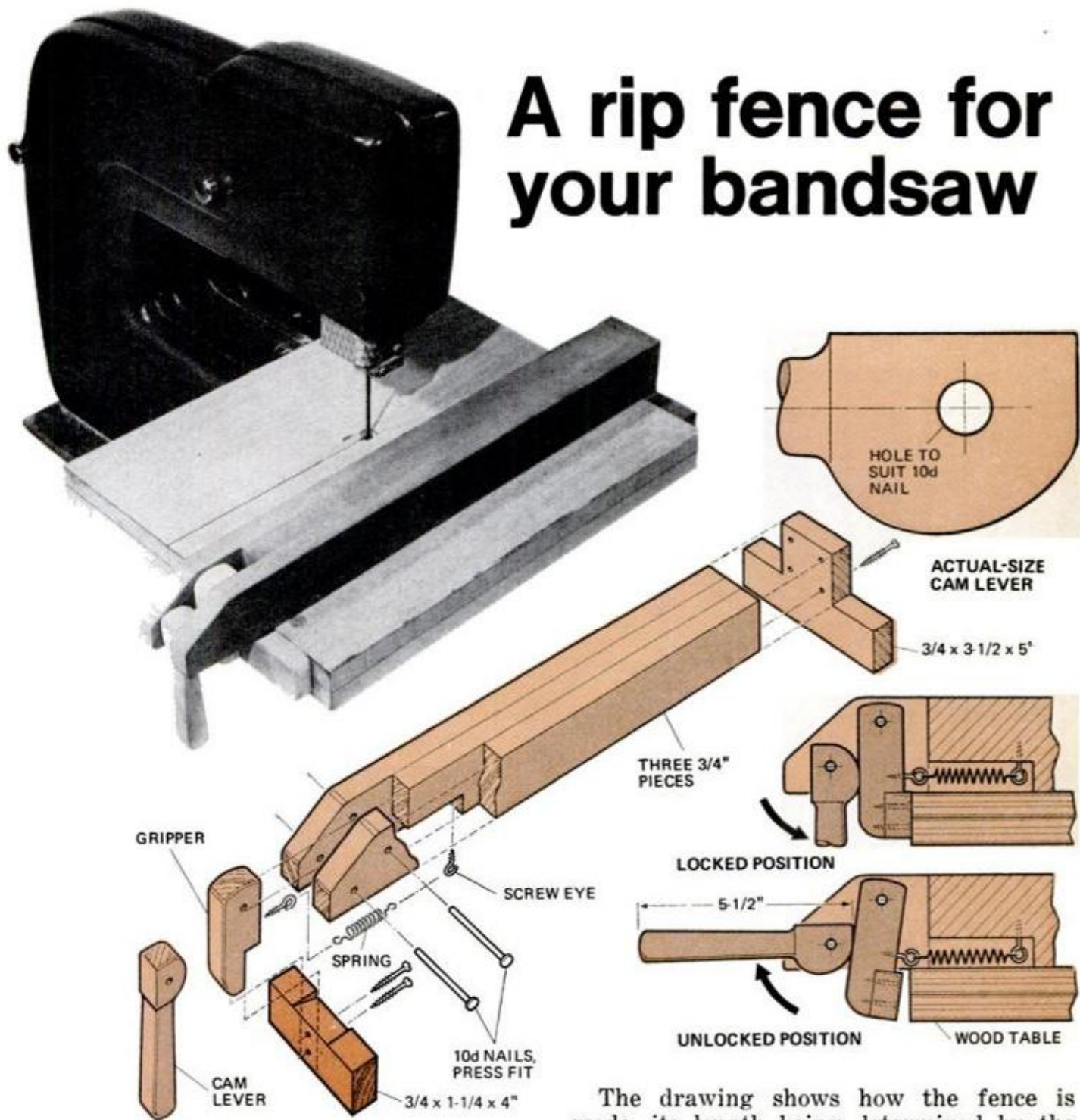
Homemade heat indicator is simply a thermometer inserted in copper tee fitting located in outlet side of fireplace coil. Use a reducing adapter, as shown above, and cement thermometer into neck with epoxy. Thermometer must be type that reads to at least 200° F., can be obtained at a laboratory-supply house.



Fireplace coil is formed from standard 3/4-inch pipe fittings. Note that U-bends at ends of loops are each made up of one elbow and one street el to provide

close-fitting turns. Length of loops must be sized to fit within fireplace space. Old section of cast-iron baseboard radiator picks up extra heat at back.

A rip fence for your bandsaw



by Paul Fiebach

Art: Peter Trojan

A rip fence on a bandsaw can be as handy as the one on a table saw, yet how many bandsaws come with a fence as standard equipment? I made this wooden one for my bandsaw, and it works as well as any fence you can buy—and costs a lot less. Its cam-locking action is positive and holds the fence securely to front and back edges of the table. When the clamping lever is released, the fence stays put yet can be moved back and forth or lifted from the table.

The drawing shows how the fence is made, its length being determined by the depth of the bandsaw table. The cam is given full size for tracing. The coil spring, housed in a 2 1/4-in.-long notch which is made in the center member of the three-piece fence, keeps the fence snug against the saw table when you make lateral adjustment. Overall length of the center piece should be 1/8-in. less than table depth.

While the cutaway drawing, which illustrates the fence in an unlocked position, shows the spring-fitted pressure pad backed off from the table, this is shown exaggerated for the sake of clarity. Actually, the spring causes the pressure pad to hug the table even when unlocked. ★★★



How to build a hood for an oven over range

by Alfred Osborne

158 POPULAR MECHANICS

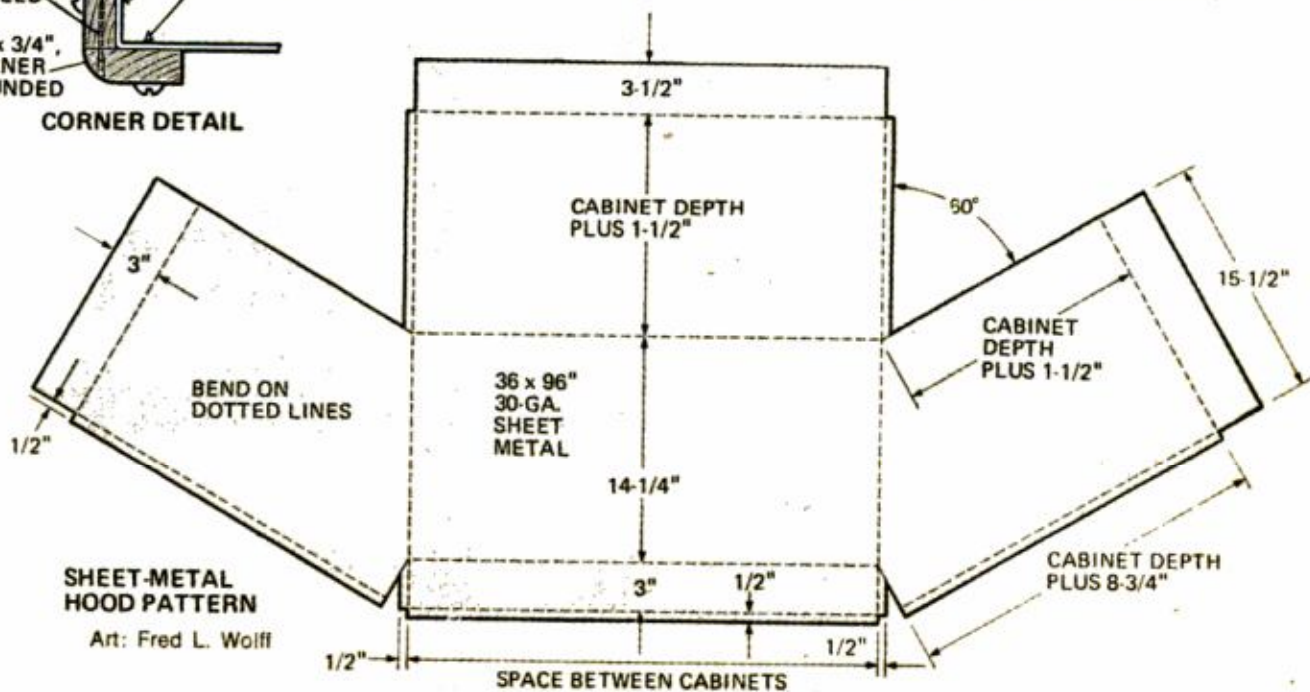
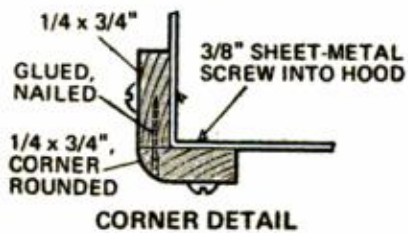
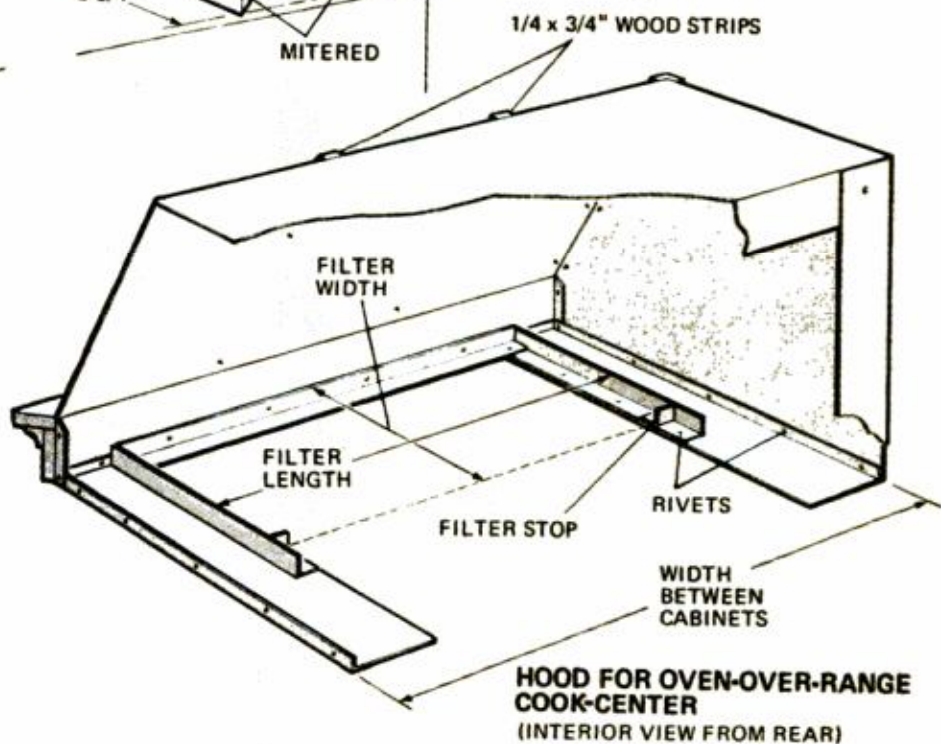
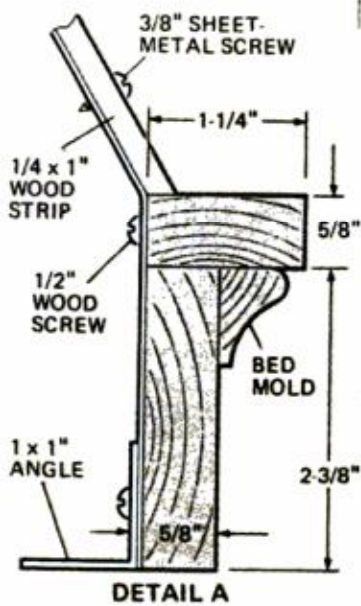
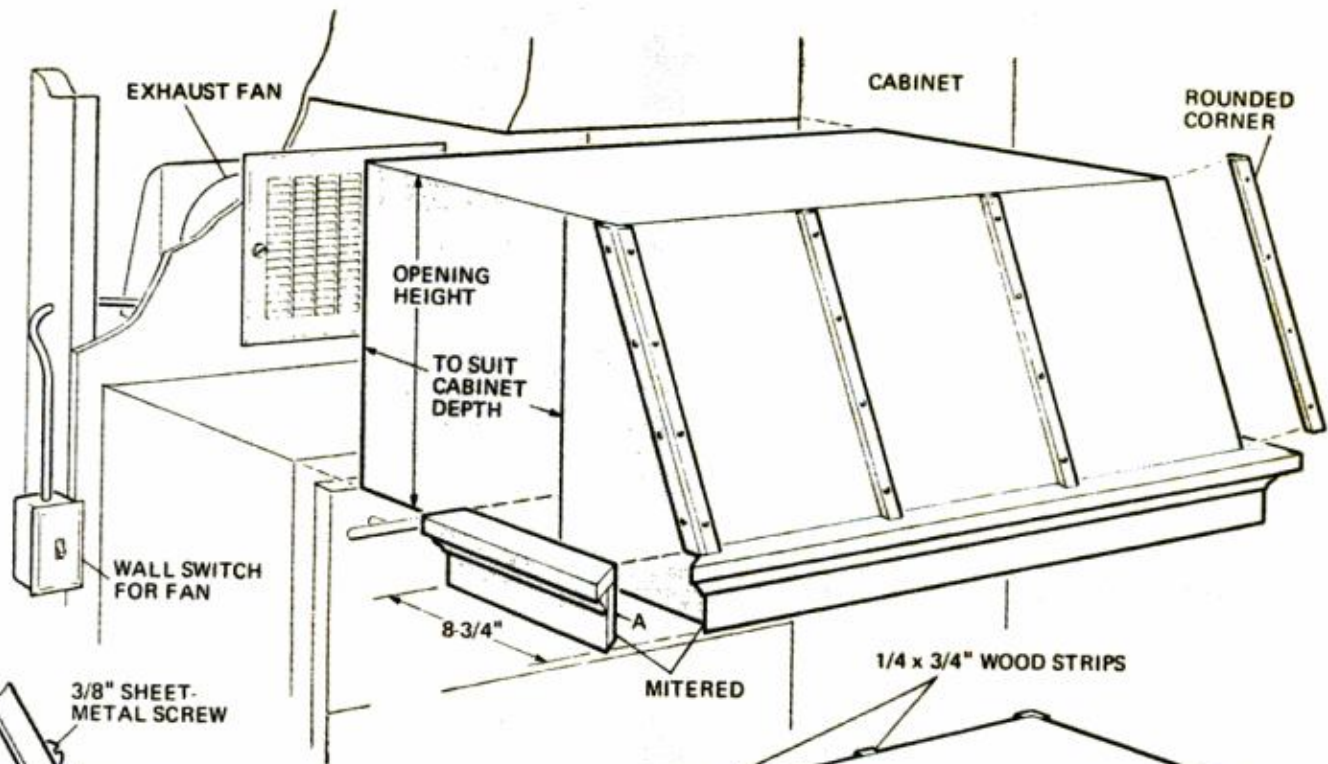
When we installed a wall oven over our kitchen range and hung it between two hanging cabinets, we couldn't find a hood with an exhaust fan that would fit between the cabinets. They were either too wide or too narrow. That's when I decided to make this attractive colonial hood which fits the space between the soffit and the top of the oven and the two flanking cabinets.

