

20 PAGES  
OF MOTOR  
CAMPING  
This year:  
More fun  
on less gas  
Starts page 146

# Popular Mechanics

## BUILD THE 'BOONIE BUG'

A new kind of car that's  
a go-anywhere camper, a peppy  
station wagon with a thrifty  
VW engine — and you can  
make it from PM plans Page 94

## CAR POOLS

How to  
make them  
work —  
best  
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to use

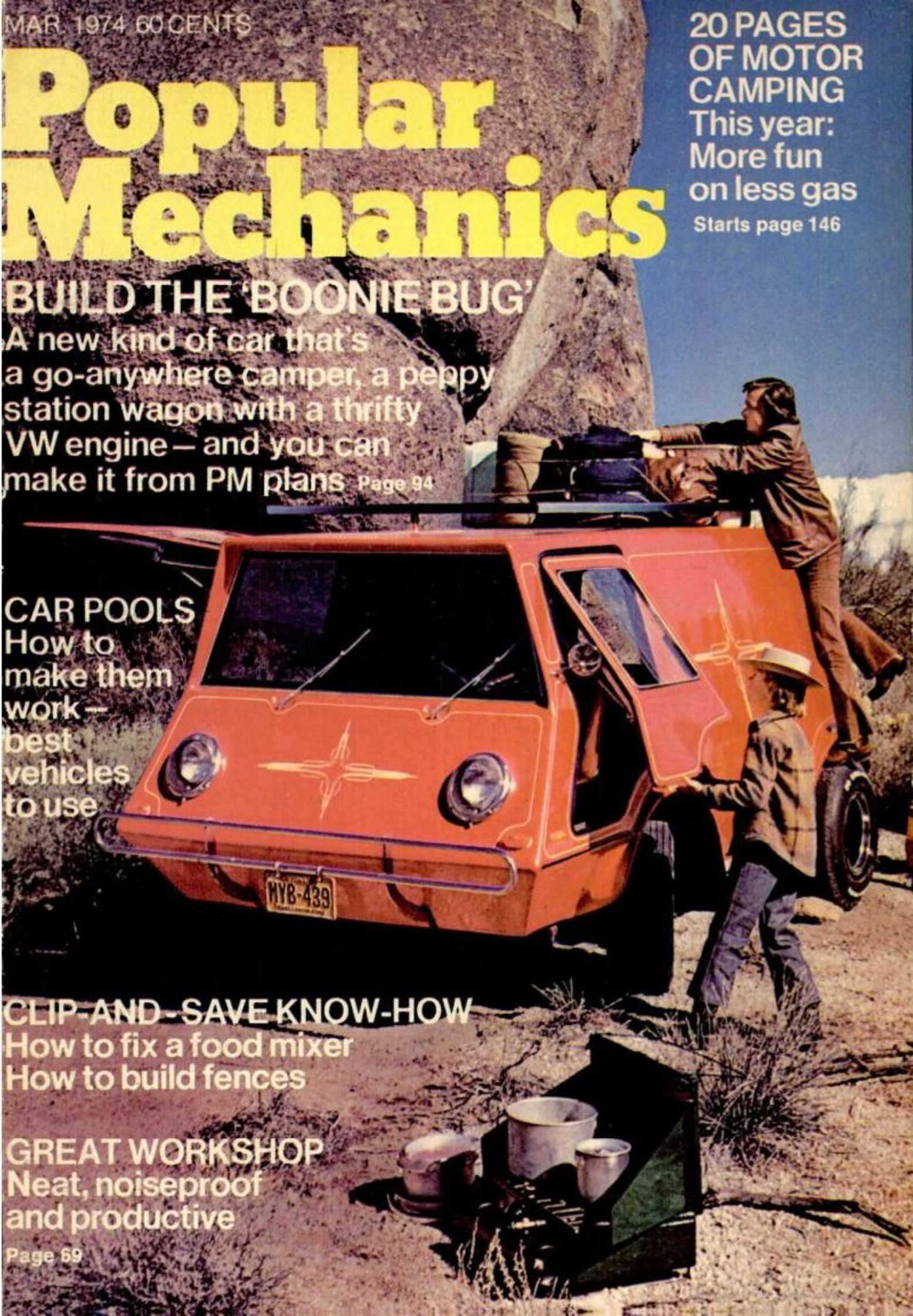
## CLIP-AND-SAVE KNOW-HOW

How to fix a food mixer  
How to build fences

## GREAT WORKSHOP

Neat, noiseproof  
and productive

Page 69



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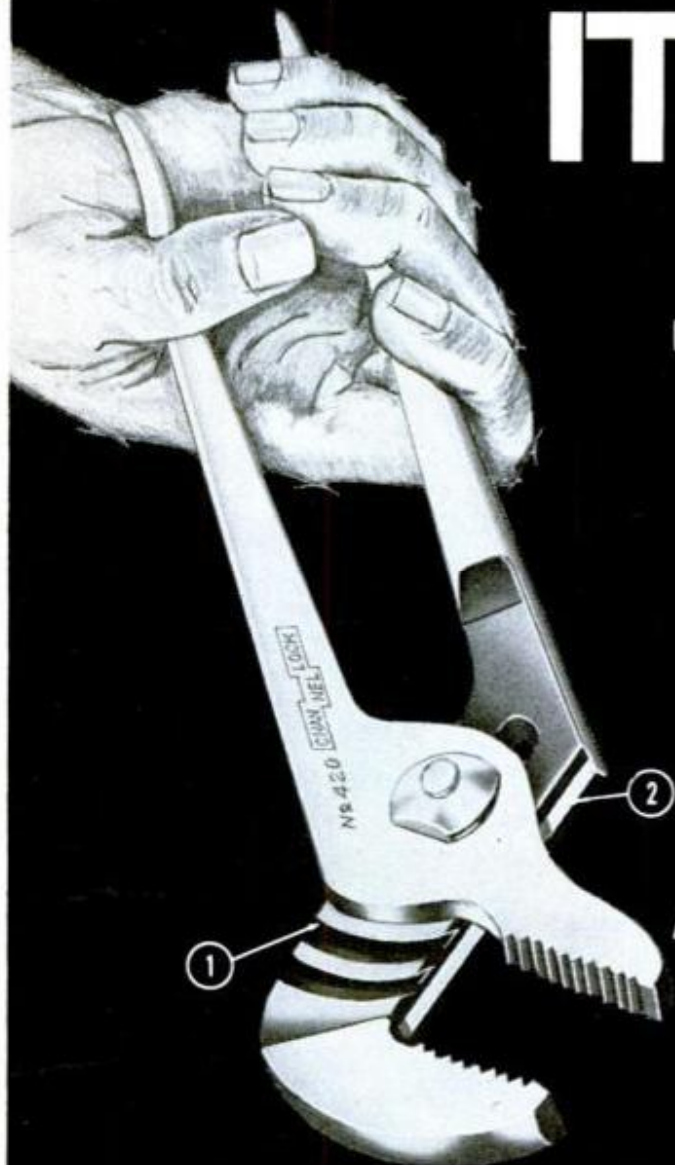


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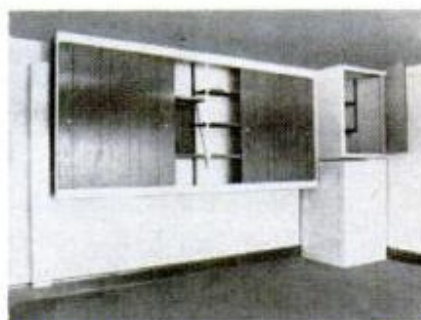


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ON THE COVER: The "Boonie Bug"—the new gas-thrifty, go-anywhere camper that you can build from *PM* plans—using a VW chassis. Photo: Don W. Jones

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**FIRESTONE TIRE ENGINEER STEVE PETRASEK  
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"IF YOU OWN A CAMPER,  
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Service Manager Mike Miley of Homebase (Ohio's largest RV center) needs proof before he'll say one product works better than another. So Firestone tire engineer Steve Petrasek gave Mike the full treatment with the Wide Oval System for campers.

Out on the turnpike. Over back roads. Over back country with no roads at all.

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Steve, who makes a high speed run in his own camper to the wilds of Montana every year, convinced Mike who said:

"You've sure sold me! It's the most practical, most stable combination you could ask for in camper tires. I don't think you can beat it."

**The Wide Oval System  
for Campers.**



**This One**



**9BW0-S9Y-361N**

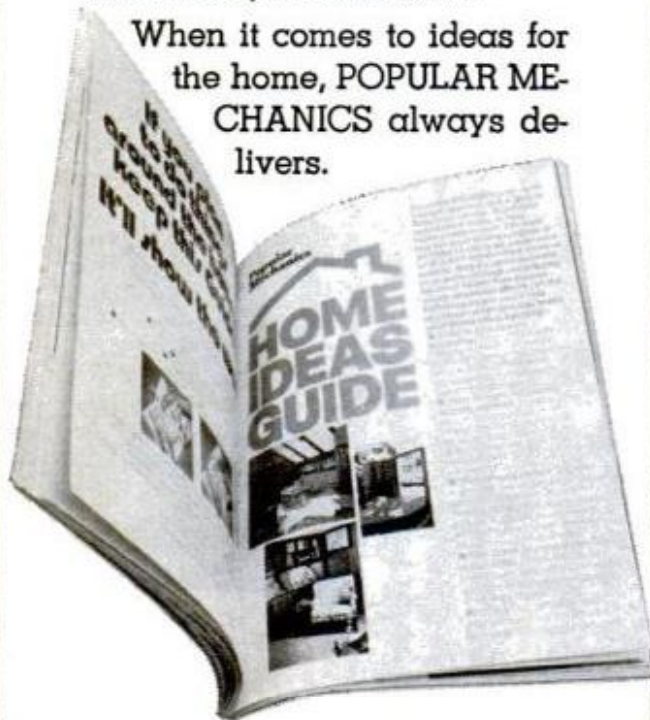
**Firestone**

# April's Special Delivery

Coming in the April issue of POPULAR MECHANICS will be the 1974 "HOME IDEAS GUIDE," a specially-created section with 36 pages of exciting ideas for your home including:

- Remodeling: Today's Solution for Young Families
  - Attic: From Storeroom to Family Room
  - Rebirth of a Stucco Bungalow
  - How to Install Kitchen Cabinets
  - How to Install Ceiling and Floor Tile
  - Tips on Insulation
  - Bathroom Decorating
- And much, much more . . .

When it comes to ideas for the home, POPULAR MECHANICS always delivers.



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# We taught Leonard Starr how to make money doing what he used to do for fun.

Leonard Starr's father wanted him to go to college and settle down in a "nice clean job in a brokerage office." But Lennie had ideas of his own.

*"I really knew what turned me on. And it wasn't the brokerage business. I like action — hot cars, motorcycles, working with tools.*

*"So I asked myself — "Why not do that for a living?"*

Well, why not? Lennie Starr got in touch with ICS — the school that trains people for careers they'll enjoy. So they can get more out of the one life they've got to live.

Now, Lennie Starr is a Master Automotive Technician at the best dealership in town. He's pulling down a bigger dollar than any of his desk-bound friends — and he's having fun.

Leonard Starr is a hypothetical person — a composite of the many thousands who are using today's ICS to change the course of their lives. But how about you?

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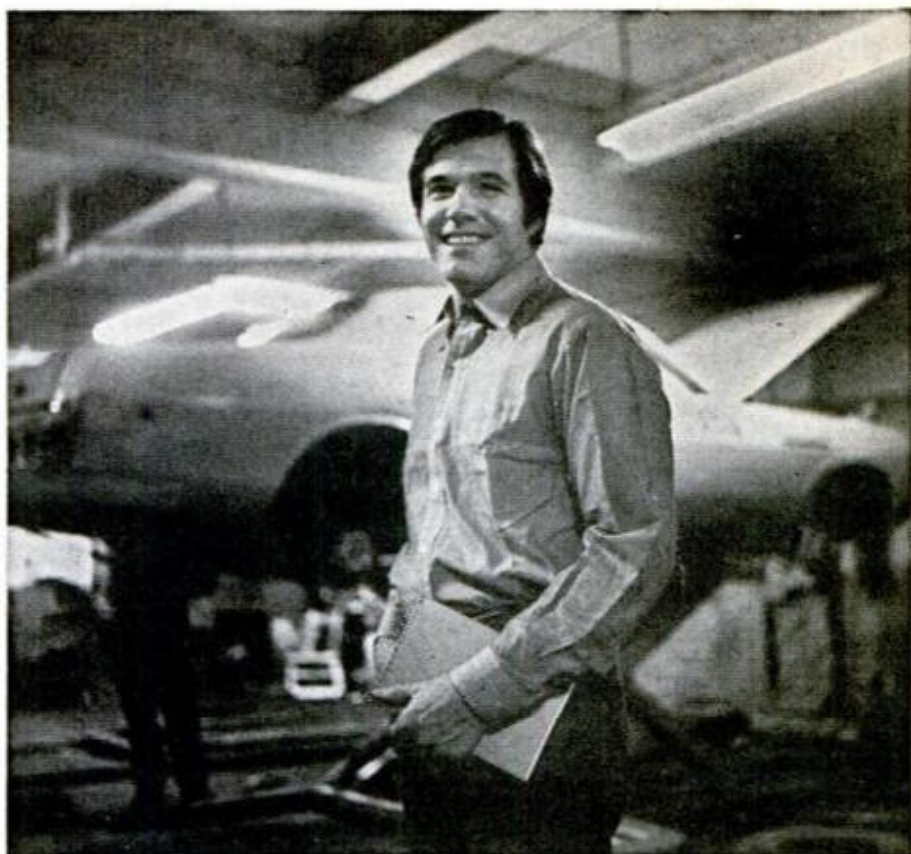
Today's ICS is for people who like to learn by doing. ICS technical career programs include valuable professional tools and equipment that you learn to use in practical projects — then keep for your new career...

a complete set of Proto hand tools (official tools of the Indy 500) and genuine Daytona test equipment with the Automotive Technician's program...

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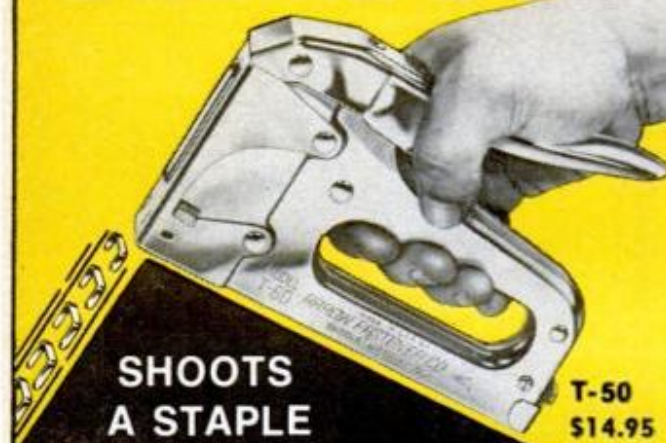
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## LETTERS

### TO THE EDITOR

#### Too bold at that price

*Bold Proposal: A Bridge for Alaskan Oil* (page 106, Jan. PM) is a very bold proposal, as a matter of fact almost too bold at a price of \$6 billion. At that cost, I doubt the IPT will ever get off the tundra. However with a few modifications, saving many millions of dollars, the system might have a good chance to make it.

First, discard the open highway and exposed top deck which would be almost impossible to clear in severe weather. The second deck would carry a two-track electrified rail line. Freight would be carried on piggyback trains. Passengers would be taken care of by Auto Trains, with their autos on double-deck cars on the trains.

This is a very important project that I would like to see built.

ALEXANDRIA, VA.

J. R. STARKE

Basically it is a good idea to save the wildlife of Alaska except for the portion of the bridge used for cars and trucks. If the bridge were built like this, don't you think it would further pollute the atmosphere?

RIVERDALE, ILL.

WILLIAM L. SHACKFORD

The article is one of the most misleading, technically unsound ideas you have ever printed.

Take the "midi" version, for instance. A few eyeball calculations are revealing: Each 300-foot precast span segment would weigh nearly 4400 tons in a static condition, without the dynamic shock loading of rail and/or vehicular traffic. The cylindrical pier would add another 240 tons—a total of over 4640 tons supported on the permafrost 30 or so feet above the ground.

Every reason given for not constructing a standard pipeline as now planned is multiplied infinitely by this proposal. Seismic forces times 30 feet? Have you seen pictures of the freeway damage in the Sylmar, Calif., quake? That was bad, but try to repair one section of this "bridge" at 40° below zero!

Despite Mr. Lin's airy disposal of "yes-

(Please turn to page 11)



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With a billion appliances in use, there are probably thousands needing repair right in your own neighborhood. They mean



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cash profits for you starting soon. Put your spare time to good use. Appliance servicing can give you the extra cash you may be seeking to do and buy the things you've always wanted.

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## In some areas a cord of firewood costs more than this. If you can get it.

What a great time to buy a McCulloch. You can save money cutting your own firewood — and save more with our lowest prices ever! This new Mini Mac 30 is just \$99.95\*. Our lowest price ever for a super lightweight saw with professional features like a 12" bar and automatic oiling.

But the real bargain with McCulloch All-American chain saws is the quality and dependability. Get lucky at your McCulloch Dealer. He's in the Yellow Pages under "Saws."

### Check these other new low prices.

**New Mini Mac 35.** More power than the Mini Mac 30, 14" bar, automatic oiling. Our lowest price ever for a saw with these features. **\$119.95\***

**Power Mac 6 Automatic.** Our finest super lightweight saw, now at our lowest price ever. 14" bar, 2.0 cu. in. engine. **\$149.95\***

**Mac 10-10 Automatic.** Our most popular full-sized lightweight saw, now at our lowest price ever. 16" bar, big 3.3 cu. in. engine. **\$174.95\***

## You're in luck when you've got a McCulloch Chain Saw.

\*Manufacturer's suggested list price. Prices slightly higher in Alaska and Canada.

## LETTERS

(Continued from page 8)

terday's ways to build an oil pipeline," we will build them in the foreseeable future much the same as they've been built in the last 10 years.

Time: that is a word that spells MONEY. Each section (300 feet long) I would estimate to cost 90 days' construction time from the form layout to the cured capacity, in place, to bear the load of the next section. Total—would you believe over 3470 years?  
LOS ANGELES DONALD G. CLARKE

### Is air travel really safer?

I cannot agree with the statistical methods used to compare air and ground travel safety, as presented in *Still Safer Than Driving?* (page 84, Jan. PM).

The most accurate and logical way to compare the safety of different modes of travel is on the basis of duration of exposure to the risk—in other words, hours, not miles, of travel.

Is it safer to fly from New York to Chicago, to go for a canter in the park, or to operate a bulldozer—all for the same length of time? The question can be answered by knowing what the risks are in terms of time of exposure to each. The distance traveled during a particular activity is immaterial insofar as risk is concerned.

In the matter of relative risk of automobile vs. air travel, it will be found that, when compared on a time basis, air travel will appear relatively more dangerous than it does when compared on the conventional mileage basis because of the difference in speed of the two modes of travel.

NILES, MICH.

S.S. MINER

### Missing shuffleboard dimensions

I am interested in making the *Shuffleboard Table* (page 154, Dec. PM), but I have a couple questions I can't find the answers to in the text or diagram. How far apart are the walnut strips for the scoring zones? What are the side bumpers made of?

LANCASTER, OHIO

SIDNEY JONES

*Sorry, we slipped up. This drawing will give you the distance for the scoring zones. The side bumpers are 15-in. lengths of sur-*

(Please turn to page 13)

# McCulloch Portable Generators. Electric power when you want it, where you want it.



**\$199.95\***

H-1500 1500 watt capacity, 68 lbs., 115 volts, 60 cycles

**\$289.95\***

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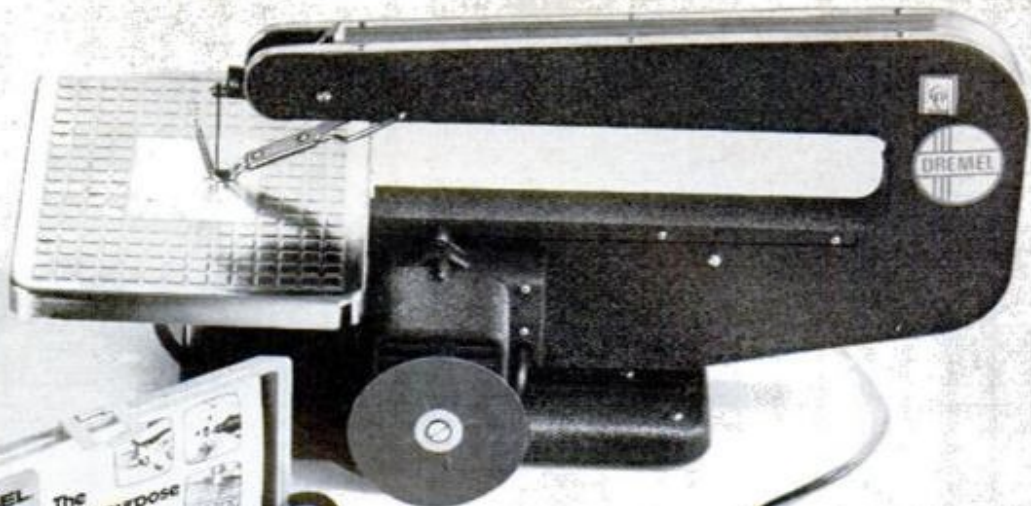
**\$399.95\***

H-3000 3000 watt capacity, 129 lbs., 115/230 volts, 60 cycles

McCulloch generators, with only one moving part, are the most reliable you can buy — at the best values anywhere. Lightweight, and compact enough to fit in your car, too. See your McCulloch Dealer. He's in the Yellow Pages under "Generators" or "Saws."

You're in luck when you've got a  
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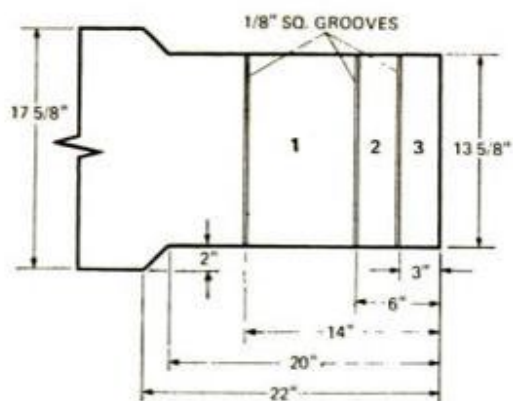
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## LETTERS

(Continued from page 11)



gical tubing from a drugstore. A  $\frac{1}{8}$ -in. dowel is inserted into the tubing, and the wood-and-rubber bumpers are glued to the inside of the side rails with contact cement. Overall length of each of the table legs is  $33\frac{1}{2}$  in.

### U.S. recreation in Russia

Your article *Outdoors America . . . Inside Russia* (page 99, Jan. *PM*) did an excellent job of presenting our Outdoor Recreation

exhibit in the Soviet Union in a short, sweet, accurate way.

The tremendous interest shown in all areas of our exhibit indicates the thirst of the Soviet people for information about our country, its people and its life style. Our exhibit with its personnel and products is a perfect vehicle for this purpose.

U.S. INFORMATION  
AGENCY

DAVID KOSAKOFF  
PROJECT DIRECTOR

### Four-wheel-drive hazards

*Don't Let Winter Stop Your Four-Wheel-Driving Fun* (page 102, Dec. *PM*) fails to warn drivers of several major hazards. I live at the end of a five-mile-long mountain road which is normally snowbound three to five months a year. Among our major problems are damage and hazards created by unwise persons doing what Mr. Lopez suggests.

Before a four-wheel driver starts on a snowbound road, he should be sure he is not cutting up a road used by residents who must ride snowmobiles out in order to reach school bus or work.

(Please turn to page 14)

# The Gopher Field Shoe

Here in Maine where we build Herman boots, we think that a good boot ought to fit right, give you years of comfortable service and stand up to the kind of punishment an outdoorsman gives it. That's just what our Gopher Field Shoes and Boots do. Gopher is an oil tanned, full-grain leather with all the natural range marks intact. It's a tough, supple leather that conforms to your foot immediately. Add soft cushioned insoles and you have a boot you can enjoy for years. And, you can choose between the sure grip of the cleated Vibram® sole

(Styles #7184 & 7684) or the cushioned footing of oil resistant Neoprene® crepe (Styles #7188, 7688 & 5688). If your boots have to stand up to everything the great outdoors can give them, try hunting up a pair of Hermans.



JOSEPH M. HERMAN SHOE CO.,  
DEPT. 34, MILLIS, MASS. 02054

I'd like to try on a pair of  
Herman Gopher Field Shoes.  
Please send me your catalog and  
the name of my nearest dealer.  
PM-GFS-4-3  
Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

Zip \_\_\_\_\_



FREE CATALOG

## LETTERS

(Continued from page 13)

If he must abandon his vehicle, he should make every effort to winch it out of the roadway. If heavy snow covers his vehicle, it may be hit or even run over by snow tractors.

Hypothermia caused by fatigue and cold is a very real danger to a driver who becomes stuck and works to the point of exhaustion to free his vehicle.

Anyone using a winch should always use old tires to protect trees they tie onto from "girdling" caused by wire rope.

I am afraid Mr. Lopez's article may stimulate more of the dangerous and senseless driving we see on our road which has resulted in numerous abandoned vehicles and several near deaths from hypothermia.

FALLEN LEAF, CALIF.      WILLIAM P. CRAVEN

### Auto compound for wood jewelry

I greatly enjoyed completing one project *Jewelry You Can Carve in a Jiffy* (page 89, Nov. PM). I made the little elephant in

three dimensions out of black walnut, using a Moto-Tool my dad had before World War II.

I have a suggestion concerning buffing rouge. I was unable to buy a small quantity locally, so I tried using the buffer with automotive finish rubbing compound. It did a beautiful job and deepened the grain of the walnut. The compound is not moistened in this usage as it is in automotive finishing.

KALAMAZOO, MICH.      D. JAMES HEATON

### Diesel pro and con

I am writing to comment favorably on *The Diesel: New Future for an Old Engine* (page 122, Dec. PM).

I am extremely satisfied with the three Mercedes-Benz diesels I have. Safety features and economy in fuel prompted the purchases. After several years' experience of ownership, dependability of the machines is an added incentive.

CROWN POINT, IND.      MARVIN PENIX

Just to give another side of the picture, I had a 1970 Mercedes-Benz 220-D for about

## The 141 hand operations in every Kabar Pocketknife®:

Blade: shear stock, blank, tumble, drill tang hole, flash, nail mark, brand, soft straighten, bunch, grind blade back, heat  
tumble, rack, draw, anneal, hard straighten, grind, bunch, buff tang, cut & color swedge, glaze point & shoulder,  
glaze & color front lower half, glaze & color back, polish 2nd & 3rd blades, grease buff  
drill tang, bunch, grind blade back, heat treat, tumble, rack, draw, anneal, hard  
straighten, grind, bunch, buff tang, cut & color swedge, glaze and mirror finish, inspect, wipe,  
grind blade tang, de-burr blade, blank, tumble, dot for drilling, drill hole, flash, soft  
straighten, hard straighten, slot test, bunch, buff tang, cut & color swedge, glaze and mirror finish, inspect, wipe,  
Scale-center: blank, pierce (2) holes, Bolster: shear stock, blank, tumble, drop hammer, trim flash; Cap-Mark: shear  
stock, blank, tumble, drop hammer, trim flash; Cap - Pile: shear stock, blank, tumble, drop hammer, trim flash; Scale  
Assembly — Mark: tommy on bolster, tommy on cap, mill scale; Cap - Pile: shear stock, blank, tumble, drop hammer, trim flash; Scale  
cap, dish scale; Scale Assembly — Pile: tommy on bolster, tommy on cap, mill scale; Cap - Pile: shear stock, blank, tumble, drop hammer, trim flash; Scale  
holes, drill bolster & cap, dish scale; Cover-Mark: install shield, rivet cover to scale assembly, drill center hole, cut pins, grind  
pin holes in cover, rivet cover to scale assembly, drill center hole, cut pins, grind  
Pile: saw covers to length, drill pin holes in cover, rivet cover to scale assembly, drill center hole, cut pins, grind  
flash rivets; Knife Assembly: assemble knife from upper half, assemble knife from lower half, cut pins, grind  
pin ends, straighten & align blades, pin pins, file, glass grind, grind back, glaze & color back, glaze & color front lower half, glaze & color back, polish 2nd & 3rd blades, polish 2nd & 3rd blades, grease buff  
glaze & color front lower half, glaze & color back, polish 2nd & 3rd blades, polish 2nd & 3rd blades, grease buff  
rough buff, set in points, glaze & color back, polish 2nd & 3rd blades, polish 2nd & 3rd blades, grease buff  
knife complete, gloss buff complete, rough inspect, grease & oil, etch, final inspect, pack

\* two-bladed

Handcrafted  
in the U.S.A.  
since 1898.

**Kabar** Brand Cutlery®

Pocketknives, Hunting Knives, Marine Kits  
a fistful of quality

Write for the name of your Kabar dealer: Kabar Cutlery, Olean, New York 14760



10 months, during which time I got more and more disgusted with it. It was grossly underpowered and at highway speeds the engine emitted an all-pervading roar that was annoying and tiring. It was also grossly overpriced. I wouldn't have another at any price.

MONTGOMERY, ALA.      ROBERT M. THURSTON

### Third wheel for a bike

I noticed two very interesting articles in the December issue. On page 54 (*The Bicycle Shop*) is a chainless bicycle. My first bicycle, in about 1914, was a Columbia Chainless. I rode it out the Columbia Highway quite often. On page 13 (*Letters*) a reader asks about a battery-powered motor for a bicycle. The latter



part of 1916 I bought a Smith Motor-Wheel—a third wheel to attach to a bicycle. The wheel was cupped and in the center there was a one-cylinder, four-cycle motor. On the hilly, crooked Columbia River Highway, it really leveled the hills.

PORTLAND, ORE.

ARTHUR E. GIBBS

### Anyway, it's hard to type with mittens on

I thought I'd inform you of a typing error in the January issue. Page 157, 17th line under "Sample Drive Test" should be "wind chill factor," not "wild chill factor."

NEW ORLEANS

DAVID ARROYO

*Outdoors editor Bill McKeown simply mutters. "That's what you think. You should have been there!"*

**CORRECTION:** In Weight Bench, (page 152, Dec. PM), price of the foam cushion should be \$4.50, the handscrew, \$2. ★★

# RIGHT!

You're right when you choose a True Temper hammer . . . and you're right when you wear safety glasses while you work.

A True Temper hammer is balanced right. It feels right. It swings right. It grips right. You can choose from a wide range of hammers in the True Temper line. There's one that's right for every job, and there's one in the price range you need.



### BE SAFE!

Always wear safety glasses when using a striking tool.

True Temper offers an informative booklet to help keep you safe while working with hand tools. Illustrated booklet is yours for only 25¢ to cover cost of the booklet and mailing.



"You'll be glad you bought the best!"

**TRUE TEMPER**

1623 EUCLID AVENUE CLEVELAND, OHIO 44115

A MEMBER COMPANY OF ALLEGHENY LUDLUM INDUSTRIES



# Jack Terry knows exactly where he's going. Thanks to ICS.

(A TRUE STORY)

At age 27, Jack Terry doesn't have it made yet.

But he knows where he's going. And he's on his way.

Jack jumped from beginner draftsman to Highway Engineer, first level.

At almost twice the pay.

"That took five promotions," Jack told us. "But my ICS training was a real help in passing each promotion examination.

"I really like my work and I know there are other promotions I can get. Because people just seem to need more roads. And there aren't that many good highway engineers around."

## **The right combination for success**

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

Especially if you're interested in one of the fast-growing careers where ICS concentrates its training. Like accounting. Engineering. Auto repair. Electrician. Air conditioning, etc. (Check your choice on attached card.)

## **Ideal way to learn**

As an ICS student, you study at home,

on your own schedule. You waste no time traveling to and from class. And you never have to miss a paycheck.

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

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

## **ICS training works**

ICS has trained 8,500,000 people in the past 80 years.

Some of the top American corporations (including Ford, U.S. Steel, Mobil, Alcoa, Pan Am, GE, Motorola and RCA) use ICS courses in their own training programs. Government agencies and unions have also approved ICS training.

## **Free demonstration lesson**

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

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

## **ICS**

*We'll show you a better way to earn a living.*

*can take a lot of pride in a highway  
signed. Jack Terry of Lake City, Fla. knows  
ling. (Photo: Yale Joel)*

# Can you spot the Camel Filters smoker?



©1974 R. J. Reynolds Tobacco Co.



At the big neighborhood Garage Sale almost everyone has a gimmick. Pick the one who doesn't. **1.** No. He's Vaughn Gudeel. Gimmick: Insists on "feeling the merchandise." Merchandise is about to teach him theory of acupuncture (it's alive).

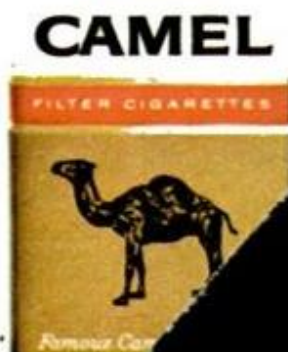
**2.** Nope. He's Ben Takin. Bought water bed—that later developed an old slick. Gimmick: Menthol cigarettes so cold, it's like trying to set fire to an igloo.

**3.** She's Vera Vane. Gimmick: With 20-400 vision, she "doesn't need" glasses. Thinks she's talking to old college beau. Smokes *Cabbage Leaf* cigarettes—preferred by two out of three inchworms. **4.** No. He's Frank Apraisal. Just bought "Man Packing Suitcase" painting.

Later cleaned it and found it's really "Alligator Having Snack." Smokes cigarette with so many air vents it's like smoking a harmonica. **5.** Right. He knows a genuine article when he sees it. Wants no gimmicks in his cigarette, either.

Camel Filters. Good taste. Honest tobacco. **6.** He's Noah Bargane. Just broke a 130-year-old chair. Now owns \$200 worth of genuine antique firewood.

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



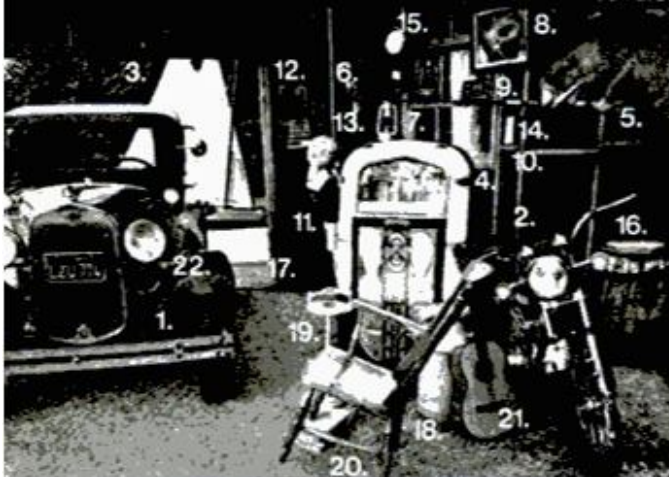
**Warning: The Surgeon General Has Determined That Cigarette Smoking Is Dangerous to Your Health.**

19 mg. "tar",  
 1.3 mg. nicotine av. per cigarette, FTC

данный авторским правом

# Even if you can't spot the Camel Filters smoker, you can win everything in this picture, or \$10,000.

as listed in rules



It's the wildest Sweepstakes ever.

**The Grand Prize:** 1. A genuine 1930 FORD Model "A" Sports Coupe—fully restored to "mint" condition. A prize winner in automotive shows, this deluxe maroon-colored sports coupe comes ready for the road. 2. Yamaha TX 500A Motorcycle. 3. AMF Sunfish Sailboat. 4. Rock-Ola Juke Box. 5. Moose Head. 6. Plastic Christmas Wreath. 7. Two old Hurricane Lanterns. 8. Painting. 9. 1937 California License Plate. 10. Indoor/Outdoor

Thermometer. 11. Tackling Dummy. 12. Paper Wall Calendar. 13. Yamaha Skis with Gertsch Bindings. 14. Garcia Kingfisher Fishing Rod with Garcia Mitchell Reel. 15. Regulator 8-Day Spring Clock. 16. Two Wooden Barrels. 17. Wavecrest 54" Water Bed Mattress. 18. 10-Gallon Milk Can. 19. Iron Floor Ashtray. 20. Antique Wooden Chair. 21. Aria 6-string Guitar. 22. Live Raccoon. Winner takes all—or \$10,000.

**5 First Prizes:** Yamaha TX 500A Motorcycle. **10 Second Prizes:** AMF Sunfish Sailboat. **1000 Third Prizes:** Carton of Camel Filter Cigarettes.

## Camel Filters "Not-For-Everybody" Sweepstakes

**OFFICIAL RULES:** 1. On an official entry blank or a 3" by 5" piece of paper, hand print or type your name, address and zip code.

2. With each entry, send 2 empty CAMEL FILTER packages or the words, "CAMEL FILTER Cigarettes" printed in block letters on a 3" by 5" piece of paper. Enter as often as you wish, but each entry must be mailed in a separate envelope. Mail to: CAMEL FILTER Sweepstakes, P.O. Box 8203, St. Paul, Minnesota 55182. Entries must be postmarked by June 3, 1974 and received by June 10, 1974.

3. Winners will be determined in random drawings conducted by Spotts International, an independent judging organization whose decisions are final.

4. The Grand Prize consists of a genuine 1930 Ford Model "A" Sports Coupe, a Yamaha TX 500A motorcycle, an AMF Sunfish sailboat, a genuine Rock-Ola juke box, a stuffed moose head, a plastic Christmas wreath, two old hurricane lanterns, a 14" by 17" painting, a 1937 California license plate, an indoor/outdoor thermometer, a football tackling dummy with helmet, jersey and pants, a paper wall calendar, Yamaha skis with Gertsch bindings, a Garcia Kingfisher Medium Action fishing rod with a Garcia Mitchell Salt-water fishing reel, a Regulator 8-Day spring clock, two wooden barrels, a Wavecrest 54" water bed mattress, a 10-gallon milk can,

an iron floor ashtray, an antique wooden chair (with arm broken), an Aria 6-string guitar and a live raccoon, or an alternate Grand Prize of \$10,000. Five first prizes are Yamaha TX 500A motorcycles. Ten second prizes are AMF Sunfish sailboats. One thousand (1,000) third prizes are cartons of CAMEL FILTER cigarettes.

5. Prizes are non-transferable and non-redeemable for cash. No substitutes for prizes are offered. Only one prize to a family. The odds of winning will be determined by the number of entries received. All 1,016 prizes will be awarded.

6. Local, state and federal taxes, if any, are the responsibility of the winners.

7. Open to residents of the Continental United States including Alaska and Hawaii. Entrants must be 21 years of age or older. Employees and their families of R.J. Reynolds Tobacco Co., its subsidiaries and affiliated companies, its advertising agencies, and Spotts International are not eligible. Void in Idaho, Missouri, Washington, Georgia, and wherever else prohibited or restricted by law. All federal, state, and local laws and regulations apply. To obtain a list of winners, send a stamped, self-addressed envelope to: CAMEL FILTER Winners, P.O. Box 8201, St. Paul, Minnesota 55182. Winners lists will be mailed before August 10, 1974.

Mail to: **Camel Filter Sweepstakes**, P.O. Box 8203, St. Paul, Minnesota, 55182.

Please enter me in the Camel Filter Sweepstakes. Enclosed are two empty Camel Filter packages or the words "CAMEL FILTER CIGARETTES" printed in block letters on a 3" by 5" piece of paper. I certify that I am 21 years of age or older. No Purchase Required.

mr \_\_\_\_\_  
mrs \_\_\_\_\_  
miss \_\_\_\_\_ phone \_\_\_\_\_

address \_\_\_\_\_

city \_\_\_\_\_ state \_\_\_\_\_ zip \_\_\_\_\_ T

**ENTRY BLANK** All 1,016 prizes valued at \$27,215 will be awarded.

## ALL OUTDOORS

### Challenge of the energy shortage

A closer look at the energy shortage indicates that outdoorsmen may be the best off of all Americans.

The well-equipped camper probably lives more comfortably than most when a storm temporarily interrupts power for light, cooking and heat. But long-range restrictions on gasoline appear to be shaping up primarily as a challenge. Smart sportsmen are already working out ways to get their action in spite of any shortages. We're not about to let a lack of some combustible cut us off from the activities we like best.

**Boating** is a good example. Sailboat sales are already up, as are early spring reports on powerboats, motors and gear. Pleasure skippers will continue to race around or cruise, though they may not plan quite such extensive passages and may drop anchor or tie up sooner when the fuel gets low. Present and foreseeable energy legislation will not insist we put all our gas in a car or lawnmower when we prefer it in our boat, points out Vic Oristano of Chris-Craft. A boatman may not always find all the gas he'd like and is not promised it. But we're assured an unrestricted hunting license to track down the boating gas we need.

Bob Hammond, president of Glastron, concurs. He sees better seamanship bound to result as boatmen learn how to operate for maximum efficiency, to plane off and then throttle down for most economical speed at least resistance. And he agrees with us that more owners of all sizes of craft will be learning the bonus pleasures of

hours on the water at minimum speed or just swinging at anchor. Boating should continue its growth as prized activity for getting away from frustrations ashore.

**Recreational vehicles**, four-wheel-drive and trail equipment, trucks and passenger cars used for travel and vacation fun make careful, economical driving particularly worthwhile. As with boats, better planning for refill stops on long trips, shorter radius of action on weekend drives, longer stays at nearer campgrounds, more use of an RV's self-contained capabilities near home plus double-duty work and play roles of many rigs make RVs more desirable than ever.

Considerable energy is saved when the power in a home is shut off during a trip. It's also true, as president John Hanson of Winnebago has noted, that annual fuel consumption of all U.S. RVs is less than 0.5 percent of all gasoline used. RV travel offers so much fun, it more than compensates for the slightly higher gas consumption of some larger rigs. RVs pay their way with pleasure, making their care and feeding particularly worthwhile.

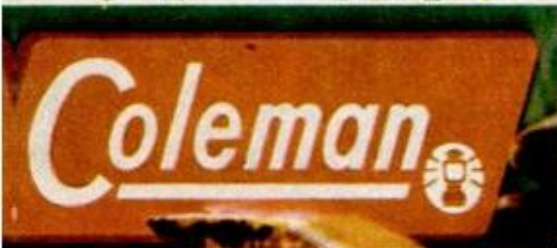
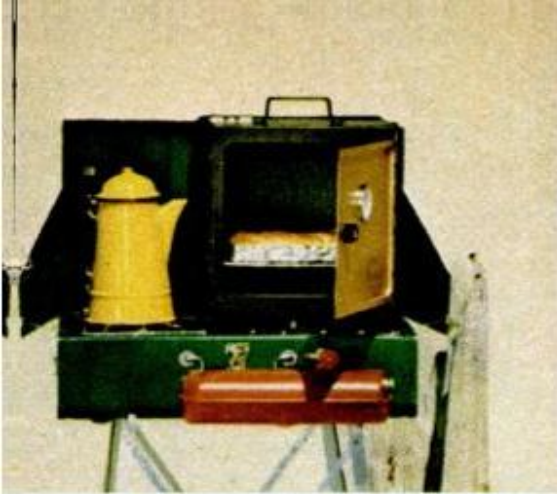
**Hunting and fishing** should experience only minimal changes from gas restrictions. Outdoorsmen are likely to plan local driving carefully so that enough gas remains for trips to lakes, hills and fields. Hunting preserves should gain in popularity as an assured source of action (a listing is available for 25 cents from the National Shooting Sports Foundation, 1075 Post Rd., Riverside, Conn. 06878).

Distant areas now are more likely to be

*(Please turn to page 24)*

**Fastest?** Rumors report this unofficial photo of the latest Evinrude Starflight, shown during secret test, pictures rig at over 150 mph with V-4 99-cu.-in. motor using development lower unit. That speed would boost present outboard record by 14 mph.





## 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.



## ALL OUTDOORS

*(Continued from page 22)*

reached by plane instead of car. Fishermen, too, will be testing waters nearer home, using a little less throttle to speed to offshore hotspots, planning trips by plane to mountain lakes and tropic lagoons of North and South America where the biggest ones live. Fishing craft speeds will be a little lower—the fish will wait.

Campers, of course, can do without gasoline, using mass transit and backpacking in from the railhead. A lot of families will add a tent to their car trunk or roof and find campsites they'd overlooked near home. Others will discover the small camping tent tows as easily behind almost any compact car (and possibly head for Canada or Mexico where KOA campgrounds currently report plenty of gas available). Van camper conversions, cap covers and campers for pickups, and mini motor homes should continue to grow in popularity.

But with the new light gear available for all outdoor sports, it's easier than ever to take to the fields, waterways and hills on muscle power alone. Add a modest allotment from your available gas supply and you'll find new ways to get your recreational money's worth from energy.

### By the numbers

Know the serial numbers of your guns? Outboard? Cameras? Camping gear? One California police official reports better than 40 percent recovery of stolen firearms when owners can supply serial numbers. It's worth the effort, helps discourage thieves. Recovered guns without numbers are destroyed.

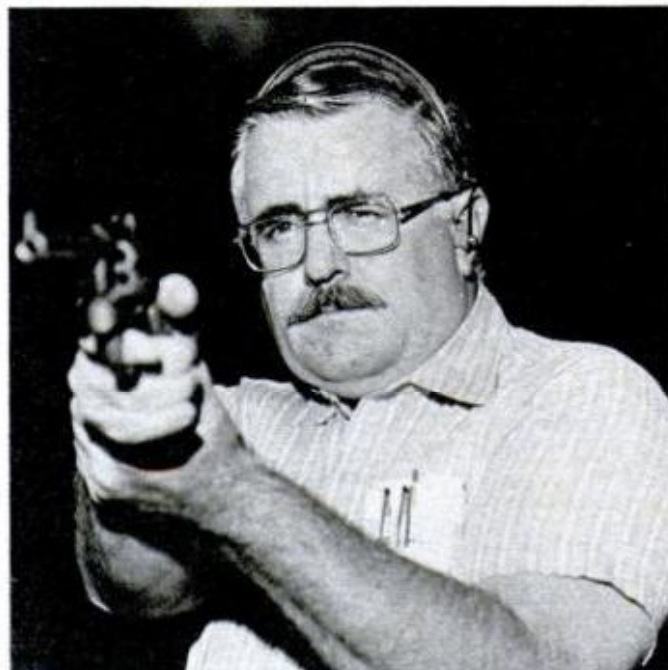
### Best bassers

Last year's final fishing tournaments crowned Rayo Breckenridge of Paragould, Ark., winner of the 1973 Miller High Life BASS Masters Classic at Clark Hill Reservoir on the South Carolina-Georgia border, and Hulon Walker of Vidor, Tex., top man at Evinrude's Bass Buster Fish-Off at Fin & Feather Marina on famous Toledo Bend Reservoir in Texas. Nearly all bass now are returned to the water alive after weigh-in at BASS tournaments. The best bass fish-

*(Please turn to page 26)*



**Browning Pocket Stove**, new addition to company's camping line, disassembles to 4½x1½ inches plus mini-cartridge, runs well at low, high altitudes. \$12.95.



**Shutting out sound** for shooters, new Willson Hi-Line Sound Ban from ESB Inc., Reading, Pa., a lightweight compact unit, offers ear protection that rates between earmuffs of standard noise-control type and earplugs. With an adjustable or fixed headband, \$5.80 unit can be carried in pocket case when not in use.

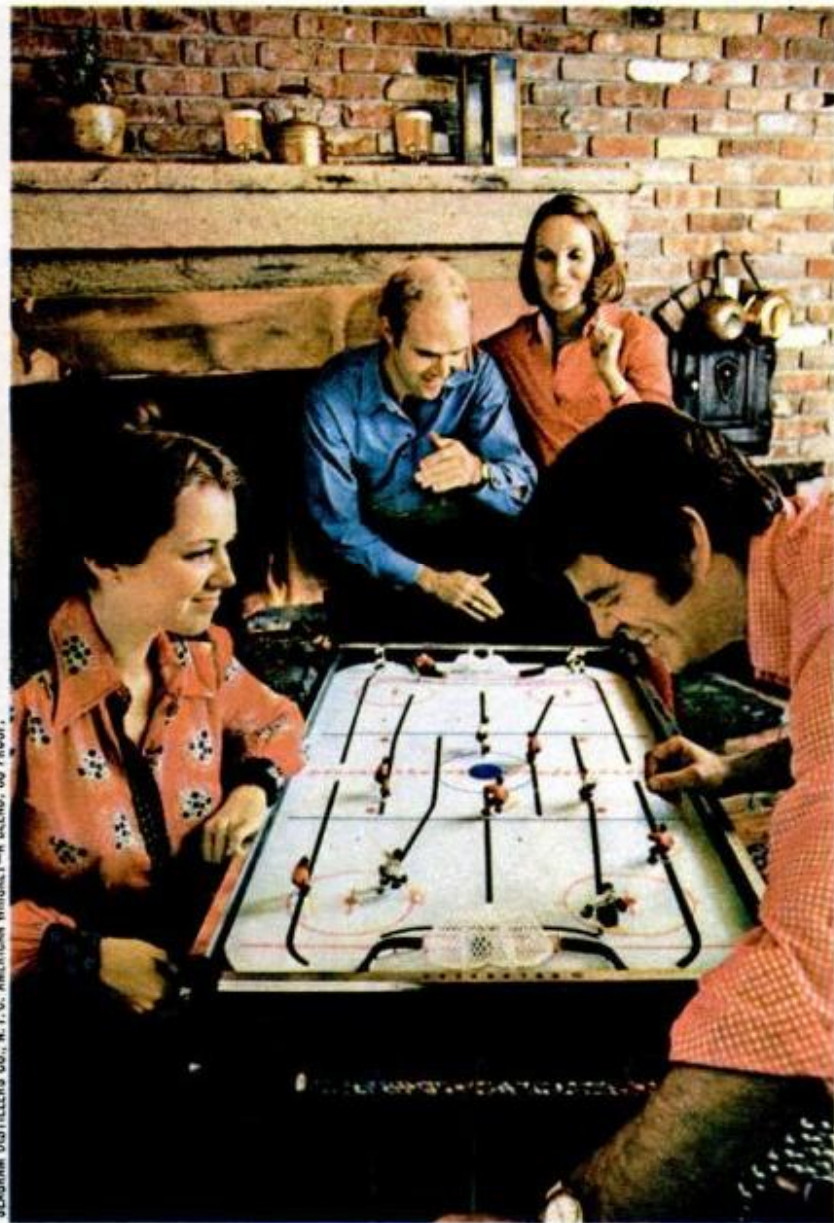


**Survival knife** is a compact 9-incher with two 4-inch blades (one with sawing edge), thermometer, fish-hooks and line, compass, candle, waterproof matches, level, whetstone and case. Available for \$10.45 from Research Reports, 1300 77th Ave. N., St. Petersburg, Fla.





# America's whiskey and how to enjoy it.



It isn't easy, sneaking one past a three-inch goalie.

So when you do, you ought to celebrate. And a Seven Sour is what you ought to celebrate with.

All it takes is lemon juice, sugar, and of course, Seagram's 7 Crown.

Give it a shake, dress it with fruit, and you've got it made.

But no matter how you like your whiskey—in a sour, with soda, or on the rocks—you'll like it better if it's Seagram's 7 Crown.

It's light, smooth, and uniquely versatile.

That's why, for 26 championship seasons, it's the whiskey America has liked best.



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

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



## THE SEVEN SOUR:

To the juice of one lemon, add one teaspoon fine sugar, and 1½ ounces Seagram's 7 Crown. Shake with ice. Garnish with orange slice and cherry.

## ALL OUTDOORS

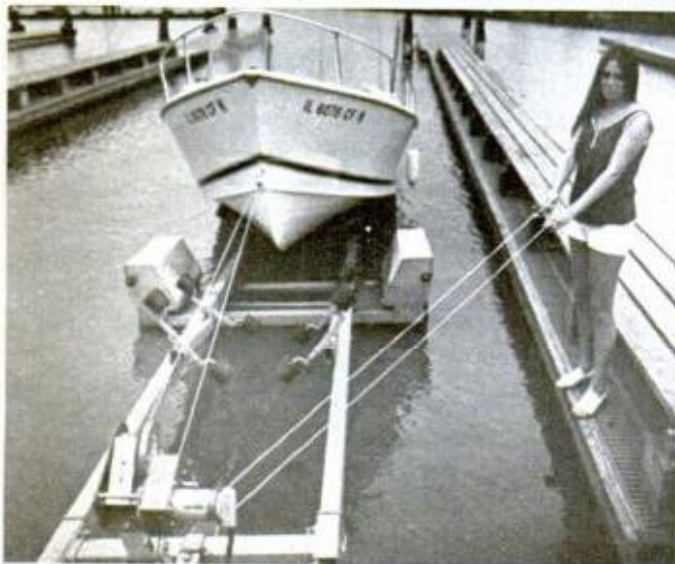
(Continued from page 24)

erman in the country, however, just might be a woman. Ms. Joan Wulff, for instance, ace fishing wife of ace fisherman Lee Wulff, has spent up to 12 hours and 55 minutes in uninterrupted fighting chair time landing a record tuna, but isn't allowed to compete in the bass events. Which may be lucky for some fishermen. ★★★



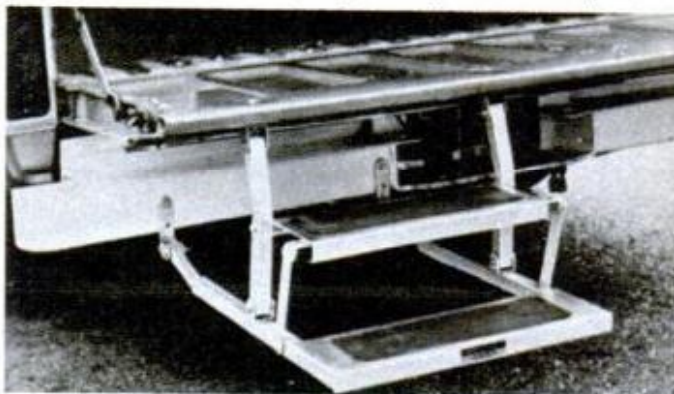
**More accommodations in trailerable sailboats** is aim of numerous new models like American 25, a \$7100 five-sleeper with full headroom from American Mariner.

**Twice the pull power** for hauling big boats is possible with double line using Dutton-Lainson DLE winch.



**Tri-Sport SL**, from Alsport of Norwalk, Ohio, is new 28-hp three-wheeler claimed street-legal for economy travel. Hi-lo front light, directionals included.

**Handi-Steps** can make boarding a pickup camper or shell easier with one or two-step tailgate models. Two-stepper is \$32 from Big Skyhouse, Great Falls, Mont.



**MerCruiser Typhoon KT-350 engine**, new from Mercury, is 350-cu.-in. V8 mill driving latest MerCruiser TR-II stern-drive unit at reported 115 mph on 21-foot tunnel.

# DATSUN



## There's more to the '74 Li'l Hustler than an honest day's work.

Sure, Li'l Hustler is designed to do the work of a big truck for a whole lot less. But a lot of folks are buying our little pickup just for the fun of it.

Maybe it's the more powerful 1800cc overhead cam engine for '74. Or the casual, car-like comfort and ride of the new contoured seat and softer suspension. Then, too, it could be because Li'l Hustler was tough enough to beat everything in its class at the '73 Baja 500.

Of course, the fact that ours was America's first small truck back in 1959 probably doesn't hurt. Neither do Li'l

Hustler's inexpensive parts and service. Nor the great gas mileage. Nor the huge variety of options and accessories available from nearly 1,000 full service dealers, nationwide. (Some of these options are shown here.)

Whatever the reasons, it just goes to show you that Li'l Hustler's good for a lot more than an honest day's work. Maybe that's why we're still No. 1 in sales. Drive a Datsun... then decide.

 **Datsun**  
**Saves**

## IMPORTS AND MOTORSPORTS

### Ration racing

A Gremlin X running at Daytona uses a bit more gas than one cruising at 50 mph, but it's still pretty economical racing. The Levi's Gremlin X won the Manufacturers



Championship for American Motors in the 1973 International Motor Sports Assn. series for Baby Grand sedans. Here, IMSA driver Amos Johnson takes the radial-shoed Gremlin through a fast turn at the Speedway on his way to winning the final race in the popular small-car competition.

### 'Spoiling' the fun

The downforce sitting on the Porsche Carrera spoiler shown here is exuberant but certainly not aerodynamic. At speed, however, the real aerodynamic downforce is substantial and contributes to the car's



directional stability. The shape of the spoiler is the result of careful wind-tunnel testing on the 911 body and precise measurement of increased adhesion at the rear wheels. After all that, the protuberance has been banned in Germany as being too "aggressive." That means if you back into a pedestrian he could get hurt, even though the spoiler is blunt-edged fiberglass. Well, back to the drawing boards . . .

### Bringing up the rear

Smooth aerodynamic shapes save gas. But miles per gallon was not the determining factor in the overall design of the wedge-shaped cars shown below. The Alfetta Spider (top) and the FL-1 are among a



goodly number of show cars that were ogled at recent European auto shows. All the cars are characterized by innovative styling, especially at the aft end. To us, the Francis Lombard FL-1 and the Pininfarina-styled Alfa Romeo Spider display the best rear ends of the crop. They're special bodies, not in production, but their lines

*(Please turn to page 26F)*

# Salem refreshes naturally.



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- Rich natural tobacco taste.
- No harsh, hot taste.



King or Super King

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

KING: 19 mg. "tar", 1.3 mg. nicotine,  
SUPER KING: 19 mg. "tar", 1.4 mg. nicotine, av. per cigarette, FTC Report SEPT, '73.

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## IMPORTS AND MOTORSPORTS

(Continued from page 26B)

will influence design of cars slated for production. In designing for greater fuel economy (possibly a minimum of 20 mpg by government legislation), improved aerodynamics will be a significant factor.

### Slick safety solution

What's safer than an airbag, a lot cheaper and hopefully soon to be in wide use? VW's new, passive seat-belt system, now installed in 50 Beetles for "real-world" testing in the United States. It's a hands-



off arrangement: One end of the shoulder belt is anchored to the door edge, the other to an automatic retractor. You open the door, slide into the seat and the retractor takes up the slack. A knee bar prevents torpedoing or sliding forward under the dash. It's also an inertial system giving you freedom of movement except in emergencies. It's safer than an airbag because you're protected in lateral and roll-over accidents, as well as in frontal collisions.

### Sticky Capri

Four-wheel drive on a road car makes traction really spectacular. Witness the Jensen FF (*Safe at Any Speed*), page 114, June '70 PM). The British-built, Ferguson Formula four-wheel-drive system is now going into a limited number of Lincoln-Mercury Capris for sale in the United States. Price tag on the FF Capris will be almost \$6000 but, for enthusiasts, it'll be worth it to go through corners—wet or dry—a lot faster than the slipping and sliding competition. ★★★



Jonathan Winters as the well-traveled Ozzie Outdoors

### "The only trouble with Harrison Air Conditioning—the little forest critters want to hop in your cab and cool off."

"When the open road calls, I answer... in my Harrison air-conditioned camper. I say, 'Hello, open road! Look at me, all cool and comfortable!' Another nice thing, Harrison removes dust, pollen and excess humidity, which I find a lot of on my way to camp. See your Chevrolet or GMC Truck dealer for a demonstration of Harrison Air Conditioning. You may have to beat the forest critters off with a stick. Bagged me an eight-point elk that way once!"

### Let Harrison Air Conditioning make you a cool camper!

Turn on "The Wacky World of Jonathan Winters" on local television.



# IF YOU'VE NEVER OWNED A CHAIN SAW, YOU NEED ALL THE HELP YOU CAN GET.

With literally hundreds of chain saws to choose from, how in the world are you supposed to know which one will end up being right for you?

That's exactly what we at Homelite had to ask ourselves when we set out to design your first chain saw.

## SHOULD YOUR FIRST CHAIN SAW HANDLE LITTLE JOBS? OR BIG JOBS?

Chances are you're going to use your chain saw for little jobs. Like pruning trees and clearing brush.

And big jobs. Like cutting trees and firewood.

So to make both jobs less like jobs, we designed your first chain saw with a separate trigger for each of them.

For the little jobs, the XL2 has a trigger up front.

This lets you get right up on top of your work, when you need really tight control.

And we put a second trigger in the rear for the big jobs.

Which gives you greater leverage and a fantastic sense of power.

## HOW LIGHT SHOULD YOUR FIRST CHAIN SAW BE?

We weighed the Homelite XL2 in at 7¼ pounds.\*

Light enough to make it easy to handle. Heavy enough so it doesn't feel like a toy.

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In designing your first chain saw, we at Homelite had to decide whether to give you an extremely low price and very little chain saw. Or a lot of chain saw and sell it at a price we could both live with.

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Your first chain saw has a 12" guide bar with the same Power-Tip® sprocket nose that professional

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Your first chain saw has an all-weather ignition so that it starts when you want it to start.

Your first chain saw has an automatic chain oiler.

Your first chain saw has a rugged carbon steel saw chain and die cast magnesium housing.

And it has all these things at a price we think is rather irresistible.

**\$119.95.**

After all, what would be the point of designing your first chain saw if we couldn't first lure you into buying it.

## HOMELITE® XL2

WITH TWO TRIGGERS.  
A FRONT TRIGGER FOR LITTLE JOBS.  
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Chris Martin of Decatur, Illinois, builds stereo speaker systems. For acoustical reasons, the cabinets must be sealed airtight.

Chris tried glue and conventional caulks, but they were too rigid to hold up over a long period of time. Then he tried Dow Corning® Silicone Rubber Bathtub Caulk.

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tioning, Refrigeration and Heating industries will increase rapidly in the next few years. There are many exciting careers waiting for the highly skilled technician. With NTS Home Training and valuable NTS equipment, that skilled technician could be you!

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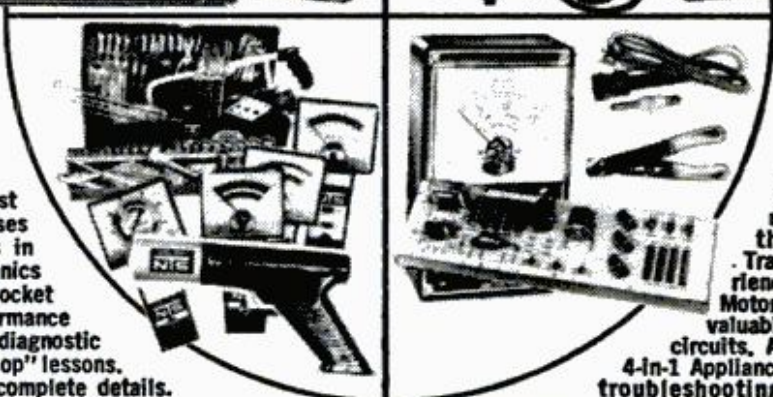
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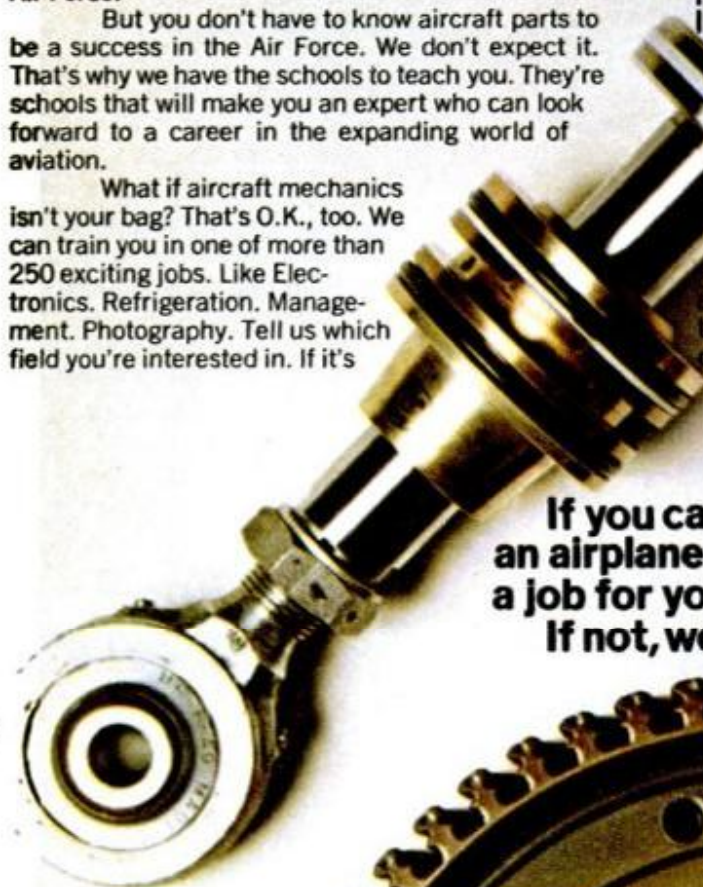
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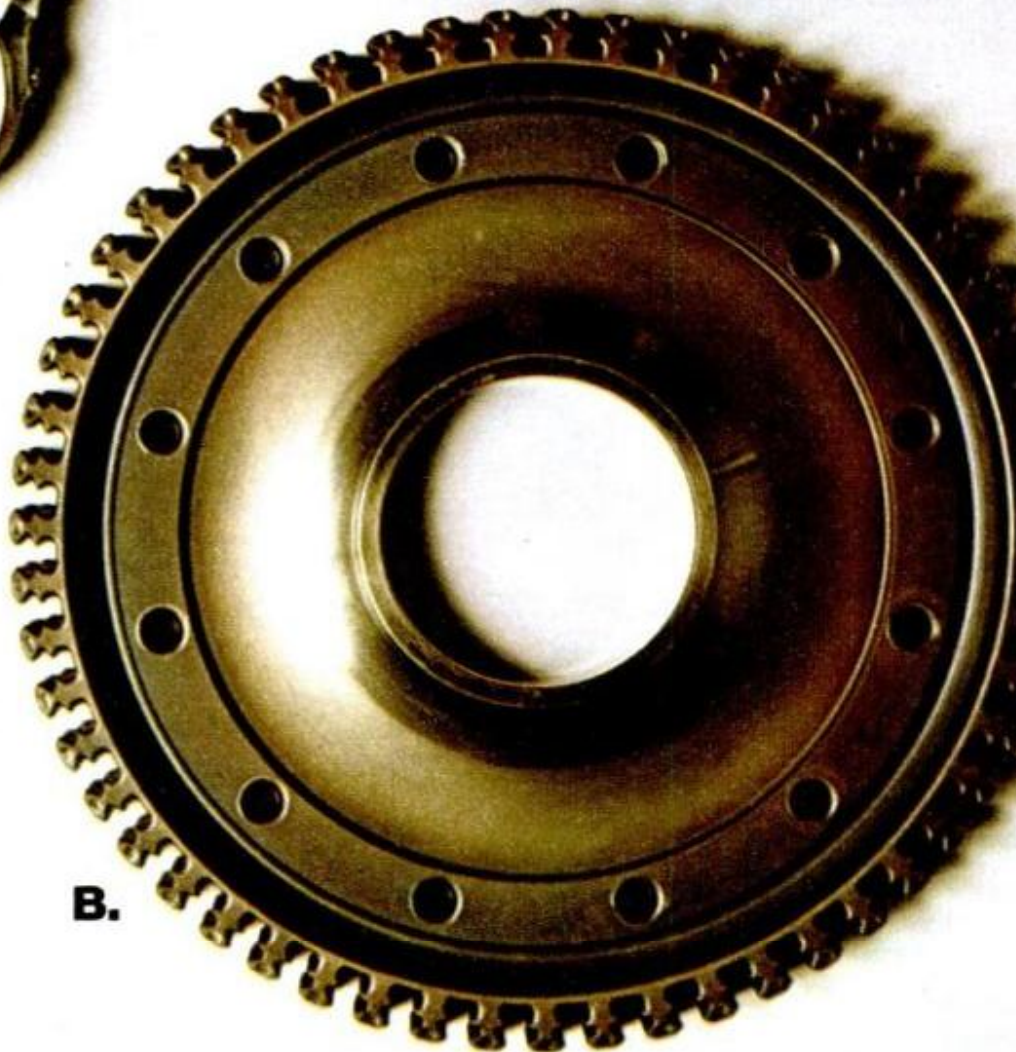
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**A.**



**B.**

## APPLIANCE CLINIC

BY PAUL MANN

### Hassle over trucking

I started a controversy when I told Peter Busch (*Appliance Clinic*, page 70H, Nov. '73 PM) that it was safe to truck a refrigerator several miles lying on its side. I stand by what I said.

Several readers have written to say that damage would result because the weight of the refrigerator's compressor would bend or break the compressor mounting. That's doubtful, in my opinion. Compressors are mounted with heavy bolts extending through rubber bushings. For a mounting to break, a bolt would have to break.

Refrigerator manufacturers and several servicemen agree with me, and so does my own experience—I have trucked several refrigerators on their sides for a distance of 50 miles without trouble, either during the trip or after it. One suggestion, though, perhaps should have been given to Mr. Busch: When you arrive at your destination and right the refrigerator, leave it off for three or four hours, allowing refrigerant fluids to return to their normal levels.

### Slow shave reprise

*I feel I must insert my oar into your capable business and comment on the problem Mr. Leahy is having with his rechargeable electric razor (Appliance Clinic, page 33, Oct. '73 PM). The cause of sluggish operation may lie not with the razor but with its power pack. Nickel-cadmium batteries undergo degradation with continued partial discharge-recharge cycling. The trouble seems to be solved when the power pack is fully discharged and then fully recharged. We own several rechargeable appliances and only the manufacturer of the calculator (Hewlett-Packard) pointed this out in the owner's instructions.—Walter R. Roser, El Paso, Tex.*

Manufacturers of cordless appliances claim that degradation of the power pack is averted if consumers charge batteries as

stated in owners' manuals. Although many don't emphasize the point made by Hewlett-Packard, it is well taken. Certainly, before money is spent trying to repair a sluggish cordless appliance or it is thrown away (some can't be disassembled for repair), discharging and recharging the power pack is worth trying. Thanks for bringing this to our attention, Mr. Roser.