I bought and installed an exhaust fan in the wall over the oven, venting it to the outside and wiring it to a switch conveniently located under the cabinets. The fan not only exhausted the heat from the oven but also the cooking odors and grease-laden vapors from the range as well. Removable filters were used to trap the grease.

I formed the hood from a 36x94-in. sheet of 30-ga. sheet metal, cutting it according to the pattern. Most of the bends are made 90° to form flanges. The exceptions are those along the bottom edges which are bent 180° and hammered flat to stiffen the metal. I used Pop rivets to join the sides to the top. A neat job of bending results from using two straight pieces of wood and clamping them to each side of the metal along the line of bend.

The built-up, 3-in.-wide wood trim along the sides and front of the hood is made in one piece as shown in detail A, then mitered at the corners to fit. The corner trim pieces are preassembled similarly, then cut to fit and attached to the hood with sheet-metal screws. Finally, I Pop-riveted 1x1-in. metal angles to the bottom hood flanges to hold removable grease filters. The corner strips, as well as the strips applied to the face of the hood, not only add decoration, but they actually serve to stiffen the hood.

The finished hood can be spray-painted a complementary color, or covered with the same wallpaper pattern as may be used in the kitchen. In the latter case, it would be best to apply the paper before adding the decorative wood strips. For a bit of Early American decor, I added a brass eagle as a final touch. ★★★



HINTS

FROM READERS



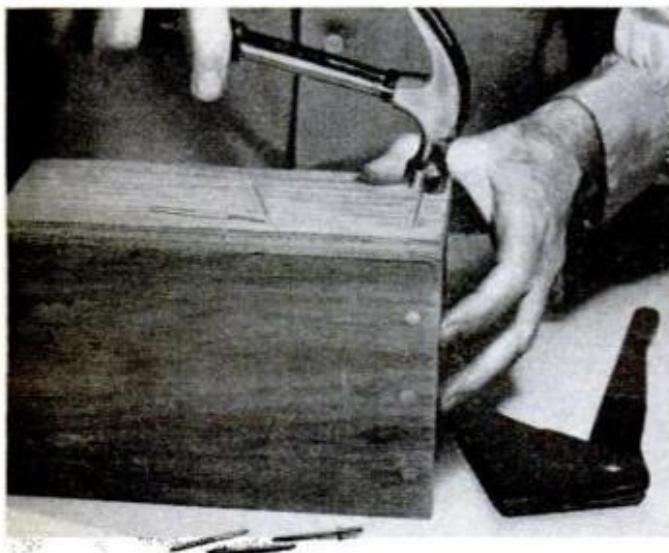
Spray-painting small knobs

Small parts like knobs are easily spray-painted if mounted on a paper plate that's supported underneath by one hand and slowly rotated.—*Ken Patterson, Regina, Sask.*



Foam aids grouting

For grouting between plastic tiles, try a piece of 1-in.-thick plastic foam with one corner cut off. You can easily control the amount of cement applied, minimize excess on tiles.—*Paul J. Fister, Sac City, Iowa*



Reusing Pop-rivet stems

The sharp-pointed, snapped-off mandrels (stems) of Pop rivets need not be wasted—they can be used as headless nails for many applications, including temporary assemblies and reinforcement of glued joints. For a stronger joint, it may help to drive successive stems at opposing angles.

—*Walter E. Burton, Akron, Ohio*



Pop rivets as studs

An easy way to install a nail-like stud in metal is to drill a hole to receive a Pop rivet, then expand the rivet only far enough to anchor it. The riveting tool is removed and the projecting stem is cut to length or bent as desired. Eye installed in plumb bob this way rotates freely, but could be secured with epoxy.—*E. B. Walters, Chicago*

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This once was a garage

Imaginative use of space and materials turned this three-car garage into a charming cottage now used as a guest house.

by Harry Wicks
WORKSHOP EDITOR

Styling: Gabe and Ira Herrick

Color photos: Hans Van Nes





Before: Three-car garage offered 560 sq. ft.



After: Same building, a comfortable guest house.



A large part of the fun of having a second home in the country is that you can have friends and relatives out for visits. However, extended visits often crowd the hosts as well as their guests. Weary of this inconvenience, an enterprising couple recently looked about their property on the eastern tip of Long Island to see what they could do about getting the room they often needed.

Like most homeowners, they first considered an addition to the main house. Contractor cost estimates, and the news that their year-old heating plant would have to be replaced because it could not warm additional space, quickly discouraged this thought. Next, they took a hard look at the usually vacant three-car garage located 150 feet from the house proper. This, they decided, would be their guest house.

Such a conversion is logical for several reasons.

1. Because the structure (shell) is already there, cost of building is sharply reduced.

2. A "guest room" set apart would assure guests and hosts complete privacy.

3. If they chose, the little house could be rented to help defray the cost.

Alterations were kept simple; no unusual or custom-built features were planned or incorporated. The biggest job on the shell was to close up the wall where the garage doors originally were located, and to install a 9-ft.-wide, sliding-door unit that would offer a pleasant view. The sliding-door unit selected is easy to assemble and install, as can be seen in the photos on the following pages. Two men did this job in one day.

Perhaps the hardest part of the job was selecting the material to use for the interior. The small rooms demanded crisp, clean decorating which would create an illusion of spaciousness. At the same time, the man of the house wanted an interior that would require minimum maintenance. Both problems were solved by covering all walls and ceilings with a slightly off-white paneling. The rich textured look

Light color of the paneling contributes much to the illusion of space and airiness.



Wicker furniture comfortably seats six or seven without crowding the room.



Kitchen-dining area. All needed appliances are in King unit next to half-wall.

Bedroom No. 2 has ample space for two beds, roomy dresser and nightstand.

High-riser used in bedroom is sofa by day, converts to pair of beds by night.



of Ranchero Nevada white (Weldwood Collection by U.S. Plywood) satisfied both demands. Its finish is tough, and care consists of nothing more than an occasional wiping with dampened cloth or sponge.

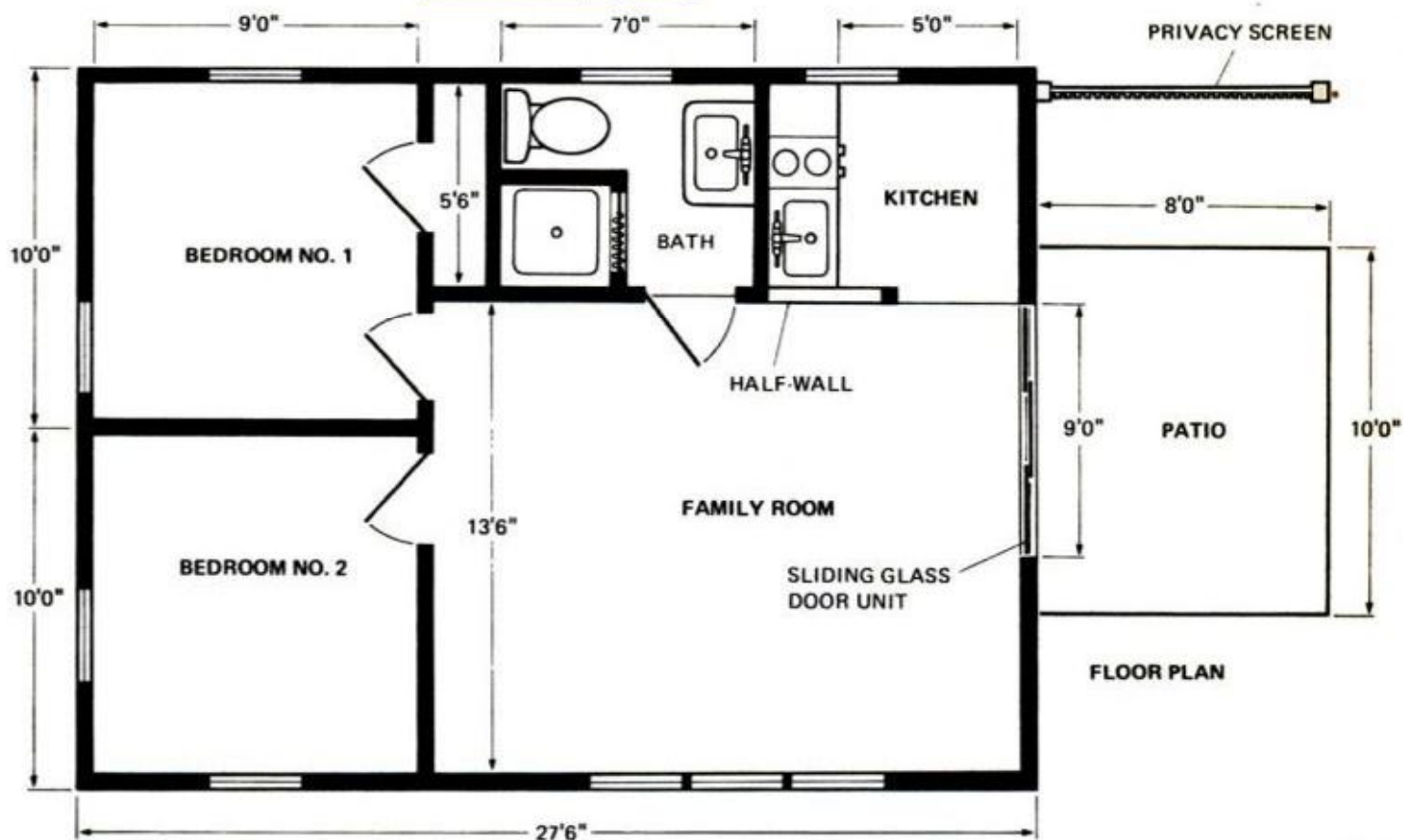
The kitchen is tiny by design. The owners felt that their guests needed one primarily for preparing breakfast. What makes it possible to have a kitchen at all is the All-In-One-Kitchen Center made by the King Refrigerator Corp. In the 24x36x39-in. cabinet there is a small sink, two cooktops and a mini refrigerator. This is more than adequate for handling light meals and snacks.

While limited space did not permit a bath-

(Please turn to page 168)



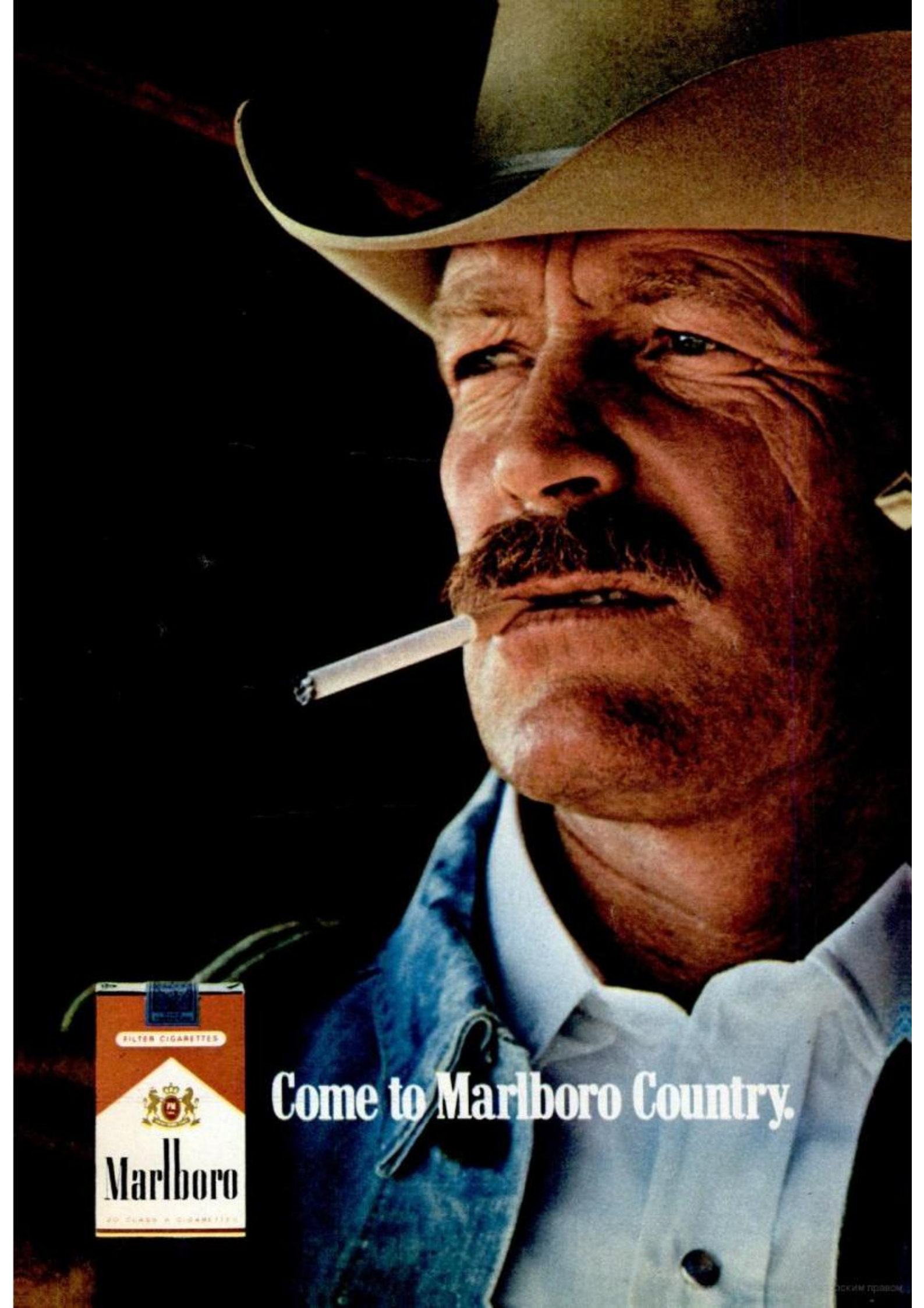
Fitting paneling around windows is done by holding panel in place and marking directly from window.




Window cutout in panel is made from back side, using circular saw. To start, use a vertical plunge cut.



Paneling is secured in place by driving precolored nails that match panel color.