### How wet is damp?

*I have a Maytag gas dryer (model KDG606) that shuts off before clothes are fully dry. What's wrong?—C. J. McDonough, Santa Maria, Calif.*

For the benefit of the rest of our readers, let me say that Mr. McDonough's clothes dryer is equipped with sensors that determine when drying is completed. The dryer is designed to leave two percent moisture in the clothes.

Saying they aren't "fully dry," then, is open to interpretation. If clothes feel moist around elastic waistbands, the dryer is probably performing properly. This two percent margin is built into the machine to keep elastic from drying out. But if clothes feel damp all over, you can increase drying time approximately eight minutes by installing a capacitor kit. You should be able to do the job if you carefully follow the instructions supplied with the kit. If you can't get it from a distributor in your area, write the Maytag Co., Newton, Iowa 50208. The part number is 3-3250.

### Chip off

*The enamel on the drum of our 6-year-old washing machine has chipped off in three places, exposing metal. Rust is forming and streaks are running down to the bottom of the drum. Can this be repaired? What can be done to prevent this condition from hap-*

(Please turn to page 34)



GM improves  
your outlook on life.



The colonnade roof featured here is shown with an available vinyl top.



GENERAL MOTORS · MAKER OF CHEVROLET · PONTIAC · OLDSMOBILE · BUICK · CADILLAC · GMC TRUCKS AND MOTORHOMES · FRIGIDAIRE APPLIANCES

The improvement is our new colonnade roof, which you'll find on many full-size General Motors cars for 1974. We wanted to create a look that was both contemporary yet timeless—and built for strength. And thanks to thin but strong roof pillars, our new colonnade roof gives you more glass area all around and a feeling of spaciousness for every passenger. What's more, the roof itself has a double construction—two panels of steel with the inner panel acoustically perforated to help absorb sound. All this you'll find in our new colonnade roof. The hard-to-top top from GM.



We want you to  
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and like what you drive.

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If you grow more than just a lawn on one to 20 acres, you need a tractor that will do more than just mow. You need the versatility and power of an Economy.

Not a toy, this rugged tractor has extra weight and traction to give you more push and pull-power, yet uses less gas per job. Automotive all-gear drive converts nearly 100% horsepower to workpower. Electromagnetic clutch gives you full control of powered attachments simply by pushing or pulling the dashboard switch. And for added safety, an electric interlock prevents tractor starts while attachments are clutch-engaged.

Mount attachments easily with new quick-hitch. Plow with ease. Prepare seed beds with 32" tiller. Plant, cultivate, fertilize and spray. Mow 2 to 3 acres an hour with the 60" rotary mower. Bulldoze with the 48" angling blade. Load gravel or dirt with the 1/4-ton bucket. Or cut a path through deep snow with the 42" snowblower. Handle all your garden and yard chores with over 20 attachments.



Write today for free color catalog.

C-30

## ECONOMY TRACTOR

1005 K-3 Anoka Avenue  
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## APPLIANCE CLINIC

(Continued from page 31)

pening in other spots?—David Fink, Jamaica, N.Y.

To get rid of rust spots, you should clean them thoroughly. Use an abrasion wheel or wire brush driven by a low-speed power tool, such as a variable-speed drill, or use hand power. Clean residue from the spots with mineral spirits or paint thinner. Coat the cleaned spots with an epoxy resin, which you can buy in a hardware store. Follow instructions on the package. Let the resin harden for at least 24 hours before using the washer. This will form a protective shield over the spots and keep the condition from spreading.

What could have been done to prevent chipping? That is difficult to say. The porcelain may have been defective to begin with, or an object such as the metal buckle on a cloth belt may have chipped it.

## Cooling down

*My General Electric refrigerator-freezer combination, model TCF15AEB, won't get warm. Water freezes. Tomatoes freeze although they are kept in the vegetable drawer. I have adjusted the control knob as high as possible, but the condition prevails. What now?—Emmett Cluff, Bountiful, Utah.*

When you mentioned setting the control "as high as possible," I'm sure that you made a slip. Turning the control toward the high numbers will make the unit colder.

If the control is set at the low end of the scale and the unit is too cold, I suggest that you investigate two possibilities. First, the problem may be caused by a blocked condenser that is causing the motor to run longer than it should. Clean dirt and dust from the condenser.

Second, the problem may be caused by a faulty control. A new one may be obtained from the GE distributor in your area. To replace the control, you simply unplug the appliance and remove the two screws holding the old control. The entire component then will come out. ★★★

*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.*



GORDON COX writes to tell us...

# "I lost 5<sup>3</sup>/<sub>4</sub> inches off my waist, 25 pounds of excess weight... and shaped up... in just 14 days!"

One 5-Minute exercise, twice daily, lying on my back, without giving up the foods I love... *Did It!!*"



Gordon as he looked the day he started.

After 7 Days — A remarkable transformation — pot almost gone — revitalized.

After 14 Incredible Days — Slimmed, reshaped, looking 15 years younger, feeling 25 years younger

## SEE AND FEEL AMAZING RESULTS IN JUST 3 DAYS!!

### WHAT IS THIS INGENIOUS PLAN?

The Weider "5" Minute Body Shaper plan is based on doing ONE CONTINUOUS RHYTHMIC CO-ORDINATED EXERCISE while still eating the foods you like. That's all you do! This one five-minute exercise is designed to attack the Waist and Hips (where fat accumulates quickest, giving your body a flabby, weak and distorted look) — as well as burn off excess body fat fast by speeding up your metabolism, burning up stored calories and releasing excess water—while reshaping your chest, abdomen, firming up your legs and arms — your total body!

It's safer than strenuous workouts, beats the time consumption and dangers of gym workouts.... or any other vigorous sport.

The unit weighs about 16 oz. and fits any wallet-sized case. You can carry it and use it wherever there's floor space — anytime. Even while watching television.

### WHAT COMES OFF IN 14 DAYS?

Individual results vary, but during an average 14 day period, you can expect to lose up to four inches from your waistline and up to ten pounds off your present weight. It strengthens your heart and lungs, increases stamina and endurance, improves your digestive function and general health. IT TOUGHENS YOU UP. For a "5-Minute Exerciser" — it sure does a lot!

### WHAT SATISFIED CUSTOMERS SAY:

Results vary depending on how much overweight each of our students is. Nevertheless, this is a sampling from the impressive letters we receive: **Willie Ellis** — "I lost 3 inches off my waist and 9 pounds in 7 days." **Kent Christensen** — "I lost 5 1/2 inches off my waist and 20 pounds in 10 days." **Marino Zoller, M.D.** — "I lost 2 inches off my waist in 14 days." **Michael Benedict** — "I lost 6 inches off my waist and 22 pounds in 21 days." **Ken Waller** — "I lost 3 inches off my waist in 5 days."

### WHAT THE EXPERTS SAY:

Medical Doctors, Chiropractors, Osteopaths, Athletic Coaches...agree its the most successful Waistline-Weight Reducer and Shaping Up Plan ever invented!

Patent Pending. Copyright Joe Weider, 1973

"Doctors have always known, exercise done while lying on the back virtually eliminates strains while slimming and reshaping the body. Yours is the finest Body Shaper Program on the market."  
RICHARD TYLER, D.C.

"Beats jogging and working out in gyms — and much safer. I lost 4 1/2 inches off my waist in 14 days." — JIM HANLEY, famous athletic coach.

"Based on sound physiological and medical knowledge, it burns fat and shapes the body without strain to the heart or other organs. I lost 12 lbs. of excess weight using it."  
DR. ANITA D. SANTANGELO, Chiropractic Orthopedics

**\*EXPOSING EFFORTLESS EXERCISERS**  
Reader's Digest (Sept. 1971), New York Times and Good Housekeeping, among others, exposed sauna wraps, inflated belts, weighted belts and effortless exercisers as frauds. Scientific researchers, medical and fitness experts all agree...there is only one way to firm, shape and trim up your body... you must work the inches off!

### NO GIMMICKS, NO CATCHES MONEY BACK GUARANTEE OFFER

Because this isn't a "gimmick" plan — and you have been fooled in the past by "effortless exercisers" — I make you this UNCONDITIONAL GUARANTEE: "GET IT OFF FAST" — and see measurable and firming results in three days or return the exerciser for a full 100% refund! Proven results are already verified. The guarantee is in writing. Now, can you think of a reason for not ordering your "5-Minute Total Body Shaper?"

### FREE TRIAL OFFER!!

See your exciting new body begin to take shape in 3 days or every penny back!

**SEND TODAY**  
Weight just 16 oz.



14 days shaped me up in the privacy of my home!

## 5-MINUTE BODY SHAPER

We Care About The Shape  
You're In — **DON'T YOU?**

**SEND TODAY** COMPLETE KIT **\$9.95**  
ONLY

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Prove to me I can see results and start shaping up in 3 days!  I enclose \$9.95 for "5" Minute Body Shaper & Slimming Course, plus \$1.00 for shipping and handling.  SAVE! Order TWO for only \$17.95, plus \$1.00 for shipping and handling. (No C.O.D.'s please). Enclosed is  check or  money order or  cash for \$..... (Calif. residents add 6% sales tax.)

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(Please print clearly)

IN CANADA: "5" Minute Body Shaper Plan, 2875 Bates Road, Montreal, Quebec.

## CAR CLINIC

BY MORT SCHULTZ

### Mini saving for Maxiwagon

*I have a 1973 Dodge Sportsman Custom Maxiwagon B-300. It is equipped with a 318-cu.-in. engine and three-speed automatic transmission. I use the vehicle only as a passenger carrier for my family of five. Would I sacrifice anything besides initial acceleration by having the ring and pinion gears changed in the rear end to alter the ratio from 4.10:1 to 3.54:1? My purpose is to improve fuel economy.—Michael G. Falcone, Houston.*

You may also sacrifice a little power on hills, but it won't amount to much. Neither will your fuel savings. This is why I ask that you think twice before making this conversion. The most optimistic opinion I have heard is that you will increase fuel economy by one to two miles per gallon. Weigh this against the cost of conversion, which will be over \$100.

### Don't listen to rumors

*I recently bought a used 1969 Ford Mustang with 250-cu.-in. engine. The solenoid on the carburetor was disconnected, with its wire coiled around and sticking up in the air. The dealer told me that the solenoid wasn't necessary, but I am getting a dieseling condition and was wondering if the inoperative solenoid would correct this.—Glenn L. Otten, St. Louis.*

Your dealer is 100 percent wrong. The throttle solenoid is a necessary part of the car and would probably clear up that after-running condition. It serves to close the throttle positively so no excess fuel is available for combustion in the cylinders after the ignition is turned off. The throttle solenoid wire should be hooked into its jack in the main wiring harness, and the solenoid should be tested to make sure it's working properly.

Run the engine and open the throttle by hand. The solenoid plunger should follow the throttle lever until the plunger is fully extended. Now disconnect the solenoid lead.

The plunger should retract. If the solenoid doesn't work this way, replace it. The solenoid also has to be adjusted properly. This is done by setting curb-idle rpm using the hex-head adjusting screw on the solenoid plunger.

### Losing liquid gold

*The gas cap of my 1969 Chevrolet Nova allows gas to leak out of the tank during acceleration. I have replaced the gas cap, thinking it might be the wrong one. It wasn't. My dealer can't offer any suggestions. Can you?—Alan O'Connell, LaMirado, Calif.*

*Please help a guy with an old, but good car—my 1962 Pontiac Tempest station wagon. It's losing gas. At first I thought the gas tank was leaking, but I had it pressure-tested and there is no flaw. So I did some observing and found that gas is flowing out from the gas cap. Can you tell me why?—Andrew Burton, Colorado Springs, Colo.*

It's possible the lips of the filler tube to which the gas cap locks have worn, and the cap isn't seating tightly. However, it is often difficult to detect wear just by looking at these tangs. Therefore, you should compare the condition of the lips of the filler tube on your car with those on a brand-new fuel tank.

With the Tempest there could be another problem: The 1962-1964 Tempest station wagon was equipped with a vented gas cap. All other 1962-1964 Tempest models used a nonvented cap. Could you have accidentally equipped your car with the wrong cap?

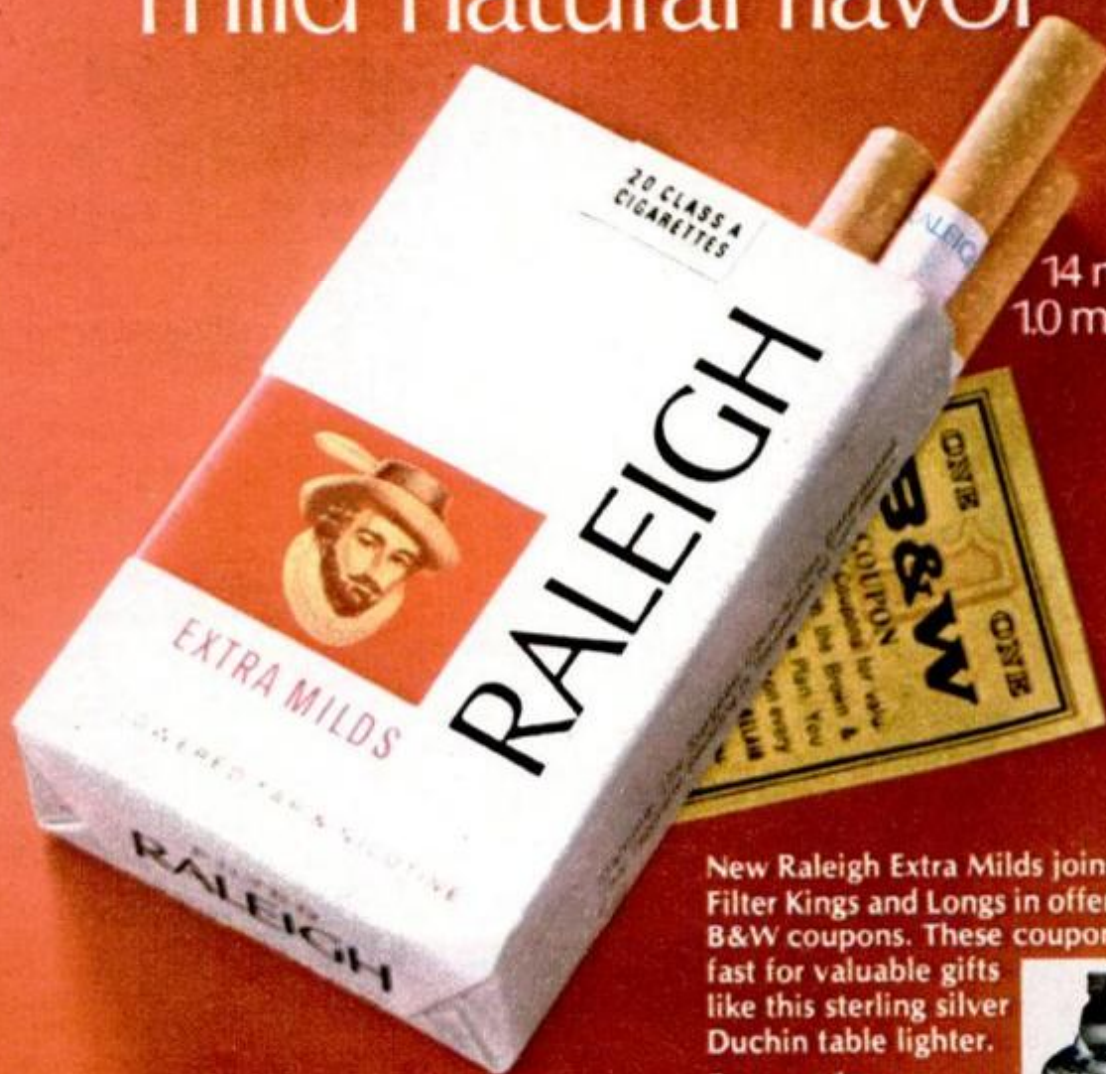
### Bucking Bronco

*My 1973 Bronco runs fine at cruising speed, but when I slow down and reaccelerate I get a loss of power for a couple of seconds. Then, it catches and is okay until I slow down*

*(Please turn to page 38)*

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## CAR CLINIC

(Continued from page 36)

again. The dealer has set the engine up exactly to specification, and the car does perform better, but the loss of power on acceleration is still there. Can I get rid of it? —John Gleaton, Monroe, Ga.

Ask the dealer if he has provided for a maximum accelerator pump stroke. If he has, ask him to replace the accelerator pump diaphragm. It may help.

### Faded upholstery

I have a 1970 Chevelle Malibu. The black nylon upholstery has faded badly. Is there a way to restore its appearance? What causes this?—L.W. Bruce, Portland, Ore.

Sun beating through the windshield causes the fading. Black, red and blue upholstery are most susceptible. Try to park in the shade as much as possible. As for restoration, an upholstery spray paint may prove worthwhile. Sears is one chain that stocks it. GM also has a dye called Dy-Nu you can get from a dealer. The problem is not confined to GM. Most other carmakers are experiencing the same difficulty.

### Coolant loss, but where?

The cooling system of my 1970 Buick Skylark (350-cu.-in. engine) loses about one pint of coolant every 100-200 miles. This has been going on for six months, and no one has been able to help me. The system has been pressure-tested to show no loss of pressure. There's no evidence of radiator leaks, no coolant in the oil, no water in the exhaust. The engine doesn't overheat; I keep adding coolant. I'm not overfilling either. Please help before this drives me crazy.—Oleh B. Mackiewicz, Union, N.J.

First, check every unit and connection again for leakage, just to be sure you haven't missed anything. Do this with the engine cold since a small leak that would show dampness with the system cold could evaporate under heat. If you see grayish-white or rust-colored stains at a joint,

suspect a leak there. Closely examine the radiator filler neck for damage keeping the radiator cap from sealing and holding pressure. Did you have that cap tested with the pressure tester to be sure it's in good shape?

Have the system tested for an air or exhaust-gas leak. Air or gas entrained in the cooling system can raise the level in the radiator and cause loss of coolant through the overflow. Air may be leaking in the system at the water pump seal. And exhaust gas may be forcing its way in the cooling system through a small leak at the cylinder head gasket.

Finally, there may be a cracked cylinder head in the area between the valves. A close, careful inspection with the rocker-arm covers removed is necessary.

## SERVICE TIPS

□ **If your Capri** requires frequent additions of water to the battery, wires within the harness between the alternator and regulator may have been inadvertently crossed in production, leading to a maximum charging rate at all times. Lincoln-Mercury shops have been cautioned to keep on the lookout for the condition. When found, shops are to replace the alternator-to-regulator wiring.

□ **Chevrolet automatics:** Problems with the Turbo Hydra-Matic 400 when it is operating at maximum temperature have been pinned on intermediate-clutch inner piston seals that have lost the ability to seal when hot. Problems include no second gear, shifting to neutral on a downshift, slipping in second, missing second altogether, and transmission hunting (1-3-1). Unfortunately, examination of the intermediate clutch and seals generally shows no wear or damage. This is why Chevy has issued this blanket directive: "If a complaint such as those listed above is encountered, the intermediate clutch piston seals must be replaced."

□ **All Chrysler Corp. cars** and light trucks prior to 1972 that are experiencing excessive engine-oil consumption can be helped by the installation of an improved intake valve stem seal (part No. 36716161). Care must be taken when installing this seal. It should be pressed firmly and squarely over the valve guide, using the valve stem as a pilot. It must not be crushed by the valve spring retainer when the lock is installed. A slipup in repair will allow the oil consumption problem to continue. ★★★

**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.

THE MORE YOU KNOW, THE MORE YOU'LL WANT

# DELCO

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TO HAVE YOUR AIR CONDITIONER CHECKED.**

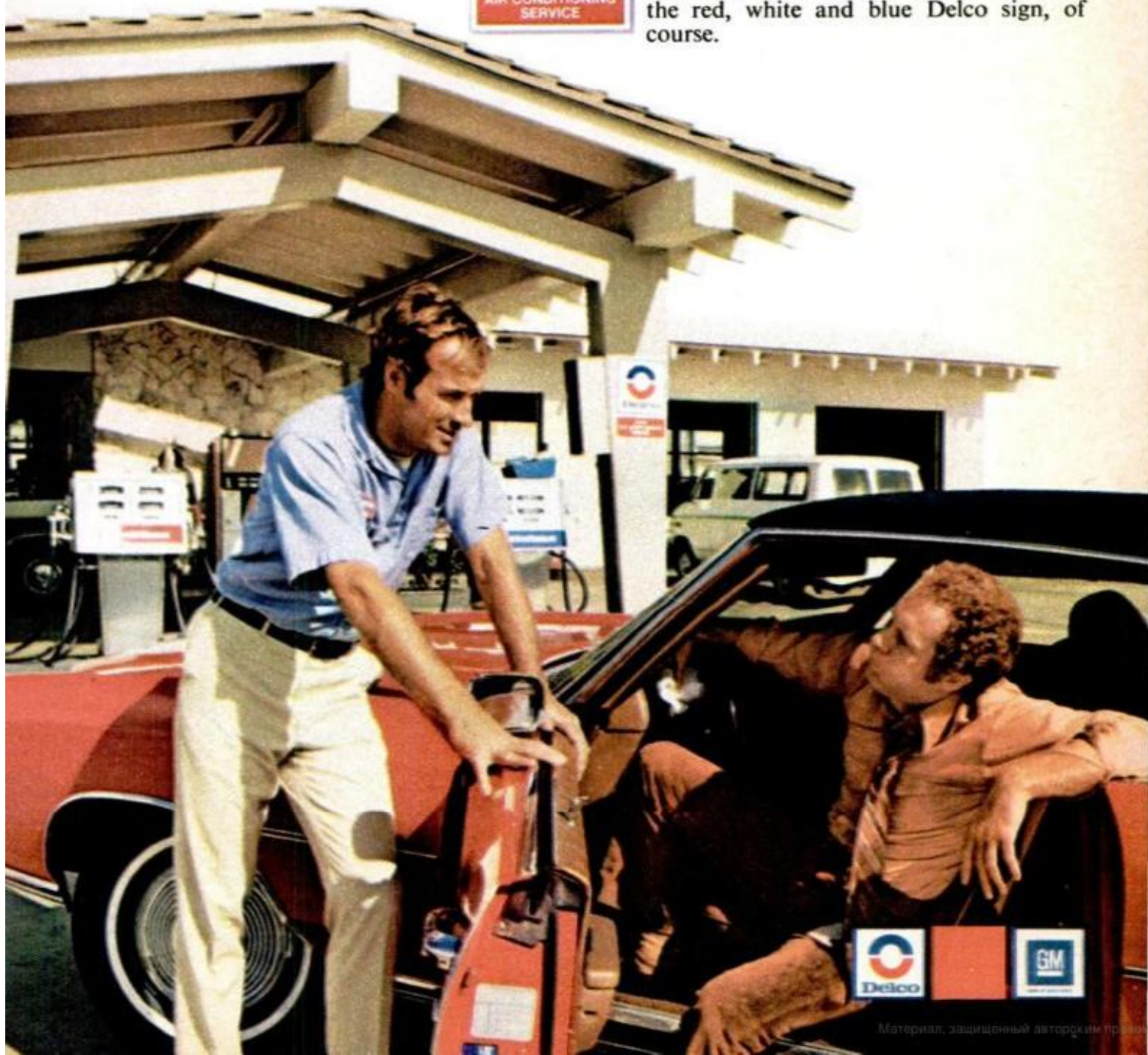
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Imperial	Vega	Fairlane	Montego
Cadillac	Pinto	Tempest	Torino
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## DETROIT LISTENING POST

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### GM pushing shrink program

GM's big cars aren't due to get new bodies until fall of 1976—for the 1977 model year. But in light of all the ills afflicting big cars, GM is reviewing plans for its full-sizers and, if possible, will advance the change-over by a year. All the cars, Cadillac included, will be smaller than '74 versions. This is not a recent decision. GM ordered a general scaling down of its big jobs more than two years ago, long before the energy crisis/gas shortage hit Detroit.

---

### Small-car fever at Ford

Ford has decided to run with a junior Lincoln without waiting for Cadillac to pave the way. But the small Cadillac will still be first out of the gate—by at least a year. Ford has been playing cat-and-mouse, waiting to see the compact Cadillac before tooling for a little Lincoln. But with all the problems confronting the big cars, Ford feels it can't wait any longer.

In another small-car development at Ford, a company source has now confirmed what we said here last month about pulling additional compacts off existing tooling. The company will use production equipment for this year's Maverick along with a few new dies to create another new car for 1975, so there will be both a Maverick and a son-of-Maverick later this year.

---

### Big bargains on big cars

If you're shopping for a new car, watch yourself or you could wind up with more automobile than you intended to buy. The auto companies and dealers have rigged things so those big gas-guzzlers look like too good a buy to pass up.

The rigging is strictly legit. Nothing illegal or dishonest about it. What they've done is increase prices on small cars and cut prices on big cars, narrowing the price spread to a point where it's hard to refuse

the big car. For another \$100 or so, as the salesman is quick to point out, you can get a bigger, heavier, classier car. The salesman isn't stretching it when he says the bigger car is a real buy for the money.

If you've always wanted to own a big job, this is the time to bite the bait. But if you go for the big car, consider what it will cost to keep gassed up, what you will have to pay for insurance and upkeep and, assuming the fuel situation doesn't improve, be prepared to take your lumps on depreciation when it's time to trade it in.

---

### Crashproof parts still viable

What happens to GM's program to develop body sections that self-restore to their original shape after impact now that petroleum is in short supply? The plastic material GM has been using to produce experimental parts that "forgive and forget" after a smashup has a petroleum base. GM cautions that it may be a long time before you see bounce-back body panels on production cars, but GM isn't giving up on the idea. The company says it has formulas for producing plastics that do not require petroleum, so the research program is still going on.

---

### Larger gas tanks on future cars

Sunday shutdowns of gas stations could influence the size of fuel tanks in cars of the future. The auto companies think many service stations will continue to close on Sunday, even after the fuel shortage is over: "The gas station guys are entitled to a day off, just like everybody else," is the way Detroit figures it. Many stations are not expected to return to a seven-day week even if gas becomes plentiful again. But car owners are still going to want to make long weekend trips without worrying about finding a station open. That's no big problem. By enlarging fuel tanks to take another

*(Please turn to page 48)*

Ford announces a timely new  
mid-size car  
in the Thunderbird Tradition.



GRAN TORINO

*Elite*



FORD GRAN TORINO ELITE

FORD DIVISION





Elite's optional luxury interior featuring knit cloth upholstery.

Elite, the personal luxury mid-size that's Thunderbird inspired, from its classic grille to its unique twin opera windows. And in the Thunderbird tradition of value, Elite gives you standards like vinyl roof. SelectShift Cruise-O-Matic transmission. Power steering. Power front disc brakes. Steel-belted radial ply tires. And a standard engine that does not require premium gas. The Gran Torino Elite. America's youngest luxury car. At a mid-size price.

Below—the 1974 Gran Torino Elite with optional deep dish wheels, WSW tires, deluxe bumper group and accent stripes.



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## DETROIT LISTENING POST

(Continued from page 45)

two or three gallons, most cars will be able to cover 250 miles over a weekend with enough gas left to get to the station Monday morning.

### More keys to confound car crooks

You may eventually have to carry three keys, instead of the customary two, to operate your car. One for doors, one for the ignition and a third for the trunk. Car-makers are considering different combinations of keys and locks to make it more difficult for thieves to break into your car, into the trunk and to start the car (via the ignition) if they get by the door locks.

If you've driven a '74 model GM car, you will have noticed that one key opens both the doors and trunk, but not the ignition. The square-headed key works only in the ignition—a change from the usual setup where the ignition key also opens the doors. GM is eager to get statistics it can compare with last year's to see if the change cuts down on thefts and break-ins on GM cars.

Speaking of locks, have you tried to buy a locking gas cap? It's like looking for an all-silver dime in your pocket change.

### Speedometers to be cut back

Detroit used to put 125-mph speedometer readings on cars that couldn't top 95 if they were going down a greased hill in a tornado. Now some GM cars that can do 115 and 120 have speedometer mark that stop at 100. All '75 models are expected to understate top speeds. Sen. Charles Percy has asked the industry to cut the top reading to 85 or 90. Assuming the companies sell enough cars to use all speedometer panels printed for '74 models, markings will be cut back to 90 on the '75s.

### Last year for Javelin

American Motors may keep the Javelin name to designate a model when the '75s go into production, but the car will be discontinued as a separate line the end of this model year. If the name is retained, it won't be on AMC's new mini commuter car. ★★

# AN EXPERT ANSWERS YOUR QUESTIONS ABOUT MUSCLES

Our files show that thousands of readers like yourself want to build bulging muscles and achieve real physical power like their favorite athletic champions. How to go about it? We decided to ask an expert, Dave Prowse, 3-times British Weightlifting champion and leading fitness expert. Here are his answers.

**Q** *What does it take to build muscles?*

**A** Basically, it takes exercise. Almost any exercise will help to develop at least some of your muscles if you keep at it long enough and hard enough.

**Q** *Isn't there an easier way?*

**A** Yes. There is one outstandingly effective training method that is also fast and easy—the Bullworker system.

**Q** *What's that?*

**A** The Bullworker is a revolutionary new muscle-building exerciser based on Isometrics, the science that increases strength up to four times faster than conventional methods. In my opinion, it's the most advanced training system in the world today. Many leading athletes use it: World Heavyweight Judo Champion Wim Ruska, and Cycling Champion Eddy Merckx, to name only a few.

## Built-in Powermeter

You can actually *measure* your musclepower g-r-o-w-i-n-g from the very first day.



**Q** *How long does Bullworker training take?*

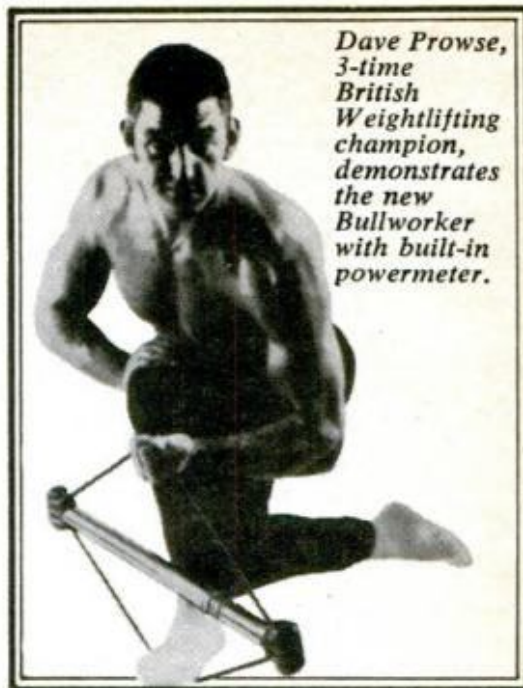
**A** Bullworker provides absolutely the fastest kind of exercise possible. In fact, an introductory training program takes only 70 seconds a day.

**Q** *How long does it take before you begin getting results?*

**A** With the Bullworker, you can actually begin to *see* and *measure* the positive results right from the very first day! Isometric Bullworker training can increase your power at the amazing rate of up to 4% per week!

**Q** *But to get such impressive results, don't you have to work very hard?*

**A** Absolutely not! That's the outstanding advantage of Isometric training... it's so amazingly easy! Each "Static-power" Isometric exercise takes only 7 seconds, and you barely have to move.



Dave Prowse, 3-time British Weightlifting champion, demonstrates the new Bullworker with built-in powermeter.

**Q** *Can Bullworker training even develop bodies which are weak and skinny, or fat and flabby?*

**A** Definitely! Bullworker training helps transform weak, thin arms into rippling, muscular pillars of strength. Helps build broad, powerful shoulders. Turns flat, shallow chests into deep, manly ones. Forges loose stomach flab into steel-hard, well-defined muscle. Helps charge your whole body with new energy and go-power... And all this in *record time!*

What's more, I've known skinny, shy fellows who, after just a few short weeks with Bullworker, turned into real go-getters... every inch a man... bowling girls over with their dynamism, confidence, and new found power!

**Q** *How can our readers find out more about the Bullworker?*

**A** I understand that the Bullworker distributor in the U.S.A. is now making it available—free—on a two week home-trial basis. If your readers are interested in developing their bodies, I suggest that they contact the distributor for full details.

© BULLWORKER SERVICE,

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## THE BICYCLE SHOP

BY EUGENE A. SLOANE

### Easier rider?

*I am fascinated with the idea of a recumbent bicycle, especially the type on which the rider sits as in a chair. To my knowledge, no one has made a bicycle of this type, which is surprising when you consider some of the weird things that have been manufactured. The recumbent may be an alternative to the current design.—John T. Riley, Iowa City, Iowa*

The recumbent bicycle has been around quite a while. However, tests conducted by racing cyclists in Europe revealed that they take a good deal more energy to pedal. That is why they have never been successful and are not on the market.

### What's a good derailleur?

*Recently I bought a bicycle with a GT 150 derailleur. Is this a good derailleur? What do you think of Shimano derailleurs?—Mark Goodman, Bloomington, Minn.*

The GT 150 is a reasonably good one, but on the heavy side. The lighter Shimano derailleurs, such as the Crane line, are very excellent and compare favorably with European units.

### A search and a tip

*Where can I get a rivet remover in Tampa, Brooksville or St. Petersburg? Also, here is a tip: When you get a new cable, take it out of the case, put lubricant on the cable and put the cable back in its case.—Ronnie Bornmann, Brooksville, Fla.*

You should be able to find a rivet remover in any good bicycle store in St. Petersburg, especially if the store caters to high-quality bicycles. If not, try a mail-order house, such as Wheel Goods, Inc., 2737 Hennepin Ave., Minneapolis, Minn., which has a \$2 catalog of parts. And thanks for the tip. It's an old trick, but the problem is that if



**The Cannondale Bike Tuning Stand** is handy for the serious cyclist. Made of 3/4-inch plated tubular steel, it stands on four molded rubber feet that prevent sliding on floors. Three polished Lexan spools cradle the frame of a bicycle and prevent marring of the bike's finish. The BTS 100 will accommodate virtually every adult bicycle made today. When sitting on the floor, the stand raises the derailleur about 20 inches off the ground. Price is \$15. Cannondale Corp., 35 Pulaski St., Stamford, Conn. 06902.

you put lots of grease on a cable, you'll find a lot of dust and dirt getting into the cable and clogging it up. I prefer a light coating of oil which will soak into the cable and still make the cable slide easier in its plastic or steel spaghetti tubing. It's a good idea to keep cable tubing as short as possible to minimize the problem of dirt getting into the tubing.

### Silencing a squeal

*When I apply my front brakes they squeal. The rim is not dirty and the brake rubbers*  
*(Please turn to page 52)*

# Have one of mine.

Get hold of  
honest taste.

Have an  
Old Gold.



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

19 mg. "tar," 1.2 mg. nicotine  
av. per cigarette, FTC Report Sept. 73.

## THE BICYCLE SHOP

*(Continued from page 50)*

*are not glazed. What could be the trouble?*  
—Ken Baine, Toronto, Ont.

Could be you have small pieces of metal embedded in the brake shoes. Could be the brake shoe composition is basically wrong. You could also have the brake shoes toed the wrong way. I suggest you cut the brake shoes slightly away at the front so they will "toe in" a bit. This will put pressure on the brake arms, causing them to bend slightly as the brake is applied. The wrong-way toe is primarily a problem of old caliper brakes that are worn.

---

### Look for Zeus in Spain

*I am assigned to a U.S. Navy vessel operating in the Mediterranean. We will be going into port, such as Barcelona, Spain. Could you provide me with the name and address of a quality Spanish bicycle manufacturer?*  
—Cmdr. R.C. Johnson, FPO New York

Zeus makes a very fine line of bicycles—just as good as any bicycle made anyplace. You should be able to find Zeus bikes and parts anywhere in Europe, certainly in Spain. If you have problems, write Zeus Industrial S.A., Apartado 72, Durango, Vizcaya, Spain.

---

### What grease for a 10-speed?

*I have a good 10-speed bicycle. I recently repacked the bearings in the steering head and the front wheel. But I don't know how to do the pedal and rear-wheel assemblies. I don't want to go to a bicycle shop because of the cost. Can you tell me how to do this? I used grease from a gas station which is used for lubricating cars. Is this okay? And where can I buy your Complete Book of Bicycling?*—Gayle Jones, Storrs, Conn.

I do not recommend your using chassis lube grease. It's too heavy for your bike. Use Lubriplate Type A automotive grease, which you can buy in an auto-parts store, or Lubriplate Marinelube grease, which you can buy in a marine parts store. Both are the same type of grease. As for maintaining pedals and rear-wheel assemblies, check the July 1972 *Bicycle Shop* (page 34) for pedals and the April 1972 column (page 31) for hubs. You might also check my book, *The*

*Complete Book of Bicycling*, available either from your local book store or directly from Trident Press Div., Simon and Schuster, 630 Fifth Ave., New York, N.Y. 10020. Price is \$9.95.

---

### Brave brazer

*I am interested in brazing together my own frame out of Reynolds 531 double-butted or Columbus tubing. Where can I buy such tubing?*—Greg Meyer, South Elgin, Ill.

I think you're going to have trouble finding the small amount of tubing you want since both these firms sell tubing primarily to bicycle manufacturers, in large quantity. However, you may be able to persuade Reynolds to part with enough for a bike. First, write Reynolds Tube Co., Ltd., Hay Hall Works, Tyseley, Birmingham 11, Great Britain, and ask for the brochure on cycle tubing. I hope you are an expert brazer because this type of steel working takes a lot of skill. You should also have a frame jig to hold the tube members in correct alignment. Best of luck. (If you should make up a frame, write and let me know so I can get in touch with you.)

---

### Curing a five-speed 'pop-off'

*When shifting into first gear (large sprocket) on my five-speed bicycle, the chain comes off the chainwheel after about a minute. What is the solution?*—Glenn Serkez, Tappan, N.Y.

To make sure we're both talking about the same thing, I assume when you say chainwheel that you are talking about the front sprocket, and when you talk about shifting into first gear (large sprocket), you mean the largest rear gear. It could be that your chainwheel is wavy or bent, which will cause the chain to pop off the chainwheel. This would be particularly true when the chain is at an extreme angle, as it is when it is on either the small or the large rear gear. This "pop-off" could also be caused by worn teeth or a worn chain, which gives excess play in the chain travel. Try pulling the chain apart. Remove the chain and lay it flat on a piece of paper on the ground. With the chain compressed, measure its length; again, measure the chain when

*(Please turn to page 54)*



# CHEVY

With full time 4-wheel drive.

# 4-WHEELERS



4-wheel-drive Chevy pickup



4-wheel-drive Suburban



4-wheel-drive Blazer

**Now with full-time 4-wheel drive.** Chevy's system gives you the advantages of 4-wheel drive full time. You cruise smoothly on the highway while enjoying improved stability under varying road conditions. The system eliminates the need for free-wheeling front hubs; allows you to move on or off the road at will without having to get out and lock or unlock the hubs. V8 models have Chevy's full-time 4-wheel drive; sixes have conventional 4-wheel drive. Two-wheel-drive models available with either Six or V8.

**Built like there were no roads at all.** Chevy's 4-wheelers are built tough: Blazers, Suburbans, pickups—all have ladder-type frames made of high-tensile-strength carbon steel. Doors and front cowls are double walls of steel. Hood and front

fenders are double-walled, too. Even the rear light lenses, made of Lexan,<sup>®</sup> are almost unbreakable. And to help smooth the ride, strong multi-leaf springs front and rear are standard.

**New brake systems computer-matched to vehicle size and capacity.** Fade-resistant front disc/rear drum brakes with power assist are provided on Chevy 4-wheelers. And they're computer-matched to vehicle size and capacity. Heavier duty trucks get heavier duty brakes. Also provided on most models is a built-in disc brake lining wear sensor which sounds an audible signal when pads need replacement.

Another example of Chevy trucks' built-in value.



Chevrolet

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rusty. You just brush  
it on. Then wash  
it off. Rust is  
gone. Fang is  
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little rusty. I  
wonder if it  
would work  
on him.

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Boulder, Colorado 80303 *frostline kits*

## THE BICYCLE SHOP

*(Continued from page 52)*

you pull it apart. If you have much more than  $\frac{1}{8}$ -inch play, the chain is worn. I would suggest, in that case, replacing both the chain and chain-wheel.

### Stretching for one

*I have an expensive racing bicycle on which I intend to race. Should I install Cinelli or TTT "Record" stem end bars? According to your book, the distance from my elbow to outstretched fingers ( $16\frac{1}{2}$  inches) should equal the distance from the bars to the nose of the saddle. If this is so, I would need a stem length of 1 inch. Could this be correct?—Jim Davis, Cedar Rapids, Iowa*

I would recommend the Cinelli bars and stem. With regard to stem length, my book mentions that a fairly rough indication of correct stem length is to measure the "distance from your elbow to your outstretched fingertips. This should be the distance from the very rear edge of the center part of the handlebars to the nose of the saddle." You should be sitting more or less upright when you make the measurement. If the measurement calls for a 1-inch stem, you may have trouble finding such a short one.

### Well spoken

*What size spoke do you use for respoking a 26-inch rim?—B. Sherwood, Lake George, N.Y.*

If you're lacing up a wheel with 36 holes, four cross, and the wheel is  $26 \times 1\frac{3}{8}$  inches with English-size tires, use  $11\frac{1}{4}$ -inch spokes. If you use English-size tires on a  $1\frac{1}{4}$ -inch rim, use  $11\frac{1}{2}$ -inch spokes. If you use U.S. clincher tires, with 2.125 rims, use  $10\frac{5}{8}$ -inch spokes; for 1.35-inch rims, use  $11\frac{7}{16}$ -inch spokes; for  $1\frac{3}{8}$ -inch rims, use  $11\frac{7}{16}$ -inch spokes; and for 1.75-inch rims, use  $10\frac{7}{8}$ -inch spokes. ★★

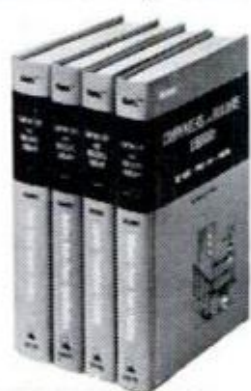
*Gene answers letters of general reader interest in every third or fourth Bicycle Shop column. However, it is impossible for him to give individual responses to your letters, so please do not enclose a stamped envelope for a reply. Letters should be addressed to The Bicycle Shop, Popular Mechanics, 224 West 57th St., New York, N.Y. 10019.*



**"For an amateur,  
he's a whiz.  
How'd he get  
so good?"**

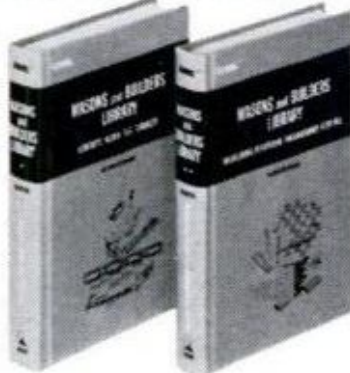
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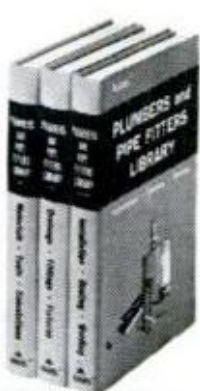
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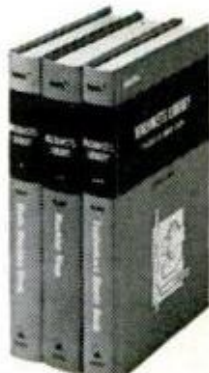
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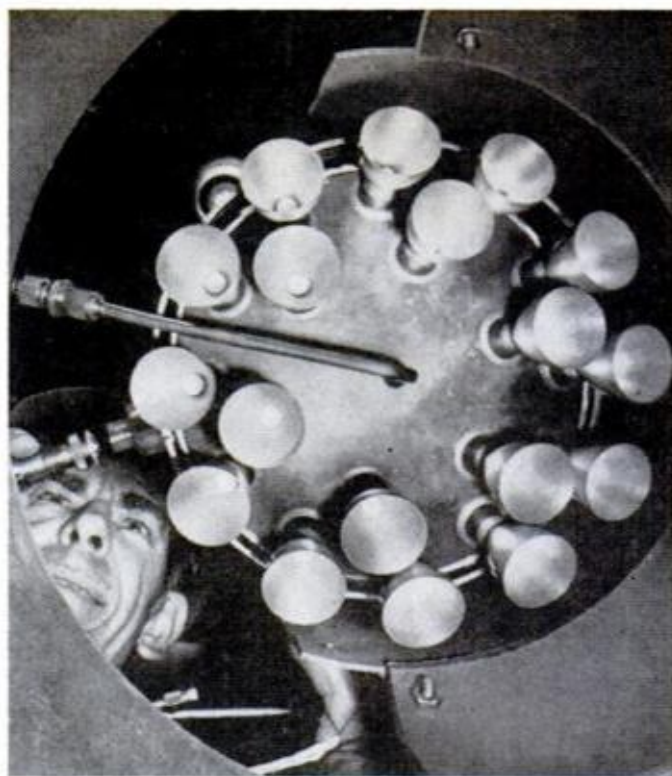
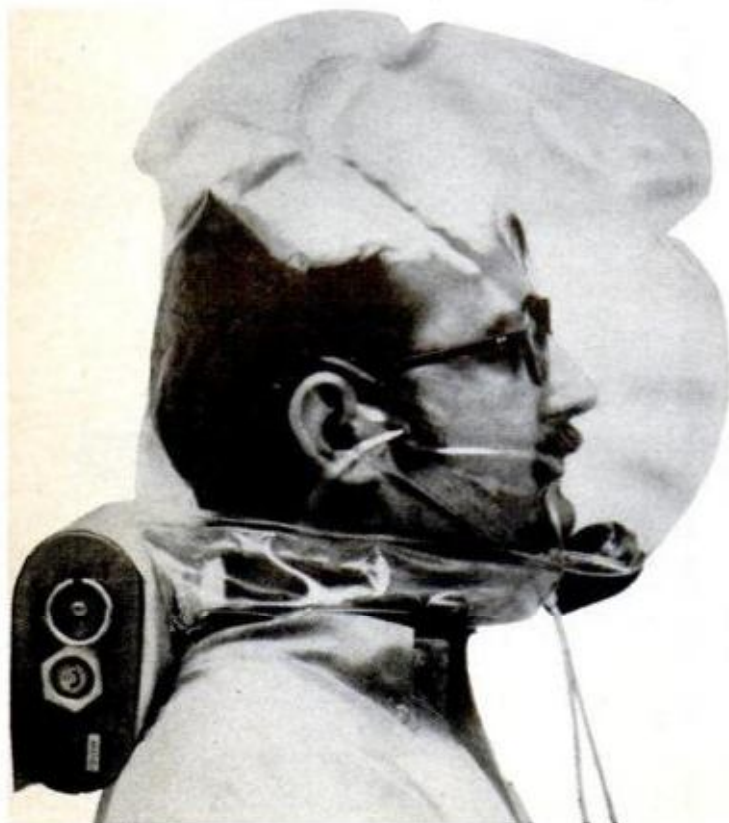
## SCIENCE WORLDWIDE

### Stored gasoline can be dynamite

Motorists who store extra gasoline in cans in their cars or homes are actually harboring potentially lethal bombs. That warning comes from National Safety Council experts who say that one gallon of gasoline has an explosive force equal to about 14 sticks of dynamite. Expanding gasoline vapors can split the seams of an unvented can or cause vapor leakage from a vented "safety" can. Sparks from a light switch, car ignition or short in a taillight circuit can then trigger an explosion. The only safe storage place for gasoline, say experts, is in your car's gasoline tank.

### For escape in an emergency

A self-contained breathing apparatus for escape from smoke or fume-filled environments has been developed by Lear Siegler, Inc., Anaheim, Calif. It consists of a transparent, fire-resistant hood and a rechargeable air reservoir that will last for five minutes. Positive air pressure and an elastic neckband combine to keep out noxious gases.



### Rocket engine for Mars lander

NASA's Viking spacecraft, scheduled to land on Mars in 1976 after a year-long journey from Earth, will use three rocket engines to cushion the descent. As shown above, the bottom of each engine will have 18 small nozzles to disperse engine blast. The blast from a conventional single nozzle would disturb the surface near the lander and thus affect experiments that rely on samples taken from the surface. The 18-nozzle configuration was developed by engineers at Martin Marietta Aerospace, Denver. The lander will perform a wide range of experiments to determine the nature of the atmosphere and surface of Mars as part of an investigation to determine if life forms exist.

### Joggers, keep smiling!

If you're a jogger, think pleasant thoughts while running and you'll decrease your heart rate. That advice comes from Louisiana State University, where 80 student-subjects running on a treadmill were either given complex mental problems to solve or told to think about vacations, good food or other pleasant prospects. Participants were wired to a cardiograph recorder. To establish the validity of the data, each experimental subject later was put through the exercise routine without mental stimulus. Results showed that runners under mental

*(Please turn to page 58)*

# THE MACHINE THAT WON'T TAKE NO FOR AN ANSWER. FROM BLACK & DECKER.

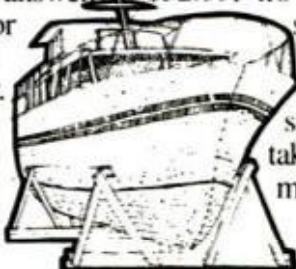
We're talking about the Black & Decker 7450 belt sander. Whatever it is that's between you and the wood, with this baby you can sand it good-bye.



Like thick varnish. Or heavy coats of paint. Or even polyurethane. Just put on a coarse-grit belt, and the 7450—with its powerful ¾ HP motor—just won't take no for an answer.

For *tough* jobs like boat hulls or painted table tops, it'll get you down to the bare wood. And *fast*.

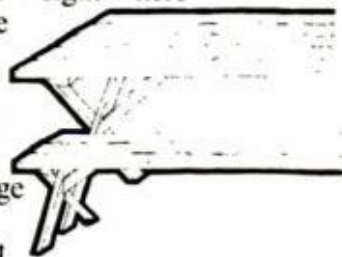
And because of its unique "low center of gravity" construction, the 7450 handles easily, too.



The motor is mounted down low, between the pulleys. This puts the weight where it should be, keeping the machine flat on the work, with no "gouging" or "rocking." All you have to do is guide it.

The 7450 doesn't gouge on the price, either. At \$52.99, it's a lot of belt sander for the money.

The Black & Decker 7450 belt sander. All things considered, the machine that won't take no for an answer is a tough machine to say no to.



7450. 3"x24" LCG BELT SANDER

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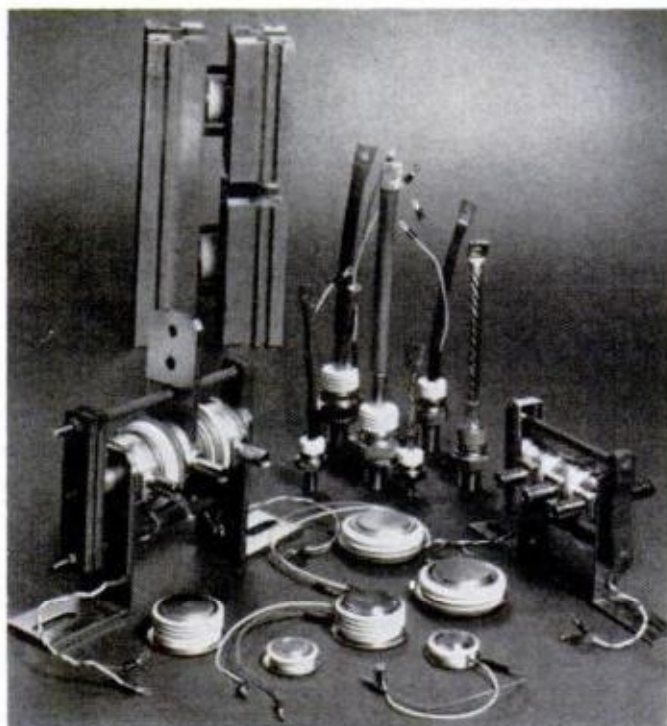
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## SCIENCE WORLDWIDE

(Continued from page 56)

stress consistently registered higher heart rates, that those with a happy outlook registered lower.



## Know-how transferred by computer

Making high-power semiconductors like those shown above takes skilled personnel and sophisticated technology. When the Westinghouse Corp. recently signed a \$10-million contract with Poland to equip and put into operation a semiconductor facility near Warsaw, Westinghouse scientists developed a computer program to export their technology. The manufacturing system was divided into 32 functions, 175 specific operations and 430 individual work stations. The computer also oversees materials, some 3000 specific items ranging from conveyors to thumb guards, and helps supervisors train employees "by the numbers." Semiconductors shown above are used in industry to control large amounts of electrical power.

## Deep wells for cooling

Scientists at a General Electric lab are studying a new concept for conserving energy by storing heat in underground water wells. The method would provide an alternative to water towers or rivers for cooling in powerplant operations. Each method creates environmental problems. ★★★



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Gel Gasket takes the place of an inventory of gaskets. You can replace any soft gasket, do a better job than a gasket does, faster and simpler, and save money too.

Gel Gasket seals the moment you assemble the parts. So you can use the assembly immediately. Unlike with soft gaskets, a Gel Gasket assembly has great structural strength. And Gel Gasket doesn't age, crack, relax or let fluids wick through. It even comes off with a flick of your finger.

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up paneling easily, in minutes,  
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Countersinks wood-toned nails. No filling. No mars,  
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A HAMMER USE THE  
WHAMMER!**

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# PHOTO HINTS

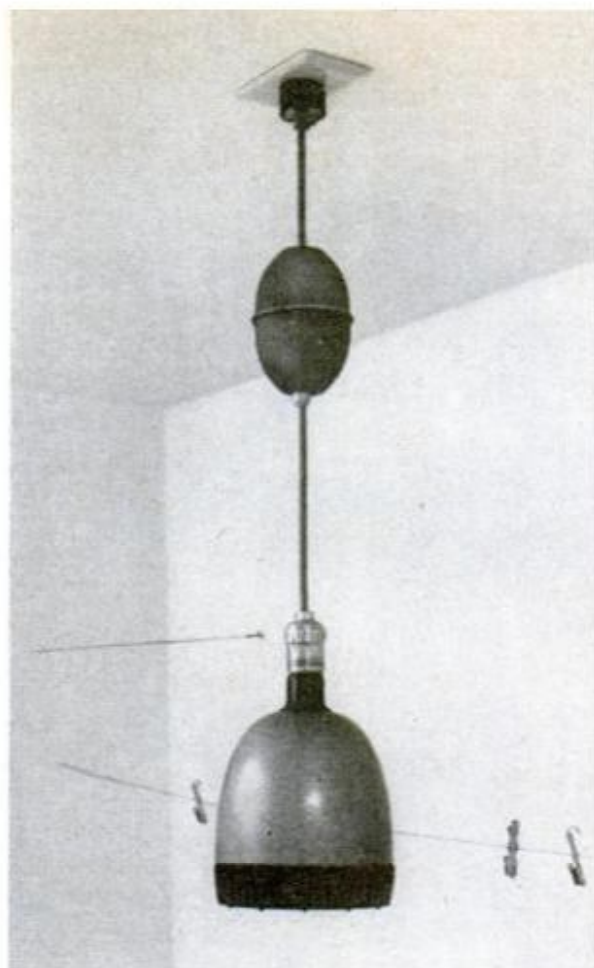
## FROM READERS



### Slip-on erasers cut darkroom slipups

The rubber erasers that slip onto pencils can slip helpfully into your darkroom, too. They can give you a better grip on the knobs of some photo timers (above, left), while keeping the timer's metal from contamination by any photo chemicals on your hands. And erasers over the ends of glass darkroom thermometers (above, right) help protect them from breakage, without interfering with temperature measurement.

—Ken Patterson, Regina, Sask.



### Pull-down safelight proves more useful

Attach your safelight to a pull-down reel of the type made for household light fixtures, and you double its utility. You can lower it over a tray for better inspection of developing prints, or raise it for more general illumination and to avoid fogging high-speed papers. I attached mine to a ceiling outlet, using a commercial type twist-lock electrical plug, but you can also mount it permanently, if you prefer.

—Val Hawes, Brea, Calif.



### Tape over film tank prevents mistakes

If you don't develop your film right after you load it into your film tank you may forget you've loaded it—or forget what type of film you've loaded. Fastening a piece of tape around the lid will remind you (and others) that the tank is loaded. Write the film type and developing time on the tape.—Ken Patterson, Regina, Sask.



### Easy bracket holds flash

Holding the flashgun away from your camera, or adding off-camera extension flashes, gives your shots more interesting illumination. But how do you hold the camera and still aim a flash—especially a flash beyond arm's reach?

This simple stand can do it for you. It can be made in minutes from a small square of scrap  $\frac{3}{4}$ -inch lumber, plus a pair of standard 3-inch angle irons and a pair of  $\frac{1}{4}$ -inch bolts with wingnuts.

The mounting shoe for the flash is cut from a tin can, then formed with pliers and its sharp edges filed. A  $\frac{1}{4}$ -20 nut epoxied into a hole in the wood base (or a  $\frac{1}{4}$ -20 T-nut) also permits tripod mounting when required.

—George Daniels, Danbury, Conn.



## Minolta helps you define the innocence of children.

You can enter a child's world with a camera that doesn't hold you back, a camera responsive enough to catch the fleeting moment.

From the moment you pick it up, you're comfortable with a Minolta SR-T. This is the 35mm reflex camera that lets you concentrate on mood and insight. The viewfinder gives you all the information needed for correct exposure and focusing. Because you never have to look away from the finder to adjust a Minolta SR-T, you're ready to catch the one photograph that could never be taken again.

Try a Minolta SR-T camera and rediscover childhood. For more information, see your photo dealer or write Minolta Corporation, 200 Park Avenue South, N.Y., N.Y. 10003. In Canada: Anglophoto Ltd., P.Q.



**Minolta SR-T 101/Minolta SR-T 102**



**Shoppers Keep Coming Back for More at Their Ace Hardware Store**

• More National Brands • More Savings  
• More Service



**WEN 6" Electric Grinder**

Grinds tools. Sharpens bits. Buffs and polishes. 1/2 HP 8.5 amp shaded pole motor. Balanced and ventilated for smooth, quiet running. Model 1030. Reg. 59.95

**Only 44.88**



**LIQUID WRENCH  
Aerosol Spray  
Rust-Solvent**

Loosens nuts, bolts, screws and parts frozen by rust, corrosion, scale, paint or varnish. Protects finely finished surfaces. Reg. 1.20 6 oz.

**Only 99¢**



**KNAPE & VOGT**

**Shelving, Wall Standards and Brackets**

Shelving of laminated walnut finish. Looks like wood. Sizes 8" x 24" to 12" x 48". Standards and shelf brackets available in various finishes. Standards in sizes 24" to 72". Matching brackets available 6" to 12".

**ORTHO  
WEED-B-GON  
Weed Control**

Kills broad leaf weeds in lawns. Wipes out dandelions. Won't harm grass. Reseed anytime after application. 32 ounce can.



**Only 2.98**

Due to physical size and merchandising policies, some stores may not have in stock all items illustrated in this advertisement.

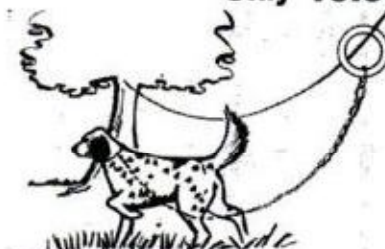
(PM374)



**ROCKWELL Cordless Electric  
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Battery-operated. No pumping, no hose. Sprays at a simple touch. Great for roses, spot-spraying of lawns, shrubs and bushes. Model 30.

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**ACCO TENSO  
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Lightweight yet strong stake action. Allows dog freedom for exercise. Large wire ring on one end and swivel-snap on the other end. Reg. 4.75

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**WISS  
Pruning Shears**

Teflon-S coated Wissaloy steel blade. Two position thumb latch facilitates rapid, light pruning, thinning or picking. Non-slip comfort grips. Model T708 Reg. 4.50

**Only 3.79**

**FREE  
1000 HUFFY  
TEN-SPEED  
BIKES!**

*Check with Your  
Ace Hardware Store.*

**PUBLICATIONS WORTH  
WRITING FOR**

**PM'S PICTURE-TOOLS** are a great new idea to take the confusion out of *what goes where* on workshop and tool panels.

The complete PM **PICTURE-TOOL KIT** consists of seven big sheets (9 3/4 x 11 3/4 in.) of a special heavy-weight paper with a pressure-sensitive adhesive on the back. On each sheet are beautiful drawings of hand tools and portable power tools—all you're likely to have in your shop (74 in total). Most are full size; the others nearly so.

Also enclosed in the kit is a blank sheet of the same special paper, printed in an overall color to match the tools. This sheet enables you to design your own drawings of special tools.

Each of the PM **PICTURE-TOOLS** is carefully die-cut. You simply peel off the backing paper and apply it to the proper spot: on painted or unpainted wood, plywood, hardboard and even perforated-hardboard surface.

Later, if you want to move a few tools or rearrange the entire panel, you can peel off the PM **PICTURE-TOOLS** and reuse them in new locations!

Once your **PICTURE-TOOLS** are in place, you'll know at a glance exactly where each tool belongs.

Order your PM **PICTURE-TOOL KIT** today. Simply send a check or money order for \$3.95 to Popular Mechanics, Dept. PT, Box 1014, Radio City, New York, N.Y. 10019. Be sure to enclose your name and address. ★★★

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Get into the big, year-round  
**EXTRA MONEY BUSINESS**  
that's EASY to learn—EASY to do  
—and EASY ON YOU!

# Be a LOCKSMITH!

Make Up to \$10 an Hour —even while learning! Train FAST at Home!

Never before have money-making opportunities been so big for qualified Locksmiths. Now lucrative regular lock and key business has multiplied a thousandfold as millions seek greater protection against zooming crime. Yet there's only one Locksmith for every 17,000 people!

### LEARN THE QUICK AND EASY BELSAW WAY

to take advantage of this tremendous opportunity for year-round EXTRA INCOME in sparetime—or in a fulltime, high-profit business of your own... now and for THE REST OF YOUR LIFE! All tools plus professional Key Machine given you with course. These plus practice equipment, plus easy illustrated lessons, plus personalized help from expert teachers, plus business-getting guidance—enable you to make \$5 to \$10 an hour almost from the start! Hundreds we've trained have done it. So can YOU!

### JOIN THESE BELSAW MONEYMAKERS

"I earned \$500 while learning. My best week was \$125. Business gets better and better."  
V. Tizio, Brooklyn, N.Y.

"I cleared \$110 last Saturday! I'm doing wonderful. Locksmithing is a great business."  
R. W. Davis, St. Louis, Mo.

### FIND OUT ALL ABOUT IT No Obligation — No Salesman Will Call

Discover what's in Locksmithing for you with Belsaw training...how you can depend on this urgently needed skill for MORE INCOME, EASIER, MORE ENJOYABLE LIVING now and for retirement. Just fill in and send the coupon to receive full information by return mail.

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Approved for Veteran Benefits

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**Clears \$75 a Week Sparetime!**

"I'm proud to be a Belsaw graduate and a success in this great profession. I'm making over \$300.00 a month in my sparetime with your training—the best there is."

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### THIS PRO KEY MACHINE— YOURS TO KEEP

can add \$25 to \$40  
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Tells how to  
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Locksmithing—  
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Start.

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## Mail This Card Today—No Stamp Needed!

### LOCKSMITHS ENJOY ALL THESE ADVANTAGES:



- You're part of a firmly established, vitally necessary professional trade.
- Shortage of qualified locksmiths everywhere.
- Clean, respected work that's easy to do—and easy on you.
- You collect cash for work—no credit losses, no collection expenses, no employment problems.
- Business-getting methods are simple. No salesmanship required.
- You're a trusted member of your community.

Please send me free of cost or obligation your publication "Keys to Your Future" on how Belsaw can train me to quickly make money in Locksmithing and how all tools and Key Machine are given me to keep. I understand no salesman will call.

Name \_\_\_\_\_

Address \_\_\_\_\_

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CUT ALONG DOTTED LINES

# Pool it!

Choosing the vehicle and setting up the rules are the first steps to organizing a car pool that really works.

by **Bill Hartford** AUTO EDITOR  
and **Robert Lund** DETROIT AUTO EDITOR

**P**ooling your resources is the best way to beat the gas shortage. Here are the car-pool vehicles that will give you the most seating capacity for the money. All are van-type vehicles and, except for one VW, will seat a minimum of eight, including driver. The small VW van seats seven. (Incidentally, VW doesn't call its van a van. VW calls it a wagon. But it's a van by any other definition.)

If you order the spare seat, which will cost you extra, you can accommodate 9 to 12 people, depending on the vehicle make and model you buy. Dodge has an optional seating package for one model, the B-300 Sportsman Maxi-Wagon, that seats 15.

Vans are longer and higher than passenger cars, so if you want to garage the vehicle at night, measure your garage and check the dimensions against the length/height figures in the chart on page 64F to make sure the rig will fit in your garage.

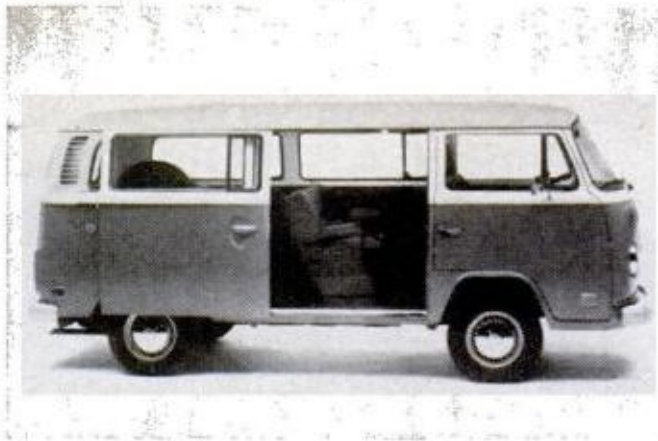
You can get help from the Census Bureau in putting together a car pool. But you have to supply the Bureau with a lot of information. The program worked up by the Bureau can help if you work in a big office or factory employing several hundred people, but it is not practical for one guy trying to round up neighbors to share the ride. For additional information, write Users Service Staff, Data Users Office, Bureau of Census, Washington, D.C. 20233.

Prices shown in the chart are for the basic vehicle and do not include freight, dealer make-ready and local taxes. You will also have to pay extra for any trimmings you add—radio, automatic transmission, power steering—excepting Checker's Aero-bus, which comes with the extras built in.

(We haven't listed motor homes here. True, they burn more gas than vans, but with a full complement of commuters, they,

*(Please turn to page 64D)*

**Volkswagen Station Wagon**



**International Travelall**



**Dodge B-200 Royal Sportsman Wagon**



**Chevrolet Suburban C-20**





CARPET DETERGER



UPHOLSTERY DETERGER



WALL DETERGER

# PART TIME or FULL TIME

*have your own  
money-making  
business*

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

Have your own money-making business and make the kind of income you probably thought impossible. You can when you clean carpeting or upholstery or walls with Von Schrader professional cleaning equipment. Every home, every building, are potential customers. And every customer represents repeat business.

Moreover, we help you every step of the way . . . just as we have helped thousands of other Von Schrader Associates build money-making businesses for almost 40 years. Here are some comments. Carpet: "You people sure helped me and I'll never forget it. I'm averaging about \$18,000 a year."—*H. Kendall*. "During first 2 months made \$2500 net."—*R. Pilong*. Upholstery: "One day I did a \$135 job. Best week was \$500."—*C. Lambert*. "We passed over the

\$450 mark in five days."—*T. E. Baylor*. Wall: "I work just 2 or 3 days a week. Best month was \$1200."—*J. R. Johnson*.

There are three easy-to-operate Von Schrader Detergers. You need no special skills. Each offers a proven way to a growing income. (1) Von Schrader Carpet Deterger gives deep-level cleaning to carpeting (2) Von Schrader Upholstery Deterger cleans fabrics and synthetics beautifully. (3) Von Schrader Wall Deterger cleans walls (and ceilings) five times faster than by hand.

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

There are no fees, royalties, or contracts. There's no franchise involved to shackle you with giving up part of your income. Instead, you own your equipment, keep all you earn. Cost of the equipment is so small you may find it hard to believe. What's more, we help you get started and continue to help afterwards. For complete information—without any obligation—send for the interesting free booklet.



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

—Francis von Schrader, President

Read about the big demand for on-location cleaning, see why Von Schrader Detergers are the finest of their kind, how easy they are to operate. Learn how other men have become financially independent, how Von Schrader helps you every step of the way. Fill in the coupon and send for free booklet.

**Extra! Special Recorded Message included with booklet.** Listen as Francis von Schrader talks to you personally about your growing future with Von Schrader Detergers.



Three proven ways to your own profitable business with Von Schrader Detergers

39 years of helping people earn good money

**VON SCHRADER company**

1034 Place, Racine, Wisconsin 53403

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## POOL IT!

(Continued from page 64B)

too, can be a cost-effective and comfortable way to go!)

"The secret of a successful car pool," says Ira Herrick, a PM art director, "is to run it exactly as if you were running a small commuter railroad." He knows: His eight-member car pool has been running smoothly for nine years. They commute between Rockland County and New York City in a Dodge van, their third vehicle since organizing the car pool—and their organization is impressive.

Members pay a monthly "commutation fare" of \$40 to the car-pool treasurer. That's about half what it would cost to commute on the railroad. Another saving is that most of the members don't need a second or "station" car in the family. More railroad fares are saved when other members of the families wish to go into the city: There's room in the 12-passenger van.