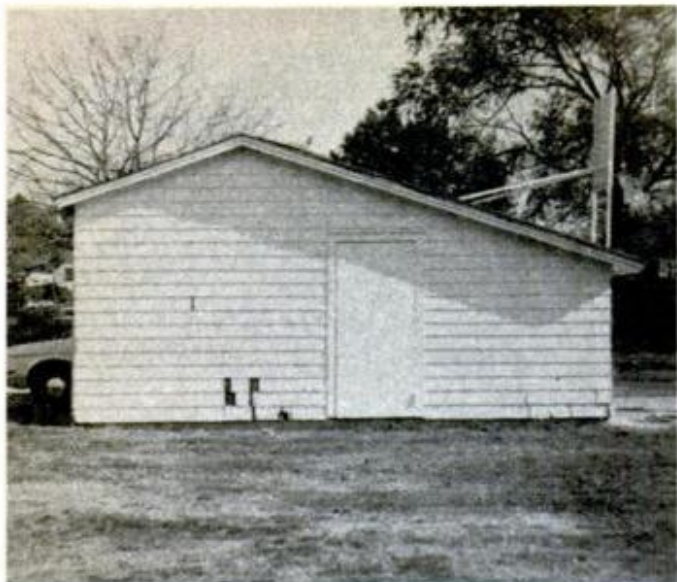


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South wall of garage prior to conversion. Peachtree aluminum sliding doors were installed on this wall.



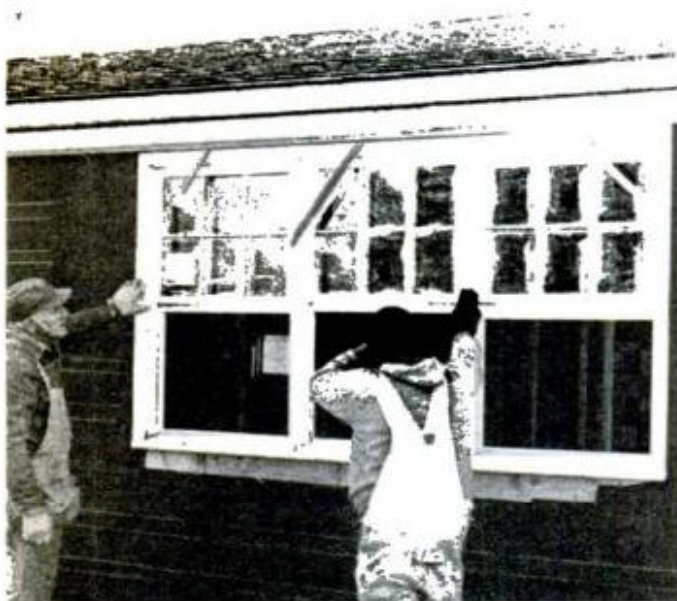
Wall section comes down fast. Because wall was first framed, there is no need for a temporary support wall.



Two men push frame into opening. After plumbing frame with level, it is fastened to studs with screws.



Last step is to install door itself. Door shown is fully weatherstripped to minimize air infiltration.



Triple-window mullion was installed in the wall which replaced sliding garage doors on the original front.

THIS ONCE WAS A GARAGE

(Continued from page 165)

room large enough to accept a tub, the 5½x 7-ft. room does have a full-size shower. Also, because of its size, the house had to be carefully decorated. Old wicker furniture was resurrected from the owner's basement, scrubbed down and painted white, and fabrics were then selected to complete the light, spacious feeling of the rooms. The attractive bedroom furniture groupings and the shutters were selected from the Montgomery Ward catalog.

Floors in the family room and bedrooms were covered with Armstrong's shag carpeting over a polyethylene vapor barrier, while kitchen and bath were treated with seamless vinyl floor covering. ★★★

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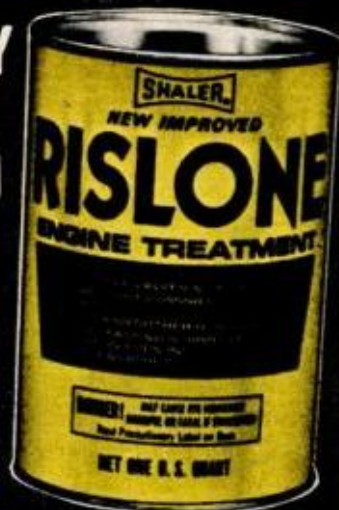
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SUN POWER FROM THE SEA

(Continued from page 133)

too big a turbine for the present state of the art."

To get around that problem, the Andersons have incorporated a propane turbine in their system. Warm ocean water heats liquid propane to 70° F., causing it to boil and form propane vapor. Cold ocean water chills the propane to 50°.

"The resulting system can operate at about 160 p.s.i.," explains Anderson. "Right now the standard propane turbine systems are operating at 200 p.s.i. with a temperature spread of 110° to 50° F. So it should be a relatively short step to scale up such a system for our sea-thermal plant."

The Andersons plan to float their football-field-sized powerplant over a source of cold ocean water some 2000 feet down. Doing this, they save the expense of stringing a long pipeline along a steeply sloping ocean floor. Interestingly, Georges Claude turned to such a floating design after his Cuban powerplant was wrecked.

In the Anderson plant, propane boilers would be located 290 feet beneath the sea, and condensers 150 feet down. Different pressures at those levels would equalize pressure within the propane system, resulting in greater operating efficiencies.

The Andersons prefer their design and, not surprisingly, Dr. Othmer prefers his. But the rivalry between them is friendly. After talking with the three sea-power advocates, you come away with the impression they all hope both methods will win substantial financial backing.

Another expert in the field is Dr. Clarence Zener of Carnegie-Mellon University in Pittsburgh. He heads a group of researchers who have been using computer models to pin down materials requirements, construction costs and net energy production. Like Dr. Othmer, he favors Caribbean sites for the initial plants, primarily because this would avoid tampering with the Gulf Stream.

Even though it is thought that thermal powerplants would have little effect on the heat load of the Gulf Stream, Dr. Zener warns there might be political fallout. The Gulf Stream is a key factor in the weather of western Europe. Massive thermal plants off the Florida coast could well give rise to international problems.

Dr. William E. Heronemus, professor of civil engineering at the University of Mas-

sachusetts, feels certain that thermal plants would not produce "local, regional or global weather modification or other adverse environmental impact."

Dr. Heronemus heads a large group—it includes the Andersons—that has produced a detailed study focusing on a huge sea-thermal plant. The study was funded by the National Science Foundation.

"Our research has concentrated on a grand-scale system to be installed afloat in the Gulf Stream in a swath about 15 miles wide by 500 miles long," Dr. Heronemus explains. The system would be made up of many individual plants, each with a net output of 400 megawatts. The working fluid in these plants would be propane, not water.

A side benefit of schemes such as that of Dr. Othmer would be an extensive mariculture operation. When pumps tap the cold brine some two-thirds of a mile beneath the sea's surface, they draw up the nutrient-rich water in which so many fish thrive. Instead of simply discharging this water—after it's used for cooling—it could be fed to fish in a huge array of mariculture tanks.

An ongoing experiment on the Caribbean island of St. Croix has proven that mariculture is feasible and practical economically. On St. Croix, oysters, clams and scallops are nurtured in cold water sucked up from the sea. They mature in an average time of seven months; compared with three to four years under natural, uncontrolled conditions.

How long would it take to get a sea-thermal plant into operation? "All of the technology required for the ocean thermal differences process is quite straightforward and a usable baseline is close at hand," says Dr. Heronemus. "If there were a national commitment to the development of the process, the first prototype plant could be on station in six years, and that as a result of a properly executed step-by-step component and subsystem development program."

We should get on with the program, stresses the Massachusetts scientist. In a lecture to a college audience, he said: "There is a compelling need for the United States to slow down its energy demand growth rate, intelligently and deliberately, and to convert to solar energy processes as soon as they are economic. The conversion can and should start in the very near future . . . This country does have some major energy problems and to many of us they will perhaps soon bring displeasure and even hardship.

"This country should not, however, permit

these problems, which have been long abuilding, to panic us into shortsighted action such as expanded unregulated proliferation of nuclear powerplants, action whose long-term consequence could be grave for our progeny. This lecture is meant to be a message of hope, a plea for return to the energy which nature has always intended us to use—solar energy.” ★★

COLONIAL TRESTLE DESK

(Continued from page 79)

bet and butt-joint construction and fitted to slide freely in the opening. The sides and backs are of $\frac{3}{8}$ -in. stock, fronts are $\frac{3}{4}$ in. and all are grooved to accept $\frac{1}{8}$ -in. hard-board bottoms.

Desk back. Cut a $\frac{3}{4}$ -in. board to size of 11 x 58 $\frac{1}{2}$ in. for the back. Round the top edge and attach the board from the back and from the end with fh screws in counter-bored holes. Plug the holes with screw buttons and sand flush.

Cut two pieces from 1 $\frac{1}{4}$ -in. stock 12x20 in. for the legs. Lay out the pieces following dimensions, bandsaw them, cut the $\frac{3}{4}$ x 5-in. rail mortises and sand the edges. Next cut the 2 x 2 $\frac{1}{2}$ -in. head and foot pieces and dowel them to the top and bottom ends of the legs. Note that No. 10 x 1 $\frac{1}{2}$ -in. fh screws are used in countersunk holes in the top cross members to attach the legs to the upper assembly.

Glue together the three members that make up the 2 $\frac{1}{4}$ -in.-thick rail (trestle); letting the center member project at each end to form a shouldered tenon. Drill $\frac{1}{2}$ -in. holes in the tenons for the cross pegs. The latter should be cut from scrap and shaped to rough form.

Finishing. The desk is now ready for its final sanding with No. 150 grit or finer sandpaper. After sanding it smooth, I applied Minwax Jacobean, which is a dark stain that tends to enhance the grain structure in pine. Since I prefer varnish to lacquer due to its ability to resist water spots, I next used Valspar No. 11 Soft Glow. I sprayed on five coats, sanded the desk lightly between coats with No. 280 sandpaper and cleaned the finish with a tack rag.

After the fifth coat, I sanded it ever so lightly with the 280-grit paper and then applied four coats of paste wax with an 000 steel-wool pad. Finally I followed this with 10 more coats of paste wax, buffing these coats to a soft luster with a soft cloth. ★★

CHECKER MARATHON

(Continued from page 115)

and all the comforts. Despite extra factory preparation, though, the Marathon showed workmanship no better than most American cars. Squeaks, rattles, a water leak and a poorly spot-painted rear door were among the small details. If this car were put together flawlessly, and it *could* have been so easily, I'd be the first to call it great.

Of engineering mistakes, I found very few. The most serious involves the rear bumper pan, where the vinyl flap tends to collect overflow from the gas tank. Several 1974 cars share this problem.

Checker engineers sift through individual components from other makes of cars, looking specifically for the most rugged parts. For example, the lower A-arm of the front suspension is 1954 Ford. This car had particularly rugged A-arms. Ball-joints, meanwhile are Saginaw—GM. The rear axle by Dana-Spicer is identical with Chrysler's of a few years ago.

In many ways, the Marathon reminded me of a Chrysler Windsor of the 1949-54 period—huge and flat rear floor, chair-high seats, rather mushy performance, very ample trunk and no frills. Handling, though is completely up to date, and it corners amazingly well. With steel-belted radials (optional), it sticks to the road despite its high roll center and quite a body lean. Steering is quick, and the Saginaw, variable-ratio feature makes parking a breeze. My only objection is the slippery steering wheel.

You step up into a Checker, never crouch, and once inside you get a commanding view of the road. The driver can see out over the roofs of most other cars. Seating benches are upright, wide and comfortable. Ride tends to be somewhat noisy and rough by Detroit standards, but most of the noise comes from the engine fan plus air rushing past the passenger compartment.

I asked the Checker people whether they plan to update the Marathon's 1953 styling, and they said no—it's good for another 22 years. Many who buy Checkers do so in protest against Detroit's annual model changes. They also figure on many trouble-free miles, because as cabs, it's not unusual for Checkers to rack up 300,000 to 400,000 miles (of course, so do other taxis).

My hope is that Checker will cure those workmanship blues. If so, the Marathon will move up from being simply another pretty face to being absolutely great. ★★

GREETING CARDS FROM YOUR PHOTOS

(Continued from page 83)

Prestype message on a single, handmade card, then shoot a copy negative from which you can print photo and message in one step. The problem here is that the finished picture won't be as sharp as the original, and any white space around it will probably print as tones of gray, not pure white.

A better, but more complicated, way requires two negatives: The original, continuous-tone picture and a high-contrast negative for the written message, best made on Kodak Kodalith film. Since Kodalith films like it and the special developers they require are commercial products not often sold in small quantities, you may find it cheaper to have Kodalith negatives made for you by a commercial photographer.

There are several ways to combine normal and Kodalith negatives to make your finished card. You can, for example, print your photo and greeting on one sheet of paper in two steps, masking off the photo area while printing the lettering, and vice versa. This is more time-consuming than most of the other techniques I've described, but the results are outstanding.

If your Kodalith negative is as big as your finished card, you could use it as a printing mask. First cut a "window" in the Kodalith, precisely where you want your picture to go. Then lay the Kodalith over the printing paper, and enlarge the picture through the window. Expose the lettering with a flashlight held directly above it and in contact with the Kodalith, to make sure the letters come out properly black; but be sure the flashlight doesn't leak enough white light (red light is all right, of course) to fog the picture area. To save time in making multiple copies, you might tape the Kodalith to the underside of your enlarging easel's swing-up mask so it will stay in place throughout your printing.

Still another way to combine Kodalith and continuous-tone negatives is to mount your negative itself in the Kodalith negative's window. If your picture negative is big enough to show up well in a contact print, you can use a Kodalith mask the size of your final card, as just described; but you contact-print, rather than enlarge, through the "window." If your main picture negative is small enough and your enlarger takes a big enough negative (a 4x5 or 2 1/4x3 1/4 enlarger and a 35-mm negative, for example), you could use a small Kodalith negative

that will fit your largest negative carrier, with a tiny "window" cut for the picture negative, and enlarge both at once. If your enlarger has a glass sandwich carrier, you may be able to hold both negatives in place without tape.

The copy negative technique outlined on page 83 works with Kodalith, too. But here, the *lettering* comes out properly black and white, while the *photo* loses its intermediate gray tones. As you can see from some of the cards illustrated, the effect isn't always bad, and can be quite interesting. Unless you're already experienced at evaluating how pictures will look when given the high-contrast treatment, you're probably best advised to experiment first, to find out which of your negatives look best with straight high-contrast printing or with such variations as tone-line, bas-relief, moire patterns or texture screens. (You'll find details on those processes in many books on advanced dark-room work.) You can then use your high-contrast print as part of the paste-up from which you shoot your high-contrast copy negative.

When you plan on making many prints from a normal or high-contrast copy negative, you can often save time by shooting several paste-ups at once onto a single copy negative. That way a single print will yield several cards in one operation—all you have to do is trim them apart afterward.