The \$320 collected each month is more than enough to pay for the van (they get a new one about every three years), all maintenance and repairs, parking, tolls, gas and so on. The van is registered in one name and insured with the other members of the car pool listed as alternate drivers.

One member is responsible for seeing that the van is serviced regularly and the bills are paid by the treasurer from the general fund. There's always surplus money and it

(Please turn to page 64F)

## Checker Aerobus



## GMC Rally Wagon



## Ford E-300

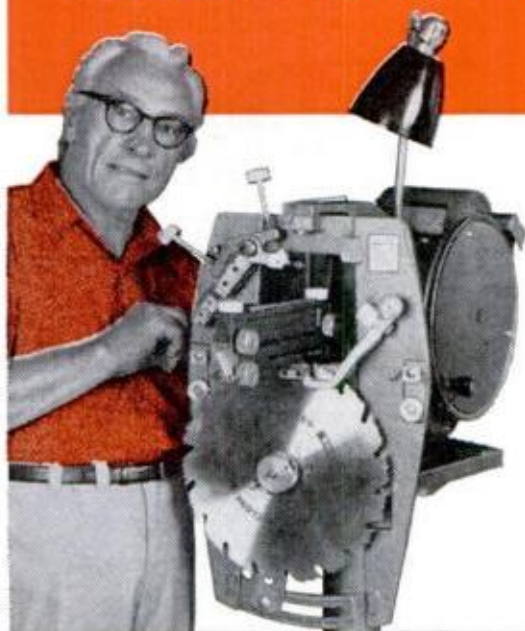




Need More Money? Want to Be Your Own Boss?

# START SAW SHARPENING BUSINESS

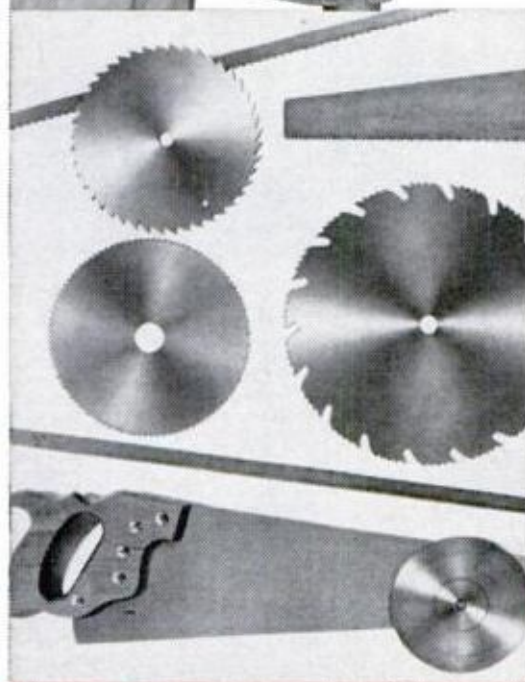
Of Your Own - in Your Sparetime



Turn your spare hours in the evening or weekends into extra dollars, this proven practical way—start your own money-making sharpening business—No selling or canvassing—No experience required. You can do it automatically with the Foley Saw Filer or Lawn Mower Sharpener.

## Beginners Earn \$5 to \$8 an Hour

People, just like yourself, all over the United States are making extra cash—\$20 to \$30 a week—right now in their spare time. "My spare-time saw filing business has made me \$952 these first ten months," says R. T. Chapman. Many start part-time, find it so profitable that they build year-round service business. You can, too, simply by following easy Foley plan.



## Town of 150 Supports Profitable Business

Here's the story from Dick and Jo Ann Koester after being in business less than a year. "We have acquired another Foley Saw Filer and for the past two months we have been in full-time operation. As we live in a small town of 150 population in farm area we use our truck to pick up saws in five nearby towns. With a family to support and plans for building to our house we had to pick up a business fast and already sharpen an average of 15-20 saws a day. Business for the future looks even better as good machine filing is our best advertising."

## CASH for Sharpening Mowers

Every neighbor with a lawn needs his lawn mower sharpened at least once a year. No experience is needed to start—anyone can operate and turn out professional jobs. All operations are handled quickly, easily and accurately.



Sharpen These Professionally  
with amazing

## Foley Saw Filer

You can sharpen combination (rip and crosscut) circular saws, band saws, hand saws, crosscut circular saws—and do a perfect job every time without experience or special training. The precision Foley Filer does it for you automatically! A complete repair shop in one machine! Set up in basement or garage, work your own hours in your own way and earn big sparetime profits.

## FOLEY WILL FINANCE YOU

Foley will help you get started with minimum investment. No franchise fee. Write for complete information. No obligation.

**Foley**

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Minneapolis, Minnesota 55418

Send Free Information on  Saw Sharpening Business  Lawn Mower Sharpening

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zipcode \_\_\_\_\_

## POOL IT!

(Continued from page 64D)

accumulates quickly—especially after the van is paid for. A member who moves or otherwise wishes to drop out of the car pool, gets back his equity in the van.

The member of the car pool who lives farthest from the city keeps the vehicle at his house. He's the one who has to get up first on cold mornings and start the run. So he pays \$10 a month less than the other members. He picks them up right at their doorstep. If they're not ready, too bad.

Still, it's not an impersonal, dreary business. The members are, of course, neighbors in the community and friends. Each has a card with the telephone number of the others, and, whenever possible, they phone the member up the road if they won't be going into work that day. If they know the day before, they indicate it on the clipboard in the van. Each member is listed, with drivers scheduled for morning and evening trips. In addition to the scheduling clipboard carried in the van, there's a maintenance log and a credit card for gas.

"We expect drivers to observe speed limits and be considerate of fellow passengers," says Ira. "They should drive so that limp, slumping sleepers don't get thrown onto the floor. Cap it off with a ban on discussions of politics, religion and sex—and you've got a working car pool!" ★ ★ ★



A car-pool van carrying a PM staffer rolls into town. The group's current van is this 12-passenger Dodge.



Driving schedule, names of pool members ("x" shows who's not riding that day) and toll book are kept on a clipboard. Good organization makes the car pool work.

Manufacturer and Model	Seating Capacity	Wheel-base (in.)	Overall Length (in.)	Overall Height (in.)	Standard Engine (cu. in.)	Optional Engine (cu. in.)	Price
<b>CHECKER</b> Aerobus	12	189.0	270.75	62.7	350 V8	NA	\$6211
<b>CHEVROLET</b> Sportvan G-20	8	110.0	177.0	80.0	250 6-cyl.	350 V8	\$3802
Sportvan G-20	8	125.0	201.0	80.0	250 6-cyl.	350 V8	\$3937
Sportvan G-30	12	125.0	201.0	81.0	250 6-cyl.	350 V8	\$4037
Sportvan G-30	12	125.0	201.0	81.0	350 V8	NA	\$4200
Suburban C-10	9	129.5	218.7	71.0	250 6-cyl.	454 V8	\$3863
Suburban C-20	9	129.5	218.7	72.0	454 V8	NA	\$4933
<b>DODGE</b> Sportsman B-200	8	109.0	176.0	80.8	225 6-cyl.	318 or 360 V8	\$3827
Sportsman B-200	8	127.0	194.0	80.8	225 6-cyl.	318 or 360 V8	\$3844
Sportsman B-300	12	127.0	194.0	80.8	318 V8	360 V8	\$4539
Maxi-Wagon B-300	15	127.0	212.0	80.8	318 V8	360 V8	\$4735
<b>FORD</b> E-200	8	105.5	169.1	78.9	240 6-cyl.	300 6-cyl. or 302 V8	\$3797
E-200	8	123.5	187.1	80.2	240 6-cyl.	300 6-cyl. or 302 V8	\$3921
E-300	8	105.5	169.1	78.9	240 6-cyl.	300 6-cyl. or 302 V8	\$4035
E-300	8	123.5	187.1	80.4	240 6-cyl.	300 6-cyl. or 302 V8	\$4160
E-300	12	123.5	187.1	80.5	240 6-cyl.	302 V8	\$4241
<b>GMC</b> Suburban	9	129.5	218.3	71.0	250 6-cyl.	350 or 454 V8	\$3863
Rally Wagon	12	125.0	201.0	80.5	250 6-cyl.	350 V8	\$4037
<b>INTERNATIONAL</b> Travelall	9	120.0	204.8	66.0	345 V8	392 or 401 V8	\$4125
<b>VOLKSWAGEN</b> Stat. Wag.	7	94.5	179.0	77.0	109.5 4-cyl.	NA	\$4350
Stat. Wag.	9	94.5	179.0	77.0	109.5 4-cyl.	NA	\$4400



## Eska motors give you more fishing hours with less gas

Don't let the gas shortage stop your fishing enjoyment. Eska outboard fishing motors can give you more fishing hours with less gas. In fact, all of our models will let you troll all morning on less than a gallon of gas.

You see, we make only fishing motors, under 20 h.p., and no other kind. We've designed them from start to finish for the special needs of the fisherman. Maybe that's why we make the best selling fishing motors in America.

All Eska outboards feature Power Loop<sup>®</sup> engine design to save gas for you. This lets Eska engines burn virtually 100% of the fuel they take in. No gas is wasted and you get better performance, a cleaner exhaust, and the gas you save saves you money.

Our motors feature a drainless crankcase (which we pioneered), so there's no waste and no way raw gas can pollute the water.

Our exhaust is under-

water for quieter operation.

Our models from 7 h.p.—up have solid state ignition. Solid state ignitions never go out of tune. You get sure starts. And, again you save since routine ignition maintenance is never needed. Our carburetors are pre-set for maximum fuel efficiency. This too saves gas for you.

On our 9.5 and 14 h.p. outboards, we even have an automatic spark advance that adjusts engine output to match your boat's load. This gives you easier starts and saves your gas, too.

Our rotary intake valves provide uniform fuel distribution for smoother trolling and clean-running.

Eska outboards are lightweight and small enough to fit into the trunk of your car. Best of all, they're less expensive than fishing motors made by most other outboard manufacturers.

It all adds up to more fishing for less gas and less money when you buy Eska.

# ESKA

AMERICA'S MOST POPULAR FISHING MOTORS

2400 KERPER BOULEVARD, DUBUQUE, IOWA 52001 • Subsidiary of TALLEY Industries, Inc.

## HOMEOWNERS' CLINIC

BY W. CLYDE LAMMEY

### Spreader rusted out

*After only two seasons of use my lawn fertilizer spreader is so badly rusted that it does not spread uniformly, causing burned strips in the grass. I kept it housed when not in use. Why does it rust so quickly and what can I do to prevent further damage?—James Holt, St. Louis*

Most lawn fertilizers contain chemicals that are activated when moisture is present. They can cause rapid corrosion of metals. If the spreader is as badly damaged by rust as your description would seem to indicate, then I'm afraid it's beyond repair, and I suggest you replace it.

How do you prevent rusting? To begin with, never leave unused fertilizer in the spreader. Wash the hopper inside and out with a strong spray from your garden hose after each use. After it dries, run a row of drops of oil just above the agitator and close the gate. The coating of oil formed this way will help.

### Cracks in garage ramp

*The sloping approach ramp to my garage, only about 30 in. wide, keeps breaking away from the floor, even though I've renewed the patch in the crack twice with a cement mix. How can I fill this crack permanently?—J. Ralston, Detroit*

As a rule, new concrete will not bond to old, and the same is true of the cement mix you used. Also, the ramp may be settling slightly, causing the crack to open and break out the patching; if settling is still going on, you cannot expect any rigid patch to last. I suggest you try again by first cleaning the opening as thoroughly as possible, then filling it with a patching material that is made especially for filling cracks. Tamp the mix into the opening as you go, using a dowel for a tamper. Finish with a whisk broom. When you apply the patching material, be sure to follow manufacturer's instructions in all details.

### Weatherstrip noise

*My front door faces west and is weatherstripped with a bronze stripping. When the wind is strong from the northwest, there is an intermittent loud buzzing sound that is most annoying, especially at night. What can I do to correct this?—Donald Ray, Sioux Falls, S.D.*

"Humming" weatherstrip is a common problem. It happens when the door does not close tightly or weatherstrip has loosened. Tighten the nails in the weatherstrip by setting them with hammer and nailset, then pry the strip up slightly so that it makes uniform contact with the edge of the door. If this does not solve the problem, it may be necessary to shim the door hinges with cardboard to obtain a tighter closure.

### Termites or rot?

*Wooden beams and supporting posts in the basement of my old home—which I've recently bought—are a brownish color and the surface of the wood seems soft and crumbly. Is this certain evidence that termites are at work?—Edward Van Vellen, Reading, Pa.*

Rather, I think it's evidence of what is known as "dry rot," caused by a fungus that attacks the cellular structure of the wood. "Wet rot" might be the better term, as this fungus is activated by moisture. You can't undo the damage, but you can at least slow deterioration by providing better ventilation and coating wood surfaces with a preservative containing pentachlorophenol. This is sold as a liquid, and where immersing the wood is not practical, as in your case, it should be brushed on in two or more heavy coats. *Caution:* Protect eyes and skin when you work with pentachlorophenol. ★★

*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.*

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**Come all the way up to KOOL**

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

16 mg. "tar," 1.3 mg. nicotine, av. per cigarette, FTC Report Sept. '73  
Копировать, распространять, использовать запрещено

# Nothing runs like a Deere



6- and 7-h.p. John Deere Riding Mowers. Under their sporty looks is solid satisfaction.

Take a restful ride on a roomy platform with a cushioned seat.

Mow non-scalp in five cutting heights, adjustable from the driver's seat.



Smooth, three-speed shifting gives you the range you need for mowing, trimming, transporting.



With automotive-type steering, you turn sharp trim to within 1/2 inch of shrubs and flower beds.



Feel the stability of wide-stance design and an oscillating front axle.



## The reasons are all around you

Want extra peace and quiet? Switch on a battery-powered John Deere Electric Rider.



There's a lot you'll like about your John Deere Riding Mower. The responsive handling. The beautiful job it does. But what you'll like best is the way it stays on the job, season after season. Get John Deere dependability, only from dealers who service what they sell. Find your dealer in the Yellow Pages. Ask about financing, too.





Shop owner H.H. Baskin Jr. puts finishing touches—waxing and buffing—on the handsome monk's refectory table he built. As were the original tables of this type, Baskin's version is built in "knock-down" fashion; table is assembled for use with shaped pegs. PM's Workshop Editor, impressed with table's looks and rigidity, drew plans (page 73) so readers could duplicate the table.

Photos: Fred Ward, Black Star

## A great shop that's neat, noiseproof and productive

by Harry Wicks  
WORKSHOP EDITOR

When H. H. "Ham" Baskin Jr. moved to his new home about eight years ago, one of the first chores he tackled was to set up his new workshop. With his shop installed and in order, he could give his full attention to the various do-it-yourself projects that would reflect the Baskins' tastes to make their house a distinctive home. The Baskin modified-Spanish-style ranch boasts many creature comforts (and aesthetically pleasing details) which were built and installed by this active, successful attorney. "My wife," Ham remarked with a smile, "never runs out of things for me to do around the house indoors and out." Most of Baskin's spare time is devoted to workshop-related

## Noise and rust had to be kept to a minimum



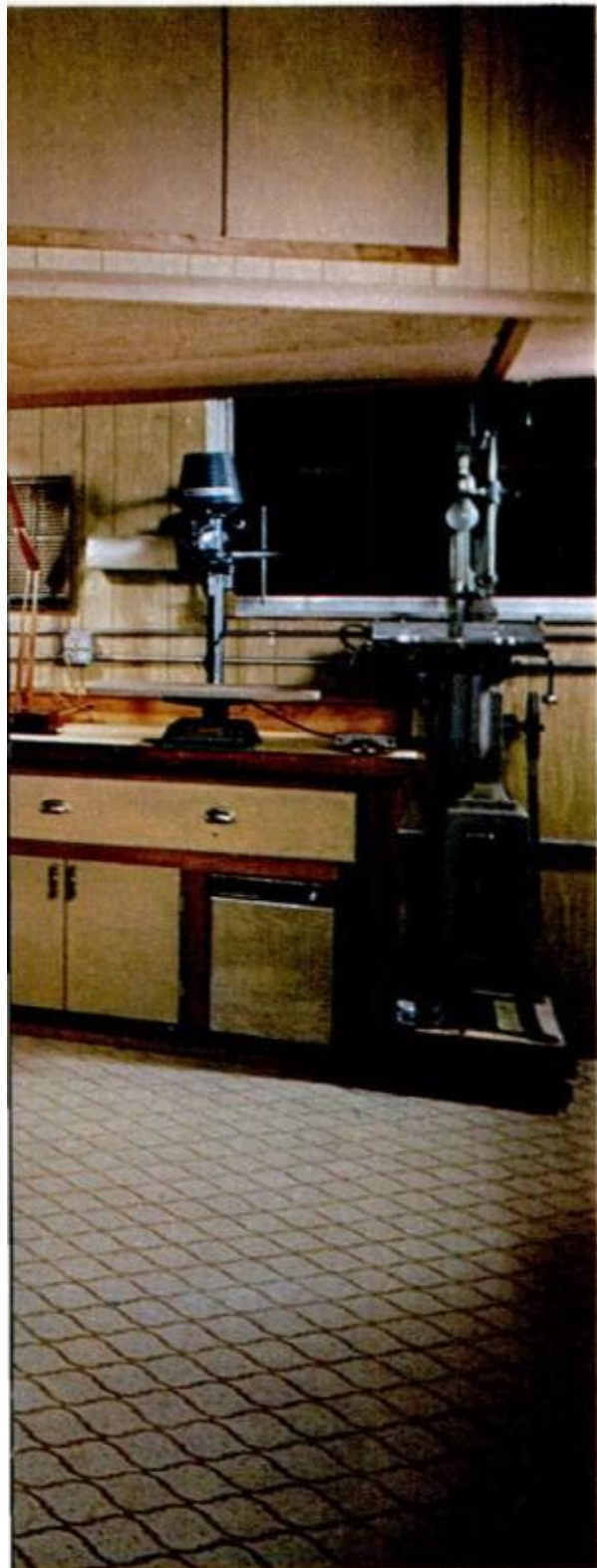
activities. While he used to play golf regularly, he gave up that pleasurable pursuit in order to devote extra time to his first interest—working with wood. His projects, shown in the photos on these pages, reveal the expertise he has achieved.

When Baskin laid out his on-grade shop, there were four major considerations he felt had to be kept in mind:

□ First, it had to be as noiseproof as possi-

ble so that nighttime and early-morning work sessions would not annoy his non-woodworking neighbors. (This is a fact that many woodworkers fail to consider when setting up their first workshop.) To accomplish “noiseproofing,” he used full-thick (six-inch) insulation on walls, ceiling and beneath all workbench tops. The walls and ceiling were then covered with paneling and ceiling tiles, respectively. Cabinets lining

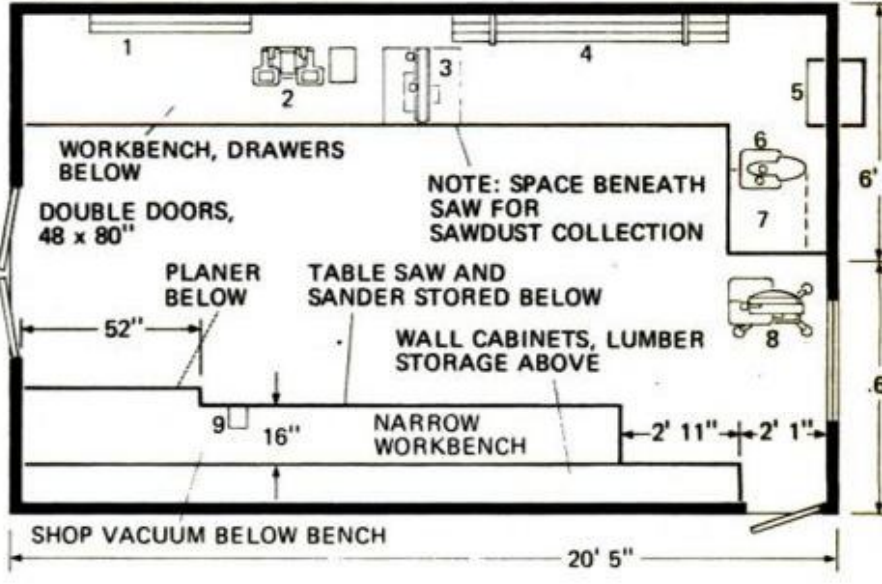




**1. Overall view of narrow shop from double doors (see plan below). Good stunt used by Baskin: Radial-saw table is over workbench surface, old drill-press table supports work being cut. Thus, materials and tools (Surform tools here) needn't be moved from bench when piece of stock is cut.**  
**2. View from opposite end of shop shows how owner gets good use of limited space. Ceiling over bench is dropped to gain storage above.**  
**3. Shallow cabinets over 16-in.-wide bench.**

**Getting the most in small space:** 1. large workbench; 2. bench grinder (and old drill-press table); 3. radial saw; 4. short-lengths-of-lumber storage; 5. airconditioner; 6. bench drill press; 7. dehumidifier; 8. bandsaw; 9. machinist's vise. Hand tools are stored in drawers under workbench; various materials are kept in shallow cabinets over narrow workbench. For looks and cleanup convenience, floor is covered with Armstrong Cork Co.'s Excelon tile.

COURTYARD (PATIO)



FLOOR PLAN

## Projects galore indoors and out



**1. Front gate** is constructed of  $1\frac{1}{2}$ -in. thick stock; long lengths of 2x2s are separated by short 2x6 blocks. Because of weight, hefty hinges were used here.

**2. Elongated Parson's bench** parked by window does not obscure view of attractive courtyard.

**3. Gate to storage area** in back yard is made up of scrap: Squared pieces of pecky cypress are simply glued and finish-nailed to a door made of  $\frac{1}{2}$ -in. exterior-grade plywood.

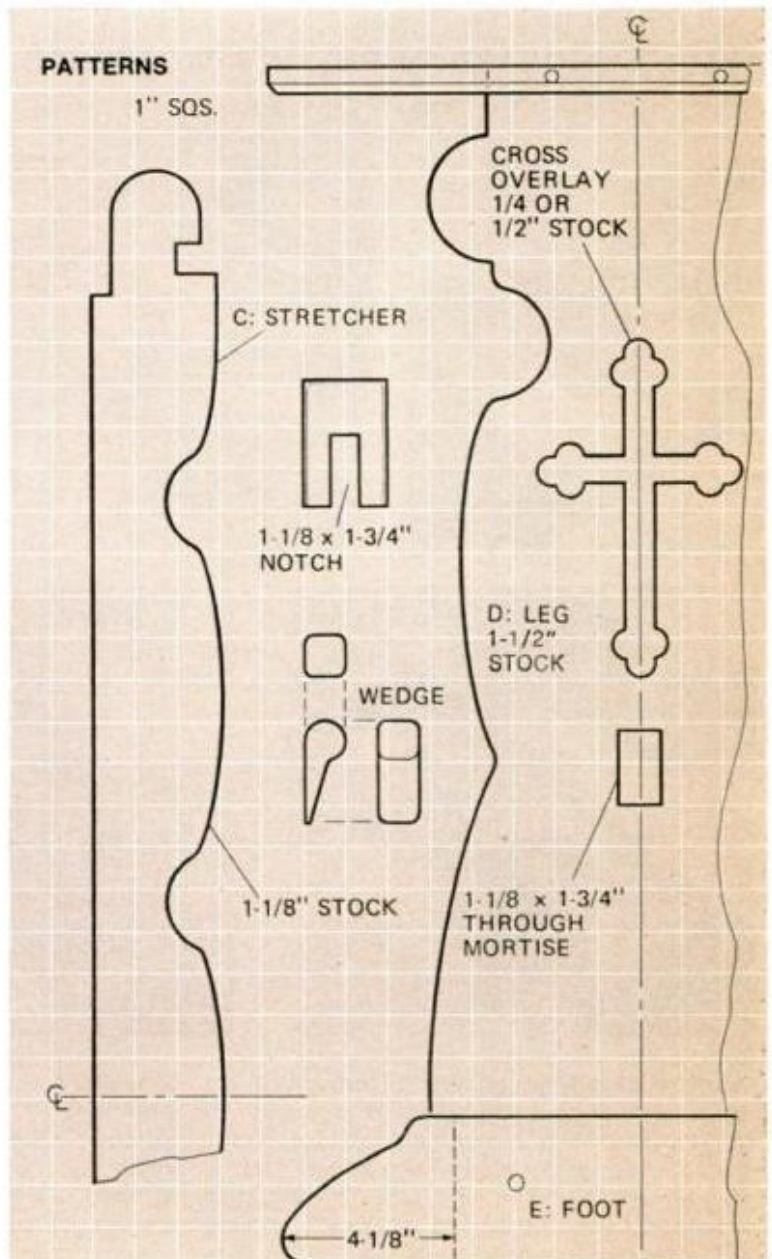
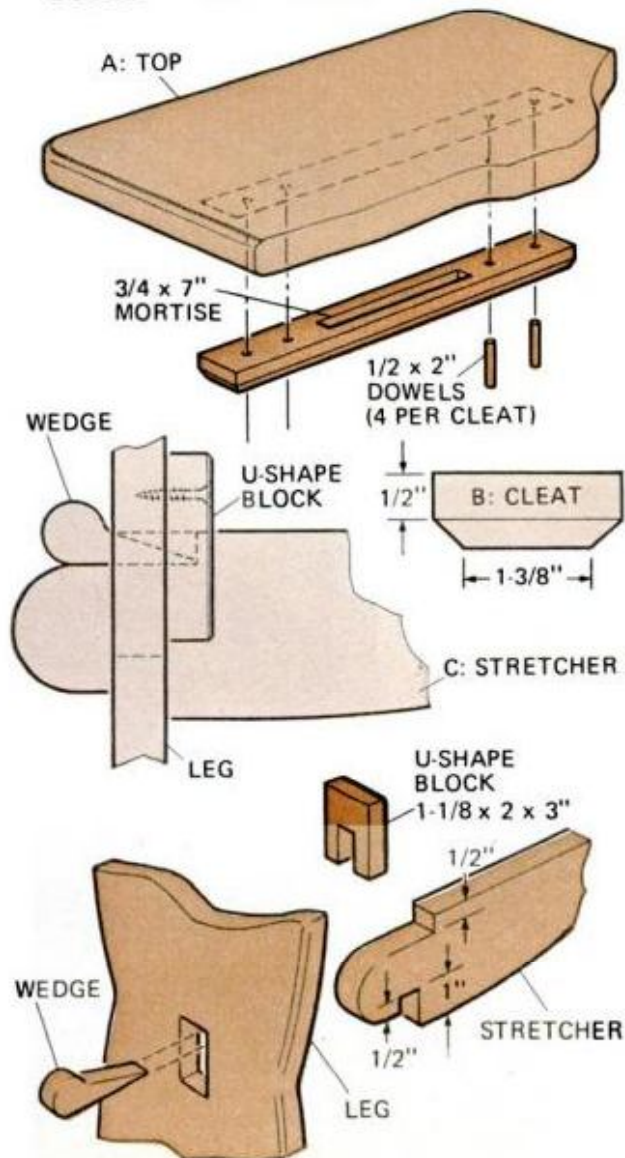
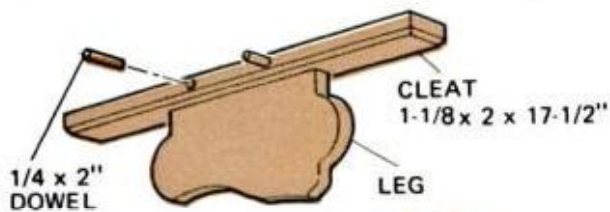
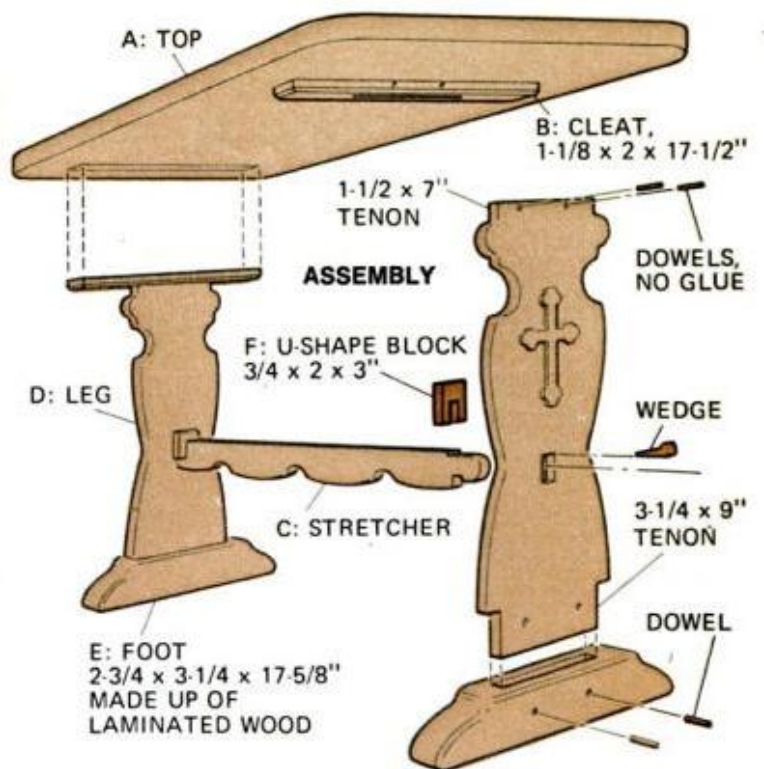
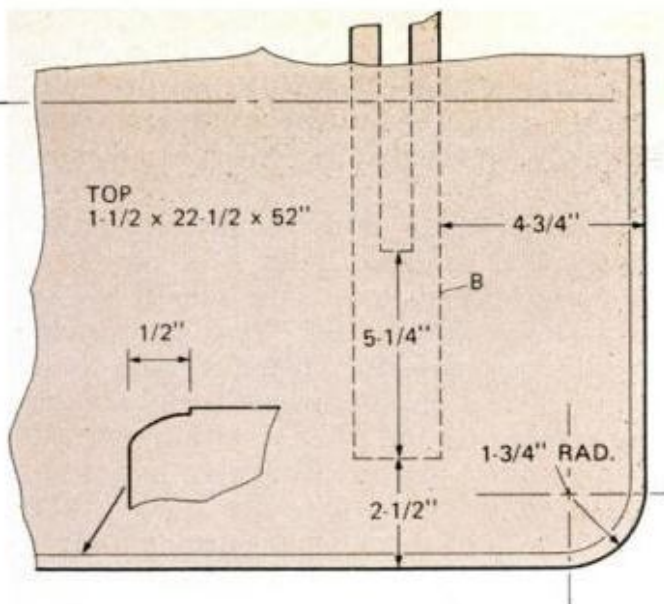
**4. Wall opposite bar** in family room features family-interest objects arranged on masculine-looking shelves built and installed by the owner.



most of the wall areas reduce the level of escaping noises even more.

□ Personal convenience, Baskin felt, was important, too. As can be seen on the floor plan, he has access to his shop directly from his home as well as through a pair of doors which open onto an enclosed courtyard. The double doors were his idea and are, in fact, a good example of solid, think-ahead planning. In clear weather, he can open both doors and have, in effect, an outdoor extension of his workshop. To keep dust inside

# REFECTORY TABLE



to a minimum, it is his practice to move projects outdoors and, working on a portable bench, use the courtyard for such chores as sanding, router work and cutting with his portable saw. The 48-in. opening also makes it simple for Ham to single-handedly haul large projects and materials in and out of the shop.

□ He wanted minimum time for cleanup. To accomplish this, Baskin decided that most of his tools would be stored in drawers beneath the main workbench and in cabinets. The hardware-store inventory of small items, a must in all active workshops, is kept corraled in wall cabinets over that 16-in.-wide workbench. To make cleaning easier, Baskin covered the concrete floor with a service-gauge tile made by the Armstrong Cork Co. "Besides making cleanup easier, the finish floor just makes the shop nicer to be in," he says.

□ The final problem for Ham to resolve was to keep to a minimum rust on tools in the humid Florida climate. He beat this problem completely by installing a dehumidifier and an air conditioner. Finally, all drawers are lined with scraps of carpeting and tools are sprayed periodically with a silicone spray.

Jane Baskin gets as much pleasure from the workshop as Ham does. "Rather than have my wife relegated to the role of workshop widow, we decided that we would share all our projects." Together the Baskins select and decide what furniture or home accessories he should build. Armed with a camera, flashbulbs, ruler and pad, they search out the furniture pieces that appeal to both of them. One concession Mrs. Baskin must make, Ham emphasized, "is that I have to feel that I can duplicate the

*(Please turn to page 184)*

#### TYPICAL STORAGE IN BASKIN'S WORKSHOP



4

1



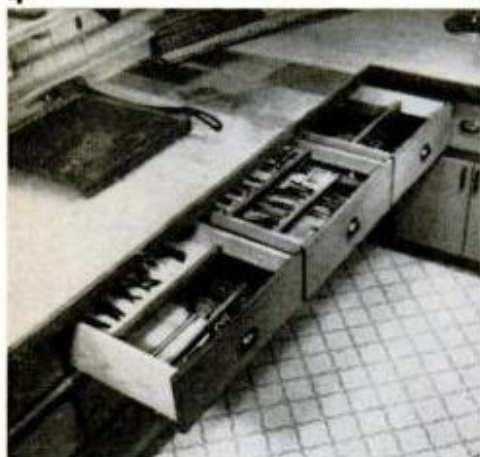
5

2



6

3



**Drawers shown** in photos 1 through 4 are beneath main workbench, were selected at random for photos. No. 1 shows how assortment of files, rasps, various-size chisels and gauges are stored; No. 2 contains coping saw, hacksaw and other cutting tools; 3, wide variety of hammers owned by Baskin; 4, snips, shears, and other cutting hand tools are kept in these drawers

and in the drawers below them (accessories for stationery tools, such as radial and bench saw, are also kept in these drawers); 5, veritable hardware store is behind one of those doors in row covering cabinets in photo 6. Narrow, 16-in. workbench is below these cabinets; long lumber is stacked above cabinets extended by wall-mounted, metal shelf brackets.

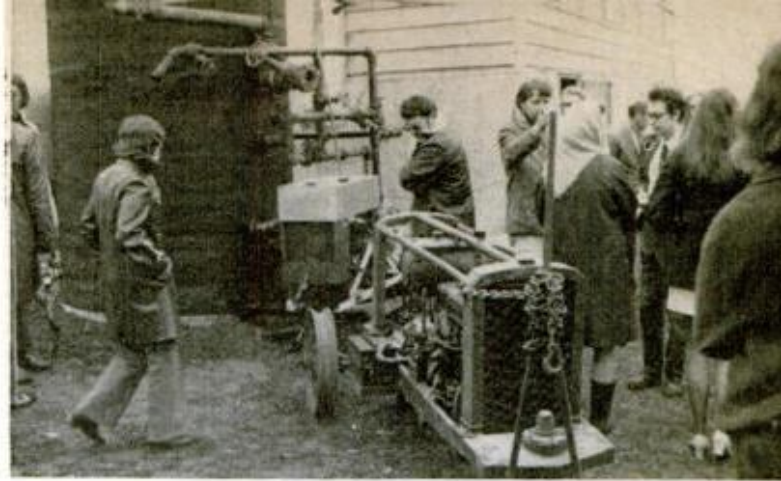
# Cooking with cow power

The energy crisis may yet revitalize the pioneering spirit that once characterized America. A prime example of a renewed interest in achieving a degree of self-sufficiency can be found on the Red Key, Ind., cattle farm of Dick Shuttleworth.

In collaboration with his son John and a couple of expert consultants, Shuttleworth built a prototype generator that converts cow manure and other waste materials into methane—natural gas—and a nitrogen-rich fertilizer. At a recent demonstration for the press, the Shuttleworths used home-brewed methane to run a variety of equipment: a 1948 Chevrolet engine, a gas lamp, a range (on which they fried an egg), a gas refrigerator and a space heater.

Manure is mixed with water to form a slurry. Anaerobic bacteria, which live in an absence of oxygen, break down the solid matter to produce methane. John Shuttleworth estimates that the manure from the 36 head of cattle on his father's farm would provide enough gas to heat the large Shuttleworth farmhouse.

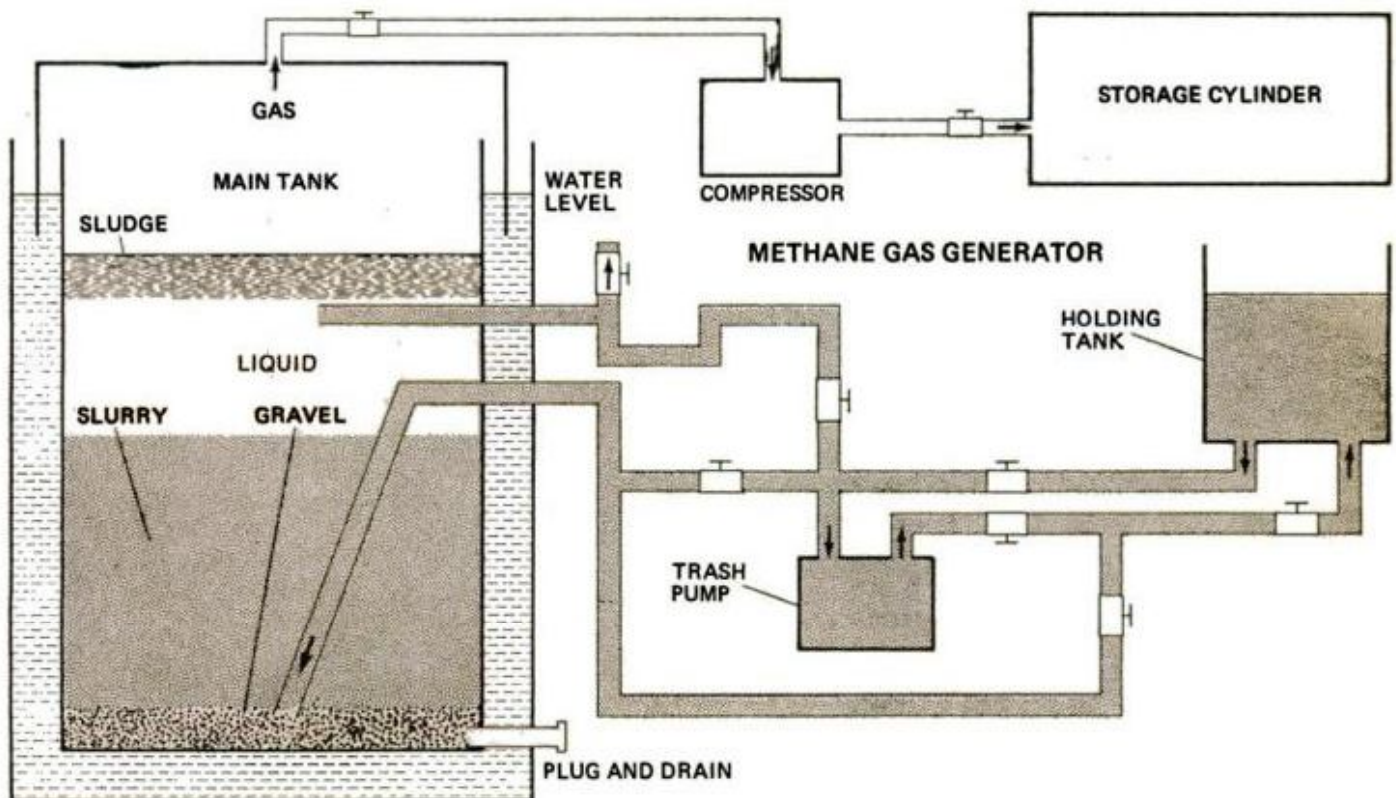
The project is sponsored by *The Mother Earth News*, an ecology magazine published by John Shuttleworth. ★ ★ ★



Methane is piped from generator (left) to unmodified Chevy powerplant through garden hose that connects with engine's carburetor.



Schematic drawing of generating system, being explained by John Shuttleworth, is partially lighted by lamp burning farm-fresh methane.

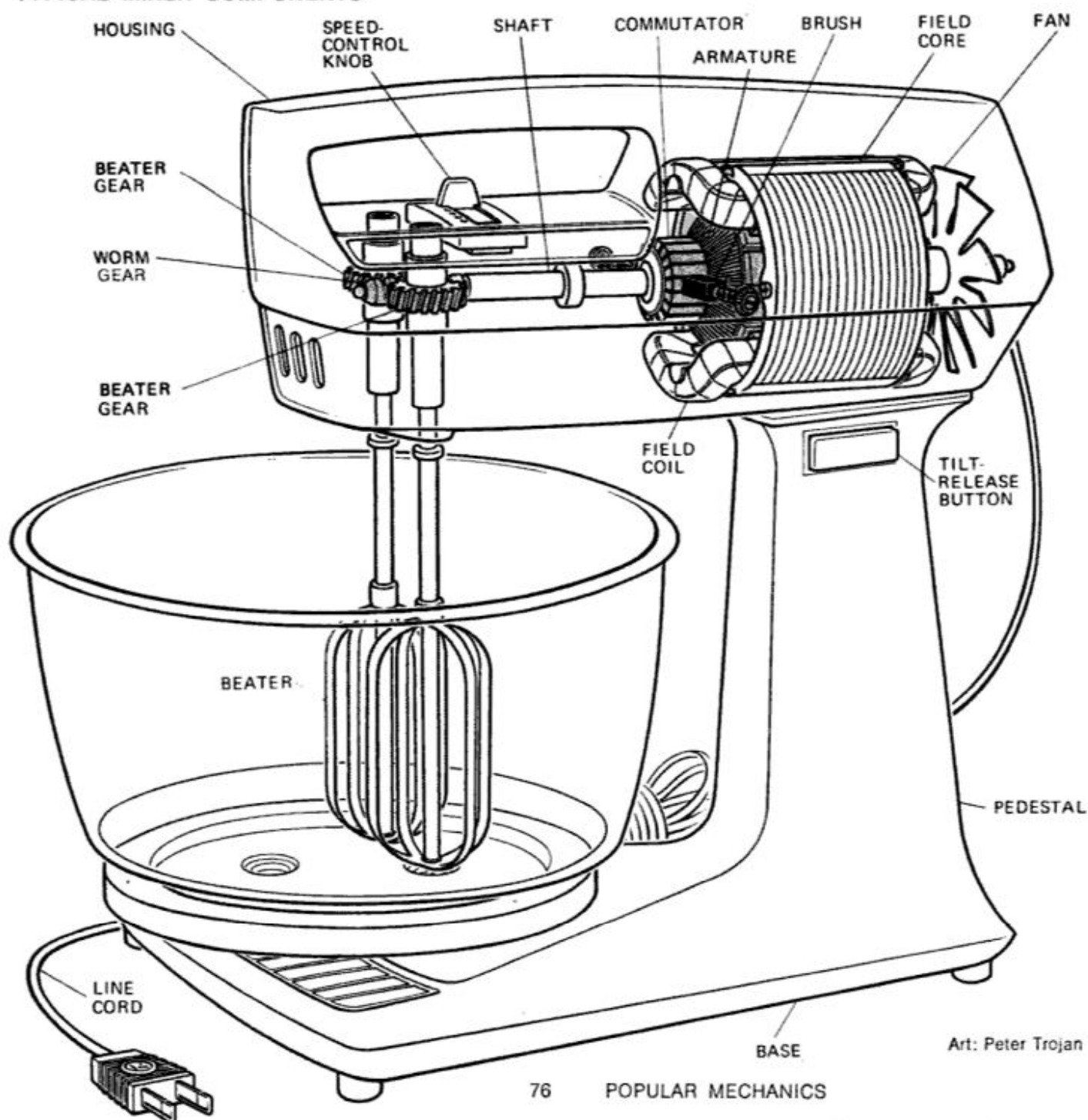


# How to troubleshoot a food mixer

Most electric food mixers are powered by motors of the universal type with carbon brushes. This type of motor develops high torque and speed, but is noisy and, because the brushes tend to spark, requires capacitors to prevent radio and TV interference. To deal with foods of different consistencies, the motor must turn at different speeds. The three common methods of speed control are a centrifugal switch, tapped field and adjustable brushes.

The centrifugal switch is a governor that keeps the motor at the desired speed by shutting off and restoring current. When the motor is off, its contacts touch (see page 79). The contacts stay together until the motor reaches a speed at which centrifugal force overcomes spring tension and the contacts separate, breaking the circuit. The motor then slows until the spring can bring the contacts together again. The cycle is short enough that the motor runs

## TYPICAL MIXER COMPONENTS



Art: Peter Trojan

Data: Ed Franzese

smoothly. Speeds are varied by moving the adjustable contact.

With tapped-field control, parts of the field coil are cut out of the motor circuit, giving it lower resistance and producing higher speed. At low speed, the entire coil is used. A medium setting, using part of the tapped coil, provides moderate speed.

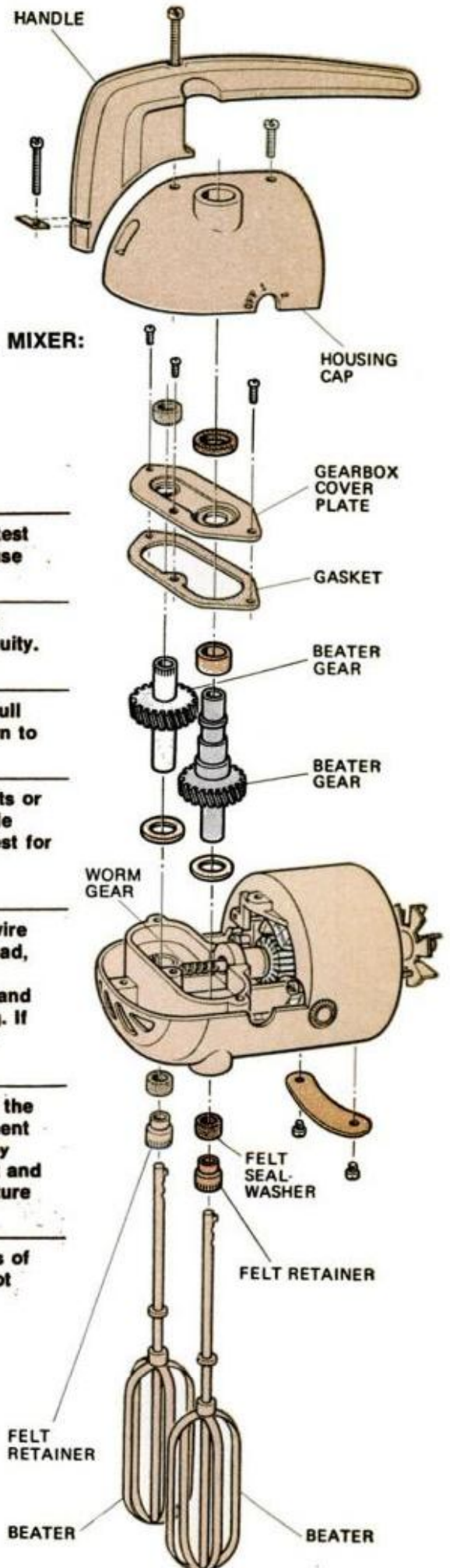
Adjustable-brush control provides lower motor speeds by moving the brushes away

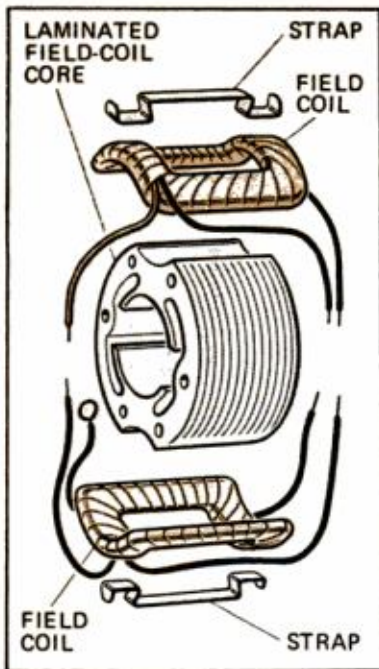
*(Text continues on page 81)*

### Motor does not run

POSSIBLE CAUSES	WHAT TO TRY
1. No power.	Check for power at wall outlet with 115-v. test lamp. If there is no reading, replace line fuse or reset circuit breaker.
2. Defective cord.	Disconnect cord from outlet and then from motor casing. Test wires in cord for continuity. If either gives no reading, replace cord.
3. Worn brushes.	Remove brush caps from mixer housing. Pull out carbon brushes. If they have worn down to $\frac{1}{4}$ in. or less, replace them.
4. Defective on-off switch.	Remove switch and inspect contacts for pits or burned spots. Clean contacts with a fine file or sandpaper (do not use emery cloth). Test for continuity across terminals. If there is no reading with switch on, replace it.
5. Open field coil.	Test coil for continuity with one probe at wire junction of line cord, capacitor and field lead, other at lead from coil. There should be a reading. Also test between other coil lead and lead to brushes. There should be a reading. If there are no readings, replace field coil or check price of a new mixer.
6. Open armature winding.	Test for continuity across each segment of the commutator. Replace armature if any segment gives no reading. Test for armature short by placing one probe on commutator segment and the other on armature body. Replace armature if there is a reading.
7. Centrifugal switch stuck open.	Press switch closed. Clean all moving parts of the switch and put a drop of oil on the pivot point—do not over-oil.

### PEDESTAL MIXER: GEARBOX

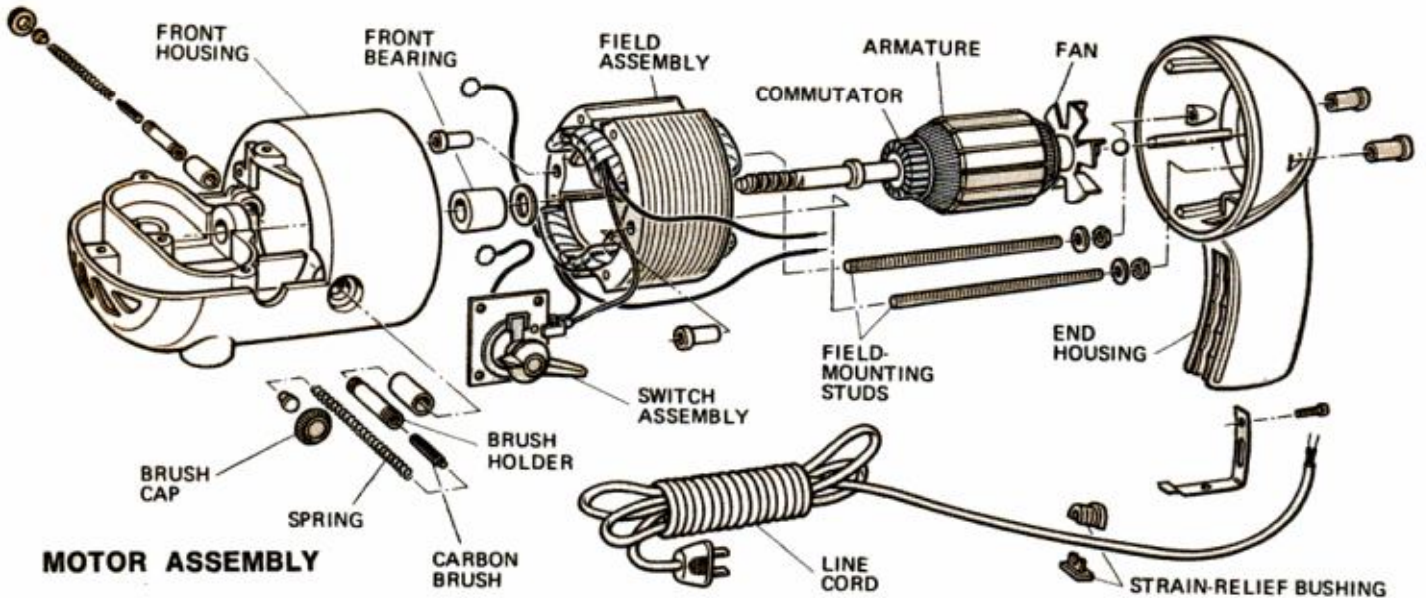




**FIELD ASSEMBLY**

**Motor does not run, blows fuses**

POSSIBLE CAUSES	WHAT TO TRY
1. Jammed bearings or spindles.	Remove gear housing. Apply penetrating oil to spindles; remove them at setscrews. Clean gear case, spindle holes with trichloroethylene solvent. Replace worn, broken gears. Grease gear compartment with proper lubricant, reassemble.
2. Jammed armature.	Disassemble mixer. Straighten or replace armature shaft. Spin armature by hand to check for clearance. Reassemble mixer.
3. Shorted line capacitor.	Test capacitor for continuity. There should be a reading for a split second. If no reading or if it is permanent, replace the capacitor.
4. Defective field coil or armature.	See preceding chart.
5. Shorted line cord.	Remove cord from outlet and then from motor casing. Test for continuity across plug prongs. If there is a reading, replace the cord.

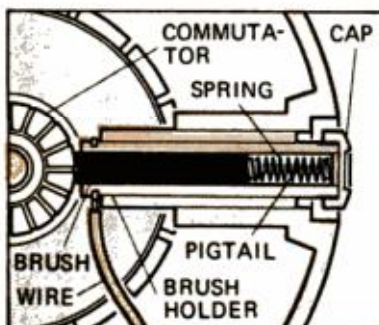


**MOTOR ASSEMBLY**

**Motor overheats**

POSSIBLE CAUSES	WHAT TO TRY
1. Centrifugal switch stuck closed.	Remove switch, separate contacts by hand. Check contacts for pits or burned spots. Clean with fine file or sandpaper (not emery cloth). Put a drop of oil on pivot point—do not over-oil.
2. Motor dirty.	Clean motor air intake with vacuum cleaner. Remove stubborn dirt with small toothbrush. Do not use solvents on internal motor parts.
3. Field coil or armature shorted or grounded.	Look for burn marks near edges of commutator segments, indicating a shorted or grounded winding. Test for continuity between commutator segment and shaft; a reading indicates a short or ground. Test field coil with one probe on coil lead, other on mixer housing. Replace any parts that produce readings.

**TYPICAL BRUSH ASSEMBLY**

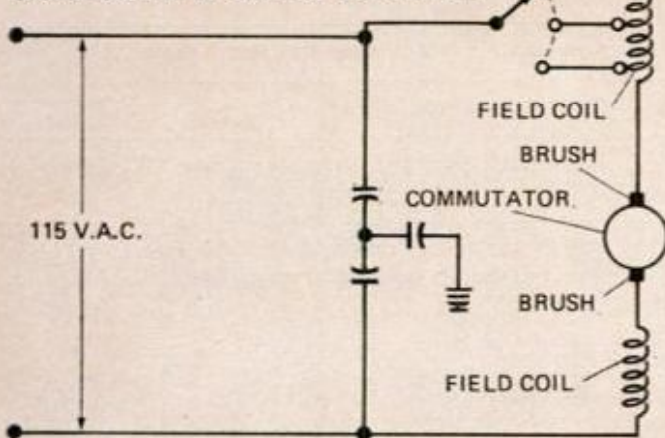




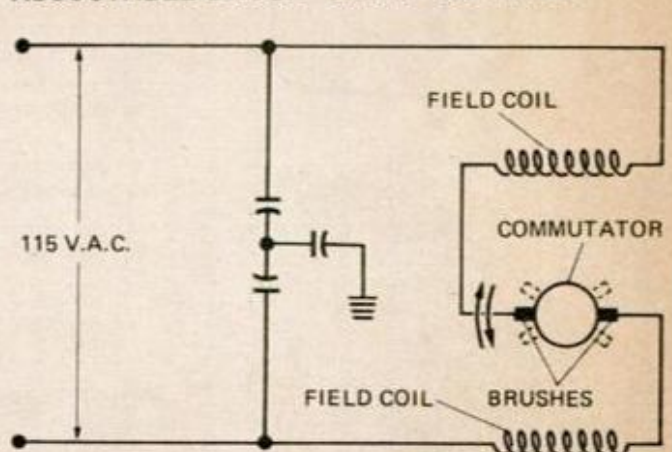
## Motor speed erratic

POSSIBLE CAUSES	WHAT TO TRY
1. Defective cord.	Test each side of cord for continuity while wiggling cord. Any variation in reading indicates a break. Replace cord.
2. Worn brushes.	See chart, "Motor does not run," page 77.
3. Loose connections.	Check all solder joints and wiring insulation. Correct any defects found.
4. Defective motor speed control.	See chart, "Motor overheats," page 78. Check tapped field by testing for continuity across resistor. Replace resistor if there is no reading. Test motor capacitor; see chart, "Motor does not run, blows fuses," page 78. Check adjustable-brush control by examining brushes; see chart, "Motor does not run."

### TAPPED-FIELD SPEED CONTROL



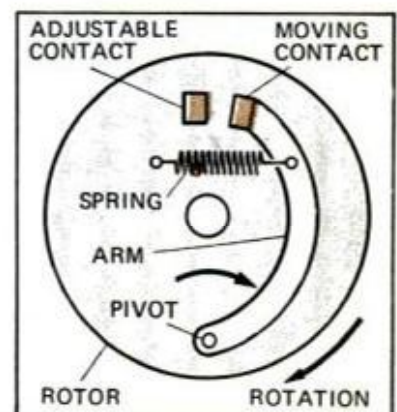
### ADJUSTABLE-BRUSH SPEED CONTROL

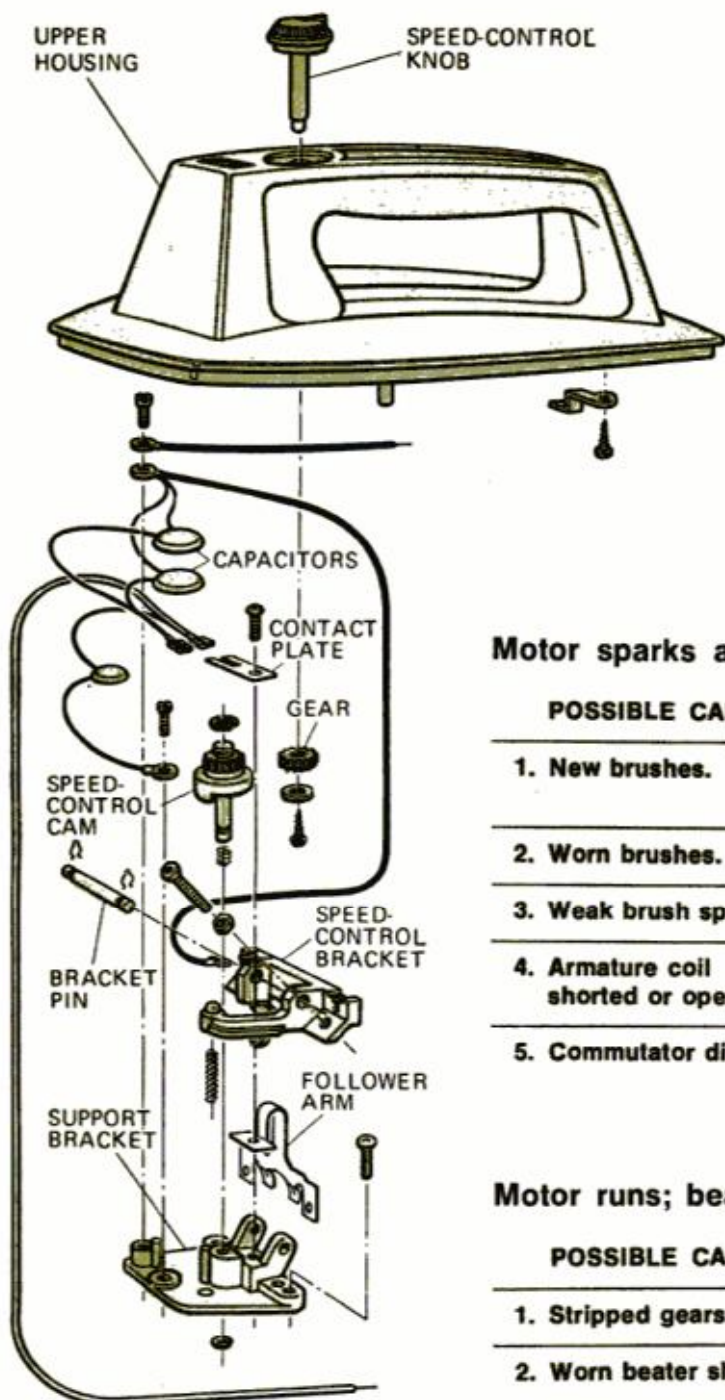


## Noisy operation

POSSIBLE CAUSES	WHAT TO TRY
1. Worn bearings.	Tighten or replace bearings.
2. Play at end of rotor.	Shim rotor end with small thrust washers, .005 to .025 in. thick.
3. Motor dirty.	See chart, "Motor overheats," page 78.
4. Gears broken or dry.	Remove gear housing, check for chipped or broken gear teeth or lack of lubricant. Replace all worn or broken gears and grease with the recommended lubricant.
5. Bent beaters.	Straighten beaters so they clear each other.
6. Bent fan blades.	Straighten fan blades to clear housing.

### CENTRIFUGAL-SWITCH CONTROL





**HAND-MIXER: UPPER SECTION AND CONTROLS**

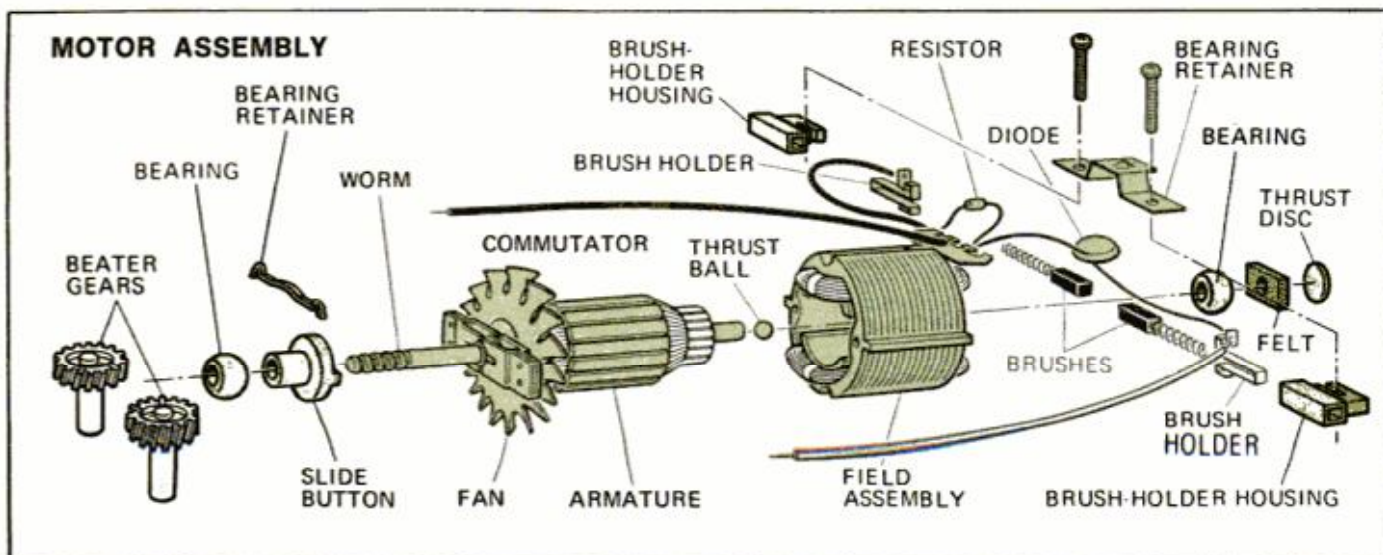
**Caution:** Be sure power is turned off before you handle components. Make all continuity tests with power off. When using a test lamp, keep power off while connecting and disconnecting the lamp. Use your manufacturer's manual to locate components, and use only replacement parts that meet his specifications.

**Motor sparks at brushes**

POSSIBLE CAUSES	WHAT TO TRY
1. New brushes.	Normal condition until new brushes wear to fit contour of commutator.
2. Worn brushes.	See chart, "Motor does not run," page 77.
3. Weak brush springs.	Replace springs.
4. Armature coil shorted or open.	See chart, "Motor overheats," page 78.
5. Commutator dirty.	Polish surface of commutator with fine sandpaper (do not use emery cloth).

**Motor runs; beaters do not turn**

POSSIBLE CAUSES	WHAT TO TRY
1. Stripped gears.	See chart, "Noisy operation," page 79.
2. Worn beater shafts.	Replace beaters.



## Motor runs slowly or lacks torque

POSSIBLE CAUSES	WHAT TO TRY
1. Wrong speed for load.	Change speed.
2. Load too heavy.	Not mixer's fault; don't use on unusually stiff mixtures.
3. Worn brushes.	See chart, "Motor does not run," page 77.
4. Rotor binding.	Check for proper end-play clearance—this clearance should be .005 in.
5. Centrifugal switch stuck closed.	See chart, "Motor overheats," page 78.
6. Field coil grounded to mixer housing.	Place one probe of 115-v. test lamp on mixer housing, other probe on known ground. If there is a reading, replace field coil or check price of a new mixer.

## Motor runs continuously

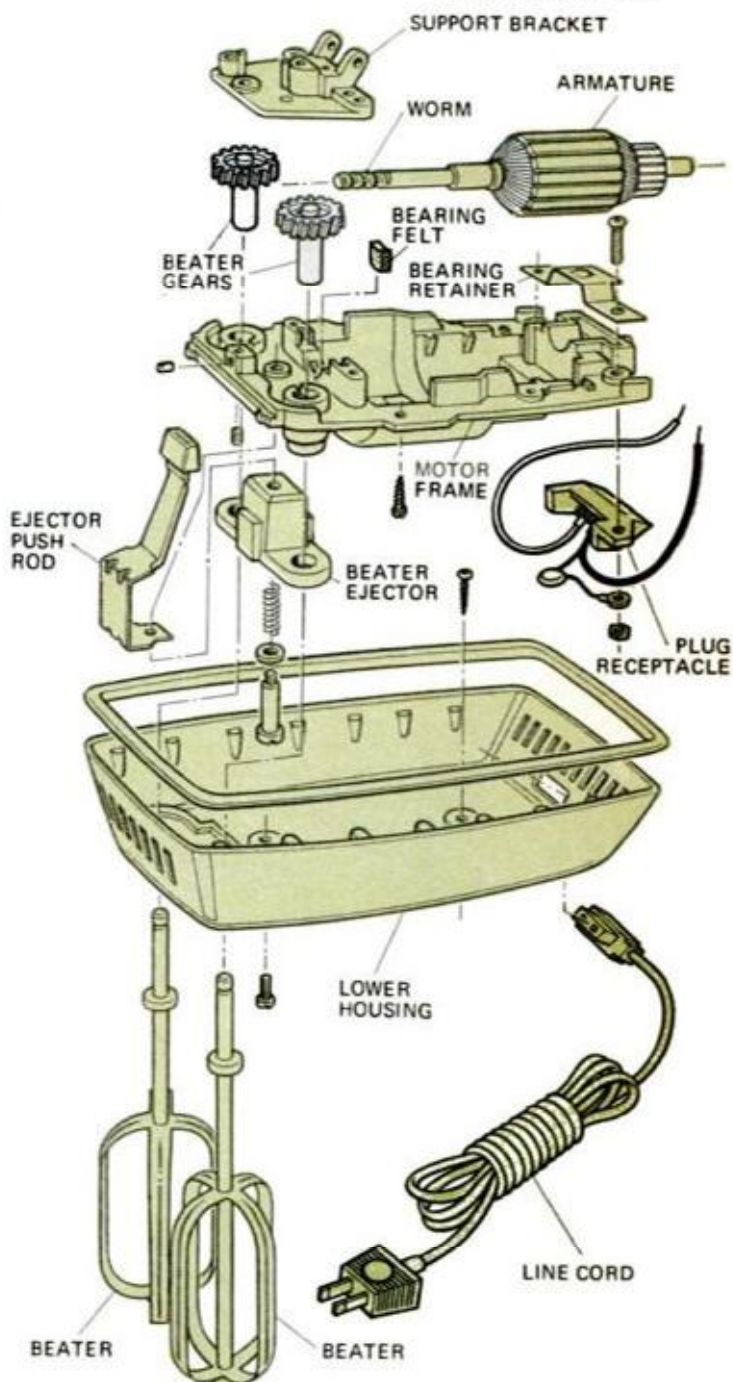
POSSIBLE CAUSES	WHAT TO TRY
1. Switch dial broken.	Cam pin broken or worked loose. Replace.
2. On-off switch shorted.	Test for continuity across switch terminals with switch off. Replace switch if there is a reading.

from their position of maximum efficiency with respect to the commutator. This type of control reduces torque as it reduces speed, and for this reason is not commonly found on newer machines.

At one time or another, a food mixer will require lubrication for proper performance. Some mixers have accessible oil holes or grease cups that permit lubrication without disassembly. If water or another liquid has found its way into the gearbox, all of the old grease should be removed and the compartment repacked with grease of a weight recommended by the manufacturer of the mixer.

Many mixer problems can be solved without taking the appliance apart. Stuck beaters can be loosened by squirting penetrating oil into their sleeves. Bent beater blades can be straightened, although a bent beater shaft usually requires replacement. If beaters slip in their spindles, the trouble is usually a worn shaft that should be replaced. Brushes are accessible through caps on the mixer housing. When you must take a mixer apart, keep careful track of the sequence of disassembly so that you can reverse the process with a minimum of difficulty. ★★

## LOWER SECTION AND GEARBOX



# How to build and install fences

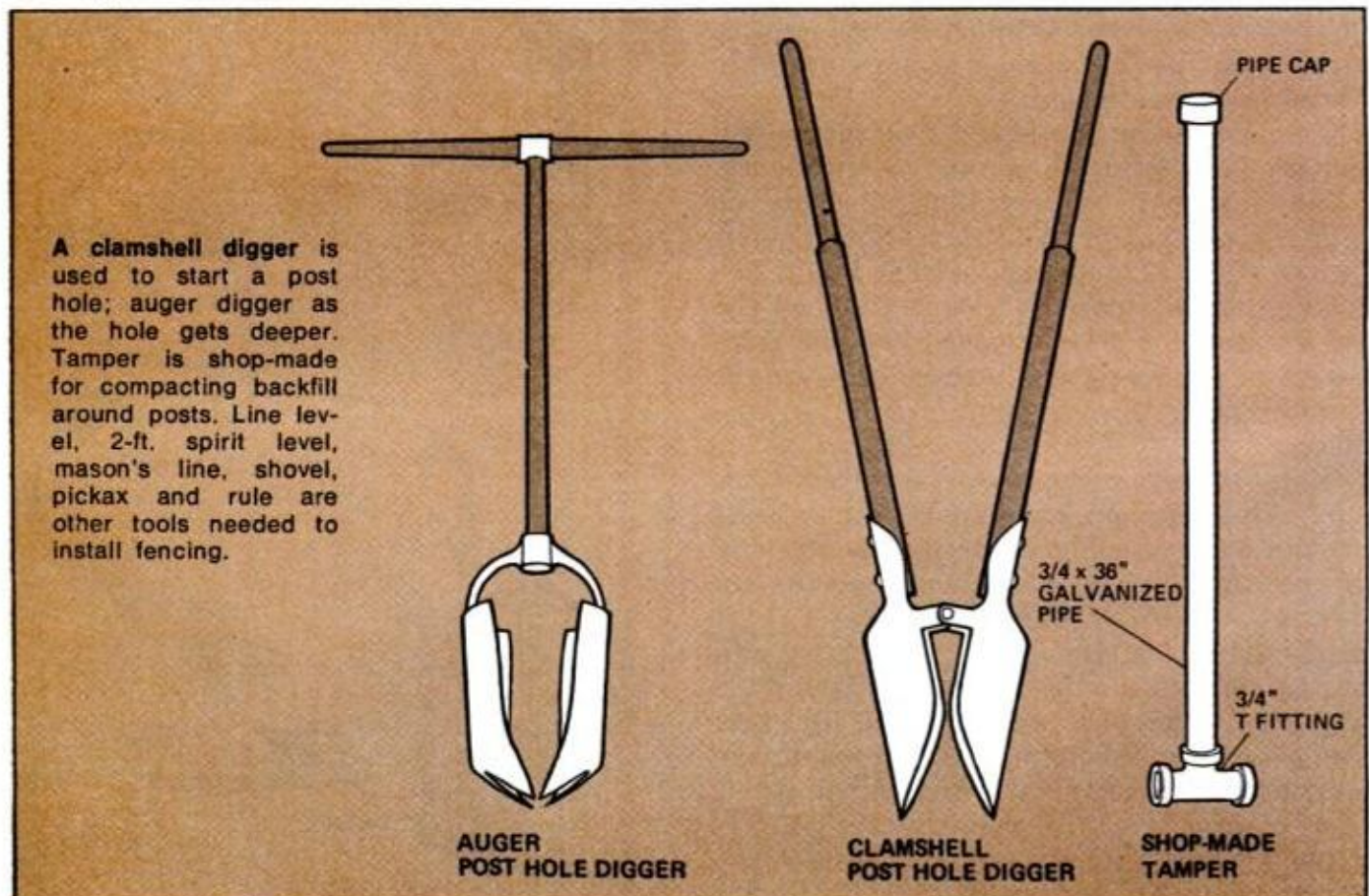
You may want to put up a fence for any one of a number of reasons—to protect a garden against animals, enclose pastures, mark property lines, hide unsightly views, obtain greater privacy, or enhance the architectural style of your home.

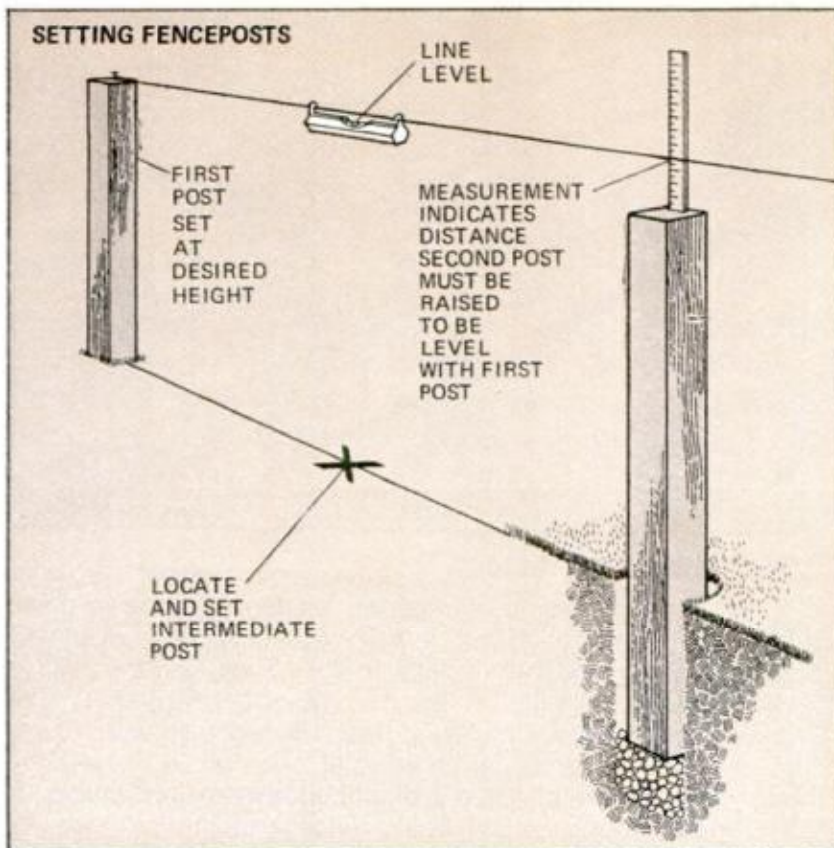
Your first concern in building any fence is choosing a wood for the in-the-ground posts that resists rot due to moisture. Cedar, redwood and cypress are generally used for fenceposts, although chestnut, locust and arborvitae are also used. If possible, lumber chemically treated under pressure at the mill for maximum rot resistance should be used; the antivermin chemical penetrates entirely through the wood, not just the surface. (Painting or soaking post ends with creosote, a wood preservative, treats only the surface and adds little to the post's overall life span.)

There is also danger of rot and resulting fungus where two pieces are joined in a fence, such as pickets to a rail. Priming and painting prior to assembly, plus a third coat after installation, will give you maximum protection against this type of rot. In addition, keep the post adjacent to the house at least 2 in. from the building. Nailing an end post to the house can also cause rot due to water trapped in the joint.

Before erecting your fence, check local zoning laws with your building department. Many municipalities have strict laws concerning height of fences as well as the percent of the fence that must be left open. Once you know your zoning laws thoroughly, determine your legal property lines by using your survey. If you can't locate your property stakes, hire a licensed surveyor to come in and establish them for you.

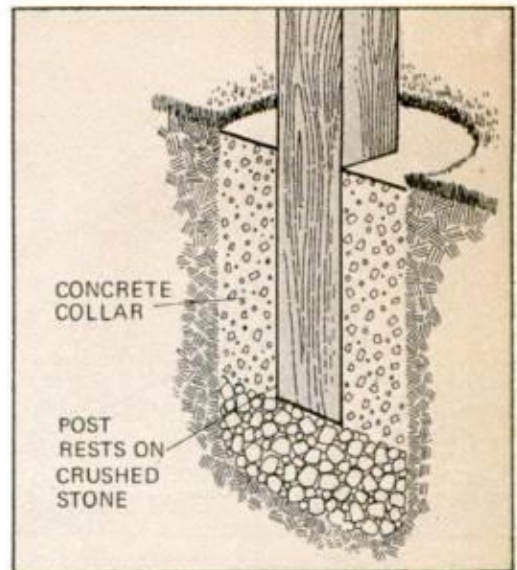
## Tools you will need





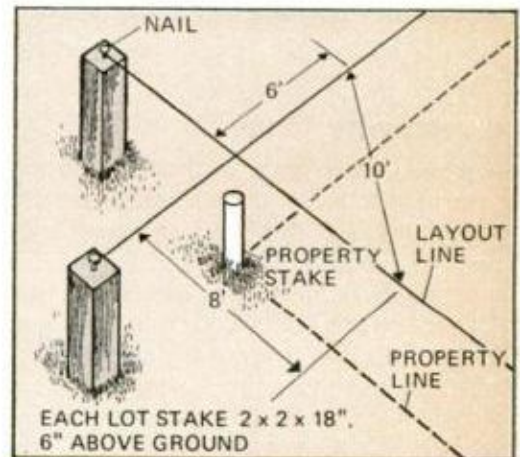
### How to install fenceposts

After your boundary markers for the fence have been established (sketch at right), stretch a mason's line tightly between nails at tops of markers. Measure the locations of centers of the posts on the ground under the line. Mark these points with a galvanized nail or other easily visible marker. (Measurement between on-center posts should usually not exceed 8 ft. as the rails will not be rigid enough.) Dig the two end post holes first. Holes should be a minimum of 30 in. deep for an open or picket-type fence, 36 to 42 in. deep for higher and heavier fences. Start hole with clamshell digger and continue until it is difficult to remove dirt because the handles hit against sides of the hole. At this point, switch to the auger digger. Set one end post to establish the desired fence height. Backfill and secure the post as shown at right above. Plumb the post in both planes with a spirit level. If the fence is to be very long, dig hole for the second post no more than 50 ft. away. Dig to approximate depth. Nail mason's line to top of the post already set. Have a helper attach a line level in approximate center of the line between the posts. Holding the second post approximately plumb, raise or lower the line until your helper says the level indicates the mason's line is level. Measure this distance up or down from the top of the second post and remove the post. Add or remove crushed stone as measured; replace post, tamp and fill as before. Stretch mason's line and nail it at top of second post. This line will establish the depth of the hole required for each of the posts in between. A 2x2 cut to the post length makes a good gauge and saves you from constantly testing with the heavier post.



### Securing posts in ground

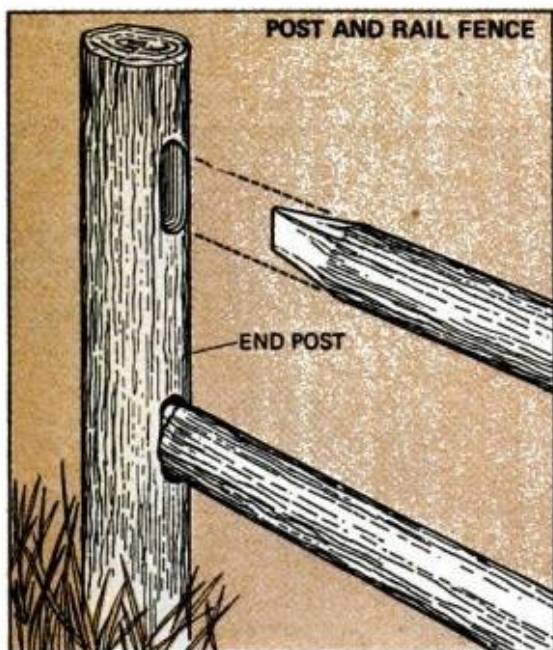
Bottom of post should rest on crushed stone to allow water to drain. Fill remainder of hole around post with concrete or backfill, packed in layers for maximum compression and support with shop-made tamper (opposite page). If using concrete (collar), make sure the post goes *through* footing or water will be trapped inside post and cause rotting.



### Establishing boundary markers

To obtain square corners, use 6, 8 and 10-ft. triangle dimensions as shown. Locate boundary markers for fence in line with property stake if fence is going to coincide with property line; set off-center distance desired if fence is to be inside. (*Caution:* Many zoning laws require fences to be a certain distance from front property line.)

# Typical fences



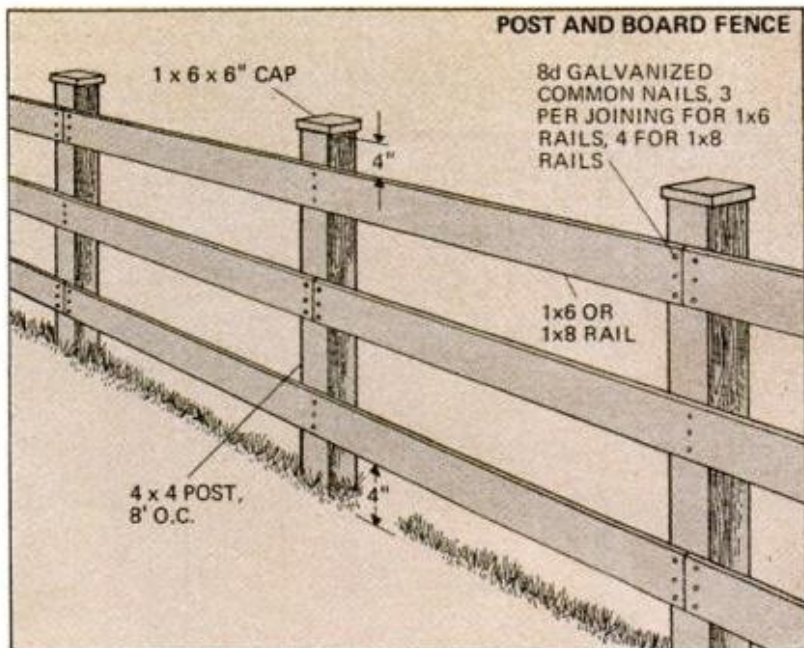
## Post-and-rail fence

This type of fence usually has cedar posts, blind-mortised with either two or three large slots per end post, depending upon the number of rails desired. Posts in between, of course, are mortised through. Ordinarily, the posts are set 10 ft. apart with the rails 11 ft. long and tapered to flat ends for insertion into the post slots. A post-and-rail fence is often adapted to retain animals by stapling 1-in. wire mesh to the top rails and posts and burying the wire in a trench in the ground. The wire will eventually rust and must be replaced in approximately five years.

## Woven wire fence

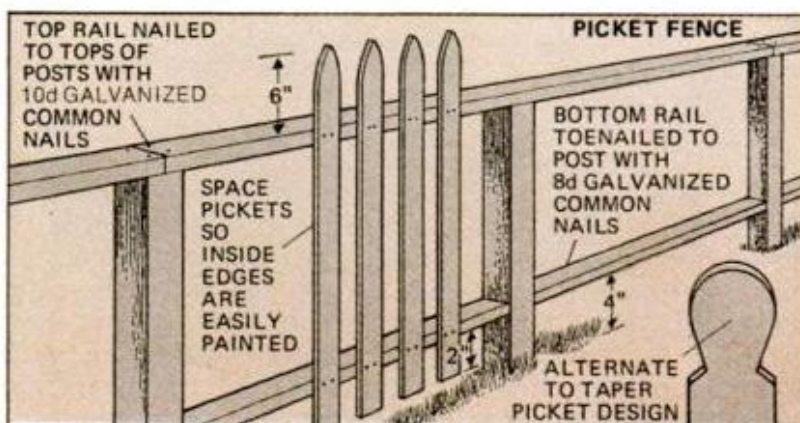
A woven wire fence (not shown) has wire mesh stretched over galvanized posts and rails. Although this kind of fence is practically indestructible and provides excellent security, it is very difficult to install. The posts are set in concrete after several inches of sand are put around the bottom of each post to assure drainage of rainwater. A hacksaw or powered pipe cutter is required to cut the posts and rails to length, and a fence stretcher must be rented to stretch the wire mesh taut. A woven wire fence, not the most aesthetically pleasing type, can be made much more attractive by covering it partially or fully with vines.

After you have determined the cost of materials and labor involved in erecting such a fence, obtain a price from a professional fence erector. The price he gives you may well be worth your labor.



## Post-and-board fence

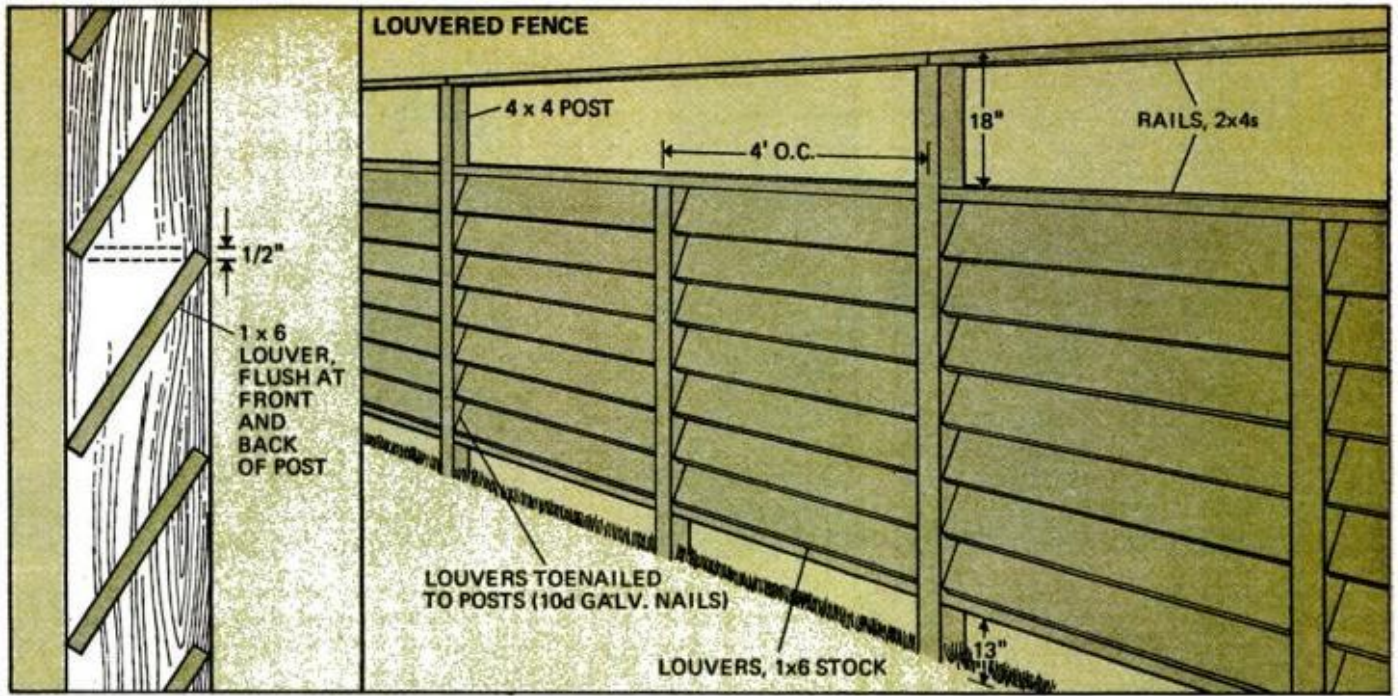
A fairly common, quite handsome residential fence is made by installing 4x4 posts set on 8-ft. centers. Either 1x6 or 1x8 boards are nailed horizontally to the posts, usually with a wide space between the boards. The end joints should be staggered as shown above so that one post does not have all the butt joints of the horizontal boards. Ordinarily, the posts of this type of fence are capped with 6x6-in. pieces of 1-in. material. A post-and-board fence is most often made of rough lumber that is either whitewashed or painted white.



## Picket fence

The picket fence, a choice of many homeowners, is also based on 4x4 posts set on 8-ft. centers. The top and bottom rails are 2x4s. The top rail should consist of a minimum of 16-ft. lengths nailed to the tops of the posts. The bottom rail is made up of lengths cut to fit between posts and toenailed to them. Pickets are usually 2 in. wide, tapered at the top (or rounded as shown above). Pickets should extend at least 6 in. above the top rail, 2 in. below the bottom rail, and still be 2 in. above the ground. Determine height of fence and length of pickets prior to laying out the rails; an average height for a picket fence is 36 in.

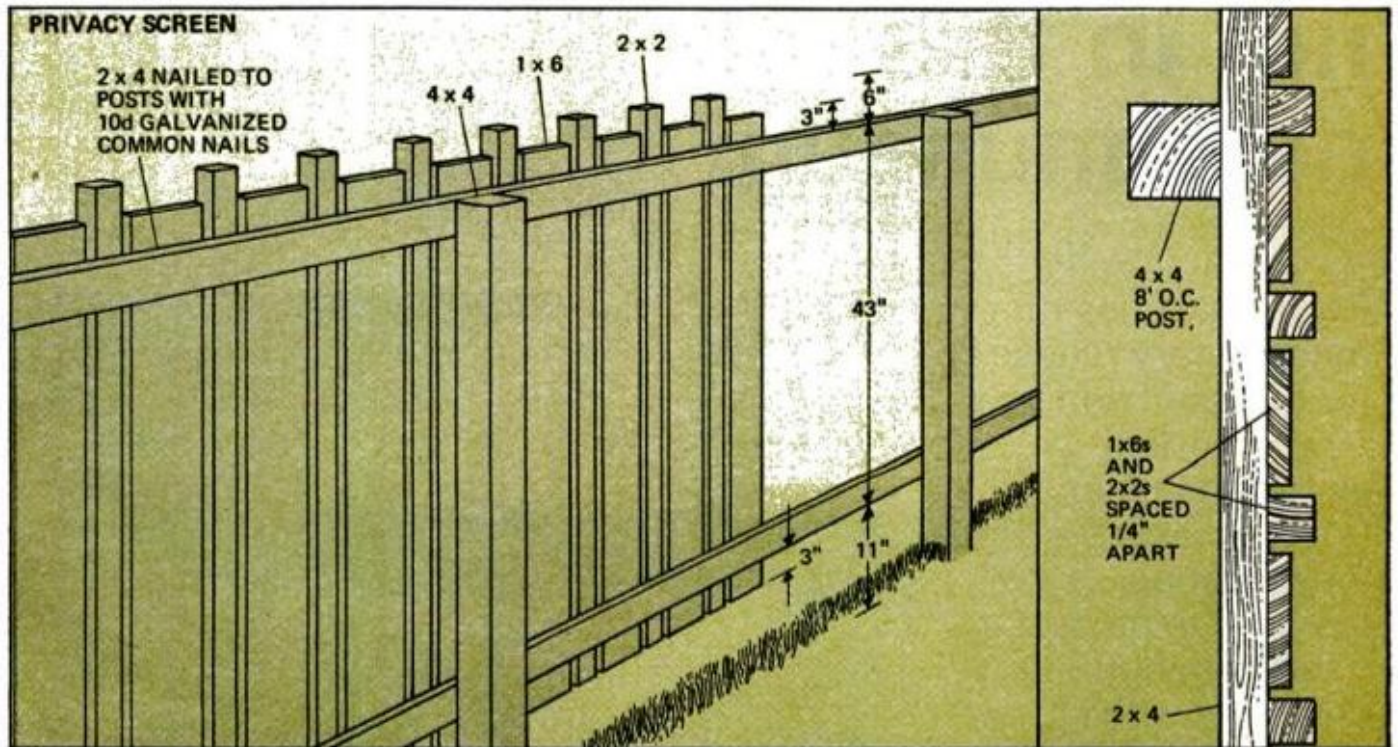
# Privacy fences



## Louvered fence

Standard 4x4 posts are used here, with 1x6 horizontal boards toenailed at a slight angle between the posts. Top and bottom rails (2x4 stock) are often used, and by having alternate posts 18 in. higher, finished with an uppermost rail, a very pleas-

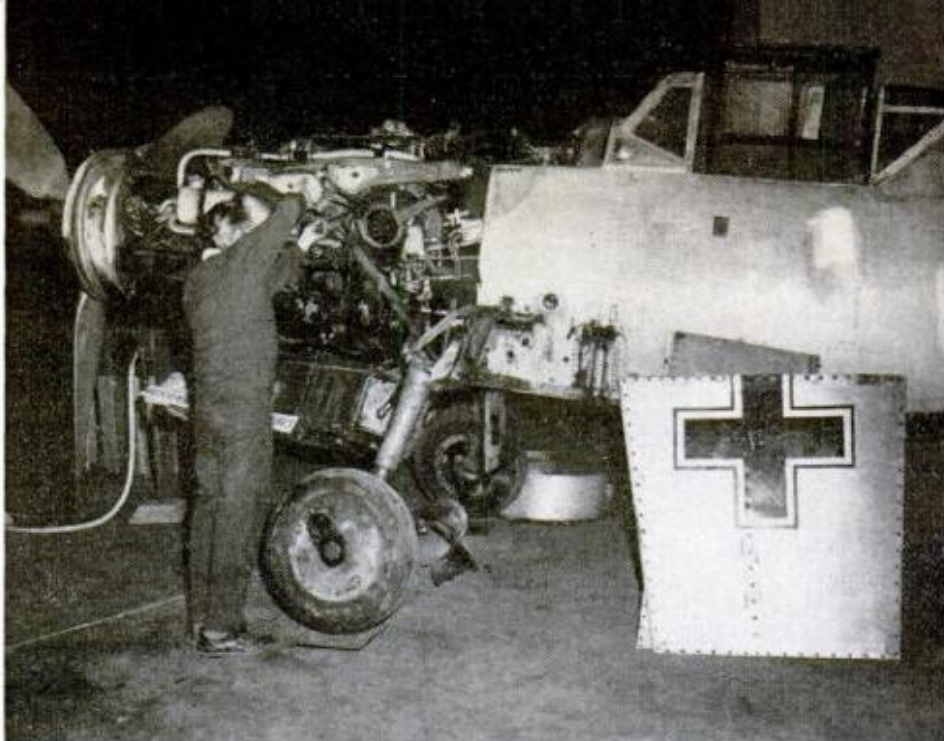
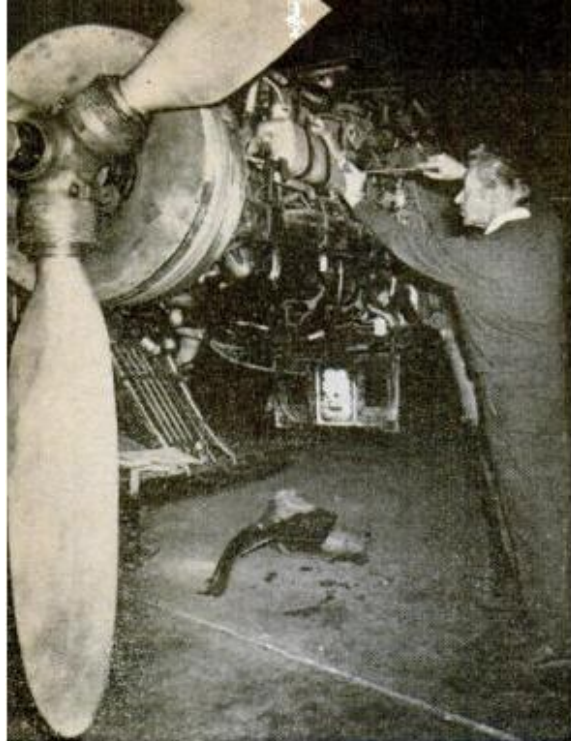
ing effect is achieved. Posts and rails must be completely plumb and level before you cut the louvers. Louvers can also be fastened vertically. Both methods allow airflow, but if set vertically, the louvers allow privacy from only one angle.



## Wind and privacy screen

The screen shown has alternating 1x6s and 2x2s nailed to 2x4 rails and spaced 1/4 in. apart. If desired, 2x2s can extend 3 in. below 1x6s. The shadow lines from these varying thicknesses and heights make this fence extremely attractive.

After a week or two, any newly installed fence may lean due to winds and settling backfill. Just straighten the fence, add earth where needed and tamp firmly. Eventually earth will lock the posts in place and fence will stand without leaning. ★ ★ ★



**Deadly German fighter** of World War II, a Messerschmitt ME-109 captured by Allies, is readied for display in new Smithsonian museum scheduled to open in 1976. Note massive steel nose shielding behind prop in photo at left.

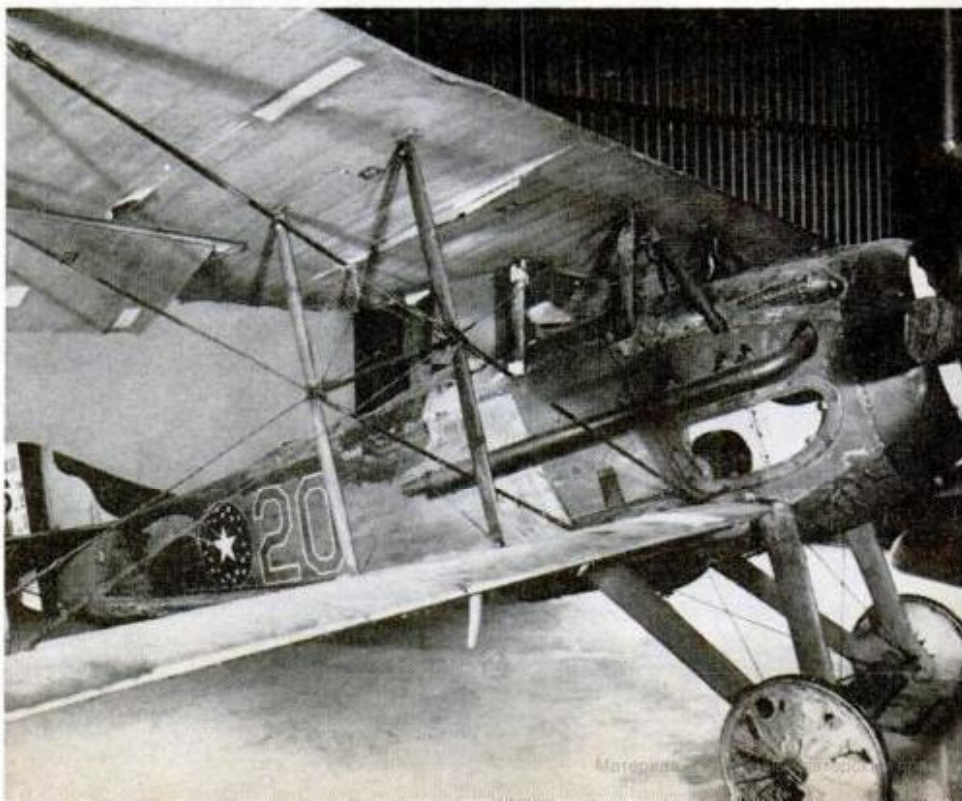
# Old warbirds never die—not in this new museum

If you're in Washington, D.C., on July 4, 1976—our nation's bicentennial year—you can be on hand for the scheduled opening of the Smithsonian Institution's new National Air and Space Museum.

But even this \$40 million structure will not be large enough to provide display space for all the 200-plus planes in the Smithsonian's armada. Aircraft will be rotated from the Institution's 24-acre storage compound in Silver Hill, Md., where machinists,

Patching up famous battle-weary relics for the Smithsonian's new historical aircraft museum is a special art—they must be restored to perfect condition, but complete with all original bullet holes.

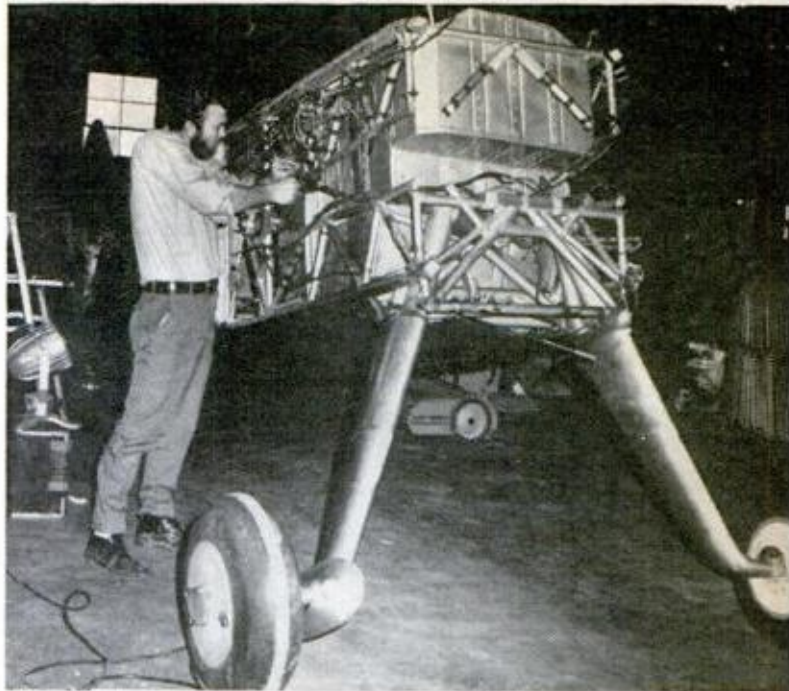
by C. H. Echols Jr.







Two famous old-timers come to life again in photos above. At left is Amelia Earhart's Lockheed Vega in which she made first trans-Atlantic solo flight by a woman. At right is Roscoe Turner's Pesco Special rac-



er that broke many speed records in the '30s. Flashy speedster, made especially for Turner, is now being completely rebuilt. Photo shows fuselage frame prior to installation of engine, wings and outer covering.

woodworkers, painters and other specialists do meticulous repair jobs.

"It takes a special kind of craftsman to work here," says Don Merchant, chief of the museum's Preservation, Restoration and Storage Div. "Restoring a single plane requires many different skills, from crafting handmade metal parts to replacing old woodwork and fabric. Much of the work calls for skills that are almost forgotten."

All the planes are significant for one

reason or another. Some figured in historic flights, some made speed or altitude records. Many were flown by famous pilots. In one corner of the workshop building stands the Lockheed Sirius seaplane flown 'round the world by Charles and Anne Lindbergh in the 1930s. Near it is the Lockheed Vega that Amelia Earhart piloted when she became the first woman to solo the Atlantic in 1932.

In another part of the workshop, a Mes-

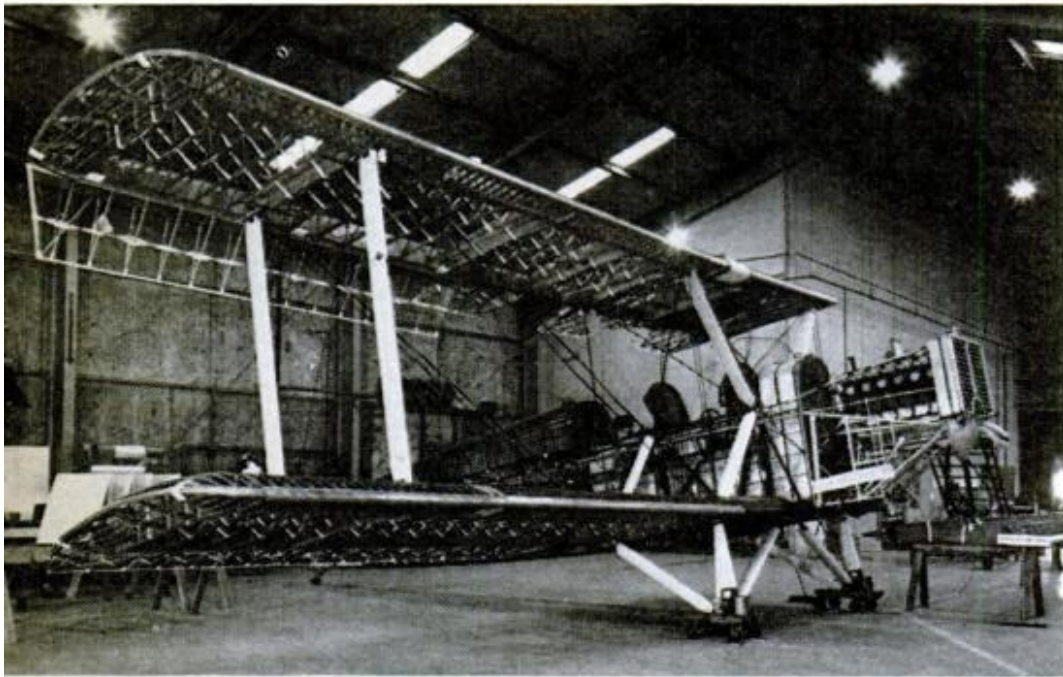


Bullet-riddled Spad (facing page), workhorse of American airmen in World War I, is restored complete with original markings and bullet patches on wings. At left, above, worker installs machine gun in wing of

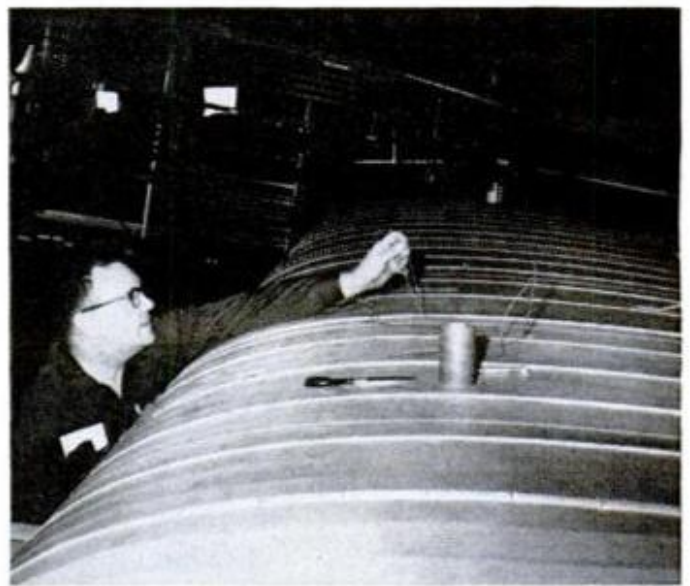
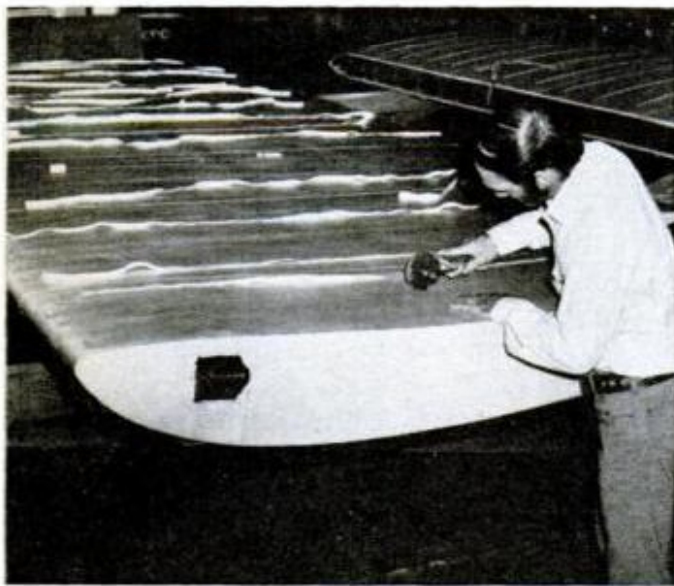


British Spitfire, one of most feared fighters to come out of World War II. At right is nose of historic Enola Gay, the B-29 that dropped the first atomic bomb on Hiroshima to help speed Japanese surrender.

## The work is meticulous, the job unending



**Mighty Douglas World Cruiser,** one of largest biplanes ever built, stands stripped at left, ready to be recovered with new fabric. Below, worker uses rotary hole puncher (top left) to make evenly spaced holes for stitching fabric to World Cruiser's wing. Other photos show sewing fabric in place (top right), fitting finished panel into wing (bottom left) and brushing dope on rudder (bottom right) to stretch fabric taut.

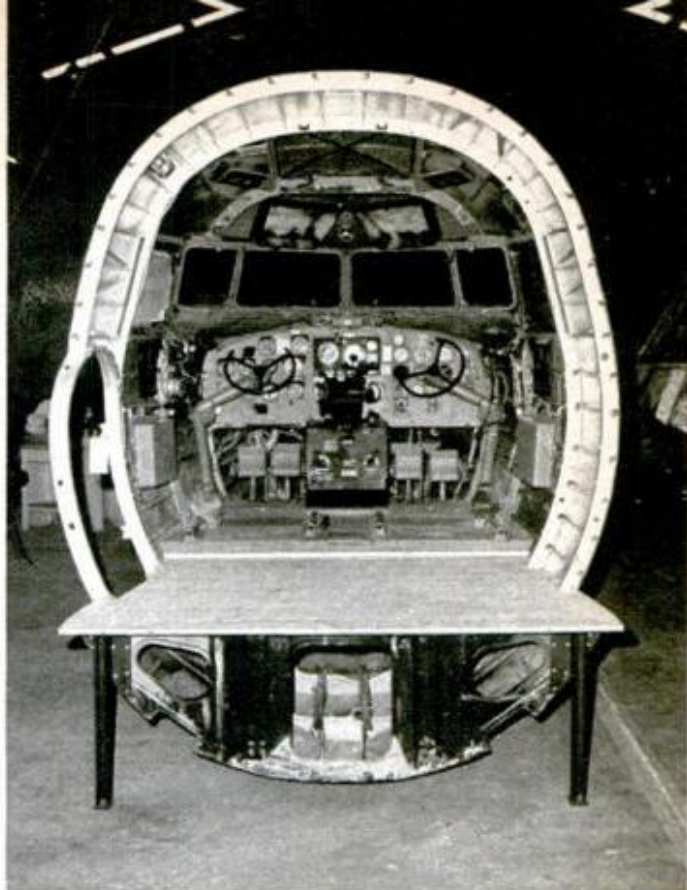


serschmidt 109-G, one of several versions of Germany's outstanding fighter of World War II, is having rust removed from its wheel struts before painting. Nearby stands an old enemy, a Spitfire Mark VII, one of Britain's all-time greats. The Spitfire's wing-mounted machine guns are being removed so they can be disassembled and cleaned.

Many planes go back to the early days of aviation. Hanging from the workshop's roof are a number of rare old birds, including Louis Bleriot's frail-looking mono-plane, similar to the one in which he flew across the English Channel in 1909.

Not every plane is restored to the same degree. There is a small World War I Spad, for example, which still carries a

*(Please turn to page 182)*



**Cockpit section** of DC-3, one of first and best-loved early airliners, is recreated for museum exhibit. Many controls and instruments had to be handmade to duplicate missing originals.



**Short-lived but devastating**, this first rocket fighter was developed by Germans near end of World War II. Capable of only few minutes' flight, the ME-163-B could reach 35,000 feet.



**Little-known but an important historical first** is Douglas D-558-2 shown in photos at left—the first rocket-powered plane to fly at twice the speed of sound or about 1400 mph. Called the Skyrocket, it's one of few prototype models in existence, is being cleaned here for a new paint job.



# Coming: Smaller cars from Chrysler

by Bill Hartford AUTO EDITOR  
and Harry Bradley ILLUSTRATOR

The Plymouth Duster and Dodge Dart are carrying the banner for Chrysler right now. They're good, solid, economical cars—cars you can easily service yourself and can afford to run. That's the whole Chrysler line-up, now that fuel is at a premium.

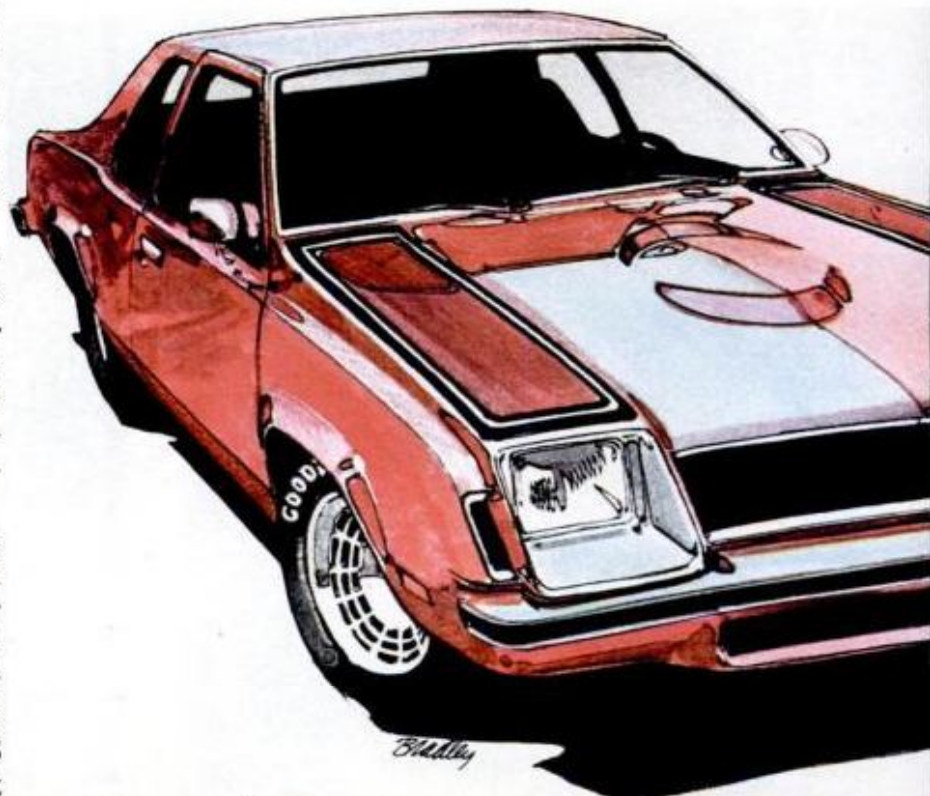
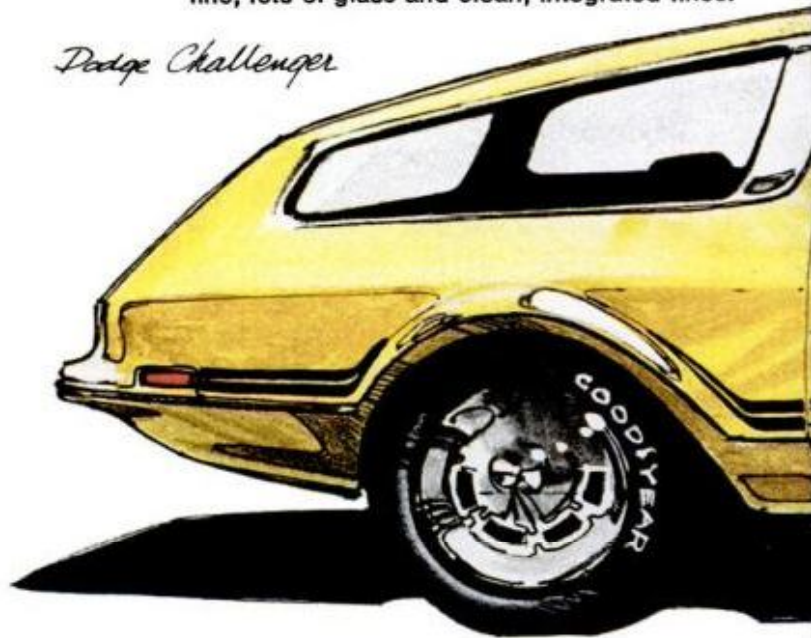
Chrysler put almost all its apples in the big-car basket. So, too, have GM and Ford. But the latter two did introduce an ample range of compacts and subcompacts in recent years, and they are also flexible enough to quickly convert more of their large-car assembly plants to manufacture smaller gas-savers. American Motors, with its traditional concentration in the compact and subcompact market, is now riding high.

That leaves Chrysler. The corporation must soon, if it has not already, commit itself to production of smaller cars. It probably won't have a choice: Congress is quickly moving toward the legislation of a 20-mpg minimum performance standard for U.S. cars.

Chrysler has small-car designs on the boards right now, and some concepts even further along. But there's no way it'll have production lines in gear before 1977. Most likely, the cars will be introduced in '77 as '78 models. They're still under tight wraps, but we've pieced together enough to get an idea of what they might look like. ★★★

Chrysler's ponycars, Barracuda and Challenger, are antiquated. In ponycar design, Ford led the way by scaling down its original and coming up with the Mustang II. Chrysler should do the same: new Challenger and Barracuda versions could share the same chassis, even doors and glass area could be interchangeable. Reduced weight would result in economy and performance. Emphasis in styling should be on low belt line, lots of glass and clean, integrated lines.

*Dodge Challenger*



*Plymouth Road Runner*

## THE SPORTY MOPARS

*Plymouth Barracuda*



## THE COMPACT MOPARS

*Dodge Dart Sedan*



On a slightly larger chassis than the new ponycars, Chrysler should update the successful Duster and Dart. The current cars are going great guns, but the sheet metal is old. It's time for an all-new car that reflects current styling trends: big greenhouses, clean body sides and a front that leans back at the top. The look will be decidedly European. The lineup should include two-doors, four-door family sedans and it should be topped off with a sporty Road Runner version.

(For the Mini Mopars, see overleaf)

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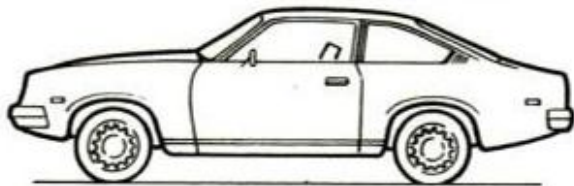
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## THE MINI MOPARS

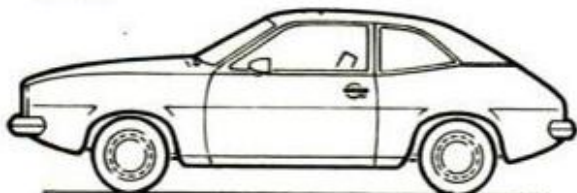
Among the subcompacts, Chrysler has no entry. (Don't count the Dodge Colt: It's a "captive import"—made in Japan and sold by Dodge dealers.) The Pinto, Vega and Gremlin have been running away with all the chips. A modern, yet practical, design that borders on the futuristic could put Chrysler way ahead of the competition. If the Mini Mopar shown here goes into production, it'll make the other subcompacts stale overnight. Plymouth and Dodge would each have a version of this subcompact to be offered in three models: coupe, hatchback and station wagon. Paint and detail options could transform each car from a basic bread-and-butter model into a snappy, performance-oriented automobile. A GT version of the coupe and a sportwagon version of the basic wagon would wipe out the "GT" on Vega, panic Pinto and knock the "X" off Gremlin.



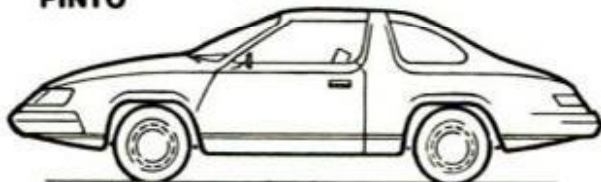
*Plymouth & Dodge:  
Standard Hatchback version*



**VEGA**



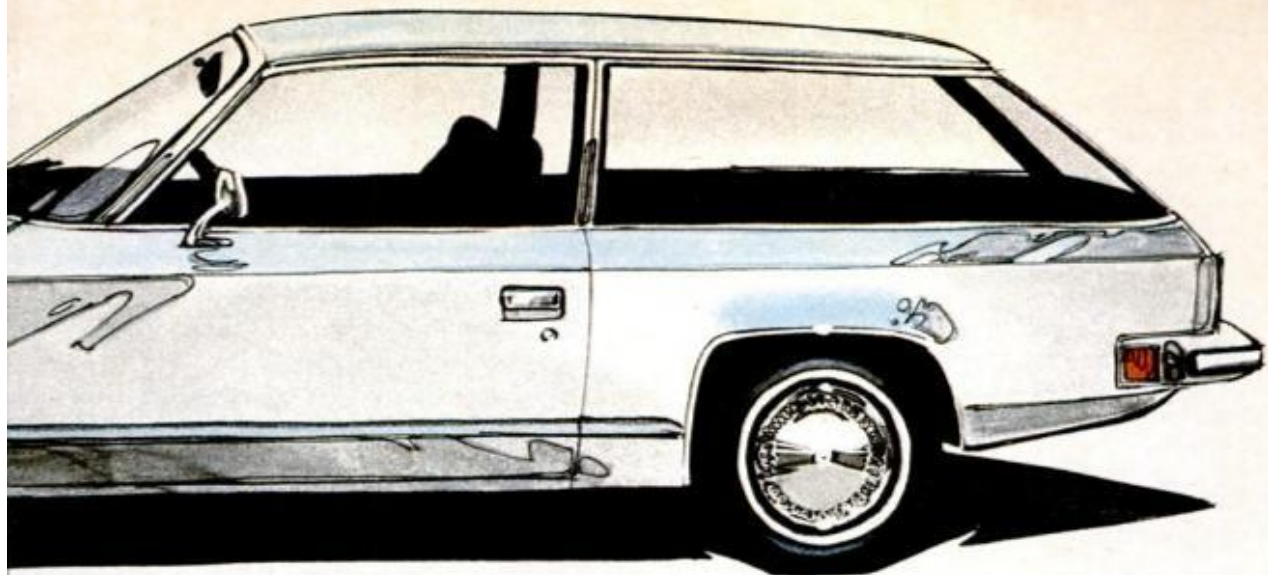
**PINTO**



**MOPAR**

*Plymouth & Dodge: GT version*





*Plymouth & Dodge: Station wagon version*



# Build PM's 'Boonie Bug'

Based on a VW bus chassis, this gas-saving, go-anywhere camper is equally at home on or off the road. You can make it from plans.

by Robert Q. Riley

**Smart-looking** with its gleaming red exterior, build-it-yourself "Boonie Bug" camper is a smooth-rider on the highway and a rugged mountain cat on back trails.

With *PM'S* "Boonie Bug," you can have your cake and eat it, too. A new concept in recreational vehicles, it combines the best of two worlds: You can take it into the wilderness for a weekend of camping fun, then drive it to work Monday morning. The problem with most dune buggies, ATVs and other off-the-road vehicles is that they're not generally suitable for around-town chores or highway driving. Many can't even be licensed for street use. The Boonie Bug, however, offers the go-anywhere ruggedness of an ATV, the sleeping and camping facilities of an enclosed van and the smooth-riding qualities of a conventional station wagon at highway speeds—rolled into one slick-looking, smartly styled vehicle equally at home on or off the road.

Designed for *PM* by recreational expert Dave Carey, the Boonie Bug gets its name from what it does best—roaming the "boondocks"—plus the fact it's built around a

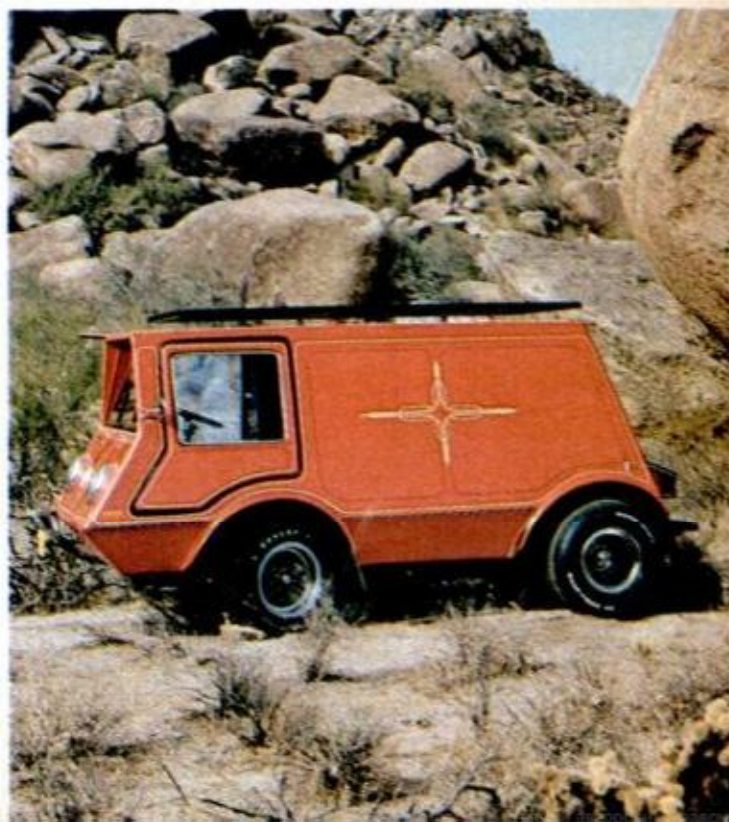




**Oversize tires** are secret of both soft ride and good traction on rough terrain. Front tires are 8 inches wide on 15-inch mag rims; rear are 10 inches wide on 15-inch reversed rims. Using reversed rims offsets tires to the outside, in effect widening rear track for better stability. Photos below show interior of cab (top right), rakish forward-slant body profile (bottom).



Photos: Don W. Jones



## Lots of go on little gas

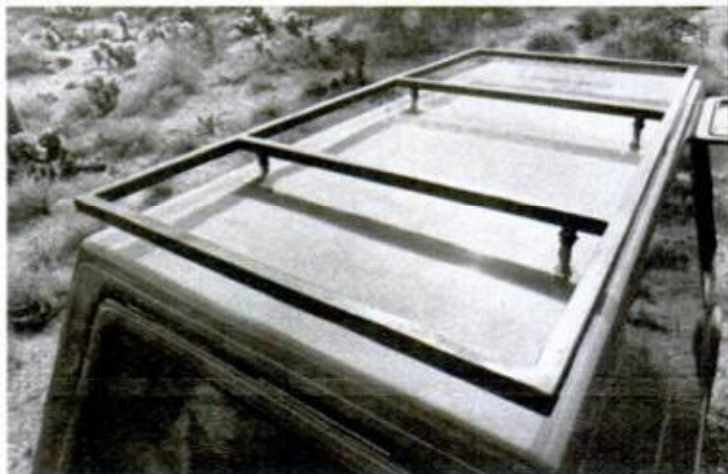
Volkswagen bus chassis. The VW bus was chosen because it's easy to convert to off-the-road use, inexpensive if bought second-hand and—most important—thrifty on fuel.

The Bug sleeps two adults with room to spare for squeezing in a youngster or two for family outings. Hinged floor boards provide a sleeping deck with 90 cubic feet of space. Underneath is an additional 34 cubic feet of storage for supplies and gear. Complete plans for building the Boonie Bug are available from *PM* for \$14.95 (see instruc-

### How to order PM plans for building the 'Boonie Bug'

For large, detailed plans and complete instructions on building the "Boonie Bug" camper on a Volkswagen bus chassis, send \$14.95 to Popular Mechanics, Dept. BB, Box 1014, Radio City, New York, N.Y. 10019. Request plans No. B1307.

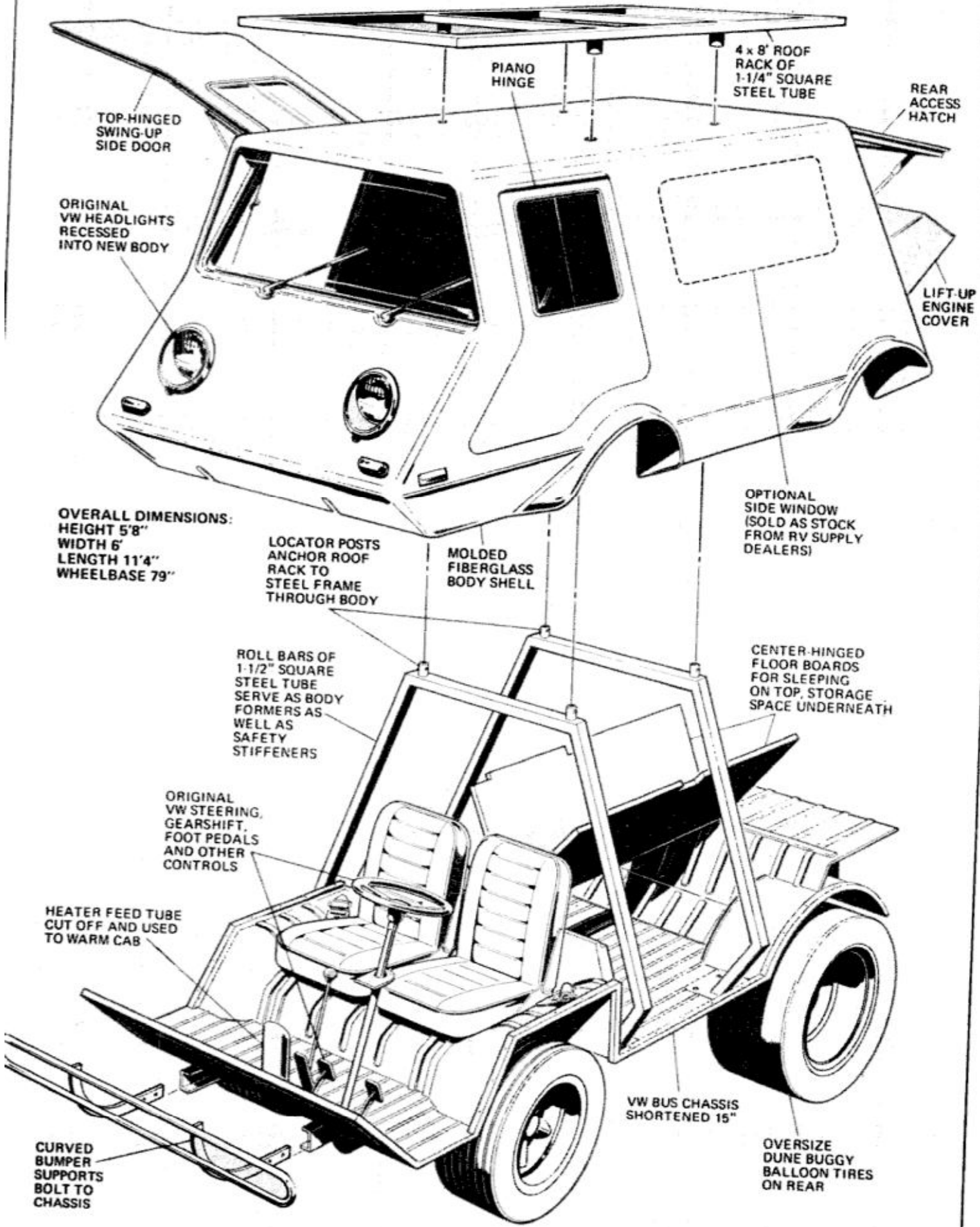
*Popular Mechanics* disclaims all responsibility for the quality, condition, design, workmanship and materials of the vehicle built from these plans, and for its proper and safe functioning in use.



Top-hinged side doors (left, above) swing up clear out of the way for unobstructed access to cab, helpful in loading and unloading supplies. Photos at right show big, sturdy roof rack made of heavy square steel tub-

ing (top) and hinged engine cover at rear that lifts up for easy checking or servicing of parts (bottom). Above engine is rear access door to camper's sleeping quarters. Side windows are optional extras.

# Exploded view of VW conversion



TOP-HINGED SWING-UP SIDE DOOR

ORIGINAL VW HEADLIGHTS RECESSED INTO NEW BODY

PIANO HINGE

4 x 8' ROOF RACK OF 1-1/4" SQUARE STEEL TUBE

REAR ACCESS HATCH

LIFT-UP ENGINE COVER

OVERALL DIMENSIONS:  
HEIGHT 5'8"  
WIDTH 6'  
LENGTH 11'4"  
WHEELBASE 79"

LOCATOR POSTS ANCHOR ROOF RACK TO STEEL FRAME THROUGH BODY

MOLDED FIBERGLASS BODY SHELL

OPTIONAL SIDE WINDOW (SOLD AS STOCK FROM RV SUPPLY DEALERS)

ROLL BARS OF 1-1/2" SQUARE STEEL TUBE SERVE AS BODY FORMERS AS WELL AS SAFETY STIFFENERS

CENTER-HINGED FLOOR BOARDS FOR SLEEPING ON TOP, STORAGE SPACE UNDERNEATH

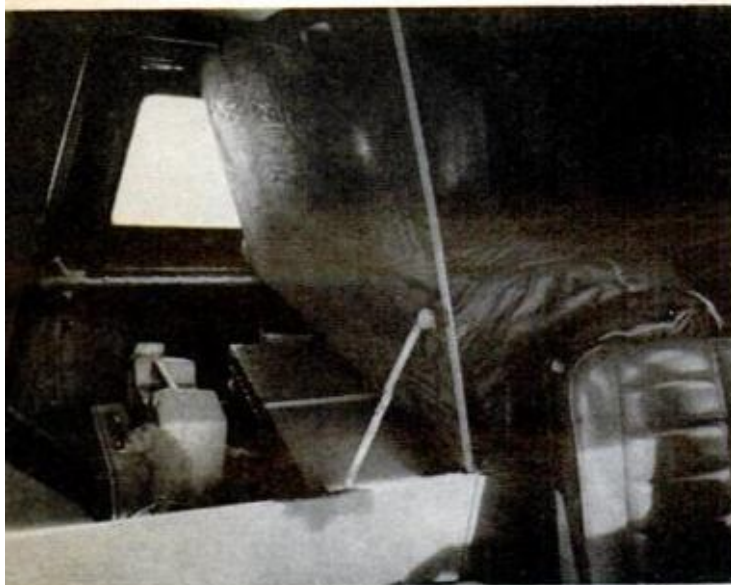
ORIGINAL VW STEERING, GEARSHIFT, FOOT PEDALS AND OTHER CONTROLS

HEATER FEED TUBE CUT OFF AND USED TO WARM CAB

VW BUS CHASSIS SHORTENED 15"

OVERSIZE DUNE BUGGY BALLOON TIRES ON REAR

CURVED BUMPER SUPPORTS BOLT TO CHASSIS



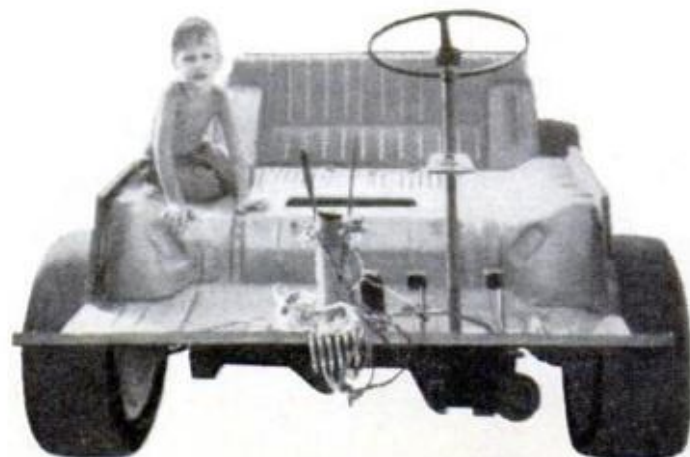
**Roomy sleeping quarters** behind cab are shown in top photos. Ceiling light gives good interior illumination. Bottom photo shows storage space under lift-up floor boards. Seats are fold-down boat type, but original VW bench seat could be left in if desired. At right is stripped VW chassis before adding new body.

tions for ordering on page 96). The first step in making the conversion is to remove the old VW van body. A 15-inch-wide section is cut from the chassis to shorten the wheelbase to 79 inches. The shorter wheelbase enables the Boonie Bug to ride over ridges and gullies without hanging up. The modification is actually simple because, with the engine in the rear, there are few parts to interfere with the cutting.

Two "roll bars" of heavy square tubing serve both as frame formers for the new body and reinforcing stiffeners for safety, making the Bug virtually crushproof. The body shell is formed of polyurethane foam sheets sandwiched between inner and outer skins of fiberglass. The polyurethane foam is the same material used to insulate refrigerators so it provides an extremely warm as well as durable enclosure. The fiberglass skins create a smart, gleaming exterior and a smooth, easy-to-keep-clean interior.

Big, fat, oversize balloon tires—the kind used on dune buggies—are what give the Bug its mountain goat capabilities on soft sand, mud, brush, rocky ground, steep grades and other rough terrain. The front tires are 8 inches wide, the rear 10 inches. The use of reversed rims on the rear has the effect of widening the track to 68 inches for good stability. Side windows are optional. If wanted, they can be added easily using stock frames sold by RV suppliers.

How much the Boonie Bug conversion will cost you depends, of course, on what you pay for the original VW chassis. The one shown here was bought used for \$100 with a rusted-out body that was discarded anyway. Outlays for body materials, steel framing, tires, rims and other incidentals came to \$530—totaling less than \$700 for a tough, scrappy little fun camper you can't buy anywhere at any price. ★★★



# Heath's take-along TV has three-way power

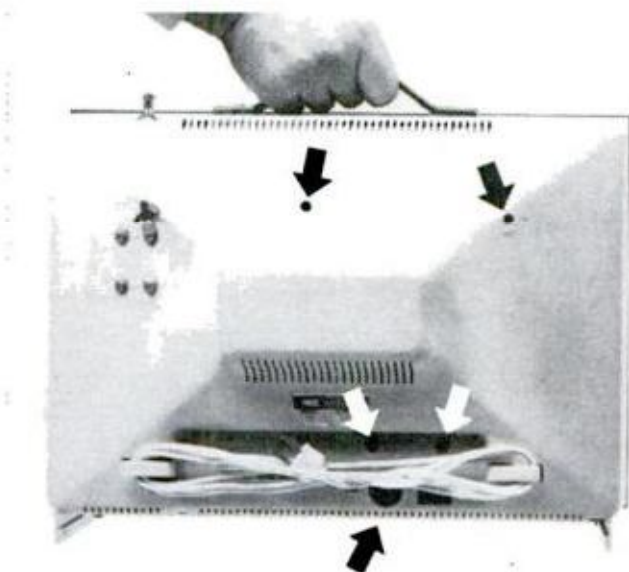
by Ivan Berger

Photos: Peter Schneider

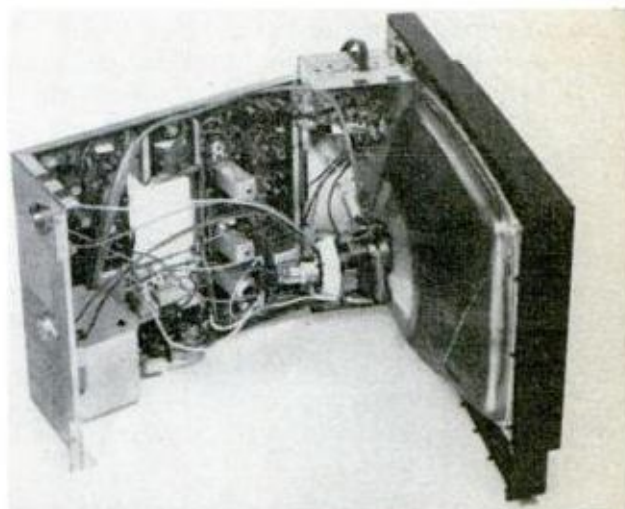
Optional battery pack and sunshade (\$42.95) adapt Heath's GR-104C for outdoor use.