Some interesting cards combine photographic and nonphotographic ideas. The tree ornament (photo, page 81), a form of folded sculpture, is one example. I experimented with a number of layouts until a flat pattern was evolved which could be folded and taped into a solid. I filled each of the triangular areas that were to become the sides of the finished polygon with photos which I felt would work well in high contrast, and added both greetings and assembly instructions in Prestype on the portions of the card outside the pattern area. Then I shot the resulting paste-up on high-contrast film. The end product is a most unusual holiday greeting, one I know will stand out among the deluge of commercial cards. ★ ★ ★

Editor's note: If this inspires you to make some really clever holiday cards, or if you've already done some on your own, please send us a sample—with a note on how the card was made. If we get good ones, we'll run them as a roundup next year—and pay for them, of course, at our usual rates for reader hints. Sorry, but we can acknowledge only the cards we'll run. Address cards to: Photo Editor, Popular Mechanics, 224 West 57th St., New York, N.Y. 10019.

FIREPLACE FURNACE

(Continued from page 156)

adequate supply is no problem. Where firewood is less plentiful or too costly to use in quantity, he suggests a compromise: Use the fireplace at night when the house is at its coldest and a roaring blaze can be most appreciated, then let the oil burner take over during the day. This way, you'll still save fuel as well as enjoy a cozy fire.

Feeney's system calls for one minor modification in the furnace wiring. The relay that normally kicks in the circulator pump when the oil burner turns on must be bypassed so the pump will operate even when the oil burner is off. This is done by wiring the pump through a double-throw toggle switch so it can operate directly from a 117-volt source or the relay. With the switch flipped to direct power, the pump runs continuously to circulate water from the fireplace coil through the house, whether the oil burner is on or not. With the switch in the other position, the pump runs only when activated by the relay. You can switch quickly to fireplace heat or oil-burner operation.

The fireplace heating loop can easily be cut out of the system, too, when not wanted. By closing the two gate valves at the inlet and outlet sides of the loop and opening the gate valve in the original return line, the fireplace coil is shut off. Water flows directly from the baseboard convectors back to the circulator pump through the existing return line, restoring the system to normal oil-burner operation. This enables you to disconnect the fireplace heater when, say, you may be away from home a few days. At the same time, you flip the circulator pump switch over to relay operation and you can leave the system unattended for as long as you want. When you return, you just reverse the three gate valves, switch the pump to direct power, and resume heating with firewood.

Installing the fireplace heater is relatively simple for anyone with a little plumbing and electrical know-how. But if you're in doubt as to where to make the connections on your particular system, you may wish to have a professional do the work—at least the basic hookup. The fireplace coil itself is easily made from standard $\frac{3}{4}$ -inch pipe fittings. Its exact size will depend on the size of your fireplace opening—the idea is to fit in as many coil loops as space permits; the more you have, the more heat they'll pick up. The U-bends at the ends of the coil

loops are made by combining a regular elbow with a street el. While two elbows could be used together with a nipple to connect them, a street el—which has male threads on one end and female on the other—eliminates the need for a nipple and makes possible tighter hairpin bends. Thus you can space your loops closer, fitting more coil turns into the available space.

The coil is supported above the fireplace floor by short pipe legs capped at the bottom. The legs are left hollow so water flows into them while passing through the coil to pick up more heat from coals below the grate. At the back of the fireplace, the coil is connected into an old section of cast-iron baseboard radiator. The radiator, available at junkyards and plumbing shops, traps heat as it flows up the chimney, increasing the coil's efficiency. Inlet and outlet ends of the coil are simply led out the front of the fireplace at the corners and connected to $\frac{3}{4}$ -inch copper tubing with pipe-to-tubing adapters. From there on, plumbing connections are made with copper fittings, but don't use copper for the grate itself as it and its soldered joints would not withstand the intense heat.

Feeney finds that the temperature of water leaving the fireplace coil averages around 165° —hot enough for effective heating but not so high as to pose a safety problem. As a precaution, however, he installed an auxiliary pressure-relief valve in the line from the fireplace coil to the circulator pump. This will release excess pressure should water temperature build up too high. Feeney also keeps tabs on water temperature with a simple heat gauge made by cementing a glass thermometer into a copper tee fitting in the hot side of the fireplace loop so the thermometer's bulb sticks into the water flow (see drawing, page 156). If additional protection is desired, a temperature-controlled aquastat and zone valve can be installed in the hot side of the loop to dump excessive heat either back into the cold side of the line or into an auxiliary radiator in the basement. This should not be needed, however, except in extreme cases where temperatures get up into the 180° to 190° F. range—not a likely possibility.

Feeney isn't sure exactly how much money he's saved with his homemade heating system, but he knows one thing—he had a 550-gallon oil tank filled last fall and it's still almost full. That's a pretty good sign he must be doing something right. ★★

DETROIT '75—AMC

(Continued from page 105)

will likewise grace some non-California cars, and the high-performance 360-c.i.d. V8 with four-barrel carb will carry four converters plus two mufflers.

Both Sixes have been redesigned to drop their profile three inches. That will allow for lower hoods on future cars. The hood on the Pacer, for example, drops abruptly from windshield to front bumper.

Hornet hatchbacks and the Sportabout get a new touring package, with a special sound-deadening package, super-quiet insulation, 24-oz. carpeting and plush trim.

A new line of styled wheels uses urethane plastic facing bonded to steel backing. These wheels replace the all-metal mag types. Urethane wheels let AMC offer more styles. They're also lighter, easier to clean and more durable than aluminum/magnesium wheels. Matadors have them as standard



Urethane-faced wheels will be standard on Matadors.

equipment; Gremlins and Hornets get them optionally with front disc brakes.

AMC's electronic ignition, developed by Prestolite, needs no maintenance. It's said to deliver higher starting voltages than rival units. Its sensing circuit uses magnetic detection instead of the conventional rpm detector to signal when to fire each sparkplug. This is important at starting (cranking) speeds, especially in very hot or very cold weather.

AMC continues its Buyer Protection Plan and emphasizes shop service with minimum downtime. ★ ★ ★

DETROIT '75—CHRYSLER CORP.

(Continued from page 107)

55 mph. Solid mechanical improvements on both cars include a new three-speed manual transmission and refined 225-cu.-in. Six. An optional "Overdrive-4" transmission will be

available by January. Electronic ignition is now standard on all cars, and Long Life sparkplugs and batteries are a big plus.

Driving the '75s with Fuel Pacers was an eye-opening experience; the device can save you a bundle if you don't choose to ignore it. Chrysler, like all the Detroit automakers, will have catalytic converters on all cars going to California, but will offer two engines without the converters for the rest of the country: the 318 V8 two-barrel and the 360 four-barrel.

Dodge Coronet and Plymouth Fury. The intermediates (restyled, and renamed in the case of Fury) are where the action is as far as Chrysler is concerned. That judgment is being borne out in the post-gas-shortage market. In demand is a smaller car with all the luxury that was previously only offered in the biggest of the big. The new mid-size cars, including the Charger SE, have a superior noise isolation package that extends from the fiberglass headliner down to the wheelhouse.

Dodge Monaco and Plymouth Gran Fury. I think that nameplate changes like adding "Gran" to Fury and "Royal" to Monaco Brougham only make work for the badge designers, but I can understand that when C-P and Dodge improve a car they want everyone to know it, so they revise the name. Both car lines offer more this year than they did last year when they were entirely restyled. Steel-belted radial tires are standard, the electric wipers have the washer nozzles in the arms, sound insulation is improved as are the lap/shoulder belts.

An automatic height-control system is a new option. The air-chamber rear shocks do the adjusting: When a load lowers the rear, a sensing valve opens and allows air from a reserve tank to enter the shocks. The air in the reserve tank is held ready at 150 p.s.i. maintained by a vacuum-powered compressor. Air is bled off as the load is lightened, and a time delay keeps the system from reacting to road variations.

Chrysler. The all-new Cordoba is Chrysler's kiddie car. It's not just that the car is "only" 115 inches in wheelbase, but it's aimed specifically at the high rollers in their early thirties. The so-called "intermediate specialty" market has grown steadily over the past half dozen years and Chrysler now has a car to confront the competition. Standard on the Cordoba are power front disc brakes and steel-belted radials, automatic transmission and power steering. The list of



Dodge Royal Monaco Brougham two-door hardtop. Automatic vehicle-leveling system is among new options.

options is too long for the space we have. Worth mentioning, however, are the light and heavy-duty trailer packages which Chrysler designed specifically for the car. They're excellent.

The Chrysler full-size models are under the Newport and New Yorker nameplates. An additional offering is a personal luxury car, the St. Regis. It's distinction with its padded canopy vinyl roof with inset opera window. In the Imperial line, a Crown Coupe is a similar styling package.

The Imperial has the distinction of having the most sophisticated idiot lights in the industry. They're solid-state, light-emitting diodes. Used in the fuel, cooling and electrical systems, they glow when gasoline level drops below one-eighth, coolant temperature exceeds 245° F. and voltage drops below 11.2 volts. I've heard that Chrysler is working on another that will light when it's time to trade in. ★★★

DETROIT '75—GM

(Continued from page 109)

board features on all GM cars is High Energy Ignition (HEI). The breakerless ignition system with its higher voltage output is standard in all GM cars from the Cadillac limos to Vegas (and Pontiac's Vega-version, the Astre).

Weight-watcher engineering will be the word at GM from here on in, and already there are two good examples of lighter designs in production. Eight pounds have been trimmed by going to a plastic instead of rubber case for the battery. Sixteen pounds have been lopped off airconditioned cars by redesigning the compressor. Less weight means better fuel economy, and efficient engineering saves valuable resources. Changes in GM's cars aren't all under the skin, though. Here are other things to look for.

Camaro and Firebird are alive and well. And if you like to look back at the slower cars you've dusted off, they've got a new wraparound rear window that really improves visibility. Looks good, too. Now you can get air with the 250 Six, rear drums are finned, and exhaust muffler with V8s is single-inlet/dual-outlet type.

Chevelle, LeMans, Century and Cutlass intermediates get styling refinements front and rear. Improved "down-the-road" tracking at highway cruising speeds is achieved by a simple increase in caster angle from zero to +2°. It sets up the car for the standard radial tires. Caster angle is set at plus one degree if you order the "credit option" of bias ply tires. (Get the radials.)

Intermittent wipers, Fuel Economy Indicator vacuum gauge, cruise control are new options and so is a headlight-on reminder buzzer. The roads will be safer if the latter results in greater headlight use during twilight hours and on rainy days.

Monte Carlo, Grand Prix, Riviera, Toronado and Eldorado are GM divisions' personal luxury cars. It's the usual once-a-year facial for Monte Carlo and Grand Prix, but a genuine facelifting for the Riv, Toronado and Eldorado. They've been restyled around the new, rectangular headlamps—with the wraparound Riviera styling coming off the best. The Buick designers really got it right.



Cadillac Fleetwood Eldorado Coupe is restyled around new headlights; skirt on rear wheel opening dropped.

Full-size Chevrolet, Catalina, LeSabre, Electra 225, Delta 88 and Ninety-Eight models have new roof lines and styling refinements that alter their appearance for '75. Available on any of these cars are all the comfort and convenience options that GM offers. But along with the solid automotive value the cars represent—the smooth power trains, quiet ride, efficient brakes, solid construction—there are the frills and monograms that continue to proclaim that

bigger is best, and there is the wasted space that could be used so much more wisely.

The days are numbered for the 20-foot long full-size cars. Even Cadillac will have its "compact" on the market soon.

All Cadillac models now use the 500-cu.-in. V8 (the 472 has been discontinued) and all have rectangular headlights.

A new convenience option is one that I find quite amusing. It's called "illuminated entry" (or "lighted door lock package" when an option on the full-size Oldsmobiles). What you do—what *anyone* can do—is walk up to the car and push the door handle button. That activates a light that illuminates the lock cylinder *and* turns on the interior lights for 20 to 30 seconds. It's designed to enable you to unlock your car, buckle up and get the key in the ignition without fumbling. But just think how much fun the neighborhood kids will have with it. ★ ★ ★

DETROIT '75—FORD, LINC-MERC

(Continued from page 111)

special package for the Ghia called the Silver Luxury Group: special paint job, body stripes, padded vinyl roof and other razz-matazz. The V8 engine in Ghia is available as an option on other Mustang II models.

Here's what's new on other Ford Div. products:

In case you missed the announcement last June, the division has a new light truck. Called Super Cab, it's a takeoff of the Dodge Club Cab. There's an extra seat—44 cubic feet of space—behind the driver's seat for cargo or passengers. This is a makes-sense move by Ford—car prices being what they are, more and more motorists are getting double duty out of trucks, using them for work and in place of automobiles.

The full-size Ford has some new sheet metal. On the two-door, a thin, vertical window has been set in the B post. There's a sealed-in quarter window behind the post.

Ford Div.'s other cars are virtually unchanged except for differences in trim and an expanded line of options. New options for Pinto include power steering, power brakes, a low-vacuum warning light and, for wagons, a 2.8-liter V6 engine. Maverick will offer power front-disc brakes for the first time—as an option. Two new options for Thunderbird are four-wheel disc brakes and a hydraulically activated "Sure Track" braking system.

Except for the new Monarch, Lincoln-

Mercury has gone the same route as Ford Div., making minor changes in its cars and increasing the list of options.

The Monterey series in the full-size Merc line has been discontinued. All full-sizers get a left-hand remote-control mirror, automatic seat-back release on two doors, plus a larger fuel tank for hardtops (24 gallons against 22 last year). For long hauls you can get an auxiliary gas tank to carry an extra 8 gallons—10 on station wagons.

Montego comes with a 351-c.i.d. V8 engine replacing the 302 V8 standard last year. All Montegos carry power front-disc brakes, power steering and automatic transmission as standard. Cougar gets a sliding roof and Comet gets front disc brakes, as options. Capri, L-M's import, won't be changed until calendar 1975.

Lincoln Continental has a new roof and an option that wins this year's prize for the ultimate in cat's meow. The roof has a thick B pillar, and as a *ne plus ultra* touch you can have "coach lamps" mounted on the post—outside the car. The lights can be flicked on when you turn on the headlights or parking lights. The lights will cost you extra, but there's no add-on charge for an AM/FM/MPX stereo radio, power door locks, power trunk release and tilt steering wheel—factory-installed in all '75 Lincolns.

A hydro-boost power-braking system and four-wheel disc brakes have been made standard on Continental Mark IV. The rear discs are Ford's single-piston, floating caliper design. Smaller than the front discs, they incorporate a mechanical device to move the brake pad when the parking brake is applied. The hydro-boost system and four-wheel discs combined add up to about the best brakes you can have on a car.

Some Ford cars—Granada/Monarch and Maverick and Comet—have a new suspension system to give a softer ride. The new system uses longer front springs, rubber bushings on front suspension, an improved ball joint, rubber Iso-Clamps on the rear and larger rubber bushings on rear springs.