Attach a car-lighter cord to the plug supplied for the set's 12-volt input, and you can run your TV from your car or camper battery. (In a moving car, of course, the set should be placed in the back seat to meet safety and legal requirements.)



Easy to carry, the set weighs only 20 pounds, has hooks for wrapping the a.c. power cord, and a comfortable handle. Access holes are for AGC and height adjustment (upper black arrows), circuit-breaker resetting (white arrows) and plug for 12-volt power from car or battery pack (lower black arrow).



Swing-open chassis means easy service and adjustment—which is the big plus feature of Heathkit TVs. Assembly and adjustments took 17½ hours.

Heath's smallest TV-set kit yet is also its most versatile: The new \$129.95 GR-104C operates from 110-130 volts a.c., or 12-volt d.c. supplied by your car's battery or the set's optional battery pack.

It's also a good performer. With its retractable whip antenna extended, it pulled in local stations even more clearly than my big set does with rabbit ears. The picture was clear and steady, though vertical hold adjustment was a little sensitive; probably thanks to its regulated power supply, it seemed less affected by a.c.-line voltage drops than my big set is.

And it was handy. Easy to carry, it followed me into the living room while I

worked on rewiring my hi-fi, into the kitchen when I cooked, and into my home office so I could keep tabs on an interesting guest on the late-night talk shows.

Construction of the kit took about 17½ hours, thanks to the preassembled and aligned tuners (with detents for every channel on the UHF as well as VHF), the prefabricated wiring harness, and an integrated circuit that takes the place of 39 parts in the audio circuit.

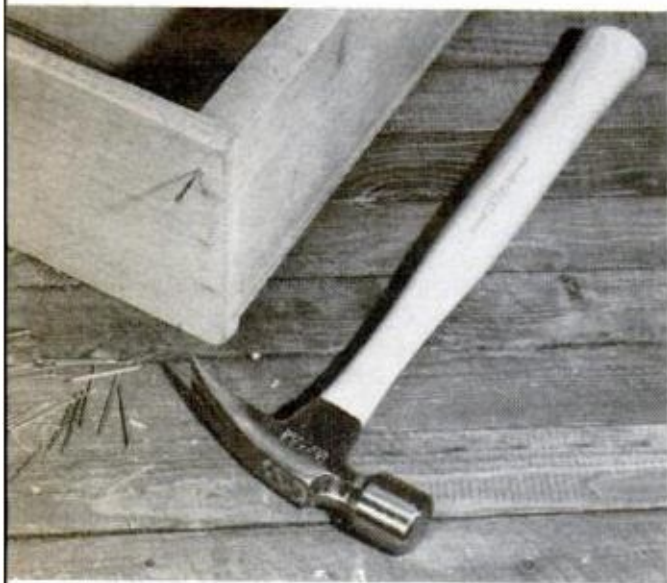
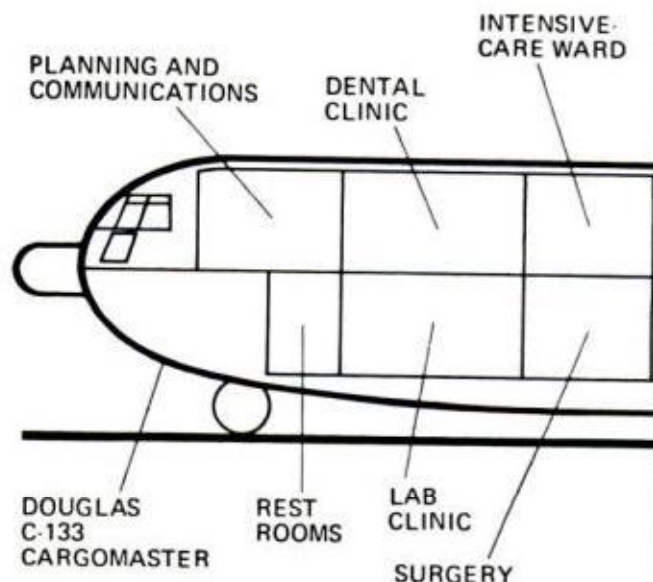
As usual with Heath's TV kits, the manual has an extensive troubleshooting section (12 pages), so you can solve most problems without calling a repairman. The chassis hinges open for servicing ease. ★★★

# IT'S NEW NOW



## Flying hospital to speed help to far-off disaster victims

This flying hospital is a fully equipped medical center, including operating rooms and laboratories, that can be flown anywhere in the world to aid disaster victims at a moment's notice. An airborne version of the Project Hope hospital ship, the specially fitted out C-133 Cargomaster is being readied for use by the Foundation for Airborne Relief, a nonprofit organization set up to help needy nations in times of trouble.



## Fancy hammer for fine cabinetwork

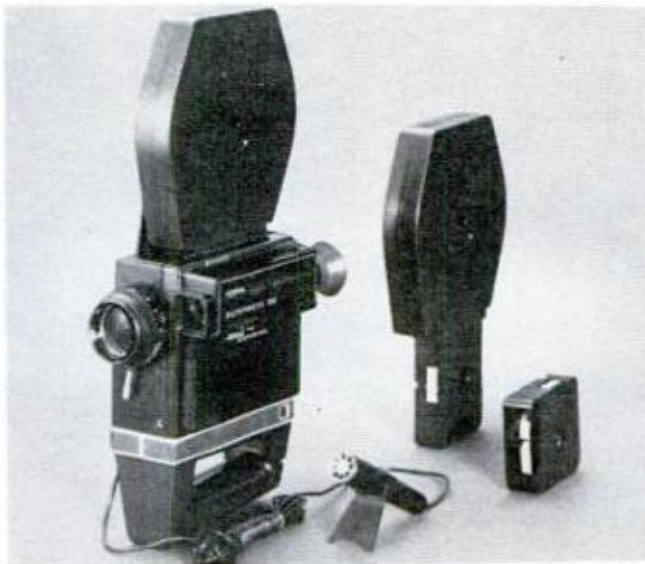
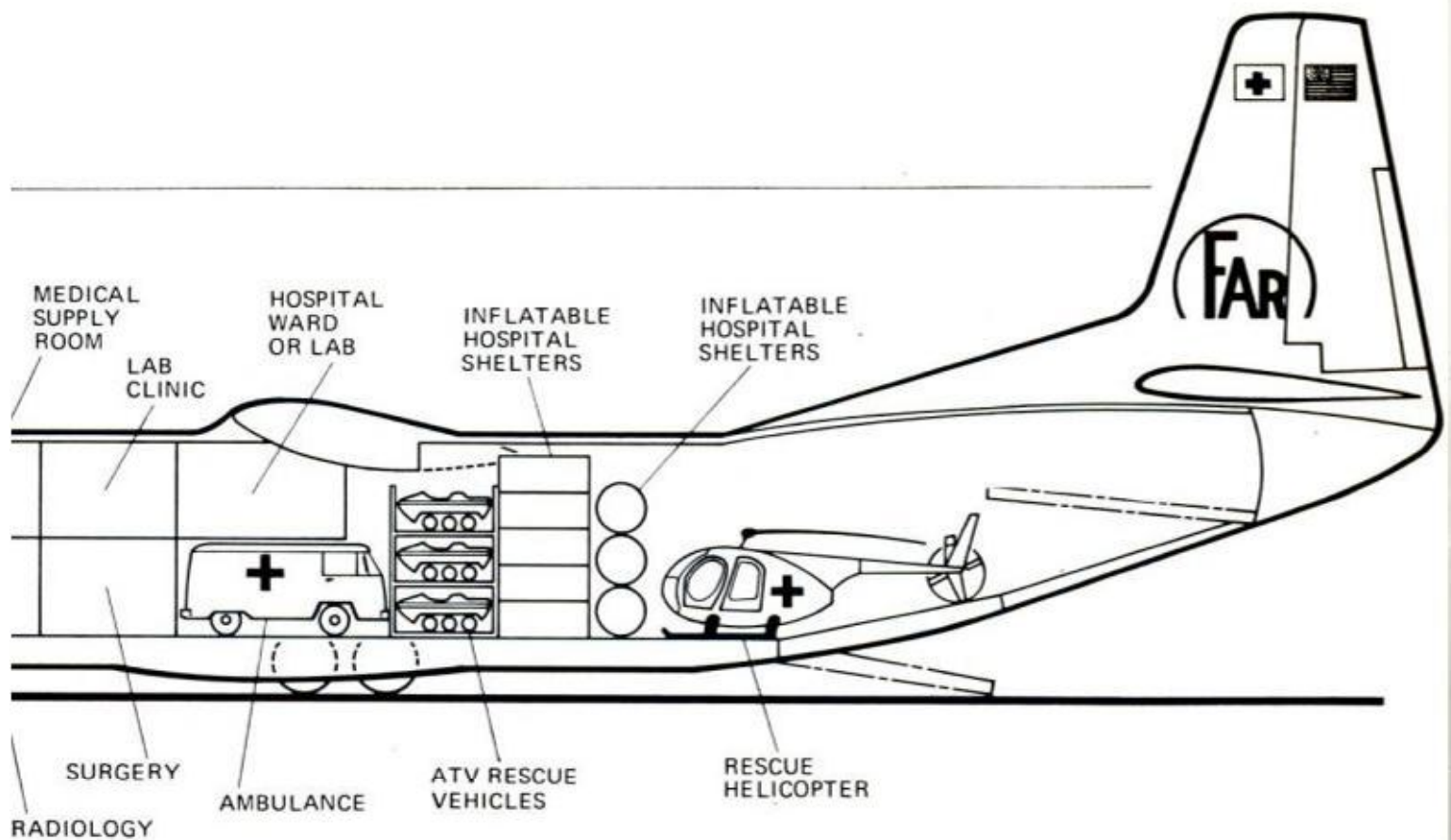
For precision work with fine finishing nails or brads, this cabinetmaker's hammer combines light weight and good balance with a large 15/16-in.-dia. striking face. The head is drop-forged vanadium steel, the handle solid white hickory. Brookstone Co., Peterborough, N.H. 03458, sells it for \$5.95 plus shipping charges.

100 POPULAR MECHANICS

## Go-anywhere collapsible fishing raft

AquaRaft is a small, lightweight, shallow-draft fun and fishing craft that will get you places where conventional boats can't go. Supported on fiberglass floats, it will carry two adults and take outboard engines up to 5 hp. Length is 74 inches; width, 60 inches; weight, 125 pounds. The unsinkable craft disassembles for easy transporting and storage, can be carried in a station wagon, camper or on a cartop carrier. Price is \$188 plus \$12.50 shipping from Blue Moon Ventures, Box 3306, Simi Valley, Calif. 93063.





## Kodak's Super-8 sound system now takes 'long-play' cartridges

Kodak's Ektasound Super-8 sound-on-film movie system now includes a camera that takes 200-foot cartridges of prestriped Kodak Super-8 film, as well as standard 50-foot cartridges. Designed for advanced use, Supermatic 200 has both manual and auto exposure control, runs at 18 and 24 f.p.s.

## Sauna bath you put on and wear

You don't need a special sauna room with this portable suitlike outfit. Just zip yourself into it, attach a conventional hair drier to an inlet at the bottom, and you're ready to sweat off a few pounds. The Sauna Suit will be marketed soon by Spacetron, Broadville, Ill.



# NOW



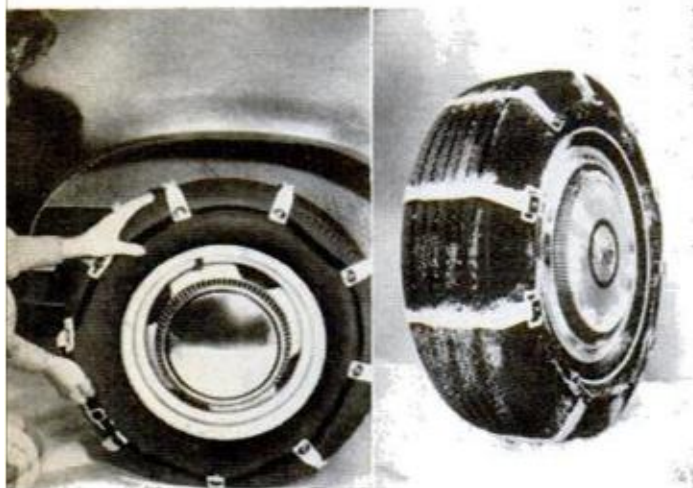
## Flashbars find a second camera

Keystone's new 60-second Rapid-Shot instant-picture camera not only takes Polaroid regular and square film packs, but uses GE's Flashbars, originally introduced for Polaroid's SX-70 camera. Rapid-Shot has electric-eye shutter with speeds to 1/500 second, costs \$74.95.



## Slip-on tractor cab keeps you warm and dry in rain or snow

New line of Homelite garden tractors features an accessory fiberglass cab enclosure (top photo above) for all-weather comfort in winter snows or summer rains. Other attachments include rotary broom (top) and grader blade (center). The tractors offer a choice of power from 8 to 16 hp, with hydrostatic transmission available on the top-of-the-line 16-hp model. Mower attachments come in 36 to 42-inch widths and fasten to the front axle instead of body frame so they remain level with the lawn for no-scalp cutting regardless of body tilt on grades (bottom photo).



## Plastic 'chains' can't break or clank

Plastic Sno-Treds strap on in minutes, permit driving at highway speeds without breaking. On bare roads, the cross links lie flat. In snow, their toothed edges turn sideways and dig in for traction. In sizes to fit regular or snow tires; \$25 to \$35 a pair. Detwiler Corp., 36 New York Ave., Westbury, N. Y. 11590.





### Self-cleaning car mirror

This rear-view side mirror wipes itself clean, but there's a twist—the miniature wiper blade remains fixed, while a tiny electric motor turns the mirror. It's the invention of H. P. Smallbone, Birmingham 29, England.

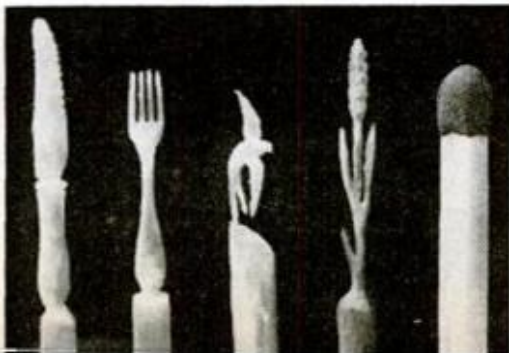
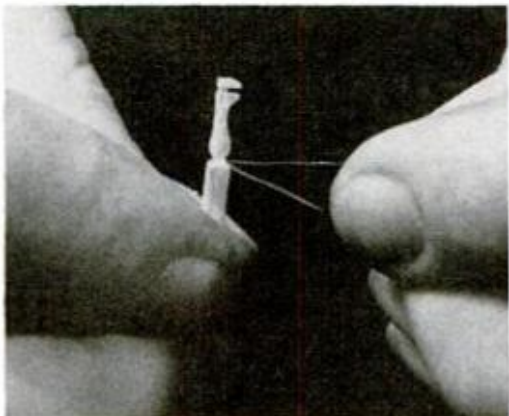


### Fold-up luggage carrier eases heavy loads

Portable lightweight luggage tote lets you wheel heavy baggage easily around air and rail terminals. When not in use, it folds flat for compact storing or carrying (right, above). Weighs less than 5 pounds and comes with elastic straps to hold luggage on cart. \$21.95 plus postage from E-Z Rider, 103 Pryor St. N.E., Atlanta, Ga. 30303.

### Matchstick miniatures

British sculptor Ray Cook likes to think small so he's developed a whole new artform carving tiny objects from wood matchsticks. His collection totals several hundred, including items like the miniature wrench at top, below; knife and fork at bottom. His tools: bits of broken razor blades.



### Bucket loader is built in, not added on

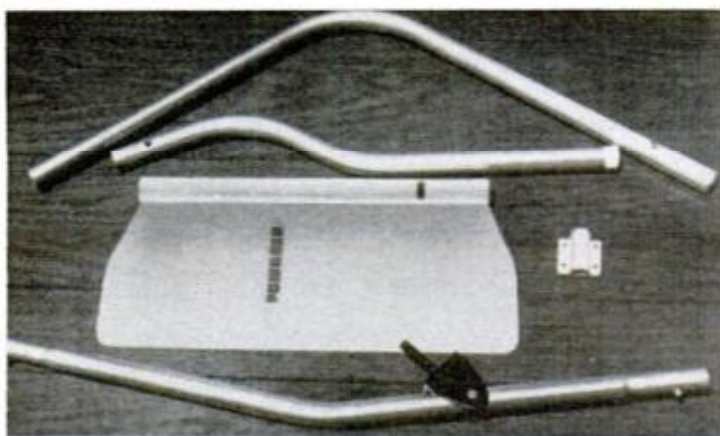
New J. I. Case tractor is designed as a bucket loader from the ground up instead of taking an add-on attachment. Results are said to be greater bucket capacity, increased ruggedness, easier control. Hydraulic bucket will lift 1000 pounds and dig, grade and backfill as well. Two models are 14-hp 644 for \$2384 and 16½-hp 646 for \$2822.

# NOW



**No problem leaving this meter on**

Forgetting to turn this new Triplet portable FET volt-ohm-milliammeter off after use won't kill its batteries. The meter's current drain is so low that battery life in use approaches normal shelf life, even if the meter's always left on. The \$165 meter also has polarity switching.



**Your boat can swim like a fish**

One-hand rowing is possible with this sculling oar attached to the stern of a small boat. Swinging fin back and forth propels boat forward the way a fish swims with its tail. Ideal for anglers who want a hand free for fishing or as auxiliary power for a becalmed sailboat, Powr-Oar can be mounted on most boat transoms. \$32.95 postpaid from Moderncraft, 1306 West Glenoaks Blvd. Glendale, Calif. 91201.



**Barge 'raises its head' for a better look**

When the captain of this icebreaking river barge has difficulty seeing where he's going in tricky waters, he simply raises the elevating pilot house for a better view. The unusual 50-foot craft was built by MonArk Shipyards of Pine Bluff, Ark., for maintenance work by the U. S. Army Corps of Engineers on the Mississippi River.



### Safety vent for parked cars

With this expandable plastic grille fitted into a partially opened car window, pets and children can be safely left in parked vehicles without the danger of overheating and lack of air that can cause suffocation. Levergap Ventilator is made by Freeline Ltd., Bath Rd., Bristol, England.

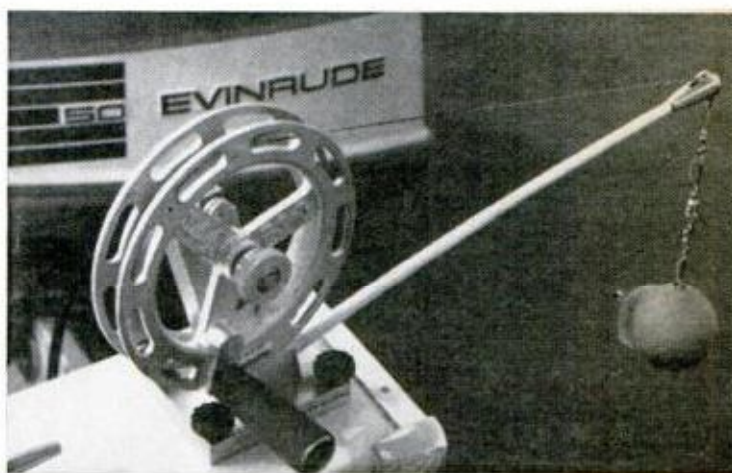


### Inexpensive drill and sabre saw

A  $\frac{3}{8}$ -in. double-insulated drill (above) and a single-speed sabre saw, each with a suggested retail price of \$9.99, are part of a new line of 36 power tools available from McGraw-Edison Co. at hardware stores. Included are saws, drills, sanders, bench grinders with steel I-beam construction.

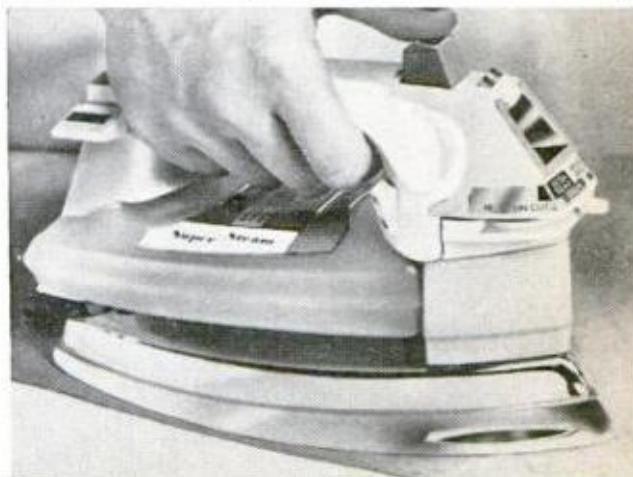
### Deck reel gets your lure really deep down

For bottom trolling, this deck-mounted reel and pole rig puts a 7 $\frac{1}{4}$ -pound weight up to 200 feet deep. It comes with right or left-hand crank and has a footage counter for precise depth measuring. Downrigger Deluxe is \$93.95 from Big Jon, Inc., 14393 Peninsula Dr., Traverse City, Mich. 49684. Electric-drive model with 300 feet of line is also available.



### Super-spray iron has modular parts

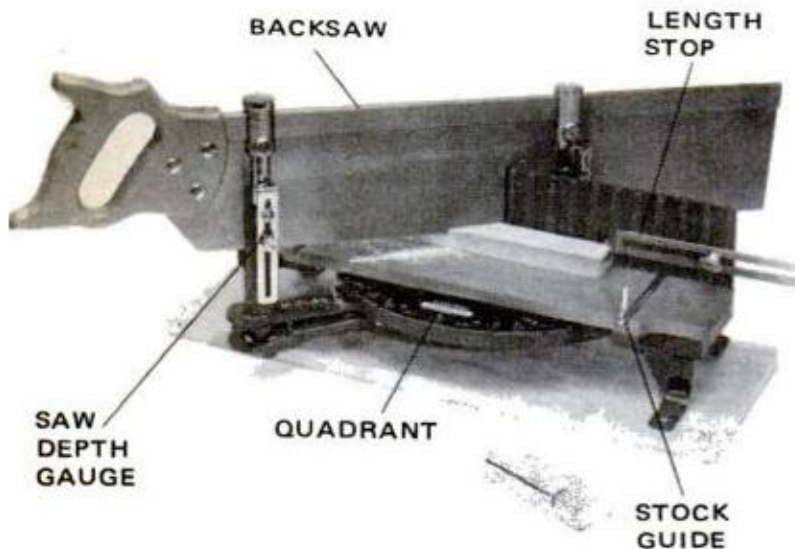
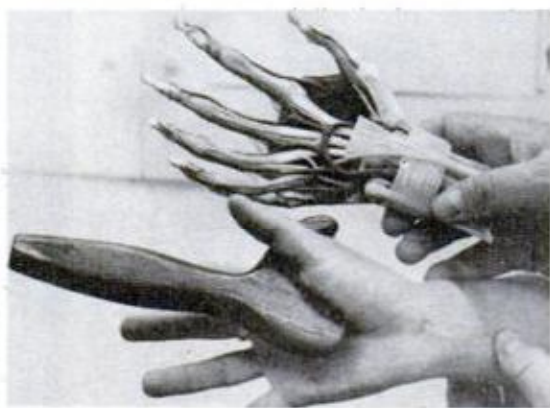
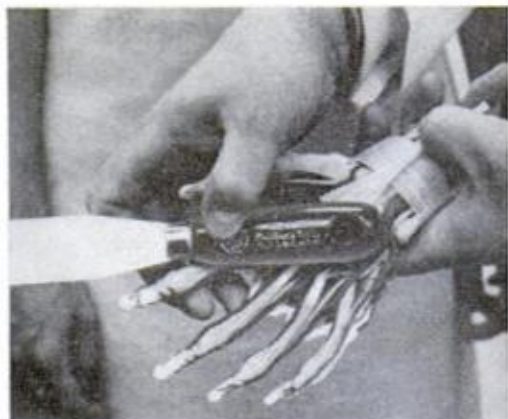
"Super-Steam" iron from Proctor-Silex has control button for regular spray or controlled blast of extra steam; see-through water tank; five modular snap-together parts for easy replacement; soleplate with Teflon or mirror finish. At hardware and large department stores. Suggested retail price: \$30.95 (with Teflon).



# NOW

## Fitting the machine to the man

People can't change, but machines can—that's the idea behind studies being conducted at New York University where scientists are seeking ways to better adapt mechanical objects to human anatomy. Called biomechanics, the studies involve tests of car controls, chairs, tools, utensils, appliances—all the everyday things people must handle. At upper left, a researcher using a human skeleton checks a chair design for office workers who must operate business equipment all day long. An ordinary putty knife (upper right) fits the human hand more comfortably when the handle is angled (lower left). At lower right, a driving simulator tests for proper eye-hand coordination of car controls. Results of the studies are said to help manufacturers design safer, more efficient, easier-to-use products.



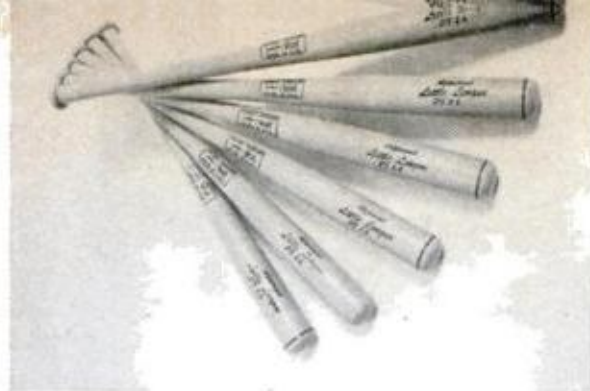
## Full-featured miterbox

Something to dream about, this miterbox has everything—and is great to use. Stock guides hold work, leaving hands free. Saw lifts automatically when swivel position is changed. Length stop works on both sides. Made by Stanley Tools, it's \$122.95 at hardware stores and building-supply outlets.

## Watch tells you how you are

A glance at this watch tells you how you're feeling. The novel Swiss-made timepiece is based on the "biorhythmic" theory that the human body experiences periodic changes in physical and mental well-being, with regular high and low points. Low points are days to look out for. The watch, which also tells conventional time and date, sells for about \$175 from Watches of Switzerland, 16 Old Bond St., London W. I., England.



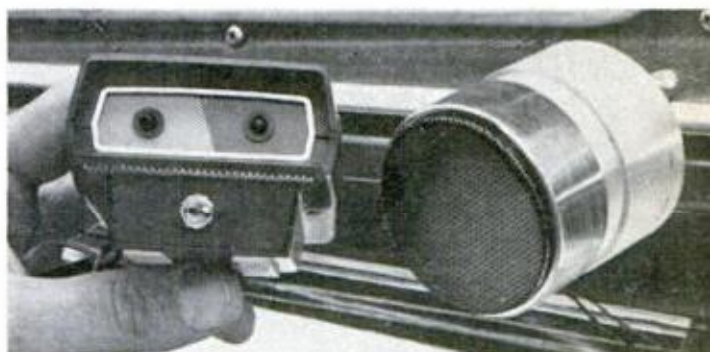


### Nylon bat is unbreakable

Even the heaviest-hitting Little League slugger won't be able to break this bat—it's made of nylon. Built around a rock maple core, it looks, feels and hits like wood, but lasts longer, for economy, and doesn't sting or dent as metal bats do. Nylon bat sells for \$12.95 at sporting goods stores. AMF Voit, 3801 South Harbor Blvd., Santa Ana, Calif. 92704.

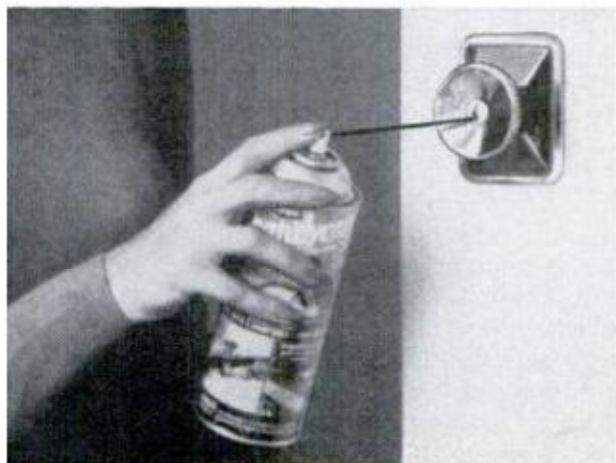
### Early-warning fog detector for cars

In the wake of mounting death tolls from killer highway fogs comes this fog-warning device developed by Joe Dawson of Prestwich, England. It consists of a cylindrical sensor on the front bumper (at right in top photo below) and a small dashboard indicator. The sensor electronically detects temperature, humidity and dewpoint, flashing a yellow light when fog conditions are indicated five miles ahead. A red light then comes on as the car nears the fog, giving the driver plenty of time to slow down or turn off.

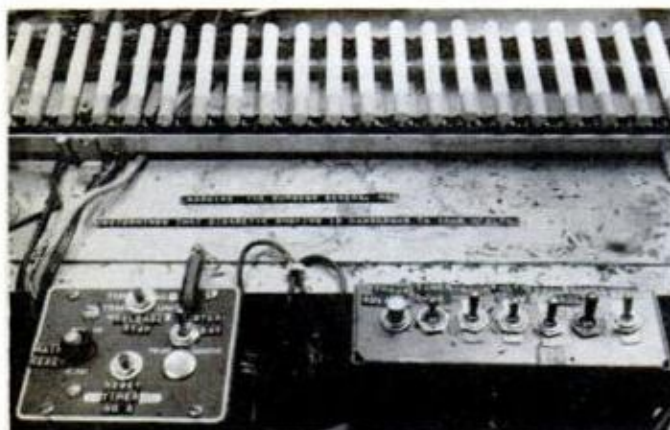
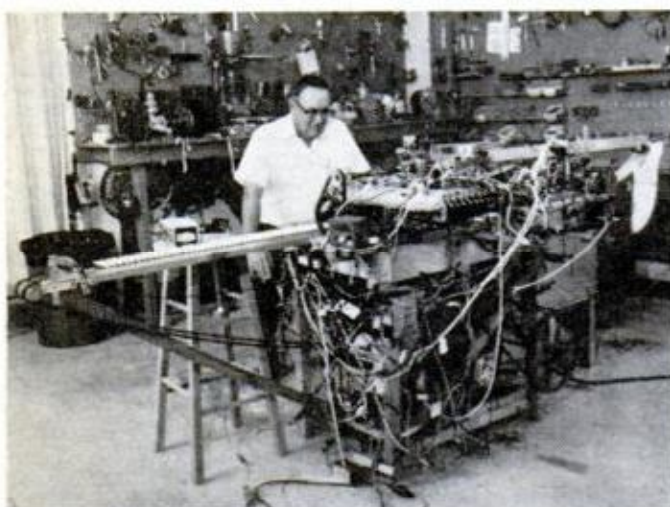
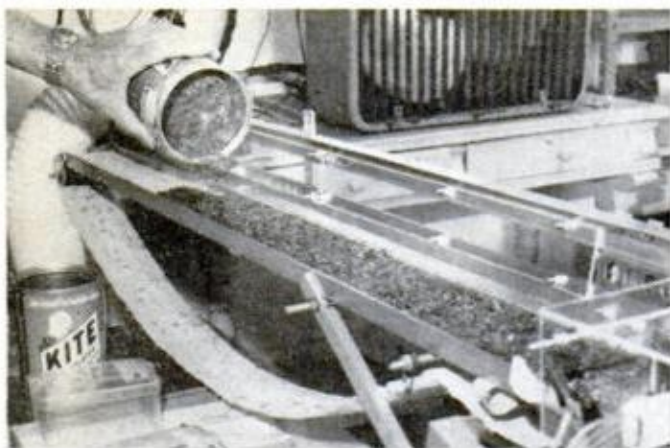


### Adjustable aerosol troubleshooter

Handycan aerosol from Magic American Chemical Corp., 23700 Mercantile Rd., Cleveland, Ohio 44122, lubricates, penetrates corrosion, protects metals against rust and dries out moisture. Container supplied by Continental Can Co. has Dial-A-Spray feature that lets the user set the right spray rate for the job, and has a tube nozzle extension for getting the spray into tightest spots. Handycan sells for \$1.98 at hardware, building and auto supply stores.



# NOW



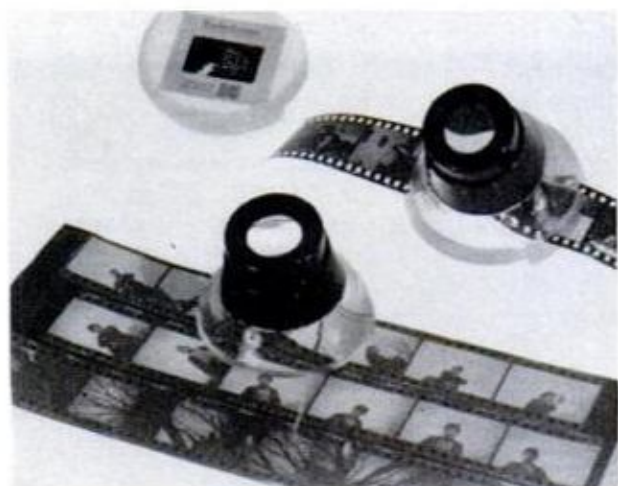
## Rolling your own the mechanized way

Bill Luly of Titusville, Fla., has found one way to cut the high cost of living—he makes his own cigars, but not in the usual roll-your-own, one-at-a-time way. His 9½-foot-long homemade assembly line consists of 15 motors, 51 switches and 16 chain and belt drives. The Rube-Goldbergish machine, cobbled up from junk parts in Luly's home workshop, turns out 20 smokes an hour at an average cost of less than one cent apiece.



## Kits for making wire sculptures

For your children, Skil-Craft produces two kits containing materials and tools for creating wire sculpture designs from easy-to-bend aluminum wire. Beginner's kit (under \$10 in toy stores) has step-by-step instructions with line drawings to make a spider, balloon man, and prehistoric figure. Advanced kit (under \$14) also contains instructions for a large bird.



## Photo magnifier with strong, wide view

Spiratone's new Foto-Lupe is the only magnifier we've seen that magnifies 8 times, yet still covers a full 1x1½-inch 35-mm frame and more, with sharp, 3-element optics. Clear sides let light onto your subject. Complete with lens cap, millimeter scale and slide holder, it's \$9.95 plus 30 cents postage from Spiratone, 135-06 Northern Blvd., Flushing, N.Y. 11354.



**Swimming in 44,000 plastic balls**

Pour 44,000 tiny plastic balls into a swimming pool and what have you got? At Dohrenbach, Germany, they have a heated open-air pool that can be used even in winter when temperatures drop below freezing. The floating balls cover the surface and act as an insulating blanket, keeping the water comfortably warm without interfering with swimmers' actions.

**Portable kitchen even has water and sink**

Portable fold-up camp kitchen has everything for on-the-go cooking—even a sink with running water. The Trailcooker contains 52 items, including two-burner propane stove, dishware service for four, pots, griddle, cooking utensils, 2½-gallon water supply with faucet and 12-volt light powered from car or boat. Indian Head Associates, Box 321, Nashua, N.H. 03060.



**Switching paddle power to motor**

Adding power to a canoe is easy with the adjustable clamp-on motor bracket. The aluminum crossbar fits all types and sizes of canoes, will take outboard engines of up to 3 hp and can be quickly reversed to put motor on right or left side of gunwale. It's \$22.95 from Bremer Mfg. Co., Inc., Box 54, Elkhart Lake, Wis. 53020.



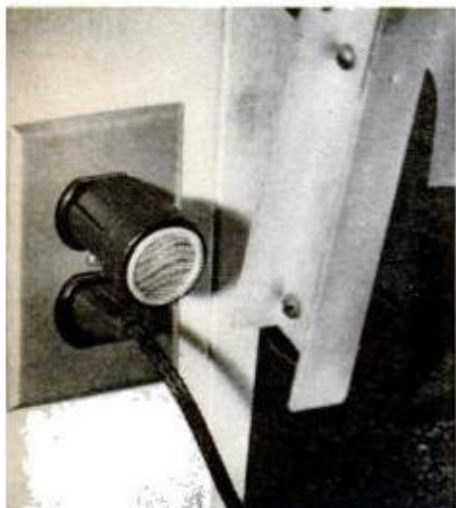
**Fishy-looking chess match**

When they play chess "down under" in Australia, they really mean *down under*. An 18-man chess team equipped with scuba gear recently staged an underwater tournament near Sidney, their only audience a few passing curious fish. A magnetic chess board was used to keep the pieces in place.

# NOW

## Enlarger timer you can hear

Watch what you do when burning in or dodging your enlargements, and you can't watch a clock. But your ears can. The new Honeywell-Wein Micronome plugs in either your enlarger timer or a wall outlet and gives an audible tick each second. \$14.95. For information, write Honeywell, Box 1010, Littleton, Colo. 80120



## Five-way solder kit

This versatile solder craft kit from Black & Decker has interchangeable tips for conventional soldering, hot-knife cutting, wood burning, leathercraft and foil writing. Tool is double-insulated and UL-listed; retail price, \$6.99.



## Glow-in-the-dark wheel covers for safer cycling

These brightly colored, glow-in-the-dark wheel covers make bike riding safer as well as more fun for the young set. The pinwheel design creates a whirling psychedelic effect as the wheel turns, attracting motorists' attention. The plastic Spoke-Cloaks fit any bike, sell for \$2.95. Hand Industries, 320 Fifth Ave., New York, N.Y. 10001

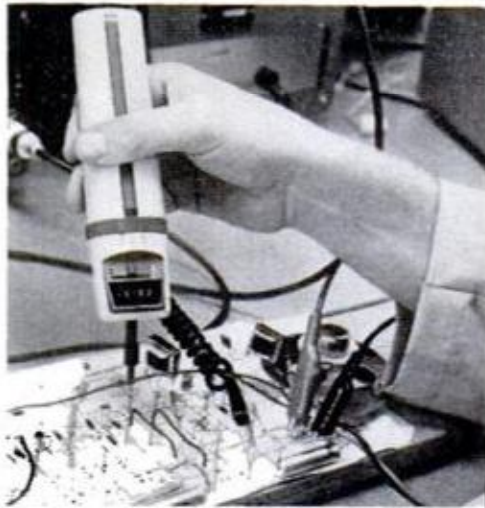
## Nozzle for canned air

Dust-off, a refillable compressed air can that blows dust from photo negatives, phonograph records, etc., now has a two-foot accessory nozzle extension for tight corners. Dust-Off, \$10.95; refill, \$1.95; extension, \$2.50, from Falcon.



## Meter probe? No—it's the whole meter!

Hewlett-Packard's new HP970A digital multimeter reads ohms and d.c. or a.c. volts, and automatically switches ranges and polarities. Display shows polarity on d.c., and its digits flip over for upside-down use. Interchangeable tips fold for storage. Price is \$275; accessory a.c./d.c. bench ammeter attachment will be \$45. Hewlett-Packard, Loveland, Colo.



## Low-voltage post light

Outdoor post light has four 12-volt lights mounted on a 6-ft. post of unfinished solid redwood. \$82.45 postpaid from Sylvan Designs, Inc., 21420 Valerio St., Canoga Park, Calif. 91303. Finished post and transformer and cable are extra.







### Cliff-hanger for climbers

Suspended 60 feet above the street on the side of a building, British mountain climbers test out a new type of hanging tent designed to shelter climbers trapped on the sheer face of a mountain cliff. Mountaineer Ed Drummond got the idea for the novel shelter after being stuck for three days on a vertical Norwegian rock face several years ago. Two-man tent can be hung from conventional pitons used to anchor climbing ropes.

### Oil cooler for campers

Add-on cooling system for motor homes, pickup campers and trailer-towing cars is said to protect engine and transmission oil from overheating. \$126.90. Hayden Trans-Cooler, 1531 Pomona Rd., Corona, Calif. 91720.



### Darkroom jugs with class

Chemstor darkroom chemical bottles are compact and have driplless spouts, big, clear labels and wide, airtight caps (also labeled to prevent contamination). Gallon, \$3.95; quart, \$2.50. For information, write Falcon, Mountainside, N.J. 07092.



### Indoor-outdoor cordless sprayer

Cordless electric yard and garden sprayer from Rockwell International's Power Tool Div. eliminates hoses, hand pumping. It has quart capacity, sprays 3 quarts of insecticide, fertilizer or other liquid on a single battery charge. Sprayer's suggested retail price is \$19.99.



### Slip-proof skis

Looking like bristles of a brush, these nylon-fiber strips on the bottom of cross-country skis permit uphill climbing without slipping. Made by 3M Co., fibers dig in for uphill grip, flatten out for free running downhill.

## PM OWNERS REPORT: CHEVROLET LUV

# Two little pickups with lots

A nationwide survey based on 1,150,000 owner-driven miles.

by Michael Lamm

WEST COAST EDITOR

Photos by the author



## PM OWNERS REPORT: FORD COURIER

A nationwide survey based on 789,000 owner-driven miles.



# of appeal, plenty of bounce

Ever wonder why all those little Japanese pickups look so much alike? No, it's not that they're all carbon copies of each other—nor even copies of one successful formula (though the formula is successful). Rather it's because the Japanese government regulates dimensions for all of that nation's vehicles—and it's the compact dimensions that give these toy trucks so much of their appeal.

The mini-truck boom came to this country when Datsun began importing its Li'l Hustler in the Sixties. Datsun figured there might be a modest market for perky half-ton pickups, but then, without warning, people—especially young people—stormed Datsun showrooms, and Li'l Hustlers were back-ordered for months. The boom was so fantastic that Toyota jumped in with a rival soon afterward.

Not to be outdone, Ford and Chevrolet exercised their interests in Mazda and Isuzu respectively and began, in mid-1972, to bring in captive imports of their own. Ford



Owners feel Chevrolet Luv's torsion-bar front suspension and standard stabilizer bar aid ride and handling. Luv's capacity is rated at up to 1480 pounds for driver, passenger, cargo. Isuzu Motors Ltd. makes Luv in Tokyo. General Motors acquired 34.2 percent interest in Isuzu in 1971, sold 35,000 Luvs in 1973.

called its half-tonner the Courier, and Chevrolet's goes by the name Luv. L.u.v. stands for light utility vehicle.

Luv owners tend to be young in years as well as heart. In our survey, more than half were 29 and under. This means many are single and footloose. They don't need more than a two-place vehicle, and the pickup's

Most owners use their Couriers as a second set of wheels: 68.6 percent. But these mini-pickups serve as everyday transport for about a third, and the Courier's extracurricular duties seem split pretty evenly between camping, recreation and hauling—same as the Luv's.

How comfortable is the Courier? "A mite small for tall people," says a Louisiana schoolteacher. An Oregon accountant avers, "I'm six feet tall, and it's a bit cramped." The dividing line between comfort and cramping seems to be six feet. Taller drivers complained but shorter ones were happy.

What about ride? "Ride is pretty rough without a load," observes a Texas city employee, "but with a 250-pound camper, the ride is decent." Another Texan: "Rides much better than the two Datsun pickups I owned previously." A California tech rep: "It's as comfortable and as smooth or rough as any other half-ton pickup." Many owners confessed that they had anticipated the Courier's rather jouncy ride and that they thus don't mind it.



Ford Courier uses conventional coil-spring independent front suspension plus stabilizer bar. Rated for 1400-pound payload, Courier boasts 3-speed automatic and airconditioning options. Toyo Kogyo builds Couriers in Japan, but not with rotary engines. Ford began importing in May 1972, sold 50,000 units last year.

As to what specific praises of owners for their Couriers, here's a cross section. "Easy handling and parking, good mileage, cruises 80 mph." "ECONOMY!" "Handy to get around country roads." "Hauls anything from furniture to firewood, from kids to dogs." "Most mechanical parts have easy access, specs are clearly marked on truck, easy handling,

## CHEVROLET LUV

*(Continued from page 113)*

versatility lets them use their Luv's not only as everyday transport (32.1 percent do) but also for hauling (24.5 percent) and recreation (39.0 percent). Says a 28-year-old North Carolina fleet maintenance foreman, "I see them all. The Luv is useful, dependable, low-cost and very fun to drive. I enjoy riding around in it better than in a car. And I hate to say this, but workmanship is better than American. The Luv is

built just like the trucks of the 1950s."

What do Luv owners think of their pickups' ride and comfort? "My only passengers," says a Navy radioman, "are my wife and our Irish setter. My wife thinks the Luv is heaven, and the dog doesn't care much either way." A West Virginia coal technician does care. "If the ride can be described as anything, it's hell. Passengers agree." A California office worker: "I can feel every bump in the road. Bigger tires would no doubt help."

As with the Courier, the Luv's six-ply-



## FORD COURIER

*(Continued from page 113)*

smoothest ride of all mini-trucks, economy." "Ease of parking, good acceleration in traffic." "I like the way it's designed, both inside and out."

What about the Courier's performance? "It accelerates better than most other small pickups I drove," maintains a California boat mechanic. A USAF sergeant: "Handles well, holds highway speeds quite easily, carries loads like a regular pickup but is

easier to park." A New Mexico heavy-equipment operator: "Climbs hills real good."

On the other side of the performance coin, 10.4 percent of our respondents said they'd like a more powerful engine. Smog equipment forced Ford to lower Courier's rated net horsepower from 94 to 76 last year, and this figure is still used. Thus quite a few owners said they could do without the emissions control equipment; mostly, they felt it cut not only power but gas mileage and smoothness as well.



rated factory tires came in for a few squawks. They seem to contribute to the Luv's bouncy ride. Many owners replaced them with steel-belted radials and reported a better ride and improved handling. Most conceded the Luv rides stiffly unloaded but that with a load, ride becomes quite acceptable. An auto shop foreman wrote that to soften the ride, he removed one leaf from each rear spring. This gave what he called "a 60 percent better ride." He said the missing leaf didn't cut down load-carrying capacity "all that much."



Many owners observed that three-abreast seating is impossible due to a large transmission tunnel. A few suggested making bucket seats optional for that reason.

What are some of Luv owners' specific likes? "Looks good, runs good, good on gas," says a California lithographer. A Huntington Beach meat-cutter: "It's easy to work on." A California biologist: "I drove them all, and I found the Luv's performance and ease of shifting and steering unmatched." An Illinois body-shop owner: "It's reliable, economical, was inexpensive to buy, is fun to drive, and serves my purposes perfectly."

What don't owners like? Rough ride, mostly. It cropped up as the Luv's No. 1 gripe (17.9 percent), followed by lower-than-expected gas mileage. However, the Luv's 21.5-mpg average for all types of driving makes it one of the thriftier little trucks on the road.

More nagging complaints ran about like this: "Fuel tank too small—seven gallons doesn't get you very far." "Giving you only

**Economy was the big reason** owners gave for buying a Luv: They're getting between 20.0 and 23.0 mpg.

Courier owners' most common complaint centered on poor gas mileage, so-called. Yet the average for combined city and highway driving came to 20.6 mpg—pretty good in anybody's book nowadays. Next in frequency of gripes came "inadequate power," but you can't have it both ways.

More minor, but nagging, complaints involved the brakes. These were judged too fragile for hard use. It wasn't so much that the brakes wouldn't stop the vehicle (although there were a few mentions of that, too), but owners said that the brakes had

to be "set up" or adjusted too often. One went so far as to observe that he avoided using his brakes simply to save them for later. He downshifted for decelerating, but that, of course, doesn't help a transmission's longevity.

Rough ride kept cropping up as a general gripe; to remedy it some Courier drivers felt the standard six-ply-rated factory tires might be to blame. A few even suggested replacing them with two or four-ply-rated tires. In that case, though, the Courier's load-capacity rating would drop.

In the handling department: "I must say I was quite surprised when I drove from Wisconsin to Littleton, Colo., with 1800 pounds of cargo plus two passengers at 60 mph and got 23 mpg. The Courier handled beautifully considering the weight, and maneuverability was superb," comments a Colorado warehouse manager. A California machinist adds, "In snow, the back end is just a little light, and it skates like any other truck." Overall, though, owners praised the Courier's handling and maneu-

**Owners chose the Courier, too,** for the economy they expected from it: They're getting 19.6 to 21.7 mpg.



## CHEVROLET LUV

(Continued from page 115)

one sun visor seems a silly way to cut corners." (An extra visor is optional.) "Gas pedal too small." Too much glare from the instruments at night and no way to dim them." "Needs a more powerful engine for more get-up-and-go."

Handling came up tops with most Luv owners. They praised its ease of steering and parking, its maneuverability in traffic, and its ability to negotiate rough terrain. Its road-holding at highway speeds was also ranked good.

What of workmanship and overall quality? "Very impressive." "Good quality; very surprised and pleased with the craftsmanship." "Adequate." "Far ahead of American-made products." "Excellent workmanship, but I feel they use too light-gauge materials for sheet metal and upholstery, etc."

Ironically, while a noticeable number of Luv owners lamented the why-can't-we-put-as-much-quality-into-American-products theme, an even greater number mentioned they were glad the Japanese pickup was



Insert Luv's jack handle into a special hole in tail panel and crank down the spare. A chain suspends wheel. It might be a little awkward to reach, but its position saves valuable space. Not many owners mentioned the inconvenience since they drop it only when they rotate tires.

## FORD COURIER

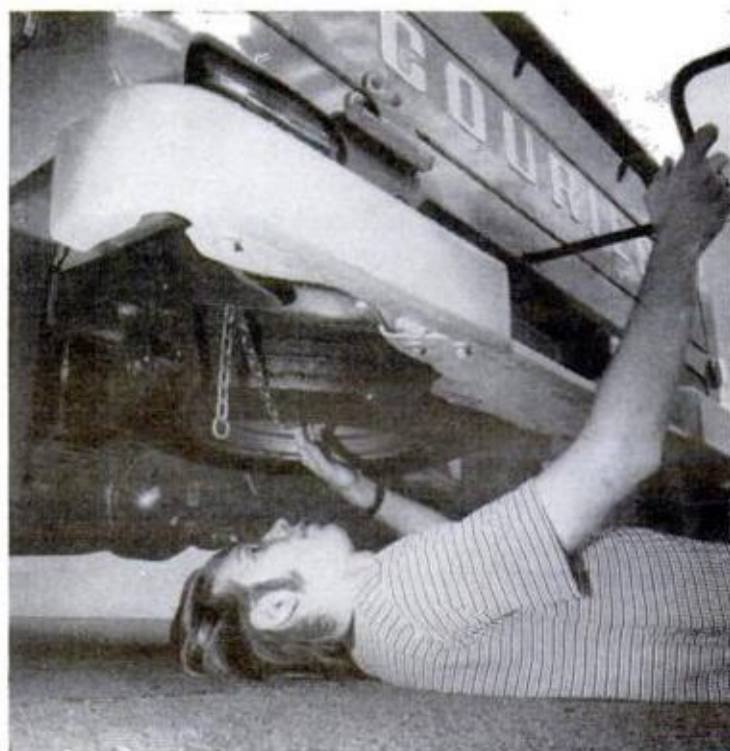
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verability and dubbed these features tops on their "likes" list.

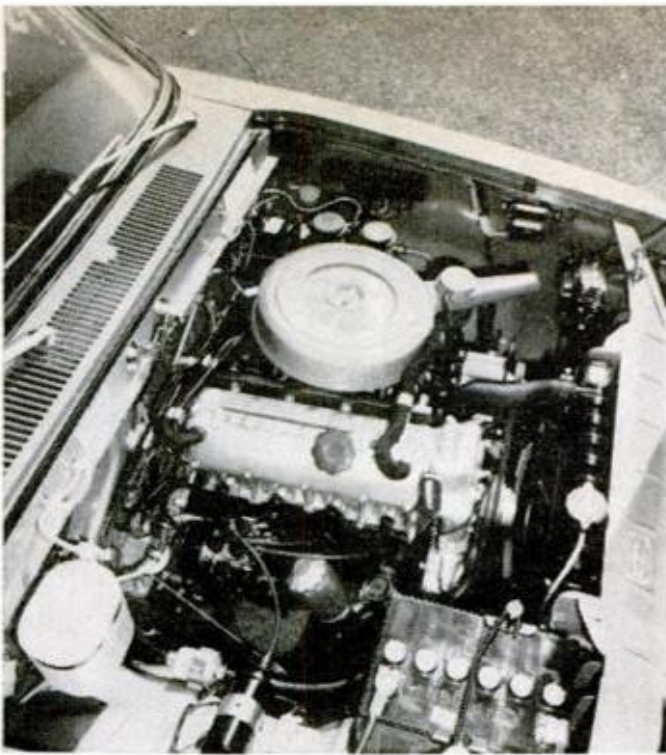
What would Courier owners like to see changed? "Better gas mileage," shouted a vociferous 14.6 percent. Suggestions for improvements included these: "Needs the Ford V6." "Larger gas tank." "A little more room in the cab." "Less noise and heat through the floor." "Lengthen and widen the bed." "More padding between ceiling and top." "A floor-mounted dimmer switch." "Double-walled tailgate." "Wish it had a four-wheel-drive option." "Bucket seats." "Rheostat for dash lights." "Cab rear window should open for better communication to camper."

Courier owners appear well satisfied with workmanship and overall quality. One owner commented, "It's great, but why can't we build pickups like this in the U.S.A.?"

Interestingly, the percentage of owners reporting mechanical troubles was virtually identical for the Courier and its U.S.-made running mate, the *Ranchero* (see *Owners Report*, page 88, July '73 PM). However, a



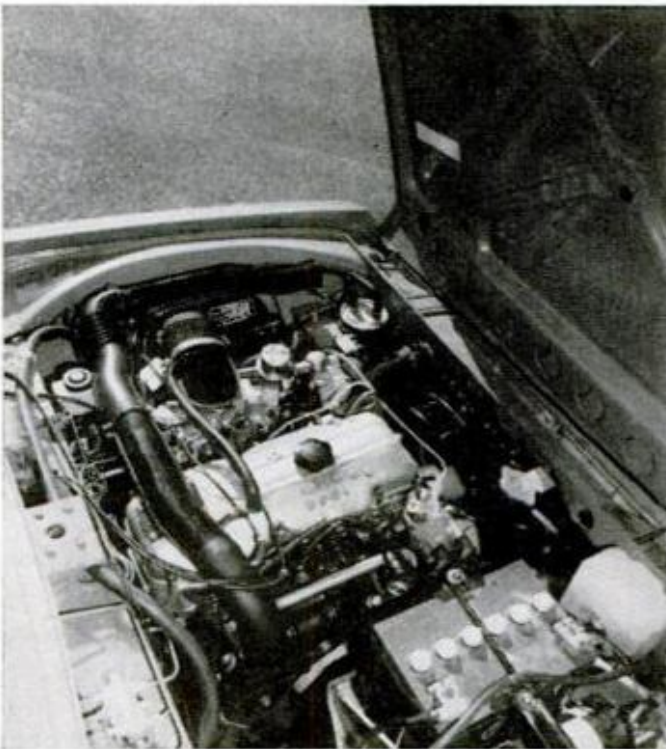
Courier's spare also stows beneath bed and may be cranked down on a chain. Since chain wraps around tire, it's lockable. The 11.9-gallon gas tank and electric fuel pump are also under bed. As with the Luv, owners indicated they'd like bigger gas tank for greater driving range.



**Luv's 100.8-cu.-in. Four** delivers 75 bhp at a high 5000 rpm. Engine's over-squareness (greater bore than stroke) lets it wind freely. Our gas mileage survey shows owners averaging 21.5 mpg. Owners also like idea that although their vehicle is Japanese-made, it's backed by Chevy.



**Luv's optional Mikado trim package** includes three-spoke wheel, bright upholstery, carpeting. Easy-to-see instruments should include ammeter, oil-pressure gauge instead of warning lights. Transmission hump makes comfort difficult for middle passenger; some owners want buckets.



**Couriers average 20.6 mpg**, according to owners. Single-overhead-cam Four resembles Luv's, puts out 8 fewer bhp. Courier owners report good engine access. Many do their own maintenance. Some owners, referring to the big engine option on Mustang II, would like the Ford V6.



**Courier's dials** are also easy to glance at through steering rim, but despite frosted lenses, glare can make viewing difficult. This mini-pickup does use working gauges instead of idiot lights. Several requests from owners were for additional padding in the cab's headliner.



Enough headroom and legroom for all but tallest drivers, observe owners, but big trans. tunnel restricts center seating. Hidden storage behind seatback gives

room for smaller valuables plus tools and jack. Luv's bed is 1.5 in. shorter than Courier's but 1.5 wider. Pickup's double-wall tailgate prevents unsightly dings.

## CHEVROLET LUV

*(Continued from page 117)*

backed by a large Detroit company. It gave them added confidence, they said.

What improvements do owners suggest? "More options." "I feel that an automatic transmission and factory airconditioning should be available," suggests a California supervisor. An electrician echoes, "The manufacturer does not offer enough options

so that you cannot order the Luv equipped for specific needs. For instance, I would have preferred airconditioning, tinted windshield, larger engine, etc."

Most owners are happy and enjoy their Luv's multipurpose versatility. They rate it a sturdy, economical, attractive, fun-to-drive workhorse—very much "in" at the moment. A draftsman from Winston-Salem wasn't the only one who ended his questionnaire with a scrawly "I love my Luv." ★★★



Courier's optional airconditioning uses ducts integrated into bottom of dashboard. Automatic shift lever cuts usable space, should be on column. Latches at

both sides of seatback take two hands to release, making it harder to reach storage areas. Several campers and shells are available via dealers for mini-pickups.

## FORD COURIER

*(Continued from page 117)*

slightly greater percentage of Courier owners performed their own repairs, probably because the smaller pickup is simpler to work on. And while there were some complaints of muddled service and waits for parts, no fewer than 64 percent rated their Ford dealers "good to excellent."

Asked if they'd go the Courier route

again, 79.6 percent said "yes" (as compared with 76.1 percent "yes" for the Luv). That's not a rave testimonial, but it's not bad either when you consider that owners of such mini-pickups tend to be young. Being young, they expect changes in the size of their families, which means that a two-passenger vehicle might not suit their needs next time around. For the time being, though, Courier owners seem to agree that they're having a ball on a shoestring. ★★★



## Summary of 1974 Chevrolet Luv Owners Reports\*

Total miles driven .....1,153,244

### Average miles per gallon

Local driving .....20.0  
Long trips .....23.0

### Why the Luv?

Economy .....64.8%  
Pickup features .....20.1  
Size .....15.1  
Price .....11.9  
Style .....11.3

### Specific likes:

Handling .....55.4%  
Economy .....55.1  
Styling .....19.9  
Power .....16.0  
Comfort .....12.2  
Performance .....10.9  
Size .....9.6

### Specific dislikes:

Rough ride .....17.9  
Poor gas mileage .....9.9  
Lack of power .....6.6  
Gas tank too small .....6.0  
Poor dealer service .....6.0

### Types of work or recreation used for:

Everyday transportation .....32.1%  
Hauling .....24.5

Hunting .....18.2  
Fishing .....13.2  
Camping .....11.6  
Motorcycling .....6.3

### Number of vehicles owned:

Luv only .....21.1%  
Two .....66.5  
Three .....10.6  
Four .....1.9

### Makes of other vehicles owned:

Chevrolet .....45.2%  
Ford .....13.5  
Pontiac .....9.5  
Volkswagen .....7.1

### Comfort opinion:

Good to excellent .....18.7%  
Average to poor .....78.8

### Workmanship opinion:

Good to excellent .....74.6%  
Average to poor .....25.5

### Had any mechanical trouble?

No .....55.9%  
Yes .....44.1

### What type of trouble?

Carburator .....15.7%  
Electrical .....8.6

Oil leaks .....5.7  
Transmission .....5.7

### Did you repair it yourself?

No .....82.9  
Yes .....17.1

### Dealer repairs satisfactory?

Yes .....62.3%  
No .....37.7

### Options and accessories:

Radio .....77.2%  
Accessory rear bumper .....37.3  
Airconditioning .....12.0  
Whitewall tires .....10.1  
Right-side sun visor .....7.6  
Oversized tires .....7.6

### What changes would you like?

Bigger gas tank .....11.2%  
Better ride .....9.8  
More power .....7.0  
Better quality materials .....5.6

### Age distribution of owners:

16-29 years .....50.9%  
30-49 years .....35.2  
50-plus .....13.8

### Would you buy another Luv?

Yes .....76.1%  
No .....23.9

\*Percentages might not equal 100% due to rounding or insufficient data.

## Summary of 1974 Ford Courier Owners Reports\*

Total miles driven .....789,260

### Average miles per gallon

Local driving .....19.6  
Long trips .....21.7

### Why the Courier?

Economy .....61.5%  
Size .....21.4  
Pickup features .....17.1  
Price .....12.0

### Specific likes:

Handling .....55.3  
Economy .....55.3  
Styling .....16.7  
Size .....12.3  
Power .....11.4

### Specific dislikes:

Poor gas mileage .....12.1  
Not enough power .....12.1  
Weak brakes .....8.6  
Rough ride .....8.6  
Rattles .....8.6

### Types of work or recreation used for:

Everyday transportation .....35.6%  
Hunting .....19.5  
Fishing .....19.5

Hauling .....18.6  
Camping .....15.3

### Number of vehicles owned:

Courier only .....16.1%  
Two .....68.6  
Three .....13.6  
Four .....1.7

### Makes of other vehicles owned:

Ford .....25.3%  
Chevrolet .....14.1  
Mercury .....9.1  
Oldsmobile .....8.1  
Volkswagen .....7.1  
Buick .....7.1

### Comfort opinion:

Good to excellent .....20.3%  
Average to poor .....79.7

### Workmanship opinion:

Good to excellent .....77.3%  
Average to poor .....22.6

### Had any mechanical trouble?

No .....58.8%  
Yes .....41.2

### What type of trouble?

Brakes .....12.2%  
Transmission .....12.2

Oil leaks .....10.2  
Fuel pump .....10.2  
Valves .....8.2

### Did you repair it yourself?

No .....89.8%  
Yes .....10.2

### Dealer repairs satisfactory?

Yes .....61.5%  
No .....38.5

### Options and accessories?

Radio .....66.4%  
Bumper guards .....39.8  
Airconditioning .....21.2  
Bigger side mirror(s) .....15.0

### What changes would you like?

Better gas mileage .....14.6%  
Bigger engine .....10.4  
Better brakes .....7.3  
Bigger gas tank .....7.3

### Age distribution of owners:

16-29 years .....35.6%  
30-49 years .....41.7  
50-plus .....22.7

### Would you buy another Courier?

Yes .....79.6%  
No .....20.4

\*Percentages might not equal 100% due to rounding or insufficient data.



One screen, two projectors, two slides—and you can dissolve one slide smoothly into the other, without having one blank second on the screen.

Photos by the authors

## Cross-fade your slides with this simple dissolve control

by Rowland Burns and James Blair

One reason professional slide shows are often easier to watch than amateur ones is that professionals dissolve their slides into one another. One slide fades in on the screen while the other fades out, with none of that abrupt black blink between pictures that accompanies slide changes at home. The pros have other uses for dissolves as well: time-lapse effects of changing seasons, fading sunsets, or a child's growth—even "zoom" effects from successions of slides showing the same subject at higher and higher magnifications.

Your home slide shows can have these

professional effects, too. Though commercial dissolvers are expensive (over \$200 for the Kodak model), here's one you can build for well under \$20. And though its operation does require two remote-control projectors, most slide buffs have friends who would also be interested in such a project. The two projectors needn't be identical, provided both have lenses of the same focal length and accept bulbs of the same wattage.

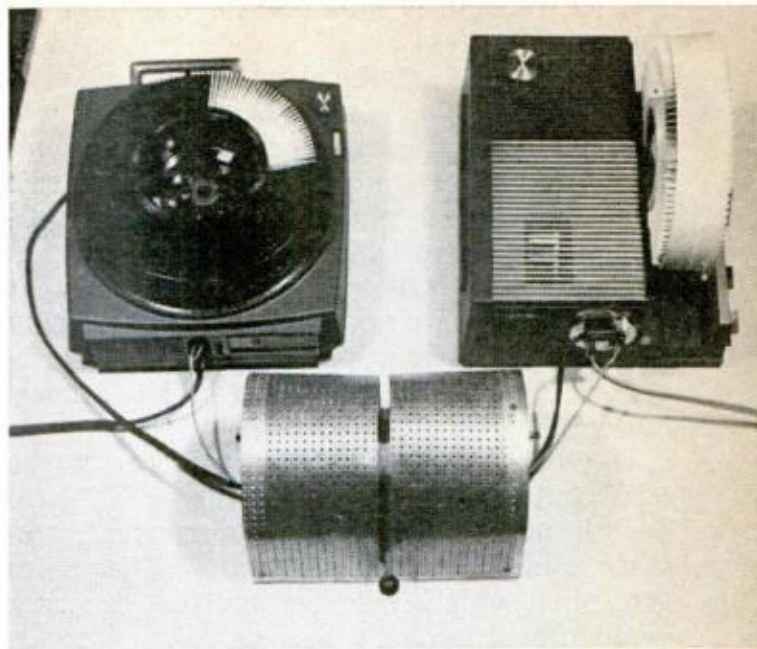
The heart of the dissolver is a pair of standard room-light dimmer switches, with their knobs glued together (see photo, lower right). A small hole is drilled along a diameter of the glued joint, and a rod inserted to act as a dimmer handle. Pushing the dimmer handle will fade one projector in while fading the other out; pulling the handle will reverse the action.

Plug the dimmer switches into the knob assembly, and mount the whole arrangement on a suitable base (say, 6 by 10-inch heavy plywood) with angle brackets. Make sure you can remove the dimmers readily to allow replacement should a dimmer fail, for easier balancing of the two projectors' light output, and (if your dimmers are the common push-on, push-off type) to allow the dimmers to be switched back on should they get switched off before or during assembly.

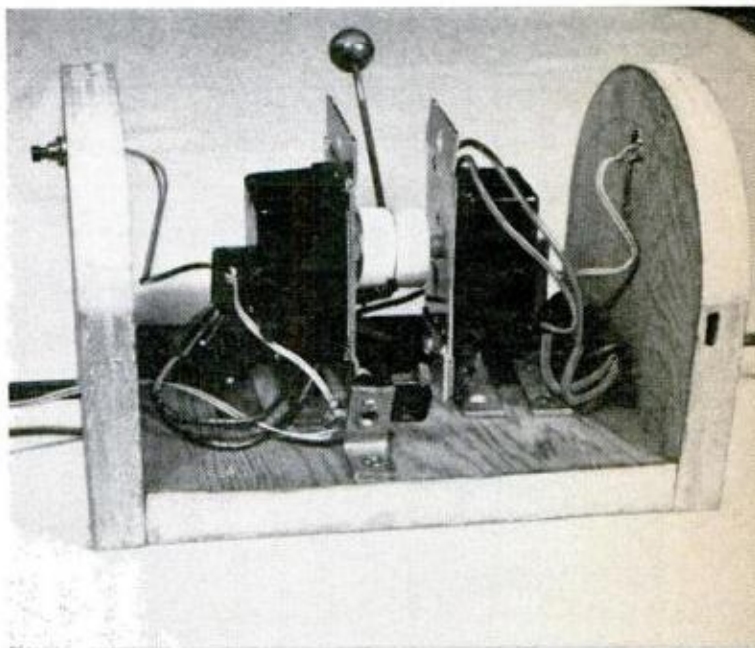
Mount roller-arm switches to the base so that the dimmer handle will press one switch closed at each end of its rotation; these switches will automatically change the slide in the darkened projector. (Additional pushbuttons for manual slide advance may be wired in parallel with these switches, if you wish.) Now begin wiring the projectors.

The dissolver operates by reducing the voltage fed to the projection lamps. But since fan motors cannot operate properly on this reduced voltage, some internal projector rewiring is called for (except on remote-control Kodak Carousel projectors, which have separate lamp connections in their remote-control sockets).

For non-Kodak projectors, find an area within the projector which is near the bulb and which has sufficient room for a 10-amp. female socket (see photo, page 122) and a 10-amp single-pole double-throw (s.p.d.t.) toggle switch. After building a pocket of masking tape inside the projector to catch filings, cut holes to mount the plug and switch. Then cut one of the two leads to



**Simple setup** (above) adds only one lever to control two projectors—and the projectors needn't be identical. Two ordinary light dimmers (below), knobs cemented back to back, provide automatic cross-fading.