Solid-state ignition—a running change Ford made during the '74 model year—will be standard on all Ford makes, along with steel-belted radial tires. ★ ★ ★

NEXT MONTH: Again this year at the Press On Regardless International Rally in Michigan, the world's best rally drivers will literally run their cars into the ground—after spending time and money to put them in perfect shape. Read about it in *Drive It Into the Ground* in November.

-- re-**DISCOVER** --

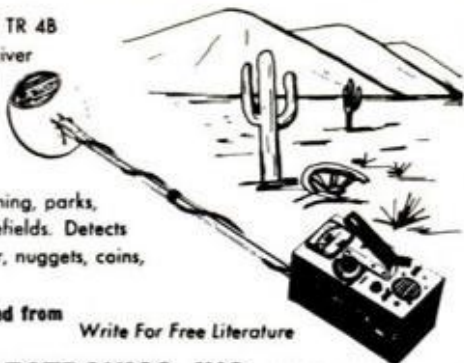
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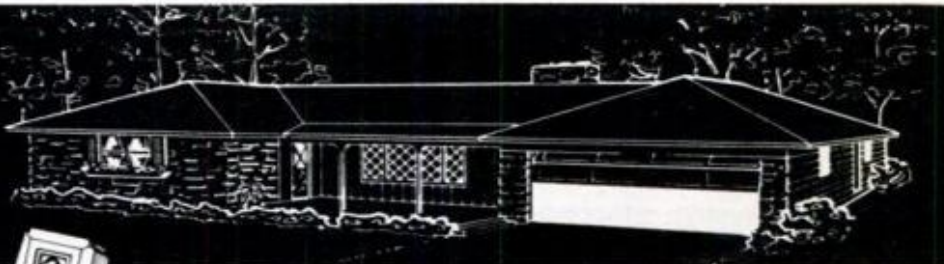
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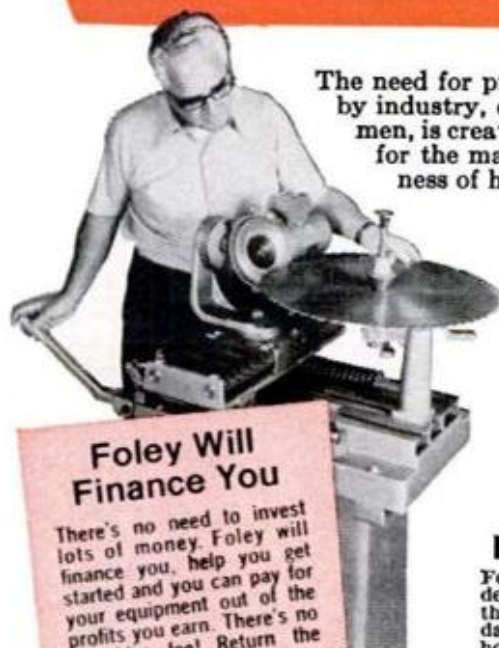
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Add a little scope to your hi-fi system



Audio scope styling blends well with stereo gear; Heath scope and receiver shown are close match. Test shown here is tone-arm antiskating adjustment.

New oscilloscopes that look like hi-fi components make system testing easy—and they're fun to watch, too

by Ivan Berger
ELECTRONICS EDITOR

Use an oscilloscope to track down your stereo system's mysterious misbehaviors, and you may become mildly addicted to the sight of musical waveforms rippling across the screen as an abstract visual accompaniment to your listening. But service scopes, though fun to watch, are drab to look at—one reason why more of them aren't hooked up to living-room stereo systems.

If you could keep a scope permanently by your system, though, you'd use it more—and your system would perform better as a result. That's why we checked out three scopes with styling and features designed to blend easily into home hi-fi systems (the Technics, Pioneer and Heathkit on the facing page) and carefully examined the specifications of a fourth (the McIntosh, overleaf), whose maker does not send equipment out for test. Obviously, they look nice—but what are they good for, really?

FM tuning may be their most important

use. Scopes for the home first appeared as part of a Marantz tuner, since they're the perfect FM tuning indicator. Only an oscilloscope trace can show you simultaneously how accurately you've tuned in the station and how well you've aimed your antenna—not to mention giving you a preview of the signal's sound by showing you its strength, its freedom from (or degradation by) multipath interference, and whether the station is modulating the signal properly.

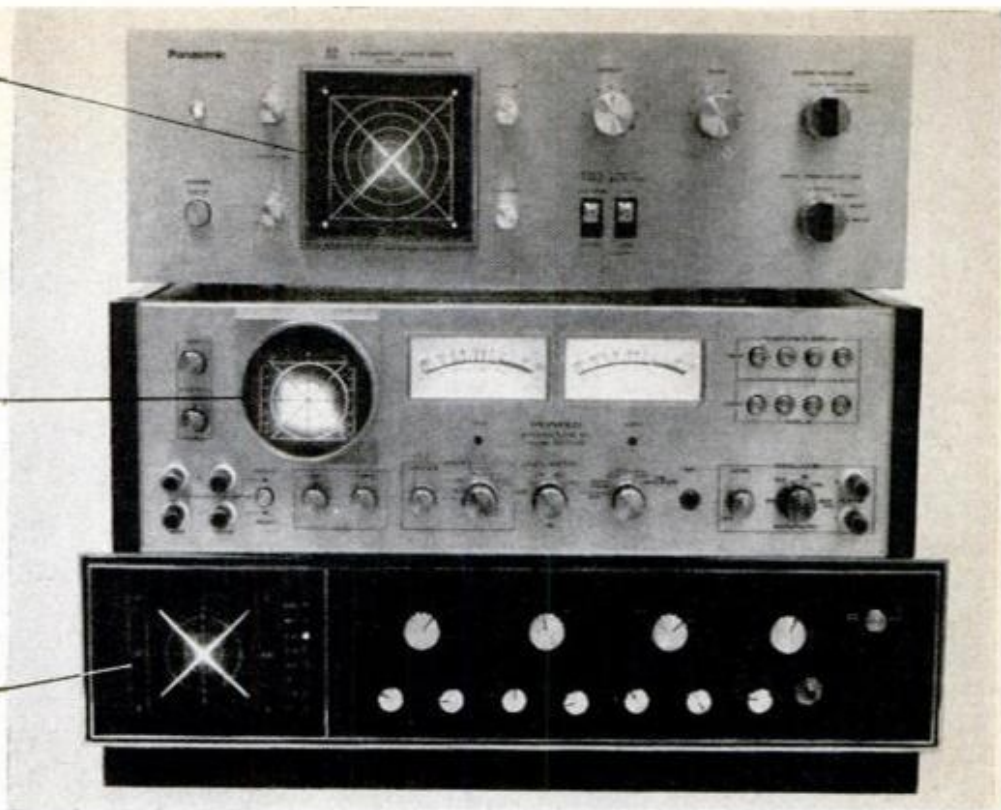
All the scopes have FM-tuning modes and connections, though the Technics-by-Panasonic scope (and the earlier Panasonic we tested, identical save for the change in name) had a nonstandard tuning display that did show multipath interference, but apparently doesn't indicate signal strength, modulation level or tuning accuracy. And you can only check FM reception on the Technics if your audio connections are made to its speaker-level terminals, not to its preamp-level terminals.

The stereo display mode on all but the Technics scope gives you a dancing ball of steel wool in center screen that shows you stereo separation (if you're accidentally listening to mono—no uncommon accident—the ball flattens out into a line), whether both channels are operating (and, if not,

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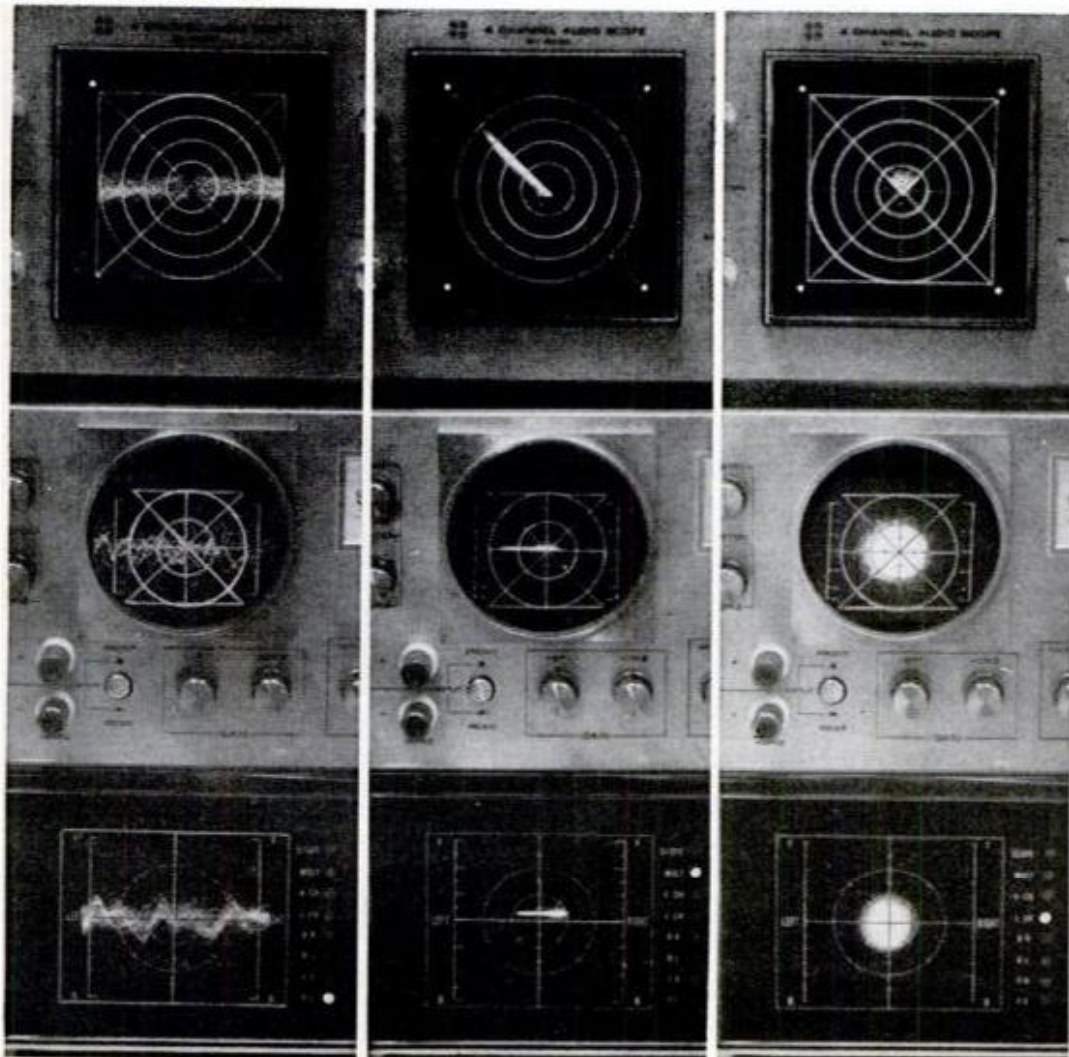
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Four-channel balance display shown is just an example of test facilities and visual fun that oscilloscopes add to your sound system. Pioneer scope shows sound

pattern most clearly, without distracting "X" patterns of Heathkit and Technics scopes. McIntosh scope (next page) is stereo only, has no quadraphonic display.

Photos: Peter Schneider



Single-channel signals (far left) help check program content, frequency response, recording level. Each scope shown is monitoring a different channel.

FM tuning display (center), from tuners with a scope output, shows signal strength, tuning accuracy, multipath interference and signal modulation. The slanted display of the Technics scope at top shows only multipath interference.

Stereo "steel wool," or Lissajous-pattern display (at near left) shows changing phase and balance relations between channels. Technics, designed single-mindedly for four-channel use, shows smaller V-patterns instead, is less useful if you usually play stereo but is an automatic reminder that you're not listening quadratically.

which one is dead), whether the two channels are in balance and if they're in phase.

This stereo mode can help you set up a turntable, too—first, by showing you when you've increased the tracking force just far enough to clear up the lumps, loops and bends in the trace that indicate mistracking; then by helping you optimize the antiskating by adjusting it for the most symmetrical pattern when playing a middle groove.

The Pioneer scope has the best facilities for these tests, with a field of pushbutton switches that let you compare any of its four input channels to any other. The Heath gives a stereo display of its front two channels only, while the McIntosh has only two channels to display. But the Technics, built single-mindedly for four-channel use, displays stereo signals not as a ball but in a vee, as the front quadrant of a four-channel signal ([see photo, page 183](#))—useful for balance and separation checks, but apparently not for phasing.

Four-channel display is one feature you won't find on service scopes, and one reason interest in audio scopes is picking up. With a more complex sound field to balance, it's a great help to have a single, visual indication—even recording studios use these scopes, now. The Heathkit and Technics scopes also let you check phasing between front and rear, with a rear-channel phase-reversal switch; that's important if your front and rear amplifiers aren't identical. If your front and rear speakers are dissimilar, though, you'll get more use from the front and rear gain controls on the Pioneer, that let you center the scope's pattern when the sound levels are equal at the center of

the room even if the amplifiers' output levels are unequal.

The Pioneer also had the clearest quadraphonic display, a shifting blob similar to the stereo ball, whose proportions showed the relative sound level in each channel; the Technics and Heath scopes overlaid this blob with a bright, distracting "X" pattern.

Waveform displays are familiar, useful, and usually the most fun to watch. By watching each channel's waveform you can check signal levels and crosstalk, measure amplifier power output (the McIntosh even has a scale to measure it directly, from 0.1 to 1000 watts) and gain, find out if your amplifier's clipping, and check back along the chain of components to find the source of any trouble.

All the audio scopes let you watch each of your channels at the flick of a switch—another feature not on service scopes. The McIntosh has "dual-trace" circuitry that lets you watch both stereo channels at once.

For frequency response checks, the Heath and Pioneer have built-in, 20-20,000 Hz test signal generators, with front-panel outputs (as well as a rear-panel jack on the Heath). These oscillators can be set at any frequency in the audio range, and the Pioneer's can also sweep automatically across that range, while the scope trace moves in synchronization with it across a calibrated frequency scale. That simplifies the test—and lets you even photograph the results as a time exposure. To help you read output variations in decibels, the Pioneer has dual meters, while the McIntosh can convert its dual traces to vertical bars

(Please turn to page 186)



McIntosh MP1-4, \$600, is stereo only, but has dual-trace viewing, direct power readout, other unique features.

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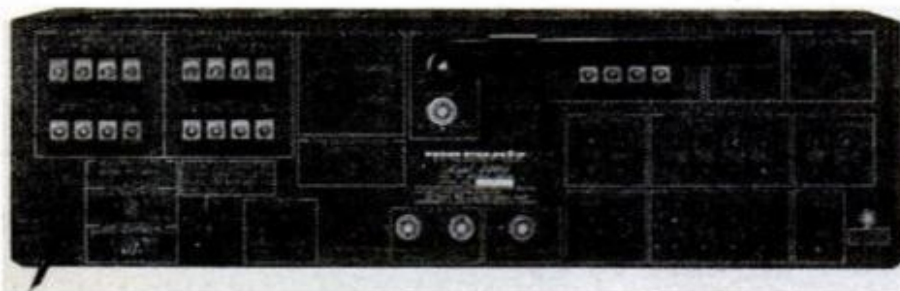
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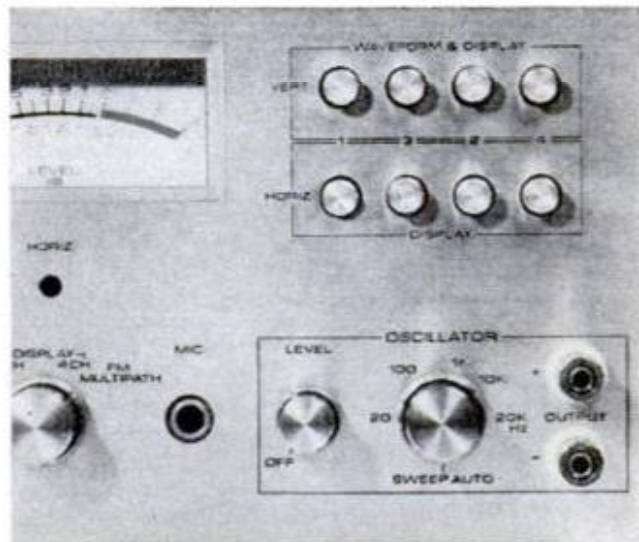
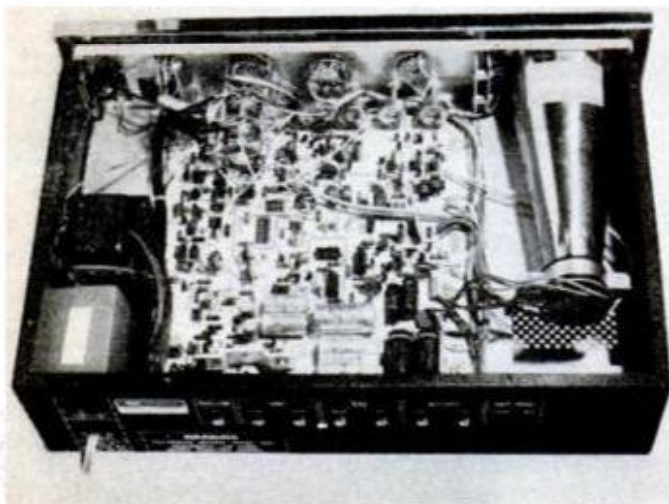
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Oscilloscopes are built into some components, such as this Marantz receiver, the Sequerra and SAE tuners, and the new Epicure preamplifier control center. The Sequerra tuner has an optional display that shows stations within 1 MHz of one tuned in.



Uncluttered Heathkit took only 12 hours to build, but it was a bore to wire, thanks to one enormous circuit board. Because it's a kit, it cost less than others.

Pioneer's extras included audio sweep generator and test mike input for frequency response checks, level meters, pushbutton channel-display selector.

ADD A LITTLE SCOPE TO YOUR HI-FI

(Continued from page 184)

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Recording level is easier to monitor on a scope than on a VU meter, since the scope trace of a waveform shows the number, amplitude and frequency of fast peaks which a recorder's VU meters don't show; frequency is especially important, since highs are more likely to overload the tape. But except for the dual-trace McIntosh, the scopes show only one channel's waveform at a time.

In stereo or four-channel modes, though

frequencies are harder to see, you can check interchannel phasing (important for live recordings) and level at a glance.

Rear-panel connections on all the scopes let you keep the wiring to your system out of sight. But the Heath and Pioneer also have front-panel inputs so you can use them like conventional scopes.

Which is best? The Technics is the least expensive, but the Heathkit gives best value for the money—if you don't mind building it yourself. For four-channel use, the Pioneer is easiest to read and most versatile; but for stereo, the dual-trace McIntosh would probably gain top honors. ★★★

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(Continued from page 87)

holes into an acid bath. The resulting continuous threads of soy protein are spun into cubes, loaves or other shapes.

By varying the color and flavor additives, scientists can turn out textured soy protein products with almost the same texture, appearance and taste of chicken or ham. Compared with the real thing, however, the analog has more protein, less fat and less cholesterol. And it costs less.

Not content to stake the fate of a new spectrum of food products on existing artificial flavoring materials, soy companies have engaged in extensive basic research into food flavors. What makes beef taste like beef? By means of complicated chromatographic analysis, they have isolated dozens of the specific chemicals which make up meat flavors. Adding those substances in appropriate amounts to soybean flour or concentrated soy protein creates "meat" that tastes a lot like the real thing. Meat analogs are now available on the consumer market, at least on a limited basis.

When meat prices hit a rapidly ascending escalator some time back, Midwest food chains began to add soy extender to chopped meat, chopping about 20 cents a pound off the price. Shoppers loved the idea.

Several soy companies are now marketing soy protein extender so that home cooks can add it to their meat dishes. Ham and chicken analogs based on textured soy protein are on supermarket shelves in frozen, dehydrated and canned forms. Cubes of ham-analog or chicken-analog are generally tossed into dishes such as chicken a la king, scalloped potatoes and baked beans.

"I expect that some day you may be eating soybean products because you like soybeans," says Dr. Joe Rakosky, a microbiologist who is known in the trade as the soybean ambassador. "For the present, soybeans will be used mainly for extending meat or producing look-alikes for meat favorites. And that's enough to keep our mills running full time."

Looking to the future, Dr. Rakosky foresees the use of soybeans in the production of artificial milk and milk products. And he estimates that "meat analogs and extenders will probably take over 10 to 20 percent of the meat market by 1980 or 2000. After that, who knows? One thing is certain—soybeans are sure to amount to much more than just a hill of beans!"

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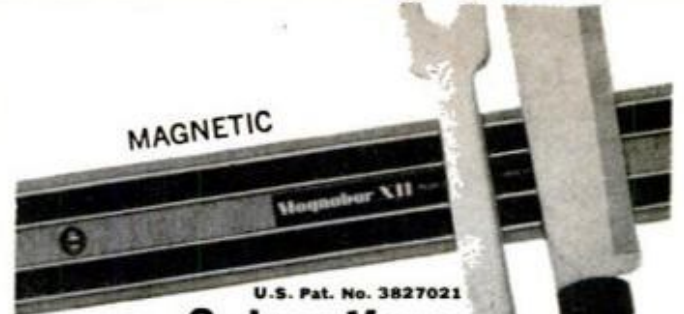
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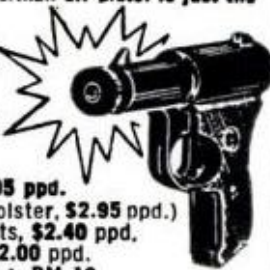
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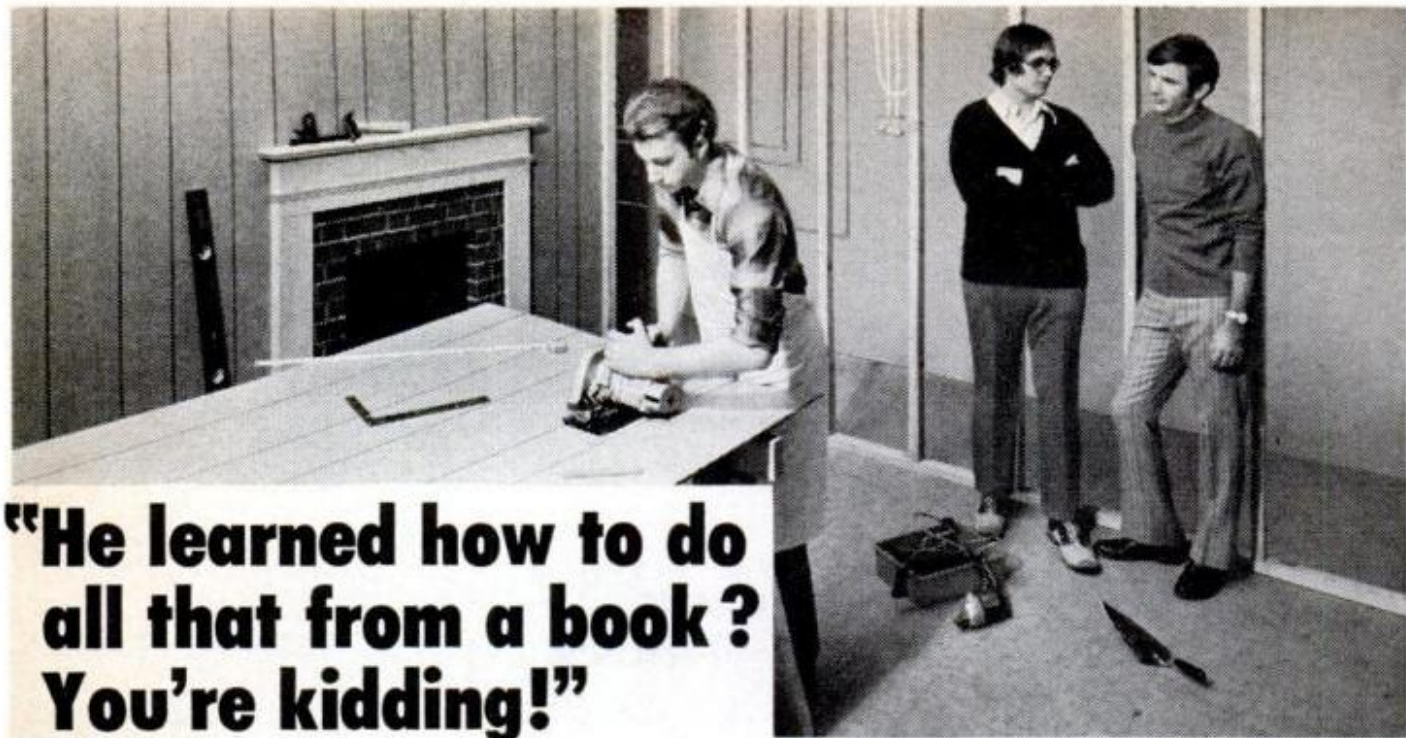


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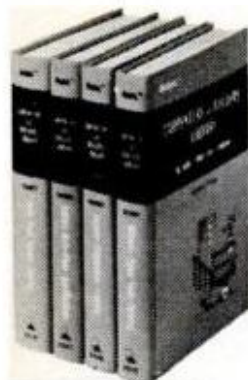
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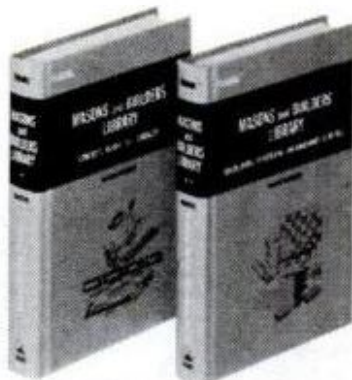
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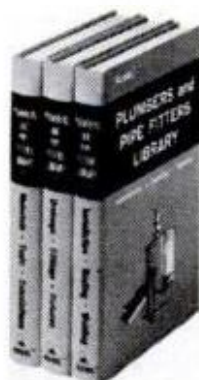
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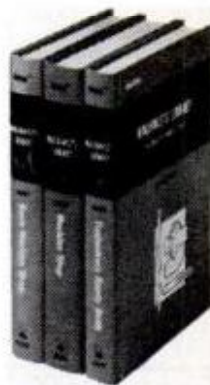
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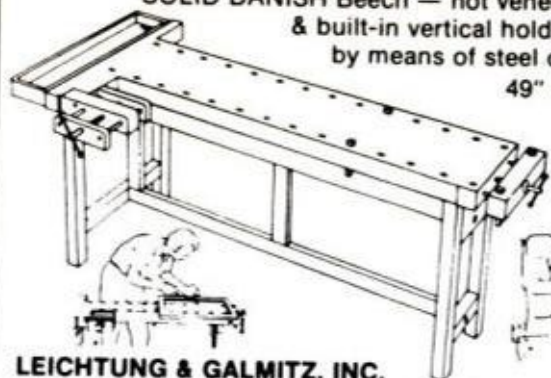
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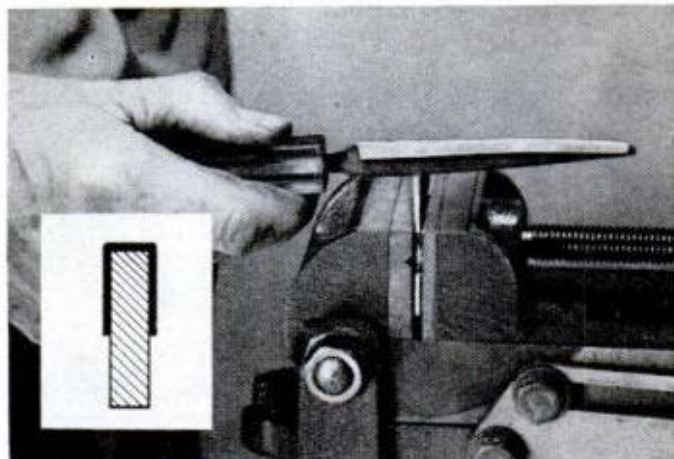
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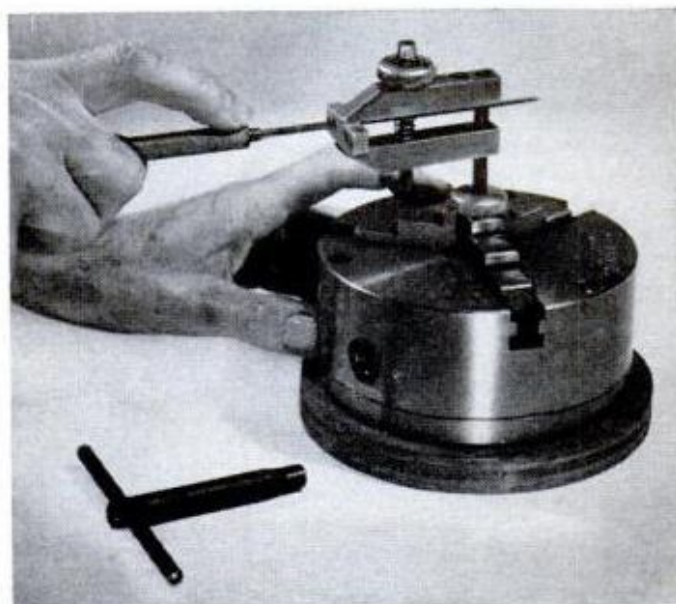
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FROM READERS