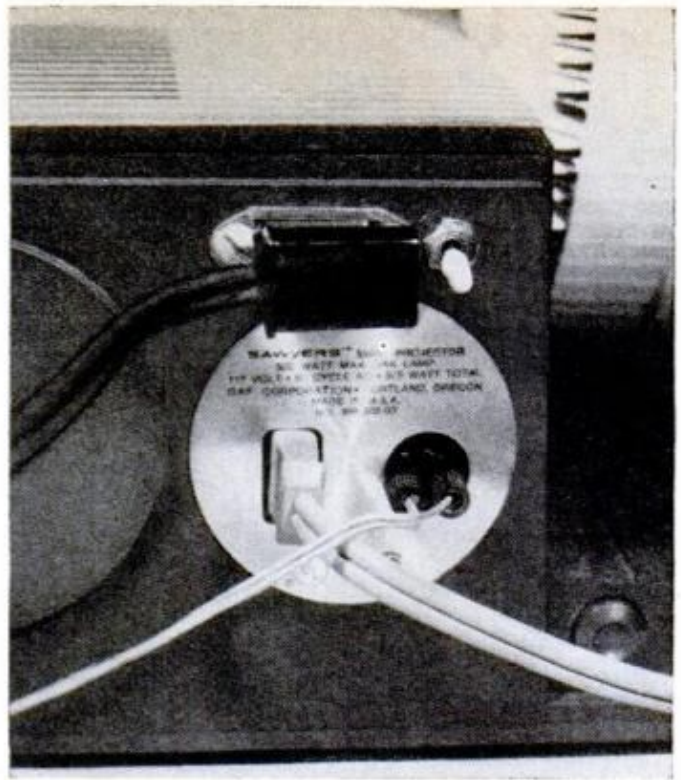
the bulb, solder one of the cut ends to the switch's center terminal, and solder the other to one of the switch's remaining terminals and to one terminal of the newly installed female socket. Now connect the remaining terminals of the switch and socket to each other. (All wiring you add should be of at least as heavy a gauge as the original wire you cut, and should have insulation rated for a reasonably high temperature.) The switch position which reestablishes the connection between the bulb leads you cut earlier will allow for normal projector operation, while the other

switch position is intended for use with the dissolver.

Connect one of the dimmers to an electric cord of the same gauge as the bulb wiring (insulation temperature rating matters less here), and connect to the cord's other end a male plug matching the female connector you installed in the projector. If you use standard a.c. plugs for this, it might be a good idea to paint the male plug a bright color, or otherwise indicate plainly that it is *not* to be plugged into an a.c. outlet.

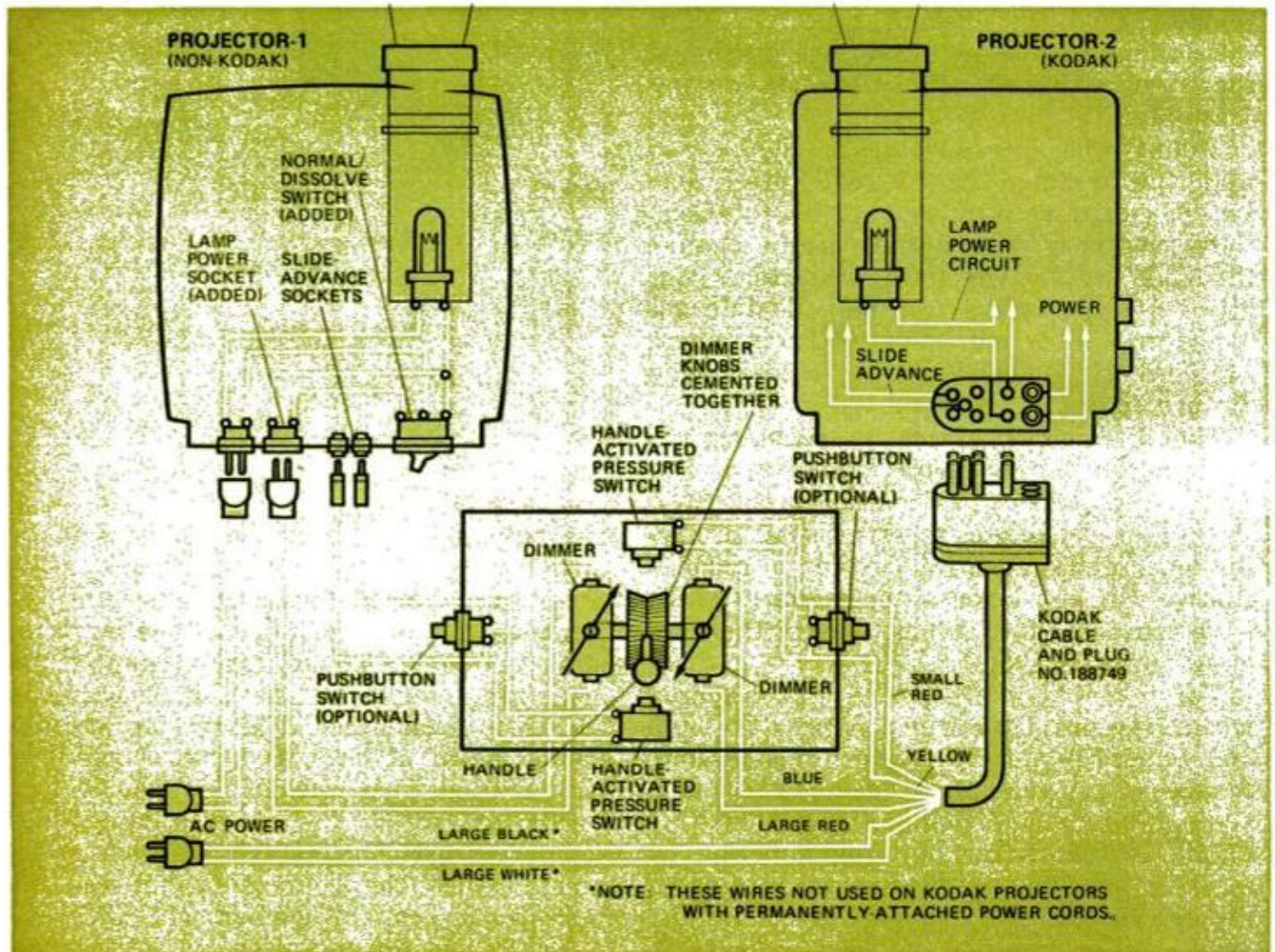
If you've connected this projector to the left-hand dimmer, wire the roller-arm switch nearest you to the projector's remote slide-changing contacts. (These are the pins which will be shorted together when the projector's built-in slide advance button is pressed; if you're checking continuity with an ohmmeter, make sure the power is off first.) If you're connected to the right-hand dimmer, use the roller switch farthest from you.

Kodak remote-control Carousel projectors  
*(Please turn to page 182)*



Extra socket and switch install neatly in most projectors; pin-plugs in remote-control socket handle slide-changing. Kodak Carousel remote-control projectors can be used without even these modifications.

### Wiring diagram for slide-dissolve control

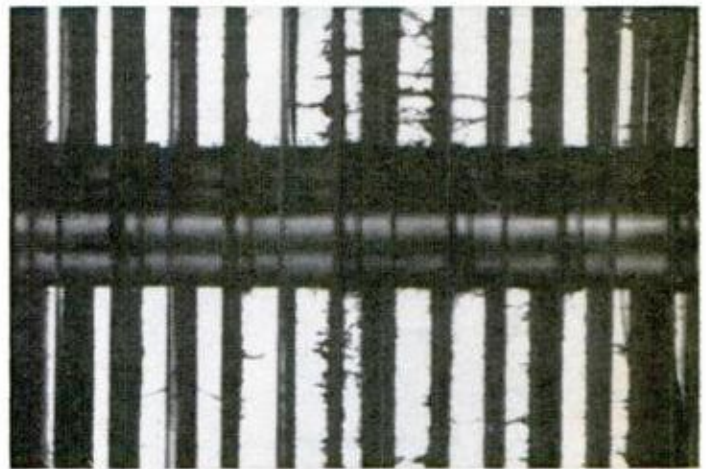
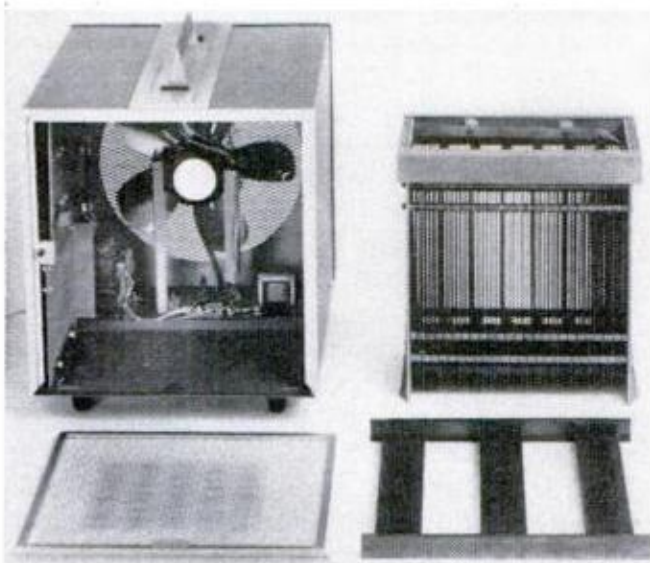


# New Heathkit clears the air— electronically

by Ivan Berger  
ELECTRONICS EDITOR

Photos: Peter Schneider

**Unobtrusive**—if not quite elegant—Heathkit GD-1003 air purifier takes up about two cubic feet of space (it's 15 in. high by 13½ in. wide by 17¾ in. deep), cleans up to 95 percent of contaminants from air of a 20 by 20-foot room. Handle on the top and cord storage below help in moves from room to room, but weight (46 lbs.) and the handle's shape make longer moves awkward.



**Purifier disassembles** in seconds (left) to reach charcoal odor filter (center foreground), dust-ionizing grid (background). Close-up above shows trapped dust.

Heath's latest kit has cut my Kleenex-consumption, lengthened the visits my cat-allergic friends can pay, and even covers up my kitchen disasters—all by removing dust, pollen, animal hair and smoke from the air. Like some industrial pollution-control equipment, Heath's new GD-1003 air purifier works by electrostatically precipitating airborne particles: A two-speed fan draws air through an 8000-volt d.c. grid that charges the particles so they'll be attracted to the 4000-volt collecting plates. The

dust-free air then flows through an activated charcoal filter that removes odors (even persistent smells, like cat-litter boxes). Heath says it clears out particles as small as .01 micron (.0000004 inch)—up to 95 percent of them in a 20 by 20-foot room.

The kit takes about five hours to build, with no hangups. Mine buzzes slightly on uneven floors, and the edges of its triangular handle hurt when carrying it more than a few rooms, but other than that, I—and my sinuses—love it. ★★★

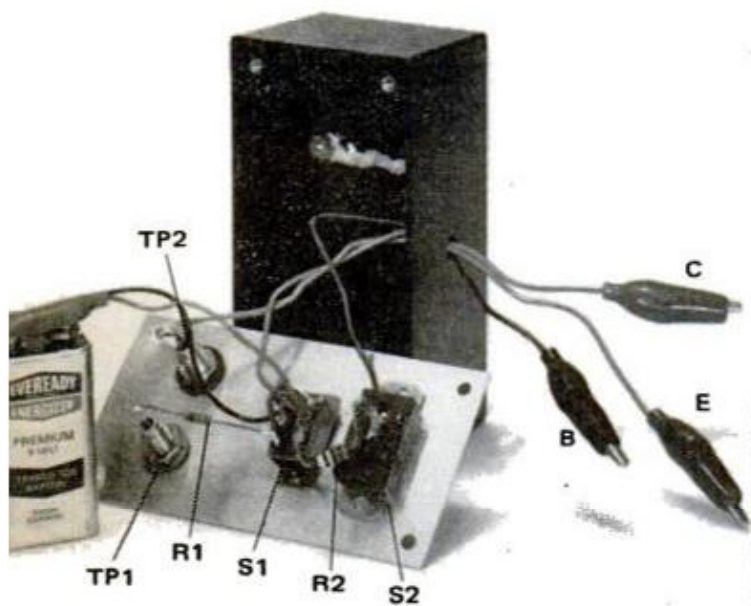
# Build this simple transistor tester

by Larry D. Smith

If you're a typical weekend electronic genius, you need a transistor tester, both to expose bad transistors in devices you're trying to fix, and to tell you the characteristics of the transistors in your junk box. This little tester does both, costs next to nothing and takes very little time to build.

What the circuit does is measure emitter-collector leakage and d.c. current gain (which is usually quite close to the a.c. current gain, or Beta). Switch one (S1) applies the correct battery polarity to the transistor. S2 opens to disconnect the base lead

Photos: Robert D. Borst



Construction is ultrasimple; the size of the box and layout aren't in the least critical.

124 POPULAR MECHANICS



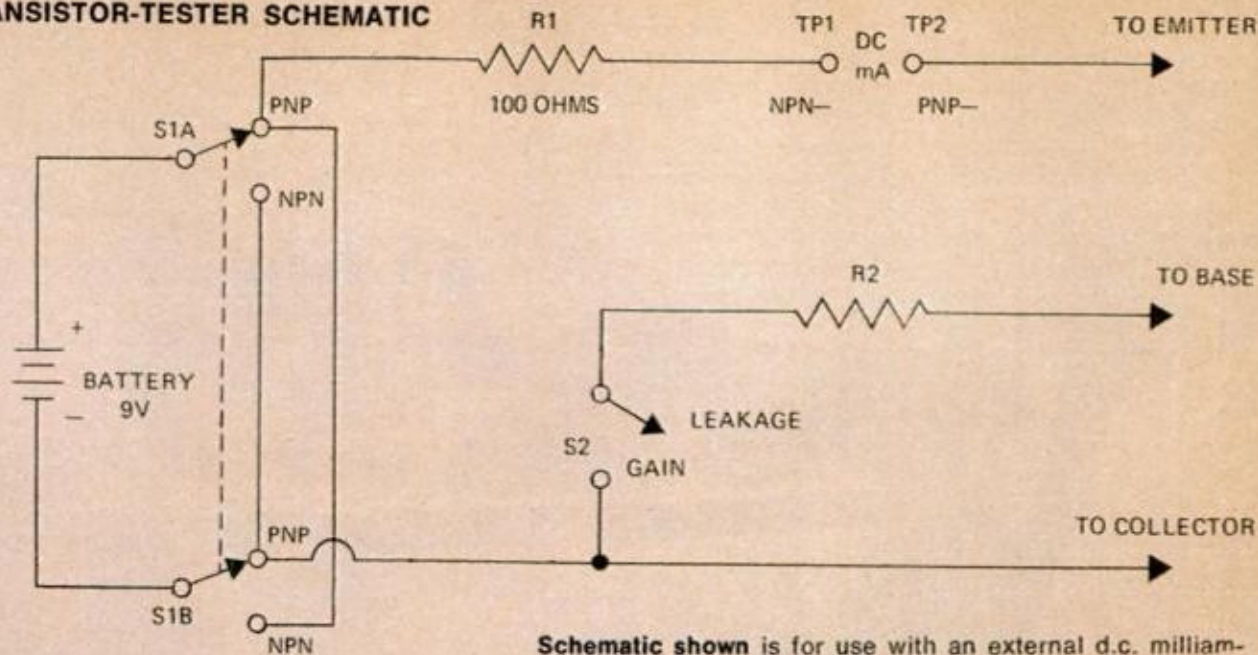
Used with any d.c. milliammeter, this simple tester tells you a transistor's gain, type (PNP or NPN), and whether or not it's working properly.

for leakage measurement, or closes to connect the base lead to the collector through resistor two (R2) for measuring gain. R1 is simply to protect the meter in case the transistor under test is shorted.

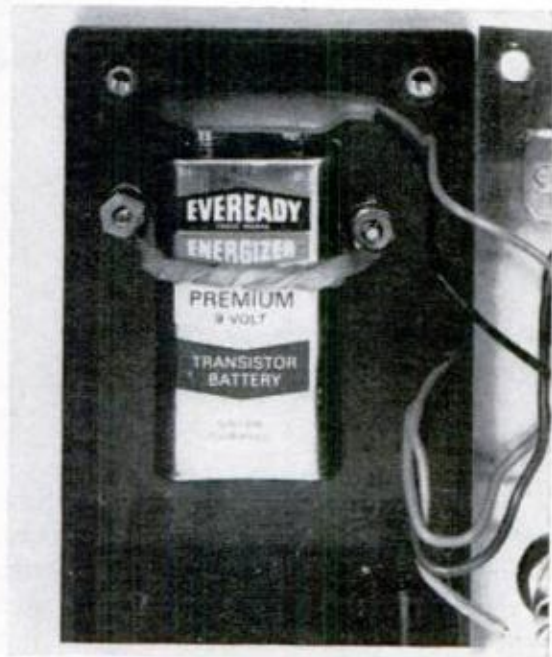
For d.c. gain measurement, a nine-volt battery supplies a current of about .01 mA through the emitter-base junction, that current being determined by the combined resistances of R2 (820K) and the junction itself. D.c. current gain is the ratio between the emitter-collector and the emitter-base currents, which, in this case, amounts to 100 times the emitter-collector current in mA.

If you already have a multimeter with a d.c. mA range, you can keep the cost of the tester to a minimum by providing test points instead of a built-in d.c. milliammeter; if you prefer a self-sufficient tester, you can build the meter in. Either way, connect the meter correctly, as indicated on the schematic. Since Test Point 1 (TP1) is the negative terminal when testing NPN transistors, and TP2 is negative when testing PNPs, you'll have to switch leads to your

## TRANSISTOR-TESTER SCHEMATIC



Schematic shown is for use with an external d.c. milliammeter, as illustrated. But a self-contained version, with built-in milliammeter can also be built (see text).



A rubber band, two bolts run through holes drilled in the cabinet and four nuts hold the small 9-volt battery in place.

### Parts list

- S1**—D.p.s.t. switch\*
- S2**—S.p.s.t. switch
- TP1, TP2**—Insulated tipjacks to fit VOM or VTVM probes\*
- R1**—100-ohm, 1/2-w. resistor
- R2**—820 k, 1/2-w. resistor
- E1**—9-v. transistor battery
- Misc.**—small utility box, 3 small, insulated alligator clips, wire battery lead.
- \*Optional—a 4-p.d.t. switch and d.c. milliammeter may be substituted for the starred items above (see text).
- Note:** A complete kit of parts as shown is available for \$6.95 postpaid, from Route Electronics, Echo Plaza, Route 22, Springfield, N.J. 07081.

external meter, or wire a second double-pole, double-throw (d.p.d.t.) switch to change the meter's polarity the same way S1 reverses the battery's. (A 4-p.d.t. switch would reverse both polarities at once.)

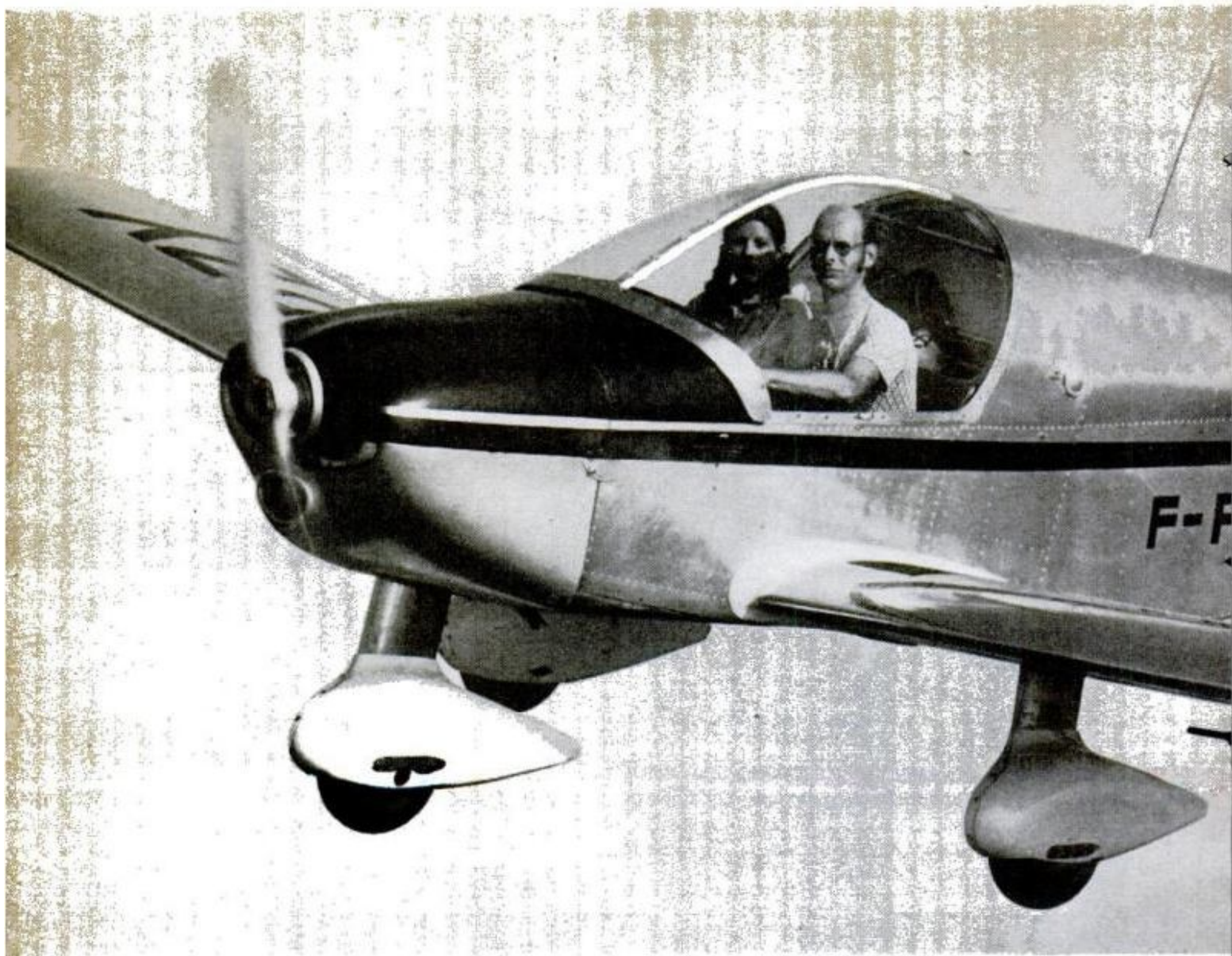
To use the tester, first set S1 to the correct position for the type of transistor (NPN or PNP) under test. Observing correct polarity, insert the milliammeter leads into TP1 and TP2. Connect the three small clip leads to their correct transistor terminals (color-coding the wires will help you keep them straight).

To read leakage, open S2. A good transistor will give you a very low reading, usually a few tenths of a milliamper or less. If you get a high leakage reading it indicates a partially or completely shorted transistor.

To read gain, close S2 and multiply the meter reading by 100.

If you get the same reading for both positions of S2, you may have set S1 for the wrong transistor type. If you get no reading for either position of S2, the transistor is open.

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## Dual-control homebuilt for double the fun

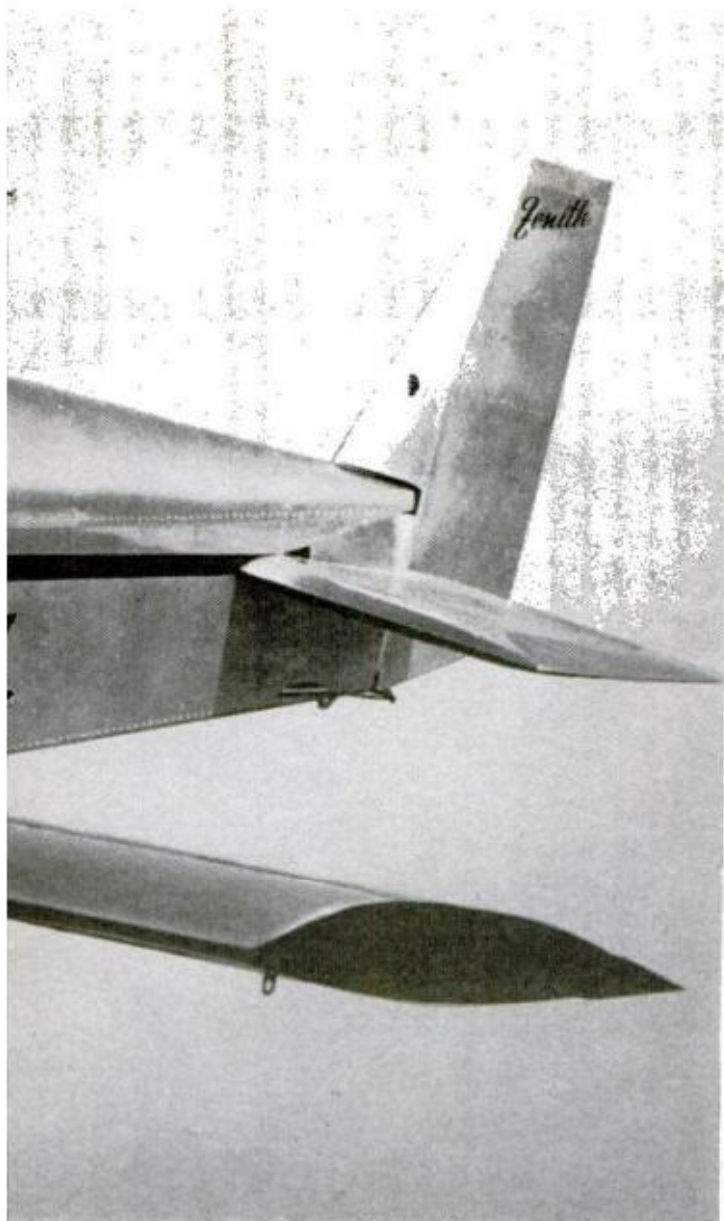
This simple, sporty side-by-side two-seater is a breeze to build, a joy to fly and ideal for beginning pilots or impressing girl friends.

by Sheldon M. Gallager  
and Howard Levy

There's nothing quite so exciting as having a pilot turn to you and say, "Here, take the controls. She's all yours." Whether you're a passenger getting your first crack at the controls or a pilot showing off a new ship to a friend, the ability to share the experience is one of things that make sport flying fun. This trim little side-by-side two-seater is ideal for such companion flying as well as being easy to build and easy to fly. Called the Zenith, it's the handiwork of Chris Heintz, a professional aircraft designer from Canada (the name Zenith, incidentally, comes from the letters that spell Heintz).

The sporty-looking all-metal monoplane is rugged, requires little maintenance and can be built from plans without jigs, heat treating or special tools. Construction time runs from 750 to 1000 hours at an approximate cost of \$2700. The ship is not "hot," but provides good performance on modest pow-

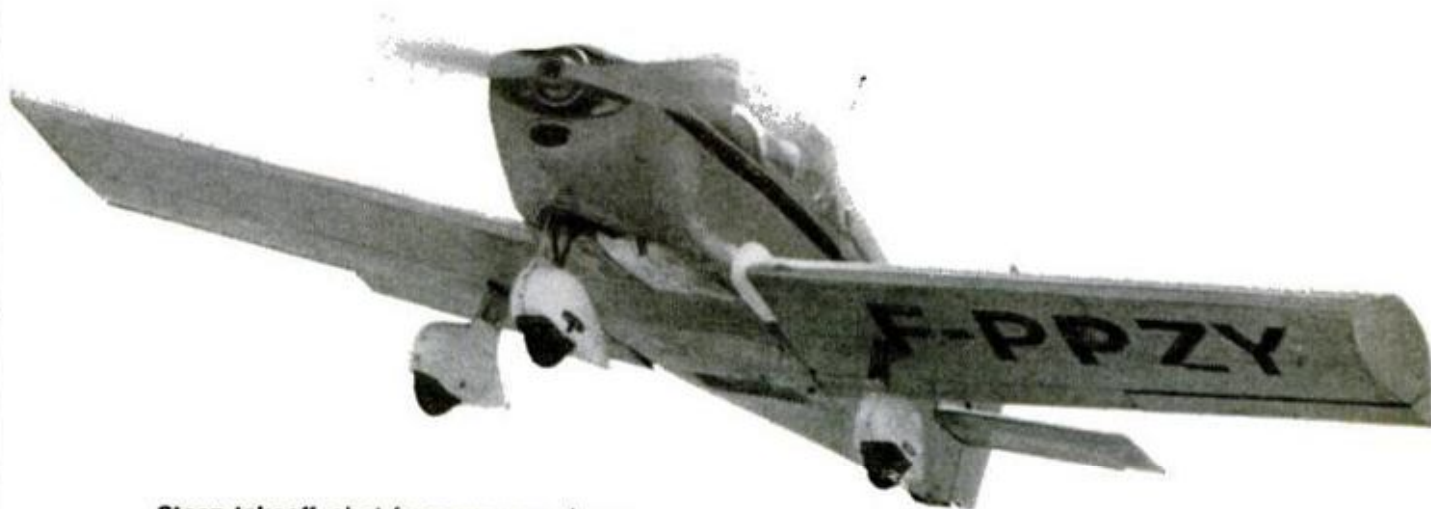




**Electric flaps**, one of which is shown lowered above, are ingeniously controlled by motor-driven window operator from a car. Cockpit view (below) shows side-by-side seating with unusual single centered control stick. Dual throttle control has handle at each side of instrument panel within easy reach of either pilot.

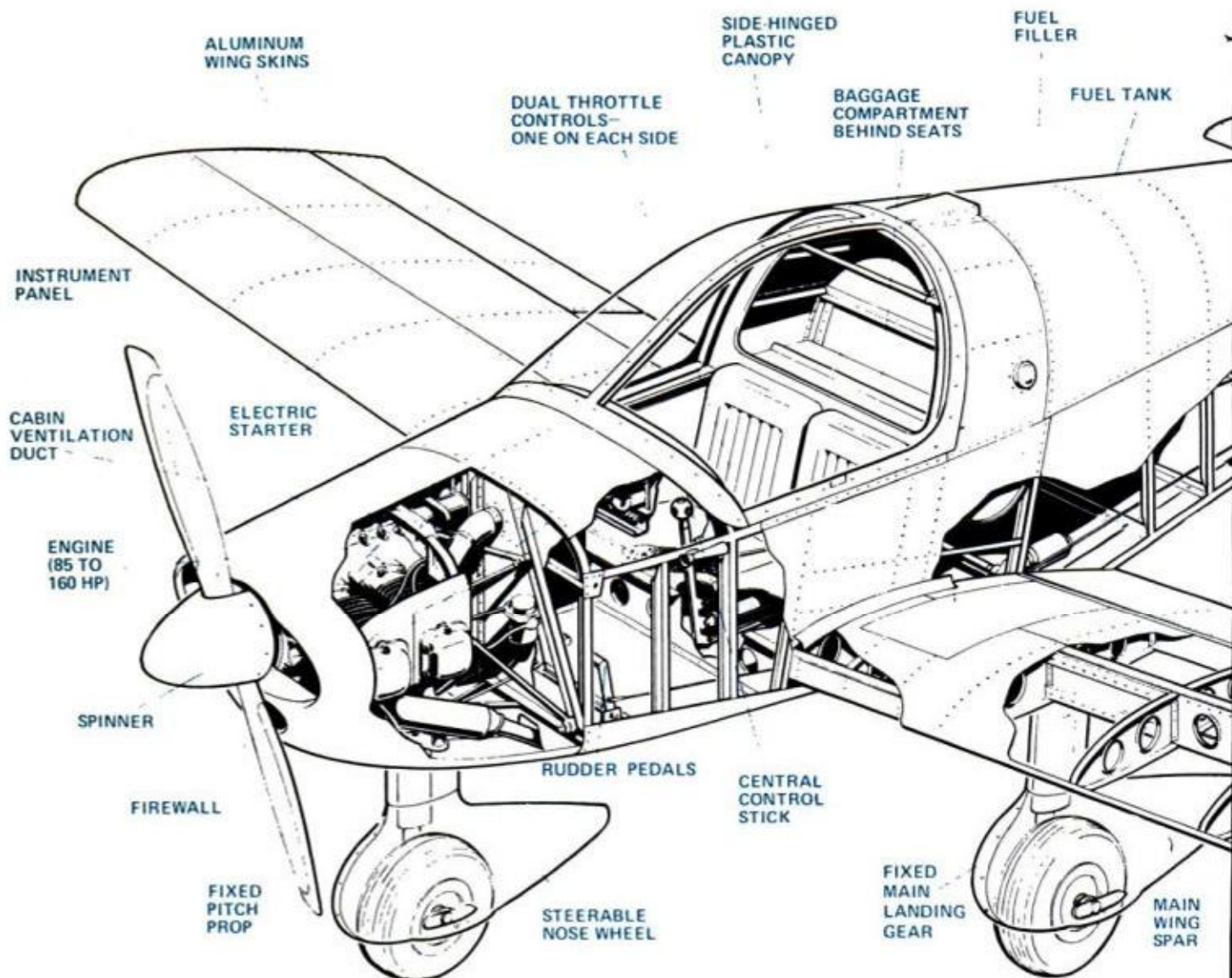


Photos: Howard Levy

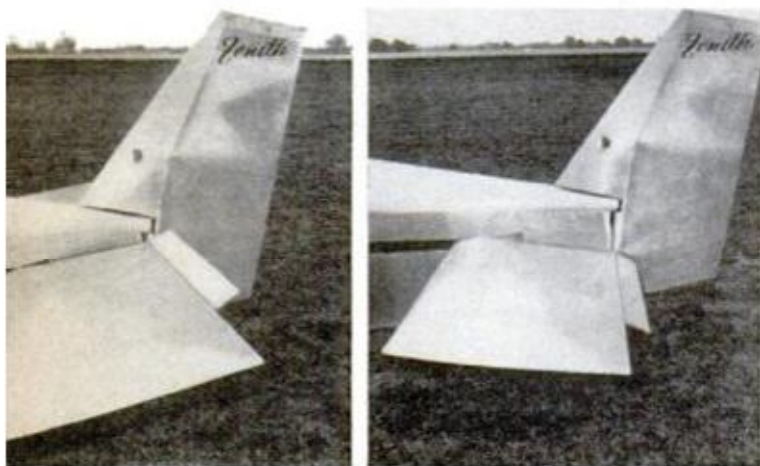


**Steep takeoff**, shot from runway, shows how quickly the Zenith gets off the ground. Ship requires takeoff run of only 600 feet, can land in even less—about 580 feet. Rate of climb is 880 feet per minute.

## Easy to fly, hard to get into trouble with



**All-moving tail** has no conventional rudder and elevator surfaces. Instead, entire vertical stabilizer pivots on central bearing to serve as rudder. Horizontal stabilizer works in same way to provide elevator control. Latter is shown in up position at left, below; in down position at right. Small tabs at trailing edges of horizontal stabilizer are for elevator trim.



er. Engine options range from 85 hp up to 160. Chris's prototype is equipped with a 100-hp Continental from which he gets a top speed of 150 mph and a cruising speed of 130. Rate of climb is 880 feet per minute with a service ceiling of 12,000 feet. Range is 500 miles at 130 mph.

The ship's low-speed characteristics are actually more impressive than its all-out capabilities. Its low stall speed—45 mph with flaps, 51 without—and leisurely landing speed of 53 mph combine to make it a plane that's easy to handle and hard to get into trouble with. It can land in 580 feet and take off in 600, enabling it to operate safely from small barnyard-type fields.

Incorporated in the Zenith are several novel features. Both vertical and horizontal stabilizers are "all-moving" for good control and simplified construction. The entire

## Report from the cockpit: PM editor test-flies the Zenith

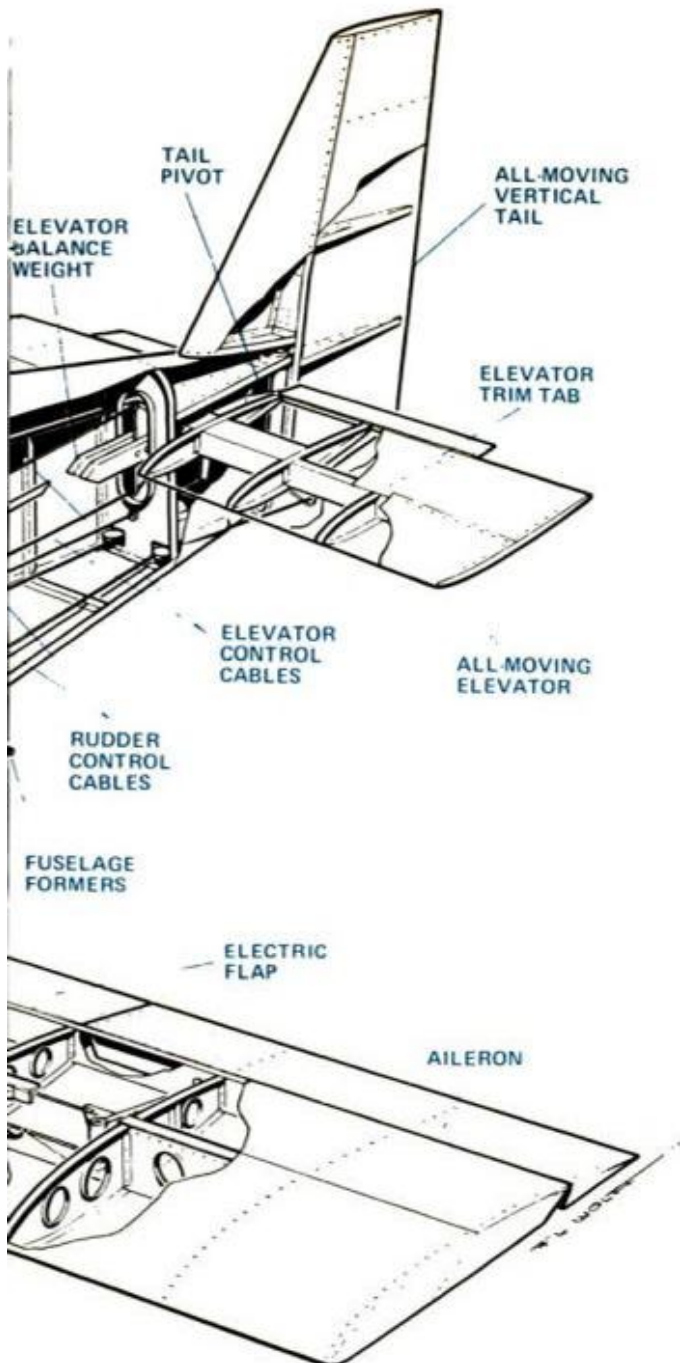


PM executive editor Shel Gallagher (at left above) prepares for test ride in the Zenith.

I eyed the single centered control stick dubiously as we climbed into Chris Heintz's shiny little Zenith for a test ride. Protruding up between the twin seats, it looked more like a floor shift in a car than an aircraft control column. Occupying the right-hand seat, I'd have to work it with my left hand. Would it feel awkward? Chris smiled. "Don't worry, you'll get used to it."

As we zoomed off the runway in a steep banking turn, I was amazed to find how quickly you do get used to it. The ship is so smoothly responsive that only light fingertip pressure is needed to move the stick—and you don't lock onto it in a ham-fisted death-grip as many beginning pilots tend to do with a conventional between-the-knees stick. We spiraled lazily up to about 3000 feet and Chris asked, "Want to try a stall?" I looked dubious again. Deliberately stall a ship I'd never flown before? "Go ahead," he urged. I pulled the nose up into a shallow climb and watched the airspeed indicator drop as Chris eased back on the throttle: 80 . . . 70 . . . 60 . . . 55. At 51 mph, there was a slight quiver and the controls went mushy. We were in a stall. I waited for the sickening, violent fall-off typical of stalls, but nothing happened. We just hung there, stable and level. Recovery was a simple matter of putting down the nose and pouring on a few revs. "Now we'll try it with flaps," said Chris. This time the airspeed needle sank all the way to 45 mph before the stall set in. Still nothing—merely a gentle floating sensation. Incredible, I thought—you just can't spin this baby.

Excited, I rolled the Zenith into a series of tight vertical banks—as close as we could come to aerobatics in our restricted test area—and she handled as smartly as a racer rounding a pylon on a wingtip. Without a doubt, the Zenith is one of the safest and easiest-to-fly homebuilts I've had the pleasure to try.—*Shel Gallagher*



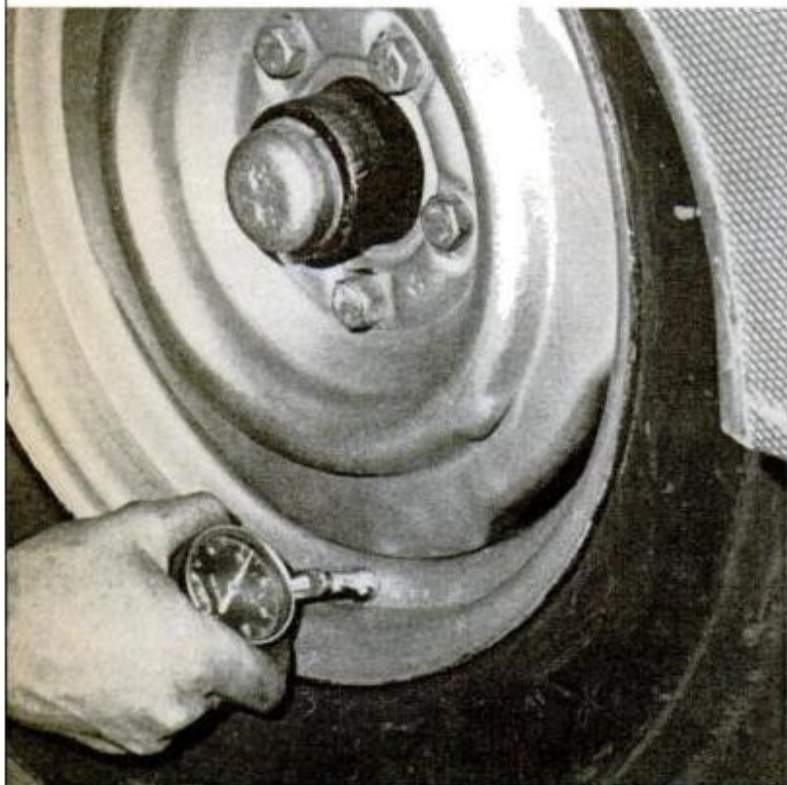
vertical tail fin pivots to function as a rudder, and the horizontal stabilizer swings up and down for elevator effect. Wing flaps for increased lift are electrically operated by the same mechanism used to control push-button car windows. One of the most unusual touches is a single centered control stick shared by both pilots. It looks a bit odd at first, but you find yourself liking it after a little practice. Two advantages are a less complicated control linkage and more cockpit leg space.

The wings have a constant chord of 55 inches for easy assembly and span 23 feet. Overall fuselage length is 20 feet, 8 inches. Empty weight is 880 pounds; gross, 1450. Complete construction plans for building the Zenith are \$150 from Chris Heintz, Zenith Aviation, 236 Richmond St., Richmond Hill, Ont., Canada. ★ ★ ★

# Wear, oh, where has my tire tread gone?

It's easy to 'read' worn tires and figure out how they got the way they did: The trick is to keep them wearing evenly

by Mort Schultz



**Checking pressure periodically** is the best thing you can do for your tires. Always check with your own gauge—don't trust readings at service station air hoses. Surveys have found them less accurate than inexpensive, easy-to-use hand-held gauges.

**Y**ou'll wave goodbye to tire tread if you don't check tire pressure and check it often. Too little pressure causes tires to flex excessively. Flexing creates heat. When heat reaches 250°F., which is the temperature at which vulcanization is done, tread separation can occur.

Don't invite trouble when it can be prevented with a simple pressure check. The alternative is to wait for tread to show wear, but that's a waste of good rubber.

Check pressure *at least* once a month with your own personal tire gauge. Don't trust gauges available at service stations. According to the National Bureau of Standards, one of every three is inaccurate by four pounds per square inch (p.s.i.) or more, and three out of five are wrong by two p.s.i. or more.

Check pressure only when tires are cold. Hot tires build up six or more pounds of pressure as protection against heat. This is normal, so never bleed air from hot tires. You will underinflate them or make them more underinflated than before.

According to the Rubber Manufacturers Assn. (RMA), a cold tire is one that hasn't been run for three or more hours, and then is driven at low to moderate speed for no more than one mile. What do you do if you live more than a mile from an air source?

Check tires in your driveway and make a note of how many pounds each needs. Add that amount when you get to a service station.

Say that one of your tires has 21 p.s.i. of pressure in your driveway, needing three pounds for "normal," but shows 23 p.s.i. after you arrive at a gas station. Add the three pounds although the tire will now have 26 pounds. It will drop to the normal 24 pounds when it cools off.

Seldom should you deviate from tire inflation specifications given in your car owner's manual or on the label glued to the glove compartment door. The only time you do is when making a long trip at high speed, pulling a trailer or carrying a full load of passengers and luggage (check the owner's manual to find out the "full load" for your car).

Under these conditions, add four pounds extra, but only if the total inflation pressure doesn't exceed the maximum stamped on the tire sidewall. Tires should never be inflated beyond this.

Make a mental note to check inflation when there is a wide swing in atmospheric temperature. Tire pressure drops one pound for each 9° change. Tires inflated, say, to a normal (for your car) pressure of 24 p.s.i. at 70°F. will drop to 20 p.s.i. if the temperature falls to 34° F. At 20 p.s.i., they would be underinflated.

If you keep your car in a heated garage during the winter, check pressure outside. That's where the car is driven. Tires lose pressure when going into cold air from a warm garage.

If your car is equipped with radials and they are properly inflated, they will look "bulgy." That's okay. They're supposed to. Any attempt to "debulge" radials by raising pressure will result in overinflation.

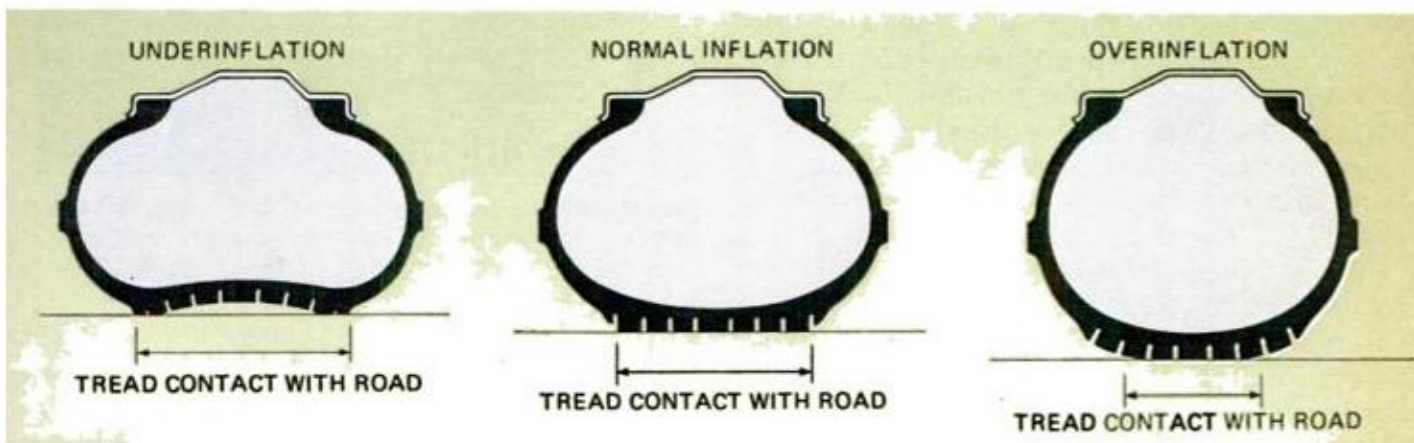
Radials should never be mixed with any other type of tire. This goes for snow tires too. If you use radials on one or more wheels, you have to use them on all four. Vehicle instability results if you don't.

Incorrect inflation aside, an unsafe tire is also one that has worn excessively or

has suffered structural damage. For example, if tread is worn below a depth of  $\frac{1}{16}$  inch in any two adjacent grooves, the tire should be replaced.

Measure depth with a tire troubleshooting tool that you should get and use: a tire depth gauge. Tires manufactured in the last few years have had tread-wear indicators inserted. Solid bands appear across the tread surface when tread has worn to the danger point. But checking tires before you can see a pattern of wear is essential to getting more life from them. By checking tread depth at several points around the circumference of a tire, you can plot the nature of the tread wear. If the wear is even, fine. If the wear is found to be uneven, then you can diagnose the problem and correct it before the uneven wear ruins the tire.

Tread or sidewalls that are cut or cracked deep enough to expose ply cords present a serious safety hazard. Surprisingly, "big" cuts that look ominous are often innocent. It's the small ones you



Uneven wear of tires results from underinflation and overinflation as shown above. Other factors such as suspension and steering problems also contribute to uneven tread wear. The best way to spot the problems before uneven wear goes too far is to use a tread-depth gauge as shown at the left. If you measure depth of each tread groove at, say, 5 to 10-inch intervals all the way around the circumference of the tire, you can plot the pattern of wear on the tire. If it's uneven, you can correct the problem before the uneven wear pattern goes so far as to show up by eyeballing the tire. This type of check is done easiest with the wheel off the car. It takes patience, but you'll get a lot more miles from your tires for your trouble.

usually have to worry about. Probe a cut carefully with a small screwdriver or your tread-depth gauge. If the tip reaches the cord, get rid of the tire.

A bulge or bump in the sidewall or tread is another reason for discarding a tire. Bulges and bumps indicate that tread or sidewall has separated from the tire body. The tire is a candidate for a blowout.

Richard C. Vannoy, manager of Firestone's Test Center at Fort Stockton, Tex., thinks that drivers should check tires for damage as often as once a week, and should also pry out stones and other objects that have become wedged in the tread. He'd be happy, I'm sure, if most drivers did this even once a month, since many never do it.

The technique of plotting tread wear using a tread-depth gauge is painstaking. If you're not conscientious enough to do it you can still get advance warning of wear-producing conditions by driving by the seat of your pants. For example, a continuous or cycling vibration in the steering wheel or floor on a smooth highway at a steady speed of approximately 60 mph or above is not normal. Makes no matter that the shake disappears at a speed above or below which it comes on. Something is wrong, and that something should be corrected before it ruins tires.

The problem might be unbalanced wheel assemblies, so have balance checked. Wheel assemblies can be balanced statically with assemblies off the car and stationary. Assemblies are also balanced dynamically with the brake drum, wheel and tire moving at high speed. Dynamic balancing may be done with the assembly on or off the car, depending on the type of machinery.

You should have assemblies of your car balanced dynamically if you usually drive at highway speeds. Static balancing is acceptable if the car is used mainly around town.

Watch out for one thing if a mechanic uses an off-the-car balancer. Oldsmobile warns that you won't get accurate results unless the assembly is mounted by means of the wheel-stud holes. Machines that use cone-type adapters which allow "balancing" to be done without the wheel being attached by stud holes should be avoided.

Other mechanical failures that can cause "shake" and subsequent tire wear are front-end misalignment, grabbing brakes, worn-out wheel bearings, loose steering linkage

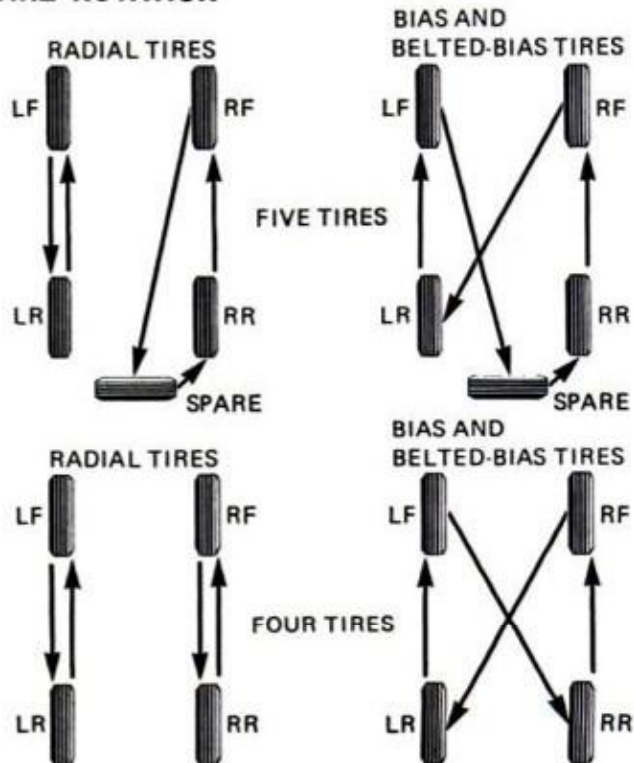


**Dynamic wheel balancers** check balance of a spinning wheel; this one works like stroboscopic timing light.

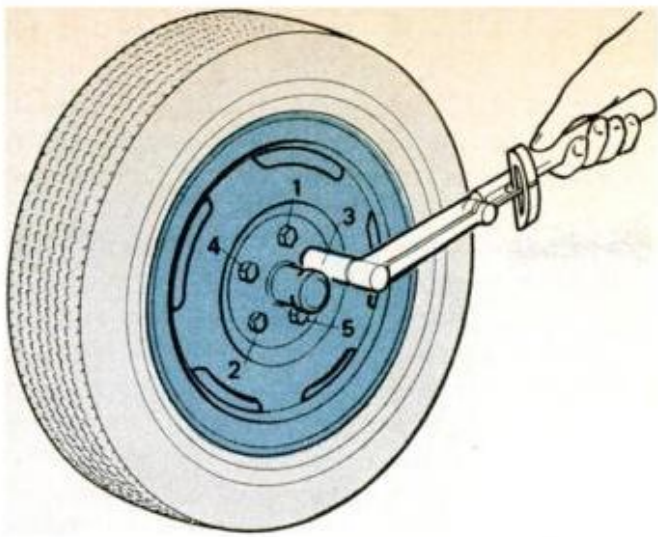


**Wheel and tire assemblies** should be balanced when old tires are remounted or new tires are purchased.

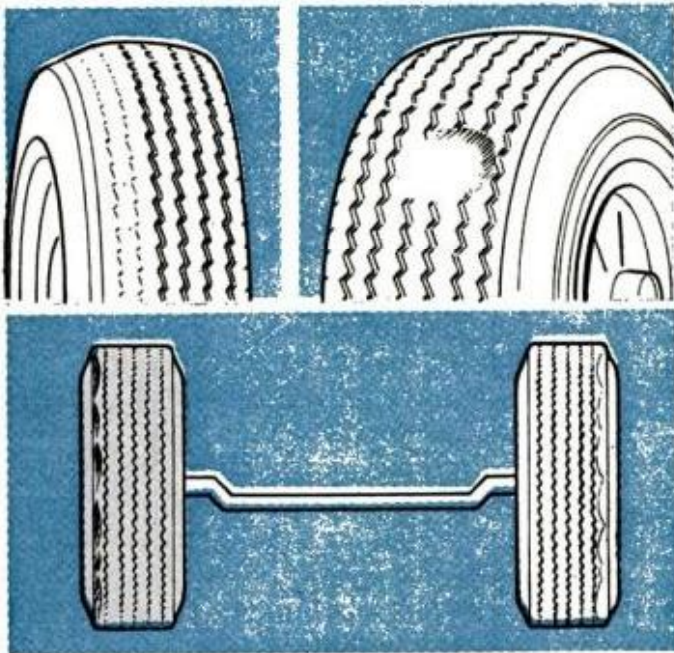
### TIRE ROTATION



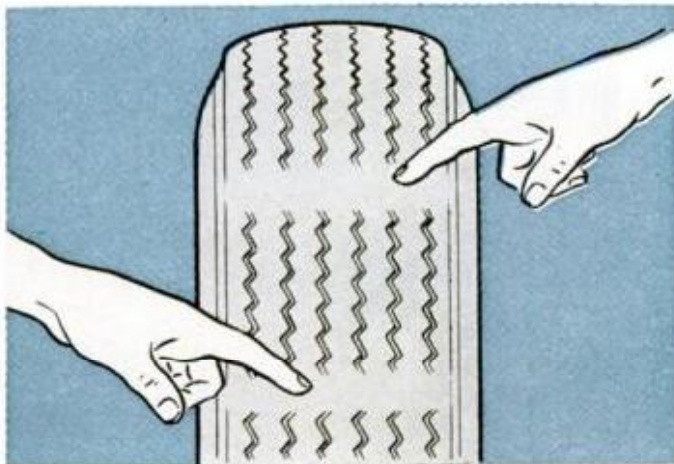
**Tire rotation patterns** depend on the type of tire and whether or not you're including the spare.



**Tighten wheel nuts** with a torque wrench in the sequence shown above. If your wheel uses only four lugs, tighten the nuts in a crisscross fashion.



**Toe misalignment** causes a feathered edge inside or outside (top left). Grabbing brakes are the cause of spotting (top right). Uneven or excessive wear (above) can be caused by unbalance, worn wheel bearings, worn shocks or a loose steering linkage.



**Built-in wear indicators** tell you when your tread is legally all gone—show when tread's down to  $\frac{1}{16}$  in.

parts and worn shock absorbers. (See *How to Track Down a Handling Problem*, page 152, July '73 PM.)

Another way tires have of issuing a warning is by thumping. A thump is felt in the steering wheel, seat or floor at about 25 mph or slightly above. The cause is usually a high spot on one of the tires.

To find the offending tire, inflate all of them to 50 p.s.i., which will eliminate the thump. Then reduce inflation to normal pressure one tire at a time between road tests on a smooth pavement until the offending tire is uncovered.

You have a choice of what to do with it. You can use it for the spare, or you can bring it back to the dealer for truing, which involves grinding down the high spot.

Let's talk about wheels for a minute. If you ever have to change a flat or if you have a garage to work where wheels have to be mounted, be aware that overtightening studs can distort brakes and damage wheels.

Nuts should never be tightened with an impact wrench. Use a torque wrench, because nuts should be tightened to the specification given by the manufacturer.

Manufacturers also recommend that nuts be tightened in a crisscross fashion so that bolt pressure around the wheel is equalized.

This information about wheel nuts will come in handy when you rotate tires—and you should rotate your tires: Front tires experience more wear on the outer shoulders because of cornering. Rear tires wear more in the center because of power thrust from the rear axle. Rotation equalizes wear, resulting in longer tire life.

In fact, Firestone claims that if you rotate tires every 5000 miles, you will get 20 percent more miles from each tire.

Rotation has an added benefit. When you remove tires, it's easy to check tread depth with a depth gauge to detect abnormal wear before it gets serious.

Radials and conventional tires are rotated differently—radials from front to back on the same side, and conventional tires in crisscross fashion.

Once tires are set up to give you every penny's worth that you invested in them, you can keep them looking sharp by periodically washing them with soapy water and a brush, rag or sponge. Don't use a cleaning solvent with a petroleum base, since petroleum causes rubber to deteriorate.

If a stubborn stain persists, use a steel-wool cleaning pad and tire detergent. ★★

# Safer fluorescent lighting

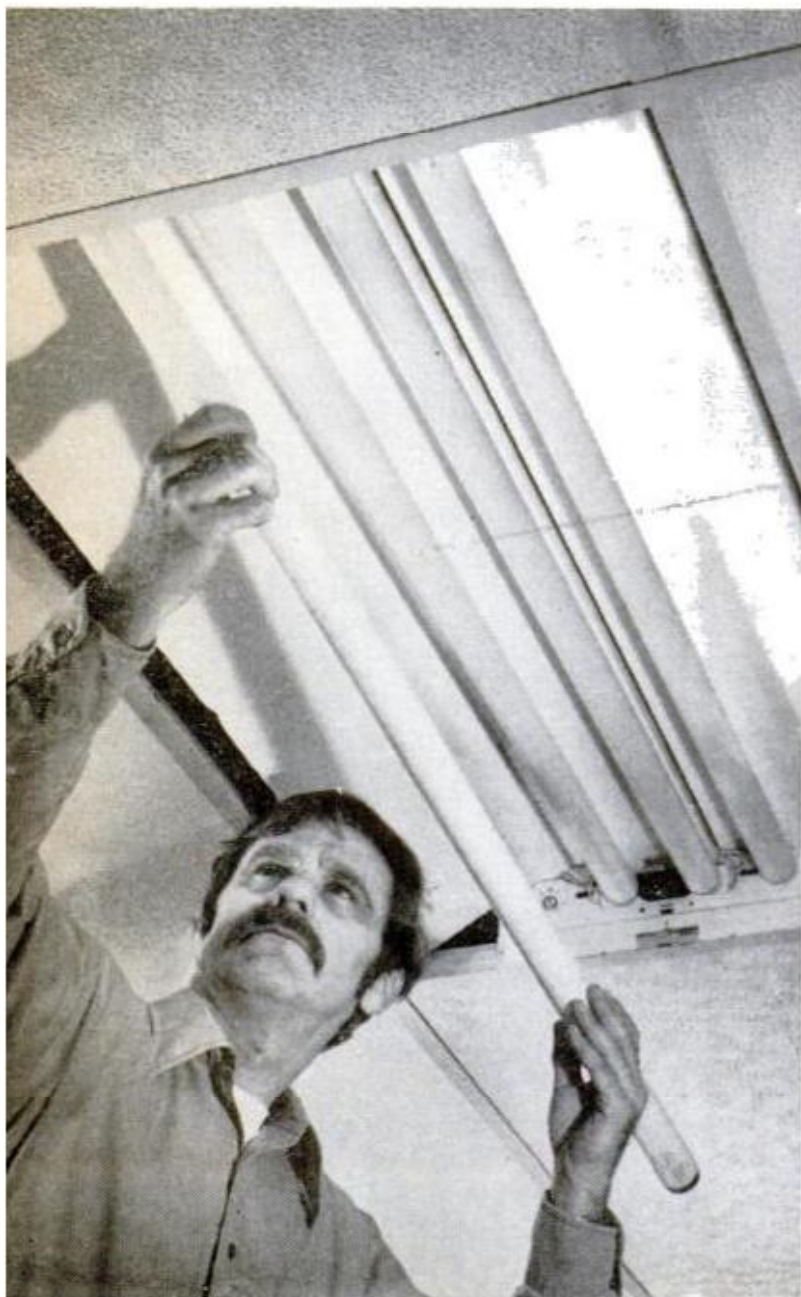
by John P. Reid

If you have an older fluorescent lighting fixture in your home, you may be living with a time bomb. Safer fixtures are available now. And you should know about them and use them wherever you have fluorescent lighting.

The problem is in the transformer-like ballast, a coil that regulates current flow through fluorescent tubes. When it fails, after a decade or so of use, the result is a short circuit, not severe enough to blow a fuse or trip a circuit breaker, but often bad enough to cause a smoky, smelly fire in the ballast's tarry potting compound. Such a fire *can* spread to the surrounding structure.

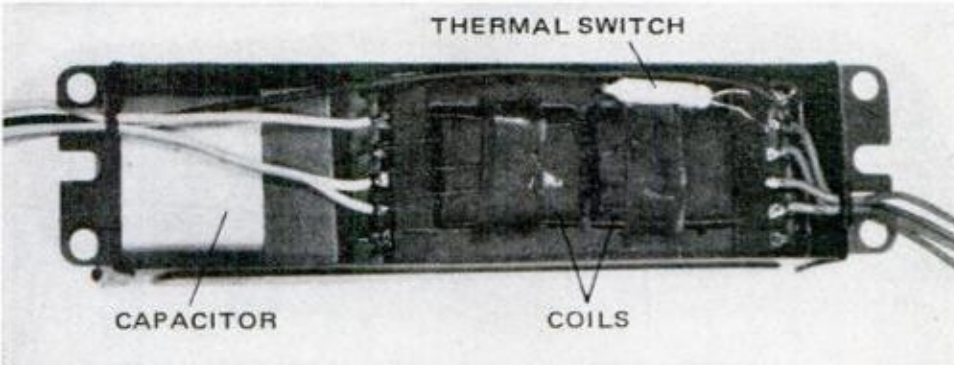
Heat causes the deterioration of insulation that leads to ballast failure, so the way to prevent failures is to limit heat. Thermal-protected ballasts, designated "Class P", have switches, usually bimetals like those in thermostats, that open when temperatures get too high (about 230° F.). After cooling to 185° F., they reset, allowing the lamp to operate again. Thermal-protected ballasts are considered important enough that they're now required by the National Electrical Code for all indoor fluorescent fixtures except single-tube fixtures of 20 watts or less using a two-wire ballast.

New fluorescent installations should now include thermal protection, but code enforcement is local and may yet be spotty. Most popular fixtures in large dealers' stocks now meet requirements, but unprotected fixtures may still be on some dealers' shelves. If you are having

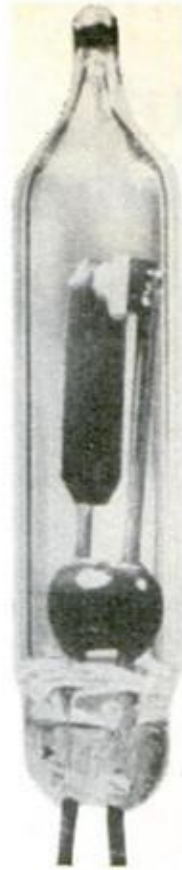


Jet of hot gas from ballast fire did this to ceramic tile, could have ignited other materials.





Melted potting material, charred label, dangling wire are evidence of ballast fire (top). Class P protected ballast (above) has thermal switch to prevent overheating (components are shown without potted compound). At right: close-up of self-resetting thermal switch shows bimetal.

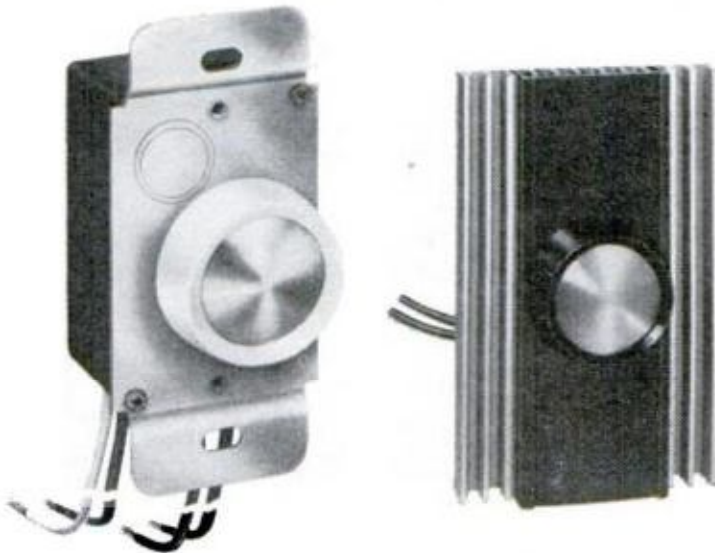


fixtures installed and have any doubts, have your contractor specify Class P ballasts in writing.

What if your home is full of older fixtures? Replacing all the ballasts may leave you safer but in the dark, since an older fixture's normal operating temperature can trip the thermal switch. This "nuisance tripping" will turn out the light for 10 minutes to two hours; if this should occur, the fixture is judged to be too hot by today's standards.

Since nuisance tripping is possible, consider the advantages of replacing old fixtures. If you want to try modernizing them instead, be sure local codes and your fire insurance allow you to do the work. Order a Class P ballast that otherwise duplicates the old one's specifications; it will cost at least \$1 more. Look for the Class P and UL trademark on the label. Do what you can for cool operation: avoid diffusers that enclose the tubes and lower the unit from the ceiling if possible. ★★★

### Now, dimmer switches designed for fluorescent lighting



Satisfactory dimmer switches for fluorescent lighting are also a recent development. The two shown at left are UL-listed for use with special dimming ballasts. Each mounts in a standard wall outlet box and offers full-range dimming of from 2 to 12 40-watt rapid-start lamps, with positive on-off control and an intergrated circuit that's compensated to prevent blackout from voltage drops caused by other loads on line. No. 6675-UL (far left) is \$38, No. 6676-UL, \$46 at electrical-supply outlets. Leviton Manufacturing Co., Incorporated, 59-25 Little Neck Pkwy., Little Neck, N.Y. 11362.