Sheath for brittle files

A thin warding file is so brittle it is easily broken in use if you're not extra careful. You can strengthen it with a snug-fitting sheet-metal "sheath" to slip over the edge. It's easily switched from one edge to the other.—*H. Miller, Biggs., Calif.*



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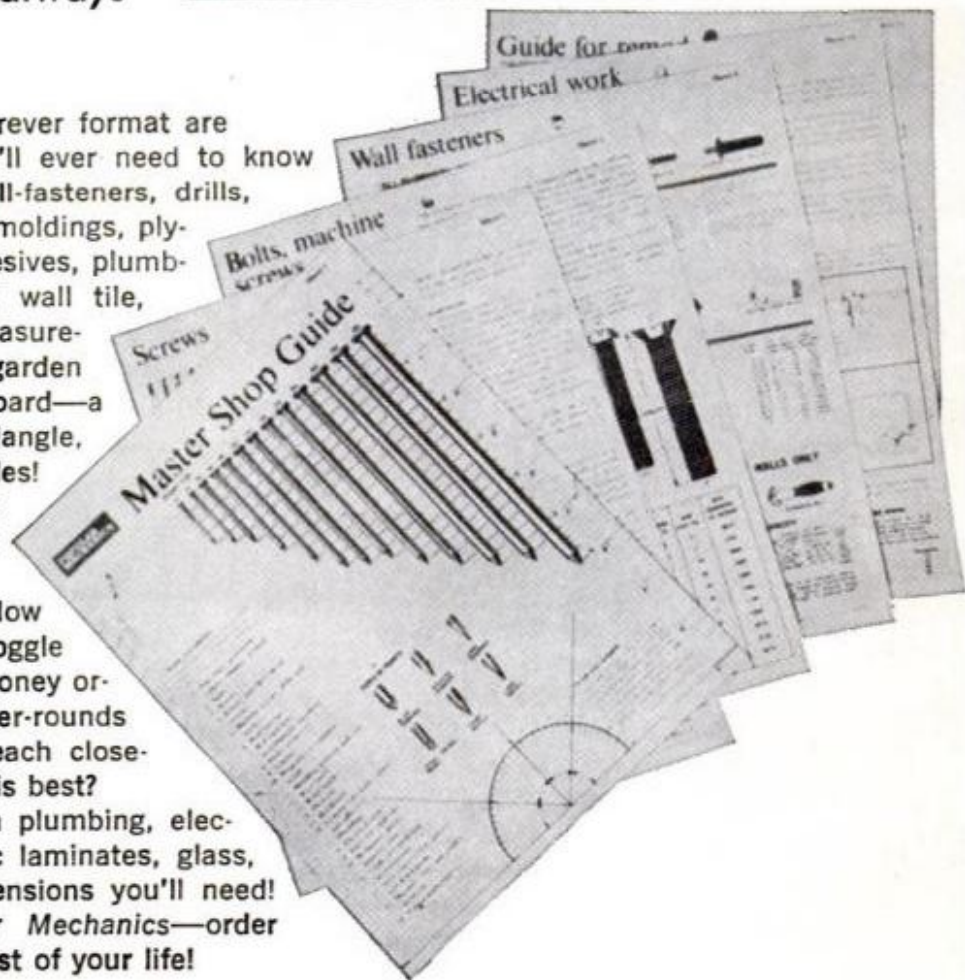
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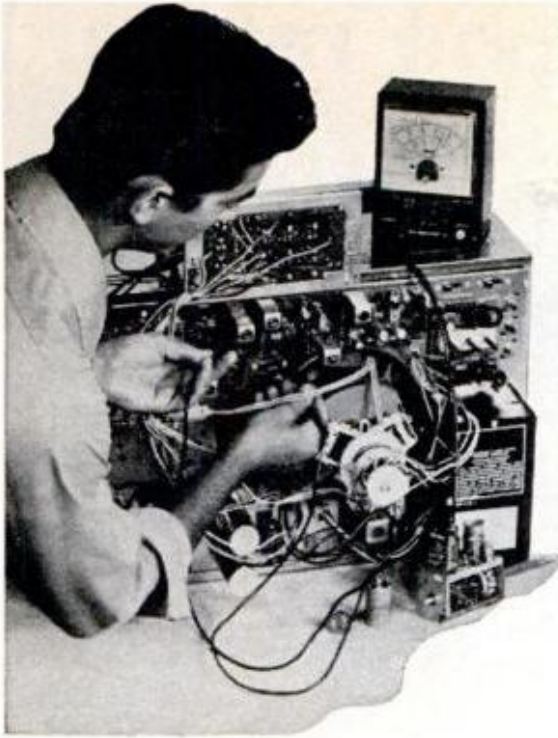


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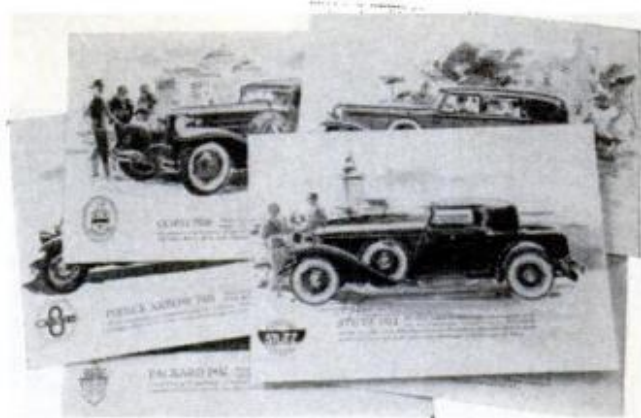
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BIG BUSINESS in Invisible Vinyl Repair. Sensational process repairs, refinishes, recolors vinyl, leather, naugahyde furniture, luggage, car tops. One 20 minute job puts \$20 in your pocket. Make \$600 a month spare time. Homes, restaurants, offices, cars, unlimited customers. Easy to learn and do. Details FREE. VIP, 2007 Montrose, Chicago, 60618.

LEARN how the experts make money in mailorder. Get profitable facts now. Melton, 10915 Garland Road, Dept. 706, Dallas, Texas 75218.

GET Everything Your Government Has To Give. Free Details. Quality Products, 32 Maine Avenue, Carteret, N.J. 07008.

\$250/THOUSAND STUFFING ENVELOPES! Free Supplies! Send Stamped-Addressed Envelope. Rick Wilson, 1045 Berkeley, Fircrest, Washington 98466.

MAKE MAGNETIC SIGNS. BIG PROFITS. FREE information. Universal, Lenora, Kansas 67645.

OWN YOUR OWN Mortgage Business. Full or Part-Time. No Capital or Experience Required. Highly Successful. Free information. Foley, Box 535-CD, Lawrence, Mass. 01842.

MAILORDER Opportunity!! Operate own business using your imprinted catalogs. Instructions, sample catalog 25¢. Colvin House, Box 363PM, Lancaster, PA. 17604.

"MAKE \$25,000 YEARLY" Your Own Mail Order Business!!! GET THE FACTS!!! Free Proof. MICHAELS! Dept. PM-10, Box 6685, Kansas City, Missouri 64123.

\$30,000 YEARLY!! . . . Becoming a Mail-order Expert!! . . . Free proof! Wiemels, 325MO Elmwood, Bay Village, Ohio 44140.

EARN \$80.00 Daily Manufacturing Wooden Brick Molds. Practically No Investment. Send Large Stamped Envelope. Hilmar Molds, Route One, Box 347-DH, Valrico, Florida 33594.

BIG MONEY Raising Potted Herbs. Free Minicourse. Herbalism Institute-B, Box 968, Glendora, California 91740.

\$178.00 WEEKLY. Work One Hour Daily. Free Brochure FAS, Box 13703-PM, San Antonio, Texas 78213.

MAILORDER— Establish your own business. Everything supplied—catalogs, ads, photos, mailing lists. Merchandise drop-shipped. Gif-Guide, 1137 Crenshaw, Dept. 404, Los Angeles 90019.

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START Your Own Correspondence School. United Career Schools, 5820P Imperial Hyway, South Gate, Calif. 90280.

WORLD'S Largest supply, Merchandise 25% to 40% under wholesale. Bankrupts. Closeouts 10¢ on dollar. Imports. Hong Kong clothes. Automobile discounts. Free details. International Buyers, Box 16386 MM, Portland, Oregon 97233.

SELL Books by mail. Complete dealer set-up—25¢. Midwest Mail Sales, Box 44R2-PM, Shawano, Wisconsin 54166.

MAKE Magnetic signs. Machineless method. Profits enormous. Write: R1B49APM, Bardstown, Ky. 40004.

HOLLYWOOD CEMENTCRAFT: Offers Highly Profitable Home Business. Experience Unnecessary. Unlimited Unique Pottery Designs Easily Made Without Moulds. Bird-baths, Fountains, Washing-Wells, Waterfalls, etc. Chemical Coloring Formulas. Marble-glazing. FREE Illustrated Brochure. **CONCRETE FACTS**, 602 Athens Street, Altadena, California 91001.

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FREE Catalogs. Repair air conditioning refrigeration. Tools, supplies, full instructions. Doolin, 2016 Canton, Dallas, Texas 75201.

\$70 TO \$200 WEEKLY—Home, Spare Time Simplified Mail Bookkeeping. Immediate Income. Easy. Auditax, Box 34741A, Los Angeles, Calif. 90034.

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CLAIM ABANDONED SILVER—\$20,000 Secret Revealed! Free Information: Silverman 4A-13, Box 548, Woodville, Texas 75799.

EARN \$60.00 Daily manufacturing Concrete Fence Posts. Practically no investment. Send stamped-addressed envelope. American, Excelsior Springs, Mo. 64024.

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EARN Money raising fishworms for us! Write: Oakhaven-38, Cedar Hill, Texas 75104.

\$1.00 LISTS You year sent to 1000 Importers, Jobbers, Mailers, our mailing year. Dixiem, King, North Carolina 27021.

MAILORDER Millionaire helps beginners make \$500 weekly. Free report reveals secret plan! Executive (1A10), 333 North Michigan, Chicago 60601.

FREE SECRET BOOK "2042 Unique Proven Enterprises." Tiny businesses but huge profits! How Little Fellows beat inflation. Work home! Haylings, T47, Carlsbad, California 92008.

\$200.00 DAILY In Your Mailbox! Opportunity To Follow Mailorder Experts. Free Details. Associates, Box 136-A, Holland, Mich. 49423.

TAKE Catalog orders. We drop-ship 1001 best selling specialty products. Lowest below wholesale prices. Immediate Delivery Spectacular home business opportunity. Free Book. Specialty Merchandise, Dept. 20-22, Woodland Hills, California 91364.

MAIL Baby Catalogs Imprinted with your address to New Mothers for Big Profits! Details 25¢. Volz PM, Ypsilanti, Michigan 48197.

MAILORDER BEGINNERS LIBRARY, Learn Professional Secrets Inexpensively! Write: HOW, Box 4457-PM10, Downey, California 90241.

NEW. Compact fire extinguisher. Fantastic profits. Exclusive territories. Norwich Chemical, Norwich, Connecticut 06397.

(Continued on next page)

BUSINESS OPPORTUNITIES

(Continued from preceding page)

MAKE \$92.00 FROM Square Foot Plywood (Jigsaw or Bandsaw necessary). (Proof), details 25¢. (Refundable). Woodart, Bridgewater, Mass. 02324.

MAKE \$7.50 to \$15.00 hourly building portable custom cases in your home. Huge demand. Get orders by mail. We supply materials, instructions—everything. Free details. Customcase, 6075 De Soto, Dept. C-20-22, Woodland Hills, California 91364.

REPAIR WATCHES For Profit or Hobby. Learn at home. Free information. Chicago School of Watchmaking, Dept. YKA, Fox River Grove, Illinois 60021.

BECOME "Mortgage Broker." Lucrative! Capital Sources. Box 640099, Uleta, Florida 33164.

\$200.00 SPARE Time earnings with your Tablesaw. Write: Workshop Five, 3800 Harney, Vancouver, Washington 98660.

REPAIR Hydraulic Jacks—Details Free. Write: Hydraulic Parts Supply, Box 295, Port Isabel, Texas 78578.

\$200 WEEKLY STUFFING ENVELOPES home. Start immediately. Details 25¢. ARTHUR'S, Box 526PM, Mt. Airy, North Carolina 27030.

MAILORDER—Sell "Insiders" Money Secrets! Kildebeck-TA, 1207 Eighth Alhambra, California 91801.

RECEIVE Mail Galore! National Listing. \$1.00. Sullins, 1313-M, Brunswick, GA. 31520.

1000% PROFIT Preserving Baby Shoes in China or Bronze. **FREE LITERATURE.** NBC-PM, Drawer C-1, Coral Springs, Florida 33065.

BECOME Our Mail Order Distributor with \$150 Investment. Free Brochure. Audit Controls, 40 Brookside Ave., Fair Lawn, New Jersey 07410.

STUFF Envelopes. \$250—Thousand. Free Opportunity Catalog. Send Stamped-Addressed Envelope. Bobier, RD2-188-M6, Kirkwood, New York 13795.

FREE 100-Page Catalog waiting to bring you Big spare-time cash commissions. Sell Advertising Book Matches. Every business a prospect... complete selling instructions furnished. Steady, repeat business. Dept. MX1074, Superior Match Company, 7530 South Greenwood Avenue, Chicago, Illinois 60619.

MAILORDER Dealers wanted. Earn outstanding profits using tested promotions! Executive Type Business. Rutward-PE, Georgetown, Conn. 06829.

SEVEN Complete Mailorder Opportunities. Details Free! AM Sales, 31-14 94 St., East Elmhurst, NY 11369.

SUCCESSFUL Mailorder Business! We Show You How! Free details! PW, Box 562, Royal Oak, Michigan 48073.

JOKE CARDS, BUMPER STRIPS, SCROLLS, ETC. Our racks placed in stores. Make you money every day. Free details. Bangers, Dept. PM10, 2400 W. Magnolia Blvd., Burbank, California 91506.

\$100.00 DAY. Manufacturing Concrete Blocks, Posts, Semi-Automatic Block Machines. Mold Equipment Catalog, over sixty items, \$2.00 refundable. Carlayne, Route One, Box 95, Rapid City, South Dakota 57701.

AMAZING Mailorder Profits using proven methods. Details Free. Chapman, 390-VE Danbury Road, Wilton, Conn. 06897.

\$100 WEEKLY Possible! Mailing circulars for advertisers. Details—Rush stamped envelope. Service, Box 721-P, Lynbrook, N.Y. 11563.