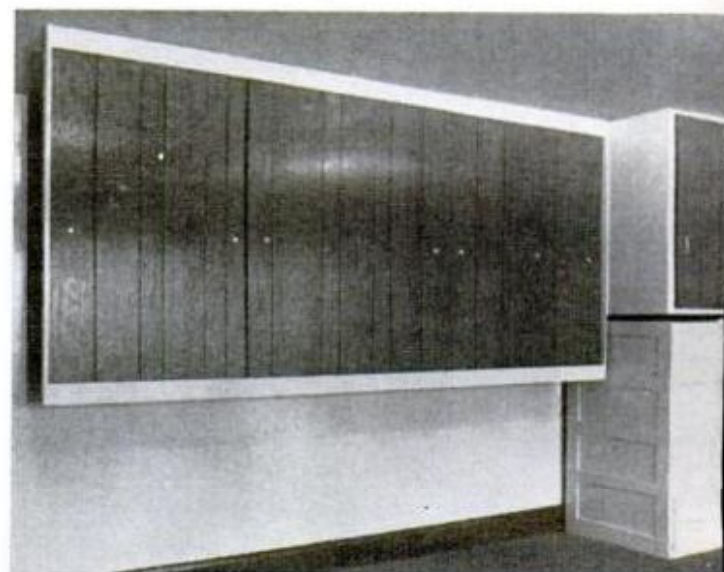
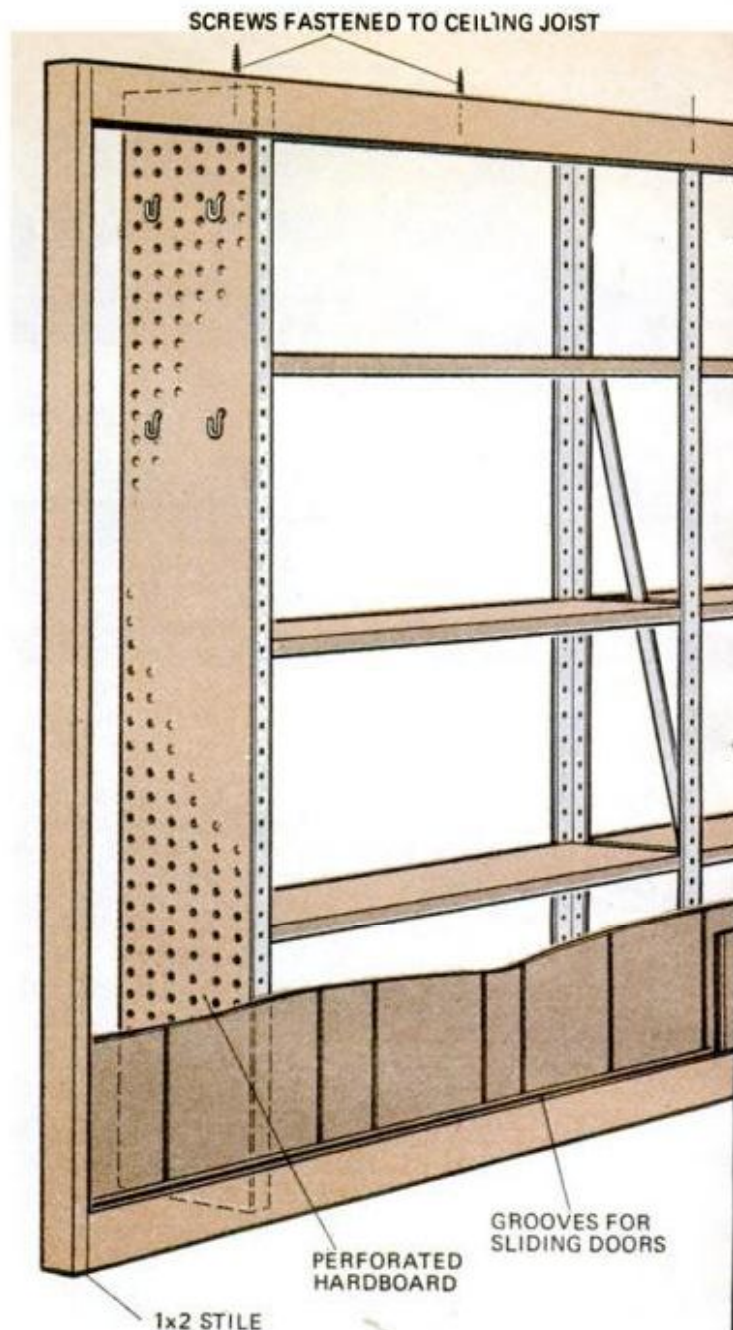
# Quick cover-up for utility shelving

by Craig Wilson

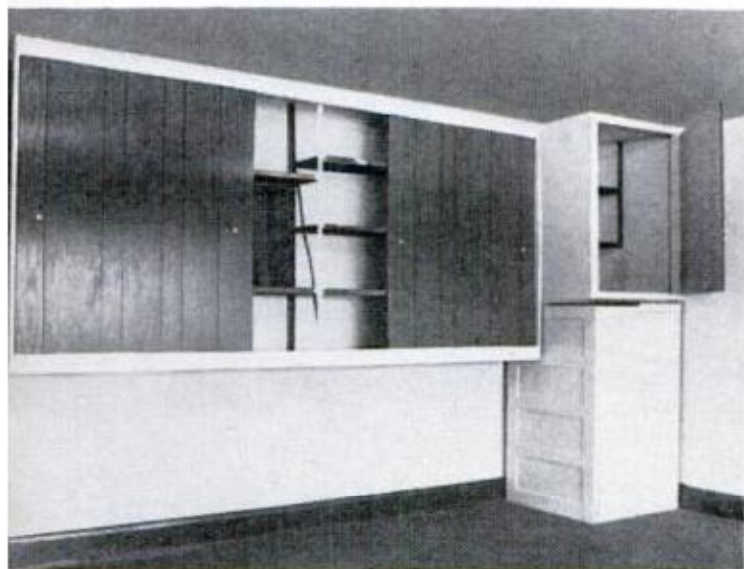
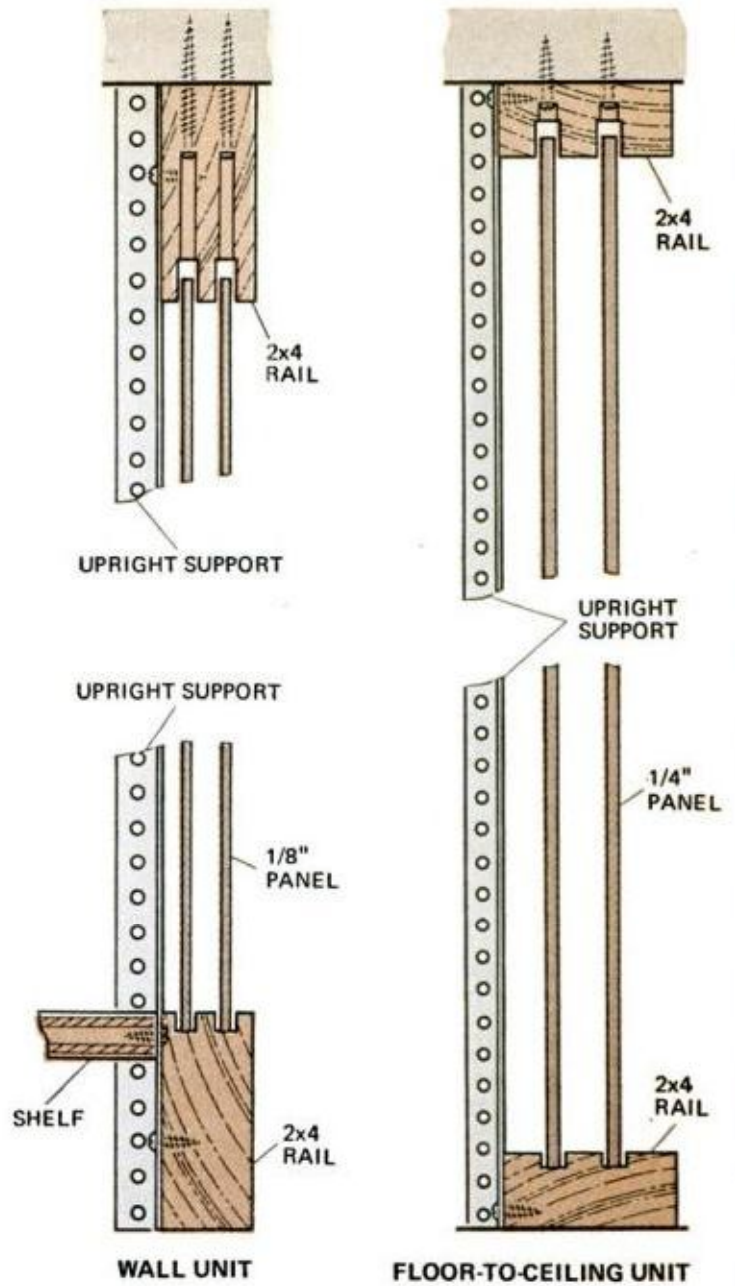
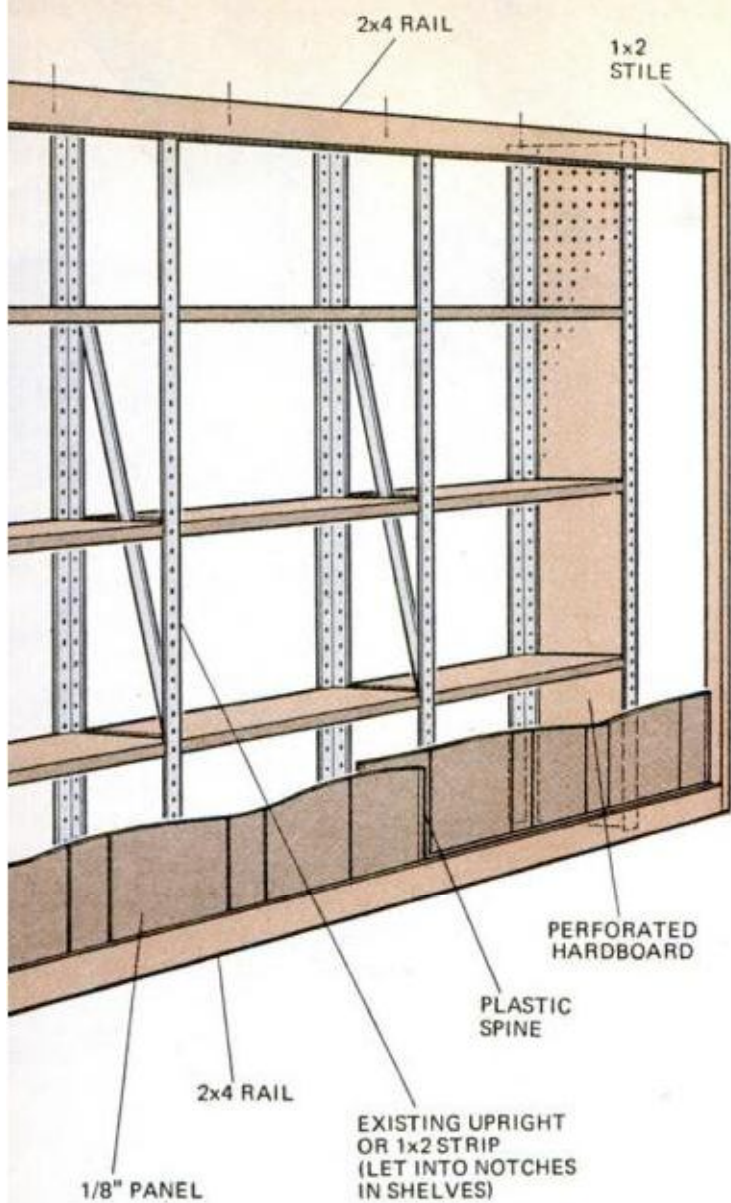
Utility shelving is functional but not very pretty. If you use your basement for recreation as well as storage, or if you'd just like a neater looking garage, you want those cluttered shelves out of sight. I covered mine up inexpensively with a few sheets of prefinished  $\frac{1}{8}$ -in. plywood paneling.

Panel doors slide in double grooves in kiln-dried 2x4 rails; it's important that the lumber you buy for these rails is straight. Grooves are made with a router or cut on a table saw (or you can have this step done at the lumberyard). Shelving must be securely fastened to the wall. Fasten the rails to shelf uprights and to ceiling joists, where possible, with wood screws. The rails must be level; if shelves were made inaccurately, shims may be necessary. Vertical 1x2 end strips are fastened with glue and finishing nails. Make the framework wider than the shelves, close the sides in with perforated hardboard, and you'll have extra space for hanging storage. Panels are cut  $\frac{3}{8}$  in. shorter than the distance between bottom of lower groove and top of upper groove; cut a test strip to be sure of this dimension. Cut wide enough to allow at least 1-in. overlap between panels; bowing will be less likely if grain is vertical.

After the framework has been sanded, primed and painted (with gloss enamel for easy cleaning), bottom grooves are rubbed with beeswax to help panels slide smoothly. To dress up panel edges, glue on  $\frac{1}{8}$ -in. plastic report-cover spines. These are sold in a variety of colors by office-supply outlets; 100 ft. should cost only about \$5. Spines that will fit  $\frac{1}{4}$ -in. paneling are also available. ★★★

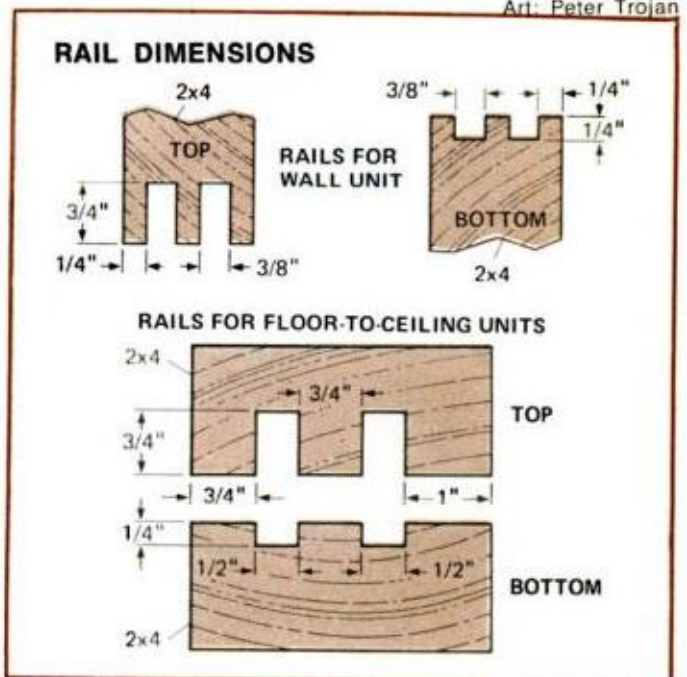


Framework and paneling produce a handsome cabinet look. Recessed pulls are pressed into 1-in. holes in panels, should be located above children's reach.



Storage space inside is plentiful. Enclosure with a hinged door (paneling on 1/2-in. plywood) was made oversize for maximum space above existing cabinet.

Art: Peter Trojan



Some metal tubing can be bent satisfactorily simply by wrapping it around grooved pulley wheel (sheave). Here,  $\frac{3}{8}$ -in. aluminum tubing is bent this way; the swivel block is optional.



# Look what you can make from metal tubing

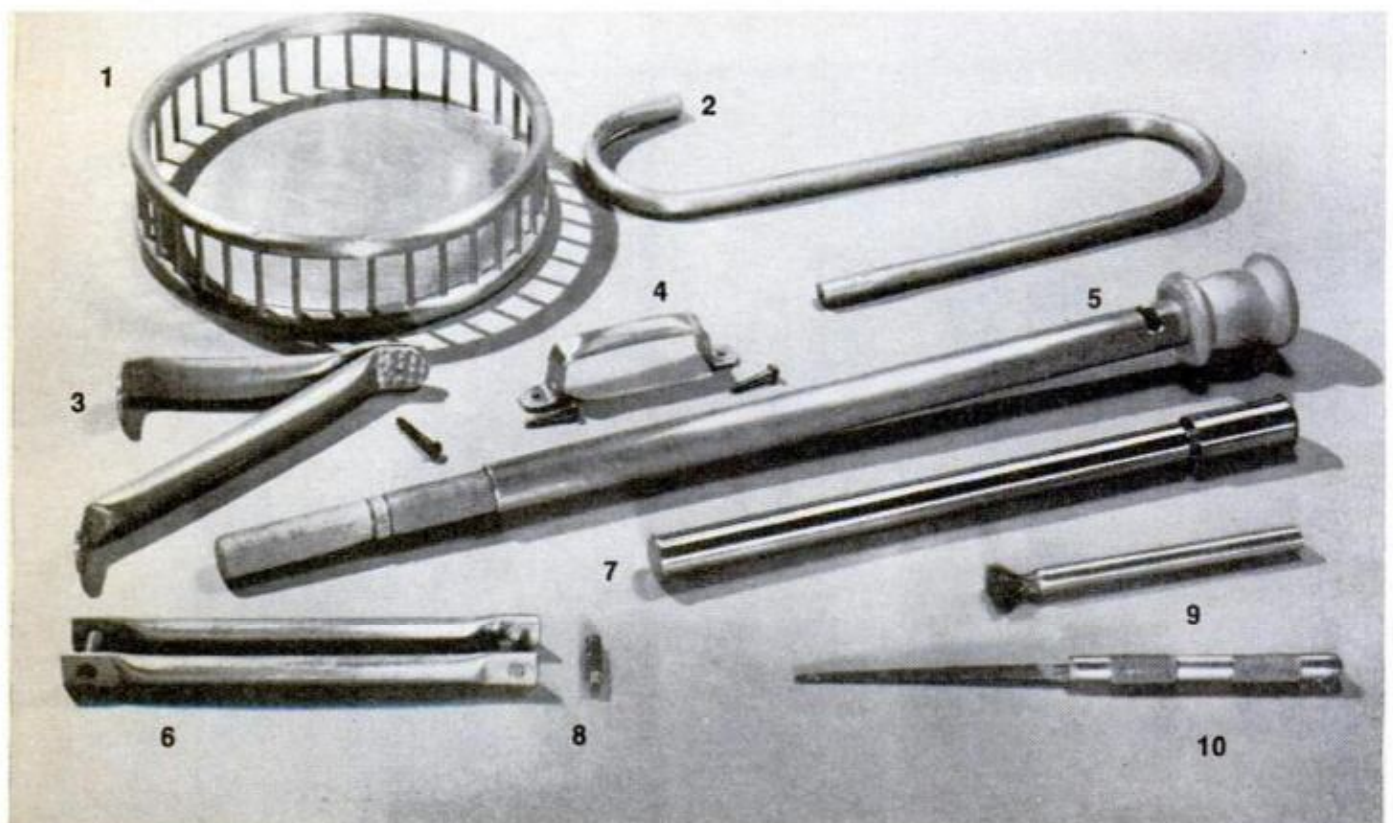
by Walter E. Burton

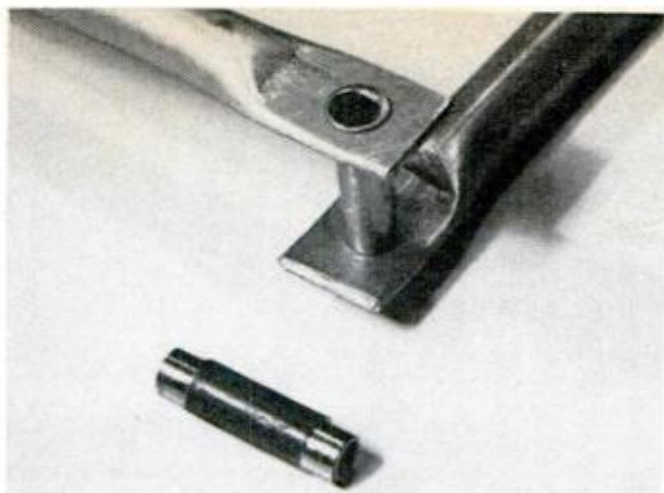
Various items that can be made from metal tubing include 1) ring basket or tray, 2) siphon, 3) shelf bracket, 4) drawer or door pull, 5) slide whistle, 6) metal tubing with ends flattened, connected by peened spacers, 7) adjustable shelf post/bookend, 8) spacer, 9) brush handle and 10) file handle.

Many useful objects can be made from aluminum, copper, brass or steel tubing. Metal tubing is cut with a hacksaw, tubing cutter or lathe. Cut ends are file-finished, or smoothed in a lathe. For smooth surfaces, abrasive cloth or a flap-type sanding wheel is used and a final luster is given with metal polish. Tubing can be joined by soldering, brazing, welding—or even using epoxy or plugs (either metal or wood) and screws, pins or nails. Bending can be done with coil-spring sleeves or the method shown above.

Details on six metal tubing projects fol-

Photos by the author

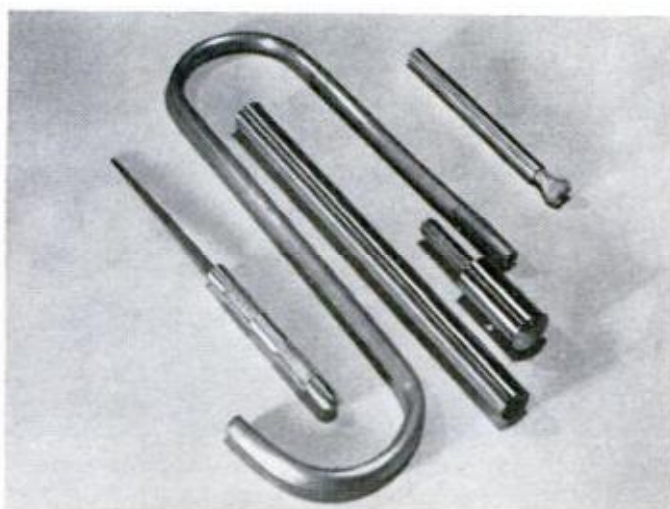




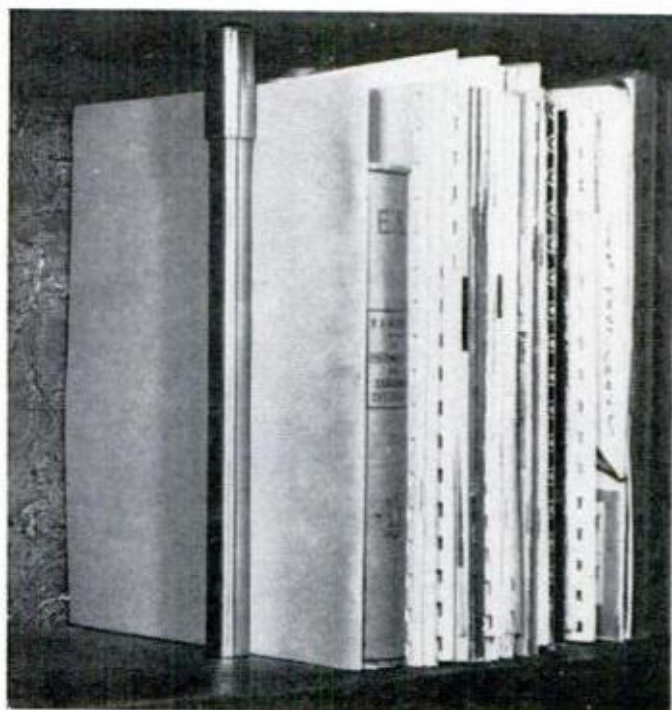
Spacer with diameter of ends reduced connects flattened ends of larger tubing; spacer ends are peened.



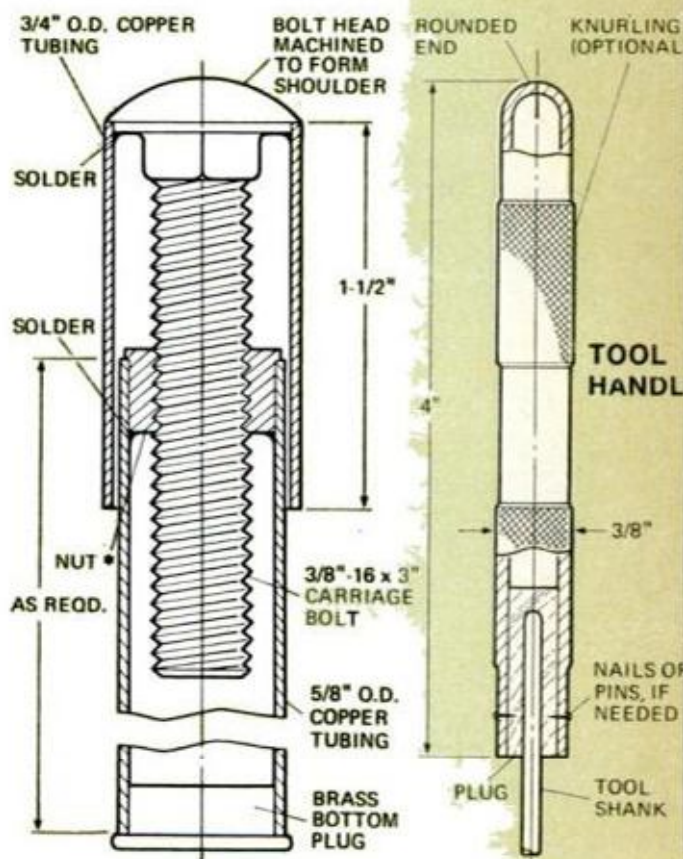
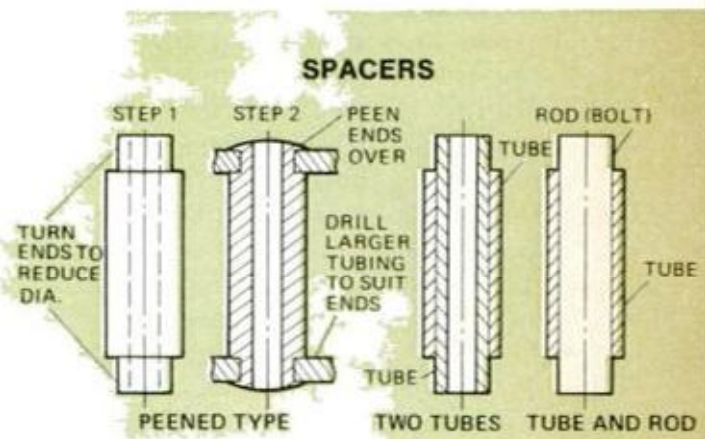
Aluminum tubing can be closed and rounded by cutting as shown and lightly tapping the cut ends.



Tool handles and siphon made from  $\frac{3}{8}$ -in. aluminum tube; post bookend from  $\frac{3}{4}$  and  $\frac{5}{8}$ -in. copper tubes.



Adjustable bookshelf post serves as a bookend and as an added support for the upper shelf.



ADJUSTABLE SHELF POST/BOOKEND

\*CORNERS TURNED DOWN

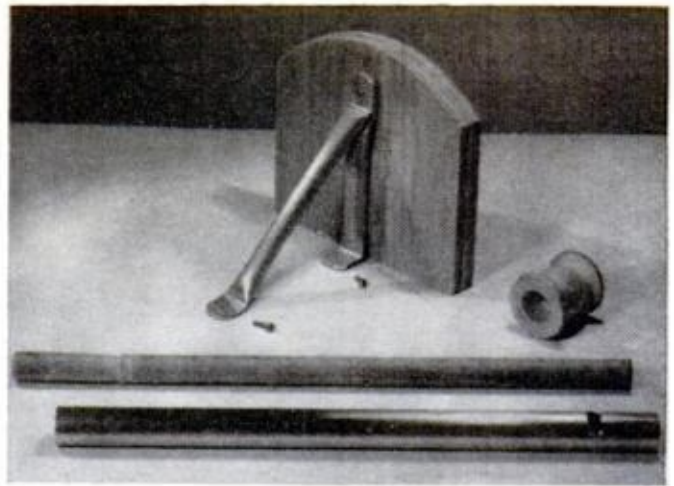
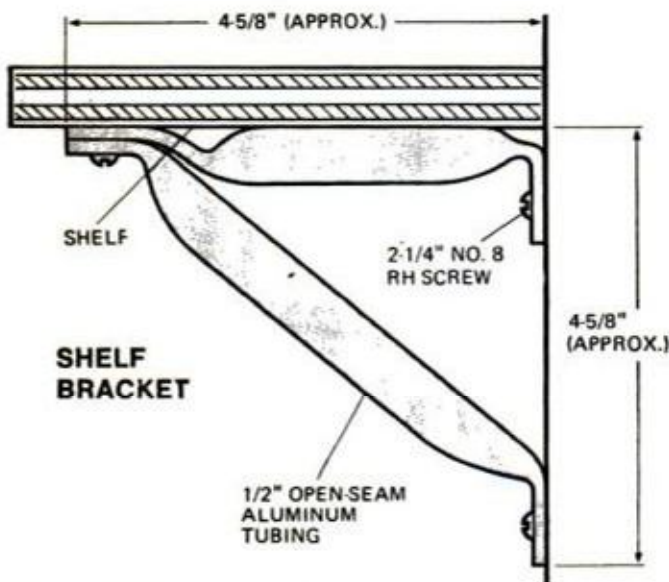
low. All sizes of tubing given refer to outside dimensions.

**Spacers.** Short lengths of tubing are often used as spacers between two plates, strips or other elements of a mechanism. One type of spacer is made from a single tube, with the ends turned or filed down to form shoulders and peened over after installation. A tube, rod or bolt within a tube as shown on the previous page might also be used.

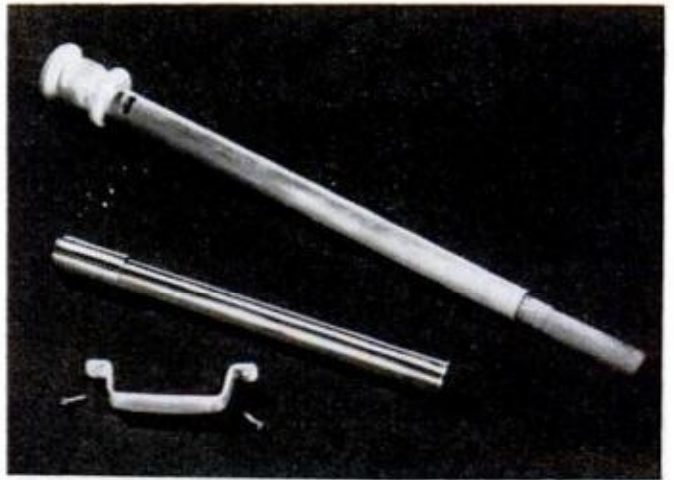
**Tool handles.** Improvised tool handles can be made easily from tubing. A common way to anchor the tool shank is to drive a wood dowel into the tube and drill a hole in the dowel for the tool. The relatively new "plastic-metal" preparations or an epoxy filler could also be used. Outer end of the handle can be left open, plugged or closed by using the method shown on page 139 or by spinning or bending the metal. Light knurling makes a handle less slippery.

**Adjustable shelf post/bookend.** This dual-purpose item is made from  $\frac{5}{8}$ -in. and  $\frac{3}{4}$ -in. copper tubing with a  $\frac{3}{8}$ -16 x 3-in. carriage bolt and nut providing the adjustable movement. Nut corners are turned down for about  $\frac{5}{16}$  of their length, forming a shoulder to rest on end of  $\frac{5}{8}$ -in. tubing (see drawing on previous page). The bolt head is machined to form a shallow shoulder to rest on end of  $\frac{3}{4}$ -in. tubing. Nut and bolt head are soldered to their respective tubes by fluxing the joints, placing bits of solder inside the tubes and heating over stove burner. Plug at bottom of post prevents denting of the shelf.

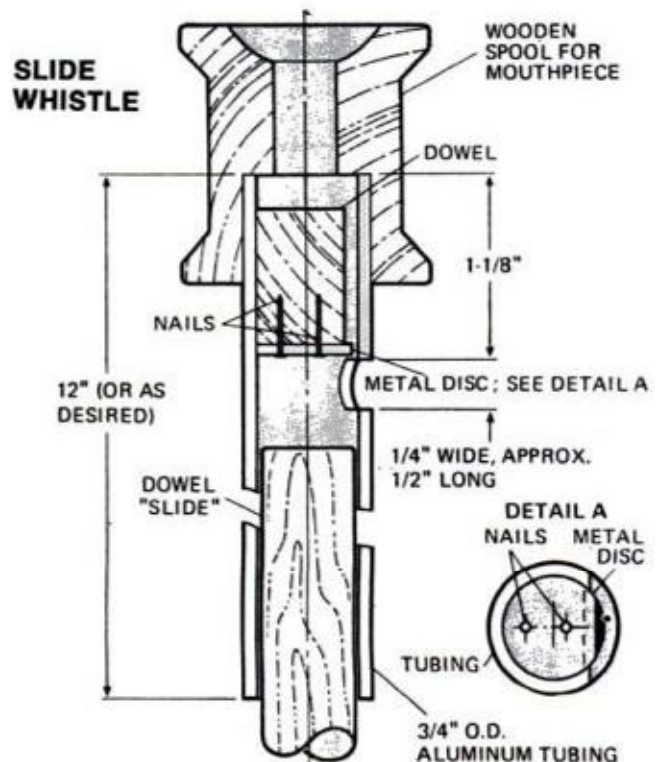
**Shelf bracket.** By flattening ends of two lengths of aluminum tubing and drilling screw holes in them, a handy shelf bracket

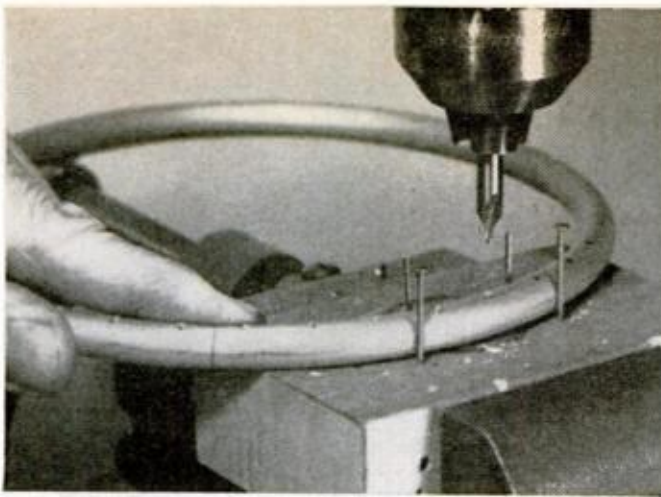


**Shelf bracket** is made from  $\frac{1}{2}$ -in. aluminum tubing; whistle from  $\frac{3}{4}$ -in. aluminum tubing, dowel and spool.

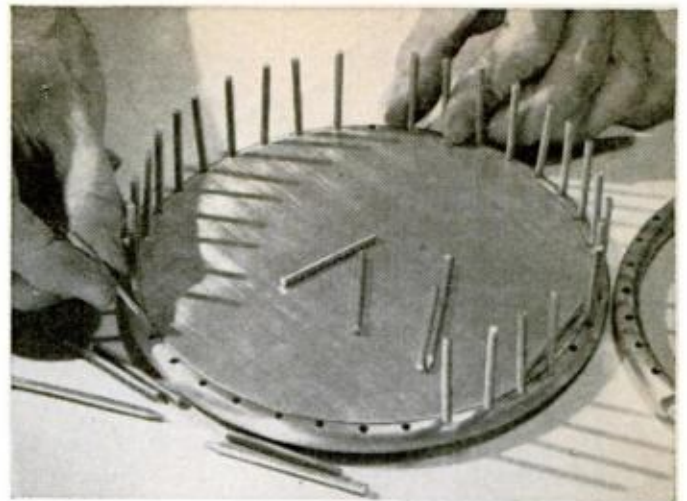


**From top:** assembled slide whistle, adjustable bookshelf post, drawer pull from  $\frac{3}{8}$ -in. aluminum tubing.





Nails in clamped wood hold metal ring in place for drilling holes in center of rim to receive "side rods."



"Side rods" (nails with heads cut off) are inserted in bottom ring holes; sheet aluminum bottom fits inside.

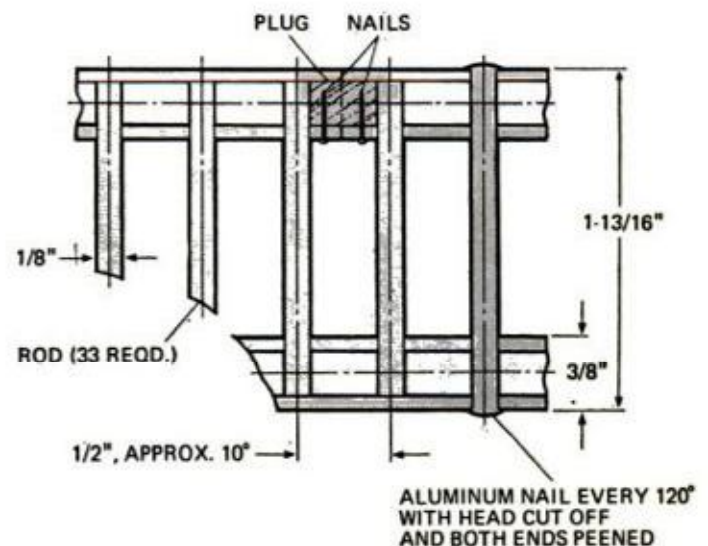
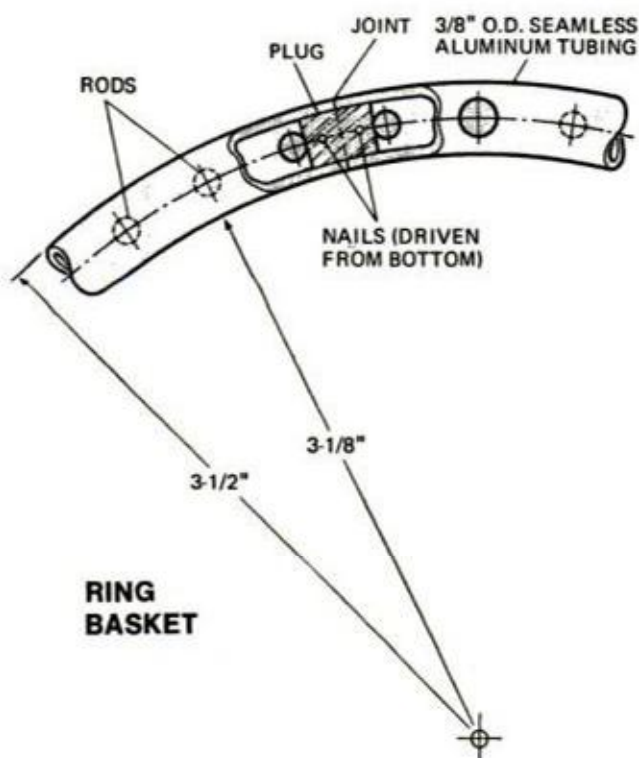


Basket made from  $\frac{3}{8}$ -in. seamless aluminum tubing and aluminum nails makes attractive server.

can be made (drawing on opposite page).

**Slide whistle.** A slot in the tube (opposite page) is made by drilling two  $\frac{1}{4}$ -in. holes tangent to one another and filing out intervening metal. The plug is a short piece of dowel; a metal disc with a flat area on its circumference is nailed to one end of the plug and positioned at slot edge. The slide is a free-moving length of dowel, the mouth-piece, a wood spool.

**Ring basket.** Two lengths of metal tubing are bent to form two circles with 7-in. outside diameters. Ends of each circle are joined by inserting a maple plug and nailing through tubing into plug. The circles are joined with 36 "side rods" made by cutting heads from  $\frac{1}{8}$ -in.-dia. aluminum nails. A total of 33 "rods" engage holes drilled through one side of each ring; the other three are longer and extend through rings with their ends peened. The bottom piece is sheet aluminum cut from siding scrap and glued in place with epoxy cement. ★★★



# Black & Decker's newest cordless drill

by Harry Wicks

WORKSHOP EDITOR



Photos: Robert D. Borst



Nuisance of dangling cord is eliminated, a big plus when you're working on a ladder.



Chuck-key holder is conveniently located but it did not hold key securely, author found.

When the new Black & Decker cordless drill came to my attention, I was planning a major job—re-covering my home with mineral siding. This was my chance to see if the drill would perform under actual job conditions. The tough-to-work-with siding material, for example, required a carbide-tipped blade to cut it. And three of us would use the tool on the job—not in a clinical laboratory under ideal conditions.

After 5½ days of constant use, I can report the drill came through with flying colors. If it could take this punishment, it will easily handle such workshop tasks as boring in steel and hardwoods.

Don't confuse this new model with B&D's original cordless drill. It's compactly designed, easy to handle and priced below \$60 with battery and charger included. After the initial charge, the drill delivers about 80 percent of its no-load-rated 800 rpm. Subsequent 16-hour recharges bring speed up to maximum. If you need a low-speed drill you might consider this model that eliminates the extension cord.

#### Model 7077 cordless drill specifications

Power pack: self-contained  
 Full recharge: 16 hours  
 Chuck capacity: ¼ in.  
 Speed: 800 rpm  
 Weight: 3½ lbs.  
 Charger: use with 60-cycle, 115-120 v.a.c.  
 Price: \$59.99  
 Manufacturer: Black & Decker Mfg. Co., Towson, Md. 21204.



# Sears' lightweight low-cost sander



Though compact, sander delivers satisfactory power. Adjustment above is made when change in paper creates a clattering.

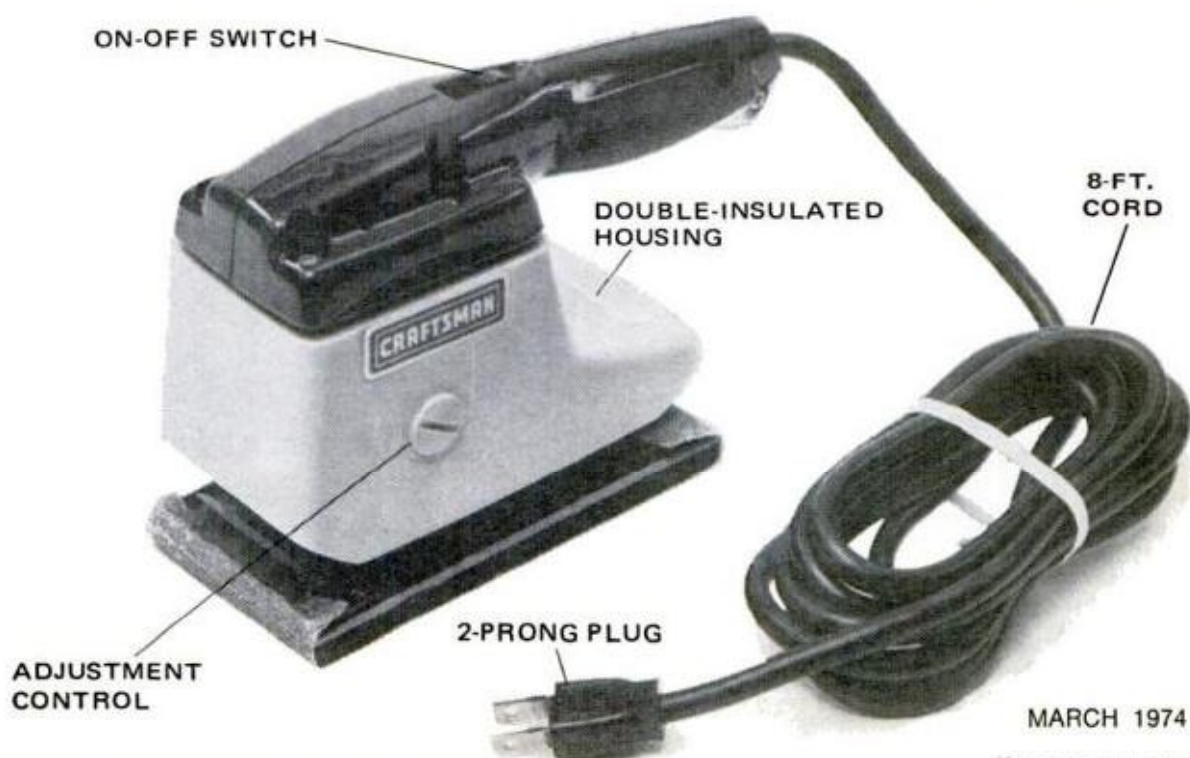
Don't let the price tag on this finishing sander lull you into thinking it's a toy rather than a workshop tool. Though that price is under \$13, I found that the sander worked just fine on various finishing jobs. Remember, however, not to expect more from a tool than it was designed to deliver—especially a sander. This little one will not handle the big jobs best left to belt sanders. Save it for lighter type finishing work.

A handy device is the single adjustment control (photo, center left) which must be adjusted occasionally when you change from heavy to light paper or to a polishing pad. This can be done quickly with a coin. When adjusted properly, the sander will have a distinct hum and clattering will be eliminated. The paper-holding clamps are easy to manipulate when you are changing the paper.

The tool performed well during all tests I subjected it to, including an unusual one where flannel was used to polish a finish with fine rouge. For the price, this double-insulated sander is worth buying just to have a spare on hand. ★★★

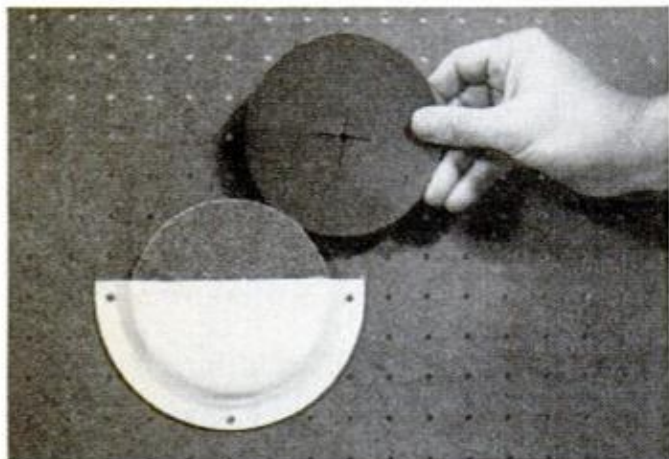
#### Model 9 G 1161 sander specifications

Speed: 14,400 strokes per minute  
 Pad size: 3 x 5 7/8 in.  
 Cord length: 8 ft.  
 Power: Double insulated, magnetic impulse driven; for use with 60-cycle, 110-120 v.a.c. U.L. listed.  
 Price: \$12.88 from Sears, Roebuck and Co., Chicago, Ill. 60601. Available at Sears stores or through its catalog.



# HINTS

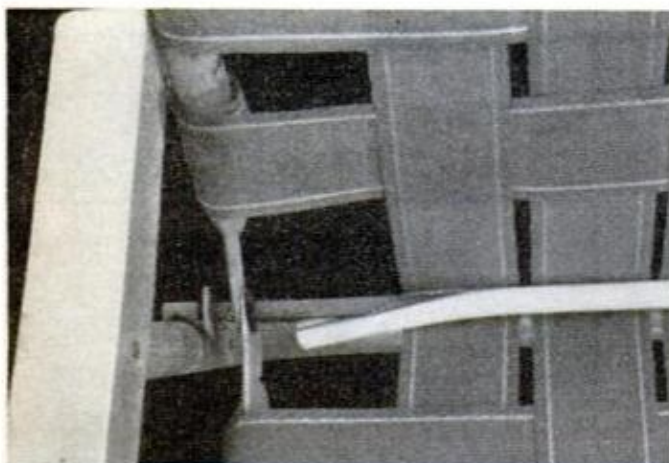
## FROM READERS



### Sanding-disc holder

A simple and practical way to store sanding discs is with halves of paper plates mounted on the workbench wall. Plate's inside diameter should match the diameter of the discs. Use several and mark abrasive grade on each for quick identification.

—Ken Patterson, Regina, Sask.



### Tubing stretches chair life

Chair-webbing deterioration on aluminum chairs is usually caused by rust on the steel bar used for reinforcing between the seat and back. To prevent, or at least minimize, such rusting, sheath this bar in rigging cover—split-plastic tubing—sold in 6-ft. lengths at marine supply stores.

—Bill Baughman, Garden Grove, Calif.



### Book strap subs as clamp

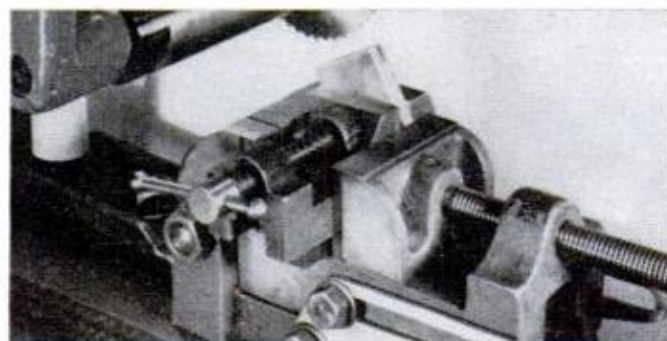
For applying wraparound-pressure to glued joints, you can't beat a rubber book strap. A hook-and-eye connector at the end of the strap enables you to wind strap tightly around the work and hook it to hold it securely in place.—W.B. May, Oak Park, Ill.



### Screwdriver leverage aid

Increase screwdriver turning power by equipping the shank with a hex sleeve (arrow) to fit a ratchet box-end wrench. Sleeve shown was drilled, filed to accommodate a square screwdriver shank. Head of 8-32 set-screw holds sleeve, acts as a wrench stop.

—E. B. Walters, Chicago



### Double vise for right angle

When using a milling machine with a non-rotating table vise, you can hold a workpiece at a right angle to the vise jaws by gripping it in a small drill-press vise, which, in turn, is clamped in the milling-machine vise.—Walter E. Burton, Akron, Ohio

## Johnson's loop-charged 50 hp.



## Tightfisted as a Yankee lobsterman.

Nobody works harder for a buck than the men who lobster for a living. So they've got a right to want the most out of a gas dollar. And that's where the loop-charged 50 comes in. It delivers dependable power for them without burning a whole lot of gas.

It can deliver the same for you. For skiing, cruising, fishing. Johnson's performance-engineering does it.

Does it with loop charging. Precisely positioned intake and exhaust ports bring in the new fuel mixture

while pushing out exhaust in one continuous power loop. Making gas work harder and last longer.

Does it with exhaust tuning. Uses sound energy to clear cylinders more completely of exhaust and to pack in more of the new fuel charge. Gives you more power without using more gas.

And pressure-back piston rings reduce friction, engine wear, and fuel consumption. MagFlash™ capacitor discharge ignition keeps the running smooth, throughout the speed

spectrum. That saves you gas, too.

Johnson's loop-charged 50. See it at your Johnson dealer. See our 70 hp looper, too. And other power choices, 2 to 135 hp, plus new electric auxiliary motor. Or write for free catalog. Johnson Outboards, Div. Outboard Marine Corp., Sea-Horse Drive, Waukegan, Illinois 60085. Dept. PM-34



*First in Dependability*  
**Johnson**  
OUTBOARDS

# New for the road in '74



More fun for the fuel burned is the promise of latest RVs.

by Bill McKeown  
OUTDOORS EDITOR



**Brave II**, latest from Winnebago, no longer has the old flat-front shoe-box look, is up to 24 feet and sells for under \$9000.

**Designed to follow** a compact tow car, Viking's 16-foot Little Gasser sleeps six, has all essentials as standard equipment.



**R**ecreational vehicle owners this year are going to continue to go long on fun no matter how short the fuel supply. It looks now as if vacationers won't travel as far, best-selling rigs won't be as big, campground stops won't be limited

to just an overnight. Instead of bragging about how many miles they drove in a week, touring families will be telling about new spots they've found that are worth days of sightseeing right in one place. There is no doubt that Americans



**All-electric Swinger motor home** has heat, airconditioning, hot water, cooking without any LP gas.

**Cadet models** from Coachmen (top, right) come in four truck campers and eight travel trailers ranging from 15 to 24 feet. All carry a full one-year warranty.

**Winnie Wagon** from Winnebago (center right) has station-wagon dimensions to fit a garage plus lift-top headroom, a stove and sink, and bunks for four.

**El Dorado** fifth-wheel trailers (bottom, right) will come in five plans. Others include mini and large motor homes, chassis mounts and pickups.

ingenious enough to turn cars into rolling camping homes can work out ways to continue their sport with less gasoline.

Since even a little RV can usually accommodate a large family or a couple small ones, group and motor-pool camping will be one popular way to share and stretch vacation mileage. Compact camping and travel trailers will be supplemented with tents and screened-in awning add-ons. Van conversions and chopped-van mini-motor homes can take advantage of the same space-stretchers. Bigger trailers, fifth-wheelers and motor homes will start making better use of all that living room as they do multiple duty.

Large camping vehicles can more than pay for themselves as they turn into a spare office, workshop, or guest house when not on the road. Underway, they can bus a group to work, or on a sport or vacation outing.

New is a Swinger all-electric motor home with a compact but high-output Generac system that replaces any need for LP gas. Built-in airconditioning, heat, hot water stove and microwave range make this RV





**Futuristic experimental station wagon "Camp(or) Car RV-2" from Toyota makes its Mark II into a prototype that opens into a test model with interior eating or sleeping space for four. With sides swung out, tent top and sides enclose compact camping area. Unit may suggest models for future marketing.**



**Twin tilt-outs** are provided by Newmar Kountry-Aire and others for expansive living space for owners spending extended time at one campground. Fifteen-minute setup is claimed.

**Handi-Van**, from Champion Motor Homes, comes with standard double bed overhead, hatchback door at rear, multiple layouts and options for versatile \$6000 17-footer.

particularly self-contained. Onan is offering a generator mounted in a drawer so it can be pulled out for easy servicing.

New space—and ways to use it—is being added to bigger models. Among 44 Open Road models is a Professional Vehicle motor home with kitchen and bathroom across the back and the rest open for a design-your-own office or living interior. Ardon has a 30-foot fifth-wheeler with barn-size back doors and completely empty inside. It also makes a legal 40-foot-long model with two tip-out rooms, also available in Newmar Kountry-Aire travel trailers and others.

Split-level arrangements are enlarging living space in Kon-Tiki Traveler units. Citation by Whirl-A-Way offers standing headroom in its forward fifth-wheel "living

*(Please turn to page 150)*



# FOR 1974, DODGE HAS SOME GREAT WAYS TO "TOW 'N GO."

Fifth-wheel rigs, passenger cars, van-type wagons — Dodge offers factory-engineered trailer-towing packages for them all, and more besides! Many packages also include a factory-designed, load-distributing hitch platform, A.T.A. seven-pin electrical connector, and wiring harness. Chances are, your Dodge Dealer can deliver a new '74 unit to you ready to tow. See him now.

DODGE PICKUPS (tow up to 10,000 lbs.).



DODGE MONACO BROUGHAM WAGONS (tow up to 7,000 lbs.).



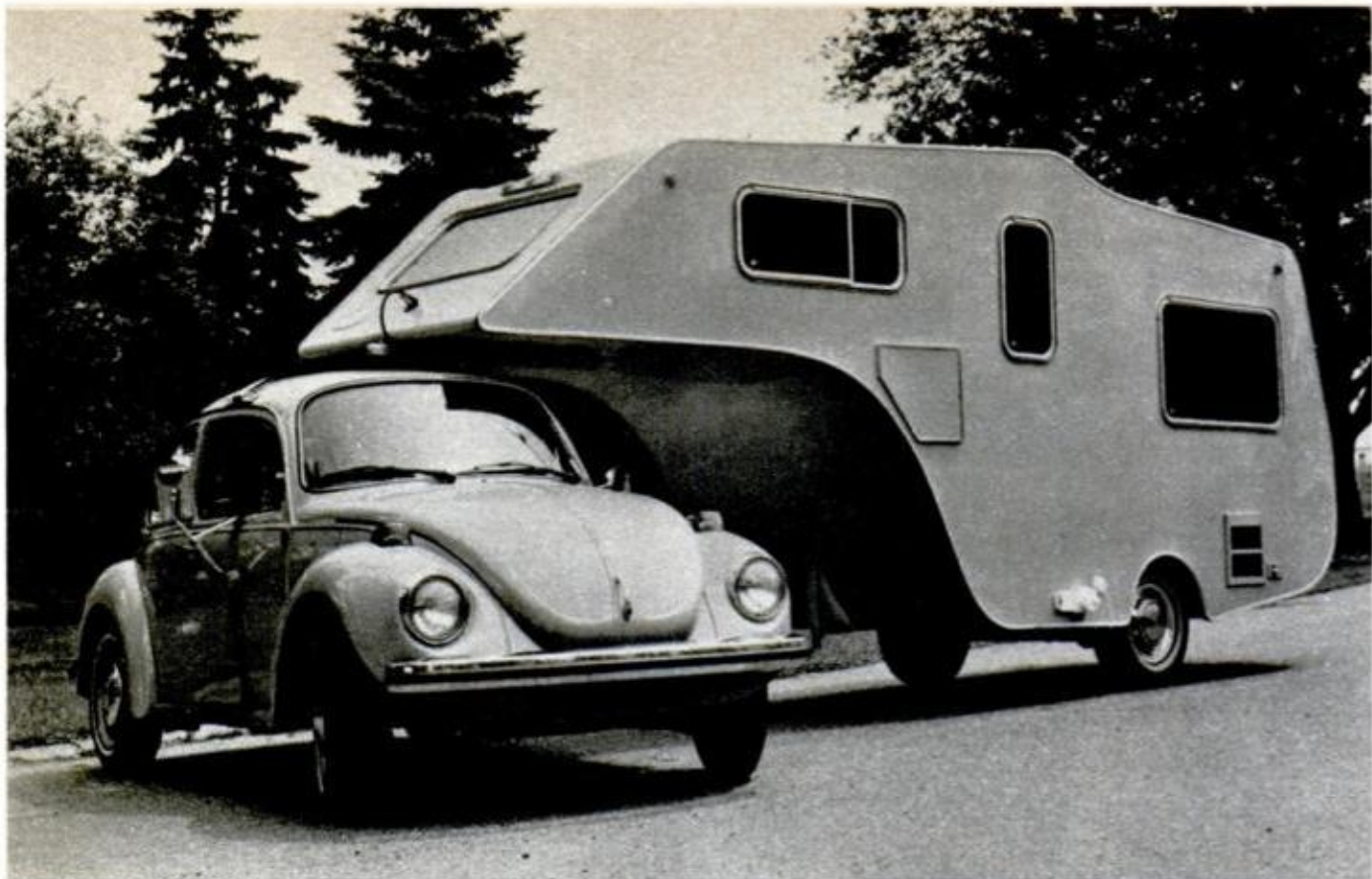
DODGE SPORTSMAN WAGONS (tow up to 6,000 lbs.).



## Turn to Dodge for leadership in Recreational Vehicles.

FOR LEADERSHIP IN RV'S...





**El Chico**, 19-foot rooftop-hitch unit, is designed by International Travel Trailers for small-car hookup. Four-sleeper rig claims 360° maneuvering for tow car.



**Couples Coach**, newest and smallest motor home from Avco, plans accommodations designed primarily for two in 22-foot length with full-size bath, extra berths.



**Grumman** also goes rugged and compact with 21-footer having 3400-pound carrying capacity for gear, passengers after filling 35-gallon tank of Dodge chassis.

## NEW FOR THE ROAD IN '74

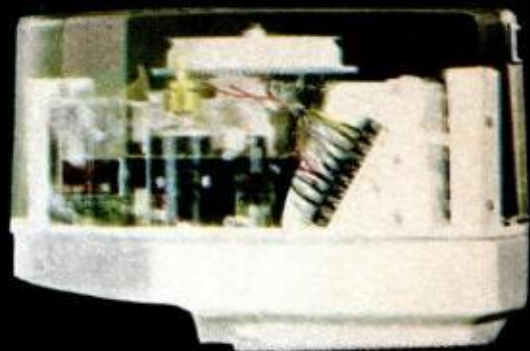
*(Continued from page 148)*

room"; Space-Craft 38-foot fifth wheel, by Motor Homes, Inc., is one make with a second extension over the truck cab. Midas Combi-Camper raises the roof for more space; Cabana Coach opens its Penthouse I motor home with an inner ladder to a rooftop deck. White's Rectrans Discoverer mo-

tor home has a dropleaf back porch with canopy. Exterior height of Holiday Rambler's biggest new motor home will be reduced by engineering the airconditioner inside. Cobra has sleeked and streamlined its complete trailer and motor home line right down to gas bottle enclosures.

With special hitches for passenger cars to tow fifth-wheelers, travelers have an even wider RV choice. ★★★





The new Super-Charged 60 is the most powerful BIA-certified 2-cylinder outboard anywhere! Packed with more Chrysler engineering innovations than any other outboard in Chrysler history: MAGNAPOWER II, an advanced C-D ignition with only two moving parts; SUPER-POWER-CHARGING, a direct-flow fuel-charging system that provides optimum performance throughout the entire speed range; precision-tuned carburetion and exhaust; separate coils for each cylinder; and much, much more.

# Chrysler introduces a new era in outboard performance!

**Engineered for maximum fuel efficiency and economy!**

For 1974, Chrysler has put together one of the most exciting, innovative outboard engines ever to hit the water—including 6 brand-new models that prove nobody can pack so much power into so little space as Chrysler.

Our new lightweight 5-hp. Swinger carries and stows like a 4, yet it packs early the displacement of a 6. Our 60-Profile (15-cu.-in. displacement) provides enough power to get a youngster up on skis. The new 3-cylinder Chrysler 75 delivers more horsepower and displacement than any other comparable 3-cylinder model. High compression, a tuffed crankcase, and race-style porting help the new 90 deliver the highest BIA-

certified hp. ever in a 3-cylinder outboard. The fast-moving 135 is the highest BIA-certified hp. production outboard ever offered. And the all-new Super-Charged 60 introduces a new era in outboard design. (See above.)

All told, Chrysler covers the waterfront with 67 different models. And every one is engineered for quick starting, smooth operation and easy maintenance with Chrysler advances like exclusive Fuel Saver Cruise Control to reduce fuel consumption up to 25%.

Stop by and see them yourself—at your nearby Chrysler Crew dealer's. Pick up your free copy of the 1974 Chrysler Boat Buying Guide, too.



**Engineered to make things easy for you!**

Материал предоставлен редакцией

# Little—but mighty practical

The trend is toward new and stronger compact rigs that require less car and gas consumption, more equipment, options, versatility, economy.



**B**ig news comes in compact packages now as many large RV producers put new stress on small rigs.

Advantages—in addition to thrifty gas consumption? Less cost, less wind resistance, less need for a big engine to tow or carry them, easier parking, often less need for hookups and pull-through campsites. And, what a number of owners might consider a plus, less conveniences in some models and a chance for more back-to-nature camping.

Small RVs are often scaled-down models of big ones. Largest rigs around—the fifth-wheel trailers are now as short as Ardon's 18-footer. Standard travel trailers have always come in various lengths and now names like Shasta, Midas, Hunter, Apeco, Amerigo, Open Road,



Even the smallest compact car can tow camping and tent rigs like Apache's new solid wall unfoldable (above). With bigger beds and windows, it should be a type of rig to show popularity with gas-thrifty campers in 1974.

Blazon, Rover, Starcraft, Holiday Rambler, Rover, Steury, El Dorado and many more are on rigs of eight feet and up where Serro Scotty has led the way.

Motor homes are also becoming more mini and versatile than ever. In sizes that are easy and economical to drive and can double as the family station wagon, this year's camping van conversions, chopped vans and mini



**Cargo-bed covers** for pickup trucks make quick conversion of a worker to camper with minimum cost. International now makes new fiberglass cap shown and camper coaches for its 8-foot, 9½-foot and 10½-foot pickup models. Deluxe cap has a front skylight, added headroom.



**Coachmen newcomers** are Dodge and Chevrolet van conversions with fiberglass tops and 6-foot 3-inch headroom. Coachmen Modelay, priced under \$6000, has pull-out gauchio bed and overhead bunk to sleep four, icebox, two-burner stove, LP-gas tank, water tank, carpets.



**Trav-L-Toy**, from the Recreational Vehicles Div. of Apeco Corp., has aerodynamic styling to further reduce the wind resistance during small-car towing of this lightweight four-sleeper. Options available can make it fully self-contained.

motor homes look like popularity winners in the motor camper league. Gas mileage for many should be about that for a large passenger car, with the bonus of livability aboard. Examples of the improved streamlined look that fiberglass can add are the new Hall Coach GTC, Balboa and Starcraft's Star Trek.

Volkswagen deserves credit as one of the first van conversions, and its camper can now be adapted for permanent standing headroom by Adventure Campers in Sylmar, Calif., and others. Open-end rigs with rear doors that swing aside or up are earning new attention from motorcycle, snowmobile and boat-owning outdoorsmen. Skyhawk rear-loading trailers range from 15 to 23 feet. Smuggler by Journeyman Trailers, in eight models 14 to 20 feet, claims its biggest can transport five cycles or sleep six. Champion's newest, the Handi-Van on a Ford or Chevy chassis, comes in camping,



**Penthouse Sleeper**, by American Leisure Systems, is cartop sleeper for about \$400, will also fit VWs, compacts, 4WDs.

**Ramblette**, newest from Holiday Rambler, is quality economy trailer in center or rear-bath models of 21, 23, or 25 feet.

**Trail Star** standard model from Starcraft, new compact in extensive tent trailer line, offers extendable awning outside door.





**Winnebago's Travel Trailer 136**, its newest, sleeps four in 13-foot 6-inch rig, includes 18-gallon water tank, refrigerator, LP two-burner stove, dinette, gaucho, stainless sink, dolly wheel and electric brakes as standard equipment for \$1175 price.



**Sportster Travel Mate** from Travel Equipment Co., a 13-footer with 90-pound hitch weight that any compact can tow, sleeps five with addition of an optional overhead bunk. The 985-pound rig is priced at \$1275.

cargo, office, bus, sport or party models with big lift-open hatch back, lots of options, at about \$6000.

Call them camping trailers or tent campers, the little unfoldables that can tow behind the smallest car and open into sleeping space for 10 may spend this year as the most popular RVs around. Even the most compact imported car can trail one. Hitched behind a four-wheel-drive, these versatile low-profilers take to off-road trails. Vesely's Apaches offer solid thermoplastic panel walls or fabric in eight models. Coleman's Minuteman flips its top to set up in 60 sec-

onds. Starcraft, Gladding Del-Rey, Camel and Viking are among makes to be crowding campgrounds. And pitching a tent pent-house-style is also possible atop the family car with models like Penthouse Sleeper double bed from American Leisure Systems and Camp'otel International's cartopper tent with bunks for four for \$450 up.

Pickup covers are available for all trucks from Dodge's new rear dual-wheel Sweptline to small imports. Rover, Chinook and others have pickup coaches for minis; even Ford and International have added standard sizes. For '74, small RVs are big. ★★★



# Cars to take your rig in tow

A proper tow-package will give much more go on less gas.

by Mort Schultz

With gasoline a limited commodity these days, your choice of car to pull your rig farthest on the least fuel was never more important. Compact cars are fine, but with a trailer hitched behind you may find a bigger model's performance will more than balance its expense and appetite.

A tow car's needs can be divided into two groups. First come engine, transmission, rear axle, suspension system, cooling system, electrical system, brakes, tires and wheels. You require these anyway, but wouldn't need heavy-duty choices if you weren't towing a trailer. The second group includes hitch, special wiring harness and trailer brake controller. Choice of equipment in both groups will depend somewhat, of course, on the size, weight and wind resistance of the rig you have hitched up.

Every manufacturer of 1974 American-made automobiles offers the stronger, more powerful equipment options in the first group. The time to specify your larger engine and heavier duty suspension and the rest is when you order your car. Trying to install it later on is usually too expensive. Not all manufacturers offer the hitches and wiring of our second group as original equipment. If not, they can be added later.

How do you find out exactly what equipment you need for pulling your lightweight, medium or heavyweight trailer? Start by studying the trailer and tow-package literature that is available from new car dealers.

Notice that manufacturers refer in general to equipment as either "required" or "recommended." Required equipment is necessary. Recommended equipment is nice to have, but not essential.

Several points are important to note:

- When judging maximum trailer weight, remember that this is not the advertised hitch weight. Maximum weight is total weight—that is, the weight of the trailer plus the weight of a recommended maximum load.
- Maximum tongue load should also be considered when determining if a car can handle a trailer. Maximum tongue load refers to the amount of weight transferred from trailer to car by the hitch. It is usually 10 percent of maximum trailer weight.
- Check before you select a hitch. The 1974 cars are equipped with collapsible rear bumpers to protect against a five-mph rear-end collision. Attaching a hitch that requires rigid fore and aft connections between the bumper and another part of the car will put the bumper out of commission.
- Since towing puts extra strain on a car, extra maintenance should be provided. These services, which are outlined in your car owner's manual, call for more frequent changes of engine oil, automatic transmission fluid and rear axle lubricant.

Most cars will tow a trailer weighing up to 2000 pounds. This includes such "compacts" as Gremlin and Maverick. There should, however, be conditions attached. Maverick, for example, may be used for towing trailers weighing less than 2000 pounds if the frontal area of the trailer is less than 25 square feet. Also watch out for exceptions. Vega, Camaro and even Corvette, for instance, should not be used for hauling trailers of more than 1000 pounds. Pinto and Mustang II are restricted to an 800-pound gross trailer weight.

Consider the maximum weight of the trailer and match it to the capability of the car. It would be sad if you ordered a Buick Apollo, say, and then found out after getting it that it couldn't handle your 4000-pound trailer. Do your homework with the trailer-towing-tips brochures prepared by your car's manufacturer, plus those from your trailer company and available from trailer dealers and equalizing hitch manufacturers. Unfortunately, many new-car salesmen know next to nothing about matching your trailer to the capabilities of the car you plan to buy.

## AMERICAN MOTORS

Any 1974 AMC car can pull a trailer weighing 2000 pounds or less. The company offers a trailer-towing equipment package for Hornet, Gremlin and Javelin consisting of a special wiring harness and heavy-duty turn signal flasher, heavy-duty cooling system, heavy-duty suspension (including a front sway bar for six-cylinder models) and a frame or body-mounted hitch.

Only the Ambassador and Matador should be used for towing trailers having a maximum weight of 5000 pounds. The equipment provided in the trailer-towing package for these cars is the same as listed above, but also includes a rear sway bar.

Two trailer equipment packages containing recommended items are provided for the 1974 Jeep Wagoneer and Cherokee. For Jeeps that will tow trailers weighing up to 3500 pounds there is a heavy-duty cooling system, wiring harness, heavy-duty turn flasher, and frame-mounted hitch. In addition, you will need a 360-cu.-in., 2-bbl. V8 engine, automatic transmission, power disc brakes, power steering and H78x15 load range B tires.

Package B is for Jeeps that will tow trailers weighing up to 7000 pounds. The package contains a heavy-duty cooling system, special wiring harness, equalizing hitch receptacle, an inside spare-tire mount with vinyl case, heavy-duty electrical system and heavy-duty suspension.

The category of basic equipment that is essential for Jeeps when doing heavyweight towing is the same as listed above, but includes, in addition, a rear-axle option offering a 3.54-to-1 ratio.

## CHRYSLER

The capabilities and options for Chrysler cars of 1974 for towing work out as follows:

Plymouth Valiant and Dodge Dart and Challenger have a 2000-pound towing limitation. Trailer frontal area should not exceed 20 square feet.

Plymouth Barracuda and Satellite, and Dodge Charger and Coronet, have a 6000-pound towing limitation. Trailer frontal area may be up to 65 square feet.

Plymouth Fury, Dodge Monaco, Chrysler and Imperial can tow trailers having a maximum weight of 7000 pounds and a full frontal area.

Chrysler Corp. offers customers two trailer-towing packages: A34 and A35. A34 includes equipment needed for towing a trailer weighing no more than 2000 pounds with a frontal area not in excess of 20 square feet. The package consists of a special bumper-mounted load-carrying hitch that won't hinder the collapsible rear bumper, plus special wiring harness, heavy-duty turn signal flasher, wide rim wheels designed for compact and intermediate models (the tires are not included) and heavy-duty suspension.