MAIL ORDER BUSINESS. Seven booklets full of professional secrets for success. Start on a shoestring. Pyramid your profits. Be you the Boss. Act now send \$10.00. Satisfaction guaranteed. Salvador Vasquez P., 6011 Broadway, Woodside, New York 11377.

\$18.00 PROFIT on every \$45.00 Sale. Details \$1.00 (Refundable). Glenn Wessell, Box 3950, Rochester, New York 14610.

\$1,000 MONTHLY Spare-time! Free details. Jennie-Lynn, Box 6627A, Columbus, Ga. 31907.

\$26.00 HUNDRED. Addressing Envelopes Details \$1.00 and Stamped Addressed Envelope. Keen, Box 999PM, San Diego, Cal. 92109.

WHOLESALE BOOK BUYERS GUIDE. Sell Books Profitably from Kitchen Table. Guide plus Detailed Explanations \$4.00 from: Vazquez One, 6011 Broadway, Woodside, New York 11377.

GET That Extra Income with this Amazing New Mailorder Plan! Free Details! AD, Box 295, Rancho Cordova, CA 95670.

\$200 WEEKLY! Make, Sell Bricks! Free Information! Xcito Bricks, 5715 N. Mozart, Chicago, Ill. 60659.

\$1000 MONTHLY. Free Mail-order Brochure. Imperial, 621 Tucson, Lexington, Ky. 40503.

\$25,000.00 YEARLY—Proven Dynamic Mailorder System! Minimum investment. Particulars, 25¢. Mears-PM, 5363 Essex, Alexandria, Virginia 22311.

CLASSIFIED ADVERTISERS!! USE WEEKLY TV tabloid. Low rates; proven results. Copy, rates \$1.00. Liebig, Cold Springs Road, Huntington, Pennsylvania 16652.

FREE Details! 500 Money-making Mail-Order Ideas!!! Just one could make you rich! DIEN, Dept. A201, 239 Kittredge St., Roslindale, Mass. 02131.

AMAZING PROFITS IN USED BICYCLES. Two Booklets Fully Illustrated tell how. How to Get and Sell Them at High Profits. Technical Illustrations and Exploded Drawings. **GUARANTEED.** \$3.00. Kilbride, Drawer 578-AI, Sunland, Calif. 91040.

"STUFF Envelopes." \$250/Thousand Immediately. Free Supplies. Rush Stamped, addressed envelope. Sullivan-PM, 2122 S. Westshore, Tampa, Fla. 33609.

MAKE \$1000 Monthly selling information. Quality Products, 32 Maine Avenue, Carteret, New Jersey 07008.

BIG Profits Addressing Envelopes 25¢. Willard, Box 1036X, Palm Springs, Cal. 92262.

HOMEWORKERS—Mailers Wanted! Free Information. A. Allen, 2418 Lori, Santa Ana, California, 92706.

FREE COLLECTION AGENCY Details!! \$1000.00 Monthly Possible. Master-PM, Dawsonville, Georgia 30534.

HOW TO RAISE \$100.00 to \$1,000,000.00!! Write: Capital-PM, Dawsonville, Georgia 30534.

ELECTRONIC Assembly Business. Big profits. Start home, spare time. Investment, knowledge, experience unnecessary. Free illustrated literature. Barta, Box 248-GJ, Walnut Creek, Calif. 94597.

ULTRAVIOLET Booth Franchises. Sun Hut Inc. 200 S. Main, Janesville, WI 53545.

HOMEWORKERS! \$200.00 WEEKLY Possible addressing for firms. **BEGIN IMMEDIATELY.** Details 25¢. Hodgkins, Box 10279, FM2, Fort Worth, Texas 76114.

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COUPLES, \$300.00 Weekly Possible working 3 hours daily. Details \$3.00. Head, Route 4, Box 38, Owensboro, Ky. 42301.

START Mail Order New Product! Interesting, profitable. Free Information. Toadstools, POB 1044-P5, Mason City, Iowa 50401.

\$2,000.00 MONTHLY In Fabulous mail order business! Write: Luciano, 81 Main, North Easton, Mass. 02356.

37 WAYS—Earn \$100 Day While Unemployed. Details absolutely free. Dunnf, Box 44.2, Baltimore 21223.

MAILORDER . . . The Complete library of moneymaking. Write . . . Donofrio, 133-42 114th St., Ozone Park, NY 11420.

HOW To Start A Mailorder Business With Free Advertising! Spencer (1C10), Box 4641, Atlanta, Georgia 30302.

MILLION Dollar Music Market Wide Open! Fantastic Details, Free. (Prime Source) Uralnick, 712 Gunhill, Bronx, New York 10467.

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PEOPLE Are Moving, Everywhere, Everyday. You Can Cash In On It. Send \$3.00. Frazier, 189 Pleasant, Winthrop, Mass. 02152.

SPECIALTIES! Below Wholesale, Catalog, Details 25¢. Lee's Gifts, Box M235, Dayton, Nevada 89403.

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START Home Business. Send Stamp. Dornfeld, 509 Main, Mayville, Wis. 53050.

RAISE Small Laboratory Animals. Millions purchased yearly. Complete market. Instructions. \$1.00. Bio-Research, Box 15-U Crystal Lake, Illinois 60014.

BUILD An Instant Fortune! Proven Secret. Details, Casterline, Dept. PM2, Box 2201, Ft. Myer, Florida 33902.

ADDRESSERS Mailers Homeworkers Needed. 50 Firms Listed. Rush 25¢ stamped addressed envelope: L. F. Heaton, Rt. 1, Box 187A, Evergreen, Ala. 36401.

\$250.00 PER Thousand Envelopes Stuffed. Plus 50% commissions. Act Now! Details 25¢, and stamp. Satisfaction Sales, Dept. 14, Box 87, Ward Hill, Mass. 01830.

AMAZING INSTRUCTIVE BOOK. "How to Make Your Mail Order Fortune From Classified Ads." \$7.95. Cazin, 526 Maple, Redwood City, CA 94763.

(Continued on next page)

BUSINESS OPPORTUNITIES

(Continued from preceding page)

MONTHLY Newsletter Best Business Finders Fee, Investments Free Trial Subscription. Robinson Enterprises, Box 38, Augusta, Georgia 30901.

BOOKKEEPING, Tax Returns. Start your own Business at home. \$10.00-\$20.00 hour. Free Details. Jefferson Business Institute, Box 4564-GS, Springfield, Missouri 65804.

INCOME APARTMENTS Make Money. Free Information. Sullivan (PM10), 754 Myrtle, Albany, New York 12208.

BIG Money! Sell our Books Mailorder. Secrets 25¢. Walter Studios, Box 4902-D, Carson, Calif. 90745.

OVER 5000 People become Millionaires every year! Would you like to be next? Full information on "How" on request. Bill's Mail House, Ida Grove, Iowa 51445.

MAKE Durable Building Plastic easily. Waterproof, Fireproof, Economical. Bays Laboratory, Cedaredge, Colo. 81413.

EARN \$2000 Monthly in Amazing, interesting Businesses. Free Details. James W. Clark Co., Box 71368, Dept. 81, Los Angeles, CA 90001.

PORTABLE Sandblaster \$29.95. Distributor wanted. Free Brochure. Inka, 66573-A, Houston, Texas 77006.

MAILORDER Can Be Profitable!! Know What Makes It So. Free Details. A. Low, 61 Clark, Paterson, New Jersey 07505.

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SILKSCREEN Printing Business—See advertisement under "Printing Presses" (Resources Press).

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MAKE 2 to 3 Times Your Cost on Hundreds of Products. Gift Item, Novelties, Toys, Carded Merchandise, 1001 Others. Giant Wholesale Catalog, Details, \$2.00, (Refundable). Spectacular Home Business Opportunity. Castle, 7715-PM Keiffer Street, Philadelphia, PA. 19128.

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A FORTUNE IN JUNK! Learn Upholstery at home . . . turn cast-offs into chairs, sofas worth \$100's. No experience needed. We show you how . . . even supply all tools and practical furniture kits! Veteran approved. Booklet mailed FREE. Modern Upholstery Institute, 1205 W. Barkley, Dept.-KPM3, Box 16, Orange, Calif. 92666.

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YOUR OWN BUSINESS! Franchise Directory \$2.00. Describes Top Money Makers. Pacific Publishing, P.O. Box 986, Pacifica, California 94044.

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\$2,000.00 MONTHLY Unique Advertising Business or Selling Information By Mail. Ropchan, Box 10251P, Eugene, Oregon 97401.

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AMAZING 19.95 MIMEOGRAPH Free Samples: Siciliano, Dept 301, Box 7210, Portland, Maine 04112.

PROVEN Successful Mailorder Imprint Catalog Program. Free Details. Allen, 544PM10 Spruce, Garwood, New Jersey 07027.

MAKE 2 to 3 Times Your cost on hundreds of products. Gift items, novelties, toys, carded merchandise, 1001 others. \$1.00 brings giant catalog, refundable on first order. Baldwin Co., P.O. Box 704, Culver City, Cal. 90230.

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WHOLESALEERS NEEDED. Highest Profits. Catalog \$1.00. Refundable On First Order. Concord House Specialties, Box 402, Fishkill, New York 12524.

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REVEALED!! Proven Methods of Financial Security. Not Mailorder Scheme. Enterprise, Box 1296—P3, Newport News, Virginia 23601.

HOW To make money fast. New powerful free brochure. Thorne Co., P.O. 354-P, Saugerties, N.Y. 12477.

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WHY Wait? Travel NOW and get PAID for it. SASE for details. Griffin, Box 826PM, Keystone, Fla. 32656.

OPERATE Mailorder My Way. To \$7.00 Profit Every \$1.00 Invested. Proven, Fantastically Successful. Facts Free. Benton, 114-B Carrier, Liberty, N.Y. 12754.

BEGINNERS BEST START, Mail Order. Comscope, Box 4077-P14, New York, N.Y. 10017.

WOMEN Earn spare time profits. Pleasant home work. Instruction manual \$2.00: Meneley, Box 1157-B10, Spring Valley, Calif. 92077.

\$300.00 WEEKLY Possible—Stuffing Envelopes. Start immediately! Details, 50¢ (refundable). Royal-PM5, Box 36643, Los Angeles 90036.

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VINYL'S WHERE THE MONEY IS: Invisibly repair, refinish, recolor furniture, luggage, car tops. Quick, easy. Two small \$20 jobs a day earn you \$1,000 a month. Homes, cars, offices, restaurants, unlimited customers. Start earning after an hour's practice. Sensational details FREE. VIP, 2062 Montrose, Chicago 60618.

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FINANCE YOUR DREAMS With Taxfree Foundation Grants. Free details. TOU-PM10, 6311 Yucca, Hollywood, 90028.

SELL New Sensational Low-Cost Burglar Alarm. Samples for trial. Lightning seller. Northwest Electric, Ave. 456, Mitchell, S.Dak. 57301.

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MONEYMAKING OPPORTUNITIES

(Continued from preceding page)

HOW TO Make Money Writing Short Paragraphs. Information Free. Barrett, Dept. C-25-S, 6216 N. Clark, Chicago 60660.

\$40 DAILY Possible tying fishing flies at home. Details 50¢. Flyco, Box 946PM, Albany, Oregon 97321.

CLIP Newspaper Items. \$1.00-\$5.00 each. Details free. Walter, Box 1360-PA, Erie, Pa 16512.

MAKE Statuettes, novelties, imitation marble. Sell to stores or start gift shop. Free details. Marbleizing, 41 Waverton, St. Louis, Mo. 63124.

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SWEEPSTAKES Contests. How to win. Write for free information. General Contests, 1609-18 East 5th., Duluth, Minnesota 55812.

FREE SECRET BOOK "2042 Unique, Proven Enterprises." Largest successful collection! Fabulous "Little Knowns." Work home! Haylings-T46, Carlsbad, Calif. 92008.

\$200.00 FROM Sheet 1/4" plywood (scrap). Details 35¢. Novelties, 610 So. 24th, Elwood, Indiana 46036.

LEARN The secrets of repairing junk batteries. "Fabulous Profits" at home. Apex Engineering, 3100 Ramona, Atascadero, California 93422.

WORLD'S Leading Contest Magazine. 50¢. Prizewinner, 1315 Central, St. Petersburg, Fla. 33705.

LEARN Sign Painting—\$1000 Monthly, Part-Time. Free Catalogue. Kaufmann Company, Centertown, Missouri 65023.

SPARETIME MONEY, own home, by mail. Been telling how since 1929. Factual, case histories, new products, thousand offers. Specimen 50¢; annually \$12. Mail Trade Magazine, Box 1302, Springfield, IL 62705.

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AMAZING NEW Money Masters Manual. Powerful Money Making Secrets Revealed. Details 25¢. ADCO, Box 976, JM, Ft. Lauderdale, Fla. 33302.

FREE—Easy Ways to make money selling exciting new products—Full—spare time. Send name, age for 5 months free subscription. Salesman's Opportunity Magazine, 1460 Hancock Center, Dept. 181, Chicago 60611.

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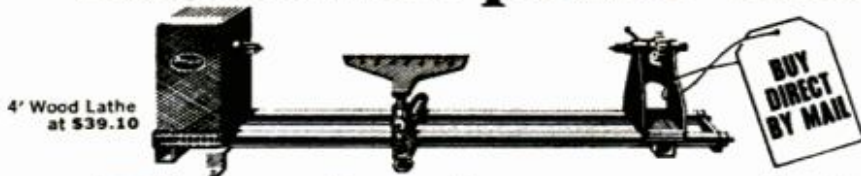
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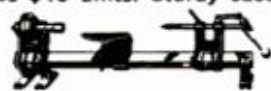
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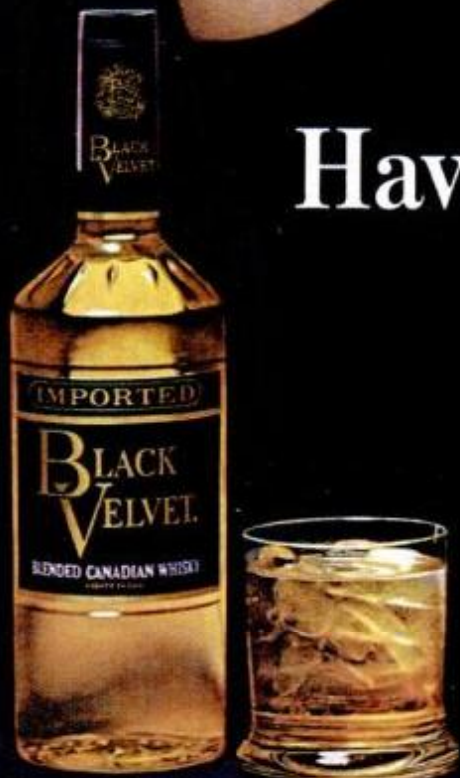


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