The A35 trailer-towing package is needed on Chrysler intermediate models towing up to 6000 pounds and full-size cars with up to 7000 pounds in tow. The package contains a heavy-duty electrical system and dual battery charging circuit, special wiring harness, load-distributing hitch platform, trailer brake controller, 3.23:1 rear axle, heavy-duty cooling system, auxiliary transmission oil cooler, heavy-duty suspension, wide rim wheels with tires and a heavy-duty turn signal flasher.

If you are towing a trailer weighing 4000 pounds or more with an intermediate model, you should order the 400-cu.-in. V8 engine. If you are going to tow a trailer weighing 5000 pounds or more with a full-size car, order a 440-cu.-in. V8.

## FORD

FoMoCo has set up three packages of trailer-towing equipment. The class I package is for cars towing trailers weighing up to 2000 pounds and includes a special wiring harness and hitch. The class II package is for trailers weighing from 2000 to 3500 pounds. It has heavy-duty cooling and electrical systems, heavy-duty suspension and special wiring harness. Also for this weight class:

For Ford and Monterey—400-cu.-in., 2-bbl. V8 engine, 3.25:1 rear axle, H78x15 tires, heavy-duty wheels and weight distributing hitch.

For Torino, Cougar and Montego—351-cu.-in. engine, automatic transmission, 3:25:1 rear axle, power steering, power disc brakes and weight-distributing hitch.

For Thunderbird, Marquis and Lincoln—heavy-duty cooling system, automatic transmission, 3.25:1 rear axle, heavy suspension, 70-amp. alternator and weight-distributing hitch.

The class III package for trailers of 3500

to 6000 pounds includes heavy-duty frame and cooling system, 3.25-1 axle, heavy-duty suspension, wheels and electrical system plus special wiring harness.

For Ford and Monterey you'll also want a 400-cu.-in. V8 engine, H78x15 tires and weight-distributing hitch. For Torino, Cougar and Montego there are also power steering and disc brakes, heavy-duty frame (except for Torino) and H78x14 tires. The Thunderbird, Marquis and Lincoln add a 460-cu.-in. 4-bbl. engine. Some Ford equipment listed here is standard on some models and does not have to be ordered.

## GENERAL MOTORS

Buick Apollo can haul up to 2000 pounds, Century and Regal up to 4000, and LeSabre, Estate Wagon, Electra and Riviera up to a formidable 7000 pounds of trailer. No additional equipment except add-ons like a hitch are necessary for trailers lighter than 2000 when towed by any Buick. For 2000 to 4000 pounds with Century and Regal, Buick recommends a 3.08:1 rear axle for sedans, 3.23:1 for wagons plus a heavy-duty cooling system for all models.

For 2000 to 7000-pound trailers, the LeSabre and Estate Wagon need a 3.42:1 rear axle for the 350-cu.-in. engine, a 3.23:1 for 455 cu. in. The Electra should use the Riviera's standard 2.93:1 axle. A trailer wiring harness is available for the Estate Wagon.

Cadillacs of the Series 75 should not be used for towing. For other models, a heavy-duty turn signal flasher is available for trailers under 2000 pounds, and the flasher plus a 3.15:1 axle (except for Eldorado) and heavy-duty cooling system with fan for trailers to 6000 pounds.

Chevrolet Camaro, Corvette and Vega will tow a 1000-pound trailer with heavy-duty radiator for Camaro and Vega, power brakes for Camaro and Corvette. Nova needs auto transmission, heavy-duty cooling and suspension and power brakes for up to 2000 pounds, power steering for 4000. Monte Carlo pulls up to 6000-pound trailers with heavy-duty cooling, suspension and a heavy-duty alternator for over 4000, as do Malibu wagons. Laguna and Malibu sedans should have auto transmission plus the heavy-duty gear above for trailer weights to 6000.

Caprice Estate and Impala and Bel Air wagons have the same capabilities, need L78x15 load range C tires. Caprice Classic, Impala and Bel Air sedans are rated for

trailers to 7000 pounds with the gear above. Hitches are available from Chevrolet.

Oldsmobile Omega will tow 2000 pounds with a 350-cu.-in. V8, heavy-duty cooling. Cutlass sedans need only heavy-duty wheels for under 2000 pounds, heavy-duty cooling and 3.23:1 axle for up to 4000. Vista Cruiser and Cutlass Supreme need a 455-cu.-in. engine, heavy suspension and cooling, plus a 3.23:1 rear axle for 2000 to 4000 pounds. Delta 88 and Royale Delta 88 with this equipment can handle up to 6000; only heavy suspension is needed for under 4000 pounds. Custom Cruisers need only heavy-duty cooling for 4000 pounds and can go to 7000 with heavy suspension, 3.23:1 axle. The 98, Luxury and Regency are equipped the same for up to 7000, but use 2.93:1 axle and superlift rear shocks for trailers between 2000 and 4000 pounds. Toronado needs heavy-duty cooling and 3.07:1 axle ratio for trailers to 4000, heavier suspension for up to 7000 pounds. Olds provides trailer wiring harnesses for some models.

Pontiac Catalina, Bonneville, Grand Ville, Safari and Grand Safari will tow 7000 pounds with a 400 or 455-cu.-in. engine, dual exhausts for 4-bbl. carburetor, 3.23:1 rear axle, heavy-duty frame for over 4000, and heavy-duty auto transmission, flasher, springs and front shocks, superlift rear shocks, cooling, and fan if the car doesn't have airconditioning.

The Grand Prix handles up to 3500 pounds with heavy-duty wheels, fan, cooling, springs, flasher, superlift rear shocks, heavy springs and front shocks if trailer tops 2000. LeMans models and Grand Am capabilities are the same with 400-cu.-in. V8 and 3.23:1 axle, plus power brakes for over 2000 pounds. Pontiac also sells light-duty hitches for trailers up to that weight.

## INTERNATIONAL

Travelall model 100s can haul trailers to 5000 pounds. No changes in the basic vehicle are necessary for up to only 2000 pounds. For trailers of 2000 to 3500 pounds, Travelall 100s should be ordered with the optional four-speed manual or three-speed automatic transmission. For trailers of 3500 to 5000 pounds, order a 392-cu.-in. V8, transmission oil cooler for the automatic, special rear axle and L78x15 load B tires. Hitches, wiring harnesses, sway bars and other tow packages are available from International. ★★





# Tires for trails and tows

Rugged radials are the big news for fitting out off and on-road RVs

by Robert L. Behme

**Added traction, flotation over soft ground, clearance** are provided by these off-the-road radials from Sears for four-wheel-drive vehicles.

**T**ires suitable for RV use are more abundant than ever. For example, Goodyear, world's largest tiremaker, offers more than 300 sizes, plies and types for RV use. Unless shortages of petroleum-based chemicals interfere, '74 stocks should be excellent.

## Tow cars

Radials are winners. Most new-car manufacturers offer them as standard equipment. They are popular as replacements and provide excellent tow service. Biggest news is the "General Motors Tire," a steel-belted radial built to GM engineering designs to deliver what GM considers the best ride, handling, tread life, endurance, hazard resistance and wet-weather performance. Five major tire builders worked on the project and the tires are standard on '74 models, could be used as replacement on others.

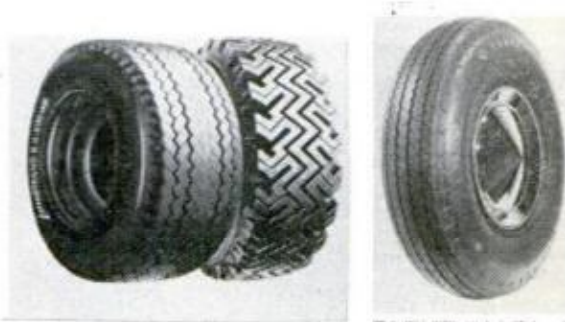
Why radials? They offer a flatter tread, better handling and cornering, improved high-speed performance, and less rolling resistance that can improve fuel economy 7 to 10 percent. Use heavy-duty tires for towing, possibly in the "C" or six-ply range.

Check inflation and rotate frequently; towing increases rear-tire wear.

Flat-proof tires are on the way. B.F. Goodrich's Golden Lifesaver has expandable air cells to seal off a leak instantly. Pirelli has a thick sidewall that keeps its shape. Goodyear is working on Permafoam filling.

## Trailers

Since trailer wheels turn freely with little torque, properly inflated tires wear well. Use stiff sidewalls and a conventional ribbed



**Armstrong's rhino line** of four and six-ply designs (left) is new for off-road use. Goodyear Travel Trailer Hi-Miler (right) is standard on many trailer rigs.

tread. Load range is most important. Load your rig for the road and weigh it. Divide weight by your number of wheels and add 20 percent for safety. Purchase a tire in that load range. Tires are now rated by load range rather than ply. B is equivalent to a four-ply rating, C to six, and so on.

Mobile-home tires can be used on a travel trailer without speed restrictions, but most have less tread depth and are not good buys. Several firms build special travel trailer tires. Goodyear's Cushion Hi Miler, for example, is standard on Holiday Rambler, Coachman and Airstream.

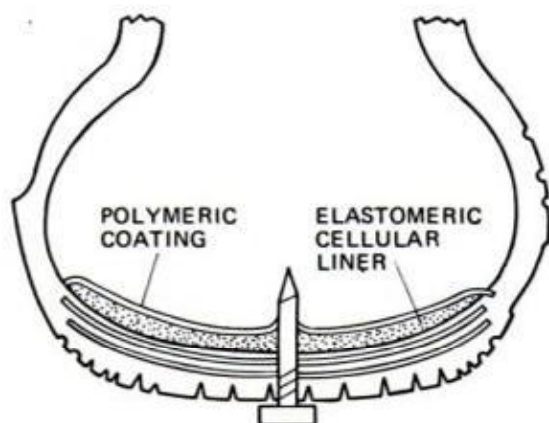
Buy only the load range you need; extra plies give a rougher ride, more heat build-up. Avoid radials since their softer sidewalls allow more trailer sway at speed and may cause poor handling. When storing your rig for over a month, block up to take the load off tires and deflate tires to 10 p.s.i.

### Pickups

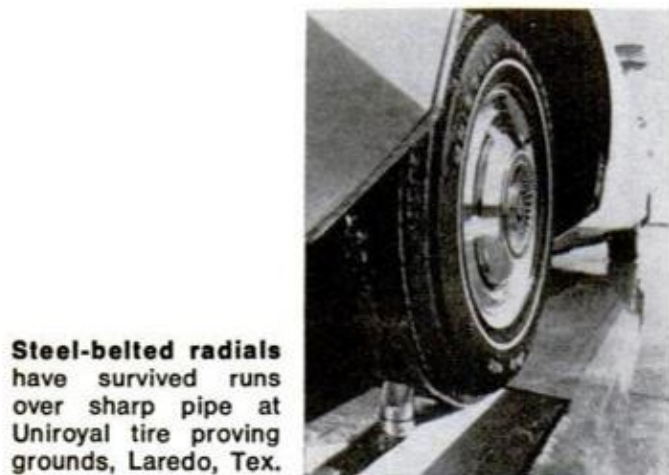
Again radials make news. Ford offers steel-belted radials as options on some light trucks. The HR78-15B, by Firestone, General, Uniroyal and others, is available with the 5500 GVW package. Michelin and others build radials in commercial sizes that many van and mini-motor-home owners swear by. "Extra-wide," "Super-wide" or "Super-sin-



Designed especially for RV service, Firestone Wide Oval 500 is used on many camper-coach pickups, vans, panels.



**Golden Lifesaver**, newest from B.F. Goodrich, can seal punctures from objects up to ¼-inch diameter, according to firm. Inner lining expands to seal off leak in steel radial instantly, even after nail is removed.



**Steel-belted radials** have survived runs over sharp pipe at Uniroyal tire proving grounds, Laredo, Tex.

gle" are excellent for pickup campers, with 12-16.5 the most popular. Firestone has a new Traction All-Season with nylon cord and tread for trail freeway.

### Motor homes

Most important has been the introduction of a "thumpless" tire developed by Dodge and Goodyear. Its new polyester cord does not take the nylon "set" overnight. Remember that a motor home is a truck or bus-type vehicle requiring heavy-duty commercial tires. Check to prevent overloading and never overinflate to compensate for too much load.

### Off-road vehicles

Here we have tires with increased diameter for better ground clearance, wider print for improved flotation, block treads to aid traction. Armstrong and its new Rhino line, Firestone's latest all-Terrain T/C Gates, Norseman and new puncture-proof Norseman 11, Sears and Uniroyal with new wide-base "Intersteel" are noted OTR makes. ★★★



**Radials manufactured** to GM engineering specifications are standard or optional on many General Motors cars this year. Radial-tired Buick wagon above tows Avion.



# It's built to carry two kinds of campers.



First, there's the human kind. For them, we offer a cab with plenty of glass area for good visibility. And there's a wide choice of luxury interiors available.

Underneath, there's a long wheelbase with rear leaf springs. And independent coil spring front suspension. And standard power front disc brakes with audible wear indicators.

Then there's the other kind of camper—the made-of-metal kind. We've thought of that, too. We've developed special camper tie-down packages that are available to facilitate mounting. And there's Eilmi-pitch that hydraulically snubs

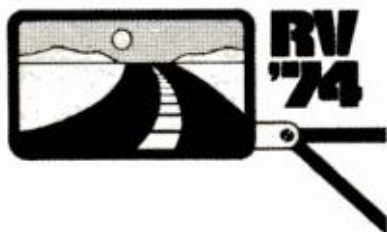
the camper body in case it tries to pitch up or down.

Also available are dual rear wheels. Full-time four-wheel-drive. Or trailer towing packages that can handle virtually anything you want to pull—even fifth-wheel units.

If you're in the market for a pickup, think about the two kinds of campers in your life. And get a GMC.



**The Truck  
People from  
General Motors**



# Checkups that keep your rig rolling

Season-stretching maintenance tricks add mileage and more fun for your RV money.

by Don Edgar

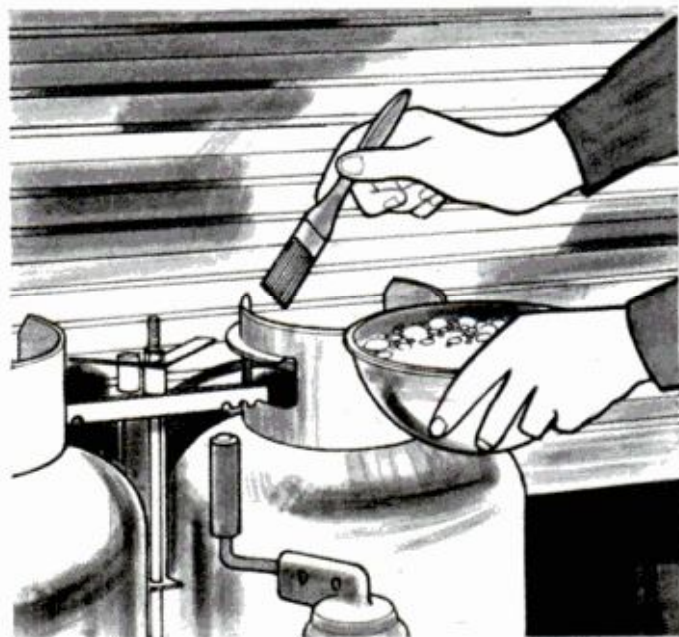
**R**V owners are learning their rigs offer more than double the fun for the fuel consumed when they're serviced to keep rolling all year. Many motorized vehicles can be kept in commission to serve part-time as the family car and full-time for all-season camping as well. Trailers, too, provide both rolling and stationary utility with just a little routine attention.

Spring and fall checkups should be comprehensive. Add to these a quick daily inspection while traveling to spot any potential problems before they happen. It's worthwhile to work up your own checklists so that nothing is overlooked during the major exams. Then get in the habit of a walk-around routine each day before you start out.

Spring checkup is probably the most important one if your trailer, camper or motor home doesn't receive as much use during the winter as the other seasons. Tires, wheels and axle are a good starting point. Review the load limitations, and remember gross weight is the total poundage of the RV loaded for a trip and not the weight shown on the vehicle registration form. Axle, wheels and tires have maximum load-carrying ability that must not be exceeded. Tire pressures should be sufficient to handle

the loaded weight of a trailer; for example, divided by two tires, or four with a tandem axle unit. Maximum rating and pressure is shown on the tire sidewall in pounds or the Department of Transportation code letters. Inspect tires for sidewall cracks, tread separating from the casing, or cupping that might mean a hitch out of alignment. Look at the inner sides of tires as well, and trailer wheels to assure the electric brake wiring is intact.

Check wheel lug nuts with a cross-wrench



Gas leak test should be made after every refilling. Paint soapsuds on LP connections, watch for bubbles.

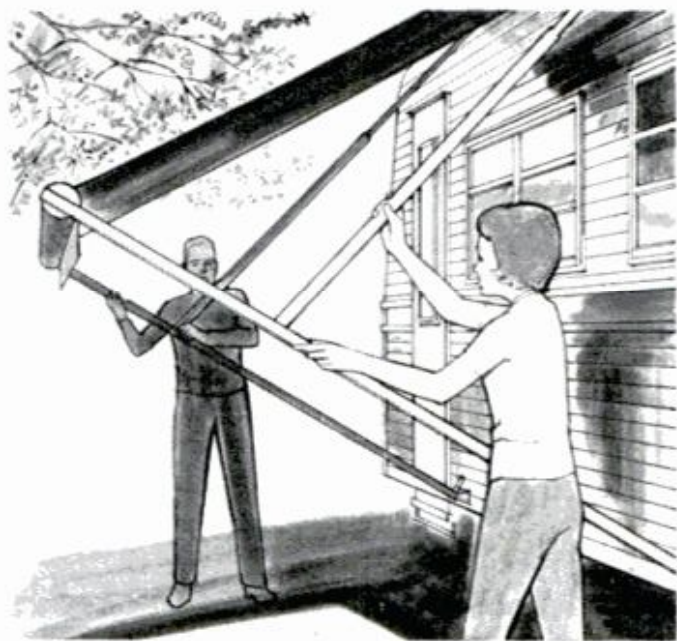
during regular inspections and daily on long trips. Look for any signs of wheel or rim metal fatigue—radial cracks from the stud holes, for example. Trailer owners may find it worthwhile to have a qualified mechanic repack wheel bearings annually and check magnets and pads of electric brakes. After hitching up, trailer and car brakes should be set to work together or with the trailer's just ahead of the car's.

Start a vacation or winter weekend with liquid-petroleum gas tanks full. Right after filling, check for leaks, especially at valve and regulator connections. Apply soapy water with a half-inch paintbrush and look for bubbles. Never, of course, use a match or flame.

Look over all exposed gas lines under a vehicle; they are vulnerable to scrapes and flying rocks. Check the copper tubing at

any point it enters or comes in contact with the frame or body of the RV. The rubber grommets used to protect tubing and wiring at these spots can deteriorate but are easy to replace. After checking the LP-gas lines test each gas appliance while keeping a fire extinguisher handy. Refrigerators, space heaters, stoves and hot-water tanks should be examined carefully. Vibration can fracture hidden lines and create the chance of explosion.

Only the water system needs complete



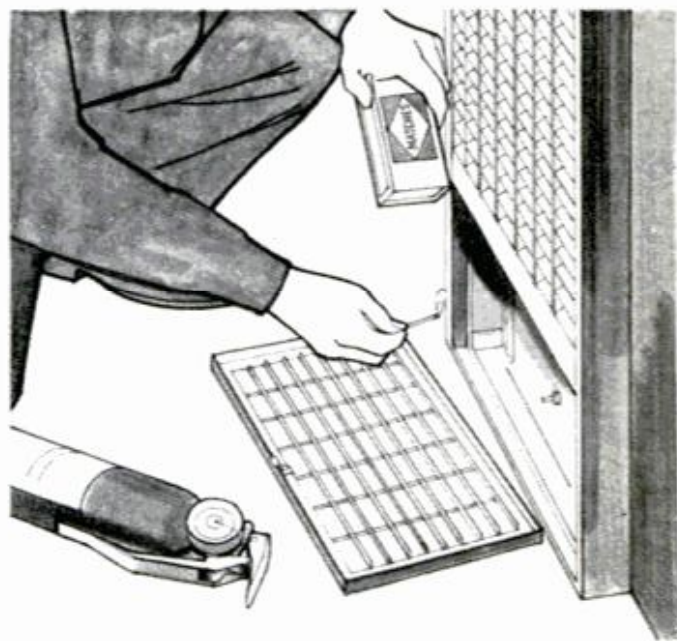
Even when rig is not in use, extend awnings once a month, check tires, note and correct leaks, any rust.

winterizing during cold weather. Most thorough method is to drain all tanks and lines, then blow them out with compressed air through taps and connectors to get all water out of low spots where freeze-up and fracture might occur. Sometimes such cracks can be soldered but usually the line must be replaced. Another method is to refill the water system with a chemical that won't normally freeze and is nontoxic; various brands are available from RV accessory dealers. Traps in the kitchen sink line, bathroom drains and toilet bowl should be filled with permanent-type antifreeze.

During northern winter trips, many campers keep their water system empty and avoid dumping any liquids down drains. Toilets can be used by adding permanent antifreeze to the holding tank and then dumping it before leaving a campground.

Self-contained vehicles like motor homes that have continual heat can use all their systems as long as the heat is left on or the vehicle is kept in a warm garage. Once heat is off, the rig must be winterized.

When reactivating a system, the water tank can be flushed with a sodium bicarbonate solution to get back a fresh taste, though many RV owners prefer to carry a cooler of drinking water and use tank water for dish washing, showers and toilet. Gate valve of a holding tank should be closed and locked



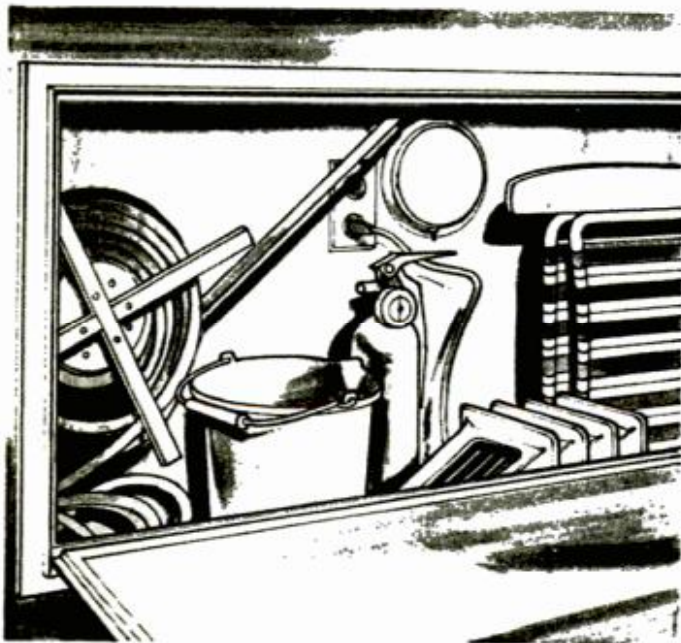
All LP-gas appliances should be lit and examined regularly for operation, leaks. Keep extinguisher handy.

before each trip and checked periodically to be sure that no small bits of toilet tissue in the gate are causing seepage.

Most recreational vehicles, especially those without a generator, have both a 110 and a 12-volt system. Plug the 110-volt system into your house current to check it, using a grounded adapter if your house is not equipped with a three-pronged outlet socket. Most 110-volt-system problems are caused by blown fuses or burned-out bulbs. The 12-volt system is a self-contained unit, and a discharged battery may be the source of problems. Many newer trailers include a charger and 110-volt outlet in the trunk as standard equipment. The recharge line from the tow car's alternator to the trailer battery should be fused. Check this whenever the 12-volt system is inoperative.

Most 12-volt trailer light problems result

from poor connections or ground between car and tow. Remove any oxidation from the electrical connectors with a small knife or fine sandpaper. Cleaning dirt and grease from the hitch ball and spring bar sockets will help create a better ground. If the problem persists, try a line with quick-disconnect alligator clamps from the car's trunk locking plate to the trailer's LP-gas bottle tie-down post. "Hot skin" that gives you a shock when you touch your RV can result when insulation has worn off a 110-



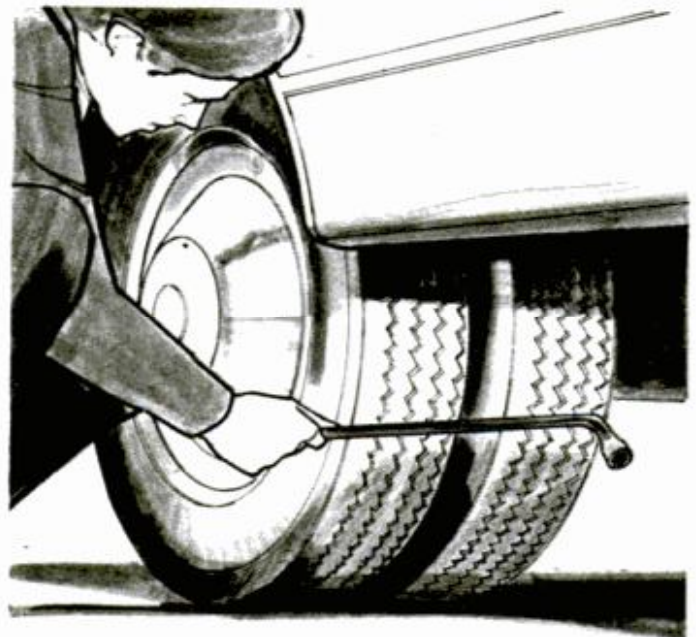
**Well-equipped RV** will carry spare tools, wash-down gear, leveling chocks, rope, wire, hose, gauge, jack.

volt line. Polarity may be reversed if you are connected to an ungrounded two-prong outlet. Disconnect immediately and try to track down the cause. Rewiring your rig may be necessary.

Every time your tow car is up on a garage hoist for a lube and oil job, check the hitch portion bolted or welded to the frame. And before installing the ball and riser assembly into the hitch receiving tube platform on a car, check for cracks, especially where the shank meets the bottom of the ball. Changing the ball every two years is an inexpensive (\$2) item and well worth the added safety of a new part. Check the welds on ball and riser for hairline fatigue cracks. Replace the assembly; do not try to correct by further welding. U-bolts on the trailer portion of a hitch can work loose and should be inspected and retorqued as required.

Clean the mating surfaces between hitch and antisway device, but do not grease or lube these surfaces to make them ride quietly. This will prevent the antisway action basically caused by friction. And before leaving the driveway, check brake response, all stop, clearance, signal and brake lights, breakaway switch and safety chains.

For really cold camping, storm windows are available to fit into the slots used by screens in summer. Some RV families merely tape clear plastic over the windows to




**Thump inner tire** of duals for quick sound-check of inflation. Back-tire pressure is often neglected.

keep heat in, cold out. For extended winter use, your heater should be equipped with a blower for better heat distribution. Use of electric heaters is common, but can blow campsite fuses or cause a fire if a youngster kicks a blanket over one on the floor.

Sufficient oxygen in the small confines of an RV is an important winter consideration. Airflow under a rig should not be blocked off if the heater is vented through the floor. At least one window or ceiling vent should be left open about one inch to assure air to breathe.

Off-season suggestions include jacking up your rig, removing tires, wheels and battery, taking down the curtains and covering seats with sheets or newspapers. This does no harm, but better than decommissioning is keeping your RV ready to go and using it throughout the year. ★★



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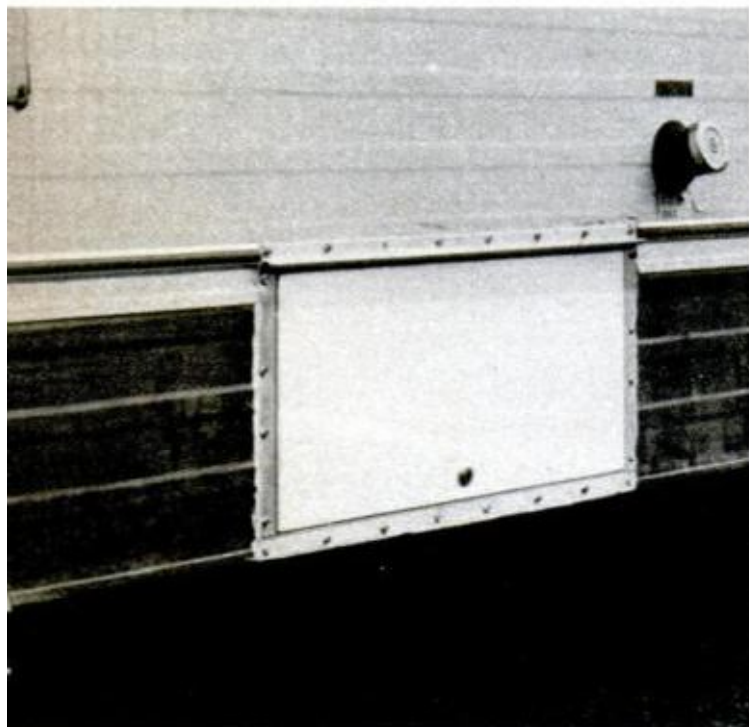
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# Storage on the side

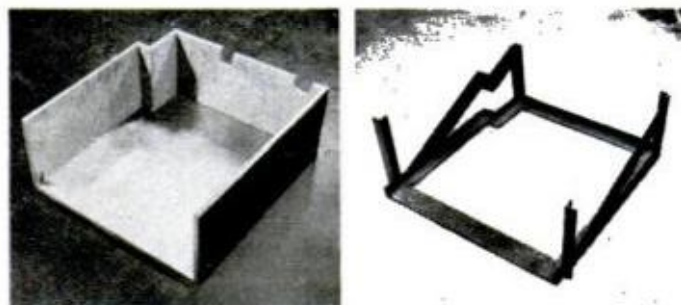
by Dwayne Harlan



Outside access compartment looks as if it's factory-installed; is result of prefab aluminum door selection from RV supply, plus careful matching installation.



Suitable storage space is located by crawling under vehicle. Use sabre saw for side-wall door cutout.



Compartment (left) is of  $\frac{5}{8}$ -in. exterior plywood. Flooring of aluminum protects wood from heavy gear. Angle-iron frame is welded to chassis, bolted to skin.

No RV seems to have enough storage space for everything. After using available corners and closets inside your rig, examine the outside. Often there is a spot under the floor or between frame and outside wall. Since access will be from outside, take dimensions to an RV equipment dealer for an aluminum door and frame, slightly smaller than the opening planned.

With a sabre saw, cut a hole in the side of your vehicle  $1\frac{1}{4}$  in. wider and  $\frac{1}{8}$  in. higher than the door frame. Measure back to the vehicle frame and construct a support frame to suit that depth and  $1\frac{1}{4}$  in. wider than the door frame. Make it from  $1\frac{1}{2}$ -in. angle iron and weld back to the frame; bolt the front to inside of the vehicle wall.

With the frame in place and painted, construct storage compartment of  $\frac{5}{8}$ -in. exterior plywood to slide into frame. Cover bottom of compartment with 18-ga. alumi-

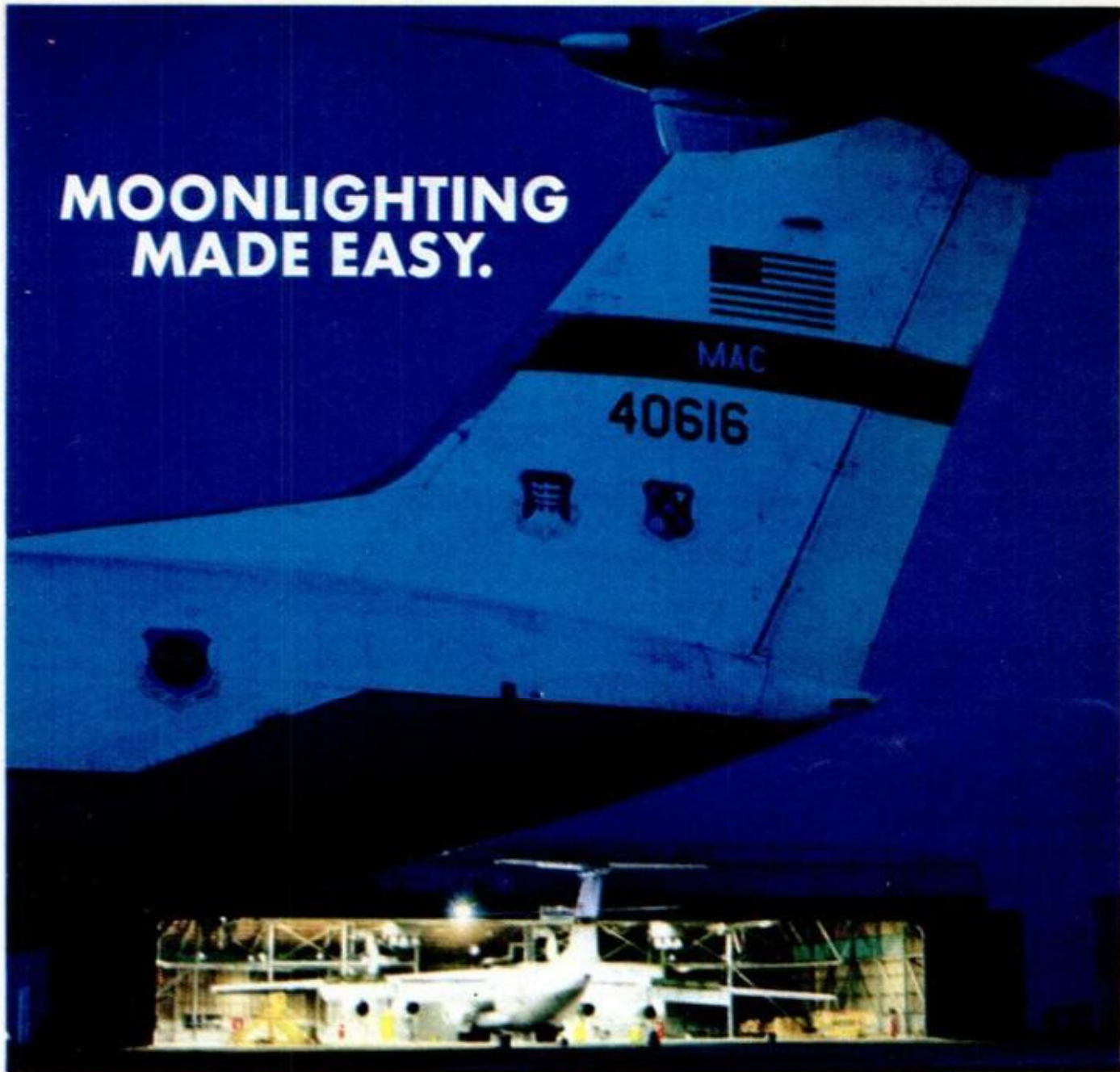


Frame is installed and compartment box slides in, ready for door. Exterior right-angle braces secure box to bottom of vehicle floor. Caulking seals unit.

num and assemble with anchor shank nails and steel corner braces. Bottom and sides can be covered with 22-ga. aluminum stapled on. Secure compartment to frame with bolts, screws or rivets. Seal with caulk. Adding more caulk, install door and frame using galvanized lag bolts. With care, you'll find your work looks like a factory job. ★★★



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# Camper accessories

In addition to the newly popular fuel flow meters and auxiliary gas tanks, RV owners can find many new items to make trips safer as well as outing gear to make an extended campsite stay more pleasant. Light equipment can keep down gross vehicle loads, adding gas mileage and RV life.



VWs, like bigger cars, can add to oil cooling when trailer towing with Swirl-Cool, new \$70 auxiliary unit from Hayden Trans-Cooler.



Van owners can create camper conversions with kits. Dana-Camp units in VW above are kitchen/closet, front seat sling bed, seat/bed/table from Inter-Commerce.



Van Door Tire Carriers, at \$19.50, mount a spare on a Chevrolet, Ford or Dodge van or van-conversion motor home. By Kenco Engineering.



Warning Hitch Ball from Giant Products, Tenafly, N.J., sounds instrument panel warning, lights light, if hitch hookup is loose on 1½ or 2-inch ball. Price: \$60.



Mini-trailer for compact imported and domestic cars comes in 15 or 18 cu ft., \$270 up, doesn't block engine air. By Central States Tool & Die.

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PM-89



# The almost-safe

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Here's how to keep the explosive energy of gasoline where it belongs—inside the spare can.

---

By Mort Schultz

Toting an extra container of gasoline in your camper van, trailer, pickup, motor home or passenger car can be dangerous. Carrying and storing it may be illegal in some states. But, where legal, if you are going to transport spare gas to guard against running dry, here are important points you should consider.

"There is no absolutely safe way to store gasoline—either in the house or in a car," says the National Safety Council. But there are precautions to observe that will lessen the danger. First, use an "approved" container only. A container tested and approved by Underwriters Laboratories bears the UL label. This is an easy way to spot a good container, but some UL-approved containers are plastic and the National Fire Protection Assn. in Boston does not agree with this rating. According to the NFPA code, the delivery of gasoline should be made only in a metal container. Richard Peacock of the NFPA notes that in time gas fumes can begin permeating plastic. The danger of gasoline lies with its vapors. It isn't the gasoline that explodes—it's the fumes.

Don't carry gasoline in a glass jug; it won't leak but it is breakable. Don't use makeshift containers such as plastic bleach bottles. They aren't leakproof, can puncture easily or crack, and let fumes escape.

To be as safe as possible, the container you select for gasoline should be made of heavy-gauge metal and be capable of being perfectly sealed. It should provide a relief vent, have a spring lock, and come with a separate screw-on spout or be designed so that the contents can be poured without being spilled. If you can locate some surplus military five-gallon containers—the old

"jerry can" type—you will get some of the safest containers made. Recall, as well, how the military usually mounts these gas storage cans on the outside of vehicles where any escaping vapors will not accumulate.

Never fill a gasoline container to the very top. Leave room for expansion. One-gallon cans should be filled with 8/10ths of a gallon. Five-gallon cans should be topped to only 4½ gallons.

The trunk of your car, unfortunately, is one of the most dangerous places to store and carry spare gas. There is the possibility of a rear-end collision rupturing the tank, or the motion and bouncing of travel chafing through the tank, plus tools and luggage wearing or puncturing it. Explosive gas-air mix can also collect in the trunk since the best of containers are vented and allow gas vapor to escape. A spark from a short-circuit in worn taillight wiring could ignite it. So could lighting a cigaret, pipe or cigar in the passenger compartment if escaping vapors seep forward.

RV owners usually have more optional spots for gas container storage. Compartments that open and vent to the outside air are one possibility if the container can be securely anchored down inside. Gas-can carriers that mount on any flat surface and hold five-gallon containers are also available from camper and automotive parts suppliers. For a passenger car, a roof rack can provide a spot where gas cans may be solidly secured upright and in the open air.

Some RVs can also be fitted with auxiliary saddle tanks. These are made of heavy-gauge steel and tapped into the vehicle's fuel system. A valve allows switching from regular to spare tanks. Auxiliaries are usually positioned midway beneath the chassis, are vented to the outside and have separate outside filler caps. Dual tanks sell for over \$100 plus installation. Single auxiliary tanks are about \$60 and up. Your RV dealer can be of assistance. (Used tanks from junkyards are considered a poor and dangerous purchase; they may have rust spots inside that may corrode through at any time.)

# way to carry extra gas

Fire protection engineer Leonard Clements of Gulf Engineering & Environmental Systems in San Diego has additional recommendations as a result of his extensive testing and experimentation:

Choose a metal container with double-lap seam construction to help ward off seal rupture.

Use a tank with spring-loaded rather than screw-on top.

The container should have a flash arrester screen of double mesh with about 225 holes per square inch in the fill opening to prevent flame from entering.

When transporting a gas container inside a car such as a station wagon, the spout closure should face toward the rear of the car so that a sudden stop will not cause the gas to slosh forward against the fill cap and possibly spill.

If you don't have an individual pour spout (about \$10) that screws into the neck of the container, be sure to carry an extra-wide-mouth funnel to prevent spillage.

Clements estimates superior gas containers will cost about \$17 for a five-gallon can, \$11 for one-gallon, and rates containers from Justrite Manufacturing, Chicago; Eagle Manufacturing, Wellsburg, W. Va., and Protectoseal, Bensenville, Ill., to be of good quality.

The worst place to store gasoline in your home is in your living quarters. Next is the basement, where escaping vapors can travel along the floor and any spark from a water heater, washing machine or even light switch could touch off an explosion. Safest is a detached storage shed or detached garage. If you have neither, you could build a small bin, like a garbage-can bin, away from the house.

While some homeowners' insurance policies contain an "increased hazard" clause referring to "loss occurring while the hazard is increased by any means within the control or knowledge of the insured," many also contain a waiver of this clause and presumably in this case your coverage would include a fire accidentally set off by exploding stored gasoline. Before storing

## Transporting and storing tips

First, determine whether state and local ordinances and your insurance permit carrying and storing extra gas.

Use only an approved container (metal is preferred).

Avoid carrying container in car trunk if possible. Secure it to a roof rack on passenger car or to bracket on RV.

Fill cans only four-fifths full to allow for expansion.

Stow can with filler cap toward rear to reduce slosh-pressure during quick stop.

Check regularly for gas smell indicating leaks.

Store gas, if possible, in enclosure away from home.

gasoline, however, it would be well to read your policy carefully and check with your insurance agent. There also is presently no RV or automobile insurance policy clause, apparently, which would void a policy in the event of a gasoline-related accident.

Check local and state regulations, however. The New York City administrative code, for example, provides for a \$500 fine or six months in jail for transporting or storing more than one gallon of gas without a permit. In Chicago you can store five gallons in a frame garage or 10 in one of stone, but the gas must be divided into one-gallon containers. Connecticut requires a permit for over 60 gallons. Maryland, New Jersey, Washington, D.C., and New York are among other areas where there are city or state laws.

According to the Consumer Product Safety Commission in Bethesda, Md., 25,000 people were treated for fuel-related injuries in 1972, months before the gas shortage sparked the rush for spare-gas cans. When carrying or storing gasoline's pent-up energy, particular care is very much in order. ★★★

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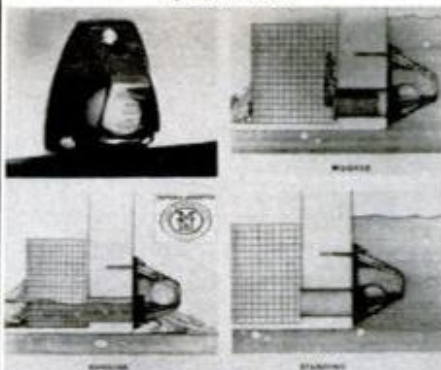
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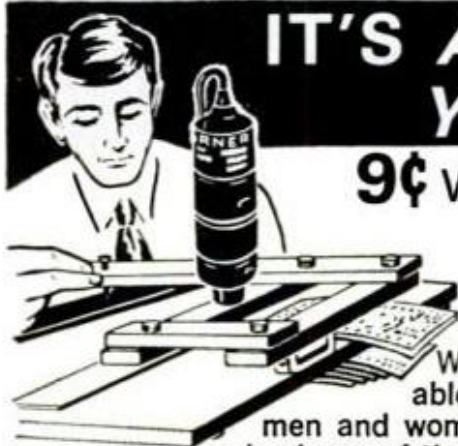
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## SIMPLE SLIDE-DISSOLVE CONTROL

(Continued from page 122)

require no modifications. Just have your dealer order a Kodak cable and plug No. 188749 for you (it should cost about \$7), and wire it as per the diagram on page 122. On Kodak projectors with permanently attached power cords, such as the new Custom Carousels, the large black and white power wires at the squared-off end of the plug aren't used. These and any other unused wires should be taped back to avoid accidental contact with other parts. (For further information, write to Kodak's Motion Picture and Education Markets Div., Rochester, N.Y. 14650, for pamphlet No. S-54.)

If the screen illumination drops or peaks visibly during a dissolve (this is easiest to check with empty slide mounts in the projector apertures), you can minimize it by pulling one dimmer from the knob assembly and rotating it a few degrees before reattaching the knob, repeating this step through trial and error until light output is as uniform as possible.

Now cover the completed dimmer. Our case uses plywood end pieces and light aluminum filigree sheet, but materials and design aren't too critical.

Remember when preparing slides for dual-projector shows that the slide sequence must be split between projectors, with all the odd-numbered slides in one tray and all the even ones in the other. And make sure you start your show with the odd-numbered slides (number 1, and so on) rather than with the even ones. ★★★

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(Continued from page 89)

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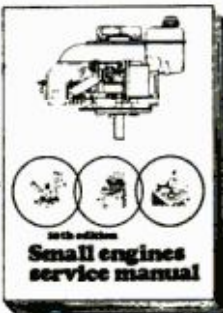
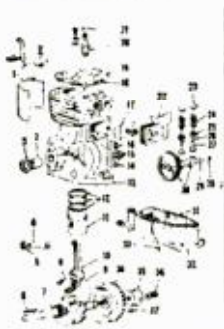
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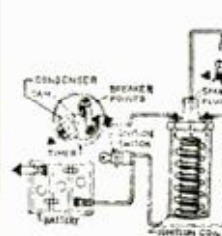


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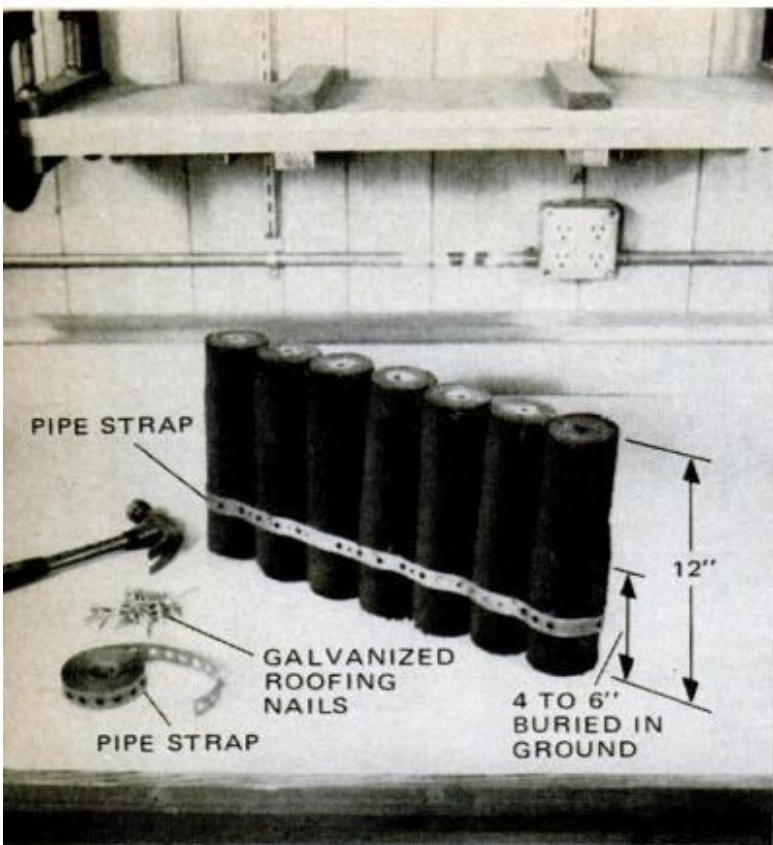
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2



3

## NEAT, NOISEPROOF SHOP

(Continued from page 74)

piece without having detailed drawings." After touring—and critically inspecting—Baskin's house, projects, and the craftsmanship he puts into his work, I can say that his expertise is such that he rarely needs detailed drawings. It was obvious that he has acquired the skill necessary to work out kinks and problems on any prototype piece.

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Ham took the liberty of making two changes from the original they spotted. First, although the original table was constructed of oak, he built his of solid walnut to blend with the furniture in the room. Second, the Byzantine cross on both legs is his contribution to the design. While he recognizes that this reduces the authenticity of the reproduction, he feels that the changes add to the overall looks. ★★

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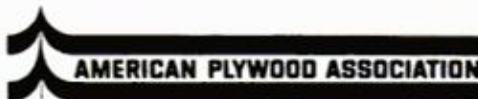
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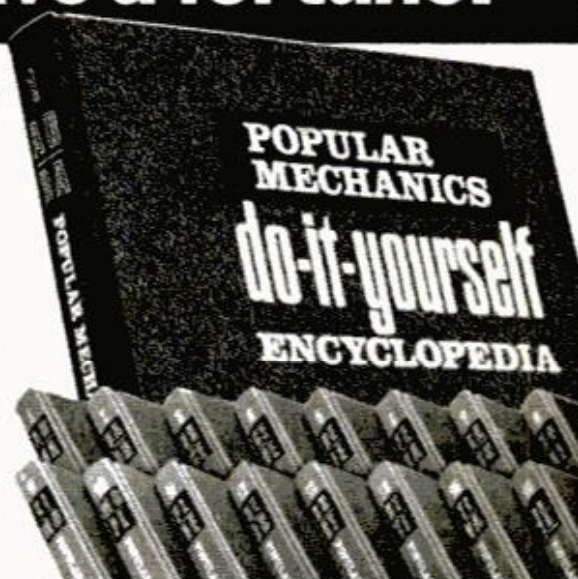
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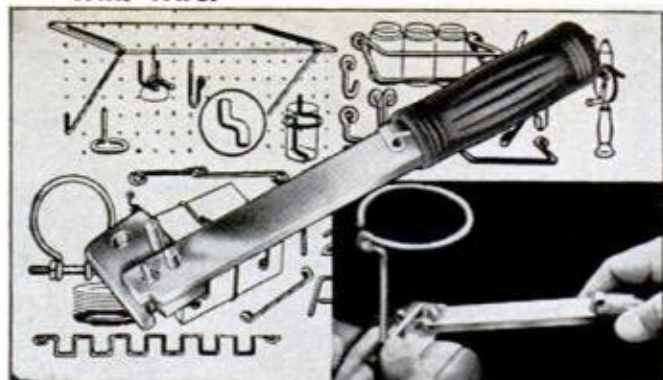
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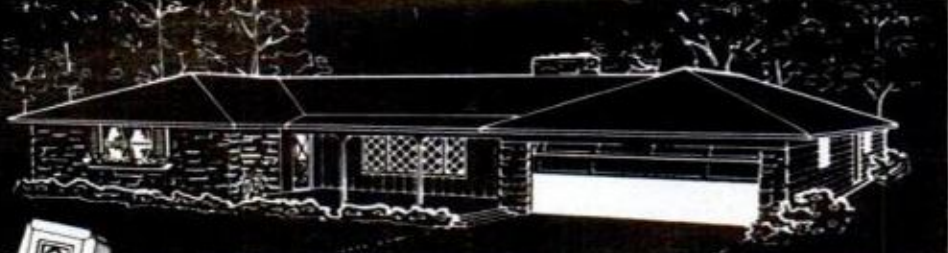
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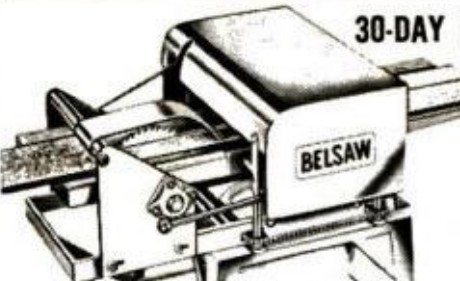
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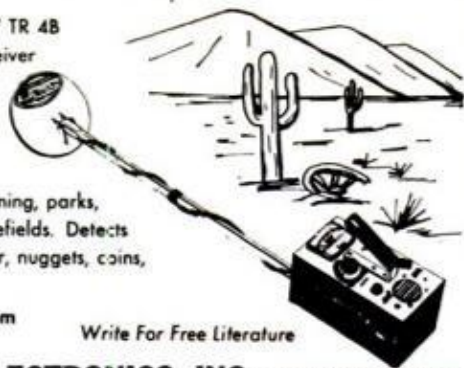
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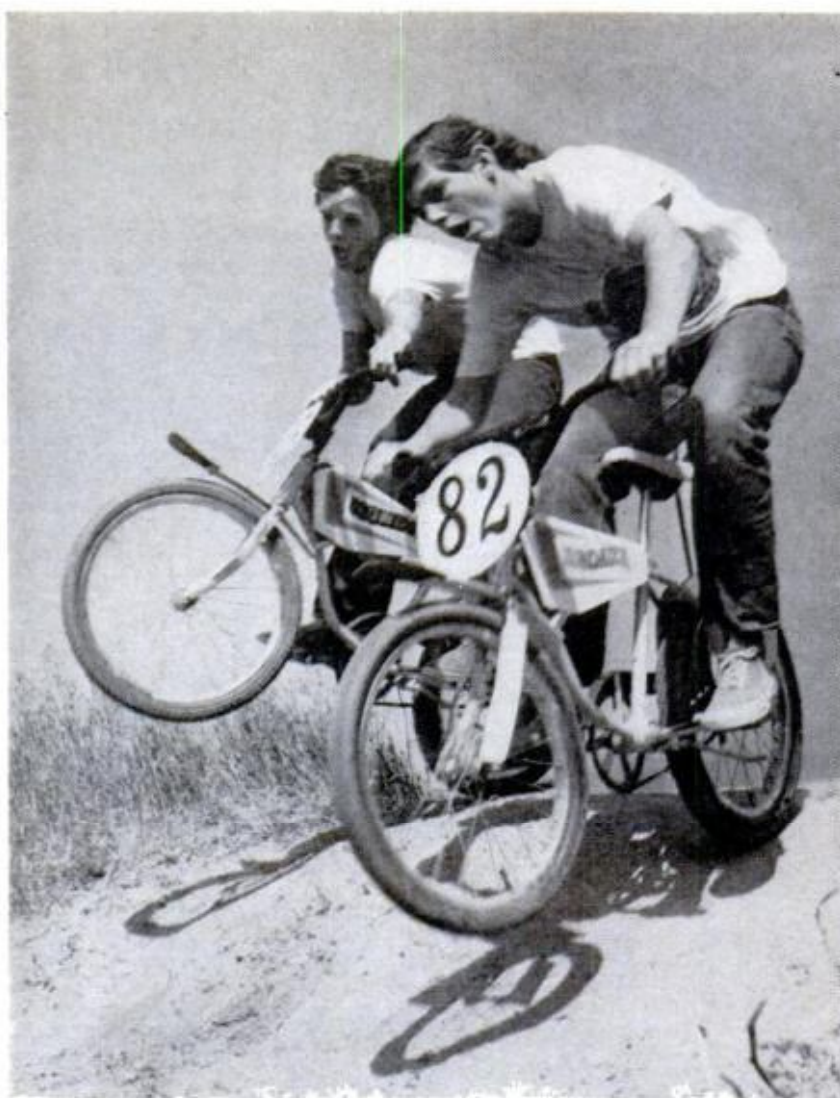
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# Bicycle motocross: New two-wheel sport

by Mike Anson

Photos: David Gooley



**Flying over a steep drop-off**, two young bicycle motocross riders display their skill on a quarter-mile course. Tight turns, mud holes, sand pits and a grove of trees further test their riding abilities.

**Transformation of a 20-inch bike** into a machine that looks like a motorcycle is aided by firms that make kits which include motocross handlebars, plastic fenders, mud flaps, number plates, replica gas tanks.

**L**ike their heroes in the World Championship Grand Prix of Motocross, youngsters in bicycle motocross jump over hills of dirt, forge and splash their way through mud holes and sand traps—and have a great time doing it.

But where Grand Prix competitors have powerful engines to rely on, the youngsters provide their own power as they pump furiously until small legs and bicycle pedals become one fast-moving blur.

The racers range in age from 8 to 15, and they don't need much room to stage an event; an unoccupied lot or even a city park can become a bicycle motocross track.

It doesn't cost much, either. All that is

needed is a strong bike (20-inch Stingrays with high-rise handlebars and banana seats are the most common), strong thigh muscles and lots of lung power. Paper plates tied to handlebars carry riders' numbers.

More elaborate machinery is available. Starting with a stock, 20-inch bike, young riders replace the handlebar grips with motocross-type motorcycle grips. Next comes a set of rattrap pedals, the kind usually found on 10-speed bikes, to prevent feet from slipping. Mud scrapers—lengths of wire formed in the shape of a light bulb—are attached to the frame to keep the knobby tires clean. Finally, if the original

*(Please turn to page 194)*

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## BICYCLE MOTOCROSS

(Continued from page 192)



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Rules are lifted from the American Motorcycle rule book with one exception: age. Categories are beginner, novice and expert, each broken down further by age.

A course in Long Beach, Calif., designed by 16-year-old Scott Breithaupt and friends, is typical of bicycle motocross courses. Including jumps and gulleys, it's about a quarter of a mile long. Riders compete in heat races of two laps each.

Ten riders in each heat race around the narrow, twisting course that starts with an uphill right-hand sweep that leads to a five-foot drop-off. On downhill is a small jump that leads into a tight turn and a short straightaway. A small jump, followed by a large jump ends in a left turn. As they leap into the air, the young riders throw the rear ends of their bikes to the right and land sideways in the turn.

Between that jump and the finish line is a grove of pine trees to be negotiated, followed by a mud hole and sand pit. Then the second lap starts. Bent wheels, cracked frames and deformed handlebars are common, but, so far, the resilient riders have come through unhurt. ★★★



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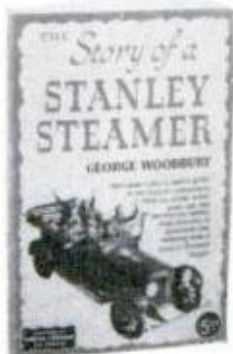
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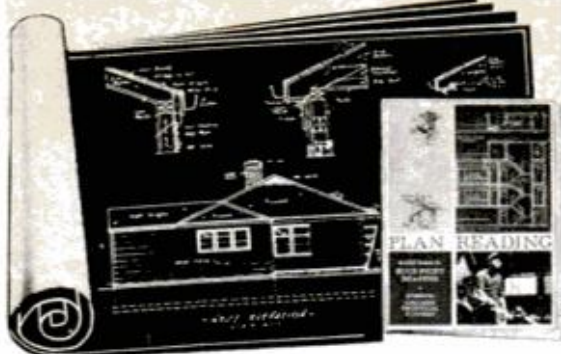


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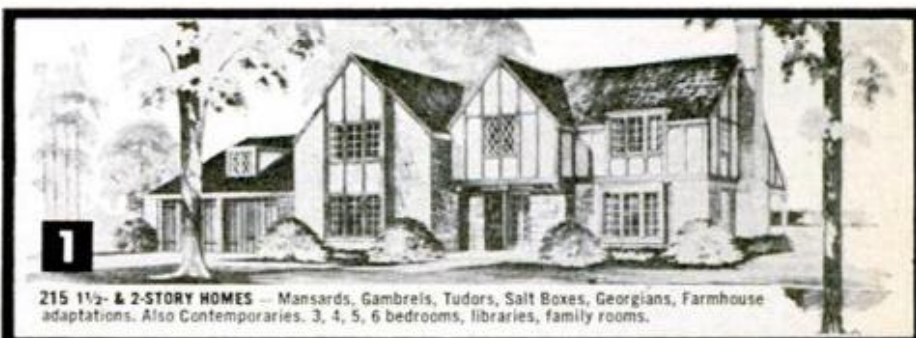
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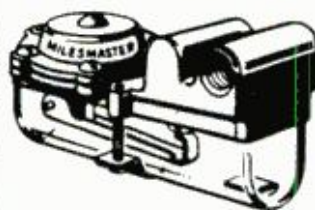
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(Continued on next page)

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(Continued from preceding page)

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**HOW** To Make Money!! Learn "insider" secrets! Associates, Box 212 PM3, Stoneham, Massachusetts 02180.

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**MAILORDER BEGINNERS** Learn Professional Secrets. Details Wanted, we dropship. Details Write: IGW, Box 4022M3, Downey, Calif. 90241.

(Continued on next page)

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(Continued from preceding page)

**SECRETS!** Mail Order Success. Internationally famous expert reveals how to make home business fortunes. Beginners: Get free report "Make Money By Mail". Discloses free advertising, profitable products. Mailco, Dept. HC703, Woodland Hills, California 91364.

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**PROFITABLE** Mailorder Secrets Could Make You Rich. Literature 25¢. Refundable. Hall's, USSAH Box 23, Washington, D.C. 20317.

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**FABULOUS** Import Export Business. Learn How to get Started Fast. Send \$1.50. Martin Konkel, 2128 Marie PK., N.E., Dept. 53, Albuquerque, New Mexico 87112.

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**BIG** Mails! Free Packet! Kennedy Mailing Service, Box 351, Selma, Alabama 36701.

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**WORLD'S** Easiest Mailorder Business. Take Advantage Now! \$2.00. Arrasmith, 6868D Ladysmith, Anderson, Calif. 96007.

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**HOMEWORKERS,** Part/Full Time. Send 25¢, self-addressed Envelope. O'Dowd, P.O. Box 2195, Seal Beach, CA. 90740.

**HOW** To Earn at Home Addressing Envelopes. Send Stamped Addressed Envelope. Smith, Box 176, Corona, CA. 91720.

**50 COMPANIES** Offering Homework Opportunities, Big Profits, Send \$1.00. D. Hagan, Box 512-PMA, Maxton, North Carolina, 28364.

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**MAILORDER DEALERS WANTED.** Earn out standing profits using tested promotions! Executive type business. RUTWARD-PE, Georgetown, Conn. 06829.

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**EARN** Money raising fishworms for us! Write: Oakhaven-38, Cedar Hill, Texas 75104.

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**\$200 WEEKLY!** Make, Sell Bricks! Free Information! Xcito Bricks, 5715 N. Mozart, Chicago, Ill. 60659.

**I MADE \$40,000.00** Year by Mailorder! Helped others make money! Start with \$15.00—Free Proof. Torrey, Box 318-Y, Ypsilanti, Michigan 48197.

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(Continued from preceding page)

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**BEGINNERS, Best Start, Mail Order.** Details Free. Cornucopia, Box 3-39223, Groesbeck, Ohio 45239.

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**SELL New Sensational Low-Cost Car Thief Signal.** Exceptional Margin. Samples for trial. Northwest Electric Co., Ave. 271, Mitchell, S. Dak.

**HOW TO BUILD Your Own Mail-order Business, Profitable.** Details \$1.00 Refundable. Hardin, 2444 Woodbine, Knoxville, Tenn. 37917.

**HOMEWORKERS EARN \$150.00 WEEKLY** Stuffing our sales letter into preaddressed stamped envelopes. Make \$1.00 each, no limit. Beginners kit \$2.00. Boldventures, Drawer 956-K, Orange Park, Florida 32073.

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**EXTRA Money.** Booklet shows how to make money in spare time. \$1.00. B&B Gallery, 219 Congdon, Georgetown, S. Car. 29440.

**MAKE EXTRA MONEY!** Check your Coins for Investment and Big Profits! Learn how to Start Collecting Coins. Where to Sell. Lists of Valuable Coins. All for Only \$1.00. Lybrooks, 4837-B North Parkway, Kokomo, Indiana 46901.

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**SPEEDOMETER REPAIR,** Fascinating, Profitable! Free Brochure. Instrument Training School, 120 North Cherokee, Muskogee, Oklahoma 74401.

**YOU Can Make Immediate PROFITS—Spare or Full Time From your own Home—Details 25¢—Cavallero, Box 15, Needham, Mass. 02192.**

**HOW To Start Your Own Mail Order Business—Send \$1.00—Cavallero, Box 15, Needham, Mass. 02192.**

**SELL \$3.00 Health Books—Mailorder.** Cost 50¢. Amrose, Box 8282-XX, Richmond, VA. 23226.

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**HOW To Make Money Writing for Magazines.** Free Proof! Sunrise; 25-P Lake, White Plains, New York 10603.

**MAKE MONEY COLLECTING COINS.** Seven Page Report Tells how. Crammed with Information. Satisfaction Guaranteed. \$1.00. E-Z Chair Gifts, Dept. 1, Sylvester, Georgia 31791.

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**HOW To EARN at HOME ADDRESSING ENVELOPES.** RUSH Addressed Stamped Envelope. Castle, Box 10218, Panama City, Florida 32401.

**"HOW To Pick Winners Actually Announced Before Each Race!"** \$2.95! Castle's, 507-PH Fifth, NYC 10017.

**EASY MONEY Working Few Minutes for Our Company.** Details Free. Kyriakidis Products, Athens 810, Greece.

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(Continued from preceding page)

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**ADDRESSERS**—50 Companies want Addressers. Send self-addressed envelope. Cal Enterprises, Box 4516-X, Compton, Calif. 90224.

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(Continued from preceding page)

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(Continued from preceding page)

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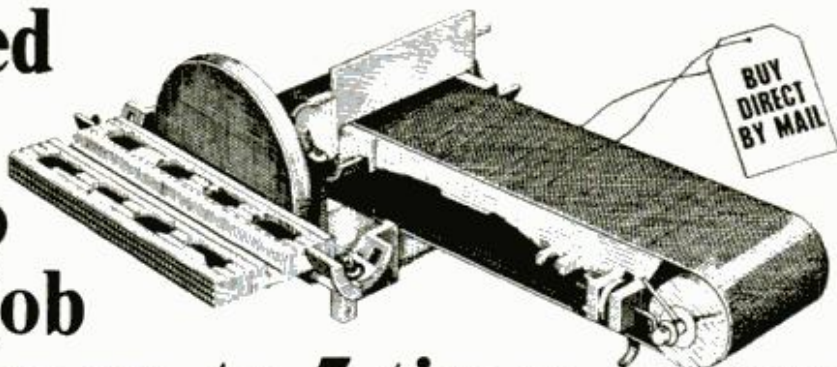
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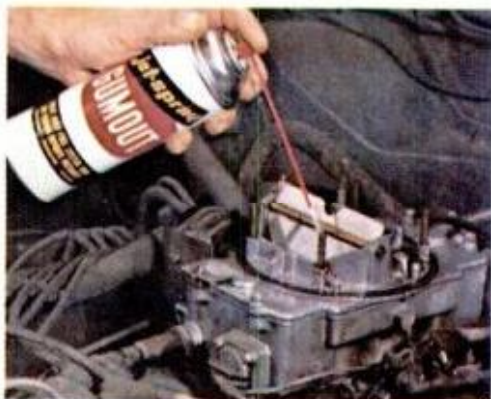
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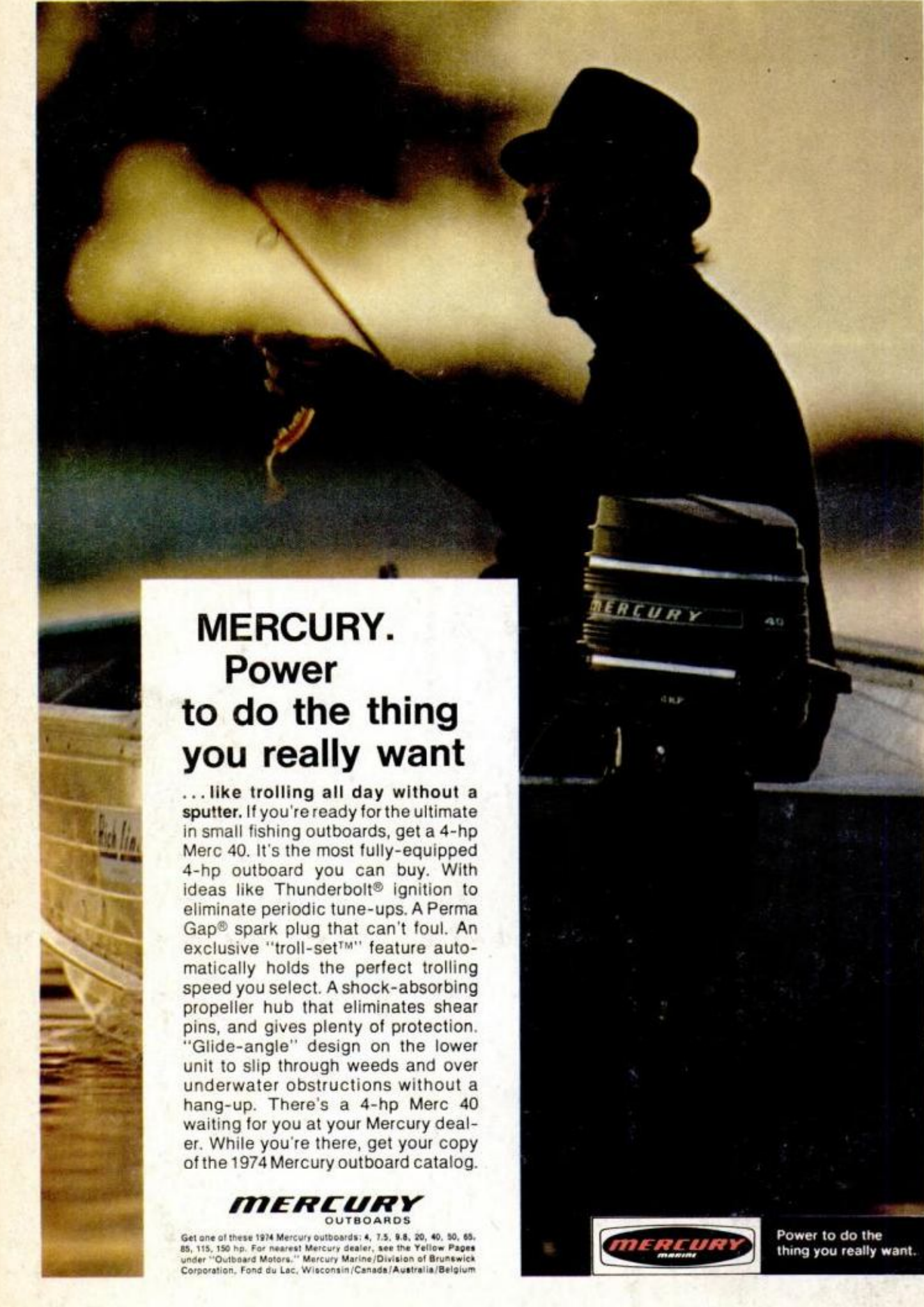
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